Walt Disney Parks and Resorts US, Inc.

Radio Node

FCC 15.247:2018

Bluetooth Low Energy (DTS) Radio

Report # SYNA0249.1 Rev. 2

NVLAP LAB CODE: 200630-0
NVLAP LAB CODE: 200629-0

CERTIFICATE OF TEST

Last Date of Test: April 1, 2019
Walt Disney Parks and Resorts US, Inc.
Model: Radio Node

Radio Equipment Testing

Standards

Specification	Method
FCC 15.207:2019	ANSI C63.10:2013, KDB 558074
FCC 15.247:2018	

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	Yes	Pass	
11.12.1, 11.13.2, 6.5, 6.6	Spurious Radiated Emissions	Yes	Pass	
11.6	Duty Cycle	Yes	Pass	
11.8.2	Occupied Bandwidth	Yes	Pass	
11.9.1.1	Output Power	Yes	Pass	
11.10.2	Power Spectral Density	Yes	Pass	
11.11	Band Edge Compliance	Yes	Pass	
11.11	Spurious Conducted Emissions	Yes	Pass	

Deviations From Test Standards

None

Approved By:

Kyle Holgate, Operations Manager

Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information.

REVISION HISTORY

Revision Number	Description	Date (yyyy-mm-dd)	Page Number
01	Replaced Powerline Conducted Emissions data with new	2019-03-08	29-37
	Changed last date of test to March 8, 2019	2019-03-08	1, 2, 8, and 28
	Added SYNA0249-2 to configurations	2019-03-13	10
	Updated version of FCC 15.107 spec to match new Powerline Conducted Emissions data	2019-03-13	2
02	Replaced Powerline Conducted Emissions data with new	2019-04-03	29-37
	Changed last date of test to April 1, 2019	2019-04-03	1, 2, 8, and 28
	Updated specification and method on Certificate of Test to match new Powerline Conducted Emissions data	2019-04-03	2

ACCREDITATIONS AND AUTHORIZATIONS

United States

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

A2LA - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Element to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with ISED.

European Union

European Commission – Within Element, we have a EU Notified Body validated for the EMCD and RED Directives.

Australia/New Zealand

ACMA - Recognized by ACMA as a CAB for the acceptance of test data.

Korea

MSIT / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

Taiwan

BSMI – Recognized by BSMI as a CAB for the acceptance of test data.

NCC - Recognized by NCC as a CAB for the acceptance of test data.

Singapore

IDA – Recognized by IDA as a CAB for the acceptance of test data.

Israel

MOC – Recognized by MOC as a CAB for the acceptance of test data.

Hong Kong

OFCA – Recognized by OFCA as a CAB for the acceptance of test data.

Vietnam

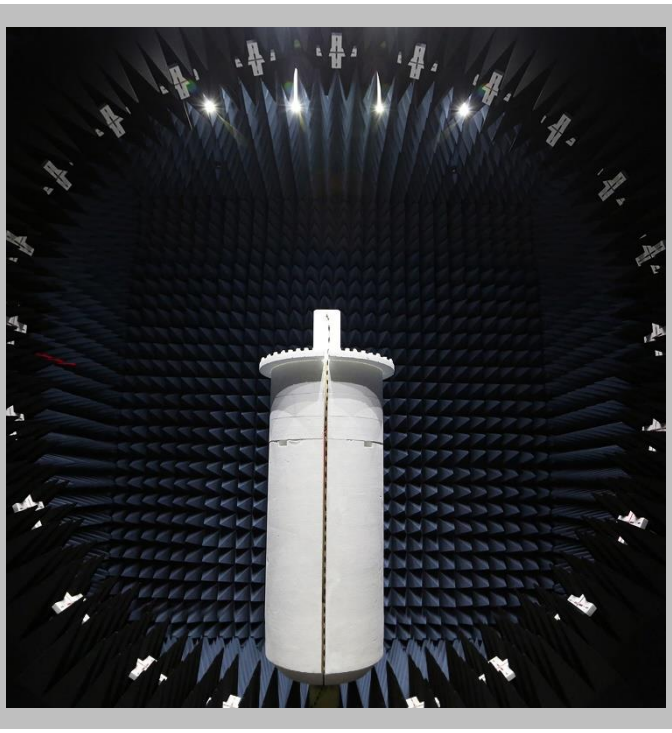
MIC – Recognized by MIC as a CAB for the acceptance of test data.

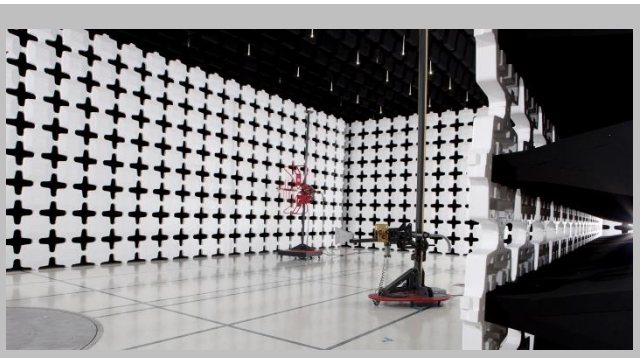
SCOPE

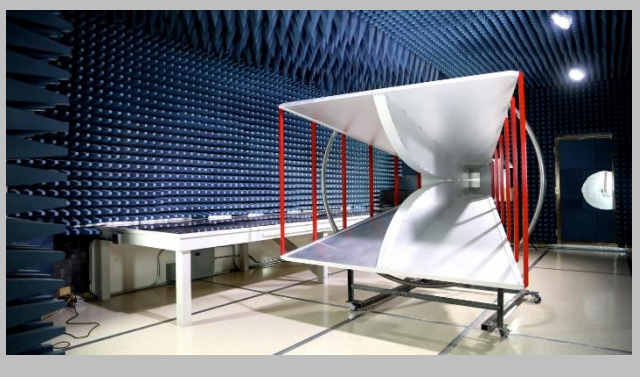
For details on the Scopes of our Accreditations, please visit:
https://www.nwemc.com/emc-testing-accreditations

FACILITIES

California	Minnesota	New York	Oregon	Texas	Washington
Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Labs NC01-05 19201 120th Ave NE Bothell, WA 98011 (425)984-6600
NVLAP					
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Innovation, Science and Economic Development Canada					
2834B-1, 2834B-3	2834E-1, 2834E-3	N/A	2834D-1, 2834D-*2*	2834G-1	2834F-1
BSMI					
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI					
A-0029	A-0109	N/A	A-0108	A-0201	A-0110
Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA					
US0158	US0175	N/A	US0017	US0191	US0157







MEASUREMENT UNCERTAINTY

element
TMU.2015.07.10

Measurement Uncertainty

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution.

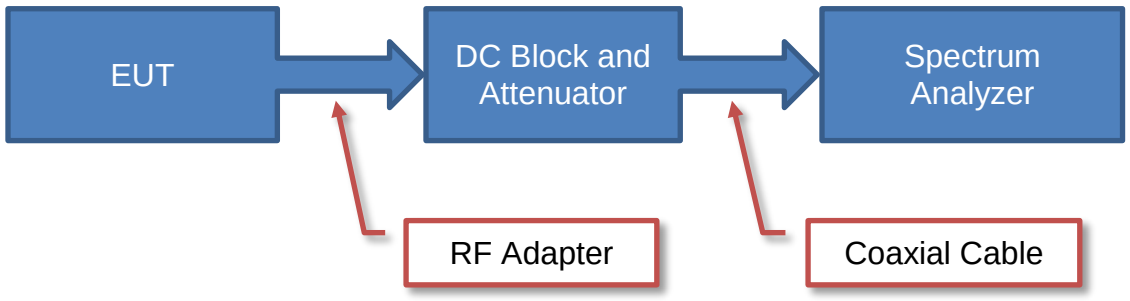
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable test description page. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

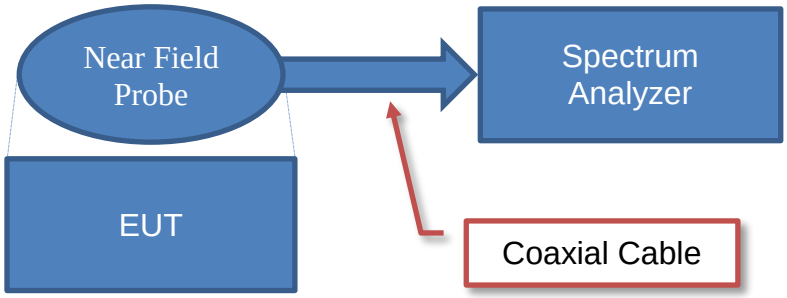
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.2 dB	-5.2 dB
AC Powerline Conducted Emissions (dB)	2.4 dB	-2.4 dB

Test Setup Block Diagrams

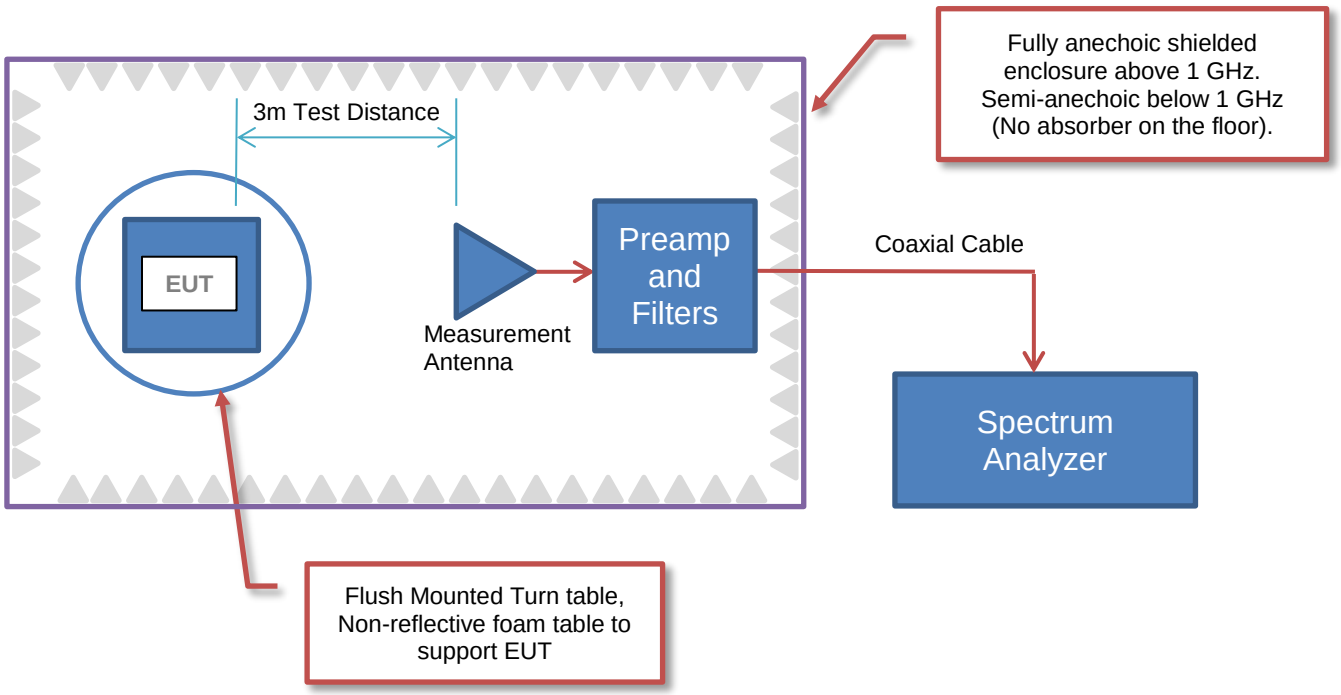
Antenna Port Conducted Measurements



Near Field Test Fixture Measurements



Spurious Radiated Emissions



PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	Walt Disney Parks and Resorts US, Inc.
Address:	PO Box 10000
City, State, Zip:	Lake Buena Vista, FL 32830
Test Requested By:	Brian Piquette of Synapse Product Development LLC
Model:	Radio Node
First Date of Test:	August 3, 2018
Last Date of Test:	April 1, 2019
Receipt Date of Samples:	August 2, 2018
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
Device is a multi-port BLE + proprietary 2.4GHz radio. Additional external interfaces include PoE, Ethernet, DC input (24VDC), RS485 and RS232, Amplified audio output, Relay outputs (2) and optocoupled inputs (2), USB host ports(2).

Testing Objective:
To demonstrate compliance of the Bluetooth radio to FCC 15.247 requirements.

CONFIGURATIONS

Configuration SYNA0249- 1

Software/Firmware Running during test	
Description	**Version**
Radio Tool	08/02/2018

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Node	Walt Disney Parks and Resorts US, Inc.	RNv1	E45
3 Dipole Antennas	Linx	ANT-2.4-CW-HWR-SMA	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Audio Peripheral	Walt Disney Parks and Resorts US, Inc.	Two	None

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Power Adapter - Laptop	HP	090560-11	None
Laptop	HP	ProBook 4540s	
AC/DC Power Adapter - Switch	Netgear	NUA3-6540240-11	None
Switch	Netgear	GS108pp	58617ADUA11A9

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable - Laptop	No	2 m	Yes	Laptop	AC/DC Power Adapter - Laptop
AC Power Cable - Laptop	No	2 m	No	AC/DC Power Adapter - Laptop	AC Mains
DC Power Cable - Switch	No	1.5 m	No	Switch	AC/DC Power Adapter - Switch
AC Power Cable - Switch	No	2 m	No	AC/DC Power Adapter - Switch	AC Mains
Relay & DC Out Cable	No	2 m	No	Audio Peripheral	Radio Node
Audio DMX Cable	No	1 m	No	Audio Peripheral	Radio Node
Ethernet Cable	No	7.5 m	No	Radio Node	Switch

CONFIGURATIONS

Configuration SYNA0249- 2

Software/Firmware Running during test	
Description	**Version**
Radio Tool	08/02/2018

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Node	Walt Disney Parks and Resorts US, Inc.	RNv1	E45

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Audio Peripheral	Walt Disney Parks and Resorts US, Inc.	Two	None
3 Dipole Antennas	Linx	ANT-2.4-CW-HWR-SMA	None
Power Supply	Kiethley	2200-60-2	9200230

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Power Adapter - Laptop	HP	090560-11	None
Laptop	HP	ProBook 4540s	

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable - Laptop	No	2 m	Yes	Laptop	AC/DC Power Adapter - Laptop
AC Power Cable - Laptop	No	2 m	No	AC/DC Power Adapter - Laptop	AC Mains
Relay & DC Out Cable	No	2 m	No	Audio Peripheral	Radio Node
Audio DMX Cable	No	1 m	No	Audio Peripheral	Radio Node
Ethernet Cable	No	7.5 m	No	Radio Node	Switch
AC Power Cable	No	1.5 m	No	Power Supply	AC Mains
DC Power Cable	No	1.1 m	No	Radio Node	Power Supply

CONFIGURATIONS

Configuration SYNA0249- 5

Software/Firmware Running during test	
Description	**Version**
Radio Tool	08/02/2018

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Node	Walt Disney Parks and Resorts US, Inc.	RNv1	E45
Directional Antenna	Walt Disney Parks and Resorts US, Inc.	PA 3X3	000146
2 Dipole Antennas	Linx	ANT-2.4-CW-HWR-SMA	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Audio Peripheral	Walt Disney Parks and Resorts US, Inc.	Two	None
Power Supply	Kiethley	2200-60-2	9200230

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Power Adapter - Laptop	HP	090560-11	None
Laptop	HP	ProBook 4540s	

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable - Laptop	No	2 m	Yes	Laptop	AC/DC Power Adapter - Laptop
AC Power Cable - Laptop	No	2 m	No	AC/DC Power Adapter - Laptop	AC Mains
Relay & DC Out Cable	No	2 m	No	Audio Peripheral	Radio Node
Audio DMX Cable	No	1 m	No	Audio Peripheral	Radio Node
Ethernet Cable	No	7.5 m	No	Radio Node	Switch
Coax	Yes	0.9 m	No	Radio Node	Directional Antenna
AC Power Cable	No	1.5 m	No	Power Supply	AC Mains
DC Power Cable	No	1.1 m	No	Radio Node	Power Supply
USB Cable	Yes	2.5 m	No	Radio Node	Unterminated

CONFIGURATIONS

Configuration SYNA0249- 7

Software/Firmware Running during test	
Description	**Version**
Radio Tool	08/02/2018

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Node	Walt Disney Parks and Resorts US, Inc.	RNv1	E43

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Power Adapter - Switch	Netgear	NUA3-6540240-11	None
Switch	Netgear	GS108pp	58617ADUA11A9

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable - Switch	No	1.5 m	No	Switch	AC/DC Power Adapter - Switch
AC Power Cable - Switch	No	2 m	No	AC/DC Power Adapter - Switch	AC Mains
Ethernet Cable	No	7.5 m	No	Radio Node	Switch

CONFIGURATIONS

Configuration SYNA0249- 9

Software/Firmware Running during test	
Description	**Version**
Radio Tool	08/02/2018

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Node	Walt Disney Parks and Resorts US, Inc.	RNv1	E45
2 Dipole Antennas	Linx	ANT-2.4-CW-HWR-SMA	None
Directional Antenna	Walt Disney Parks and Resorts US, Inc.	PA 2X2	E01

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Audio Peripheral	Walt Disney Parks and Resorts US, Inc.	Two	None

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Power Adapter - Switch	Netgear	NUA3-6540240-11	None
Switch	Netgear	GS108pp	58617ADUA11A9

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable - Laptop	No	2 m	Yes	Laptop	AC/DC Power Adapter - Laptop
AC Power Cable - Laptop	No	2 m	No	AC/DC Power Adapter - Laptop	AC Mains
Relay & DC Out Cable	No	2 m	No	Audio Peripheral	Radio Node
Audio DMX Cable	No	1 m	No	Audio Peripheral	Radio Node
Ethernet Cable	No	7.5 m	No	Radio Node	Switch
Coax	Yes	0.9 m	No	Radio Node	Directional Antenna
USB Cable	Yes	4.5 m	No	Radio Node	Unterminated
Ethernet	No	0.9 m	No	Radio Node	Unterminated

CONFIGURATIONS

Configuration SYNA0249- 10

Software/Firmware Running during test	
Description	**Version**
Radio Tool	08/02/2018

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Node	Walt Disney Parks and Resorts US, Inc.	RNv1	E45
3 Dipole Antennas	Linx	ANT-2.4-CW-HWR-SMA	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Audio Peripheral	Walt Disney Parks and Resorts US, Inc.	Two	None

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Power Adapter - Switch	Netgear	NUA3-6540240-11	None
Switch	Netgear	GS108pp	58617ADUA11A9

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable - Laptop	No	2 m	Yes	Laptop	AC/DC Power Adapter - Laptop
AC Power Cable - Laptop	No	2 m	No	AC/DC Power Adapter - Laptop	AC Mains
Relay & DC Out Cable	No	2 m	No	Audio Peripheral	Radio Node
Audio DMX Cable	No	1 m	No	Audio Peripheral	Radio Node
Ethernet Cable	No	7.5 m	No	Radio Node	Switch
Coax	Yes	0.9 m	No	Radio Node	Directional Antenna
USB Cable	Yes	4.5 m	No	Radio Node	Unterminated
Ethernet	No	0.9 m	No	Radio Node	Unterminated

CONFIGURATIONS

Configuration SYNA0249- 11

Software/Firmware Running during test	
Description	**Version**
Radio Tool	08/02/2018

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Node	Walt Disney Parks and Resorts US, Inc.	RNv1	E45
3 Dipole Antennas	Linx	ANT-2.4-CW-HWR-SMA	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Audio Peripheral	Walt Disney Parks and Resorts US, Inc.	Two	None
Power Supply	Kiethley	2200-60-2	9200230

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Relay & DC Out Cable	No	2 m	No	Audio Peripheral	Radio Node
Audio DMX Cable	No	1 m	No	Audio Peripheral	Radio Node
Ethernet Cable	No	7.5 m	No	Radio Node	Switch
Coax	Yes	0.9 m	No	Radio Node	Directional Antenna
USB Cable	Yes	4.5 m	No	Radio Node	Unterminated
Ethernet	No	0.9 m	No	Radio Node	Unterminated
DC Power Cable	No	1.8 m	No	Radio Node	Power Supply

CONFIGURATIONS

Configuration SYNA0249- 12

Software/Firmware Running during test	
Description	**Version**
Radio Tool	08/02/2018

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Node	Walt Disney Parks and Resorts US, Inc.	RNv1	E45
2 Dipole Antennas	Linx	ANT-2.4-CW-HWR-SMA	None
Directional Antenna	Walt Disney Parks and Resorts US, Inc.	PA 2X2	E01

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Audio Peripheral	Walt Disney Parks and Resorts US, Inc.	Two	None
Power Supply	Kiethley	2200-60-2	9200230

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable - Laptop	No	2 m	Yes	Laptop	AC/DC Power Adapter - Laptop
AC Power Cable - Laptop	No	2 m	No	AC/DC Power Adapter - Laptop	AC Mains
Relay & DC Out Cable	No	2 m	No	Audio Peripheral	Radio Node
Audio DMX Cable	No	1 m	No	Audio Peripheral	Radio Node
Ethernet Cable	No	7.5 m	No	Radio Node	Switch
Coax	Yes	0.9 m	No	Radio Node	Directional Antenna
USB Cable	Yes	4.5 m	No	Radio Node	Unterminated
Ethernet	No	0.9 m	No	Radio Node	Unterminated
DC Power Cable	No	1.8 m	No	Radio Node	Power Supply

CONFIGURATIONS

Configuration SYNA0249- 13

Software/Firmware Running during test	
Description	**Version**
Radio Tool	08/02/2018

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Node	Walt Disney Parks and Resorts US, Inc.	RNv1	E45
2 Dipole Antennas	Linx	ANT-2.4-CW-HWR-SMA	None
Directional Antenna	Walt Disney Parks and Resorts US, Inc.	PA 3X3	000146

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Audio Peripheral	Walt Disney Parks and Resorts US, Inc.	Two	None
Power Supply	Kiethley	2200-60-2	9200230

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable - Laptop	No	2 m	Yes	Laptop	AC/DC Power Adapter - Laptop
AC Power Cable - Laptop	No	2 m	No	AC/DC Power Adapter - Laptop	AC Mains
Relay & DC Out Cable	No	2 m	No	Audio Peripheral	Radio Node
Audio DMX Cable	No	1 m	No	Audio Peripheral	Radio Node
Ethernet Cable	No	7.5 m	No	Radio Node	Switch
Coax	Yes	0.9 m	No	Radio Node	Directional Antenna
USB Cable	Yes	4.5 m	No	Radio Node	Unterminated
Ethernet	No	0.9 m	No	Radio Node	Unterminated
DC Power Cable	No	1.8 m	No	Radio Node	Power Supply

CONFIGURATIONS

Configuration SYNA0259- 1

Software/Firmware Running during test	
Description	**Version**
Radio Tool	08/02/2018

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Node	Walt Disney Parks and Resorts US, Inc.	RNv1	E52
Audio Peripheral	Walt Disney Parks and Resorts US, Inc.	Two	None
3 Dipole Antennas	Linx	ANT-2.4-CW-HWR-SMA	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Power Adapter - Laptop	Lenovo	ADP-65KH B	11S36001646ZZ10012A7AA
Laptop	Lenovo	0679	CB07171536
AC/DC Power Adapter - Gigabit Switch	Netgear	AD810F10	31133019X1032901A1
Gigabit Switch	LinkSys	SD2005	RED40H805884
Power Supply	Kiethley	2200-60-2	9200230

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable - Laptop	No	2 m	Yes	Laptop	AC/DC Power Adapter - Laptop
AC Power Cable - Laptop	No	2 m	No	AC/DC Power Adapter - Laptop	AC Mains
DC Power Cable - Switch	No	1.5 m	No	Gigabit Switch	AC/DC Power Adapter - Gigabit Switch
Relay & DC Out Cable	No	2 m	No	Audio Peripheral	Radio Node
Audio DMX Cable	No	1 m	No	Audio Peripheral	Radio Node
Ethernet Cable	No	7.5 m	No	Radio Node	Switch
AC Power Cable	No	1.5 m	No	Power Supply	AC Mains
DC Power Cable	No	1.1 m	No	Radio Node	Power Supply
USB Cable	Yes	2.5 m	No	Radio Node	Unterminated
USB Cable	Yes	0.9 m	No	Radio Node	Unterminated
Ethernet Cable	No	1.0 m	No	Radio Node	Unterminated
Ethernet	No	1.8 m	No	Laptop	Switch
Ethernet	No	0.9 m	No	Radio Node	Unterminated

CONFIGURATIONS

Configuration SYNA0259- 2

Software/Firmware Running during test	
Description	**Version**
Radio Tool	08/02/2018

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Node	Walt Disney Parks and Resorts US, Inc.	RNv1	E52
Audio Peripheral	Walt Disney Parks and Resorts US, Inc.	Two	None
3 Dipole Antennas	Linx	ANT-2.4-CW-HWR-SMA	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Power Adapter - Laptop	Lenovo	ADP-65KH B	11S36001646ZZ10012A7AA
Laptop	Lenovo	0679	CB07171536
POE Switch	Netgear	GS108PP	58617ADUA11A9
AC/DC Power Adapter - POE Switch	Netgear	NUA3-6540240-I1	2417414951100102PL

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable - Laptop	No	2 m	Yes	Laptop	AC/DC Power Adapter - Laptop
AC Power Cable - Laptop	No	2 m	No	AC/DC Power Adapter - Laptop	AC Mains
Relay & DC Out Cable	No	2 m	No	Audio Peripheral	Radio Node
Audio DMX Cable	No	1 m	No	Audio Peripheral	Radio Node
Ethernet Cable	No	7.5 m	No	Radio Node	Switch
USB Cable	Yes	2.5 m	No	Radio Node	Unterminated
USB Cable	Yes	0.9 m	No	Radio Node	Unterminated
Ethernet Cable	No	1.0 m	No	Radio Node	Unterminated
Ethernet	No	1.8 m	No	Laptop	Switch
Ethernet	No	0.9 m	No	Radio Node	Unterminated
DC Power Cable	No	1.1m	No	Radio Node	Unterminated

CONFIGURATIONS

Configuration SYNA0259- 3

Software/Firmware Running during test	
Description	**Version**
Radio Tool	08/02/2018

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Node	Walt Disney Parks and Resorts US, Inc.	RNv1	E52
Audio Peripheral	Walt Disney Parks and Resorts US, Inc.	Two	None
Directional Antenna	Walt Disney Parks and Resorts US, Inc.	PA 2X2	E01
2 Dipole Antennas	Linx	ANT-2.4-CW-HWR-SMA	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Power Adapter - Laptop	Lenovo	ADP-65KH B	11S36001646ZZ10012A7AA
Laptop	Lenovo	0679	CB07171536
AC/DC Power Adapter - Gigabit Switch	Netgear	AD810F10	31133019X1032901A1
Gigabit Switch	LinkSys	SD2005	RED40H805884
Power Supply	Kiethley	2200-60-2	9200230

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable - Laptop	No	2 m	Yes	Laptop	AC/DC Power Adapter - Laptop
AC Power Cable - Laptop	No	2 m	No	AC/DC Power Adapter - Laptop	AC Mains
DC Power Cable - Switch	No	1.5 m	No	Gigabit Switch	AC/DC Power Adapter - Gigabit Switch
Relay & DC Out Cable	No	2 m	No	Audio Peripheral	Radio Node
Audio DMX Cable	No	1 m	No	Audio Peripheral	Radio Node
Ethernet Cable	No	7.5 m	No	Radio Node	Switch
AC Power Cable	No	1.5 m	No	Power Supply	AC Mains
DC Power Cable	No	1.1 m	No	Radio Node	Power Supply
USB Cable	Yes	2.5 m	No	Radio Node	Unterminated
USB Cable	Yes	0.9 m	No	Radio Node	Unterminated
Ethernet Cable	No	1.0 m	No	Radio Node	Unterminated
Ethernet	No	1.8 m	No	Laptop	Switch
Ethernet	No	0.9 m	No	Radio Node	Unterminated

CONFIGURATIONS

Configuration SYNA0259- 4

Software/Firmware Running during test	
Description	**Version**
Radio Tool	08/02/2018

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Node	Walt Disney Parks and Resorts US, Inc.	RNv1	E52
Audio Peripheral	Walt Disney Parks and Resorts US, Inc.	Two	None
Directional Antenna	Walt Disney Parks and Resorts US, Inc.	PA 2X2	E01
2 Dipole Antennas	Linx	ANT-2.4-CW-HWR-SMA	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Power Adapter - Laptop	Lenovo	ADP-65KH B	11S36001646ZZ10012A7AA
Laptop	Lenovo	0679	CB07171536
POE Switch	Netgear	GS108PP	58617ADUA11A9
AC/DC Power Adapter - POE Switch	Netgear	NUA3-6540240-I1	2417414951100102PL

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable - Laptop	No	2 m	Yes	Laptop	AC/DC Power Adapter - Laptop
AC Power Cable - Laptop	No	2 m	No	AC/DC Power Adapter - Laptop	AC Mains
Relay & DC Out Cable	No	2 m	No	Audio Peripheral	Radio Node
Audio DMX Cable	No	1 m	No	Audio Peripheral	Radio Node
Ethernet Cable	No	7.5 m	No	Radio Node	Switch
USB Cable	Yes	2.5 m	No	Radio Node	Unterminated
USB Cable	Yes	0.9 m	No	Radio Node	Unterminated
Ethernet Cable	No	1.0 m	No	Radio Node	Unterminated
Ethernet	No	1.8 m	No	Laptop	Switch
Ethernet	No	0.9 m	No	Radio Node	Unterminated
DC Power Cable	No	1.1m	No	Radio Node	Unterminated

CONFIGURATIONS

Configuration SYNA0259- 5

Software/Firmware Running during test	
Description	**Version**
Radio Tool	08/02/2018

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Node	Walt Disney Parks and Resorts US, Inc.	RNv1	E52
Audio Peripheral	Walt Disney Parks and Resorts US, Inc.	Two	None
Directional Antenna	Walt Disney Parks and Resorts US, Inc.	PA 3X3	000146
2 Dipole Antennas	Linx	ANT-2.4-CW-HWR-SMA	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Power Adapter - Laptop	Lenovo	ADP-65KH B	11S36001646ZZ10012A7AA
Laptop	Lenovo	0679	CB07171536
AC/DC Power Adapter - Gigabit Switch	Netgear	AD810F10	31133019X1032901A1
Gigabit Switch	LinkSys	SD2005	RED40H805884
Power Supply	Kiethley	2200-60-2	9200230

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable - Laptop	No	2 m	Yes	Laptop	AC/DC Power Adapter - Laptop
AC Power Cable - Laptop	No	2 m	No	AC/DC Power Adapter - Laptop	AC Mains
DC Power Cable - Switch	No	1.5 m	No	Gigabit Switch	AC/DC Power Adapter - Gigabit Switch
Relay & DC Out Cable	No	2 m	No	Audio Peripheral	Radio Node
Audio DMX Cable	No	1 m	No	Audio Peripheral	Radio Node
Ethernet Cable	No	7.5 m	No	Radio Node	Switch
AC Power Cable	No	1.5 m	No	Power Supply	AC Mains
DC Power Cable	No	1.1 m	No	Radio Node	Power Supply
USB Cable	Yes	2.5 m	No	Radio Node	Unterminated
USB Cable	Yes	0.9 m	No	Radio Node	Unterminated
Ethernet Cable	No	1.0 m	No	Radio Node	Unterminated
Ethernet	No	1.8 m	No	Laptop	Switch
Ethernet	No	0.9 m	No	Radio Node	Unterminated

CONFIGURATIONS

Configuration SYNA0259- 6

Software/Firmware Running during test	
Description	**Version**
Radio Tool	08/02/2018

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Node	Walt Disney Parks and Resorts US, Inc.	RNv1	E52
Audio Peripheral	Walt Disney Parks and Resorts US, Inc.	Two	None
Directional Antenna	Walt Disney Parks and Resorts US, Inc.	PA 3X3	000146
2 Dipole Antennas	Linx	ANT-2.4-CW-HWR-SMA	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Power Adapter - Laptop	Lenovo	ADP-65KH B	11S36001646ZZ10012A7AA
Laptop	Lenovo	0679	CB07171536
POE Switch	Netgear	GS108PP	58617ADUA11A9
AC/DC Power Adapter - POE Switch	Netgear	NUA3-6540240-I1	2417414951100102PL

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable - Laptop	No	2 m	Yes	Laptop	AC/DC Power Adapter - Laptop
AC Power Cable - Laptop	No	2 m	No	AC/DC Power Adapter - Laptop	AC Mains
Relay & DC Out Cable	No	2 m	No	Audio Peripheral	Radio Node
Audio DMX Cable	No	1 m	No	Audio Peripheral	Radio Node
Ethernet Cable	No	7.5 m	No	Radio Node	Switch
USB Cable	Yes	2.5 m	No	Radio Node	Unterminated
USB Cable	Yes	0.9 m	No	Radio Node	Unterminated
Ethernet Cable	No	1.0 m	No	Radio Node	Unterminated
Ethernet	No	1.8 m	No	Laptop	Switch
Ethernet	No	0.9 m	No	Radio Node	Unterminated
DC Power Cable	No	1.1m	No	Radio Node	Unterminated

CONFIGURATIONS

Configuration SYNA0260- 1

Software/Firmware Running during test	
Description	**Version**
radio tool	08/02/2018

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Node	Walt Disney Parks and Resorts US, Inc.	RNv1	E52
2 Dipole Antennas	Linx	ANT-2.4-CW-HWR-SMA	None
Yagi Antenna	Walt Disney Parks and Resorts US, Inc.	C3EY	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Power Adapter - Laptop	Lenovo	ADP-65KH B	11S36001646ZZ10012A7AA
Laptop	Lenovo	0679	CB07171536
AC/DC Power Adapter - Gigabit Switch	Netgear	AD810F10	31133019X1032901A1
Gigabit Switch	LinkSys	SD2005	RED40H805884
Audio Peripheral	Walt Disney Parks and Resorts US, Inc.	Two	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable - Laptop	No	2 m	Yes	Laptop	AC/DC Power Adapter - Laptop
AC Power Cable - Laptop	No	2 m	No	AC/DC Power Adapter - Laptop	AC Mains
DC Power Cable - Switch	No	1.5 m	No	Gigabit Switch	AC/DC Power Adapter - Gigabit Switch
Relay & DC Out Cable	No	2 m	No	Audio Peripheral	Radio Node
Audio DMX Cable	No	1 m	No	Audio Peripheral	Radio Node
Ethernet Cable	No	7.5 m	No	Radio Node	Switch
SMA Cable	Yes	1.2 m	No	Radio Node	Directional Antenna
AC Power Cable	No	1.5 m	No	Power Supply	AC Mains
DC Power Cable	No	1.1 m	No	Radio Node	Power Supply
USB Cable	Yes	2.5 m	No	Radio Node	Unterminated
USB Cable	Yes	0.9 m	No	Radio Node	Unterminated
Ethernet Cable	No	1.0 m	No	Radio Node	Unterminated
Ethernet	No	1.8 m	No	Laptop	Switch
USB Cable	Yes	4.5 m	No	Radio Node	Unterminated

CONFIGURATIONS

Configuration SYNA0260- 2

Software/Firmware Running during test	
Description	**Version**
radio tool	08/02/2018

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Node	Walt Disney Parks and Resorts US, Inc.	RNv1	E52
2 Dipole Antennas	Linx	ANT-2.4-CW-HWR-SMA	None
Directional Antenna	Ventev	T24130P10006GT	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Power Adapter - Laptop	Lenovo	ADP-65KH B	11S36001646ZZ10012A7AA
Laptop	Lenovo	0679	CB07171536
AC/DC Power Adapter - Gigabit Switch	Netgear	AD810F10	31133019X1032901A1
Gigabit Switch	LinkSys	SD2005	RED40H805884
Audio Peripheral	Walt Disney Parks and Resorts US, Inc.	Two	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable - Laptop	No	2 m	Yes	Laptop	AC/DC Power Adapter - Laptop
AC Power Cable - Laptop	No	2 m	No	AC/DC Power Adapter - Laptop	AC Mains
DC Power Cable - Switch	No	1.5 m	No	Gigabit Switch	AC/DC Power Adapter - Gigabit Switch
Relay & DC Out Cable	No	2 m	No	Audio Peripheral	Radio Node
Audio DMX Cable	No	1 m	No	Audio Peripheral	Radio Node
Ethernet Cable	No	7.5 m	No	Radio Node	Switch
SMA Cable	Yes	1.2 m	No	Radio Node	Directional Antenna
AC Power Cable	No	1.5 m	No	Power Supply	AC Mains
DC Power Cable	No	1.1 m	No	Radio Node	Power Supply
USB Cable	Yes	2.5 m	No	Radio Node	Unterminated
USB Cable	Yes	0.9 m	No	Radio Node	Unterminated
Ethernet Cable	No	1.0 m	No	Radio Node	Unterminated
Ethernet	No	1.8 m	No	Laptop	Switch
USB Cable	Yes	4.5 m	No	Radio Node	Unterminated

CONFIGURATIONS

Configuration SYNA0260- 3

Software/Firmware Running during test	
Description	**Version**
radio tool	08/02/2018

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Node	Walt Disney Parks and Resorts US, Inc.	RNv1	E52
2 Dipole Antennas	Linx	ANT-2.4-CW-HWR-SMA	None
Directional Antenna	Ventev	T24130P10006GT	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Power Adapter - Laptop	Lenovo	ADP-65KH B	11S36001646ZZ10012A7AA
Laptop	Lenovo	0679	CB07171536
AC/DC Power Adapter - Gigabit Switch	Netgear	AD810F10	31133019X1032901A1
Gigabit Switch	LinkSys	SD2005	RED40H805884
Audio Peripheral	Walt Disney Parks and Resorts US, Inc.	Two	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable - Laptop	No	2 m	Yes	Laptop	AC/DC Power Adapter - Laptop
AC Power Cable - Laptop	No	2 m	No	AC/DC Power Adapter - Laptop	AC Mains
DC Power Cable - Switch	No	1.5 m	No	Gigabit Switch	AC/DC Power Adapter - Gigabit Switch
Relay & DC Out Cable	No	2 m	No	Audio Peripheral	Radio Node
Audio DMX Cable	No	1 m	No	Audio Peripheral	Radio Node
Ethernet Cable	No	7.5 m	No	Radio Node	Switch
SMA Cable	Yes	1.2 m	No	Radio Node	Directional Antenna
AC Power Cable	No	1.5 m	No	Power Supply	AC Mains
DC Power Cable	No	1.1 m	No	Radio Node	Power Supply
USB Cable	Yes	2.5 m	No	Radio Node	Unterminated
USB Cable	Yes	0.9 m	No	Radio Node	Unterminated
Ethernet Cable	No	1.0 m	No	Radio Node	Unterminated
Ethernet	No	1.8 m	No	Laptop	Switch
USB Cable	Yes	4.5 m	No	Radio Node	Unterminated

CONFIGURATIONS

Configuration SYNA0260- 4

Software/Firmware Running during test	
Description	**Version**
radio tool	08/02/2018

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Node	Walt Disney Parks and Resorts US, Inc.	RNv1	E52
2 Dipole Antennas	Linx	ANT-2.4-CW-HWR-SMA	None
Single Element Patch	L-Com	RE09P-NM	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Power Adapter - Laptop	Lenovo	ADP-65KH B	11S36001646ZZ10012A7AA
Laptop	Lenovo	0679	CB07171536
AC/DC Power Adapter - Gigabit Switch	Netgear	AD810F10	31133019X1032901A1
Gigabit Switch	LinkSys	SD2005	RED40H805884
Audio Peripheral	Walt Disney Parks and Resorts US, Inc.	Two	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable - Laptop	No	2 m	Yes	Laptop	AC/DC Power Adapter - Laptop
AC Power Cable - Laptop	No	2 m	No	AC/DC Power Adapter - Laptop	AC Mains
DC Power Cable - Switch	No	1.5 m	No	Gigabit Switch	AC/DC Power Adapter - Gigabit Switch
Relay & DC Out Cable	No	2 m	No	Audio Peripheral	Radio Node
Audio DMX Cable	No	1 m	No	Audio Peripheral	Radio Node
Ethernet Cable	No	7.5 m	No	Radio Node	Switch
SMA Cable	Yes	1.2 m	No	Radio Node	Directional Antenna
AC Power Cable	No	1.5 m	No	Power Supply	AC Mains
DC Power Cable	No	1.1 m	No	Radio Node	Power Supply
USB Cable	Yes	2.5 m	No	Radio Node	Unterminated
USB Cable	Yes	0.9 m	No	Radio Node	Unterminated
Ethernet Cable	No	1.0 m	No	Radio Node	Unterminated
Ethernet	No	1.8 m	No	Laptop	Switch
USB Cable	Yes	4.5 m	No	Radio Node	Unterminated

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2018-08-03	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	2018-08-07	Duty Cycle	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
3	2018-08-07	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
4	2018-08-07	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
5	2018-08-07	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
6	2018-08-07	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
7	2018-10-02	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
8	2019-04-01	Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

POWERLINE CONDUCTED EMISSIONS

TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Per the standard, an insulating material was also added to ground plane between the EUT's power and remote I/O cables. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50ohm measuring port is terminated by a 50ohm EMI meter or a 50ohm resistive load. All 50ohm measuring ports of the LISN are terminated by 50ohm. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Receiver	Rohde & Schwarz	ESCI	ARE	2018-08-28	2019-08-28
Cable - Conducted Cable Assembly	Northwest EMC	NC4	NC4C	2019-03-20	2020-03-20
LISN	Solar Electronics	9252-50-R-24-BNC	LIK	2018-07-16	2019-07-16
LISN	Solar Electronics	9252-50-R-24-BNC	LIM	2018-07-16	2019-07-16

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

CONFIGURATIONS INVESTIGATED

SYNA0249-1
SYNA0249-2

MODES INVESTIGATED

EMC Test Mode, Volume 10

POWERLINE CONDUCTED EMISSIONS

EUT:	Radio Node	Work Order:	SYNA0249
Serial Number:	E43	Date:	2019-04-01
Customer:	Walt Disney Parks and Resorts US, Inc.	Temperature:	22.4°C
Attendees:	Hattie Spetla	Relative Humidity:	31.4%
Customer Project:	None	Bar. Pressure:	1021 mb
Tested By:	Salvador Solorzano	Job Site:	NC05
Power:	24 VDC	Configuration:	SYNA0249-2

TEST SPECIFICATIONS

Specification: Equipment Class A	Method:
FCC 15.207:2019	ANSI C63.10:2013

TEST PARAMETERS

Run #:	12	Line:	High Line	Add. Ext. Attenuation (dB):	0

COMMENTS

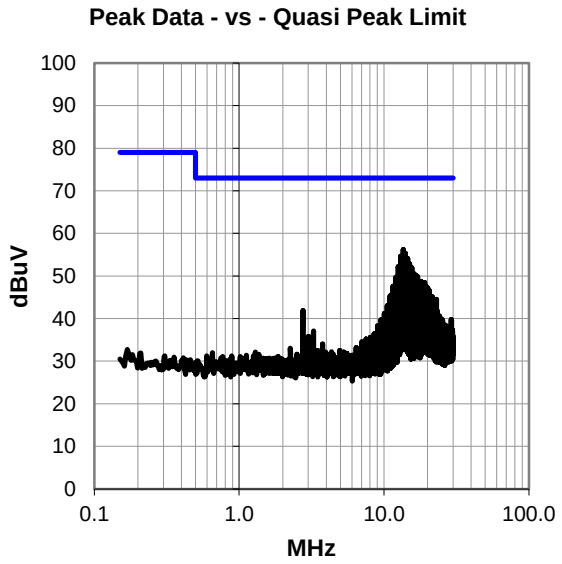
The Radio Node was pseudorandomly transmitting on one of the 3 BLE channel and also on the only DTS channel of operation.

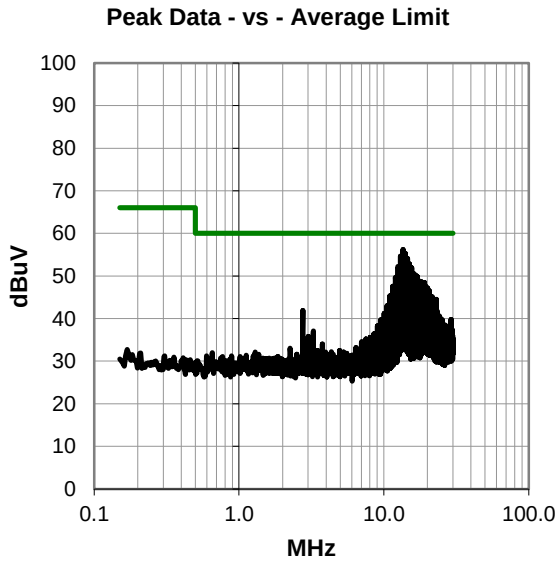
EUT OPERATING MODES

EMC Test Mode, Volume 10

DEVIATIONS FROM TEST STANDARD

None





POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #12

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.540	35.2	21.0	56.2	73.0	-16.8
14.040	34.3	21.0	55.3	73.0	-17.7
13.036	33.7	20.9	54.6	73.0	-18.4
14.543	33.0	21.1	54.1	73.0	-18.9
15.043	31.7	21.1	52.8	73.0	-20.2
12.536	31.4	20.8	52.2	73.0	-20.8
15.547	30.8	21.1	51.9	73.0	-21.1
16.047	29.5	21.1	50.6	73.0	-22.4
16.551	29.0	21.2	50.2	73.0	-22.8
17.050	28.5	21.3	49.8	73.0	-23.2
12.036	28.9	20.8	49.7	73.0	-23.3
17.550	27.5	21.3	48.8	73.0	-24.2
18.054	27.3	21.4	48.7	73.0	-24.3
19.058	27.0	21.5	48.5	73.0	-24.5
18.554	27.0	21.4	48.4	73.0	-24.6
11.533	26.8	20.8	47.6	73.0	-25.4
19.558	26.0	21.5	47.5	73.0	-25.5
20.057	25.6	21.5	47.1	73.0	-25.9
13.290	25.7	21.0	46.7	73.0	-26.3
13.790	25.6	21.0	46.6	73.0	-26.4
20.561	24.9	21.6	46.5	73.0	-26.5
12.786	24.5	20.9	45.4	73.0	-27.6
14.290	24.4	21.0	45.4	73.0	-27.6
11.033	24.6	20.7	45.3	73.0	-27.7
21.061	23.6	21.6	45.2	73.0	-27.8
21.565	23.4	21.7	45.1	73.0	-27.9

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.540	35.2	21.0	56.2	60.0	-3.8
14.040	34.3	21.0	55.3	60.0	-4.7
13.036	33.7	20.9	54.6	60.0	-5.4
14.543	33.0	21.1	54.1	60.0	-5.9
15.043	31.7	21.1	52.8	60.0	-7.2
12.536	31.4	20.8	52.2	60.0	-7.8
15.547	30.8	21.1	51.9	60.0	-8.1
16.047	29.5	21.1	50.6	60.0	-9.4
16.551	29.0	21.2	50.2	60.0	-9.8
17.050	28.5	21.3	49.8	60.0	-10.2
12.036	28.9	20.8	49.7	60.0	-10.3
17.550	27.5	21.3	48.8	60.0	-11.2
18.054	27.3	21.4	48.7	60.0	-11.3
19.058	27.0	21.5	48.5	60.0	-11.5
18.554	27.0	21.4	48.4	60.0	-11.6
11.533	26.8	20.8	47.6	60.0	-12.4
19.558	26.0	21.5	47.5	60.0	-12.5
20.057	25.6	21.5	47.1	60.0	-12.9
13.290	25.7	21.0	46.7	60.0	-13.3
13.790	25.6	21.0	46.6	60.0	-13.4
20.561	24.9	21.6	46.5	60.0	-13.5
12.786	24.5	20.9	45.4	60.0	-14.6
14.290	24.4	21.0	45.4	60.0	-14.6
11.033	24.6	20.7	45.3	60.0	-14.7
21.061	23.6	21.6	45.2	60.0	-14.8
21.565	23.4	21.7	45.1	60.0	-14.9

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	Radio Node	Work Order:	SYNA0249
Serial Number:	E43	Date:	2019-04-01
Customer:	Walt Disney Parks and Resorts US, Inc.	Temperature:	22.4°C
Attendees:	Hattie Spetla	Relative Humidity:	31.4%
Customer Project:	None	Bar. Pressure:	1021 mb
Tested By:	Salvador Solorzano	Job Site:	NC05
Power:	24 VDC	Configuration:	SYNA0249-2

TEST SPECIFICATIONS

Specification: Equipment Class A	Method:
FCC 15.207:2019	ANSI C63.10:2013

TEST PARAMETERS

Run #:	13	Line:	Neutral	Add. Ext. Attenuation (dB):	0

COMMENTS

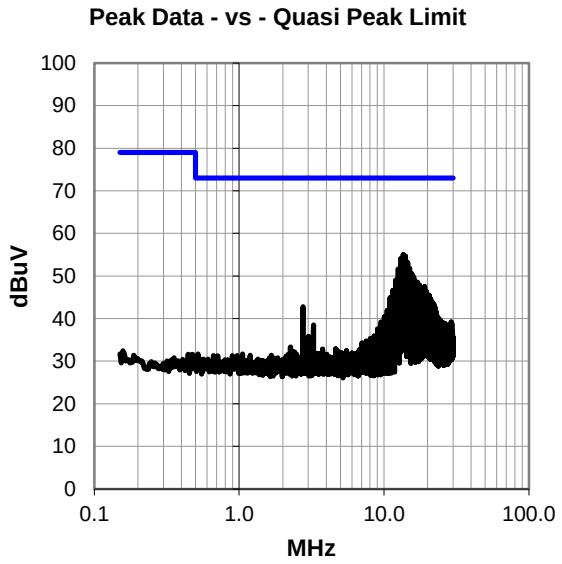
The Radio Node was pseudorandomly transmitting on one of the 3 BLE channel and also on the only DTS channel of operation.

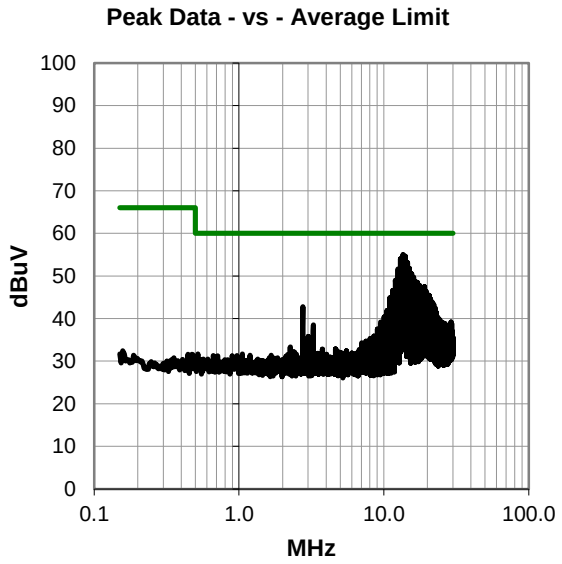
EUT OPERATING MODES

EMC Test Mode, Volume 10

DEVIATIONS FROM TEST STANDARD

None





POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #13

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.540	34.0	21.0	55.0	73.0	-18.0
14.040	33.6	21.0	54.6	73.0	-18.4
13.040	33.1	20.9	54.0	73.0	-19.0
14.543	32.0	21.1	53.1	73.0	-19.9
15.047	30.7	21.1	51.8	73.0	-21.2
12.536	30.8	20.8	51.6	73.0	-21.4
15.547	29.4	21.1	50.5	73.0	-22.5
16.051	28.6	21.1	49.7	73.0	-23.3
12.036	28.2	20.8	49.0	73.0	-24.0
16.551	27.5	21.2	48.7	73.0	-24.3
17.050	27.2	21.3	48.5	73.0	-24.5
17.550	26.5	21.3	47.8	73.0	-25.2
19.058	26.0	21.5	47.5	73.0	-25.5
18.554	25.6	21.4	47.0	73.0	-26.0
18.054	25.5	21.4	46.9	73.0	-26.1
11.533	25.8	20.8	46.6	73.0	-26.4
13.290	25.5	21.0	46.5	73.0	-26.5
19.558	24.9	21.5	46.4	73.0	-26.6
13.790	25.1	21.0	46.1	73.0	-26.9
20.061	24.1	21.5	45.6	73.0	-27.4
20.561	23.8	21.6	45.4	73.0	-27.6
11.033	24.2	20.7	44.9	73.0	-28.1
12.786	23.7	20.9	44.6	73.0	-28.4
21.061	23.0	21.6	44.6	73.0	-28.4
14.290	23.4	21.0	44.4	73.0	-28.6
21.565	22.1	21.7	43.8	73.0	-29.2

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.540	34.0	21.0	55.0	60.0	-5.0
14.040	33.6	21.0	54.6	60.0	-5.4
13.040	33.1	20.9	54.0	60.0	-6.0
14.543	32.0	21.1	53.1	60.0	-6.9
15.047	30.7	21.1	51.8	60.0	-8.2
12.536	30.8	20.8	51.6	60.0	-8.4
15.547	29.4	21.1	50.5	60.0	-9.5
16.051	28.6	21.1	49.7	60.0	-10.3
12.036	28.2	20.8	49.0	60.0	-11.0
16.551	27.5	21.2	48.7	60.0	-11.3
17.050	27.2	21.3	48.5	60.0	-11.5
17.550	26.5	21.3	47.8	60.0	-12.2
19.058	26.0	21.5	47.5	60.0	-12.5
18.554	25.6	21.4	47.0	60.0	-13.0
18.054	25.5	21.4	46.9	60.0	-13.1
11.533	25.8	20.8	46.6	60.0	-13.4
13.290	25.5	21.0	46.5	60.0	-13.5
19.558	24.9	21.5	46.4	60.0	-13.6
13.790	25.1	21.0	46.1	60.0	-13.9
20.061	24.1	21.5	45.6	60.0	-14.4
20.561	23.8	21.6	45.4	60.0	-14.6
11.033	24.2	20.7	44.9	60.0	-15.1
12.786	23.7	20.9	44.6	60.0	-15.4
21.061	23.0	21.6	44.6	60.0	-15.4
14.290	23.4	21.0	44.4	60.0	-15.6
21.565	22.1	21.7	43.8	60.0	-16.2

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	Radio Node	Work Order:	SYNA0249
Serial Number:	E43	Date:	2019-04-01
Customer:	Walt Disney Parks and Resorts US, Inc.	Temperature:	22.4°C
Attendees:	Hattie Spetla	Relative Humidity:	31.4%
Customer Project:	None	Bar. Pressure:	1021 mb
Tested By:	Salvador Solorzano	Job Site:	NC05
Power:	POE	Configuration:	SYNA0249-1

TEST SPECIFICATIONS

Specification: Equipment Class A	Method:
FCC 15.207:2019	ANSI C63.10:2013

TEST PARAMETERS

Run #:	14	Line:	High Line	Add. Ext. Attenuation (dB):	0

COMMENTS

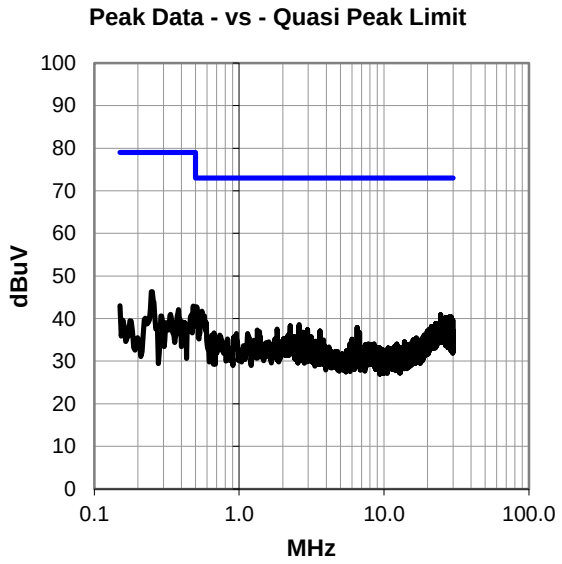
The Radio Node was pseudorandomly transmitting on one of the 3 BLE channel and also on the only DTS channel of operation.

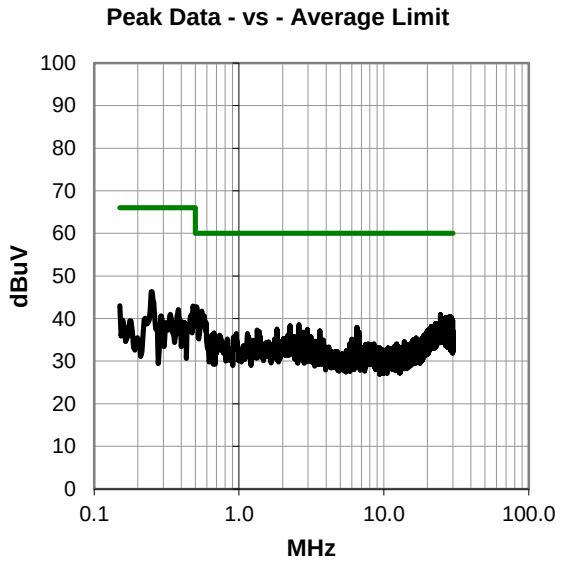
EUT OPERATING MODES

EMC Test Mode, Volume 10

DEVIATIONS FROM TEST STANDARD

None





POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #14

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.508	22.9	19.9	42.8	73.0	-30.2
0.553	21.8	19.9	41.7	73.0	-31.3
24.564	18.8	22.1	40.9	73.0	-32.1
28.202	17.9	22.5	40.4	73.0	-32.6
29.112	17.7	22.7	40.4	73.0	-32.6
0.247	26.4	19.9	46.3	79.0	-32.7
26.683	17.9	22.3	40.2	73.0	-32.8
25.172	18.0	22.1	40.1	73.0	-32.9
25.773	17.7	22.2	39.9	73.0	-33.1
26.385	17.5	22.3	39.8	73.0	-33.2
25.717	17.5	22.2	39.7	73.0	-33.3
26.251	17.5	22.2	39.7	73.0	-33.3
29.843	16.8	22.8	39.6	73.0	-33.4
24.982	17.4	22.1	39.5	73.0	-33.5
26.340	17.1	22.3	39.4	73.0	-33.6
27.594	17.0	22.4	39.4	73.0	-33.6
25.467	17.1	22.2	39.3	73.0	-33.7
28.504	16.7	22.6	39.3	73.0	-33.7
25.430	17.0	22.2	39.2	73.0	-33.8
26.586	16.9	22.3	39.2	73.0	-33.8
27.448	16.8	22.4	39.2	73.0	-33.8
25.109	17.0	22.1	39.1	73.0	-33.9
25.575	16.9	22.2	39.1	73.0	-33.9
25.922	16.9	22.2	39.1	73.0	-33.9
26.034	16.9	22.2	39.1	73.0	-33.9
26.183	16.9	22.2	39.1	73.0	-33.9

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.508	22.9	19.9	42.8	60.0	-17.2
0.553	21.8	19.9	41.7	60.0	-18.3
24.564	18.8	22.1	40.9	60.0	-19.1
28.202	17.9	22.5	40.4	60.0	-19.6
29.112	17.7	22.7	40.4	60.0	-19.6
0.247	26.4	19.9	46.3	66.0	-19.7
26.683	17.9	22.3	40.2	60.0	-19.8
25.172	18.0	22.1	40.1	60.0	-19.9
25.773	17.7	22.2	39.9	60.0	-20.1
26.385	17.5	22.3	39.8	60.0	-20.2
25.717	17.5	22.2	39.7	60.0	-20.3
26.251	17.5	22.2	39.7	60.0	-20.3
29.843	16.8	22.8	39.6	60.0	-20.4
24.982	17.4	22.1	39.5	60.0	-20.5
26.340	17.1	22.3	39.4	60.0	-20.6
27.594	17.0	22.4	39.4	60.0	-20.6
25.467	17.1	22.2	39.3	60.0	-20.7
28.504	16.7	22.6	39.3	60.0	-20.7
25.430	17.0	22.2	39.2	60.0	-20.8
26.586	16.9	22.3	39.2	60.0	-20.8
27.448	16.8	22.4	39.2	60.0	-20.8
25.109	17.0	22.1	39.1	60.0	-20.9
25.575	16.9	22.2	39.1	60.0	-20.9
25.922	16.9	22.2	39.1	60.0	-20.9
26.034	16.9	22.2	39.1	60.0	-20.9
26.183	16.9	22.2	39.1	60.0	-20.9

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	Radio Node	Work Order:	SYNA0249
Serial Number:	E43	Date:	2019-04-01
Customer:	Walt Disney Parks and Resorts US, Inc.	Temperature:	22.4°C
Attendees:	Hattie Spetla	Relative Humidity:	31.4%
Customer Project:	None	Bar. Pressure:	1021 mb
Tested By:	Salvador Solorzano	Job Site:	NC05
Power:	POE	Configuration:	SYNA0249-1

TEST SPECIFICATIONS

Specification: Equipment Class A	Method:
FCC 15.207:2019	ANSI C63.10:2013

TEST PARAMETERS

Run #:	15	Line:	Neutral	Add. Ext. Attenuation (dB):	0

COMMENTS

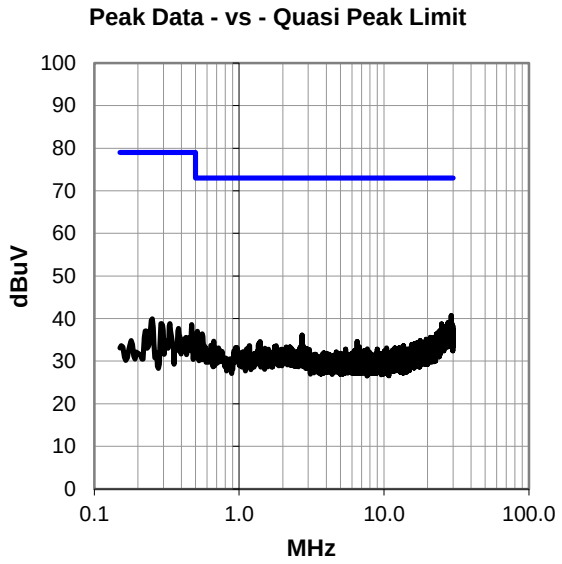
The Radio Node was pseudorandomly transmitting on one of the 3 BLE channel and also on the only DTS channel of operation.

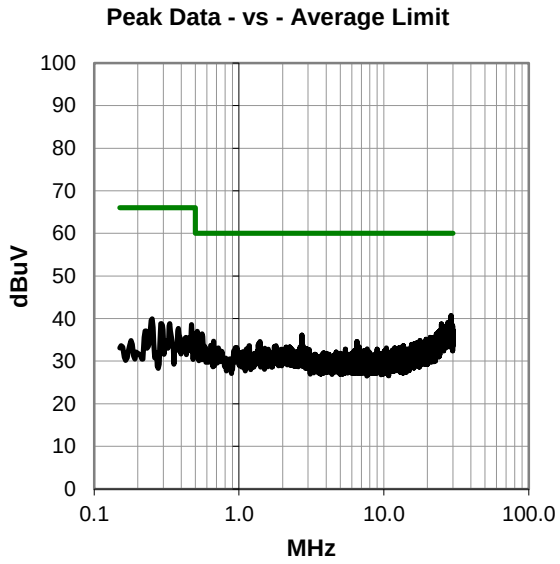
EUT OPERATING MODES

EMC Test Mode, Volume 10

DEVIATIONS FROM TEST STANDARD

None





POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #15

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
29.112	18.0	22.7	40.7	73.0	-32.3
27.594	16.7	22.4	39.1	73.0	-33.9
28.474	16.5	22.6	39.1	73.0	-33.9
28.802	16.5	22.6	39.1	73.0	-33.9
27.896	16.5	22.5	39.0	73.0	-34.0
29.239	16.3	22.7	39.0	73.0	-34.0
28.623	16.2	22.6	38.8	73.0	-34.2
29.411	16.1	22.7	38.8	73.0	-34.2
25.046	16.6	22.1	38.7	73.0	-34.3
27.668	16.2	22.5	38.7	73.0	-34.3
27.929	16.0	22.5	38.5	73.0	-34.5
28.496	15.9	22.6	38.5	73.0	-34.5
27.194	16.0	22.3	38.3	73.0	-34.7
29.030	15.6	22.7	38.3	73.0	-34.7
29.832	15.5	22.8	38.3	73.0	-34.7
26.642	15.9	22.3	38.2	73.0	-34.8
28.679	15.6	22.6	38.2	73.0	-34.8
25.169	16.0	22.1	38.1	73.0	-34.9
26.680	15.7	22.3	38.0	73.0	-35.0
28.579	15.4	22.6	38.0	73.0	-35.0
29.716	15.2	22.8	38.0	73.0	-35.0
25.773	15.7	22.2	37.9	73.0	-35.1
27.291	15.6	22.3	37.9	73.0	-35.1
28.205	15.4	22.5	37.9	73.0	-35.1
27.493	15.4	22.4	37.8	73.0	-35.2
29.093	15.1	22.7	37.8	73.0	-35.2

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
29.112	18.0	22.7	40.7	60.0	-19.3
27.594	16.7	22.4	39.1	60.0	-20.9
28.474	16.5	22.6	39.1	60.0	-20.9
28.802	16.5	22.6	39.1	60.0	-20.9
27.896	16.5	22.5	39.0	60.0	-21.0
29.239	16.3	22.7	39.0	60.0	-21.0
28.623	16.2	22.6	38.8	60.0	-21.2
29.411	16.1	22.7	38.8	60.0	-21.2
25.046	16.6	22.1	38.7	60.0	-21.3
27.668	16.2	22.5	38.7	60.0	-21.3
27.929	16.0	22.5	38.5	60.0	-21.5
28.496	15.9	22.6	38.5	60.0	-21.5
27.194	16.0	22.3	38.3	60.0	-21.7
29.030	15.6	22.7	38.3	60.0	-21.7
29.832	15.5	22.8	38.3	60.0	-21.7
26.642	15.9	22.3	38.2	60.0	-21.8
28.679	15.6	22.6	38.2	60.0	-21.8
25.169	16.0	22.1	38.1	60.0	-21.9
26.680	15.7	22.3	38.0	60.0	-22.0
28.579	15.4	22.6	38.0	60.0	-22.0
29.716	15.2	22.8	38.0	60.0	-22.0
25.773	15.7	22.2	37.9	60.0	-22.1
27.291	15.6	22.3	37.9	60.0	-22.1
28.205	15.4	22.5	37.9	60.0	-22.1
27.493	15.4	22.4	37.8	60.0	-22.2
29.093	15.1	22.7	37.8	60.0	-22.2

CONCLUSION

Pass

Tested By

SPURIOUS RADIATED EMISSIONS 2x2 ANTENNA

PSA-ESCI 2018.05.04

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz

POWER SETTINGS INVESTIGATED

24 VDC

POE

CONFIGURATIONS INVESTIGATED

SYNA0249 - 12

SYNA0249 - 9

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26.5 GHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Cable	ESM Cable Corp.	KMKM-72	EVY	31-Aug-2017	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AVU	31-Aug-2017	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AIV	NCR	0 mo
Cable	None	Standard Gain Horns Cable	EVF	30-Nov-2017	12 mo
Amplifier - Pre-Amplifier	L-3 Narda-MITEQ	AMF-6F-08001200-30-10P	PAO	30-Nov-2017	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AHU	NCR	0 mo
Filter - Low Pass	Micro-Tronics	LPM50004	LFD	28-Feb-2018	12 mo
Filter - High Pass	Micro-Tronics	HPM50111	HFO	1-Feb-2018	12 mo
Attenuator	Coaxicom	3910-20	AXZ	28-Feb-2018	12 mo
Cable	N/A	Double Ridge Horn Cables	EVB	29-Nov-2017	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAG	29-Nov-2017	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AIZ	7-Feb-2018	24 mo
Cable	N/A	Bilog Cables	EVA	25-Jul-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AOL	30-Nov-2017	12 mo
Antenna - Biconilog	EMCO	3141	AXH	NCR	0 mo
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	18-Mar-2018	12 mo

TEST DESCRIPTION

The highest gain antenna of each type to be used with the EUT was tested. The EUT was configured for the required transmit frequencies and the modes as showed in the data sheets.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis if required, and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

Measurements at the edges of the allowable band may be presented in an alternative method as provided for in the ANSI C63.10 Marker-Delta method. This method involves performing an in-band fundamental measurement followed by a screen capture of the fundamental and out-of-band emission using reduced measurement instrumentation bandwidths. The amplitude delta measured on this screen capture is applied to the fundamental emission value to show the out-of-band emission level as applied to the limit.

Where the radio test software does not provide for a duty cycle at continuous transmit conditions (> 98%) and the RMS (power average) measurements were made across the on and off times of the EUT transmissions, a duty cycle correction is added to the measurements using the formula of 10*LOG(dc).

SPURIOUS RADIATED EMISSIONS 2x2 ANTENNA

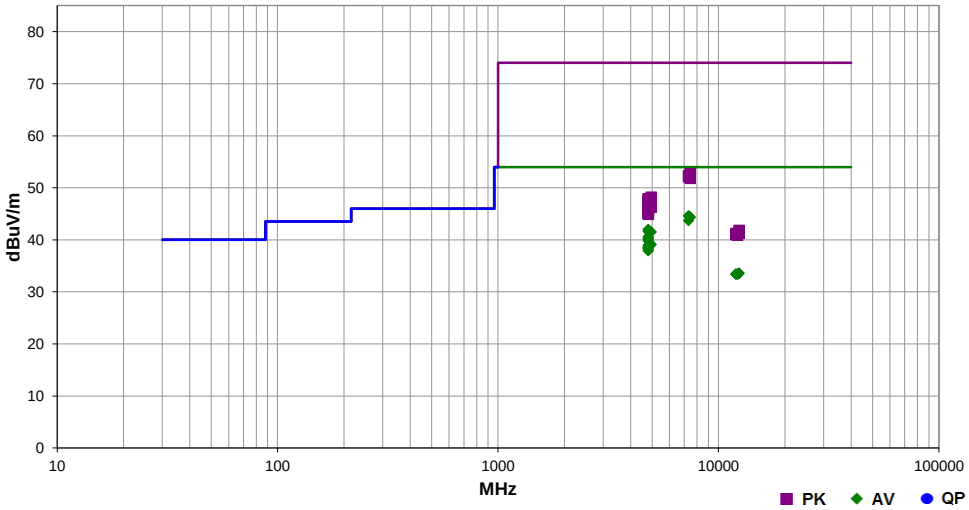
element

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0249	**Date:**	10-Aug-2018		
Project:	None	**Temperature:**	23.1 °C		
Job Site:	EV01	**Humidity:**	44.6% RH		
Serial Number:	E45	**Barometric Pres.:**	1018 mbar	**Tested by:**	Jeff Alcoke
EUT:	Radio Node				
Configuration:	9				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	See comments below for Channel, EUT orientation, and Antenna orientation. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	59	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7320.483	29.1	12.2	1.1	335.0	3.3	0.0	Horz	AV	0.0	44.6	54.0	-9.4	Mid Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
7440.600	28.1	13.0	1.0	19.0	3.3	0.0	Vert	AV	0.0	44.4	54.0	-9.6	High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
7440.533	28.0	13.0	1.0	305.0	3.3	0.0	Horz	AV	0.0	44.3	54.0	-9.7	High Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
7317.950	28.2	12.2	1.0	151.0	3.3	0.0	Vert	AV	0.0	43.7	54.0	-10.3	Mid Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4803.892	34.9	3.8	1.4	331.0	3.3	0.0	Horz	AV	0.0	42.0	54.0	-12.0	Low Ch, EUT Vert. Ant Vert, Directional PA 2x2 Ant
4804.100	34.8	3.8	1.9	341.0	3.3	0.0	Horz	AV	0.0	41.9	54.0	-12.1	Low Ch, EUT Horz, Ant Vert, Directional PA 2x2 Ant
4803.892	34.6	3.8	1.9	341.0	3.3	0.0	Horz	AV	0.0	41.6	54.0	-12.4	Low Ch, EUT on Side, Ant Vert, Directional PA 2x2 Ant
4880.025	33.2	5.0	1.7	341.0	3.3	0.0	Horz	AV	0.0	41.5	54.0	-12.5	Mid Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4960.017	33.0	5.2	1.7	342.0	3.3	0.0	Horz	AV	0.0	41.5	54.0	-12.5	High Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4804.100	33.5	3.8	2.9	18.0	3.3	0.0	Vert	AV	0.0	40.6	54.0	-13.4	Low Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4803.900	33.3	3.8	2.3	22.0	3.3	0.0	Vert	AV	0.0	40.4	54.0	-13.6	Low Ch, EUT Horz, Ant on Side, Directional PA 2x2 Ant
4804.050	33.1	3.8	1.0	341.0	3.3	0.0	Horz	AV	0.0	40.2	54.0	-13.8	Low Ch, EUT Horz, Ant on Side, Directional PA 2x2 Ant
4803.983	32.9	3.8	1.3	332.0	3.3	0.0	Horz	AV	0.0	40.0	54.0	-14.0	Low Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4803.967	32.7	3.8	2.5	9.0	3.3	0.0	Vert	AV	0.0	39.8	54.0	-14.2	Low Ch, EUT Vert, Ant on Side, Directional PA 2x2 Ant
4879.908	30.9	5.0	3.9	18.0	3.3	0.0	Vert	AV	0.0	39.2	54.0	-14.8	Mid Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4960.000	30.6	5.2	3.0	19.0	3.3	0.0	Vert	AV	0.0	39.1	54.0	-14.9	High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4804.067	31.8	3.8	2.7	306.0	3.3	0.0	Horz	AV	0.0	38.9	54.0	-15.1	Low Ch, EUT Vert, Ant on Side, Directional PA 2x2 Ant
4803.933	31.8	3.8	1.0	266.0	3.3	0.0	Horz	AV	0.0	38.9	54.0	-15.1	Low Ch, EUT on Side, Ant Horz, Directional PA 2x2 Ant
4804.092	31.5	3.8	1.0	29.0	3.3	0.0	Vert	AV	0.0	38.6	54.0	-15.4	Low Ch, EUT Horz, Ant Vert, Directional PA 2x2 Ant
4804.083	31.4	3.8	1.4	263.0	3.3	0.0	Vert	AV	0.0	38.5	54.0	-15.5	Low Ch, EUT on Side, Ant Horz, Directional PA 2x2 Ant
4804.075	31.4	3.8	1.0	331.0	3.3	0.0	Vert	AV	0.0	38.5	54.0	-15.5	Low Ch, EUT Horz, Ant Horz, Directional PA 2x2 Ant
4804.017	31.3	3.8	1.0	312.0	3.3	0.0	Vert	AV	0.0	38.4	54.0	-15.6	Low Ch, EUT Vert, Ant Horz, Directional PA 2x2 Ant
4804.067	31.3	3.8	1.1	22.0	3.3	0.0	Vert	AV	0.0	38.4	54.0	-15.6	Low Ch, EUT on Side, Ant Vert, Directional PA 2x2 Ant
4804.033	31.2	3.8	1.0	282.0	3.3	0.0	Horz	AV	0.0	38.3	54.0	-15.7	Low Ch, EUT Horz, Ant Horz, Directional PA 2x2 Ant
4803.925	30.9	3.8	1.0	261.0	3.3	0.0	Horz	AV	0.0	38.0	54.0	-16.0	Low Ch, EUT Vert, Ant Horz, Directional PA 2x2 Ant
4803.950	30.8	3.8	1.0	-2.0	3.3	0.0	Vert	AV	0.0	37.9	54.0	-16.1	Low Ch, EUT Vert. Ant Vert, Directional PA 2x2 Ant
12399.030	29.1	1.2	1.0	360.0	3.3	0.0	Vert	AV	0.0	33.6	54.0	-20.4	High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12398.590	29.0	1.2	1.8	0.0	3.3	0.0	Horz	AV	0.0	33.5	54.0	-20.5	High Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12199.040	29.2	0.9	1.6	192.0	3.3	0.0	Vert	AV	0.0	33.4	54.0	-20.6	Mid Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12008.780	29.1	1.0	1.0	145.0	3.3	0.0	Vert	AV	0.0	33.4	54.0	-20.6	Low Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12008.030	29.1	1.0	1.0	309.0	3.3	0.0	Horz	AV	0.0	33.4	54.0	-20.6	Low Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12199.250	29.2	0.9	1.0	193.0	3.3	0.0	Horz	AV	0.0	33.4	54.0	-20.6	Mid Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
7442.242	39.7	13.0	1.0	305.0		0.0	Horz	PK	0.0	52.7	74.0	-21.3	High Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
7321.125	40.1	12.2	1.1	335.0		0.0	Horz	PK	0.0	52.3	74.0	-21.7	Mid Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
7321.767	39.9	12.2	1.0	151.0		0.0	Vert	PK	0.0	52.1	74.0	-21.9	Mid Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
7440.267	38.8	13.0	1.0	19.0		0.0	Vert	PK	0.0	51.8	74.0	-22.2	High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4959.542	43.0	5.2	1.7	342.0		0.0	Horz	PK	0.0	48.2	74.0	-25.8	High Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4804.558	44.0	3.9	1.9	341.0		0.0	Horz	PK	0.0	47.9	74.0	-26.1	Low Ch, EUT Horz, Ant Vert, Directional PA 2x2 Ant
4803.825	44.0	3.8	1.4	331.0		0.0	Horz	PK	0.0	47.8	74.0	-26.2	Low Ch, EUT Vert. Ant Vert, Directional PA 2x2 Ant

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4803.367	43.8	3.8	1.9	341.0		0.0	Horz	PK	0.0	47.6	74.0	-26.4	Low Ch, EUT on Side, Ant Vert, Directional PA 2x2 Ant
4880.950	42.5	5.0	1.7	341.0		0.0	Horz	PK	0.0	47.5	74.0	-26.5	Mid Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4804.392	43.4	3.8	1.3	332.0		0.0	Horz	PK	0.0	47.2	74.0	-26.8	Low Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4803.658	43.4	3.8	2.9	18.0		0.0	Vert	PK	0.0	47.2	74.0	-26.8	Low Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4804.333	43.4	3.8	2.3	22.0		0.0	Vert	PK	0.0	47.2	74.0	-26.8	Low Ch, EUT Horz, Ant on Side, Directional PA 2x2 Ant
4880.117	41.6	5.0	3.9	18.0		0.0	Vert	PK	0.0	46.6	74.0	-27.4	Mid Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4803.633	42.7	3.8	1.0	341.0		0.0	Horz	PK	0.0	46.5	74.0	-27.5	Low Ch, EUT Horz, Ant on Side, Directional PA 2x2 Ant
4803.642	42.6	3.8	1.4	263.0		0.0	Vert	PK	0.0	46.4	74.0	-27.6	Low Ch, EUT on Side, Ant Horz, Directional PA 2x2 Ant
4959.983	41.1	5.2	3.0	19.0		0.0	Vert	PK	0.0	46.3	74.0	-27.7	High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4803.750	42.2	3.8	2.5	9.0		0.0	Vert	PK	0.0	46.0	74.0	-28.0	Low Ch, EUT Vert, Ant on Side, Directional PA 2x2 Ant
4804.500	42.1	3.8	1.0	331.0		0.0	Vert	PK	0.0	45.9	74.0	-28.1	Low Ch, EUT Horz, Ant Horz, Directional PA 2x2 Ant
4804.825	41.9	3.9	2.7	306.0		0.0	Horz	PK	0.0	45.8	74.0	-28.2	Low Ch, EUT Vert, Ant on Side, Directional PA 2x2 Ant
4804.133	41.8	3.8	1.0	266.0		0.0	Horz	PK	0.0	45.6	74.0	-28.4	Low Ch, EUT on Side, Ant Horz, Directional PA 2x2 Ant
4804.342	41.5	3.8	1.0	282.0		0.0	Horz	PK	0.0	45.3	74.0	-28.7	Low Ch, EUT Horz, Ant Horz, Directional PA 2x2 Ant
4804.283	41.4	3.8	1.0	-2.0		0.0	Vert	PK	0.0	45.2	74.0	-28.8	Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4804.017	41.4	3.8	1.1	22.0		0.0	Vert	PK	0.0	45.2	74.0	-28.8	Low Ch, EUT on Side, Ant Vert, Directional PA 2x2 Ant
4804.400	41.3	3.8	1.0	312.0		0.0	Vert	PK	0.0	45.1	74.0	-28.9	Low Ch, EUT Vert, Ant Horz, Directional PA 2x2 Ant
4804.717	41.2	3.9	1.0	29.0		0.0	Vert	PK	0.0	45.1	74.0	-28.9	Low Ch, EUT Horz, Ant Vert, Directional PA 2x2 Ant
4804.567	41.0	3.9	1.0	261.0		0.0	Horz	PK	0.0	44.9	74.0	-29.1	Low Ch, EUT Vert, Ant Horz, Directional PA 2x2 Ant
12398.910	40.6	1.2	1.0	360.0		0.0	Vert	PK	0.0	41.8	74.0	-32.2	High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12398.660	40.1	1.2	1.8	0.0		0.0	Horz	PK	0.0	41.3	74.0	-32.7	High Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12007.790	40.2	1.0	1.0	145.0		0.0	Vert	PK	0.0	41.2	74.0	-32.8	Low Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12201.110	40.3	0.9	1.0	193.0		0.0	Horz	PK	0.0	41.2	74.0	-32.8	Mid Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12007.720	40.0	1.0	1.0	309.0		0.0	Horz	PK	0.0	41.0	74.0	-33.0	Low Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12199.900	40.0	0.9	1.6	192.0		0.0	Vert	PK	0.0	40.9	74.0	-33.1	Mid Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant

SPURIOUS RADIATED EMISSIONS 2x2 ANTENNA

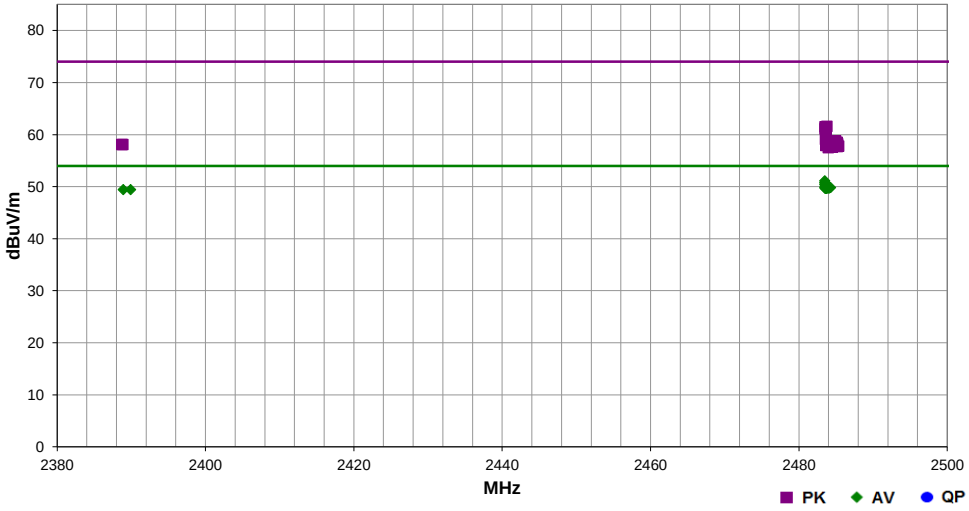
element

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0249	**Date:**	10-Aug-2018		
Project:	None	**Temperature:**	22.5 °C		
Job Site:	EV01	**Humidity:**	45.1% RH		
Serial Number:	E45	**Barometric Pres.:**	1019 mbar	**Tested by:**	Jeff Alcoke
EUT:	Radio Node				
Configuration:	9				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	See comments below for Channel, EUT orientation, and Antenna orientation. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	62	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.503	32.3	-4.5	1.5	21.0	3.3	20.0	Horz	AV	0.0	51.1	54.0	-2.9	High Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
2483.510	32.0	-4.5	1.7	17.0	3.3	20.0	Horz	AV	0.0	50.8	54.0	-3.2	High Channel, EUT on Side, Ant Vert, Directional PA 2x2 Ant
2483.533	31.9	-4.5	1.2	18.0	3.3	20.0	Vert	AV	0.0	50.7	54.0	-3.3	High Channel, EUT Vert, Ant on Side, Directional PA 2x2 Ant
2483.543	31.9	-4.5	1.8	24.0	3.3	20.0	Horz	AV	0.0	50.7	54.0	-3.3	High Channel, EUT Horz, Ant Vert, Directional PA 2x2 Ant
2483.503	31.6	-4.5	3.5	15.0	3.3	20.0	Vert	AV	0.0	50.4	54.0	-3.6	High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
2483.560	31.3	-4.5	1.0	0.0	3.3	20.0	Vert	AV	0.0	50.1	54.0	-3.9	High Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
2483.517	31.1	-4.5	1.0	39.0	3.3	20.0	Horz	AV	0.0	49.9	54.0	-4.1	High Channel, EUT Vert, Ant on Side, Directional PA 2x2 Ant
2484.273	30.9	-4.4	3.6	261.0	3.3	20.0	Vert	AV	0.0	49.8	54.0	-4.2	High Channel, EUT on Side, Ant Vert, Directional PA 2x2 Ant
2483.520	31.0	-4.5	1.6	359.0	3.3	20.0	Horz	AV	0.0	49.8	54.0	-4.2	High Channel, EUT Horz, Ant on Side, Directional PA 2x2 Ant
2483.720	30.9	-4.5	1.0	35.0	3.3	20.0	Horz	AV	0.0	49.7	54.0	-4.3	High Channel, EUT Vert, Ant Horz, Directional PA 2x2 Ant
2483.743	30.9	-4.5	3.8	92.0	3.3	20.0	Vert	AV	0.0	49.7	54.0	-4.3	High Channel, EUT Vert, Ant Horz, Directional PA 2x2 Ant
2484.060	30.9	-4.5	1.0	301.0	3.3	20.0	Horz	AV	0.0	49.7	54.0	-4.3	High Channel, EUT on Side, Ant Horz, Directional PA 2x2 Ant
2483.573	30.9	-4.5	1.0	40.0	3.3	20.0	Vert	AV	0.0	49.7	54.0	-4.3	High Channel, EUT on Side, Ant Horz, Directional PA 2x2 Ant
2483.793	30.9	-4.5	1.6	117.0	3.3	20.0	Horz	AV	0.0	49.7	54.0	-4.3	High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
2483.713	30.9	-4.5	1.0	106.0	3.3	20.0	Vert	AV	0.0	49.7	54.0	-4.3	High Channel, EUT Horz, Ant Vert, Directional PA 2x2 Ant
2483.630	30.9	-4.5	1.0	223.0	3.3	20.0	Vert	AV	0.0	49.7	54.0	-4.3	High Channel, EUT Horz, Ant on Side, Directional PA 2x2 Ant
2483.537	30.9	-4.5	1.1	159.0	3.3	20.0	Horz	AV	0.0	49.7	54.0	-4.3	High Channel, EUT Horz, Ant Horz, Directional PA 2x2 Ant
2483.653	30.9	-4.5	1.0	228.0	3.3	20.0	Vert	AV	0.0	49.7	54.0	-4.3	High Channel, EUT Horz, Ant Horz, Directional PA 2x2 Ant
2388.927	31.0	-4.9	1.0	155.0	3.3	20.0	Horz	AV	0.0	49.4	54.0	-4.6	Low Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
2389.920	31.0	-4.9	1.0	0.0	3.3	20.0	Vert	AV	0.0	49.4	54.0	-4.6	Low Channel, EUT on Side, Ant Vert, Directional PA 2x2 Ant
2483.760	46.1	-4.5	1.5	21.0		20.0	Horz	PK	0.0	61.6	74.0	-12.4	High Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
2483.527	46.0	-4.5	1.7	17.0		20.0	Horz	PK	0.0	61.5	74.0	-12.5	High Channel, EUT on Side, Ant Vert, Directional PA 2x2 Ant
2483.520	45.6	-4.5	1.8	24.0		20.0	Horz	PK	0.0	61.1	74.0	-12.9	High Channel, EUT Horz, Ant Vert, Directional PA 2x2 Ant
2483.680	45.5	-4.5	1.2	18.0		20.0	Vert	PK	0.0	61.0	74.0	-13.0	High Channel, EUT Vert, Ant on Side, Directional PA 2x2 Ant
2483.570	43.6	-4.5	3.5	15.0		20.0	Vert	PK	0.0	59.1	74.0	-14.9	High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
2484.957	43.2	-4.4	1.0	0.0		20.0	Vert	PK	0.0	58.8	74.0	-15.2	High Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
2485.173	42.9	-4.4	3.8	92.0		20.0	Vert	PK	0.0	58.5	74.0	-15.5	High Channel, EUT Vert, Ant Horz, Directional PA 2x2 Ant
2485.173	42.6	-4.4	1.0	301.0		20.0	Horz	PK	0.0	58.2	74.0	-15.8	High Channel, EUT on Side, Ant Horz, Directional PA 2x2 Ant
2485.227	42.6	-4.4	1.1	159.0		20.0	Horz	PK	0.0	58.2	74.0	-15.8	High Channel, EUT Horz, Ant Horz, Directional PA 2x2 Ant
2388.703	43.0	-4.9	1.0	155.0		20.0	Horz	PK	0.0	58.1	74.0	-15.9	Low Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
2388.863	43.0	-4.9	1.0	0.0		20.0	Vert	PK	0.0	58.1	74.0	-15.9	Low Channel, EUT on Side, Ant Vert, Directional PA 2x2 Ant
2484.853	42.4	-4.4	1.0	35.0		20.0	Horz	PK	0.0	58.0	74.0	-16.0	High Channel, EUT Vert, Ant Horz, Directional PA 2x2 Ant
2485.043	42.4	-4.4	1.6	117.0		20.0	Horz	PK	0.0	58.0	74.0	-16.0	High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
2483.627	42.4	-4.5	1.0	106.0		20.0	Vert	PK	0.0	57.9	74.0	-16.1	High Channel, EUT Horz, Ant Vert, Directional PA 2x2 Ant
2484.960	42.3	-4.4	1.6	359.0		20.0	Horz	PK	0.0	57.9	74.0	-16.1	High Channel, EUT Horz, Ant on Side, Directional PA 2x2 Ant
2485.043	42.2	-4.4	1.0	39.0		20.0	Horz	PK	0.0	57.8	74.0	-16.2	High Channel, EUT Vert, Ant on Side, Directional PA 2x2 Ant
2485.357	42.2	-4.4	1.0	40.0		20.0	Vert	PK	0.0	57.8	74.0	-16.2	High Channel, EUT on Side, Ant Horz, Directional PA 2x2 Ant
2485.187	42.1	-4.4	1.0	223.0		20.0	Vert	PK	0.0	57.7	74.0	-16.3	High Channel, EUT Horz, Ant on Side, Directional PA 2x2 Ant
2484.500	42.0	-4.4	3.6	261.0		20.0	Vert	PK	0.0	57.6	74.0	-16.4	High Channel, EUT on Side, Ant Vert, Directional PA 2x2 Ant

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.967	42.0	-4.5	1.0	228.0		20.0	Vert	PK	0.0	57.5	74.0	-16.5	High Channel, EUT Horz, Ant Horz, Directional PA 2x2 Ant

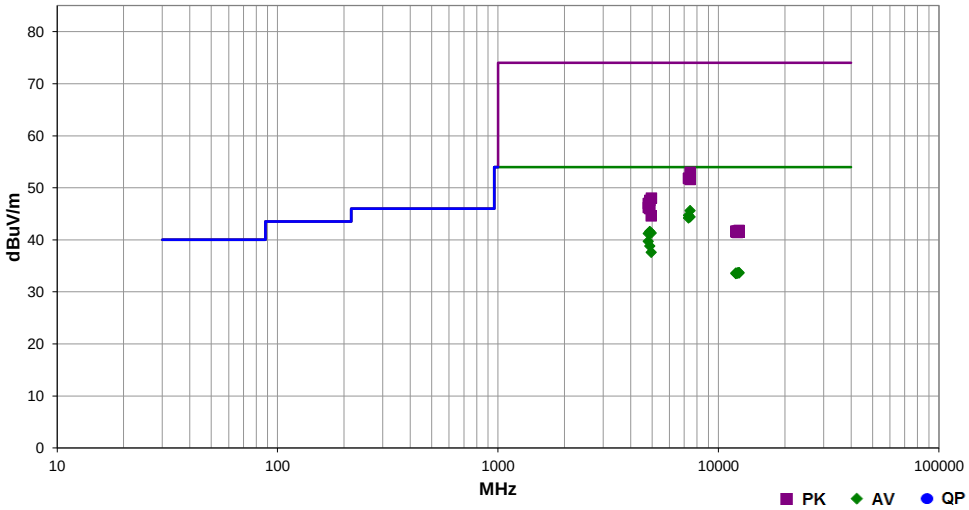
SPURIOUS RADIATED EMISSIONS 2x2 ANTENNA

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0249	**Date:**	14-Aug-2018		
Project:	None	**Temperature:**	22.7 °C		
Job Site:	EV01	**Humidity:**	44.5% RH		
Serial Number:	E45	**Barometric Pres.:**	1015 mbar	**Tested by:**	Jeff Alcoke
EUT:	Radio Node				
Configuration:	12				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	24 VDC				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Measurements made on worst case orientations determined from testing on the POE system. See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	89	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7439.550	29.3	13.0	1.7	324.0	3.3	0.0	Horz	AV	0.0	45.6	54.0	-8.4	High Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
7319.558	29.2	12.2	1.8	20.0	3.3	0.0	Horz	AV	0.0	44.7	54.0	-9.3	Mid Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
7440.683	28.1	13.0	1.0	0.0	3.3	0.0	Vert	AV	0.0	44.4	54.0	-9.6	High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
7319.458	28.7	12.2	1.3	26.0	3.3	0.0	Vert	AV	0.0	44.2	54.0	-9.8	Mid Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4880.067	33.3	5.0	1.8	345.0	3.3	0.0	Horz	AV	0.0	41.6	54.0	-12.4	Mid Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4959.967	32.8	5.2	2.2	342.0	3.3	0.0	Horz	AV	0.0	41.3	54.0	-12.7	High Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4804.008	34.1	3.8	2.0	343.0	3.3	0.0	Horz	AV	0.0	41.2	54.0	-12.8	Low Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4804.108	32.6	3.8	3.7	27.0	3.3	0.0	Vert	AV	0.0	39.7	54.0	-14.3	Low Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4879.992	30.5	5.0	3.3	34.0	3.3	0.0	Vert	AV	0.0	38.8	54.0	-15.2	Mid Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4960.208	29.1	5.2	1.0	354.0	3.3	0.0	Vert	AV	0.0	37.6	54.0	-16.4	High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12397.590	29.2	1.2	1.0	236.0	3.3	0.0	Horz	AV	0.0	33.7	54.0	-20.3	High Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12397.700	29.1	1.2	1.0	144.0	3.3	0.0	Vert	AV	0.0	33.6	54.0	-20.4	High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12199.570	29.4	0.9	1.4	147.0	3.3	0.0	Vert	AV	0.0	33.6	54.0	-20.4	Mid Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12008.920	29.3	1.0	1.0	360.0	3.3	0.0	Horz	AV	0.0	33.6	54.0	-20.4	Low Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12198.680	29.4	0.9	1.8	330.0	3.3	0.0	Horz	AV	0.0	33.6	54.0	-20.4	Mid Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12008.230	29.2	1.0	2.4	181.0	3.3	0.0	Vert	AV	0.0	33.5	54.0	-20.5	Low Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
7439.725	40.0	13.0	1.7	324.0		0.0	Horz	PK	0.0	53.0	74.0	-21.0	High Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
7320.833	39.6	12.2	1.3	26.0		0.0	Vert	PK	0.0	51.8	74.0	-22.2	Mid Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
7320.858	39.6	12.2	1.8	20.0		0.0	Horz	PK	0.0	51.8	74.0	-22.2	Mid Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
7437.800	38.6	13.0	1.0	0.0		0.0	Vert	PK	0.0	51.6	74.0	-22.4	High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4960.700	42.8	5.2	2.2	342.0		0.0	Horz	PK	0.0	48.0	74.0	-26.0	High Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4880.475	42.6	5.0	1.8	345.0		0.0	Horz	PK	0.0	47.6	74.0	-26.4	Mid Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4803.183	43.2	3.8	2.0	343.0		0.0	Horz	PK	0.0	47.0	74.0	-27.0	Low Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4804.200	42.4	3.8	3.7	27.0		0.0	Vert	PK	0.0	46.2	74.0	-27.8	Low Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4880.642	41.0	5.0	3.3	34.0		0.0	Vert	PK	0.0	46.0	74.0	-28.0	Mid Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4959.492	39.4	5.2	1.0	354.0		0.0	Vert	PK	0.0	44.6	74.0	-29.4	High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12399.140	40.6	1.2	1.0	144.0		0.0	Vert	PK	0.0	41.8	74.0	-32.2	High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12199.630	40.8	0.9	1.4	147.0		0.0	Vert	PK	0.0	41.7	74.0	-32.3	Mid Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12009.020	40.7	1.0	1.0	360.0		0.0	Horz	PK	0.0	41.7	74.0	-32.3	Low Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12012.120	40.5	1.0	2.4	181.0		0.0	Vert	PK	0.0	41.5	74.0	-32.5	Low Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12399.690	40.3	1.2	1.0	236.0		0.0	Horz	PK	0.0	41.5	74.0	-32.5	High Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12201.470	40.5	0.9	1.8	330.0		0.0	Horz	PK	0.0	41.4	74.0	-32.6	Mid Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant

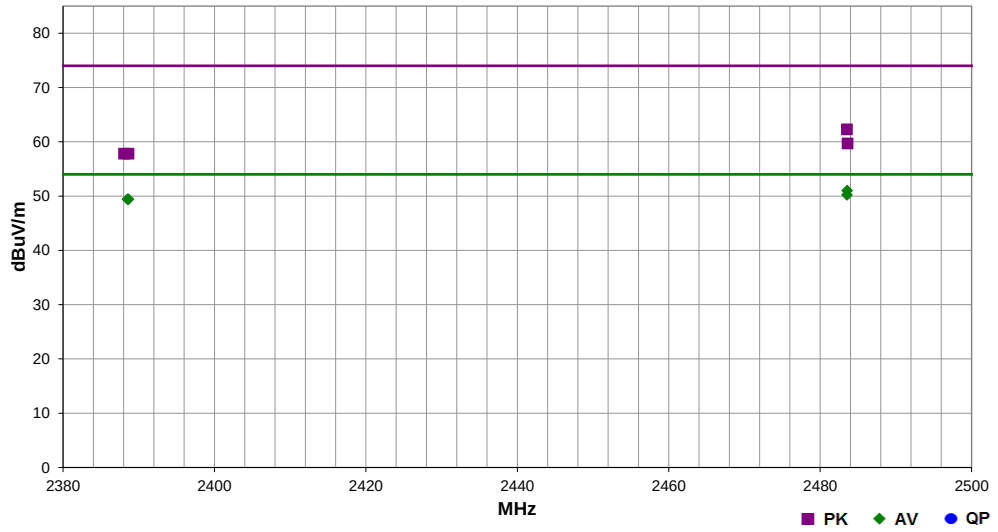
SPURIOUS RADIATED EMISSIONS 2x2 ANTENNA

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0249	**Date:**	14-Aug-2018		
Project:	None	**Temperature:**	22.7 °C		
Job Site:	EV01	**Humidity:**	44.5% RH		
Serial Number:	E45	**Barometric Pres.:**	1015 mbar	**Tested by:**	Jeff Alcoke
EUT:	Radio Node				
Configuration:	12				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	24 VDC				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Measurements made on worst case orientations determined from testing on the POE system. See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	92	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.577	32.2	-4.5	2.4	16.0	3.3	20.0	Horz	AV	0.0	51.0	54.0	-3.0	High Channel, EUT Vert, Ant Vert, Directional PA 2x2 ant
2483.553	31.4	-4.5	2.6	33.0	3.3	20.0	Vert	AV	0.0	50.2	54.0	-3.8	High Channel, EUT Vert, Ant on Side, Directional PA 2x2 ant
2388.527	31.0	-4.9	1.0	147.0	3.3	20.0	Horz	AV	0.0	49.4	54.0	-4.6	Low Channel, EUT Vert, Ant Vert, Directional PA 2x2 ant
2388.643	31.0	-4.9	2.6	33.0	3.3	20.0	Vert	AV	0.0	49.4	54.0	-4.6	Low Channel, EUT Vert, Ant on Side, Directional PA 2x2 ant
2483.537	46.8	-4.5	2.4	16.0		20.0	Horz	PK	0.0	62.3	74.0	-11.7	High Channel, EUT Vert, Ant Vert, Directional PA 2x2 ant
2483.627	44.2	-4.5	2.6	33.0		20.0	Vert	PK	0.0	59.7	74.0	-14.3	High Channel, EUT Vert, Ant on Side, Directional PA 2x2 ant
2388.063	42.7	-4.9	1.0	147.0		20.0	Horz	PK	0.0	57.8	74.0	-16.2	Low Channel, EUT Vert, Ant Vert, Directional PA 2x2 ant
2388.640	42.7	-4.9	2.6	33.0		20.0	Vert	PK	0.0	57.8	74.0	-16.2	Low Channel, EUT Vert, Ant on Side, Directional PA 2x2 ant

SPURIOUS RADIATED EMISSIONS 2X2 ANTENNA

PSA-ESCI 2018.05.04

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz

POWER SETTINGS INVESTIGATED

24VDC

POE

CONFIGURATIONS INVESTIGATED

SYNA0259 - 3

SYNA0259 - 4

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26000 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Attenuator	S.M. Electronics	SA6-20	REO	25-Jan-2018	12 mo
Filter - High Pass	Micro-Tronics	HPM50111	HGQ	25-Jan-2018	12 mo
Filter - Low Pass	Micro-Tronics	LPM50004	HGK	25-Jan-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	JSDWK42-18004000-60-5P	PAN	28-Dec-2017	12 mo
Cable	D-Coax	None	OC4	28-Dec-2017	12 mo
Antenna - Double Ridge	A.H. Systems, Inc.	SAS-574	AXV	15-May-2018	24 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVP	10-Jul-2018	12 mo
Antenna - Standard Gain	EMCO	3160-08	AHK	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVL	17-Oct-2017	12 mo
Cable	ESM Cable Corp.	8-18GHz cables	OCY	14-May-2018	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AHX	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVJ	10-Jul-2018	12 mo
Cable	ESM Cable Corp.	1-8GHz cables	OCX	14-May-2018	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AIR	28-Jun-2018	24 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	PAD	10-Jul-2018	12 mo
Cable	ESM Cable Corp.	30-1GHz cables	OCW	10-May-2018	12 mo
Antenna - Biconilog	EMCO	3142	AXB	5-Apr-2018	24 mo
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFJ	8-Dec-2017	12 mo

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

The highest gain antenna of each type to be used with the EUT was tested. The EUT was configured for the required transmit frequencies and the modes as showed in the data sheets.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis if required, and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

Measurements at the edges of the allowable band may be presented in an alternative method as provided for in the ANSI C63.10 Marker-Delta method. This method involves performing an in-band fundamental measurement followed by a screen capture of the fundamental and out-of-band emission using reduced measurement instrumentation bandwidths. The amplitude delta measured on this screen capture is applied to the fundamental emission value to show the out-of-band emission level as applied to the limit.

Where the radio test software does not provide for a duty cycle at continuous transmit conditions (> 98%) and the RMS (power average) measurements were made across the on and off times of the EUT transmissions, a duty cycle correction is added to the measurements using the formula of 10*LOG(dc).

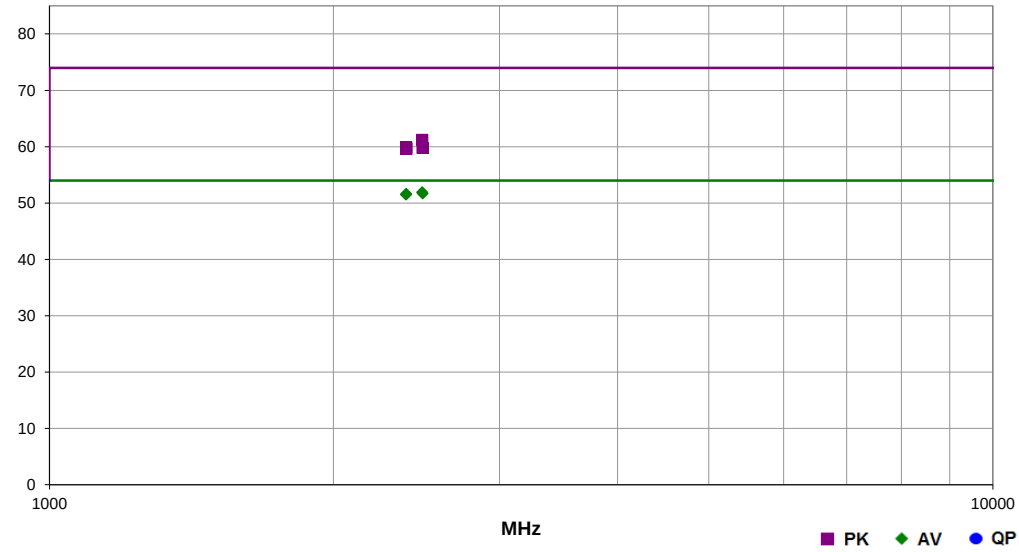
SPURIOUS RADIATED EMISSIONS 2X2 ANTENNA

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0259	**Date:**	8-Sep-2018		
Project:	None	**Temperature:**	23.6 °C		
Job Site:	OC07	**Humidity:**	53.4% RH		
Serial Number:	E52	**Barometric Pres.:**	1014 mbar	**Tested by:**	Mark Baytan
EUT:	Radio Node				
Configuration:	3				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	24VDC				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Measurements made on worst case orientations determined from testing on the POE system in SYNA0249. See comments below for EUT and antenna orientation. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).system. See comments below for EUT and antenna orientation.				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	59	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.613	32.8	-4.2	1.3	182.0	3.3	20.0	Vert	AV	0.0	51.9	54.0	-2.1	High Ch, EUT Vert, Ant on Side, Directional PA 2x2 Ant
2486.658	32.6	-4.2	1.0	63.0	3.3	20.0	Horz	AV	0.0	51.7	54.0	-2.3	High Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
2389.063	32.9	-4.6	1.9	22.0	3.3	20.0	Vert	AV	0.0	51.6	54.0	-2.4	Low Ch, EUT Vert, Ant on Side, Directional PA 2x2 Ant
2388.080	32.8	-4.6	1.3	23.0	3.3	20.0	Horz	AV	0.0	51.5	54.0	-2.5	Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
2483.563	45.4	-4.2	1.3	182.0	0.0	20.0	Vert	PK	0.0	61.2	74.0	-12.8	High Ch, EUT Vert, Ant on Side, Directional PA 2x2 Ant
2388.720	44.5	-4.6	1.9	22.0	0.0	20.0	Vert	PK	0.0	59.9	74.0	-14.1	Low Ch, EUT Vert, Ant on Side, Directional PA 2x2 Ant
2486.508	44.0	-4.2	1.0	63.0	0.0	20.0	Horz	PK	0.0	59.8	74.0	-14.2	High Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
2389.940	44.2	-4.6	1.3	23.0	0.0	20.0	Horz	PK	0.0	59.6	74.0	-14.4	Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant

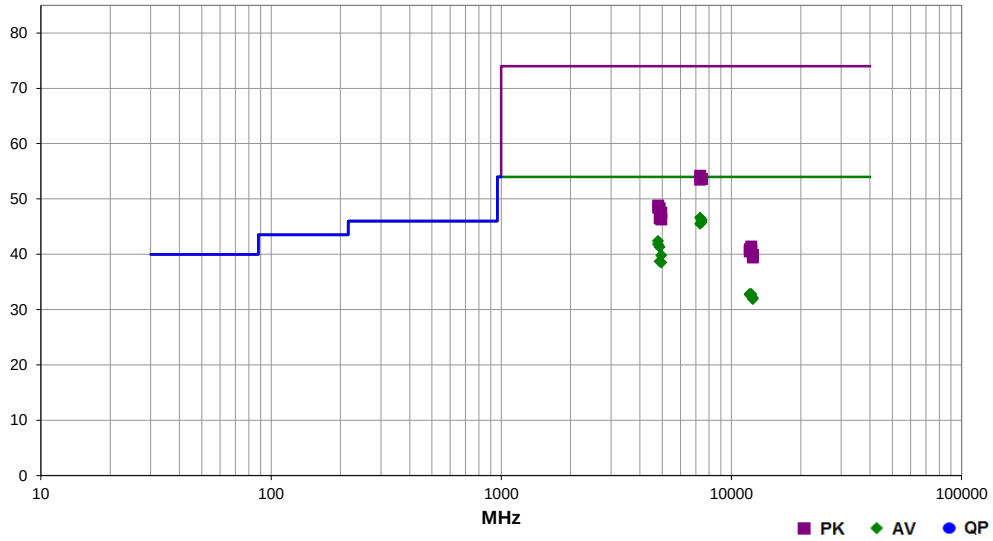
SPURIOUS RADIATED EMISSIONS 2X2 ANTENNA

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0259	**Date:**	8-Sep-2018		
Project:	None	**Temperature:**	23.6 °C		
Job Site:	OC07	**Humidity:**	53.4% RH		
Serial Number:	E52	**Barometric Pres.:**	1014 mbar	**Tested by:**	Mark Baytan
EUT:	Radio Node				
Configuration:	3				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	24VDC				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Measurements made on worst case orientations determined from testing on the POE system in SYNA0249. See comments below for EUT and antenna orientation. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).system. See comments below for EUT and antenna orientation.				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	60	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7319.587	32.2	11.1	1.0	347.0	3.3	0.0	Vert	AV	0.0	46.6	54.0	-7.4	Mid Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
7439.527	31.2	11.7	1.0	200.0	3.3	0.0	Vert	AV	0.0	46.2	54.0	-7.8	High Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
7439.683	30.8	11.7	3.3	18.0	3.3	0.0	Horz	AV	0.0	45.8	54.0	-8.2	High Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
7319.493	31.1	11.1	4.0	0.0	3.3	0.0	Horz	AV	0.0	45.5	54.0	-8.5	Mid Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4803.873	34.6	4.5	1.9	225.0	3.3	0.0	Horz	AV	0.0	42.4	54.0	-11.6	Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4804.120	34.0	4.5	1.0	93.0	3.3	0.0	Vert	AV	0.0	41.8	54.0	-12.2	Low Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4879.990	33.7	4.3	1.0	53.0	3.3	0.0	Vert	AV	0.0	41.3	54.0	-12.7	Mid Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4959.883	32.3	4.2	3.7	50.0	3.3	0.0	Vert	AV	0.0	39.8	54.0	-14.2	High Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4879.817	31.1	4.3	1.6	217.0	3.3	0.0	Horz	AV	0.0	38.7	54.0	-15.3	Mid Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4960.043	31.0	4.2	1.0	315.0	3.3	0.0	Horz	AV	0.0	38.5	54.0	-15.5	High Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
7319.243	43.1	11.1	1.0	347.0	0.0	0.0	Vert	PK	0.0	54.2	74.0	-19.8	Mid Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
7440.097	41.9	11.7	3.3	18.0	0.0	0.0	Horz	PK	0.0	53.6	74.0	-20.4	High Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
7439.840	41.9	11.7	1.0	200.0	0.0	0.0	Vert	PK	0.0	53.6	74.0	-20.4	High Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
7319.110	42.4	11.1	4.0	0.0	0.0	0.0	Horz	PK	0.0	53.5	74.0	-20.5	Mid Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12008.590	33.0	-3.5	1.7	79.0	3.3	0.0	Horz	AV	0.0	32.8	54.0	-21.2	Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12198.720	32.0	-2.5	1.0	323.0	3.3	0.0	Horz	AV	0.0	32.8	54.0	-21.2	Mid Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12009.010	32.9	-3.5	1.0	78.0	3.3	0.0	Vert	AV	0.0	32.7	54.0	-21.3	Low Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12199.100	31.7	-2.5	2.7	68.0	3.3	0.0	Vert	AV	0.0	32.5	54.0	-21.5	Mid Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12398.890	31.6	-2.8	1.0	350.0	3.3	0.0	Horz	AV	0.0	32.1	54.0	-21.9	High Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12398.640	31.4	-2.8	1.7	337.0	3.3	0.0	Vert	AV	0.0	31.9	54.0	-22.1	High Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4804.380	44.3	4.5	1.9	225.0	0.0	0.0	Horz	PK	0.0	48.8	74.0	-25.2	Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4804.447	43.9	4.5	1.0	93.0	0.0	0.0	Vert	PK	0.0	48.4	74.0	-25.6	Low Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4880.410	44.0	4.3	1.0	53.0	0.0	0.0	Vert	PK	0.0	48.3	74.0	-25.7	Mid Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4960.557	43.3	4.2	3.7	50.0	0.0	0.0	Vert	PK	0.0	47.5	74.0	-26.5	High Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4879.873	42.2	4.3	1.6	217.0	0.0	0.0	Horz	PK	0.0	46.5	74.0	-27.5	Mid Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4960.497	42.1	4.2	1.0	315.0	0.0	0.0	Horz	PK	0.0	46.3	74.0	-27.7	High Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12200.440	43.9	-2.5	2.7	68.0	0.0	0.0	Vert	PK	0.0	41.4	74.0	-32.6	Mid Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12010.590	44.4	-3.5	1.7	79.0	0.0	0.0	Horz	PK	0.0	40.9	74.0	-33.1	Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12199.530	43.3	-2.5	1.0	323.0	0.0	0.0	Horz	PK	0.0	40.8	74.0	-33.2	Mid Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12008.700	44.0	-3.5	1.0	78.0	0.0	0.0	Vert	PK	0.0	40.5	74.0	-33.5	Low Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12398.790	42.7	-2.8	1.0	350.0	0.0	0.0	Horz	PK	0.0	39.9	74.0	-34.1	High Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12398.680	42.2	-2.8	1.7	337.0	0.0	0.0	Vert	PK	0.0	39.4	74.0	-34.6	High Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant

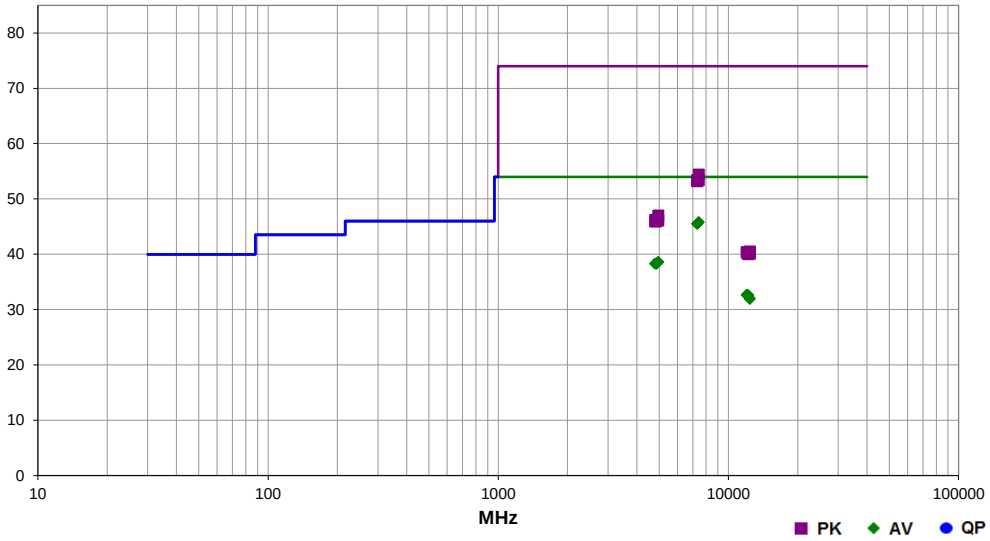
SPURIOUS RADIATED EMISSIONS 2X2 ANTENNA

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0259	**Date:**	8-Sep-2018		
Project:	None	**Temperature:**	23.6 °C		
Job Site:	OC07	**Humidity:**	53.4% RH		
Serial Number:	E52	**Barometric Pres.:**	1014 mbar	**Tested by:**	Mark Baytan
EUT:	Radio Node				
Configuration:	4				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Measurements made on worst case orientations determined from testing on the POE system in SYNA0249. See comments below for EUT and antenna orientation. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).system. See comments below for EUT and antenna orientation.				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	62	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7438.820	30.8	11.7	2.0	188.0	3.3	0.0	Horz	AV	0.0	45.8	54.0	-8.2	High Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
7439.825	30.8	11.7	1.0	279.0	3.3	0.0	Vert	AV	0.0	45.8	54.0	-8.2	High Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
7320.390	31.1	11.1	1.9	186.0	3.3	0.0	Horz	AV	0.0	45.5	54.0	-8.5	Mid Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
7318.855	31.1	11.1	1.0	301.0	3.3	0.0	Vert	AV	0.0	45.5	54.0	-8.5	Mid Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4959.175	31.1	4.2	3.8	149.0	3.3	0.0	Horz	AV	0.0	38.6	54.0	-15.4	High Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4959.865	31.1	4.2	1.0	117.0	3.3	0.0	Vert	AV	0.0	38.6	54.0	-15.4	High Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4881.355	30.7	4.3	1.0	27.0	3.3	0.0	Horz	AV	0.0	38.3	54.0	-15.7	Mid Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4881.165	30.7	4.3	1.1	194.0	3.3	0.0	Vert	AV	0.0	38.3	54.0	-15.7	Mid Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4804.670	30.5	4.5	3.8	148.0	3.3	0.0	Horz	AV	0.0	38.3	54.0	-15.7	Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4804.040	30.5	4.5	2.4	290.0	3.3	0.0	Vert	AV	0.0	38.3	54.0	-15.7	Low Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
7440.760	42.7	11.7	2.0	188.0	0.0	0.0	Horz	PK	0.0	54.4	74.0	-19.6	High Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
7440.490	41.7	11.7	1.0	279.0	0.0	0.0	Vert	PK	0.0	53.4	74.0	-20.6	High Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
7319.375	42.3	11.1	1.0	301.0	0.0	0.0	Vert	PK	0.0	53.4	74.0	-20.6	Mid Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
7319.515	42.1	11.1	1.9	186.0	0.0	0.0	Horz	PK	0.0	53.2	74.0	-20.8	Mid Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12008.510	32.9	-3.5	3.6	1.0	3.3	0.0	Vert	AV	0.0	32.7	54.0	-21.3	Low Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12009.350	32.8	-3.5	1.0	5.0	3.3	0.0	Horz	AV	0.0	32.6	54.0	-21.4	Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12199.200	31.8	-2.5	2.8	74.0	3.3	0.0	Horz	AV	0.0	32.6	54.0	-21.4	Mid Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12199.030	31.8	-2.5	2.6	58.0	3.3	0.0	Vert	AV	0.0	32.6	54.0	-21.4	Mid Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12399.180	31.5	-2.8	3.3	150.0	3.3	0.0	Horz	AV	0.0	32.0	54.0	-22.0	High Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12399.890	31.4	-2.8	1.0	188.0	3.3	0.0	Vert	AV	0.0	31.9	54.0	-22.1	High Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4958.900	42.8	4.2	3.8	149.0	0.0	0.0	Horz	PK	0.0	47.0	74.0	-27.0	High Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4880.325	41.9	4.3	1.1	194.0	0.0	0.0	Vert	PK	0.0	46.2	74.0	-27.8	Mid Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4804.730	41.7	4.5	2.4	290.0	0.0	0.0	Vert	PK	0.0	46.2	74.0	-27.8	Low Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4959.580	41.9	4.2	1.0	117.0	0.0	0.0	Vert	PK	0.0	46.1	74.0	-27.9	High Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4880.750	41.7	4.3	1.0	27.0	0.0	0.0	Horz	PK	0.0	46.0	74.0	-28.0	Mid Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4805.405	41.4	4.5	3.8	148.0	0.0	0.0	Horz	PK	0.0	45.9	74.0	-28.1	Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12399.880	43.3	-2.8	1.0	188.0	0.0	0.0	Vert	PK	0.0	40.5	74.0	-33.5	High Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12009.930	43.9	-3.5	1.0	5.0	0.0	0.0	Horz	PK	0.0	40.4	74.0	-33.6	Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12010.090	43.8	-3.5	3.6	1.0	0.0	0.0	Vert	PK	0.0	40.3	74.0	-33.7	Low Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12201.300	42.6	-2.5	2.6	58.0	0.0	0.0	Vert	PK	0.0	40.1	74.0	-33.9	Mid Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12399.800	42.9	-2.8	3.3	150.0	0.0	0.0	Horz	PK	0.0	40.1	74.0	-33.9	High Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12201.400	42.5	-2.5	2.8	74.0	0.0	0.0	Horz	PK	0.0	40.0	74.0	-34.0	Mid Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant

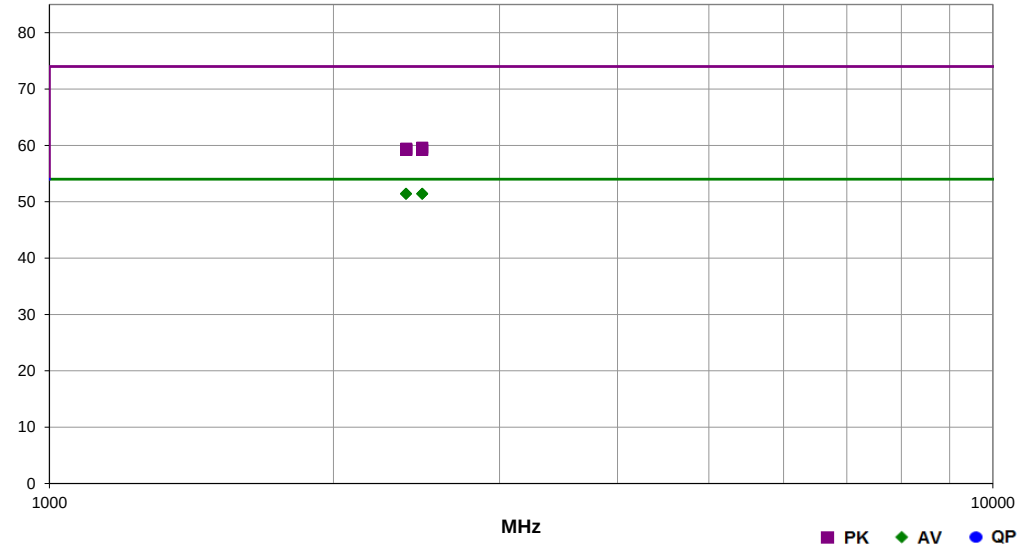
SPURIOUS RADIATED EMISSIONS 2X2 ANTENNA

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0259	**Date:**	8-Sep-2018		
Project:	None	**Temperature:**	23.6 °C		
Job Site:	OC07	**Humidity:**	53.4% RH		
Serial Number:	E52	**Barometric Pres.:**	1014 mbar	**Tested by:**	Mark Baytan
EUT:	Radio Node				
Configuration:	4				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Measurements made on worst case orientations determined from testing on the POE system in SYNA0249. See comments below for EUT and antenna orientation. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).system. See comments below for EUT and antenna orientation.				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	64	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2388.063	32.7	-4.6	1.0	81.0	3.3	20.0	Horz	AV	0.0	51.4	54.0	-2.6	Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
2388.163	32.7	-4.6	3.8	189.0	3.3	20.0	Vert	AV	0.0	51.4	54.0	-2.6	Low Ch, EUT Vert, Ant on Side, Directional PA 2x2 Ant
2484.330	32.3	-4.2	1.2	117.0	3.3	20.0	Horz	AV	0.0	51.4	54.0	-2.6	High Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
2485.263	32.3	-4.2	2.2	299.0	3.3	20.0	Vert	AV	0.0	51.4	54.0	-2.6	High Ch, EUT Vert, Ant on Side, Directional PA 2x2 Ant
2484.300	43.8	-4.2	2.2	299.0	0.0	20.0	Vert	PK	0.0	59.6	74.0	-14.4	High Ch, EUT Vert, Ant on Side, Directional PA 2x2 Ant
2388.717	44.0	-4.6	3.8	189.0	0.0	20.0	Vert	PK	0.0	59.4	74.0	-14.6	Low Ch, EUT Vert, Ant on Side, Directional PA 2x2 Ant
2389.753	43.8	-4.6	1.0	81.0	0.0	20.0	Horz	PK	0.0	59.2	74.0	-14.8	Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
2484.190	43.4	-4.2	1.2	117.0	0.0	20.0	Horz	PK	0.0	59.2	74.0	-14.8	High Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant

SPURIOUS RADIATED EMISSIONS 3X3 ANTENNA

PSA-ESCI 2018.05.04

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz

POWER SETTINGS INVESTIGATED

24 VDC

POE

CONFIGURATIONS INVESTIGATED

SYNA0249 - 13

SYNA0249 - 5

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26.5 GHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Cable	ESM Cable Corp.	KMKM-72	EVY	31-Aug-2017	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AVU	31-Aug-2017	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AIV	NCR	0 mo
Cable	None	Standard Gain Horns Cable	EVF	30-Nov-2017	12 mo
Amplifier - Pre-Amplifier	L-3 Narda-MITEQ	AMF-6F-08001200-30-10P	PAO	30-Nov-2017	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AHU	NCR	0 mo
Filter - Low Pass	Micro-Tronics	LPM50004	LFD	28-Feb-2018	12 mo
Filter - High Pass	Micro-Tronics	HPM50111	HFO	1-Feb-2018	12 mo
Attenuator	Coaxicom	3910-20	AXZ	28-Feb-2018	12 mo
Cable	N/A	Double Ridge Horn Cables	EVB	29-Nov-2017	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAG	29-Nov-2017	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AIZ	7-Feb-2018	24 mo
Cable	N/A	Bilog Cables	EVA	25-Jul-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AOL	30-Nov-2017	12 mo
Antenna - Biconilog	EMCO	3141	AXH	NCR	0 mo
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	18-Mar-2018	12 mo

TEST DESCRIPTION

The highest gain antenna of each type to be used with the EUT was tested. The EUT was configured for the required transmit frequencies and the modes as showed in the data sheets.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis if required, and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

Measurements at the edges of the allowable band may be presented in an alternative method as provided for in the ANSI C63.10 Marker-Delta method. This method involves performing an in-band fundamental measurement followed by a screen capture of the fundamental and out-of-band emission using reduced measurement instrumentation bandwidths. The amplitude delta measured on this screen capture is applied to the fundamental emission value to show the out-of-band emission level as applied to the limit.

Where the radio test software does not provide for a duty cycle at continuous transmit conditions (> 98%) and the RMS (power average) measurements were made across the on and off times of the EUT transmissions, a duty cycle correction is added to the measurements using the formula of 10*LOG(dc).

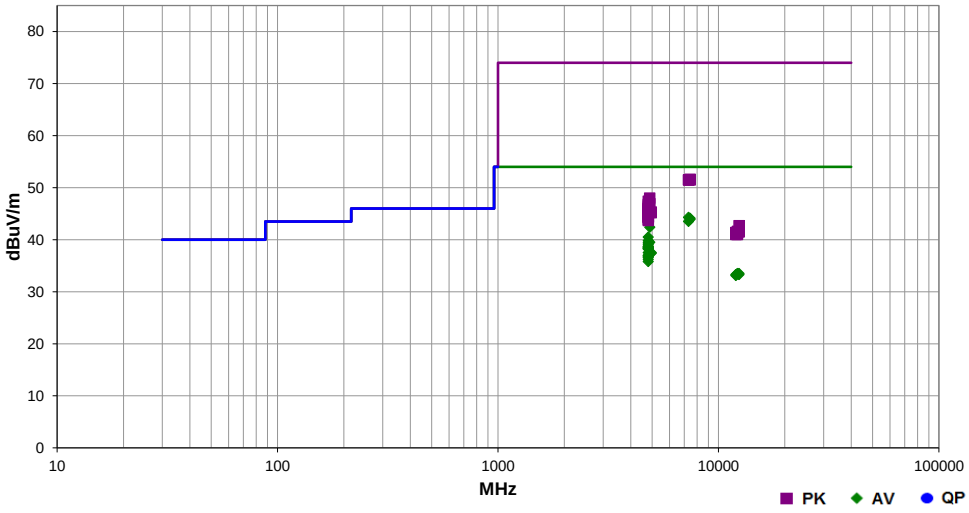
SPURIOUS RADIATED EMISSIONS 3X3 ANTENNA

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0249	**Date:**	3-Aug-2018		
Project:	None	**Temperature:**	22.5 °C		
Job Site:	EV01	**Humidity:**	43.8% RH		
Serial Number:	E45	**Barometric Pres.:**	1022 mbar	**Tested by:**	Jeff Alcoke
EUT:	Radio Node				
Configuration:	5				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	Hattie Spetla				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz.				
Deviations:	None				
Comments:	See comments below for channel, EUT orientation, and Antenna orientation. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	28	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7319.592	28.8	12.2	1.7	51.0	3.3	0.0	Horz	AV	0.0	44.3	54.0	-9.7	Mid Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7440.500	27.8	13.0	1.0	54.0	3.3	0.0	Horz	AV	0.0	44.1	54.0	-9.9	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7440.758	27.6	13.0	2.9	250.0	3.3	0.0	Vert	AV	0.0	43.9	54.0	-10.1	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7318.108	28.0	12.2	2.8	94.0	3.3	0.0	Vert	AV	0.0	43.5	54.0	-10.5	Mid Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4880.083	34.0	5.0	1.1	234.0	3.4	0.0	Horz	AV	0.0	42.4	54.0	-11.6	Mid Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4803.975	33.4	3.8	1.1	232.0	3.3	0.0	Horz	AV	0.0	40.5	54.0	-13.5	Low Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4804.058	32.7	3.8	1.5	235.0	3.3	0.0	Horz	AV	0.0	39.8	54.0	-14.2	Low Channel, EUT Vert, Ant on Side, Directional PA 3x3 Ant
4879.992	31.2	5.0	1.0	360.0	3.3	0.0	Vert	AV	0.0	39.5	54.0	-14.5	Mid Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4804.083	32.3	3.8	1.2	317.0	3.3	0.0	Horz	AV	0.0	39.4	54.0	-14.6	Low Channel, EUT Horz, Ant Vert, Directional PA 3x3 Ant
4804.092	32.0	3.8	1.5	312.0	3.3	0.0	Horz	AV	0.0	39.1	54.0	-14.9	Low Channel, EUT on Side, Ant Vert, Directional PA 3x3 Ant
4803.958	31.6	3.8	1.2	319.0	3.3	0.0	Horz	AV	0.0	38.7	54.0	-15.3	Low Channel, EUT Vert, Ant Vert, Directional PA 3x3 Ant
4803.917	31.6	3.8	3.1	43.0	3.3	0.0	Horz	AV	0.0	38.7	54.0	-15.3	Low Channel, EUT Vert, Ant Horz, Directional PA 3x3 Ant
4804.042	31.4	3.8	1.2	241.0	3.3	0.0	Horz	AV	0.0	38.5	54.0	-15.5	Low Channel, EUT Horz, Ant on Side, Directional PA 3x3 Ant
4804.125	31.4	3.8	1.0	357.0	3.3	0.0	Vert	AV	0.0	38.5	54.0	-15.5	Low Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4804.042	31.2	3.8	1.0	357.0	3.3	0.0	Vert	AV	0.0	38.3	54.0	-15.7	Low Channel, EUT Horz, Ant on Side, Directional PA 3x3 Ant
4804.083	31.2	3.8	3.4	82.0	3.3	0.0	Vert	AV	0.0	38.3	54.0	-15.7	Low Channel, EUT Horz, Ant Horz, Directional PA 3x3 Ant
4803.892	31.1	3.8	3.7	54.0	3.3	0.0	Horz	AV	0.0	38.2	54.0	-15.8	Low Channel, EUT on Side, Ant Horz, Directional PA 3x3 Ant
4803.908	30.4	3.8	1.0	0.0	3.3	0.0	Vert	AV	0.0	37.5	54.0	-16.5	Low Channel, EUT on Side, Ant Horz, Directional PA 3x3 Ant
4960.092	29.0	5.2	1.0	237.0	3.3	0.0	Horz	AV	0.0	37.5	54.0	-16.5	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4960.217	28.9	5.2	1.1	0.0	3.3	0.0	Vert	AV	0.0	37.4	54.0	-16.6	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4803.942	29.9	3.8	1.0	5.0	3.3	0.0	Vert	AV	0.0	37.0	54.0	-17.0	Low Channel, EUT Vert, Ant on Side, Directional PA 3x3 Ant
4804.025	29.8	3.8	1.0	355.0	3.3	0.0	Vert	AV	0.0	36.9	54.0	-17.1	Low Channel, EUT Vert, Ant Horz, Directional PA 3x3 Ant
4804.225	29.6	3.8	1.0	144.0	3.3	0.0	Vert	AV	0.0	36.7	54.0	-17.3	Low Channel, EUT Horz, Ant Vert, Directional PA 3x3 Ant
4803.950	29.5	3.8	1.0	315.0	3.3	0.0	Horz	AV	0.0	36.6	54.0	-17.4	Low Channel, EUT Horz, Ant Horz, Directional PA 3x3 Ant
4804.217	29.1	3.8	1.0	234.0	3.3	0.0	Vert	AV	0.0	36.2	54.0	-17.8	Low Channel, EUT Vert, Ant Vert, Directional PA 3x3 Ant
4804.308	28.7	3.8	1.0	319.0	3.3	0.0	Vert	AV	0.0	35.8	54.0	-18.2	Low Channel, EUT on Side, Ant Vert, Directional PA 3x3 Ant
12397.660	29.0	1.2	1.0	276.0	3.3	0.0	Vert	AV	0.0	33.5	54.0	-20.5	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12201.500	29.3	0.9	1.0	355.0	3.3	0.0	Horz	AV	0.0	33.5	54.0	-20.5	Mid Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12201.850	29.2	0.9	1.0	134.0	3.3	0.0	Vert	AV	0.0	33.4	54.0	-20.6	Mid Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12397.500	28.8	1.2	3.1	287.0	3.3	0.0	Horz	AV	0.0	33.3	54.0	-20.7	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12007.980	29.0	1.0	1.0	212.0	3.3	0.0	Horz	AV	0.0	33.3	54.0	-20.7	Low Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12007.870	28.8	1.0	3.1	161.0	3.3	0.0	Vert	AV	0.0	33.1	54.0	-20.9	Low Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7439.775	38.6	13.0	2.9	250.0		0.0	Vert	PK	0.0	51.6	74.0	-22.4	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7321.550	39.3	12.2	1.7	51.0		0.0	Horz	PK	0.0	51.5	74.0	-22.5	Mid Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7322.275	39.3	12.2	2.8	94.0		0.0	Vert	PK	0.0	51.5	74.0	-22.5	Mid Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7440.883	38.5	13.0	1.0	54.0		0.0	Horz	PK	0.0	51.5	74.0	-22.5	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4879.725	43.0	5.0	1.1	234.0		0.0	Horz	PK	0.0	48.0	74.0	-26.0	Mid Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4803.442	43.6	3.8	1.1	232.0		0.0	Horz	PK	0.0	47.4	74.0	-26.6	Low Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4880.400	41.9	5.0	1.0	360.0		0.0	Vert	PK	0.0	46.9	74.0	-27.1	Mid Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4803.817	43.0	3.8	1.5	235.0		0.0	Horz	PK	0.0	46.8	74.0	-27.2	Low Channel, EUT Vert, Ant on Side, Directional PA 3x3 Ant
4803.333	42.7	3.8	1.2	317.0		0.0	Horz	PK	0.0	46.5	74.0	-27.5	Low Channel, EUT Horz, Ant Vert, Directional PA 3x3 Ant
4803.408	42.3	3.8	1.5	312.0		0.0	Horz	PK	0.0	46.1	74.0	-27.9	Low Channel, EUT on Side, Ant Vert, Directional PA 3x3 Ant
4804.517	42.2	3.8	1.2	319.0		0.0	Horz	PK	0.0	46.0	74.0	-28.0	Low Channel, EUT Vert, Ant Vert, Directional PA 3x3 Ant
4803.542	42.1	3.8	1.2	241.0		0.0	Horz	PK	0.0	45.9	74.0	-28.1	Low Channel, EUT Horz, Ant on Side, Directional PA 3x3 Ant
4804.258	41.9	3.8	1.0	357.0		0.0	Vert	PK	0.0	45.7	74.0	-28.3	Low Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4803.408	41.7	3.8	3.4	82.0		0.0	Vert	PK	0.0	45.5	74.0	-28.5	Low Channel, EUT Horz, Ant Horz, Directional PA 3x3 Ant
4803.642	41.5	3.8	3.1	43.0		0.0	Horz	PK	0.0	45.3	74.0	-28.7	Low Channel, EUT Vert, Ant Horz, Directional PA 3x3 Ant
4960.175	40.1	5.2	1.0	237.0		0.0	Horz	PK	0.0	45.3	74.0	-28.7	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4803.975	41.4	3.8	3.7	54.0		0.0	Horz	PK	0.0	45.2	74.0	-28.8	Low Channel, EUT on Side, Ant Horz, Directional PA 3x3 Ant
4959.892	40.0	5.2	1.1	0.0		0.0	Vert	PK	0.0	45.2	74.0	-28.8	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4803.817	41.2	3.8	1.0	357.0		0.0	Vert	PK	0.0	45.0	74.0	-29.0	Low Channel, EUT Horz, Ant on Side, Directional PA 3x3 Ant
4804.433	41.2	3.8	1.0	0.0		0.0	Vert	PK	0.0	45.0	74.0	-29.0	Low Channel, EUT on Side, Ant Horz, Directional PA 3x3 Ant
4804.417	40.6	3.8	1.0	144.0		0.0	Vert	PK	0.0	44.4	74.0	-29.6	Low Channel, EUT Horz, Ant Vert, Directional PA 3x3 Ant
4803.042	40.6	3.8	1.0	5.0		0.0	Vert	PK	0.0	44.4	74.0	-29.6	Low Channel, EUT Vert, Ant on Side, Directional PA 3x3 Ant
4803.108	40.5	3.8	1.0	315.0		0.0	Horz	PK	0.0	44.3	74.0	-29.7	Low Channel, EUT Horz, Ant Horz, Directional PA 3x3 Ant
4803.875	40.5	3.8	1.0	355.0		0.0	Vert	PK	0.0	44.3	74.0	-29.7	Low Channel, EUT Vert, Ant Horz, Directional PA 3x3 Ant
4802.942	40.1	3.8	1.0	234.0		0.0	Vert	PK	0.0	43.9	74.0	-30.1	Low Channel, EUT Vert, Ant Vert, Directional PA 3x3 Ant
4804.583	39.8	3.9	1.0	319.0		0.0	Vert	PK	0.0	43.7	74.0	-30.3	Low Channel, EUT on Side, Ant Vert, Directional PA 3x3 Ant
12399.430	41.5	1.2	1.0	276.0		0.0	Vert	PK	0.0	42.7	74.0	-31.3	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12201.610	40.7	0.9	1.0	355.0		0.0	Horz	PK	0.0	41.6	74.0	-32.4	Mid Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12397.880	40.3	1.2	3.1	287.0		0.0	Horz	PK	0.0	41.5	74.0	-32.5	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12008.290	40.4	1.0	3.1	161.0		0.0	Vert	PK	0.0	41.4	74.0	-32.6	Low Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12199.620	40.1	0.9	1.0	134.0		0.0	Vert	PK	0.0	41.0	74.0	-33.0	Mid Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12008.530	40.0	1.0	1.0	212.0		0.0	Horz	PK	0.0	41.0	74.0	-33.0	Low Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant

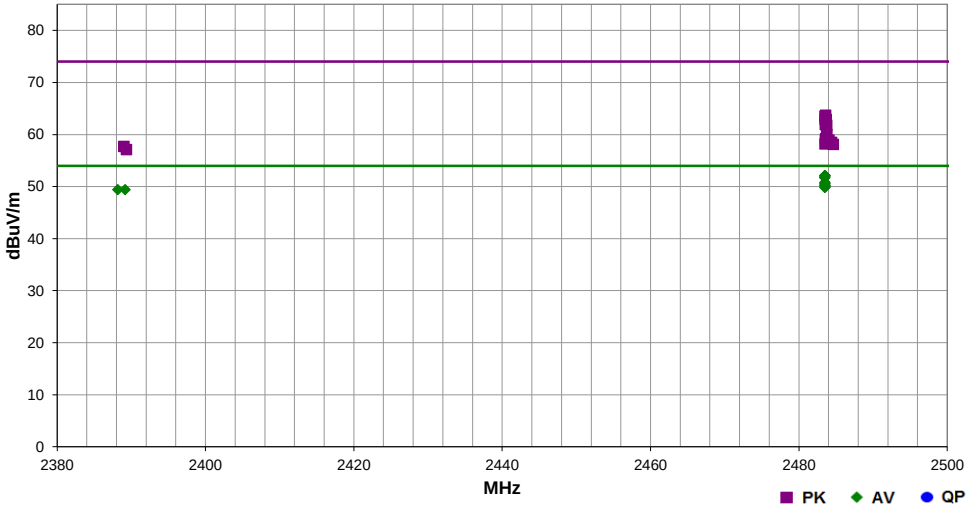
SPURIOUS RADIATED EMISSIONS 3X3 ANTENNA

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0249	**Date:**	3-Aug-2018		
Project:	None	**Temperature:**	22.5 °C		
Job Site:	EV01	**Humidity:**	43.8% RH		
Serial Number:	E45	**Barometric Pres.:**	1022 mbar	**Tested by:**	Jeff Alcoke
EUT:	Radio Node				
Configuration:	5				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	Hattie Spetla				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz.				
Deviations:	None				
Comments:	See comments below for channel, EUT orientation, and Antenna orientation. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	30	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.513	33.3	-4.5	1.8	-7.0	3.3	20.0	Horz	AV	0.0	52.1	54.0	-1.9	High Channel, EUT on Side, Ant Vert, Directional PA 3x3 Ant
2483.507	33.3	-4.5	1.7	3.0	3.3	20.0	Horz	AV	0.0	52.1	54.0	-1.9	High Channel, EUT Horz, Ant Vert, Directional PA 3x3 Ant
2483.517	33.2	-4.5	1.4	4.0	3.3	20.0	Horz	AV	0.0	52.0	54.0	-2.0	High Channel, EUT Vert, Ant Vert, Directional PA 3x3 Ant
2483.513	33.2	-4.5	1.4	2.0	3.3	20.0	Vert	AV	0.0	52.0	54.0	-2.0	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
2483.503	32.9	-4.5	1.3	-3.0	3.3	20.0	Vert	AV	0.0	51.7	54.0	-2.3	High Channel, Eut Horz, Ant Vert, Directional PA 3x3 Ant
2483.500	32.9	-4.5	1.3	-2.0	3.3	20.0	Vert	AV	0.0	51.7	54.0	-2.3	High Channel, EUT Vert, Ant on Side, Directional PA 3x3 Ant
2483.517	32.0	-4.5	1.5	1.0	3.3	20.0	Horz	AV	0.0	50.8	54.0	-3.2	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
2483.513	31.8	-4.5	1.6	-2.0	3.3	20.0	Horz	AV	0.0	50.6	54.0	-3.4	High Channel, EUT Horz, Ant on Side, Directional PA 3x3 Ant
2483.510	31.8	-4.5	1.8	3.0	3.3	20.0	Horz	AV	0.0	50.6	54.0	-3.4	High Channel, EUT Vert, Ant on Side, Directional PA 3x3 Ant
2483.523	31.5	-4.5	1.6	3.0	3.3	20.0	Vert	AV	0.0	50.3	54.0	-3.7	High Channel, EUT on Side, Ant Vert, Directional PA 3x3 Ant
2483.503	31.4	-4.5	1.0	6.0	3.3	20.0	Vert	AV	0.0	50.2	54.0	-3.8	High Channel, EUT Horz, Ant Vert, Directional PA 3x3 Ant
2483.530	31.4	-4.5	1.4	2.0	3.3	20.0	Vert	AV	0.0	50.2	54.0	-3.8	High Channel, EUT Vert, Ant Vert, Directional PA 3x3 Ant
2483.560	31.1	-4.5	1.8	3.0	3.3	20.0	Horz	AV	0.0	49.9	54.0	-4.1	High Channel, EUT on Side, Ant Horz, Directional PA 3x3 Ant
2483.503	31.0	-4.5	2.8	281.0	3.3	20.0	Vert	AV	0.0	49.8	54.0	-4.2	High Channel, EUT on Side, Ant Horz, Directional PA 3x3 Ant
2388.180	31.0	-4.9	1.0	327.0	3.3	20.0	Horz	AV	0.0	49.4	54.0	-4.6	Low Channel, EUT on Side, Ant Vert, Directional PA 3x3 Ant
2389.180	31.0	-4.9	1.0	287.0	3.3	20.0	Vert	AV	0.0	49.4	54.0	-4.6	Low Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
2483.607	48.2	-4.5	1.8	-7.0		20.0	Horz	PK	0.0	63.7	74.0	-10.3	High Channel, EUT on Side, Ant Vert, Directional PA 3x3 Ant
2483.527	48.0	-4.5	1.7	3.0		20.0	Horz	PK	0.0	63.5	74.0	-10.5	High Channel, EUT Horz, Ant Vert, Directional PA 3x3 Ant
2483.657	47.4	-4.5	1.4	2.0		20.0	Vert	PK	0.0	62.9	74.0	-11.1	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
2483.537	47.4	-4.5	1.4	4.0		20.0	Horz	PK	0.0	62.9	74.0	-11.1	High Channel, EUT Vert, Ant Vert, Directional PA 3x3 Ant
2483.553	46.4	-4.5	1.3	-2.0		20.0	Vert	PK	0.0	61.9	74.0	-12.1	High Channel, EUT Vert, Ant on Side, Directional PA 3x3 Ant
2483.747	46.3	-4.5	1.3	-3.0		20.0	Vert	PK	0.0	61.8	74.0	-12.2	High Channel, Eut Horz, Ant Vert, Directional PA 3x3 Ant
2483.760	44.5	-4.5	1.5	1.0		20.0	Horz	PK	0.0	60.0	74.0	-14.0	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
2483.610	43.7	-4.5	1.6	-2.0		20.0	Horz	PK	0.0	59.2	74.0	-14.8	High Channel, EUT Horz, Ant on Side, Directional PA 3x3 Ant
2484.043	43.4	-4.5	1.8	3.0		20.0	Horz	PK	0.0	58.9	74.0	-15.1	High Channel, EUT on Side, Ant Horz, Directional PA 3x3 Ant
2483.580	43.4	-4.5	1.8	3.0		20.0	Horz	PK	0.0	58.9	74.0	-15.1	High Channel, EUT Vert, Ant on Side, Directional PA 3x3 Ant
2484.403	42.9	-4.4	1.6	3.0		20.0	Vert	PK	0.0	58.5	74.0	-15.5	High Channel, EUT on Side, Ant Vert, Directional PA 3x3 Ant
2484.027	42.9	-4.5	1.0	6.0		20.0	Vert	PK	0.0	58.4	74.0	-15.6	High Channel, EUT Horz, Ant Vert, Directional PA 3x3 Ant
2483.520	42.7	-4.5	2.8	281.0		20.0	Vert	PK	0.0	58.2	74.0	-15.8	High Channel, EUT on Side, Ant Horz, Directional PA 3x3 Ant
2484.627	42.5	-4.4	1.4	2.0		20.0	Vert	PK	0.0	58.1	74.0	-15.9	High Channel, EUT Vert, Ant Vert, Directional PA 3x3 Ant
2389.017	42.6	-4.9	1.0	287.0		20.0	Vert	PK	0.0	57.7	74.0	-16.3	Low Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
2389.347	42.0	-4.9	1.0	327.0		20.0	Horz	PK	0.0	57.1	74.0	-16.9	Low Channel, EUT on Side, Ant Vert, Directional PA 3x3 Ant

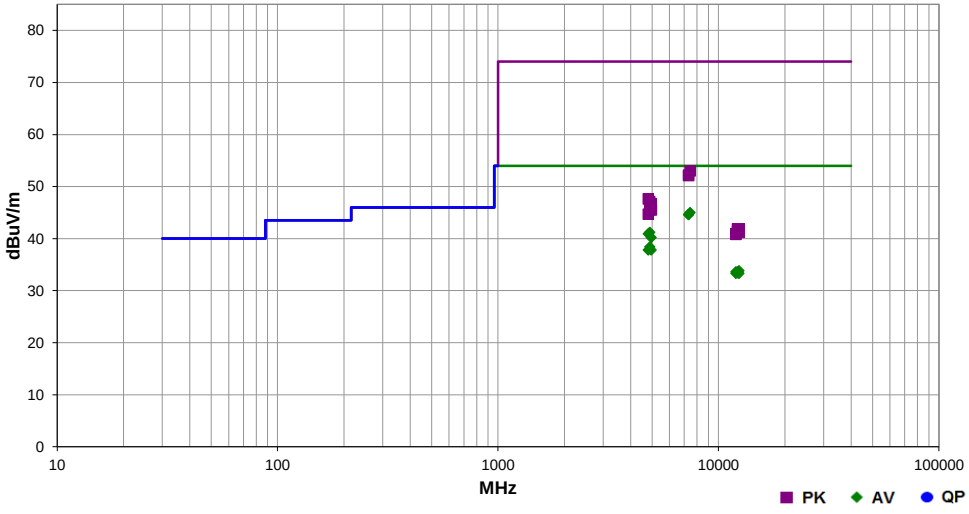
SPURIOUS RADIATED EMISSIONS 3X3 ANTENNA

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0249	**Date:**	14-Aug-2018		
Project:	None	**Temperature:**	23.2 °C		
Job Site:	EV01	**Humidity:**	45.4% RH		
Serial Number:	E45	**Barometric Pres.:**	1014 mbar	**Tested by:**	Jeff Alcoke
EUT:	Radio Node				
Configuration:	13				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	24 VDC				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Measurements made on worst case orientations determined from testing on the POE system. See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	93	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7439.633	28.7	13.0	1.3	126.0	3.3	0.0	Horz	AV	0.0	45.0	54.0	-9.0	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7319.550	29.1	12.2	1.9	135.0	3.3	0.0	Horz	AV	0.0	44.6	54.0	-9.4	Mid Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7319.517	29.1	12.2	1.6	177.0	3.3	0.0	Vert	AV	0.0	44.6	54.0	-9.4	Mid Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4879.967	32.9	5.0	1.0	343.0	3.3	0.0	Horz	AV	0.0	41.2	54.0	-12.8	Mid Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4803.917	33.8	3.8	1.3	344.0	3.3	0.0	Horz	AV	0.0	40.9	54.0	-13.1	Low Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4960.133	31.7	5.2	1.7	342.0	3.3	0.0	Horz	AV	0.0	40.2	54.0	-13.8	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4880.250	30.1	5.0	1.3	105.0	3.3	0.0	Vert	AV	0.0	38.4	54.0	-15.6	Mid Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4803.900	30.7	3.8	1.0	331.0	3.3	0.0	Vert	AV	0.0	37.8	54.0	-16.2	Low Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4960.108	29.3	5.2	1.0	233.0	3.3	0.0	Vert	AV	0.0	37.8	54.0	-16.2	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12399.230	29.3	1.2	1.3	58.0	3.3	0.0	Vert	AV	0.0	33.8	54.0	-20.2	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12201.230	29.4	0.9	1.0	271.0	3.3	0.0	Vert	AV	0.0	33.6	54.0	-20.4	Mid Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12007.730	29.3	1.0	1.0	235.0	3.3	0.0	Vert	AV	0.0	33.6	54.0	-20.4	Low Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12199.100	29.2	0.9	3.4	88.0	3.3	0.0	Horz	AV	0.0	33.4	54.0	-20.6	Mid Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12399.090	28.8	1.2	4.0	104.0	3.3	0.0	Horz	AV	0.0	33.3	54.0	-20.7	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12008.000	29.0	1.0	3.2	197.0	3.3	0.0	Horz	AV	0.0	33.3	54.0	-20.7	Low Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7439.617	40.0	13.0	1.3	126.0		0.0	Horz	PK	0.0	53.0	74.0	-21.0	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7319.175	40.0	12.2	1.9	135.0		0.0	Horz	PK	0.0	52.2	74.0	-21.8	Mid Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7321.042	39.9	12.2	1.6	177.0		0.0	Vert	PK	0.0	52.1	74.0	-21.9	Mid Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4803.833	43.8	3.8	1.3	344.0		0.0	Horz	PK	0.0	47.6	74.0	-26.4	Low Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4879.658	42.1	5.0	1.0	343.0		0.0	Horz	PK	0.0	47.1	74.0	-26.9	Mid Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4959.467	41.5	5.2	1.7	342.0		0.0	Horz	PK	0.0	46.7	74.0	-27.3	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4879.825	40.5	5.0	1.3	105.0		0.0	Vert	PK	0.0	45.5	74.0	-28.5	Mid Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4960.800	40.3	5.2	1.0	233.0		0.0	Vert	PK	0.0	45.5	74.0	-28.5	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4803.483	40.9	3.8	1.0	331.0		0.0	Vert	PK	0.0	44.7	74.0	-29.3	Low Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12399.280	40.7	1.2	1.3	58.0		0.0	Vert	PK	0.0	41.9	74.0	-32.1	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12198.230	41.0	0.9	3.4	88.0		0.0	Horz	PK	0.0	41.9	74.0	-32.1	Mid Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12200.420	40.5	0.9	1.0	271.0		0.0	Vert	PK	0.0	41.4	74.0	-32.6	Mid Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12399.570	40.0	1.2	4.0	104.0		0.0	Horz	PK	0.0	41.2	74.0	-32.8	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12010.640	39.9	1.0	1.0	235.0		0.0	Vert	PK	0.0	40.9	74.0	-33.1	Low Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12007.870	39.8	1.0	3.2	197.0		0.0	Horz	PK	0.0	40.8	74.0	-33.2	Low Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant

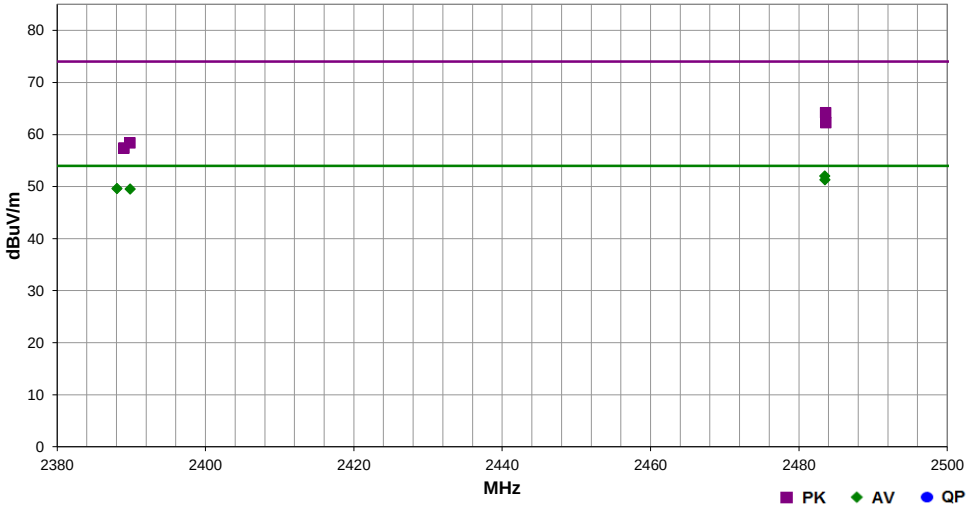
SPURIOUS RADIATED EMISSIONS 3X3 ANTENNA

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0249	**Date:**	14-Aug-2018		
Project:	None	**Temperature:**	23.2 °C		
Job Site:	EV01	**Humidity:**	45.4% RH		
Serial Number:	E45	**Barometric Pres.:**	1014 mbar	**Tested by:**	Jeff Alcoke
EUT:	Radio Node				
Configuration:	13				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	24 VDC				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Measurements made on worst case orientations determined from testing on the POE system. See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	95	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.500	33.2	-4.5	1.9	95.0	3.3	20.0	Horz	AV	0.0	52.0	54.0	-2.0	High Channel, EUT on Side, Ant Vert, Directional PA 3x3 Ant
2483.527	32.5	-4.5	1.5	104.0	3.3	20.0	Vert	AV	0.0	51.3	54.0	-2.7	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
2388.083	31.2	-4.9	1.0	153.0	3.3	20.0	Vert	AV	0.0	49.6	54.0	-4.4	Low Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
2389.853	31.1	-4.9	1.9	95.0	3.3	20.0	Horz	AV	0.0	49.5	54.0	-4.5	Low Channel, EUT on Side, Ant Vert, Directional PA 3x3 Ant
2483.600	48.7	-4.5	1.9	95.0		20.0	Horz	PK	0.0	64.2	74.0	-9.8	High Channel, EUT on Side, Ant Vert, Directional PA 3x3 Ant
2483.630	46.8	-4.5	1.5	104.0		20.0	Vert	PK	0.0	62.3	74.0	-11.7	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
2389.807	43.3	-4.9	1.0	153.0		20.0	Vert	PK	0.0	58.4	74.0	-15.6	Low Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
2389.000	42.3	-4.9	1.9	95.0		20.0	Horz	PK	0.0	57.4	74.0	-16.6	Low Channel, EUT on Side, Ant Vert, Directional PA 3x3 Ant

SPURIOUS RADIATED EMISSIONS 3X3 ANTENNA

PSA-ESCI 2018.05.04

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz

POWER SETTINGS INVESTIGATED

24VDC

POE

CONFIGURATIONS INVESTIGATED

SYNA0259 - 5

SYNA0259 - 6

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26000 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Attenuator	S.M. Electronics	SA6-20	REO	25-Jan-2018	12 mo
Filter - High Pass	Micro-Tronics	HPM50111	HGQ	25-Jan-2018	12 mo
Filter - Low Pass	Micro-Tronics	LPM50004	HGK	25-Jan-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	JSDWK42-18004000-60-5P	PAN	28-Dec-2017	12 mo
Cable	D-Coax	None	OC4	28-Dec-2017	12 mo
Antenna - Double Ridge	A.H. Systems, Inc.	SAS-574	AXV	15-May-2018	24 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVP	10-Jul-2018	12 mo
Antenna - Standard Gain	EMCO	3160-08	AHK	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVL	17-Oct-2017	12 mo
Cable	ESM Cable Corp.	8-18GHz cables	OCY	14-May-2018	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AHX	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVJ	10-Jul-2018	12 mo
Cable	ESM Cable Corp.	1-8GHz cables	OCX	14-May-2018	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AIR	28-Jun-2018	24 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	PAD	10-Jul-2018	12 mo
Cable	ESM Cable Corp.	30-1GHz cables	OCW	10-May-2018	12 mo
Antenna - Biconilog	EMCO	3142	AXB	5-Apr-2018	24 mo
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFJ	8-Dec-2017	12 mo

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

The highest gain antenna of each type to be used with the EUT was tested. The EUT was configured for the required transmit frequencies and the modes as showed in the data sheets.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis if required, and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

Measurements at the edges of the allowable band may be presented in an alternative method as provided for in the ANSI C63.10 Marker-Delta method. This method involves performing an in-band fundamental measurement followed by a screen capture of the fundamental and out-of-band emission using reduced measurement instrumentation bandwidths. The amplitude delta measured on this screen capture is applied to the fundamental emission value to show the out-of-band emission level as applied to the limit.

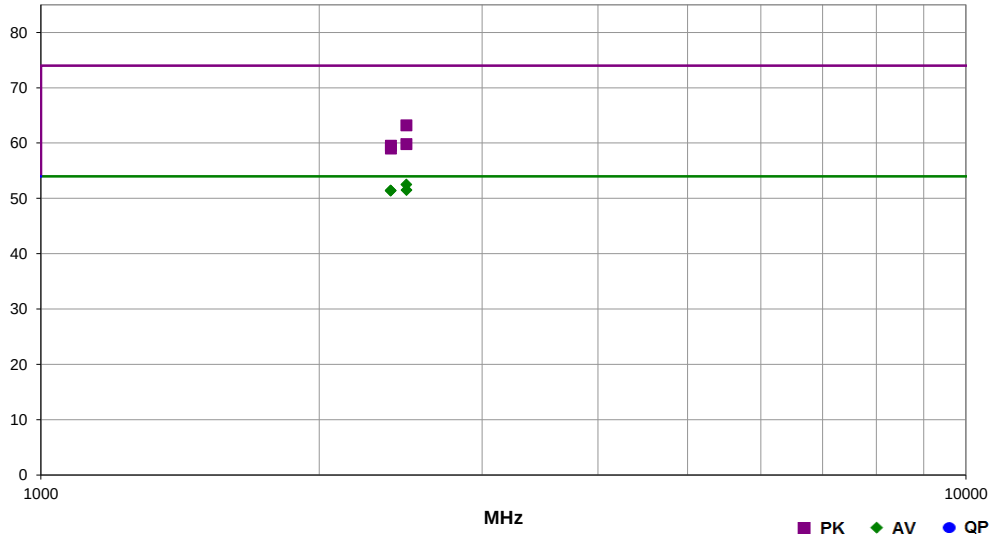
SPURIOUS RADIATED EMISSIONS 3X3 ANTENNA

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0259	**Date:**	9-Sep-2018		
Project:	None	**Temperature:**	27 °C		
Job Site:	OC07	**Humidity:**	43.5% RH		
Serial Number:	E52	**Barometric Pres.:**	1012 mbar	**Tested by:**	Mark Baytan
EUT:	Radio Node				
Configuration:	6				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Measurements made on worst case orientations determined from testing on the POE system in SYNA0249. See comments below for EUT and antenna orientation. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	65	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.500	33.4	-4.2	1.2	29.0	3.3	20.0	Vert	AV	0.0	52.5	54.0	-1.5	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
2484.317	32.4	-4.2	2.9	81.0	3.3	20.0	Horz	AV	0.0	51.5	54.0	-2.5	High Ch, EUT on Side, Ant Vert, Directional PA 3x3 Ant
2388.750	32.7	-4.6	1.0	26.0	3.3	20.0	Vert	AV	0.0	51.4	54.0	-2.6	Low Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
2388.943	32.7	-4.6	3.5	69.0	3.3	20.0	Horz	AV	0.0	51.4	54.0	-2.6	Low Ch, EUT on Side, Ant Vert, Directional PA 3x3 Ant
2483.530	47.4	-4.2	1.2	29.0	0.0	20.0	Vert	PK	0.0	63.2	74.0	-10.8	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
2483.737	44.0	-4.2	2.9	81.0	0.0	20.0	Horz	PK	0.0	59.8	74.0	-14.2	High Ch, EUT on Side, Ant Vert, Directional PA 3x3 Ant
2389.603	44.1	-4.6	1.0	26.0	0.0	20.0	Vert	PK	0.0	59.5	74.0	-14.5	Low Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
2389.470	43.6	-4.6	3.5	69.0	0.0	20.0	Horz	PK	0.0	59.0	74.0	-15.0	Low Ch, EUT on Side, Ant Vert, Directional PA 3x3 Ant

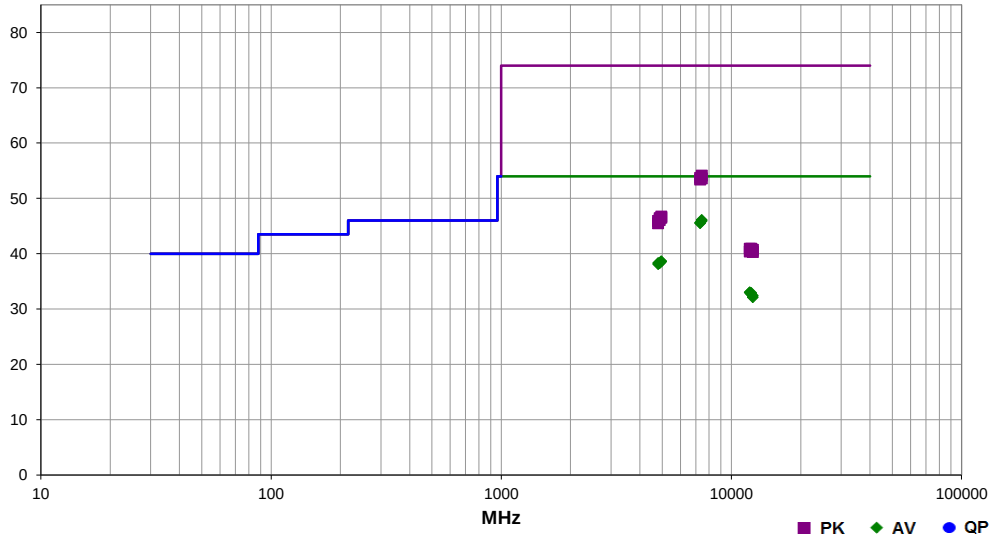
SPURIOUS RADIATED EMISSIONS 3X3 ANTENNA

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0259	**Date:**	9-Sep-2018		
Project:	None	**Temperature:**	26.9 °C		
Job Site:	OC07	**Humidity:**	43% RH		
Serial Number:	E52	**Barometric Pres.:**	1012 mbar	**Tested by:**	Mark Baytan
EUT:	Radio Node				
Configuration:	6				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Measurements made on worst case orientations determined from testing on the POE system in SYNA0249. See comments below for EUT and antenna orientation. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	66	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7439.475	31.1	11.7	1.0	357.0	3.3	0.0	Vert	AV	0.0	46.1	54.0	-7.9	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7440.895	30.9	11.7	1.6	360.0	3.3	0.0	Horz	AV	0.0	45.9	54.0	-8.1	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7318.900	31.2	11.1	2.2	17.0	3.3	0.0	Horz	AV	0.0	45.6	54.0	-8.4	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7319.380	31.1	11.1	1.0	333.0	3.3	0.0	Vert	AV	0.0	45.5	54.0	-8.5	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4958.640	31.1	4.2	1.5	118.0	3.3	0.0	Horz	AV	0.0	38.6	54.0	-15.4	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4958.540	31.1	4.2	3.4	11.0	3.3	0.0	Vert	AV	0.0	38.6	54.0	-15.4	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4805.390	30.5	4.5	1.0	308.0	3.3	0.0	Vert	AV	0.0	38.3	54.0	-15.7	Low Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4878.540	30.7	4.3	1.0	74.0	3.3	0.0	Horz	AV	0.0	38.3	54.0	-15.7	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4878.950	30.7	4.3	1.0	270.0	3.3	0.0	Vert	AV	0.0	38.3	54.0	-15.7	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4805.475	30.3	4.5	3.1	108.0	3.3	0.0	Horz	AV	0.0	38.1	54.0	-15.9	Low Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7439.090	42.4	11.7	1.0	357.0	0.0	0.0	Vert	PK	0.0	54.1	74.0	-19.9	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7320.810	42.6	11.1	1.0	333.0	0.0	0.0	Vert	PK	0.0	53.7	74.0	-20.3	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7440.270	41.9	11.7	1.6	360.0	0.0	0.0	Horz	PK	0.0	53.6	74.0	-20.4	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7320.830	42.3	11.1	2.2	17.0	0.0	0.0	Horz	PK	0.0	53.4	74.0	-20.6	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12009.160	33.2	-3.5	1.3	134.0	3.3	0.0	Horz	AV	0.0	33.0	54.0	-21.0	Low Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12008.850	33.2	-3.5	1.0	347.0	3.3	0.0	Vert	AV	0.0	33.0	54.0	-21.0	Low Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12198.990	32.1	-2.5	1.8	118.0	3.3	0.0	Horz	AV	0.0	32.9	54.0	-21.1	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12199.430	31.9	-2.5	3.3	43.0	3.3	0.0	Vert	AV	0.0	32.7	54.0	-21.3	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12398.790	31.9	-2.8	1.2	284.0	3.3	0.0	Horz	AV	0.0	32.4	54.0	-21.6	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12399.240	31.6	-2.8	2.3	117.0	3.3	0.0	Vert	AV	0.0	32.1	54.0	-21.9	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4960.595	42.5	4.2	1.5	118.0	0.0	0.0	Horz	PK	0.0	46.7	74.0	-27.3	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4959.100	42.3	4.2	3.4	11.0	0.0	0.0	Vert	PK	0.0	46.5	74.0	-27.5	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4878.645	42.1	4.3	1.0	270.0	0.0	0.0	Vert	PK	0.0	46.4	74.0	-27.6	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4878.520	41.8	4.3	1.0	74.0	0.0	0.0	Horz	PK	0.0	46.1	74.0	-27.9	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4804.220	41.4	4.5	1.0	308.0	0.0	0.0	Vert	PK	0.0	45.9	74.0	-28.1	Low Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4803.745	41.0	4.5	3.1	108.0	0.0	0.0	Horz	PK	0.0	45.5	74.0	-28.5	Low Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12010.360	44.4	-3.5	1.3	134.0	0.0	0.0	Horz	PK	0.0	40.9	74.0	-33.1	Low Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12199.110	43.4	-2.5	1.8	118.0	0.0	0.0	Horz	PK	0.0	40.9	74.0	-33.1	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12201.410	43.3	-2.5	3.3	43.0	0.0	0.0	Vert	PK	0.0	40.8	74.0	-33.2	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12399.770	43.5	-2.8	1.2	284.0	0.0	0.0	Horz	PK	0.0	40.7	74.0	-33.3	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12009.300	43.9	-3.5	1.0	347.0	0.0	0.0	Vert	PK	0.0	40.4	74.0	-33.6	Low Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12398.810	43.1	-2.8	2.3	117.0	0.0	0.0	Vert	PK	0.0	40.3	74.0	-33.7	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant

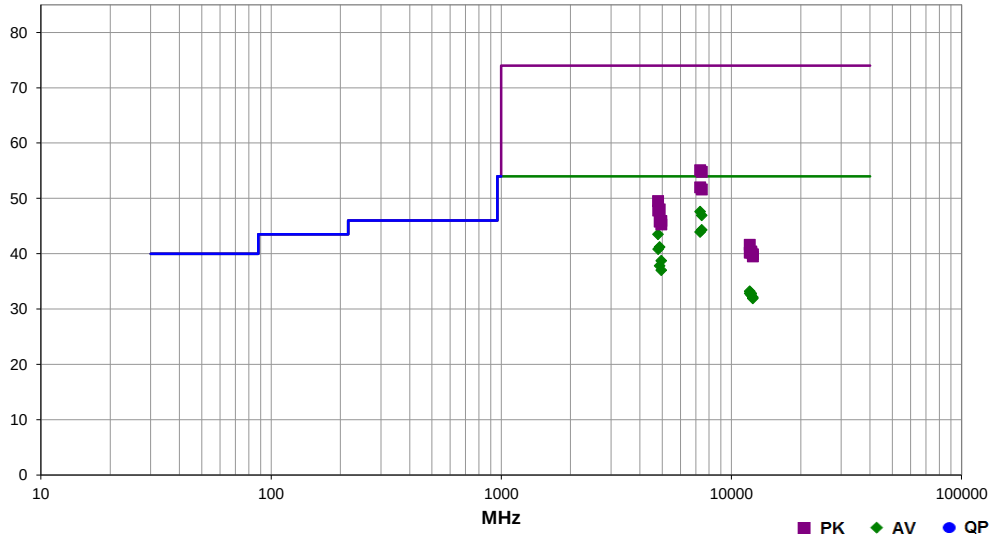
SPURIOUS RADIATED EMISSIONS 3X3 ANTENNA

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0259	**Date:**	9-Sep-2018		
Project:	None	**Temperature:**	26.9 °C		
Job Site:	OC07	**Humidity:**	43% RH		
Serial Number:	E52	**Barometric Pres.:**	1012 mbar	**Tested by:**	Mark Baytan
EUT:	Radio Node				
Configuration:	5				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	24VDC				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Measurements made on worst case orientations determined from testing on the POE system in SYNA0249. See comments below for EUT and antenna orientation. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	68	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7319.380	33.2	11.1	2.0	146.0	3.3	0.0	Horz	AV	0.0	47.6	54.0	-6.4	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7439.445	31.9	11.7	1.9	151.0	3.3	0.0	Horz	AV	0.0	46.9	54.0	-7.1	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7440.290	29.3	11.7	1.0	133.0	3.3	0.0	Vert	AV	0.0	44.3	54.0	-9.7	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7318.930	29.5	11.1	2.2	155.0	3.3	0.0	Vert	AV	0.0	43.9	54.0	-10.1	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4803.690	35.7	4.5	1.8	140.0	3.3	0.0	Horz	AV	0.0	43.5	54.0	-10.5	Low Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4879.705	33.6	4.3	2.3	154.0	3.3	0.0	Horz	AV	0.0	41.2	54.0	-12.8	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4804.340	33.0	4.5	1.2	46.0	3.3	0.0	Vert	AV	0.0	40.8	54.0	-13.2	Low Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4960.180	31.2	4.2	1.2	220.0	3.3	0.0	Horz	AV	0.0	38.7	54.0	-15.3	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4880.455	30.2	4.3	1.0	31.0	3.3	0.0	Vert	AV	0.0	37.8	54.0	-16.2	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4959.900	29.5	4.2	3.1	314.0	3.3	0.0	Vert	AV	0.0	37.0	54.0	-17.0	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7319.465	44.0	11.1	2.0	146.0	0.0	0.0	Horz	PK	0.0	55.1	74.0	-18.9	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7440.915	43.1	11.7	1.9	151.0	0.0	0.0	Horz	PK	0.0	54.8	74.0	-19.2	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12010.740	33.4	-3.5	4.0	335.0	3.3	0.0	Horz	AV	0.0	33.2	54.0	-20.8	Low Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12008.630	33.0	-3.5	1.0	263.0	3.3	0.0	Vert	AV	0.0	32.8	54.0	-21.2	Low Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12199.120	32.0	-2.5	3.8	174.0	3.3	0.0	Horz	AV	0.0	32.8	54.0	-21.2	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12201.470	31.7	-2.5	2.5	8.0	3.3	0.0	Vert	AV	0.0	32.5	54.0	-21.5	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12399.590	31.6	-2.8	1.2	245.0	3.3	0.0	Horz	AV	0.0	32.1	54.0	-21.9	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7318.720	40.9	11.1	2.2	155.0	0.0	0.0	Vert	PK	0.0	52.0	74.0	-22.0	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12399.510	31.4	-2.8	1.0	122.0	3.3	0.0	Vert	AV	0.0	31.9	54.0	-22.1	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7440.765	39.9	11.7	1.0	133.0	0.0	0.0	Vert	PK	0.0	51.6	74.0	-22.4	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4803.695	45.0	4.5	1.8	140.0	0.0	0.0	Horz	PK	0.0	49.5	74.0	-24.5	Low Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4879.545	43.7	4.3	2.3	154.0	0.0	0.0	Horz	PK	0.0	48.0	74.0	-26.0	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4804.415	43.3	4.5	1.2	46.0	0.0	0.0	Vert	PK	0.0	47.8	74.0	-26.2	Low Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4959.415	41.7	4.2	1.2	220.0	0.0	0.0	Horz	PK	0.0	45.9	74.0	-28.1	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4880.815	41.5	4.3	1.0	31.0	0.0	0.0	Vert	PK	0.0	45.8	74.0	-28.2	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4960.630	41.1	4.2	3.1	314.0	0.0	0.0	Vert	PK	0.0	45.3	74.0	-28.7	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12010.250	45.1	-3.5	4.0	335.0	0.0	0.0	Horz	PK	0.0	41.6	74.0	-32.4	Low Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12200.100	42.9	-2.5	3.8	174.0	0.0	0.0	Horz	PK	0.0	40.4	74.0	-33.6	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12009.650	43.7	-3.5	1.0	263.0	0.0	0.0	Vert	PK	0.0	40.2	74.0	-33.8	Low Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12199.030	42.7	-2.5	2.5	8.0	0.0	0.0	Vert	PK	0.0	40.2	74.0	-33.8	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12399.580	42.7	-2.8	1.0	122.0	0.0	0.0	Vert	PK	0.0	39.9	74.0	-34.1	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12398.710	42.3	-2.8	1.2	245.0	0.0	0.0	Horz	PK	0.0	39.5	74.0	-34.5	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant

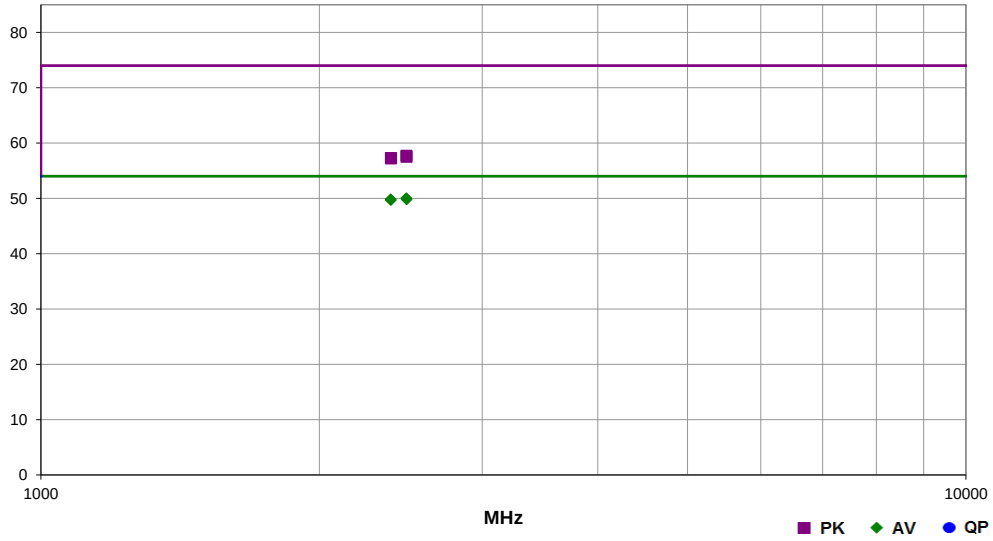
SPURIOUS RADIATED EMISSIONS 3X3 ANTENNA

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0259	**Date:**	9-Sep-2018		
Project:	None	**Temperature:**	26.9 °C		
Job Site:	OC07	**Humidity:**	43% RH		
Serial Number:	E52	**Barometric Pres.:**	1012 mbar	**Tested by:**	Mark Baytan
EUT:	Radio Node				
Configuration:	5				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	24VDC				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Measurements made on worst case orientations determined from testing on the POE system in SYNA0249. See comments below for EUT and antenna orientation. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	71	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.507	30.9	-4.2	2.5	210.0	3.3	20.0	Horz	AV	0.0	50.0	54.0	-4.0	High Ch, EUT on Side, Ant Vert, Directional PA 3x3 Ant
2388.780	31.1	-4.6	3.8	192.0	3.3	20.0	Vert	AV	0.0	49.8	54.0	-4.2	Low Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
2485.335	30.7	-4.2	1.0	150.0	3.3	20.0	Vert	AV	0.0	49.8	54.0	-4.2	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
2389.963	31.0	-4.6	1.0	120.0	3.3	20.0	Horz	AV	0.0	49.7	54.0	-4.3	Low Ch, EUT on Side, Ant Vert, Directional PA 3x3 Ant
2483.537	41.9	-4.2	2.5	210.0	0.0	20.0	Horz	PK	0.0	57.7	74.0	-16.3	High Ch, EUT on Side, Ant Vert, Directional PA 3x3 Ant
2484.440	41.7	-4.2	1.0	150.0	0.0	20.0	Vert	PK	0.0	57.5	74.0	-16.5	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
2389.277	41.9	-4.6	1.0	120.0	0.0	20.0	Horz	PK	0.0	57.3	74.0	-16.7	Low Ch, EUT on Side, Ant Vert, Directional PA 3x3 Ant
2389.505	41.8	-4.6	3.8	192.0	0.0	20.0	Vert	PK	0.0	57.2	74.0	-16.8	Low Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant

SPURIOUS RADIATED EMISSIONS DIPOLE

PSA-ESCI 2018.05.04

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz

POWER SETTINGS INVESTIGATED

24 VDC

POE

CONFIGURATIONS INVESTIGATED

SYNA0249 - 11

SYNA0249 - 10

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26.5 GHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Cable	ESM Cable Corp.	KMKM-72	EVY	31-Aug-2017	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AVU	31-Aug-2017	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AIV	NCR	0 mo
Cable	None	Standard Gain Horns Cable	EVF	30-Nov-2017	12 mo
Amplifier - Pre-Amplifier	L-3 Narda-MITEQ	AMF-6F-08001200-30-10P	PAO	30-Nov-2017	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AHU	NCR	0 mo
Filter - Low Pass	Micro-Tronics	LPM50004	LFD	28-Feb-2018	12 mo
Filter - High Pass	Micro-Tronics	HPM50111	HFO	1-Feb-2018	12 mo
Attenuator	Coaxicom	3910-20	AXZ	28-Feb-2018	12 mo
Cable	N/A	Double Ridge Horn Cables	EVB	29-Nov-2017	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAG	29-Nov-2017	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AIZ	7-Feb-2018	24 mo
Cable	N/A	Bilog Cables	EVA	25-Jul-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AOL	30-Nov-2017	12 mo
Antenna - Biconilog	EMCO	3141	AXH	NCR	0 mo
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	18-Mar-2018	12 mo

TEST DESCRIPTION

The highest gain antenna of each type to be used with the EUT was tested. The EUT was configured for the required transmit frequencies and the modes as showed in the data sheets.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis if required, and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

Measurements at the edges of the allowable band may be presented in an alternative method as provided for in the ANSI C63.10 Marker-Delta method. This method involves performing an in-band fundamental measurement followed by a screen capture of the fundamental and out-of-band emission using reduced measurement instrumentation bandwidths. The amplitude delta measured on this screen capture is applied to the fundamental emission value to show the out-of-band emission level as applied to the limit.

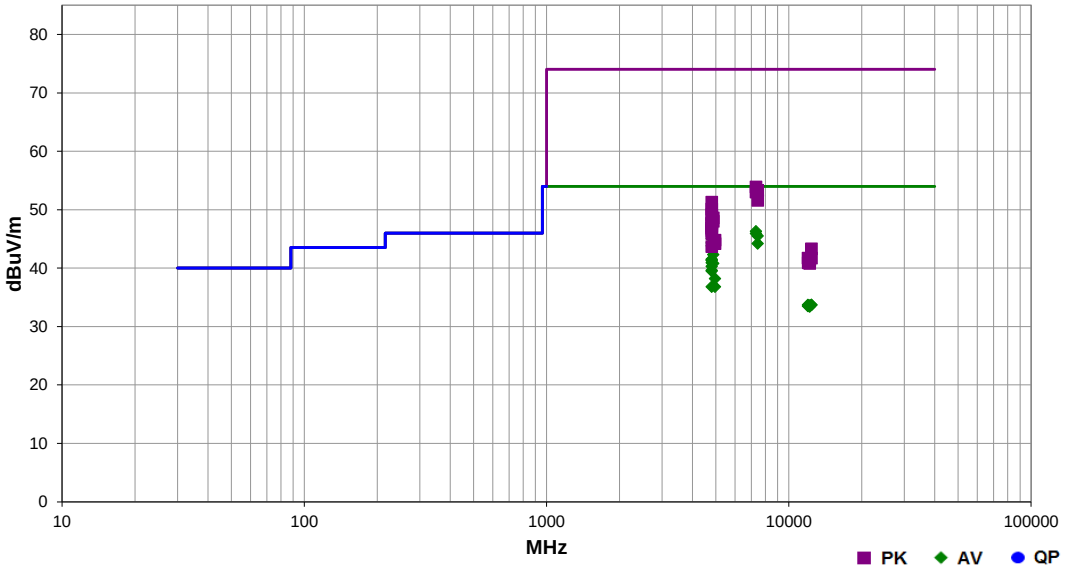
SPURIOUS RADIATED EMISSIONS DIPOLE

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0249	**Date:**	13-Aug-2018		
Project:	None	**Temperature:**	22.7 °C		
Job Site:	EV01	**Humidity:**	45.5% RH		
Serial Number:	E45	**Barometric Pres.:**	1019 mbar	**Tested by:**	Jeff Alcoke
EUT:	Radio Node				
Configuration:	10				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	74	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4803.950	39.9	3.8	2.5	171.0	3.2	0.0	Horz	AV	0.0	46.9	54.0	-7.1	Low Channel, EUT on Side, Ant Vert, Dipole
7319.592	30.8	12.2	3.2	33.0	3.3	0.0	Horz	AV	0.0	46.3	54.0	-7.7	Mid Channel, EUT on Side, Ant Vert, Dipole
7319.508	30.4	12.2	1.8	22.0	3.3	0.0	Vert	AV	0.0	45.9	54.0	-8.1	Mid Channel, EUT Horz, Ant Vert, Dipole
7439.533	29.2	13.0	2.2	28.0	3.3	0.0	Horz	AV	0.0	45.5	54.0	-8.5	High Channel, EUT on Side, Ant Vert, Dipole
4803.950	38.1	3.8	1.0	301.0	3.2	0.0	Horz	AV	0.0	45.1	54.0	-8.9	Low Channel, EUT Horz, Ant Horz, Dipole
4803.942	37.2	3.8	1.2	106.0	3.3	0.0	Horz	AV	0.0	44.3	54.0	-9.7	Low Channel, EUT Vert, Ant Vert, Dipole
7440.025	27.9	13.0	1.0	30.0	3.3	0.0	Vert	AV	0.0	44.2	54.0	-9.8	High Channel, EUT Horz, Ant Vert, Dipole
4803.950	36.8	3.8	1.0	38.0	3.2	0.0	Vert	AV	0.0	43.8	54.0	-10.2	Low Channel, EUT Horz, Ant Vert, Dipole
4879.942	34.0	5.0	2.6	14.0	3.3	0.0	Horz	AV	0.0	42.3	54.0	-11.7	Mid Channel, EUT on Side, Ant Vert, Dipole
4804.008	34.4	3.8	3.8	275.0	3.3	0.0	Vert	AV	0.0	41.5	54.0	-12.5	Low Channel, EUT on Side, Ant Vert, Dipole
4803.975	34.3	3.8	1.0	64.0	3.3	0.0	Horz	AV	0.0	41.4	54.0	-12.6	Low Channel, EUT on Side, Ant Horz, Dipole
4804.075	34.3	3.8	1.0	324.0	3.2	0.0	Vert	AV	0.0	41.3	54.0	-12.7	Low Channel, EUT Vert, Ant Horz, Dipole
4804.008	33.8	3.8	3.9	38.0	3.3	0.0	Vert	AV	0.0	40.9	54.0	-13.1	Low Channel, EUT Horz, Ant Horz, Dipole
4880.067	32.5	5.0	1.0	45.0	3.3	0.0	Vert	AV	0.0	40.8	54.0	-13.2	Mid Channel, EUT Horz, Ant Vert, Dipole
4803.933	33.2	3.8	1.0	236.0	3.3	0.0	Vert	AV	0.0	40.3	54.0	-13.7	Low Channel, EUT Vert, Ant Vert, Dipole
4804.050	32.5	3.8	3.8	18.0	3.3	0.0	Vert	AV	0.0	39.6	54.0	-14.4	Low Channel, EUT on Side, Ant Horz, Dipole
4804.083	32.4	3.8	3.9	294.0	3.3	0.0	Horz	AV	0.0	39.5	54.0	-14.5	Low Channel, EUT Horz, Ant Vert, Dipole
4960.083	29.7	5.2	3.4	359.0	3.3	0.0	Horz	AV	0.0	38.2	54.0	-15.8	High Channel, EUT on Side, Ant Vert, Dipole
4804.183	29.7	3.8	2.6	241.0	3.3	0.0	Horz	AV	0.0	36.8	54.0	-17.2	Low Channel, EUT Vert, Ant Horz, Dipole
4962.008	28.3	5.2	1.0	57.0	3.3	0.0	Vert	AV	0.0	36.8	54.0	-17.2	High Channel, EUT Horz, Ant Vert, Dipole
7320.750	41.7	12.2	3.2	33.0		0.0	Horz	PK	0.0	53.9	74.0	-20.1	Mid Channel, EUT on Side, Ant Vert, Dipole
12008.860	29.4	1.0	1.0	40.0	3.3	0.0	Vert	AV	0.0	33.7	54.0	-20.3	Low Channel, EUT Horz, Ant Vert, Dipole
12399.010	29.2	1.2	1.0	302.0	3.3	0.0	Vert	AV	0.0	33.7	54.0	-20.3	High Channel, EUT Horz, Ant Vert, Dipole
12397.690	29.2	1.2	1.0	355.0	3.3	0.0	Horz	AV	0.0	33.7	54.0	-20.3	High Channel, EUT on Side, Ant Vert, Dipole
12202.010	29.4	0.9	1.0	200.0	3.3	0.0	Horz	AV	0.0	33.6	54.0	-20.4	Mid Channel, EUT on Side, Ant Vert, Dipole
12008.440	29.2	1.0	1.0	0.0	3.3	0.0	Horz	AV	0.0	33.5	54.0	-20.5	Low Channel, EUT on Side, Ant Vert, Dipole
12201.520	29.2	0.9	2.1	358.0	3.3	0.0	Vert	AV	0.0	33.4	54.0	-20.6	Mid Channel, EUT Horz, Ant Vert, Dipole
7440.825	40.3	13.0	2.2	28.0		0.0	Horz	PK	0.0	53.3	74.0	-20.7	High Channel, EUT on Side, Ant Vert, Dipole
7319.283	40.8	12.2	1.8	22.0		0.0	Vert	PK	0.0	53.0	74.0	-21.0	Mid Channel, EUT Horz, Ant Vert, Dipole

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7440.833	38.6	13.0	1.0	30.0		0.0	Vert	PK	0.0	51.6	74.0	-22.4	High Channel, EUT Horz, Ant Vert, Dipole
4803.425	47.5	3.8	2.5	171.0		0.0	Horz	PK	0.0	51.3	74.0	-22.7	Low Channel, EUT on Side, Ant Vert, Dipole
4803.875	46.3	3.8	1.0	301.0		0.0	Horz	PK	0.0	50.1	74.0	-23.9	Low Channel, EUT Horz, Ant Horz, Dipole
4803.883	45.4	3.8	1.0	38.0		0.0	Vert	PK	0.0	49.2	74.0	-24.8	Low Channel, EUT Horz, Ant Vert, Dipole
4804.833	45.3	3.9	1.2	106.0		0.0	Horz	PK	0.0	49.2	74.0	-24.8	Low Channel, EUT Vert, Ant Vert, Dipole
4880.300	43.6	5.0	2.6	14.0		0.0	Horz	PK	0.0	48.6	74.0	-25.4	Mid Channel, EUT on Side, Ant Vert, Dipole
4879.158	43.0	5.0	1.0	45.0		0.0	Vert	PK	0.0	48.0	74.0	-26.0	Mid Channel, EUT Horz, Ant Vert, Dipole
4804.517	43.9	3.8	1.0	324.0		0.0	Vert	PK	0.0	47.7	74.0	-26.3	Low Channel, EUT Vert, Ant Horz, Dipole
4804.600	43.7	3.9	1.0	64.0		0.0	Horz	PK	0.0	47.6	74.0	-26.4	Low Channel, EUT on Side, Ant Horz, Dipole
4803.567	43.4	3.8	3.8	275.0		0.0	Vert	PK	0.0	47.2	74.0	-26.8	Low Channel, EUT on Side, Ant Vert, Dipole
4804.767	43.0	3.9	3.9	38.0		0.0	Vert	PK	0.0	46.9	74.0	-27.1	Low Channel, EUT Horz, Ant Horz, Dipole
4804.542	43.0	3.8	1.0	236.0		0.0	Vert	PK	0.0	46.8	74.0	-27.2	Low Channel, EUT Vert, Ant Vert, Dipole
4804.142	42.6	3.8	3.8	18.0		0.0	Vert	PK	0.0	46.4	74.0	-27.6	Low Channel, EUT on Side, Ant Horz, Dipole
4804.017	42.1	3.8	3.9	294.0		0.0	Horz	PK	0.0	45.9	74.0	-28.1	Low Channel, EUT Horz, Ant Vert, Dipole
4959.758	39.6	5.2	3.4	359.0		0.0	Horz	PK	0.0	44.8	74.0	-29.2	High Channel, EUT on Side, Ant Vert, Dipole
4961.192	39.0	5.2	1.0	57.0		0.0	Vert	PK	0.0	44.2	74.0	-29.8	High Channel, EUT Horz, Ant Vert, Dipole
4803.783	39.9	3.8	2.6	241.0		0.0	Horz	PK	0.0	43.7	74.0	-30.3	Low Channel, EUT Vert, Ant Horz, Dipole
12399.000	42.1	1.2	1.0	302.0		0.0	Vert	PK	0.0	43.3	74.0	-30.7	High Channel, EUT Horz, Ant Vert, Dipole
12009.190	40.7	1.0	1.0	40.0		0.0	Vert	PK	0.0	41.7	74.0	-32.3	Low Channel, EUT Horz, Ant Vert, Dipole
12399.450	40.5	1.2	1.0	355.0		0.0	Horz	PK	0.0	41.7	74.0	-32.3	High Channel, EUT on Side, Ant Vert, Dipole
12198.270	40.5	0.9	1.0	200.0		0.0	Horz	PK	0.0	41.4	74.0	-32.6	Mid Channel, EUT on Side, Ant Vert, Dipole
12009.460	39.9	1.0	1.0	0.0		0.0	Horz	PK	0.0	40.9	74.0	-33.1	Low Channel, EUT on Side, Ant Vert, Dipole
12200.540	39.9	0.9	2.1	358.0		0.0	Vert	PK	0.0	40.8	74.0	-33.2	Mid Channel, EUT Horz, Ant Vert, Dipole

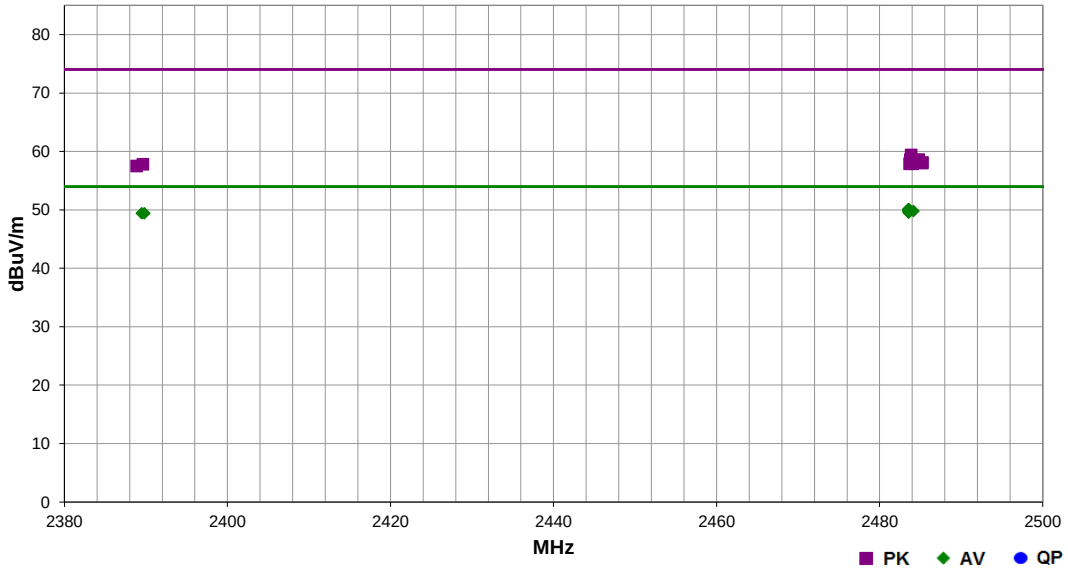
SPURIOUS RADIATED EMISSIONS DIPOLE

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0249	**Date:**	13-Aug-2018		
Project:	None	**Temperature:**	22.7 °C		
Job Site:	EV01	**Humidity:**	45.5% RH		
Serial Number:	E45	**Barometric Pres.:**	1019 mbar	**Tested by:**	Jeff Alcoke
EUT:	Radio Node				
Configuration:	10				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	76	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.593	31.3	-4.5	1.0	331.0	3.3	20.0	Horz	AV	0.0	50.1	54.0	-3.9	High Channel, EUT Horz, Ant Horz, Dipole
2483.523	31.3	-4.5	1.0	84.0	3.3	20.0	Vert	AV	0.0	50.1	54.0	-3.9	High Channel, EUT Vert, Ant Horz, Dipole
2483.570	31.1	-4.5	1.0	13.0	3.3	20.0	Horz	AV	0.0	49.9	54.0	-4.1	High Channel, EUT on Side, Ant Vert, Dipole
2483.537	31.1	-4.5	2.7	128.0	3.3	20.0	Vert	AV	0.0	49.9	54.0	-4.1	High Channel, EUT Horz, Ant Vert, Dipole
2483.600	31.1	-4.5	1.0	264.0	3.3	20.0	Horz	AV	0.0	49.9	54.0	-4.1	High Channel, EUT Vert, Ant Vert, Dipole
2484.150	30.9	-4.4	1.0	10.0	3.3	20.0	Horz	AV	0.0	49.8	54.0	-4.2	High Channel, EUT on Side, Ant Horz, Dipole
2483.603	31.0	-4.5	1.0	111.0	3.3	20.0	Vert	AV	0.0	49.8	54.0	-4.2	High Channel, EUT Horz, Ant Horz, Dipole
2483.553	31.0	-4.5	3.4	21.0	3.3	20.0	Vert	AV	0.0	49.8	54.0	-4.2	High Channel, EUT Vert, Ant Vert, Dipole
2483.523	30.9	-4.5	2.0	290.0	3.3	20.0	Vert	AV	0.0	49.7	54.0	-4.3	High Channel, EUT on Side, Ant Vert, Dipole
2483.630	30.9	-4.5	1.0	48.0	3.3	20.0	Vert	AV	0.0	49.7	54.0	-4.3	High Channel, EUT on Side, Ant Horz, Dipole
2483.613	30.9	-4.5	1.0	0.0	3.3	20.0	Horz	AV	0.0	49.7	54.0	-4.3	High Channel, EUT Vert, Ant Horz, Dipole
2483.573	31.0	-4.5	1.0	0.0	3.3	20.0	Horz	AV	0.0	49.5	54.0	-4.5	High Channel, EUT Horz, Ant Vert, Dipole
2389.503	31.0	-4.9	1.0	7.0	3.3	20.0	Vert	AV	0.0	49.4	54.0	-4.6	Low Channel, EUT Vert, Ant Horz, Dipole
2389.813	31.0	-4.9	3.7	357.0	3.3	20.0	Horz	AV	0.0	49.4	54.0	-4.6	Low Channel, EUT Horz, Ant Horz, Dipole
2483.860	43.9	-4.5	1.0	84.0		20.0	Vert	PK	0.0	59.4	74.0	-14.6	High Channel, EUT Vert, Ant Horz, Dipole
2484.803	43.0	-4.4	1.0	111.0		20.0	Vert	PK	0.0	58.6	74.0	-15.4	High Channel, EUT Horz, Ant Horz, Dipole
2483.780	43.1	-4.5	3.4	21.0		20.0	Vert	PK	0.0	58.6	74.0	-15.4	High Channel, EUT Vert, Ant Vert, Dipole
2484.207	42.9	-4.4	1.0	48.0		20.0	Vert	PK	0.0	58.5	74.0	-15.5	High Channel, EUT on Side, Ant Horz, Dipole
2483.753	42.7	-4.5	1.0	10.0		20.0	Horz	PK	0.0	58.2	74.0	-15.8	High Channel, EUT on Side, Ant Horz, Dipole
2484.073	42.7	-4.5	1.0	0.0		20.0	Horz	PK	0.0	58.2	74.0	-15.8	High Channel, EUT Vert, Ant Horz, Dipole
2485.233	42.5	-4.4	1.0	13.0		20.0	Horz	PK	0.0	58.1	74.0	-15.9	High Channel, EUT on Side, Ant Vert, Dipole
2484.140	42.6	-4.5	1.0	331.0		20.0	Horz	PK	0.0	58.1	74.0	-15.9	High Channel, EUT Horz, Ant Horz, Dipole
2485.223	42.4	-4.4	2.0	290.0		20.0	Vert	PK	0.0	58.0	74.0	-16.0	High Channel, EUT on Side, Ant Vert, Dipole
2484.033	42.4	-4.5	1.0	0.0		20.0	Horz	PK	0.0	57.9	74.0	-16.1	High Channel, EUT Horz, Ant Vert, Dipole
2483.667	42.4	-4.5	2.7	128.0		20.0	Vert	PK	0.0	57.9	74.0	-16.1	High Channel, EUT Horz, Ant Vert, Dipole
2483.860	42.4	-4.5	1.0	264.0		20.0	Horz	PK	0.0	57.9	74.0	-16.1	High Channel, EUT Vert, Ant Vert, Dipole
2389.623	42.7	-4.9	1.0	7.0		20.0	Vert	PK	0.0	57.8	74.0	-16.2	Low Channel, EUT Vert, Ant Horz, Dipole
2388.860	42.4	-4.9	3.7	357.0		20.0	Horz	PK	0.0	57.5	74.0	-16.5	Low Channel, EUT Horz, Ant Horz, Dipole

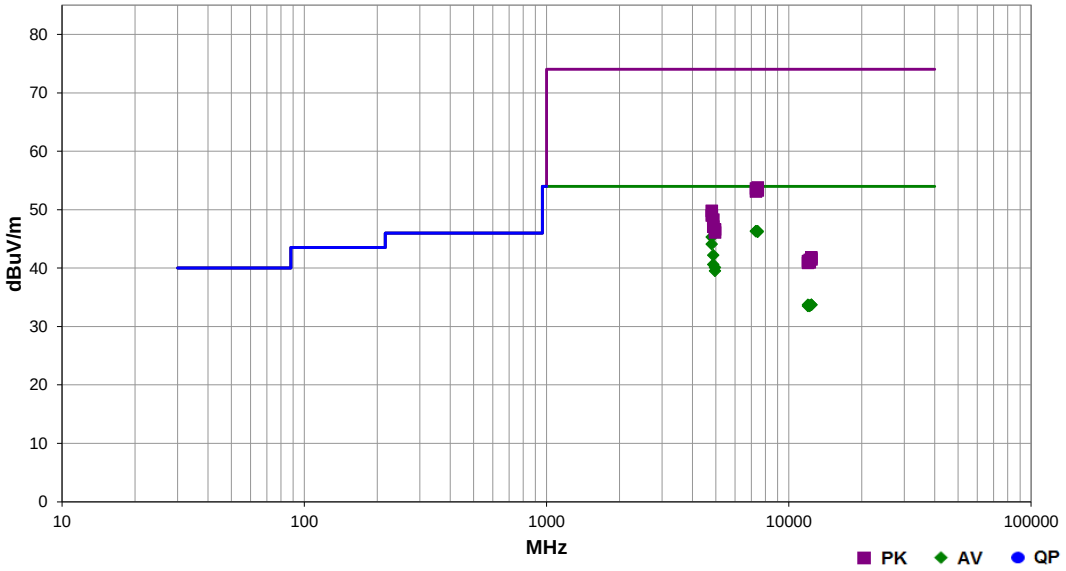
SPURIOUS RADIATED EMISSIONS DIPOLE

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0249	**Date:**	13-Aug-2018		
Project:	None	**Temperature:**	22.7 °C		
Job Site:	EV01	**Humidity:**	45.5% RH		
Serial Number:	E45	**Barometric Pres.:**	1019 mbar	**Tested by:**	Jeff Alcoke
EUT:	Radio Node				
Configuration:	11				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	24 VDC				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Measurements made on worst case orientations determined from testing on the POE system. See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	78	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7319.567	30.8	12.2	1.4	360.0	3.3	0.0	Vert	AV	0.0	46.3	54.0	-7.7	Mid Channel, EUT Horz, Ant Vert, Dipole
7439.633	30.0	13.0	2.1	6.0	3.3	0.0	Horz	AV	0.0	46.3	54.0	-7.7	High Channel, EUT on Side, Ant Vert, Dipole
7319.525	30.8	12.2	1.9	5.0	3.3	0.0	Horz	AV	0.0	46.3	54.0	-7.7	Mid Channel, EUT on Side, Ant Vert, Dipole
7439.517	29.9	13.0	4.0	69.0	3.3	0.0	Vert	AV	0.0	46.2	54.0	-7.8	High Channel, EUT Horz, Ant Vert, Dipole
4803.942	38.3	3.8	3.0	34.0	3.2	0.0	Horz	AV	0.0	45.3	54.0	-8.7	Low Channel, EUT on Side, Ant Vert, Dipole
4803.925	37.1	3.8	1.0	12.0	3.2	0.0	Vert	AV	0.0	44.1	54.0	-9.9	Low Channel, EUT Horz, Ant Vert, Dipole
4880.158	33.9	5.0	4.0	15.0	3.3	0.0	Horz	AV	0.0	42.2	54.0	-11.8	Mid Channel, EUT on Side, Ant Vert, Dipole
4879.958	32.3	5.0	1.0	12.0	3.3	0.0	Vert	AV	0.0	40.6	54.0	-13.4	Mid Channel, EUT Horz, Ant Vert, Dipole
4960.083	31.6	5.2	2.7	21.0	3.3	0.0	Horz	AV	0.0	40.1	54.0	-13.9	High Channel, EUT on Side, Ant Vert, Dipole
4959.967	31.0	5.2	2.5	41.0	3.3	0.0	Vert	AV	0.0	39.5	54.0	-14.5	High Channel, EUT Horz, Ant Vert, Dipole
7440.492	40.8	13.0	4.0	69.0		0.0	Vert	PK	0.0	53.8	74.0	-20.2	High Channel, EUT Horz, Ant Vert, Dipole
12008.960	29.4	1.0	2.9	9.0	3.3	0.0	Horz	AV	0.0	33.7	54.0	-20.3	Low Channel, EUT on Side, Ant Vert, Dipole
12399.220	29.2	1.2	1.8	137.0	3.3	0.0	Horz	AV	0.0	33.7	54.0	-20.3	High Channel, EUT on Side, Ant Vert, Dipole
12397.700	29.2	1.2	1.0	182.0	3.3	0.0	Vert	AV	0.0	33.7	54.0	-20.3	High Channel, EUT Horz, Ant Vert, Dipole
7320.608	41.4	12.2	1.9	5.0		0.0	Horz	PK	0.0	53.6	74.0	-20.4	Mid Channel, EUT on Side, Ant Vert, Dipole
12201.090	29.4	0.9	1.0	119.0	3.3	0.0	Horz	AV	0.0	33.6	54.0	-20.4	Mid Channel, EUT on Side, Ant Vert, Dipole
12200.730	29.3	0.9	2.6	360.0	3.3	0.0	Vert	AV	0.0	33.5	54.0	-20.5	Mid Channel, EUT Horz, Ant Vert, Dipole
12007.880	29.2	1.0	1.0	238.0	3.3	0.0	Vert	AV	0.0	33.5	54.0	-20.5	Low Channel, EUT Horz, Ant Vert, Dipole
7439.142	40.3	13.0	2.1	6.0		0.0	Horz	PK	0.0	53.3	74.0	-20.7	High Channel, EUT on Side, Ant Vert, Dipole
7319.633	40.9	12.2	1.4	360.0		0.0	Vert	PK	0.0	53.1	74.0	-20.9	Mid Channel, EUT Horz, Ant Vert, Dipole
4803.625	46.0	3.8	3.0	34.0		0.0	Horz	PK	0.0	49.8	74.0	-24.2	Low Channel, EUT on Side, Ant Vert, Dipole
4803.333	45.2	3.8	1.0	12.0		0.0	Vert	PK	0.0	49.0	74.0	-25.0	Low Channel, EUT Horz, Ant Vert, Dipole
4880.675	43.3	5.0	4.0	15.0		0.0	Horz	PK	0.0	48.3	74.0	-25.7	Mid Channel, EUT on Side, Ant Vert, Dipole
4880.467	42.1	5.0	1.0	12.0		0.0	Vert	PK	0.0	47.1	74.0	-26.9	Mid Channel, EUT Horz, Ant Vert, Dipole
4960.400	41.4	5.2	2.5	41.0		0.0	Vert	PK	0.0	46.6	74.0	-27.4	High Channel, EUT Horz, Ant Vert, Dipole
4960.767	40.9	5.2	2.7	21.0		0.0	Horz	PK	0.0	46.1	74.0	-27.9	High Channel, EUT on Side, Ant Vert, Dipole
12399.440	40.6	1.2	1.8	137.0		0.0	Horz	PK	0.0	41.8	74.0	-32.2	High Channel, EUT on Side, Ant Vert, Dipole

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
12399.020	40.3	1.2	1.0	182.0		0.0	Vert	PK	0.0	41.5	74.0	-32.5	High Channel, EUT Horz, Ant Vert, Dipole
12199.690	40.5	0.9	1.0	119.0		0.0	Horz	PK	0.0	41.4	74.0	-32.6	Mid Channel, EUT on Side, Ant Vert, Dipole
12009.010	40.2	1.0	2.9	9.0		0.0	Horz	PK	0.0	41.2	74.0	-32.8	Low Channel, EUT on Side, Ant Vert, Dipole
12198.720	40.1	0.9	2.6	360.0		0.0	Vert	PK	0.0	41.0	74.0	-33.0	Mid Channel, EUT Horz, Ant Vert, Dipole
12008.630	39.9	1.0	1.0	238.0		0.0	Vert	PK	0.0	40.9	74.0	-33.1	Low Channel, EUT Horz, Ant Vert, Dipole

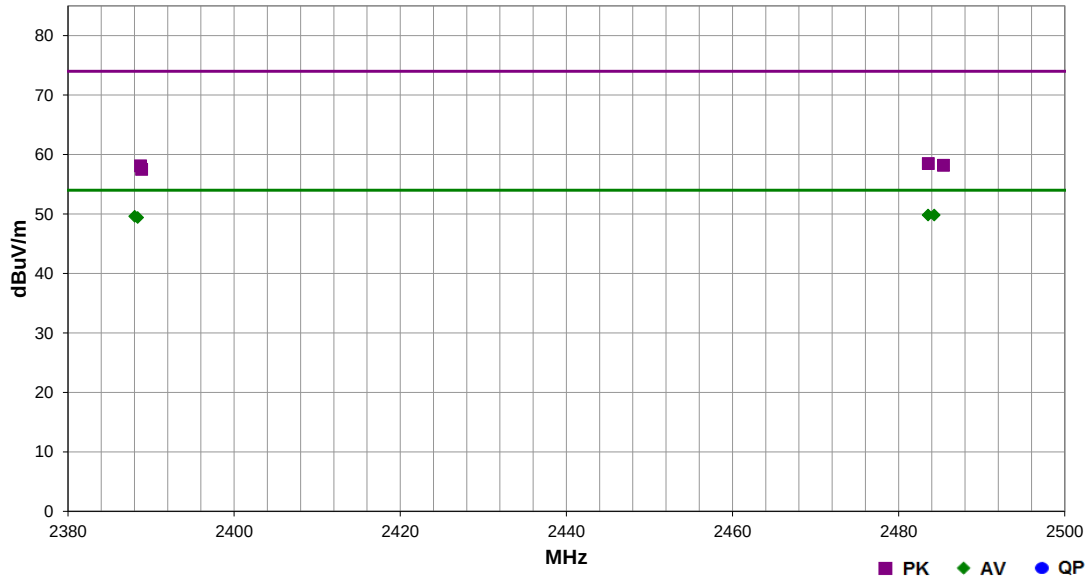
SPURIOUS RADIATED EMISSIONS DIPOLE

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0249	**Date:**	13-Aug-2018		
Project:	None	**Temperature:**	22.7 °C		
Job Site:	EV01	**Humidity:**	45.5% RH		
Serial Number:	E45	**Barometric Pres.:**	1019 mbar	**Tested by:**	Jeff Alcoke
EUT:	Radio Node				
Configuration:	11				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	24 VDC				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Measurements made on worst case orientations determined from testing on the POE system. See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	77	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.547	31.0	-4.5	1.0	0.0	3.3	20.0	Horz	AV	0.0	49.8	54.0	-4.2	High Channel, EUT Horz, Ant Horz, Dipole
2484.303	30.9	-4.4	1.0	324.0	3.3	20.0	Vert	AV	0.0	49.8	54.0	-4.2	High Channel, EUT Vert, Ant Horz, Dipole
2388.040	31.2	-4.9	1.8	15.0	3.3	20.0	Horz	AV	0.0	49.6	54.0	-4.4	Low Channel, EUT Horz, Ant Horz, Dipole
2388.403	31.0	-4.9	1.0	348.0	3.3	20.0	Vert	AV	0.0	49.4	54.0	-4.6	Low Channel, EUT Vert, Ant Horz, Dipole
2483.583	43.0	-4.5	1.0	324.0		20.0	Vert	PK	0.0	58.5	74.0	-15.5	High Channel, EUT Vert, Ant Horz, Dipole
2485.410	42.6	-4.4	1.0	0.0		20.0	Horz	PK	0.0	58.2	74.0	-15.8	High Channel, EUT Horz, Ant Horz, Dipole
2388.723	43.0	-4.9	1.8	15.0		20.0	Horz	PK	0.0	58.1	74.0	-15.9	Low Channel, EUT Horz, Ant Horz, Dipole
2388.867	42.4	-4.9	1.0	348.0		20.0	Vert	PK	0.0	57.5	74.0	-16.5	Low Channel, EUT Vert, Ant Horz, Dipole

SPURIOUS RADIATED EMISSIONS DIPOLE

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Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz

POWER SETTINGS INVESTIGATED

POE

24VDC

CONFIGURATIONS INVESTIGATED

SYNA0259 - 2

SYNA0259 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	100000 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Attenuator	S.M. Electronics	SA6-20	REO	25-Jan-2018	12 mo
Filter - Low Pass	Micro-Tronics	LPM50004	HGK	25-Jan-2018	12 mo
Filter - High Pass	Micro-Tronics	HPM50111	HGQ	25-Jan-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	JSDWK42-18004000-60-5P	PAN	28-Dec-2017	12 mo
Cable	D-Coax	None	OC4	28-Dec-2017	12 mo
Antenna - Double Ridge	A.H. Systems, Inc.	SAS-574	AXV	15-May-2018	24 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVP	10-Jul-2018	12 mo
Antenna - Standard Gain	EMCO	3160-08	AHK	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVL	17-Oct-2017	12 mo
Cable	ESM Cable Corp.	8-18GHz cables	OCY	14-May-2018	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AHX	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVJ	10-Jul-2018	12 mo
Cable	ESM Cable Corp.	1-8GHz cables	OCX	14-May-2018	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AIR	28-Jun-2018	24 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	PAD	10-Jul-2018	12 mo
Cable	ESM Cable Corp.	30-1GHz cables	OCW	10-May-2018	12 mo
Antenna - Biconilog	EMCO	3142	AXB	5-Apr-2018	24 mo
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFJ	8-Dec-2017	12 mo

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

The highest gain antenna of each type to be used with the EUT was tested. The EUT was configured for the required transmit frequencies and the modes as showed in the data sheets.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis if required, and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

Measurements at the edges of the allowable band may be presented in an alternative method as provided for in the ANSI C63.10 Marker-Delta method. This method involves performing an in-band fundamental measurement followed by a screen capture of the fundamental and out-of-band emission using reduced measurement instrumentation bandwidths. The amplitude delta measured on this screen capture is applied to the fundamental emission value to show the out-of-band emission level as applied to the limit.

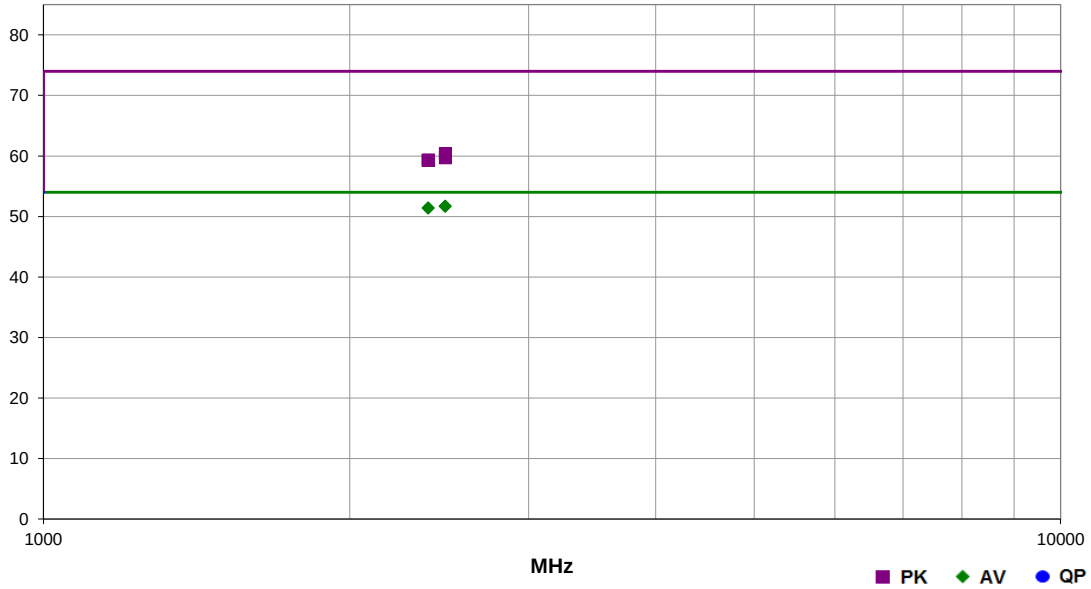
SPURIOUS RADIATED EMISSIONS DIPOLE

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0259	**Date:**	7-Sep-2018		
Project:	None	**Temperature:**	25.9 °C		
Job Site:	OC07	**Humidity:**	45.7% RH		
Serial Number:	E45	**Barometric Pres.:**	1015 mbar	**Tested by:**	Mark Baytan
EUT:	Radio Node				
Configuration:	2				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Measurements made on worst case orientations determined from testing on the POE system in SYNA0249. See comments below for EUT and antenna orientation. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).system. See comments below for EUT and antenna orientation.				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	52	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.517	32.6	-4.2	1.0	143.0	3.3	20.0	Horz	AV	0.0	51.7	54.0	-2.3	High Ch, EUT Horz, Ant Horz, Dipole
2483.597	32.6	-4.2	2.0	42.0	3.3	20.0	Vert	AV	0.0	51.7	54.0	-2.3	High Ch, EUT Vert, Ant Horz, Dipole
2389.087	32.7	-4.6	1.8	295.0	3.3	20.0	Horz	AV	0.0	51.4	54.0	-2.6	Low Ch, EUT Horz, Ant Horz, Dipole
2389.093	32.7	-4.6	3.1	180.0	3.3	20.0	Vert	AV	0.0	51.4	54.0	-2.6	Low Ch, EUT Vert, Ant Horz, Dipole
2484.173	44.6	-4.2	1.0	143.0	0.0	20.0	Horz	PK	0.0	60.4	74.0	-13.6	High Ch, EUT Horz, Ant Horz, Dipole
2484.393	43.9	-4.2	2.0	42.0	0.0	20.0	Vert	PK	0.0	59.7	74.0	-14.3	High Ch, EUT Vert, Ant Horz, Dipole
2389.897	43.9	-4.6	1.8	295.0	0.0	20.0	Horz	PK	0.0	59.3	74.0	-14.7	Low Ch, EUT Horz, Ant Horz, Dipole
2389.113	43.9	-4.6	3.1	180.0	0.0	20.0	Vert	PK	0.0	59.3	74.0	-14.7	Low Ch, EUT Vert, Ant Horz, Dipole

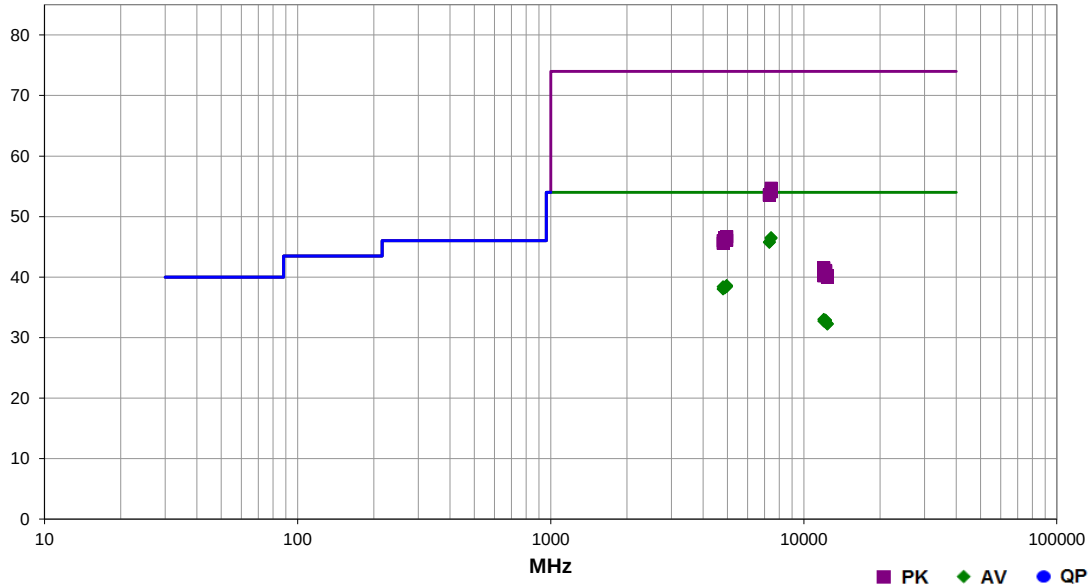
SPURIOUS RADIATED EMISSIONS DIPOLE

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0259	**Date:**	7-Sep-2018		
Project:	None	**Temperature:**	25.9 °C		
Job Site:	OC07	**Humidity:**	45.7% RH		
Serial Number:	E45	**Barometric Pres.:**	1015 mbar	**Tested by:**	Mark Baytan
EUT:	Radio Node				
Configuration:	2				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Measurements made on worst case orientations determined from testing on the POE system in SYNA0249. See comments below for EUT and antenna orientation. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).system. See comments below for EUT and antenna orientation.				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	53	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7439.665	31.5	11.7	1.0	186.0	3.3	0.0	Vert	AV	0.0	46.5	54.0	-7.5	High Ch, EUT Horz, Ant Vert, Dipole
7440.635	31.4	11.7	1.0	224.0	3.3	0.0	Horz	AV	0.0	46.4	54.0	-7.6	High Ch, EUT on Side, Ant Vert, Dipole
7320.715	31.4	11.1	3.4	122.0	3.3	0.0	Horz	AV	0.0	45.8	54.0	-8.2	Mid Ch, EUT on Side, Ant Vert, Dipole
7319.590	31.3	11.1	3.8	360.0	3.3	0.0	Vert	AV	0.0	45.7	54.0	-8.3	Mid Ch, EUT Horz, Ant Vert, Dipole
4959.040	31.1	4.2	2.5	67.0	3.3	0.0	Horz	AV	0.0	38.6	54.0	-15.4	High Ch, EUT on Side, Ant Vert, Dipole
4805.405	30.6	4.5	2.5	64.0	3.3	0.0	Horz	AV	0.0	38.4	54.0	-15.6	Low Ch, EUT on Side, Ant Vert, Dipole
4958.510	30.9	4.2	2.5	170.0	3.3	0.0	Vert	AV	0.0	38.4	54.0	-15.6	High Ch, EUT Horz, Ant Vert, Dipole
4878.915	30.7	4.3	1.6	296.0	3.3	0.0	Horz	AV	0.0	38.3	54.0	-15.7	Mid Ch, EUT on Side, Ant Vert, Dipole
4879.860	30.6	4.3	1.0	146.0	3.3	0.0	Vert	AV	0.0	38.2	54.0	-15.8	Mid Ch, EUT Horz, Ant Vert, Dipole
4802.560	30.2	4.5	1.0	24.0	3.3	0.0	Vert	AV	0.0	38.0	54.0	-16.0	Low Ch, EUT Horz, Ant Vert, Dipole
7440.880	43.0	11.7	1.0	224.0	0.0	0.0	Horz	PK	0.0	54.7	74.0	-19.3	High Ch, EUT on Side, Ant Vert, Dipole
7440.380	42.4	11.7	1.0	186.0	0.0	0.0	Vert	PK	0.0	54.1	74.0	-19.9	High Ch, EUT Horz, Ant Vert, Dipole
7318.795	42.5	11.1	3.8	360.0	0.0	0.0	Vert	PK	0.0	53.6	74.0	-20.4	Mid Ch, EUT Horz, Ant Vert, Dipole
7319.570	42.4	11.1	3.4	122.0	0.0	0.0	Horz	PK	0.0	53.5	74.0	-20.5	Mid Ch, EUT on Side, Ant Vert, Dipole
12010.070	33.2	-3.5	1.9	131.0	3.3	0.0	Vert	AV	0.0	33.0	54.0	-21.0	Low Ch, EUT Horz, Ant Vert, Dipole
12199.740	32.1	-2.5	3.0	0.0	3.3	0.0	Vert	AV	0.0	32.9	54.0	-21.1	Mid Ch, EUT Horz, Ant Vert, Dipole
12199.750	32.0	-2.5	1.0	137.0	3.3	0.0	Horz	AV	0.0	32.8	54.0	-21.2	Mid Ch, EUT on Side, Ant Vert, Dipole
12008.540	32.9	-3.5	1.0	235.0	3.3	0.0	Horz	AV	0.0	32.7	54.0	-21.3	Low Ch, EUT on Side, Ant Vert, Dipole
12399.590	31.8	-2.8	3.2	46.0	3.3	0.0	Horz	AV	0.0	32.3	54.0	-21.7	High Ch, EUT on Side, Ant Vert, Dipole
12399.990	31.7	-2.8	1.0	170.0	3.3	0.0	Vert	AV	0.0	32.2	54.0	-21.8	High Ch, EUT Horz, Ant Vert, Dipole
4959.650	42.5	4.2	2.5	67.0	0.0	0.0	Horz	PK	0.0	46.7	74.0	-27.3	High Ch, EUT on Side, Ant Vert, Dipole
4880.135	42.2	4.3	1.6	296.0	0.0	0.0	Horz	PK	0.0	46.5	74.0	-27.5	Mid Ch, EUT on Side, Ant Vert, Dipole
4960.150	41.9	4.2	2.5	170.0	0.0	0.0	Vert	PK	0.0	46.1	74.0	-27.9	High Ch, EUT Horz, Ant Vert, Dipole

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4881.145	41.8	4.3	1.0	146.0	0.0	0.0	Vert	PK	0.0	46.1	74.0	-27.9	Mid Ch, EUT Horz, Ant Vert, Dipole
4804.175	41.5	4.5	2.5	64.0	0.0	0.0	Horz	PK	0.0	46.0	74.0	-28.0	Low Ch, EUT on Side, Ant Vert, Dipole
4802.895	41.1	4.5	1.0	24.0	0.0	0.0	Vert	PK	0.0	45.6	74.0	-28.4	Low Ch, EUT Horz, Ant Vert, Dipole
12009.770	45.0	-3.5	1.9	131.0	0.0	0.0	Vert	PK	0.0	41.5	74.0	-32.5	Low Ch, EUT Horz, Ant Vert, Dipole
12200.180	43.6	-2.5	1.0	137.0	0.0	0.0	Horz	PK	0.0	41.1	74.0	-32.9	Mid Ch, EUT on Side, Ant Vert, Dipole
12199.580	43.4	-2.5	3.0	0.0	0.0	0.0	Vert	PK	0.0	40.9	74.0	-33.1	Mid Ch, EUT Horz, Ant Vert, Dipole
12010.180	43.7	-3.5	1.0	235.0	0.0	0.0	Horz	PK	0.0	40.2	74.0	-33.8	Low Ch, EUT on Side, Ant Vert, Dipole
12399.710	43.0	-2.8	3.2	46.0	0.0	0.0	Horz	PK	0.0	40.2	74.0	-33.8	High Ch, EUT on Side, Ant Vert, Dipole
12399.800	42.8	-2.8	1.0	170.0	0.0	0.0	Vert	PK	0.0	40.0	74.0	-34.0	High Ch, EUT Horz, Ant Vert, Dipole

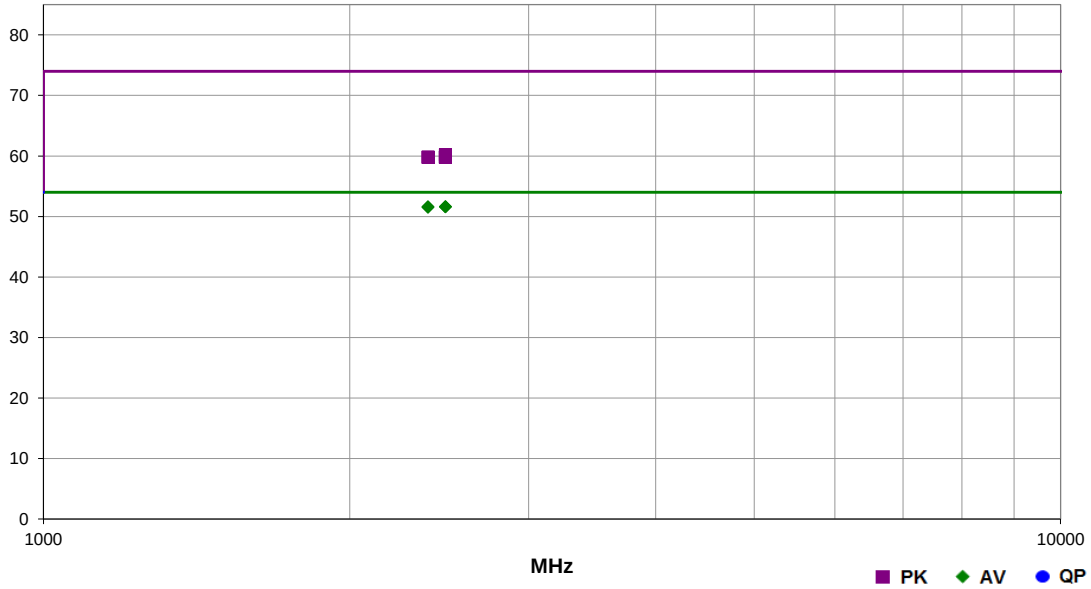
SPURIOUS RADIATED EMISSIONS DIPOLE

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0259	**Date:**	8-Sep-2018		
Project:	None	**Temperature:**	22.6 °C		
Job Site:	OC07	**Humidity:**	52.2% RH		
Serial Number:	E45	**Barometric Pres.:**	1015 mbar	**Tested by:**	Mark Baytan
EUT:	Radio Node				
Configuration:	1				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	24VDC				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Measurements made on worst case orientations determined from testing on the POE system in SYNA0249. See comments below for EUT and antenna orientation. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).system. See comments below for EUT and antenna orientation.				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	56	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2388.483	32.9	-4.6	1.0	101.0	3.3	20.0	Horz	AV	0.0	51.6	54.0	-2.4	Low Ch, EUT Horz, Ant Horz, Dipole
2484.750	32.5	-4.2	1.4	179.0	3.3	20.0	Horz	AV	0.0	51.6	54.0	-2.4	High Ch, EUT Horz, Ant Horz, Dipole
2485.300	32.5	-4.2	1.0	345.0	3.3	20.0	Vert	AV	0.0	51.6	54.0	-2.4	High Ch, EUT Vert, Ant Horz, Dipole
2388.740	32.8	-4.6	1.0	18.0	3.3	20.0	Vert	AV	0.0	51.5	54.0	-2.5	Low Ch, EUT Vert, Ant Horz, Dipole
2484.697	44.4	-4.2	1.4	179.0	0.0	20.0	Horz	PK	0.0	60.2	74.0	-13.8	High Ch, EUT Horz, Ant Horz, Dipole
2388.633	44.4	-4.6	1.0	101.0	0.0	20.0	Horz	PK	0.0	59.8	74.0	-14.2	Low Ch, EUT Horz, Ant Horz, Dipole
2388.307	44.4	-4.6	1.0	18.0	0.0	20.0	Vert	PK	0.0	59.8	74.0	-14.2	Low Ch, EUT Vert, Ant Horz, Dipole
2483.567	44.0	-4.2	1.0	345.0	0.0	20.0	Vert	PK	0.0	59.8	74.0	-14.2	High Ch, EUT Vert, Ant Horz, Dipole

SPURIOUS RADIATED EMISSIONS DIPOLE

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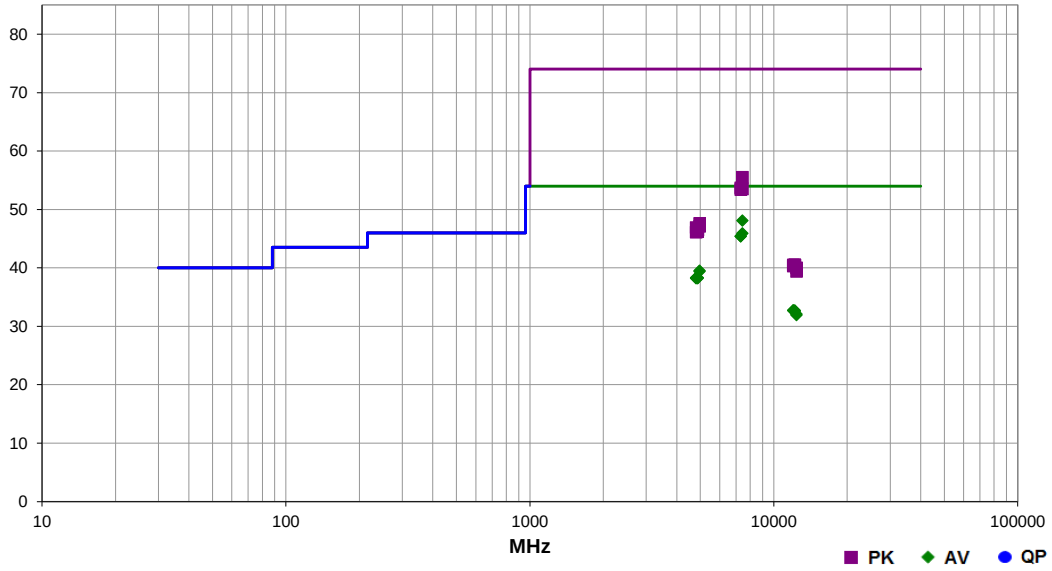
EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0259	**Date:**	8-Sep-2018		
Project:	None	**Temperature:**	22.6 °C		
Job Site:	OC07	**Humidity:**	52.2% RH		
Serial Number:	E45	**Barometric Pres.:**	1015 mbar	**Tested by:**	Mark Baytan
EUT:	Radio Node				
Configuration:	1				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	24VDC				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Measurements made on worst case orientations determined from testing on the POE system in SYNA0249. See comments below for EUT and antenna orientation. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).system. See comments below for EUT and antenna orientation.				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	57	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7440.610	33.1	11.7	2.1	78.0	3.3	0.0	Horz	AV	0.0	48.1	54.0	-5.9	High Ch, EUT on Side, Ant Vert, Dipole, Dipole
7439.180	30.9	11.7	1.0	97.0	3.3	0.0	Vert	AV	0.0	45.9	54.0	-8.1	High Ch, EUT Horz, Ant Vert, Dipole, Dipole
7319.740	31.0	11.1	1.0	338.0	3.3	0.0	Horz	AV	0.0	45.4	54.0	-8.6	Mid Ch, EUT on Side, Ant Vert, Dipole, Dipole
7319.230	31.0	11.1	1.9	293.0	3.3	0.0	Vert	AV	0.0	45.4	54.0	-8.6	Mid Ch, EUT Horz, Ant Vert, Dipole, Dipole
4959.920	32.0	4.2	3.5	297.0	3.3	0.0	Horz	AV	0.0	39.5	54.0	-14.5	High Ch, EUT on Side, Ant Vert, Dipole, Dipole
4959.625	31.9	4.2	2.9	213.0	3.3	0.0	Vert	AV	0.0	39.4	54.0	-14.6	High Ch, EUT Horz, Ant Vert, Dipole, Dipole
4880.065	30.7	4.3	1.1	211.0	3.3	0.0	Vert	AV	0.0	38.3	54.0	-15.7	Mid Ch, EUT Horz, Ant Vert, Dipole, Dipole
4803.330	30.5	4.5	1.0	360.0	3.3	0.0	Vert	AV	0.0	38.3	54.0	-15.7	Low Ch, EUT Vert, Ant Horz, Dipole, Dipole
4878.500	30.6	4.3	2.7	165.0	3.3	0.0	Horz	AV	0.0	38.2	54.0	-15.8	Mid Ch, EUT on Side, Ant Vert, Dipole, Dipole
4804.165	30.4	4.5	1.2	300.0	3.3	0.0	Horz	AV	0.0	38.2	54.0	-15.8	Low Ch, EUT Horz, Ant Horz, Dipole, Dipole
7438.745	43.8	11.7	2.1	78.0	0.0	0.0	Horz	PK	0.0	55.5	74.0	-18.5	High Ch, EUT on Side, Ant Vert, Dipole, Dipole
7320.810	42.6	11.1	1.9	293.0	0.0	0.0	Vert	PK	0.0	53.7	74.0	-20.3	Mid Ch, EUT Horz, Ant Vert, Dipole, Dipole
7439.340	41.8	11.7	1.0	97.0	0.0	0.0	Vert	PK	0.0	53.5	74.0	-20.5	High Ch, EUT Horz, Ant Vert, Dipole, Dipole
7320.485	42.3	11.1	1.0	338.0	0.0	0.0	Horz	PK	0.0	53.4	74.0	-20.6	Mid Ch, EUT on Side, Ant Vert, Dipole, Dipole
12008.780	32.9	-3.5	1.3	228.0	3.3	0.0	Horz	AV	0.0	32.7	54.0	-21.3	Low Ch, EUT Horz, Ant Horz, Dipole, Dipole
12009.040	32.9	-3.5	1.0	211.0	3.3	0.0	Vert	AV	0.0	32.7	54.0	-21.3	Low Ch, EUT Vert, Ant Horz, Dipole, Dipole
12198.730	31.9	-2.5	1.7	288.0	3.3	0.0	Horz	AV	0.0	32.7	54.0	-21.3	Mid Ch, EUT Horz, Ant Horz, Dipole, Dipole
12199.800	31.8	-2.5	3.0	101.0	3.3	0.0	Vert	AV	0.0	32.6	54.0	-21.4	Mid Ch, EUT Vert, Ant Horz, Dipole, Dipole
12398.750	31.6	-2.8	1.0	287.0	3.3	0.0	Horz	AV	0.0	32.1	54.0	-21.9	High Ch, EUT Horz, Ant Horz, Dipole, Dipole
12398.600	31.4	-2.8	1.0	208.0	3.3	0.0	Vert	AV	0.0	31.9	54.0	-22.1	High Ch, EUT Vert, Ant Horz, Dipole, Dipole
4960.455	43.4	4.2	2.9	213.0	0.0	0.0	Vert	PK	0.0	47.6	74.0	-26.4	High Ch, EUT Horz, Ant Vert, Dipole, Dipole
4960.655	42.9	4.2	3.5	297.0	0.0	0.0	Horz	PK	0.0	47.1	74.0	-26.9	High Ch, EUT on Side, Ant Vert, Dipole, Dipole
4802.860	42.4	4.5	1.0	360.0	0.0	0.0	Vert	PK	0.0	46.9	74.0	-27.1	Low Ch, EUT Vert, Ant Horz, Dipole, Dipole
4879.945	42.2	4.3	2.7	165.0	0.0	0.0	Horz	PK	0.0	46.5	74.0	-27.5	Mid Ch, EUT on Side, Ant Vert, Dipole, Dipole
4878.825	41.9	4.3	1.1	211.0	0.0	0.0	Vert	PK	0.0	46.2	74.0	-27.8	Mid Ch, EUT Horz, Ant Vert, Dipole, Dipole
4803.155	41.6	4.5	1.2	300.0	0.0	0.0	Horz	PK	0.0	46.1	74.0	-27.9	Low Ch, EUT Horz, Ant Horz, Dipole, Dipole
12010.010	44.0	-3.5	1.3	228.0	0.0	0.0	Horz	PK	0.0	40.5	74.0	-33.5	Low Ch, EUT Horz, Ant Horz, Dipole, Dipole

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
12200.870	43.0	-2.5	1.7	288.0	0.0	0.0	Horz	PK	0.0	40.5	74.0	-33.5	Mid Ch, EUT Horz, Ant Horz, Dipole, Dipole
12200.430	43.0	-2.5	3.0	101.0	0.0	0.0	Vert	PK	0.0	40.5	74.0	-33.5	Mid Ch, EUT Vert, Ant Horz, Dipole, Dipole
12008.770	43.8	-3.5	1.0	211.0	0.0	0.0	Vert	PK	0.0	40.3	74.0	-33.7	Low Ch, EUT Vert, Ant Horz, Dipole, Dipole
12399.390	42.8	-2.8	1.0	287.0	0.0	0.0	Horz	PK	0.0	40.0	74.0	-34.0	High Ch, EUT Horz, Ant Horz, Dipole, Dipole
12399.290	42.2	-2.8	1.0	208.0	0.0	0.0	Vert	PK	0.0	39.4	74.0	-34.6	High Ch, EUT Vert, Ant Horz, Dipole, Dipole

SPURIOUS RADIATED EMISSIONS 4 - ELEMENT

PSA-ESCI 2018.05.04

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz

POWER SETTINGS INVESTIGATED

POE

CONFIGURATIONS INVESTIGATED

SYNA0260 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26000 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Cable	Northwest EMC	10kHz-1GHz RE Cables	OCH	20-Sep-2018	12 mo
Antenna - Biconilog	Teseq	CBL 6141A	AYE	7-Nov-2017	24 mo
Amplifier - Pre-Amplifier	Miteq	AM-1402	AOZ	10-Jul-2018	12 mo
Attenuator	S.M. Electronics	SA6-20	REO	25-Jan-2018	12 mo
Filter - Low Pass	Micro-Tronics	LPM50004	HGK	25-Jan-2018	12 mo
Filter - High Pass	Micro-Tronics	HPM50111	HGQ	25-Jan-2018	12 mo
Cable	Northwest EMC	8-18GHz RE Cables	OCO	6-Sep-2018	12 mo
Cable	Northwest EMC	18-26GHz RE Cables	OCK	27-Dec-2017	12 mo
Cable	Northwest EMC	1-8GHz RE Cables	OCJ	6-Sep-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-4D-010120-30-10P-1	AOP	6-Sep-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AOI	27-Dec-2017	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AOF	7-Sep-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AOE	7-Sep-2018	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AHT	NCR	0 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AHR	NCR	0 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AHN	NCR	0 mo
Antenna - Double Ridge	EMCO	3115	AHB	28-Mar-2018	24 mo
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAY	21-Nov-2017	12 mo

TEST DESCRIPTION

The highest gain antenna of each type to be used with the EUT was tested. The EUT was configured for the required transmit frequencies and the modes as showed in the data sheets.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis if required, and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

Measurements at the edges of the allowable band may be presented in an alternative method as provided for in the ANSI C63.10 Marker-Delta method. This method involves performing an in-band fundamental measurement followed by a screen capture of the fundamental and out-of-band emission using reduced measurement instrumentation bandwidths. The amplitude delta measured on this screen capture is applied to the fundamental emission value to show the out-of-band emission level as applied to the limit.

Where the radio test software does not provide for a duty cycle at continuous transmit conditions (> 98%) and the RMS (power average) measurements were made across the on and off times of the EUT transmissions, a duty cycle correction is added to the measurements using the formula of 10*LOG(dc).

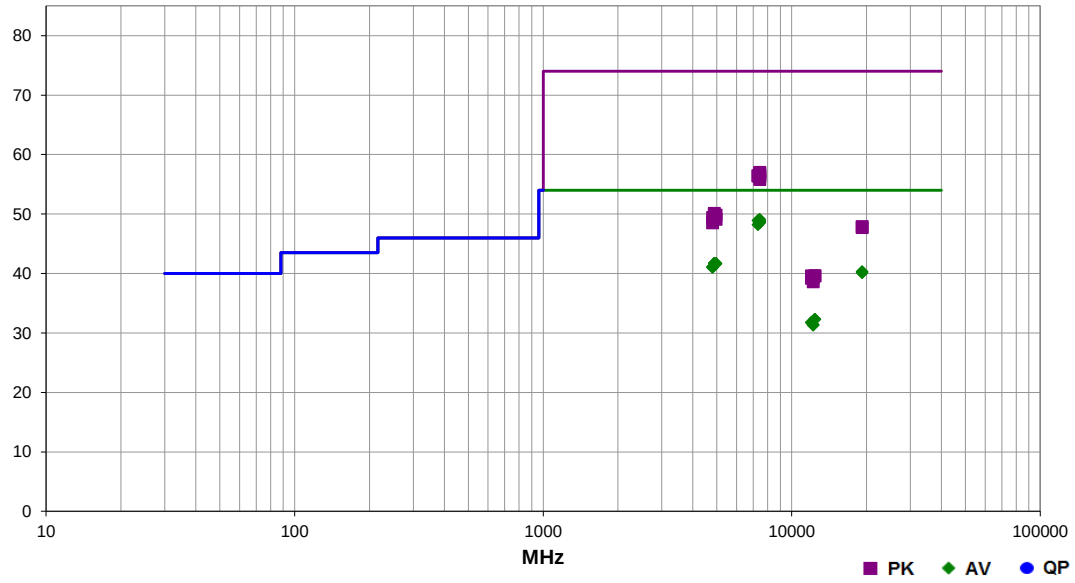
SPURIOUS RADIATED EMISSIONS 4 - ELEMENT

EmiR5 2018.09.26 PSA-ESCI 2018.07.27

Work Order:	SYNA0260	**Date:**	28-Sep-2018		
Project:	None	**Temperature:**	22.7 °C		
Job Site:	OC10	**Humidity:**	53% RH		
Serial Number:	E52	**Barometric Pres.:**	1016 mbar	**Tested by:**	Salvador Solorzano
EUT:	Radio Node				
Configuration:	2				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Transmitting using 4-element patch array antenna part number T24130P10006GT on Port 7. See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	157	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7439.985	28.0	17.8	1.0	179.0	3.3	0.0	Vert	AV	0.0	49.1	54.0	-4.9	EUT Horz, Ant Horz, High Ch, Port 7
7320.585	28.3	17.3	1.0	158.0	3.3	0.0	Vert	AV	0.0	48.9	54.0	-5.1	EUT Horz, Ant Horz, Mid Ch, Port 7
7439.910	27.7	17.8	1.0	12.0	3.3	0.0	Horz	AV	0.0	48.8	54.0	-5.2	EUT Horz, Ant Horz, High Ch, Port 7
7439.730	27.7	17.8	1.0	208.0	3.3	0.0	Horz	AV	0.0	48.8	54.0	-5.2	EUT Vert , Ant Vert, High Ch, Port 7
7440.370	27.6	17.8	1.0	220.0	3.3	0.0	Horz	AV	0.0	48.7	54.0	-5.3	EUT on Side, Ant on Side. High Ch, Port 7
7439.475	27.5	17.8	1.1	142.0	3.3	0.0	Vert	AV	0.0	48.6	54.0	-5.4	EUT on Side, Ant on Side. High Ch, Port 7
7438.520	27.4	17.8	1.0	215.0	3.3	0.0	Vert	AV	0.0	48.5	54.0	-5.5	EUT Vert , Ant Vert, High Ch, Port 7
7319.380	27.6	17.3	1.0	138.0	3.3	0.0	Horz	AV	0.0	48.2	54.0	-5.8	EUT Horz, Ant Horz, Mid Ch, Port 7
4959.515	25.9	12.5	1.4	252.0	3.3	0.0	Horz	AV	0.0	41.7	54.0	-12.3	EUT Horz, Ant Horz, High Ch, Port 7
4878.635	26.3	12.1	1.0	18.0	3.3	0.0	Horz	AV	0.0	41.7	54.0	-12.3	EUT Horz, Ant Horz, Mid Ch, Port 7
4879.400	26.3	12.1	4.0	140.0	3.3	0.0	Vert	AV	0.0	41.7	54.0	-12.3	EUT Horz, Ant Horz, Mid Ch, Port 7
4958.620	25.8	12.5	1.0	318.0	3.3	0.0	Vert	AV	0.0	41.6	54.0	-12.4	EUT Horz, Ant Horz, High Ch, Port 7
4804.095	26.5	11.3	1.0	246.0	3.3	0.0	Vert	AV	0.0	41.1	54.0	-12.9	EUT Horz, Ant Horz, Low Ch, Port 7
4804.685	26.4	11.3	1.0	71.0	3.3	0.0	Horz	AV	0.0	41.0	54.0	-13.0	EUT Horz, Ant Horz, Low Ch, Port 7
19216.790	40.9	-3.9	1.5	138.0	3.3	0.0	Horz	AV	0.0	40.3	54.0	-13.7	EUT Horz, Ant Horz, Low Ch, Port 7
19216.210	40.7	-3.9	1.5	202.0	3.3	0.0	Vert	AV	0.0	40.1	54.0	-13.9	EUT Horz, Ant Horz, Low Ch, Port 7
7440.520	39.2	17.8	1.0	179.0	0.0	0.0	Vert	PK	0.0	57.0	74.0	-17.0	EUT Horz, Ant Horz, High Ch, Port 7
7441.055	39.1	17.8	1.0	220.0	0.0	0.0	Horz	PK	0.0	56.9	74.0	-17.1	EUT on Side, Ant on Side. High Ch, Port 7
7441.300	38.8	17.8	1.0	12.0	0.0	0.0	Horz	PK	0.0	56.6	74.0	-17.4	EUT Horz, Ant Horz, High Ch, Port 7
7440.650	38.6	17.8	1.0	215.0	0.0	0.0	Vert	PK	0.0	56.4	74.0	-17.6	EUT Vert , Ant Vert, High Ch, Port 7
7320.710	39.1	17.3	1.0	138.0	0.0	0.0	Horz	PK	0.0	56.4	74.0	-17.6	EUT Horz, Ant Horz, Mid Ch, Port 7
7320.025	39.1	17.3	1.0	158.0	0.0	0.0	Vert	PK	0.0	56.4	74.0	-17.6	EUT Horz, Ant Horz, Mid Ch, Port 7
7440.550	38.4	17.8	1.1	142.0	0.0	0.0	Vert	PK	0.0	56.2	74.0	-17.8	EUT on Side, Ant on Side. High Ch, Port 7
7440.860	38.0	17.8	1.0	208.0	0.0	0.0	Horz	PK	0.0	55.8	74.0	-18.2	EUT Vert , Ant Vert, High Ch, Port 7
12398.790	32.4	-3.4	1.0	62.0	3.3	0.0	Horz	AV	0.0	32.3	54.0	-21.7	EUT Horz, Ant Horz, High Ch, Port 7
12398.570	32.4	-3.4	1.0	42.0	3.3	0.0	Vert	AV	0.0	32.3	54.0	-21.7	EUT Horz, Ant Horz, High Ch, Port 7

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
12011.490	33.9	-5.4	1.0	334.0	3.3	0.0	Horz	AV	0.0	31.8	54.0	-22.2	EUT Horz, Ant Horz, Low Ch, Port 7
12011.500	33.8	-5.4	1.0	39.0	3.3	0.0	Vert	AV	0.0	31.7	54.0	-22.3	EUT Horz, Ant Horz, Low Ch, Port 7
12201.460	31.9	-3.8	1.0	203.0	3.3	0.0	Horz	AV	0.0	31.4	54.0	-22.6	EUT Horz, Ant Horz, Mid Ch, Port 7
12201.080	31.8	-3.8	1.0	290.0	3.3	0.0	Vert	AV	0.0	31.3	54.0	-22.7	EUT Horz, Ant Horz, Mid Ch, Port 7
4880.095	38.0	12.1	4.0	140.0	0.0	0.0	Vert	PK	0.0	50.1	74.0	-23.9	EUT Horz, Ant Horz, Mid Ch, Port 7
4959.355	37.3	12.5	1.4	252.0	0.0	0.0	Horz	PK	0.0	49.8	74.0	-24.2	EUT Horz, Ant Horz, High Ch, Port 7
4879.320	37.7	12.1	1.0	18.0	0.0	0.0	Horz	PK	0.0	49.8	74.0	-24.2	EUT Horz, Ant Horz, Mid Ch, Port 7
4803.830	38.1	11.3	1.0	246.0	0.0	0.0	Vert	PK	0.0	49.4	74.0	-24.6	EUT Horz, Ant Horz, Low Ch, Port 7
4959.330	36.6	12.5	1.0	318.0	0.0	0.0	Vert	PK	0.0	49.1	74.0	-24.9	EUT Horz, Ant Horz, High Ch, Port 7
4802.765	37.2	11.3	1.0	71.0	0.0	0.0	Horz	PK	0.0	48.5	74.0	-25.5	EUT Horz, Ant Horz, Low Ch, Port 7
19216.870	51.8	-3.9	1.5	138.0	0.0	0.0	Horz	PK	0.0	47.9	74.0	-26.1	EUT Horz, Ant Horz, Low Ch, Port 7
19216.210	51.6	-3.9	1.5	202.0	0.0	0.0	Vert	PK	0.0	47.7	74.0	-26.3	EUT Horz, Ant Horz, Low Ch, Port 7
12009.090	45.0	-5.4	1.0	334.0	0.0	0.0	Horz	PK	0.0	39.6	74.0	-34.4	EUT Horz, Ant Horz, Low Ch, Port 7
12399.360	43.0	-3.4	1.0	62.0	0.0	0.0	Horz	PK	0.0	39.6	74.0	-34.4	EUT Horz, Ant Horz, High Ch, Port 7
12398.720	43.0	-3.4	1.0	42.0	0.0	0.0	Vert	PK	0.0	39.6	74.0	-34.4	EUT Horz, Ant Horz, High Ch, Port 7
12200.600	43.1	-3.8	1.0	203.0	0.0	0.0	Horz	PK	0.0	39.3	74.0	-34.7	EUT Horz, Ant Horz, Mid Ch, Port 7
12009.820	44.6	-5.4	1.0	39.0	0.0	0.0	Vert	PK	0.0	39.2	74.0	-34.8	EUT Horz, Ant Horz, Low Ch, Port 7
12200.220	42.4	-3.8	1.0	290.0	0.0	0.0	Vert	PK	0.0	38.6	74.0	-35.4	EUT Horz, Ant Horz, Mid Ch, Port 7

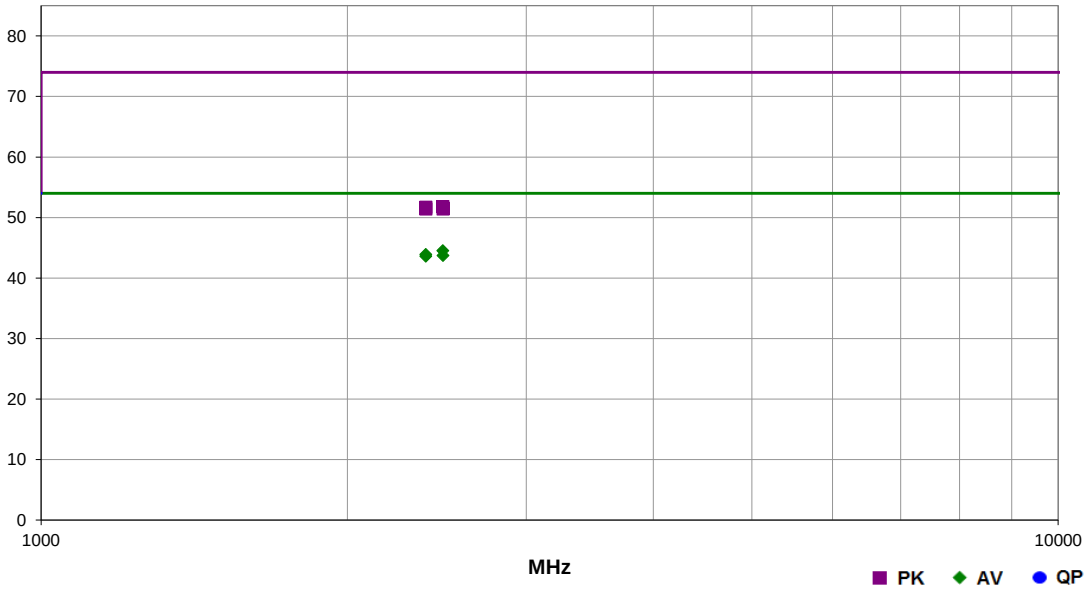
SPURIOUS RADIATED EMISSIONS 4 - ELEMENT

EmiR5 2018.09.26 PSA-ESCI 2018.07.27

Work Order:	SYNA0260	**Date:**	28-Sep-2018		
Project:	None	**Temperature:**	21.6 °C		
Job Site:	OC10	**Humidity:**	54.7% RH		
Serial Number:	E52	**Barometric Pres.:**	1013 mbar	**Tested by:**	Salvador Solorzano
EUT:	Radio Node				
Configuration:	2				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, Low Channel = 2402 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Transmitting using 4-element patch array antenna part number T24130P10006GT on Port 7. See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	160	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.948	28.2	3.0	1.0	277.0	3.3	10.0	Vert	AV	0.0	44.5	54.0	-9.5	EUT Horz, Ant Horz, High Ch, Port 7
2389.642	28.0	2.6	1.0	137.0	3.3	10.0	Vert	AV	0.0	43.9	54.0	-10.1	EUT Horz, Ant Horz, Low Ch, Port 7
2484.087	27.4	3.0	1.0	2.0	3.3	10.0	Horz	AV	0.0	43.7	54.0	-10.3	EUT Horz, Ant Horz, High Ch, Port 7
2389.382	27.7	2.6	1.0	162.0	3.3	10.0	Horz	AV	0.0	43.6	54.0	-10.4	EUT Horz, Ant Horz, Low Ch, Port 7
2483.707	38.8	3.0	1.0	2.0	0.0	10.0	Horz	PK	0.0	51.8	74.0	-22.2	EUT Horz, Ant Horz, High Ch, Port 7
2389.682	39.1	2.6	1.0	162.0	0.0	10.0	Horz	PK	0.0	51.7	74.0	-22.3	EUT Horz, Ant Horz, Low Ch, Port 7
2389.698	38.8	2.6	1.0	137.0	0.0	10.0	Vert	PK	0.0	51.4	74.0	-22.6	EUT Horz, Ant Horz, Low Ch, Port 7
2484.312	38.4	3.0	1.0	277.0	0.0	10.0	Vert	PK	0.0	51.4	74.0	-22.6	EUT Horz, Ant Horz, High Ch, Port 7

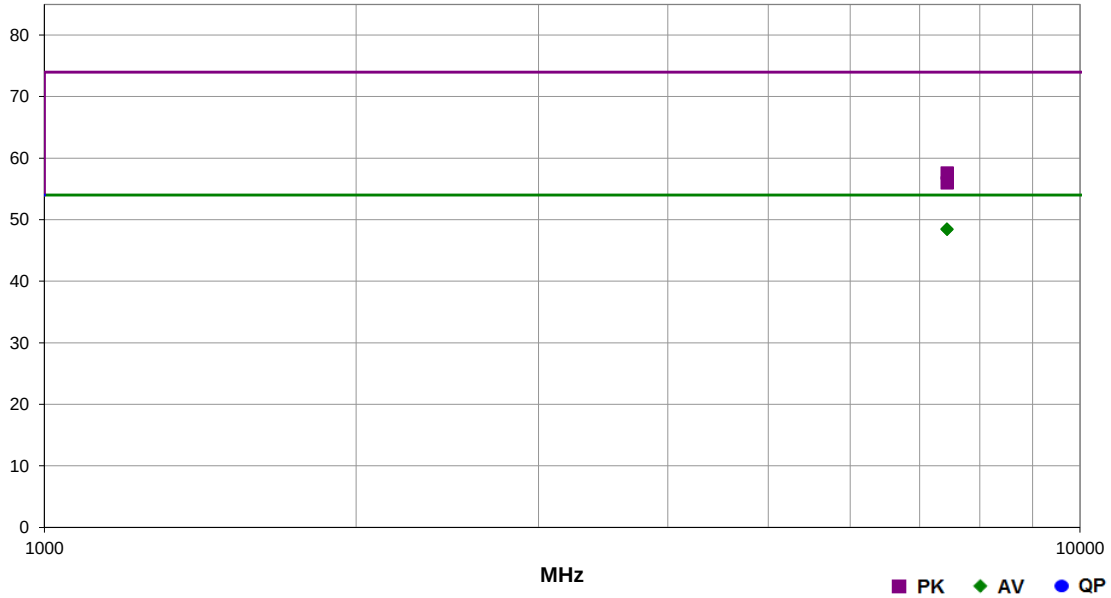
SPURIOUS RADIATED EMISSIONS 4 - ELEMENT

EmiR5 2018.09.26 PSA-ESCI 2018.07.27

Work Order:	SYNA0260	**Date:**	28-Sep-2018		
Project:	None	**Temperature:**	21.6 °C		
Job Site:	OC10	**Humidity:**	54.7% RH		
Serial Number:	E52	**Barometric Pres.:**	1013 mbar	**Tested by:**	Salvador Solorzano
EUT:	Radio Node				
Configuration:	2				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Transmitting using 4-element patch array antenna part number T24130P10006GT on Port 8. See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	161	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7439.210	27.4	17.8	1.0	258.0	3.3	0.0	Vert	AV	0.0	48.5	54.0	-5.5	EUT Horz, Ant Horz, High Ch, Port 8
7441.295	27.3	17.8	1.0	204.0	3.3	0.0	Horz	AV	0.0	48.4	54.0	-5.6	EUT Horz, Ant Horz, High Ch, Port 8
7440.915	39.8	17.8	1.0	258.0	0.0	0.0	Vert	PK	0.0	57.6	74.0	-16.4	EUT Horz, Ant Horz, High Ch, Port 8
7441.290	38.2	17.8	1.0	204.0	0.0	0.0	Horz	PK	0.0	56.0	74.0	-18.0	EUT Horz, Ant Horz, High Ch, Port 8

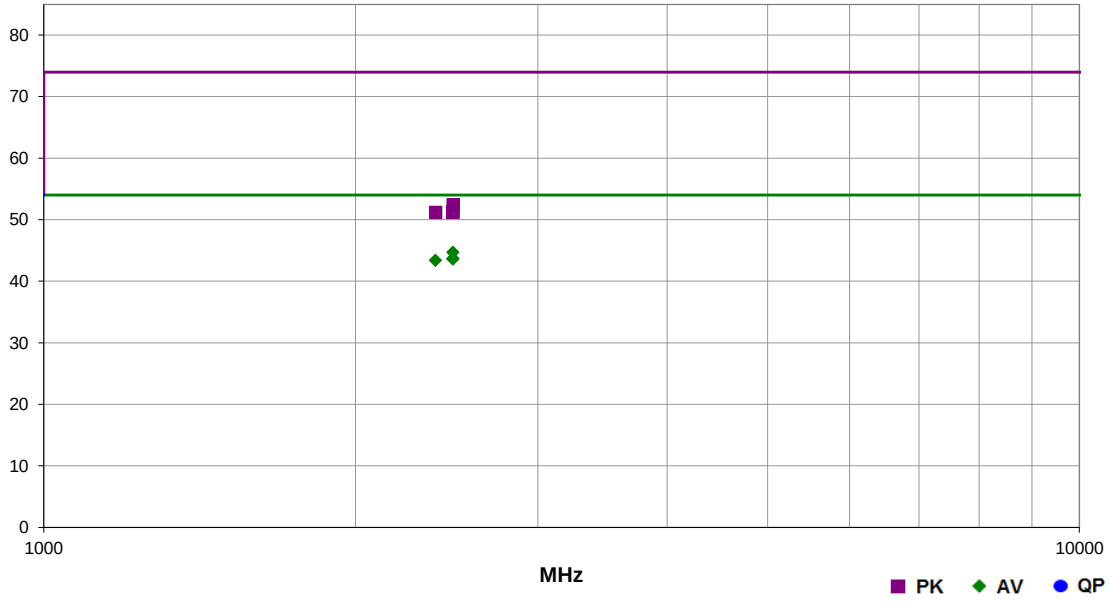
SPURIOUS RADIATED EMISSIONS 4 - ELEMENT

EmiR5 2018.09.26 PSA-ESCI 2018.07.27

Work Order:	SYNA0260	**Date:**	28-Sep-2018		
Project:	None	**Temperature:**	21.6 °C		
Job Site:	OC10	**Humidity:**	54.7% RH		
Serial Number:	E52	**Barometric Pres.:**	1013 mbar	**Tested by:**	Salvador Solorzano
EUT:	Radio Node				
Configuration:	2				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, Low Channel = 2402 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Transmitting using 4-element patch array antenna part number T24130P10006GT on Port 8. See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	162	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.670	28.4	3.0	1.0	215.0	3.3	10.0	Vert	AV	0.0	44.7	54.0	-9.3	EUT Horz, Ant Horz, High Ch, Port 8
2483.650	27.4	3.0	1.8	267.0	3.3	10.0	Horz	AV	0.0	43.7	54.0	-10.3	EUT Horz, Ant Horz, High Ch, Port 8
2483.723	27.3	3.0	1.8	290.0	3.3	10.0	Horz	AV	0.0	43.6	54.0	-10.4	EUT Horz, Ant Horz, Low Ch, Port 8
2389.138	27.5	2.6	1.0	10.0	3.3	10.0	Vert	AV	0.0	43.4	54.0	-10.6	EUT Horz, Ant Horz, Low Ch, Port 8
2484.415	39.4	3.0	1.0	215.0	0.0	10.0	Vert	PK	0.0	52.4	74.0	-21.6	EUT Horz, Ant Horz, High Ch, Port 8
2483.965	38.3	3.0	1.8	290.0	0.0	10.0	Horz	PK	0.0	51.3	74.0	-22.7	EUT Horz, Ant Horz, Low Ch, Port 8
2484.147	38.2	3.0	1.8	267.0	0.0	10.0	Horz	PK	0.0	51.2	74.0	-22.8	EUT Horz, Ant Horz, Low Ch, Port 8
2389.945	38.6	2.6	1.0	10.0	0.0	10.0	Vert	PK	0.0	51.2	74.0	-22.8	EUT Horz, Ant Horz, High Ch, Port 8

SPURIOUS RADIATED EMISSIONS 16 - ELEMENT

PSA-ESCI 2018.05.04

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz

POWER SETTINGS INVESTIGATED

POE

CONFIGURATIONS INVESTIGATED

SYNA0260 - 3

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26000 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Cable	Northwest EMC	10kHz-1GHz RE Cables	OCH	20-Sep-2018	12 mo
Antenna - Biconilog	Teseq	CBL 6141A	AYE	7-Nov-2017	24 mo
Amplifier - Pre-Amplifier	Miteq	AM-1402	AOZ	10-Jul-2018	12 mo
Attenuator	S.M. Electronics	SA6-20	REO	25-Jan-2018	12 mo
Filter - Low Pass	Micro-Tronics	LPM50004	HGK	25-Jan-2018	12 mo
Filter - High Pass	Micro-Tronics	HPM50111	HGQ	25-Jan-2018	12 mo
Cable	Northwest EMC	8-18GHz RE Cables	OCO	6-Sep-2018	12 mo
Cable	Northwest EMC	18-26GHz RE Cables	OCK	27-Dec-2017	12 mo
Cable	Northwest EMC	1-8GHz RE Cables	OCJ	6-Sep-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-4D-010120-30-10P-1	AOP	6-Sep-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AOI	27-Dec-2017	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AOF	7-Sep-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AOE	7-Sep-2018	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AHT	NCR	0 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AHR	NCR	0 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AHN	NCR	0 mo
Antenna - Double Ridge	EMCO	3115	AHB	28-Mar-2018	24 mo
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAY	21-Nov-2017	12 mo

TEST DESCRIPTION

The highest gain antenna of each type to be used with the EUT was tested. The EUT was configured for the required transmit frequencies and the modes as showed in the data sheets.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis if required, and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

Measurements at the edges of the allowable band may be presented in an alternative method as provided for in the ANSI C63.10 Marker-Delta method. This method involves performing an in-band fundamental measurement followed by a screen capture of the fundamental and out-of-band emission using reduced measurement instrumentation bandwidths. The amplitude delta measured on this screen capture is applied to the fundamental emission value to show the out-of-band emission level as applied to the limit.

Where the radio test software does not provide for a duty cycle at continuous transmit conditions (> 98%) and the RMS (power average) measurements were made across the on and off times of the EUT transmissions, a duty cycle correction is added to the measurements using the formula of 10*LOG(dc).

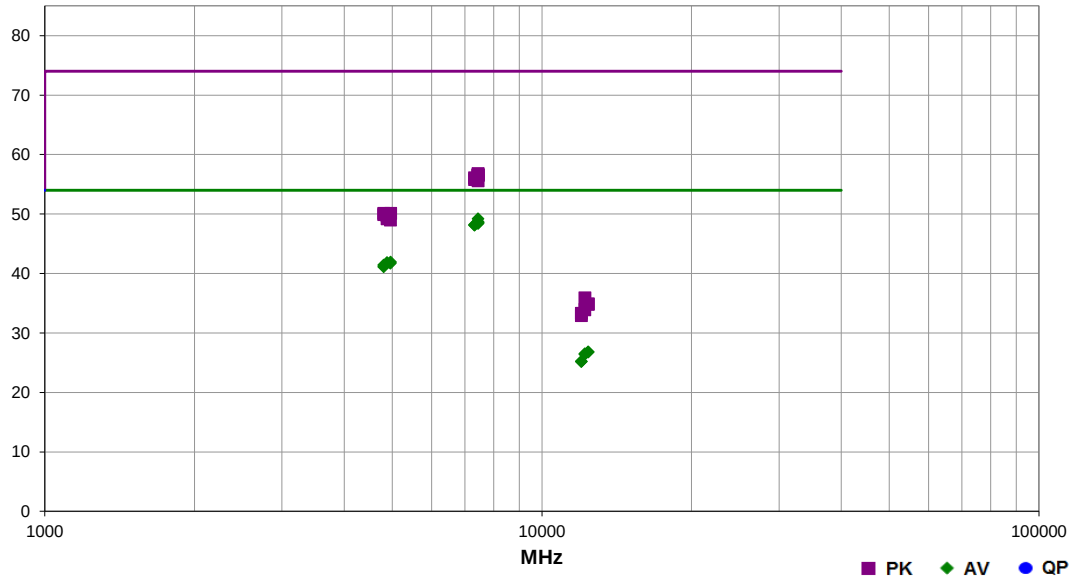
SPURIOUS RADIATED EMISSIONS 16 - ELEMENT

EmiR5 2018.09.26 PSA-ESCI 2018.07.27

Work Order:	SYNA0260	**Date:**	28-Sep-2018		
Project:	None	**Temperature:**	21.5 °C		
Job Site:	OC10	**Humidity:**	52.3% RH		
Serial Number:	E52	**Barometric Pres.:**	1014 mbar	**Tested by:**	Salvador Solorzano
EUT:	Radio Node				
Configuration:	3				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Transmitting using 16-element antenna part number T24190P10006GT on Port 7. See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	168	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7439.570	28.1	17.8	1.8	290.0	3.3	0.0	Horz	AV	0.0	49.2	54.0	-4.8	EUT on side, Ant on side, High Ch, Port 7
7439.505	27.6	17.8	2.6	325.0	3.3	0.0	Vert	AV	0.0	48.7	54.0	-5.3	EUT Vert, Ant Vert, High Ch, Port 7
7440.505	27.5	17.8	1.0	116.0	3.3	0.0	Vert	AV	0.0	48.6	54.0	-5.4	EUT Horz, Ant Horz, High Ch, Port 7
7440.085	27.4	17.8	1.0	50.0	3.3	0.0	Horz	AV	0.0	48.5	54.0	-5.5	EUT Horz, Ant Horz, High Ch, Port 7
7438.525	27.4	17.8	1.0	280.0	3.3	0.0	Horz	AV	0.0	48.5	54.0	-5.5	EUT Vert, Ant Vert, High Ch, Port 7
7440.080	27.3	17.8	1.0	155.0	3.3	0.0	Vert	AV	0.0	48.4	54.0	-5.6	EUT on side, Ant on side, High Ch, Port 7
7320.305	27.6	17.3	3.4	300.0	3.3	0.0	Vert	AV	0.0	48.2	54.0	-5.8	EUT Vert, Ant Vert, Mid Ch, Port 7
7320.455	27.5	17.3	1.0	142.0	3.3	0.0	Horz	AV	0.0	48.1	54.0	-5.9	EUT on Side, Ant on Side, Mid Ch, Port 7
4959.840	26.1	12.5	1.0	274.0	3.3	0.0	Vert	AV	0.0	41.9	54.0	-12.1	EUT Vert, Ant Vert, High Ch, Port 7
4880.675	26.4	12.1	1.0	212.0	3.3	0.0	Vert	AV	0.0	41.8	54.0	-12.2	EUT Vert, Ant Vert, Mid Ch, Port 7
4880.800	26.4	12.1	1.0	249.0	3.3	0.0	Horz	AV	0.0	41.8	54.0	-12.2	EUT on Side, Ant on Side, Mid Ch, Port 7
4958.605	25.9	12.5	1.0	163.0	3.3	0.0	Horz	AV	0.0	41.7	54.0	-12.3	EUT on Side, Ant on Side, High Ch, Port 7
4804.465	26.8	11.3	1.0	331.0	3.3	0.0	Vert	AV	0.0	41.4	54.0	-12.6	EUT Vert, Ant Vert, Low Ch, Port 7
4804.840	26.5	11.3	1.0	325.0	3.3	0.0	Horz	AV	0.0	41.1	54.0	-12.9	EUT on Side, Ant on Side, Low Ch, Port 7
7441.275	39.0	17.8	2.6	325.0	0.0	0.0	Vert	PK	0.0	56.8	74.0	-17.2	EUT Vert, Ant Vert, High Ch, Port 7
7439.105	38.8	17.8	1.0	50.0	0.0	0.0	Horz	PK	0.0	56.6	74.0	-17.4	EUT Horz, Ant Horz, High Ch, Port 7
7438.690	38.8	17.8	1.0	116.0	0.0	0.0	Vert	PK	0.0	56.6	74.0	-17.4	EUT Horz, Ant Horz, High Ch, Port 7
7439.470	38.7	17.8	1.8	290.0	0.0	0.0	Horz	PK	0.0	56.5	74.0	-17.5	EUT on side, Ant on side, High Ch, Port 7
7441.015	38.7	17.8	1.0	280.0	0.0	0.0	Horz	PK	0.0	56.5	74.0	-17.5	EUT Vert, Ant Vert, High Ch, Port 7
7321.200	38.8	17.3	3.4	300.0	0.0	0.0	Vert	PK	0.0	56.1	74.0	-17.9	EUT Vert, Ant Vert, Mid Ch, Port 7
7319.585	38.5	17.3	1.0	142.0	0.0	0.0	Horz	PK	0.0	55.8	74.0	-18.2	EUT on Side, Ant on Side, Mid Ch, Port 7
7439.200	37.8	17.8	1.0	155.0	0.0	0.0	Vert	PK	0.0	55.6	74.0	-18.4	EUT on side, Ant on side, High Ch, Port 7
4961.320	37.6	12.5	1.0	274.0	0.0	0.0	Vert	PK	0.0	50.1	74.0	-23.9	EUT Vert, Ant Vert, High Ch, Port 7
4804.945	38.8	11.3	1.0	331.0	0.0	0.0	Vert	PK	0.0	50.1	74.0	-23.9	EUT Vert, Ant Vert, Low Ch, Port 7
4804.805	38.6	11.3	1.0	325.0	0.0	0.0	Horz	PK	0.0	49.9	74.0	-24.1	EUT on Side, Ant on Side, Low Ch, Port 7
4881.465	37.6	12.1	1.0	212.0	0.0	0.0	Vert	PK	0.0	49.7	74.0	-24.3	EUT Vert, Ant Vert, Mid Ch, Port 7

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4879.490	37.1	12.1	1.0	249.0	0.0	0.0	Horz	PK	0.0	49.2	74.0	-24.8	EUT on Side, Ant on Side, Mid Ch, Port 7
4958.945	36.5	12.5	1.0	163.0	0.0	0.0	Horz	PK	0.0	49.0	74.0	-25.0	EUT on Side, Ant on Side, High Ch, Port 7
12398.760	26.9	-3.4	1.9	329.0	3.3	0.0	Horz	AV	0.0	26.8	54.0	-27.2	EUT on Side, Ant on Side, High Ch, Port 7
12399.000	26.9	-3.4	1.0	293.0	3.3	0.0	Vert	AV	0.0	26.8	54.0	-27.2	EUT Vert, Ant Vert, High Ch, Port 7
12201.470	27.0	-3.8	1.0	352.0	3.3	0.0	Horz	AV	0.0	26.5	54.0	-27.5	EUT on Side, Ant on Side, Mid Ch, Port 7
12201.120	26.9	-3.8	3.8	161.0	3.3	0.0	Vert	AV	0.0	26.4	54.0	-27.6	EUT Vert, Ant Vert, Mid Ch, Port 7
12011.090	27.3	-5.4	2.0	26.0	3.3	0.0	Horz	AV	0.0	25.2	54.0	-28.8	EUT on Side, Ant on Side, Low Ch, Port 7
12011.430	27.3	-5.4	1.0	176.0	3.3	0.0	Vert	AV	0.0	25.2	54.0	-28.8	EUT Vert, Ant Vert, Low Ch, Port 7
12201.410	39.7	-3.8	1.0	352.0	0.0	0.0	Horz	PK	0.0	35.9	74.0	-38.1	EUT on Side, Ant on Side, Mid Ch, Port 7
12398.590	38.3	-3.4	1.9	329.0	0.0	0.0	Horz	PK	0.0	34.9	74.0	-39.1	EUT on Side, Ant on Side, High Ch, Port 7
12398.940	38.2	-3.4	1.0	293.0	0.0	0.0	Vert	PK	0.0	34.8	74.0	-39.2	EUT Vert, Ant Vert, High Ch, Port 7
12200.080	37.7	-3.8	3.8	161.0	0.0	0.0	Vert	PK	0.0	33.9	74.0	-40.1	EUT Vert, Ant Vert, Mid Ch, Port 7
12010.980	38.7	-5.4	2.0	26.0	0.0	0.0	Horz	PK	0.0	33.3	74.0	-40.7	EUT on Side, Ant on Side, Low Ch, Port 7
12009.540	38.3	-5.4	1.0	176.0	0.0	0.0	Vert	PK	0.0	32.9	74.0	-41.1	EUT Vert, Ant Vert, Low Ch, Port 7

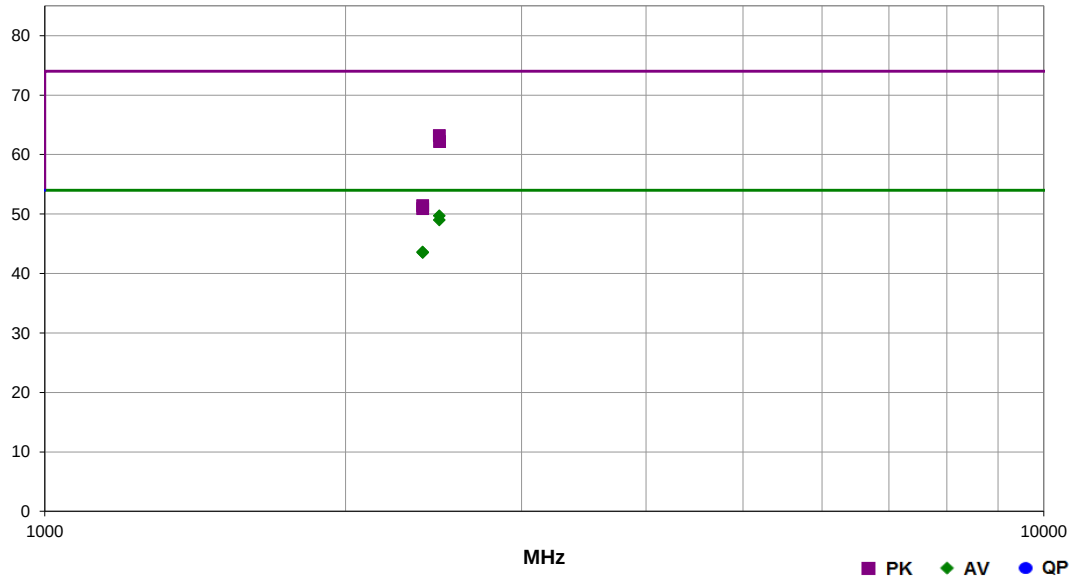
SPURIOUS RADIATED EMISSIONS 16 - ELEMENT

EmiR5 2018.09.26 PSA-ESCI 2018.07.27

Work Order:	SYNA0260	**Date:**	28-Sep-2018		
Project:	None	**Temperature:**	21.5 °C		
Job Site:	OC10	**Humidity:**	52.3% RH		
Serial Number:	E52	**Barometric Pres.:**	1014 mbar	**Tested by:**	Salvador Solorzano
EUT:	Radio Node				
Configuration:	3				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Transmitting using 16-element antenna part number T24190P10006GT on Port 7. See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	172	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.502	33.4	3.0	3.5	353.0	3.3	10.0	Vert	AV	0.0	49.7	54.0	-4.3	EUT Vert, Ant Vert, High Ch, Port 7
2483.510	32.7	3.0	2.2	359.0	3.3	10.0	Horz	AV	0.0	49.0	54.0	-5.0	EUT on Side, Ant on Side, High Ch, Port 7
2389.367	27.7	2.6	1.0	233.0	3.3	10.0	Vert	AV	0.0	43.6	54.0	-10.4	EUT Vert, Ant Vert, Low Ch, Port 7
2389.852	27.6	2.6	4.0	113.0	3.3	10.0	Horz	AV	0.0	43.5	54.0	-10.5	EUT on Side, Ant on Side, Low Ch, Port 7
2483.513	50.2	3.0	3.5	353.0	0.0	10.0	Vert	PK	0.0	63.2	74.0	-10.8	EUT Vert, Ant Vert, High Ch, Port 7
2483.608	49.2	3.0	2.2	359.0	0.0	10.0	Horz	PK	0.0	62.2	74.0	-11.8	EUT on Side, Ant on Side, High Ch, Port 7
2389.473	38.8	2.6	1.0	233.0	0.0	10.0	Vert	PK	0.0	51.4	74.0	-22.6	EUT Vert, Ant Vert, Low Ch, Port 7
2389.622	38.3	2.6	4.0	113.0	0.0	10.0	Horz	PK	0.0	50.9	74.0	-23.1	EUT on Side, Ant on Side, Low Ch, Port 7

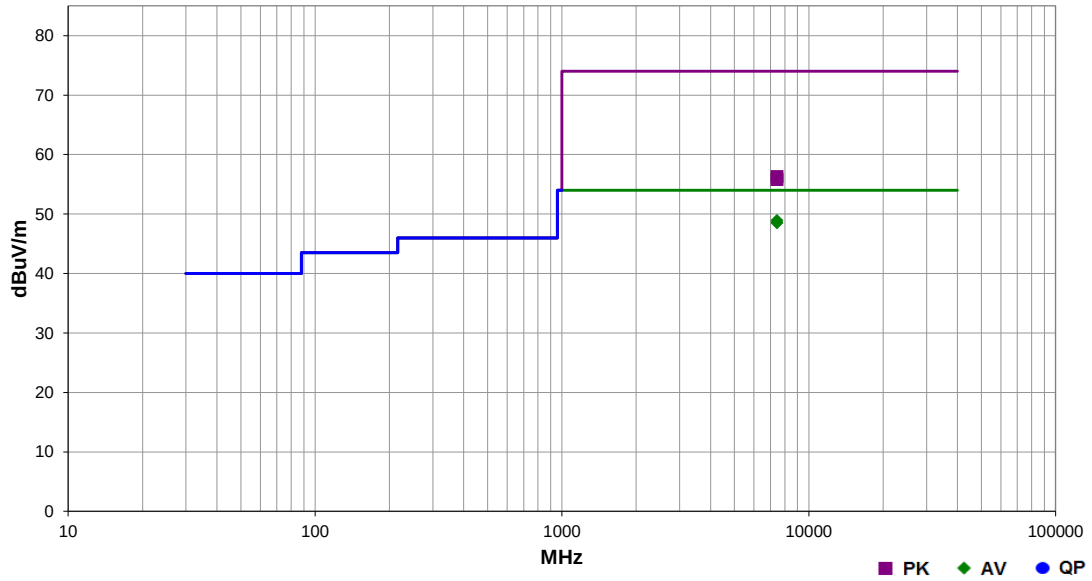
SPURIOUS RADIATED EMISSIONS 16 - ELEMENT

EmiR5 2018.09.26 PSA-ESCI 2018.07.27

Work Order:	SYNA0260	**Date:**	28-Sep-2018		
Project:	None	**Temperature:**	21.5 °C		
Job Site:	OC10	**Humidity:**	52.3% RH		
Serial Number:	E52	**Barometric Pres.:**	1014 mbar	**Tested by:**	Salvador Solorzano
EUT:	Radio Node				
Configuration:	3				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Transmitting using 16-element antenna part number T24190P10006GT on Port 8. See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	174	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7439.615	27.8	17.8	1.0	299.0	3.3	0.0	Vert	AV	0.0	48.9	54.0	-5.1	EUT Vert, Ant Vert, High Ch, Port 8
7438.975	27.4	17.8	1.0	292.0	3.3	0.0	Horz	AV	0.0	48.5	54.0	-5.5	EUT on Side, Ant on Side, High Ch, Port 8
7438.870	38.5	17.8	1.0	299.0	0.0	0.0	Vert	PK	0.0	56.3	74.0	-17.7	EUT Vert, Ant Vert, High Ch, Port 8
7441.060	38.0	17.8	1.0	292.0	0.0	0.0	Horz	PK	0.0	55.8	74.0	-18.2	EUT on Side, Ant on Side, High Ch, Port 8

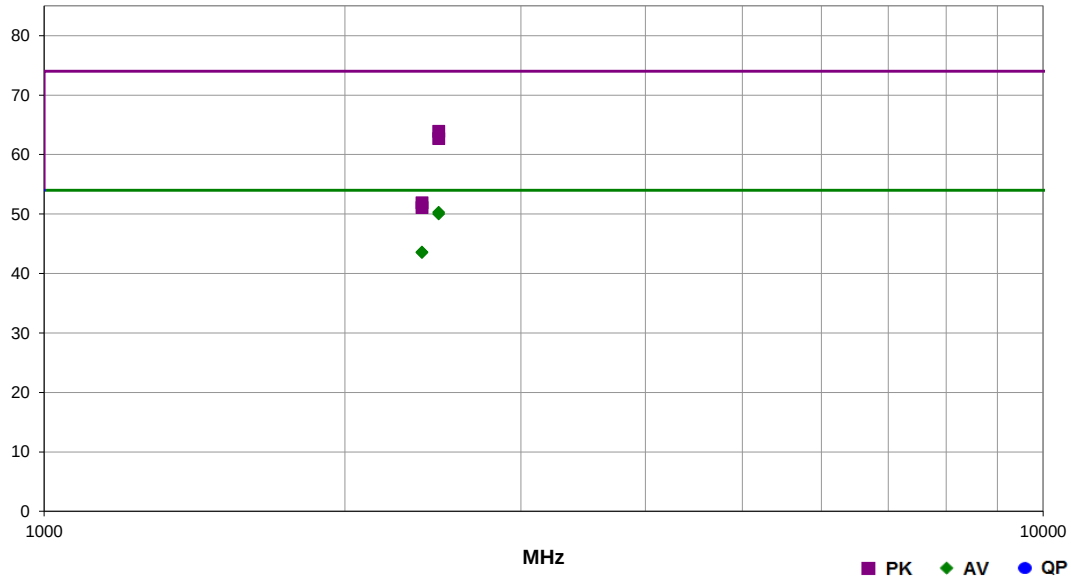
SPURIOUS RADIATED EMISSIONS 16 - ELEMENT

EmiR5 2018.09.26 PSA-ESCI 2018.07.27

Work Order:	SYNA0260	**Date:**	28-Sep-2018		
Project:	None	**Temperature:**	21.5 °C		
Job Site:	OC10	**Humidity:**	52.3% RH		
Serial Number:	E52	**Barometric Pres.:**	1014 mbar	**Tested by:**	Salvador Solorzano
EUT:	Radio Node				
Configuration:	3				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Transmitting using 16-element antenna part number T24190P10006GT on Port 8. See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	173	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.527	34.0	3.0	2.8	352.0	3.3	10.0	Horz	AV	0.0	50.3	54.0	-3.7	EUT on Side, Ant on Side, High Ch, Port 8
2483.505	33.7	3.0	3.4	343.0	3.3	10.0	Vert	AV	0.0	50.0	54.0	-4.0	EUT Vert, Ant Vert, High Ch, Port 8
2483.515	50.9	3.0	2.8	352.0	0.0	10.0	Horz	PK	0.0	63.9	74.0	-10.1	EUT on Side, Ant on Side, High Ch, Port 8
2389.382	27.7	2.6	3.4	165.0	3.3	10.0	Vert	AV	0.0	43.6	54.0	-10.4	EUT Vert, Ant Vert, Low Ch, Port 8
2389.250	27.6	2.6	3.1	90.0	3.3	10.0	Horz	AV	0.0	43.5	54.0	-10.5	EUT on Side, Ant on Side, Low Ch, Port 8
2483.550	49.7	3.0	3.4	343.0	0.0	10.0	Vert	PK	0.0	62.7	74.0	-11.3	EUT Vert, Ant Vert, High Ch, Port 8
2389.183	39.3	2.6	3.4	165.0	0.0	10.0	Vert	PK	0.0	51.9	74.0	-22.1	EUT Vert, Ant Vert, Low Ch, Port 8
2389.177	38.5	2.6	3.1	90.0	0.0	10.0	Horz	PK	0.0	51.1	74.0	-22.9	EUT on Side, Ant on Side, Low Ch, Port 8

SPURIOUS RADIATED EMISSIONS
SINGLE - ELEMENT

PSA-ESCI 2018.05.04

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz

POWER SETTINGS INVESTIGATED

POE

CONFIGURATIONS INVESTIGATED

SYNA0260 - 4

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26000 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Cable	Northwest EMC	10kHz-1GHz RE Cables	OCH	20-Sep-2018	12 mo
Antenna - Biconilog	Teseq	CBL 6141A	AYE	7-Nov-2017	24 mo
Amplifier - Pre-Amplifier	Miteq	AM-1402	AOZ	10-Jul-2018	12 mo
Attenuator	S.M. Electronics	SA6-20	REO	25-Jan-2018	12 mo
Filter - Low Pass	Micro-Tronics	LPM50004	HGK	25-Jan-2018	12 mo
Filter - High Pass	Micro-Tronics	HPM50111	HGQ	25-Jan-2018	12 mo
Cable	Northwest EMC	8-18GHz RE Cables	OCO	6-Sep-2018	12 mo
Cable	Northwest EMC	18-26GHz RE Cables	OCK	27-Dec-2017	12 mo
Cable	Northwest EMC	1-8GHz RE Cables	OCJ	6-Sep-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-4D-010120-30-10P-1	AOP	6-Sep-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AOI	27-Dec-2017	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AOF	7-Sep-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AOE	7-Sep-2018	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AHT	NCR	0 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AHR	NCR	0 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AHN	NCR	0 mo
Antenna - Double Ridge	EMCO	3115	AHB	28-Mar-2018	24 mo
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAY	21-Nov-2017	12 mo

TEST DESCRIPTION

The highest gain antenna of each type to be used with the EUT was tested. The EUT was configured for the required transmit frequencies and the modes as showed in the data sheets.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis if required, and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

Measurements at the edges of the allowable band may be presented in an alternative method as provided for in the ANSI C63.10 Marker-Delta method. This method involves performing an in-band fundamental measurement followed by a screen capture of the fundamental and out-of-band emission using reduced measurement instrumentation bandwidths. The amplitude delta measured on this screen capture is applied to the fundamental emission value to show the out-of-band emission level as applied to the limit.

Where the radio test software does not provide for a duty cycle at continuous transmit conditions (> 98%) and the RMS (power average) measurements were made across the on and off times of the EUT transmissions, a duty cycle correction is added to the measurements using the formula of 10*LOG(dc).

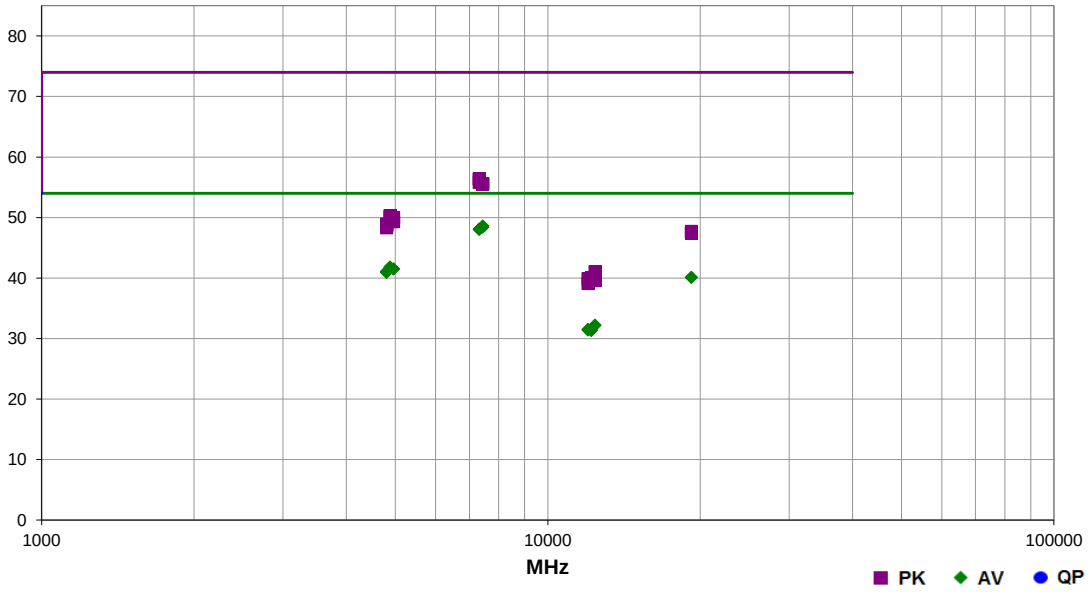
SPURIOUS RADIATED EMISSIONS SINGLE - ELEMENT

EmiR5 2018.09.26 PSA-ESCI 2018.07.27

Work Order:	SYNA0260	**Date:**	28-Sep-2018		
Project:	None	**Temperature:**	22.2 °C		
Job Site:	OC10	**Humidity:**	52.9% RH		
Serial Number:	E52	**Barometric Pres.:**	1017 mbar	**Tested by:**	Salvador Solorzano
EUT:	Radio Node				
Configuration:	4				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Transmitting using Single-element patch antenna part number RE09P-NM on Port 7. See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	146	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7439.733	27.5	17.8	1.0	94.0	3.3	0.0	Vert	AV	0.0	48.6	54.0	-5.4	EUT Horz, Ant Horz, High Ch, Port 7
7441.892	27.3	17.8	1.0	36.0	3.3	0.0	Horz	AV	0.0	48.4	54.0	-5.6	EUT Horz, Ant Horz, High Ch, Port 7
7320.895	27.5	17.3	1.0	178.0	3.3	0.0	Horz	AV	0.0	48.1	54.0	-5.9	EUT Horz, Ant Horz, Mid Ch, Port 7
7320.750	27.4	17.3	1.9	272.0	3.3	0.0	Vert	AV	0.0	48.0	54.0	-6.0	EUT Horz, Ant Horz, Mid Ch, Port 7
4879.370	26.4	12.1	1.0	276.0	3.3	0.0	Horz	AV	0.0	41.8	54.0	-12.2	EUT Horz, Ant Horz, Mid Ch, Port 7
4878.850	26.3	12.1	1.0	0.0	3.3	0.0	Vert	AV	0.0	41.7	54.0	-12.3	EUT Horz, Ant Horz, Mid Ch, Port 7
4960.383	25.7	12.5	1.0	222.0	3.3	0.0	Horz	AV	0.0	41.5	54.0	-12.5	EUT Horz, Ant Horz, High Ch, Port 7
4958.175	25.7	12.5	1.0	244.0	3.3	0.0	Vert	AV	0.0	41.5	54.0	-12.5	EUT Horz, Ant Horz, High Ch, Port 7
4804.905	26.4	11.3	1.0	150.0	3.3	0.0	Horz	AV	0.0	41.0	54.0	-13.0	EUT Horz, Ant Horz, Low Ch, Port 7
4803.665	26.4	11.3	2.0	251.0	3.3	0.0	Vert	AV	0.0	41.0	54.0	-13.0	EUT Horz, Ant Horz, Low Ch, Port 7
4804.330	26.4	11.3	1.0	154.0	3.3	0.0	Horz	AV	0.0	41.0	54.0	-13.0	EUT on side, Ant on Side, Low Ch, port 7
4805.155	26.4	11.3	3.4	328.0	3.3	0.0	Vert	AV	0.0	41.0	54.0	-13.0	EUT on side, Ant on Side, Low Ch, port 7
4805.325	26.4	11.3	1.6	331.0	3.3	0.0	Horz	AV	0.0	41.0	54.0	-13.0	EUT Vert, Ant Vert, Low Ch, Port 7
4805.490	26.3	11.3	1.0	360.0	3.3	0.0	Vert	AV	0.0	40.9	54.0	-13.1	EUT Vert, Ant Vert, Low Ch, Port 7
19217.170	40.7	-3.9	1.5	187.0	3.3	0.0	Horz	AV	0.0	40.1	54.0	-13.9	EUT Horz, Ant Horz, Low Ch, Port 7
19217.110	40.7	-3.9	1.5	235.0	3.3	0.0	Vert	AV	0.0	40.1	54.0	-13.9	EUT Horz, Ant Horz, Low Ch, Port 7
7318.895	39.1	17.3	1.0	178.0	0.0	0.0	Horz	PK	0.0	56.4	74.0	-17.6	EUT Horz, Ant Horz, Mid Ch, Port 7
7319.760	38.5	17.3	1.9	272.0	0.0	0.0	Vert	PK	0.0	55.8	74.0	-18.2	EUT Horz, Ant Horz, Mid Ch, Port 7
7441.658	37.8	17.8	1.0	36.0	0.0	0.0	Horz	PK	0.0	55.6	74.0	-18.4	EUT Horz, Ant Horz, High Ch, Port 7
7438.925	37.7	17.8	1.0	94.0	0.0	0.0	Vert	PK	0.0	55.5	74.0	-18.5	EUT Horz, Ant Horz, High Ch, Port 7
12398.580	32.3	-3.4	1.0	153.0	3.3	0.0	Horz	AV	0.0	32.2	54.0	-21.8	EUT Horz, Ant Horz, High Ch, Port 7
12398.590	32.3	-3.4	1.0	197.0	3.3	0.0	Vert	AV	0.0	32.2	54.0	-21.8	EUT Horz, Ant Horz, High Ch, Port 7
12011.380	33.6	-5.4	1.0	19.0	3.3	0.0	Vert	AV	0.0	31.5	54.0	-22.5	EUT Horz, Ant Horz, Low Ch, Port 7
12201.260	31.9	-3.8	2.7	327.0	3.3	0.0	Horz	AV	0.0	31.4	54.0	-22.6	EUT Horz, Ant Horz, Mid Ch, Port 7

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
12011.240	33.5	-5.4	1.5	23.0	3.3	0.0	Horz	AV	0.0	31.4	54.0	-22.6	EUT Horz, Ant Horz, Low Ch, Port 7
12200.660	31.8	-3.8	1.0	354.0	3.3	0.0	Vert	AV	0.0	31.3	54.0	-22.7	EUT Horz, Ant Horz, Mid Ch, Port 7
4880.905	38.2	12.1	1.0	276.0	0.0	0.0	Horz	PK	0.0	50.3	74.0	-23.7	EUT Horz, Ant Horz, Mid Ch, Port 7
4880.485	37.9	12.1	1.0	0.0	0.0	0.0	Vert	PK	0.0	50.0	74.0	-24.0	EUT Horz, Ant Horz, Mid Ch, Port 7
4958.733	37.5	12.5	1.0	222.0	0.0	0.0	Horz	PK	0.0	50.0	74.0	-24.0	EUT Horz, Ant Horz, High Ch, Port 7
4958.367	36.8	12.5	1.0	244.0	0.0	0.0	Vert	PK	0.0	49.3	74.0	-24.7	EUT Horz, Ant Horz, High Ch, Port 7
4802.560	37.6	11.3	1.0	150.0	0.0	0.0	Horz	PK	0.0	48.9	74.0	-25.1	EUT Horz, Ant Horz, Low Ch, Port 7
4802.590	37.6	11.3	1.0	154.0	0.0	0.0	Horz	PK	0.0	48.9	74.0	-25.1	EUT on side, Ant on Side, Low Ch, port 7
4802.615	37.5	11.3	3.4	328.0	0.0	0.0	Vert	PK	0.0	48.8	74.0	-25.2	EUT on side, Ant on Side, Low Ch, port 7
4804.245	37.4	11.3	2.0	251.0	0.0	0.0	Vert	PK	0.0	48.7	74.0	-25.3	EUT Horz, Ant Horz, Low Ch, Port 7
4804.140	37.3	11.3	1.0	360.0	0.0	0.0	Vert	PK	0.0	48.6	74.0	-25.4	EUT Vert, Ant Vert, Low Ch, Port 7
4804.250	37.0	11.3	1.6	331.0	0.0	0.0	Horz	PK	0.0	48.3	74.0	-25.7	EUT Vert, Ant Vert, Low Ch, Port 7
19215.170	51.6	-3.9	1.5	235.0	0.0	0.0	Vert	PK	0.0	47.7	74.0	-26.3	EUT Horz, Ant Horz, Low Ch, Port 7
19216.510	51.3	-3.9	1.5	187.0	0.0	0.0	Horz	PK	0.0	47.4	74.0	-26.6	EUT Horz, Ant Horz, Low Ch, Port 7
12398.640	44.4	-3.4	1.0	197.0	0.0	0.0	Vert	PK	0.0	41.0	74.0	-33.0	EUT Horz, Ant Horz, High Ch, Port 7
12200.090	43.8	-3.8	1.0	354.0	0.0	0.0	Vert	PK	0.0	40.0	74.0	-34.0	EUT Horz, Ant Horz, Mid Ch, Port 7
12008.940	45.3	-5.4	1.5	23.0	0.0	0.0	Horz	PK	0.0	39.9	74.0	-34.1	EUT Horz, Ant Horz, Low Ch, Port 7
12399.610	43.0	-3.4	1.0	153.0	0.0	0.0	Horz	PK	0.0	39.6	74.0	-34.4	EUT Horz, Ant Horz, High Ch, Port 7
12200.240	43.4	-3.8	2.7	327.0	0.0	0.0	Horz	PK	0.0	39.6	74.0	-34.4	EUT Horz, Ant Horz, Mid Ch, Port 7
12011.010	44.5	-5.4	1.0	19.0	0.0	0.0	Vert	PK	0.0	39.1	74.0	-34.9	EUT Horz, Ant Horz, Low Ch, Port 7

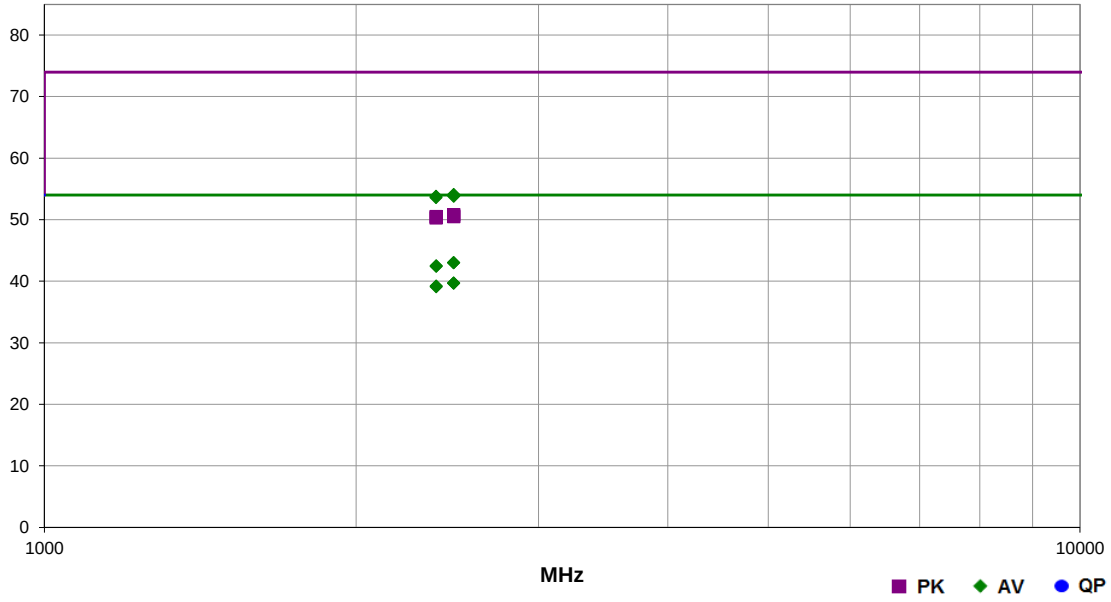
SPURIOUS RADIATED EMISSIONS SINGLE - ELEMENT

EmiR5 2018.09.26 PSA-ESCI 2018.07.27

Work Order:	SYNA0260	**Date:**	28-Sep-2018		
Project:	None	**Temperature:**	22.2 °C		
Job Site:	OC10	**Humidity:**	52.9% RH		
Serial Number:	E52	**Barometric Pres.:**	1017 mbar	**Tested by:**	Salvador Solorzano
EUT:	Radio Node				
Configuration:	4				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, Low Channel = 2402 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Transmitting using Single-element patch antenna part number RE09P-NM on Port 7. See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	149	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2484.450	37.8	3.0	1.0	117.0	3.3	10.0	Horz	AV	0.0	54.1	54.0	0.1	EUT Horz, Ant Horz, High Ch. Port 7
2389.472	37.9	2.6	3.6	135.0	3.3	10.0	Horz	AV	0.0	53.8	54.0	-0.2	EUT Horz, Ant Horz,Low Ch, Port 7
2484.882	37.5	3.0	1.0	160.0	3.3	10.0	Vert	AV	0.0	53.8	54.0	-0.2	EUT Horz, Ant Horz, High Ch. Port 7
2389.348	37.7	2.6	1.3	344.0	3.3	10.0	Vert	AV	0.0	53.6	54.0	-0.4	EUT Horz, Ant Horz,Low Ch, Port 7
2484.002	26.7	3.0	1.0	117.0	3.3	10.0	Horz	AV	0.0	43.0	54.0	-11.0	EUT Horz, Ant Horz, High Ch. Port 7
2484.367	26.7	3.0	1.0	160.0	3.3	10.0	Vert	AV	0.0	43.0	54.0	-11.0	EUT Horz, Ant Horz, High Ch. Port 7
2389.897	26.6	2.6	3.6	135.0	3.3	10.0	Horz	AV	0.0	42.5	54.0	-11.5	EUT Horz, Ant Horz,Low Ch, Port 7
2389.810	26.5	2.6	1.3	344.0	3.3	10.0	Vert	AV	0.0	42.4	54.0	-11.6	EUT Horz, Ant Horz,Low Ch, Port 7
2484.002	26.7	3.0	1.0	117.0		10.0	Horz	AV	0.0	39.7	54.0	-14.3	EUT Horz, Ant Horz, High Ch. Port 7
2484.367	26.7	3.0	1.0	160.0		10.0	Vert	AV	0.0	39.7	54.0	-14.3	EUT Horz, Ant Horz, High Ch. Port 7
2389.897	26.6	2.6	3.6	135.0		10.0	Horz	AV	0.0	39.2	54.0	-14.8	EUT Horz, Ant Horz,Low Ch, Port 7
2389.810	26.5	2.6	1.3	344.0		10.0	Vert	AV	0.0	39.1	54.0	-14.9	EUT Horz, Ant Horz,Low Ch, Port 7
2484.450	37.8	3.0	1.0	117.0		10.0	Horz	PK	0.0	50.8	74.0	-23.2	EUT Horz, Ant Horz, High Ch. Port 7
2389.472	37.9	2.6	3.6	135.0		10.0	Horz	PK	0.0	50.5	74.0	-23.5	EUT Horz, Ant Horz,Low Ch, Port 7
2484.882	37.5	3.0	1.0	160.0		10.0	Vert	PK	0.0	50.5	74.0	-23.5	EUT Horz, Ant Horz, High Ch. Port 7
2389.348	37.7	2.6	1.3	344.0		10.0	Vert	PK	0.0	50.3	74.0	-23.7	EUT Horz, Ant Horz,Low Ch, Port 7

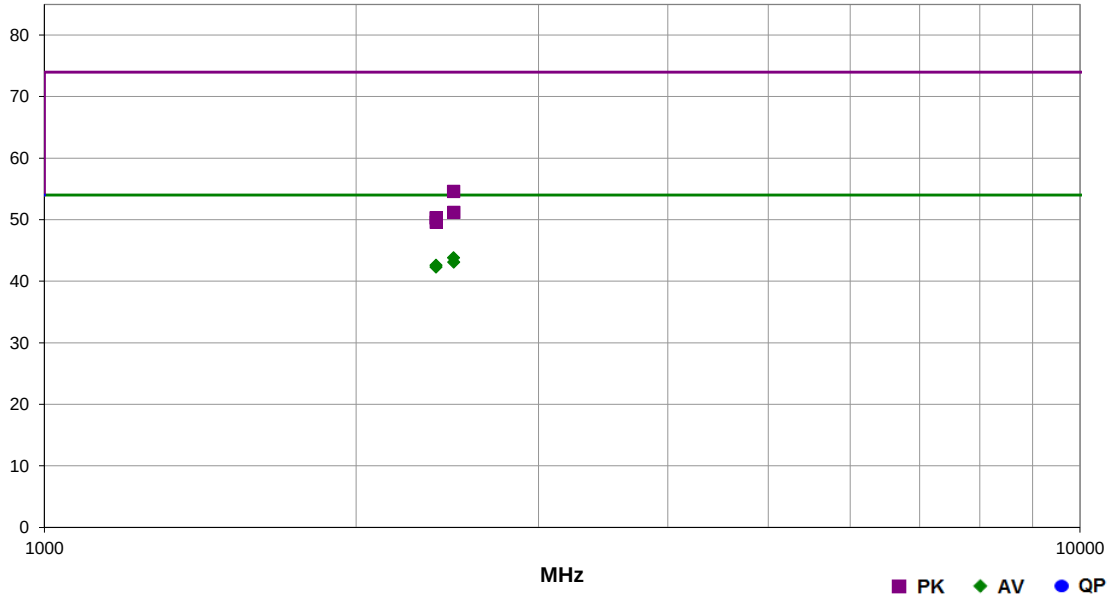
SPURIOUS RADIATED EMISSIONS SINGLE - ELEMENT

EmiR5 2018.09.26 PSA-ESCI 2018.07.27

Work Order:	SYNA0260	**Date:**	28-Sep-2018		
Project:	None	**Temperature:**	22.2 °C		
Job Site:	OC10	**Humidity:**	52.9% RH		
Serial Number:	E52	**Barometric Pres.:**	1017 mbar	**Tested by:**	Salvador Solorzano
EUT:	Radio Node				
Configuration:	4				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, Low Channel = 2402 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Transmitting using Single-element patch antenna part number RE09P-NM on Port 8. See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	150	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2484.017	27.5	3.0	1.0	276.0	3.3	10.0	Horz	AV	0.0	43.8	54.0	-10.2	EUT Horz, Ant Horz, High Ch. Port 8
2484.407	26.8	3.0	1.0	55.0	3.3	10.0	Vert	AV	0.0	43.1	54.0	-10.9	EUT Horz, Ant Horz, High Ch. Port 8
2389.162	26.7	2.6	1.0	342.0	3.3	10.0	Vert	AV	0.0	42.6	54.0	-11.4	EUT Horz, Ant Horz, Low Ch, Port 8
2389.463	26.4	2.6	1.0	186.0	3.3	10.0	Horz	AV	0.0	42.3	54.0	-11.7	EUT Horz, Ant Horz, Low Ch, Port 8
2484.025	41.6	3.0	1.0	276.0	0.0	10.0	Horz	PK	0.0	54.6	74.0	-19.4	EUT Horz, Ant Horz, High Ch. Port 8
2484.922	38.2	3.0	1.0	55.0	0.0	10.0	Vert	PK	0.0	51.2	74.0	-22.8	EUT Horz, Ant Horz, High Ch. Port 8
2389.123	37.7	2.6	1.0	342.0	0.0	10.0	Vert	PK	0.0	50.3	74.0	-23.7	EUT Horz, Ant Horz, Low Ch, Port 8
2389.587	37.0	2.6	1.0	186.0	0.0	10.0	Horz	PK	0.0	49.6	74.0	-24.4	EUT Horz, Ant Horz, Low Ch, Port 8

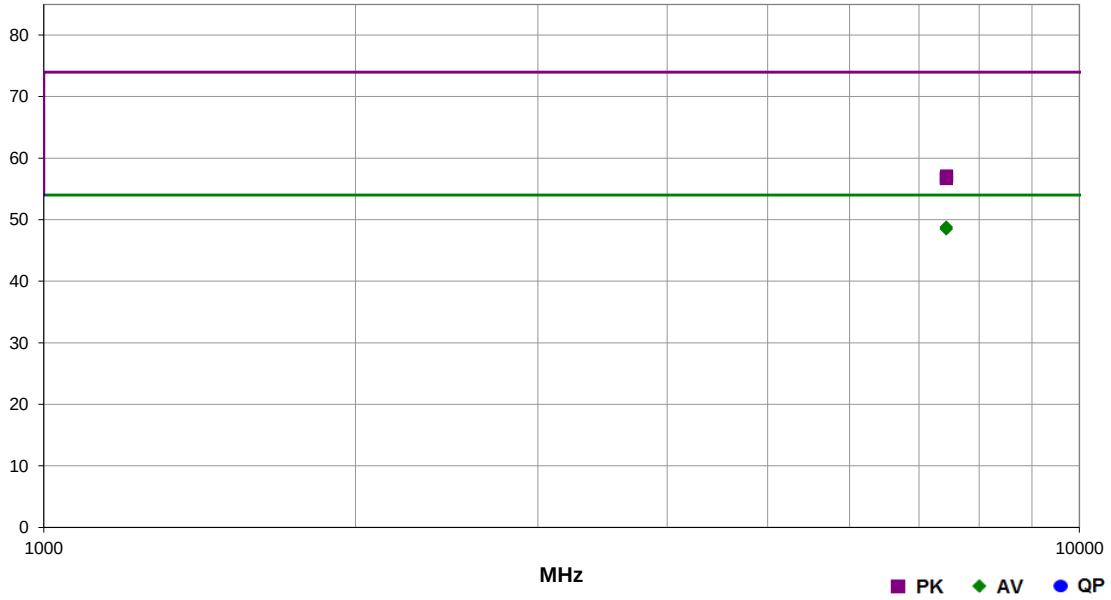
SPURIOUS RADIATED EMISSIONS SINGLE - ELEMENT

EmiR5 2018.09.26 PSA-ESCI 2018.07.27

Work Order:	SYNA0260	**Date:**	28-Sep-2018		
Project:	None	**Temperature:**	22.2 °C		
Job Site:	OC10	**Humidity:**	52.9% RH		
Serial Number:	E52	**Barometric Pres.:**	1017 mbar	**Tested by:**	Salvador Solorzano
EUT:	Radio Node				
Configuration:	4				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Transmitting using Single-element patch antenna part number RE09P-NM on Port 8. See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	151	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7439.505	27.7	17.8	1.0	312.0	3.3	0.0	Horz	AV	0.0	48.8	54.0	-5.2	EUT Horz, Ant Horz, High Ch, Port 8
7440.585	27.4	17.8	1.0	140.0	3.3	0.0	Vert	AV	0.0	48.5	54.0	-5.5	EUT Horz, Ant Horz, High Ch, Port 8
7441.485	39.3	17.8	1.0	140.0	0.0	0.0	Vert	PK	0.0	57.1	74.0	-16.9	EUT Horz, Ant Horz, High Ch, Port 8
7439.315	38.9	17.8	1.0	312.0	0.0	0.0	Horz	PK	0.0	56.7	74.0	-17.3	EUT Horz, Ant Horz, High Ch, Port 8

SPURIOUS RADIATED EMISSIONS YAGI

PSA-ESCI 2018.05.04

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz

POWER SETTINGS INVESTIGATED

POE

CONFIGURATIONS INVESTIGATED

SYNA0260 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26000 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Cable	Northwest EMC	10kHz-1GHz RE Cables	OCH	20-Sep-2018	12 mo
Antenna - Biconilog	Teseq	CBL 6141A	AYE	7-Nov-2017	24 mo
Amplifier - Pre-Amplifier	Miteq	AM-1402	AOZ	10-Jul-2018	12 mo
Attenuator	S.M. Electronics	SA6-20	REO	25-Jan-2018	12 mo
Filter - Low Pass	Micro-Tronics	LPM50004	HGK	25-Jan-2018	12 mo
Filter - High Pass	Micro-Tronics	HPM50111	HGQ	25-Jan-2018	12 mo
Cable	Northwest EMC	8-18GHz RE Cables	OCO	6-Sep-2018	12 mo
Cable	Northwest EMC	18-26GHz RE Cables	OCK	27-Dec-2017	12 mo
Cable	Northwest EMC	1-8GHz RE Cables	OCJ	6-Sep-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-4D-010120-30-10P-1	AOP	6-Sep-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AOI	27-Dec-2017	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AOF	7-Sep-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AOE	7-Sep-2018	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AHT	NCR	0 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AHR	NCR	0 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AHN	NCR	0 mo
Antenna - Double Ridge	EMCO	3115	AHB	28-Mar-2018	24 mo
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAY	21-Nov-2017	12 mo

TEST DESCRIPTION

The highest gain antenna of each type to be used with the EUT was tested. The EUT was configured for the required transmit frequencies and the modes as showed in the data sheets.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis if required, and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

Measurements at the edges of the allowable band may be presented in an alternative method as provided for in the ANSI C63.10 Marker-Delta method. This method involves performing an in-band fundamental measurement followed by a screen capture of the fundamental and out-of-band emission using reduced measurement instrumentation bandwidths. The amplitude delta measured on this screen capture is applied to the fundamental emission value to show the out-of-band emission level as applied to the limit.

Where the radio test software does not provide for a duty cycle at continuous transmit conditions (> 98%) and the RMS (power average) measurements were made across the on and off times of the EUT transmissions, a duty cycle correction is added to the measurements using the formula of 10*LOG(dc).

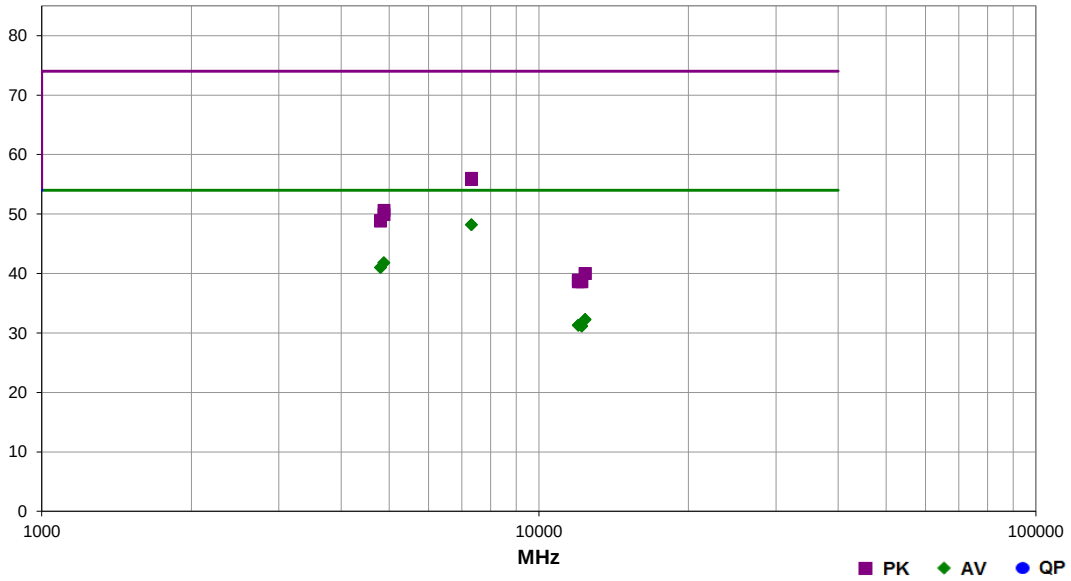
SPURIOUS RADIATED EMISSIONS YAGI

EmiR5 2018.07.19.3 PSA-ESCI 2018.05.04

Work Order:	SYNA0260	**Date:**	25-Sep-2018		
Project:	None	**Temperature:**	22.3 °C		
Job Site:	OC10	**Humidity:**	54% RH		
Serial Number:	E52	**Barometric Pres.:**	1016 mbar	**Tested by:**	Salvador Solorzano
EUT:	Radio Node				
Configuration:	1				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Transmitting using yagi antenna part number C3EY on Port 7. See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	51	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7320.640	27.6	17.3	1.0	184.0	3.3	0.0	Horz	AV	0.0	48.2	54.0	-5.8	EUT on Side, Ant on Side, Mid Ch, Port 7
7320.140	27.6	17.3	1.8	306.0	3.3	0.0	Vert	AV	0.0	48.2	54.0	-5.8	EUT Horz, Ant Horz, Mid Ch, Port 7
4879.985	26.4	12.1	1.0	136.0	3.3	0.0	Horz	AV	0.0	41.8	54.0	-12.2	EUT on Side, Ant on Side, Mid Ch, Port 7
4878.855	26.4	12.1	1.0	117.0	3.3	0.0	Vert	AV	0.0	41.8	54.0	-12.2	EUT Horz, Ant Horz, Mid Ch, Port 7
4803.610	26.4	11.3	1.0	228.0	3.3	0.0	Horz	AV	0.0	41.0	54.0	-13.0	EUT on Side, Ant on Side, Low Ch, Port 7
4804.415	26.4	11.3	1.0	78.0	3.3	0.0	Vert	AV	0.0	41.0	54.0	-13.0	EUT Horz, Ant Horz, Low Ch, Port 7
7320.320	38.7	17.3	1.8	306.0	0.0	0.0	Vert	PK	0.0	56.0	74.0	-18.0	EUT Horz, Ant Horz, Mid Ch, Port 7
7321.055	38.5	17.3	1.0	184.0	0.0	0.0	Horz	PK	0.0	55.8	74.0	-18.2	EUT on Side, Ant on Side, Mid Ch, Port 7
12399.460	32.4	-3.4	1.0	190.0	3.3	0.0	Vert	AV	0.0	32.3	54.0	-21.7	EUT Horz, Ant Horz, High Ch, Port 7
12398.770	32.3	-3.4	3.4	228.0	3.3	0.0	Horz	AV	0.0	32.2	54.0	-21.8	EUT on Side, Ant on Side, High CH, Port 7
12011.290	33.4	-5.4	2.2	350.0	3.3	0.0	Horz	AV	0.0	31.3	54.0	-22.7	EUT on Side, Ant on Side, Low Ch, Port 7
12011.290	33.4	-5.4	1.0	317.0	3.3	0.0	Vert	AV	0.0	31.3	54.0	-22.7	EUT Horz, Ant Horz, Low Ch, Port 7
12201.210	31.7	-3.8	1.0	315.0	3.3	0.0	Horz	AV	0.0	31.2	54.0	-22.8	EUT on Side, Ant on Side,Mid Ch, Port 7
12200.550	31.6	-3.8	1.0	282.0	3.3	0.0	Vert	AV	0.0	31.1	54.0	-22.9	EUT Horz, Ant Horz, Mid Ch, Port 7
4879.590	38.5	12.1	1.0	136.0	0.0	0.0	Horz	PK	0.0	50.6	74.0	-23.4	EUT on Side, Ant on Side, Mid Ch, Port 7
4881.495	37.8	12.1	1.0	117.0	0.0	0.0	Vert	PK	0.0	49.9	74.0	-24.1	EUT Horz, Ant Horz, Mid Ch, Port 7
4803.965	37.6	11.3	1.0	228.0	0.0	0.0	Horz	PK	0.0	48.9	74.0	-25.1	EUT on Side, Ant on Side, Low Ch, Port 7
4803.030	37.5	11.3	1.0	78.0	0.0	0.0	Vert	PK	0.0	48.8	74.0	-25.2	EUT Horz, Ant Horz, Low Ch, Port 7
12399.890	43.4	-3.4	3.4	228.0	0.0	0.0	Horz	PK	0.0	40.0	74.0	-34.0	EUT on Side, Ant on Side, High CH, Port 7
12399.510	43.4	-3.4	1.0	190.0	0.0	0.0	Vert	PK	0.0	40.0	74.0	-34.0	EUT Horz, Ant Horz, High Ch, Port 7
12009.310	44.3	-5.4	2.2	350.0	0.0	0.0	Horz	PK	0.0	38.9	74.0	-35.1	EUT on Side, Ant on Side, Low Ch, Port 7
12199.450	42.6	-3.8	1.0	315.0	0.0	0.0	Horz	PK	0.0	38.8	74.0	-35.2	EUT on Side, Ant on Side,Mid Ch, Port 7
12010.580	44.0	-5.4	1.0	317.0	0.0	0.0	Vert	PK	0.0	38.6	74.0	-35.4	EUT Horz, Ant Horz, Low Ch, Port 7
12200.930	42.4	-3.8	1.0	282.0	0.0	0.0	Vert	PK	0.0	38.6	74.0	-35.4	EUT Horz, Ant Horz, Mid Ch, Port 7

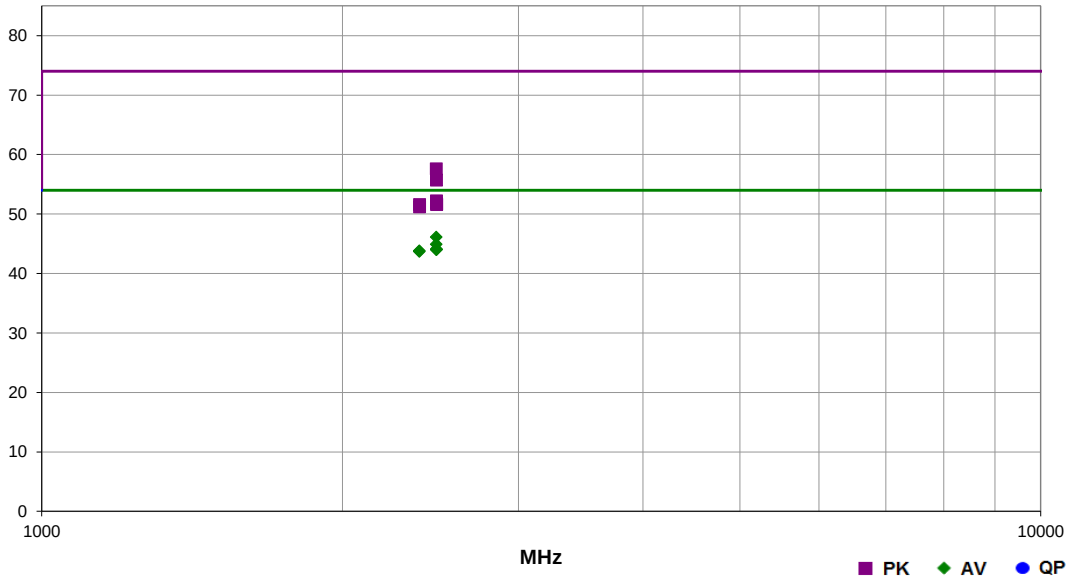
SPURIOUS RADIATED EMISSIONS YAGI

EmiR5 2018.07.19.3 PSA-ESCI 2018.05.04

Work Order:	SYNA0260	**Date:**	2-Oct-2018		
Project:	None	**Temperature:**	25 °C		
Job Site:	OC10	**Humidity:**	44.5% RH		
Serial Number:	E52	**Barometric Pres.:**	1014 mbar	**Tested by:**	Mark Baytan
EUT:	Radio Node				
Configuration:	1				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, Low Channel = 2402 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Transmitting using yagi antenna part number C3EY on Port 7. See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	144	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.547	29.8	3.0	1.0	65.0	3.3	10.0	Vert	AV	0.0	46.1	54.0	-7.9	EUT on Side, Ant on Side, High Ch, Port 7
2483.503	28.6	3.0	1.2	178.0	3.3	10.0	Horz	AV	0.0	44.9	54.0	-9.1	EUT Horz, Ant Horz, High Ch, Port 7
2483.607	27.8	3.0	1.0	233.0	3.3	10.0	Horz	AV	0.0	44.1	54.0	-9.9	EUT Vert, Ant Vert, High Ch, Port 7
2484.480	27.7	3.0	2.0	360.0	3.3	10.0	Vert	AV	0.0	44.0	54.0	-10.0	EUT Horz, Ant Horz, High Ch, Port 7
2483.793	27.7	3.0	1.0	252.0	3.3	10.0	Vert	AV	0.0	44.0	54.0	-10.0	EUT Vert, Ant Vert, High Ch, Port 7
2483.633	27.7	3.0	1.7	131.0	3.3	10.0	Horz	AV	0.0	44.0	54.0	-10.0	EUT on Side, Ant on Side, High Ch, Port 7
2388.160	27.9	2.6	1.0	290.0	3.3	10.0	Vert	AV	0.0	43.8	54.0	-10.2	EUT on Side, Ant on Side, Low Ch, Port 7
2388.430	27.8	2.6	2.9	130.0	3.3	10.0	Horz	AV	0.0	43.7	54.0	-10.3	EUT Horz, Ant Horz, Low Ch, Port 7
2483.533	44.6	3.0	1.0	65.0	0.0	10.0	Vert	PK	0.0	57.6	74.0	-16.4	EUT on Side, Ant on Side, High Ch, Port 7
2483.743	42.7	3.0	1.2	178.0	0.0	10.0	Horz	PK	0.0	55.7	74.0	-18.3	EUT Horz, Ant Horz, High Ch, Port 7
2484.180	39.2	3.0	1.0	233.0	0.0	10.0	Horz	PK	0.0	52.2	74.0	-21.8	EUT Vert, Ant Vert, High Ch, Port 7
2483.713	38.9	3.0	1.7	131.0	0.0	10.0	Horz	PK	0.0	51.9	74.0	-22.1	EUT on Side, Ant on Side, High Ch, Port 7
2484.657	38.7	3.0	2.0	360.0	0.0	10.0	Vert	PK	0.0	51.7	74.0	-22.3	EUT Horz, Ant Horz, High Ch, Port 7
2484.577	38.6	3.0	1.0	252.0	0.0	10.0	Vert	PK	0.0	51.6	74.0	-22.4	EUT Vert, Ant Vert, High Ch, Port 7
2388.950	39.0	2.6	2.9	130.0	0.0	10.0	Horz	PK	0.0	51.6	74.0	-22.4	EUT Horz, Ant Horz, Low Ch, Port 7
2388.800	38.6	2.6	1.0	290.0	0.0	10.0	Vert	PK	0.0	51.2	74.0	-22.8	EUT on Side, Ant on Side, Low Ch, Port 7

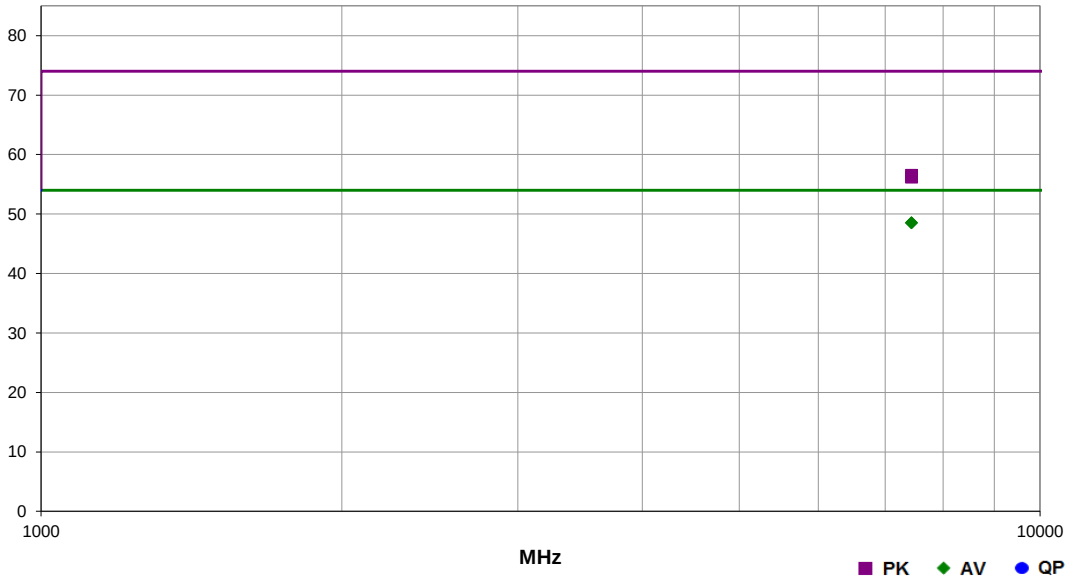
SPURIOUS RADIATED EMISSIONS YAGI

EmiR5 2018.07.19.3 PSA-ESCI 2018.05.04

Work Order:	SYNA0260	**Date:**	25-Sep-2018		
Project:	None	**Temperature:**	22.3 °C		
Job Site:	OC10	**Humidity:**	54% RH		
Serial Number:	E52	**Barometric Pres.:**	1016 mbar	**Tested by:**	Salvador Solorzano
EUT:	Radio Node				
Configuration:	1				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Transmitting using yagi antenna part number C3EY on Port 8. See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	55	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7439.315	27.4	17.8	1.0	321.0	3.3	0.0	Horz	AV	0.0	48.5	54.0	-5.5	EUT on Side, Ant on Side, High Ch, Port 8
7438.615	27.4	17.8	1.0	84.0	3.3	0.0	Vert	AV	0.0	48.5	54.0	-5.5	EUT Horz, Ant Horz, High Ch, Port 8
7439.510	38.7	17.8	1.0	321.0	0.0	0.0	Horz	PK	0.0	56.5	74.0	-17.5	EUT on Side, Ant on Side, High Ch, Port 8
7439.835	38.4	17.8	1.0	84.0	0.0	0.0	Vert	PK	0.0	56.2	74.0	-17.8	EUT Horz, Ant Horz, High Ch, Port 8

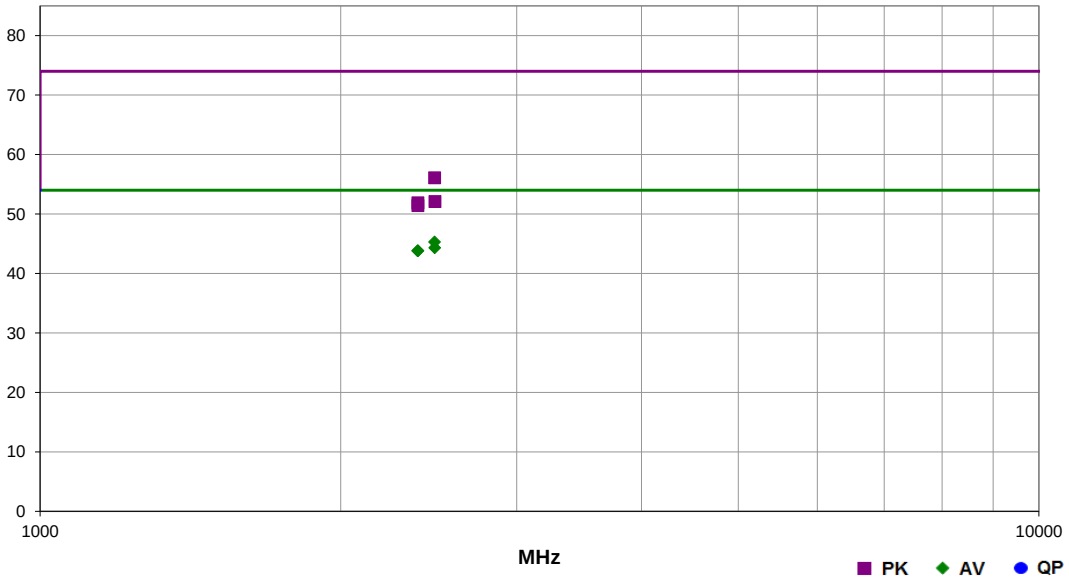
SPURIOUS RADIATED EMISSIONS YAGI

EmiR5 2018.07.19.3 PSA-ESCI 2018.05.04

Work Order:	SYNA0260	**Date:**	2-Oct-2018		
Project:	None	**Temperature:**	25 °C		
Job Site:	OC10	**Humidity:**	44.5% RH		
Serial Number:	E52	**Barometric Pres.:**	1014 mbar	**Tested by:**	Mark Baytan
EUT:	Radio Node				
Configuration:	1				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	None				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, Low Channel = 2402 MHz, High Channel = 2480 MHz				
Deviations:	None				
Comments:	Transmitting using yagi antenna part number C3EY on Port 8. See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).				

Test Specifications	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

Run #	145	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.530	29.0	3.0	1.0	58.0	3.3	10.0	Vert	AV	0.0	45.3	54.0	-8.7	EUT on Side, Ant on Side, High Ch, Port 8
2483.860	28.0	3.0	2.5	245.0	3.3	10.0	Horz	AV	0.0	44.3	54.0	-9.7	EUT Horz, Ant Horz, High Ch, Port 8
2389.810	27.9	2.6	2.4	172.0	3.3	10.0	Horz	AV	0.0	43.8	54.0	-10.2	EUT Horz, Ant Horz, Low Ch, Port 8
2388.283	27.9	2.6	1.0	77.0	3.3	10.0	Vert	AV	0.0	43.8	54.0	-10.2	EUT on Side, Ant on Side, Low Ch, Port 8
2483.533	43.1	3.0	1.0	58.0	0.0	10.0	Vert	PK	0.0	56.1	74.0	-17.9	EUT on Side, Ant on Side, High Ch, Port 8
2484.853	39.1	3.0	2.5	245.0	0.0	10.0	Horz	PK	0.0	52.1	74.0	-21.9	EUT Horz, Ant Horz, High Ch, Port 8
2389.080	39.3	2.6	1.0	77.0	0.0	10.0	Vert	PK	0.0	51.9	74.0	-22.1	EUT on Side, Ant on Side, Low Ch, Port 8
2389.520	38.8	2.6	2.4	172.0	0.0	10.0	Horz	PK	0.0	51.4	74.0	-22.6	EUT Horz, Ant Horz, Low Ch, Port 8

DUTY CYCLE

XMit 2017.12.13

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	IW Microwave	KPS-1503-720-KPS	NCU	5-Jun-18	5-Jun-19
Attenuator	Fairview Microwave	SA4014-20	TKV	19-Feb-18	19-Feb-19
Block - DC	Fairview Microwave	SD3379	AMU	19-Feb-18	19-Feb-19
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAT	21-May-18	21-May-19
Generator - Signal	Agilent	N5182A	TIF	23-Aug-17	23-Aug-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The Duty Cycle (x) of the single channel operation of the radio as controlled by the provided test software was measured for each of the EUT operating modes.

There is no compliance requirement to be met by this test, so therefore no Pass / Fail criteria.

The measurements were made using a zero span on the spectrum analyzer to see the pulses in the time domain. The transmit power was set to its default maximum.

The duty cycle was calculated by dividing the transmission pulse duration (T) by the total period of a single on and total off time.

If the transmit duty cycle < 98 percent, burst gating may have been used during some of the other tests in this report to only take the measurement during the burst duration.

DUTY CYCLE

element

TbtTx 2017.12.14 XMit 2017.12.13

EUT:	**Radio Node**			**Work Order:**	**SYNA0249**
Serial Number:	**E43**			**Date:**	**7-Aug-18**
Customer:	**Walt Disney Parks and Resorts US, Inc.**			**Temperature:**	**23.6 °C**
Attendees:	**Hattie Spetla**			**Humidity:**	**47.6% RH**
Project:	**None**			**Barometric Pres.:**	**1021 mbar**
Tested by:	**Richard Mellroth**	**Power:**	**POE**	**Job Site:**	**NC04**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

COMMENTS

Power Setting at Default

DEVIATIONS FROM TEST STANDARD

None

Configuration #	**7**	*Signature*

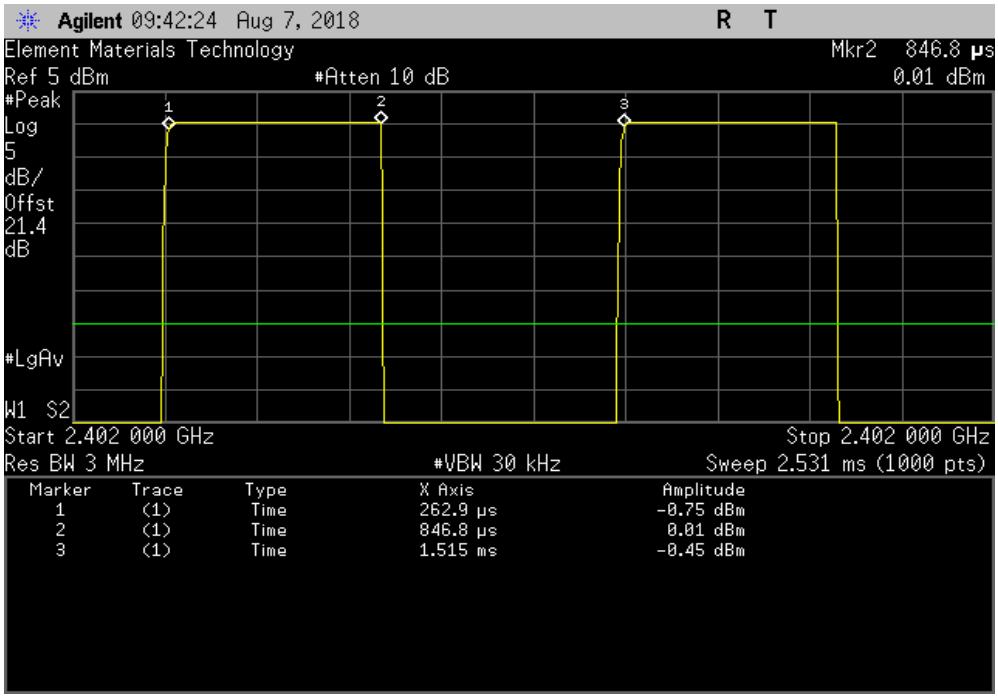
		Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
Antenna Port 7							
	BLE/GFSK						
	Low Channel, 2402 MHz	583.841 us	1.252 ms	1	46.6	N/A	N/A
	Low Channel, 2402 MHz	N/A	N/A	5	N/A	N/A	N/A
	Mid Channel, 2442 MHz	584.094 us	1.25 ms	1	46.7	N/A	N/A
	Mid Channel, 2442 MHz	N/A	N/A	5	N/A	N/A	N/A
	High Channel, 2480 MHz	586.247 us	1.252 ms	1	46.8	N/A	N/A
	High Channel, 2480 MHz	N/A	N/A	5	N/A	N/A	N/A
Antenna Port 8							
	BLE/GFSK						
	Low Channel, 2402 MHz	584.347 us	1.255 ms	1	46.6	N/A	N/A
	Low Channel, 2402 MHz	N/A	N/A	5	N/A	N/A	N/A
	Mid Channel, 2442 MHz	583.559 us	1.254 ms	1	46.5	N/A	N/A
	Mid Channel, 2442 MHz	N/A	N/A	5	N/A	N/A	N/A
	High Channel, 2480 MHz	589.161 us	1.255 ms	1	47	N/A	N/A
	High Channel, 2480 MHz	N/A	N/A	5	N/A	N/A	N/A

DUTY CYCLE

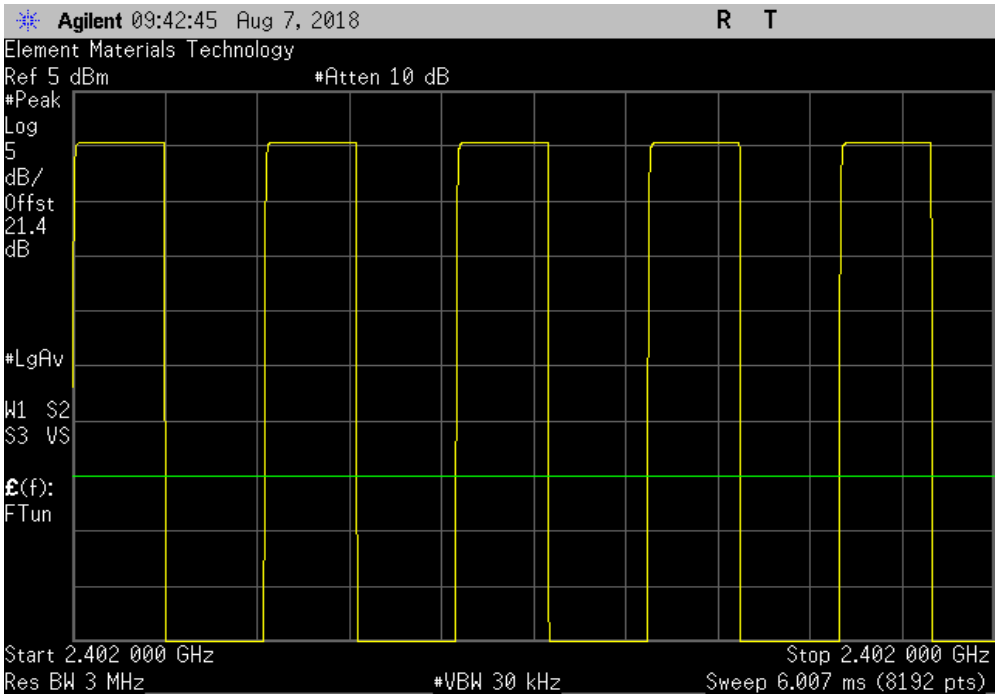
element

TbtTx 2017.12.14 XMit 2017.12.13

Antenna Port 7, BLE/GFSK, Low Channel, 2402 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	583.841 us	1.252 ms	1	46.6	N/A	N/A

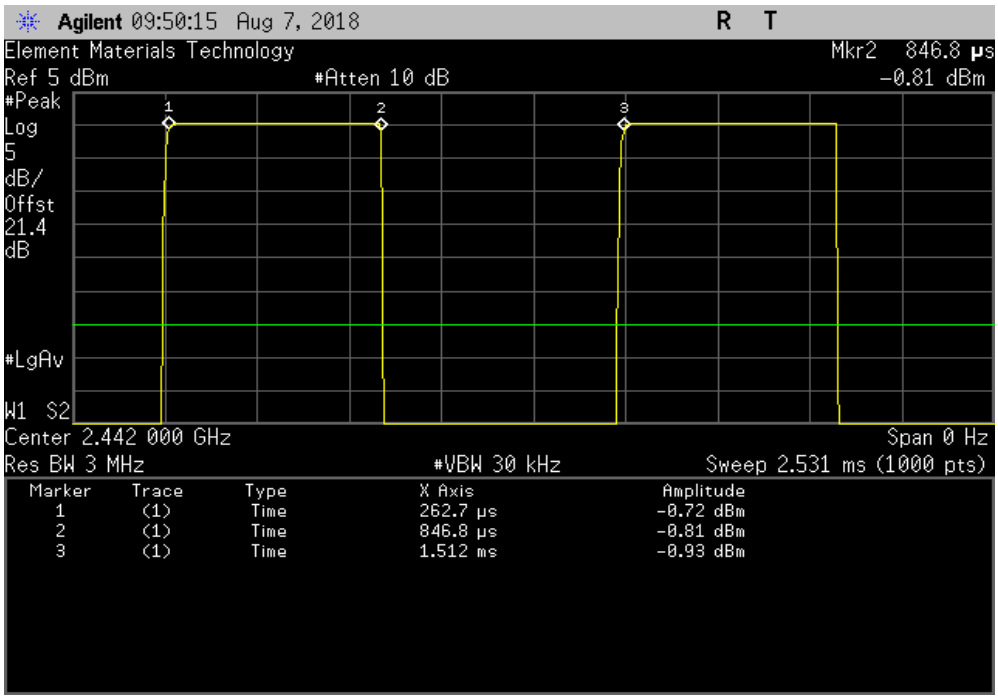


Antenna Port 7, BLE/GFSK, Low Channel, 2402 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

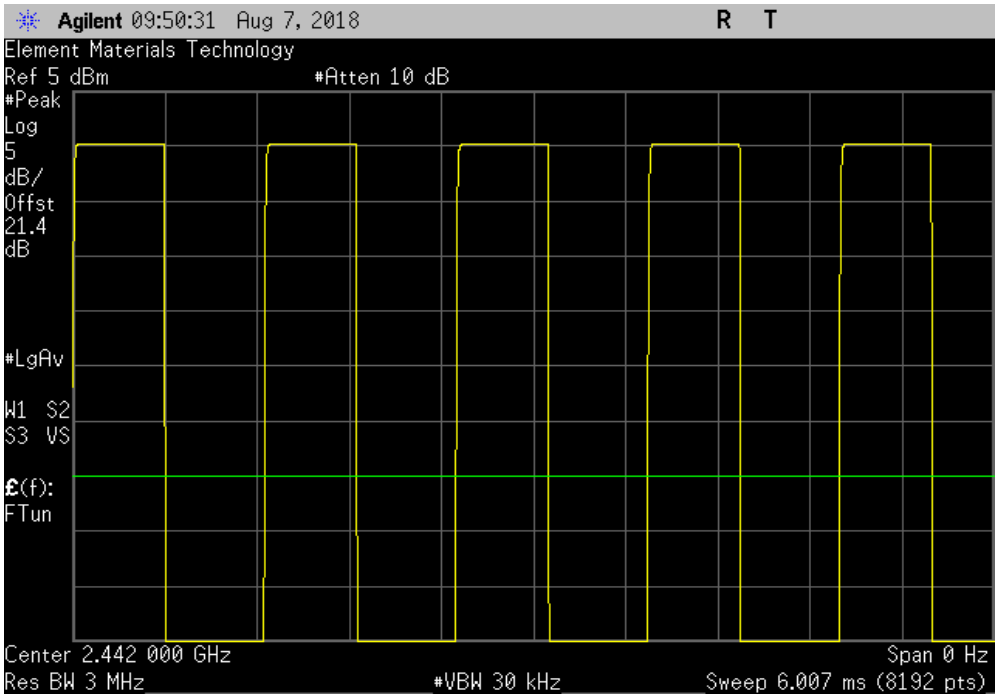


DUTY CYCLE

Antenna Port 7, BLE/GFSK, Mid Channel, 2442 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	584.094 us	1.25 ms	1	46.7	N/A	N/A



Antenna Port 7, BLE/GFSK, Mid Channel, 2442 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

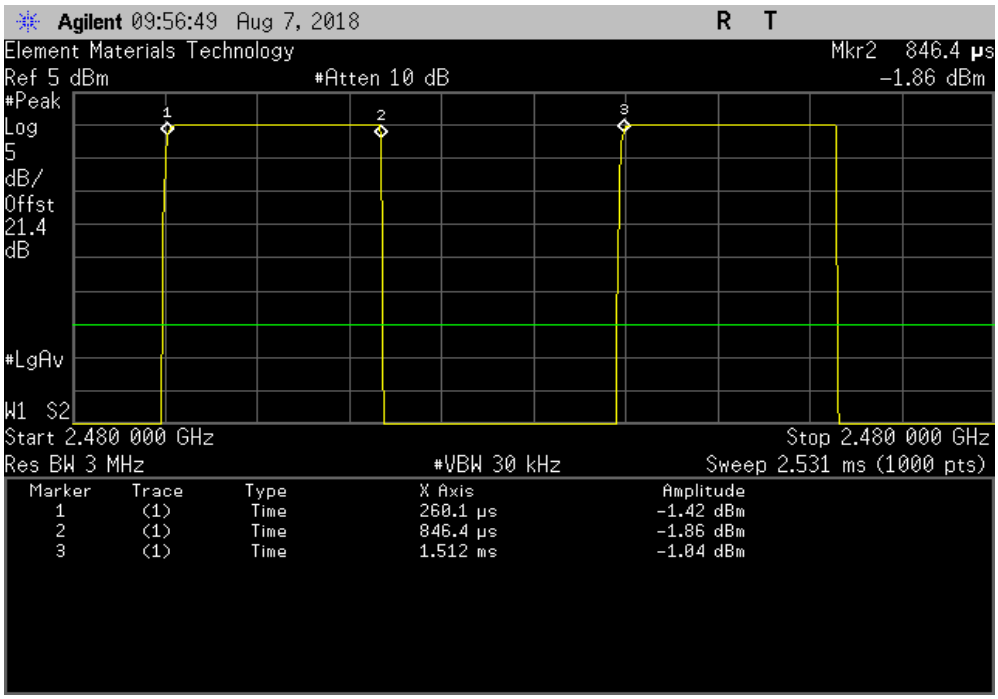


DUTY CYCLE

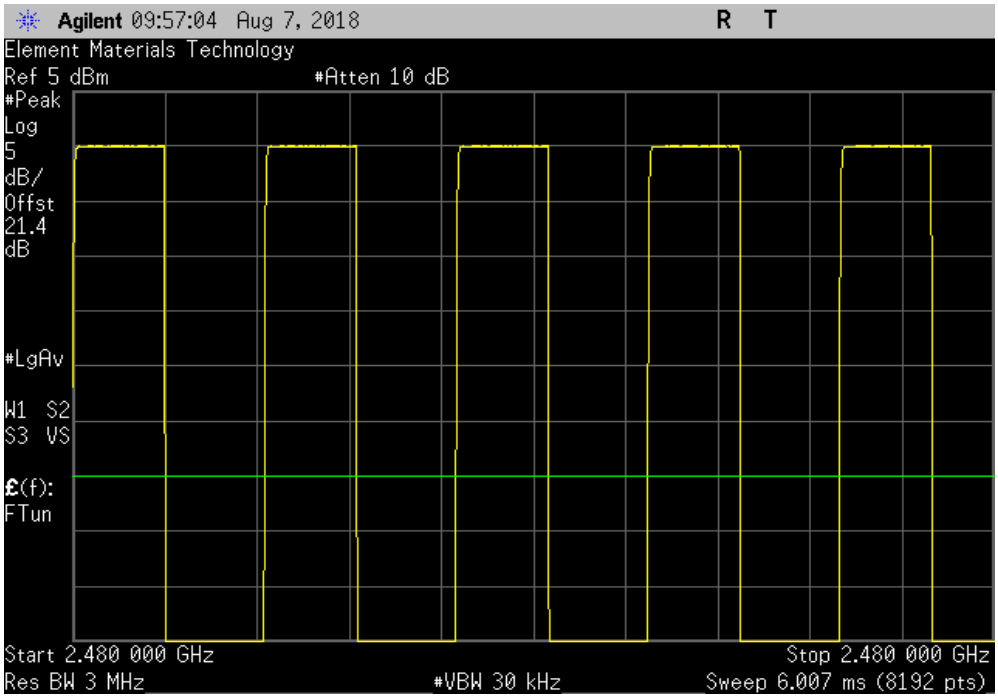
element

TbtTx 2017.12.14 XMit 2017.12.13

Antenna Port 7, BLE/GFSK, High Channel, 2480 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	586.247 us	1.252 ms	1	46.8	N/A	N/A

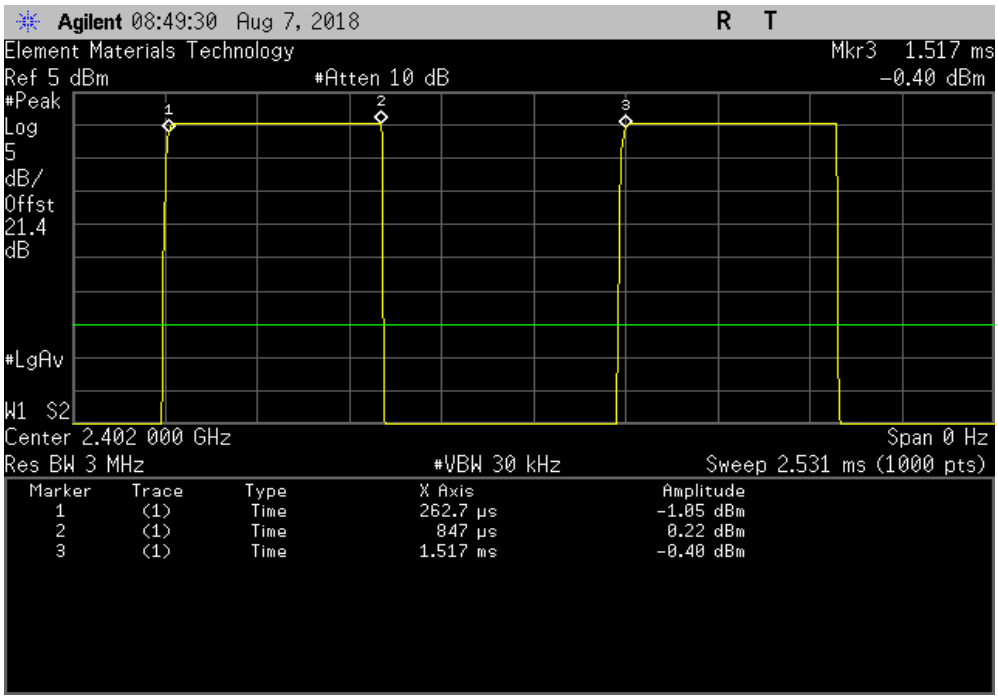


Antenna Port 7, BLE/GFSK, High Channel, 2480 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

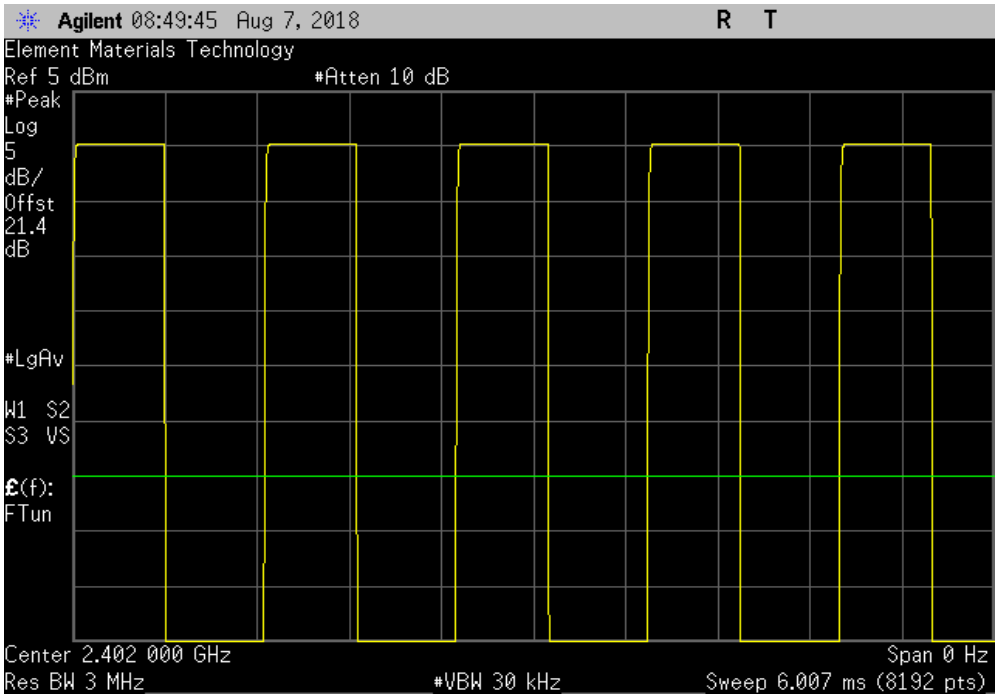


DUTY CYCLE

Antenna Port 8, BLE/GFSK, Low Channel, 2402 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	584.347 us	1.255 ms	1	46.6	N/A	N/A

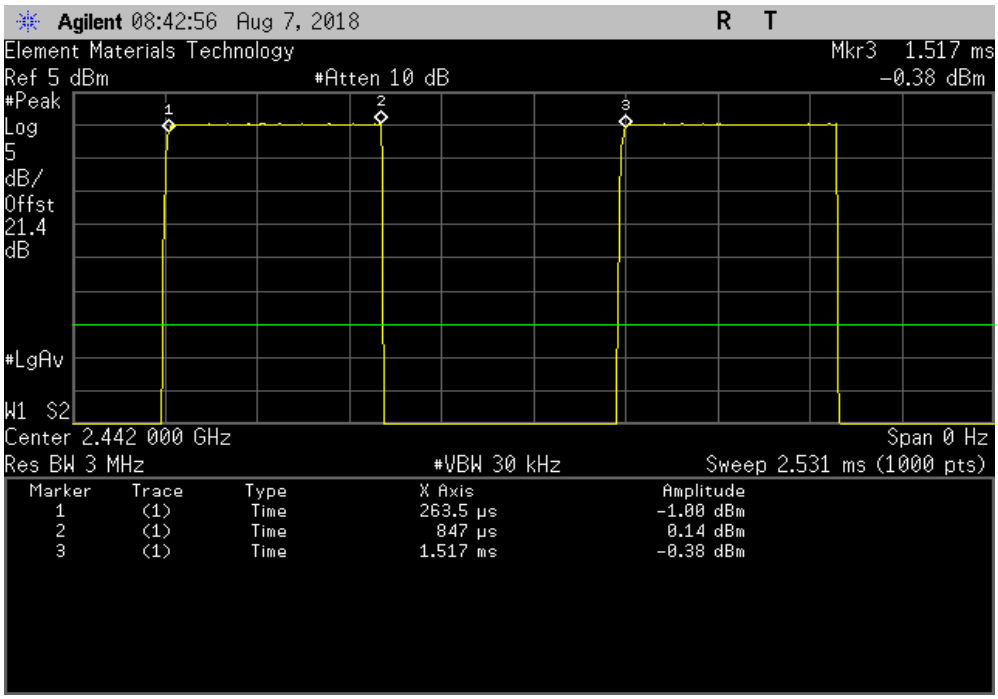


Antenna Port 8, BLE/GFSK, Low Channel, 2402 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

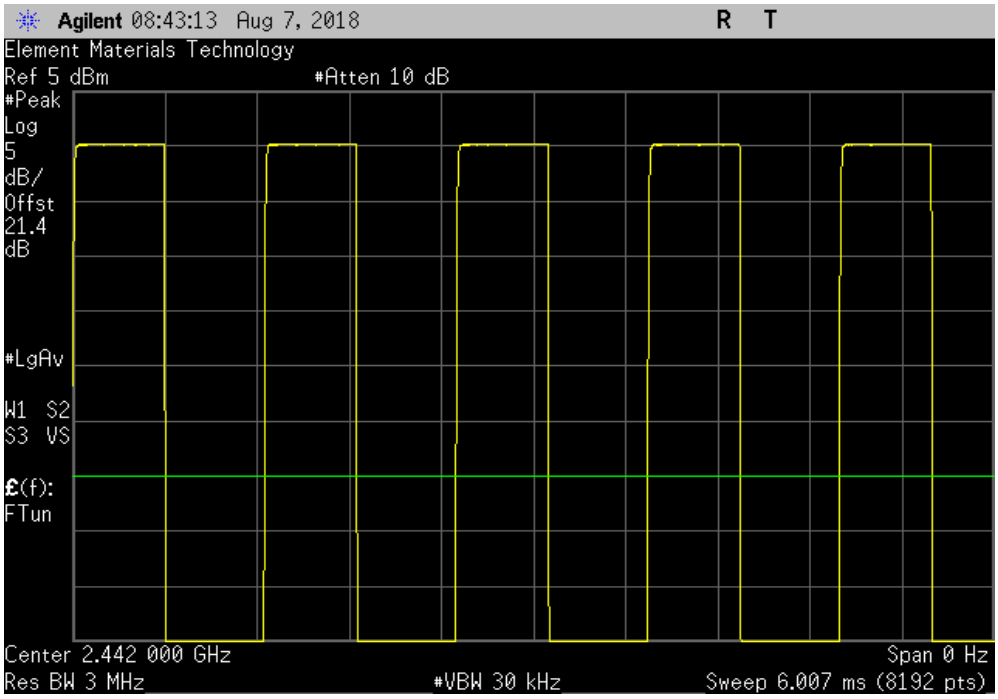


DUTY CYCLE

Antenna Port 8, BLE/GFSK, Mid Channel, 2442 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	583.559 us	1.254 ms	1	46.5	N/A	N/A



Antenna Port 8, BLE/GFSK, Mid Channel, 2442 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

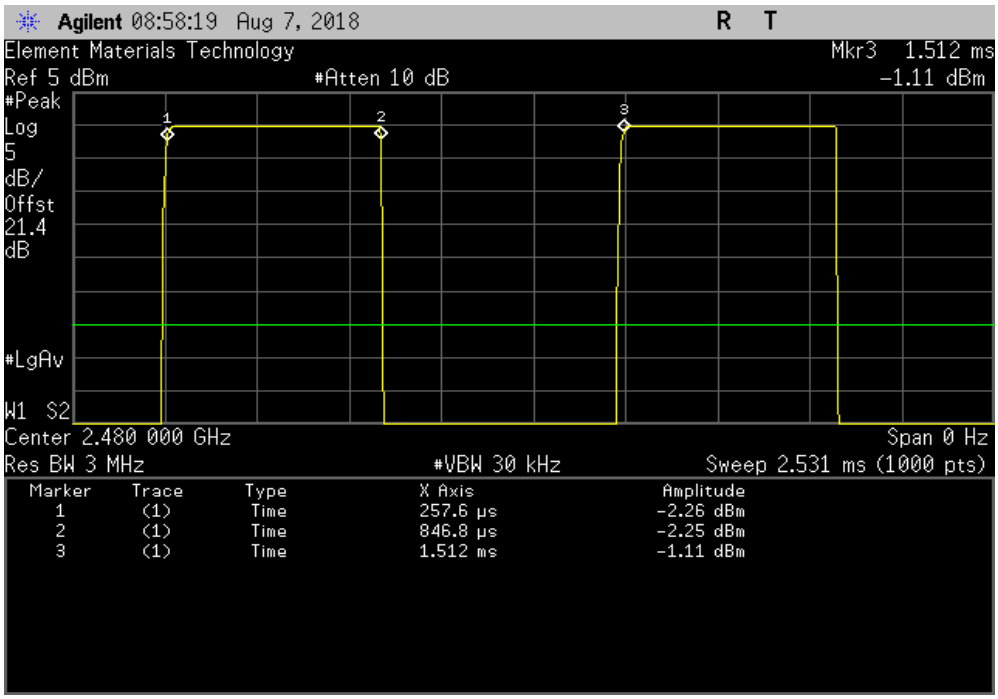


DUTY CYCLE

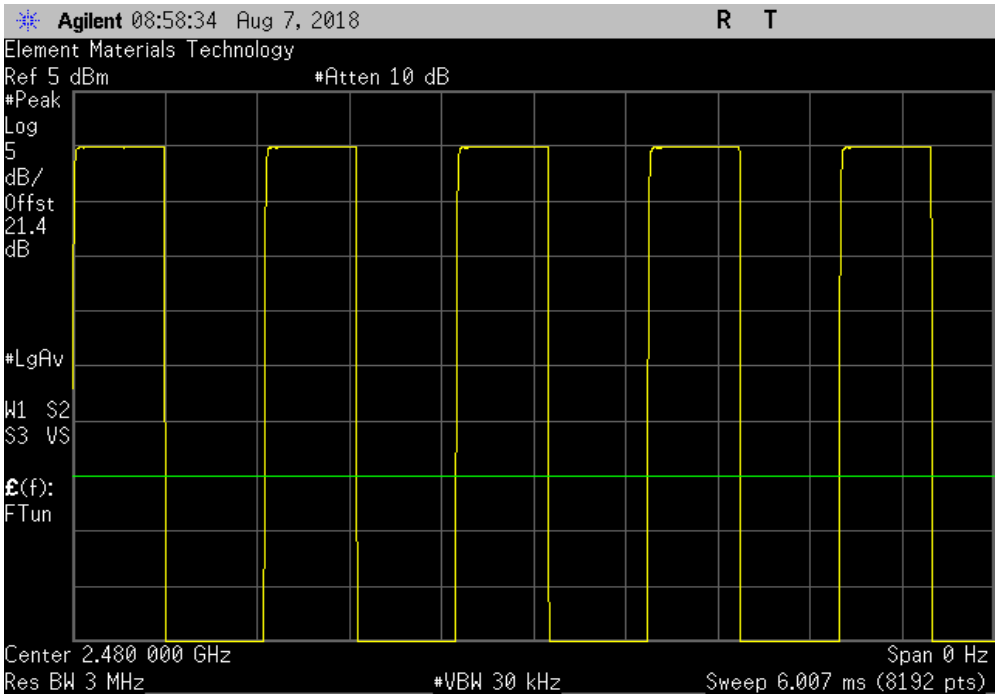
element

TbtTx 2017.12.14 XMit 2017.12.13

Antenna Port 8, BLE/GFSK, High Channel, 2480 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	589.161 us	1.255 ms	1	47	N/A	N/A



Antenna Port 8, BLE/GFSK, High Channel, 2480 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A



OCCUPIED BANDWIDTH

XMit 2017.12.13

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	IW Microwave	KPS-1503-720-KPS	NCU	5-Jun-18	5-Jun-19
Attenuator	Fairview Microwave	SA4014-20	TKV	19-Feb-18	19-Feb-19
Block - DC	Fairview Microwave	SD3379	AMU	19-Feb-18	19-Feb-19
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAT	21-May-18	21-May-19
Generator - Signal	Agilent	N5182A	TIF	23-Aug-17	23-Aug-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The EUT was set to the channels and modes listed in the datasheet.

The 6dB occupied bandwidth was measured using 100 kHz resolution bandwidth and 300 kHz video bandwidth. The 99.0% occupied bandwidth was also measured at the same time which can be needed during Output Power depending on the applicable method.

OCCUPIED BANDWIDTH

element

TbtTx 2017.12.14 XMit 2017.12.13

EUT:	**Radio Node**			**Work Order:**	**SYNA0249**
Serial Number:	**E43**			**Date:**	**7-Aug-18**
Customer:	**Walt Disney Parks and Resorts US, Inc.**			**Temperature:**	**23.5 °C**
Attendees:	**Hattie Spetla**			**Humidity:**	**48% RH**
Project:	**None**			**Barometric Pres.:**	**1021 mbar**
Tested by:	**Richard Mellroth**	**Power:**	**POE**	**Job Site:**	**NC04**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

COMMENTS

Power Setting at Default

DEVIATIONS FROM TEST STANDARD

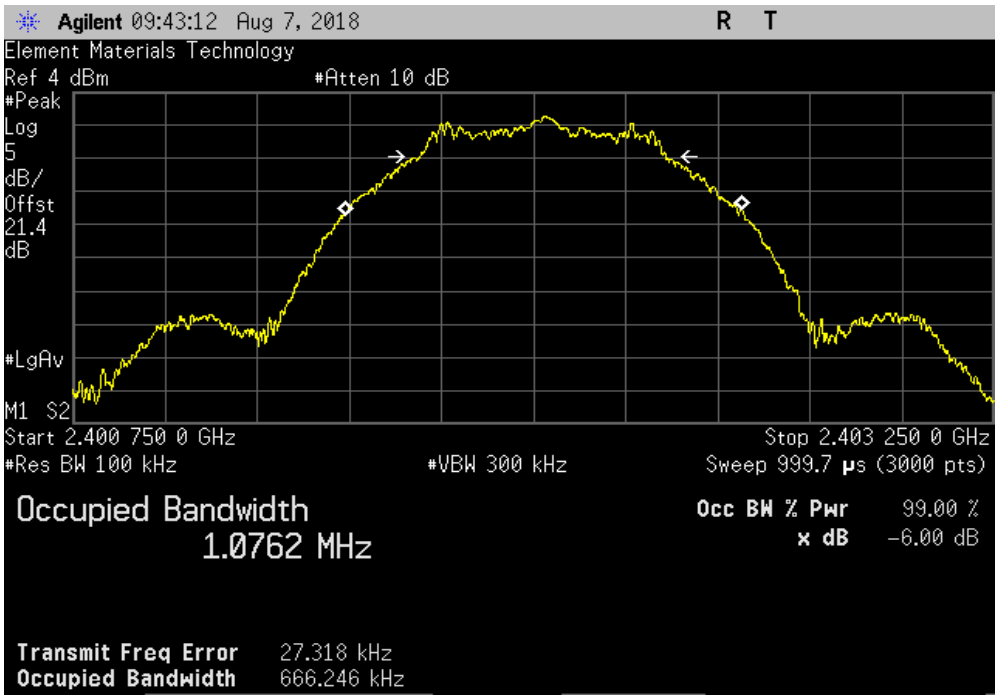
None

Configuration #	**7**	*Signature*

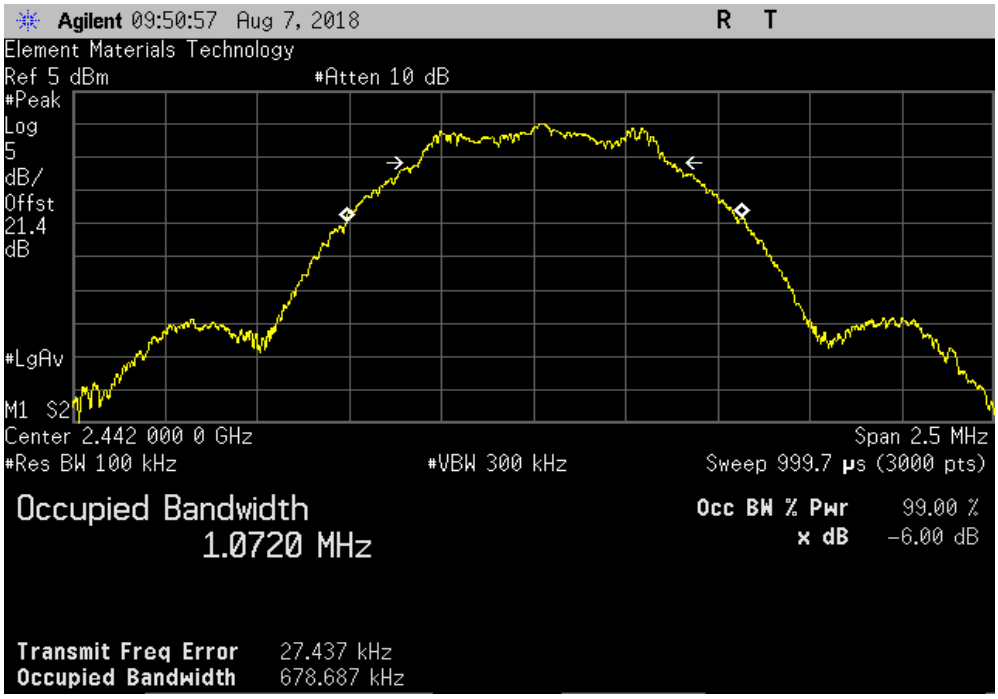
		Value	**Limit (≥)**	**Result**
Antenna Port 7				
	BLE/GFSK			
	Low Channel, 2402 MHz	666.246 kHz	500 kHz	Pass
	Mid Channel, 2442 MHz	678.687 kHz	500 kHz	Pass
	High Channel, 2480 MHz	694.263 kHz	500 kHz	Pass
Antenna Port 8				
	BLE/GFSK			
	Low Channel, 2402 MHz	685.63 kHz	500 kHz	Pass
	Mid Channel, 2442 MHz	671.818 kHz	500 kHz	Pass
	High Channel, 2480 MHz	710.398 kHz	500 kHz	Pass

OCCUPIED BANDWIDTH

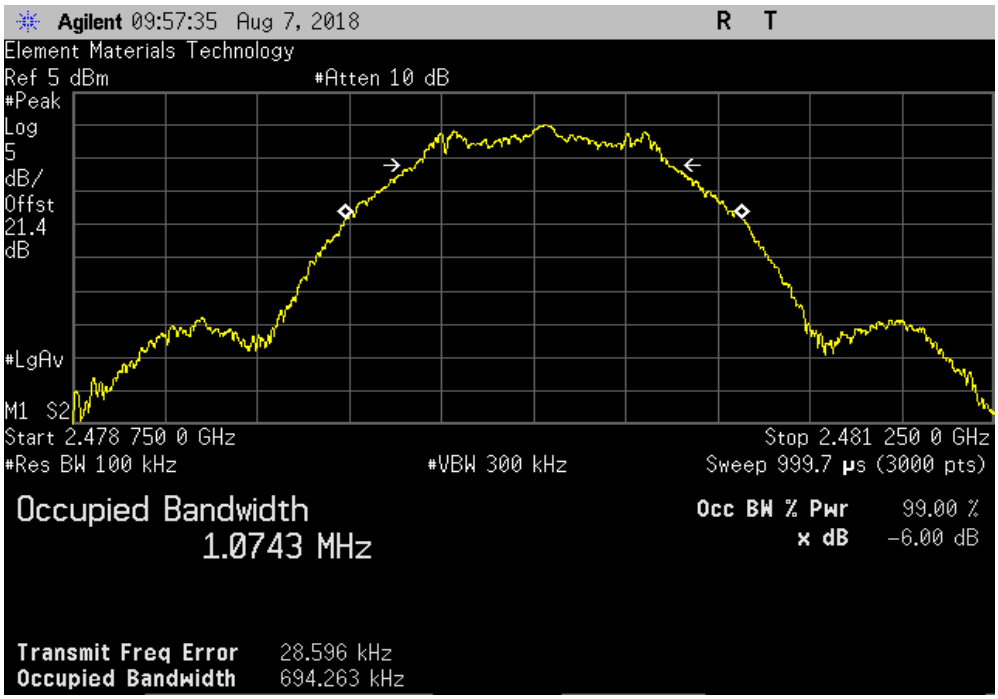
Antenna Port 7, BLE/GFSK, Low Channel, 2402 MHz						
				Value	Limit (≥)	Result
				666.246 kHz	500 kHz	Pass



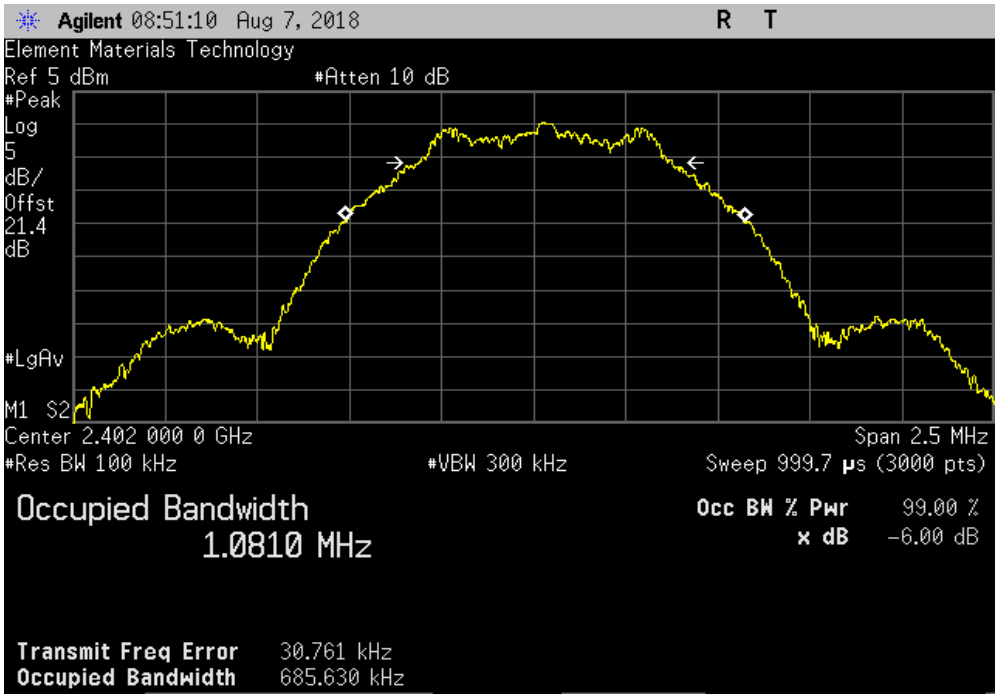
Antenna Port 7, BLE/GFSK, Mid Channel, 2442 MHz						
				Value	Limit (≥)	Result
				678.687 kHz	500 kHz	Pass



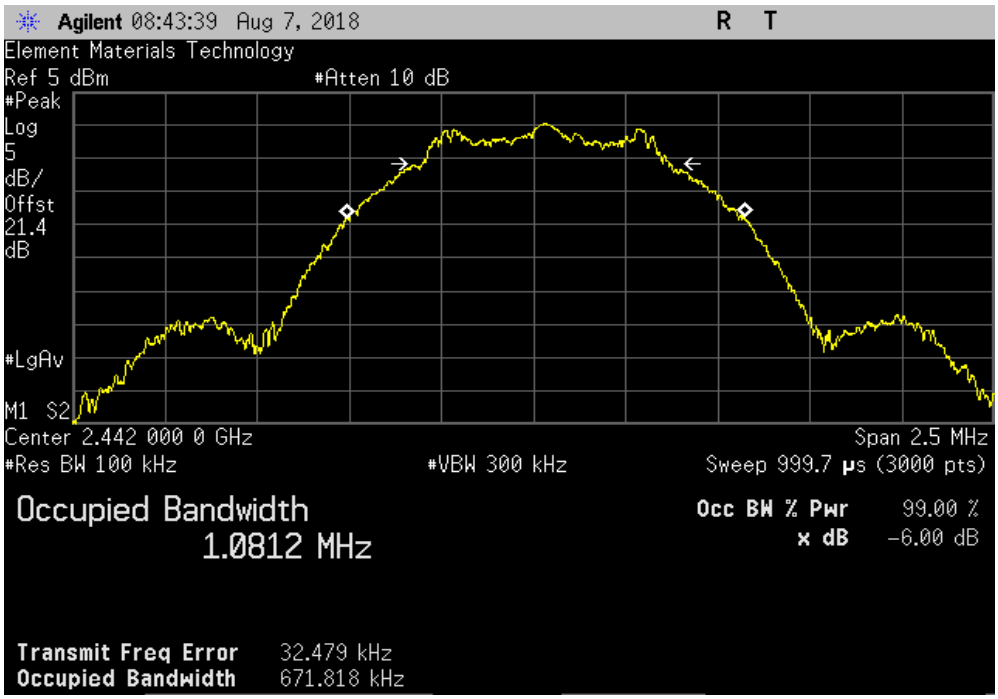
Antenna Port 7, BLE/GFSK, High Channel, 2480 MHz						
				Value	Limit (≥)	Result
				694.263 kHz	500 kHz	Pass



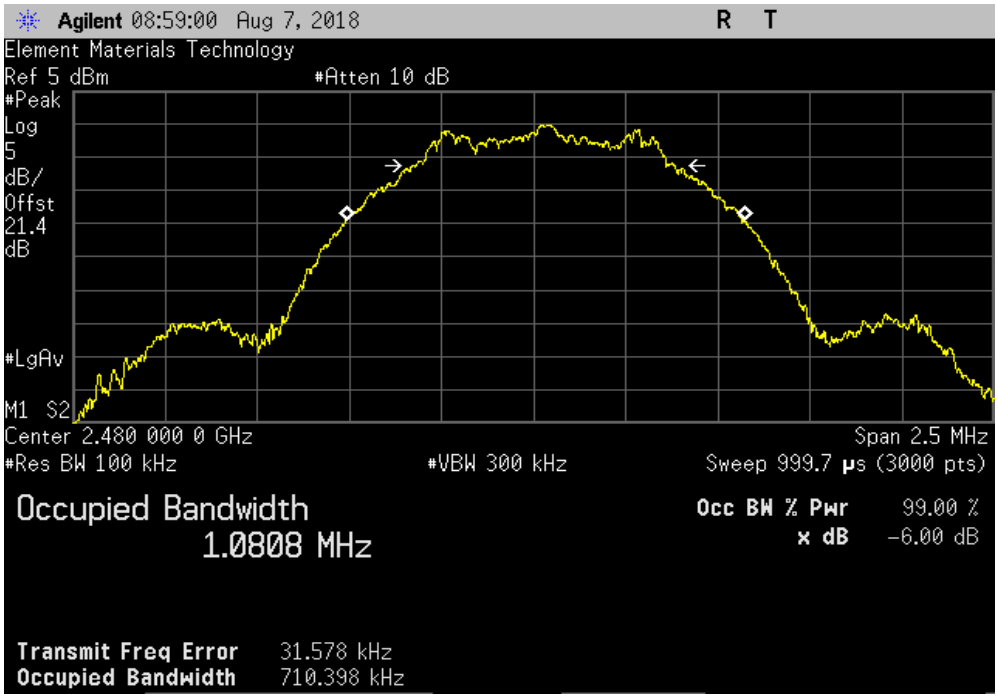
Antenna Port 8, BLE/GFSK, Low Channel, 2402 MHz						
				Value	Limit (≥)	Result
				685.63 kHz	500 kHz	Pass



Antenna Port 8, BLE/GFSK, Mid Channel, 2442 MHz						
				Value	Limit (≥)	Result
				671.818 kHz	500 kHz	Pass



Antenna Port 8, BLE/GFSK, High Channel, 2480 MHz						
				Value	Limit (≥)	Result
				710.398 kHz	500 kHz	Pass



SPURIOUS CONDUCTED EMISSIONS

XMit 2017.12.13

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	IW Microwave	KPS-1503-720-KPS	NCU	5-Jun-18	5-Jun-19
Attenuator	Fairview Microwave	SA4014-20	TKV	19-Feb-18	19-Feb-19
Block - DC	Fairview Microwave	SD3379	AMU	19-Feb-18	19-Feb-19
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAT	21-May-18	21-May-19
Generator - Signal	Agilent	N5182A	TIF	23-Aug-17	23-Aug-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting at the data rate(s) listed in the datasheet. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.

SPURIOUS CONDUCTED EMISSIONS

element

TbtTx 2017.12.14 XMit 2017.12.13

EUT:	**Radio Node**			**Work Order:**	**SYNA0249**
Serial Number:	**E43**			**Date:**	**7-Aug-18**
Customer:	**Walt Disney Parks and Resorts US, Inc.**			**Temperature:**	**23.6 °C**
Attendees:	**Hattie Spetla**			**Humidity:**	**47.8% RH**
Project:	**None**			**Barometric Pres.:**	**1021 mbar**
Tested by:	**Richard Mellroth**	**Power:**	**POE**	**Job Site:**	**NC04**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

COMMENTS

Power Setting at Default

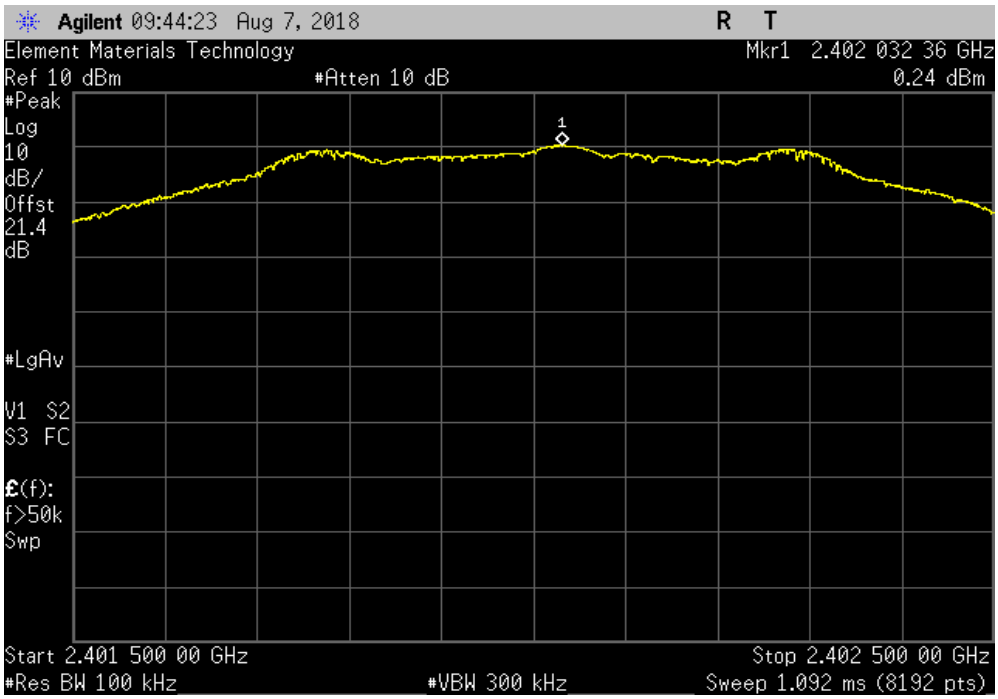
DEVIATIONS FROM TEST STANDARD

None

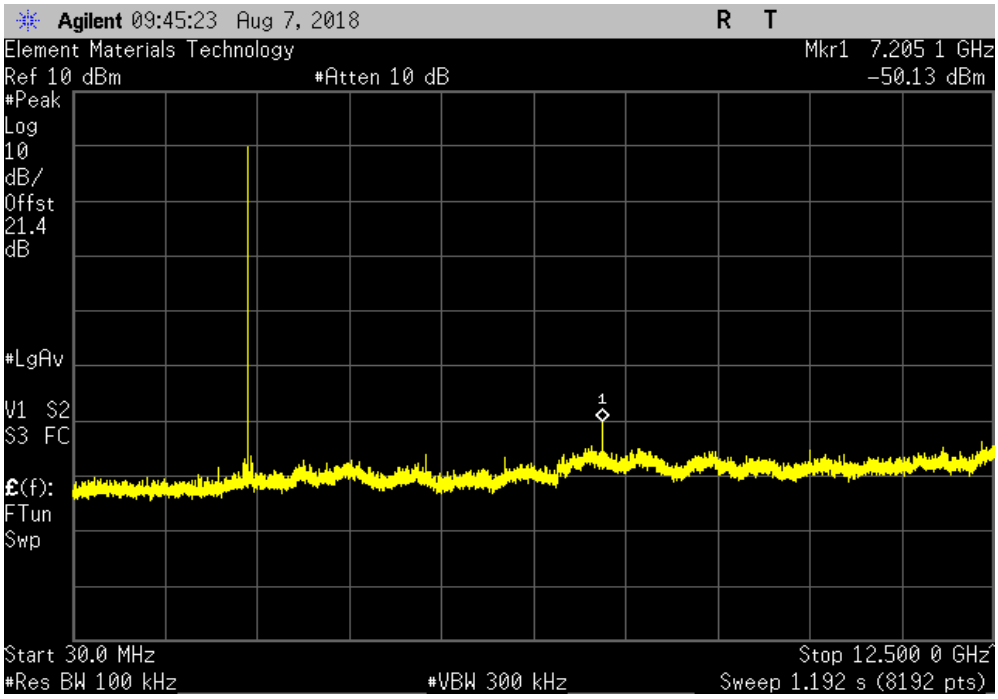
Configuration #	**7**	*Signature*

			Frequency Range	**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
Antenna Port 7						
	BLE/GFSK					
		Low Channel, 2402 MHz	Fundamental	N/A	N/A	N/A
		Low Channel, 2402 MHz	30 MHz - 12.5 GHz	-50.37	-20	Pass
		Low Channel, 2402 MHz	12.5 GHz - 25 GHz	-50.68	-20	Pass
		Mid Channel, 2442 MHz	Fundamental	N/A	N/A	N/A
		Mid Channel, 2442 MHz	30 MHz - 12.5 GHz	-52.42	-20	Pass
		Mid Channel, 2442 MHz	12.5 GHz - 25 GHz	-50.04	-20	Pass
		High Channel, 2480 MHz	Fundamental	N/A	N/A	N/A
		High Channel, 2480 MHz	30 MHz - 12.5 GHz	-51.66	-20	Pass
		High Channel, 2480 MHz	12.5 GHz - 25 GHz	-50.53	-20	Pass
Antenna Port 8						
	BLE/GFSK					
		Low Channel, 2402 MHz	Fundamental	N/A	N/A	N/A
		Low Channel, 2402 MHz	30 MHz - 12.5 GHz	-48.93	-20	Pass
		Low Channel, 2402 MHz	12.5 GHz - 25 GHz	-49.31	-20	Pass
		Mid Channel, 2442 MHz	Fundamental	N/A	N/A	N/A
		Mid Channel, 2442 MHz	30 MHz - 12.5 GHz	-53.05	-20	Pass
		Mid Channel, 2442 MHz	12.5 GHz - 25 GHz	-50.5	-20	Pass
		High Channel, 2480 MHz	Fundamental	N/A	N/A	N/A
		High Channel, 2480 MHz	30 MHz - 12.5 GHz	-50.22	-20	Pass
		High Channel, 2480 MHz	12.5 GHz - 25 GHz	-49.98	-20	Pass

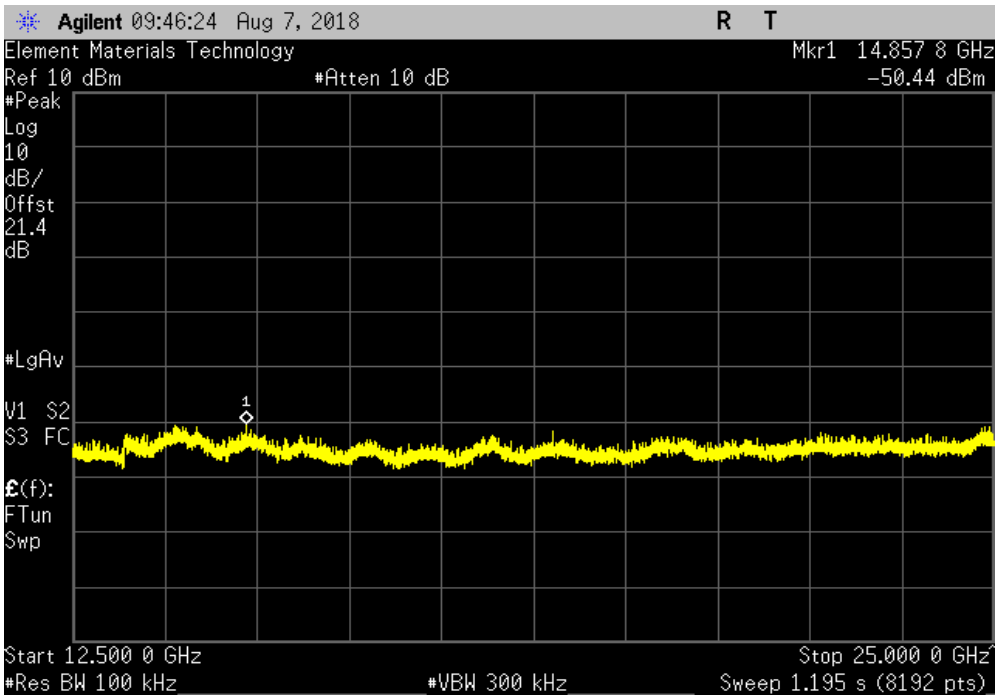
Antenna Port 7, BLE/GFSK, Low Channel, 2402 MHz						
	Frequency Range			**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
	Fundamental			N/A	N/A	N/A



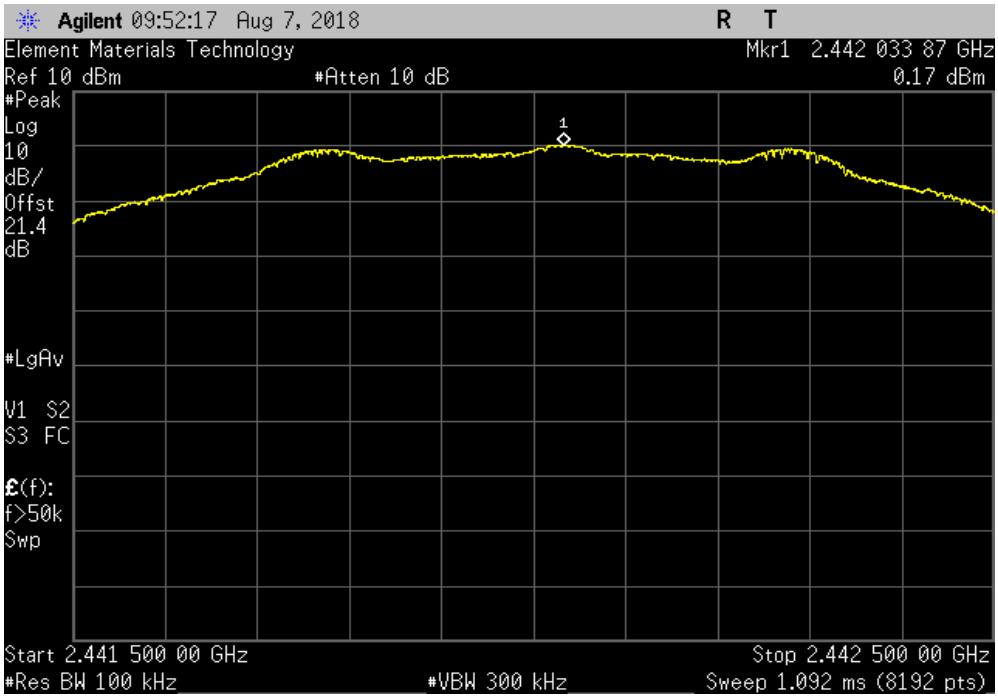
Antenna Port 7, BLE/GFSK, Low Channel, 2402 MHz				
Frequency Range		**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
30 MHz - 12.5 GHz		-50.37	-20	Pass



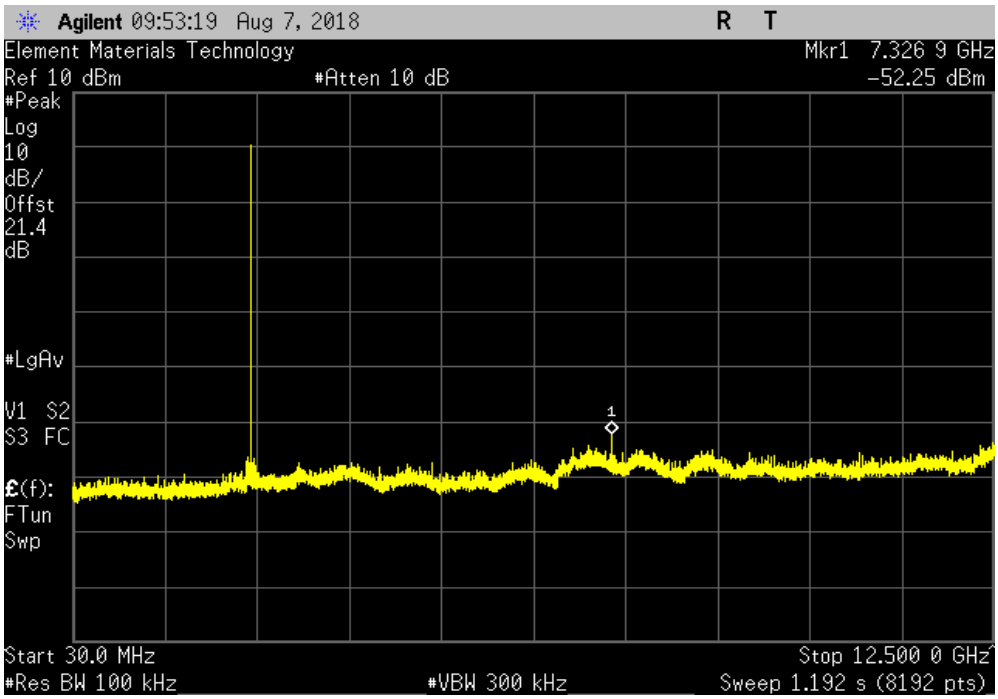
Antenna Port 7, BLE/GFSK, Low Channel, 2402 MHz				
Frequency Range		**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
12.5 GHz - 25 GHz		-50.68	-20	Pass



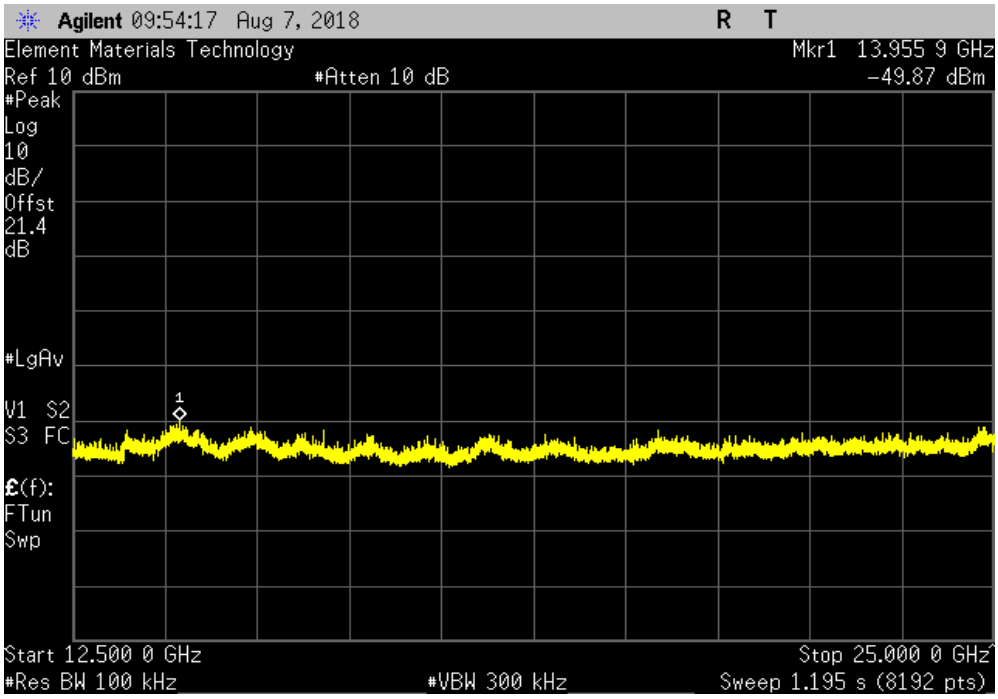
Antenna Port 7, BLE/GFSK, Mid Channel, 2442 MHz						
	Frequency Range			**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
	Fundamental			N/A	N/A	N/A



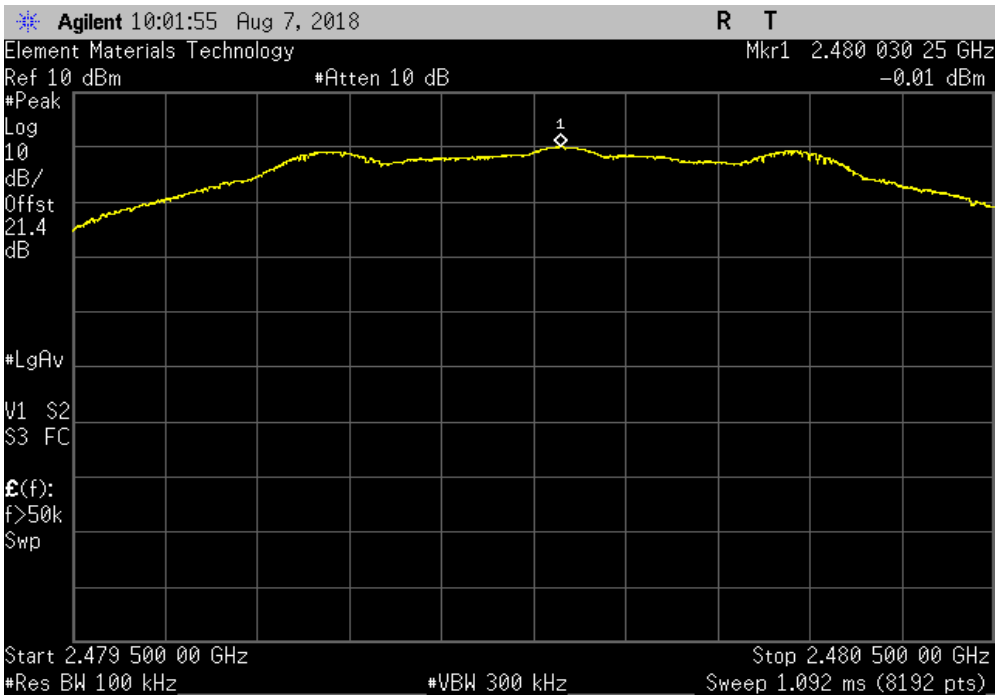
Antenna Port 7, BLE/GFSK, Mid Channel, 2442 MHz				
Frequency Range		**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
30 MHz - 12.5 GHz		-52.42	-20	Pass



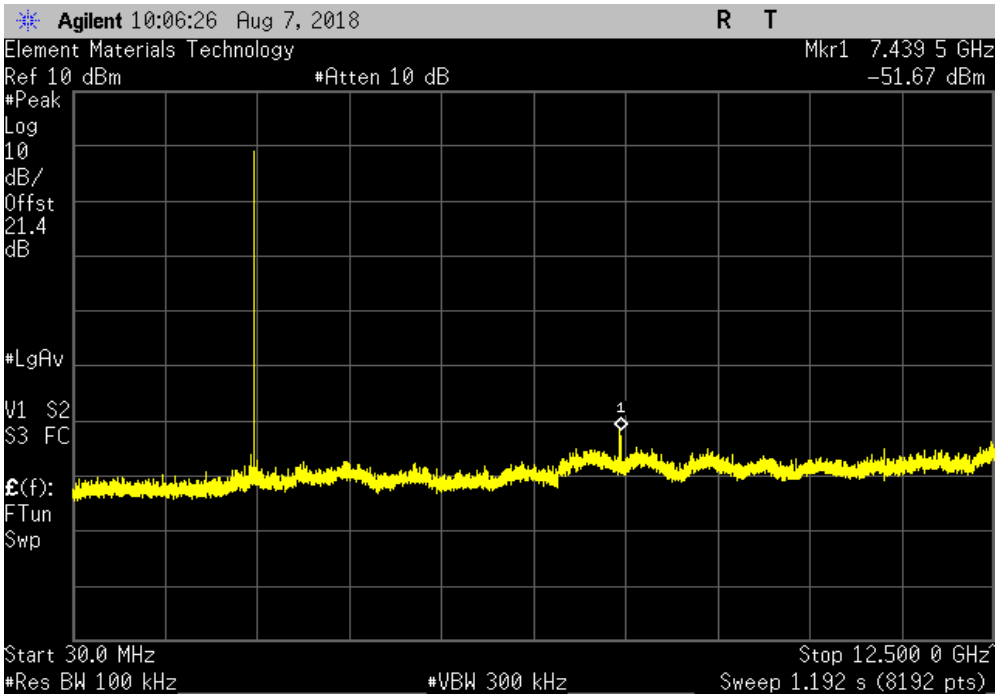
Antenna Port 7, BLE/GFSK, Mid Channel, 2442 MHz				
Frequency Range		**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
12.5 GHz - 25 GHz		-50.04	-20	Pass



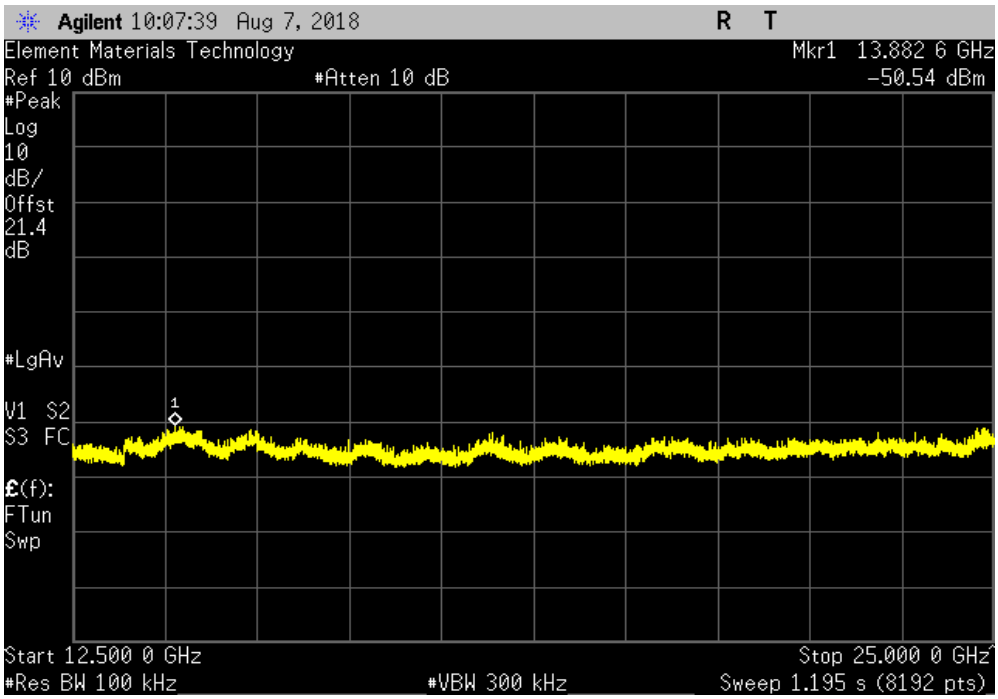
Antenna Port 7, BLE/GFSK, High Channel, 2480 MHz						
	Frequency Range			Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental			N/A	N/A	N/A



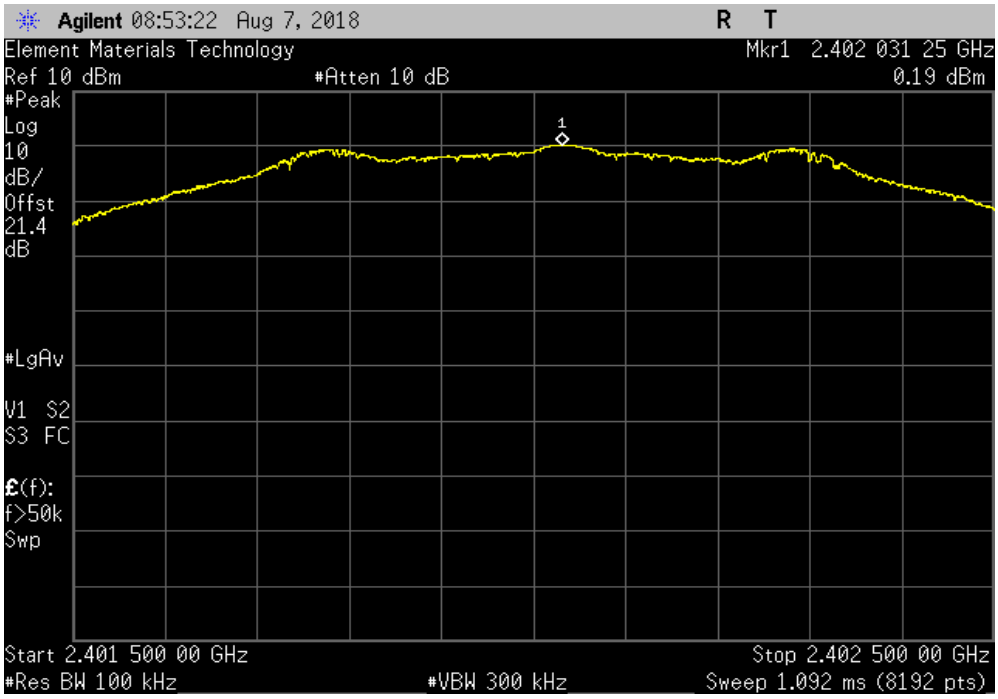
Antenna Port 7, BLE/GFSK, High Channel, 2480 MHz					
Frequency Range			Max Value (dBc)	Limit ≤ (dBc)	Result
30 MHz - 12.5 GHz			-51.66	-20	Pass



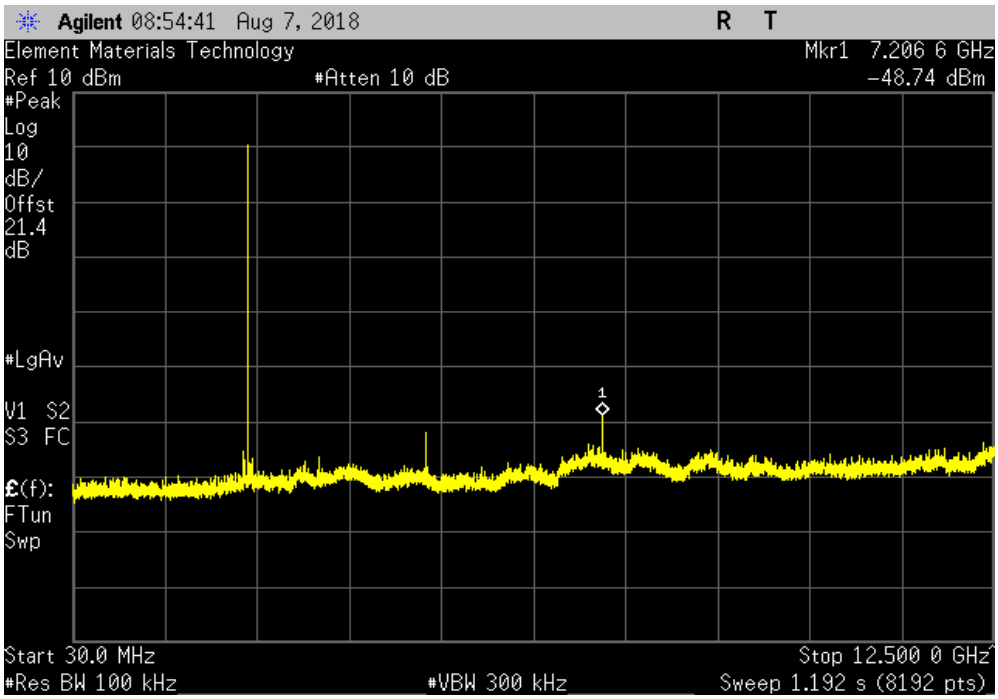
Antenna Port 7, BLE/GFSK, High Channel, 2480 MHz				
Frequency Range		**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
12.5 GHz - 25 GHz		-50.53	-20	Pass



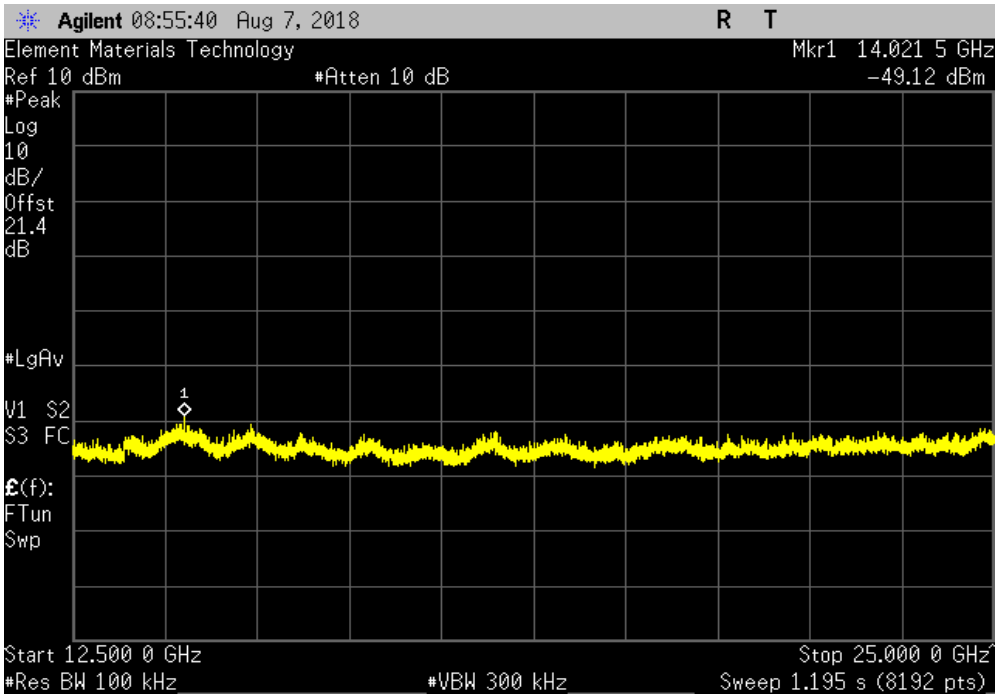
Antenna Port 8, BLE/GFSK, Low Channel, 2402 MHz						
	Frequency Range			**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
	Fundamental			N/A	N/A	N/A



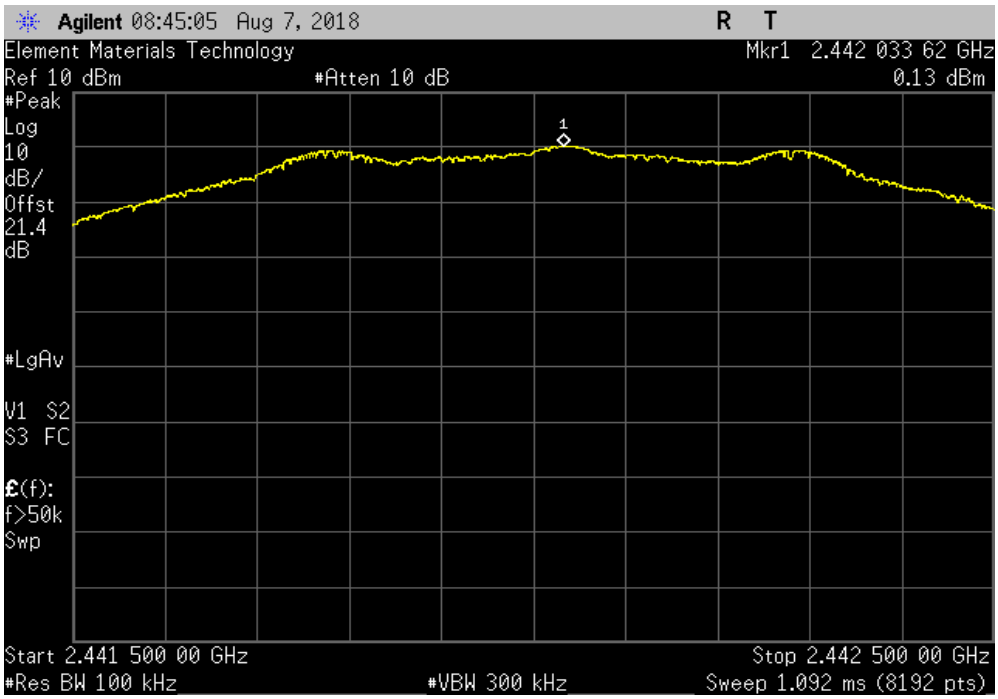
Antenna Port 8, BLE/GFSK, Low Channel, 2402 MHz				
Frequency Range		**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
30 MHz - 12.5 GHz		-48.93	-20	Pass



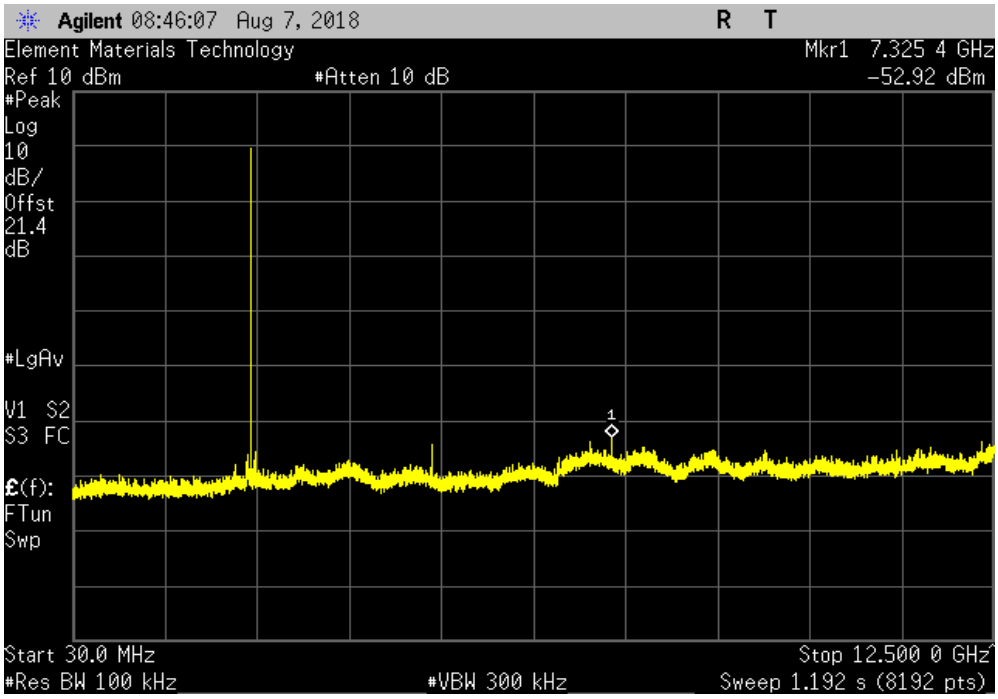
Antenna Port 8, BLE/GFSK, Low Channel, 2402 MHz				
Frequency Range		**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
12.5 GHz - 25 GHz		-49.31	-20	Pass



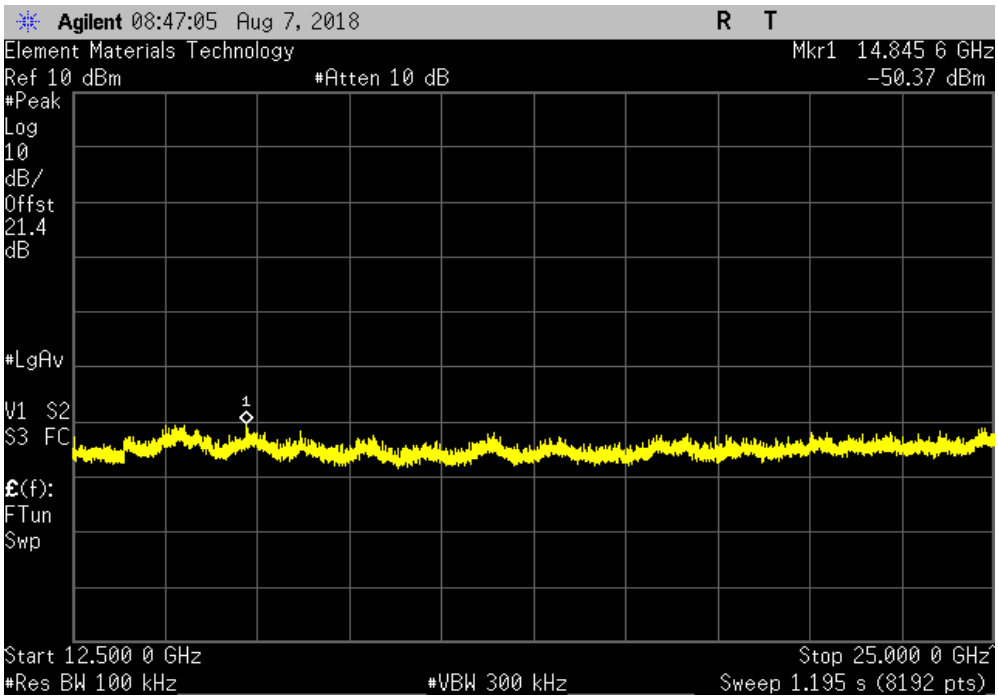
Antenna Port 8, BLE/GFSK, Mid Channel, 2442 MHz						
	Frequency Range			**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
	Fundamental			N/A	N/A	N/A



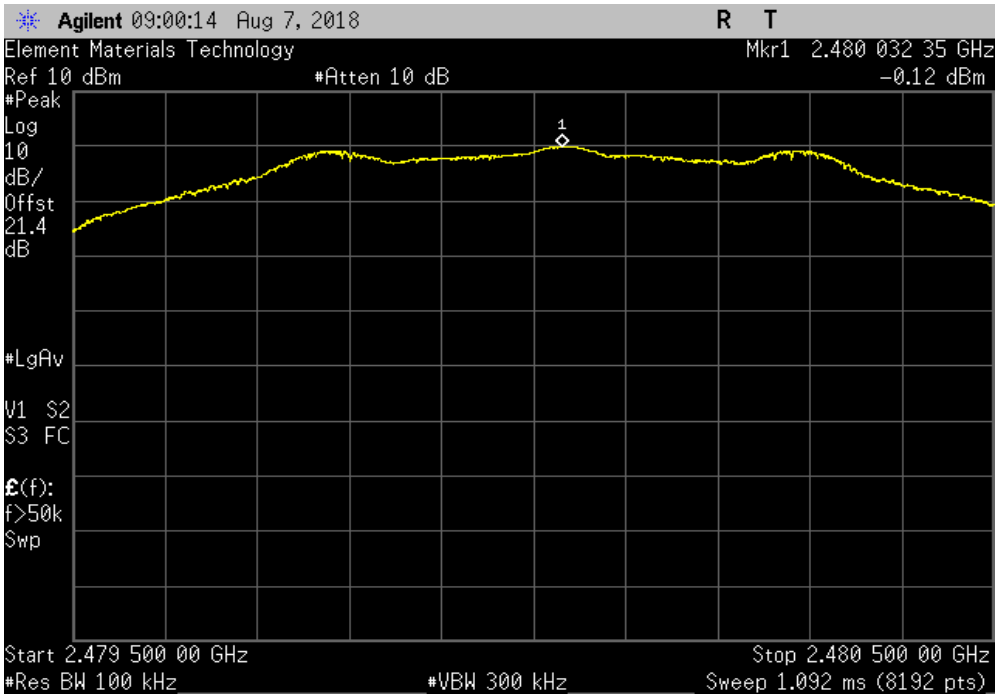
Antenna Port 8, BLE/GFSK, Mid Channel, 2442 MHz				
Frequency Range		**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
30 MHz - 12.5 GHz		-53.05	-20	Pass



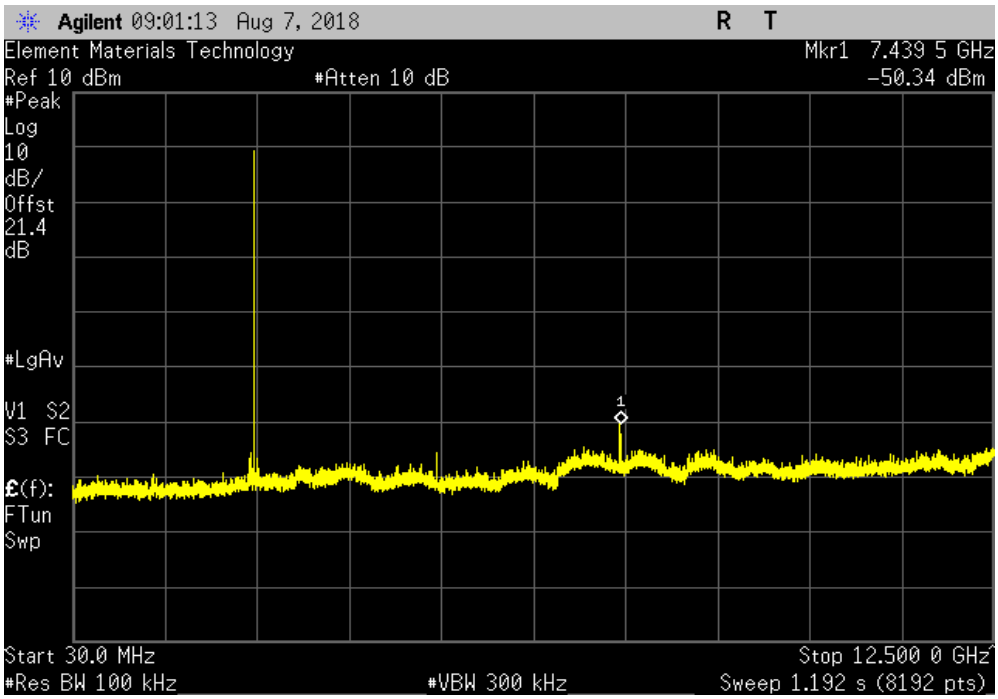
Antenna Port 8, BLE/GFSK, Mid Channel, 2442 MHz				
Frequency Range		**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
12.5 GHz - 25 GHz		-50.5	-20	Pass



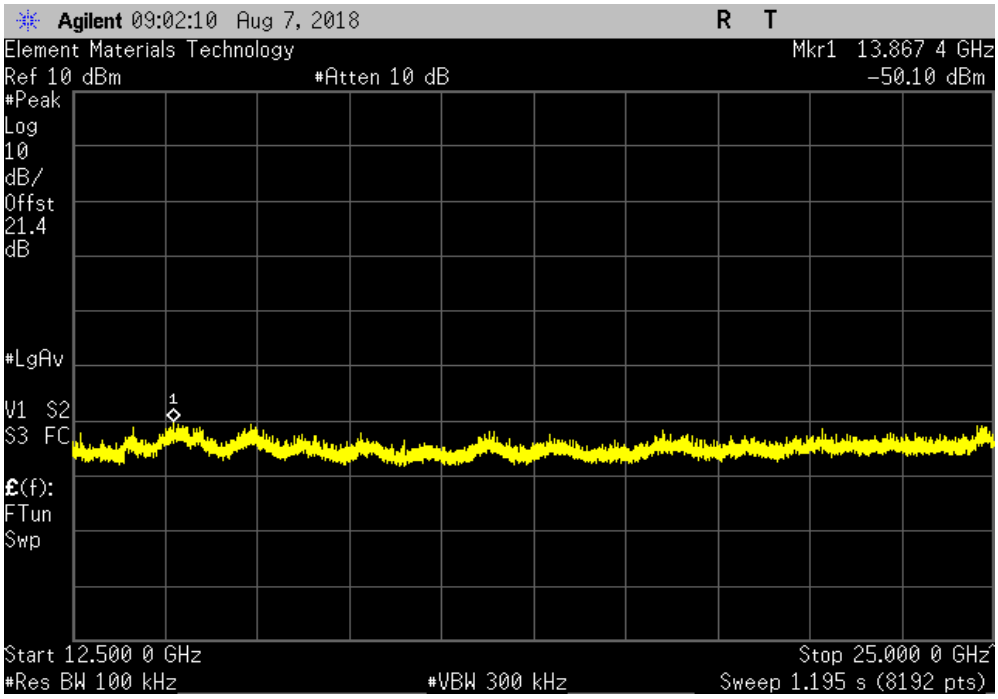
Antenna Port 8, BLE/GFSK, High Channel, 2480 MHz						
	Frequency Range			**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
	Fundamental			N/A	N/A	N/A



Antenna Port 8, BLE/GFSK, High Channel, 2480 MHz				
Frequency Range		**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
30 MHz - 12.5 GHz		-50.22	-20	Pass



Antenna Port 8, BLE/GFSK, High Channel, 2480 MHz				
Frequency Range		**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
12.5 GHz - 25 GHz		-49.98	-20	Pass



OUTPUT POWER

XMit 2017.12.13

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	IW Microwave	KPS-1503-720-KPS	NCU	5-Jun-18	5-Jun-19
Attenuator	Fairview Microwave	SA4014-20	TKV	19-Feb-18	19-Feb-19
Block - DC	Fairview Microwave	SD3379	AMU	19-Feb-18	19-Feb-19
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAT	21-May-18	21-May-19
Generator - Signal	Agilent	N5182A	TIF	23-Aug-17	23-Aug-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The transmit frequency was set to the required channels in each band. The transmit power was set to its default maximum.

Prior to measuring peak transmit power the DTS bandwidth (B) was measured.

The method found in ANSI C63.10:2013 Section 11.9.1.1 was used because the RBW on the analyzer was greater than the DTS Bandwidth of the radio.

De Facto EIRP Limit: The EUT meets the de facto EIRP limit of +36 dBm.

OUTPUT POWER

element

TbtTx 2017.12.14 XMit 2017.12.13

EUT:	**Radio Node**			**Work Order:**	**SYNA0249**
Serial Number:	**E43**			**Date:**	**7-Aug-18**
Customer:	**Walt Disney Parks and Resorts US, Inc.**			**Temperature:**	**23.5 °C**
Attendees:	**Hattie Spetla**			**Humidity:**	**48.2% RH**
Project:	**None**			**Barometric Pres.:**	**1021 mbar**
Tested by:	**Richard Mellroth**	**Power:**	**POE**	**Job Site:**	**NC04**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

COMMENTS

Power Setting at Default

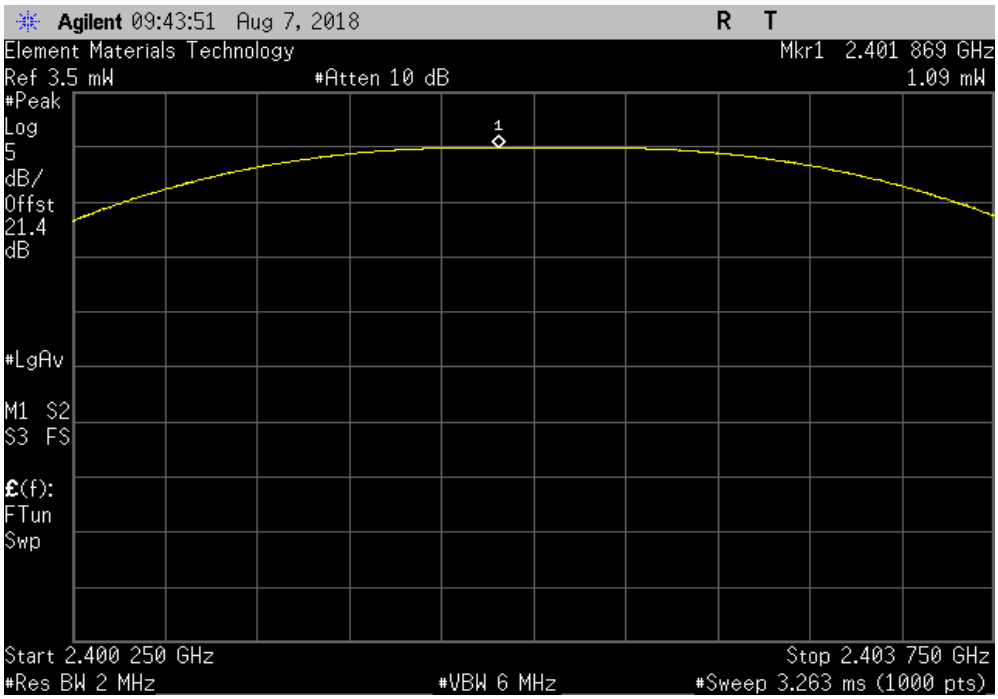
DEVIATIONS FROM TEST STANDARD

None

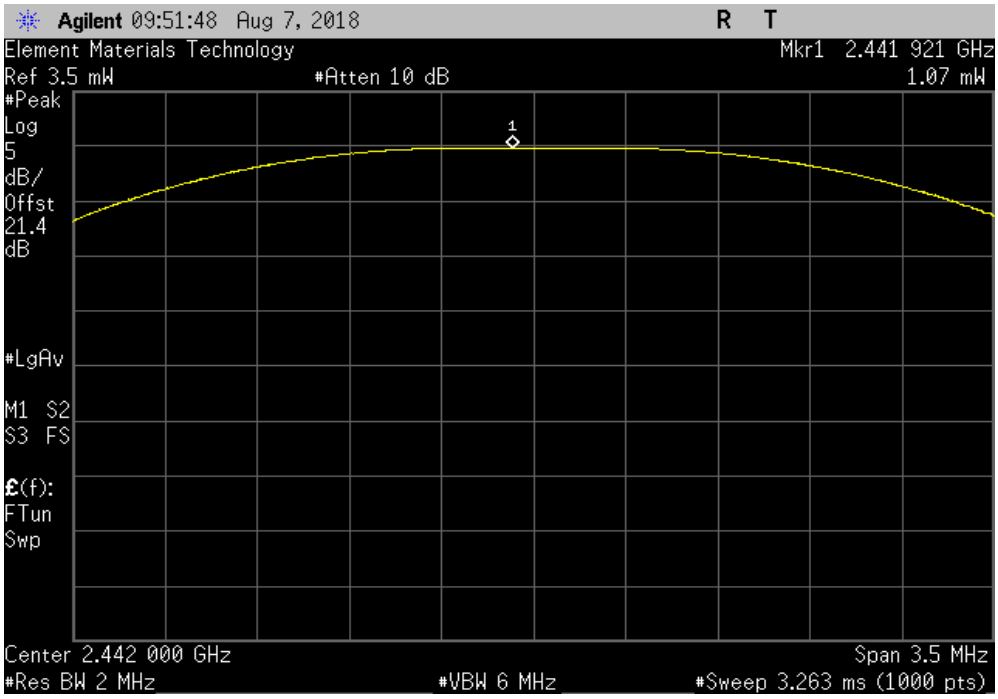
Configuration #	**7**	*Signature*

		Value	**Limit (<)**	**Result**
Antenna Port 7				
	BLE/GFSK			
	Low Channel, 2402 MHz	1.088 mW	1 W	Pass
	Mid Channel, 2442 MHz	1.068 mW	1 W	Pass
	High Channel, 2480 MHz	1.019 mW	1 W	Pass
Antenna Port 8				
	BLE/GFSK			
	Low Channel, 2402 MHz	1.070 mW	1 W	Pass
	Mid Channel, 2442 MHz	1.053 mW	1 W	Pass
	High Channel, 2480 MHz	0.994 mW	1 W	Pass

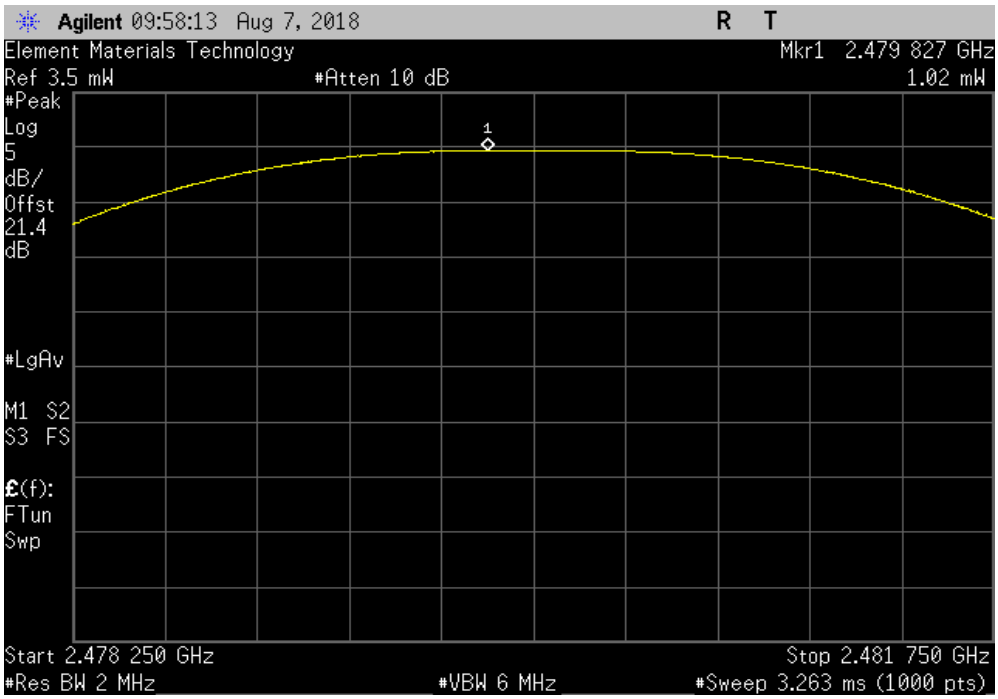
Antenna Port 7, BLE/GFSK, Low Channel, 2402 MHz						
				Value	Limit (<)	Result
				1.088 mW	1 W	Pass



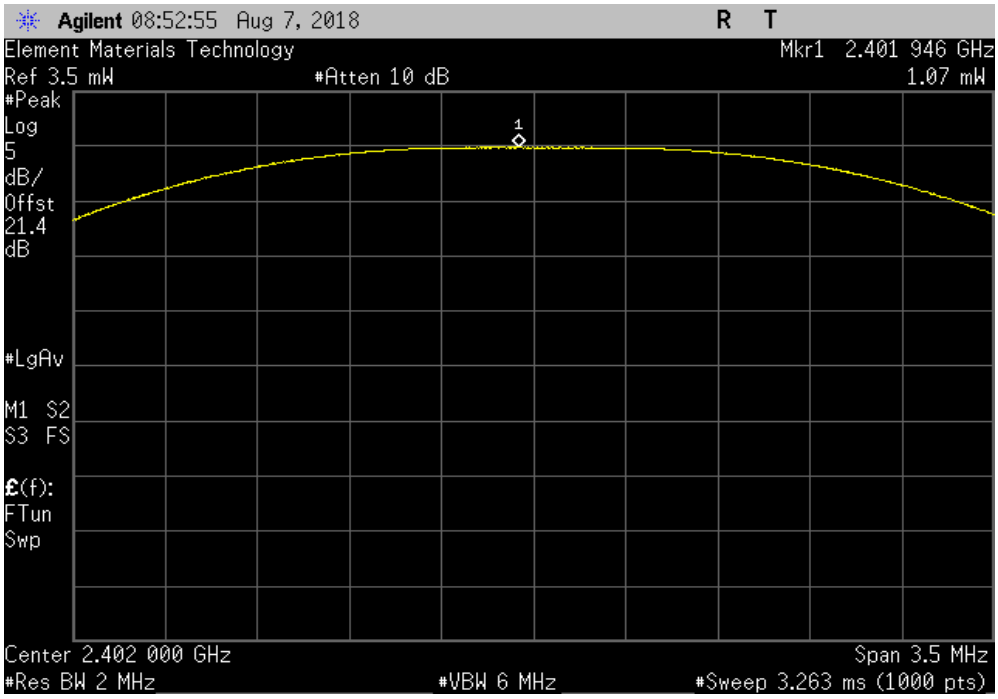
Antenna Port 7, BLE/GFSK, Mid Channel, 2442 MHz						
				Value	Limit (<)	Result
				1.068 mW	1 W	Pass



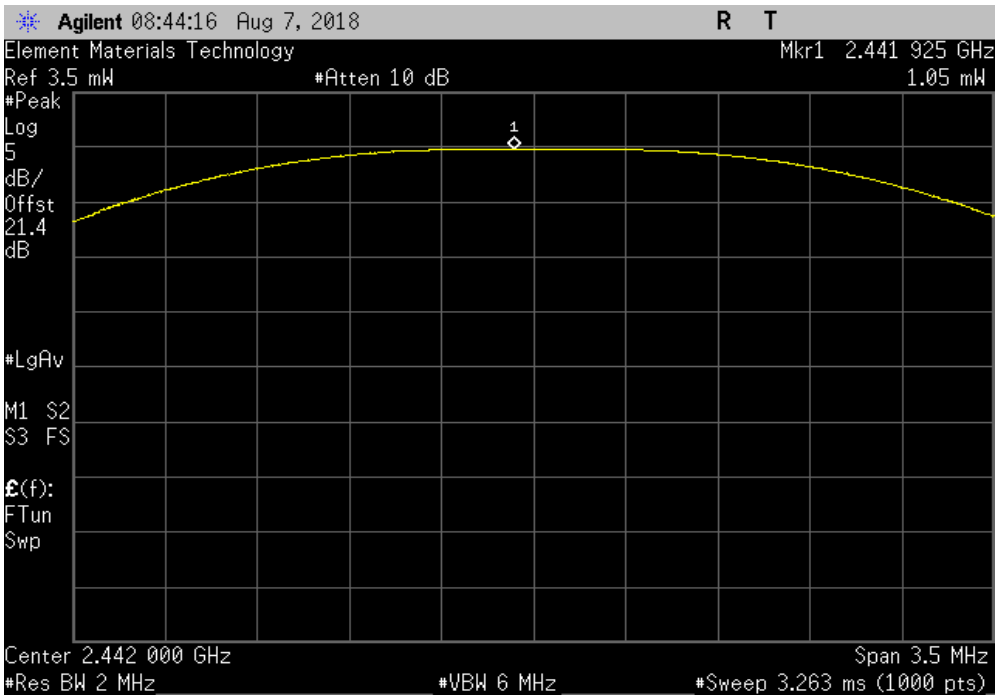
Antenna Port 7, BLE/GFSK, High Channel, 2480 MHz						
				Value	Limit (<)	Result
				1.019 mW	1 W	Pass



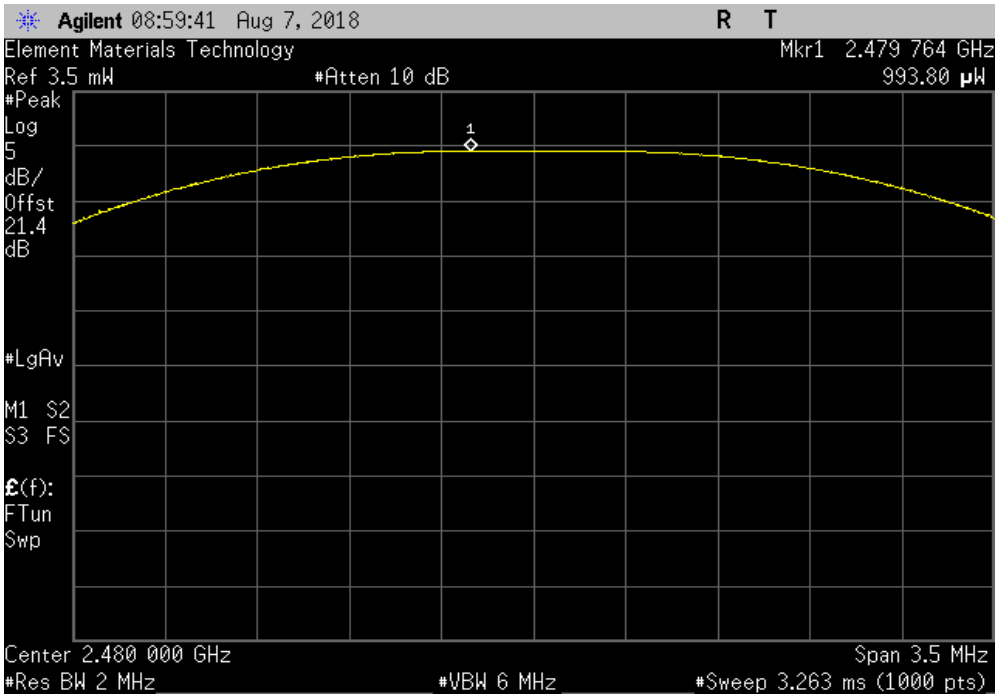
Antenna Port 8, BLE/GFSK, Low Channel, 2402 MHz						
				Value	Limit (<)	Result
				1.070 mW	1 W	Pass



Antenna Port 8, BLE/GFSK, Mid Channel, 2442 MHz						
				Value	Limit (<)	Result
				1.053 mW	1 W	Pass



Antenna Port 8, BLE/GFSK, High Channel, 2480 MHz						
				Value	Limit (<)	Result
				0.994 mW	1 W	Pass



POWER SPECTRAL DENSITY

XMit 2017.12.13

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	IW Microwave	KPS-1503-720-KPS	NCU	5-Jun-18	5-Jun-19
Attenuator	Fairview Microwave	SA4014-20	TKV	19-Feb-18	19-Feb-19
Block - DC	Fairview Microwave	SD3379	AMU	19-Feb-18	19-Feb-19
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAT	21-May-18	21-May-19
Generator - Signal	Agilent	N5182A	TIF	23-Aug-17	23-Aug-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The maximum power spectral density measurements was measured using the channels and modes as called out on the following data sheets.

Per the procedure outlined in ANSI C63.10 the peak power spectral density was measured in a 3 kHz RBW.

POWER SPECTRAL DENSITY

TbtTx 2017.12.14 XMit 2017.12.13

EUT:	**Radio Node**			**Work Order:**	**SYNA0249**
Serial Number:	**E43**			**Date:**	**7-Aug-18**
Customer:	**Walt Disney Parks and Resorts US, Inc.**			**Temperature:**	**23.6 °C**
Attendees:	**Hattie Spetla**			**Humidity:**	**48.4% RH**
Project:	**None**			**Barometric Pres.:**	**1021 mbar**
Tested by:	**Richard Mellroth**	**Power:**	**POE**	**Job Site:**	**NC04**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2018	ANSI C63.10:2013

COMMENTS

Power Setting at Default

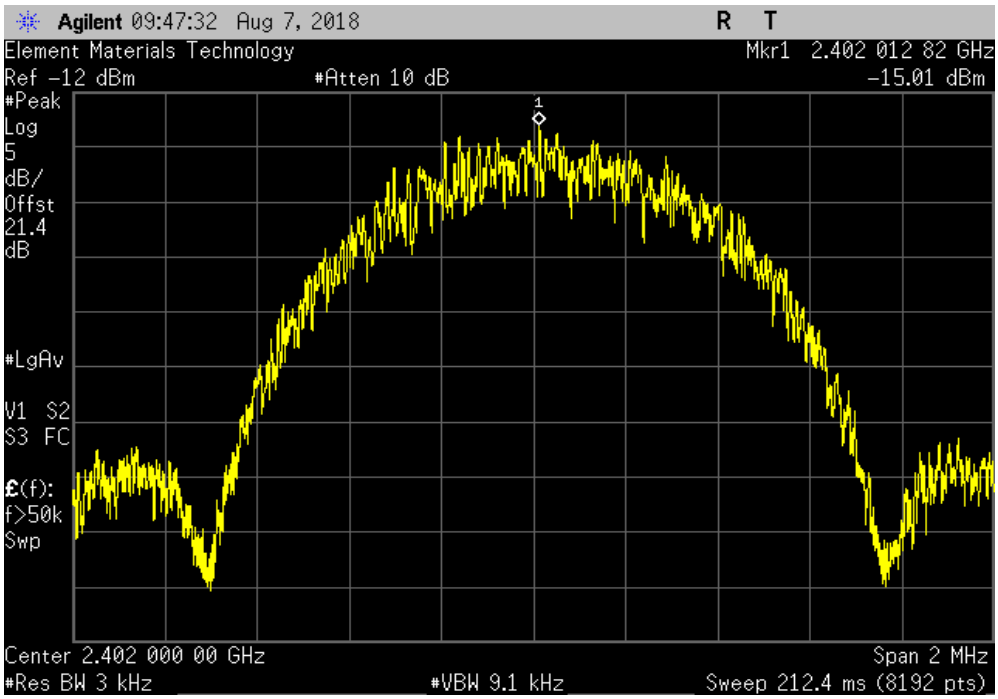
DEVIATIONS FROM TEST STANDARD

None

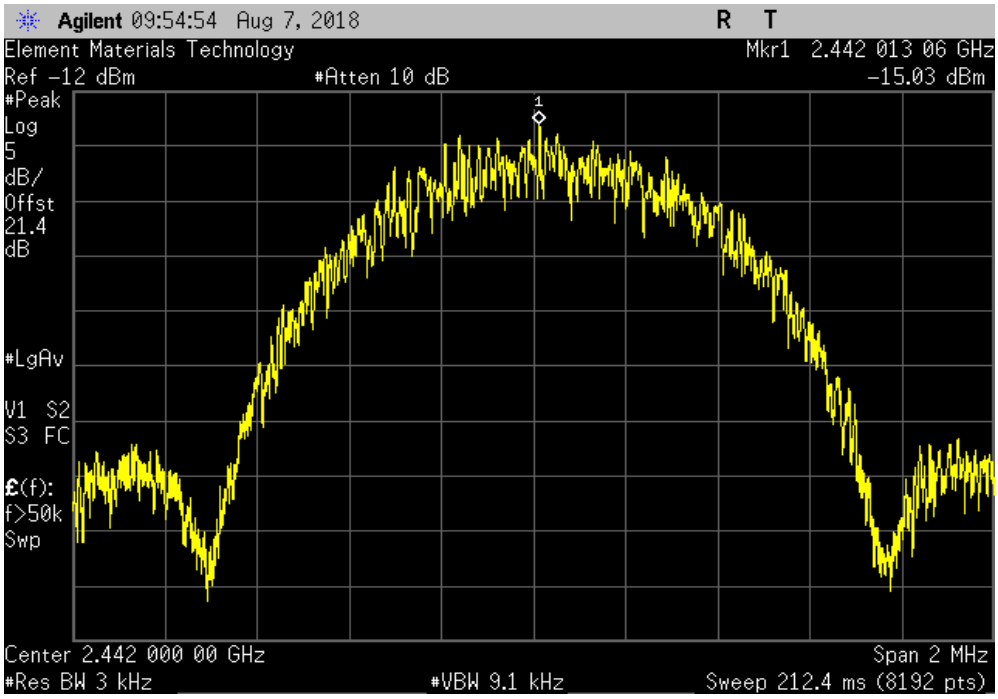
Configuration #	**7**	*Signature*

		Value dBm/3kHz	**Limit < dBm/3kHz**	**Results**
Antenna Port 7				
	BLE/GFSK			
	Low Channel, 2402 MHz	-15.013	8	Pass
	Mid Channel, 2442 MHz	-15.034	8	Pass
	High Channel, 2480 MHz	-15.305	8	Pass
Antenna Port 8				
	BLE/GFSK			
	Low Channel, 2402 MHz	-14.918	8	Pass
	Mid Channel, 2442 MHz	-14.906	8	Pass
	High Channel, 2480 MHz	-15.233	8	Pass

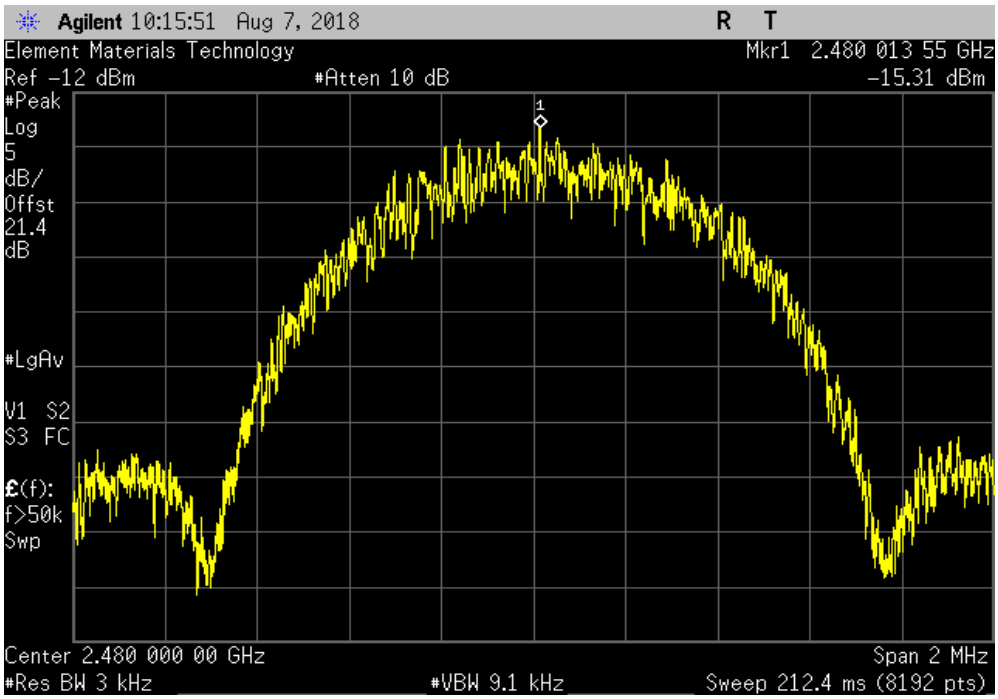
Antenna Port 7, BLE/GFSK, Low Channel, 2402 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-15.013	8	Pass



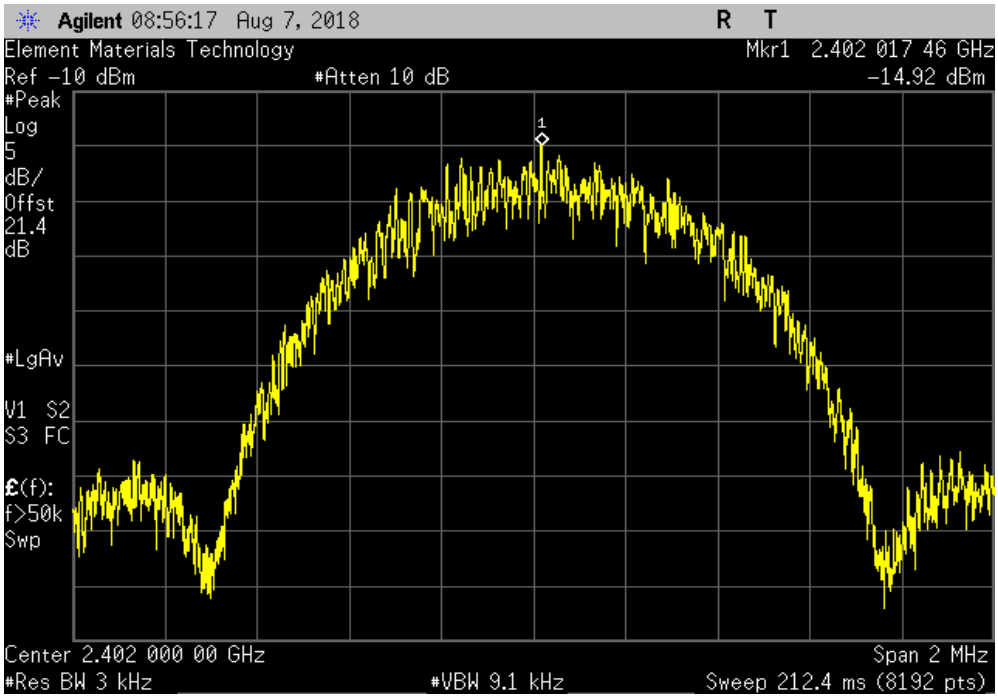
Antenna Port 7, BLE/GFSK, Mid Channel, 2442 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-15.034	8	Pass



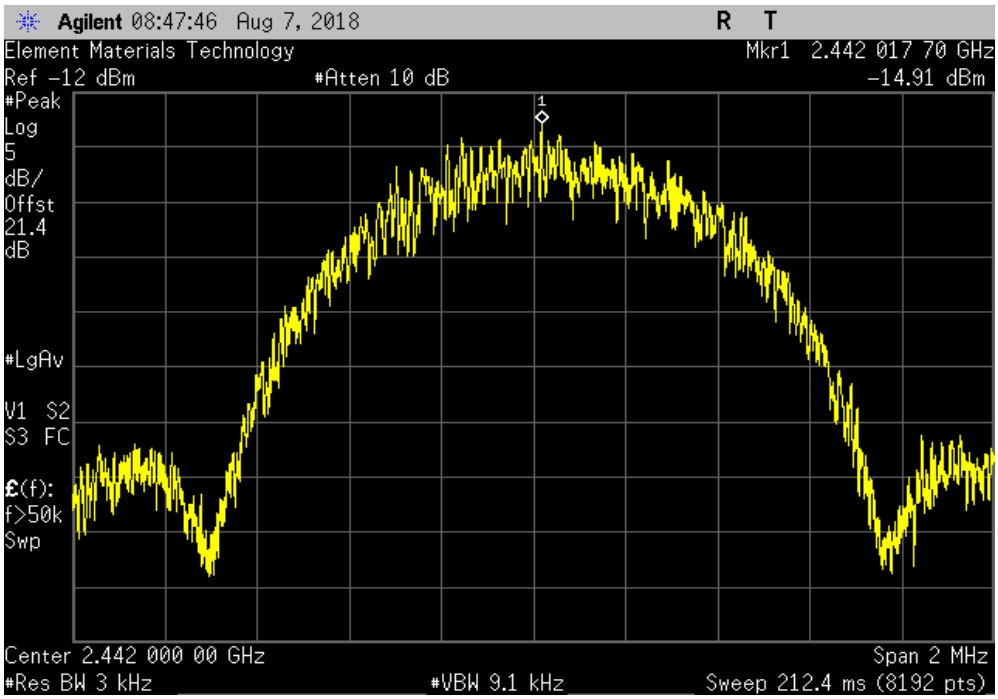
Antenna Port 7, BLE/GFSK, High Channel, 2480 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-15.305	8	Pass



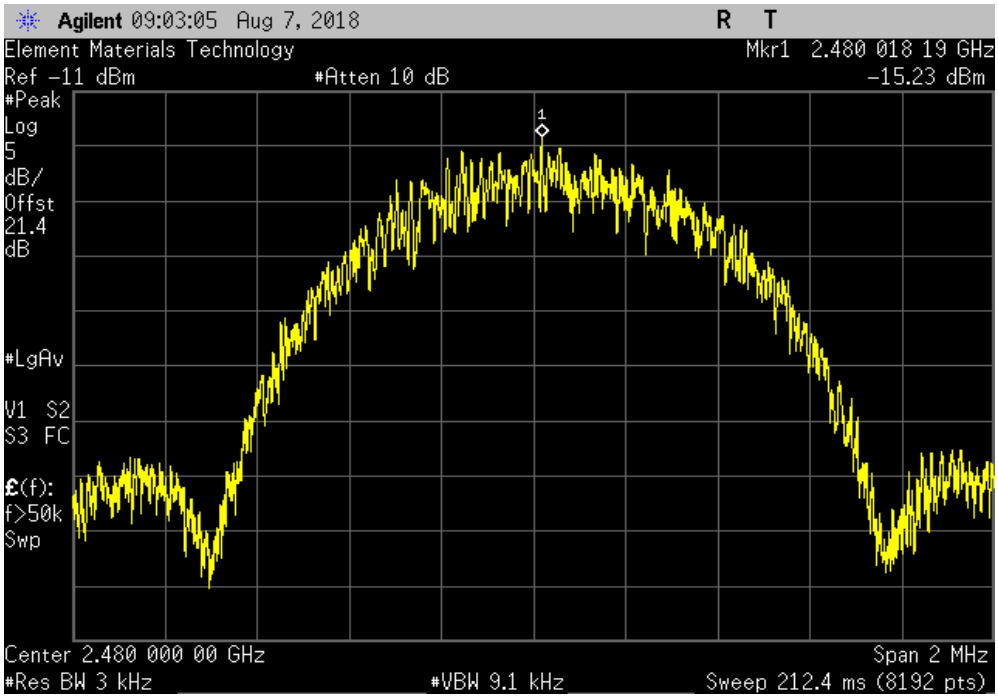
Antenna Port 8, BLE/GFSK, Low Channel, 2402 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-14.918	8	Pass



Antenna Port 8, BLE/GFSK, Mid Channel, 2442 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-14.906	8	Pass



Antenna Port 8, BLE/GFSK, High Channel, 2480 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-15.233	8	Pass



BAND EDGE COMPLIANCE

XMit 2017.12.13

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	IW Microwave	KPS-1503-720-KPS	NCU	5-Jun-18	5-Jun-19
Attenuator	Fairview Microwave	SA4014-20	TKV	19-Feb-18	19-Feb-19
Block - DC	Fairview Microwave	SD3379	AMU	19-Feb-18	19-Feb-19
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAT	21-May-18	21-May-19
Generator - Signal	Agilent	N5182A	TIF	23-Aug-17	23-Aug-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The spurious RF conducted emissions at the edges of the authorized bands were measured with the EUT set to low and high transmit frequencies in each available band. The channels closest to the band edges were selected. The EUT was transmitting at the data rate(s) listed in the datasheet.

The spectrum was scanned below the lower band edge and above the higher band edge.

BAND EDGE COMPLIANCE

TbtTx 2017.12.14 XMit 2017.12.13

EUT:	Radio Node			Work Order:	SYNA0249
Serial Number:	E43			Date:	7-Aug-18
Customer:	Walt Disney Parks and Resorts US, Inc.			Temperature:	23.5 °C
Attendees:	Hattie Spetla			Humidity:	47.4% RH
Project:	None			Barometric Pres.:	1021 mbar
Tested by:	Richard Mellroth	Power:	POE	Job Site:	NC04

TEST SPECIFICATIONS	Test Method
FCC 15.247:2018	ANSI C63.10:2013

COMMENTS

Power Setting at Default

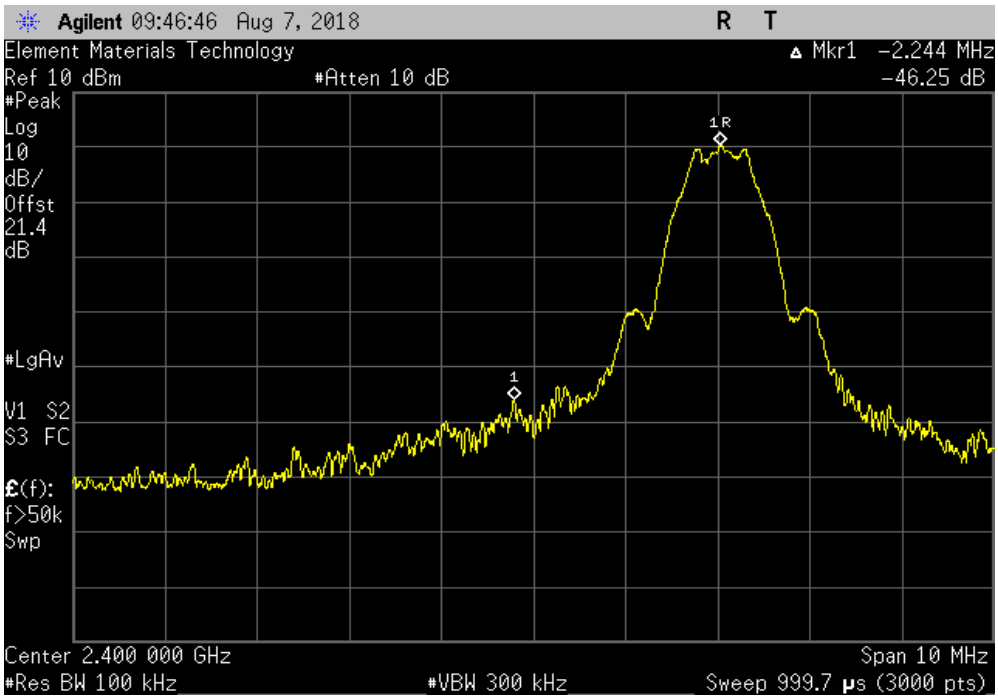
DEVIATIONS FROM TEST STANDARD

None

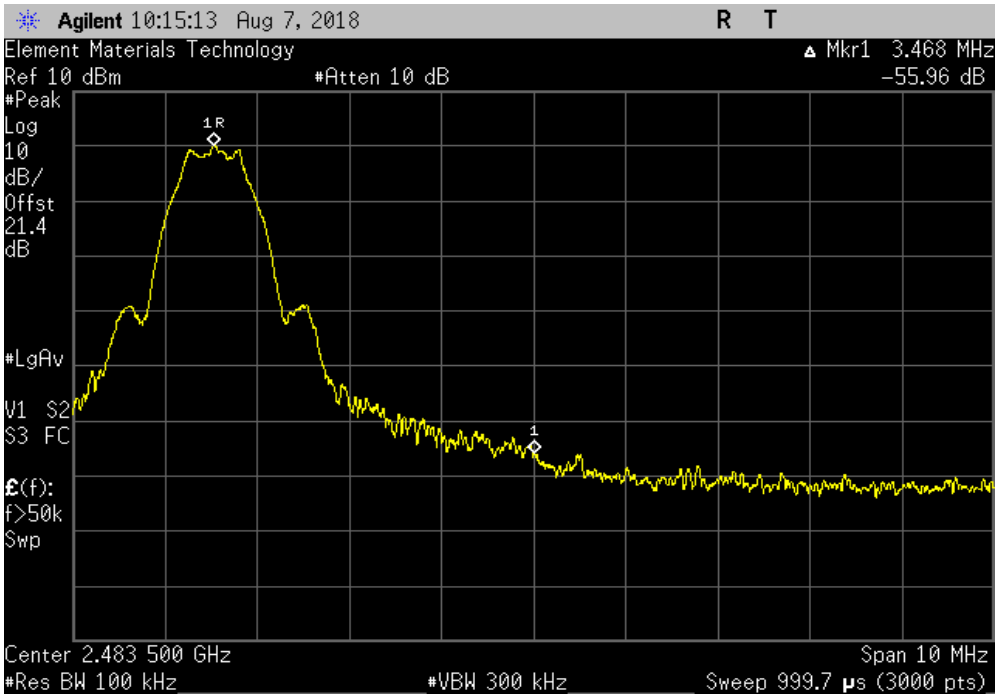
Configuration #	7	Signature

		Value (dBc)	Limit ≤ (dBc)	Result
Antenna Port 7				
	BLE/GFSK			
	Low Channel, 2402 MHz	-46.25	-20	Pass
	High Channel, 2480 MHz	-55.96	-20	Pass
Antenna Port 8				
	BLE/GFSK			
	Low Channel, 2402 MHz	-47.62	-20	Pass
	High Channel, 2480 MHz	-54.59	-20	Pass

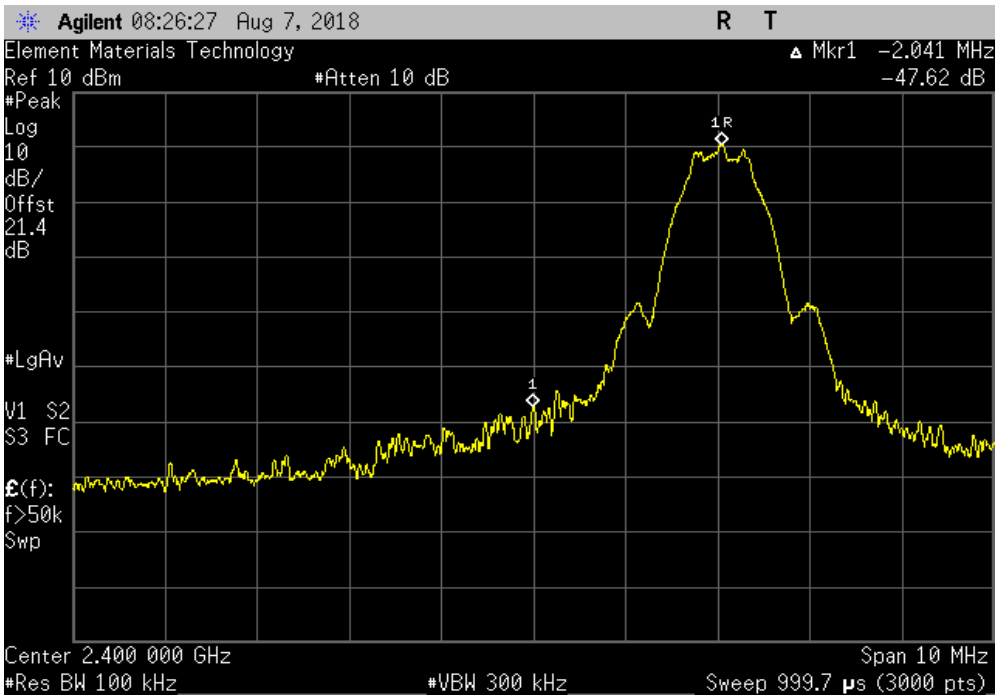
Antenna Port 7, BLE/GFSK, Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-46.25	-20	Pass



Antenna Port 7, BLE/GFSK, High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-55.96	-20	Pass



Antenna Port 8, BLE/GFSK, Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-47.62	-20	Pass



Antenna Port 8, BLE/GFSK, High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-54.59	-20	Pass