Walt Disney Parks and Resorts US, Inc.

Radio Node

FCC 15.247:2018

2.4 GHz DSSS DTS Radio

Report # SYNA0249.2 Rev. 2

NVLAP LAB CODE: 200630-0
NVLAP LAB CODE: 200629-0
NVLAP LAB CODE: 200676-0

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. As indicated in the Statement of Work sent with the quotation, Element's standard process is to always use the latest published version of the test methods even when earlier versions are cited in the test specification. Issuance of a purchase order was de facto acceptance of this approach. Otherwise, the client would have advised Element in writing of the specific version of the test methods they wanted applied to the subject testing.

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 specification 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

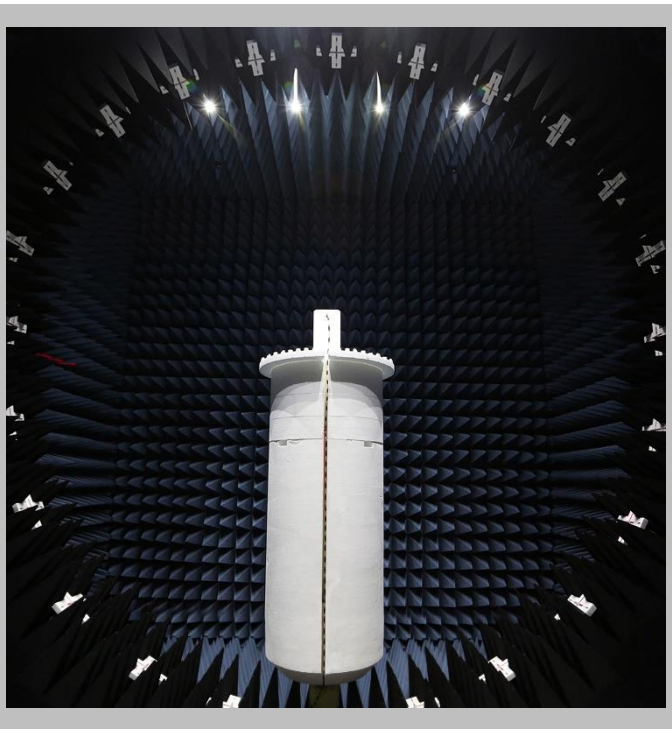
MIC – Recognized by MIC as a CAB for the acceptance of test data.

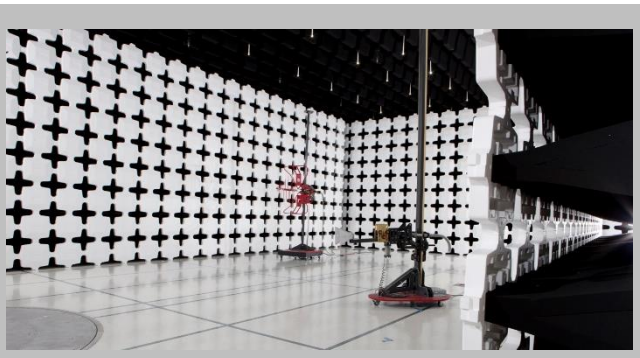
SCOPE

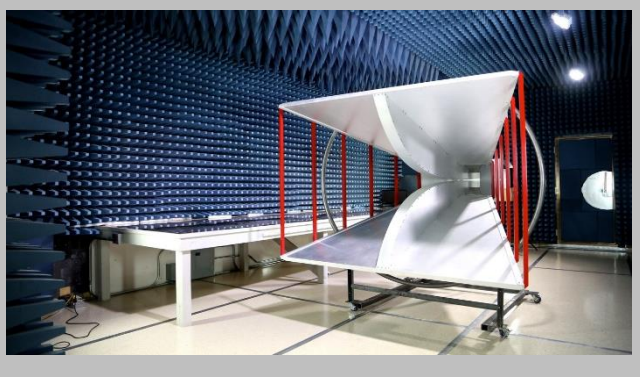
For details on the Scopes of our Accreditations, please visit:
https://www.nwemc.com/emc-testing-accreditations

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.

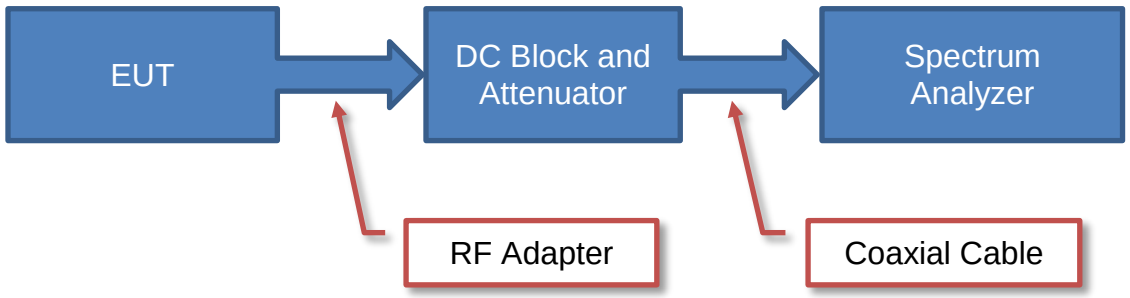
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable 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.

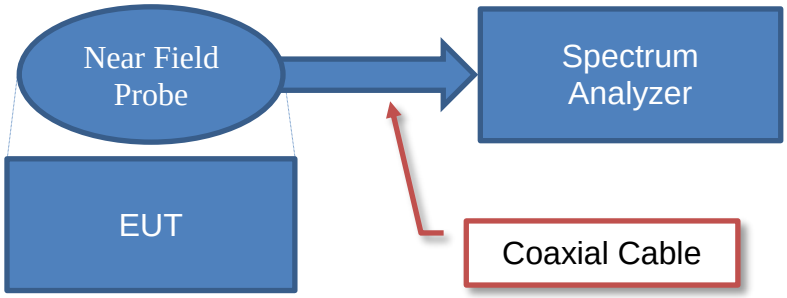
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%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

Test Setup Block Diagrams

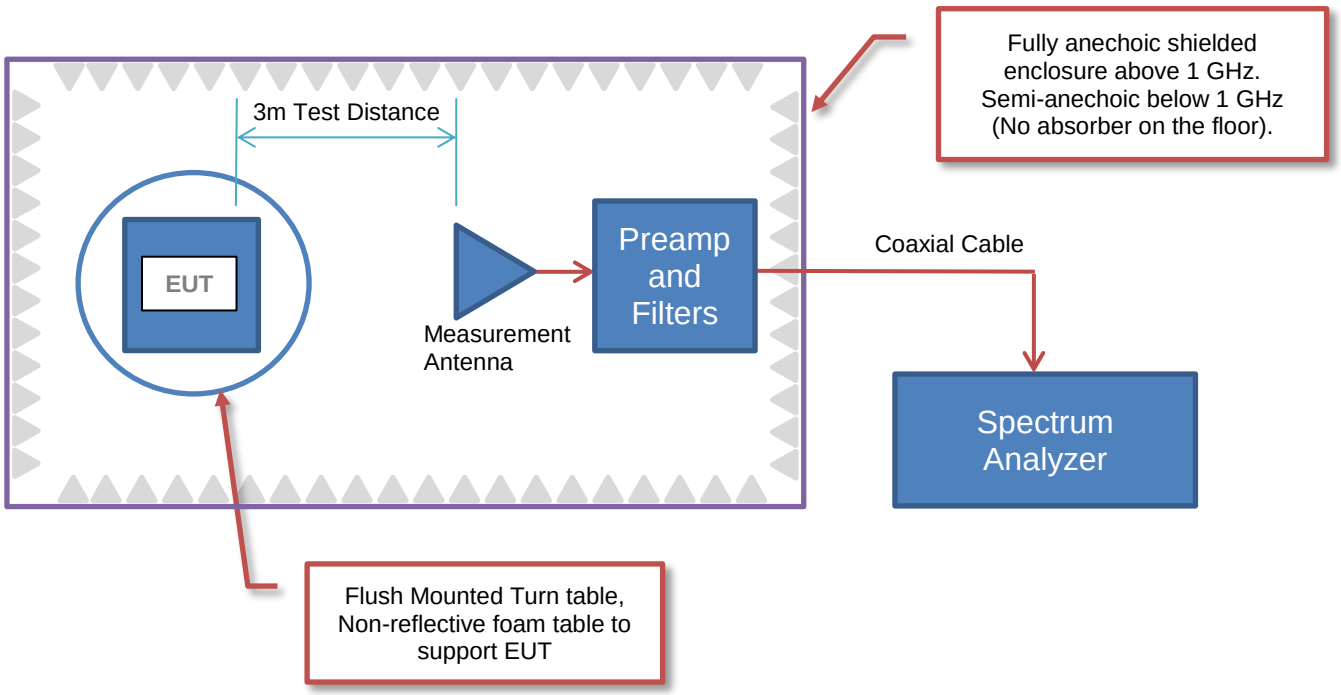
Antenna Port Conducted Measurements



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:	March 8, 2019
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 2.4 GHz DSSS DTS 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	None
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	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
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- 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	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

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	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
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- 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

element
2018-07-17

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

CONFIGURATIONS

Configuration SYNA0271- 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
Directional Antenna	Ventev	T24190P10006GT	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	Synapse	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	2018-08-02	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.
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	2018-11-05	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.

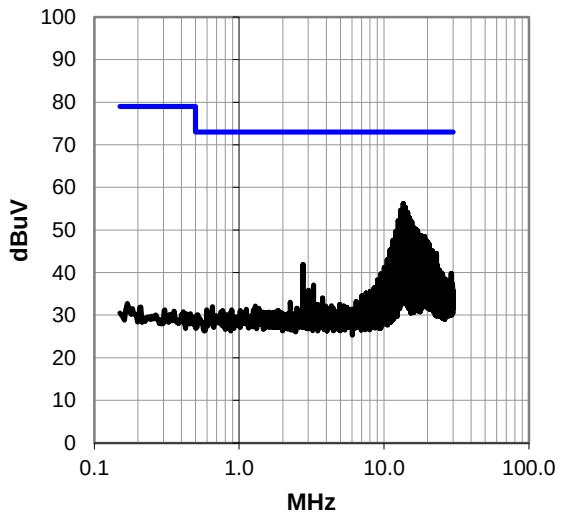
EUT OPERATING MODES

EMC Test Mode, Volume 10

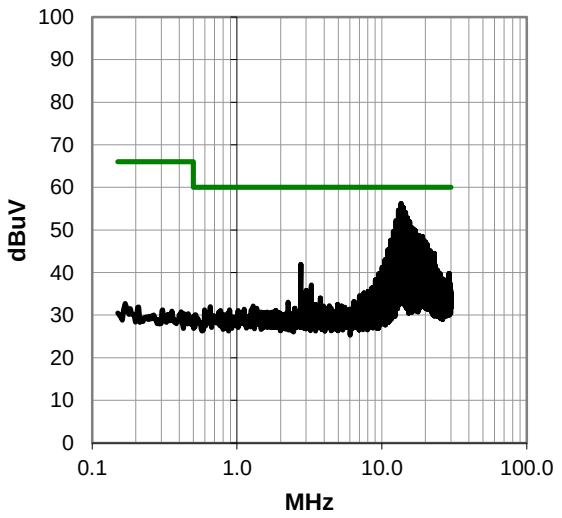
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



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

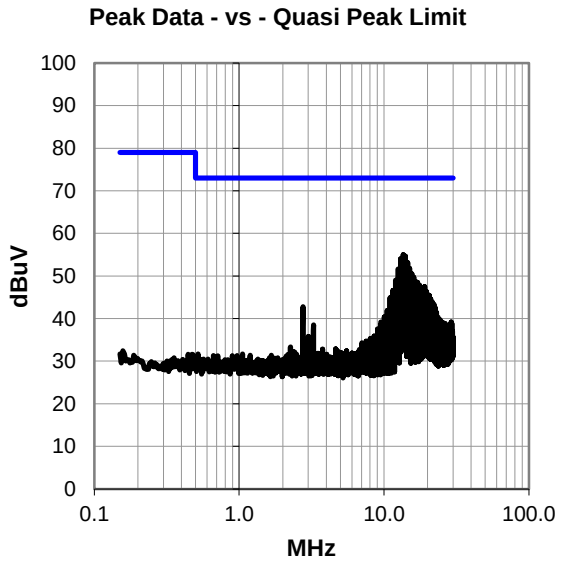
The Radio Node was pseudorandomly transmitting on one of the 3 BLE channel and also on the only DTS channel of operation.

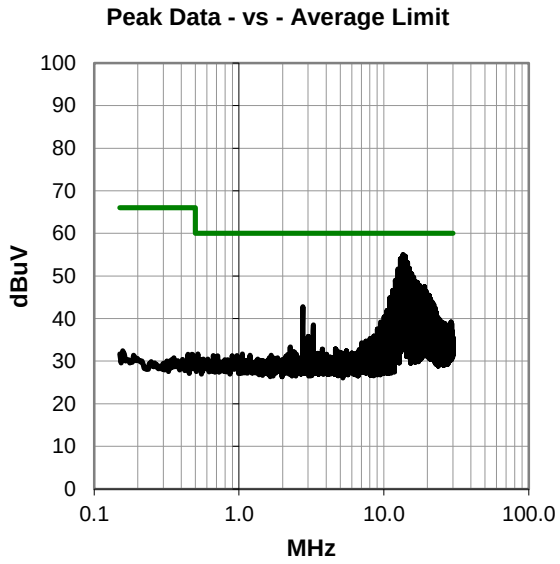
EUT OPERATING MODES

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

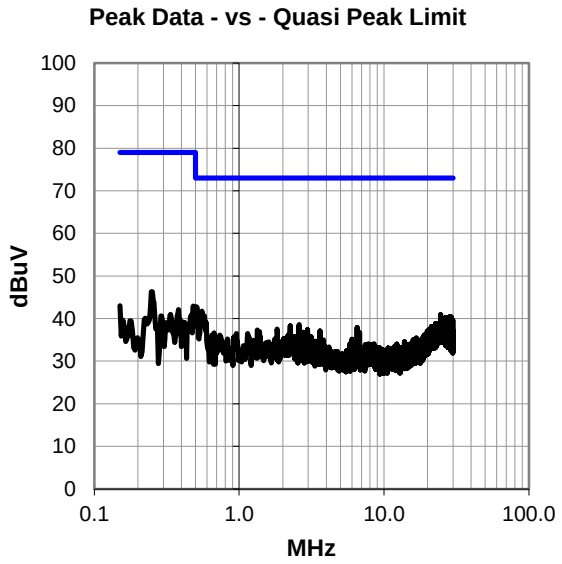
The Radio Node was pseudorandomly transmitting on one of the 3 BLE channel and also on the only DTS channel of operation.

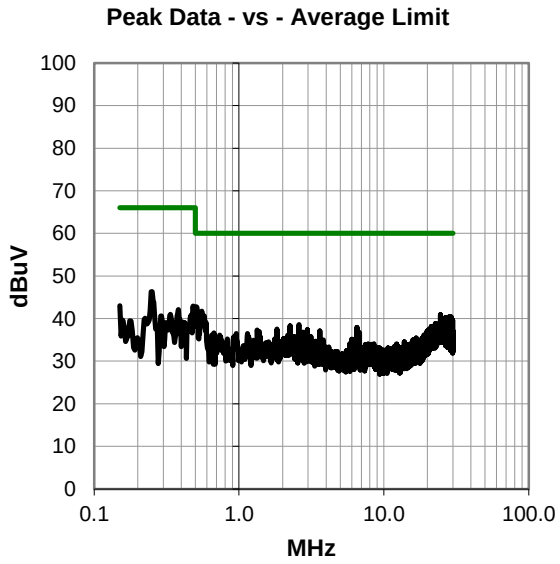
EUT OPERATING MODES

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

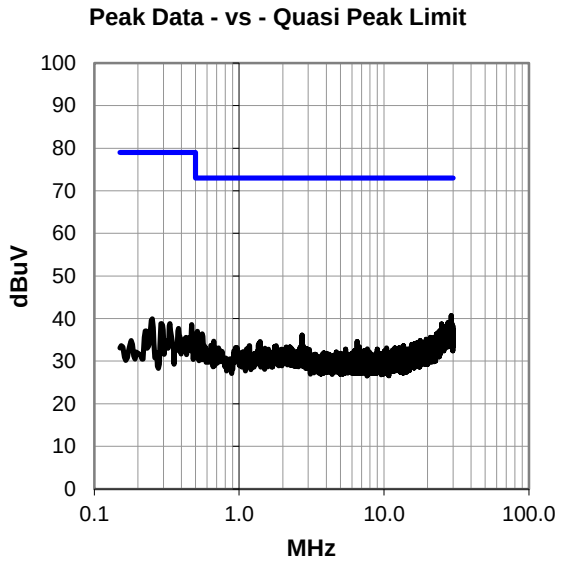
The Radio Node was pseudorandomly transmitting on one of the 3 BLE channel and also on the only DTS channel of operation.

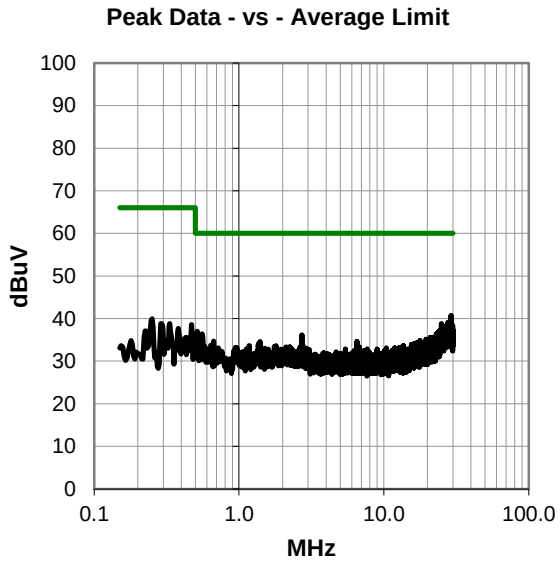
EUT OPERATING MODES

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

DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 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.

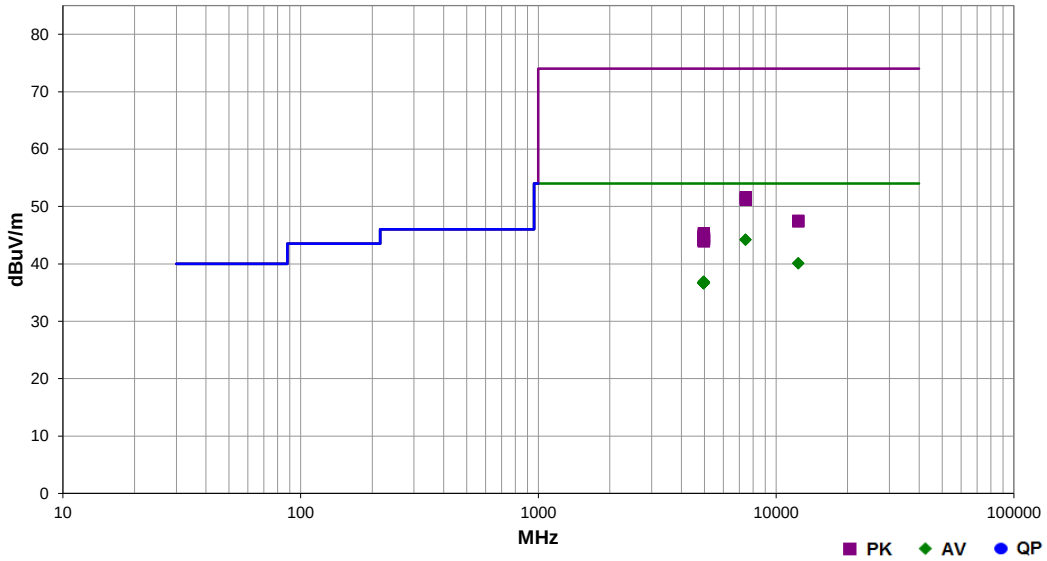
SPURIOUS RADIATED EMISSIONS 2X2 ANTENNA

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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 MHz				
Deviations:	None				
Comments:	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).				

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

Run #	45	**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
7447.275	27.9	13.0	1.0	119.0	3.3	0.0	Horz	AV	0.0	44.2	54.0	-9.8	EUT on Side, Ant Vert, Directional PA 2x2 Ant
7447.442	27.9	13.0	2.7	240.0	3.3	0.0	Vert	AV	0.0	44.2	54.0	-9.8	EUT on Side, Ant Vert, Directional PA 2x2 Ant
12411.680	26.9	9.9	1.0	337.0	3.3	0.0	Horz	AV	0.0	40.1	54.0	-13.9	EUT on Side, Ant Vert, Directional PA 2x2 Ant
12412.160	26.9	9.9	1.0	210.0	3.3	0.0	Vert	AV	0.0	40.1	54.0	-13.9	EUT on Side, Ant Vert, Directional PA 2x2 Ant
4963.967	28.5	5.1	1.5	313.0	3.3	0.0	Horz	AV	0.0	36.9	54.0	-17.1	EUT on Side, Ant Vert, Directional PA 2x2 Ant
4963.508	28.4	5.1	1.0	314.0	3.3	0.0	Vert	AV	0.0	36.8	54.0	-17.2	EUT on Side, Ant Horz, Directional PA 2x2 Ant
4962.158	28.3	5.2	3.8	332.0	3.3	0.0	Horz	AV	0.0	36.8	54.0	-17.2	EUT Horz, Ant on Side, Directional PA 2x2 Ant
4963.150	28.3	5.1	3.7	1.0	3.3	0.0	Horz	AV	0.0	36.7	54.0	-17.3	EUT on Side, Ant Horz, Directional PA 2x2 Ant
4963.975	28.3	5.1	3.2	41.0	3.3	0.0	Horz	AV	0.0	36.7	54.0	-17.3	EUT on Side, Ant on Side, Directional PA 2x2 Ant
4963.508	28.3	5.1	1.8	280.0	3.3	0.0	Vert	AV	0.0	36.7	54.0	-17.3	EUT on Side, Ant on Side, Directional PA 2x2 Ant
4964.042	28.3	5.1	1.0	10.0	3.3	0.0	Horz	AV	0.0	36.7	54.0	-17.3	EUT Horz, Ant Vert, Directional PA 2x2 Ant
4964.092	28.3	5.1	2.1	299.0	3.3	0.0	Vert	AV	0.0	36.7	54.0	-17.3	EUT Horz, Ant Vert, Directional PA 2x2 Ant
4963.717	28.3	5.1	1.0	127.0	3.3	0.0	Vert	AV	0.0	36.7	54.0	-17.3	EUT Horz, Ant on Side, Directional PA 2x2 Ant
4964.142	28.3	5.1	1.0	270.0	3.3	0.0	Horz	AV	0.0	36.7	54.0	-17.3	EUT Horz, Ant Horz, Directional PA 2x2 Ant
4963.550	28.3	5.1	3.9	361.0	3.3	0.0	Vert	AV	0.0	36.7	54.0	-17.3	EUT Horz, Ant Horz, Directional PA 2x2 Ant
4963.683	28.3	5.1	2.2	245.0	3.3	0.0	Horz	AV	0.0	36.7	54.0	-17.3	EUT Vert, Ant Horz, Directional PA 2x2 Ant
4963.150	28.3	5.1	1.1	77.0	3.3	0.0	Vert	AV	0.0	36.7	54.0	-17.3	EUT Vert, Ant Horz, Directional PA 2x2 Ant
4964.483	28.3	5.1	1.0	19.0	3.3	0.0	Vert	AV	0.0	36.7	54.0	-17.3	EUT Vert, Ant Vert, Directional PA 2x2 Ant
4964.125	28.3	5.1	3.2	74.0	3.3	0.0	Horz	AV	0.0	36.7	54.0	-17.3	EUT Vert, Ant on Side, Directional PA 2x2 Ant
4964.400	28.2	5.1	1.0	230.0	3.3	0.0	Vert	AV	0.0	36.6	54.0	-17.4	EUT on Side, Ant Vert, Directional PA 2x2 Ant
4963.842	28.2	5.1	1.0	157.0	3.3	0.0	Horz	AV	0.0	36.6	54.0	-17.4	EUT Vert, Ant Vert, Directional PA 2x2 Ant
4964.017	28.2	5.1	1.0	41.0	3.3	0.0	Vert	AV	0.0	36.6	54.0	-17.4	EUT Vert, Ant on Side, Directional PA 2x2 Ant
7444.317	38.6	13.0	2.7	240.0		0.0	Vert	PK	0.0	51.6	74.0	-22.4	EUT on Side, Ant Vert, Directional PA 2x2 Ant
7444.558	38.2	13.0	1.0	119.0		0.0	Horz	PK	0.0	51.2	74.0	-22.8	EUT on Side, Ant Vert, Directional PA 2x2 Ant
12409.620	37.6	9.9	1.0	210.0		0.0	Vert	PK	0.0	47.5	74.0	-26.5	EUT on Side, Ant Vert, Directional PA 2x2 Ant
12409.930	37.5	9.9	1.0	337.0		0.0	Horz	PK	0.0	47.4	74.0	-26.6	EUT on Side, Ant Vert, Directional PA 2x2 Ant
4962.592	40.2	5.1	1.0	19.0		0.0	Vert	PK	0.0	45.3	74.0	-28.7	EUT Vert, Ant Vert, Directional PA 2x2 Ant
4966.050	39.8	5.1	3.8	332.0		0.0	Horz	PK	0.0	44.9	74.0	-29.1	EUT Horz, Ant on Side, Directional PA 2x2 Ant
4962.125	39.7	5.2	1.1	77.0		0.0	Vert	PK	0.0	44.9	74.0	-29.1	EUT Vert, Ant Horz, Directional PA 2x2 Ant
4963.000	39.6	5.1	1.0	27.0		0.0	Horz	PK	0.0	44.7	74.0	-29.3	EUT on Side, Ant Horz, 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
4966.267	39.5	5.1	1.0	157.0		0.0	Horz	PK	0.0	44.6	74.0	-29.4	EUT Vert, Ant Vert, Directional PA 2x2 Ant
4965.242	39.4	5.1	1.0	206.0		0.0	Horz	PK	0.0	44.5	74.0	-29.5	EUT on Side, Ant on Side, Directional PA 2x2 Ant
4963.342	39.4	5.1	1.0	127.0		0.0	Vert	PK	0.0	44.5	74.0	-29.5	EUT Horz, Ant on Side, Directional PA 2x2 Ant
4962.550	39.3	5.1	1.8	280.0		0.0	Vert	PK	0.0	44.4	74.0	-29.6	EUT on Side, Ant on Side, Directional PA 2x2 Ant
4965.675	39.3	5.1	1.5	312.0		0.0	Horz	PK	0.0	44.4	74.0	-29.6	EUT on Side, Ant Vert, Directional PA 2x2 Ant
4966.183	39.2	5.1	1.0	314.0		0.0	Vert	PK	0.0	44.3	74.0	-29.7	EUT on Side, Ant Horz, Directional PA 2x2 Ant
4964.350	39.2	5.1	1.0	230.0		0.0	Vert	PK	0.0	44.3	74.0	-29.7	EUT on Side, Ant Vert, Directional PA 2x2 Ant
4965.058	39.2	5.1	1.0	270.0		0.0	Horz	PK	0.0	44.3	74.0	-29.7	EUT Horz, Ant Horz, Directional PA 2x2 Ant
4965.858	39.1	5.1	1.0	10.0		0.0	Horz	PK	0.0	44.2	74.0	-29.8	EUT Horz, Ant Vert, Directional PA 2x2 Ant
4963.942	39.0	5.1	2.1	299.0		0.0	Vert	PK	0.0	44.1	74.0	-29.9	EUT Horz, Ant Vert, Directional PA 2x2 Ant
4964.992	39.0	5.1	3.9	361.0		0.0	Vert	PK	0.0	44.1	74.0	-29.9	EUT Horz, Ant Horz, Directional PA 2x2 Ant
4962.958	39.0	5.1	2.2	245.0		0.0	Horz	PK	0.0	44.1	74.0	-29.9	EUT Vert, Ant Horz, Directional PA 2x2 Ant
4963.300	39.0	5.1	1.0	41.0		0.0	Vert	PK	0.0	44.1	74.0	-29.9	EUT Vert, Ant on Side, Directional PA 2x2 Ant
4964.700	38.8	5.1	3.2	74.0		0.0	Horz	PK	0.0	43.9	74.0	-30.1	EUT Vert, Ant on Side, Directional PA 2x2 Ant

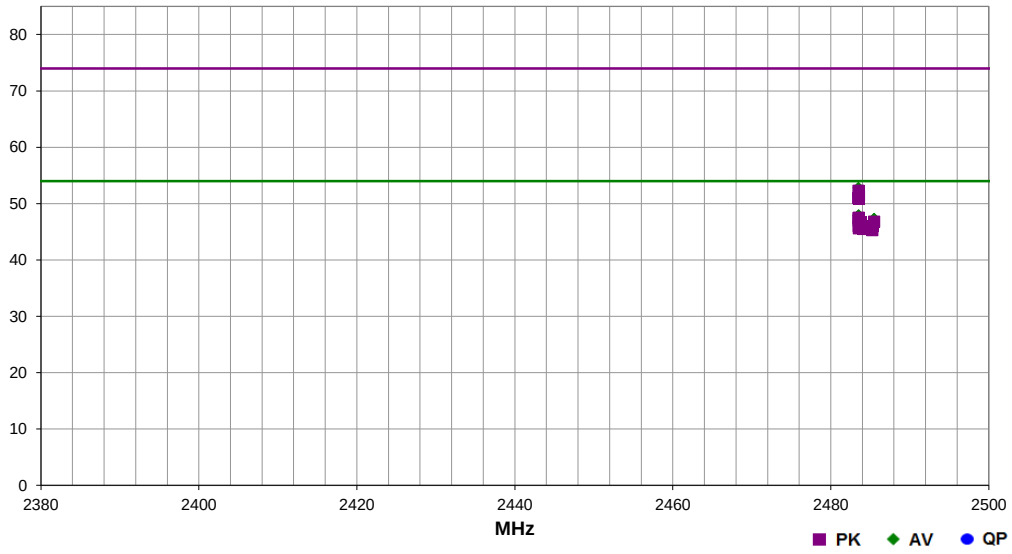
SPURIOUS RADIATED EMISSIONS 2X2 ANTENNA

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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 MHz				
Deviations:	None				
Comments:	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).				

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

Run #	41	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Calculated 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)	Marker Delta Comments
2483.507	34.0	-4.5	1.8	345.0	3.3	20.0	Vert	AV	0.0	52.8	54.0	-1.2	EUT on Side, Ant on Side, Directional PA 2x2 Ant: Fund 81.7dBuV + -47.7dBc = 34.0dBuV (calc. amp.)
2483.573	33.1	-4.5	1.8	338.0	3.3	20.0	Horz	AV	0.0	51.9	54.0	-2.1	EUT Vert, Ant Vert, Directional PA 2x2 Ant: Fund 82.5dBuV + -49.4dBc = 33.1dBuV (calc. amp.)
2483.507	32.7	-4.5	1.8	345.0	3.3	20.0	Vert	AV	0.0	51.5	54.0	-2.5	EUT Vert, Ant on Side, Directional PA 2x2 Ant: Fund 81.8dBuV + -49.1dBc = 32.7dBuV (calc. amp.)
2483.507	32.7	-4.5	1.8	345.0	3.3	20.0	Vert	AV	0.0	51.5	54.0	-2.5	EUT Horz, Ant on Side, Directional PA 2x2 Ant: Fund 81.7dBuV + -49.0dBc = 32.7dBuV (calc. amp.)
2483.520	32.7	-4.5	1.2	338.0	3.3	20.0	Horz	AV	0.0	51.5	54.0	-2.5	EUT on Side, Ant Vert, Directional PA 2x2 Ant: Fund 82.6dBuV + -49.9dBc = 32.7dBuV (calc. amp.)
2483.553	32.6	-4.5	1.2	338.0	3.3	20.0	Horz	AV	0.0	51.4	54.0	-2.6	EUT Horz, Ant Vert, Directional PA 2x2 Ant: Fund 82.3dBuV + -49.7dBc = 32.6dBuV (calc. amp.)
2483.507	29.1	-4.5	1.0	324.0	3.3	20.0	Vert	AV	0.0	47.9	54.0	-6.1	EUT Vert, Ant Vert, Directional PA 2x2 Ant: Fund 75.5dBuV + -46.4dBc = 29.1dBuV (calc. amp.)
2483.540	29.1	-4.5	1.0	347.0	3.3	20.0	Horz	AV	0.0	47.9	54.0	-6.1	EUT on Side, Ant on Side, Directional PA 2x2 Ant: Fund 75.3dBuV + -46.2dBc = 29.1dBuV (calc. amp.)
2483.527	28.7	-4.5	1.2	347.0	3.3	20.0	Vert	AV	0.0	47.5	54.0	-6.5	EUT on Side, Ant Vert, Directional PA 2x2 Ant: Fund 76.2dBuV + -47.5dBc = 28.7dBuV (calc. amp.)
2485.487	28.4	-4.4	1.1	349.0	3.3	20.0	Horz	AV	0.0	47.3	54.0	-6.7	EUT Horz, Ant on Side, Directional PA 2x2 Ant: Fund 75.8dBuV + -47.4dBc = 28.4dBuV (calc. amp.)
2483.807	28.4	-4.5	1.2	347.0	3.3	20.0	Vert	AV	0.0	47.2	54.0	-6.8	EUT Horz, Ant Vert, Directional PA 2x2 Ant: Fund 75.9dBuV + -47.5dBc = 28.4dBuV (calc. amp.)
2485.300	27.6	-4.4	4.0	171.0	3.3	20.0	Vert	AV	0.0	46.5	54.0	-7.5	EUT Vert, Ant Horz, Directional PA 2x2 Ant: Fund 72.7dBuV + -45.1dBc = 27.6dBuV (calc. amp.)
2483.520	27.7	-4.5	1.0	347.0	3.3	20.0	Horz	AV	0.0	46.5	54.0	-7.5	EUT Vert, Ant on Side, Directional PA 2x2 Ant: Fund 75.7dBuV + -48.0dBc = 27.7dBuV (calc. amp.)
2484.173	27.3	-4.4	3.7	84.0	3.3	20.0	Vert	AV	0.0	46.2	54.0	-7.8	EUT Horz, Ant Horz, Directional PA 2x2 Ant: Fund 73.5dBuV + -46.2dBc = 27.3dBuV (calc. amp.)
2483.540	27.3	-4.5	1.0	320.0	3.3	20.0	Horz	AV	0.0	46.1	54.0	-7.9	EUT Vert, Ant Horz, Directional PA 2x2 Ant: Fund 72.5dBuV + -45.2dBc = 27.3dBuV (calc. amp.)
2483.747	27.2	-4.5	4.0	296.0	3.3	20.0	Horz	AV	0.0	46.0	54.0	-8.0	EUT Horz, Ant Horz, Directional PA 2x2 Ant: Fund 71.2dBuV + -44.0dBc = 27.2dBuV (calc. amp.)

Freq (MHz)	Calculated 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)	Marker Delta Comments
2484.127	27.1	-4.5	1.0	247.0	3.3	20.0	Vert	AV	0.0	45.9	54.0	-8.1	EUT on Side, Ant Horz, Directional PA 2x2 Ant: Fund 69.3dBuV + -42.2dBc = 27.1dBuV (calc. amp.)
2485.247	26.9	-4.4	3.8	141.0	3.3	20.0	Horz	AV	0.0	45.8	54.0	-8.2	EUT on Side, Ant Horz, Directional PA 2x2 Ant: Fund 72.8dBuV + -45.9dBc = 26.9dBuV (calc. amp.)
2483.507	36.8	-4.5	1.8	345.0	0.0	20.0	Vert	PK	0.0	52.3	74.0	-21.7	EUT on Side, Ant on Side, Directional PA 2x2 Ant: Fund 84.5dBuV + -47.7dBc = 36.8dBuV (calc. amp.)
2483.573	35.9	-4.5	1.8	338.0	0.0	20.0	Horz	PK	0.0	51.4	74.0	-22.6	EUT Vert, Ant Vert, Directional PA 2x2 Ant: Fund 85.3dBuV + -49.4dBc = 35.9dBuV (calc. amp.)
2483.507	35.5	-4.5	1.8	345.0	0.0	20.0	Vert	PK	0.0	51.0	74.0	-23.0	EUT Vert, Ant on Side, Directional PA 2x2 Ant: Fund 84.6dBuV + -49.1dBc = 35.5dBuV (calc. amp.)
2483.507	35.5	-4.5	1.8	345.0	0.0	20.0	Vert	PK	0.0	51.0	74.0	-23.0	EUT Horz, Ant on Side, Directional PA 2x2 Ant: Fund 84.5dBuV + -49.0dBc = 35.5dBuV (calc. amp.)
2483.520	35.5	-4.5	1.2	338.0	0.0	20.0	Horz	PK	0.0	51.0	74.0	-23.0	EUT on Side, Ant Vert, Directional PA 2x2 Ant: Fund 85.4dBuV + -49.9dBc = 35.5dBuV (calc. amp.)
2483.553	35.4	-4.5	1.2	338.0	0.0	20.0	Horz	PK	0.0	50.9	74.0	-23.1	EUT Horz, Ant Vert, Directional PA 2x2 Ant: Fund 85.1dBuV + -49.7dBc = 35.4dBuV (calc. amp.)
2483.540	32.0	-4.5	1.0	347.0	0.0	20.0	Horz	PK	0.0	47.5	74.0	-26.5	EUT on Side, Ant on Side, Directional PA 2x2 Ant: Fund 78.2dBuV + -46.2dBc = 32.0dBuV (calc. amp.)
2483.507	31.9	-4.5	1.0	324.0	0.0	20.0	Vert	PK	0.0	47.4	74.0	-26.6	EUT Vert, Ant Vert, Directional PA 2x2 Ant: Fund 78.3dBuV + -46.4dBc = 31.9dBuV (calc. amp.)
2483.527	31.5	-4.5	1.2	347.0	0.0	20.0	Vert	PK	0.0	47.0	74.0	-27.0	EUT on Side, Ant Vert, Directional PA 2x2 Ant: Fund 79.0dBuV + -47.5dBc = 31.5dBuV (calc. amp.)
2485.487	31.2	-4.4	1.1	349.0	0.0	20.0	Horz	PK	0.0	46.8	74.0	-27.2	EUT Horz, Ant on Side, Directional PA 2x2 Ant: Fund 78.6dBuV + -47.4dBc = 31.2dBuV (calc. amp.)
2483.807	31.2	-4.5	1.2	347.0	0.0	20.0	Vert	PK	0.0	46.7	74.0	-27.3	EUT Horz, Ant Vert, Directional PA 2x2 Ant: Fund 78.7dBuV + -47.5dBc = 31.2dBuV (calc. amp.)
2485.300	30.4	-4.4	4.0	171.0	0.0	20.0	Vert	PK	0.0	46.0	74.0	-28.0	EUT Vert, Ant Horz, Directional PA 2x2 Ant: Fund 75.5dBuV + -45.1dBc = 30.4dBuV (calc. amp.)
2483.520	30.5	-4.5	1.0	347.0	0.0	20.0	Horz	PK	0.0	46.0	74.0	-28.0	EUT Vert, Ant on Side, Directional PA 2x2 Ant: Fund 78.5dBuV + -48.0dBc = 30.5dBuV (calc. amp.)
2484.173	30.2	-4.4	3.7	84.0	0.0	20.0	Vert	PK	0.0	45.8	74.0	-28.2	EUT Horz, Ant Horz, Directional PA 2x2 Ant: Fund 76.4dBuV + -46.2dBc = 30.2dBuV (calc. amp.)
2483.747	30.2	-4.5	4.0	296.0	0.0	20.0	Horz	PK	0.0	45.7	74.0	-28.3	EUT Horz, Ant Horz, Directional PA 2x2 Ant: Fund 74.2dBuV + -44.0dBc = 30.2dBuV (calc. amp.)
2483.540	30.1	-4.5	1.0	320.0	0.0	20.0	Horz	PK	0.0	45.6	74.0	-28.4	EUT Vert, Ant Horz, Directional PA 2x2 Ant: Fund 75.3dBuV + -45.2dBc = 30.1dBuV (calc. amp.)
2484.127	30.0	-4.5	1.0	247.0	0.0	20.0	Vert	PK	0.0	45.5	74.0	-28.5	EUT on Side, Ant Horz, Directional PA 2x2 Ant: Fund 72.2dBuV + -42.2dBc = 30.0dBuV (calc. amp.)
2485.247	29.7	-4.4	3.8	141.0	0.0	20.0	Horz	PK	0.0	45.3	74.0	-28.7	EUT on Side, Ant Horz, Directional PA 2x2 Ant: Fund 75.6dBuV + -45.9dBc = 29.7dBuV (calc. amp.)

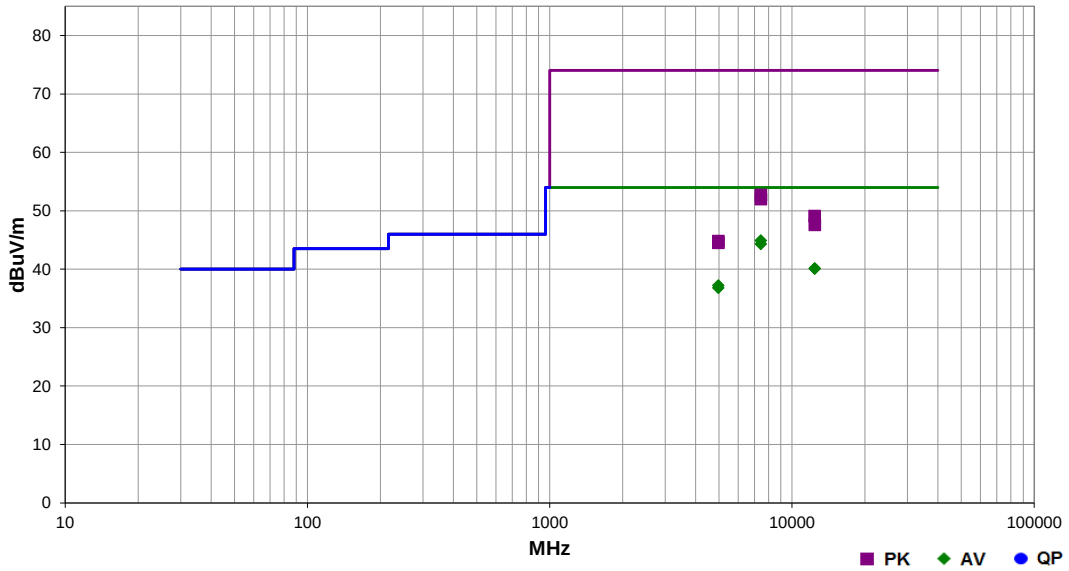
SPURIOUS RADIATED EMISSIONS 2X2 ANTENNA

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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 MHz				
Deviations:	None				
Comments:	Measurements made on worst case orientations determined from testing on the POE system. 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).				

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

Run #	87	**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
7445.550	28.6	13.0	1.4	350.0	3.3	0.0	Horz	AV	0.0	44.9	54.0	-9.1	EUT on Side, Ant Vert, Directional PA 2x2 Ant
7446.200	28.0	13.0	1.0	171.0	3.3	0.0	Vert	AV	0.0	44.3	54.0	-9.7	EUT on Side, Ant Vert, Directional PA 2x2 Ant
12412.430	26.9	9.9	1.0	344.0	3.3	0.0	Horz	AV	0.0	40.1	54.0	-13.9	EUT on Side, Ant Vert, Directional PA 2x2 Ant
12411.750	26.9	9.9	1.0	166.0	3.3	0.0	Vert	AV	0.0	40.1	54.0	-13.9	EUT on Side, Ant Vert, Directional PA 2x2 Ant
4963.917	28.8	5.1	1.0	346.0	3.3	0.0	Horz	AV	0.0	37.2	54.0	-16.8	EUT on Side, Ant Vert, Directional PA 2x2 Ant
4963.608	28.4	5.1	3.4	323.0	3.3	0.0	Vert	AV	0.0	36.8	54.0	-17.2	EUT on Side, Ant Vert, Directional PA 2x2 Ant
7446.158	39.7	13.0	1.0	171.0		0.0	Vert	PK	0.0	52.7	74.0	-21.3	EUT on Side, Ant Vert, Directional PA 2x2 Ant
7444.917	39.0	13.0	1.4	350.0		0.0	Horz	PK	0.0	52.0	74.0	-22.0	EUT on Side, Ant Vert, Directional PA 2x2 Ant
12410.080	39.2	9.9	1.0	166.0		0.0	Vert	PK	0.0	49.1	74.0	-24.9	EUT on Side, Ant Vert, Directional PA 2x2 Ant
12411.280	37.7	9.9	1.0	344.0		0.0	Horz	PK	0.0	47.6	74.0	-26.4	EUT on Side, Ant Vert, Directional PA 2x2 Ant
4963.642	39.7	5.1	3.4	323.0		0.0	Vert	PK	0.0	44.8	74.0	-29.2	EUT on Side, Ant Vert, Directional PA 2x2 Ant
4963.792	39.4	5.1	1.0	346.0		0.0	Horz	PK	0.0	44.5	74.0	-29.5	EUT on Side, Ant Vert, Directional PA 2x2 Ant

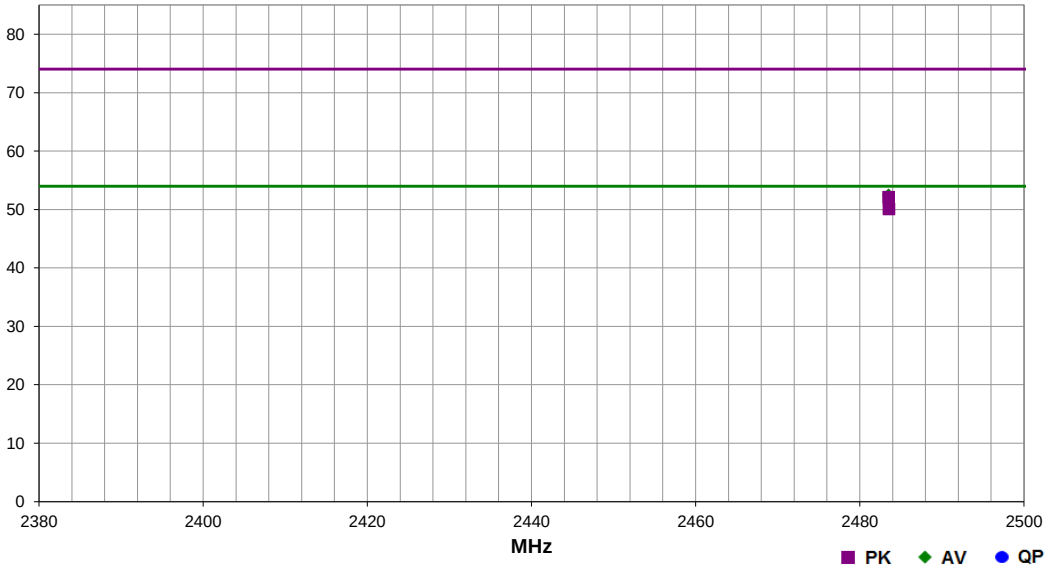
SPURIOUS RADIATED EMISSIONS 2X2 ANTENNA

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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 MHz				
Deviations:	None				
Comments:	Measurements made on worst case orientations determined from testing on the POE system. 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).				

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

Run #	86	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass

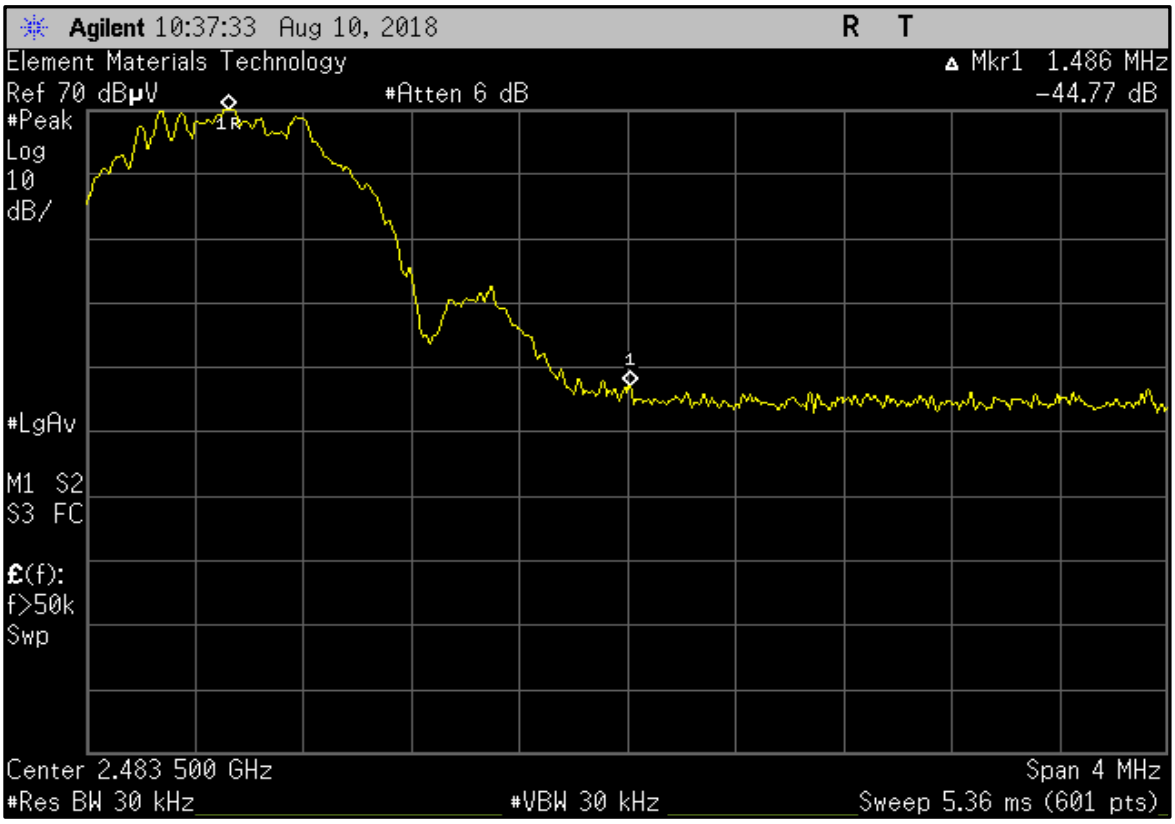


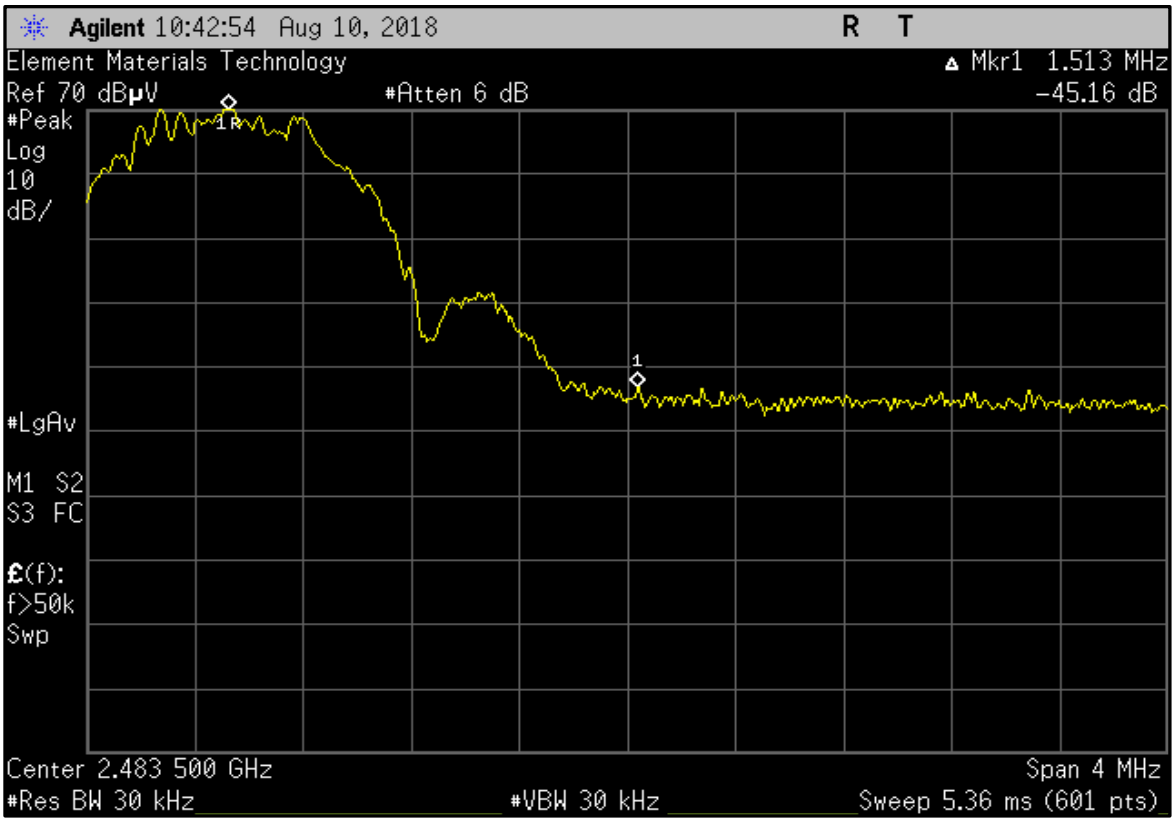
Freq (MHz)	Calculated Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Marker Delta Comments
2483.507	33.7	-4.5	1.7	325.0	3.3	20.0	Horz	AV	0.0	52.5	54.0	-1.5	DC Powered - EUT Vert, Ant Vert, Directional PA 2x2 Ant: Fund 82.9dBuV + -49.2dBc = 33.7dBuV (calc. amp.)
2483.540	31.9	-4.5	1.1	290.0	3.3	20.0	Vert	AV	0.0	50.7	54.0	-3.3	DC Powered - EUT on Side, Ant on Side, Directional PA 2x2 Ant: Fund 81.7dBuV + -49.8dBc = 31.9dBuV (calc. amp.)
2483.507	36.6	-4.5	1.7	325.0	0.0	20.0	Horz	PK	0.0	52.1	74.0	-21.9	DC Powered - EUT Vert, Ant Vert, Directional PA 2x2 Ant: Fund 85.8dBuV + -49.2dBc = 36.6dBuV (calc. amp.)
2483.540	34.6	-4.5	1.1	290.0	0.0	20.0	Vert	PK	0.0	50.1	74.0	-23.9	DC Powered - EUT on Side, Ant on Side, Directional 2x2 Ant: Fund 84.4dBuV + -49.8dBc = 34.6dBuV (calc. amp.)

SPURIOUS RADIATED EMISSIONS 2X2 ANTENNA

EUT Horz, Ant Horz, Directional 2x2 Ant

PSA-ESCI 2018.05.04



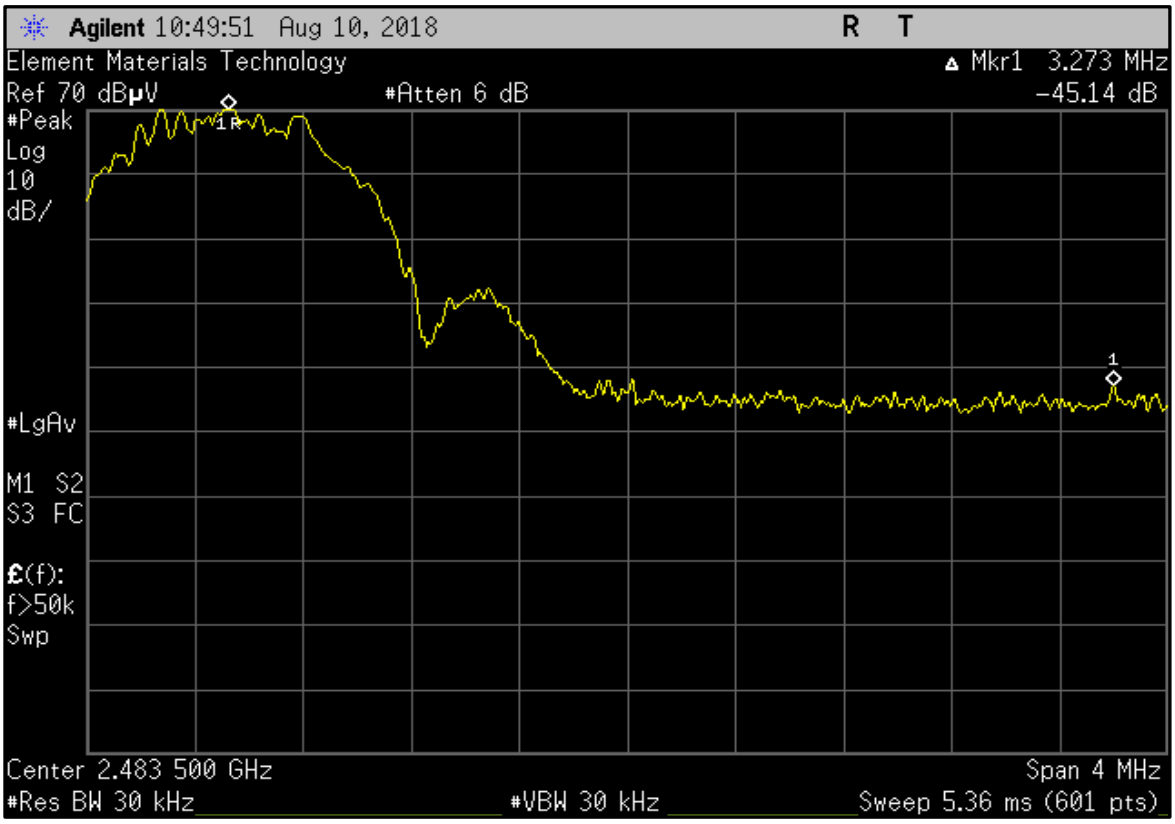


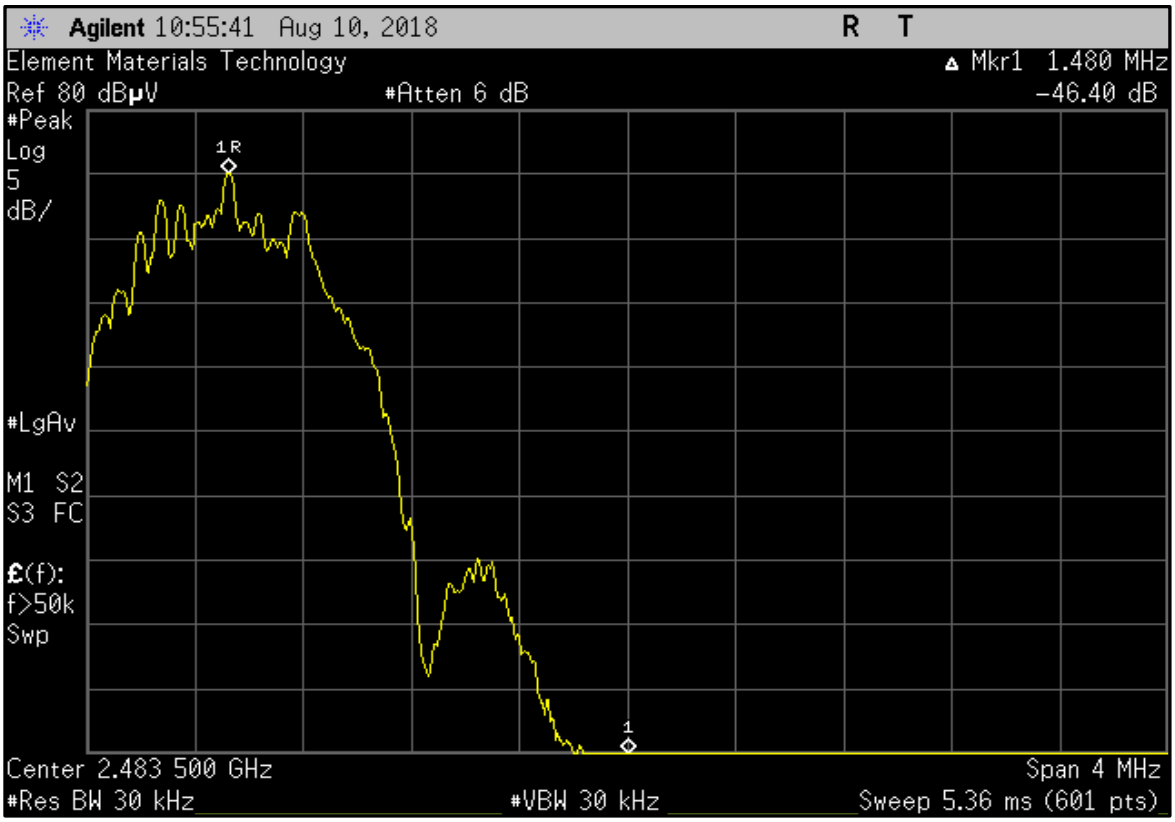
EUT Vert, Ant Horz, Directional 2x2 Ant

SPURIOUS RADIATED EMISSIONS 2X2 ANTENNA

EUT Vert, Ant Horz, Directional 2x2 Ant

PSA-ESCI 2018.05.04



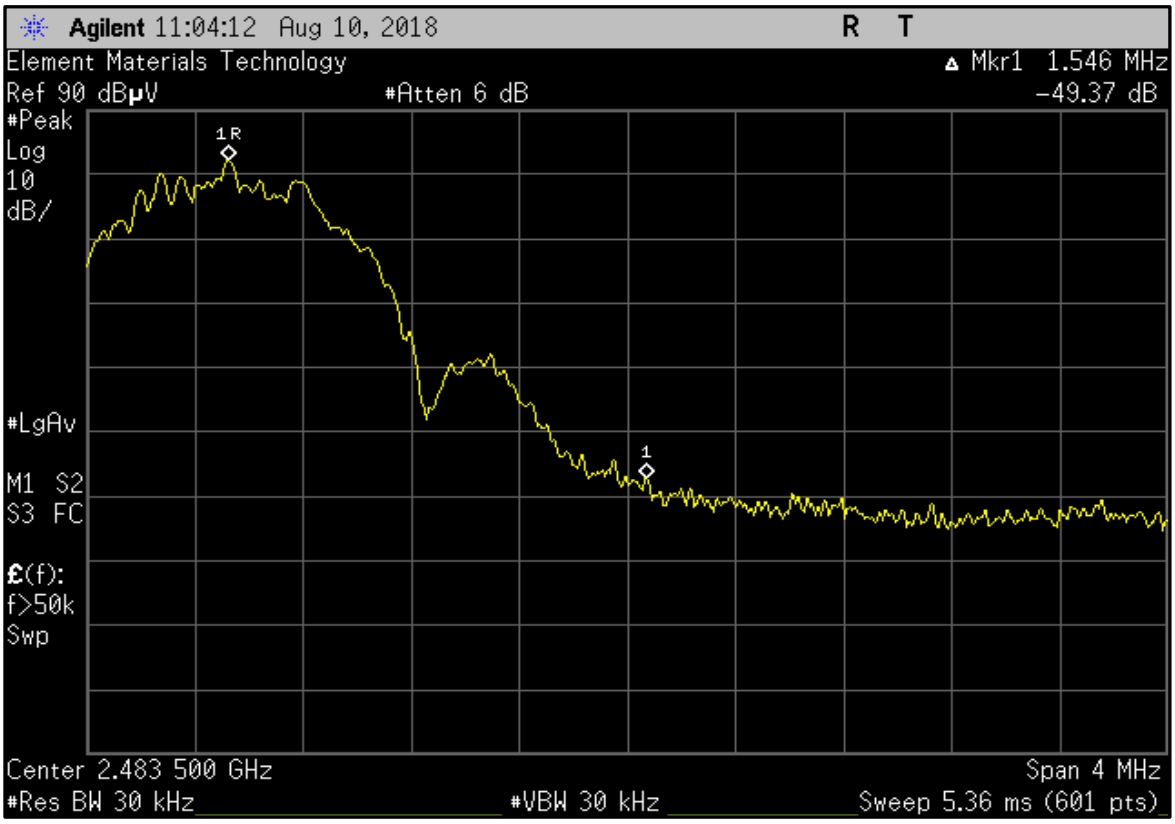


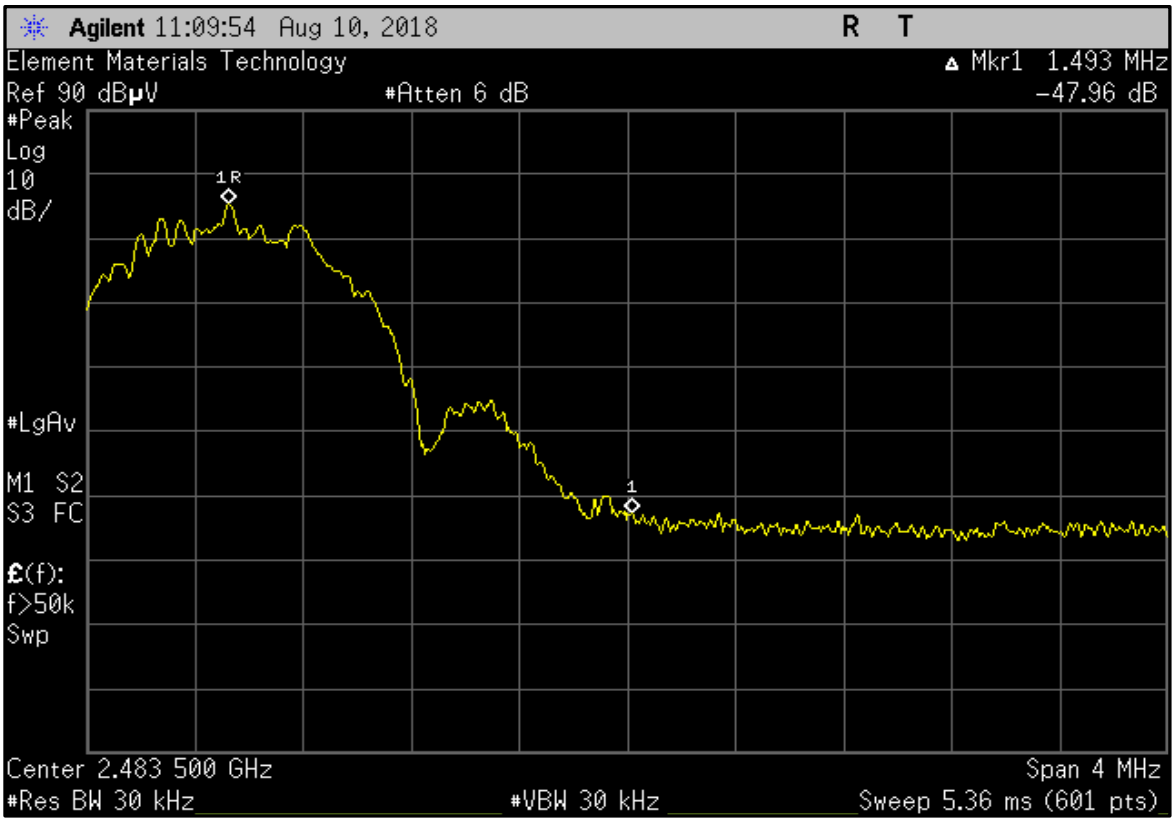
EUT Vert, Ant Vert, Directional 2x2 Ant

SPURIOUS RADIATED EMISSIONS 2X2 ANTENNA

EUT Vert, Ant Vert, Directional 2x2 Ant

PSA-ESCI 2018.05.04



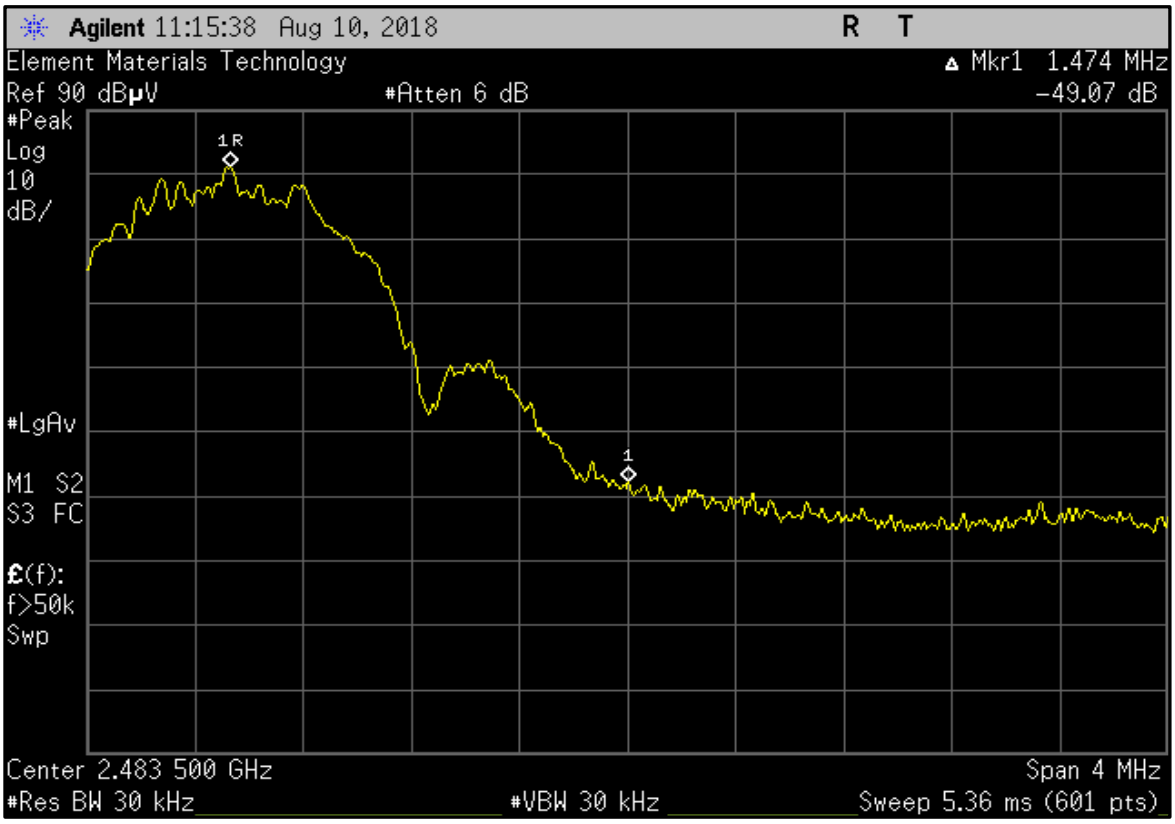


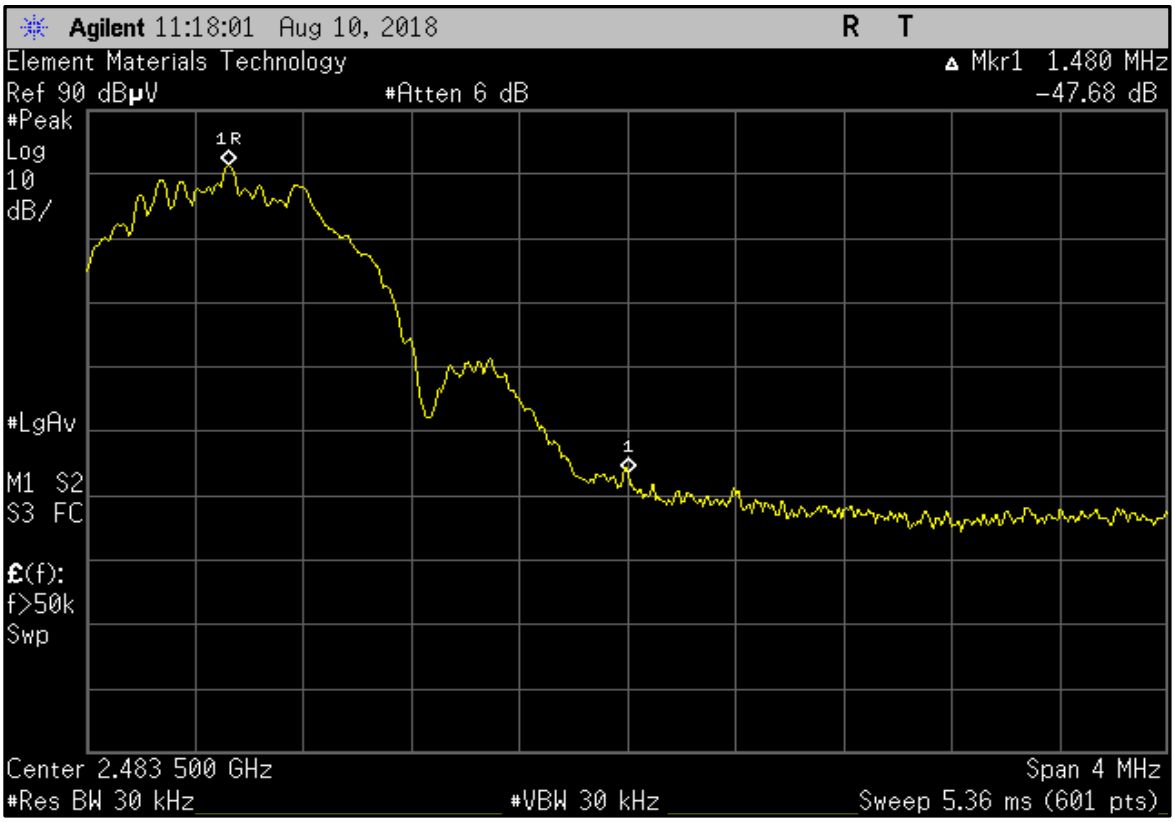
EUT Vert, Ant on Side, Directional 2x2 Ant

SPURIOUS RADIATED EMISSIONS 2X2 ANTENNA

EUT Vert, Ant on Side, Directional 2x2 Ant

PSA-ESCI 2018.05.04



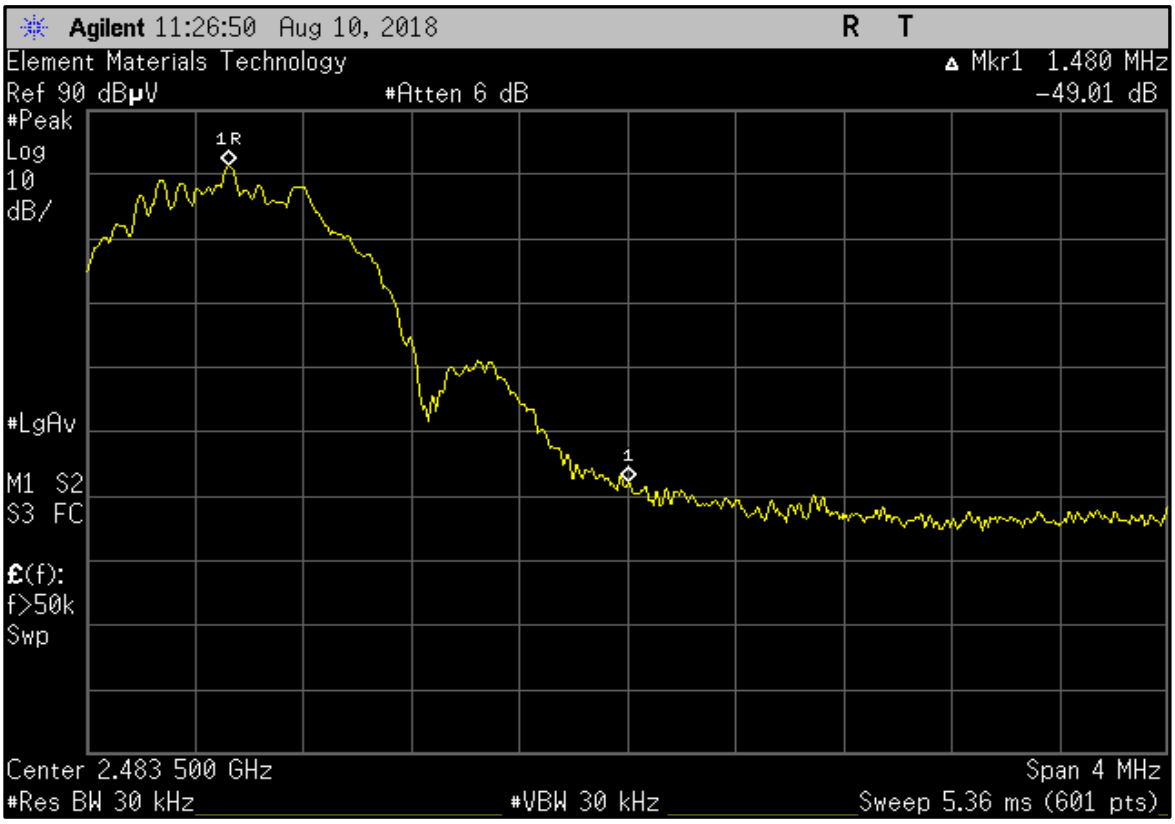


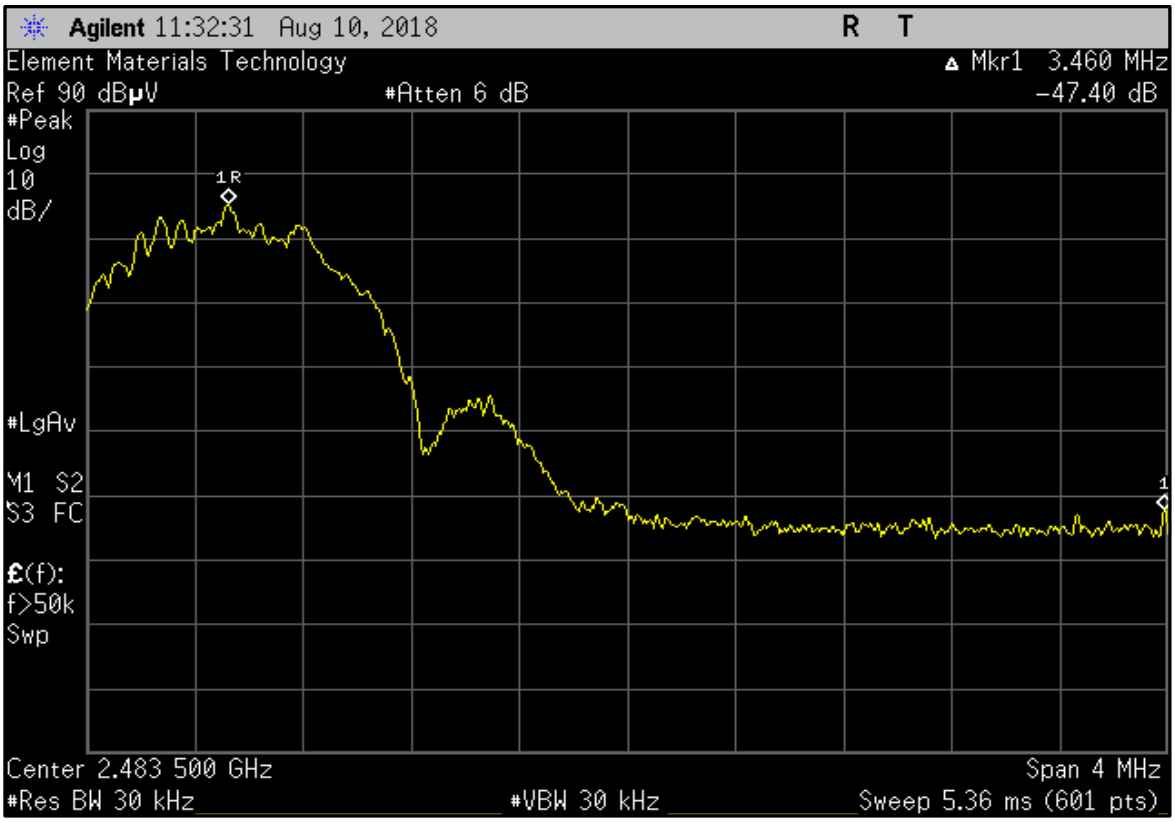
EUT on Side, Ant on Side, Directional 2x2 Ant

SPURIOUS RADIATED EMISSIONS 2X2 ANTENNA

EUT Horz, Ant on Side, Directional 2x2 Ant

PSA-ESCI 2018.05.04



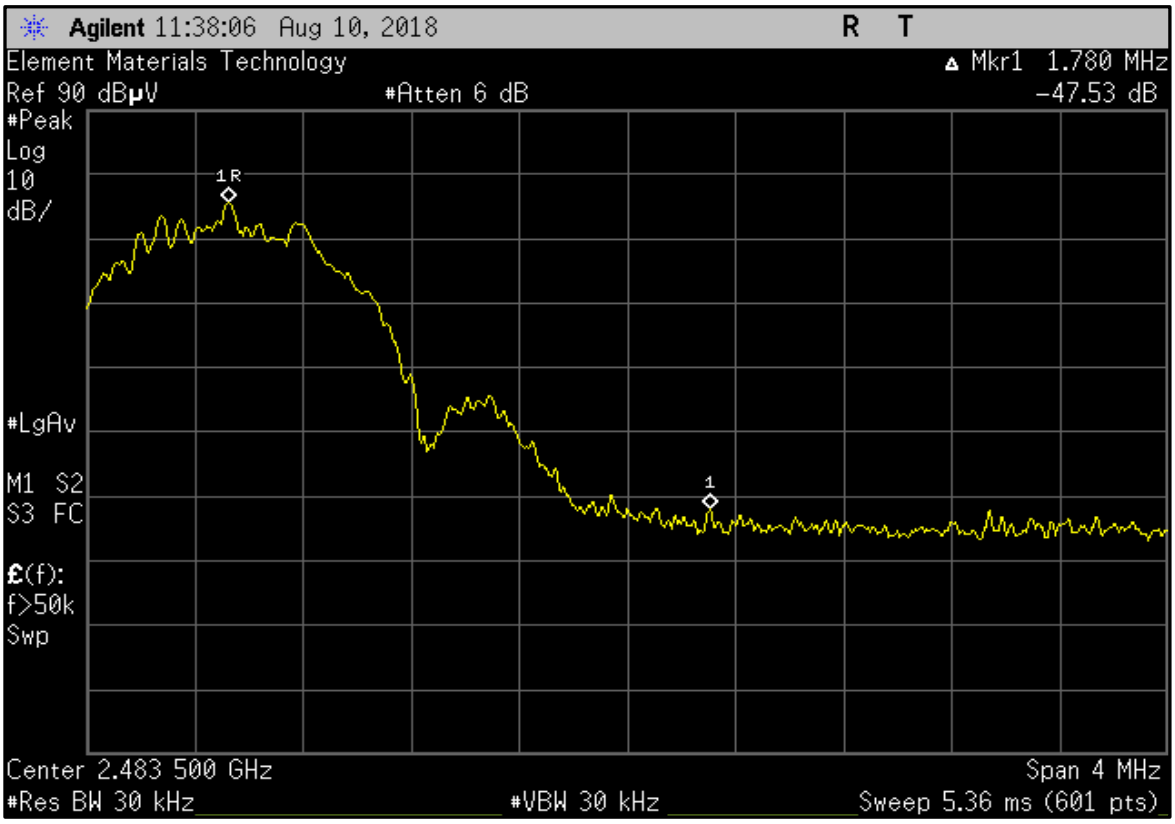


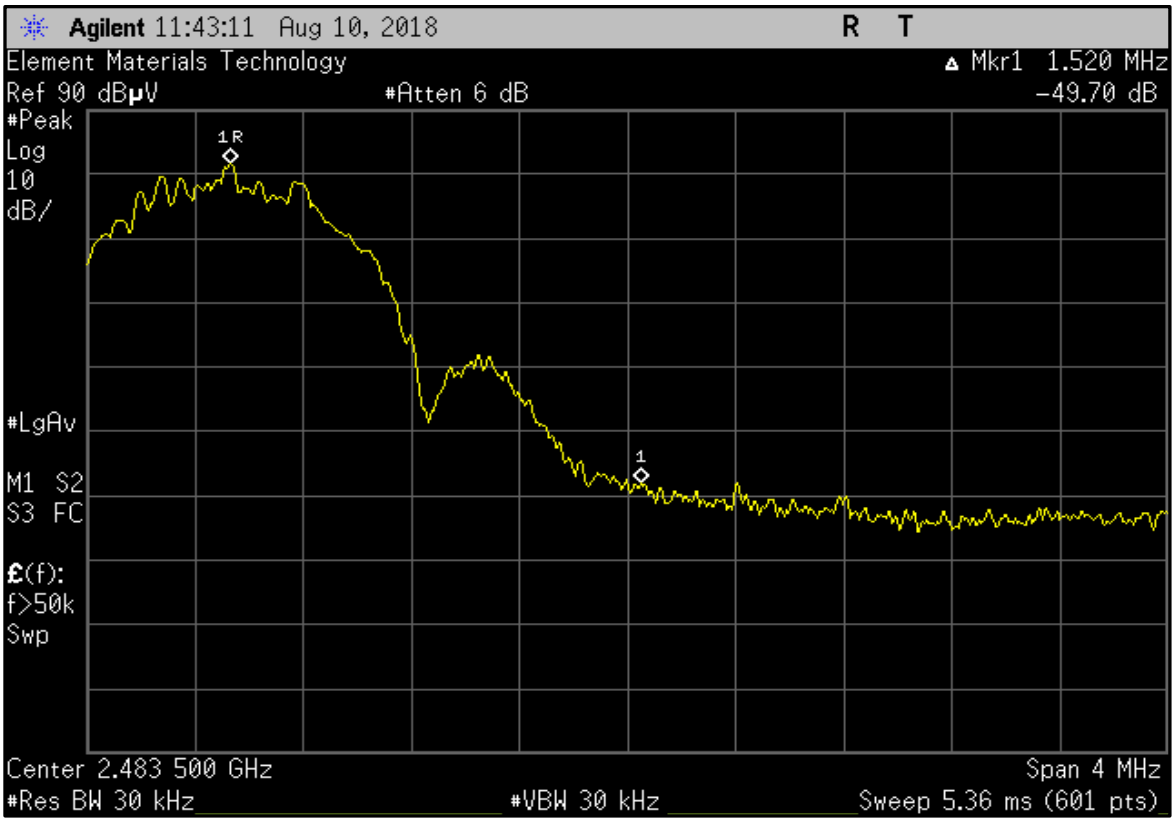
EUT Horz, Ant on Side, Directional 2x2 Ant

SPURIOUS RADIATED EMISSIONS 2X2 ANTENNA

EUT Horz, Ant Vert, Directional 2x2 Ant

PSA-ESCI 2018.05.04



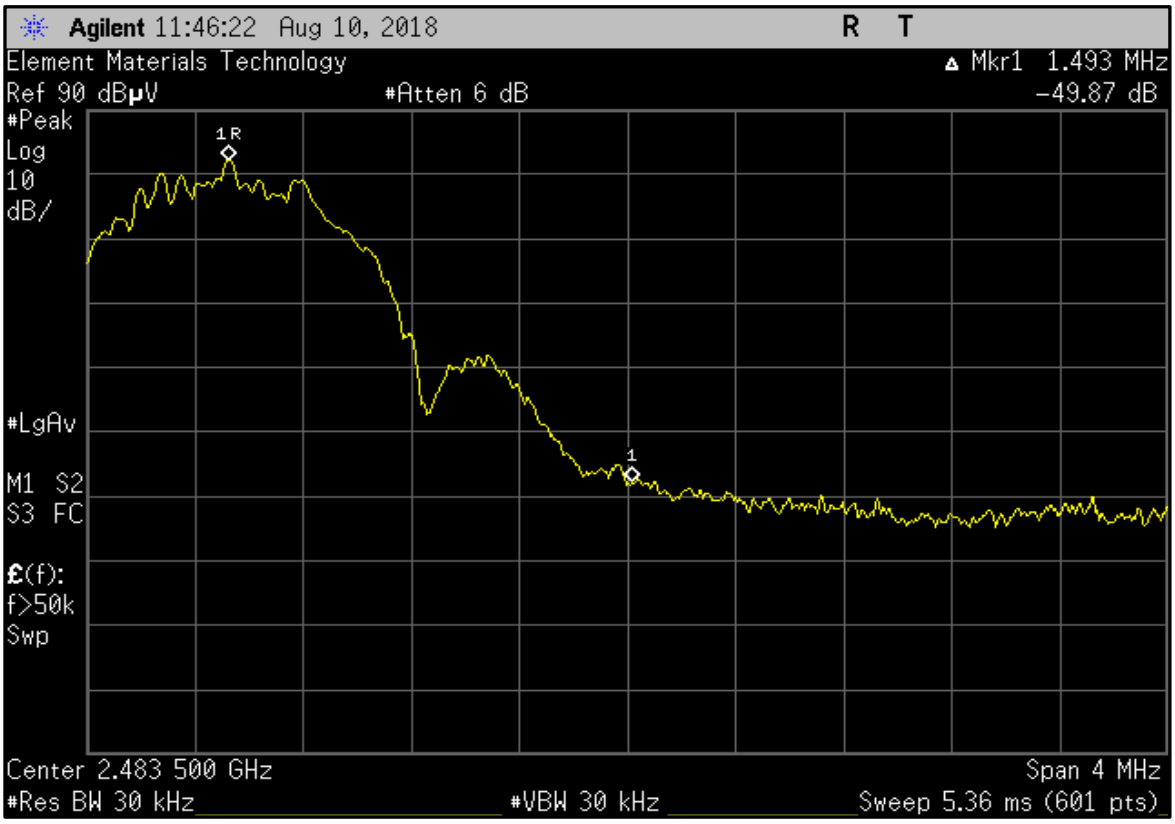


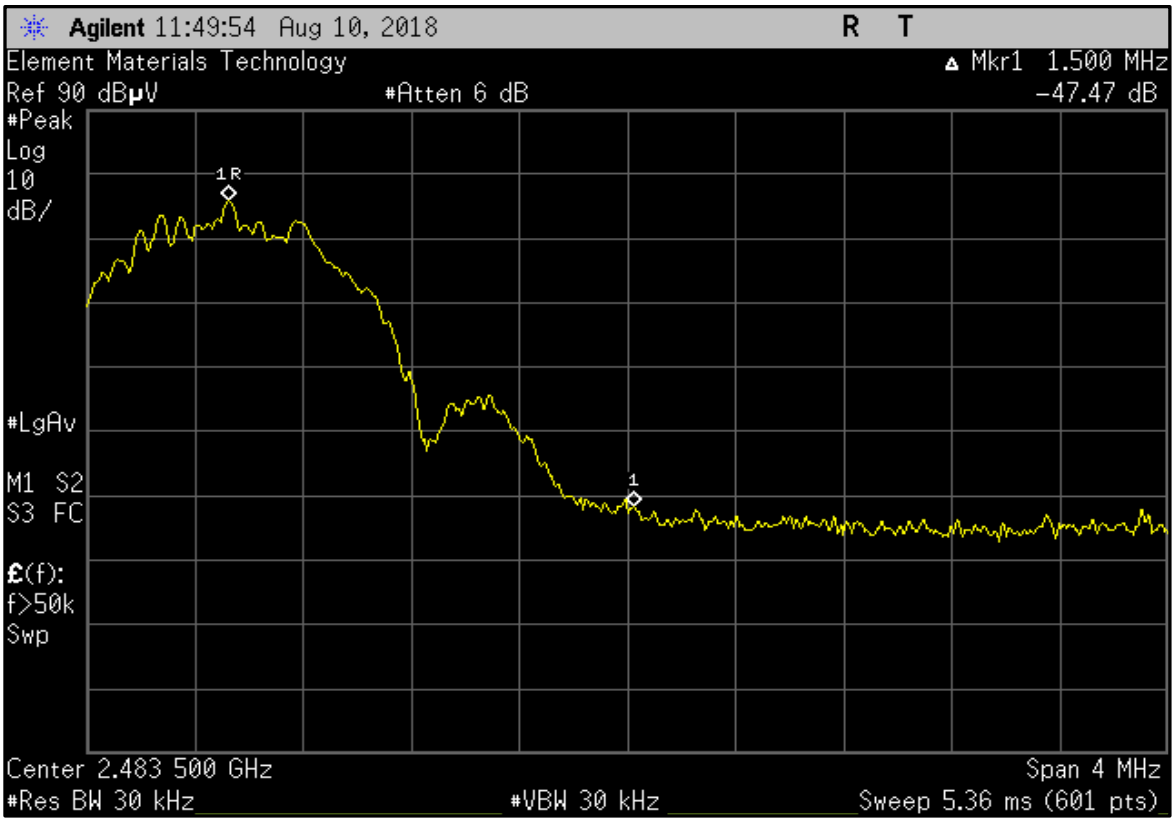
EUT Horz, Ant Vert, Directional 2x2 Ant

SPURIOUS RADIATED EMISSIONS 2X2 ANTENNA

EUT on Side, Ant Vert, Directional 2x2 Ant

PSA-ESCI 2018.05.04



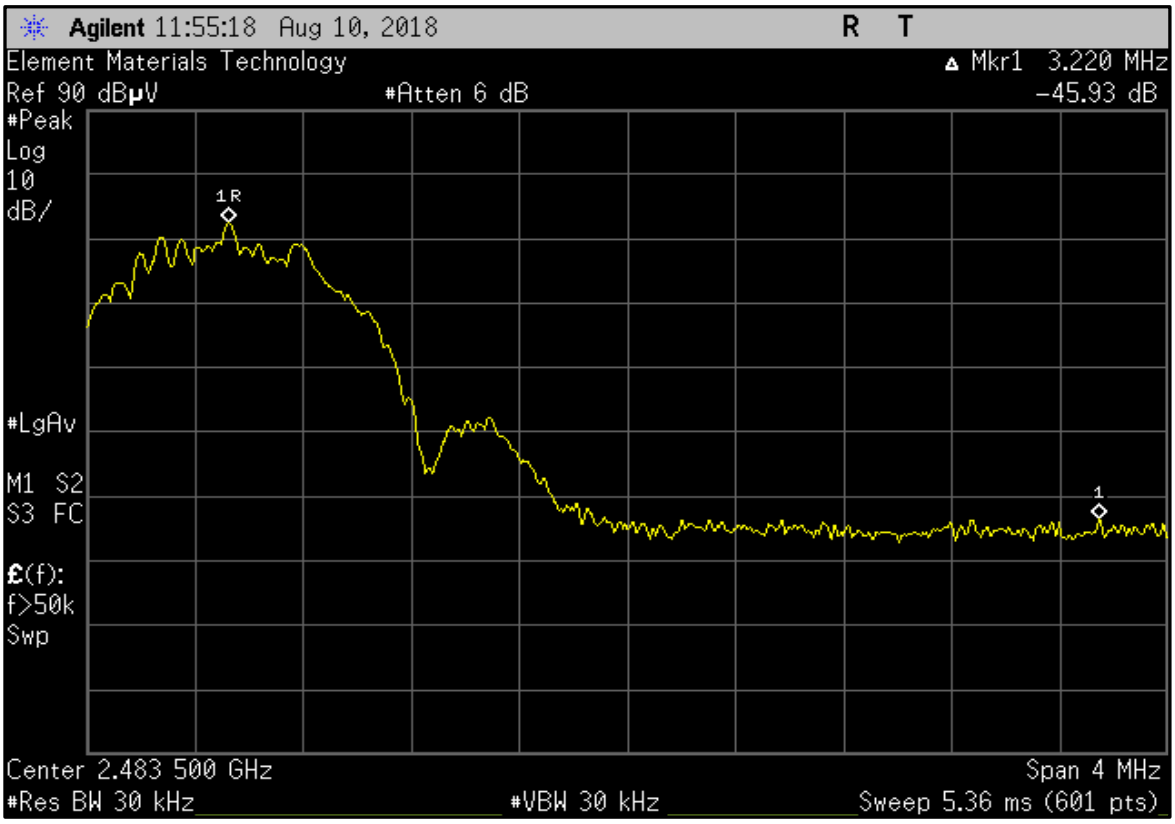


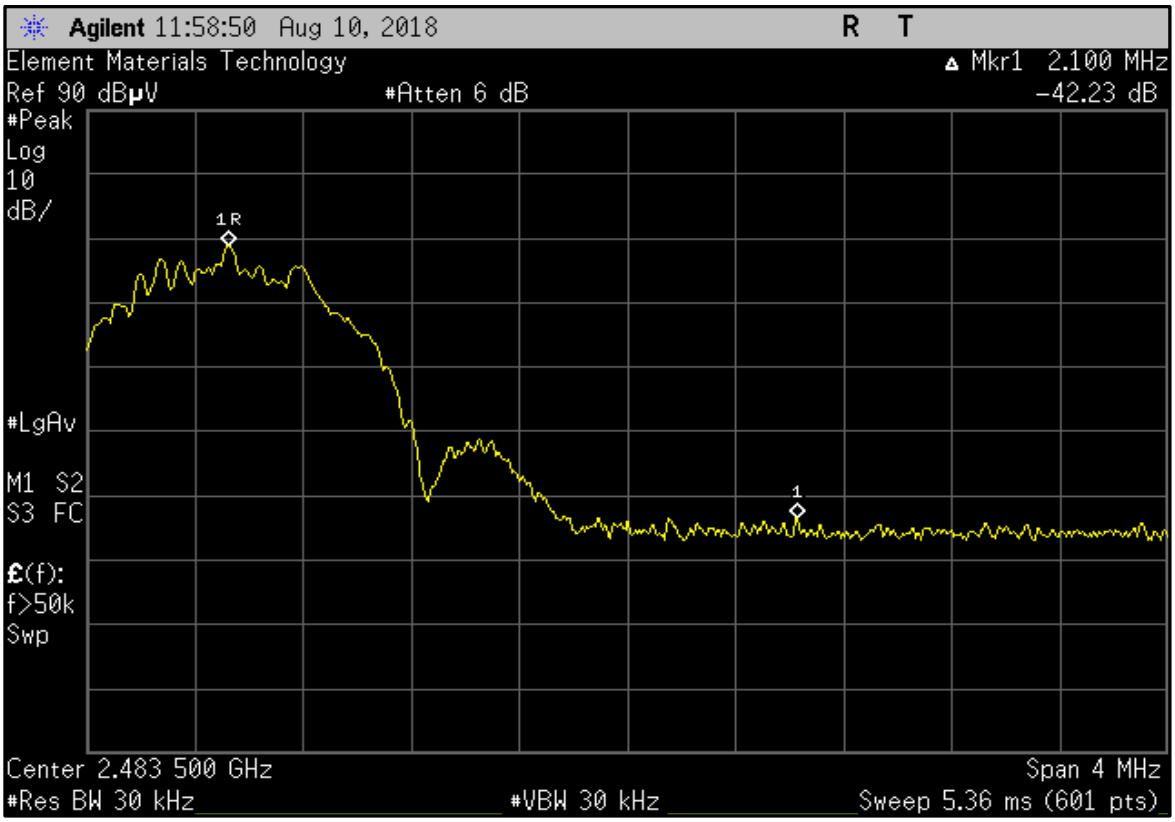
EUT on Side, Ant Vert, Directional 2x2 Ant

SPURIOUS RADIATED EMISSIONS 2X2 ANTENNA

EUT on Side, Ant Horz, Directional 2x2 Ant

PSA-ESCI 2018.05.04



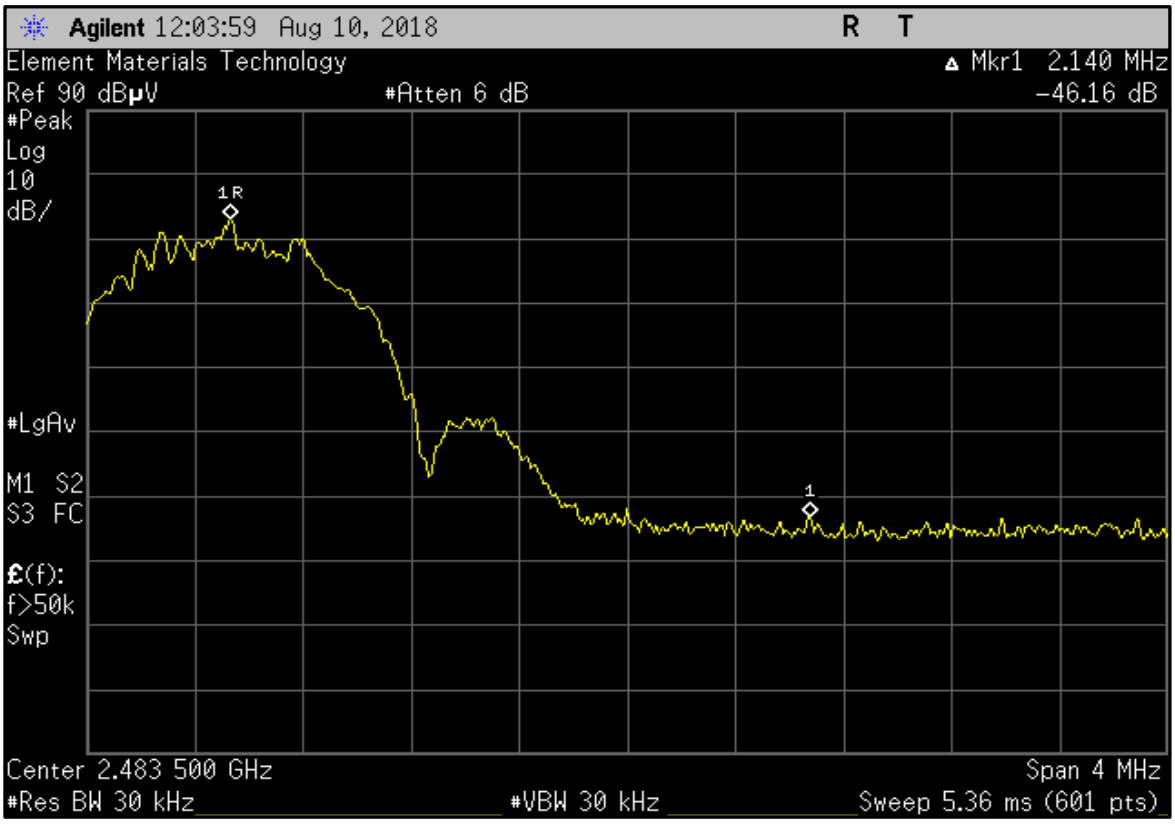


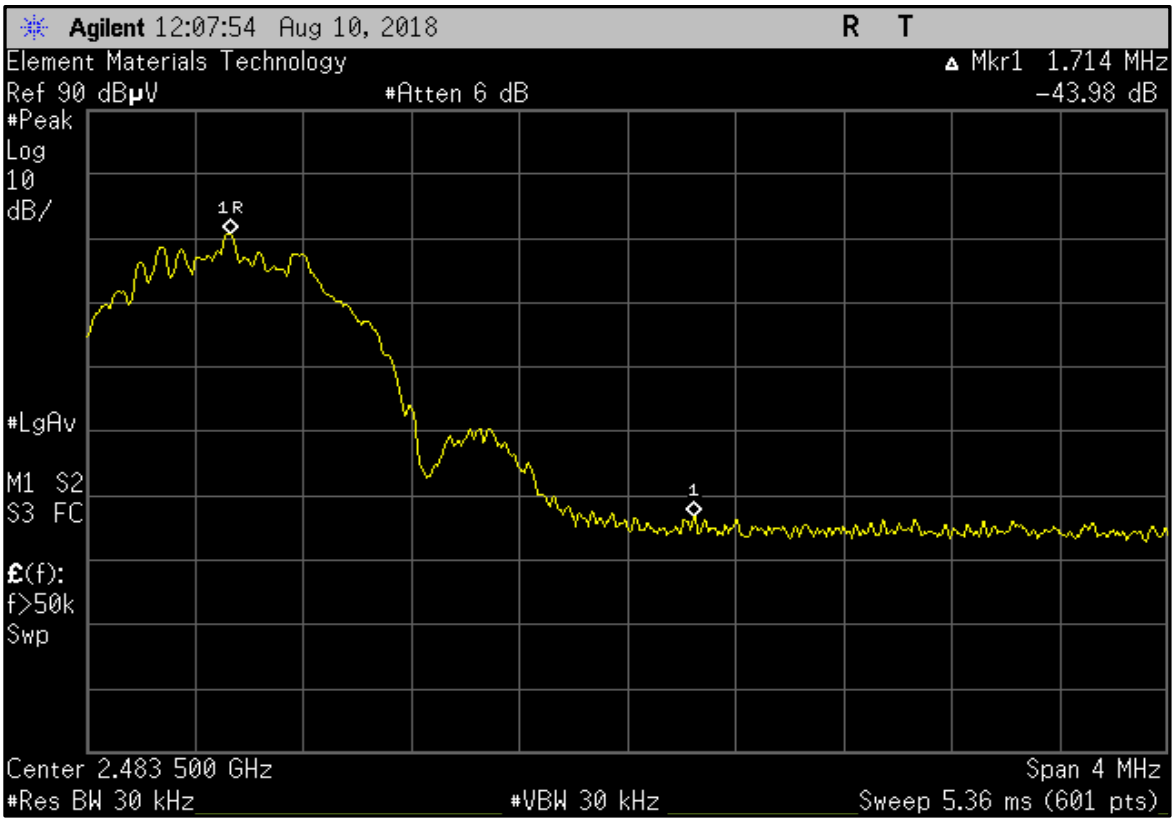
EUT on Side, Ant Horz, Directional 2x2 Ant

SPURIOUS RADIATED EMISSIONS 2X2 ANTENNA

EUT Horz, Ant Horz, Directional 2x2 Ant

PSA-ESCI 2018.05.04



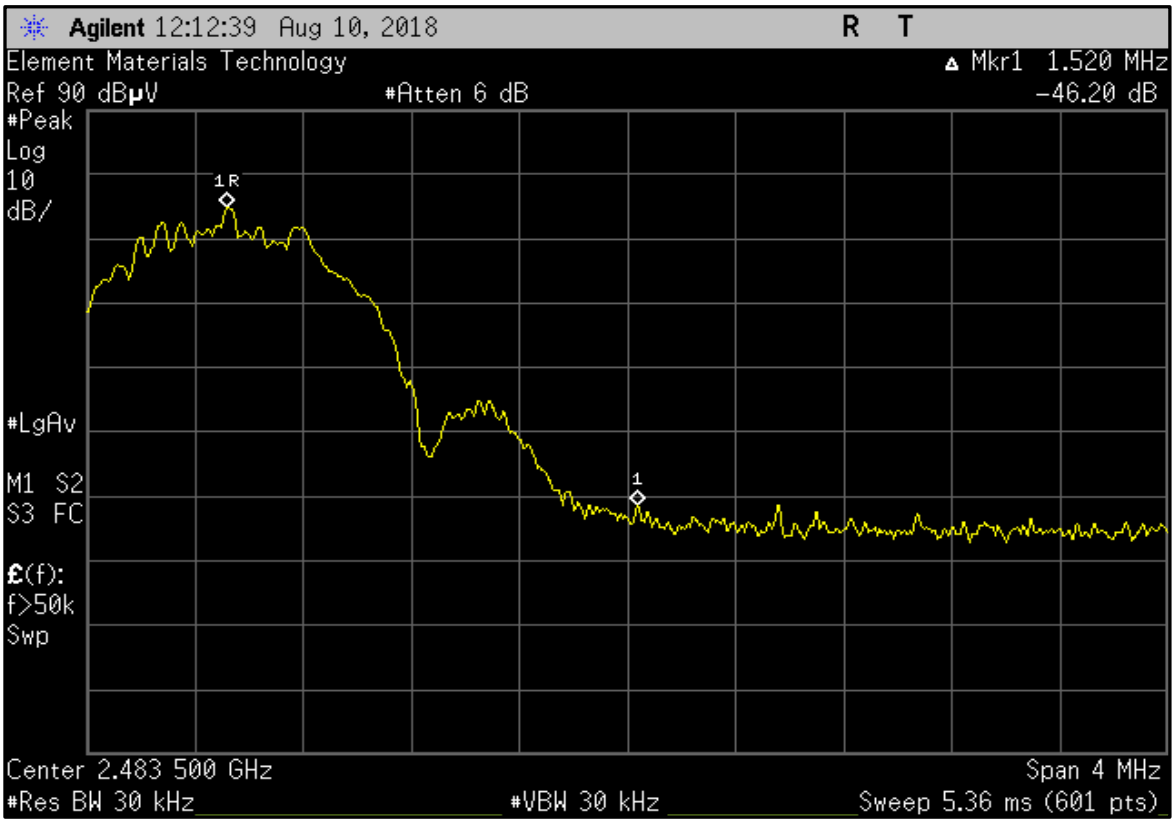


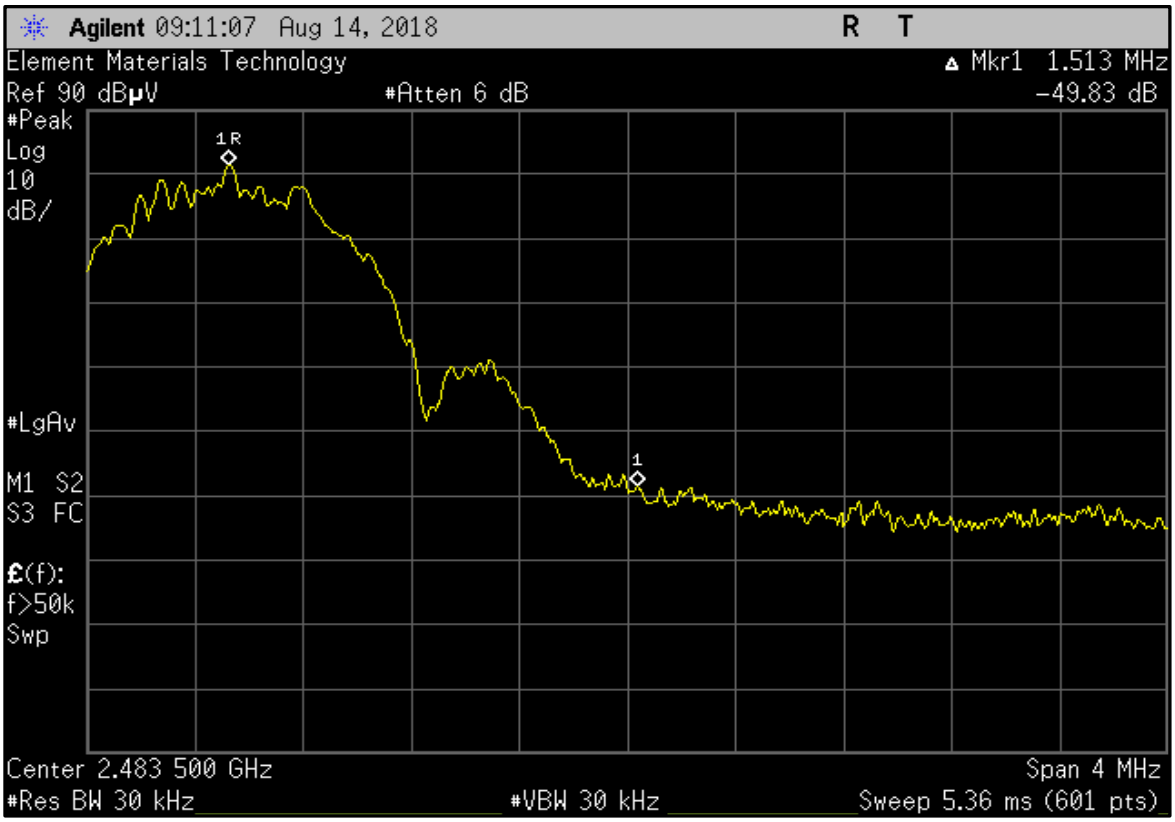
EUT Horz, Ant Horz, Directional 2x2 Ant

SPURIOUS RADIATED EMISSIONS 2X2 ANTENNA

EUT on Side, Ant on Side, Directional 2x2 Ant

PSA-ESCI 2018.05.04



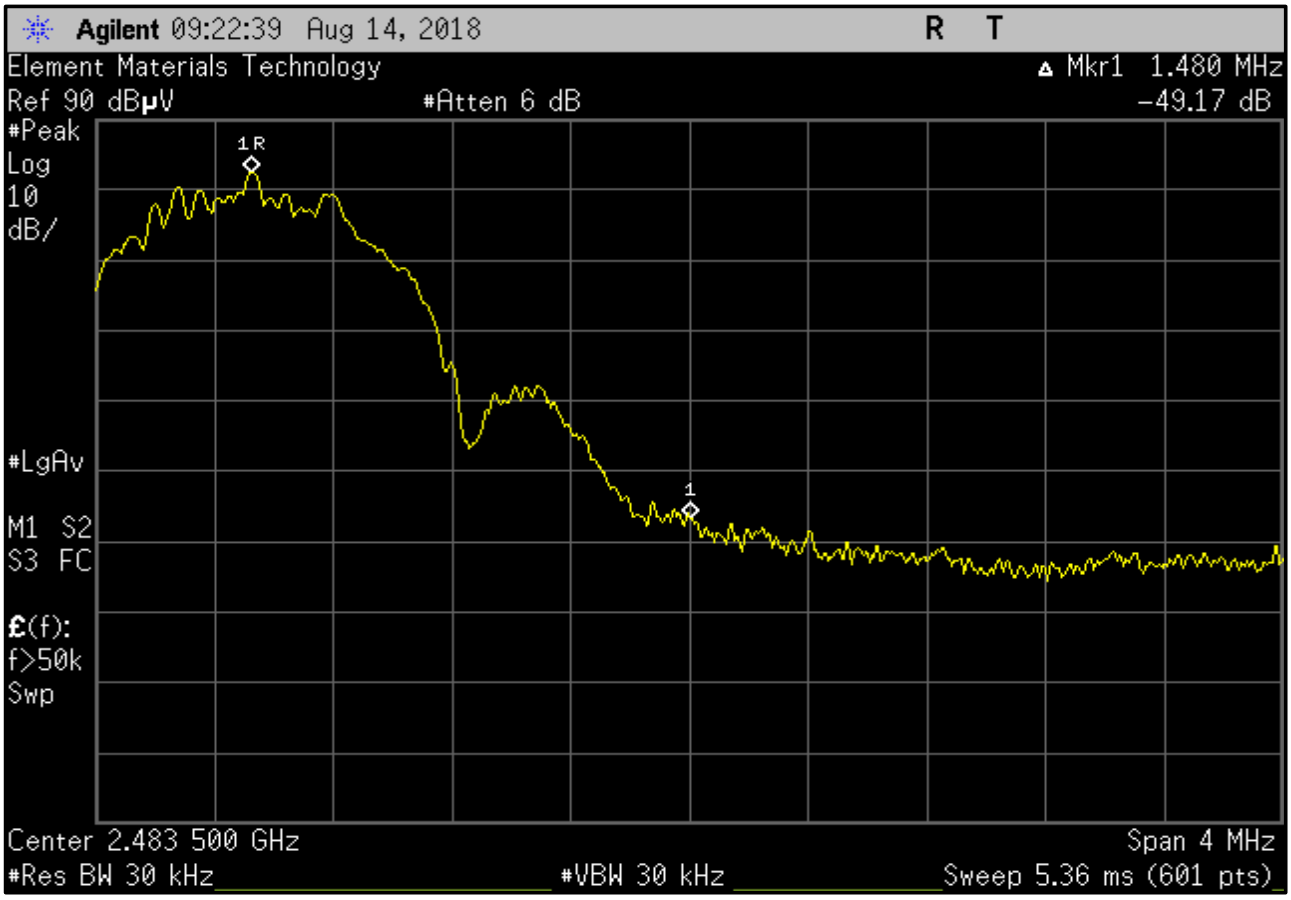


DC Powered - EUT on Side, Ant on Side, Directional 2x2 Ant

SPURIOUS RADIATED EMISSIONS 2X2 ANTENNA

DC Powered - EUT Vert, Ant Vert, Directional 2x2 Ant

PSA-ESCI 2018.05.04



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

DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 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).

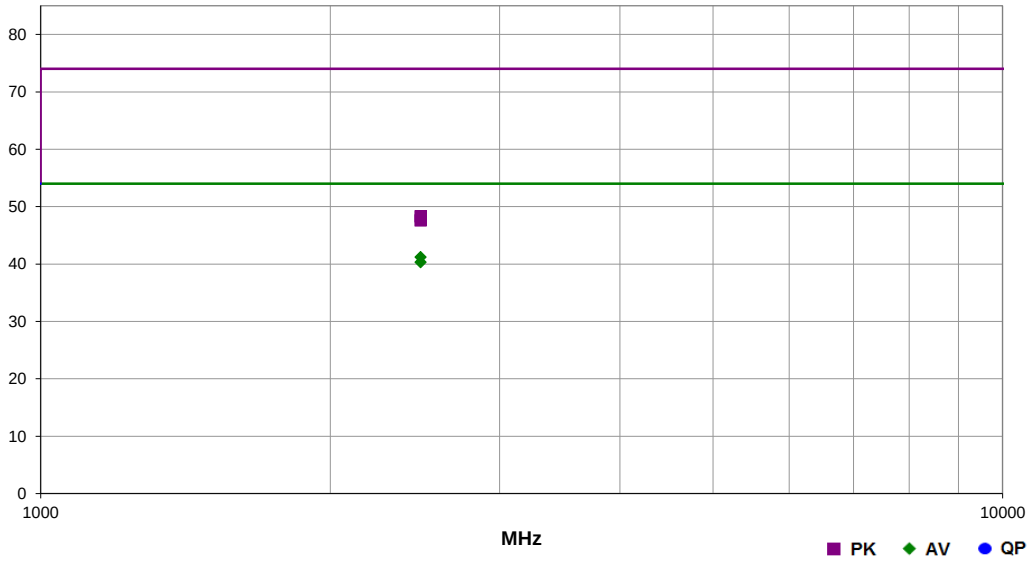
SPURIOUS RADIATED EMISSIONS 2X2 ANTENNA

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0259	**Date:**	6-Sep-2018		
Project:	None	**Temperature:**	25.1 °C		
Job Site:	OC07	**Humidity:**	44.6% RH		
Serial Number:	E52	**Barometric Pres.:**	1018 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 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 #	38	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Calculated 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)	Marker Delta Comments
2483.547	22.1	-4.2	2.7	17.0	3.3	20.0	Horz	AV	0.0	41.2	54.0	-12.8	EUT Vert, Ant Vert, Directional PA 2x2 Ant: Fund 70.0dBuV + -47.9dBc = 22.1dBuV (calc. amp.)
2483.567	21.2	-4.2	2.3	11.0	3.3	20.0	Vert	AV	0.0	40.3	54.0	-13.7	EUT on Side, Ant on Side, Directional PA 2x2 Ant: Fund 68.8dBuV + -47.6dBc = 21.2dBuV (calc. amp.)
2483.547	32.5	-4.2	2.7	17.0	0.0	20.0	Horz	PK	0.0	48.3	74.0	-25.7	EUT Vert, Ant Vert, Directional PA 2x2 Ant: Fund 80.4dBuV + -47.9dBc = 32.5dBuV (calc. amp.)
2483.567	31.8	-4.2	2.3	11.0	0.0	20.0	Vert	PK	0.0	47.6	74.0	-26.4	EUT on Side, Ant on Side, Directional PA 2x2 Ant: Fund 79.4dBuV + -47.6dBc = 31.8dBuV (calc. amp.)

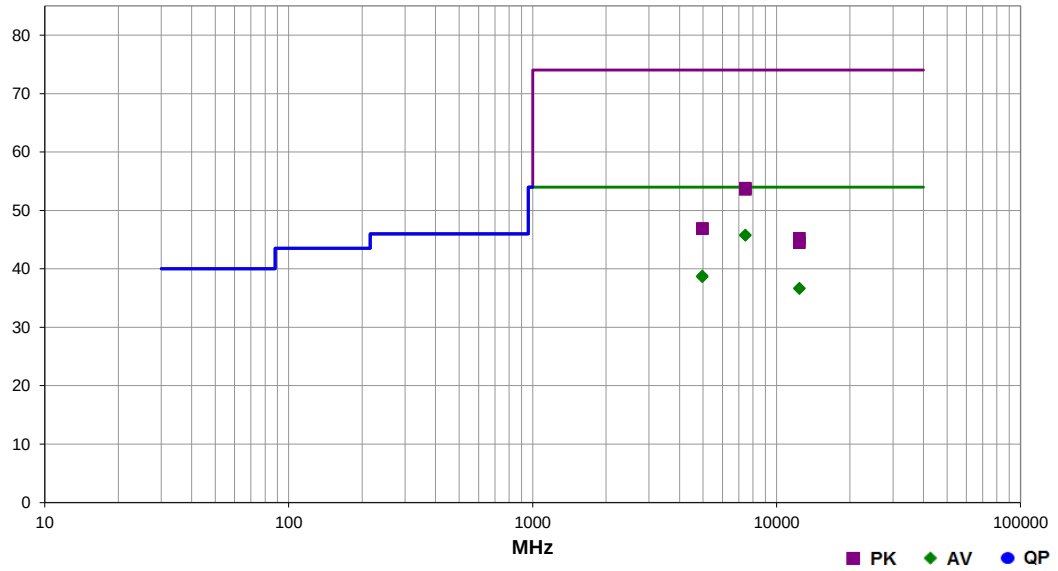
SPURIOUS RADIATED EMISSIONS 2X2 ANTENNA

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0259	**Date:**	6-Sep-2018		
Project:	None	**Temperature:**	25.1 °C		
Job Site:	OC07	**Humidity:**	44.6% RH		
Serial Number:	E52	**Barometric Pres.:**	1018 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 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 #	39	**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
7445.955	30.7	11.8	1.0	29.0	3.3	0.0	Vert	AV	0.0	45.8	54.0	-8.2	EUT on Side, Ant Vert, Directional PA 2x2 Ant
7445.330	30.6	11.8	3.5	302.0	3.3	0.0	Horz	AV	0.0	45.7	54.0	-8.3	EUT on Side, Ant Vert, Directional PA 2x2 Ant
4963.845	31.3	4.2	1.0	64.0	3.3	0.0	Horz	AV	0.0	38.8	54.0	-15.2	EUT on Side, Ant Vert, Directional PA 2x2 Ant
4963.080	31.1	4.2	1.0	66.0	3.3	0.0	Vert	AV	0.0	38.6	54.0	-15.4	EUT on Side, Ant Vert, Directional PA 2x2 Ant
12409.180	27.3	6.1	1.0	113.0	3.3	0.0	Horz	AV	0.0	36.7	54.0	-17.3	EUT on Side, Ant Vert, Directional PA 2x2 Ant
12409.910	27.2	6.1	3.3	54.0	3.3	0.0	Vert	AV	0.0	36.6	54.0	-17.4	EUT on Side, Ant Vert, Directional PA 2x2 Ant
7444.775	42.0	11.8	1.0	29.0	0.0	0.0	Vert	PK	0.0	53.8	74.0	-20.2	EUT on Side, Ant Vert, Directional PA 2x2 Ant
7446.320	41.8	11.8	3.5	302.0	0.0	0.0	Horz	PK	0.0	53.6	74.0	-20.4	EUT on Side, Ant Vert, Directional PA 2x2 Ant
4965.425	42.7	4.2	1.0	64.0	0.0	0.0	Horz	PK	0.0	46.9	74.0	-27.1	EUT on Side, Ant Vert, Directional PA 2x2 Ant
4962.850	42.7	4.2	1.0	66.0	0.0	0.0	Vert	PK	0.0	46.9	74.0	-27.1	EUT on Side, Ant Vert, Directional PA 2x2 Ant
12409.950	39.1	6.1	1.0	113.0	0.0	0.0	Horz	PK	0.0	45.2	74.0	-28.8	EUT on Side, Ant Vert, Directional PA 2x2 Ant
12409.810	38.4	6.1	3.3	54.0	0.0	0.0	Vert	PK	0.0	44.5	74.0	-29.5	EUT on Side, Ant Vert, Directional PA 2x2 Ant

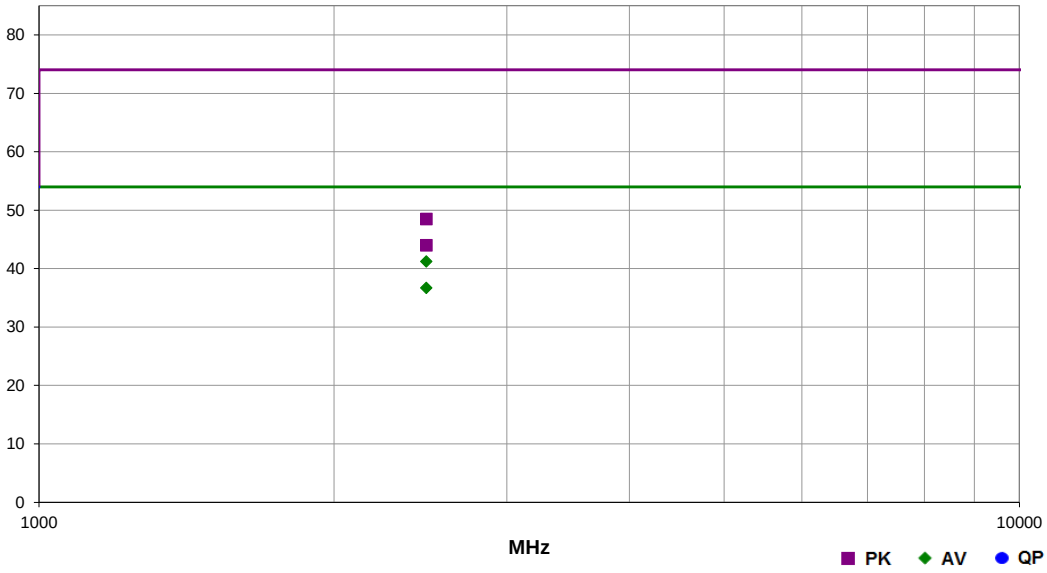
SPURIOUS RADIATED EMISSIONS 2X2 ANTENNA

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0259	**Date:**	7-Sep-2018		
Project:	None	**Temperature:**	23.3 °C		
Job Site:	OC07	**Humidity:**	53.1% RH		
Serial Number:	E52	**Barometric Pres.:**	1016 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 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 #	43	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Calculated 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)	Marker Delta Comments
2483.687	22.1	-4.2	2.3	10.0	3.3	20.0	Vert	AV	0.0	41.2	54.0	-12.8	EUT on Side, Ant on Side, Directional PA 2x2 Ant: Fund 70.0dBuV + -47.9dBc = 22.1dBuV (calc. amp.)
2483.727	17.6	-4.2	2.0	20.0	3.3	20.0	Horz	AV	0.0	36.7	54.0	-17.3	EUT Vert, Ant Vert, Directional PA 2x2 Ant: Fund 62.9dBuV + -45.3dBc = 17.6dBuV (calc. amp.)
2483.687	32.7	-4.2	2.3	10.0	0.0	20.0	Vert	PK	0.0	48.5	74.0	-25.5	EUT on Side, Ant on Side, Directional PA 2x2 Ant: Fund 80.6dBuV + -47.9dBc = 32.7dBuV (calc. amp.)
2483.727	28.2	-4.2	2.0	20.0	0.0	20.0	Horz	PK	0.0	44.0	74.0	-30.0	EUT Vert, Ant Vert, Directional PA 2x2 Ant: Fund 73.5dBuV + -45.3dBc = 28.2dBuV (calc. amp.)

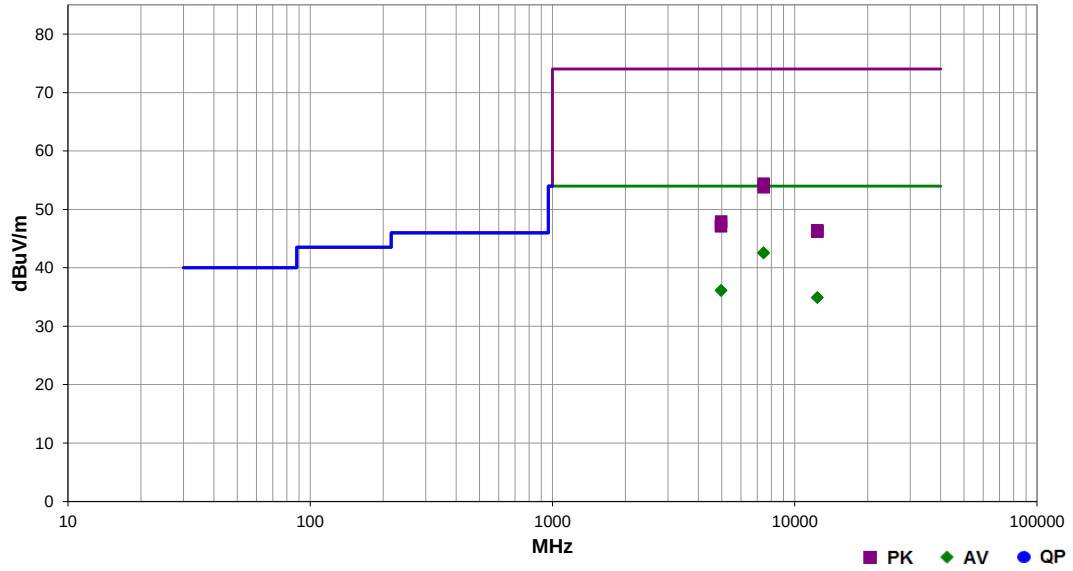
SPURIOUS RADIATED EMISSIONS 2X2 ANTENNA

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0259	**Date:**	7-Sep-2018		
Project:	None	**Temperature:**	23.3 °C		
Job Site:	OC07	**Humidity:**	53.1% RH		
Serial Number:	E52	**Barometric Pres.:**	1016 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 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 #	44	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass

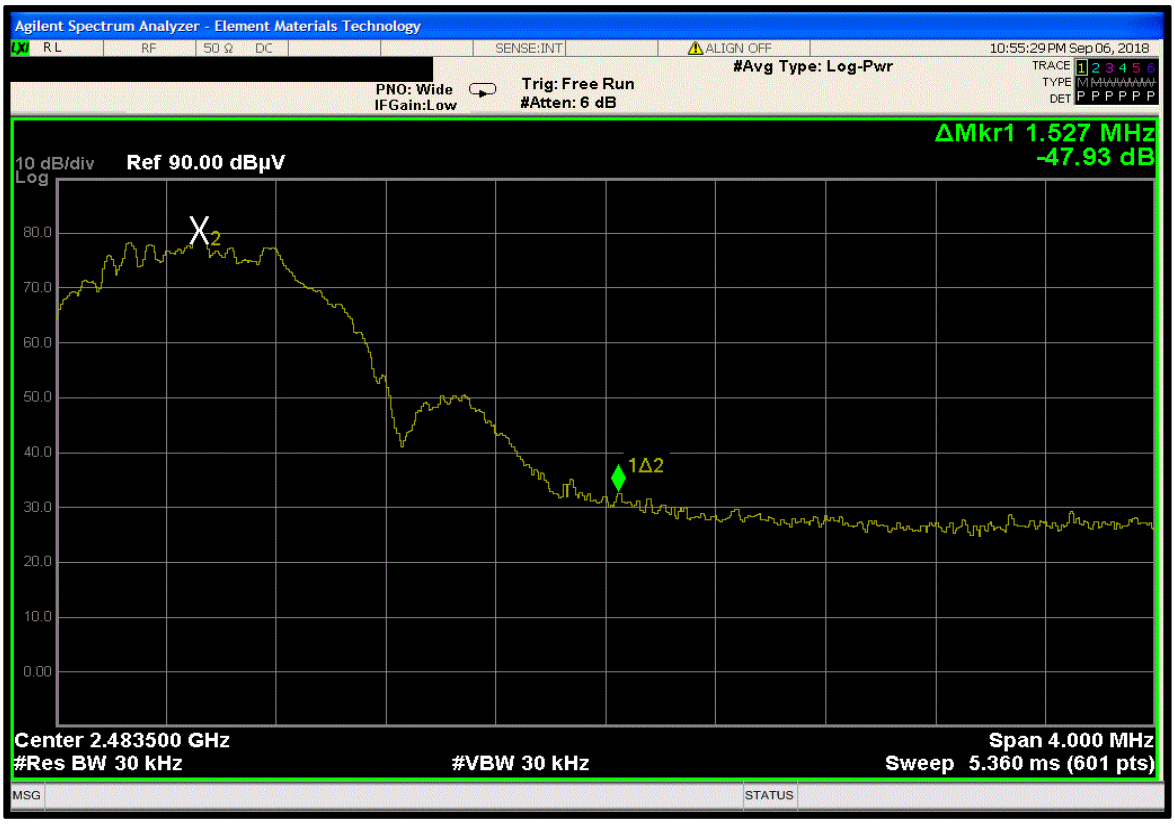


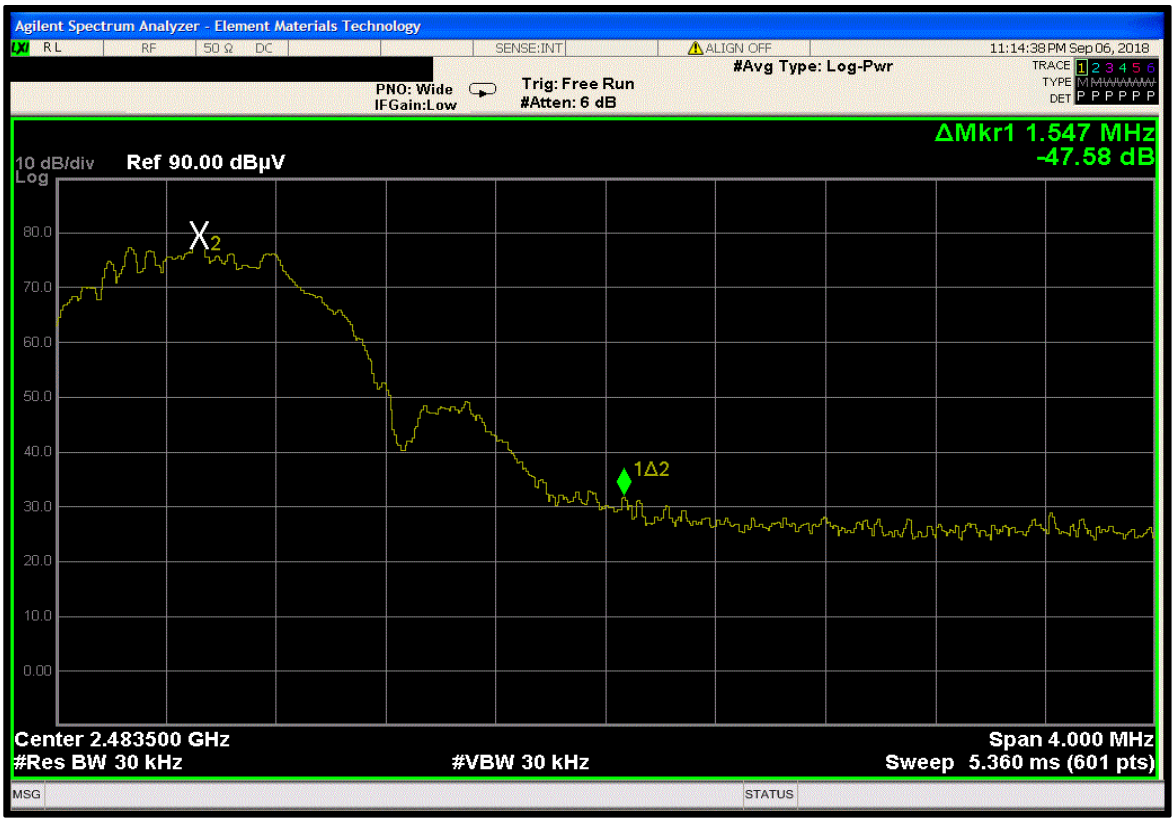
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7446.103	30.8	11.8	1.0	9.0	3.0	0.0	Horz	AV	0.0	42.6	54.0	-11.4	EUT on Side, Ant Vert, Directional PA 2x2 Ant
7446.467	30.7	11.8	1.4	88.0	3.0	0.0	Vert	AV	0.0	42.5	54.0	-11.5	EUT on Side, Ant Vert, Directional PA 2x2 Ant
4963.897	31.9	4.2	1.0	76.0	3.0	0.0	Horz	AV	0.0	36.1	54.0	-17.9	EUT on Side, Ant Vert, Directional PA 2x2 Ant
4963.637	31.9	4.2	1.0	0.0	3.0	0.0	Vert	AV	0.0	36.1	54.0	-17.9	EUT on Side, Ant Vert, Directional PA 2x2 Ant
12408.820	28.8	6.1	2.2	222.0	3.0	0.0	Horz	AV	0.0	34.9	54.0	-19.1	EUT on Side, Ant Vert, Directional PA 2x2 Ant
12408.800	28.8	6.1	1.0	182.0	3.0	0.0	Vert	AV	0.0	34.9	54.0	-19.1	EUT on Side, Ant Vert, Directional PA 2x2 Ant
7446.433	42.6	11.8	1.0	9.0	3.0	0.0	Horz	PK	0.0	54.4	74.0	-19.6	EUT on Side, Ant Vert, Directional PA 2x2 Ant
7446.580	42.0	11.8	1.4	88.0	3.0	0.0	Vert	PK	0.0	53.8	74.0	-20.2	EUT on Side, Ant Vert, Directional PA 2x2 Ant
4964.503	43.7	4.2	1.0	0.0	3.0	0.0	Vert	PK	0.0	47.9	74.0	-26.1	EUT on Side, Ant Vert, Directional PA 2x2 Ant
4963.100	42.9	4.2	1.0	76.0	3.0	0.0	Horz	PK	0.0	47.1	74.0	-26.9	EUT on Side, Ant Vert, Directional PA 2x2 Ant
12408.670	40.3	6.1	2.2	222.0	3.0	0.0	Horz	PK	0.0	46.4	74.0	-27.6	EUT on Side, Ant Vert, Directional PA 2x2 Ant
12409.020	40.1	6.1	1.0	182.0	3.0	0.0	Vert	PK	0.0	46.2	74.0	-27.8	EUT on Side, Ant Vert, Directional PA 2x2 Ant

SPURIOUS RADIATED EMISSIONS 2X2 ANTENNA

2x2, POE, EUT Vert, Ant Vert, RX Ant Horz

PSA-ESCI 2018.05.04



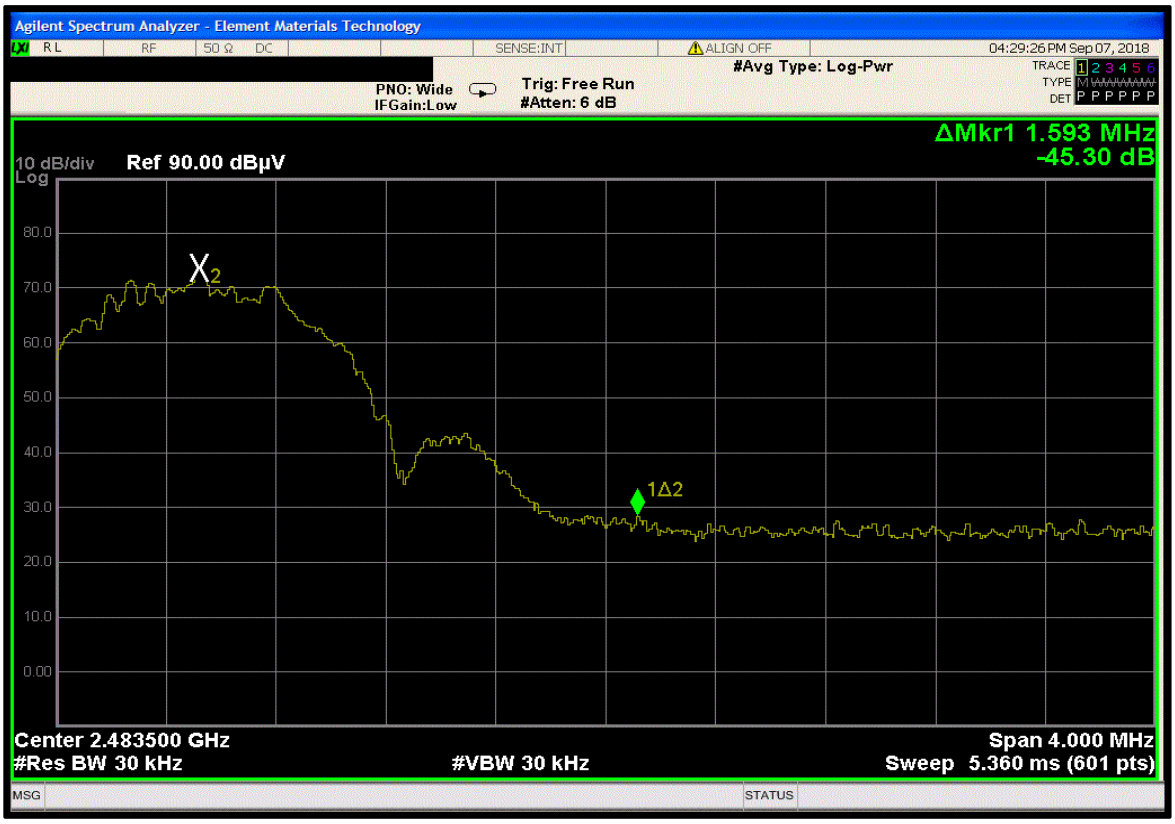


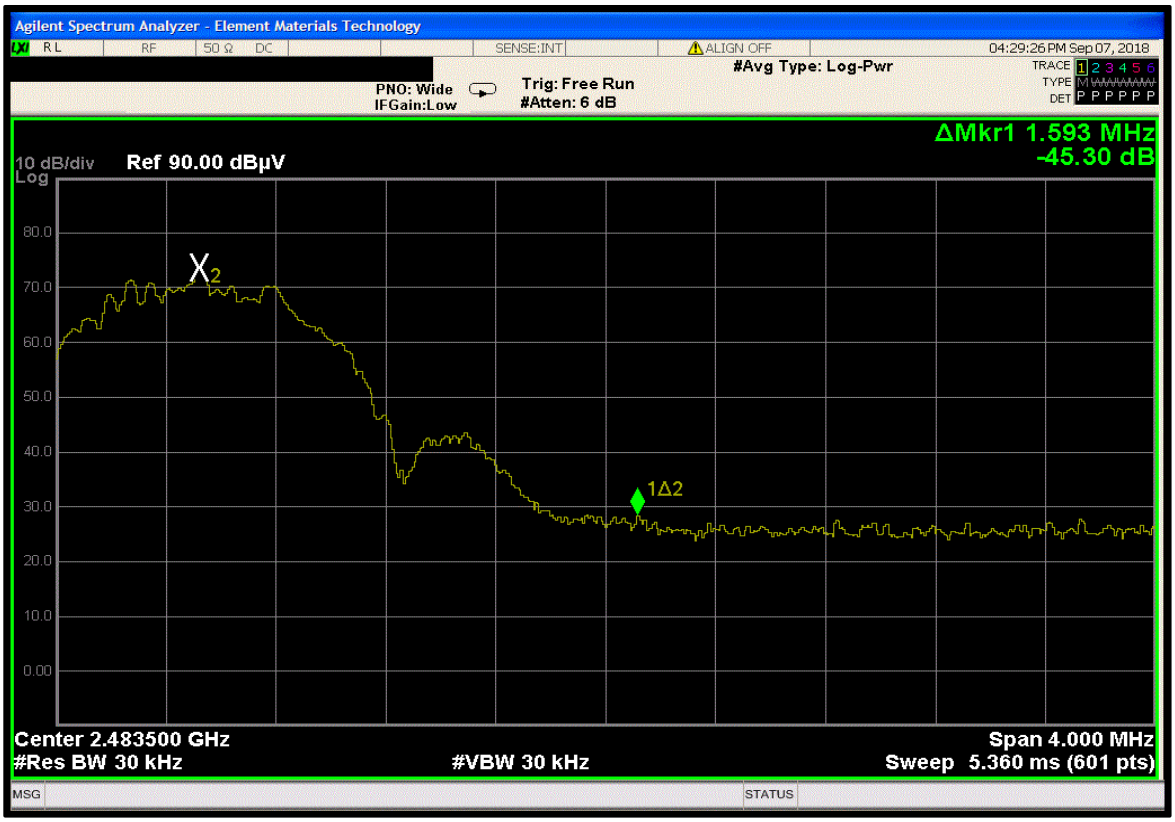
2x2, POE, EUT on Side, Ant on Side, RX Ant Vert

SPURIOUS RADIATED EMISSIONS 2X2 ANTENNA

2x2, 24VDC, EUT on Side, Ant on Side, RX Ant Vert

PSA-ESCI 2018.05.04





2x2, 24VDC, EUT Vert, Ant Vert, RX Ant Horz

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

DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 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).

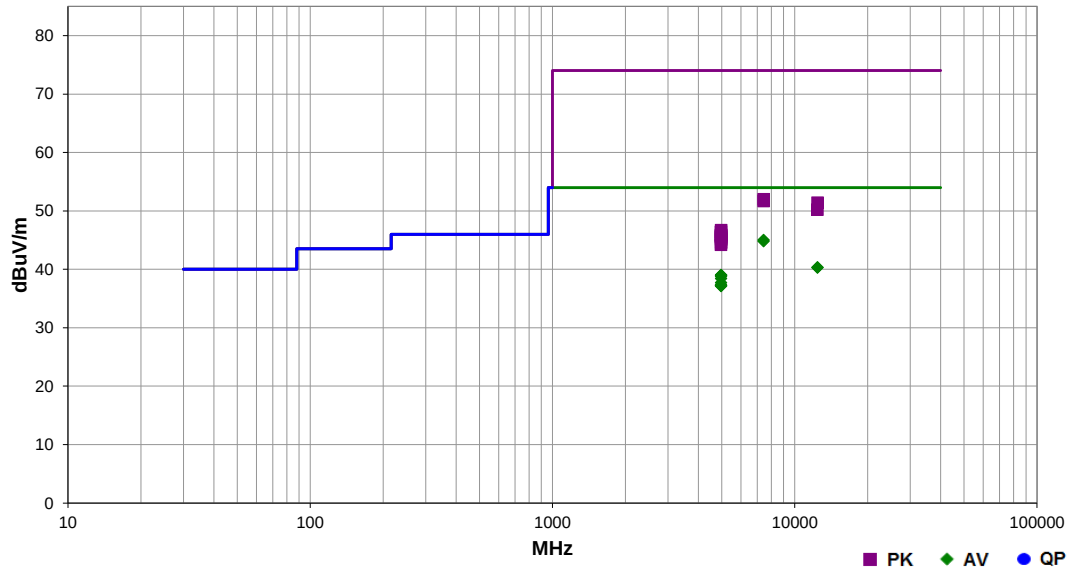
SPURIOUS RADIATED EMISSIONS 3X3 ANTENNA

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0249	**Date:**	2-Aug-2018		
Project:	None	**Temperature:**	22.9 °C		
Job Site:	EV01	**Humidity:**	44.8% 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 MHz.				
Deviations:	None				
Comments:	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).				

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

Run #	22	**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
7445.992	28.7	13.0	1.0	335.0	3.3	0.0	Vert	AV	0.0	45.0	54.0	-9.0	EUT Horz, Ant Horz, Directional PA 3x3 Ant
7445.433	28.5	13.0	1.0	325.0	3.3	0.0	Horz	AV	0.0	44.8	54.0	-9.2	EUT Horz, Ant Vert, Directional PA 3x3 Ant
4963.950	30.6	5.1	1.0	99.0	3.3	0.0	Horz	AV	0.0	39.0	54.0	-15.0	EUT Horz, Ant Vert, Directional PA 3x3 Ant
4964.200	30.6	5.1	1.8	325.0	3.3	0.0	Vert	AV	0.0	39.0	54.0	-15.0	EUT Horz, Ant Horz, Directional PA 3x3 Ant
4964.033	30.5	5.1	1.3	128.0	3.3	0.0	Horz	AV	0.0	38.9	54.0	-15.1	EUT Vert, Ant Vert, Directional PA 3x3 Ant
4964.167	30.4	5.1	2.2	38.0	3.3	0.0	Vert	AV	0.0	38.8	54.0	-15.2	EUT Vert, Ant Horz, Directional PA 3x3 Ant
4964.075	30.0	5.1	2.7	135.0	3.3	0.0	Horz	AV	0.0	38.4	54.0	-15.6	EUT Vert, Ant Horz, Directional PA 3x3 Ant
4963.983	29.3	5.1	2.9	231.0	3.3	0.0	Horz	AV	0.0	37.7	54.0	-16.3	EUT on Side, Ant Vert, Directional PA 3x3 Ant
4962.075	28.8	5.2	1.0	174.0	3.3	0.0	Vert	AV	0.0	37.3	54.0	-16.7	EUT Vert, Ant Vert, Directional PA 3x3 Ant
4964.067	28.9	5.1	1.0	14.0	3.3	0.0	Vert	AV	0.0	37.3	54.0	-16.7	EUT Horz, Ant Vert, Directional PA 3x3 Ant
4963.858	28.8	5.1	1.0	195.0	3.3	0.0	Vert	AV	0.0	37.2	54.0	-16.8	EUT on Side, Ant Vert, Directional PA 3x3 Ant
4964.008	28.7	5.1	1.0	146.0	3.3	0.0	Horz	AV	0.0	37.1	54.0	-16.9	EUT Horz, Ant Horz, Directional PA 3x3 Ant
12411.280	27.1	9.9	1.0	114.0	3.3	0.0	Horz	AV	0.0	40.3	54.0	-13.7	EUT Horz, Ant Vert, Directional PA 3x3 Ant
12412.360	27.1	9.9	1.0	256.0	3.3	0.0	Vert	AV	0.0	40.3	54.0	-13.7	EUT Horz, Ant Horz, Directional PA 3x3 Ant
7445.967	39.0	13.0	1.0	325.0	0.0	0.0	Horz	PK	0.0	52.0	74.0	-22.0	EUT Horz, Ant Vert, Directional PA 3x3 Ant
7446.183	38.7	13.0	1.0	335.0	0.0	0.0	Vert	PK	0.0	51.7	74.0	-22.3	EUT Horz, Ant Horz, Directional PA 3x3 Ant
12410.480	38.2	9.9	1.0	256.0	3.3	0.0	Vert	PK	0.0	51.4	74.0	-22.6	EUT Horz, Ant Horz, Directional PA 3x3 Ant
12408.080	37.0	9.9	1.0	114.0	3.3	0.0	Horz	PK	0.0	50.2	74.0	-23.8	EUT Horz, Ant Vert, Directional PA 3x3 Ant
4964.067	41.6	5.1	1.8	325.0	0.0	0.0	Vert	PK	0.0	46.7	74.0	-27.3	EUT Horz, Ant Horz, Directional PA 3x3 Ant
4963.417	41.3	5.1	2.7	135.0	0.0	0.0	Horz	PK	0.0	46.4	74.0	-27.6	EUT Vert, Ant Horz, Directional PA 3x3 Ant
4963.617	40.8	5.1	1.3	128.0	0.0	0.0	Horz	PK	0.0	45.9	74.0	-28.1	EUT Vert, Ant Vert, Directional PA 3x3 Ant
4963.158	40.7	5.1	1.0	195.0	0.0	0.0	Vert	PK	0.0	45.8	74.0	-28.2	EUT on Side, Ant Vert, Directional PA 3x3 Ant
4963.325	40.5	5.1	2.2	38.0	0.0	0.0	Vert	PK	0.0	45.6	74.0	-28.4	EUT Vert, Ant Horz, Directional PA 3x3 Ant
4964.333	40.5	5.1	1.0	99.0	0.0	0.0	Horz	PK	0.0	45.6	74.0	-28.4	EUT Horz, Ant Vert, Directional PA 3x3 Ant
4963.733	40.2	5.1	1.0	174.0	0.0	0.0	Vert	PK	0.0	45.3	74.0	-28.7	EUT Vert, Ant Vert, Directional PA 3x3 Ant
4964.642	40.0	5.1	1.0	14.0	0.0	0.0	Vert	PK	0.0	45.1	74.0	-28.9	EUT Horz, Ant Vert, Directional PA 3x3 Ant
4963.933	39.5	5.1	2.9	231.0	0.0	0.0	Horz	PK	0.0	44.6	74.0	-29.4	EUT on Side, Ant Vert, Directional PA 3x3 Ant
4963.058	39.1	5.1	1.0	146.0	0.0	0.0	Horz	PK	0.0	44.2	74.0	-29.8	EUT Horz, Ant Horz, Directional PA 3x3 Ant

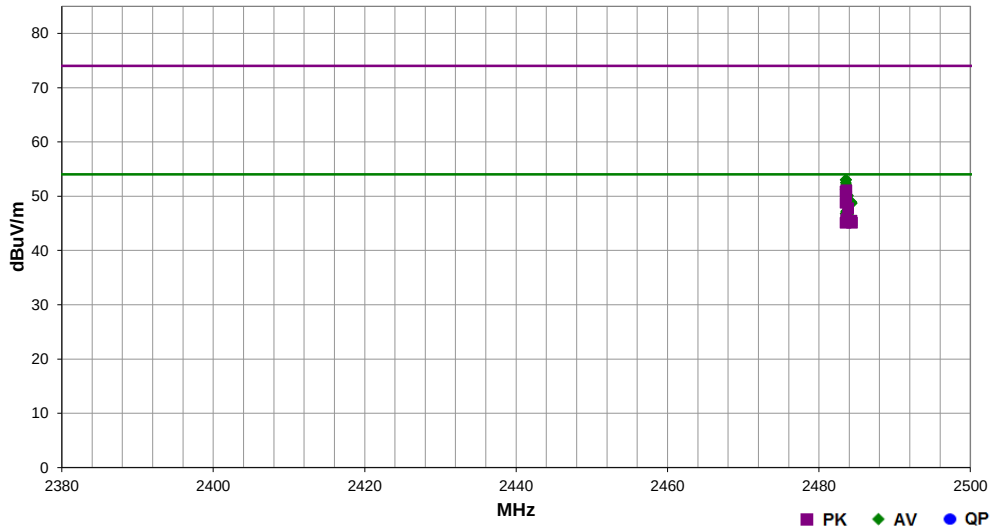
SPURIOUS RADIATED EMISSIONS 3X3 ANTENNA

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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 MHz				
Deviations:	None				
Comments:	See comments below EUT orientation, Antenna orientation and power setting. 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 #	31	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Calculated 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)	Marker Delta Comments
2483.513	32.6	-4.5	1.6	0.0	3.3	20.0	Horz	AV	0.0	53.0	54.0	-1.0	EUT Horz, Ant Vert, Directional PA 3x3 Ant, Power = -4: Fund 82.1dBuV + -49.5dBc = 32.6dBuV (calc. amp.)
2483.620	32.8	-4.5	1.4	360.0	3.3	20.0	Vert	AV	0.0	53.0	54.0	-1.0	EUT Vert, Ant on Side, Directional PA 3x3 Ant, Power = -4: Fund 80.9dBuV + -48.1dBc = 32.8dBuV (calc. amp.)
2483.560	32.3	-4.5	1.4	-3.0	3.3	20.0	Vert	AV	0.0	52.5	54.0	-1.5	EUT Horz, Ant on Side, Directional PA 3x3 Ant, Power = -4: Fund 80.8dBuV + -48.5dBc = 32.3dBuV (calc. amp.)
2483.593	31.7	-4.5	1.7	-6.0	3.3	20.0	Vert	AV	0.0	52.2	54.0	-1.8	EUT on Side, Ant on Side, Directional PA 3x3 Ant, Power = -4: Fund 80.7dBuV + -49.0dBc = 31.7dBuV (calc. amp.)
2483.507	30.5	-4.5	1.9	2.0	3.3	20.0	Horz	AV	0.0	51.2	54.0	-2.8	EUT Horz, Ant on Side, Directional PA 3x3 Ant, Power = -4: Fund 77.2dBuV + -46.7dBc = 30.5dBuV (calc. amp.)
2483.853	29.5	-4.5	1.8	2.0	3.3	20.0	Horz	AV	0.0	50.1	54.0	-3.9	EUT Vert, Ant on Side, Directional PA 3x3 Ant, Power = -4: Fund 77.2dBuV + -47.7dBc = 29.5dBuV (calc. amp.)
2484.300	26.9	-4.4	3.1	197.0	3.3	20.0	Vert	AV	0.0	48.9	54.0	-5.1	EUT Vert, Ant Horz, Directional PA 3x3 Ant, Power = -4: Fund 67.6dBuV + -40.7dBc = 26.9dBuV (calc. amp.)
2484.367	26.7	-4.4	3.1	203.0	3.3	20.0	Vert	AV	0.0	48.7	54.0	-5.3	EUT on Side, Ant Horz, Directional PA 3x3 Ant, Power = -4: Fund 67.6dBuV + -40.9dBc = 26.7dBuV (calc. amp.)
2483.593	27.0	-4.5	1.4	288.0	3.3	20.0	Horz	AV	0.0	47.2	54.0	-6.8	EUT Horz, Ant Horz, Directional PA 3x3 Ant, Power = -4: Fund 68.4dBuV + -41.4dBc = 27.0dBuV (calc. amp.)
2483.633	27.3	-4.5	1.0	57.0	3.3	20.0	Horz	AV	0.0	47.1	54.0	-6.9	EUT Vert, Ant Horz, Directional PA 3x3 Ant, Power = -4: Fund 68.0dBuV + -40.7dBc = 27.3dBuV (calc. amp.)
2483.520	26.7	-4.5	1.3	110.0	3.3	20.0	Horz	AV	0.0	46.8	54.0	-7.2	EUT on Side, Ant Horz, Directional PA 3x3 Ant, Power = -4: Fund 68.7dBuV + -42.0dBc = 26.7dBuV (calc. amp.)
2483.867	26.9	-4.5	1.0	197.0	3.3	20.0	Vert	AV	0.0	46.7	54.0	-7.3	EUT Horz, Ant Horz, Directional PA 3x3 Ant, Power = -4: Fund 67.1dBuV + -40.2dBc = 26.9dBuV (calc. amp.)
2483.620	35.6	-4.5	1.4	360.0		20.0	Vert	PK	0.0	51.1	74.0	-22.9	EUT Vert, Ant on Side, Directional PA 3x3 Ant, Power = -4: Fund 83.7dBuV + -48.1dBc = 35.6dBuV (calc. amp.)
2483.513	35.4	-4.5	1.6	0.0		20.0	Horz	PK	0.0	50.9	74.0	-23.1	EUT Horz, Ant Vert, Directional PA 3x3 Ant, Power = -4: Fund 84.9dBuV + -49.5dBc = 35.4dBuV (calc. amp.)
2483.560	35.1	-4.5	1.4	-3.0		20.0	Vert	PK	0.0	50.6	74.0	-23.4	EUT Horz, Ant on Side, Directional PA 3x3 Ant, Power = -4: Fund 83.6dBuV + -48.5dBc = 35.1dBuV (calc. amp.)

Freq (MHz)	Calculated 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)	Marker Delta Comments
2483.593	34.5	-4.5	1.7	-6.0		20.0	Vert	PK	0.0	50.0	74.0	-24.0	EUT on Side, Ant on Side, Directional PA 3x3 Ant, Power = -4: Fund 83.5dBuV + -49.0dBc = 34.5dBuV (calc. amp.)
2483.507	33.3	-4.5	1.9	2.0		20.0	Horz	PK	0.0	48.8	74.0	-25.2	EUT Horz, Ant on Side, Directional PA 3x3 Ant, Power = -4: Fund 80.0dBuV + -46.7dBc = 33.3dBuV (calc. amp.)
2483.853	32.3	-4.5	1.8	2.0		20.0	Horz	PK	0.0	47.8	74.0	-26.2	EUT Vert, Ant on Side, Directional PA 3x3 Ant, Power = -4: Fund 80.0dBuV + -47.7dBc = 32.3dBuV (calc. amp.)
2483.633	30.3	-4.5	1.0	57.0		20.0	Horz	PK	0.0	45.8	74.0	-28.2	EUT Vert, Ant Horz, Directional PA 3x3 Ant, Power = -4: Fund 71.0dBuV + -40.7dBc = 30.3dBuV (calc. amp.)
2484.300	29.9	-4.4	3.1	197.0		20.0	Vert	PK	0.0	45.5	74.0	-28.5	EUT Vert, Ant Horz, Directional PA 3x3 Ant, Power = -4: Fund 70.6dBuV + -40.7dBc = 29.9dBuV (calc. amp.)
2483.593	30.0	-4.5	1.4	288.0		20.0	Horz	PK	0.0	45.5	74.0	-28.5	EUT Horz, Ant Horz, Directional PA 3x3 Ant, Power = -4: Fund 71.4dBuV + -41.4dBc = 30.0dBuV (calc. amp.)
2483.867	29.9	-4.5	1.0	197.0		20.0	Vert	PK	0.0	45.4	74.0	-28.6	EUT Horz, Ant Horz, Directional PA 3x3 Ant, Power = -4: Fund 70.1dBuV + -40.2dBc = 29.9dBuV (calc. amp.)
2483.520	29.6	-4.5	1.3	110.0		20.0	Horz	PK	0.0	45.1	74.0	-28.9	EUT on Side, Ant Horz, Directional PA 3x3 Ant, Power = -4: Fund 71.6dBuV + -42.0dBc = 29.6dBuV (calc. amp.)
2484.367	29.5	-4.4	3.1	203.0		20.0	Vert	PK	0.0	45.1	74.0	-28.9	EUT on Side, Ant Horz, Directional PA 3x3 Ant, Power = -4: Fund 70.4dBuV + -40.9dBc = 29.5dBuV (calc. amp.)

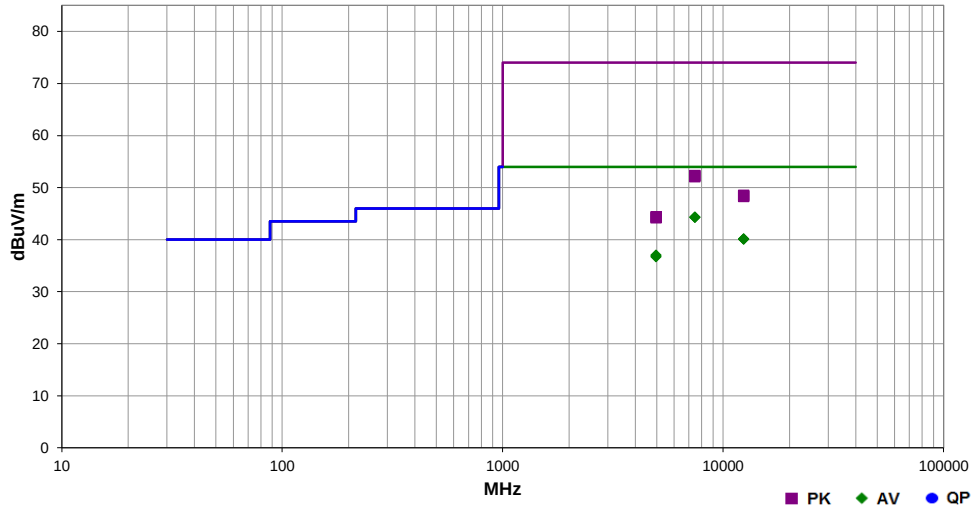
SPURIOUS RADIATED EMISSIONS 3X3 ANTENNA

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0249	**Date:**	14-Aug-2018		
Project:	None	**Temperature:**	23.1 °C		
Job Site:	EV01	**Humidity:**	45.7% RH		
Serial Number:	E45	**Barometric Pres.:**	1013 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 MHz				
Deviations:	None				
Comments:	Measurements made on worst case orientations determined from testing on the POE system. See comments below EUT orientation, Antenna orientation and power setting. 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 #	96	**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
7446.442	28.0	13.0	1.0	259.0	3.3	0.0	Horz	AV	0.0	44.3	54.0	-9.7	EUT Horz, Ant Vert, Power Setting = -4, Directional PA 3x3 Ant
7446.658	28.0	13.0	2.2	346.0	3.3	0.0	Vert	AV	0.0	44.3	54.0	-9.7	EUT Horz, Ant on Side, Power Setting = -4, Directional PA 3x3 Ant
12410.140	26.9	9.9	1.0	10.0	3.3	0.0	Horz	AV	0.0	40.1	54.0	-13.9	EUT Horz, Ant Vert, Power Setting = -4, Directional PA 3x3 Ant
12410.960	26.9	9.9	1.0	12.0	3.3	0.0	Vert	AV	0.0	40.1	54.0	-13.9	EUT Horz, Ant on Side, Power Setting = -4, Directional PA 3x3 Ant
4962.750	28.6	5.1	1.9	340.0	3.3	0.0	Vert	AV	0.0	37.0	54.0	-17.0	EUT Horz, Ant on Side, Power Setting = -4, Directional PA 3x3 Ant
4964.517	28.3	5.1	1.0	166.0	3.3	0.0	Horz	AV	0.0	36.7	54.0	-17.3	EUT Horz, Ant Vert, Power Setting = -4, Directional PA 3x3 Ant
7446.125	39.3	13.0	1.0	259.0		0.0	Horz	PK	0.0	52.3	74.0	-21.7	EUT Horz, Ant Vert, Power Setting = -4, Directional PA 3x3 Ant
7443.675	39.1	13.0	2.2	346.0		0.0	Vert	PK	0.0	52.1	74.0	-21.9	EUT Horz, Ant on Side, Power Setting = -4, Directional PA 3x3 Ant
12409.220	38.6	9.9	1.0	12.0		0.0	Vert	PK	0.0	48.5	74.0	-25.5	EUT Horz, Ant on Side, Power Setting = -4, Directional PA 3x3 Ant
12410.520	38.4	9.9	1.0	10.0		0.0	Horz	PK	0.0	48.3	74.0	-25.7	EUT Horz, Ant Vert, Power Setting = -4, Directional PA 3x3 Ant
4965.042	39.3	5.1	1.9	340.0		0.0	Vert	PK	0.0	44.4	74.0	-29.6	EUT Horz, Ant on Side, Power Setting = -4, Directional PA 3x3 Ant
4964.192	39.1	5.1	1.0	166.0		0.0	Horz	PK	0.0	44.2	74.0	-29.8	EUT Horz, Ant Vert, Power Setting = -4, Directional PA 3x3 Ant

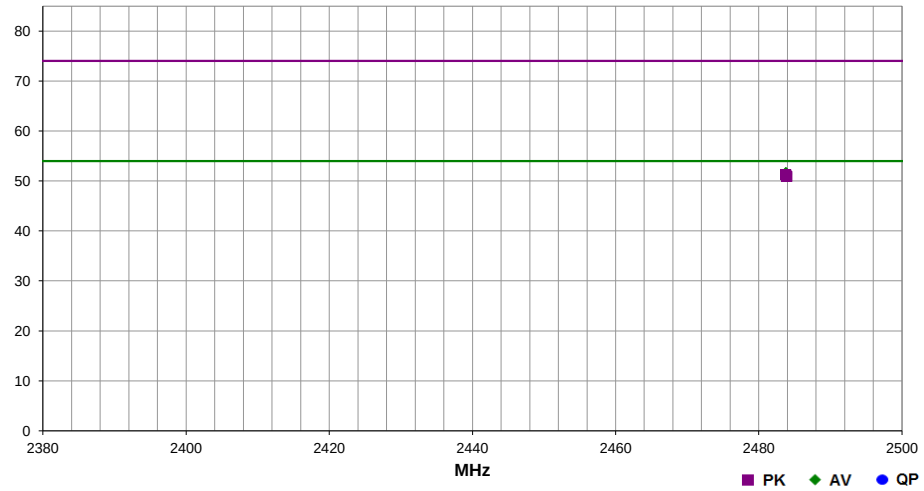
SPURIOUS RADIATED EMISSIONS 3X3 ANTENNA

EmRS 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0249	**Date:**	14-Aug-2018		
Project:	None	**Temperature:**	23.1 °C		
Job Site:	EV01	**Humidity:**	45.7% RH		
Serial Number:	E45	**Barometric Pres.:**	1013 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 MHz				
Deviations:	None				
Comments:	Measurements made on worst case orientations determined from testing on the POE system. See comments below EUT orientation, Antenna orientation and power setting. 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

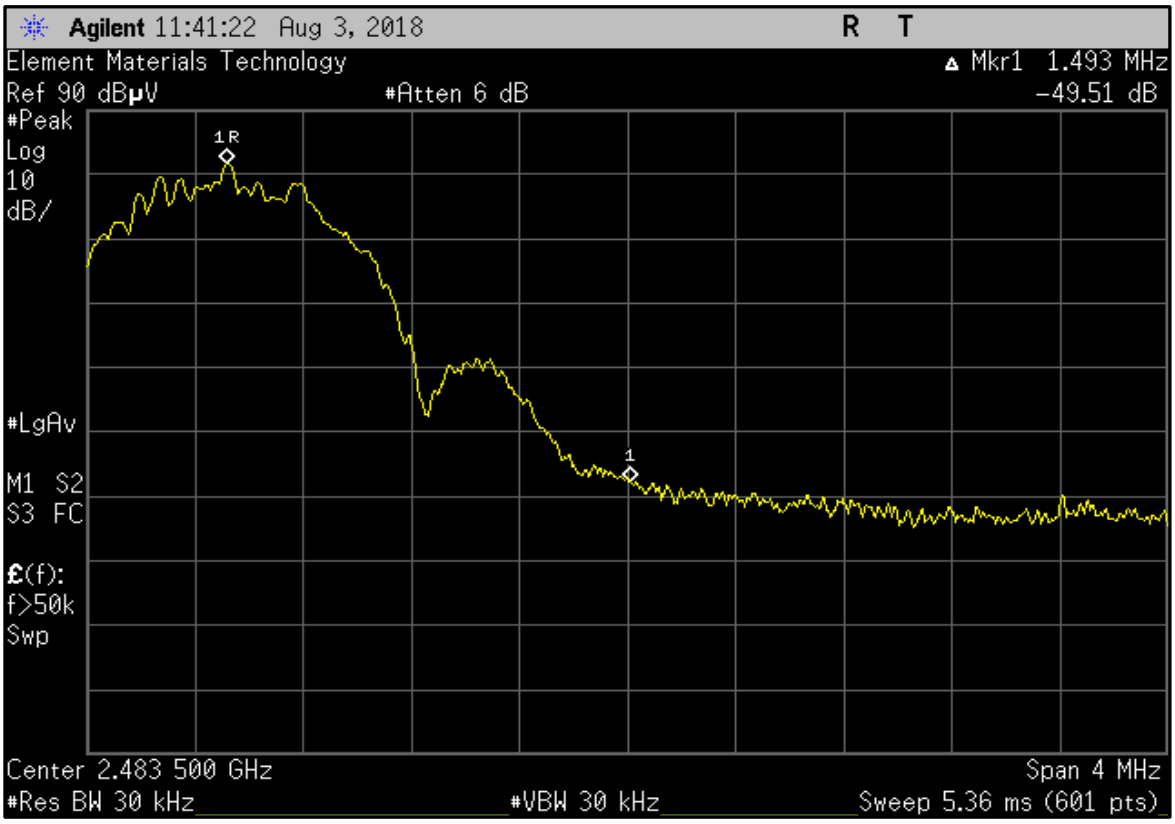


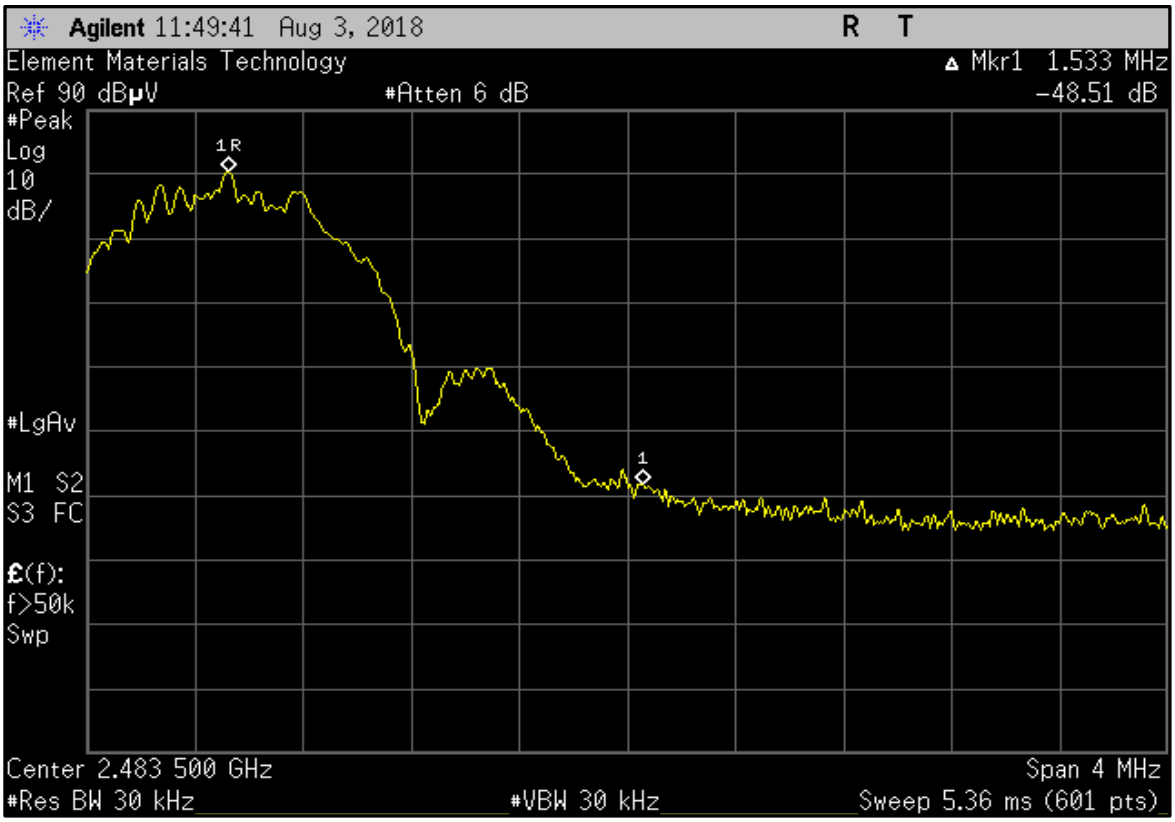
Freq (MHz)	Calculated Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Marker Delta Comments
2483.780	32.9	-4.5	1.7	-6.0	3.3	20.0	Horz	AV	0.0	51.7	54.0	-2.3	DC Powered - EUT Horz, Ant Vert, Directional PA 3x3 Ant, Power setting = -4: Fund 81.5dBuV + -48.6dBc = 32.9dBuV (calc. amp.)
2483.920	32.6	-4.5	1.8	-6.0	3.3	20.0	Vert	AV	0.0	51.4	54.0	-2.6	DC Powered - EUT Vert, Ant on Side, Directional PA 3x3 Ant, Power setting = -4: Fund 81.1dBuV + -48.5dBc = 32.6dBuV (calc. amp.)
2483.780	35.7	-4.5	1.7	-6.0	0.0	20.0	Horz	PK	0.0	51.2	74.0	-22.8	DC Powered - EUT Horz, Ant Vert, Directional PA 3x3 Ant, Power setting = -4: Fund 84.3dBuV + -48.6dBc = 35.7dBuV (calc. amp.)
2483.920	35.4	-4.5	1.8	-6.0	0.0	20.0	Vert	PK	0.0	50.9	74.0	-23.1	DC Powered - EUT Vert, Ant on Side, Directional PA 3x3 Ant, Power setting = -4: Fund 83.9dBuV + -48.5dBc = 35.4dBuV (calc. amp.)

SPURIOUS RADIATED EMISSIONS 3X3 ANTENNA

EUT Horz, Ant Horz, Power = -4, Directional PA 3x3 Ant

PSA-ESCI 2018.05.04



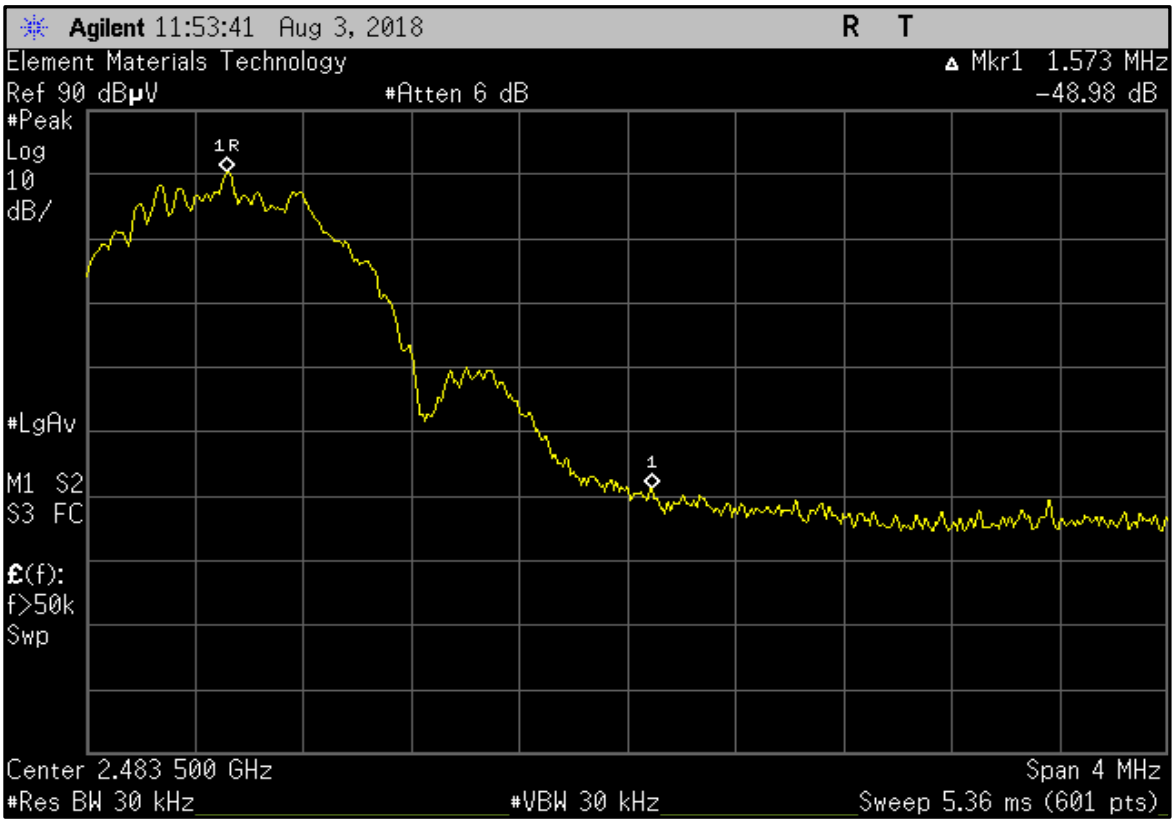


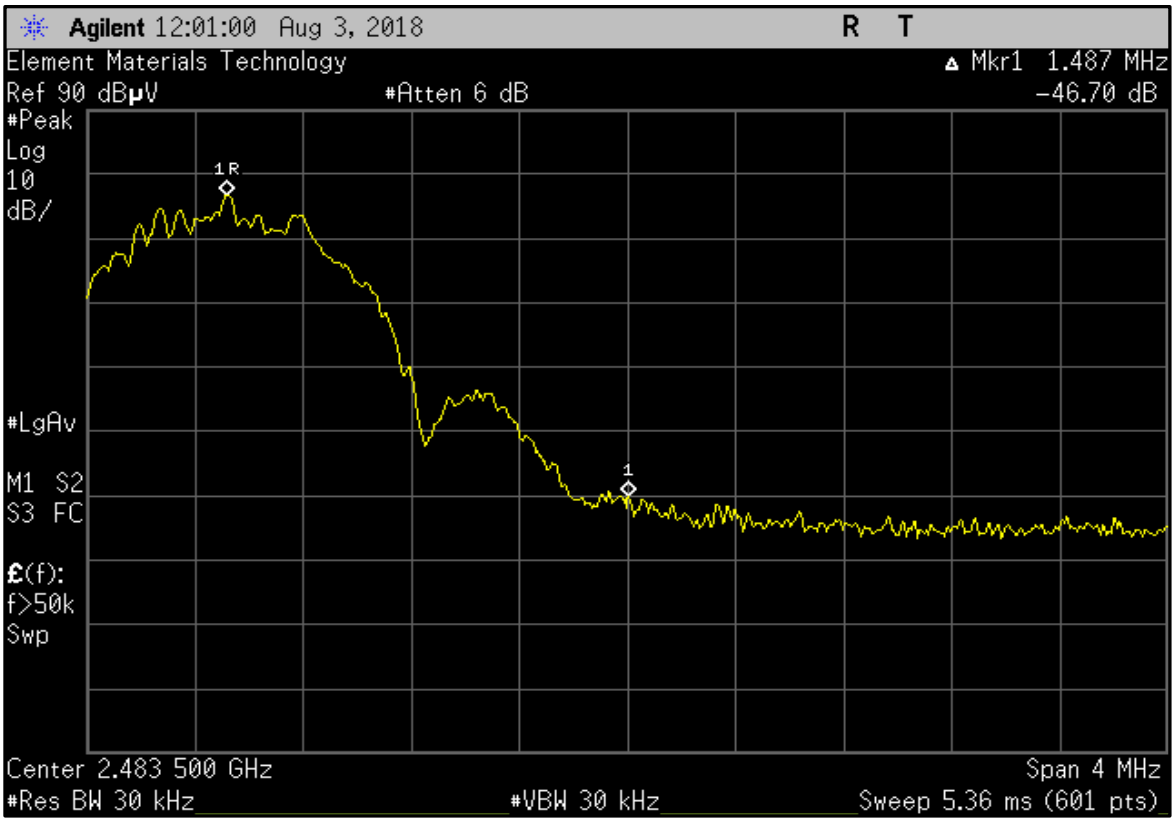
EUT Horz, Ant on Side, Power = -4, Directional PA 3x3 Ant

SPURIOUS RADIATED EMISSIONS 3X3 ANTENNA

EUT on Side, Ant on Side, Power = -4, Directional PA 3x3 Ant

PSA-ESCI 2018.05.04



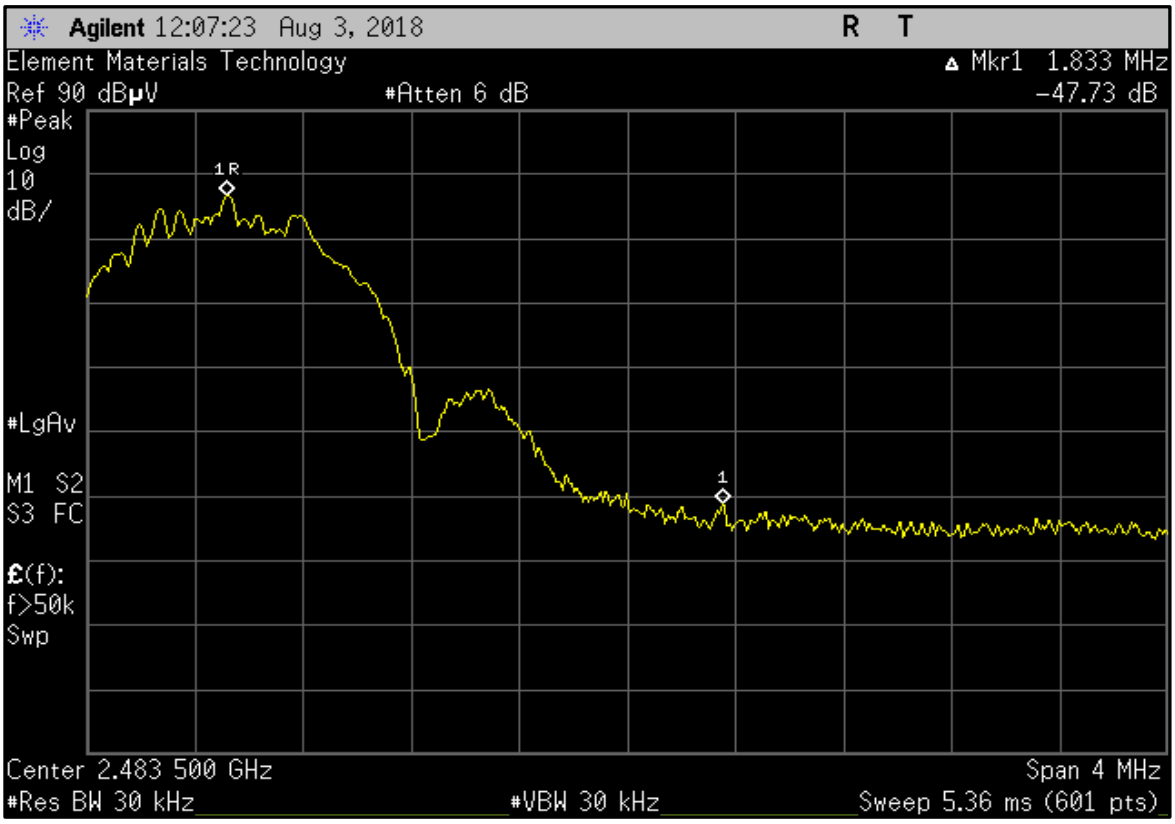


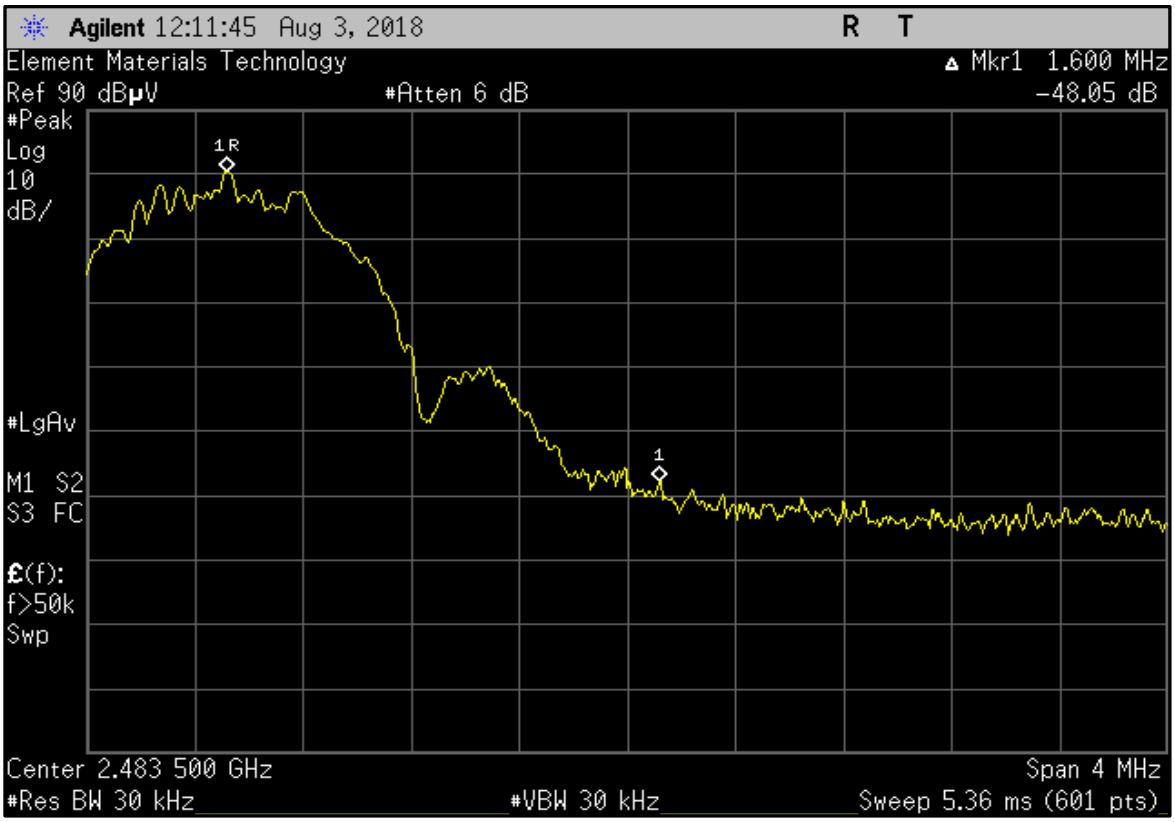
EUT Horz, Ant on Side, Power = -4, Directional PA 3x3 Ant

SPURIOUS RADIATED EMISSIONS 3X3 ANTENNA

EUT Vert, Ant on Side, Power = -4, Directional PA 3x3 Ant

PSA-ESCI 2018.05.04



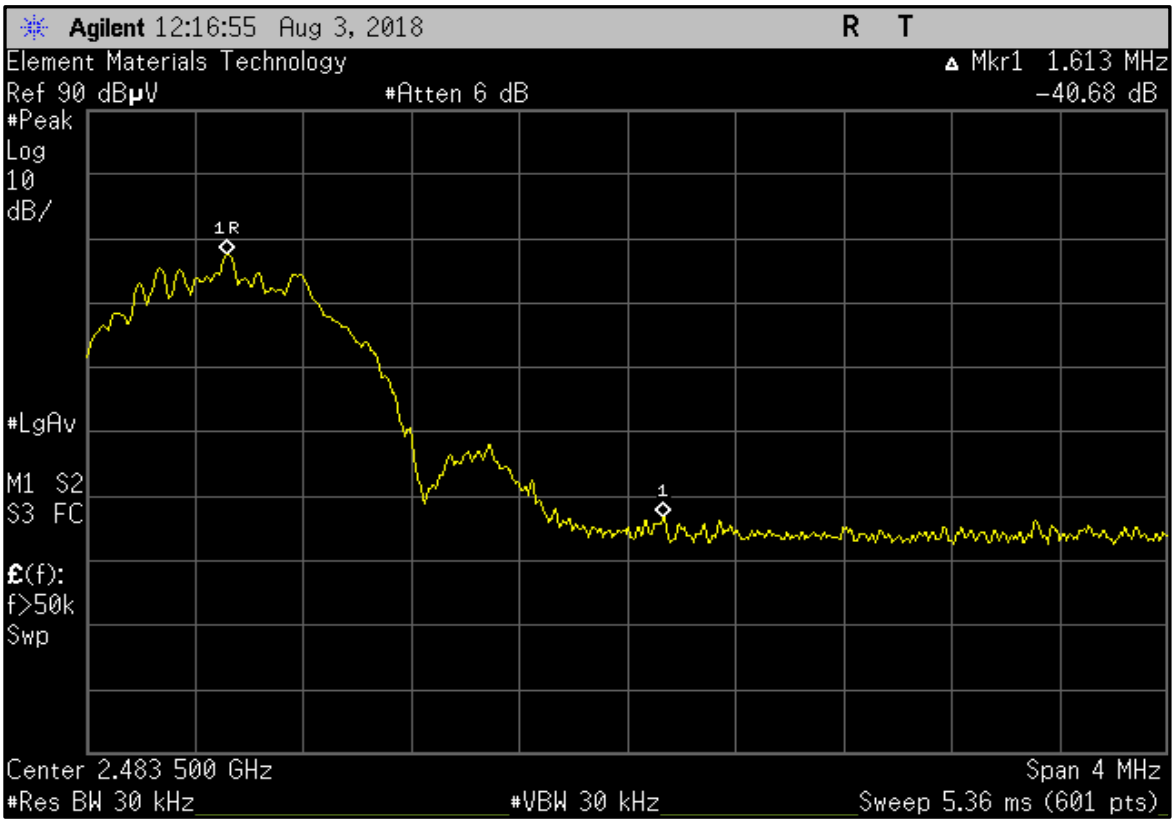


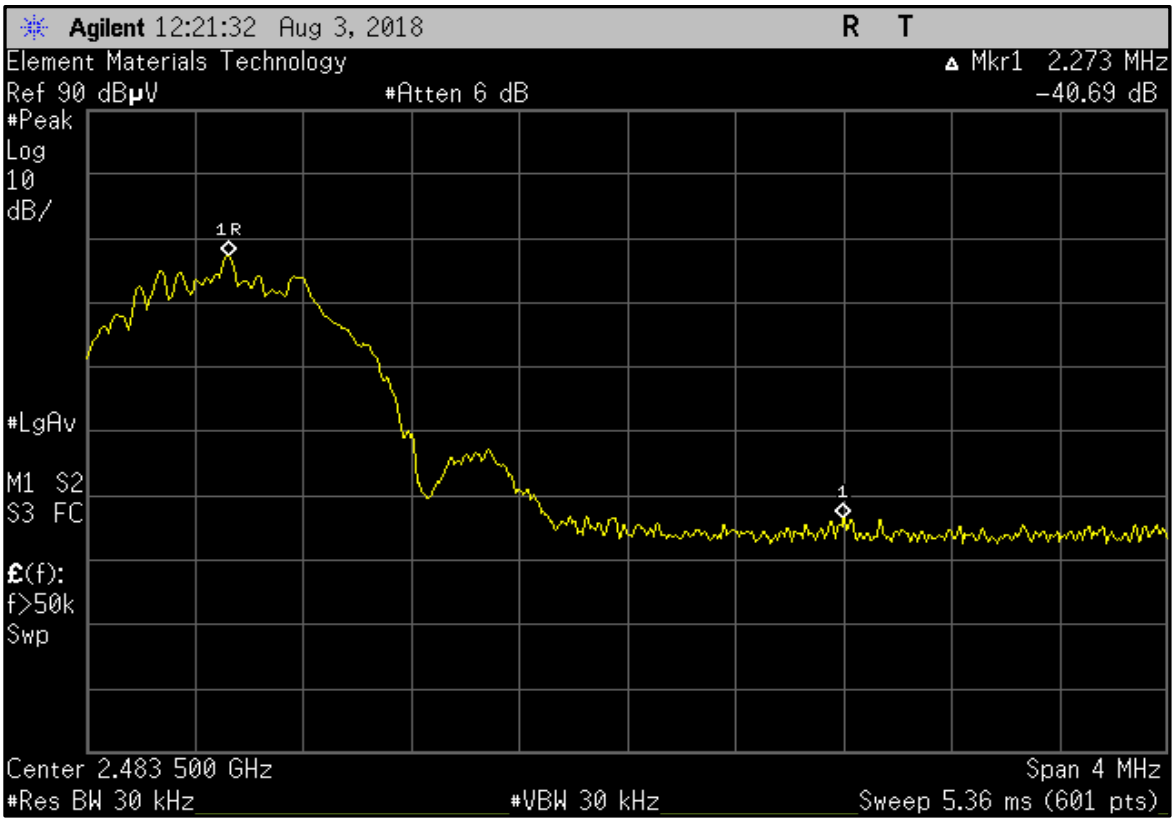
EUT Vert, Ant on Side, Power = -4, Directional PA 3x3 Ant

SPURIOUS RADIATED EMISSIONS 3X3 ANTENNA

EUT Vert, Ant Horz, Power = -4, Directional PA 3x3 Ant

PSA-ESCI 2018.05.04



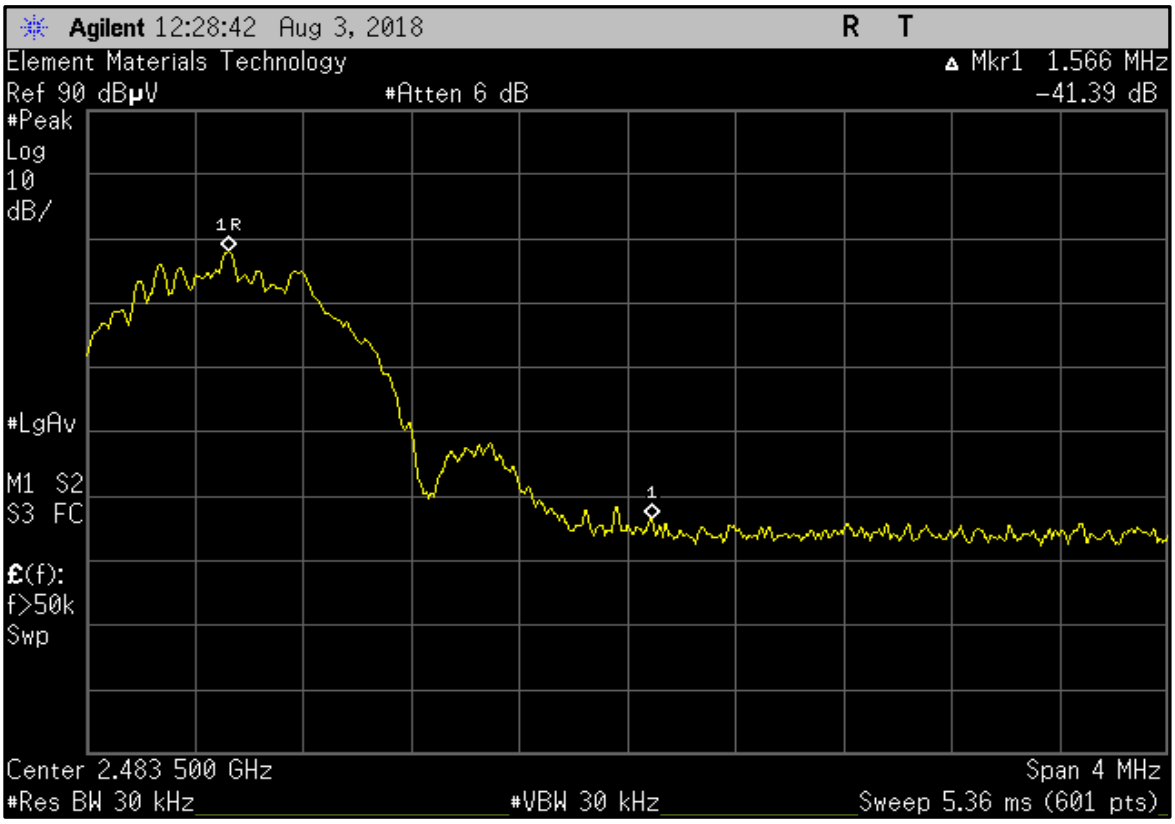


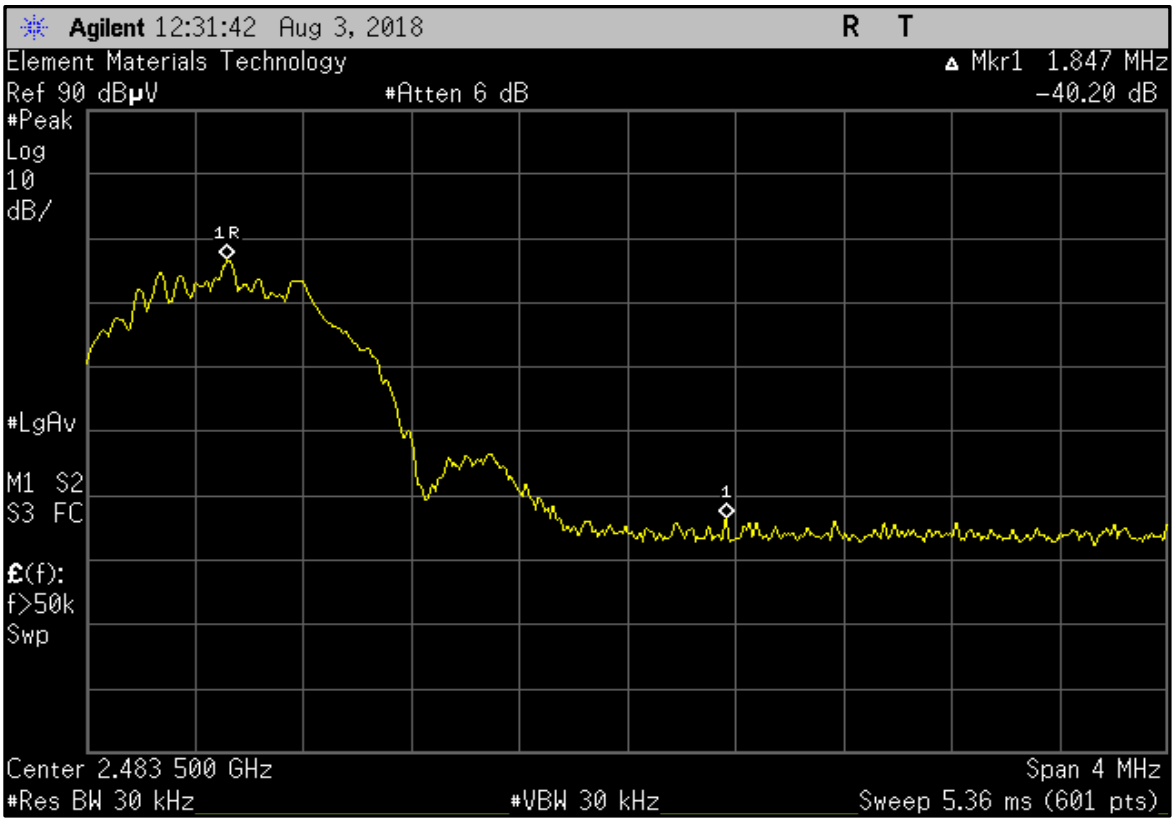
EUT Vert, Ant Horz, Power = -4, Directional PA 3x3 Ant

SPURIOUS RADIATED EMISSIONS 3X3 ANTENNA

EUT Horz, Ant Horz, Power = -4, Directional PA 3x3 Ant

PSA-ESCI 2018.05.04



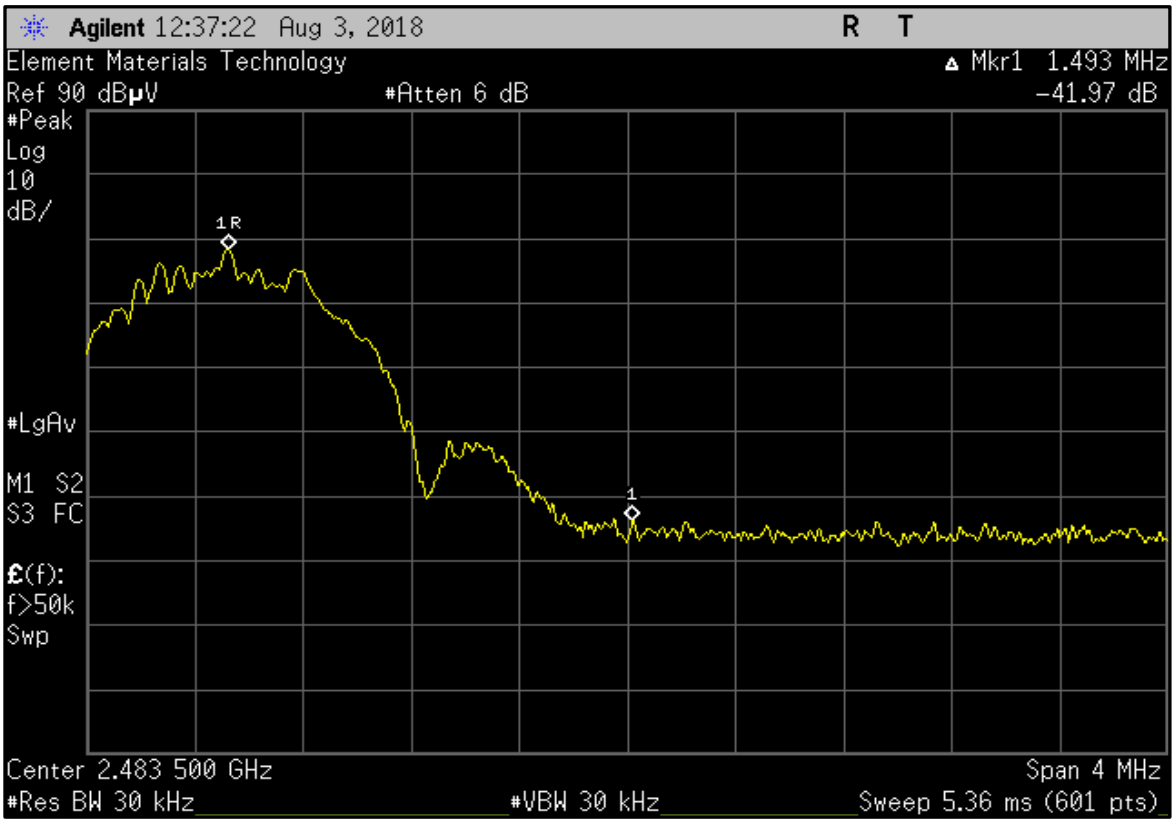


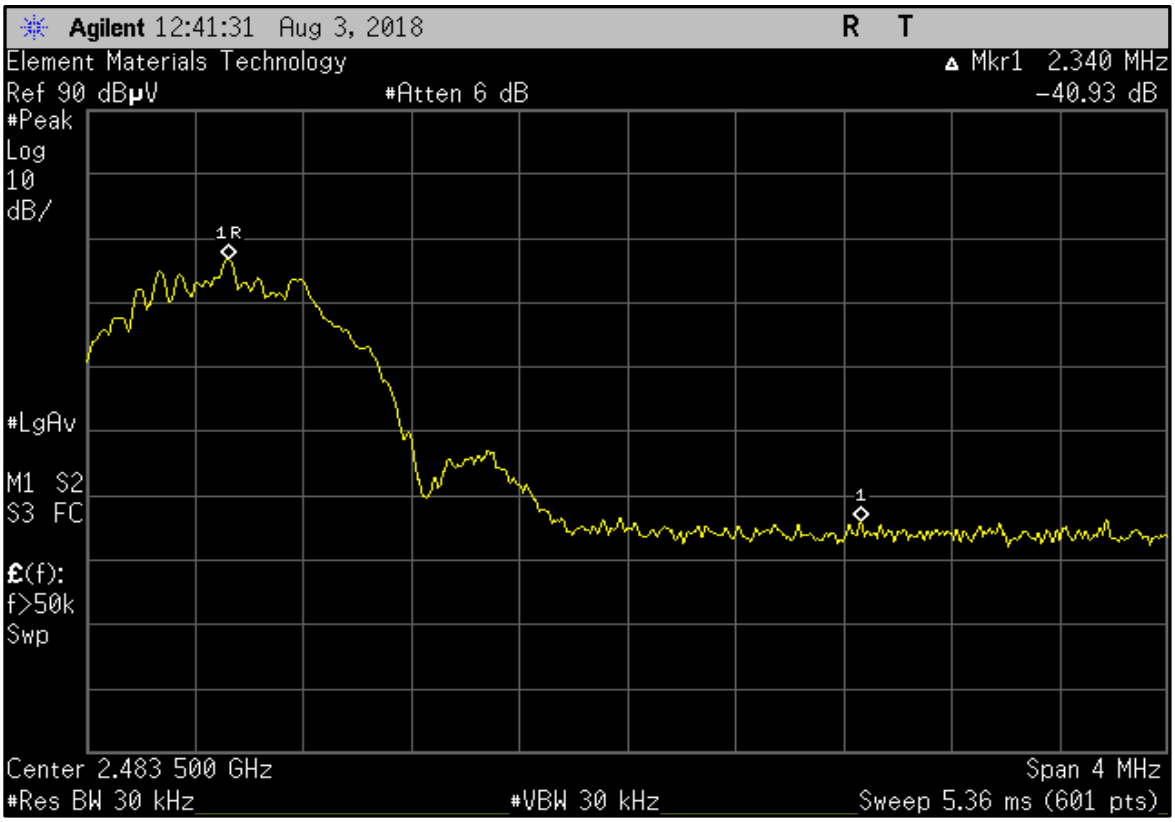
EUT Horz, Ant Horz, Power = -4, Directional PA 3x3 Ant

SPURIOUS RADIATED EMISSIONS 3X3 ANTENNA

EUT on Side, Ant Horz, Power = -4, Directional PA 3x3 Ant

PSA-ESCI 2018.05.04



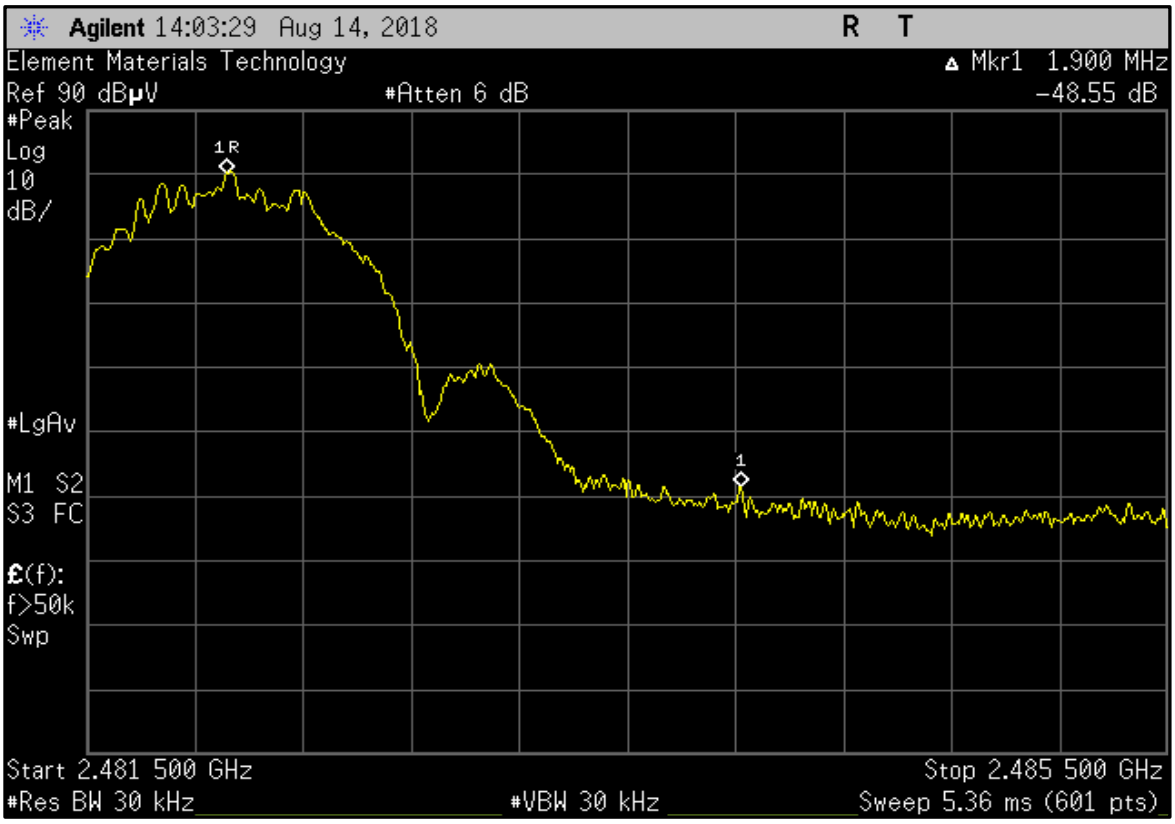


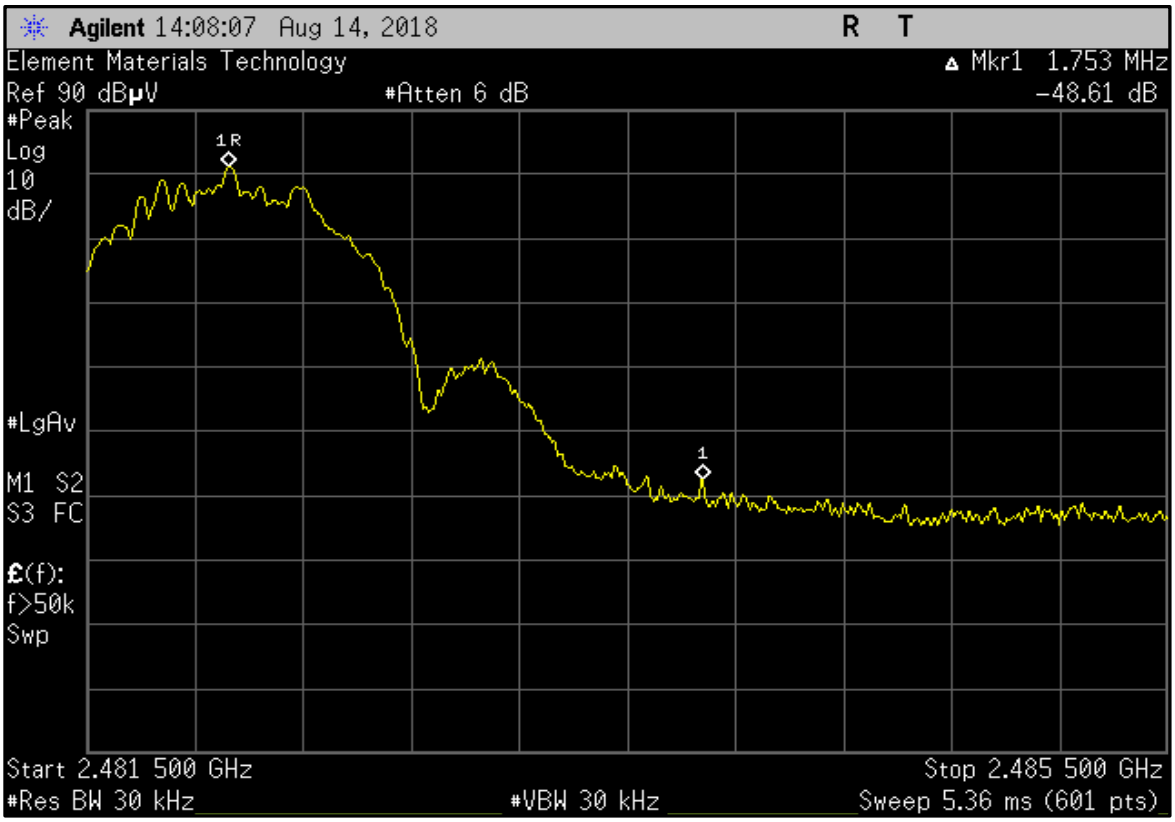
EUT on Side, Ant Horz, Power = -4, Directional PA 3x3 Ant

SPURIOUS RADIATED EMISSIONS 3X3 ANTENNA

DC Powered - EUT Vert, Ant on Side, Power setting = -4, Directional PA 3x3 Ant

PSA-ESCI 2018.05.04





DC Powered - EUT Horz, Ant Vert, Power setting = -4, 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

DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 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.

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).

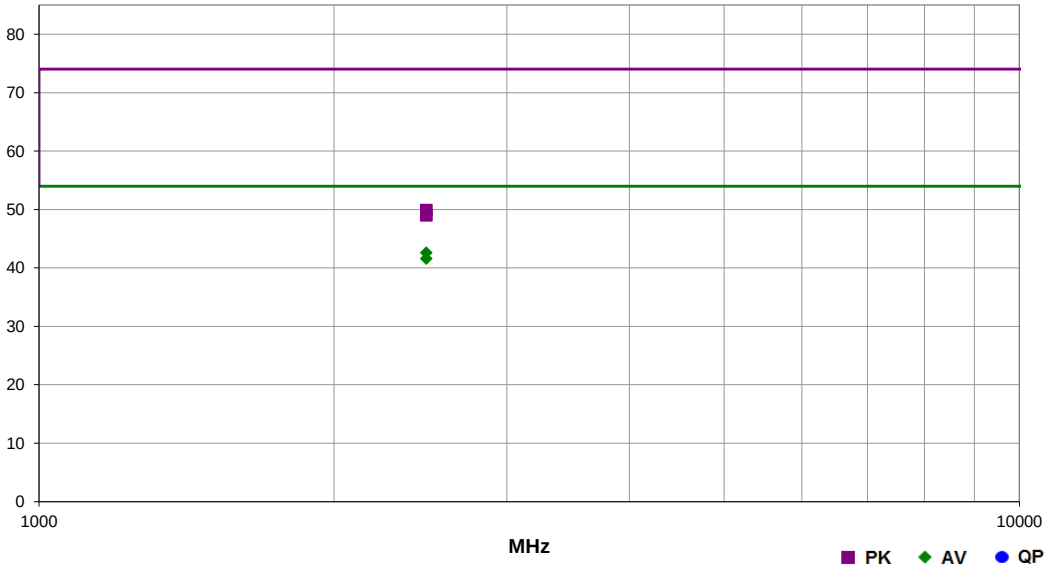
SPURIOUS RADIATED EMISSIONS 3X3 ANTENNA

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0259	**Date:**	7-Sep-2018		
Project:	None	**Temperature:**	24.4 °C		
Job Site:	OC07	**Humidity:**	51.7% RH		
Serial Number:	E52	**Barometric Pres.:**	1016 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 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. 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 #	46	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Calculated 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)	Marker Delta Comments
2483.533	23.5	-4.2	2.3	21.0	3.3	20.0	Vert	AV	0.0	42.6	54.0	-11.4	EUT Vert, Ant on Side, Directional PA 3x3 Ant: Fund 72.8dBuV + -49.3dBc = 23.5dBuV (calc. amp.)
2483.507	22.5	-4.2	2.3	20.0	3.3	20.0	Horz	AV	0.0	41.6	54.0	-12.4	EUT Horz, Ant Vert, Directional PA 3x3 Ant: Fund 71.0dBuV + -48.5dBc = 22.5dBuV (calc. amp.)
2483.533	34.1	-4.2	2.3	21.0	0.0	20.0	Vert	PK	0.0	49.9	74.0	-24.1	EUT Vert, Ant on Side, Directional PA 3x3 Ant: Fund 83.4dBuV + -49.3dBc = 34.1dBuV (calc. amp.)
2483.507	33.2	-4.2	2.3	20.0	0.0	20.0	Horz	PK	0.0	49.0	74.0	-25.0	EUT Horz, Ant Vert, Directional PA 3x3 Ant: Fund 81.7dBuV + -48.5dBc = 33.2dBuV (calc. amp.)

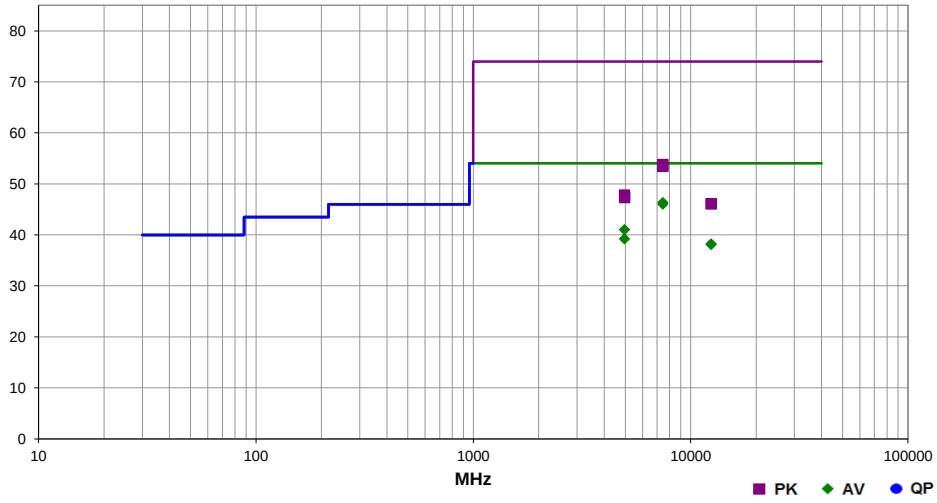
SPURIOUS RADIATED EMISSIONS 3X3 ANTENNA

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0259	**Date:**	7-Sep-2018		
Project:	None	**Temperature:**	24.4 °C		
Job Site:	OC07	**Humidity:**	51.7% RH		
Serial Number:	E52	**Barometric Pres.:**	1016 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 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 #	47	**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
7445.720	31.2	11.8	2.3	140.0	3.3	0.0	Horz	AV	0.0	46.3	54.0	-7.7	EUT Horz, Ant Vert, Directional PA 3x3 Ant, Directional PA 3x3 Ant
7445.460	30.9	11.8	2.0	120.0	3.3	0.0	Vert	AV	0.0	46.0	54.0	-8.0	EUT Horz, Ant on Side, Directional PA 3x3 Ant, Directional PA 3x3 Ant
4964.020	33.5	4.2	1.0	119.0	3.3	0.0	Horz	AV	0.0	41.0	54.0	-13.0	EUT Horz, Ant Vert, Directional PA 3x3 Ant, Directional PA 3x3 Ant
4963.970	31.7	4.2	1.0	58.0	3.3	0.0	Vert	AV	0.0	39.2	54.0	-14.8	EUT Horz, Ant on Side, Directional PA 3x3 Ant, Directional PA 3x3 Ant
12410.810	28.8	6.1	1.0	244.0	3.3	0.0	Horz	AV	0.0	38.2	54.0	-15.8	EUT Horz, Ant Vert, Directional PA 3x3 Ant, Directional PA 3x3 Ant
12409.130	28.7	6.1	1.0	360.0	3.3	0.0	Vert	AV	0.0	38.1	54.0	-15.9	EUT Horz, Ant on Side, Directional PA 3x3 Ant, Directional PA 3x3 Ant
7447.215	42.0	11.8	2.0	120.0	0.0	0.0	Vert	PK	0.0	53.8	74.0	-20.2	EUT Horz, Ant on Side, Directional PA 3x3 Ant, Directional PA 3x3 Ant
7445.980	41.6	11.8	2.3	140.0	0.0	0.0	Horz	PK	0.0	53.4	74.0	-20.6	EUT Horz, Ant Vert, Directional PA 3x3 Ant, Directional PA 3x3 Ant
4963.745	43.6	4.2	1.0	119.0	0.0	0.0	Horz	PK	0.0	47.8	74.0	-26.2	EUT Horz, Ant Vert, Directional PA 3x3 Ant, Directional PA 3x3 Ant
4965.380	43.1	4.2	1.0	58.0	0.0	0.0	Vert	PK	0.0	47.3	74.0	-26.7	EUT Horz, Ant on Side, Directional PA 3x3 Ant, Directional PA 3x3 Ant
12409.190	40.0	6.1	1.0	244.0	0.0	0.0	Horz	PK	0.0	46.1	74.0	-27.9	EUT Horz, Ant Vert, Directional PA 3x3 Ant, Directional PA 3x3 Ant
12409.420	40.0	6.1	1.0	360.0	0.0	0.0	Vert	PK	0.0	46.1	74.0	-27.9	EUT Horz, Ant on Side, Directional PA 3x3 Ant, Directional PA 3x3 Ant

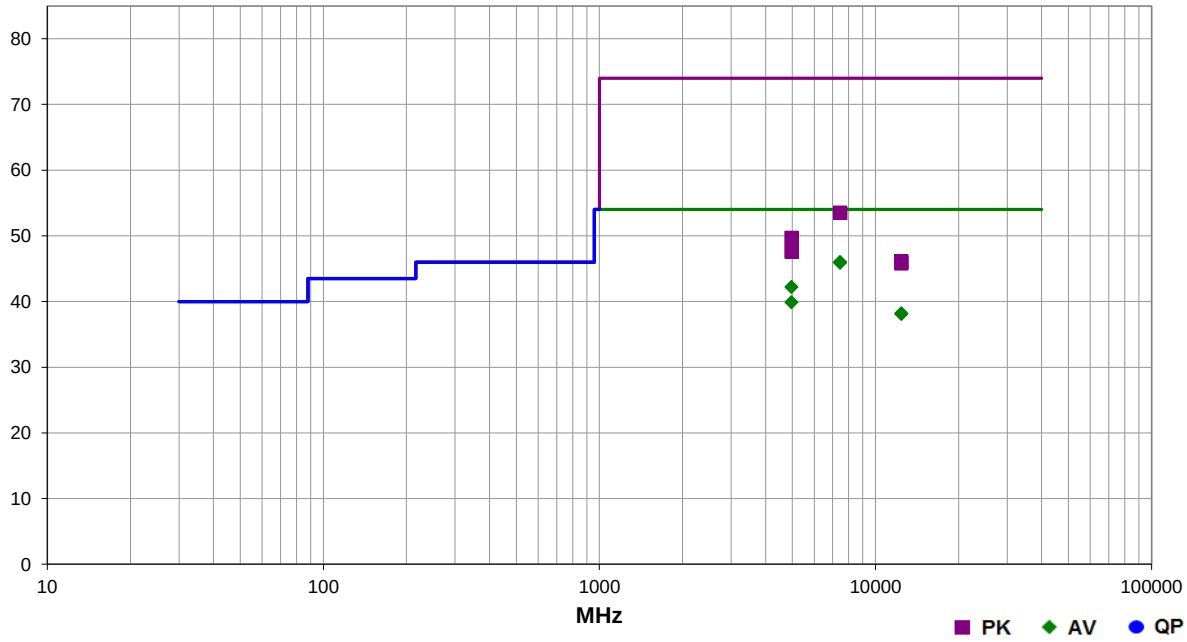
SPURIOUS RADIATED EMISSIONS 3X3 ANTENNA

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0259	**Date:**	7-Sep-2018		
Project:	None	**Temperature:**	24.4 °C		
Job Site:	OC07	**Humidity:**	51.7% RH		
Serial Number:	E52	**Barometric Pres.:**	1016 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 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 #	49	**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
7445.060	30.9	11.8	2.0	350.0	3.3	0.0	Vert	AV	0.0	46.0	54.0	-8.0	EUT Horz, Ant on Side, D
7446.093	30.8	11.8	1.0	276.0	3.3	0.0	Horz	AV	0.0	45.9	54.0	-8.1	EUT Horz, Ant Vert, Dire
4964.127	34.7	4.2	1.4	149.0	3.3	0.0	Horz	AV	0.0	42.2	54.0	-11.8	EUT Horz, Ant Vert, Dire
4963.793	32.4	4.2	1.0	318.0	3.3	0.0	Vert	AV	0.0	39.9	54.0	-14.1	EUT Horz, Ant on Side, D
12409.360	28.8	6.1	1.0	199.0	3.3	0.0	Horz	AV	0.0	38.2	54.0	-15.8	EUT Horz, Ant Vert, Dire
12410.470	28.7	6.1	1.0	216.0	3.3	0.0	Vert	AV	0.0	38.1	54.0	-15.9	EUT Horz, Ant on Side, D
7445.077	41.7	11.8	1.0	276.0	0.0	0.0	Horz	PK	0.0	53.5	74.0	-20.5	EUT Horz, Ant Vert, Dire
7445.887	41.7	11.8	2.0	350.0	0.0	0.0	Vert	PK	0.0	53.5	74.0	-20.5	EUT Horz, Ant on Side, D
4963.663	45.5	4.2	1.4	149.0	0.0	0.0	Horz	PK	0.0	49.7	74.0	-24.3	EUT Horz, Ant Vert, Dire
4963.647	43.4	4.2	1.0	318.0	0.0	0.0	Vert	PK	0.0	47.6	74.0	-26.4	EUT Horz, Ant on Side, D
12408.750	40.0	6.1	1.0	199.0	0.0	0.0	Horz	PK	0.0	46.1	74.0	-27.9	EUT Horz, Ant Vert, Dire
12410.530	39.7	6.1	1.0	216.0	0.0	0.0	Vert	PK	0.0	45.8	74.0	-28.2	EUT Horz, Ant on Side, D

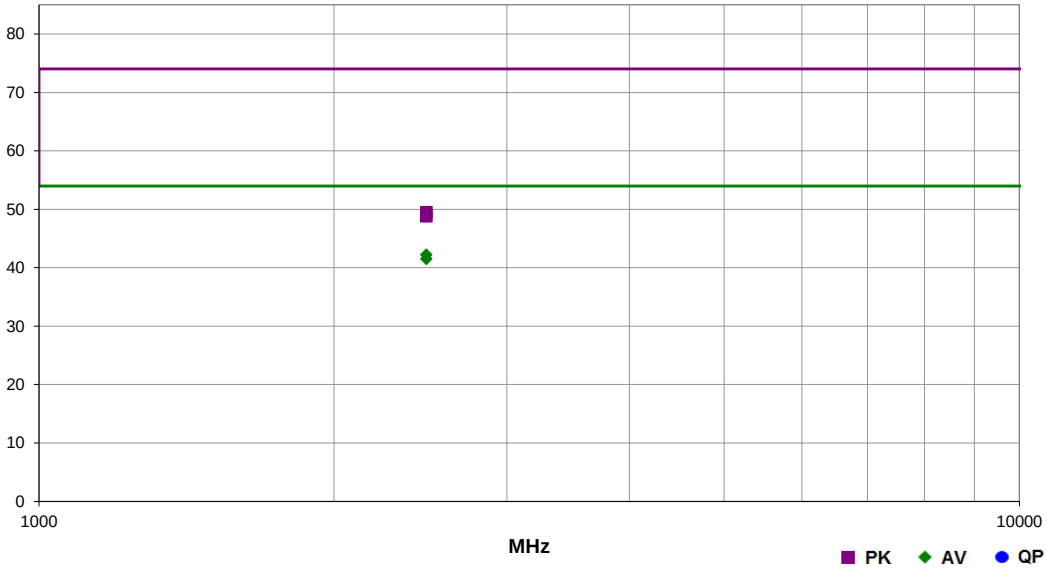
SPURIOUS RADIATED EMISSIONS 3X3 ANTENNA

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0259	**Date:**	7-Sep-2018		
Project:	None	**Temperature:**	24.4 °C		
Job Site:	OC07	**Humidity:**	51.7% RH		
Serial Number:	E52	**Barometric Pres.:**	1016 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 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 #	51	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Calculated 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)	Marker Delta Comments
2483.513	23.1	-4.2	2.1	14.0	3.3	20.0	Horz	AV	0.0	42.2	54.0	-11.8	EUT Horz, Ant Vert, Directional PA 3x3 Ant: Fund 71.8dBuV + -48.7dBc = 23.1dBuV (calc. amp.)
2483.607	22.4	-4.2	2.0	27.0	3.3	20.0	Vert	AV	0.0	41.5	54.0	-12.5	EUT Vert, Ant on Side, Directional PA 3x3 Ant: Fund 72.4dBuV + -50.0dBc = 22.4dBuV (calc. amp.)
2483.513	33.7	-4.2	2.1	14.0	0.0	20.0	Horz	PK	0.0	49.5	74.0	-24.5	EUT Horz, Ant Vert, Directional PA 3x3 Ant: Fund 82.4dBuV + -48.7dBc = 33.7dBuV (calc. amp.)
2483.607	33.0	-4.2	2.0	27.0	0.0	20.0	Vert	PK	0.0	48.8	74.0	-25.2	EUT Vert, Ant on Side, Directional PA 3x3 Ant: Fund 83.0dBuV + -50.0dBc = 33.0dBuV (calc. amp.)

SPURIOUS RADIATED EMISSIONS 3X3 ANTENNA

3x3, 24VDC, EUT Horz, Ant Vert, RX Ant Horz

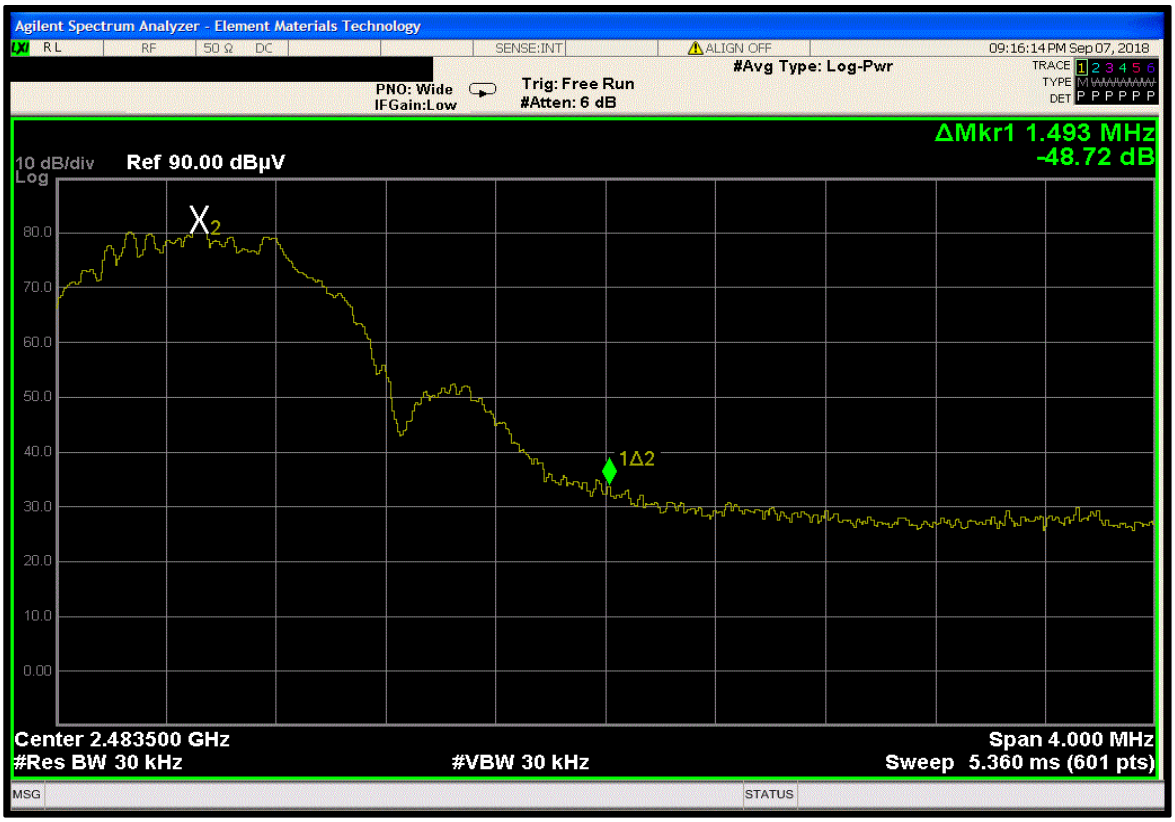
PSA-ESCI 2018.05.04

3x3, 24VDC, EUT Vert, Ant on Side, RX Ant Vert

SPURIOUS RADIATED EMISSIONS 3X3 ANTENNA

3x3, POE, EUT Vert, Ant on Side, RX Ant Vert

PSA-ESCI 2018.05.04



3x3, POE, EUT Horz, Ant Vert, RX Ant Horz

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

DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 MHz

POWER SETTINGS INVESTIGATED

24 VDC

POE

CONFIGURATIONS INVESTIGATED

SYNA0249 - 11

SYNA0249 - 6

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
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AVY	25-Oct-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.

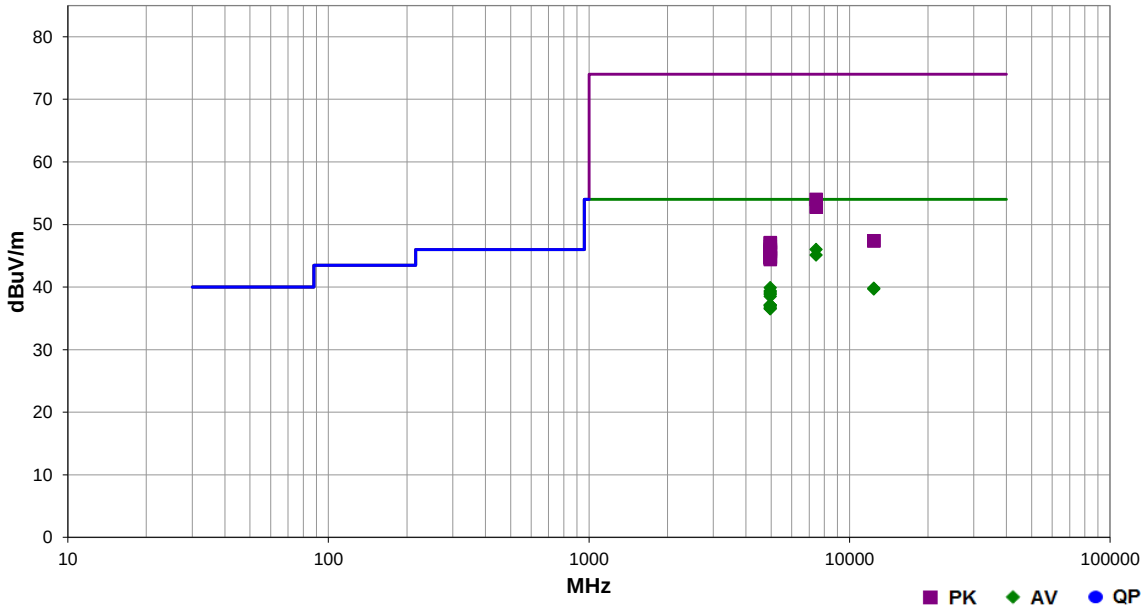
SPURIOUS RADIATED EMISSIONS DIPOLE

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0249	**Date:**	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:	6				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	Hattie Spetla				
EUT Power:	POE				
Operating Mode:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 MHz				
Deviations:	None				
Comments:	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).				

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

Run #	37	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



s (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
7445.617	29.7	13.0	1.0	293.0	3.3	0.0	Horz	AV	0.0	46.0	54.0	-8.0	EUT Horz, Ant Vert, Dipole
7445.675	28.8	13.0	4.0	291.0	3.3	0.0	Vert	AV	0.0	45.1	54.0	-8.9	EUT Vert, Ant Vert, Dipole
4964.025	31.5	5.1	1.0	344.0	3.3	0.0	Horz	AV	0.0	39.9	54.0	-14.1	EUT Horz, Ant Vert, Dipole
12410.080	26.6	9.9	1.0	348.0	3.3	0.0	Vert	AV	0.0	39.8	54.0	-14.2	EUT Vert, Ant Vert, Dipole
12411.450	26.5	9.9	2.5	344.0	3.3	0.0	Horz	AV	0.0	39.7	54.0	-14.3	EUT Horz, Ant Vert, Dipole
4964.017	31.0	5.1	2.5	235.0	3.3	0.0	Horz	AV	0.0	39.4	54.0	-14.6	EUT on Side, Ant Horz, Dipole
4964.075	30.8	5.1	1.2	0.0	3.3	0.0	Horz	AV	0.0	39.2	54.0	-14.8	EUT Vert, Ant Horz, Dipole
4963.975	30.6	5.1	1.8	293.0	3.3	0.0	Horz	AV	0.0	39.0	54.0	-15.0	EUT on Side, Ant Vert, Dipole
4964.142	30.4	5.1	1.0	220.0	3.3	0.0	Vert	AV	0.0	38.8	54.0	-15.2	EUT Vert, Ant Vert, Dipole
4964.067	30.1	5.1	2.8	117.0	3.3	0.0	Vert	AV	0.0	38.5	54.0	-15.5	EUT Horz, Ant Horz, Dipole
4963.733	28.7	5.1	3.4	56.0	3.3	0.0	Vert	AV	0.0	37.1	54.0	-16.9	EUT Horz, Ant Vert, Dipole
4963.750	28.7	5.1	3.3	214.0	3.3	0.0	Vert	AV	0.0	37.1	54.0	-16.9	EUT on Side, Ant Vert, Dipole
4964.133	28.7	5.1	3.7	325.0	3.3	0.0	Vert	AV	0.0	37.1	54.0	-16.9	EUT on Side, Ant Horz, Dipole
4964.208	28.4	5.1	1.0	75.0	3.3	0.0	Vert	AV	0.0	36.8	54.0	-17.2	EUT Vert, Ant Horz, Dipole
4963.650	28.2	5.1	1.1	107.0	3.3	0.0	Horz	AV	0.0	36.6	54.0	-17.4	EUT Horz, Ant Horz, Dipole
4964.625	28.1	5.1	2.6	0.0	3.3	0.0	Horz	AV	0.0	36.5	54.0	-17.5	EUT Vert, Ant Vert, Dipole
7447.050	41.0	13.0	1.0	293.0		0.0	Horz	PK	0.0	54.0	74.0	-20.0	EUT Horz, Ant Vert, Dipole
7445.133	39.8	13.0	4.0	291.0		0.0	Vert	PK	0.0	52.8	74.0	-21.2	EUT Vert, Ant Vert, Dipole
12408.290	37.5	9.9	1.0	348.0		0.0	Vert	PK	0.0	47.4	74.0	-26.6	EUT Vert, Ant Vert, Dipole
12409.470	37.5	9.9	2.5	344.0		0.0	Horz	PK	0.0	47.4	74.0	-26.6	EUT Horz, Ant Vert, Dipole
4963.550	42.0	5.1	3.7	325.0		0.0	Vert	PK	0.0	47.1	74.0	-26.9	EUT on Side, Ant Horz, Dipole

s (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
4964.708	41.9	5.1	1.0	344.0		0.0	Horz	PK	0.0	47.0	74.0	-27.0	EUT Horz, Ant Vert, Dipole
4963.933	41.4	5.1	1.2	0.0		0.0	Horz	PK	0.0	46.5	74.0	-27.5	EUT Vert, Ant Horz, Dipole
4963.417	41.0	5.1	2.8	117.0		0.0	Vert	PK	0.0	46.1	74.0	-27.9	EUT Horz, Ant Horz, Dipole
4963.825	40.8	5.1	2.5	235.0		0.0	Horz	PK	0.0	45.9	74.0	-28.1	EUT on Side, Ant Horz, Dipole
4964.558	40.6	5.1	1.8	293.0		0.0	Horz	PK	0.0	45.7	74.0	-28.3	EUT on Side, Ant Vert, Dipole
4963.917	40.5	5.1	1.0	220.0		0.0	Vert	PK	0.0	45.6	74.0	-28.4	EUT Vert, Ant Vert, Dipole
4963.375	39.7	5.1	3.3	214.0		0.0	Vert	PK	0.0	44.8	74.0	-29.2	EUT on Side, Ant Vert, Dipole
4962.792	39.7	5.1	1.0	75.0		0.0	Vert	PK	0.0	44.8	74.0	-29.2	EUT Vert, Ant Horz, Dipole
4961.725	39.5	5.2	2.6	0.0		0.0	Horz	PK	0.0	44.7	74.0	-29.3	EUT Vert, Ant Vert, Dipole
4966.033	39.5	5.1	3.4	56.0		0.0	Vert	PK	0.0	44.6	74.0	-29.4	EUT Horz, Ant Vert, Dipole
4965.725	39.3	5.1	1.1	107.0		0.0	Horz	PK	0.0	44.4	74.0	-29.6	EUT Horz, Ant Horz, Dipole

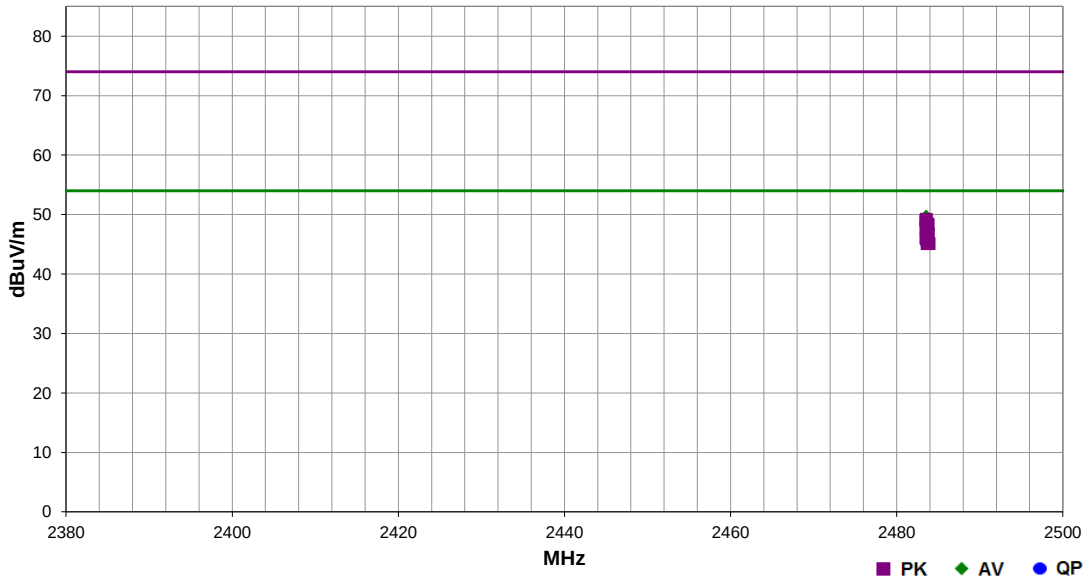
SPURIOUS RADIATED EMISSIONS DIPOLE

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:	6				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	Hattie Spetla				
EUT Power:	POE				
Operating Mode:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 MHz				
Deviations:	None				
Comments:	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).				

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

Run #	33	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Calculated 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)	Marker Delta Comments
2483.547	30.9	-4.5	1.0	318.0	3.3	20.0	Vert	AV	0.0	49.7	54.0	-4.3	EUT Horz, Ant Horz, Dipole: Fund 79.5dBuV + -48.6dBc = 30.9dBuV (calc. amp.)
2483.507	30.7	-4.5	3.2	329.0	3.3	20.0	Vert	AV	0.0	49.5	54.0	-4.5	EUT Vert, Ant Vert, Dipole: Fund 77.7dBuV + -47.0dBc = 30.7dBuV (calc. amp.)
2483.740	30.1	-4.5	1.5	173.0	3.3	20.0	Horz	AV	0.0	48.9	54.0	-5.1	EUT Vert, Ant Horz, Dipole: Fund 78.6dBuV + -48.5dBc = 30.1dBuV (calc. amp.)
2483.760	30.0	-4.5	1.0	322.0	3.3	20.0	Horz	AV	0.0	48.8	54.0	-5.2	EUT Horz, Ant Vert, Dipole: Fund 78.9dBuV + -48.9dBc = 30.0dBuV (calc. amp.)
2483.527	29.7	-4.5	2.8	72.0	3.3	20.0	Horz	AV	0.0	48.5	54.0	-5.5	EUT on Side, Ant Horz, Dipole: Fund 78.9dBuV + -49.2dBc = 29.7dBuV (calc.
2483.547	29.4	-4.5	1.0	132.0	3.3	20.0	Horz	AV	0.0	48.2	54.0	-5.8	EUT on Side, Ant Vert, Dipole: Fund 75.2dBuV + -45.8dBc = 29.4dBuV (calc.
2483.820	28.5	-4.5	1.4	273.0	3.3	20.0	Horz	AV	0.0	47.3	54.0	-6.7	EUT Vert, Ant Vert, Dipole: Fund 72.4dBuV + -43.9dBc = 28.5dBuV (calc. amp.)
2483.560	27.6	-4.5	3.2	112.0	3.3	20.0	Vert	AV	0.0	46.4	54.0	-7.6	EUT on Side, Ant Horz, Dipole: Fund 73.1dBuV + -45.5dBc = 27.6dBuV (calc.
2483.533	27.6	-4.5	1.3	45.0	3.3	20.0	Vert	AV	0.0	46.4	54.0	-7.6	EUT on Side, Ant Vert, Dipole: Fund 71.5dBuV + -43.9dBc = 27.6dBuV (calc.
2483.667	27.3	-4.5	2.7	305.0	3.3	20.0	Horz	AV	0.0	46.1	54.0	-7.9	EUT Horz, Ant Horz, Dipole: Fund 71.4dBuV + -44.1dBc = 27.3dBuV (calc. amp.)
2483.887	26.6	-4.5	1.0	301.0	3.3	20.0	Vert	AV	0.0	45.4	54.0	-8.6	EUT Horz, Ant Vert, Dipole: Fund 66.6dBuV + -40.0dBc = 26.6dBuV (calc. amp.)

Freq (MHz)	Calculated 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)	Marker Delta Comments
2483.653	26.6	-4.5	1.0	102.0	3.3	20.0	Vert	AV	0.0	45.4	54.0	-8.6	EUT Vert, Ant Horz, Dipole: Fund 68.7dBuV + -42.1dBc = 26.6dBuV (calc. amp.)
2483.547	33.7	-4.5	1.0	318.0		20.0	Vert	PK	0.0	49.2	74.0	-24.8	EUT Horz, Ant Horz, Dipole: Fund 82.3dBuV + -48.6dBc = 33.7dBuV (calc. amp.)
2483.507	33.5	-4.5	3.2	329.0		20.0	Vert	PK	0.0	49.0	74.0	-25.0	EUT Vert, Ant Vert, Dipole: Fund 80.5dBuV + -47.0dBc = 33.5dBuV (calc. amp.)
2483.740	32.9	-4.5	1.5	173.0		20.0	Horz	PK	0.0	48.4	74.0	-25.6	EUT Vert, Ant Horz, Dipole: Fund 81.4dBuV + -48.5dBc = 32.9dBuV (calc. amp.)
2483.760	32.8	-4.5	1.0	322.0		20.0	Horz	PK	0.0	48.3	74.0	-25.7	EUT Horz, Ant Vert, Dipole: Fund 81.7dBuV + -48.9dBc = 32.8dBuV (calc. amp.)
2483.527	32.5	-4.5	2.8	72.0		20.0	Horz	PK	0.0	48.0	74.0	-26.0	EUT on Side, Ant Horz, Dipole: Fund 81.7dBuV + -49.2dBc = 32.5dBuV (calc.
2483.547	32.2	-4.5	1.0	132.0		20.0	Horz	PK	0.0	47.7	74.0	-26.3	EUT on Side, Ant Vert, Dipole: Fund 78.0dBuV + -45.8dBc = 32.2dBuV (calc.
2483.820	31.3	-4.5	1.4	273.0		20.0	Horz	PK	0.0	46.8	74.0	-27.2	EUT Vert, Ant Vert, Dipole: Fund 75.2dBuV + -43.9dBc = 31.3dBuV (calc. amp.)
2483.560	30.5	-4.5	3.2	112.0		20.0	Vert	PK	0.0	46.0	74.0	-28.0	EUT on Side, Ant Horz, Dipole: Fund 76.0dBuV + -45.5dBc = 30.5dBuV (calc.
2483.533	30.5	-4.5	1.3	45.0		20.0	Vert	PK	0.0	46.0	74.0	-28.0	EUT on Side, Ant Vert, Dipole: Fund 74.4dBuV + -43.9dBc = 30.5dBuV (calc.
2483.667	30.2	-4.5	2.7	305.0		20.0	Horz	PK	0.0	45.7	74.0	-28.3	EUT Horz, Ant Horz, Dipole: Fund 74.3dBuV + -44.1dBc = 30.2dBuV (calc. amp.)
2483.887	29.6	-4.5	1.0	301.0		20.0	Vert	PK	0.0	45.1	74.0	-28.9	EUT Horz, Ant Vert, Dipole: Fund 69.6dBuV + -40.0dBc = 29.6dBuV (calc. amp.)
2483.653	29.6	-4.5	1.0	102.0		20.0	Vert	PK	0.0	45.1	74.0	-28.9	EUT Vert, Ant Horz, Dipole: Fund 71.7dBuV + -42.1dBc = 29.6dBuV (calc. amp.)

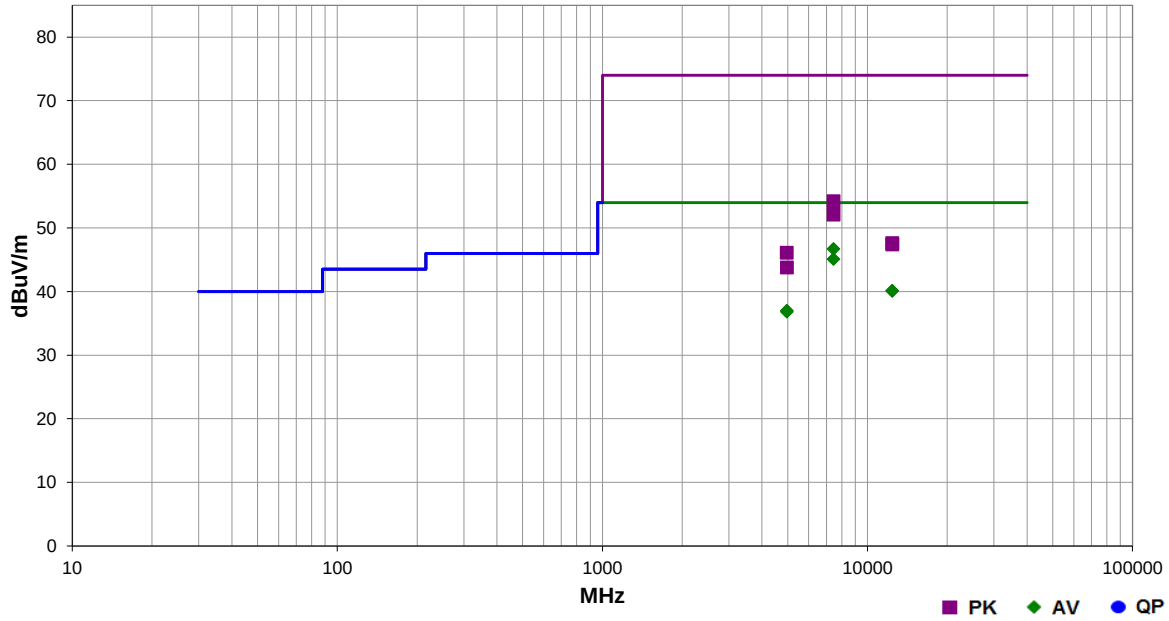
SPURIOUS RADIATED EMISSIONS DIPOLE

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:**	44.1% RH		
Serial Number:	E45	**Barometric Pres.:**	1015 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 MHz				
Deviations:	None				
Comments:	Measurements made on worst case orientations determined from testing on the POE system. 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).				

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

Run #	83	**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
7445.475	30.4	13.0	1.0	347.0	3.3	0.0	Horz	AV	0.0	46.7	54.0	-7.3	EUT Horz, Ant Vert, Dipole
7445.592	28.8	13.0	2.3	247.0	3.3	0.0	Vert	AV	0.0	45.1	54.0	-8.9	EUT Horz, Ant Horz, Dipole
12411.530	26.9	9.9	1.0	258.0	3.3	0.0	Horz	AV	0.0	40.1	54.0	-13.9	EUT Horz, Ant Vert, Dipole
12411.410	26.9	9.9	1.0	283.0	3.3	0.0	Vert	AV	0.0	40.1	54.0	-13.9	EUT Horz, Ant Horz, Dipole
4963.183	28.6	5.1	1.0	119.0	3.3	0.0	Vert	AV	0.0	37.0	54.0	-17.0	EUT Horz, Ant Horz, Dipole
4964.275	28.4	5.1	1.0	71.0	3.3	0.0	Horz	AV	0.0	36.8	54.0	-17.2	EUT Horz, Ant Vert, Dipole
7445.658	41.2	13.0	1.0	347.0		0.0	Horz	PK	0.0	54.2	74.0	-19.8	EUT Horz, Ant Vert, Dipole
7444.758	39.1	13.0	2.3	247.0		0.0	Vert	PK	0.0	52.1	74.0	-21.9	EUT Horz, Ant Horz, Dipole
12411.190	37.7	9.9	1.0	283.0		0.0	Vert	PK	0.0	47.6	74.0	-26.4	EUT Horz, Ant Horz, Dipole
12410.190	37.5	9.9	1.0	258.0		0.0	Horz	PK	0.0	47.4	74.0	-26.6	EUT Horz, Ant Vert, Dipole
4961.742	40.9	5.2	1.0	119.0		0.0	Vert	PK	0.0	46.1	74.0	-27.9	EUT Horz, Ant Horz, Dipole
4963.225	38.7	5.1	1.0	71.0		0.0	Horz	PK	0.0	43.8	74.0	-30.2	EUT Horz, Ant Vert, Dipole

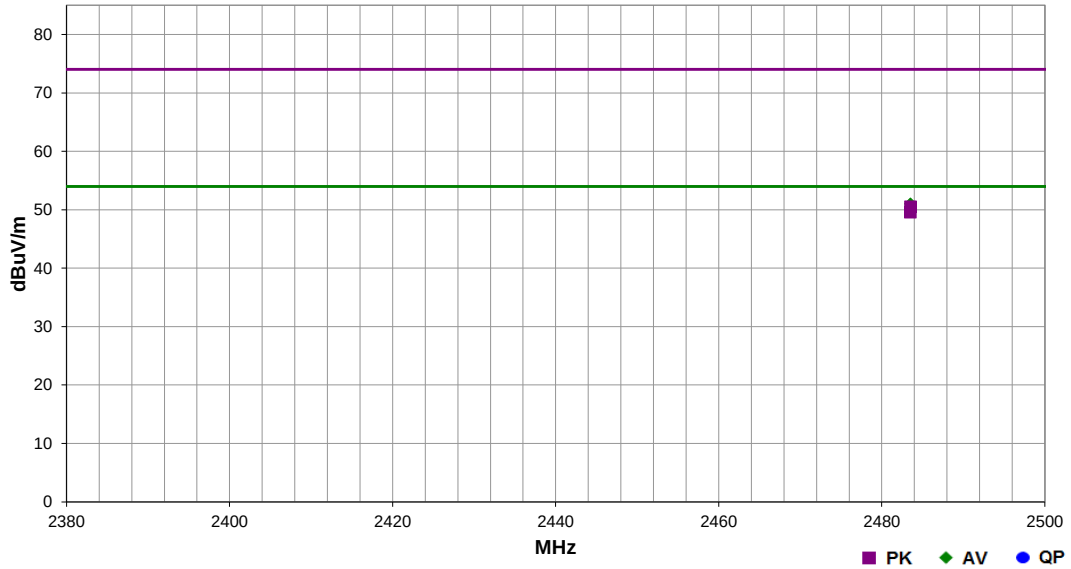
SPURIOUS RADIATED EMISSIONS DIPOLE

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:**	44.1% RH		
Serial Number:	E45	**Barometric Pres.:**	1015 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 MHz				
Deviations:	None				
Comments:	Measurements made on worst case orientations determined from testing on the POE system. 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).				

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

Run #	81	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass

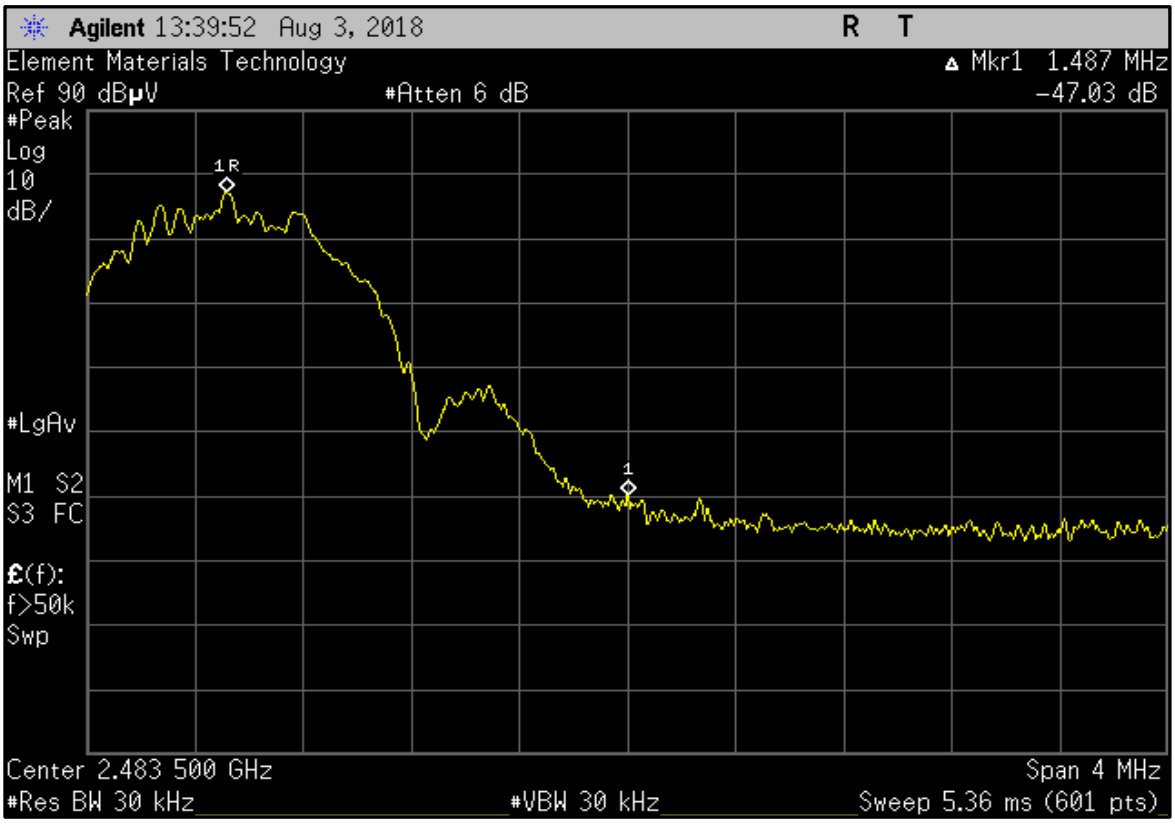


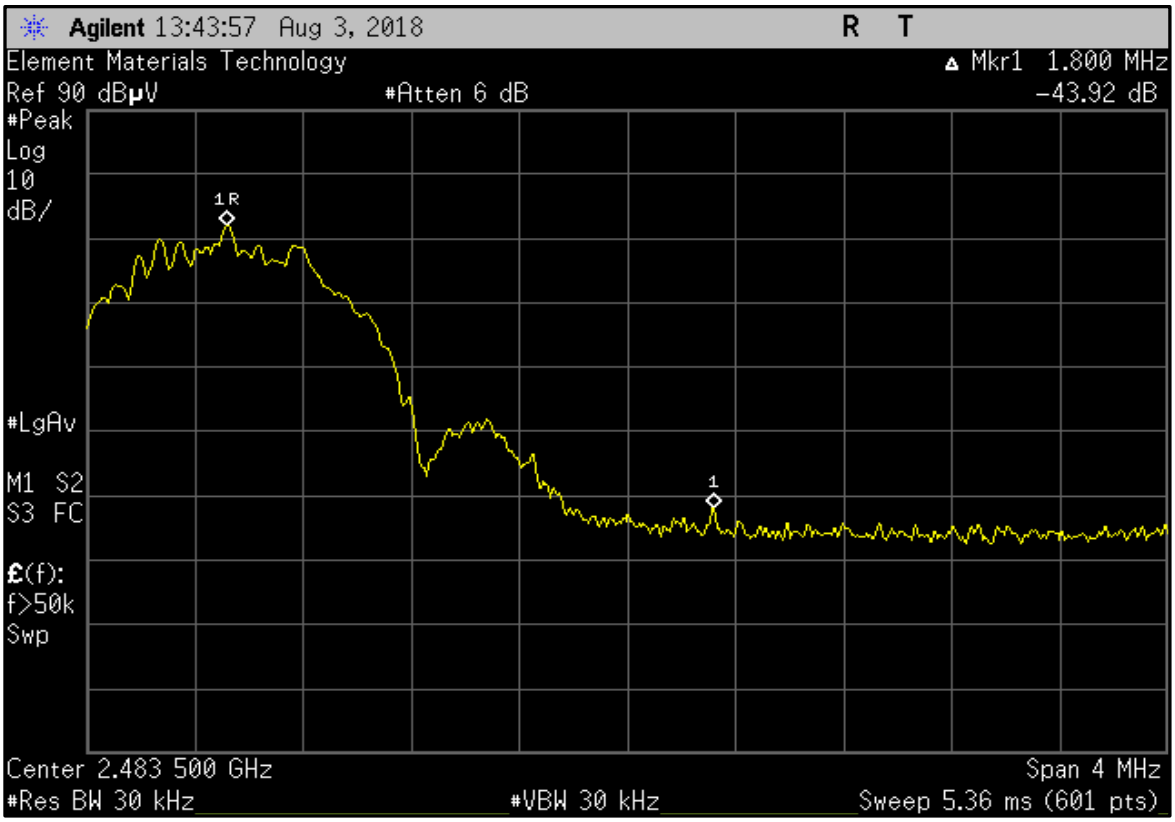
Freq (MHz)	Calculated Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Marker Delta Comments
2483.513	32.2	-4.5	1.1	15.0	3.3	20.0	Horz	AV	0.0	51.0	54.0	-3.0	DC Powered - EUT Horz, Ant Vert, Dipole: Fund 81.9dBuV + -49.7dBc = 32.2dBuV (calc. amp.)
2483.507	31.3	-4.5	1.0	45.0	3.3	20.0	Vert	AV	0.0	50.1	54.0	-3.9	DC Powered- EUT Horz, Ant Horz:, Dipole Fund 79.9dBuV + -48.6dBc = 31.3dBuV (calc. amp.)
2483.513	35.0	-4.5	1.1	15.0		20.0	Horz	PK	0.0	50.5	74.0	-23.5	DC Powered - EUT Horz, Ant Vert, Dipole: Fund 84.7dBuV + -49.7dBc = 35.0dBuV (calc. amp.)
2483.507	34.1	-4.5	1.0	45.0		20.0	Vert	PK	0.0	49.6	74.0	-24.4	DC Powered - EUT Horz, Ant Horz, Dipole: Fund 82.7dBuV + -48.6dBc = 34.1dBuV (calc.

SPURIOUS RADIATED EMISSIONS
DIPOLE

EUT Vert, Ant Vert, Dipole

PSA-ESCI 2018.05.04





EUT Vert, Ant Vert, Dipole

SPURIOUS RADIATED EMISSIONS
DIPOLE

EUT Vert, Ant Horz, Dipole

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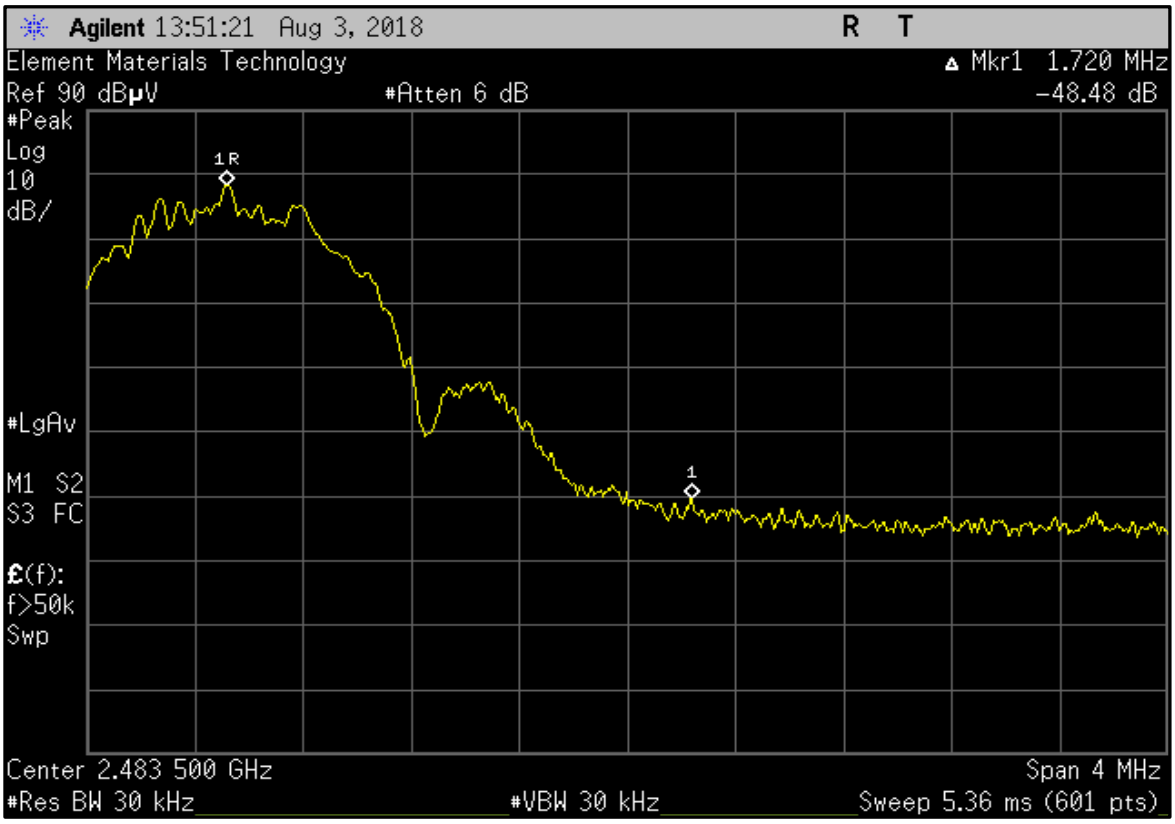
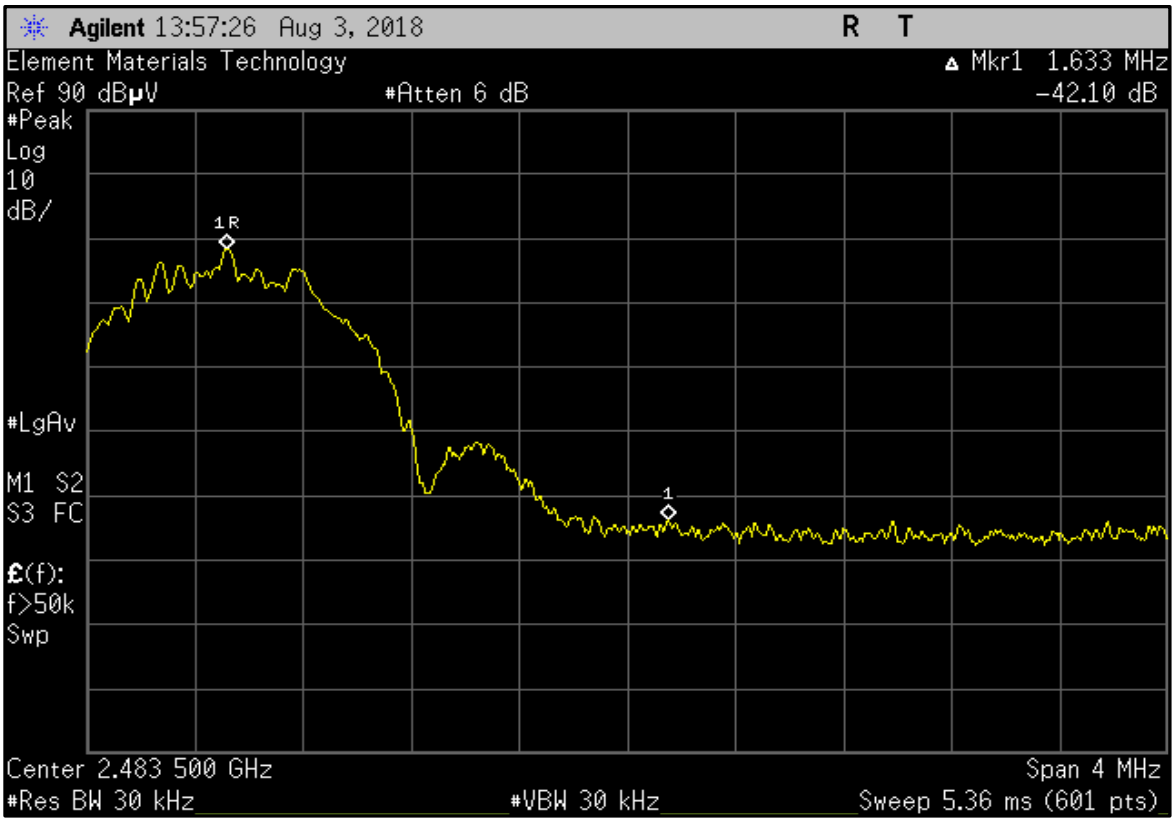


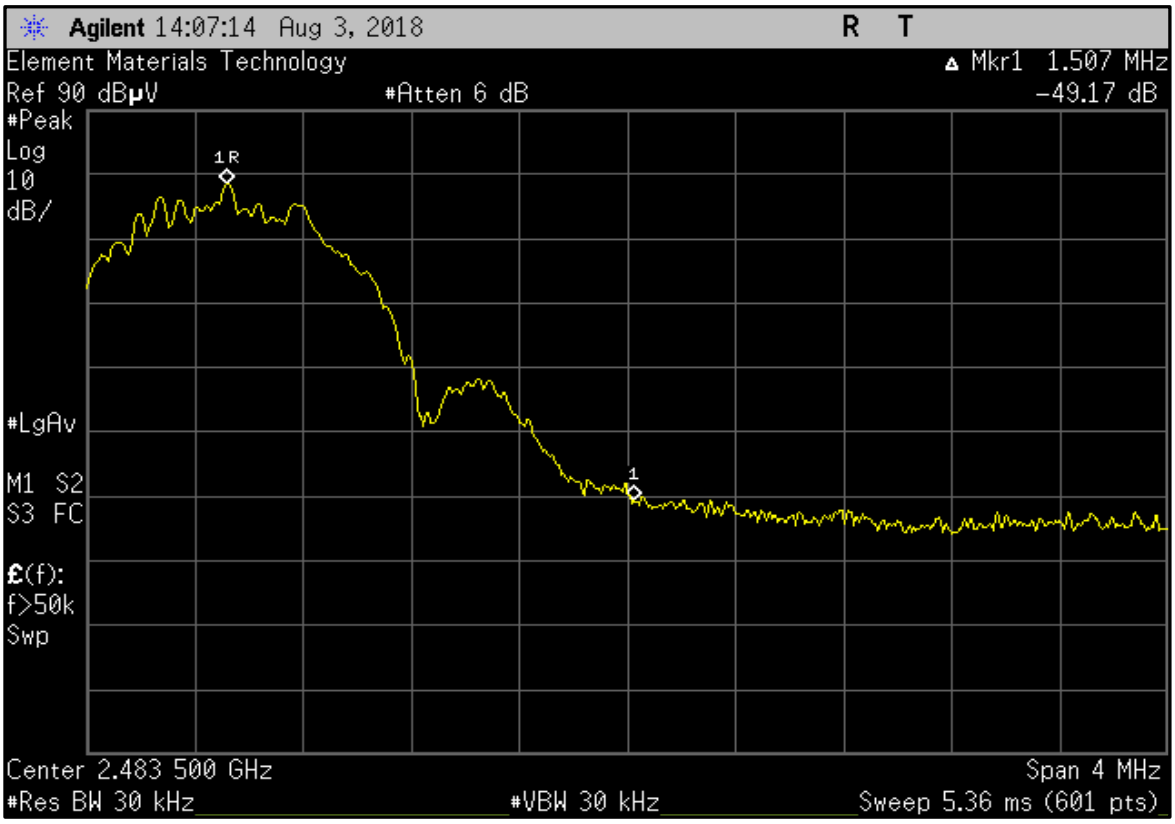


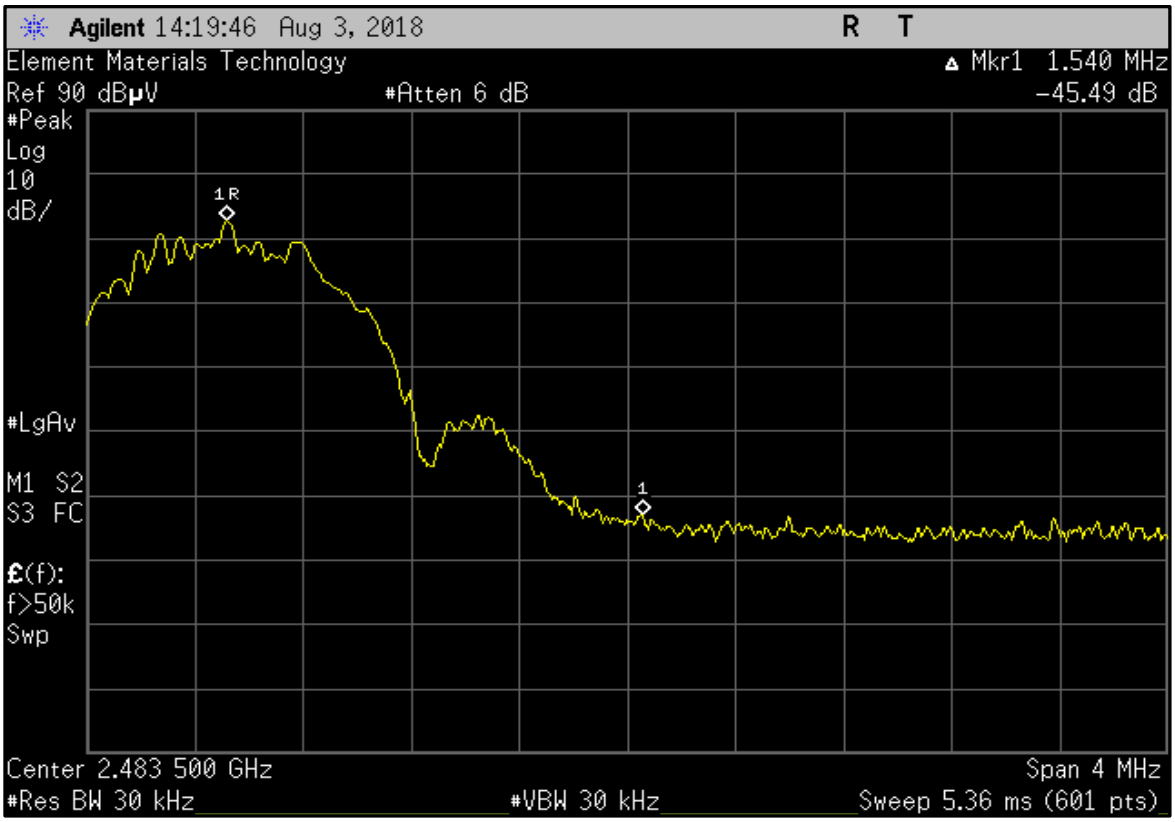
EUT Vert, Ant Horz, Dipole

SPURIOUS RADIATED EMISSIONS
DIPOLE

EUT on Side, Ant Horz, Dipole

PSA-ESCI 2018.05.04



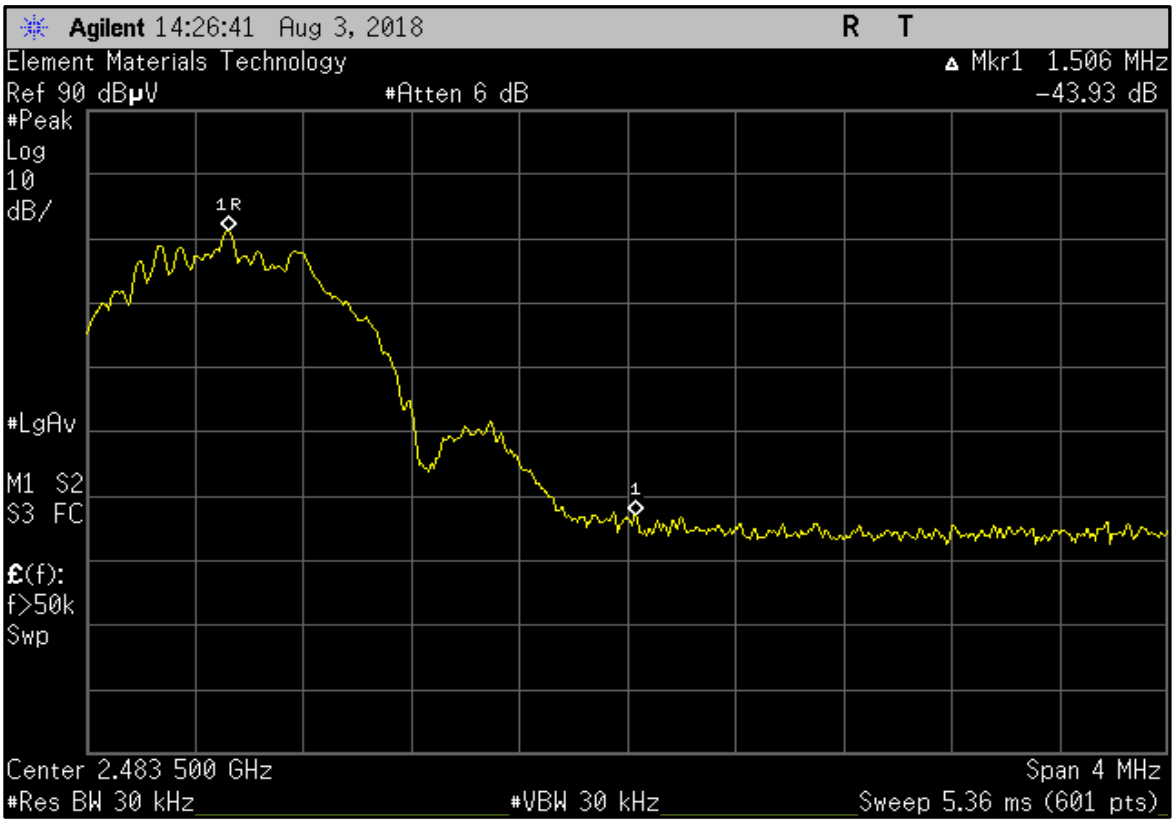


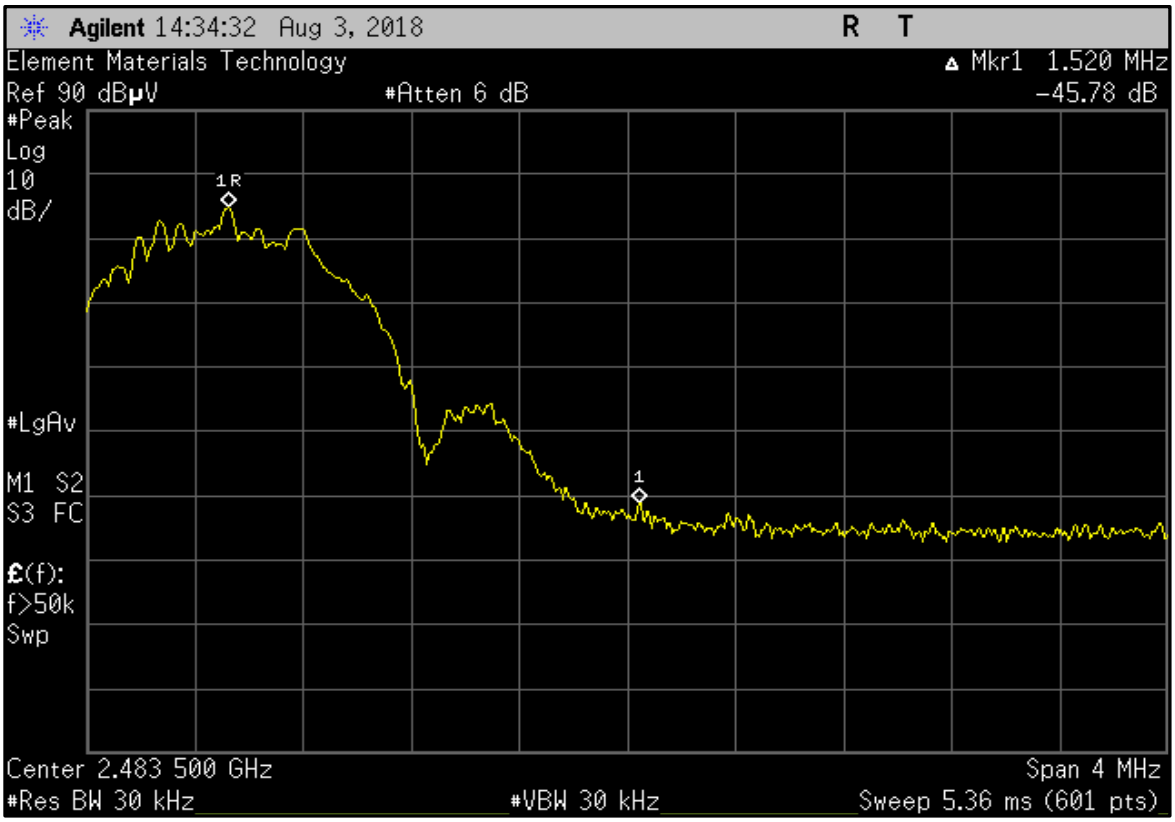
EUT on Side, Ant Horz, Dipole

SPURIOUS RADIATED EMISSIONS
DIPOLE

EUT on Side, Ant Vert, Dipole

PSA-ESCI 2018.05.04



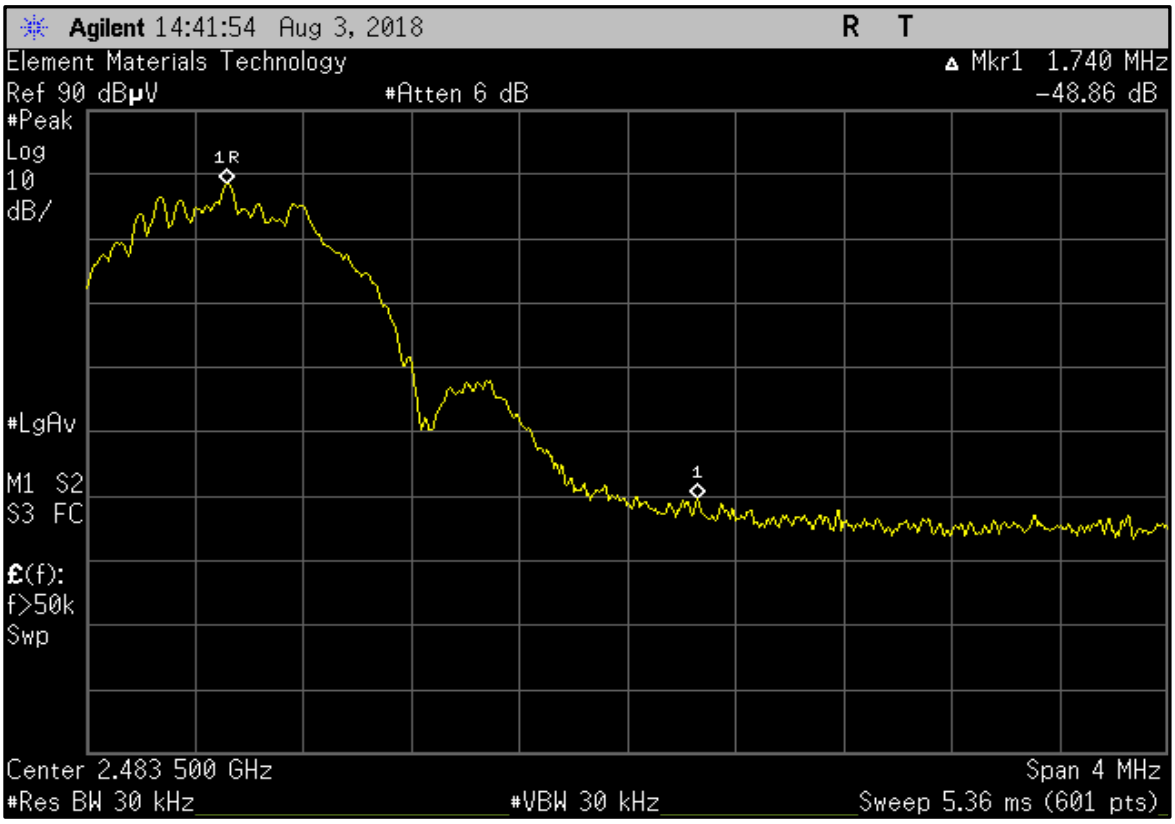


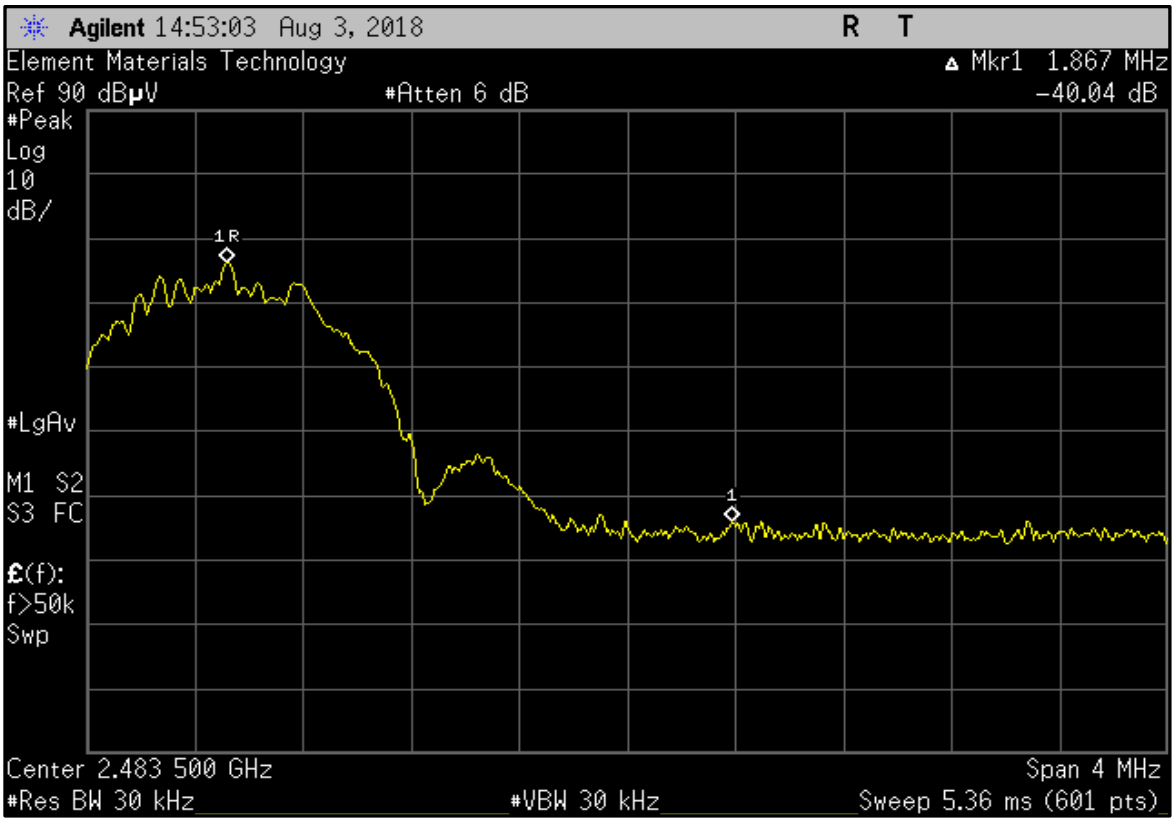
EUT on Side, Ant Vert, Dipole

SPURIOUS RADIATED EMISSIONS
DIPOLE

EUT Horz, Ant Vert, Dipole

PSA-ESCI 2018.05.04



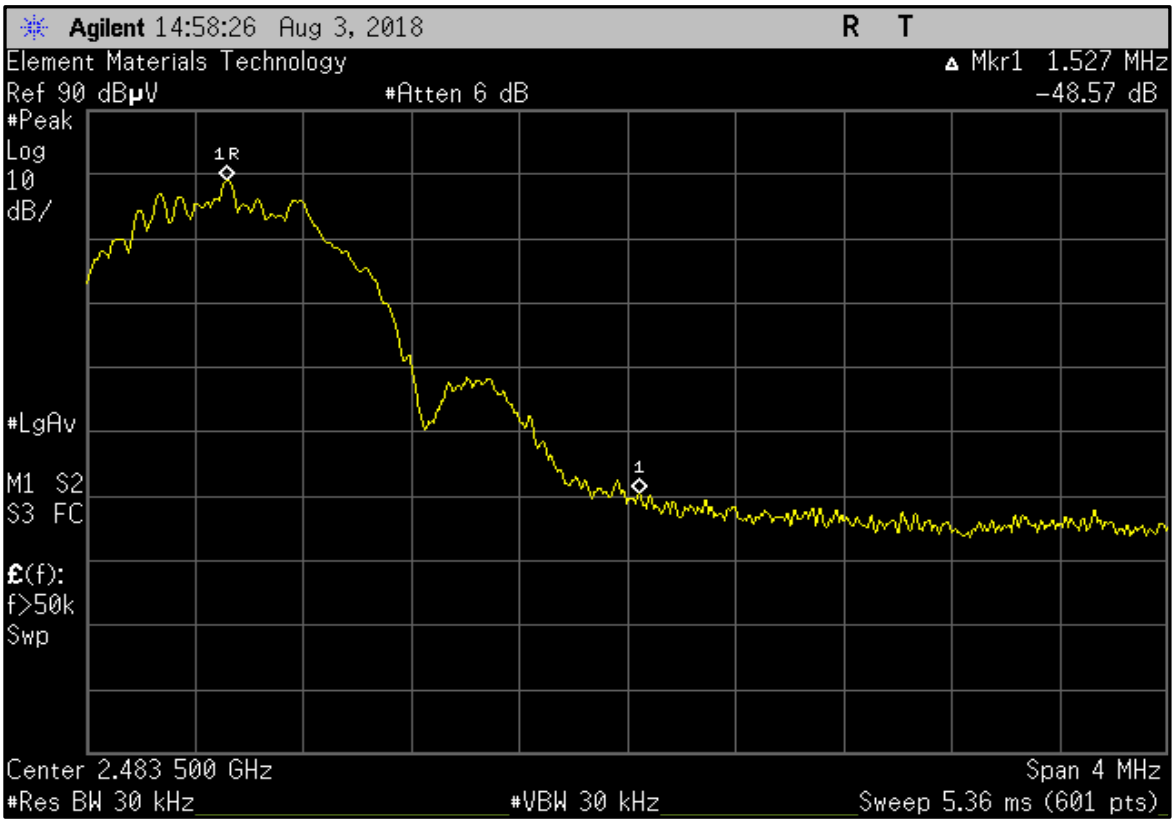


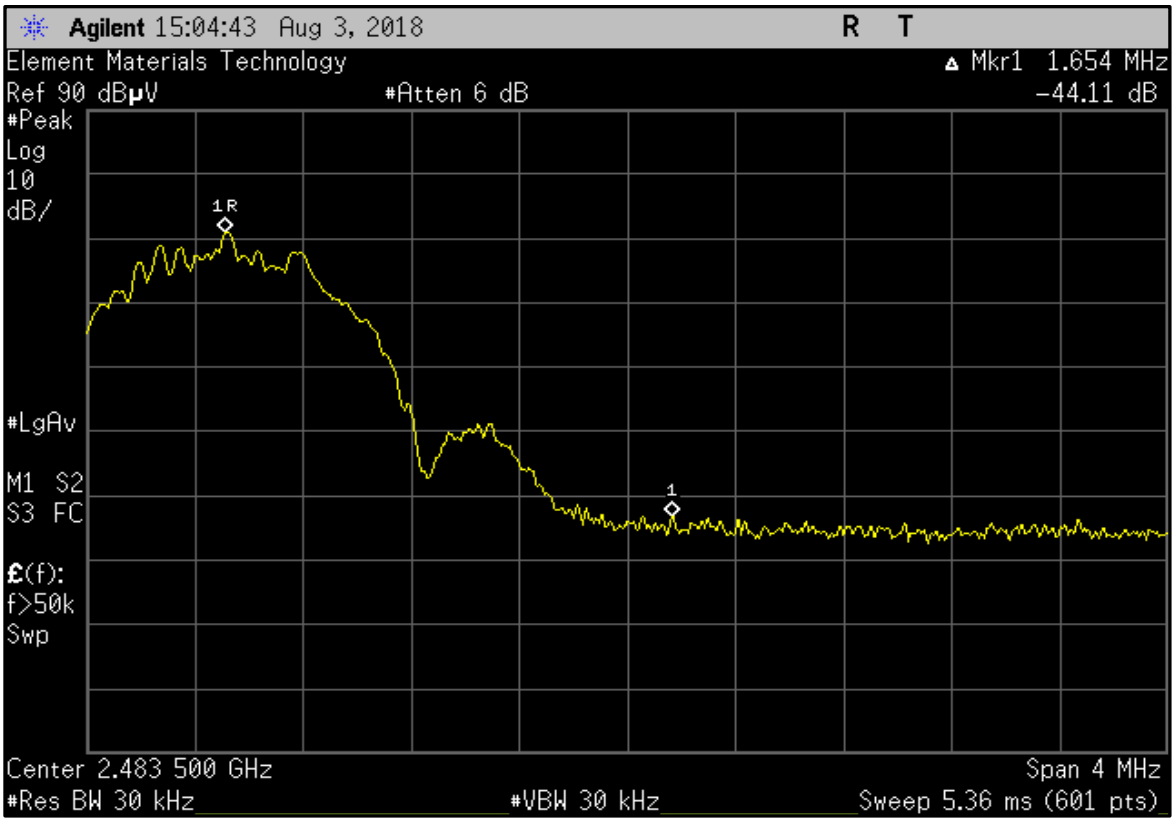
EUT Horz, Ant Vert, Dipole

SPURIOUS RADIATED EMISSIONS
DIPOLE

EUT Horz, Ant Horz, Dipole

PSA-ESCI 2018.05.04



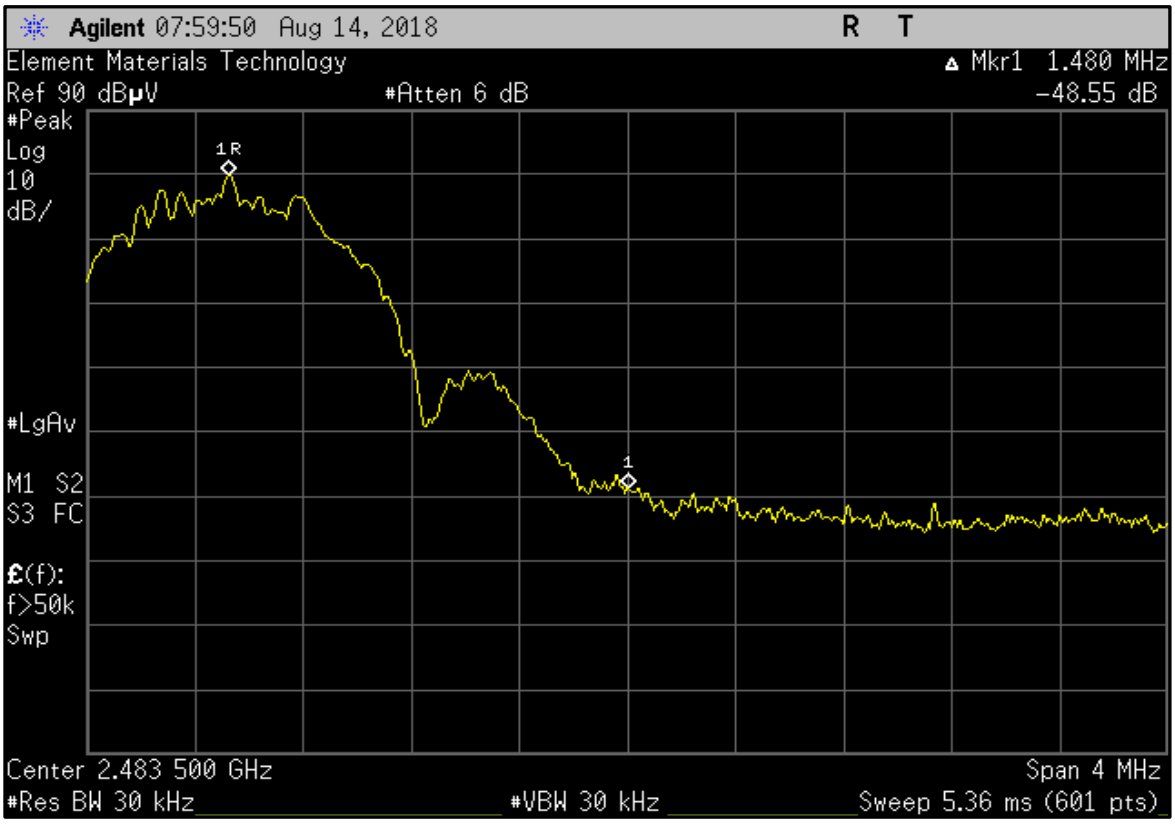


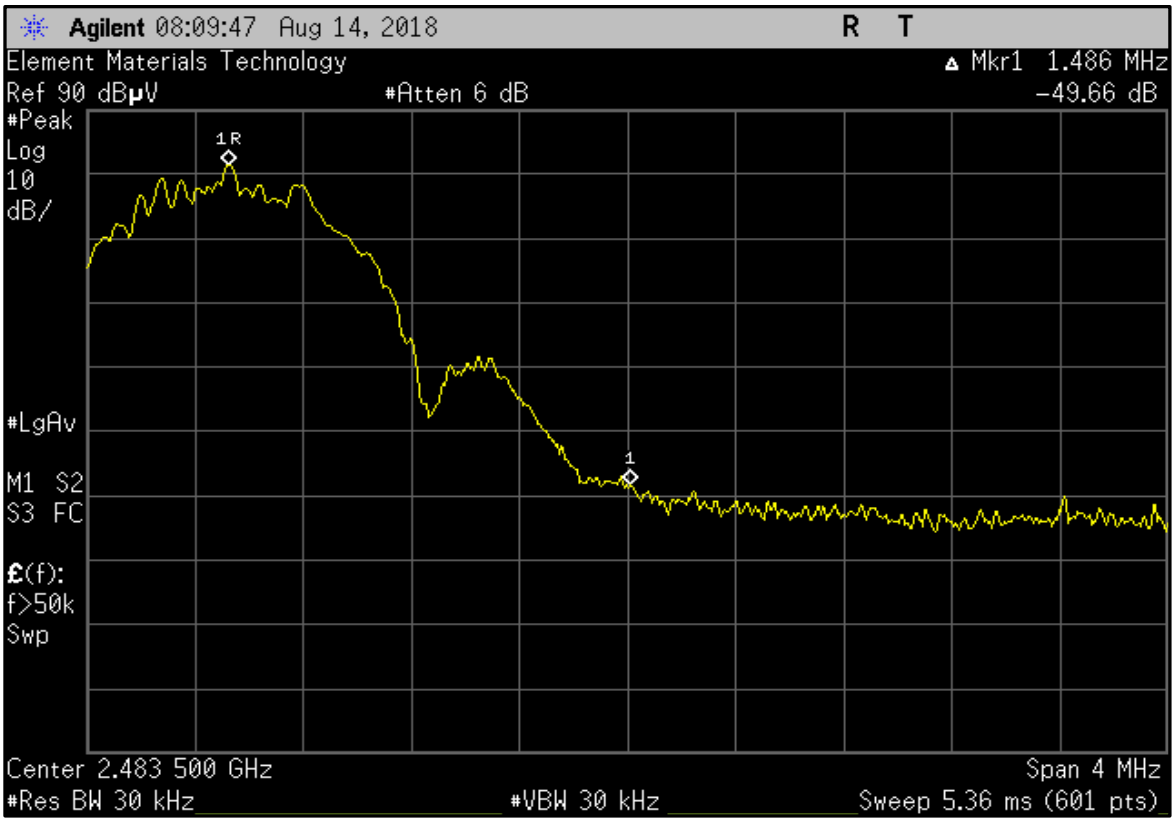
EUT Horz, Ant Horz, Dipole

SPURIOUS RADIATED EMISSIONS
DIPOLE

DC Powered - EUT Horz, Ant Horz, Dipole

PSA-ESCI 2018.05.04





DC Powered - EUT Horz, Ant Vert, Dipole

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

DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 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.

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).

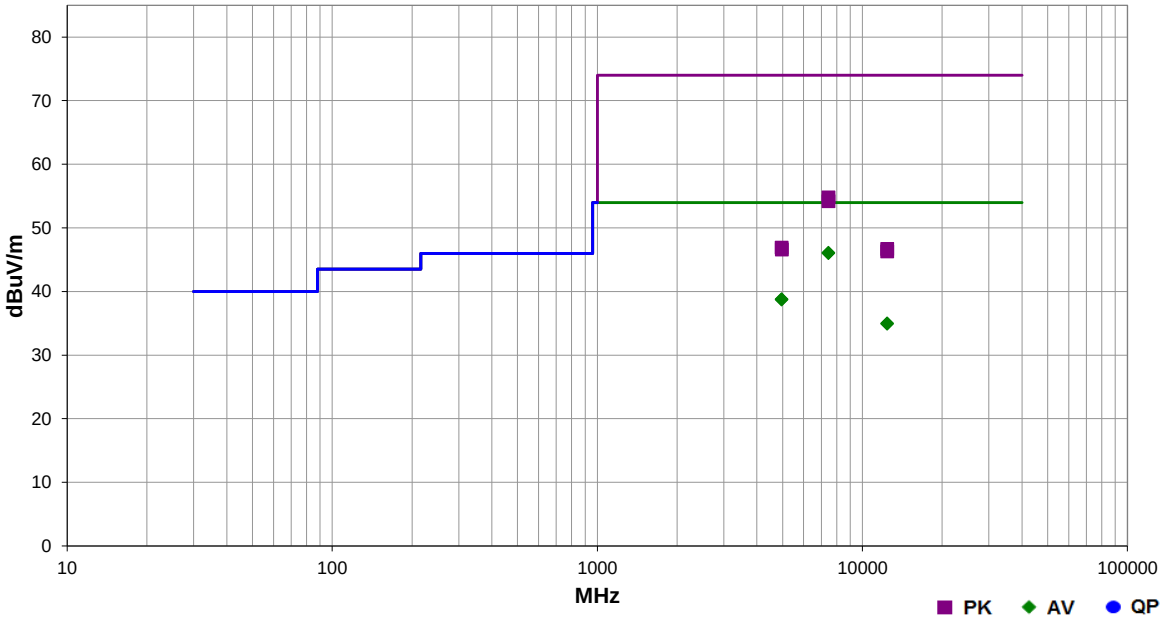
SPURIOUS RADIATED EMISSIONS DIPOLE

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0259	**Date:**	6-Sep-2018		
Project:	None	**Temperature:**	25.7 °C		
Job Site:	OC07	**Humidity:**	45.4% RH		
Serial Number:	E52	**Barometric Pres.:**	1017 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 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 #	32	**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 (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7445.285	31.0	11.8	3.0	4.0	3.3	0.0	Vert	AV	0.0	46.1	54.0	-7.9	EUT Horz, Ant Horz, Dipole
7444.625	30.9	11.8	2.8	104.0	3.3	0.0	Horz	AV	0.0	46.0	54.0	-8.0	EUT Horz, Ant Vert, Dipole
4962.660	31.3	4.2	1.0	186.0	3.3	0.0	Vert	AV	0.0	38.8	54.0	-15.2	EUT Horz, Ant Horz, Dipole
4962.683	31.2	4.2	2.9	133.0	3.3	0.0	Horz	AV	0.0	38.7	54.0	-15.3	EUT Horz, Ant Vert, Dipole
12410.880	28.9	6.1	1.0	350.0	3.0	0.0	Vert	AV	0.0	35.0	54.0	-19.0	EUT Horz, Ant Horz, Dipole
12409.410	28.8	6.1	1.0	72.0	3.0	0.0	Horz	AV	0.0	34.9	54.0	-19.1	EUT Horz, Ant Vert, Dipole
7445.830	43.0	11.8	3.0	4.0	0.0	0.0	Vert	PK	0.0	54.8	74.0	-19.2	EUT Horz, Ant Horz, Dipole
7444.550	42.4	11.8	2.8	104.0	0.0	0.0	Horz	PK	0.0	54.2	74.0	-19.8	EUT Horz, Ant Vert, Dipole
4962.810	42.7	4.2	1.0	186.0	0.0	0.0	Vert	PK	0.0	46.9	74.0	-27.1	EUT Horz, Ant Horz, Dipole
12408.730	40.6	6.1	1.0	72.0	3.0	0.0	Horz	PK	0.0	46.7	74.0	-27.3	EUT Horz, Ant Vert, Dipole
4963.308	42.4	4.2	2.9	133.0	0.0	0.0	Horz	PK	0.0	46.6	74.0	-27.4	EUT Horz, Ant Vert, Dipole
12410.920	40.2	6.1	1.0	350.0	3.0	0.0	Vert	PK	0.0	46.3	74.0	-27.7	EUT Horz, Ant Horz, Dipole

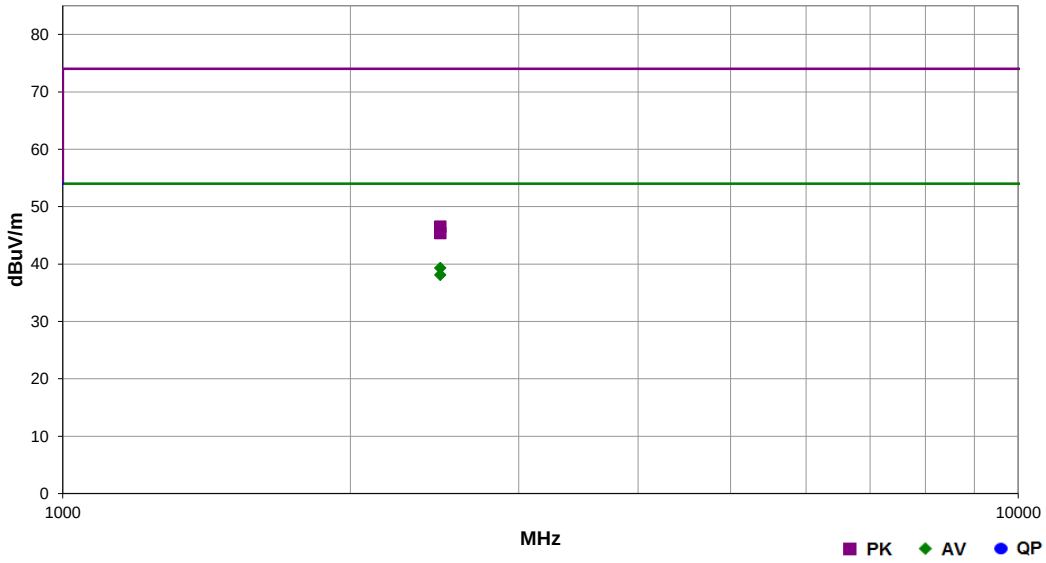
SPURIOUS RADIATED EMISSIONS DIPOLE

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0259	**Date:**	6-Sep-2018		
Project:	None	**Temperature:**	25.7 °C		
Job Site:	OC07	**Humidity:**	45.4% RH		
Serial Number:	E52	**Barometric Pres.:**	1017 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 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 #	34	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Calculated 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)	Marker Delta Comments
2483.827	20.2	-4.2	3.1	114.0	3.3	20.0	Horz	AV	0.0	39.3	54.0	-14.7	EUT Horz, Ant Vert, Dipole: Fund 69.4dBuV + -49.2dBc = 20.2dBuV (calc. amp.)
2484.310	19.0	-4.2	1.0	264.0	3.3	20.0	Vert	AV	0.0	38.1	54.0	-15.9	EUT Horz, Ant Horz, Dipole: Fund 67.0dBuV + -48.0dBc = 19.0dBuV (calc. amp.)
2483.827	30.7	-4.2	3.1	114.0	0.0	20.0	Horz	PK	0.0	46.5	74.0	-27.5	EUT Horz, Ant Vert, Dipole: Fund 79.9dBuV + -49.2dBc = 30.7dBuV (calc. amp.)
2484.310	29.6	-4.2	1.0	264.0	0.0	20.0	Vert	PK	0.0	45.4	74.0	-28.6	EUT Horz, Ant Horz, Dipole: Fund 77.6dBuV + -48.0dBc = 29.6dBuV (calc. amp.)

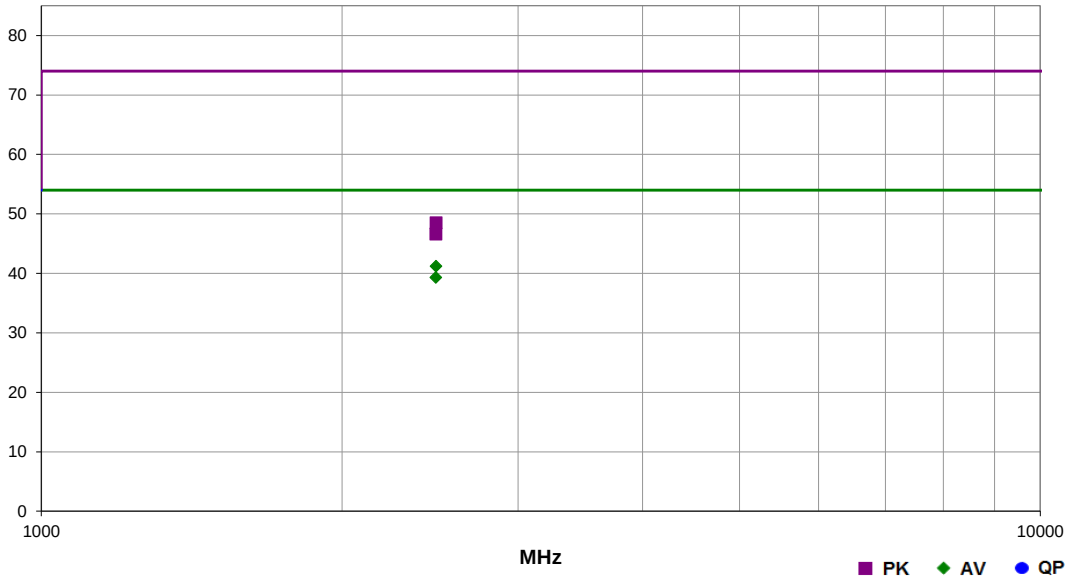
SPURIOUS RADIATED EMISSIONS DIPOLE

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0259	**Date:**	6-Sep-2018		
Project:	None	**Temperature:**	25.7 °C		
Job Site:	OC07	**Humidity:**	45.4% RH		
Serial Number:	E52	**Barometric Pres.:**	1017 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 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 #	35	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Calculated 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)	Marker Delta Comments
2483.573	22.1	-4.2	3.4	116.0	3.3	20.0	Horz	AV	0.0	41.2	54.0	-12.8	EUT Horz, EUT Vert, Dipole: Fund 70.6dBuV + -48.5dBc = 22.1dBuV (calc. amp.)
2483.520	20.2	-4.2	1.0	292.0	3.3	20.0	Vert	AV	0.0	39.3	54.0	-14.7	EUT Horz, Ant Horz, Dipole: Fund 69.2dBuV + -49.0dBc = 20.2dBuV (calc. amp.)
2483.573	32.7	-4.2	3.4	116.0	0.0	20.0	Horz	PK	0.0	48.5	74.0	-25.5	EUT Horz, EUT Vert, Dipole: Fund 81.2dBuV + -48.5dBc = 32.7dBuV (calc. amp.)
2483.520	30.8	-4.2	1.0	292.0	0.0	20.0	Vert	PK	0.0	46.6	74.0	-27.4	EUT Horz, Ant Horz, Dipole: Fund 79.8dBuV + -49.0dBc = 30.8dBuV (calc. amp.)

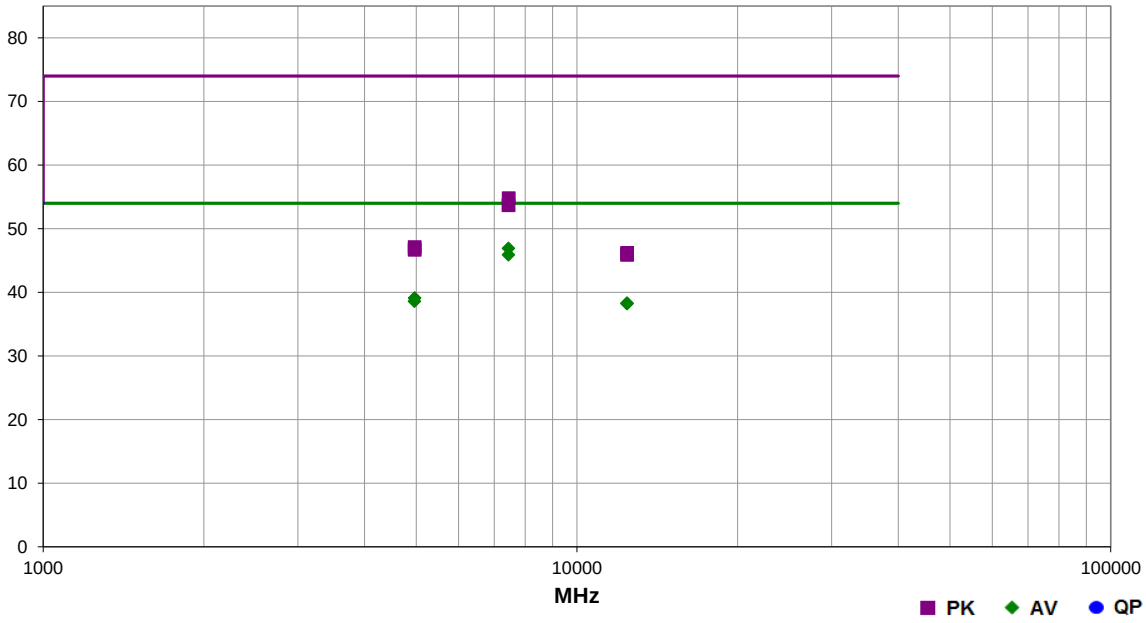
SPURIOUS RADIATED EMISSIONS DIPOLE

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0259	**Date:**	6-Sep-2018		
Project:	None	**Temperature:**	25.7 °C		
Job Site:	OC07	**Humidity:**	45.4% RH		
Serial Number:	E52	**Barometric Pres.:**	1017 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 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 #	36	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass

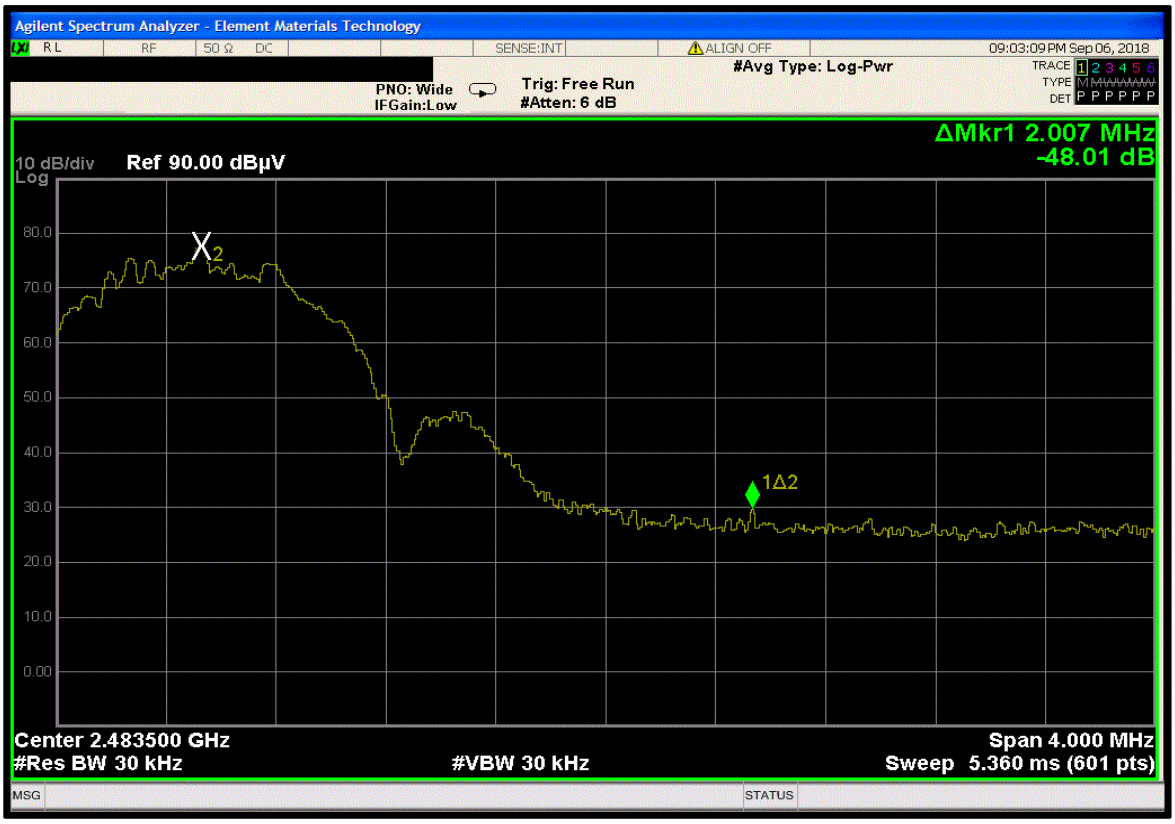


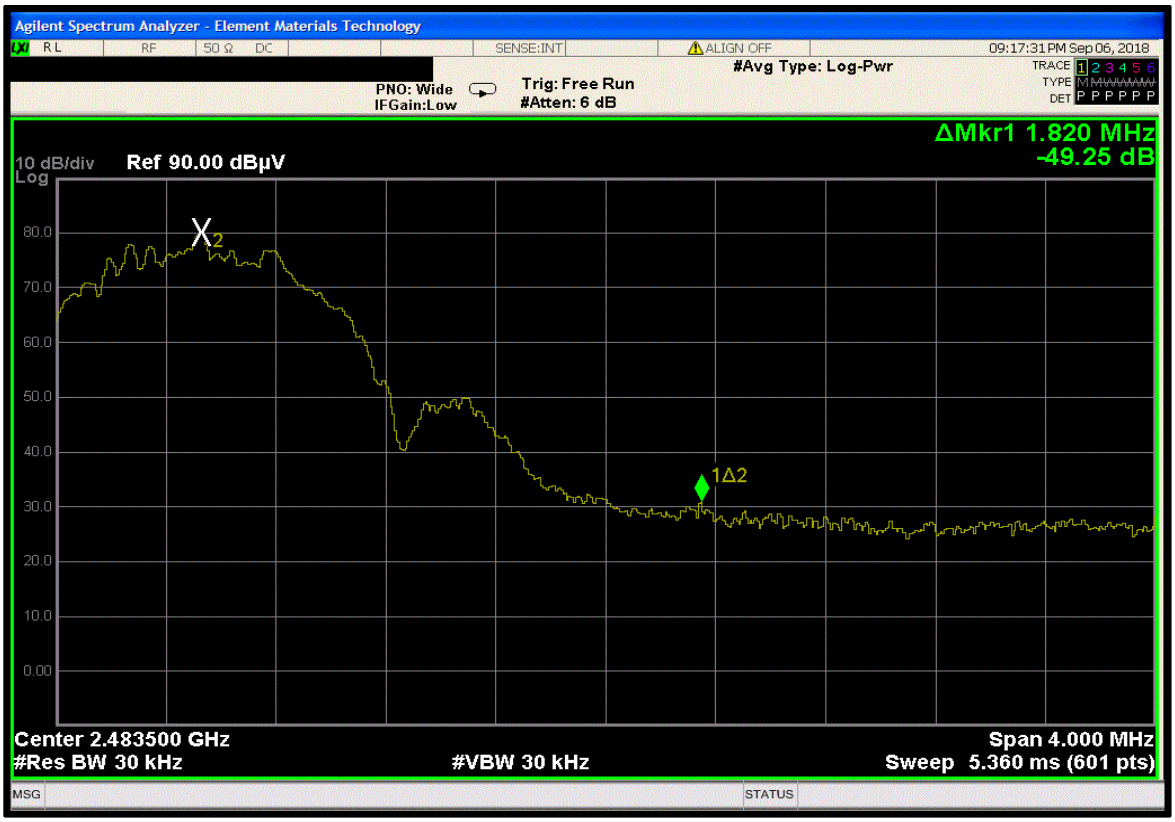
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7445.320	31.8	11.8	1.0	35.0	3.3	0.0	Vert	AV	0.0	46.9	54.0	-7.1	EUT Horz, Ant Horz, Dipole
7444.965	30.8	11.8	1.0	331.0	3.3	0.0	Horz	AV	0.0	45.9	54.0	-8.1	EUT Horz, Ant Vert, Dipole
4964.095	31.6	4.2	3.4	231.0	3.3	0.0	Vert	AV	0.0	39.1	54.0	-14.9	EUT Horz, Ant Horz, Dipole
4962.555	31.1	4.2	1.0	160.0	3.3	0.0	Horz	AV	0.0	38.6	54.0	-15.4	EUT Horz, Ant Vert, Dipole
12411.380	28.9	6.1	1.5	243.0	3.3	0.0	Horz	AV	0.0	38.3	54.0	-15.7	EUT Horz, Ant Vert, Dipole
12409.090	28.8	6.1	3.8	96.0	3.3	0.0	Vert	AV	0.0	38.2	54.0	-15.8	EUT Horz, Ant Horz, Dipole
7447.330	43.0	11.8	1.0	35.0	0.0	0.0	Vert	PK	0.0	54.8	74.0	-19.2	EUT Horz, Ant Horz, Dipole
7445.785	41.9	11.8	1.0	331.0	0.0	0.0	Horz	PK	0.0	53.7	74.0	-20.3	EUT Horz, Ant Vert, Dipole
4964.885	42.9	4.2	3.4	231.0	0.0	0.0	Vert	PK	0.0	47.1	74.0	-26.9	EUT Horz, Ant Horz, Dipole
4964.550	42.5	4.2	1.0	160.0	0.0	0.0	Horz	PK	0.0	46.7	74.0	-27.3	EUT Horz, Ant Vert, Dipole
12408.790	40.1	6.1	3.8	96.0	0.0	0.0	Vert	PK	0.0	46.2	74.0	-27.8	EUT Horz, Ant Horz, Dipole
12409.440	39.8	6.1	1.5	243.0	0.0	0.0	Horz	PK	0.0	45.9	74.0	-28.1	EUT Horz, Ant Vert, Dipole

SPURIOUS RADIATED EMISSIONS
DIPOLE

Dipole, 24VDC, EUT Horz, Ant Horz, RX Ant Vert

PSA-ESCI 2018.05.04



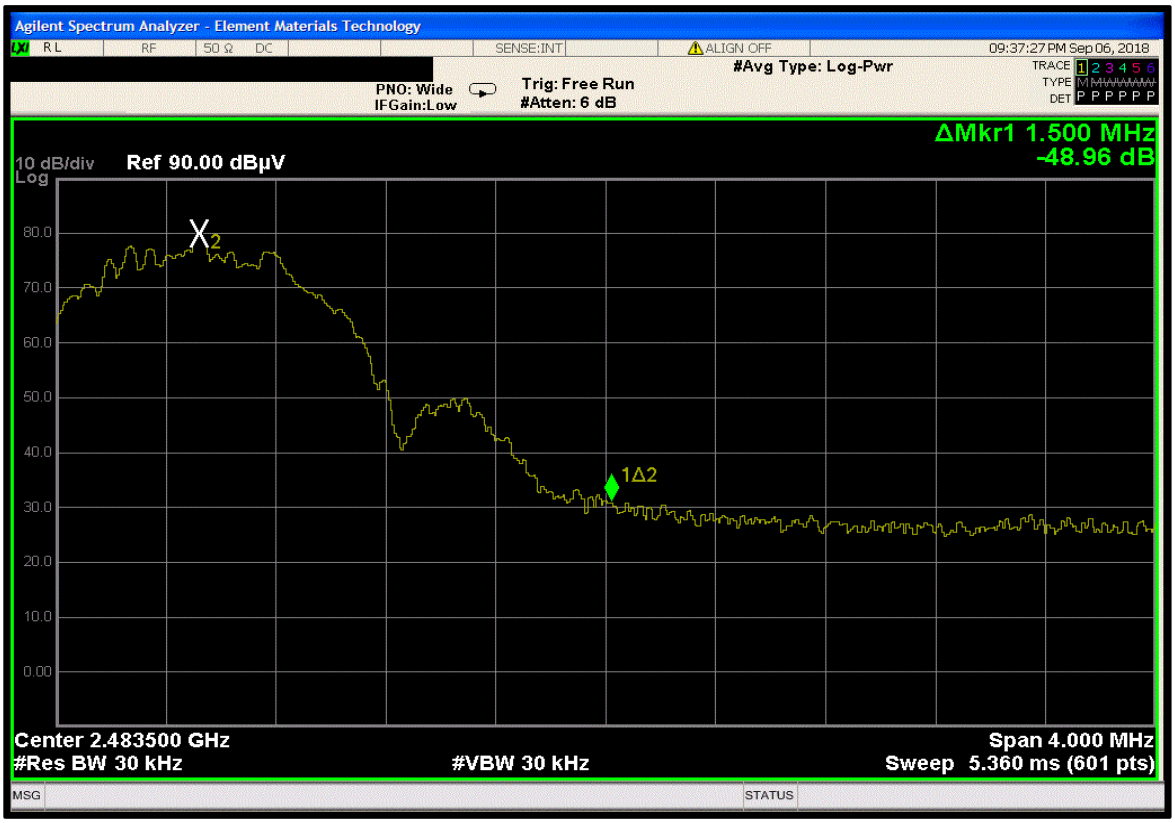


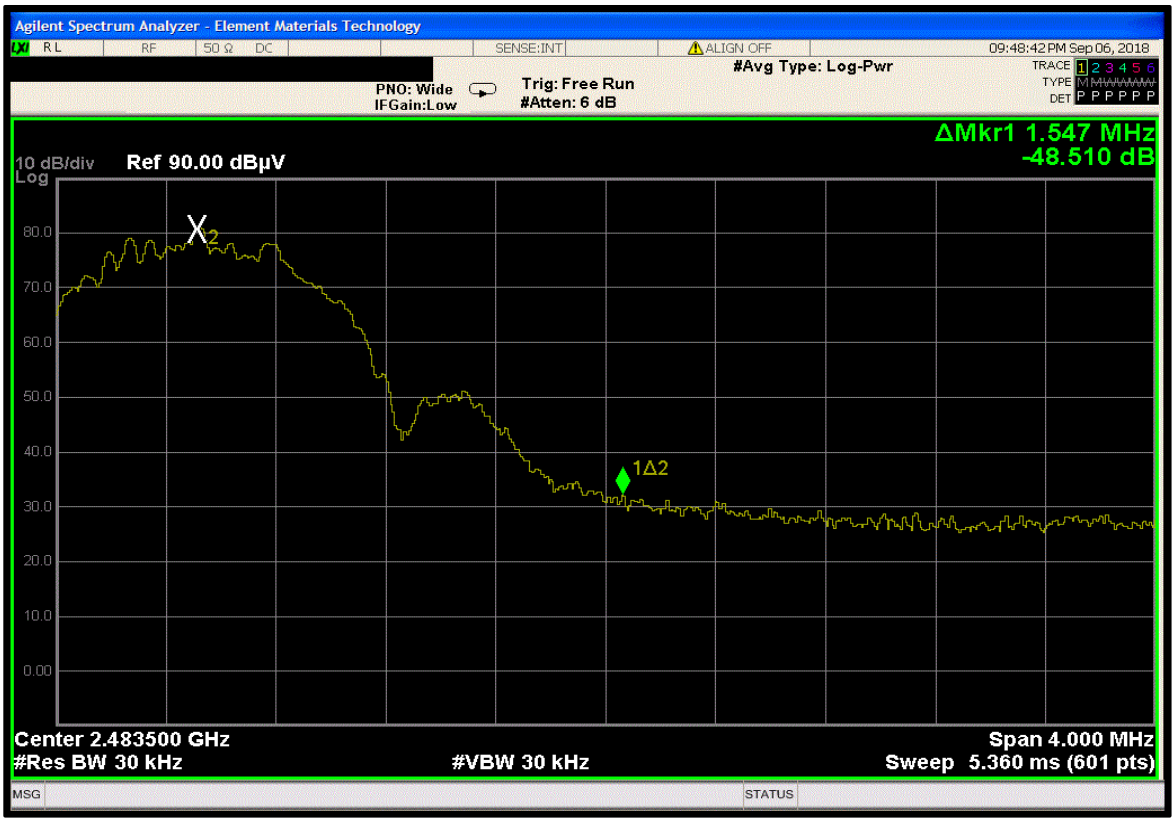
Dipole, 24VDC, EUT Horz, Ant Vert, RX Ant Horz

SPURIOUS RADIATED EMISSIONS
DIPOLE

Dipole, POE, EUT Horz, Ant Horz, RX Ant Vert

PSA-ESCI 2018.05.04





Dipole, POE, EUT Horz, Ant Vert, RX Ant Horz

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

DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 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).

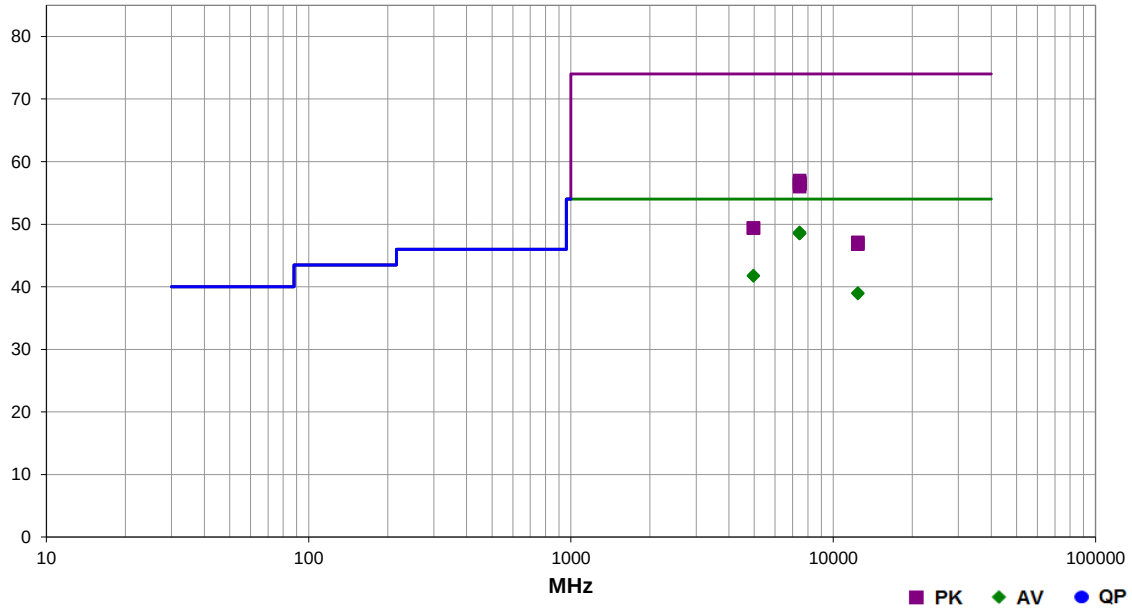
SPURIOUS RADIATED EMISSIONS 4 - ELEMENT

EmiR5 2018.09.26 PSA-ESCI 2018.07.27

Work Order:	SYNA0260	**Date:**	28-Sep-2018		
Project:	None	**Temperature:**	23.2 °C		
Job Site:	OC10	**Humidity:**	51.2% RH		
Serial Number:	E52	**Barometric Pres.:**	1015 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 MHz				
Deviations:	None				
Comments:	Transmitting using 4-Element patch antenna par 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 #	153	**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
7444.960	27.6	17.8	1.0	268.0	3.3	0.0	Horz	AV	0.0	48.7	54.0	-5.3	EUT Horz, Ant Horz, Port 7
7445.475	27.6	17.7	1.0	350.0	3.3	0.0	Vert	AV	0.0	48.6	54.0	-5.4	EUT Vert, Ant Vert, Port 7
7446.025	27.6	17.7	1.0	265.0	3.3	0.0	Vert	AV	0.0	48.6	54.0	-5.4	EUT Horz, Ant Horz, Port 7
7445.515	27.5	17.7	1.0	276.0	3.3	0.0	Horz	AV	0.0	48.5	54.0	-5.5	EUT on side, Ant on side, Port 7
7446.705	27.5	17.7	3.8	322.0	3.3	0.0	Vert	AV	0.0	48.5	54.0	-5.5	EUT on side, Ant on side, Port 7
7446.405	27.5	17.7	4.0	90.0	3.3	0.0	Horz	AV	0.0	48.5	54.0	-5.5	EUT Vert, Ant Vert, Port 7
4964.775	26.0	12.5	1.0	266.0	3.3	0.0	Vert	AV	0.0	41.8	54.0	-12.2	EUT Horz, Ant Horz, Port 7
4963.470	25.9	12.5	1.0	109.0	3.3	0.0	Horz	AV	0.0	41.7	54.0	-12.3	EUT Horz, Ant Horz, Port 7
12409.270	27.4	8.3	3.4	108.0	3.3	0.0	Vert	AV	0.0	39.0	54.0	-15.0	EUT Vert, Ant Vert, Port 7
12409.200	27.3	8.3	1.0	300.0	3.3	0.0	Horz	AV	0.0	38.9	54.0	-15.1	EUT Horz, Ant Horz, Port 7
7447.465	39.3	17.7	1.0	350.0	0.0	0.0	Vert	PK	0.0	57.0	74.0	-17.0	EUT Vert, Ant Vert, Port 7
7445.410	38.9	17.7	3.8	322.0	0.0	0.0	Vert	PK	0.0	56.6	74.0	-17.4	EUT on side, Ant on side, Port 7
7446.190	38.9	17.7	1.0	268.0	0.0	0.0	Horz	PK	0.0	56.6	74.0	-17.4	EUT Horz, Ant Horz, Port 7
7446.715	38.7	17.7	4.0	90.0	0.0	0.0	Horz	PK	0.0	56.4	74.0	-17.6	EUT Vert, Ant Vert, Port 7
7446.885	38.7	17.7	1.0	265.0	0.0	0.0	Vert	PK	0.0	56.4	74.0	-17.6	EUT Horz, Ant Horz, Port 7
7446.950	38.3	17.7	1.0	276.0	0.0	0.0	Horz	PK	0.0	56.0	74.0	-18.0	EUT on side, Ant on side, Port 7
4964.245	36.9	12.5	1.0	109.0	0.0	0.0	Horz	PK	0.0	49.4	74.0	-24.6	EUT Horz, Ant Horz, Port 7
4963.950	36.9	12.5	1.0	266.0	0.0	0.0	Vert	PK	0.0	49.4	74.0	-24.6	EUT Horz, Ant Horz, Port 7
12409.730	38.8	8.3	1.0	300.0	0.0	0.0	Horz	PK	0.0	47.1	74.0	-26.9	EUT Horz, Ant Horz, Port 7
12410.720	38.5	8.3	3.4	108.0	0.0	0.0	Vert	PK	0.0	46.8	74.0	-27.2	EUT Vert, Ant Vert, Port 7

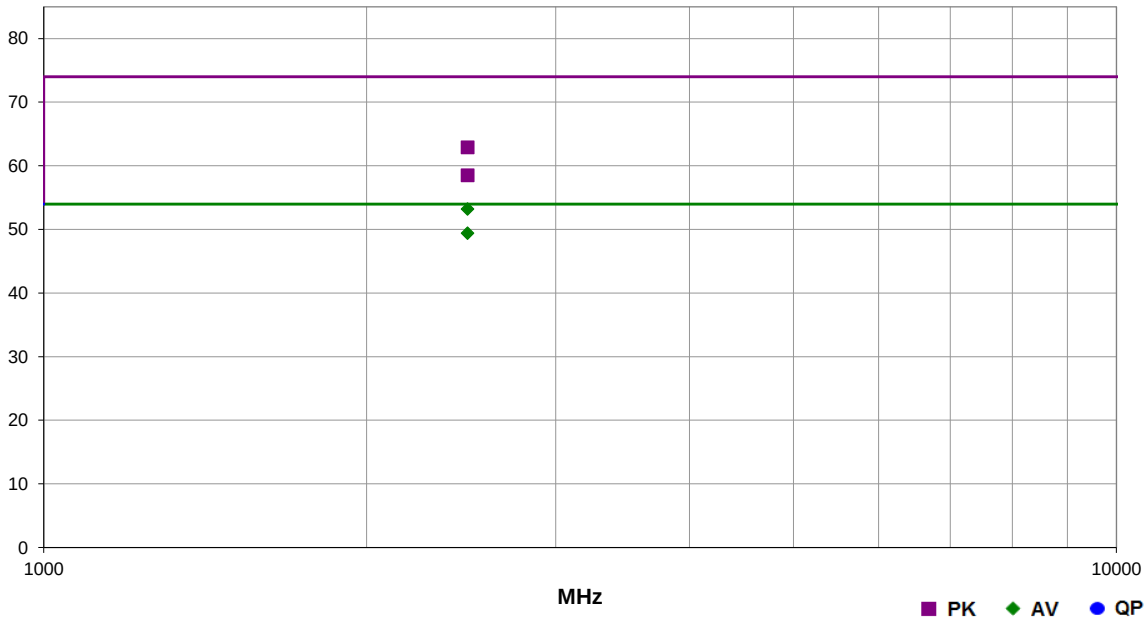
SPURIOUS RADIATED EMISSIONS 4 - ELEMENT

EmiR5 2018.09.26 PSA-ESCI 2018.07.27

Work Order:	SYNA0260	**Date:**	28-Sep-2018		
Project:	None	**Temperature:**	23.2 °C		
Job Site:	OC10	**Humidity:**	51.2% RH		
Serial Number:	E52	**Barometric Pres.:**	1015 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 MHz				
Deviations:	None				
Comments:	Transmitting using 4-Element patch antenna par 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 #	155	**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
2484.000	36.9	3.0	1.3	79.0	3.3	10.0	Horz	AV	0.0	53.2	54.0	-0.8	EUT Horz, Ant Horz, Port 7
2484.000	33.1	3.0	1.0	64.0	3.3	10.0	Vert	AV	0.0	49.4	54.0	-4.6	EUT Vert, Ant Vert, Port 7
2484.155	49.9	3.0	1.3	79.0	0.0	10.0	Horz	PK	0.0	62.9	74.0	-11.1	EUT Horz, Ant Horz, Port 7
2484.055	45.5	3.0	1.0	64.0	0.0	10.0	Vert	PK	0.0	58.5	74.0	-15.5	EUT Vert, Ant Vert, Port 7

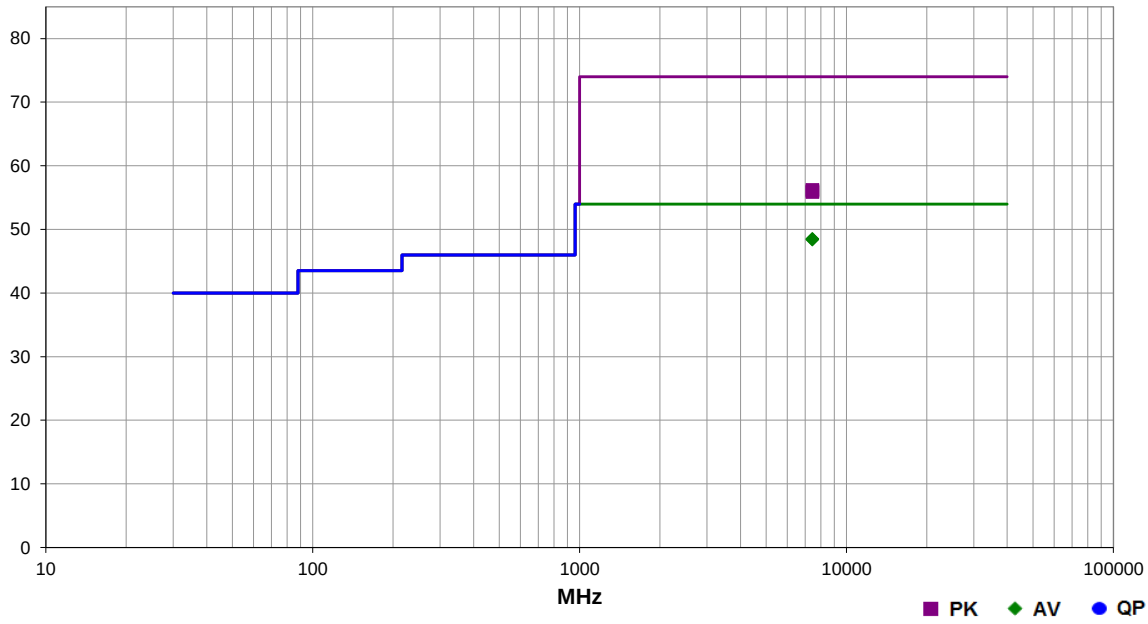
SPURIOUS RADIATED EMISSIONS 4 - ELEMENT

EmiR5 2018.09.26 PSA-ESCI 2018.07.27

Work Order:	SYNA0260	**Date:**	28-Sep-2018		
Project:	None	**Temperature:**	23.2 °C		
Job Site:	OC10	**Humidity:**	51.2% RH		
Serial Number:	E52	**Barometric Pres.:**	1015 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 MHz				
Deviations:	None				
Comments:	Transmitting using 4-Element patch antenna par 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 #	152	**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
7445.185	27.4	17.8	1.0	348.0	3.3	0.0	Vert	AV	0.0	48.5	54.0	-5.5	EUT Vert, Ant Vert, Port 8
7445.325	27.4	17.7	1.0	67.0	3.3	0.0	Horz	AV	0.0	48.4	54.0	-5.6	EUT Horz, Ant Horz, Port 8
7446.880	38.5	17.7	1.0	348.0	0.0	0.0	Vert	PK	0.0	56.2	74.0	-17.8	EUT Vert, Ant Vert, Port 8
7447.495	38.2	17.7	1.0	67.0	0.0	0.0	Horz	PK	0.0	55.9	74.0	-18.1	EUT Horz, Ant Horz, Port 8

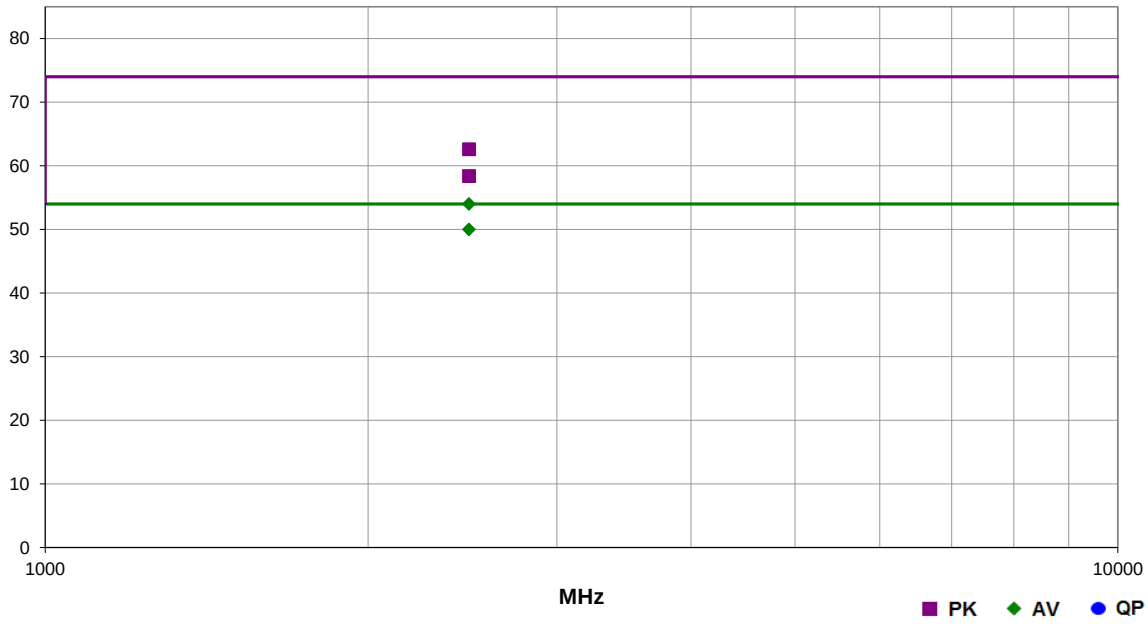
SPURIOUS RADIATED EMISSIONS 4 - ELEMENT

EmiR5 2018.09.26 PSA-ESCI 2018.07.27

Work Order:	SYNA0260	**Date:**	28-Sep-2018		
Project:	None	**Temperature:**	23.2 °C		
Job Site:	OC10	**Humidity:**	51.2% RH		
Serial Number:	E52	**Barometric Pres.:**	1015 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 MHz				
Deviations:	None				
Comments:	Transmitting using 4-Element patch antenna par 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 #	156	**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
2484.000	37.7	3.0	3.7	258.0	3.3	10.0	Horz	AV	0.0	54.0	54.0	0.0	EUT Horz, Ant Horz, Port 8
2484.000	33.7	3.0	2.6	358.0	3.3	10.0	Vert	AV	0.0	50.0	54.0	-4.0	EUT Vert, Ant Vert, Port 8
2484.045	49.6	3.0	3.7	258.0	0.0	10.0	Horz	PK	0.0	62.6	74.0	-11.4	EUT Horz, Ant Horz, Port 8
2484.023	45.4	3.0	2.6	358.0	0.0	10.0	Vert	PK	0.0	58.4	74.0	-15.6	EUT Vert, Ant Vert, 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

DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 MHz

POWER SETTINGS INVESTIGATED

POE

CONFIGURATIONS INVESTIGATED

SYNA0271 - 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.

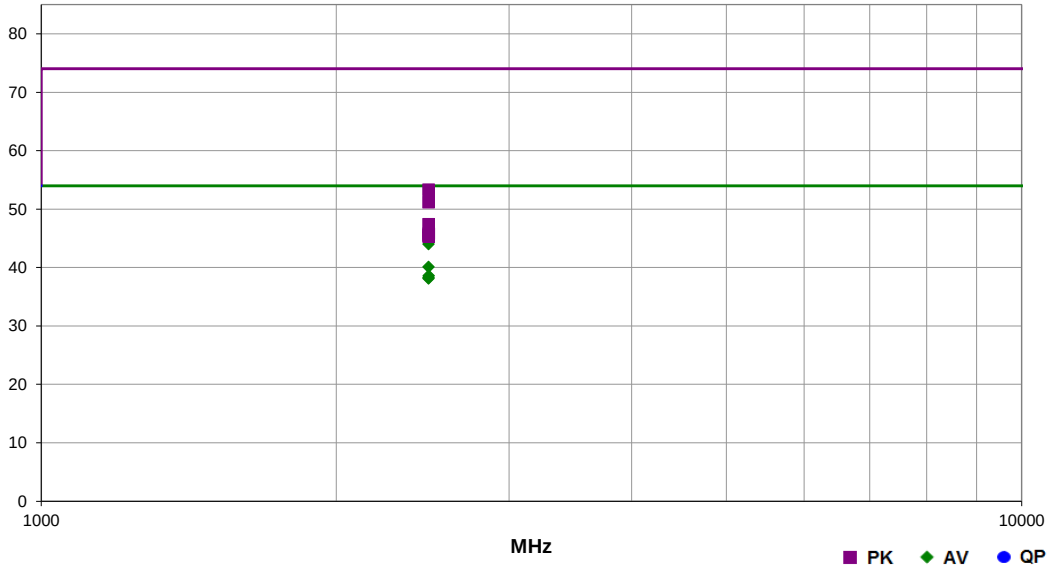
SPURIOUS RADIATED EMISSIONS 16 - ELEMENT

EmiR5 2018.09.26 PSA-ESCI 2018.07.27

Work Order:	SYNA0271	**Date:**	5-Nov-2018		
Project:	None	**Temperature:**	22.5 °C		
Job Site:	OC10	**Humidity:**	51.4% RH		
Serial Number:	E52	**Barometric Pres.:**	1013 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 MHz				
Deviations:	None				
Comments:	Transmitting using 16-element antenna 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 #	1	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Calculated 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)	Marker Delta Comments
2483.507	19.7	3.0	1.2	355.0	3.3	20.0	Horz	AV	0.0	46.0	54.0	-8.0	EUT on Side, Ant on Side: Fund 67.1dBuV + -47.4dBc = 19.7dBuV (calc. amp.)
2483.507	17.7	3.0	1.1	352.0	3.3	20.0	Vert	AV	0.0	44.0	54.0	-10.0	EUT Vert, Ant Vert: Fund 67.2dBuV + -49.5dBc = 17.7dBuV (calc. amp.)
2483.527	13.8	3.0	2.5	165.0	3.3	20.0	Horz	AV	0.0	40.1	54.0	-13.9	EUT Horz, Ant Horz: Fund 54.4dBuV + -40.6dBc = 13.8dBuV (calc. amp.)
2484.380	12.3	3.0	2.5	77.0	3.3	20.0	Vert	AV	0.0	38.6	54.0	-15.4	EUT Horz, Ant Horz: Fund 53.4dBuV + -41.1dBc = 12.3dBuV (calc. amp.)
2484.173	12.0	3.0	1.9	308.0	3.3	20.0	Horz	AV	0.0	38.3	54.0	-15.7	EUT Vert, Ant Vert: Fund 49.8dBuV + -37.8dBc = 12.0dBuV (calc. amp.)
2483.767	11.8	3.0	1.0	46.0	3.3	20.0	Vert	AV	0.0	38.1	54.0	-15.9	EUT on Side, Ant on Side: Fund 43.8dBuV + -32.0dBc = 11.8dBuV (calc. amp.)
2483.507	30.3	3.0	1.2	355.0	0.0	20.0	Horz	PK	0.0	53.3	74.0	-20.7	EUT on Side, Ant on Side: Fund 77.7dBuV + -47.4dBc = 30.3dBuV (calc. amp.)
2483.507	28.2	3.0	1.1	352.0	0.0	20.0	Vert	PK	0.0	51.2	74.0	-22.8	EUT Vert, Ant Vert: Fund 77.7dBuV + -49.5dBc = 28.2dBuV (calc. amp.)
2483.527	24.4	3.0	2.5	165.0	0.0	20.0	Horz	PK	0.0	47.4	74.0	-26.6	EUT Horz, Ant Horz: Fund 65.0dBuV + -40.6dBc = 24.4dBuV (calc. amp.)
2484.380	22.8	3.0	2.5	77.0	0.0	20.0	Vert	PK	0.0	45.8	74.0	-28.2	EUT Horz, Ant Horz: Fund 63.9dBuV + -41.1dBc = 22.8dBuV (calc. amp.)
2484.173	22.5	3.0	1.9	308.0	0.0	20.0	Horz	PK	0.0	45.5	74.0	-28.5	EUT Vert, Ant Vert: Fund 60.3dBuV + -37.8dBc = 22.5dBuV (calc. amp.)
2483.767	22.3	3.0	1.0	46.0	0.0	20.0	Vert	PK	0.0	45.3	74.0	-28.7	EUT on Side, Ant on Side: Fund 54.3dBuV + -32.0dBc = 22.3dBuV (calc. amp.)

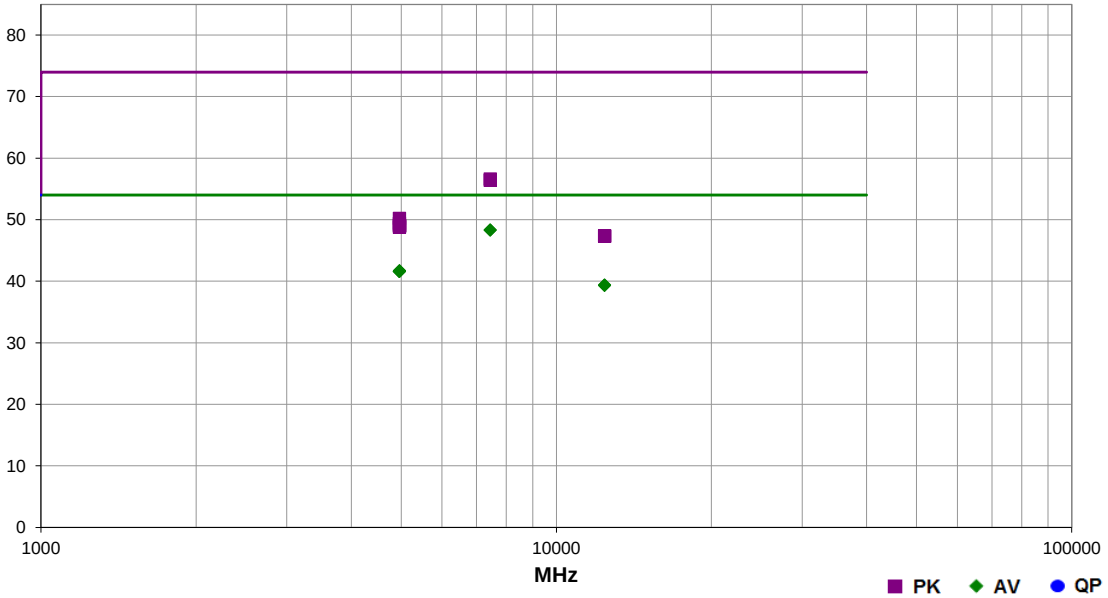
SPURIOUS RADIATED EMISSIONS 16 - ELEMENT

EmiR5 2018.09.26 PSA-ESCI 2018.07.27

Work Order:	SYNA0271	**Date:**	5-Nov-2018		
Project:	None	**Temperature:**	22.5 °C		
Job Site:	OC10	**Humidity:**	51.4% RH		
Serial Number:	E52	**Barometric Pres.:**	1013 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 MHz				
Deviations:	None				
Comments:	Transmitting using 16-element antenna 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 #	2	**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
7446.200	27.3	17.7	1.0	184.0	3.3	0.0	Horz	AV	0.0	48.3	54.0	-5.7	EUT on Side, Ant on Side, Port 7
7445.465	27.3	17.7	1.0	0.0	3.3	0.0	Vert	AV	0.0	48.3	54.0	-5.7	EUT Vert, Ant Vert, Port 7
4964.005	25.9	12.5	1.0	28.0	3.3	0.0	Vert	AV	0.0	41.7	54.0	-12.3	EUT Vert, Ant Vert, Port 7
4962.900	25.8	12.5	1.0	254.0	3.3	0.0	Horz	AV	0.0	41.6	54.0	-12.4	EUT on Side, Ant on Side, Port 7
4962.635	25.8	12.5	1.0	61.0	3.3	0.0	Vert	AV	0.0	41.6	54.0	-12.4	EUT on Side, Ant on Side, Port 7
4963.725	25.8	12.5	1.0	85.0	3.3	0.0	Horz	AV	0.0	41.6	54.0	-12.4	EUT Vert, Ant Vert, Port 7
4962.590	25.8	12.5	1.7	284.0	3.3	0.0	Horz	AV	0.0	41.6	54.0	-12.4	EUT Horz, Ant Horz, Port 7
4962.770	25.8	12.5	1.0	16.0	3.3	0.0	Vert	AV	0.0	41.6	54.0	-12.4	EUT Horz, Ant Horz, Port 7
12410.610	27.8	8.3	3.5	230.0	3.3	0.0	Horz	AV	0.0	39.4	54.0	-14.6	EUT on Side, Ant on Side, Port 7
12408.620	27.7	8.3	1.0	45.0	3.3	0.0	Vert	AV	0.0	39.3	54.0	-14.7	EUT Vert, Ant Vert, Port 7
7445.915	38.9	17.7	1.0	0.0	0.0	0.0	Vert	PK	0.0	56.6	74.0	-17.4	EUT Vert, Ant Vert, Port 7
7445.170	38.6	17.8	1.0	184.0	0.0	0.0	Horz	PK	0.0	56.4	74.0	-17.6	EUT on Side, Ant on Side, Port 7
4963.075	37.7	12.5	1.0	254.0	0.0	0.0	Horz	PK	0.0	50.2	74.0	-23.8	EUT on Side, Ant on Side, Port 7
4963.275	36.9	12.5	1.0	85.0	0.0	0.0	Horz	PK	0.0	49.4	74.0	-24.6	EUT Vert, Ant Vert, Port 7
4962.930	36.6	12.5	1.0	28.0	0.0	0.0	Vert	PK	0.0	49.1	74.0	-24.9	EUT Vert, Ant Vert, Port 7
4964.605	36.5	12.5	1.0	61.0	0.0	0.0	Vert	PK	0.0	49.0	74.0	-25.0	EUT on Side, Ant on Side, Port 7
4965.270	36.5	12.5	1.7	284.0	0.0	0.0	Horz	PK	0.0	49.0	74.0	-25.0	EUT Horz, Ant Horz, Port 7
4962.765	36.3	12.5	1.0	16.0	0.0	0.0	Vert	PK	0.0	48.8	74.0	-25.2	EUT Horz, Ant Horz, Port 7
12410.520	39.1	8.3	3.5	230.0	0.0	0.0	Horz	PK	0.0	47.4	74.0	-26.6	EUT on Side, Ant on Side, Port 7
12410.310	39.0	8.3	1.0	45.0	0.0	0.0	Vert	PK	0.0	47.3	74.0	-26.7	EUT Vert, Ant Vert, Port 7

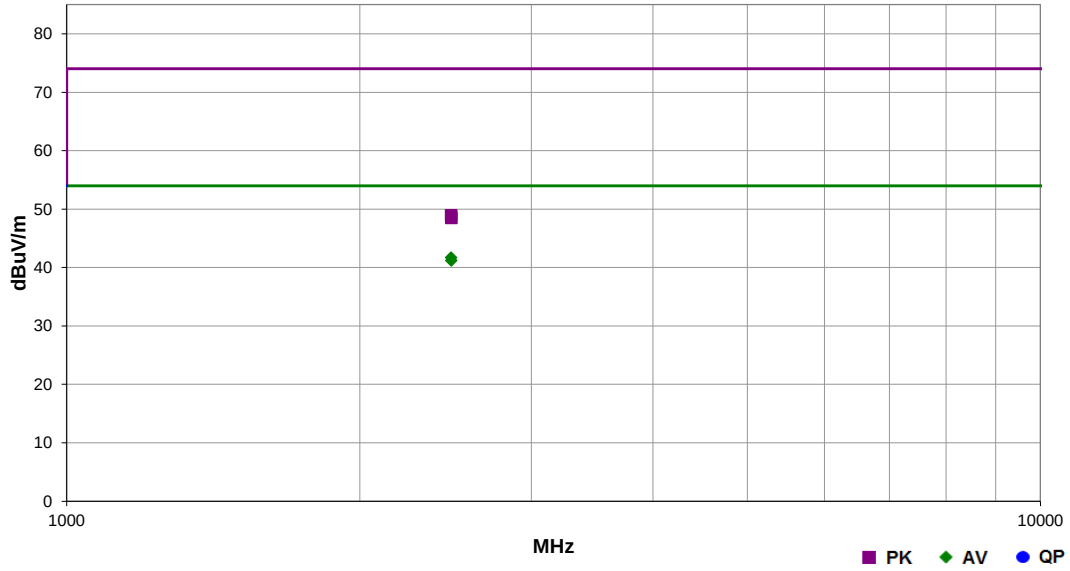
SPURIOUS RADIATED EMISSIONS 16 - ELEMENT

EmiR5 2018.09.26 PSA-ESCI 2018.07.27

Work Order:	SYNA0271	**Date:**	5-Nov-2018		
Project:	None	**Temperature:**	22.5 °C		
Job Site:	OC10	**Humidity:**	51.4% RH		
Serial Number:	E52	**Barometric Pres.:**	1013 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 MHz				
Deviations:	None				
Comments:	Transmitting using 16-element antenna 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 #	5	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Calculated 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)	Marker Delta Comments
2482.020	15.4	3.0	3.0	342.0	3.3	20.0	Horz	AV	0.0	41.7	54.0	-12.3	EUT on Side, Ant on Side: Fund 63.8dBuV + -48.4dBc = 15.4dBuV (calc. amp.)
2483.560	14.9	3.0	1.1	352.0	3.3	20.0	Vert	AV	0.0	41.2	54.0	-12.8	EUT Vert, Ant Vert: Fund 62.8dBuV + -47.9dBc = 14.9dBuV (calc. amp.)
2482.020	25.9	3.0	3.0	342.0	0.0	20.0	Horz	PK	0.0	48.9	74.0	-25.1	EUT on Side, Ant on Side: Fund 74.3dBuV + -48.4dBc = 25.9dBuV (calc. amp.)
2483.560	25.5	3.0	1.1	352.0	0.0	20.0	Vert	PK	0.0	48.5	74.0	-25.5	EUT Vert, Ant Vert: Fund 73.4dBuV + -47.9dBc = 25.5dBuV (calc. amp.)

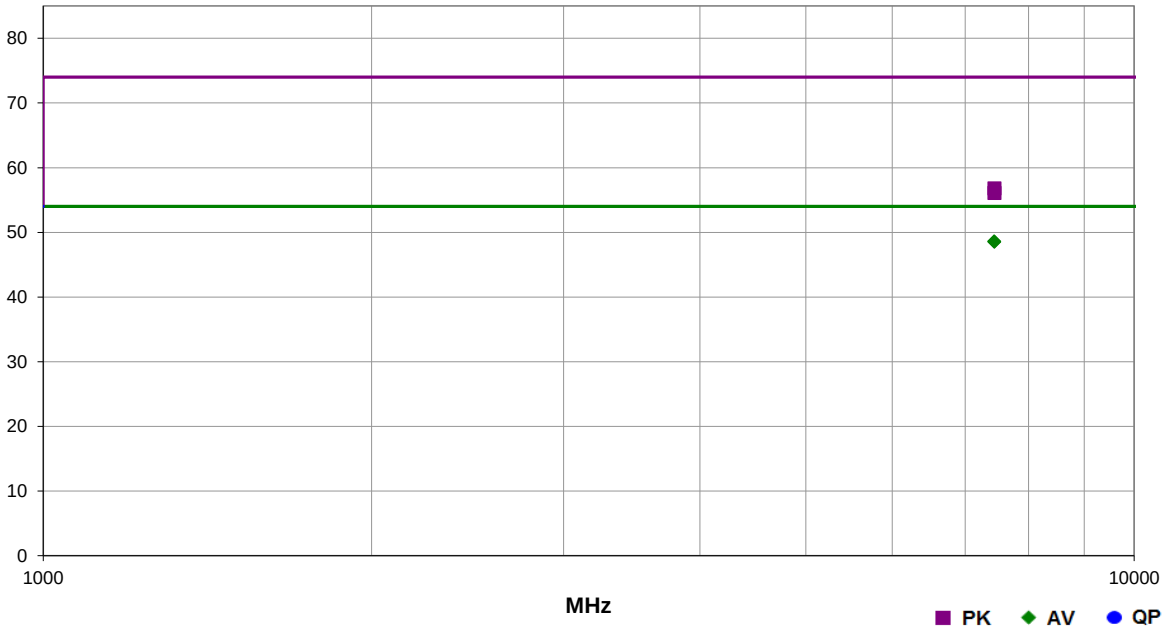
SPURIOUS RADIATED EMISSIONS 16 - ELEMENT

EmiR5 2018.09.26 PSA-ESCI 2018.07.27

Work Order:	SYNA0271	**Date:**	5-Nov-2018		
Project:	None	**Temperature:**	22.5 °C		
Job Site:	OC10	**Humidity:**	51.4% RH		
Serial Number:	E52	**Barometric Pres.:**	1013 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 MHz				
Deviations:	None				
Comments:	Transmitting using 16-element antenna 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 #	6	**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
7444.710	27.5	17.8	1.1	261.0	3.3	0.0	Horz	AV	0.0	48.6	54.0	-5.4	EUT on Side, Ant on Side,
7445.430	27.5	17.7	1.0	109.0	3.3	0.0	Vert	AV	0.0	48.5	54.0	-5.5	EUT Vert, Ant Vert, Port 8
7445.275	39.1	17.7	1.1	261.0	0.0	0.0	Horz	PK	0.0	56.8	74.0	-17.2	EUT on Side, Ant on Side, I
7446.570	38.4	17.7	1.0	109.0	0.0	0.0	Vert	PK	0.0	56.1	74.0	-17.9	EUT Vert, Ant Vert, 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

DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 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.

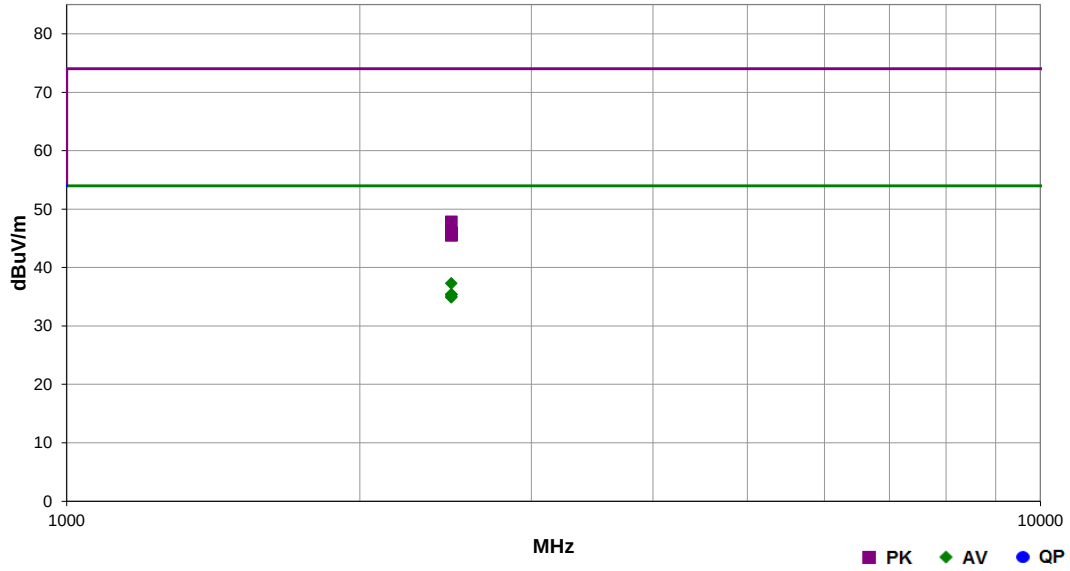
SPURIOUS RADIATED EMISSIONS SINGLE - ELEMENT

EmiR5 2018.07.19.3 PSA-ESCI 2018.07.27

Work Order:	SYNA0260	**Date:**	1-Oct-2018		
Project:	None	**Temperature:**	25.1 °C		
Job Site:	OC10	**Humidity:**	47.3% RH		
Serial Number:	E52	**Barometric Pres.:**	1010 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 MHz				
Deviations:	None				
Comments:	Transmitting using monopole 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 #	134	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Calculated Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Marker Delta Comments
2483.546	14.3	3.0	2.9	1.0	3.0	20.0	Horz	AV	0.0	37.3	54.0	-16.7	EUT on Side, Ant on Side, Port 7: Fund 61.9dBuV + -47.6dBc = 14.3dBuV (calc. amp.)
2485.247	12.4	3.0	3.9	119.0	3.0	20.0	Horz	AV	0.0	35.4	54.0	-18.6	EUT Horz, Ant Horz, Port 7: Fund 55.6dBuV + -43.2dBc = 12.4dBuV (calc. amp.)
2483.682	12.4	3.0	3.8	56.0	3.0	20.0	Vert	AV	0.0	35.4	54.0	-18.6	EUT on Side, Ant on Side, Port 7: Fund 54.9dBuV + -42.5dBc = 12.4dBuV (calc. amp.)
2483.553	13.2	2.1	2.8	345.0	3.0	20.0	Vert	AV	0.0	35.3	54.0	-18.7	EUT Vert, Ant Vert, Port 7: Fund 60.5dBuV + -47.3dBc = 13.2dBuV (calc. amp.)
2484.193	12.0	3.0	1.0	83.0	3.0	20.0	Vert	AV	0.0	35.0	54.0	-19.0	EUT Horz, Ant Horz, Port 7: Fund 53.9dBuV + -41.9dBc = 12.0dBuV (calc. amp.)
2483.773	11.9	3.0	1.0	52.0	3.0	20.0	Horz	AV	0.0	34.9	54.0	-19.1	EUT Vert, Ant Vert, Port 7: Fund 51.7dBuV + -39.8dBc = 11.9dBuV (calc. amp.)
2483.546	24.8	3.0	2.9	1.0	3.0	20.0	Horz	PK	0.0	47.8	74.0	-26.2	EUT on Side, Ant on Side, Port 7: Fund 72.4dBuV + -47.6dBc = 24.8dBuV (calc. amp.)
2485.247	22.9	3.0	3.9	119.0	3.0	20.0	Horz	PK	0.0	45.9	74.0	-28.1	EUT Horz, Ant Horz, Port 7: Fund 66.1dBuV + -43.2dBc = 22.9dBuV (calc. amp.)
2483.682	22.9	3.0	3.8	56.0	3.0	20.0	Vert	PK	0.0	45.9	74.0	-28.1	EUT on Side, Ant on Side, Port 7: Fund 65.4dBuV + -42.5dBc = 22.9dBuV (calc. amp.)
2483.553	23.6	2.1	2.8	345.0	3.0	20.0	Vert	PK	0.0	45.7	74.0	-28.3	EUT Vert, Ant Vert, Port 7: Fund 70.9dBuV + -47.3dBc = 23.6dBuV (calc. amp.)
2484.193	22.6	3.0	1.0	83.0	3.0	20.0	Vert	PK	0.0	45.6	74.0	-28.4	EUT Horz, Ant Horz, Port 7: Fund 64.5dBuV + -41.9dBc = 22.6dBuV (calc. amp.)
2483.773	22.5	3.0	1.0	52.0	3.0	20.0	Horz	PK	0.0	45.5	74.0	-28.5	EUT Vert, Ant Vert, Port 7: Fund 62.3dBuV + -39.8dBc = 22.5dBuV (calc. amp.)

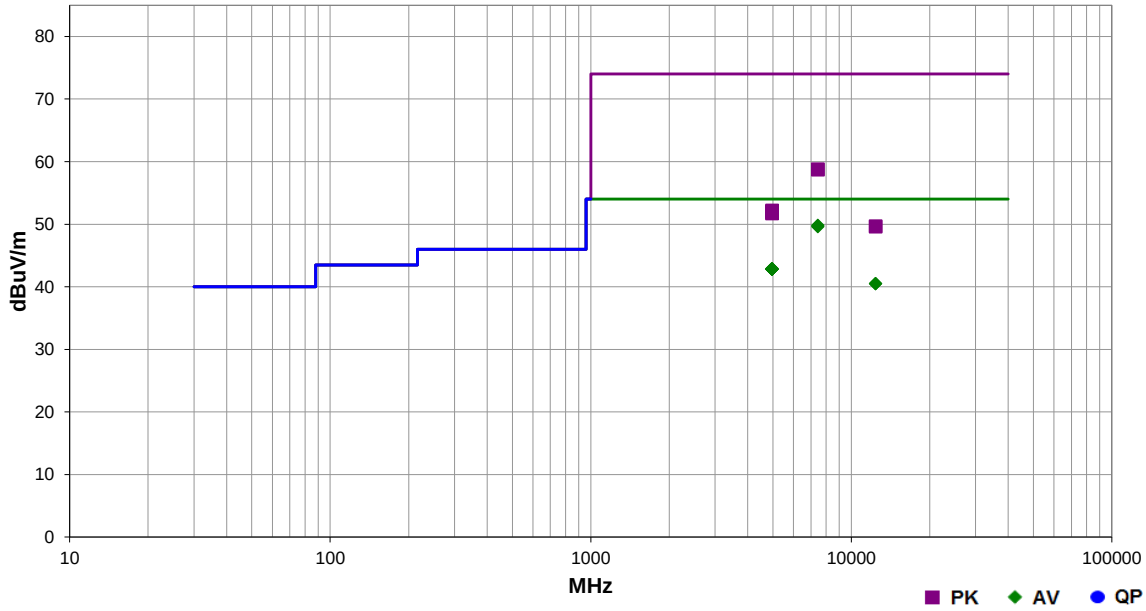
SPURIOUS RADIATED EMISSIONS SINGLE - ELEMENT

EmiR5 2018.07.19.3 PSA-ESCI 2018.07.27

Work Order:	SYNA0260	**Date:**	1-Oct-2018		
Project:	None	**Temperature:**	25.1 °C		
Job Site:	OC10	**Humidity:**	47.3% RH		
Serial Number:	E52	**Barometric Pres.:**	1010 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 MHz				
Deviations:	None				
Comments:	Transmitting using monopole 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 #	135	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7446.263	32.1	17.7	2.3	22.0	3.0	0.0	Vert	AV	0.0	49.8	54.0	-4.2	EUT on Side, Ant on Side, Port 7
7445.240	31.9	17.7	1.0	220.0	3.0	0.0	Horz	AV	0.0	49.6	54.0	-4.4	EUT on Side, Ant on Side, Port 7
4963.803	30.4	12.5	1.0	213.0	3.0	0.0	Horz	AV	0.0	42.9	54.0	-11.1	EUT on Side, Ant on Side, Port 7
4963.963	30.3	12.5	1.0	105.0	3.0	0.0	Vert	AV	0.0	42.8	54.0	-11.2	EUT on Side, Ant on Side, Port 7
4964.017	30.3	12.5	1.0	53.0	3.0	0.0	Horz	AV	0.0	42.8	54.0	-11.2	EUT Vert, Ant Vert, Port 7
4964.267	30.3	12.5	1.6	313.0	3.0	0.0	Vert	AV	0.0	42.8	54.0	-11.2	EUT Vert, Ant Vert, Port 7
4963.757	30.3	12.5	1.0	147.0	3.0	0.0	Horz	AV	0.0	42.8	54.0	-11.2	EUT Horz, Ant Horz, Port 7
4963.693	30.3	12.5	1.0	360.0	3.0	0.0	Vert	AV	0.0	42.8	54.0	-11.2	EUT Horz, Ant Horz, Port 7
12409.020	32.2	8.3	2.6	175.0	3.0	0.0	Horz	AV	0.0	40.5	54.0	-13.5	EUT on Side, Ant on Side, Port 7
12409.810	32.2	8.3	1.3	120.0	3.0	0.0	Vert	AV	0.0	40.5	54.0	-13.5	EUT on Side, Ant on Side, Port 7
7445.190	41.0	17.8	1.0	220.0	3.0	0.0	Horz	PK	0.0	58.8	74.0	-15.2	EUT on Side, Ant on Side, Port 7
7445.140	40.9	17.8	2.3	22.0	3.0	0.0	Vert	PK	0.0	58.7	74.0	-15.3	EUT on Side, Ant on Side, Port 7
4963.970	39.7	12.5	1.0	360.0	3.0	0.0	Vert	PK	0.0	52.2	74.0	-21.8	EUT Horz, Ant Horz, Port 7
4964.470	39.6	12.5	1.0	147.0	3.0	0.0	Horz	PK	0.0	52.1	74.0	-21.9	EUT Horz, Ant Horz, Port 7
4964.100	39.5	12.5	1.0	105.0	3.0	0.0	Vert	PK	0.0	52.0	74.0	-22.0	EUT on Side, Ant on Side, Port 7
4963.670	39.4	12.5	1.0	53.0	3.0	0.0	Horz	PK	0.0	51.9	74.0	-22.1	EUT Vert, Ant Vert, Port 7
4964.883	39.3	12.5	1.0	213.0	3.0	0.0	Horz	PK	0.0	51.8	74.0	-22.2	EUT on Side, Ant on Side, Port 7
4964.077	39.2	12.5	1.6	313.0	3.0	0.0	Vert	PK	0.0	51.7	74.0	-22.3	EUT Vert, Ant Vert, Port 7
12410.440	41.4	8.3	1.3	120.0	3.0	0.0	Vert	PK	0.0	49.7	74.0	-24.3	EUT on Side, Ant on Side, Port 7
12410.040	41.3	8.3	2.6	175.0	3.0	0.0	Horz	PK	0.0	49.6	74.0	-24.4	EUT on Side, Ant on Side, Port 7

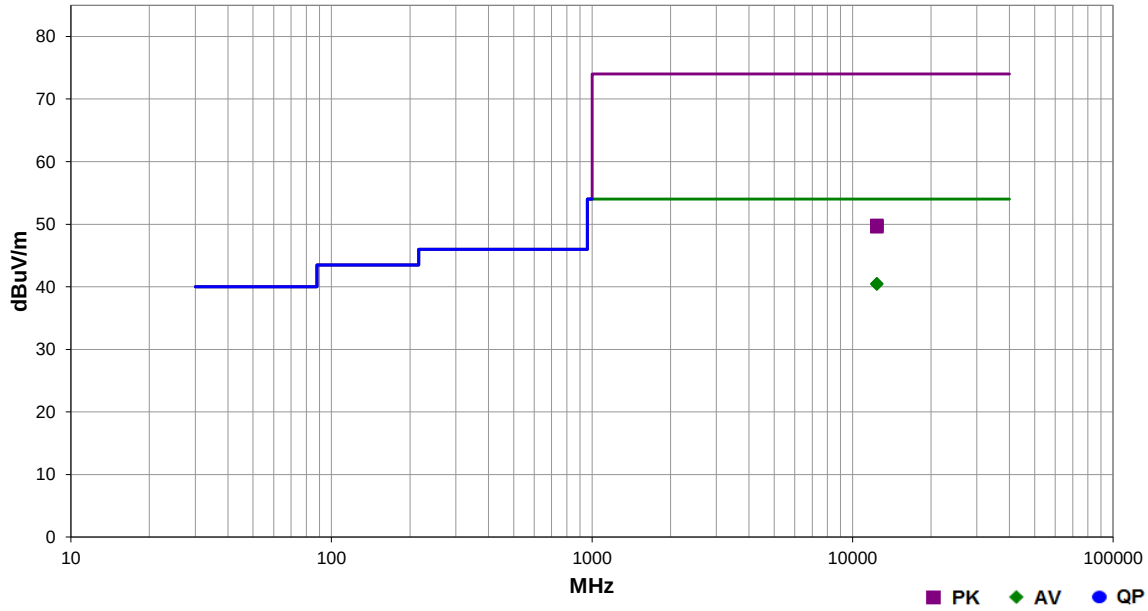
SPURIOUS RADIATED EMISSIONS SINGLE - ELEMENT

EmiR5 2018.07.19.3 PSA-ESCI 2018.07.27

Work Order:	SYNA0260	**Date:**	1-Oct-2018		
Project:	None	**Temperature:**	25.1 °C		
Job Site:	OC10	**Humidity:**	47.3% RH		
Serial Number:	E52	**Barometric Pres.:**	1010 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 MHz				
Deviations:	None				
Comments:	Transmitting using monopole 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 #	137	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
12409.570	32.2	8.3	1.6	220.0	3.0	0.0	Horz	AV	0.0	40.5	54.0	-13.5	EUT on Side, Ant on Side, Port 8
12409.680	32.1	8.3	1.0	30.0	3.0	0.0	Vert	AV	0.0	40.4	54.0	-13.6	EUT on Side, Ant on Side, Port 8
12409.100	41.5	8.3	1.6	220.0	3.0	0.0	Horz	PK	0.0	49.8	74.0	-24.2	EUT on Side, Ant on Side, Port 8
12410.530	41.3	8.3	1.0	30.0	3.0	0.0	Vert	PK	0.0	49.6	74.0	-24.4	EUT on Side, Ant on Side, Port 8

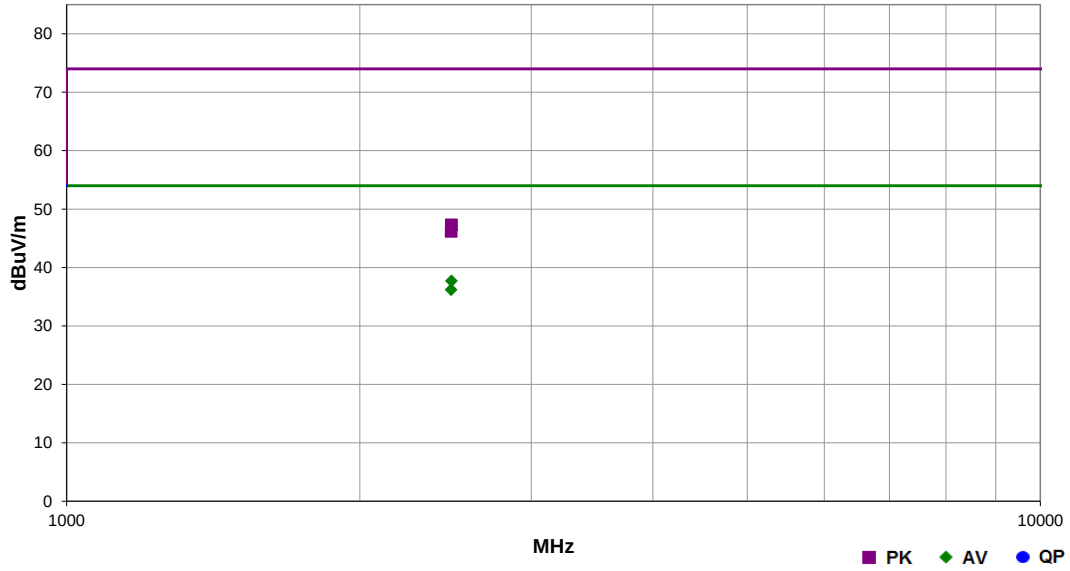
SPURIOUS RADIATED EMISSIONS SINGLE - ELEMENT

EmiR5 2018.07.19.3 PSA-ESCI 2018.07.27

Work Order:	SYNA0260	**Date:**	1-Oct-2018		
Project:	None	**Temperature:**	25.1 °C		
Job Site:	OC10	**Humidity:**	47.3% RH		
Serial Number:	E52	**Barometric Pres.:**	1010 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 MHz				
Deviations:	None				
Comments:	Transmitting using monopole 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 #	138	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Calculated Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Marker Delta Comments
2484.270	14.7	3.0	1.0	347.0	3.0	20.0	Horz	AV	0.0	37.7	54.0	-16.3	EUT on Side, Ant on Side, Port 8: Fund 62.1dBuV + -47.4dBc = 14.7dBuV (calc. amp.)
2482.027	13.2	3.0	1.0	259.0	3.0	20.0	Vert	AV	0.0	36.2	54.0	-17.8	EUT on Side, Ant on Side, Port 8: Fund 53.9dBuV + -40.7dBc = 13.2dBuV (calc. amp.)
2484.270	24.3	3.0	1.0	347.0	3.0	20.0	Horz	PK	0.0	47.3	74.0	-26.7	EUT on Side, Ant on Side, Port 8: Fund 71.7dBuV + -47.4dBc = 24.3dBuV (calc. amp.)
2482.027	23.2	3.0	1.0	259.0	3.0	20.0	Vert	PK	0.0	46.2	74.0	-27.8	EUT on Side, Ant on Side, Port 8: Fund 63.9dBuV + -40.7dBc = 23.2dBuV (calc. amp.)

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

DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 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.

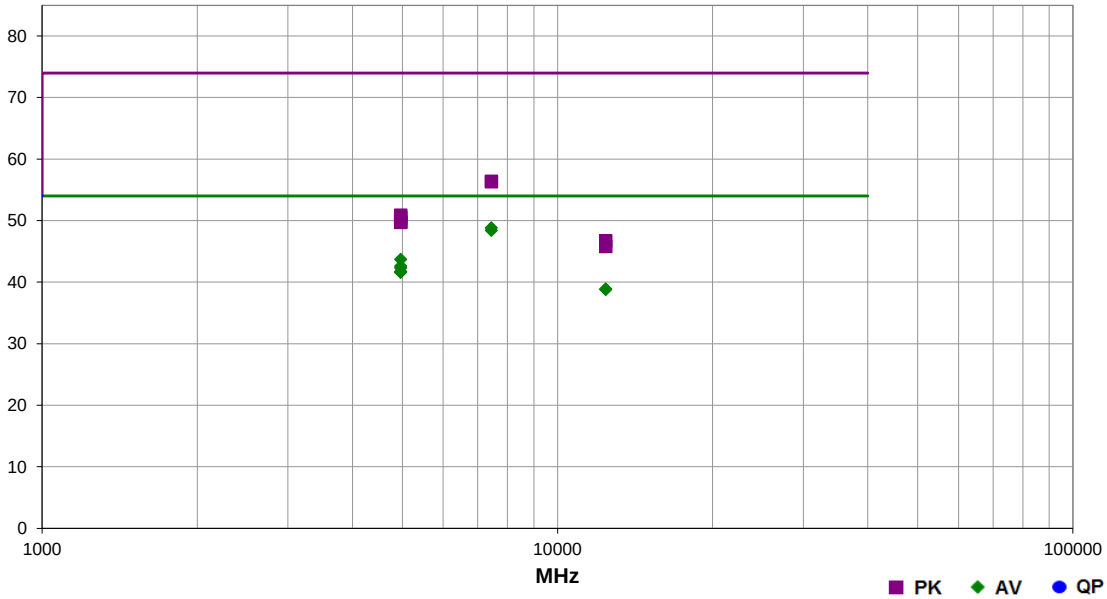
SPURIOUS RADIATED EMISSIONS YAGI

EmiR5 2018.07.19.3 PSA-ESCI 2018.05.04

Work Order:	SYNA0260	**Date:**	25-Sep-2018		
Project:	None	**Temperature:**	22.1 °C		
Job Site:	OC10	**Humidity:**	54.7% RH		
Serial Number:	E52	**Barometric Pres.:**	1017 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 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				

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

Run #	40	**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
7445.035	27.7	17.8	1.0	279.0	3.3	0.0	Horz	AV	0.0	48.8	54.0	-5.2	EUT Horz, Ant Horz, Port 7
7445.780	27.4	17.7	1.0	13.0	3.3	0.0	Vert	AV	0.0	48.4	54.0	-5.6	EUT Vert, Ant Vert, Port 7
4963.965	27.9	12.5	1.4	305.0	3.3	0.0	Horz	AV	0.0	43.7	54.0	-10.3	EUT Horz, Ant Horz, Port 7
4964.330	26.8	12.5	1.0	0.0	3.3	0.0	Horz	AV	0.0	42.6	54.0	-11.4	EUT on Side, Ant on Side, Port 7
4963.980	26.5	12.5	1.0	48.0	3.3	0.0	Vert	AV	0.0	42.3	54.0	-11.7	EUT Vert, Ant Vert, Port 7
4964.290	25.9	12.5	1.0	0.0	3.3	0.0	Vert	AV	0.0	41.7	54.0	-12.3	EUT on Side, Ant on Side, Port 7
4962.980	25.8	12.5	1.0	58.0	3.3	0.0	Vert	AV	0.0	41.6	54.0	-12.4	EUT Horz, Ant Horz, Port 7
4964.020	25.8	12.5	2.4	105.0	3.3	0.0	Horz	AV	0.0	41.6	54.0	-12.4	EUT Vert, Ant Vert, Port 7
12409.250	27.3	8.3	1.0	95.0	3.3	0.0	Horz	AV	0.0	38.9	54.0	-15.1	EUT Horz, Ant Horz, Port 7
12411.220	27.2	8.3	1.0	277.0	3.3	0.0	Vert	AV	0.0	38.8	54.0	-15.2	EUT Vert, Ant Vert, Port 7
7445.295	38.7	17.7	1.0	13.0	0.0	0.0	Vert	PK	0.0	56.4	74.0	-17.6	EUT Vert, Ant Vert, Port 7
7445.435	38.6	17.7	1.0	279.0	0.0	0.0	Horz	PK	0.0	56.3	74.0	-17.7	EUT Horz, Ant Horz, Port 7
4963.795	38.4	12.5	1.0	0.0	0.0	0.0	Horz	PK	0.0	50.9	74.0	-23.1	EUT on Side, Ant on Side, Port 7
4963.475	38.1	12.5	1.4	305.0	0.0	0.0	Horz	PK	0.0	50.6	74.0	-23.4	EUT Horz, Ant Horz, Port 7
4962.610	37.9	12.5	1.0	48.0	0.0	0.0	Vert	PK	0.0	50.4	74.0	-23.6	EUT Vert, Ant Vert, Port 7
4962.810	37.3	12.5	2.4	105.0	0.0	0.0	Horz	PK	0.0	49.8	74.0	-24.2	EUT Vert, Ant Vert, Port 7
4964.390	37.3	12.5	1.0	0.0	0.0	0.0	Vert	PK	0.0	49.8	74.0	-24.2	EUT on Side, Ant on Side, Port 7
4964.795	37.2	12.5	1.0	58.0	0.0	0.0	Vert	PK	0.0	49.7	74.0	-24.3	EUT Horz, Ant Horz, Port 7
12409.100	38.4	8.3	1.0	95.0	0.0	0.0	Horz	PK	0.0	46.7	74.0	-27.3	EUT Horz, Ant Horz, Port 7
12411.310	37.5	8.3	1.0	277.0	0.0	0.0	Vert	PK	0.0	45.8	74.0	-28.2	EUT Vert, Ant Vert, Port 7

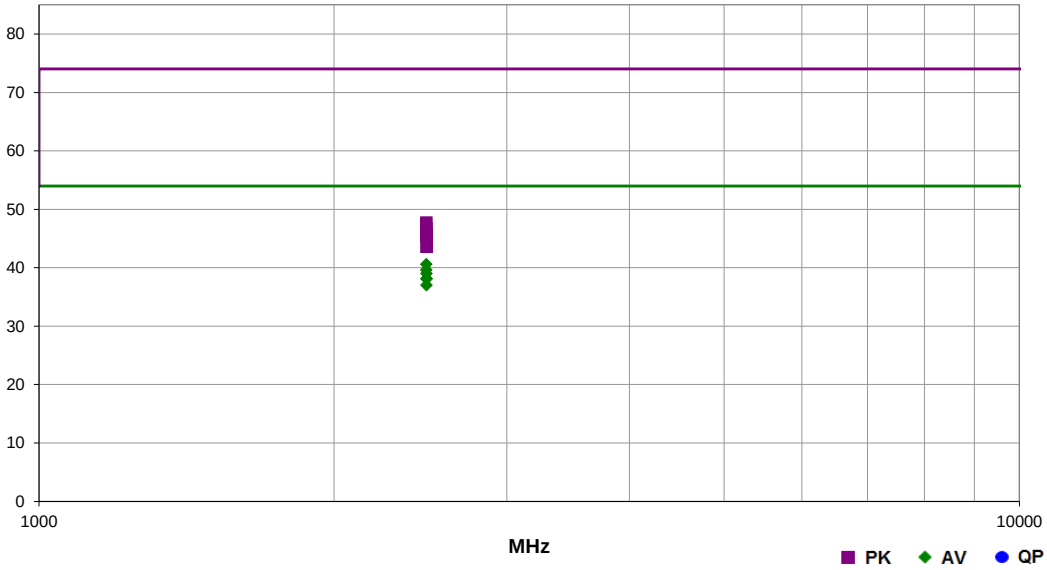
SPURIOUS RADIATED EMISSIONS YAGI

EmiR5 2018.07.19.3 PSA-ESCI 2018.05.04

Work Order:	SYNA0260	**Date:**	25-Sep-2018		
Project:	None	**Temperature:**	22.1 °C		
Job Site:	OC10	**Humidity:**	54.7% RH		
Serial Number:	E52	**Barometric Pres.:**	1017 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 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				

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

Run #	48	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass

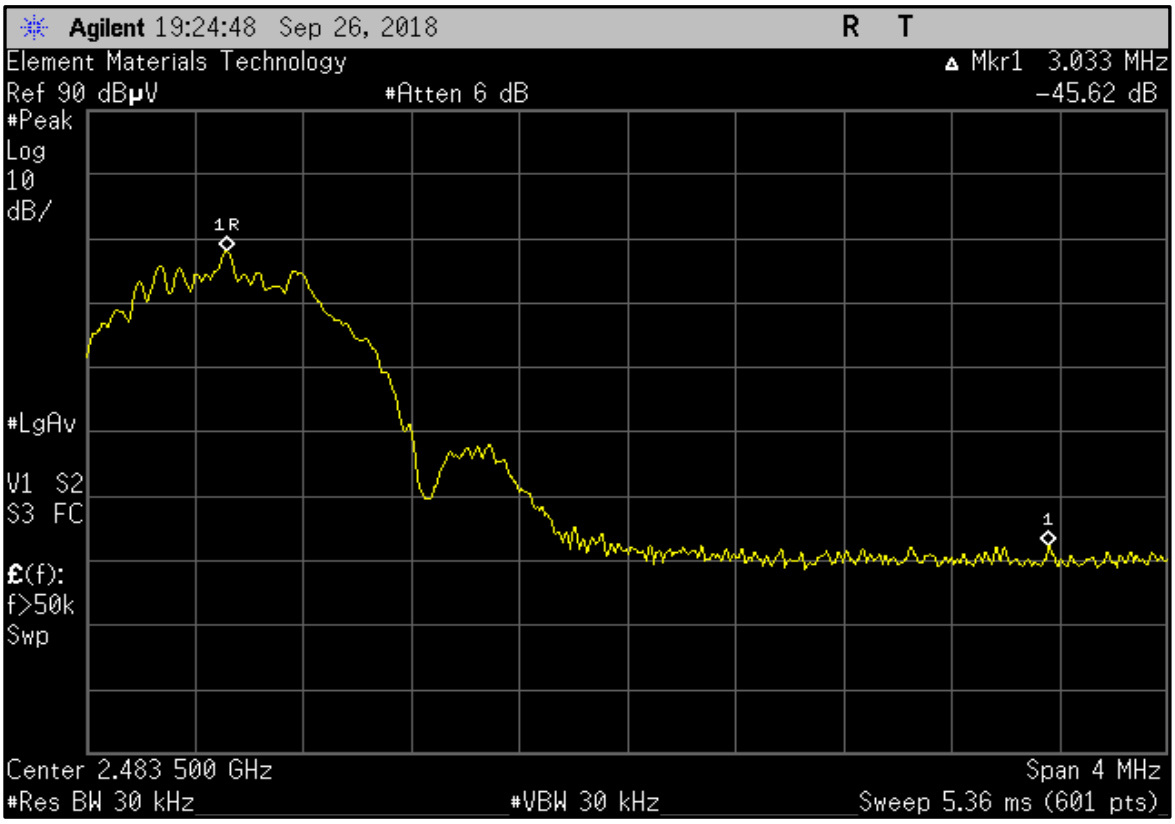


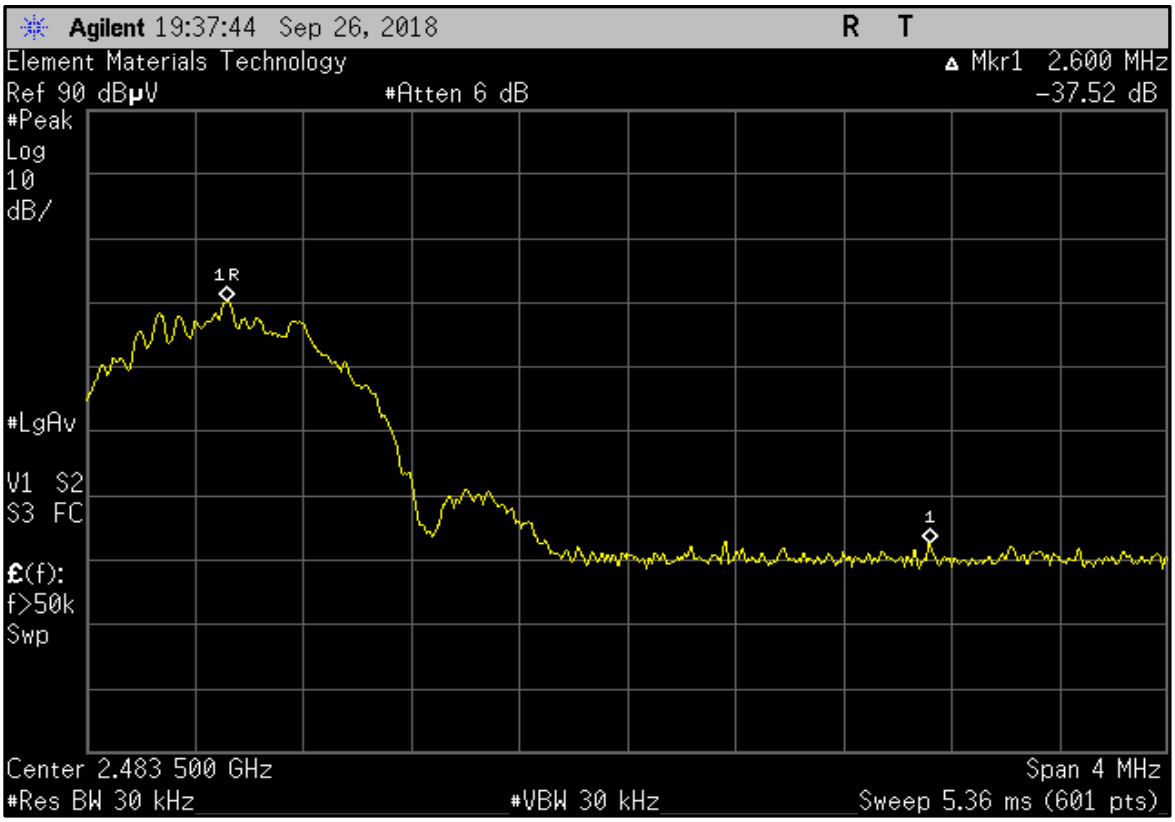
Freq (MHz)	Calculated Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Marker Delta Comments
2483.639	14.3	3.0	1.0	91.0	3.3	20.0	Vert	AV	0.0	40.6	54.0	-13.4	EUT Horz, Ant Horz, Port 7: Fund 59.1dBuV + -44.8dBc = 14.3dBuV (calc. amp.)
2483.720	13.3	3.0	3.2	224.0	3.3	20.0	Horz	AV	0.0	39.6	54.0	-14.4	EUT Horz, Ant Horz, Port 7: Fund 60.0dBuV + -46.7dBc = 13.3dBuV (calc. amp.)
2484.620	12.7	3.0	1.0	173.0	3.3	20.0	Vert	AV	0.0	39.0	54.0	-15.0	EUT on Side, Ant on Side, Port 7: Fund 50.2dBuV + -37.5dBc = 12.7dBuV (calc. amp.)
2485.053	11.8	3.0	1.0	85.0	3.3	20.0	Horz	AV	0.0	38.1	54.0	-15.9	EUT on Side, Ant on Side, Port 7: Fund 57.4dBuV + -45.6dBc = 11.8dBuV (calc. amp.)
2485.233	11.8	3.0	1.0	198.0	3.3	20.0	Vert	AV	0.0	38.1	54.0	-15.9	EUT Vert, Ant Vert, Port 7: Fund 53.6dBuV + -41.8dBc = 11.8dBuV (calc. amp.)
2484.319	10.7	3.0	2.0	88.0	3.3	20.0	Horz	AV	0.0	37.0	54.0	-17.0	EUT Vert, Ant Vert, Port 7: Fund 53.9dBuV + -43.2dBc = 10.7dBuV (calc. amp.)
2483.639	24.7	3.0	1.0	91.0	0.0	20.0	Vert	PK	0.0	47.7	74.0	-26.3	EUT Horz, Ant Horz, Port 7: Fund 69.5dBuV + -44.8dBc = 24.7dBuV (calc. amp.)
2483.720	23.7	3.0	3.2	224.0	0.0	20.0	Horz	PK	0.0	46.7	74.0	-27.3	EUT Horz, Ant Horz, Port 7: Fund 70.4dBuV + -46.7dBc = 23.7dBuV (calc. amp.)
2484.620	22.7	3.0	1.0	173.0	0.0	20.0	Vert	PK	0.0	45.7	74.0	-28.3	EUT on Side, Ant on Side, Port 7: Fund 60.2dBuV + -37.5dBc = 22.7dBuV (calc. amp.)
2485.233	22.5	3.0	1.0	198.0	0.0	20.0	Vert	PK	0.0	45.5	74.0	-28.5	EUT Vert, Ant Vert, Port 7: Fund 64.3dBuV + -41.8dBc = 22.5dBuV (calc. amp.)
2485.053	22.4	3.0	1.0	85.0	0.0	20.0	Horz	PK	0.0	45.4	74.0	-28.6	EUT on Side, Ant on Side, Port 7: Fund 68.0dBuV + -45.6dBc = 22.4dBuV (calc. amp.)
2484.319	20.6	3.0	2.0	88.0	0.0	20.0	Horz	PK	0.0	43.6	74.0	-30.4	EUT Vert, Ant Vert, Port 7: Fund 63.8dBuV + -43.2dBc = 20.6dBuV (calc. amp.)

SPURIOUS RADIATED EMISSIONS YAGI

EUT on Side, Ant on Side, Port 7

PSA-ESCI 2018.05.04



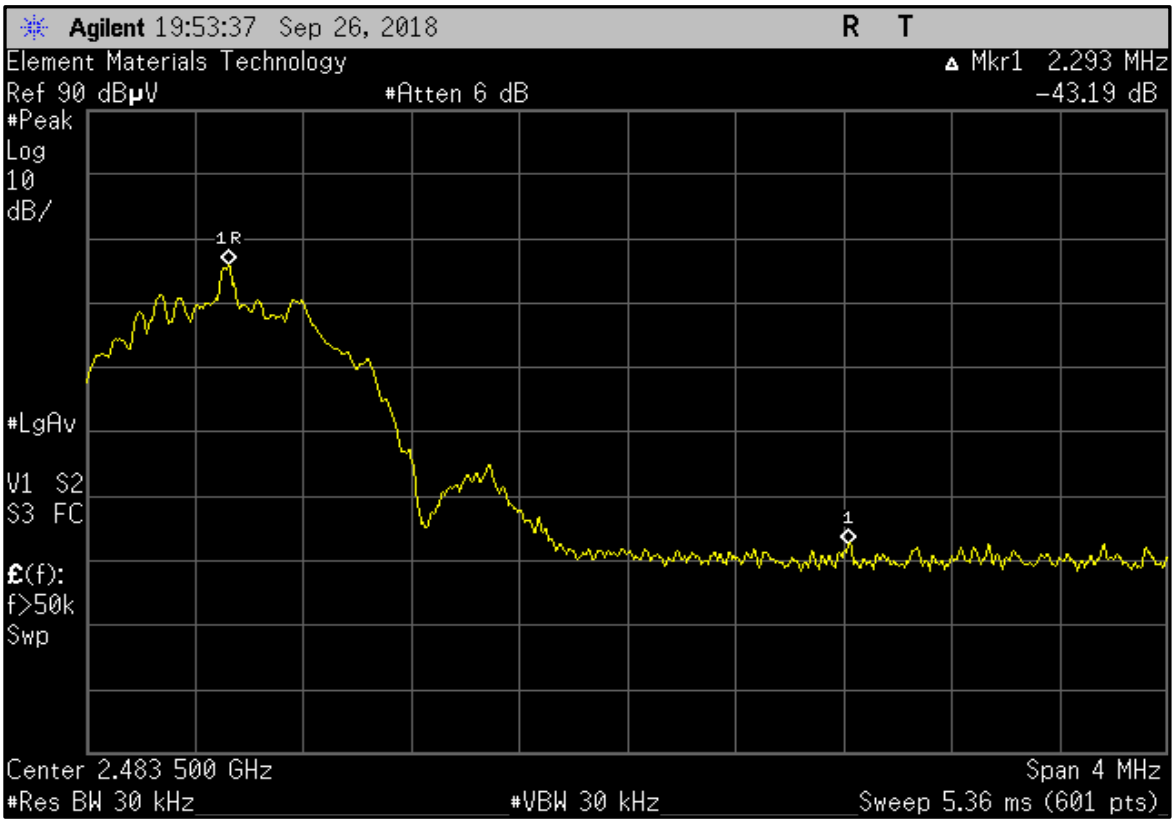


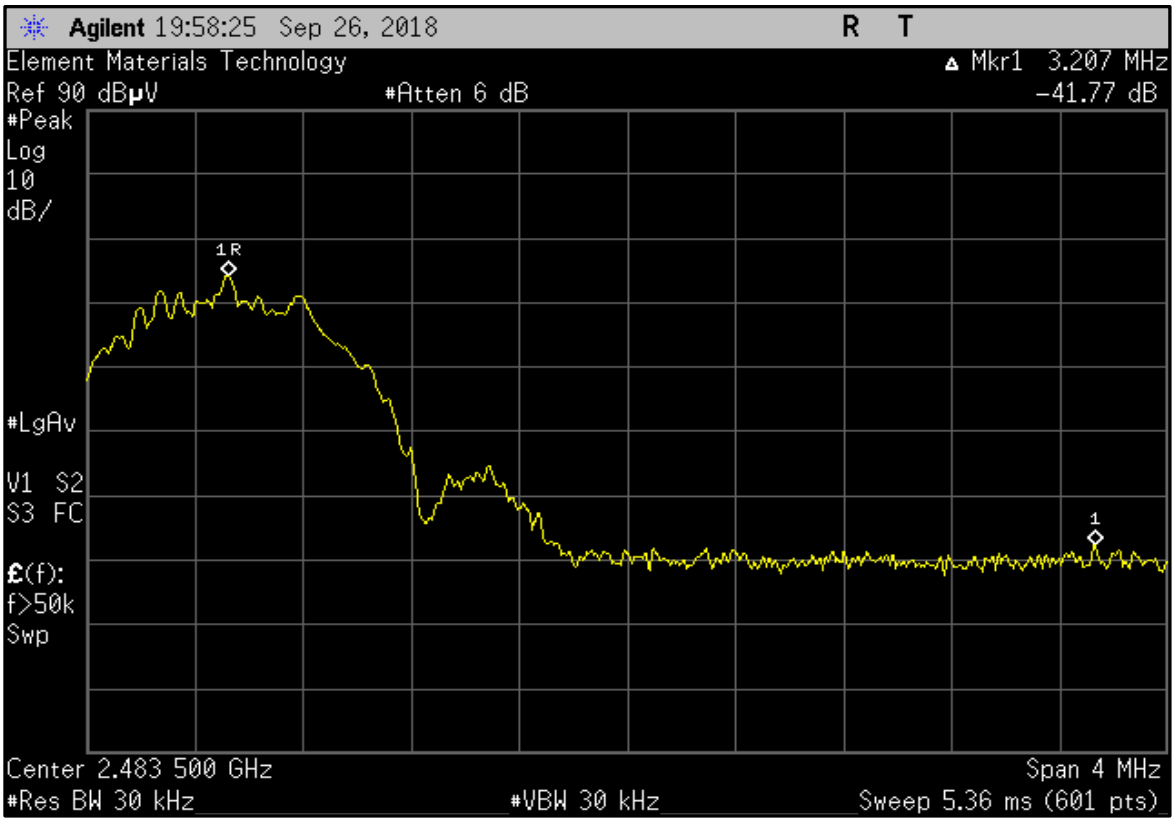
EUT on Side, Ant on Side, Port 7

SPURIOUS RADIATED EMISSIONS YAGI

EUT Vert, Ant Vert, Port 7

PSA-ESCI 2018.05.04



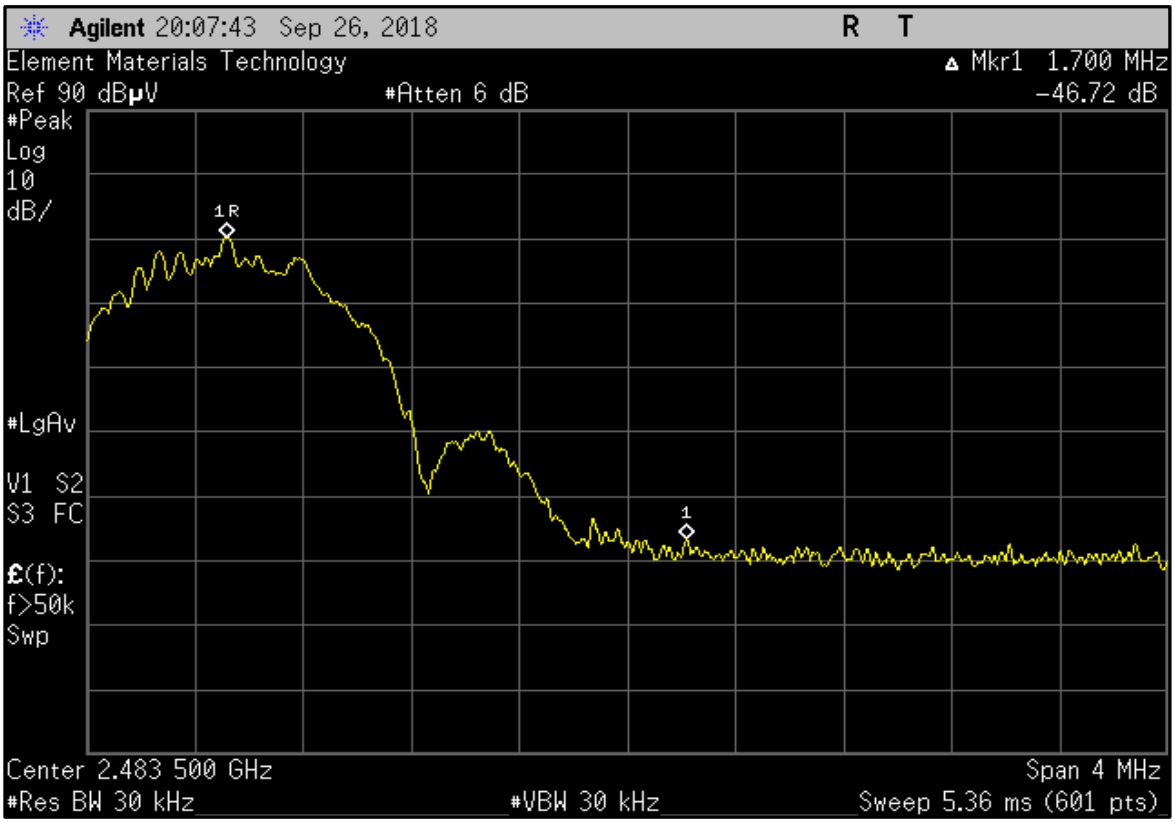


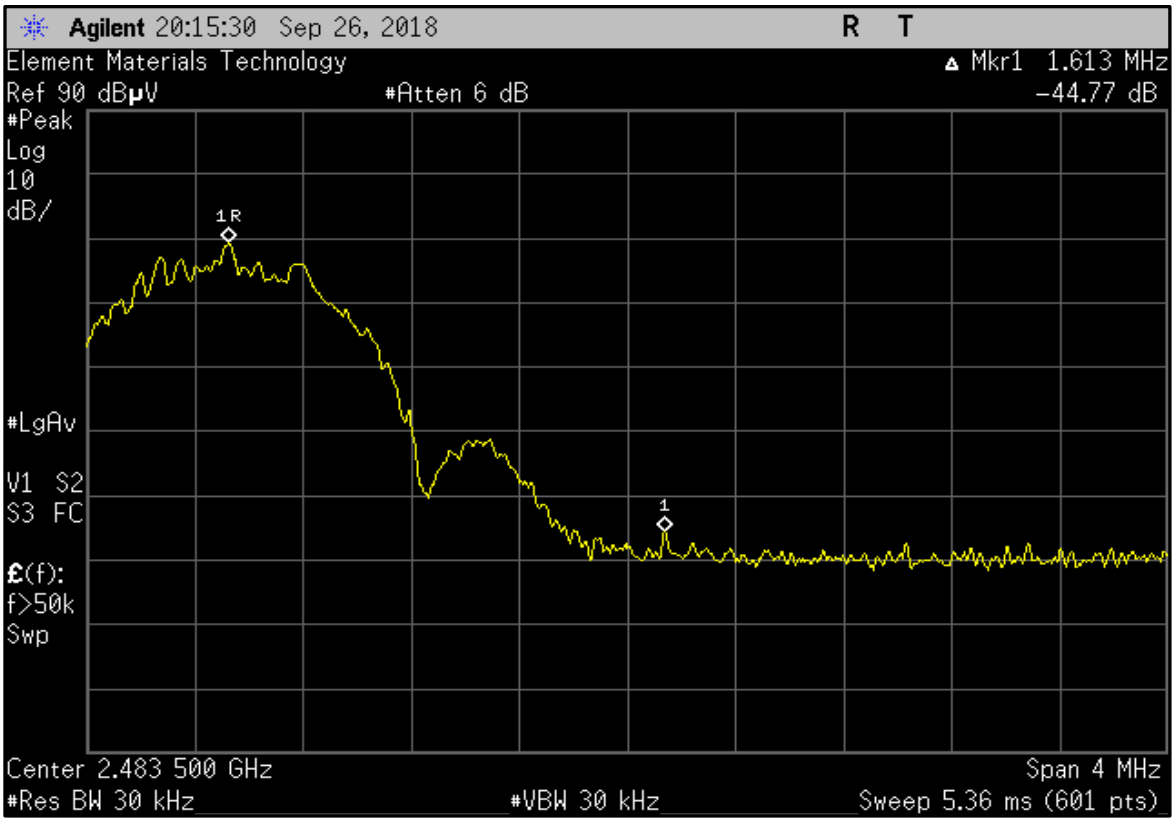
EUT Vert, Ant Vert, Port 7

SPURIOUS RADIATED EMISSIONS YAGI

EUT Horz, Ant Horz, Port 7

PSA-ESCI 2018.05.04





EUT Horz, Ant Horz, Port 7

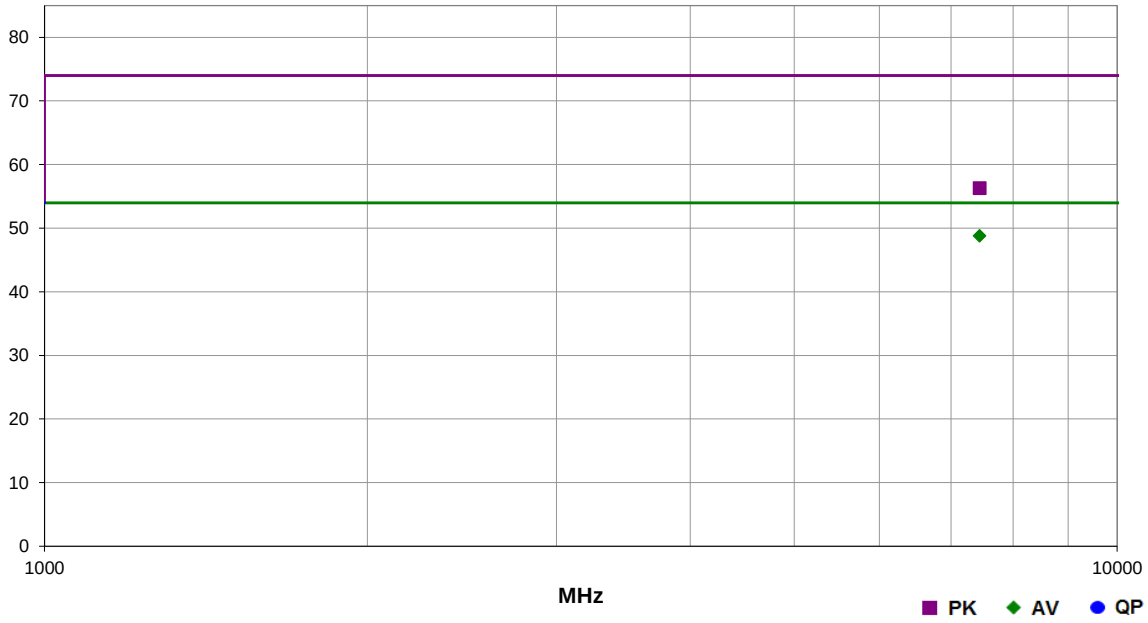
SPURIOUS RADIATED EMISSIONS YAGI

EmiR5 2018.07.19.3 PSA-ESCI 2018.05.04

Work Order:	SYNA0260	**Date:**	25-Sep-2018		
Project:	None	**Temperature:**	22.1 °C		
Job Site:	OC10	**Humidity:**	54.7% RH		
Serial Number:	E52	**Barometric Pres.:**	1017 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 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 #	46	**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
7445.035	27.7	17.8	1.0	279.0	3.3	0.0	Horz	AV	0.0	48.8	54.0	-5.2	EUT Horz, Ant Horz, Port 8
7445.435	38.6	17.7	1.0	279.0	0.0	0.0	Horz	PK	0.0	56.3	74.0	-17.7	EUT Horz, Ant Horz, Port 8

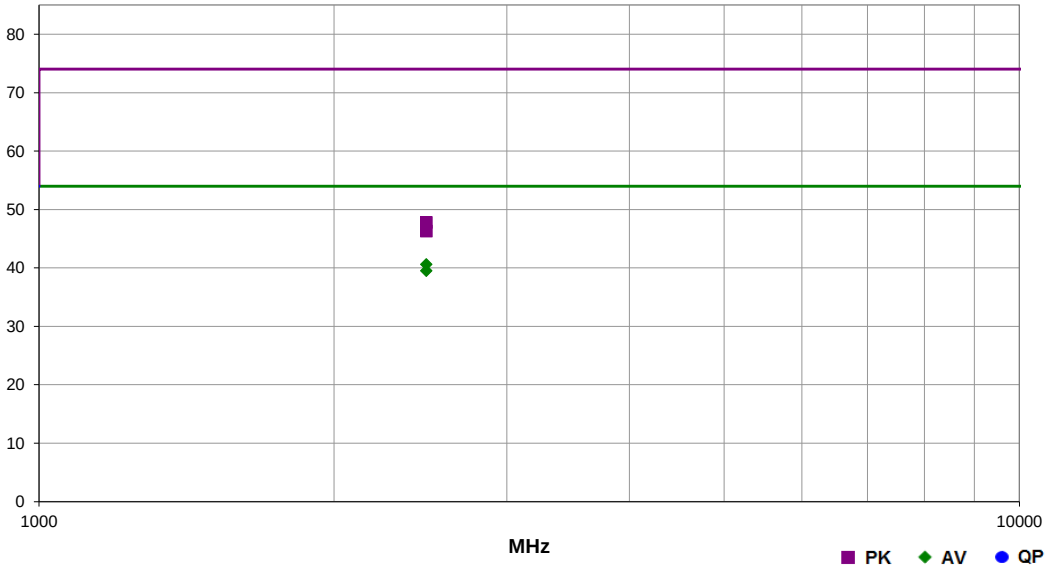
SPURIOUS RADIATED EMISSIONS YAGI

EmiR5 2018.07.19.3 PSA-ESCI 2018.05.04

Work Order:	SYNA0260	**Date:**	25-Sep-2018		
Project:	None	**Temperature:**	22.1 °C		
Job Site:	OC10	**Humidity:**	54.7% RH		
Serial Number:	E52	**Barometric Pres.:**	1017 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:	DTS Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, 2482 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 #	49	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass

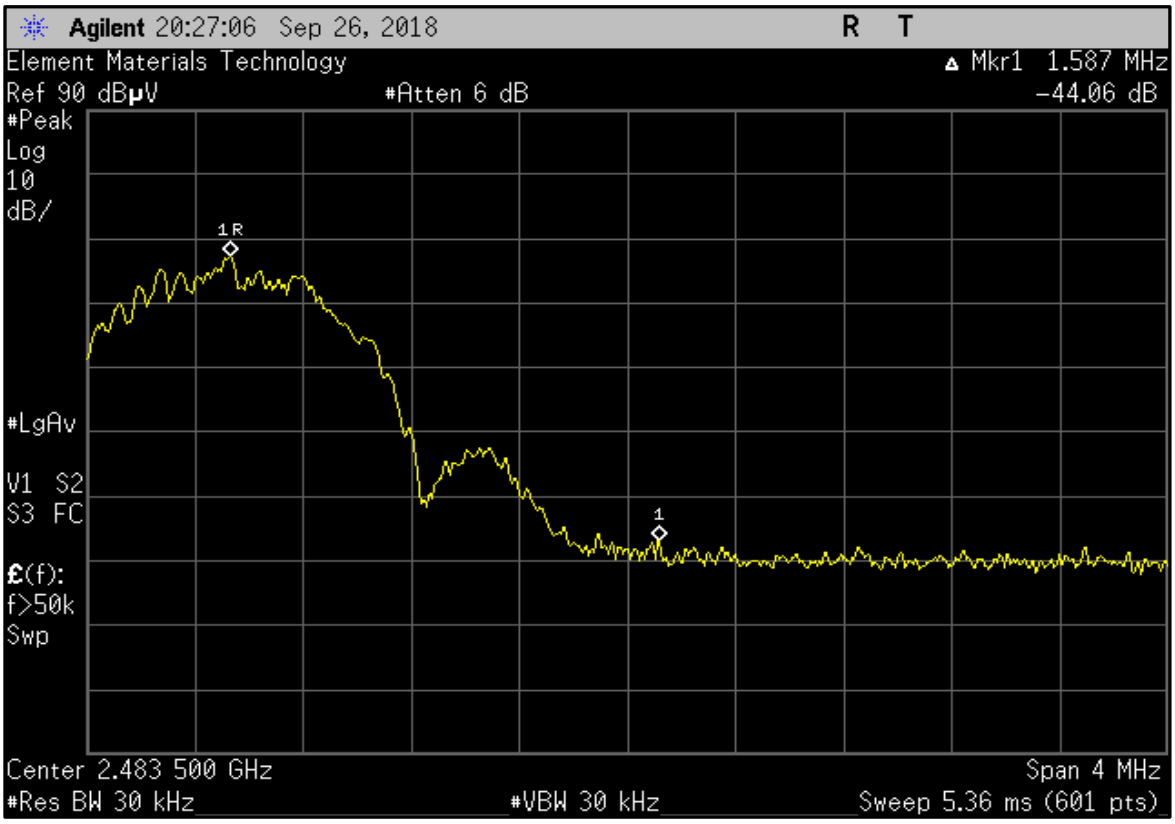


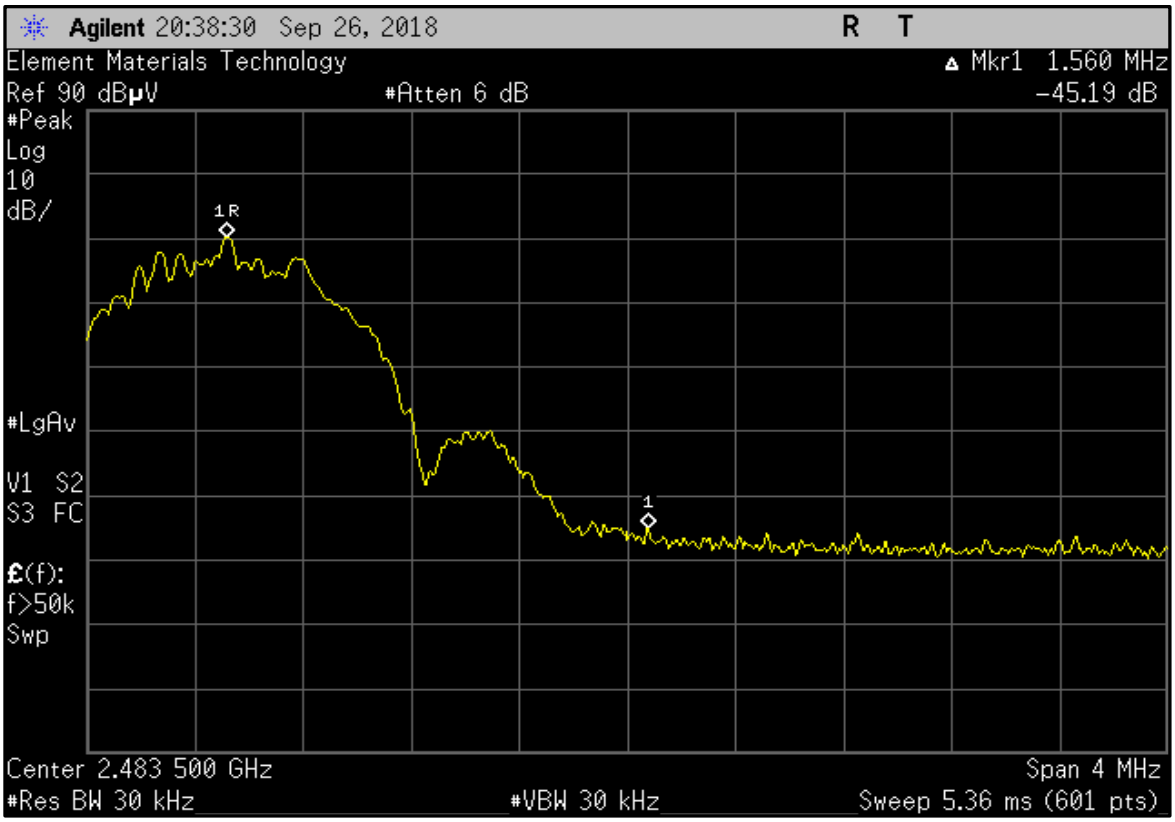
Freq (MHz)	Calculated Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Marker Delta Comments
2483.580	14.3	3.0	1.0	133.0	3.3	20.0	Vert	AV	0.0	40.6	54.0	-13.4	EUT Horz, Ant Horz, Port 8: Fund 59.5dBuV + -45.2dBc = 14.3dBuV (calc. amp.)
2483.621	13.2	3.0	1.0	237.0	3.3	20.0	Horz	AV	0.0	39.5	54.0	-14.5	EUT Horz, Ant Horz, Port 8: Fund 57.3dBuV + -44.1dBc = 13.2dBuV (calc. amp.)
2483.580	24.8	3.0	1.0	133.0	0.0	20.0	Vert	PK	0.0	47.8	74.0	-26.2	EUT Horz, Ant Horz, Port 8: Fund 70.0dBuV + -45.2dBc = 24.8dBuV (calc. amp.)
2483.621	23.3	3.0	1.0	237.0	0.0	20.0	Horz	PK	0.0	46.3	74.0	-27.7	EUT Horz, Ant Horz, Port 8: Fund 67.4dBuV + -44.1dBc = 23.3dBuV (calc. amp.)

SPURIOUS RADIATED EMISSIONS YAGI

EUT Horz, Ant Horz, Port 8

PSA-ESCI 2018.05.04





EUT Horz, Ant Horz, 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:**	**47.3% 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

None

DEVIATIONS FROM TEST STANDARD

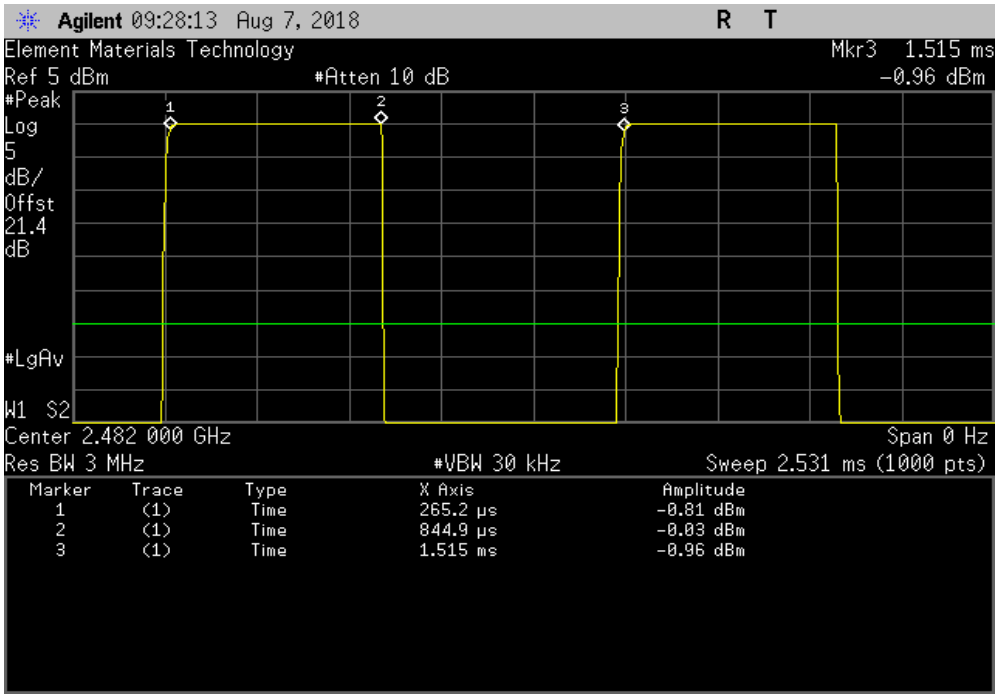
None

Configuration #	**7**	*Signature*

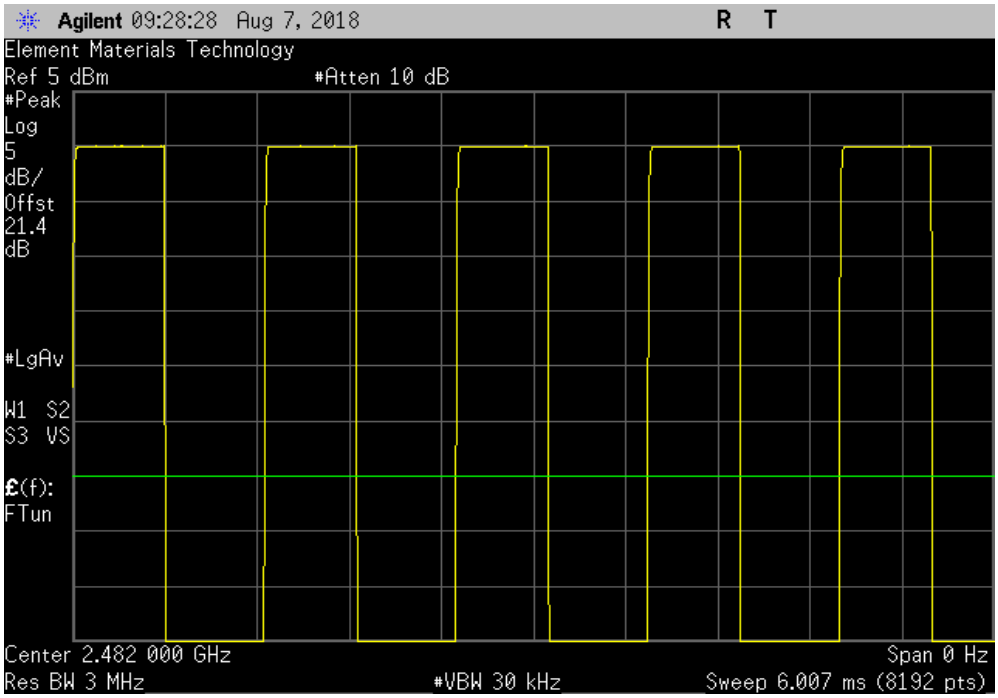
		Pulse Width	**Period**	**Number of Pulses**	**Value (%)**	**Limit (%)**	**Results**
Antenna Port 7							
	GFSK Modulation						
	Power Setting = 0, 2.0 dBi Dipole Antenna						
	Single Channel, 2482 MHz	579.661 us	1.25 ms	1	46.4	N/A	N/A
	Single Channel, 2482 MHz	N/A	N/A	5	N/A	N/A	N/A
	Power Setting = -4, 12 dBi 3x3 Array Antenna						
	Single Channel, 2482 MHz	582.447 us	1.25 ms	1	46.6	N/A	N/A
	Single Channel, 2482 MHz	N/A	N/A	5	N/A	N/A	N/A
Antenna Port 8							
	GFSK Modulation						
	Power Setting = 0, 2.0 dBi Dipole Antenna						
	Single Channel, 2482 MHz	586.627 us	1.252 ms	1	46.8	N/A	N/A
	Single Channel, 2482 MHz	N/A	N/A	5	N/A	N/A	N/A
	Power Setting = -4, 12 dBi 3x3 Array Antenna						
	Single Channel, 2482 MHz	585.994 us	1.252 ms	1	46.8	N/A	N/A
	Single Channel, 2482 MHz	N/A	N/A	5	N/A	N/A	N/A

DUTY CYCLE

Antenna Port 7, GFSK Modulation , Power Setting = 0, 2.0 dBi Dipole Antenna, Single Channel, 2482 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	579.661 us	1.25 ms	1	46.4	N/A	N/A

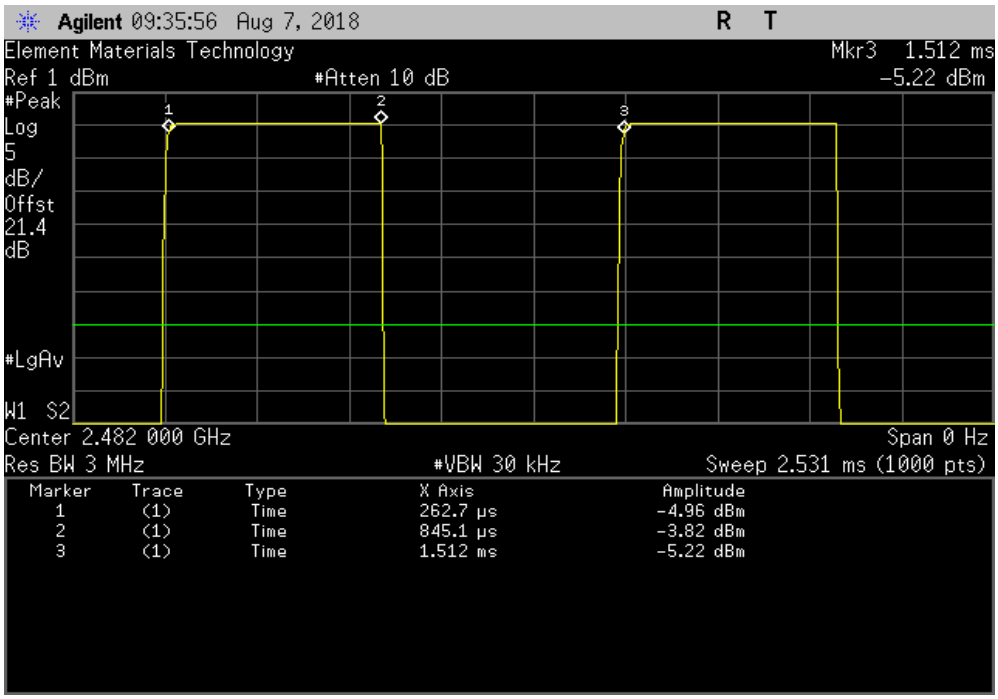


Antenna Port 7, GFSK Modulation , Power Setting = 0, 2.0 dBi Dipole Antenna, Single Channel, 2482 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

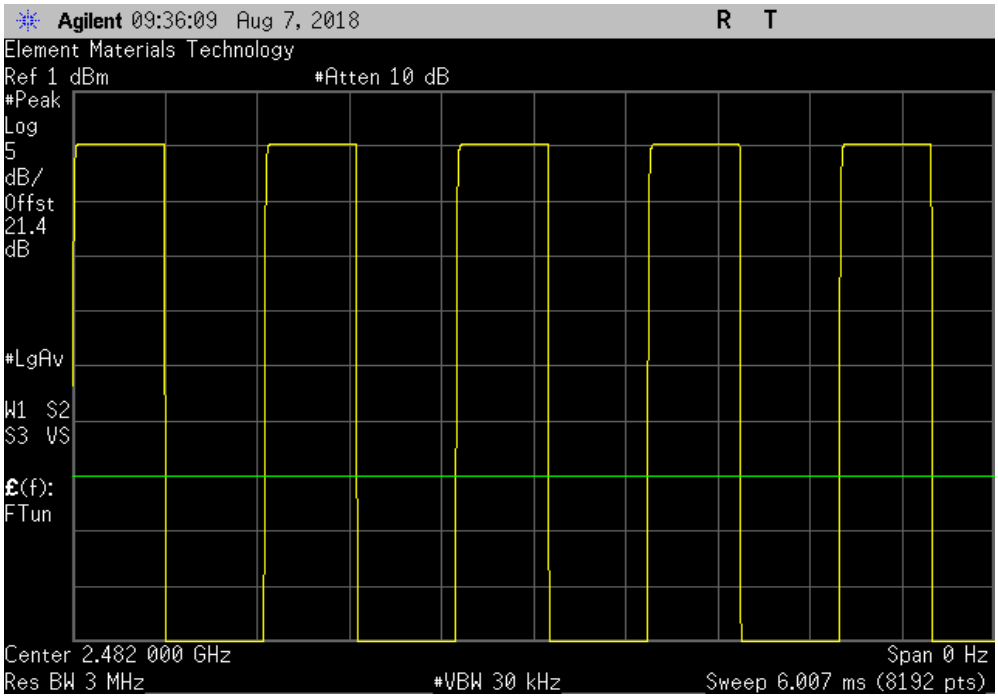


DUTY CYCLE

Antenna Port 7, GFSK Modulation , Power Setting = -4, 12 dBi 3x3 Array Antenna, Single Channel, 2482 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	582.447 us	1.25 ms	1	46.6	N/A	N/A

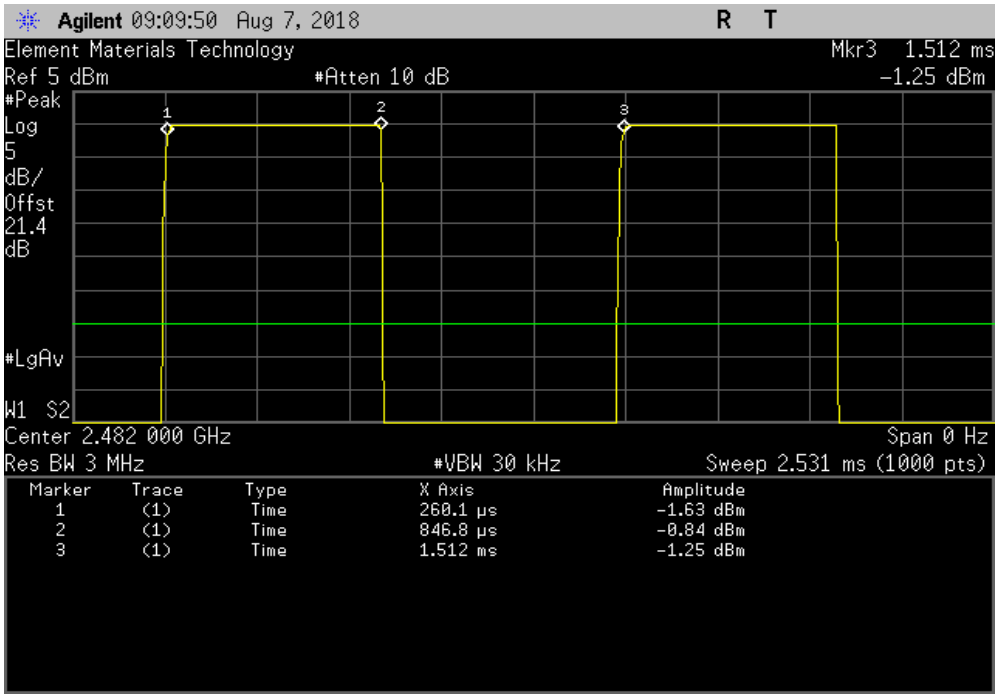


Antenna Port 7, GFSK Modulation , Power Setting = -4, 12 dBi 3x3 Array Antenna, Single Channel, 2482 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

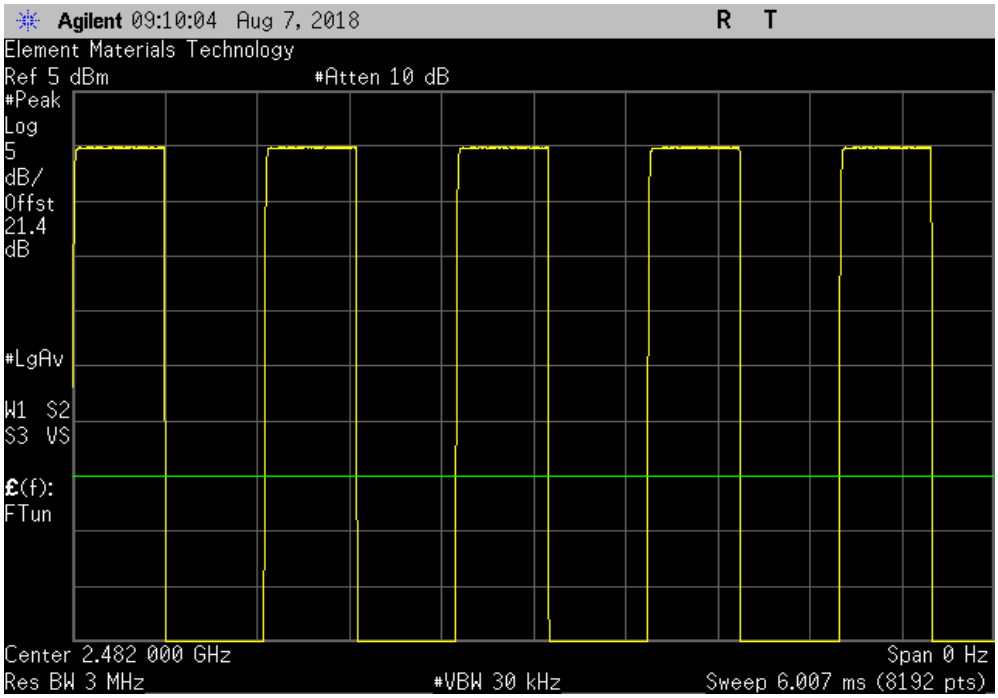


DUTY CYCLE

Antenna Port 8, GFSK Modulation , Power Setting = 0, 2.0 dBi Dipole Antenna, Single Channel, 2482 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	586.627 us	1.252 ms	1	46.8	N/A	N/A

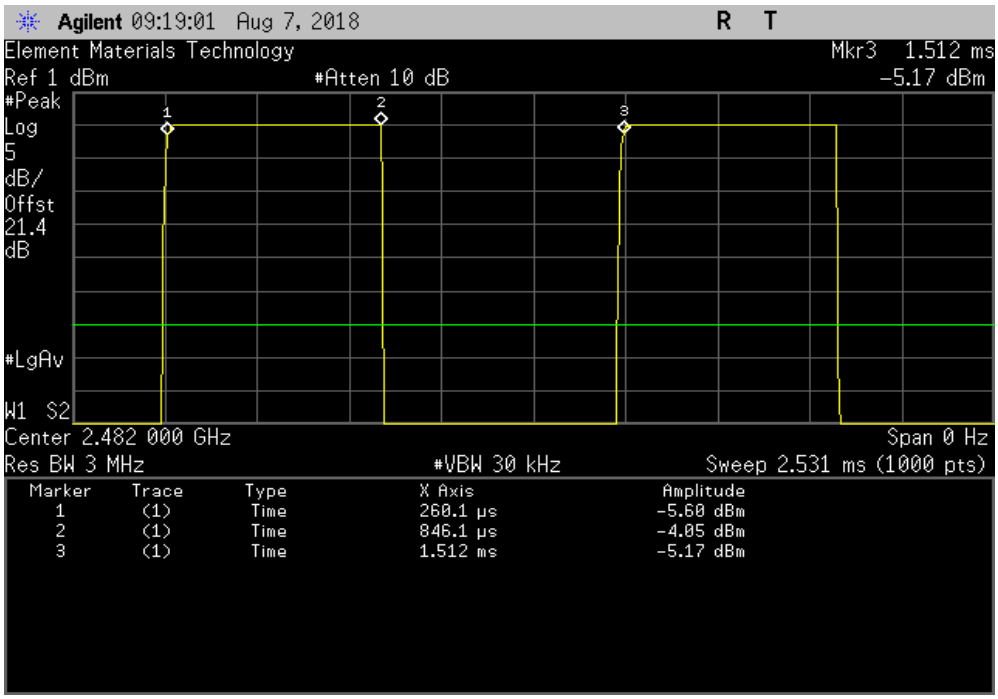


Antenna Port 8, GFSK Modulation , Power Setting = 0, 2.0 dBi Dipole Antenna, Single Channel, 2482 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

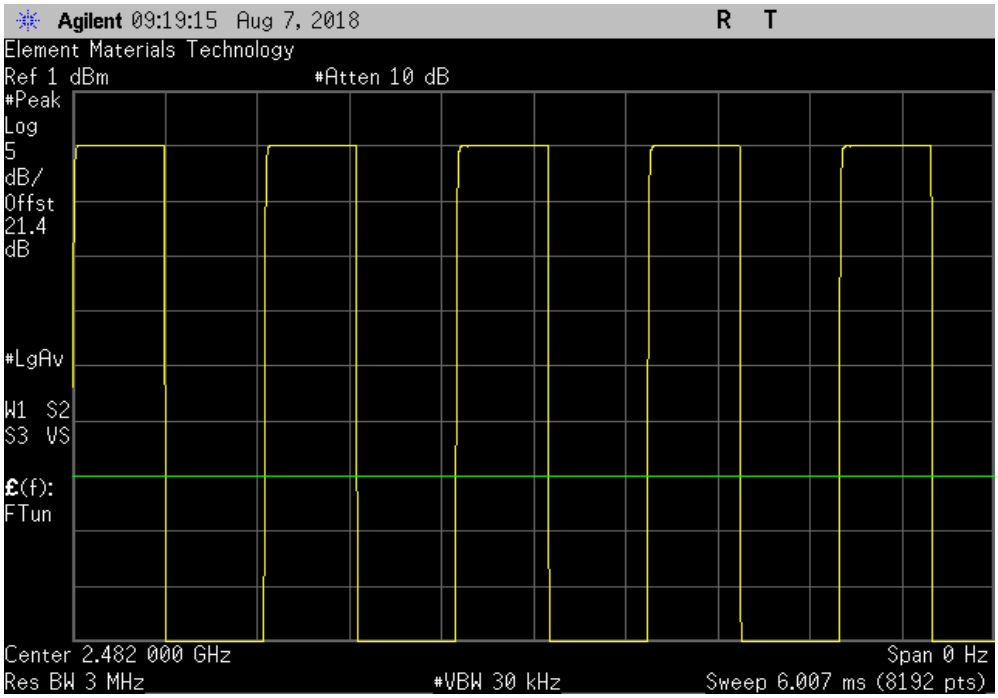


DUTY CYCLE

Antenna Port 8, GFSK Modulation , Power Setting = -4, 12 dBi 3x3 Array Antenna, Single Channel, 2482 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	585.994 us	1.252 ms	1	46.8	N/A	N/A



Antenna Port 8, GFSK Modulation , Power Setting = -4, 12 dBi 3x3 Array Antenna, Single Channel, 2482 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	N5183A	TIA	25-Apr-18	25-Apr-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

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:**	**47.6% 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

None

DEVIATIONS FROM TEST STANDARD

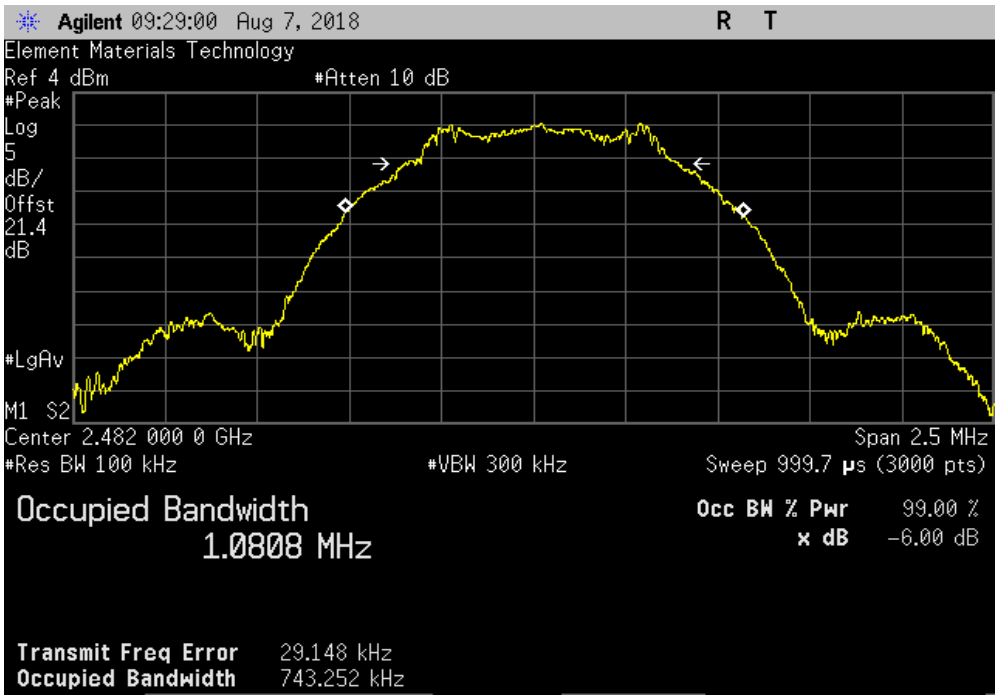
None

Configuration #	**7**	*Signature*

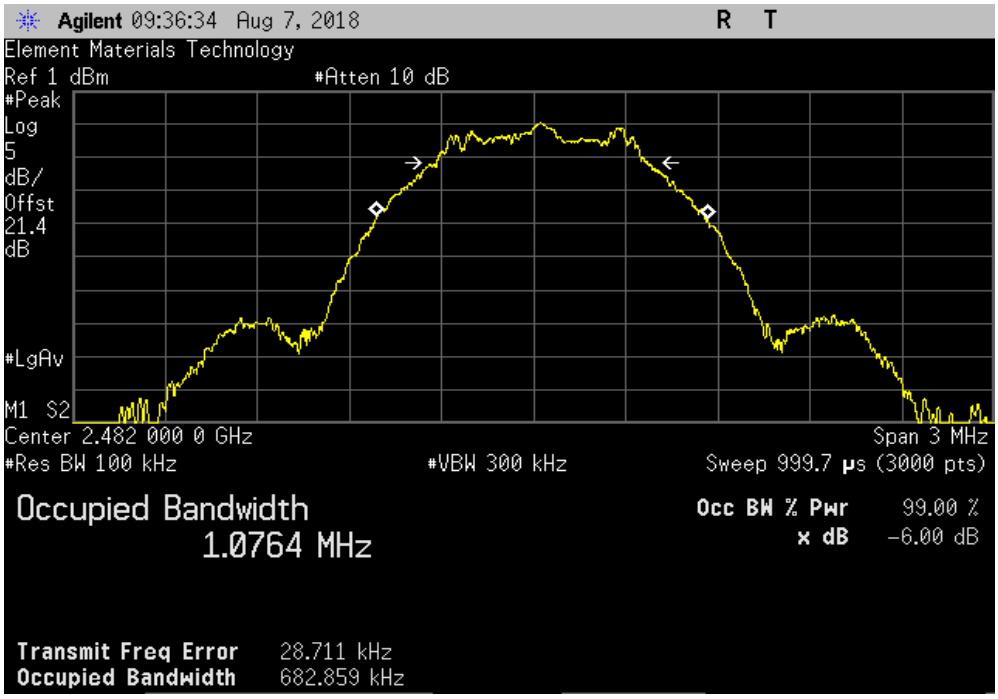
			Value	**Limit (≥)**	**Result**
Antenna Port 7					
	GFSK Modulation				
		Power Setting = 0, 2.0 dBi Dipole Antenna			
		Single Channel, 2482 MHz	743.252 kHz	500 kHz	Pass
		Power Setting = -4, 12 dBi 3x3 Array Antenna			
		Single Channel, 2482 MHz	682.859 kHz	500 kHz	Pass
Antenna Port 8					
	GFSK Modulation				
		Power Setting = 0, 2.0 dBi Dipole Antenna			
		Single Channel, 2482 MHz	690.218 kHz	500 kHz	Pass
		Power Setting = -4, 12 dBi 3x3 Array Antenna			
		Single Channel, 2482 MHz	687.185 kHz	500 kHz	Pass

OCCUPIED BANDWIDTH

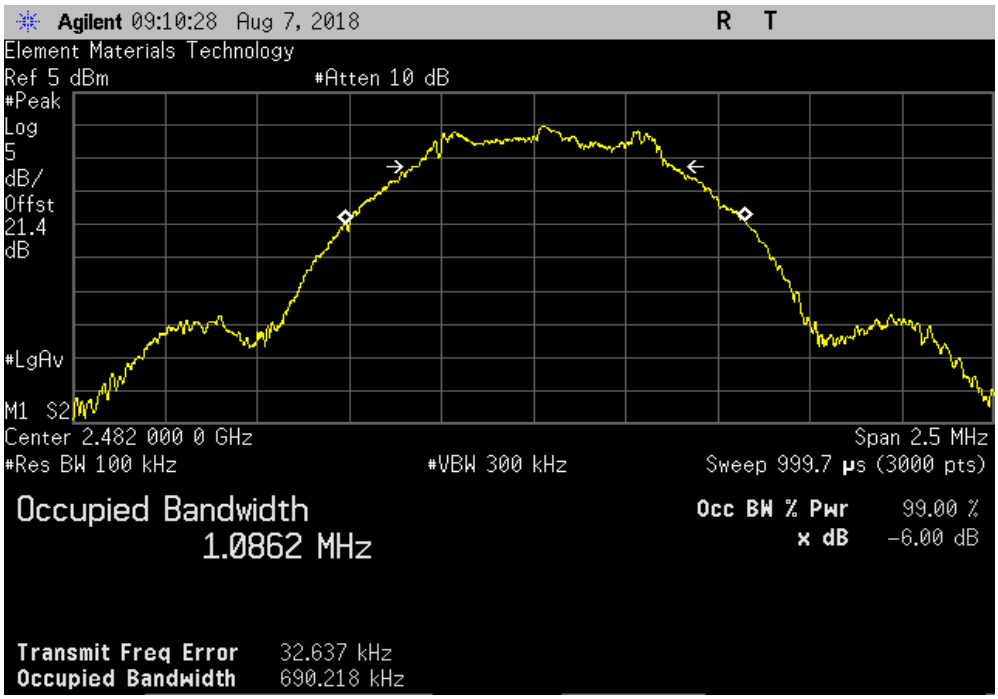
Antenna Port 7, GFSK Modulation , Power Setting = 0, 2.0 dBi Dipole Antenna, Single Channel, 2482 MHz						
				Value	Limit (≥)	Result
				743.252 kHz	500 kHz	Pass



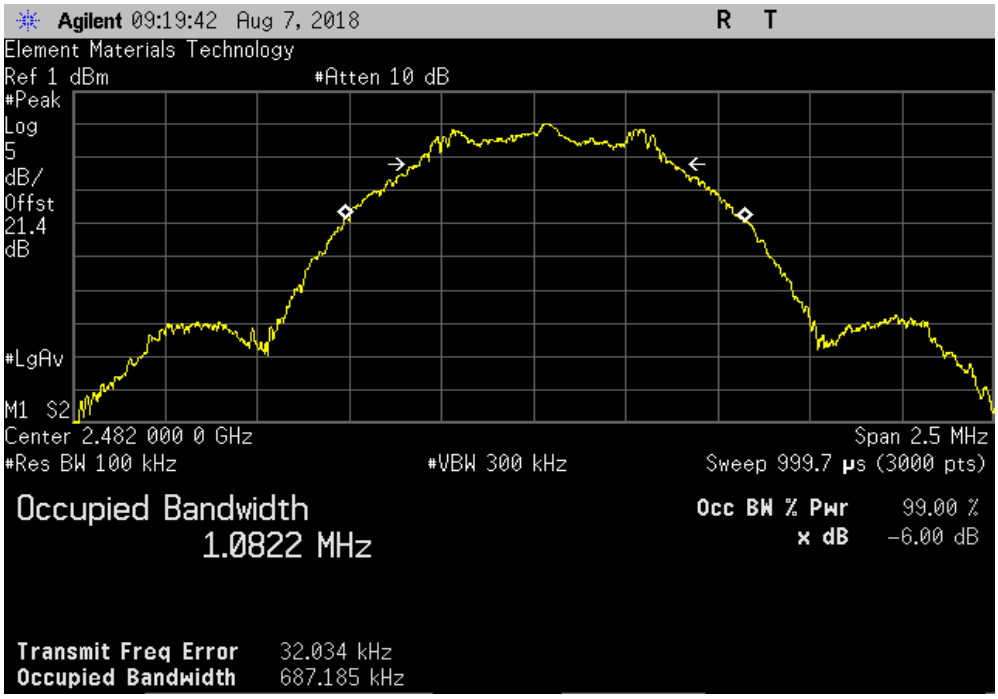
Antenna Port 7, GFSK Modulation , Power Setting = -4, 12 dBi 3x3 Array Antenna, Single Channel, 2482 MHz						
				Value	Limit (≥)	Result
				682.859 kHz	500 kHz	Pass



Antenna Port 8, GFSK Modulation , Power Setting = 0, 2.0 dBi Dipole Antenna, Single Channel, 2482 MHz						
				Value	Limit (≥)	Result
				690.218 kHz	500 kHz	Pass



Antenna Port 8, GFSK Modulation , Power Setting = -4, 12 dBi 3x3 Array Antenna, Single Channel, 2482 MHz						
				Value	Limit (≥)	Result
				687.185 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 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 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:**	**23.7 °C**
Attendees:	**Hattie Spetla**			**Humidity:**	**46.5% 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

None

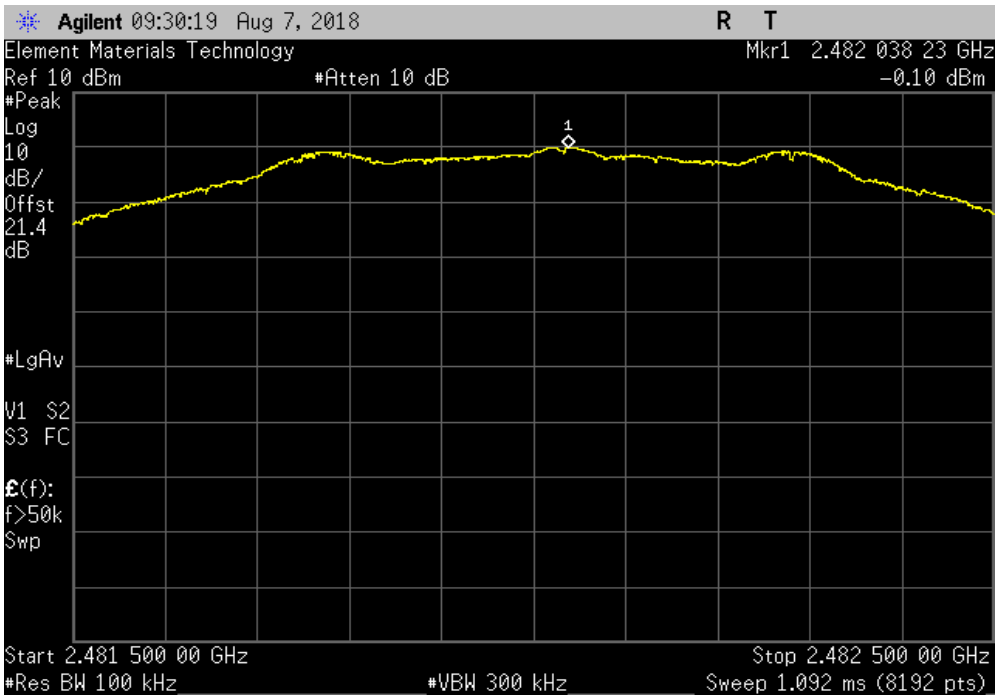
DEVIATIONS FROM TEST STANDARD

None

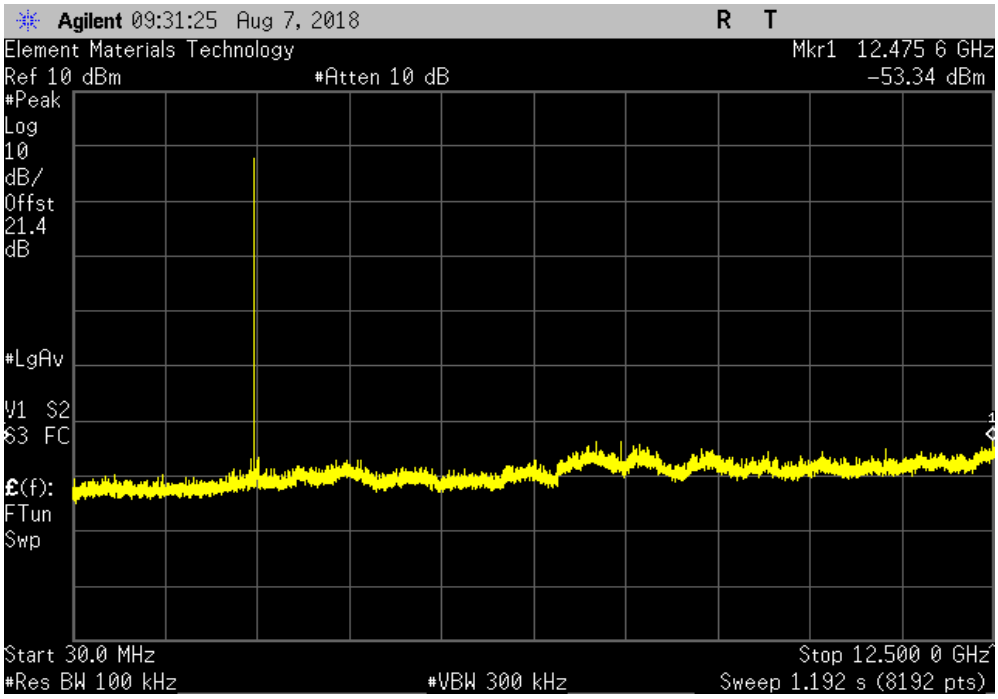
Configuration #	**7**	*Signature*

		Frequency Range	**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
Antenna Port 7					
	GFSK Modulation				
	Power Setting = 0, 2.0 dBi Dipole Antenna				
	Single Channel, 2482 MHz	Fundamental	N/A	N/A	N/A
	Single Channel, 2482 MHz	30 MHz - 12.5 GHz	-53.24	-20	Pass
	Single Channel, 2482 MHz	12.5 GHz - 25 GHz	-50.01	-20	Pass
	Power Setting = -4, 12 dBi 3x3 Array Antenna				
	Single Channel, 2482 MHz	Fundamental	N/A	N/A	N/A
	Single Channel, 2482 MHz	30 MHz - 12.5 GHz	-49.5	-20	Pass
	Single Channel, 2482 MHz	12.5 GHz - 25 GHz	-46.81	-20	Pass
Antenna Port 8					
	GFSK Modulation				
	Power Setting = 0, 2.0 dBi Dipole Antenna				
	Single Channel, 2482 MHz	Fundamental	N/A	N/A	N/A
	Single Channel, 2482 MHz	30 MHz - 12.5 GHz	-50.99	-20	Pass
	Single Channel, 2482 MHz	12.5 GHz - 25 GHz	-49.92	-20	Pass
	Power Setting = -4, 12 dBi 3x3 Array Antenna				
	Single Channel, 2482 MHz	Fundamental	N/A	N/A	N/A
	Single Channel, 2482 MHz	30 MHz - 12.5 GHz	-49.21	-20	Pass
	Single Channel, 2482 MHz	12.5 GHz - 25 GHz	-46.19	-20	Pass

Antenna Port 7, GFSK Modulation , Power Setting = 0, 2.0 dBi Dipole Antenna, Single Channel, 2482 MHz						
	Frequency Range			**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
	Fundamental			N/A	N/A	N/A

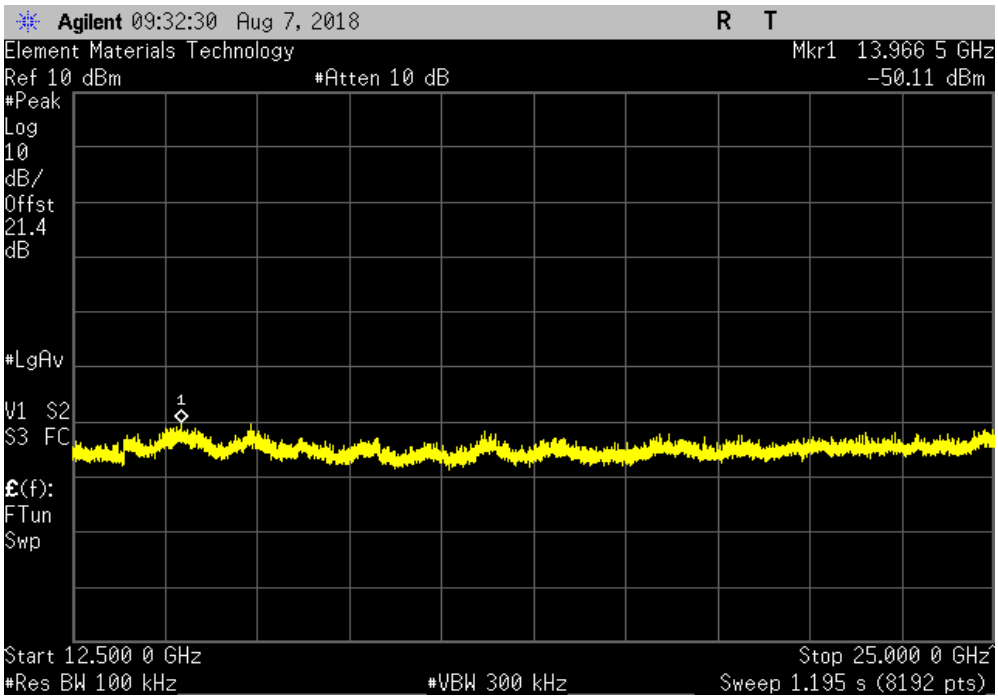


Antenna Port 7, GFSK Modulation , Power Setting = 0, 2.0 dBi Dipole Antenna, Single Channel, 2482 MHz					
Frequency Range			**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
30 MHz - 12.5 GHz			-53.24	-20	Pass



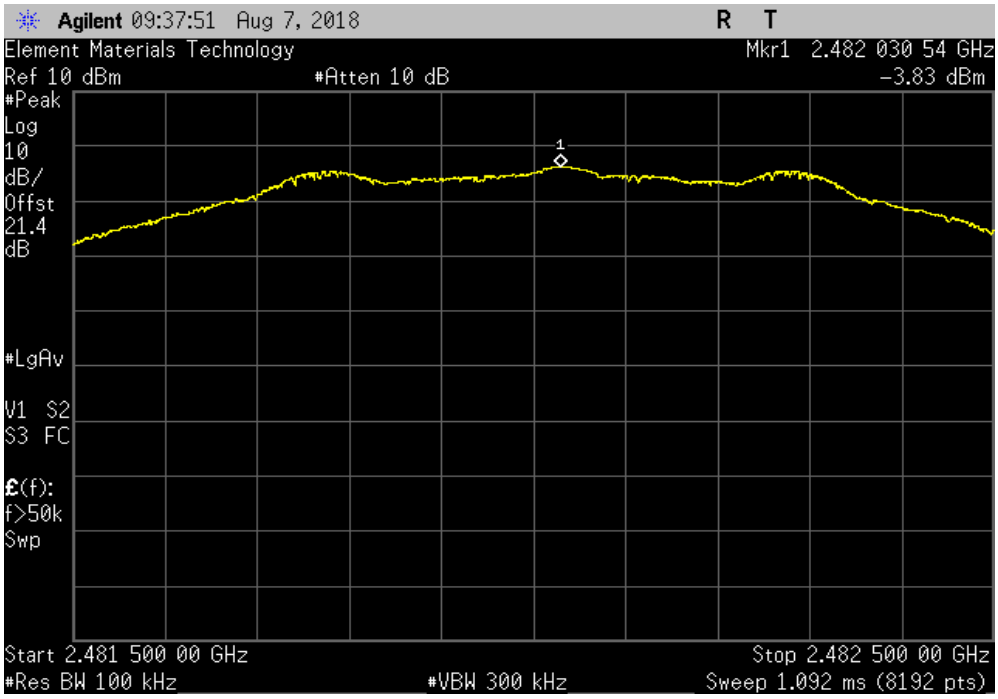
Antenna Port 7, GFSK Modulation , Power Setting = 0, 2.0 dBi Dipole Antenna, Single Channel, 2482 MHz

Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result
12.5 GHz - 25 GHz		-50.01	-20	Pass

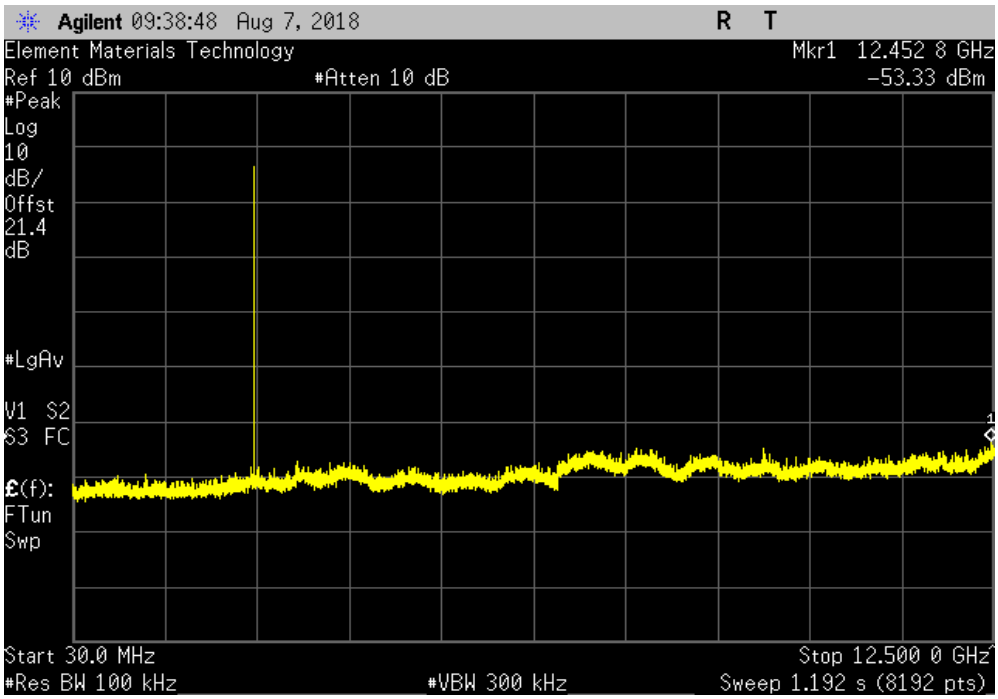


Antenna Port 7, GFSK Modulation , Power Setting = -4, 12 dBi 3x3 Array Antenna, Single Channel, 2482 MHz

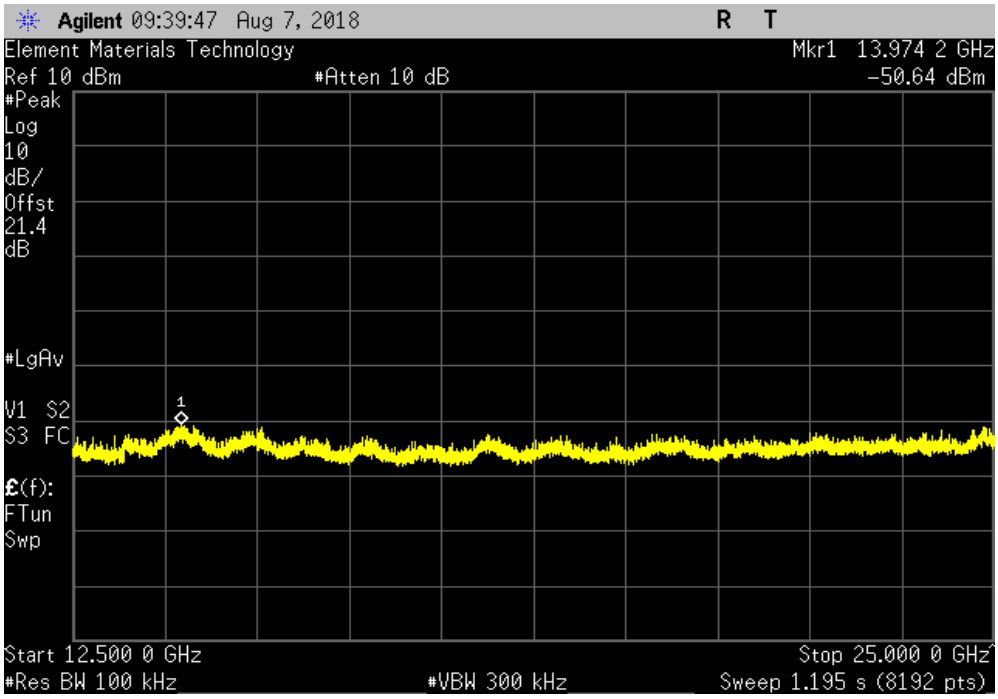
Frequency Range				Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental			N/A	N/A	N/A



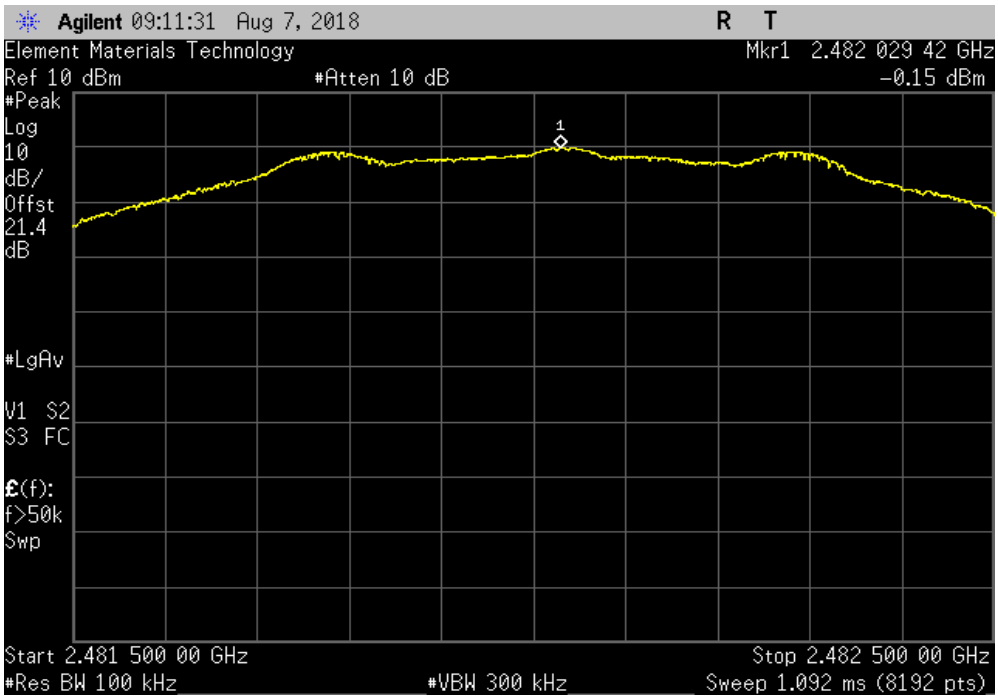
Antenna Port 7, GFSK Modulation , Power Setting = -4, 12 dBi 3x3 Array Antenna, Single Channel, 2482 MHz				
Frequency Range		**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
30 MHz - 12.5 GHz		-49.5	-20	Pass



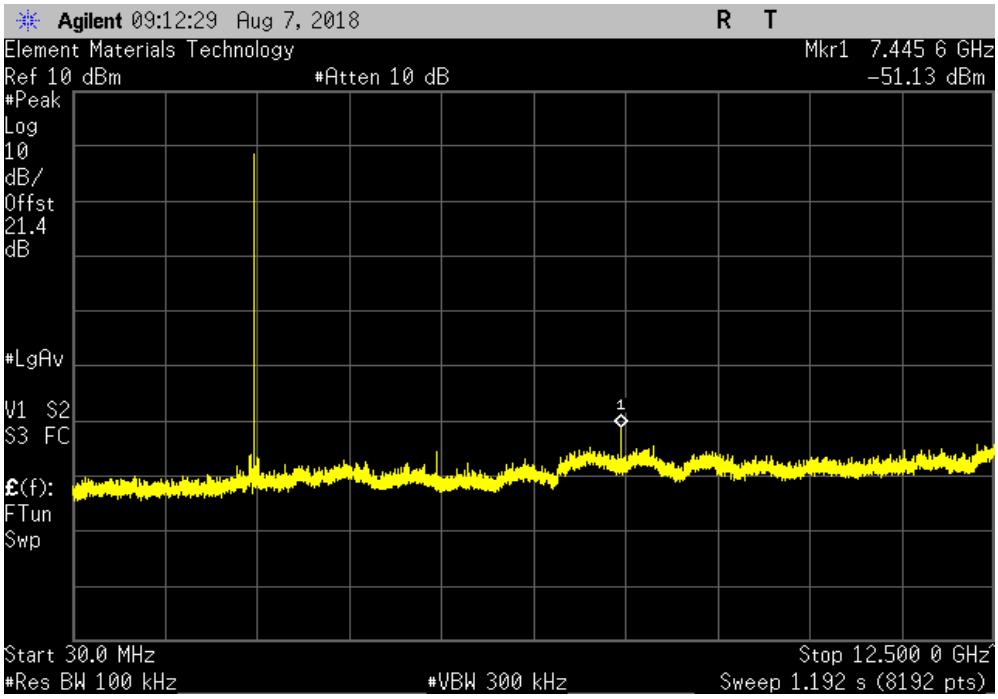
Antenna Port 7, GFSK Modulation , Power Setting = -4, 12 dBi 3x3 Array Antenna, Single Channel, 2482 MHz				
Frequency Range		**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
12.5 GHz - 25 GHz		-46.81	-20	Pass



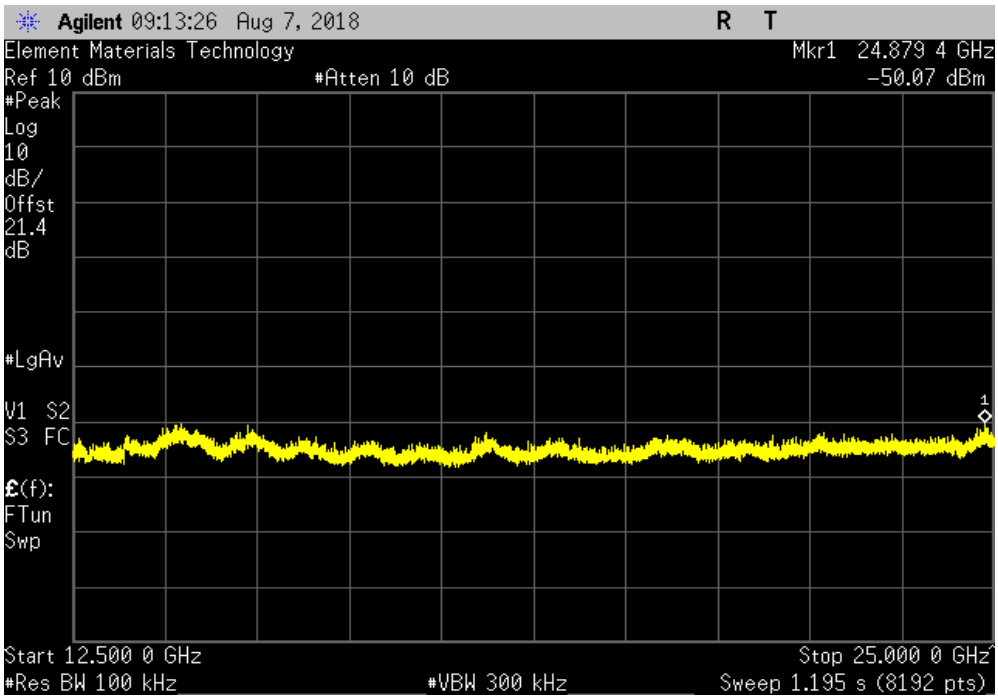
Antenna Port 8, GFSK Modulation , Power Setting = 0, 2.0 dBi Dipole Antenna, Single Channel, 2482 MHz						
	Frequency Range			Max Value (dBc)	Limit ≤ (dBc)	Result
	Fundamental			N/A	N/A	N/A



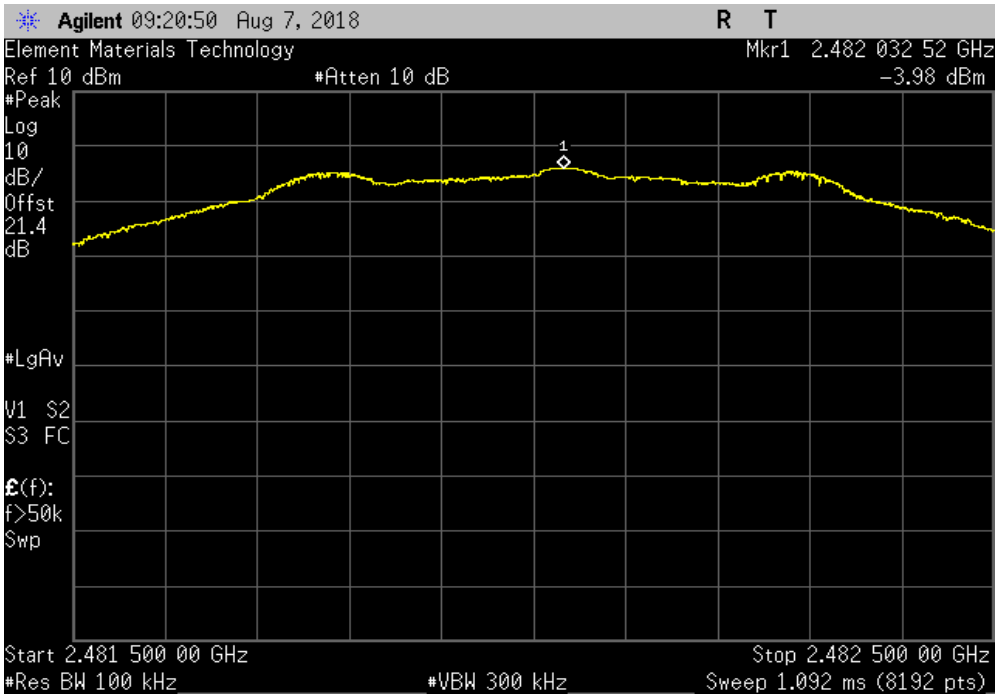
Antenna Port 8, GFSK Modulation , Power Setting = 0, 2.0 dBi Dipole Antenna, Single Channel, 2482 MHz					
Frequency Range		Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		-50.99	-20	Pass	



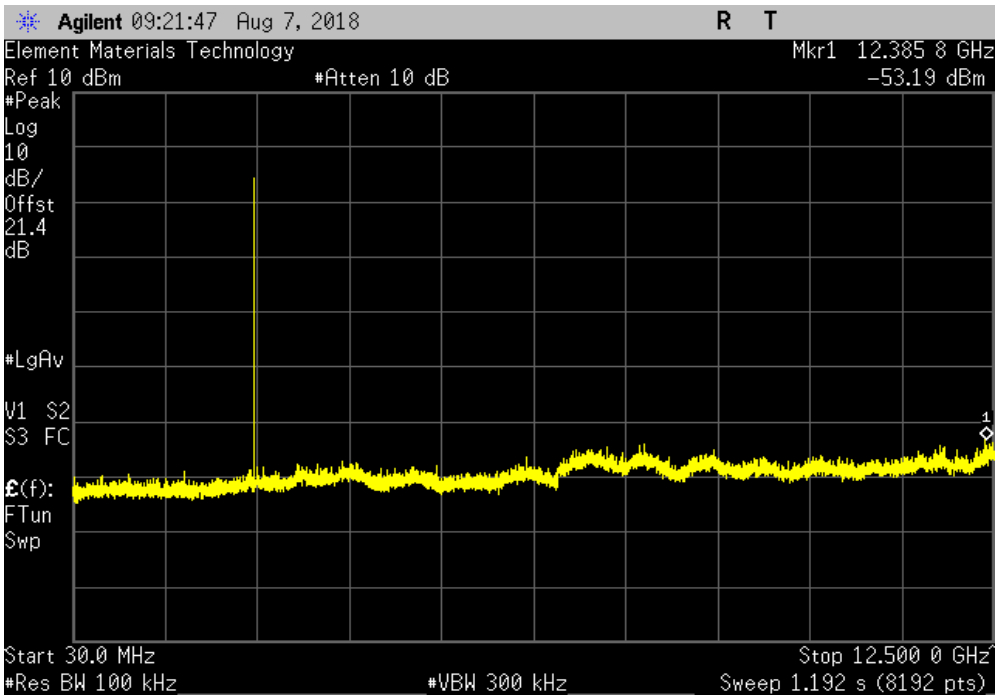
Antenna Port 8, GFSK Modulation , Power Setting = 0, 2.0 dBi Dipole Antenna, Single Channel, 2482 MHz				
Frequency Range		**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
12.5 GHz - 25 GHz		-49.92	-20	Pass



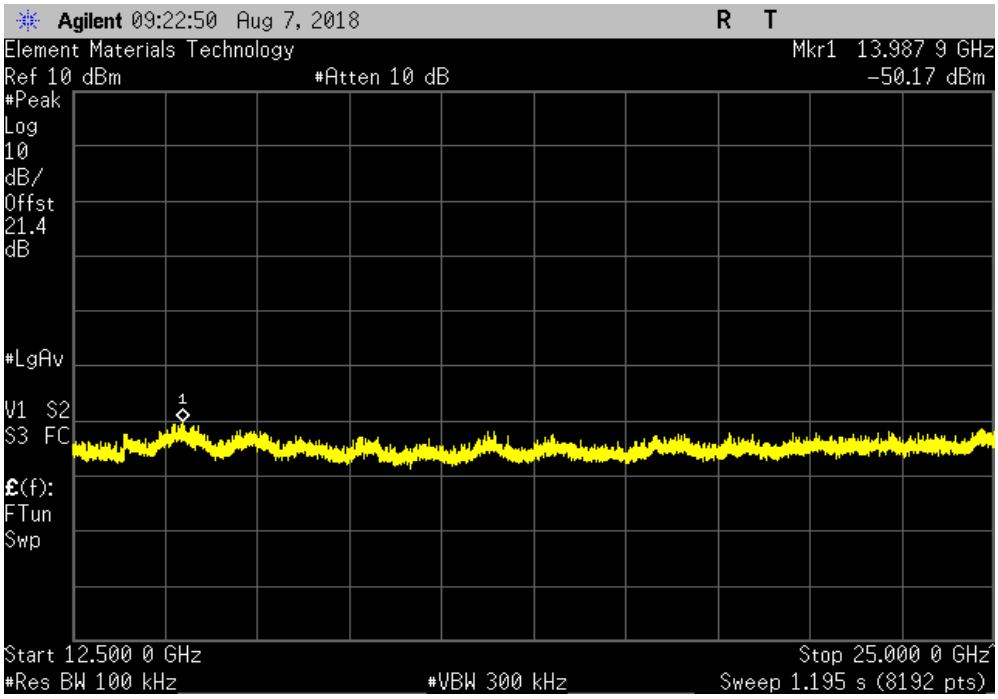
Antenna Port 8, GFSK Modulation , Power Setting = -4, 12 dBi 3x3 Array Antenna, Single Channel, 2482 MHz						
	Frequency Range			**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
	Fundamental			N/A	N/A	N/A



Antenna Port 8, GFSK Modulation , Power Setting = -4, 12 dBi 3x3 Array Antenna, Single Channel, 2482 MHz				
Frequency Range		**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
30 MHz - 12.5 GHz		-49.21	-20	Pass



Antenna Port 8, GFSK Modulation , Power Setting = -4, 12 dBi 3x3 Array Antenna, Single Channel, 2482 MHz				
Frequency Range		**Max Value (dBc)**	**Limit ≤ (dBc)**	**Result**
12.5 GHz - 25 GHz		-46.19	-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:**	**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

None

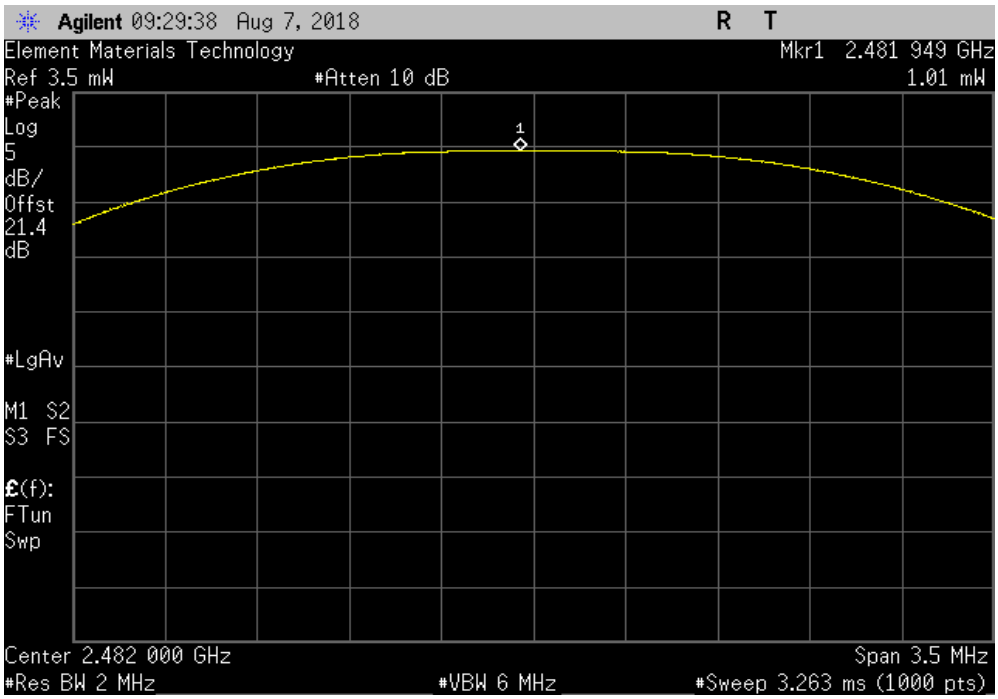
DEVIATIONS FROM TEST STANDARD

None

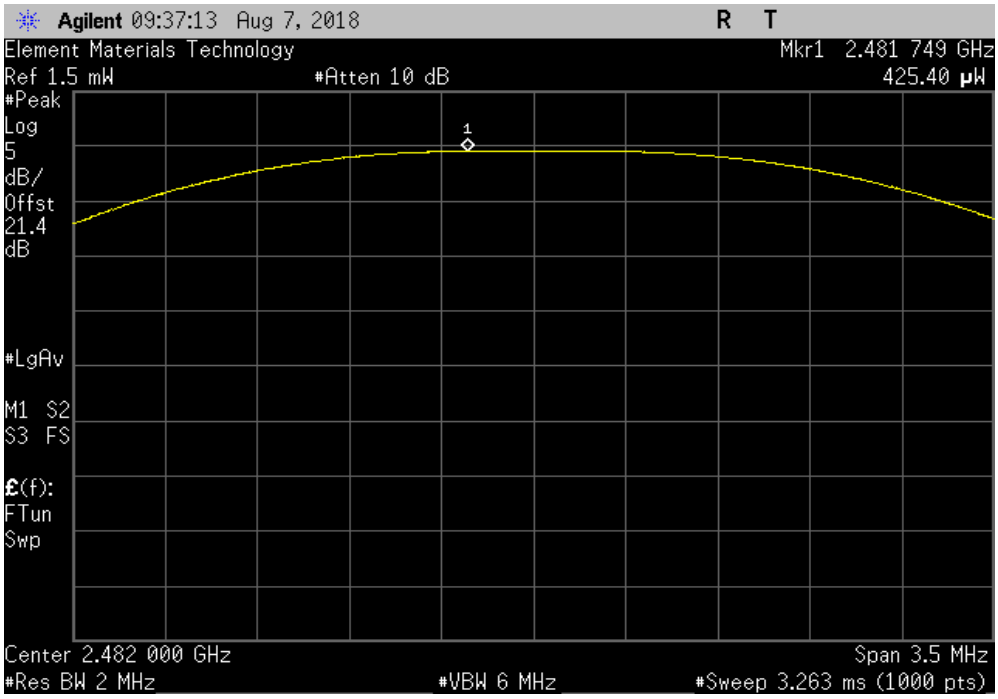
Configuration #	**7**	*Signature*

		Value	**Limit (<)**	**Result**
Antenna Port 7				
	GFSK Modulation			
	Power Setting = 0, 2.0 dBi Dipole Antenna			
	Single Channel, 2482 MHz	1.013 mW	1 W	Pass
	Power Setting = -4, 12 dBi 3x3 Array Antenna			
	Single Channel, 2482 MHz	0.425 mW	1 W	Pass
Antenna Port 8				
	GFSK Modulation			
	Power Setting = 0, 2.0 dBi Dipole Antenna			
	Single Channel, 2482 MHz	0.988 mW	1 W	Pass
	Power Setting = -4, 12 dBi 3x3 Array Antenna			
	Single Channel, 2482 MHz	0.411 mW	1 W	Pass

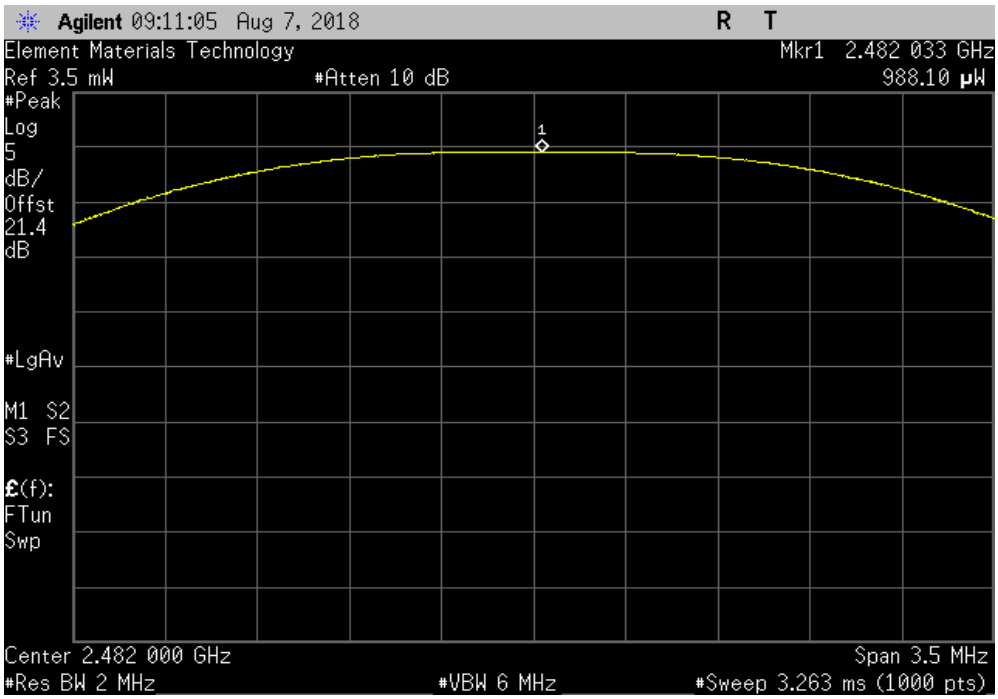
Antenna Port 7, GFSK Modulation , Power Setting = 0, 2.0 dBi Dipole Antenna, Single Channel, 2482 MHz						
				Value	Limit (<)	Result
				1.013 mW	1 W	Pass



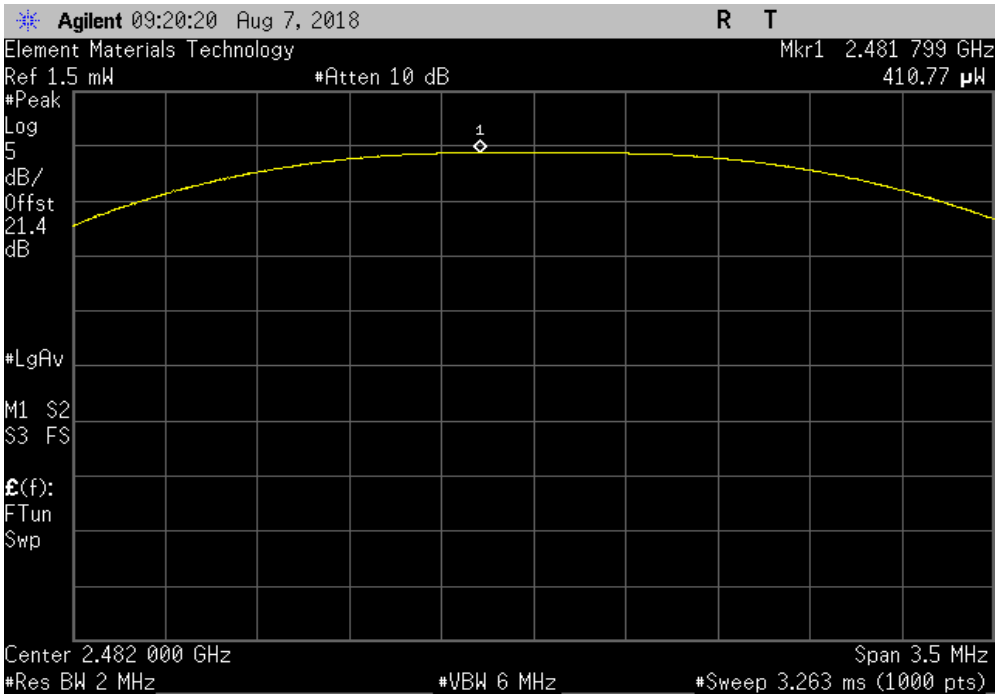
Antenna Port 7, GFSK Modulation , Power Setting = -4, 12 dBi 3x3 Array Antenna, Single Channel, 2482 MHz						
				Value	Limit (<)	Result
				0.425 mW	1 W	Pass



Antenna Port 8, GFSK Modulation , Power Setting = 0, 2.0 dBi Dipole Antenna, Single Channel, 2482 MHz						
				Value	Limit (<)	Result
				0.988 mW	1 W	Pass



Antenna Port 8, GFSK Modulation , Power Setting = -4, 12 dBi 3x3 Array Antenna, Single Channel, 2482 MHz						
				Value	Limit (<)	Result
				0.411 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

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% 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

None

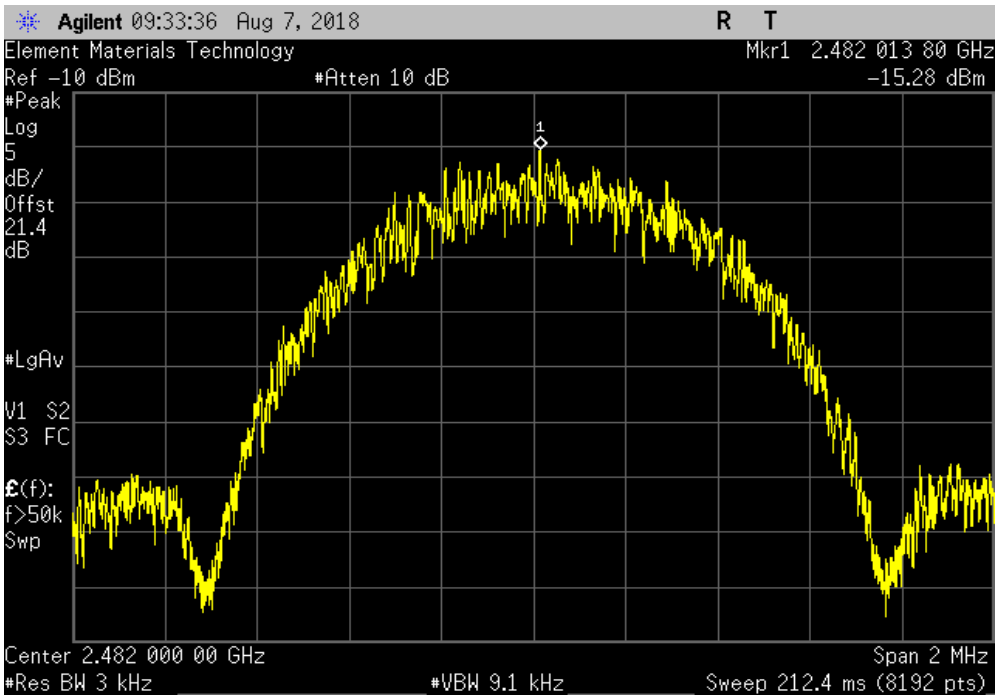
DEVIATIONS FROM TEST STANDARD

None

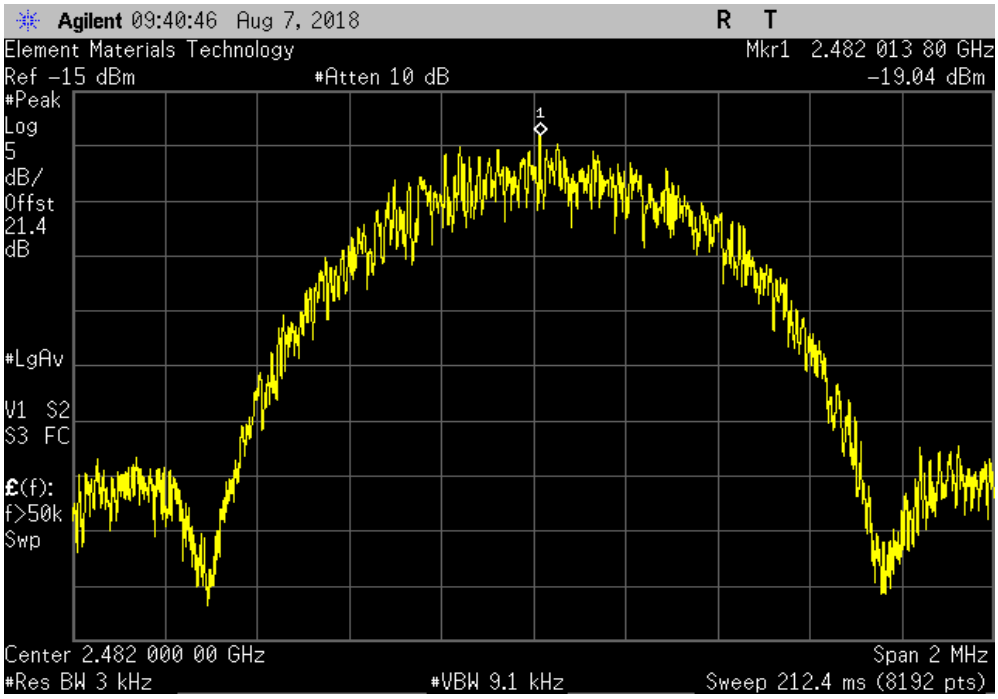
Configuration #	**7**	*Signature*

		Value dBm/3kHz	**Limit < dBm/3kHz**	**Results**
Antenna Port 7				
	GFSK Modulation			
	Power Setting = 0, 2.0 dBi Dipole Antenna			
	Single Channel, 2482 MHz	-15.277	8	Pass
	Power Setting = -4, 12 dBi 3x3 Array Antenna			
	Single Channel, 2482 MHz	-19.044	8	Pass
Antenna Port 8				
	GFSK Modulation			
	Power Setting = 0, 2.0 dBi Dipole Antenna			
	Single Channel, 2482 MHz	-15.338	8	Pass
	Power Setting = -4, 12 dBi 3x3 Array Antenna			
	Single Channel, 2482 MHz	-19.151	8	Pass

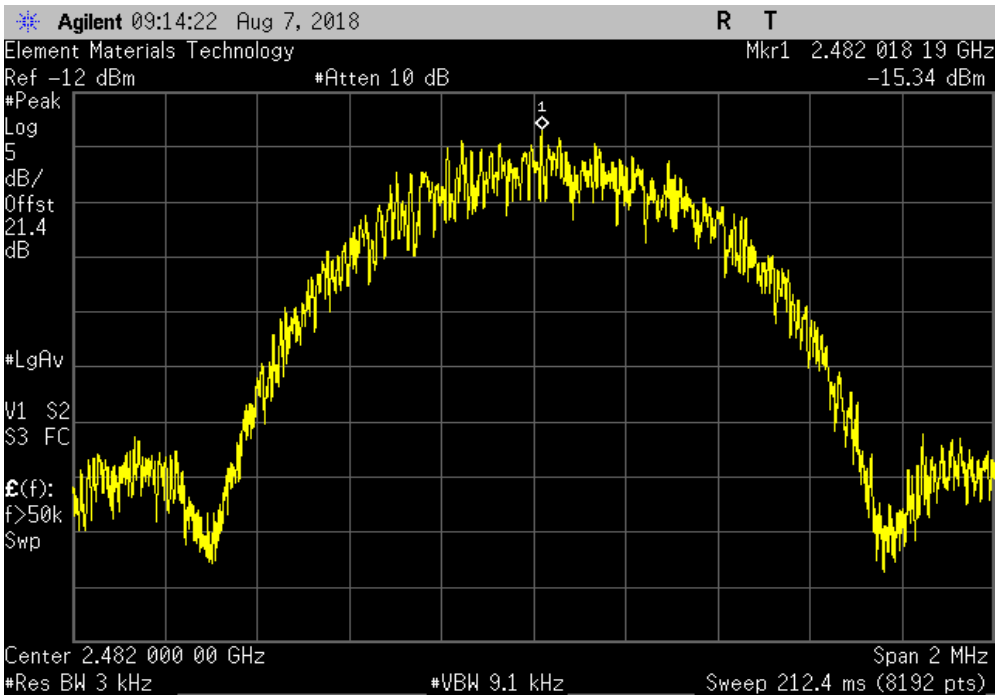
Antenna Port 7, GFSK Modulation , Power Setting = 0, 2.0 dBi Dipole Antenna, Single Channel, 2482 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-15.277	8	Pass



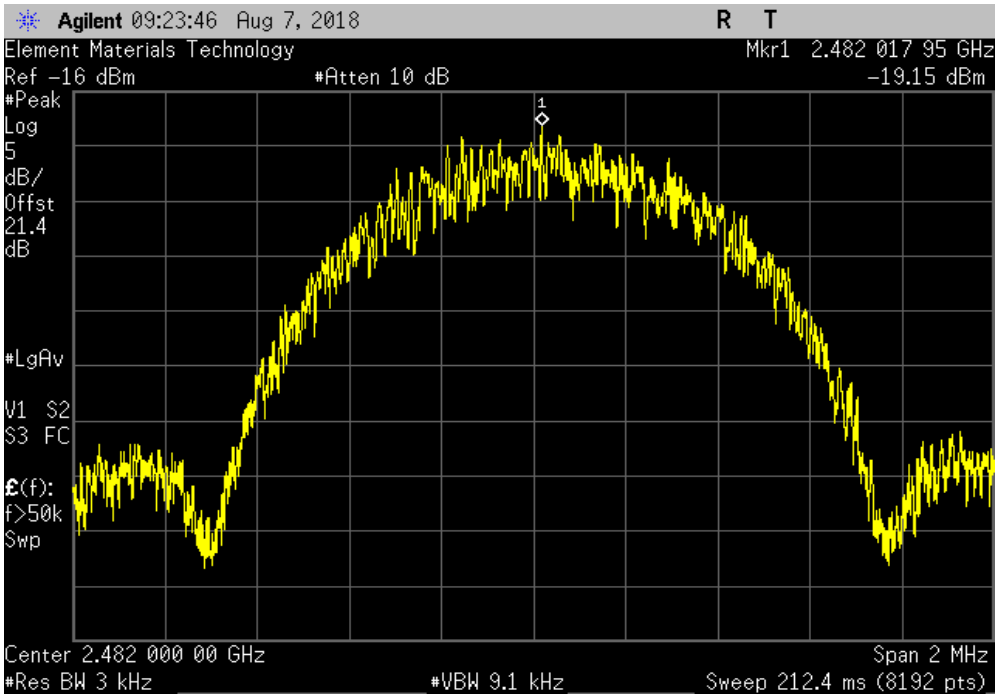
Antenna Port 7, GFSK Modulation , Power Setting = -4, 12 dBi 3x3 Array Antenna, Single Channel, 2482 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-19.044	8	Pass



Antenna Port 8, GFSK Modulation , Power Setting = 0, 2.0 dBi Dipole Antenna, Single Channel, 2482 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-15.338	8	Pass



Antenna Port 8, GFSK Modulation , Power Setting = -4, 12 dBi 3x3 Array Antenna, Single Channel, 2482 MHz						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-19.151	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:**	**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

None

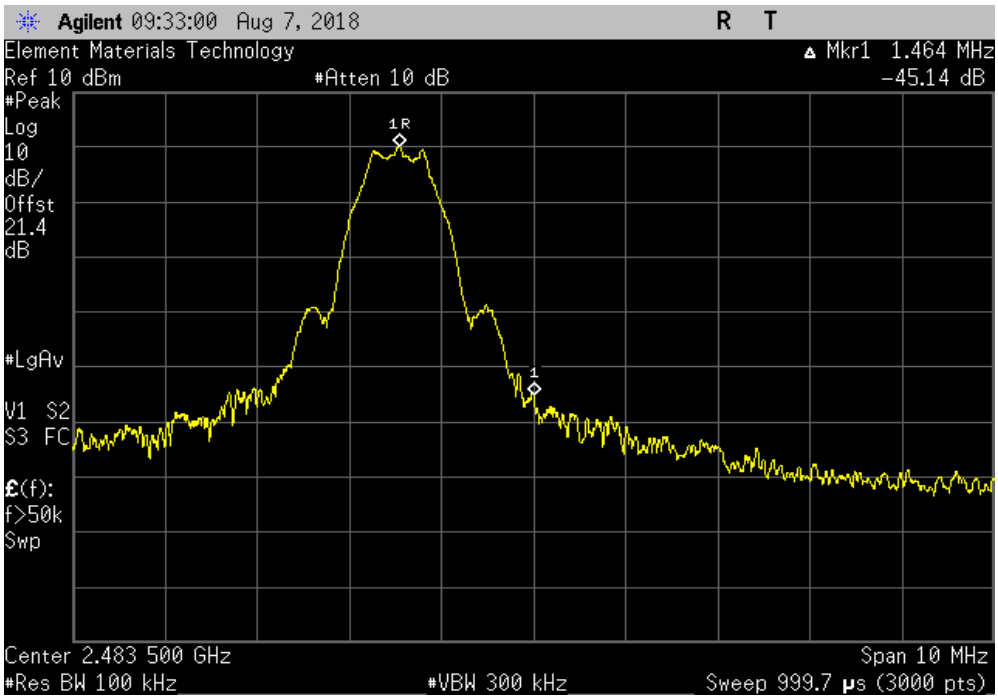
DEVIATIONS FROM TEST STANDARD

None

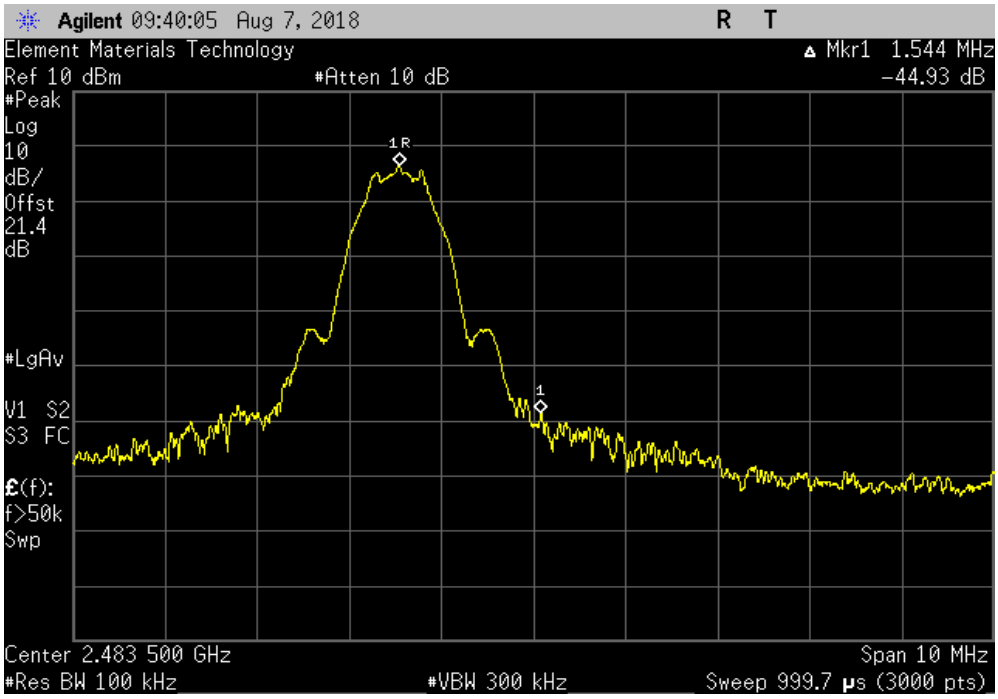
Configuration #	**7**	*Signature*

			Value (dBc)	**Limit ≤ (dBc)**	**Result**
Antenna Port 7					
	GFSK Modulation				
		Power Setting = 0, 2.0 dBi Dipole Antenna			
		Single Channel, 2482 MHz	-45.14	-20	Pass
		Power Setting = -4, 12 dBi 3x3 Array Antenna			
		Single Channel, 2482 MHz	-44.93	-20	Pass
Antenna Port 8					
	GFSK Modulation				
		Power Setting = 0, 2.0 dBi Dipole Antenna			
		Single Channel, 2482 MHz	-45.04	-20	Pass
		Power Setting = -4, 12 dBi 3x3 Array Antenna			
		Single Channel, 2482 MHz	-44.79	-20	Pass

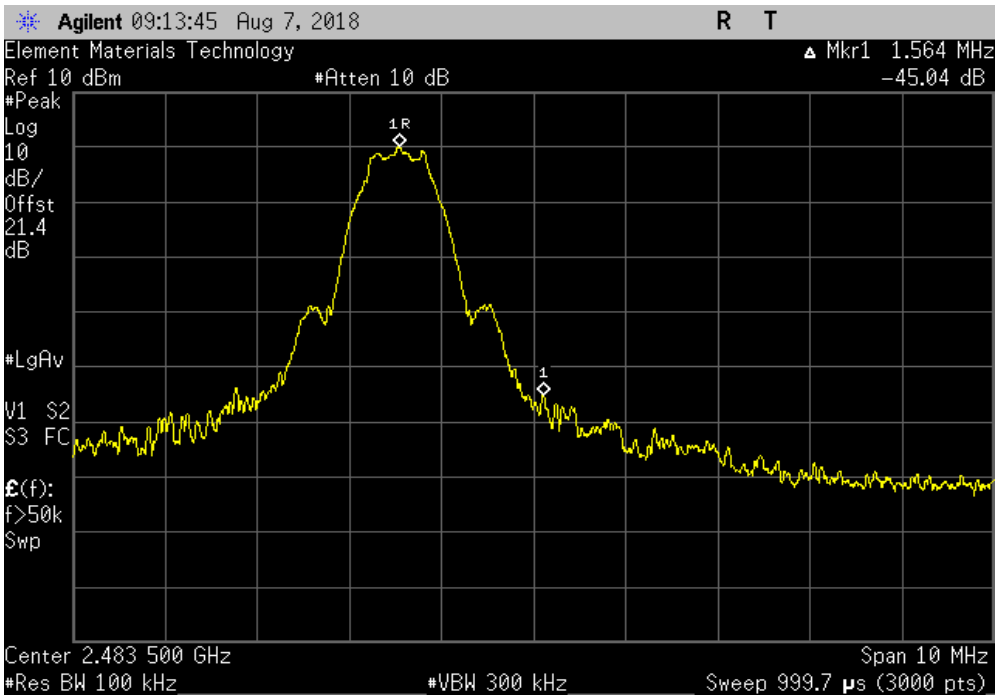
Antenna Port 7, GFSK Modulation , Power Setting = 0, 2.0 dBi Dipole Antenna, Single Channel, 2482 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-45.14	-20	Pass



Antenna Port 7, GFSK Modulation , Power Setting = -4, 12 dBi 3x3 Array Antenna, Single Channel, 2482 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-44.93	-20	Pass



Antenna Port 8, GFSK Modulation , Power Setting = 0, 2.0 dBi Dipole Antenna, Single Channel, 2482 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-45.04	-20	Pass



Antenna Port 8, GFSK Modulation , Power Setting = -4, 12 dBi 3x3 Array Antenna, Single Channel, 2482 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-44.79	-20	Pass