Walt Disney Parks and Resorts US, Inc.

TPv2/300-004278

FCC 15.247:2018

902 – 928 MHz FHSS Transceiver

Report # SYNA0242.5

NVLAP LAB CODE: 200629-0

CERTIFICATE OF TEST

Last Date of Test: June 6, 2018
Walt Disney Parks and Resorts US, Inc.
Model: TPv2/300-004278

Radio Equipment Testing

Standards

Specification	Method
FCC 15.247:2018	ANSI C63.10:2013

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	No	N/A	Not tested for evaluation of a Permissive Change due to a change of enclosure.
6.5, 6.6	Spurious Radiated Emissions	Yes	Pass	
7.5	Duty Cycle	Yes	N/A	Characterization of radio operation.
7.8.2	Carrier Frequency Separation	No	N/A	Not tested for evaluation of a Permissive Change due to a change of enclosure.
7.8.3	Number of Hopping Frequencies	No	N/A	Not tested for evaluation of a Permissive Change due to a change of enclosure.
7.8.4	Dwell Time	No	N/A	Not tested for evaluation of a Permissive Change due to a change of enclosure.
7.8.5	Output Power	Yes	Pass	
7.8.6	Band Edge Compliance	No	N/A	Not tested for evaluation of a Permissive Change due to a change of enclosure.
7.8.6	Band Edge Compliance - Hopping Mode	No	N/A	Not required for DTS devices.
7.8.7	Occupied Bandwidth	Yes	Pass	
7.8.8	Spurious Conducted Emissions	No	N/A	Not tested for evaluation of a Permissive Change due to a change of enclosure.
11.10.2	Power Spectral Density	No	N/A	Not required for FHSS devices.

Deviations From Test Standards

None

Approved By:

Rod Munro, Operations Manager

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

REVISION HISTORY

Revision Number	Description	Date	Page Number
00	None		

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

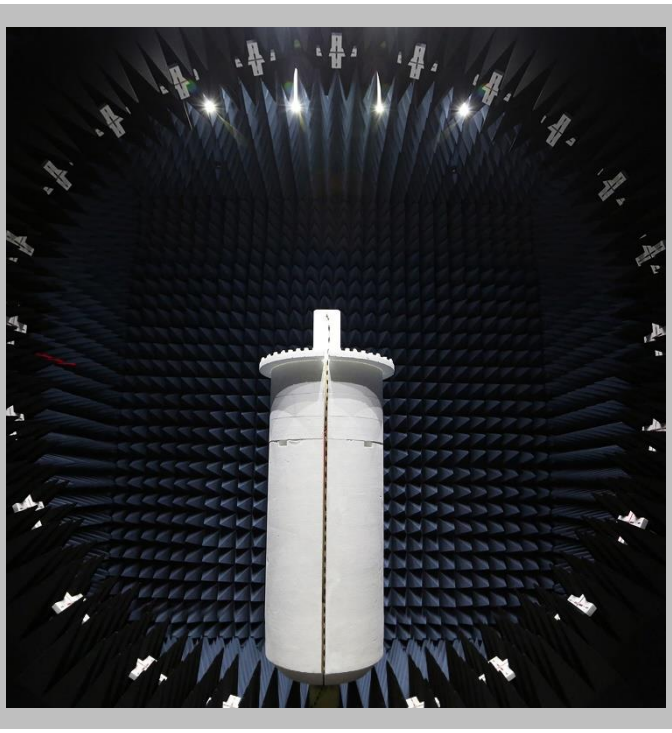
MIC – Recognized by MIC as a CAB for the acceptance of test data.

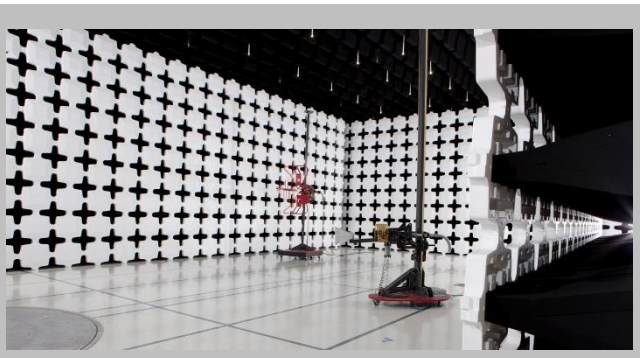
SCOPE

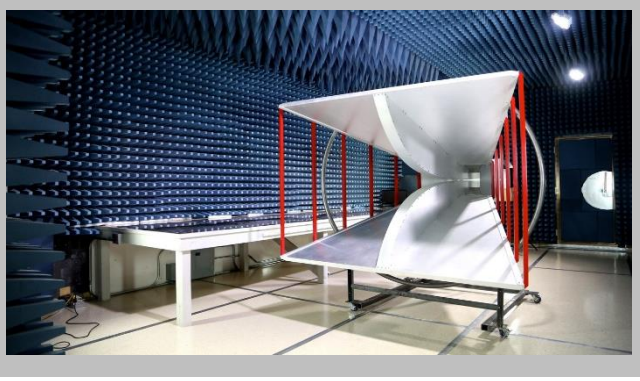
For details on the Scopes of our Accreditations, please visit:
http://portlandcustomer.element.com/ts/scope/scope.htm
http://gsi.nist.gov/global/docs/cabs/designations.html

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.

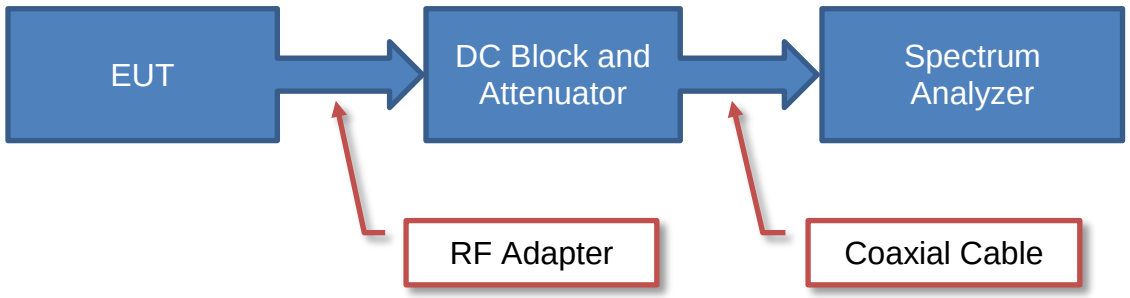
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable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

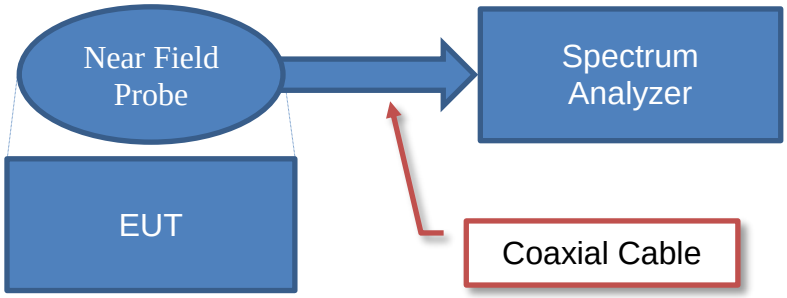
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	0	0
AC Powerline Conducted Emissions (dB)	0	0

Test Setup Block Diagrams

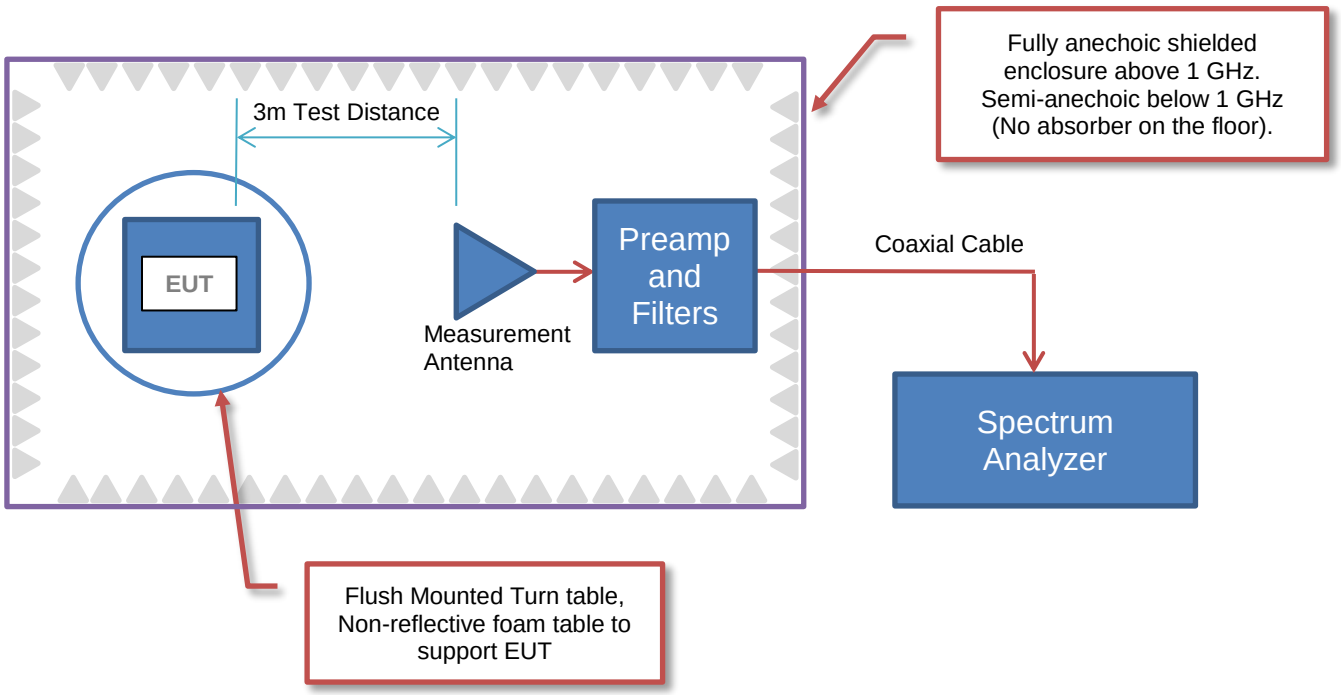
Antenna Port Conducted Measurements



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 1000
City, State, Zip:	Lake Buena Vista, Florida 32830
Test Requested By:	Brian Piquette of Synapse Product Development on behalf of Walt Disney Parks and Resorts US, Inc.
Model:	TPv2/300-004278
First Date of Test:	June 4, 2018
Last Date of Test:	June 6, 2018
Receipt Date of Samples:	June 4, 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:
Multi-ticket media reader with Ethernet network interface Device containing an HF RFID reader (ISO 14443), UHF FHSS RFID Reader (ISO 18000), BT/BLE Radio, and proprietary 2.4GHz DTS radio.

Testing Objective:
Seeking to demonstrate compliance of the UHF FHSS RFID radio under FCC 15.247:2018 for operation in the 902 - 928 MHz Band for a Permissive Change under FCC ID: 2AJS4-TP-R1G2.

CONFIGURATIONS

Configuration SYNA0242- 2

Software/Firmware Running during test	
Description	**Version**
UHF Tool	N/A

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Access Point	Walt Disney Parks and Resorts US, Inc.	TPv2/300-004278	SN03

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Laptop PC	Apple	MacBook Pro	None
DC Power Supply	Mastech	HY3003D-2	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power	No	0.7m	No	DC Power Supply	Access Point
3v3 FTDI Cable	No	1.0m	No	Access Point	Laptop PC
AC Power	No	1.8m	No	AC Mains	DC Power Supply

CONFIGURATIONS

Configuration SYNA0242- 5

Software/Firmware Running during test	
Description	**Version**
UHF Tool	N/A

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Access Point	Walt Disney Parks and Resorts US, Inc.	TPv2/300-004278	SN05

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Laptop PC	Apple	MacBook Pro	None
DC Power Supply	Mastech	HY3003D-2	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
AC Power	No	1.8m	No	AC Mains	DC Power Supply
DC Power	No	3.0m	No	DC Power Supply	Access Point
Ethernet	No	5.0m	No	Access Point	Laptop PC

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	6/4/2018	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.
2	6/4/2018	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT was taken home by the client before the next scheduled test.
3	6/6/2018	Field Strength of Spurious Emissions Greater than 30 MHz	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

SPURIOUS RADIATED EMISSIONS

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

Transmitting at Default Max Power, ASK Modulation.

CHANNELS TESTED

Low Channel, 902.75 MHz
Mid Channel, 915.25 MHz
High Channel, 927.25 MHz

POWER SETTINGS INVESTIGATED

24 VDC

CONFIGURATIONS INVESTIGATED

SYNA0242 - 5

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	12.4 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
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFE	24-Jun-2017	12 mo
Filter - High Pass	Micro-Tronics	HPM50114	HFN	13-Dec-2017	12 mo
Filter - Band Pass/Notch	K&L Microwave	3TNF-500/1000-N/N	HHO	23-Mar-2018	12 mo
Filter - Low Pass	Micro-Tronics	LPM50004	LFF	13-Dec-2017	12 mo
Filter - Low Pass	Micro-Tronics	LPM50003	LFE	19-Oct-2017	12 mo
Antenna - Biconilog	Teseq	CBL 6141B	AYL	11-Aug-2017	24 mo
Antenna - Double Ridge	ETS Lindgren	3115	AHW	12-Jul-2016	24 mo
Antenna - Standard Gain	EMCO	3160-07	AHP	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	PAB	11-Jul-2017	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVZ	4-May-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AOK	18-Aug-2017	12 mo
Cable	Northwest EMC	Bilog Cables	NC1	11-Jul-2017	12 mo
Cable	Northwest EMC	3115 Horn Cable	NC2	4-May-2018	12 mo
Cable	Northwest EMC	Standard Gain Horn Cable	NC3	4-May-2018	12 mo

MEASUREMENT BANDWIDTHS

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

TEST DESCRIPTION

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

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

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

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

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

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

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

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

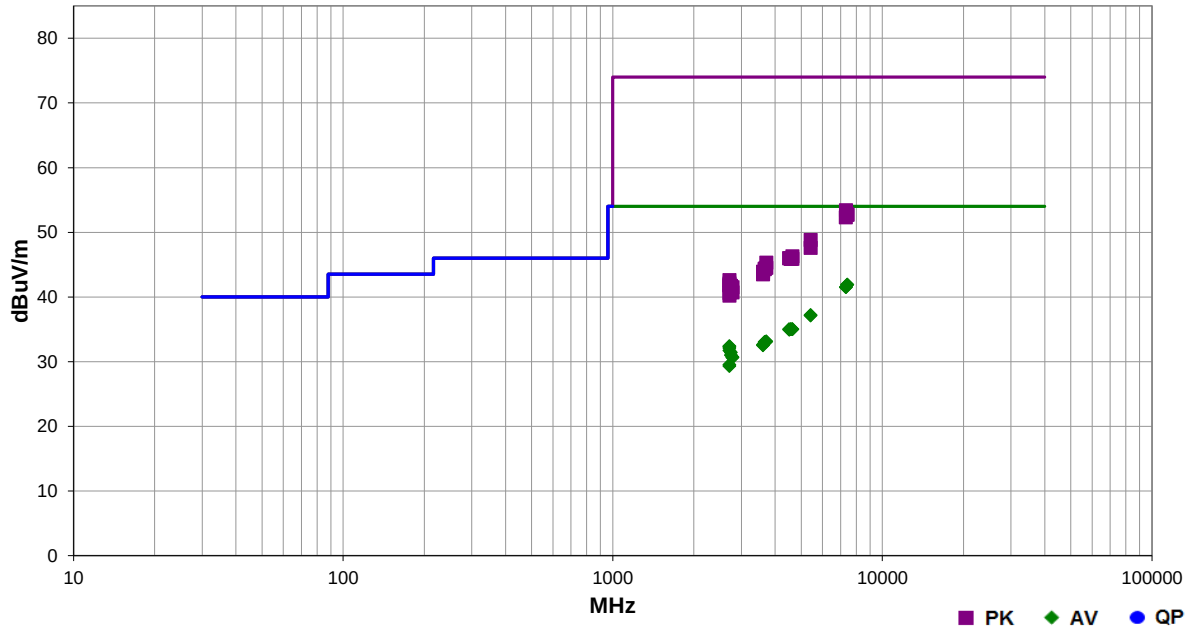
SPURIOUS RADIATED EMISSIONS

EmiR5 2018.05.07 PSA-ESCI 2018.05.04

Work Order:	SYNA0242	**Date:**	6-Jun-2018		
Project:	None	**Temperature:**	22.5 °C		
Job Site:	NC01	**Humidity:**	40.6% RH		
Serial Number:	SN05	**Barometric Pres.:**	1018 mbar	**Tested by:**	Richard Mellroth
EUT:	TPv2/300-004278				
Configuration:	5				
Customer:	Walt Disney Parks and Resorts US, Inc.				
Attendees:	Reily Blackner				
EUT Power:	24 VDC				
Operating Mode:	Transmitting at Default Max Power, ASK Modulation.				
Deviations:	None				
Comments:	See comments next to data points for EUT channel and orientation.				

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)	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
7416.630	27.7	14.2	1.6	221.0	3.0	0.0	Vert	AV	0.0	41.9	54.0	-12.1	High Ch, EUT on Back
7416.555	27.7	14.2	1.6	69.0	3.0	0.0	Horz	AV	0.0	41.9	54.0	-12.1	High Ch, EUT on Side
7320.985	27.8	13.7	2.5	225.0	3.0	0.0	Horz	AV	0.0	41.5	54.0	-12.5	Mid Ch, EUT on Side
7320.980	27.8	13.7	3.7	86.0	3.0	0.0	Vert	AV	0.0	41.5	54.0	-12.5	Mid Ch, EUT on Back
5417.030	26.8	10.4	1.6	20.0	3.0	0.0	Horz	AV	0.0	37.2	54.0	-16.8	Low Ch, EUT on Side
5415.600	26.7	10.4	1.6	229.0	3.0	0.0	Vert	AV	0.0	37.1	54.0	-16.9	Low Ch, EUT on Back
4512.725	27.5	7.5	1.7	232.0	3.0	0.0	Vert	AV	0.0	35.0	54.0	-19.0	Low Ch, EUT on Back
4575.705	27.4	7.6	3.1	2.0	3.0	0.0	Horz	AV	0.0	35.0	54.0	-19.0	Mid Ch, EUT on Side
4575.050	27.4	7.6	1.6	111.0	3.0	0.0	Vert	AV	0.0	35.0	54.0	-19.0	Mid Ch, EUT on Back
4635.905	27.3	7.7	4.0	357.0	3.0	0.0	Vert	AV	0.0	35.0	54.0	-19.0	High Ch, EUT on Back
4635.130	27.3	7.7	1.6	21.0	3.0	0.0	Horz	AV	0.0	35.0	54.0	-19.0	High Ch, EUT on Side
4514.015	27.4	7.5	1.6	89.0	3.0	0.0	Horz	AV	0.0	34.9	54.0	-19.1	Low Ch, EUT on Side
7321.080	39.7	13.7	2.5	225.0	3.0	0.0	Horz	PK	0.0	53.4	74.0	-20.6	Mid Ch, EUT on Side
3708.190	29.1	4.0	2.0	249.0	3.0	0.0	Vert	AV	0.0	33.1	54.0	-20.9	High Ch, EUT on Back
3708.250	29.1	4.0	2.0	75.0	3.0	0.0	Horz	AV	0.0	33.1	54.0	-20.9	High Ch, EUT on Side
3660.030	29.2	3.8	2.1	287.0	3.0	0.0	Horz	AV	0.0	33.0	54.0	-21.0	Mid Ch, EUT on Side
3660.090	29.2	3.8	1.6	280.0	3.0	0.0	Vert	AV	0.0	33.0	54.0	-21.0	Mid Ch, EUT on Back
7416.510	38.6	14.2	1.6	69.0	3.0	0.0	Horz	PK	0.0	52.8	74.0	-21.2	High Ch, EUT on Side

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
7419.060	38.5	14.2	1.6	221.0	3.0	0.0	Vert	PK	0.0	52.7	74.0	-21.3	High Ch, EUT on Back
3610.120	29.2	3.4	1.6	355.0	3.0	0.0	Vert	AV	0.0	32.6	54.0	-21.4	Low Ch, EUT on Back
3609.820	29.1	3.4	2.0	142.0	3.0	0.0	Horz	AV	0.0	32.5	54.0	-21.5	Low Ch, EUT on Side
2708.250	32.4	0.0	3.4	315.0	3.0	0.0	Vert	AV	0.0	32.4	54.0	-21.6	Low Ch, EUT on Back
2708.235	32.3	0.0	3.5	350.0	3.0	0.0	Vert	AV	0.0	32.3	54.0	-21.7	Low Ch, EUT Normal
7320.640	38.6	13.7	3.7	86.0	3.0	0.0	Vert	PK	0.0	52.3	74.0	-21.7	Mid Ch, EUT on Back
2708.195	32.1	0.0	1.7	330.0	3.0	0.0	Horz	AV	0.0	32.1	54.0	-21.9	Low Ch, EUT on Side
2708.325	31.7	0.0	2.9	55.0	3.0	0.0	Horz	AV	0.0	31.7	54.0	-22.3	Low Ch, EUT Normal
2745.645	31.3	0.1	1.6	35.0	3.0	0.0	Horz	AV	0.0	31.4	54.0	-22.6	Mid Ch, EUT on Side
2745.725	30.9	0.1	2.4	318.0	3.0	0.0	Vert	AV	0.0	31.0	54.0	-23.0	Mid Ch, EUT on Back
2781.775	30.5	0.2	1.1	30.0	3.0	0.0	Horz	AV	0.0	30.7	54.0	-23.3	High Ch, EUT on Side
2781.795	30.4	0.2	3.3	310.0	3.0	0.0	Vert	AV	0.0	30.6	54.0	-23.4	High Ch, EUT on Back
2708.170	29.5	0.0	3.0	270.0	3.0	0.0	Horz	AV	0.0	29.5	54.0	-24.5	Low Ch, EUT on Back
2707.655	29.3	0.0	1.6	226.0	3.0	0.0	Vert	AV	0.0	29.3	54.0	-24.7	Low Ch, EUT on Side
5415.945	38.4	10.4	1.6	20.0	3.0	0.0	Horz	PK	0.0	48.8	74.0	-25.2	Low Ch, EUT on Side
5417.500	37.2	10.4	1.6	229.0	3.0	0.0	Vert	PK	0.0	47.6	74.0	-26.4	Low Ch, EUT on Back
4635.170	38.6	7.7	4.0	357.0	3.0	0.0	Vert	PK	0.0	46.3	74.0	-27.7	High Ch, EUT on Back
4513.890	38.5	7.5	1.7	232.0	3.0	0.0	Vert	PK	0.0	46.0	74.0	-28.0	Low Ch, EUT on Back
4512.965	38.5	7.5	1.6	89.0	3.0	0.0	Horz	PK	0.0	46.0	74.0	-28.0	Low Ch, EUT on Side
4574.915	38.3	7.6	3.1	2.0	3.0	0.0	Horz	PK	0.0	45.9	74.0	-28.1	Mid Ch, EUT on Side
4575.610	38.3	7.6	1.6	111.0	3.0	0.0	Vert	PK	0.0	45.9	74.0	-28.1	Mid Ch, EUT on Back
4635.950	38.2	7.7	1.6	21.0	3.0	0.0	Horz	PK	0.0	45.9	74.0	-28.1	High Ch, EUT on Side
3707.800	41.2	4.1	2.0	249.0	3.0	0.0	Vert	PK	0.0	45.3	74.0	-28.7	High Ch, EUT on Back
3710.075	40.4	4.1	2.0	75.0	3.0	0.0	Horz	PK	0.0	44.5	74.0	-29.5	High Ch, EUT on Side
3659.565	40.6	3.8	2.1	287.0	3.0	0.0	Horz	PK	0.0	44.4	74.0	-29.6	Mid Ch, EUT on Side
3659.990	40.5	3.8	1.6	280.0	3.0	0.0	Vert	PK	0.0	44.3	74.0	-29.7	Mid Ch, EUT on Back
3610.155	40.5	3.4	2.0	142.0	3.0	0.0	Horz	PK	0.0	43.9	74.0	-30.1	Low Ch, EUT on Side
3610.835	40.1	3.4	1.6	355.0	3.0	0.0	Vert	PK	0.0	43.5	74.0	-30.5	Low Ch, EUT on Back
2708.435	42.6	0.0	3.5	350.0	3.0	0.0	Vert	PK	0.0	42.6	74.0	-31.4	Low Ch, EUT Normal
2708.190	42.1	0.0	2.9	55.0	3.0	0.0	Horz	PK	0.0	42.1	74.0	-31.9	Low Ch, EUT Normal
2708.670	41.8	0.0	1.7	330.0	3.0	0.0	Horz	PK	0.0	41.8	74.0	-32.2	Low Ch, EUT on Side
2708.575	41.8	0.0	3.4	315.0	3.0	0.0	Vert	PK	0.0	41.8	74.0	-32.2	Low Ch, EUT on Back
2745.455	41.6	0.1	1.6	35.0	3.0	0.0	Horz	PK	0.0	41.7	74.0	-32.3	Mid Ch, EUT on Side
2781.490	41.3	0.2	1.1	30.0	3.0	0.0	Horz	PK	0.0	41.5	74.0	-32.5	High Ch, EUT on Side
2746.615	40.9	0.1	2.4	318.0	3.0	0.0	Vert	PK	0.0	41.0	74.0	-33.0	Mid Ch, EUT on Back
2781.470	40.5	0.2	3.3	310.0	3.0	0.0	Vert	PK	0.0	40.7	74.0	-33.3	High Ch, EUT on Back
2709.260	40.6	0.0	3.0	270.0	3.0	0.0	Horz	PK	0.0	40.6	74.0	-33.4	Low Ch, EUT on Back
2709.150	40.2	0.0	1.6	226.0	3.0	0.0	Vert	PK	0.0	40.2	74.0	-33.8	Low Ch, EUT on Side

DUTY CYCLE

TEST DESCRIPTION

The Duty Cycle (x) were measured for each of the EUT operating modes. 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. A direct connection was made between the RF output of the EUT and a spectrum analyzer. Attenuation and a DC block were used

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

The EUT operates at 100% Duty Cycle.

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
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFO	1-May-18	1-May-19
Cable	Micro-Coax	UFD150A-1-0720-200200	NCS	19-Feb-18	19-Feb-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
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 peak output power was measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting in a no hop mode at the data rate(s) listed in the datasheet.

The method found in ANSI C63.10:2013 Section 7.8.5 was used for a FHSS radio.

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

OUTPUT POWER

TbtTx 2018.01.25 BETA XMit 2017.12.13

EUT:	**TPv2/300-004278**			**Work Order:**	**SYNA0242**
Serial Number:	**SN03**			**Date:**	**4-Jun-18**
Customer:	**Walt Disney Parks and Resorts US, Inc.**			**Temperature:**	**22.3 °C**
Attendees:	**Reily Blackner**			**Humidity:**	**42.2% RH**
Project:	**None**			**Barometric Pres.:**	**1022 mbar**
Tested by:	**Richard Mellroth**	**Power:**	**24 VDC**	**Job Site:**	**NC02**

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

COMMENTS

Power Setting = Default Max = 20dB Output

DEVIATIONS FROM TEST STANDARD

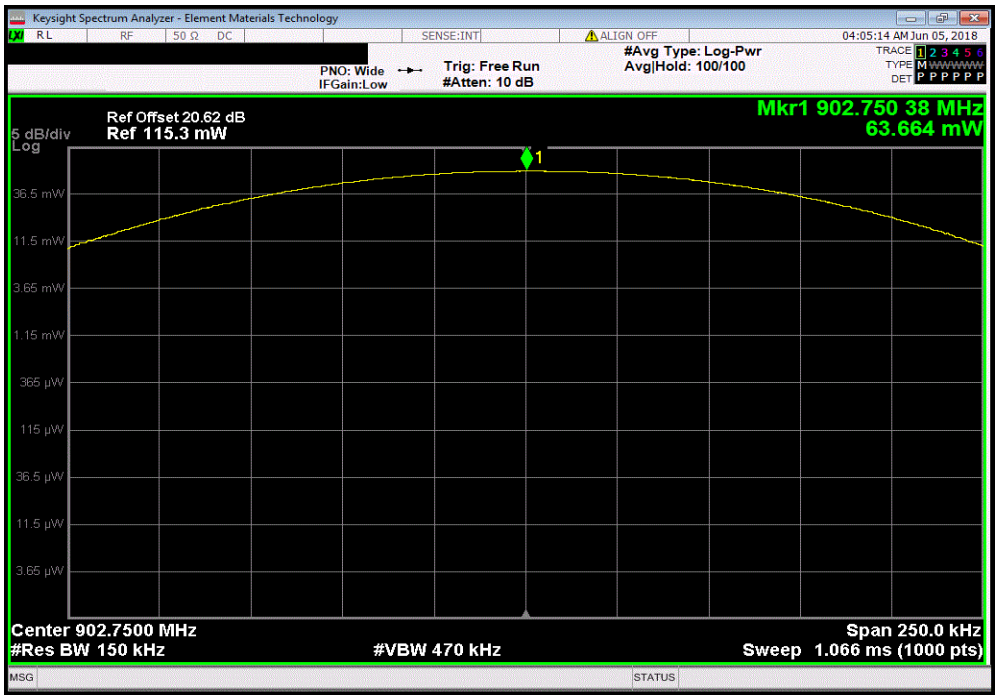
None

Configuration #	**2**	*Signature*

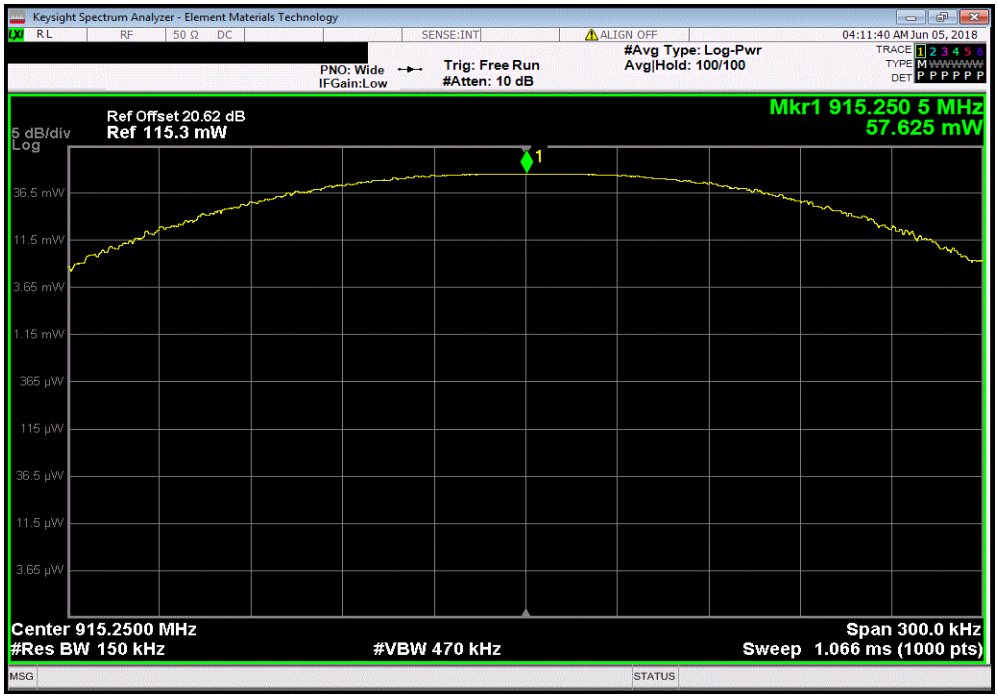
		Value	**Limit (<)**	**Result**
900 MHz Radio				
	ASK Modulation			
	Low Channel, 902.75 MHz	63.664 mW	1 W	Pass
	Mid Channel, 915.25 MHz	57.625 mW	1 W	Pass
	High Channel, 927.25 MHz	55.905 mW	1 W	Pass

OUTPUT POWER

900 MHz Radio, ASK Modulation, Low Channel, 902.75 MHz						
				Value	Limit (<)	Result
				63.664 mW	1 W	Pass

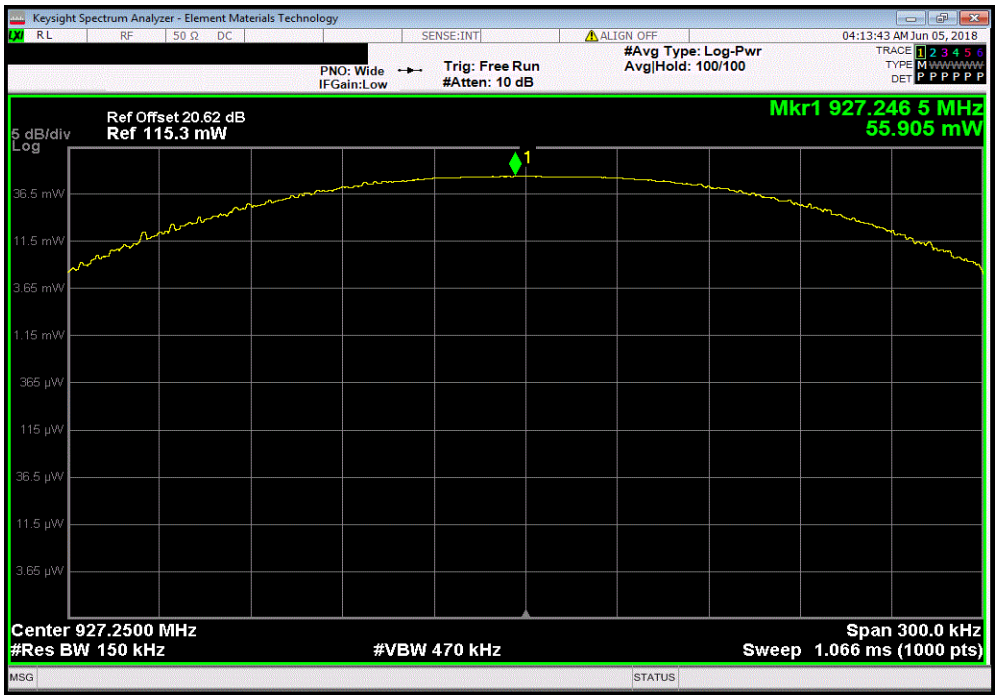


900 MHz Radio, ASK Modulation, Mid Channel, 915.25 MHz						
				Value	Limit (<)	Result
				57.625 mW	1 W	Pass



OUTPUT POWER

900 MHz Radio, ASK Modulation, High Channel, 927.25 MHz						
				Value	Limit (<)	Result
				55.905 mW	1 W	Pass



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
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFO	1-May-18	1-May-19
Cable	Micro-Coax	UFD150A-1-0720-200200	NCS	19-Feb-18	19-Feb-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
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 20 dB occupied bandwidth was measured with the EUT set to low, medium and high transmit frequencies in the band. The EUT was transmitting at the data rate(s) listed in the datasheet in a no-hop mode.

OCCUPIED BANDWIDTH

TbtTx 2018.01.25 BETA XMit 2017.12.13

EUT:	TPv2/300-004278			**Work Order:**	SYNA0242
Serial Number:	SN03			**Date:**	4-Jun-18
Customer:	Walt Disney Parks and Resorts US, Inc.			**Temperature:**	22.3 °C
Attendees:	Reily Blackner			**Humidity:**	42.2% RH
Project:	None			**Barometric Pres.:**	1022 mbar
Tested by:	Richard Mellroth	**Power:**	24 VDC	**Job Site:**	NC02

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

COMMENTS

Power Setting = Default Max = 20dB Output

DEVIATIONS FROM TEST STANDARD

None

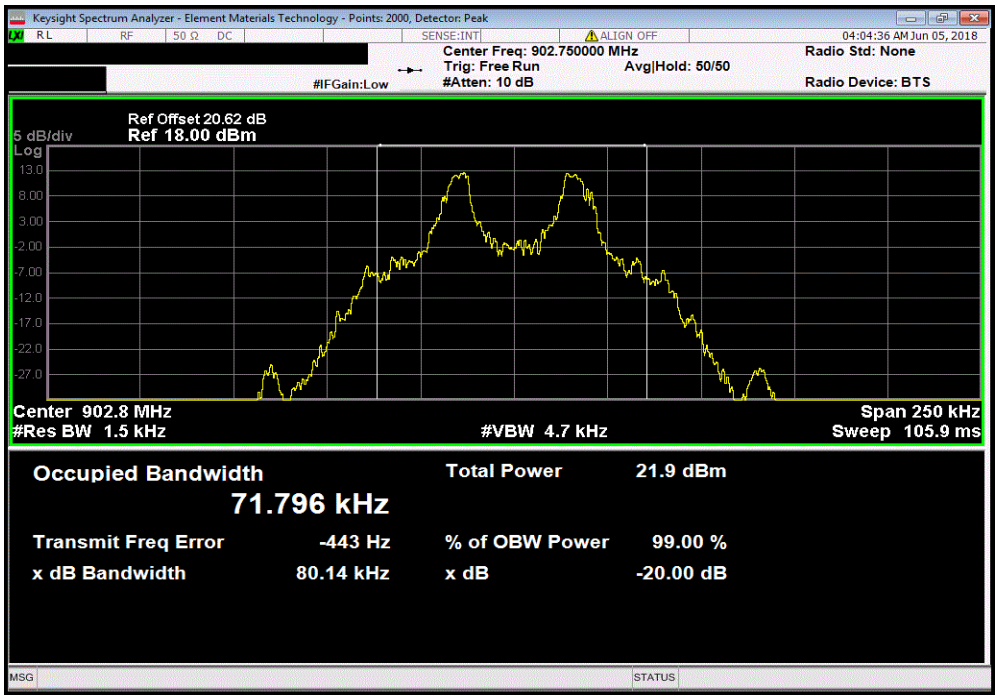
Configuration #	2	*Signature*

		Value	**Limit (<)**	**Result**
900 MHz Radio				
	ASK Modulation			
	Low Channel, 902.75 MHz	80.137 kHz	250 kHz	Pass
	Mid Channel, 915.25 MHz	82.443 kHz	250 kHz	Pass
	High Channel, 927.25 MHz	84.508 kHz	250 kHz	Pass

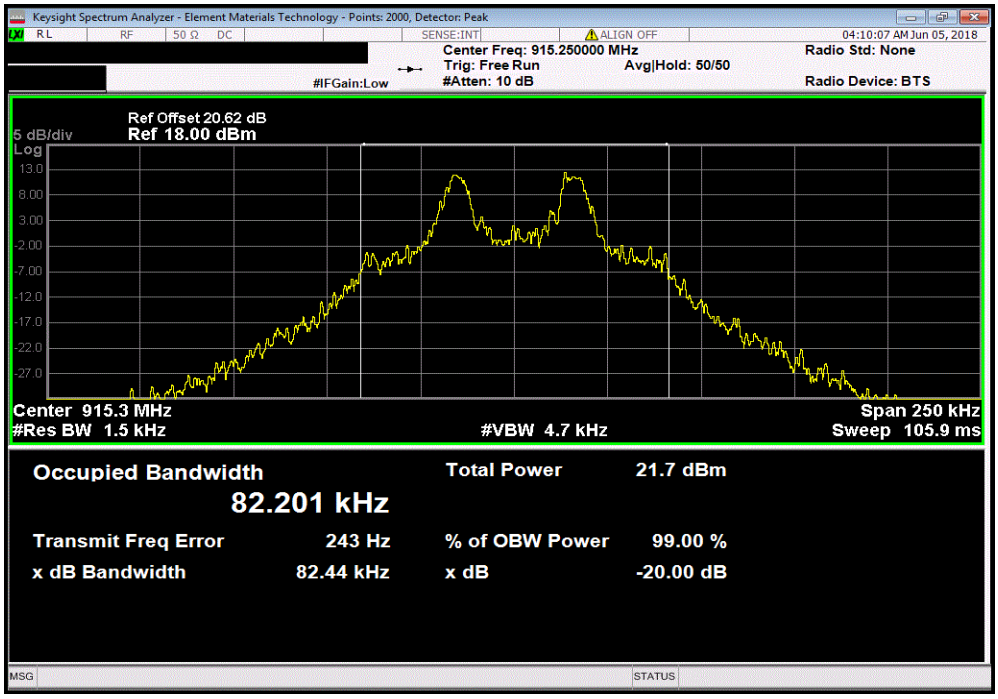
OCCUPIED BANDWIDTH

TbtTx 2018.01.25 BETA XMit 2017.12.13

900 MHz Radio, ASK Modulation, Low Channel, 902.75 MHz						
				Value	Limit (<)	Result
				80.137 kHz	250 kHz	Pass



900 MHz Radio, ASK Modulation, Mid Channel, 915.25 MHz						
				Value	Limit (<)	Result
				82.443 kHz	250 kHz	Pass



OCCUPIED BANDWIDTH

TbtTx 2018.01.25 BETA XMit 2017.12.13

900 MHz Radio, ASK Modulation, High Channel, 927.25 MHz						
				Value	Limit (<)	Result
				84.508 kHz	250 kHz	Pass