

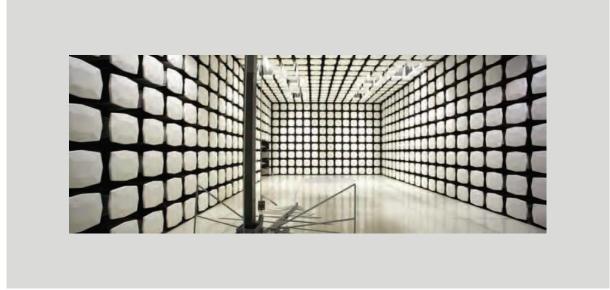
### Walt Disney Parks and Resorts US, Inc.

**Radio Node** 

FCC 15.247:2018

Bluetooth Low Energy (DTS) Radio

Report # SYNA0249.1 Rev. 2







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

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More: https://www.bis.doc.gov/index.php/forms-documents/regulations-docs/14-commerce-country-chart/fileT

### **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	ANSI C03.10.2013, KDB 330074

### Results

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

### **Deviations From Test Standards**

None

**Approved By:** 

Kyle Holgate, Operations Manager

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

## **REVISION HISTORY**



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

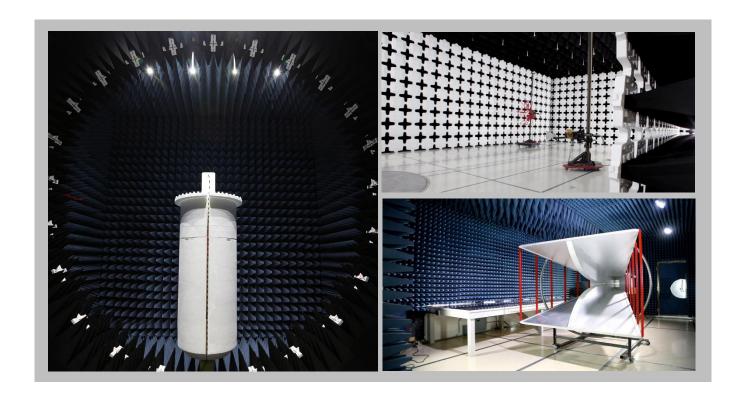
## **FACILITIES**







California Labs OC01-17	Minnesota Labs MN01-10	New York Labs NY01-04	Oregon Labs EV01-12	Texas Labs TX01-09	Washington Labs NC01-05	
41 Tesla Irvine, CA 92618 (949) 861-8918	9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	19201 120 <sup>th</sup> Ave NE Bothell, WA 98011 (425)984-6600	
(0.10) 00.1 00.10	(949) 661-6916   (612)-636-5136   (313) 554-6214   (303) 644-4066   (469) 304-5255   (423)964-6600					
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



### **Measurement Uncertainty**

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

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

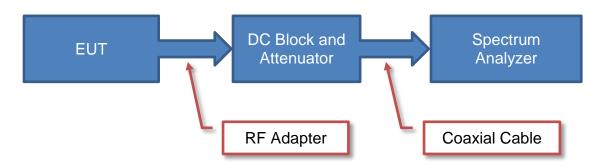
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

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

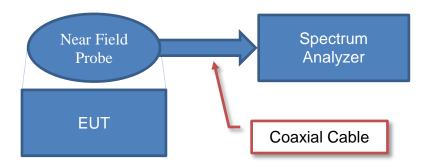
## **Test Setup Block Diagrams**



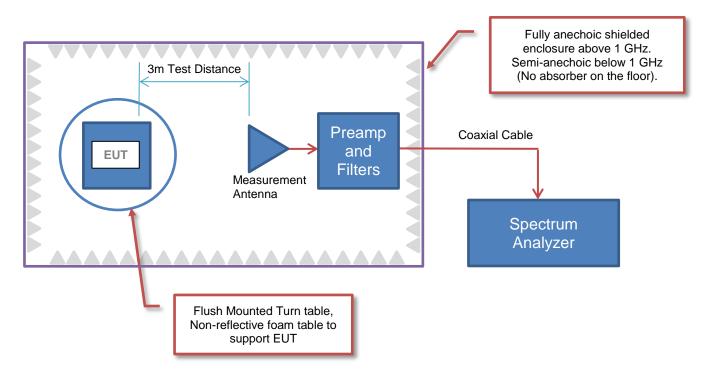
### **Antenna Port Conducted Measurements**



### **Near Field Test Fixture Measurements**



### **Spurious Radiated Emissions**



### PRODUCT DESCRIPTION



### **Client and Equipment Under Test (EUT) Information**

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

### Information Provided by the Party Requesting the Test

### **Functional Description of the EUT:**

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

### **Testing Objective:**

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



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

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

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

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

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



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	Linx	ANT-2.4-CW-HWR-	None			
Antennas	LIIIX	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



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-	None			
2 Dipole Antennas	LIIIX	SMA	None			

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

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

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



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



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-	None		
2 Dipole Antennas	LIIIX	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



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

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

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

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

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



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



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



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-	None	
		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



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



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



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



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



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



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



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-	None		
2 Dipole Antennas	LIIIX	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
DC Fower Cable - Laptop	INU	2 111	163	<b>L</b> артор	Adapter - Laptop
AC Power Cable - Laptop	No	2 m	No	AC/DC Power Adapter - Laptop	AC Mains
					AC/DC Power
DC Power Cable - Switch	No	1.5 m	No	Gigabit Switch	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



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-	None		
2 Dipole Antennas	LIIIX	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 Bower Coble Lepton	No	2 m	Yes	Lonton	AC/DC Power
DC Power Cable - Laptop	INO	2 111	165	Laptop	Adapter - Laptop
AC Power Cable - Laptop	No	2 m	No	AC/DC Power Adapter - Laptop	AC Mains
					AC/DC Power
DC Power Cable - Switch	No	1.5 m	No	Gigabit Switch	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



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-	None		
2 Dipole Antennas	LIIIX	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 -	No	2 m	Yes	Laptop	AC/DC Power Adapter -
Laptop					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



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

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

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

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

## **MODIFICATIONS**



### **Equipment Modifications**

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

#### **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

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

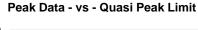
The Radio Node was pseudorandomly transmitting on one of the 3 BLE channel and also on the only DTS channel of operation.

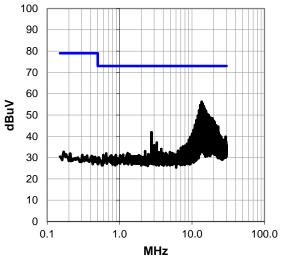
#### **EUT OPERATING MODES**

EMC Test Mode, Volume 10

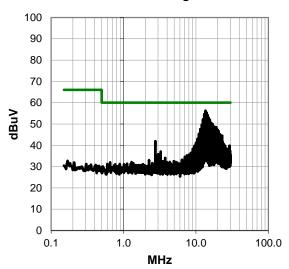
#### **DEVIATIONS FROM TEST STANDARD**

None





#### Peak Data - vs - Average Limit



### **RESULTS - Run #12**

Peak Data - vs - Quasi Peak Limit

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

### **CONCLUSION**

Pass

Tested By

-14.9

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
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### **COMMENTS**

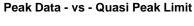
The Radio Node was pseudorandomly transmitting on one of the 3 BLE channel and also on the only DTS channel of operation.

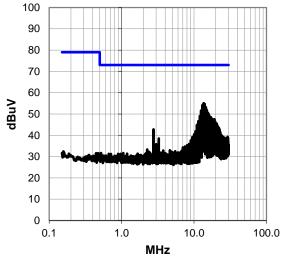
#### **EUT OPERATING MODES**

EMC Test Mode, Volume 10

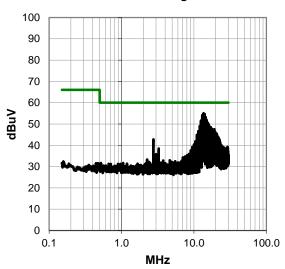
#### **DEVIATIONS FROM TEST STANDARD**

None





### Peak Data - vs - Average Limit



### **RESULTS - Run #13**

Peak Data - vs - Quasi Peak Limit

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

21.565

23.4

22.1

21.0

21.7

### **CONCLUSION**

Pass

Tested By

44.4

43.8

60.0

-15.6

-16.2

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	n (dB):	0
---	---------	---

### **COMMENTS**

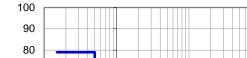
The Radio Node was pseudorandomly transmitting on one of the 3 BLE channel and also on the only DTS channel of operation.

#### **EUT OPERATING MODES**

EMC Test Mode, Volume 10

#### **DEVIATIONS FROM TEST STANDARD**

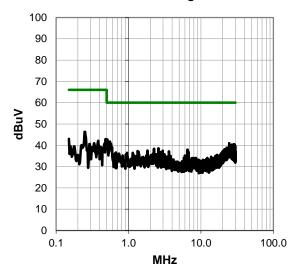
None



Peak Data - vs - Quasi Peak Limit

70 60 50 40 30 20 10 0 0.1 1.0 10.0 100.0 MHz

### Peak Data - vs - Average Limit



### **RESULTS - Run #14**

Peak Data - vs - Quasi Peak Limit

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	

22.2

22.2

22.2

16.9

16.9

16.9

25.922

26.034

26.183

### **CONCLUSION**

Pass

Tested By

39.1

39.1

39.1

60.0

60.0

-20.9

-20.9

-20.9

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**

	1-9111111111111111111111111111111111111							
Run #:	15	Line:	Neutral	Add. Ext. Attenuation (	dB):	0		

### **COMMENTS**

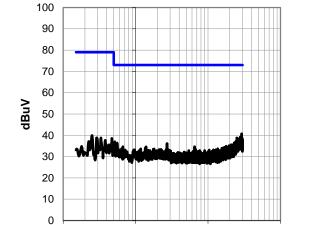
The Radio Node was pseudorandomly transmitting on one of the 3 BLE channel and also on the only DTS channel of operation.

#### **EUT OPERATING MODES**

EMC Test Mode, Volume 10

#### **DEVIATIONS FROM TEST STANDARD**

None



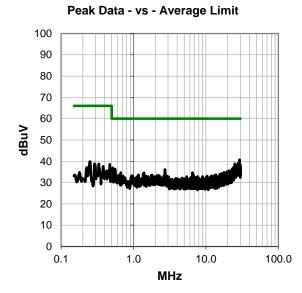
1.0

MHz

10.0

100.0

Peak Data - vs - Quasi Peak Limit



0.1

## **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

#### **CONCLUSION**

Pass

Tested By

-22.2



PSA-ESCI 2018.05.04

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

#### **MODES OF OPERATION**

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

#### **POWER SETTINGS INVESTIGATED**

24 VDC

POE

#### **CONFIGURATIONS INVESTIGATED**

SYNA0249 - 12

SYNA0249 - 9

#### FREQUENCY RANGE INVESTIGATED

Start Frequency 30 MHz Stop Frequency 26.5 GHz

#### **SAMPLE CALCULATIONS**

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

#### **TEST EQUIPMENT**

ILOI LAOII MILIAI					
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).



						eleme
					EmiR5 2018.05.07	PSA-ESCI 201
Work Order		Date:	10-Aug-2018	-		1/2
Project		Temperature:	23.1 °C	(/2	///	
Job Site:		Humidity:	44.6% RH	000	19/10	
Serial Number:		Barometric Pres.:	1018 mbar	Tested by	: Jeff Alcoke	
	Radio Node					
Configuration						
	Walt Disney Parks a	nd Resorts US, Inc.				
Attendees						
EUT Power:						
Operating Mode	Channel = 2480 MHz	cket Length = 63, PRBS9	, 1 Mbps,Low Cha	nnel = 2402 MHz, Mid (	Channel = 2440 N	ИHz, High
Deviations	None					
Comments		e of 46.5% and would not with a carrier duty cycle co				
st Specifications			Test Me	thod		
C 15.247:2018				63.10:2013		
B 41 50	T Distance (m)			412 4(22)		
<b>Run #</b> 59	Test Distance (m	) 3 Antenna I	leight(s)	1 to 4(m)	Results	Pass
80						
70						
60						
50 W/Ng 40						
<b>R</b> 40						

<b>9</b> 40													
30 -									•				
20 -													
20													
10													
0												Щ	
10	)		100			1000			10000			100000	
						MHz				■ PK	◆ AV	<ul><li>QP</li></ul>	
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)	
7320,483	29.1	12.2	1.1	335.0	3.3	0.0	Horz	AV	0.0	44.6	54.0	-9.4	Comments Mid Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
7440.600	28.1	13.0	1.0	19.0	3.3	0.0	Vert	AV	0.0	44.4	54.0	-9.6	High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
7440.533	28.0	13.0	1.0	305.0	3.3	0.0	Horz	AV	0.0	44.3	54.0	-9.7	High Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
7317.950	28.2	12.2	1.0	151.0	3.3	0.0	Vert	AV	0.0	43.7	54.0	-10.3	Mid Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4803.892	34.9	3.8	1.4	331.0	3.3	0.0	Horz	AV	0.0	42.0	54.0	-12.0	Low Ch, EUT Vert. Ant Vert, Directional PA 2x2 Ant
4804.100	34.8	3.8	1.9	341.0	3.3	0.0	Horz	AV	0.0	41.9	54.0	-12.1	Low Ch, EUT Horz, Ant Vert, Directional PA 2x2 Ant
4803.892	34.6	3.8	1.9	341.0	3.3	0.0	Horz	AV	0.0	41.6	54.0	-12.4	Low Ch, EUT on Side, Ant Vert, Directional PA 2x2 Ant
4880.025	33.2	5.0	1.7	341.0	3.3	0.0	Horz	AV	0.0	41.5	54.0	-12.5	Mid Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4960.017	33.0	5.2	1.7	342.0	3.3	0.0	Horz	AV	0.0	41.5	54.0	-12.5	High Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4804.100	33.5	3.8	2.9	18.0	3.3	0.0	Vert	AV	0.0	40.6	54.0	-13.4	Low Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4803.900	33.3	3.8	2.3	22.0	3.3	0.0	Vert	AV	0.0	40.4	54.0	-13.6	Low Ch, EUT Horz, Ant on Side, Directional PA 2x2 Ant Low Ch, EUT Horz, Ant on Side, Directional PA 2x2 Ant
4804.050	33.1	3.8	1.0	341.0	3.3	0.0	Horz	AV	0.0	40.2	54.0	-13.8	Low Ch, EUT Horz, Ant on Side, Directional PA 2x2 Ant Low Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4803.983 4803.967	32.9 32.7	3.8 3.8	1.3 2.5	332.0	3.3 3.3	0.0	Horz Vert	AV AV	0.0	40.0 39.8	54.0 54.0	-14.0 -14.2	Low Ch, EUT Vert, Ant on Side, Directional PA 2x2 Ant
4803.967 4879.908	32.7	3.8 5.0	2.5 3.9	9.0 18.0	3.3	0.0	Vert	AV		39.8	54.0 54.0	-14.2 -14.8	Mid Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4879.908	30.9	5.0	3.9	19.0	3.3	0.0	Vert	AV	0.0	39.2	54.0 54.0	-14.8 -14.9	High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4804.067	31.8	3.8	2.7	306.0	3.3	0.0	Horz	AV	0.0	38.9	54.0 54.0	-14.9	Low Ch, EUT Vert, Ant on Side, Directional PA 2x2 Ant
4004.007	31.0	3.0	1.0	306.0	3.3	0.0	Horz	AV AV	0.0	30.9	54.0	-15.1	Low Ch. FLIT on Side. Ant Horz. Directional PA 2x2 Ant

38.9

38.6 38.5 38.4 38.4 38.3 38.0 37.9 33.6 33.5 33.4

33.4 33.4 33.4 52.7 52.3 52.1 51.8

48.2 47.9 47.8

-14.9 -15.1 -15.1

-15.4 -15.5 -15.5

-15.6 -15.6 -15.7 -16.0

-16.1 -20.4 -20.5 -20.6

-20.6 -20.6 -20.6

-21.3 -21.7 -21.9 -22.2

High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant Low Ch, EUT Vert, Ant on Side, Directional PA 2x2 Ant Low Ch, EUT on Side, Ant Horz, Directional PA 2x2 Ant

High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant High Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant Mid Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant Low Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant

Mid Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant Mid Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant

Low Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant Mid Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant High Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant

High Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant Low Ch, EUT Horz, Ant Vert, Directional PA 2x2 Ant Low Ch, EUT Vert. Ant Vert, Directional PA 2x2 Ant Low Ch, EUT Vert. Ant Vert, Directional PA 2x2 Ant

Low Ch, EUT on Side, Ant Horz, Directional PA 2x2 Ant Low Ch, EUT Horz, Ant Vert, Directional PA 2x2 Ant Low Ch, EUT Horz, Ant Horz, Directional PA 2x2 Ant Low Ch, EUT Horz, Ant Horz, Directional PA 2x2 Ant Low Ch, EUT Vert, Ant Horz, Directional PA 2x2 Ant Low Ch, EUT on Side, Ant Vert, Directional PA 2x2 Ant Low Ch, EUT Horz, Ant Horz, Directional PA 2x2 Ant Low Ch, EUT Vert, Ant Horz, Directional PA 2x2 Ant Low Ch, EUT Vert, Ant Horz, Directional PA 2x2 Ant Low Ch, EUT Vert, Ant Horz, Directional PA 2x2 Ant Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant Vert, Directional

266.0

29.0 263.0 331.0

312.0 22.0 282.0

261.0

-2.0 360.0 0.0 192.0

145.0 309.0 193.0

305.0 335.0 151.0

19.0

342.0 341.0 331.0

0.0

0.0

Vert Vert Vert Vert Vert Horz Horz

Vert Vert Horz

Vert Vert Horz Horz

Horz Horz Vert Vert

Horz Horz Horz

32.9 32.7 30.9 30.6 31.8 31.8 31.4 31.3 31.2 30.9 30.8 29.1 29.1 29.2 29.1 40.1 39.9 40.1 39.9 38.8

43.0 44.0 44.0

3.8

3.8 3.8 3.8 3.8 3.8 3.8 3.8

3.8 1.2 1.2

0.9 1.0 1.0 0.9

13.0 12.2 12.2 13.0

5.2 3.9

3.9 3.0 2.7 1.0 1.0 1.4 1.0

4803.933

4804.092 4804.083 4804.075

4804.017

4804.067 4804.033

4803.925 4803.950 12399.030 12398.590

12199.040 12008.780 12008.030 12199.250

7442.242

7321.125 7321.767 7440.267

4959.542 4804.558 4803.825

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



				EmiR5 2018.05.07 PSA-ESCI 2018.05.04								
Work Order:	SYNA0249	Date:	10-Aug-2018	// //								
Project:	None	Temperature:	Temperature: 22.5 °C									
Job Site:	EV01	Humidity:	45.1% RH	CAT Alle								
Serial Number:	E45	Barometric Pres.:	1019 mbar	Tested by: Jeff Alcoke								
EUT:	Radio Node											
Configuration:	9											
Customer:	Walt Disney Parks an	d Resorts US, Inc.										
Attendees:	None											
EUT Power:	ŌE											
Operating Mode:	BTLE Tx, GFSK, Pac Channel = 2480 MHz	ket Length = 63, PRBS9	), 1 Mbps,Low Chan	nel = 2402 MHz, Mid Channel = 2440 MHz, High								
Deviations:	None											
Comments:	radio with a duty cycle	of 46.5% and would no	t allow for continuou	orientation. The provided test software configured the s operation. Per ANSI C63.10 test methods, the RMS (F) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).								
Test Specifications			Test Meth	nod								
FCC 15.247:2018			ANSI C63	3.10·2013								

Run #	62	Test Distance (m	3	Antenna I	Height(s)	1 to 4(m)	Results	Pass
80								
70								
60								
50	*						•	
50								
30								
20								
10								
0 2380		2400	242	)	2440	2460	2480	250

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

Commonic		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
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V	Vork Order:	. QVN	IA0249		Date:	14.00	g-2018				EmiR5 2018.05.07	-	PSA-ESCI 2018.05.04	1
	Project:		lone	Ter	nperature:		g-2016 7 °C	, -	1					
	Job Site:		V01		Humidity:		% RH		$\subset$	7	191	182	7	
Ser	ial Number:	Radio No	E45 de	Barome	etric Pres.:	1015	mbar		Teste	d by:	Jeff Alcoke	)		-
Co	nfiguration:	12												-
			ey Parks an	d Resorts L	JS, Inc.									- -
	Attendees: EUT Power:													-
	ating Mode	BTLE Tx,	GFSK, Pac	ket Length	= 63, PRBS	9, 1 Mbps,	Low Chanr	nel = 2402	MHz, I	Mid Ch	annel = 24	40 MHz,	High	-
Орен	ating mode.		= 2480 MHz											-
	Deviations	None												
			nents made											-
	Comments		EUT and An allow for co											
			ection factor						o raivio	data	Was correct	ou with a	ourner duty	
Test Spe	cifications						Test Meth	od						
FCC 15.2	247:2018						ANSI C63	.10:2013						
Run	# 89	Test D	istance (m)	3	Antenna	Height(s)		1 to 4(m)			Results	F	ass	-
80	+								+++				+	
									$\perp \downarrow \downarrow \downarrow$		$\perp$	4		
70	-					+++			+++				+	
60	-													
												4		
<b>-</b> <sup>50</sup>	-													
×								¶		_				
<b>W//MBp</b>	-							1						
ъ										•				
30														
20	-													
10	-													
0	10		100			1000			100	000			100000	
	10		100			MHz			100	000				
											■ PK	◆ AV	• QP	
					Duty Cycle Correction	External	Polarity/ Transducer			tance			Compared to	
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Factor (dB)	Attenuation (dB)	Type	Detector		stment dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Spec. (dB)	
	` '	, ,	, ,		, ,	, ,	Hora	A1/			(, , , ,	( , , ,		Comments High Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
7439.550 7319.558	3 29.2	13.0 12.2	1.7 1.8	324.0 20.0	3.3 3.3	0.0	Horz Horz	AV AV	0	0.0 0.0	45.6 44.7	54.0 54.0	-8.4 -9.3	Mid Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
7440.683 7319.458		13.0 12.2	1.0 1.3	0.0 26.0	3.3 3.3	0.0	Vert Vert	AV AV		0.0 0.0	44.4 44.2	54.0 54.0	-9.6 -9.8	High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant Mid Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4880.067	33.3	5.0	1.8	345.0	3.3	0.0	Horz	AV	0	0.0	41.6	54.0	-12.4	Mid Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant High Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4959.967 4804.008	34.1	5.2 3.8	2.2 2.0	342.0 343.0	3.3 3.3	0.0 0.0	Horz Horz	AV AV	0	0.0 0.0	41.3 41.2	54.0 54.0	-12.7 -12.8	Low Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4804.108 4879.992		3.8 5.0	3.7 3.3	27.0 34.0	3.3 3.3	0.0 0.0	Vert Vert	AV AV		0.0 0.0	39.7 38.8	54.0 54.0	-14.3 -15.2	Low Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant Mid Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4960.208	3 29.1	5.2	1.0	354.0	3.3	0.0	Vert	AV	0	0.0	37.6	54.0	-16.4	High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant High Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12397.59 12397.70		1.2 1.2	1.0 1.0	236.0 144.0	3.3 3.3	0.0 0.0	Horz Vert	AV AV		0.0 0.0	33.7 33.6	54.0 54.0	-20.3 -20.4	High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12199.570 12008.920		0.9 1.0	1.4 1.0	147.0 360.0	3.3 3.3	0.0 0.0	Vert Horz	AV AV		0.0 0.0	33.6 33.6	54.0 54.0	-20.4 -20.4	Mid Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant Low Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12198.68	0 29.4	0.9	1.8	330.0	3.3	0.0	Horz	AV	0	0.0	33.6	54.0	-20.4	Mid Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12008.23 7439.725		1.0 13.0	2.4 1.7	181.0 324.0	3.3	0.0 0.0	Vert Horz	AV PK		0.0 0.0	33.5 53.0	54.0 74.0	-20.5 -21.0	Low Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant High Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
7320.833 7320.858		12.2 12.2	1.3 1.8	26.0 20.0		0.0	Vert Horz	PK PK		0.0 0.0	51.8 51.8	74.0 74.0	-22.2 -22.2	Mid Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant Mid Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
7437.800	38.6	13.0	1.0	0.0		0.0	Vert	PK	0	0.0	51.6	74.0	-22.4	High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4960.700 4880.475		5.2 5.0	2.2 1.8	342.0 345.0		0.0 0.0	Horz Horz	PK PK		0.0 0.0	48.0 47.6	74.0 74.0	-26.0 -26.4	High Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant Mid Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4803.183	43.2	3.8	2.0	343.0		0.0	Horz	PK	0	0.0	47.0	74.0	-27.0	Low Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4804.200 4880.642		3.8 5.0	3.7 3.3	27.0 34.0		0.0 0.0	Vert Vert	PK PK		0.0 0.0	46.2 46.0	74.0 74.0	-27.8 -28.0	Low Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant Mid Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4959.492 12399.14		5.2 1.2	1.0 1.0	354.0 144.0		0.0	Vert Vert	PK PK		0.0 0.0	44.6 41.8	74.0 74.0	-29.4 -32.2	High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant High Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12199.63	0 40.8	0.9	1.4	147.0		0.0	Vert	PK	0	0.0	41.7	74.0	-32.3	Mid Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12009.020 12012.120		1.0 1.0	1.0 2.4	360.0 181.0		0.0 0.0	Horz Vert	PK PK		0.0 0.0	41.7 41.5	74.0 74.0	-32.3 -32.5	Low Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant Low Channel, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12399.69 12201.47	0 40.3	1.2 0.9	1.0 1.8	236.0 330.0		0.0	Horz Horz	PK PK	0	0.0	41.5 41.4	74.0 74.0	-32.5 -32.6	High Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant Mid Channel, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12201.471	0.0	0.5	1.0	550.0		0.0	11012	FIX	U		71.4	, 4.0	32.0	S



				EmiR5 2018.05.07 PSA-ESCI 2018.05.04								
Work Order:	SYNA0249	Date:	14-Aug-2018	// /h								
Project:	None	Temperature:	22.7 °C	1 1 1 1 1 1 1 1 1 1								
Job Site:	EV01	Humidity:	44.5% RH	UCAT 1/1/1/2-								
Serial Number:	E45	Barometric Pres.:	1015 mbar	Tested by: Jeff Alcoke								
EUT:	Radio Node											
Configuration:	12											
Customer:	Walt Disney Parks an	d Resorts US, Inc.										
Attendees:	None											
EUT Power:	4 VDC											
Operating Mode:	BTLE Tx, GFSK, Pacl	ket Length = 63, PRBS9	, 1 Mbps,Low Chan	nel = 2402 MHz, Mid Channel = 2440 MHz, High								
Operating wode.	Channel = 2480 MHz											
Deviations:	None											
Deviations.												
				testing on the POE system. See comments below for								
Comments:				are configured the radio with a duty cycle of 46.5% and								
Comments.	would not allow for co	ntinuous operation. Pe	r ANSI C63.10 test i	methods, the RMS data was corrected with a carrier								
	duty cycle correction t	factor (DCCF) of 3.3 dB	: DCCF (dB) = 10*lc	og(1/duty cycle).								
	duty cycle correction	uctor (DCCI ) 01 3.3 dB	. DOO! (db) = 10 ld	og (nady oyolo).								

Test Specifications
FCC 15.247:2018

Test Method ANSI C63.10:2013

Run#	92	Test Distance (	<b>m)</b> 3	Antenna H	eight(s)	1 to 4(m)	Results	Pass
80								
70								
60	-							
50	•							
50								
30								
20								
10								
2380		2400	2420	)	2440	2460	2480	250

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.577	32.2	-4.5	2.4	16.0	3.3	20.0	Horz	AV	0.0	51.0	54.0	-3.0	High Channel, EUT Vert, Ant Vert, Directional PA 2x2 ant
2483.553	31.4	-4.5	2.6	33.0	3.3	20.0	Vert	AV	0.0	50.2	54.0	-3.8	High Channel, EUT Vert, Ant on Side, Directional PA 2x2 ant
2388.527	31.0	-4.9	1.0	147.0	3.3	20.0	Horz	AV	0.0	49.4	54.0	-4.6	Low Channel, EUT Vert, Ant Vert, Directional PA 2x2 ant
2388.643	31.0	-4.9	2.6	33.0	3.3	20.0	Vert	AV	0.0	49.4	54.0	-4.6	Low Channel, EUT Vert, Ant on Side, Directional PA 2x2 ant
2483.537	46.8	-4.5	2.4	16.0		20.0	Horz	PK	0.0	62.3	74.0	-11.7	High Channel, EUT Vert, Ant Vert, Directional PA 2x2 ant
2483.627	44.2	-4.5	2.6	33.0		20.0	Vert	PK	0.0	59.7	74.0	-14.3	High Channel, EUT Vert, Ant on Side, Directional PA 2x2 ant
2388.063	42.7	-4.9	1.0	147.0		20.0	Horz	PK	0.0	57.8	74.0	-16.2	Low Channel, EUT Vert, Ant Vert, Directional PA 2x2 ant
2200 640	42.7	4.0	2.6	22.0		20.0	\/ort	DV	0.0	E7 0	74.0	-16.2	Law Channel ELIT Vert Ant on Side Directional BA 3x3 ant



PSA-ESCI 2018.05.04

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

#### MODES OF OPERATION

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

#### **POWER SETTINGS INVESTIGATED**

24VDC

POE

#### **CONFIGURATIONS INVESTIGATED**

SYNA0259 - 3

SYNA0259 - 4

#### FREQUENCY RANGE INVESTIGATED

Start Frequency 30 MHz Stop Frequency 26000 MHz

#### **SAMPLE CALCULATIONS**

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

#### **TEST EQUIPMENT**

1201 2qon men					
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	Peak Data	Quasi-Peak Data	Average Data
(MHz)	(kHz)	(kHz)	(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.

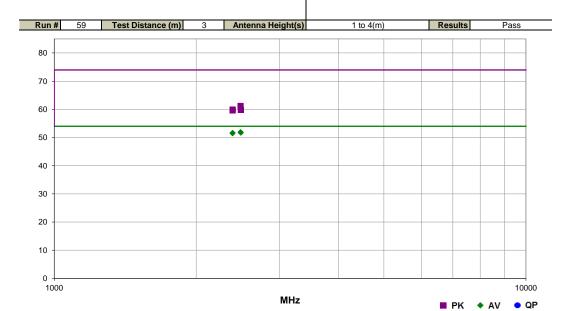
Measurements at the edges of the allowable band may be presented in an alternative method as provided for in the ANSI C63.10 Marker-Delta method. This method involves performing an in-band fundamental measurement followed by a screen capture of the fundamental and out-of-band emission using reduced measurement 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).



				EmiR5 2018.05.07 PSA-ESCI 2018.05.04
Work Order:	SYNA0259	Date:	8-Sep-2018	11 3
Project:	None	Temperature:	23.6 °C	14 Byt-
Job Site:	OC07	Humidity:	53.4% RH	
Serial Number:	E52	Barometric Pres.:	1014 mbar	Tested by: Mark Baytan
EUT:	Radio Node			
Configuration:	3			
Customer:	Walt Disney Parks an	d Resorts US, Inc.		
Attendees:	None			
EUT Power:	24VDC			
Operating Mode:	BTLE Tx, GFSK, Pacl Channel = 2480 MHz	ket Length = 63, PRBS9	), 1 Mbps,Low Chan	nel = 2402 MHz, Mid Channel = 2440 MHz, High
Deviations:	None			
	comments below for E 46.5% and would not	EUT and antenna orienta allow for continuous ope ection factor (DCCF) of	ation. The provided teration. Per ANSI C	testing on the POE system in SYNA0249. See est software configured the radio with a duty cycle of 63.10 test methods, the RMS data was corrected with a = 10*log(1/duty cycle).system. See comments below for
<b>Test Specifications</b>			Test Met	hod

FCC 15.247:2018

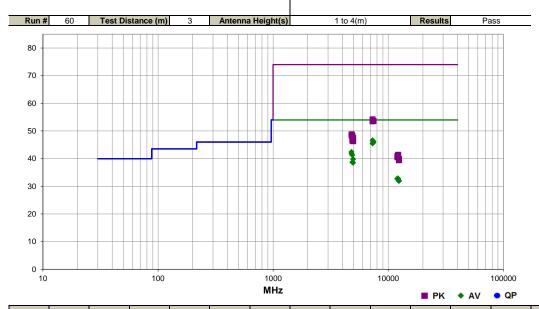


Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.613	32.8	-4.2	1.3	182.0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



				EmiR5 2018.05.07 PSA-ESCI 2018.05.04
Work Order:	SYNA0259	Date:	8-Sep-2018	11. 3
Project:	None	Temperature:	23.6 °C	14201
Job Site:	OC07	Humidity:	53.4% RH	8-Sep-2018 23.6 °C
Serial Number:	E52	Barometric Pres.:	1014 mbar	Tested by: Mark Baytan
EUT:	Radio Node			
Configuration:	3			
Customer:	Walt Disney Parks an	d Resorts US, Inc.		
Attendees:	None			
EUT Power:	24VDC			
Operating Mode:	BTLE Tx, GFSK, Pacl	et Length = 63, PRBS9,	1 Mbps,Low Chan	nel = 2402 MHz, Mid Channel = 2440 MHz, High
Operating wode.	Channel = 2480 MHz			
Deviations:	None			
Deviations.				
	Measurements made	on worst case orientation	ns determined from	testing on the POE system in SYNA0249. See
	comments below for E	UT and antenna orienta	tion. The provided	test software configured the radio with a duty cycle of
Comments:	46.5% and would not	allow for continuous ope	ration. Per ANSI C	63.10 test methods, the RMS data was corrected with a
	carrier duty cycle corr	ection factor (DCCF) of 3	3.3 dB: DCCF (dB)	= 10*log(1/duty cycle).system. See comments below for
	EUT and antenna orie	ntation.	, ,	
Test Specifications			Test Met	hod

FCC 15.247:2018

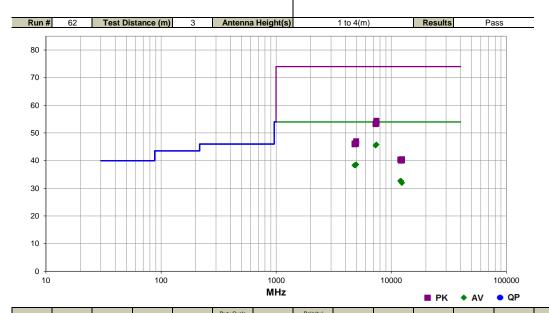


Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	
				0.47.0				***		40.0			Comments
7319.587	32.2	11.1	1.0	347.0	3.3	0.0	Vert	AV	0.0	46.6	54.0	-7.4	Mid Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
7439.527	31.2	11.7	1.0	200.0	3.3	0.0	Vert	AV	0.0	46.2	54.0	-7.8	High Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
7439.683	30.8	11.7	3.3	18.0	3.3	0.0	Horz	AV	0.0	45.8	54.0	-8.2	High Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
7319.493	31.1	11.1	4.0	0.0	3.3	0.0	Horz	AV	0.0	45.5	54.0	-8.5	Mid Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4803.873	34.6	4.5	1.9	225.0	3.3	0.0	Horz	AV	0.0	42.4	54.0	-11.6	Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4804.120	34.0	4.5	1.0	93.0	3.3	0.0	Vert	AV	0.0	41.8	54.0	-12.2	Low Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4879.990	33.7	4.3	1.0	53.0	3.3	0.0	Vert	AV	0.0	41.3	54.0	-12.7	Mid Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4959.883	32.3	4.2	3.7	50.0	3.3	0.0	Vert	AV	0.0	39.8	54.0	-14.2	High Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4879.817	31.1	4.3	1.6	217.0	3.3	0.0	Horz	AV	0.0	38.7	54.0	-15.3	Mid Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4960.043	31.0	4.2	1.0	315.0	3.3	0.0	Horz	AV	0.0	38.5	54.0	-15.5	High Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
7319.243	43.1	11.1	1.0	347.0	0.0	0.0	Vert	PK	0.0	54.2	74.0	-19.8	Mid Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
7440.097	41.9	11.7	3.3	18.0	0.0	0.0	Horz	PK	0.0	53.6	74.0	-20.4	High Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
7439.840	41.9	11.7	1.0	200.0	0.0	0.0	Vert	PK	0.0	53.6	74.0	-20.4	High Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
7319.110	42.4	11.1	4.0	0.0	0.0	0.0	Horz	PK	0.0	53.5	74.0	-20.5	Mid Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12008.590	33.0	-3.5	1.7	79.0	3.3	0.0	Horz	AV	0.0	32.8	54.0	-21.2	Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12198.720	32.0	-2.5	1.0	323.0	3.3	0.0	Horz	AV	0.0	32.8	54.0	-21.2	Mid Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12009.010	32.9	-3.5	1.0	78.0	3.3	0.0	Vert	AV	0.0	32.7	54.0	-21.3	Low Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12199.100	31.7	-2.5	2.7	68.0	3.3	0.0	Vert	AV	0.0	32.5	54.0	-21.5	Mid Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12398.890	31.6	-2.8	1.0	350.0	3.3	0.0	Horz	AV	0.0	32.1	54.0	-21.9	High Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12398.640	31.4	-2.8	1.7	337.0	3.3	0.0	Vert	AV	0.0	31.9	54.0	-22.1	High Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4804.380	44.3	4.5	1.9	225.0	0.0	0.0	Horz	PK	0.0	48.8	74.0	-25.2	Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4804.447	43.9	4.5	1.0	93.0	0.0	0.0	Vert	PK	0.0	48.4	74.0	-25.6	Low Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4880.410	44.0	4.3	1.0	53.0	0.0	0.0	Vert	PK	0.0	48.3	74.0	-25.7	Mid Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4960.557	43.3	4.2	3.7	50.0	0.0	0.0	Vert	PK	0.0	47.5	74.0	-26.5	High Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
4879.873	42.2	4.3	1.6	217.0	0.0	0.0	Horz	PK	0.0	46.5	74.0	-27.5	Mid Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
4960.497	42.1	4.2	1.0	315.0	0.0	0.0	Horz	PK	0.0	46.3	74.0	-27.7	High Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12200.440	43.9	-2.5	2.7	68.0	0.0	0.0	Vert	PK	0.0	41.4	74.0	-32.6	Mid Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12010.590	44.4	-3.5	1.7	79.0	0.0	0.0	Horz	PK	0.0	40.9	74.0	-33.1	Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12199.530	43.3	-2.5	1.0	323.0	0.0	0.0	Horz	PK	0.0	40.8	74.0	-33.2	Mid Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant
12008.700	44.0	-3.5	1.0	78.0	0.0	0.0	Vert	PK	0.0	40.5	74.0	-33.5	Low Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12398.790	42.7	-2.8	1.0	350.0	0.0	0.0	Horz	PK	0.0	39.9	74.0	-34.1	High Ch, EUT on Side, Ant on Side, Directional PA 2x2 Ant
12398.680	42.2	-2.8	1.7	337.0	0.0	0.0	Vert	PK	0.0	39.4	74.0	-34.6	High Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant



				EmiR5 2018.05.07 PSA-ESCI 2018.05.04
Work Order:	SYNA0259	Date:	8-Sep-2018	11 3
Project:	None	Temperature:	23.6 °C	142
Job Site:	OC07	Humidity:	23.6 °C 53.4% RH 1014 mbar  Tested by:  Mark Baytan  Tested by:  Mark Baytan  1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High  as determined from testing on the POE system in SYNA0249. See tion. The provided test software configured the radio with a duty cycle of ration. Per ANSI C63.10 test methods, the RMS data was corrected with a 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).system. See comments below for	
Serial Number:	E52	Barometric Pres.:	1014 mbar	Tested by: Mark Baytan
EUT:	Radio Node			
Configuration:	4			
Customer:	Walt Disney Parks an	d Resorts US, Inc.		
Attendees:	None			
EUT Power:	POE			
Operating Mode:	BTLE Tx, GFSK, Pacl Channel = 2480 MHz	ket Length = 63, PRBS9	, 1 Mbps,Low Chan	nel = 2402 MHz, Mid Channel = 2440 MHz, High
Deviations:	None			
Comments:	comments below for E 46.5% and would not	EUT and antenna orienta allow for continuous ope ection factor (DCCF) of	tion. The provided tration. Per ANSI C	est software configured the radio with a duty cycle of 63.10 test methods, the RMS data was corrected with a
Test Specifications			Test Met	hod

FCC 15.247:2018



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



■ PK ◆ AV • QP

					EmiR5 2018.05.07	PSA-ESCI 2018.05.04
Work Order:	SYNA0259	Date:	8-Sep-2018		11	
Project:	None	Temperature:	23.6 °C		43	1
Job Site:	OC07	Humidity:	53.4% RH			
Serial Number:	E52	Barometric Pres.:	1014 mbar	Т	ested by: Mark Baytan	
EUT:	Radio Node					
Configuration:	4					
Customer:	Walt Disney Parks an	d Resorts US, Inc.				
Attendees:	None					
EUT Power:	POE					
Operating Mode:	BTLE Tx, GFSK, Pacl Channel = 2480 MHz	ket Length = 63, PRBS9	, 1 Mbps,Low Chan	nel = 2402 Mi	Hz, Mid Channel = 2440 N	ИНz, High
Deviations:	None					
Comments:	comments below for E 46.5% and would not	EUT and antenna orienta allow for continuous ope ection factor (DCCF) of 3	tion. The provided t ration. Per ANSI C	est software of 63.10 test me	POE system in SYNA02 configured the radio with a thods, the RMS data was ty cycle).system. See cor	a duty cycle of s corrected with a
Test Specifications			Test Met	hod		
FCC 15.247:2018	•		ANSI C6	3.10:2013		

lun#	64	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
80							
70							
60 -				-			
50				**			
10							
30							
20							
0							
0							
1000				MHz			1000

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)
2388.063	32.7	-4.6	1.0	81.0	3.3	20.0	Horz	AV	0.0	51.4	54.0	-2.6
2388.163	32.7	-4.6	3.8	189.0	3.3	20.0	Vert	AV	0.0	51.4	54.0	-2.6
2484.330	32.3	-4.2	1.2	117.0	3.3	20.0	Horz	AV	0.0	51.4	54.0	-2.6
2485.263	32.3	-4.2	2.2	299.0	3.3	20.0	Vert	AV	0.0	51.4	54.0	-2.6
2484.300	43.8	-4.2	2.2	299.0	0.0	20.0	Vert	PK	0.0	59.6	74.0	-14.4
2388.717	44.0	-4.6	3.8	189.0	0.0	20.0	Vert	PK	0.0	59.4	74.0	-14.6
2389.753	43.8	-4.6	1.0	81.0	0.0	20.0	Horz	PK	0.0	59.2	74.0	-14.8
2484.190	43.4	-4.2	1.2	117.0	0.0	20.0	Horz	PK	0.0	59.2	74.0	-14.8

Comments

Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant Low Ch, EUT Vert, Ant on Side, Directional PA 2x2 Ant High Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant High Ch, EUT Vert, Ant on Side, Directional PA 2x2 Ant High Ch, EUT Vert, Ant on Side, Directional PA 2x2 Ant Low Ch, EUT Vert, Ant on Side, Directional PA 2x2 Ant Low Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant High Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant High Ch, EUT Vert, Ant Vert, Directional PA 2x2 Ant



PSA-ESCI 2018.05.04

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

#### **MODES OF OPERATION**

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

#### **POWER SETTINGS INVESTIGATED**

24 VDC

POE

#### **CONFIGURATIONS INVESTIGATED**

SYNA0249 - 13

SYNA0249 - 5

#### FREQUENCY RANGE INVESTIGATED

#### **SAMPLE CALCULATIONS**

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

#### **TEST EQUIPMENT**

IESI EQUIPMENI					
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).



							element
						EmiR5 2018.05.07	PSA-ESCI 2018.05.04
Work Ord	er: SYNA0249	Da	ate: 3-Au	g-2018			1/4
Proje	ct: None	Temperatu	re: 22	.5 °C	, 1 3	//	
Job Si	te: EV01	Humid	ity: 43.8	3% RH	Can	14/18	
Serial Numb		Barometric Pre	es.: 1022	2 mbar	Tested by:	Jeff Alcoke	
	JT: Radio Node						
Configuration							
	er: Walt Disney Parks ar	nd Resorts US, Inc.					
	es: Hattie Spetla						
EUT Pow							
Operating Mod	de: BTLE Tx, GFSK, Pac Channel = 2480 MHz		RBS9, 1 Mbps	, Low Channe	el = 2402 MHz, Mid (	Channel = 2440 M	MHz, High
Deviation	ns: None						
Commen	see comments below radio with a duty cycl data was corrected w	e of 46.5% and wou	ıld not allow fo	r continuous o	operation. Per ANSI	C63.10 test met	thods, the RMS
<b>Test Specification</b>	ns			<b>Test Method</b>	d		
FCC 15.247:2018	•			ANSI C63.10	0:2013		
Run # 28	Test Distance (m)	3 Ante	nna Height(s)	)	1 to 4(m)	Results	Pass
80							
70							
60			11111				1 1 1 1 1 1

Run #	28	Test Dis	tance (m)	3	Anter	na He	eight(s	)	1 to	4(m	)		Results			Pass	
80																	
70														_			
60																	
50											•						
30												•		+			
20																	
10																	
0 ↓ 10			100				1000					10000				100	0000
							MHz						■ PK	•	ΑV	•	QF

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

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



								element
							EmiR5 2018.05.07	PSA-ESCI 2018.05.04
Work Ord	er: SYNA02	249	Date:	3-Aug-2	018		- //	1/2
Proje	ct: None		Temperature:	22.5 °	C	/	2//	
Job Si	te: EV01		Humidity:	43.8%	RH '		1/ /1/10	
Serial Numb	er: E45		Barometric Pres.:	1022 m	oar	Teste	d by: Jeff Alcoke	
El	JT: Radio Node							
Configuration								
Custom	er: Walt Disney I	Parks and R	Resorts US, Inc.					
Attende	es: Hattie Spetla							
EUT Pow	er: POE							
Operating Mo	de: BTLE Tx, GF Channel = 24		Length = 63, PRBS9	, 1 Mbps, Lo	w Channel =	2402 MHz,	Mid Channel = 2440	MHz, High
Deviatio	ns: None							
Commen	radio with a d data was corr	uty cycle of	channel, EUT orienta 46.5% and would no a carrier duty cycle co	t allow for co	ntinuous ope or (DCCF) of	ration. Per i	ANSI C63.10 test me	ethods, the RMS
Test Specification	ns			T	st Method			
FCC 15.247:2018				A	NSI C63.10:2	013		
Run # 30	Test Dista	nce (m)	3 Antenna I	leight(s)	1 to	4(m)	Results	Pass
80								
70								
60								

Run #	30	Test Distance	ce (m)	3	Ante	enna H	eight(s	)	1 to	4(m)		Re	sults	5	Pass
80															
70															
60	•												-		
50	•												-		
50															
30															
20															
10															
0 2380		2400		2420			2440		24	160		24	80		250

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



ANIEN	NA						element
						EmiR5 2018.05.07	PSA-ESCI 2018.05.04
Work Order		Date:	14-Aug				1/2
Project		Temperature:	23.2		1	/ //	
Job Site		Humidity:	45.49	6 RH	101/	14/18	
Serial Number		Barometric Pres.:	1014	mbar	Tested by:	Jeff Alcoke	
	: Radio Node						
Configuration							
	r: Walt Disney Parks an	d Resorts US, Inc.					
Attendees							
EUT Power							
Operating Mode	BTLE Tx, GFSK, Pac Channel = 2480 MHz	ket Length = 63, PRBS	9, 1 Mbps,l	_ow Channel = 24	02 MHz, Mid Ch	nannel = 2440 M	Hz, High
Deviations	None None						
Comments	Channel, EUT and Ar would not allow for co	on worst case orientation on worst case orientations. The ntinuous operation. Per (DCCF) of 3.3 dB: DCC	provided to r ANSI C63	est software confi 3.10 test methods	gured the radio v	with a duty cycle	of 46.5% and
<b>Test Specifications</b>	i .			Test Method			
FCC 15.247:2018				ANSI C63.10:201	3		
	_						
<b>Run #</b> 93	Test Distance (m)	3 Antenna	Height(s)	1 to 4	(m)	Results	Pass
80							
70							
60							

Run#	93	Test Di	stance (r	<b>n)</b> 3	Antenna	a Height(s)	1 to 4(n	n)	Results	Pass
80										
70										
60										
50							-			
50							-			
30								•		
20										
10										
0 10			10	00		1000 <b>MHz</b>		10000		10000
									■ PK ◆	AV • Q

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



				EmiR5 2018.05.07 PSA-ESCI 2018.05.04								
Work Order:	SYNA0249	Date:	14-Aug-2018	// //								
Project:	None	Temperature:	23.2 °C	110/4////								
Job Site:	EV01	Humidity:	45.4% RH	UCAT 19/182								
Serial Number:	E45	Barometric Pres.:	1014 mbar	Tested by: Jeff Alcoke								
EUT:	Radio Node											
Configuration:	13											
Customer:	Walt Disney Parks and	d Resorts US, Inc.										
Attendees:	None											
EUT Power:	4 VDC											
Operating Mede:	BTLE Tx, GFSK, Pacl	ket Length = 63, PRBS9	, 1 Mbps,Low Cha	nnel = 2402 MHz, Mid Channel = 2440 MHz, High								
Operating Mode.	Channel = 2480 MHz		•									
Deviations:	None											
Deviations.												
	Measurements made	on worst case orientatio	ns determined fron	n testing on the POE system. See comments below for								
	Channel, EUT and An	tenna orientations. The	provided test softw	are configured the radio with a duty cycle of 46.5% and								
Comments:	would not allow for co	ntinuous operation. Per	ANSI C63.10 test	methods, the RMS data was corrected with a carrier duty								
	cycle correction factor	(DCCF) of 3.3 dB: DCC	CF (dB) = 10*log(1/e)	duty cycle).								
Test Specifications			Test Me	thod								

FCC 15.247:2018

Run #	95 Test Distance		<b>(m)</b> 3	Antenna I	Height(s)	1 to 4(m)	Results	Pass
80								
70								
60								
50	••							
40								
30								
20								
10								
0 2380		2400	2420	)	2440	2460	2480	250

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.500	33.2	-4.5	1.9	95.0	3.3	20.0	Horz	AV	0.0	52.0	54.0	-2.0	High Channel, EUT on Side, Ant Vert, Directional PA 3x3 Ant
2483.527	32.5	-4.5	1.5	104.0	3.3	20.0	Vert	AV	0.0	51.3	54.0	-2.7	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
2388.083	31.2	-4.9	1.0	153.0	3.3	20.0	Vert	AV	0.0	49.6	54.0	-4.4	Low Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
2389.853	31.1	-4.9	1.9	95.0	3.3	20.0	Horz	AV	0.0	49.5	54.0	-4.5	Low Channel, EUT on Side, Ant Vert, Directional PA 3x3 Ant
2483.600	48.7	-4.5	1.9	95.0		20.0	Horz	PK	0.0	64.2	74.0	-9.8	High Channel, EUT on Side, Ant Vert, Directional PA 3x3 Ant
2483.630	46.8	-4.5	1.5	104.0		20.0	Vert	PK	0.0	62.3	74.0	-11.7	High Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
2389.807	43.3	-4.9	1.0	153.0		20.0	Vert	PK	0.0	58.4	74.0	-15.6	Low Channel, EUT on Side, Ant on Side, Directional PA 3x3 Ant
2389 000	42.3	-49	19	95.0		20.0	Horz	PK	0.0	57.4	74.0	-16.6	Low Channel, EUT on Side, Ant Vert, Directional PA 3x3 Ant



PSA-ESCI 2018.05.04

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

#### **MODES OF OPERATION**

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

#### **POWER SETTINGS INVESTIGATED**

24VDC

POE

#### **CONFIGURATIONS INVESTIGATED**

SYNA0259 - 5

SYNA0259 - 6

#### FREQUENCY RANGE INVESTIGATED

Start Frequency 30 MHz Stop Frequency 26000 MHz

#### **SAMPLE CALCULATIONS**

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

#### **TEST EQUIPMENT**

I E O I E Q O II I I I E I I I					
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	Peak Data	Quasi-Peak Data	Average Data
(MHz)	(kHz)	(kHz)	(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.



				EMIR5 2018.05.07 PSA-ESCI 2018.05.04								
Work Order:	SYNA0259	Date:	9-Sep-2018	11 0								
Project:	None	Temperature:	27 °C	Mr Byt								
Job Site:	OC07	Humidity:	43.5% RH									
Serial Number:	E52	Barometric Pres.:	1012 mbar	Tested by: Mark Baytan								
EUT:	Radio Node											
Configuration:	6											
Customer:	Walt Disney Parks an	d Resorts US, Inc.										
Attendees:	None	lone										
EUT Power:	POE											
Operating Mode:	BTLE Tx, GFSK, Pacl	cet Length = 63, PRBS9	, 1 Mbps,Low Chann	iel = 2402 MHz, Mid Channel = 2440 MHz, High								
Operating wode.	Channel = 2480 MHz											
Deviations:	None											
Deviations.												
	Measurements made	on worst case orientatio	ns determined from	testing on the POE system in SYNA0249. See								
Comments:	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 ope	ration. Per ANSI C6	3.10 test methods, the RMS data was corrected with a								
Test Specifications			Test Meth	nod								
Tool opcomentions			1 COL MICH									

 Test Specifications
 Test Method

 FCC 15.247:2018
 ANSI C63.10:2013

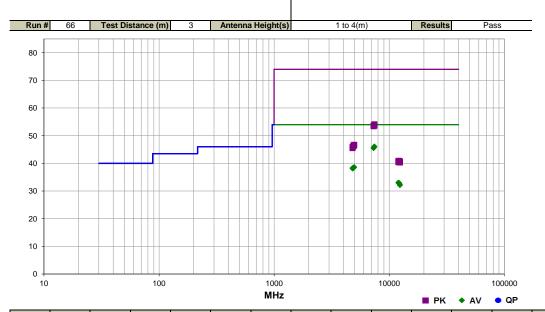
Run # 65	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
	. cet Siotunee (m)		, and the grid (b)	, 10 f(III)	Librario	. 400
80						
70						
,,						
			•			
60						
50			• *			
40						
30						
20						
20						
10						
0						
1000						10
			MHz			

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



					EmiR5 2018.05.07 PSA-ESCI 2018.05.04
Work Order:	SYNA0259	Date:	9-Sep-2018		11 3
Project:	None	Temperature:	26.9 °C		4234
Job Site:	OC07	Humidity:	43% RH		
Serial Number:	E52	Barometric Pres.:	1012 mbar	1	Tested by: Mark Baytan
EUT:	Radio Node				
Configuration:	6				
Customer:	Walt Disney Parks an	d Resorts US, Inc.			
Attendees:	None				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Pacl	et Length = 63, PRBS9	, 1 Mbps,Low Char	nnel = 2402 M	Hz, Mid Channel = 2440 MHz, High
Operating wode.	Channel = 2480 MHz		•		
Deviations:	None				
Deviations.					
	Measurements made	on worst case orientatio	ns determined fron	n testing on th	e POE system in SYNA0249. See
Comments:	comments below for E	UT and antenna orienta	tion. The provided	test software	configured the radio with a duty cycle of
	46.5% and would not	allow for continuous ope	ration. Per ANSI C	263.10 test me	ethods, the RMS data was corrected with a
Test Specifications			Test Me	thod	
rest opecifications					

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



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



				EmiR5 2018.05.07 PSA-ESCI 2018.05.04								
Work Order:	SYNA0259	Date:	9-Sep-2018	11 3								
Project:	None	Temperature:	26.9 °C	14634								
Job Site:	OC07	Humidity:	43% RH									
Serial Number:	E52	Barometric Pres.:	1012 mbar	Tested by: Mark Baytan								
EUT:	Radio Node											
Configuration:	5											
Customer:	Walt Disney Parks and	d Resorts US, Inc.										
Attendees:	None											
EUT Power:	4VDC											
Operating Mode:	BTLE Tx, GFSK, Pack	cet Length = 63, PRBS9	, 1 Mbps,Low Chanr	el = 2402 MHz, Mid Channel = 2440 MHz, High								
Operating wode.	Channel = 2480 MHz											
Deviations:	None											
Deviations.												
	Measurements made	on worst case orientatio	ns determined from	testing on the POE system in SYNA0249. See								
Comments:	comments below for E	UT and antenna orienta	tion. The provided to	est software configured the radio with a duty cycle of								
	46.5% and would not a	allow for continuous ope	ration. Per ANSI Co	3.10 test methods, the RMS data was corrected with a								
Test Specifications			Test Meth	nod								
FCC 45 047:0040			ANCLOSS									

 Test Specifications
 Test Method

 FCC 15.247:2018
 ANSI C63.10:2013

Run # 68	Test Distance (m) 3	Antenna Height(s)	1 to 4(m)	Results Pass
80				
70				
60				
50				
40				
30				
20				
10				
0				
10	100	1000 <b>MHz</b>	10000	10000

Freq	Amplitude	Factor	Antenna Height	Azimuth	Duty Cycle Correction Factor	External Attenuation	Polarity/ Transducer Type	Detector	Distance Adjustment	Adjusted	Spec. Limit	Compared to Spec.	
(MHz)	(dBuV)	(dB)	(meters)	(degrees)	(dB)	(dB)			(dB)	(dBuV/m)	(dBuV/m)	(dB)	
													Comments
7319.380	33.2	11.1	2.0	146.0	3.3	0.0	Horz	AV	0.0	47.6	54.0	-6.4	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7439.445 7440.290	31.9 29.3	11.7 11.7	1.9 1.0	151.0 133.0	3.3 3.3	0.0	Horz Vert	AV AV	0.0 0.0	46.9 44.3	54.0 54.0	-7.1 -9.7	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7318.930		11.7	2.2		3.3	0.0	Vert	AV	0.0			-9.7 -10.1	
4803.690	29.5 35.7	4.5	1.8	155.0 140.0	3.3	0.0	Horz	AV	0.0	43.9 43.5	54.0 54.0	-10.1	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant Low Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4879.705	33.6	4.3	2.3	154.0	3.3	0.0	Horz	AV	0.0	43.5 41.2	54.0 54.0	-10.5	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4804.340	33.0	4.5	1.2	46.0	3.3	0.0	Vert	AV	0.0	40.8	54.0 54.0	-12.6	Low Ch. EUT on Side, Ant on Side, Directional PA 3x3 Ant
4960.180	31.2	4.2	1.2	220.0	3.3	0.0	Horz	AV	0.0	38.7	54.0	-15.2	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4880.455	30.2	4.2	1.0	31.0	3.3	0.0	Vert	AV	0.0	37.8	54.0	-16.2	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4959.900	29.5	4.2	3.1	314.0	3.3	0.0	Vert	AV	0.0	37.0	54.0	-10.2	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7319.465	44.0	11.1	2.0	146.0	0.0	0.0	Horz	PK	0.0	55.1	74.0	-18.9	Mid Ch. EUT on Side, Ant on Side, Directional PA 3x3 Ant
7440.915	43.1	11.7	1.9	151.0	0.0	0.0	Horz	PK	0.0	54.8	74.0	-19.2	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12010.740	33.4	-3.5	4.0	335.0	3.3	0.0	Horz	AV	0.0	33.2	54.0	-20.8	Low Ch. EUT on Side, Ant on Side, Directional PA 3x3 Ant
12008.630	33.0	-3.5	1.0	263.0	3.3	0.0	Vert	AV	0.0	32.8	54.0	-21.2	Low Ch. EUT on Side. Ant on Side. Directional PA 3x3 Ant
12199.120	32.0	-2.5	3.8	174.0	3.3	0.0	Horz	AV	0.0	32.8	54.0	-21.2	Mid Ch. EUT on Side, Ant on Side, Directional PA 3x3 Ant
12201.470	31.7	-2.5	2.5	8.0	3.3	0.0	Vert	AV	0.0	32.5	54.0	-21.5	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12399.590	31.6	-2.8	1.2	245.0	3.3	0.0	Horz	AV	0.0	32.1	54.0	-21.9	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7318.720	40.9	11.1	2.2	155.0	0.0	0.0	Vert	PK	0.0	52.0	74.0	-22.0	Mid Ch. EUT on Side. Ant on Side. Directional PA 3x3 Ant
12399.510	31.4	-2.8	1.0	122.0	3.3	0.0	Vert	AV	0.0	31.9	54.0	-22.1	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
7440,765	39.9	11.7	1.0	133.0	0.0	0.0	Vert	PK	0.0	51.6	74.0	-22.4	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4803.695	45.0	4.5	1.8	140.0	0.0	0.0	Horz	PK	0.0	49.5	74.0	-24.5	Low Ch. EUT on Side, Ant on Side, Directional PA 3x3 Ant
4879.545	43.7	4.3	2.3	154.0	0.0	0.0	Horz	PK	0.0	48.0	74.0	-26.0	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4804.415	43.3	4.5	1.2	46.0	0.0	0.0	Vert	PK	0.0	47.8	74.0	-26.2	Low Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4959.415	41.7	4.2	1.2	220.0	0.0	0.0	Horz	PK	0.0	45.9	74.0	-28.1	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4880.815	41.5	4.3	1.0	31.0	0.0	0.0	Vert	PK	0.0	45.8	74.0	-28.2	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
4960.630	41.1	4.2	3.1	314.0	0.0	0.0	Vert	PK	0.0	45.3	74.0	-28.7	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12010.250	45.1	-3.5	4.0	335.0	0.0	0.0	Horz	PK	0.0	41.6	74.0	-32.4	Low Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12200.100	42.9	-2.5	3.8	174.0	0.0	0.0	Horz	PK	0.0	40.4	74.0	-33.6	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12009.650	43.7	-3.5	1.0	263.0	0.0	0.0	Vert	PK	0.0	40.2	74.0	-33.8	Low Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12199.030	42.7	-2.5	2.5	8.0	0.0	0.0	Vert	PK	0.0	40.2	74.0	-33.8	Mid Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12399.580	42.7	-2.8	1.0	122.0	0.0	0.0	Vert	PK	0.0	39.9	74.0	-34.1	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
12398.710	42.3	-2.8	1.2	245.0	0.0	0.0	Horz	PK	0.0	39.5	74.0	-34.5	High Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant



■ PK ◆ AV • QP

				EmiR5 2018.05.07 PSA-ESCI 2018.05.04								
Work Order:	SYNA0259	Date:	9-Sep-2018	11 3								
Project:	None	Temperature:	26.9 °C	Mr Byt								
Job Site:	OC07	Humidity:	43% RH									
Serial Number:	E52	Barometric Pres.:	1012 mbar	Tested by: Mark Baytan								
EUT:	Radio Node											
Configuration:	5											
Customer:	Walt Disney Parks an	d Resorts US, Inc.										
Attendees:	lone											
EUT Power:	24VDC											
Operating Mode:	BTLE Tx, GFSK, Pacl Channel = 2480 MHz	ket Length = 63, PRBS9	, 1 Mbps,Low Chani	nel = 2402 MHz, Mid Channel = 2440 MHz, High								
Deviations:	None											
	comments below for E	UT and antenna orienta	ation. The provided to	testing on the POE system in SYNA0249. See est software configured the radio with a duty cycle of 63.10 test methods, the RMS data was corrected with a								
Test Specifications			Test Met	hod								

FCC 15.247:2018

ANSI C63.10:2013

Run#	71	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
80							
<u> </u>							
70							
60							
50				••			
40							
30							
20							
10							
0 <del> </del> 1000							100
1000				MHz			100

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)	Comm
2483.507	30.9	-4.2	2.5	210.0	3.3	20.0	Horz	AV	0.0	50.0	54.0	-4.0	High C
2388.780	31.1	-4.6	3.8	192.0	3.3	20.0	Vert	AV	0.0	49.8	54.0	-4.2	Low C
2485.335	30.7	-4.2	1.0	150.0	3.3	20.0	Vert	AV	0.0	49.8	54.0	-4.2	High C
2389.963	31.0	-4.6	1.0	120.0	3.3	20.0	Horz	AV	0.0	49.7	54.0	-4.3	Low C
2483.537	41.9	-4.2	2.5	210.0	0.0	20.0	Horz	PK	0.0	57.7	74.0	-16.3	High C
2484.440	41.7	-4.2	1.0	150.0	0.0	20.0	Vert	PK	0.0	57.5	74.0	-16.5	High C
2389.277	41.9	-4.6	1.0	120.0	0.0	20.0	Horz	PK	0.0	57.3	74.0	-16.7	Low C
2389.505	41.8	-4.6	3.8	192.0	0.0	20.0	Vert	PK	0.0	57.2	74.0	-16.8	Low C

nments
h Ch, EUT on Side, Ant Vert, Directional PA 3x3 Ant
/ Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
h Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
h Ch, EUT on Side, Ant Vert, Directional PA 3x3 Ant
h Ch, EUT on Side, Ant Vert, Directional PA 3x3 Ant
h Ch, EUT on Side, Ant Vert, Directional PA 3x3 Ant
h Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant
v Ch, EUT on Side, Ant Vert, Directional PA 3x3 Ant
w Ch, EUT on Side, Ant on Side, Directional PA 3x3 Ant



PSA-ESCI 2018.05.04

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

#### **MODES OF OPERATION**

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

#### **POWER SETTINGS INVESTIGATED**

24 VDC

POE

#### **CONFIGURATIONS INVESTIGATED**

SYNA0249 - 11

SYNA0249 - 10

#### FREQUENCY RANGE INVESTIGATED

Start Frequency | 30 MHz | Stop Frequency | 26.5 GHz

#### **SAMPLE CALCULATIONS**

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

#### **TEST EQUIPMENT**

ILOI LQOII MILITI					
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.

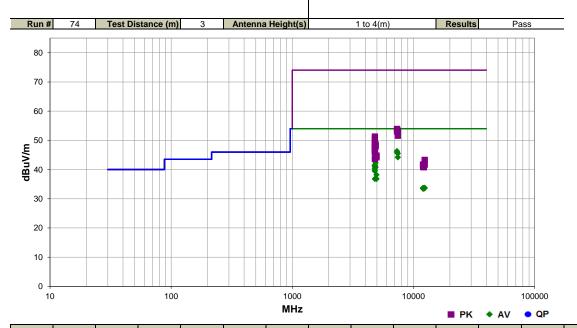
Measurements at the edges of the allowable band may be presented in an alternative method as provided for in the ANSI C63.10 Marker-Delta method. This method involves performing an in-band fundamental measurement followed by a screen capture of the fundamental and out-of-band emission using reduced measurement 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.



·				EmiR5 2018.05.07 PSA-ESCI 2018.05.0							
Work Order:	SYNA0249	Date:	13-Aug-2018	// /h							
Project:	None	Temperature:	22.7 °C								
Job Site:	EV01	Humidity:	45.5% RH	001/1/18							
Serial Number:	E45	Barometric Pres.:	1019 mbar	Tested by: Jeff Alcoke							
EUT:	Radio Node										
Configuration:	10										
Customer:	Walt Disney Parks an	d Resorts US, Inc.									
Attendees:	lone										
EUT Power:	OE										
	BTLE Tx, GFSK, Pack Channel = 2480 MHz	ket Length = 63, PRBS9	, 1 Mbps,Low Chan	nel = 2402 MHz, Mid Channel = 2440 MHz, High							
Deviations:	None										
Comments:	See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).										

 Test Specifications
 Test Method

 FCC 15.247:2018
 ANSI C63.10:2013



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

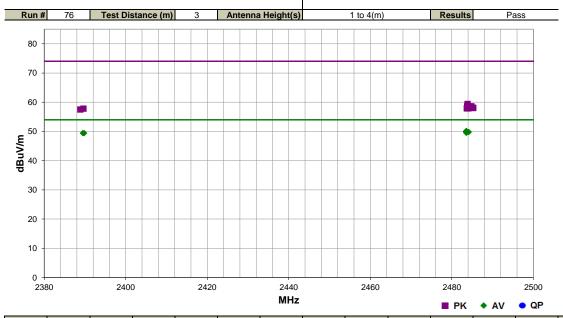
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7440.833	38.6	13.0	1.0	30.0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



				EmiR5 2018.05.07 PSA-ESCI 2018.05.04							
Work Order:	SYNA0249	Date:	13-Aug-2018	// //							
Project:	None	Temperature:	22.7 °C								
Job Site:	EV01	Humidity:	45.5% RH	001/1/1							
Serial Number:	E45	Barometric Pres.:	1019 mbar	Tested by: Jeff Alcoke							
EUT:	Radio Node										
Configuration:	10										
Customer:	Walt Disney Parks an	d Resorts US, Inc.									
Attendees:	lone										
EUT Power:	POE										
Operating Mode:	BTLE Tx, GFSK, Pack Channel = 2480 MHz	ket Length = 63, PRBS9	), 1 Mbps,Low Chan	nel = 2402 MHz, Mid Channel = 2440 MHz, High							
Deviations:	None										
Comments:	duty cycle of 46.5% a	nd would not allow for o	ontinuous operation.	. The provided test software configured the radio with a . Per ANSI C63.10 test methods, the RMS data was dB: DCCF (dB) = 10*log(1/duty cycle).							

Test Specifications
FCC 15.247:2018

Test Method ANSI C63.10:2013



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



100000

10/		0)/114.0040			D-1-	40.4 0	240				E	niR5 2018.05	i.07		PSA-ESC	CI 2018
	k Order:	SYNA0249	1	T	Date:	13-Aug-20		-	-	1	-/				2	
	Project:	None EV01			erature:	22.7 °C		(	/		7			//		
	Job Site: Number:				umidity:	45.5% R			Ŧ.	-4	han la	eff Alco				$\sim$
Seriai i				Barometr	ic Pres.:	1019 mb	ar		16	stea	by: Je	en Aico	ке			
Cantia		Radio Node														
	guration:															_
	tendees:	Walt Disney Pa	rks and Re	esons US	, Inc.											_
	T Power:															_
Operatin		DTLE TH OFOR		Length = 6	63, PRBS9,	1 Mbps,Low	Channel	= 2402	2 MF	lz, M	id Char	nnel = 2	2440 N	ЛHz,	High	_
Dev	viations:	None														
st Specifi	ications	would not allow cycle correction				F (dB) = 10*		cycle)							- Curric	
	:2018					AN	SI C63.10	0.2010								
Run #	78	Test Distanc	e (m)	3	Antenna H			1 to 4(n	n)			Result	ts	!	Pass	
		Test Distanc	e (m)	3	Antenna H				n)			Result	ts		Pass	
Run #		Test Distanc	e (m)	3	Antenna H				n)			Result	ts		Pass	
		Test Distanc	ee (m)	3	Antenna H				n)			Result	ts		Pass	
Run #		Test Distanc	ee (m)	3	Antenna H				n)			Result	es		Pass	
Run #		Test Distanc	se (m)	3	Antenna H				n)			Result	ts		Pass	
<b>Run #</b>		Test Distanc	ee (m)	3	Antenna H				n)			Result	:s		Pass	
80		Test Distanc	ee (m)	3	Antenna H				n)			Result	is		Pass	
<b>Run #</b>		Test Distance	ee (m)	3	Antenna H				n)			Result	ts		Pass	_
80		Test Distanc	se (m)	3	Antenna H				n)			Result	ts		Pass	
80 70 60		Test Distanc	ee (m)	3	Antenna H				n)			Result	ts		Pass	
80		Test Distanc	e (m)	3	Antenna H				n)			Result	ts		Pass	
80		Test Distance	ee (m)	3	Antenna H				n)			Result	ts		Pass	
80		Test Distance	e (m)	3	Antenna H				n)			Result	ts		Pass	
80 70 60		Test Distanc	e (m)	3	Antenna H				n)			Result	is		Pass	
80		Test Distanc	ee (m)	3	Antenna H				n)			Result			Pass	
80		Test Distanc	ee (m)	3	Antenna H				1)			Result			Pass	
80		Test Distance	e (m)	3	Antenna H				n)			Result	is .		Pass	
80		Test Distanc	ee (m)	3	Antenna H				n)			Result			Pass	

1000

MHz

100

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

10000

10

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



					EmiR5 2018.05.07	PSA-ESCI 2018.05.04						
Work Order:	SYNA0249	Date:	13-Aug-2018		- //	1/4						
Project:	None	Temperature:	22.7 °C	/								
Job Site:	EV01	Humidity:	45.5% RH		27 19/18							
Serial Number:	E45	Barometric Pres.:	1019 mbar	Te	ested by: Jeff Alcoke							
EUT:	Radio Node											
Configuration:	11											
Customer:	Walt Disney Parks an	d Resorts US, Inc.										
Attendees:	None											
EUT Power:	24 VDC											
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps,Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High											
Operating wode.	Channel = 2480 MHz											
Deviations:	None											
Dovidiono.												
					e POE system. See comm							
Comments:	Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and											
Commonto.	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: DCC	CF (dB) = 10*log(1/d)	uty cycle).								
Test Specifications			Test Meth	od								
FCC 15.247:2018	•		ANSI C63	.10:2013								

Run#	77	Test Distance (m)	3	Anten	na Heig	nt(s)	1 to 4(	m)	Results	Pass
80										
70										
60										
50									•	
40										
30										
20										
10										
2380		2400	2420	)		440	246	60	2480	250

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



PSA-ESCI 2018.05.04

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

### MODES OF OPERATION

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

### POWER SETTINGS INVESTIGATED

POE

24VDC

### **CONFIGURATIONS INVESTIGATED**

SYNA0259 - 2

SYNA0259 - 1

### FREQUENCY RANGE INVESTIGATED

Start Frequency 30 MHz	Stop Frequency	100000 MHz
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### 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	Peak Data	Quasi-Peak Data	Average Data
(MHz)	(kHz)	(kHz)	(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.



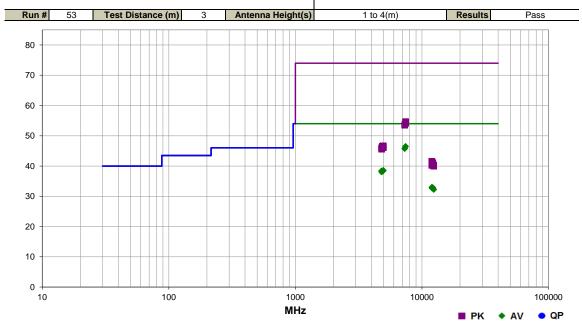
	ork Order: Project: Job Site: al Number:	No OC	A0259 one C07 45		Date: nperature: Humidity: etric Pres.:	7-Sep 25.9 45.79 1015	9 °C % RH		Tested by:	EmiR5 2018.05.07	3,+	PSA-ESCI 2018.05.0-	j
	figuration: Customer:	Walt Disne	e ey Parks and	l Resorts U	JS, Inc.			•					- - - -
	Attendees:												=
	UT Power: ting Mode:			et Length	= 63, PRBS	9, 1 Mbps,l	Low Chan	inel = 2402 l	MHz, Mid C	Channel = 24	140 MHz,	High	-
D	eviations:	None											
С	comments:	comments 46.5% and carrier duty	below for E I would not a	UT and an allow for co	ase orientati tenna orient ntinuous op or (DCCF) of	ation. The eration. Per 3.3 dB: D0	provided of ANSI C	test softwar 63.10 test n = 10*log(1/o	e configure nethods, the	d the radio e RMS data	with a duty was corre	cycle of cted with a	-
<b>Test Spec</b>	ifications						Test Met	hod					_
FCC 15.24		Tast Dis	stance (m)	3	Antenna	Height(s)	ANSI C63	3.10:2013 1 to 4(m)		Results	Г	ass	_
Ruii #	32	I GSL DIS	stance (iii)	3	Antenna	neigni(s)		1 10 4(111)		Results	F	ass	-
80													
70													
60													
50					**								
40													
30 —													
20 -													
0													
100	0											10000	
						MHz				■ PK	◆ AV	• QP	
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.517 2483.597 2389.087 2389.093 2484.173 2484.393 2389.897 2389.113	32.6 32.6 32.7 32.7 44.6 43.9 43.9	-4.2 -4.6 -4.6 -4.2 -4.2 -4.6 -4.6	1.0 2.0 1.8 3.1 1.0 2.0 1.8 3.1	143.0 42.0 295.0 180.0 143.0 42.0 295.0 180.0	3.3 3.3 3.3 3.3 0.0 0.0 0.0	20.0 20.0 20.0 20.0 20.0 20.0 20.0 20.0	Horz Vert Horz Vert Horz Vert Horz Vert	AV AV AV PK PK PK PK	0.0 0.0 0.0 0.0 0.0 0.0 0.0	51.7 51.7 51.4 51.4 60.4 59.7 59.3 59.3	54.0 54.0 54.0 54.0 74.0 74.0 74.0 74.0	-2.3 -2.3 -2.6 -2.6 -13.6 -14.3 -14.7	High Ch, EUT Horz, Ant Horz, Dipole High Ch, EUT Vert, Ant Horz, Dipole Low Ch, EUT Horz, Ant Horz, Dipole Low Ch, EUT Vert, Ant Horz, Dipole High Ch, EUT Horz, Ant Horz, Dipole High Ch, EUT Vert, Ant Horz, Dipole Low Ch, EUT Horz, Ant Horz, Dipole Low Ch, EUT Vert, Ant Horz, Dipole



					EmiR5 2018.05.07 PSA-ESCI 2018.05.04
Work Order:	SYNA0259	Date:	7-Sep-2018		11 3
Project:	None	Temperature:	25.9 °C		4 3,4
Job Site:	OC07	Humidity:	45.7% RH		
Serial Number:	E45	Barometric Pres.:	1015 mbar	-	Tested by: Mark Baytan
EUT:	Radio Node	•		•	
Configuration:	2				
Customer:	Walt Disney Parks an	d Resorts US, Inc.			
Attendees:	None				
EUT Power:	POE				
Operating Mode:	BTLE Tx, GFSK, Pacl Channel = 2480 MHz	ket Length = 63, PRBS	9, 1 Mbps,Low C	hannel = 2402 N	MHz, Mid Channel = 2440 MHz, High
Deviations:	None				
	comments below for E 46.5% and would not	EUT and antenna orient allow for continuous op ection factor (DCCF) of	ation. The provideration. Per ANS	led test software SI C63.10 test m	ne POE system in SYNA0249. See configured the radio with a duty cycle of ethods, the RMS data was corrected with a uty cycle).system. See comments below for
Test Specifications			Test	Method	
ECC 15 247:2019			VVICI	C62 10:2012	

 Test Specifications
 Test Method

 FCC 15.247:2018
 ANSI C63.10:2013



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

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



	Serial Confi	iguration:	No OC E <sup>4</sup> Radio Nod 1	A0259 one C07 45 le ey Parks and	Barome	Date: nperature: Humidity: tric Pres.:	8-Sep 22.6 52.29 1015	6 °C % RH		Tested by:	EmiRS 2018.05.0	3,+	PSA-ESCI 2018.05.04	<u>.</u> - -
		ttendees:		y r amo am		,								_
		JT Power:												=
Op		ing Mode:	BTLE Tx, 0	GFSK, Pack 2480 MHz	et Length	= 63, PRBS	9, 1 Mbps,l	Low Chan	nel = 2402	MHz, Mid C	Channel = 2	440 MHz,	High	_
	De	eviations:	None											
	Co	omments:	comments 46.5% and carrier duty	below for E I would not a	UT and an allow for co ection facto	ase orientation tenna orient orient orient orient orient orient or (DCCF) of	tation. The eration. Pe	provided of er ANSI C	test softwar 63.10 test n	e configure nethods, the	d the radio e RMS data	with a duty a was corre	cycle of cted with a	-
Test S	Sneci	fications						Test Met	hod					_
		7:2018							3.10:2013					=
Rı	un #	56	Test Dis	stance (m)	3	Antenna	Height(s)		1 to 4(m)		Results	sl P	ass	-
	u "	00	1001 210	starioo (m)		rantonna	rioigiii(o)		1 10 1(111)		rtoount	· .		_
8	80													
7	o –													
6	50					••								
5	50					**								
4	10													
3	30													
2	20													
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	0 1000	<u> </u>											10000	
	1000	•					MHz				■ PK	◆ AV	• QP	
Fre (MH		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)	
2388. 2484. 2485. 2388. 2484. 2388. 2388. 2483.	.483 .750 .300 .740 .697 .633 .307	32.9 32.5 32.5 32.8 44.4 44.4 44.4 44.0	-4.6 -4.2 -4.2 -4.6 -4.2 -4.6 -4.6 -4.2	1.0 1.4 1.0 1.0 1.4 1.0 1.0	101.0 179.0 345.0 18.0 179.0 101.0 18.0 345.0	3.3 3.3 3.3 3.3 0.0 0.0 0.0 0.0	20.0 20.0 20.0 20.0 20.0 20.0 20.0 20.0	Horz Horz Vert Vert Horz Horz Vert Vert	AV AV AV PK PK PK PK	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	51.6 51.6 51.6 51.5 60.2 59.8 59.8 59.8	54.0 54.0 54.0 54.0 74.0 74.0 74.0 74.0	-2.4 -2.4 -2.4 -2.5 -13.8 -14.2 -14.2 -14.2	Comments  Low Ch, EUT Horz, Ant Horz, Dipole High Ch, EUT Horz, Ant Horz, Dipole High Ch, EUT Vert, Ant Horz, Dipole Low Ch, EUT Vert, Ant Horz, Dipole High Ch, EUT Horz, Ant Horz, Dipole Low Ch, EUT Horz, Ant Horz, Dipole Low Ch, EUT Horz, Ant Horz, Dipole Low Ch, EUT Vert, Ant Horz, Dipole High Ch, EUT Vert, Ant Horz, Dipole



				EmiR5 2018.05.07 PSA-ESCI 2018.05.04
Work Order:	SYNA0259	Date:	8-Sep-2018	11
Project:	None	Temperature:	22.6 °C	Mr Byt
Job Site:	OC07	Humidity:	52.2% RH	
Serial Number:	E45	Barometric Pres.:	1015 mbar	Tested by: Mark Baytan
EUT:	Radio Node			
Configuration:	1			
Customer:	Walt Disney Parks an	d Resorts US, Inc.		
Attendees:	None			
EUT Power:	24VDC			
Operating Mode:	BTLE Tx, GFSK, Pacl	ket Length = 63, PRBS9,	1 Mbps,Low Char	nnel = 2402 MHz, Mid Channel = 2440 MHz, High
Operating wode.	Channel = 2480 MHz			
Deviations:	None			
Deviations.				
	Measurements made	on worst case orientation	ns determined from	testing on the POE system in SYNA0249. See
	comments below for E	EUT and antenna orienta	tion. The provided	test software configured the radio with a duty cycle of
Comments:	46.5% and would not	allow for continuous ope	ration. Per ANSI C	263.10 test methods, the RMS data was corrected with a
				= 10*log(1/duty cycle).system. See comments below for
	EUT and antenna orie			
T			T 184	1 1
Test Specifications			Test Met	tnog

FCC 15.247:2018

ANSI C63.10:2013

<b>Run #</b> 57	Te	st Distance (m)	3	Antenna	a Height(s)	1 to 4(m)		Results	Pass
80									
70									
60									
50							2		
40			_						
30							•		
20									
10									
0 10		100			1000		10000		1000
					MHz			■ PK ◆	AV • C

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

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



PSA-ESCI 2018.05.04

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

### **MODES OF OPERATION**

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

### **POWER SETTINGS INVESTIGATED**

POE

### **CONFIGURATIONS INVESTIGATED**

SYNA0260 - 2

### FREQUENCY RANGE INVESTIGATED

Start Fi	equency	30 MHz	Stop Free	quency	260	000 MHz
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### **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.

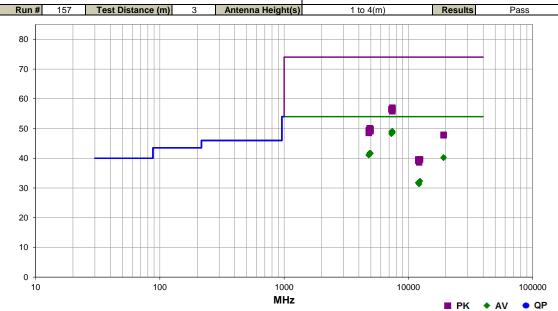
Where the radio test software does not provide for a duty cycle at continuous transmit conditions (> 98%) and the RMS (power average) measurements were made across the on and off times of the EUT transmissions, a duty cycle correction is added to the measurements using the formula of 10\*LOG(dc).



				EmiR5 2018.09.26 PSA-ESCI 2018.07.27							
Work Order:	SYNA0260	Date:	28-Sep-2018	/// /							
Project:	None	Temperature:	22.7 °C	All S							
Job Site:	OC10	Humidity:	53% RH								
Serial Number:	E52	Barometric Pres.:	1016 mbar	Tested by: Salvador Solorzano							
EUT:	Radio Node										
Configuration:	2										
Customer:	Walt Disney Parks an	d Resorts US, Inc.									
Attendees:	None										
EUT Power:	POE										
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High										
Operating wode.	Channel = 2480 MHz										
Deviations:	None										
Deviations.											
	Transmitting using 4-6	element patch array ante	enna part number T	24130P10006GT on Port 7. See comments below for							
Commonte	Channel, EUT and Ar	tenna orientations. The	provided test softwa	are configured the radio with a duty cycle of 46.5% and							
Comments.	would not allow for co	ntinuous operation. Per	r ANSI C63.10 test r	nethods, the RMS data was corrected with a carrier duty							
	cycle correction factor	(DCCF) of 3.3 dB: DC0	CF (dB) = 10*log(1/d	uty cycle).							
Test Specifications			Test Met	hod							
1 cot opesifications	l .		1 CSt MCt	nou .							

FCC 15.247:2018 ANSI C63.10:2013

Run # 157 Test Distance (m) 3 Antenna Height(s) 1 to 4(m) Re



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

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



										EmiR5 2018.09.26		PSA-ESCI 2018.07.27	,
Wo	ork Order:	SYNA			Date:		p-2018	_					
	Project:	Nor			nperature:		6 °C	10	led		5		
	Job Site:	OC			Humidity:		% RH	(100 E) (1)					
Seria	I Number:	E5	52	Barome	tric Pres.:	1013	mbar		Tested by:	Salvador S	Solorzano		
		Radio Node	9										_
	iguration:												=
	Customer:	Walt Disney	y Parks and	Resorts L	JS, Inc.								<del>-</del>
	Attendees:												-
	JT Power:												=
	ing Mode:	BTLE Tx, G	SFSK, Pack	et Length	= 63, PRBS	9, 1 Mbps,	Low Char	nnel = 2402	MHz, High	Channel =	2480 MHz		<del>-</del>
D	eviations:	None											<del>-</del>
Co	omments:	Channel, El	UT and And	enna orien itinuous op	ntations. The peration. Pe	e provided er ANSI C6	test softwa 3.10 test n	24130P1000 are configure nethods, the luty cycle).	ed the radio	with a duty	cycle of 4	6.5% and	_
Test Speci	ifications						Test Met	hod					_
FCC 15.24		1					ANSI C63						=
. 00 10.24	2010						, 11401 000	10.2010					
Run #	160	Test Dis	tance (m)	3	Antenna	Height(s)		1 to 4(m)		Results	Pa	ass	<u>-</u> -
80													
70													
60													
50													
					•								
40													
30													
20													
10													
0													
1000	)					N#1 1						10000	
						MHz				■ PK	◆ AV	• QP	
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.948	28.2	3.0	1.0	277.0	3.3	10.0	Vert	AV	0.0	44.5	54.0	-9.5	EUT Horz, Ant Horz, High Ch, Port 7
2389.642	28.0	2.6	1.0	137.0	3.3	10.0	Vert	AV	0.0	43.9	54.0	-10.1	EUT Horz, Ant Horz, Low Ch, Port 7
2484.087	27.4	3.0	1.0	2.0	3.3	10.0	Horz	AV	0.0	43.7	54.0	-10.3	EUT Horz, Ant Horz, High Ch, Port 7
2389.382	27.7	2.6	1.0	162.0	3.3	10.0	Horz	AV	0.0	43.6	54.0	-10.4	EUT Horz, Ant Horz, Ligh Ch. Port 7
2483.707	38.8	3.0	1.0	2.0	0.0	10.0	Horz	PK	0.0	51.8	74.0	-22.2	EUT Horz, Ant Horz, High Ch, Port 7
2389.682 2389.698	39.1 38.8	2.6 2.6	1.0 1.0	162.0 137.0	0.0 0.0	10.0 10.0	Horz Vert	PK PK	0.0 0.0	51.7 51.4	74.0 74.0	-22.3 -22.6	EUT Horz, Ant Horz, Low Ch, Port 7 EUT Horz, Ant Horz, Low Ch, Port 7
2389.698	38.8	3.0	1.0	277.0	0.0	10.0	Vert	PK PK	0.0	51.4 51.4	74.0 74.0	-22.6 -22.6	EUT Horz, Ant Horz, High Ch, Port 7



Work Order: SYNA0260 Date: 28-Sep-2018 Project: None Temperature: 21.5°C Job Site: OC10 Humidity: 54.7% RH Serial Number: E52 Barometric Press; 1013 mbar Tested by: Salvador Solorzano  EUT: Radio Node Configuration: 2 Customer: Walt Disney Parks and Resorts US, Inc. Attendees: None EUT Power: POE Operating Mode: Deviations:  Transmitting using 4-element patch array antenna part number T24130P10006GT on Port 8. See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle old-65.% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle overection factor (DCCP) of 3.3 dB: DCCF (dB) = 10*log(1/duty cycle).  Run # 161 Test Distance (m) 3 Antenna Height(s) 1 to 4(m) Results Pass  MHz  WHZ  PK AV QP  Preq (MHz) Referent leight Admust Pass Results Resu				_							EmiR5 2018.0	09.26		PSA-ESCI 2	018.07.27
Sefral Number:   E52   Barometric Press:   1013 mbar   Tested by:   Salvador Solorzano	Work	Order:	SYNA	0260		Date:					-			2_	
Serial Number:   E52   Barometric Pres.  1013 mbar   Tested by:  Salvador Solorzano					Ter				1	1			,		
Configuration: 2  Customer: Wall Disney Parks and Resorts US, Inc.  Attendess: None  EUT Power: POE  Operating Mode: BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, High Channel = 2480 MHz  Deviations: None  Transmitting using 4-element patch array antenna part number T24130P10006GT on Port 8. See comments below for Comments: 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 bits methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10*log(f/duty cycle).  St Specifications  Total Test Distance (m) 3 Antenna Height(s) 1 to 4(m) Results Pass  ANSI C63.10:2013  Run # 161 Test Distance (m) 3 Antenna Height(s) 1 to 4(m) Results Pass  MHz  #################################	Jo	b Site:	OC	10		Humidity:									
Contiguration: 2  Customer: Wall Disney Parks and Resorts US. Inc.  Attendees: None  EUT Power: POE  Operating Mode:  Deviations:  Comments:  Transmitting using 4-element patch array antenna part number T24130P10006GT on Port 8. See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10 logal (futur cycle).  EST Specifications  Test Method  ANSI C63.10:2013  Antenna Height(s)  1 to 4(m)  Results  Pass  WH2  Pass  WH2  Pass  Pigen Angeliade  Factor (MH2)  Results  Pass  Composition (RH)  Results  Results  Pass  Composition (RH)  Results  Results  Results  Pass  Composition (RH)  Results  Result	Serial N	umber:	E!	52	Barome	etric Pres.:	1013	mbar		Tested by	: Salvado	r Solo	rzano		
Attenders None  EUT Power: POE  Operating Modes: Deviations: None  Transmitting using 4-element patch array antenna part number T24130P10006GT on Port 8. See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C83.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dis: DCCF (69) = 10°logit/duty cycle).  St Specifications  ZC 15.247:2018  Run # 161 Test Distance (m) 3 Antenna Height(s) 1 to 4(m) Results Pass  ANSI C63.10:2013  MHz  WHz  PASS  MHz  PER Method  Applituse Pass  Applituse Feator Antenna Height Azimult Chrycycle Ecentral Filterating Transductor Declaration Adjustment Adjustmen		EUT:	Radio Nod	е											
Attendes None  EUT Power:  ODE  Operating Mode:  Deviations:  Comments:  Comments:  Comments:  Sepecifications:  C 15.247:2018   Run # 161 Test Distance (m) 3 Antenna Height(s) 1 to 4(m) Results Pass  None  Run # 161 Test Distance (m) 3 Antenna Height(s) 1 to 4(m) Results Pass  None  Run # 160 Test Distance (m) 3 Antenna Height(s) 1 to 4(m) Results Pass  None  Run # 160 Test Distance (m) 3 Antenna Height(s) 1 to 4(m) Results Pass  None  None  Run # 160 Test Distance (m) 3 Antenna Height(s) 1 to 4(m) Results Pass  None  None  None  Transmitting using 4-element patch array antenna part number T24130P10006GT on Port 8. See comments below for channel. EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB: DCCF (dB) = 10¹loq(1/duty cycle).  Run # 161 Test Distance (m) 3 Antenna Height(s) 1 to 4(m) Results Pass  None  None  None  None  None  Test Method  ANSI C63.10:2013  None  Non	Configu	ration:	2												
Attendees: None EUT Power: POE Operating Mode:  Deviations:  Transmitting using 4-element patch array antenna part number T24130P10006GT on Port 8. See comments below for Antennae, EUT and Antennae orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C83.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.9 dB: DCCF (dB) = 10 log (fluthy cycle).  St Specifications  Test Method ANSI C83.10:2013  Antenna Height(s)  1 to 4(m) Results Pass  MHz  Run # 161 Test Distance (m)  Antenna Height(s)  NHz  Run # 200				v Parks and	Resorts	US. Inc.									
Deviations:  Deviations:  Deviations:  Deviations:  Deviations:  Deviations:  Transmitting using 4-element patch array antenna part number T24130P10006GT on Port 8. See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction factor (PCCF) of 3.3 dB: DCCF (dB) = 10 log(1/dtuty cycle).  St Specifications:  Test Method  ANSI C63.10:2013  Run # 161 Test Distance (m) 3 Antenna Height(s) 1 to 4(m) Results Pass  None  MHz  MHz  Deviations:  MHz  Detector Anguand Anguand Spec. Limit Compensed to Geogrees (debuty my cycle).  Specifications or the continuous operation. Per ANSI C63.10:2013    Test Method						,									
Deviations:   Deviations:   None															
Transmitting using 4-element patch array antenna part number T24130P10006GT on Port 8. See comments below for Channel, EUT and Antenna orientations. The provided test software configured the radio with a duty cycle of 46.5% and would not allow for continuous operation. Per ANSI C63.10 tests methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 3.3 dB. DCCF (dB) = 10¹log(1/tdl/ty cycle).  St Specifications  Test Method  ANSI C63.10.2013  ANSI C63.10.2013  ANSI C63.10.2013  ANSI C63.10.2013  ANSI C63.10.2013  But the first bistance (m) 3 Antenna Height(s) 1 to 4(m) Results Pass  But the first bistance (m) 4 Antenna Grant Bistance (m) 4 Daty Cycle Correction factor (DCCF) of 3.3 dB. DCCF (dB) = 10¹log(1/tdl/ty cycle).  But the first bistance (m) 3 Antenna Height(s) 1 to 4(m) Results Pass  But the first bistance (m) 4 Antenna Grant Bistance (m) 4 Daty Cycle (meters) (dB) the first bistance (m) 4 Daty Cycle (meters) (dB) the first bistance (m) 4 Daty Cycle (meters) (dB) the first bistance (m) 5 Daty Cycle (meters) (dB) the first bistance (m) 5 Daty Cycle (meters) (dB) the first bistance (m) 5 Daty Cycle (meters) (dB) the first bistance (m) 5 Daty Cycle (meters) (dB) the first bistance (m) 5 Daty Cycle (meters) (dB) the first bistance (m) 5 Daty Cycle (meters) (dB) the first bistance (m) 5 Daty Cycle (meters) (dB) the first bistance (m) 5 Daty Cycle (meters) (dB) the first bistance (m) 5 Daty Cycle (meters) (dB) the first bistance (m) 5 Daty Cycle (meters) (dB) the first bistance (m) 5 Daty Cycle (meters) (dB) the first bistance (m) 5 Daty Cycle (modern) (dB) the first bistance (m) 5 Daty Cycle (modern) (dB) the first bistance (m) 5 Daty Cycle (modern) (dB) the first bistance (m) 5 Daty Cycle (modern) (dB) the first bistance (m) 5 Daty Cycle (modern) (m) 5 Daty Cycle (m)				GFSK, Packe	et Length	= 63, PRBS	39, 1 Mbps,	High Cha	annel = 248	0 MHz					
Comments: 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*loq(1/duty cycle).  St Specifications  To 15.247:2018    Test Method   ANSI C63.10:2013	Devi	ations:	None												
Run #   161   Test Distance (m)   3   Antenna Height(s)   1 to 4(m)   Results   Pass	Com	mems.	Channel, E would not a	EUT and Ante	enna orie tinuous o	ntations. The peration. P	e provided er ANSI C6	test softw 3.10 test	are configur methods, th	ed the radi e RMS dat	io with a c	duty cy	cle of	46.5%	and
Run #   161   Test Distance (m)   3   Antenna Height(s)   1 to 4(m)   Results   Pass	et Specific	ations						Tost Mot	had						
Run #   161   Test Distance (m)   3   Antenna Height(s)   1 to 4(m)   Results   Pass															
80 70 60 40 30 20 1000 MHz    Polarity/ Transduct   Traybur   Detector   Traybur   Detector   Traybur   Detector   Adjusted   Spec. Limit   Sp															
To 60  50  40  30  20  10000  MHz  PK AV QP  Transducer Transducer Transductor Transductor Transductor Adjustent Adjustent Adjustent Adjustent Adjustent Spec. Limit Compared to Spec. Limit Compared	Run #	161	Test Dis	stance (m)	3	Antenna	Height(s)		1 to 4(m)		Resu	Its	P	ass	
The second of th															
The second of th	80														
60  50  40  30  20  10  MHz  MHz  Polarity/ Transducer Freq Amplitude Factor Antenna Height Azimuth Eactor Attenuation Type Detector Adjustment Adjusted Spec. Limit Spec.															
60 50 40 30 20 10 10 MHz    Polarity    Transducer   Polarity    Transducer   Trans	_														
50 40 30 20 1000  MHz    Polarity/ Transducer Transducer Transducer Adjustment Adjusted Spec. Limit Compared to Spec.	70														
50 40 30 20 1000  MHz    PK   AV   QP															
50 40 30 20 10 10 10 MHz    PK   AV   QP															
40  30  20  1000  MHz  Polarity/ Type Detector Adjustment Adjusted Spec. Limit Spec.  Compared to Spec.	60 +														
40  30  20  1000  MHz  Polarity/ Tryse Detector Adjustment Adjusted Spec. Llimit Spec.  Compared to Spec.															
40  30  20  1000  MHz  Polarity/ Tryse Detector Adjustment Adjusted Spec. Llimit Spec.  Compared to Spec.															
40 30 20 10 10 10 MHz  PK • AV • QP  Freq Amplitude Factor Antenna Height Azimuth Duty Cycle Correction Factor Factor Attenuation Type Detector Adjustment Adjusted Spec. Limit Spec.	50 +											•			
30 - 20 - 10 - 10000  MHz    PK												·			
30 - 20 - 10 - 10000  MHz    PK	40														
20 - 10 - 10000  MHz    PK	40														
20 - 10 - 10000  MHz    PK															
20 - 10 - 10000  MHz    PK	20														
1000  MHz  PK • AV • QP  Treq Amplitude Factor Antenna Height Azimuth Factor Type Detector Type Detector Adjustment Adjusted Spec. Limit Spec.	30														
Treq Amplitude Factor Antenna Height Azimuth Duty Cycle Correction Factor Attenuation Type Detector Adjustment Adjusted Spec. Limit Spec.															
Treq Amplitude Factor Antenna Height Azimuth Duty Cycle Correction Factor Type Detector Adjustment Adjusted Spec. Limit Spec.	20 —														
0 1000  MHz  ■ PK ◆ AV ● QP  Freq Amplitude Factor Antenna Height Azimuth Factor Factor Attenuation Type Detector Adjustment Adjusted Spec. Limit Spec.															
0 1000  MHz  ■ PK ◆ AV ● QP  Freq Amplitude Factor Antenna Height Azimuth Factor Factor Type Detector Type Detector Adjustment Adjusted Spec. Limit Spec.															
0 1000  MHz  ■ PK ◆ AV ● QP  Freq Amplitude Factor Antenna Height Azimuth Factor Factor Type Detector Type Detector Adjustment Adjusted Spec. Limit Spec.	10 —														
10000  MHz  MHz  ■ PK ◆ AV ● QP    Preq   Amplitude   Factor   Antenna Height   Azimuth   Factor   Factor   Factor   Attenuation   Factor   Attenuation   Type   Detector   Adjustment   A															
10000  MHz  MHz  ■ PK ◆ AV ● QP    Preq   Amplitude   Factor   Antenna Height   Azimuth   Factor   Factor   Factor   Attenuation   Factor   Attenuation   Type   Detector   Adjustment   A															
Freq Amplitude Factor Antenna Height Azimuth Factor Factor Type Detector Type Detector Adjustment Adjusted Spec. Limit Compared to Spec. Limit Spec. Spec. Limit Spec. Compared to Spec. Limit Spec.	0 —														
Freq Amplitude Factor Antenna Height Azimuth Factor Type Detector Adjustment Adjusted Spec. Limit Spec.	1000													1000	0
Freq Amplitude Factor Antenna Height Azimuth Factor Type Detector Adjustment Adjusted Spec. Limit Spec.							MHz								
Freq Amplitude Factor Antenna Height Azimuth Factor External Transducer Distance Compared to Spec. Limit Spec.							WILIZ				■ PI	K •	AV	<ul><li>Q</li></ul>	Р
Freq Amplitude Factor Antenna Height Azimuth Factor Attenuation Type Detector Adjustment Adjusted Spec. Limit (MHz) (dBuV) (dB) (meters) (degrees) (dB) (dB) (dB) (dB) (dB) (dB) (dB) (dB						Duty Cycle		Polority/							
Freq Amplitude Factor Antenna Height Azimuth Factor Attenuation Type Detector Adjustment Adjusted Spec. Limit Spec.						Correction		Transducer						Compa	ared to
(MHz) (dBuV) (dB) (meters) (degrees) (dB) (dB) (dB) (dB) (dB) (dB) (dBuV/m) (dB)								Туре	Detector					Spe	ec.
	(MHz)	(dBuV)	(dB)	(meters)	(degrees)	(dB)	(dB)			(dB)	(dBuV/m	) (c	iBuV/m)	(dl	R)

7439.210 7441.295 7440.915 7441.290

27.4 27.3 39.8 38.2 17.8 17.8 17.8 17.8 1.0 1.0 1.0 1.0 258.0 204.0 258.0 204.0 3.3 3.3 0.0 0.0 0.0 0.0 0.0 0.0 Vert Horz Vert Horz AV AV PK PK 0.0 0.0 0.0 0.0 48.5 48.4 57.6 56.0 54.0 54.0 74.0 74.0 -5.5 -5.6 -16.4 -18.0 EUT Horz, Ant Horz, High Ch, Port 8 EUT Horz, Ant Horz, High Ch, Port 8 EUT Horz, Ant Horz, High Ch, Port 8

EUT Horz, Ant Horz, High Ch, Port 8



PSA-ESCI 2018.07.27

EmiR5 2018.09.26

Seri Cor E Opera	offiguration: Customer: Attendees: EUT Power: ating Mode: Deviations:	Walt Disney Park None POE BTLE Tx, GFSK, None Transmitting usin	Baron s and Resorts Packet Length	n = 63, PRBS	21.1 54.7' 1013	number T2	nnel = 2402 24130P100	06GT on Po	Channel =	2480 MHz	elow for	
•	Comments:	Channel, EUT and would not allow for duty cycle correct	or continuous									
Tost Sno	cifications	, .,		, olo de		Test Meth						
FCC 15.2						ANSI C63						-
			, N									_
Run	<b>#</b> 162	Test Distance	<b>(m)</b> 3	Antenna	Height(s)		1 to 4(m)		Results	Pa	ass	_
80 -												
70 -												
60 -												
50 -				•								
40 -												
30 -												
20 -												
0 +												
10	00										10000	
				Duty Cycle	MHz	Polarity/			■ PK	◆ AV	• QP	
Freq (MHz)	Amplitude (dBuV)	Factor Antenna H	rs) (degrees)	Correction Factor (dB)	External Attenuation (dB)	Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.670 2483.650 2483.723 2389.138 2484.415 2483.965 2484.147 2389.945	27.4 27.3 27.5 39.4 38.3 38.2	3.0 1.0 3.0 1.8 3.0 1.8 2.6 1.0 3.0 1.0 3.0 1.8 3.0 1.8 2.6 1.0	267.0 290.0 10.0 215.0 290.0 267.0	3.3 3.3 3.3 3.3 0.0 0.0 0.0	10.0 10.0 10.0 10.0 10.0 10.0 10.0	Vert Horz Horz Vert Vert Horz Horz Vert	AV AV AV AV PK PK PK PK	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	44.7 43.7 43.6 43.4 52.4 51.3 51.2 51.2	54.0 54.0 54.0 54.0 74.0 74.0 74.0 74.0	-9.3 -10.3 -10.4 -10.6 -21.6 -22.7 -22.8 -22.8	EUT Horz, Ant Horz, High Ch, Port 8 EUT Horz, Ant Horz, High Ch, Port 8 EUT Horz, Ant Horz, Low Ch, Port 8 EUT Horz, Ant Horz, Low Ch, Port 8 EUT Horz, Ant Horz, High Ch, Port 8 EUT Horz, Ant Horz, Low Ch, Port 8 EUT Horz, Ant Horz, Low Ch, Port 8 EUT Horz, Ant Horz, Low Ch, Port 8



PSA-ESCI 2018.05.04

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

### **MODES OF OPERATION**

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

### **POWER SETTINGS INVESTIGATED**

POF

### **CONFIGURATIONS INVESTIGATED**

SYNA0260 - 3

### FREQUENCY RANGE INVESTIGATED

Start Fi	equency	30 MHz	Stop Free	quency	260	000 MHz
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### **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.

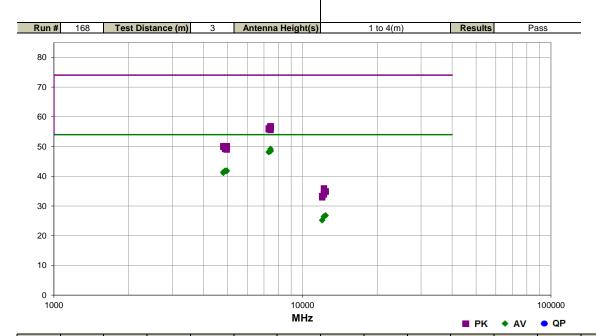
Where the radio test software does not provide for a duty cycle at continuous transmit conditions (> 98%) and the RMS (power average) measurements were made across the on and off times of the EUT transmissions, a duty cycle correction is added to the measurements using the formula of 10\*LOG(dc).



					EmiR5 2018.09.26	PSA-ESCI 2018.07.27
Work Order:	SYNA0260	Date:	28-Sep-2018			
Project:	None	Temperature:	21.5 °C	~		
Job Site:	OC10	Humidity:	52.3% RH			
Serial Number:	E52	Barometric Pres.:	1014 mbar	1	ested by: Salvador Solorz	ano
EUT:	Radio Node					
Configuration:	3					
Customer:	Walt Disney Parks an	d Resorts US, Inc.				
Attendees:	None					
EUT Power:	POE					
Operating Mode:	BTLE Tx, GFSK, Pacl	ket Length = 63, PRBS9	, 1 Mbps, Low C	hannel = 2402 l	MHz, Mid Channel = 2440 N	/lHz, High
Operating wode.	Channel = 2480 MHz					
Deviations:	None					
Deviations.						
	Transmitting using 16	-element antenna part n	umber T24190F	10006GT on Po	ort 7. See comments below	for Channel,
Comments:	EUT and Antenna orie	entations. The provided	test software co	nfigured the radi	o with a duty cycle of 46.5%	and would not
Comments.	allow for continuous o	peration. Per ANSI C63	3.10 test method	s, the RMS data	was corrected with a carrie	er duty cycle
	correction factor (DCC	CF) of 3.3 dB: DCCF (dB	3) = 10*log(1/dut)	v cycle).		
Test Specifications			Test I	Method		

 Test Specifications
 Test Method

 FCC 15.247:2018
 ANSI C63.10:2013



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

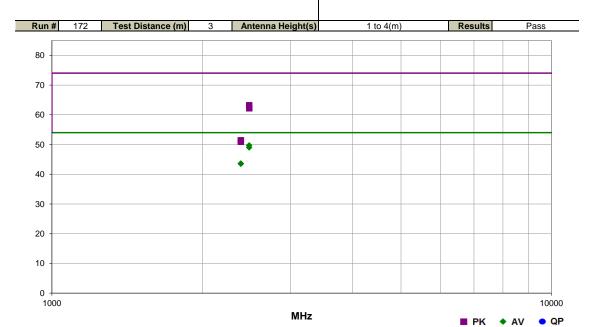
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4879.490	37.1	12.1	1.0	249.0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



					EmiR5 2018.09.26	PSA-ESCI 2018.07.27
Work Order:	SYNA0260	Date:	28-Sep-2018			
Project:	None	Temperature:	21.5 °C	1	and the same	
Job Site:	OC10	Humidity:	52.3% RH			
Serial Number:	E52	Barometric Pres.:	1014 mbar		Tested by: Salvador Solo	rzano
EUT:	Radio Node					
Configuration:	3					
Customer:	Walt Disney Parks an	d Resorts US, Inc.				
Attendees:	None					
EUT Power:	POE					
Operating Mode:	BTLE Tx, GFSK, Pacl	ket Length = 63, PRBS9	, 1 Mbps, Low Ch	annel = 2402	MHz, Mid Channel = 2440	MHz, High
Operating Mode.	Channel = 2480 MHz		*			
Deviations:	None					
Deviations.						
	Transmitting using 16	-element antenna part n	umber T24190P1	0006GT on Po	ort 7. See comments below	v for Channel,
Comments:	EUT and Antenna orie	entations. The provided	test software conf	igured the radi	io with a duty cycle of 46.5	% and would not
Comments.	allow for continuous o	peration. Per ANSI C63	3.10 test methods	, the RMS data	a was corrected with a carr	ier duty cycle
	correction factor (DCC	CF) of 3.3 dB: DCCF (dE	S = 10*log(1/duty)	cycle).		
Test Specifications			Test M	ethod		
FCC 15 247:2019	I			62 10:2012		

 Test Specifications
 Test Method

 FCC 15.247:2018
 ANSI C63.10:2013



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



										EmiR5 2018.09.26		PSA-ESCI 2018.07.27	<u>,</u>
We	ork Order:		A0260		Date:		p-2018					~	
	Project:		one	Ten	nperature:		5 °C	1			>		
	Job Site:		C10		Humidity:		% RH						
Seria	I Number:		52	Barome	tric Pres.:	1014	mbar		Tested by:	Salvador S	olorzano		=
0	EUT:	Radio Noo	de										_
	figuration:	3											_
	Customer:		ey Parks an	d Resorts l	JS, Inc.								_
	Attendees:												_
El	UT Power:												_
Operat	ing Mode:		GFSK, Pacl = 2480 MHz	ket Length	= 63, PRBS	89, 1 Mbps,	, Low Chan	nel = 2402	MHz, Mid C	hannel = 24	140 MHz,	High	_
D	eviations:	None											
С	omments:	EUT and A allow for c	ng using 16 Antenna orie continuous o factor (DCC	entations. Toperation. F	he provide Per ANSI C	d test softw 63.10 test r	are configunethods, th	red the rad	io with a du	ty cycle of 4	6.5% and	would not	<u>.</u>
<b>Test Spec</b>	ifications						Test Meth	od					_
FCC 15.24							ANSI C63						-
													_
Run #	174	Test Di	stance (m)	3	Antenna	Height(s)		1 to 4(m)		Results	P	ass	-
80 +													
70													
′° T													
60													
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0 <del> </del>			100			1000			10000			100000	
10	J		100						10000			100000	
						MHz				■ PK	◆ AV	• QP	
			Antenna		Duty Cycle Correction	External	Polarity/ Transducer		Distance			Compared to	
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Height (meters)	Azimuth (degrees)	Factor (dB)	Attenuation (dB)	Туре	Detector	Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Spec. (dB)	Comments
7439.615	27.8	17.8	1.0	299.0	3.3	0.0	Vert	AV	0.0	48.9	54.0	-5.1	EUT Vert, Ant Vert, High Ch, Port 8
7438.975	27.4	17.8	1.0	292.0	3.3	0.0	Horz	AV	0.0	48.5	54.0	-5.5	EUT on Side, Ant on Side, High Ch, Port 8
7438.870	38.5	17.8	1.0	299.0	0.0	0.0	Vert	PK	0.0	56.3	74.0	-17.7	EUT Vert, Ant Vert, High Ch, Port 8
7441.060	38.0	17.8	1.0	292.0	0.0	0.0	Horz	PK	0.0	55.8	74.0	-18.2	EUT on Side, Ant on Side, High Ch, Port 8



				EmiR5 2018.09.26 PSA-ESCI 2018.07.27
Work Order:	SYNA0260	Date:	28-Sep-2018	
Project:	None	Temperature:	21.5 °C	telet S
Job Site:	OC10	Humidity:	52.3% RH	
Serial Number:	E52	Barometric Pres.:	1014 mbar	Tested by: Salvador Solorzano
EUT:	Radio Node			
Configuration:	3			
Customer:	Walt Disney Parks an	d Resorts US, Inc.		
Attendees:	None			
EUT Power:	POE			
Operating Mode:	BTLE Tx, GFSK, Pack	ket Length = 63, PRBS9	, 1 Mbps, Low Char	nnel = 2402 MHz, Mid Channel = 2440 MHz, High
Operating wode.	Channel = 2480 MHz	-	•	-
Deviations:	None			
Deviations:				
	Transmitting using 16	-element antenna part n	number T24190P100	006GT on Port 8. See comments below for Channel,
Comments:	EUT and Antenna orie	entations. The provided	test software config	ured the radio with a duty cycle of 46.5% and would not
Comments.				ne RMS data was corrected with a carrier duty cycle
	correction factor (DCC	CF) of 3.3 dB: DCCF (dE	3) = 10*log(1/duty cy	rcle).
Test Specifications			Test Met	hod
root opcomeations			T C ST IVICE	

ANSI C63.10:2013

FCC 15.247:2018

Run # 173 Test Distance (m) Antenna Height(s) 1 to 4(m) Results Pass 80 70 60 50 40 30 20 10 0 -1000 10000 MHz ■ PK ◆ AV • QP

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



PSA-ESCI 2018.05.04

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

### **MODES OF OPERATION**

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

### **POWER SETTINGS INVESTIGATED**

POF

### **CONFIGURATIONS INVESTIGATED**

SYNA0260 - 4

### FREQUENCY RANGE INVESTIGATED

Start Frequency 30 MHz	Stop Frequency	26000 MHz
Ctart : requestey   ce :::: in	Olop oquooj	_0000

#### 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.

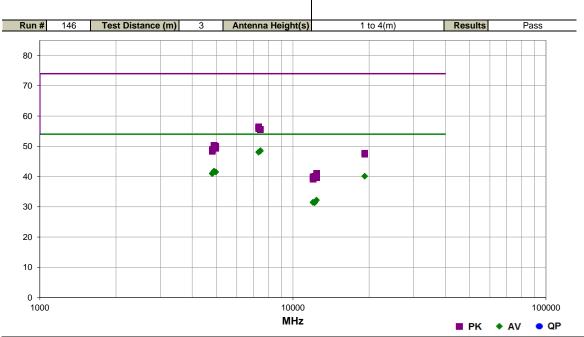
Where the radio test software does not provide for a duty cycle at continuous transmit conditions (> 98%) and the RMS (power average) measurements were made across the on and off times of the EUT transmissions, a duty cycle correction is added to the measurements using the formula of 10\*LOG(dc).



				EmiR5 2018.09.26 PSA-ESCI 2018.07.27
Work Order:	SYNA0260	Date:	28-Sep-2018	
Project:	None	Temperature:	22.2 °C	the second
Job Site:	OC10	Humidity:	52.9% RH	
Serial Number:	E52	Barometric Pres.:	1017 mbar	Tested by: Salvador Solorzano
EUT:	Radio Node	•		•
Configuration:	4			
Customer:	Walt Disney Parks an	d Resorts US, Inc.		
Attendees:	None			
EUT Power:	POE			
Operating Mode:	BTLE Tx, GFSK, Paci	ket Length = 63, PRBS9	, 1 Mbps, Low Char	nnel = 2402 MHz, Mid Channel = 2440 MHz, High
Operating wode.	Channel = 2480 MHz			
Deviations:	None			
Deviations.				
				609P-NM on Port 7. See comments below for Channel,
Comments:	EUT and Antenna orie	entations. The provided	test software config	ured the radio with a duty cycle of 46.5% and would not
Comments.	allow for continuous o	peration. Per ANSI C63	3.10 test methods, tl	ne RMS data was corrected with a carrier duty cycle
	correction factor (DCC	CF) of 3.3 dB: DCCF (dE	3) = 10*log(1/duty c)	rcle).
Toot Coordinations			Toot Mot	had

Test Specifications
FCC 15.247:2018

Test Method ANSI C63.10:2013



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

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



Work Order:	SYNA0260	Date:	28-Sep-2018		/// -	
Project:		Temperature:	22.2 °C	- All	1	er
Job Site:		Humidity:	52.9% RH			
Serial Number:		Barometric Pres.:	1017 mbar	Teste	d by: Salvador Solor	zano
EUT:	Radio Node				•	
Configuration:						
Customer:		d Resorts US, Inc.				
Attendees:						
EUT Power:						
Operating Mode:	BILE IX, GFSK, Pack	ket Length = 63, PRBS9	, 1 Mbps, Low C	Channel = 2402 MHz,	High Channel = 248	0 MHz
Deviations:	None					
Comments:	EUT and Antenna orionallow for continuous o	ngle-element patch ante entations. The provided peration. Per ANSI C63 CF) of 3.3 dB: DCCF (dB	test software co 3.10 test method	nfigured the radio with	h a duty cycle of 46.5	% and would n
est Specifications			Test I	Method		
CC 15.247:2018				C63.10:2013		
Dun # 140	Toot Distance (m)	2 Antonna I	loight(s)	1 to 1/m)	Doculto	Door
<b>Run #</b> 149	Test Distance (m)	3 Antenna H	leight(s)	1 to 4(m)	Results	Pass
<b>Run #</b> 149	Test Distance (m)	3 Antenna F	leight(s)	1 to 4(m)	Results	Pass
Run # 149	Test Distance (m)	3 Antenna H	leight(s)	1 to 4(m)	Results	Pass
	Test Distance (m)	3 Antenna F	leight(s)	1 to 4(m)	Results	Pass
80 -	Test Distance (m)	3 Antenna F	leight(s)	1 to 4(m)	Results	Pass
	Test Distance (m)	3 Antenna F	leight(s)	1 to 4(m)	Results	Pass
70	Test Distance (m)	3 Antenna F	leight(s)	1 to 4(m)	Results	Pass
80 -	Test Distance (m)	3 Antenna F	leight(s)	1 to 4(m)	Results	Pass
70	Test Distance (m)	3 Antenna F	leight(s)	1 to 4(m)	Results	Pass
80 70 60	Test Distance (m)	3 Antenna F	leight(s)	1 to 4(m)	Results	Pass
70	Test Distance (m)	3 Antenna F	leight(s)	1 to 4(m)	Results	Pass
80 70 60	Test Distance (m)	3 Antenna F	leight(s)	1 to 4(m)	Results	Pass
80 70 60	Test Distance (m)	3 Antenna F	leight(s)	1 to 4(m)	Results	Pass
80	Test Distance (m)	3 Antenna F	leight(s)	1 to 4(m)	Results	Pass
80	Test Distance (m)	3 Antenna F	leight(s)	1 to 4(m)	Results	Pass
80	Test Distance (m)	3 Antenna F	leight(s)	1 to 4(m)	Results	Pass
80	Test Distance (m)	3 Antenna F	leight(s)	1 to 4(m)	Results	Pass
80	Test Distance (m)	3 Antenna I	leight(s)	1 to 4(m)	Results	Pass
80	Test Distance (m)	3 Antenna F	leight(s)	1 to 4(m)	Results	Pass
80	Test Distance (m)	3 Antenna F	leight(s)	1 to 4(m)	Results	Pass
80	Test Distance (m)	3 Antenna F	leight(s)	1 to 4(m)	Results	Pass
80	Test Distance (m)	3 Antenna F	leight(s)	1 to 4(m)	Results	Pass
80	Test Distance (m)	3 Antenna F	leight(s)	1 to 4(m)	Results	
80	Test Distance (m)	3 Antenna F		1 to 4(m)	Results	Pass 10000
80	Test Distance (m)	3 Antenna I	Height(s)	1 to 4(m)		

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



18/	ault Oudau.	CVALAGO	00		Data	20.00	- 2010			EmiR5 2018.09.26		PSA-ESCI 2018.07.27	7
VVC	ork Order: Project:	SYNA026 None	60	Ton	Date:	28-Sep	2 °C	_					
	Job Site:	OC10			Humidity:		% RH		-		>		
Soria	I Number:	E52			tric Pres.:		mbar		Tested by:	Salvador S	olorzano		1
Seria		Radio Node		Daionie	liic Fies	1017	IIIDai		rested by.	Salvauoi S	Olorzano		_
Conf	figuration:												_
00111	Customer	Walt Disney P	arks and F	Resorts I	IS Inc								_
	Attendees:		and and i	1030113 0	)O, IIIO.								=
	UT Power:												=
	ing Mode:	BTLE Tx, GFS	SK, Packet	Length =	= 63, PRBS	9, 1 Mbps,	Low Chan	nel = 2402	MHz, High	Channel =	2480 MHz		-
D	eviations:	None											<del>-</del> -
C	omments:	Transmitting u EUT and Ante allow for conting correction fact	nna orient nuous ope	ations. T ration. F	he provided Per ANSI C	d test softw 63.10 test n	are configunethods, th	ured the rac he RMS dat	dio with a du	ity cycle of	46.5% and	would not	_
Test Spec	ifications						Test Meth	nod					_
FCC 15.24							ANSI C63						_
D	450	Tank Binkan	()	0	•	H-i-rh(-)		4 42 4/22		Dtr-	D		_
Run #	150	Test Distan	ice (m)	3	Antenna	Height(s)		1 to 4(m)		Results	Pa	iss	-
80													
70													
60													
50 -													
40					••								
30 -													
20 —													
10													
1000	0											10000	
				• QP									
Freq (MHz)	Amplitude (dBuV)		enna Height meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2484.017 2484.407 2389.162 2389.463 2484.025 2484.922 2389.123	27.5 26.8 26.7 26.4 41.6 38.2 37.7	3.0 3.0 2.6 2.6 3.0 3.0 2.6	1.0 1.0 1.0 1.0 1.0 1.0 1.0	276.0 55.0 342.0 186.0 276.0 55.0 342.0	3.3 3.3 3.3 3.3 0.0 0.0	10.0 10.0 10.0 10.0 10.0 10.0 10.0	Horz Vert Vert Horz Horz Vert Vert	AV AV AV AV PK PK PK	0.0 0.0 0.0 0.0 0.0 0.0 0.0	43.8 43.1 42.6 42.3 54.6 51.2 50.3	54.0 54.0 54.0 54.0 74.0 74.0 74.0	-10.2 -10.9 -11.4 -11.7 -19.4 -22.8 -23.7	EUT Horz, Ant Horz, High Ch. Port 8 EUT Horz, Ant Horz, High Ch. Port 8 EUT Horz, Ant Horz, Low Ch, Port 8 EUT Horz, Ant Horz, Low Ch, Port 8 EUT Horz, Ant Horz, Ligh Ch. Port 8 EUT Horz, Ant Horz, High Ch. Port 8 EUT Horz, Ant Horz, High Ch. Port 8
2389.587	37.0	2.6	1.0	186.0	0.0	10.0	Horz	PK	0.0	49.6	74.0	-24.4	EUT Horz, Ant Horz, Low Ch, Port 8



W	ork Order:	SYNA02	260		Date:	28-Sei	p-2018			EmiR5 2018.09.26		PSA-ESCI 2018.07.27	
-	Project:	None		Ten	nperature:		2 °C	_	len		-		
	Job Site:	OC10			Humidity:		% RH		AT.				
Seria	al Number:	E52			tric Pres.:		mbar		Tested by	: Salvador	Solorzano		
	EUT:	Radio Node				_							
Con	figuration:	4											
		Walt Disney F	Parks and	Resorts l	JS, Inc.								
	Attendees:	None											
E	UT Power:												
Opera	ting Mode:	BTLE Tx, GF Channel = 24		et Length	= 63, PRBS	9, 1 Mbps,	Low Chai	nnel = 2402	MHz, Mic	Channel = 2	2440 MHz,	High	
ı	Deviations:	None Transmitting	using Sing	alo olomo	nt natch ant	tonna nart i	numbor D	EOOD NM o	n Dort 9	coo common	te bolow fo	Channel	
C	Comments:	EUT and Ante allow for cont correction fac	enna orier tinuous op	ntations. T eration. F	he provided Per ANSI C	d test softw 63.10 test r	are config	ured the rad he RMS dat	dio with a	duty cycle of	46.5% and	would not	
Tost Sno	cifications						Test Met						
FCC 15.2								3.10:2013					
Run #	151	Test Dista	ince (m)	3	Antenna	Height(s)		1 to 4(m)		Results	P	ass	
80													
70 -													
60											1		
50										•			
40													
30													
20 -													
10													
0 +	00											10000	
100						MHz				■ PK	◆ AV	• QP	
Freq (MHz)	Amplitude (dBuV)		tenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustmen (dB)	t Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	s _
7439.505 7440.585 7441.485 7439.315	27.7 27.4 39.3 38.9	17.8 17.8 17.8 17.8	1.0 1.0 1.0 1.0	312.0 140.0 140.0 312.0	3.3 3.3 0.0 0.0	0.0 0.0 0.0 0.0	Horz Vert Vert Horz	AV AV PK PK	0.0 0.0 0.0 0.0	48.8 48.5 57.1 56.7	54.0 54.0 74.0 74.0	-5.2 EUT Horz -5.5 EUT Horz -16.9 EUT Horz	, Ant Horz, High Ch, Port 8 , Ant Horz, High Ch, Port 8 , Ant Horz, High Ch, Port 8 , Ant Horz, High Ch, Port 8



PSA-ESCI 2018.05.04

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

### **MODES OF OPERATION**

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

### **POWER SETTINGS INVESTIGATED**

POF

### **CONFIGURATIONS INVESTIGATED**

SYNA0260 - 1

### FREQUENCY RANGE INVESTIGATED

Start Frequency 30 MHz Stop Frequency 26000 MHz

### SAMPLE CALCULATIONS

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

### **TEST EQUIPMENT**

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

### **TEST DESCRIPTION**

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

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

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

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

QP = Quasi-Peak Detector

PK = Peak Detector

AV = RMS Detector

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

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

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

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



				EmiR5 2018.07.19.3 PSA-ESCI 20	18.05.04								
Work Order:	SYNA0260	Date:	25-Sep-2018	///	_								
Project:	None	Temperature:	22.3 °C	telet S									
Job Site:	OC10	Humidity:	54% RH										
Serial Number:	E52	Barometric Pres.:	1016 mbar	Tested by: Salvador Solorzano									
EUT:	Radio Node												
Configuration:	1												
Customer:	Walt Disney Parks an	d Resorts US, Inc.											
Attendees:	None												
EUT Power:	POE	DE											
Operating Mode:	BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, Low Channel = 2402 MHz, Mid Channel = 2440 MHz, High												
Operating Mode.	Channel = 2480 MHz												
Deviations:	None												
Deviations.													
	Transmitting using yas	gi antenna part number	C3EY on Port 7. Se	ee comments below for Channel, EUT and Antenna									
Comments:				a duty cycle of 46.5% and would not allow for									
Comments.	continuous operation.	continuous operation. Per ANSI C63.10 test methods, the RMS data was corrected with a carrier duty cycle correction											
	factor (DCCF) of 3.3 c	B: DCCF (dB) = 10*log(	1/duty cycle).										
Test Specifications			Test Met	hod									

FCC 15.247:2018

ANSI C63.10:2013

t <b>un #</b> 51	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass	
80							
70							
60							
50		-	•				
10							
30							
20							
0							
1000			10000			1000	

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



Work Order: SYNA0260 Date: 2-Oct-2018 Project None 25 °C Temperature: 44.5% RH Job Site: OC10 Humidity: F52 Tested by: Mark Baytan Serial Number: **Barometric Pres.:** 1014 mbar EUT: Radio Node Configuration: Customer: Walt Disney Parks and Resorts US, Inc. Attendees: None **EUT Power: POE** BTLE Tx, GFSK, Packet Length = 63, PRBS9, 1 Mbps, Low Channel = 2402 MHz, High Channel = 2480 MHz **Operating Mode** Deviations 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 Comments 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** FCC 15.247:2018 ANSI C63.10:2013 144 Test Distance (m) Antenna Height(s) Run# 1 to 4(m) Results Pass 80 70 60 50 .. 40 30 20 10 0 1000 10000 MHz QP PK AV Duty Cycle Polarity External Freq (MHz) Height (meters) Azimuth Factor Attenuation Туре Adjustment Adjusted Spec. Limit (dB) Comments 2483.547 3.0 1.0 65.0 3.3 EUT on Side, Ant on Side, High Ch, Port 7 Vert 2483.503 28.6 3.0 1.2 178.0 3.3 10.0 Horz ΑV 0.0 44.9 54.0 -9.1 EUT Horz, Ant Horz, High Ch, Port 7 ΑV -9.9 EUT Vert, Ant Vert, High Ch, Port 7 2483.607 27.8 1.0 233.0 3.3 Horz 0.0 44.1 54.0 3.0 10.0 27.7 27.7 3.3 2484.480 3.0 2.0 360.0 10.0 Vert ΑV 0.0 44.0 54.0 -10.0 EUT Horz, Ant Horz, High Ch, Port 7 1.0 ΑV EUT Vert, Ant Vert, High Ch. Port 7 2483,793 3.0 252.0 10.0 Vert 0.0 44.0 54.0 -10.0 2483.633 131.0 Horz ΑV -10.0 EUT on Side, Ant on Side, High Ch, Port 7

AV AV

PK PK

PK PK PK

PK PK 0.0

0.0

0.0

0.0

0.0

0.0

0.0

0.0

43.8 43.7

57.6

55.7

51.9

51.7

51.6

51.6

54.0 54.0

74.0

74.0

74 0

74.0

74.0

74.0

-10.2 -10.3

-16.4

-18.3

-21.8

-22 1

-22.3

-22.4

-22.4

EUT on Side, Ant on Side, Low Ch, Port 7 EUT Horz, Ant Horz, Low Ch, Port 7

EUT on Side, Ant on Side, High Ch, Port 7 EUT Horz, Ant Horz, High Ch, Port 7

EUT Vert, Ant Vert, High Ch, Port 7 EUT on Side, Ant on Side, High Ch, Port 7

EUT Horz, Ant Horz, High Ch, Port 7

EUT Vert, Ant Vert, High Ch, Port 7 EUT Horz, Ant Horz, Low Ch, Port 7

EUT on Side, Ant on Side, Low Ch, Port 7

27.9 27.8

44.6 42.7

39.2

38.9

38.7

38.6

39.0

2388.160

2388.430

2483.533

2483.743

2484.180

2483 713

2484.657

2484.577

2388.950

2388.800

2.6 2.6

3.0

3.0

3.0

3.0

3.0

3.0

2.6

1.0 2.9

1.0

1.2

1.0

17

2.0

1.0

2.9

3.3 3.3

0.0

0.0

0.0

0.0

0.0

0.0

0.0

10.0

10.0

10.0

10.0

10.0

10.0

10.0

10.0

10.0

Vert

Horz

Vert

Horz

Horz

Horz

Vert

Vert

Horz

290.0

130.0

65.0

178.0

233.0

131 0

360.0

252.0

130.0



										EmiR5 2018.07.19.3		PSA-ESCI 2018.05.0	04
Wo	ork Order:	SYNA	0260		Date:	25-Se	p-2018					-7	7
	Project:	No		Ten	nperature:		3 °C	_	111		5		
	Job Site:	OC			<b>Humidity:</b>		6 RH	10.000	37				
Seria	I Number:	E		Barome	tric Pres.:	1016	mbar		Tested by	: Salvador S	Solorzano		<u> </u>
		Radio Nod	е										<u> </u>
	figuration:	1											_
	Customer:		y Parks an	d Resorts l	JS, Inc.								_
		None											_
EU	UT Power:	POE											_
Operat	ing Mode:	BTLE Tx, C	GFSK, Pack	ket Length	= 63, PRBS	9, 1 Mbps,	High Cha	annel = 248	0 MHz				_
D	eviations:	None											
C	omments:	orientations continuous	s. The prov operation.	ided test so Per ANSI	oftware conf	figured the tmethods,	radio with	a duty cycle	of 46.5%	Channel, E and would n h a carrier du	ot allow fo	r	
Test Spec	ifications						Test Met	hod					_
FCC 15.24		1						3.10:2013					=
													_
Run #	55	Test Dis	stance (m)	3	Antenna	Height(s)		1 to 4(m)		Results	F	Pass	<u> </u>
80													
-													
70													
60													
50										•			
40													
40													
30													
30													
20													
10													
0 1	0											10000	
1000	U					MHz						10000	
						1411 12				■ PK	◆ AV	• QP	
			Antenna		Duty Cycle Correction	External	Polarity/ Transducer		Distance			Compared to	
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Height (meters)	Azimuth (degrees)	Factor (dB)	Attenuation (dB)	Туре	Detector	Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Spec. (dB)	Comments
7439.315 7438.615	27.4 27.4	17.8 17.8	1.0 1.0	321.0 84.0	3.3 3.3	0.0 0.0	Horz Vert	AV AV	0.0 0.0	48.5 48.5	54.0 54.0	-5.5 -5.5	EUT on Side, Ant on Side, High Ch, Port 8 EUT Horz, Ant Horz, High Ch, Port 8
7438.615	27.4 38.7	17.8	1.0	84.0 321.0	0.0	0.0	Horz	PK	0.0	48.5 56.5	54.0 74.0	-5.5 -17.5	EUT norz, Ant norz, High Ch, Port 8 EUT on Side, Ant on Side, High Ch, Port 8
7439.835	38.4	17.8	1.0	84.0	0.0	0.0	Vert	PK	0.0	56.2	74.0	-17.8	EUT Horz, Ant Horz, High Ch, Port 8



										EmiR5 2018.07.19.3		PSA-ESCI 2018.05.0	м.
Wo	ork Order:	SYNA	A0260		Date:	2-Oc	t-2018		11	Emires 2018.07.19.3		PSA-ESCI 2018.05.0	Ţ
	Project:		ne	Ten	nperature:		i °C		4	4	5,4		
	Job Site:		10		<b>Humidity:</b>	44.5	% RH		17.0		7		
Seria	I Number:	E:		Barome	etric Pres.:	1014	mbar		Tested by	: Mark Bayta	an		
		Radio Nod	е										_
	iguration:												_
			y Parks and	Resorts L	JS, Inc.								_
	ttendees:												_
E	JT Power:		2501/ 5 1		00 0000	0.414	. 01	1 0100			0.400.141.1		_
Operat	ing Mode:		JFSK, Pack	et Length	= 63, PRBS	9, 1 Mbps,	, Low Chai	nnel = 2402	MHz, Higi	h Channel =	2480 MHz		<u>-</u>
D	eviations:	None											=
C	omments:	orientation continuous	s. The provi	ded test so Per ANSI	oftware cont C63.10 test	figured the tmethods,	radio with the RMS	a duty cycle	of 46.5%	r Channel, El and would n h a carrier du	ot allow for	r	_
Test Spec	est Specifications Test Method												-
FCC 15.24								3.10:2013					_
													_
Run #	145	Test Dis	stance (m)	3	Antenna	Height(s)		1 to 4(m)		Results	P	ass	-
80													
70													
60													
50					_								
40					**								
30													
20 +													
10													
0 1000	<u> </u>											10000	
1000	,					MHz				■ PK	◆ AV	• QP	
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.530	29.0	3.0	1.0	58.0	3.3	10.0	Vert	AV	0.0	45.3	54.0	-8.7	EUT on Side, Ant on Side, High Ch, Port 8
2483.860	28.0	3.0	2.5	245.0	3.3	10.0	Horz	AV	0.0	44.3	54.0	-9.7	EUT Horz, Ant Horz, High Ch, Port 8
2389.810	27.9	2.6	2.4	172.0	3.3	10.0	Horz	AV	0.0	43.8	54.0	-10.2	EUT Horz, Ant Horz, Low Ch, Port 8
2388.283	27.9 43.1	2.6 3.0	1.0	77.0 58.0	3.3 0.0	10.0	Vert	AV PK	0.0 0.0	43.8 56.1	54.0 74.0	-10.2 -17.9	EUT on Side, Ant on Side, Low Ch, Port 8
2483.533 2484.853	43.1 39.1	3.0	1.0 2.5	58.0 245.0	0.0	10.0 10.0	Vert Horz	PK PK	0.0	56.1 52.1	74.0 74.0	-17.9 -21.9	EUT on Side, Ant on Side, High Ch, Port 8 EUT Horz, Ant Horz, High Ch, Port 8
2389.080	39.3	2.6	1.0	77.0	0.0	10.0	Vert	PK	0.0	51.9	74.0	-22.1	EUT on Side, Ant on Side, Low Ch, Port 8
2389.520	38.8	2.6	2.4	172.0	0.0	10.0	Horz	PK	0.0	51.4	74.0	-22.6	EUT Horz, Ant Horz, Low Ch, Port 8

### **DUTY CYCLE**



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

### **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.



EUT: Radio Node
Serial Number: E43
Customer: Walt Disney Parks and Resorts US, Inc.
Attendees: Hatte Spetla Work Order: SYNA0249
Date: 7-Aug-18
Temperature: 23.6 °C Humidity: 47.6% RH
Barometric Pres.: 1021 mbar Project: None
Tested by: Richard Mellroth
TEST SPECIFICATIONS Power: POE
Test Method Job Site: NC04 FCC 15.247:2018 ANSI C63.10:2013 COMMENTS DEVIATIONS FROM TEST STANDARD Vist Configuration # Signature Number of Pulses Value (%) Limit (%) Pulse Width Period Results Antenna Port 7 BLE/GFSK 46.6 N/A 46.7 N/A N/A N/A N/A N/A N/A N/A Low Channel, 2402 MHz Low Channel, 2402 MHz 583.841 us 1.252 ms N/A 1.25 ms N/A Mid Channel, 2442 MHz 584.094 us Mid Channel, 2442 MHz High Channel, 2480 MHz N/A 1.252 ms 5 N/A N/A N/A N/A 586.247 us 46.8 N/A High Channel, 2480 MHz N/A N/A N/A N/A N/A Antenna Port 8 BLE/GFSK N/A N/A N/A Low Channel, 2402 MHz 584.347 us 1.255 ms 46.6 N/A N/A N/A N/A Low Channel, 2402 MHz Mid Channel, 2442 MHz N/A 1.254 ms N/A 46.5 N/A 583.559 us N/A 5 N/A 47 N/A N/A N/A Mid Channel, 2442 MHz N/A N/A N/A High Channel, 2480 MHz 589.161 us 1.255 ms N/A High Channel, 2480 MHz N/A N/A

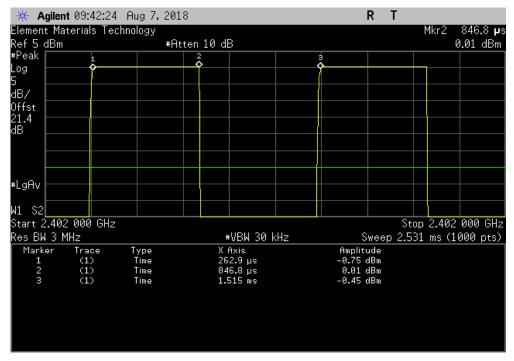


Antenna Port 7, BLE/GFSK, Low Channel, 2402 MHz

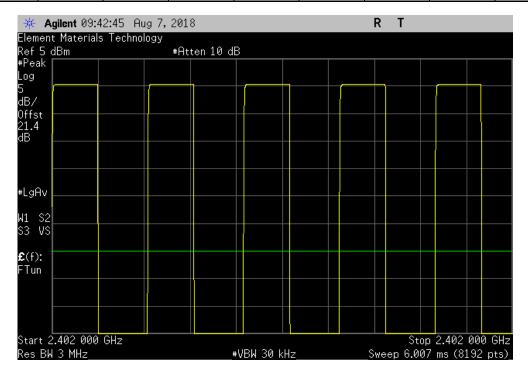
Number of Value Limit

Pulse Width Period Pulses (%) (%) Results

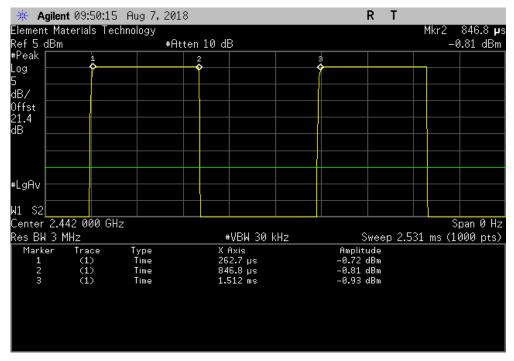
583.841 us 1.252 ms 1 46.6 N/A N/A



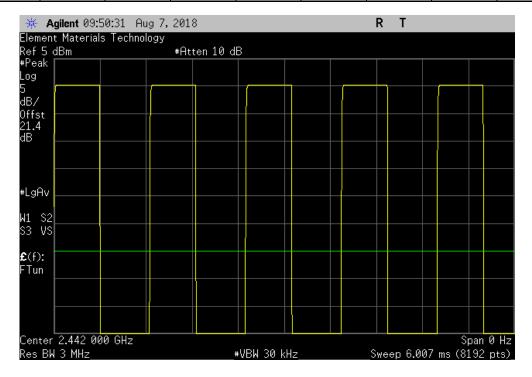
Antenna Port 7, BLE/GFSK, Low Channel, 2402 MHz						
			Number of	Value	Limit	
	Pulse Width	Period	Pulses	(%)	(%)	Results
	N/A	N/A	5	N/A	N/A	N/A







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



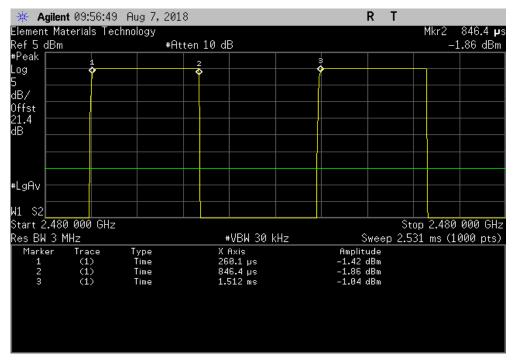


Antenna Port 7, BLE/GFSK, High Channel, 2480 MHz

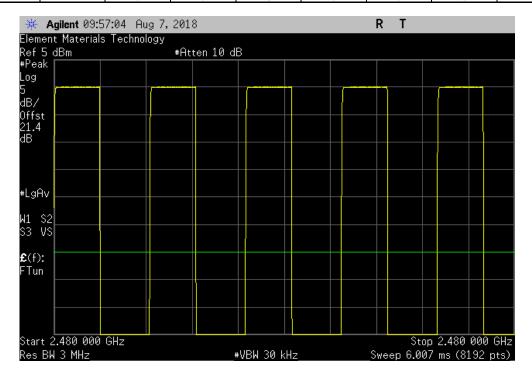
Number of Value Limit

Pulse Width Period Pulses (%) (%) Results

586.247 us 1.252 ms 1 46.8 N/A N/A



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



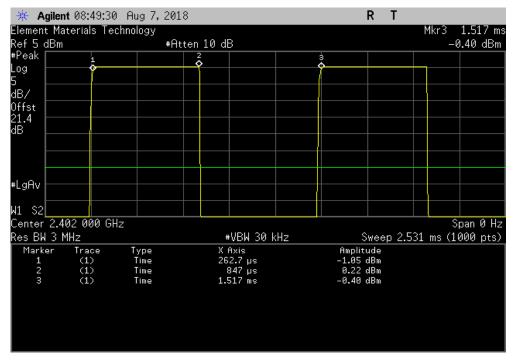


Antenna Port 8, BLE/GFSK, Low Channel, 2402 MHz

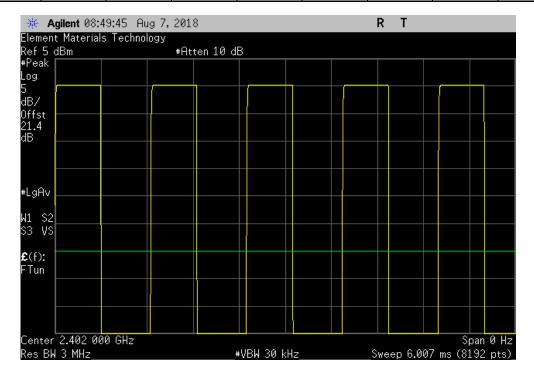
Number of Value Limit

Pulse Width Period Pulses (%) (%) Results

584.347 us 1.255 ms 1 46.6 N/A N/A



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



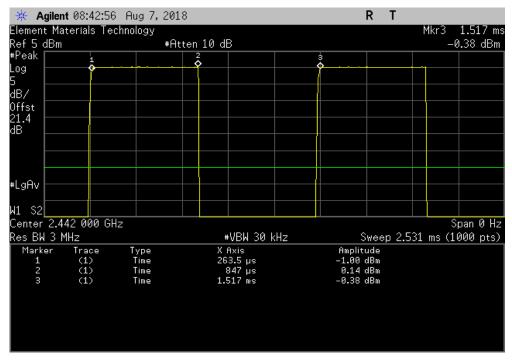


Antenna Port 8, BLE/GFSK, Mid Channel, 2442 MHz

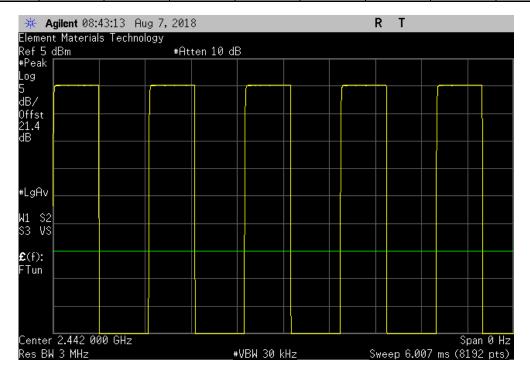
Number of Value Limit

Pulse Width Period Pulses (%) (%) Results

583.559 us 1.254 ms 1 46.5 N/A N/A



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



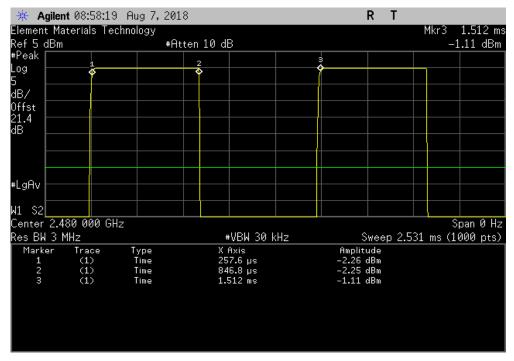


Antenna Port 8, BLE/GFSK, High Channel, 2480 MHz

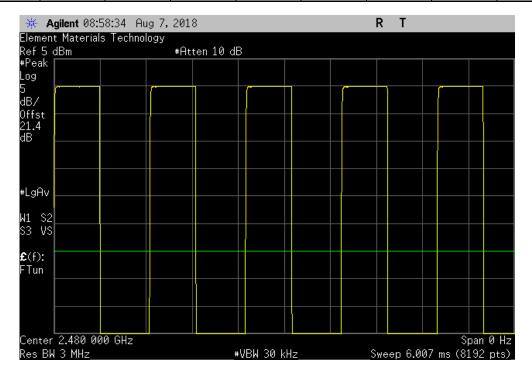
Number of Value Limit

Pulse Width Period Pulses (%) (%) Results

589.161 us 1.255 ms 1 47 N/A N/A



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





XMit 2017.12.13

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

#### **TEST EQUIPMENT**

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

#### **TEST DESCRIPTION**

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

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



EUT: Radio Node
Serial Number: E43
Customer: Walt Disney Parks and Resorts US, Inc.
Attendees: Hattie Spetla
Project: None
Tested by: Richard Mellroth
TEST SPECIFICATIONS Work Order: SYNA0249
Date: 7-Aug-18
Temperature: 23.5 °C Humidity: 48% RH
Barometric Pres.: 1021 mbar Power: POE
Test Method Job Site: NC04 FCC 15.247:2018 ANSI C63.10:2013 COMMENTS Power Setting at Default DEVIATIONS FROM TEST STANDARD Wist Configuration # Signature Limit (≥) Value Result Antenna Port 7 BLE/GFSK Pass Pass Pass Low Channel, 2402 MHz Mid Channel, 2442 MHz 666.246 kHz 678.687 kHz 500 kHz 500 kHz High Channel, 2480 MHz 694.263 kHz 500 kHz Antenna Port 8 BLE/GFSK Low Channel, 2402 MHz Mid Channel, 2442 MHz 685.63 kHz 671.818 kHz 500 kHz 500 kHz Pass Pass High Channel, 2480 MHz 710.398 kHz 500 kHz Pass

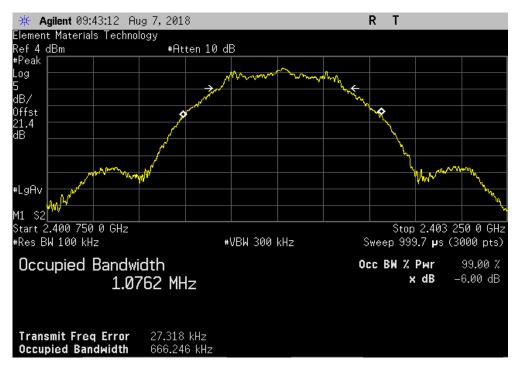


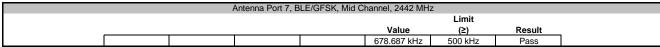
Antenna Port 7, BLE/GFSK, Low Channel, 2402 MHz

Limit

Value (2) Result

666.246 kHz 500 kHz Pass









Antenna Port 7, BLE/GFSK, High Channel, 2480 MHz

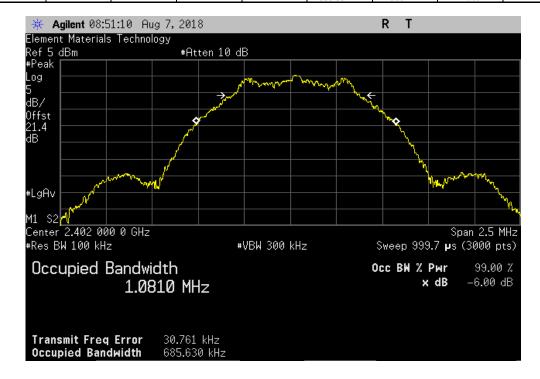
Limit

Value (≥) Result

694.263 kHz 500 kHz Pass









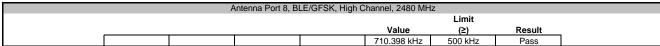
Antenna Port 8, BLE/GFSK, Mid Channel, 2442 MHz

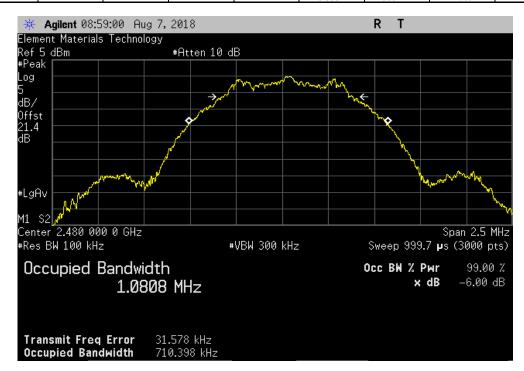
Limit

Value (≥) Result

671.818 kHz 500 kHz Pass









XMit 2017.12.13

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

#### **TEST EQUIPMENT**

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

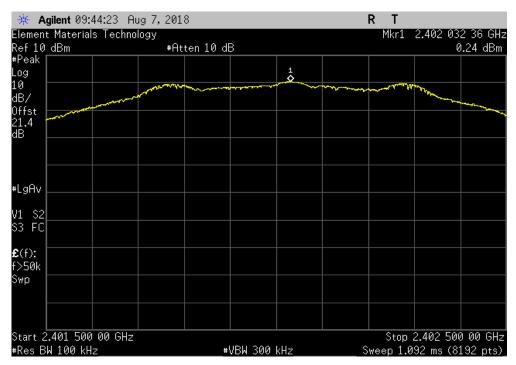
#### **TEST DESCRIPTION**

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

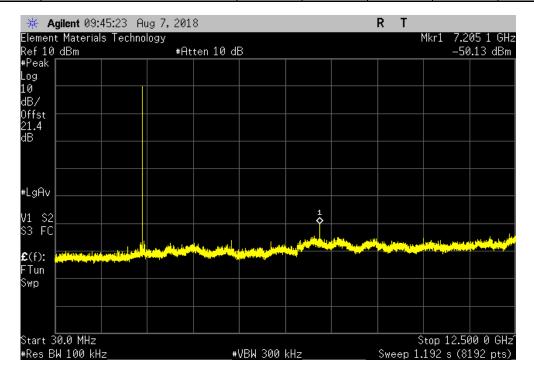


			TbtTx 2017.12.14	XMit 20
EUT: Radio Node		Work Order:		
Serial Number: E43			7-Aug-18	
Customer: Walt Disney Parks and Resorts US, Inc.		Temperature:		
Attendees: Hattie Spetla			47.8% RH	
Project: None		Barometric Pres.:		
Tested by: Richard Mellroth	Power: POE	Job Site:	NC04	
TEST SPECIFICATIONS	Test Method			
FCC 15.247:2018	ANSI C63.10:2013			
COMMENTS				
Ower Setting at Default				
ower Setting at Derault				
DEVIATIONS FROM TEST STANDARD				
lone				
Configuration # 7	01 10			
3	nature			
	Frequency	Max Value	Limit	
	Range	(dBc)	≤ (dBc)	Result
Antenna Port 7				
BLE/GFSK				
Low Channel, 2402 MHz	Fundamental	N/A	N/A	N/A
Low Channel, 2402 MHz	30 MHz - 12.5 GHz	-50.37	-20	Pass
Low Channel, 2402 MHz	12.5 GHz - 25 GHz	-50.68	-20	Pass
Mid Channel, 2442 MHz	Fundamental	N/A	N/A	N/A
Mid Channel, 2442 MHz	30 MHz - 12.5 GHz	-52.42	-20	Pass
Mid Channel, 2442 MHz	12.5 GHz - 25 GHz	-50.04	-20	Pass
High Channel, 2480 MHz	Fundamental	N/A	N/A	N/A
High Channel, 2480 MHz	30 MHz - 12.5 GHz	-51.66	-20	Pass
High Channel, 2480 MHz	12.5 GHz - 25 GHz	-50.53	-20	Pass
BLE/GFSK				
Low Channel, 2402 MHz	Fundamental	N/A	N/A	N/A
Low Channel, 2402 MHz	30 MHz - 12.5 GHz	-48.93	-20	Pass
Low Channel, 2402 MHz	12.5 GHz - 25 GHz	-49.31	-20	Pass
Mid Channel, 2442 MHz	Fundamental	N/A	N/A	N/A
Mid Channel, 2442 MHz	30 MHz - 12.5 GHz	-53.05	-20	Pass
Mid Channel, 2442 MHz	12.5 GHz - 25 GHz	-50.5	-20	Pass
High Channel, 2480 MHz	Fundamental	N/A	N/A	N/A
High Channel, 2480 MHz	30 MHz - 12.5 GHz	-50.22	-20	Pass
High Channel, 2480 MHz	12.5 GHz - 25 GHz	-49.98	-20	Pass

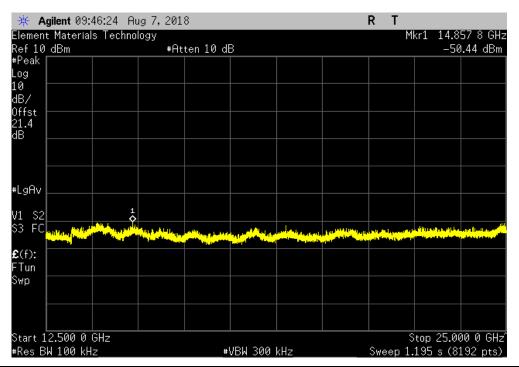




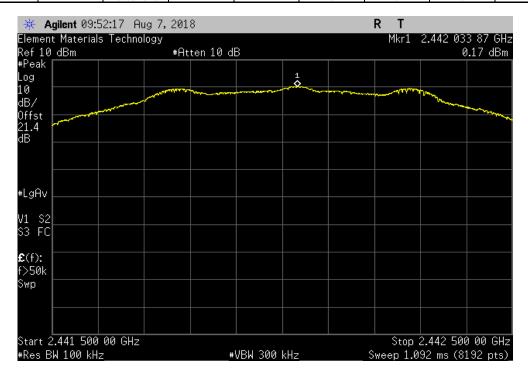
	Antenna Port 7, BLE/GFSK, Low Channel, 2402 MHz				
	Frequency		Max Value	Limit	
_	Range		(dBc)	≤ (dBc)	Result
	30 MHz - 12.5 GHz		-50.37	-20	Pass



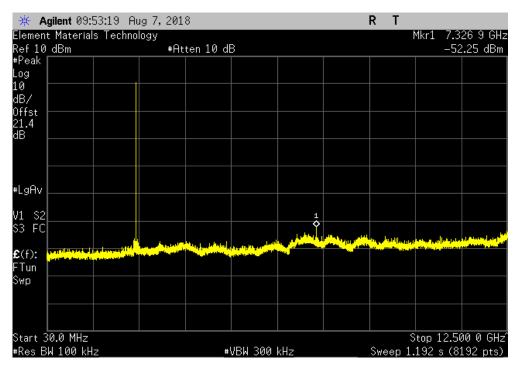




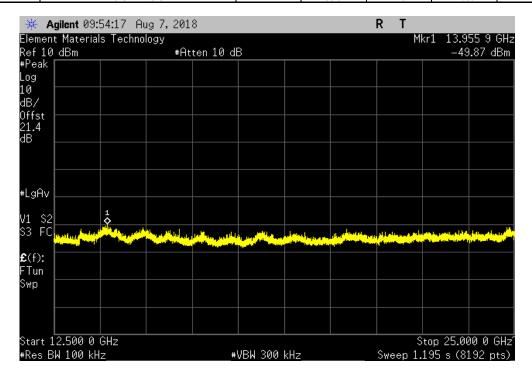
Antenna Port 7, BLE/GFSK, Mid Channel, 2442 MHz					
Frequency	Max Value	Limit			
Range	(dBc)	≤ (dBc)	Result		
Fundamental	N/A	N/A	N/A		



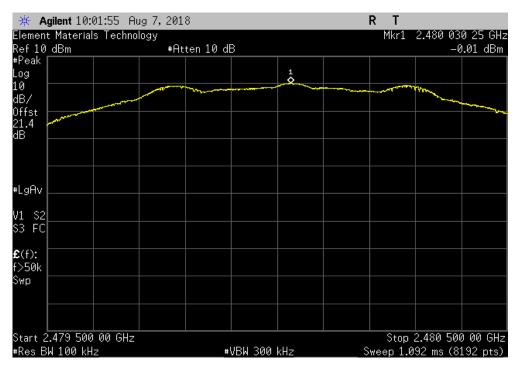




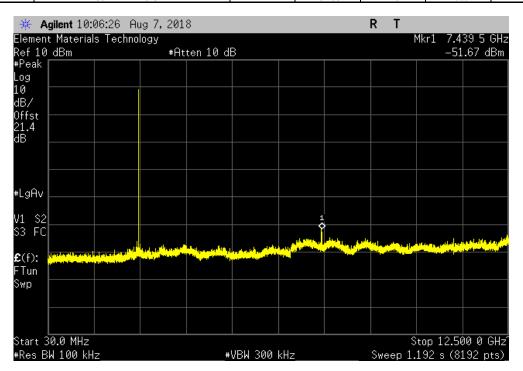
Ante	Antenna Port 7, BLE/GFSK, Mid Channel, 2442 MHz				
Frequency		Max Value	Limit		
Range		(dBc)	≤ (dBc)	Result	
12.5 GHz - 25 GHz		-50.04	-20	Pass	



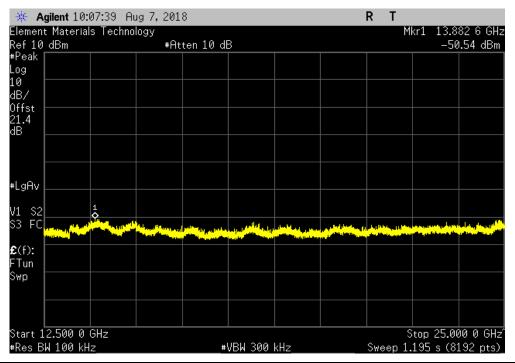


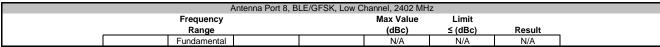


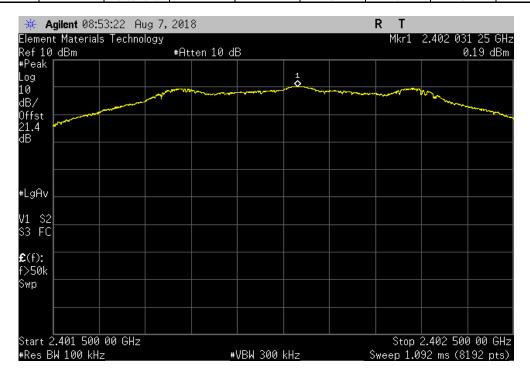
Antenna Port 7,	BLE/GFSK, High Cha	annel, 2480 MH	Z	
Frequency		Max Value	Limit	
Range		(dBc)	≤ (dBc)	Result
30 MHz - 12.5 GHz		-51.66	-20	Pass



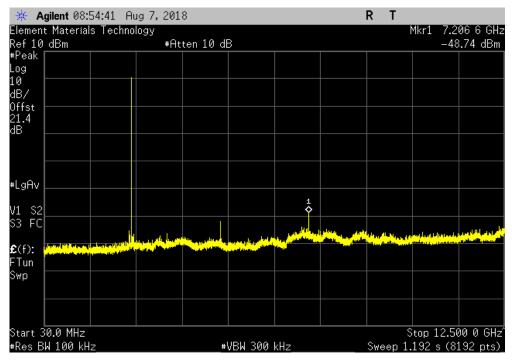




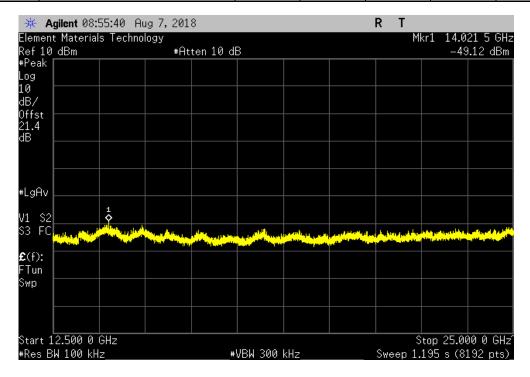








	Antenna Port 8, B	LE/GFSK, Low C	hannel, 2402 MH	Z	
	Frequency		Max Value	Limit	
_	Range		(dBc)	≤ (dBc)	Result
ĺ	12.5 GHz - 25 GHz		-49.31	-20	Pass





Antenna Port 8, BLE/GFSK, Mid Channel, 2442 MHz

Frequency

Range
(dBc) ≤ (dBc)

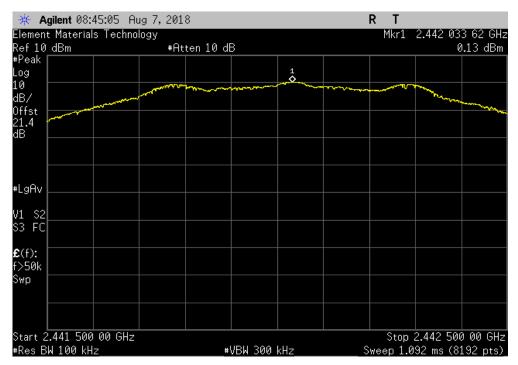
Fundamental

N/A

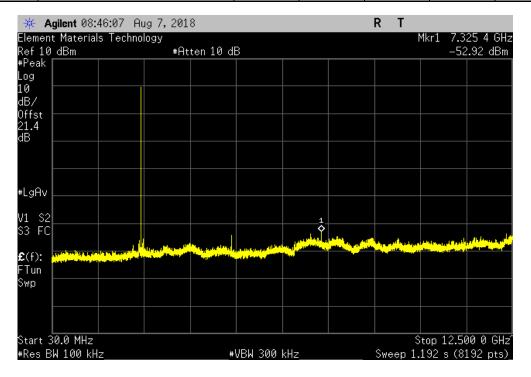
N/A

N/A

N/A



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





Antenna Port 8, BLE/GFSK, Mid Channel, 2442 MHz

Frequency

Range
(dBc) ≤ (dBc)

12.5 GHz - 25 GHz

Antenna Port 8, BLE/GFSK, Mid Channel, 2442 MHz

Max Value

Limit
(dBc)

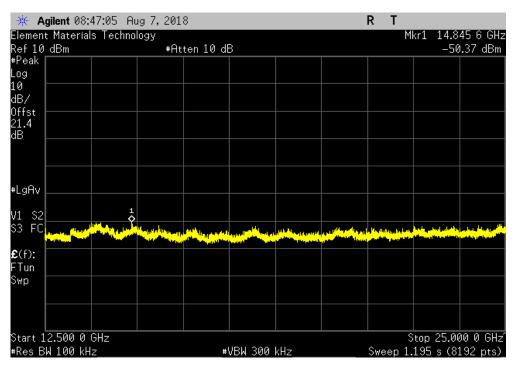
≤ (dBc)

Result

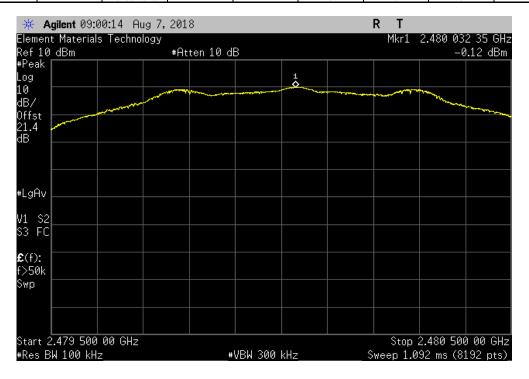
1-50.5

-20

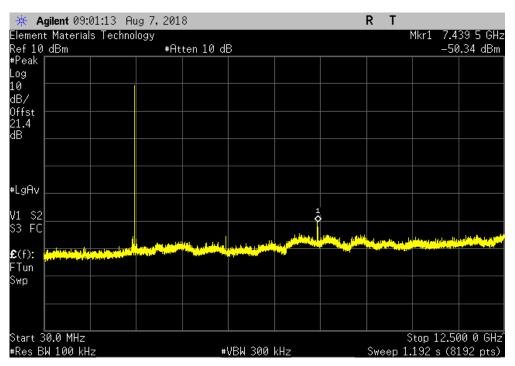
Pass



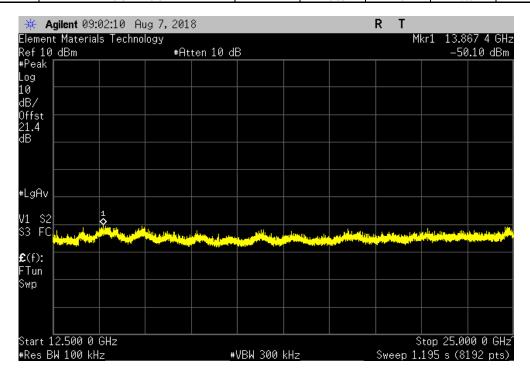
	Antenna Port 8, BLE/GFSK, High	n Channel, 2480 MF	łz	
Frequency		Max Value	Limit	
Range		(dBc)	≤ (dBc)	Result
Fundamenta	d .	N/A	N/A	N/A







	Antenna Port 8, B	LE/GFSK, High C	hannel, 2480 MH	Z			
	Frequency		Max Value	Limit			
_	Range		(dBc)	≤ (dBc)	Result		
. [	12.5 GHz - 25 GHz		-49.98	-20	Pass		





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

#### **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.



EUT: Radio Node
Serial Number: E43
Customer: Walt Disney Parks and Resorts US, Inc.
Attendees: Hattie Spetla
Project: None
Tested by: Richard Mellroth
TEST SPECIFICATIONS Work Order: SYNA0249
Date: 7-Aug-18
Temperature: 23.5 °C Humidity: 48.2% RH
Barometric Pres.: 1021 mbar Power: POE
Test Method Job Site: NC04 FCC 15.247:2018 ANSI C63.10:2013 COMMENTS Power Setting at Default DEVIATIONS FROM TEST STANDARD Wist Configuration # Signature Value Result (<) Antenna Port 7 BLE/GFSK Low Channel, 2402 MHz Mid Channel, 2442 MHz High Channel, 2480 MHz 1 W 1 W 1 W Pass Pass Pass 1.088 mW 1.068 mW 1.019 mW Antenna Port 8 BLE/GFSK 1 W 1 W 1 W Low Channel, 2402 MHz Mid Channel, 2442 MHz 1.070 mW 1.053 mW Pass Pass High Channel, 2480 MHz 0.994 mW Pass

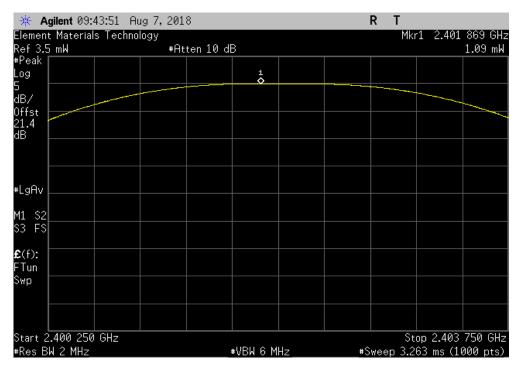


Antenna Port 7, BLE/GFSK, Low Channel, 2402 MHz

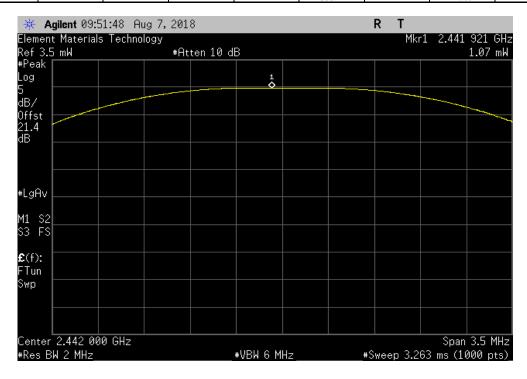
Limit

Value (c) Result

1.088 mW 1 W Pass



	Antenna Port 7, B	LE/GFSK, Mid C	hannel, 2442 MH	Z	
				Limit	
			Value	(<)	Result
			1.068 mW	1 W	Pass



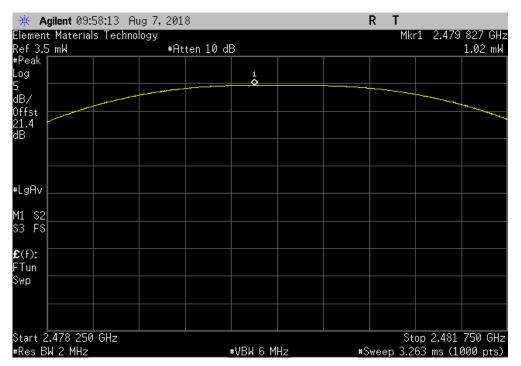


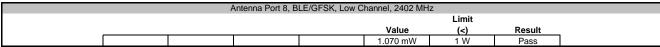
Antenna Port 7, BLE/GFSK, High Channel, 2480 MHz

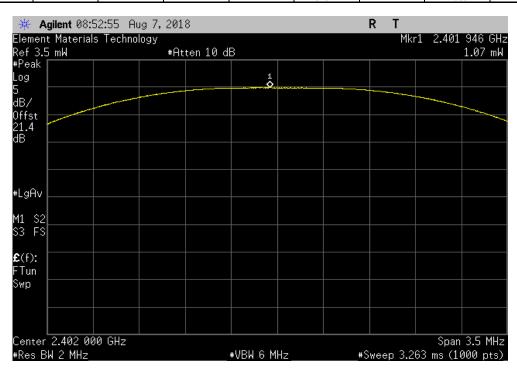
Limit

Value (c) Result

1.019 mW 1 W Pass



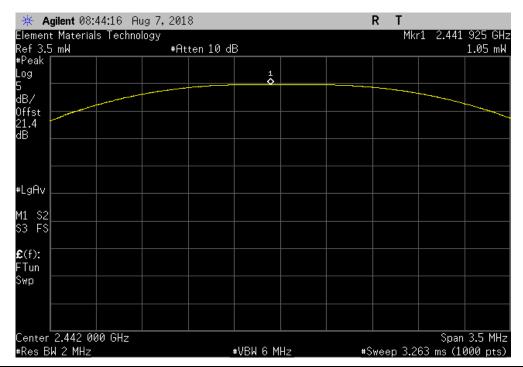




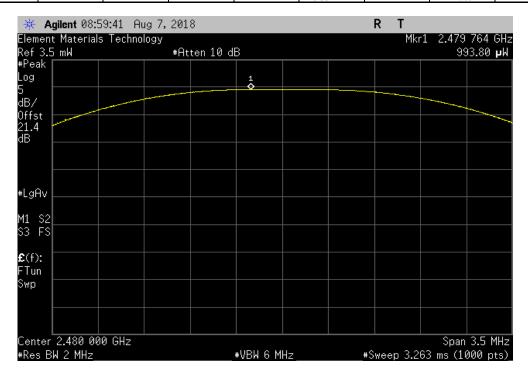


Antenna Port 8, BLE/GFSK, Mid Channel, 2442 MHz

| Limit | Value (<) Result | 1.053 mW | 1 W | Pass |



	A	Antenna Port 8, Bl	LE/GFSK, High C	hannel, 2480 MH	z		
					Limit		
				Value	(<)	Result	
				0.994 mW	1 W	Pass	]





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

#### **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.



							TbtTx 2017.12.14	XMit 2017.12.13
	Radio Node				W		SYNA0249	
Serial Number:							7-Aug-18	
	: Walt Disney Parks and R	Resorts US, Inc.			Те	mperature:		
	Hattie Spetla						48.4% RH	
Project:					Barom		1021 mbar	
	: Richard Mellroth		Power:			Job Site:	NC04	
TEST SPECIFICAT	TONS			Test Method				
FCC 15.247:2018				ANSI C63.10:2013				
COMMENTS								
Power Setting at D	efault							
1								
<b>DEVIATIONS FROM</b>	M TEST STANDARD							
None								
			01 10					
Configuration #	7		Mary					
Configuration #	7	Signature	flish					
Configuration #	7	Signature	flish			Value	Limit	
_	7	Signature	Pust			Value m/3kHz	Limit < dBm/3kHz	Results
Configuration #  Antenna Port 7		Signature	Rust					Results
_	BLE/GFSK		flish		dB	m/3kHz		
_	BLE/GFSK Low Channel	ıl, 2402 MHz	Rust		dB	m/3kHz 15.013	< dBm/3kHz	Pass
_	BLE/GFSK Low Channel Mid Channel	il, 2402 MHz , 2442 MHz	Pust		dB	m/3kHz 15.013 15.034	< dBm/3kHz  8 8	Pass Pass
Antenna Port 7	BLE/GFSK Low Channel	il, 2402 MHz , 2442 MHz	Phote		dB	m/3kHz 15.013	< dBm/3kHz	Pass
_	BLE/GFSK  Low Channel Mid Channel High Channe	il, 2402 MHz , 2442 MHz	Rust		dB	m/3kHz 15.013 15.034	< dBm/3kHz  8 8	Pass Pass
Antenna Port 7	BLE/GFSK  Low Channel Mid Channel High Channel BLE/GFSK	il, 2402 MHz I, 2442 MHz al, 2480 MHz	Pust			15.013 15.034 15.305	< dBm/3kHz  8 8	Pass Pass Pass
Antenna Port 7	BLE/GFSK  Low Channel Mid Channel High Channel  BLE/GFSK  Low Channel	il, 2402 MHz , 2442 MHz ,l. 2480 MHz	Rist		- dB	m/3kHz 15.013 15.034 15.305	< dBm/3kHz  8 8 8	Pass Pass Pass
Antenna Port 7	BLE/GFSK  Low Channel Mid Channel High Channel BLE/GFSK  Low Channel Mid Channel	il, 2402 MHz , 2442 MHz al, 2480 MHz il, 2402 MHz , 2442 MHz	Rust		dB	m/3kHz 15.013 15.034 15.305 14.918 14.906	< dBm/3kHz  8 8 8 8 8	Pass Pass Pass Pass Pass
Antenna Port 7	BLE/GFSK  Low Channel Mid Channel High Channel  BLE/GFSK  Low Channel	il, 2402 MHz , 2442 MHz al, 2480 MHz il, 2402 MHz , 2442 MHz	Phote		dB	m/3kHz 15.013 15.034 15.305	< dBm/3kHz  8 8 8	Pass Pass Pass

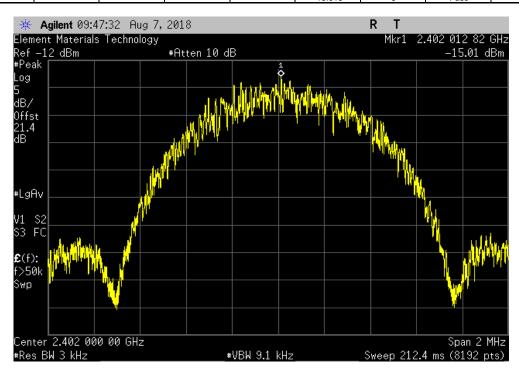


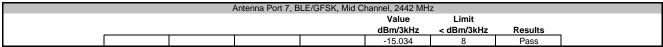
Antenna Port 7, BLE/GFSK, Low Channel, 2402 MHz

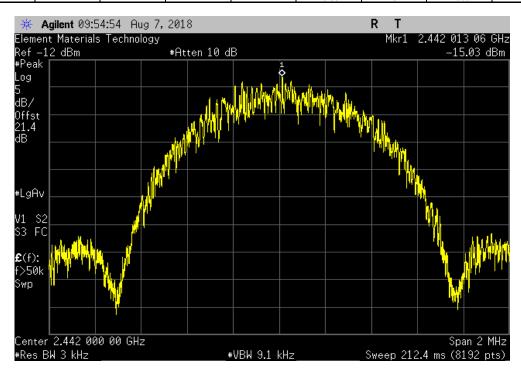
Value Limit

dBm/3kHz < dBm/3kHz Results

-15.013 8 Pass







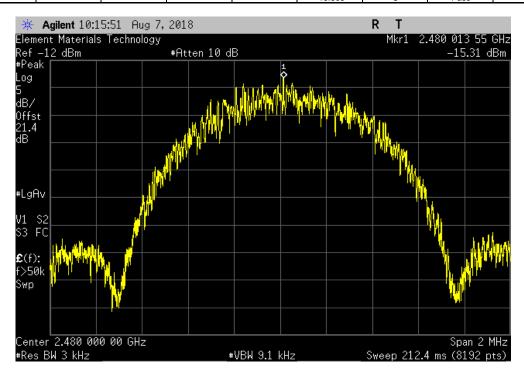


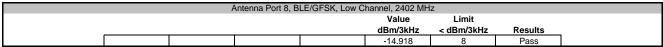
Antenna Port 7, BLE/GFSK, High Channel, 2480 MHz

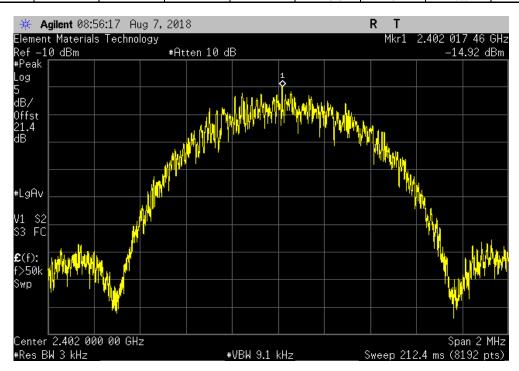
Value Limit

dBm/3kHz < dBm/3kHz Results

-15.305 8 Pass







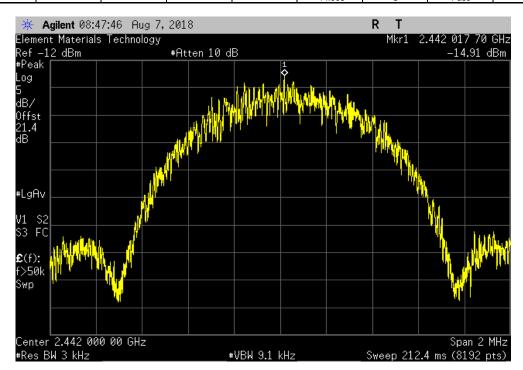


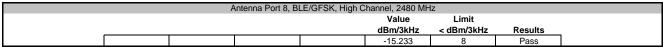
Antenna Port 8, BLE/GFSK, Mid Channel, 2442 MHz

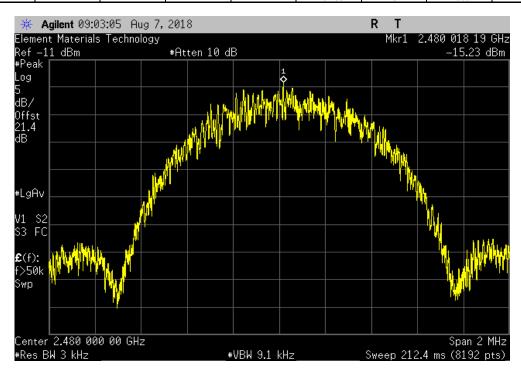
Value Limit

dBm/3kHz < dBm/3kHz Results

-14.906 8 Pass









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.



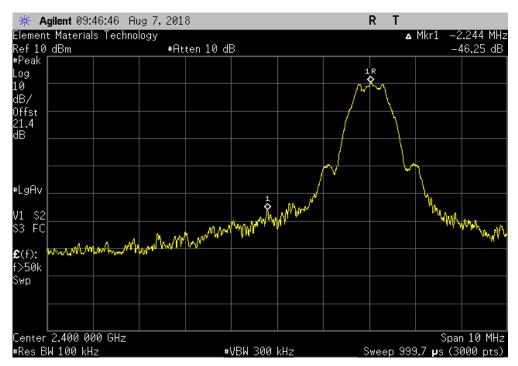
						TbtTx 2017.12.14	XMit 2017.12.13
	T: Radio Node				Work Order:		
Serial Numbe						7-Aug-18	
Custome	r: Walt Disney Parks and	I Resorts US, Inc.			Temperature:		
Attendees	s: Hattie Spetla					47.4% RH	
	t: None				Barometric Pres.:		
Tested by	y: Richard Mellroth		Power:	POE	Job Site:	NC04	
TEST SPECIFICAT	TIONS			Test Method			
FCC 15.247:2018				ANSI C63.10:2013			
COMMENTS							
Power Setting at	Default						
DEVIATIONS FRO	OM TEST STANDARD						
None							
			0: h				
Configuration #	7		VALE				
		Signature	proc 10				
					Value	Limit	
					(dBc)	≤ (dBc)	Result
Antenna Port 7							
	BLE/GFSK						
	Low Chan	nel, 2402 MHz			-46.25	-20	Pass
	High Char	nel, 2480 MHz			-55.96	-20	Pass
Antenna Port 8							
	BLE/GFSK						
	Low Chan	nel, 2402 MHz			-47.62	-20	Pass
	High Char	nel, 2480 MHz			-54.59	-20	Pass
	=						



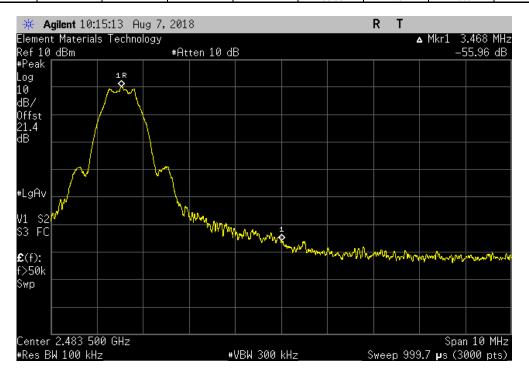
Antenna Port 7, BLE/GFSK, Low Channel, 2402 MHz

Value Limit
(dBc) ≤ (dBc) Result

-46.25 -20 Pass



	A	Antenna Port 7, Bl	LE/GFSK, High C	hannel, 2480 MH	Z	
				Value	Limit	
				(dBc)	≤ (dBc)	Result
				-55.96	-20	Pass

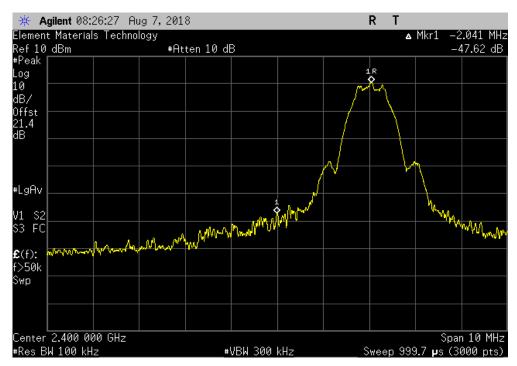




Antenna Port 8, BLE/GFSK, Low Channel, 2402 MHz

Value Limit
(dBc) ≤ (dBc) Result

-47 62 -20 Pass



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

