

EMC Test Report

Project Number: 4272209

Report Number: 4272209EMC04

Revision Level: 2

Client: Curiouser Products Inc

Equipment Under Test: Smart Mirror

Model Number: M1R0

FCC ID: 2AOSD-RLSYM1R0

IC ID: 23685-RLSY

Applicable Standards: ANSI C63.10: 2013 (FCC Part 15 Subpart C, § 15.247)

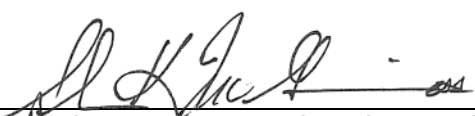
RSS-247, Issue 2

RSS-GEN Issue 4

Report issued on: 14 August 2018

Test Result: Compliant

Tested by:


Shawn McGuinness, EMC Engineering Leader

Reviewed by:


David Schramm, Operations Manager

Remarks: This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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1 Summary of Test Results

Test Description	Test Specification		Test Result
Occupied Bandwidth	15.247(a)(1)	RSS-247 5.1(1) RSS-GEN 6.6	Compliant
Peak Power Output	15.247(a)(1)	RSS-247 5.4(2)	Compliant
Conducted Spurious Emissions	15.247(d)	RSS-247 5.5	Compliant
Band Edge	15.247(d)	RSS-247 5.5	Compliant
Radiated Spurious Emissions	15.247(d), 15.35(b),15.209	RSS-GEN 8.10	Compliant
Pseudo-Random Hop Sequence	15.247(a)(1)	RSS-247 5.1(1)	Compliant
Channel Separation	15.247(a)(1)	RSS-247 5.1(2)	Compliant
Number of Hopping Channels	15.247(a)(1)(iii)	RSS-247 5.1(4)	Compliant
Dwell Time	15.247(a)(1)(iii)	RSS-247 5.1(4)	Compliant
Number of hopping frequencies	15.247(a)(1)(iii)	RSS-247 5.1(4)	Compliant
Antenna Requirement	15.203	RSS-GEN S8.3	Compliant (1)
AC Powerline Conducted Emission	15.107, 15.207	RSS-GEN 7.2.4	Compliant

1) Internal PCB trace antenna

1.1 Modifications Required for Compliance

None

2 General Information

2.1 Client Information

Name: Curiouser Products Inc
Address: 524 Broadway 11th Floor
City, State, Zip, Country: New York, NY 10013, USA

2.2 Test Laboratory

Name: SGS North America, Inc.
Address: 620 Old Peachtree Road NW, Suite 100
City, State, Zip, Country: Suwanee, GA 30024, USA

Accrediting Body: A2LA
Type of lab: Testing Laboratory
Certificate Number: 3212.01

2.3 General Information of EUT

Type of Product: Smart Mirror
Model Number: 1
Serial Number: M1R010050

Frequency Range: 2402 to 2480 MHz, 79 Channels
Data Modes: Bluetooth GFSK, EDR-2, EDR-3 (DH1, DH3, DH5)
Antenna: Internal, PCB – Molex, P/N: 146153-0100, 3.0dB Gain.

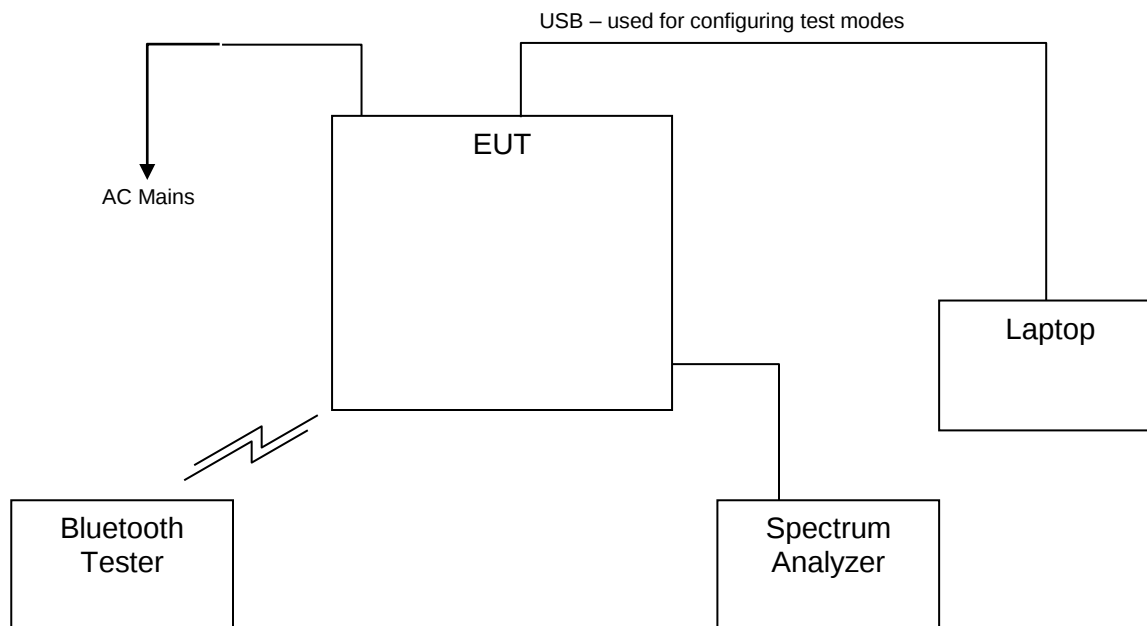
Rated Voltage: 120Vac, 60Hz
Test Voltage: 120Vac, 60Hz

Sample Received Date: 20 February 2018
Dates of testing: 08 March – 06 June 2018

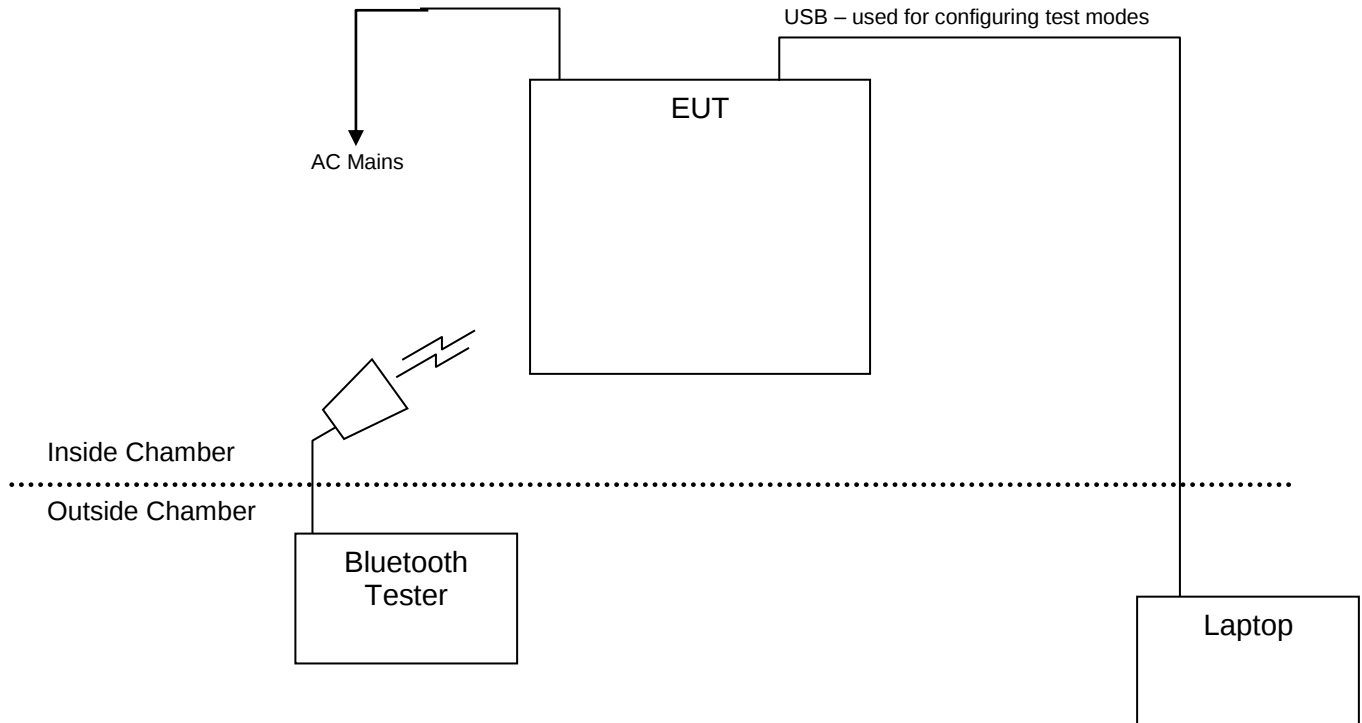
2.4 Operating Modes and Conditions

During radiated spurious emissions tests, continuous traffic was generated using test commands. For conducted measurements, the EUT was placed in test mode and a Bluetooth tester was connected to the device. Where the duty cycle measured below 98%, ANSI C63.10, Section 7.5 was used.

2.5 EUT Connection Block Diagram – Conducted Measurements



2.6 EUT Connection Block Diagram – Radiated Measurements



2.7 System Configurations

Device reference	Manufacturer	Description	Model Number	Serial Number
A	Curiouser Products Inc	Smart Mirror	M1R0	M1R010050
B	HP	Notebook	15-1233wm	5CD6415H9V
C	Rohde & Schwarz	Communications Tester	CMW-500	127722

3 Occupied Bandwidth

3.1 Test Result

Test Description	Basic Standards	Test Result
99% bandwidth	ANSI C63.10: 2013 15.247(a)(1) RSS-247 5.1(1) RSS-GEN 6.6	Compliant

3.2 Test Method

Occupied bandwidth measurements were taken using the methods defined in ANSI C63.10, Clause 6.9; Measurements were recorded using the 99% OBW function of the measurement receiver.

3.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.1 °C
 Relative Humidity: 34.5 %

3.4 Test Equipment

Test End Date: 5-Mar-2018

Tester: JOP

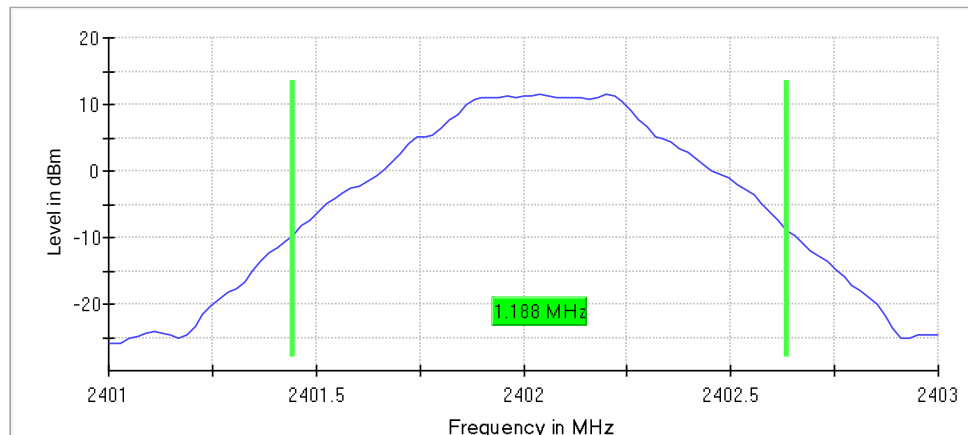
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
RF CABLE	SF102	HUBER & SUHNER	B079822	25-Jul-2019
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	1-Nov-2019
Switch platform with integrated power sensors	OPS120	ROHDE & SCHWARZ	15039	15-Dec-2019
ATTENUATOR, 10DB	10DB	ROHDE & SCHWARZ	B095591	25-Jul-2019

Note: The equipment calibration period is 1 year except for the FSV which is on a 2-year calibration cycle.

3.5 Test Data – 99% Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
Basic Rate, DH-5						
2402.000000	1.188118	---	---	2401.445545	2402.633663	PASS
2440.000000	1.188118	---	---	2439.445545	2440.633663	PASS
2480.000000	1.188118	---	---	2479.465347	2480.653465	PASS
EDR-2, DH-5						
2402.000000	1.445544	---	---	2401.326733	2402.772277	PASS
2440.000000	1.445544	---	---	2439.346535	2440.792079	PASS
2480.000000	1.425742	---	---	2479.346535	2480.772277	PASS
EDR-3, DH-5						
2402.000000	1.445544	---	---	2401.326733	2402.772277	PASS
2440.000000	1.445544	---	---	2439.326733	2440.772277	PASS
2480.000000	1.425742	---	---	2479.346535	2480.772277	PASS

Representative Plot



Representative Measurement Settings

Setting	Instrument Value	Target Value
Start Frequency	2.40100 GHz	2.40100 GHz
Stop Frequency	2.40300 GHz	2.40300 GHz
Span	2.000 MHz	2.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	101	~ 40
Sweptime	18.938 μ s	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	200	200
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	11 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.16 dB	0.50 dB

4 Peak Output Power

4.1 Test Result

Test Description	Test Specification	Test Result
Peak Output Power	ANSI C63.10: 2013 15.247(a)(1) RSS-247 5.4(2)	Compliant

4.2 Test Method

Output power measurements were taken using the methods defined in ANSI C63.10, Clause 7.8.5. A peak power meter was used for final measurements.

Limit

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW (21 dBm).

4.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.1 °C
 Relative Humidity: 34.5 %

4.4 Test Equipment

Test End Date: 22-Mar-2018

Tester: JOP

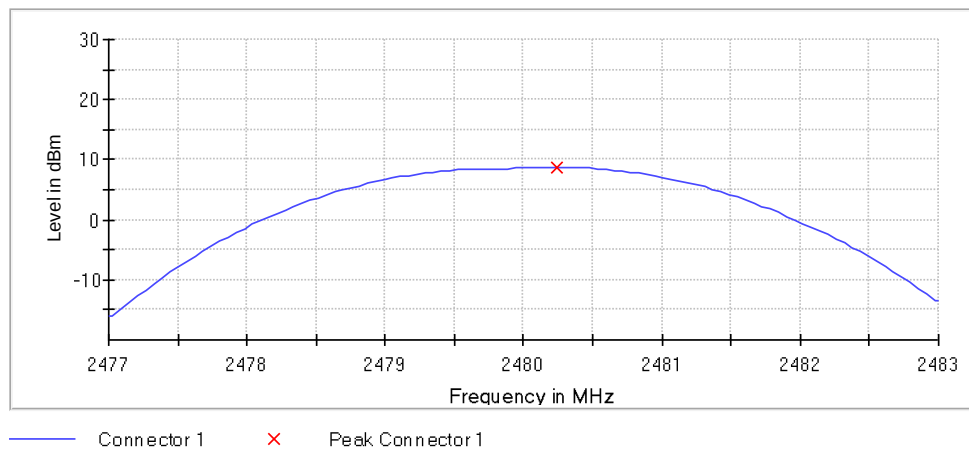
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	1-Nov-2019
RF CABLE	SF102	HUBER & SUHNER	B079822	27-Jul-2018
OPEN SWITCH AND CONTROL UNIT	OSP 120	ROHDE & SCHWARZ	S/N: 101182	CNR
ATTENUATOR, 10DB	10DB	ROHDE & SCHWARZ	B095591	28-Jul-2018

Note: The equipment calibration period is 1 year except for the FSV which is on a 2-year calibration cycle.

4.5 Test Data

DUT Frequency (MHz)	Peak Power (dBm)	Limit Max (dBm)	Result
Basic Rate, DH-5			
2402.000000	8.9	21.0	PASS
2440.000000	7.9	21.0	PASS
2480.000000	9.1	21.0	PASS
EDR-2, DH-5			
2402.000000	8.6	21.0	PASS
2440.000000	7.7	21.0	PASS
2480.000000	8.8	21.0	PASS
EDR-3, DH-5			
2402.000000	9.0	21.0	PASS
2440.000000	7.9	21.0	PASS
2480.000000	9.1	21.0	PASS

Representative Plot



Representative Measurement Settings

Setting	Instrument Value	Target Value
Start Frequency	2.47700 GHz	2.47700 GHz
Stop Frequency	2.48300 GHz	2.48300 GHz
Span	6.000 MHz	6.000 MHz
RBW	2.000 MHz	>= 1.000 MHz
VBW	10.000 MHz	>= 6.000 MHz
SweepPoints	101	~ 101
SweepTime	953.450 ns	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	6 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

5 Conducted Spurious Emissions

5.1 Test Result

Test Description	Test Specification	Test Result
Conducted Spurious Emissions	ANSI C63.10: 2013 15.247(d) RSS-247 5.4(2)	Compliant

5.2 Test Method

Conducted spurious emissions measurements were taken using the methods defined in ANSI C63.10, Clauses 5.5 and 5.6. Authorized band edge measurements were recorded using the methods in clause 6.10.4. EDR-3 with a DH5 packet type was used as the worst-case mode of operation for spurious measurements. Band edge measurements were recorded using each modulation (Basic Rate, EDR-2, and EDR-3).

The limit is 20 dB below the measured peak power.

5.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.1 °C
 Relative Humidity: 34.5 %

5.4 Test Equipment

Test End Date: 22-Mar-2018

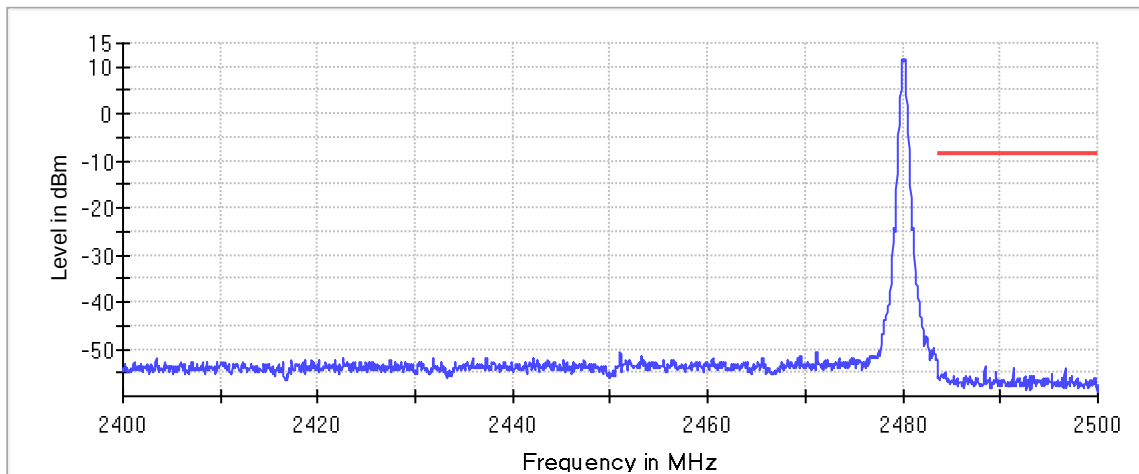
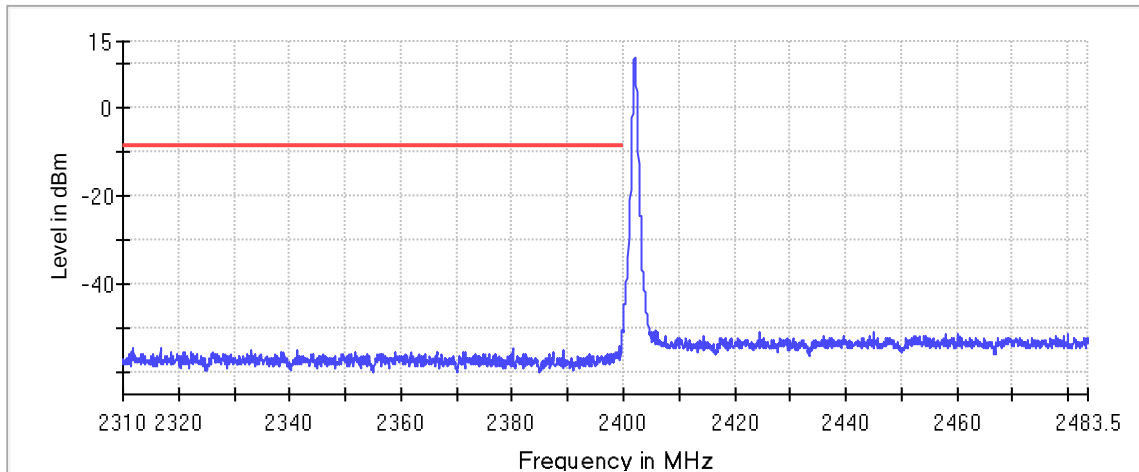
Tester: JOP

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	1-Nov-2019
RF CABLE	SF102	HUBER & SUHNER	B079822	27-Jul-2018
OPEN SWITCH AND CONTROL UNIT	OSP 120	ROHDE & SCHWARZ	S/N: 101182	CNR
ATTENUATOR, 10DB	10DB	ROHDE & SCHWARZ	B095591	28-Jul-2018

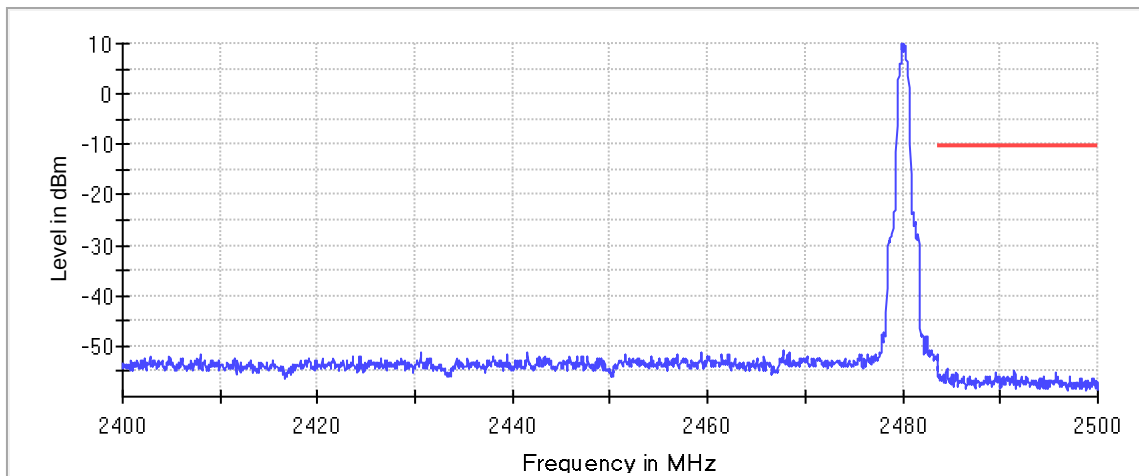
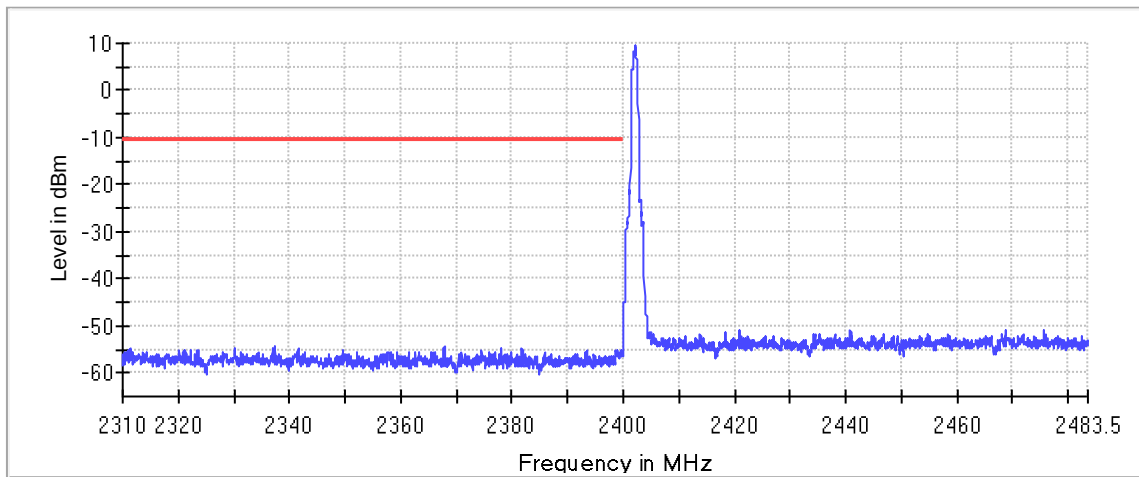
Note: The equipment calibration period is 1 year except for the FSV which is on a 2-year calibration cycle.

5.5 Test Data –Band Edge

Basic Rate
Lower band edge / Upper band edge

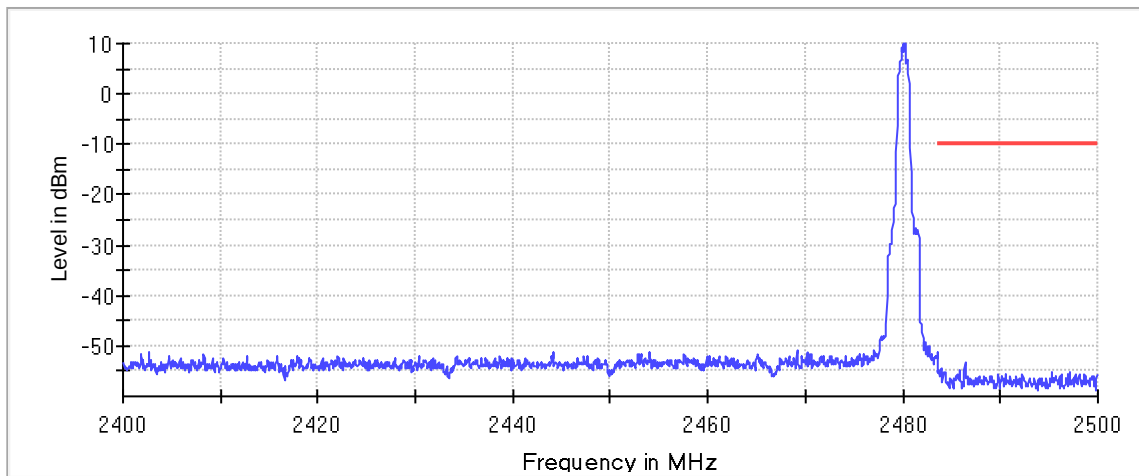
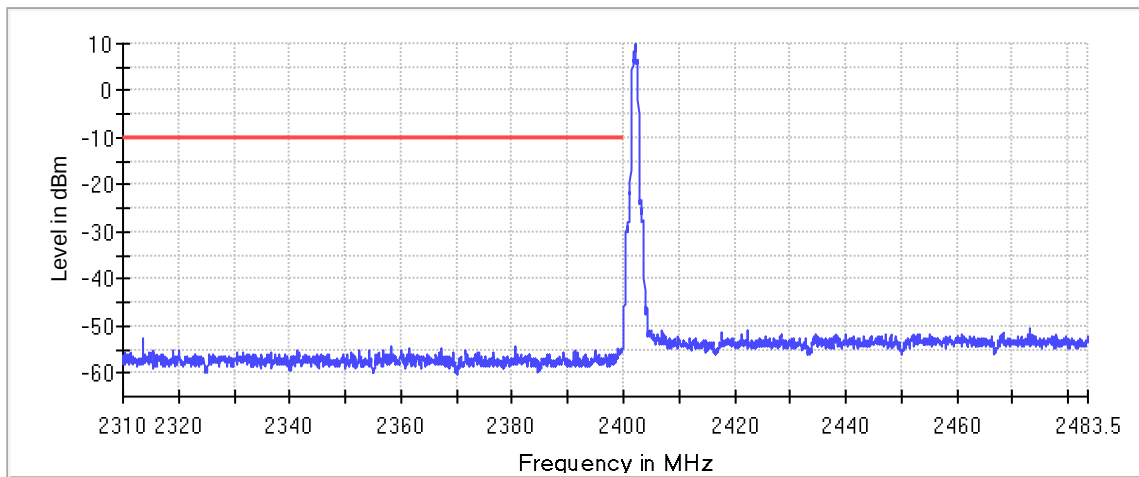


EDR 2 Lower band edge / Upper band edge

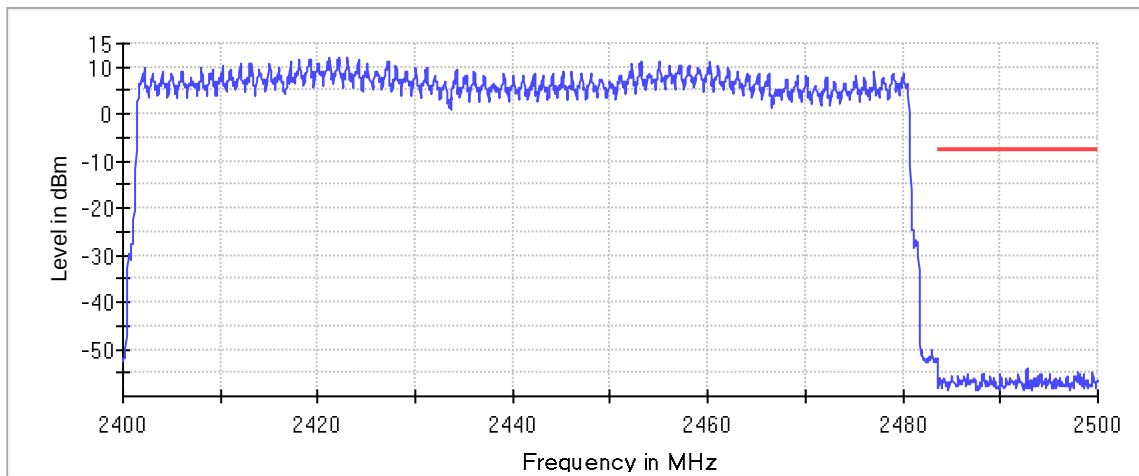
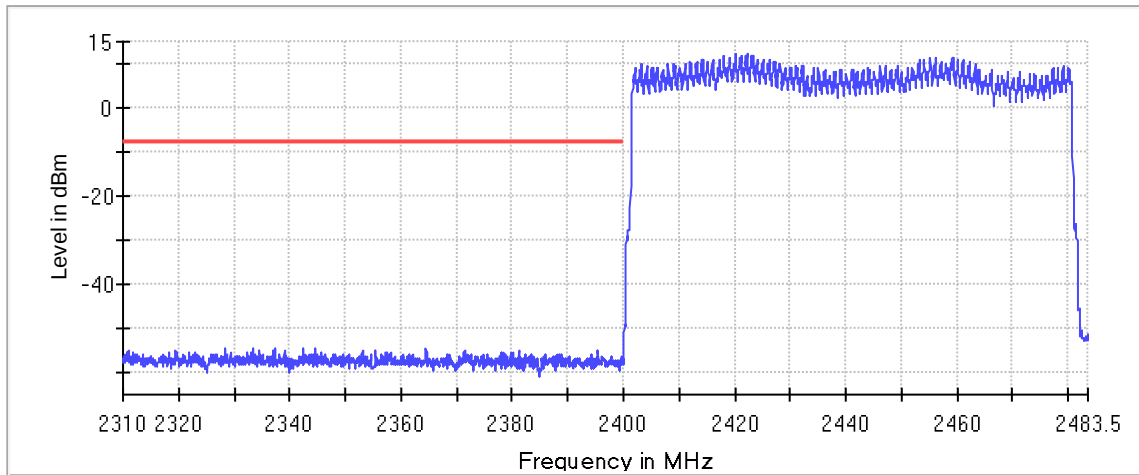


EDR 3

Lower band edge / Upper band edge

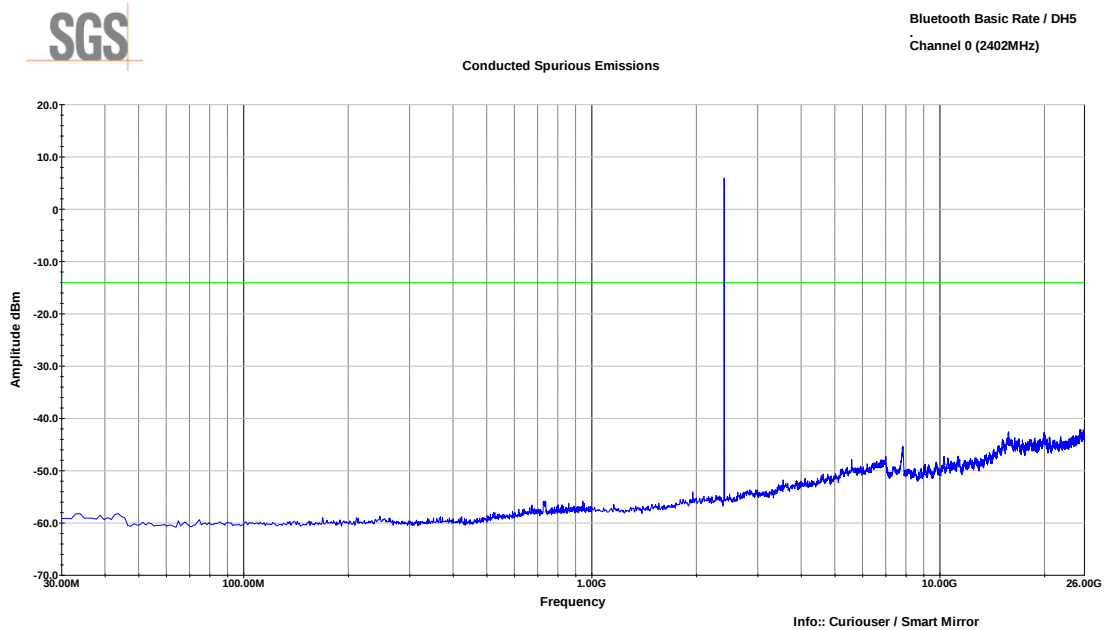


EDR 3 (Hopping Mode) Lower band edge / Upper band edge

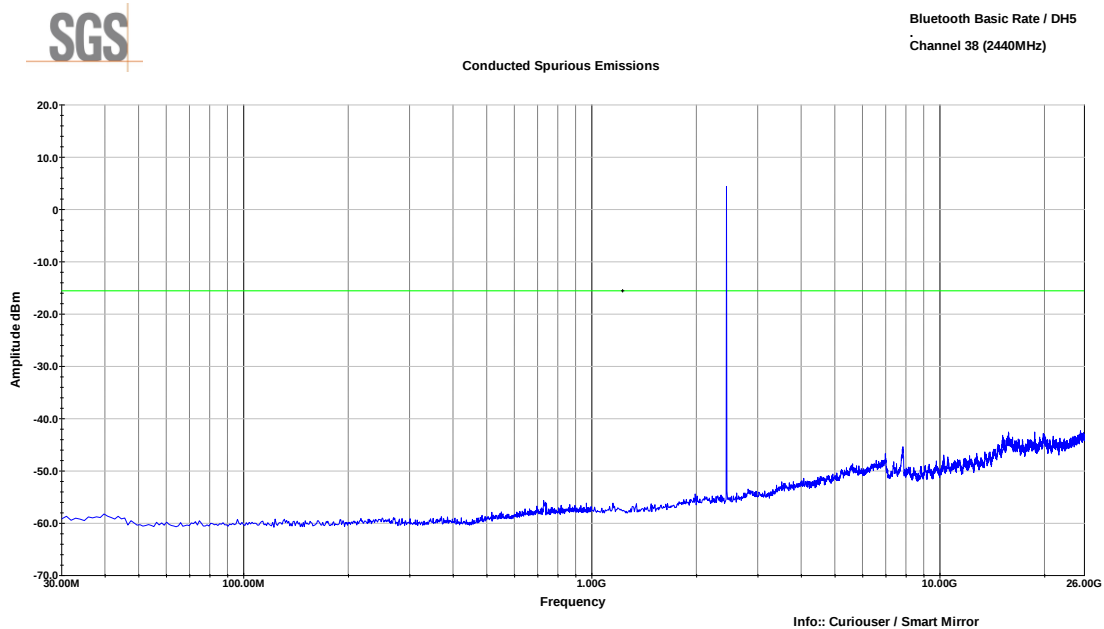


5.6 Test Data – Conducted Spurious Emissions

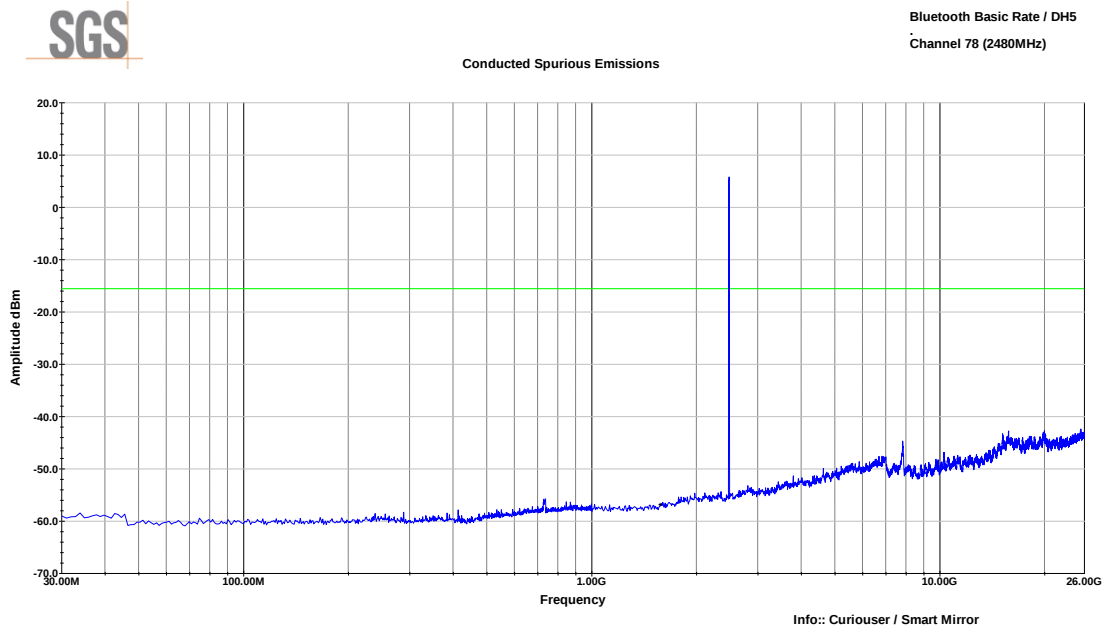
BR, Channel 0, 2402 MHz



BR, Channel 38, 2440 MHz



BR, Channel 78, 2480 MHz



6 Field Strength of Spurious Radiation

6.1 Test Result

Test Description	Test Specification		Test Result
Spurious Emissions	15.247 (d) and 15.209	RSS-247 S5.5	Compliant

6.2 Test Method

The measurement methods defined in ANSI C63.10: 2013 were used.

Lowest, middle, and highest channels were investigated – the device was commanded to continuously transmit on channels 0, 39, and 78. Worst-case mode was determined to be Basic Rate with DH5 packet type.

Test distance:

- 9k to 30 MHz – Near field prescan to determine if there were any emissions.
- 30 to 1000 MHz - The EUT to measurement antenna distance was 3 meters
- 1 to 18 GHz - The EUT to measurement antenna distance was 3 meters
- 18 to 26 GHz - The EUT to measurement antenna distance was 3 meter

Limits within restricted bands of operation:

Frequency	Limits ⁽¹⁾		Peak Limits dBuV/m
	Microvolts/m	dBuV/m	
30 - 88 MHz	100	40 ⁽²⁾	--
88 - 216 MHz	150	43.5 ⁽²⁾	--
216 - 960 MHz	200	46 ⁽²⁾	--
960 - 1000 MHz	500	54 ⁽²⁾	--
1 - 40 GHz	500	54 ⁽³⁾	74

(1) These limits are applicable to emissions outside of the intentional transmit frequency band.

(2) Quasi-peak limit

(3) Average limit

6.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.5 °C
 Relative Humidity: 31.2 %
 Atmospheric Pressure: 97.9 kPa

6.4 Test Equipment

Test End Date: 20-Mar-2018

Tester: JOP

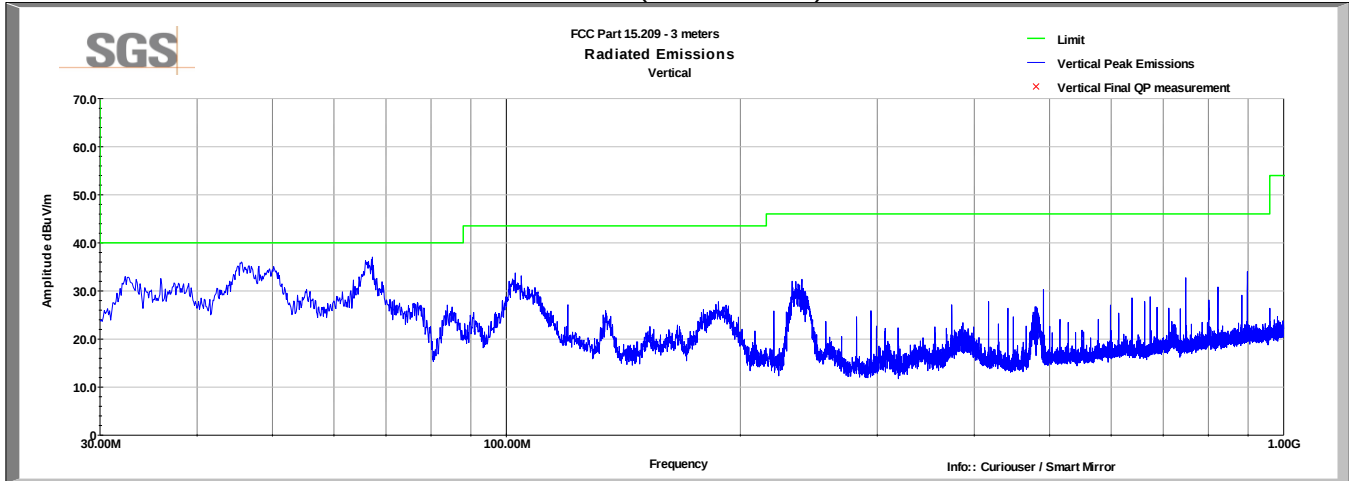
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	25-Apr-2018
EMI TEST RECEIVER	ESU8	ROHDE & SCHWARZ	B085759	25-Jul-2018
ANTENNA, BILOG	JB6	SUNOL	B079690	29-Nov-2018
RF CABLE	SF106	HUBER & SUHNER	B079661	25-Jul-2018
RF CABLE	SF106	HUBER & SUHNER	B079713	24-Jul-2018
RF CABLE	UC-N-MM-78	MAURY MICROWAVE	17017	25-Jul-2018
RF CABLE	SUCOFLEX 100	HUBER & SUHNER	B108523	24-Jul-2018
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	B094463	6-Mar-2019
ANTENNA, DRG HORN (MEDIUM)	3117	ETS LINDGREN	B079691	27-Jul-2018
RF CABLE	SF106	HUBER & SUHNER	B079712	24-Jul-2018
RF CABLE	104PE	HUBER & SUHNER	B079793	24-Jul-2018
FILTER, HIGH PASS (>2800MHZ)	HPM50111	MICRO-TRONICS	B085747	27-Jul-2018
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	15003	28-Jul-2018
HORN(SMALL)	LB-180400-20-C-KF	A-INFO	15007	21-Mar-2018
RF CABLE	SF102	HUBER & SUHNER	B079822	27-Jul-2018
RF CABLE	SF102	HUBER & SUHNER	B079824	26-Jul-2018
LOW NOISE AMPLIFIER	NSP1840-HG	MITEQ	B087572	28-Jul-2018
ANTENNA, LOOP, ACTIVE	6502	ETS LINDGREN	B085752	22-Aug-2018

Note: The equipment calibration period is 1 year.

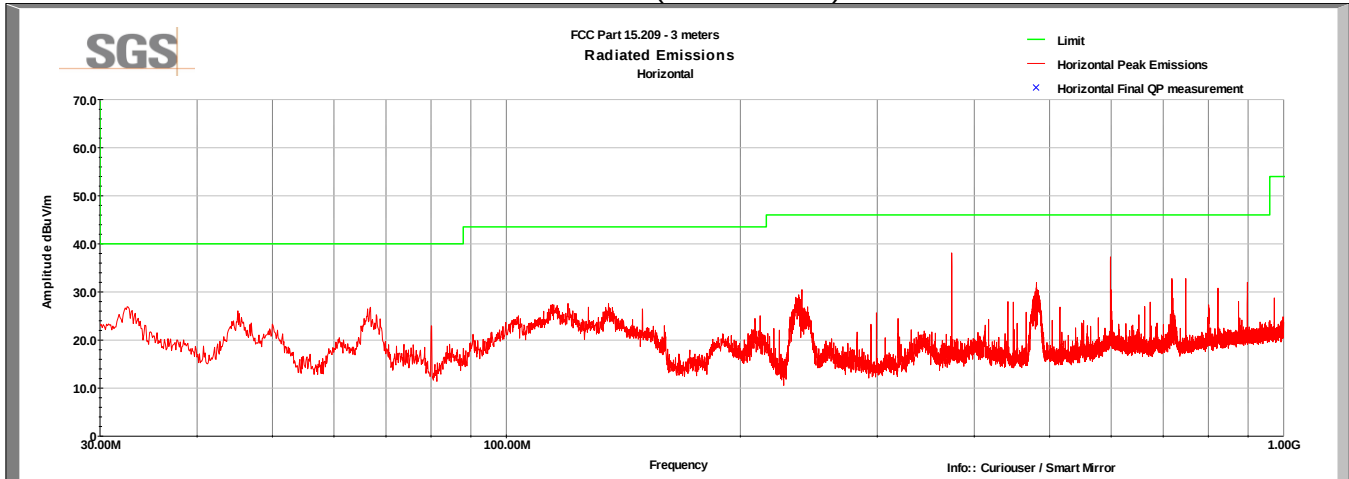
6.5 Test Data – Peak Plots

No emissions associated with the radio were detected in the range 9kHz to 30MHz.

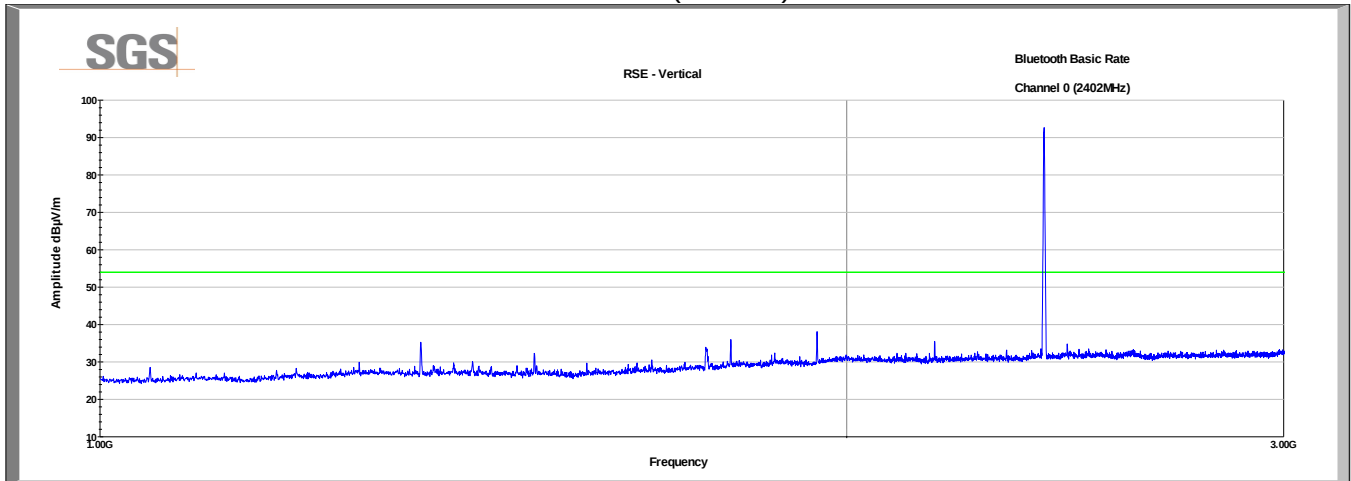
Bluetooth Channel 0
 Vertical (30-1000MHz)



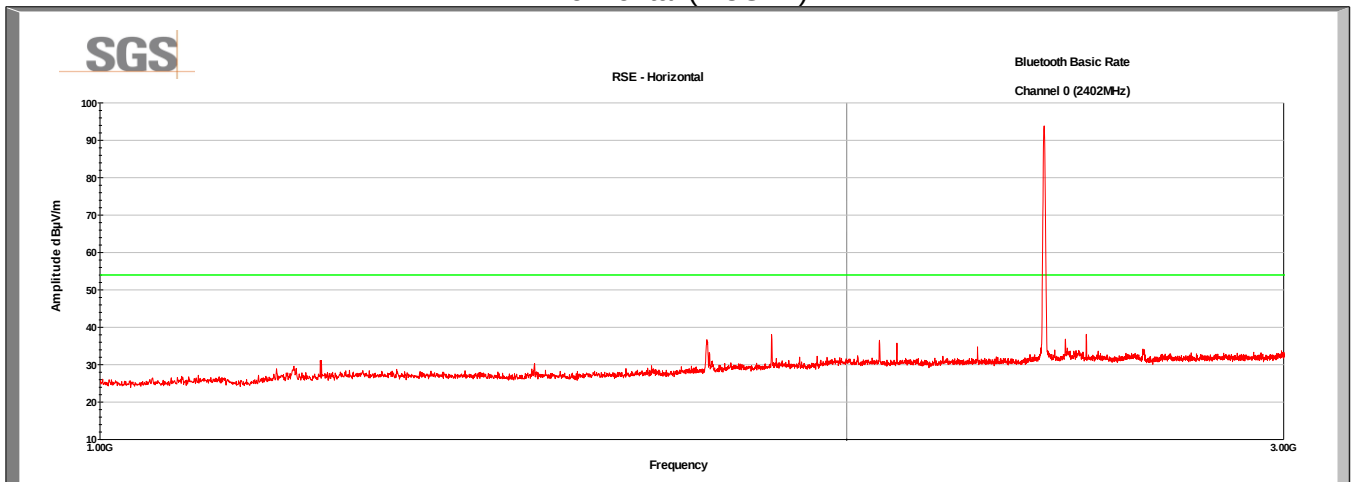
Bluetooth Channel 0
 Horizontal (30-1000MHz)



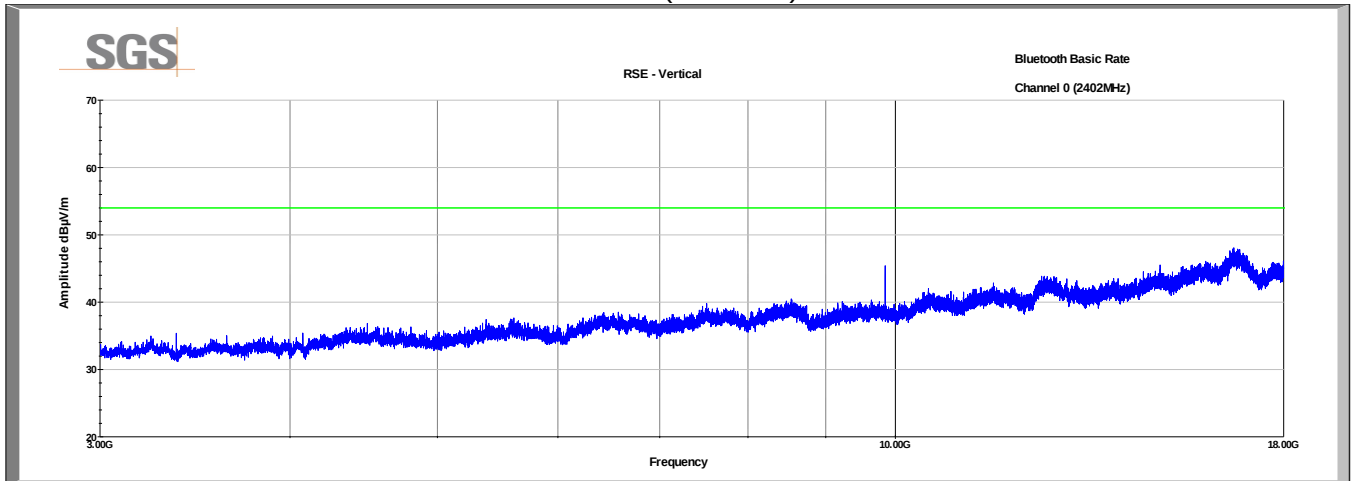
Bluetooth Channel 0 Vertical (1-3GHz)



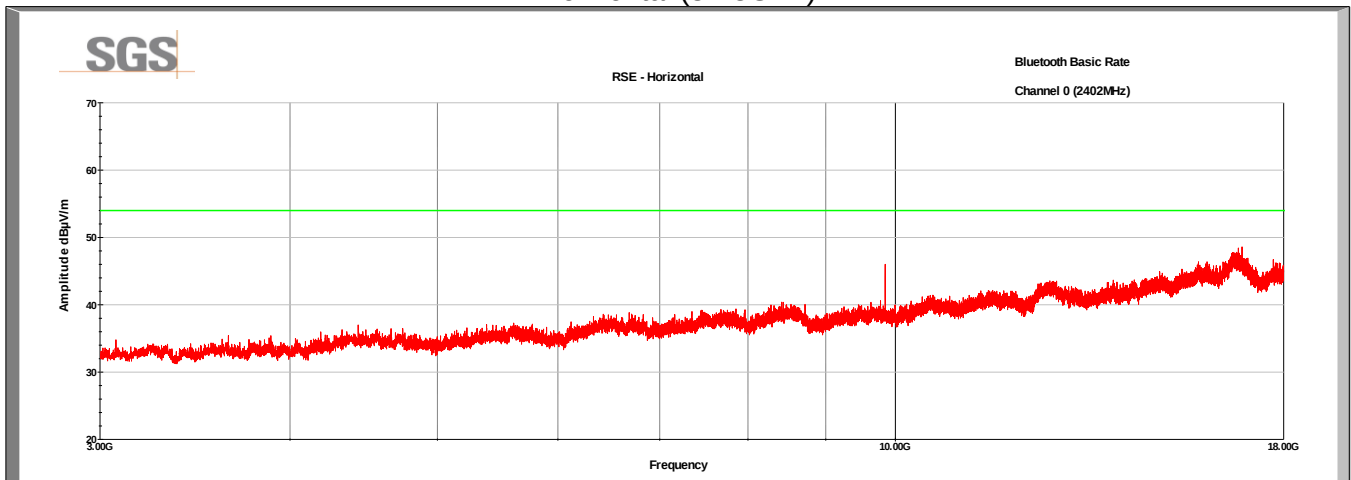
Bluetooth Channel 0 Horizontal (1-3GHz)



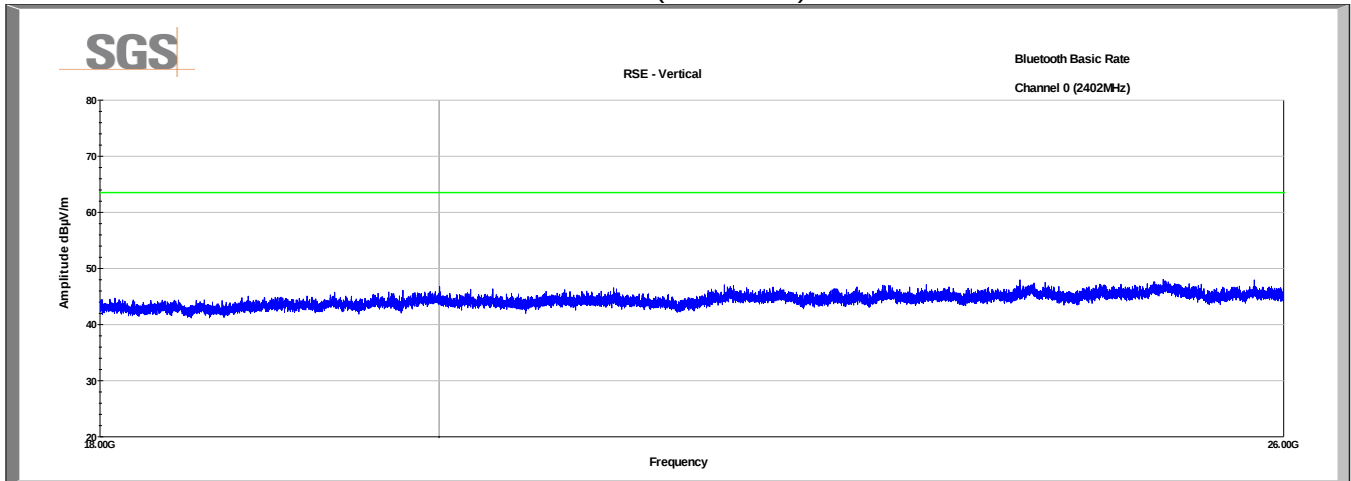
Bluetooth Channel 0 Vertical (3-18GHz)



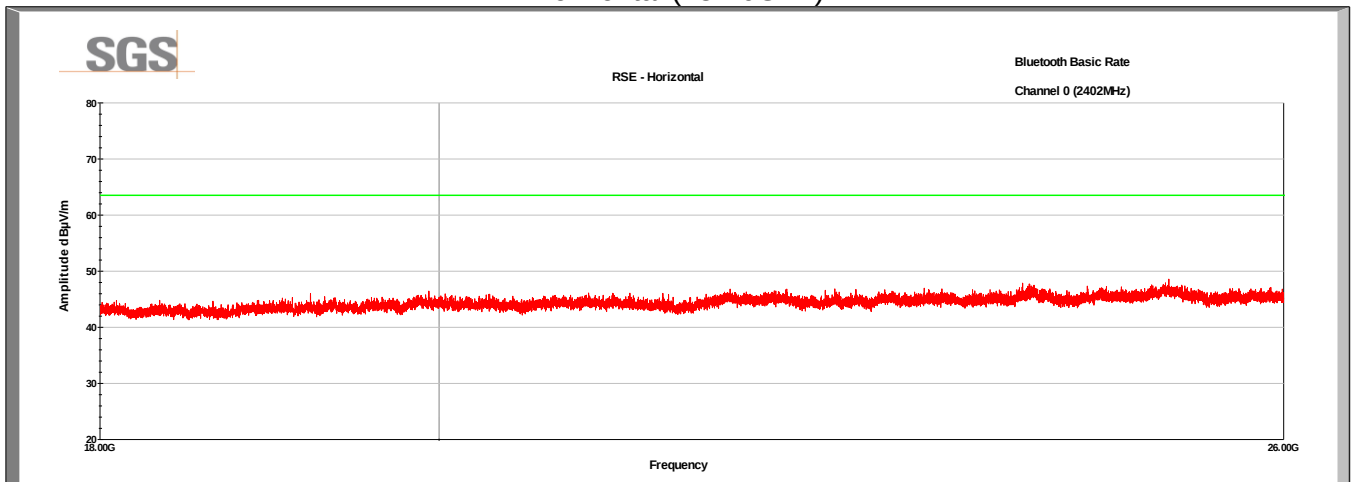
Bluetooth Channel 0 Horizontal (3-18GHz)



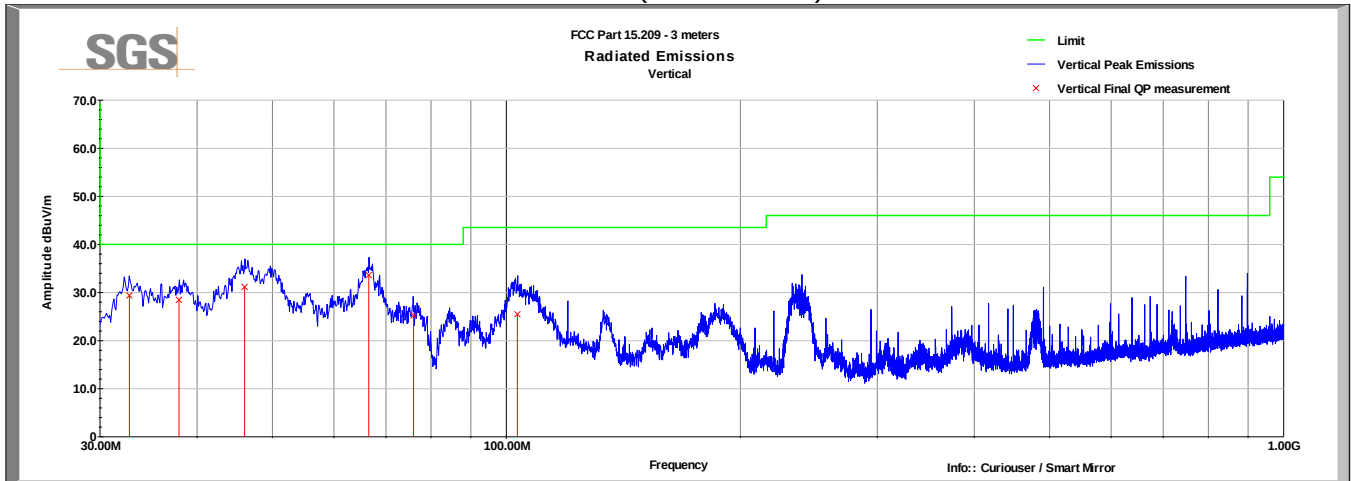
Bluetooth Channel 0 Vertical (18-26GHz)



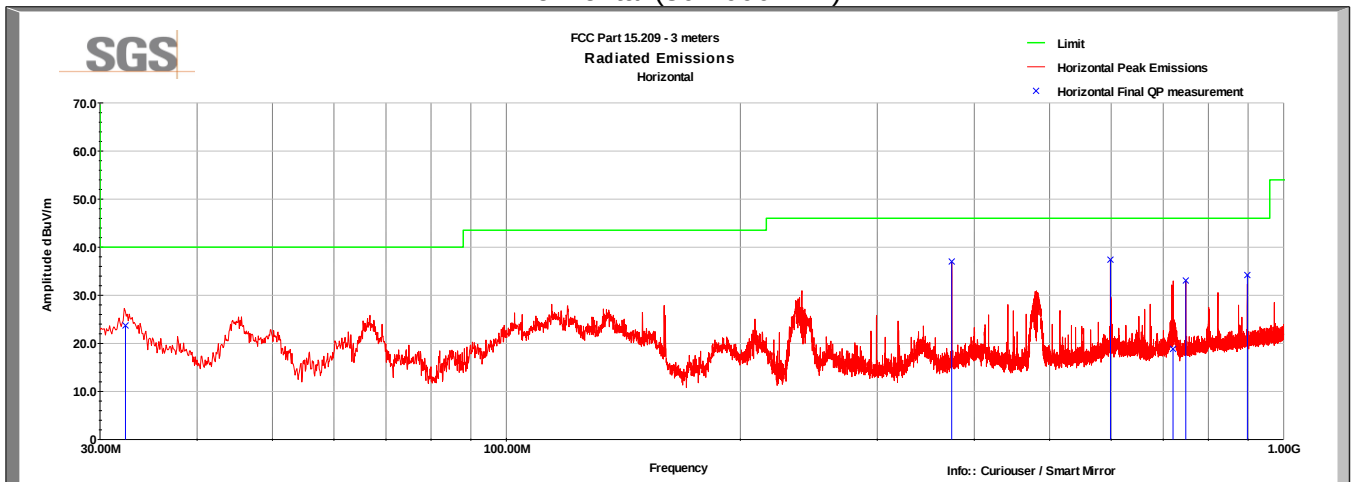
Bluetooth Channel 0 Horizontal (18-26GHz)



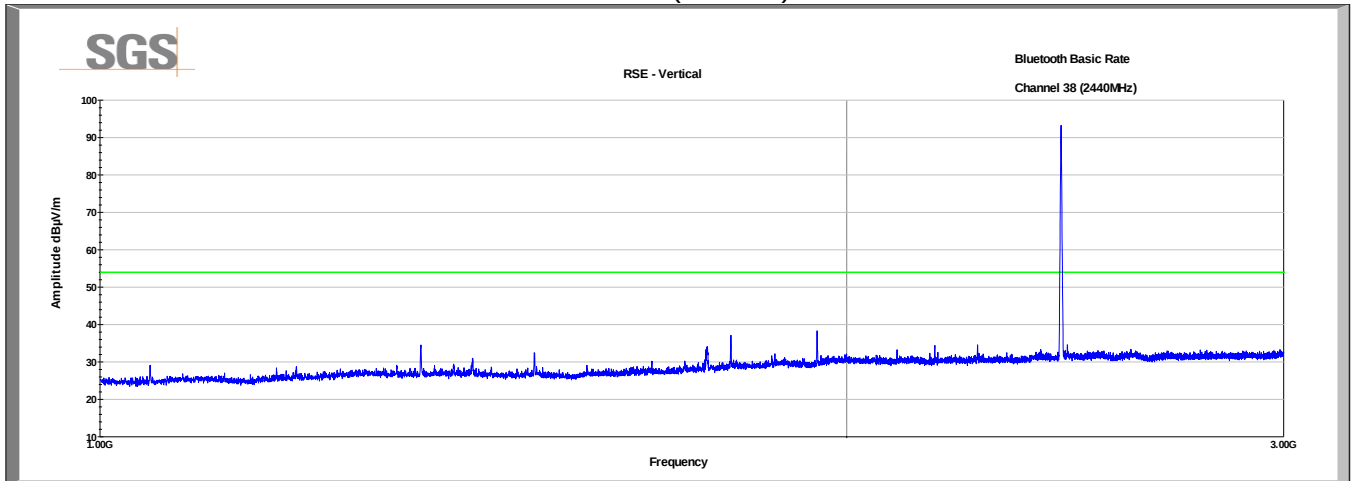
BLE Channel 38 Vertical (30-1000MHz)



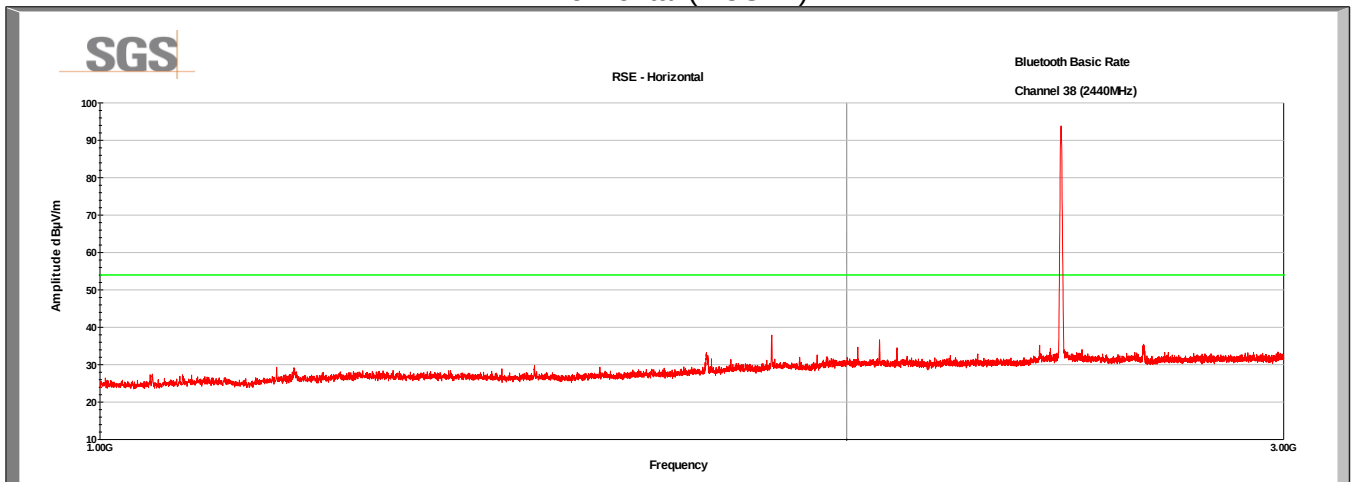
BLE Channel 38 Horizontal (30-1000MHz)



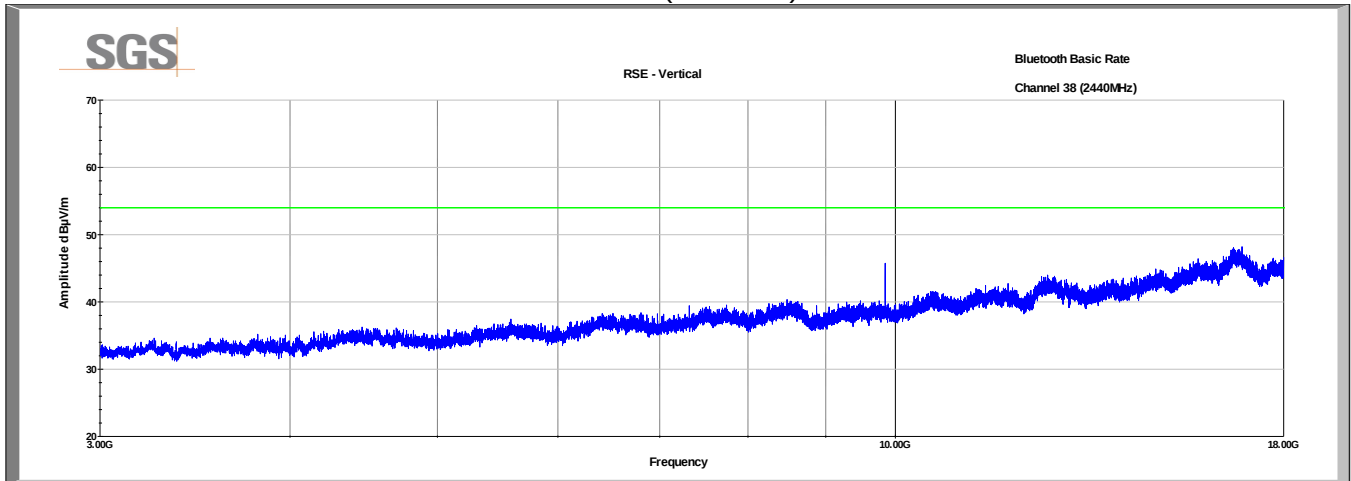
Bluetooth Channel 38 Vertical (1-3GHz)



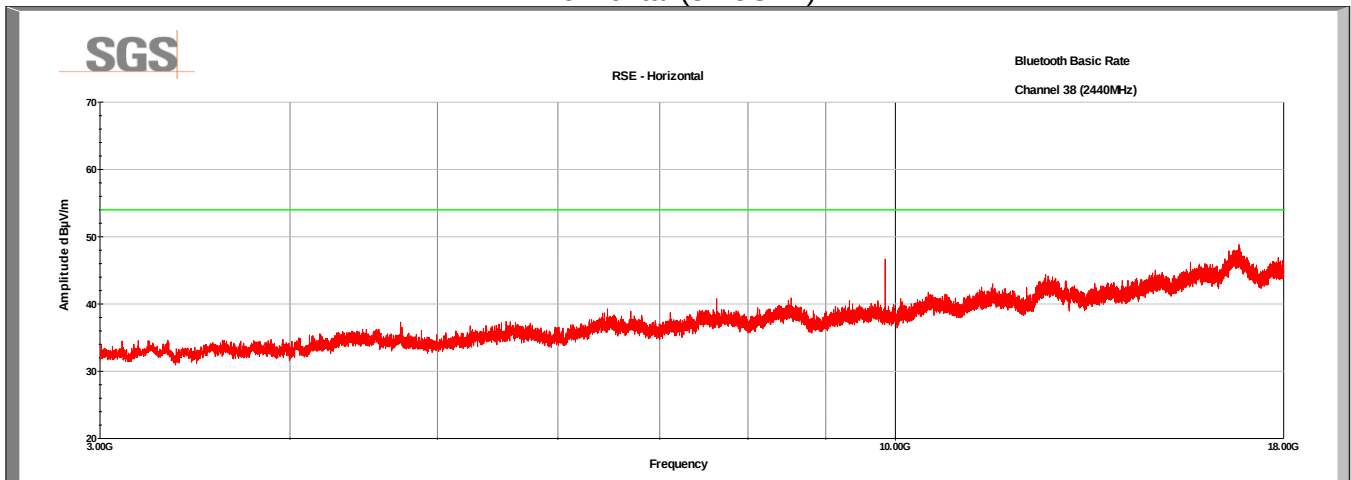
Bluetooth Channel 38 Horizontal (1-3GHz)



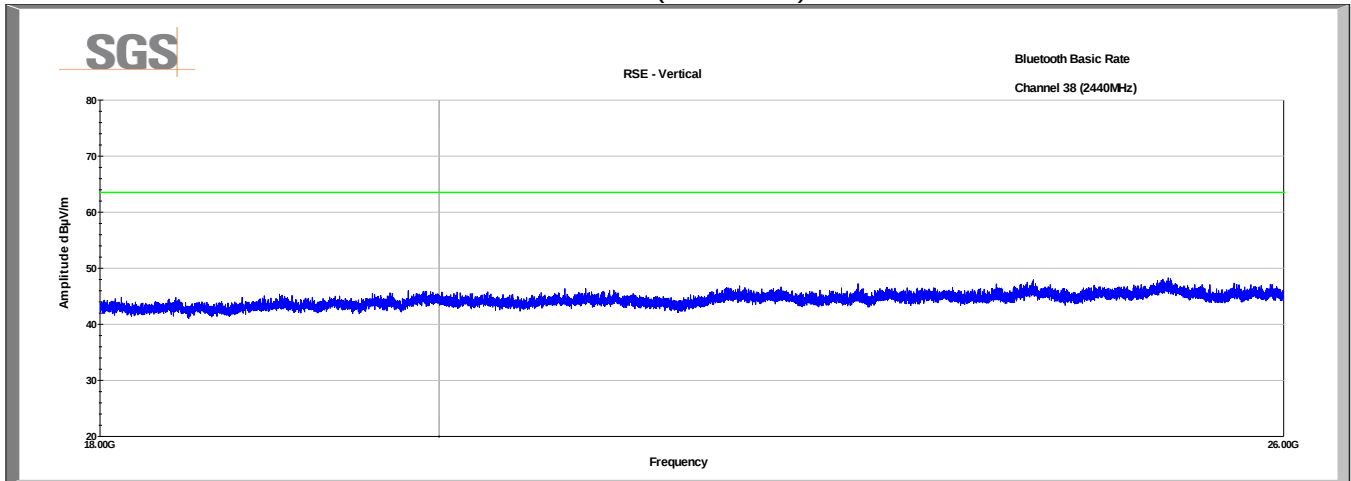
Bluetooth Channel 38 Vertical (3-18GHz)



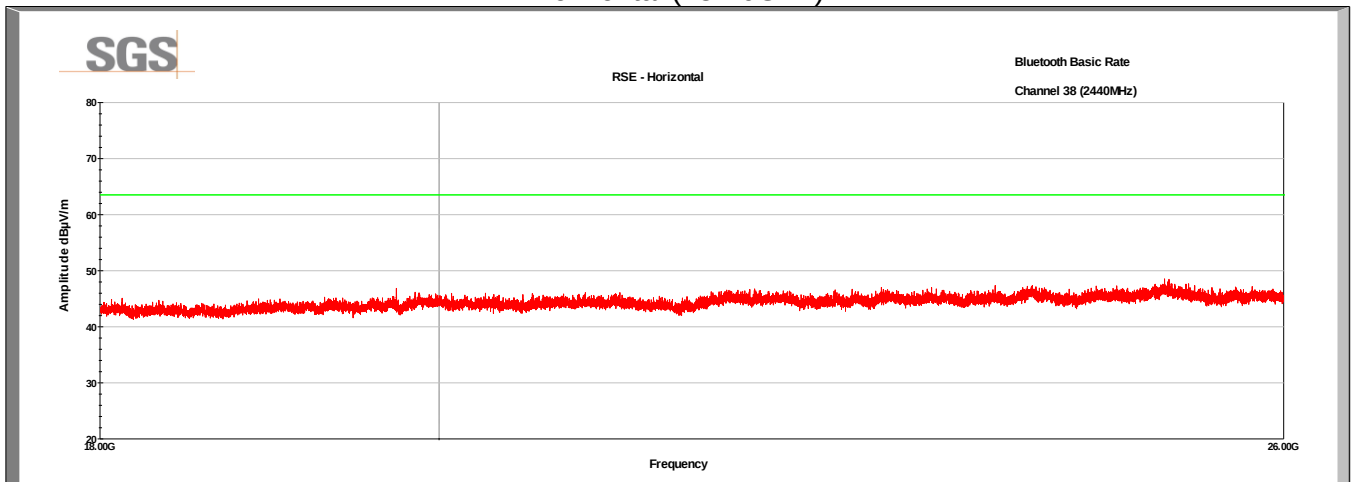
Bluetooth Channel 38 Horizontal (3-18GHz)



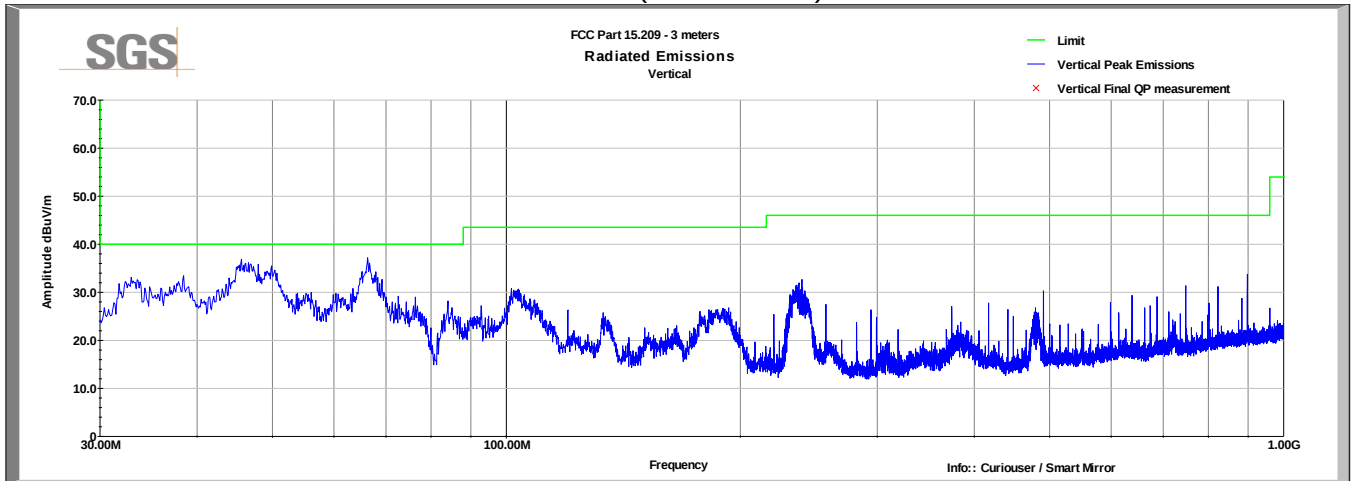
Bluetooth Channel 38 Vertical (18-26GHz)



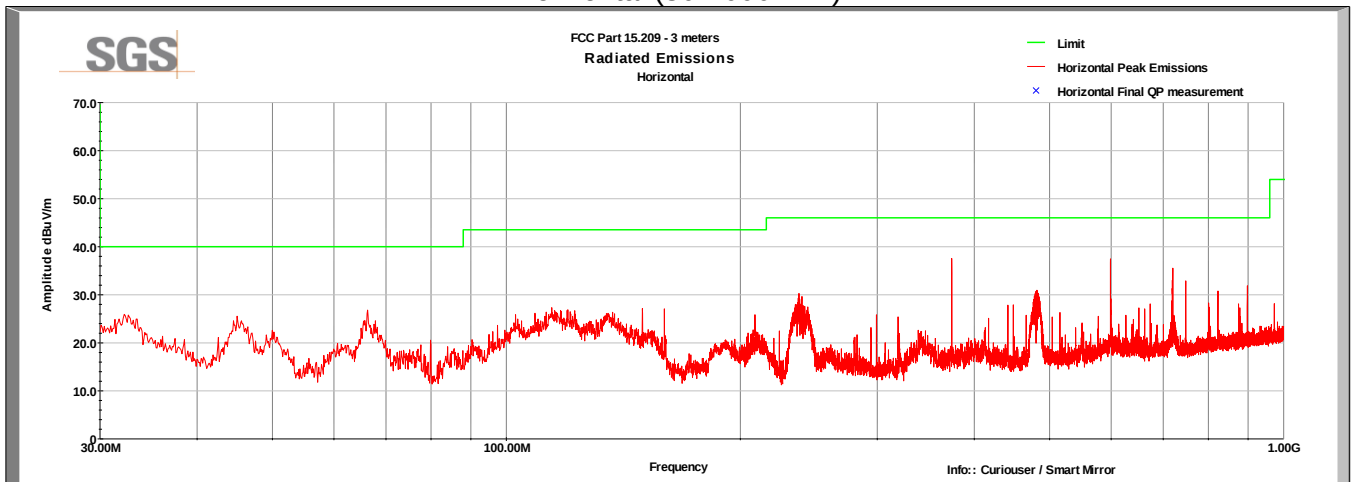
Bluetooth Channel 38 Horizontal (18-26GHz)



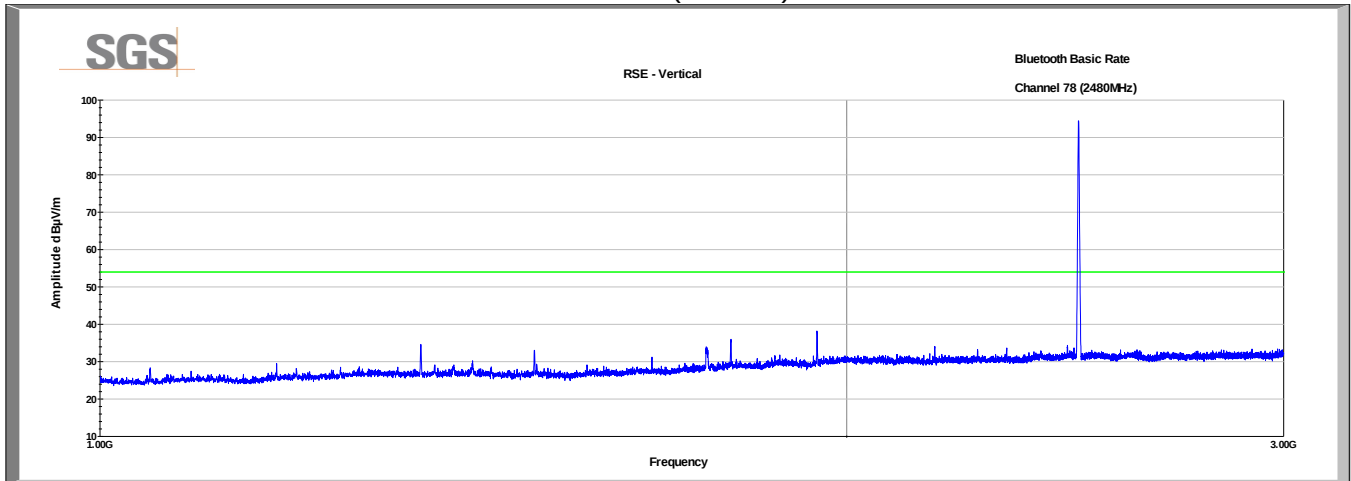
BLE Channel 78 Vertical (30-1000MHz)



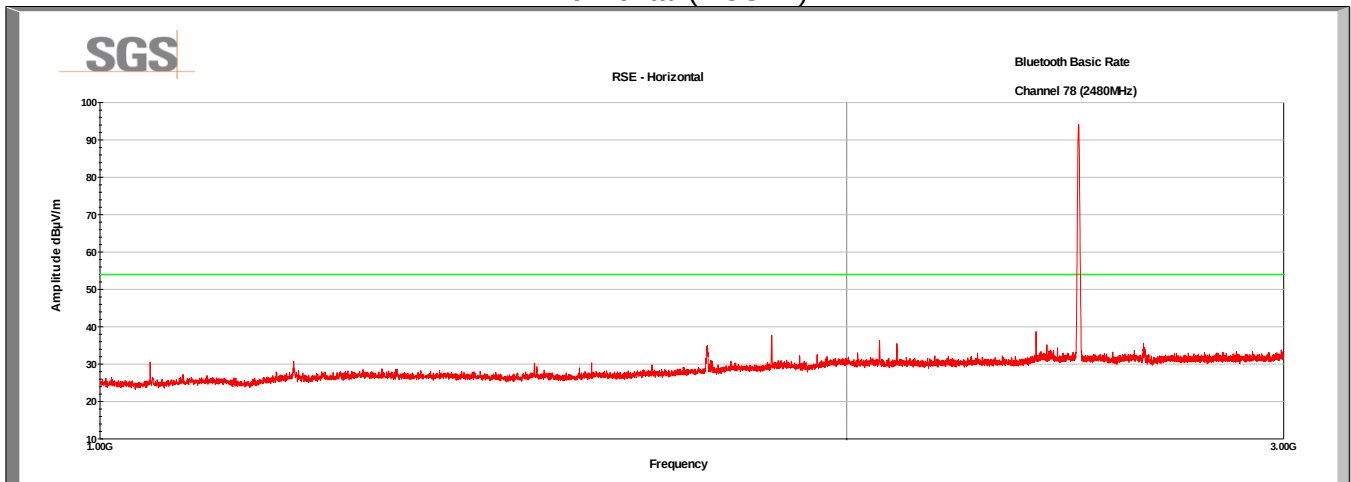
BLE Channel 78 Horizontal (30-1000MHz)



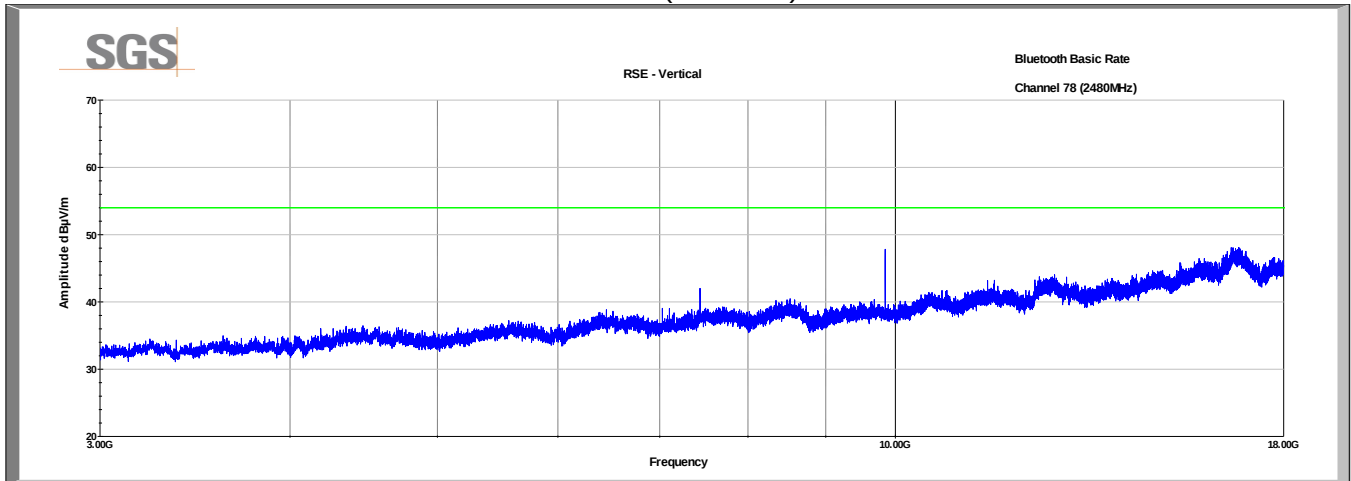
Bluetooth Channel 78 Vertical (1-3GHz)



Bluetooth Channel 78 Horizontal (1-3GHz)

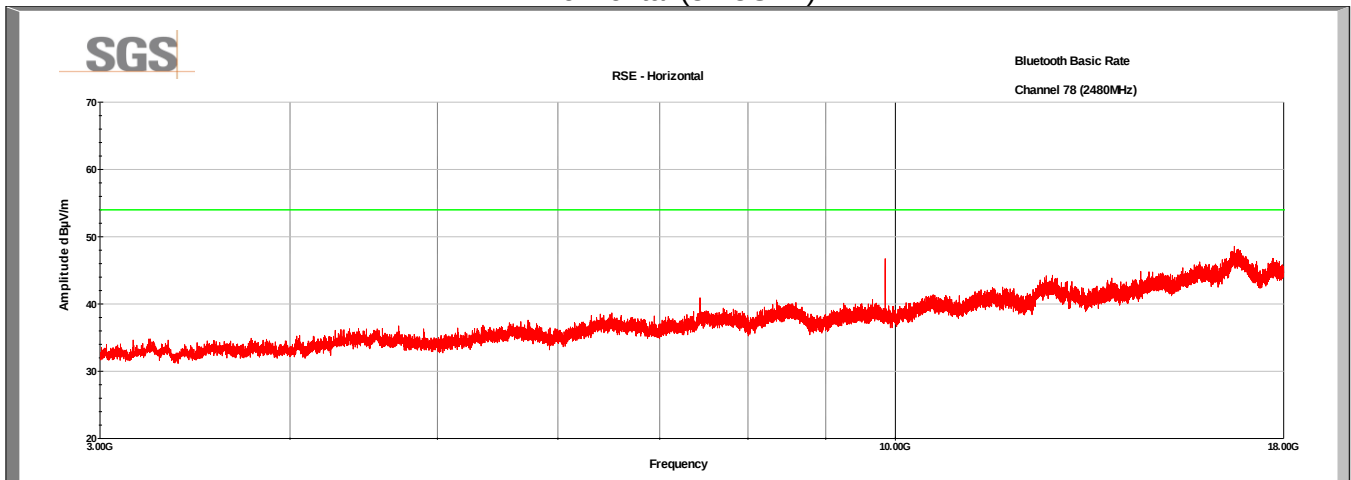


Bluetooth Channel 78 Vertical (3-18GHz)



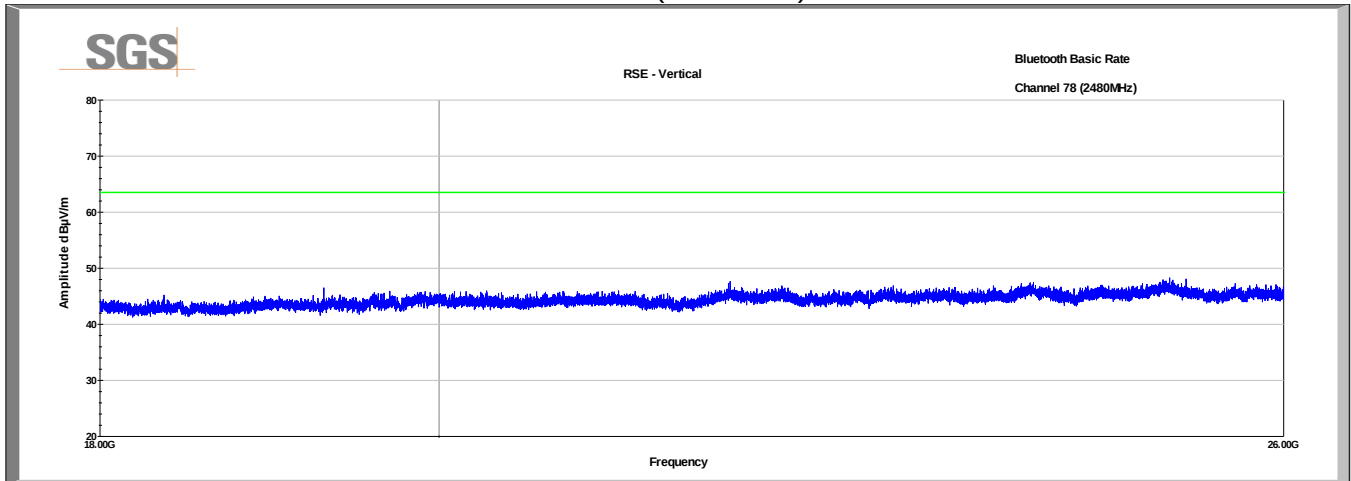
Peak at 9848MHz was not associated with the Bluetooth radio.

Bluetooth Channel 78 Horizontal (3-18GHz)

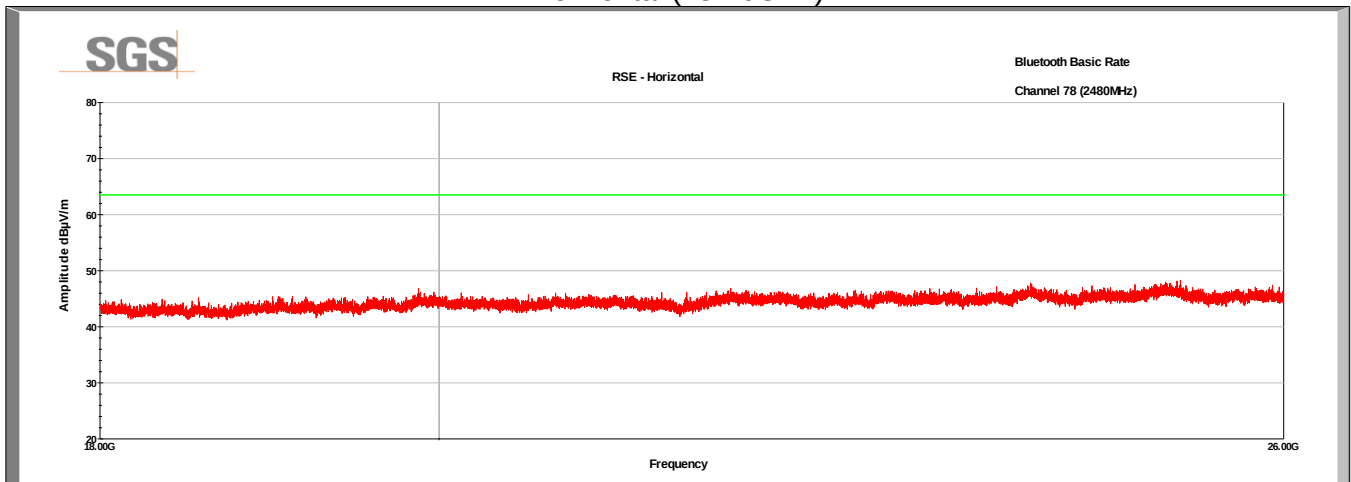


Peak at 9848MHz was not associated with the Bluetooth radio.

Bluetooth Channel 78 Vertical (18-26GHz)



Bluetooth Channel 78 Horizontal (18-26GHz)



6.6 Test Data – Tabular Data

Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
32.74	40.6	V	266.0	175.0	20.2	0.5	31.9	29.4	40.0	-10.6
37.91	43.9	V	220.0	175.0	16.3	0.5	32.2	28.5	40.0	-11.5
46.04	52.7	V	330.0	175.0	10.6	0.6	32.7	31.2	40.0	-8.8
66.51	58.0	V	0.0	175.0	8.1	0.7	33.3	33.6	40.0	-6.4
75.95	49.6	V	2.0	175.0	8.2	0.8	33.3	25.2	40.0	-14.8
103.31	47.1	V	4.0	175.0	11.2	0.9	33.7	25.5	43.5	-18.0
32.35	34.6	H	184.0	325.0	20.5	0.5	31.9	23.7	40.0	-16.3
374.18	53.1	H	330.0	175.0	15.7	1.8	33.5	37.0	46.0	-9.0
598.67	48.8	H	303.0	325.0	19.7	2.3	33.3	37.4	46.0	-8.6
720.78	28.5	H	38.0	175.0	21.1	2.5	33.3	18.8	46.0	-27.2
748.34	42.6	H	0.0	175.0	21.2	2.5	33.3	33.1	46.0	-13.0
898.01	41.8	H	58.0	175.0	22.9	2.8	33.3	34.2	46.0	-11.8
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										

Below 1GHz, there was no discernible difference among the different transmit channels. Data provided for Channel 38. There were no spurs above 1GHz that fell within 10dB of the limit.

7 Radiated Emissions at Band Edge / Restricted Band

7.1 Test Result

Test Description	Test Specification	Test Result
Field strength of spurious radiation	ANSI C63.10: 2013 15.247(d), 15.35(b), 15.209, RSS-GEN S8.10	Compliant

7.2 Test Method

Field strength measurements were performed at the restricted band edges of 2390MHz and 2483.5MHz for each modulation. Measurements were made using the conducted methods defined in ANSI C63.10, Section 11.12.2.

Offset Calculations:

Offset calculations so that conducted measurements on the spectrum analyzer in dBμV represent field strength measurements in dBμV/m.

$$\text{Offset} = -20\log(D) + 104.8 - 107 + \text{CL} + \text{DC} + \text{AG}$$

$$\text{Offset}_{3m} = -11.7 + \text{CL} + \text{DC} + \text{AG}$$

D = 3m	Distance
CL = 2.2 dB	Cable Loss
DC = 1.1 dB (77.1%)	Duty Cycle Correction Factor (Basic Rate, EDR-2, and EDR-3)
AG = 3.0 dB	Antenna Gain

$$\text{Offset} = -5.4 \text{ dB}$$

7.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature:	23.8 °C
Relative Humidity:	37.6 %
Atmospheric Pressure:	97.9 kPa

7.4 Test Equipment

Test End Date: 10-Apr-2018

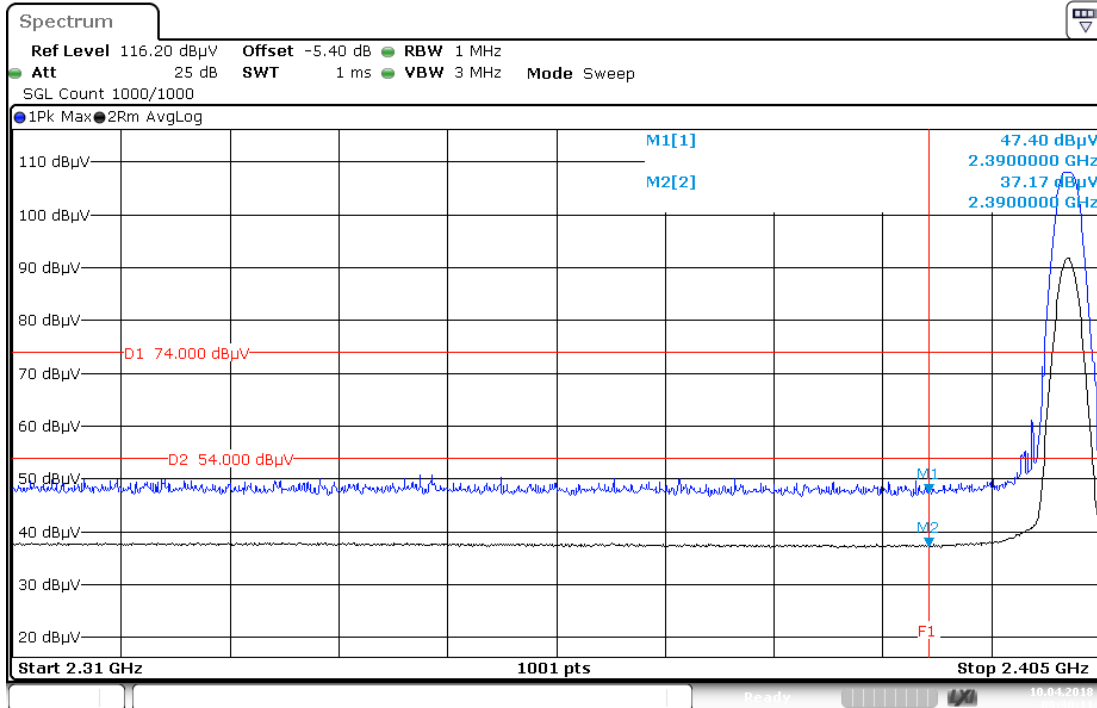
Tester: JOP

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	1-Nov-2019
RF CABLE	SF102	HUBER & SUHNER	B079822	27-Jul-2018

Note: The equipment calibration period is 1 year except for the FSV which is on a 2 year cycle.

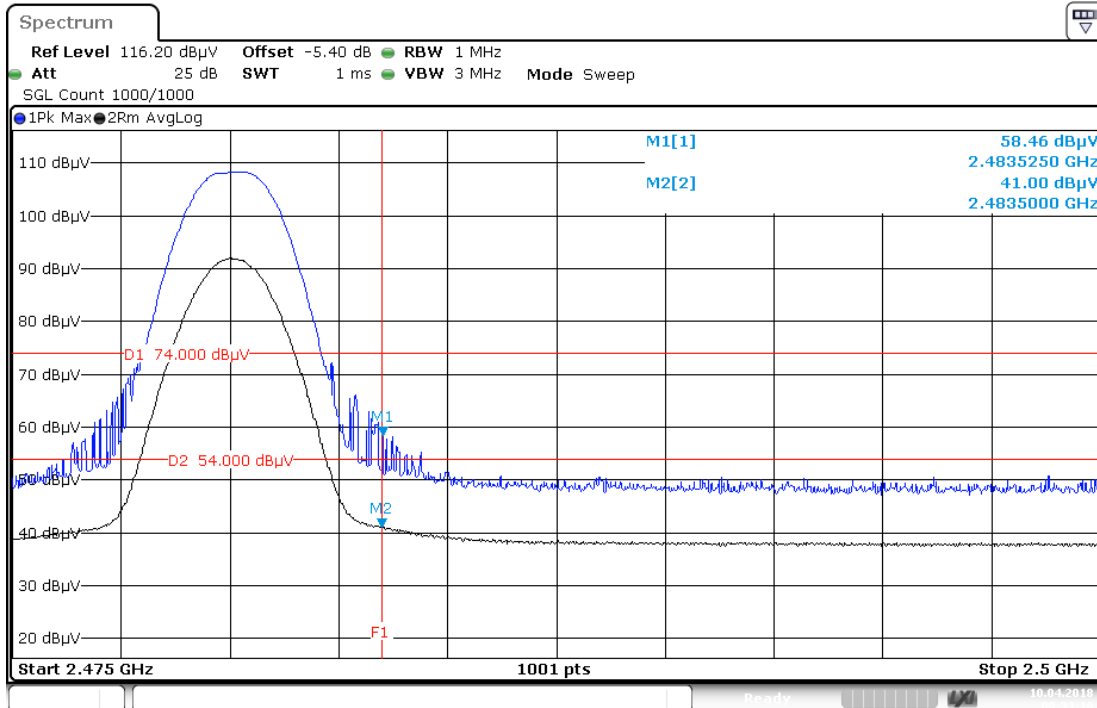
7.5 Test Data – Restricted Band Edge

Basic Rate - DH5, Ch0



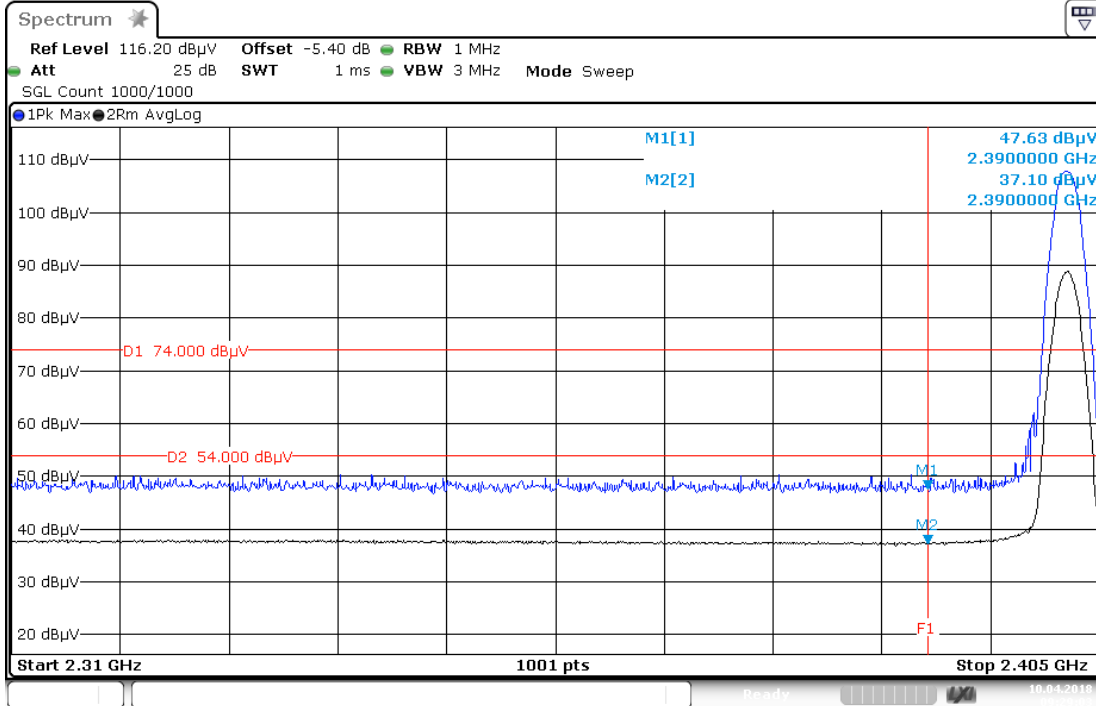
Date: 10.APR.2018 09:30:11

Basic Rate - DH5, Ch78

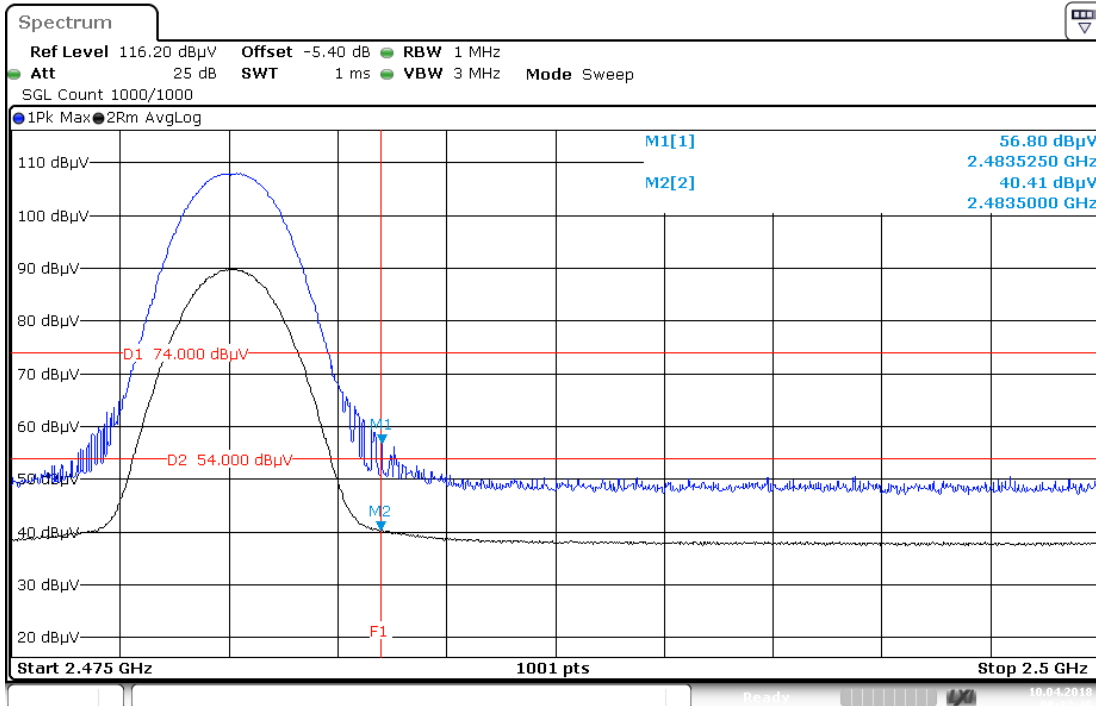


Date: 10.APR.2018 09:33:11

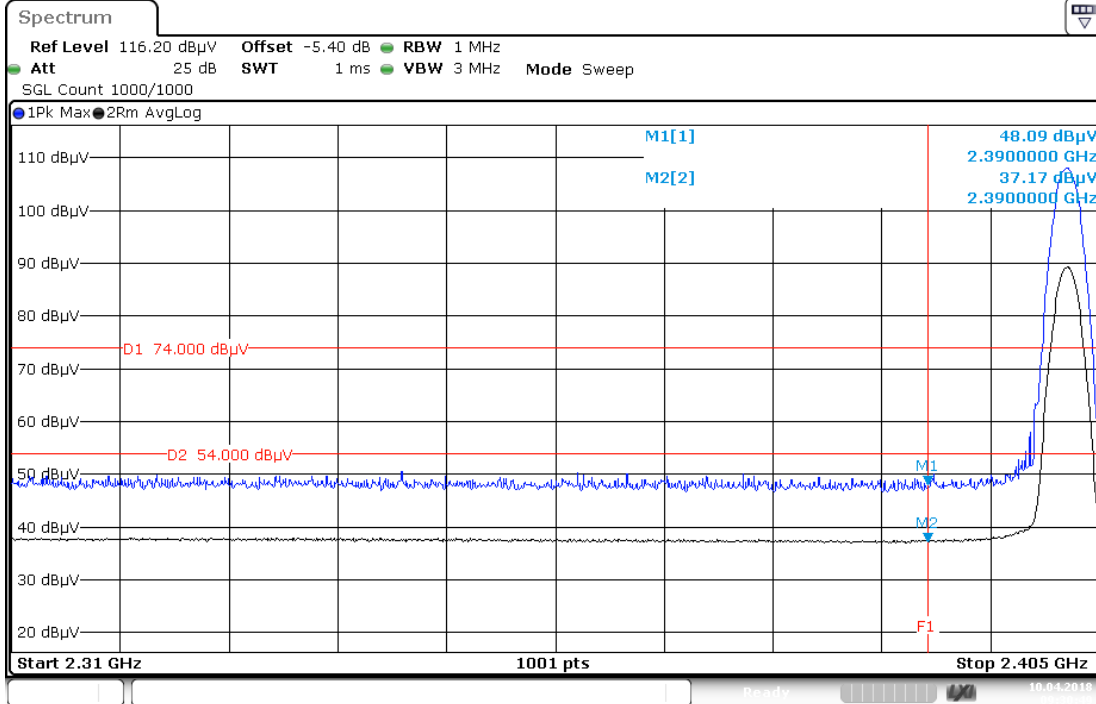
EDR-2 - DH5, Ch0



EDR-2 - DH5, Ch78

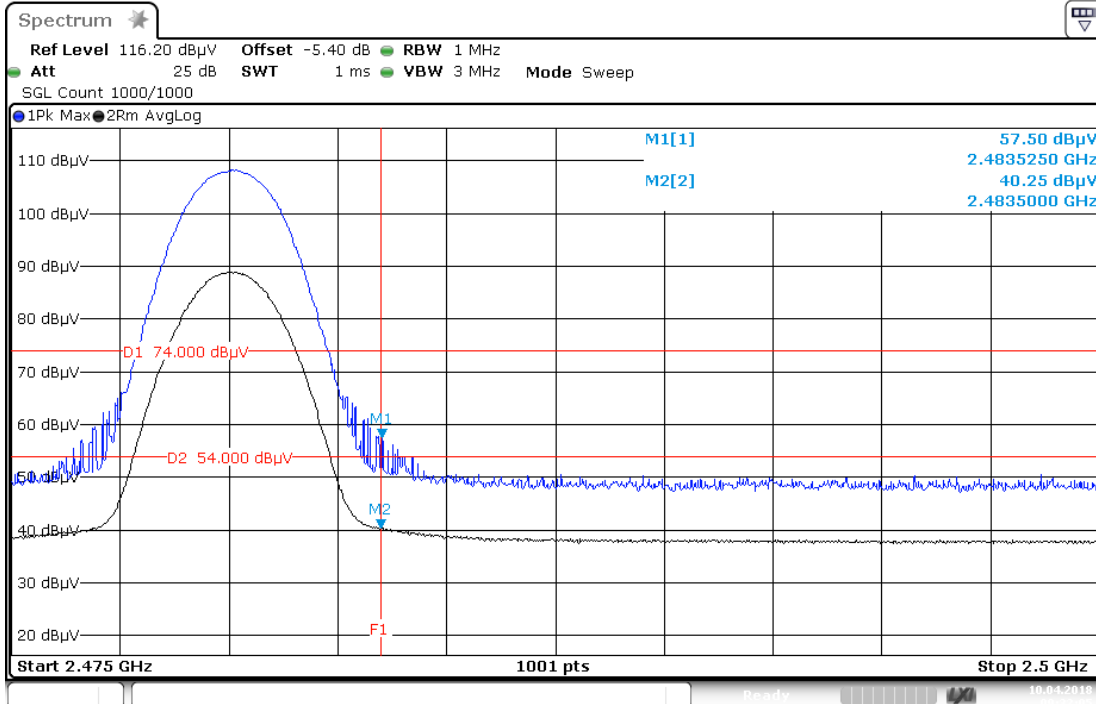


EDR-3 - DH5, Ch0



Date: 10.APR.2018 09:30:50

EDR-3 - DH5, Ch78



Date: 10.APR.2018 09:32:05

8 Pseudo-Random Hop Sequence

8.1 Test Result

Test Description	Test Specification	Test Result
Pseudo-Random Hop Sequence	15.247(a)(1), RSS-247 5.1(1) ANSI C63.10	Compliant ⁽¹⁾

Note (1): The theory of operation states that the device is Bluetooth and operates using a pseudo-random hopping technique.

8.2 Test Method

Compliance is demonstrated by Manufacturer's declaration or is stated in the Theory of Operation.

Requirement

The hopset shall be such that the near-term distribution of frequencies appears random, with sequential hops randomly distributed in both direction and magnitude of change in the hopset, while the long-term distribution appears evenly distributed.

9 Channel Separation

9.1 Test Result

Test Description	Test Specification	Test Result
Number of Hopping Channels	ANSI C63.10:2013 15.247(a)(1)(iii) RSS-247 5.1(2)	Compliant

9.2 Test Method

Measurements were taken using the methods defined in ANSI C63.10, Clause 7.8.2. The test data was measured using a spectrum analyzer with Peak detector (max hold) and a resolution bandwidth of 100 kHz. The trace was allowed to stabilize until all channels were displayed.

Requirement

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the -20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the band 2400-2483.5 MHz may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the -20 dB bandwidth of the hopping channel, whichever is greater, provided that the systems operate with an output power no greater than 0.125 W.

9.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.1 °C
 Relative Humidity: 34.5 %

9.4 Test Equipment

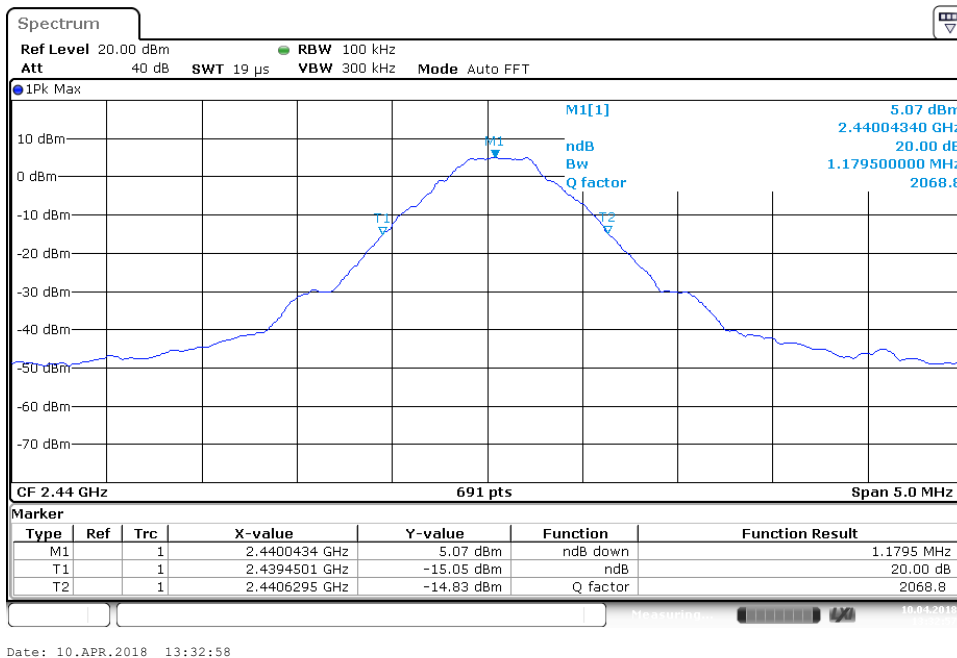
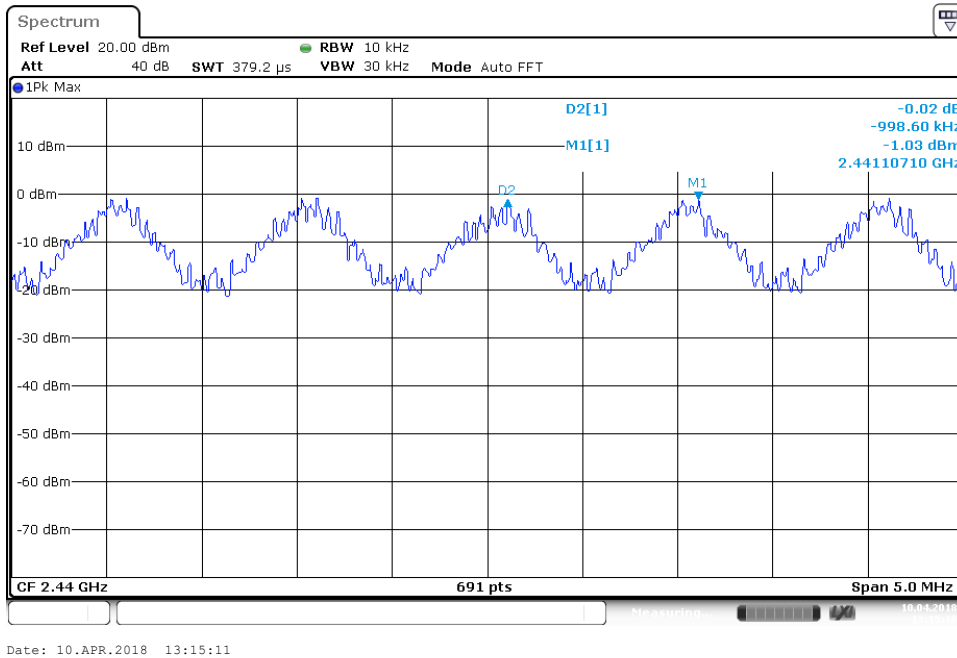
Test End Date: 22-Mar-2018

Tester: JOP

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	1-Nov-2019
RF CABLE	SF102	HUBER & SUHNER	B079822	27-Jul-2018
OPEN SWITCH AND CONTROL UNIT	OSP 120	ROHDE & SCHWARZ	S/N: 101182	CNR
ATTENUATOR, 10DB	10DB	ROHDE & SCHWARZ	B095591	28-Jul-2018

Note: The equipment calibration period is 1 year except for the FSV which is on a 2-year calibration cycle.

9.5 Test Data



10 Number of Hopping Channels

10.1 Test Result

Test Description	Test Specification	Test Result
Number of Hopping Channels	15.247(a)(1)(iii) RSS-247 5.1(4)	Compliant

10.2 Test Method

Measurements were taken using the methods defined in ANSI C63.10, Clause 7.8.3. The test data was measured using a spectrum analyzer with Peak detector (max hold) and a resolution bandwidth of 30 kHz. The trace was allowed to stabilize until all channels were displayed.

Requirement

Frequency hopping systems operating in the band 2400-2483.5 MHz shall use at least 15 hopping channels.

10.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.1 °C
 Relative Humidity: 34.5 %

10.4 Test Equipment

Test End Date: 22-Mar-2018

Tester: JOP

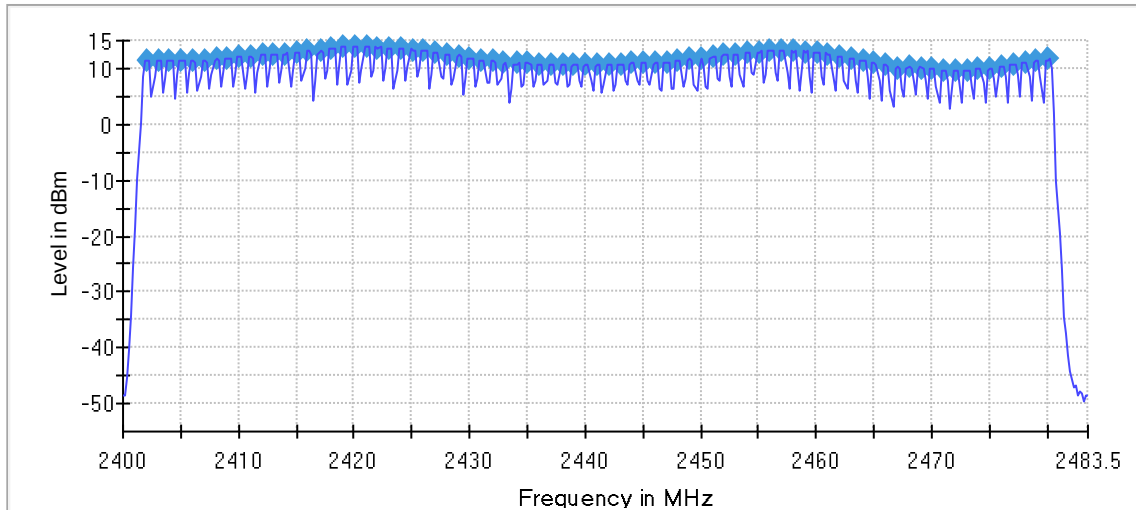
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	1-Nov-2019
RF CABLE	SF102	HUBER & SUHNER	B079822	27-Jul-2018
OPEN SWITCH AND CONTROL UNIT	OSP 120	ROHDE & SCHWARZ	S/N: 101182	CNR
ATTENUATOR, 10DB	10DB	ROHDE & SCHWARZ	B095591	28-Jul-2018

Note: The equipment calibration period is 1 year except for the FSV which is on a 2-year calibration cycle.

10.5 Test Data

Channels

Channels	Limit Min	Limit Max	Result
79	15	---	PASS



Representative Measurement Settings

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	200.000 kHz	<= 299.000 kHz
VBW	200.000 kHz	>= 200.000 kHz
SweepPoints	418	~ 418
SweepTime	47.405 μ s	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	104 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.01 dB	0.50 dB

11 Dwell Time

11.1 Test Result

Test Description	Test Specification	Test Result
Dwell Time	ANSI C63.10:2013 15.247(a)(1)(iii) RSS-247 5.1(4)	Compliant

11.2 Test Method

Measurements were taken using the methods defined in ANSI C63.10, Clause 7.8.4. The EUT was set to test mode which allowed it to be controlled by the Bluetooth Tester. The Bluetooth Tester was then set to operate on US/EU Hopping Scheme with pseudo-random data. For each packet type and data rate, the pulse width of the packet was measured and the pulses were counted over the total observation period.

Requirement

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds, multiplied by the number of hopping channels employed ($0.4 \times 79 = 31.6s$).

11.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.1 °C
 Relative Humidity: 34.5 %

11.4 Test Equipment

Test End Date: 22-Mar-2018

Tester: JOP

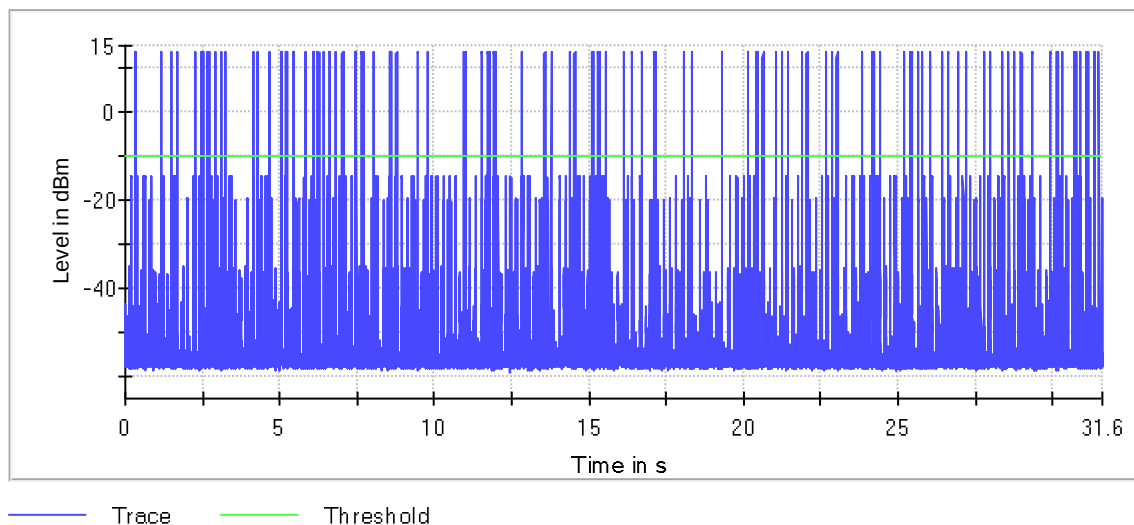
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	1-Nov-2019
RF CABLE	SF102	HUBER & SUHNER	B079822	27-Jul-2018
OPEN SWITCH AND CONTROL UNIT	OSP 120	ROHDE & SCHWARZ	S/N: 101182	CNR
ATTENUATOR, 10DB	10DB	ROHDE & SCHWARZ	B095591	28-Jul-2018

Note: The equipment calibration period is 1 year except for the FSV which is on a 2-year calibration cycle.

11.5 Test Data

Mode	DUT Frequency (MHz)	Time (ms)	Limit Max (ms)	Limit Min (ms)	Threshold (dBm)	Result
Basic Rate	2440.000000	12.310	400.000	0.000	-10.0	PASS
EDR-2	2440.000000	8.910	400.000	0.000	-10.0	PASS
EDR-3	2440.000000	7.350	400.000	0.000	-10.0	PASS

Representative Plot



Representative Instrument Settings

Setting	Instrument Value	Target Value
Center Frequency	2.44000 GHz	2.44000 GHz
Span	ZeroSpan	ZeroSpan
RBW	500.000 kHz	~ 500.000 kHz
VBW	1.000 MHz	~ 1.500 MHz
SweepPoints	30001	~ 30001
Sweptime	31.600 s	31.600 s
Reference Level	0.000 dBm	0.000 dBm
Attenuation	10.000 dB	0.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	1	1
Filter	Channel	Channel
Trace Mode	Clear Write	Clear Write
Sweeptype	Sweep	AUTO
Preamp	off	off
Trigger	External	External
Trigger Offset	0.000 ms	0.000 ms

12 Conducted Emissions

12.1 Test Result

Test Description	Basic Standards	Test Result
Conducted Emissions, Class B	RSS-GEN 7.2.4 15.207 ANSI C63.4:2014	Compliant

12.2 Test Method

With the receiver's resolution bandwidth was set to 9 kHz the exploratory scans were performed over the measuring frequency range (0.15MHz to 30MHz) using a max hold mode incorporating a Peak detector and Average detector and using the TILE! software. The final test data was measured using a Quasi-Peak detector and Average detector and compared against the limits indicated in the table below.

Frequency Range	Class A Limits (dBuV)	Class B Limits (dBuV) CISPR
0.15 to 0.5 MHz	Avg 66 QP 79	Avg 56 to 46 QP 66 to 56
0.5 to 5 MHz	Avg 60 QP 73	Avg 46 Pk 56
5 to 30 MHz	Avg 60 QP 73	Avg 50 Pk 60

12.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.8°C
 Relative Humidity: 22.2%

12.4 Test Equipment

Test End Date: 6-Jun-2018

Tester: SKM

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
LINE IMPEDANCE STABILIZATION NETWORK	NNB 51	TESEQ	B087573	21-Nov-2018
RF CABLE	UC-N-MM-78	MAURY MICROWAVE	17016	25-Jul-2018
EMI TEST RECEIVER	ESU8	ROHDE & SCHWARZ	B085759	25-Jul-2018

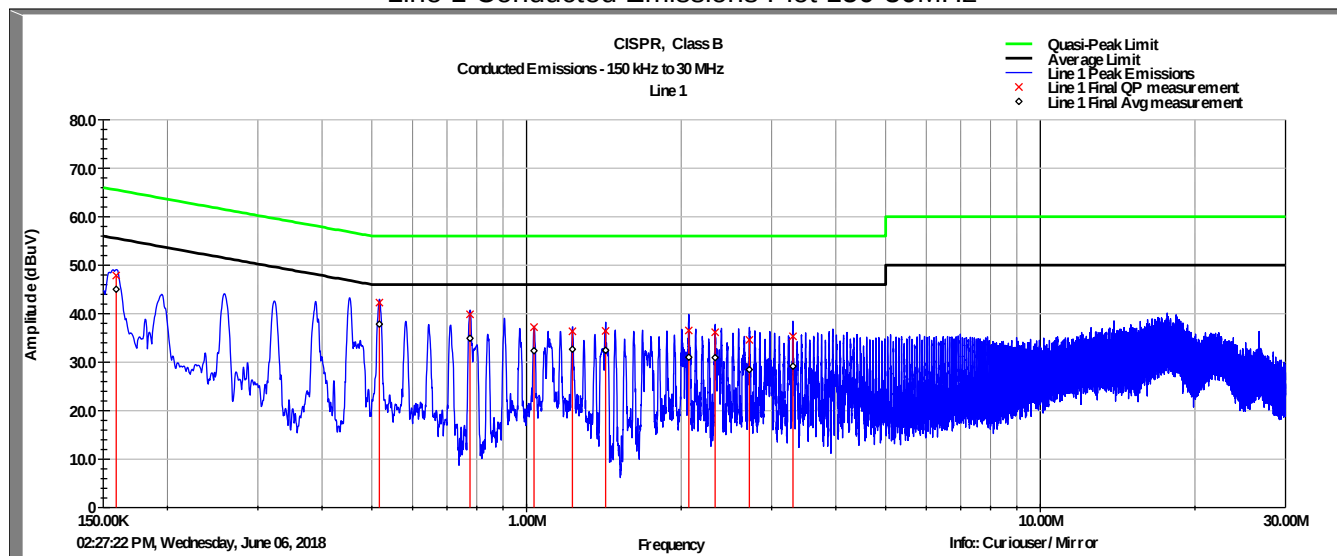
Note: The equipment calibration period is 1 year.

Software:

"Conducted Emissions" TILE! profile dated Dec 2015

12.5 Test Data

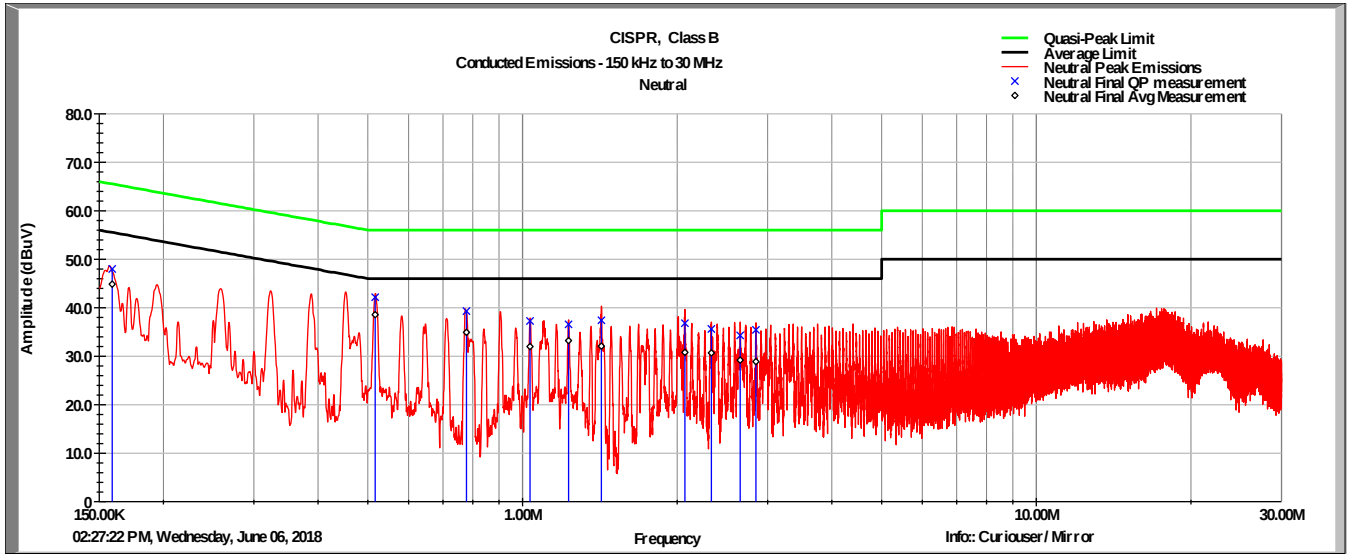
Line 1 Conducted Emissions Plot 150-30MHz



Line 1 Conducted Emissions Data 150-30MHz

Frequency MHz	QP Value dBuV	QP Limit dBuV	QP Margin dB	Avg Value dBuV	Avg Limit dBuV	Avg Margin dB
0.159	47.9	65.5	-17.7	45.0	55.5	-10.5
0.517	42.3	56.0	-13.7	37.8	46.0	-8.2
0.776	39.9	56.0	-16.1	34.9	46.0	-11.1
1.034	37.2	56.0	-18.8	32.3	46.0	-13.7
1.228	36.3	56.0	-19.7	32.7	46.0	-13.3
1.425	36.4	56.0	-19.6	32.4	46.0	-13.6
2.069	36.5	56.0	-19.5	31.0	46.0	-15.0
2.329	36.2	56.0	-19.8	30.9	46.0	-15.1
2.715	34.6	56.0	-21.4	28.5	46.0	-17.5
3.300	35.3	56.0	-20.7	29.2	46.0	-16.8

Neutral Conducted Emissions Plot 150-30MHz



Neutral Conducted Emissions Data 150-30MHz

Frequency MHz	QP Value dBuV	QP Limit dBuV	QP Margin dB	Avg Value dBuV	Avg Limit dBuV	Avg Margin dB
0.159	48.0	65.5	-17.6	44.8	55.5	-10.7
0.517	42.2	56.0	-13.8	38.6	46.0	-7.4
0.778	39.3	56.0	-16.7	34.9	46.0	-11.1
1.034	37.3	56.0	-18.7	32.0	46.0	-14.0
1.229	36.6	56.0	-19.4	33.2	46.0	-12.8
1.424	37.4	56.0	-18.6	32.1	46.0	-13.9
2.070	36.8	56.0	-19.2	30.8	46.0	-15.2
2.331	35.6	56.0	-20.4	30.7	46.0	-15.3
2.653	34.3	56.0	-21.7	29.2	46.0	-16.8
2.846	35.4	56.0	-20.6	28.9	46.0	-17.1

13 Revision History

Revision Level	Description of changes	Revision Date
0	Initial release	7 June 2018
1	Corrected client address. Corrected output power limit.	3 August 2018
2	Corrected limit on page 11	14 August 2018