

RF Test Report

Project Number: 4316591

Report Number: 4316591EMC01

Revision Level: 1

Client: 3M Company

Equipment Under Test: 3M™ DBI-SALA® Smart Lock Connected Self-Retracting Lifeline

Model: 3503806

FCC ID: DGFPSD3503806

IC ID: 458A-PSD3503806

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


RSS-247, Issue 2

RSS-GEN Issue 4

Report issued on: 28 June 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
Bandwidth	15.247(a)(2)	RSS-247 S5.2 (1) RSS-GEN S6.6	Compliant
Peak Output Power	15.247(b)(3)	RSS-247 S5.4 (4)	Compliant
Power Spectral Density	15.247(e)	RSS-247 S5.2 (2)	Compliant
Conducted Spurious Emissions / Band Edge	15.247(d)	RSS-247 S5.5	Compliant
Field Strength of Spurious Radiation	15.247(d), 15.209	RSS-247 S5.5	Compliant
Emissions in Restricted Frequency Bands	15.205, 15.209	RSS-GEN S8.9, S8.10	Compliant
Antenna Requirement	15.203	RSS-GEN S8.3	Compliant ¹
AC Powerline Conducted Emissions	15.107, 15.207	RSS-GEN S8.8	N/A ²

Note 1: The equipment under test (EUT) has an internal pcb trace antenna with no antenna connector.

Note 2: This test is not applicable. The EUT is battery powered and has no means of connection to external power.

1.1 Modifications Required for Compliance

None

2 General Information

2.1 Client Information

Name: DB INDUSTRIES LLC
DBA 3M FALL PROTECTION
Address: 3883 SALA WAY
City, State, Zip, Country: Red Wing MN 55066 United States

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

Product Marketing Name (PMN): 3M™ DBI-SALA® Smart Lock Connected Self-Retracting Lifeline
Model Number (HVIN): 3503806
Firmware Version ID (FVIN): N/A
Serial Number: 3635

Frequency Range: 2402 – 2480 MHz
Data Modes: Bluetooth Low Energy – GFSK
Antenna: Internal PCB Trace

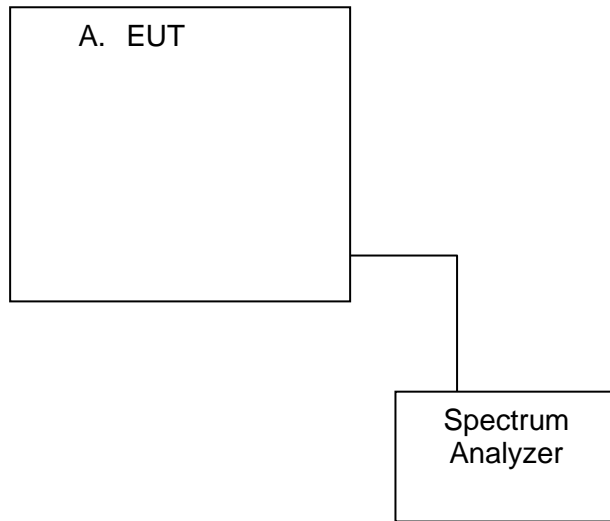
Rated Voltage: 9V battery
Test Voltage: 9V battery, fully charged

Sample Received Date: 05/30/2018
Dates of testing: 06/05/2018 to 6/20/2018

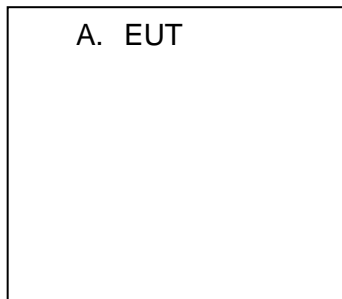
2.4 Operating Modes and Conditions

The EUT was programmed by the manufacturer to transmit on low, mid and high channels in all necessary modulation and modes of operation. The circuit board with the RF components was operated outside of the enclosure to facilitate testing.

2.5 EUT Connection Block Diagram – Conducted Measurements



2.6 EUT Connection Block Diagram – Radiated Measurements



Inside Chamber

.....
 Outside Chamber

2.7 System Configurations

Device reference	Manufacturer	Description	Model Number	Serial Number
A	3M Company	Digital Self Retracting Line	3503806	3635

3 Bandwidth

3.1 Test Result

Test Description	Test Specification		Test Result
6 dB bandwidth	15.247(d)	RSS-247 S5.2 (1) RSS-GEN S6.6	Compliant
20 dB bandwidth			Reported

3.2 Test Method

The procedures from ANSI C63.10: 2013 clause 11.8 and 558074 D01 DTS Meas Guidance v04 were used to determine the 6 dB and 20 dB bandwidths.

3.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 24.3 °C

Relative Humidity: 45.6 %

Atmospheric Pressure: 97.5 kPa

3.4 Test Equipment

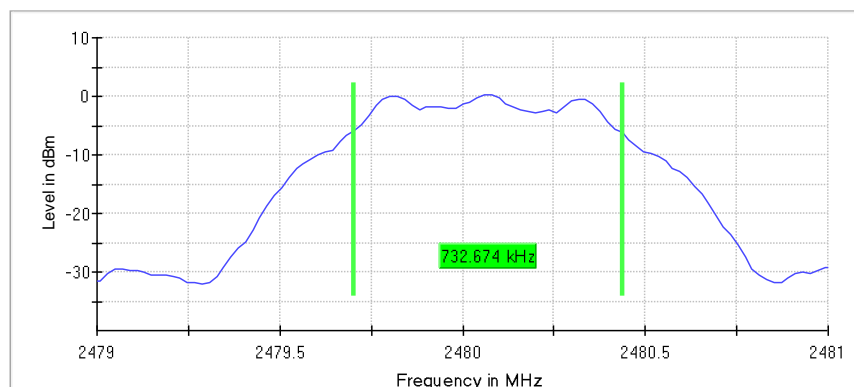
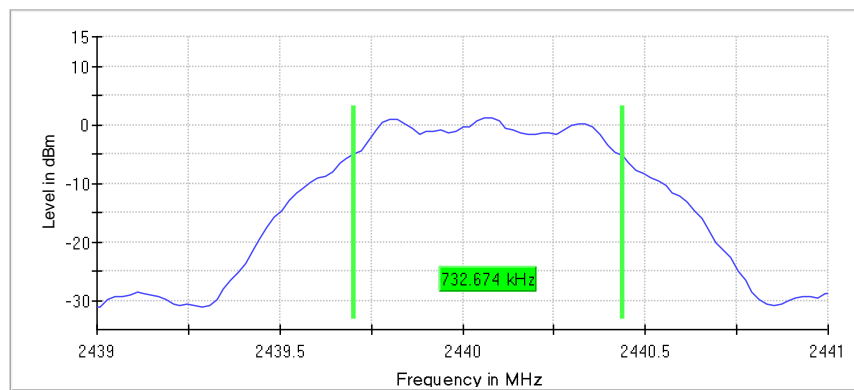
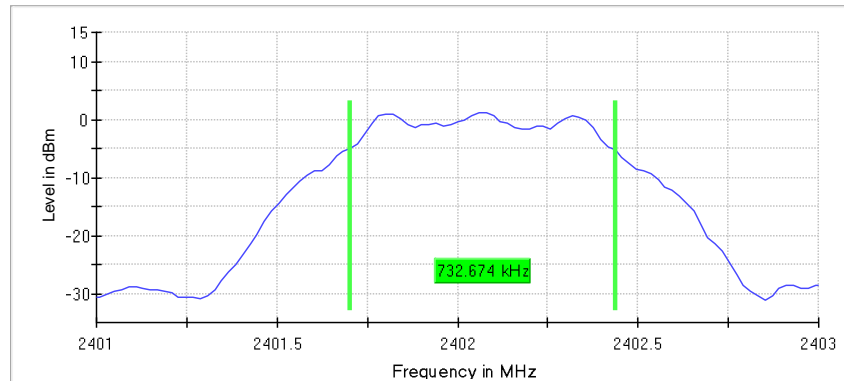
Test End Date: 6 June 2018

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Spectrum Analyzer	FSV30	Rohde & Schwarz	B085749	7/24/2018
OSP	OSP-120	Rohde & Schwarz	101182	12/17/2018
Power Meter	OSP-B157	Rohde & Schwarz	25875491	12/17/2018
Signal Generator	SMB100A	Rohde & Schwarz	B094876	1/12/2020
RF Cable	141	Huber & Suhner	B095585	1/12/2020

Note: The equipment calibration period is 1 year.

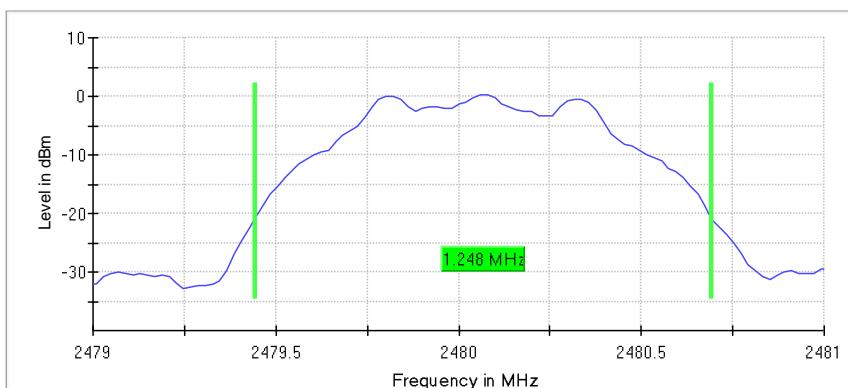
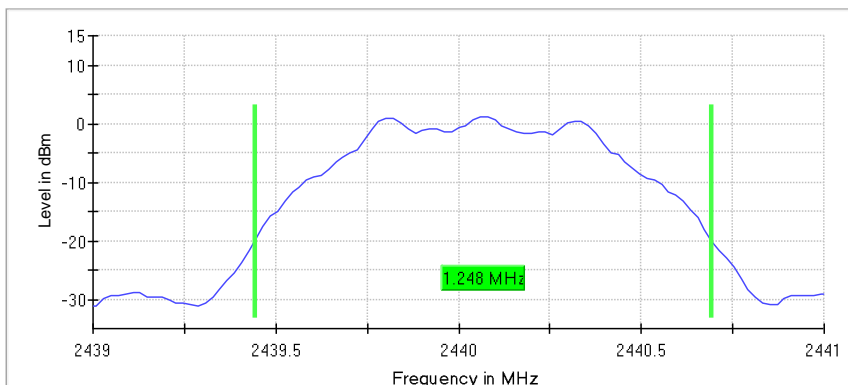
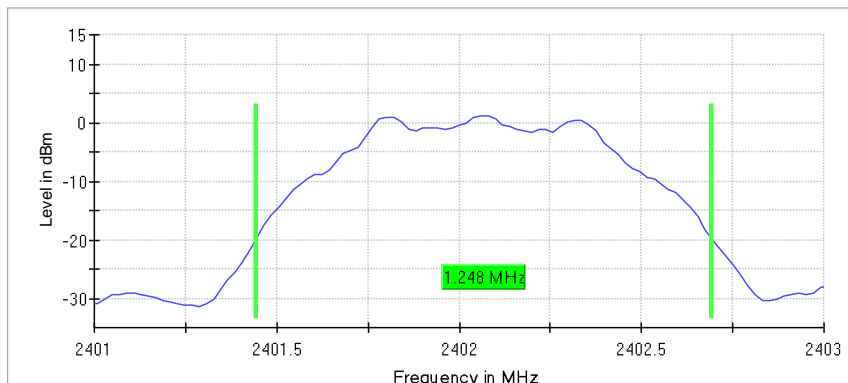
3.5 Test Data – 6 dB bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2402.000000	0.732674	0.500000	2401.702970	2402.435644
2440.000000	0.732674	0.500000	2439.702970	2440.435644
2480.000000	0.732674	0.500000	2479.702970	2480.435644



3.6 Test Data – 20 dB bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2402.000000	1.247524	-	2401.445545	2402.693069
2440.000000	1.247524	-	2439.445545	2440.693069
2480.000000	1.247524	-	2479.445545	2480.693069



4 Peak Output Power

4.1 Test Result

Test Description	Test Specification		Test Result
Peak Output Power	15.247(b)(3)	RSS-247 S5.4 (4)	Compliant

4.2 Test Method

Fundamental peak power measurements were recorded using the procedures from ANSI C63.10: 2013 clause 11.9 and KDB 558074 D01 Measurement Guidance v04.

Limit

(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. For using antennas with greater than 6dBi of gain, the limit is reduced in dB by the amount the gain exceeds 6dBi (e.g. for a 7.4dBi antenna, the limit is reduced from 30dBm to 28.6dBm)

4.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 24.3 °C

Relative Humidity: 45.6 %

Atmospheric Pressure: 97.5 kPa

4.4 Test Equipment

Test End Date: 21 June 2018

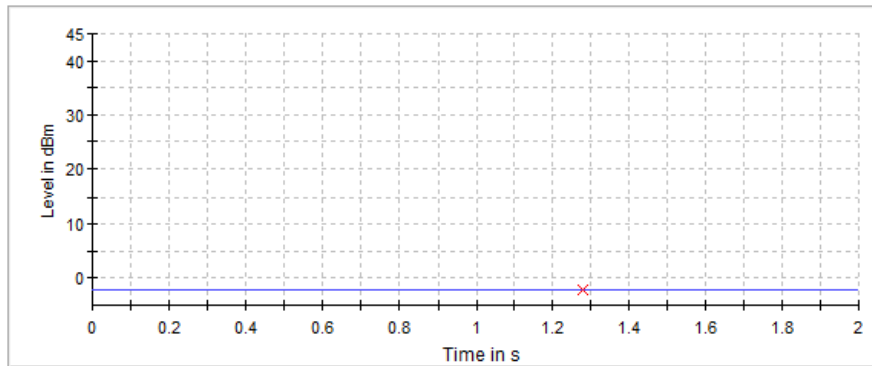
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Spectrum Analyzer	FSV30	Rohde & Schwarz	B085749	7/24/2018
OSP	OSP-120	Rohde & Schwarz	101182	12/17/2018
Power Meter	OSP-B157	Rohde & Schwarz	25875491	12/17/2018
Signal Generator	SMB100A	Rohde & Schwarz	B094876	1/12/2020
RF Cable	141	Huber & Suhner	B095585	1/12/2020

Note: The equipment calibration period is 1 year.

4.5 Test Data

DUT Frequency (MHz)	Peak Power (dBm)	Limit Max (dBm)	Result
2402.000000	-2.1	30.0	PASS
2440.000000	-2.6	30.0	PASS
2480.000000	-3.5	30.0	PASS

2402 MHz power vs time (gated)
Plot and setting are representative of other frequencies



— Connector 1 × Peak Connector 1

Measurement

Setting	Instrument Value	Target Value
Center Frequency	2.40200 GHz	2.40200 GHz
Span	Zero Span	Zero Span
RBW	1.229 MHz	>= 1.000 MHz
VBW	10.000 MHz	>= 6.000 MHz
SweepPoints	101	~ 101
SweepTime	2.000 s	2.000 s
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	10	10
Filter	Channel	Channel
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	AUTO
Preamp	off	off

5 Power Spectral Density

5.1 Test Result

Test Description	Test Specification		Test Result
Power Spectral Density	15.247(e)	RSS-247 S5.2 (2)	Compliant

5.2 Test Method

Power spectral density measurements were recorded using the procedures from ANSI C63.10: 2013 clause 11.10 and KDB 558074 D01 Measurement Guidance v04.

Limit

The limit is 8 dBm.

5.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 24.3 °C
 Relative Humidity: 45.6 %
 Atmospheric Pressure: 97.5 kPa

5.4 Test Equipment

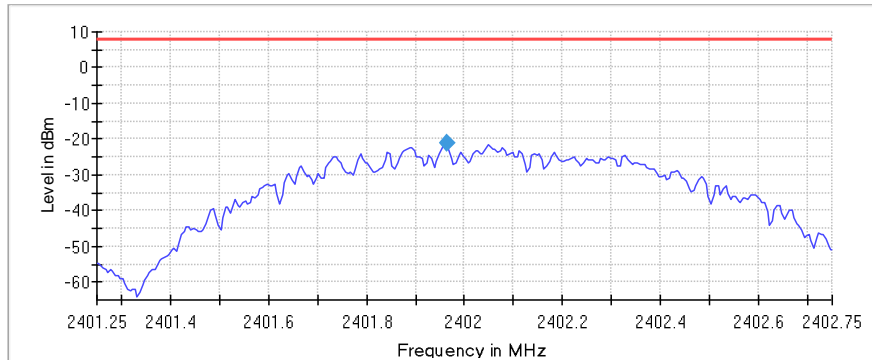
Test End Date: 21 June 2018

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Spectrum Analyzer	FSV30	Rohde & Schwarz	B085749	7/24/2018
OSP	OSP-120	Rohde & Schwarz	101182	12/17/2018
Power Meter	OSP-B157	Rohde & Schwarz	25875491	12/17/2018
Signal Generator	SMB100A	Rohde & Schwarz	B094876	1/12/2020
RF Cable	141	Huber & Suhner	B095585	1/12/2020

Note: The equipment calibration period is 1 year.

5.5 Test Data

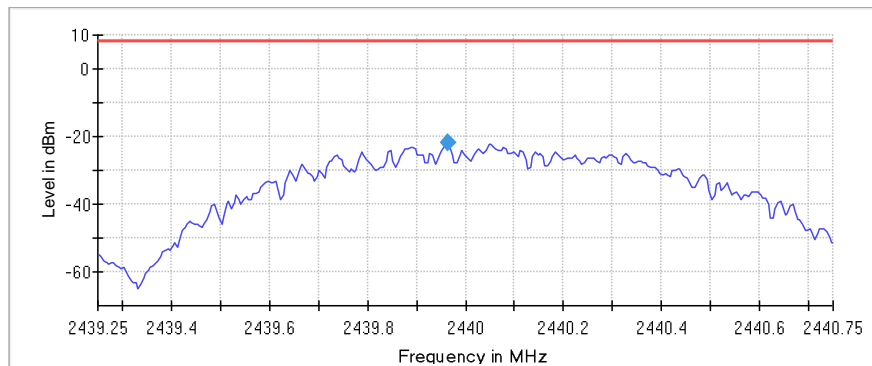
DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2402.000000	2401.962500	-21.223	8.0	PASS
2440.000000	2439.962500	-21.826	8.0	PASS
2480.000000	2479.962500	-22.572	8.0	PASS



— Limit — Sum Level ◆ PSD

Measurement

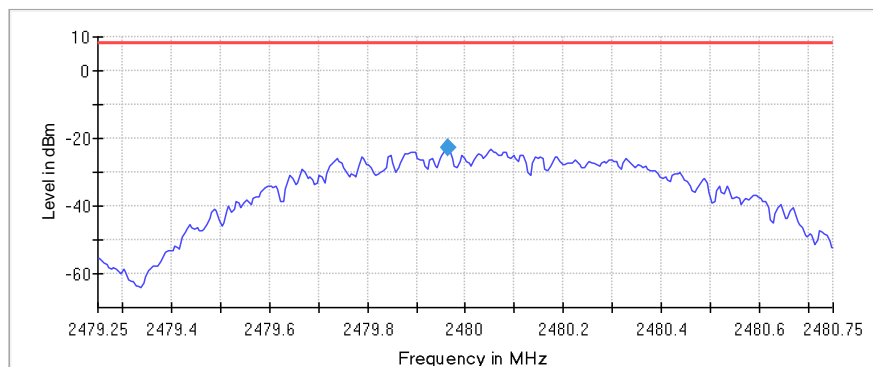
Setting	Instrument Value	Target Value
Start Frequency	2.40125 GHz	2.40125 GHz
Stop Frequency	2.40275 GHz	2.40275 GHz
Span	1.500 MHz	1.500 MHz
RBW	10.000 kHz	<= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	300	~ 300
Sweeptime	1.500 s	1.500 s
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	RMS	RMS
SweepCount	1	1
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	Sweep
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.10 dB	0.50 dB



— Limit — Sum Level ◆ PSD

Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.43925 GHz	2.43925 GHz
Stop Frequency	2.44075 GHz	2.44075 GHz
Span	1.500 MHz	1.500 MHz
RBW	10.000 kHz	<= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	300	~ 300
Sweeptime	1.500 s	1.500 s
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	RMS	RMS
SweepCount	1	1
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	Sweep
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.15 dB	0.50 dB



— Limit — Sum Level ◆ PSD

Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.47925 GHz	2.47925 GHz
Stop Frequency	2.48075 GHz	2.48075 GHz
Span	1.500 MHz	1.500 MHz
RBW	10.000 kHz	<= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	300	~ 300
Sweeptime	1.500 s	1.500 s
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	10.000 dB	AUTO
Detector	RMS	RMS
SweepCount	1	1
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	Sweep
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.20 dB	0.50 dB

6 Conducted Spurious Emissions / Band Edge

6.1 Test Result

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

6.2 Test Method

Spurious emissions in non-restricted frequency bands were recorded using the methods defined in ANSI C63.10: 2013 clause 11.11 and KDB 558074 D01 Measurement Guidance v04.

Lowest, middle, and highest channels were investigated.

Because the maximum conducted peak output power was used to determine compliance with the output power limits, the limit in any 100 kHz band outside of the authorized band is 20 dB below the maximum in-band peak level.

6.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 24.3 °C

Relative Humidity: 45.6 %

Atmospheric Pressure: 97.5 kPa

6.4 Test Equipment

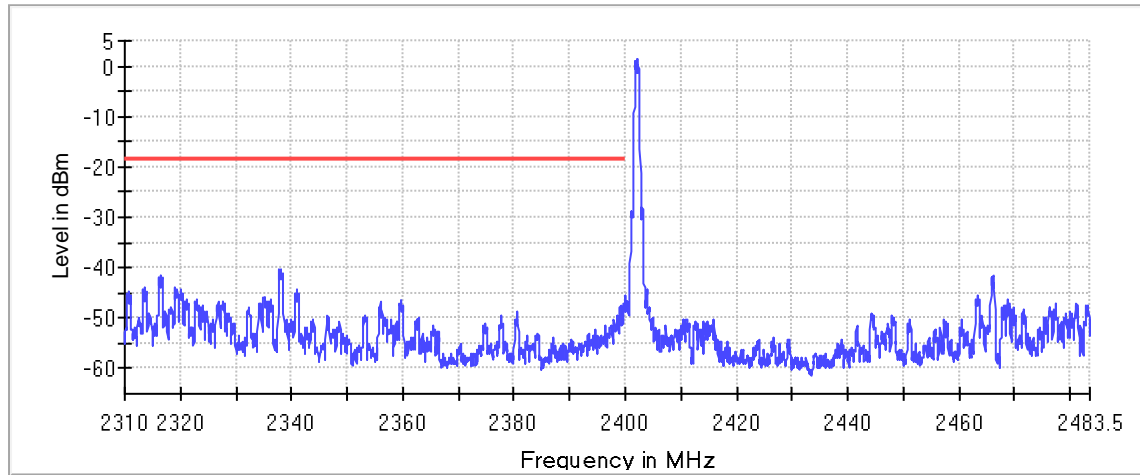
Test End Date: 6 June 2018

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
Spectrum Analyzer	FSV30	Rohde & Schwarz	B085749	7/24/2018
OSP	OSP-120	Rohde & Schwarz	101182	12/17/2018
Power Meter	OSP-B157	Rohde & Schwarz	25875491	12/17/2018
Signal Generator	SMB100A	Rohde & Schwarz	B094876	1/12/2020
RF Cable	141	Huber & Suhner	B095585	1/12/2020

Note: The equipment calibration period is 1 year.

6.5 Test Data – DTS Band Edge

BLE - Lower band edge:



— Limit — Sum Level × Fail

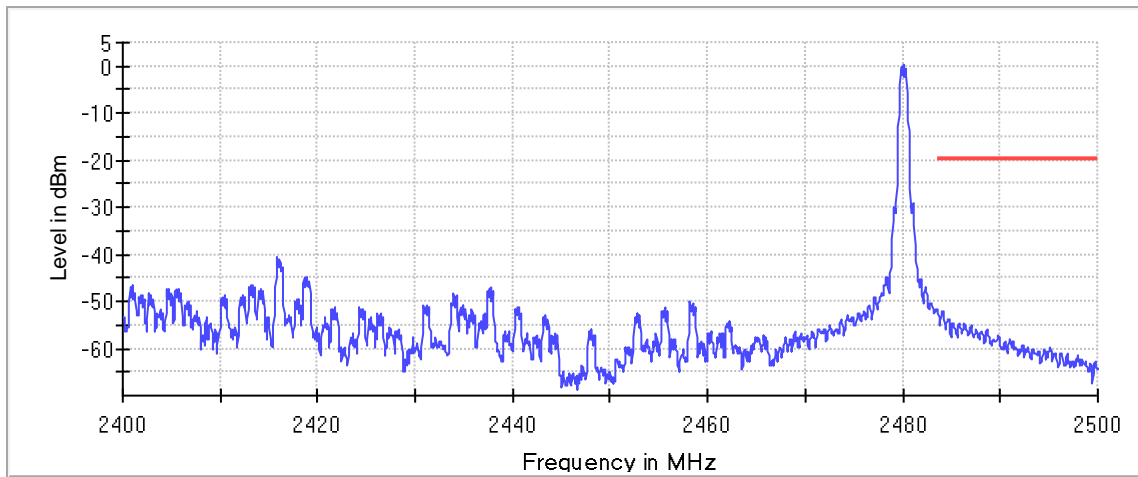
Result

DUT Frequency (MHz)	Result
2402.000000	PASS

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2338.075000	-40.2	21.6	-18.6	PASS
2337.825000	-40.4	21.8	-18.6	PASS
2337.775000	-40.5	21.9	-18.6	PASS
2338.025000	-40.6	22.0	-18.6	PASS
2338.325000	-41.0	22.4	-18.6	PASS
2338.125000	-41.3	22.7	-18.6	PASS
2337.975000	-41.4	22.8	-18.6	PASS
2338.275000	-41.4	22.8	-18.6	PASS
2316.425000	-41.6	23.0	-18.6	PASS
2316.175000	-42.1	23.5	-18.6	PASS
2316.675000	-42.1	23.5	-18.6	PASS
2338.375000	-42.1	23.5	-18.6	PASS
2337.925000	-42.1	23.5	-18.6	PASS
2337.875000	-42.2	23.6	-18.6	PASS
2316.125000	-42.2	23.6	-18.6	PASS

BLE - Upper band edge:



— Limit — Sum Level × Fail

Result

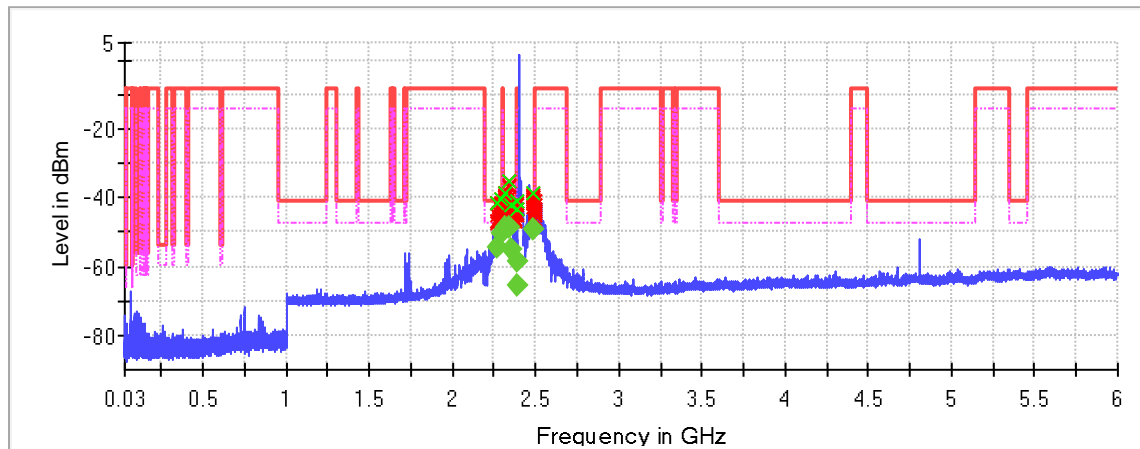
DUT Frequency (MHz)	Result
2480.000000	PASS

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2483.525000	-51.5	31.8	-19.7	PASS
2483.575000	-52.0	32.4	-19.7	PASS
2484.075000	-52.1	32.4	-19.7	PASS
2484.125000	-52.1	32.4	-19.7	PASS
2484.025000	-52.1	32.4	-19.7	PASS
2484.175000	-52.1	32.5	-19.7	PASS
2483.625000	-52.4	32.7	-19.7	PASS
2483.975000	-52.4	32.7	-19.7	PASS
2483.675000	-52.7	33.0	-19.7	PASS
2484.225000	-52.8	33.1	-19.7	PASS
2483.925000	-53.2	33.5	-19.7	PASS
2483.725000	-53.2	33.6	-19.7	PASS
2484.625000	-53.9	34.2	-19.7	PASS
2484.675000	-53.9	34.2	-19.7	PASS
2484.575000	-53.9	34.2	-19.7	PASS

6.6 Test Data – Conducted Spurious Emissions

Conducted Spurs – Channel 0



— Limit — Sum Level — Threshold x Critical
x Final Critical ◆ Fail ◆ Pass

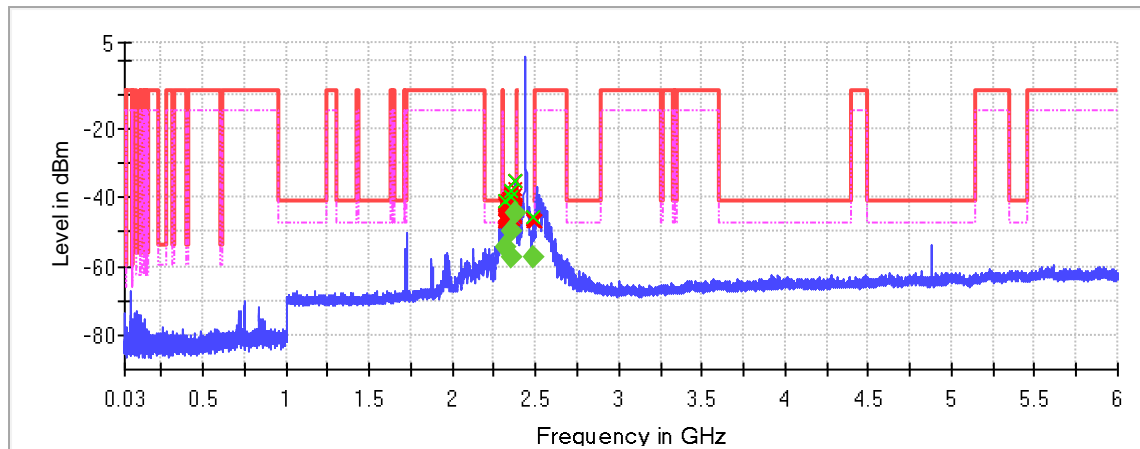
Result

DUT Frequency (MHz)	Result
2402.000000	PASS

Final measurements

Frequency (MHz)	Level Pre Measurement (dBm)	level (dBm)	Limit (dBm)	Margin (dB)	Result
2274.750000	-41.4	-54.5	-41.2	13.3	PASS
2298.750000	-40.6	-50.3	-41.2	9.1	PASS
2319.750000	-38.5	-48.4	-41.2	7.2	PASS
2338.750000	-35.1	-48.5	-41.2	7.3	PASS
2357.250000	-42.1	-54.8	-41.2	13.6	PASS
2384.250000	-43.4	-58.5	-41.2	17.3	PASS
2389.750000	-41.2	-65.8	-41.2	24.6	PASS
2484.250000	-38.9	-49.4	-41.2	8.2	PASS

Conducted Spurs – Channel 19



— Limit — Sum Level — Threshold × Critical
× Final Critical ◆ Fail ◆ Pass

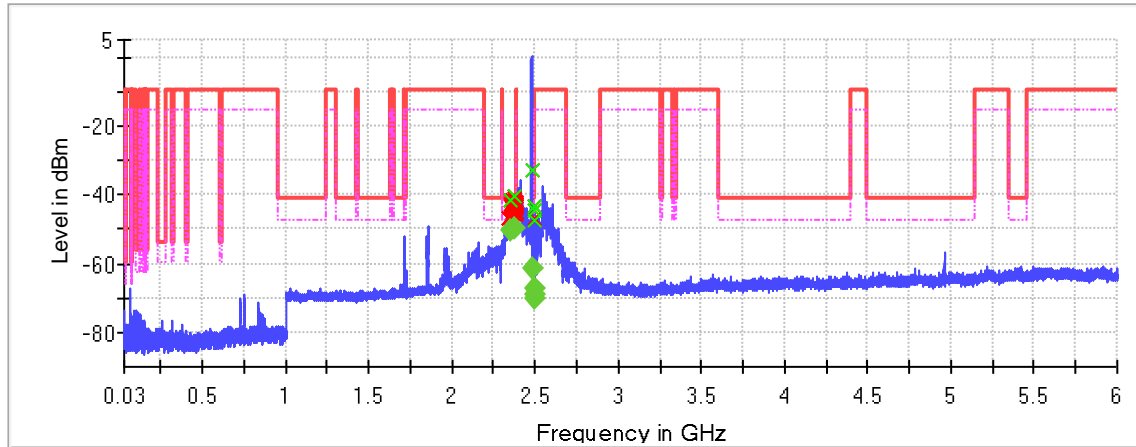
Result

DUT Frequency (MHz)	Result
2440.000000	PASS

Final measurements

Frequency (MHz)	Level Pre Measurement (dBm)	level (dBm)	Limit (dBm)	Margin (dB)	Result
2312.750000	-41.3	-54.6	-41.2	13.4	PASS
2347.750000	-39.9	-57.4	-41.2	16.2	PASS
2358.750000	-38.3	-49.7	-41.2	8.5	PASS
2376.250000	-35.2	-44.8	-41.2	3.6	PASS
2486.750000	-45.8	-57.6	-41.2	16.4	PASS

Conducted Spurs – Channel 39



— Limit
— Sum Level
— Threshold
x Critical
x Final Critical
◆ Fail
◆ Pass

Result

DUT Frequency (MHz)	Result
2480.000000	PASS

Final measurements

Frequency (MHz)	Level Pre Measurement (dBm)	level (dBm)	Limit (dBm)	Margin (dB)	Result
2352.250000	-41.5	-50.4	-41.2	9.2	PASS
2376.750000	-40.5	-50.0	-41.2	8.8	PASS
2483.750000	-32.9	-61.2	-41.2	20.0	PASS
2495.750000	-43.2	-70.3	-41.2	29.1	PASS
2497.750000	-44.8	-67.0	-41.2	25.8	PASS
2499.750000	-47.2	-69.0	-41.2	27.8	PASS

7 Field Strength of Spurious Radiation

7.1 Test Result

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

7.2 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, 19, and 39. The device was rotated through each of its orthogonal axes.

Test distance:

- 9k to 30 MHz – Near field pre-scan 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 1 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

7.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 24.3 °C

Relative Humidity: 45.6 %

Atmospheric Pressure: 97.5 kPa

7.4 Test Equipment

Test End Date: 19 June 2018

Tester: BEO

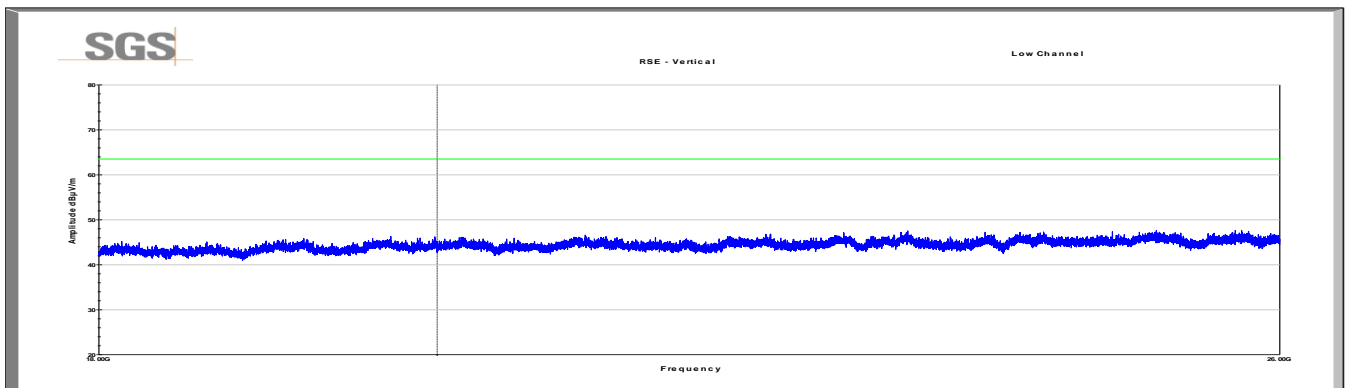
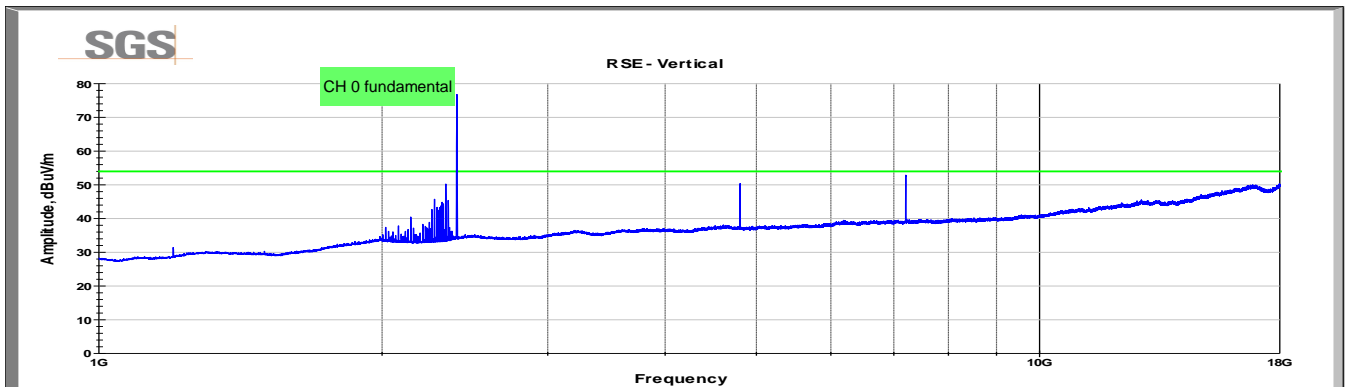
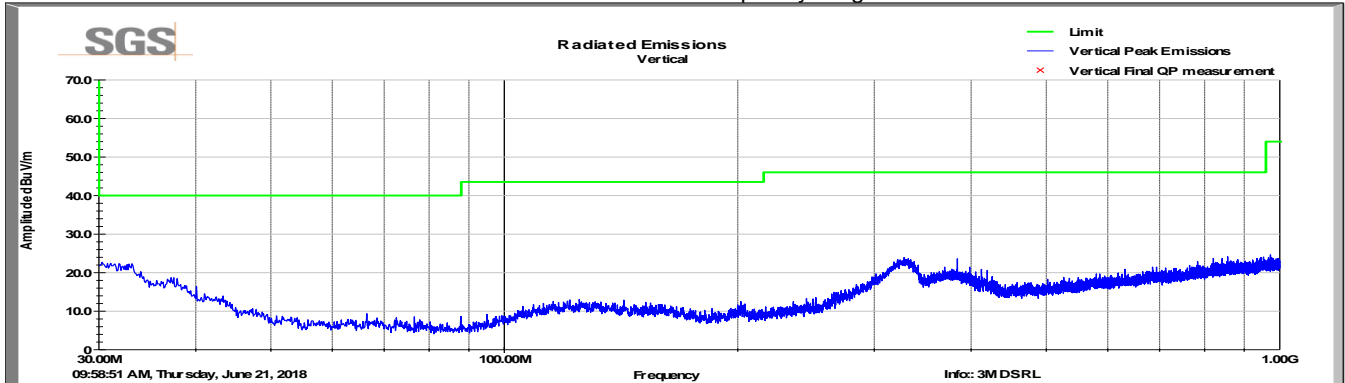
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
ANTENNA DRG HORN (MEDIUM)	3117	ETS LINDGREN	B079691	27-Jul-2018
ANTENNA HORN (MEDIUM)	BBHA 9120 B	SCHWARZBECK	16001	2-Apr-2019
RF CABLE	SF106	HUBER & SUHNER	B079716	24-Jul-2018
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	B094463	6-Mar-2019
RF CABLE	104PE	HUBER & SUHNER	B079793	24-Jul-2018
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	25-Apr-2018
FILTER, HIGH PASS (>2800MHZ)	HPM50111	MICRO-TRONICS	B085747	27-Jul-2018
FILTER, BAND REJECT (2.4G ISM)	BRM50709	MICRO-TRONICS	B079790	27-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
ANTENNA HORN (SMALL)	LB-180400-20-C-KF	A-INFO	15007	30-Mar-2019
LOW NOISE AMPLIFIER	NSP1840-HG	MITEQ	B087572	28-Jul-2018
RF CABLE	SF102	HUBER & SUHNER	B079824	26-Jul-2018
RF CABLE	SF102	HUBER & SUHNER	B079822	26-Jul-2018

Note: The equipment calibration period is 1 year.

7.5 Test Data – Peak Plots

7.5.1 Low Channel (CH 0)

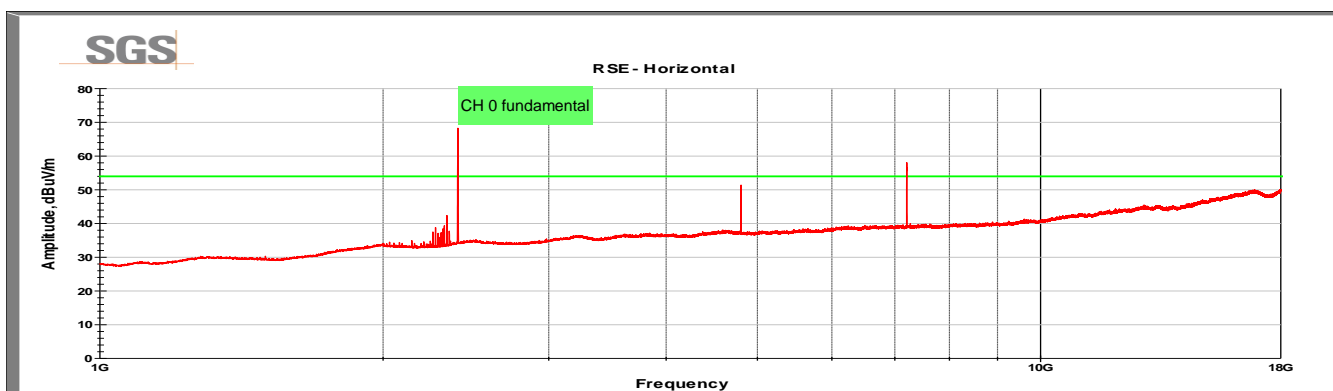
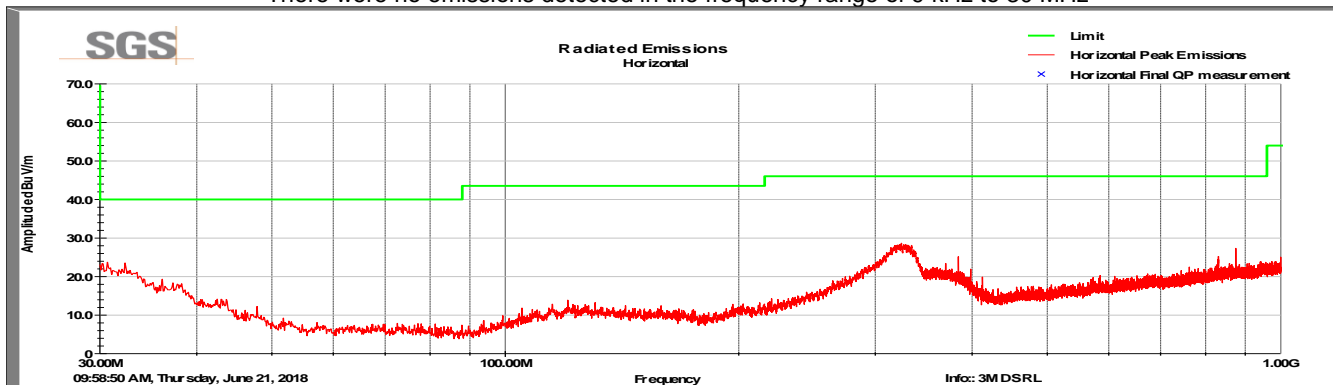
There were no emissions detected in the frequency range of 9 kHz to 30 MHz



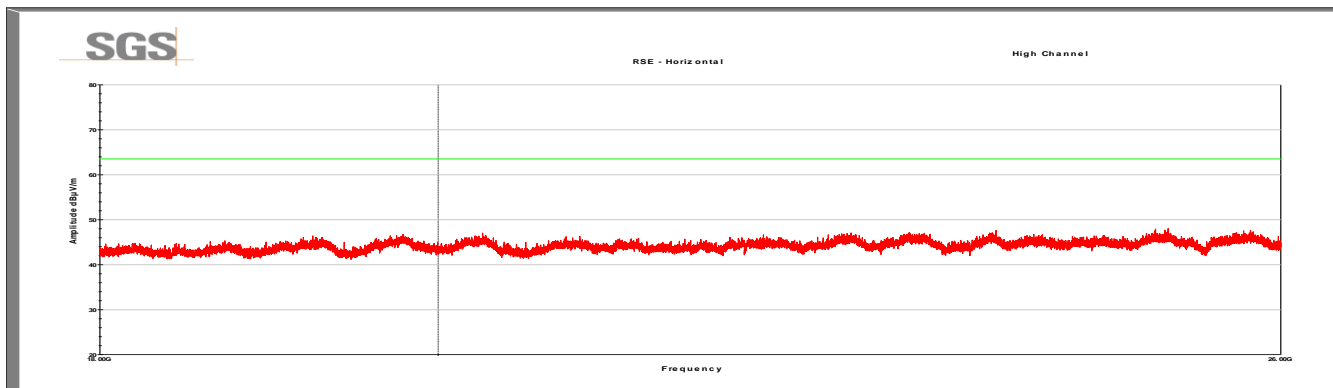
Frequency MHz	Polarity (V/H)	Final Value (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Measure Method	Pwr set	CH	Axis
4804.0	V	50.3	54.0	-3.7	Peak	0	19	y
4804.0	V	45.2	54.0	-8.8	Peak	0	19	z
7206.0	V	Note ¹	Note ¹	Note ¹	Peak	0	19	y
7206.0	V	Note ¹	Note ¹	Note ¹	Peak	0	19	z

Note: This emission did not fall within the restricted band

There were no emissions detected in the frequency range of 9 kHz to 30 MHz



Note: 2.4 GHz ISM Band reject filter is in place to suppress the fundamental.

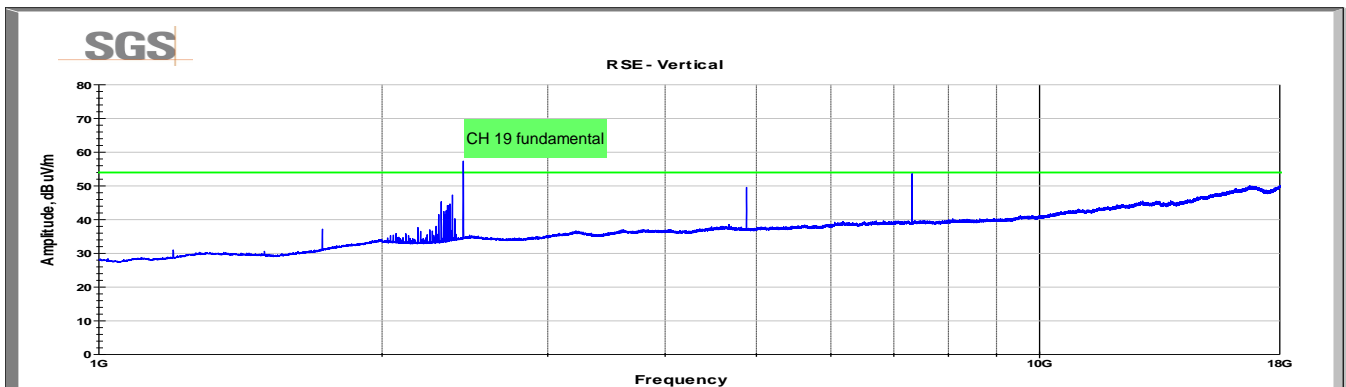
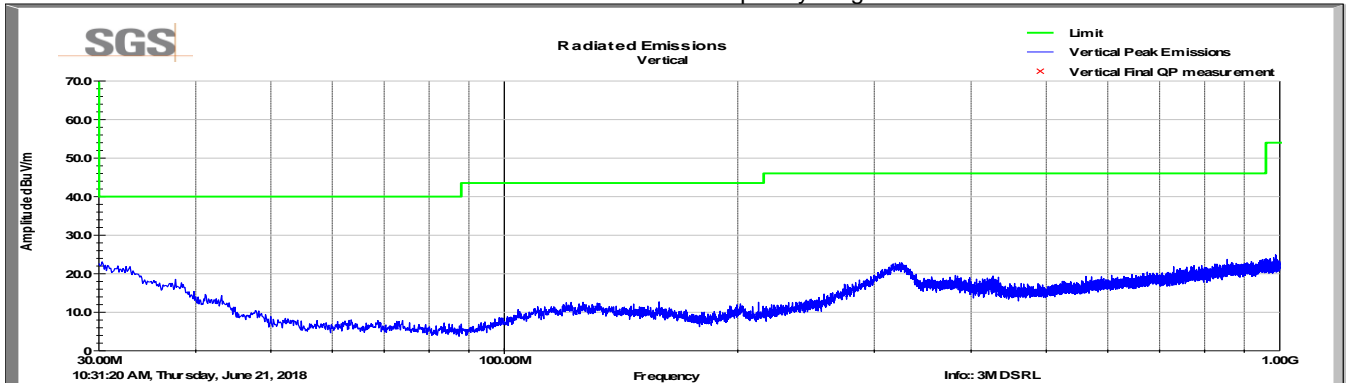


Frequency MHz	Polarity (V/H)	Final Value (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Measure Method	Pwr set	CH	Axis
4804.0	H	50.3	54.0	-3.7	Peak	0	19	y
4804.0	H	51.4	54.0	-2.6	Peak	0	19	z
7206.0	H	Note ¹	Note ¹	Note ¹	Peak	0	19	y
7206.0	H	Note ¹	Note ¹	Note ¹	Peak	0	19	z

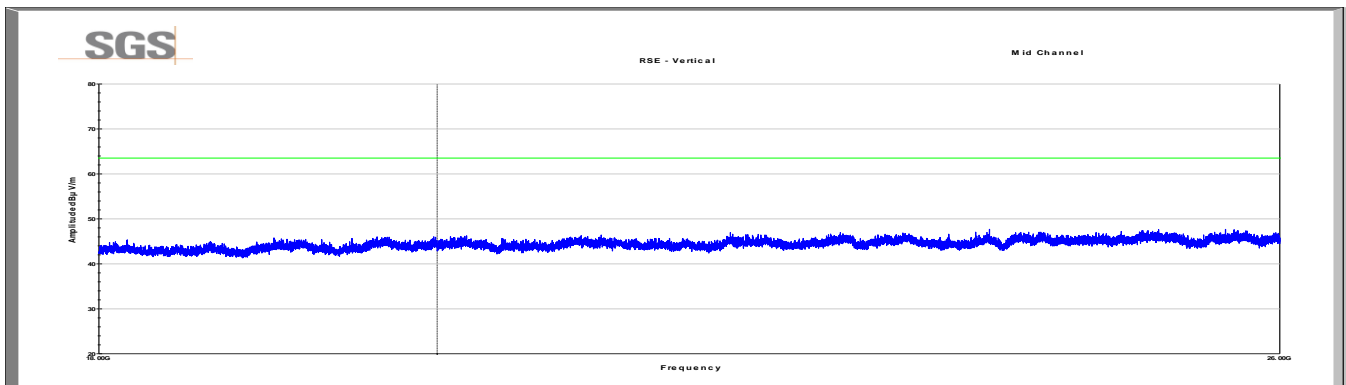
Note: This emission did not fall within the restricted band

7.5.2 Mid Channel (CH 19)

There were no emissions detected in the frequency range of 9 kHz to 30 MHz

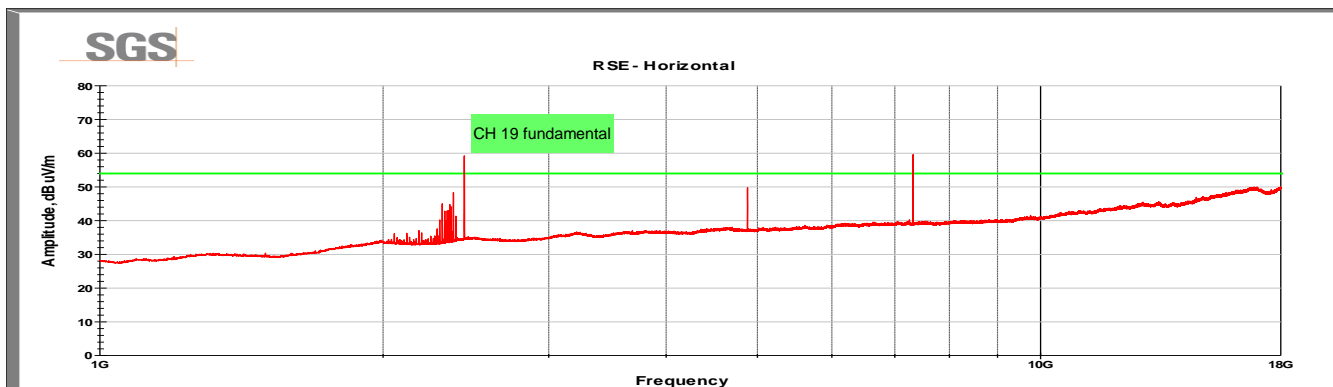
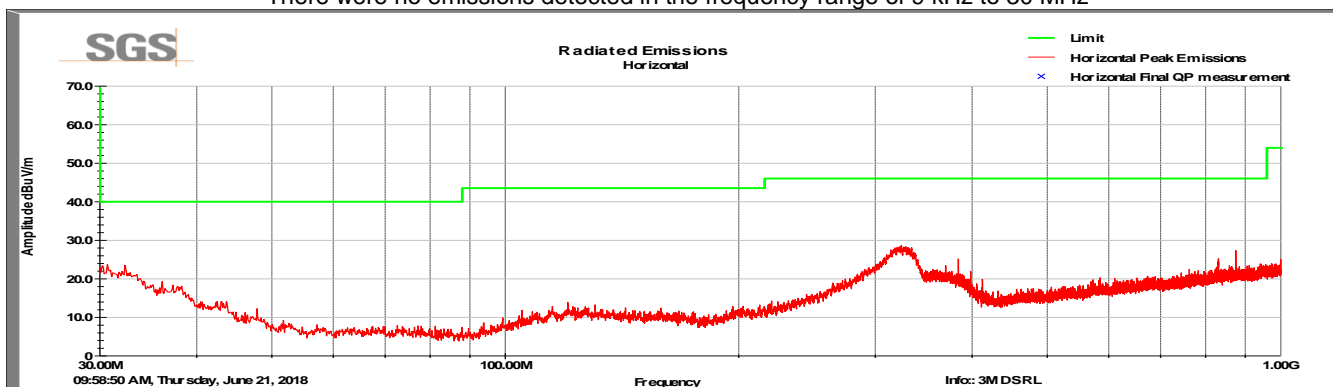


Note: 2.4 GHz ISM Band reject filter is in place to suppress the fundamental.

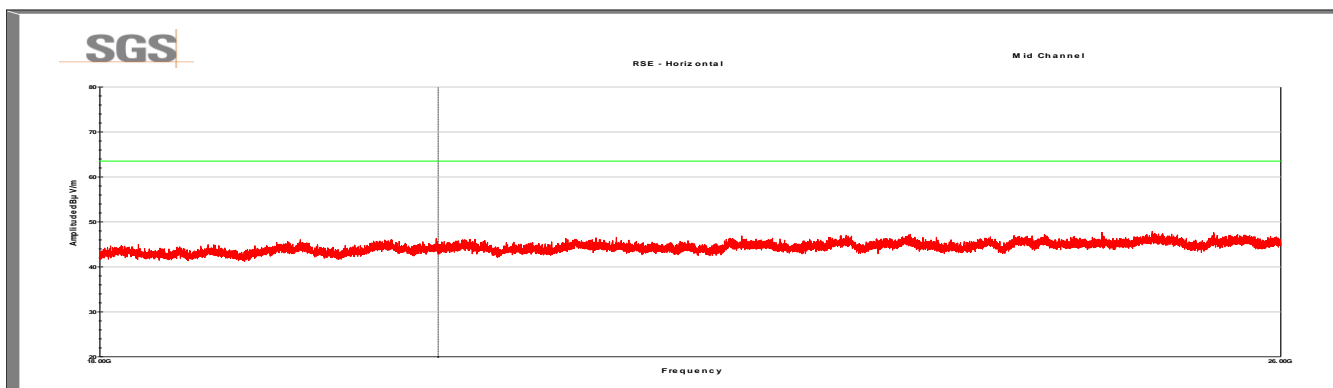


Frequency MHz	Polarity (V/H)	Final Value (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Measure Method	Pwr set	CH	Axis
4880.0	V	49.6	54.0	-4.4	Peak	0	19	y
7320.2	V	48.3	54.0	-5.7	Avg	0	19	y
7320.2	V	43.2	54.0	-10.8	Avg	0	19	z

There were no emissions detected in the frequency range of 9 kHz to 30 MHz



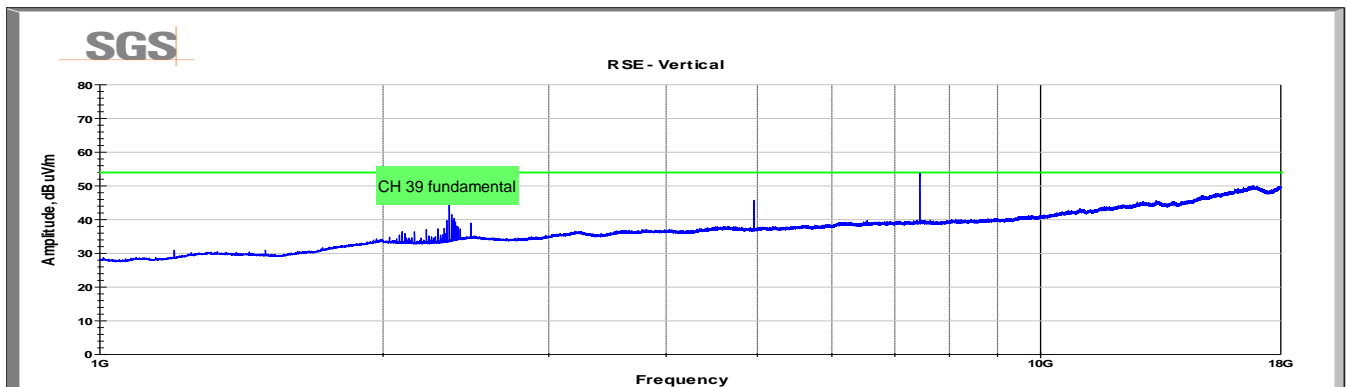
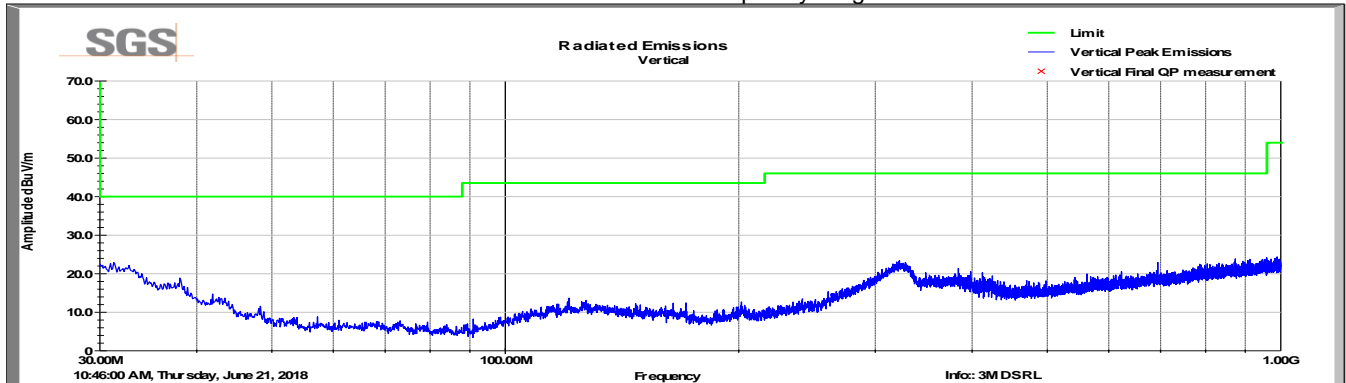
Note: 2.4 GHz ISM Band reject filter is in place to suppress the fundamental.



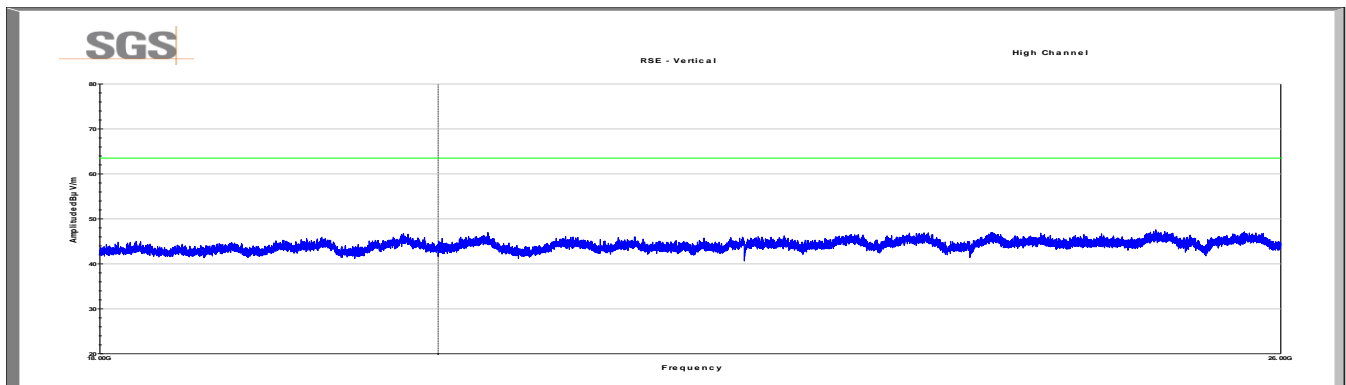
Frequency MHz	Polarity (V/H)	Final Value (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Measure Method	Pwr set	CH	Axis
4880.0	H	49.8	54.0	-4.2	Peak	0	19	y
7320.2	H	45.8	54.0	-8.2	Avg	0	19	y
7320.2	H	48.4	54.0	-5.6	Avg	0	19	z

7.5.3 High Channel (CH 39)

There were no emissions detected in the frequency range of 9 kHz to 30 MHz

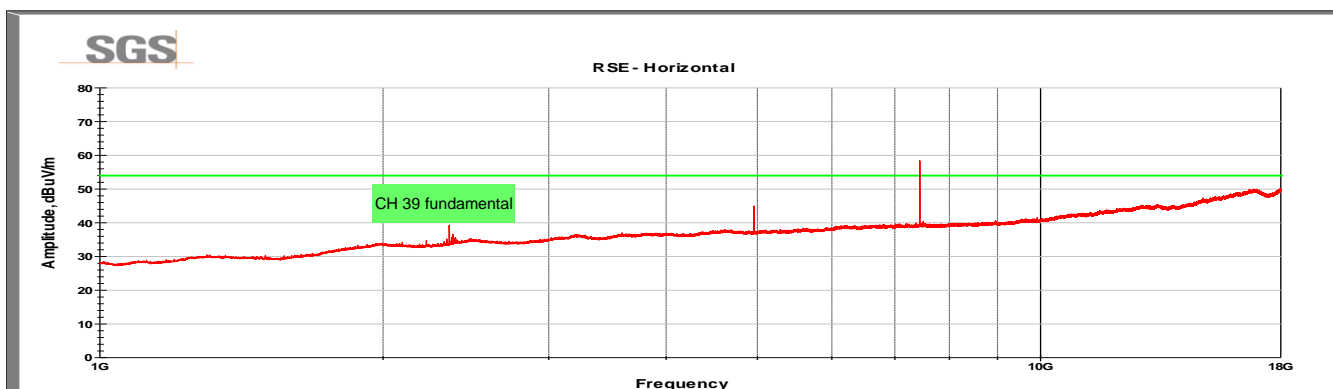
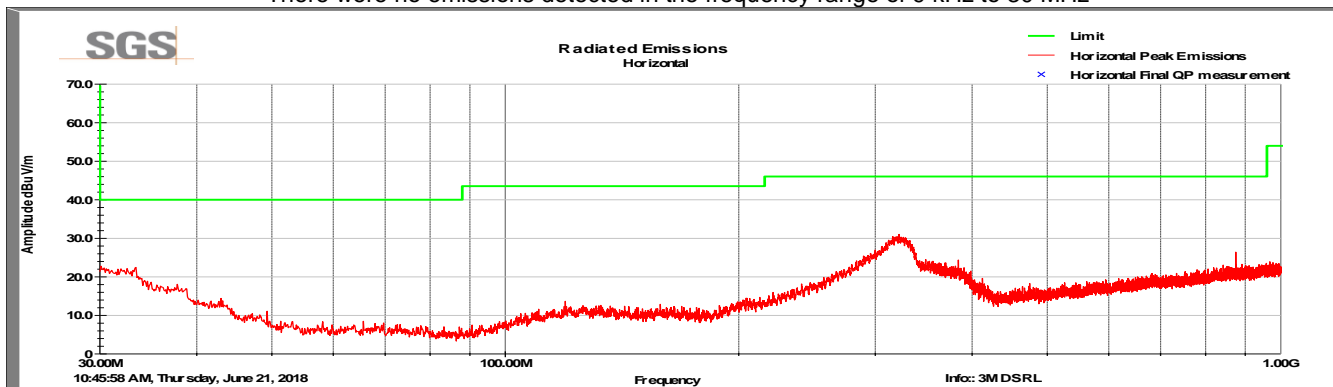


Note: 2.4 GHz ISM Band reject filter is in place to suppress the fundamental.

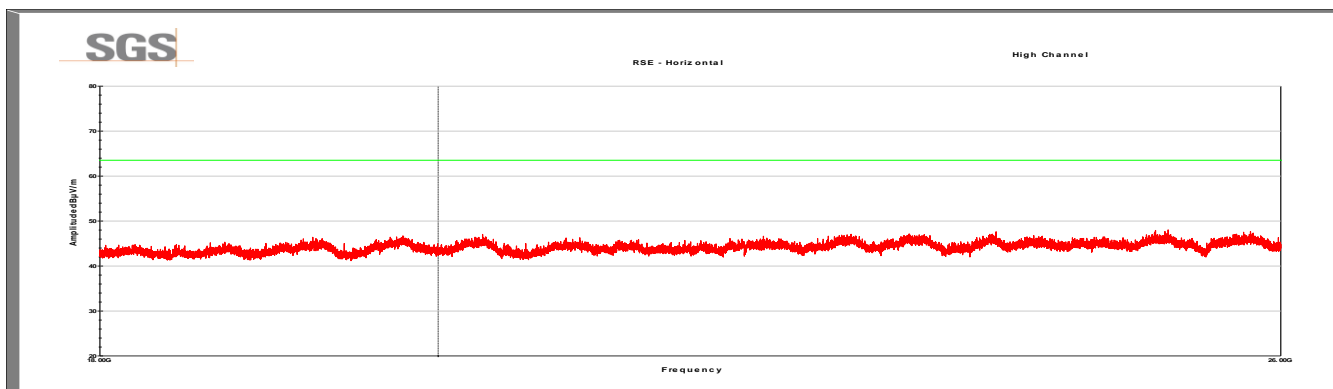


Frequency MHz	Polarity (V/H)	Final Value (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Measure Method	Pwr set	CH	Axis
4960.0	V	45.6	54.0	-9.6	Peak	0	39	z
7440.2	V	49.6	54.0	-4.4	Avg	0	39	y
7440.2	V	40.9	54.0	-13.1	Avg	0	39	z

There were no emissions detected in the frequency range of 9 kHz to 30 MHz



Note: 2.4 GHz ISM Band reject filter is in place to suppress the fundamental.



Frequency MHz	Polarity (V/H)	Final Value (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Measure Method	Pwr set	CH	Axis
4960.0	H	45.0	54.0	-9.0	Peak	0	39	y
7440.2	H	42.1	54.0	-11.9	Avg	0	39	y
7440.2	H	48.5	54.0	-5.5	Avg	0	39	z

8 Emissions in Restricted Frequency Bands

8.1 Test Result

Test Description	Test Specification		Test Result
Restricted Band Emissions	15.205 / 15.209	RSS-GEN S8.9 / 8.10	Compliant

8.2 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.

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

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

D = 3m	Distance
CL = 0.8 dB	Cable Loss
DC = 3.9 dB	Duty Cycle Correction Factor
AG = 2.0 dB	Antenna Gain

$$\text{Offset} = -5.1 \text{ dB}$$

8.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature:	23.0 °C
Relative Humidity:	50.5 %

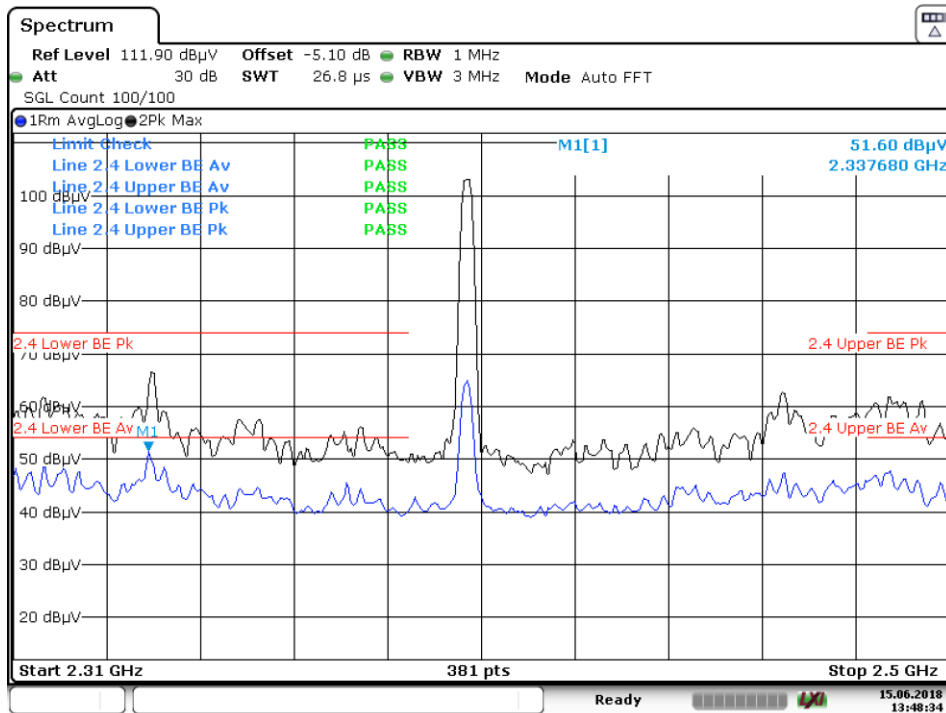
8.4 Test Equipment

Test End Date: 15-Jun-2018

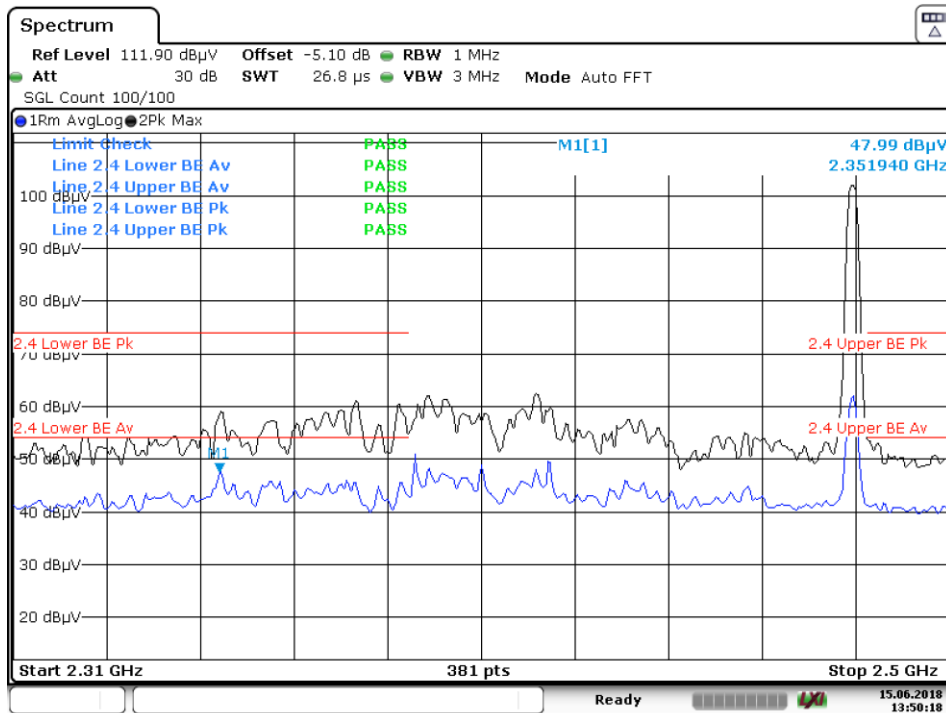
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	1-Nov-2019
RF CABLE	141	HUBER & SUHNER	B095585	26-Jul-2018

Note: The equipment calibration period is 1 year.

8.5 Test Data – Restricted Band Edge



Date: 15.JUN.2018 13:48:34



Date: 15.JUN.2018 13:50:18

9 Revision History

Revision Level	Description of changes	Revision Date
DRAFT	--	
0	Initial release	22 June 2018
1	Corrected test specification reference for FCC Part 15.247 bandwidth on page 4. On page 7, revised bandwidth reference from 99% to 20 dB.	28 June 2018