

RF Test Report

Project Number: 4134771

Report Number: 4134771EMC04

Revision Level: 2

Client: Crestron Electronics Inc.

Equipment Under Test: Infinet Ceiling Fan Controller

Model: FANDELVEX

FCC ID: EROFANDELVEX

IC ID: 5683C-FANDELVEX

Applicable Standards: ANSI C63.10: 2013

FCC Part 15 Subpart C, § 15.247


RSS-247, Issue 2, February 2017

RSS-GEN, Issue 4, November 2014

Report issued on: 26 June 2018

Test Result: Compliant

Tested by:



Aaron Froehlich, EMC Test Engineer
for Jeremy Pickens, Senior EMC Engineer

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
Duty Cycle	15.35(b), 15.205(b)	RSS-247 S5.5	Compliant
Bandwidth	15.247(d)	RSS-247 S5.2 (1) RSS-GEN S6.6	Compliant
Transmitter 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
Radiated Spurious Emissions / Restricted Bands	15.35(b), 15.209	RSS-GEN S6.13 RSS-GEN S8.10	Compliant
Antenna Requirement	15.203	RSS-GEN S8.3	Compliant (1)
AC Powerline Conducted Emission	15.107, 15.207	RSS-GEN S8.8	Compliant

(1) Non-detachable chip antenna.

1.1 Modifications Required for Compliance

None

2 General Information

2.1 Client Information

Name: Crestron Electronics Inc
Address: 15 Volvo Drive
City, State, Zip, Country: Rockleigh, NJ 07647, USA

2.1 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

2.2 General Information of EUT

Type of Product: Infinet Ceiling Fan Controller
Model Number: FANDELVEX
Serial Number: SNX126836

Frequency Range: 2405-2480MHz
Modulation: 802.15.4 (Zigbee)
Antenna: 2.1dBi Chip Antenna (Antenova, P/N: A5839)

Rated Voltage: 4Vdc
Test Voltage: 4Vdc

Sample Received Date: 05 May 2017
Dates of testing: 18 May 2017 (Radiated Spurious Emissions)
26 March 2018 (Antenna Port Conducted Measurements and radiated emissions <1GHz)

2.3 Operating Modes and Conditions

Continuous traffic was generated using test commands. The device was programmed to transmit at 100% duty cycle at low, middle, and high channels.

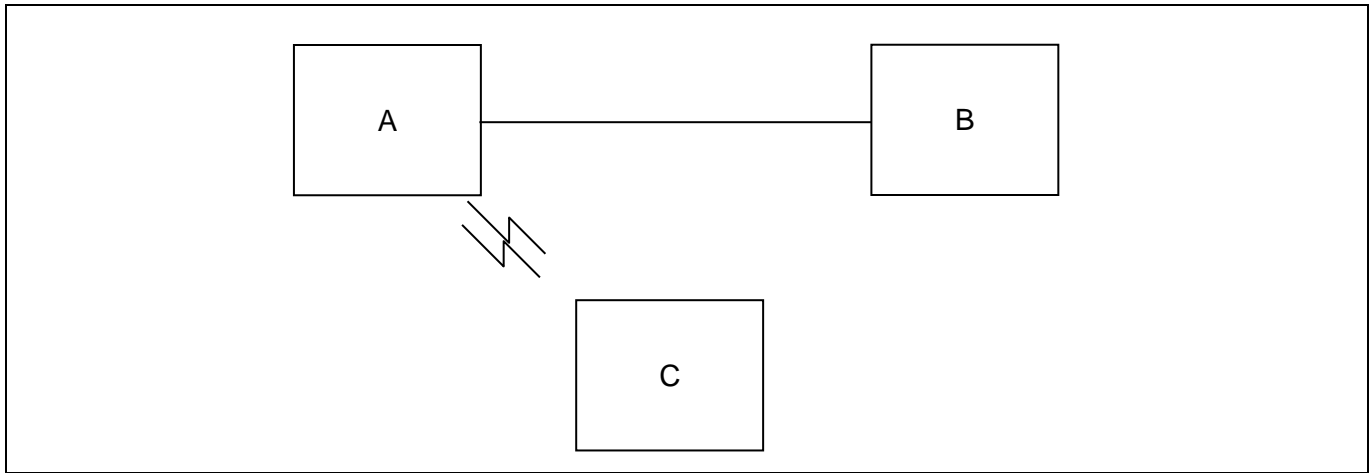
Channel 11, 2405MHz

Channel 18, 2440MHz

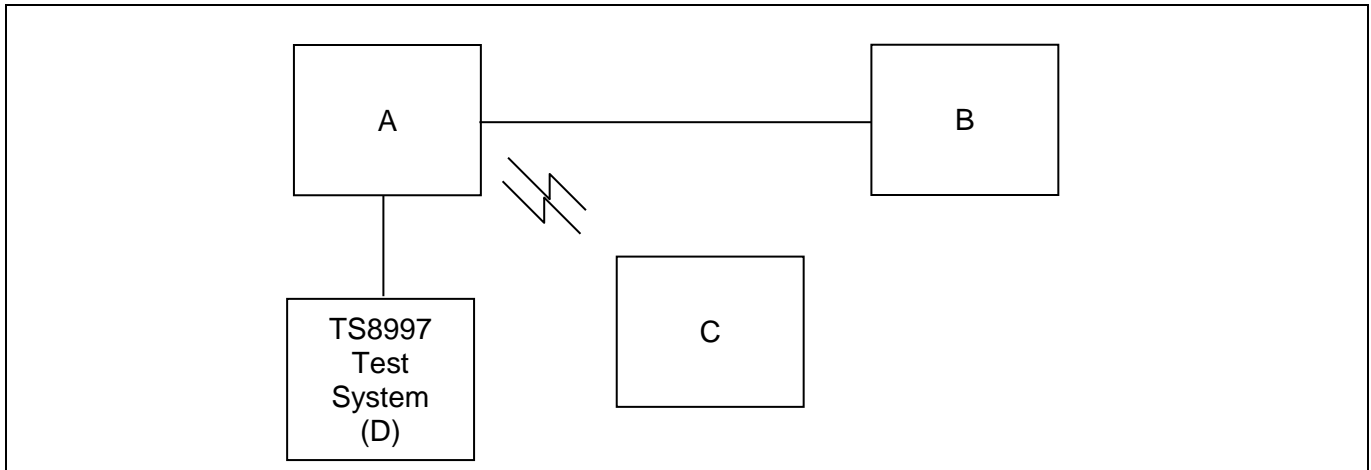
Channel 26, 2480MHz

Average measurements were obtained by applying a 21.27 dB duty-cycle correction factor (DCCF) to the peak reading as tested in section 4.

2.4 Radiated System Configuration



2.5 Conducted System Configuration



Device reference	Manufacturer	Description	Model Number	Serial Number
A	Crestron	Infinet Ceiling Fan Controller	FANDELVEX	SNX126836
B	Rigol	DC power supply	DP711	DP7A182700833
C	Crestron	Control System	MC3	7911847
D	Rohde & Schwarz	Wireless Test System	TS8997	Not Labeled

3 Bandwidth

3.1 Test Result

Test Description	Test Specification		Test Result
6 dB bandwidth / 99% OBW	15.247(d)	RSS-247 S5.2 (1) RSS-GEN S6.6	Compliant

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 bandwidth and 99% OBW.

3.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 21.9 °C

Relative Humidity: 32.9 %

3.4 Test Equipment

Test End Date: 26-Mar-2018

Tester: JOP

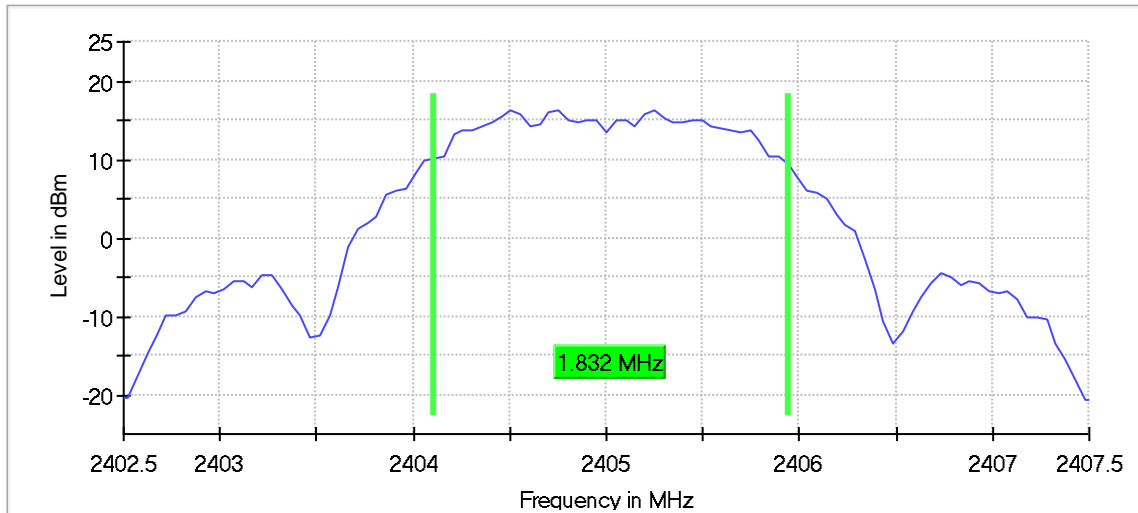
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	1-Nov-2019
RF CABLE	SF102	HUBER & SUHNER	B079822	27-Jul-2018
OPEN SWITCH AND CONTROL UNIT	OSP 120	ROHDE & SCHWARZ	S/N: 101182	CNR
ATTENUATOR, 10DB	10DB	ROHDE & SCHWARZ	B095591	28-Jul-2018

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

3.5 Test Data - 6 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Max Level (dBm)	Result
2405.000000	1.831683	0.500000	---	2404.108911	2405.940594	16.3	PASS
2440.000000	1.683168	0.500000	---	2439.158416	2440.841584	16.0	PASS
2480.000000	1.683168	0.500000	---	2479.158416	2480.841584	-43.4	PASS

Representative Plot



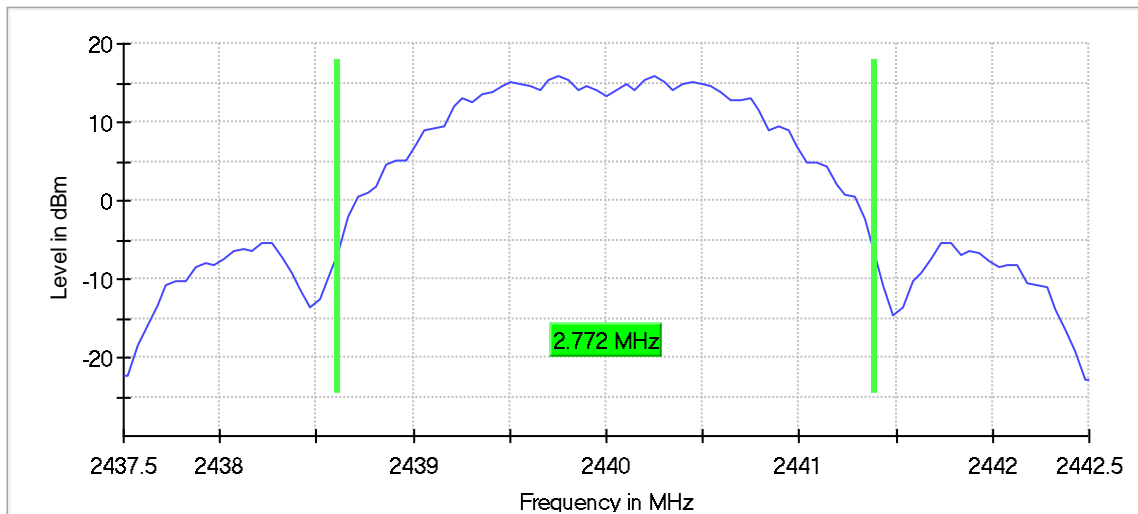
Representative Measurement Settings

Setting	Instrument Value	Target Value
Start Frequency	2.40250 GHz	2.40250 GHz
Stop Frequency	2.40750 GHz	2.40750 GHz
Span	5.000 MHz	5.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	101	~ 50
Sweeptime	18.938 μ s	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	19 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.39 dB	0.50 dB

3.6 Test Data – 99% Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Max Level (dBm)	Result
2405.000000	2.772278	---	---	2403.613861	2406.386139	16.2	PASS
2440.000000	2.772278	---	---	2438.613861	2441.386139	16.0	PASS
2480.000000	2.772278	---	---	2478.613861	2481.386139	-43.3	PASS

Representative Plot



Representative Measurement Settings

Setting	Instrument Value	Target Value
Start Frequency	2.43750 GHz	2.43750 GHz
Stop Frequency	2.44250 GHz	2.44250 GHz
Span	5.000 MHz	5.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	101	~ 100
Sweeptime	18.938 μ s	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	14 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.13 dB	0.50 dB

4 Duty Cycle

4.1 Test Result

Test Description	Test Specification		Test Result
Duty Cycle	15.247	RSS-247 S5.2 (1) RSS-GEN S6.6	Compliant

4.2 Test Method

The procedures from ANSI C63.10: 2013 clause 11.6 and 558074 D01 DTS Meas Guidance v04 Clause 6 option b) were used to determine the duty cycle.

4.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 24.5 °C

Relative Humidity: 50.4 %

4.4 Test Equipment

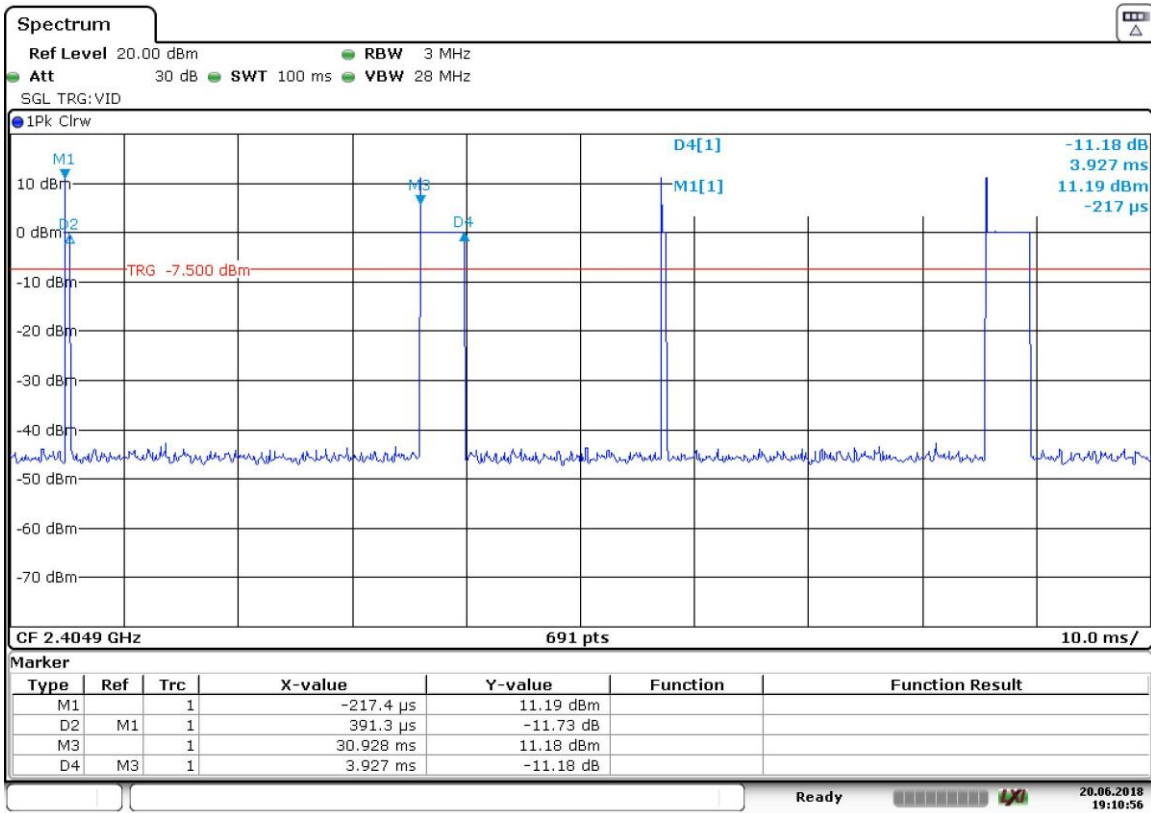
Test End Date: 20-Jun-2018

Tester: ASF

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	1-Nov-2019
RF CABLE	SF102	HUBER & SUHNER	B079823	26-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



Date: 20.JUN.2018 19:10:57

DUT	Pulse 1 (ms)	Pulse 2 (ms)	Pulses per 100 ms	Time (ms)	DCR	DCCF
FANDELVEX	3.927	0.3913	2	100	0.086366	-21.27314388

5 Output Power

5.1 Test Result

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

5.2 Test Method

Fundamental power measurements were recorded using the peak power 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

5.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 21.9 °C
Relative Humidity: 32.9 %

5.4 Test Equipment

Test End Date: 26-Mar-2018

Tester: JOP

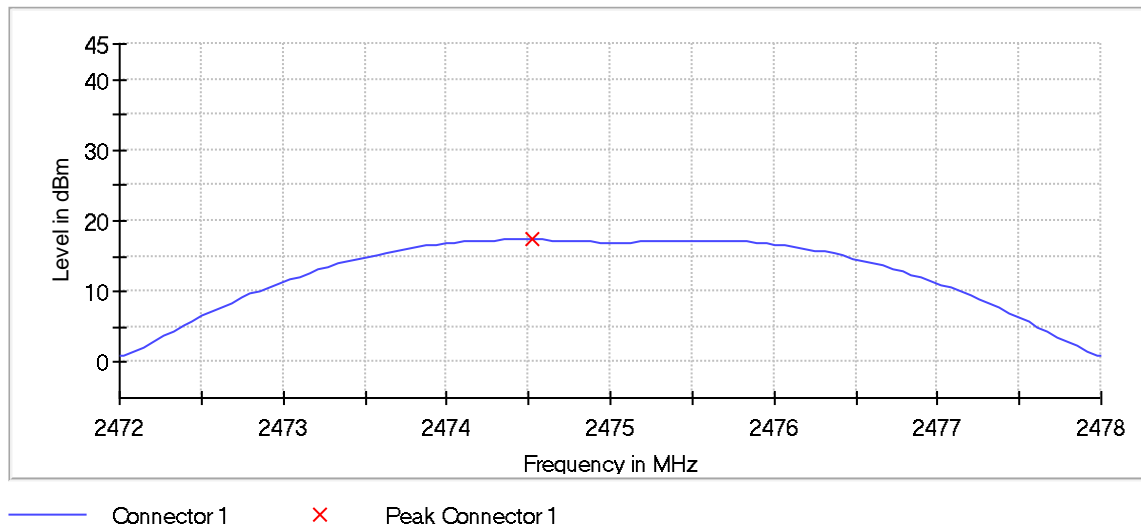
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	1-Nov-2019
RF CABLE	SF102	HUBER & SUHNER	B079822	27-Jul-2018
OPEN SWITCH AND CONTROL UNIT	OSP 120	ROHDE & SCHWARZ	S/N: 101182	CNR
ATTENUATOR, 10DB	10DB	ROHDE & SCHWARZ	B095591	28-Jul-2018

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

5.5 Test Data

DUT Frequency (MHz)	Peak Power (dBm)	Limit Max (dBm)	Result
2405.000000	17.9	30.0	PASS
2440.000000	17.4	30.0	PASS
2475.000000	17.3	30.0	PASS
2480.000000	-39.5	30.0	PASS

Representative Plot



Representative Measurement Settings

Setting	Instrument Value	Target Value
Start Frequency	2.47200 GHz	2.47200 GHz
Stop Frequency	2.47800 GHz	2.47800 GHz
Span	6.000 MHz	6.000 MHz
RBW	2.000 MHz	>= 1.832 MHz
VBW	10.000 MHz	>= 6.000 MHz
SweepPoints	101	~ 101
Sweeptime	953.450 ns	AUTO
Reference Level	20.000 dBm	20.000 dBm
Attenuation	40.000 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	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.08 dB	0.50 dB

6 Power Spectral Density

6.1 Test Result

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

6.2 Test Method

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

Limit

The limit is 8 dBm.

6.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 22.9 °C

Relative Humidity: 36.4 %

6.4 Test Equipment

Test End Date: 27-Mar-2018

Tester: JOP

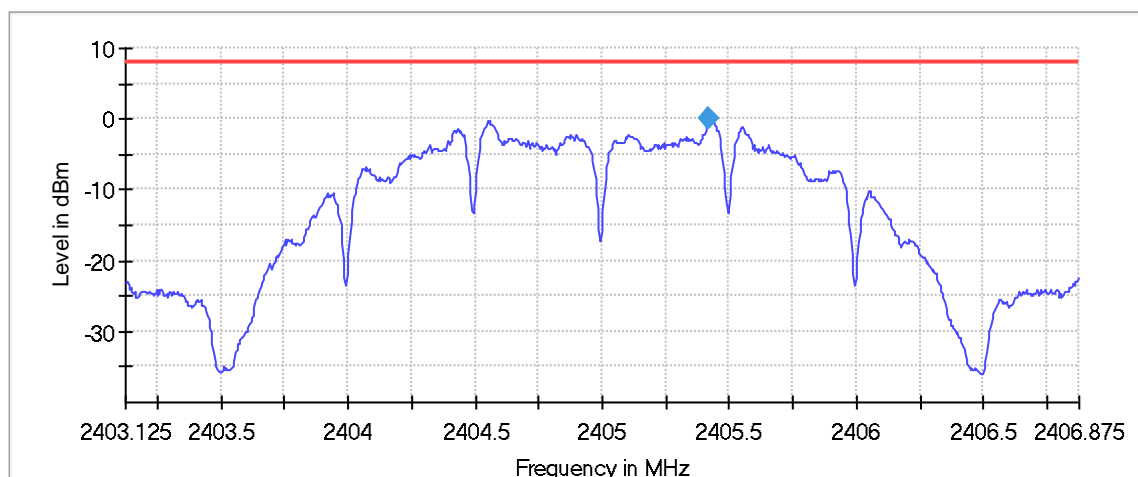
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	1-Nov-2019
RF CABLE	SF102	HUBER & SUHNER	B079822	27-Jul-2018
OPEN SWITCH AND CONTROL UNIT	OSP 120	ROHDE & SCHWARZ	S/N: 101182	CNR
ATTENUATOR, 10DB	10DB	ROHDE & SCHWARZ	B095591	28-Jul-2018

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

6.5 Test Data

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2405.000000	2405.417500	-0.034	8.0	PASS
2440.000000	2440.432500	-0.673	8.0	PASS
2475.000000	2474.562500	-0.748	8.0	PASS
2480.000000	2480.427500	-57.473	8.0	PASS

Representative Plot



— Limit — Sum Level ◆ PSD

Representative Measurement Settings

Setting	Instrument Value	Target Value
Start Frequency	2.40313 GHz	2.40313 GHz
Stop Frequency	2.40688 GHz	2.40688 GHz
Span	3.750 MHz	3.750 MHz
RBW	10.000 kHz	<= 10.000 kHz
VBW	30.000 kHz	>= 30.000 kHz
SweepPoints	750	~ 750
Sweeptime	3.750 s	3.750 s
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 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	19 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.49 dB	0.50 dB

7 Conducted Spurious Emissions

7.1 Test Result

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

7.2 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 is 20 dB below the maximum in-band peak PSD level in 100 kHz.

7.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 22.9 °C

Relative Humidity: 36.4 %

7.4 Test Equipment

Test End Date: 27-Mar-2018

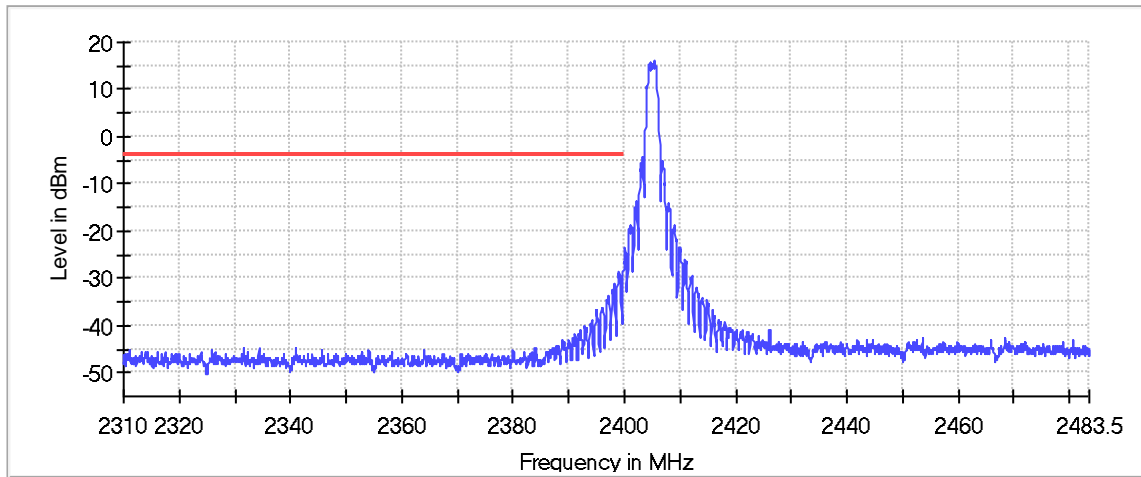
Tester: JOP

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.

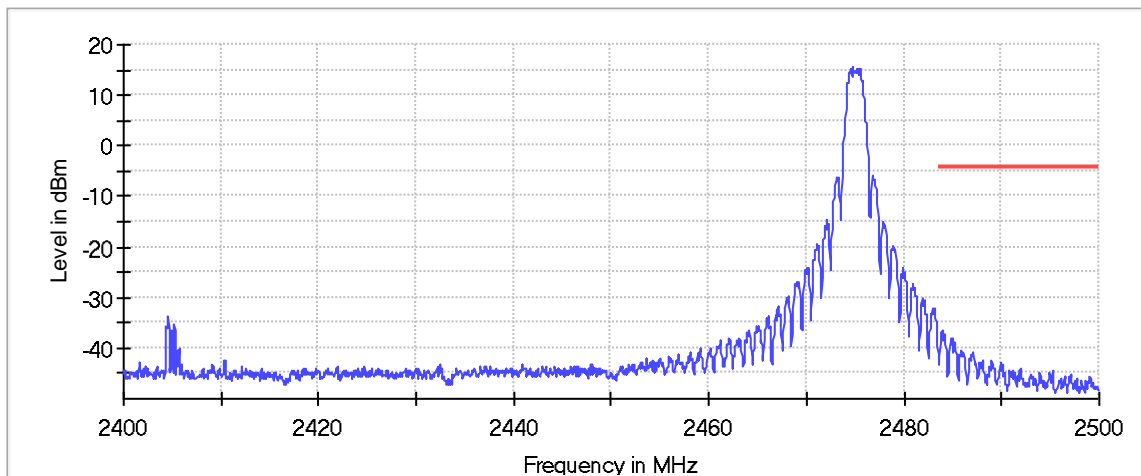
7.5 Test Data – DTS Bandedge

Lower band edge



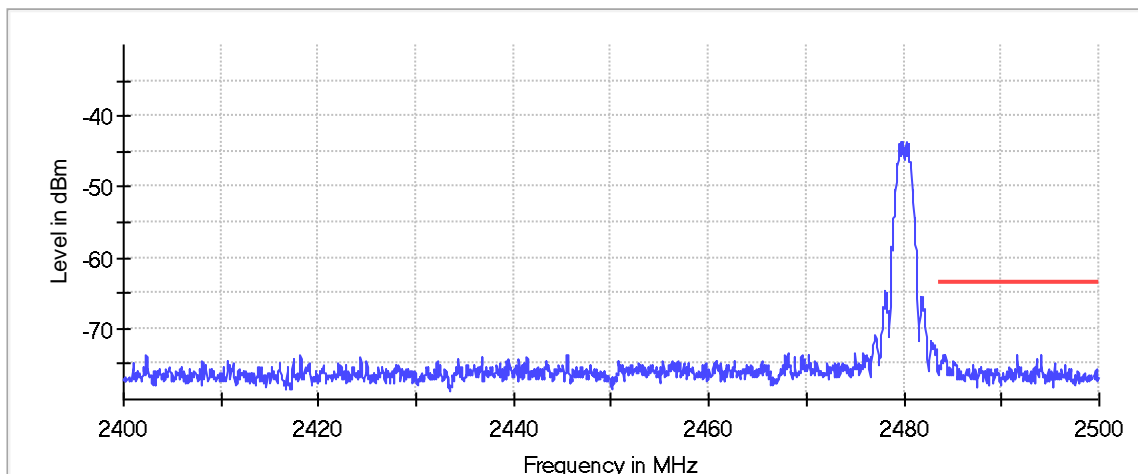
— Limit — Sum Level × Fail

Upper band edge (Channel 25)



— Limit — Sum Level × Fail

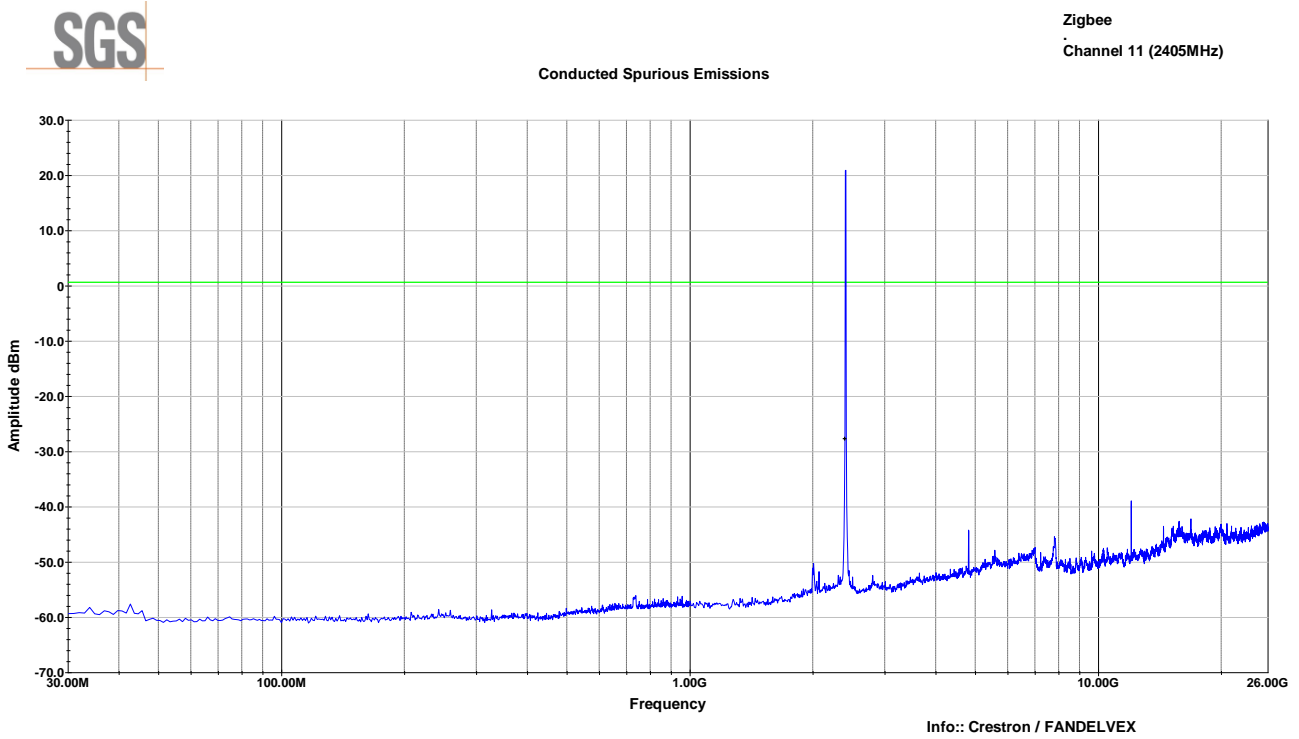
Upper band edge (Channel 26)



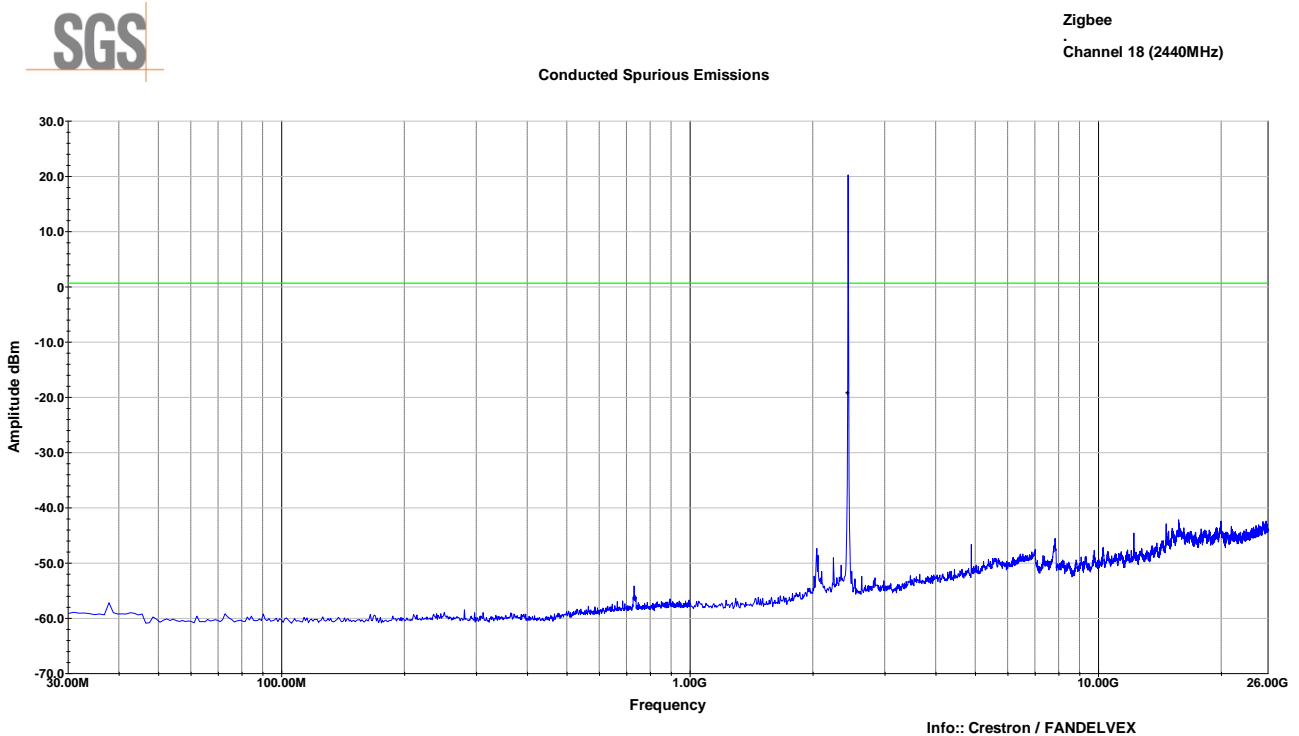
— Limit — Sum Level × Fail

7.6 Test Data – Conducted Spurious Emissions

Conducted Spurs –Channel 11



Conducted Spurs –Channel 18

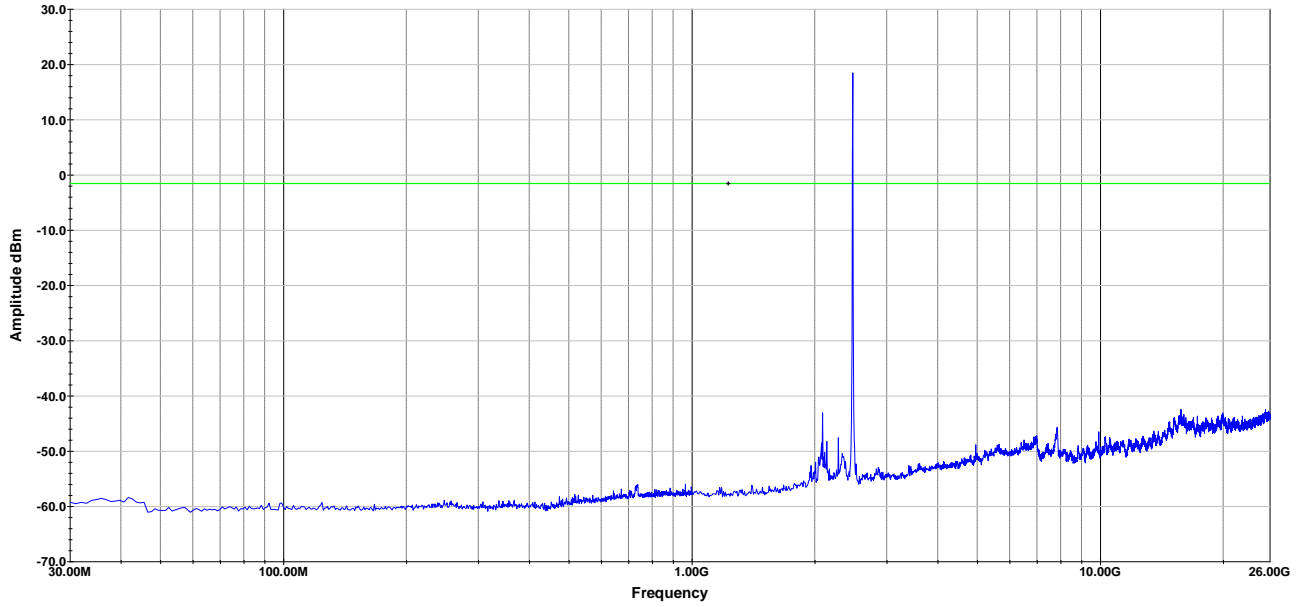


Conducted Spurs –Channel 25



Zigbee
Channel 25 (2475MHz)

Conducted Spurious Emissions



8 Field Strength of Spurious Radiation

8.1 Test Result

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

8.2 Test Method

Radiated emission measurements were performed with the chip antenna installed as intended. The measurement methods defined in ANSI C63.10: 2013 were used.

Lowest, middle, and highest channels were investigated. For this evaluation, Channel 25 was used as the upper channel for spurious emissions measurements. This was chosen due to the significant power reduction at Channel 26.

Test distance:

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 meters

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

8.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.3 °C

Relative Humidity: 48.9 %

8.4 Test Equipment

Measurements >1GHz

Test End Date: 7-Jun-2018

Tester: ASF

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
ANTENNA, DRG HORN (MEDIUM)	3117	ETS LINDGREN	B079691	27-Jul-2018
RF CABLE	141	HUBER & SUHNER	B095590	26-Jul-2018
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	B094463	6-Mar-2019
RF CABLE	104PE	HUBER & SUHNER	B079793	24-Jul-2018
FILTER, HIGH PASS (>2800MHZ)	HPM50111	MICRO-TRONICS	B085747	27-Jul-2018
ANTENNA, DRG HORN (SMALL)	3116B	ETS LINDGREN	B079695	27-Jul-2018
LOW NOISE AMPLIFIER	NSP1840-HG	MITEQ	B087572	28-Jul-2018
RF CABLE	SF102	HUBER & SUHNER	B079823	26-Jul-2018
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B085759	22-Nov-2018

Note: The equipment calibration period is 1 year.

Measurements <1GHz

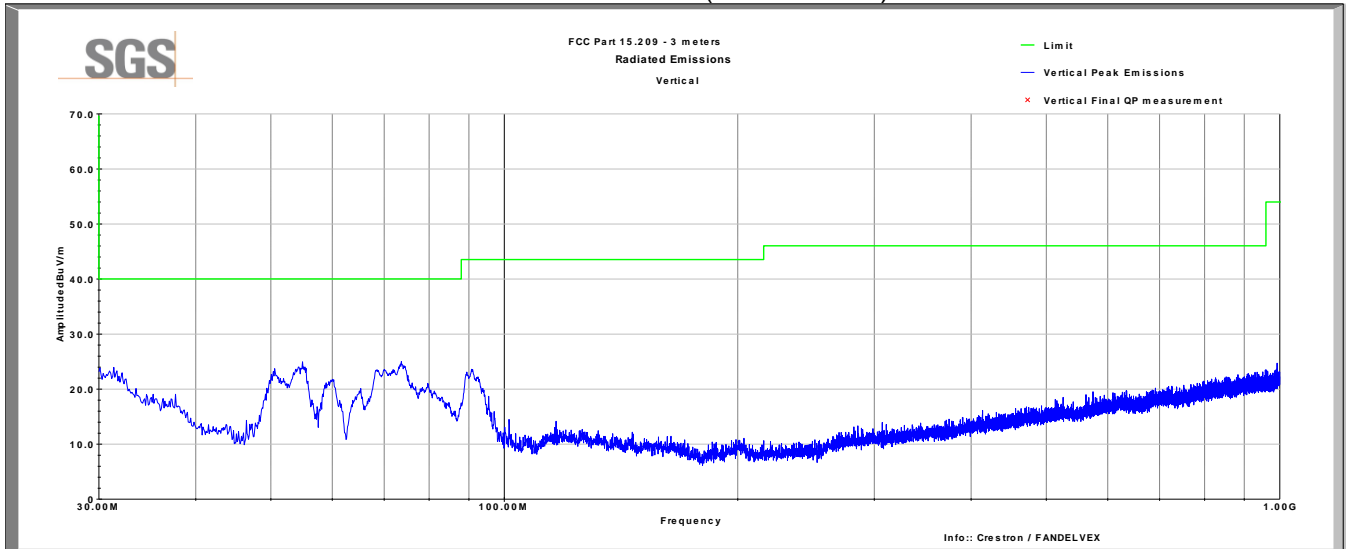
Test End Date: 26-Mar-2018

Tester: JOP

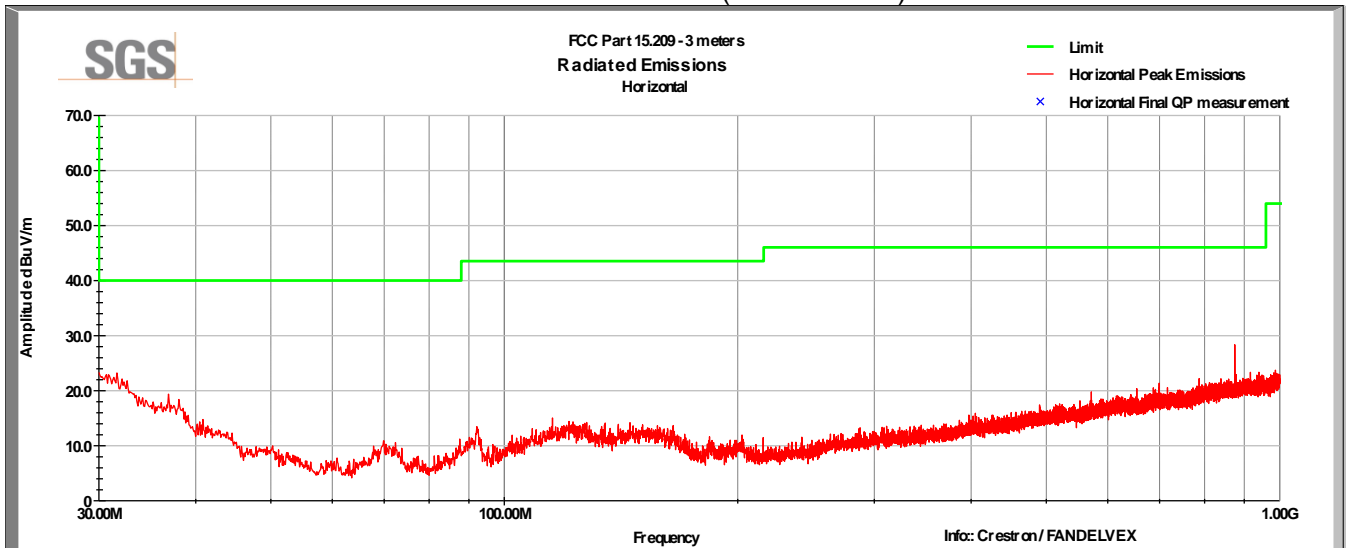
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	25-Apr-2018
ANTENNA, BILOG	JB6	SUNOL	B079690	29-Nov-2018
RF CABLE	SF106	HUBER & SUHNER	B079661	25-Jul-2018
RF CABLE	SF106	HUBER & SUHNER	B079713	24-Jul-2018
RF CABLE	UC-N-MM-78	MAURY MICROWAVE	17017	25-Jul-2018
RF CABLE	104PE	HUBER & SUHNER	B079793	24-Jul-2018
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	B094463	6-Mar-2019

8.5 Test Data – Peak Plots

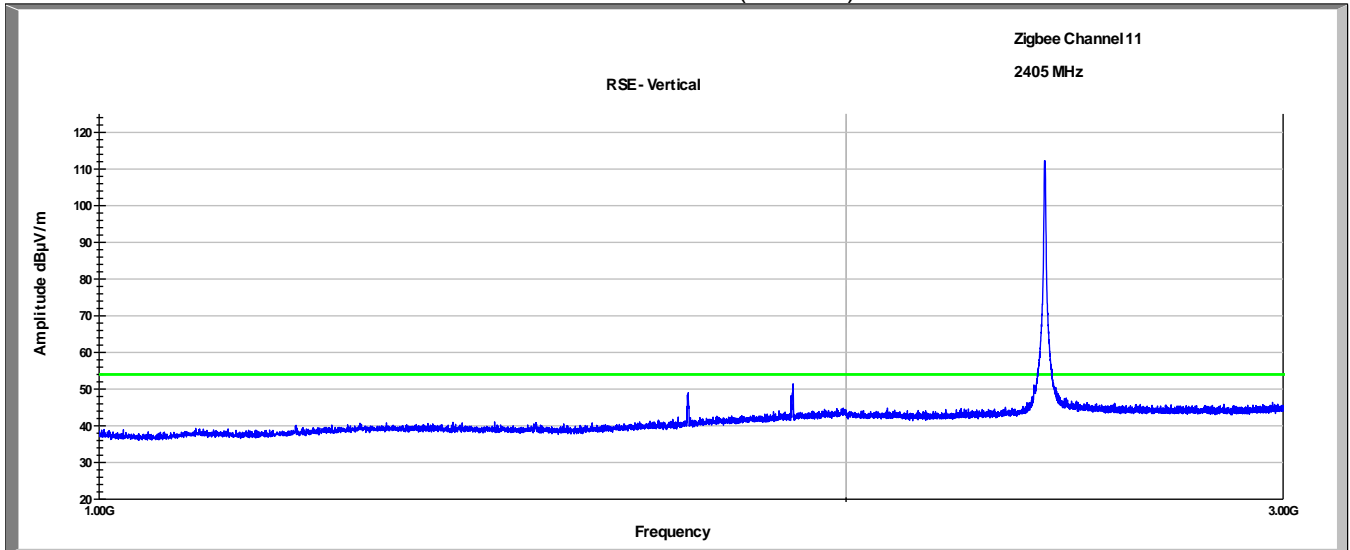
Low Channel (Channel 11, 2405MHz)
Peak Plot Vertical (30-1000MHz)



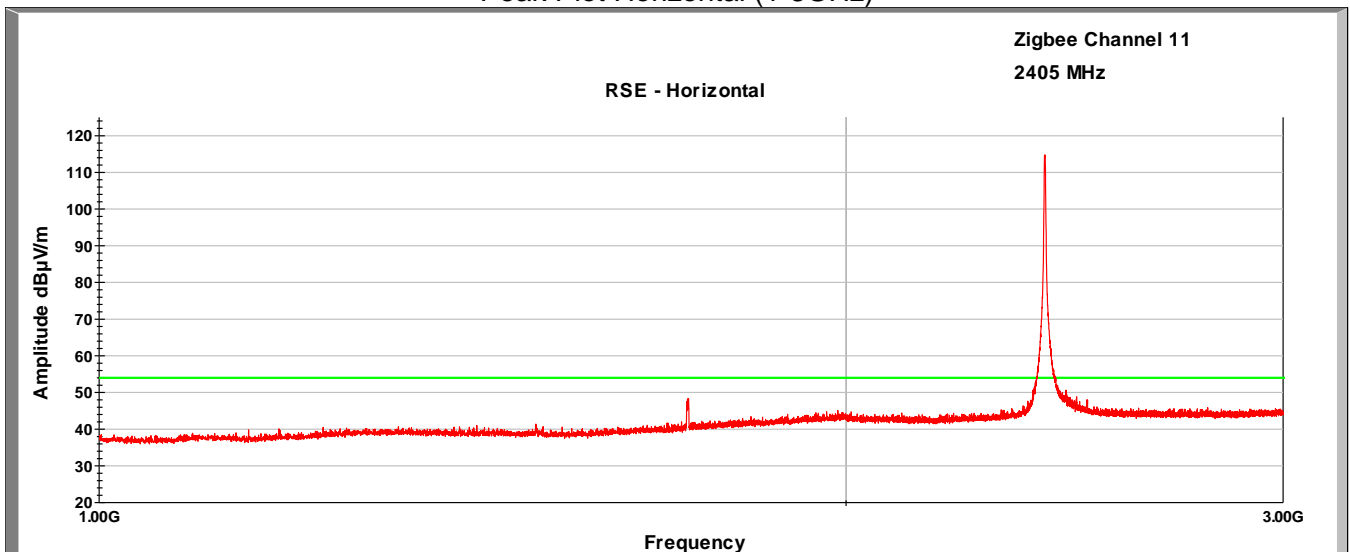
Low Channel (Channel 11, 2405MHz)
Peak Plot Horizontal (30-1000MHz)



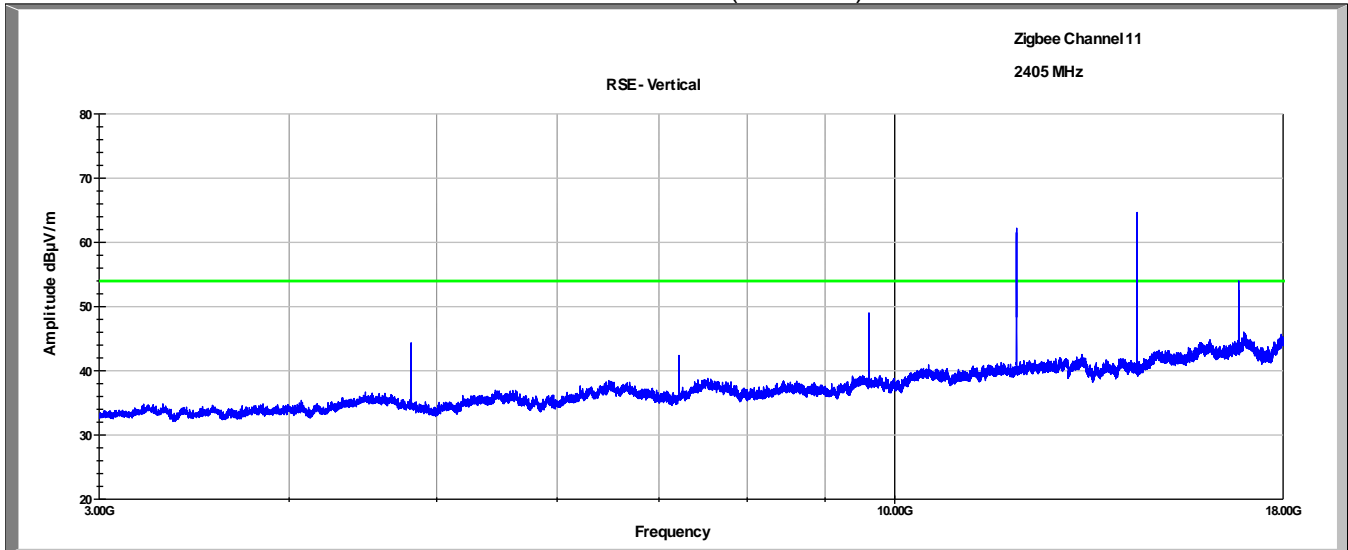
Low Channel (Channel 11, 2405MHz)
Peak Plot Vertical (1-3GHz)



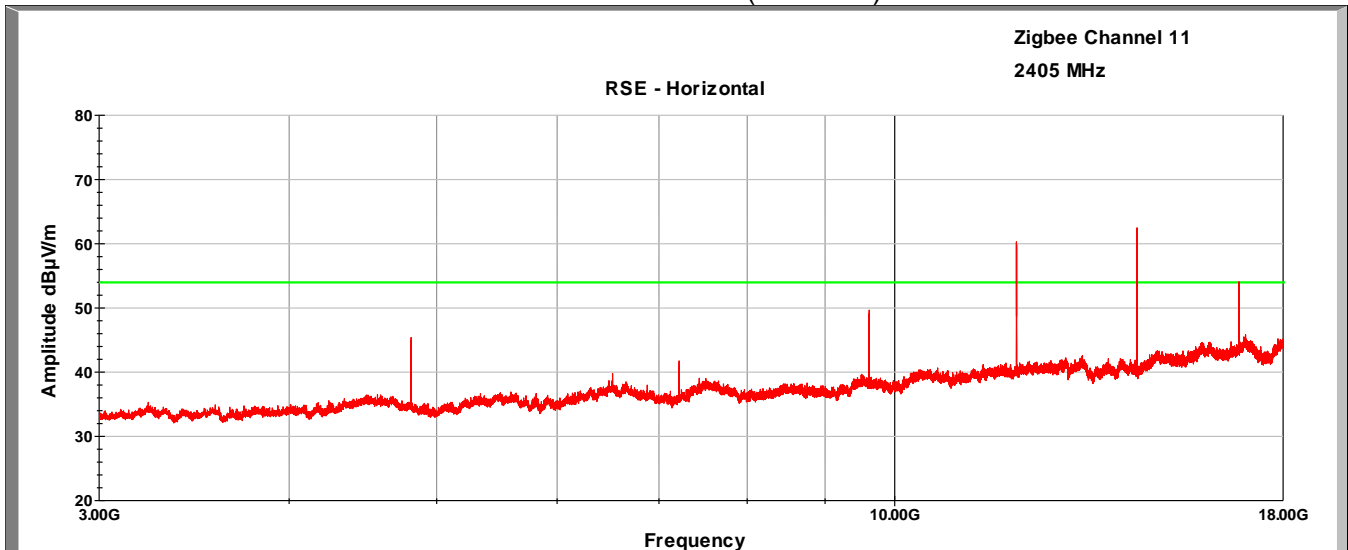
Low Channel (Channel 11, 2405MHz)
Peak Plot Horizontal (1-3GHz)



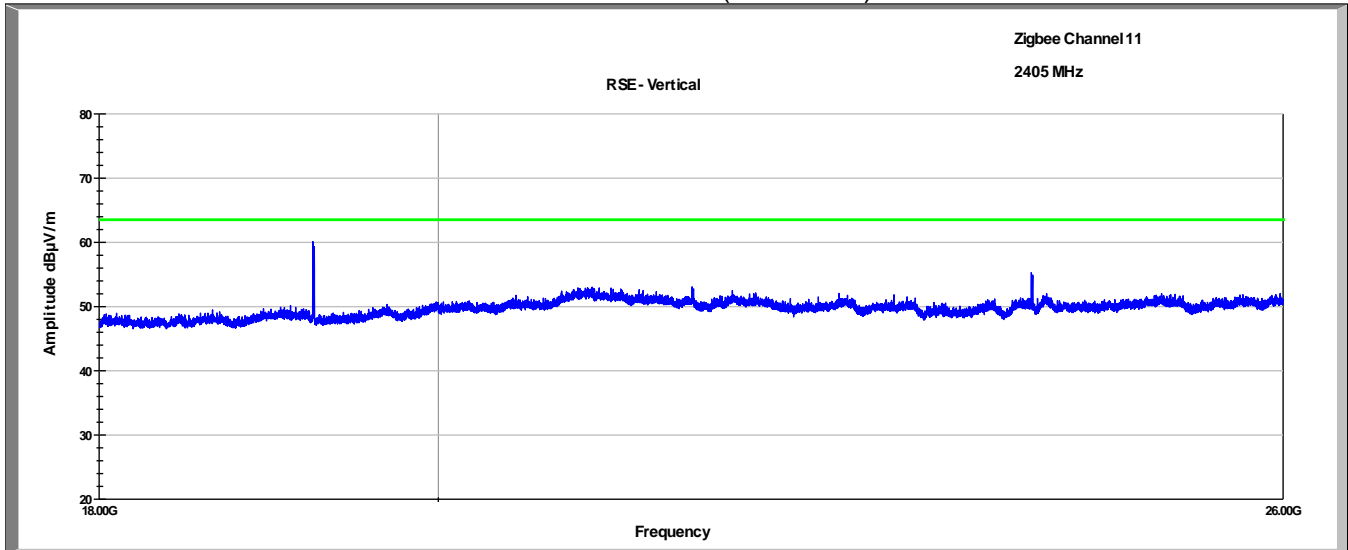
Low Channel (Channel 11, 2405MHz)
Peak Plot Vertical (3-18GHz)



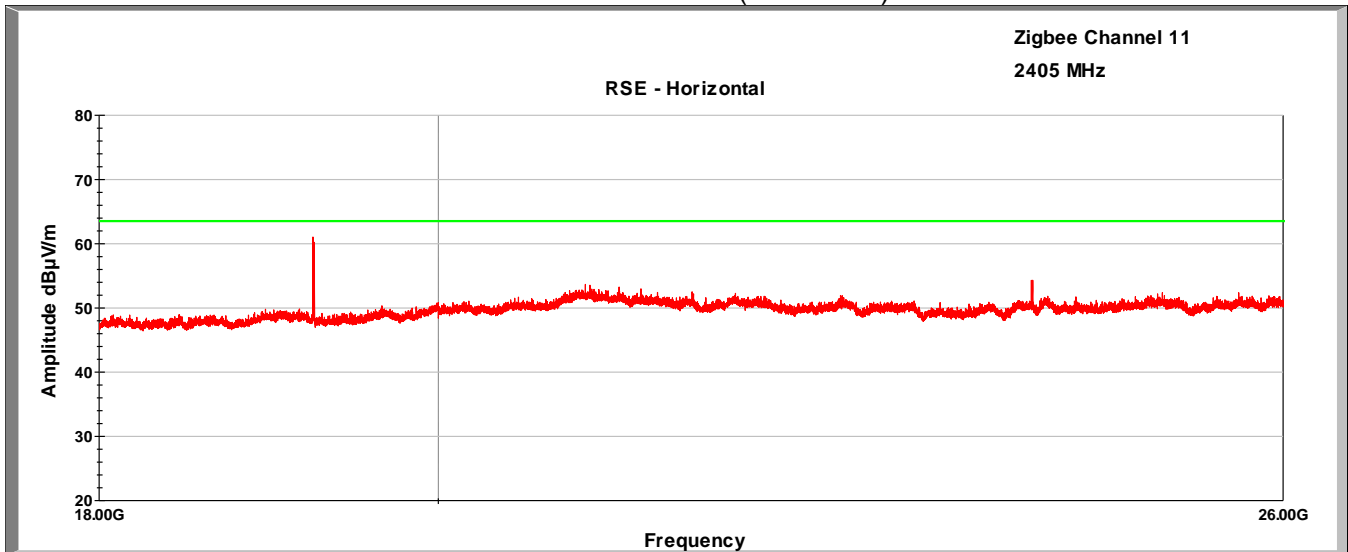
Low Channel (Channel 11, 2405MHz)
Peak Plot Horizontal (3-18GHz)



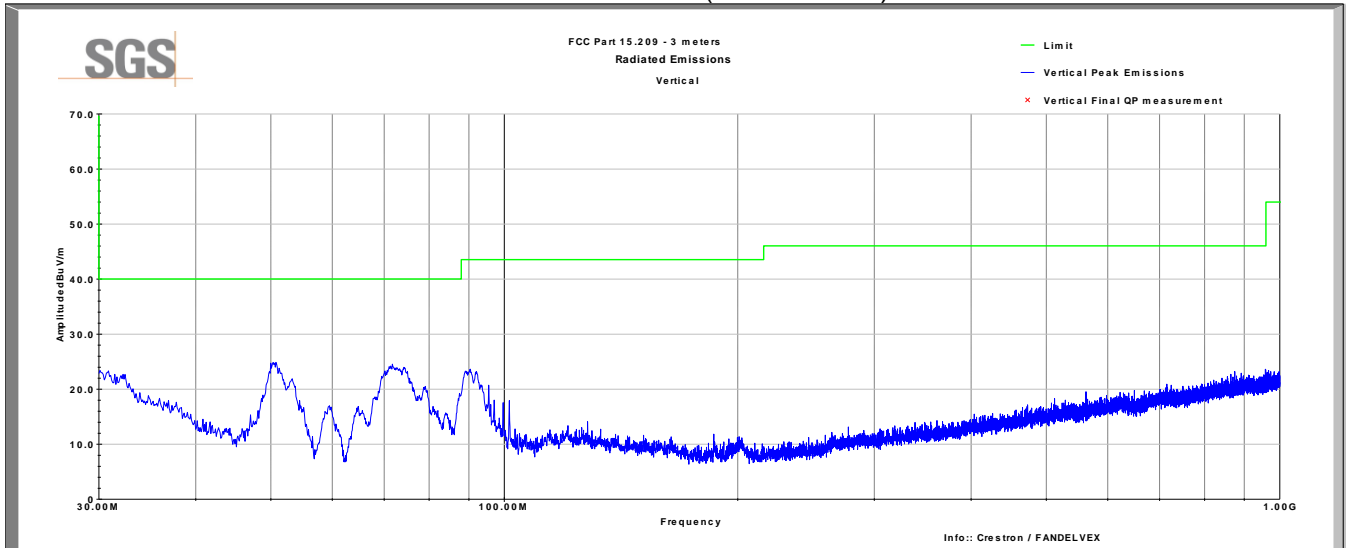
Low Channel (Channel 11, 2405MHz)
Peak Plot Vertical (18-26GHz)



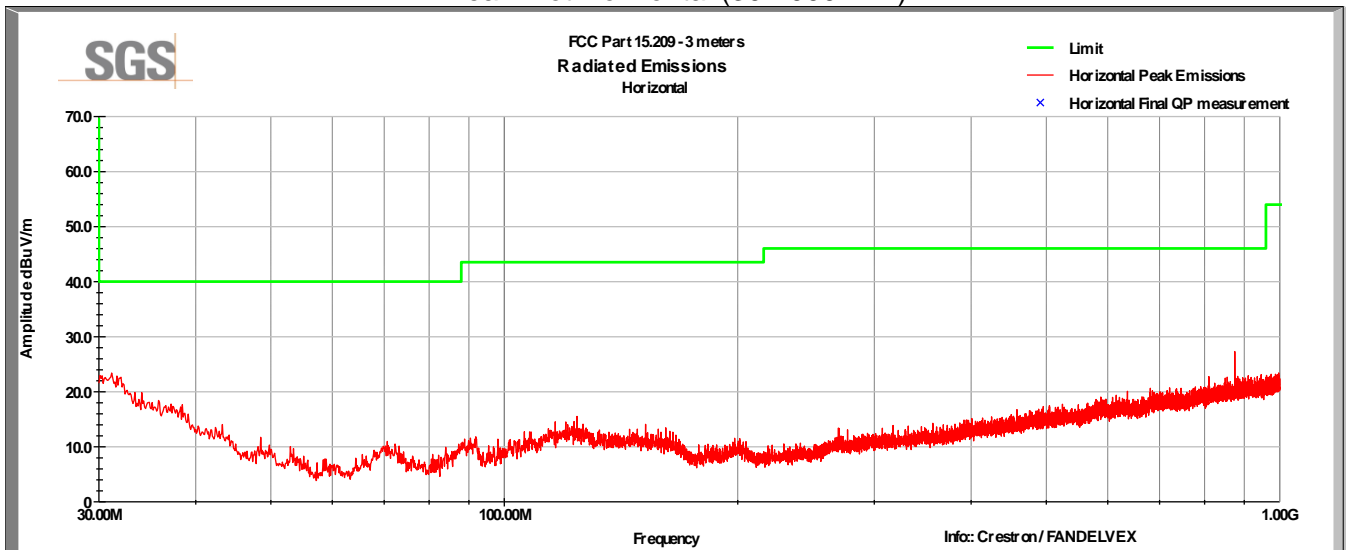
Low Channel (Channel 11, 2405MHz)
Peak Plot Horizontal (18-26GHz)



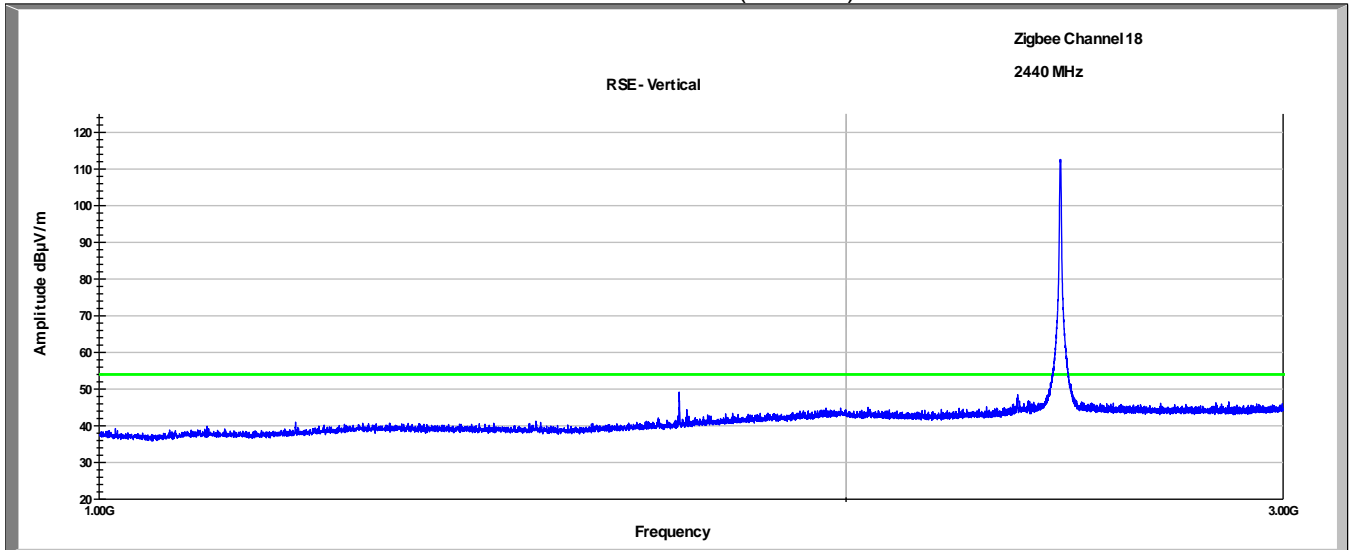
Low Channel (Channel 18, 2440MHz)
Peak Plot Vertical (30-1000MHz)



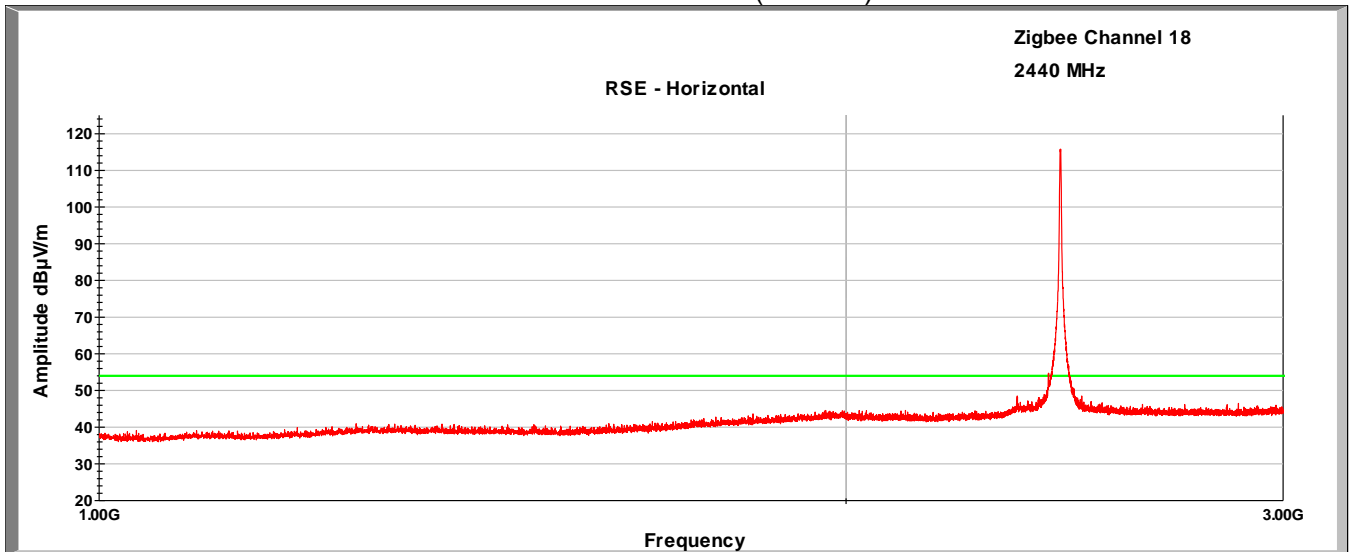
Low Channel (Channel 18, 2440MHz)
Peak Plot Horizontal (30-1000MHz)



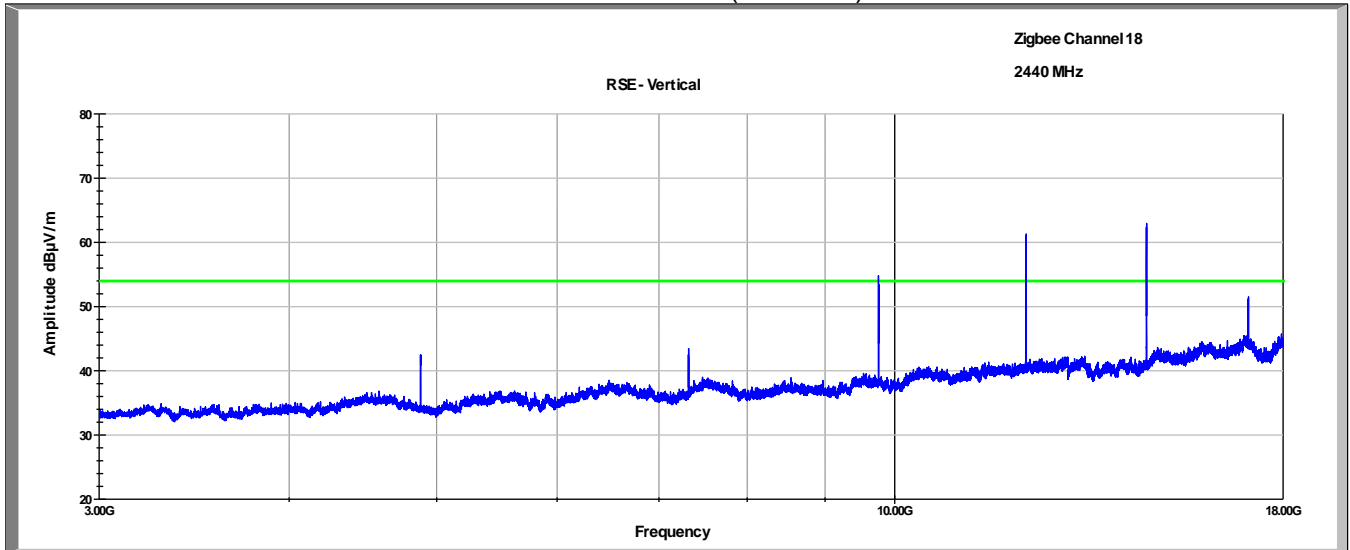
Low Channel (Channel 18, 2440MHz)
Peak Plot Vertical (1-3GHz)



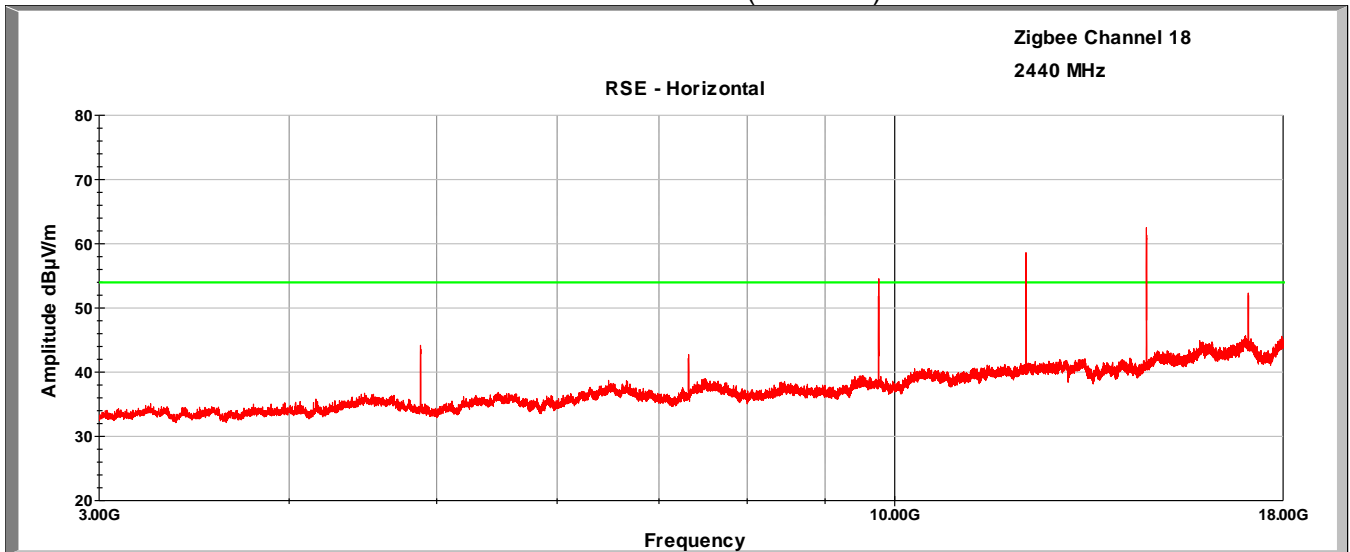
Low Channel (Channel 18, 2440MHz)
Peak Plot Horizontal (1-3GHz)



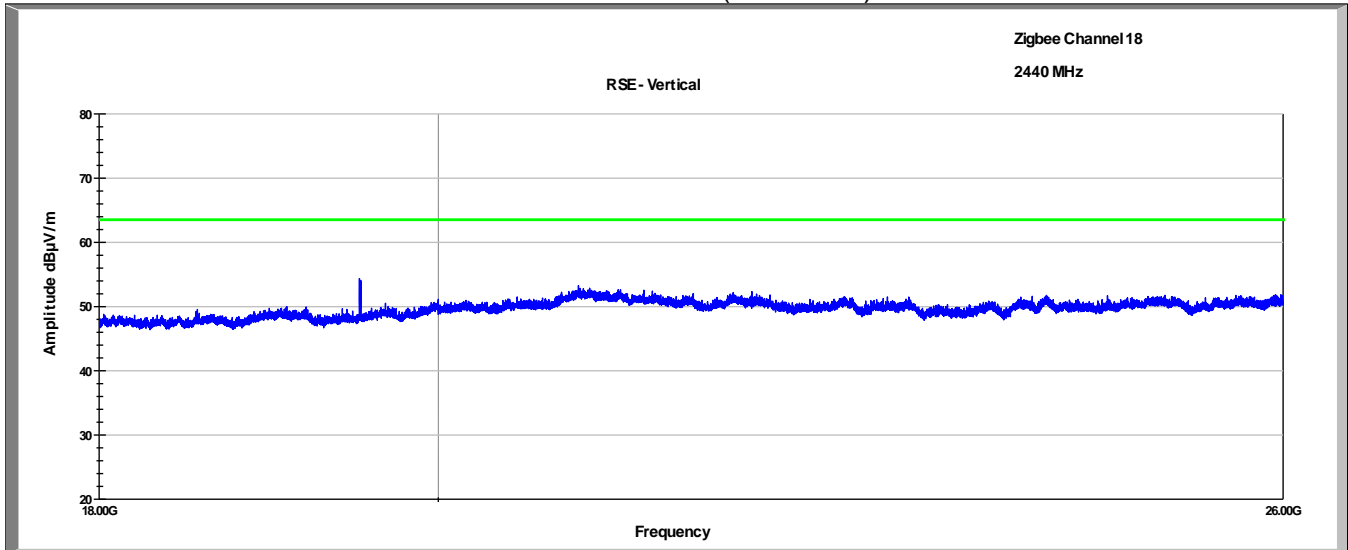
Low Channel (Channel 18, 2440MHz)
Peak Plot Vertical (3-18GHz)



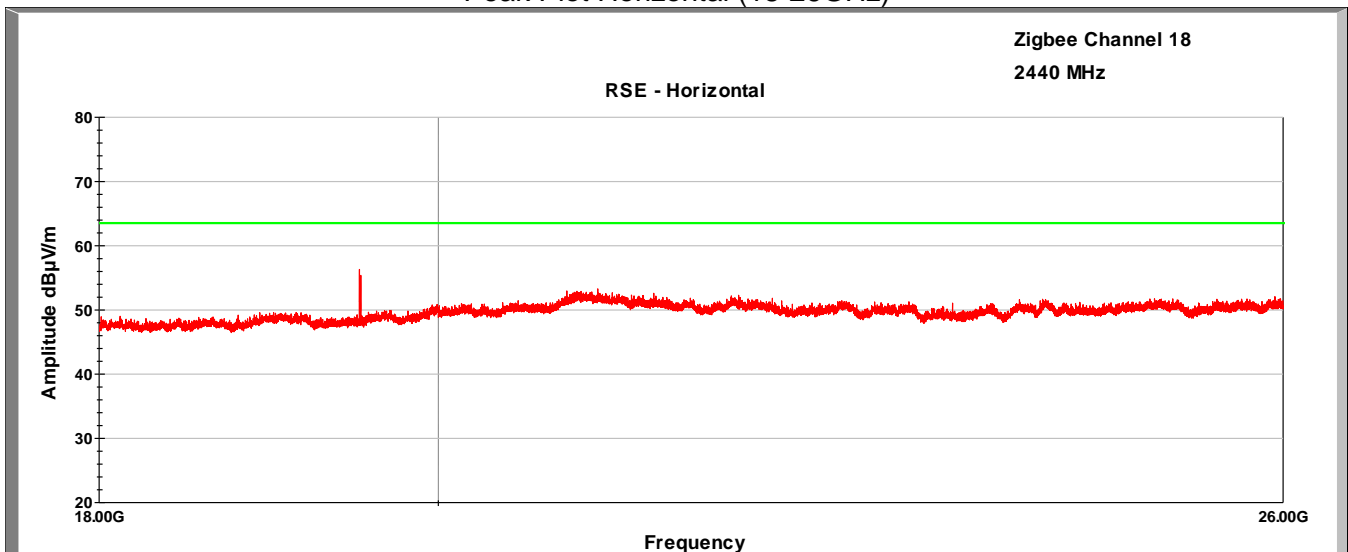
Low Channel (Channel 18, 2440MHz)
Peak Plot Horizontal (3-18GHz)



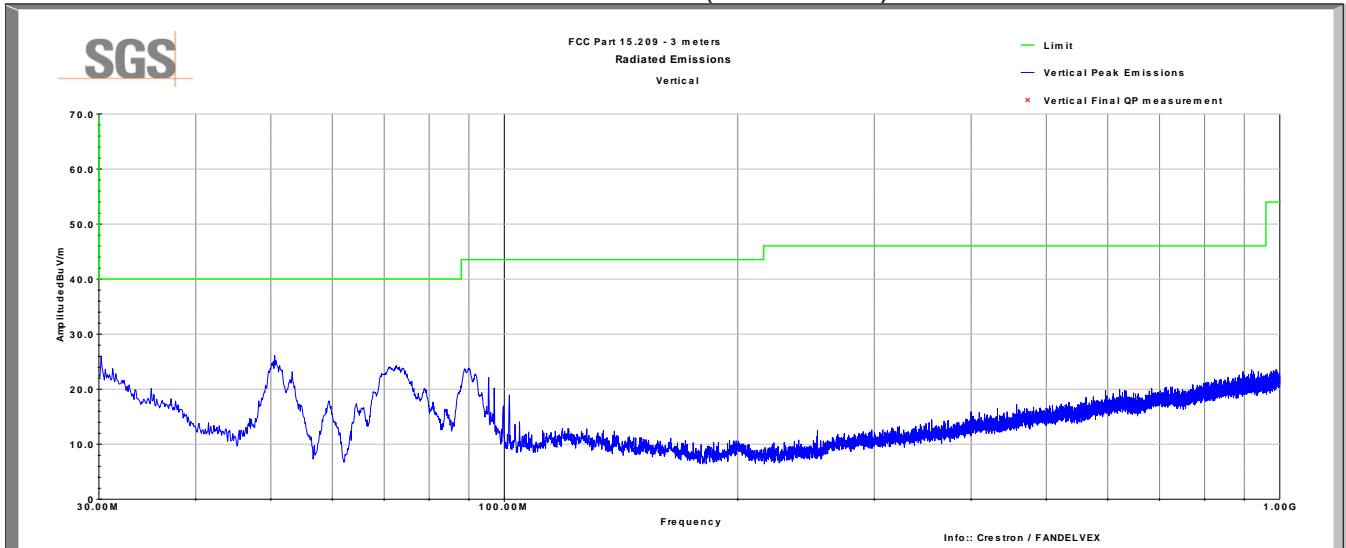
Mid Channel (Channel 18, 2440MHz)
Peak Plot Vertical (18-26GHz)



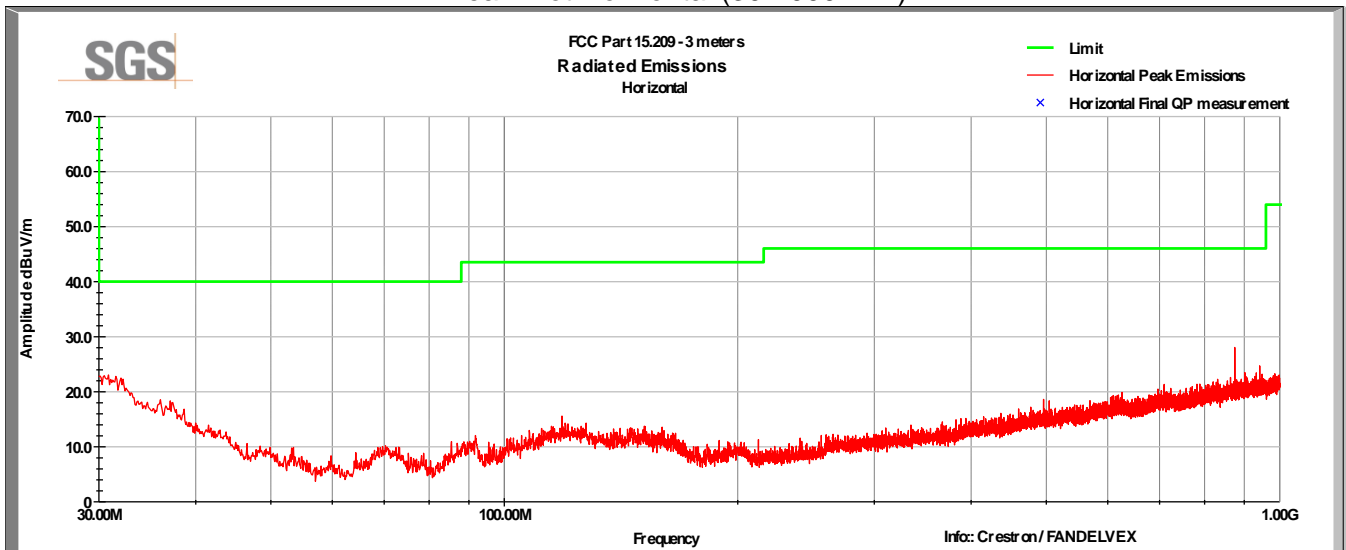
Mid Channel (Channel 18, 2440MHz)
Peak Plot Horizontal (18-26GHz)



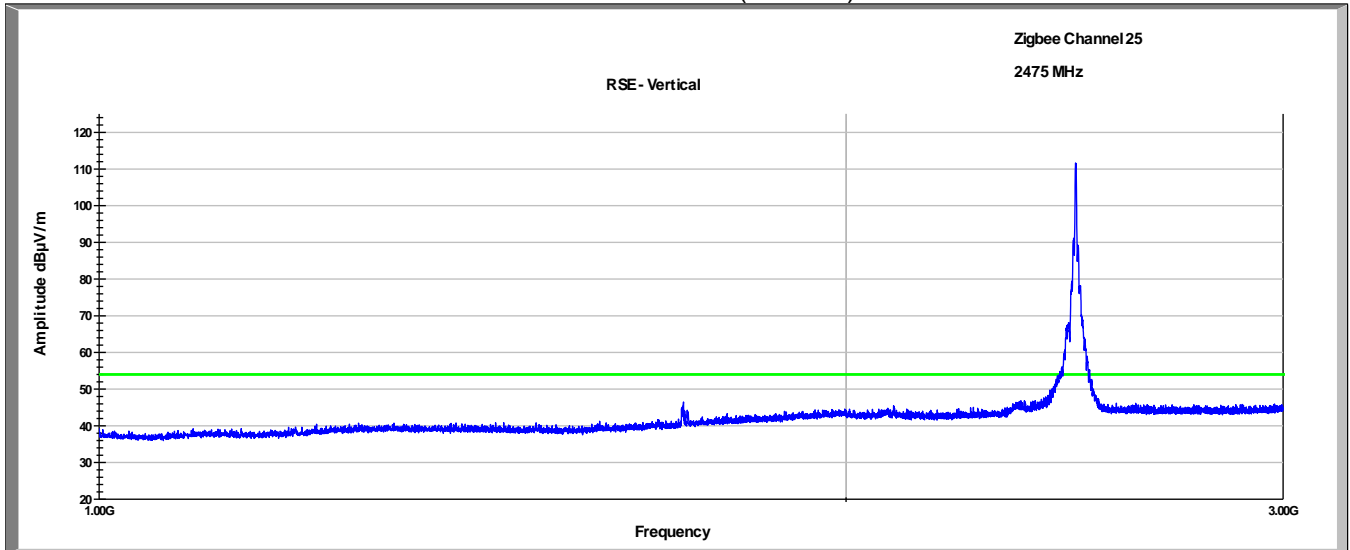
Low Channel (Channel 25, 2475MHz)
Peak Plot Vertical (30-1000MHz)



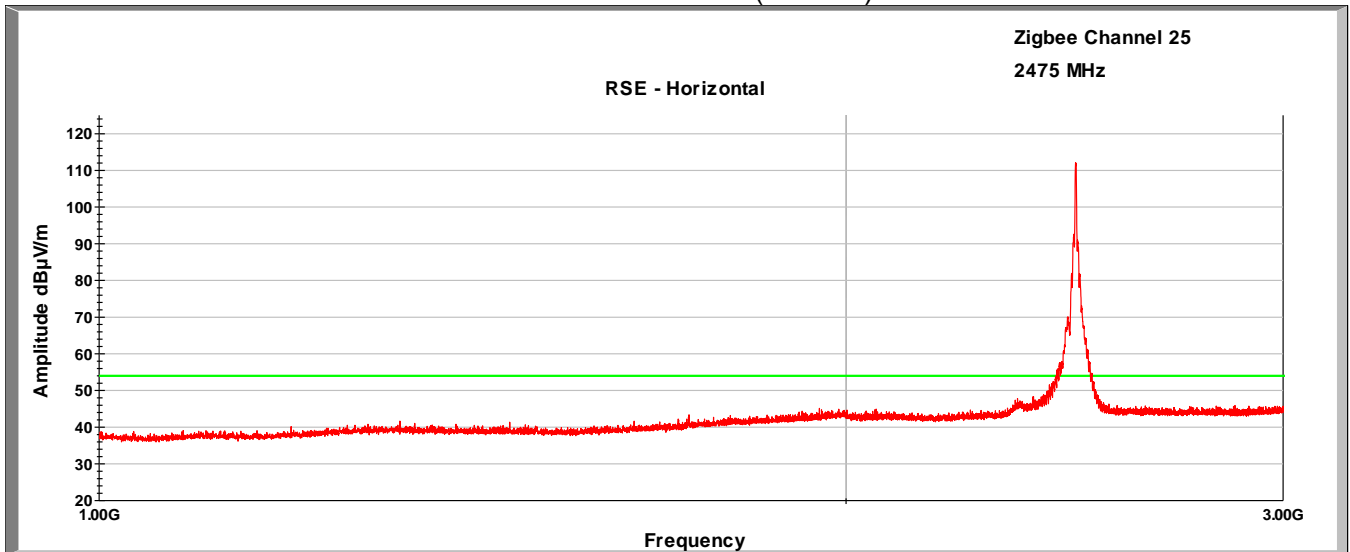
Low Channel (Channel 25, 2475MHz)
Peak Plot Horizontal (30-1000MHz)



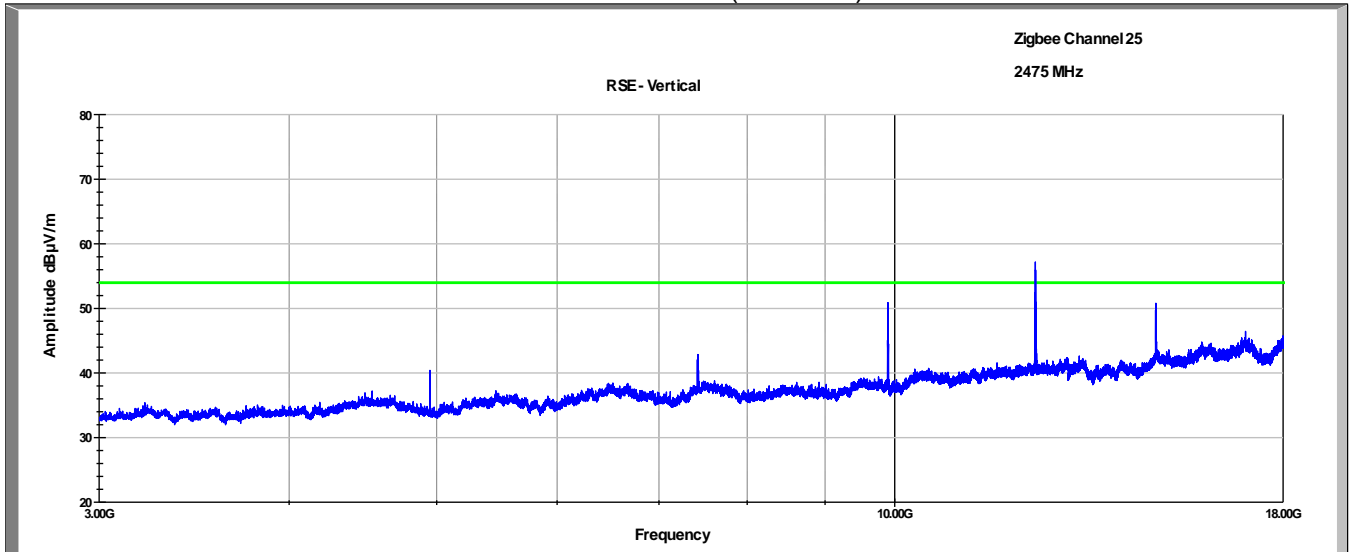
High Channel (Channel 25, 2475MHz)
Peak Plot Vertical (1-3GHz)



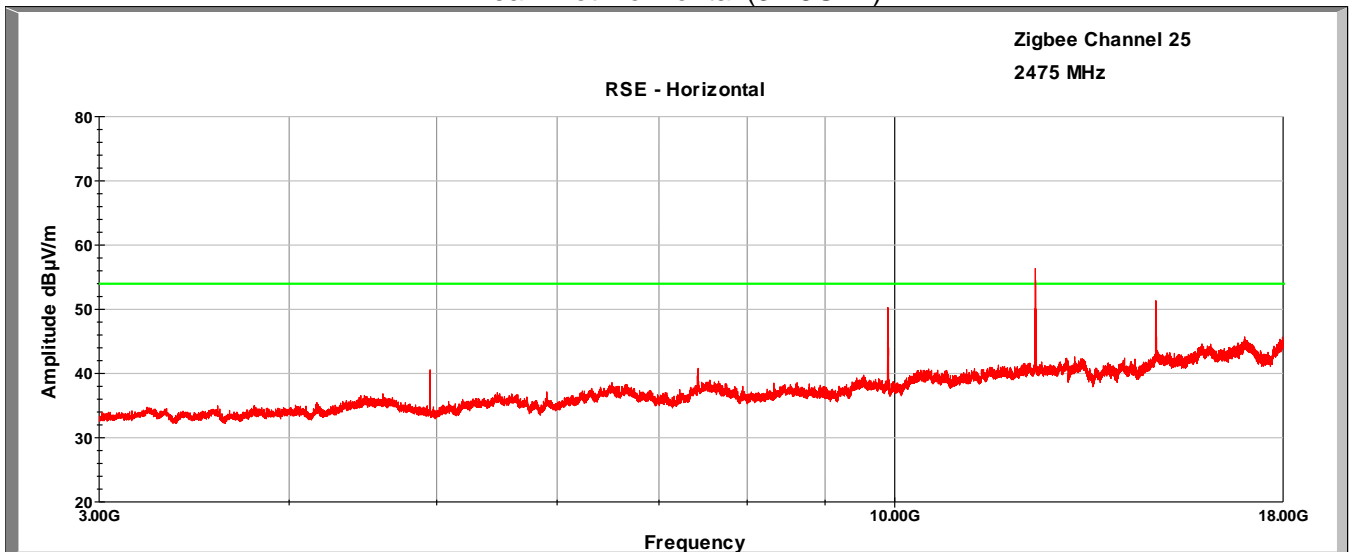
High Channel (Channel 25, 2475MHz)
Peak Plot Horizontal (1-3GHz)



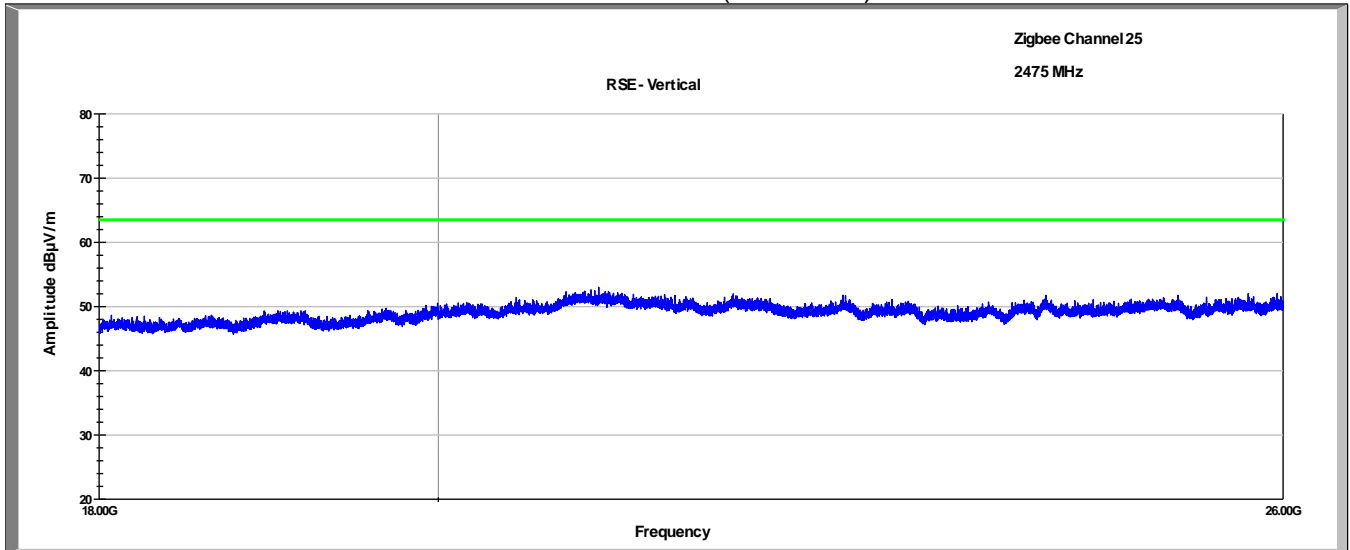
High Channel (Channel 25, 2475MHz)
Peak Plot Vertical (3-18GHz)



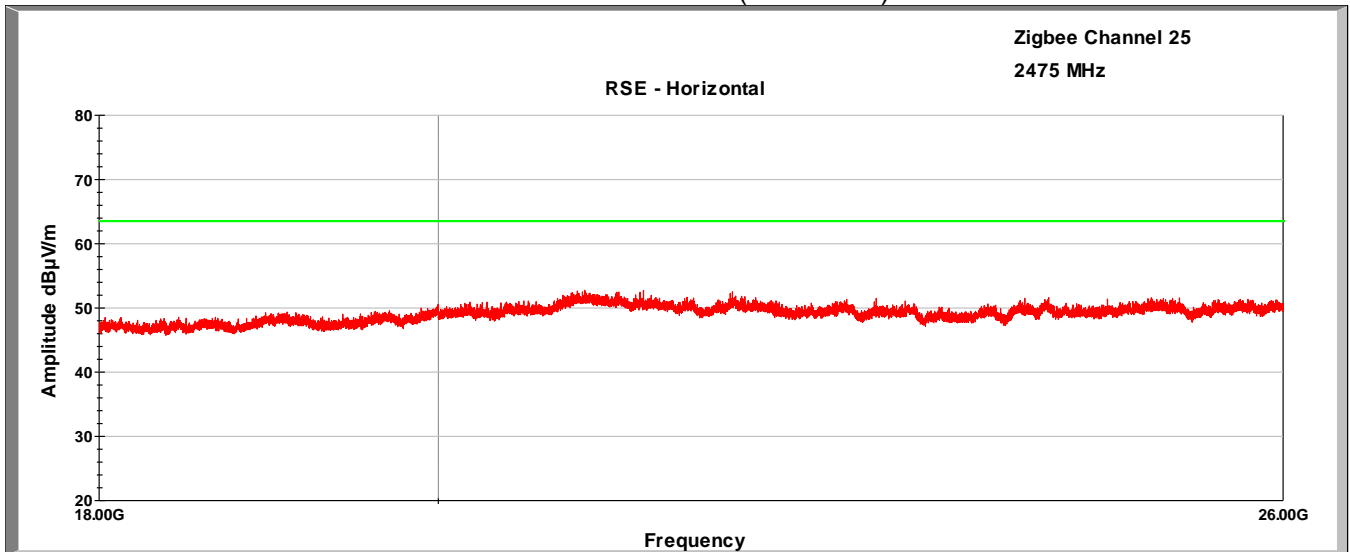
High Channel (Channel 25, 2475MHz)
Peak Plot Horizontal (3-18GHz)



High Channel (Channel 25, 2475MHz)
Peak Plot Vertical (18-26GHz)



High Channel (Channel 25, 2475MHz)
Peak Plot Horizontal (18-26GHz)



8.6 Test Data – Tabular Data

DUT Ch #	Frequency MHz	Polarity V/H	Final Value dBuV/m	Limit dBuV/m	Margin dB	Detector	
11	9618	V	48.97	NA	NA	Peak	*
11	9618	V	27.70	NA	NA	Average	*
11	9622	H	49.66	NA	NA	Peak	*
11	9622	H	28.39	NA	NA	Average	*
11	12028	V	62.22	74	-11.78	Peak	
11	12028	V	40.95	54	-13.05	Average	
11	12022	H	60.30	74	-13.70	Peak	
11	12022	H	39.03	54	-14.97	Average	
11	14433	V	64.64	NA	NA	Peak	*
11	14433	V	43.37	NA	NA	Average	*
11	14427	H	62.38	NA	NA	Peak	*
11	14427	H	41.11	NA	NA	Average	*
11	16832	V	53.96	NA	NA	Peak	*
11	16832	V	32.69	NA	NA	Average	*
11	16832	H	54.00	NA	NA	Peak	*
11	16832	H	32.73	NA	NA	Average	*
11	19236	V	60.13	74	-13.87	Peak	
11	19236	V	38.86	54	-15.14	Average	
11	19236	H	61.05	74	-12.95	Peak	
11	19236	H	39.78	54	-14.22	Average	

DUT Ch #	Frequency MHz	Polarity V/H	Final Value dBuV/m	Limit dBuV/m	Margin dB	Detector	
18	9757	V	54.54	NA	NA	Peak	*
18	9757	V	33.27	NA	NA	Average	*
18	9762	H	54.56	NA	NA	Peak	*
18	9762	H	33.29	NA	NA	Average	*
18	12203	V	61.26	74	-12.74	Peak	
18	12203	V	39.99	54	-14.01	Average	
18	12198	H	58.26	74	-15.74	Peak	
18	12198	H	36.99	54	-17.01	Average	
18	14643	V	62.96	NA	NA	Peak	*
18	14643	V	41.69	NA	NA	Average	*
18	14637	H	62.40	NA	NA	Peak	*
18	14637	H	41.13	NA	NA	Average	*
18	17084	V	51.48	NA	NA	Peak	*
18	18074	V	30.21	NA	NA	Average	*
18	17076	H	52.28	NA	NA	Peak	*
18	17076	H	31.01	NA	NA	Average	*
18	19516	V	54.36	74	-19.64	Peak	
18	19516	V	33.09	54	-20.91	Average	
18	19516	H	56.31	74	-17.69	Peak	
18	19516	H	35.04	54	-18.96	Average	

DUT Ch #	Frequency MHz	Polarity V/H	Final Value dBuV/m	Limit dBuV/m	Margin dB	Detector	
25	9898	V	50.88	NA	NA	Peak	*
25	9898	V	29.61	NA	NA	Average	*
25	9898	H	50.24	NA	NA	Peak	*
25	9898	H	28.97	NA	NA	Average	*
25	12373	V	57.15	74	-16.85	Peak	
25	12373	V	35.88	54	-18.12	Average	
25	12373	H	56.36	74	-17.64	Peak	
25	12373	H	35.09	54	-18.91	Average	
25	14848	V	50.80	NA	NA	Peak	*
25	14848	V	29.53	NA	NA	Average	*
25	14847	H	51.20	NA	NA	Peak	*
25	14847	H	29.93	NA	NA	Average	*

*These Emissions did not fall into restricted bands

Average measurements were obtained by applying a 21.27 dB duty-cycle correction factor (DCCF) to the peak reading as tested in section 4.

9 Radiated Emissions at Band Edge / Restricted Band

9.1 Test Result

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

9.2 Test Method

Peak and average field strength measurements were performed at the restricted band edges of 2390MHz and 2483.5MHz. Measurements were made using the radiated methods defined in FCC KDB publication 558074 D01 DTS Meas Guidance.

9.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 22.1 °C

Relative Humidity: 38.4 %

9.4 Test Equipment

Test End Date: 18-May-2017

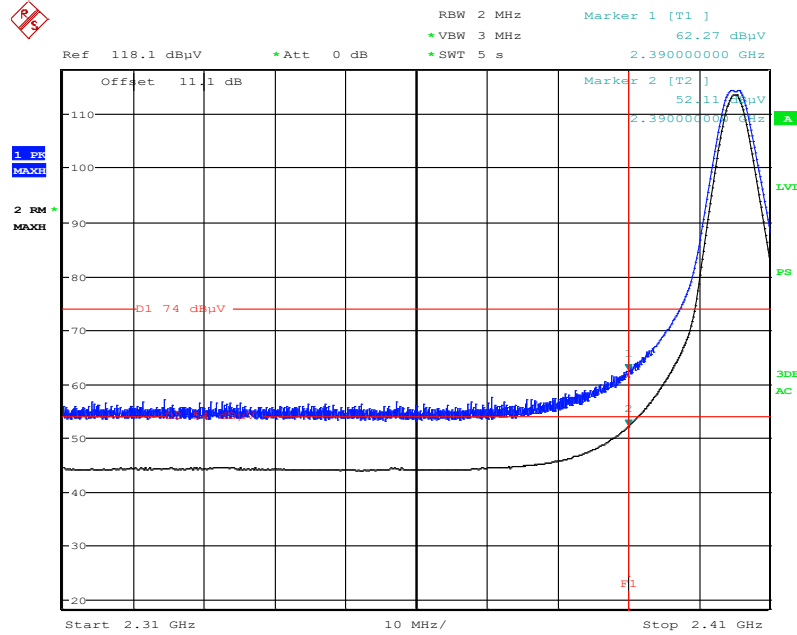
Tester: JOP

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	25-Apr-2018
RF CABLE	SF106	HUBER & SUHNER	B079713	27-Jul-2017
RF CABLE	104PE	HUBER & SUHNER	B079793	27-Jul-2017
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	15003	29-Jul-2017
ANTENNA, DRG HORN (MEDIUM)	3117	ETS LINDGREN	B079691	27-Jul-2017
HORN(SMALL)	LB-180400-20-C-KF	A-INFO	15007	21-Mar-2018
RF CABLE	SF102	HUBER & SUHNER	B079822	27-Jul-2017
RF CABLE	SF102	HUBER & SUHNER	B079824	27-Jul-2017
LOW NOISE AMPLIFIER	NSP1840-HG	MITEQ	B087572	29-Jul-2017
FILTER, HIGH PASS (>2400MHZ)	HPM50110	MICRO-TRONICS	B079792	28-Jul-2017

Note: The equipment calibration period is 1 year.

9.5 Test Data

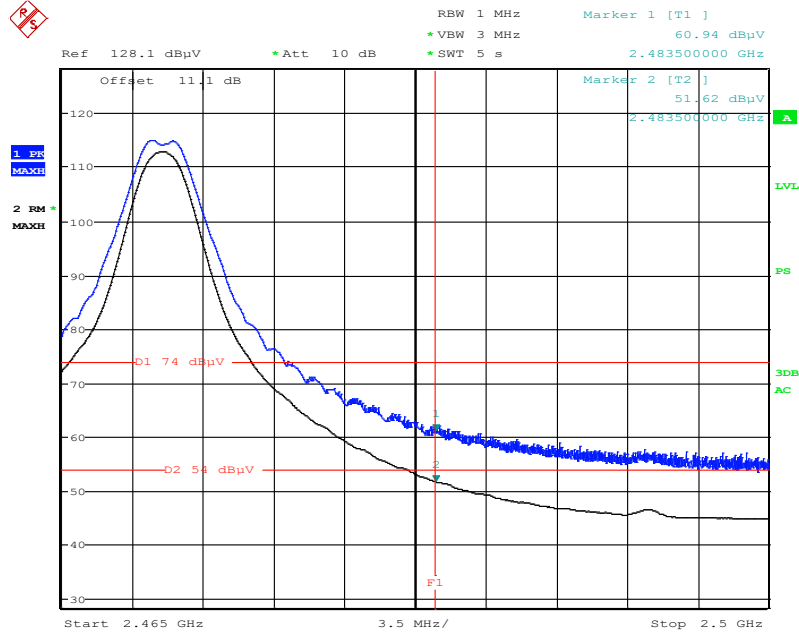
Channel 11



Date: 18.MAY.2017 04:50:09

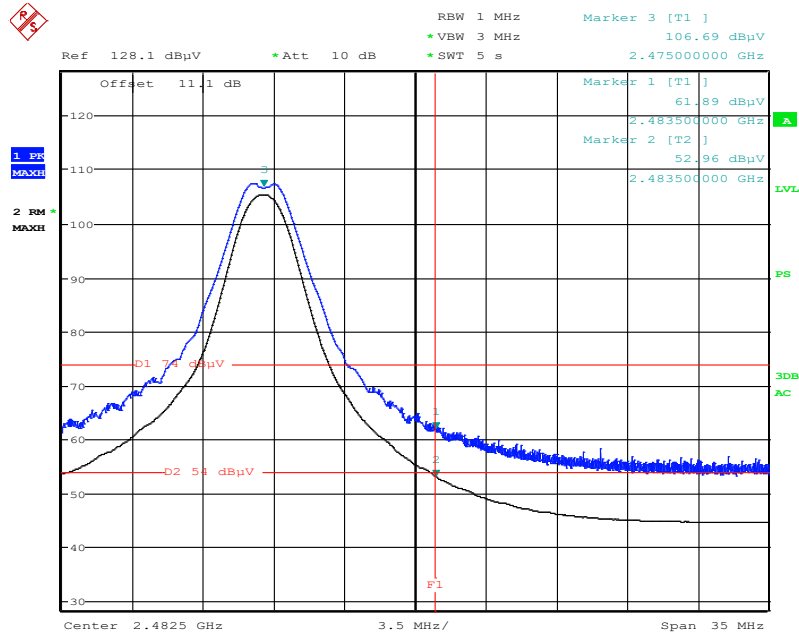
Channel	Frequency (MHz)	Reading (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Measurement Detector
11	2390	62.3	74	-11.7	Peak
11	2390	52.7	54	-1.3	RMS

Channel 24



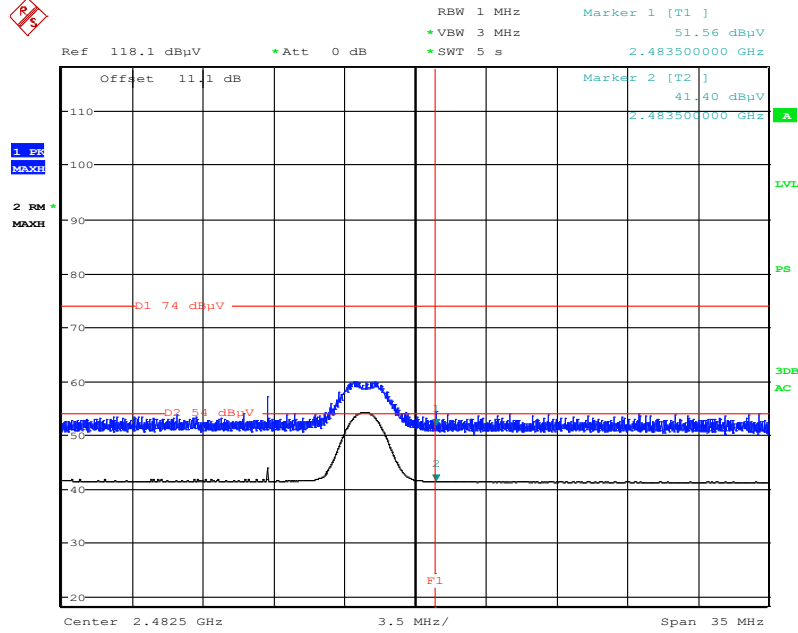
Date: 18.MAY.2017 04:03:56

Channel 25



Date: 18.MAY.2017 04:27:21

Channel 26



Date: 18.MAY.2017 04:47:05

Channel	Frequency (MHz)	Reading (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Measuremnt Detector
24	2483.5	60.9	74	-13.1	Peak
24	2483.5	51.6	54	-2.4	RMS
25	2483.5	61.9	74	-12.1	Peak
25	2483.5	53	54	-1	RMS
26	2483.5	51.6	74	-22.4	Peak
26	2483.5	41.4	54	-12.6	RMS

10 Conducted Emissions

10.1 Test Result

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

10.2 Test Method

With the receiver resolution bandwidth was set to 9 kHz the initial preliminary 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 B Limits (dBuV)
0.15 to 0.5 MHz	Avg 56 to 46 QP 66 to 56
0.5 to 5 MHz	Avg 46 Pk 56
5 to 30 MHz	Avg 50 Pk 60

10.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.0 °C

Relative Humidity: 48.5 %

10.4 Test Equipment

Test End Date: 27-Mar-2018

Tester: JOP

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU8	ROHDE & SCHWARZ	B085759	25-Jul-2018
RF CABLE	UC-N-MM-275	MAURY MICROWAVE	17015	25-Jul-2018
LINE IMPEDANCE STABILIZATION NETWORK	NNB 51	TESEQ	B087573	21-Nov-2018

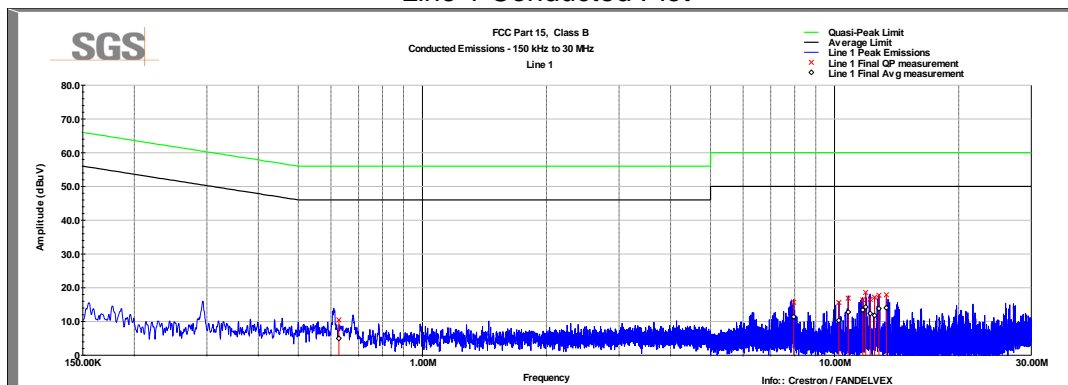
Note: The equipment calibration period is 1 year.

Software:

“Conducted Emissions” TILE! profile dated December 2015

10.5 Test Data

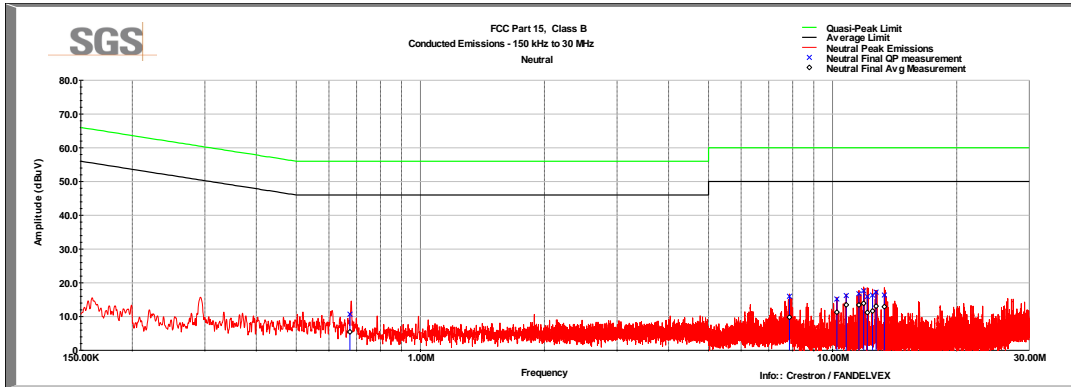
Line 1 Conducted Plot



Line 1 Conducted Emissions

Frequency MHz	QP Value dBuV	QP Limit dBuV	QP Margin dB	Avg Value dBuV	Avg Limit dBuV	Avg Margin dB
0.627	10.5	56.0	-45.5	5.0	46.0	-41.0
7.957	15.7	60.0	-44.3	11.4	50.0	-38.6
10.244	15.6	60.0	-44.4	10.3	50.0	-39.7
10.794	16.9	60.0	-43.1	12.8	50.0	-37.2
11.709	16.4	60.0	-43.6	13.4	50.0	-36.6
11.893	18.6	60.0	-41.4	14.3	50.0	-35.7
12.201	16.6	60.0	-43.4	12.4	50.0	-37.6
12.503	17.2	60.0	-42.8	11.8	50.0	-38.2
12.809	17.8	60.0	-42.2	13.8	50.0	-36.2
13.358	17.9	60.0	-42.1	14.0	50.0	-36.0

Neutral Conducted Plot



Neutral Conducted Emissions

Frequency MHz	QP Value dBuV	QP Limit dBuV	QP Margin dB	Avg Value dBuV	Avg Limit dBuV	Avg Margin dB
0.675	10.7	56.0	-45.3	5.4	46.0	-40.6
7.859	16.0	60.0	-44.0	9.8	50.0	-40.2
10.244	15.2	60.0	-44.8	11.3	50.0	-38.7
10.794	16.2	60.0	-43.8	13.4	50.0	-36.6
11.587	16.8	60.0	-43.2	13.4	50.0	-36.6
11.893	17.6	60.0	-42.4	13.9	50.0	-36.1
12.140	15.9	60.0	-44.1	11.2	50.0	-38.8
12.503	16.3	60.0	-43.7	11.6	50.0	-38.4
12.748	17.2	60.0	-42.8	13.1	50.0	-36.9
13.358	16.4	60.0	-43.6	12.9	50.0	-37.1

11 Revision History

Revision Level	Description of changes	Revision Date
0	Initial release	8 June 2018
1	Added DCCF (Duty Cycle Correction Factor) description to operational description	11 June 2018
2	Added DCCF test data section and modified Section 7 data accordingly	26 June 2018