

RF Test Report

Project Number: 4135637 **Proposal Number:** 3757
Report Number: 4135637EMC04 **Revision Level:** 1
Client: Crestron Electronics Inc.

Equipment Under Test: ZigBee Radio
Model: ZUMMESH-KPBATT
FCC ID: EROZUMKPBATT
IC ID: 5683C-ZUMKPBATT

Applicable Standards: ANSI C63.10:2013
FCC Part 15 Subpart C, § 15.247
RSS-247, Issue 2, February 2017
RSS-GEN, Issue 5, April 2018

Report issued on: 14 February 2019
Test Result: Compliant

Tested by:



Martin Taylor, RF/EMC Engineer
For Jeremy O. 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
Bandwidth	15.247(a)(2)	RSS-247 S5.2 (a) RSS-GEN S6.7	Compliant
Transmitter Output Power	15.247(b)(3)	RSS-247 S5.4 (d)	Compliant
Power Spectral Density	15.247(e)	RSS-247 S5.2 (b)	Compliant
Conducted Spurious Emissions / Band edge	15.247(d)	RSS-247 S5.5	Compliant
Radiated Spurious Emissions / Restricted Bands	15.35, 15.247(d), 15.205, 15.209	RSS-GEN S6.13 RSS-GEN S8.9 RSS-GEN S8.10	Compliant
Antenna Requirement	15.203	RSS-GEN S6.8	Compliant ⁽¹⁾
AC Powerline Conducted Emission	15.107, 15.207	RSS-GEN S8.8	NA ⁽²⁾

(1) Non-detachable chip antenna.

(2) The device is DC-powered and cannot connect to the AC mains.

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

2.2 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: ZigBee Radio
Model Number: ZUMMESH-KPBATT
Serial Number: CNA9241328 (Conducted sample)
(Radiated sample not labeled)

Frequency Range: 2405-2480MHz
Modulation: 802.15.4 (ZigBee)
Antenna: 0.5dBi Chip Antenna (Johanson Technology, P/N: 2450AT18A100)

Rated Voltage: 3Vdc
Test Voltage: 3Vdc

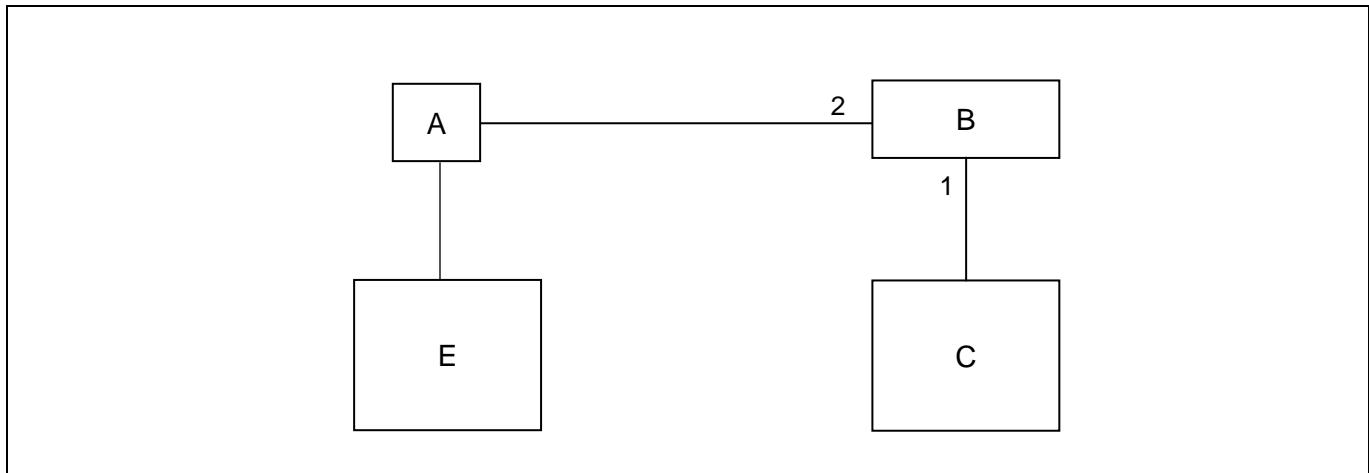
Sample Received Date: 05 May 2017
Dates of testing: 26-28 March 2018 (Antenna Port Conducted Measurements and Radiated Spurious Emissions <1GHz)
05 September 2018 (Restricted Band Edge)
31 January 2019 (Radiated Spurious Emissions >1GHz)

2.4 Operating Modes and Conditions

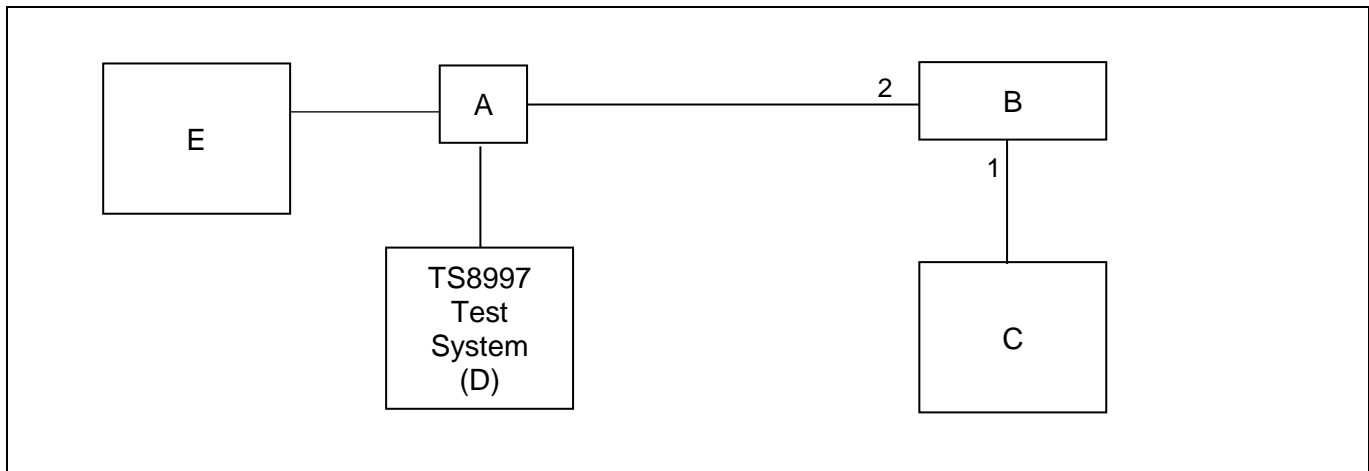
Continuous traffic was generated using test commands. The device was programmed to transmit at 100% duty cycle at low, middle and high channels.

Channel 11, 2405MHz
Channel 18, 2440MHz
Channel 26, 2480MHz

2.5 EUT Connection Block Diagram – Radiated Measurements



2.6 EUT Connection Block Diagram – Conducted Measurements



2.7 System Configuration

Device reference	Manufacturer	Description	Model Number	Serial Number
A	Crestron	ZigBee Radio (EUT)	ZUMMESH-KPBATT	CNA9241328
B	Silicon Labs	Debug Board	STK	152405761
C	Lenovo	Laptop	T420	R8-X9XFV
C (1)	Dell	Laptop	PP18L	1608143
D	Rohde & Schwarz	Wireless Test System	TS8997	Not Labeled
E	Rigol	DC Power Supply	DP711	DP7A182700833

Note 1: The Dell laptop was used for the Radiated Spurious Emissions testing above 1GHz and for the Restricted Band Band Edge testing. The Lenovo laptop was used for the rest of the testing.

2.8 Cable List

Cable reference	Port Name	Start	End	Cable Length (m)	Ferrite installed?	Shielded?
1	USB	Laptop	Debug Board	1.8	No	Yes
2	Ribbon Cable	Debug Board	EUT	0.35	No	No

3 Bandwidth

3.1 Test Result

Test Description	Test Specification		Test Result
6 dB Bandwidth / 99% OBW	15.247(a)(2)	RSS-247 S5.2 (a) RSS-GEN S6.7	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: 22.5 °C
 Relative Humidity: 34.6 %

3.4 Test Equipment

Test End Date: 28-Mar-2018

Tester: JOP

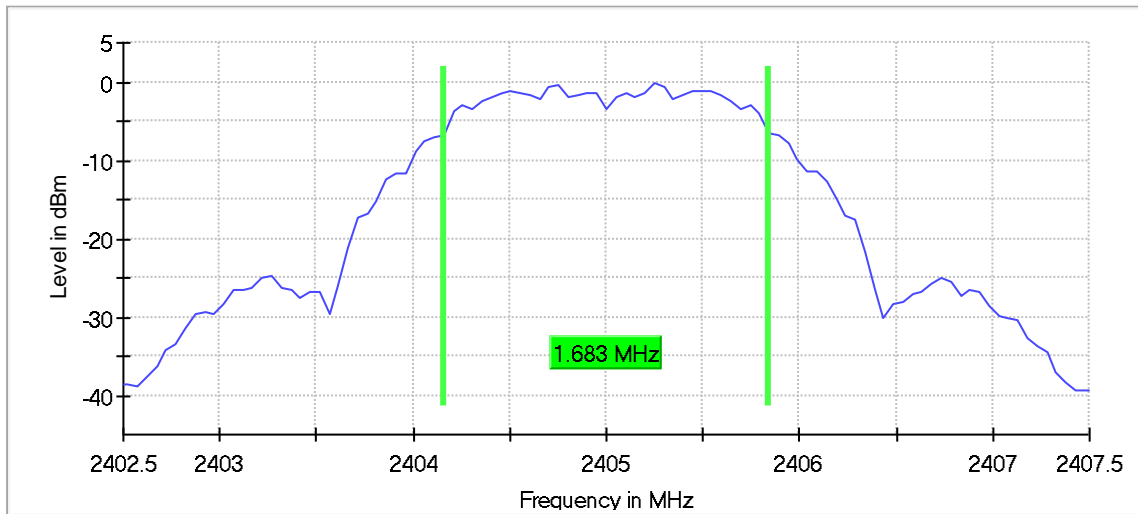
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	1-Nov-2019
RF CABLE	SF102	HUBER & SUHNER	B079822	27-Jul-2018
OPEN SWITCH AND CONTROL UNIT	OSP 120	ROHDE & SCHWARZ	S/N: 101182	CNR
ATTENUATOR, 10DB	10DB	ROHDE & SCHWARZ	B095591	28-Jul-2018

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	1.683168	0.500000	---	2404.158416	2405.841584	-0.2	PASS
2440.000000	1.683168	0.500000	---	2439.158416	2440.841584	0.3	PASS
2480.000000	1.732673	0.500000	---	2479.108911	2480.841584	0.0	PASS

Representative Plot



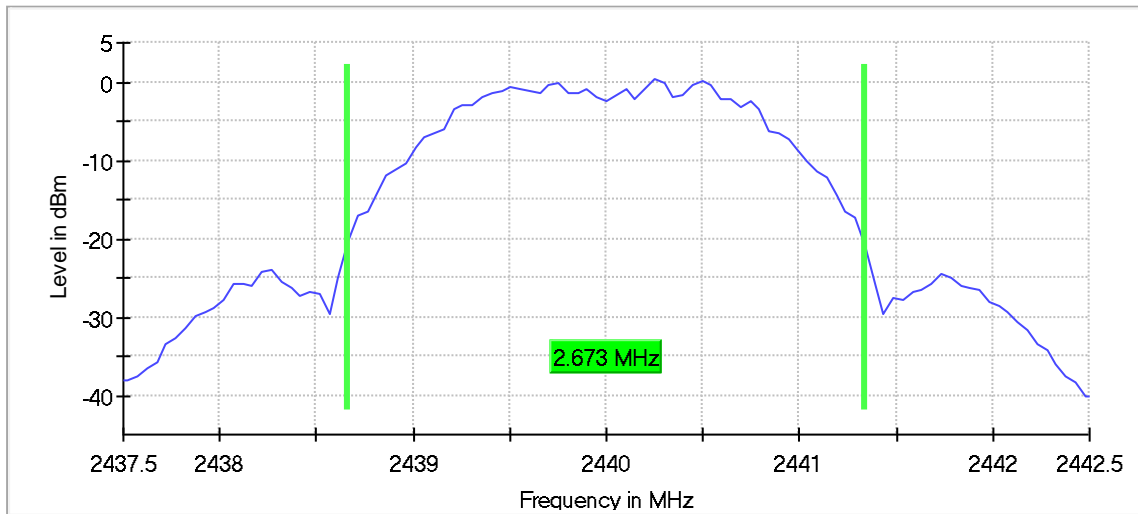
Representative Measurement Settings

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	5.000 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	11 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.23 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	2.673268	---	---	2403.663366	2406.336634	-0.2	PASS
2440.000000	2.673268	---	---	2438.663366	2441.336634	0.3	PASS
2480.000000	2.673268	---	---	2478.663366	2481.336634	-0.3	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 μs	AUTO
Reference Level	-10.000 dBm	-10.000 dBm
Attenuation	5.000 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	16 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.18 dB	0.50 dB

4 Output Power

4.1 Test Result

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

4.2 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

4.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 22.5 °C
 Relative Humidity: 34.6 %

4.4 Test Equipment

Test End Date: 28-Mar-2018

Tester: JOP

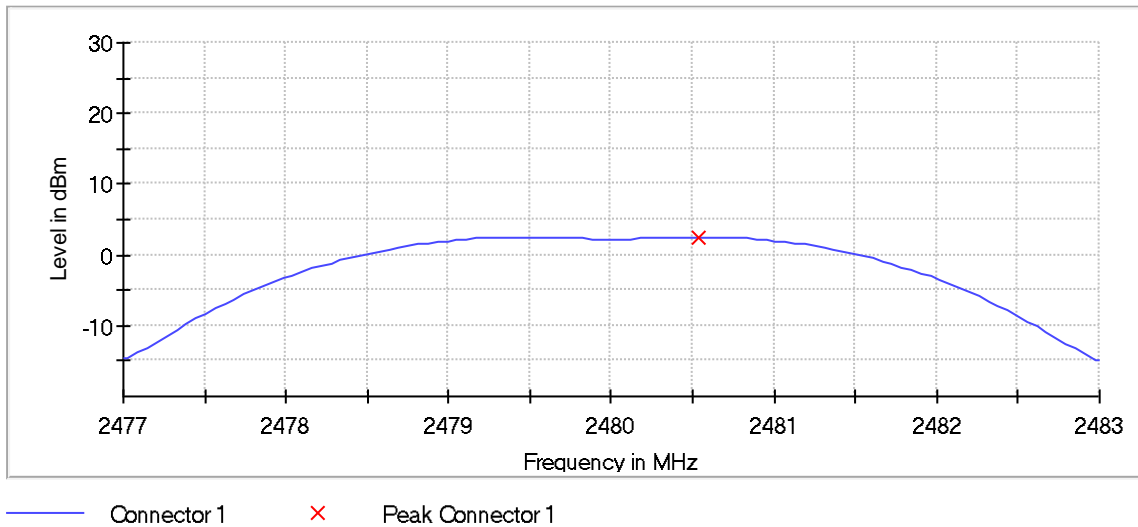
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	1-Nov-2019
RF CABLE	SF102	HUBER & SUHNER	B079822	27-Jul-2018
OPEN SWITCH AND CONTROL UNIT	OSP 120	ROHDE & SCHWARZ	S/N: 101182	CNR
ATTENUATOR, 10DB	10DB	ROHDE & SCHWARZ	B095591	28-Jul-2018

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
2405.000000	2.4	30.0	PASS
2440.000000	2.7	30.0	PASS
2480.000000	2.5	30.0	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	>= 1.733 MHz
VBW	10.000 MHz	>= 6.000 MHz
SweepPoints	101	~ 101
SweepTime	953.450 ns	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	15.000 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	0.02 dB	0.50 dB

5 Power Spectral Density

5.1 Test Result

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

5.2 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.

5.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 22.5 °C
 Relative Humidity: 34.6 %

5.4 Test Equipment

Test End Date: 28-Mar-2018

Tester: JOP

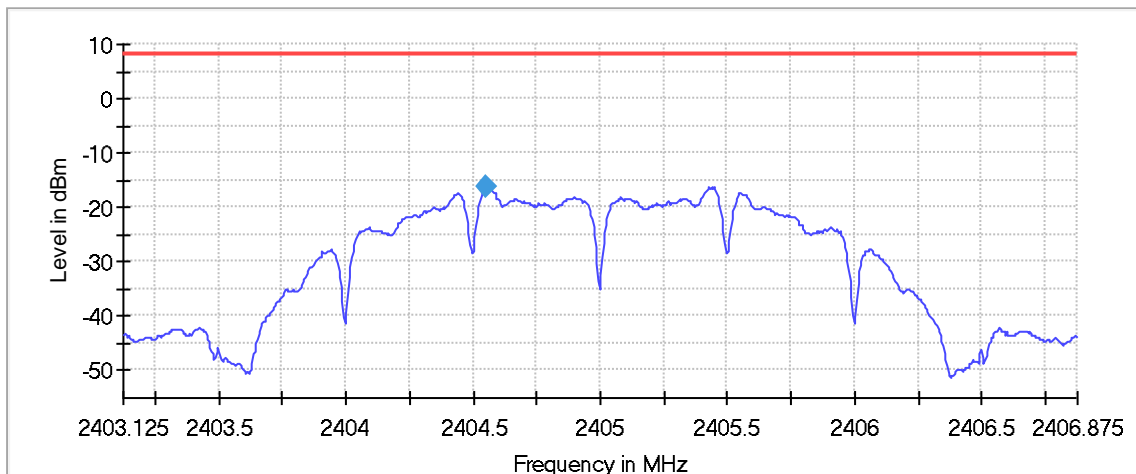
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	1-Nov-2019
RF CABLE	SF102	HUBER & SUHNER	B079822	27-Jul-2018
OPEN SWITCH AND CONTROL UNIT	OSP 120	ROHDE & SCHWARZ	S/N: 101182	CNR
ATTENUATOR, 10DB	10DB	ROHDE & SCHWARZ	B095591	28-Jul-2018

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)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2405.000000	2404.552500	-16.118	8.0	PASS
2440.000000	2439.552500	-15.718	8.0	PASS
2480.000000	2479.552500	-15.937	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	5.000 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	9 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.12 dB	0.50 dB

6 Conducted Spurious Emissions / Band Edge

6.1 Test Result

Test Description	Test Specification		Test Result
Conducted Spurious Emissions and Band Edge	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 is 20 dB below the maximum in-band peak PSD level in 100 kHz.

6.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 22.5 °C
 Relative Humidity: 34.6 %

6.4 Test Equipment

Test End Date: 28-Mar-2018

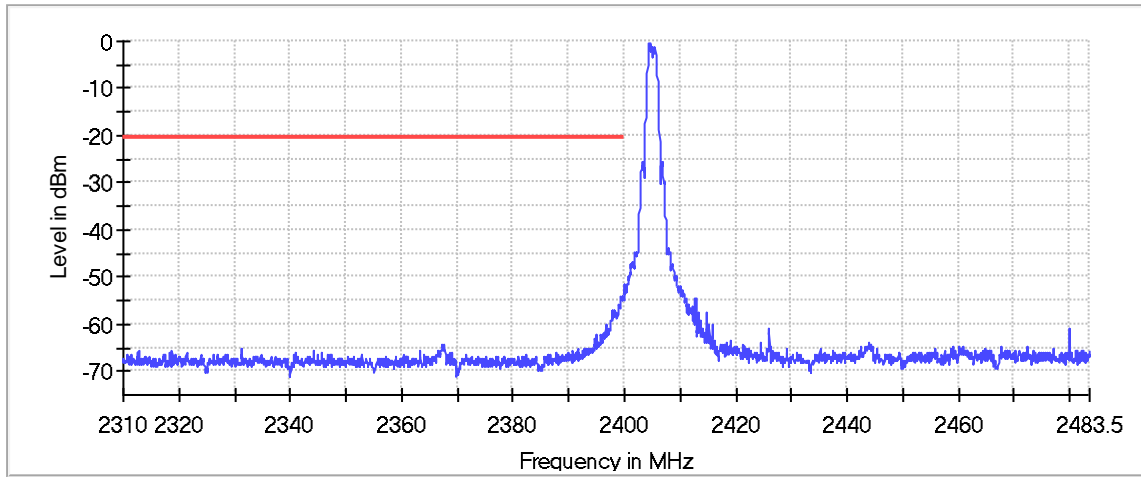
Tester: JOP

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.

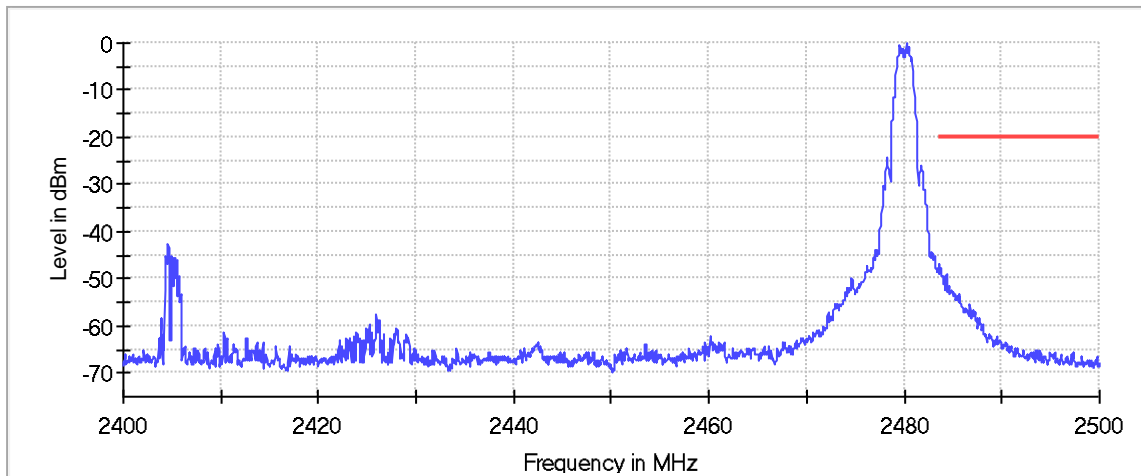
6.5 Test Data – DTS Band Edge

Lower band edge



— Limit — Sum Level × Fail

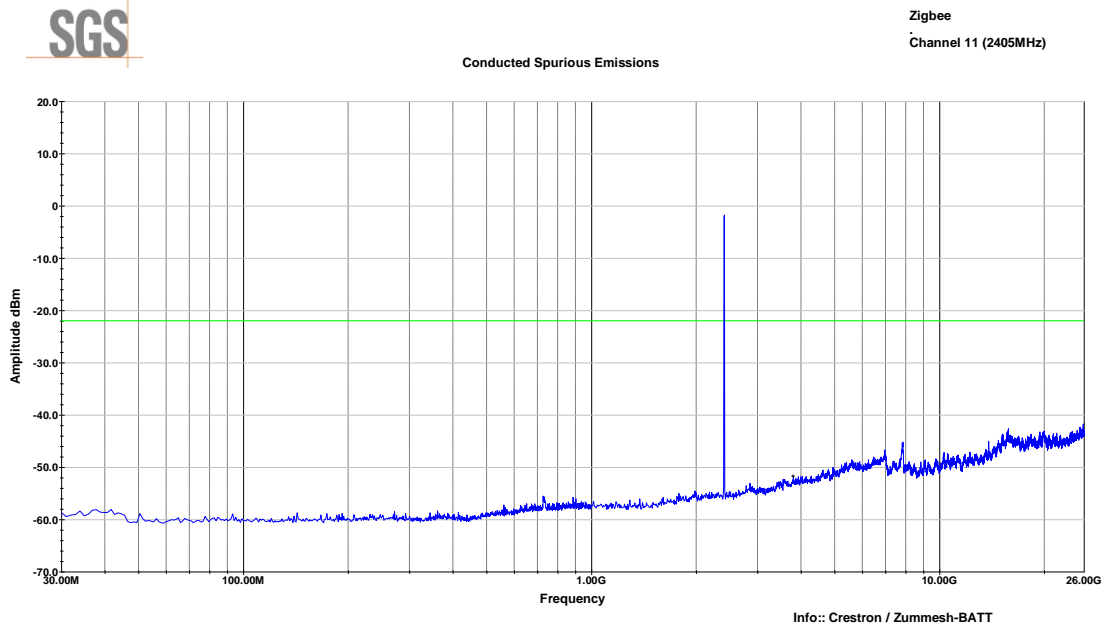
Upper band edge



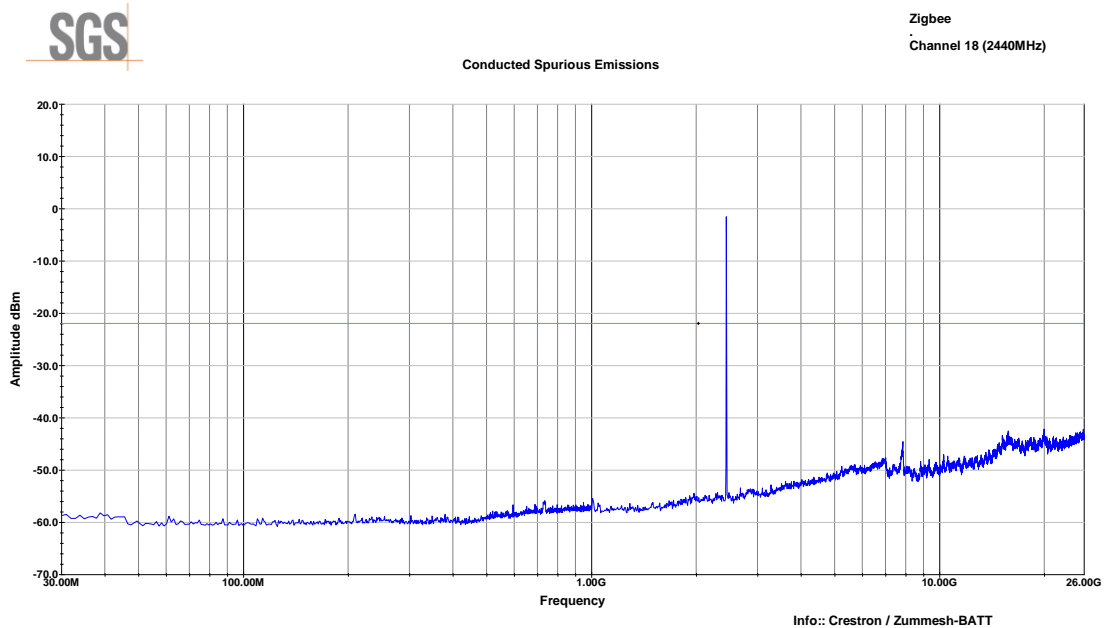
— Limit — Sum Level × Fail

6.6 Test Data – Conducted Spurious Emissions

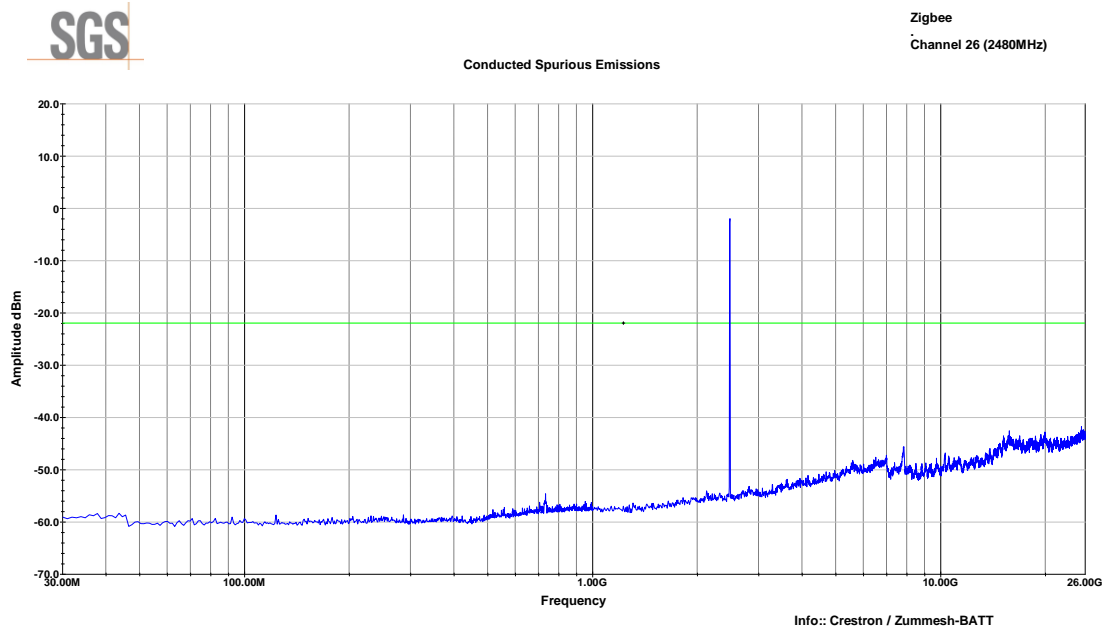
Conducted Spurs –Channel 11



Conducted Spurs –Channel 18



Conducted Spurs –Channel 26



7 Field Strength of Spurious Radiation

7.1 Test Result

Test Description	Test Specification		Test Result
Radiated Spurious Emissions	15.35, 15.247(d), 15.205, 15.209	RSS-GEN S6.13 RSS-GEN S8.9 RSS-GEN S8.10	Compliant

7.2 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.

Test distance:

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 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

7.3 Test Site

Absorber Lined Shielded Enclosure (ALSE), SGS EMC Laboratory, Suwanee, GA

Environmental Conditions	30-1000MHz	1-18GHz	18-26GHz
Enclosure:	10m Chamber	3m Chamber	3m Chamber
Temperature:	22.8 °C	23.2 °C	23.3 °C
Relative Humidity:	34.5 %	17.5 %	19.7 %

7.4 Test Equipment

30-1000MHz Measurements

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

1-18GHz Measurements

Test End Date: 31-Jan-2019

Tester: MT

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
ANTENNA, DRG HORN (MEDIUM)	3117	ETS LINDGREN	B079699	2-Jul-2019
RF CABLE	NMS-290-236.2-NMS	FLORIDA RF LABS	B095020	23-Jul-2019
RF CABLE	SUCOFLEX 100	HUBER & SUHNER	B108523	24-Jul-2019
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	B094463	6-Mar-2019
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	2-Jul-2019

18-26GHz Measurements

Test End Date: 31-Jan-2019

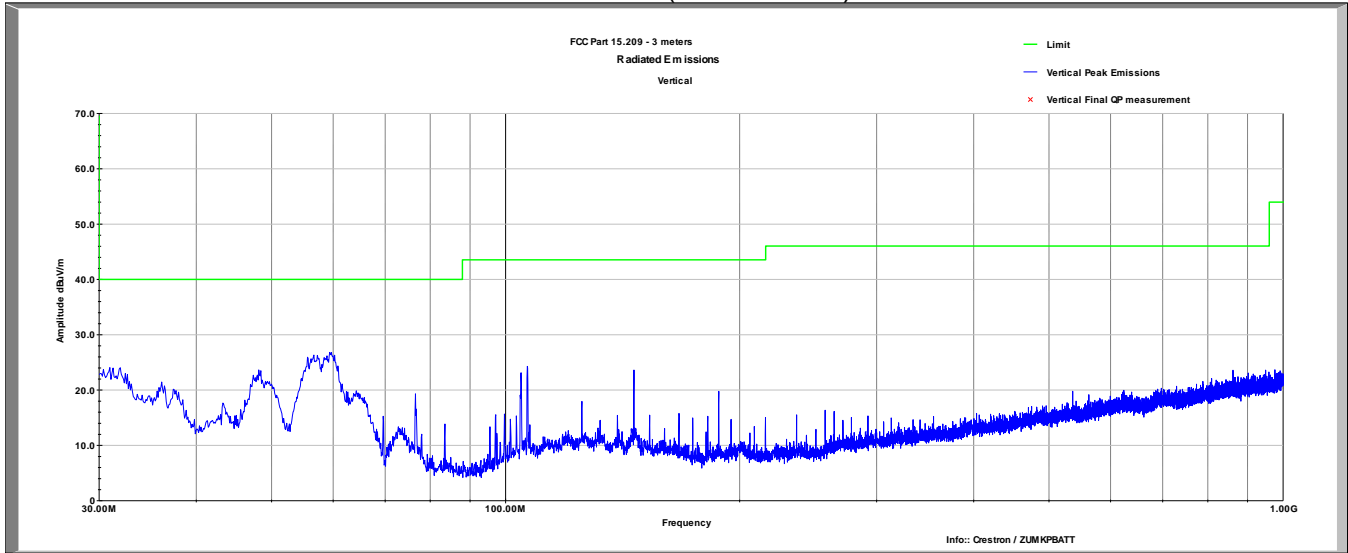
Tester: MT

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
ANTENNA, HORN (SMALL)	LB-180400-20-C-KF	A-INFO	15007	30-Mar-2019
RF CABLE	SF102	HUBER & SUHNER	B079822	25-Jul-2019
RF CABLE	SF102	HUBER & SUHNER	B079823	25-Jul-2019
LOW NOISE AMPLIFIER	NSP1840-HG	MITEQ	B087572	27-Jul-2019
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	2-Jul-2019

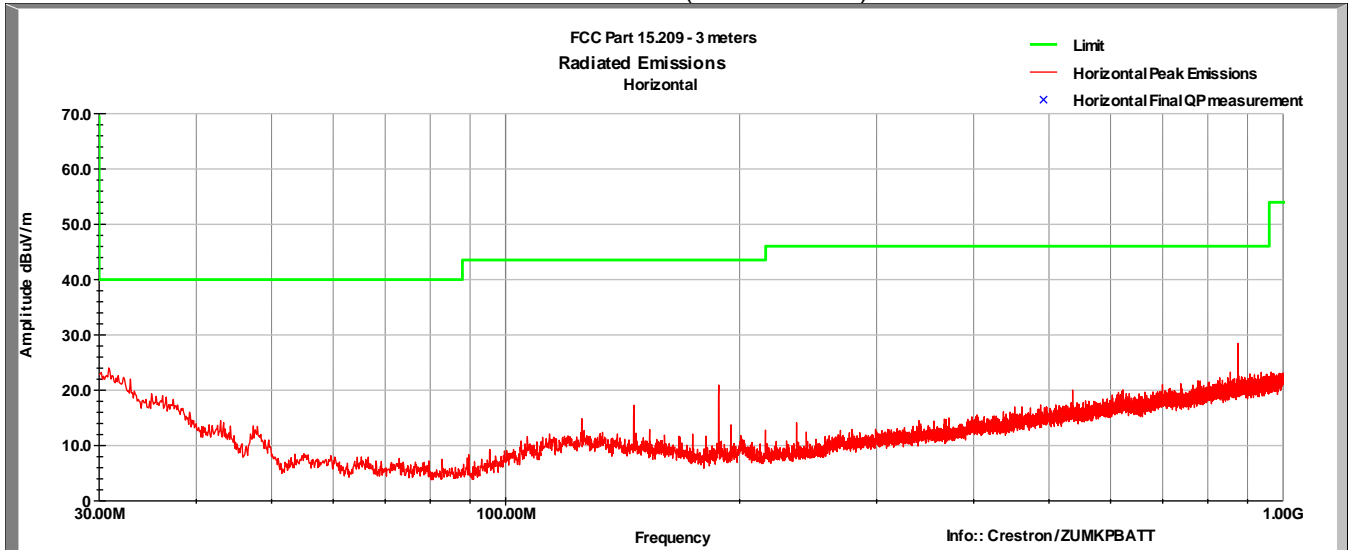
Note: The equipment calibration period is 1 year.

7.5 Test Data – Plots

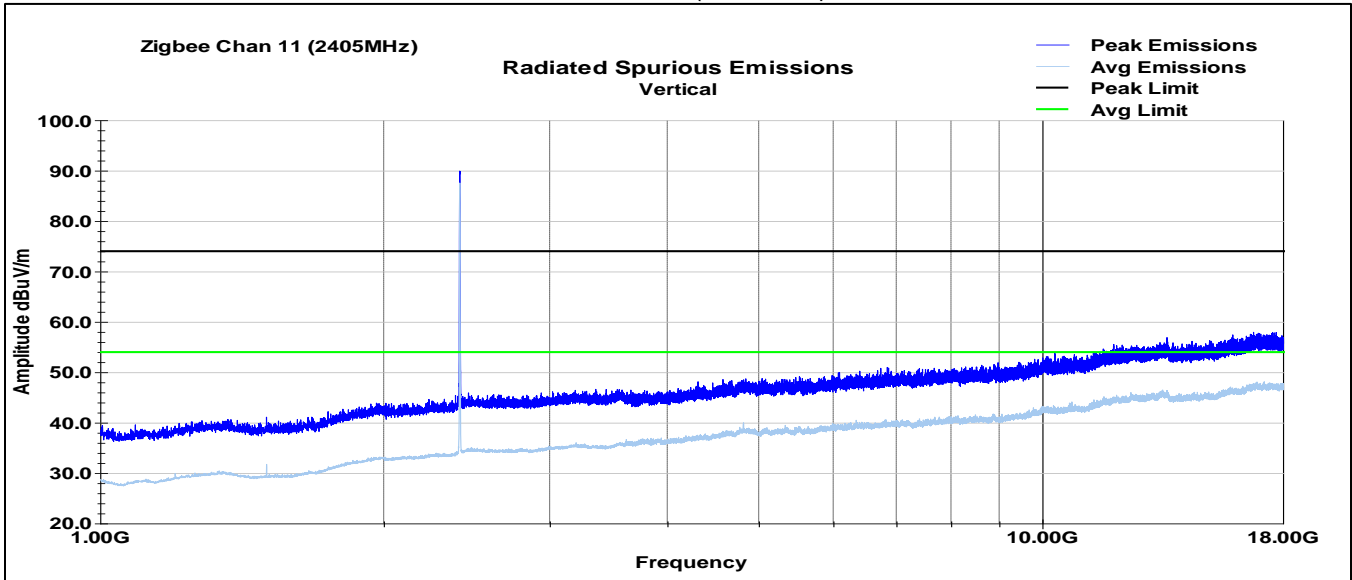
Low Channel (Channel 11, 2405MHz)
 Vertical Plot (30-1000MHz)



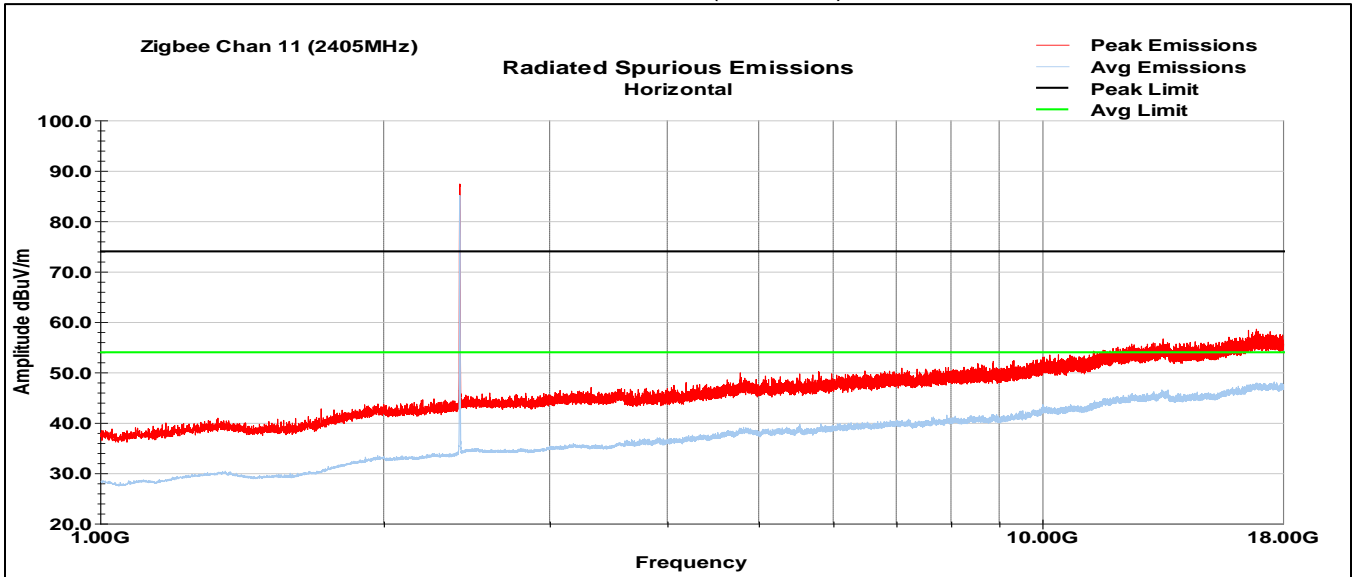
Low Channel (Channel 11, 2405MHz)
 Horizontal Plot (30-1000MHz)



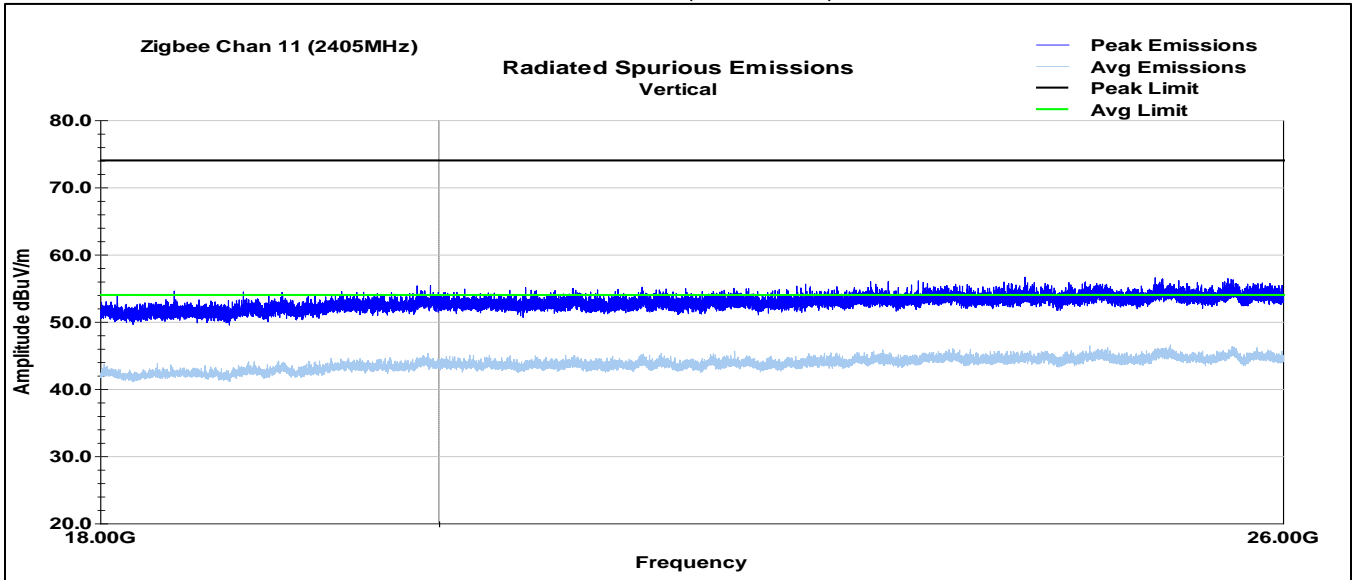
Low Channel (Channel 11, 2405MHz)
 Vertical Plot (1-18GHz)



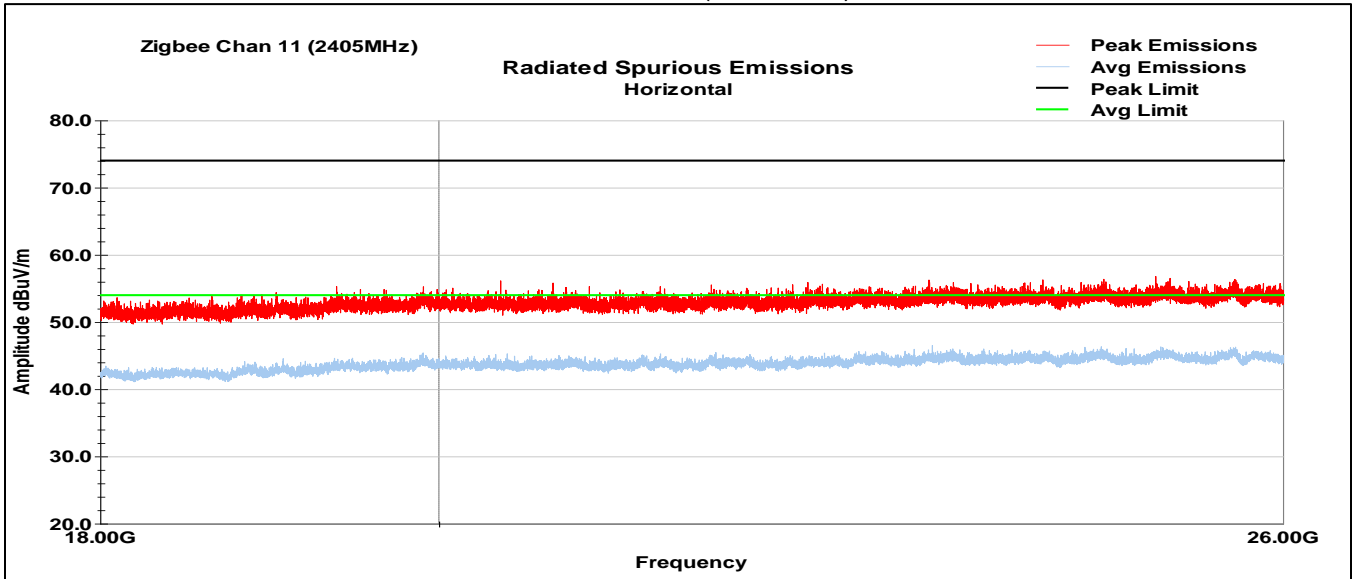
Low Channel (Channel 11, 2405MHz)
 Horizontal Plot (1-18GHz)



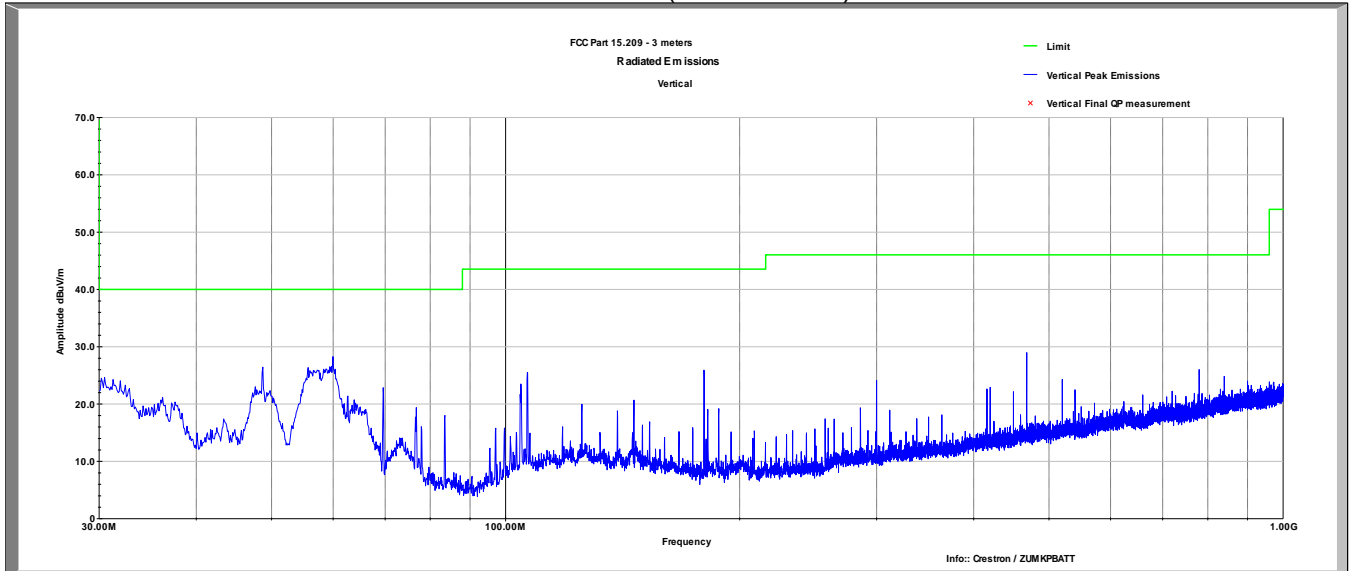
Low Channel (Channel 11, 2405MHz)
 Vertical Plot (18-26GHz)



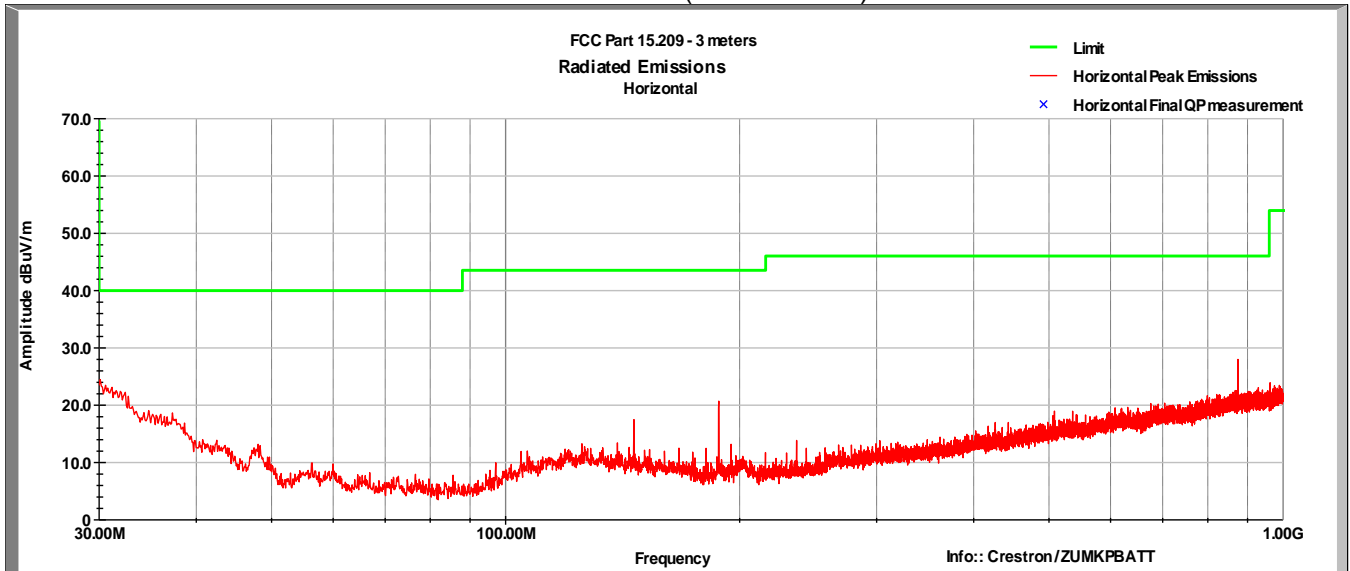
Low Channel (Channel 11, 2405MHz)
 Horizontal Plot (18-26GHz)



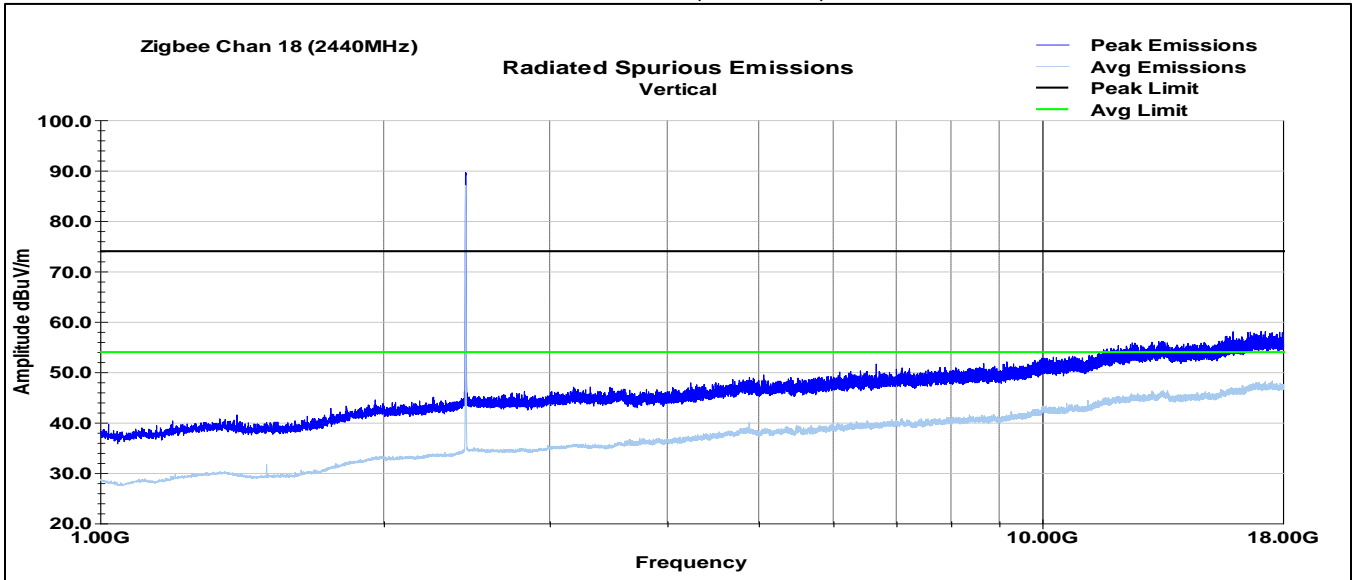
Mid Channel (Channel 18, 2440MHz)
 Vertical Plot (30-1000MHz)



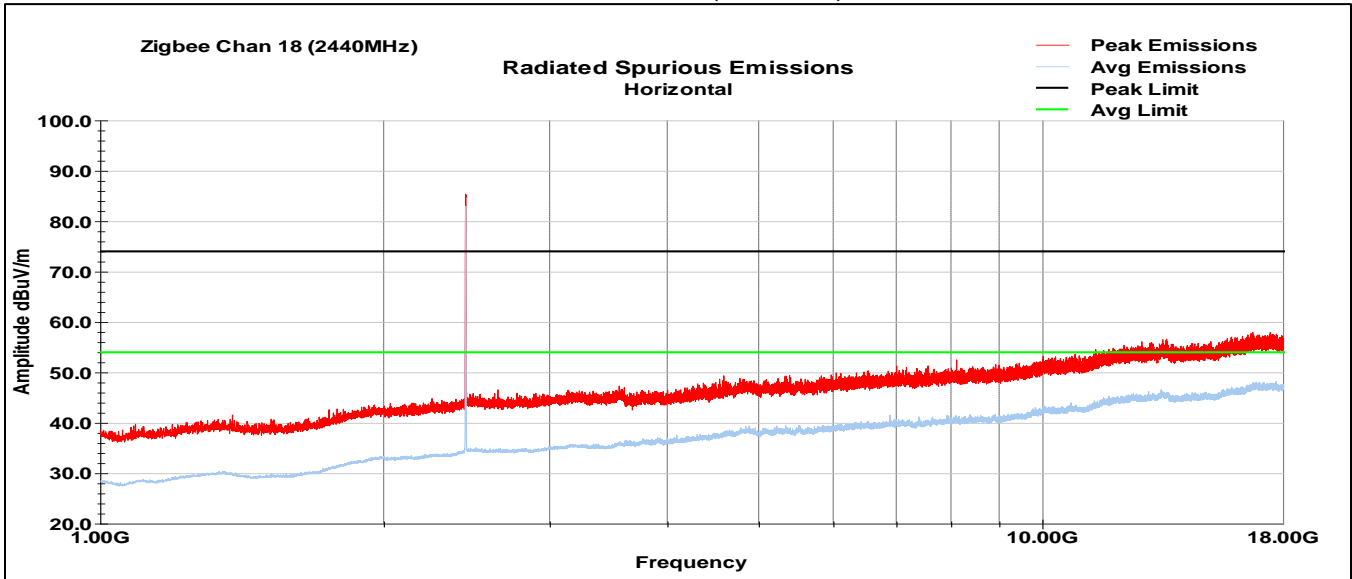
Mid Channel (Channel 18, 2440MHz)
 Horizontal Plot (30-1000MHz)



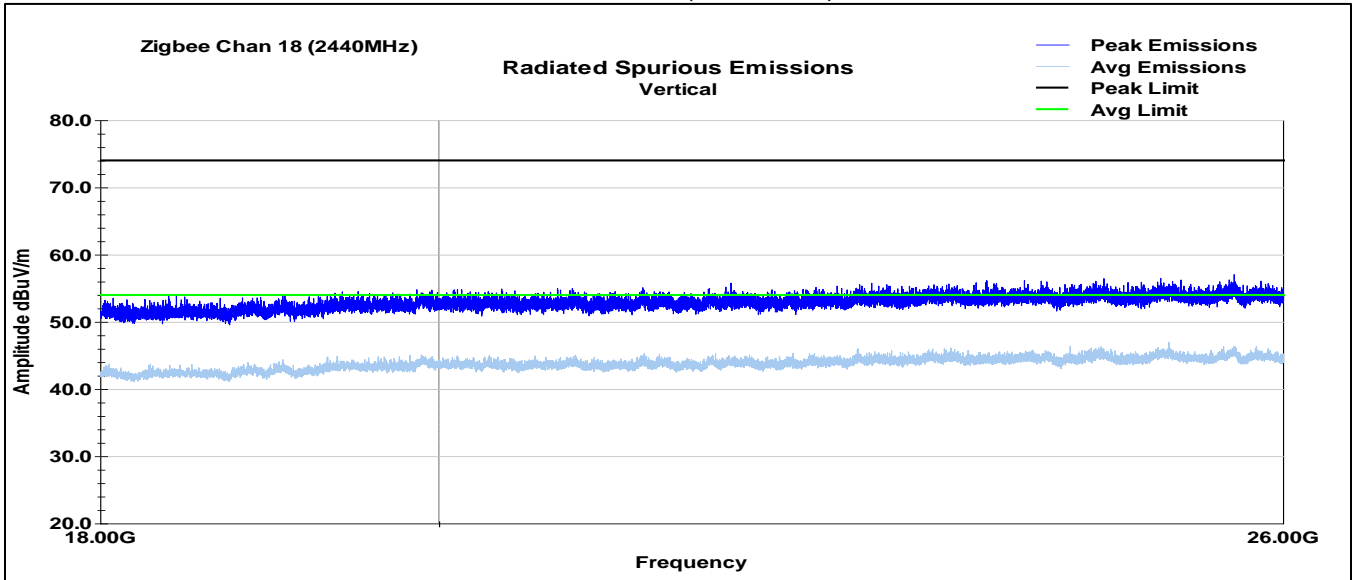
Mid Channel (Channel 18, 2440MHz)
 Vertical Plot (1-18GHz)



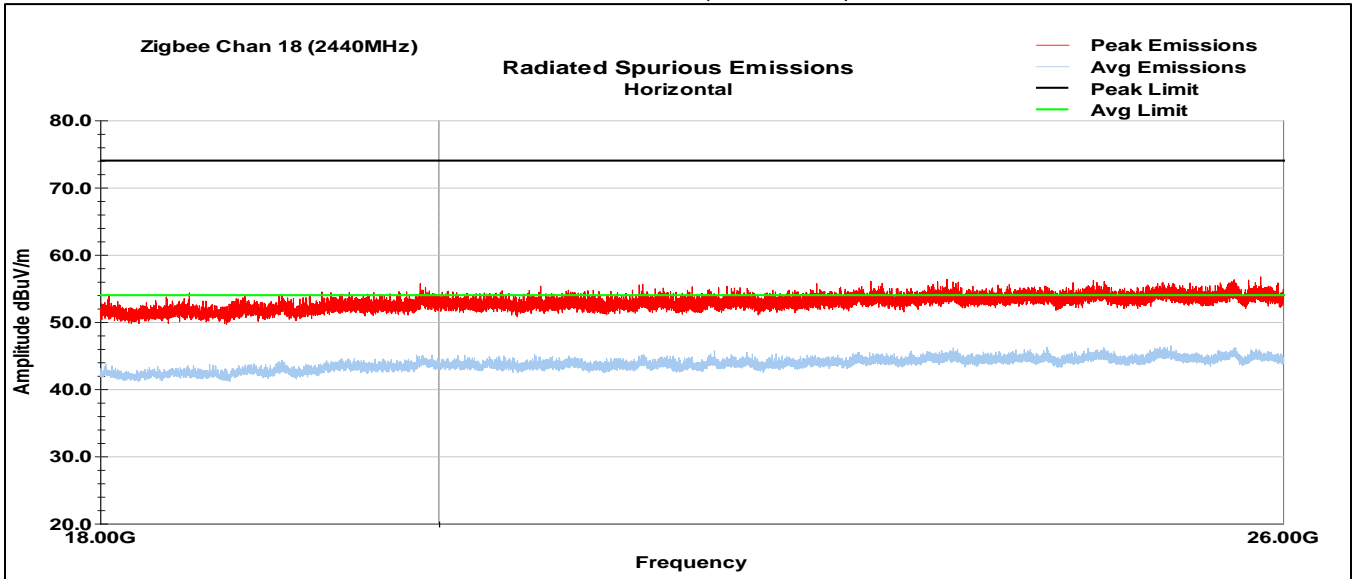
Mid Channel (Channel 18, 2440MHz)
 Horizontal Plot (1-18GHz)



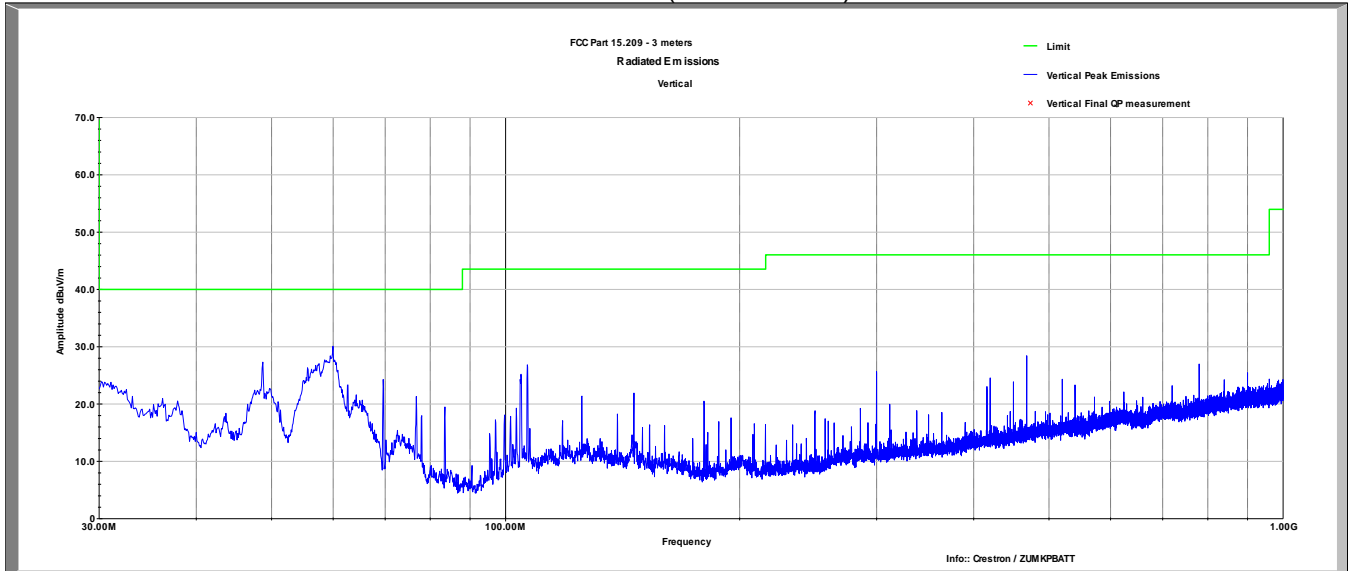
Mid Channel (Channel 18, 2440MHz)
 Vertical Plot (18-26GHz)



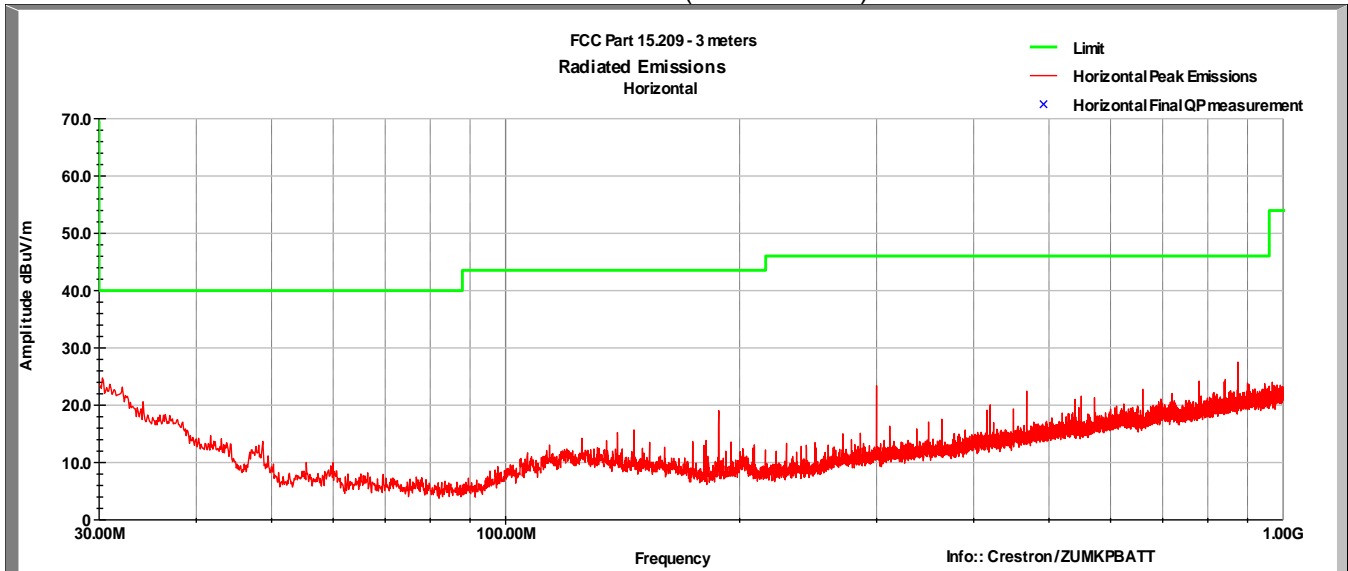
Mid Channel (Channel 18, 2440MHz)
 Horizontal Plot (18-26GHz)



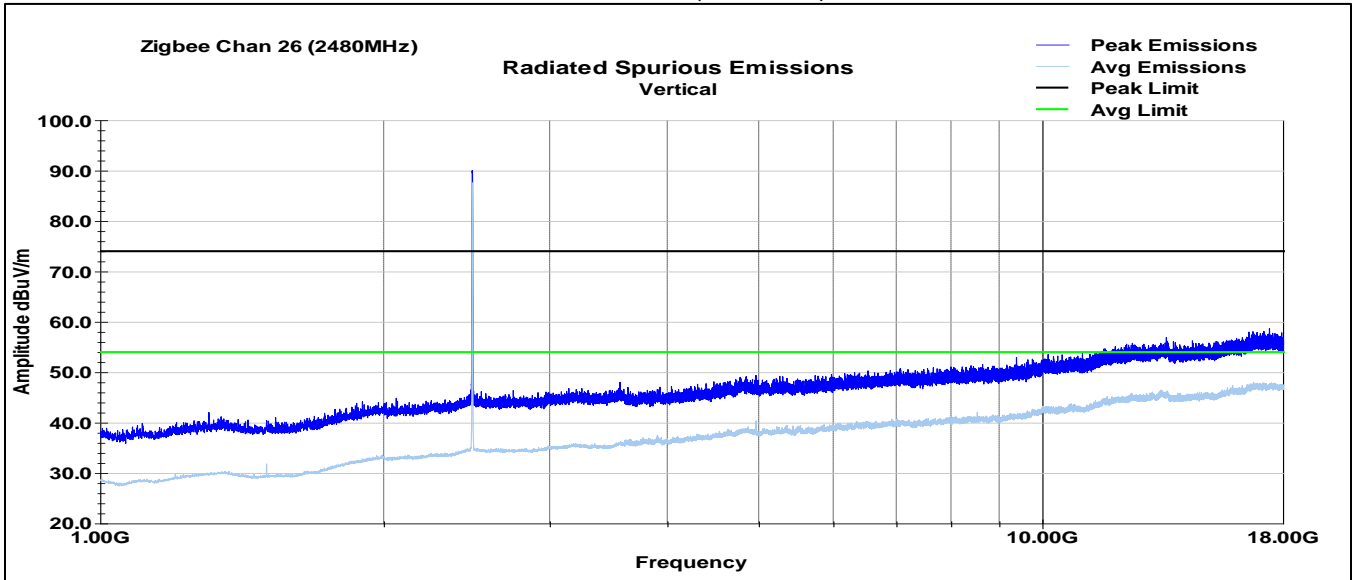
High Channel (Channel 26, 2480MHz)
 Vertical Plot (30-1000MHz)



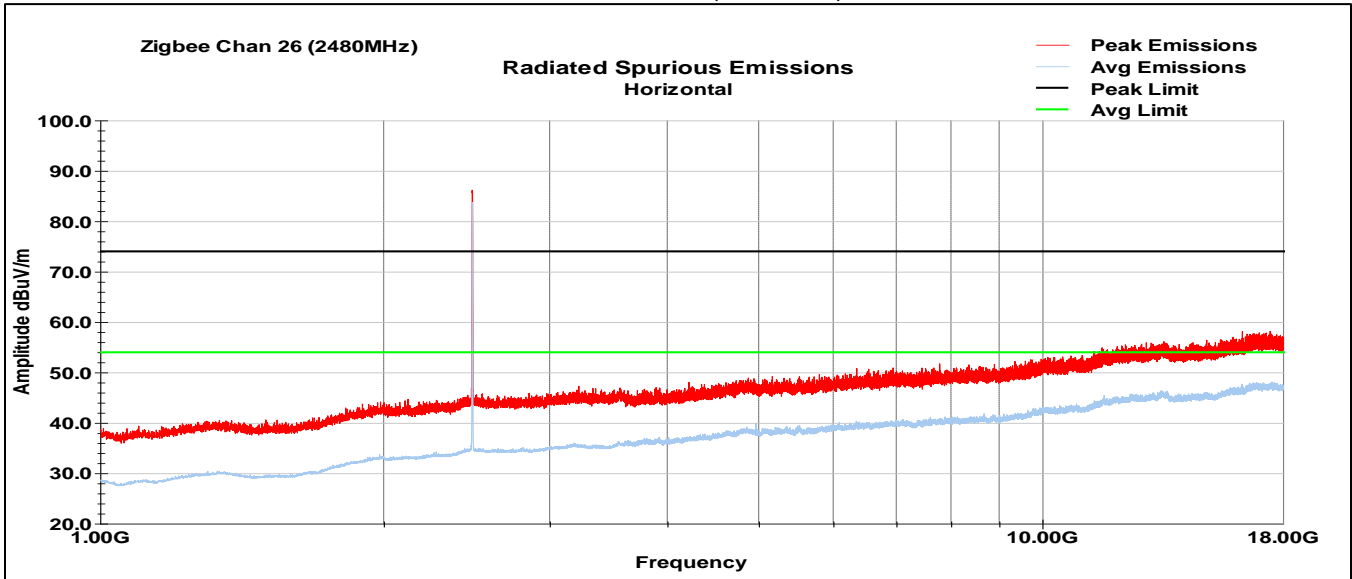
High Channel (Channel 26, 2480MHz)
 Horizontal Plot (30-1000MHz)



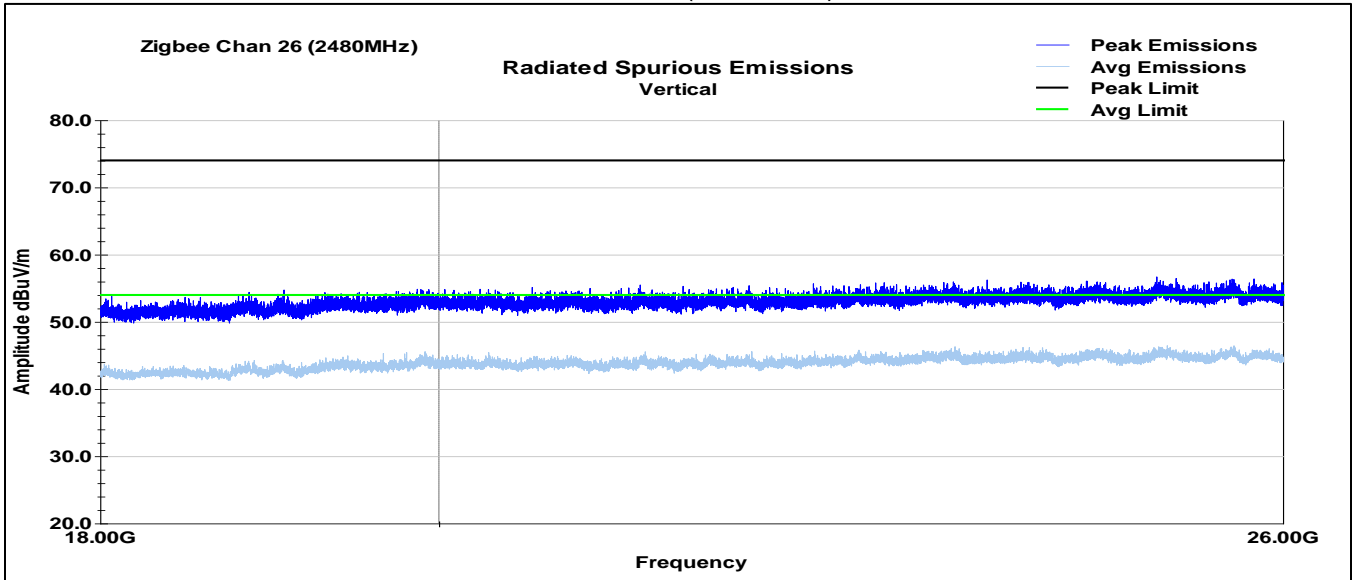
High Channel (Channel 26, 2480MHz)
 Vertical Plot (1-18GHz)



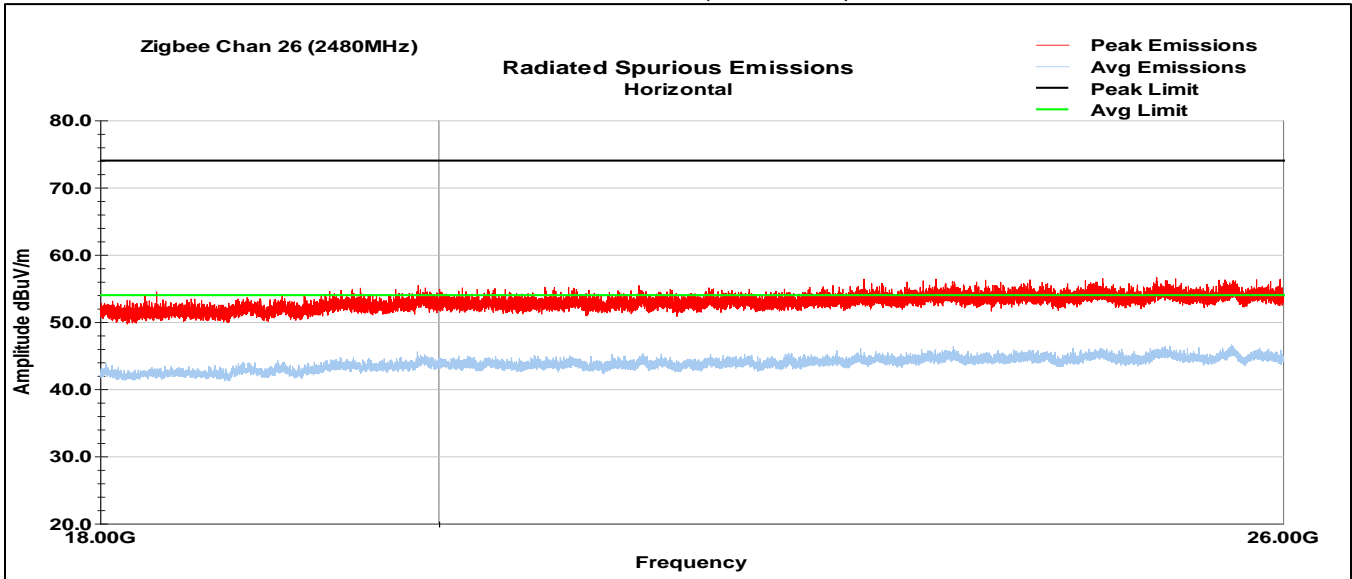
High Channel (Channel 26, 2480MHz)
 Horizontal Plot (1-18GHz)



High Channel (Channel 26, 2480MHz)
 Vertical Plot (18-26GHz)



High Channel (Channel 26, 2480MHz)
 Horizontal Plot (18-26GHz)



8 Radiated Emissions at Band Edge / Restricted Band

8.1 Test Result

Test Description	Test Specification		Test Result
Emissions in Restricted Frequency Bands	15.247(d), 15.205, 15.209	RSS-GEN S8.9 RSS-GEN S8.10	Compliant

8.2 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 conducted methods defined in FCC KDB publication 558074 D01 DTS Meas Guidance v04.

8.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.0 °C

Relative Humidity: 52.9 %

8.4 Test Equipment

Test End Date: 5-Sep-2018

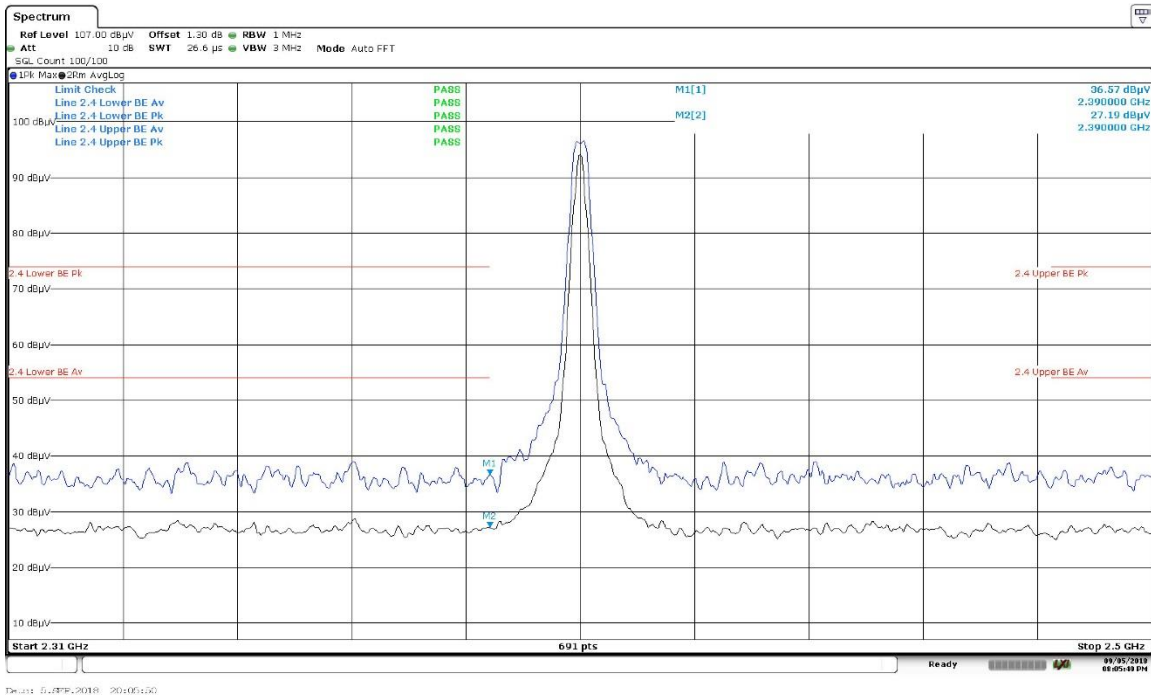
Tester: ASF

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
RF CABLE	141	HUBER & SUHNER	B095585	25-Jul-2019
ATTENUATOR, 10DB	10DB	ROHDE & SCHWARZ	B095591	25-Jul-2019
POWER METER (TS8997)	OSP-B157	ROHDE & SCHWARZ	15040	15-Dec-2019
RF SWITCH (TS8997)	OSP	ROHDE & SCHWARZ	15039	15-Dec-2019
SIGNAL ANALYZER (TS8997)	FSV30	ROHDE & SCHWARZ	B085749	1-Nov-2019

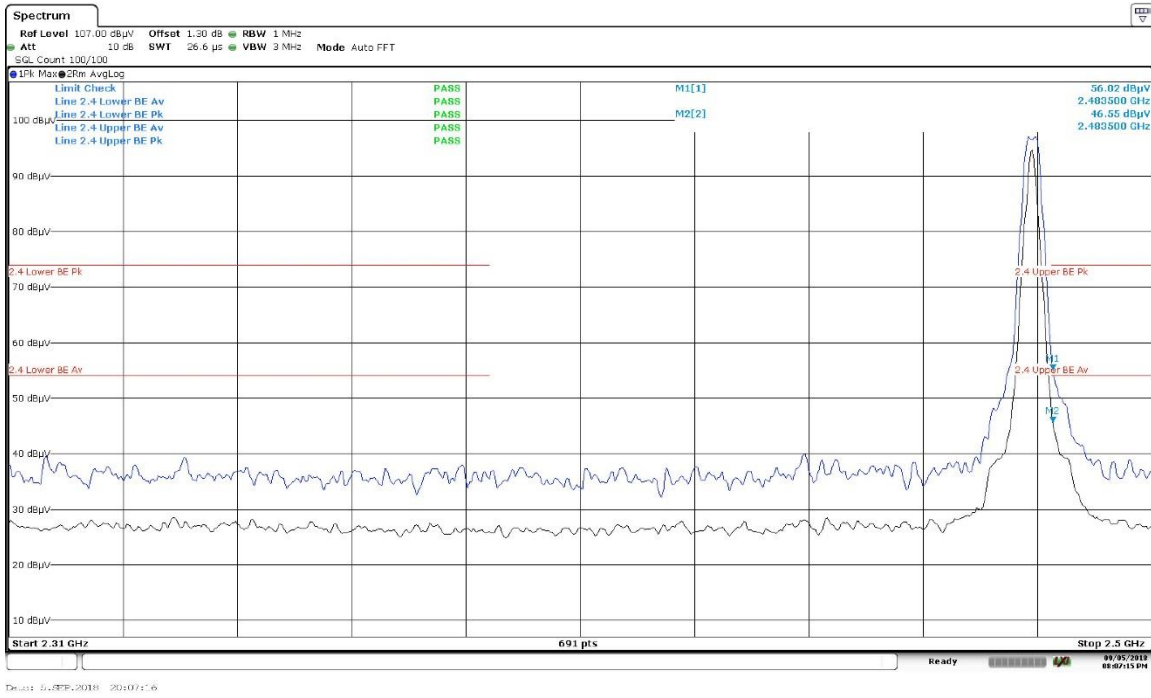
Note: The equipment calibration period is 1 year.

8.5 Test Data

Channel 11



Channel 26



9 Revision History

Revision Level	Description of changes	Revision Date
0	Initial release	5 September 2018
1	<ul style="list-style-type: none"> - Removed the word "Module" from EUT description (title page) - Added Proposal Number (title page) - Updated RSS-GEN reference from Issue 4 to Issue 5 (title page) - Corrected rule part references (sections 1, 3.1, 4.1, 5.1, 7.1, 8.1) - Corrected numbering in section 2 - Corrected model number (was CWD7563) (section 2.3) - Corrected rated and test voltages (were 5Vdc) (section 2.3) - Updated dates of testing (section 2.3) - Added E (DC Power Supply) to block diagrams (sections 2.5 - 2.6) - Added heading for System Configuration (section 2.7) - Added Dell Laptop & DC Power Supply to Sys Config (section 2.7) - Updated expired RSE>1GHz test data (sections 7.3 – 7.5) - Corrected test method (changed "radiated" to "conducted") for Restricted Band Band Edge test (section 8.2) - Added Test Data heading and plot titles for Restricted Band Band Edge test (section 8.5) 	14 February 2019