Supplemental EMC Test Report

Project Number: 4107226

Report Number: 4107226EMC01 **Revision Level:** 0

Client: Crestron Electronics Inc.

Equipment Under Test: Zigbee Radio Module

Model: CWD7550

FCC ID: EROCWD7550

IC ID: 5683C-CWD7550

Applicable Standards: FCC Part 15 Subpart C, § 15.247

RSS-247, Issue 2, February 2017

ANSI C63.10: 2013

RSS-GEN, Issue 4, November 2014

Report issued on: 05 March 2017

Test Result: Compliant

Tested by: _____
Jeremy O. Pickens, Senior EMC Engineer

Reviewed by: _____
David Schramm, EMC/RF/SAR/HAC 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.

Table of Contents

1 Summary of Test Results

Test Description	Test Specification		Test Result
Bandwidth	15.247(d)	RSS-247 S5.2 (1) RSS-GEN S6.6	N/S (1)
Transmitter Output Power	15.247(b)(3)	RSS-247 S5.4 (4)	N/S (1)
Power Spectral Density	15.247(e)	RSS-247 S5.2 (2)	N/S (1)
Conducted Spurious Emissions / Band edge	15.247(d)	RSS-247 S5.5	N/S (1)
Radiated Spurious Emissions / Restricted Bands	15.35(b),15.209	RSS-GEN S6.13 RSS-GEN S8.10	Compliant
AC Powerline Conducted Emission	15.107, 15.207	RSS-GEN S8.8	N/S (1)

(1) This report includes only the radiated spurious emissions above 1GHz per the test methods of ANSI C63.10: 2013. Refer to Crestron report CFR-CWD7550-10202016 for test results.

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

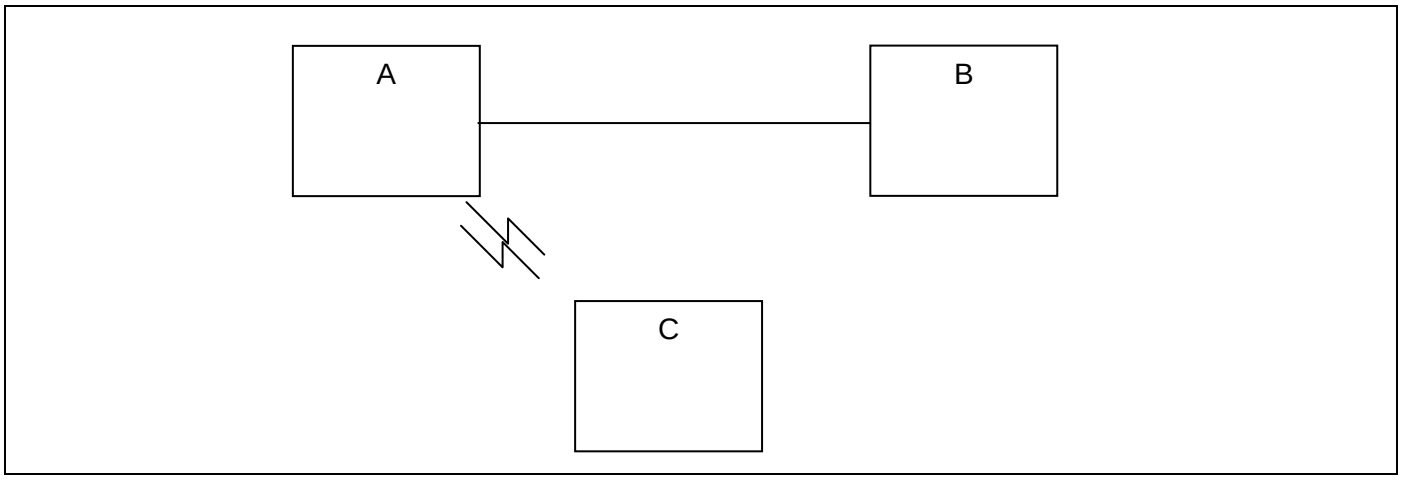
2.2 *General Information of EUT*

Type of Product:	Zigbee Radio Module
Model Number:	CWD7550
Serial Number:	CNA9164060
Frequency Range:	2405-2480MHz
Modulation:	802.15.4 (Zigbee)
Antenna:	1.9dBi Chip Antenna (Antenova, P/N: A5645)
Rated Voltage:	5Vdc
Test Voltage:	5Vdc
Sample Received Date:	15 February 2017
Dates of testing:	24 February – 01 March 2017

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

2.4 *Radiated System Configuration*



Device reference	Manufacturer	Description	Model Number	Serial Number
A	Crestron	Two-Way RF Transceiver Module	CWD7550	CNA9164060
B	Rigol	DC power supply	DP711	DP7A182700833
C	Crestron	Control System	MC3	7911847

C* - Used to set EUT into various test modes – not in test field.

3 Field Strength of Spurious Radiation

3.1 *Test Result*

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

3.2 *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 us the upper channel for spurious emissions measurements. This was chosen due to the significant power reduction at Channel 26.

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 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

3.3 *Test Site*

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.8 °C
Relative Humidity: 38.3 %

3.4 *Test Equipment*

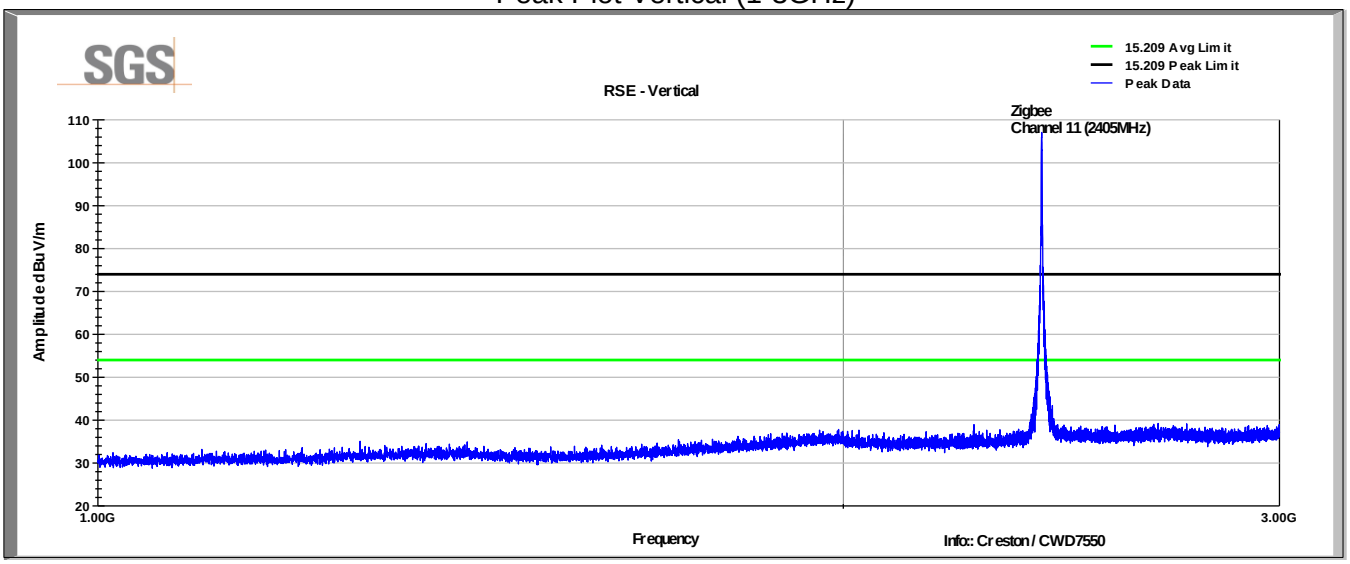
Test End Date: 1-Mar-2017 Tester: JOP

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	20-Jun-2017
RF CABLE	SUCOFLEX 100	HUBER & SUHNER	B108523	4-Aug-2017
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	15003	29-Jul-2017
RF CABLE	SF106	HUBER & SUHNER	B079712	27-Jul-2017
ANTENNA, DRG HORN (MEDIUM)	3117	ETS LINDGREN	B079691	27-Jul-2017
HORN(SMALL)	LB-180400-20-C-KF	A-INFO	15007	29-Mar-2017
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

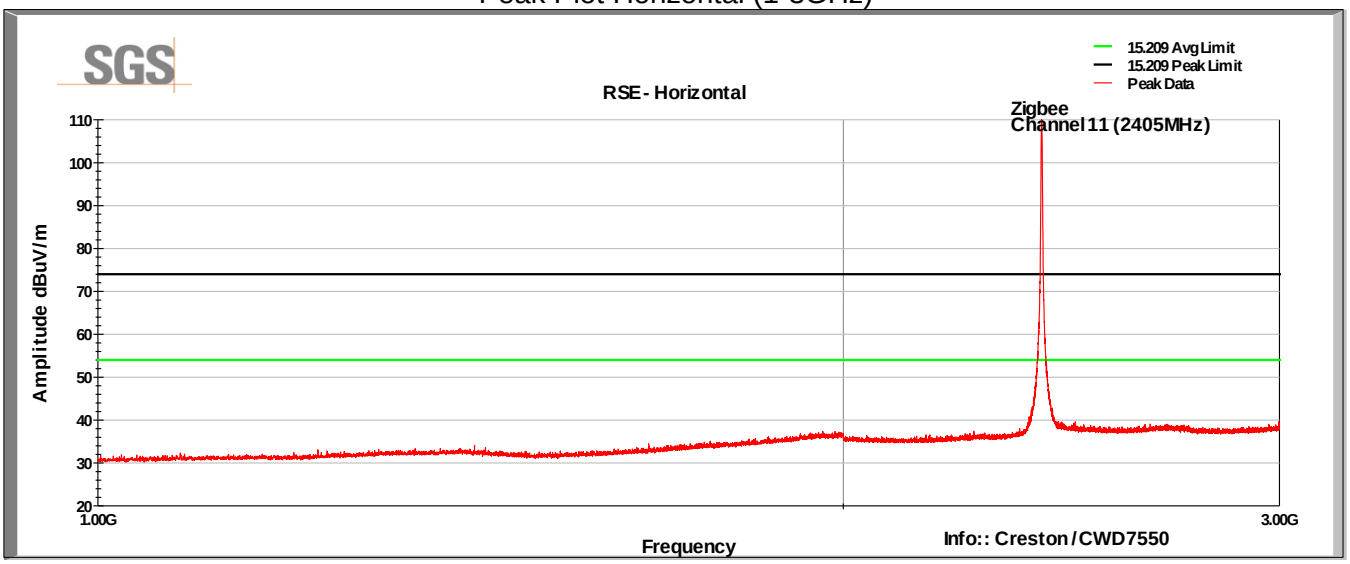
Note: The equipment calibration period is 1 year.

3.5 *Test Data – Peak Plots*

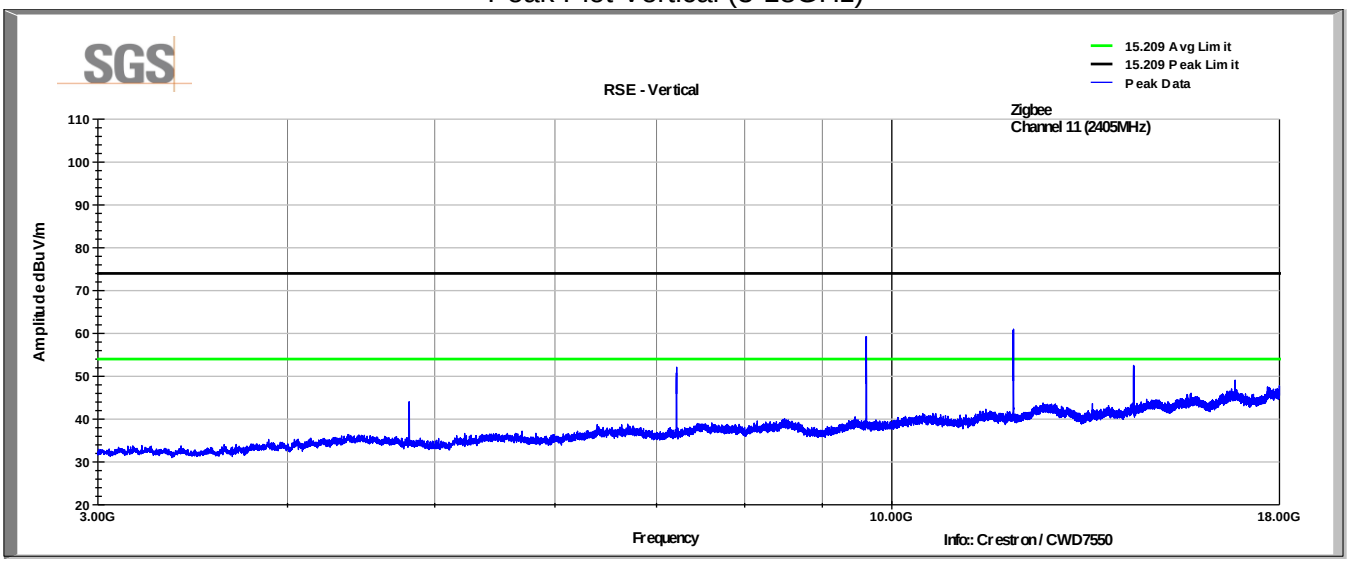
Low Channel (Channel 11, 2405MHz)
Peak Plot Vertical (1-3GHz)



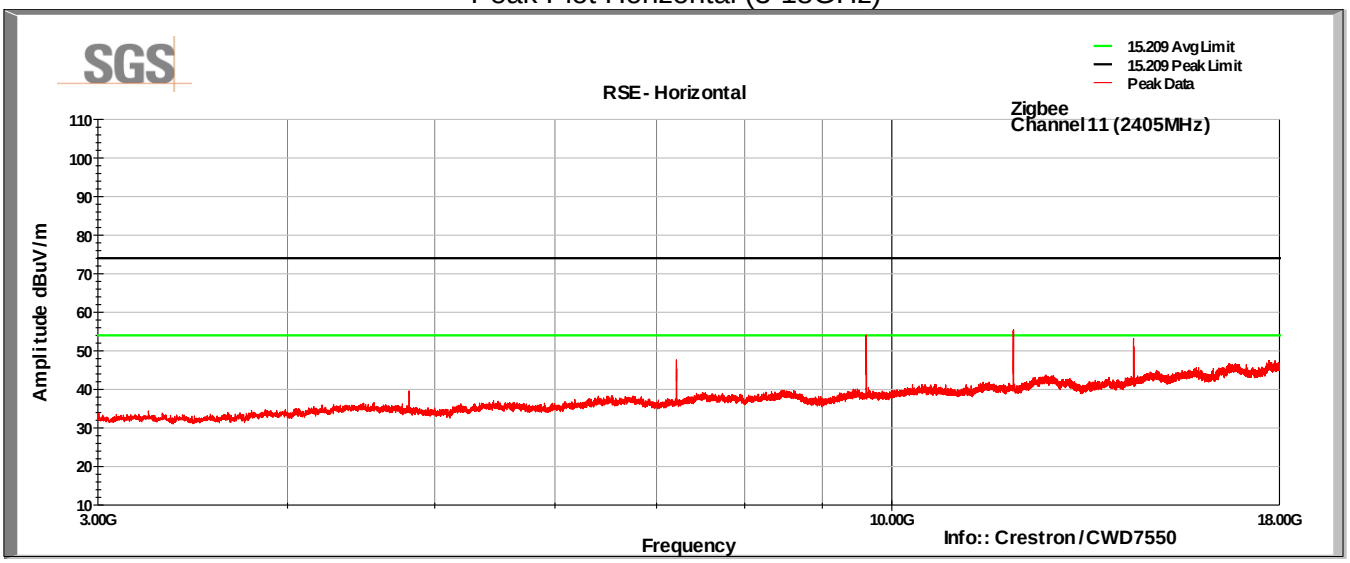
Low Channel (Channel 11, 2405MHz)
Peak Plot Horizontal (1-3GHz)



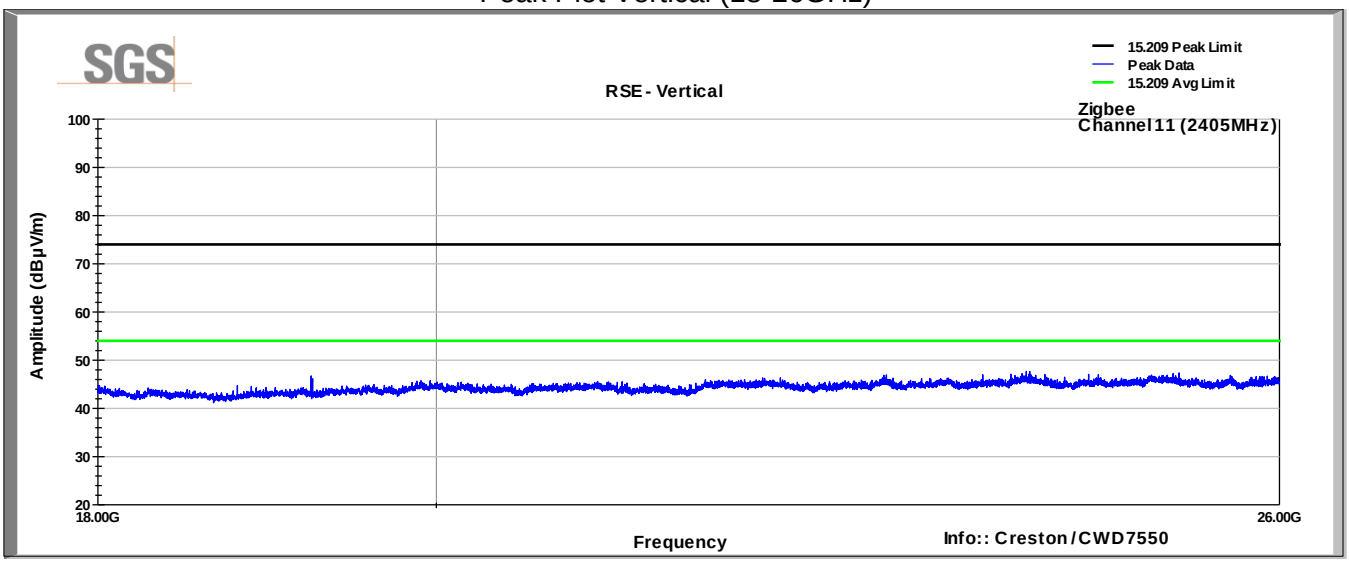
Low Channel (Channel 11, 2405MHz)
Peak Plot Vertical (3-18GHz)



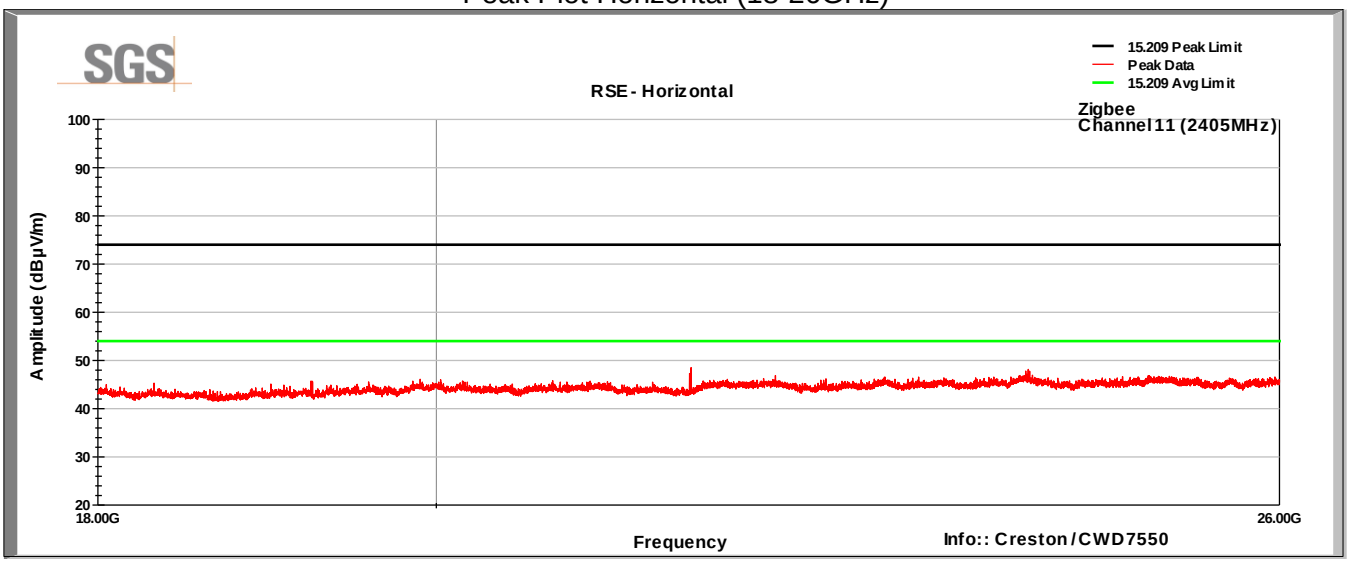
Low Channel (Channel 11, 2405MHz)
Peak Plot Horizontal (3-18GHz)



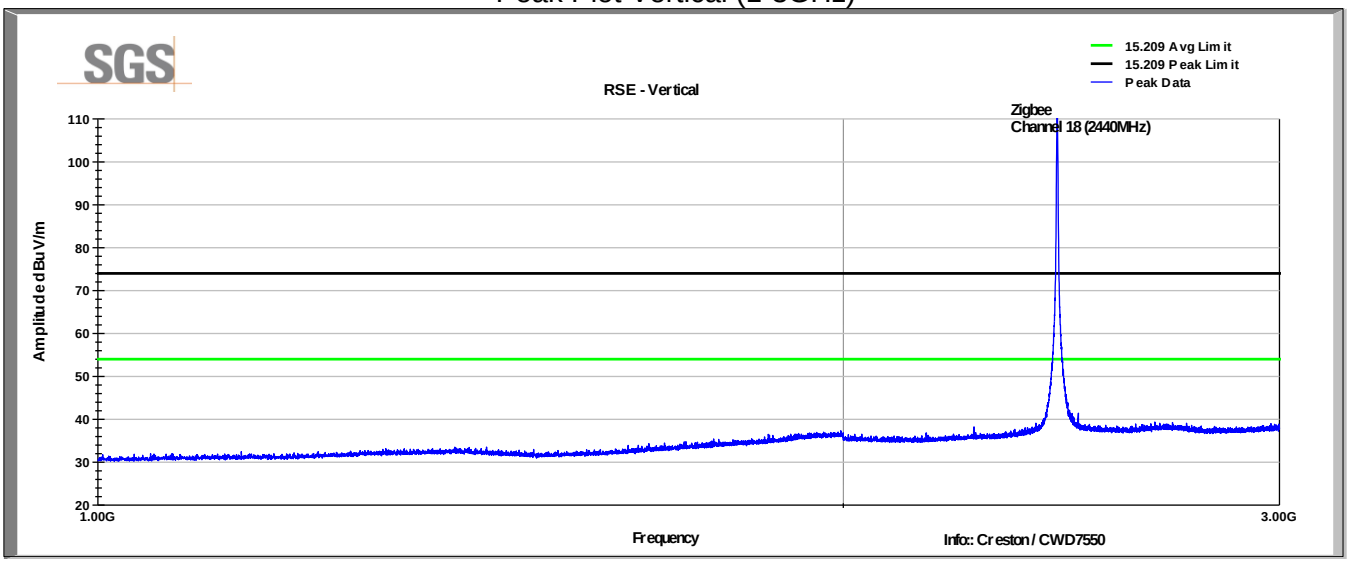
Low Channel (Channel 11, 2405MHz)
Peak Plot Vertical (18-26GHz)



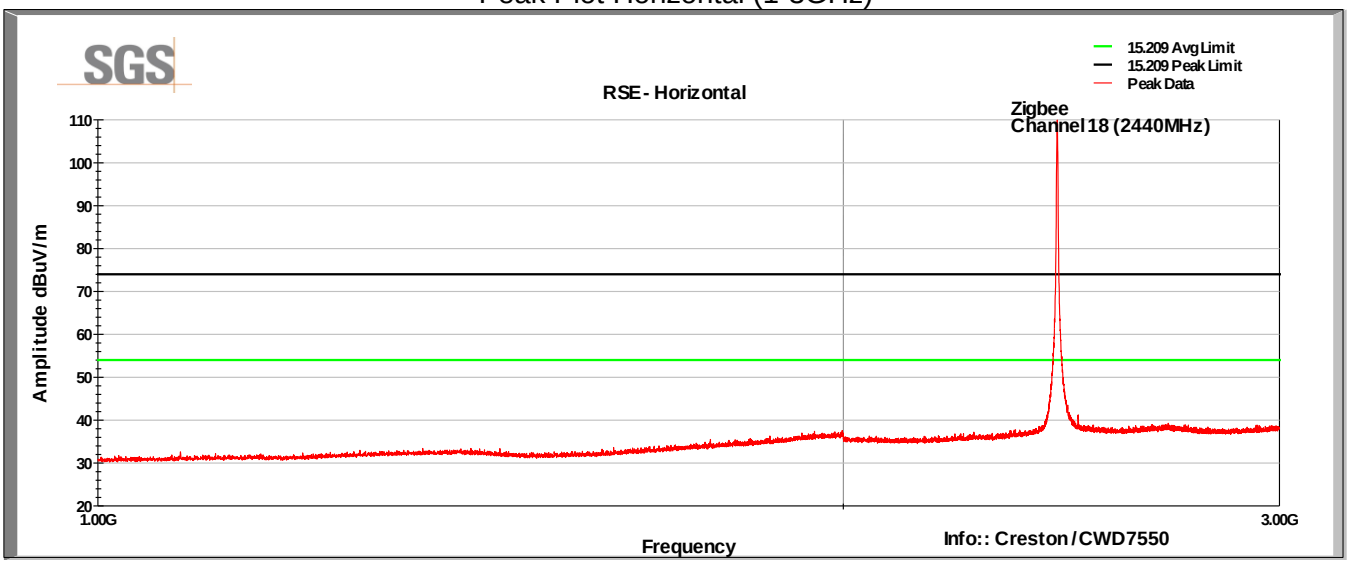
Low Channel (Channel 11, 2405MHz)
Peak Plot Horizontal (18-26GHz)



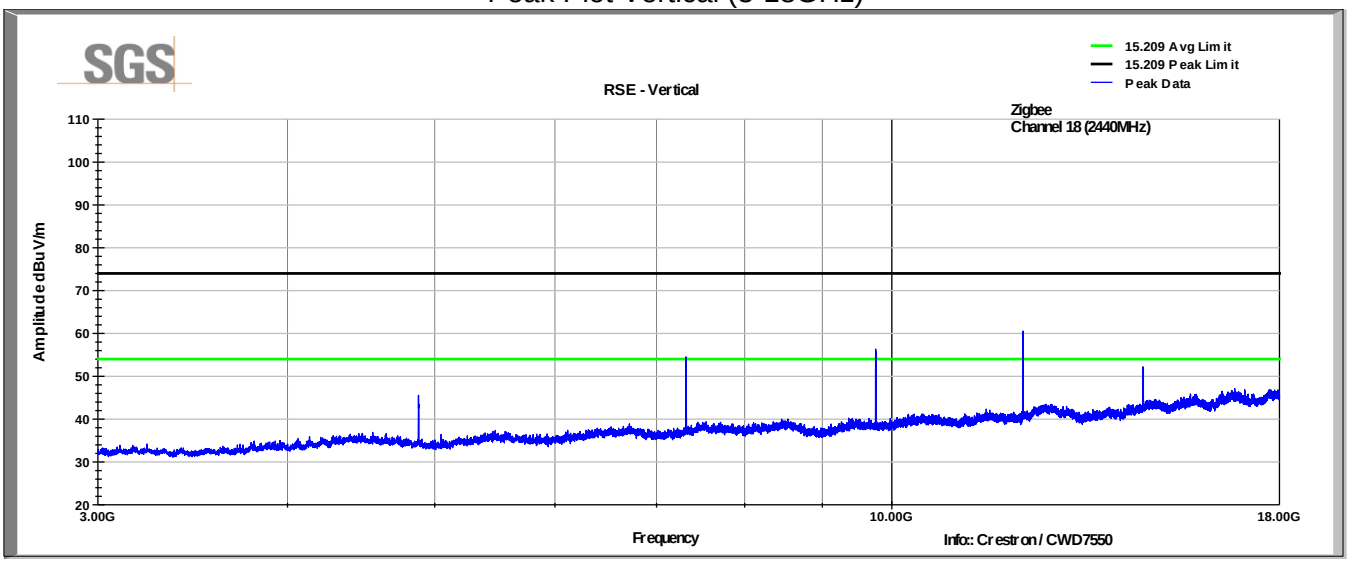
Low Channel (Channel 18, 2440MHz)
Peak Plot Vertical (1-3GHz)



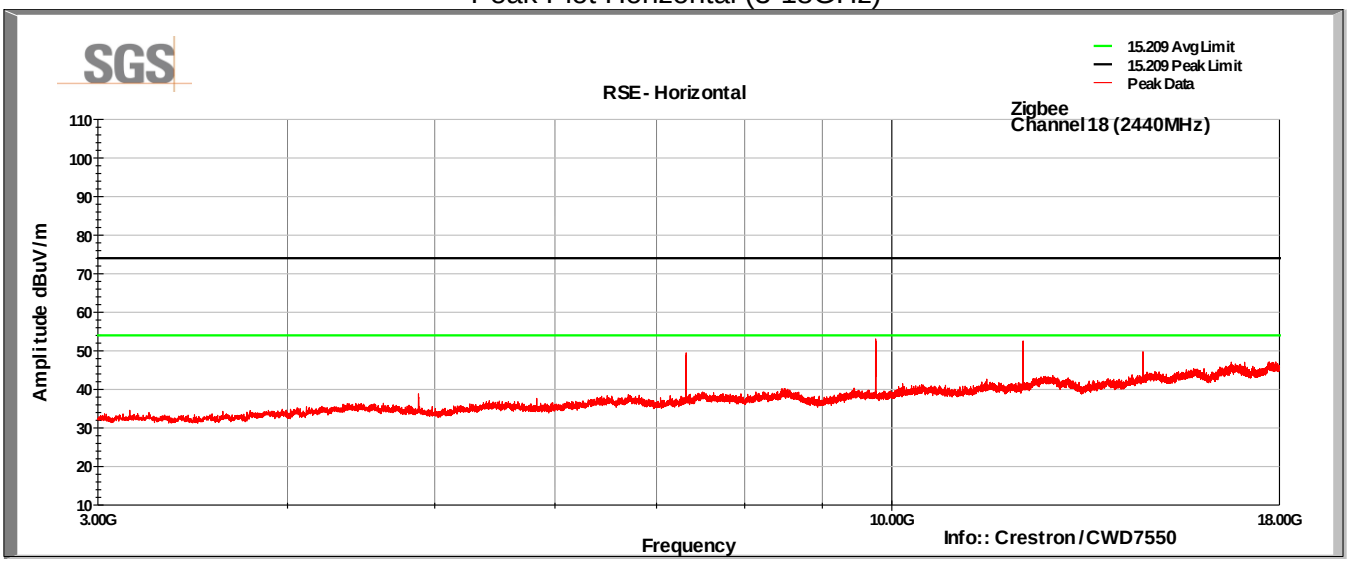
Low Channel (Channel 18, 2440MHz)
Peak Plot Horizontal (1-3GHz)



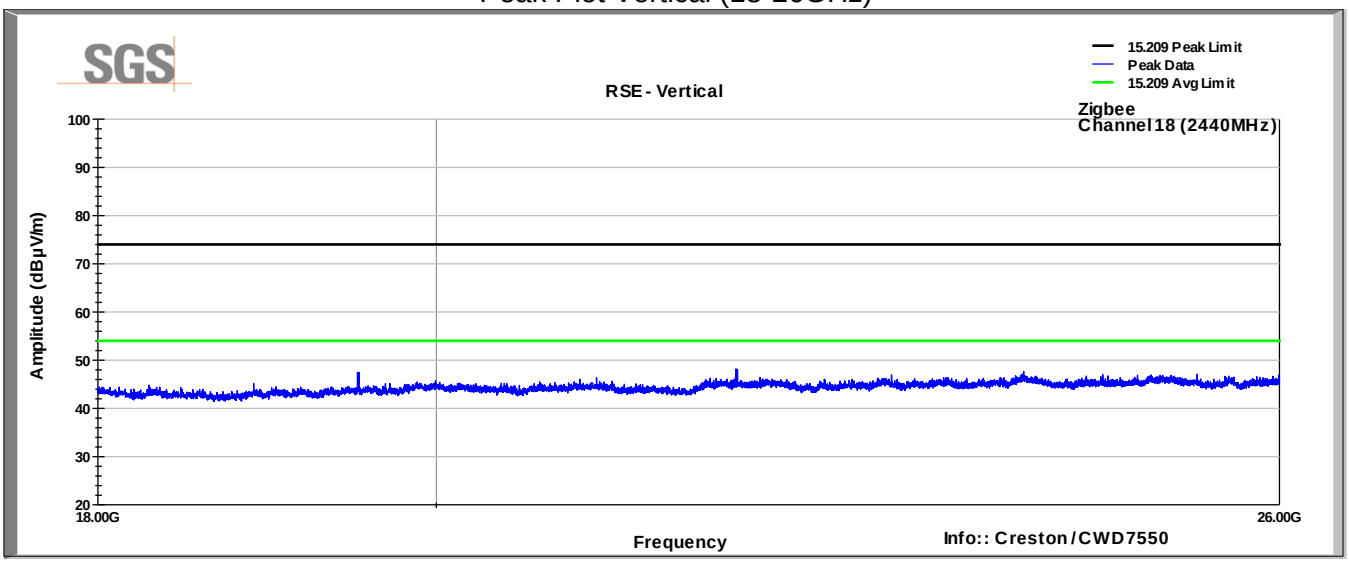
Low Channel (Channel 18, 2440MHz)
Peak Plot Vertical (3-18GHz)



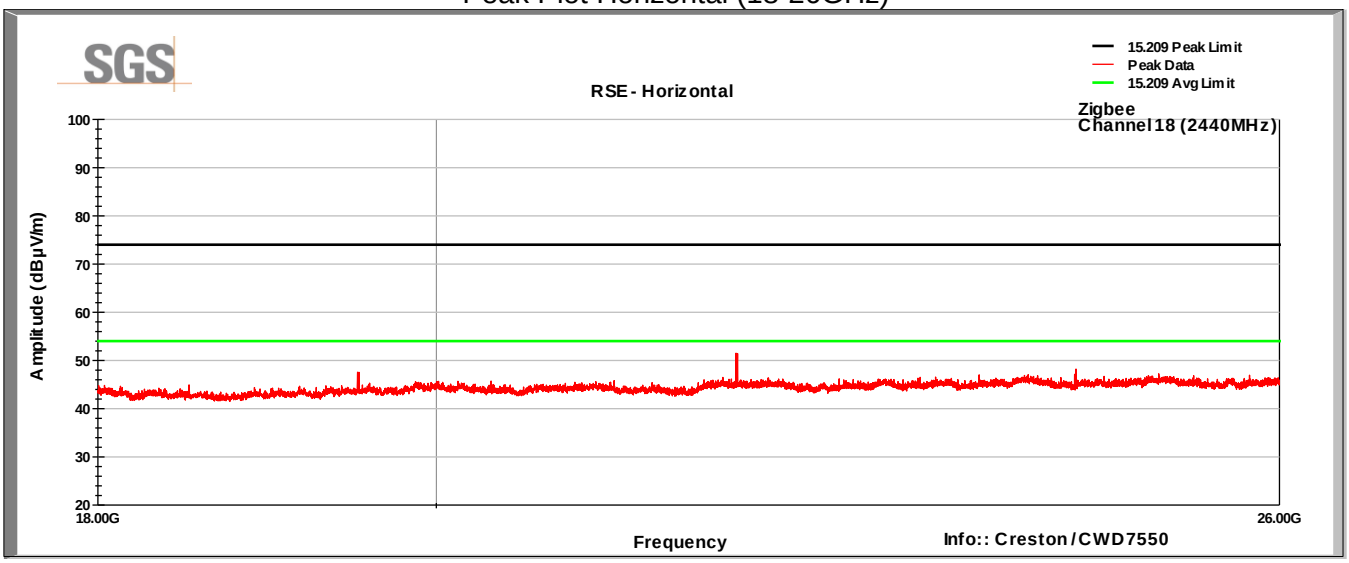
Low Channel (Channel 18, 2440MHz)
Peak Plot Horizontal (3-18GHz)



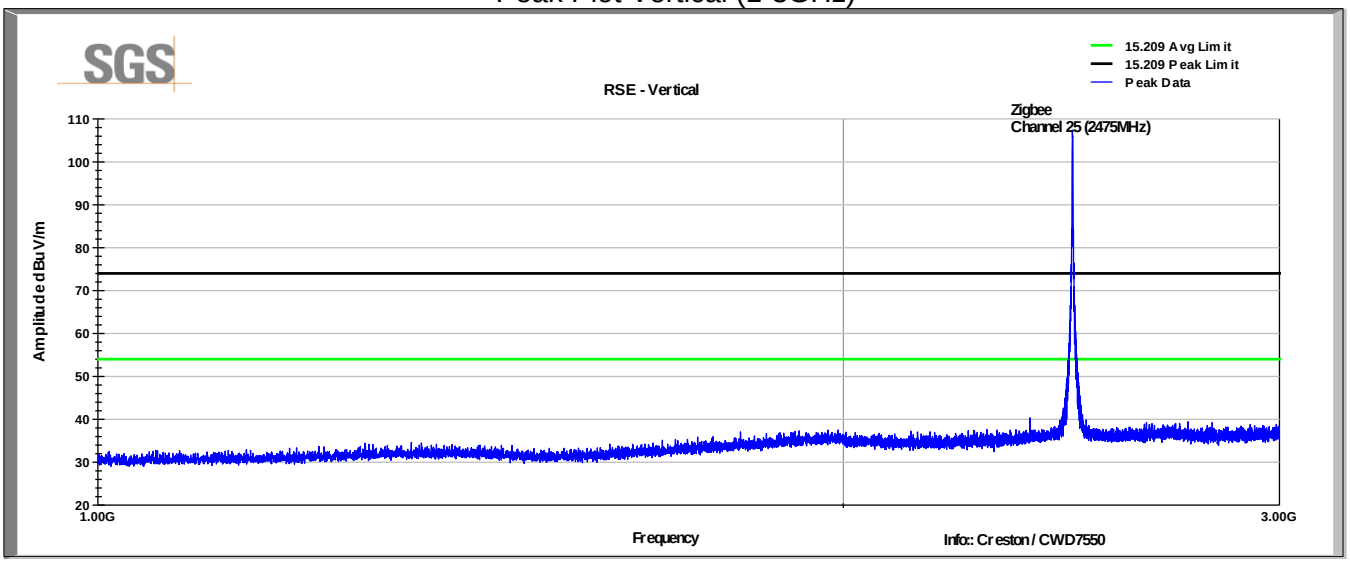
Mid Channel (Channel 18, 2440MHz)
Peak Plot Vertical (18-26GHz)



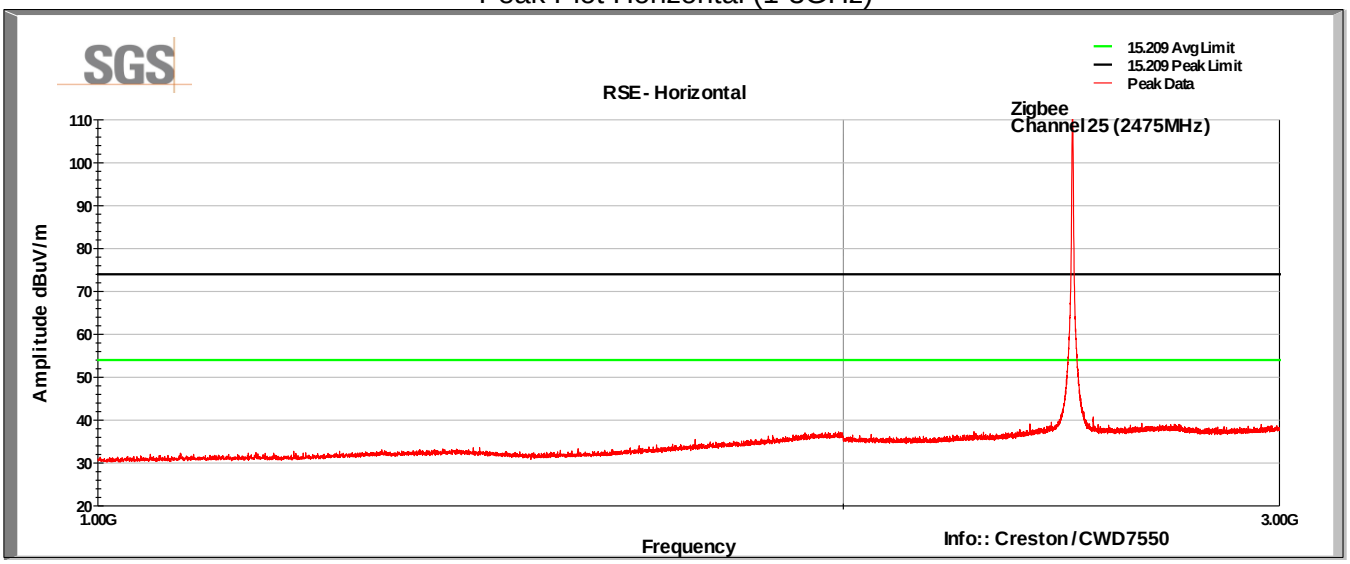
Mid Channel (Channel 18, 2440MHz)
Peak Plot Horizontal (18-26GHz)



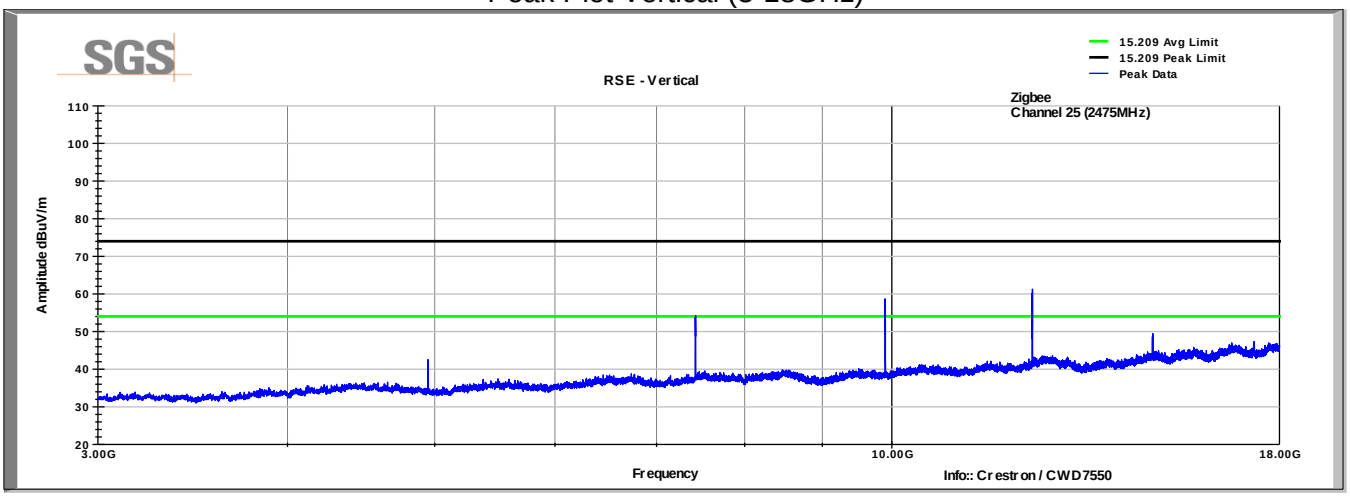
High Channel (Channel 25, 2475MHz)
Peak Plot Vertical (1-3GHz)



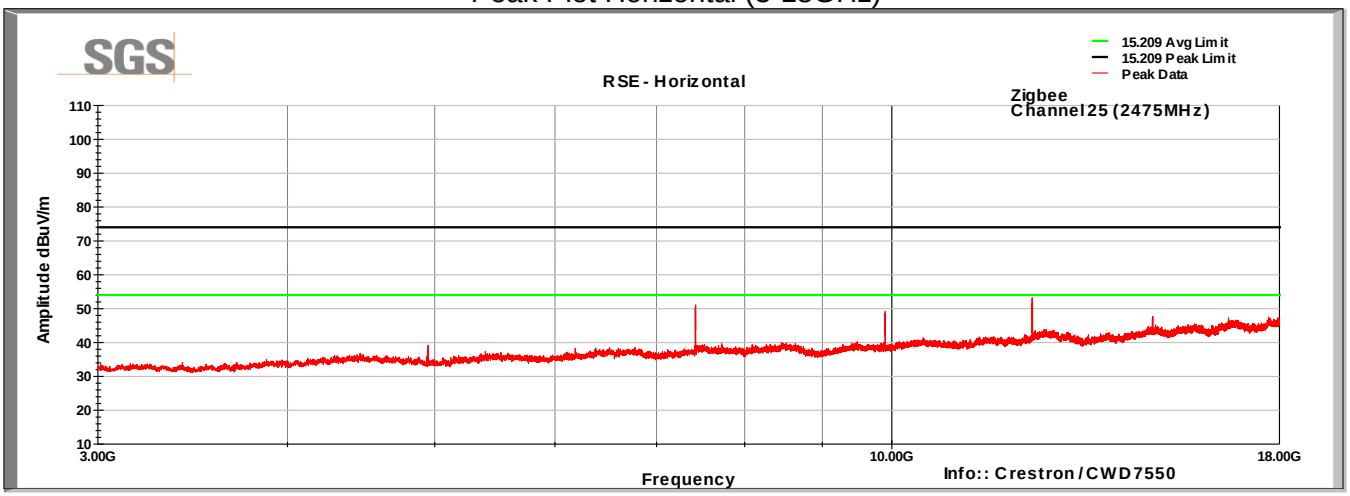
High Channel (Channel 25, 2475MHz)
Peak Plot Horizontal (1-3GHz)



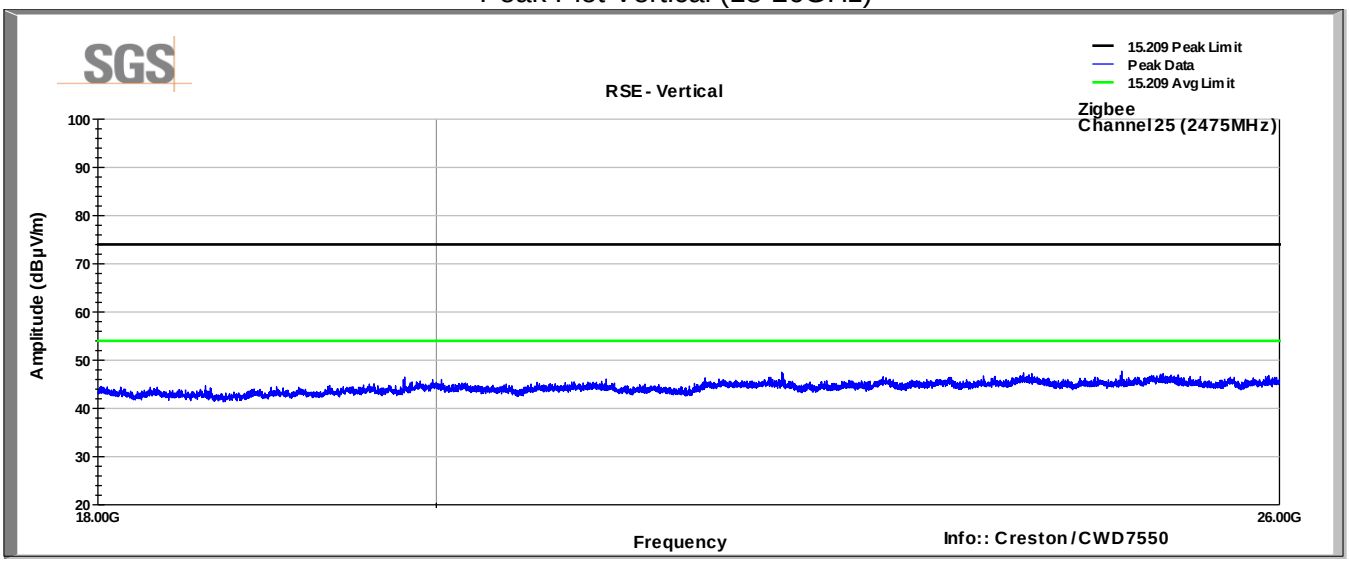
High Channel (Channel 25, 2475MHz)
Peak Plot Vertical (3-18GHz)



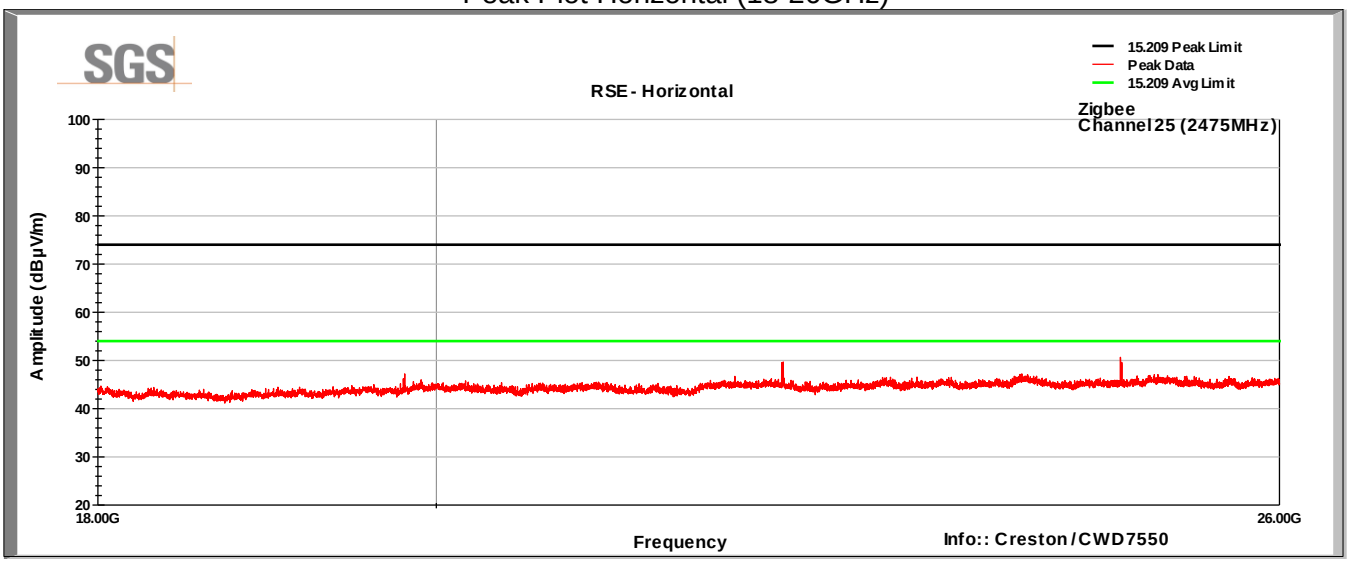
High Channel (Channel 27, 2475MHz)
Peak Plot Horizontal (3-18GHz)



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



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



3.6 *Test Data – Tabular Data*

Frequency MHz	Raw Meas (dBuV)	Polarity (V/H)	Correction (dB/m)	Corr Value dBuV/m	Limit (dBuV/m)	Margin (dB)	Detector	
Channel 11 (2405MHz)								
4810.00	41.0	V	2.9	43.9	74.0	-30.1	Peak	
4810.00	29.1	V	2.9	32.0	54.0	-22.0	Average	
4810.00	36.7	H	2.9	39.6	74.0	-34.4	Peak	
4810.00	24.8	H	2.9	27.7	54.0	-26.3	Average	
7215.00	47.1	V	5.0	52.1	NA	NA	Peak	*
7215.00	35.2	V	5.0	40.2	NA	NA	Average	*
7215.00	42.7	H	5.0	47.7	NA	NA	Peak	*
7215.00	30.8	H	5.0	35.8	NA	NA	Average	*
9620.00	52.6	V	6.6	59.2	NA	NA	Peak	*
9620.00	40.7	V	6.6	47.3	NA	NA	Average	*
9620.00	47.5	H	6.6	54.1	NA	NA	Peak	*
9620.00	35.6	H	6.6	42.2	NA	NA	Average	*
12025.00	50.8	V	10.1	60.9	74.0	-13.1	Peak	
12025.00	38.9	V	10.1	49.0	54.0	-5.0	Average	
12025.00	45.4	H	10.1	55.5	74.0	-18.5	Peak	
12025.00	33.5	H	10.1	43.6	54.0	-10.4	Average	
14430.00	41.3	V	11.2	52.5	NA	NA	Peak	*
14430.00	29.4	V	11.2	40.6	NA	NA	Average	*
14430.00	42.0	H	11.2	53.2	NA	NA	Peak	*
14430.00	30.1	H	11.2	41.3	NA	NA	Average	*
Channel 18 (2440MHz)								
4880.00	42.6	V	2.9	45.5	74.0	-28.5	Peak	
4880.00	30.7	V	2.9	33.6	54.0	-20.4	Average	
7320.00	49.5	V	5.0	54.5	74.0	-19.5	Peak	
7320.00	37.6	V	5.0	42.6	54.0	-11.4	Average	
7320.00	44.5	H	5.0	49.5	74.0	-24.5	Peak	
7320.00	32.6	H	5.0	37.6	54.0	-16.4	Average	
9760.00	49.6	V	6.8	56.4	NA	NA	Peak	*
9760.00	37.7	V	6.8	44.5	NA	NA	Average	*
9760.00	46.3	H	6.8	53.1	NA	NA	Peak	*
9760.00	34.4	H	6.8	41.2	NA	NA	Average	*
12200.00	50.2	V	10.3	60.5	74.0	-13.5	Peak	
12200.00	38.3	V	10.3	48.6	54.0	-5.4	Average	
12200.00	42.3	H	10.3	52.6	74.0	-21.4	Peak	
12200.00	30.4	H	10.3	40.7	54.0	-13.3	Average	
14640.00	40.2	V	12.0	52.2	NA	NA	Peak	*
14640.00	28.3	V	12.0	40.3	NA	NA	Average	*
14640.00	37.7	H	12.0	49.7	NA	NA	Peak	*
14640.00	25.8	H	12.0	37.8	NA	NA	Average	*
Channel 25 (2475MHz)								
4950.00	39.6	V	2.9	42.5	74.0	-31.5	Peak	
4950.00	27.7	V	2.9	30.6	54.0	-23.4	Average	
4950.00	36.3	H	2.9	39.2	74.0	-34.8	Peak	
4950.00	24.4	H	2.9	27.3	54.0	-26.7	Average	
7425.00	48.9	V	5.3	54.2	74.0	-19.8	Peak	
7425.00	37.0	V	5.3	42.3	54.0	-11.7	Average	
7425.00	45.8	H	5.3	51.1	74.0	-22.9	Peak	
7425.00	33.9	H	5.3	39.2	54.0	-14.8	Average	
9900.00	51.6	V	7.1	58.7	NA	NA	Peak	*
9900.00	39.7	V	7.1	46.8	NA	NA	Average	*
9900.00	42.1	H	7.1	49.2	NA	NA	Peak	*
9900.00	30.2	H	7.1	37.3	NA	NA	Average	*
12375.00	51.0	V	10.3	61.3	74.0	-12.7	Peak	
12375.00	39.1	V	10.3	49.4	54.0	-4.6	Average	
12375.00	42.9	H	10.3	53.2	74.0	-20.8	Peak	
12375.00	31.0	H	10.3	41.3	54.0	-12.7	Average	

* These emissions did not fall into restricted bands.

Average measurements were obtained by applying an 11.9dB duty-cycle correction factor (DCCF) to the peak reading. Duty-cycle calculations are in Crestron report CFR-CWD7550-10202016.

4 Radiated Emissions at Band Edge / Restricted Band

4.1 *Test Result*

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

4.2 *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 v03r05.

4.3 *Test Site*

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions
Temperature: 23.8 °C
Relative Humidity: 38.3 %

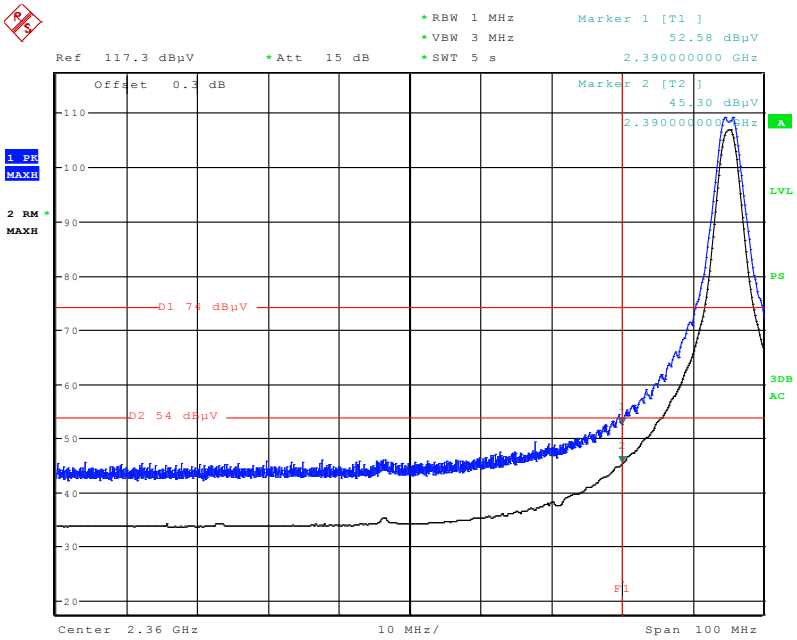
4.4 *Test Equipment*

Test End Date: 27-Feb-2017 Tester: JOP

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	20-Jun-2017
RF CABLE	SUCOFLEX 100	HUBER & SUHNER	B108523	4-Aug-2017
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	15003	29-Jul-2017
RF CABLE	SF106	HUBER & SUHNER	B079712	27-Jul-2017
ANTENNA, DRG HORN (MEDIUM)	3117	ETS LINDGREN	B079691	27-Jul-2017

Note: The equipment calibration period is 1 year.

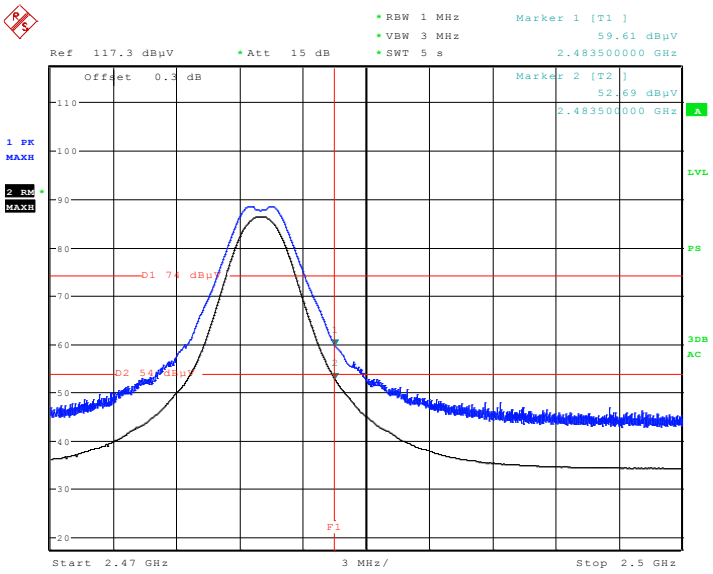
Test Data
Channel 11



Date: 27.FEB.2017 10:05:29

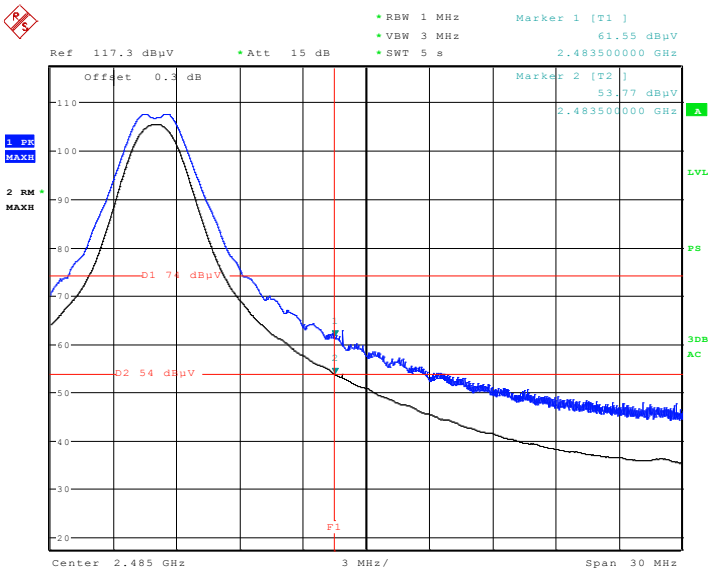
Channel	Frequency (MHz)	Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Measuremnt Detector
11	2390	52.6	74	-21.4	Peak
11	2390	45.3	54	-8.7	RMS

Channel 26



Date: 27.FEB.2017 10:26:31

Channel 25



Date: 27.FEB.2017 10:29:18

Channel	Frequency (MHz)	Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Measuremnt Detector
25	2483.5	61.6	74	-12.4	Peak
25	2483.5	53.8	54	-0.2	RMS
26	2483.5	59.6	74	-12.4	Peak
26	2483.5	52.7	54	-0.2	RMS

5 Revision History

Revision Level	Description of changes	Revision Date
0	Initial release	05 March 2017