EMC Test Report

Project Number: 4127074

Report Number: 4127074EMC01 **Revision Level:** 0

Client: VideoMining Corporation

Equipment Under Test: IP Camera w/BLE

Models: OMNISENSR_V2

FCC ID: 2ALT7-OMNISENR-V2

Applicable Standards: FCC Part 15 Subpart C, § 15.247

ANSI C63.10: 2013

Report issued on: 25 April 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)	Compliant
Transmitter Output Power	15.247(b)(3)	Compliant
Power Spectral Density	15.247(e)	Compliant
Conducted Spurious Emissions / Band edge	15.247(d)	Compliant
Radiated Spurious Emissions / Restricted Bands	15.35(b),15.209	Compliant
AC Powerline Conducted Emission	15.107, 15.207	NA(1)

(1) The device was powered over the Ethernet interface.

1.1 *Modifications Required for Compliance*

None

2 General Information

2.1 *Client Information*

Name:	VideoMining Corporation
Address:	403 South Allen Street Suite 101
City, State, Zip, Country:	State College, PA 16801, 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

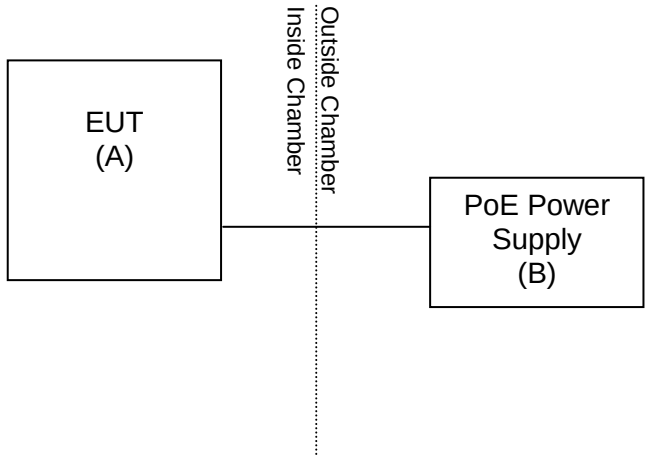
2.3 *General Information of EUT*

EUT:	IP Camera
Model Number:	OMNISENSR_V2
Serial Number:	Not Labeled
Frequency Range:	2402-2480 MHz
Channels:	40
Data Modes:	Bluetooth Low Energy
Antenna:	2dBi Detachable Monopole Antenna (Reverse SMA)
Rated Voltage:	48Vdc Supplied by PoE Supply
Sample Received Date:	28 March 2017
Dates of testing:	21 – 24 April 2017

2.4 *Operating Modes and Conditions*

Continuous traffic was generated using test commands. Where the duty cycle measured below 99% and an RMS detector was employed, corrections of 10*LOG(1/D) were applied according to KDB publication 558074 D01 DTS Meas Guidance v04.

2.5 *EUT Connection Block Diagram*



2.6 *System Configurations*

Device reference	Manufacturer	Description	Model Number	Serial Number
A	VideoMining Corp	IP Camera	OMNISENSR_V2	Not Labeled
B	TP-LINK	PoE Supply	TL-POE150S	2169947007835

2.7 *Cable List*

Cable reference	Port Name	Start	End	Cable Length (m)	Ferrite installed?	Shielded?
1	Ethernet	PoE Supply	EUT	10	No	No

3 Occupied Bandwidth

3.1 *Test Result*

Test Description	Basic Standards	Test Result
Bandwidth	15.247(d)	Pass

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: 23.3 °C
Relative Humidity: 43.5 %

3.4 *Test Equipment*

Test Date: 24-Apr-2017 Tester: JOP

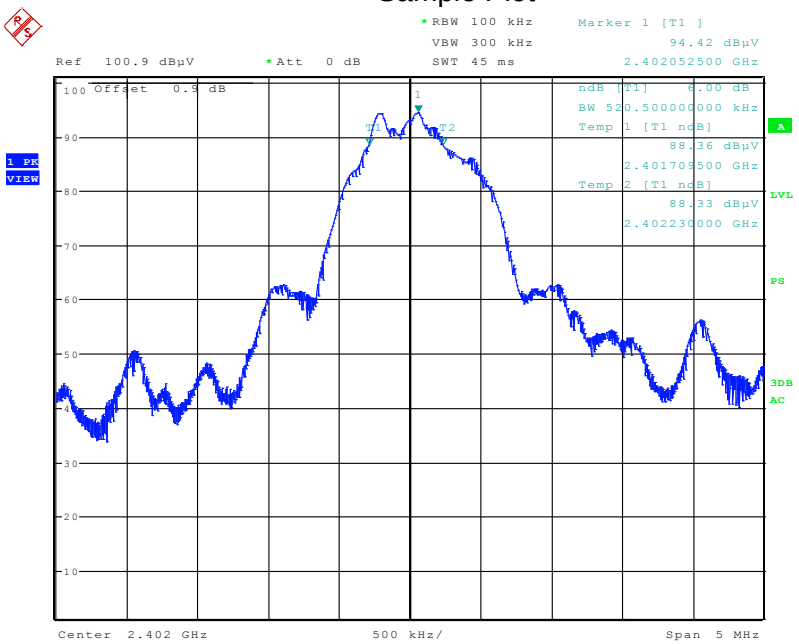
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	S/N: 10196	1-Dec-2017
ANTENNA, DRG HORN (MEDIUM)	3117	ETS LINDGREN	B079699	26-Apr-2017
RF CABLE	SF106	HUBER & SUHNER	B079712	27-Jul-2017
RF CABLE	104PE	HUBER & SUHNER	B079793	27-Jul-2017
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	B094463	22-Feb-2018

Note: The equipment calibration period is 1 year.

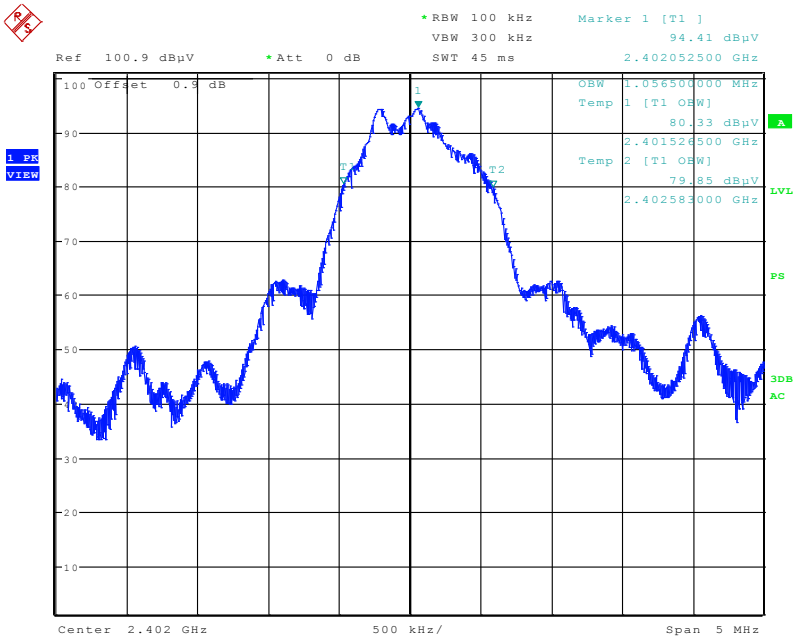
3.5 *Test Data*

Protocol	Channel	6dB Bandwidth (MHz)	Occupied Bandwidth (99%) (MHz)
BLE	0	0.521	1.057
BLE	19	0.529	1.053
BLE	39	0.529	1.074

Sample Plot



Date: 24.APR.2017 08:19:47



Date: 24.APR.2017 08:21:27

4 Peak Output Power

4.1 *Test Result*

Test Description	Test Specification	Test Result
Peak Output Power	15.247(b)(3)	Compliant

4.2 *Test Method*

Using radiated methods, the peak power procedures from KDB 558074 D01 DTS Meas Guidance v04 Clause 9.1.1 were applied. The fundamental emission was maximized using the procedures in ANSI C63.10: 2013 and using a correction of 95.2dB, the field strength measurement was converted from a 3m field strength measurement in dBµV/m to an EIRP value in dBm.

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: 23.3 °C
Relative Humidity: 43.5 %

4.4 *Test Equipment*

Test Date: 24-Apr-2017 Tester: JOP

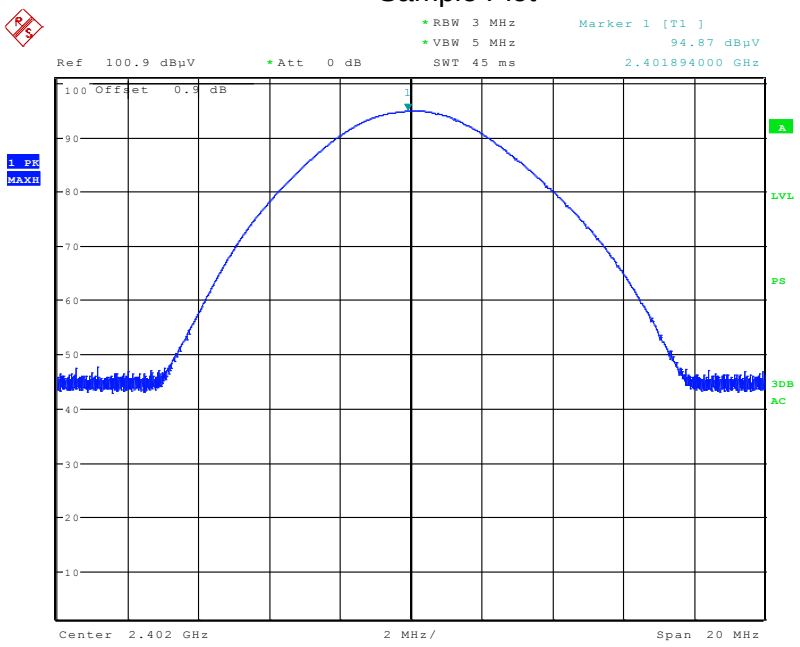
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	S/N: 10196	1-Dec-2017
ANTENNA, DRG HORN (MEDIUM)	3117	ETS LINDGREN	B079699	26-Apr-2017
RF CABLE	SF106	HUBER & SUHNER	B079712	27-Jul-2017
RF CABLE	104PE	HUBER & SUHNER	B079793	27-Jul-2017
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	B094463	22-Feb-2018

Note: The equipment calibration period is 1 year.

4.5 *Test Data*

Frequency	Measured Field Strength (dBµV/m@3m)	Free Space Correction Factor	Peak Output Power (dBm)	Peak Output Power (W)
2402	94.9	95.2	-0.3	0.0009
2440	98.0	95.2	2.8	0.0019
2480	102.4	95.2	7.2	0.0052

Sample Plot



Date: 24.APR.2017 08:15:48

5 Power Spectral Density

5.1 *Test Result*

Test Description	Test Specification	Test Result
Power Spectral Density	15.247(e)	Compliant

5.2 *Test Method*

Using radiated methods, the peak PSD procedures from KDB 558074 D01 DTS Meas Guidance v04 Clause 10.2 were applied. The fundamental emission was maximized using the procedures in ANSI C63.10: 2013 and using a correction of 95.2dB, the field strength measurement was converted from a 3m field strength measurement in dBµV/m to an ERP PSD value in dBm.

Limit
The limit is 8 dBm.

5.3 *Test Site*

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions
Temperature: 23.3 °C
Relative Humidity: 43.5 %

5.4 *Test Equipment*

Test Date: 24-Apr-2017 Tester: JOP

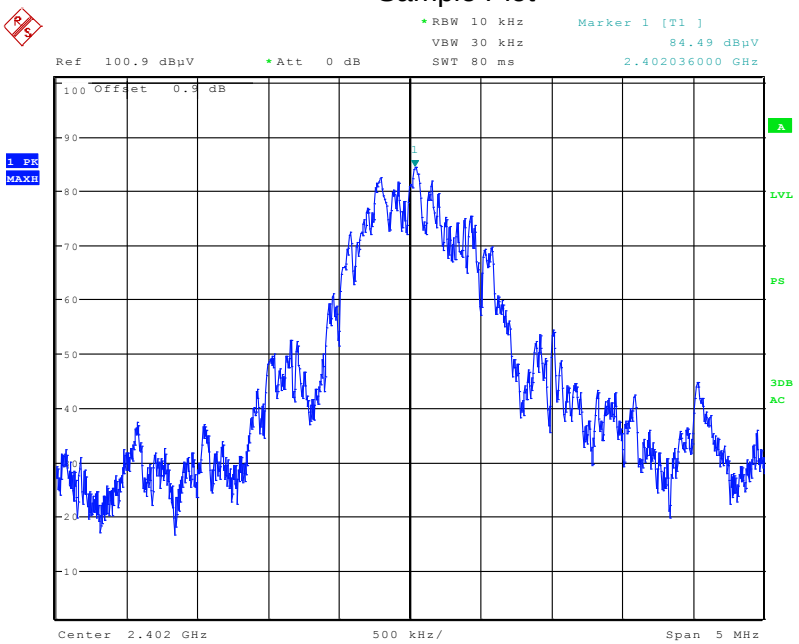
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	S/N: 10196	1-Dec-2017
ANTENNA, DRG HORN (MEDIUM)	3117	ETS LINDGREN	B079699	26-Apr-2017
RF CABLE	SF106	HUBER & SUHNER	B079712	27-Jul-2017
RF CABLE	104PE	HUBER & SUHNER	B079793	27-Jul-2017
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	B094463	22-Feb-2018

Note: The equipment calibration period is 1 year.

5.5 *Test Data*

Channel (MHz)	Peak PSD (dBµV/m)	Correction (dB)	Peak PSD (dBm)	Limit (dBm)	Margin (dB)
2402	84.5	-95.2	-10.7	8	-18.7
2440	87.7	-95.2	-7.5	8	-15.5
2480	92.3	-95.2	-2.9	8	-10.9

Sample Plot



Date: 24.APR.2017 08:25:12

6 Band Edge / Out of Band Emissions

6.1 *Test Result*

Test Description	Test Specification	Test Result
Conducted Spurious Emissions	15.247(d)	Compliant

6.2 *Test Method*

Using radiated methods, the procedures from KDB 558074 D01 DTS Meas Guidance v04 Clause 11 were applied.

The limit is 20 dB below the measured peak power in any 100kHz band.

6.3 *Test Site*

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.3 °C
Relative Humidity: 43.5 %

6.4 *Test Equipment*

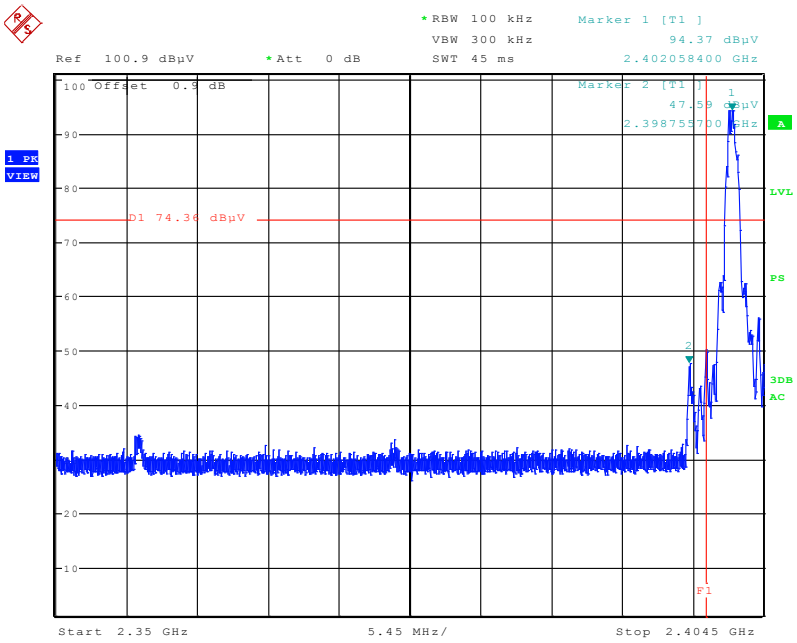
Test Date: 24-Apr-2017 Tester: JOP

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	S/N: 10196	1-Dec-2017
ANTENNA, DRG HORN (MEDIUM)	3117	ETS LINDGREN	B079699	26-Apr-2017
RF CABLE	SF106	HUBER & SUHNER	B079712	27-Jul-2017
RF CABLE	104PE	HUBER & SUHNER	B079793	27-Jul-2017
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	B094463	22-Feb-2018

Note: The equipment calibration period is 1 year.

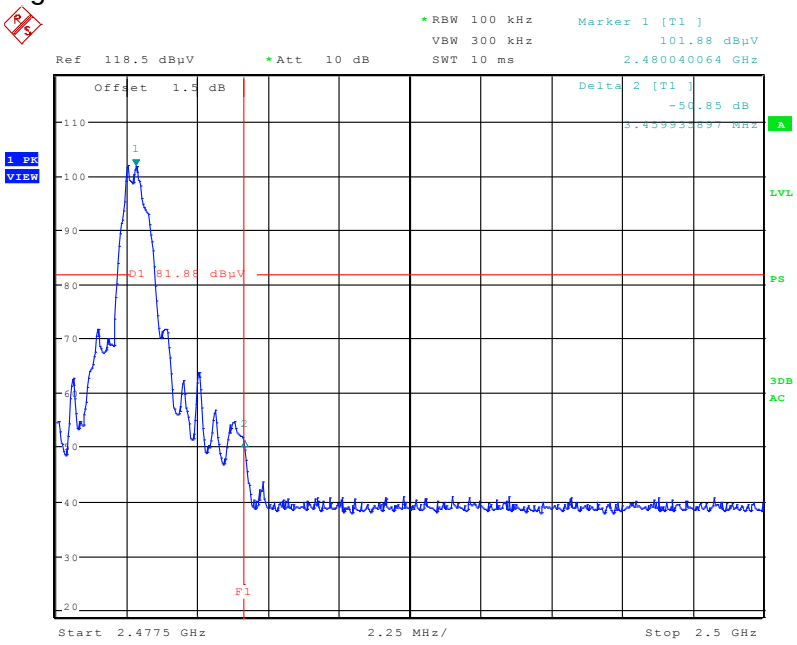
6.5 *Test Data (DTS Band-Edge)*

Low Channel – 2402MHz



Date: 24.APR.2017 08:29:21

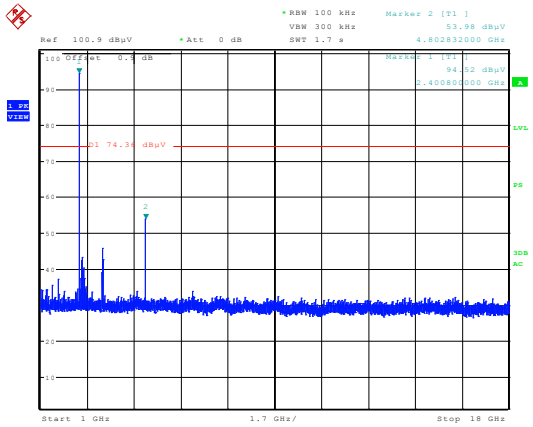
High Channel – 2480MHz



Date: 24.APR.2017 08:52:19

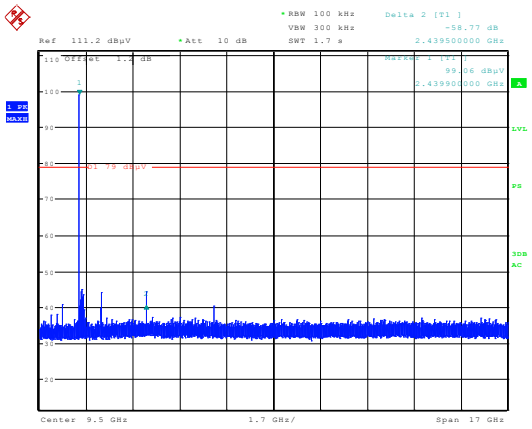
6.6 *Test Data (Spurious Emissions)*

Low Channel - 2402 MHz



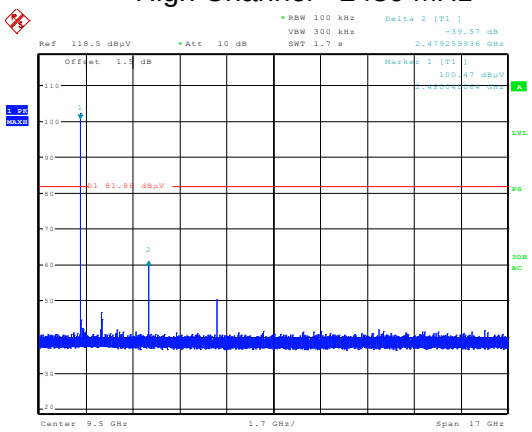
Date: 24.APR.2017 08:34:01

Mid Channel - 2440 MHz



Date: 24.APR.2017 10:22:22

High Channel - 2480 MHz



Date: 24.APR.2017 09:01:44

7 Field Strength of Spurious Radiation

7.1 *Test Result*

Test Description	Test Specification	Test Result
Field strength of spurious radiation	15.247(d), 15.35(b),15.205, 15.209	Compliant

7.2 *Test Method*

Radiated spurious emissions measurements were recorded with the device configured to transmit at the lowest, middle, and highest channels. The frequency range investigated was up through the 10th harmonic of the fundamental transmit frequency. The methods defined in ANSI C63.10: 2013 were used.

For measurements below 1GHz, the device was manipulated through three orthogonal axes. Above 1GHz, the alternative method in Clause 6.6.5 was used.

Test distance:

9k to 30 MHz – Near field prescan to determine if there were any emissions.
30 MHz to 1 GHz - The EUT to measurement antenna distance was 3 meters
1 to 18 GHz - The EUT to measurement antenna distance was 3 meters
18 to 40 GHz - The EUT to measurement antenna distance was 3 meter

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 within the restricted bands of operation defined in FCC §15.205.
(2) Quasi-peak limit
(3) Average limit

7.3 *Test Site*

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 22.9 °C
Relative Humidity: 46.3 %

7.4 *Test Equipment*

Test Date: 25-Apr-2017 Tester: JOP

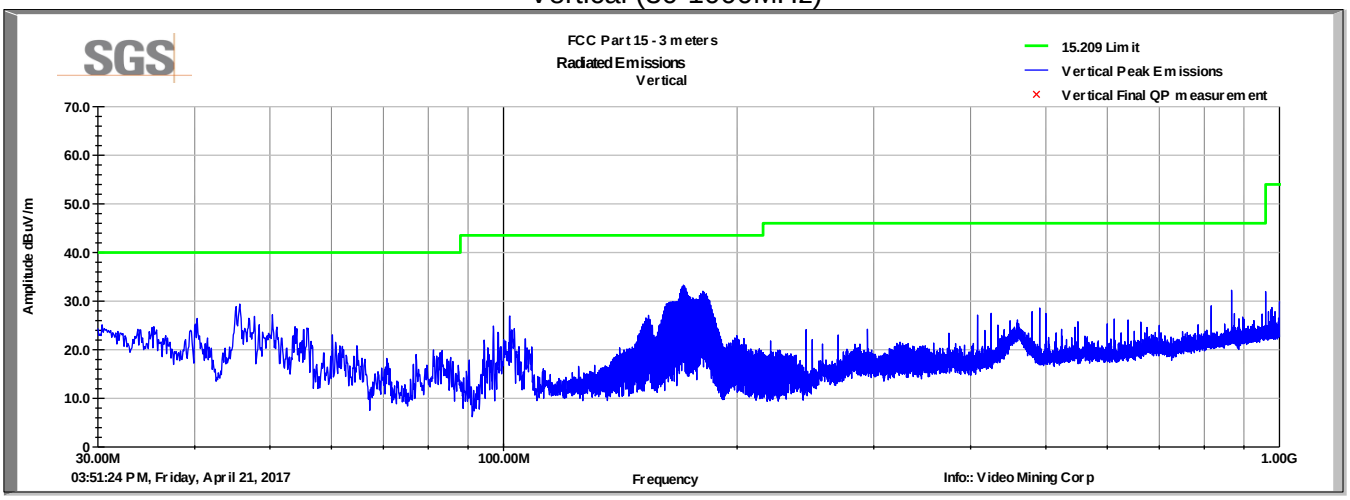
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU8	ROHDE & SCHWARZ	B085759	21-Jul-2017
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	S/N: 100196	1-Dec-2017
ANTENNA, BILOG	JB6	SUNOL	B079690	10-Nov-2017
RF CABLE	CBL-25FT-NMNM	MINI-CIRCUITS	B094941	25-Jul-2017
RF CABLE	SF106	HUBER & SUHNER	B079717	27-Jul-2017
RF CABLE	SUCOFLEX 100	HUBER & SUHNER	B108523	4-Aug-2017
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	15003	29-Jul-2017
ANTENNA, DRG HORN (MEDIUM)	3117	ETS LINDGREN	B079699	26-Apr-2017
RF CABLE	SF106	HUBER & SUHNER	B079712	27-Jul-2017
RF CABLE	104PE	HUBER & SUHNER	B079793	27-Jul-2017
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	B094463	22-Feb-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
HORN(SMALL)	LB-180400-20-C-KF	A-INFO	15007	21-Mar-2018

Note: The equipment calibration period is 1 year.

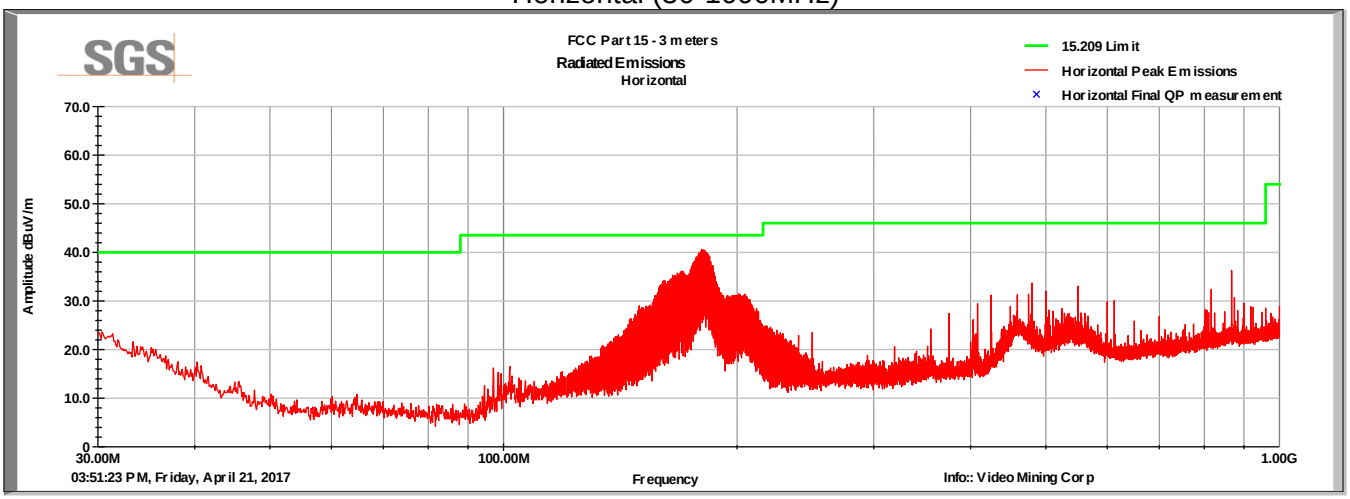
7.5 *Test Data – Peak Plots*

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

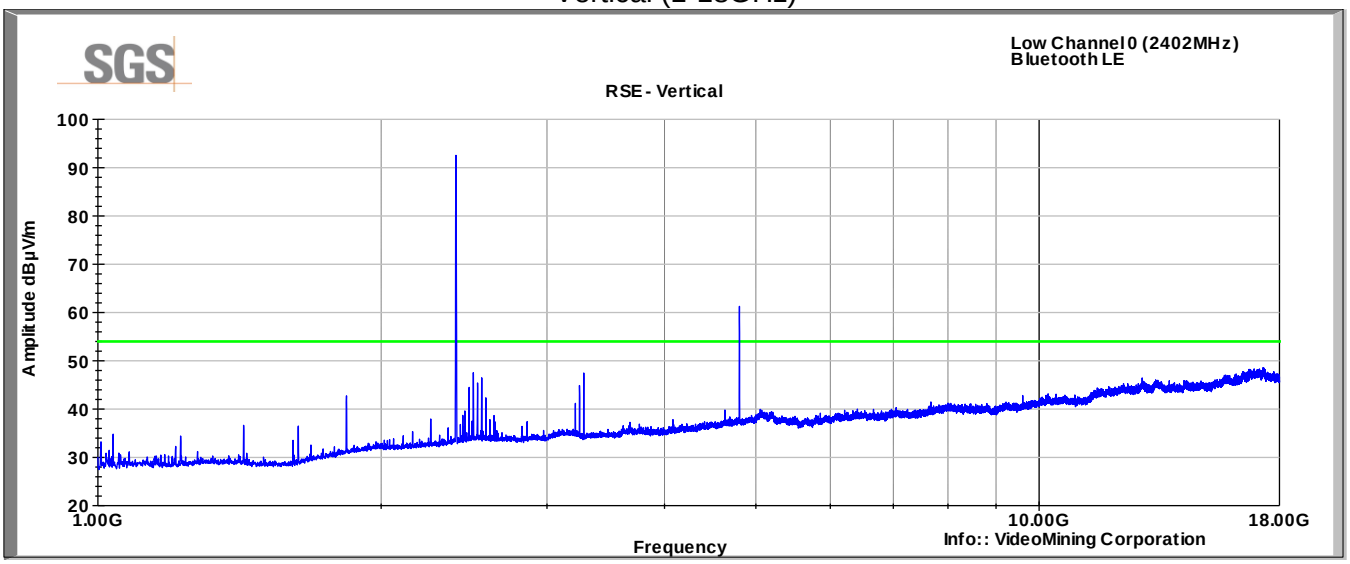
BLE Channels 0
Vertical (30-1000MHz)



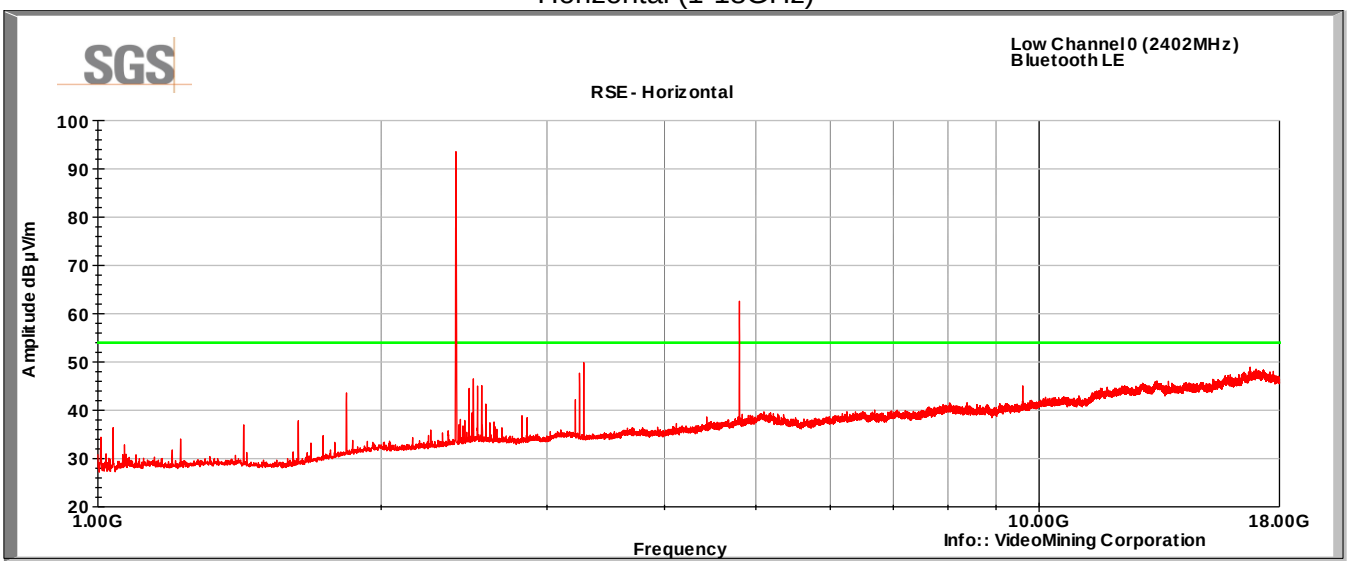
BLE Channels 0
Horizontal (30-1000MHz)



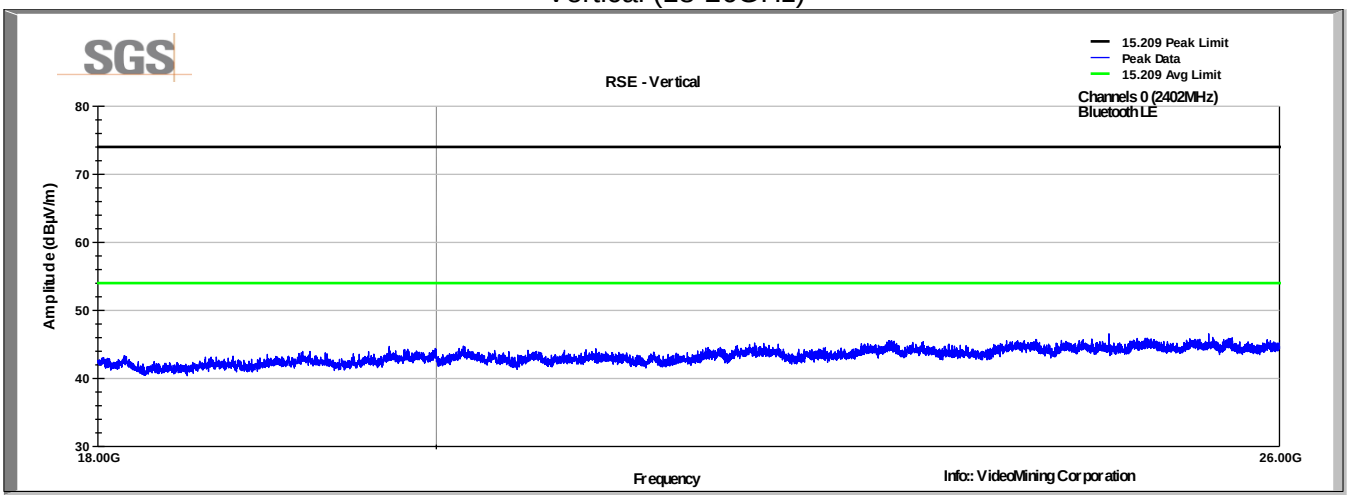
BLE Channels 0
Vertical (1-18GHz)



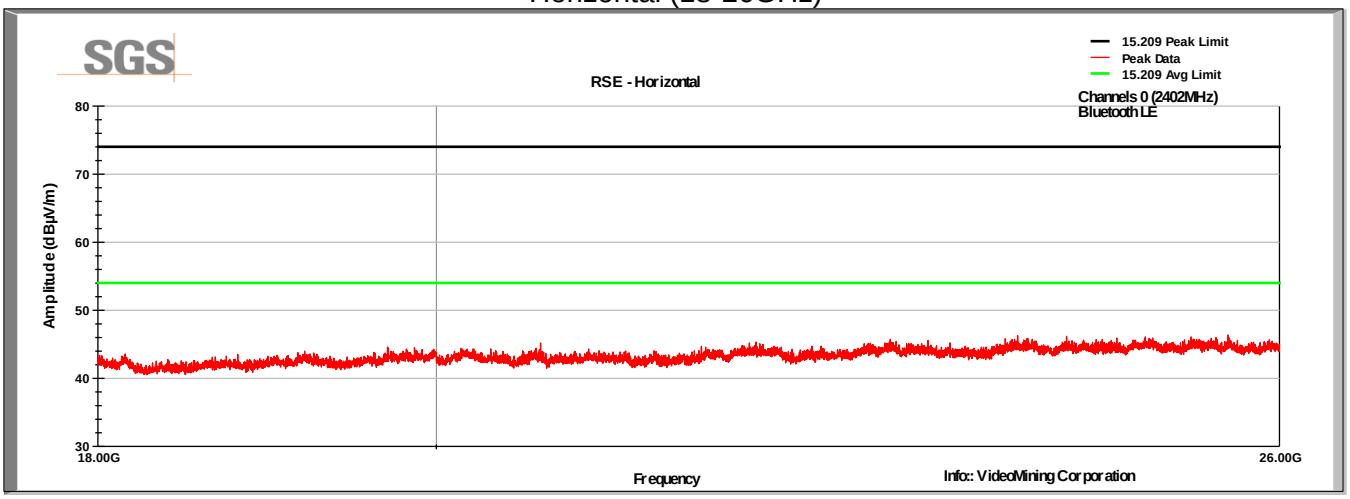
BLE Channels 0
Horizontal (1-18GHz)



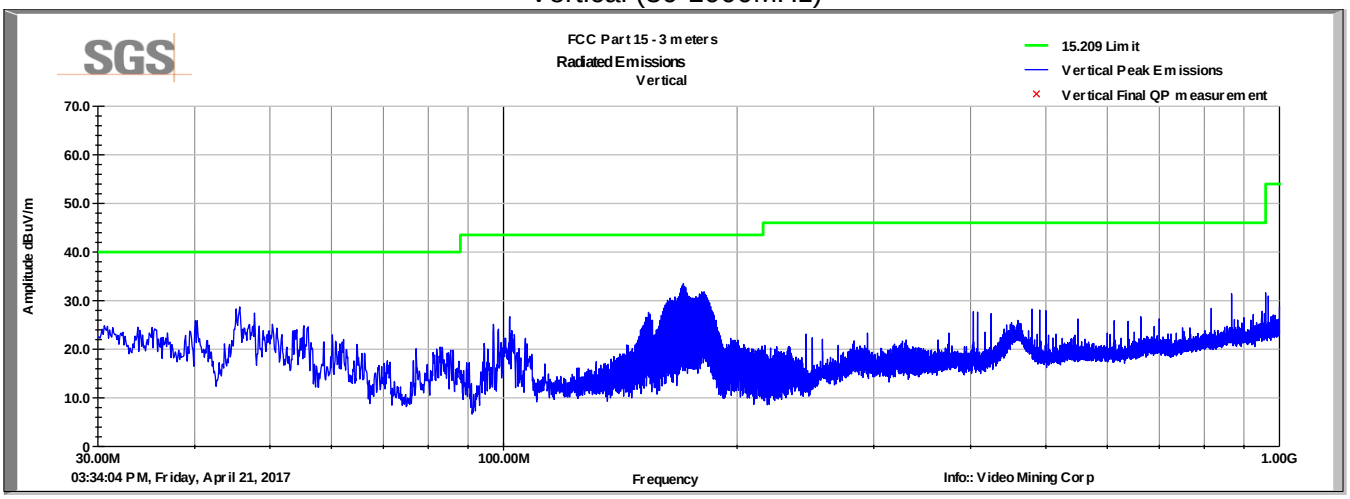
BLE Channels 0
Vertical (18-26GHz)



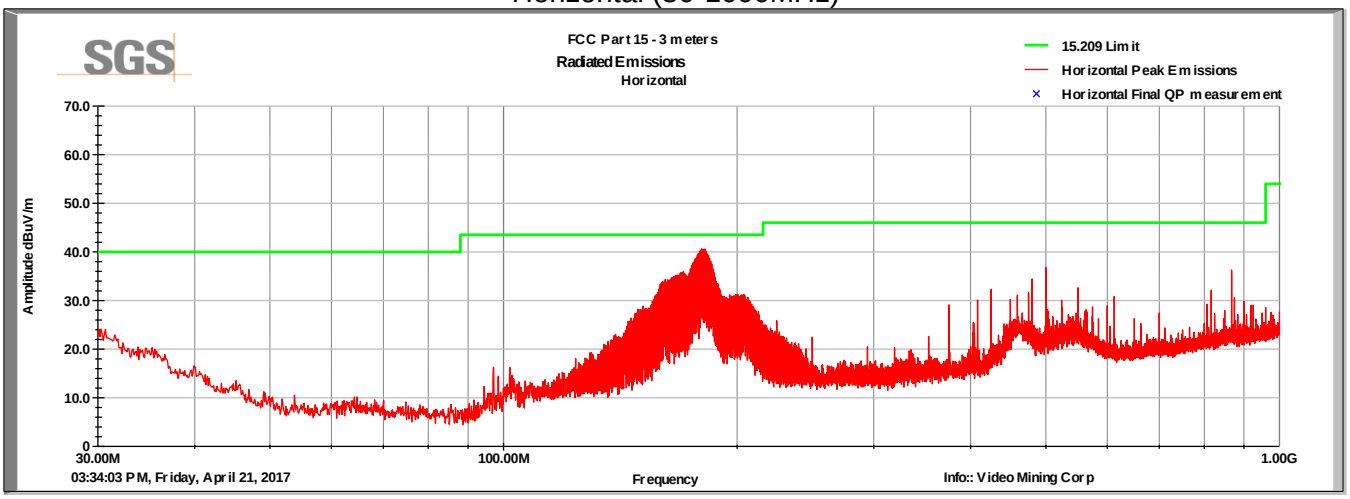
BLE Channels 0
Horizontal (18-26GHz)



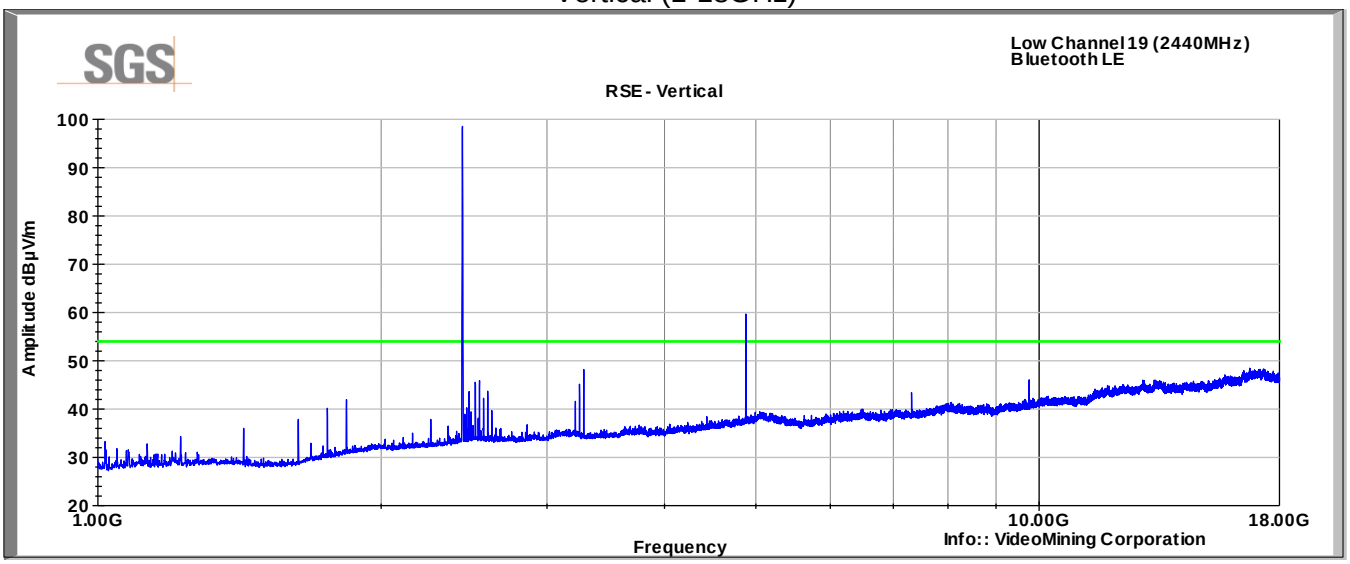
BLE Channels 19
Vertical (30-1000MHz)



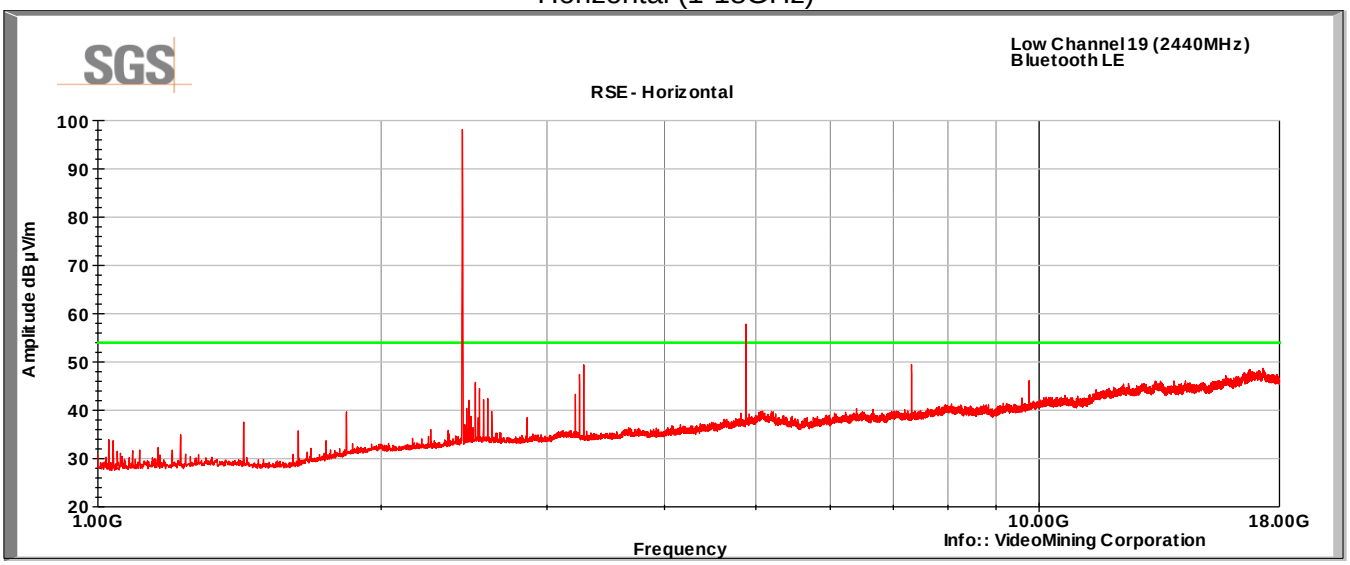
BLE Channels 19
Horizontal (30-1000MHz)



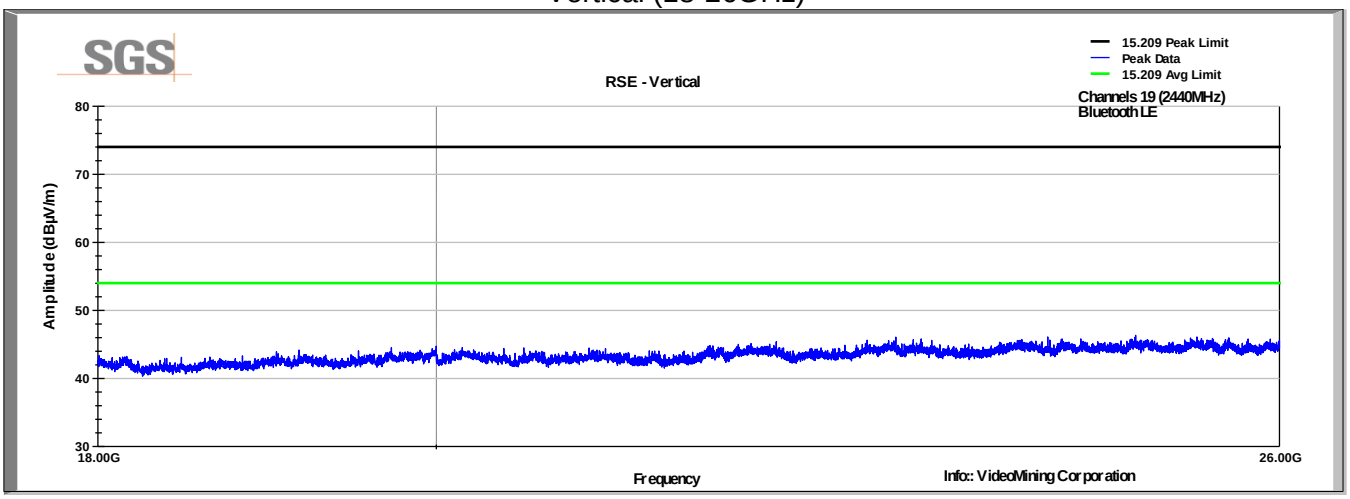
BLE Channels 19
Vertical (1-18GHz)



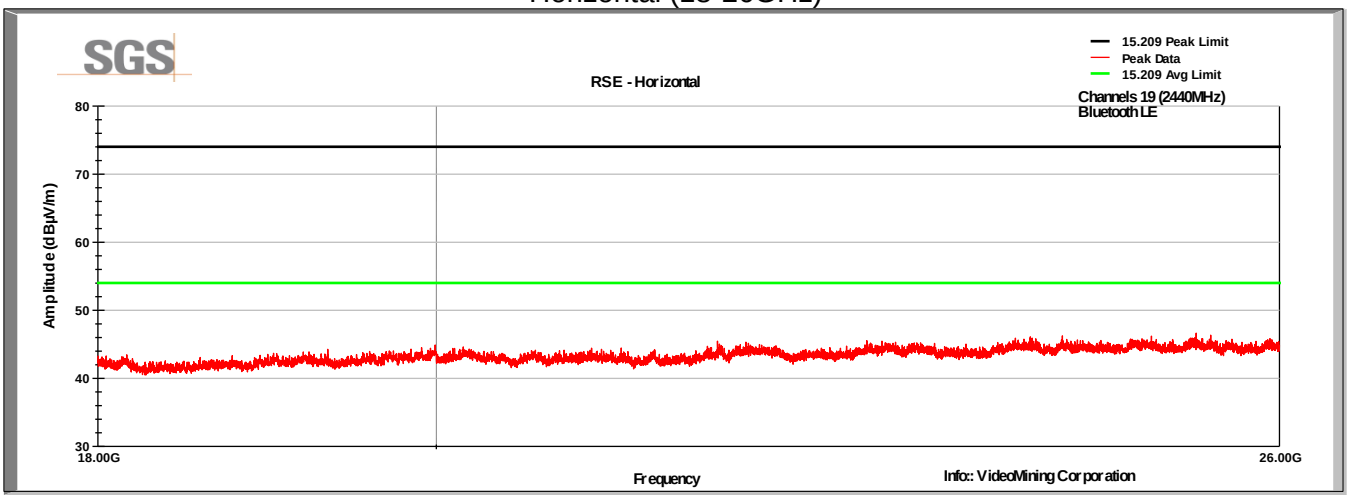
BLE Channels 19
Horizontal (1-18GHz)



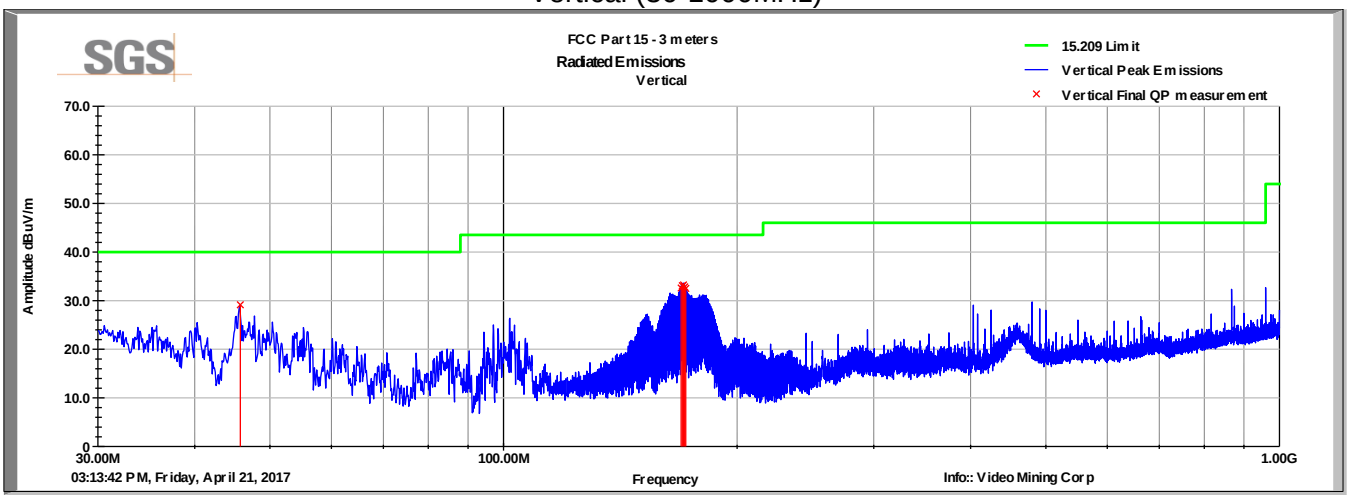
BLE Channels 19
Vertical (18-26GHz)



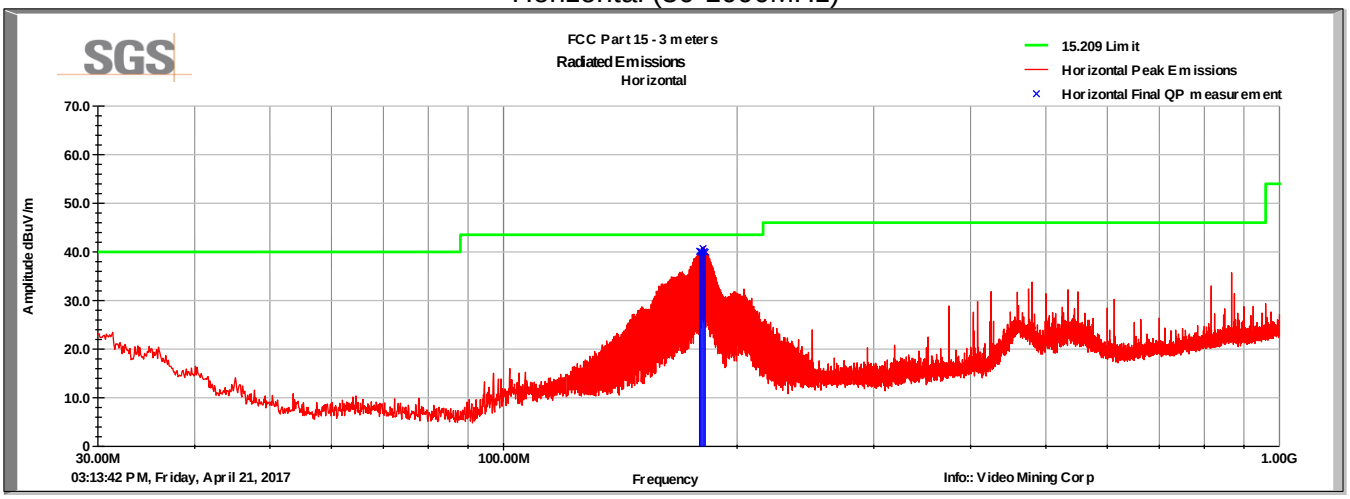
BLE Channels 19
Horizontal (18-26GHz)



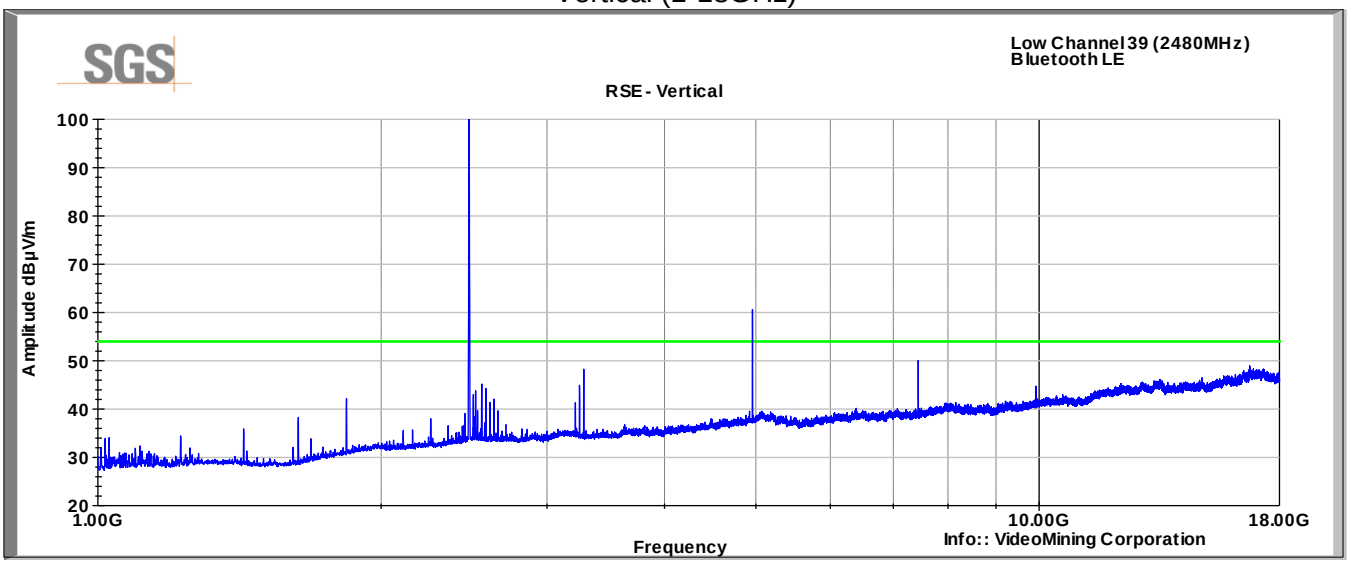
BLE Channels 39
Vertical (30-1000MHz)



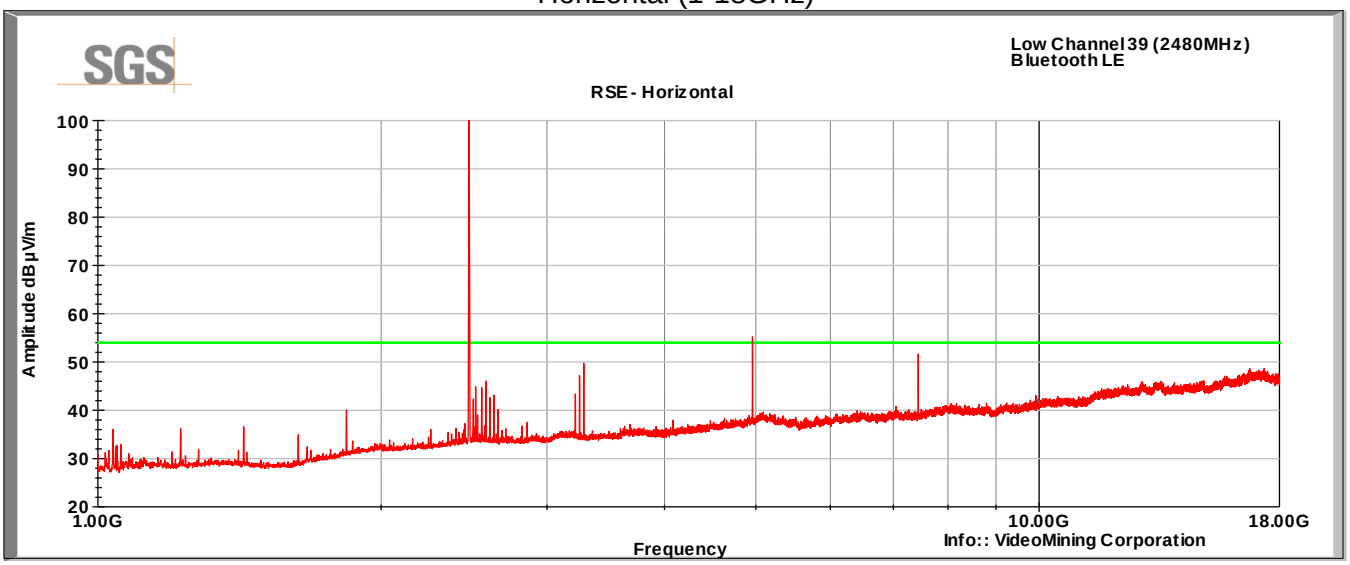
BLE Channels 39
Horizontal (30-1000MHz)



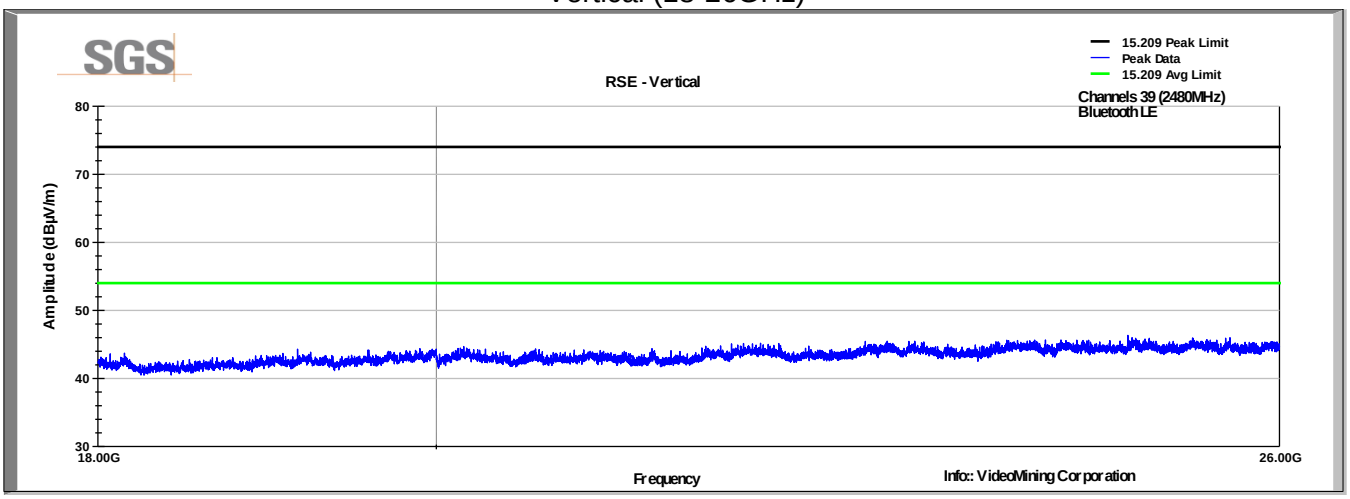
BLE Channels 39
Vertical (1-18GHz)



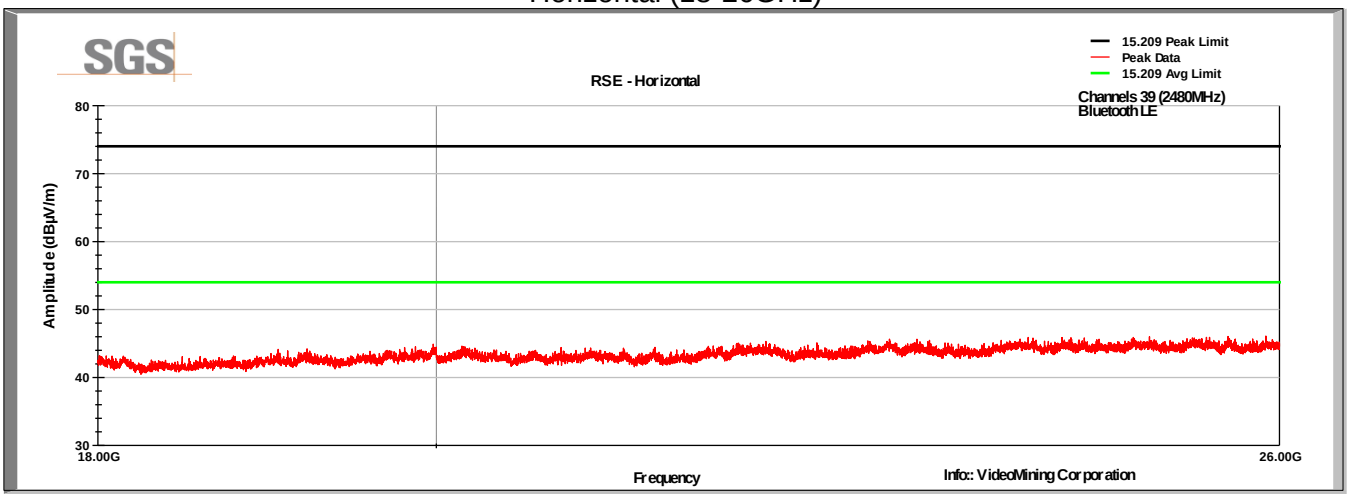
BLE Channels 39
Horizontal (1-18GHz)



BLE Channels 39
Vertical (18-26GHz)



BLE Channels 39
Horizontal (18-26GHz)



7.6 *Test Data – Tabular Data*

30-1000MHz

Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
45.78	50.0	V	178.0	100.0	10.7	1.0	32.6	29.1	39.1	-10.0
169.38	51.9	V	168.0	223.0	12.2	2.1	33.6	32.6	43.5	-10.9
169.99	52.4	V	175.0	223.0	12.1	2.1	33.6	33.1	43.5	-10.4
170.57	52.6	V	180.0	224.0	12.0	2.1	33.6	33.2	43.5	-10.3
171.19	52.3	V	191.0	234.0	12.0	2.1	33.6	32.8	43.5	-10.7
171.78	52.0	V	185.0	224.0	11.9	2.1	33.6	32.5	43.5	-11.0
178.97	60.2	H	258.0	130.0	11.3	2.2	33.6	40.1	43.5	-3.4
179.57	60.2	H	103.0	184.0	11.3	2.2	33.6	40.1	43.5	-3.4
180.15	60.0	H	117.0	205.0	11.3	2.2	33.6	39.9	43.5	-3.6
180.77	60.8	H	255.0	139.0	11.2	2.2	33.6	40.7	43.5	-2.8
181.39	60.2	H	260.0	120.0	11.2	2.2	33.5	40.1	43.5	-3.4
181.96	60.0	H	89.0	129.0	11.2	2.2	33.5	39.9	43.5	-3.6
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										

Note: There was no discernible difference in the measurement data below 1GHz when transmitting at different channels. QP measurements were only recorded with the device transmitting on Channel 39.

1-26GHz

Frequency MHz	Raw Meas (dBuV)	Polarity (V/H)	Correction (dB/m)	Corr Value dBuV/m	Limit (dBuV/m)	Margin (dB)	Detector
Channel 0 (2402MHz)							
4804.00	57.1	V	4.2	61.3	74.0	-12.7	Peak
4804.00	48.0	V	4.2	52.2	54.0	-1.8	Average
4804.00	58.4	H	4.2	62.6	74.0	-11.4	Peak
4804.00	49.3	H	4.2	53.5	54.0	-0.5	Average
Channel 19 (2440MHz)							
4880.00	55.5	V	4.2	59.7	74.0	-14.3	Peak
4880.00	46.4	V	4.2	50.6	54.0	-3.4	Average
4880.00	53.6	H	4.2	57.8	74.0	-16.2	Peak
4880.00	44.5	H	4.2	48.7	54.0	-5.3	Average
Channel 39 (2480MHz)							
4960.00	56.4	V	4.2	60.6	74.0	-13.4	Peak
4960.00	47.3	V	4.2	51.5	54.0	-2.5	Average
4960.00	51.0	H	4.2	55.2	74.0	-18.8	Peak
4960.00	41.9	H	4.2	46.1	54.0	-7.9	Average

8 Radiated Emissions at Band Edge / Restricted Band

8.1 *Test Result*

Test Description	Test Specification		Test Result
Spurious 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 using the radiated methods defined in Section 12 of FCC publication D01 DTS Meas Guidance v04.

8.3 *Test Site*

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.3 °C
Relative Humidity: 43.5 %

8.4 *Test Equipment*

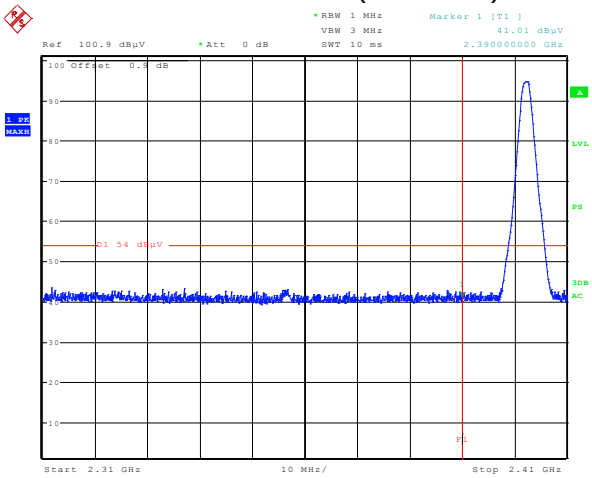
Test Date: 24-Apr-2017 Tester: JOP

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	S/N: 10196	1-Dec-2017
ANTENNA, DRG HORN (MEDIUM)	3117	ETS LINDGREN	B079699	26-Apr-2017
RF CABLE	SF106	HUBER & SUHNER	B079712	27-Jul-2017
RF CABLE	104PE	HUBER & SUHNER	B079793	27-Jul-2017
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	B094463	22-Feb-2018

Note: The equipment calibration period is 1 year.

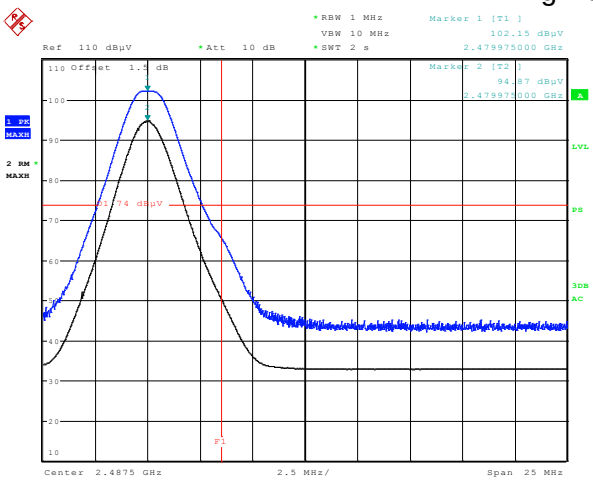
8.5 *Test Data – Restricted Band Edge*

Low Channel (2402MHz)

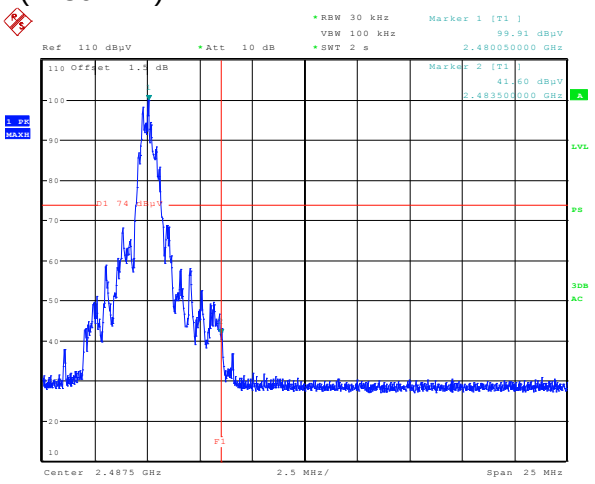


Date: 24.APR.2017 08:38:36

High Channel (2480MHz)



Date: 24.APR.2017 09:19:50



Date: 24.APR.2017 09:21:32

Marker-Delta Method							
Detector	A 2480MHz 1MHz RBW (dBuV/m)	B 2480MHz 30kHz RBW (dBuV/m)	C 2483.5MHz 30kHz RBW (dBuV/m)	D Delta (dB)	E Corrected Measurement (dBuV/m)	F Limit (dBuV/m)	G Margin (dB)
Peak	102.2	99.9	41.6	58.3	43.9	74	-30.1
Average	94.9			58.3	36.6	54	-17.4

Formulas: D=B-C
E=A-D
G=E-F

9 Revision History

Revision Level	Description of changes	Revision Date
0	Initial release	25 April 2017