

EMC Test Report

Project Number: 3958632

Report Number: 3958632EMC04 **Revision Level:** 0

Client: Deere & Company

Equipment Under Test: Modular Telematics Gateway 4G LTE

Model Number: MA4G

FCC ID: OV5-MA4G

IC ID: 11137A-MA4G

Applicable Standards: FCC Part 15 Subpart C, § 15.247

RSS-247, Issue 1, May 2015

ANSI C63.10: 2013

RSS-GEN Issue 4, November 2014

Report issued on: 10 May 2016

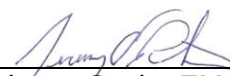
Test Result: Compliant

Tested by:



Fabian Nica, Senior Technician

Reviewed by:



Jeremy Pickens, Senior EMC Engineer

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
Occupied Bandwidth	15.247(a)(1)	RSS-247 5.1(1)	Compliant
Peak Power Output	15.247(a)(1)	RSS-247 5.4(2)	Compliant
Conducted Spurious Emissions	15.247(d)	RSS-247 5.5	Compliant
Band Edge	15.247(d)	RSS-247 5.5	Compliant
Radiated Spurious Emissions	15.247(d), 15.35(b),15.209	RSS-GEN 8.10	Compliant
Pseudo-Random Hop Sequence	15.247(a)(1)	RSS-247 5.1(1)	Compliant
Channel Separation	15.247(a)(1)	RSS-247 5.1(2)	Compliant
Number of Hopping Channels	15.247(a)(1)(iii)	RSS-247 5.1(4)	Compliant
Dwell Time	15.247(a)(1)(iii)	RSS-247 5.1(4)	Compliant
Number of hopping frequencies	15.247(a)(1)(iii)	RSS-247 5.1(4)	Compliant
AC Powerline Conducted Emission	15.107, 15.207	RSS-GEN 7.2.4	NA(1)

(1) The device does not connect to the AC mains

1.1 Modifications Required for Compliance

None

2 General Information

2.1 Client Information

Name: Deere & Company
Address: One John Deere Place
City, State, Zip, Country: Moline, IL 61265, 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: Modular Telematics Gateway 4G LTE
Model Number: MA4G
Serial Number: PCMA4GF100254 (Conducted)
PCMA4GF100300 (Radiated)
IMEI Number: 004401081652188 (Conducted)
004401081651966 (Radiated)
FCC ID: OV5-MA4G
IC ID: 11137A-MA4G
Frequency Range: 2402 to 2480 MHz, 79 Channels
Data Modes: Bluetooth GFSK, EDR-2, EDR-3 (DH1, DH3, DH5)
Antenna: External – (-2.62 to -0.44dBi)

Rated Voltage: 9.0-32.0 Vdc
Test Voltage: 12Vdc
Sample Received Date: 18 March 2016
Dates of testing: 28 March – 07 April 2016

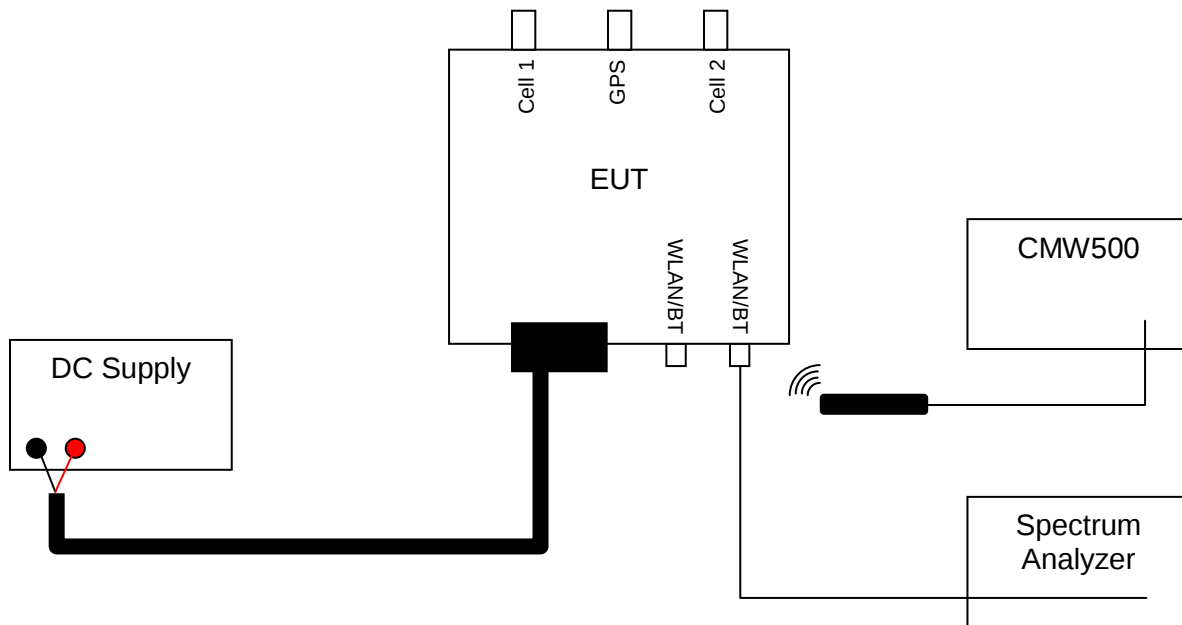
Operating Modes and Conditions

Using software commands, the EUT was placed into Bluetooth test mode. While in test mode, a CMW500 was used to connect to the EUT and control the channel, the modulation, the packet type, and force the EUT to max power. The duty cycle was >98%.

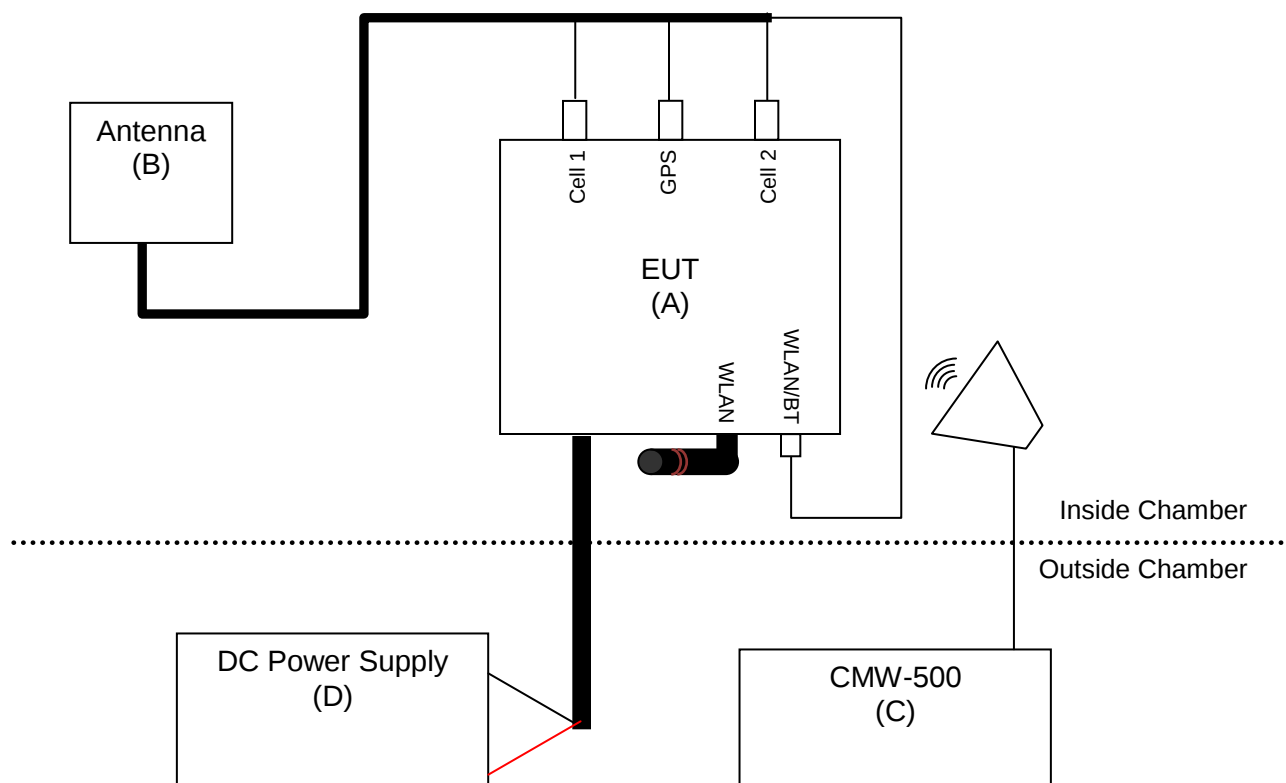
As specified in Section 5.11 of ANSI C63.10:2013:

- The software allowed configuration and operation on all available unlicensed wireless device channels.
- The software allowed configuration and operation using all available modulations and data rates
- The software allowed configuration and operation on all available power out levels

2.3 *EUT Connection Block Diagram – Conducted Measurements*



2.4 EUT Connection Block Diagram – Radiated Measurements



2.5 System Configurations

Device reference	Manufacturer	Description	Model Number	Serial Number
A	Deere & Company	Modular Telematics Gateway	MA4G	PCMA4GF100254 (Conducted) PCMA4GF100300 (Radiated)
B	PCTEL	LTE/Wi-Fi/GPS/GLONASS Antenna	PFA10877	Not Labeled
C	Rohde & Schwarz	Communications Base Station	CMW-500	127722
D	Kenwood	DC Power Supply	PR18-1.2A	5090198

3 Occupied Bandwidth

3.1 Test Result

Test Description	Basic Standards	Test Result
99% bandwidth	15.247(a)(1) RSS-247 5.1(1) ANSI C63.10: 2013	Compliant

3.2 Test Method

Occupied bandwidth measurements were taken using the methods defined in ANSI C63.10, Clause 6.9; Measurements were recorded using the 99% OBW function of the measurement receiver.

3.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 22.7 °C

Relative Humidity: 34.1 %

3.4 Test Equipment

Test Date: 29-Mar-2016

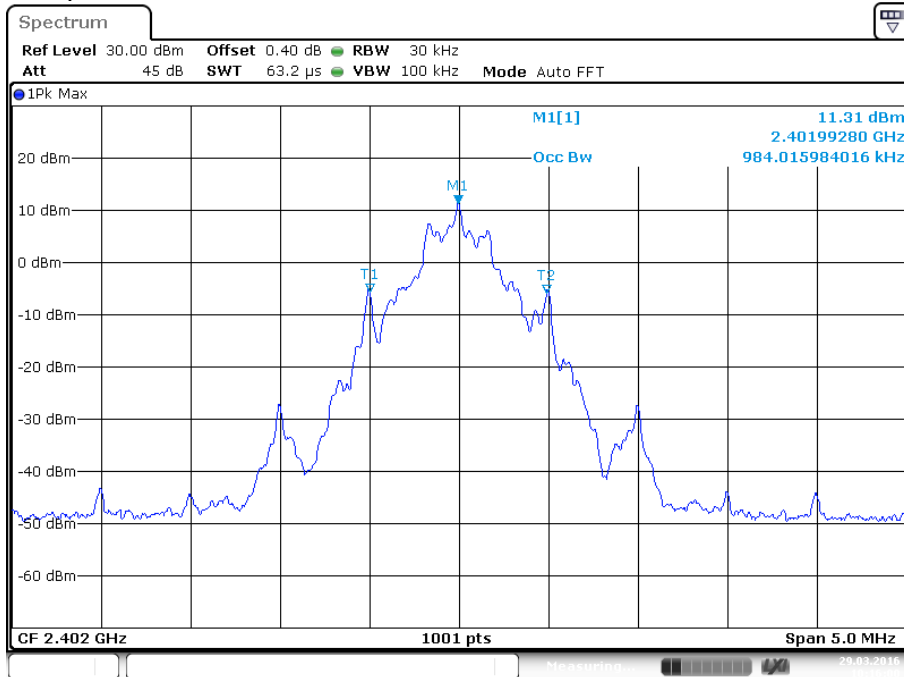
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	8-Oct-2017
COAXIAL CABLE	SUCOFLEX 102	HUBER&SUHNER	B079824	4-Aug-2016
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B079788	21-Oct-2017

Note: The calibration period equipment is 1 year except for the CMW500 which is on a 3 year cal cycle and the FSV which is one a 2 year cal cycle per manufacturer's recommendations.

3.5 Test Data

Frequency	Channel No	Modulation	99% bandwidth kHz
2402	0	Basic Rate	984.0
		EDR-2	1178.8
		EDR-3	1178.8
2441	39	Basic Rate	984.0
		EDR-2	1173.8
		EDR-3	1178.8
2480	78	Basic Rate	989.0
		EDR-2	1173.8
		EDR-3	1178.8

Sample Plot



Date: 29.MAR.2016 10:16:00

4 Peak Output Power

4.1 Test Result

Test Description	Test Specification	Test Result
Peak Output Power	15.247(a)(1) RSS-247 5.4(2) ANSI C63.10: 2013	Compliant

4.2 Test Method

Output power measurements were taken using the methods defined in ANSI C63.10, Clause 7.8.5. A peak power meter was used for final measurements.

Limit

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels: 1 watt.

4.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 22.7 °C
Relative Humidity: 34.1 %

4.4 Test Equipment

Test Date: 29-Mar-2016

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	8-Oct-2017
COAXIAL CABLE	SUCOFLEX 102	HUBER&SUHNER	B079824	4-Aug-2016
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B079788	21-Oct-2017
SIGNAL GENERATOR	SMB 100A	ROHDE & SCHWARZ	B094876	2-Dec-2016
OPEN SWITCH PLATFORM w/B157 POWER SENSORS	OSP 120	ROHDE & SCHWARZ	S/N: 101182	VBU

Note: The calibration period equipment is 1 year except for the CMW500 which is on a 3 year cal cycle and the FSV which is one a 2 year cal cycle per manufacturer's recommendations. The SMB100 and FSV were used to validate the OSP 120 power sensors.

4.5 Test Data

Modulation	Packet Type	Frequency (MHz)	Peak Power (dBm)	Peak Power (Watts)
Basic Rate (GFSK)	DH1	2402.000000	11.7	0.0148
		2441.000000	12.1	0.0162
		2480.000000	11.7	0.0148
	DH3	2402.000000	11.7	0.0148
		2441.000000	12.1	0.0162
		2480.000000	11.5	0.0141
	DH5	2402.000000	11.6	0.0145
		2441.000000	12.1	0.0162
		2480.000000	11.5	0.0141
EDR2	DH1	2402.000000	5.3	0.0034
		2441.000000	6.6	0.0046
		2480.000000	5.7	0.0037
	DH3	2402.000000	5.3	0.0034
		2441.000000	6.6	0.0046
		2480.000000	5.7	0.0037
	DH5	2402.000000	5.3	0.0034
		2441.000000	6.6	0.0046
		2480.000000	5.7	0.0037
EDR3	DH1	2402.000000	5.2	0.0033
		2441.000000	6.5	0.0045
		2480.000000	5.7	0.0037
	DH3	2402.000000	5.3	0.0034
		2441.000000	6.6	0.0046
		2480.000000	5.7	0.0037
	DH5	2402.000000	5.3	0.0034
		2441.000000	6.6	0.0046
		2480.000000	5.7	0.0037

5 Conducted Spurious Emissions

5.1 Test Result

Test Description	Test Specification	Test Result
Conducted Spurious Emissions	15.247(d) RSS-247 5.4(2) ANSI C63.10: 2013	Compliant

5.2 Test Method

Conducted spurious emissions measurements were taken using the methods defined in ANSI C63.10, Clauses 5.5 and 5.6. Authorized band edge measurements were recorded using the methods in clause 6.10.4. Basic rate with a DH1 packet type was used as the worst-case mode of operation for spurious measurements. Band edge measurements were recorded using each modulation (Basic Rate, EDR-2, and EDR-3).

The limit is 20 dB below the measured peak power.

5.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 22.7 °C
Relative Humidity: 34.1 %

5.4 Test Equipment

Test Date: 29-Mar-2016

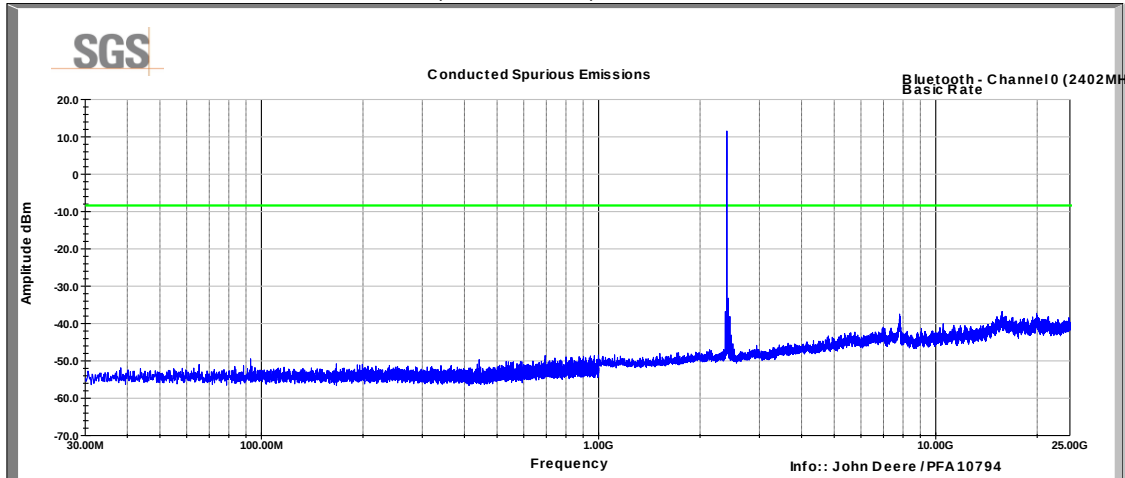
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	8-Oct-2017
COAXIAL CABLE	SUCOFLEX 102	HUBER&SUHNER	B079824	4-Aug-2016
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B079788	21-Oct-2017

Note: The calibration period equipment is 1 year except for the CMW500 which is on a 3 year cal cycle and the FSV which is one a 2 year cal cycle per manufacturer's recommendations.

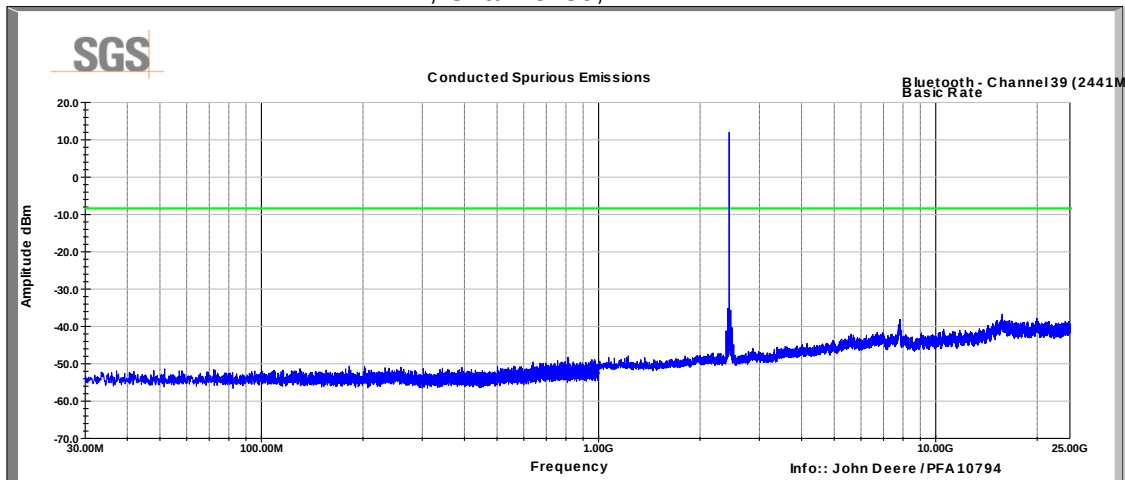
5.5 Test Data

No spurious emissions detected within 10dB of the limit.

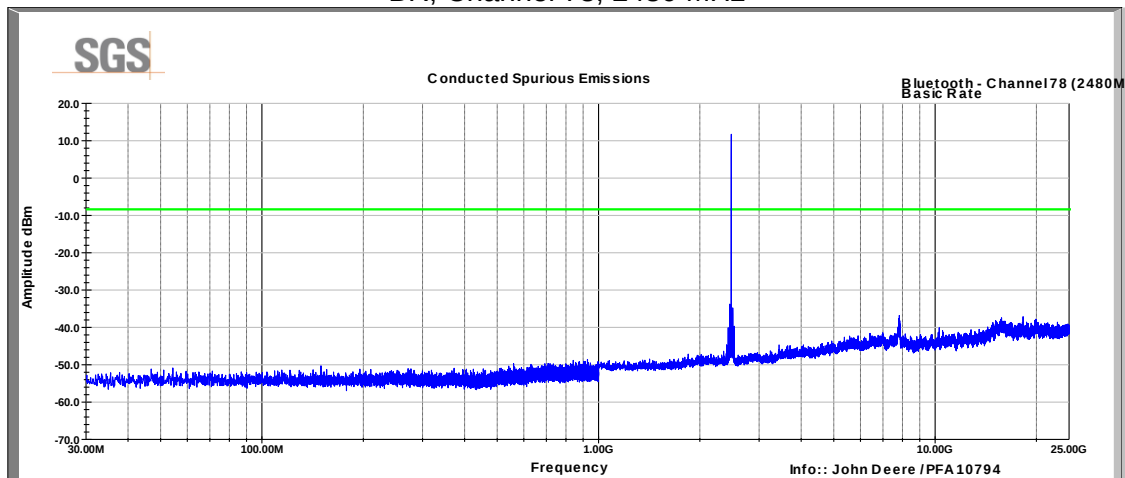
BR, Channel 0, 2402 MHz



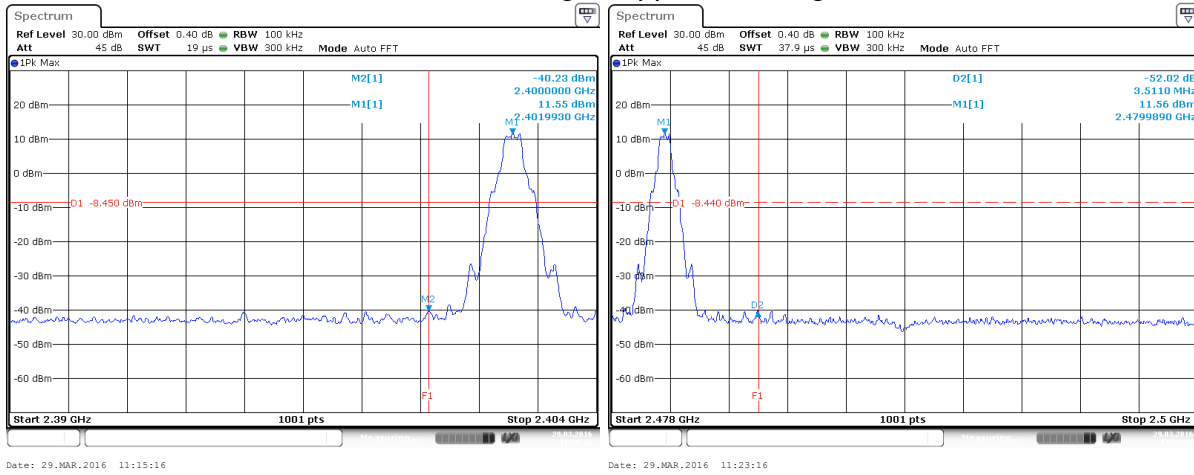
BR, Channel 39, 2441 MHz



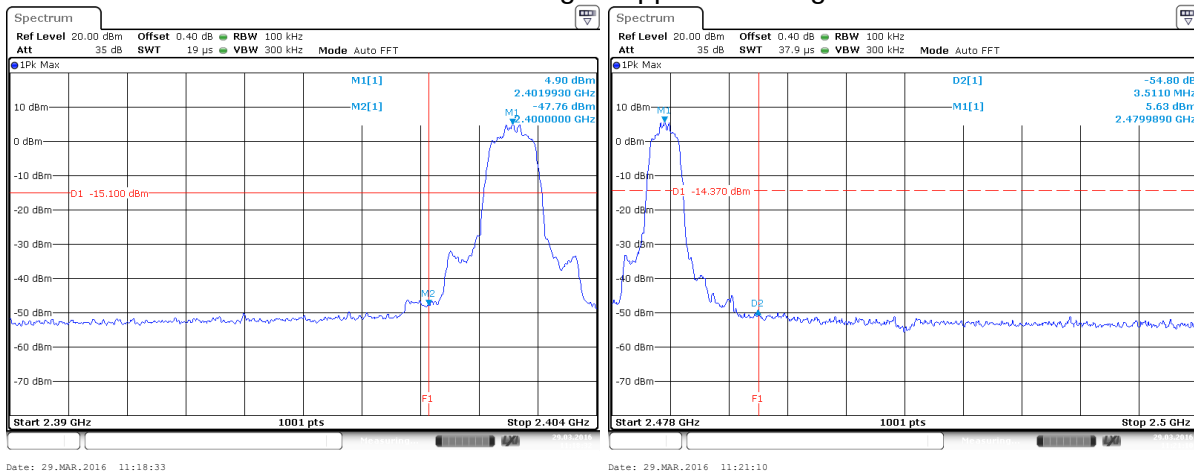
BR, Channel 78, 2480 MHz



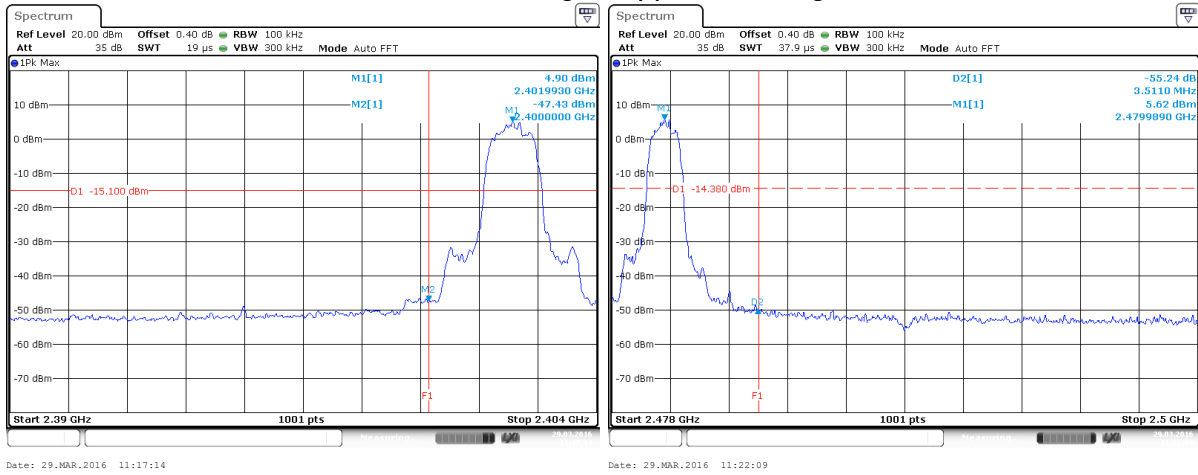
Basic Rate Lower band edge / Upper band edge



EDR 2 Lower band edge / Upper band edge



EDR 3 Lower band edge / Upper band edge



6 Field Strength of Spurious Radiation

6.1 Test Result

Test Description	Test Specification	Test Result
Field strength of spurious radiation	15.247(d), 15.35(b), 15.209, RSS-GEN S8.10	Compliant

6.2 Test Method

Exploratory scans were performed over the frequency range as indicated in the tables below using the max hold function and incorporating a Peak detector and using TILE! software. The final test data was measured using a Quasi-Peak detector below 1GHz and a Peak detector above 1GHz. For harmonics of the fundamental, Average measurements were made by correcting the peak value with the duty cycle correction factor. For emissions other than harmonics of the fundamental, the Average measurements were made using the Average detector. The receivers resolution bandwidth was set to 120 kHz for measurements taken in the 30MHz to 1GHz frequency range and 1MHz for measurements for 1GHz and higher. Measurements were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna height was varied from 1 m to 4 m and the EUT was rotated 360° to find the maximum emitting point for each frequency. The radiated measurements were recorded and compared to the limits indicated in the table below.

Test distance:

30 MHz to 1 GHz - The EUT to measurement antenna distance is 3 meters

1 to 18 GHz - The EUT to measurement antenna distance is 3 meters

18 to 40 GHz - The EUT to measurement antenna distance is 1 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 outside of the intentional transmit frequency band.

(2) Quasi-peak limit

(3) Average limit

6.3 Test Site

10m Absorber Lined Shielded Enclosure (ALSE), Suwanee, GA

Environmental Conditions

Temperature: 23.8 °C

Relative Humidity: 38.6 %

6.4 Test Equipment

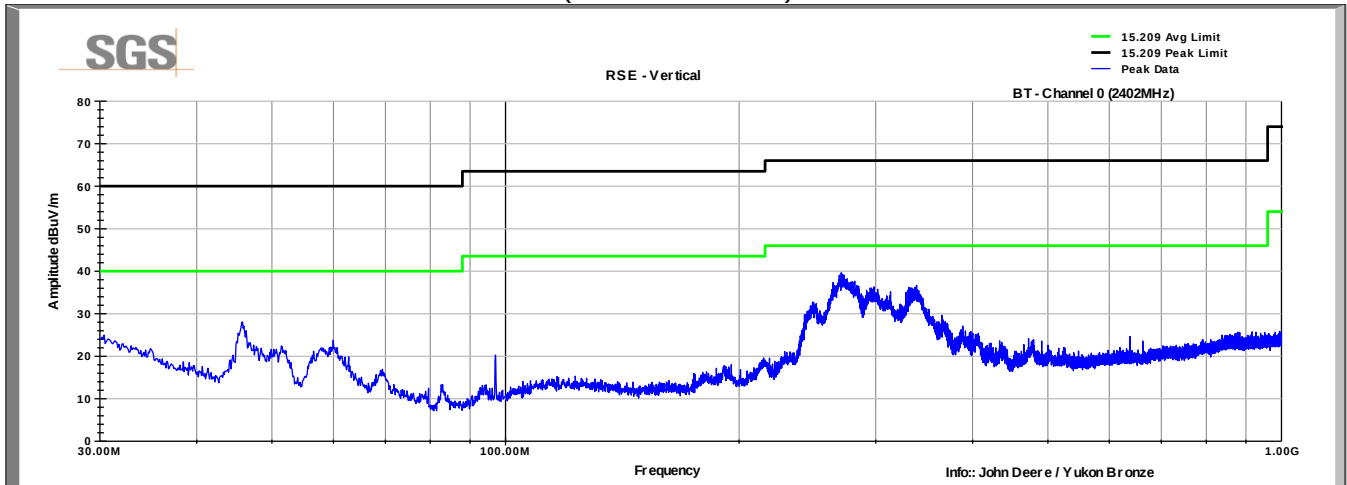
Test End Date: 7-Apr-2016

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
ANTENNA, BILOG	JB6	SUNOL	B079690	21-Oct-2016
RF CABLE - 7000MM (10KHZ - 18GHZ)	SF106	HUBER&SUHNER	B079716	3-Aug-2016
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B079788	21-Oct-2017
RF CABLE - 7500MM (10KHZ - 18GHZ)	SF106	HUBER&SUHNER	B079713	3-Aug-2016
TYPE N CABLE	104PE	HUBER&SUHNER	B079793	4-Aug-2016
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	4-Aug-2016
RF CABLE - 7000MM (10KHZ - 18GHZ)	SF106	HUBER&SUHNER	B079712	3-Aug-2016
PREAMPLIFIER	TS-PR18	ROHDE & SCHWARZ	15003	24-Aug-2016
PREAMPLIFIER	TS-PR18	ROHDE & SCHWARZ	B094463	16-Feb-2017
COAXIAL CABLE	SUCOFLEX 102	HUBER&SUHNER	B079822	4-Aug-2016
COAXIAL CABLE	SUCOFLEX 102	HUBER&SUHNER	B079824	4-Aug-2016
DRG HORN (SMALL)	3116B	ETS-LINDGREN	B079697	29-Mar-2017
FIXED GAIN AMPLIFIER	NSP1840-HG	MITEQ	B087572	15-Oct-2016
RF CABLE	SF106	HUBER&SUHNER	B085892	3-Aug-2016
6DB ATTENUATOR 50 Ohm	15542	Mini Circuit	15017	3-Aug-2016

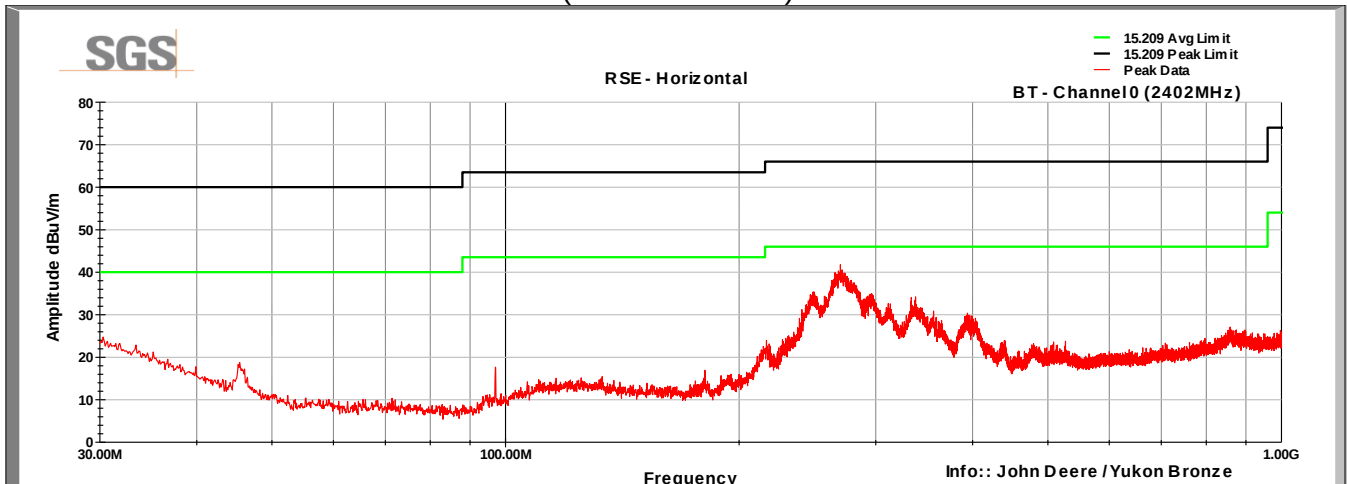
Note: The calibration period equipment is 1 year except for the CMW500 which is on a 3-year calibration cycle based on manufacturer's recommendation..

6.5 Test Data

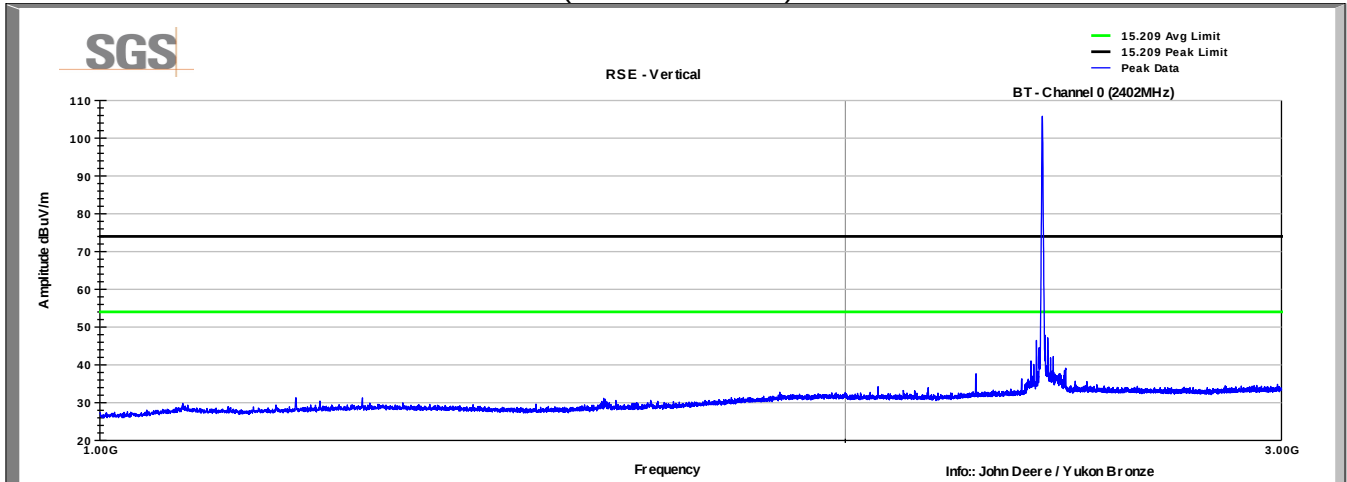
Bluetooth, Channel 0
30-1000MHz
Vertical
(3m test distance)



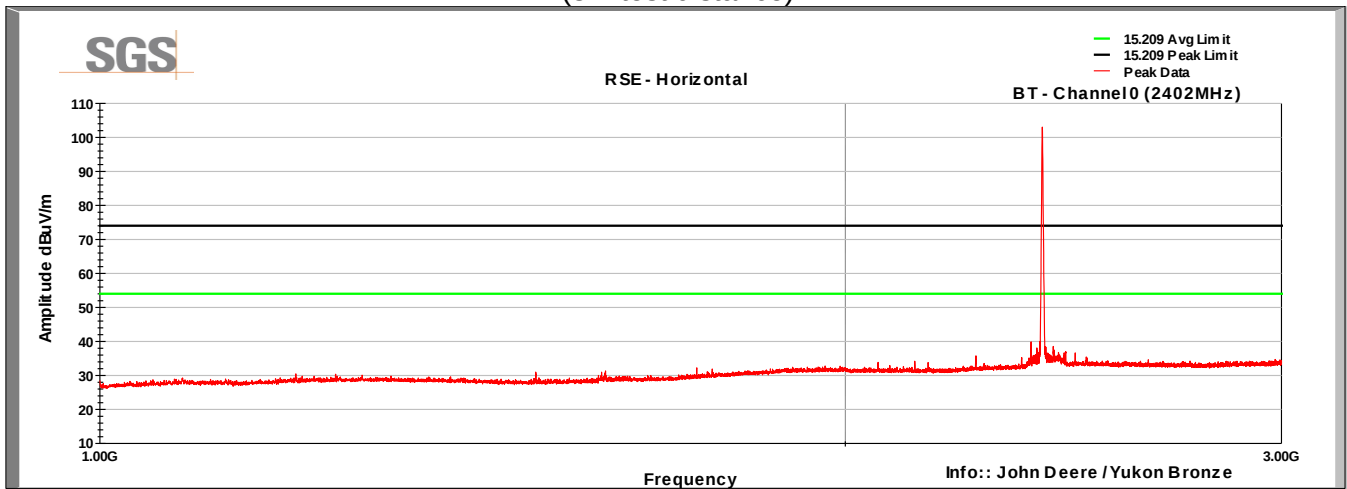
Bluetooth, Channel 0
30-1000MHz
Horizontal
(3m test distance)



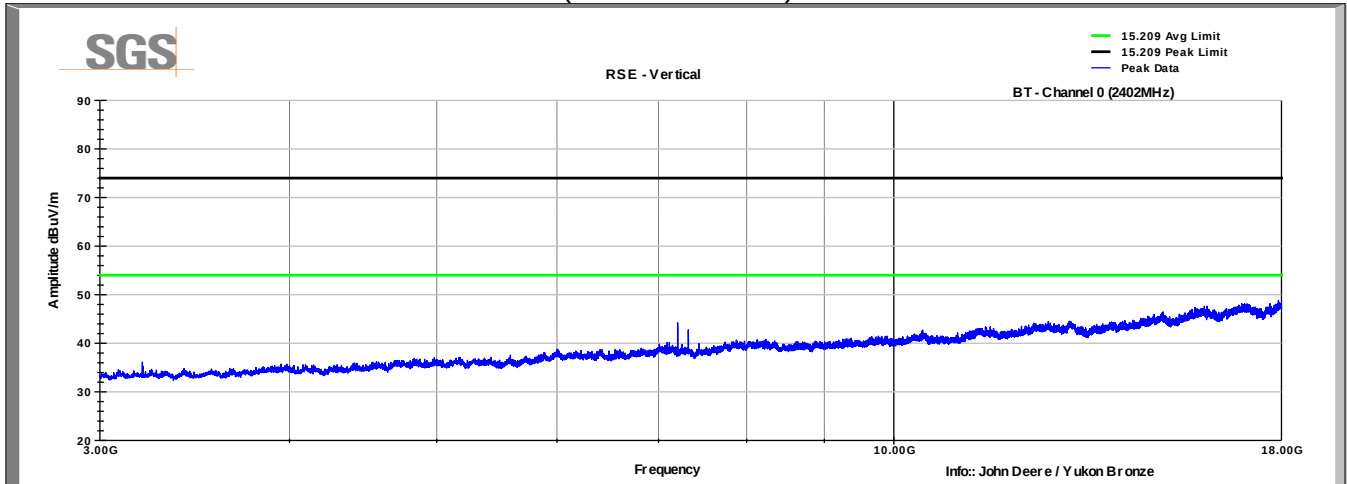
Bluetooth, Channel 0
1-3GHz
Vertical
(3m test distance)



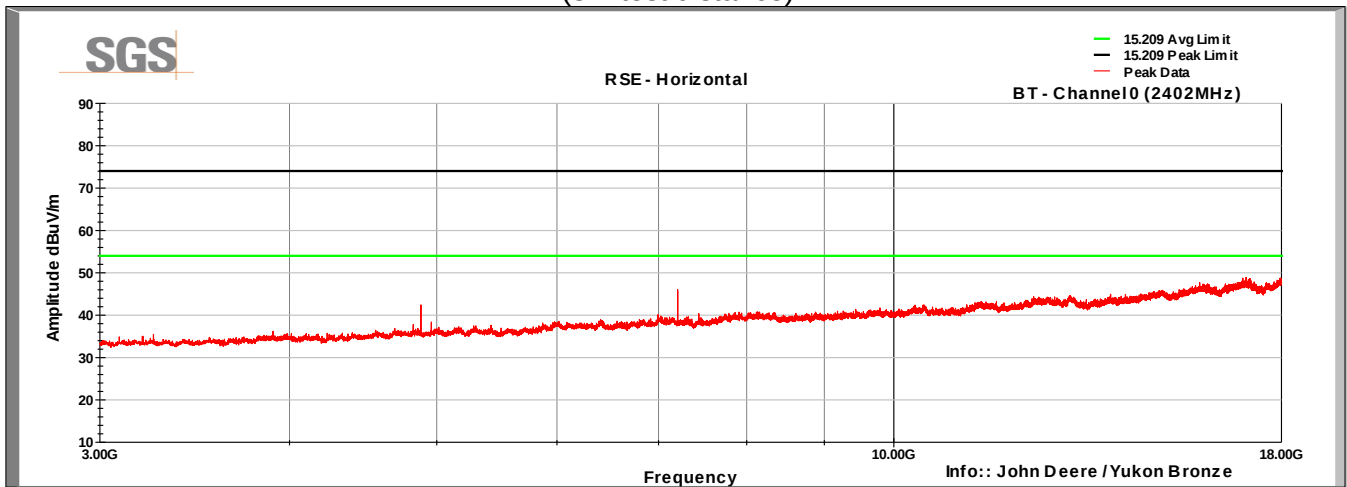
Bluetooth, Channel 0
1-3GHz
Horizontal
(3m test distance)



Bluetooth, Channel 0
3-18GHz
Vertical
(3m test distance)

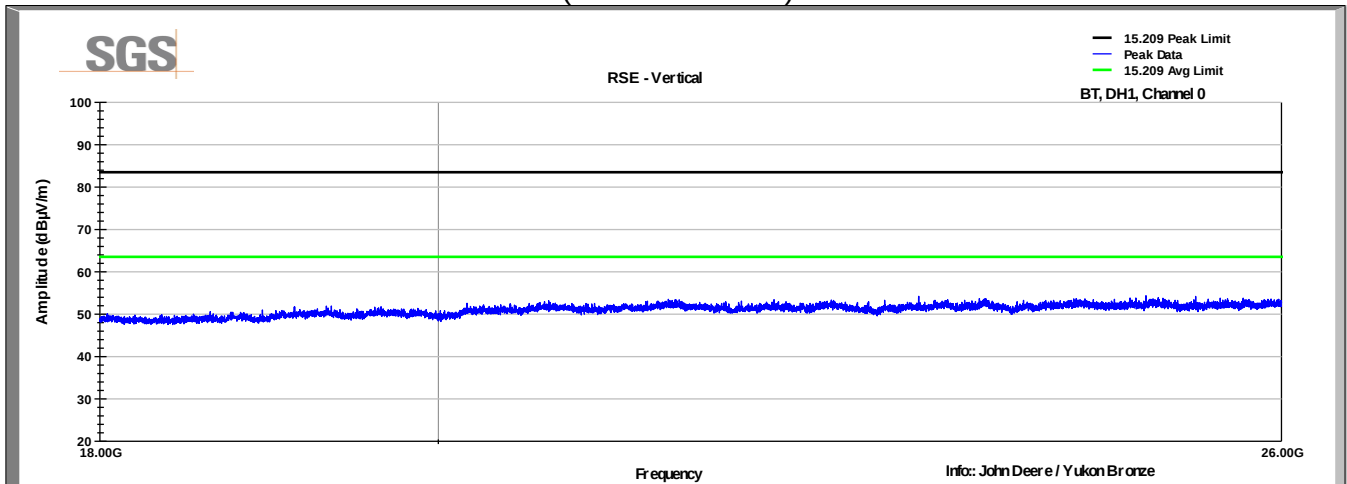


Bluetooth, Channel 0
3-18GHz
Horizontal
(3m test distance)

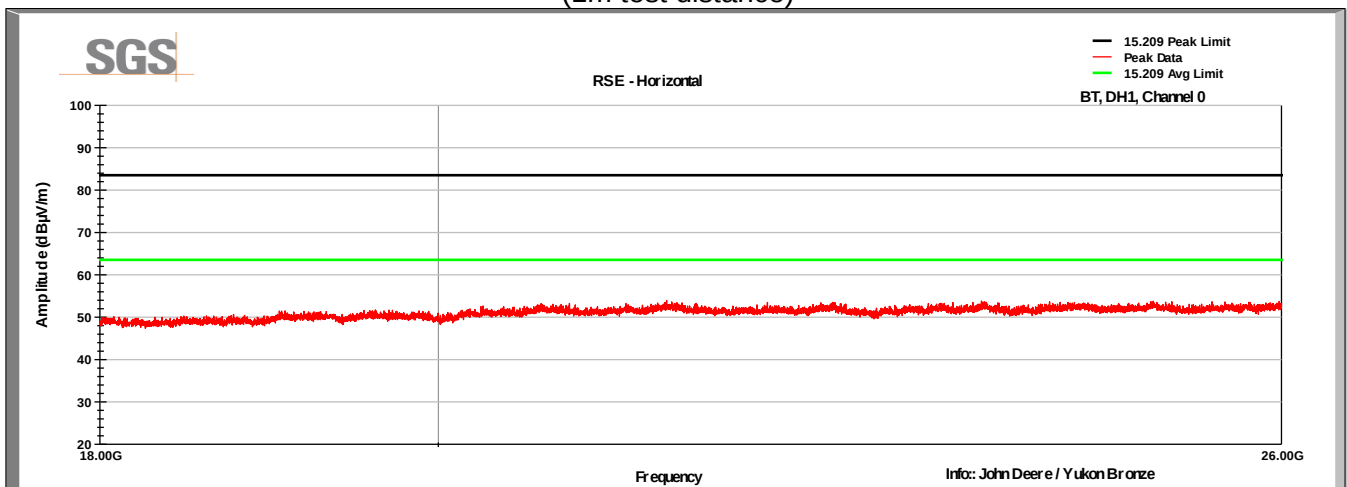


Worst-case spur: 46.1dBuV/m (Peak) @ 7206MHz. 7.9dB below the average limit.

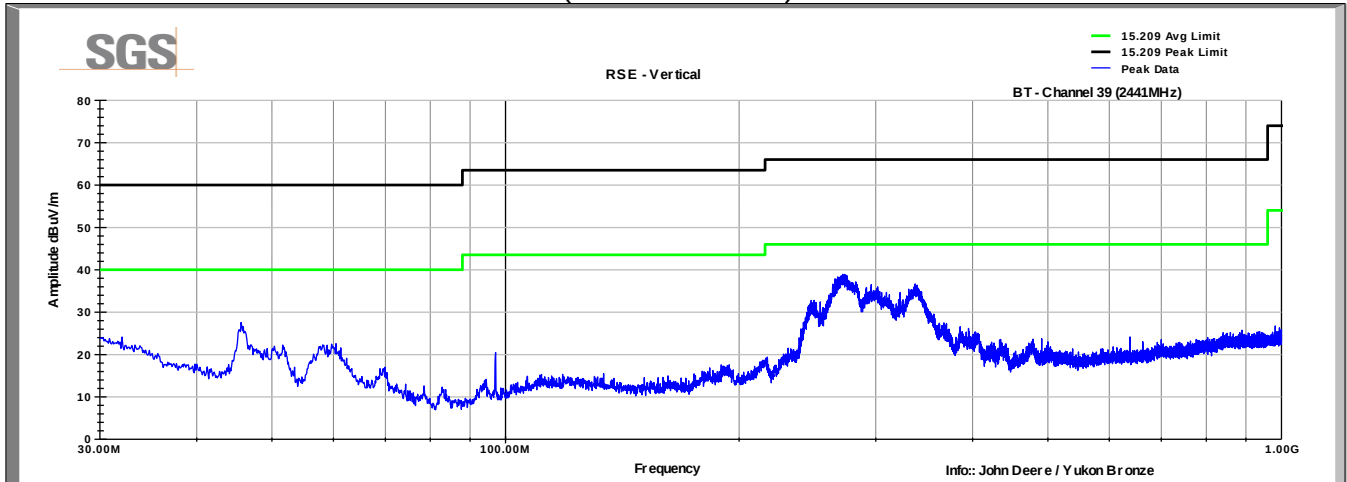
Bluetooth, Channel 0
18-26GHz
Vertical
(1m test distance)



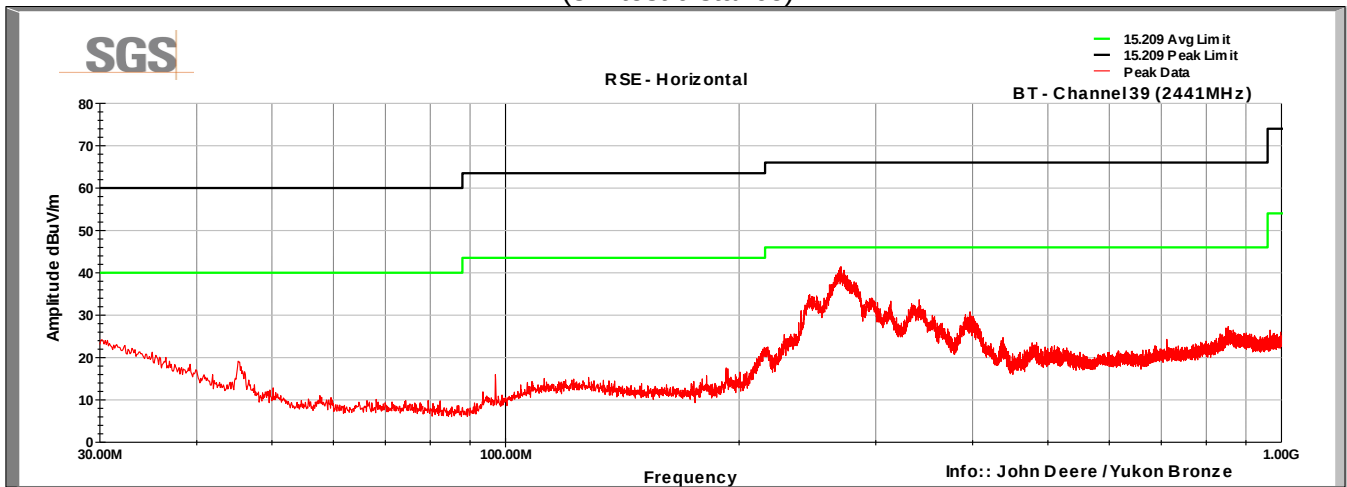
Bluetooth, Channel 0
18-26GHz
Horizontal
(1m test distance)



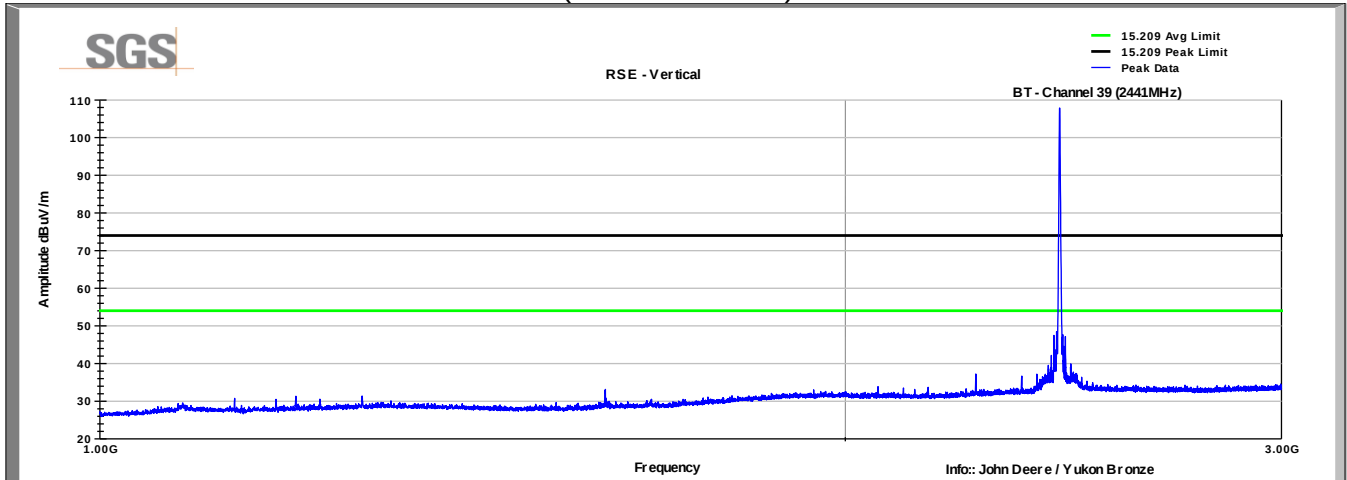
Bluetooth, Channel 39
30-1000MHz
Vertical
(3m test distance)



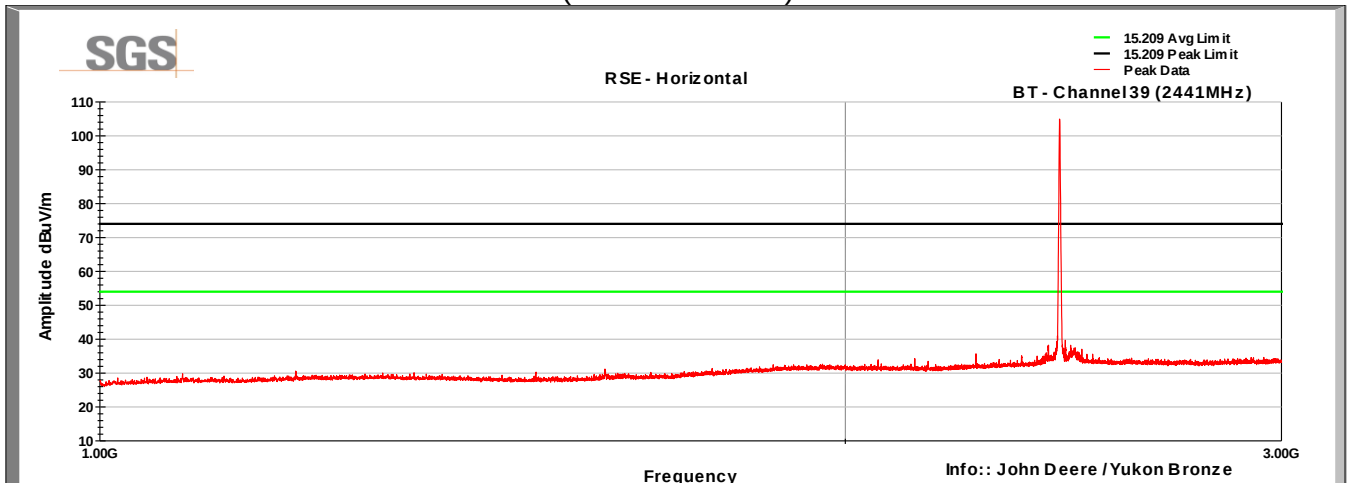
Bluetooth, Channel 39
30-1000MHz
Horizontal
(3m test distance)



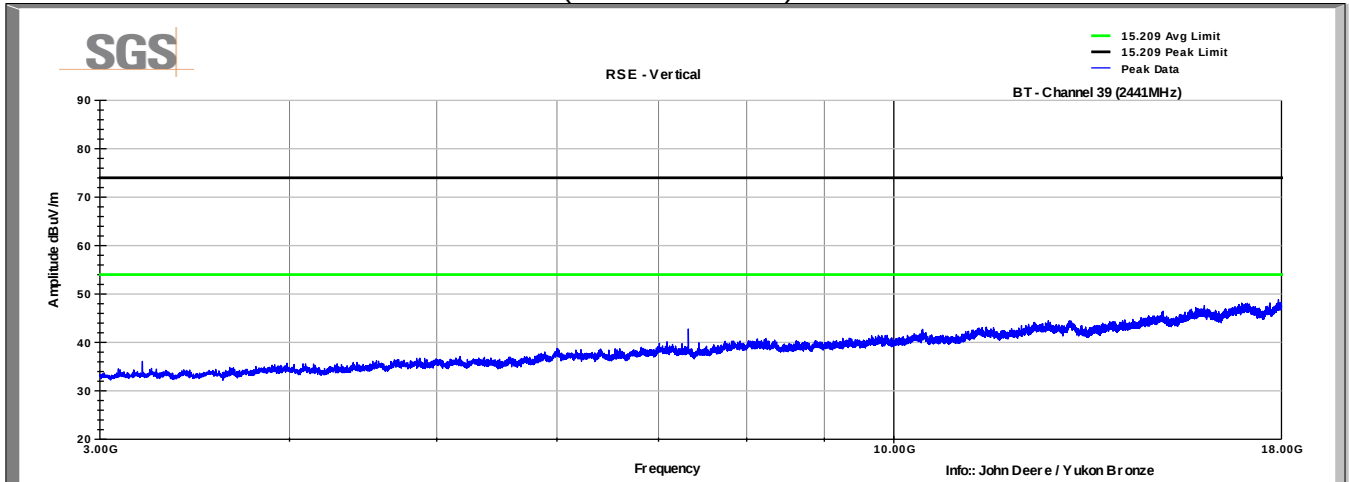
Bluetooth, Channel 39
1-3GHz
Vertical
(3m test distance)



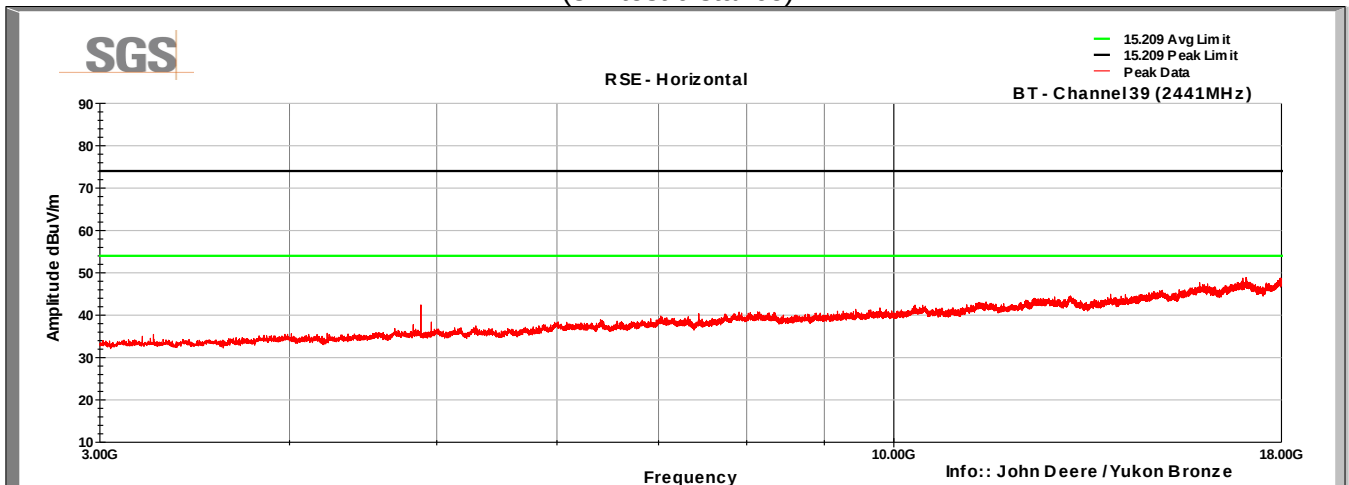
Bluetooth, Channel 39
1-3GHz
Horizontal
(3m test distance)



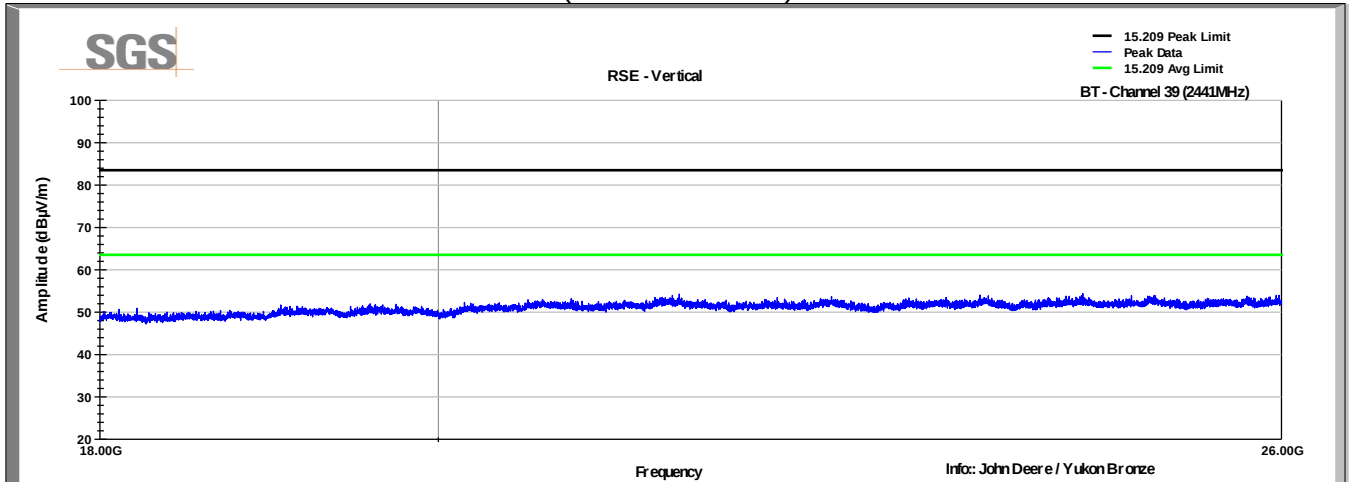
Bluetooth, Channel 39
3-18GHz
Vertical
(3m test distance)



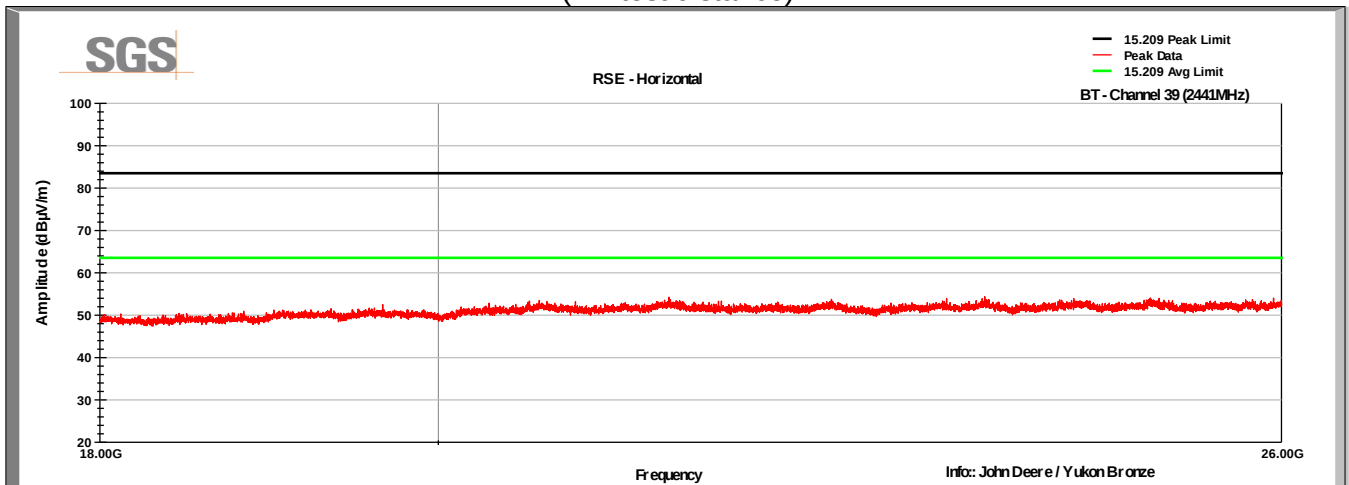
Bluetooth, Channel 39
3-18GHz
Horizontal
(3m test distance)



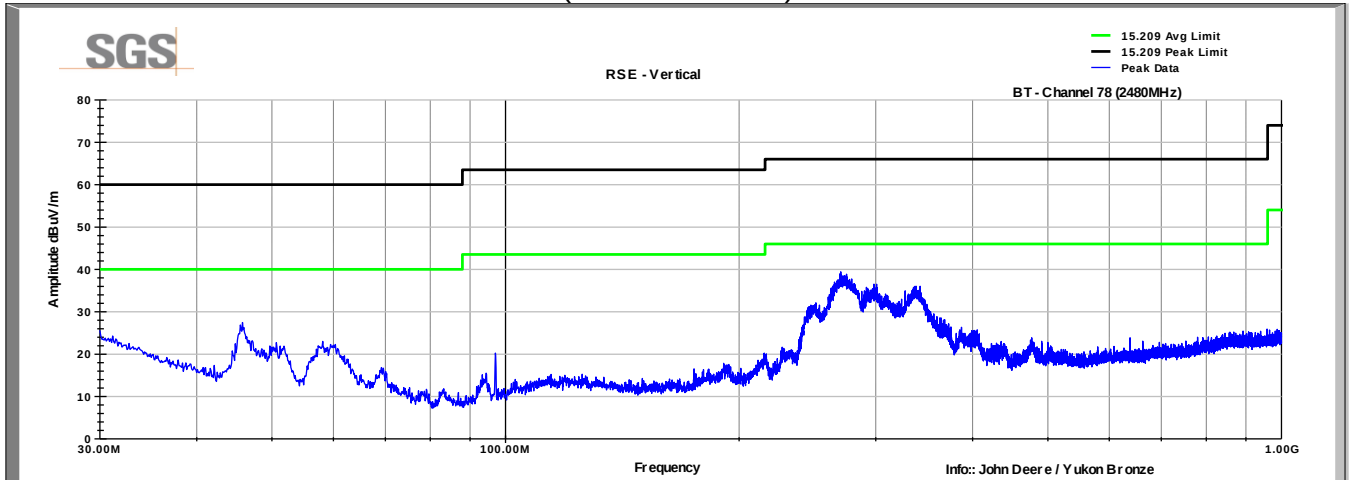
Bluetooth, Channel 39
18-26GHz
Vertical
(1m test distance)



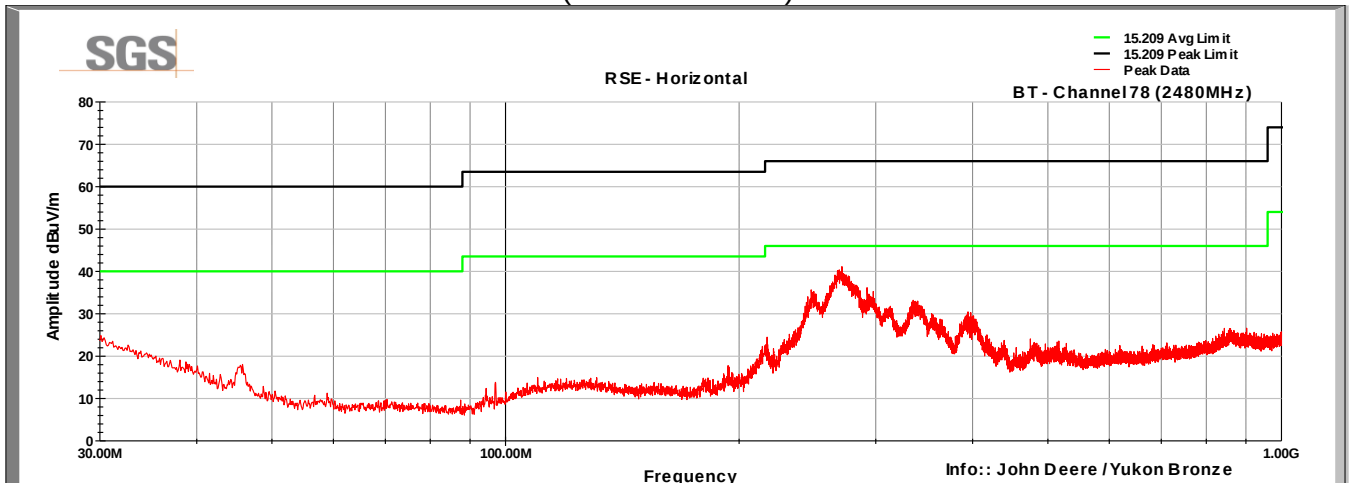
Bluetooth, Channel 39
18-26GHz
Horizontal
(1m test distance)



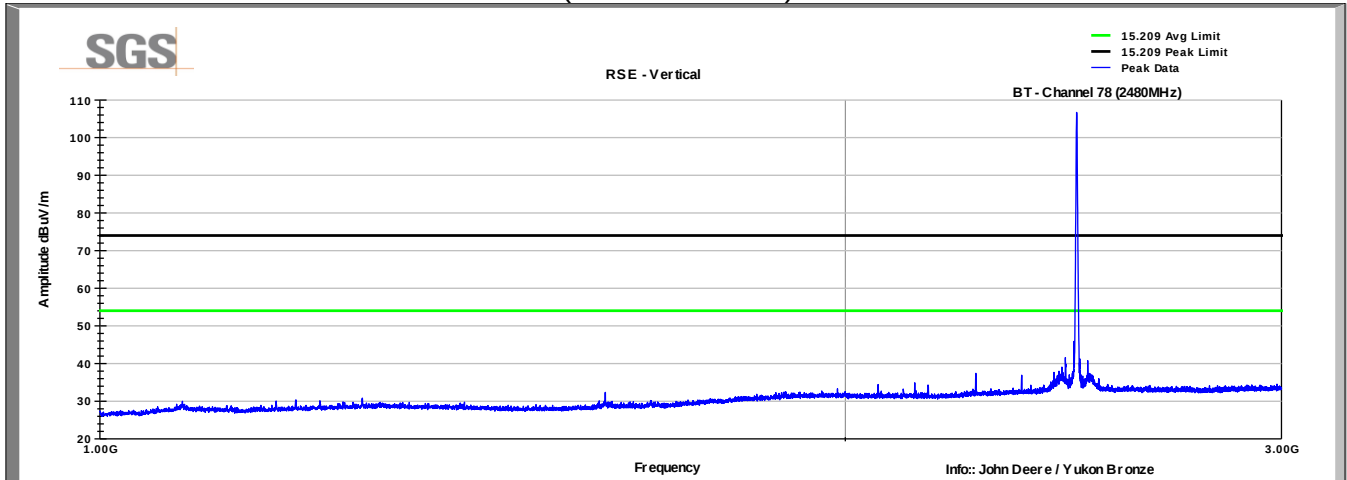
Bluetooth, Channel 78
30-1000MHz
Vertical
(3m test distance)



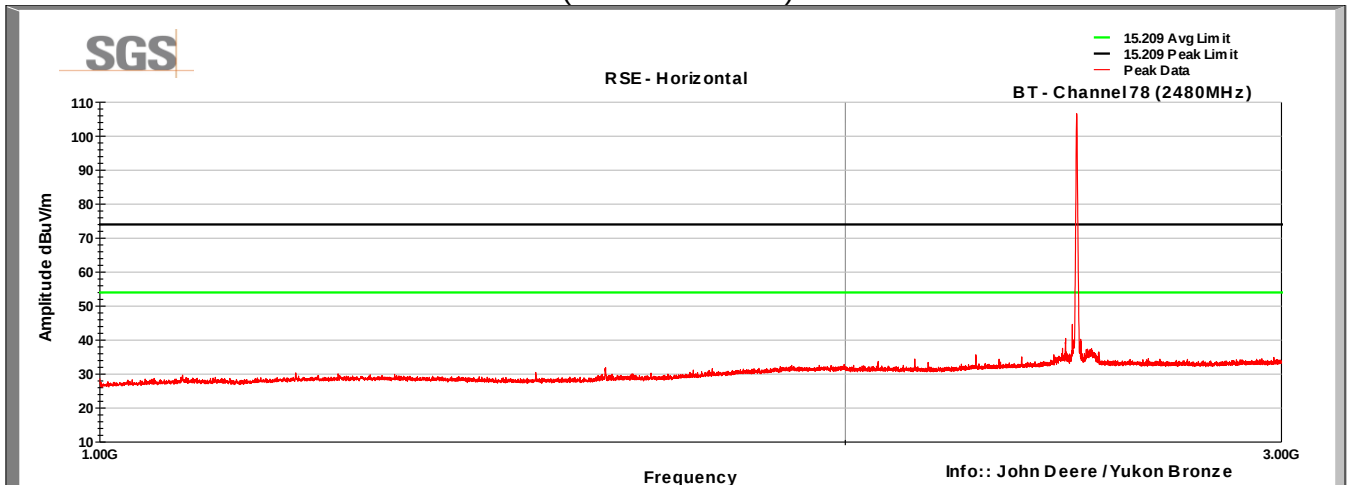
Bluetooth, Channel 78
30-1000MHz
Horizontal
(3m test distance)



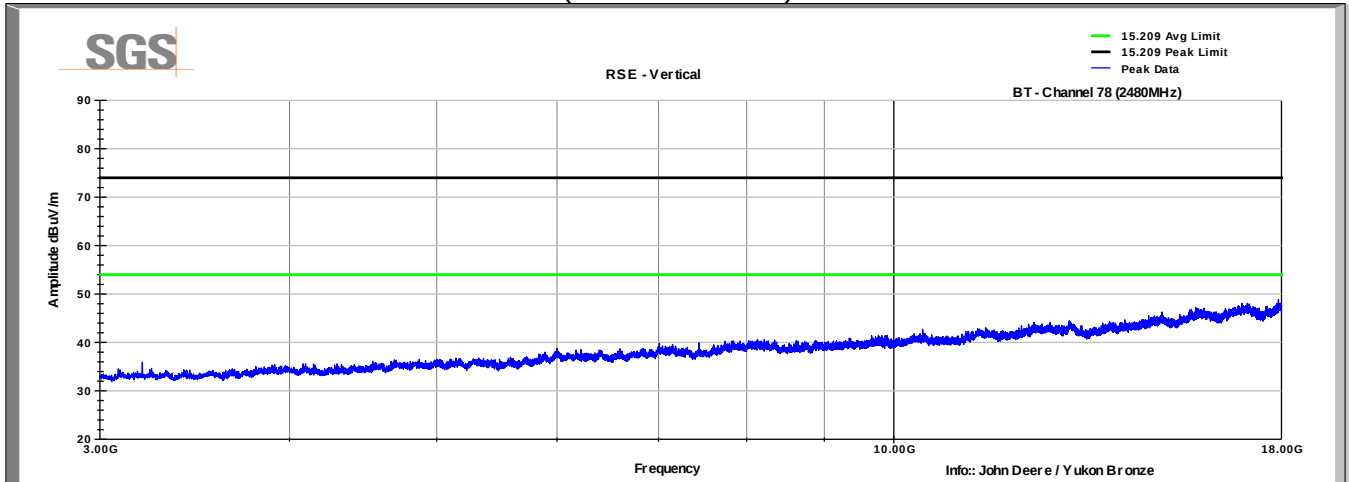
Bluetooth, Channel 78
1-3GHz
Vertical
(3m test distance)



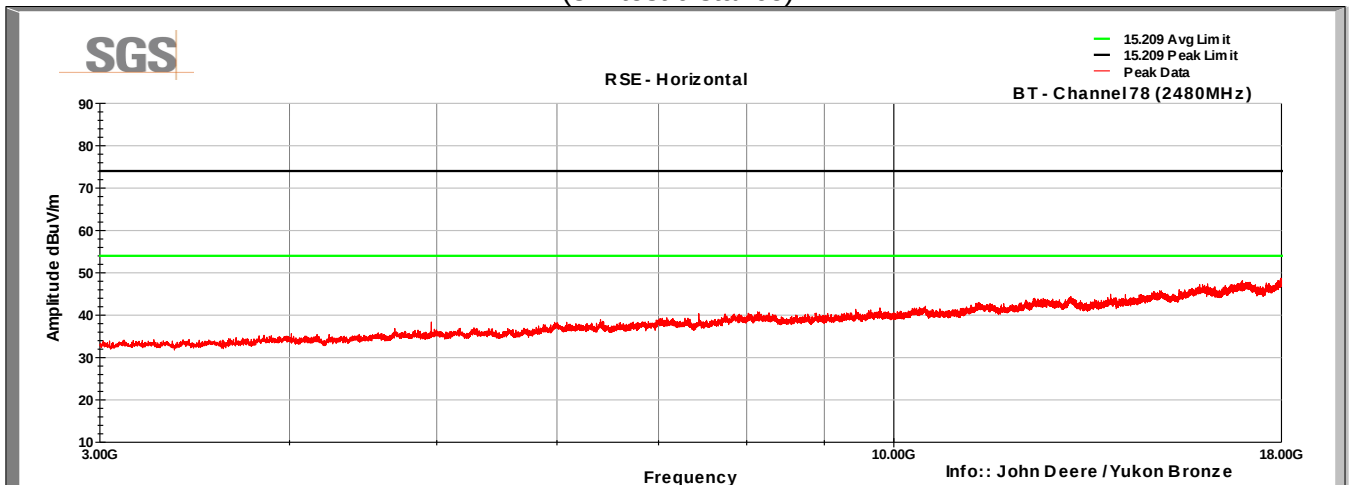
Bluetooth, Channel 78
1-3GHz
Horizontal
(3m test distance)



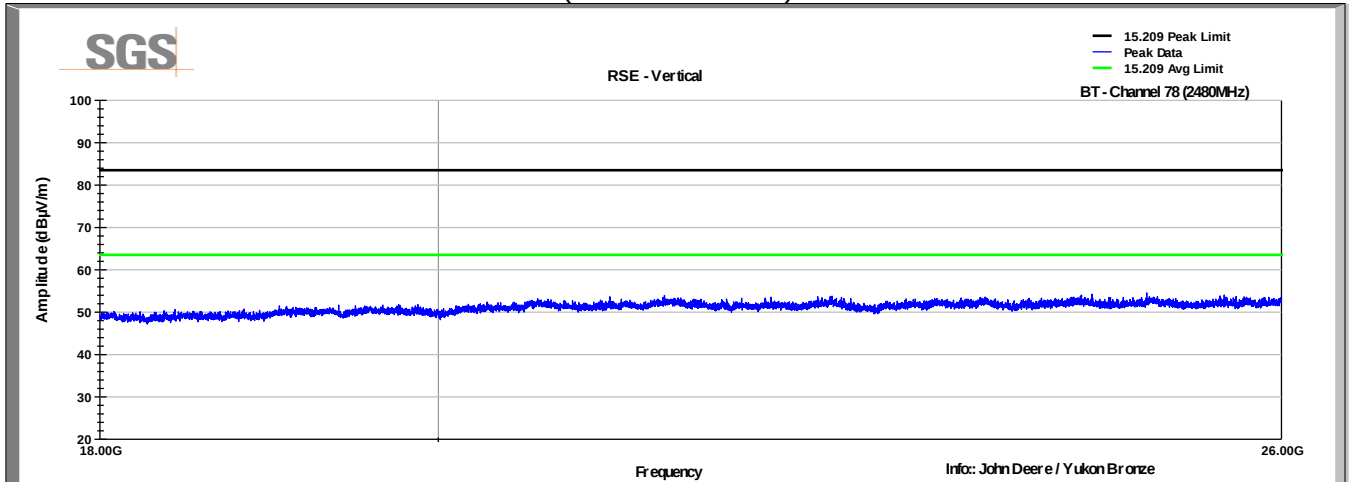
Bluetooth, Channel 78
3-18GHz
Vertical
(3m test distance)



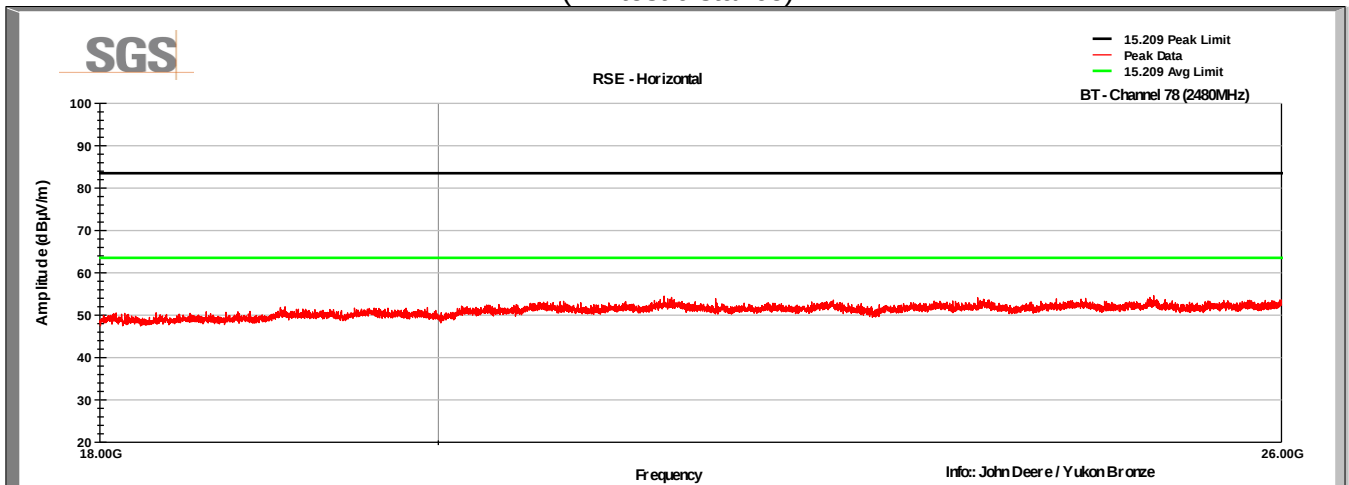
Bluetooth, Channel 78
3-18GHz
Horizontal
(3m test distance)



Bluetooth, Channel 78
18-26GHz
Vertical
(1m test distance)



Bluetooth, Channel 78
18-26GHz
Horizontal
(1m test distance)



7 Radiated Emissions at Band Edge / Restricted Band

7.1 Test Result

Test Description	Test Specification	Test Result
Field strength of spurious radiation	15.247(d), 15.35(b), 15.209, RSS-GEN S8.10 ANSI C63.10: 2013	Compliant

7.2 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 Section 12 of FCC publication KDB 558074 D01 DTS Meas Guidance v03r05. At the upper band edge, the marker-delta method defined in ANSI C63.10, Section 6.10.6 was employed.

7.3 Test Site

3m Absorber Lined Shielded Enclosure (ALSE), Suwanee, GA

Environmental Conditions

Temperature: 23.8 °C

Relative Humidity: 38.6 %

7.4 Test Equipment

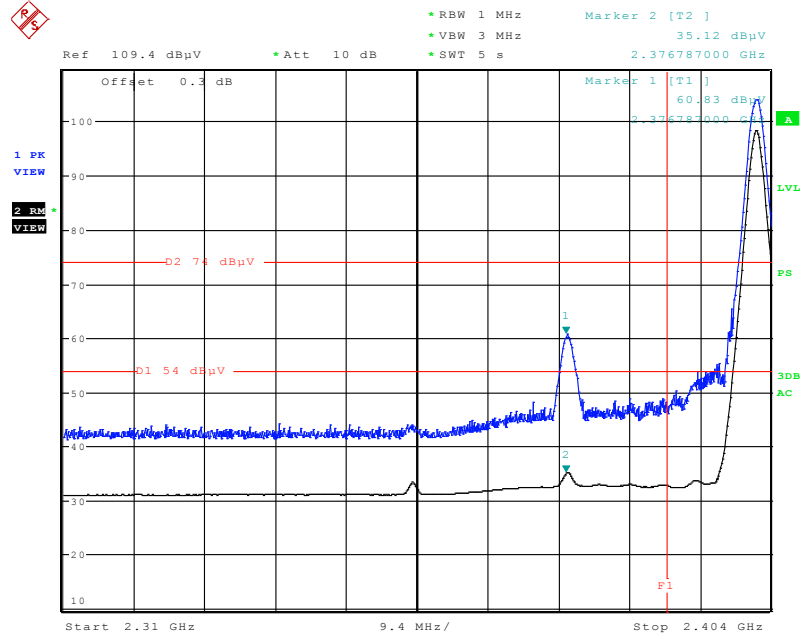
Test End Date: 7-Apr-2016

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B079788	21-Oct-2017
TYPE N CABLE	104PE	HUBER&SUHNER	B079793	4-Aug-2016
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	4-Aug-2016
RF CABLE - 7000MM (10KHZ - 18GHZ)	SF106	HUBER&SUHNER	B079712	3-Aug-2016
PREAMPLIFIER	TS-PR18	ROHDE & SCHWARZ	15003	24-Aug-2016
6DB ATTENUATOR 50 Ohm	15542	Mini Circuit	15017	3-Aug-2016

Note: The calibration period equipment is 1 year except for the CMW500 which is on a 3 year cal cycle per manufacturer's recommendations.

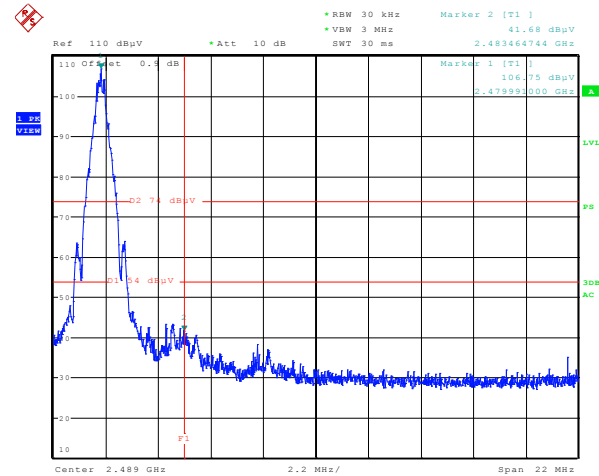
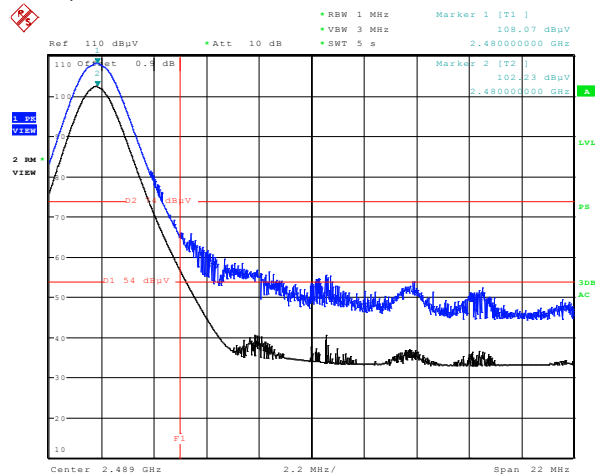
7.5 Test Data

DH1, Ch0



Date: 6.APR.2016 16:39:52

DH1, Ch78



Date: 6.APR.2016 16:29:32

Date: 6.APR.2016 16:31:49

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	108.07	106.75	41.68	65.07	43	74	-31.0
Average	102.23			65.07	37.16	54	-16.8

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

8 Pseudo-Random Hop Sequence

8.1 Test Result

Test Description	Test Specification	Test Result
Pseudo-Random Hop Sequence	15.247(a)(1), RSS-247 5.1(1) ANSI C63.10	Compliant ⁽¹⁾

Note (1): The theory of operation states that the device is Bluetooth and operates using a pseudo-random hopping technique.

8.2 Test Method

Compliance is demonstrated by Manufacturer's declaration or is stated in the Theory of Operation.

Requirement

The hopset shall be such that the near-term distribution of frequencies appears random, with sequential hops randomly distributed in both direction and magnitude of change in the hopset, while the long-term distribution appears evenly distributed.

9 Channel Separation

9.1 Test Result

Test Description	Test Specification	Test Result
Number of Hopping Channels	15.247(a)(1)(iii) RSS-247 5.1(2) ANSI C63.10	Compliant

9.2 Test Method

Measurements were taken using the methods defined in ANSI C63.10, Clause 7.8.2. The test data was measured using a spectrum analyzer with Peak detector (max hold) and a resolution bandwidth of 100 kHz. The trace was allowed to stabilize until all channels were displayed.

Requirement

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the -20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the band 2400-2483.5 MHz may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the -20 dB bandwidth of the hopping channel, whichever is greater, provided that the systems operate with an output power no greater than 0.125 W.

9.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 24.1 °C
Relative Humidity: 19.0 %

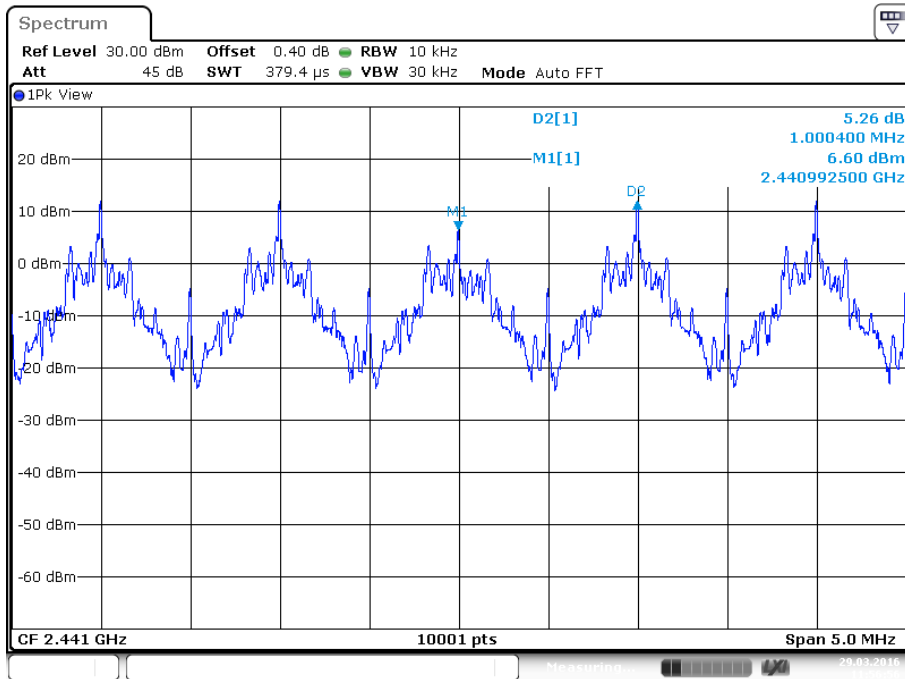
9.4 Test Equipment

Test Date: 29-Mar-2016

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	8-Oct-2017
COAXIAL CABLE	SUCOFLEX 102	HUBER&SUHNER	B079824	4-Aug-2016
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B079788	21-Oct-2017

Note: The calibration period equipment is 1 year except for the CMW500 which is on a 3 year cal cycle and the FSV which is one a 2 year cal cycle per manufacturer's recommendations.

9.5 Test Data



Date: 29.MAR.2016 11:56:56

10 Number of Hopping Channels

10.1 Test Result

Test Description	Test Specification	Test Result
Number of Hopping Channels	15.247(a)(1)(iii) RSS-247 5.1(4)	Compliant

10.2 Test Method

Measurements were taken using the methods defined in ANSI C63.10, Clause 7.8.3. The test data was measured using a spectrum analyzer with Peak detector (max hold) and a resolution bandwidth of 30 kHz. The trace was allowed to stabilize until all channels were displayed.

Requirement

Frequency hopping systems operating in the band 2400-2483.5 MHz shall use at least 15 hopping channels.

10.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 24.1 °C
Relative Humidity: 19.0 %

10.4 Test Equipment

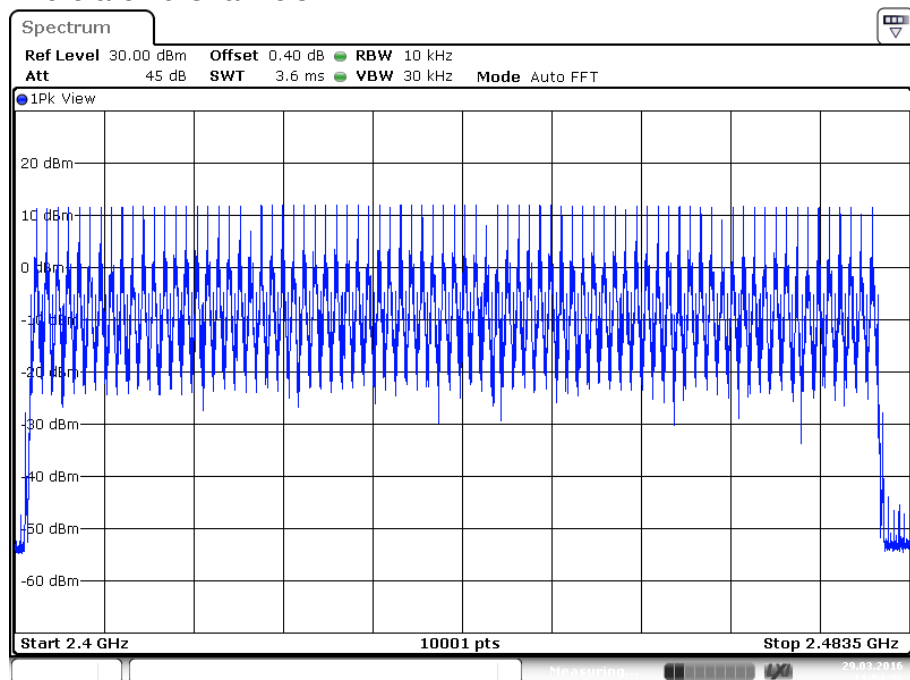
Test Date: 29-Mar-2016

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	8-Oct-2017
COAXIAL CABLE	SUCOFLEX 102	HUBER&SUHNER	B079824	4-Aug-2016
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B079788	21-Oct-2017

Note: The calibration period equipment is 1 year except for the CMW500 which is on a 3 year cal cycle and the FSV which is one a 2 year cal cycle per manufacturer's recommendations.

10.5 Test Data

There are 79 Channels.



Date: 29.MAR.2016 11:54:26

11 Dwell Time

11.1 Test Result

Test Description	Test Specification	Test Result
Dwell Time	15.247(a)(1)(iii) RSS-247 5.1(4)	Compliant

11.2 Test Method

Measurements were taken using the methods defined in ANSI C63.10, Clause 7.8.4. The EUT was set to test mode which allowed it to be controlled by the Bluetooth Tester. The Bluetooth Tester was then set to operate on US/EU Hopping Scheme with pseudo-random data. For each packet type and data rate, the pulse width of the packet was measured and the pulses were counted over the total observation period.

Requirement

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds, multiplied by the number of hopping channels employed ($0.4 \times 79 = 31.6s$).

11.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 24.1 °C

Relative Humidity: 19.0 %

11.4 Test Equipment

Test Date: 29-Mar-2016

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	8-Oct-2017
COAXIAL CABLE	SUCOFLEX 102	HUBER&SUHNER	B079824	4-Aug-2016
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B079788	21-Oct-2017

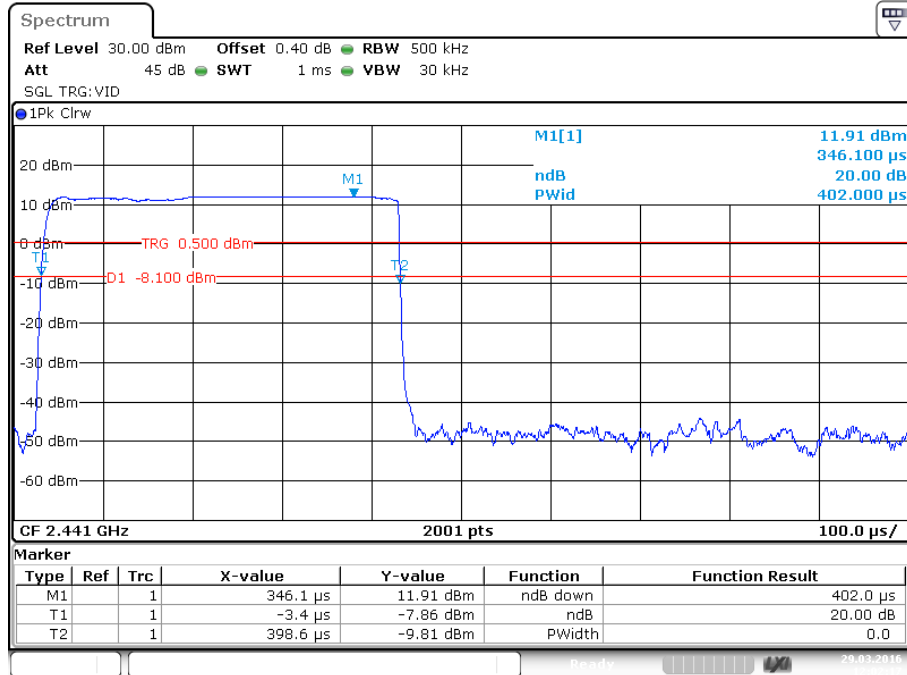
Note: The calibration period equipment is 1 year except for the CMW500 which is on a 3 year cal cycle and the FSV which is one a 2 year cal cycle per manufacturer's recommendations.

11.5 Test Data

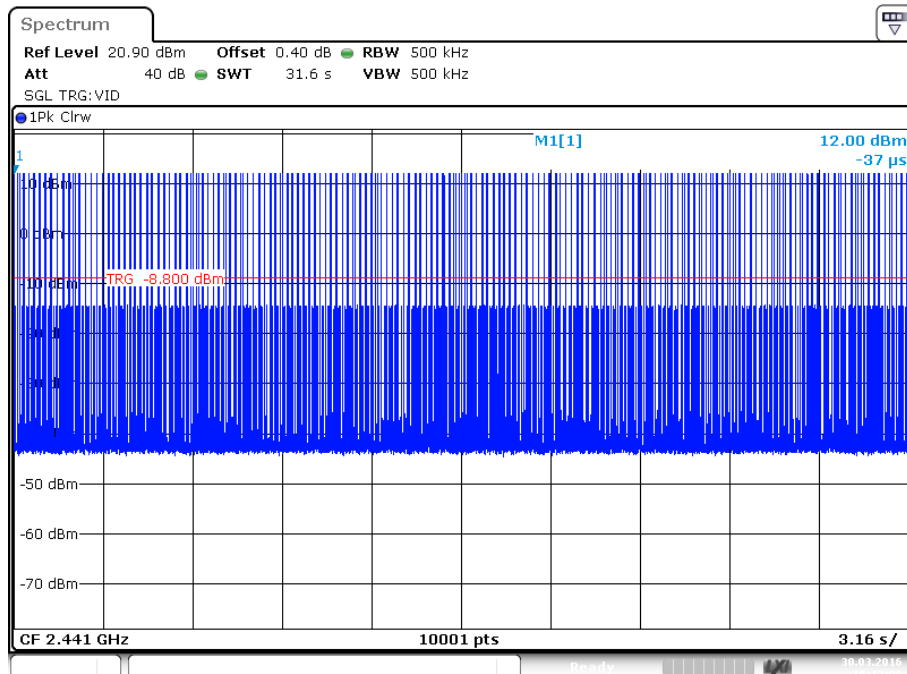
	Packet Type	Pulse Width ms	Pulses per 31.6 sec	Dwell Time Sec	Limit	Result
BR	DH1	0.402	353	0.142	0.4	PASS
	DH3	1.664	139	0.231	0.4	PASS
	DH5	2.906	107	0.311	0.4	PASS
EDR2	DH1	0.409	348	0.126	0.4	PASS
	DH3	1.663	151	0.251	0.4	PASS
	DH5	2.913	93	0.271	0.4	PASS
EDR3	DH1	0.410	345	0.141	0.4	PASS
	DH3	1.662	157	0.261	0.4	PASS
	DH5	2.913	95	0.277	0.4	PASS

11.6 Plots

DH1 Packet Type, Basic Rate

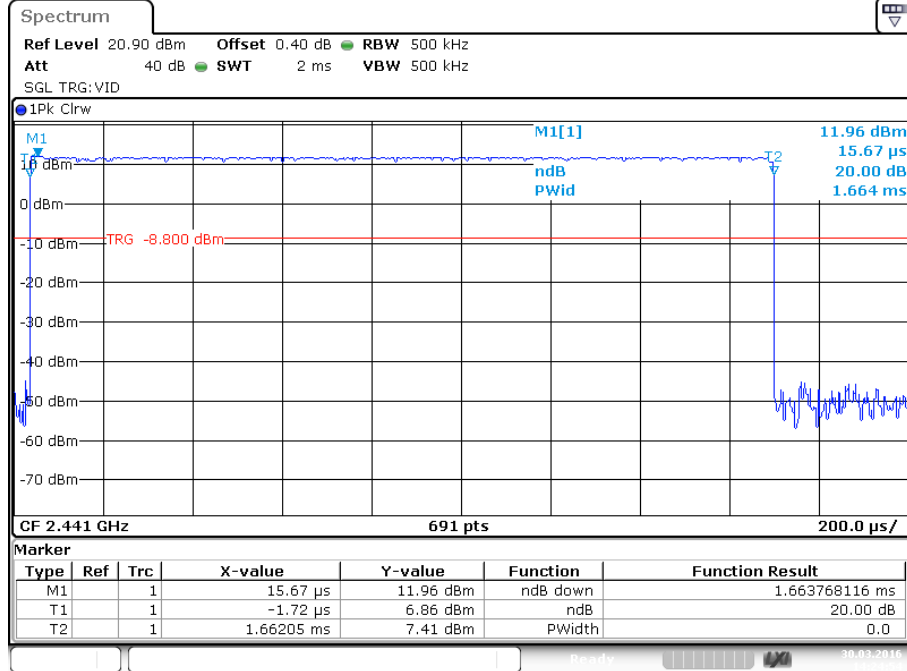


Date: 29.MAR.2016 12:02:18

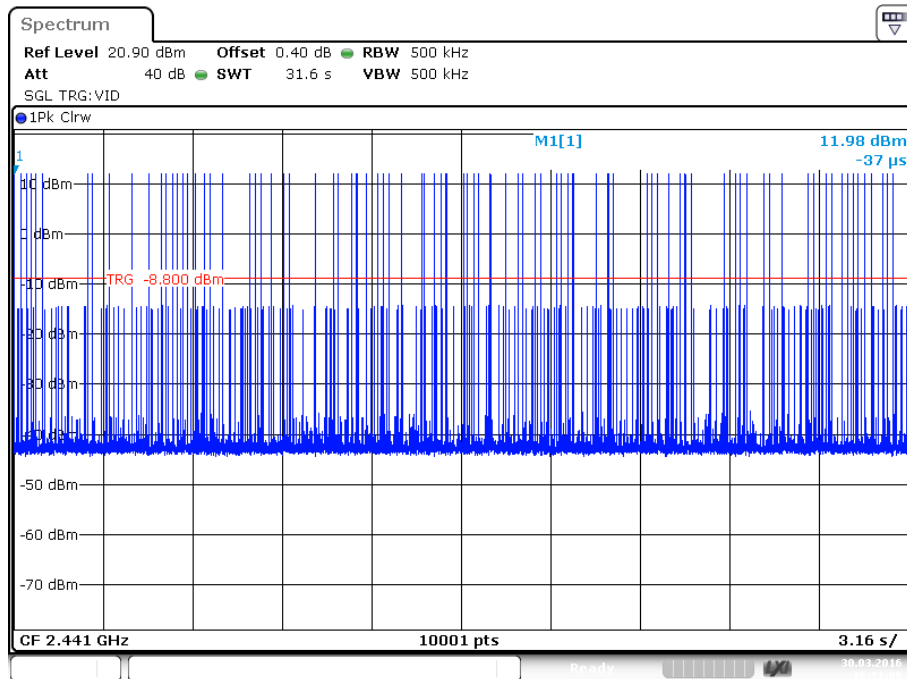


Date: 30.MAR.2016 16:12:07

DH3 Packet Type, Basic Rate

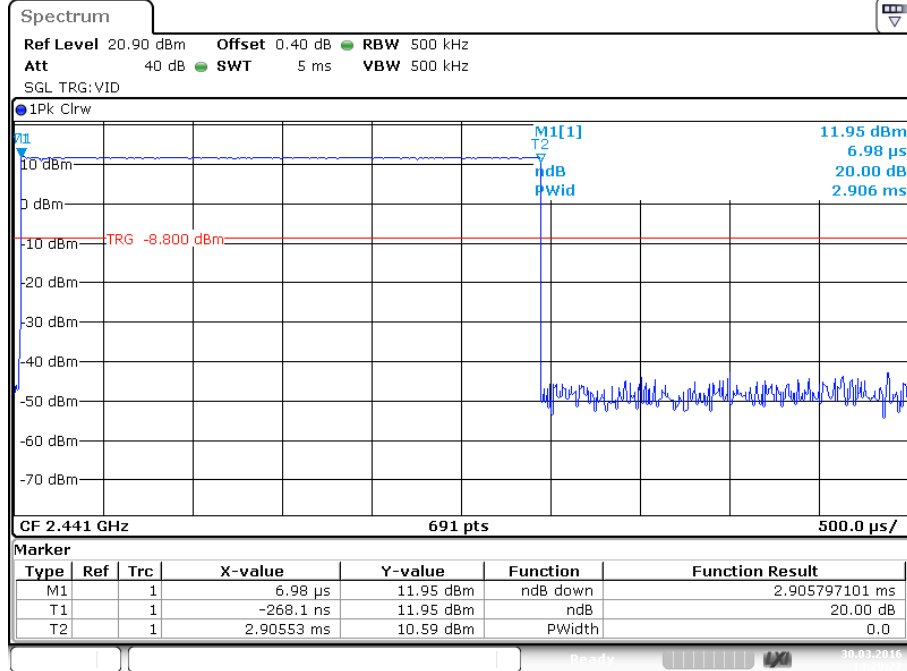


Date: 30.MAR.2016 14:24:54

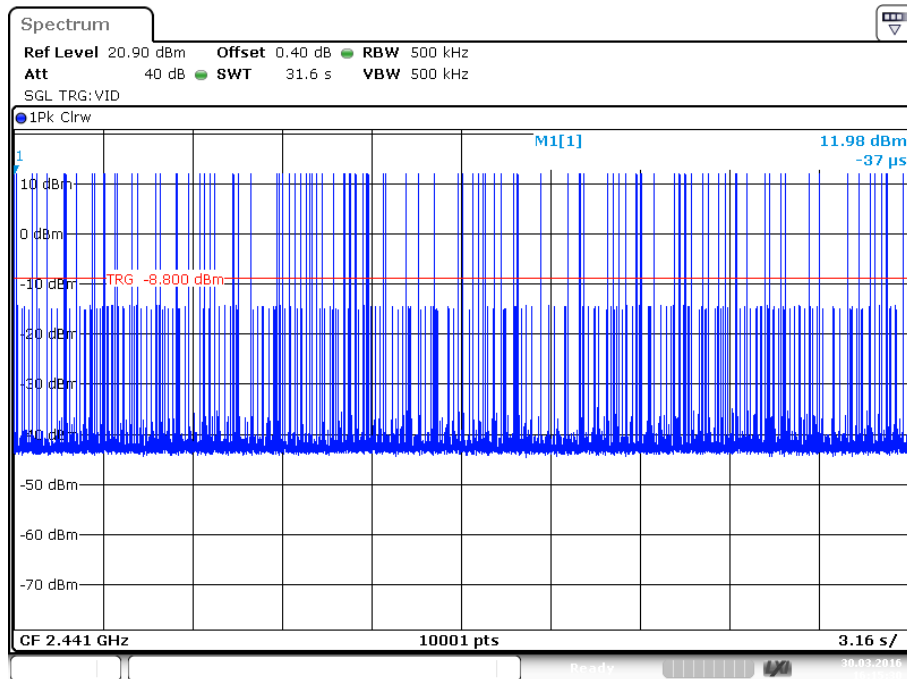


Date: 30.MAR.2016 16:11:00

DH5 Packet Type, Basic Rate

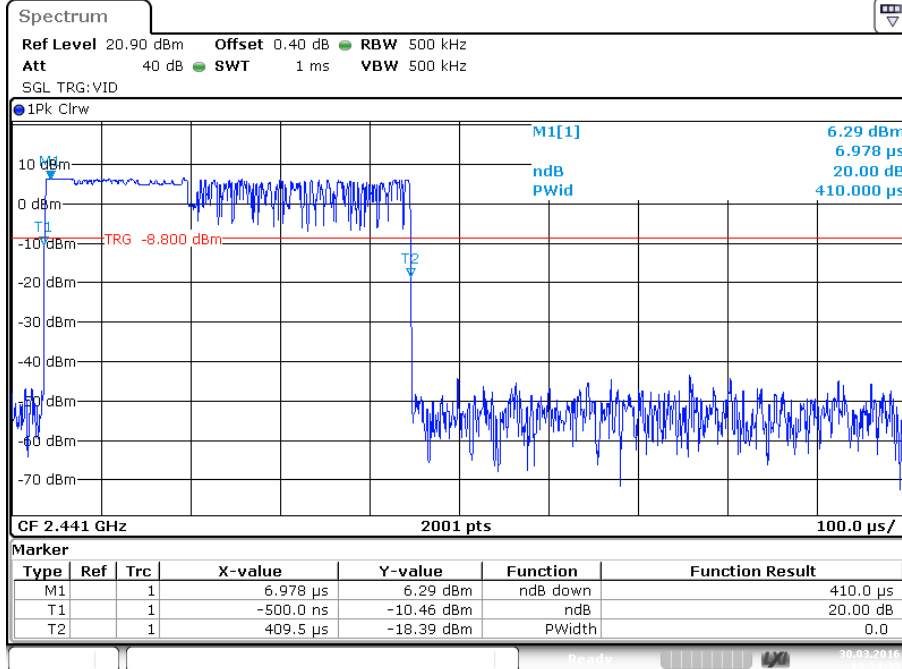


Date: 30.MAR.2016 14:29:28

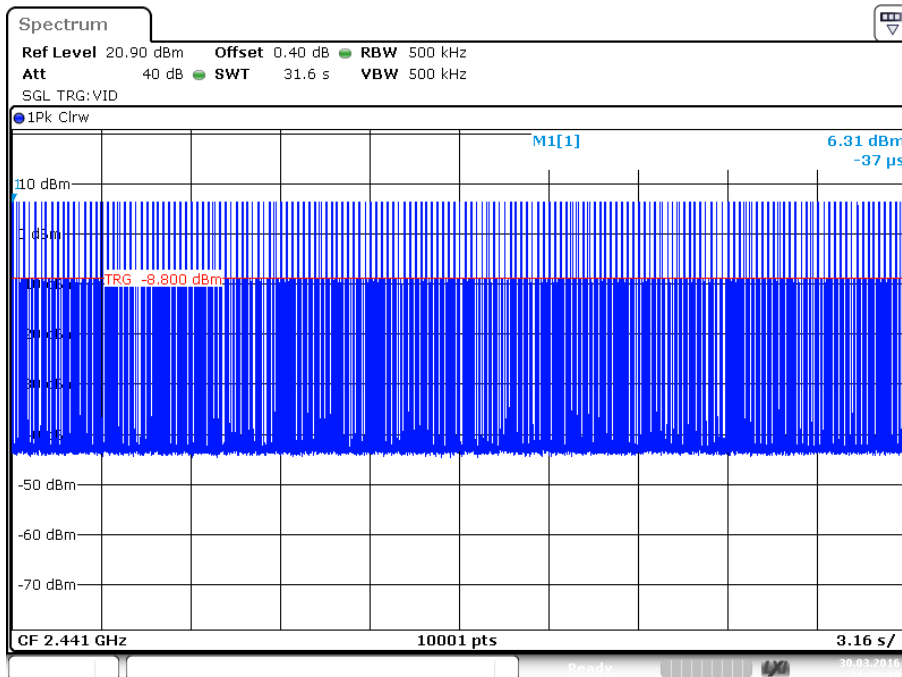


Date: 30.MAR.2016 16:15:30

DH1 Packet Type, EDR 2

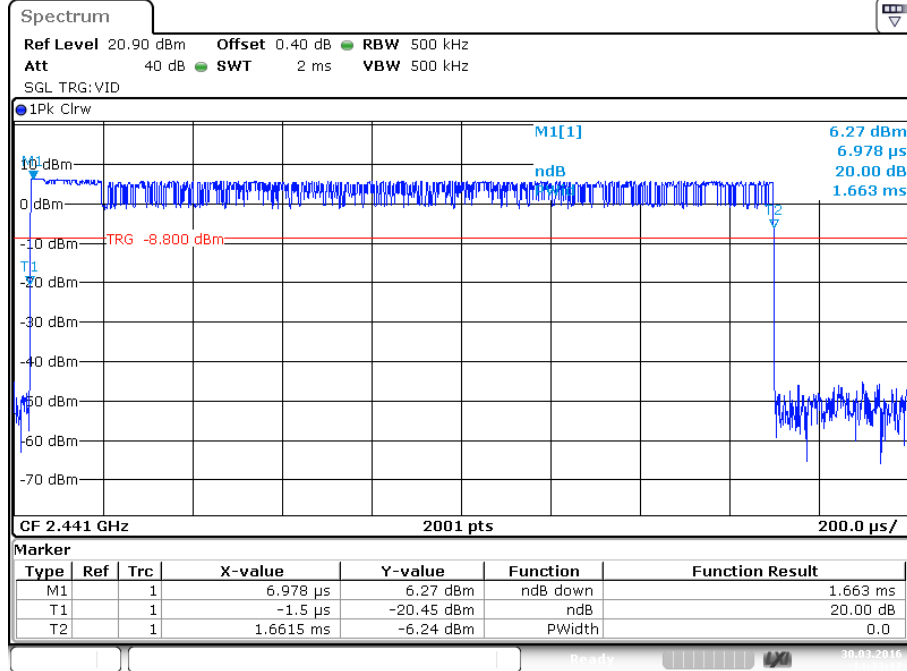


Date: 30.MAR.2016 14:34:35

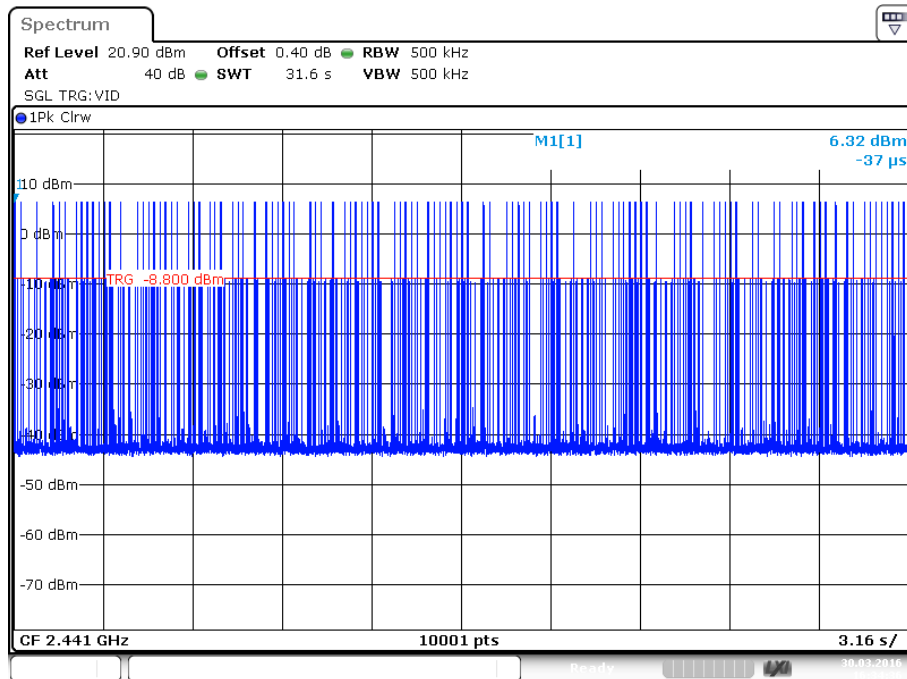


Date: 30.MAR.2016 16:29:31

DH3 Packet Type, EDR 2

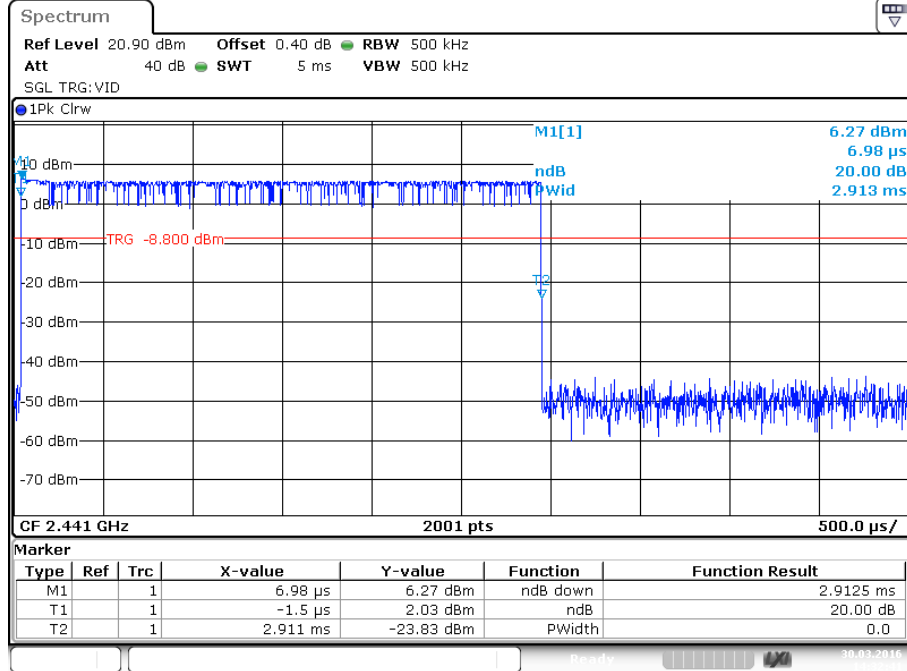


Date: 30.MAR.2016 14:33:18

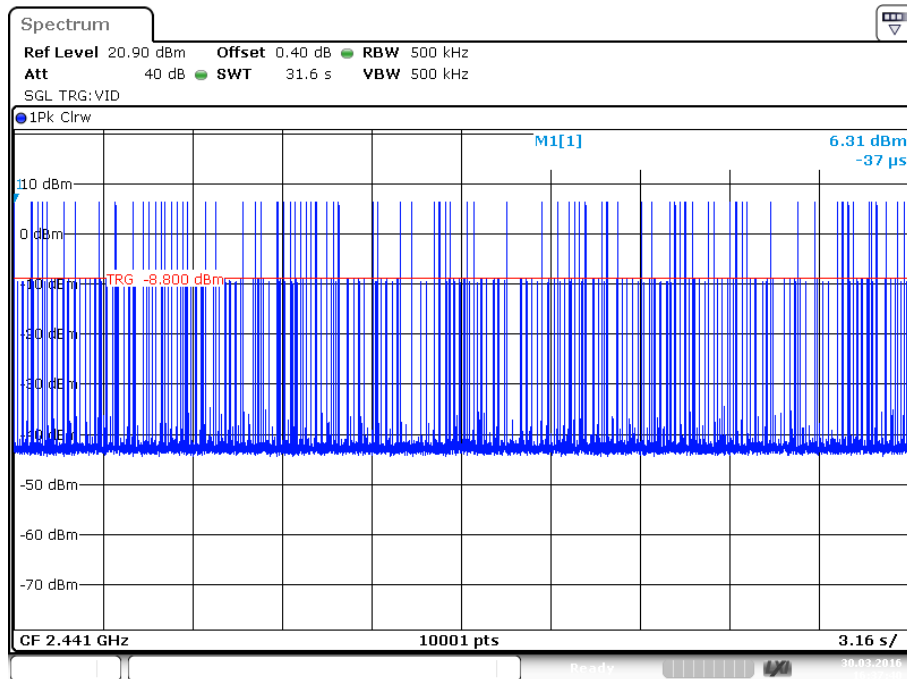


Date: 30.MAR.2016 16:34:37

DH5 Packet Type, EDR 2

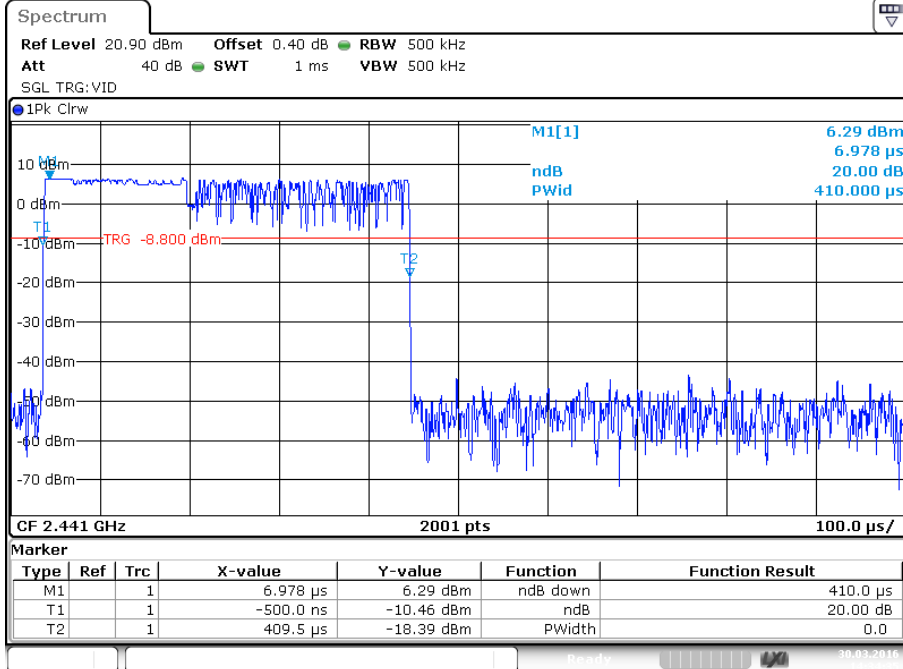


Date: 30.MAR.2016 14:32:42

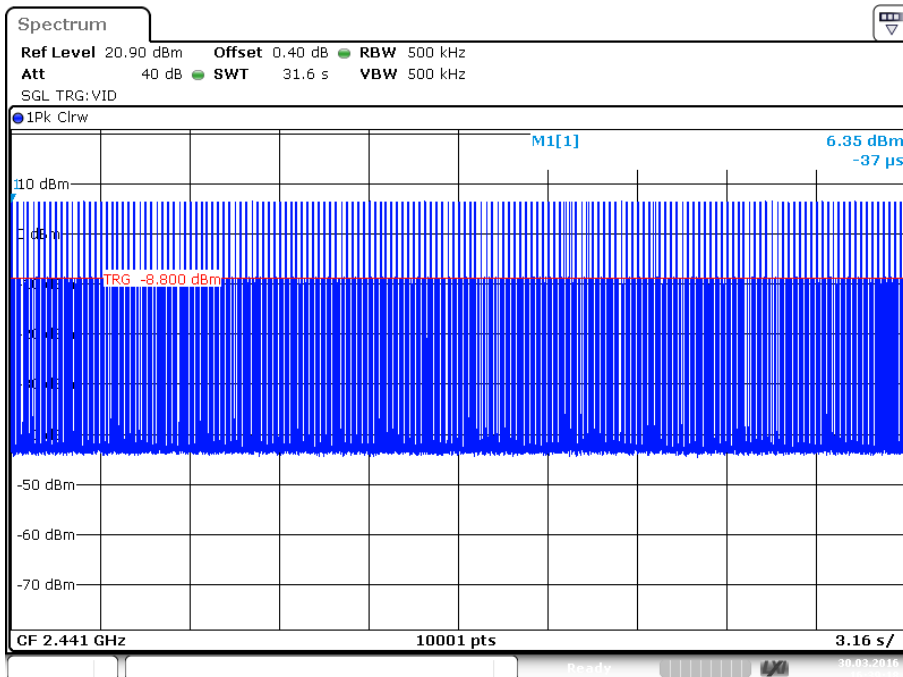


Date: 30.MAR.2016 16:37:41

DH1 Packet Type, EDR 3

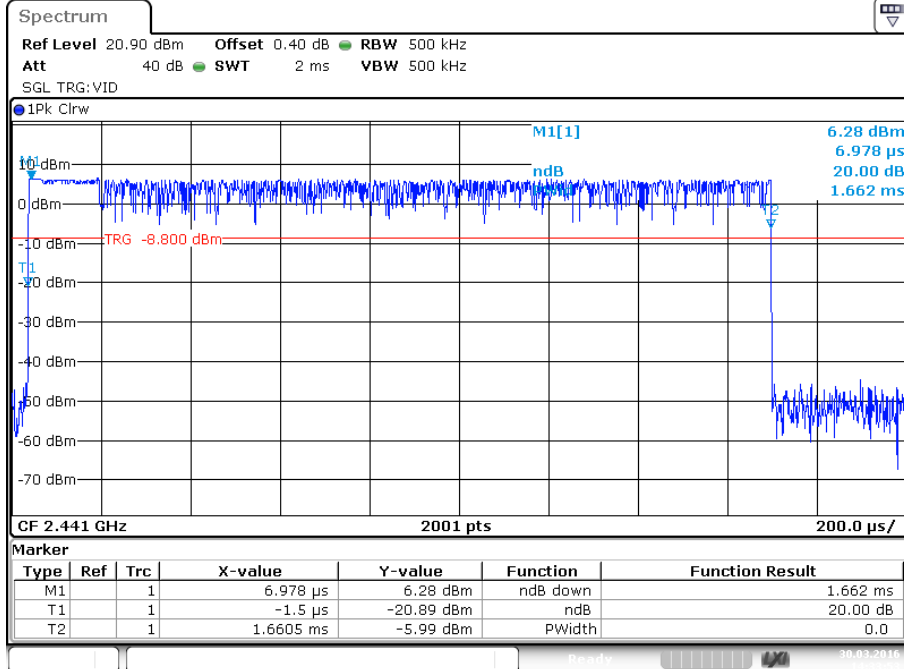


Date: 30.MAR.2016 14:34:35

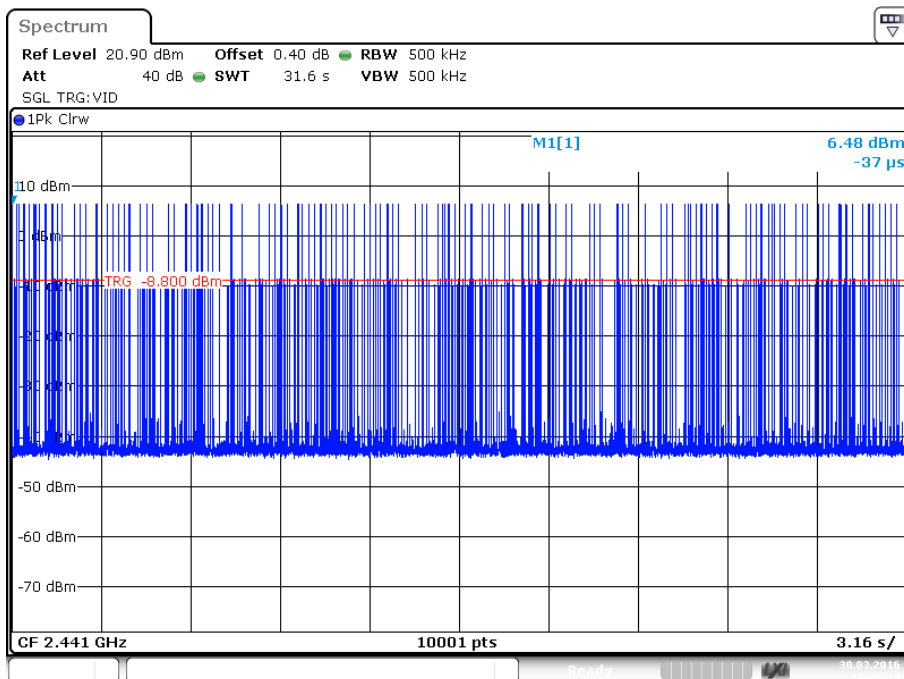


Date: 30.MAR.2016 16:39:19

DH3 Packet Type, EDR 3

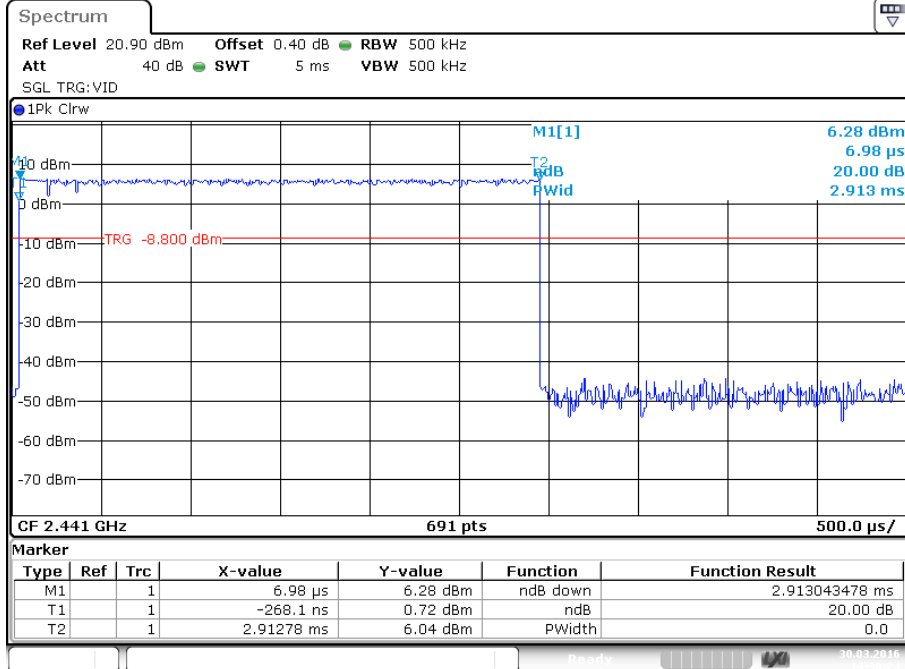


Date: 30.MAR.2016 14:33:53

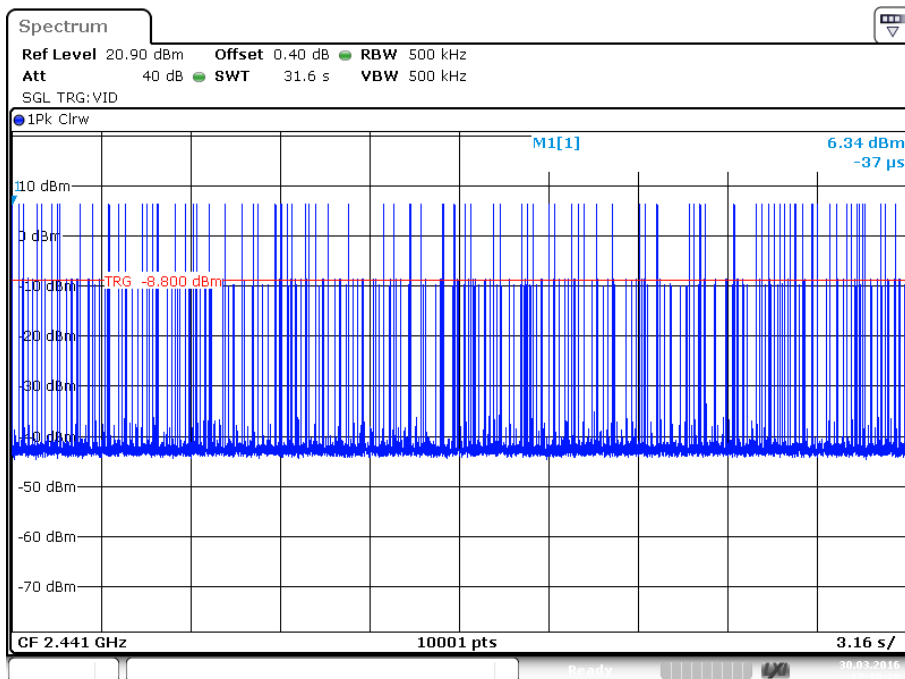


Date: 30.MAR.2016 17:09:24

DH5 Packet Type, EDR 3



Date: 30.MAR.2016 14:30:25



Date: 30.MAR.2016 17:10:29

12 Revision History

Revision Level	Description of changes	Revision Date
0	Initial release	10 May 2016
	-	
	-	