



DESIGN ASSURANCE ENGINEERING
Wireless Transceiver Bluetooth Test Report



FCC ID: A94422914 IC: 3232A-422914

Test Type: Emissions Immunity

Product Type: Wireless Speaker

Product Name/Number: Model Number: 422914
FCC ID: A94422914
IC: 3232A-422914

Prepared For: Design Assurance Engineering Department,
Bose Corporation

Test Results: Pass Fail

Applicable Standards: FCC CFR 47 Part 15 Subpart C
Industry Canada RSS-247 Issue 2
Industry Canada RSS-GEN Issue 4

Report Number: EMC.422914.17.100.1

	Print Name	Signature	Date
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Electrical Engineer Review* By:	Michael Royer	<i>Michael A. Royer</i>	April 13, 2017

* Since every test result is separately reviewed after its completion, the electrical engineer review indicated above represents a higher level review to ensure this report lists and contains all applicable and appropriate requirements.

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Table of Contents

1. Test Report Summary	3
2. 20dB and 99% Bandwidth	5
3. Conducted Output Power	9
4. Hopping Frequency Separation.....	11
5. Conducted Spurious Emissions	12
6. Average Time of Occupancy	20
7. Number of Hopping Channels	23
8. Radiated Emissions.....	24
9. AC Mains Conducted Emissions	49
10. Equipment list	51
11. Measurement uncertainty.....	52

1. Test Report Summary

Product Information:

Description:

The EUT is a battery powered wireless speaker that contains Bluetooth/BLE radio integrated circuit. The EUT does not operate while being charged.

The following rates / modulations tested are:

- DH5 = Basic rate (1 Mbps) GFSK modulation
- 2DH5 = Enhanced data rate (2 Mbps) QPSK modulation
- 3DH5 = Enhanced data rate (3 Mbps) 8PSK modulation.

All rates tested using maximum payload (data packet size) for maximum duty cycle.

The following two samples were used for testing:

- SN2 (connectorized unit) for conducted RF measurements.
- SN3 (normal samples) for radiated measurements.

Setup (Cables and Accessories):

Radiated emission and power line conducted emission were performed with the EUT playing IEC pink noise over the BT link. EUT is not sold with a power supply so when necessary a Bose part number 745559-0030 power supply was used for charging

EUT Antenna Description:

The antenna is a PCB etch antenna with maximum antenna gain of 1.84dBi, non-removable.

Software / Firmware:

The firmware installed in the EUT during testing was version 0.7.21.524
The test utility software used during testing was Polycomm, version 0.2.0.0 and CSR Blue Suite version 2.6.2.

Scope:

This report covers EMC standards / requirements.

FCC 15B, FCC 15.247, RSS 247 (issue 2), RSS Gen (issue 4)

Test Objective:

Verify product meets all applicable EMC requirements.

Results:

Product complies with all applicable EMC requirements. All results represent worst-case final emissions.

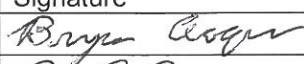

Conclusions:

The device under test (D.U.T.):

meets all test standards listed in this report.

does not meet all test standards selected in section 2 of this report.

Affirmation of Test Results:

	Print Name	Signature	Date
Testing Engineer/Technician	Bryan Cerqua		April 10, 2017
Testing Engineer/Technician	Karl Klemm		April 10, 2017



Test Standards

Emissions:

	Standard
<input checked="" type="checkbox"/>	FCC Part 15C (15.247)
<input checked="" type="checkbox"/>	Canada RSS-247 (issue 2)
<input checked="" type="checkbox"/>	Canada RSS-GEN (issue 4)

Environmental Conditions

Ambient:

Temperature:	22±4°C
Humidity:	30-60%RH
Mains Voltage:	<input checked="" type="checkbox"/> 120VAC



2. 20dB and 99% Bandwidth

Requirement:

None: For reporting purposes, only.

Test Procedure:

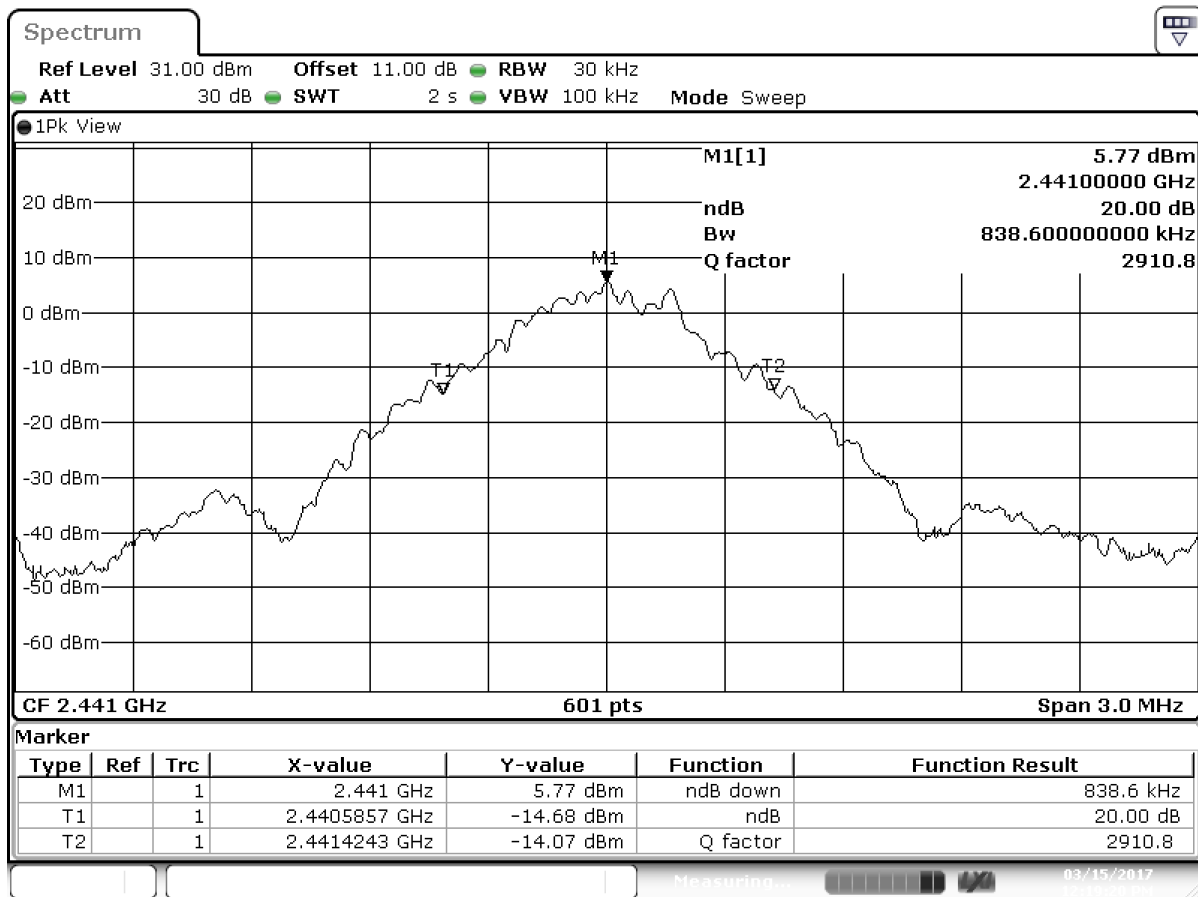
The transmitter output is connected to a spectrum analyzer. The RBW is set to 1-5% of the 20 dB bandwidth and 99% Occupied Bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

20dB Occupied Bandwidth

20 dB OBW Summary Table (Basic Rate: 1 Mbps)				
Channel	Frequency (MHz)	Mode	20 dB OBW (MHz)	Limit NA
Low	2402	DH5	0.839	-
Middle	2441	DH5	0.839	-
High	2480	DH5	0.839	-
20 dB OBW Summary Table (Enhanced Rate: 2 Mbps)				
Channel	Frequency (MHz)	Mode	20 dB OBW (MHz)	Limit NA
Low	2402	2-DH5	1.243	-
Middle	2441	2-DH5	1.248	-
High	2480	2-DH5	1.258	-
20 dB OBW Summary Table (Enhanced Rate: 3 Mbps)				
Channel	Frequency (MHz)	Mode	20 dB OBW (MHz)	Limit NA
Low	2402	3-DH5	1.263	-
Middle	2441	3-DH5	1.268	-
High	2480	3-DH5	1.268	-

See next page for a representative plot on how the measurement is made.

20 dB Occupied Bandwidth (Representative screen shot, DH5 2441 MHz)



Plot2 20dB OBW DH5 2441 MHz

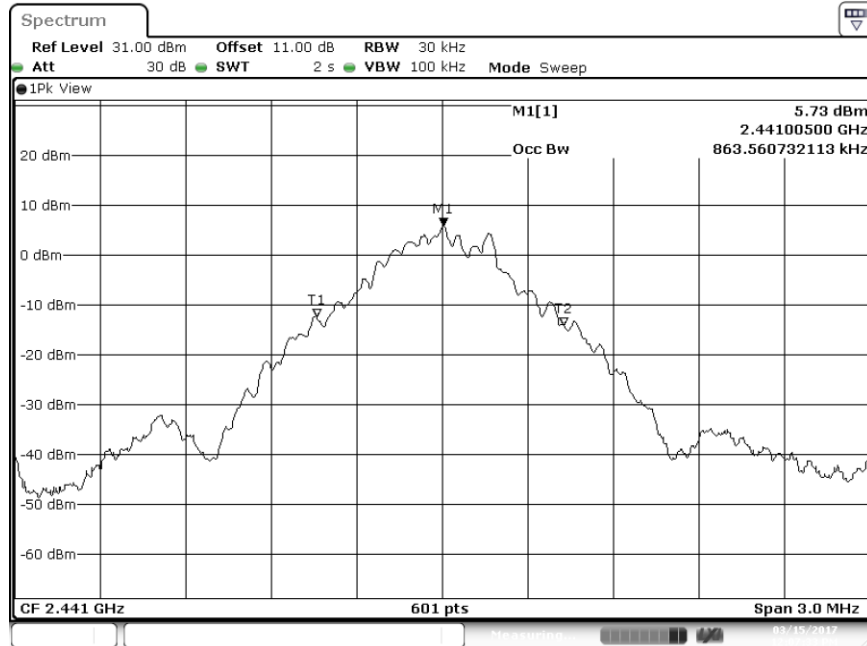
Date: 15.MAR.2017 12:19:20



99% Occupied Bandwidth

99% OBW Summary Table (Basic Rate: 1 Mbps)				
Channel	Frequency (MHz)	Mode	99% OBW (MHz)	Limit NA
Low	2402	DH5	0.869	-
Middle	2441	DH5	0.864	-
High	2480	DH5	0.874	-
99% OBW Summary Table (Enhanced Rate: 2 Mbps)				
Channel	Frequency (MHz)	Mode	99% OBW (MHz)	Limit NA
Low	2402	2-DH5	1.183	-
Middle	2441	2-DH5	1.218	-
High	2480	2-DH5	1.258	-
99% OBW Summary Table (Enhanced Rate: 3 Mbps)				
Channel	Frequency (MHz)	Mode	99% OBW (MHz)	Limit NA
Low	2402	3-DH5	1.168	-
Middle	2441	3-DH5	1.213	-
High	2480	3-DH5	1.238	-

99% Occupied Bandwidth (Representative screen shot, DH5 2441 MHz)



Plot2 99P OBW DH5 2441 MHz
 Date: 15.MAR.2017 12:07:33

3. Conducted Output Power

Requirements:

FCC 15.247 (b) (1)

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

RSS-247 5.4 (2)

For frequency hopping systems operating in the band 2400-2483.5 MHz and employing at least 75 hopping channels, the maximum peak conducted output power shall not exceed 1 W; for all other frequency hopping systems in the band, the maximum peak conducted output power shall not exceed 0.125 W (21 dBm).

Test setup details:

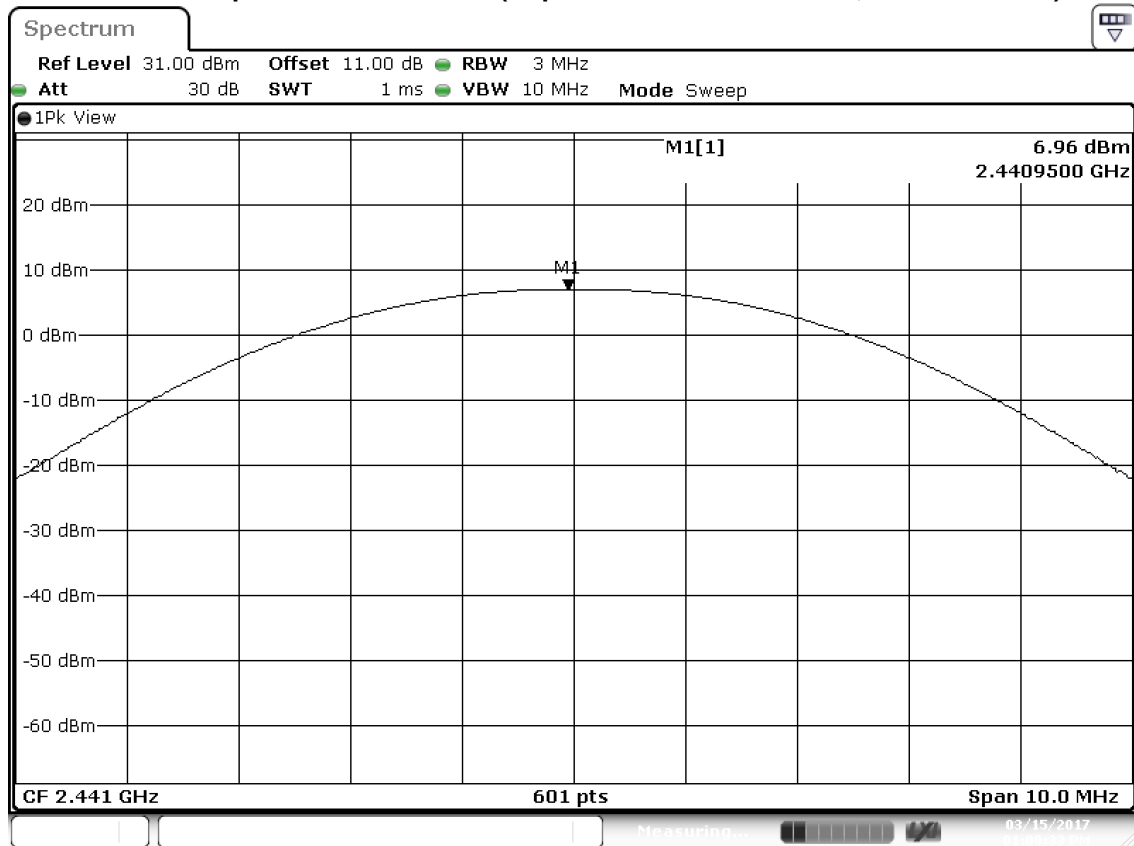
The EUT is controlled via the USB port with CSR's Blue Suite software which is used to set the test modes of the Bluetooth device. The EUT antenna is disconnected. A temporary test connector is mounted to the PCB. An 8 inch u.FL to SMA adapter cable with 1 dB loss was used for all conducted measurements. To compensate for the cable loss, the reference level offset feature of the spectrum analyzer was used. The EUT is programmed to operate on fixed frequencies at the low, middle, and high end of the authorized frequency band. The spectrum analyzer resolution bandwidth is set to 3 MHz (higher than the occupied bandwidth), peak detector and max hold. The maximum output power is recorded for each of the three frequencies in both basic and enhanced data rates.

Test Results:

Output Power Summary Table (Basic Rate: 1 Mbps)							
Channel	Frequency (MHz)	Mode	Output Power (dBm)	Directional Gain (dBi)	Limit (dB)	Margin (dB)	Result
Low	2402	DH5	5.81	1.84	30	24.19	Pass
Middle	2441	DH5	6.96	1.84	30	23.04	Pass
High	2480	DH5	7.79	1.84	30	22.21	Pass
Output Power Summary Table (Enhanced Rate: 2 Mbps)							
Channel	Frequency (MHz)	Mode	Output Power (dBm)	Directional Gain (dBi)	Limit (dB)	Margin (dB)	Result
Low	2402	2-DH5	4.59	1.84	30	25.41	Pass
Middle	2441	2-DH5	6.29	1.84	30	23.71	Pass
High	2480	2-DH5	7.25	1.84	30	22.75	Pass
Output Power Summary Table (Enhanced Rate: 3 Mbps)							
Channel	Frequency (MHz)	Mode	Output Power (dBm)	Directional Gain (dBi)	Limit (dB)	Margin (dB)	Result
Low	2402	3-DH5	4.92	1.84	30	25.08	Pass
Middle	2441	3-DH5	6.46	1.84	30	23.54	Pass
High	2480	3-DH5	7.40	1.84	30	22.60	Pass



Conducted power measurement (Representative screen shot, DH5 2441 MHz)



Plot2 Power DH5 2441 MHz
 Date: 15.MAR.2017 13:09:33

* Reference level offset = u.FL to SMA cable + 10 dB Pad = 11 dB

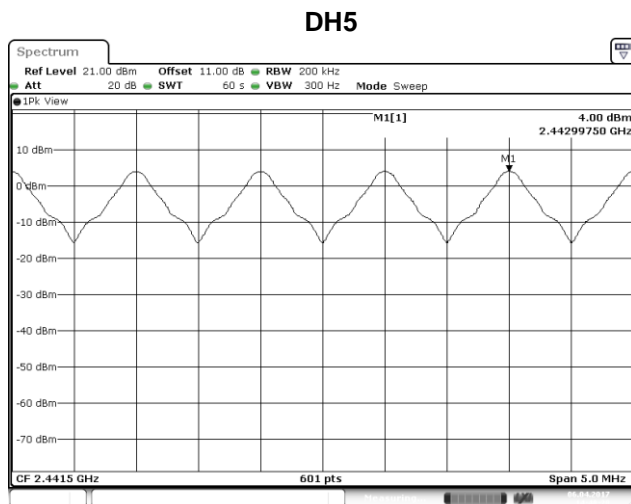
4. Hopping Frequency Separation

Requirements:

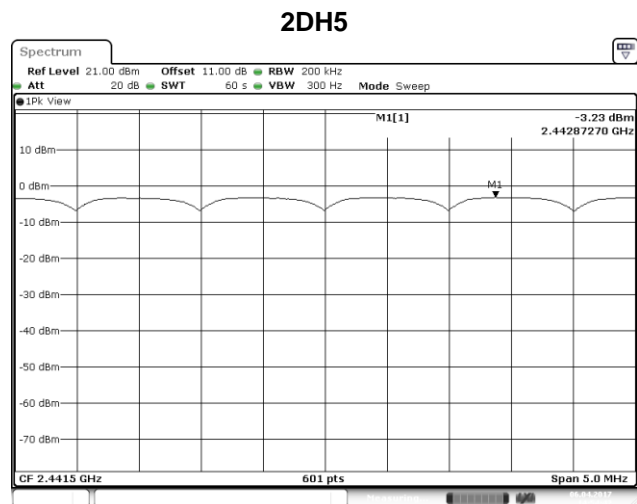
FCC 15.247 (a) (1), IC RSS-247 5.1 (2)

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 2400-2483.5 MHz band 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 the systems operate with an output power no greater than 125 mW.

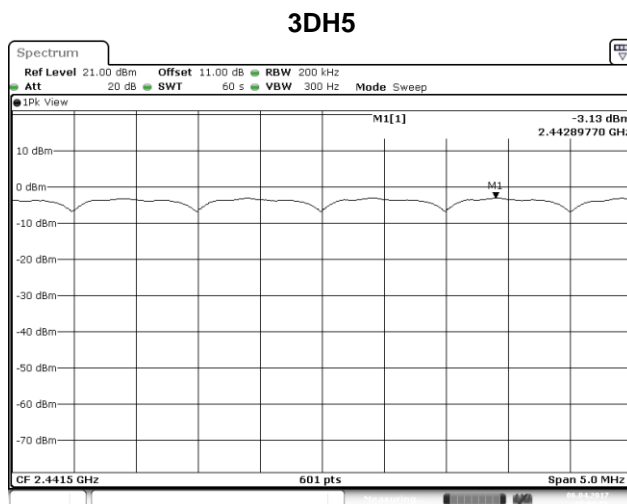
The following plots have the frequency per division of 0.5 MHz, the corresponding peaks are 1 MHz apart.



Plot1 Frequency Separation DH5 Hopping
Date: 6 APR 2017 14:48:28

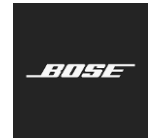


Plot2 Frequency Separation 2DH5 Hopping
Date: 6 APR 2017 14:54:43



Plot3 Frequency Separation 3DH5 Hopping
Date: 6 APR 2017 15:00:57

Hopping frequencies are separated by 1 MHz which is more than the required minimum of 25kHz and more than 2/3 of the 20dB bandwidth: Maximum 20 dB BW = 1.27 MHz; $2/3 * 1.27 \text{ MHz} = 846 \text{ kHz}$. $1 \text{ MHz} > 846 \text{ kHz}$.



5. Conducted Spurious Emissions

Requirements:

FCC 15.247 (d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in 15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see 15.205(c)).

IC RSS-247 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section A8.4 (4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

Note: Antenna gain outside of the operating band was assumed to be 0 dBi. The conducted spurious readings are for additional information as the radiated readings take precedence, see section 8 of this report; radiated emissions.



Spurious Band-edge Emissions

Lower band edge (hopping mode):

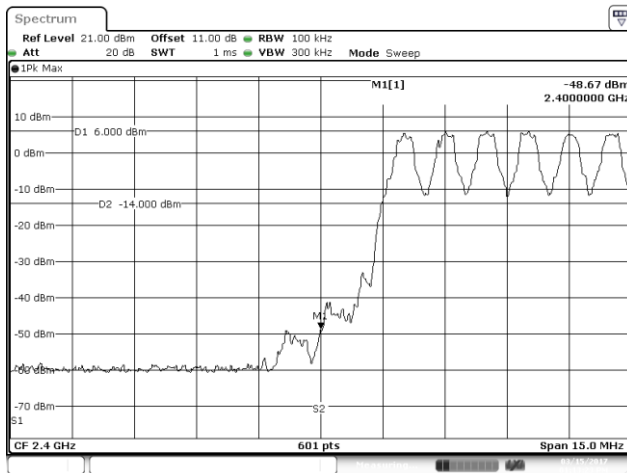
Lower Band Edge (Basic Rate: 1 Mbps)						
Mode	Frequency (MHz)	Mode	Worst Case (dBc)	Limit (dBc)	Margin (dB)	Result
Hopping	All	DH5	54.67	20	34.67	Pass
Lower Band Edge (Enhanced Rate: 2 Mbps)						
Mode	Frequency (MHz)	Mode	Worst Case (dBc)	Limit (dBc)	Margin (dB)	Result
Hopping	All	2-DH5	44.23	20	24.23	Pass
Lower Band Edge (Enhanced Rate: 3 Mbps)						
Mode	Frequency (MHz)	Mode	Worst Case (dBc)	Limit (dBc)	Margin (dB)	Result
Hopping	All	3-DH5	47.21	20	27.21	Pass

Upper band edge (hopping mode):

Upper Band Edge (Basic Rate: 1 Mbps)						
Mode	Frequency (MHz)	Mode	Worst Case (dBc)	Limit (dBc)	Margin (dB)	Result
Hopping	All	DH5	64.45	20	44.45	Pass
Upper Band Edge (Enhanced Rate: 2 Mbps)						
Mode	Frequency (MHz)	Mode	Worst Case (dBc)	Limit (dBc)	Margin (dB)	Result
Hopping	All	2-DH5	56.23	20	36.23	Pass
Upper Band Edge (Enhanced Rate: 3 Mbps)						
Mode	Frequency (MHz)	Mode	Worst Case (dBc)	Limit (dBc)	Margin (dB)	Result
Hopping	All	3-DH5	57.70	20	37.70	Pass

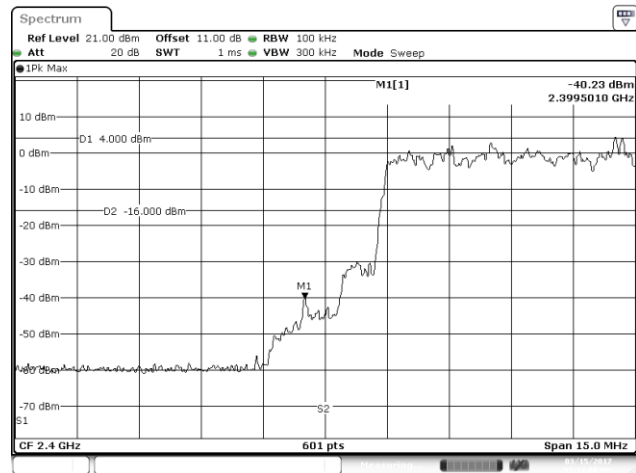
Lower band edge screen shots (hopping mode):

DH5



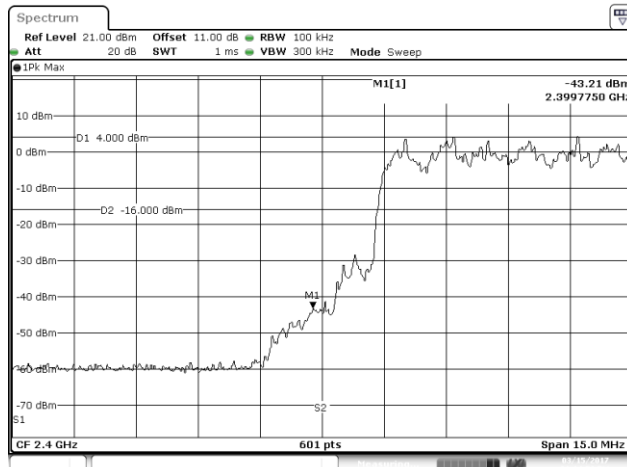
Plot1 Lower Band Edge DH5 Hopping
Date: 15.MAR.2017 13:13:23

2DH5



Plot2 Lower Band Edge 2DH5 Hopping
Date: 15.MAR.2017 13:14:07

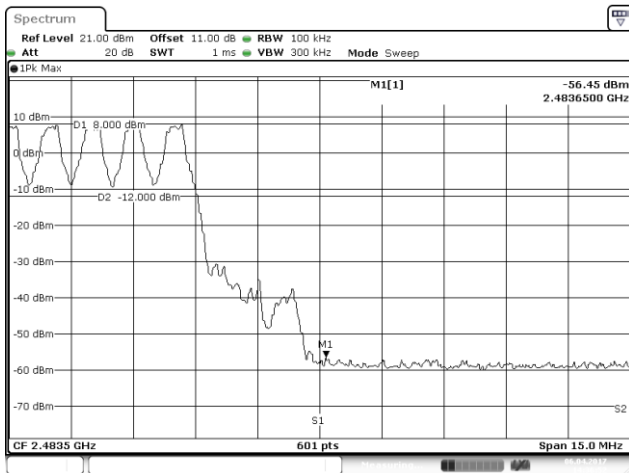
3DH5



Plot3 Lower Band Edge 3DH5 Hopping
Date: 15.MAR.2017 13:14:52

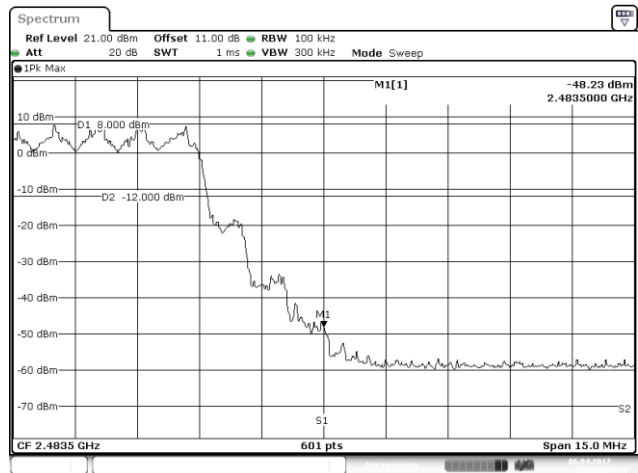
Upper band edge screen shots (hopping mode):

DH5



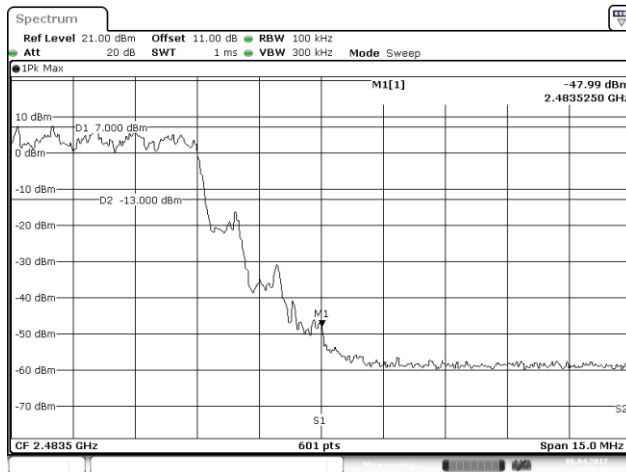
Plot1 Upper Band Edge DH5 Hopping
Date: 6 APR 2017 14:36:53

2DH5



Plot2 Upper Band Edge 2DH5 Hopping
Date: 6 APR 2017 14:37:38

3DH5



Plot3 Upper Band Edge 3DH5 Hopping
Date: 6 APR 2017 14:38:50

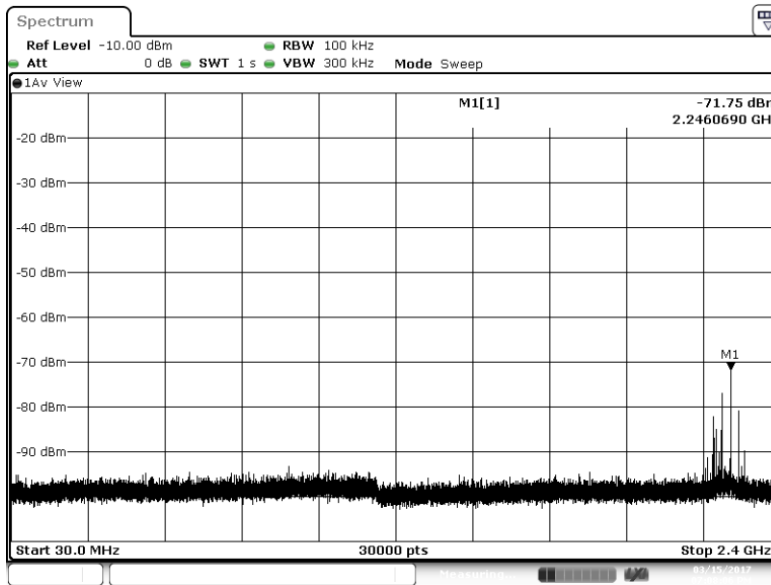
Conducted spurious emissions (pre-screen)

For these readings, a 2.4 GHz band notch filter and 10 dB Pad was used to protect the EMI receiver from overload. The 10 dB Pad provides impedance matching when transmitting into the 2.4 GHz notch filter. The conducted measurement is converted into an equivalent E field value, a narrower RBW = 100 kHz was used for this pre-screen. Later in section 6 of this report the required radiated measurements will be done using a RBW = 1 MHz.

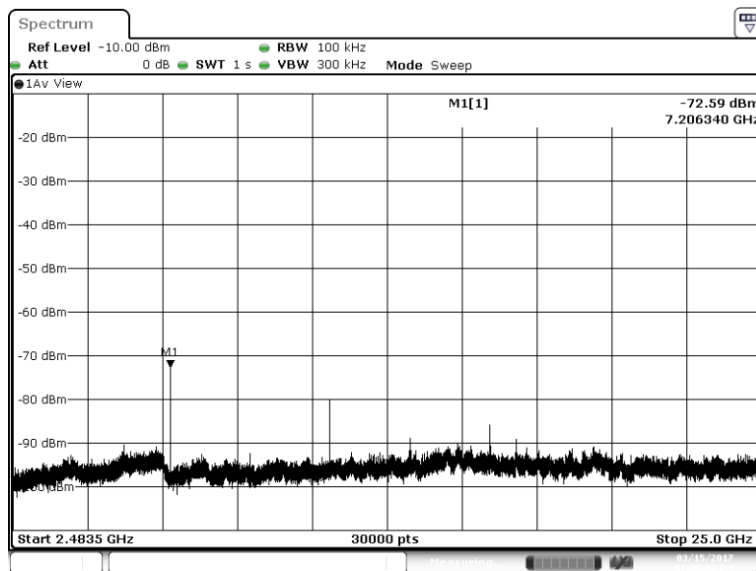
Basic rate (DH5) 1 Mbps showed highest worst case emissions.

DH5 Low channel (2402 MHz)

Spurious Summary Table (Basic Rate: 1 Mbps)											
Channel	Band Range (MHz)	Mode	Raw Measurement (dBm)	Test Cable Loss (dB)	Pad ATTN (dB)	Out of Band Antenna Gain 0 (dBi)	Corrected Reading (dBm)	Convert to E-Field at 3 meters (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Result
Low	30 To 2400	DH5	-71.7	1.0	10.0	0.0	-60.7	34.48	54	19.52	Pass
Low	2483.5 To 25000	DH5	-72.6	1.0	10.0	0.0	-61.6	33.64	54	20.36	Pass



Plot1 DH5 2402 MHz Average Band 1
Date: 15.MAR.2017 19:08:06

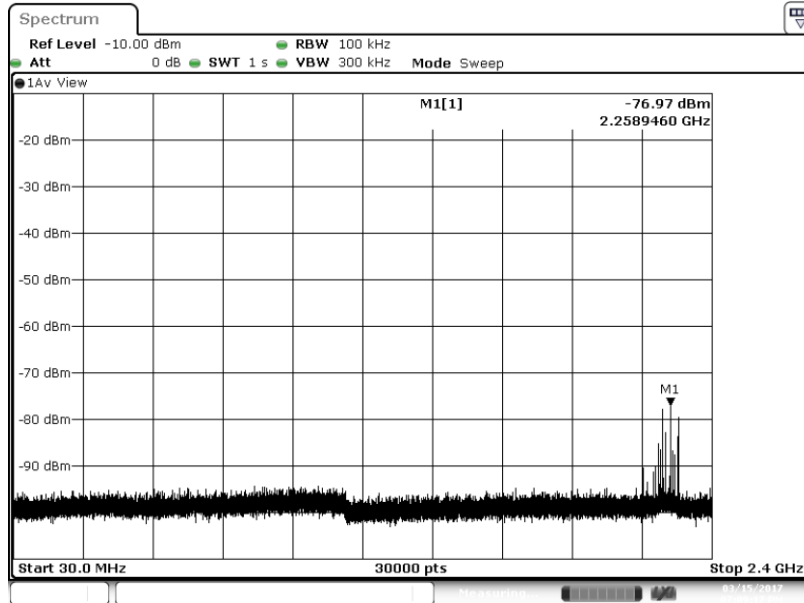


Plot2 DH5 2402 MHz Average Band 2
Date: 15.MAR.2017 19:08:30

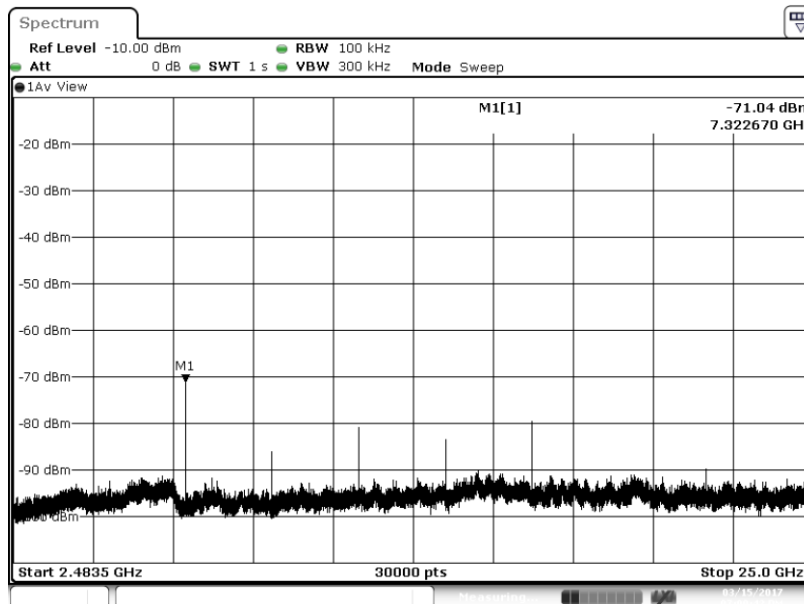
Marker 1 is the 3rd harmonic, also measured radiated, see section 8.

DH5 Mid channel (2441 MHz)

Spurious Summary Table (Basic Rate: 1 Mbps)											
Channel	Band Range (MHz)	Mode	Raw Measurement (dBm)	Test Cable Loss (dB)	Pad ATTN (dB)	Out of Band Antenna Gain 0 (dBi)	Corrected Reading (dBm)	Convert to E-Field at 3 meters (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Result
Mid	30 To 2400	DH5	-77.0	1.0	10.0	0.0	-66.0	29.26	54	24.74	Pass
Mid	2483.5 To 25000	DH5	-71.0	1.0	10.0	0.0	-60.0	35.19	54	18.81	Pass



Plot1 DH5 2441 MHz Average Band 1
Date: 15.MAR.2017 19:09:18



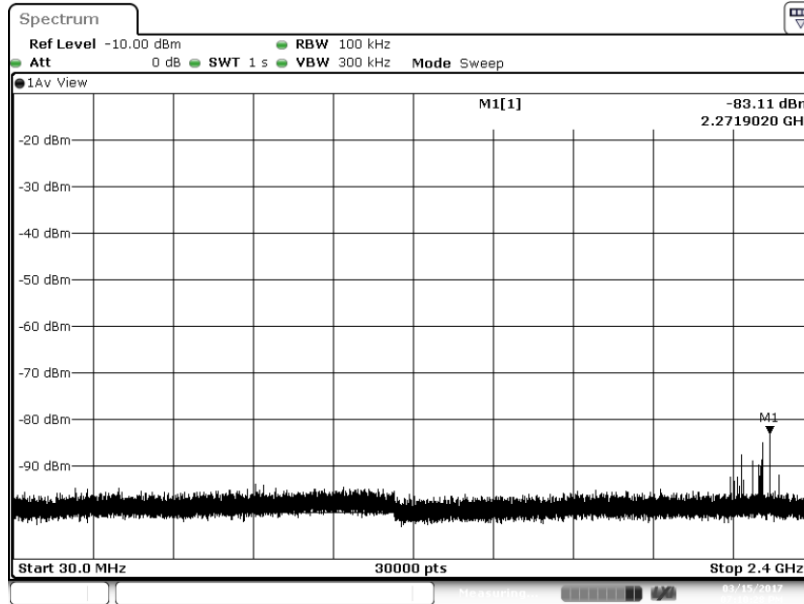
Plot2 DH5 2441 MHz Average Band 2
Date: 15.MAR.2017 19:09:41

Marker 1 is the third harmonic, also measured radiated, see section 8, radiated emissions.

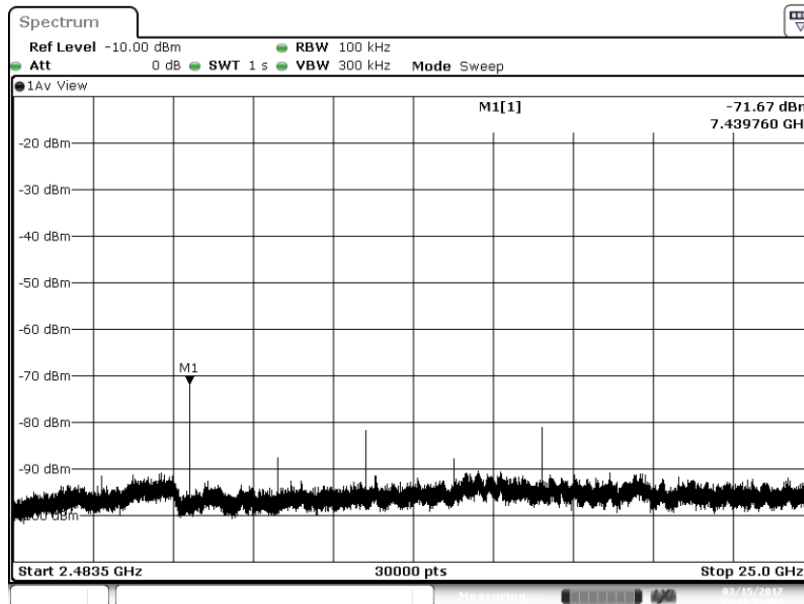
DH5 High channel (2480 MHz)

Spurious Summary Table (Basic Rate: 1 Mbps)

Channel	Band Range (MHz)	Mode	Raw Measurement (dBm)	Test Cable Loss (dB)	Pad ATTN (dB)	Out of Band Antenna Gain 0 (dBi)	Corrected Reading (dBm)	Convert to E-Field at 3 meters (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Result
High	30 To 2400	DH5	-83.1	1.0	10.0	0.0	-72.1	23.12	54	30.88	Pass
High	2483.5 To 25000	DH5	-71.7	1.0	10.0	0.0	-60.7	34.56	54	19.44	Pass



Plot1 DH5 2480 MHz Average Band 1
Date: 15.MAR.2017 19:10:28



Plot2 DH5 2480 MHz Average Band 2
Date: 15.MAR.2017 19:10:52

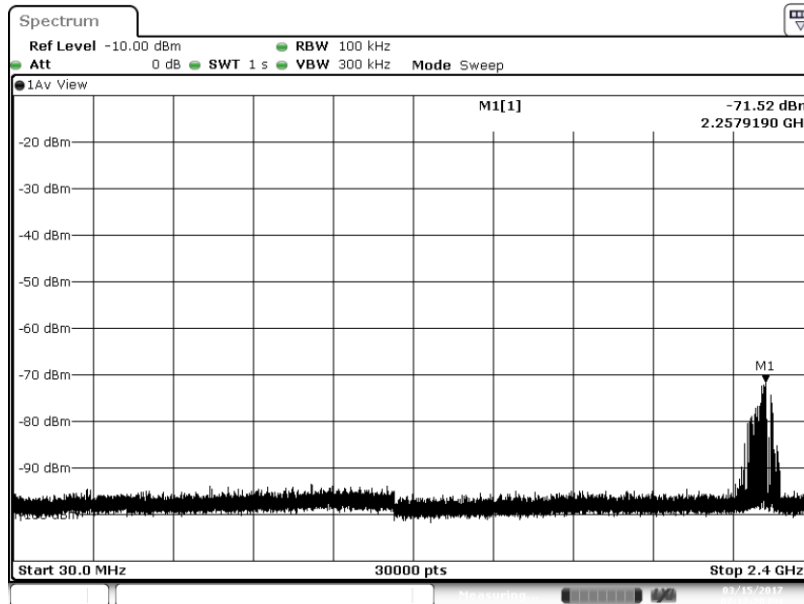
Marker 1 is the third harmonic, also measured radiated, see section 8, radiated emissions.



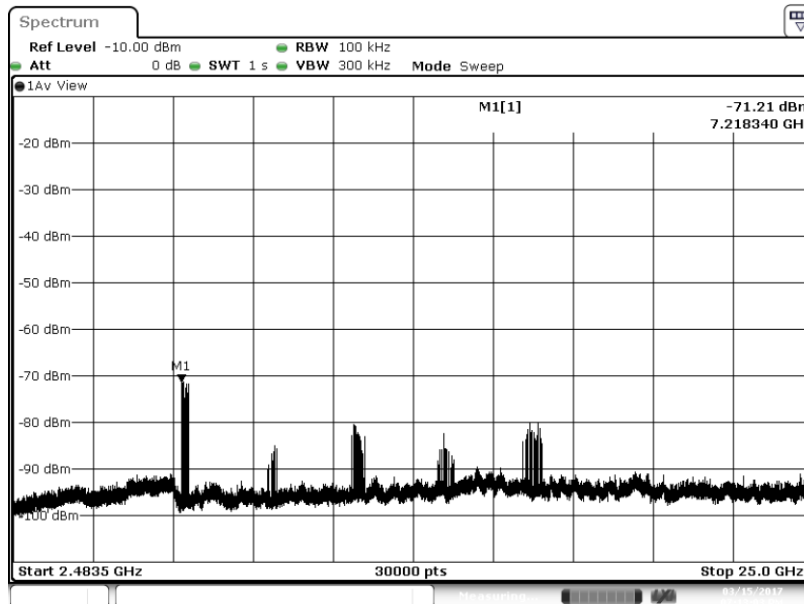
DH5 Hopping Mode

Spurious Summary Table (Basic Rate: 1Mbps)

Channel	Band Range (MHz)	Mode	Raw Measurement (dBm)	Test Cable Loss (dB)	Pad ATTN (dB)	Out of Band Antenna Gain 0 (dBi)	Corrected Reading (dBm)	Convert to E-Field at 3 meters (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Result
Hopping	30 To 2400	DH5	-71.5	1.0	10.0	0.0	-60.5	34.71	54	19.29	Pass
Hopping	2483.5 To 25000	DH5	-71.2	1.0	10.0	0.0	-60.2	35.02	54	18.98	Pass



Plot1 DH5 Hopping Average Band 1
Date: 15.MAR.2017 19:12:19



Plot2 DH5 Hopping Average Band 2
Date: 15.MAR.2017 19:13:03

Marker 1 is the 3rd harmonic, also measured radiated, see section 8, radiated emissions.

6. Average Time of Occupancy

Requirements:

FCC 15.247 (a) (1) (iii), IC RSS-247 5.1 (4)

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.

Test setup details

The EUT is controlled via the USB cable with CSR's Blue Suite software which is used to set the test modes of EUT. The EUT is programmed to operate at fixed frequencies at the low, middle, and high end of the authorized frequency band.

Using zero span mode on the channel center frequency the transmit pulse width was measured for each of the following modes, DH1, DH3 & DH5 with the maximum payload size for basic and enhanced data rates.

$$\begin{aligned} \text{Calculated Dwell Time} &= (\text{TX Pulse Width}) * (\text{Hop Rate}) / (\# \text{ of Channels}) / (\# \text{ of slots}) * 31.6 \\ &= (\text{TX Pulse Width}) * 1600 / 79 / (\# \text{ of Slots}) * 31.6 \\ &= (\text{TX Pulse Width}) * 640 / (\# \text{ Slots}) \end{aligned}$$

$$\text{Hop Rate} = 1600 \text{ hops / S}$$

$$\# \text{ of channels} = 79$$

$$\# \text{ of slots} = \text{number of slots used per packet in each mode: DH1} = 2, \text{ DH3} = 4, \text{ DH5} = 6$$

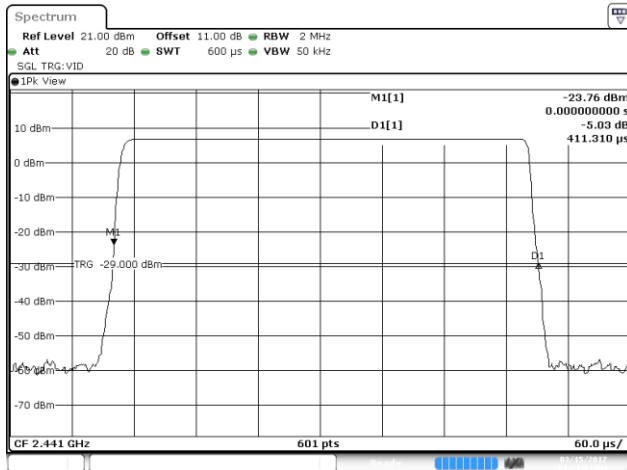
$$\text{Observation period} = 31.6 \text{ Seconds} = (79 \text{ channels}) * 0.4 \text{ Seconds}$$

Test Results:

TX Pulse Width (xDH1)									
Channel	Frequency (MHz)	Mode	Pulse Width (mS)	Number of pulses in 3.16 S	Number of pulses in 31.6 S (X 10)	Time of occupancy (Pulse Width X Number of pulses) (mS)	Limit (mS)	Margin (mS)	Result
Middle	2441	DH1	0.411	32	320	131.6	400	268.38	Pass
Middle	2441	2-DH1	0.423	32	320	135.5	400	264.55	Pass
Middle	2441	3-DH1	0.423	33	330	139.7	400	260.31	Pass
TX Pulse Width (xDH3)									
Channel	Frequency (MHz)	Mode	Pulse Width (mS)	Number of pulses in 3.16 S	Number of pulses in 31.6 S (X 10)	Time of occupancy (Pulse Width X Number of pulses) (mS)	Limit (mS)	Margin (mS)	Result
Middle	2441	DH3	1.669	16	160	267.0	400	133.03	Pass
Middle	2441	2-DH3	1.676	16	160	268.2	400	131.81	Pass
Middle	2441	3-DH3	1.676	16	160	268.2	400	131.81	Pass
TX Pulse Width (xDH5)									
Channel	Frequency (MHz)	Mode	Pulse Width (mS)	Number of pulses in 3.16 S	Number of pulses in 31.6 S (X 10)	Time of occupancy (Pulse Width X Number of pulses) (mS)	Limit (mS)	Margin (mS)	Result
Middle	2441	DH5	2.915	11	110	320.7	400	79.33	Pass
Middle	2441	2-DH5	2.915	11	110	320.7	400	79.33	Pass
Middle	2441	3-DH5	2.922	11	110	321.4	400	78.60	Pass

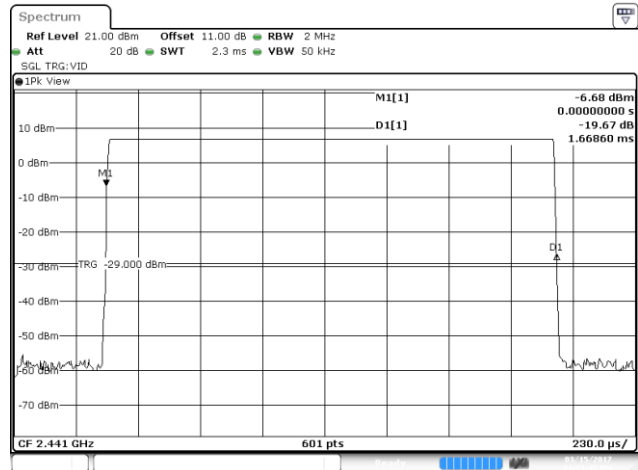
Measured pulse widths (2441 MHz)

DH1



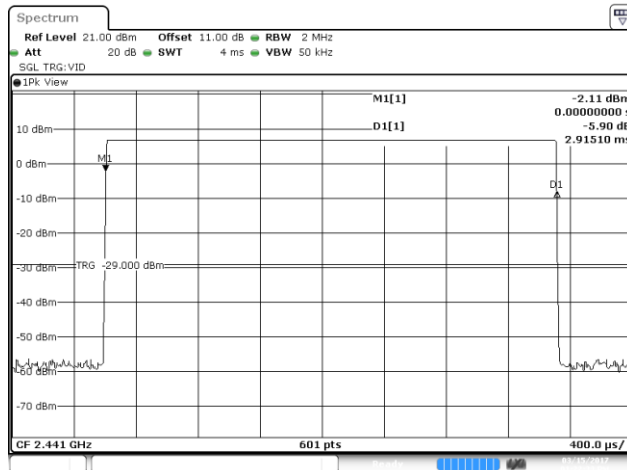
Plot1 2441 TX pulse width DH1
Date: 15.MAR.2017 13:21:02

DH3



Plot4 2441 TX pulse width DH3
Date: 15.MAR.2017 13:21:48

DH5

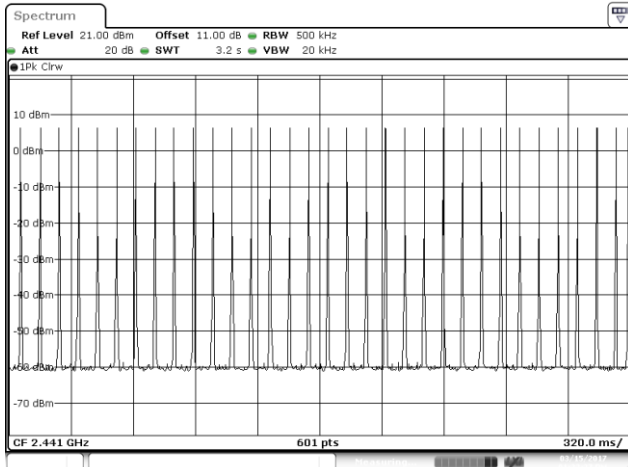


Plot7 2441 TX pulse width DH5
Date: 15.MAR.2017 13:22:33

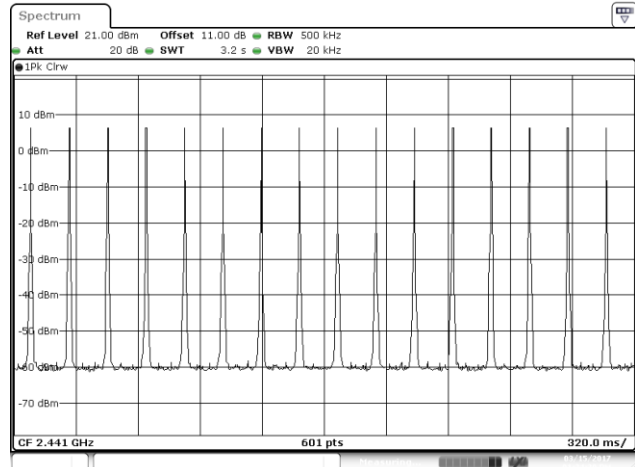
Number of pulses within observation period divided by 10 = 31.6/10 = 3.16 S

DH1 (33 pulses)

DH3 (16 pulses)

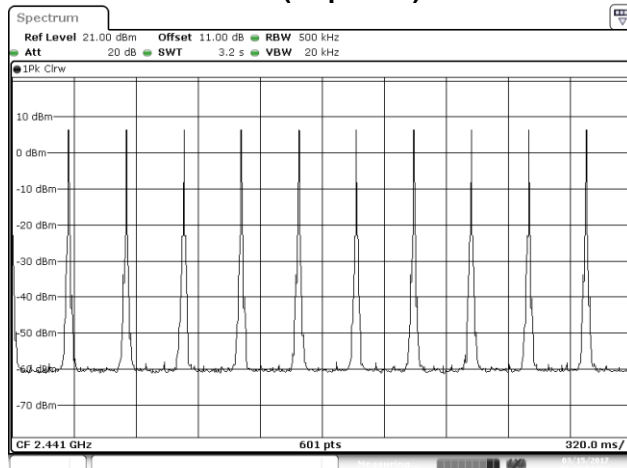


Plot10 2441 TX pulse count DH1
Date: 15 MAR 2017 13:23:27



Plot13 2441 TX pulse count DH3
Date: 15 MAR 2017 13:24:39

DH5 (11 pulses)



Plot16 2441 TX pulse count DH5
Date: 15 MAR 2017 13:25:51



Certificate # 1514.1

DESIGN ASSURANCE ENGINEERING Wireless Transceiver Bluetooth Test Report

FCC ID: A94422914 IC: 3232A-422914



7. Number of Hopping Channels

Requirements:

FCC 15.247 (a) (1) (iii), IC RSS-247 5.1 (4)

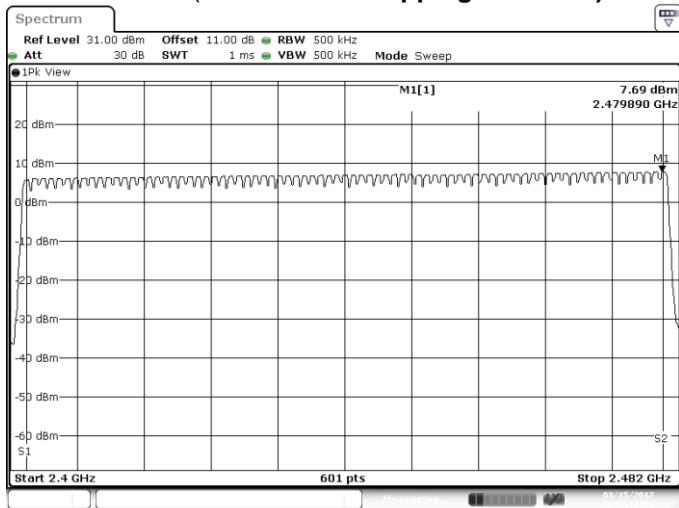
Frequency hopping systems in the 2400 - 2483.5 MHz band shall use at least 15 non-overlapping channels.

Test Setup:

EUT is controlled by CSR's Blue Suite software to enable testing of the spurious output in specific operational modes. Measurements are made with the EUT in normal DH5 operation (hopping through all available channels).

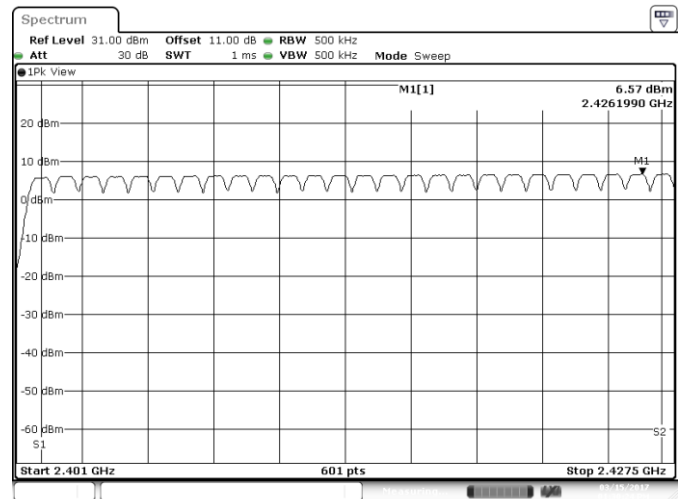
Test Results:

(Shows all 79 hopping channels)



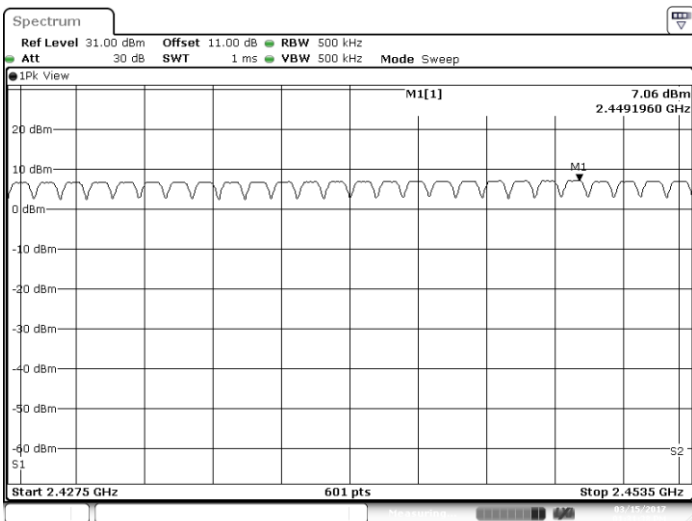
Plot1 79 Hopping Frequency DH5
Date: 15.MAR.2017 13:29:11

(Shows lower 26 channels)



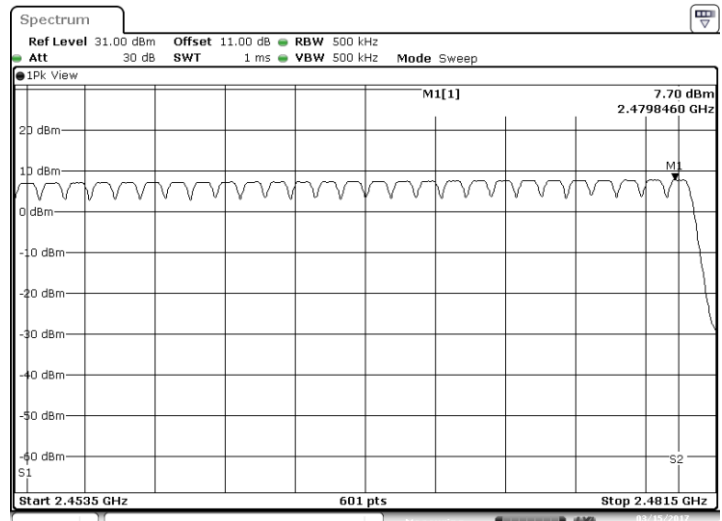
Plot2 1st segment DH5 (26 Frequencies)
Date: 15.MAR.2017 13:30:25

(Show middle 26 Channels)



Plot3 2nd segment DH5 (26 Frequencies)
Date: 15.MAR.2017 13:31:38

(Shows upper 27 Channels)



Plot4 3rd segment DH5 (27 Frequencies)
Date: 15.MAR.2017 13:32:52



8. Radiated Emissions

Requirements:

FCC 15.205, 15.209, 15.247 (d), IC RSS-GEN Clause 8.9 (Transmitter)

In any of the restricted bands defined in FCC part 15.209(a) & 15.205(a) the field strength at a distance of 3 meters shall not exceed 54dB μ V/m (average) or 74dB μ V/m (peak)

Test Setup:

The EUT is placed in a standard ANSI C63.10 test setup. Standard gain horn antennas with suitable pre-amps mounted directly on the horn antennas are used for the measurement of the harmonics.

For band edge measurements, the EUT is operated with hopping active in addition to hopping stopped while operating on the lowest and highest frequencies. The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz measurements and 1.5 m above the ground plane for above 1GHz. The EUT is rotated around the vertical axis, the antenna polarization changed from H to V and the antenna height is varied from 1 to 4 meters in order to find the maximum value of the harmonic emission. Account is taken of the beam width of the horn antennas to make sure the EUT remains in the main lobe of the antenna. EUT was tested in 3 orthogonal axes and the worst-case results are shown below. The measurement distance is 3 meters.

For measurements below 1 GHz the resolution bandwidth is set to 120 kHz and a quasi-peak detector was used. For peak measurements above 1 GHz, a resolution bandwidth of 1 MHz was used and video bandwidth of 3 MHz was used. For average measurements above 1 GHz, the resolution bandwidth and video bandwidth are set as described in ANSI C63.10:2013. An average detector was used and a duty cycle correction factor was added, DH5 duty cycle with maximum payload in test mode is 78%. Actual usage use case duty cycle is less than 10%.

Radiated emissions below 1 GHz

EUT operated in Bluetooth mode playing pink noise at maximum volume paired with iPod.

Vertical and Horizontal antenna polarizations combined.

(SN3 measured highest out of 5 units)



Date: 31.MAR.2017 09:43:35

FCC 15B Class B Product (Residential) @ 3 Meters									
Emission Frequency (MHz)	Measured Amplitude (dBµV/m) QP/AVG*	Measured Amplitude (dBµV/m) Peak	FCC 15B				Table Azimuth (0° closest to ant)	Receiving Antenna	
			Limit (dBµV/m) QP/AVG*	Limit (dBµV/m) Peak	Margin (dB) QP/AVG*	Margin (dB) Peak		Pol (H/V)	Height (Meters)
215.500	38.10	41.60	43.5	N/A	5.4	N/A	360	H	1.5

Marker 2: Peak is below the QP limit, no measurement performed.

EUT is being charged (reported battery state is 30%)

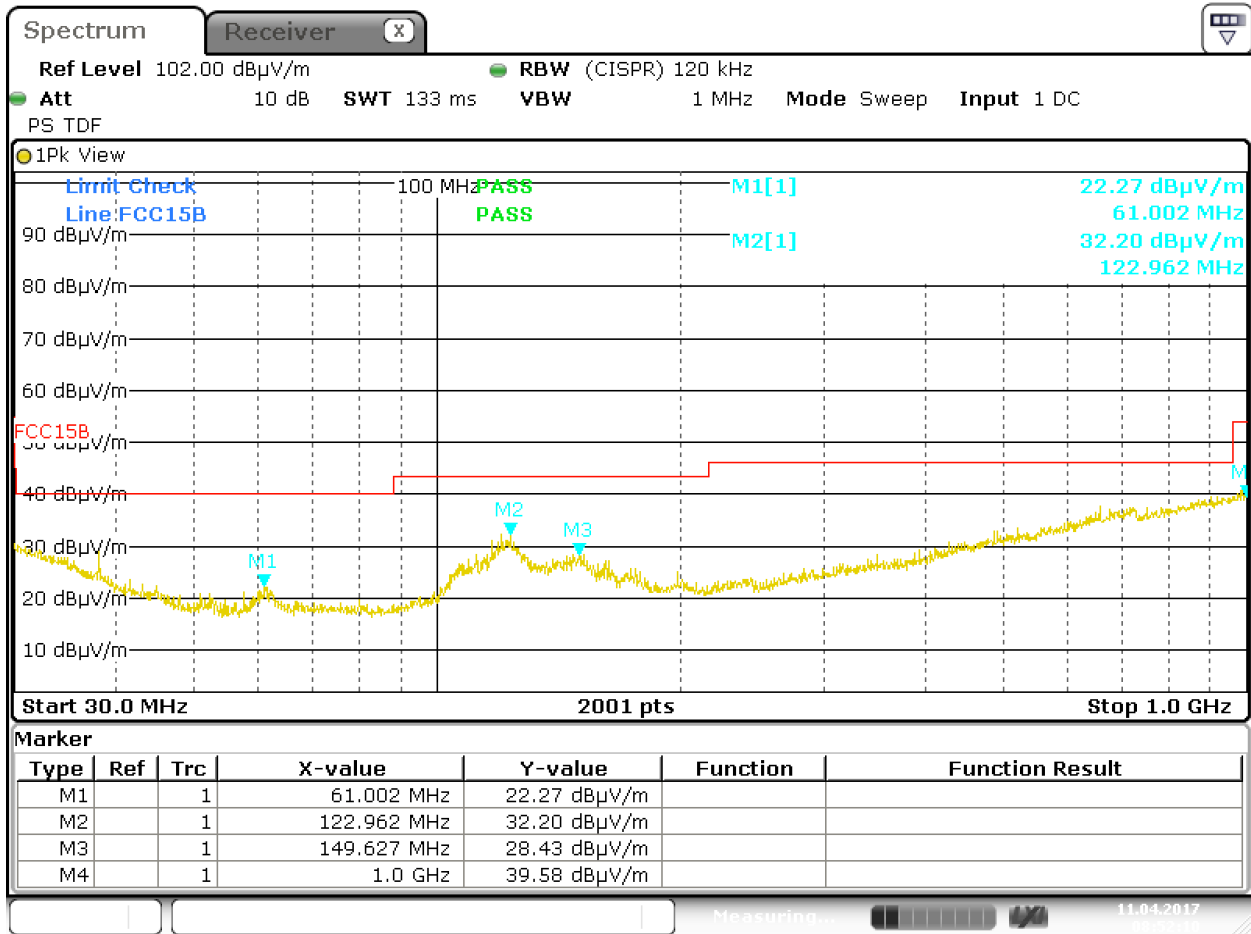
EUT does not operate while being charged.

Supporting equipment: Bose USB 5V one amp power supply, model 329679

Power supply is plugged into 120VAC 60 Hz.

SN3:

Vertical and Horizontal antenna polarizations combined.



Date: 11.APR.2017 08:52:11

FCC 15B Class B Product (Residential) @ 3 Meters										
Emission Frequency (MHz)	Measured Amplitude (dBµV/m) QP/AVG*	Measured Amplitude (dBµV/m) Peak	FCC 15B				Table Azimuth (0° closest to ant)	Receiving Antenna		*Average detector used for frequencies above 1 GHz. Notes / Mode
			Limit (dBµV/m) QP/AVG*	Limit (dBµV/m) Peak	Margin (dB) QP/AVG*	Margin (dB) Peak		Pol (H/V)	Height (Meters)	
122.960	20.90	32.80	43.5	N/A	22.6	N/A	360	V	1.0	Charging mode (Bose champ type power supply)

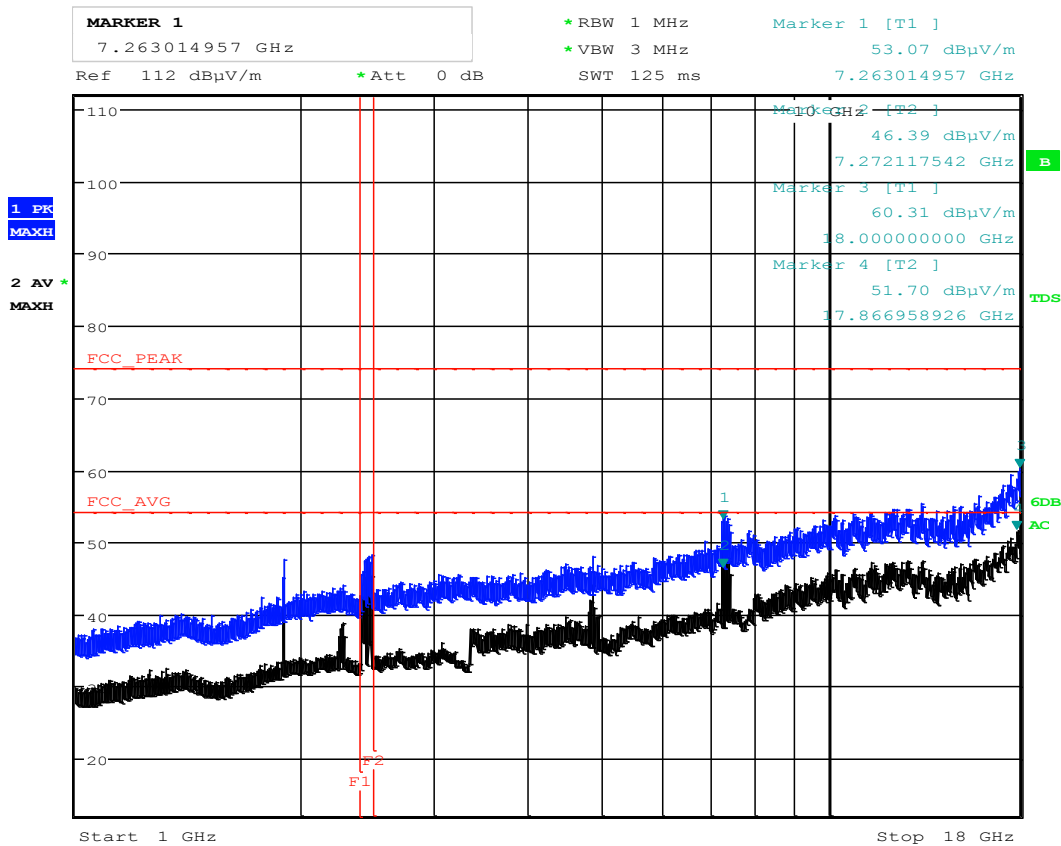
Transmitter harmonics & spurious above 1 GHz

For these readings, a notch filter was used to protect the external preamp from overload. For the plots capturing the entire frequency range the EUT was measured with hopping active as well as on the low, middle and high frequencies. The following measurements done for basic rate mode (DH5) that showed worst case emissions. Sweep points set to 30,001.

Vertical and Horizontal antenna polarizations combined.

EUT lying flat (X Orientation, DH5 hopping mode)

1 to 18 GHz



DH5 Hopping V&HAP 1G 18G
 Date: 7.APR.2017 16:26:21

Frequencies between the F1 and F2 vertical lines are the fundamental attenuated by the 2.4 GHz notch filter. Frequencies at marker 1 is the 3rd harmonic and will be measured later in this report

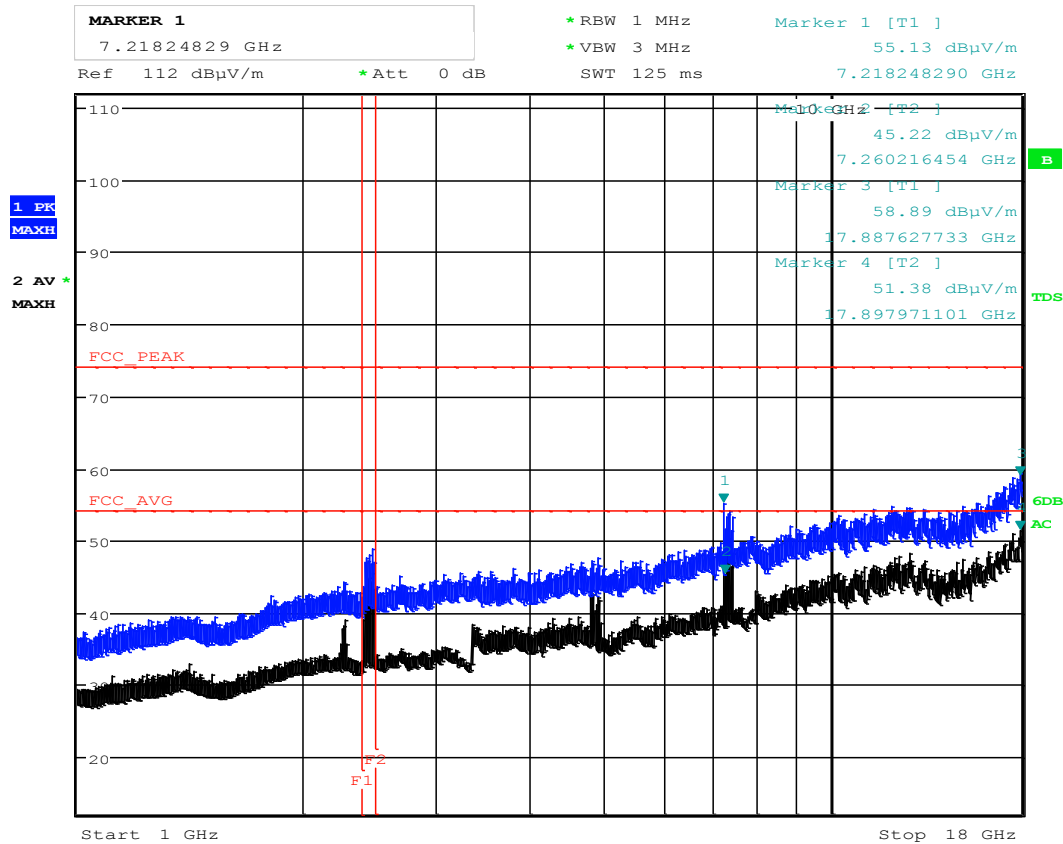


Vertical and Horizontal antenna polarizations combined.

EUT on edge (Y Orientation, DH5 hopping mode)

See corresponding setup photos document for orientations.

1 to 18 GHz



DH5 Hopping V&HAP 1G 18G EDGE

Date: 7.APR.2017 16:34:16

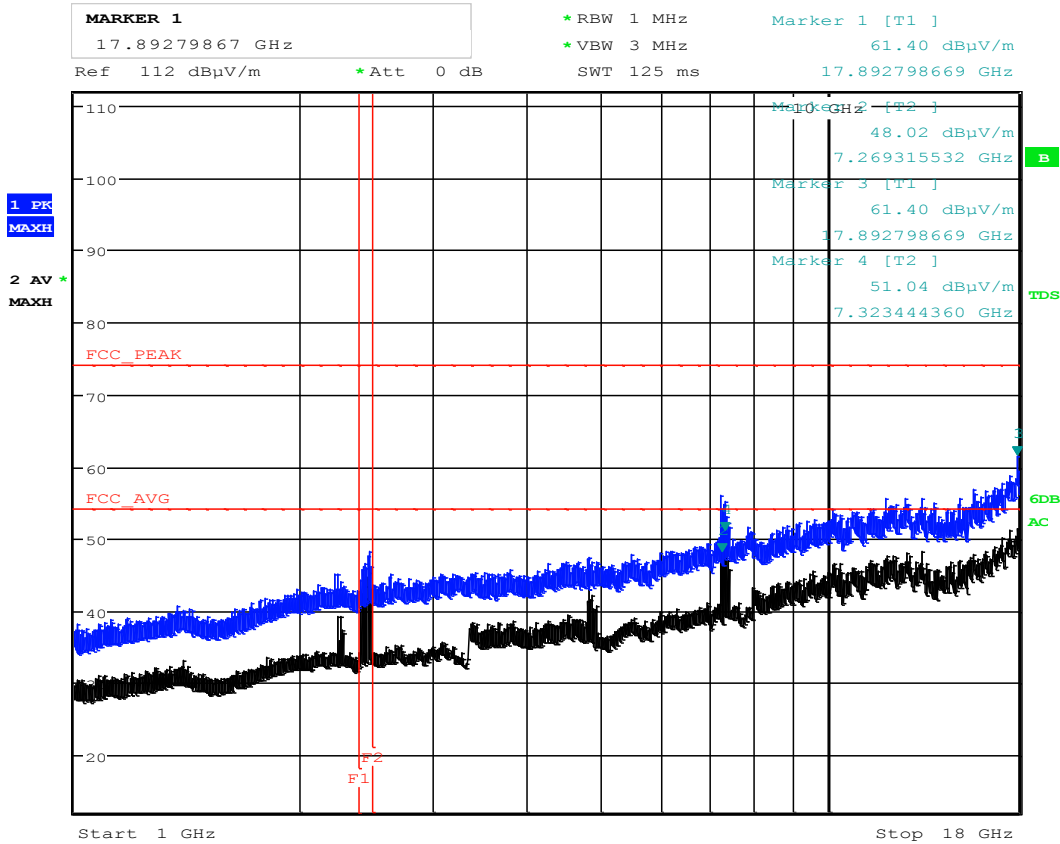
Frequencies between the F1 and F2 vertical lines are the fundamental attenuated by the 2.4 GHz notch filter.
Frequencies at marker 1 is the 3rd harmonic and will be measured later in this report.



Vertical and Horizontal antenna polarizations combined.

EUT facing upwards (Z Orientation, DH5 hopping mode)

1 to 18 GHz



DH5 Hopping V&HAP 1G 18G UUP

 Date: 7.APR.2017 16:47:41

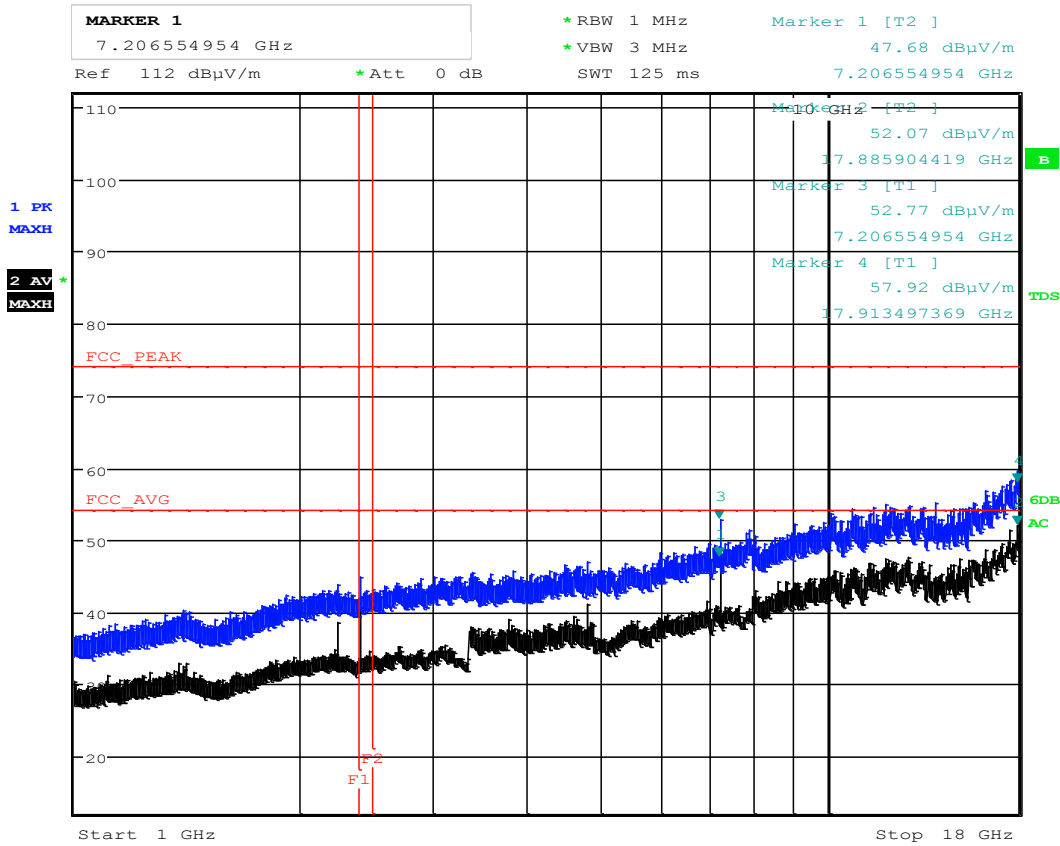
Frequencies between the F1 and F2 vertical lines are the fundamental attenuated by the 2.4 GHz notch filter.

 Frequencies at marker 2 is the 3rd harmonic and will be measured later in this report

Vertical and Horizontal antenna polarizations combined.

EUT lying flat (X Orientation, DH5 2402 MHz)

1 to 18 GHz



DH5 2402 V&HAP 1G 18G FLAT

 Date: 7.APR.2017 17:10:49

Frequencies between the F1 and F2 vertical lines are the fundamental attenuated by the 2.4 GHz notch filter.

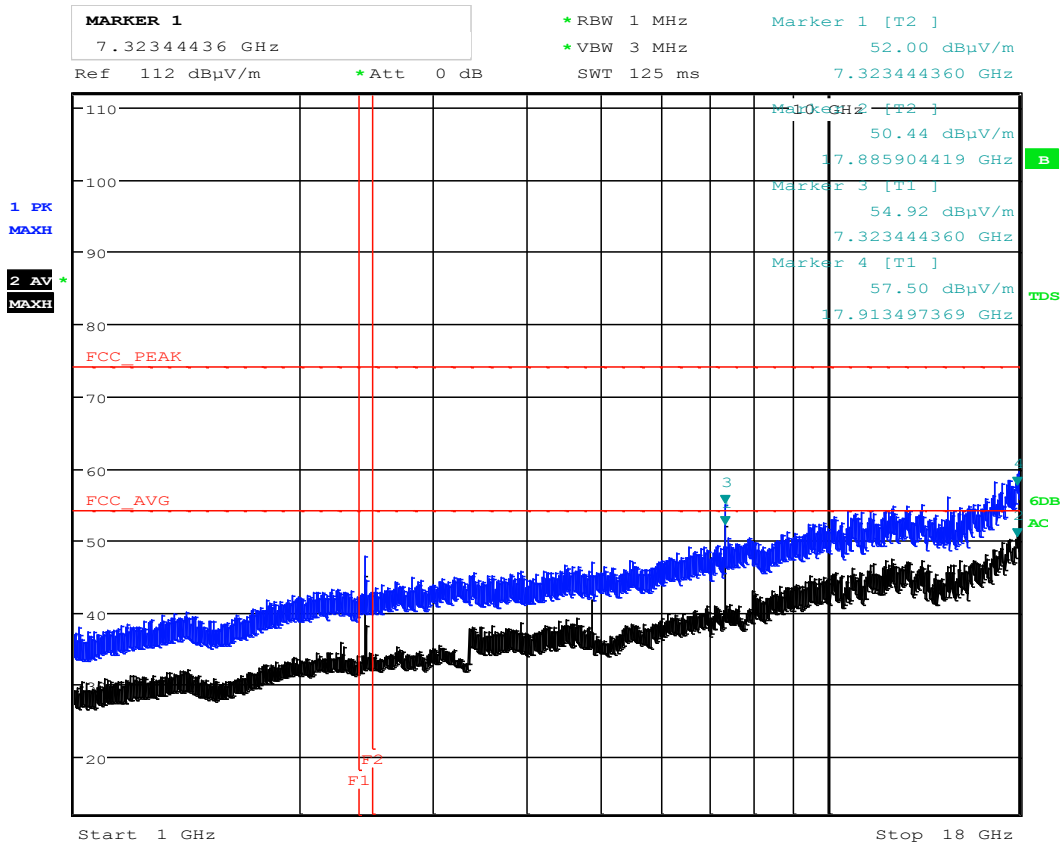
 Frequencies at marker 1 is the 3rd harmonic and will be measured later in this report



Vertical and Horizontal antenna polarizations combined.

EUT lying flat (X Orientation, DH5 2441 MHz)

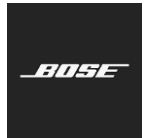
1 to 18 GHz



DH5 2441 V&HAP 1G 18G FLAT

Date: 7.APR.2017 17:20:37

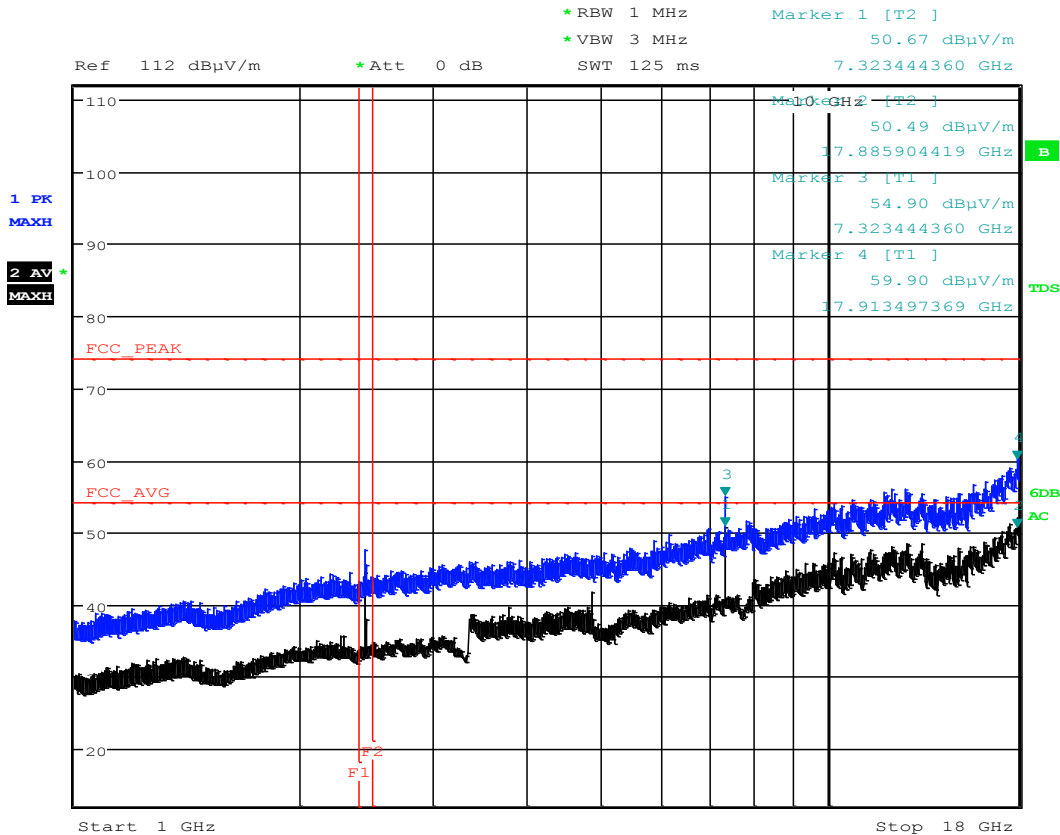
Frequencies between the F1 and F2 vertical lines are the fundamental attenuated by the 2.4 GHz notch filter.
Frequencies at marker 1 is the 3rd harmonic and will be measured later in this report



Vertical and Horizontal antenna polarizations combined.

EUT lying flat (X Orientation, DH5 2480 MHz)

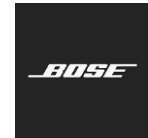
1 to 18 GHz



DH5 2480 V&HAP 1G 18G FLAT

Date: 7.APR.2017 17:55:30

Frequencies between the F1 and F2 vertical lines are the fundamental attenuated by the 2.4 GHz notch filter.
 Frequencies at marker 1 is the 3rd harmonic and will be measured later in this report



3rd harmonic measurements performed in analyzer in receiver mode (R&S ESU)

Measurement time = 1 second

FCC 15B Class B Product (Residential) @ 3 Meters										
Emission Frequency (MHz)	Measured Amplitude (dBµV/m) QP/AVG*	Measured Amplitude (dBµV/m) Peak	FCC 15B				Table Azimuth (0° closest to ant)	Receiving Antenna		*Average detector used for frequencies Notes / Mode
			Limit (dBµV/m) AVG	Limit (dBµV/m) Peak	Margin (dB) AVG	Margin (dB) Peak		Pol (H/V)	Height (Meters)	
7206.000	46.30	55.00	54.0	74.0	7.7	19.0	11	V	215.0	DH5 2402 (X Orientation) VAP
7206.000	46.10	54.80	54.0	74.0	7.9	19.2	170	H	219.0	DH5 2402 (X Orientation) HAP
7206.000	47.00	55.20	54.0	74.0	7.0	18.8	177	V	202.0	DH5 2402 (Y Orientation) VAP
7206.000	47.10	55.40	54.0	74.0	6.9	18.6	273	H	179.0	DH5 2402 (Y Orientation) HAP
7206.000	44.60	53.50	54.0	74.0	9.4	20.5	241	V	267.0	DH5 2402 (Z Orientation) VAP
7206.000	46.60	55.40	54.0	74.0	7.4	18.6	174	H	244.0	DH5 2402 (Z Orientation) HAP
7323.000	48.70	56.60	54.0	74.0	5.3	17.4	203	V	222.0	DH5 2441 (X Orientation) VAP
7323.000	44.80	54.50	54.0	74.0	9.2	19.5	100	H	216.0	DH5 2441 (X Orientation) HAP
7323.000	46.00	55.70	54.0	74.0	8.0	18.3	320	V	201.0	DH5 2441 (Y Orientation) VAP
7323.000	51.10	58.70	54.0	74.0	2.9	15.3	267	H	112.0	DH5 2441 (Y Orientation) HAP *
7323.000	48.50	56.60	54.0	74.0	5.5	17.4	253	V	226.0	DH5 2441 (Z Orientation) VAP
7323.000	48.50	56.70	54.0	74.0	5.5	17.3	184	H	248.0	DH5 2441 (Z Orientation) HAP
7440.000	44.60	54.10	54.0	74.0	9.4	19.9	47	V	139.0	DH5 2480 (X Orientation) VAP
7440.000	46.90	55.20	54.0	74.0	7.1	18.8	354	H	237.0	DH5 2480 (X Orientation) HAP
7440.000	45.50	54.40	54.0	74.0	8.5	19.6	136	V	224.0	DH5 2480 (Y Orientation) VAP
7440.000	47.60	56.40	54.0	74.0	6.4	17.6	214	H	158.0	DH5 2480 (Y Orientation) HAP
7440.000	46.50	55.40	54.0	74.0	7.5	18.6	68	V	178.0	DH5 2480 (Z Orientation) VAP
7440.000	47.20	55.50	54.0	74.0	6.8	18.5	29	H	228.0	DH5 2480 (Z Orientation) HAP
7323.000	53.26	58.70	54.0	74.0	0.7	15.3	267	H	112.0	DH5 2441 (Y Orientation) HAP * AVG Corrected for 78% Duty Cycle 20*Log(1/0.78) = 2.16 dB

* Falls in FCC 15.205 restricted band

Yellow highlighted: Worst case average measurement duty cycle corrected (DH5 maximum payload has 78% duty cycle).
This is only for test mode, in normal frequency hopping mode the duty cycle will be much less < 10%.

Other emissions were not above the measurement system noise floor.

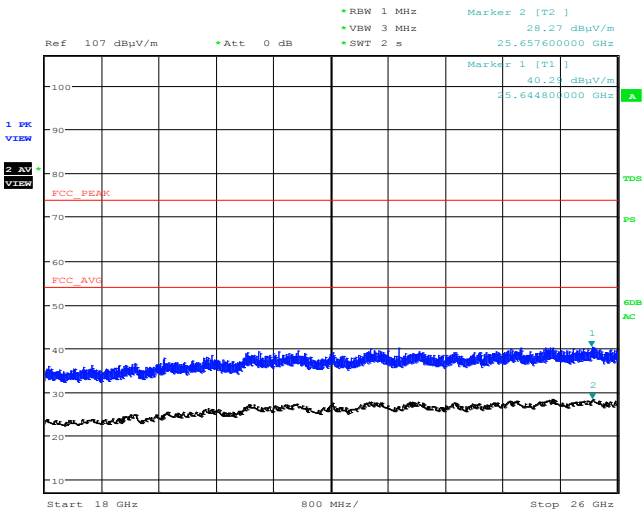
Note: FCC 15.205 restricted band for 3rd harmonics: 7.25 to 7.75 GHz.

For fundamental frequencies between 2417 & 2480 MHz have 3rd harmonics in the FCC 15.205 restricted band.

18 to 26 GHz

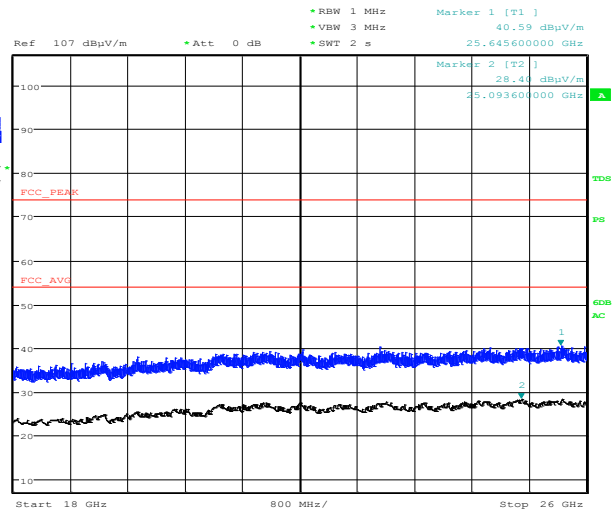
DH5 (Vertical & Horizontal polarizations combined)

2402 MHz



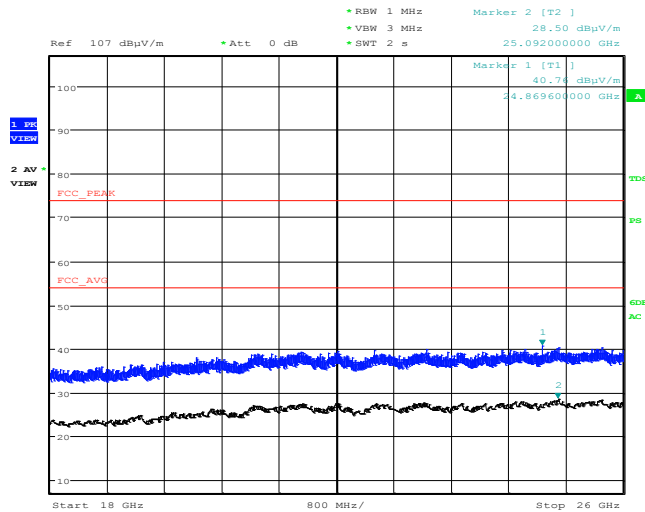
Date: 29.MAR.2017 13:29:02

2441 MHz



Date: 29.MAR.2017 13:34:18

2480 MHz



Date: 29.MAR.2017 13:37:03

No emissions above the noise floor observed.

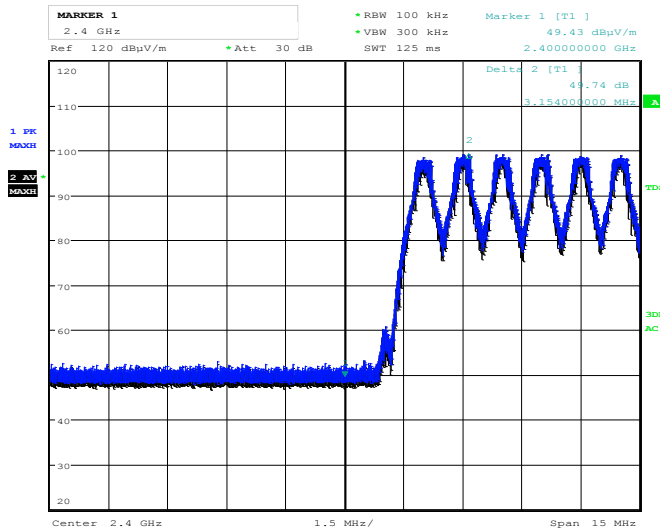


Band edge radiated emission measurements:

EUT tested per ANSI C63.10 2013 section 6.10, table data not suitable for reporting band edge emissions.

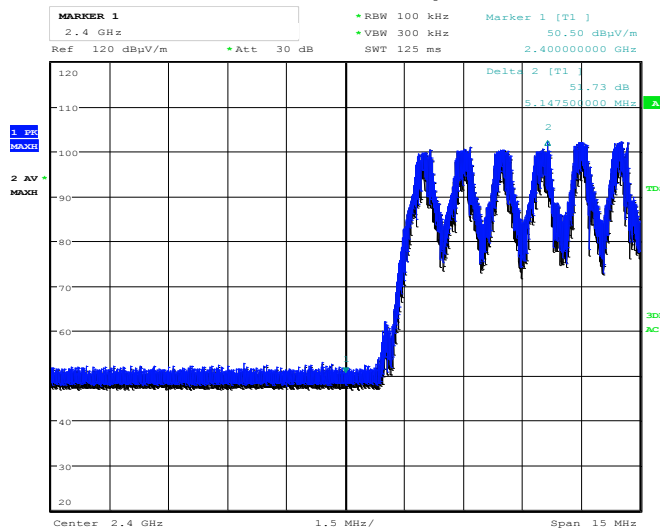
Lower band edge (DH5 Hopping mode):

Vertical antenna polarization



DH5 Hopping VAP LBE
Date: 7.APR.2017 10:46:59

Horizontal antenna polarization



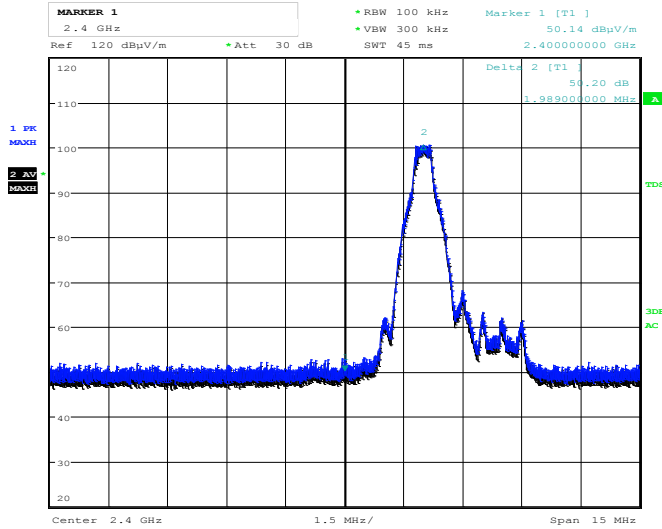
DH5 Hopping HAP LBE
Date: 7.APR.2017 10:57:39

More than 20 dBc measured.
Sweep points set to 30,001.



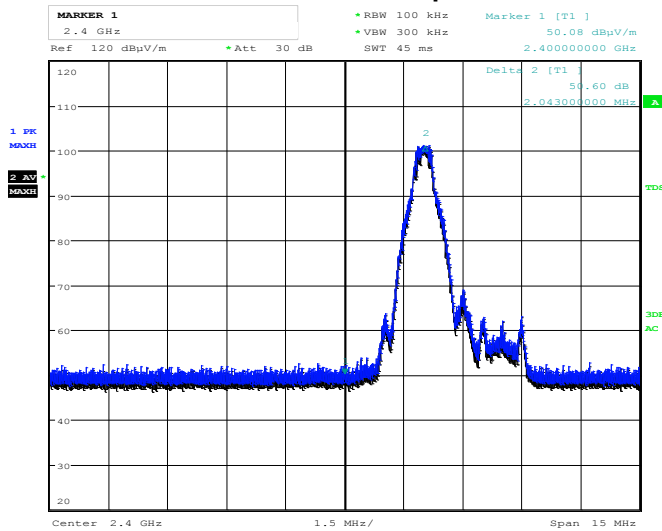
Lower band edge (DH5 2402 MHz, lowest data rate):

Vertical antenna polarization



DH5 2402 VAP LBE
 Date: 7.APR.2017 11:50:45

Horizontal antenna polarization



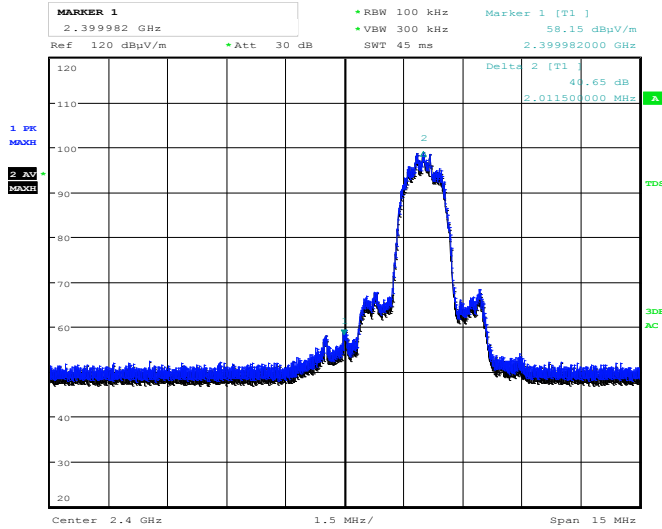
DH5 2402 HAP LBE
 Date: 7.APR.2017 11:53:47

More than 20 dBc measured.



Lower band edge (3DH5 2402 MHz, highest data rate):

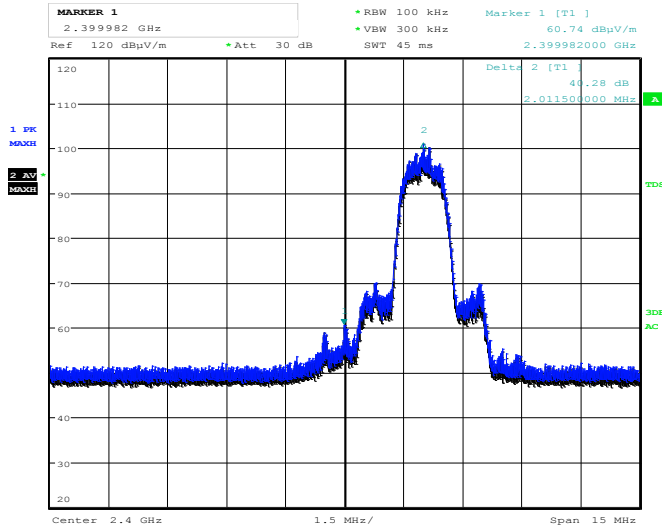
Vertical antenna polarization



3DH5 2402 VAP LBE
Date: 7.APR.2017 12:23:02



Horizontal antenna polarization

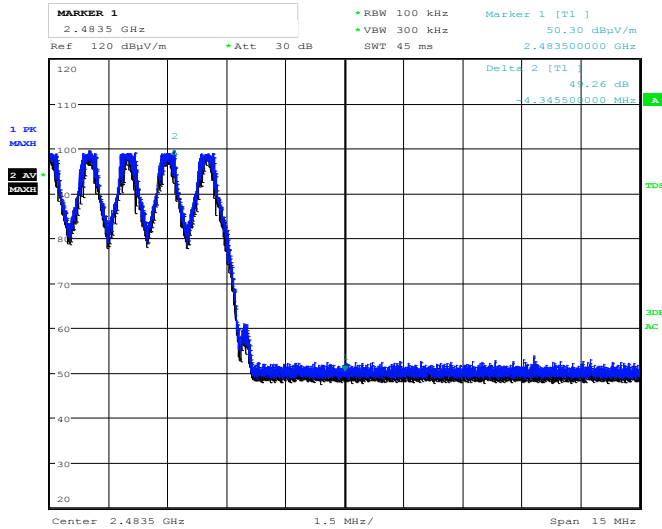


3DH5 2402 HAP LBE
 Date: 7.APR.2017 12:19:16

More than 20 dBc measured.

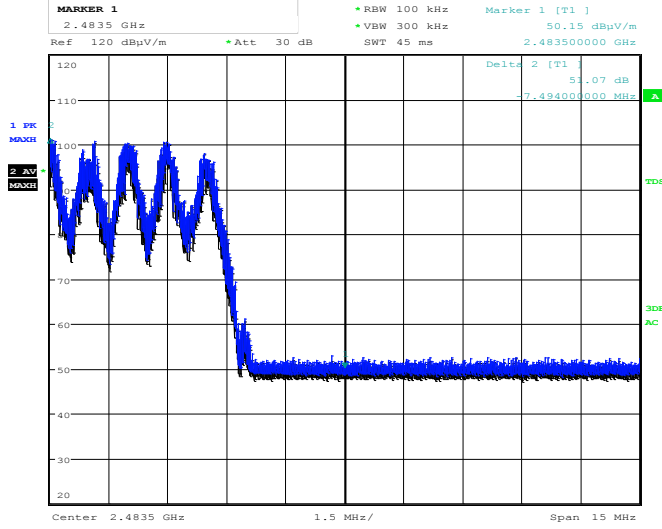
Upper band edge (DH5 Hopping mode):

Vertical antenna polarization



DH5 Hopping VAP UBE
 Date: 7.APR.2017 11:06:31

Horizontal antenna polarization

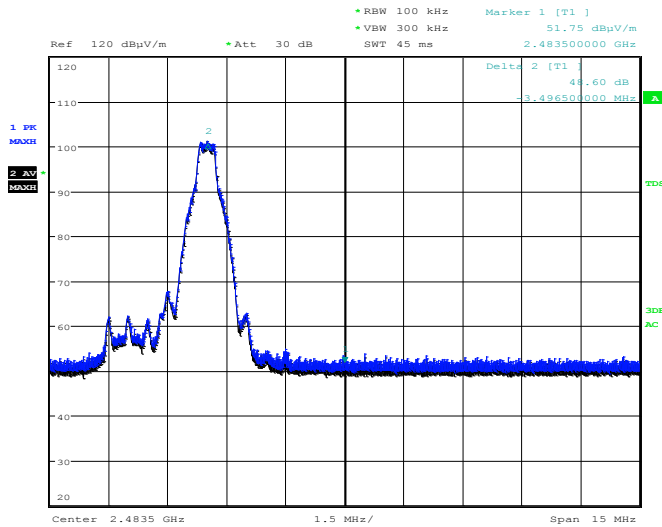


DH5 Hopping HAP UBE
 Date: 7.APR.2017 11:11:28

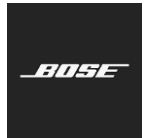
More than 20 dBc measured.

Upper band edge (DH5 2480 MHz, lowest data rate):

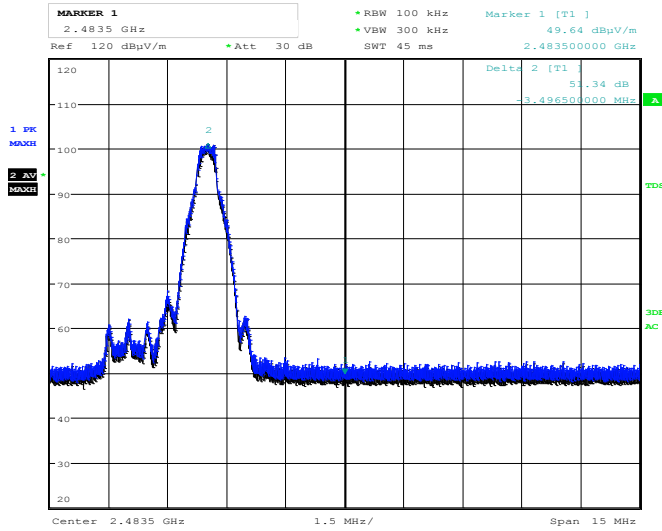
Vertical antenna polarization



DH5 2480 VAP UBE
 Date: 7.APR.2017 11:45:19



Horizontal antenna polarization



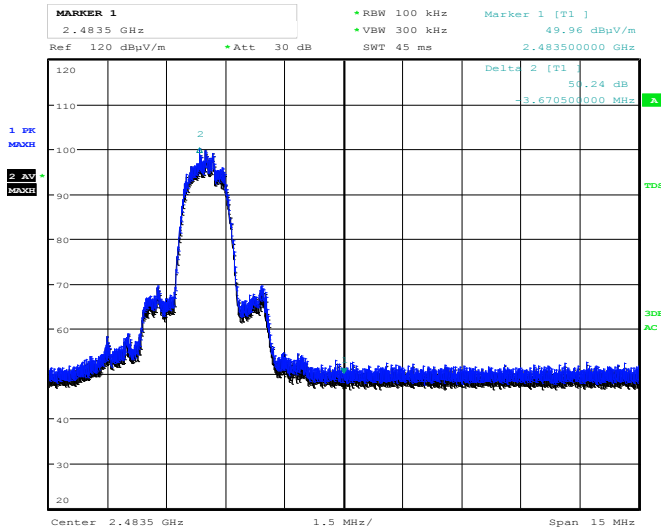
DH5 2480 HAP UBE
Date: 7.APR.2017 11:18:59

More than 20 dBc measured.



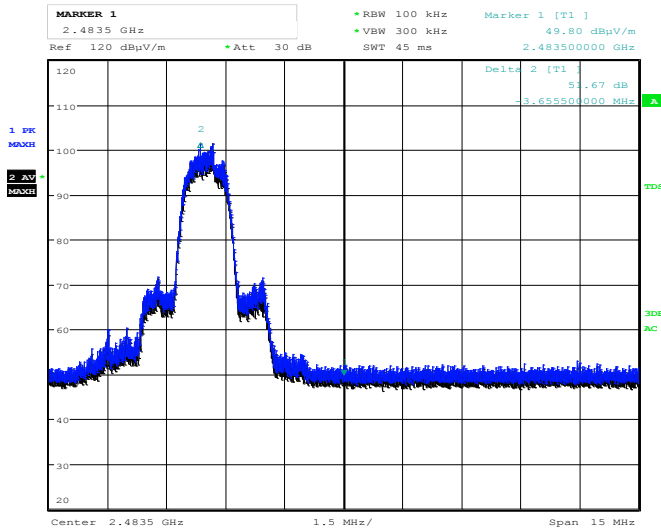
Upper band edge (3DH5 2480 MHz, highest data rate):

Vertical antenna polarization



3DH5 2480 VAP UBE
 Date: 7.APR.2017 12:27:15

Horizontal antenna polarization



3DH5 2480 HAP UBE
 Date: 7.APR.2017 12:29:52

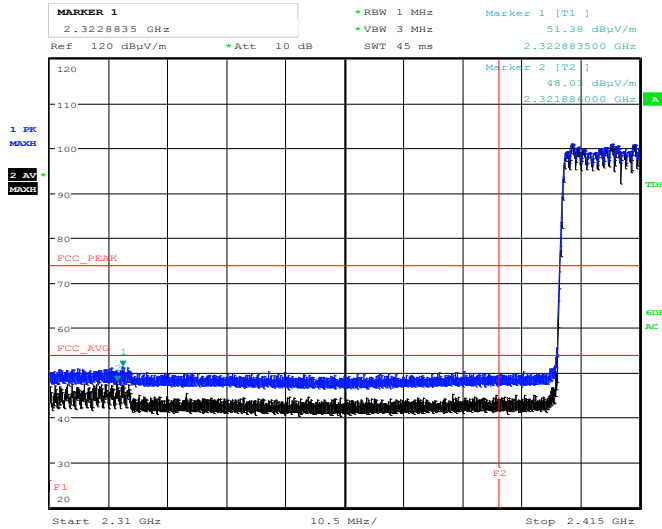
More than 20 dBc measured.



Restricted band radiated emissions

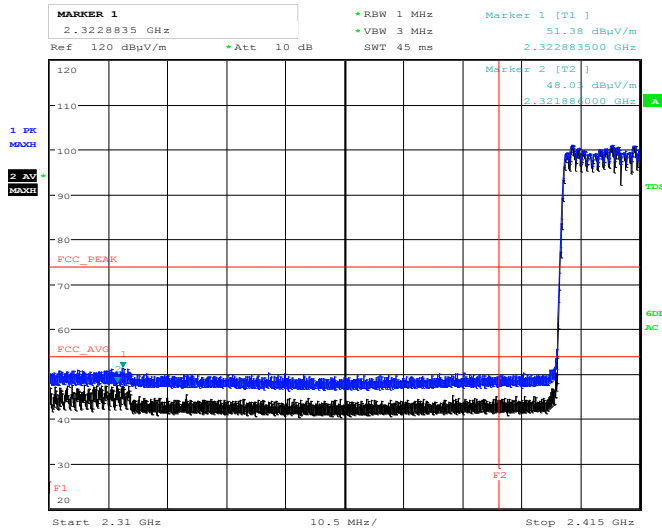
Lower restricted band (DH5 hopping mode)

Vertical antenna polarization



DH5 Hopping VAP LRB
Date: 7.APR.2017 12:46:23

Horizontal antenna polarization



DH5 Hopping VAP LRB
Date: 7.APR.2017 12:46:23

Frequency search limit lines at 2310 & 2390 MHz.

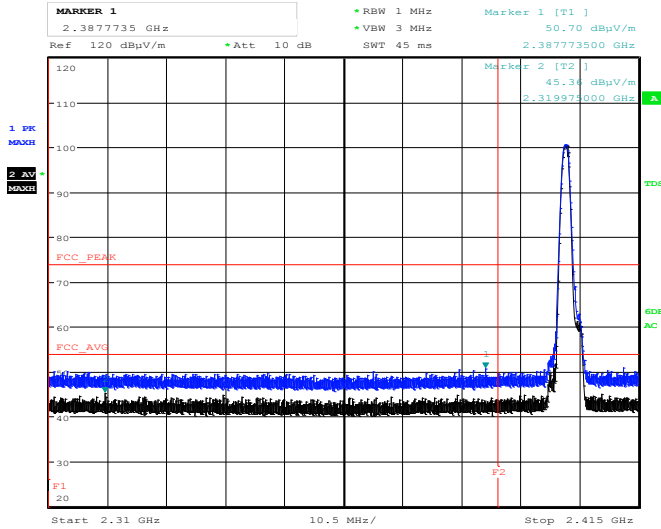
Peak emissions below the average limit.

Sweep points 30,001



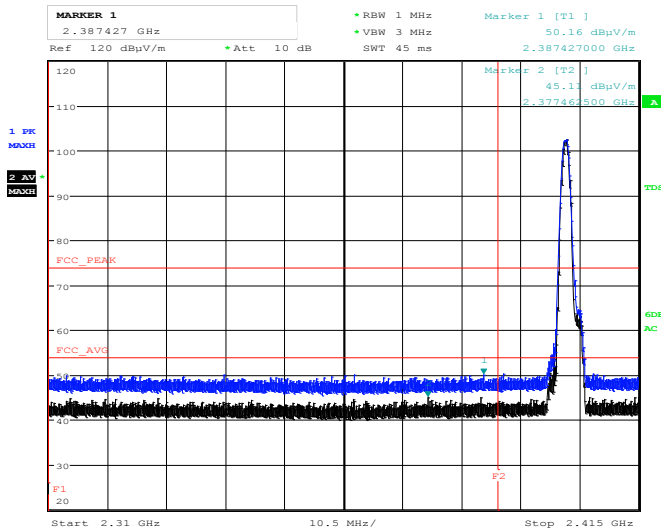
Lower restricted band (DH5 2402 MHz)

Vertical antenna polarization



DH5 2402 VAP LRB
Date: 7.APR.2017 13:18:45

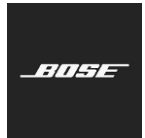
Horizontal antenna polarization



DH5 2402 HAP LRB
Date: 7.APR.2017 13:21:18

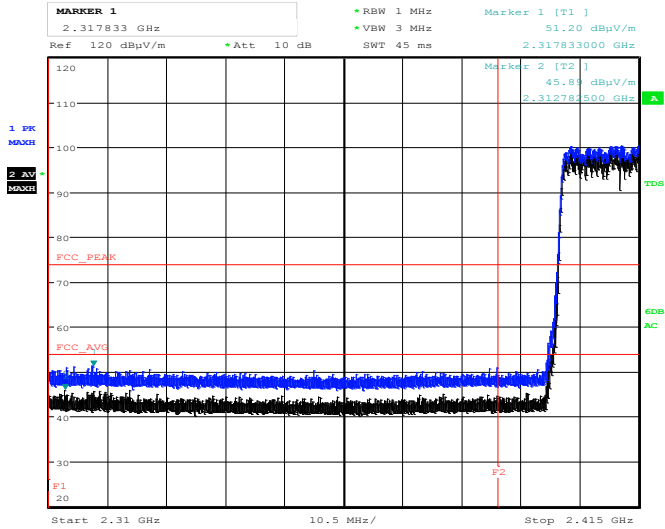
Frequency search limit lines at 2310 & 2390 MHz.

Peak emissions below the average limit.



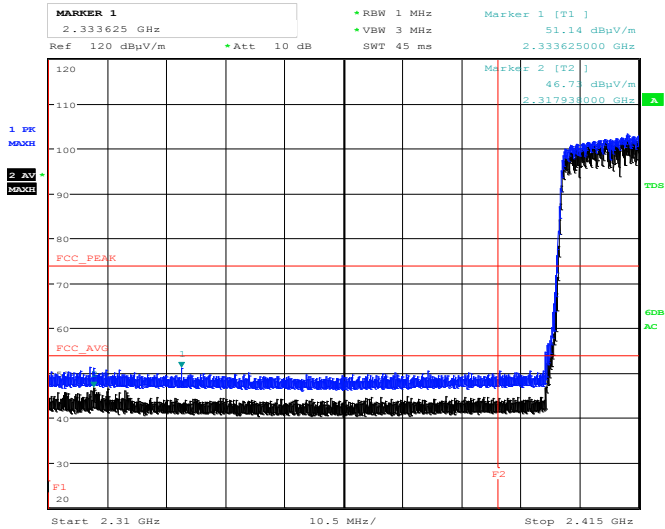
Lower restricted band (3DH5 hopping mode)

Vertical antenna polarization



3DH5 Hopping VAP LRB
 Date: 7.APR.2017 13:30:47

Horizontal antenna polarization:



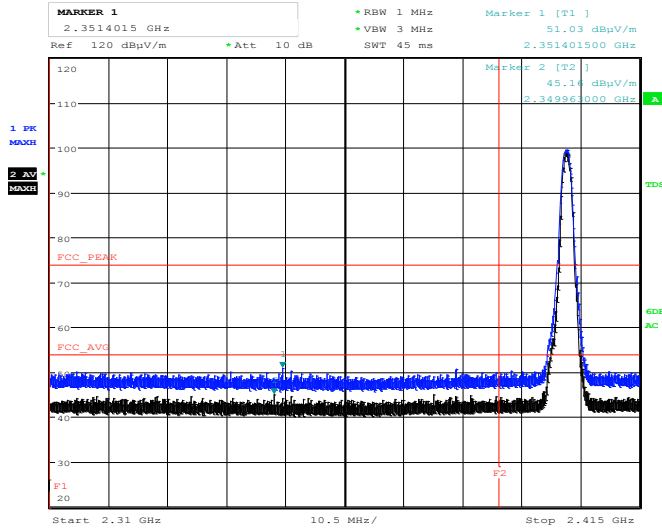
3DH5 Hopping HAP LRB
 Date: 7.APR.2017 13:27:20

Frequency search limit lines at 2310 & 2390 MHz.

Peak emissions below the average limit.

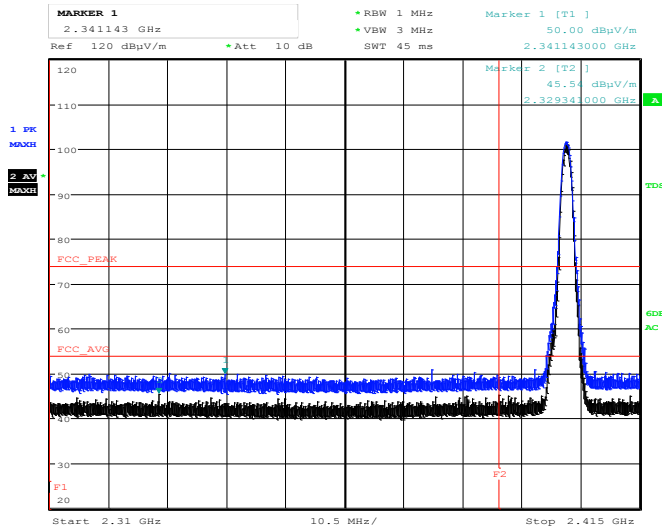
Lower restricted band (3DH5 2402 MHz)

Vertical antenna polarization



3DH5 2402 VAP LRB
 Date: 7.APR.2017 13:34:54

Horizontal antenna polarization



3DH5 2402 HAP LRB
 Date: 7.APR.2017 13:37:16

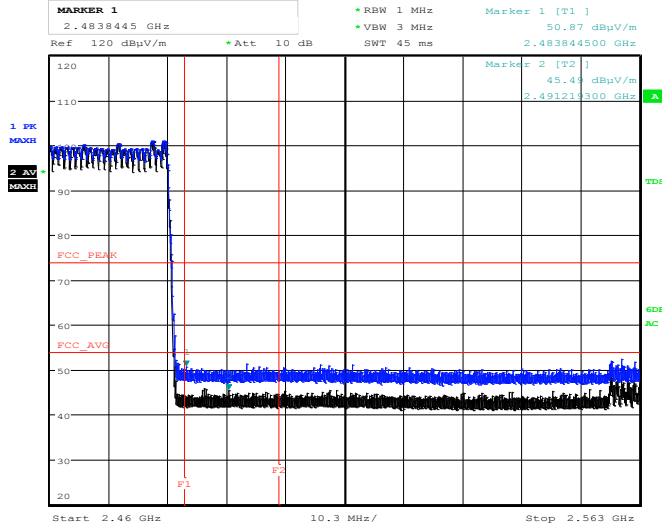
Frequency search limit lines at 2310 & 2390 MHz.

Peak emissions below the average limit.



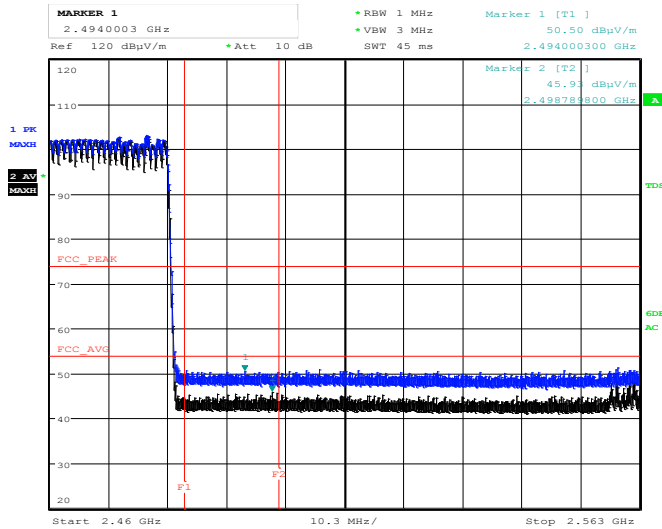
Upper restricted band (DH5 hopping mode)

Vertical antenna polarization



DH5 Hopping VAP URB
 Date: 7.APR.2017 12:59:10

Horizontal antenna polarization



DH5 Hopping HAP URB
 Date: 7.APR.2017 13:03:27

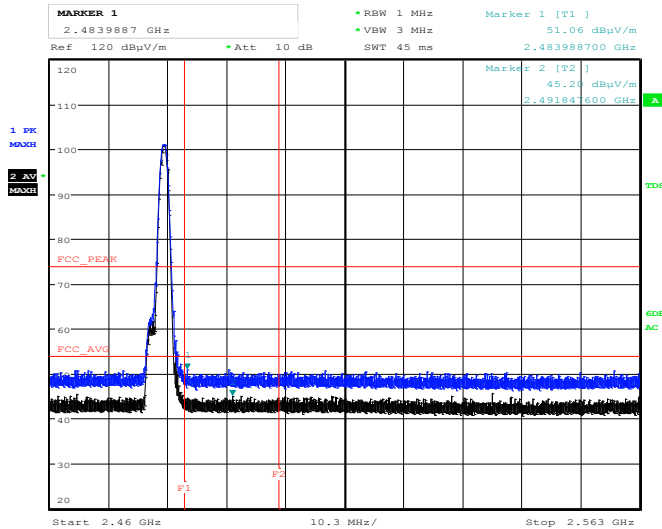
Frequency search limit lines at 2483.5 & 2500 MHz.

Peak emissions below the average limit.



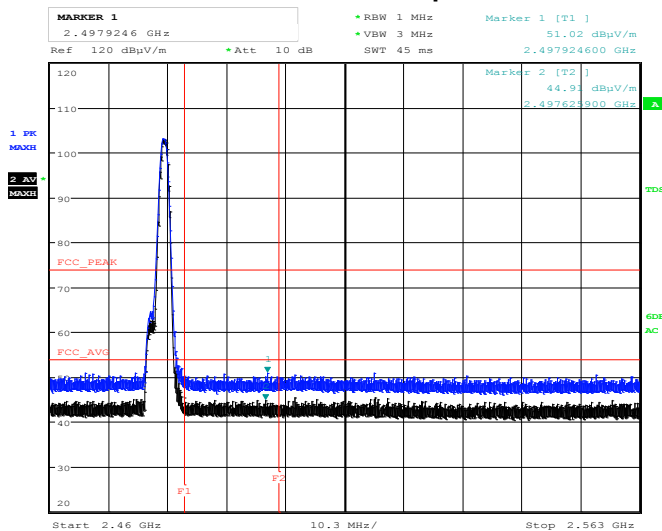
Upper restricted band (DH5 2480 MHz)

Vertical antenna polarization



DH5 2480 VAP URB
Date: 7.APR.2017 13:08:36

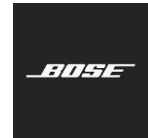
Horizontal antenna polarization



DH5 2480 HAP URB
Date: 7.APR.2017 13:10:44

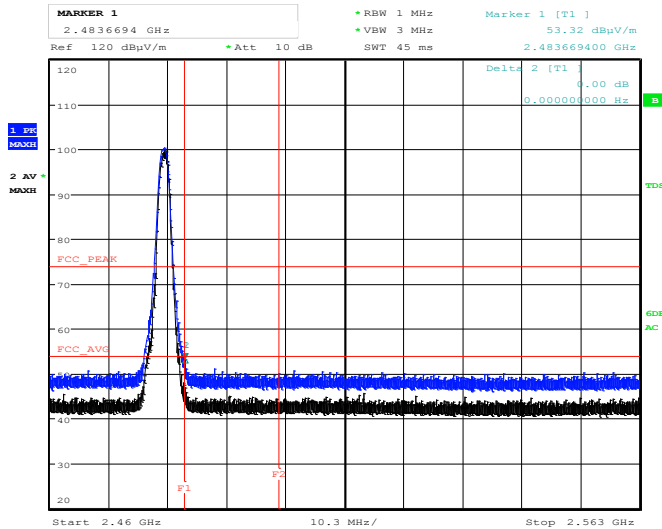
Frequency search limit lines at 2483.5 & 2500 MHz.

Peak emissions below the average limit.



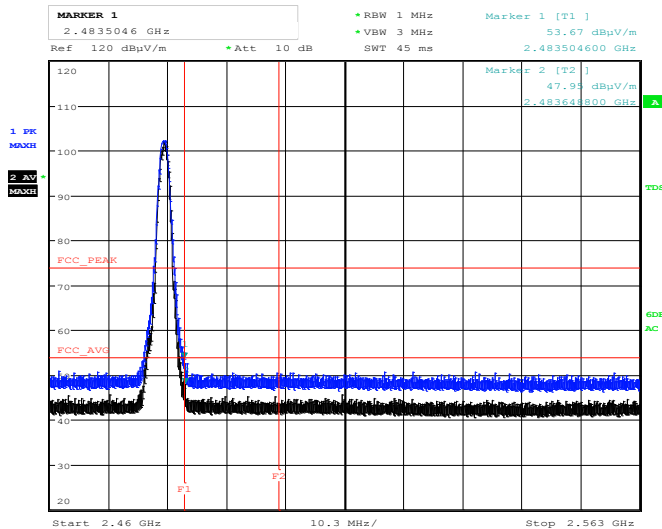
Upper restricted band (3DH5 2480 MHz)

Vertical antenna polarization



3DH5 2480 VAP URB
 Date: 7.APR.2017 13:57:42

Horizontal antenna polarization



3DH5 2480 HAP URB
 Date: 7.APR.2017 13:52:48

Frequency search limit lines at 2483.5 & 2500 MHz.

Peak emissions below the average limit.



Certificate # 1514.1

DESIGN ASSURANCE ENGINEERING Wireless Transceiver Bluetooth Test Report

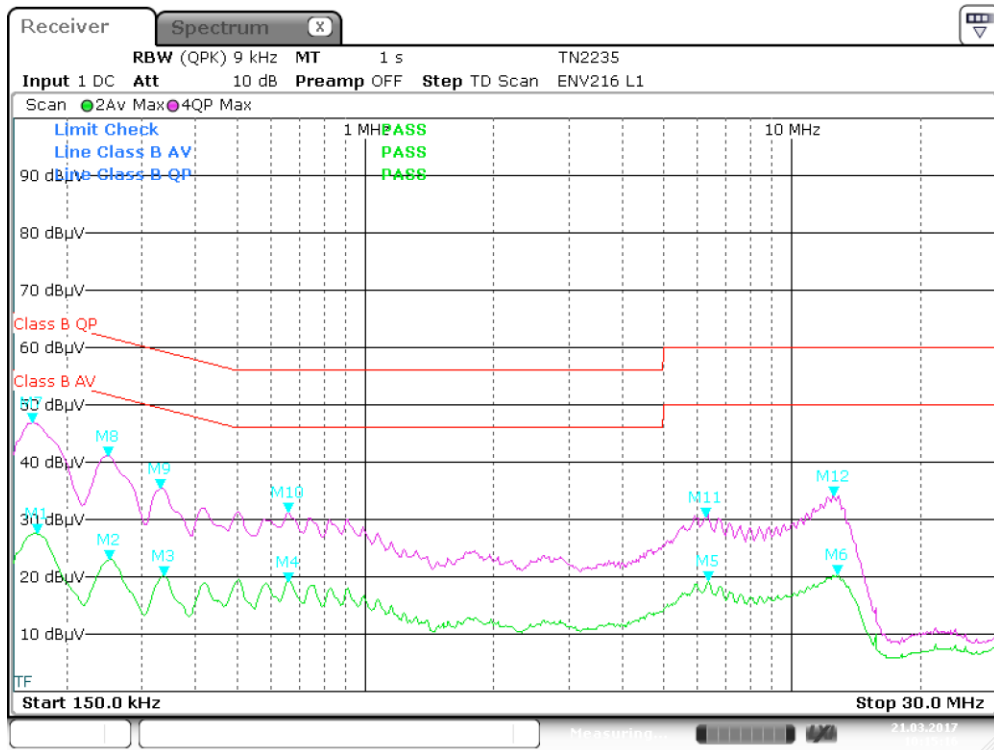
FCC ID: A94422914 IC: 3232A-422914



9. AC Mains Conducted Emissions

EUT is in charging mode with 5V USB power supply.
EUT does not operate while charging.

Max Hold plot: 150 kHz to 30 MHz, Line (120 V, 60 Hz)

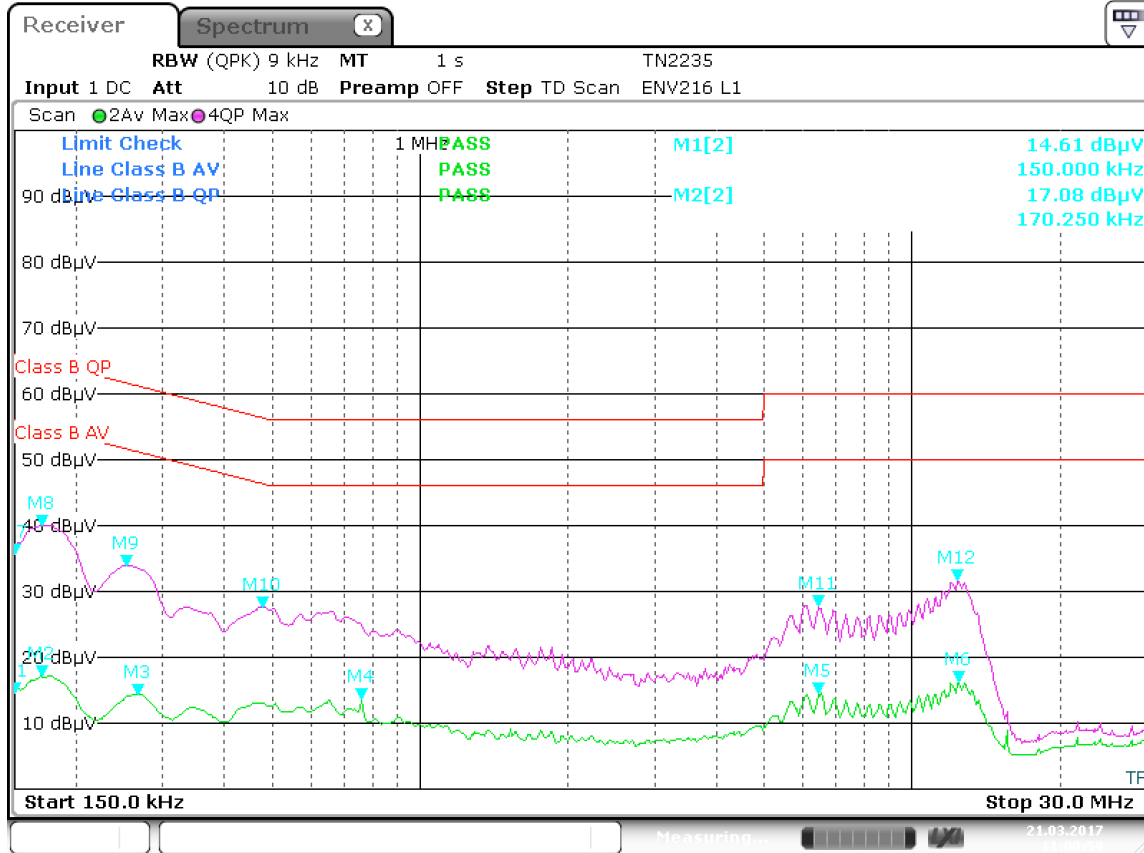


Date: 21.MAR.2017 10:15:17

FCC 15B Class B, CISPR 13, CISPR 22 Class B Product							
Frequency MHz	MEASURED		LIMIT		MARGIN		Notes
	dBµV QP	dBµV AVG	dBµV QP	dBµV AVG	dB QP	dB AVG	
0.1703	40.50	17.40	64.9	54.9	24.4	37.5	Line
0.1703	40.50	17.40	64.9	54.9	24.4	37.5	Line
0.2558	34.20	14.40	61.6	51.6	27.4	37.2	Line
0.2648	33.90	14.50	61.3	51.3	27.4	36.8	Line
12.3338	31.90	16.20	60.0	50.0	28.1	33.8	Line
11.9985	31.40	16.20	60.0	50.0	28.6	33.8	Line
0.4763	27.70	13.00	56.4	46.4	28.7	33.4	Line
0.1500	35.90	15.00	66.0	56.0	30.1	41.0	Line
0.7620	25.00	13.60	56.0	46.0	31.0	32.4	Line
6.4568	27.90	14.70	60.0	50.0	32.1	35.3	Line
6.4613	27.90	14.70	60.0	50.0	32.1	35.3	Line
15.6863	12.50	9.10	60.0	50.0	47.5	40.9	Line

Passes FCC limits by 24.4 dB at 0.1703 MHz (QP measurement) on the Line side

Max Hold plot: 150 kHz to 30 MHz, Neutral (120 V, 60 Hz)



Date: 21.MAR.2017 11:00:59

FCC 15B Class B, CISPR 13, CISPR 22 Class B Product							
Frequency MHz	MEASURED		LIMIT		MARGIN		Notes
	dBµV QP	dBµV AVG	dBµV QP	dBµV AVG	dB QP	dB AVG	
0.1703	40.10	17.10	64.9	54.9	24.8	37.8	Neutral
0.1703	40.10	17.10	64.9	54.9	24.8	37.8	Neutral
0.2535	34.00	14.10	61.6	51.6	27.6	37.5	Neutral
0.2670	33.50	14.40	61.2	51.2	27.7	36.8	Neutral
12.3630	31.80	16.20	60.0	50.0	28.2	33.8	Neutral
12.4418	31.80	16.20	60.0	50.0	28.2	33.8	Neutral
0.4785	27.70	13.00	56.4	46.4	28.7	33.4	Neutral
0.1500	35.70	14.60	66.0	56.0	30.3	41.4	Neutral
0.1500	35.70	14.60	66.0	56.0	30.3	41.4	Neutral
0.7620	25.00	13.70	56.0	46.0	31.0	32.3	Neutral
6.4703	27.90	14.50	60.0	50.0	32.1	35.5	Neutral
6.4613	27.90	14.50	60.0	50.0	32.1	35.5	Neutral

Passes FCC limits by 24.8 dB at 0.1703 MHz (QP measurement) on the Neutral side.



Certificate # 1514.1

DESIGN ASSURANCE ENGINEERING
Wireless Transceiver Bluetooth Test Report

FCC ID: A94422914 IC: 3232A-422914



10. Equipment list

Used For	Tracking Number	Description	Model	Make	Most recent calibration	Calibration Due Date	Most Recent Verification	Verification Due Date
RE Below 1 GHz	TN1375	Positioner	SC99V	Sunol Sciences	NA	NA		
RE Below 1 GHz	TN2319	EMI Analyzer	ESR26	Rohde & Schwarz	4/14/2016	4/14/2017		
RE Below 1 GHz	TN644	3m Chamber	AP191	Rantec	5/23/2016	5/3/2017		4/23/2017
RE Below 1 GHz	TN1541-3	Antenna	JB6	Sunol Sciences	10/24/2016	10/24/2017		
RE Below 1 GHz	TN2077	Pre-Amp	Bose	MN ZX60-3018G+			4/23/2016	4/23/2017
RE Below 1 GHz	TN2281	iPod	4G	Apple	NA	NA	NA	NA
RE Above 1 GHz	TN2602	Pre-Amp	AFS42-01001800-28-10P-42	Miteq			1/8/2016	1/7/2018
RE Above 1 GHz	TN1663	EMI Analyzer	ESU40	Rohde & Schwarz	4/5/2017	4/6/2018		
RE Above 1 GHz	TN2414	2.4 GHz Notch Filter	BRM50702-07	Micro-Tronics			3/29/2016	3/29/2018
RE Above 1 GHz	TN2385	Chamber	3 Meter	AP Americas			11/24/2015	11/24/2018
RE Above 1 GHz	TN1757	Pre-Amp	JS4018004000-30-8P-A1	Miteq			1/8/2016	1/7/2018
RE Above 1 GHz	TN1596	Horn	AT4640	Amplifier Research	NA	NA	NA	NA
RE Above 1 GHz	TN2349	Horn	3117	ETS Lindgren	11/23/2016	11/23/2017		
RE Above 1 GHz	TN2368	Cable	TRU-210	TRU			1/8/2016	1/7/2018
RE Above 1 GHz	TN2342	2.4 GHz Notch Filter	BRM50702-07	Micro-Tronics			3/29/2016	3/29/2018
RF Conducted	TN2342	2.4 GHz Notch Filter	BRM50702-07	Micro-Tronics			3/29/2016	3/29/2018
RF Conducted	TN2408	EMI Analyzer	FSV40	Rohde & Schwarz	4/5/2017	4/5/2018		
AC Mains CE	TN2235	LISN	ENV216	Rohde & Schwarz	12/3/2015	12/2/2017		
AC Mains CE	TN2247	EMI Analyzer	ESR7	Rohde & Schwarz	4/4/2017	4/4/2018		



Certificate # 1514.1

DESIGN ASSURANCE ENGINEERING Wireless Transceiver Bluetooth Test Report

FCC ID: A94422914 IC: 3232A-422914



11. Measurement uncertainty

AC Mains conducted emissions uncertainty.

Uncertainty Budget (AC mains measurements)				
Title:	Conducted RF Emissions (Mains)			
Source of Uncertainty	Value units:± dB	Distribution	Divisor	Uncertainty (± dB)
Receiver - absolute level	0.3	Rect.	1.73	0.17
Receiver - frequency response	1.0	Rect.	1.73	0.58
Receiver - attenuator switching	0.2	Rect.	1.73	0.12
Receiver - bandwidth switching	0.2	Rect.	1.73	0.12
Receiver - display	0.5	Rect.	1.73	0.29
LISN impedance	2.6	Triang.	2.45	1.06
LISN insertion loss	0.6	Norm.	2.00	0.30
Cable correction factor	0.1	Norm.	2.00	0.05
Combined uncertainty (RSS):				1.30
Coverage factor (2 sigma):				2.00
Extended uncertainty (95% confidence):				2.60

Radiated emission uncertainty (30 MHz – 1 GHz)

Uncertainty Budget				
Title:	Radiated RF Emissions (30MHz-1GHz)			
Source of Uncertainty	Value units:± dB	Distribution	Divisor	Uncertainty (± dB)
Receiver - absolute level	0.3	Rect.	1.73	0.17
Receiver - frequency response	0.8	Rect.	1.73	0.46
Receiver - attenuator switching	0.2	Rect.	1.73	0.12
Receiver - bandwidth switching	0.2	Rect.	1.73	0.12
Receiver - display	0.5	Rect.	1.73	0.29
Antenna factor	0.8	Norm.	2.00	0.38
Antenna directivity	1.0	Norm.	2.00	0.50
Preamp correction factor	0.5	Norm.	2.00	0.25
Cable correction factor	0.5	Norm.	2.00	0.25
Site imperfection - NSA	4.0	Triang.	2.45	1.63
Test table impact	1.1	Rect.	1.73	0.64
Combined uncertainty (RSS):				1.98
Coverage factor (2 sigma):				2.00
Extended uncertainty (95% confidence):				3.97

Radiated emissions above 1 GHz

Uncertainty Budget				
Title:	Radiated Emissions above 1 GHz			
Source of Uncertainty	Value units:± dB	Distribution	Divisor	Uncertainty (± dB)
RF spec anal-level-Ref.	0.6	Rect.	1.73	0.35
RF spec anal-level-Freq resp.	1.0	Rect.	1.73	0.58
RF spec anal-level-Display	0.3	Rect.	1.73	0.17
RF spec anal-level-QP det.	1.0	Rect.	1.73	0.58
Antenna factor	0.9	Norm.	2.00	0.45
Preamp corr. Factor	0.5	Rect.	1.73	0.29
Cable corr. Factor	0.5	Rect.	1.73	0.29
Combined uncertainty (RSS):				1.09
Coverage factor (2 sigma):				2.00
Extended uncertainty (95% confidence):				2.18

Conducted RF measurements

Uncertainty Budget				
Title:	Conducted RF measurements			
Source of Uncertainty	Value units:± dB	Distribution	Divisor	Uncertainty (± dB)
Analyzer - absolute level	0.3	Rect.	1.73	0.17
Analyzer - frequency response	0.5	Rect.	1.73	0.29
Analyzer - attenuator switching	0.2	Rect.	1.73	0.12
Analyzer - bandwidth switching	0.2	Rect.	1.73	0.12
Analyzer - display	0.5	Rect.	1.73	0.29
Cable correction factor	0.5	Norm.	2.00	0.25
Combined uncertainty (RSS):				0.54
Coverage factor (2 sigma):				2.00
Extended uncertainty (95% confidence):				1.07

End of Report