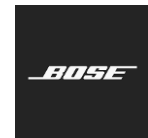




DESIGN ASSURANCE ENGINEERING
Wireless Transceiver Bluetooth Test Report



FCC ID: A94423816 IC: 3232A-423816

Test Type: Emissions Immunity

Product Type: Wireless Speaker

Product Name/Number: *Model Number: 423816*
FCC ID: A94423816
IC: 3232A-423816

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.423816.17.41.2*

General Comments/Special Test Conditions:

This report relates only to the items tested. This report covers EMC marking requirements for *Enter product and any special modifications or test conditions.*

	Print Name	Signature	Date
Prepared By:	Chad Bell	<i>Chad Bell</i>	August 23, 2017
Electrical Engineer Review* By:	Michael Royer	<i>Michael A. Royer</i>	August 23, 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.

If the report carries the "accredited" logo, the reviewer must verify all the tests in this report are covered under the current ISO17025 accreditation. The A2LA-accredited logo must be removed if any of the tests in the report are not performed under the current scope of accreditation. It is the responsibility of the reviewer to ensure the A2LA advertising policy is followed.



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Test Report Summary

Product Information:

Description

The EUT is a wireless speaker that contains Bluetooth/BLE transceivers, manufactured by Cambridge Silicon Radio, CSR8670. The EUT uses Adaptive Frequency Hopping (AFH) mode, using a reduced hop set if interference is detected in band, however a maximum of 20 channels is always maintained..

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. For radio tests the BT radio was configured with CSR Blue Suite software (details provided in SOFTWARE AND FIRMWARE section).

EUT Antenna Description

The antenna is an internal inverted F antenna with antenna gain of 3.574dBi formed by printed circuit board etch.

SOFTWARE AND FIRMWARE

*The firmware installed in the EUT during testing was version 0.1.4.5437
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 requirements. Enter specific EMC requirements covered by this report (i.e. FCC).

Test Objective:

Verify product meets all applicable EMC requirements.

Results:

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

Conclusions:

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

meets all test standards selected in section 2 of 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	Chad Bell	<i>Chad Bell</i>	February 10, 2017



Test Standards

Emissions:

- | | |
|-------------------------------------|----------------|
| | Standard |
| <input checked="" type="checkbox"/> | FCC Part 15C |
| <input checked="" type="checkbox"/> | Canada RSS-247 |
| <input checked="" type="checkbox"/> | Canada RSS-GEN |

Environmental Conditions

Ambient:

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

20dB and 99% Bandwidth

Requirement:

None; for reporting purposes only. Test per FCC 15.247(a)(1); IC RSS-247 5.1 (1), RSS-Gen 6.6.

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	0.844	-
High	2480	DH5	0.844	-

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	1.243	-
High	2480	2-DH5	1.243	-

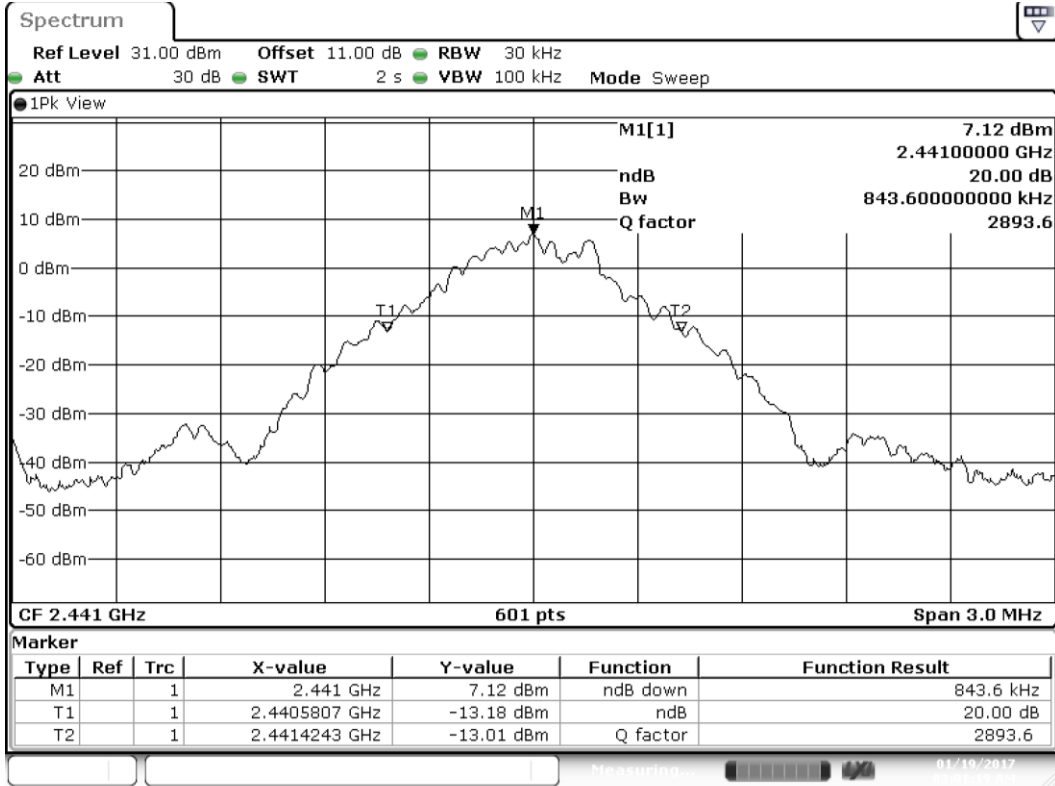
20 dB OBW Summary Table (Enhanced Rate: 3 Mbps)				
Channel	Frequency (MHz)	Mode	20 dB OBW (MHz)	Limit NA
Low	2402	3-DH5	1.263	-
Middle	2441	3-DH5	1.263	-
High	2480	3-DH5	1.263	-



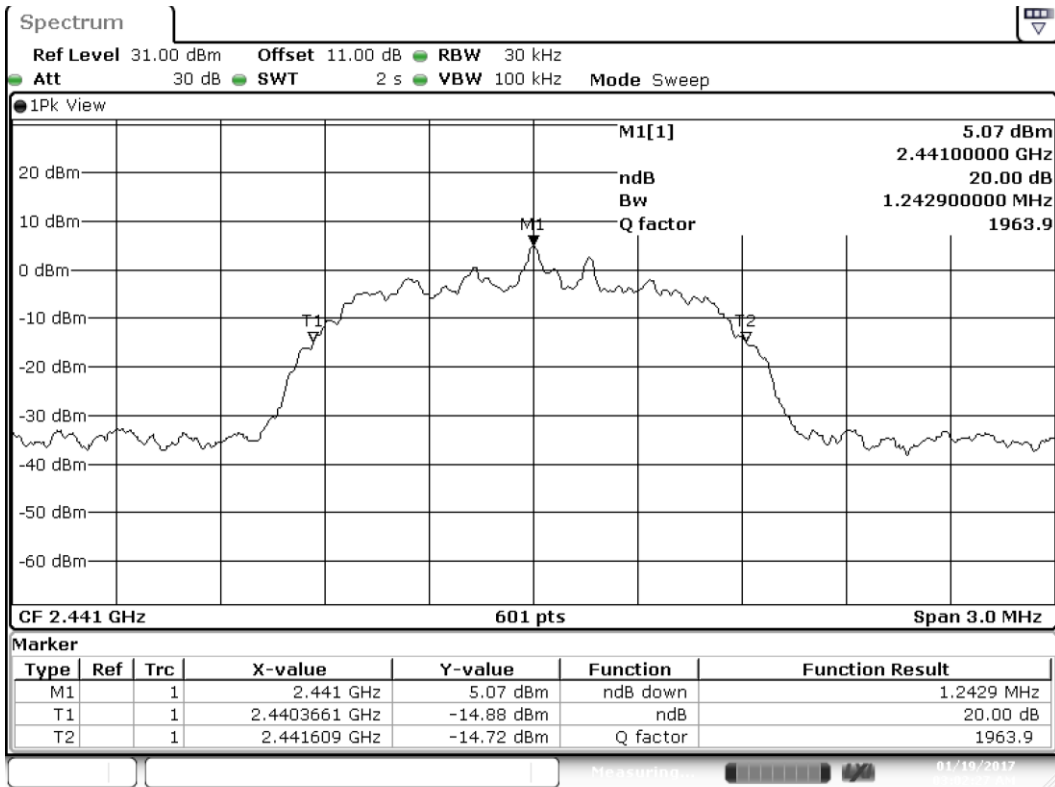
Certificate # 1514.1

DESIGN ASSURANCE ENGINEERING Wireless Transceiver Bluetooth Test Report

FCC ID: A94423816 IC: 3232A-423816



Plot2 20dB OBW DH5 2441 MHz



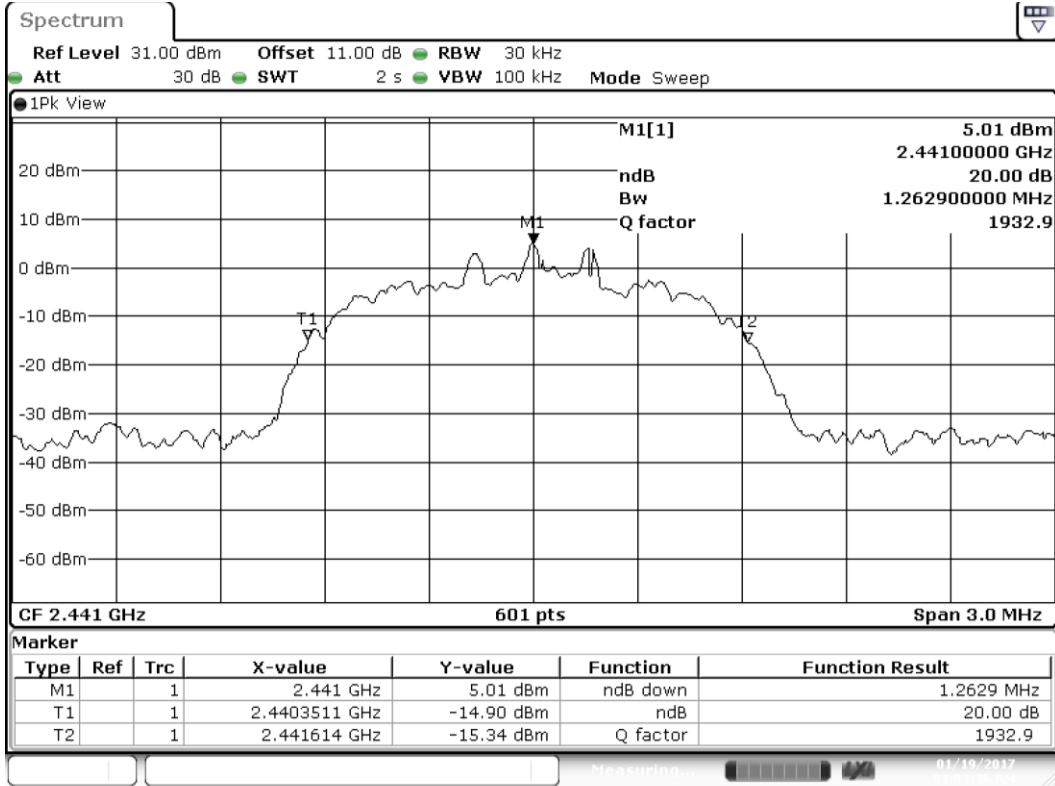
Plot5 20dB OBW 2DH5 2441 MHz



Certificate # 1514.1

DESIGN ASSURANCE ENGINEERING Wireless Transceiver Bluetooth Test Report

FCC ID: A94423816 IC: 3232A-423816



Plot8 20dB OBW 3DH5 2441 MHz

99% Occupied Bandwidth

99% OBW Summary Table (Basic Rate: 1 Mbps)				
Channel	Frequency (MHz)	Mode	99% OBW (MHz)	Limit NA
Low	2402	DH5	0.864	-
Middle	2441	DH5	0.859	-
High	2480	DH5	0.864	-

99% OBW Summary Table (Enhanced Rate: 2 Mbps)				
Channel	Frequency (MHz)	Mode	99% OBW (MHz)	Limit NA
Low	2402	2-DH5	1.173	-
Middle	2441	2-DH5	1.173	-
High	2480	2-DH5	1.173	-

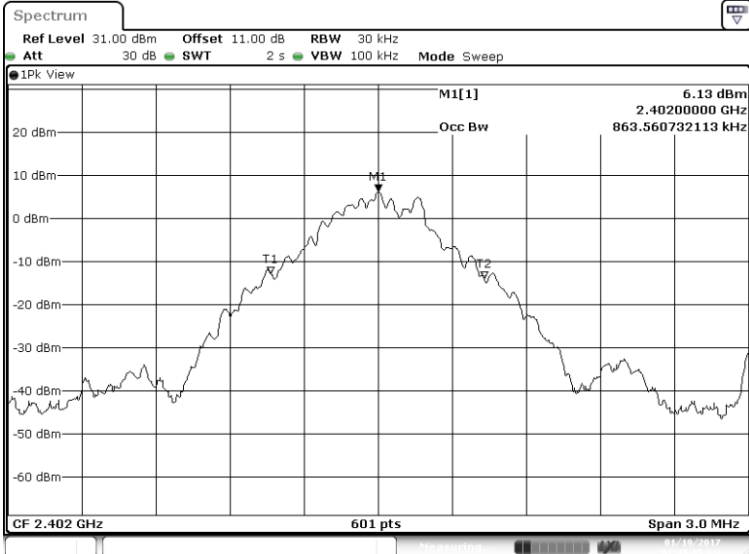
99% OBW Summary Table (Enhanced Rate: 3 Mbps)				
Channel	Frequency (MHz)	Mode	99% OBW (MHz)	Limit NA
Low	2402	3-DH5	1.168	-
Middle	2441	3-DH5	1.168	-
High	2480	3-DH5	1.168	-



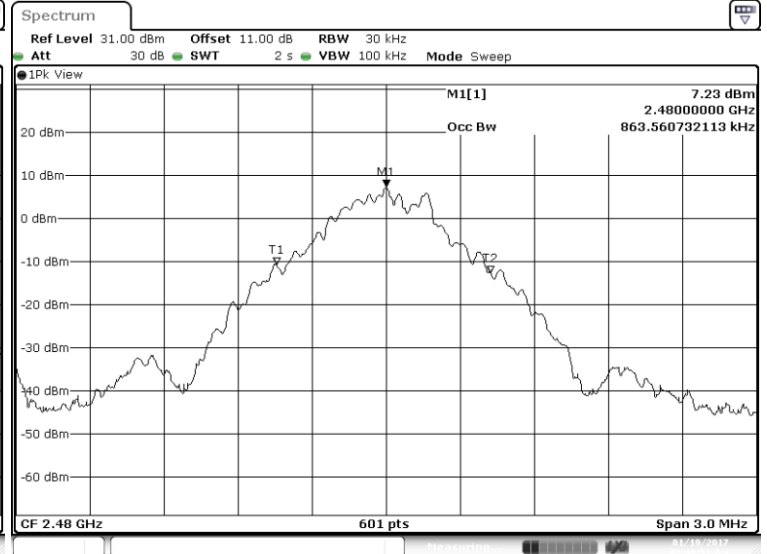
Certificate # 1514.1

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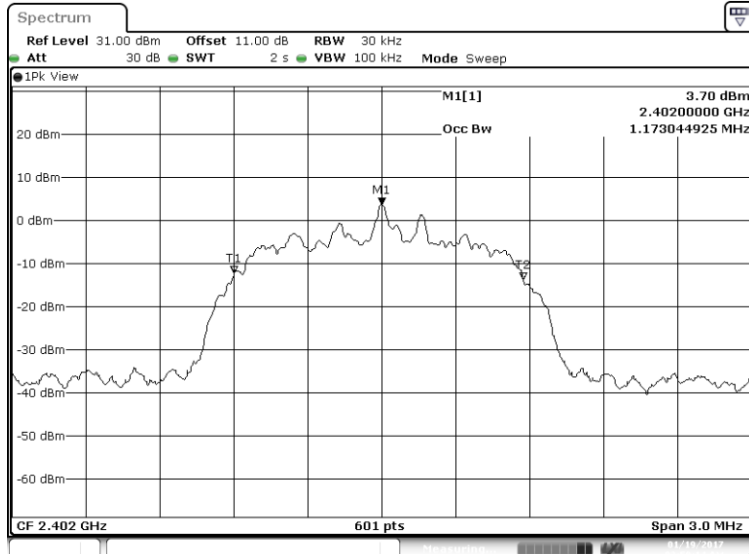
FCC ID: A94423816 IC: 3232A-423816



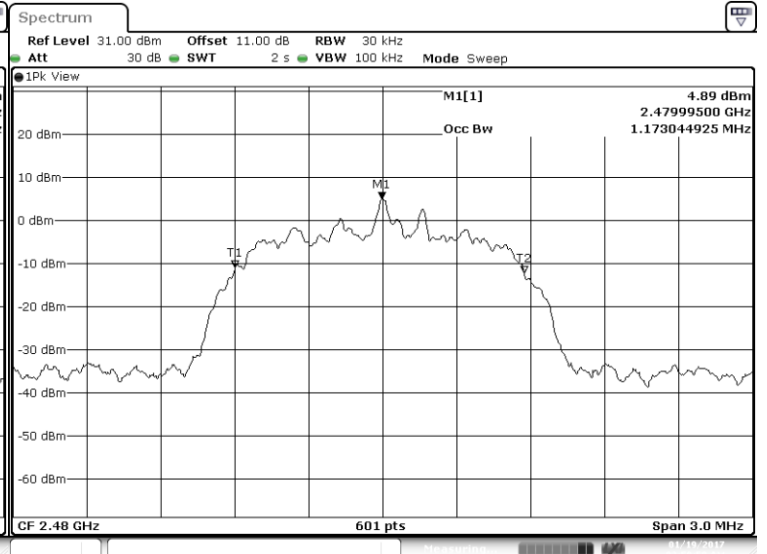
Plot1 99P OBW DH5 2402 MHz



Plot3 99P OBW DH5 2480 MHz



Plot4 99P OBW 2DH5 2402 MHz



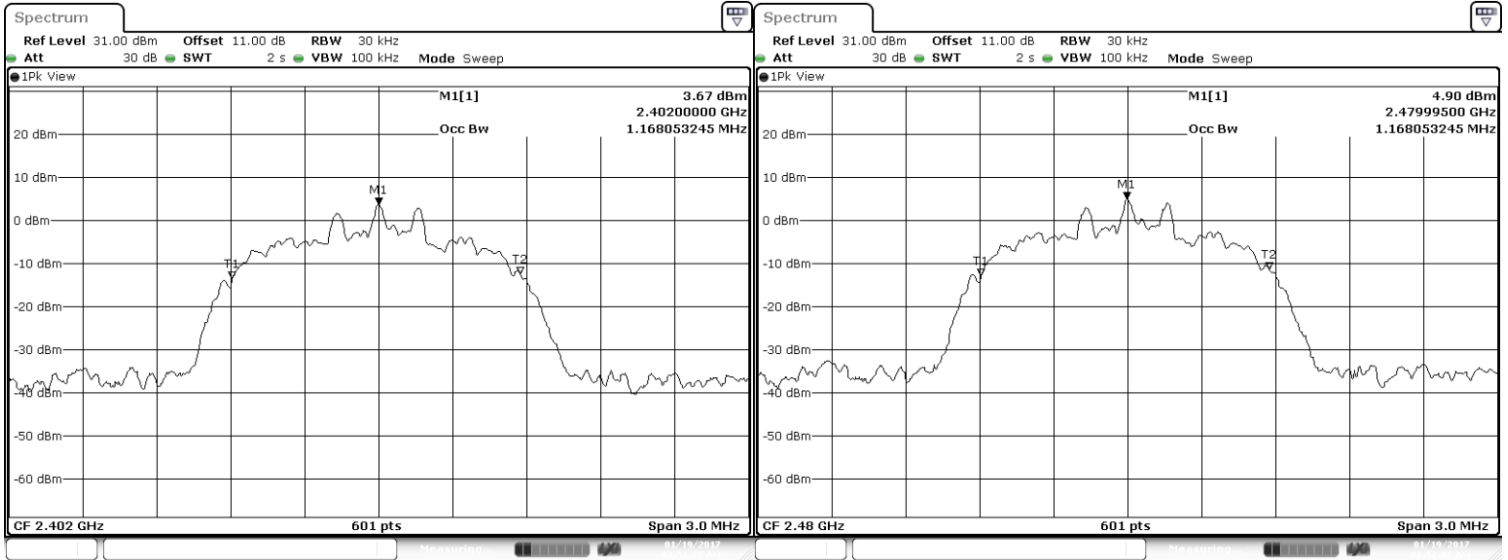
Plot6 99P OBW 2DH5 2480 MHz



Certificate # 1514.1

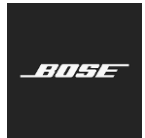
DESIGN ASSURANCE ENGINEERING Wireless Transceiver Bluetooth Test Report

FCC ID: A94423816 IC: 3232A-423816



Plot7 99P OBW 3DH5 2402 MHz

Plot9 99P OBW 3DH5 2480 MHz



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.

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 (GFSK)	7.62	3.574	30	18.80	Pass
Middle	2441	DH5 (GFSK)	8.64	3.574	30	17.79	Pass
High	2480	DH5 (GFSK)	8.72	3.574	30	17.70	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 (DQPSK)	6.09	3.574	30	20.33	Pass
Middle	2441	2-DH5 (DQPSK)	7.38	3.574	30	19.05	Pass
High	2480	2-DH5 (DQPSK)	7.22	3.574	30	19.21	Pass

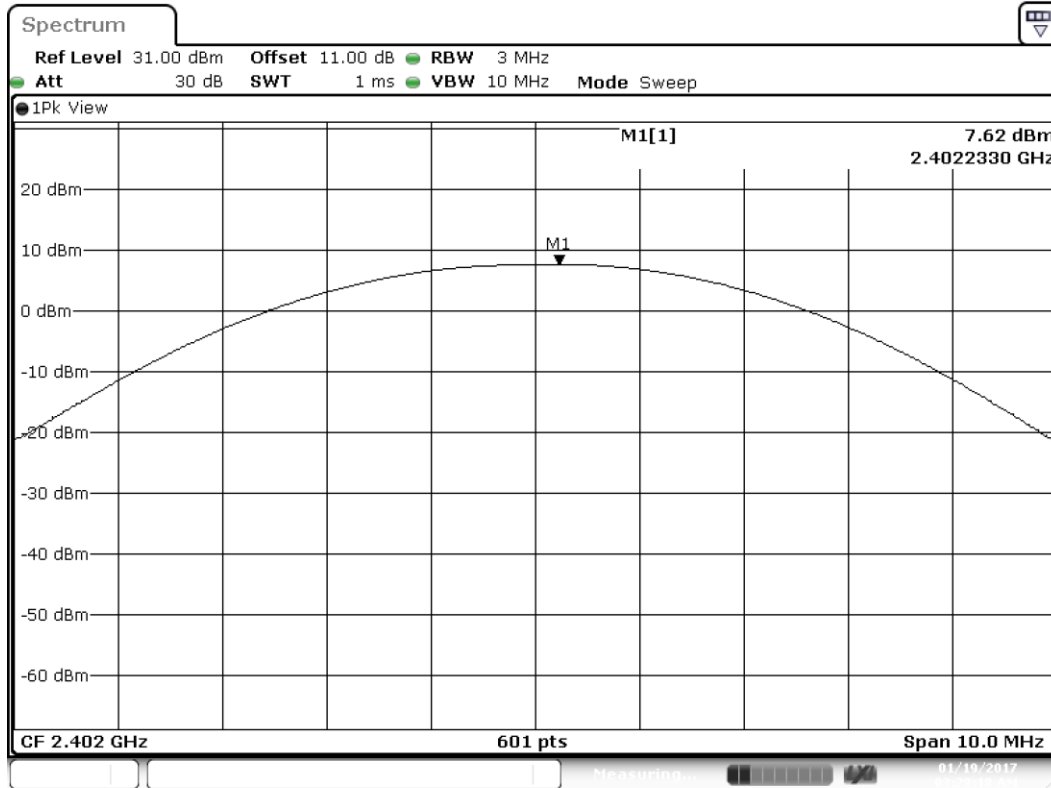
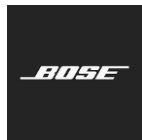
Output Power Summary Table (Enhanced Rate: 3 Mbps)							
Channel	Frequency (MHz)	Mode	Output Power (dBm)	Directional Gain (dBi)	Limit (dB)	Margin (dB)	Result
Low	2402	3-DH5 (8PSK)	6.49	3.574	30	19.94	Pass
Middle	2441	3-DH5 (8PSK)	7.67	3.574	30	18.76	Pass
High	2480	3-DH5 (8PSK)	7.57	3.574	30	18.86	Pass



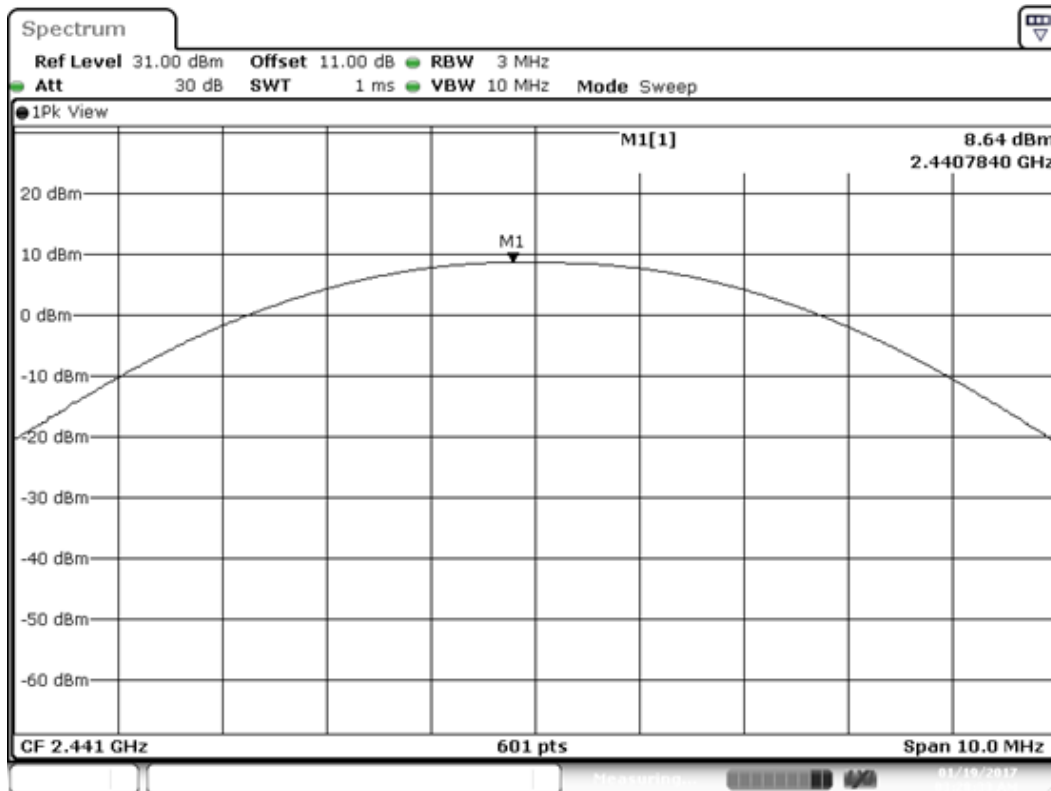
Certificate # 1514.1

DESIGN ASSURANCE ENGINEERING Wireless Transceiver Bluetooth Test Report

FCC ID: A94423816 IC: 3232A-423816



Plot1 Power DH5 2402 MHz



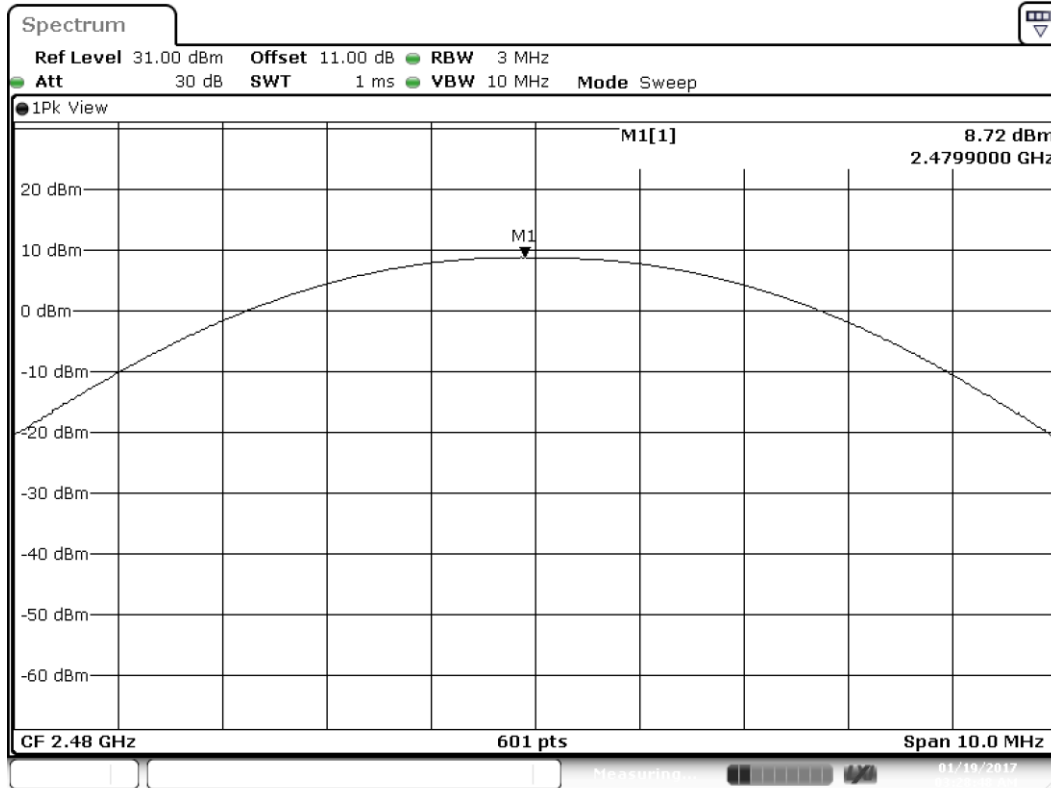
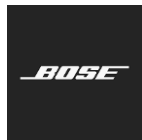
Plot2 Power DH5 2441 MHz



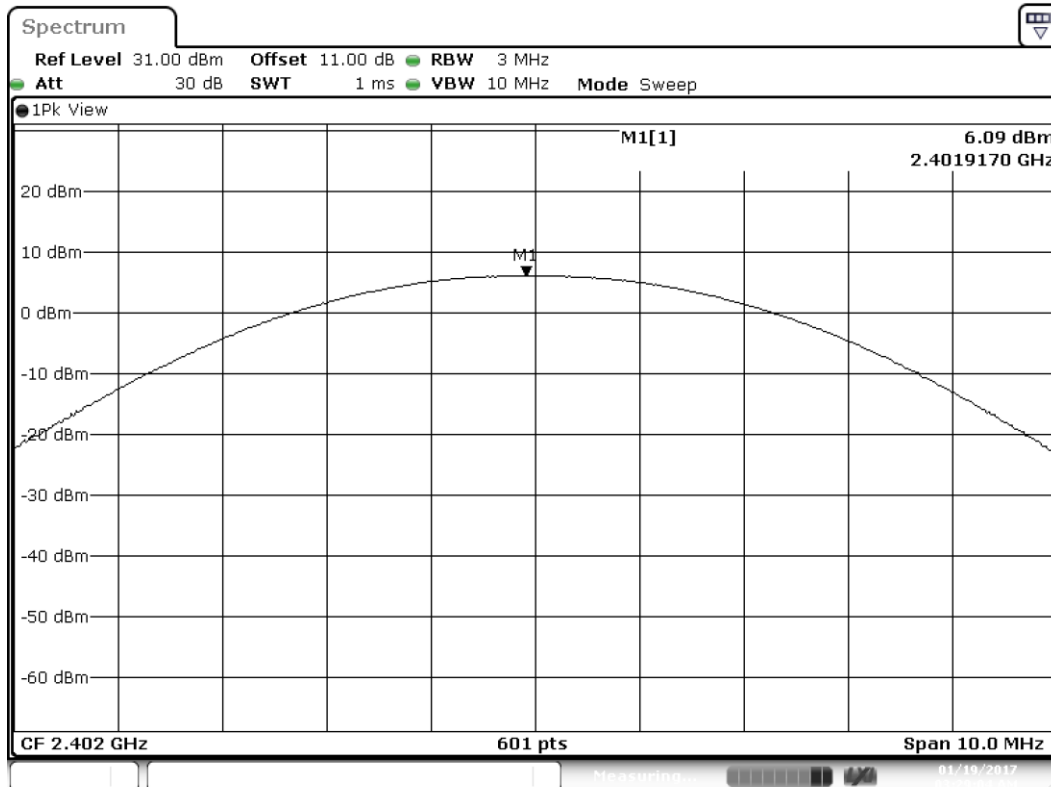
Certificate # 1514.1

DESIGN ASSURANCE ENGINEERING Wireless Transceiver Bluetooth Test Report

FCC ID: A94423816 IC: 3232A-423816



Plot3 Power DH5 2480 MHz



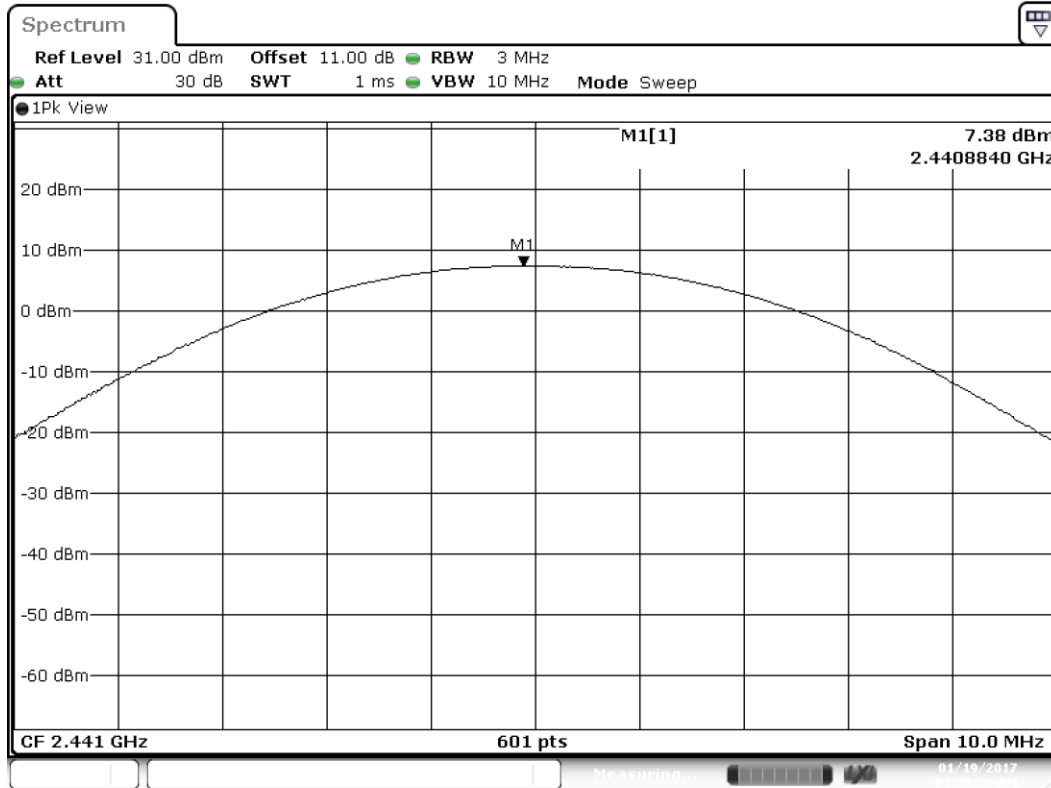
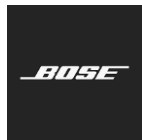
Plot4 Power 2DH5 2402 MHz



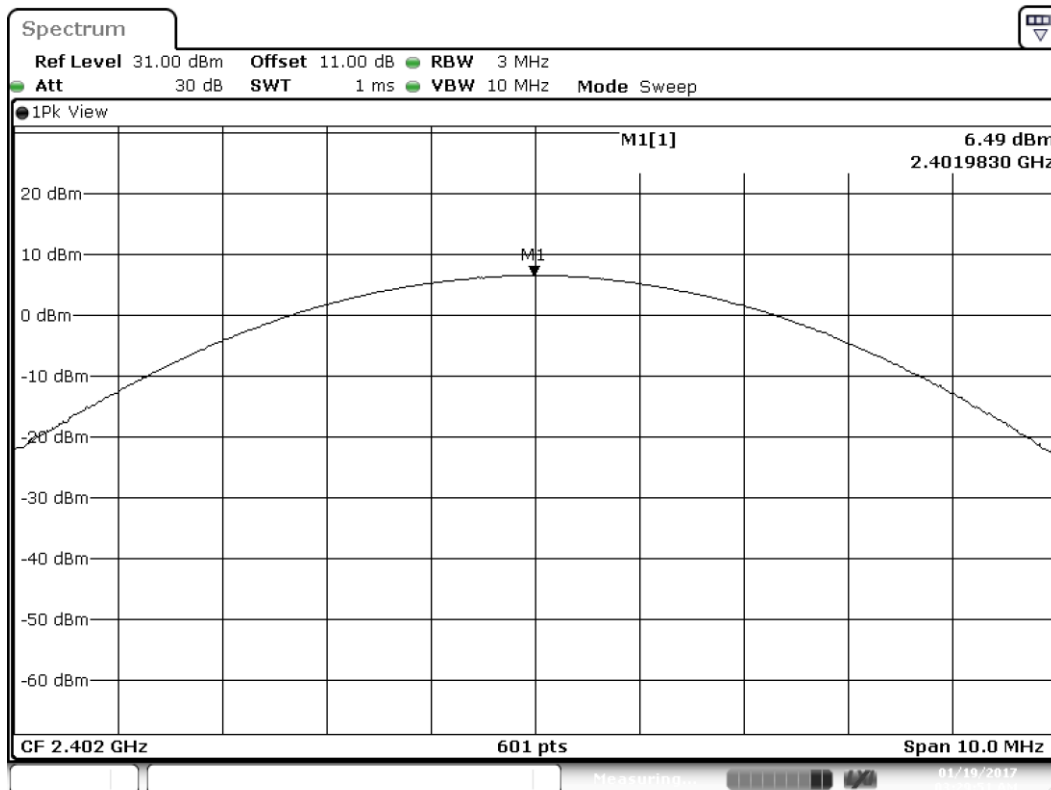
Certificate # 1514.1

DESIGN ASSURANCE ENGINEERING Wireless Transceiver Bluetooth Test Report

FCC ID: A94423816 IC: 3232A-423816



Plot5 Power 2DH5 2441 MHz



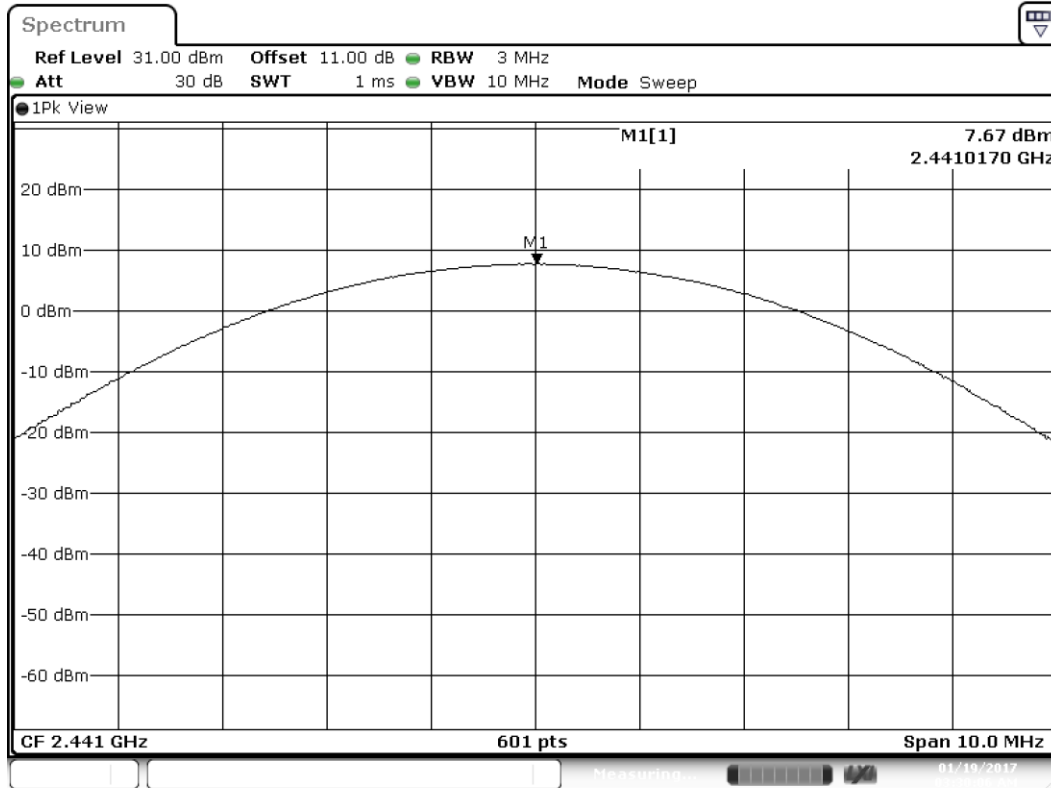
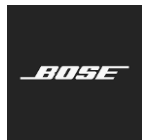
Plot7 Power 3DH5 2402 MHz



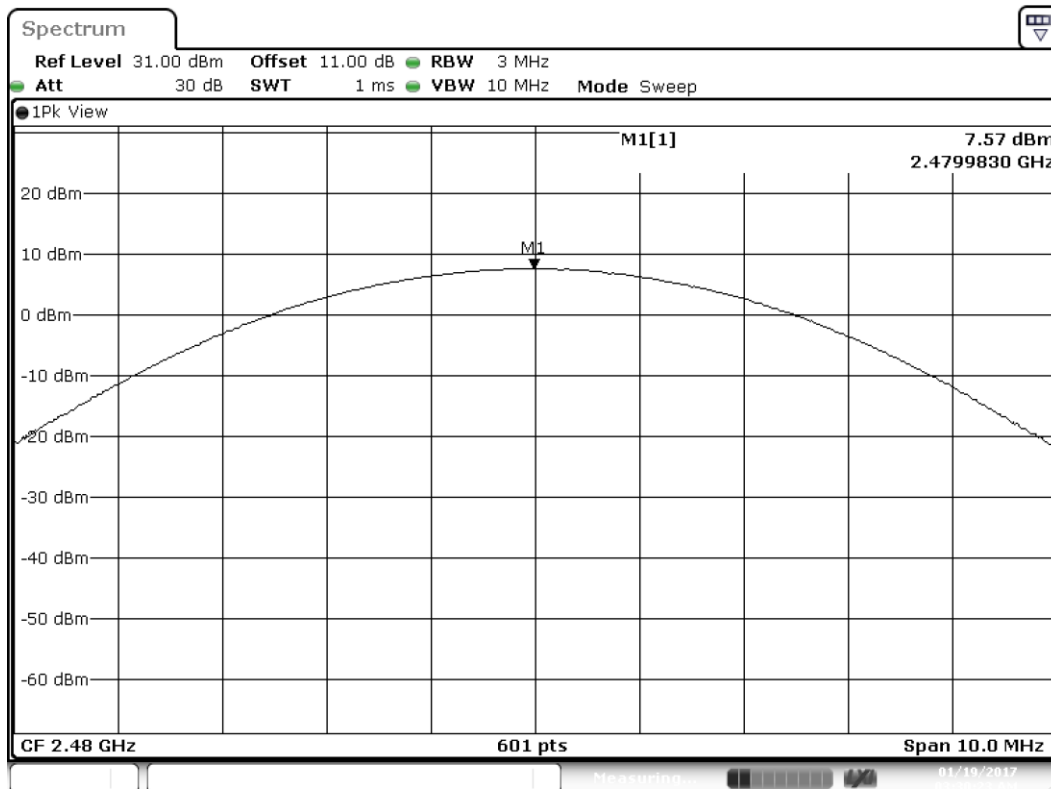
Certificate # 1514.1

DESIGN ASSURANCE ENGINEERING Wireless Transceiver Bluetooth Test Report

FCC ID: A94423816 IC: 3232A-423816



Plot8 Power 3DH5 2441 MHz



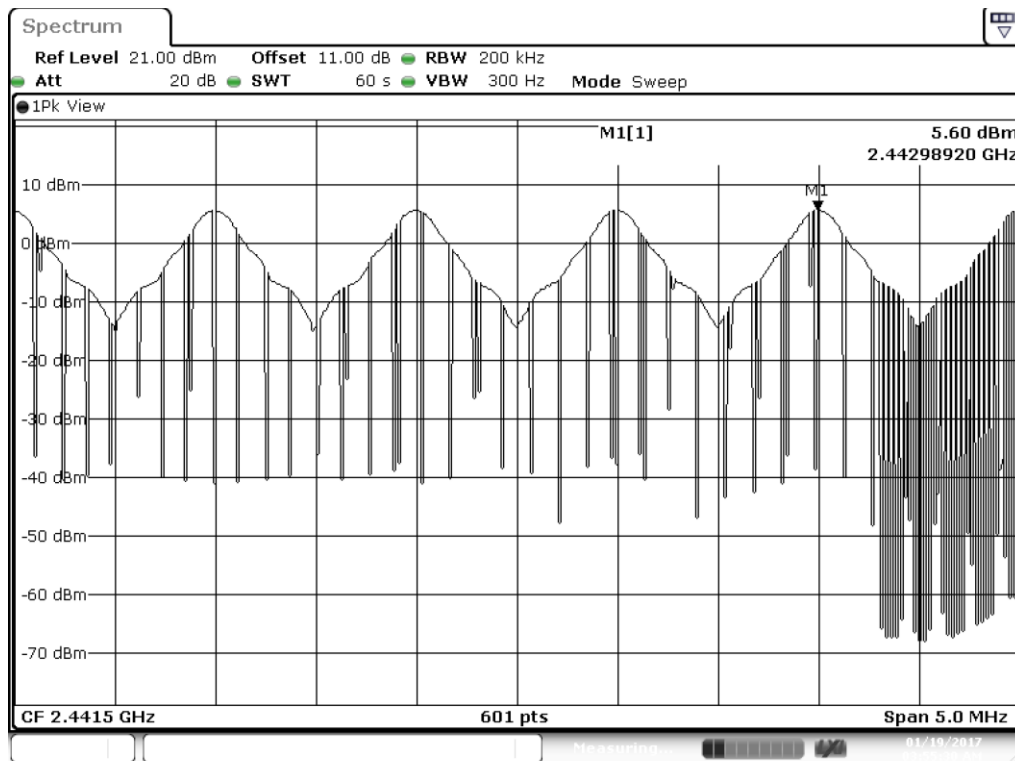
Plot9 Power 3DH5 2480 MHz

Model 423816 meets the conducted power limit of 1W (30dBm) by 17.70dB in DH5 mode at 2480MHz.

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.



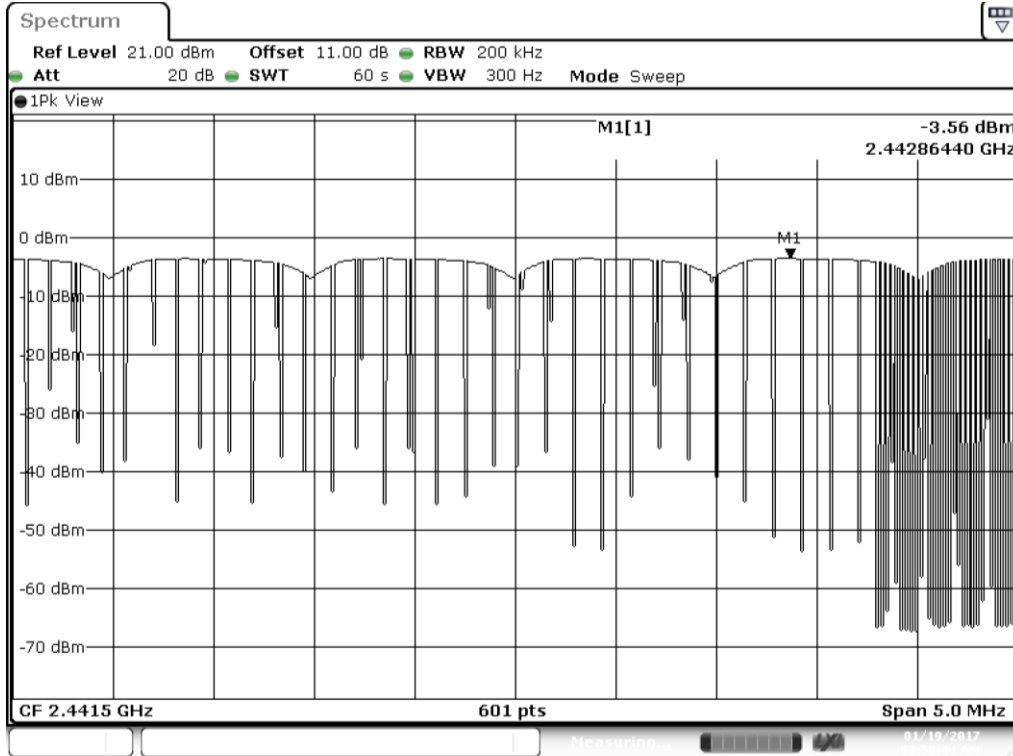
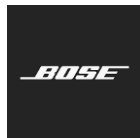
Plot1 Frequency Separation DH5 Hopping



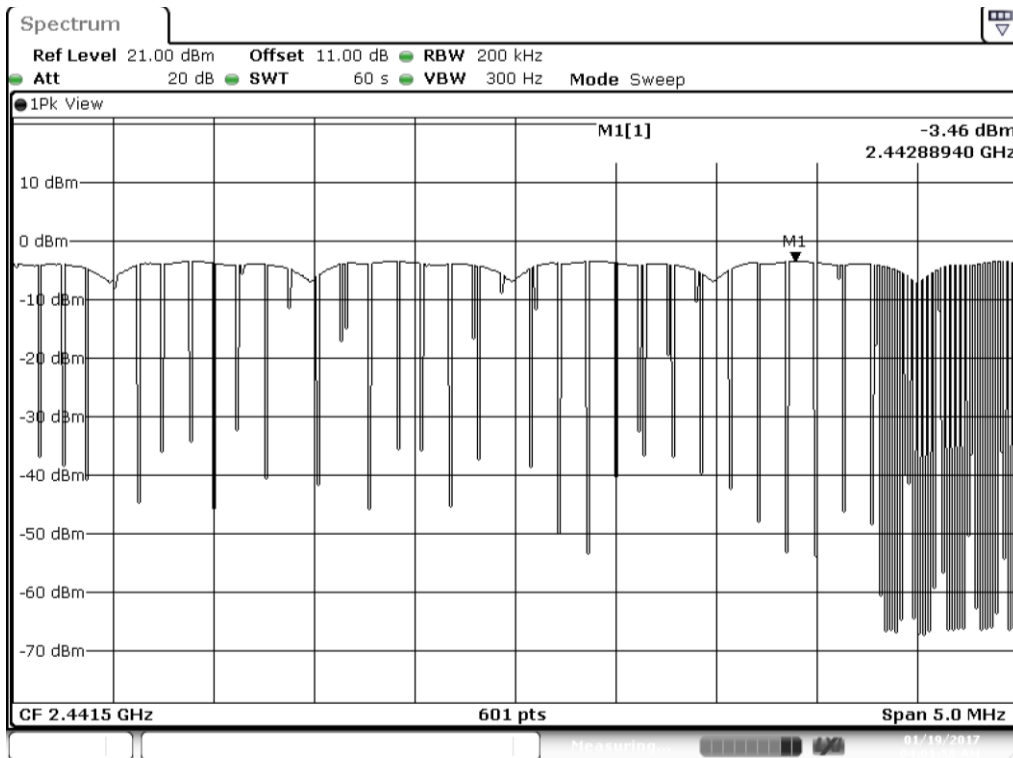
Certificate # 1514.1

DESIGN ASSURANCE ENGINEERING Wireless Transceiver Bluetooth Test Report

FCC ID: A94423816 IC: 3232A-423816



Plot2 Frequency Separation 2DH5 Hopping



Plot3 Frequency Separation 3DH5 Hopping

Hopping frequencies are separated by 1MHz which is more than the required minimum of 25kHz and more than 2/3 of the 20dB bandwidth of the hopping channel which would be 842kHz.



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

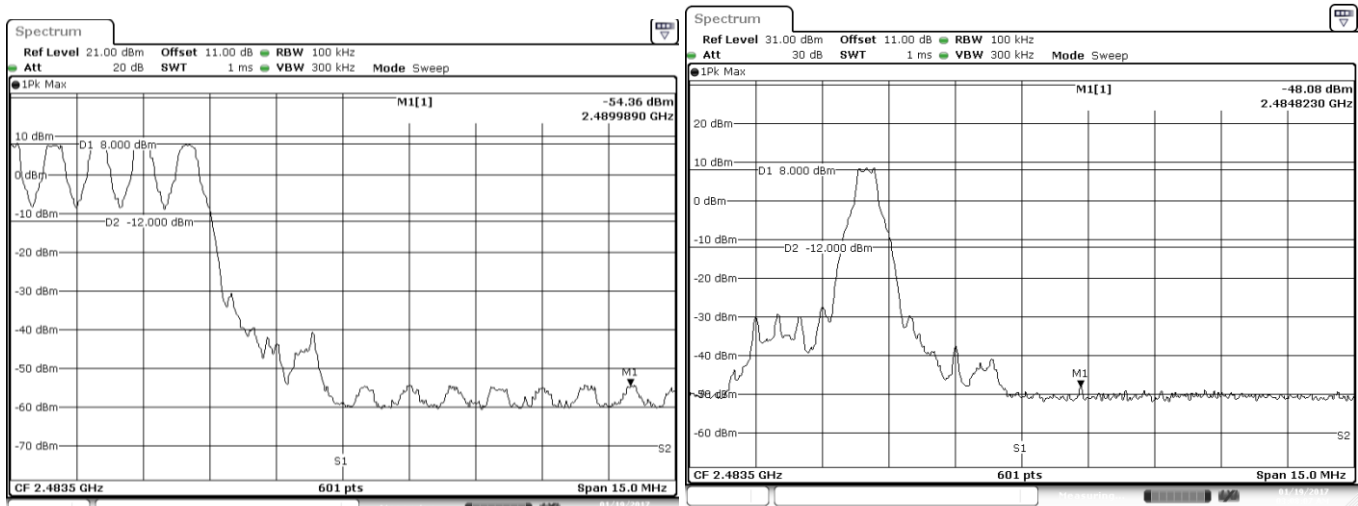
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either 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 wanted band was assumed to be zero. The conducted spurious readings are for additional information as the radiated readings take precedence.

Spurious Band-edge Emissions

Upper Band Edge (Basic Rate: 1 Mbps) (Hopping Mode)						
Mode	Frequency (MHz)	Mode	Worst Case (dBc)	Limit (dBc)	Margin (dB)	Result
Hopping	All	DH5	62.36	20	42.36	Pass

Upper Band Edge (Basic Rate: 1 Mbps) (Non-Hopping Mode)						
Channel	Frequency (MHz)	Mode	Worst Case (dBc)	Limit (dBc)	Margin (dB)	Result
High	2480	DH5	56.08	20	36.08	Pass

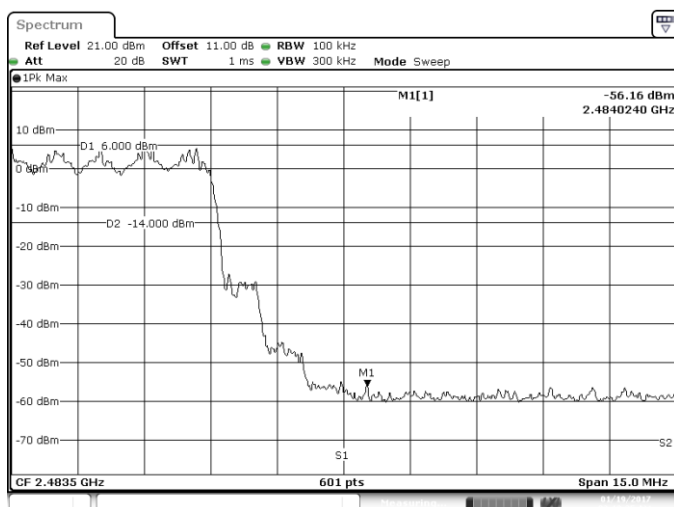


Plot1 Upper Band Edge DH5 Hopping

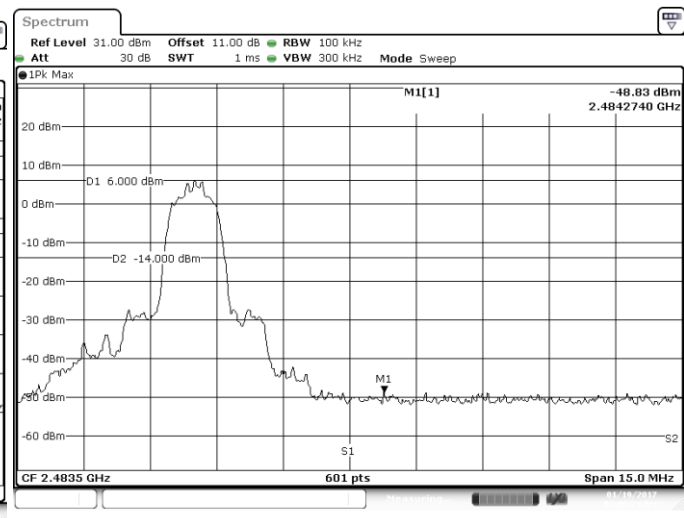
Plot1 Upper Band Edge DH5 2480 MHz

Upper Band Edge (Enhanced Rate: 2 Mbps) (Hopping Mode)						
Mode	Frequency (MHz)	Mode	Worst Case (dBc)	Limit (dBc)	Margin (dB)	Result
Hopping	All	2-DH5	62.16	20	42.16	Pass

Upper Band Edge (Enhanced Rate: 2 Mbps) (Non-Hopping Mode)						
Channel	Frequency (MHz)	Mode	Worst Case (dBc)	Limit (dBc)	Margin (dB)	Result
High	2480	2-DH5	54.83	20	34.83	Pass



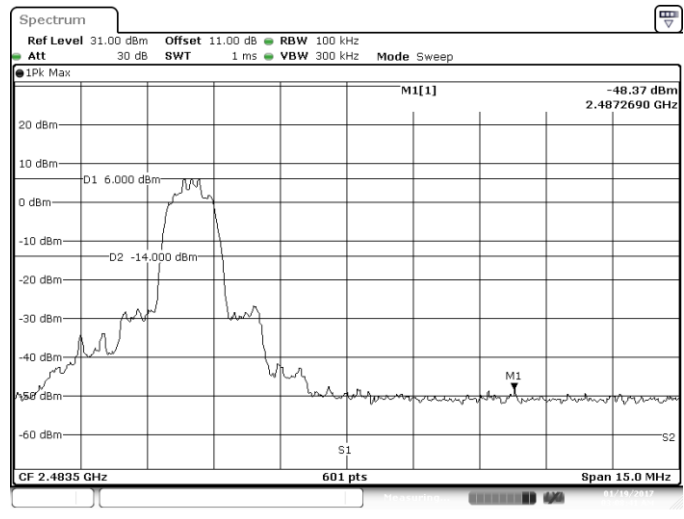
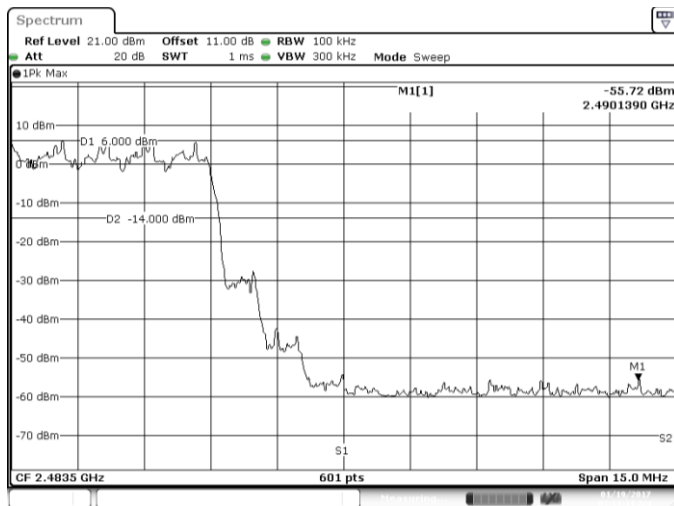
Plot2 Upper Band Edge 2DH5 Hopping



Plot2 Upper Band Edge 2DH5 2480 MHz

Upper Band Edge (Enhanced Rate: 3 Mbps) (Hopping Mode)						
Mode	Frequency (MHz)	Mode	Worst Case (dBc)	Limit (dBc)	Margin (dB)	Result
Hopping	All	3-DH5	61.72	20	41.72	Pass

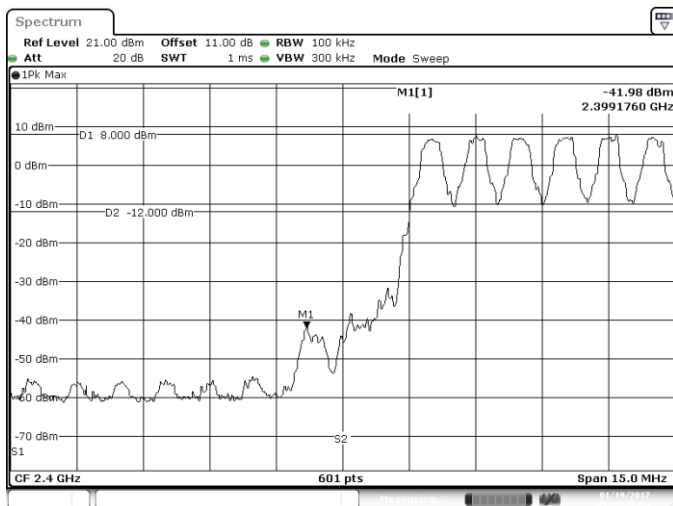
Upper Band Edge (Enhanced Rate: 3 Mbps) (Non-Hopping Mode)						
Channel	Frequency (MHz)	Mode	Worst Case (dBc)	Limit (dBc)	Margin (dB)	Result
High	2480	3-DH5	54.37	20	34.37	Pass



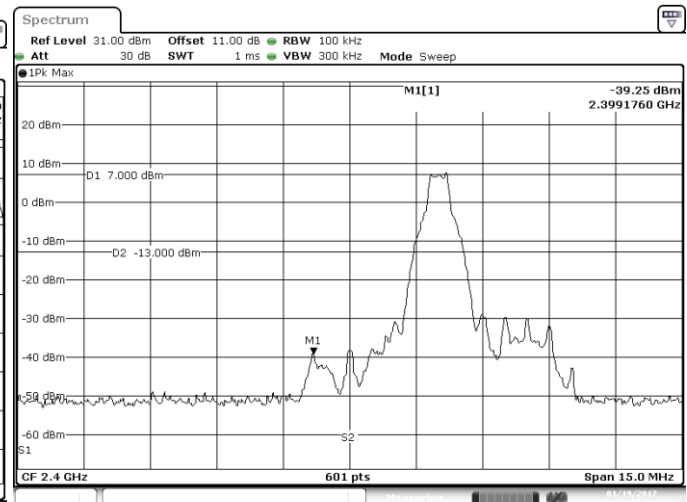


Lower Band Edge (Basic Rate: 1 Mbps) (Hopping Mode)						
Mode	Frequency (MHz)	Mode	Worst Case (dBc)	Limit (dBc)	Margin (dB)	Result
Hopping	All	DH5	49.98	20	29.98	Pass

Lower Band Edge (Basic Rate: 1 Mbps) (Non-Hopping Mode)						
Channel	Frequency (MHz)	Mode	Worst Case (dBc)	Limit (dBc)	Margin (dB)	Result
Low	2402	DH5	46.72	20	26.72	Pass



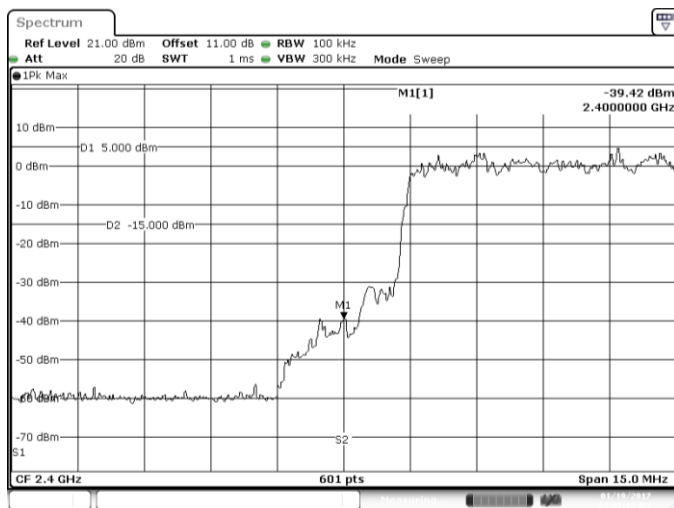
Plot1 Lower Band Edge DH5 Hopping



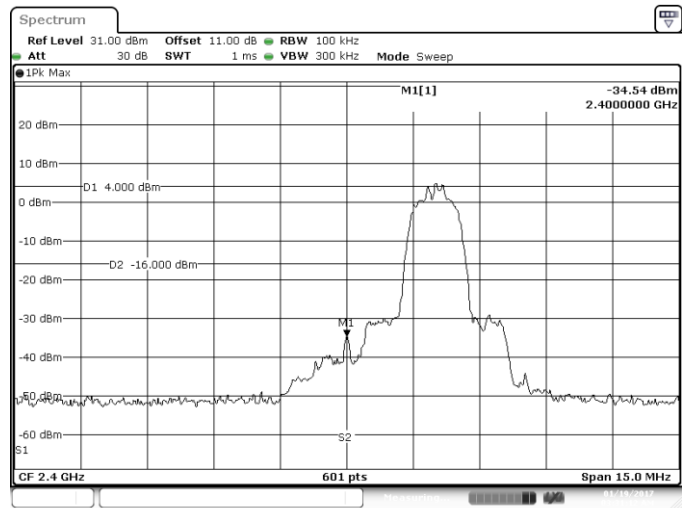
Plot1 Lower Band Edge DH5 2402 MHz

Lower Band Edge (Enhanced Rate: 2 Mbps) (Hopping Mode)						
Mode	Frequency (MHz)	Mode	Worst Case (dBc)	Limit (dBc)	Margin (dB)	Result
Hopping	All	2-DH5	44.42	20	24.42	Pass

Lower Band Edge (Enhanced Rate: 2 Mbps) (Non-Hopping Mode)						
Channel	Frequency (MHz)	Mode	Worst Case (dBc)	Limit (dBc)	Margin (dB)	Result
Low	2402	2-DH5	38.54	20	18.54	Pass



Plot2 Lower Band Edge 2DH5 Hopping



Plot2 Lower Band Edge 2DH5 2402 MHz



Certificate # 1514.1

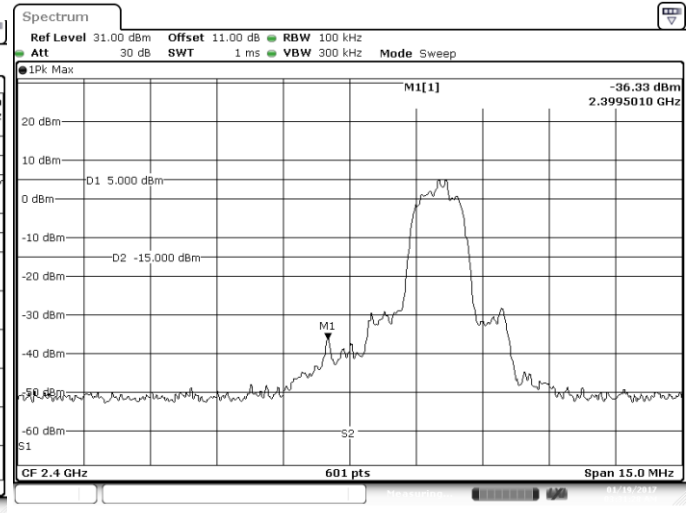
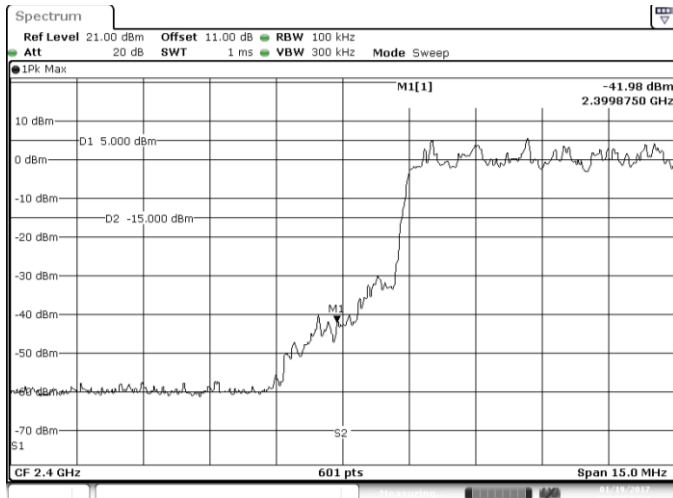
DESIGN ASSURANCE ENGINEERING Wireless Transceiver Bluetooth Test Report

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Lower Band Edge (Enhanced Rate: 3 Mbps) (Hopping Mode)						
Mode	Frequency (MHz)	Mode	Worst Case (dBc)	Limit (dBc)	Margin (dB)	Result
Hopping	All	3-DH5	46.98	20	26.98	Pass

Lower Band Edge (Enhanced Rate: 3 Mbps) (Non-Hopping Mode)						
Channel	Frequency (MHz)	Mode	Worst Case (dBc)	Limit (dBc)	Margin (dB)	Result
Low	2402	3-DH5	41.81	20	21.81	Pass





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FCC ID: A94423816 IC: 3232A-423816

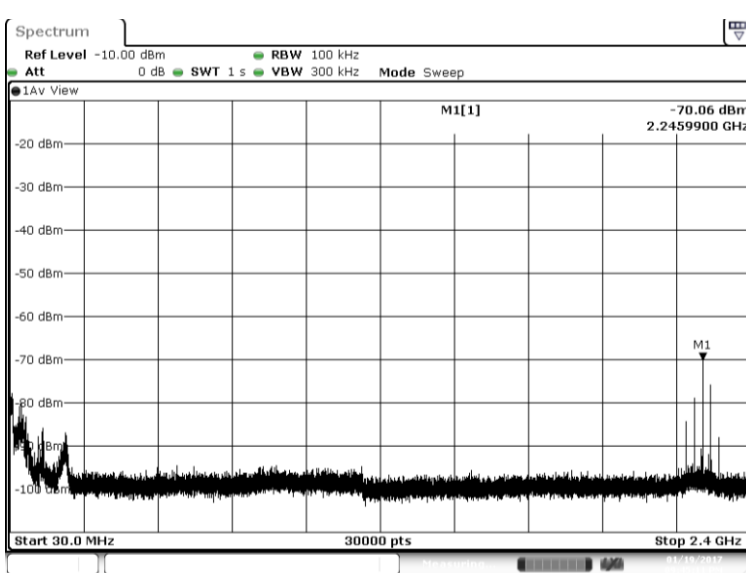


Spurious Emissions

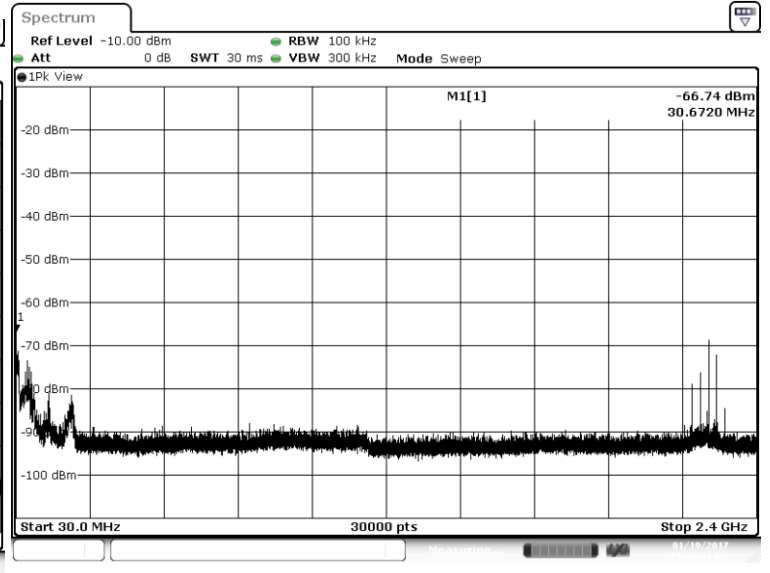
For these readings, a notch filter was used to protect the EMI receiver from overload. A correction factor was applied to account for the effect of the notch filter.

Spurious Summary Table (Basic Rate: 1 Mbps)											
Channel	Band Range (MHz)	Mode	Raw Measurement (dBm)	Test Cable Loss (dB)	Pad ATTN (dB)	EUT Antenna Gain At Harmonic Frequency (dBi)	Corrected Reading (dBm)	Convert to E-Field at 3 meters (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Result
Low	30 To 1000	DH5	-70.1	1.0	10.0	0.0	-59.1	36.17	54	17.83	Pass
Low	2483.5 To 25000	DH5	-72.9	1.0	10.0	0.0	-61.9	33.37	54	20.63	Pass

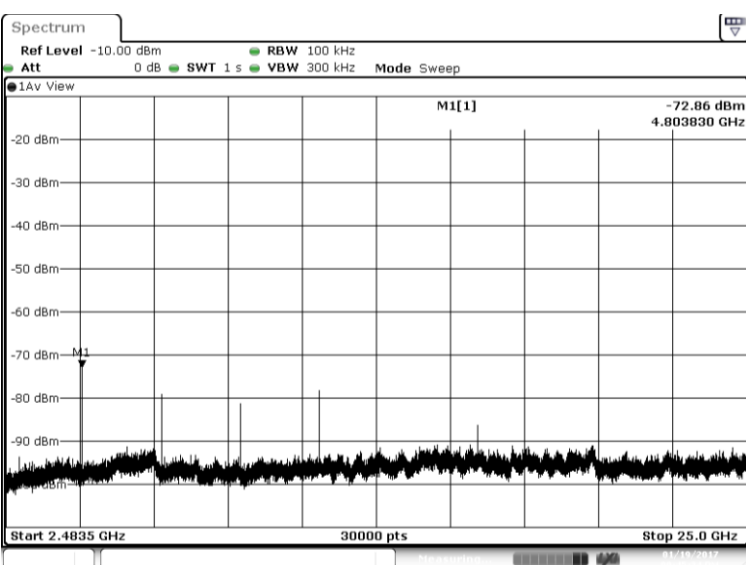
Spurious Summary Table (Basic Rate: 1 Mbps)											
Channel	Band Range (MHz)	Mode	Raw Measurement (dBm)	Test Cable Loss (dB)	Pad ATTN (dB)	EUT Antenna Gain At Harmonic Frequency (dBi)	Corrected Reading (dBm)	Convert to E-Field at 3 meters (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Result
Low	30 To 1000	DH5	-66.7	1.0	10.0	0.0	-55.7	39.49	74	34.51	Pass
Low	2483.5 To 25000	DH5	-65.9	1.0	10.0	0.0	-54.9	40.30	74	33.70	Pass



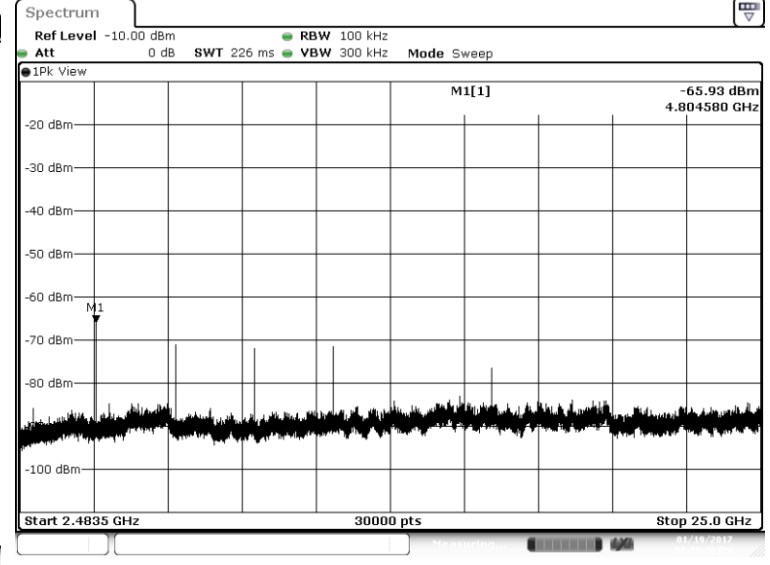
Plot1 DH5 2402 MHz Average Band 1



Plot1 DH5 2402 MHz Peak Band 1



Plot2 DH5 2402 MHz Average Band 2



Plot2 DH5 2402 MHz Peak Band 2



Certificate # 1514.1

DESIGN ASSURANCE ENGINEERING Wireless Transceiver Bluetooth Test Report

FCC ID: A94423816 IC: 3232A-423816

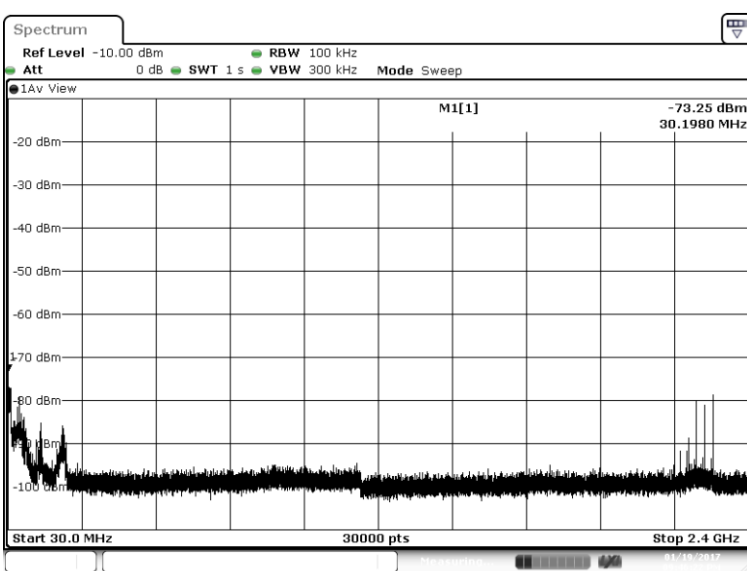


Spurious Summary Table (Basic Rate: 1 Mbps)

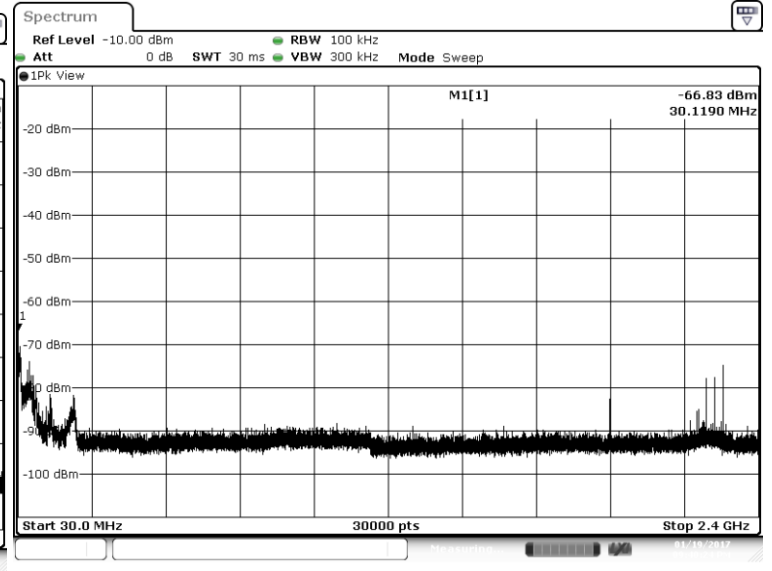
Channel	Band Range (MHz)	Mode	Raw Measurement (dBm)	Test Cable Loss (dB)	Pad ATTN (dB)	EUT Antenna Gain At Harmonic Frequency (dBi)	Corrected Reading (dBm)	Convert to E-Field at 3 meters (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Result
Mid	30 To 1000	DH5	-73.2	1.0	10.0	0.0	-62.2	32.98	54	21.02	Pass
Mid	2483.5 To 25000	DH5	-74.3	1.0	10.0	0.0	-63.3	31.98	54	22.02	Pass

Spurious Summary Table (Basic Rate: 1 Mbps)

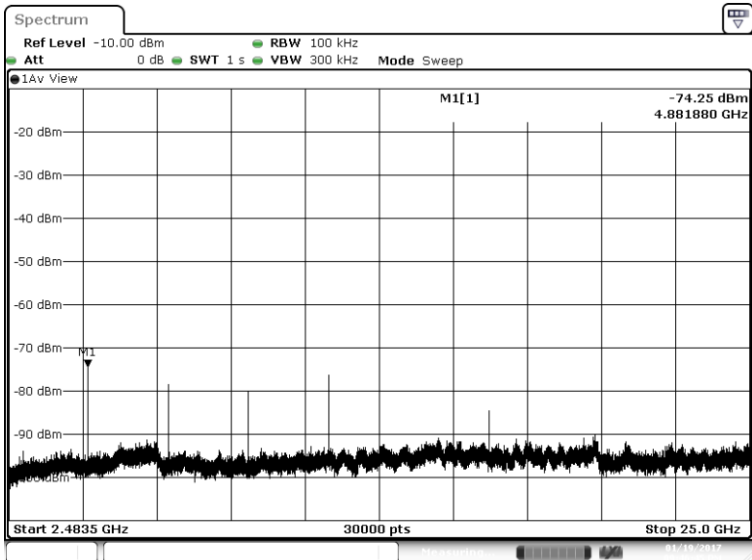
Channel	Band Range (MHz)	Mode	Raw Measurement (dBm)	Test Cable Loss (dB)	Pad ATTN (dB)	EUT Antenna Gain At Harmonic Frequency (dBi)	Corrected Reading (dBm)	Convert to E-Field at 3 meters (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Result
Mid	30 To 1000	DH5	-66.8	1.0	10.0	0.0	-55.8	39.40	74	34.60	Pass
Mid	2483.5 To 25000	DH5	-65.0	1.0	10.0	0.0	-54.0	41.18	74	32.82	Pass



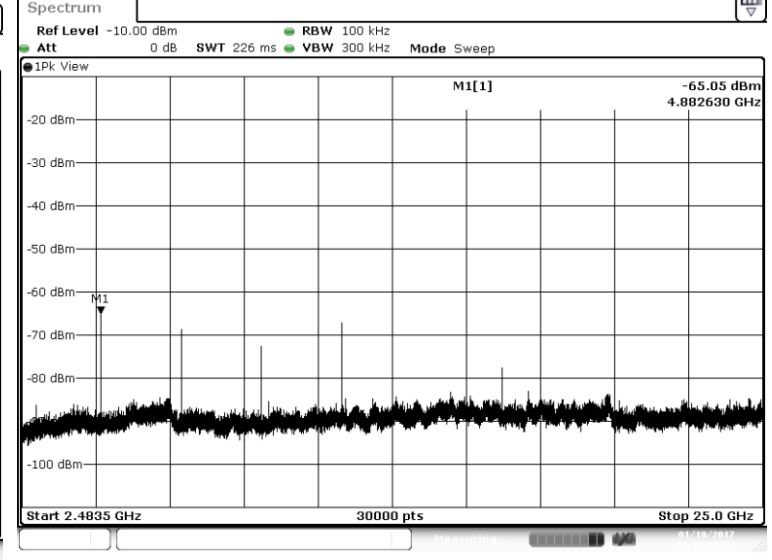
Plot1 DH5 2441 MHz Average Band 1



Plot1 DH5 2441 MHz Peak Band 1



Plot2 DH5 2441 MHz Average Band 2



Plot2 DH5 2441 MHz Peak Band 2



Certificate # 1514.1

DESIGN ASSURANCE ENGINEERING Wireless Transceiver Bluetooth Test Report

FCC ID: A94423816 IC: 3232A-423816

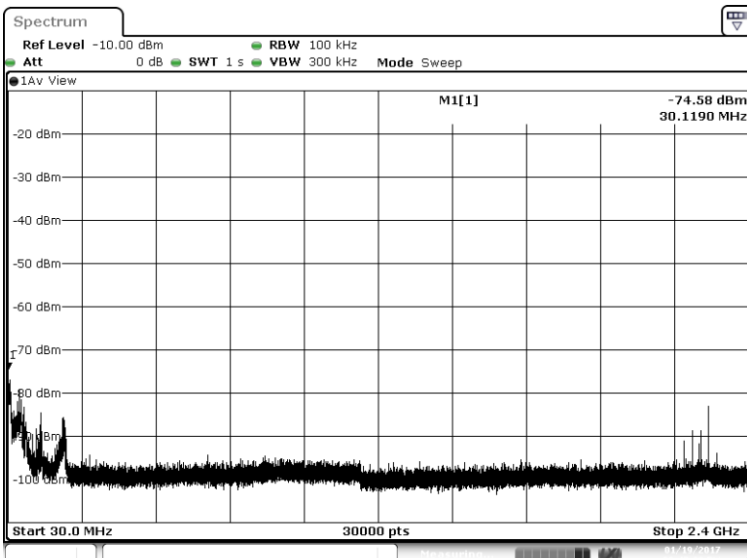


Spurious Summary Table (Basic Rate: 1 Mbps)

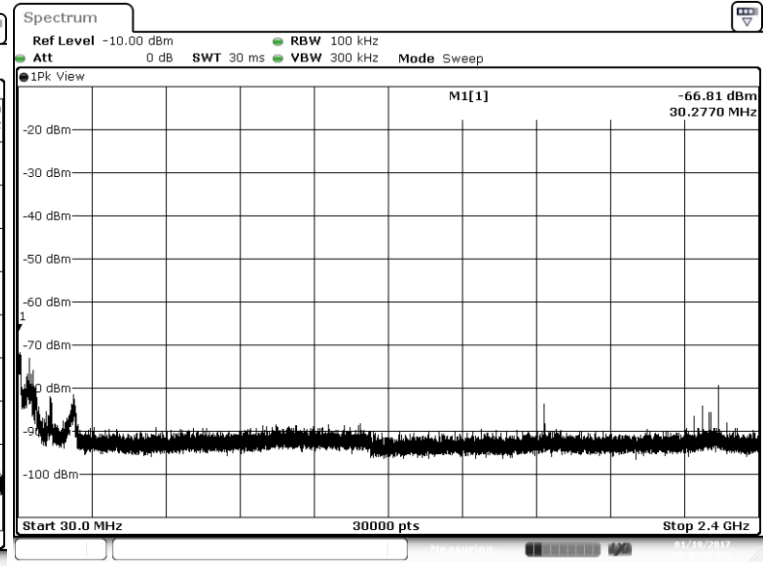
Channel	Band Range (MHz)	Mode	Raw Measurement (dBm)	Test Cable Loss (dB)	Pad ATTN (dB)	EUT Antenna Gain At Harmonic Frequency (dBi)	Corrected Reading (dBm)	Convert to E-Field at 3 meters (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Result
High	30 To 1000	DH5	-74.6	1.0	10.0	0.0	-63.6	31.65	54	22.35	Pass
High	2483.5 To 25000	DH5	-71.4	1.0	10.0	0.0	-60.4	34.88	54	19.12	Pass

Spurious Summary Table (Basic Rate: 1 Mbps)

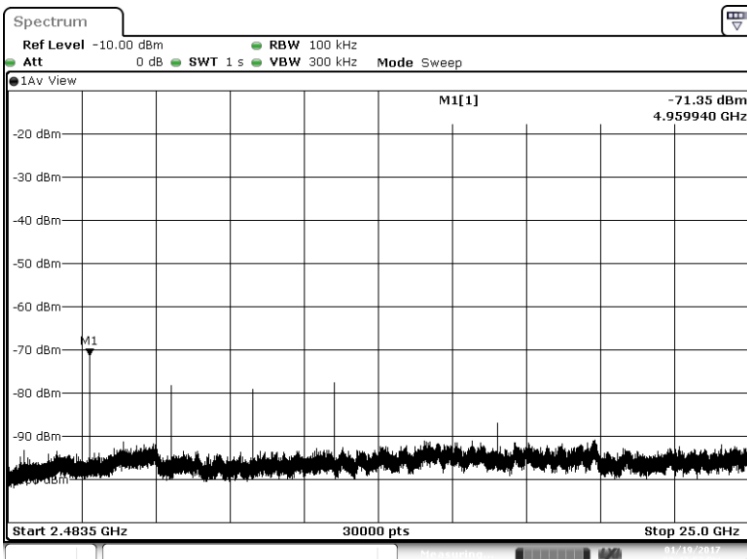
Channel	Band Range (MHz)	Mode	Raw Measurement (dBm)	Test Cable Loss (dB)	Pad ATTN (dB)	EUT Antenna Gain At Harmonic Frequency (dBi)	Corrected Reading (dBm)	Convert to E-Field at 3 meters (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Result
High	30 To 1000	DH5	-66.8	1.0	10.0	0.0	-55.8	39.42	74	34.58	Pass
High	2483.5 To 25000	DH5	-66.2	1.0	10.0	0.0	-55.2	40.01	74	33.99	Pass



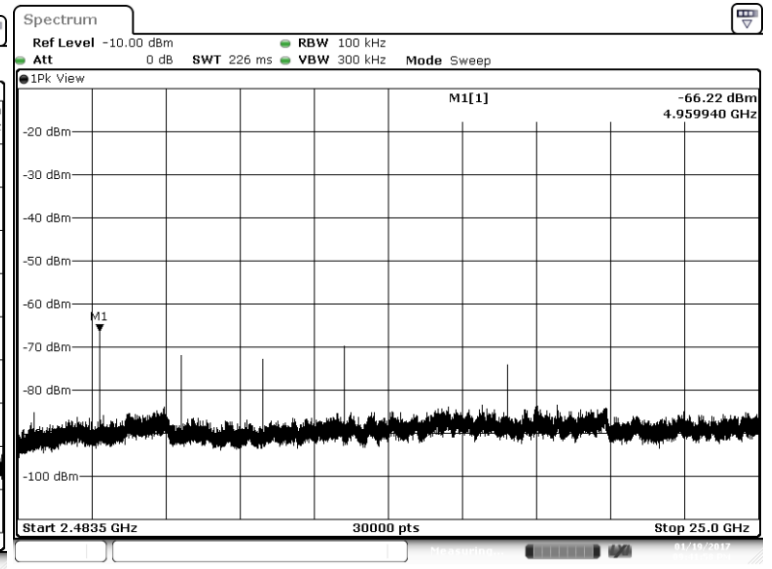
Plot1 DH5 2480 MHz Average Band 1



Plot1 DH5 2480 MHz Peak Band 1



Plot2 DH5 2480 MHz Average Band 2



Plot2 DH5 2480 MHz Peak Band 2



Certificate # 1514.1

DESIGN ASSURANCE ENGINEERING Wireless Transceiver Bluetooth Test Report

FCC ID: A94423816 IC: 3232A-423816

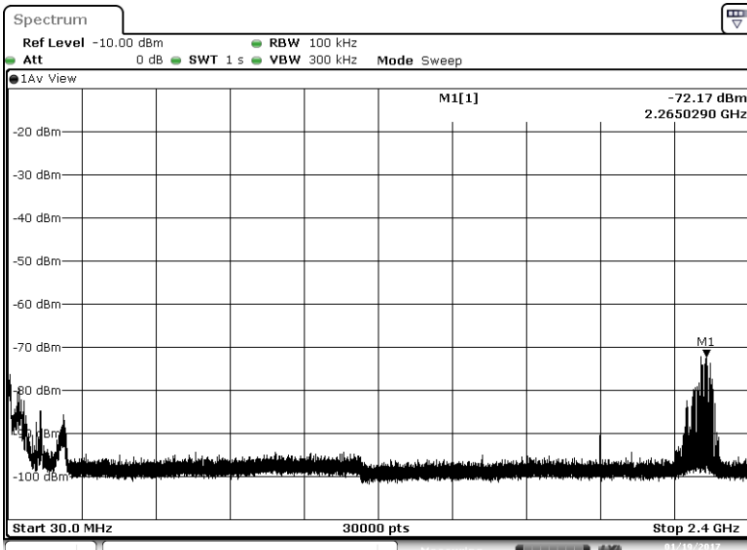


Spurious Summary Table (Basic Rate: 1Mbps)

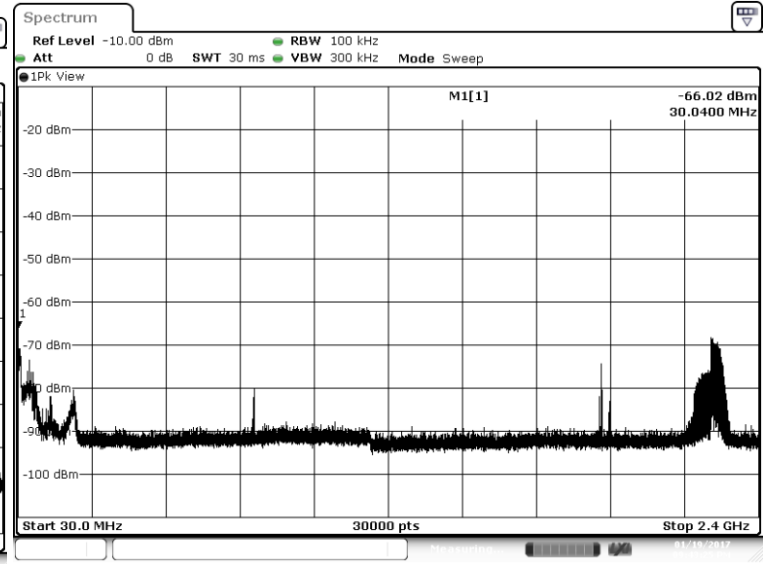
Channel	Band Range (MHz)	Mode	Raw Measurement (dBm)	Test Cable Loss (dB)	Pad ATTN (dB)	EUT Antenna Gain At Harmonic Frequency (dBi)	Corrected Reading (dBm)	Convert to E-Field at 3 meters (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Result
Hopping	30 To 1000	DH5	-72.2	1.0	10.0	0.0	-61.2	34.06	54	19.94	Pass
Hopping	2483.5 To 25000	DH5	-72.2	1.0	10.0	0.0	-61.2	33.98	54	20.02	Pass

Spurious Summary Table (Basic Rate: 1Mbps)

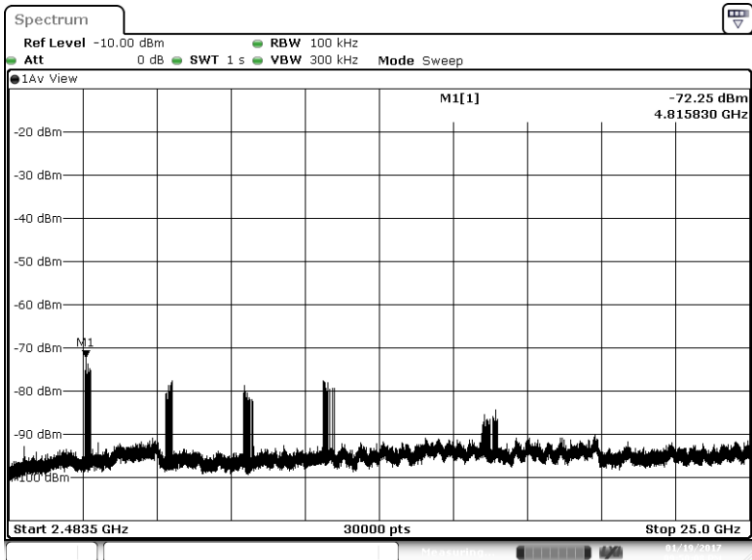
Channel	Band Range (MHz)	Mode	Raw Measurement (dBm)	Test Cable Loss (dB)	Pad ATTN (dB)	EUT Antenna Gain At Harmonic Frequency (dBi)	Corrected Reading (dBm)	Convert to E-Field at 3 meters (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Result
Hopping	30 To 1000	DH5	-66.0	1.0	10.0	0.0	-55.0	40.21	74	33.79	Pass
Hopping	2483.5 To 25000	DH5	-64.8	1.0	10.0	0.0	-53.8	41.40	74	32.60	Pass



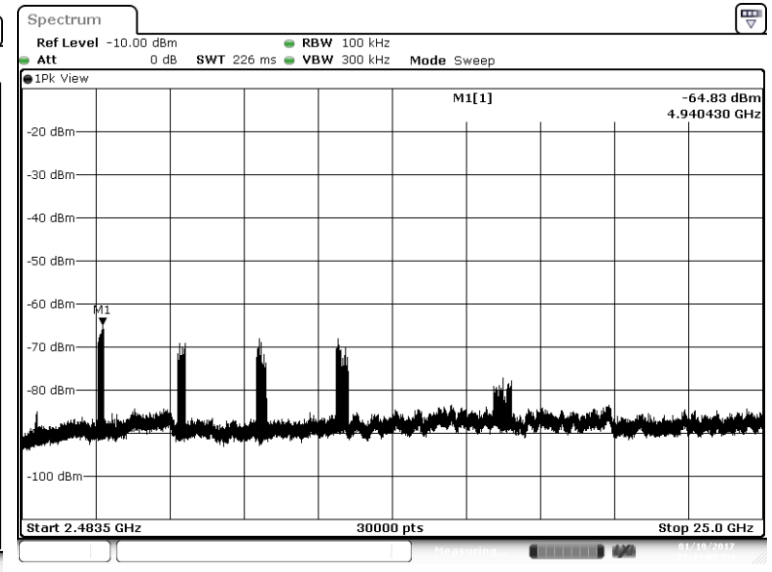
Plot1 DH5 Hopping Average Band 1



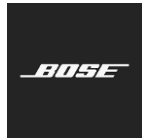
Plot1 DH5 Hopping Peak Band 1



Plot2 DH5 Hopping Average Band 2



Plot2 DH5 Hopping Peak Band 2



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.

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

Hop Rate = 1600 hops / S

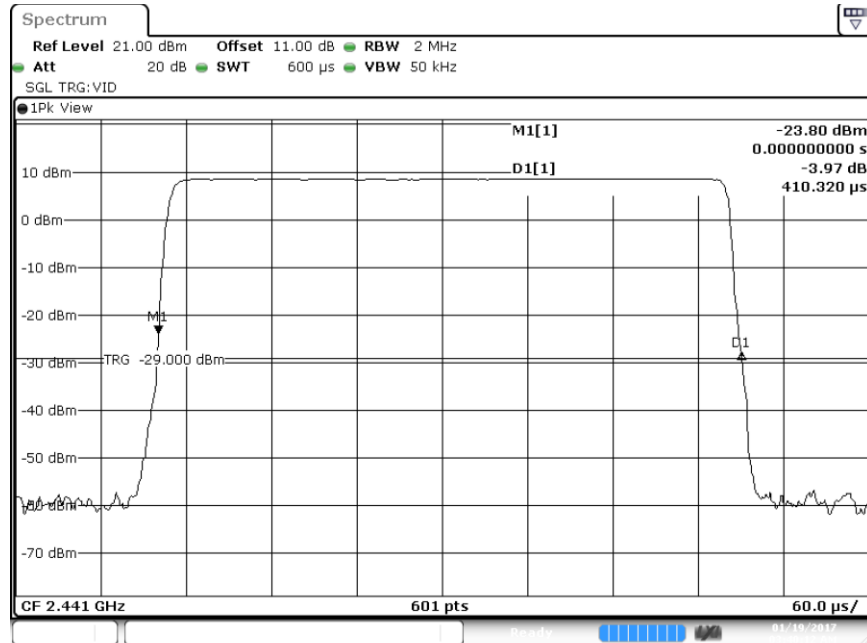
of channels = 79

of slots = number of slots used per packet in a given mode: DH1 = 2, DH3 = 4, DH5 = 6

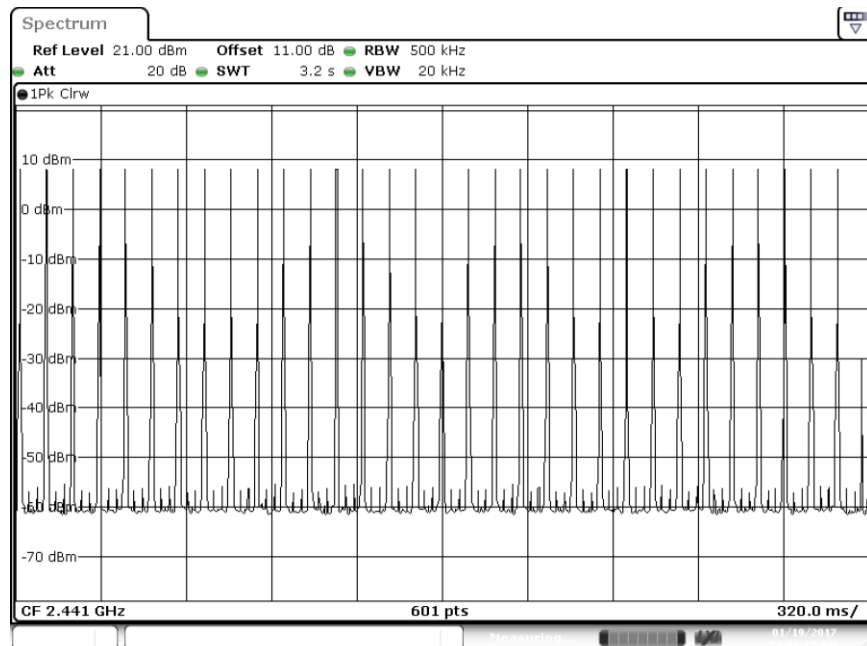
$$31.6 \text{ Seconds} = (79 \text{ channels}) * 0.4 \text{ Seconds}$$

$$8 \text{ Seconds} = (20 \text{ channels}) * 0.4 \text{ Seconds}$$

Test Results:

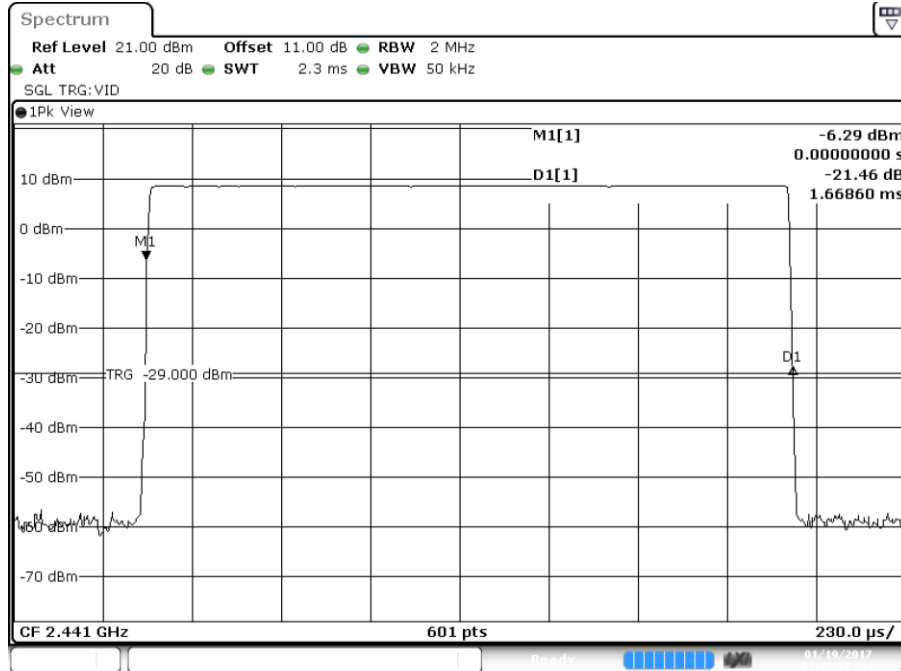


Plot1 2441 TX pulse width DH1

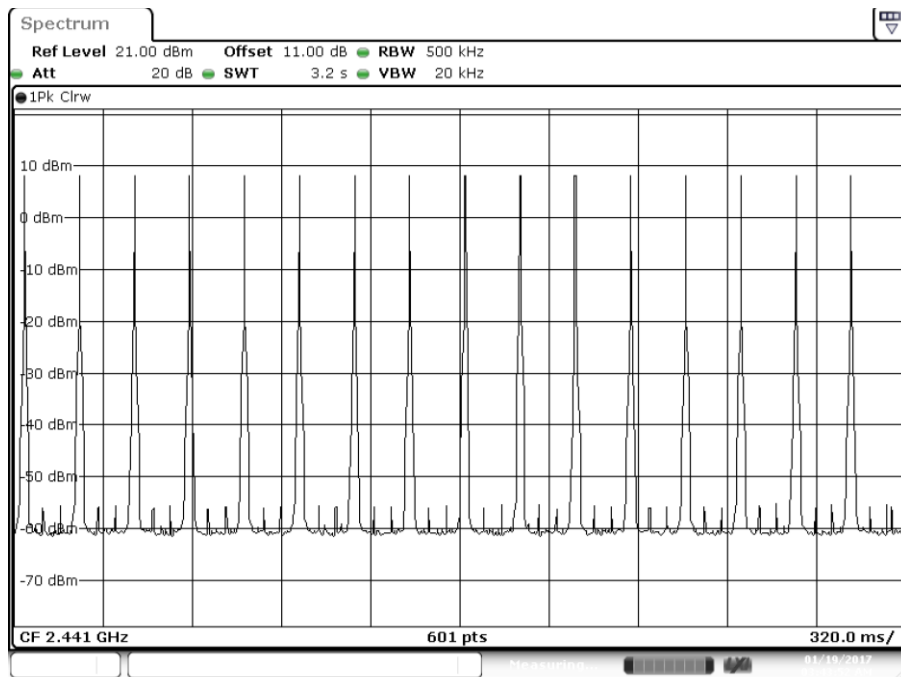


Plot10 2441 TX pulse count DH1

TX Pulse Width (xDH1)				79 Channels						20 Channels					
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	Number of pulses in 0.8 S	Number of pulses in 8 S (X 10)	Time of occupancy (Pulse Width X Number of pulses) (mS)	Limit (mS)	Margin (mS)	Result
Middle	2441	DH1	0.409	33	330	135.1	400	264.93	Pass	8	83	33.8	400	366.23	Pass
Middle	2441	2-DH1	0.422	32	315	133.0	400	266.98	Pass	8	79	33.3	400	366.74	Pass
Middle	2441	3-DH1	0.422	32	320	135.1	400	264.87	Pass	8	80	33.8	400	366.22	Pass

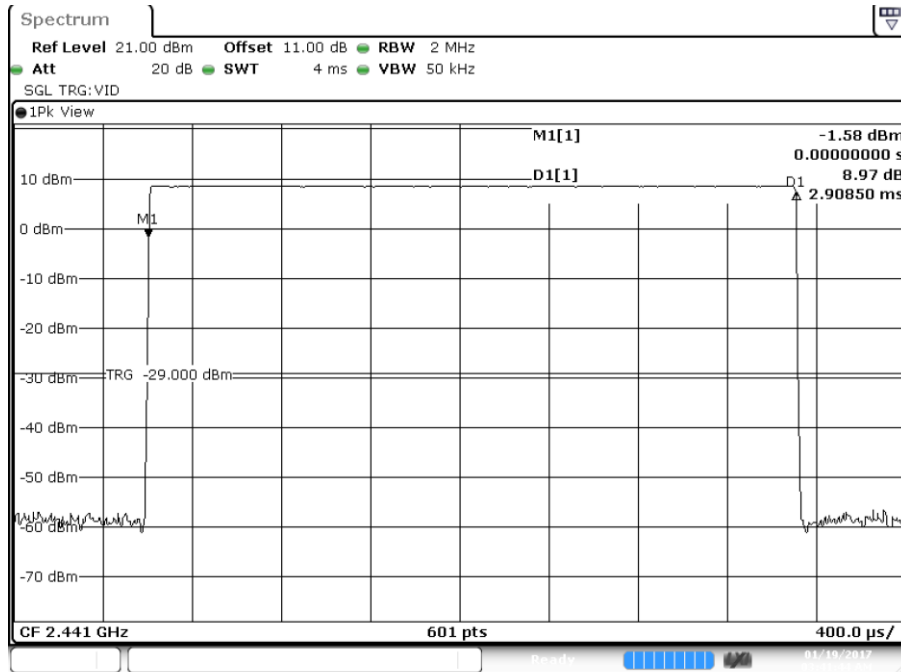


Plot4 2441 TX pulse width DH3

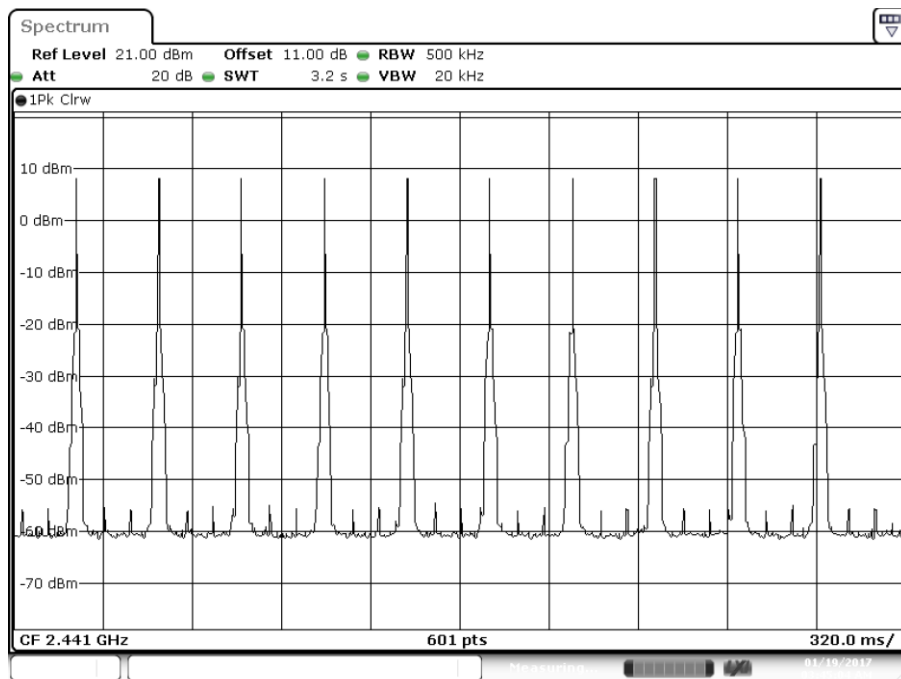


Plot13 2441 TX pulse count DH3

TX Pulse Width (xDH3)				20 Channels											
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	Number of pulses in 0.8 S	Number of pulses in 8 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	4	40	66.7	400	333.26	Pass
Middle	2441	2-DH3	1.676	17	170	285.0	400	115.04	Pass	4	43	71.2	400	328.76	Pass
Middle	2441	3-DH3	1.672	17	170	284.3	400	115.70	Pass	4	43	71.1	400	328.92	Pass



Plot7 2441 TX pulse width DH5



Plot16 2441 TX pulse count DH5

TX Pulse Width (xDH5)				20 Channels											
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	Number of pulses in 0.8 S	Number of pulses in 8 S (X 10)	Time of occupancy (Pulse Width X Number of pulses) (mS)	Limit (mS)	Margin (mS)	Result
Middle	2441	DH5	2.908	10	100	290.8	400	109.15	Pass	3	25	72.7	400	327.29	Pass
Middle	2441	2-DH5	2.915	11	110	320.7	400	79.33	Pass	3	28	80.2	400	319.83	Pass
Middle	2441	3-DH5	2.922	11	110	321.4	400	78.60	Pass	3	28	80.3	400	319.65	Pass

Number of Hopping Channels

Requirements:

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

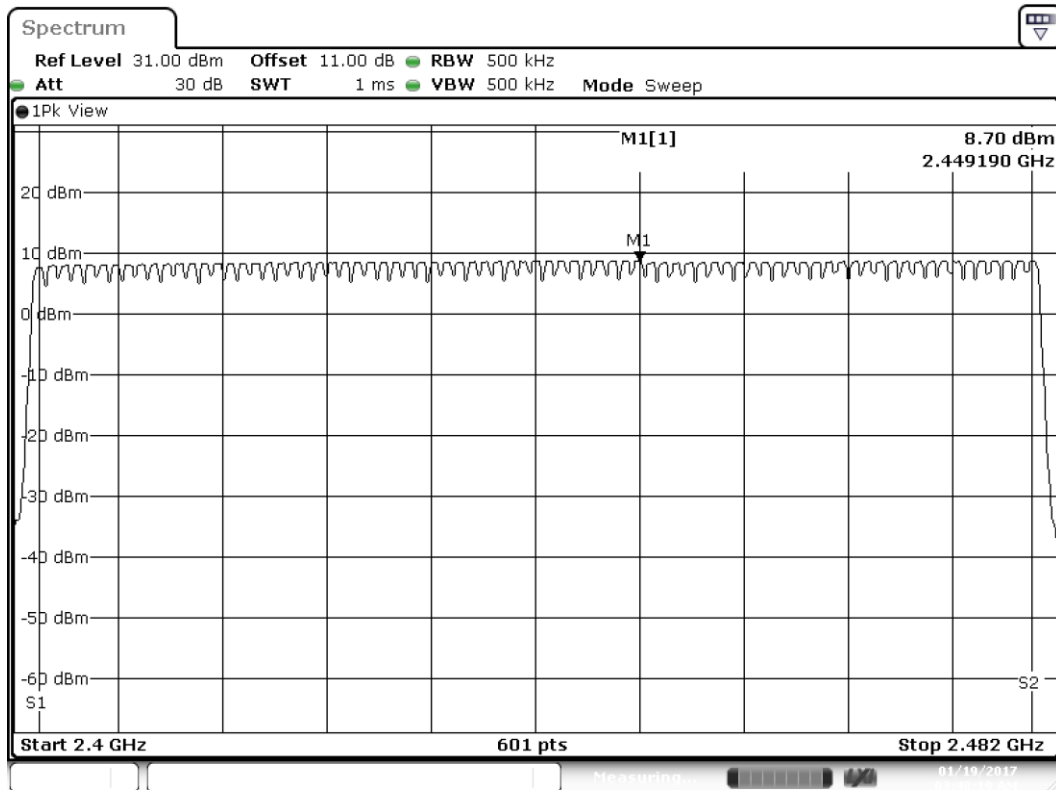
Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

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 operation (hopping through all available channels) in basic and enhanced data rate modes.

Test Results:



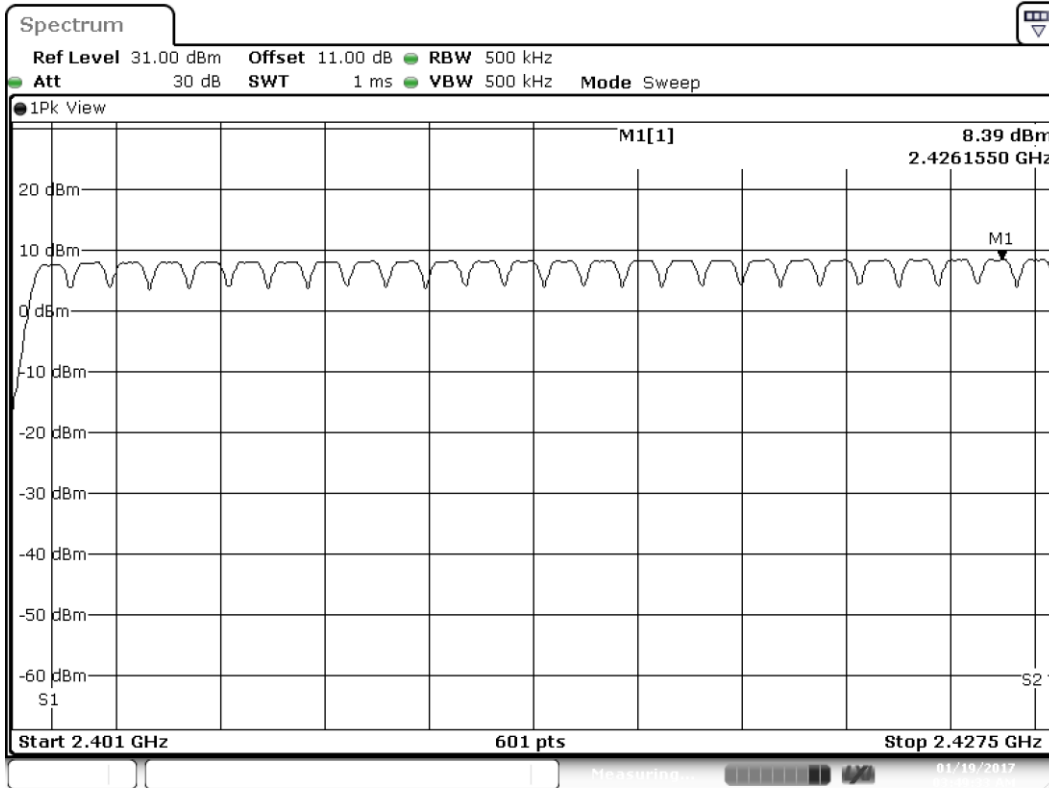
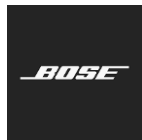
Plot1 79 Hopping Frequency DH5



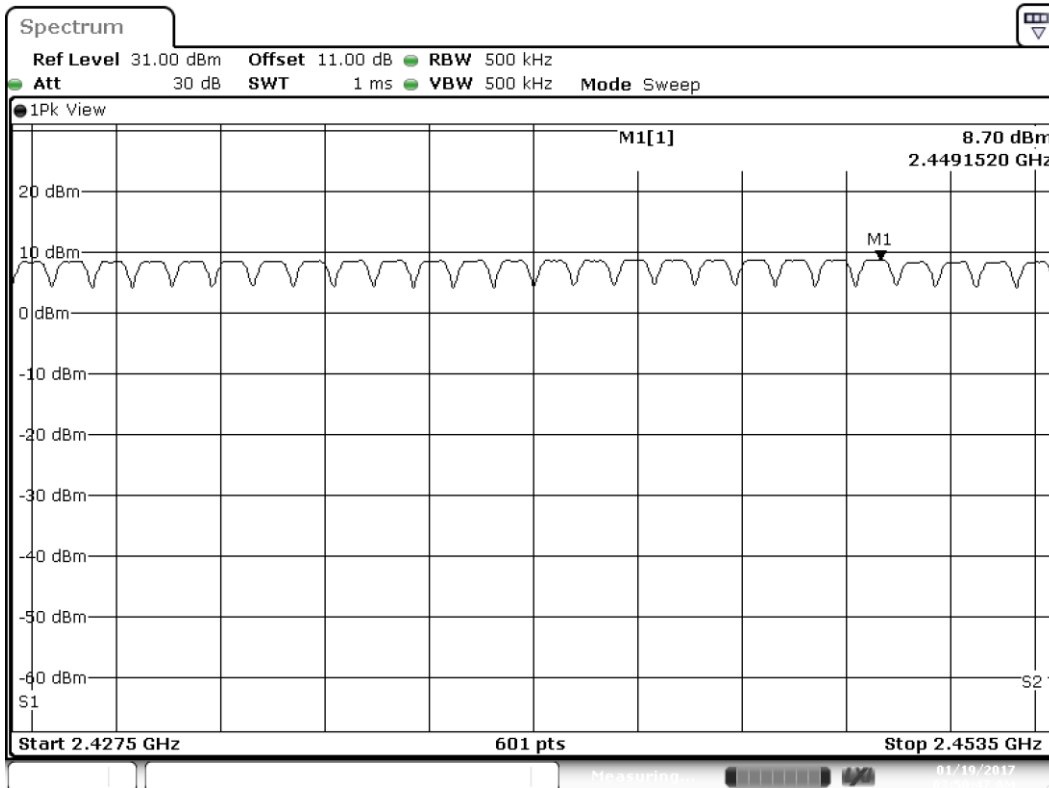
Certificate # 1514.1

DESIGN ASSURANCE ENGINEERING Wireless Transceiver Bluetooth Test Report

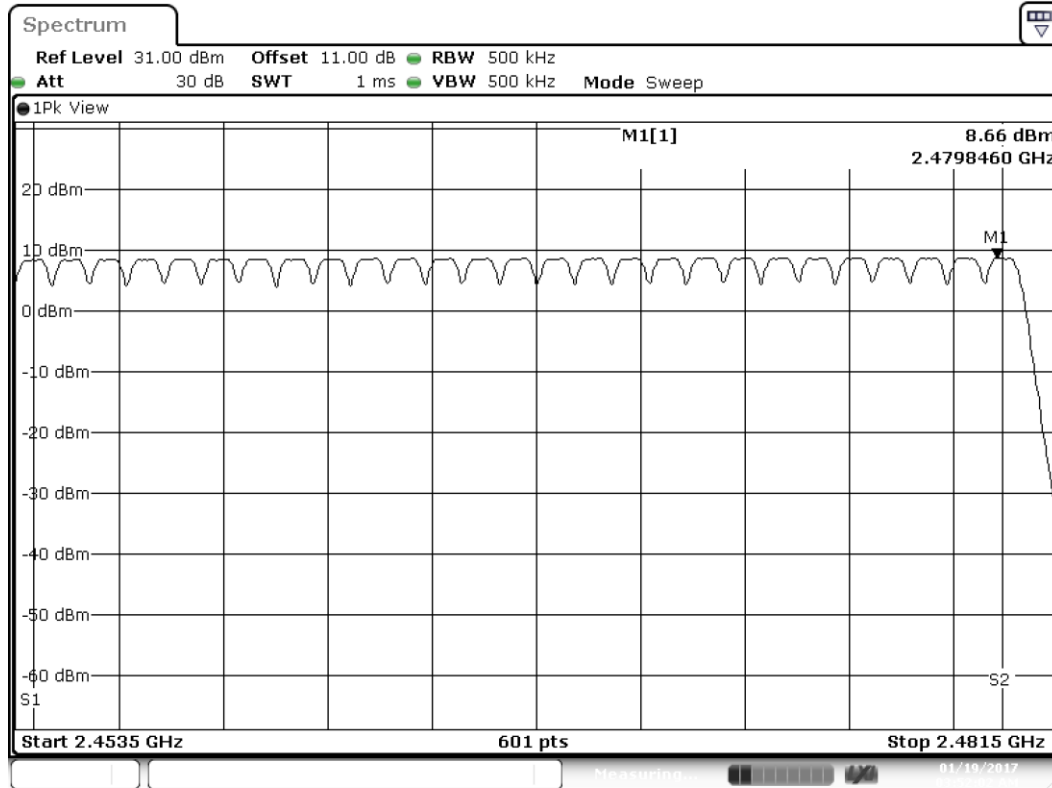
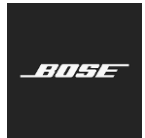
FCC ID: A94423816 IC: 3232A-423816



Plot2 1st segment DH5 (26 Frequencies)



Plot3 2nd segment DH5 (26 Frequencies)



Plot4 3rd segment DH5 (27 Frequencies)

Conducted Measurements Resources Used

TN	Description	Model	S/N	Manufacturer	Most Recent Calibration	Calibration Due Date	Most Recent Verification	Verification Due Date
2409	Spectrum Analyzer	FSV40	101413	Rohde & Schwarz	07-Apr-2016	07-Apr-2017	n/a	n/a
2342	Band Reject Filter	BRM50702-07	001	Micro-Tronics	n/a	n/a	29-Mar-2016	29-Mar-2017



Radiated Emissions Test Results

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), 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

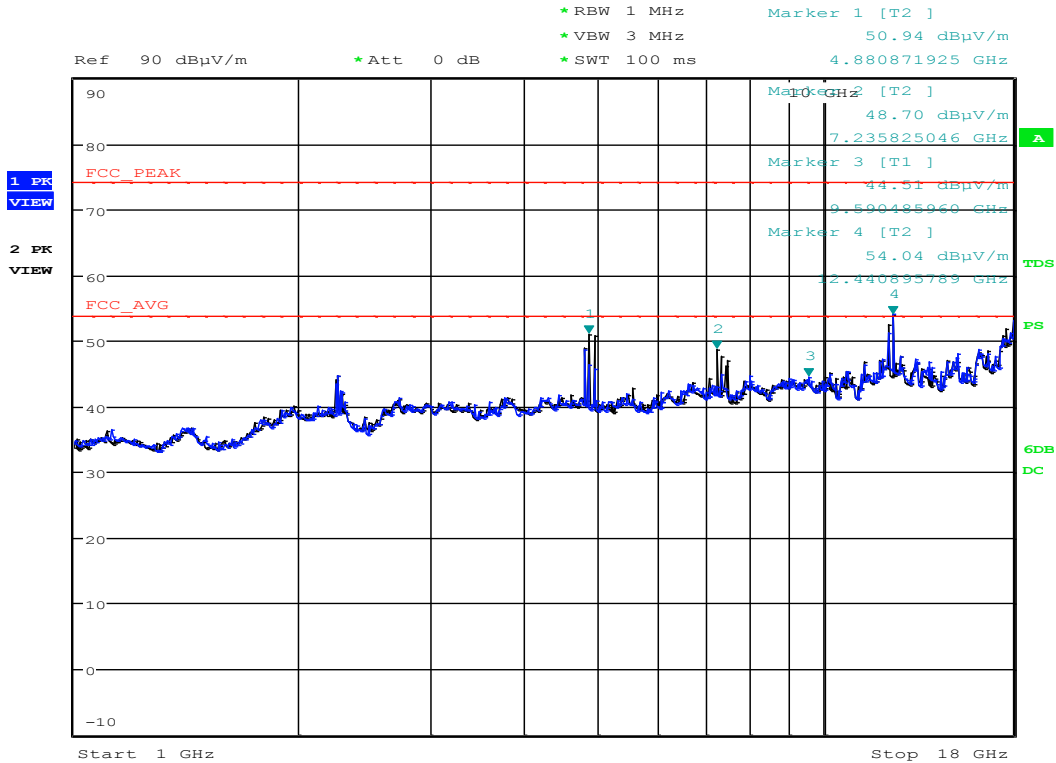
The EUT is placed in a standard ANSI C63.10 test setup. Standard Gain Horn Antennas and Double Ridged Guide Horn Antennas with suitable pre-amps mounted directly on the horn antennas are used for the measurement of the harmonics. The EUT hopping is stopped and measurements are made in the low, mid and high end of the frequency range at the defined limit distance of 3 meters. 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 measurements. 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.

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 1GHz, the resolution bandwidth and video bandwidth are set as described in ANSI C63.10:2013 for the applicable measurement. An average detector was used and a duty cycle correction factor was added to correspond to the average during the transmission.

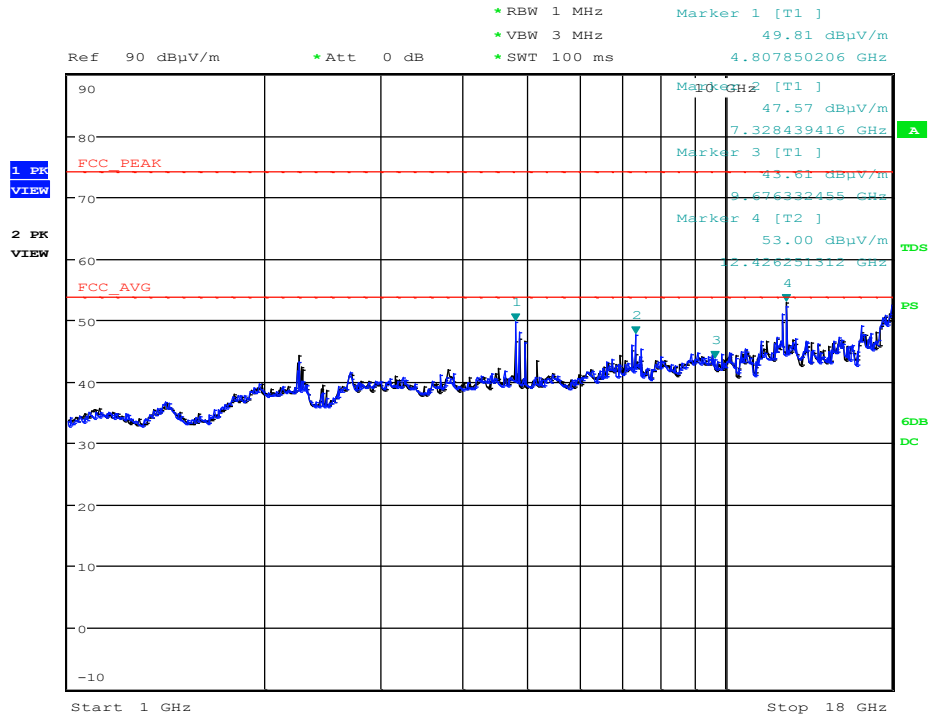
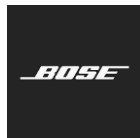


Transmitter Harmonics/Spurious

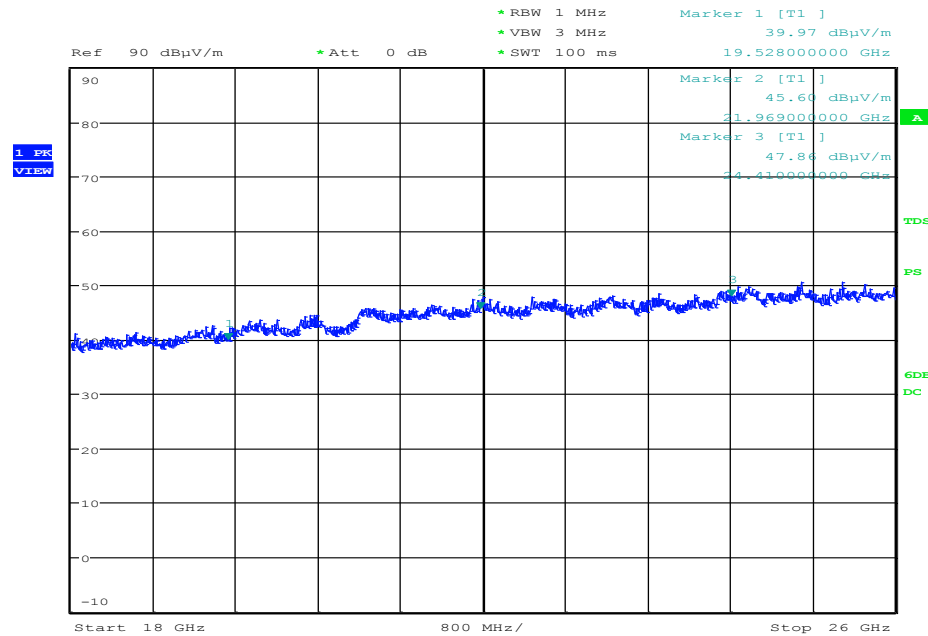
For these readings, a notch filter was used to protect the EMI receiver from overload. A correction factor was applied to account for the effect of the notch filter. For the plots capturing the entire frequency range the EUT was hopping on all channels to capture all emissions. For individual readings, the hopping was disabled to maximize the duty cycle.



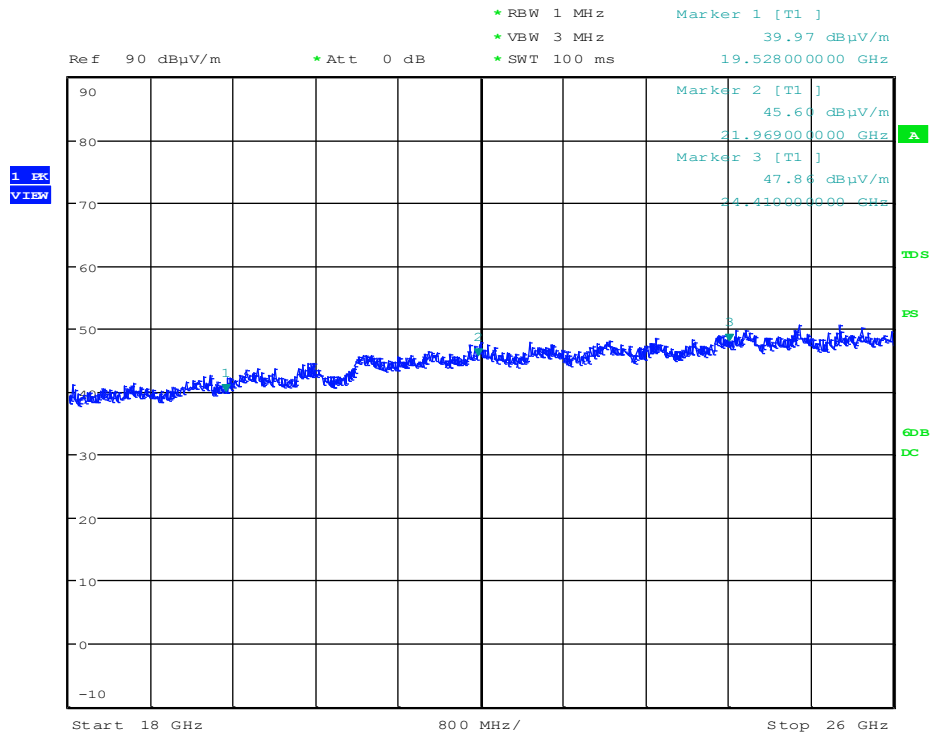
DH5, hopping, vertical orientation
 Date: 19.JAN.2017 17:15:07



DH5, hopping, horizontal orientation
 Date: 18.JAN.2017 19:34:19



DH5, hopping, 1 m antenna distance.
 No harmonics visible.
 Date: 24.JAN.2017 19:33:31



DH5, hopping, 1 m antenna distance.
 No harmonics visible.
 Date: 24.JAN.2017 19:33:31

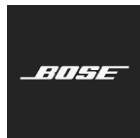


Certificate # 1514.1

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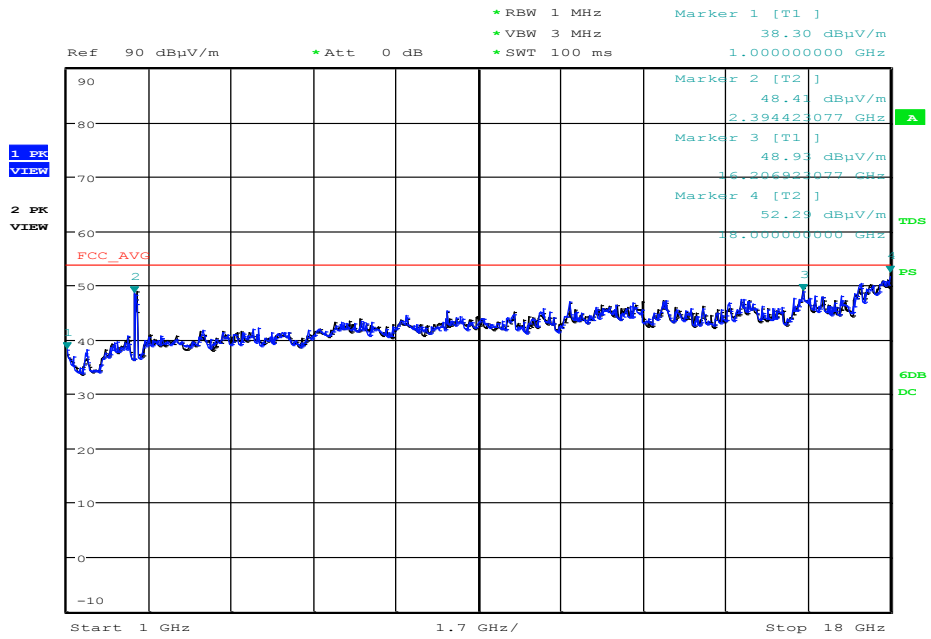
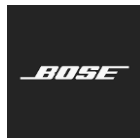
Wireless Transceiver Bluetooth Test Report

FCC ID: A94423816 IC: 3232A-423816



FCC Tx Harmonics @ 3 Meters										
Emission Frequency (MHz)	Measured Amplitude (dBµV/m) AVG	Measured Amplitude (dBµV/m) Peak	FCC 15B				Table Azimuth (0° closest to ant)	Receiving Antenna		Notes / Mode
			Limit (dBµV/m) AVG	Limit (dBµV/m) Peak	Margin (dB) AVG	Margin (dB) Peak		Pol (H/V)	Height (Meters)	
2402, vertical single frequency										
4803.976	43.50	50.20	54.0	74.0	10.5	23.8	41	H	1.6	
7205.961	41.70	50.40	72.1	80.8	30.4	30.4	325	H	2.6	
9608.000	32.20	46.20	72.1	80.8	39.9	34.6				noise floor
12010.024	37.50	51.10	54.0	74.0	16.5	22.9	135	H	2.7	
14412.000	33.60	47.20	72.1	80.8	38.5	33.6				noise floor
16814.023	33.70	48.20	72.1	80.8	38.4	32.6				noise floor
2441, vertical single frequency										
4881.957	43.30	49.80	54.0	74.0	10.7	24.2	40	H	1.6	
7323.011	42.10	50.90	54.0	74.0	11.9	23.1	329	H	2.6	
9764.000	31.60	45.40	72.1	80.8	40.5	35.4				noise floor
12204.939	39.60	52.40	54.0	74.0	14.4	21.6	139	H	1.5	
14646.000	34.30	48.50	72.1	80.8	37.8	32.3				noise floor
17087.026	34.70	48.50	72.1	80.8	37.4	32.3				noise floor
2480, vertical single frequency										
4959.955	44.10	50.80	54.0	74.0	9.9	23.2	38	H	1.0	
7439.948	41.10	50.60	54.0	74.0	12.9	23.4	323	H	2.4	
9919.952	33.30	47.20	72.1	80.8	38.8	33.6	32	H	2.7	
12399.966	43.50	55.40	54.0	74.0	10.5	18.6	139	H	4.0	
14880.000	34.00	48.00	72.1	80.8	38.1	32.8				noise floor
17360.019	37.90	51.90	72.1	80.8	34.2	28.9				noise floor

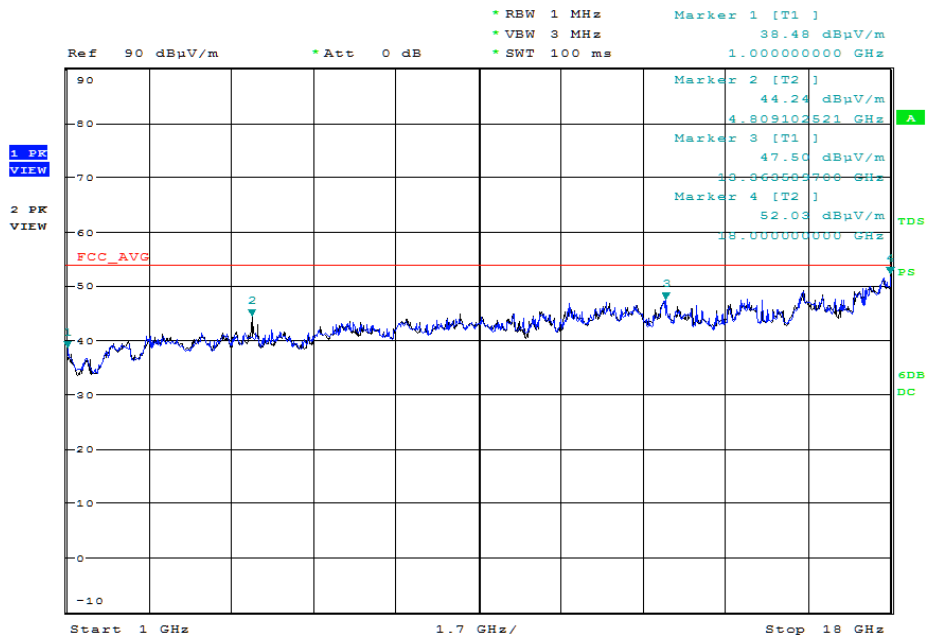
FCC Tx Harmonics @ 3 Meters										
Emission Frequency (MHz)	Measured Amplitude (dBµV/m) AVG	Measured Amplitude (dBµV/m) Peak	FCC 15B				Table Azimuth (0° closest to ant)	Receiving Antenna		Notes / Mode
			Limit (dBµV/m) AVG	Limit (dBµV/m) Peak	Margin (dB) AVG	Margin (dB) Peak		Pol (H/V)	Height (Meters)	
2402, horizontal single frequency										
4803.976	46.50	52.30	54.0	74.0	7.5	21.7	334	V	1.0	
7205.961	40.70	50.00	73.6	82.6	32.9	32.6	298	V	1.0	
9608.000	32.50	46.30	73.6	82.6	41.1	36.3				noise floor
12010.024	37.40	50.40	54.0	74.0	16.6	23.6	217	H	2.3	
14412.000	33.60	47.90	73.6	82.6	40.0	34.7				noise floor
16814.023	33.70	48.40	73.6	82.6	39.9	34.2				noise floor
2441, horizontal single frequency										
4881.989	44.90	51.10	54.0	74.0	9.1	22.9	330	V	1.0	
7323.011	41.50	50.50	54.0	74.0	12.5	23.5	300	V	1.0	
9764.000	31.20	45.30	73.6	82.6	42.4	37.3				noise floor
12204.939	41.90	54.70	54.0	74.0	12.1	19.3	232	H	2.2	
14646.000	34.30	48.40	73.6	82.6	39.3	34.2				noise floor
17087.026	34.70	47.90	73.6	82.6	38.9	34.7				noise floor
2480, horizontal single frequency										
4959.979	43.60	50.00	54.0	74.0	10.4	24.0	313	V	1.0	
7439.948	40.50	49.70	54.0	74.0	13.5	24.3	299	V	1.0	
9919.952	34.20	46.90	73.6	82.6	39.4	35.7	127	V	1.0	
12399.966	43.30	55.30	54.0	74.0	10.7	18.7	242	H	2.2	
14880.000	33.90	48.10	73.6	82.6	39.7	34.5				noise floor
17360.019	38.10	52.00	73.6	82.6	35.5	30.6				noise floor



Charging, pink noise at max volume.

 Horizontal orientation

 Date: 23.JAN.2017 22:58:26



Charging, pink noise at max volume.

 Vertical orientation

 Date: 23.JAN.2017 22:11:03



Certificate # 1514.1

DESIGN ASSURANCE ENGINEERING
Wireless Transceiver Bluetooth Test Report

FCC ID: A94423816 IC: 3232A-423816



FCC 15B Class B Product (Residential) @ 3 Meters

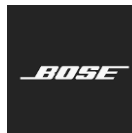
Emission Frequency (MHz)	Measured Amplitude (dBµV/m) QP	Measured Amplitude (dBµV/m) Peak	FCC 15B				Table Azimuth (0° closest to ant)	Receiving Antenna Pol (H/V)	Antenna Height (Meters)	*Average detector used for frequencies Notes / Mode
			Limit (dBµV/m) QP/AVG*	Limit (dBµV/m) Peak	Margin (dB) QP/AVG*	Margin (dB) Peak				
Charging and playing pink noise at max volume										
Horizontal orientation										
1000.000	21.40	50.40	54.0	74.0	32.6	23.6	160	V	1.4	
2394.423			54.0	74.0						Tx fundamental
16206.923	37.20	51.80	54.0	74.0	16.8	22.2				noise floor
18000.000	40.70	55.20	54.0	74.0	13.3	18.8				noise floor
Charging and playing pink noise at max volume										
Vertical orientation										
1000.000	22.20	35.90	54.0	74.0	31.8	38.1	231	V	2.9	
4809.103			54.0	74.0						harmonic
13363.590	35.50	49.90	54.0	74.0	18.5	24.1				noise floor
18000.000	40.70	54.50	54.0	74.0	13.3	19.5				noise floor
On battery and playing pink noise at max volume										
Vertical orientation										
2253.205	25.60	41.90	54.0	74.0	28.4	32.1				noise floor
4841.346			54.0	74.0						harmonic
13368.590	35.30	49.30	54.0	74.0	18.7	24.7				noise floor
18000.000	40.70	54.30	54.0	74.0	13.3	19.7	360	V	1.0	noise floor
On battery and playing pink noise at max volume										
Horizontal orientation										
1108.974	22.30	36.10	54.0	74.0	31.7	37.9	360	V	1.0	
1417.051	23.40	37.40	54.0	74.0	30.6	36.6	0	V	1.0	
13322.500	35.10	49.00	54.0	74.0	18.9	25.0				noise floor
17844.936	39.70	54.10	54.0	74.0	14.3	19.9				noise floor



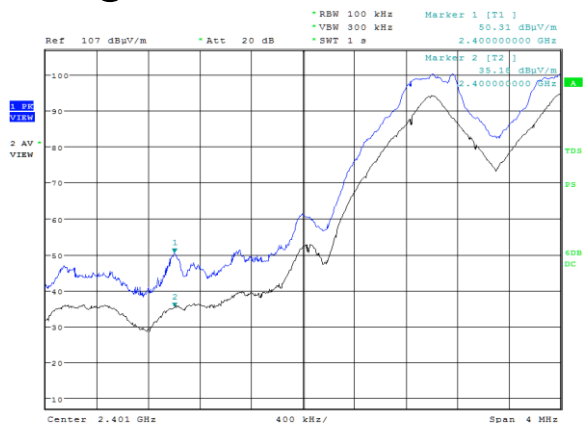
Certificate # 1514.1

DESIGN ASSURANCE ENGINEERING Wireless Transceiver Bluetooth Test Report

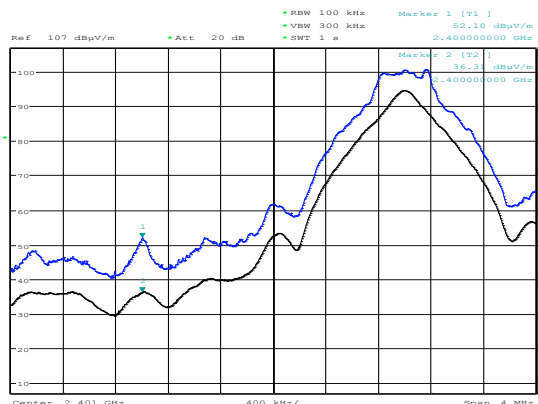
FCC ID: A94423816 IC: 3232A-423816



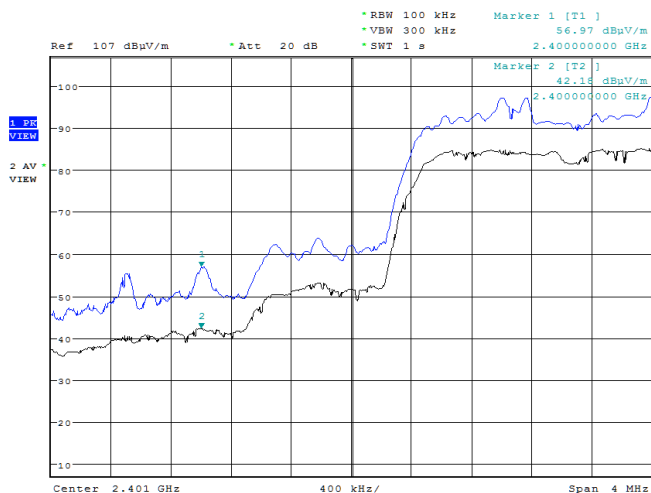
Band edge radiated emission measurements:



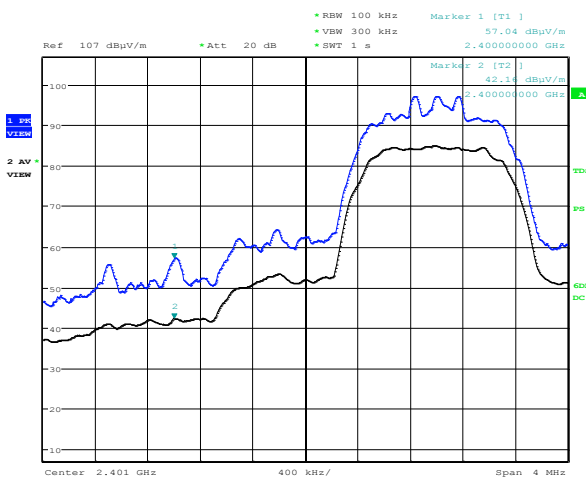
DHS hopping, Lower band edge, vertical orientation
Date: 19.JAN.2017 21:24:22



DHS, Lower band edge, vertical orientation
Date: 19.JAN.2017 18:37:15



3-DHS hopping, Lower band edge, vertical orientation
Date: 19.JAN.2017 23:06:07



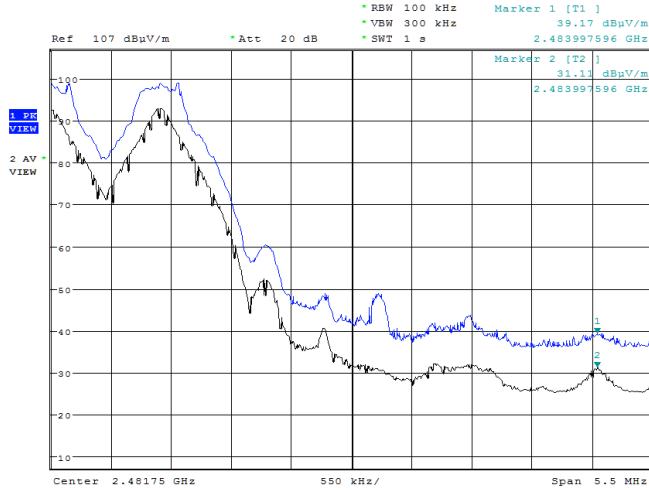
3-DHS, Lower band edge, vertical orientation
Date: 19.JAN.2017 20:10:25



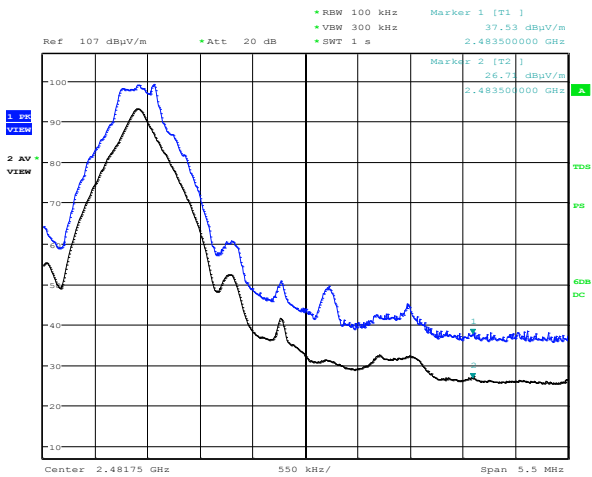
Certificate # 1514.1

DESIGN ASSURANCE ENGINEERING Wireless Transceiver Bluetooth Test Report

FCC ID: A94423816 IC: 3232A-423816



DH5 hopping, Upper band edge, vertical orientation
Date: 19.JAN.2017 21:41:47



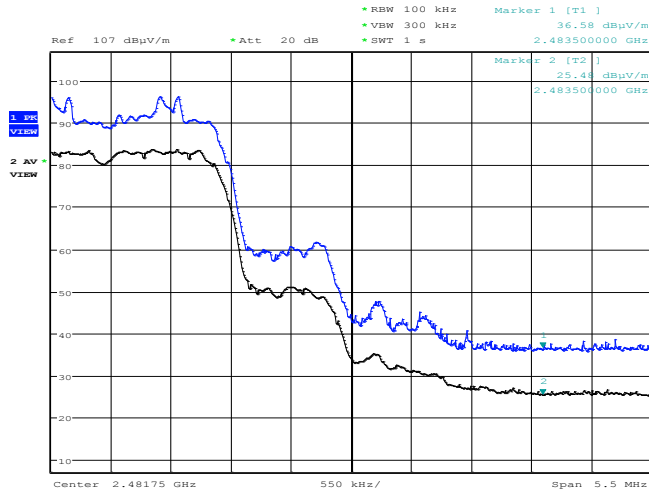
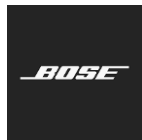
DH5, Upper band edge, vertical orientation
Date: 19.JAN.2017 18:47:03



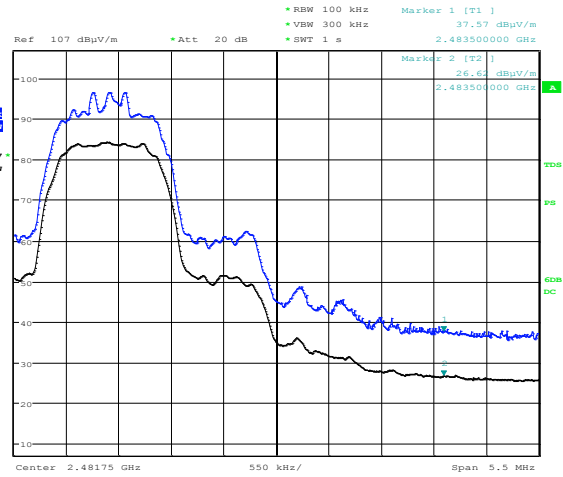
Certificate # 1514.1

DESIGN ASSURANCE ENGINEERING Wireless Transceiver Bluetooth Test Report

FCC ID: A94423816 IC: 3232A-423816



3=DH5 hopping, Upper band edge, vertical orientation
Date: 19.JAN.2017 23:18:52



3=DH5, Upper band edge, vertical orientation
Date: 19.JAN.2017 20:19:43



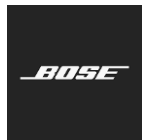
Certificate # 1514.1

DESIGN ASSURANCE ENGINEERING Wireless Transceiver Bluetooth Test Report

FCC ID: A94423816 IC: 3232A-423816



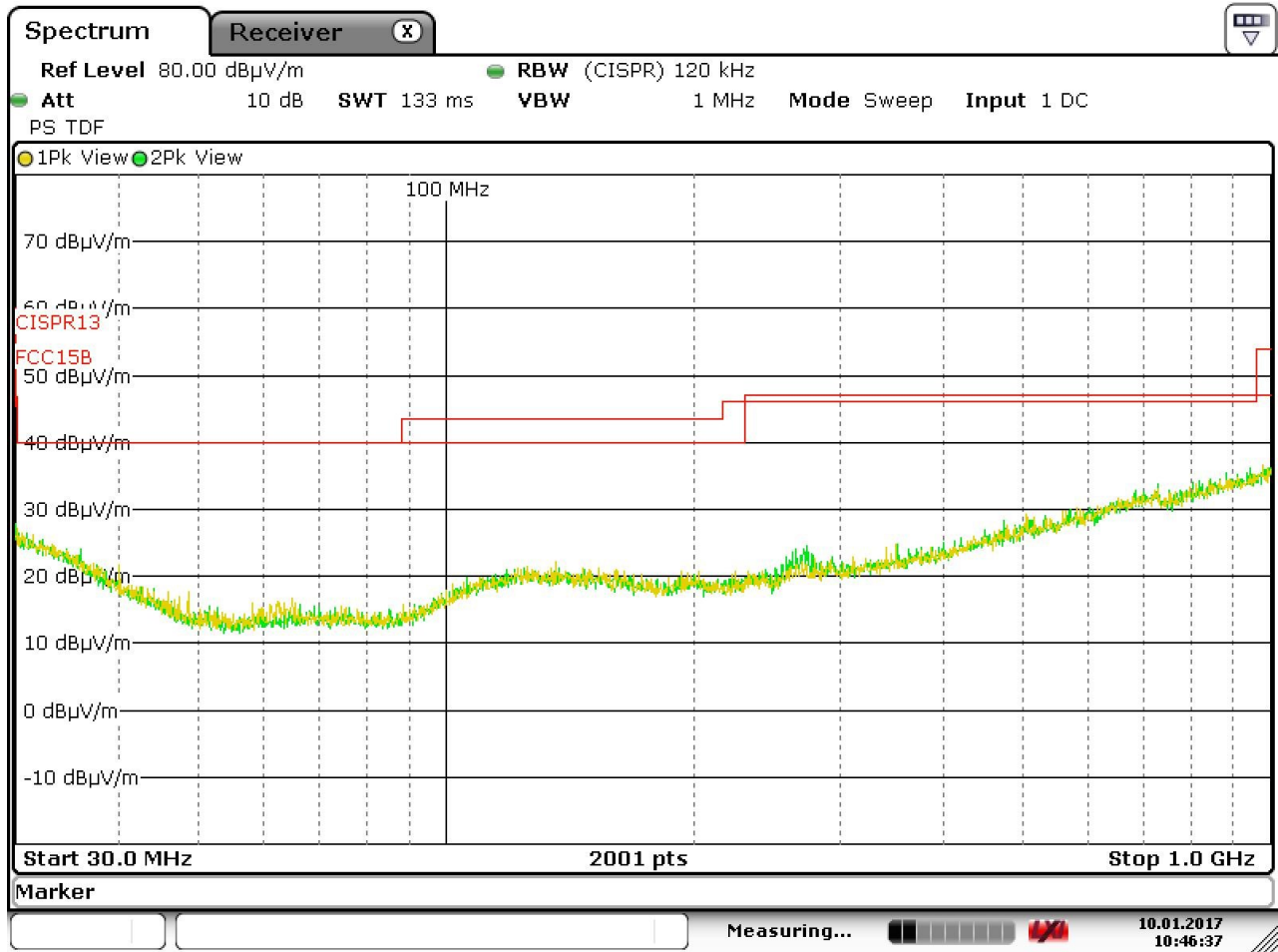
FCC 15B Class B Product (Residential) @ 3 Meters										
Emission Frequency (MHz)	Measured Amplitude (dBµV/m) AVG	Measured Amplitude (dBµV/m) Peak	FCC 15B				Table Azimuth (0° closest to ant)	Receiving Antenna		Notes / Mode
			Limit (dBµV/m) AVG	Limit (dBµV/m) Peak	Margin (dB) AVG	Margin (dB) Peak		Pol (H/V)	Height (Meters)	
Marker-Delta readings										
	98.00	103.00								1 MHz RBW, Max levels
2402.000	98.00	103.00					32	V	1.3	1 MHz
2441.000	96.20	101.80					105	H	1.4	1 MHz
2480.000	96.90	102.70					117	H	1.3	1 MHz
2402.000	92.10	100.80					32	V	1.3	100 kHz RBW
2441.000	91.20	99.40					105	H	1.4	100 kHz RBW
2480.000	91.30	100.10					117	H	1.3	100 kHz RBW
	92.10	100.80								100 kHz RBW, Max levels
2400.000	35.20	50.30					32	V	1.3	100 kHz RBW
2483.998	31.10	39.20					117	H	1.3	100 kHz RBW
Lower Band Edge										
2400.000	35.10	57.20	72.1	80.8	37.0	23.6	32	V	1.3	Standard method
Upper Band Edge										
2483.998	34.30	49.10	54.0	74.0	19.7	24.9	117	H	1.3	Standard method
Marker-Delta readings										
	92.30	97.90								1 MHz RBW, Max levels
2402.000	92.30	97.90					32	V	1.3	1 MHz
2441.000	91.40	97.00					105	H	1.4	1 MHz
2480.000	91.60	97.10					117	H	1.3	1 MHz
2402.000	82.40	97.30					32	V	1.3	100 kHz RBW
2441.000	81.70	96.60					105	H	1.4	100 kHz RBW
2480.000	81.70	96.60					117	H	1.3	100 kHz RBW
	82.40	97.30								100 kHz RBW, Max levels
2400.000	42.20	57.00					32	V	1.3	100 kHz RBW
2483.500	25.50	36.60					117	H	1.3	100 kHz RBW
Lower Band Edge										
2400.000	35.70	66.00	62.4	77.3	26.7	11.3	32	V	1.3	Standard method
Upper Band Edge										
2483.500	34.20	47.90	54.0	74.0	19.8	26.1	117	H	1.3	Standard method



Resources Used

TN	Description	Model	S/N	Manufacturer	Most Recent Calibration	Calibration Due Date	Most Recent Verification	Verification Due Date
1663	EMI Test Receiver	ESU40	100098	Rohde & Schwarz	06-Apr-2016	06-Apr-2017	n/a	n/a
2357	RF Cable 30MHz-18GHz	TRU-300	TRU- 12707-03	TRU Corporation	n/a	n/a	08-Jan-2016	07-Jan-2018
2373	RF Cable 30MHz-18GHz	TRU-300	N/A	TRU Corporation	n/a	n/a	12-Nov-2014	12-Nov-2017
2385	Marconi Manor	3 Meter Chamber	N/A	AP Americas	n/a	n/a	24-Nov-2015	24-Nov-2018
2478	RF cable 30MHz-18GHz	257-257- 3052640	N/A	SRC Haverhill	n/a	n/a	06-Jan-2016	05-Jan-2018
2342	Band Reject Filter	BRM50702-07	001	Micro-Tronics	n/a	n/a	29-Mar-2016	29-Mar-2017
2602	Miteq pre-amp 1-18GHz 35dB	AFS42- 01001800-28- 10P-42	N/A	Miteq	n/a	n/a	08-Jan-2016	07-Jan-2018
1757	18GHz-40GHz Preamp	JS4018004000- 30-8P-A1	1406279	Miteq	n/a	n/a	08-Jan-2016	07-Jan-2018
1596	Standard Gain Horn Antenna 18GHz - 26.5GHz	AT4640	309234	Amplifier Research	n/a	n/a	n/a	n/a
2368	RF Cable 30MHz- 26.5GHz	TRU-210	TRU- 12767-35	TRU Corporation	n/a	n/a	08-Jan-2016	07-Jan-2018
2349	Double Ridged Guide Horn Antenna 1- 18GHz	3117	00152406	ETS Lindgren	23-Nov-2016	23-Nov- 2017	n/a	n/a

30-1000MHz radiated emissions:



Date: 10.JAN.2017 10:46:37

Max-Hold Peak Pre-scan, 30 MHz to 1 GHz – max volume pink noise in BT mode, **battery powered (second sample)**. Yellow trace is VERT, Green trace is HORZ

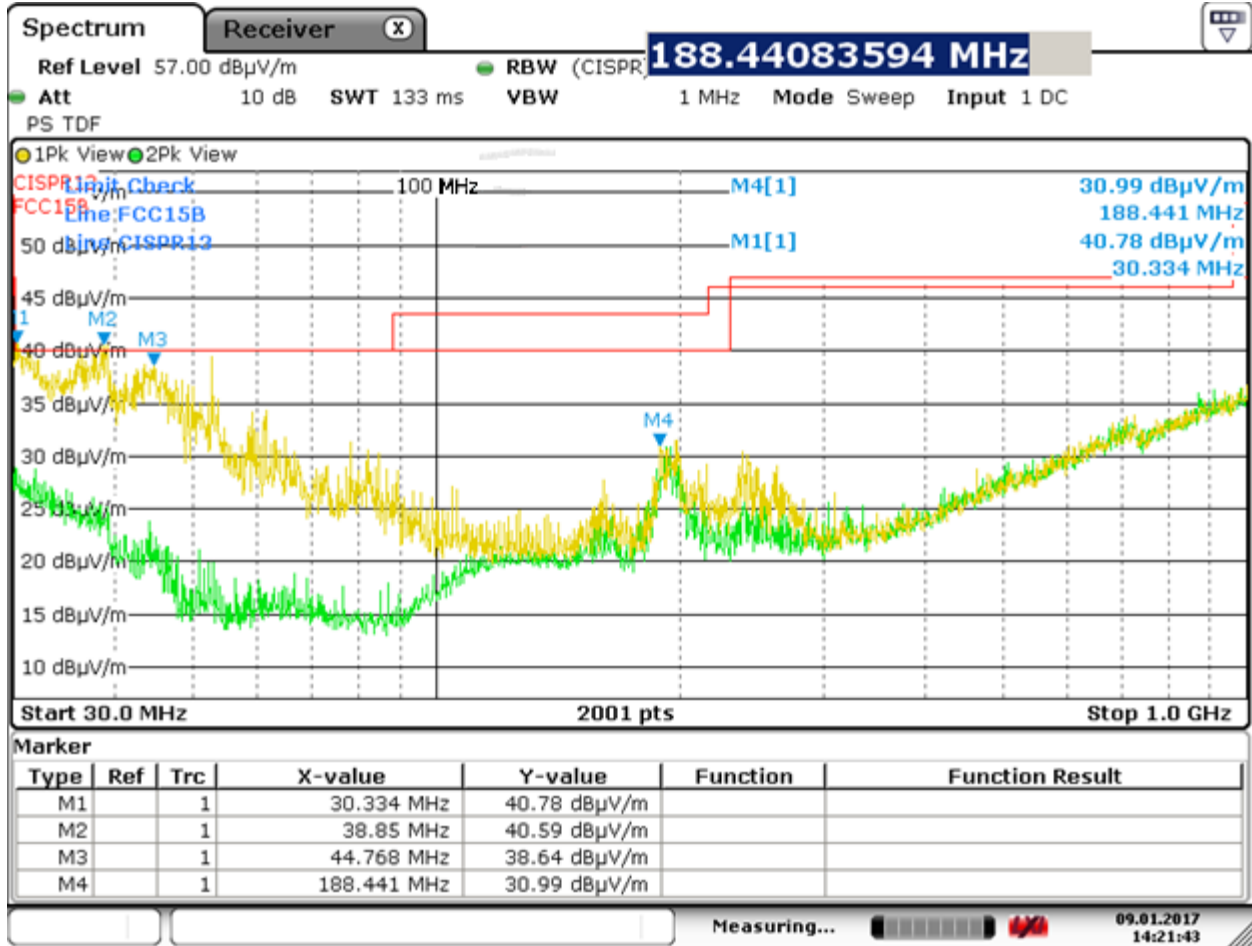
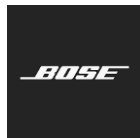
Playing max volume pink noise via Bluetooth while battery powered there were not any emissions close enough to the limit to maximize.



Certificate # 1514.1

DESIGN ASSURANCE ENGINEERING Wireless Transceiver Bluetooth Test Report

FCC ID: A94423816 IC: 3232A-423816



Max-Hold Peak Pre-scan, 30 MHz to 1 GHz – max volume pink noise in BT mode, 120V AC Mains
Yellow trace is VERT, Green trace is HORZ

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
			Limit (dBµV/m) QP/AVG*	Limit (dBµV/m) Peak	Margin (dB) QP/AVG*	Margin (dB) Peak		Pol (H/V)	Height (Meters)	
30.334	35.60	42.10	40.0	N/A	4.4	N/A	0	V	1.0	
38.850	34.40	42.20	40.0	N/A	5.6	N/A	200	V	1.0	
44.768	31.40	40.40	40.0	N/A	8.6	N/A	0	V	1.0	
52.802	26.40	38.20	40.0	N/A	13.6	N/A	0	V	1.0	
188.626	26.20	33.80	43.5	N/A	17.3	N/A	158	V	1.0	
197.425	25.90	33.50	43.5	N/A	17.6	N/A	187	V	1.0	

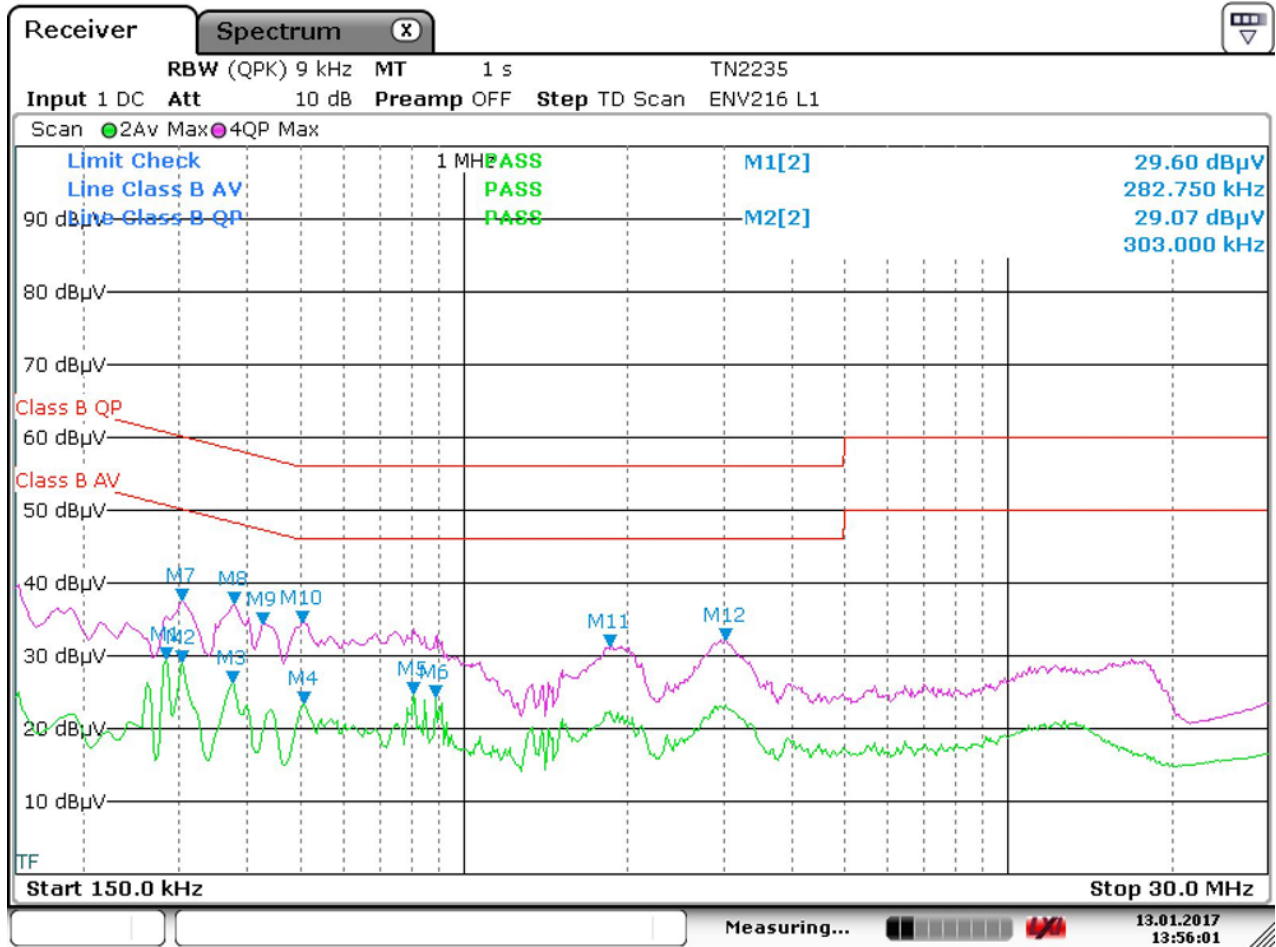
Model 423816 in Bluetooth mode powered at 120V passes FCC Class B by 4.4 dB at 30.3 MHz.



Resources Used

TN	Description	Model	S/N	Manufacturer	Most Recent Calibration	Calibration Due Date	Most Recent Verification	Verification Due Date
2319	EMI Test Receiver	ESR26	101276	Rohde & Schwarz	14-Apr-2016	14-Apr-2017	n/a	n/a
644	Maxwell House 3 Meter Chamber	N/A	1698A	EM Test	n/a	n/a	23-Mar-2016	23-Mar-2018
1445	Maxwell House Cable Set	N/A	N/A	Bose Corporation	n/a	n/a	21-Mar-2016	21-Mar-2017
2077	Preamplifier	N/A	N/A	Bose Corporation	n/a	n/a	21-Mar-2016	21-Mar-2017
1541	Antenna 30MHz - 6GHz, Broadband Hybrid Antenna	JB6	A050807	Sunol Sciences Corp	24-Oct-2016	24-Oct-2017	n/a	n/a
1569	Comb Generator	CG-520	451016	Com-Power Corporation	n/a	n/a	26-Jan-2016	25-Jan-2018
2281	iPod touch	16GB	CCQM2PAUFFCJ	Apple	Verify before use	Verify before use	Verify before use	Verify before use

AC Power Line Conducted Emissions



Max Hold plot with QP and Average detectors: 150 kHz to 30 MHz, Line/Neutral

120 V – Max volume Pink noise via BT

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	
0.2828	35.50	29.60	60.7	50.7	25.2	21.1	120V, max volume pink noise via BT
0.3030	37.70	29.10	60.2	50.2	22.5	21.1	120V, max volume pink noise via BT
0.3750	36.90	26.20	58.4	48.4	21.5	22.2	120V, max volume pink noise via BT
0.3773	37.20	26.10	58.3	48.3	21.1	22.2	120V, max volume pink noise via BT
0.4268	34.40	19.70	57.3	47.3	22.9	27.6	120V, max volume pink noise via BT
0.5055	34.60	23.40	56.0	46.0	21.4	22.6	120V, max volume pink noise via BT
0.5078	34.50	23.40	56.0	46.0	21.5	22.6	120V, max volume pink noise via BT
0.8070	33.70	24.80	56.0	46.0	22.3	21.2	120V, max volume pink noise via BT
0.8880	32.90	24.30	56.0	46.0	23.1	21.7	120V, max volume pink noise via BT
1.8578	31.30	22.40	56.0	46.0	24.7	23.6	120V, max volume pink noise via BT
3.0345	32.20	23.10	56.0	46.0	23.8	22.9	120V, max volume pink noise via BT

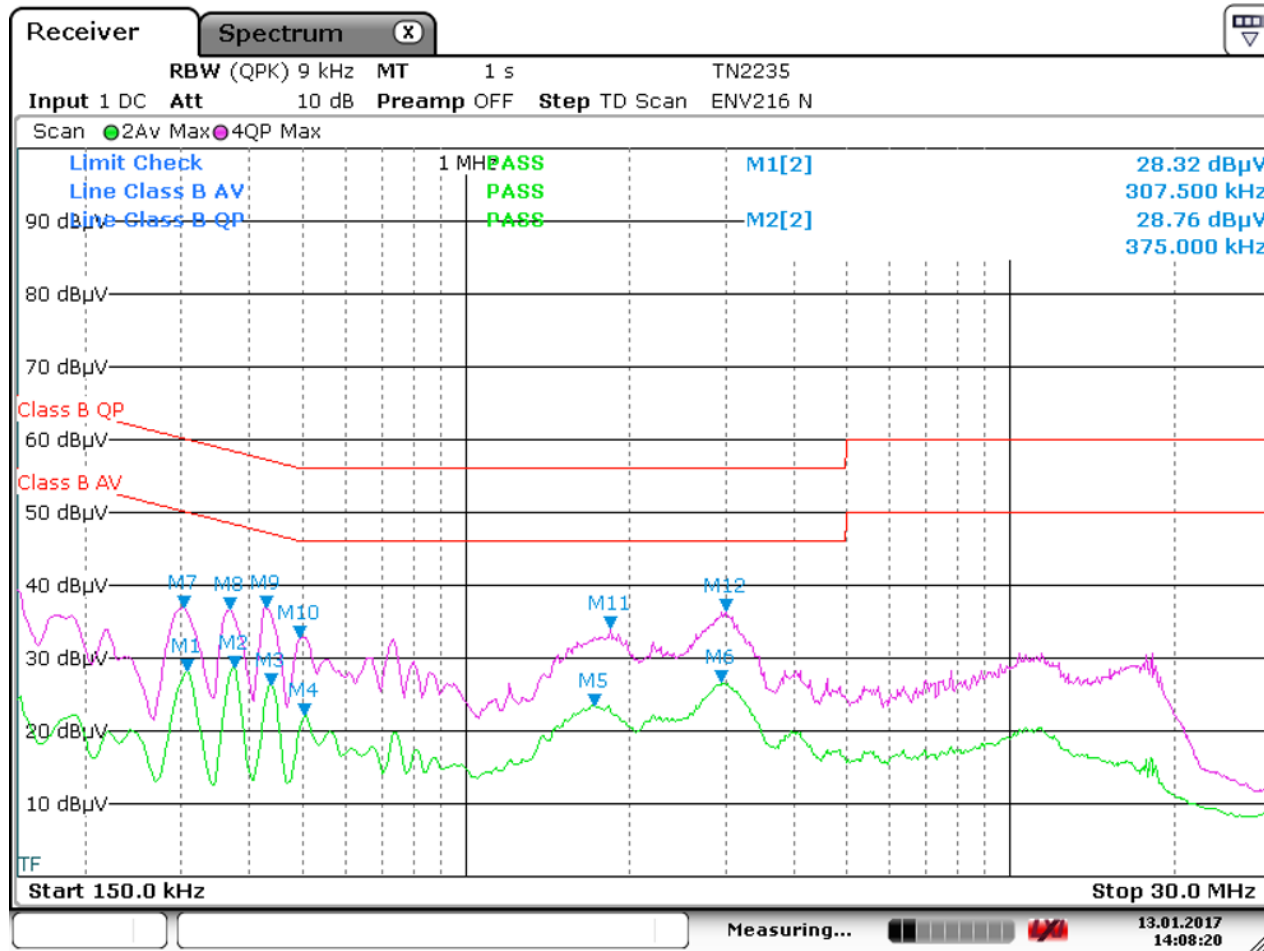
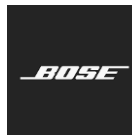
DP1 Minnow **Passes** FCC Class B conducted emissions by 21.1 dB at 0.283 MHz when powered at 120V playing max volume pink noise via BT



Certificate # 1514.1

DESIGN ASSURANCE ENGINEERING Wireless Transceiver Bluetooth Test Report

FCC ID: A94423816 IC: 3232A-423816



Max Hold plot: 150 kHz to 30 MHz, Line/Neutral

120 V – Standby mode

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	
2.9513	36.30	26.70	56.0	46.0	19.7	19.3	120V, standby mode
3.0165	36.40	26.50	56.0	46.0	19.6	19.5	120V, standby mode
0.3750	35.80	28.80	58.4	48.4	22.6	19.6	120V, standby mode
0.4290	36.90	24.80	57.3	47.3	20.4	22.5	120V, standby mode
0.4380	36.20	26.40	57.1	47.1	20.9	20.7	120V, standby mode
0.3683	36.70	27.70	58.5	48.5	21.8	20.8	120V, standby mode
0.3075	36.80	28.30	60.0	50.0	23.2	21.7	120V, standby mode
1.8443	34.10	22.80	56.0	46.0	21.9	23.2	120V, standby mode
0.3030	37.00	27.90	60.2	50.2	23.2	22.3	120V, standby mode
1.7250	32.90	23.50	56.0	46.0	23.1	22.5	120V, standby mode
0.5055	32.80	22.10	56.0	46.0	23.2	23.9	120V, standby mode
0.4965	32.80	21.30	56.1	46.1	23.3	24.8	120V, standby mode

DP1 Minnow **Passes** FCC Class B conducted emissions by 19.3 dB at 2.9513 MHz when powered at 120V in Standby mode



Resources Used

TN	Description	Model	S/N	Manufacturer	Most Recent Calibration	Calibration Due Date	Most Recent Verification	Verification Due Date
2247	EMI Test Receiver, 7GHZ	ESR7	101263	Rohde & Schwarz	08-Apr-2016	08-Apr-2017	n/a	n/a
1380	Conducted Comb Generator	CGC-510	311559	Com-Power Corporation	n/a	n/a	28-Mar-2016	28-Mar-2017
2235	2-LINE V-NETWORK	ENV216	101192	Rohde & Schwarz	03-Dec-2015	02-Dec-2017	n/a	n/a

End of Report