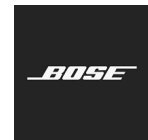




PRODUCT ASSURANCE ENGINEERING
Wireless Transceiver DSS/DTS Test Report



FCC ID: A94BMD0011 IC: 3232A-BMD0011

Test Type: Emissions Immunity

Product Type: Wireless Headphones

Product Name/Number: *Model Number(s): BMD0011*
FCC ID: A94BMD0011
IC: 3232A-BMD0011

Prepared For: *Product Assurance Engineering Department,*
Bose Corporation

Test Results: Pass Fail

Applicable Standards: Unintentional Radiated Interference referenced in:
FCC CFR 47 Part 15 Subpart B
FCC CFR 47 Part 15 Subpart C
Industry Canada RSS-247 Issue 2
Industry Canada RSS-GEN Issue 5

Report Number: *EMC.433948.20.174.3*

General Comments/Special Test Conditions:

This report relates only to the items tested. This report covers EMC marking requirements for model BMD0011

	Print Name	Signature	Date
Prepared By:	Karl Klemm		6/26/2020
Electrical Engineer Review* By:	Bryan Cerqua		6/24/2020

* 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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Wireless Transceiver DSS/DTS Test Report



FCC ID: A94BMD0011 IC: 3232A-BMD0011

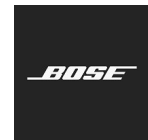
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Test Report Summary

Product Information:

Description

The EUT is a wireless headphone that contains DSS/DTS transceivers, manufactured by Qualcomm Technologies, QCC5127. The EUT uses Adaptive Frequency Hopping (AFH) mode, using a reduced hop set if interference is detected in band, however a minimum of 20 channels is always maintained.

There are two frame styles (Soprano and Tenor) which use identical electronics and are differentiated only by cosmetic differences in the enclosure. The differences in the enclosures have no impact on the transmitter function or characteristics. The Soprano frame style was used for testing.

Setup (Cables and Accessories)

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

EUT Antenna Description

The antenna is an internal PIF variant with antenna gain of 2.8 dBi formed by printed circuit board etch.

SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was version 0.2.114

The test utility software used during testing was Polycomm, version 2.6.0 and Blue Suite version 3.2.3.

Scope:

This report covers EMC requirements. FCC CFR 47 PART 15 SUBPART C, Industry Canada RSS-247 Issue 2, and Industry Canada RSS-GEN Issue 5.

Test Objective:

Verify product meets all applicable EMC requirements.

Measurement Method:

ANSI C63.10 (2013).

Results:

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

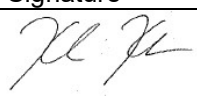
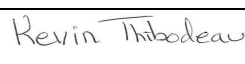
Conclusions:

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.

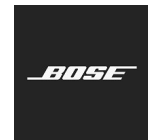
Affirmation of Test Results:

	Print Name	Signature	Date
Testing Engineer/Technician	Karl Klemm		6/26/2020
Testing Engineer/Technician	Kevin Thibodeau		6/26/2020



PRODUCT ASSURANCE ENGINEERING
Wireless Transceiver DSS/DTS Test Report
FCC ID: A94BMD0011 IC: 3232A-BMD0011





Test Standards

Emissions:

- Standard
- FCC Part 15C
- Canada RSS-247
- Canada RSS-GEN

Environmental Conditions

Ambient:

- Temperature: 22±4 °C
- Humidity: 30-60 %RH
- Mains Voltage: 5 Vdc

FCC Test Site Accreditation.

Firm Name	Location	Accreditation	MRA	Designation Number	Expiration Date	Contact	Contact Title
Bose Corporation	1 New York Avenue, Framingham, MA	American Association for Laboratory Accreditation	N/A	US1088	09/30/2020	Carole Park	Quality Manager

Canadian Test Site Registration.

Organization	CAB identifier	Scope / Recognition Date (yyyy-mm-dd)	Expiration (yyyy-mm-dd)
BOSE CORPORATION 1 New York Avenue Framingham, MA 01701 UNITED STATES Website: https://www.bose.com/en_us/index.html ISED#: 3232A Contact: Benjamin Cerretani benjamin_cerretani@bose.com	US0210	RSS-GEN (2019-02-11) RSS-210 (2019-02-11) RSS-247 (2019-02-11)	RECOGNIZED UNTIL: 2020-07-31 A2LA ISO/IEC 17025:2005 Expires: 2020-07-31



Radiated Emissions 30 MHz to 1 GHz

Requirement:

Spurious emissions shall not exceed the radiated emissions limits shown below

radiated emissions limits

Frequency (MHz)	Field strength ($\mu\text{V}/\text{m}$ at 3 metres) ^{Note 1}
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

Test Procedure:

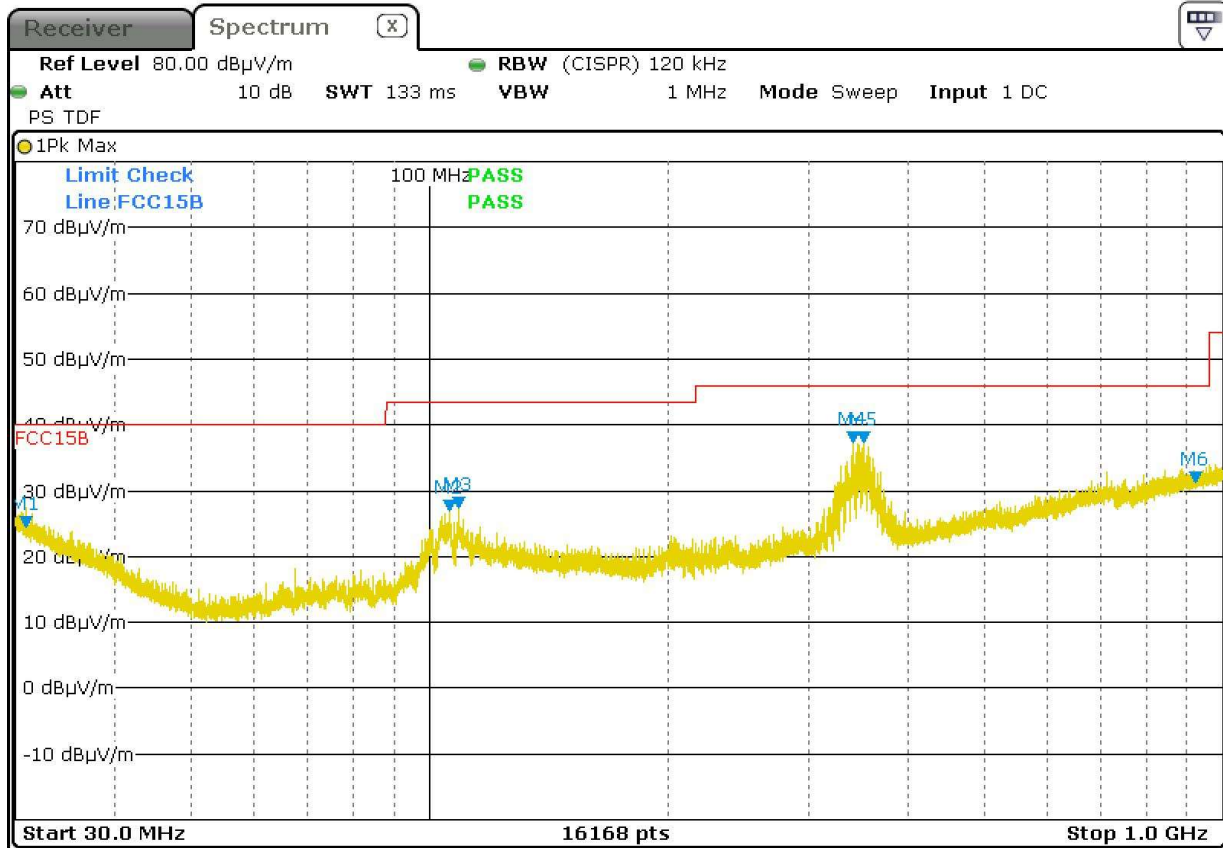
The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz measurements. The EUT is rotated around the vertical axis, the antenna polarization changed from H to V and the antenna height is varied from 1 to 4 meters in order to find the maximum value of the harmonic emission. Account is taken of the beam width of the antenna 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.

Test setup details:

EUT is playing pink noise at max volume via Bluetooth from an ipod. EUT is powered by the internal battery.

EUT is connected to a power supply and charging; no audio is playing. EUT is not provided with a power supply; using Bose power supply MN: MOPP5V1.3C-1U-US.

Test Results:



EUT S/N:	082071U01161063AE	Power applied:	Battery	Plot#	
EUT Setup:	Bluetooth mode playing pink noise from iPod at full volume.				
Comments:	Investigated on mode at various volumes and off mode. Worst case for emissions was on full at volume. Plots taken in worst case mode.				

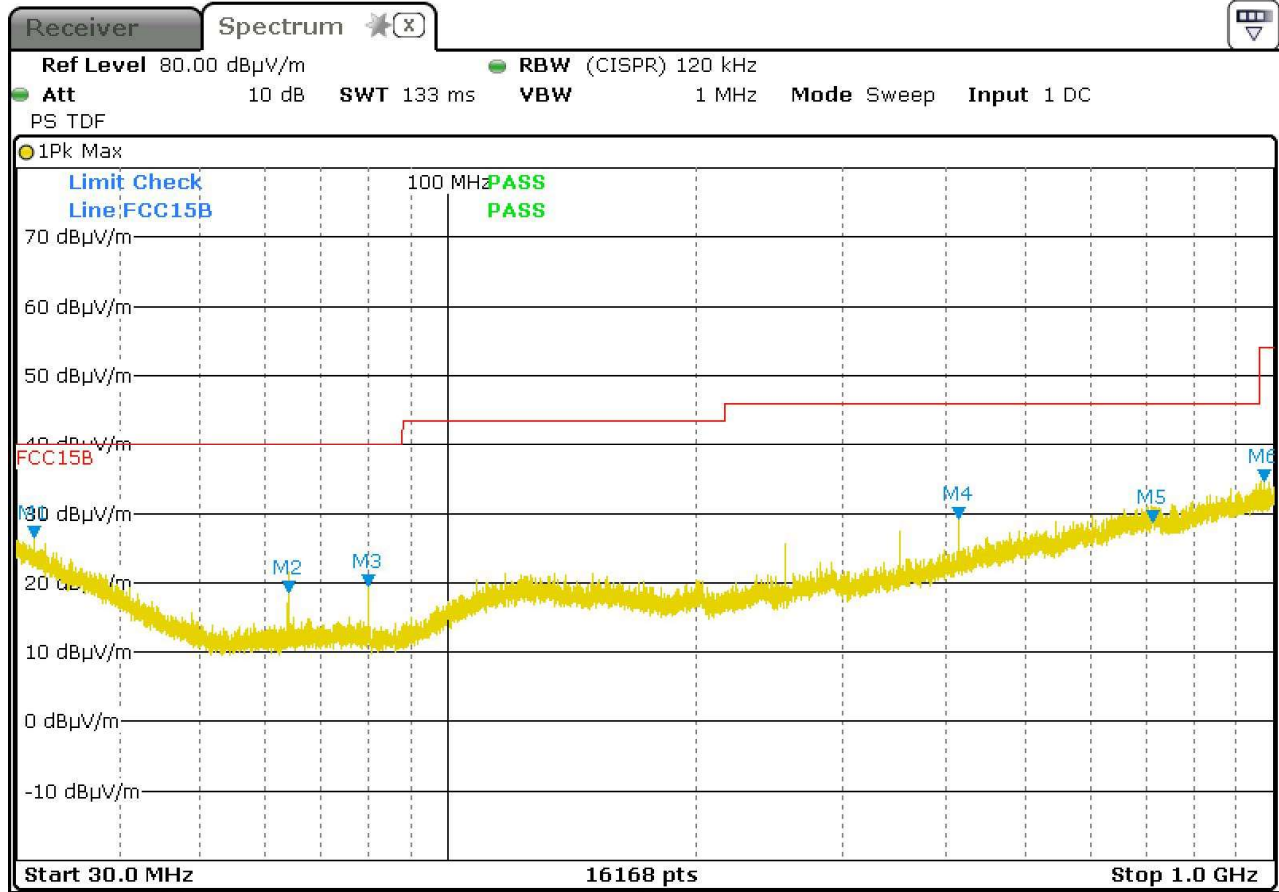
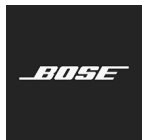
FCC 15B Class B Product (Residential) @ 3 Meters											
MK #	Emission Frequency (MHz)	Measured Amplitude (dBµV/m) QP/AVG*	Measured Amplitude (dBµV/m) Peak	FCC 15B Class B				Table Azimuth (0° closest to ant)	Receiving Antenna		*Average detector used for frequencies above 1 GHz. Notes/Mode
				Limit (dBµV/m) QP/AVG*	Limit (dBµV/m) Peak	Margin (dB) QP/AVG	Margin (dB) Peak		Pol (H/V)	Height (Meters)	
1	30.929	16.70	27.40	40.0	N/A	23.3	N/A	367	H	1.01	Noise floor
2	105.961	21.00	27.40	43.5	N/A	22.5	N/A	0	H	1.01	
3	108.614	21.40	28.60	43.5	N/A	22.1	N/A	341	H	1.01	
4	341.468	33.00	38.80	46.0	N/A	13.0	N/A	0	H	1.01	
5	352.836	33.60	40.00	46.0	N/A	12.4	N/A	360	H	1.01	
6	921.907	21.30	33.20	46.0	N/A	24.7	N/A	0	H	1.01	Noise floor



Certificate # 1514.1

PRODUCT ASSURANCE ENGINEERING
Wireless Transceiver DSS/DTS Test Report

FCC ID: A94BMD0011 IC: 3232A-BMD0011



EUT S/N:	082071U01161063AE	Power applied:	120VAC 60Hz	Plot#	
EUT Setup:	Charging mode.				
Comments:	Bluetooth will not operate while charging.				

FCC 15B Class B Product (Residential) @ 3 Meters											
MK #	Emission Frequency (MHz)	Measured Amplitude (dBµV/m) QP/AVG*	Measured Amplitude (dBµV/m) Peak	FCC 15B Class B				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)	
1	31.541	17.70	26.70	40.0	N/A	22.3	N/A	314	V	1.01	Noise floor
2	63.978	14.80	22.40	40.0	N/A	25.2	N/A	0	V	1.01	
3	79.999	16.70	20.60	40.0	N/A	23.3	N/A	360	V	1.01	
4	416.076	18.50	29.40	46.0	N/A	27.5	N/A	0	V	1.01	
5	715.045	19.60	30.90	46.0	N/A	26.4	N/A	360	V	1.01	Noise floor
6	974.097	21.10	33.90	54.0	N/A	32.9	N/A	0	V	1.01	Noise floor



Test Equipment Used:

TN	Description	Model	S/N	Manufacturer	Most Recent Service	Service Due Date
644	Maxwell House 3 Meter Semi-Anechoic Chamber	N/A	1698A	EM Test	21-Jan-2020	20-Jan-2022
2319	EMI Test Receiver	ESR26	101276	Rohde & Schwarz	26-Mar-2019	23-June-2020
1445	Maxwell House Radiated Emissions Cable Set	N/A	N/A	Bose Corporation	13-Aug-2019	12-Aug-2020
1541	Antenna 30MHz - 6GHz	JB6	A050807	Sunol Sciences Corp	10-Dec-2019	09-Dec-2020
2077	PreAmplifier	N/A	N/A	Bose Corporation	13-Aug-2019	12-Aug-2020
2282	iPod touch	16GB	CCQM211SFFCJ	Apple	N/A	N/A

Date(s) of test: 26-May-2020



Radiated Emissions 1 GHz to 40 GHz

Requirement:

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

Restricted Bands:

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)

Non-Restricted Bands:

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, 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.

Test Procedure:

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-amplifiers 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 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 to compute the emission level that would have been measured had the test been performed at 100 % duty cycle. The duty cycle correction factor(s) used can be found on the following pages.

Test setup details:

The EUT is software programmed via the USB cable with software which is used to set the test modes of the Bluetooth device. The EUT antenna is connected, the measurements are made using a radiated emissions setup. Testing performed in the worst case orientation - with the glasses closed and the lenses down.

Spurious/Harmonics

The EUT is transmitting at full power, either on 2402 MHz, 2441 MHz (BT) or 2442 MHz (BLE), 2480 MHz. For Bluetooth mode, DH5 packets were used. For BLE, 1M and 2M modes were tested.

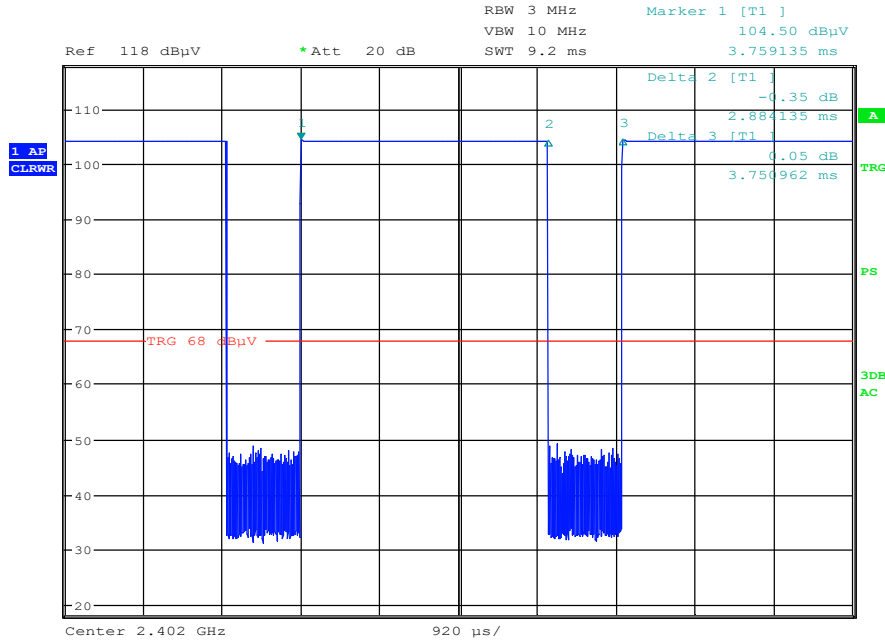
Band-edge

The EUT is transmitting at full power, either on 2402 MHz, 2480 MHz, or hopping on all channels. For Bluetooth mode, 3DH5 packets were used. For BLE, 1M and 2M modes were tested.



Test Results:

Duty Cycle Correction



DH5 packets transmitting in test mode. Marker D2 = Time ON, Marker D3 = Period.

$$\text{Duty Cycle} = \text{Time ON} / \text{Period} = D2 / D3$$

$$= 2.88 / 3.75 = 0.77$$

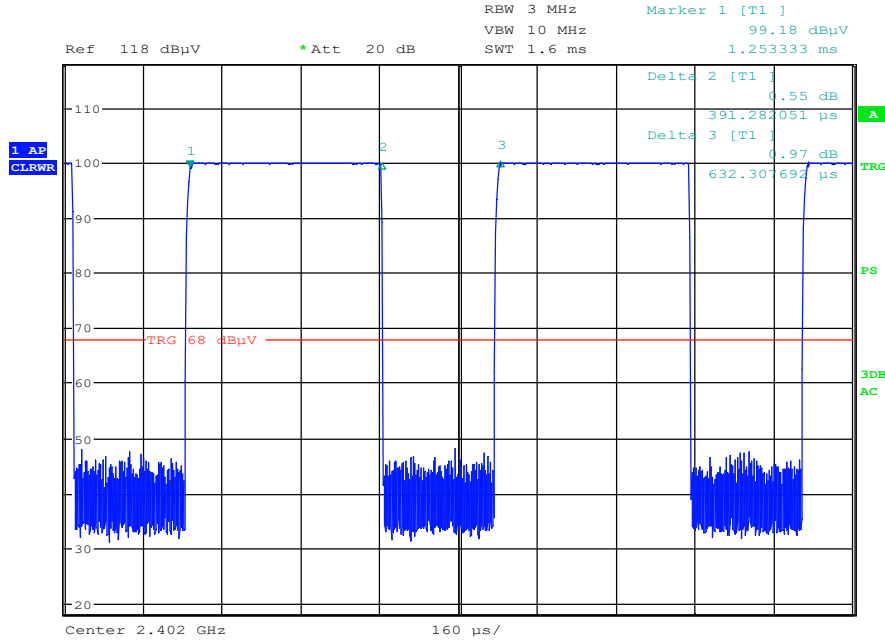
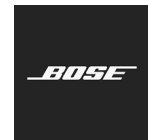
Duty Cycle (%) = 77 %

$$\text{Duty Cycle correction factor (dB)} = 10 \cdot \text{LOG}(1/\text{Duty Cycle})$$

$$= 10 \cdot \text{LOG}(1/0.77) = 1.1$$

Duty Cycle correction factor (dB) = 1.1 dB

Note: 3DH5 has the same duty cycle and correction factor



BLE 1M packets transmitting in test mode. Marker D2 = Time ON, Marker D3 = Period.

$$\text{Duty Cycle} = \text{Time ON} / \text{Period} = D2 / D3$$

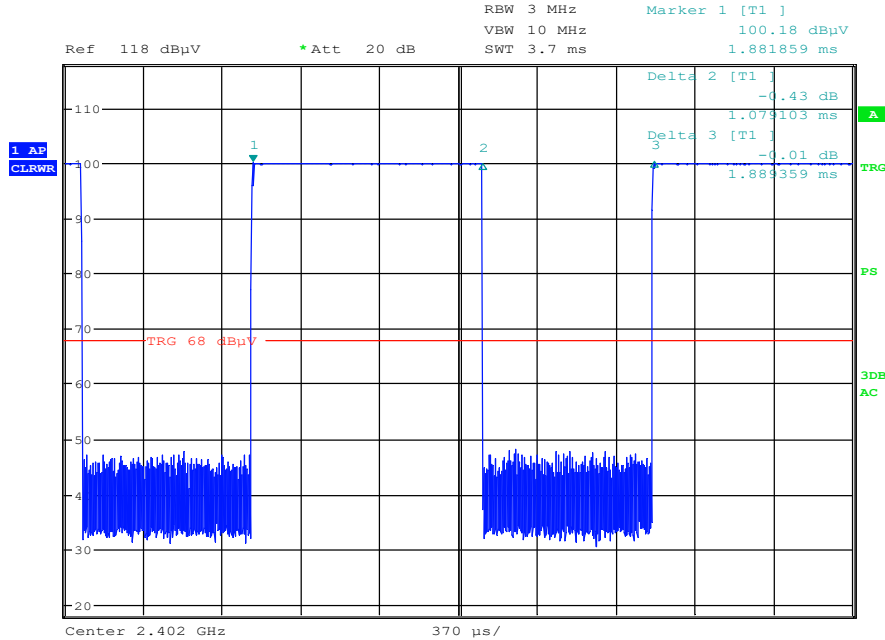
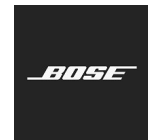
$$= 0.391 / 0.632 = 0.618$$

Duty Cycle (%) = 61.8 %

$$\text{Duty Cycle correction factor (dB)} = 10 * \text{LOG}(1/\text{Duty Cycle})$$

$$= 10 * \text{LOG}(1/0.618) = 2.1$$

Duty Cycle correction factor (dB) = 2.1 dB



BLE 2M packets transmitting in test mode. Marker D2 = Time ON, Marker D3 = Period.

$$\begin{aligned}
 \text{Duty Cycle} &= \text{Time ON} / \text{Period} = D2 / D3 \\
 &= 1.07 / 1.89 = 0.566
 \end{aligned}$$

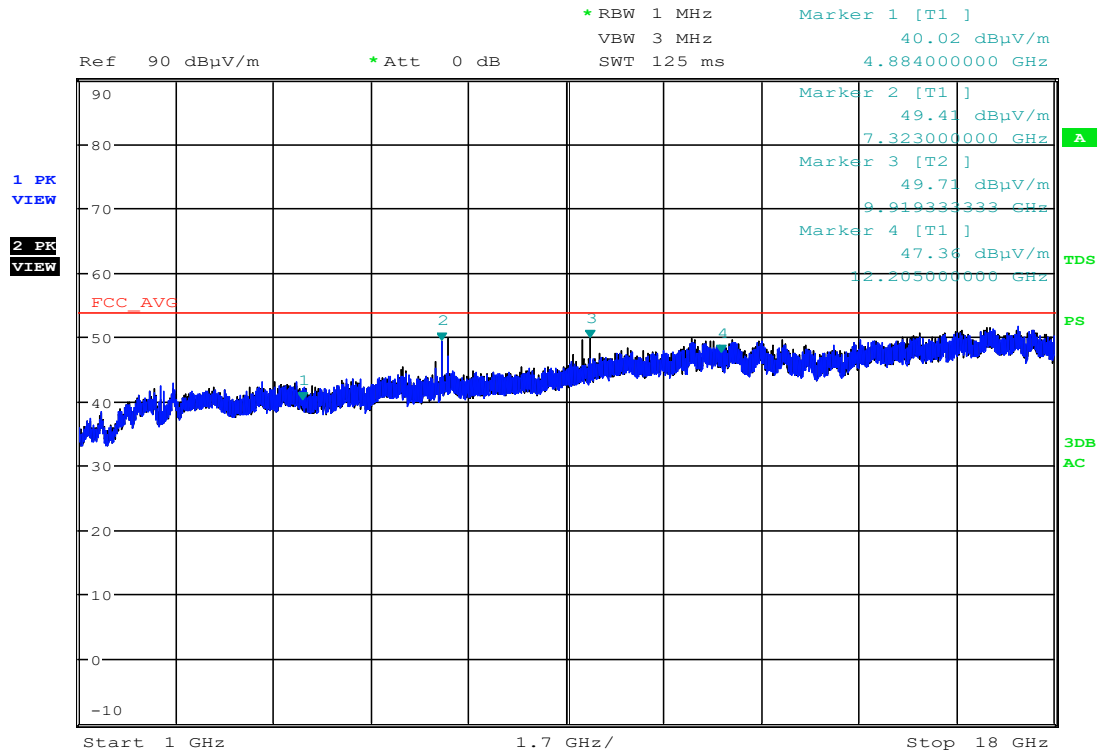
Duty Cycle (%) = 56.6 %

$$\begin{aligned}
 \text{Duty Cycle correction factor (dB)} &= 10 \cdot \text{LOG}(1/\text{Duty Cycle}) \\
 &= 10 \cdot \text{LOG}(1/0.566) = 2.5
 \end{aligned}$$

Duty Cycle correction factor (dB) = 2.5 dB



Harmonics/Spurious



Max-Hold Pre-scan, 1 GHz to 18 GHz

Transmitting DH5 packets on 2402 MHz, 2441 MHz, and 2480 MHz
Vertical orientation
Blue trace = VERT, Black trace = HORZ

Vertical orientation was found to be worst case for harmonics. Normal orientation was found to be worst case for Bandedge.

Bluetooth PASSES FCC Average Limit by 4.2 dB at 2483.504 MHz
BLE PASSES FCC Average Limit by 3.8 dB at 2483.526 MHz.

All emissions were below the restricted band limits, which are more stringent than the non-restricted band limits.

Note: no emissions were visible over the noise floor above 18 GHz.

Restricted Band – Harmonics and bandedge

DSS Radio - BT (DH5) Data

Emission Frequency (MHz)	Measured Amplitude (dBµV/m) AVG	Duty Cycle Correction Factor (dB)	Corrected Amplitude (dBµV/m) AVG	Measured Amplitude (dBµV/m) Peak	FCC 15B				Table Azimuth (0° closes to ant)	Receiving Ant		Notes/Mode
					Limit (dBµV/m) AVG	Limit (dBµV/m) Peak	Margin (dB) AVG	Margin (dB) Peak		Pol (H/V)	Height (Meters)	
Tx DH5 (15, 339) at max power (10), hopping on LMH (2402, 2441, 2480)												
Vertical orientation												
4804.000	34.2	1.1	35.3	54.3	54.0	74.0	18.7	19.7	49	V	1.1	
4882.000	30.5	1.1	31.6	56.6	54.0	74.0	22.4	17.4	339	V	4.0	
4959.900	34.7	1.1	35.8	57.1	54.0	74.0	18.2	16.9	72	V	1.0	
7205.900	40.5	1.1	41.6	57.7	54.0	74.0	12.4	16.3	101	V	1.0	
7322.865	43.2	1.1	44.3	58.8	54.0	74.0	9.7	15.2	360	H	2.5	
7439.864	44.5	1.1	45.6	57.4	54.0	74.0	8.4	16.6	349	H	2.6	
9607.200	39.0	1.1	40.1	55.0	54.0	74.0	13.9	19.0	338	H	1.0	
9763.158	41.5	1.1	42.6	53.7	54.0	74.0	11.4	20.3	338	H	1.0	
9920.400	41.7	1.1	42.8	53.1	54.0	74.0	11.2	20.9	0	H	1.1	
12009.100	40.3	1.1	41.4	51.0	54.0	74.0	12.6	23.0	211	H	2.2	
12205.500	38.9	1.1	40.0	50.8	54.0	74.0	14.0	23.2	213	H	2.2	
12399.000	38.6	1.1	39.7	50.6	54.0	74.0	14.3	23.4	213	H	2.5	
14412.000	35.1	1.1	36.2	49.3	54.0	74.0	17.8	24.7				noise floor reading
14646.700	38.6	1.1	39.7	50.1	54.0	74.0	14.3	23.9	208	H	2.8	
14880.700	39.6	1.1	40.7	50.1	54.0	74.0	13.3	23.9	206	H	2.3	
16814.000	38.4	1.1	39.5	53.7	54.0	74.0	14.5	20.3				noise floor reading
17087.000	37.2	1.1	38.3	51.6	54.0	74.0	15.7	22.4				noise floor reading
17360.000	38.3	1.1	39.4	52.3	54.0	74.0	14.6	21.7				noise floor reading

Emission Frequency (MHz)	Measured Amplitude (dBµV/m) AVG	Duty Cycle Correction Factor (dB)	Corrected Amplitude (dBµV/m) AVG	Measured Amplitude (dBµV/m) Peak	FCC 15B				Table Azimuth (0° closes to ant)	Receiving Ant		Notes/Mode
					Limit (dBµV/m) AVG	Limit (dBµV/m) Peak	Margin (dB) AVG	Margin (dB) Peak		Pol (H/V)	Height (Meters)	
BT, 3DH5, Max power (10), Tx on LH (2402, 2480)												
Normal orientation												
2323.460				53.7		74.0		20.3	141	H	1.4	Lower Restricted Band
2389.880	43.1	1.1	44.2		54.0		9.8		141	H	1.4	Lower Restricted Band
2483.509				63.4		74.0		10.6	145	H	1	Upper Restricted Band
2483.504	48.7	1.1	49.8		54.0		4.2		145	H	1	Upper Restricted Band

Duty cycle correction was added to all average measurements above the noise floor. The raw and corrected readings are displayed in the tables above.

Duty cycle = 77 %, correction factor = 1.1 dB

The duty cycle corrected average values were calculated by adding the duty cycle correction to the measured average reading.
AVG corrected for D.C. = AVG reading(raw) + correction factor

For 4804 MHz:
AVG corrected for D.C. = 34.2 dBuV/m + 1.1 dB = 35.3 dBuV/m



Certificate # 1514.1

PRODUCT ASSURANCE ENGINEERING
Wireless Transceiver DSS/DTS Test Report

FCC ID: A94BMD0011 IC: 3232A-BMD0011



DTS radio - BLE Data

Emission Frequency (MHz)	Measured Amplitude (dBµV/m) AVG	Duty Cycle Correction Factor (dB)	Corrected Amplitude (dBµV/m) AVG	Measured Amplitude (dBµV/m) Peak	FCC 15B				Table Azimuth (0° closes to ant)	Receiving Ant		Notes/Mode
					Limit (dBµV/m) AVG	Limit (dBµV/m) Peak	Margin (dB) AVG	Margin (dB) Peak		Pol (H/V)	Height (Meters)	
Tx BLE 1M at max power (6), on LMH (2402, 2442, 2480)												
Vertical orientation												
4803.900	29.5	2.1	31.6	42.9	54.0	74.0	22.4	31.1	49	V	1.0	
4884.000	28.7	2.1	30.8	43.1	54.0	74.0	23.2	30.9	339	V	1.0	
4959.900	30.1	2.1	32.2	43.5	54.0	74.0	21.8	30.5	65	V	1.0	
7205.079	36.0	2.1	38.1	49.3	54.0	74.0	15.9	24.7	102	V	1.0	
7325.067	35.6	2.1	37.7	48.7	54.0	74.0	16.3	25.3	356	H	2.5	
7439.076	36.3	2.1	38.4	49.0	54.0	74.0	15.6	25.0	344	H	2.6	
9606.800	35.2	2.1	37.3	48.8	54.0	74.0	16.7	25.2	349	H	1.0	
9766.800	36.8	2.1	38.9	50.0	54.0	74.0	15.1	24.0	338	H	1.0	
9918.800	36.9	2.1	39.0	50.8	54.0	74.0	15.0	23.2	1	H	1.1	
12008.500	37.2	2.1	39.3	51.1	54.0	74.0	14.7	22.9	216	H	2.2	
12208.500	36.6	2.1	38.7	50.1	54.0	74.0	15.3	23.9	214	H	2.2	
12398.500	37.0	2.1	39.1	50.9	54.0	74.0	14.9	23.1	216	H	2.5	
14412.000	34.9	2.1	37.0	48.2	54.0	74.0	17.0	25.8				noise floor reading
14650.200	37.0	2.1	39.1	50.5	54.0	74.0	14.9	23.5	208	H	2.8	
14878.200	37.1	2.1	39.2	51.7	54.0	74.0	14.8	22.3	202	H	2.3	
16814.000	38.4	2.1	40.5	53.1	54.0	74.0	13.5	20.9				noise floor reading
17094.000	37.2	2.1	39.3	50.4	54.0	74.0	14.7	23.6				noise floor reading
17360.000	38.3	2.1	40.4	51.5	54.0	74.0	13.6	22.5				noise floor reading

Emission Frequency (MHz)	Measured Amplitude (dBµV/m) AVG	Duty Cycle Correction Factor (dB)	Corrected Amplitude (dBµV/m) AVG	Measured Amplitude (dBµV/m) Peak	FCC 15B				Table Azimuth (0° closes to ant)	Receiving Ant		Notes/Mode
					Limit (dBµV/m) AVG	Limit (dBµV/m) Peak	Margin (dB) AVG	Margin (dB) Peak		Pol (H/V)	Height (Meters)	
BLE 1M at max power (6), Tx on LH (2402, 2480)												
Normal orientation												
2351.880				55.6		74.0		18.4	141	H	1.4	Lower Restricted Band
2330.060	43.8	2.1	45.9		54.0		8.1		141	H	1.4	Lower Restricted Band
2489.700				56.4		74.0		17.6	145	H	1	Upper Restricted Band
2483.531	45.0	2.1	47.1		54.0		6.9		145	H	1	Upper Restricted Band

Duty cycle correction was added to all average measurements above the noise floor. The raw and corrected readings are displayed in the tables above.

Duty cycle = 61.8 %, correction factor = 2.1 dB

The duty cycle corrected average values were calculated by adding the duty cycle correction to the measured average reading.
AVG corrected for D.C. = AVG reading(raw) + correction factor

For 4884 MHz:

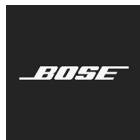
AVG corrected for D.C. = 28.7 dBuV/m + 2.1 dB = 30.8 dBuV/m



Certificate # 1514.1

PRODUCT ASSURANCE ENGINEERING
Wireless Transceiver DSS/DTS Test Report

FCC ID: A94BMD0011 IC: 3232A-BMD0011



Emission Frequency (MHz)	Measured Amplitude (dBµV/m) AVG	Duty Cycle Correction Factor (dB)	Corrected Amplitude (dBµV/m) AVG	Measured Amplitude (dBµV/m) Peak	FCC 15B				Table Azimuth (0° closes to ant)	Receiving Ant		Notes/Mode
					Limit (dBµV/m) AVG	Limit (dBµV/m) Peak	Margin (dB) AVG	Margin (dB) Peak		Pol (H/V)	Height (Meters)	
Tx BLE 2M at max power (6), on LMH (2402, 2442, 2480)												
Vertical orientation												
4804.900	29.2	2.5	31.7	42.5	54.0	74.0	22.3	31.5	49	V	1.1	
4882.000	28.6	2.5	31.1	42.8	54.0	74.0	22.9	31.2	345	V	4.0	
4960.950	29.5	2.5	32.0	43.2	54.0	74.0	22.0	30.8	62	V	1.0	
7204.529	34.9	2.5	37.4	48.3	54.0	74.0	16.6	25.7	100	V	1.0	
7327.340	34.4	2.5	36.9	48.3	54.0	74.0	17.1	25.7	347	H	2.5	
7441.236	35.2	2.5	37.7	48.3	54.0	74.0	16.3	25.7	346	H	2.6	
9605.800	34.6	2.5	37.1	49.0	54.0	74.0	16.9	25.0	335	H	1.0	
9769.894	35.8	2.5	38.3	49.8	54.0	74.0	15.7	24.2	336	H	1.0	
9917.750	35.9	2.5	38.4	50.3	54.0	74.0	15.6	23.7	0	H	1.1	
12012.400	36.6	2.5	39.1	52.2	54.0	74.0	14.9	21.8	211	H	2.2	
12207.300	35.9	2.5	38.4	50.1	54.0	74.0	15.6	23.9	209	H	2.2	
12397.450	36.5	2.5	39.0	50.4	54.0	74.0	15.0	23.6	217	H	2.5	
14412.000	34.9	2.5	37.4	48.8	54.0	74.0	16.6	25.2				noise floor reading
14648.620	36.6	2.5	39.1	50.5	54.0	74.0	14.9	23.5	206	H	2.8	
14876.630	36.8	2.5	39.3	50.8	54.0	74.0	14.7	23.2	202	H	2.3	
16814.000	38.4	2.5	40.9	51.6	54.0	74.0	13.1	22.4				noise floor reading
17094.000	37.2	2.5	39.7	51.2	54.0	74.0	14.3	22.8				noise floor reading
17360.000	38.4	2.5	40.9	51.9	54.0	74.0	13.1	22.1				noise floor reading

Emission Frequency (MHz)	Measured Amplitude (dBµV/m) AVG	Duty Cycle Correction Factor (dB)	Corrected Amplitude (dBµV/m) AVG	Measured Amplitude (dBµV/m) Peak	FCC 15B				Table Azimuth (0° closes to ant)	Receiving Ant		Notes/Mode
					Limit (dBµV/m) AVG	Limit (dBµV/m) Peak	Margin (dB) AVG	Margin (dB) Peak		Pol (H/V)	Height (Meters)	
BLE 2M at max power (6), Tx on LH (2402, 2480)												
Normal orientation												
2321.840				56.3		74.0		17.7	141	H	1.4	Lower Restricted Band
2389.860	43.9	2.5	46.4		54.0		7.6		141	H	1.4	Lower Restricted Band
2483.654				58.0		74.0		16.0	145	H	1	Upper Restricted Band
2483.526	47.7	2.5	50.2		54.0		3.8		145	H	1	Upper Restricted Band

Duty cycle correction was added to all average measurements above the noise floor. The raw and corrected readings are displayed in the tables above.

$$\text{Duty cycle} = 56.6\%, \text{ correction factor} = 2.5 \text{ dB}$$

The duty cycle corrected average values were calculated by adding the duty cycle correction to the measured average reading.

$$\text{AVG corrected for D.C.} = \text{AVG reading(raw)} + \text{correction factor}$$

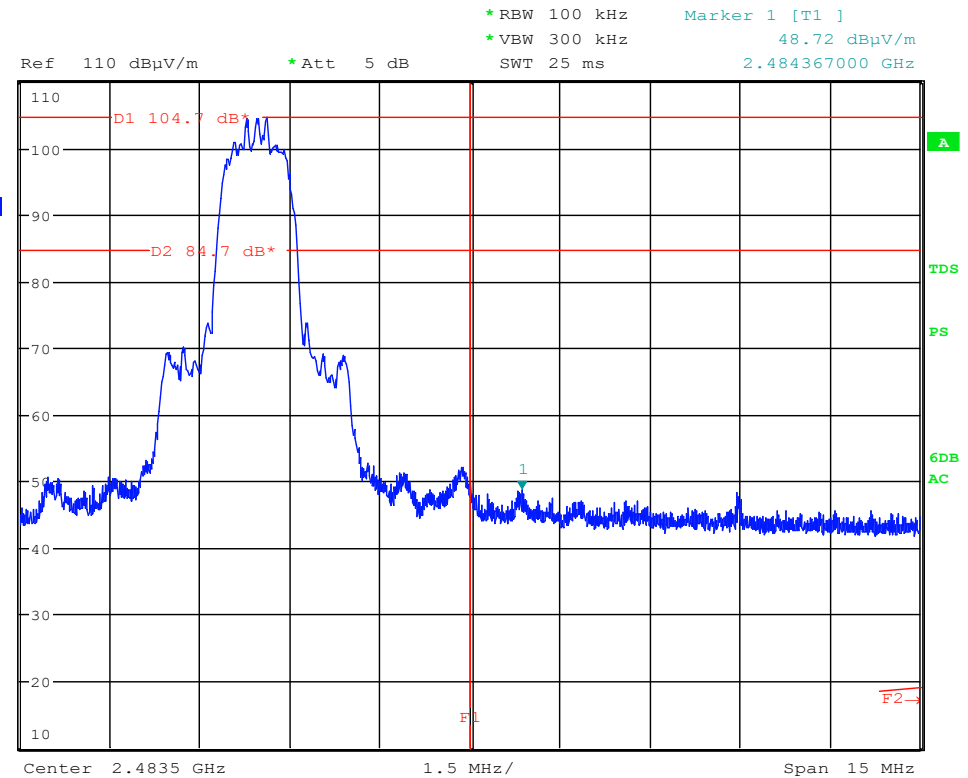
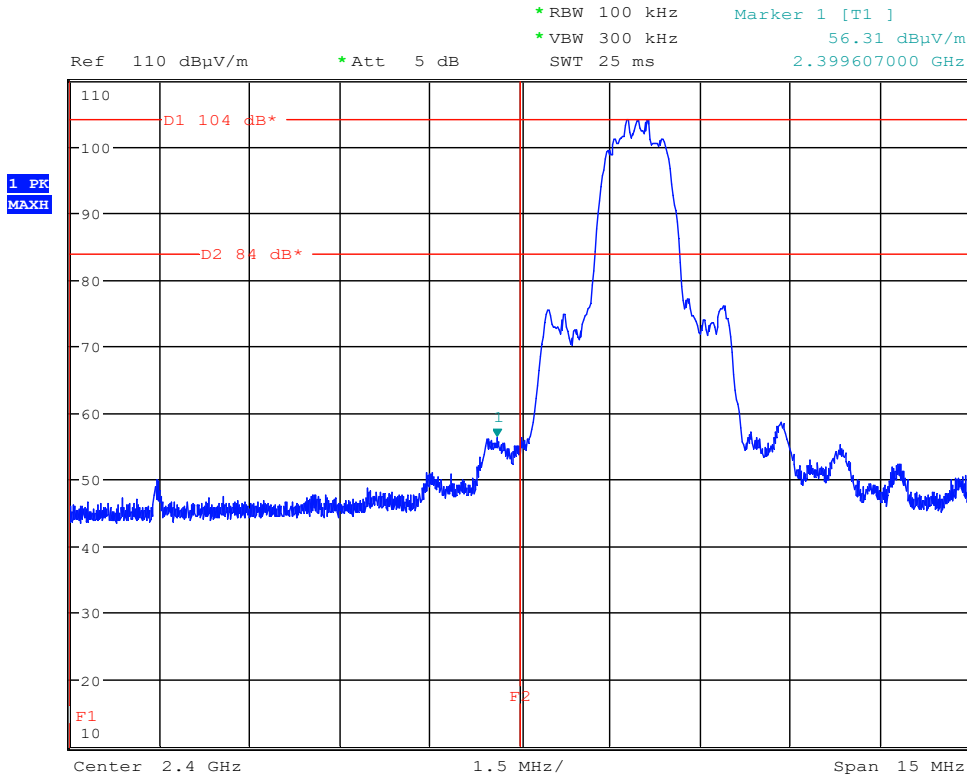
For 4882 MHz:

$$\text{AVG corrected for D.C.} = 28.6 \text{ dBuV/m} + 2.5 \text{ dB} = 31.1 \text{ dBuV/m}$$

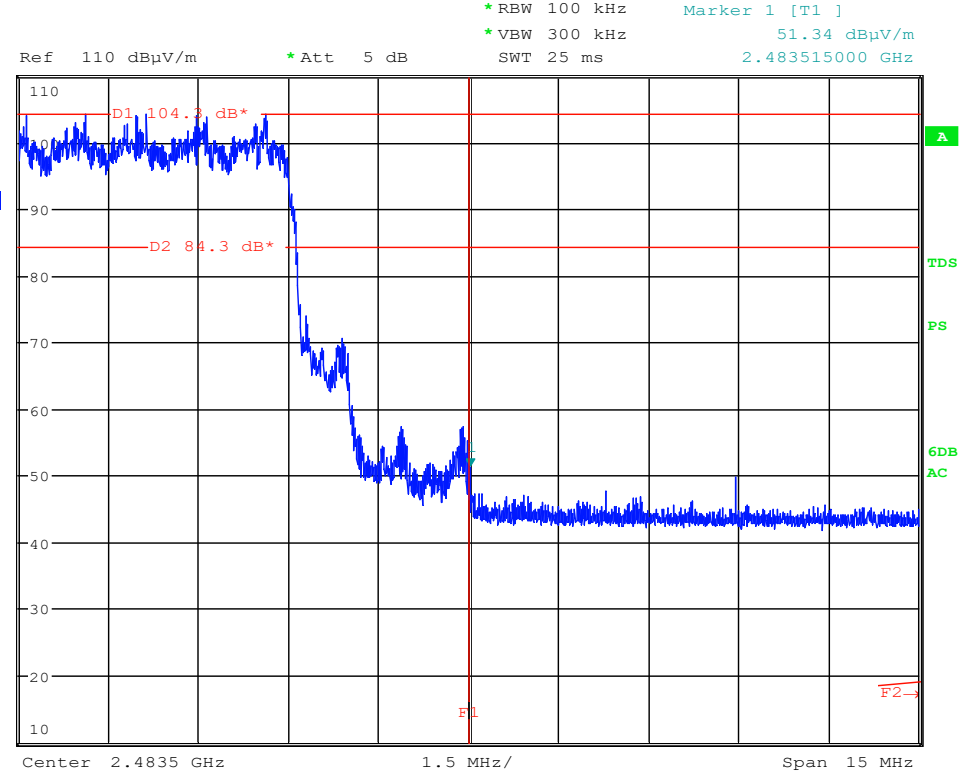
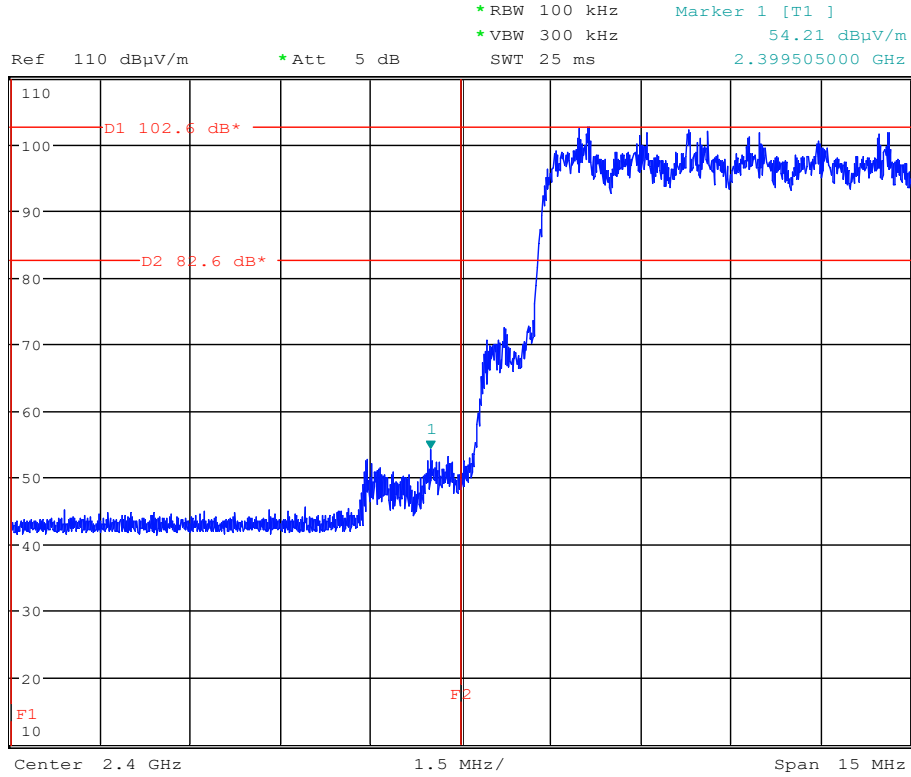


Non-restricted band - Bandedge

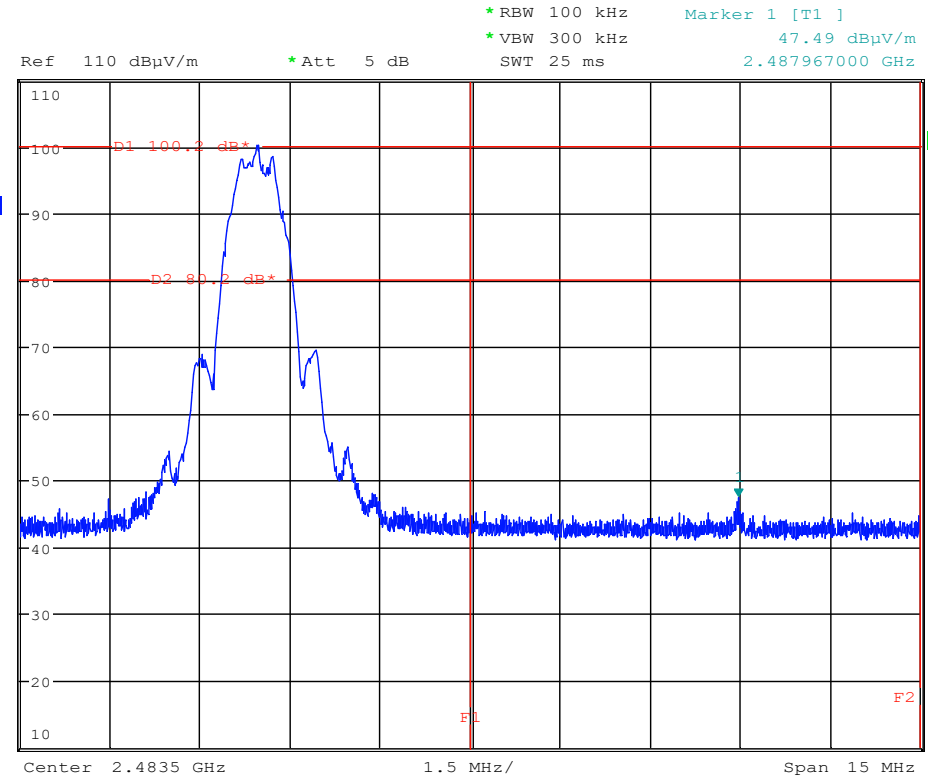
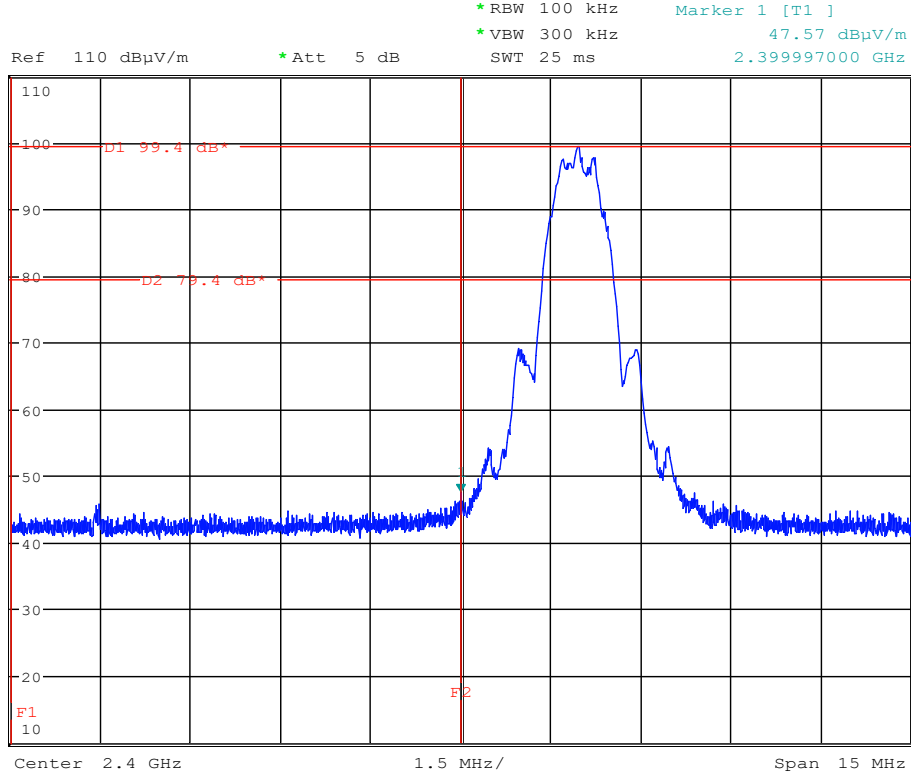
Plots show the non-restricted band limits of -20 dBc (Line D2, X.Y dB*). The frequency marker, F1 or F2, denotes the edge of the band.



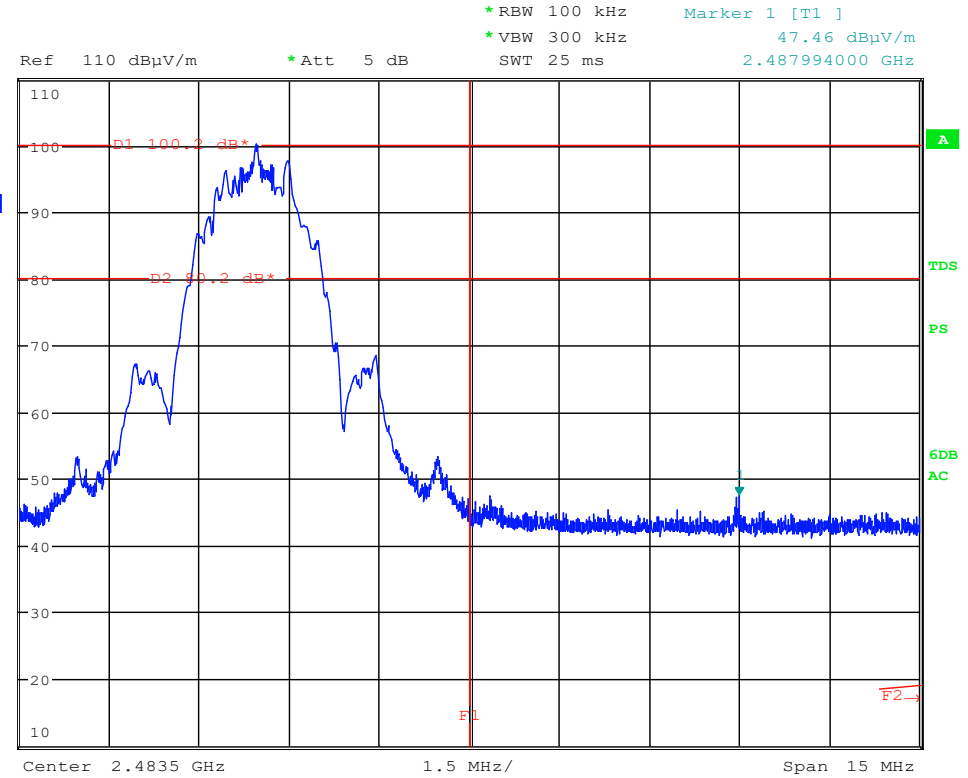
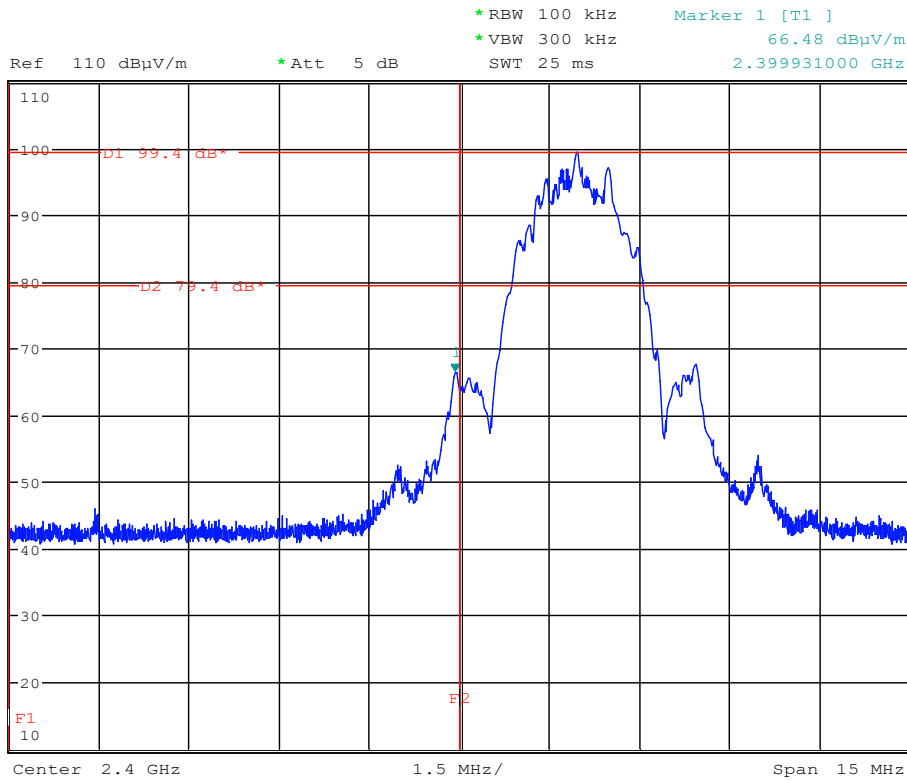
3DH5 lower and upper bandedge, hopping disabled



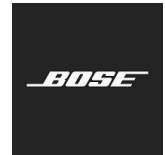
3DH5 lower and upper bandedge, hopping on all channels



BLE 1M, lower and upper bandedge



BLE 2M, lower and upper bandedge



Test Equipment Used:

TN	Description	Model	S/N	Manufacturer	Most Recent Service	Service Due Date
2349	Double Ridge Waveguide Horn Antenna 1-18GHz	3117	00152406	ETS Lindgren	30-Jan-2020	29-Jan-2021
2602	Miteq pre-amp 1-18GHz 35dB	AFS42-01001800-28-10P-42	N/A	Miteq	19-Jun-2019	18-Jun-2020
2414	Band Reject Filter (2.4GHz)	BRM50702-07	003	Micro-Tronics	10-Apr-2020	10-Apr-2021
2479	RF cable 30MHz-18GHz	257-257-3052640	N/A	SRC Haverhill	12-Mar-2020	12-Mar-2021
2373	RF Cable 30MHz-18GHz - 25 feet "N"	TRU-300	N/A	TRU Corporation	Verify before use	
2357	RF Cable 30MHz-18GHz	TRU-300	TRU-12707-03	TRU Corporation	12-Mar-2020	12-Mar-2021
2929	Mini-circuits band-edge pre-amp 300 MHz - 8 GHz 20 dB	ZX60HV-83LN+	N/A	Mini-Circuits	10-Apr-2020	10-Apr-2021

Date(s) of test: 09-Jun-2020 to 12-Jun-2020



End of Report