



PRODUCT ASSURANCE ENGINEERING  
Wireless Transceiver DSS/DTS Test Report

FCC ID: A94429358 IC: 3232A-429358



Test Type: Emissions  Immunity

Product Type: Wireless Headphones

Product Name/Number: *Model Number(s): 429358*  
*FCC ID: A94429358*  
*IC: 3232A-429358*

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.429358.22.056.3*

General Comments/Special Test Conditions:

This report relates only to the items tested. This report covers EMC marking requirements for model 429358

	Print Name	Signature	Date
Prepared By:	Karl Klemm		26-Apr-2022
Electrical Engineer Review* By:	Bryan Cerqua		26-Apr-2022

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

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# 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.*

### 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 SMD chip antenna with antenna gain of 2.2 dBi, Johanson Technology model 2450AT45A100.*

### SOFTWARE AND FIRMWARE

*The firmware installed in the EUT during testing was version 00.00.09  
The test utility software used during testing was Blue Suite version 3.3.10.*

### 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.



# 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	Expiration Date	Contact	Contact Title
<a href="#">Bose Corporation</a>	1 New York Avenue, Framingham, MA	American Association for Laboratory Accreditation N/A US1088	07/31/2022	Mr. Cable Best	Quality Manager

# Canadian Test Site Registration.

Organization	CAR identifier	Scope/Recognition Date (yyyy-mm-dd)	Expiration (yyyy-mm-dd)
BOSE CORPORATION  1 New York Avenue Framingham, MA 01701 UNITED STATES  <b>Company Number: 3232A</b>  Contact: Mario Espinal <a href="mailto:mario_espinal@bose.com">mario_espinal@bose.com</a>	US0210	RSS-GEN (2019-02-11)  RSS-210 (2019-02-11) RSS-247 (2019-02-11) RSS-248 (2021-11-19)	<b>RECOGNIZED UNTIL: 2022-07-31</b>  A2LA ISO/IEC 17025:2017 Expires: 2022-07-31



# 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) <sup>Note 1</sup>
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.

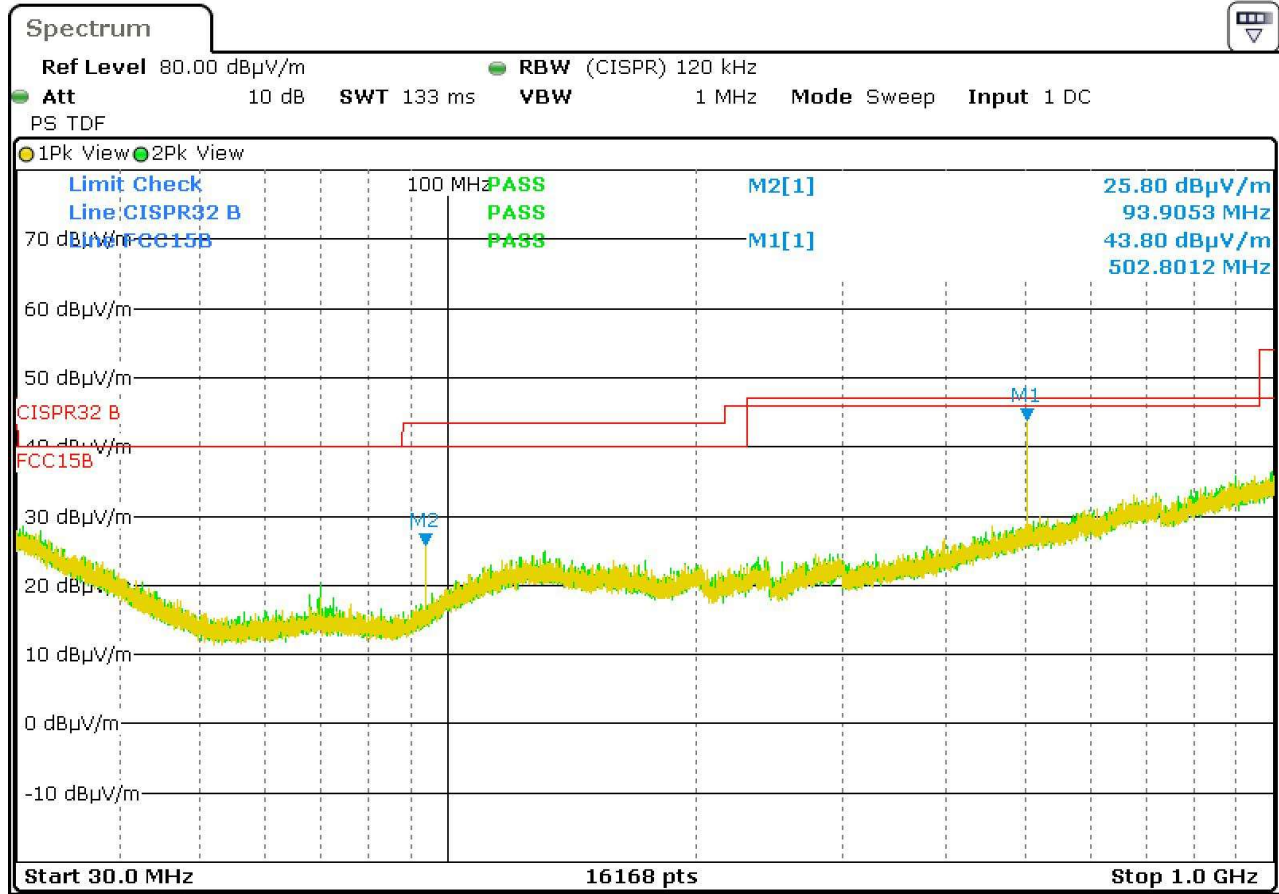
## Test setup details:

BT mode: Streaming audio from an iPod via Bluetooth  
Aux mode: Playing audio from an iPod via Aux in port  
In both modes the EUT is powered by two AA batteries.

TSO mode (intercom) is not applicable for commercial testing.

# Test Results:

Aux input connected to iPod; IEC pink noise at max volume; ANR set to Full, BT connected but not streaming audio.



CISPR 32&11 @ 3 Meters and FCC B Class B @ 3 Meters

MK #	Emission Frequency (MHz)	Measured Amplitude (dBµV/m) QP	Measured Amplitude (dBµV/m) Peak	CISPR 32&11		FCC B		Table Azimuth (0° closest to ant)	Receiving Antenna		Notes / Mode
				Limit (dBµV/m) QP	Margin (dB) QP	Limit (dBµV/m) QP	Margin (dB) QP		Pol (H/V)	Height (Meters)	
1	502.801	16.50	27.50	47.0	30.5	46.0	29.5	0	V	1.00	Transient Emission
2	93.905	6.00	16.70	40.0	34.0	43.5	37.5	360	V	1.00	Transient Emission



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BT Streaming from an iPod; IEC pink noise at max volume; ANR set to Full; Aux cable connected (unterminated) Controller on one side and headset on the other, focus being the cables bundled in middle of table.



CISPR 32&11 @ 3 Meters and FCC B Class B @ 3 Meters											
MK #	Emission Frequency (MHz)	Measured Amplitude (dBµV/m) QP	Measured Amplitude (dBµV/m) Peak	CISPR 32&11		FCC B		Table Azimuth (0° closest to ant)	Receiving Antenna		Notes / Mode
				Limit (dBµV/m) QP	Margin (dB) QP	Limit (dBµV/m) QP	Margin (dB) QP		Pol (H/V)	Height (Meters)	
1	74.008	14.90	22.00	40.0	25.1	40.0	25.1	198	H	2.73	
2	73.728	12.70	19.60	40.0	27.3	40.0	27.3	198	H	2.73	



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# Test Equipment Used:

TN	Description	Model	S/N	Manufacturer	Most Recent Service	Service Due Date
2077	PreAmplifier	N/A	N/A	Bose Corporation	01-Sep-2021	01-Sep-2022
1445	Maxwell House Radiated Emissions Cable Set	N/A	N/A	Bose Corporation	01-Sep-2021	01-Sep-2022
1375	System Controller	SC99V	050905-1	Sunol Sciences Corp	Verify before use	
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	25-Aug-2020	25-Aug-2022
2407	Antenna 30MHz - 6GHz	JB6	A100514	Sunol Sciences Corp	30-Jun-2021	30-Jun-2022

Date(s) of test: 21-Dec-2021





# 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 $\mu$ V/m (average) or 74dB $\mu$ 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 1 GHz, the resolution bandwidth and video bandwidth are set as described in ANSI C63.10:2013 Section 12.7.7.2. An average detector was used with 1 MHz RBW and 3 MHz VBW, 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.

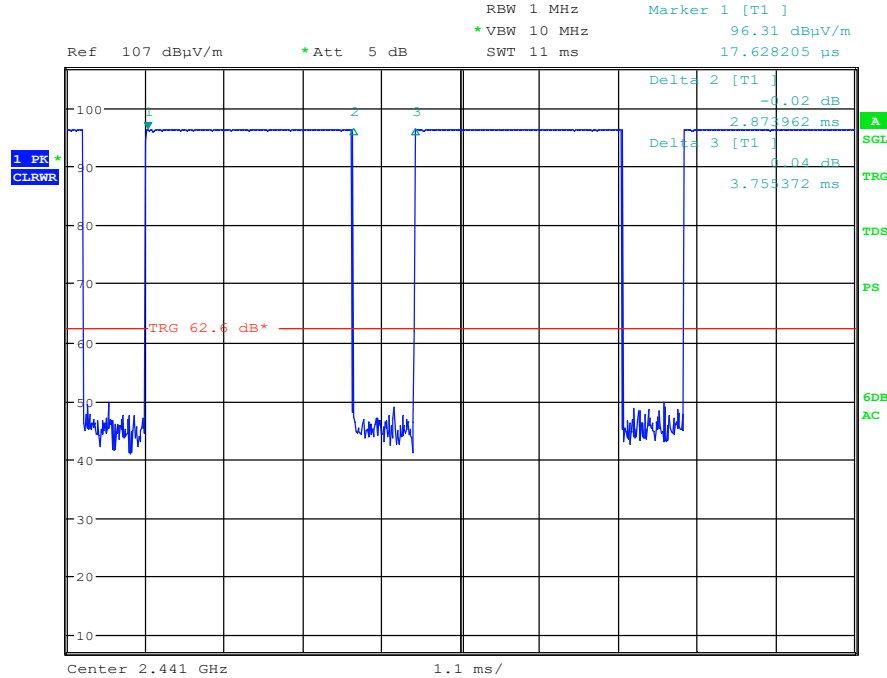
### *Band-edge*

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.

$$\begin{aligned} \text{Duty Cycle} &= \text{Time ON} / \text{Period} = D2 / D3 \\ &= 2.87 / 3.76 = 0.77 \end{aligned}$$

**Duty Cycle (%) = 77 %**

$$\begin{aligned} \text{Duty Cycle correction factor (dB)} &= 10 * \text{LOG}(1/\text{Duty Cycle}) \\ &= 10 * \text{LOG}(1/0.77) = 1.2 \end{aligned}$$

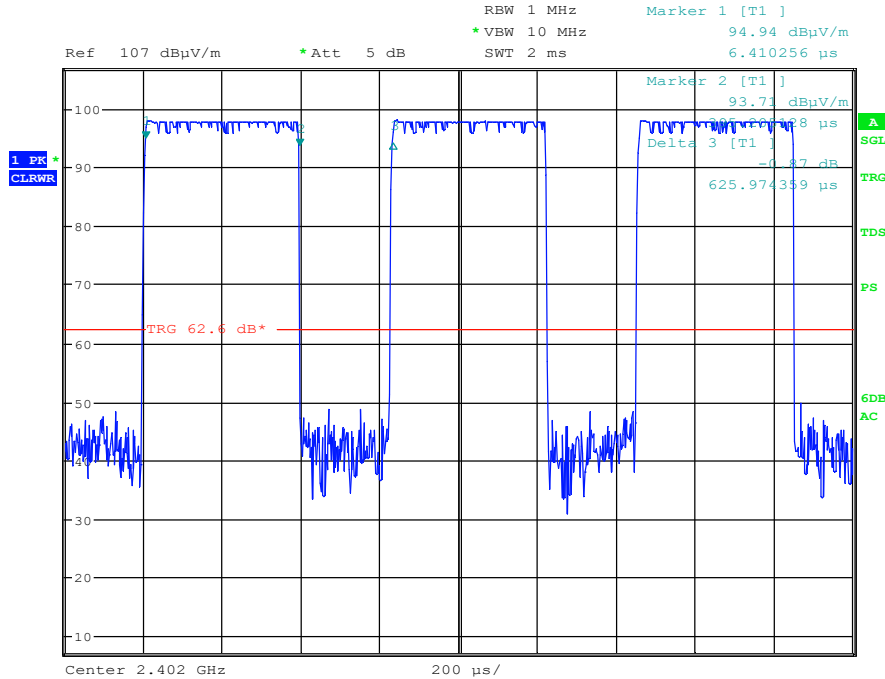
**Duty Cycle correction factor (dB) = 1.2 dB**

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



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

$$\text{Duty Cycle} = \text{Time ON} / \text{Period} = D2 / D3 \\ = 0.395 / 0.626 = 0.63$$

**Duty Cycle (%) = 63 %**

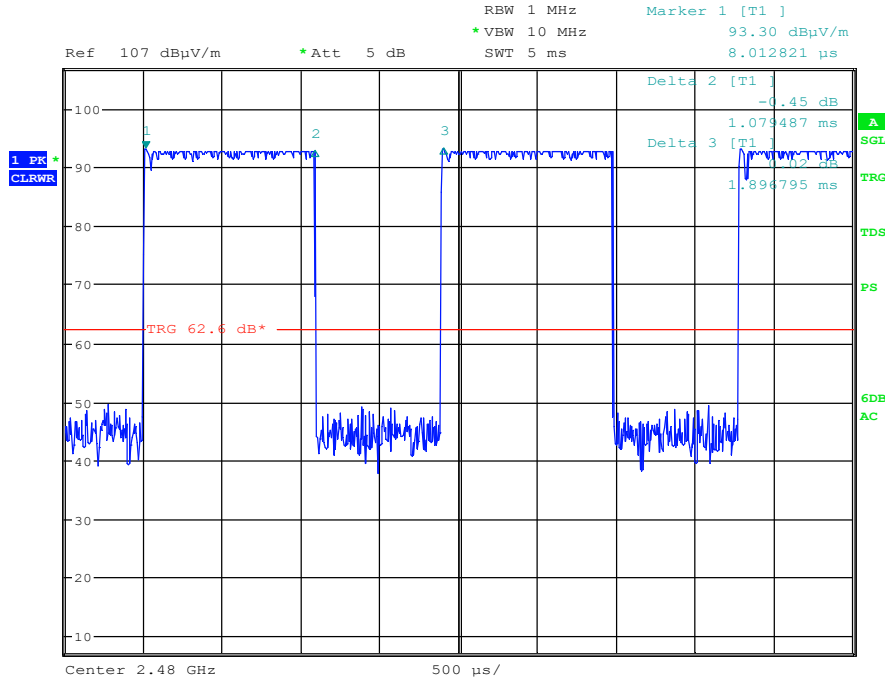
$$\text{Duty Cycle correction factor (dB)} = 10 * \text{LOG}(1/\text{Duty Cycle}) \\ = 10 * \text{LOG}(1/0.63) = 2.0$$

**Duty Cycle correction factor (dB) = 2.0 dB**



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

$$\text{Duty Cycle} = \text{Time ON} / \text{Period} = D2 / D3 \\ = 1.08 / 1.90 = 0.57$$

**Duty Cycle (%) = 57 %**

$$\text{Duty Cycle correction factor (dB)} = 10 * \text{LOG}(1/\text{Duty Cycle}) \\ = 10 * \text{LOG}(1/0.57) = 2.5$$

**Duty Cycle correction factor (dB) = 2.5 dB**

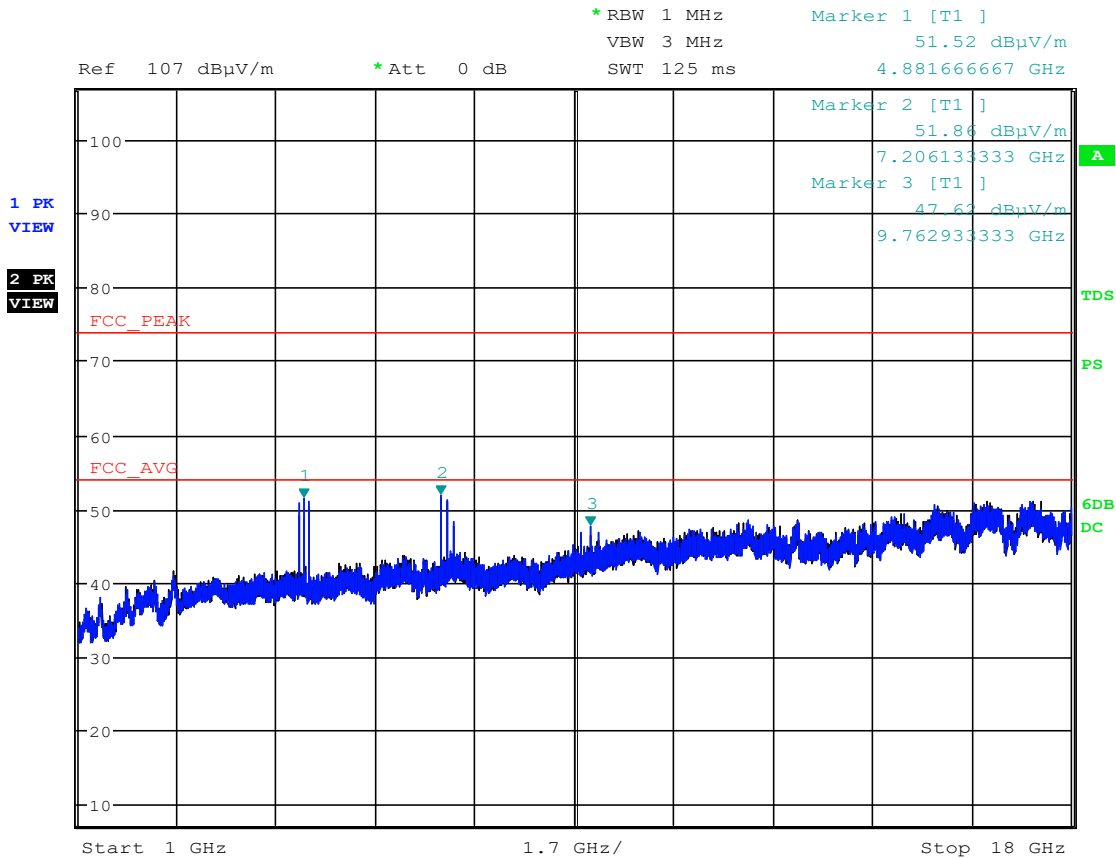


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## Harmonics/Spurious



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

Transmitting DH5 packets on 2402 MHz, 2441 MHz, and 2480 MHz

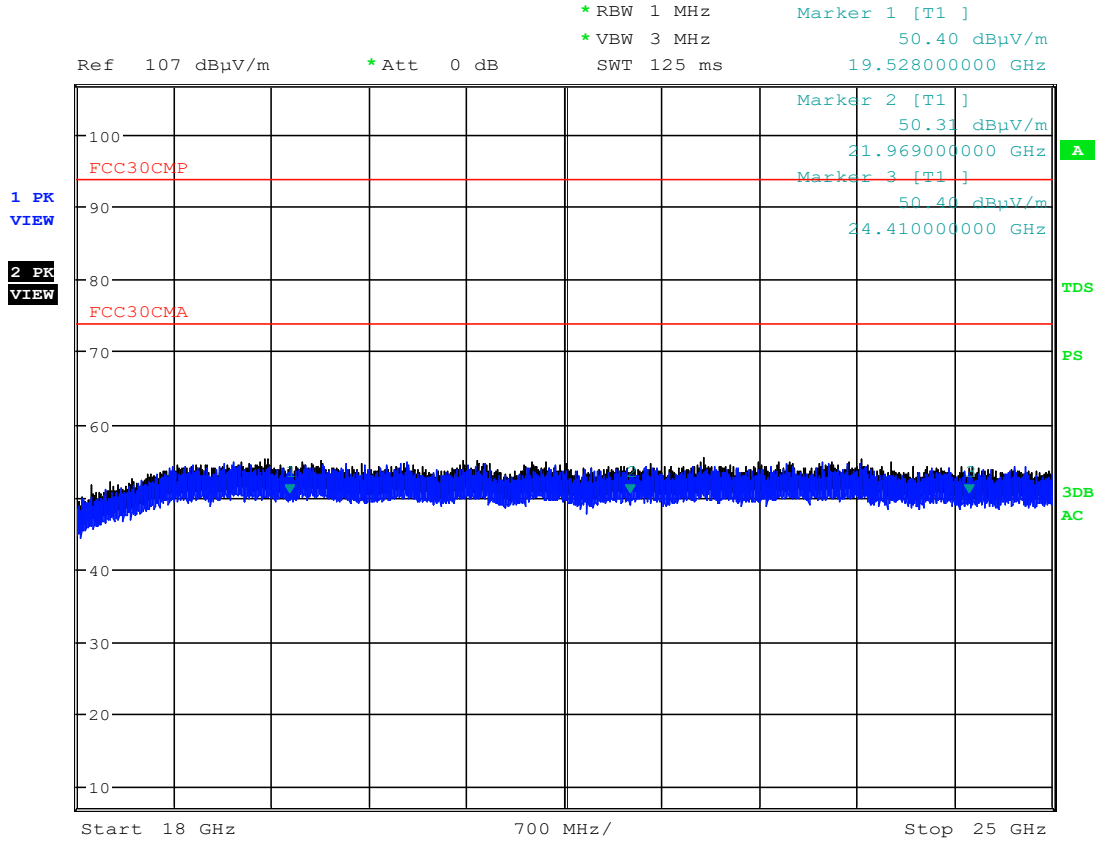
Control module facing antenna

Blue trace = VERT, Black trace = HORZ



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**Max-Hold Pre-scan, 18 GHz to 25 GHz (30 cm antenna distance)**

Transmitting DH5 packets on 2402 MHz, 2441 MHz, and 2480 MHz  
 Control module facing antenna  
 Blue trace = VERT, Black trace = HORZ

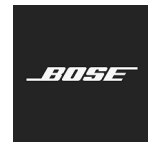
Bluetooth PASSES FCC Average Limit by 4.4 dB at 4959.951 MHz  
 BLE PASSES FCC Average Limit by 4.8 dB at 4959.950 MHz.

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.



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**Restricted Band – Harmonics and bandedge**

Note: Restricted Band measurements were made using a 1 MHz RBW

**DSS Radio - BT (xDH5) Data**

FCC 15B Class B Product (Residential) @ 3 Meters												
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)	
<b>Tx DH5 (15, 339) at max power (10), on LMH (2402, 2441, 2480)</b>												
<b>CM buttons facing antenna</b>												
4803.965	47.4	1.2	48.6	53.4	54.0	74.0	5.4	20.6	167	V	1.6	
7205.941	47.2	1.2	48.4	55.0	54.0	74.0	5.6	19.0	116	V	1.2	
9607.909	38.1	1.2	39.3	49.8	54.0	74.0	14.7	24.2	338	V	1.6	
12009.870	36.2	1.2	37.4	50.1	54.0	74.0	16.6	23.9	51	H	3.7	
14412.840	37.1	1.2	38.3	50.7	54.0	74.0	15.7	23.3	328	H	1.5	
16814.000	37.4	0.0	37.4	51.9	54.0	74.0	16.6	22.1				noise floor reading
4881.950	47.5	1.2	48.7	53.4	54.0	74.0	5.3	20.6	166	V	2.2	
7322.900	47.1	1.2	48.3	54.9	54.0	74.0	5.7	19.1	109	V	1.2	
9763.936	39.1	1.2	40.3	50.8	54.0	74.0	13.7	23.2	344	V	2.1	
12205.500	36.3	1.2	37.5	50.3	54.0	74.0	16.5	23.7	294	H	2.3	
14644.900	36.6	1.2	37.8	50.6	54.0	74.0	16.2	23.4	326	H	1.1	
17087.000	38.0	0.0	38.0	52.2	54.0	74.0	16.0	21.8				noise floor reading
4959.951	48.4	1.2	49.6	53.9	54.0	74.0	4.4	20.1	119	V	1.9	
7439.950	45.1	1.2	46.3	53.4	54.0	74.0	7.7	20.6	114	V	1.1	
9919.900	39.1	1.2	40.3	50.8	54.0	74.0	13.7	23.2	347	V	1.9	
12399.150	36.6	1.2	37.8	50.3	54.0	74.0	16.2	23.7	302	H	2.9	
14880.600	37.9	1.2	39.1	52.0	54.0	74.0	14.9	22.0	325	H	1	
17360.000	39.3	0.0	39.3	54.2	54.0	74.0	14.7	19.8				

FCC 15B Class B Product (Residential) @ 3 Meters												
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)	
<b>BT, 3DH5, Max power (10), Tx on LH (2402, 2480)</b>												
<b>Normal orientation</b>												
2389.550				42.0		74.0		32.0	223	V	1.0	Lower Restricted Band
2388.225	30.0	1.2	31.2		54.0		22.8		223	V	1.0	Lower Restricted Band
2483.550				50.4		74.0		23.6	302	H	1.3	Upper Restricted Band
2483.500	36.2	1.2	37.4		54.0		16.6		302	H	1.3	Upper Restricted Band

Note: DH5 was found to be worst case for harmonic emissions and 3DH5 was found to be worst case for bandedge.

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

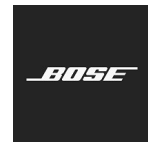
Duty cycle = 77 %, correction factor = 1.2 dB

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 7439.950 MHz:  
 AVG corrected for D.C. = 45.1 dBuV/m + 1.2 dB = 46.3 dBuV/m



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**DTS radio - BLE Data**

FCC 15B Class B Product (Residential) @ 3 Meters												
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)	
<b>Tx BLE 1M at max power, on LMH (2402, 2440, 2480)</b>												
<b>CM buttons facing antenna</b>												
4803.950	46.5	2.0	48.5	53.5	54.0	74.0	5.5	20.5	167	V	1.6	
7205.290	46.0	2.0	48.0	55.0	54.0	74.0	6.0	19.0	113	V	1.2	
9608.800	38.7	2.0	40.7	50.4	54.0	74.0	13.3	23.6	338	V	1.6	
12011.150	36.8	2.0	38.8	50.5	54.0	74.0	15.2	23.5	51	H	3.7	
14413.350	37.0	2.0	39.0	50.3	54.0	74.0	15.0	23.7	328	H	1.5	
16814.000	37.4	0.0	37.4	51.5	54.0	74.0	16.6	22.5				noise floor reading
4879.950	46.0	2.0	48.0	53.2	54.0	74.0	6.0	20.8	164	V	2.2	
7320.500	46.1	2.0	48.1	54.8	54.0	74.0	5.9	19.2	111	V	1.1	
9760.800	39.7	2.0	41.7	51.2	54.0	74.0	12.3	22.8	346	V	2.1	
12200.950	36.3	2.0	38.3	49.3	54.0	74.0	15.7	24.7	297	H	2.3	
14638.350	36.9	2.0	38.9	50.7	54.0	74.0	15.1	23.3	329	H	1.3	
17080.000	37.9	0.0	37.9	52.0	54.0	74.0	16.1	22.0				noise floor reading
4959.950	47.2	2.0	49.2	54.2	54.0	74.0	4.8	19.8	118	V	1.9	
7440.533	43.9	2.0	45.9	53.4	54.0	74.0	8.1	20.6	114	V	1.1	
9919.000	39.5	2.0	41.5	51.4	54.0	74.0	12.5	22.6	347	V	1.9	
12398.650	36.6	2.0	38.6	49.8	54.0	74.0	15.4	24.2	297	H	2.9	
14881.400	37.8	2.0	39.8	52.0	54.0	74.0	14.2	22.0	331	H	1.0	
17360.000	39.3	0.0	39.3	53.6	54.0	74.0	14.7	20.4				noise floor reading

Note: BLE 1M was found to be worst case for harmonic emissions

FCC 15B Class B Product (Residential) @ 3 Meters												
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)	
<b>BLE, 1M, power setting unknown, Tx on LH (2402, 2480)</b>												
<b>Normal orientation</b>												
2335.500				43.1		74.0		30.9	223	V	1.0	Lower Restricted Band
2384.913	30.1	2.0	32.1		54.0		21.9		223	V	1.0	Lower Restricted Band
2485.103				47.8		74.0		26.2	302	H	1.3	Upper Restricted Band
2483.552	34.9	2.0	36.9		54.0		17.1		302	H	1.3	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.

$$\text{Duty cycle} = 63\%, \text{ correction factor} = 2.0 \text{ dB}$$

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 4883.950 MHz:  
 AVG corrected for D.C. = 46.5 dBuV/m + 2.0 dB = 48.5 dBuV/m





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

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)	
<b>BLE, 2M, power setting unknown, Tx on LH (2402, 2480)</b>												
<b>Normal orientation</b>												
2326.738				42.2		74.0		31.8	223	V	1.0	Lower Restricted Band
2372.200	29.8	2.5	32.3		54.0		21.7		223	V	1.0	Lower Restricted Band
2486.104				48.1		74.0		25.9	302	H	1.3	Upper Restricted Band
2483.924	33.5	2.5	36.0		54.0		18.0		302	H	1.3	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 = 57%, correction factor = 2.5 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 2372.200 MHz:  
AVG corrected for D.C. = 29.8 dBuV/m + 2.5 dB = 32.3 dBuV/m



**PRODUCT ASSURANCE ENGINEERING**  
**Wireless Transceiver DSS/DTS Test Report**

FCC ID: A94429358 IC: 3232A-429358



**Non-restricted band – Bandedge**

**DSS Radio - BT (xDH5) Data**

FCC 15B Class B Product (Residential) @ 3 Meters												
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)	
<b>BT, 3DH5, Max power (10), Tx on LH (2402, 2480)</b>												
<b>Normal orientation</b>												
2399.942				42.0	72.5			30.5	223	V	1.0	Lower Bandedge
2399.884				40.5	72.5			32.0	223	V	1.0	Lower Bandedge, hopping
2487.988				41.5	76.9			35.4	302	H	1.3	Upper Bandedge
2485.997				41.6	76.7			35.1	302	H	1.3	Upper Bandedge, hopping

**DTS radio - BLE Data**

FCC 15B Class B Product (Residential) @ 3 Meters												
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)	
<b>BLE, 1M, power setting unknwn, Tx on LH (2402, 2480)</b>												
<b>Normal orientation</b>												
2399.996				39.3	73.0			33.7	223	V	1.0	Lower Bandedge
2487.974				41.8	77.6			35.8	302	H	1.3	Upper Bandedge

FCC 15B Class B Product (Residential) @ 3 Meters												
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)	
<b>BLE, 2M, power setting unknwn, Tx on LH (2402, 2480)</b>												
<b>Normal orientation</b>												
2395.948		38.1		38.7	72.7			34.0	223	V	1.0	Lower Bandedge
2485.975				42.4	77.6			35.2	302	H	1.3	Upper Bandedge

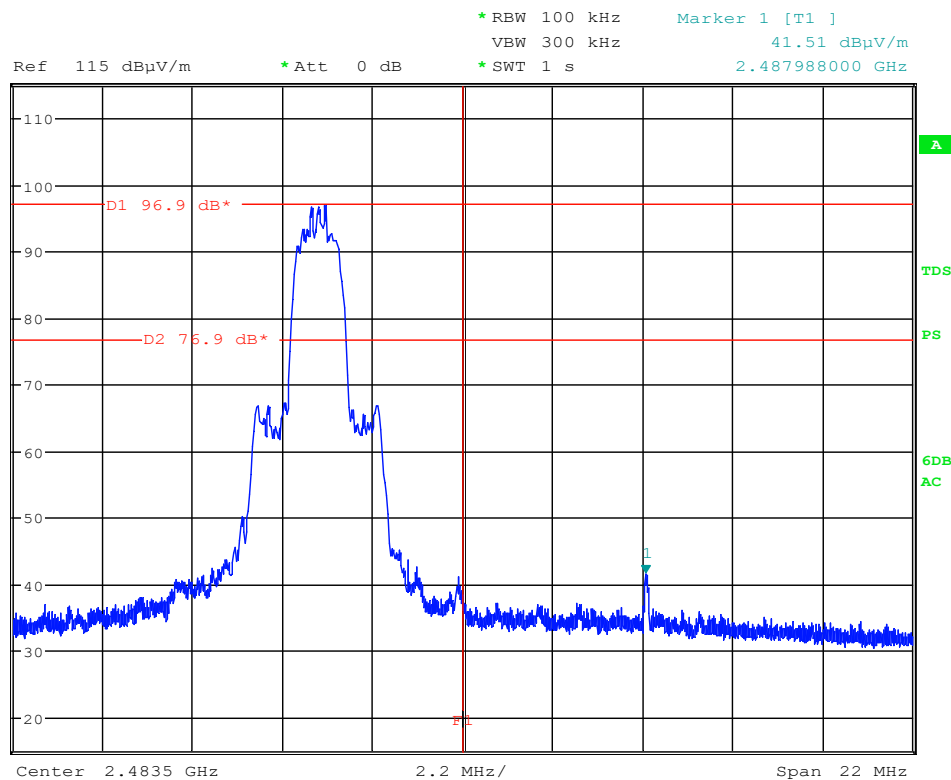
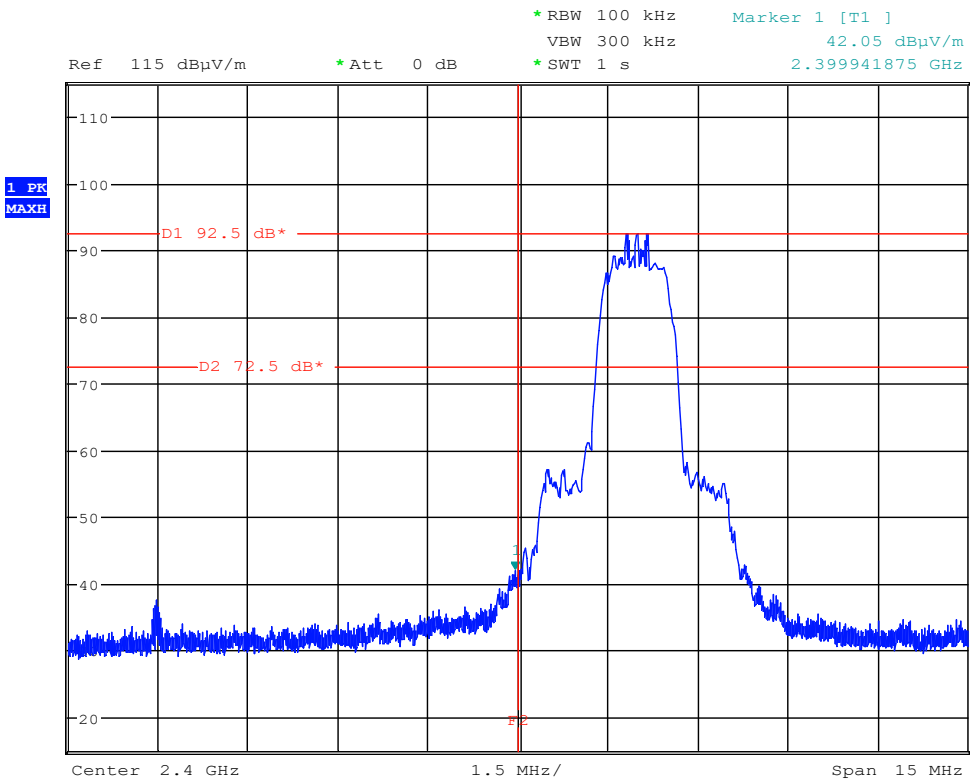


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Plots show the non-restricted band limits of -20 dBc (Line D2, X.Y dB\*). The frequency marker, F1 or F2, denotes the edge of the band.



3DH5 lower and upper bandedge, hopping disabled

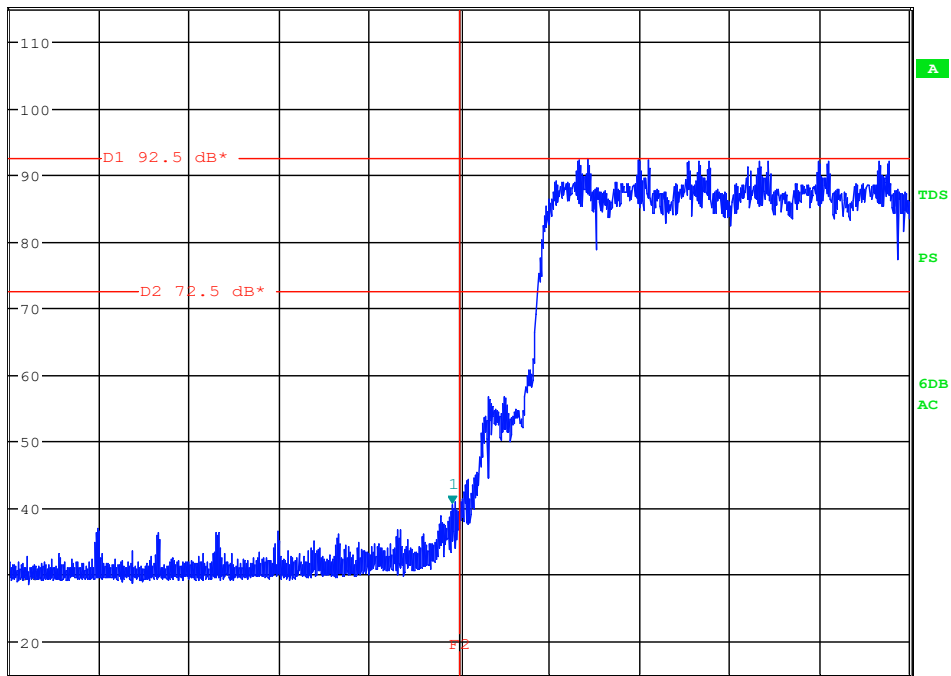


PRODUCT ASSURANCE ENGINEERING  
 Wireless Transceiver DSS/DTS Test Report

FCC ID: A94429358 IC: 3232A-429358

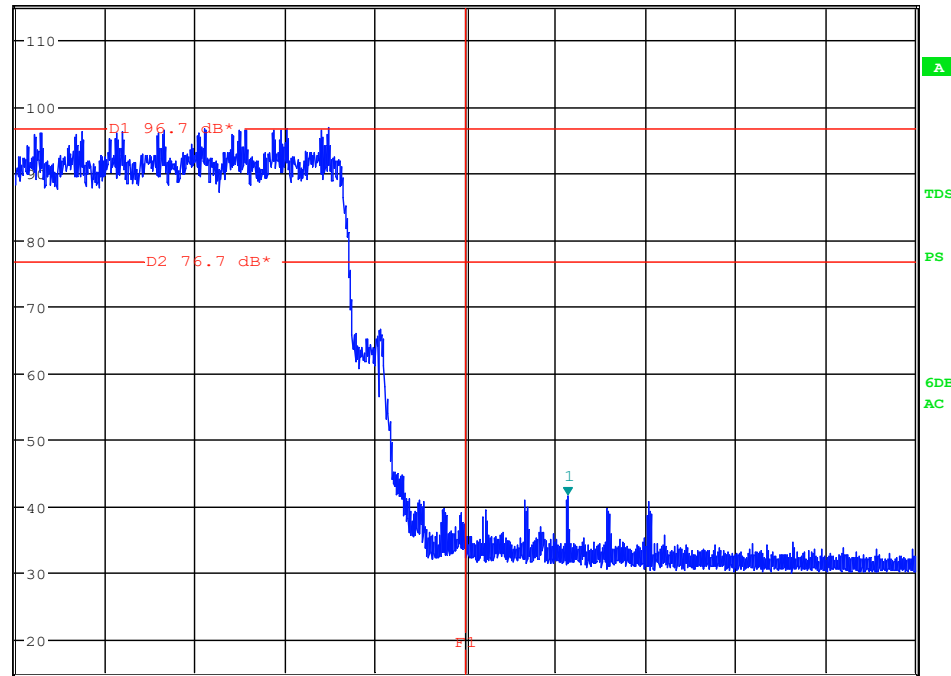


Ref 115 dBµV/m \*Att 0 dB \*RBW 100 kHz Marker 1 [T1 ]  
 VBW 300 kHz 40.54 dBµV/m  
 \*SWT 1 s 2.399883750 GHz



Center 2.4 GHz 1.5 MHz/ Span 15 MHz

Ref 115 dBµV/m \*Att 0 dB \*RBW 100 kHz Marker 1 [T1 ]  
 VBW 300 kHz 41.58 dBµV/m  
 \*SWT 1 s 2.485997000 GHz



Center 2.4835 GHz 2.2 MHz/ Span 22 MHz

3DH5 lower and upper bandedge, hopping on all channels



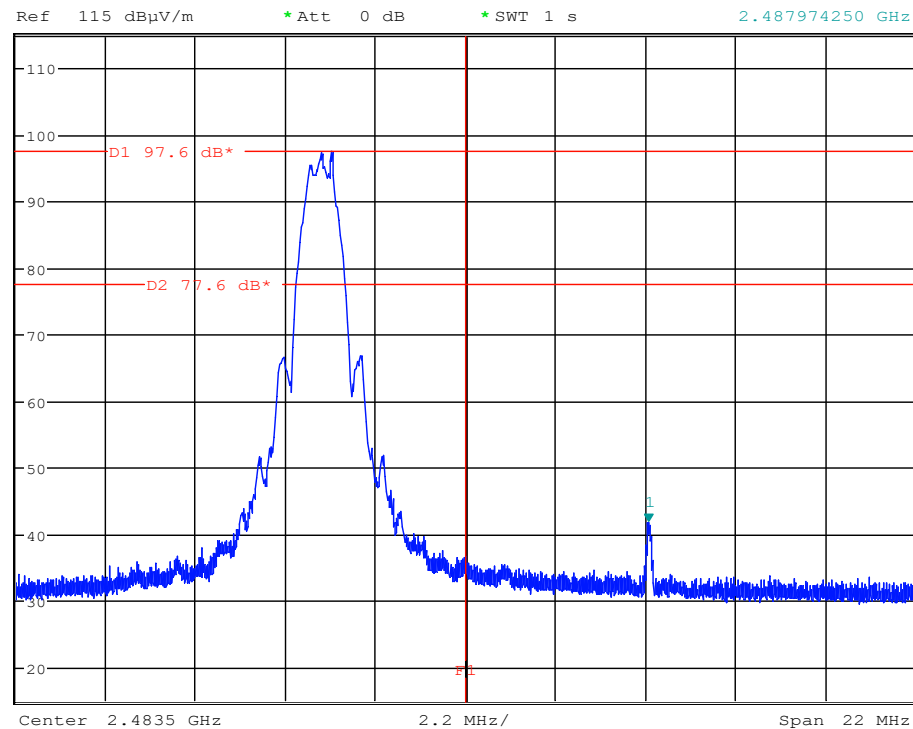
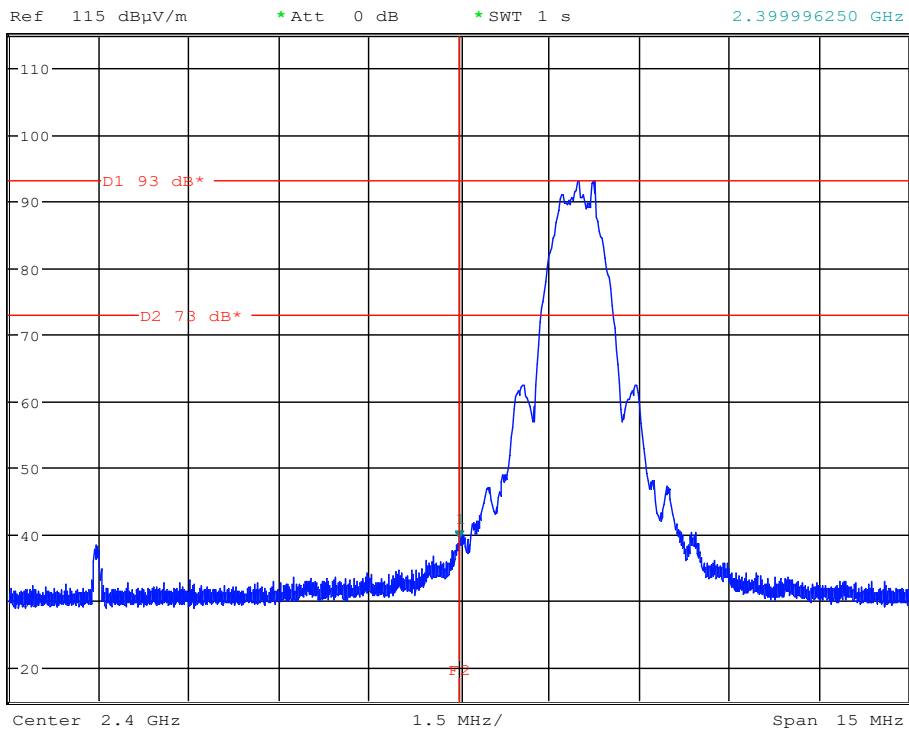
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 Wireless Transceiver DSS/DTS Test Report

FCC ID: A94429358 IC: 3232A-429358



\*RBW 100 kHz Marker 1 [T1 ]  
 VBW 300 kHz 39.34 dBμV/m  
 \*SWT 1 s 2.399996250 GHz

\*RBW 100 kHz Marker 1 [T1 ]  
 VBW 300 kHz 41.82 dBμV/m  
 \*SWT 1 s 2.487974250 GHz



BLE 1M, lower and upper bandedge



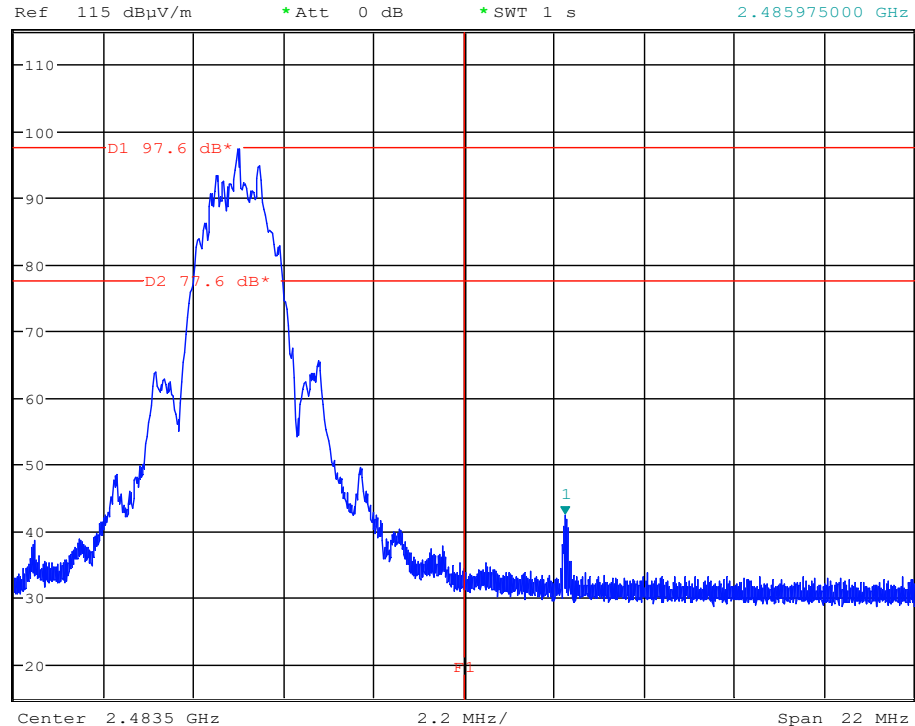
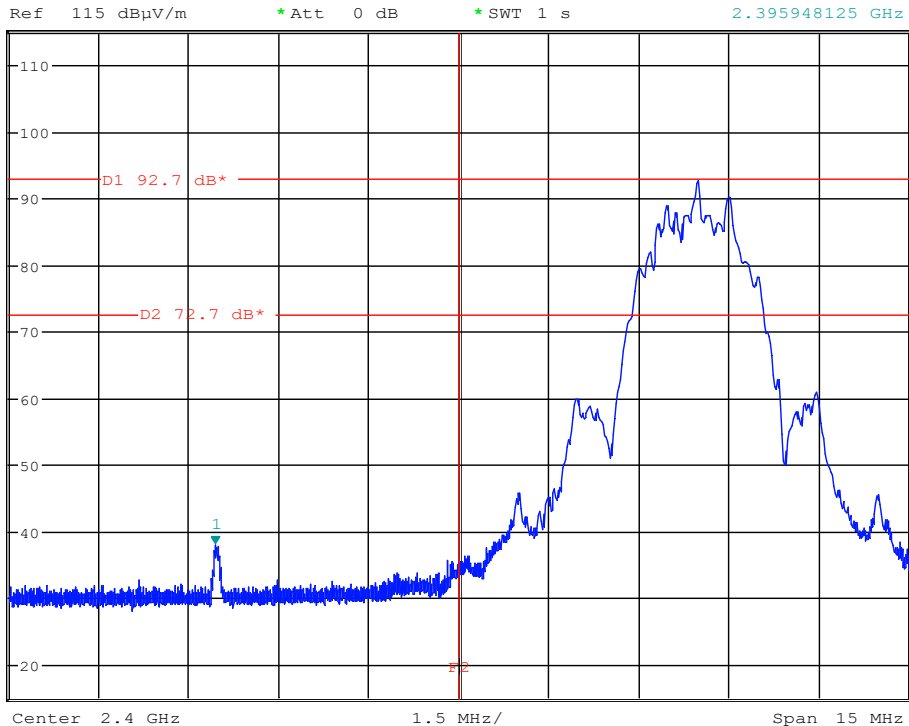
PRODUCT ASSURANCE ENGINEERING  
Wireless Transceiver DSS/DTS Test Report

FCC ID: A94429358 IC: 3232A-429358



\*RBW 100 kHz    Marker 1 [T1 ]  
VBW 300 kHz    38.07 dBμV/m  
\*SWT 1 s        2.395948125 GHz

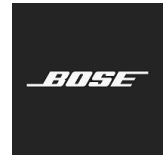
\*RBW 100 kHz    Marker 1 [T1 ]  
VBW 300 kHz    42.42 dBμV/m  
\*SWT 1 s        2.485975000 GHz



BLE 2M, lower and upper bandedge



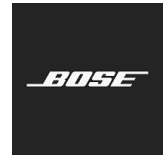
**PRODUCT ASSURANCE ENGINEERING  
Wireless Transceiver DSS Test Report**



# 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	17-Feb-2021	17-Feb-2022
2602	Miteq pre-amp 1-18GHz 35dB	AFS42-01001800-28-10P-42	N/A	Miteq	07-Jul-2021	07-Jul-2022
2414	Band Reject Filter (2.4GHz)	BRM50702-07	003	Micro-Tronics	23-Mar-2021	23-Mar-2022
2373	RF Cable 30MHz-18GHz - 25 feet "N"	TRU-300	N/A	TRU Corporation	Verify Before Use	
2479	RF cable 30MHz-18GHz	257-257-3052640	N/A	SRC Haverhill	23-Mar-2021	23-Mar-2022
2357	RF Cable 30MHz-18GHz	TRU-300	TRU-12707-03	TRU Corporation	23-Mar-2021	23-Mar-2022
2929	Mini-circuits band-edge pre-amp 300 MHz - 8 GHz 20 dB	ZX60HV-83LN+	N/A	Mini-Circuits	23-Mar-2021	23-Mar-2022
1757	18GHz-40GHz Preamp	JS4018004000-30-8P-A1	1406279	Miteq	07-Jul-2021	07-Jul-2022
369	RF Cable 30MHz-40GHz	TRU-160	TRU-12766-13	TRU Corporation	23-Mar-2021	23-Mar-2022
1596	Horn Antenna 18GHz - 26.5GHz	AT4640	309234	Amplifier Research	Verify Before Use	

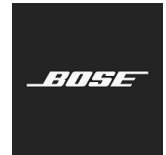
Date(s) of test: 08-Dec-2021, 09-Dec-2021



# Revision History

Date	Author	Changes
10-Mar-2022	KK	Initial release
26-Apr-2022	KK	Updated with >18 GHz plot and equipment Clarified average measurement method





# End of Report