

Test Type: Emissions [X] Immunity []

Product Type: Wireless Earbuds

Product Name/Number: *Model Number: 424611*
FCC ID: A94424611
IC: 3232A-424611

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

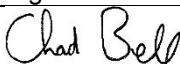
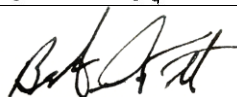
Test Results: Pass [X] Fail []

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

Report Number: *EMC. 424611.17. 299.4*

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		December 1, 2017
Electrical Engineer Review* By:	Brent Dewitt		December 1, 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 earbud that contains BLE transceivers, manufactured by ST Microelectronics, BLUENRG-MSCSP.

Setup (Cables and Accessories)

Radiated emissions was performed with the EUT playing audio while the earbuds are paired to the companion app and while charging the earbuds and the battery in the charging cradle. Conducted emissions was performed while charging the earbuds and the battery in the charging cradle. EUT is sold with Bose part number 776716-0010 power supply which was used for charging during testing. For radio tests, the BLE radio was configured using LightBlue® Explorer by Punch Through.

EUT Antenna Description

The antenna is a Laser Direct Structuring (LDS) antenna with 1.316 dBi antenna gain.

SOFTWARE AND FIRMWARE

The firmware installed in the charge case during testing was version T0.08.31 and the earbud firmware was version 1.3.1-43-g7b90185.

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 4

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.

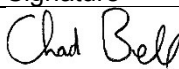
Conclusions:

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		November 8, 2017

Test Standards

Emissions:

	Standard
☒	FCC Part 15C
☒	Canada RSS-247
☒	Canada RSS-GEN
☒	FCC KDB 558074 D01 DTS measurement guidance v04

Environmental Conditions

Ambient:

Temperature:	22±4°C
Humidity:	30-60%RH
Mains Voltage:	☒ 120VAC

MEASUREMENT METHODS

Duty Cycle: KDB 558074 D01 Section 6.0
 6 dB BW: KDB 558074 D01, Section 8.1.
 99% Occupied Bandwidth: ANSI C63.10-2013, Section 6.9.3
 Output Power: KDB 558074 D01 Section 9.1.2
 Power Spectral Density: KDB 558074 D01 Section 10.2.
 Out-of-band emissions in non-restricted bands: KDB 558074 D01 Section 11.0.
 Out-of-band emissions in restricted bands: KDB 558074 D01 Section 12.2.5.2
 General Radiated Emissions: ANSI C63.10:2013 Sections 6.3-6.6
 Line Conducted Emissions: ANSI C63.10:2013 Sections 6.2

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	07/31/2018	Carole Park	Quality Manager

Canadian Test Site Registration.

Radiated emissions below 1GHz were performed in Test Site 3232A-1. Radiated emissions above 1GHz were performed in Test Site 3232A-2.

Scope of Accreditation for: Bose Corporation

Test Site	OATS 3m	OATS 10m	OATS 30m	Chamber 3m	Chamber 10m	Expiry Date
3232A-2	No	No	No	Yes	No	2020-06-27
3232A-1	No	No	No	Yes	No	2020-04-25

6dB Bandwidth Requirement:

FCC 15.247(a)(2); IC RSS-247 5.2 (1)

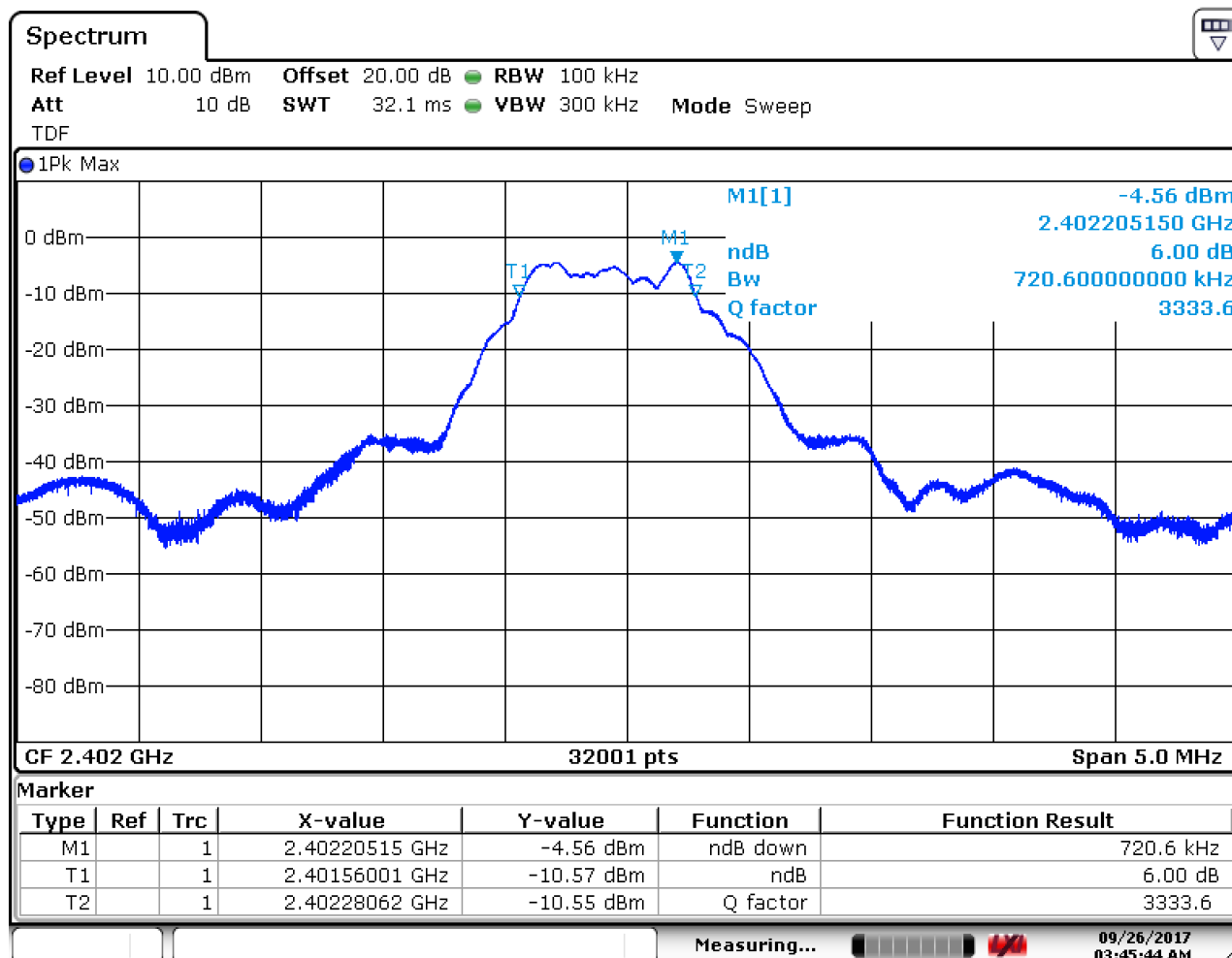
The minimum 6 dB bandwidth shall be at least 500 kHz.

Test Procedure:

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100kHz. The VBW is set $\geq 3 \times$ RBW. The sweep time is coupled. Peak detector is used with max hold.

Test Results:

DTS Bandwidth Summary Table (BLE)						
Channel	Frequency (MHz)	Mode	DTS BW (kHz)	Limit (kHz)	Margin (kHz)	Result
Low	2402	BLE	720.6	500	220.6	Pass
Middle	2442	BLE	747.95	500	247.95	Pass
High	2480	BLE	764.5	500	264.5	Pass



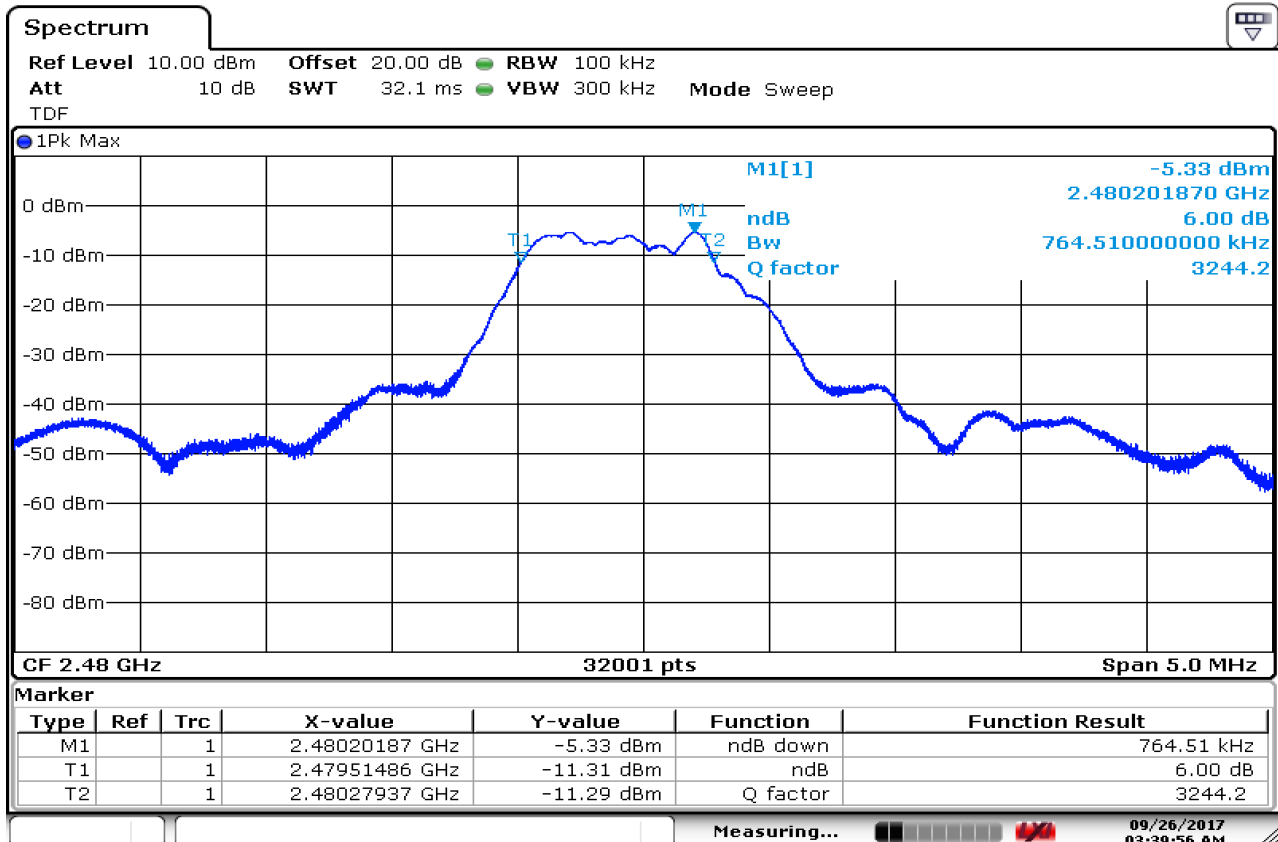
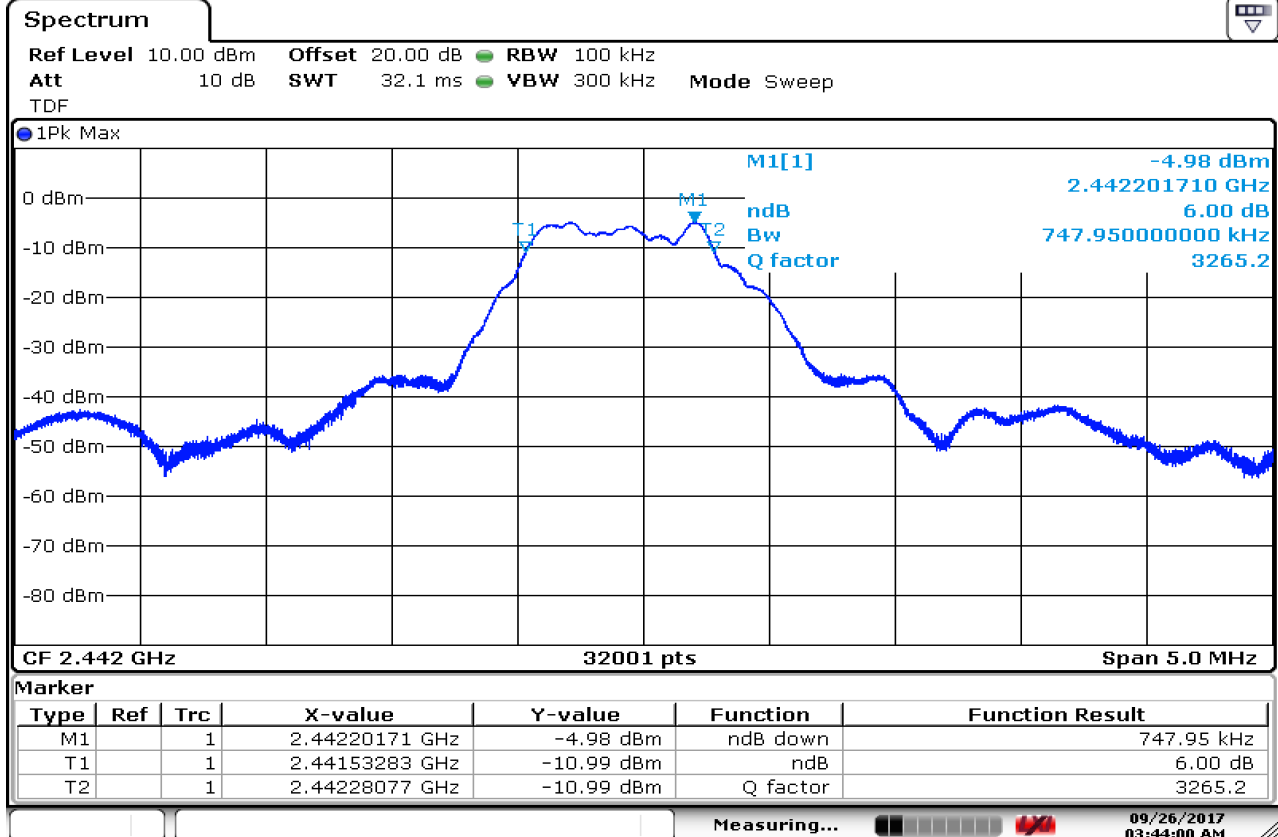


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BOSE



The minimum 6dB bandwidth is 720.6kHz which is more than the 500kHz minimum required.

Test Equipment Used:

TN	Description	Model	S/N	Manufacturer	Most Recent Calibration	Calibration Due Date	Most Recent Verification	Verification Due Date
2409	Signal and Spectrum Analyzer	FSV40	101413	Rohde & Schwarz	05-Apr-2017	05-Apr-2018		
1388	DC Power Supply	E3646A	MY40005729	Agilent			Verify Before Use	Verify Before Use
2877	EMC Cable	GA08-S1S1-39	17024401002	MegaPhase			Verify Before Use	Verify Before Use

Test performed on November 26, 2017

99% Bandwidth Requirement:

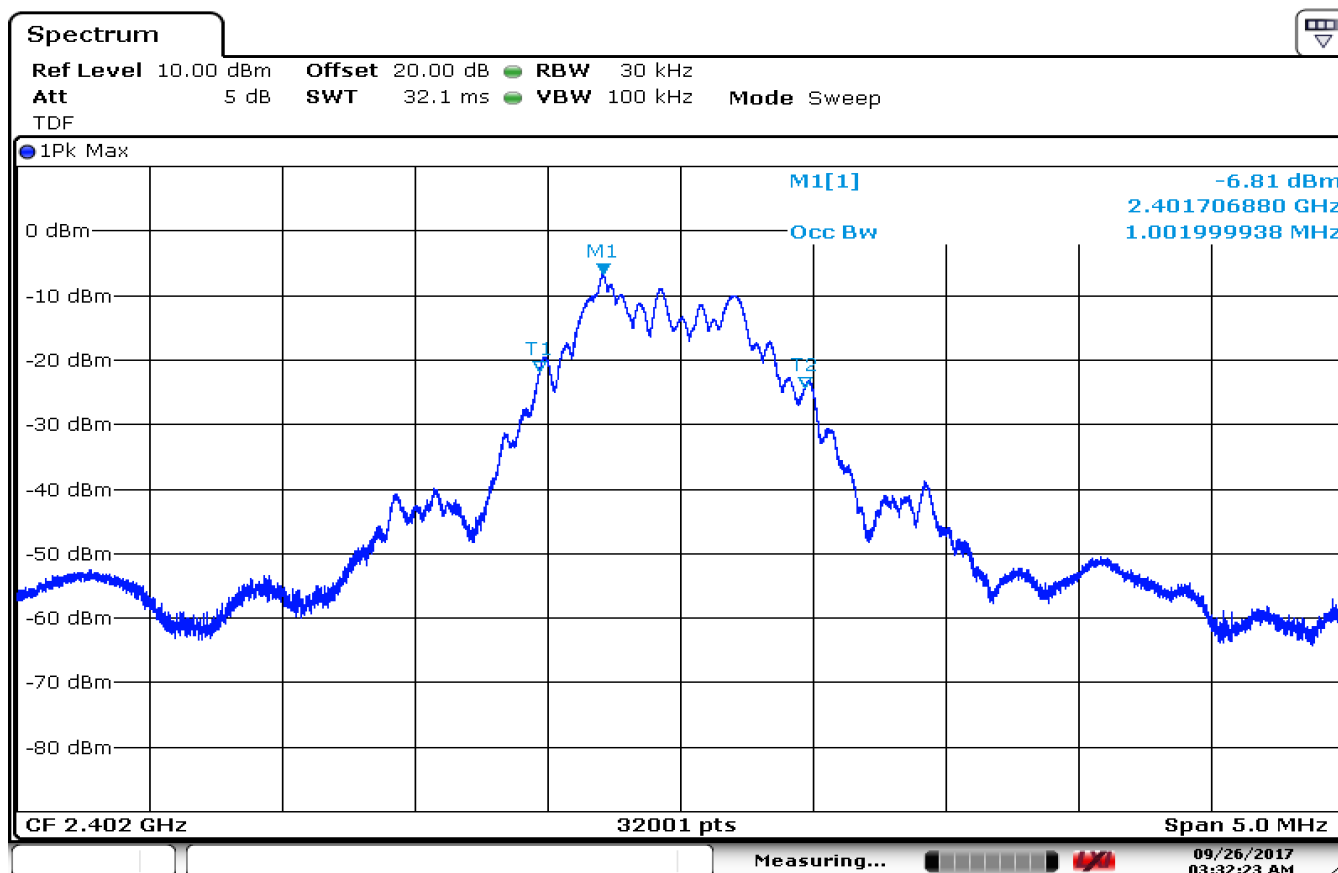
None; for reporting purposes, only. Test per FCC 15.247(a)(1); IC RSS-247 5.1 (1), RSS-Gen 6.6.

Test Procedure:

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

Test Results:

99% Bandwidth Summary Table (BLE)			
Channel	Frequency (MHz)	Mode	99% Bandwidth (kHz)
Low	2402	BLE	1002.0
Middle	2442	BLE	999.0
High	2480	BLE	1002.0

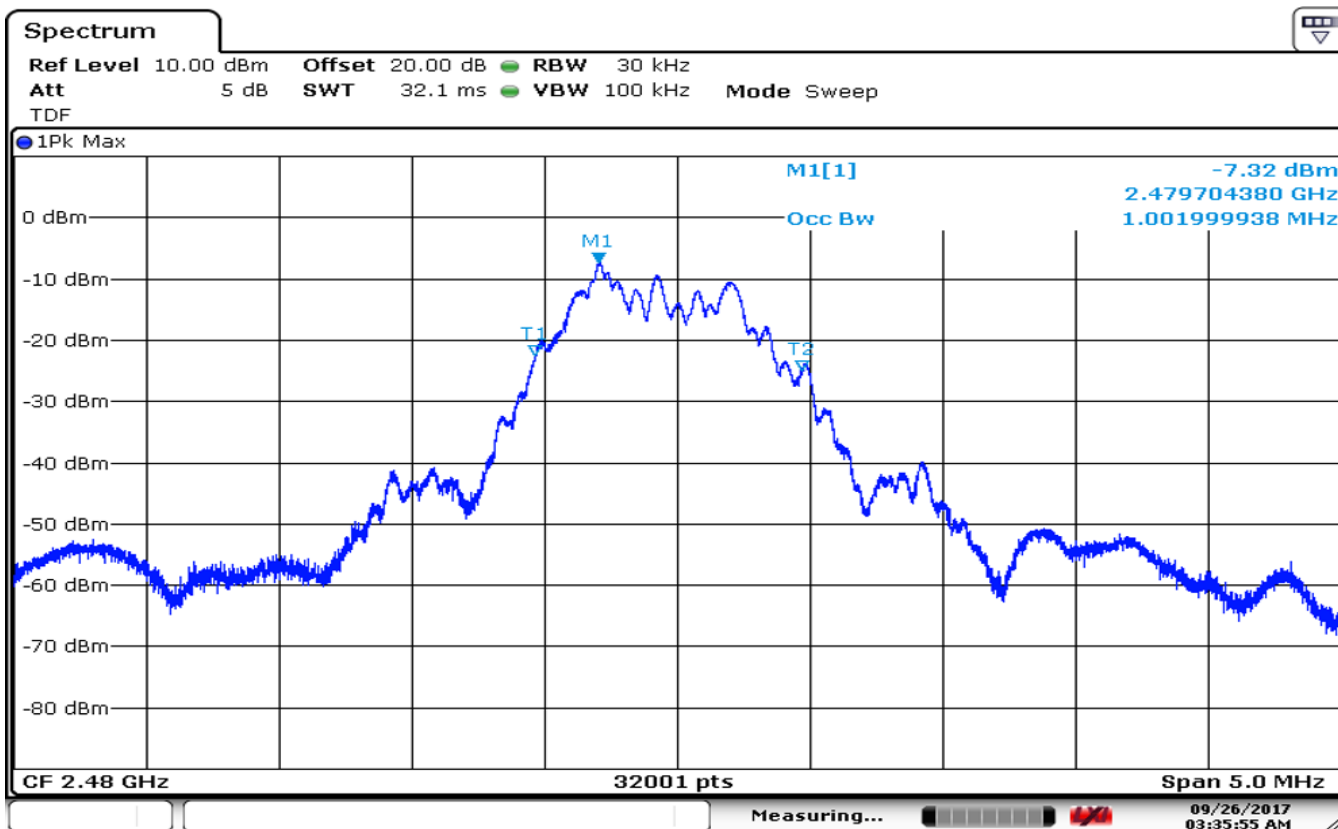
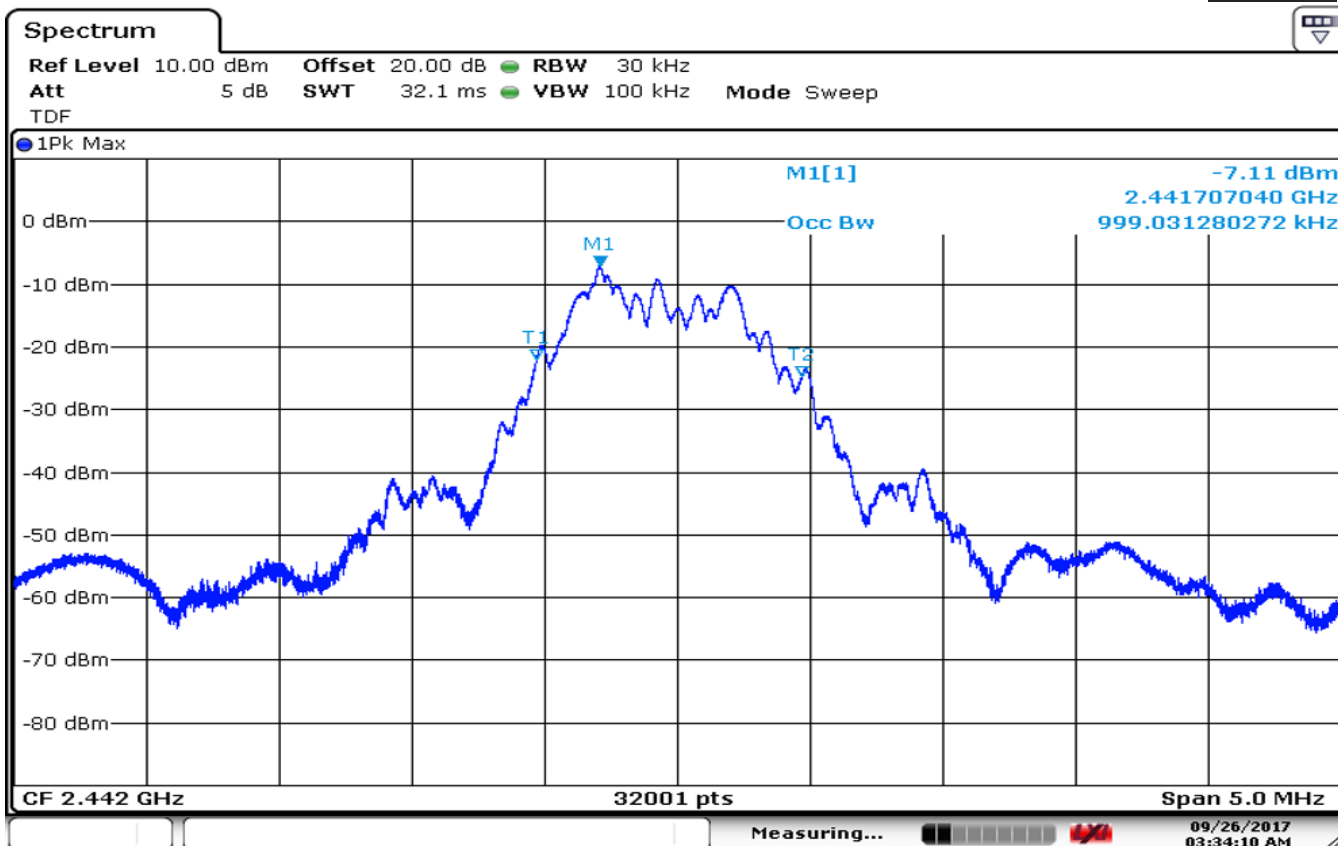




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The maximum 99% occupied bandwidth is 1002.0 kHz.



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Test Equipment Used:

TN	Description	Model	S/N	Manufacturer	Most Recent Calibration	Calibration Due Date	Most Recent Verification	Verification Due Date
2409	Signal and Spectrum Analyzer	FSV40	101413	Rohde & Schwarz	05-Apr-2017	05-Apr-2018		
1388	DC Power Supply	E3646A	MY40005729	Agilent			Verify Before Use	Verify Before Use
2877	EMC Cable	GA08-S1S1-39	17024401002	MegaPhase			Verify Before Use	Verify Before Use

Test performed on September 26, 2017

Conducted Output Power Requirements:

FCC 15.247 (b) (3)

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

RSS-247 5.4 (4)

For EUTs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. Except as provided in Section 5.4(5), the E.I.R.P. shall not exceed 4 W.

Test setup details:

The EUT is controlled via the LightBlue iOS app. A 4 inch SMA cable with 0.5 dB loss and a 20 dB pad were used for all conducted measurements. To compensate for the cable loss and pad attenuation, the reference level offset feature of the spectrum analyzer was used for the attenuator and a transducer factor was used for the cable. 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.

Test Results:

Output Power Summary Table (BLE)						
Channel	Frequency (MHz)	Output Power (dBm)	Directional Gain (dBi)	Limit (dB)	Margin (dB)	Result
Low	2402	-4.32	1.316	30	33.004	Pass
Middle	2442	-4.72	1.316	30	33.404	Pass
High	2480	-5.06	1.316	30	33.744	Pass



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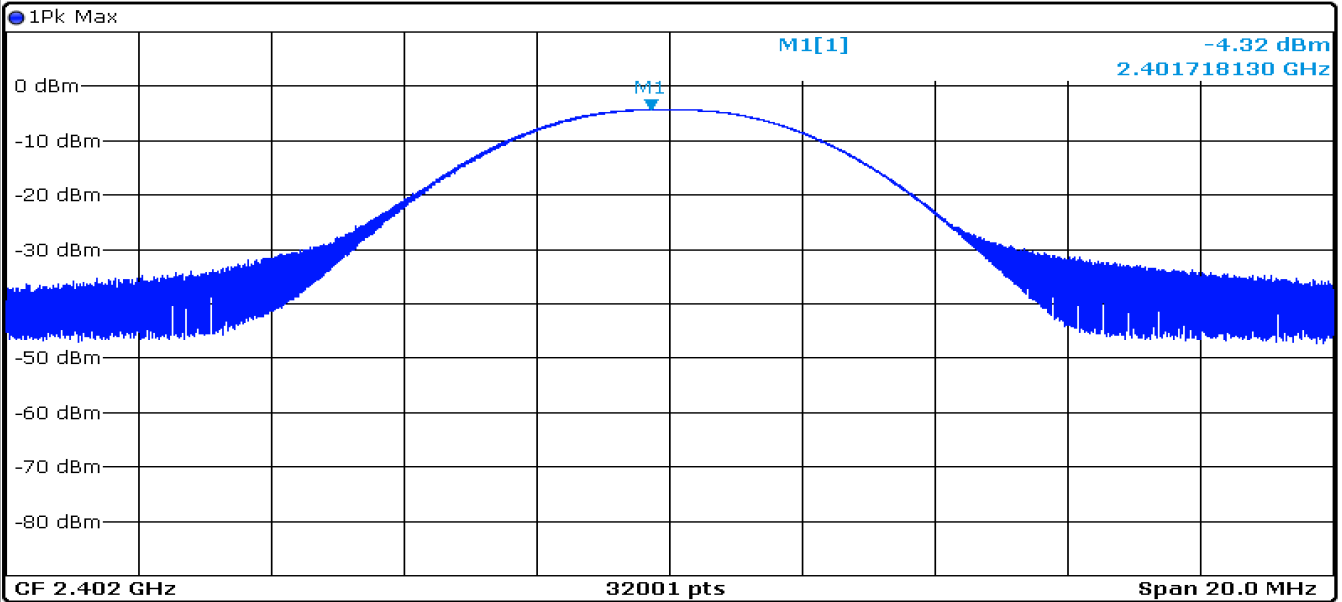
DESIGN ASSURANCE ENGINEERING Wireless Transceiver Bluetooth Low Energy Test Report

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Spectrum

Ref Level 10.00 dBm Offset 20.00 dB RBW 3 MHz
Att 10 dB SWT 32.1 ms VBW 5 MHz Mode Sweep
TDF



Marker

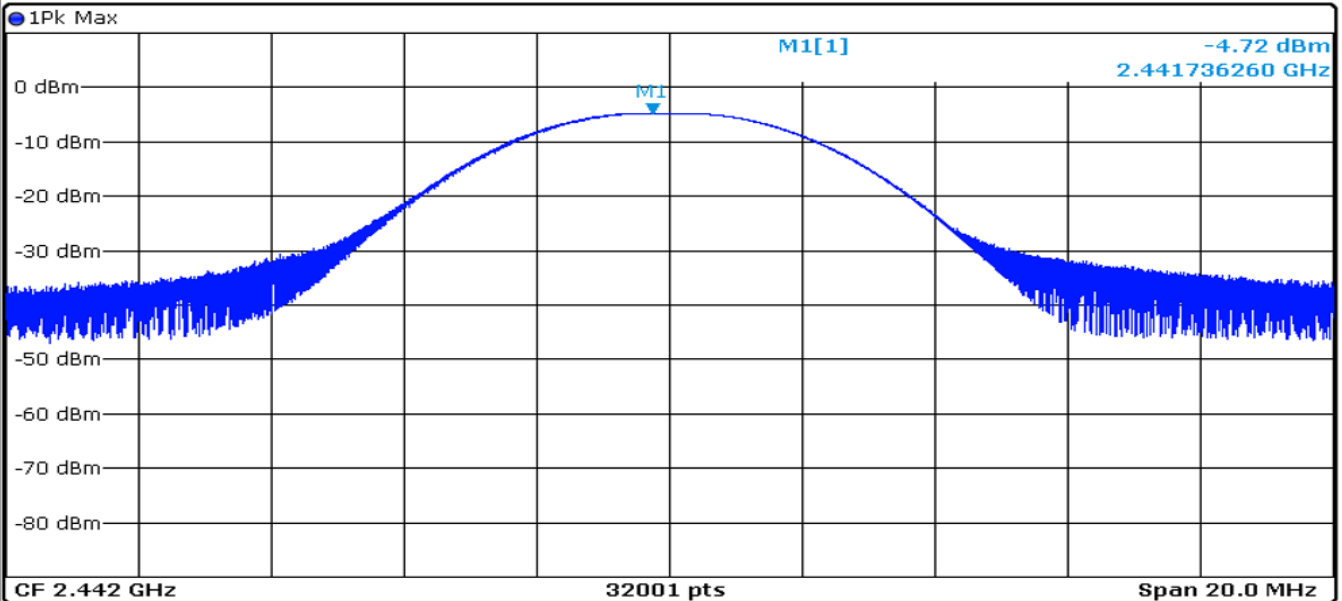
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40171813 GHz	-4.32 dBm		

Measuring...

09/26/2017
03:23:57 AM

Spectrum

Ref Level 10.00 dBm Offset 20.00 dB RBW 3 MHz
Att 10 dB SWT 32.1 ms VBW 5 MHz Mode Sweep
TDF



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.44173626 GHz	-4.72 dBm		

Measuring...

09/26/2017
03:21:45 AM

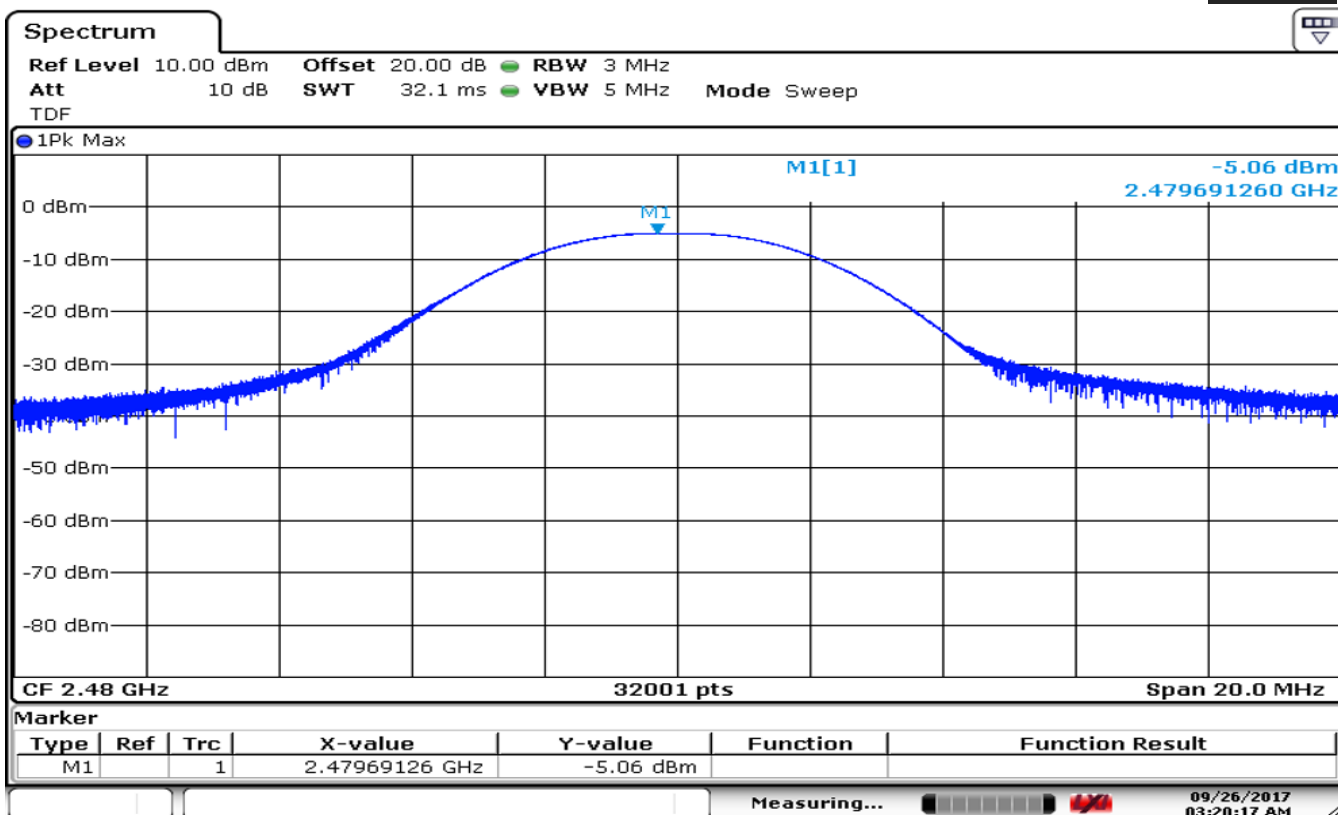
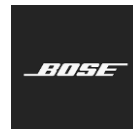


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Model 424611 meets the conducted power limit of 1W (30dBm) by 33dB at 2402MHz.

Test Equipment Used:

TN	Description	Model	S/N	Manufacturer	Most Recent Calibration	Calibration Due Date	Most Recent Verification	Verification Due Date
2409	Signal and Spectrum Analyzer	FSV40	101413	Rohde & Schwarz	05-Apr-2017	05-Apr-2018		
1388	DC Power Supply	E3646A	MY40005729	Agilent			Verify Before Use	Verify Before Use
2877	EMC Cable	GA08-S1S1-39	17024401002	MegaPhase			Verify Before Use	Verify Before Use

Test performed on September 26, 2017



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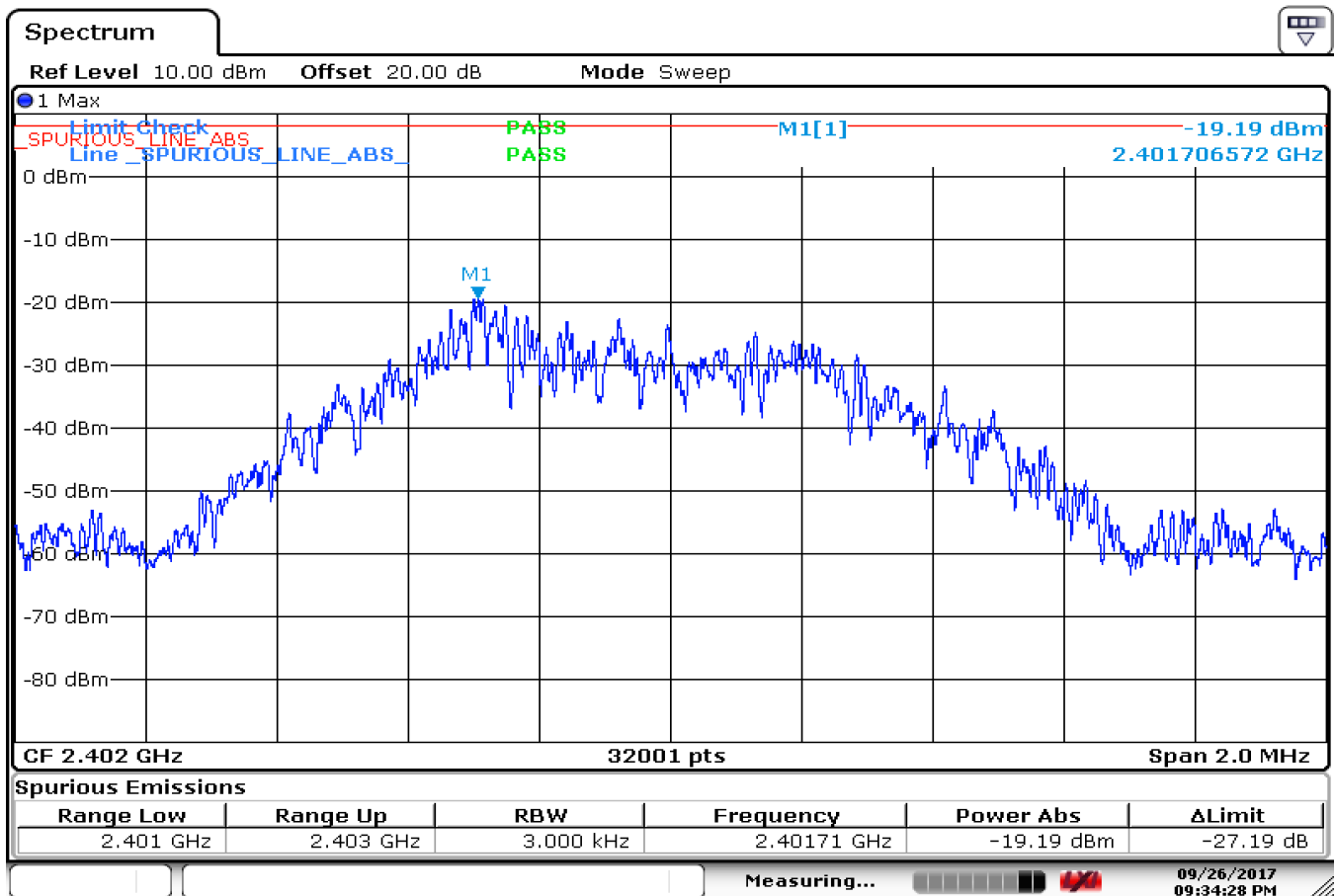
Power Spectral Density Requirements:

FCC 15.247 (e) and IC RSS-247 5.2 (2)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Test Results:

Power Spectral Density Summary Table (BLE)					
Channel	Frequency (MHz)	PSD (dBm)	Limit (dB)	Margin (dB)	Result
Low	2402	-19.19	8	27.19	Pass
Middle	2442	-19.66	8	27.66	Pass
High	2480	-20.02	8	28.02	Pass

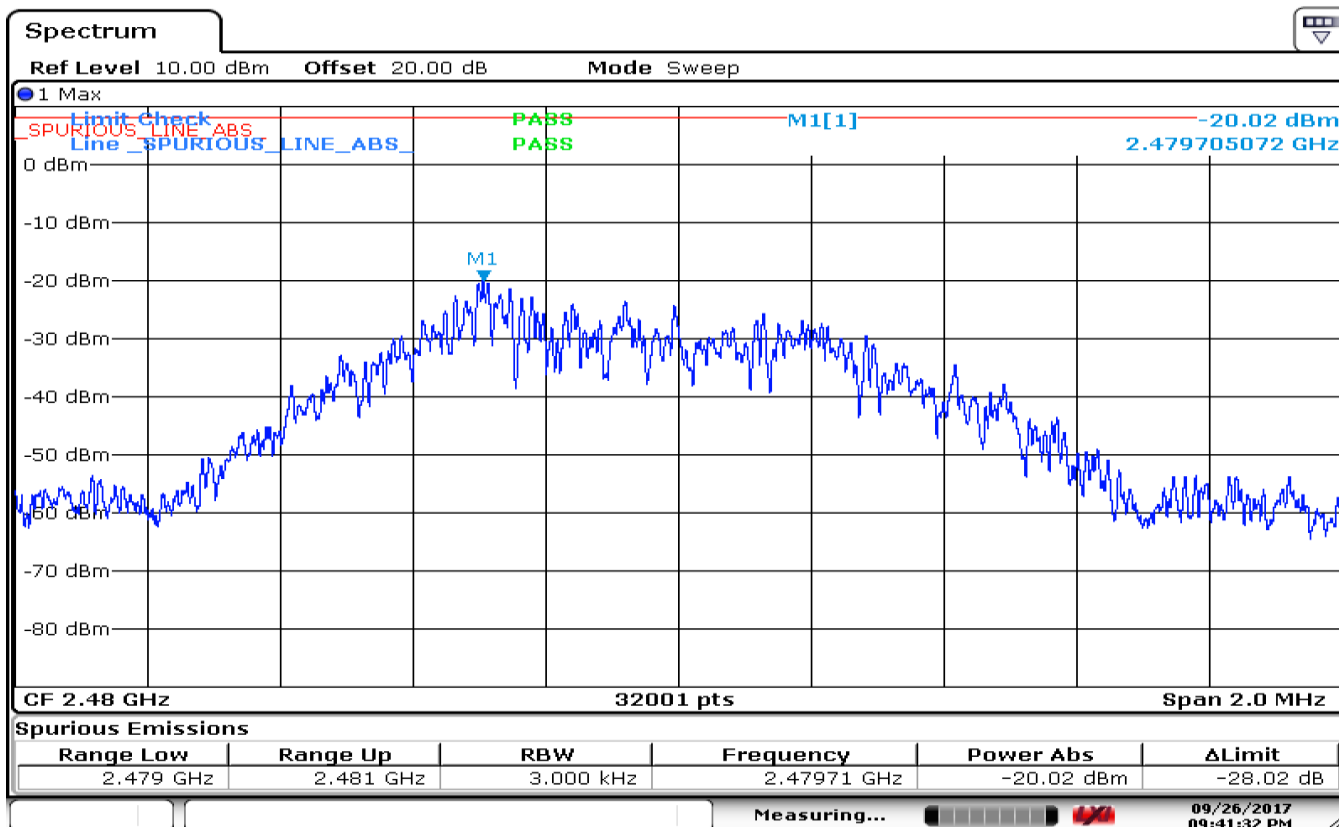
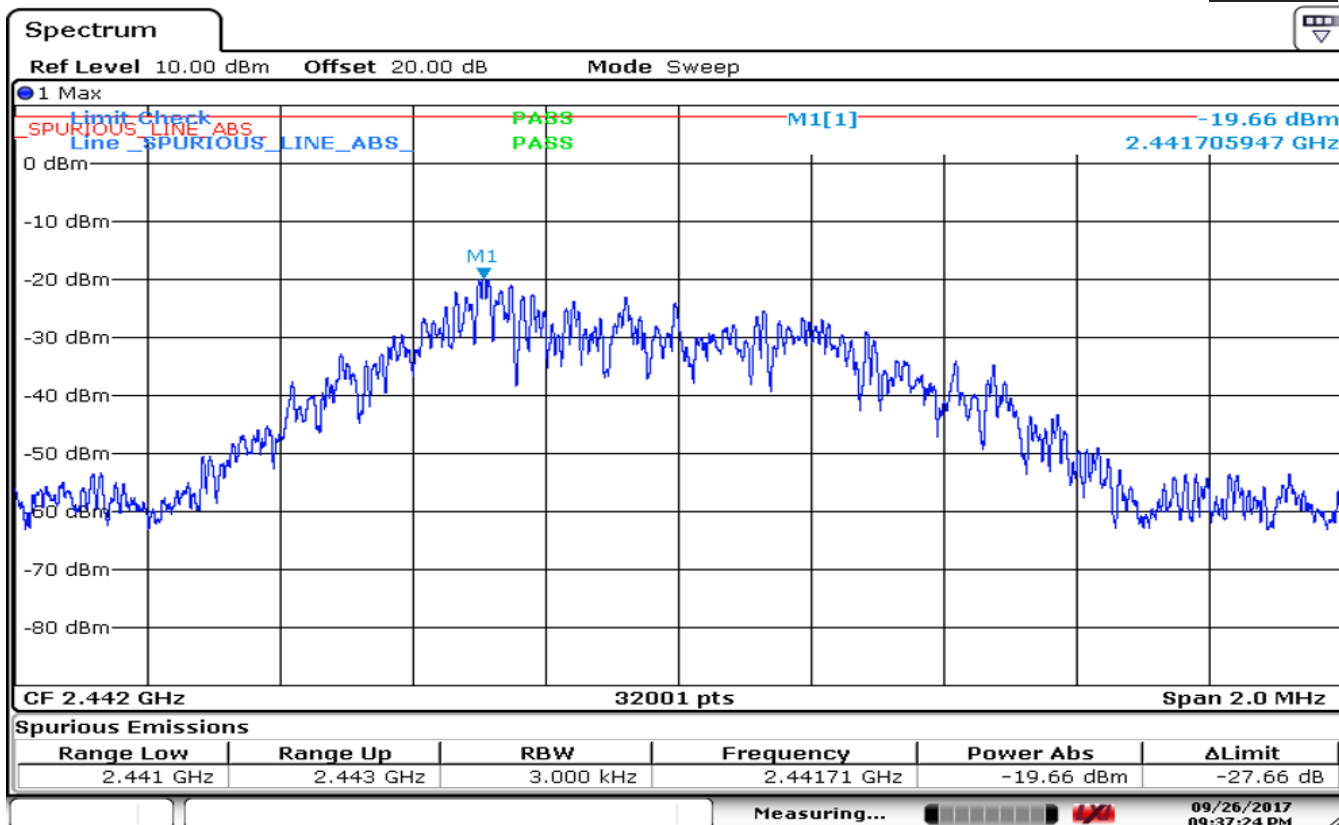
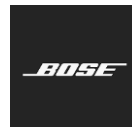




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The Model 424611 passes FCC power spectral density by 27.19dB.



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Test Equipment Used:

TN	Description	Model	S/N	Manufacturer	Most Recent Calibration	Calibration Due Date	Most Recent Verification	Verification Due Date
2409	Signal and Spectrum Analyzer	FSV40	101413	Rohde & Schwarz	05-Apr-2017	05-Apr-2018		
1388	DC Power Supply	E3646A	MY40005729	Agilent			Verify Before Use	Verify Before Use
2465	EMC Cable	GA08-S1S1-30	17024401002	MegaPhase			Verify Before Use	Verify Before Use

Test performed on September 26, 2017

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.



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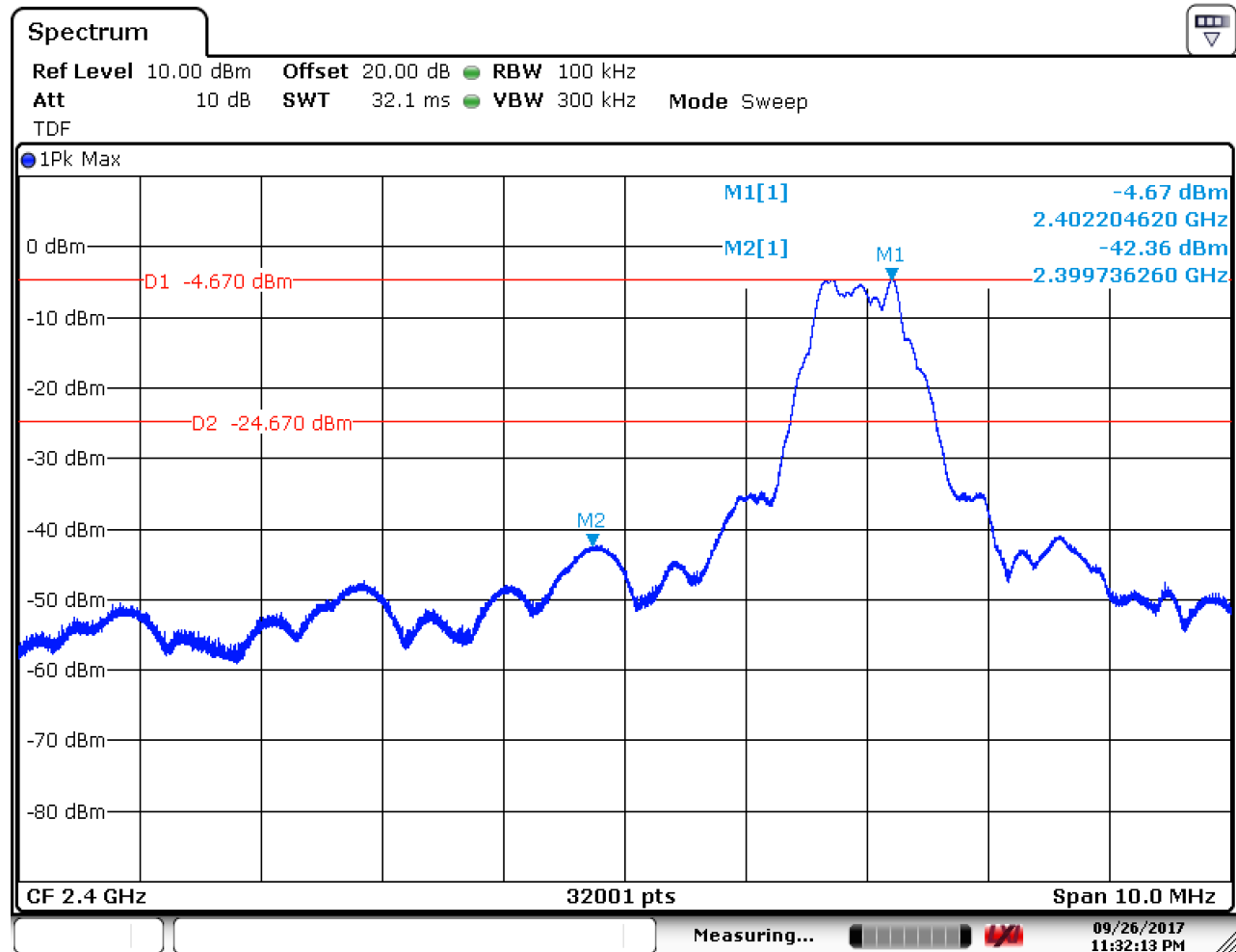
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Spurious Band-edge Emissions

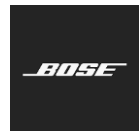
Lower Band Edge (BLE)						
Channel	Frequency (MHz)	Mode	Worst Case (dBc)	Limit (dBc)	Margin (dB)	Result
Low	2402	BLE	37.69	20	17.69	Pass





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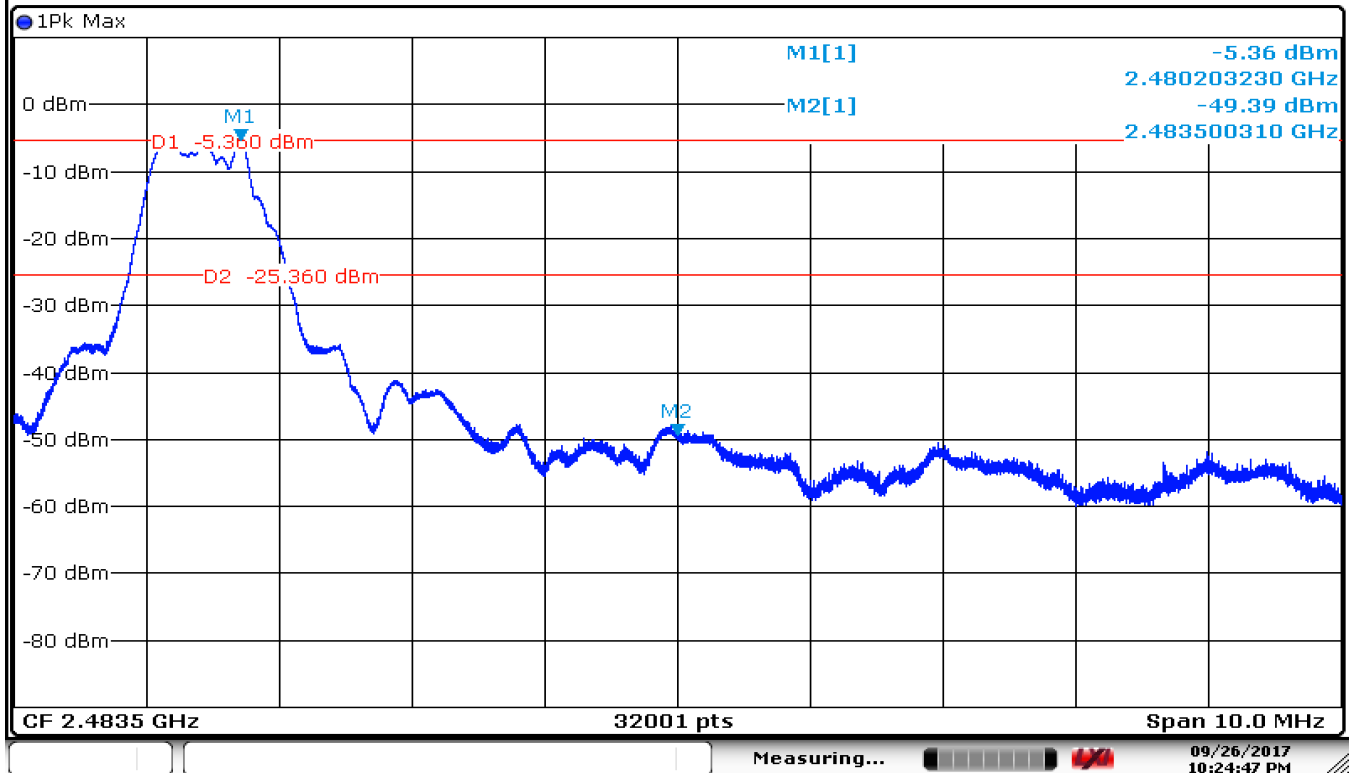
FCC ID: A94424611 IC: 3232A-424611

Upper Band Edge (BLE) (Peak Detector)						
Channel	Frequency (MHz)	Mode	Worst Case (dBc)	Limit (dBc)	Margin (dB)	Result
High	2480	BLE	44.03	20	24.03	Pass

Spectrum



Ref Level 10.00 dBm Offset 20.00 dB RBW 100 kHz
Att 10 dB SWT 32.1 ms VBW 300 kHz Mode Sweep
TDF





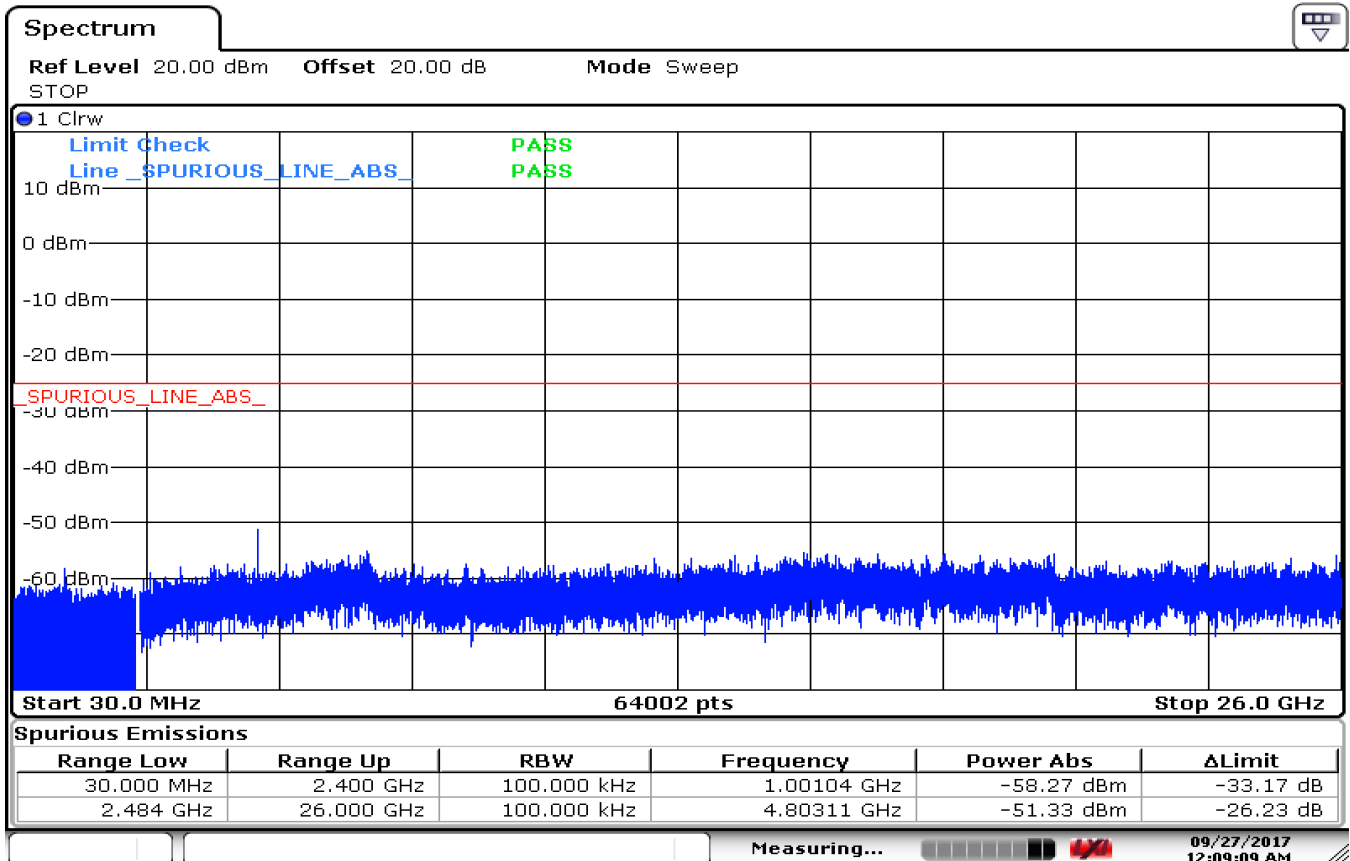
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Spurious Emissions



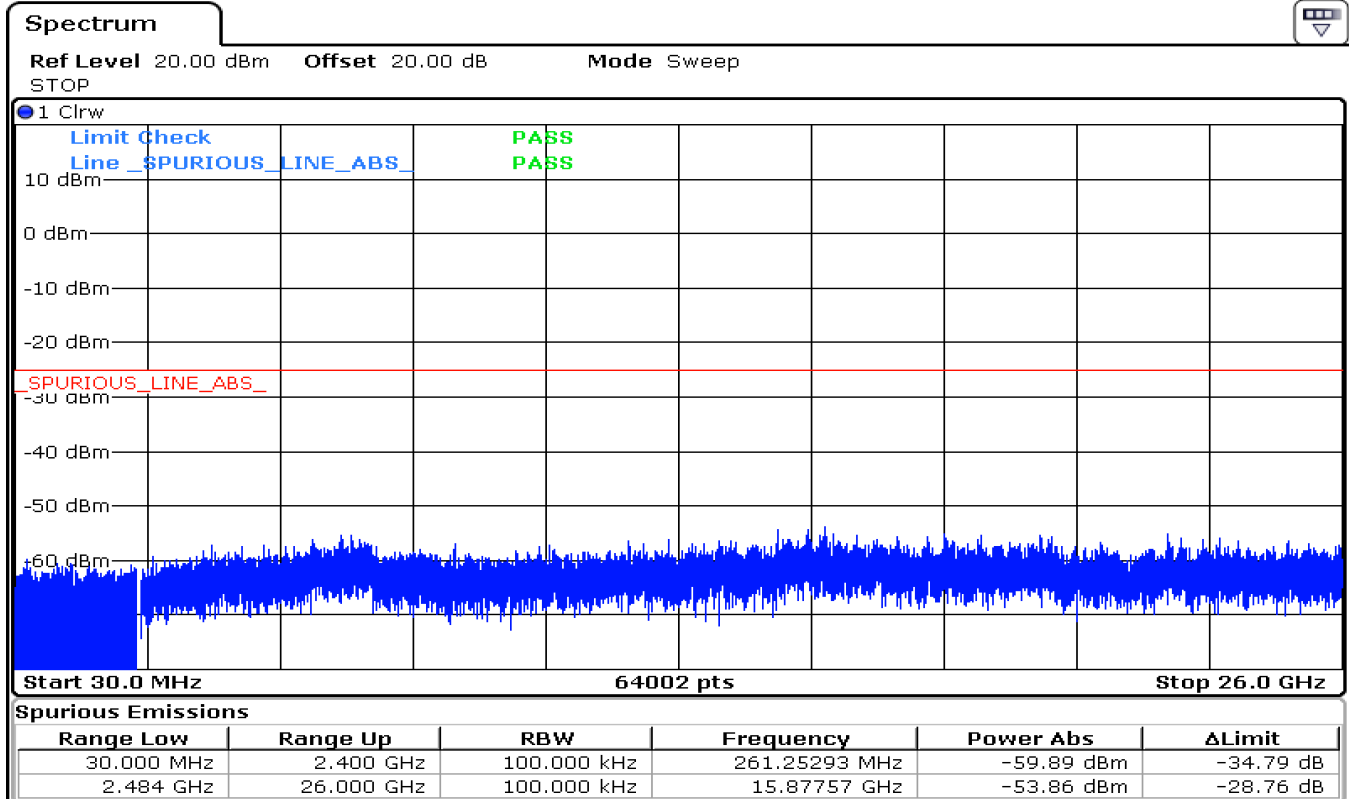
BLE Channel 0. In above plot 2.4GHz to 2.4835GHz was not measured. Limit line shown is 20dB below the highest reading using a 100kHz RBW at BLE Channel 0. Passes by 26.23dB when transmitting on channel 0.



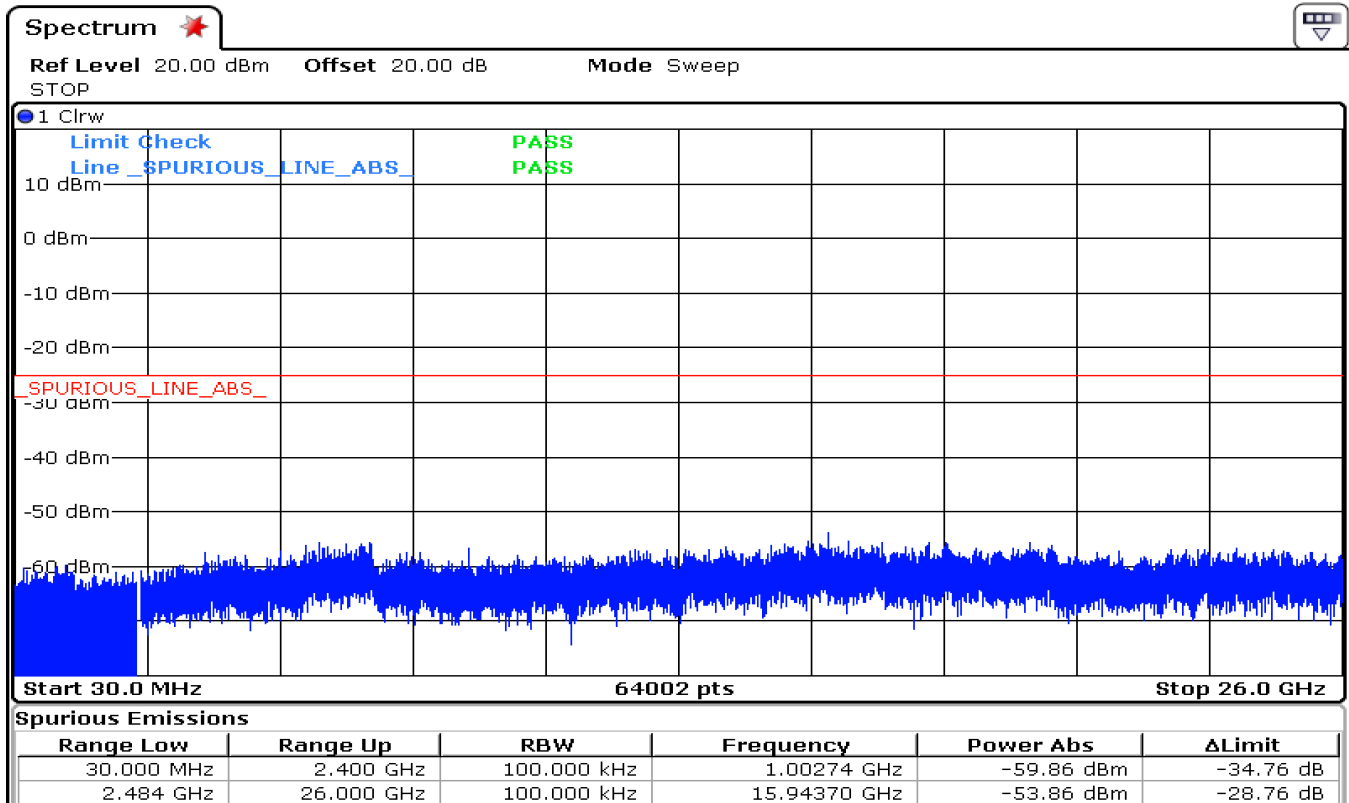
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BLE Channel 20. In above plot 2.4GHz to 2.4835GHz was not measured. Limit line shown is 20dB below the highest reading using a 100kHz RBW at BLE Channel 20. Passes by 28.6dB when transmitting on channel 20.



BLE Channel 39. In above plot 2.4GHz to 2.4835GHz was not measured. Limit line shown is 20dB below the highest reading using a 100kHz RBW at BLE Channel 39. Passes by 28.76dB when transmitting on channel 39.



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Test Equipment Used:

TN	Description	Model	S/N	Manufacturer	Most Recent Calibration	Calibration Due Date	Most Recent Verification	Verification Due Date
2409	Signal and Spectrum Analyzer	FSV40	101413	Rohde & Schwarz	05-Apr-2017	05-Apr-2018		
1388	DC Power Supply	E3646A	MY40005729	Agilent			Verify Before Use	Verify Before Use
2465	EMC Cable	GA08-S1S1-30	17024401002	MegaPhase			Verify Before Use	Verify Before Use

Test performed on September 26, 2017

Radiated Emissions Test Results

Requirements:

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

Limits:

Standard	Freq Range (MHz)	Limits (dBuV QP ¹)			Comments
		Class A		Class B	
		10 m	3 m ²	3 m	
FCC 15B	30-88	39	49	40	Measurements above 1 GHz are made using average and peak detectors. Mains cables draped to floor, not bundled. *For measurements above 1 GHz, peak limits must also be met that are 20 dB higher than average limits.
	88-216	43.5	53.5	43.5	
	216-960	46.5	56.5	46	
	>960	49.5*	59.5*	54*	

In any of the restricted bands defined in FCC part 15.209(a), the field strength at 3 meters shall not exceed 54dBuV/m (average) or 74dBuV/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 to compute the emission level that would have been measured had the test been performed at 100 % duty cycle. The duty cycle correction factor used was 6.7dB to correct for the 46.3% duty cycle.

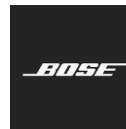
Transmitter Harmonics/Spurious

Typically, we use a notch filter to protect the preamp from overload however, in this case, the transmit power is sufficiently low that overload was not a concern. The radio was programmed to transmit on a single channel, low mid and high channels were checked, at max power at higher duty cycles than would ever be realized in normal operation. Then a duty cycle correction factor of 6.7dB was added to the average readings. For each frequency tested the earbud was oriented in 3 orthogonal axes and the highest plots and readings are shown below.

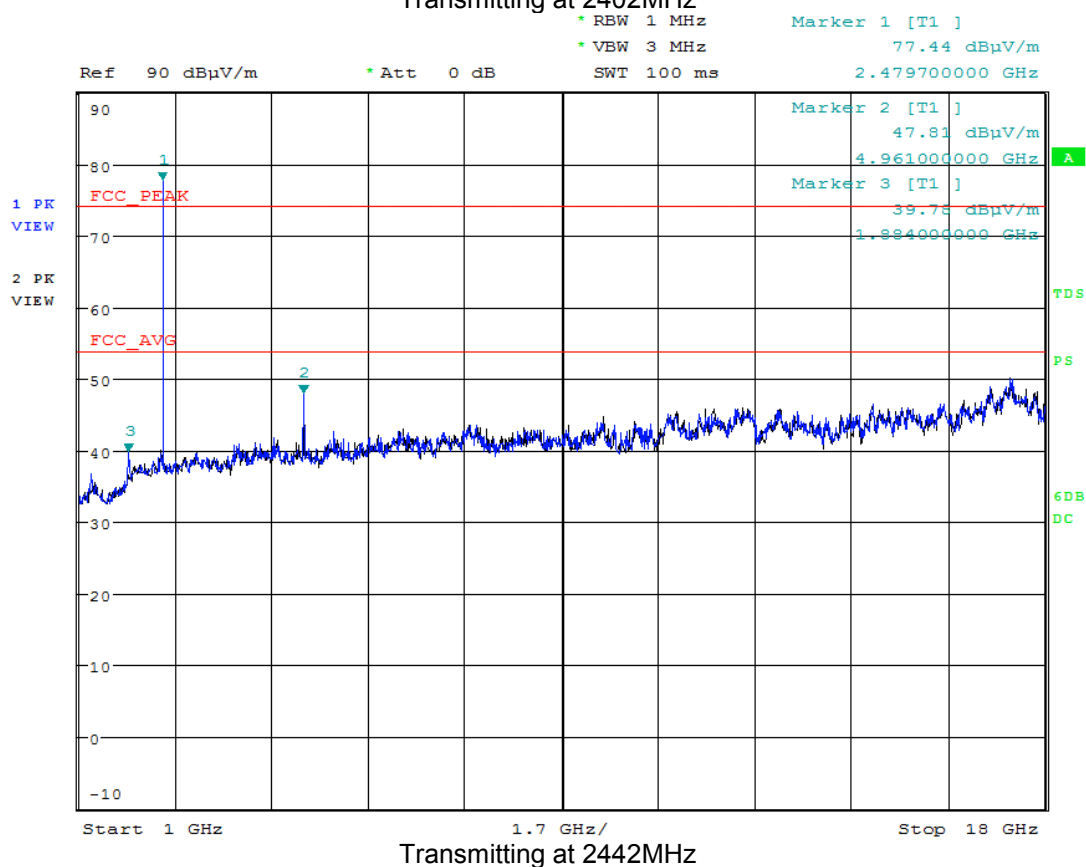
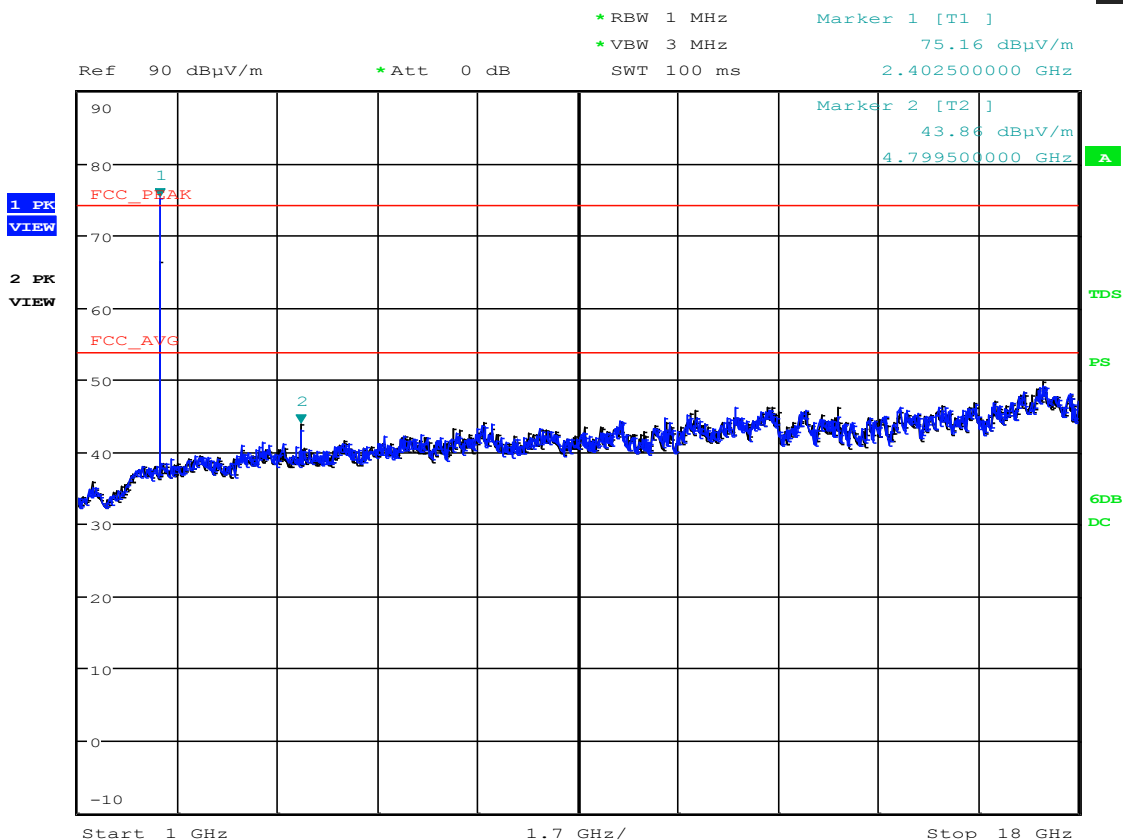


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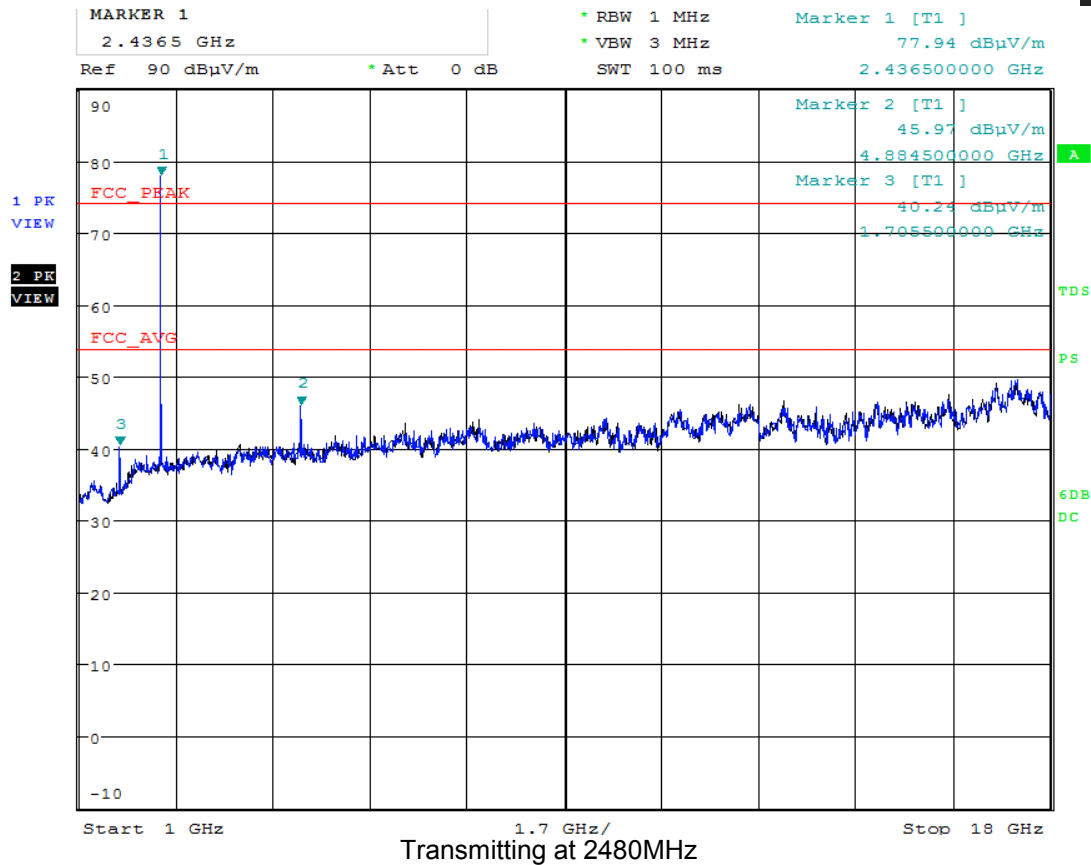
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FCC 15B Class B Product (Residential) @ 3 Meters										
Emission Frequency (MHz)	Measured Amplitude (dBuV/m) AVG	Measured Amplitude (dBuV/m) Peak	FCC 15B				Table Azimuth (0° closest to ant)	Receiving Antenna		Notes / Mode
			Limit (dBuV/m) AVG	Limit (dBuV/m) Peak	Margin (dB) AVG	Margin (dB) Peak		Pol (H/V)	Height (Meters)	
2402.000	73.90	81.90	54.0	74.0	-19.9	-7.9	177	H	1.6	Fundamental
2479.700	66.20	74.50	54.0	74.0	-12.2	-0.5	177	H	1.6	Fundamental
2441.655	70.10	78.60	54.0	74.0	-16.1	-4.6	178	H	1.6	Fundamental
2402, horizontal single frequency										
4803.401	45.00	49.30	54.0	74.0	9.0	24.7	183	V	1.8	6.7dB duty cycle correction added to average reading
7205.184	37.50	44.80	54.0	74.0	16.5	29.2	183	V	1.8	6.7dB duty cycle correction added to average reading
9608.000	31.20	45.00	54.0	74.0	22.8	29.0				noise floor
12010.000	33.60	46.80	54.0	74.0	20.4	27.2				noise floor
14412.000	33.80	46.70	54.0	74.0	20.2	27.3				noise floor
16814.000	35.50	48.80	54.0	74.0	18.5	25.2				noise floor
19216.000	33.10	46.10	54.0	74.0	20.9	27.9				noise floor
21618.000	36.20	49.20	54.0	74.0	17.8	24.8				noise floor
24020.000	39.30	52.30	54.0	74.0	14.7	21.7				noise floor
2441, horizontal single frequency										



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DESIGN ASSURANCE ENGINEERING

Wireless Transceiver Bluetooth Low Energy Test Report



FCC ID: A94424611 IC: 3232A-424611

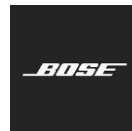
4883.400	42.60	47.50	54.0	74.0	11.4	26.5	359	V	1.3	6.7dB duty cycle correction added to average reading
7325.120	38.20	45.20	54.0	74.0	15.8	28.8	200	V	1.6	6.7dB duty cycle correction added to average reading
9768.000	31.20	45.00	54.0	74.0	22.8	29.0				noise floor
12210.000	33.60	46.80	54.0	74.0	20.4	27.2				noise floor
14652.000	33.80	46.70	54.0	74.0	20.2	27.3				noise floor
17094.000	35.50	48.80	54.0	74.0	18.5	25.2				noise floor
19536.000	33.10	46.10	54.0	74.0	20.9	27.9				noise floor
21978.000	36.20	49.20	54.0	74.0	17.8	24.8				noise floor
24420.000	39.30	52.30	54.0	74.0	14.7	21.7				noise floor
2480, horizontal single frequency										
4959.360	46.10	50.70	54.0	74.0	7.9	23.3	172	V	1.3	6.7dB duty cycle correction added to average reading
7439.090	38.30	45.50	54.0	74.0	15.7	28.5	138	H	1.6	6.7dB duty cycle correction added to average reading
9920.000	31.00	44.20	54.0	74.0	23.0	29.8				noise floor
12400.000	31.50	44.50	54.0	74.0	22.5	29.5				noise floor
14880.000	32.00	45.40	54.0	74.0	22.0	28.6				noise floor
17360.000	37.00	51.10	54.0	74.0	17.0	22.9				noise floor
19840.000	33.10	46.10	54.0	74.0	20.9	27.9				noise floor
22320.000	36.20	49.20	54.0	74.0	17.8	24.8				noise floor
24800.000	39.30	52.30	54.0	74.0	14.7	21.7				noise floor

Band edge radiated emission measurements:



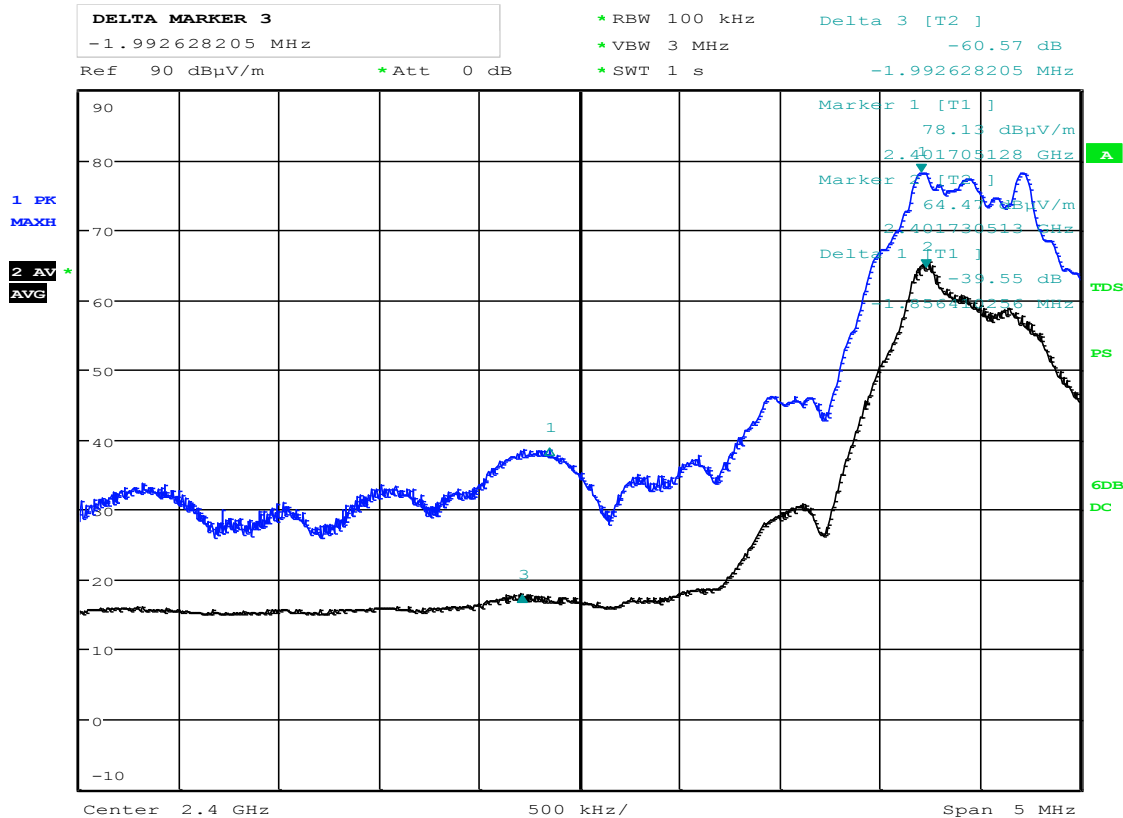
DESIGN ASSURANCE ENGINEERING

Wireless Transceiver Bluetooth Low Energy Test Report

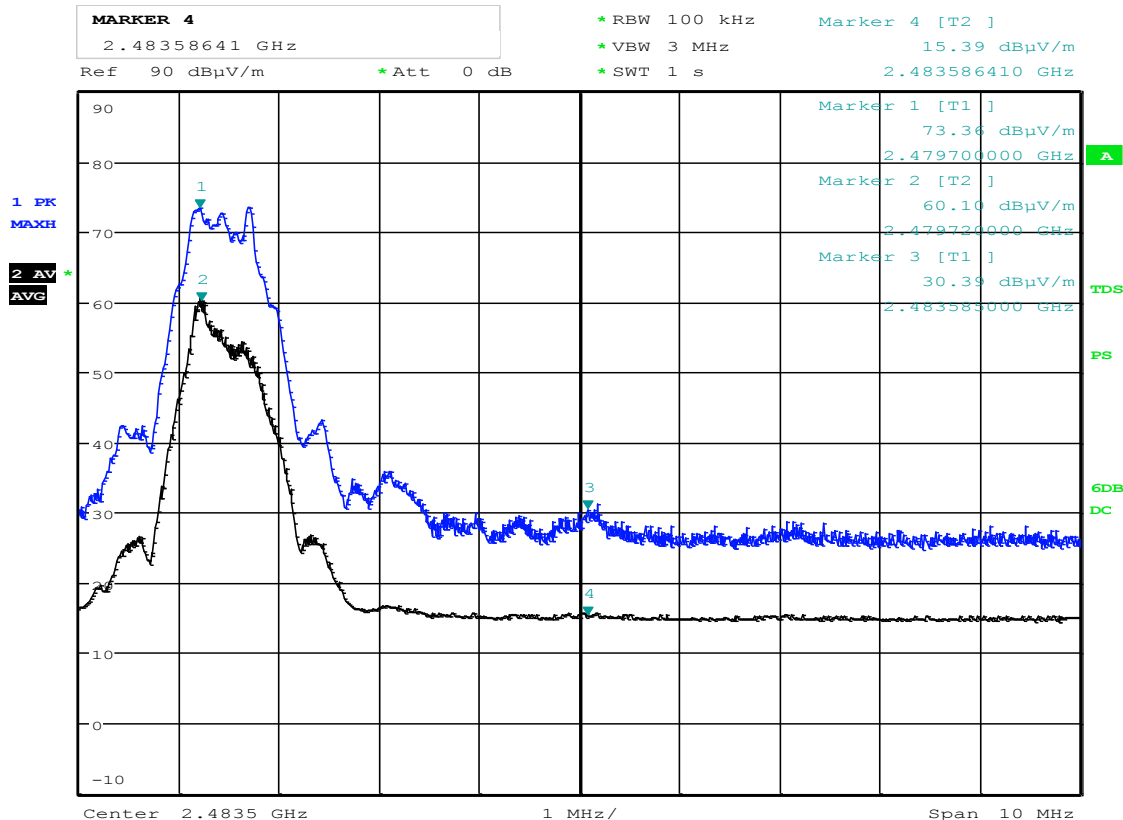


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FCC ID: A94424611 IC: 3232A-424611



Passes by a minimum of 19.55dB



Passes by a minimum of 44.71dB.



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-2018
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

Test performed on October 27, 2017



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DESIGN ASSURANCE ENGINEERING

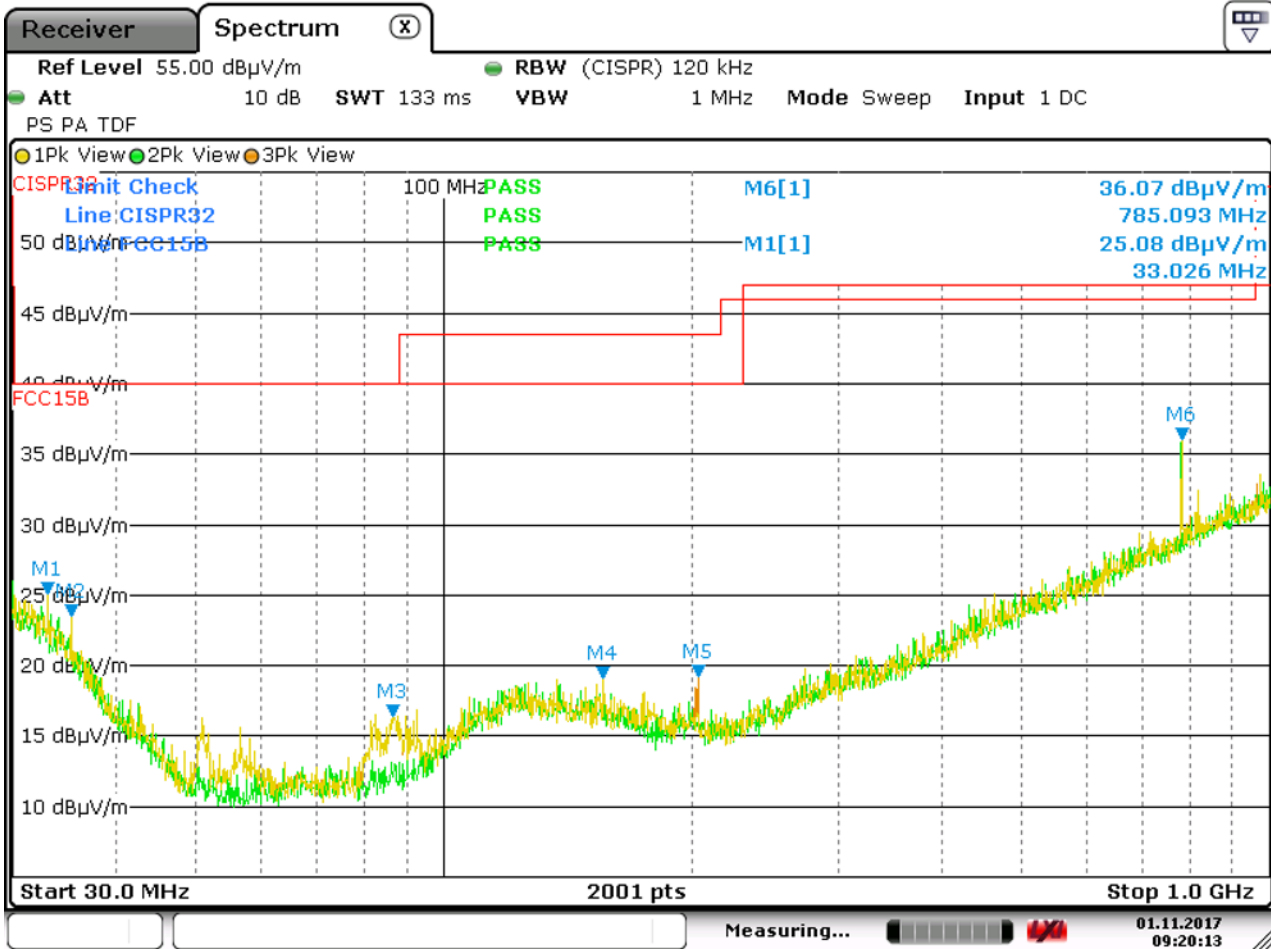
Wireless Transceiver Bluetooth Low Energy Test Report



FCC ID: A94424611 IC: 3232A-424611

30-1000MHz radiated emissions:

EUT Mods:	None
EUT Setup:	Charging case battery and earbuds with new firmware that supports earbud charging
Comments:	



Max hold pre-scan. The yellow trace is Vertical, the green trace is Horizontal, and orange trace is a max hold for vertical and horizontal combined.

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				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	33.026	16.60	24.90	40.0	N/A	23.4	N/A	0	V	1.00	
2	35.288	15.30	23.30	40.0	N/A	24.7	N/A	0	V	1.00	
3	86.656	11.60	17.90	40.0	N/A	28.4	N/A	0	V	1.01	
4	156.036	11.20	18.90	43.5	N/A	32.3	N/A	0	V	1.01	
5	202.948	10.20	18.50	43.5	N/A	33.3	N/A	0	V	1.01	
6	785.094	21.60	29.70	46.0	N/A	24.4	N/A	0	V	1.01	



Certificate # 1514.1

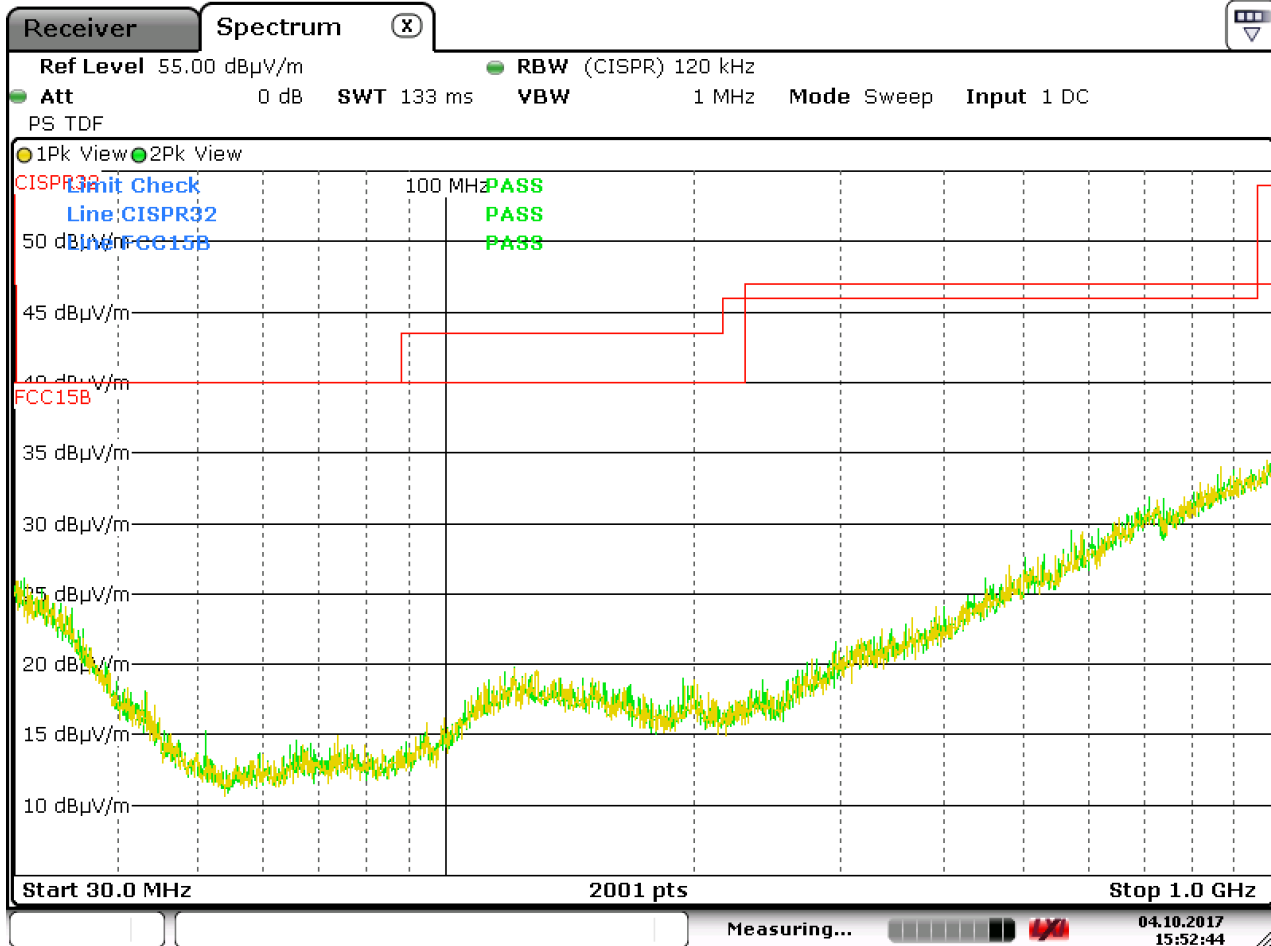
DESIGN ASSURANCE ENGINEERING

Wireless Transceiver Bluetooth Low Energy Test Report



FCC ID: A94424611 IC: 3232A-424611

EUT S/N:	0288AE	Power applied:	120V	Plot#	2
EUT Mods:	None				
EUT Setup:	Playing pink noise at max volume while paired to test app on iPad				
Comments:					



Max hold pre-scan. Yellow trace is Vertical, green trace is Horizontal.

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				Table Azimuth (0° closest to ant)	Receiving Antenna		*Average detector used for frequencies above 1GHz. Notes / Mode
				Limit (dBµV/m) QP/AVG*	Limit (dBµV/m) Peak	Margin (dB) QP/AVG*	Margin (dB) Peak		Pol (H/V)	Height (Meters)	
1	30.000	19.20	25.90	40.0	N/A	20.8	N/A	0	V	1.00	Noise floor reading. Earbud playing music
2	32.000	17.30	24.80	40.0	N/A	22.7	N/A	0	V	1.00	Noise floor reading. Earbud playing music
3	35.000	15.90	23.40	40.0	N/A	24.1	N/A	0	V	1.00	Noise floor reading. Earbud playing music
4	990.000	24.40	32.40	54.0	N/A	29.6	N/A	0	V	1.00	Noise floor reading. Earbud playing music
5	995.000	24.60	32.60	54.0	N/A	29.4	N/A	0	V	1.00	Noise floor reading. Earbud playing music
6	1000.000	24.60	32.40	54.0	N/A	29.4	N/A	0	V	1.00	Noise floor reading. Earbud playing music

Resources Used

TN	Description	Model	S/N	Manufacturer	Most Recent Calibration	Calibration Due Date	Most Recent Verification	Verification Due Date
644	Maxwell House 3 Meter Semi-Anechoic Chamber	N/A	1698A	EM Test			23-Mar-2016	23-Mar-2018
1375	System Controller	SC99V	050905-1	Sunol Sciences Corp				
1445	Maxwell House Radiated Emissions Cable Set	N/A	N/A	Bose Corporation			28-Jul-2017	28-Jul-2018
1541	Antenna 30MHz - 6GHz	JB6	A050807	Sunol Sciences Corp	24-Oct-2016	24-Oct-2017		
2077	PreAmplifier	N/A	N/A	Bose Corporation			28-Jul-2017	28-Jul-2018
2319	EMI Test Receiver	ESR26	101276	Rohde & Schwarz	06-Apr-2017	06-Apr-2018		

Test performed on October 4, 2017

AC Power Line Conducted Emissions

Limits:

FCC §15.207 (a)

RSS-Gen 7.2.2

AC MAINS PORTS

Standard	Class	Freq Range (MHz)	Limits (dBμV)		Comments
			QP	AVG	
FCC 15B/ CISPR32 based	A	0.15 - 0.5	79	66	-Ensure bandwidth set to 9 kHz. -EUT must pass both QP and AVG limits. ¹ These limits decrease linearly with the log of the frequency.
		0.5 - 30	73	60	
	B	0.15 - 0.5	66-56¹	56-46¹	CISPR32 based standards: EN55032, AS/NZS CISPR32
		0.5 - 5	56	46	
		5 - 30	60	50	

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10. The receiver is set to a resolution bandwidth of 9 kHz. Quasi-peak and average detectors were used. Line conducted data is recorded for both line and neutral.



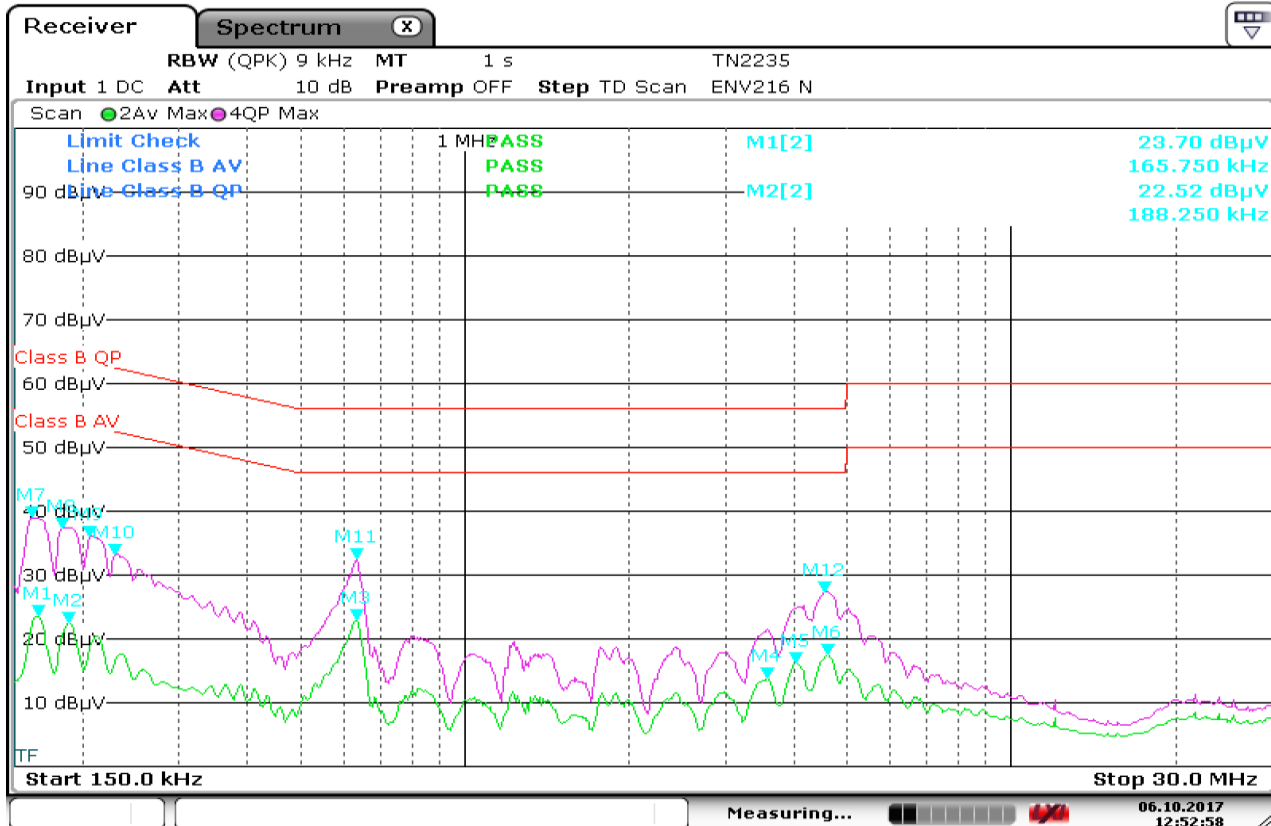
Certificate # 1514.1

DESIGN ASSURANCE ENGINEERING

Wireless Transceiver Bluetooth Low Energy Test Report

FCC ID: A94424611 IC: 3232A-424611

BOSE



FCC 15B and CISPR 32 Class B Product

Frequency MHz	MEASURED		LIMIT		MARGIN		Notes
	dBµV QP	dBµV AVG	dBµV QP	dBµV AVG	dB QP	dB AVG	
0.6338	34.00	24.00	56.0	46.0	22.0	22.0	Line - 120V charging
0.6360	34.00	24.00	56.0	46.0	22.0	22.0	Line - 120V charging
0.1613	39.60	25.10	65.4	55.4	25.8	30.3	Line - 120V charging
0.1658	39.30	26.80	65.2	55.2	25.9	28.4	Line - 120V charging
0.1905	38.10	26.40	64.0	54.0	25.9	27.6	Line - 120V charging
0.1883	38.10	26.70	64.1	54.1	26.0	27.4	Line - 120V charging
0.2108	36.90	24.70	63.2	53.2	26.3	28.5	Line - 120V charging
0.2063	37.00	22.80	63.3	53.3	26.3	30.5	Line - 120V charging
4.5443	29.50	17.10	56.0	46.0	26.5	28.9	Line - 120V charging
4.5690	29.30	17.20	56.0	46.0	26.7	28.8	Line - 120V charging
4.0470	28.10	16.80	56.0	46.0	27.9	29.2	Line - 120V charging
0.2288	34.40	19.80	62.5	52.5	28.1	32.7	Line - 120V charging
0.6360	32.50	23.10	56.0	46.0	23.5	22.9	Neutral - 120V charging
0.6360	32.50	23.10	56.0	46.0	23.5	22.9	Neutral - 120V charging
0.1613	39.10	22.30	65.4	55.4	26.3	33.1	Neutral - 120V charging
0.1658	38.80	23.70	65.2	55.2	26.4	31.5	Neutral - 120V charging
0.1883	37.30	22.50	64.1	54.1	26.8	31.6	Neutral - 120V charging
0.1838	37.40	20.60	64.3	54.3	26.9	33.7	Neutral - 120V charging
0.2063	36.10	18.60	63.3	53.3	27.2	34.7	Neutral - 120V charging
4.6140	27.30	17.60	56.0	46.0	28.7	28.4	Neutral - 120V charging
4.5420	27.40	17.10	56.0	46.0	28.6	28.9	Neutral - 120V charging
0.2288	33.30	16.30	62.5	52.5	29.2	36.2	Neutral - 120V charging
4.0448	24.70	16.20	56.0	46.0	31.3	29.8	Neutral - 120V charging
3.5858	21.50	13.80	56.0	46.0	34.5	32.2	Neutral - 120V charging

Drowsy DP1 powered at 120V passes conducted emissions by 22dB



Certificate # 1514.1

DESIGN ASSURANCE ENGINEERING
Wireless Transceiver Bluetooth Low Energy Test Report



FCC ID: A94424611 IC: 3232A-424611

Equipment 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	04-Apr-2017	04-Apr-2018		
2235	2-LINE V-NETWORK	ENV216	101192	Rohde & Schwarz	03-Dec-2015	02-Dec-2017		
1380	Conducted Comb Generator	CGC-510	311559	Com-Power Corporation			25-Apr-2017	25-Apr-2018

Test performed on October 6, 2017

End of Report