

TEST REPORT		
Report Number..... :	90535-22-72-22-PP002	
Date of issue	2022-06-25	
Tested by (+signature)	Duke	<i>Duke Chen</i>
Approved by (+signature).... :	Jason	<i>Jason gao</i>
Testing Laboratory name..... :	SLG-CPC Testlaboratory Co., Ltd.	
Address	No. 11, Wu Song Road, Dongcheng District, Dongguan, Guangdong Province, China 523117	
Applicant's name	Roadget Business PTE. LTD	
Address	7 Temasek Boulevard #12-07 Suntec Tower One Singapore 038987	
Manufacturer's name	Roadget Business PTE. LTD	
Address	7 Temasek Boulevard #12-07 Suntec Tower One Singapore 038987	
Factory's name	Dongguan Zhengrong Electronics co. Ltd	
Address	o.4 Shugang Avenue, Hongmei Town, Dongguan City, Guangdong Province	
Standard(s)..... :	FCC 47 CFR Part 2, Subpart J FCC 47 CFR Part 15, Subpart C	
Test item description..... :	Active Noise Cancelling True Wireless Earbuds	
Trade Mark..... :	JMMO	
Model/Type reference..... :	T201,T202,T203,T205,T206,T207,T208,T209,T210,T211,T212,T213,T215,T216,T217	
FCC ID	2A692-T205	
Date of receipt of test item .. :	2022-06-10	
Date (s) of performance of test..... :	2022-06-11 to 2022-06-24	
Summary of Test Results..... :	Pass	
The Summary of Test Results based on a technical opinion belongs to the standard(s).		
General disclaimer: This report shall not be reproduced except in full, without the written approval of SLG-CPC Testlaboratory Co., Ltd. The test results in the report only apply to the tested sample.		

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Modified Information

Version	Report No.	Revision Data	Summary
Ver.1.0	90535-22-72-22-PP002	2022-06-25	Original Version

1 EUT TECHNICAL DESCRIPTION

Product	Active Noise Cancelling True Wireless Earbuds
Model Number	T201,T202,T203,T205,T206,T207,T208,T209,T210,T211,T212,T213,T215,T216,T217 (All are the same except the model name and color; All tests were performed on model T205)
Device Type	Bluetooth V5.1
Data Rate :	1Mbps or 2Mbps for GFSK modulation
Modulation:	Bluetooth DTS: GFSK
Operating Frequency Range:	2402-2480MHz
Number of Channels:	40 Channels for Bluetooth DTS;
Transmit Power Max:	-2.59 dBm
Antenna Type:	Chip Antenna
Antenna Gain:	-0.33 dBi
Power supply	☒ DC supply: DC 3.7 by battery 45mAh
Temperature Range:	-20°C ~ +55°C

Note: for more details, please refer to the User's manual of the EUT.

2 SUMMARY OF TEST RESULT

FCC Part Clause	Test Parameter	Verdict	Remark
15.247(a)(2)	DTS (6dB) Bandwidth	PASS	
15.247(b)(3)	Maximum Peak Conducted Output Power	PASS	
15.247(e)	Maximum Power Spectral Density Level	PASS	
15.247(d)	Unwanted Emission Into Non-Restricted Frequency Bands	PASS	
15.247(d) 15.209	Unwanted Emission Into Restricted Frequency Bands (conducted)	PASS	
15.247(d) 15.209	Radiated Spurious Emission	PASS	
15.207	Conducted Emission Test	N/A	
15.247(b)	Antenna Application	PASS	
	NOTE1: N/A (Not Applicable) NOTE2: According to FCC KDB 558074 D01 15.247 Meas Guidance v05r02, the report use radiated measurements in the restricted frequency bands. In addition, the radiated test is also performed to ensure the emissions emanating from the device cabinet also comply with the applicable limits.		

RELATED SUBMITTAL(S) / GRANT(S):

This submittal(s) (test report) is intended for FCC ID: 2A692-T205 filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

3 TEST METHODOLOGY

3.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:

FCC 47 CFR Part 2, Subpart J

FCC 47 CFR Part 15, Subpart C

FCC KDB 558074 D01 15.247 Meas Guidance v05r02

3.2 MEASUREMENT EQUIPMENT USED

Equipment	Model	Manufacturer	S/N	Last Cal.	DUE Cal.
RF Connected Test					
Vector Signal Generator	Rohde & Schwarz	SMBV100B(6G)	101166	2021/07/30	1 year
Analog Signal Generator	Rohde & Schwarz	SMB100A(40G)	181333	2021/07/30	1 year
Signal Analyzer	Rohde & Schwarz	FSV40	101527	2022/04/19	1 year
Power Analyzer	Rohde & Schwarz	OSP-B157W8	N/A	2021/09/23	1 year
Wideband Radio Communication Tester	R&S	CMW270	101985	2021/07/30	1 year
Temperature&Humidity test chamber	ESPEC	VC 4018	/	2022/03/23	1 year
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	166898	2021/09/07	1 year
Radiated Emission Test					
EMI Test Receiver	KEYSIGHT	N9010A	MY56070465	2021/12/10	1 year
EMI Test Receiver	Rohde & Schwarz	FSV40	101511	2022/04/19	1 year
Bilog Antenna	Schwarzbeck	VULB 9163	01335	2020/04/28	3 year
Power Amplifier	EMEC	EM330	060676	2021/12/10	3 year
Cable	Tuyue	F4309	L-400-NmNm-12000	2021/12/10	1 year
Horn Antenna	Schwarzbeck	BBHA9120D	1779	2022/04/21	3 year
Horn Antenna	Schwarzbeck	BBHA9170	00954	2019/10/09	3 year
Power Amplifier	Rohde & Schwarz	SCU-18F	180118	2022/04/21	3 year
Active Loop Antenna	ETS LINDGREN	6512	41623	2022/04/23	3 year
Test Software	Farad	EZ-EMC	Ver.CPC-3A1	/	/
Conducted Emission Test					
LISN	Schwarzbeck	NSLK 8127	8127-892	2022/03/19	1 year
LISN	Schwarzbeck	NSLK 8127	8127-437	2021/08/11	1 year
EMI Test Receiver	R&S	ESR3	102124	2021/12/10	1 year
Pulse Limiter	R&S	ESH3-Z2	357.8810.52	2021/12/10	1 year
Test Software	Farad	EZ-EMC	Ver.CPC-3A1	/	/

3.3 DESCRIPTION OF TEST MODES

The EUT has been tested under its typical operating condition.

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Those data rates (Bluetooth V5.1 DTS :1Mbps or 2Mbps) were used for all test.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Frequency and Channel list for Bluetooth V5.1 DTS:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	19	2440	...	...
1	2404	20	2442	37	2476
2	2406	21	2444	38	2478
...	...	...	...	39	2480
Note: $f_c = 2402\text{MHz} + k \times 1\text{MHz}$ $k=1$ to 39					

Test Frequency and channel for Bluetooth V5.1 DTS:

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	19	2440	39	2480

4 FACILITIES AND ACCREDITATIONS

4.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

No. 11, Wu Song Road, Dongcheng District, Dongguan, Guangdong Province, China 523117

The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.10 and CISPR Publication 32.

4.2 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

EMC Lab.

:

Accredited by ISED, October 04 2021

CAB identifier: CN0126

Company Number: 27767

Accredited by A2LA, October 04 2021

The Certificate Registration Number is 6325.01

Name of Firm

: SLG-CPC Testlaboratory Co., Ltd.

Site Location

: No. 11, Wu Song Road, Dongcheng District, Dongguan,
Guangdong Province, China 523117

5 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

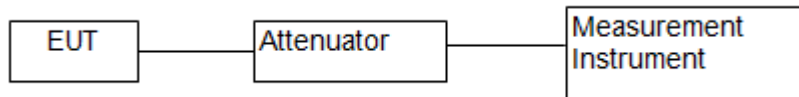
Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-5}$
Maximum Peak Output Power Test	$\pm 1.0\%$
Conducted Emissions Test	$\pm 3.08\text{dB}$
Radiated Emission Test	$\pm 4.60\text{dB}$
Power Density	$\pm 0.9\%$
Occupied Bandwidth Test	$\pm 2.3\%$
Band Edge Test	$\pm 1.2\%$
Antenna Port Emission	$\pm 3\text{dB}$
Temperature	$\pm 3.2\%$
Humidity	$\pm 2.5\%$

Measurement Uncertainty for a level of Confidence of 95%

6 SETUP OF EQUIPMENT UNDER TEST

6.1 RADIO FREQUENCY TEST SETUP 1

The Bluetooth V5.1 DTS component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



6.2 RADIO FREQUENCY TEST SETUP 2

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m. The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 32.

Below 30MHz:

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT.

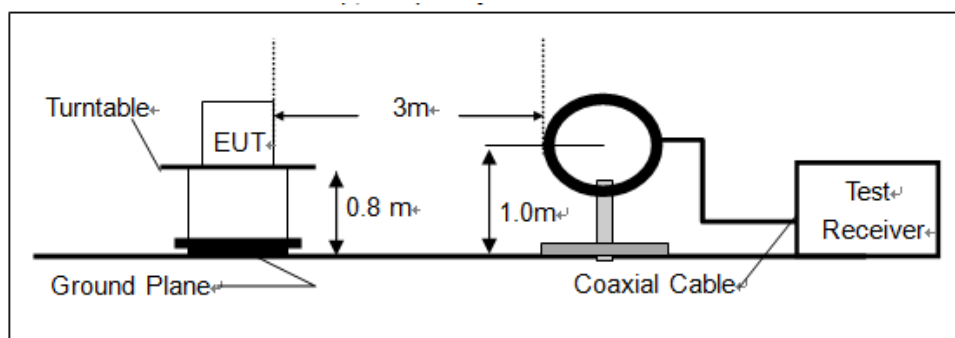
30MHz-1GHz:

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

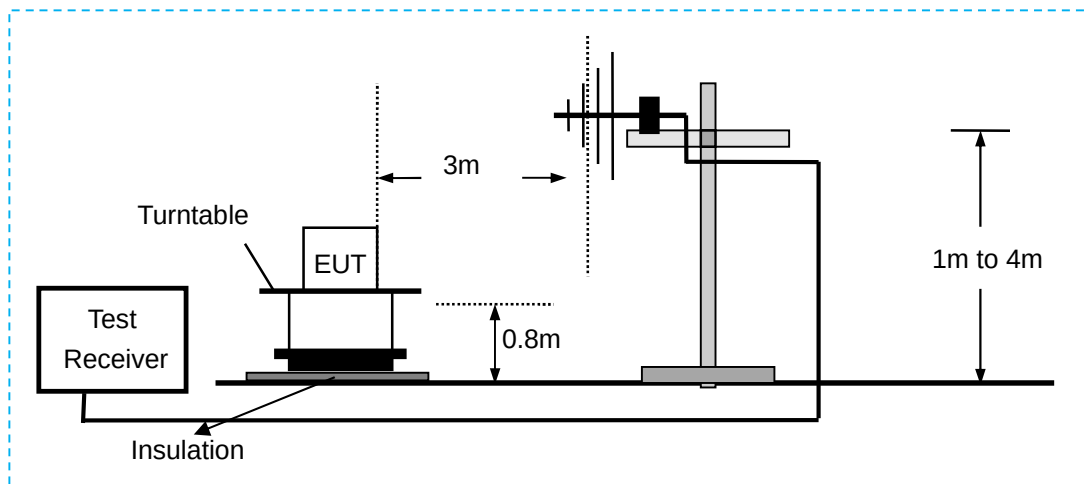
Above 1GHz:

The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

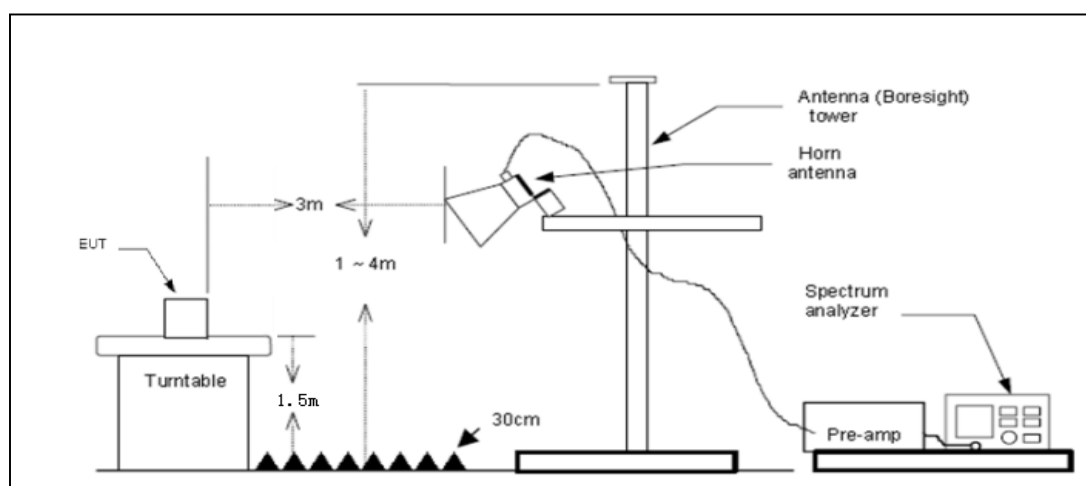
(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



(b) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(c) Radiated Emission Test Set-Up, Frequency above 1000MHz

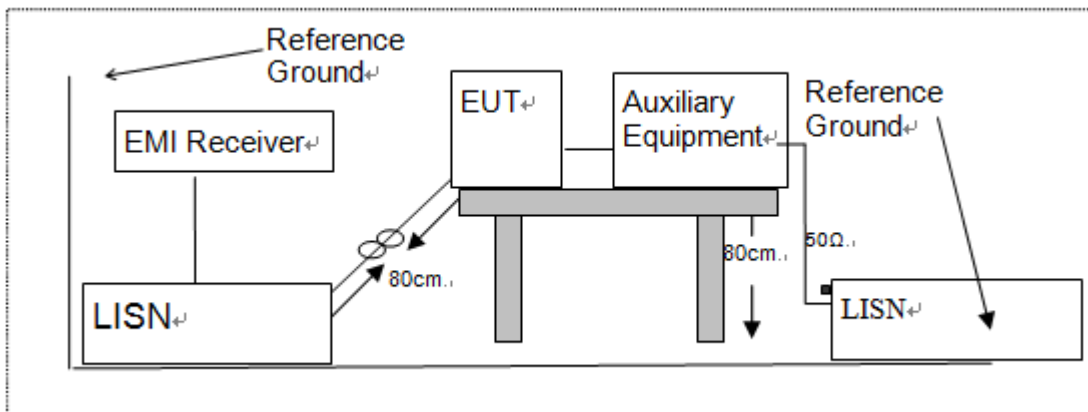


6.3 CONDUCTED EMISSION TEST SETUP

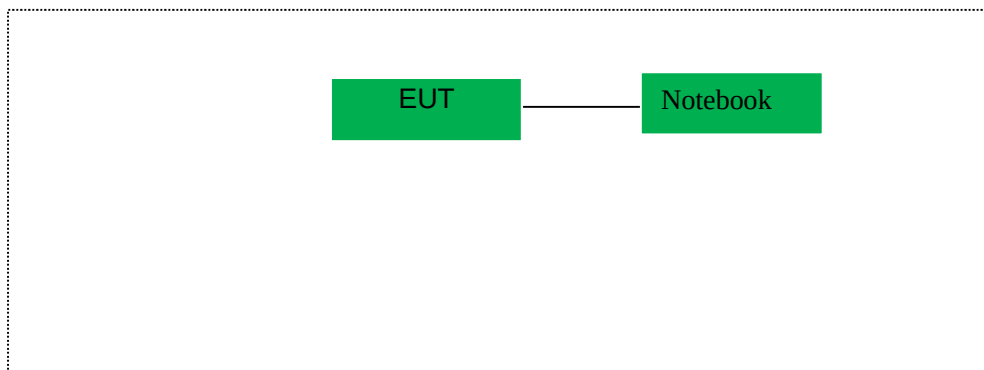
The mains cable of the EUT (maybe per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.1 m.

According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.



6.4 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM



6.5 SUPPORT EQUIPMENT

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite

Auxiliary Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Notebook	Lenovo	MPNXB1505007	MP1XHYV7
Adapter	HUAWEI	HW-200675CD1	/

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

7 TEST REQUIREMENTS

7.1 DTS 6DB BANDWIDTH

7.1.1 Applicable Standard

According to FCC Part 15.247(a)(2) and KDB 558074 D01 15.247 Meas Guidance v05r02

7.1.2 Conformance Limit

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

7.1.3 Test Configuration

Test according to clause 6.1 radio frequency test setup 1

7.1.4 Test Procedure

The EUT was operating in Bluetooth V5.1 DTS mode and controlled its channel. Printed out the test result from the spectrum by hard copy function.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously

Set RBW = 100 kHz.

Set the video bandwidth (VBW) =300 kHz.

Set Span=2 times OBW

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = auto couple.

Allow the trace to stabilize.

Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

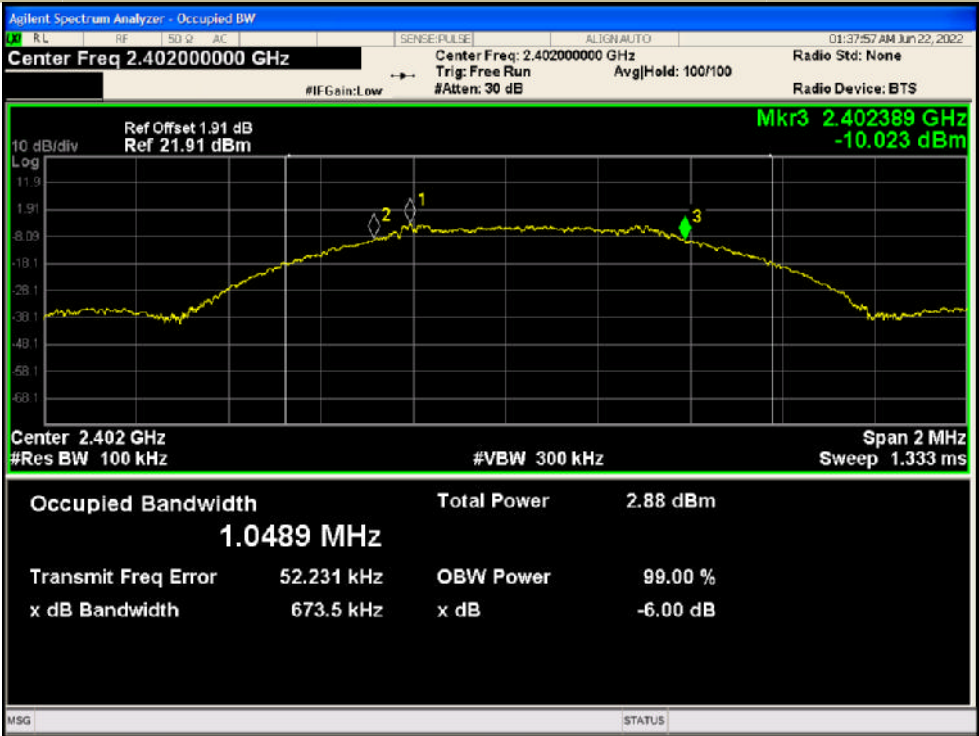
Measure and record the results in the test report.

Test Results

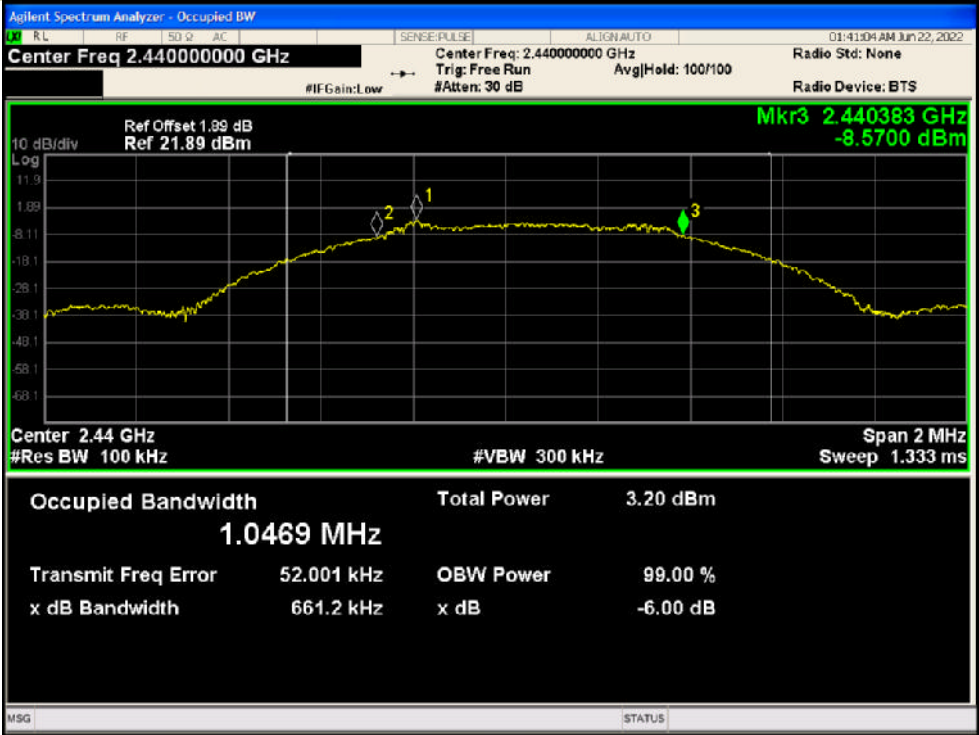
Temperature:	26° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Bandwidth (kHz)	Limit (kHz)	Verdict
Bluetooth V5.1 DTS (1Mbps)	0	2402	674	>500	PASS
	19	2440	661	>500	PASS
	39	2480	686	>500	PASS
Bluetooth V5.1 DTS (2Mbps)	0	2402	1391	>500	PASS
	19	2440	1334	>500	PASS
	39	2480	1316	>500	PASS

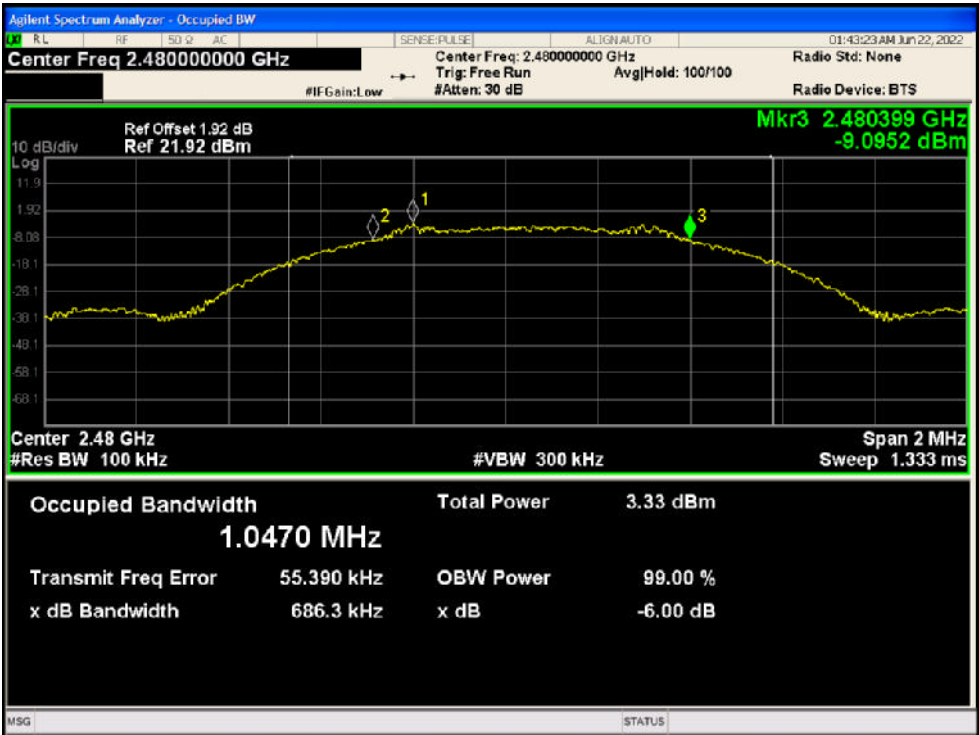
Test Model	DTS (6dB) Bandwidth
	Bluetooth V5.1 DTS 1Mbps
	Channel 0: 2402MHz



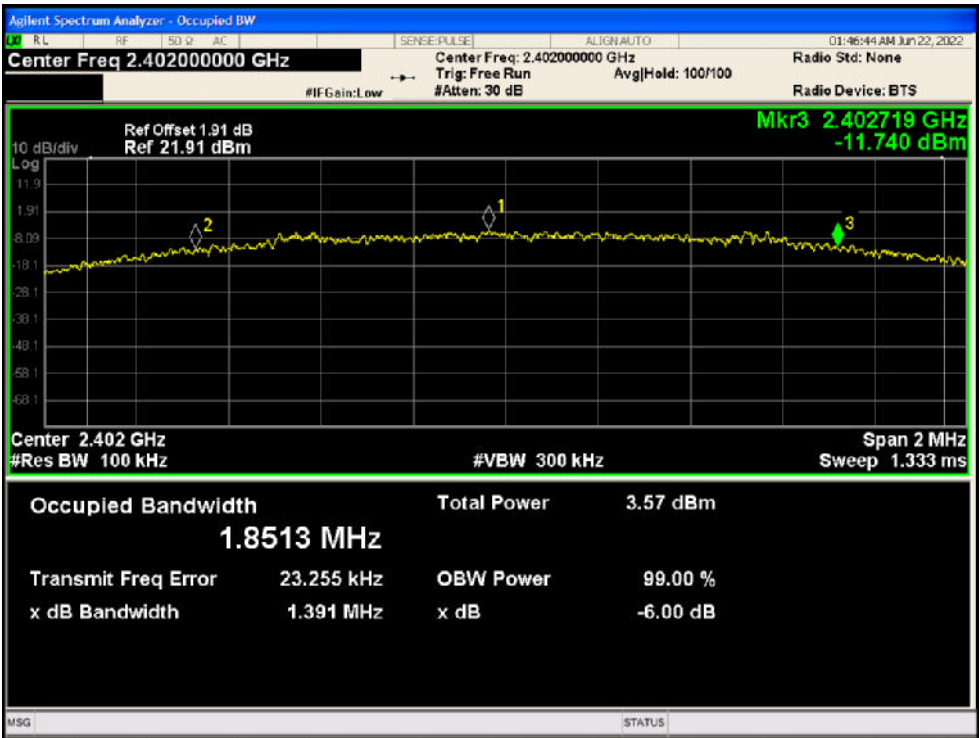
Test Model	DTS (6dB) Bandwidth
	Bluetooth V5.1 DTS 1Mbps
	Channel 19: 2440MHz



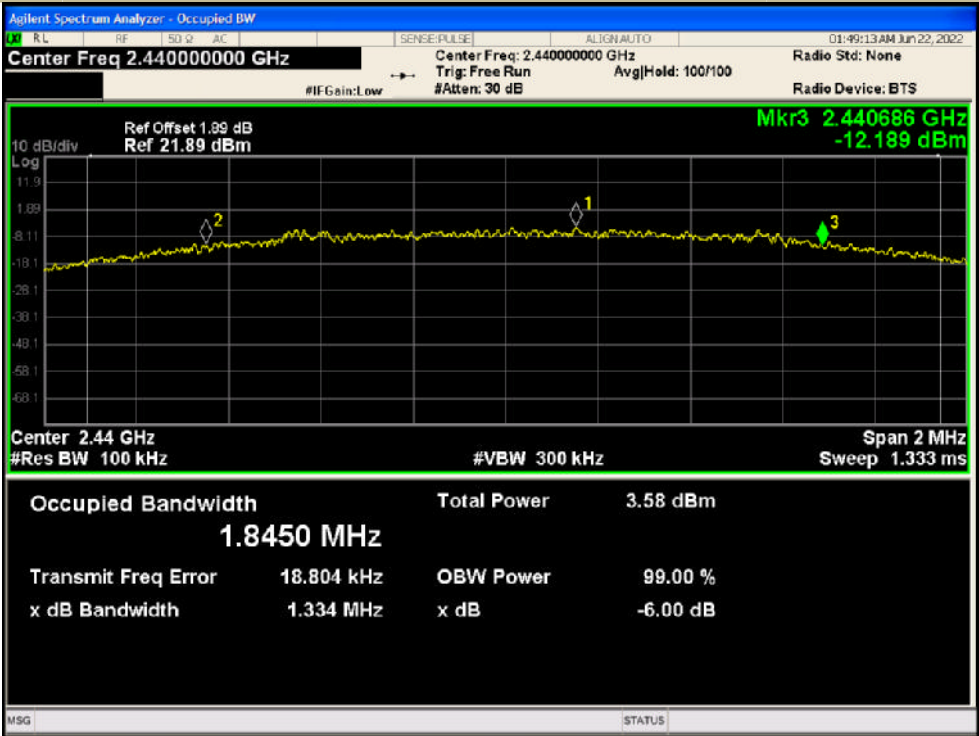
Test Model	DTS (6dB) Bandwidth
	Bluetooth V5.1 DTS 1Mbps
Channel 39: 2480MHz	



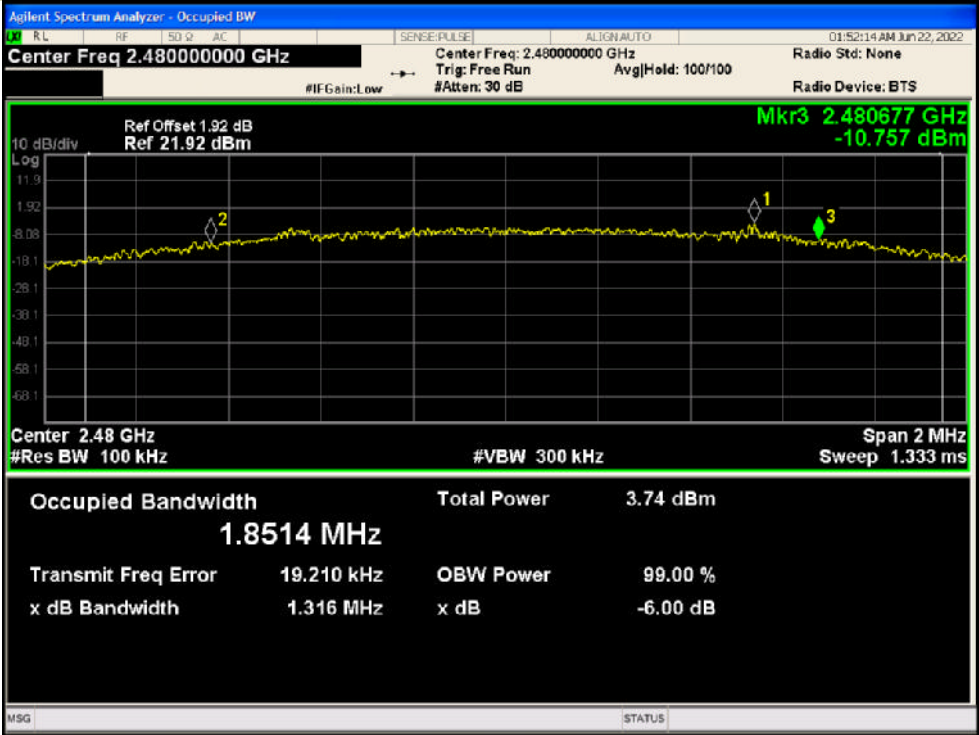
Test Model	DTS (6dB) Bandwidth
	Bluetooth V5.1 DTS 2Mbps
Channel 0: 2402MHz	



Test Model	DTS (6dB) Bandwidth
	Bluetooth V5.1 DTS 2Mbps
Channel 19: 2440MHz	



Test Model	DTS (6dB) Bandwidth
	Bluetooth V5.1 DTS 2Mbps
Channel 39: 2480MHz	



7.2 MAXIMUM PEAK CONDUCTED OUTPUT POWER

7.2.1 Applicable Standard

According to FCC Part 15.247(b)(3) and KDB 558074 D01 15.247 Meas Guidance v05r02

7.2.2 Conformance Limit

The maximum peak conducted output power of the intentional radiator for systems using digital modulation in the 2400 - 2483.5 MHz bands shall not exceed: 1 Watt (30dBm).

7.2.3 Test Configuration

Test according to clause 6.1 radio frequency test setup 1

7.2.4 Test Procedure

■ According to FCC Part 15.247(b)(3)

As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. For smart system, Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

Set the RBW $\geq$ DTS bandwidth.

Set VBW = 3*RBW

Set the span $\geq$ 3*RBW

Set Sweep time = auto couple.

Set Detector = peak.

Set Trace mode = max hold.

Allow trace to fully stabilize. Use peak marker function to determine the peak amplitude level.

■ According to FCC Part 15.247(b)(4):

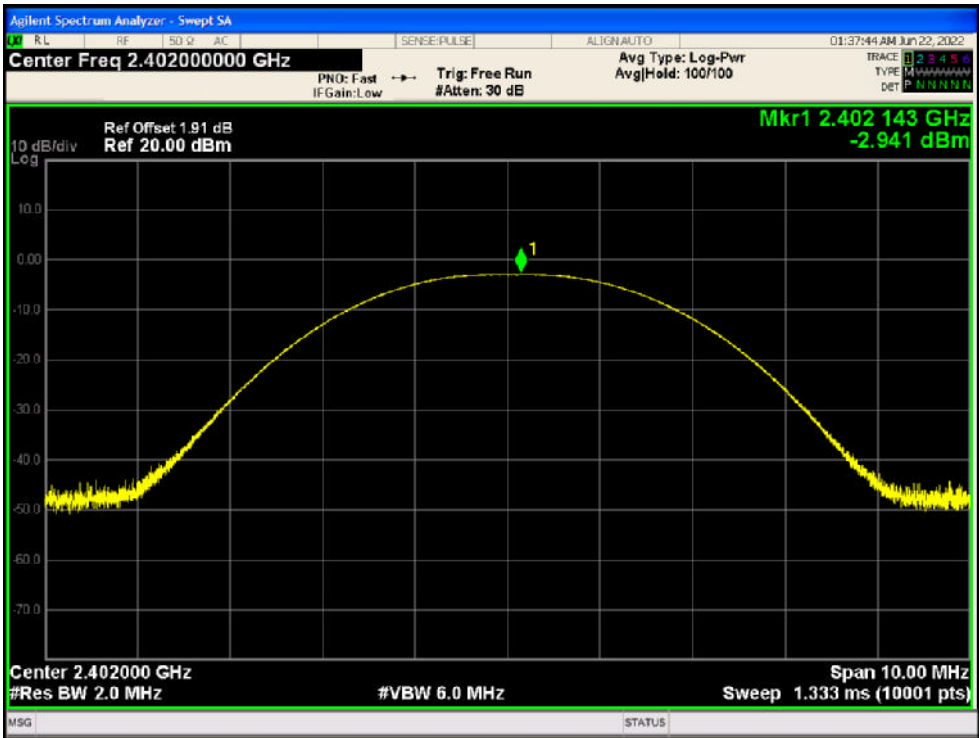
Conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Results

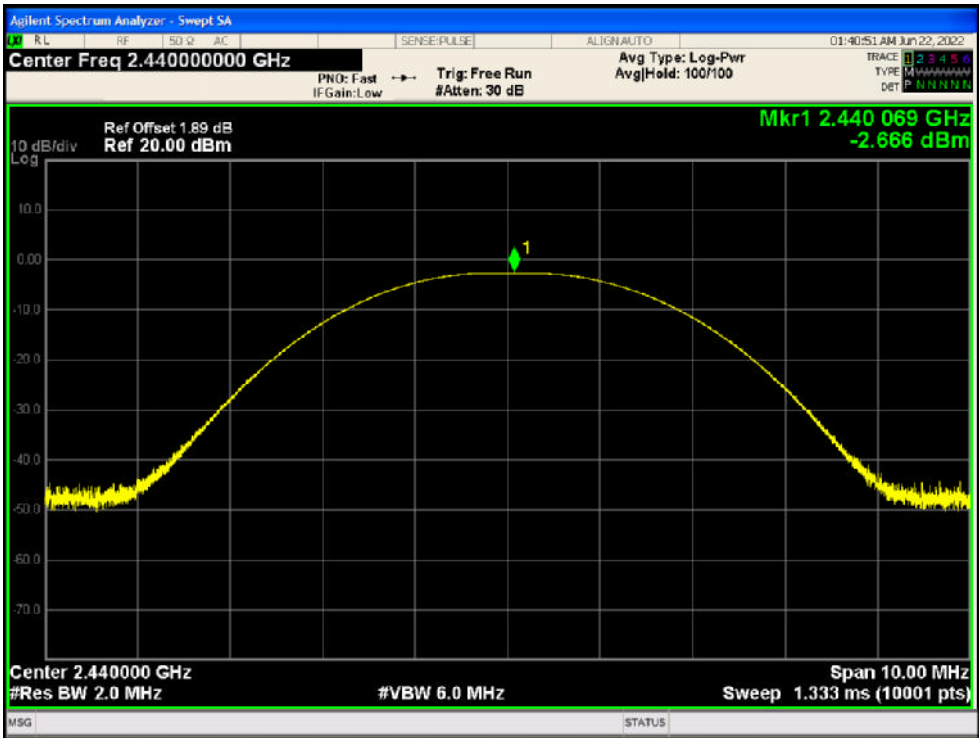
Temperature:	26° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm)	Limit (dBm)	Verdict
Bluetooth V5.1 DTS (1Mbps)	0	2402	-2.94	30	PASS
	19	2440	-2.67	30	PASS
	39	2480	-2.59	30	PASS
Bluetooth V5.1 DTS (2Mbps)	0	2402	-3.00	30	PASS
	19	2440	-2.92	30	PASS
	39	2480	-2.75	30	PASS

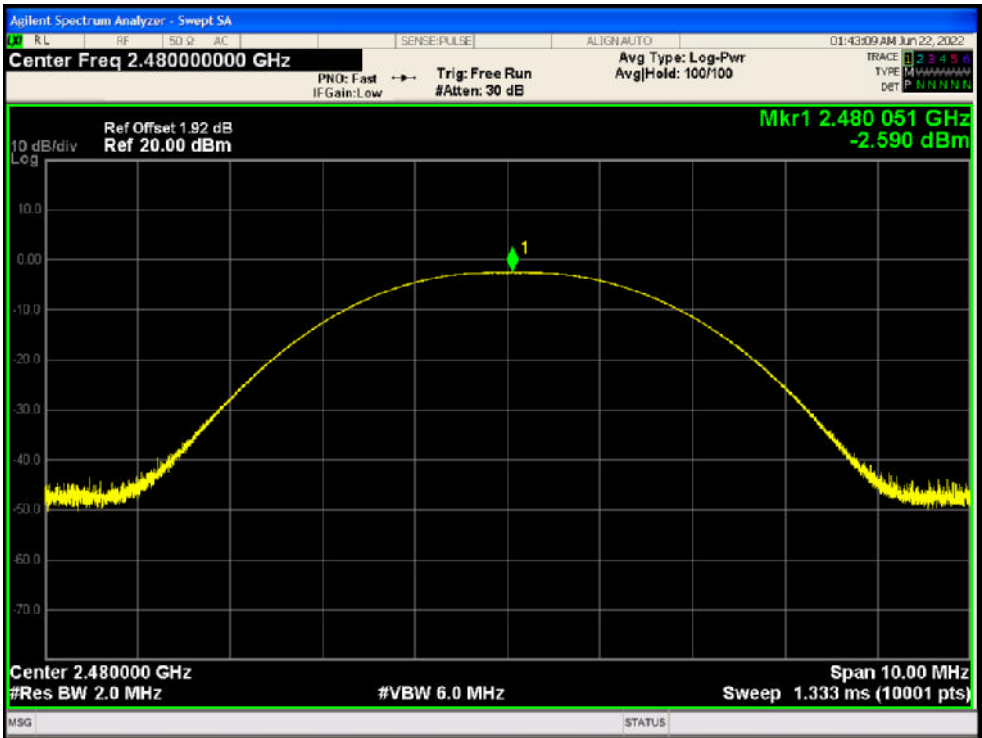
Test Model	Maximum Conducted Output Power	
	Bluetooth V5.1 DTS (1Mbps)	
	Channel 0: 2402MHz	GFSK modulation



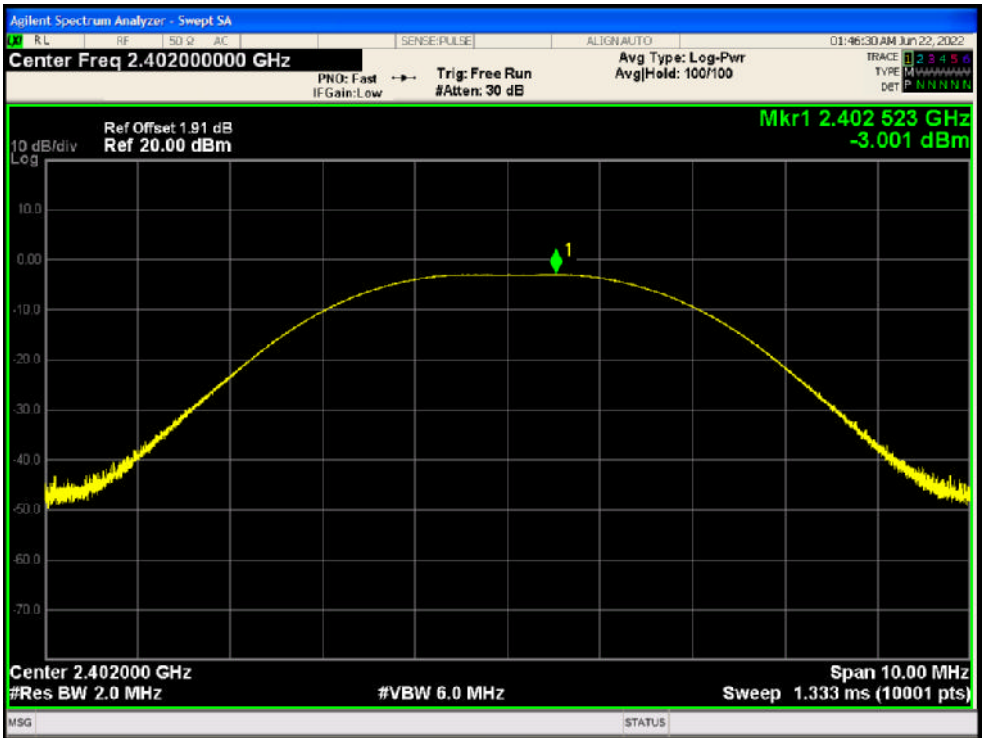
Test Model	Maximum Conducted Output Power	
	Bluetooth V5.1 DTS (1Mbps)	
	Channel 19: 2440MHz	GFSK modulation



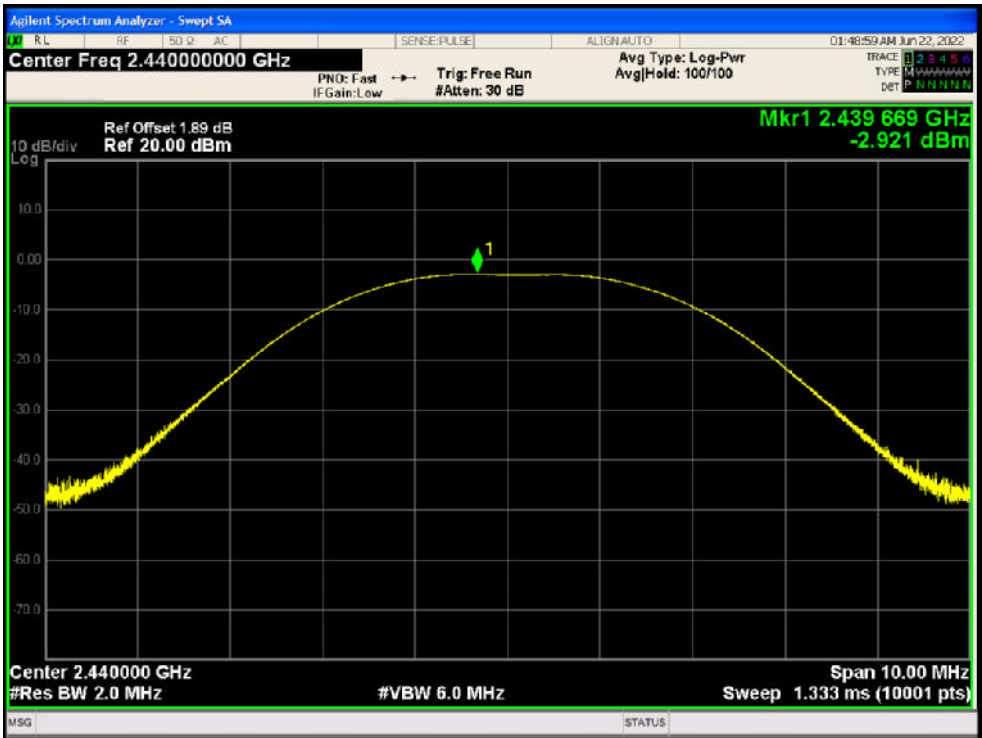
Test Model	Maximum Conducted Output Power	
	Bluetooth V5.1 DTS (1Mbps)	
	Channel 39: 2480MHz	GFSK modulation



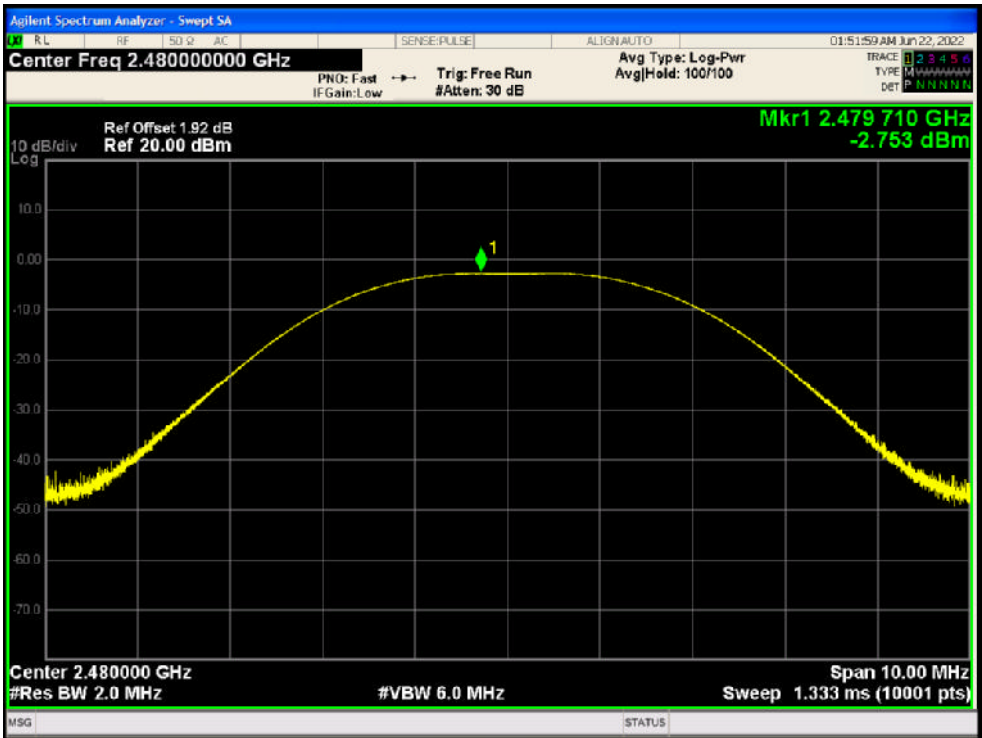
Test Model	Maximum Conducted Output Power	
	Bluetooth V5.1 DTS (2Mbps)	
	Channel 0: 2402MHz	GFSK modulation



Test Model	Maximum Conducted Output Power	
	Bluetooth V5.1 DTS (2Mbps)	
	Channel 19: 2440MHz	GFSK modulation



Test Model	Maximum Conducted Output Power	
	Bluetooth V5.1 DTS (2Mbps)	
	Channel 39: 2480MHz	GFSK modulation



7.3 MAXIMUM POWER SPECTRAL DENSITY

7.3.1 Applicable Standard

According to FCC Part 15.247(e) and KDB 558074 D01 15.247 Meas Guidance v05r02

7.3.2 Conformance Limit

The transmitter 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.

7.3.3 Test Configuration

Test according to clause 6.1 radio frequency test setup 1

7.3.4 Test Procedure

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance

The transmitter output (antenna port) was connected to the spectrum analyzer

Set analyzer center frequency to DTS channel center frequency.

Set the span to 1.5 times the DTS bandwidth.

Set the RBW to: 3 kHz

Set the VBW to: 10 kHz.

Set Detector = peak.

Set Sweep time = auto couple.

Set Trace mode = max hold.

Allow trace to fully stabilize.

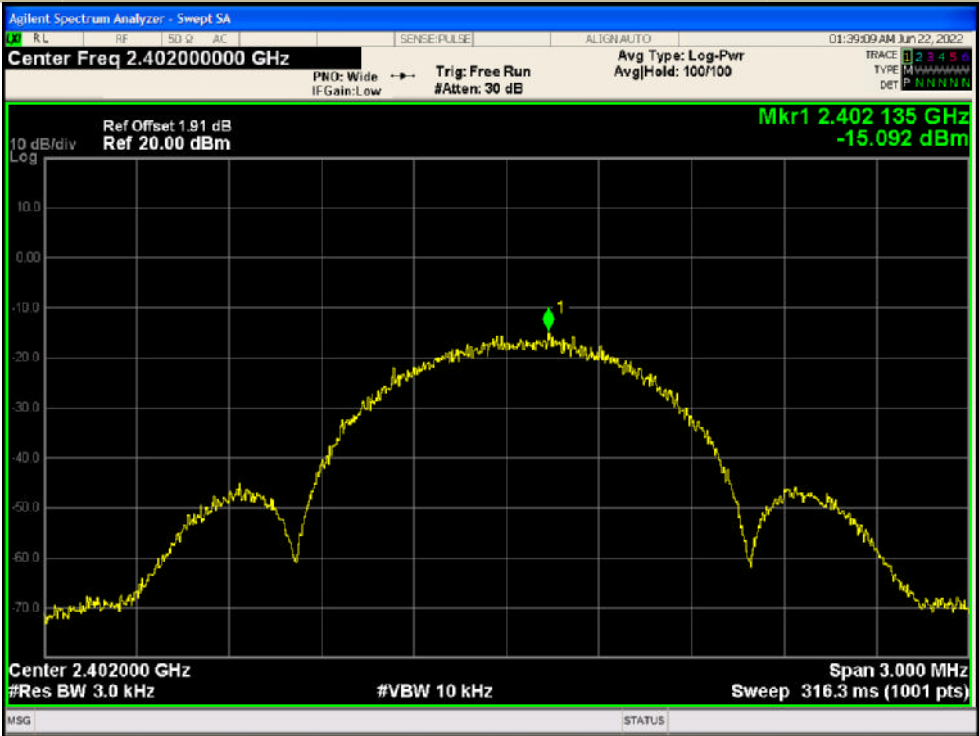
Use the peak marker function to determine the maximum amplitude level within the RBW.

7.3.5 Test Results

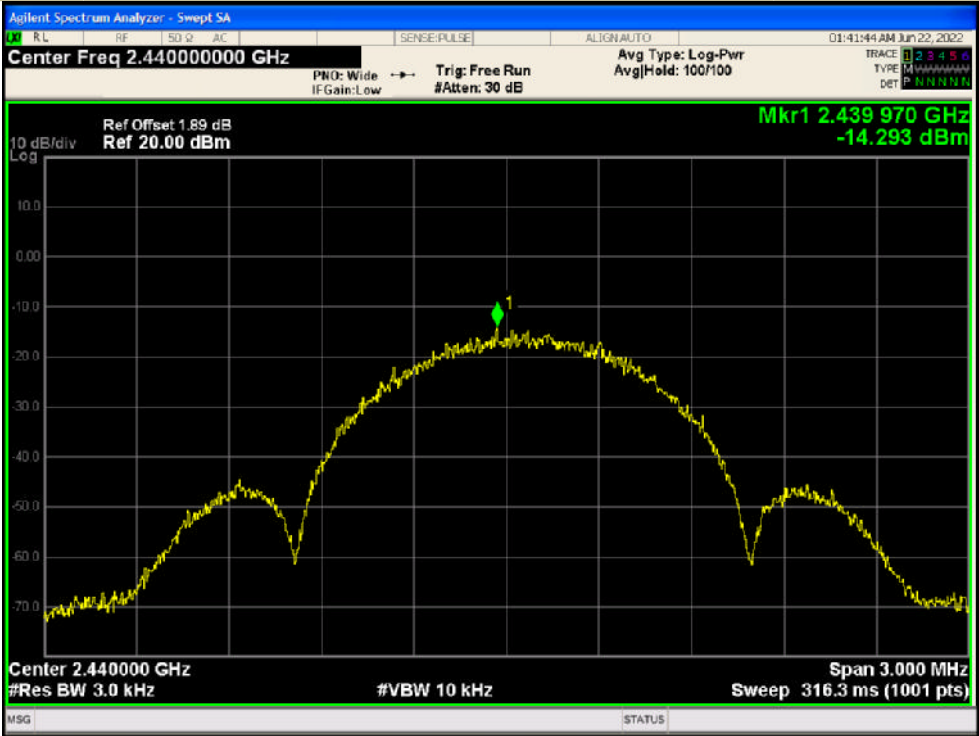
Temperature:	26° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
Bluetooth V5.1 DTS (1Mbps)	0	2402	-15.09	<8	PASS
	19	2440	-14.29	<8	PASS
	39	2480	-14.42	<8	PASS
Bluetooth V5.1 DTS (2Mbps)	0	2402	-17.82	<8	PASS
	19	2440	-17.54	<8	PASS
	39	2480	-17.14	<8	PASS
Note: N/A					

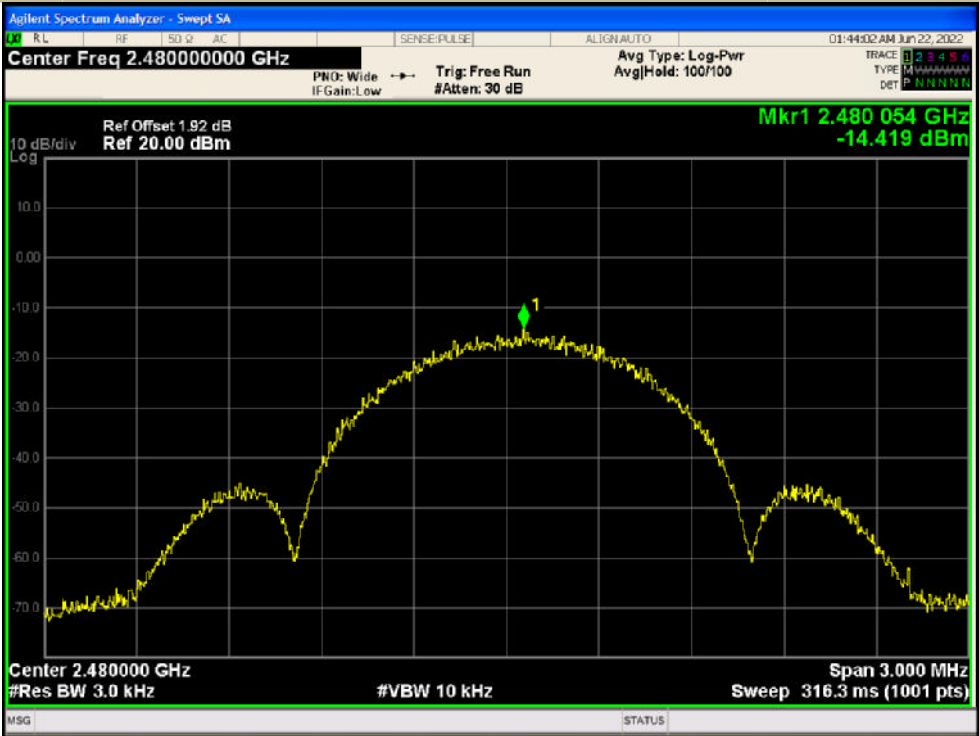
Test Model	Power Spectral Density
	Bluetooth V5.1 DTS (1Mbps)
Channel 0: 2402MHz	



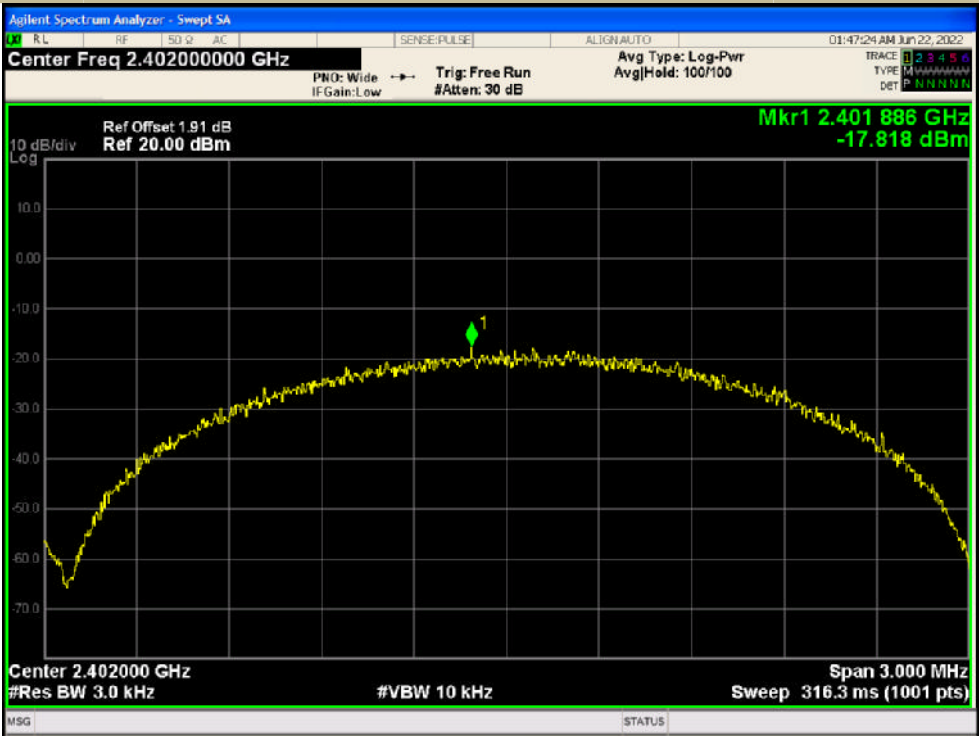
Test Model	Power Spectral Density
	Bluetooth V5.1 DTS (1Mbps)
Channel 19: 2440MHz	



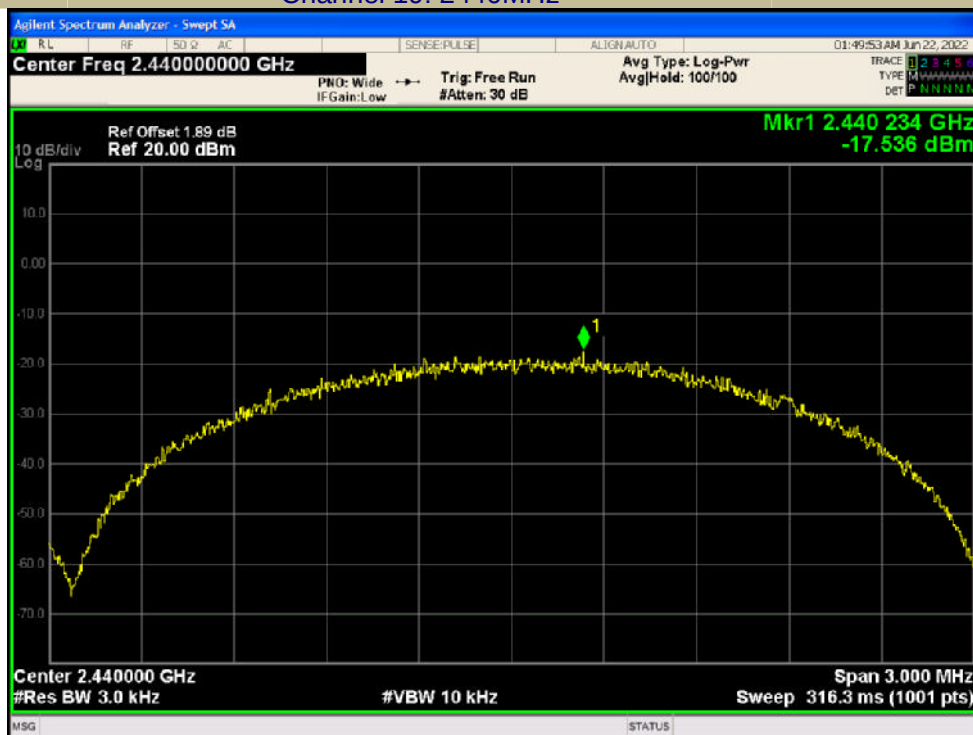
Test Model	Power Spectral Density
	Bluetooth V5.1 DTS (1Mbps)
Channel 39: 2480MHz	



Test Model	Power Spectral Density
	Bluetooth V5.1 DTS (2Mbps)
Channel 0: 2402MHz	



Test Model

Power Spectral Density
Bluetooth V5.1 DTS (2Mbps)
Channel 19: 2440MHz

Test Model

Power Spectral Density
Bluetooth V5.1 DTS (2Mbps)
Channel 39: 2480MHz