

Shenzhen Toby Technology Co., Ltd.

Report No.: TB-FCC145295

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FCC Radio Test Report FCC ID: 2AF7A-F20

Original Grant

Report No. TB-FCC145295

Shenzhen Mercury Innovations Science and Technology Ltd **Applicant**

Equipment Under Test (EUT)

EUT Name Wearable Outdoor Sports Speaker

Model No. F20

Series Model No. N/A

Brand Name MiFa

Receipt Date 2015-08-31

Test Date 2015-09-01 to 2015-10-15

Issue Date 2015-10-16

Standards FCC Part 15: 2015, Subpart C(15.247)

Test Method ANSI C63.10: 2013

Conclusions PASS

In the configuration tested, the EUT complied with the standards specified above,

The EUT technically complies with the FCC requirements

Test/Witness Engineer

Approved& Authorized

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

TB-RF-074-1.0

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1. General Information about EUT

1.1 Client Information

Applicant: Shenzhen Mercury Innovations Science and Technology Ltd

Address: The 3rd and 5th Floor, Building A1, Tongfuyu Industrial Park, Xixiang,

Baoan District, Shenzhen, China

Manufacturer : Shenzhen Mercury Innovations Science and Technology Ltd

Address : The 3rd and 5th Floor, Building A1, Tongfuyu Industrial Park, Xixiang,

Baoan District, Shenzhen, China

1.2 General Description of EUT (Equipment Under Test)

EUT Name	:	Wearable Outdoor Sports Speaker			
Models No.) :	F20	A VICTOR OF THE PARTY OF THE PA		
Model Difference		N/A			
		Operation Frequency: Bluetooth:2402~2480MHz BLE:2402~2480MHz	TOTAL TOTAL		
Product		Number of Channel:	Bluetooth:79 Channels see Note 3		
Description		Max Peak Output Power:	Bluetooth: 4.00 dBm(8-DPSK)		
		Antenna Gain:	0 dBi PCB Antenna		
	3	Modulation Type:	GFSK 1Mbps(1 Mbps) π /4-DQPSK(2 Mbps) 8-DPSK(3 Mbps)		
Power Supply	Č	DC Voltage supplied from DC power by Li-ion Batter	Host System by USB cable.		
Power Rating : DC 5.0V by USB cable. DC 3.7V 800mAh Li-ion Ba					
Connecting I/O Port(S)		Please refer to the User's Manual			

Note:

- (1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- (2) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual. The EUT has also been tested and complied the FCC 15C for BLE function, and recorded in the separate test report.



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(3) Channel List:

Bluetooth Channel List						
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	
00	2402	27	2429	54	2456	
01	2403	28	2430	55	2457	
02	2404	29	2431	56	2458	
03	2405	30	2432	57	2459	
04	2406	31	2433	58	2460	
05	2407	32	2434	59	2461	
06	2408	33	2435	60	2462	
07	2409	34	2436	61	2463	
08	2410	35	2437	62	2464	
09	2411	36	2438	63	2465	
10	2412	37	2439	64	2466	
11	2413	38	2440	65	2467	
12	2414	39	2441	66	2468	
13	2415	40	2442	67	2469	
14	2416	41	2443	68	2470	
15	2417	42	2444	69	2471	
16	2418	43	2445	70	2472	
17	2419	44	2446	71	2473	
18	2420	45	2447	72	2474	
19	2421	46	2448	73	2475	
20	2422	47	2449	74	2476	
21	2423	48	2450	75	2477	
22	2424	49	2451	76	2478	
23	2425	50	2452	77	2479	
24	2426	51	2453	78	2480	
25	2427	52	2454		1	
26	2428	53	2455	CHID:	~ \	

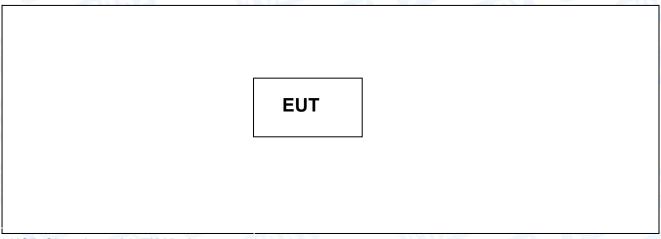
⁽⁴⁾ The Antenna information about the equipment is provided by the applicant.



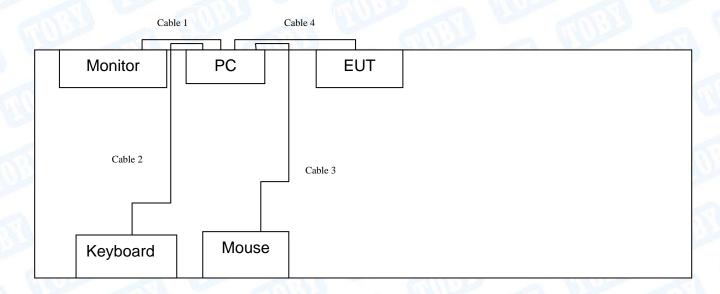
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1.3 Block Diagram Showing the Configuration of System Tested

TX Mode



USB Charging with TX Mode



1.4 Description of Support Units

Equipment Information							
Name	Model	FCC ID/DOC	Manufacturer	Used "√"			
LCD Monitor	E170Sc	DOC	DELL	√			
PC	OPTIPLEX380	DOC	DELL	√			
Keyboard	L100	DOC	DELL	1			
Mouse	M-UARDEL7	DOC	DELL	1			
		Cable Informa	tion				
Number	Number Shielded Type Ferrite Core Length Note						
Cable 1	YES	YES	1.5M				



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Cable 2	YES	YES	1.5M	137
Cable 2	YES	NO	1.5M	COURT OF
Cable 3	NO	NO	0.6M	Provided by the applicant

1.5 Description of Test Mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned follow was evaluated respectively.

For Conducted Test						
Final Test Mode Description						
Mode 1	USB Charging with TX GFSK Mode					

For Radiated Test				
Final Test Mode Description				
Mode 1	USB Charging with TX GFSK Mode			
Mode 2	TX Mode(GFSK) Channel 00/39/78			
Mode 3	TX Mode(π /4-DQPSK) Channel 00/39/78			
Mode 4	TX Mode(8-DPSK) Channel 00/39/78			
Mode 5	Hopping Mode(GFSK)			
Mode 6	Hopping Mode(π /4-DQPSK)			
Mode 7	Hopping Mode(8-DPSK)			

Note:

(1) For all test, we have verified the construction and function in typical operation. And all the test modes were carried out with the EUT in transmitting operation in maximum power with all kinds of data rate. We have pretested all the test mode above.

According to ANSI C63.10 standards, the measurements are performed at the highest, middle, lowest available channels, and the worst case data rate as follows:

TX Mode: GFSK (1 Mbps)
TX Mode: π /4-DQPSK (2 Mbps)
TX Mode: 8-DPSK (3 Mbps)

(2) The EUT is considered a portable unit; it was pre-tested on the positioned of each 3 axis, X-plane, Y-plane and Z-plane. The worst case was found positioned on X-plane as the normal use. Therefore only the test data of this X-plane was used for radiated emission measurement test.



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1.6 Description of Test Software Setting

During testing channel& Power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of Bluetooth mode.

Test Software Version		RTL BT Device Auto Che	ck
Frequency	2402 MHz	2441MHz	2480 MHz
GFSK	DEF	DEF	DEF
π /4-DQPSK	DEF	DEF	DEF
8-DPSK	DEF	DEF	DEF

1.7 Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

Test Item	Parameters	Expanded Uncertainty (U _{Lab})
The same of the sa	Level Accuracy:	(40)
Conducted Emission	9kHz~150kHz	±3.42 dB
	150kHz to 30MHz	±3.42 dB
Dadiated Emission	Level Accuracy:	. 4 60 dD
Radiated Emission	9kHz to 30 MHz	±4.60 dB
Dadiated Emission	Level Accuracy:	. 4 40 dD
Radiated Emission	30MHz to 1000 MHz	±4.40 dB
Radiated Emission	Level Accuracy:	±4.20 dB
Naulateu Emission	Above 1000MHz	±4.20 UD



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1.8 Test Facility

The testing report were performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at 1A/F., Bldg.6, Yusheng Industrial Zone, The National Road No.107 Xixiang Section 467, Xixiang, Bao'an, Shenzhen, Guangdong, China. At the time of testing, the following bodies accredited the Laboratory:

CNAS (L5813)

The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

FCC List No.: (811562)

The Laboratory is listed in the United States of American Federal Communications Commission (FCC), and the registration number is 811562.

IC Registration No.: (11950A-1)

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A-1.

May 22, 2014 certificated by TUV Rheinland(China) Co., Ltd. with TUV certificate No.: UA 50282953 0001 and report No.: 17026822 002. The certificate is valid until the next scheduled audit or up to 18 months, at the discretion of TUV Rhineland.



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2. Test Summary

FCC Part 15 Subpart C(15.247)/ RSS 247 Issue 1					
Standard Section		T	1 1	_	
FCC	IC	Test Item	Judgment	Remark	
15.203		Antenna Requirement	PASS	N/A	
15.207	RSS-GEN 7.2.2	Conducted Emission	PASS	N/A	
15.205	RSS-Gen 7.2.3	Restricted Bands	PASS	N/A	
15.247(a)(1)	RSS 247 5.1 (2)	Hopping Channel Separation	PASS	N/A	
15.247(a)(1)	RSS 247 5.1 (4)	Dwell Time	PASS	N/A	
15.247(b)(1)	RSS 247 5.4 (2)	Peak Output Power	PASS	N/A	
15.247(b)(1)	RSS 247 5.1 (4)	Number of Hopping Frequency	PASS	N/A	
15.247(c)	RSS 247 5.5	Radiated Spurious Emission	PASS	N/A	
15.247(a)	RSS 247 5.1 (1)	99% Occupied Bandwidth & 20dB Bandwidth	PASS	99%OBW GFSK:924.00kHz π/4-DQPSK: 1188.00kHz 8-DPSK: 1170.00kHz	

Note: N/A is an abbreviation for Not Applicable.



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3. Test Equipment

Conducted Emission Test						
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date	
EMI Test Receiver	Rohde & Schwarz	ESCI	100321	Aug. 07, 2015	Aug. 06, 2016	
RF Switching Unit	Compliance Direction Systems Inc	RSU-A4	34403	Aug. 07, 2015	Aug. 06, 2016	
AMN	SCHWARZBECK	NNBL 8226-2	8226-2/164	Aug. 07, 2015	Aug. 06, 2016	
LISN	Rohde & Schwarz	ENV216	101131	Aug. 07, 2015	Aug. 06, 2016	
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date	
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.		
Analyzer EMI Test	Agilent Rohde & Schwarz	E4407B ESCI	MY45106456 100010/007	Aug. 29, 2015 Aug. 07, 2015	Aug. 28, 2016 Aug. 06, 2016	
Receiver Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar. 28, 2015	Mar. 27, 2016	
Bilog Antenna	ETS-LINDGREN	3142E	00117542	Mar. 28, 2015	Mar. 27, 2016	
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar. 28, 2015	Mar. 27, 2016	
Horn Antenna	ETS-LINDGREN	3117	00143209	Mar. 28, 2015	Mar. 27, 2016	
Pre-amplifier	Sonoma	310N	185903	Mar. 28, 2015	Mar. 27, 2016	
Pre-amplifier	HP	8447B	3008A00849	Mar. 28, 2015	Mar. 27, 2016	
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar. 28, 2015	Mar. 27, 2016	
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A	



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4. Conducted Emission Test

4.1 Test Standard and Limit

4.1.1Test Standard FCC Part 15.207

4.1.2 Test Limit

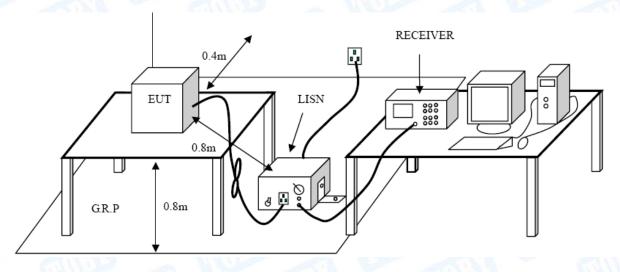
Conducted Emission Test Limit

Evanuanov	Maximum RF Line Voltage (dBμV)				
Frequency	Quasi-peak Level	Average Level			
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *			
500kHz~5MHz	56	46			
5MHz~30MHz	60	50			

Notes:

- (1) *Decreasing linearly with logarithm of the frequency.
- (2) The lower limit shall apply at the transition frequencies.
- (3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2 Test Setup



4.3 Test Procedure

The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/50uH of coupling impedance for the measuring instrument.

Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.



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I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

LISN at least 80 cm from nearest part of EUT chassis

The bandwidth of EMI test receiver is set at 9kHz, and the test frequency band is from 0.15MHz to 30MHz.

4.4 EUT Operating Mode

Please refer to the description of test mode.

4.5 Test Data

Please see the next page.



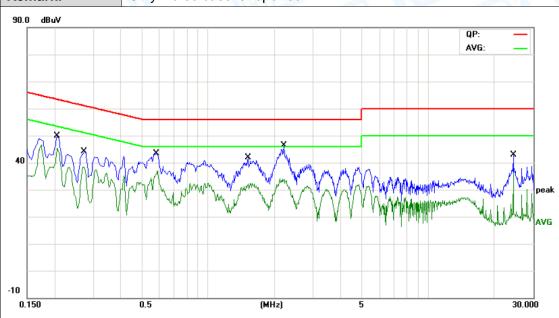
EUT:Wearable Outdoor Sports
SpeakerModel Name :F20Temperature:25 °CRelative Humidity:55%

Test Voltage: AC 120V/60 Hz

Terminal: Line

Test Mode: USB Charging with TX GFSK Mode 2402 MHz

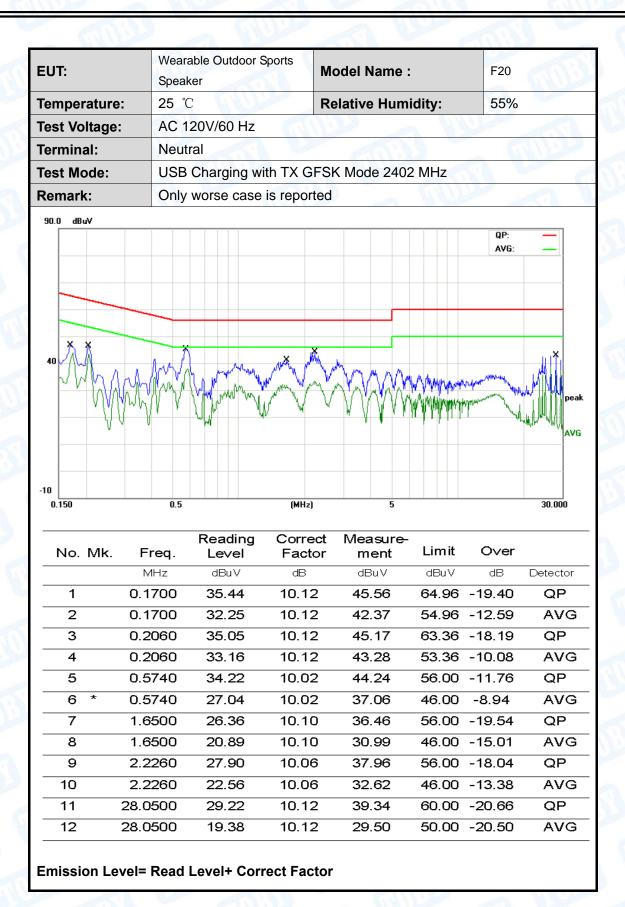
Remark: Only worse case is reported



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∨	dB	dBu∀	dBu∀	dB	Detector
1		0.2060	38.26	10.12	48.38	63.36	-14.98	QP
2	*	0.2060	35.37	10.12	45.49	53.36	-7.87	AVG
3		0.2740	32.37	10.09	42.46	60.99	-18.53	QP
4		0.2740	27.75	10.09	37.84	50.99	-13.15	AVG
5		0.5820	32.44	10.02	42.46	56.00	-13.54	QP
6		0.5820	25.92	10.02	35.94	46.00	-10.06	AVG
7		1.5140	26.68	10.11	36.79	56.00	-19.21	QP
8		1.5140	21.19	10.11	31.30	46.00	-14.70	AVG
9		2.2100	28.36	10.06	38.42	56.00	-17.58	QP
10		2.2100	23.02	10.06	33.08	46.00	-12.92	AVG
11		24.3300	28.77	10.06	38.83	60.00	-21.17	QP
12		24.3300	25.82	10.06	35.88	50.00	-14.12	AVG



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Wearable Outdoor Sports EUT: F20 **Model Name:** Speaker **25** ℃ 55% Temperature: **Relative Humidity:** AC 240V/60 Hz **Test Voltage:** Line Terminal: Test Mode: USB Charging with TX GFSK Mode 2402 MHz Only worse case is reported Remark: 90.0 dBuV QP: AVG: -10 0.5 30.000 0.150 (MHz) Reading Correct Measure-Limit Over No. Mk. Freq. Level Factor ment MHz dBuV dΒ dBuV dBuV dΒ Detector 0.1700 10.12 -14.29 1 40.55 50.67 64.96 QP 2 0.1700 45.37 AVG 35.25 10.12 54.96 -9.59 3 0.2058 38.33 10.12 48.45 63.37 -14.92 QΡ 4 0.2058 35.22 10.12 45.34 53.37 -8.03 AVG QP 0.4138 33.65 10.05 43.70 57.57 -13.87 5 0.4138 10.05 36.92 47.57 -10.65 AVG 6 26.87 7 0.5816 32.34 10.02 42.36 56.00 -13.64 QΡ 8 0.5816 25.28 10.02 35.30 46.00 -10.70 AVG 1.6495 35.53 10.10 45.63 -10.37 QP 9 56.00 10 1.6495 26.18 10.10 36.28 46.00 -9.72AVG 11 2.2259 35.11 10.06 45.17 56.00 -10.83 QP 12 2.2259 23.08 10.06 33.14 46.00 -12.86 AVG **Emission Level= Read Level+ Correct Factor**



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EUT	:	Weara Speak	able Outdoor S er	ports	el Name :		F20	modified the second
Tem	perature:	25 ℃		Rela	tive Humid	ity:	55%	
Test	Voltage:	AC 2	40V/60 Hz			* 67	N. Carlot	
Tern	ninal:	Neutr	Neutral					
Test	Mode:	USB	USB Charging with TX GFSK Mode 2402 MHz					
Rem	nark:	Only	Only worse case is reported					
90.0	dBu∀							
40 🗸	A M		A Mary Carry		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	V/VMIPAA-A	QP: AVG:	peak
-10 0.19	50	0.5	VIII	(MHz)	5			30.000
N	lo. Mk.	Freq.	Reading Le∨el	Correct Factor	Measure- ment	Limit	O∨er	
		MHz	dBu∨	dB	dBu∨	dBu∨	dB	Detector
	1	0.2058	37.33	10.12	47.45	63.37	-15.92	QP
	2 *	0.2058	34.22	10.12	44.34	53.37	-9.03	AVG
	3	0.4138	34.65	10.05	44.70	57.57		QP
	4	0.4138	27.87	10.05	37.92	47.57	-9.65	AVG
	5	0.4138 0.5737	27.87 32.54	10.05 10.02	37.92 42.56	47.57 56.00	-9.65 -13.44	AVG QP
_						56.00		

Emission Level= Read Level+ Correct Factor

21.68

32.53

23.19

33.29

22.07

10.14

10.10

10.09

10.06

10.06

31.82

42.63

33.28

43.35

32.13

46.00 -14.18

56.00 -13.37

46.00 -12.72

56.00 -12.65

46.00 -13.87

0.9657

1.6497

1.6577

2.1259

2.1259

8

9

10

11 12 AVG

QP

AVG

AVG

QP



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5. Radiated Emission Test

5.1 Test Standard and Limit

5.1.1 Test Standard FCC Part 15.209

5.1.2 Test Limit

Radiated Emission Limit (9 kHz~1000MHz)

Frequency (MHz	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Radiated Emission Limit (Above 1000MHz)

Frequency	Class B (dBuV	//m)(at 3m)
(MHz)	Peak	Average
Above 1000	74	54

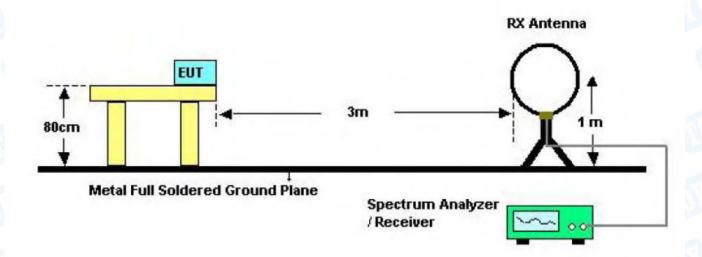
Note:

- (1) The tighter limit applies at the band edges.
- (2) Emission Level (dBuV/m)=20log Emission Level (uV/m)

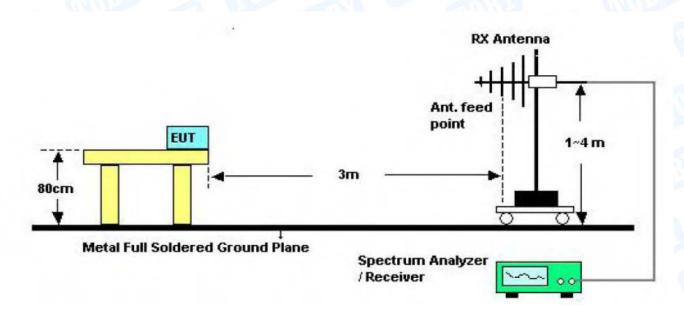


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5.2 Test Setup



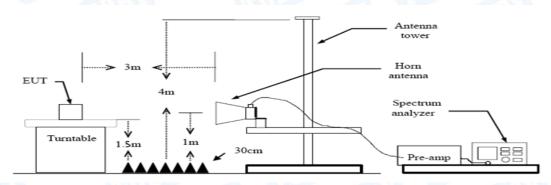
Bellow 30MHz Test Setup



Bellow 1000MHz Test Setup



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Above 1GHz Test Setup

5.3 Test Procedure

- (1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- (2) Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
- (3) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- (4) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- (5) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
- (6) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
- (7) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
- (8) For the actual test configuration, please see the test setup photo.

5.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power in TX mode.

5.5 Test Data

Remark: During testing above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=1 Kz with Peak Detector for Average Values.

Test data please refer the following pages.



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EUT:	Wearable Outdoo Speaker	or Sports	Model Name	e :	F20	TOP
Temperature:	25 ℃		Relative Hu	midity:	55%	
Test Voltage:	DC 5V	11111		BILL		1
Ant. Pol.	Horizontal	10	العاليا			
Test Mode:	TX GFSK Mode 2	2402MHz	Militar		NA	6
Remark:	Only worse case	is reported		MADE		2
80.0 dBuV/m						
				(RF)FCC 150	3M Radiation	
					Margin -6	1B [
						\dashv
30 1 ×	2		4	5 X	e *	
	J.M.M.Lu.	3 X., 1	ا بالد قال د	Mhousterwa	- Jack Property	gelyn/hywyner
and of	Materia natural All Material	MM _{MAAA} A _{CU, 2} AA	Havilleradildrags	Affly many		
2 margin	rited very will					
-20 30.000 40 50	60 70 80	(MHz)	300	400 500	600 700	1000.000
30.000 40 30	00 10 00	(14112)	300	400 300	000 100	1000.000
	Reading	Correct	Measure-	1::4	O	
	req. Level	Factor	ment	Limit	Over	
1	MHz dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1 * 41.	.2764 45.20	-20.70	24.50	40.00	-15.50	peak
2 79.	.2425 45.86	-23.31	22.55	40.00	-17.45	peak
	5.0066 40.55	-22.34	18.21	43.50	-25.29	peak
	9.9874 41.41	-18.59	22.82	46.00	-23.18	peak
5 375	5.9384 38.88	-14.40	24.48	46.00	-21.52	peak
6 699	0.3046 31.74	-6.89	24.85	46.00	-21.15	peak
	Over limit !:over margin	rect Factor				



Page: 22 of 94

UT:	Speal	able Outdoo ker	Model Nam	e:	F20		
emperature:	25 °C			Relative Hu	ımiditv:	55%	-
est Voltage:	DC 5		CTITI:	7.3	WE I		
Ant. Pol.	Vertic	al	133	100		(TI	TOP
est Mode:	TX G	FSK Mode 2	2402MHz	All lines		A V	
Remark:	Only	worse case	is reported		MILLE		a
80.0 dBuV/m							
30		2 X X V	3 Maryan Janah	Manufacture to the day have a pr	(RF)FCC 15	5C 3M Radiation Margin -6	
30.000 40 50	0 60 70	80	(MHz)	300	400 50	00 600 700	1000.00
30.000 40 50		Reading	Correct	Measure-	400 50 Limit	00 600 700 Over	1000.00
No. Mk.	70 60 70 = req.						1000.00
30.000 40 50 No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
No. Mk. F	F req .	Reading Level	Correct Factor	Measure- ment dBuV/m	Limit dBuV/m	Over	Detect
No. Mk. F	Freq. MHz .8444	Reading Level dBuV 50.73	Correct Factor dB/m -20.52	Measure- ment dBuV/m	Limit dBuV/m 40.00	Over dB -9.79	Detection peal
No. Mk. F 1 * 40 2 80 3 167	Freq. MHz .8444 .9274	Reading Level dBuV 50.73 48.39	Correct Factor dB/m -20.52 -23.22	Measurement dBuV/m 30.21 25.17	Limit dBuV/m 40.00 40.00	Over dB -9.79 -14.83	Detection peal
No. Mk. F 1 * 40 2 80 3 167 4 375	Freq. MHz .8444 .9274 7.8240	Reading Level dBuV 50.73 48.39 41.17	Correct Factor dB/m -20.52 -23.22 -21.04	Measure- ment dBuV/m 30.21 25.17 20.13	Limit dBuV/m 40.00 40.00 43.50	Over dB -9.79 -14.83 -23.37	Detection peal peal peal



Page: 23 of 94

UT:		Wear Speal	able Outdoo ker	or Sports	Model Nai	me :	F20	
empe	rature:	25 ℃	(MILE)		Relative H	lumidity:	55%	
est Vo	oltage:	DC 5	/	THE STATE OF	13	BRI		
nt. Po	ol.	Horizo	ontal	1	ATTI A		_ GV	Miles
est Mo	ode:	ТХ л	/4-DQPSK	Mode 2402	2MHz		1	
Remarl	k:	Only	worse case	is reported		anno		a '
80.0 dB	uV/m							
						(RF)FCC 15	C 3M Radiation	
							Margin -6	dB
30								
	1 X		2	3 4	5	e e		La Amar
- L J	M	14.01	2 X MUMANIAN WANDARD	Munday May	. Ta albaa l	white the homesterness	Aymyd Melwhileth Landing	a Short in Man.
dw.	· Varian	and the second of the second	ւ հեթենակ	JANA AND STANTANTON		-1111		
				'Y	'			
20								
30.000	40	50 60 70	80	(MHz)	300	400 50	0 600 700	1000.00
			Reading	Correct	Measure-			
No.	Mk.	Freq.	Level	Factor	ment	Limit	Over	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detecto
1	* 4	1.2764	45.20	-20.70	24.50	40.00	-15.50	peak
2	7	9.2425	44.36	-23.31	21.05	40.00	-18.95	peak
3	12	25.0066	41.05	-22.34	18.71	43.50	-24.79	peak
4	15	8.6675	37.93	-20.60	17.33	43.50	-26.17	peak
	23	39.9874	36.91	-18.59	18.32	46.00	-27.68	peak
5						40.00	-00.50	
5 6		75.9384	37.88	-14.40	23.48	46.00	-22.52	peak



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UT:	Weara Speak	able Outdoo ker	r Sports	Model Na	me :	F20	
emperature:	25 °C			Relative F	lumidity:	55%	G.
est Voltage:	DC 5\	/	CITIE .		UE		4
nt. Pol.	Vertica	al				(TI	NO
est Mode:	ТΧ π	/4-DQPSK	Mode 2402	MHz		NE	
emark:	Only v	vorse case	is reported		MILES		a
80.0 dBuV/m							
					(RF)FCC 15	C 3M Radiation	
						Margin -6	dB
30 X					_	6	
NAM	1	~ Muntiphywlandig	4		5 X	Mary Mary	while
Jana .	AND VALUE OF THE PARTY OF THE P	vol. Military Military Military	Mynamen J. J.	many manufactures	hater and the second	Made	
	\		, MAC	W. Carrellian Color			
20							
30.000 40 50	60 70	80	(MHz)	300	400 50	0 600 700	1000.0
		Reading	Correct	Measure-		_	
No. Mk. F	req.	Level	Factor	ment	Limit	O∨er	
	ЛHz	dBu∀	- IC.	alDest Man	dBuV/m	dB	Detecto
11	ппΖ	ubu v	dB/m	dBuV/m	ubu v/III	QD.	
	8444	51.23	-20.52	30.71	40.00	-9.29	
1 * 40.8							peak
1 * 40.5 2 80.5	8444	51.23	-20.52	30.71	40.00	-9.29	peak peak
1 * 40.8 2 80.9 3 122	8444 9274	51.23 45.39	-20.52 -23.22	30.71 22.17	40.00 40.00	-9.29 -17.83	peak peak
1 * 40.5 2 80.5 3 122 4 167	8444 9274 .8340	51.23 45.39 43.25	-20.52 -23.22 -22.41	30.71 22.17 20.84	40.00 40.00 43.50	-9.29 -17.83 -22.66	peal peal peal
1 * 40.5 2 80.5 3 122 4 167 5 375	8444 9274 .8340 .8240	51.23 45.39 43.25 40.17	-20.52 -23.22 -22.41 -21.04	30.71 22.17 20.84 19.13	40.00 40.00 43.50 43.50	-9.29 -17.83 -22.66 -24.37	peak peak peak peak peak



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UT:	Speak	able Outdoo ker	Model Nar	F20			
emperature:	25 ℃			Relative H	lumidity:	55%	
est Voltage:	DC 5\	/	THE STATE		BE		1
nt. Pol.	Horizo	ontal	1				Mar
est Mode:	TX 8-I	DPSK Mode	e 2402 MHz	Alle			
emark:	Only v	worse case	is reported		CHILL		9
80.0 dBuV/m							
					(RF)FCC 150	C 3M Radiation	
						Margin -6	dB
30							
2		3	_	5	6 X		
' O		X	4	×	1.4	Bulkery Paking Parish	War Chrys Har Chan
	Market Market	ANATONIA YOUNG AND	Minima	ya ^{wa} kasahu ^l akasahulaka, ka	When it was	, , , , , , , , , , , , , , , , , , ,	
30.000 40 50	60 70	80	(MHz)	300	400 500		1000.00
	60 70		(MHz)	300 Measure-	MAK 1 m		1000.00
30.000 40 50	60 70 Freq.	Reading Level			MAK 1 m		1000.00
30.000 40 50 No. Mk. F		Reading	Correct	Measure-	400 500	0 600 700	1000.00
30.000 40 50 No. Mk. F	req.	Reading Level	Correct Factor	Measure- ment	400 500 Limit	0 600 700 Over	
No. Mk. F	F req .	Reading Level	Correct Factor	Measure- ment dBuV/m	400 500 Limit dBuV/m	0 600 700 Over	Detecto
No. Mk. F 1 36. 2 * 41.	Freq. MHz 0007	Reading Level dBuV 37.24	Correct Factor dB/m -17.67	Measure- ment dBuV/m	400 500 Limit dBu\//m 40.00	Over dB -20.43	Detecto peak
No. Mk. F 1 36. 2 * 41. 3 79.	Freq. MHz 0007 2765	Reading Level dBuV 37.24 43.70	Correct Factor dB/m -17.67 -20.70	Measurement dBuV/m 19.57 23.00	Limit dBu\/m 40.00 40.00	Over dB -20.43 -17.00	Detecto peak peak
No. Mk. F 1 36. 2 * 41. 3 79. 4 191	Freq. MHz 0007 2765 2426	Reading Level dBuV 37.24 43.70 43.86	Correct Factor dB/m -17.67 -20.70 -23.31	Measure- ment dBuV/m 19.57 23.00 20.55	Limit dBuV/m 40.00 40.00 40.00	Over dB -20.43 -17.00 -19.45	Detecto peak peak peak
No. Mk. F 1 36. 2 * 41. 3 79. 4 191 5 239	Freq. MHz 0007 2765 2426 .7450	Reading Level dBuV 37.24 43.70 43.86 38.07	Correct Factor dB/m -17.67 -20.70 -23.31 -20.81	Measure- ment dBuV/m 19.57 23.00 20.55 17.26	Limit dBuV/m 40.00 40.00 40.00 43.50	Over dB -20.43 -17.00 -19.45 -26.24	Detector peak peak peak peak



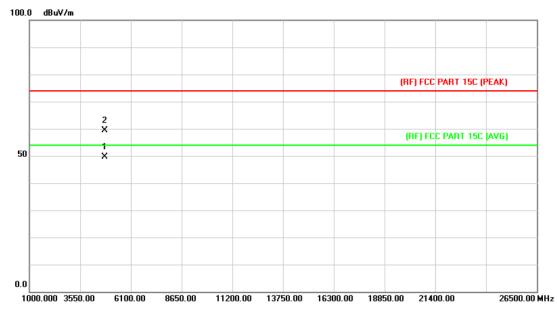
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EUT:	Wearable Outdoor Sports Speaker		Model Nar	ne :	F20		
emperature:	25 ℃			Relative H	lumidity:	55%	
est Voltage:	DC 5V		CI II		BALL		-61
Ant. Pol.	Vertical					CIV)	Like
est Mode:	TX 8-DP	SK Mode 2	402MHz	Alle		10	
Remark:	Only wor	se case is	reported		UNION		
80.0 dBuV/m							
30 X X X X X X X X X X X X X X X X X X X	3 *************************************		5	Notation and the second	to Land to construct the construction of the c	A War	Mu
30.000 40 50	60 70 80		(MHz)	300	400 500	600 700	1000.00
	req. L	.evel	orrect Factor	Measure- ment	Limit	Over	
		dBuV	dB/m	dBuV/m	dBuV/m		Detecto
1 36.	0007 4	8.74 -	17.67	31.07	40.00	-8.93	peak
2 * 40.	8446 5	1.73 -	20.52	31.21	40.00	-8.79	peak
3 80.	9275 4	5.89 -	23.22	22.67	40.00	-17.33	peak
4 122	.8340 4	1.75 -	22.41	19.34	43.50	-24.16	peak
5 191	.7450 3	8.79 -	20.81	17.98	43.50	-25.52	peak
6 578	.6699 3	4.51 -	10.03	24.48	46.00	-21.52	peak
*:Maximum data x:		ver margin	t Factor				



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EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20			
Temperature:	25 ℃	Relative Humidity:	55%			
Test Voltage:	DC 5V					
Ant. Pol.	Horizontal					
Test Mode:	TX GFSK Mode 2402MHz	The same				
Remark:	No report for the emission w prescribed limit.	hich more than 10 dB b	elow the			

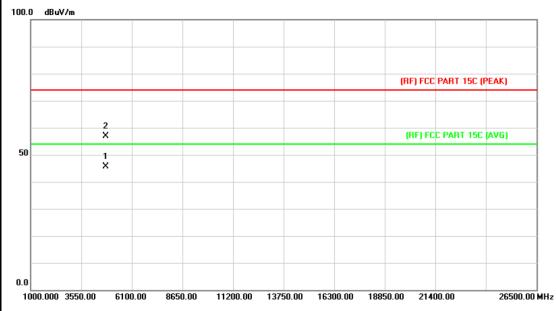


No	o. Mk	. Freq.	Reading Level		Measure- ment	Limit	O∨er	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4803.769	36.18	13.44	49.62	54.00	-4.38	AVG
2		4803.790	46.00	13.44	59.44	74.00	-14.56	peak



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EUT:	Wearable Outdoor Sports Speaker Model Name :		F20			
Temperature:	25 ℃	Relative Humidity:	55%			
Test Voltage:	DC 5V					
Ant. Pol.	Vertical					
Test Mode:	TX GFSK Mode 2402MHz	1				
Remark: No report for the emission which more than 10 dB below the prescribed limit.						

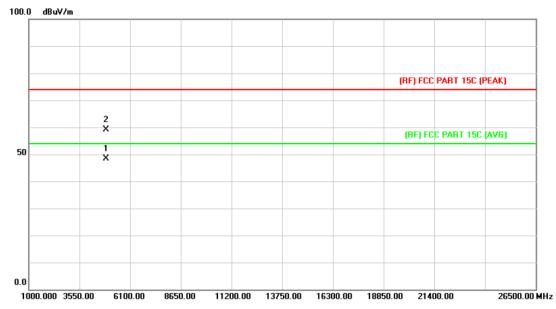


N	lo. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4803.742	32.23	13.44	45.67	54.00	-8.33	AVG
2		4804.174	43.54	13.44	56.98	74.00	-17.02	peak



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EUT:	Wearable Outdoor Sports Speaker Model Name :		F20			
Temperature:	25 ℃	Relative Humidity:	55%			
Test Voltage:	DC 5V					
Ant. Pol.	Horizontal					
Test Mode:	TX GFSK Mode 2441MHz	100				
Remark: No report for the emission which more than 10 dB below the prescribed limit.						

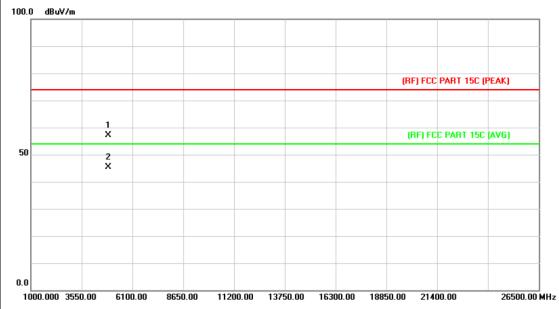


No	. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4882.064	34.46	13.90	48.36	54.00	-5.64	AVG
2		4882.309	45.12	13.90	59.02	74.00	-14.98	peak



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EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20				
Temperature:	25 ℃	Relative Humidity:	55%				
Test Voltage:	DC 5V	DC 5V					
Ant. Pol.	Vertical						
Test Mode:	TX GFSK Mode 2441MHz	The same of the sa					
Remark:	No report for the emission which more than 10 dB below the prescribed limit.						

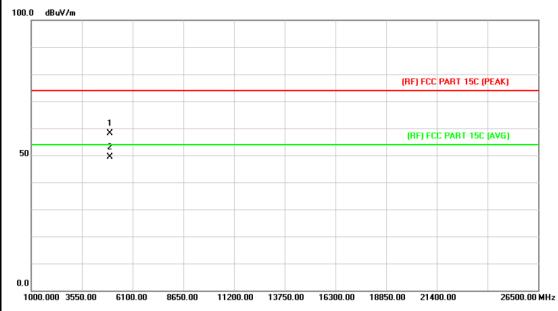


No	o. Mk	. Freq.	_	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4881.678	43.30	13.90	57.20	74.00	-16.80	peak
2	*	4882.091	31.42	13.90	45.32	54.00	-8.68	AVG



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EUT:	Wearable Outdoor Sports Speaker Model Name :		F20			
Temperature:	25 ℃	Relative Humidity:	55%			
Test Voltage:	DC 5V					
Ant. Pol.	Horizontal					
Test Mode:	TX GFSK Mode 2480MHz	The same of the sa				
Remark: No report for the emission which more than 10 dB below the prescribed limit.						

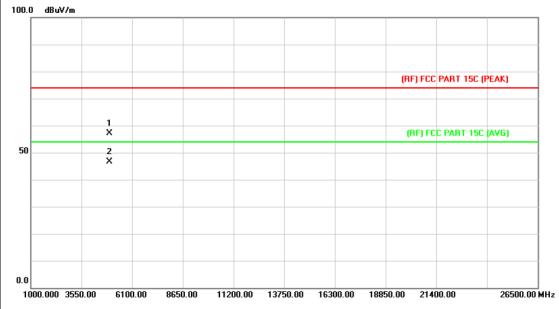


No	o. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4960.156	43.76	14.36	58.12	74.00	-15.88	peak
2	*	4960.156	34.98	14.36	49.34	54.00	-4.66	AVG



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EUT:	Wearable Outdoor Sports Speaker Model Name:		F20		
Temperature:	25 ℃	Relative Humidity:	55%		
Test Voltage:	: Voltage: DC 5V				
Ant. Pol.	Vertical		CHILL SE		
Test Mode:	TX GFSK Mode 2480MHz	The same			
Remark:	No report for the emission which more than 10 dB below the prescribed limit.				

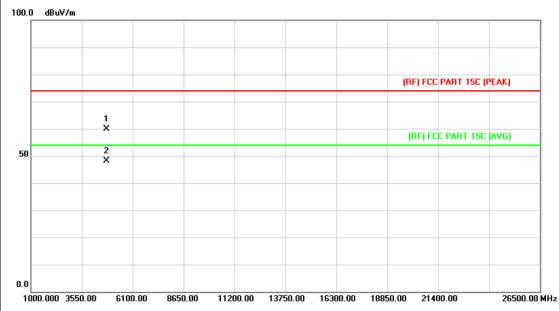


No	o. Mk	. Freq.	_	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4960.125	42.76	14.36	57.12	74.00	-16.88	peak
2	*	4960.214	32.22	14.36	46.58	54.00	-7.42	AVG



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EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20			
Temperature:	25 ℃	Relative Humidity:	55%			
Test Voltage:	DC 5V					
Ant. Pol.	Horizontal					
Test Mode:	TX 8-DPSK Mode 2402MHz	100				
Remark:	No report for the emission which more than 10 dB below the prescribed limit.					

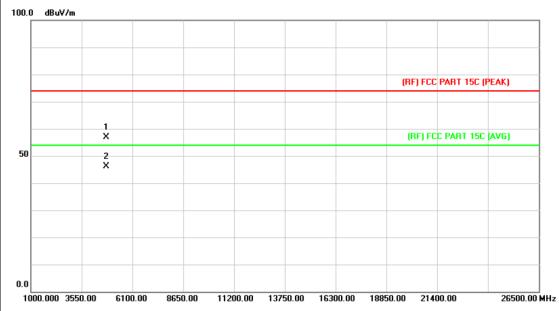


No	. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	O∨er	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4803.322	46.35	13.44	59.79	74.00	-14.21	peak
2	*	4803.643	34.74	13.44	48.18	54.00	-5.82	AVG



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EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20			
Temperature:	25 ℃	Relative Humidity:	55%			
Test Voltage:	DC 5V					
Ant. Pol.	Vertical					
Test Mode:	TX 8-DPSK Mode 2402MHz					
Remark: No report for the emission which more than 10 dB below the prescribed limit.						

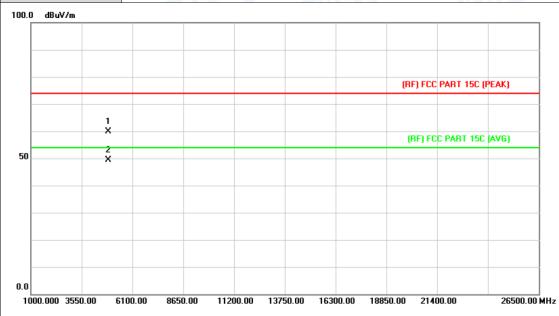


No	o. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	O∨er	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4803.324	43.40	13.44	56.84	74.00	-17.16	peak
2	*	4803.654	32.80	13.44	46.24	54.00	-7.76	AVG



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EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20			
Temperature:	25 ℃	Relative Humidity:	55%			
Test Voltage:	DC 5V					
Ant. Pol.	Horizontal					
Test Mode:	TX 8-DPSK Mode 2441MHz					
Remark:	No report for the emission which more than 10 dB below the prescribed limit.					

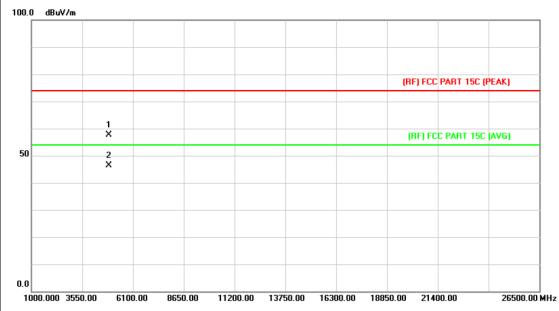


No	. Mk	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4881.616	46.02	13.90	59.92	74.00	-14.08	peak
2	*	4881.964	35.46	13.90	49.36	54.00	-4.64	AVG



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EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20			
Temperature:	25 ℃	Relative Humidity:				
Test Voltage:	DC 5V					
Ant. Pol.	Vertical					
Test Mode:	TX 8-DPSK Mode 2441MHz					
Remark:	No report for the emission which more than 10 dB below the prescribed limit.					

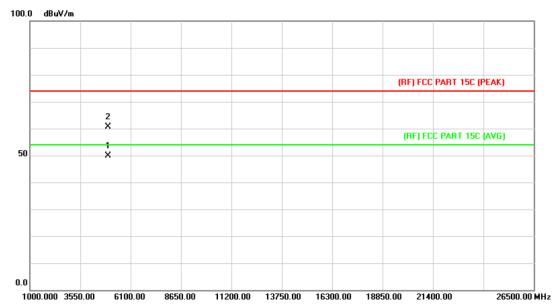


No	. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4881.657	43.75	13.90	57.65	74.00	-16.35	peak
2	*	4881.958	32.44	13.90	46.34	54.00	-7.66	AVG



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EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20				
Temperature:	25 °C Relative Humidity: 55%						
Test Voltage:	DC 5V						
Ant. Pol.	Horizontal						
Test Mode:	TX 8-DPSK Mode 2480MH	z					
Remark:	No report for the emission which more than 10 dB below the prescribed limit.						



No	o. Mk	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4959.742	35.48	14.36	49.84	54.00	-4.16	AVG
2		4959.952	46.26	14.36	60.62	74.00	-13.38	peak



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EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20				
Temperature:	25 ℃	55%					
Test Voltage:	DC 5V						
Ant. Pol.	Vertical						
Test Mode:	TX 8-DPSK Mode 2480MHz						
Remark:	No report for the emission which more than 10 dB below the prescribed limit.						



No	o. Mk	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4959.325	43.97	14.36	58.33	74.00	-15.67	peak
2	*	4959.624	33.29	14.36	47.65	54.00	-6.35	AVG



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6. Restricted Bands Requirement

6.1 Test Standard and Limit

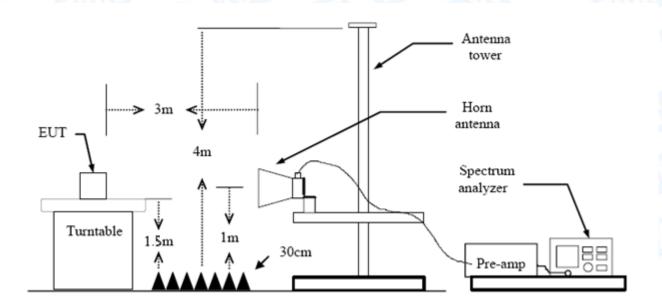
6.1.1 Test Standard FCC Part 15.209 FCC Part 15.205

6.1.2 Test Limit

Restricted Frequency	Class B (dBuV/m)(at 3m)			
Band (MHz)	Peak	Average		
2310 ~2390	74	54		
2483.5 ~2500	74	54		

Note: All restriction bands have been tested, only the worst case is reported.

6.2 Test Setup



6.3 Test Procedure

- (1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- (2) Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.



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(3) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.

- (4) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- (5) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
- (6) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
- (7) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
- (8) For the actual test configuration, please see the test setup photo.

6.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

6.4 Test Data

Remark: During testing above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=1 KHz with Peak Detector for Average Values.

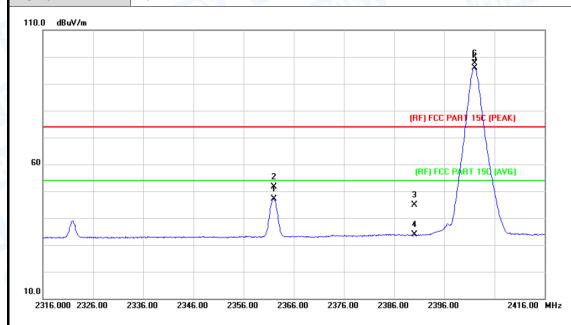
All restriction bands have been tested, only the worst case is reported.



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(1) Radiation Test

EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20				
Temperature:	25 ℃ Relative Humidity: 55%						
Test Voltage:	DC 5V						
Ant. Pol.	Horizontal	The same of the sa					
Test Mode:	TX GFSK Mode 2402MHz						
Remark:	N/A						

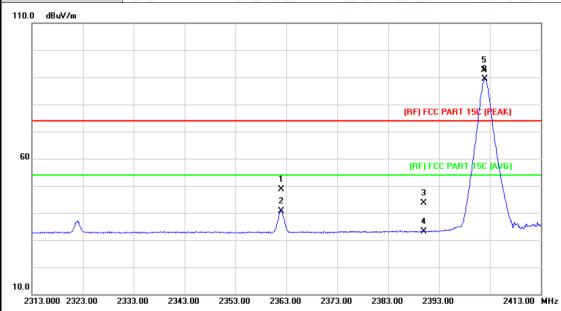


No.	Mk.	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	O∨er	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2362.000	46.57	0.65	47.22	54.00	-6.78	AVG
2		2362.100	50.95	0.65	51.60	74.00	-22.40	peak
3		2390.000	44.09	0.77	44.86	74.00	-29.14	peak
4		2390.000	33.05	0.77	33.82	54.00	-20.18	AVG
5	*	2402.000	95.14	0.82	95.96	Fundamenta	I Frequency	AVG
6	Х	2402.100	96.71	0.82	97.53	Fundamenta	I Frequency	peak



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EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20					
Temperature:	25 ℃	Relative Humidity:	55%					
Test Voltage: DC 5V								
Ant. Pol.	Vertical							
Test Mode:	TX GFSK Mode 2402MHz	1						
Remark: N/A								
110.0 dBuV/m								

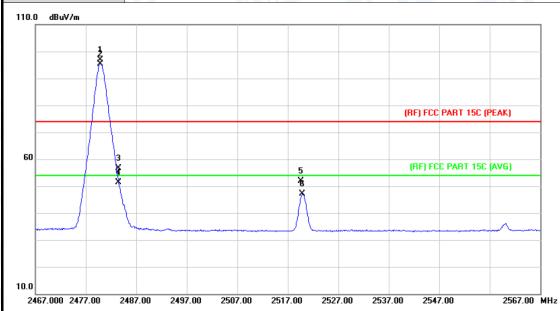


No.	Mk.	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2362.000	47.98	0.65	48.63	74.00	-25.37	peak
2		2362.000	39.99	0.65	40.64	54.00	-13.36	AVG
3		2390.000	42.85	0.77	43.62	74.00	-30.38	peak
4		2390.000	32.29	0.77	33.06	54.00	-20.94	AVG
5	Х	2401.800	91.69	0.82	92.51	Fundamental	Frequency	peak
6	*	2402.000	88.46	0.82	89.28	Fundamental	I Frequency	AVG



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EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20				
Temperature:	25 ℃	Relative Humidity:	55%				
Test Voltage:	DC 5V						
Ant. Pol.	Horizontal						
Test Mode:	TX GFSK Mode 2480 MHz						
Remark:	N/A		1				

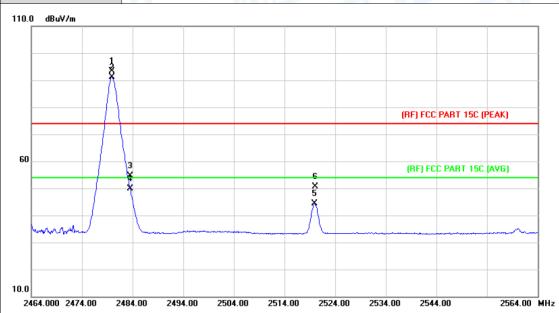


No	. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1	Χ	2479.900	95.83	1.15	96.98	Fundamental Frequency		peak
2	*	2479.900	94.25	1.15	95.40	Fundamental	Frequency	AVG
3		2483.500	55.58	1.17	56.75	74.00	-17.25	peak
4		2483.500	50.25	1.17	51.42	54.00	-2.58	AVG
5		2519.600	50.41	1.36	51.77	74.00	-22.23	peak
6		2519.900	45.66	1.36	47.02	54.00	-6.98	AVG



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EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20					
Temperature:	25 ℃	Relative Humidity:	55%					
Test Voltage:	DC 5V	DC 5V						
Ant. Pol.	Vertical							
Test Mode:	TX GFSK Mode 2480 MHz	TX GFSK Mode 2480 MHz						
Remark:	N/A							

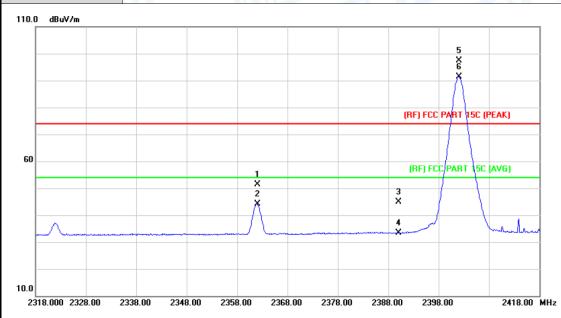


	No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
			MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1		Х	2479.900	92.16	1.15	93.31	Fundamental	Frequency	peak
2	2	*	2479.900	89.93	1.15	91.08	Fundamental	Frequency	AVG
3	3		2483.500	53.44	1.17	54.61	74.00	-19.39	peak
4	1		2483.500	48.83	1.17	50.00	54.00	-4.00	AVG
5	5		2519.900	42.91	1.36	44.27	54.00	-9.73	AVG
6	3		2520.000	49.23	1.36	50.59	74.00	-23.41	peak



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EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20			
Temperature:	25 ℃	Relative Humidity:	55%			
Test Voltage:	DC 5V					
Ant. Pol.	Horizontal					
Test Mode:	TX 8-DPSK Mode 2402MHz					
Remark:	N/A					

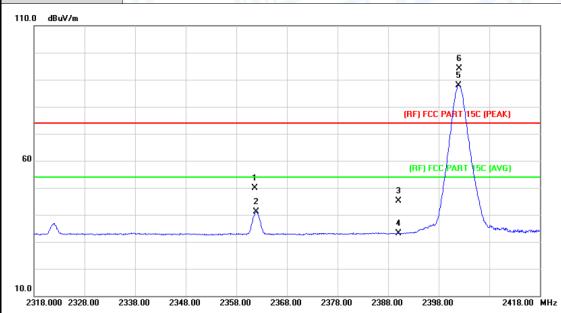


No	. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2362.000	50.85	0.65	51.50	74.00	-22.50	peak
2		2362.000	43.43	0.65	44.08	54.00	-9.92	AVG
3		2390.000	44.03	0.77	44.80	74.00	-29.20	peak
4		2390.000	32.72	0.77	33.49	54.00	-20.51	AVG
5	Х	2402.100	96.52	0.82	97.34	Fundamental	Frequency	peak
6	*	2402.100	90.55	0.82	91.37	Fundamental	Frequency	AVG



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EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20			
Temperature:	25 ℃	Relative Humidity:	55%			
Test Voltage:	DC 5V					
Ant. Pol.	Vertical					
Test Mode:	TX 8-DPSK Mode 2402MHz					
Remark:	N/A					

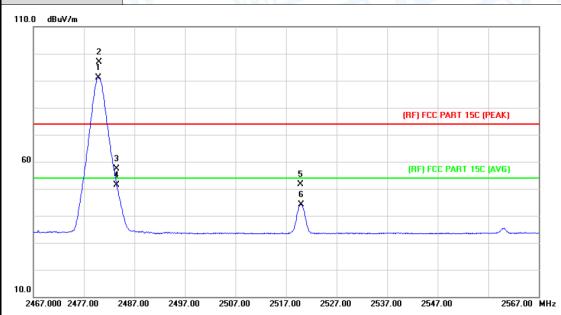


No	. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2361.700	49.11	0.65	49.76	74.00	-24.24	peak
2		2361.900	40.41	0.65	41.06	54.00	-12.94	AVG
3		2390.000	44.38	0.77	45.15	74.00	-28.85	peak
4		2390.000	32.28	0.77	33.05	54.00	-20.95	AVG
5	*	2401.900	87.14	0.82	87.96	Fundamental	Frequency	AVG
6	Х	2402.000	93.21	0.82	94.03	Fundamental	Frequency	peak



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EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20			
Temperature:	25 ℃	Relative Humidity:	55%			
Test Voltage:	DC 5V					
Ant. Pol.	Horizontal					
Test Mode:	TX 8-DPSK Mode 2480MH	z				
Remark:	N/A	THUE				
110.0 dBuV/m						

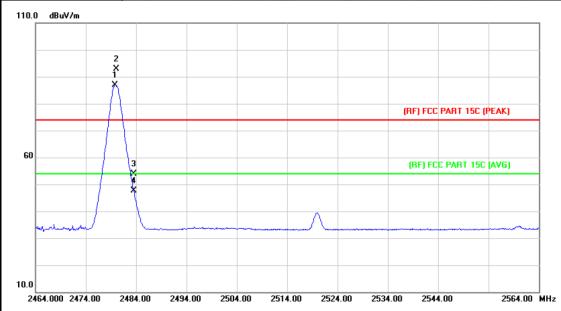


No	. Mk	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	O∨er	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	2479.900	89.95	1.15	91.10	Fundamental	Frequency	AVG
2	Х	2480.000	95.73	1.15	96.88	Fundamental	Frequency	peak
3		2483.500	56.18	1.17	57.35	74.00	-16.65	peak
4		2483.500	50.27	1.17	51.44	54.00	-2.56	AVG
5		2519.900	50.19	1.36	51.55	74.00	-22.45	peak
6		2520.000	42.79	1.36	44.15	54.00	-9.85	AVG

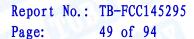


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EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20			
Temperature:	25 ℃	Relative Humidity:	55%			
Test Voltage:	DC 5V					
Ant. Pol.	Vertical					
Test Mode:	TX 8-DPSK Mode 2480MHz					
Remark:	N/A					

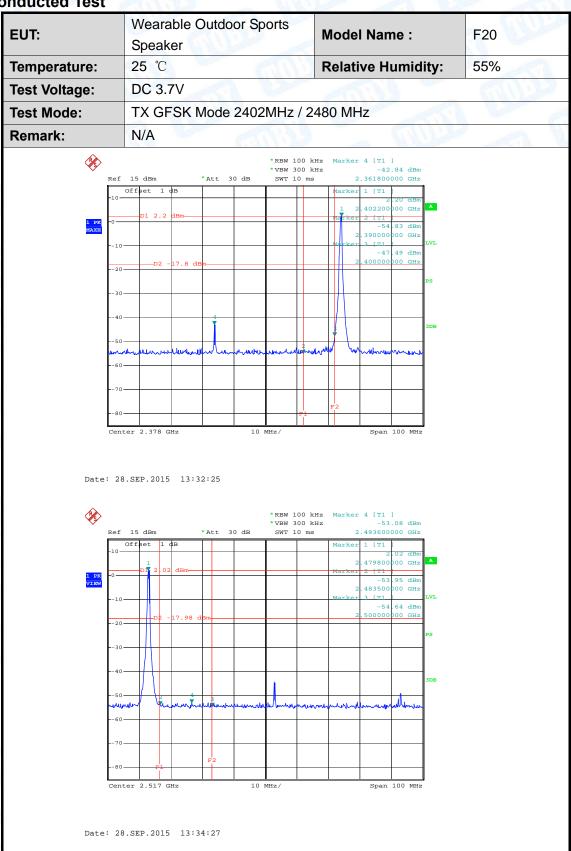


No	. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	O∨er	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	2479.800	85.85	1.15	87.00	Fundamental	Frequency	AVG
2	Х	2480.000	91.73	1.15	92.88	Fundamental	Frequency	peak
3		2483.500	52.64	1.17	53.81	74.00	-20.19	peak
4		2483.500	46.58	1.17	47.75	54.00	-6.25	AVG





(2) Conducted Test





Wearable Outdoor Sports EUT: **Model Name:** F20 Speaker 25 ℃ Temperature: **Relative Humidity:** 55% DC 3.7V Test Voltage: **Test Mode: GFSK Hopping Mode** Remark: N/A *RBW 100 kHz Marker 4 [T1]

*VBW 300 kHz -42.04 dBm
SWT 10 ms 2.374200000 GHz **%** Ref 10 dBm *Att 30 dB Center 2.384 GHz Date: 30.SEP.2015 12:20:45 *RBW 100 kHz Marker 4 [T1]

*VBW 300 kHz -43.51
SWT 10 ms 2.494800000 Date: 30.SEP.2015 12:22:59



Wearable Outdoor Sports EUT: **Model Name:** F20 Speaker 25 ℃ Temperature: **Relative Humidity:** 55% DC 3.7V **Test Voltage: Test Mode:** TX 8-DPSK Mode 2402MHz / 2480 MHz Remark: N/A **%** Ref 15 dBm *Att 30 dB 08 dBn Center 2.383 GHz Span 100 MHz Date: 28.SEP.2015 13:36:56 *RBW 100 kHz Marker 4 [T1]

*VBW 300 kHz -53.68 dBm
SWT 10 ms 2.495000000 GHz 15 dBm *Att 30 dB Offset 1 dB 483500 00 GH2 Date: 28.SEP.2015 13:35:39



Wearable Outdoor Sports EUT: **Model Name:** F20 Speaker 25 ℃ Temperature: **Relative Humidity:** 55% DC 3.7V **Test Voltage: Test Mode:** 8-DPSK Hopping Mode Remark: N/A *RBW 100 kHz Marker 4 [T1]

*VBW 300 kHz -45.38 dBm
SWT 10 ms 2.372800000 GHz **%** Ref 10 dBm *Att 30 dB ŊIJĿIJĸĹŢŢ₽₽ŊŊŊĸ<mark>ŢĸŊŢ</mark>ŦŊIJĸŊĬ Center 2.384 GHz Span 100 MHz Date: 30.SEP.2015 12:28:45 *RBW 100 kHz Marker 4 [T1]

*VBW 300 kHz -45.85 dBm
SWT 10 ms 2.486800000 GHz And the state of t Date: 30.SEP.2015 12:26:10



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7. Number of Hopping Channel

7.1 Test Standard and Limit

6.1.1 Test Standard FCC Part 15.247 (a)(1)

6.1.2 Test Limit

Section	Test Item	Limit
15.247	Number of Hopping Channel	>15

7.2 Test Setup



7.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Spectrum Setting: RBW=100 KHz, VBW=100 KHz, Sweep time= Auto.

7.4 EUT Operating Condition

The EUT was set to the Hopping Mode by the Customer.

7.5 Test Data



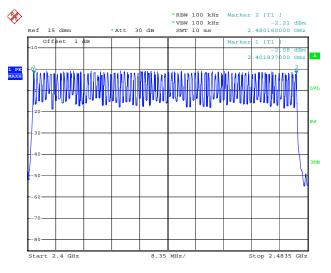
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EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V	JES THE	

Test Mode: Hopping Mode (GFSK/ 8-DPSK)

Frequency Range	Quantity of Hopping Channel	Limit	
2402MHz~2480MHz	79	>15	
Z4UZIVIMZ~Z40UIVIMZ	79		

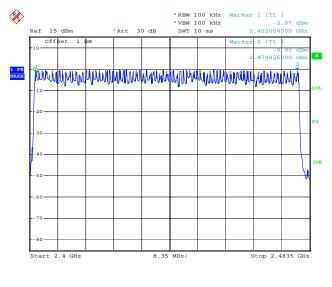
GFSK Mode



Date: 30.SEP.2015 11:26:52

Date: 30.SEP.2015 11:33:31

8-DPSK Mode





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8. Average Time of Occupancy

8.1 Test Standard and Limit

8.1.1 Test Standard FCC Part 15.247 (a)(1)

8.1.2 Test Limit

Section	Test Item	Limit
15.247(a)(1)/ RSS-210	Average Time of	0.4.000
Annex 8(A8.1d)	Occupancy	0.4 sec

8.2 Test Setup



8.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Spectrum Setting: RBW=1MHz, VBW=1MHz.
- (3) Use video trigger with the trigger level set to enable triggering only on full pulses.
- (4) Sweep Time is more than once pulse time.
- (5) Set the center frequency on any frequency would be measure and set the frequency span to zero.
- (6) Measure the maximum time duration of one single pulse.
- (7) Set the EUT for packet transmitting.
- (8) Measure the maximum time duration of one single pulse.

8.4 EUT Operating Condition

The EUT was set to the Hopping Mode by the Customer.



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8.5 Test Data

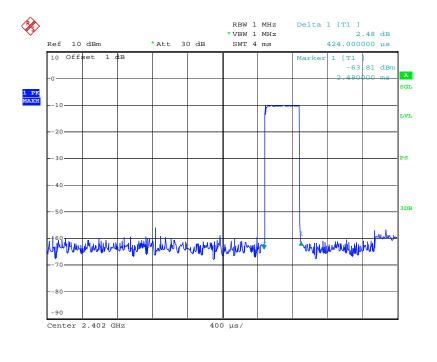
EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		A TOTAL
			The second second

Test Mode: Hopping Mode (GFSK DH1)

Channel	Pulse Time	Total of Dwell	Period Time	Limit	Result
(MHz)	(ms)	(ms)	(s)	(ms)	Nesuit
2402	0.424	135.68			
2441	0.424	135.68	31.60	400	PASS
2480	0.424	135.68			

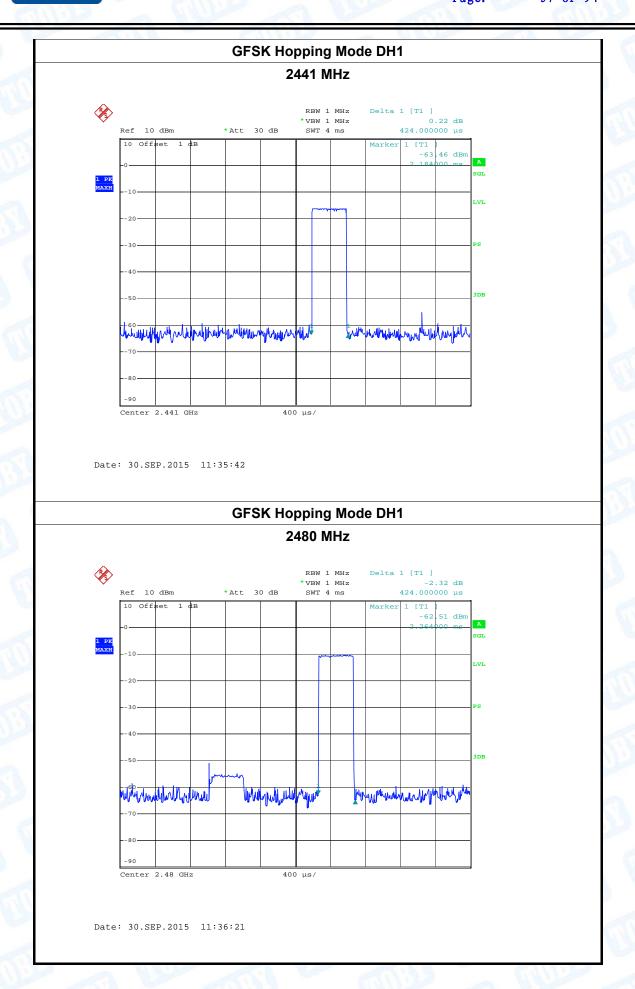
GFSK Hopping Mode DH1

2402 MHz



Date: 30.SEP.2015 11:35:03







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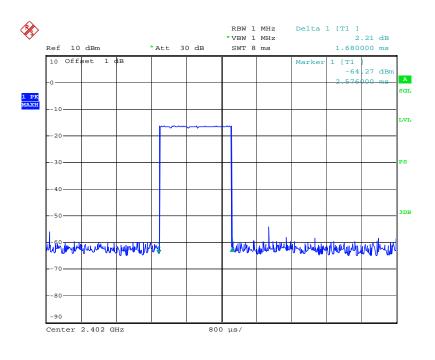
EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V	THE PERSON NAMED IN	

Test Mode: Hopping Mode (GFSK DH3)

Channel (MHz)	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
2402	1.680	268.80			
2441	1.688	270.08	31.60	400	PASS
2480	1.704	272.64			

GFSK Hopping Mode DH3

2402 MHz

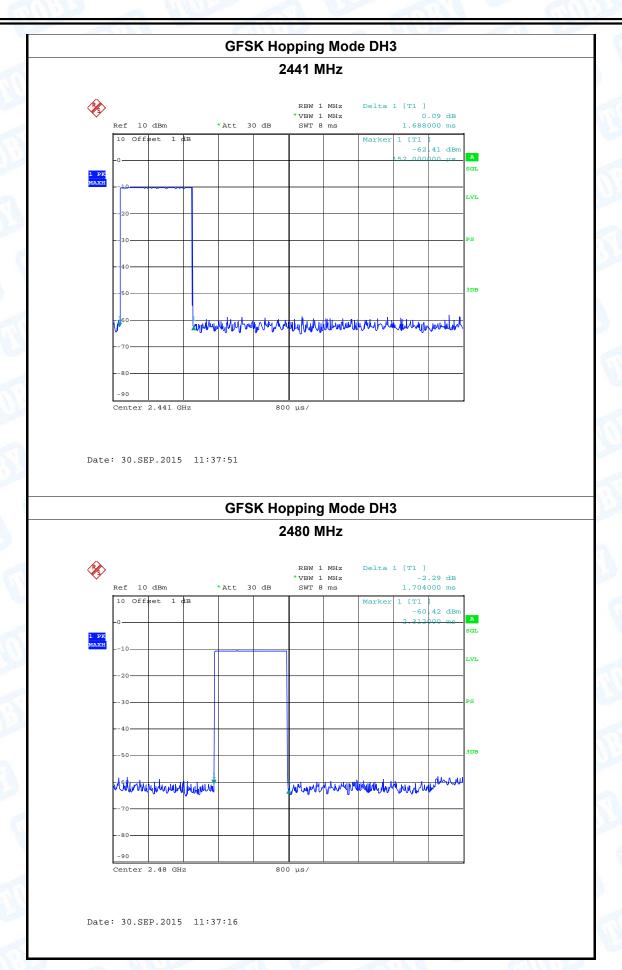


Date: 30.SEP.2015 11:38:52





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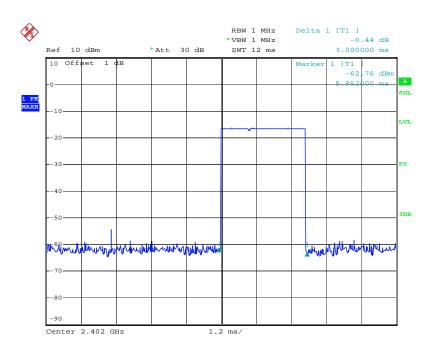
EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V	THE PARTY OF THE P	

Test Mode: Hopping Mode (GFSK DH5)

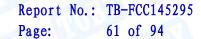
Channel (MHz)	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
2402	3.000	320.00			
2441	3.000	320.00	31.60	400	PASS
2480	2.952	314.88			

GFSK Hopping Mode DH5

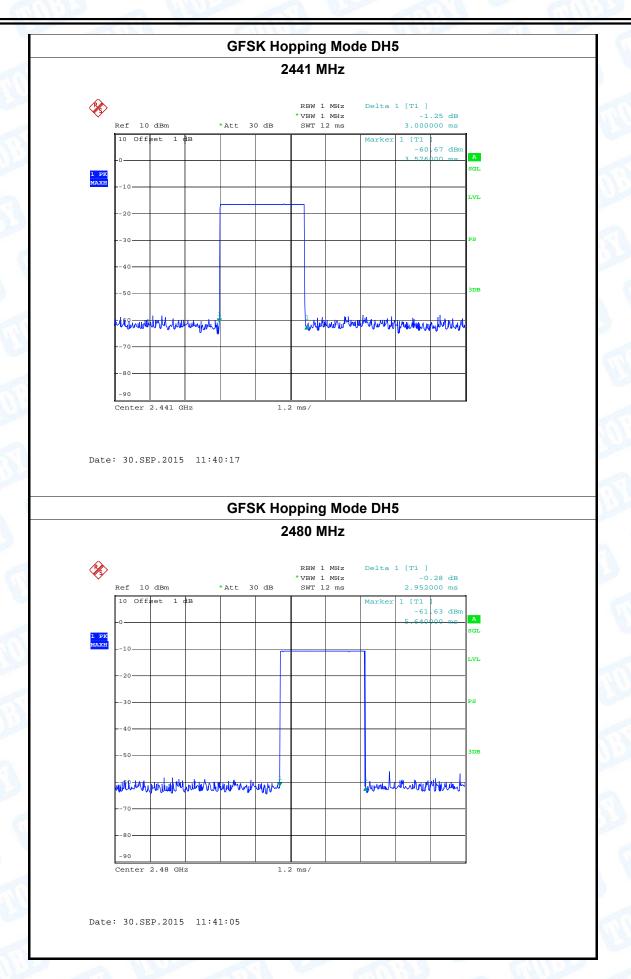
2402 MHz



Date: 30.SEP.2015 11:39:40









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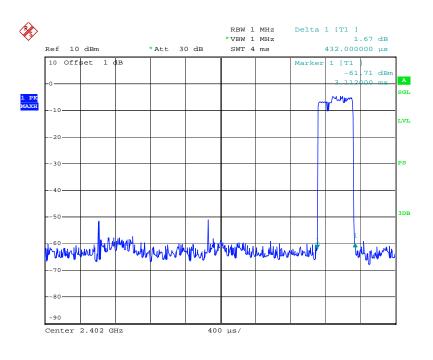
EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V	A HALL	

Test Mode: Hopping Mode (π /4-DQPSK DH1)

Channel	Pulse Time	Total of Dwell	Period Time	Limit	Result
(MHz)	(ms)	(ms)	(s)	(ms)	Result
2402	0.432	138.24			
2441	0.432	138.24	31.60	400	PASS
2480	0.432	138.24			

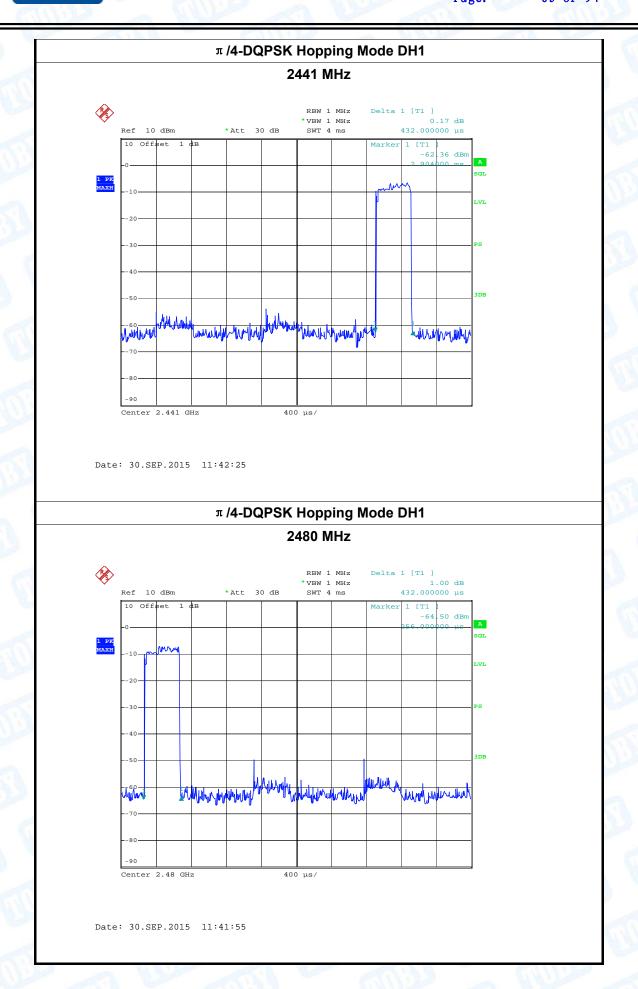
π /4-DQPSK Hopping Mode DH1

2402 MHz



Date: 30.SEP.2015 11:43:28







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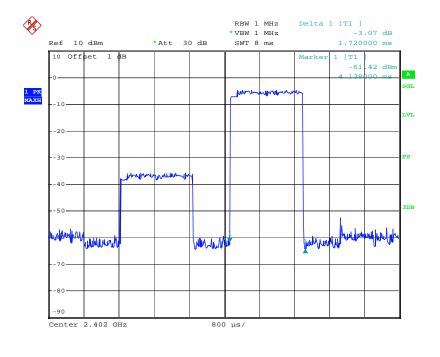
EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		

Test Mode: Hopping Mode (π /4-DQPSK DH3)

		The State and the state of the			
Channel	Pulse Time	Total of Dwell	Period Time	Limit	Result
(MHz)	(ms)	(ms)	(s)	(ms)	Result
2402	1.720	275.20			
2441	1.712	273.92	31.60	400	PASS
2480	1.712	273.92			

π /4-DQPSK Hopping Mode DH3

2402 MHz

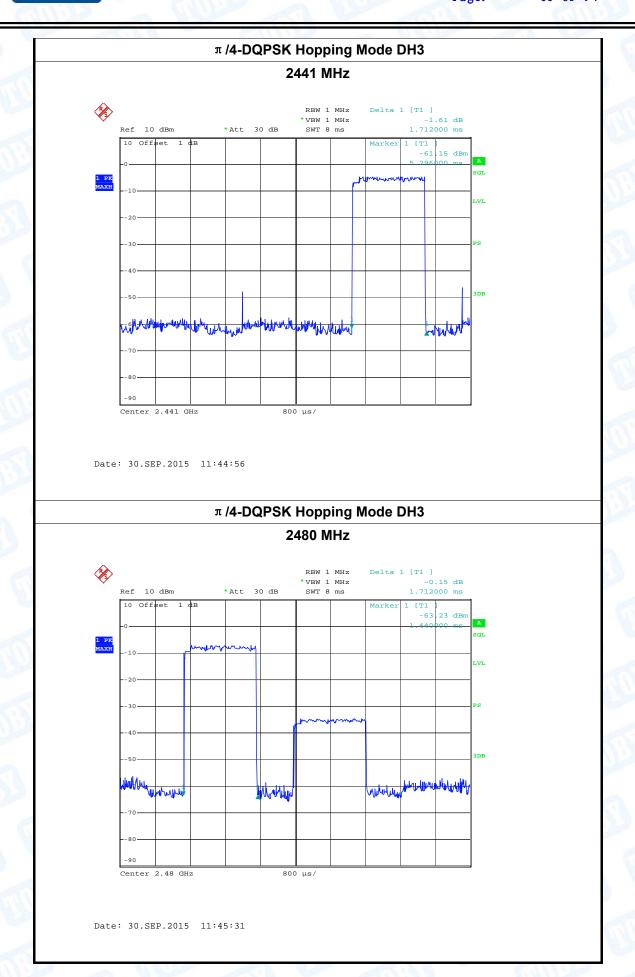


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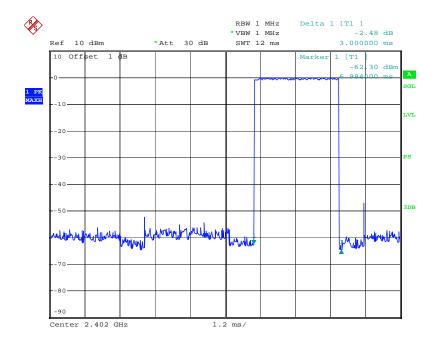
EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		

Test Mode: Hopping Mode (π /4-DQPSK DH5)

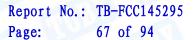
Channel	Pulse Time	Total of Dwell	Period Time	Limit	Result
(MHz)	(ms)	(ms)	(s)	(ms)	Result
2402	3.000	320.00			
2441	3.000	320.00	31.60	400	PASS
2480	3.000	320.00			

π /4-DQPSK Hopping Mode DH5

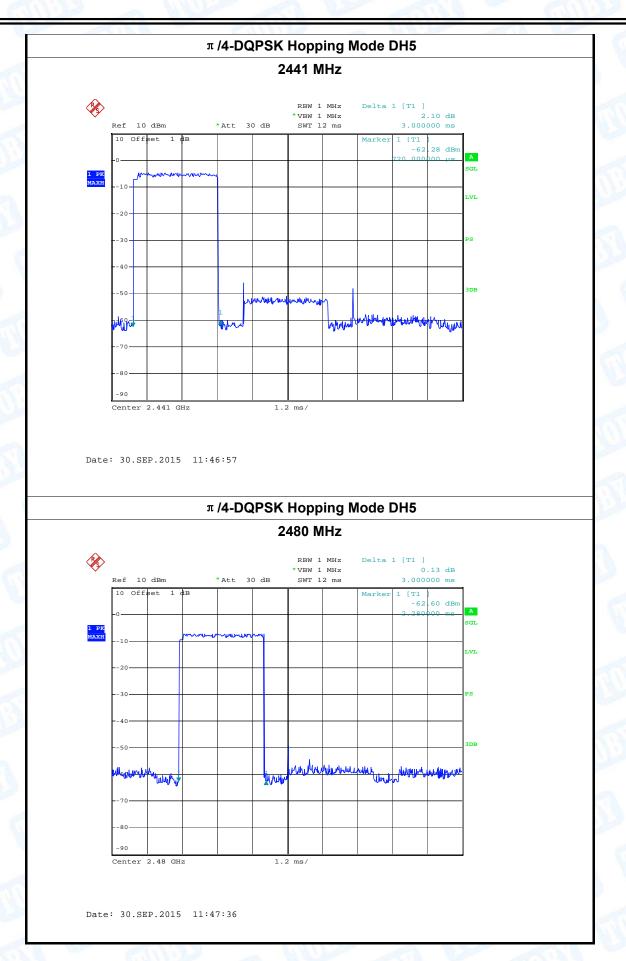
2402 MHz



Date: 30.SEP.2015 11:46:20









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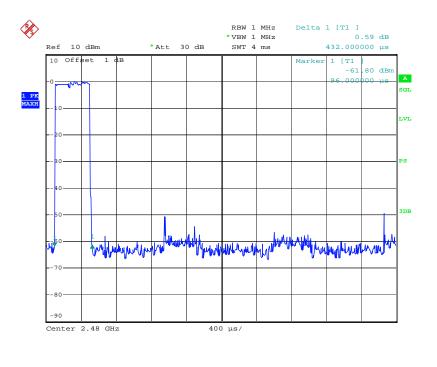
EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		

Test Mode: Hopping Mode (8-DPSK DH1)

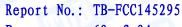
Channel (MHz)	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
2402	0.432	138.24			
2441	0.432	138.24	31.60	400	PASS
2480	0.432	138.24			

8-DPSK Hopping Mode DH1

2402 MHz

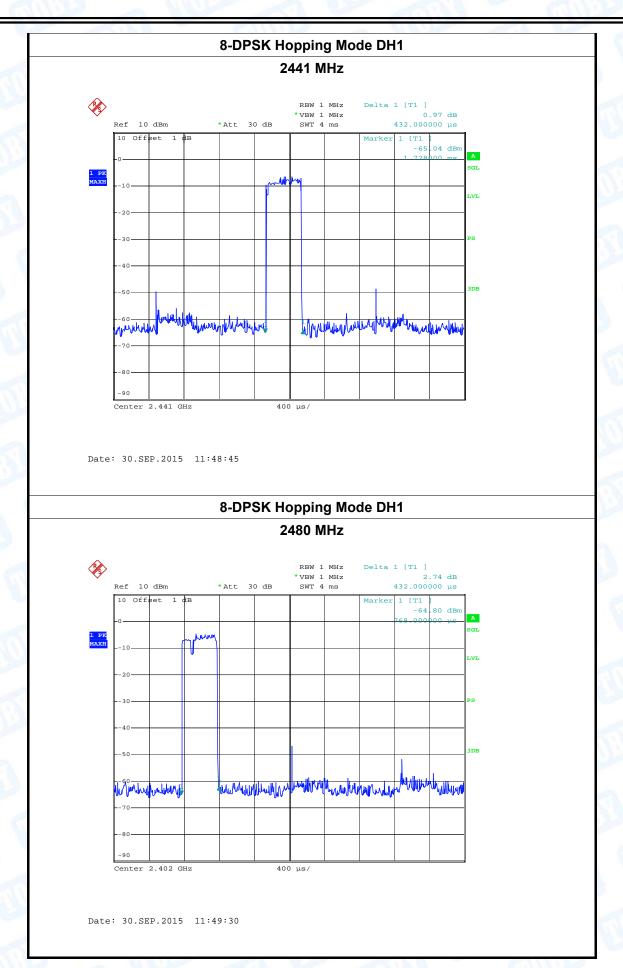


Date: 30.SEP.2015 11:48:10





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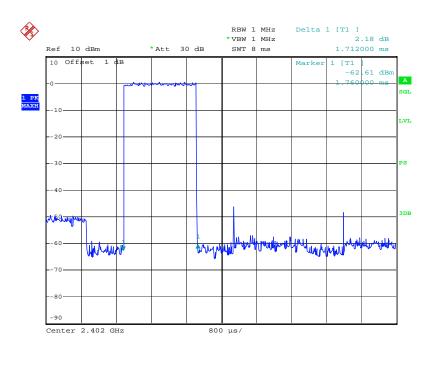
EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V	D WILL	

Test Mode: Hopping Mode (8-DPSK DH3)

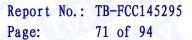
Channel (MHz)	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
2402	1.712	273.92			
2441	1.712	273.92	31.60	400	PASS
2480	1.712	273.92			

8-DPSK Hopping Mode DH3

2402 MHz



Date: 30.SEP.2015 11:50:30





8-DPSK Hopping Mode DH3 2441 MHz RBW 1 MHz 2.64 dB 1.712000 ms *VBW 1 MHz SWT 8 ms Ref 10 dBm *Att 30 dB 10 Offset 1 dB white numun Center 2.441 GHz 800 µs/ Date: 30.SEP.2015 11:51:16 8-DPSK Hopping Mode DH3 2480 MHz Delta 1 [T1] RBW 1 MHz *VBW 1 MHz 1.712000 ms Ref 10 dBm *Att 30 dB SWT 8 ms Marker 1 [T1 -63 80 dBr



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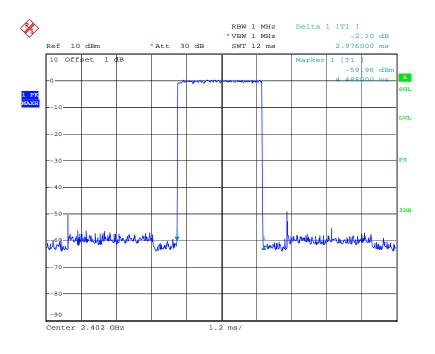
EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		

Test Mode: Hopping Mode (8-DPSK DH5)

Channel	Pulse Time	Total of Dwell	Period Time	Limit	
(MHz)	(ms)	(ms)	(s)	(ms)	Result
2402	2.976	317.44			
2441	2.976	317.44	31.60	400	PASS
2480	2.976	317.44			

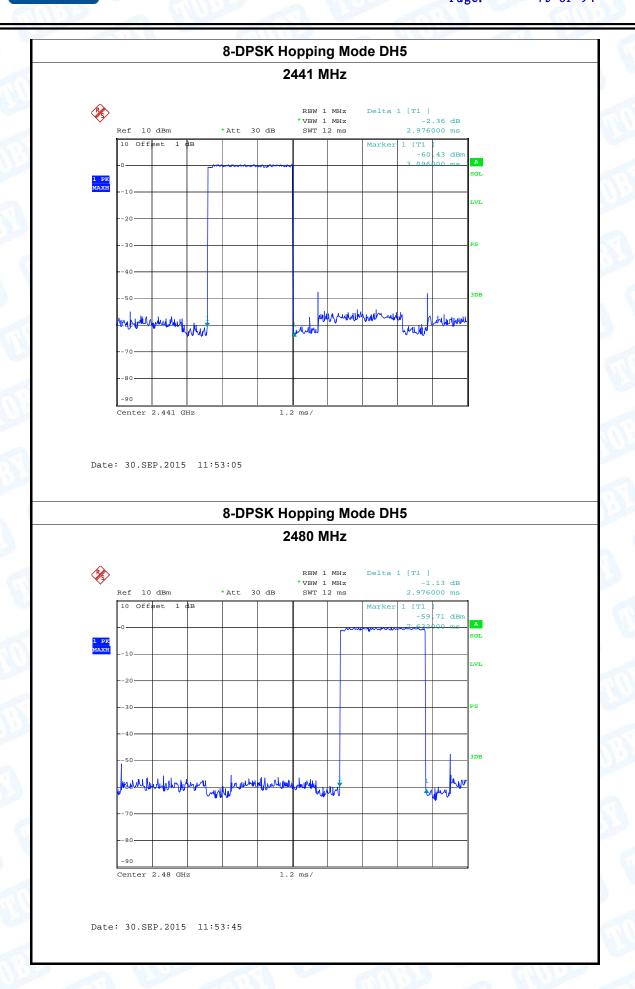
8-DPSK Hopping Mode DH5

2402 MHz



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9. Channel Separation and Bandwidth Test

9.1 Test Standard and Limit

9.1.1 Test Standard FCC Part 15.247

9.1.2 Test Limit

Test Item	Limit	Frequency Range(MHz)
Bandwidth	<=1 MHz (20dB bandwidth)	2400~2483.5
Channel Separation	>25KHz or >two-thirds of the 20 dB bandwidth Which is greater	2400~2483.5

9.2 Test Setup



9.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Spectrum Setting:

Channel Separation: RBW=30 kHz, VBW=100 kHz.

Bandwidth: RBW=30 kHz, VBW=100 kHz.

- (3) The bandwidth is measured at an amplitude level reduced 20dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst –case (i.e the widest) bandwidth.
 - (4) Measure the channel separation the spectrum analyzer was set to Resolution Bandwidth:30 kHz, and Video Bandwidth:100 kHz. Sweep Time set auto.

9.4 EUT Operating Condition

The EUT was set to the Hopping Mode for Channel Separation Test and continuously transmitting for the Bandwidth Test.



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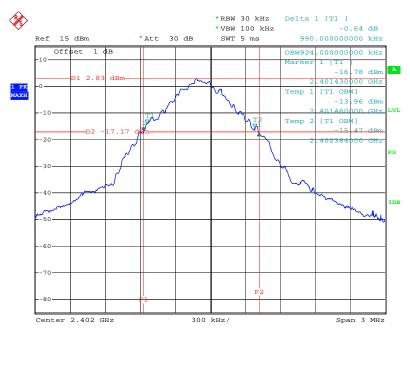
9.5 Test Data

EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V	COLUMN TO THE PARTY OF THE PART	- WULL
Test Mode:	TX Mode (GFSK)		

Channel frequency (MHz)	99% OBW (kHz)	20dB Bandwidth (kHz)	20dB Bandwidth *2/3 (kHz)
2402	924.00	990.00	
2441	924.00	990.00	
2480	918.00	990.00	

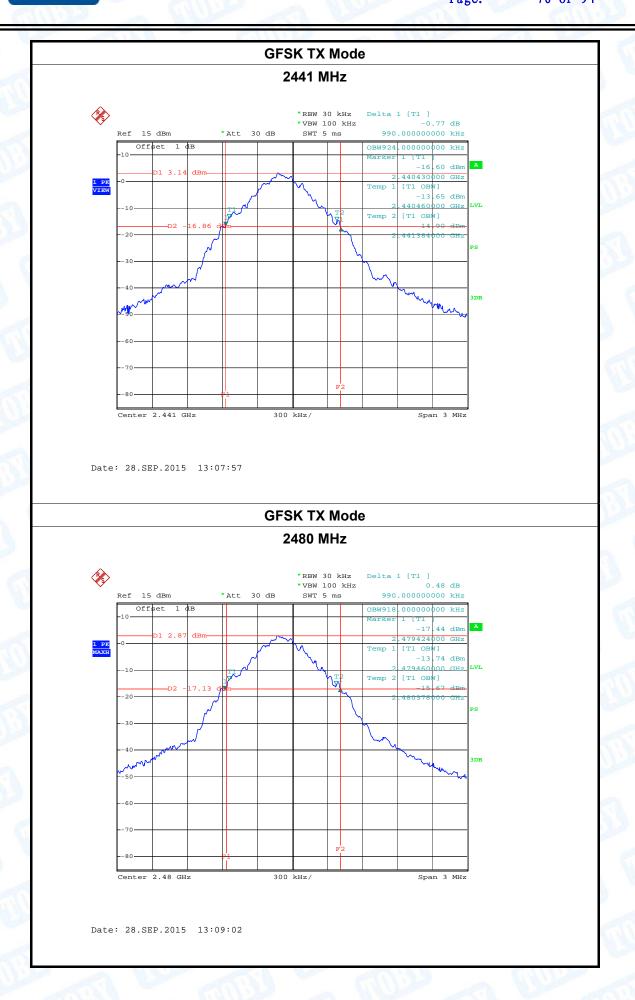
GFSK TX Mode

2402 MHz



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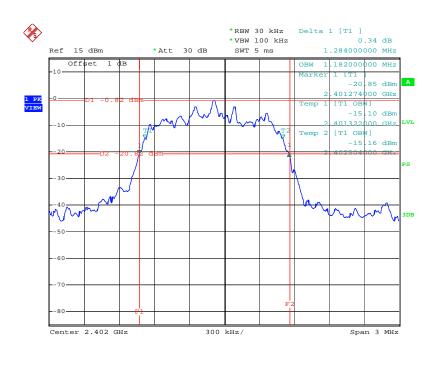
EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		

Test Mode: ΤΧ Mode (π /4-DQPSK)

Channel frequency (MHz)	99% OBW (kHz)	20dB Bandwidth (kHz)	20dB Bandwidth *2/3 (kHz)
2402	1182.00	1284.00	856.00
2441	1188.00	1272.00	848.00
2480	1188.00	1284.00	856.00

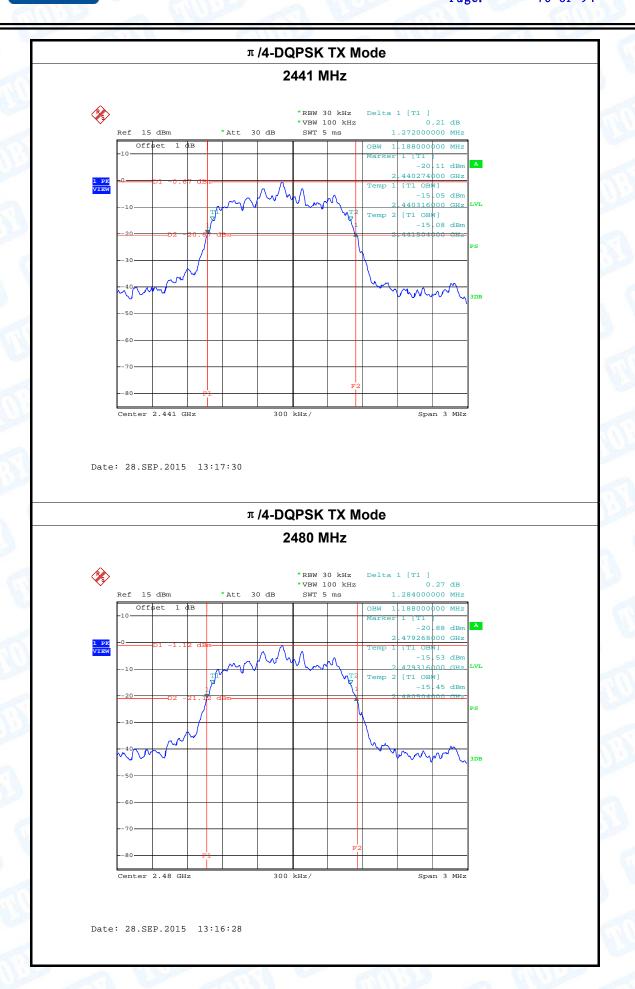
π/4-DQPSK TX Mode

2402 MHz



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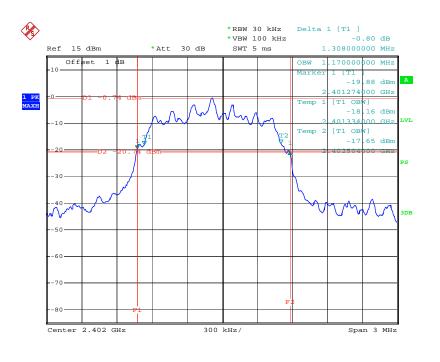


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EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		
Test Mode:	TX Mode (8-DPSK)		

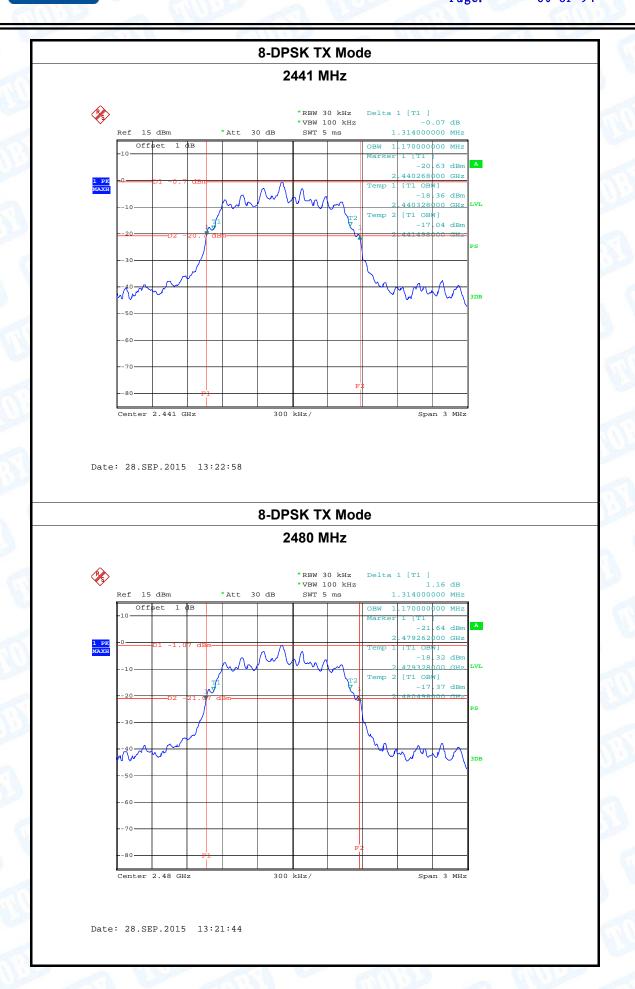
		A CALL OF A PARTY	
Channel frequency	99% OBW	20dB Bandwidth	20dB
(MHz)	(kHz)	(kHz)	Bandwidth *2/3
			(kHz)
2402	1170.00	1308.00	872.00
2441	1170.00	1314.00	876.00
2480	1170.00	1314.00	876.00

8-DPSK TX Mode 2402 MHz



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2480

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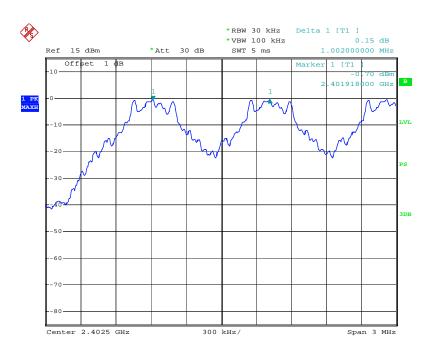
990.00

EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		(3)
Test Mode:	Hopping Mode (GFSK)	IN THE	

rest wode.	1 lopping i	viode (Gi Git)	
Channel frequency (MHz)		Separation Read Value	Separation Limit (kHz)
		(kHz)	
2402		1002.00	990.00
2441		1002.00	990.00

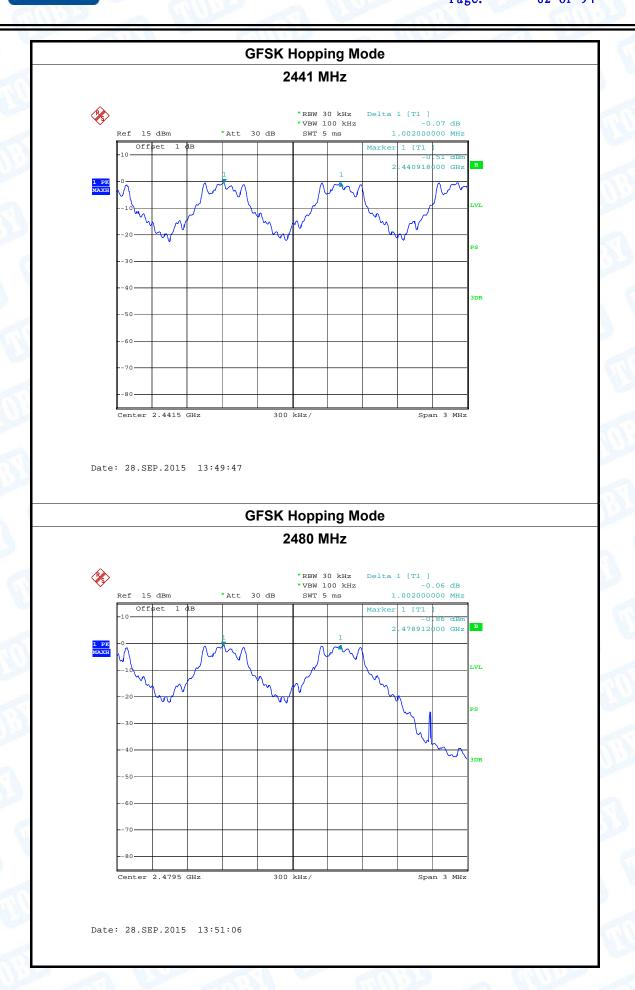
1002.00 GFSK Hopping Mode

2402 MHz



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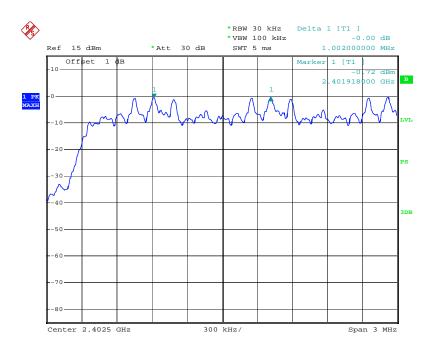
EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V	THE PARTY OF THE P	

Test Mode: Hopping Mode (π /4-DQPSK)

Channel frequency (MHz)	Separation Read Value	Separation Limit (kHz)
	(kHz)	
2402	1002.00	856.00
2441	1002.00	848.00
2480	1002.00	856.00

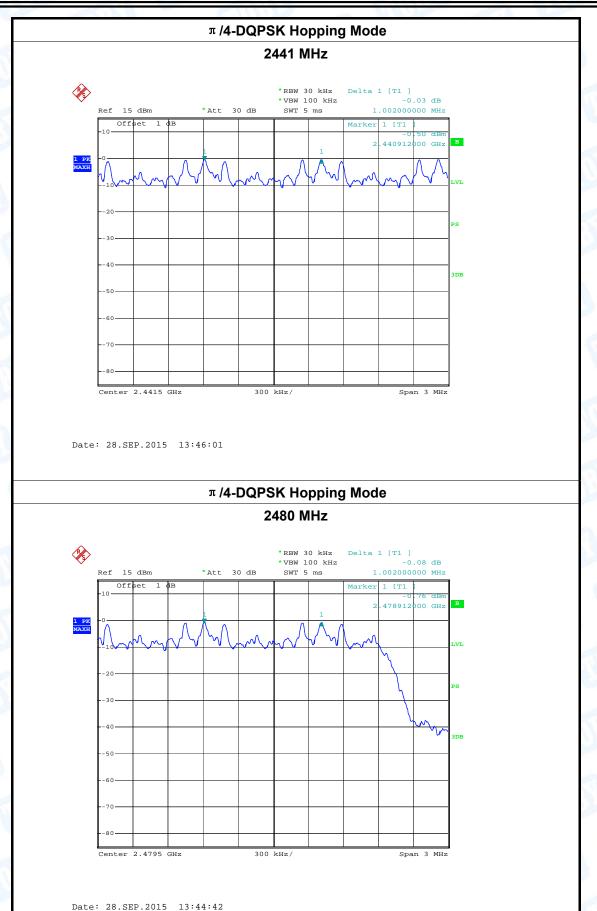
π /4-DQPSK Hopping Mode

2402 MHz



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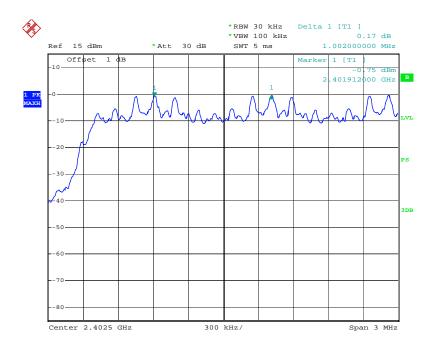
EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V	D MILLS	

Test Mode: Hopping Mode (8-DPSK)

Channel frequency (MHz)	Separation Read Value	Separation Limit (kHz)
	(kHz)	
2402	1002.00	872.00
2441	1002.00	876.00
2480	1002.00	876.00

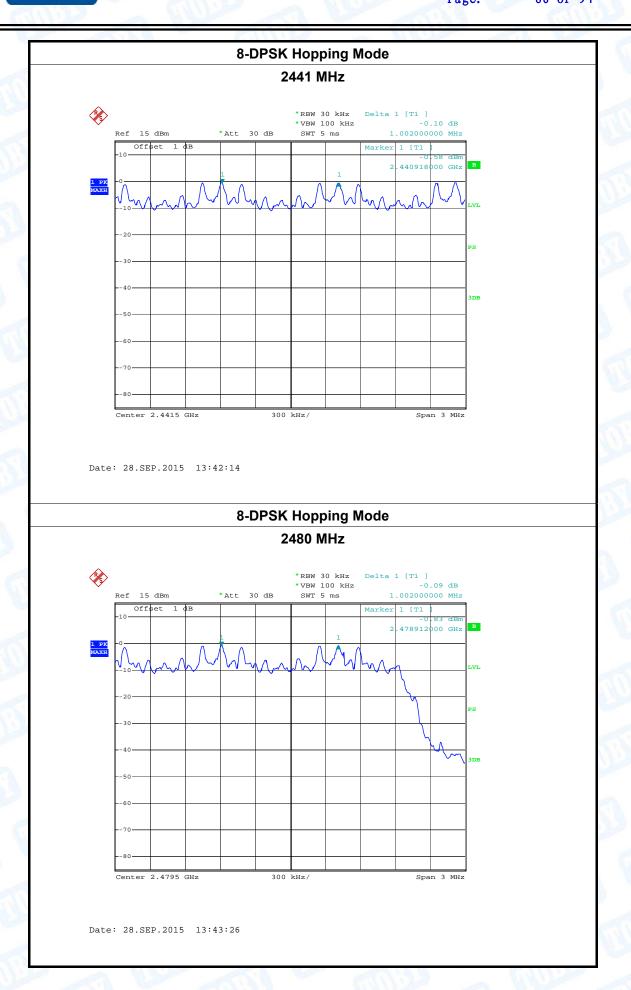
8-DPSK Hopping Mode

2402 MHz



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10. Peak Output Power Test

10.1 Test Standard and Limit

10.1.1 Test Standard FCC Part 15.247 (b) (1)

10.1.2 Test Limit

Test Item	Limit	Frequency Range(MHz)
Peak Output Power	Hopping Channels>75 Power<1W(30dBm) Other <125 mW(21dBm)	2400~2483.5

10.2 Test Setup



10.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Spectrum Setting:

Peak Detector: RBW=1 MHz, VBW=3 MHz for bandwidth less than 1MHz. RBW=3 MHz, VBW=3 MHz for bandwidth more than 1MHz.

10.4 EUT Operating Condition

The EUT was set to continuously transmitting in the max power during the test.

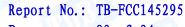


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10.5 Test Data

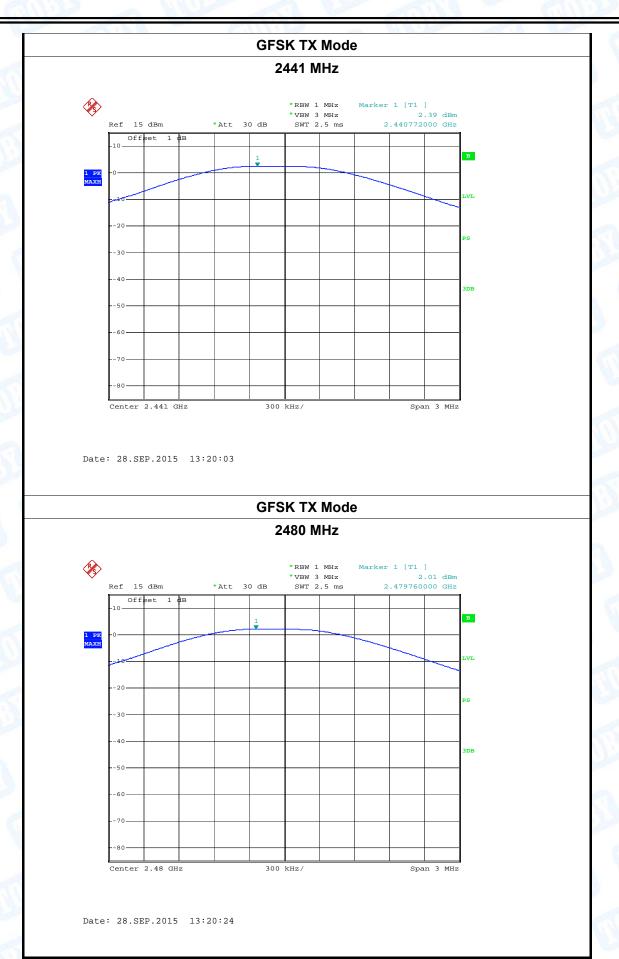
EUT:	Wearable Speaker	Outdoor S	ports	Model	Name :	F20
Temperature:	25 ℃	11111		Relativ	e Humidity:	55%
Test Voltage:	DC 3.7V			112		
Test Mode:	TX Mode	(GFSK)	11000		MAG	
Channel freque	ncy (MHz)	Test	Result (d	Bm)	Lim	it (dBm)
2402			2.25			
2441			2.39			30
2480			2.01			
		056				
			SK TX Mo 2402 MHz			
Ref 1	.5 dBm			Marker	1 [T1] 2.25 dBm .401736000 GH2	
Of	5 dBm føet 1 dB	2	*RBW 1 MHZ	Marker	2.25 dBm	
		2	*RBW 1 MHZ	Marker	2.25 dBm	
Of		2	*RBW 1 MHZ	Marker	2.25 dBm .401736000 GHz	
Of -10 -0		2	*RBW 1 MHZ	Marker	2.25 dBm .401736000 GHz	
1 PK -0		2	*RBW 1 MHZ	Marker	2.25 dBm .401736000 GHz	
Of -10 -0 -0		2	*RBW 1 MHZ	Marker	2.25 dBm .401736000 GHz	
Of -10 -0 -0		2	*RBW 1 MHZ	Marker	2.25 dBm .401736000 GHz	
об -10 — -0 — -0 —20 —30 —30 —		2	*RBW 1 MHZ	Marker	2.25 dBm .401736000 GHz	

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EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20
Temperature:	25 ℃	Relative Humidity:	55%
Toet Voltago:	DC 3.7V	# 30 E #	

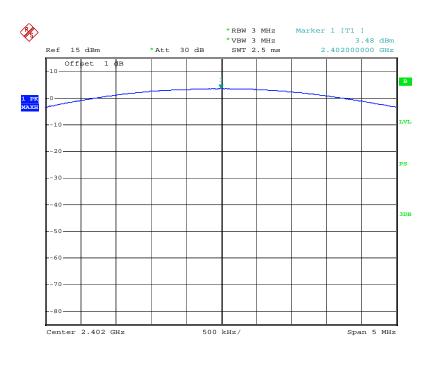
Test Voltage: DC 3.7V

Test Mode: TX Mode (π /4-DQPSK)

Channel frequency (MHz)	Test Result (dBm)	Limit (dBm)
2402	3.48	
2441	3.61	21
2480	3.10	

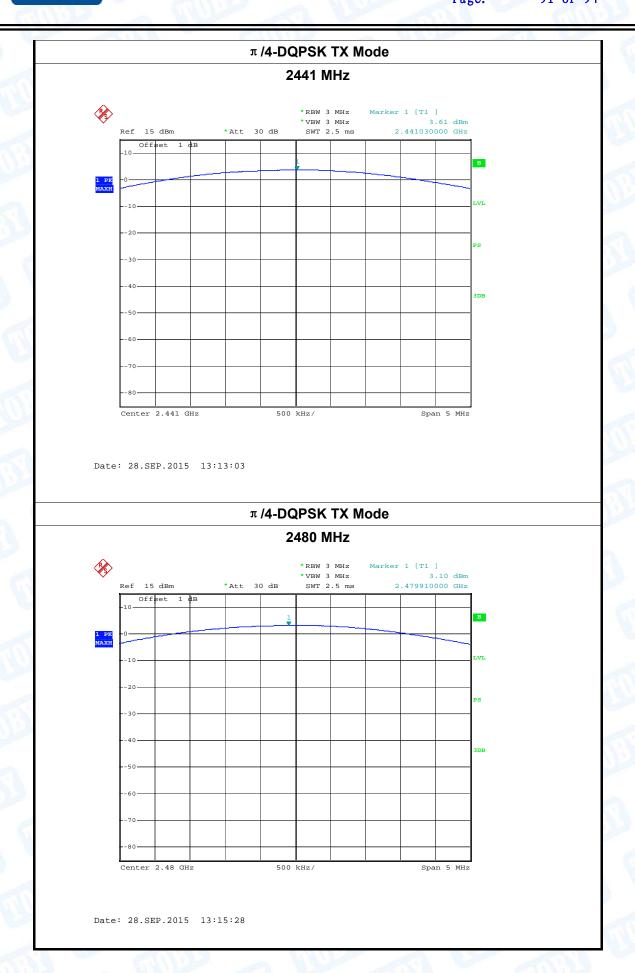
π /4-DQPSK TX Mode

2402 MHz



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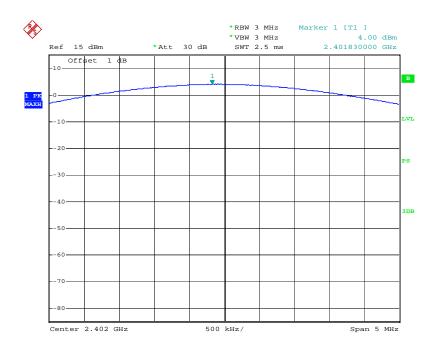
EUT:	Wearable Outdoor Sports Speaker	Model Name :	F20
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		

Test Mode: TX Mode (8-DPSK)

Channel frequency (MHz)	Test Result (dBm)	Limit (dBm)
2402	4.00	
2441	3.96	21
2480	3.44	

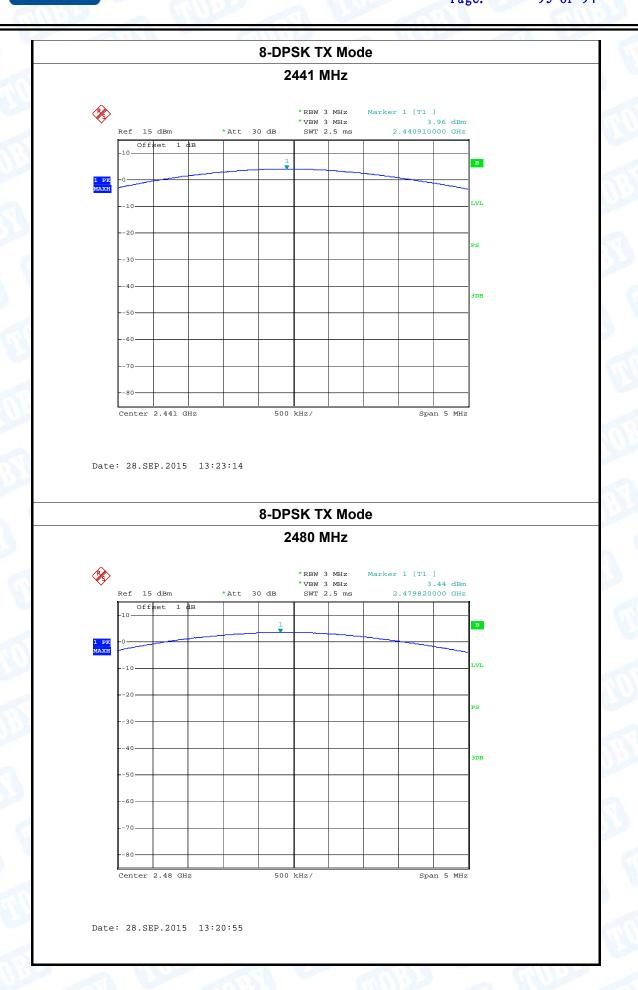
8-DPSK TX Mode

2402 MHz



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11. Antenna Requirement

11.1 Standard Requirement

11.1.1 Standard FCC Part 15.203

11.1.2 Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

11.2 Antenna Connected Construction

The directional gains of the antenna used for transmitting is 0 dBi, and the antenna connector is de-signed with permanent attachment and no consideration of replacement. Please see the EUT photo for details.

The EUT antenna is a PCB antenna. It complies with the standard requirement.

	Antenna Type
a w	▶ Permanent attached antenna
	□ Unique connector antenna
100	☐ Professional installation antenna