

# Shenzhen Toby Technology Co., Ltd.

Report No.: TB-FCC142365
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# FCC Radio Test Report FCC ID: 2ABHA7123-04

# **Original Grant**

Report No. : TB-FCC142365

**Applicant**: NINGBO CSTAR IMP&EXP CO., LTD.

**Equipment Under Test (EUT)** 

**EUT Name**: Mobile Odyssey Duke Waterproof Bluetooth Speaker

**Model No.** : 7123-04

Series Model : N/A

No.

**Receipt Date** : 2014-10-28

**Test Date** : 2014-10-28 to 2014-11-05

**Issue Date** : 2014-11-05

Standards : FCC Part 15: 2014, Subpart C(15.247)

Test Method : ANSI C63.4:2003

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**: NINGBO CSTAR IMP&EXP CO., LTD.

Address : Floor 4, Building E, No. 655-90, Qiming Road, Yinzhou Investment &

Innovation Center, Ningbo, China.

Manufacturer: NINGBO CSTAR IMP&EXP CO., LTD.

Address : Floor 4, Building E, No. 655-90, Qiming Road, Yinzhou Investment &

Innovation Center, Ningbo, China.

# 1.2 General Description of EUT (Equipment Under Test)

EUT Name	:	Mobile Odyssey Duke Waterproof Bluetooth Speaker		
Models No.	:	7123-04		
Model	:	N/A		
Difference				
		Operation Frequency:		
		Bluetooth:2402~2480MHz		
Product		Number of Channel:	Bluetooth:79 Channels see note (2)	
Description	:	Max Peak Output Power:	8-DPSK: 2.661dBm (Conducted Power)	
		Antenna Gain:	0 dBi PCB Antenna	
		Modulation Type:	GFSK 1Mbps(1 Mbps)	
			π /4-DQPSK(2 Mbps)	
			8-DPSK(3 Mbps)	
Power Supply	:	DC Voltage supplied from	Host System by USB cable	
		DC power by 400mA Li-ion Battery		
Power Rating	:	DC 5.0V by USB cable.		
		DC 3.7V Li-ion Battery.		
Connecting I/O	:	Please refer to the User's Manual		
Port(S)				
Note:	Note:			

#### Note:

- (1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- (2) This Test Report is FCC Part 15.247 for Bluetooth, and test procedure in accordance with Public Notice: DA 00-705.
- (3) Channel List:



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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		
26	2428	53	2455		

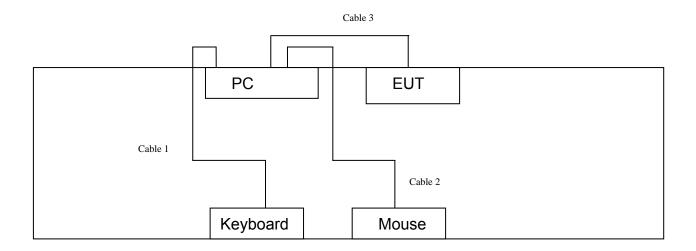
<sup>(4)</sup> The Antenna information about the equipment is provided by the applicant.



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# 1.3 Block Diagram Showing the Configuration of System Tested

#### TX Mode



# 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	√	
Mouse	M-UARDEL7	DOC	DELL	√	
		Cable Information			
Number	Shielded Type	Ferrite Core	Length	Note	
Cable 1	YES	NO	1.5M		
Cable 2	YES	NO	1.5M		
Cable 3	NO	NO	0.8M	Accessories	

# 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.



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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( IT /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 C63.4 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: 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.

## 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	Bluetooth Authentication Test Tool v1.3.3-CE/FCC		
Frequency	2402 MHz	2441MHz	2480 MHz
GFSK	DEF	DEF	DEF
π /4-DQPSK	DEF	DEF	DEF
8-DPSK	DEF	DEF	DEF



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## 1.7 Test Facility

The testing was 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.



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# 2. Test Summary

FCC Part 15 Subpart C(15.247)				
Standard Section	Test Item	Judgment	Remark	
15.203	Antenna Requirement	PASS	N/A	
15.207	Conducted Emission	PASS	N/A	
15.205	Restricted Bands	PASS	N/A	
15.247(a)(1)	Hopping Channel Separation	PASS	N/A	
15.247(a)(1)	Dwell Time	PASS	N/A	
15.247(b)(1)	Peak Output Power	PASS	N/A	
15.247(b)(1)	Number of Hopping Frequency	PASS	N/A	
15.247(c)	Radiated Spurious Emission	PASS	N/A	
15.247(c)	Antenna Conducted Spurious Emission	PASS	N/A	
15.247(a)	20dB Bandwidth	PASS	N/A	
Note: N/A is an abbreviat	ion for Not Applicable.			



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# 3. Conducted Emission Test

#### 3.1 Test Standard and Limit

3.1.1Test Standard FCC Part 15.207

#### 3.1.2 Test Limit

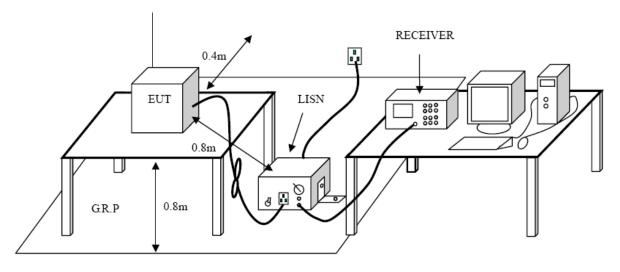
#### **Conducted Emission Test Limit**

Eroguanov	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.

# 3.2 Test Setup



#### 3.3 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.

# 3.4 Test Equipment Used

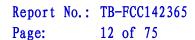
Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
EMI Test	ROHDE&		400004	Aug. 09. 2014	Aug 07, 2015
Receiver	SCHWARZ	ESCI	100321	Aug. 08, 2014	Aug.07, 2015
50ΩCoaxial	Anritsu	MP59B	X10321	Aug. 08, 2014	Aug.07, 2015
Switch	Annisu	MIPSSP	X10321	Aug. 06, 2014	Aug.07, 2015
L.I.S.N	Rohde & Schwarz	ENV216	101131	Aug. 08, 2014	Aug.07, 2015
L.I.S.N	SCHWARZBECK	NNBL 8226-2	8226-2/164	Aug. 08, 2014	Aug.07, 2015

# 3.5 EUT Operating Mode

Please refer to the description of test mode.

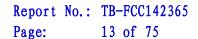
#### 3.6 Test Data

Please see the next page.





EUT: Mobile Odyssey Duke 7123-04 **Model Name:** Waterproof Bluetooth Speaker 25 ℃ 55% Temperature: Relative Humidity: AC 120V/60 Hz **Test Voltage:** Terminal: Line **Test Mode:** USB Charging with TX GFSK Mode 2402 MHz Remark: Only worse case is reported 90 N dRuV QP: AVG: AVG -10 0.150 0.5 (MHz) 30.000 Reading Correct Measure-Limit Over No. Mk. Freq. Level Factor ment dBuV MHz dB dBuV dBuV dB Detector 0.2100 38.04 10.02 48.06 63.20 -15.14 QΡ 1 2 0.2100 34.70 10.02 44.72 53.20 -8.48 AVG 3 0.5780 32.94 10.06 43.00 56.00 -13.00 QΡ 0.5780 25.54 AVG 4 10.06 35.60 46.00 -10.40 QP 5 0.9700 28.62 10.07 56.00 -17.31 38.69 0.9700 22.27 10.07 32.34 46.00 -13.66 AVG 6 25.55 QΡ 7 2.2060 10.05 35.60 56.00 -20.40 8 2.2060 22.07 10.05 32.12 46.00 -13.88 AVG 24.62 9.99 56.00 -21.39 QΡ 9 4.0900 34.61 10 AVG 4.0900 20.83 9.99 30.82 46.00 -15.18 21.57 QΡ 11 24.1340 10.16 31.73 60.00 -28.27 AVG 12 24.1340 8.86 10.16 19.02 50.00 -30.98 **Emission Level= Read Level+ Correct Factor** 





EUT: Mobile Odyssey Duke 7123-04 **Model Name:** Waterproof Bluetooth Speaker 25 ℃ Temperature: Relative Humidity: 55% AC 120V/60 Hz **Test Voltage:** Terminal: Neutral **Test Mode:** USB Charging with TX GFSK Mode 2402 MHz Remark: Only worse case is reported 90.0 dBuV ΩP-AVG: AVG -10 (MHz) 0.150 30.000 Reading Correct Measure-Limit Over No. Mk. Freq. Level Factor ment dBuV MHz dB dBuV dBuV dΒ Detector 0.1700 36.13 10.12 64.96 -18.71 1 46.25 QΡ 2 0.1700 32.80 10.12 42.92 54.96 -12.04 AVG 3 0.2100 34.19 10.12 44.31 63.20 -18.89 QΡ 4 0.2100 31.60 10.12 41.72 53.20 -11.48 AVG QP 5 0.2779 26.02 10.09 60.88 -24.77 36.11 0.2779 20.38 6 10.09 30.47 50.88 -20.41 AVG 7 0.5780 34.67 10.02 44.69 56.00 -11.31 QΡ 27.28 37.30 46.00 -8.70 AVG 8 0.5780 10.02 QΡ 9 1.5940 27.36 10.10 37.46 56.00 -18.54 AVG 10 21.68 10.10 31.78 46.00 -14.22 1.5940 2.2060 25.68 10.06 35.74 56.00 -20.26 QΡ 11 2.2060 22.42 32.48 46.00 -13.52 AVG 12 10.06 **Emission Level= Read Level+ Correct Factor** 



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# 4. Radiated Emission Test

# 4.1 Test Standard and Limit

4.1.1 Test Standard FCC Part 15.209

4.1.2 Test Limit

#### Radiated Emission Limit (9 kHz~1000MHz)

h	Radiated Linission Linit (3 Kitz 1000Mitz)				
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

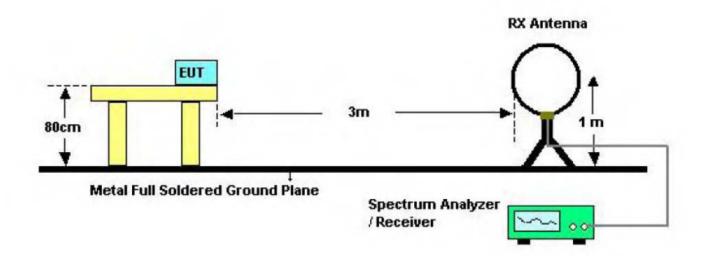
#### Note:

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

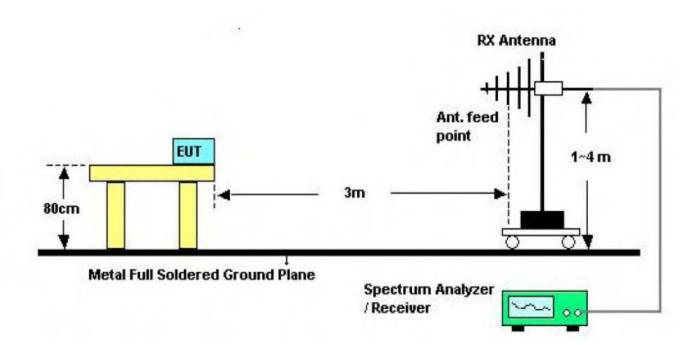


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# 4.2 Test Setup



Bellow 30MHz Test Setup



Bellow 1000MHz Test Setup



Turntable

EUT

0.8 m lm to 4m

Coaxial Cable

Above 1GHz Test Setup

#### 4.3 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 the ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- (2) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- (3) 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.
- (4) 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.
- (5) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
- (6) 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.
- (7) For the actual test configuration, please see the test setup photo.

# 4.4 EUT Operating Condition

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



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# 4.5 Test Equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Mar. 20, 2014	Mar. 19, 2015
Spectrum Analyzer	Rohde & Schwarz	FSP30	DE25181	Aug. 08, 2014	Aug.07, 2015
EMI Test Receiver	Rohde & Schwarz	ESCI	101165	Aug. 08, 2014	Aug.07, 2015
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar. 07, 2014	Mar.06, 2015
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar. 07, 2014	Mar.06, 2015
Pre-amplifier	HP	11909A	185903	Mar. 07, 2014	Mar.06, 2015
Pre-amplifier	HP	8447B	3008A00849	Mar. 07, 2014	Mar.06, 2015
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar. 07, 2014	Mar.06, 2015
Signal Generator	Rohde & Schwarz	SML03	IKW682-054	Feb. 11, 2014	Feb.10, 2015
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A

#### 4.6 Test Data

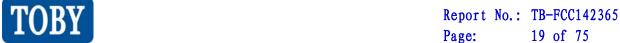
Remark: During testing above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.

Test data please refer the following pages.



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EUT:	Mobile Ody	ssey Duke			7400.04	
	Waterproof	Bluetooth Speak	er Mc	del Name :	7123-04	
Temperature:	25 ℃		Re	lative Humidity	: 55%	
Test Voltage:	DC 5V					
Ant. Pol.	Horizontal					
Test Mode:	TX GFSK N	lode 2402MHz				
Remark:	Only worse	case is reported				
80.0 dBuV/m						
				(RF)FCC 15C	3M Radiation	
					Margin -6 dB	
	1					
30	Ä	2	_	4 5 X	The state of the s	
No.		2 X	3 X	Harrist Land Commission of the Land Commission of the Commission o	grade agent	
a secretario de la properta de la constanta de	Mary Mary	yanganga lamang	h. M. A.	Mach		
The state of the s						
30.000 40 50	60 70 80	(MHz)		300 400 500	600 700 1000.0	00
No. Mk. Fr	Rea eq. Le	-	Measu men		Over	
	Hz dB		dBuV		dB Detect	or
1 * 71.8	320 55.	05 -23.56	31.4	9 40.00	-8.51 pea	k
2 143.8	3295 43.	75 -21.67	22.0	8 43.50	-21.42 pea	k
3 204.2	2377 41.	67 -20.20	21.4	7 43.50	-22.03 pea	k
4 287.9	9904 43.	37 -17.32	26.0	5 46.00	-19.95 pea	k
5 533.8	3321 36.	42 -10.14	26.2	8 46.00	-19.72 pea	k
6 696.8	3567 37.	17 -6.95	30.2	2 46.00	-15.78 pea	k
*:Maximum data x:O	ver limit !:over	margin				
viaxiiiiuiii data X.O	*C. IIIIII :.0VEI	margin				
Emission Level=	Read Level+	Correct Factor	•			

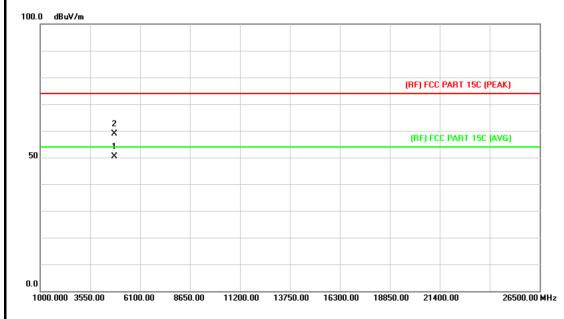


EUT: Mobile Odyssey Duke 7123-04 **Model Name:** Waterproof Bluetooth Speaker Temperature: 25 ℃ 55% **Relative Humidity:** DC 5V **Test Voltage:** Ant. Pol. Vertical **Test Mode:** TX GFSK Mode 2402MHz Remark: Only worse case is reported dBuV/m 80.0 (RF)FCC 15C 3M Radiation Margin -6 dB 30 -20 30.000 (MHz) 600 700 1000.000 Reading Correct Measure-Limit Over No. Mk. Freq. Level Factor ment MHz dBuV dΒ dBuV/m dBuV/m Detector dB/m 1 35.6240 40.23 -17.45 22.78 40.00 -17.22peak 2 71.8320 56.80 -23.56 33.24 -6.76 40.00 peak 3 119.8556 41.71 -22.50 19.21 43.50 -24.29 peak 4 143.8295 45.23 -21.67 23.56 43.50 -19.94 peak 5 204.2377 42.67 -20.20 22.47 43.50 -21.03 peak 6 625.0780 41.17 -8.51 32.66 46.00 -13.34 peak \*:Maximum data x:Over limit !:over margin **Emission Level= Read Level+ Correct Factor** 



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EUT:	Mobile Odyssey Duke Waterproof Bluetooth Speaker	Model Name :	7123-04			
Temperature:	<b>25</b> ℃	Relative Humidity: 55%				
Test Voltage:	DC 3.7V					
Ant. Pol.	Horizontal					
Test Mode:	TX GFSK Mode 2402MHz					
Remark:	No report for the emission which n	No report for the emission which more than 10 dB below the				
	prescribed limit.					

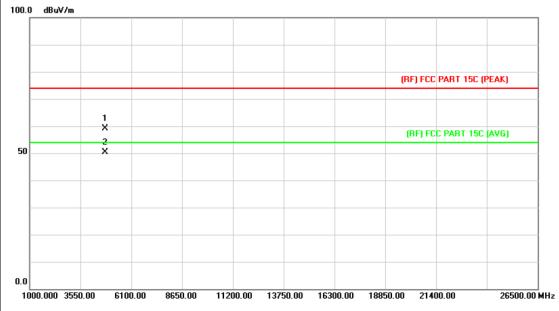


No	o. Mk	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4803.695	37.01	13.44	50.45	54.00	-3.55	AVG
2		4804.070	45.50	13.44	58.94	74.00	-15.06	peak



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EUT:	Mobile Odyssey Duke	Model Name: 7123-04				
	Waterproof Bluetooth Speaker	Woder Name .	7123-04			
Temperature:	25 ℃	Relative Humidity: 55%				
Test Voltage:	DC 3.7V					
Ant. Pol.	Vertical					
Test Mode:	TX GFSK Mode 2402MHz					
Remark:	No report for the emission which more than 10 dB below the prescribed limit.					
	F					

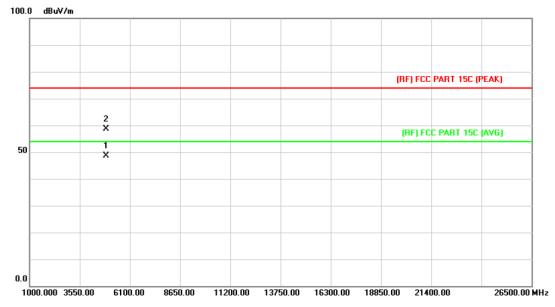


No	. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4803.720	45.65	13.44	59.09	74.00	-14.91	peak
2	*	4804.005	36.99	13.44	50.43	54.00	-3.57	AVG



Page: 22 of 75

EUT:	Mobile Odyssey Duke	Model Name :	7123-04			
	Waterproof Bluetooth Speaker	Woder Name .	7 123-04			
Temperature:	<b>25</b> ℃	Relative Humidity: 55%				
Test Voltage:	DC 3.7V					
Ant. Pol.	Horizontal					
Test Mode:	TX GFSK Mode 2441MHz					
Remark:	No report for the emission which more than 10 dB below the prescribed limit.					
	ргозопоса шти.					

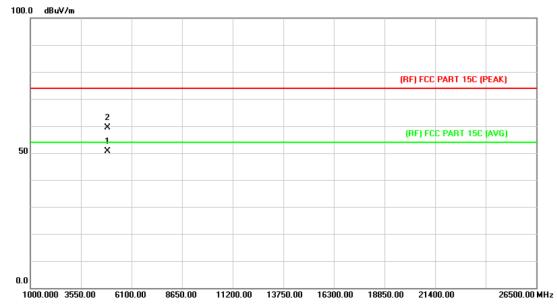


N	o. Mk	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4881.950	34.83	13.90	48.73	54.00	-5.27	AVG
2		4882.235	44.71	13.90	58.61	74.00	-15.39	peak



Page: 23 of 75

EUT:	Mobile Odyssey Duke	Model Name :	7123-04				
	Waterproof Bluetooth Speaker	Woder Name :	/ 123-U4				
Temperature:	25 ℃	°C Relative Humidity: 55%					
Test Voltage:	DC 3.7V						
Ant. Pol.	Vertical						
Test Mode:	TX GFSK Mode 2441MHz						
Remark:	No report for the emission which	more than 10 dB below	v the				
	prescribed limit.						

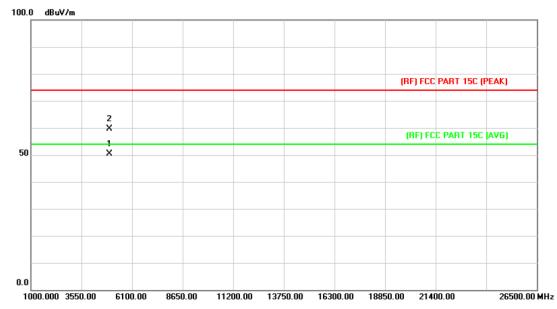


N	o. N	Лk.	Freq.	•	Correct Factor	Measure- ment	Limit	Over	
			MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4	4882.045	36.79	13.90	50.69	54.00	-3.31	AVG
2		•	4882.055	45.52	13.90	59.42	74.00	-14.58	peak



Page: 24 of 75

EUT:	Mobile Odyssey Duke	Model Name :	7123-04				
	Waterproof Bluetooth Speaker	Woder Name .	7 123-04				
Temperature:	<b>25</b> ℃	Relative Humidity: 55%					
Test Voltage:	DC 3.7V						
Ant. Pol.	Horizontal						
Test Mode:	TX GFSK Mode 2480MHz						
Remark:	No report for the emission which more than 10 dB below the prescribed limit.						
	produited mine.						

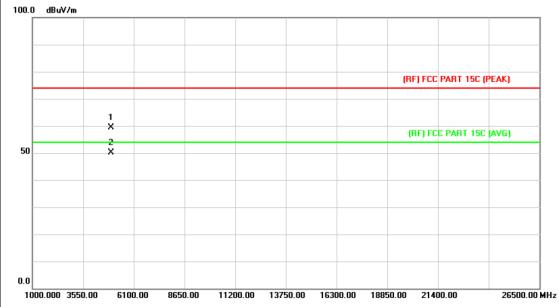


No	. Mk	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4959.775	36.03	14.36	50.39	54.00	-3.61	AVG
2		4960.145	45.22	14.36	59.58	74.00	-14.42	peak



Page: 25 of 75

EUT:	Mobile Odyssey Duke	Model Name: 7123-04				
	Waterproof Bluetooth Speaker	Woder Name .	7123-04			
Temperature:	25 °C Relative Humidity: 55%					
Test Voltage:	DC 3.7V					
Ant. Pol.	Vertical					
Test Mode:	TX GFSK Mode 2480MHz					
Remark:	No report for the emission which more than 10 dB below the					
	prescribed limit.					



	No.	Mk.	Freq.		Correct Factor	Measure- ment	Limit	Over	
			MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1			4959.940	45.09	14.36	59.45	74.00	-14.55	peak
2		*	4959.955	35.71	14.36	50.07	54.00	-3.93	AVG



Page: 26 of 75

EUT:	Mobile Odyssey Duke	Model Name :	7123-04			
	Waterproof Bluetooth Speaker	Woder Name .	7123-04			
Temperature:	25 °C Relative Humidity: 55%					
Test Voltage:	DC 3.7V					
Ant. Pol.	Horizontal					
Test Mode:	TX 8-DPSK Mode 2402MHz					
Remark:	No report for the emission which more than 10 dB below the prescribed limit.					
	1					

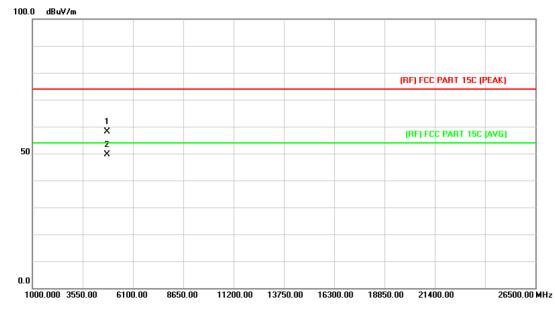


No	o. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4803.984	36.57	13.44	50.01	54.00	-3.99	AVG
2		4804.014	43.92	13.44	57.36	74.00	-16.64	peak



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EUT:	Mobile Odyssey Duke	Model Name :	7123-04			
	Waterproof Bluetooth Speaker	Woder Name .	7123-04			
Temperature:	<b>25</b> ℃	Relative Humidity: 55%				
Test Voltage:	DC 3.7V					
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.					

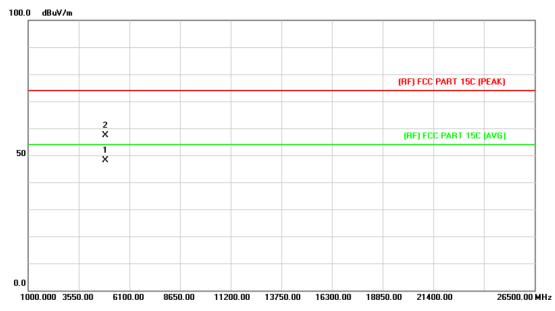


No	. Mk	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4803.984	44.60	13.44	58.04	74.00	-15.96	peak
2	*	4804.011	36.10	13.44	49.54	54.00	-4.46	AVG



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EUT:	Mobile Odyssey Duke	Model Name :	7123-04			
	Waterproof Bluetooth Speaker	Woder Name :	7123-04			
Temperature:	25 °C Relative Humidity: 55%					
Test Voltage:	DC 3.7V					
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.					

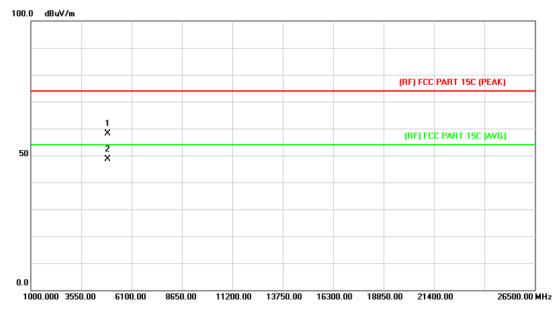


No	o. Mk	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4881.947	34.24	13.90	48.14	54.00	-5.86	AVG
2		4882.112	43.58	13.90	57.48	74.00	-16.52	peak



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EUT:	Mobile Odyssey Duke	Model Name :	7123-04			
	Waterproof Bluetooth Speaker	Woder Name .	7123-04			
Temperature:	5 °C Relative Humidity: 55%					
Test Voltage:	DC 3.7V					
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		Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4882.031	44.22	13.90	58.12	74.00	-15.88	peak
2	*	4882.351	34.78	13.90	48.68	54.00	-5.32	AVG



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EUT:	Mobile Odyssey Duke	Model Name :	7123-04			
	Waterproof Bluetooth Speaker	Woder Name :	7123-04			
Temperature:	25 °C Relative Humidity: 55%					
Test Voltage:	DC 3.7V					
Ant. Pol.	Horizontal					
Test Mode:	TX 8-DPSK Mode 2480MHz					
Remark:	No report for the emission which more than 10 dB below the					
	prescribed limit.					



No	. Mk	. Freq.	_	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4959.932	43.12	14.36	57.48	74.00	-16.52	peak
2	*	4959.988	33.96	14.36	48.32	54.00	-5.68	AVG



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EUT:	Mobile Odyssey Duke	Model Name :	7123-04			
	Waterproof Bluetooth Speaker	Woder Name .	7 123-04			
Temperature:	25 °C Relative Humidity: 55%					
Test Voltage:	DC 3.7V					
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	. Mk	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4959.932	43.12	14.36	57.48	74.00	-16.52	peak
2	*	4959.988	33.96	14.36	48.32	54.00	-5.68	AVG



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# 5. Restricted Bands Requirement

#### 5.1 Test Standard and Limit

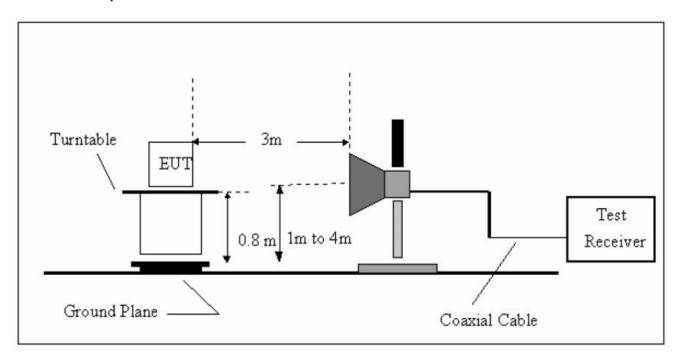
5.1.1 Test Standard FCC Part 15.209 FCC Part 15.205

5.1.2 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 hands have been tested only the yearst age is remarked						

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

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



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and then Quasi Peak detector mode re-measured.

(4) 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.

- (5) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
- (6) 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.
- (7) 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.

### 5.5 Test Equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Mar. 20, 2014	Mar. 19, 2015
Spectrum Analyzer	Rohde & Schwarz	FSP30	DE25181	Aug. 08, 2014	Aug. 07, 2015
EMI Test Receiver	Rohde & Schwarz	ESCI	101165	Aug. 08, 2014	Aug.07, 2015
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar. 07, 2014	Mar.06, 2015
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar. 07, 2014	Mar.06, 2015
Pre-amplifier	HP	11909A	185903	Mar. 07, 2014	Mar.06, 2015
Pre-amplifier	HP	8447B	3008A00849	Mar. 07, 2014	Mar.06, 2015
Cable	HUBER+SUHNE R	100	SUCOFLEX	Mar. 07, 2014	Mar.06, 2015
Signal Generator	Rohde & Schwarz	SML03	IKW682-054	Feb. 11, 2014	Feb.10, 2015
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A

#### 5.6 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.

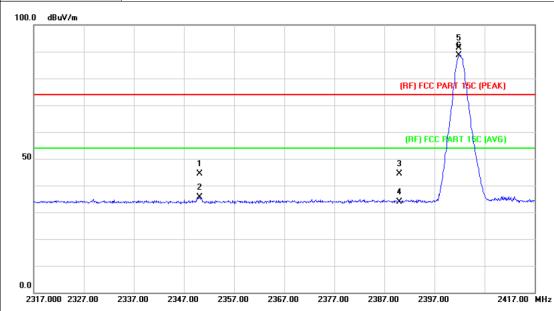
All restriction bands have been tested, only the worst case is reported.



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# (1) Radiation Test

EUT:	Mobile Odyssey Duke	Model Name :	7123-04	
	Waterproof Bluetooth Speaker	Woder Name .	1123-04	
Temperature:	<b>25</b> ℃	Relative Humidity:	55%	
Test Voltage:	DC 3.7V			
Ant. Pol.	Horizontal			
Test Mode:	TX GFSK Mode 2402MHz			
Remark:	N/A			

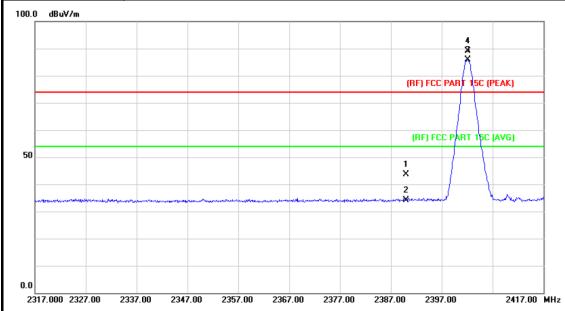


No.	Mk.	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2350.100	43.79	0.61	44.40	74.00	-29.60	peak
2		2350.100	34.96	0.61	35.57	54.00	-18.43	AVG
3		2390.000	43.59	0.77	44.36	74.00	-29.64	peak
4		2390.000	33.19	0.77	33.96	54.00	-20.04	AVG
5	Χ	2401.900	90.53	0.82	91.35	Fundamental	Frequency	peak
6	*	2401.900	87.83	0.82	88.65	Fundamental	Frequency	AVG



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EUT:	Mobile Odyssey Duke	Model Name :	7123-04		
	Waterproof Bluetooth Speaker	Woder Name .			
Temperature:	25 ℃	Relative Humidity:	55%		
Test Voltage:	DC 3.7V				
Ant. Pol.	Vertical				
Test Mode:	TX GFSK Mode 2402MHz				
Remark:	N/A				

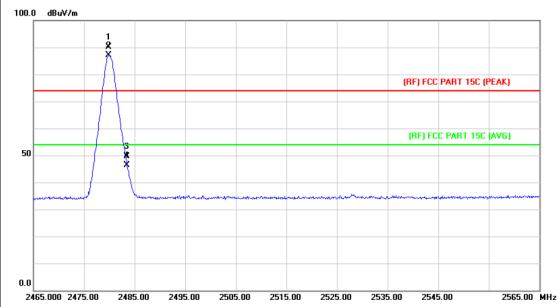


No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	42.97	0.77	43.74	74.00	-30.26	peak
2		2390.000	33.34	0.77	34.11	54.00	-19.89	AVG
3	*	2402.100	85.03	0.82	85.85	Fundamental Frequency		AVG
4	Χ	2402.200	88.19	0.82	89.01	Fundamental	Frequency	peak



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EUT:	Mobile Odyssey Duke	Model Name :	7123-04			
	Waterproof Bluetooth Speaker	Woder Name :	7123-04			
Temperature:	<b>25</b> ℃	Relative Humidity:	55%			
Test Voltage:	DC 3.7V					
Ant. Pol.	Horizontal					
Test Mode:	TX GFSK Mode 2480 MHz					
Remark:	N/A					

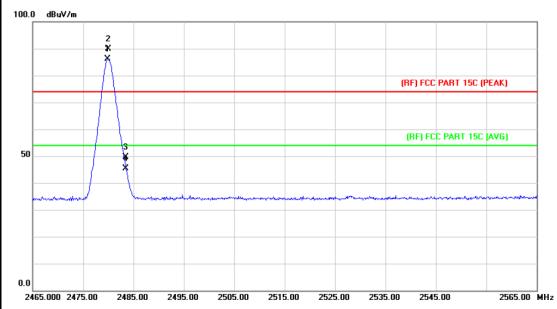


1	No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
			MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		Χ	2479.900	89.06	1.15	90.21	Fundamenta	l Frequency	peak
2		*	2479.900	86.05	1.15	87.20	Fundamenta	Frequency	AVG
3			2483.500	48.55	1.17	49.72	74.00	-24.28	peak
4			2483.500	45.33	1.17	46.50	54.00	-7.50	AVG



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EUT:	Mobile Odyssey Duke	Model Name :	7123-04		
	Waterproof Bluetooth Speaker	Woder Name :	7123-04		
Temperature:	<b>25</b> ℃	Relative Humidity:	55%		
Test Voltage:	DC 3.7V				
Ant. Pol.	Vertical				
Test Mode:	TX GFSK Mode 2480 MHz				
Remark:	N/A				



No	. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	2479.900	85.08	1.15	86.23	Fundamental	Frequency	AVG
2	Χ	2480.000	88.82	1.15	89.97	Fundamental	Frequency	peak
3		2483.500	48.39	1.17	49.56	74.00	-24.44	peak
4		2483.500	44.31	1.17	45.48	54.00	-8.52	AVG



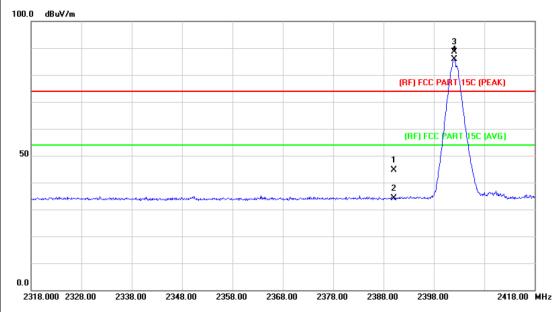
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EUT:				ile Ody erproof				(er	Mod	el Nam	ne :		712	23-04
Гетре	eratu	re:	25 °		Diac	iootii	Орса	(Ci	Rela	tive H	umid	itv:	55	%
Test V			DC 3						11010		иа			
Ant. P				zontal										
Test N				B-DPSI	K Mod	de 240	)2MH;	 Z						
Rema			N/A											
100.0	dBuV/m													
												6		
												6		
										(F	RF) FCC	PART	15C (PE	AK)
												7		
											(DE) EC	PAR	1 15C (A	vei
50											(NF) FC	FAR	1 TSC (A	Yaj
				1 X 2						X				
		and the state of t		X	Carried Street	-	general mention of the contract of the contrac	and delination parties		4	كمعيويسة		L.	againment at the court
0.0 2319.	000 232	29.00 2	339.00	2349.0	0 23	59.00	2369.00	2379	9.00	2389.00	2399	0.00		2419.00 MI
				Read	dina	Cor	rect	Mea	sure	-				
No.	Mk.	Fre	eq.	Lev	_		ctor		ent	Lin	nit	С	)ver	
		MH	lz	dBı	uV	dB	/m	dBı	uV/m	dBı	uV/m		dB	Detecto
1		2349.	900	42.	84	0.	61	43	3.45	74	.00	-3	30.55	peak
2		2349.	900	35.	05	0.	61	35	5.66	54	.00	-1	18.34	AVG
3		2390.	000	43.	20	0.	77	43	3.97	74	.00	-3	30.03	peak
_		2390.	000	33.	15	0.	77	33	3.92	54	1.00	-2	20.08	AVG
4				- 00	25	0	82	87	7.17	Fund	ament	al Fro	allency	, AVG
5	*	2402.	100	86.	35	0.0	02			i dila	uc	ai i i 6	quenc	



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EUT:	Mobile Odyssey Duke	Model Name :	7123-04		
	Waterproof Bluetooth Speaker	Woder Name .	7123-04		
Temperature:	<b>25</b> ℃	Relative Humidity:	55%		
Test Voltage:	DC 3.7V				
Ant. Pol.	Vertical				
Test Mode:	TX 8-DPSK Mode 2402MHz				
Remark:	N/A				

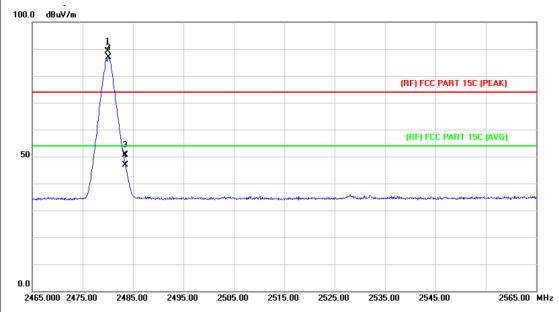


No.	. Mk.	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	43.98	0.77	44.75	74.00	-29.25	peak
2		2390.000	33.38	0.77	34.15	54.00	-19.85	AVG
3	Χ	2402.100	87.72	0.82	88.54	Fundamental	Frequency	peak
4	*	2402.100	85.06	0.82	85.88	Fundamental	Frequency	AVG



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EUT:	Mobile Odyssey Duke	Model Name :	7123-04		
	Waterproof Bluetooth Speaker	Woder Name .	7 123-04		
Temperature:	<b>25</b> ℃	Relative Humidity:	55%		
Test Voltage:	DC 3.7V				
Ant. Pol.	Horizontal				
Test Mode:	TX 8-DPSK Mode 2480MHz				
Remark:	N/A				
-					

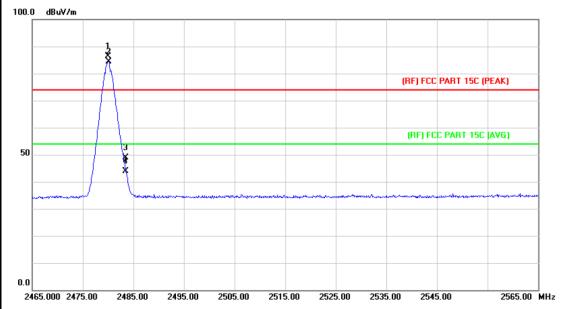


No	. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1	Χ	2480.000	87.96	1.15	89.11	Fundamental	Frequency	peak
2	*	2480.100	85.78	1.15	86.93	Fundamental	Frequency	AVG
3		2483.500	49.38	1.17	50.55	74.00	-23.45	peak
4		2483.500	45.70	1.17	46.87	54.00	-7.13	AVG

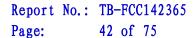


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EUT:	Mobile Odyssey Duke	Model Name :	7123-04			
	Waterproof Bluetooth Speaker	Woder Name .	7 125-04			
Temperature:	25 ℃	Relative Humidity:	55%			
Test Voltage:	OC 3.7V					
Ant. Pol.	Vertical					
Test Mode:	TX 8-DPSK Mode 2480MHz					
Remark:	Remark: N/A					
100.0 dBuV/m						



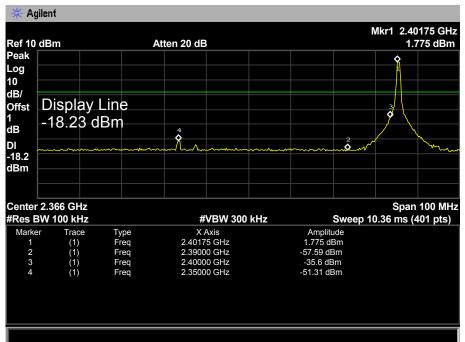
	No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
			MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		Χ	2480.000	85.19	1.15	86.34	Fundamental	l Frequency	peak
2	2	*	2480.100	83.26	1.15	84.41	Fundamental	Frequency	AVG
3	3		2483.500	47.70	1.17	48.87	74.00	-25.13	peak
4			2483.500	42.80	1.17	43.97	54.00	-10.03	AVG

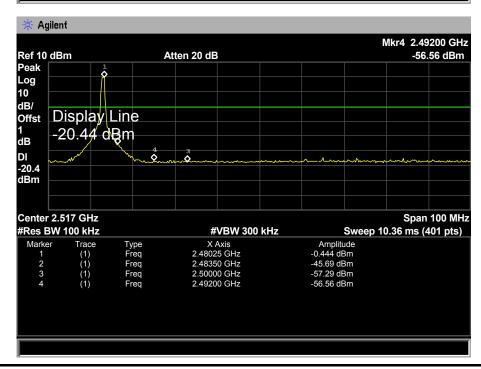


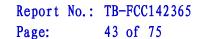


(2) Conducted Test

EUT:	Mobile Odyssey Duke	Model Name :	7123-04			
	Waterproof Bluetooth Speaker					
Temperature:	25 ℃	Relative Humidity:	55%			
Test Voltage:	DC 3.7V	DC 3.7V				
Test Mode:	TX GFSK Mode 2402MHz / 2480 MHz					
Remark:	N/A	·				

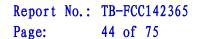








EUT: Mobile Odyssey Duke 7123-04 **Model Name:** Waterproof Bluetooth Speaker 25 ℃ Temperature: **Relative Humidity:** 55% DC 3.7V **Test Voltage: Test Mode: GFSK Hopping Mode** Remark: N/A Agilent Mkr1 2.40575 GHz 1.815 dBm Ref 10 dBm Atten 20 dB Log <u>~YY#YYYYVVYYYYVVYYYY</u> 10 dB/ Display Line Offst 1 dB DI -18.2 dBm Center 2.377 GHz Span 100 MHz #Res BW 100 kHz **#VBW 300 kHz** Sweep 10.36 ms (401 pts) Amplitude 1.815 dBm -54.36 dBm -52.45 dBm X Axis 2.40575 GHz 2.39000 GHz 2.40000 GHz 2.35500 GHz Type Freq Freq Marke (1) (1) (1) (1) -39.38 dBm \* Agilent Mkr1 2.46825 GHz Ref 10 dBm Atten 20 dB -0.118 dBm Peak Log 10 dB/ Display Line Offst -20.12 dBm dΒ DI -20.1 dBm Span 100 MHz Center 2.517 GHz #Res BW 100 kHz **#VBW 300 kHz** Sweep 10.36 ms (401 pts) Amplitude -0.118 dBm Type Freq X Axis 2.46825 GHz Markei (1) (1) (1) (1) Freq Freq Freq 2.48350 GHz 2.50000 GHz 2.49900 GHz -47.36 dBm -43.49 dBm -43.37 dBm





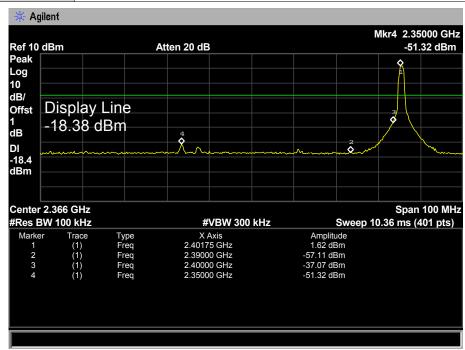
EUT: Mobile Odyssey Duke
Waterproof Bluetooth Speaker

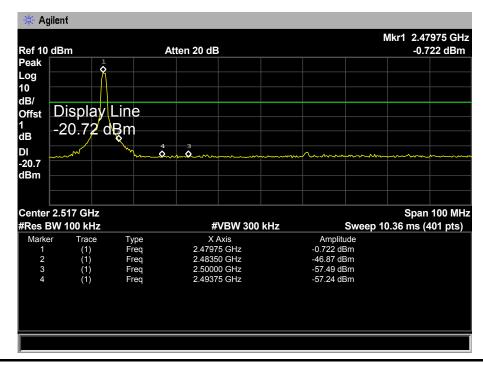
Temperature: 25 ℃ Relative Humidity: 55%

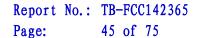
Test Voltage: DC 3.7V

Test Mode: TX 8-DPSK Mode 2402MHz / 2480 MHz

Remark: N/A









EUT:

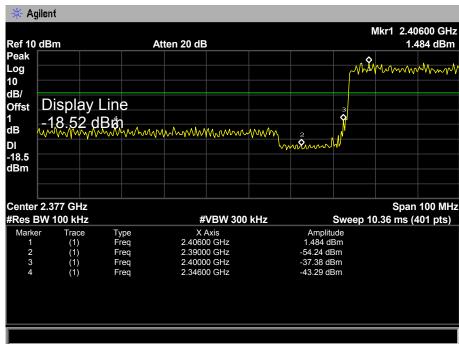
Mobile Odyssey Duke
Waterproof Bluetooth Speaker

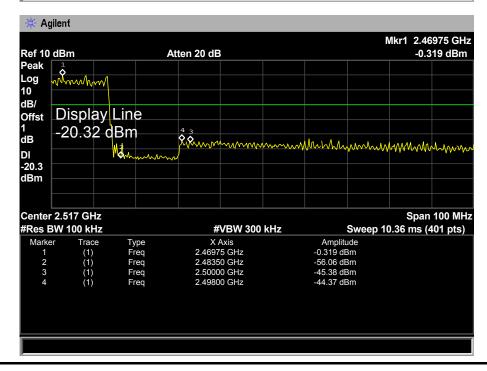
Temperature:
25 °C
Relative Humidity:
55%

Test Voltage:
DC 3.7V

Test Mode:
8-DPSK Hopping Mode

Remark:
N/A







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# 6. Number of Hopping Channel

# 6.1 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

## 6.2 Test Setup



## 6.3 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.

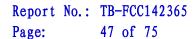
# 6.4 EUT Operating Condition

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

## 6.5 Test Equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Mar. 20, 2014	Mar. 19, 2015

## 6.6 Test Data





EUT: Mobile Odyssey Duke
Waterproof Bluetooth Speaker

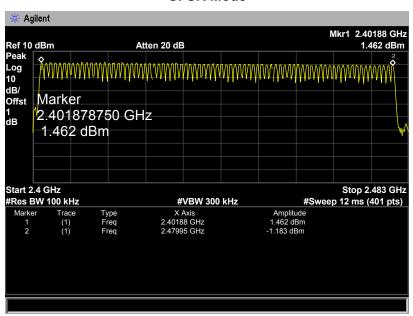
Temperature: 25 °C Relative Humidity: 55%

Test Voltage: DC 3.7V

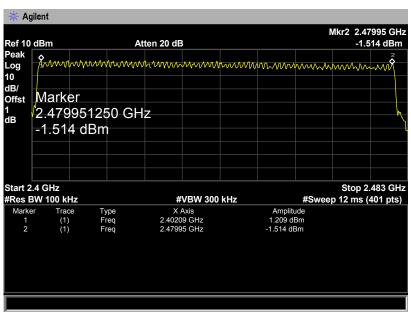
Test Mode: Hopping Mode (GFSK/ 8-DPSK)

Frequency Range	Quantity of Hopping Channel	Limit
2402MHz~2480MHz	79	<b>\1</b> E
2402WIH2~246UWIH2	79	>15

#### **GFSK Mode**



### 8-DPSK Mode





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# 7. Average Time of OcCupancy

## 7.1 Test Standard and Limit

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

5.1.2 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

## 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=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.

## 7.4 EUT Operating Condition

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

## 7.5 Test Equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum	Agilent		MY45106456	Mar. 20, 2014	Mar. 19. 2015
Analyzer	Agiletti	E4407B	W 1 45 100456	Mai. 20, 2014	Mai. 19, 2015



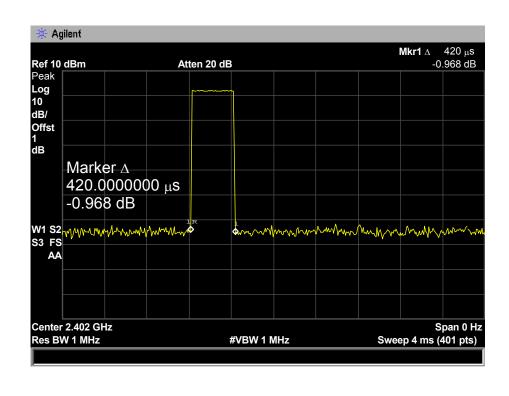
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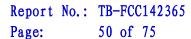
## 7.6 Test Data

EUT:	Mobile Odyssey Duke	Model Name :	7123-04	
	Waterproof Bluetooth Speaker	Widdel Name .	7123-04	
Temperature:	25 ℃	Relative Humidity:	55%	
Test Voltage:	DC 3.7V			
Test Mode:	Hopping Mode (GFSK DH1)			

Channel (MHz)	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
2402	0.420	134.40			
2441	0.420	134.40	31.60	400	PASS
2480	0.420	134.40			

## **GFSK Hopping Mode DH1**

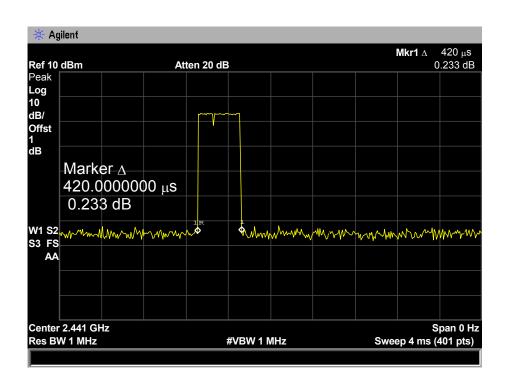




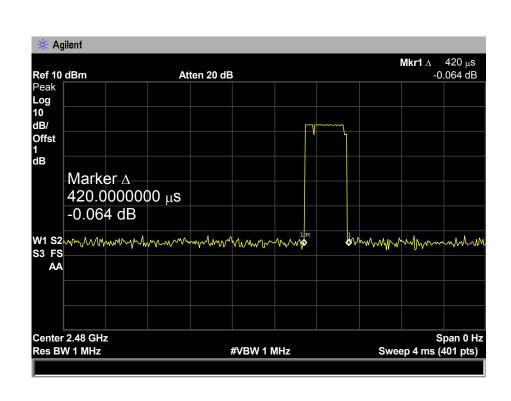


GFSK Hopping Mode DH1





### **GFSK Hopping Mode DH1**





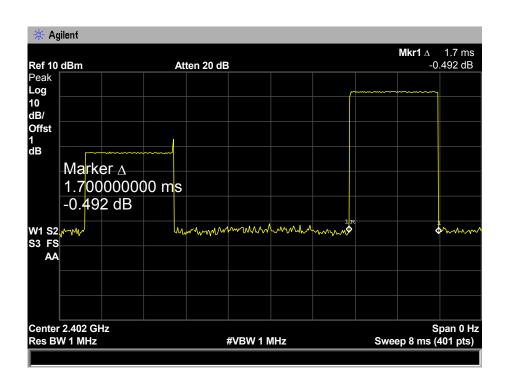
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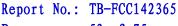
EUT:	Mobile Odyssey Duke Waterproof Bluetooth Speaker	Model Name :	7123-04
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		

**Test Mode:** Hopping Mode (GFSK DH3)

Channel (MHz)	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
2402	1.700	272.00			
2441	1.700	272.00	31.60	400	PASS
2480	1.700	272.00			

## **GFSK Hopping Mode DH3**



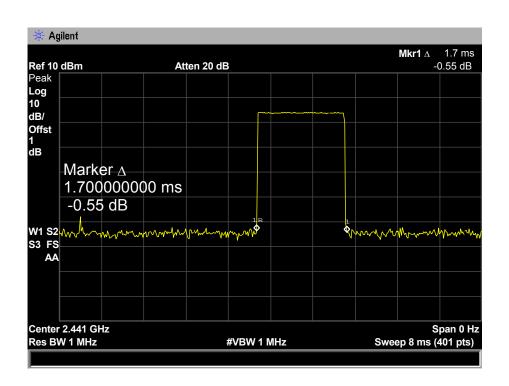




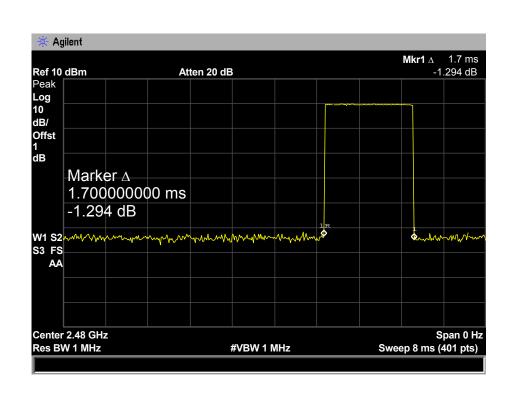
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#### 2441 MHz



## **GFSK Hopping Mode DH3**





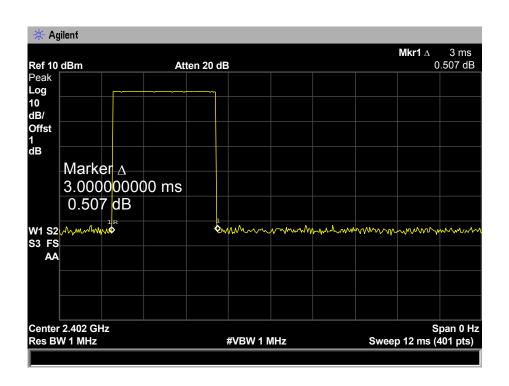
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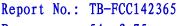
EUT:	Mobile Odyssey Duke Waterproof Bluetooth Speaker	Model Name :	7123-04
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		
	(050(5)		

**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	3.000	320.00			

## **GFSK Hopping Mode DH5**



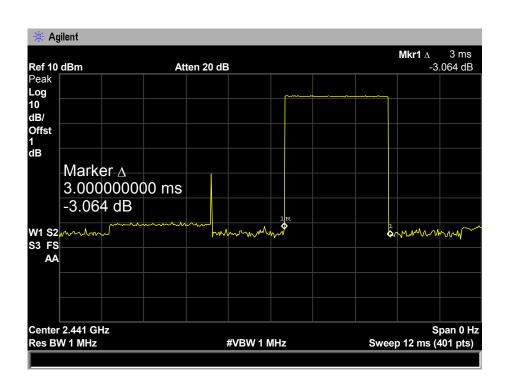




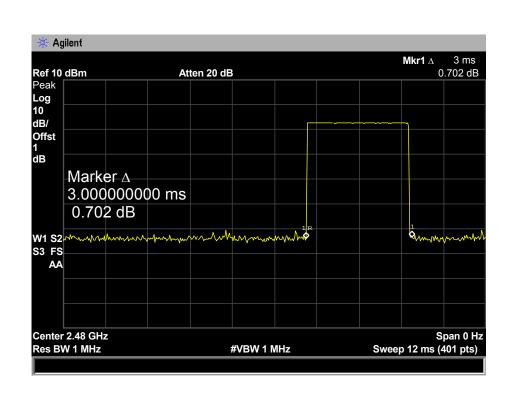
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#### 2441 MHz



## **GFSK Hopping Mode DH5**





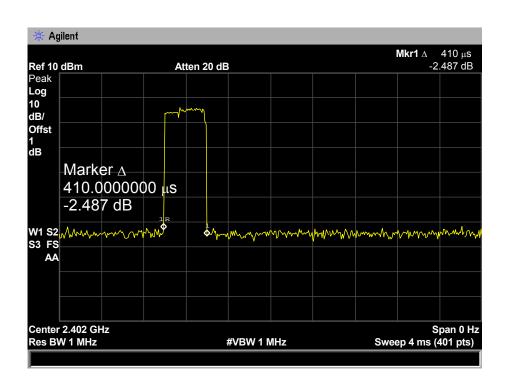
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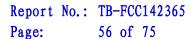
EUT:	Mobile Odyssey Duke Waterproof Bluetooth Speaker	Model Name :	7123-04
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		

**Test Mode:** Hopping Mode (8-DPSK DH1)

	- 1-1- 3	( ,			
Channel (MHz)	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit	Result
2402	0.410	131.20	24.0		
2441	0.410	131.20	31.6	400	PASS
2480	0.420	134.40	U		

## 8-DPSK Hopping Mode DH1

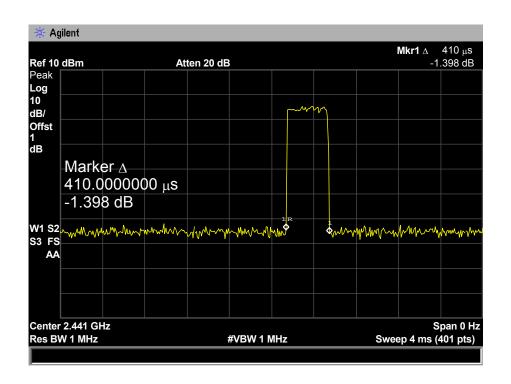




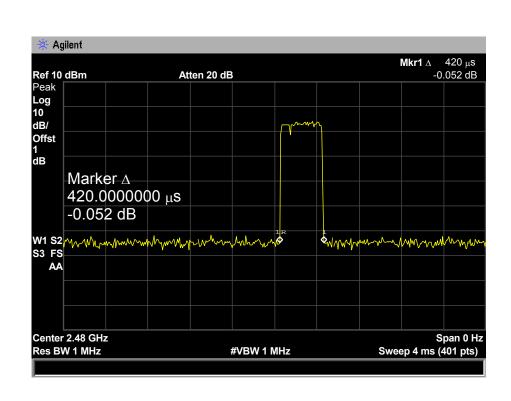


8-DPSK Hopping Mode DH1

#### 2441 MHz



### 8-DPSK Hopping Mode DH1





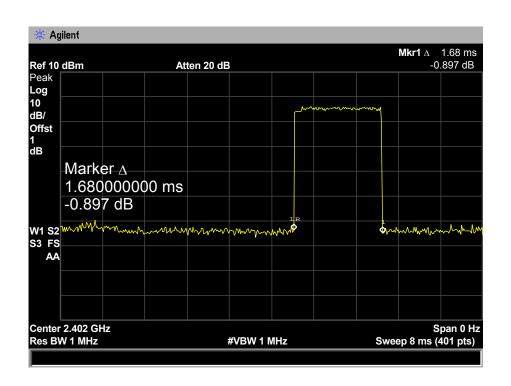
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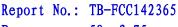
EUT:	Mobile Odyssey Duke Waterproof Bluetooth Speaker	Model Name :	7123-04
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		
	(0. D.D.O.(, D.LIO)		

**Test Mode:** Hopping Mode (8-DPSK DH3)

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

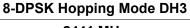
# 8-DPSK Hopping Mode DH3



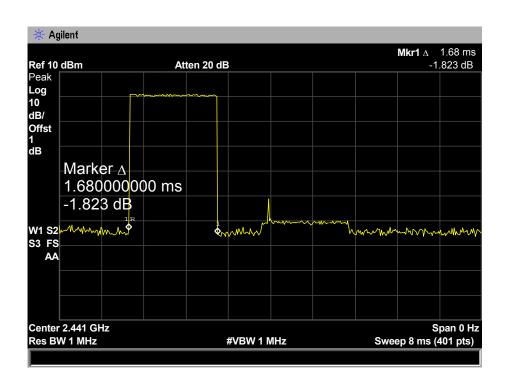




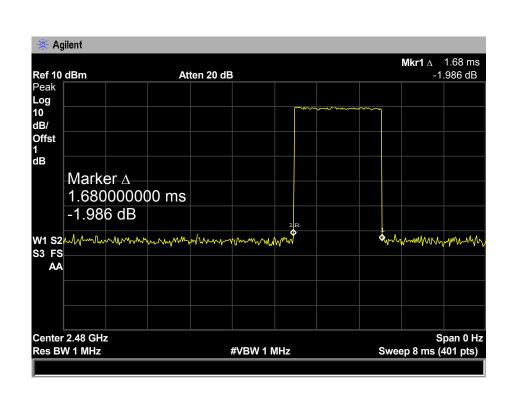
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#### 2441 MHz



### 8-DPSK Hopping Mode DH3





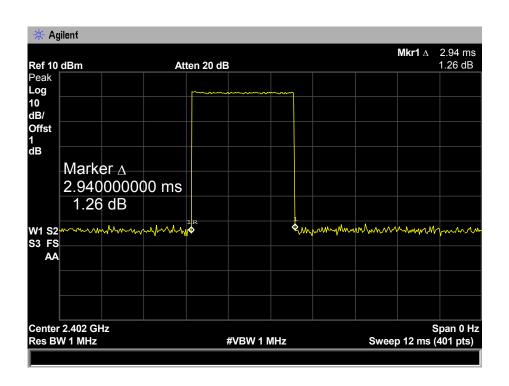
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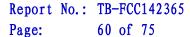
EUT:	Mobile Odyssey Duke Waterproof Bluetooth Speaker	Model Name :	7123-04
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		

**Test Mode:** Hopping Mode (8-DPSK DH5)

Channel (MHz)	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
2402	2.940	313.60			
2441	2.970	316.80	31.60	400	PASS
2480	2.970	316.80			

# 8-DPSK Hopping Mode DH5

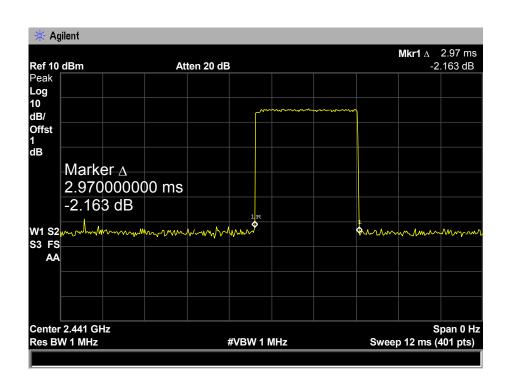




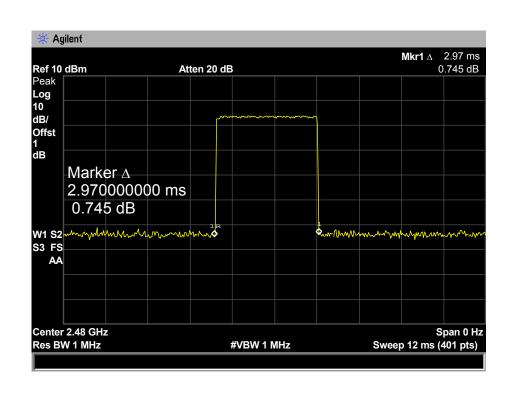


8-DPSK Hopping Mode DH5

2441 MHz



### 8-DPSK Hopping Mode DH5





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# 8. Channel Separation and Bandwidth Test

## 8.1 Test Standard and Limit

8.1.1 Test Standard FCC Part 15.247

8.1.2 Test Limit

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

## 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:

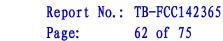
Channel Separation: RBW=30 kHz, VBW=100 kHz.

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.

## 8.4 EUT Operating Condition

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





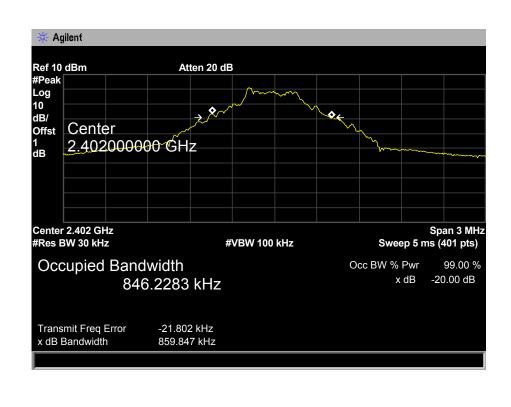
8.5 Test Equipment

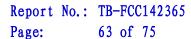
Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Mar. 20, 2014	Mar. 19, 2015

## 8.6 Test Data

EUT:	Mobile Odyssey Duke Waterproof Bluetooth Speaker	Model Name :	7123-04
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		
Test Mode:	TX Mode (GFSK)		
Channel frequence	99% OBW (kHz)	20dB Bandwidth	
(MHz)		(kHz)	
2402	846.2283	859.847	
2441	839.1092	851.661	
2480	828.9790	855.023	

### **GFSK TX Mode**







**GFSK TX Mode** 2441 MHz Agilent Ref 10 dBm Atten 20 dB #Peak Log 10 dB/ 4 Center Offst 1 dB 2.441000000 GHz Center 2.441 GHz Span 3 MHz #Res BW 30 kHz Sweep 5 ms (401 pts) **#VBW 100 kHz** Occupied Bandwidth Occ BW % Pwr 99.00 % x dB -20.00 dB

839.1092 kHz

-23.654 kHz

851.661 kHz

Transmit Freq Error

x dB Bandwidth

## **GFSK TX Mode** 2480 MHz



10 dB/ Offst 1 dB 2.480000000 GHz Center 2.48 GHz Span 3 MHz #Res BW 30 kHz **#VBW 100 kHz** Sweep 5 ms (401 pts) Occupied Bandwidth Occ BW % Pwr 99.00 % -20.00 dB x dB 828.9790 kHz Transmit Freq Error -28.429 kHz x dB Bandwidth 855.023 kHz

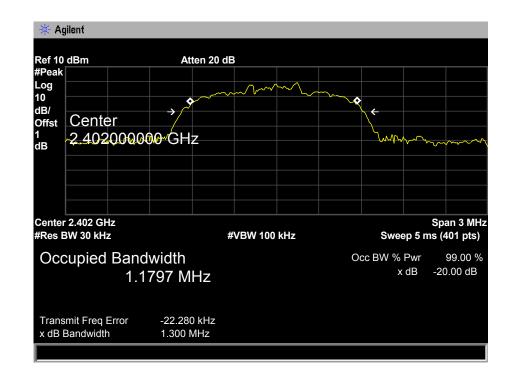


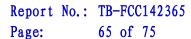
EUT:	Mobile Odyssey Duke Waterproof Bluetooth Speaker	Model Name :	7123-04
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		

Test Mode: TX Mode (8-DPSK)

Channel frequency (MHz)	99% OBW (kHz)	20dB Bandwidth (kHz)	20dB Bandwidth *2/3 (kHz)
2402	1179.70	1300.00	866.67
2441	1176.10	1300.00	866.67
2480	1171.00	1289.00	859.33

## 8-DPSK TX Mode 2402 MHz





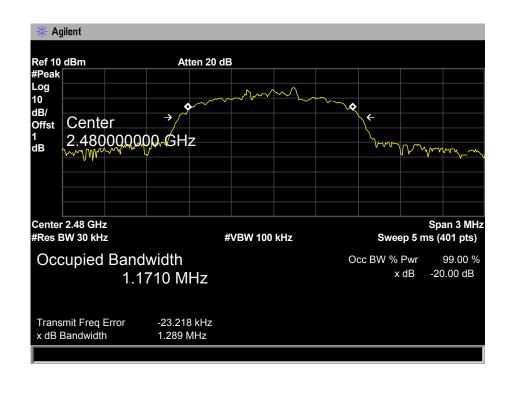


x dB Bandwidth

8-DPSK TX Mode 2441 MHz Agilent Ref 10 dBm Atten 20 dB #Peak Log 10 dB/ Center Offst 2.441000000 GHz 1 dB Center 2.441 GHz Span 3 MHz #Res BW 30 kHz Sweep 5 ms (401 pts) **#VBW 100 kHz** Occupied Bandwidth Occ BW % Pwr 99.00 % x dB -20.00 dB 1.1761 MHz Transmit Freq Error -24.101 kHz

# 8-DPSK TX Mode

1.300 MHz



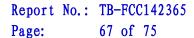


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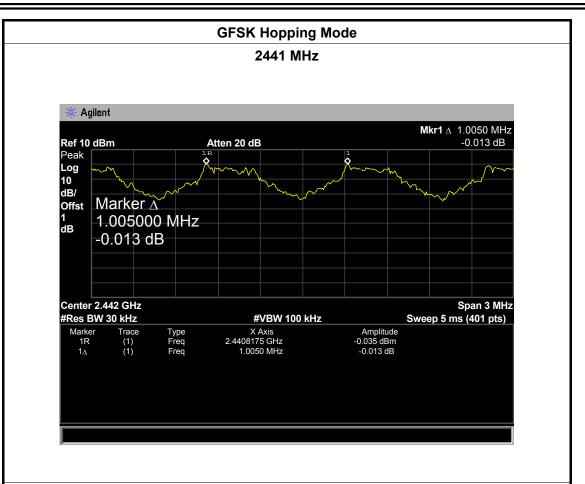
EUT:		lyssey Duke of Bluetooth Speaker	Model Name: 7123-04		7123-04
Temperature:	25 ℃		Relative Humidity: 55		55%
Test Voltage:	DC 3.7V	V			
Test Mode:	Hopping N	g Mode (GFSK)			
Channel frequen	cy (MHz)	Separation Read V	alue	Separation	Limit (kHz)
		(kHz)			
2402		1005.00		859.	.847
2441		1005.00		851.	.661
2480		1005.00		855	.023

## **GFSK Hopping Mode**

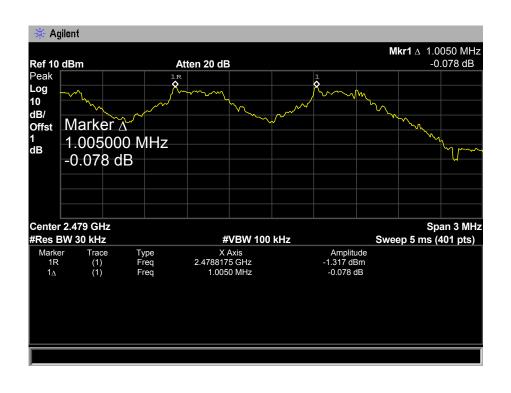














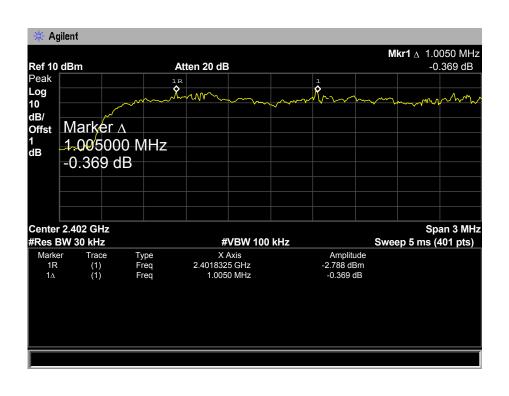
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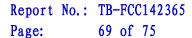
EUT:	Mobile Odyssey Duke Waterproof Bluetooth Speaker	Model Name :	7123-04
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		

Test Mode: Hopping Mode (8-DPSK)

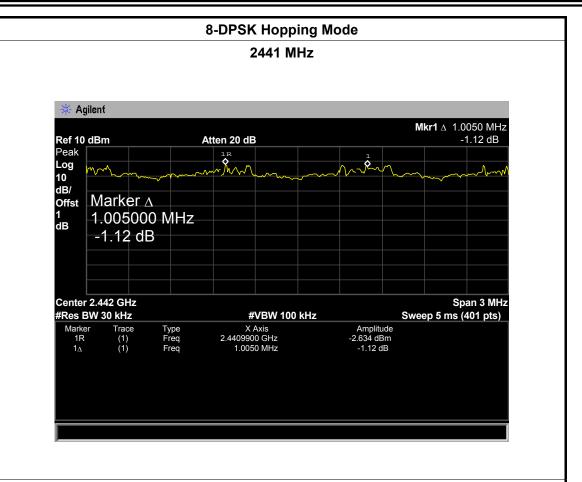
Channel frequency (MHz)	Separation Read Value	Separation Limit (kHz)
	(kHz)	
2402	1005.00	866.67
2441	1005.00	866.67
2480	1005.00	859.33

## 8-DPSK Hopping Mode

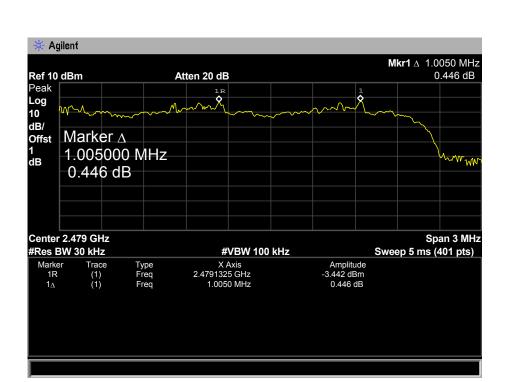














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# 9. Peak Output Power Test

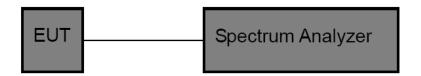
## 9.1 Test Standard and Limit

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

9.1.2 Test Limit

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

# 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:

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

## 9.4 EUT Operating Condition

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

# 9.5 Test Equipment

Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Mar. 20, 2014	Mar. 19, 2015

## 9.6 Test Data



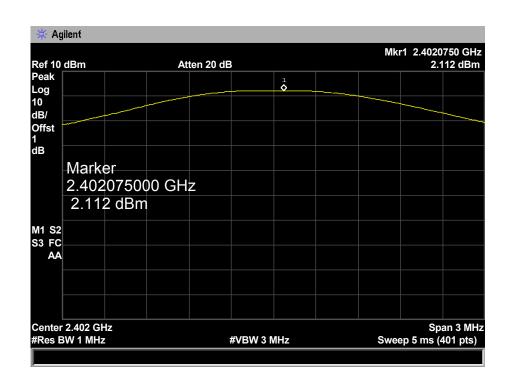
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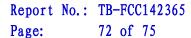
EUT:	Mobile Odyssey Duke Waterproof Bluetooth Speaker	Model Name :	7123-04
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		

Test Mode: TX Mode (GFSK)

Channel frequency (MHz)	Test Result (dBm)	Limit (dBm)
2402	2.112	
2441	1.169	30
2480	-0.175	

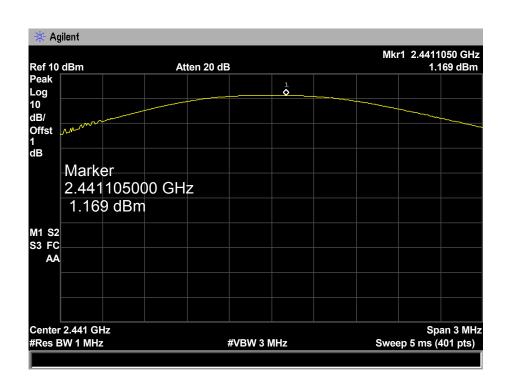
### **GFSK TX Mode**



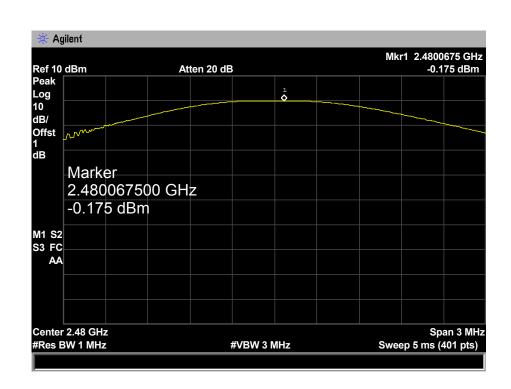




GFSK TX Mode 2441 MHz



### **GFSK TX Mode**





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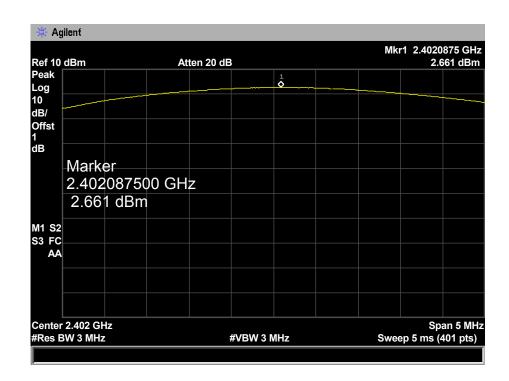
EUT:	Mobile Odyssey Duke Waterproof Bluetooth Speaker	Model Name :	7123-04
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		

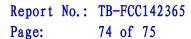
lest voltage: DC 3.7 V

Test Mode: TX Mode (8-DPSK)

Channel frequency (MHz)	Test Result (dBm)	Limit (dBm)	
2402	2.661		
2441	1.867	21	
2480	0.595		

## 8-DPSK TX Mode

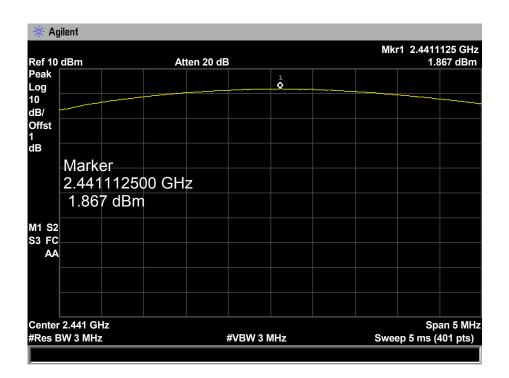




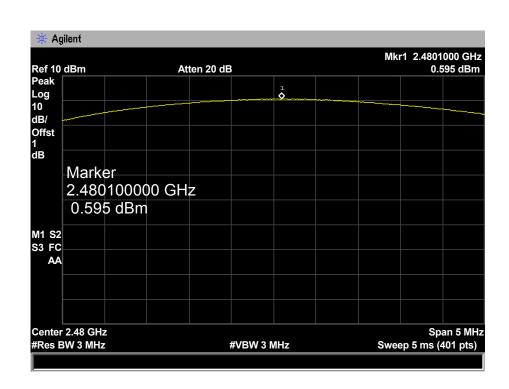


8-DPSK TX Mode

#### 2441 MHz



### 8-DPSK TX Mode





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# 10. Antenna Requirement

## 10.1 Standard Requirement

10.1.1 Standard FCC Part 15.203

## 10.1.2 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.

## 10.2 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.

## 10.2 Result

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