

Shenzhen Toby Technology Co., Ltd.

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FCC Radio Test Report FCC ID: 2ABHA0015

Original Grant

Report No. TB-FCC151073

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

Equipment Under Test (EUT)

EUT Name True Wireless Earbuds

7198-04 Model No.

CT16286 Series Model No.

Brand Name Cstar

Receipt Date 2016-12-22

Test Date 2016-12-23 to 2016-12-27

Issue Date 2016-12-28

Standards FCC Part 15: 2016, 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: NINGBO CSTAR IMP&EXP CO., LTD

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

Innovation Center, Ningbo, China

Manufacturer : ShenZhen C-Star Electronic Tech. Co., Ltd

Address : 2, 3/F, Building B, No. 2 Bada Industrial Park, Yongfu Road, Heping

Community, Fuyong Town, Baoan District, Shenzhen, China

1.2 General Description of EUT (Equipment Under Test)

EUT Name	À	True Wireless Earbuds		
Models No.	:	7198-04, CT16286		
Model Difference	:	All these models are identical in the same PCB, layout and el circuit, the only difference is model name for commercial.		
		Operation Frequency:	Bluetooth 4.1: 2402~2480 MHz	
		Number of Channel:	Bluetooth: 79 Channels see Note 2	
Product		Max Peak Output Power:	Bluetooth: 4.040 dBm(GFSK)	
Description		Antenna Gain:	0 dBi PCB Antenna	
		Modulation Type:	GFSK 1Mbps(1 Mbps) π /4-DQPSK(2 Mbps) 8-DPSK(3 Mbps)	
Power Supply	3	DC Voltage Supplied by th DC Supply by the Battery.	e Host System.	
Power Rating			n Battery.	
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) 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



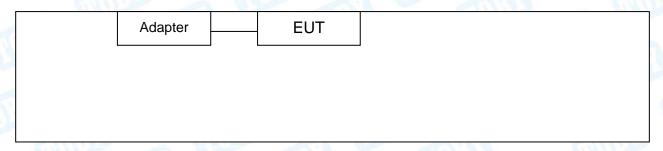
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04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	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		-0
26	2428	53	2455	Will a	- N.S.

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

1.3 Block Diagram Showing the Configuration of System Tested

AC Charging with TX Mode



TX Mode

EU	IT	



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1.4 Description of Support Units

Equipment Information					
Name	Model	FCC ID/VOC	Manufacturer	Used "√"	
AC/DC Adapter	TEKA012	VOC	TEKA	√	
AC/DC Adapter:	Input:100~240V, 50/60	OHz, 0.2A. Output: 5V	/, 1A		
		Cable Information			
Number	Shielded Type	Ferrite Core	Length	Note	
Cable 1	NO	NO	0.4M	COUNTY OF THE PARTY OF THE PART	

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 modes 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 (3Mbps)



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(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	Airoha.AB1500_	FamilyLabTestTool_20151127	'_1.4.17.0_Verifying
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})
Conducted Emission	Level Accuracy: 9kHz~150kHz 150kHz to 30MHz	±3.42 dB ±3.42 dB
Radiated Emission	Level Accuracy: 9kHz to 30 MHz	±4.60 dB
Radiated Emission	Level Accuracy: 30MHz to 1000 MHz	±4.40 dB
Radiated Emission	Level Accuracy: Above 1000MHz	±4.20 dB



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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.



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2. Test Summary

	F	CC Part 15 Subpart C(15.247)/ RSS	247 Issue 1	
Standard Section		Tarak Marin		
FCC	IC	Test Item	Judgment	Remark
15.203	1	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(d)	RSS 247 5.5	Band Edge	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)& 15.209	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:1005.10kHz π/4-DQPSK: 1083.70kHz 8-DPSK: 1129.50KHz

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



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3. Test Equipment

AC Main C	conducted Emiss	sion			
Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
EMI Test Receiver	ROHDE& SCHWARZ	ESCI	100321	Jul. 22, 2016	Jul. 21, 2017
RF Switching Unit	Compliance Direction Systems Inc	RSU-A4	34403	Jul. 22, 2016	Jul. 21, 2017
L.I.S.N	Rohde & Schwarz	ENV216	101131	Jul. 22, 2016	Jul. 21, 2017
L.I.S.N	SCHWARZBECK	NNBL 8226-2	8226-2/164	Jul. 22, 2016	Jul. 21, 2017
Radiation	Spurious Emiss	ion			Cal. Due
Description	Manufacturer	Model No.	Serial No.	Cal. Date	Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 22, 2016	Jul. 21, 2017
EMI Test Receiver	Rohde & Schwarz	ESPI	100010/007	Jul. 22, 2016	Jul. 21, 2017
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar. 20, 2016	Mar. 19, 2017
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar. 19, 2016	Mar. 18, 2017
Pre-amplifier	Sonoma	310N	185903	Mar. 20, 2016	Mar. 19, 2017
Pre-amplifier	HP	8447B	3008A00849	Mar. 26, 2016	Mar. 25, 2017
Loop Antenna	Laplace instrument	RF300	0701	Mar. 19, 2016	Mar. 18, 2017
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar. 26, 2016	Mar. 25, 2017
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A
Antenna C	Conducted Emiss	sion			
Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 22, 2016	Jul. 21, 2017
Spectrum Analyzer	Rohde & Schwarz	ESCI	100321	Jul. 22, 2016	Jul. 21, 2017



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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

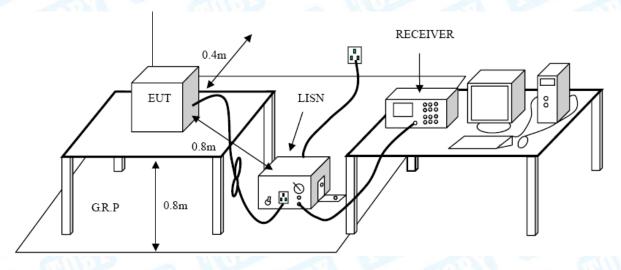
Conducted Emission Test Limit

Eroguonov	Maximum RF Line Voltage (dBμV)			
Frequency	Quasi-peak Level	Average Leve		
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 9 kHz, 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

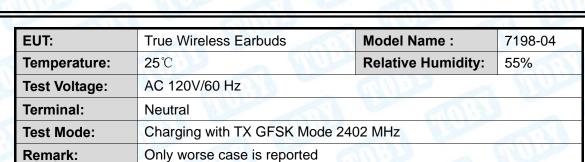
Test data please refer the following pages.

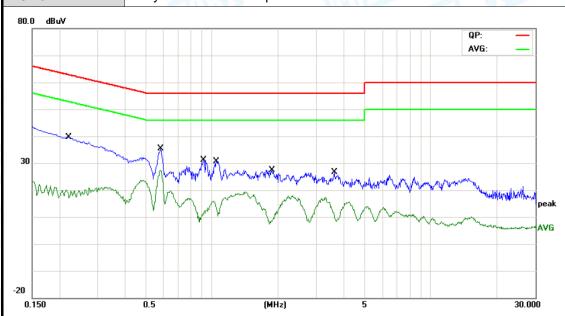


EUT:	True Wire	eless Earb	uds	Model N	Name :	71	98-04
Temperature:	25℃			Relative	Humidity	y : 55	%
Test Voltage:	AC 120V	/60 Hz		1 6	-	1919	
Terminal:	Line		WILL TO		Billin		
Test Mode:	Charging	with TX G	FSK Mode	2402 MHz	3	· 1	TIT.
Remark:	Only wor	se case is	reported	1		1	
80.0 dBuV							
						QP: AVG:	
×							
* The same of the	×						
30	Jan Vala	Mini	Maria Maria	L		dia.	
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	**************************************		147 June	The Control of the Co	The think the think the tensor th	horangh miles	Mayalulanika pea
	, A.	Y W	$\sim$		Many Many	a Marine	
			,			war.	AVI
-20							
0.150	0.5		(MHz)	5			30.000
	F	Reading	Correct	Measure-			
No. Mk.	Freq.	Level	Factor	ment	Limit	Over	
	MHz	dBu∀	dB	dBu∀	dBu∀	dB	Detector
1 (	0.1641	28.42	9.95	38.37	65.25 -	26.88	QP
2 (	0.1641	9.79	9.95	19.74	55.25 -	35.51	AVG
3 (	2 5020					04.00	QP
	0.5820	21.06	10.06	31.12	56.00 -	24.88	Q.
4 * (							
	0.5820	16.60	10.06	26.66	46.00 -	19.34	AVG
5 (	0.5820 0.9140	16.60 13.25	10.06 10.08	26.66 23.33	46.00 - 56.00 -	19.34 32.67	AVG QP
5 (	0.5820 0.9140 0.9140	16.60 13.25 1.19	10.06 10.08 10.08	26.66 23.33 11.27	46.00 - 56.00 -	19.34 32.67 34.73	AVG QP AVG
5 ( 6 ( 7	0.5820 0.9140 0.9140 1.0420	16.60 13.25 1.19 12.92	10.06 10.08 10.08 10.06	26.66 23.33 11.27 22.98	46.00 - 56.00 - 46.00 -	19.34 32.67 34.73 33.02	AVG QP AVG QP
5 ( 6 ( 7 8	0.5820 0.9140 0.9140 1.0420 1.0420	16.60 13.25 1.19 12.92 2.53	10.06 10.08 10.08 10.06 10.06	26.66 23.33 11.27 22.98 12.59	46.00 - 56.00 - 46.00 - 46.00 -	19.34 32.67 34.73 33.02 33.41	AVG QP AVG QP AVG
5 ( 6 ( 7 8	0.5820 0.9140 0.9140 1.0420	16.60 13.25 1.19 12.92	10.06 10.08 10.08 10.06	26.66 23.33 11.27 22.98	46.00 - 56.00 - 46.00 -	19.34 32.67 34.73 33.02 33.41	AVG QP AVG
5 ( 6 ( 7 8 9	0.5820 0.9140 0.9140 1.0420 1.0420	16.60 13.25 1.19 12.92 2.53	10.06 10.08 10.08 10.06 10.06	26.66 23.33 11.27 22.98 12.59	46.00 - 56.00 - 46.00 - 46.00 -	19.34 32.67 34.73 33.02 33.41 35.92	AVG QP AVG QP AVG
5 (6 (7 ) 8 9 10	0.5820 0.9140 0.9140 1.0420 1.0420 1.7660	16.60 13.25 1.19 12.92 2.53 10.02	10.06 10.08 10.08 10.06 10.06	26.66 23.33 11.27 22.98 12.59 20.08	46.00 - 56.00 - 46.00 - 46.00 - 56.00 -	19.34 32.67 34.73 33.02 33.41 35.92 35.51	AVG QP AVG QP AVG



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No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBu∀	dBu∨	dB	Detector
1		0.2220	25.77	10.11	35.88	62.74	-26.86	QP
2		0.2220	8.19	10.11	18.30	52.74	-34.44	AVG
3		0.5820	21.37	10.02	31.39	56.00	-24.61	QP
4	*	0.5820	16.94	10.02	26.96	46.00	-19.04	AVG
5		0.9140	13.08	10.12	23.20	56.00	-32.80	QP
6		0.9140	0.94	10.12	11.06	46.00	-34.94	AVG
7		1.0460	12.78	10.16	22.94	56.00	-33.06	QP
8		1.0460	2.29	10.16	12.45	46.00	-33.55	AVG
9		1.8700	9.84	10.07	19.91	56.00	-36.09	QP
10		1.8700	-2.63	10.07	7.44	46.00	-38.56	AVG
11		3.6060	7.90	10.06	17.96	56.00	-38.04	QP
12		3.6060	0.37	10.06	10.43	46.00	-35.57	AVG



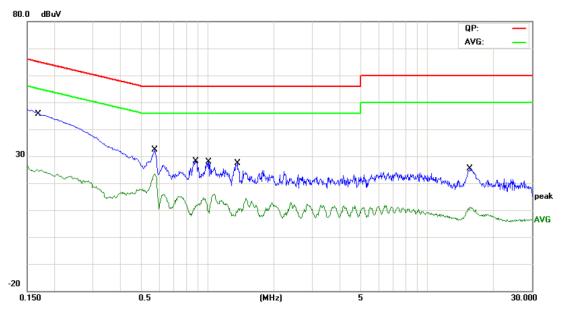
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EUT:	True W	/ireless Earb	ouds	Model	Name:	7	198-04
Temperature:	<b>25</b> ℃			Relativ	ve Humidi	i <b>ty:</b> 55	5%
Test Voltage:	AC 240	0V/60 Hz			600	M.	
Terminal:	Line	)	WHIT:		a W	all the same of	
Test Mode:	Chargi	ng with TX (	GFSK Mode	2402 MHz		4 6	Miles
Remark:	Only w	orse case is	reported	Trans.			
80.0 dBuV							
						QP: AVG:	
30	Market Market	^ XX	X x			×	
and the same		wate my part	Marina	and afternoon white of	inay a fel more interesting	that who have the	harman harman
		WW	MAN	$^{\Lambda}\Lambda \Lambda \Lambda M$	Manum	<u></u>	pea
				0 4 4 4 4		-440	AV
20							
0.150	0.5		(MHz)	5			30.000
		Reading	Correct	Measure-			
No. Mk.	Freq.	Level	Factor	ment	Limit	Over	
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1	0.5740	18.23	10.06	28.29	56.00	-27.71	QP
2 *	0.5740	13.49	10.06	23.55	46.00		AVG
	0.8780	9.33	10.08	19.41	56.00		QP
	0.8780	0.81	10.08	10.89	46.00		AVG
	0.9860	9.00	10.06	19.06	56.00		QP
6	0.9860	1.93	10.06	11.99	46.00	-34.01	AVG
7	1.3740	7.34	10.06	17.40	56.00	-38.60	QP
8	1.3740	-0.56	10.06	9.50	46.00	-36.50	AVG
9	2.2460	4.90	10.05	14.95	56.00	-41.05	QP
	2.2460	-1.98	10.05	8.07	46.00		AVG
	5.6900	10.36	10.25	20.61	60.00		QP
	5.6900	0.57	10.25	10.82	50.00		AVG
12 1							4 1/1 =



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EUT:	True Wireless Earbuds	Model Name :	7198-04				
Temperature:	25℃	Relative Humidity:	55%				
Test Voltage:	AC 240V/60 Hz						
Terminal:	Neutral	Neutral					
Test Mode:	Charging with TX GFSK Mode 2	402 MHz	Millian				
Remark:	Only worse case is reported						
80.0 dBuV							



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBu∀	dBuV	dB	Detector
1	*	0.1712	31.34	10.12	41.46	64.90	-23.44	QP
2		0.1712	12.50	10.12	22.62	54.90	-32.28	AVG
3		0.5740	16.62	10.02	26.64	56.00	-29.36	QP
4		0.5740	11.91	10.02	21.93	46.00	-24.07	AVG
5		0.8820	8.72	10.10	18.82	56.00	-37.18	QP
6		0.8820	0.96	10.10	11.06	46.00	-34.94	AVG
7		1.0060	8.85	10.16	19.01	56.00	-36.99	QP
8		1.0060	-2.02	10.16	8.14	46.00	-37.86	AVG
9		1.3660	7.98	10.12	18.10	56.00	-37.90	QP
10		1.3660	-1.94	10.12	8.18	46.00	-37.82	AVG
11		15.6940	8.17	10.06	18.23	60.00	-41.77	QP
12		15.6940	-0.88	10.06	9.18	50.00	-40.82	AVG



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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)

Fraguancy	Distance Met	ers (at 3m)
Frequency (MHz)	Peak (dBuV/m)	Average (dBuV/m)
Above 1000	74	54

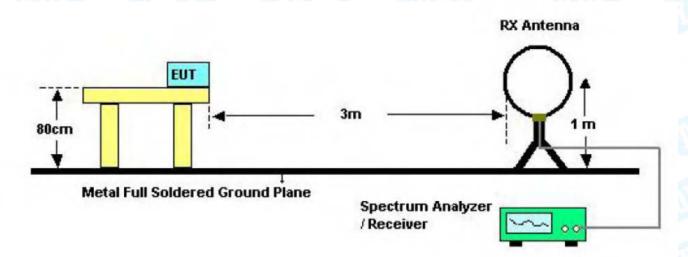
#### Note:

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

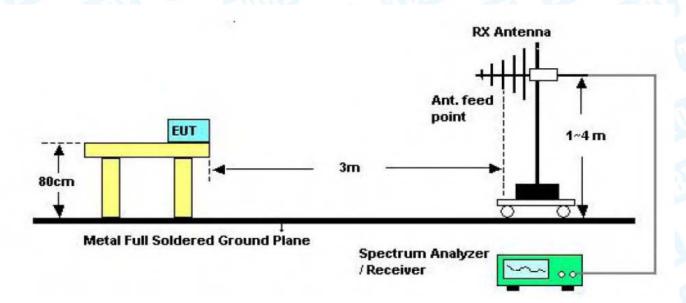


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## 5.2 Test Setup



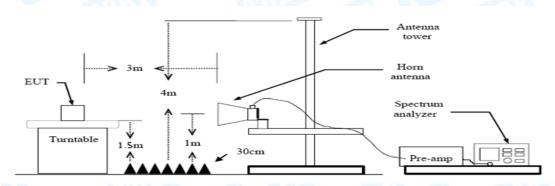
**Below 30MHz Test Setup** 



**Below 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=10Hz with Peak Detector for Average Values.

Test data please refer the following pages.



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#### 9 KHz~30 MHz

From 9 KHz to 30 MHz: Conclusion: PASS

Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

#### 30MHz~1GHz

EUT:			True Wireless Earbuds						Model Name :				7198-04				
Ten	nperatu	ıre:	2	<b>25</b> ℃	111	W			l N	Rel	ative	Hum	idity	<b>'</b> :	55%	6	I
Tes	t Volta	ge:		OC 3	3.7V				7		, N				6	a.	
Ant	. Pol.		H	Horiz	zonta	al	b.	Contract of the Contract of th	611	113			. (			No.	
Tes	t Mode	):	7	ΓX G	FSK	Mc	ode :	2402MHz	67		1	1		W.			1
Rer	nark:		(	Only	wor	se c	ase	is reported	t	9	111						L)
80.	0 dBuV/n	n															_
																	1
												(RF)FC	: 15C 3I	M Radi	ation		1
														Marg	in -6	dB	1
									+								-
30																	
													5		6 X	بالمرائد والمراجع	,,,
	1									3			WALLAND THE	AND THE PROPERTY.	PERSONAL V	M**	1
	Mary Mary	an landa						2 mydlishiningarlyshin	Maryana	productive pr	A A STANSON OF THE ST	<b>N</b>					$\frac{1}{1}$
		Mary Mary	hyanykhykhy	استوريالهماير	lingholdstroin	Milero	And a company	Podlobou									$\parallel$
																	-
-20																	
30	0.000	40 5	50 6	io 70	0 80			(MHz)		3	00	400	500	600	700	1000	_  ).0(
30	0.000	40 E	50 6	60 70		adi	na		Mea			400	500	600	700	1000	 ).0(
	0.000 A		50 6		Re	adi		(MHz) Correct Factor		asure ent	-	400 imit		600 :		1000	J 3.00
		ζ.		1.	Re L		el	Correct Factor	m	asure	- L		-		r	1000	
N		ζ.	Frec MHz	1.	Re Lo	eve IBuV	el	Correct Factor	m dB	asure ent suV/m	- L	imit BuV/n	1	Over dB	r	Detec	cto
1		35	Fred MHz	Į. 12	Re Lo	eve IBuV 7.73	3	Correct Factor dB/m -17.37	m dB 10	asure ent buV/m 0.36	- L d	imit BuV/n	) -;	Over dB 29.6	r 54	Detec	cto ak
1 2		35	Fred MHz 3.251 3.41	1. 12 38	Re Lo	eve 1Bu/ 7.73 9.63	3	Correct Factor dB/m -17.37 -20.82	m dB 10	asure lent 0.36	- L d	imit BuV/n 10.00	) -/	Dver dB 29.6	64 69	Detection pea	ak ak
1		35	Fred MHz	1. 12 38	Re Lo	eve IBuV 7.73	3	Correct Factor dB/m -17.37	m dB 10	asure ent buV/m 0.36	- L d	imit BuV/n	) -/	Over dB 29.6	64 69	Detec	eto ak ak
1 2		35 168 299	Fred MHz 3.251 3.41	1. 12 38 58	2 2 2 2	eve 1Bu/ 7.73 9.63	3 3 3	Correct Factor dB/m -17.37 -20.82	m dB 10 8	asure lent 0.36	- L	imit BuV/n 10.00	C -:	Dver dB 29.6	54 59	Detection pea	ak ak
1 2 3		35 168 299 434	Fred MHz 3.251 3.41	1. 12 38 58	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	eve 7.73 9.63 8.23	3 3 2	Correct Factor dB/m -17.37 -20.82 -16.67	m dB 10 8 11 15 15 15 15 15 15 15 15 15 15 15 15	asure ent 0.36 3.81	- L	imit BuV/n 10.00 13.50	C - :	Over dB 29.6 34.6 34.4	64 69 14	Detection per per	ak ak ak

*:Maximum data x:Over limit !:over margin



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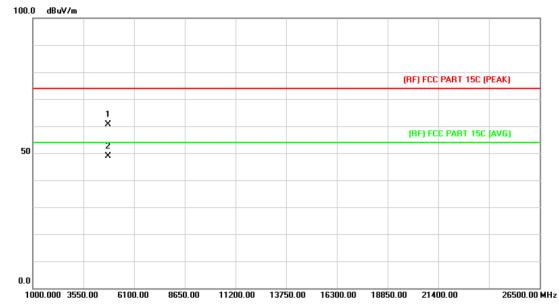
EUT:	True W	ireless Earb	ouds	Model	Name:	7198	3-04	
Temperature:	25℃	THE PARTY OF		Relativ	e Humidity	: 55%	55%	
Test Voltage:	DC 3.7	V				18		
Ant. Pol.	Vertical		CHAT.		I Han		and a	
Test Mode:	TX GFS	SK Mode 24	I02MHz		3	01		
Remark:	Only wo	orse case is	reported	Commen		3	(	
80.0 dBuV/m								
					(RF)FCC 15C	3M Radiation		
						Margin -6	dB	
30								
					5	6	Material March 1994	
1			3		5 Egyadouber Halvedreap Arra Stephin	Marilia		
Markon dan Mar	المناوا المناوا المناوات والمناورة و	2 Washington William Mary	when the second	which the mentioner that he had the				
	Mendal Manager 1	,						
-20 30.000 40	50 60 70	80	(MHz)	300	400 500	600 700	1000.00	
					100 000	000 100		
No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
	MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detecto	
1 34	1.6385	27.03	-17.01	10.02	40.00	-29.98	peak	
2 10	5.2718	28.01	-21.85	6.16	43.50	-37.34	peak	
	5.2718 3.2005	27.94	-21.85 -20.35	6.16 7.59		-37.34 -35.91	peak	
3 18 4 34	3.2005 1.9786	27.94 28.34	-20.35 -14.65	7.59 13.69	43.50 46.00	-35.91 -32.31	peak peak	
3 18 4 34 5 51	3.2005	27.94	-20.35	7.59	43.50 46.00	-35.91	peak peak peak peak	



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#### **Above 1GHz**

EUT:	True Wireless Earbuds	Model Name :	7198-04				
Temperature:	25℃	Relative Humidity:	55%				
Test Voltage:	DC 3.7V	WILL OF THE PARTY					
Ant. Pol.	Horizontal	Horizontal					
Test Mode:	TX GFSK Mode 2402MHz	THE PARTY OF	A. S. S.				
Remark:	No report for the emission which	more than 10 dB belo	w the				
	prescribed limit.						

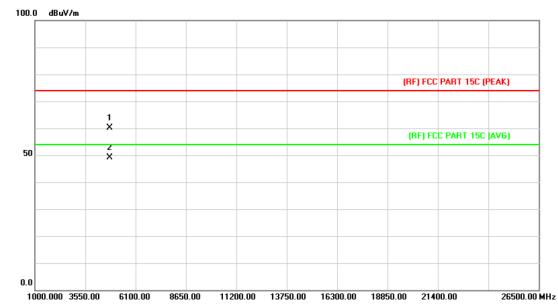


No	. Mk	Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4803.530	47.07	13.44	60.51	74.00	-13.49	peak
2	*	4804.056	35.34	13.44	48.78	54.00	-5.22	AVG



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EUT:	True Wireless Earbuds	Model Name :	7198-04				
Temperature:	25℃	55%					
Test Voltage:	DC 3.7V						
Ant. Pol.	Vertical						
Test Mode:	TX GFSK Mode 2402MHz	20137	DITT. S				
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		4803.779	46.69	13.44	60.13	74.00	-13.87	peak
2	*	4803.961	35.74	13.44	49.18	54.00	-4.82	AVG



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EUT:	True Wireless Earbuds	Model Name :	7198-04					
Temperature:	25℃ Relative Humidity: 55%							
Test Voltage:	DC 3.7V	DC 3.7V						
Ant. Pol.	Horizontal							
Test Mode:	TX GFSK Mode 2441MHz	20137	Chillian .					
Remark: No report for the emission which more than 10 dB below the prescribed limit.								

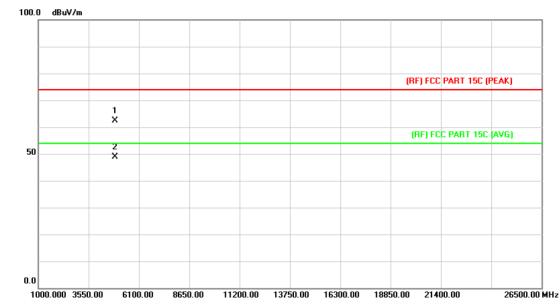


N	o. M	k. Freq.	_	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4882.140	34.77	13.90	48.67	54.00	-5.33	AVG
2		4882.458	46.56	13.90	60.46	74.00	-13.54	peak



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EUT:	True Wireless Earbuds	7198-04						
Temperature:	25℃	55%						
Test Voltage:	DC 3.7V	DC 3.7V						
Ant. Pol.	Vertical							
Test Mode:	TX GFSK Mode 2441MHz	201:373	CHIT:					
Remark:	No report for the emission which more than 10 dB below the prescribed limit.							

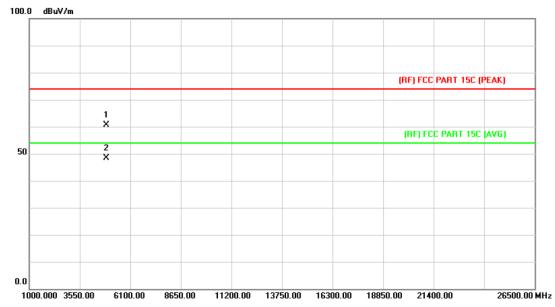


No	o. Mk	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4881.979	48.43	13.90	62.33	74.00	-11.67	peak
2	*	4881.979	34.95	13.90	48.85	54.00	-5.15	AVG



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EUT:	True Wireless Earbuds	Model Name :	7198-04			
Temperature:	25℃	55%				
Test Voltage:	DC 3.7V					
Ant. Pol.	Horizontal					
Test Mode:	TX GFSK Mode 2480MHz		Millian			
Remark:	No report for the emission which prescribed limit.	more than 10 dB below	the			

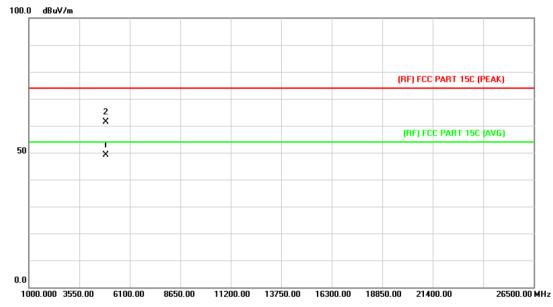


N	o. Mk	. Freq.			Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4895.908	46.60	13.99	60.59	74.00	-13.41	peak
2	*	4896.132	34.33	13.99	48.32	54.00	-5.68	AVG



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EUT:	EUT: True Wireless Earbuds		7198-04				
Temperature:	25℃	55%					
Test Voltage:	ge: DC 3.7V						
Ant. Pol.	Vertical						
Test Mode:	TX GFSK Mode 2480MHz		DITT.				
Remark:	No report for the emission which prescribed limit.	more than 10 dB below	w the				

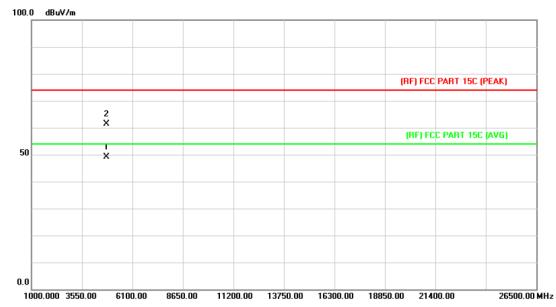


No	. Mk	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4896.035	35.17	13.99	49.16	54.00	-4.84	AVG
2		4896.167	47.27	13.99	61.26	74.00	-12.74	peak



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EUT:	True Wireless Earbuds	Model Name :	7198-04						
Temperature:	25℃	55%							
Test Voltage:	DC 3.7V	DC 3.7V							
Ant. Pol.	Horizontal								
Test Mode:	TX 8-DPSK Mode 2402MHz	10:30	DITT.						
Remark:	Remark: No report for the emission which more than 10 dB below the prescribed limit.								

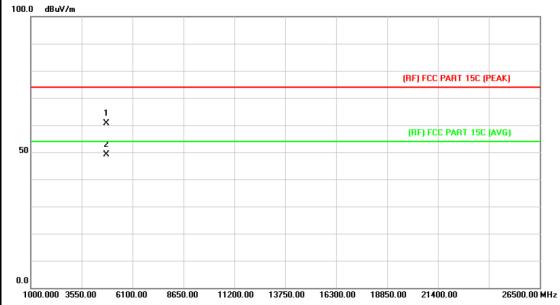


N	o. Mk	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4804.076	35.70	13.44	49.14	54.00	-4.86	AVG
2		4804.451	47.92	13.44	61.36	74.00	-12.64	peak



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EUT:	True Wireless Earbuds	Model Name :	7198-04
Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		
Ant. Pol.	Vertical		
Test Mode:	TX 8-DPSK Mode 2402MHz	111:12	Millian
Remark:	No report for the emission which	more than 10 dB below	the
	prescribed limit.		1

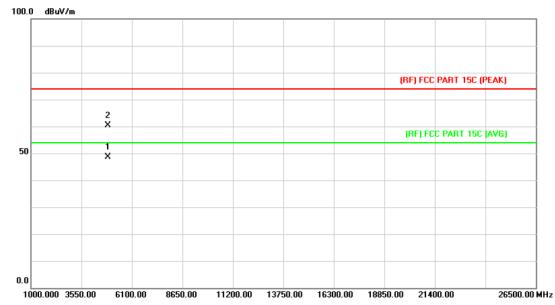


No.	Mk.	Freq.	_		Measure- ment	Limit	Over	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4803.781	47.12	13.44	60.56	74.00	-13.44	peak
2	*	4803.976	35.79	13.44	49.23	54.00	-4.77	AVG



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EUT:	True Wireless Earbuds	Model Name :	7198-04
Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		
Ant. Pol.	Horizontal		
Test Mode:	TX 8-DPSK Mode 2441MHz		Millian
Remark:	No report for the emission which	h more than 10 dB below	v the
	prescribed limit.		THE RESERVE



1	No.	Mk.	Freq.			Measure- ment	Limit	Over	
			MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1		*	4881.752	34.76	13.90	48.66	54.00	-5.34	AVG
2			4882.359	46.51	13.90	60.41	74.00	-13.59	peak



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EUT:	True Wireless Earbuds	Model Name :	7198-04
Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V	TO THE	
Ant. Pol.	Vertical		
Test Mode:	TX 8-DPSK Mode 2441MHz	10:30	MILLER
Remark:	No report for the emission which no prescribed limit.	nore than 10 dB below	the

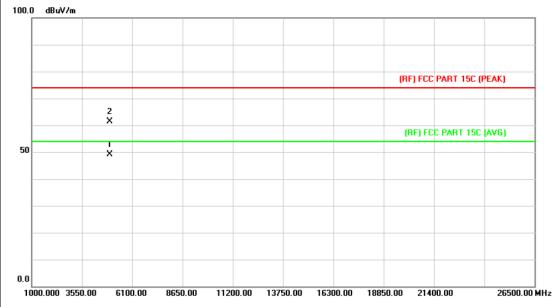


No	o. MI	k. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4881.826	34.72	13.90	48.62	54.00	-5.38	AVG
2		4882.173	47.30	13.90	61.20	74.00	-12.80	peak



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EUT:	True Wireless Earbuds	Model Name :	7198-04
Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V	THE STATE OF THE S	
Ant. Pol.	Horizontal		
Test Mode:	TX 8-DPSK Mode 2480MHz		MILLER
Remark:	No report for the emission which prescribed limit.	more than 10 dB below	the

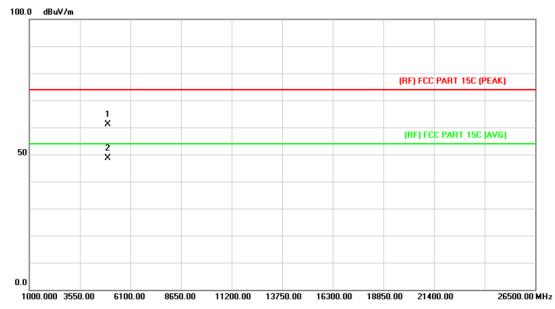


N	o. M	k. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4959.781	34.80	14.36	49.16	54.00	-4.84	AVG
2		4960.454	46.94	14.36	61.30	74.00	-12.70	peak



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EUT:	True Wireless Earbuds	Model Name :	7198-04
Temperature:	<b>25</b> ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		
Ant. Pol.	Vertical	TO VILLE	
Test Mode:	TX 8-DPSK Mode 2480MHz	201377	DIO.
Remark:	No report for the emission which prescribed limit.	more than 10 dB belo	w the



No.	Mk.	Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4959.627	46.71	14.36	61.07	74.00	-12.93	peak
2	*	4960.235	34.19	14.36	48.55	54.00	-5.45	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

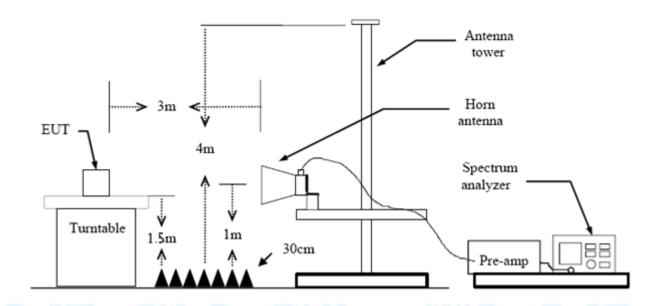
FCC Part 15.247(d)

6.1.2 Test Limit

Restricted Frequency	Distance Meters (at 3m)				
Band (MHz)	Peak (dBuV/m)	Average (dBuV/m)			
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



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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.

## 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=10Hz with Peak Detector for Average Values.

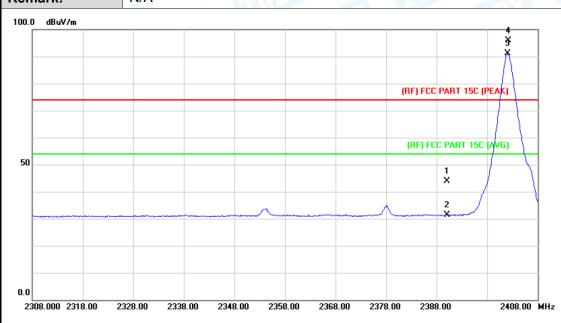
All restriction bands have been tested, only the worst case is reported.



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## (1) Radiation Test

EUT:	True Wireless Earbuds	Model Name :	7198-04			
Temperature:	25℃	Relative Humidity:	55%			
Test Voltage:	DC 3.7V					
Ant. Pol.	Horizontal	11:30 T	CIULIA			
Test Mode:	TX GFSK Mode 2402MHz					
Remark:	N/A	THU THE	1			



No.	Mk.	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	43.01	0.77	43.78	74.00	-30.22	peak
2		2390.000	30.66	0.77	31.43	54.00	-22.57	AVG
3	*	2402.000	90.37	0.82	91.19	Fundamental Frequency		AVG
4	X	2402.200	94.97	0.82	95.79	Fundamental Frequency		peak



Report No.: TB-FCC151073
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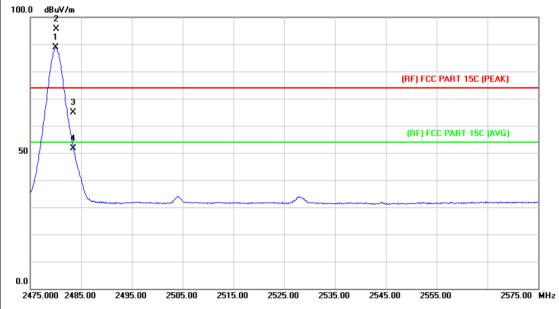
Page:

EUT:			True \	Wirele	ss Ea	arbuds	HE	Model Name: 7198-04		8-04		
Гетр	erature	:	<b>25</b> ℃			13		R	Relativ	e Humidit	y: 55%	5
Test V	oltage	:	DC 3.	.7V				<b>\</b>	3	(III)	333	
Ant. P	ol.	/	Vertic	al		11/1						TIME
Test N	lode:		TX G	FSK N	lode :	2402MH	Z	9	11/18			
Rema	rk:		N/A	MB.				V				
100.0	dBuV/m											
										(RF) FCC PA	RT 15C (PEAK	]
50										(RF) FCC P	ART 15C (AVG	
										2 X		
0.0	000 2320.	<b>0</b> 0 <b>2</b> 33	30.00	2340.00	235	0.00 2360	0.00	2370.0	0 2380	1.00 2390.00	1 2	410.00 MH
	Mk	Free	~	Read		Corre			sure-	Limit	Over	
No.	IVIIX.		4.	Lev	eı	Facto	or	me	ii it	LIIIII		
No.	IVIK.	MHz	<u> </u>	dBu		dB/m			V/m	dBuV/m	dB	Detect
No.			· <u>·</u>		ı۷			dBu			dB -31.47	
No. 1 2	2	MHz	000	dBu	ı∨ 76	dB/m		dBu	V/m .53	dBuV/m		
1	2	MHz 2390.0	000	dBu	76 32	dB/m 0.77		42. 31.	V/m .53	dBuV/m 74.00	-31.47 -22.91	pea



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EUT:	True Wireless Earbuds	Model Name :	7198-04				
Temperature:	25℃	Relative Humidity:	55%				
Test Voltage:	DC 3.7V	MILLS					
Ant. Pol.	Horizontal						
Test Mode:	TX GFSK Mode 2480 MHz						
Remark:	N/A						
100.0 dBuV/m							
1							
		(RF) FCC PART 1	5C (PEAK)				
3							

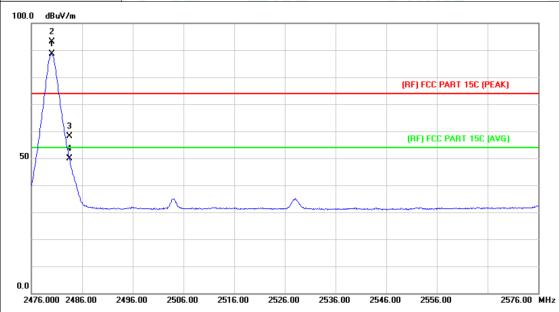


No.	Mk	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	2480.000	87.66	1.15	88.81	Fundamental	Frequency	AVG
2	Χ	2480.100	94.42	1.15	95.57	Fundamental Frequency		peak
3		2483.500	63.76	1.17	64.93	74.00	-9.07	peak
4		2483.500	50.55	1.17	51.72	54.00	-2.28	AVG



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EUT:	True Wireless Earbuds	Model Name :	7198-04
Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V	TO B	
Ant. Pol.	Vertical		
Test Mode:	TX GFSK Mode 2480 MHz		DITT.
Remark:	N/A		

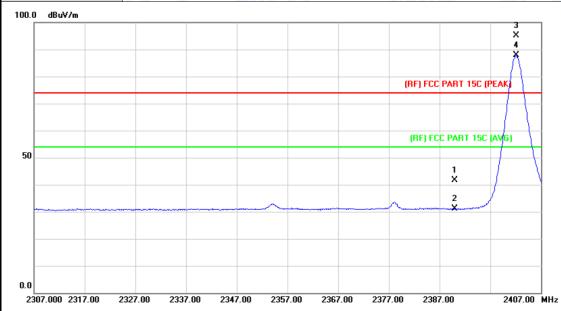


No	o. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	2480.000	87.57	1.15	88.72	Fundamental	Frequency	AVG
2	X	2480.100	91.88	1.15	93.03	Fundamental I	reauencv	peak
3		2483.500	56.87	1.17	58.04	74.00	-15.96	peak
4		2483.500	48.60	1.17	49.77	54.00	-4.23	AVG



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EUT:	True Wireless Earbuds	Model Name :	7198-04
Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V	mn i	
Ant. Pol.	Horizontal		
Test Mode:	TX 8-DPSK Mode 2402MHz		Alle
Remark:	N/A		

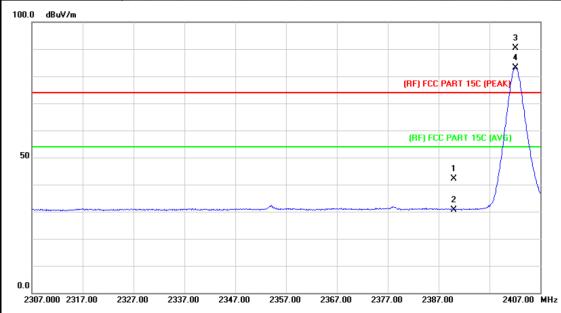


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	40.78	0.77	41.55	74.00	-32.45	peak
2		2390.000	30.35	0.77	31.12	54.00	-22.88	AVG
3	X	2402.100	94.25	0.82	95.07	Fundamental Frequency		peak
4	*	2402.100	87.07	0.82	87.89	Fundamental	Frequency	AVG



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EUT:	True Wireless Earbuds	Model Name :	7198-04				
Temperature:	25℃	Relative Humidity:	55%				
Test Voltage:	DC 3.7V	DC 3.7V					
Ant. Pol.	Vertical						
Test Mode:	TX 8-DPSK Mode 2402MHz		Millian				
Remark:	N/A						

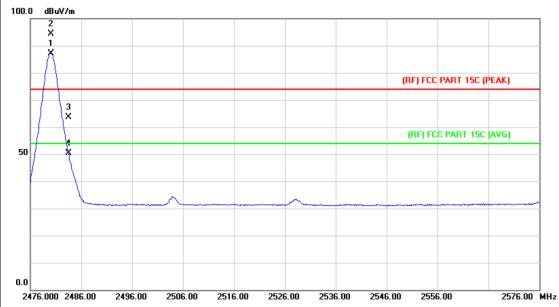


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	41.39	0.77	42.16	74.00	-31.84	peak
2		2390.000	29.91	0.77	30.68	54.00	-23.32	AVG
3	X	2402.100	89.44	0.82	90.26	Fundamental	Frequency	peak
4	*	2402.200	82.38	0.82	83.20	Fundamental	Frequency	AVG



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		Mr. Villa						
EUT:	True Wireless Earbuds	Model Name :	7198-04					
Temperature:	25℃	25℃ Relative Humidity: 55%						
Test Voltage:	DC 3.7V	mili i						
Ant. Pol.	Horizontal							
Test Mode:	TX 8-DPSK Mode 2480MHz	CHILL ST.	Alle					
Remark:	N/A							
100.0 dBuV/m								
2 X 1								

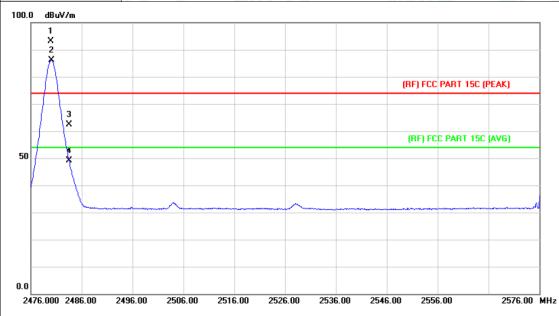


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	2480.000	86.07	1.15	87.22	Fundamenta	al Frequency	AVG
2	Χ	2480.100	93.18	1.15	94.33	Fundamenta	al Frequency	peak
3		2483.500	62.52	1.17	63.69	74.00	-10.31	peak
4		2483.500	49.25	1.17	50.42	54.00	-3.58	AVG



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EUT:	True Wireless Earbuds	Model Name :	7198-04
Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V	mn's	
Ant. Pol.	Vertical		
Test Mode:	TX 8-DPSK Mode 2480MHz	CIU.	Million
Remark:	N/A		
100.0 40.47-	·		

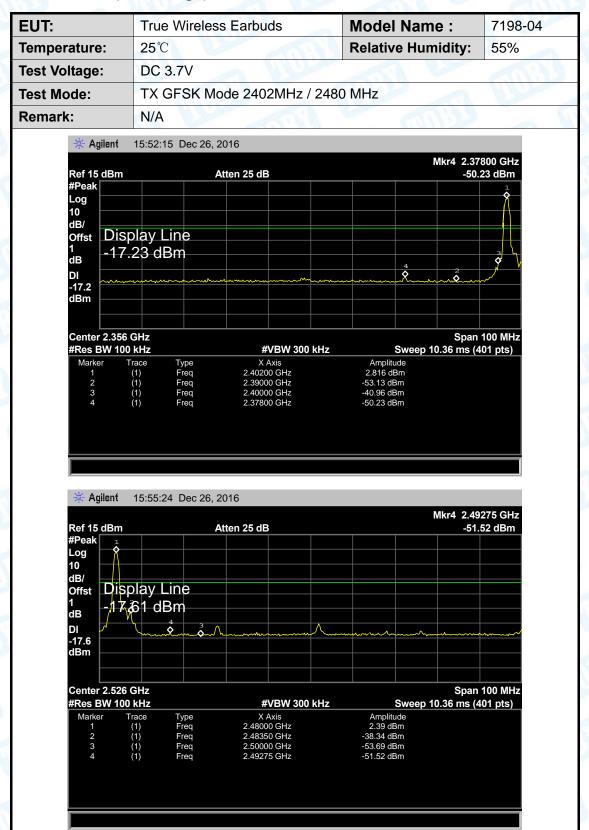


N	lo. M	1k.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
			MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1	Χ		2479.900	91.97	1.15	93.12	Fundamenta	I Frequency	peak
2	*		2480.000	85.06	1.15	86.21	Fundamental	Frequency	AVG
3			2483.500	61.12	1.17	62.29	74.00	-11.71	peak
4			2483.500	48.08	1.17	49.25	54.00	-4.75	AVG



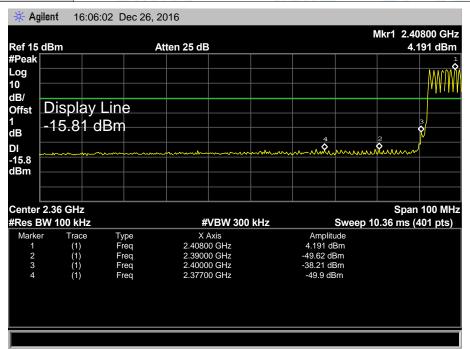
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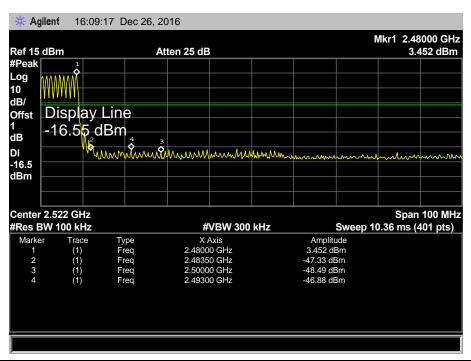
# (2) Conducted Test(Band Edge)





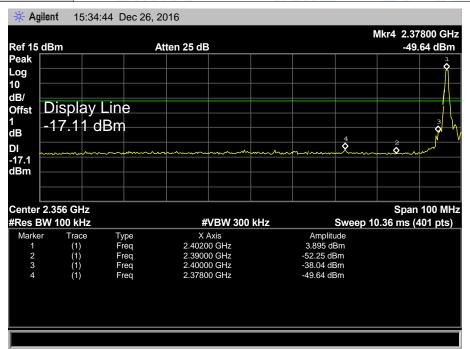
EUT:	True Wireless Earbuds	Model Name :	7198-04
Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V	The same	3
Test Mode:	GFSK Hopping Mode	THE RESERVE TO SERVE	1
Remark:	N/A		CHILL

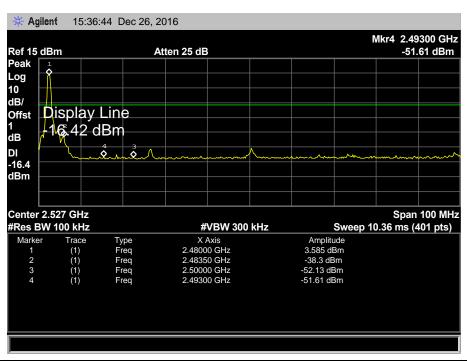






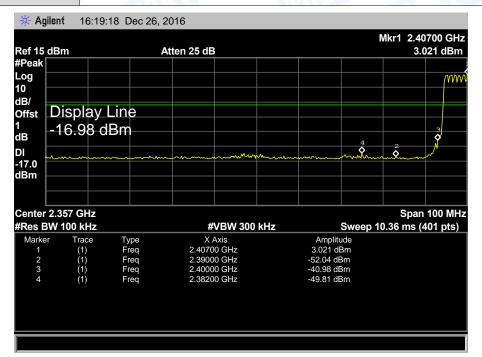
EUT:	True Wireless Earbuds	e Wireless Earbuds Model Name :			
Temperature:	25℃	Relative Humidity:	55%		
Test Voltage:	DC 3.7V				
Test Mode:	TX 8-DPSK Mode 2402MHz / 2480 MHz				
Remark:	N/A				

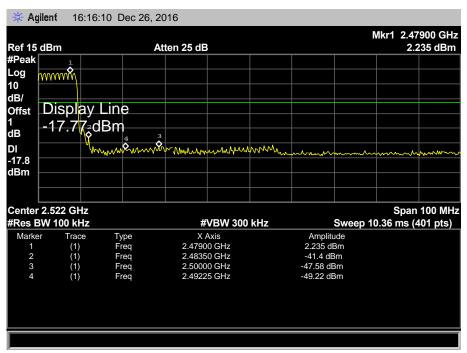






EUT:	True Wireless Earbuds	Model Name :	7198-04
Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		
Test Mode:	8-DPSK Hopping Mode		
Remark:	N/A		CHILL







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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



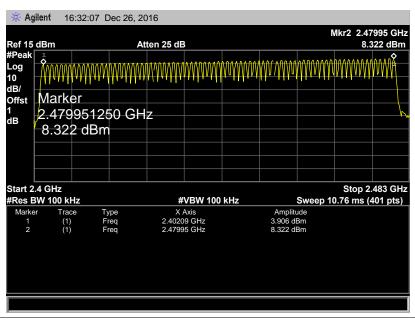
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EUT:	True Wireless Earbuds	Model Name :	7198-04
Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V	mili	

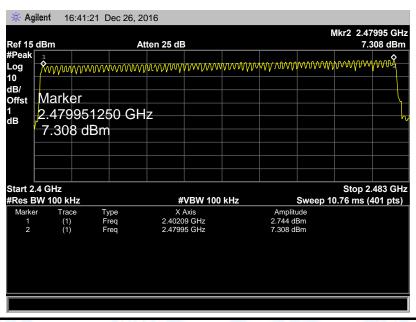
**Test Mode:** Hopping Mode (GFSK/8-DPSK)

Frequency Range	Quantity of Hopping Channel	Limit
2402MU- 2400MU-	79	<b>\1</b> E
2402MHz~2480MHz	79	>15

#### **GFSK Mode**



#### 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 average time of occupancy on any channel within the Period can be calculated with formulas:

 ${Total of Dwell} = {Pulse Time} * (1600 / X) / {Number of Hopping Frequency} * {Period} = 0.4s * {Number of Hopping Frequency}$ 

Note: X=2 or 4 or 6 (1DH1=2, 1DH3=4, 1DH5=6. 2DH1=2, 2DH3=4, 2DH5=6. 3DH1=2,3DH3=4, 3DH5=6)

The lowest, middle and highest channels are selected to perform testing to record the dwell time of each occupation measured in this channel, which is called Pulse Time here.

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



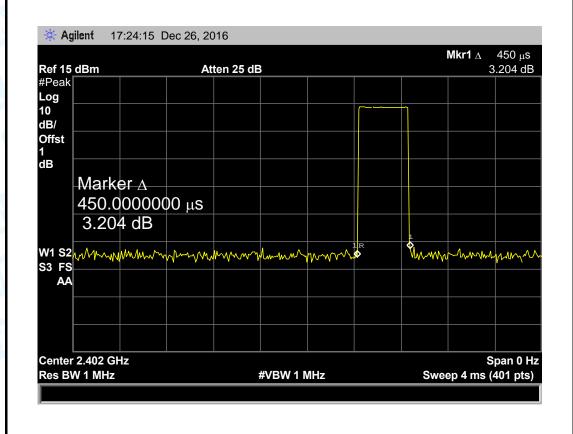
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# 8.5 Test Data

EUT:	True Wireles	s Earbuds	Model Name :		7198-04				
Temperature:	25℃		Relative Humi	dity:	55%				
Test Voltage:	DC 3.7V	MUL		S. San					
Test Mode:	Hopping Mod	de (GFSK DH1)	CHILD ST		Maria				
Channel	Pulse Time	Total of Dwell	Period Time	Limit	Popult				
(MHz)	(ms)	(ms)	(s)	(ms)	Result				
2402	0.450	144.00							
2441	0.460	147.20	31.60	400	PASS				
2480	0.460	147.20							
Nata Dinali Ga	D T	Note: Dwell time Dules Time (ms) (4000 2 70) 24.0							

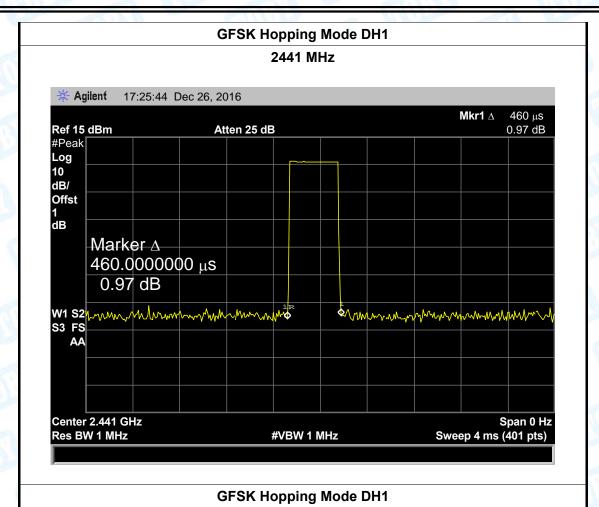
Note: Dwell time=Pulse Time (ms)  $\times$  (1600  $\div$  2  $\div$  79)  $\times$ 31.6

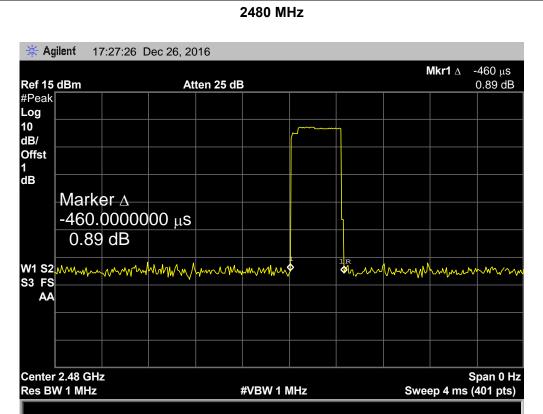
## **GFSK Hopping Mode DH1**





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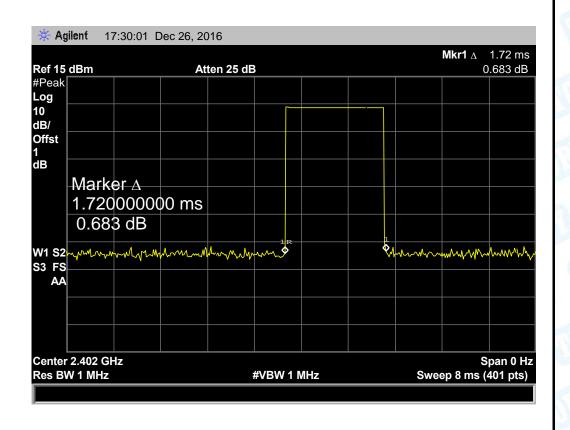


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True Wirele	ess Earbuds	Model Name :		7198-04
<b>25</b> ℃		Relative Humidity:		55%
DC 3.7V	N. C.	1		
Hopping M	ode (GFSK DH3)		F. P.	
Pulse Time	Total of Dwell	Period Time	Limit	Result
(ms)	(ms)	(s)	(ms)	Resuit
1.720	275.20			
1.720	275.20	31.60	400	PASS
1.740	278.40			
	25°C DC 3.7V Hopping M Pulse Time (ms) 1.720 1.720	DC 3.7V Hopping Mode (GFSK DH3)  Pulse Time (ms) (ms)  1.720 275.20  1.720 275.20	25℃ Relative Hum  DC 3.7V  Hopping Mode (GFSK DH3)  Pulse Time (ms) (ms) (s)  1.720 275.20  1.720 275.20 31.60	25℃ Relative Humidity:  DC 3.7V Hopping Mode (GFSK DH3)  Pulse Time (ms) (ms) (s) (ms)  1.720 275.20  1.720 275.20 31.60 400

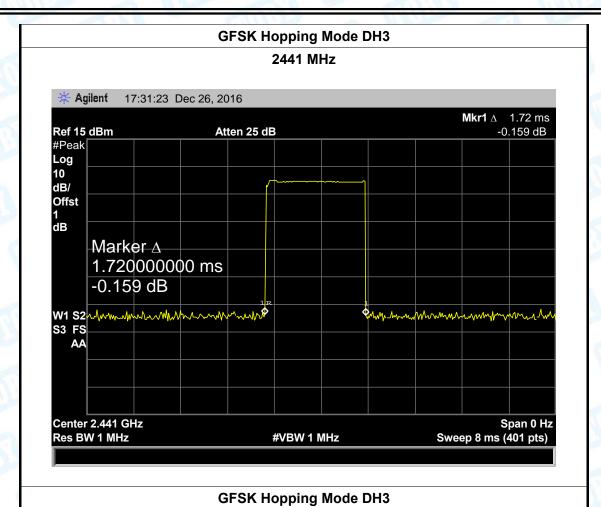
Note: Dwell time=Pulse Time (ms)  $\times$  (1600  $\div$  4  $\div$  79)  $\times$ 31.6

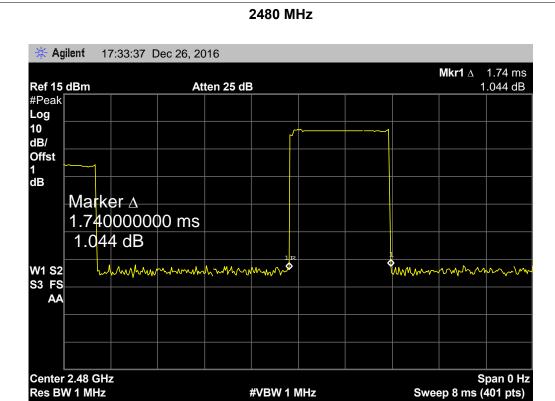
## **GFSK Hopping Mode DH3**





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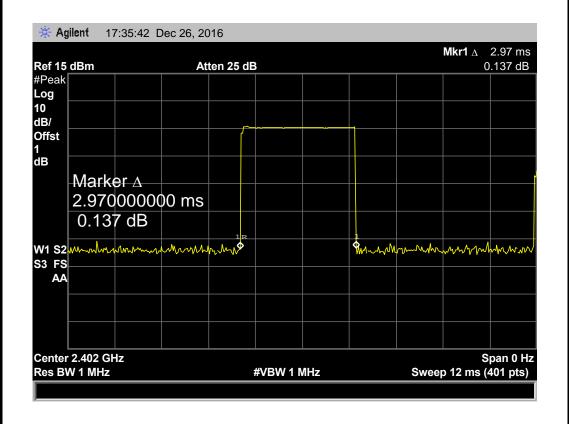


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EUT:	True Wirele	ess Earbuds	Model Name	e :	7198-04
Temperature	<b>25</b> ℃		Relative Hum	Relative Humidity:	
Test Voltage:	DC 3.7V		1 6		3
Test Mode:	Hopping M	ode (GFSK DH5)		F. P.	1
Channel	Pulse Time	Total of Dwell	Period Time	Limit	Result
(MHz)	(ms)	(ms)	(s)	(ms)	Result
2402	2.970	316.80			
2441	2.970	316.80	31.60	400	PASS
2480	3.000	320.00			
					•

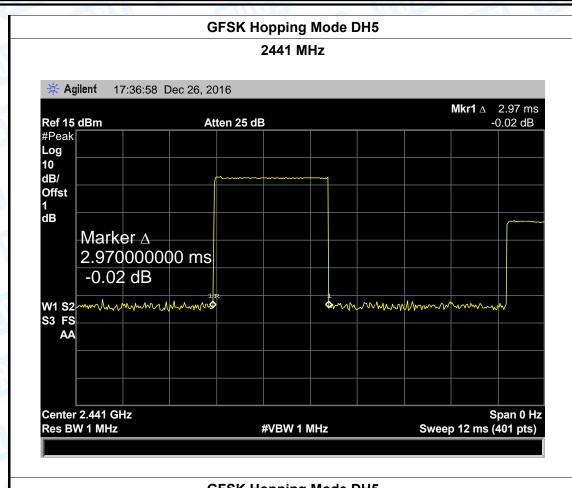
Note: Dwell time=Pulse Time (ms)  $\times$  (1600  $\div$  6  $\div$  79)  $\times$ 31.6

## **GFSK Hopping Mode DH5**

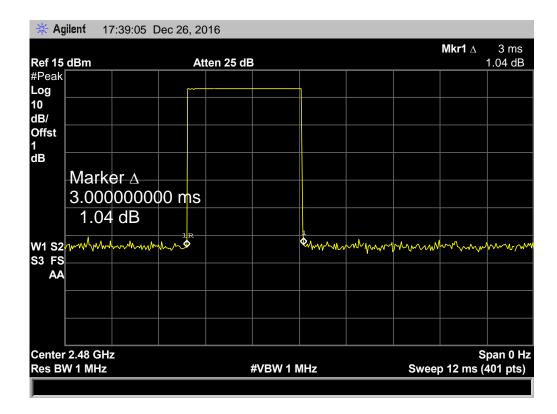




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# GFSK Hopping Mode DH5 2480 MHz



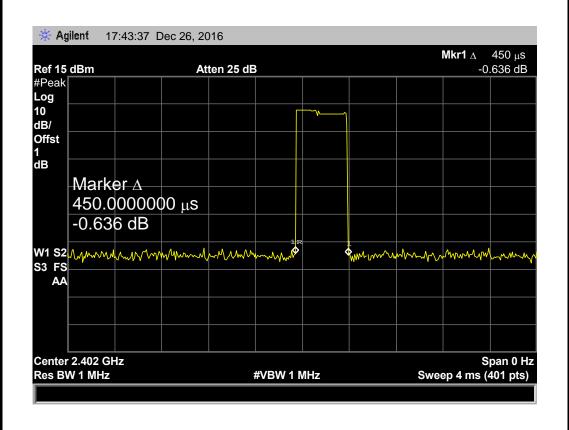


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EUT:	True Wirele	ess Earbuds	Model Nam	e:	7198-04
Temperature	: <b>25</b> ℃		Relative Hum	idity:	55%
Test Voltage:	DC 3.7V	W. Comment	1		
Test Mode:	Hopping M	ode ( $\pi$ /4-DQPSK DF	H1)	A Division of the Land	
Channel	Pulse Time	Total of Dwell	Period Time	Limit	Result
(MHz)	(ms)	(ms)	(s)	(ms)	Result
2402	0.450	144.00			
2441	0.460	147.20	31.60	400	PASS
2480	0.460	147.20			

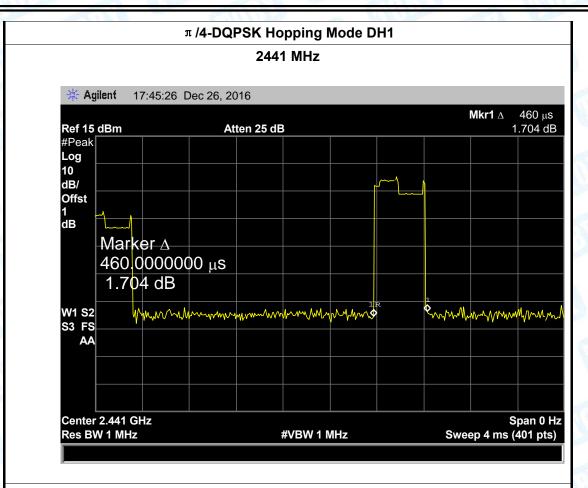
Note: Dwell time=Pulse Time (ms)  $\times$  (1600  $\div$  2  $\div$  79)  $\times$ 31.6

# $\pi$ /4-DQPSK Hopping Mode DH1

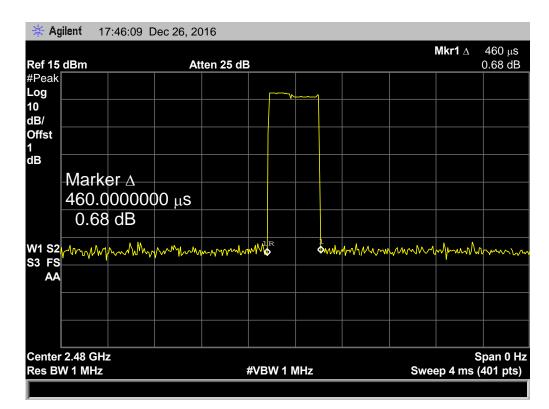




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2441

2480

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400

**PASS** 

31.60

EUT:	True Wire	eless Earbuds	Model Nam	e :	7198-04
Temperature: 25°C			Relative Hum	idity:	55%
Test Voltage:	DC 3.7V			M	
Test Mode:	Hopping	Hopping Mode ( π /4-DQPSK DH3)			
Channel	Channel Pulse Time Total of Dwell		Period Time	Limit	Result
(MHz)	(ms)	(ms)	(s)	(ms)	Result
2402	1.720	275.20			

Note: Dwell time=Pulse Time (ms) x (1600  $\div$  4  $\div$  79) x31.6

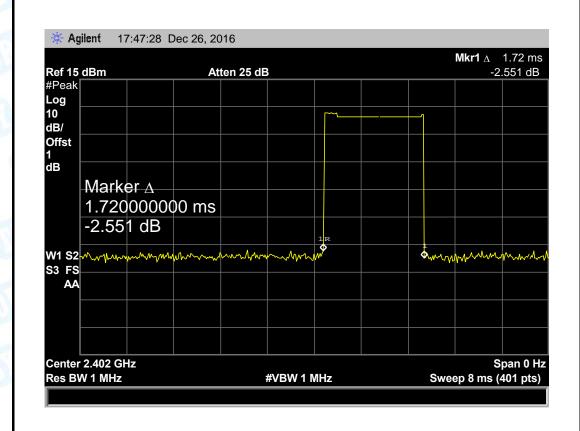
1.720

1.720

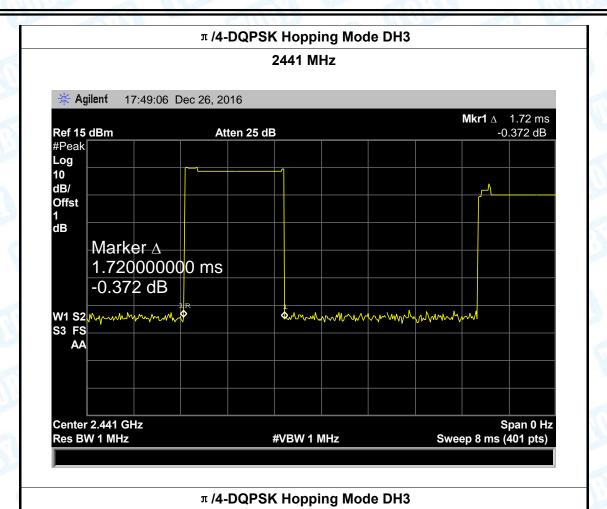
## $\pi$ /4-DQPSK Hopping Mode DH3

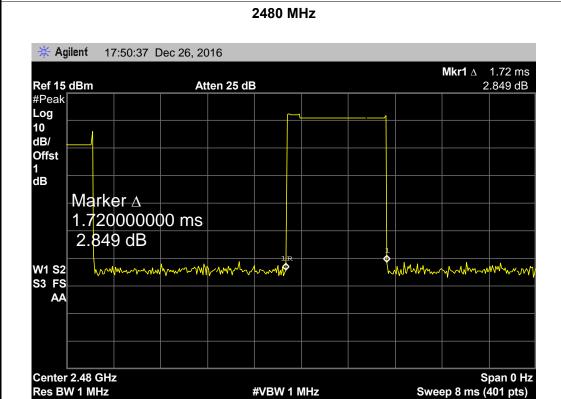
275.20

275.20











2480

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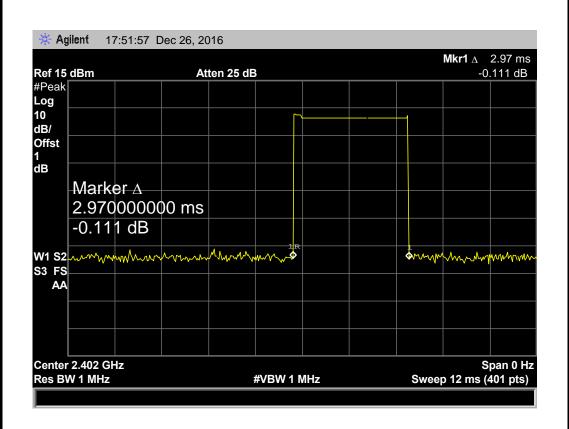
EUT:	True Wir	True Wireless Earbuds		Model Name :	
Temperature	: <b>25</b> ℃	<b>25</b> ℃		Relative Humidity:	
Test Voltage:	DC 3.7	V	TV P		
Test Mode:	Hopping	Hopping Mode ( π /4-DQPSK DH5)			
Channel	Pulse Tim	ne Total of Dwe	II Period Time	Limit	Result
(MHz)	(ms)	(ms)	(s)	(ms)	Result
2402	2.970	316.80			
2441	2.970	316.80	31.60	400	PASS
1	1				1

Note: Dwell time=Pulse Time (ms)  $\times$  (1600  $\div$  6  $\div$  79)  $\times$ 31.6

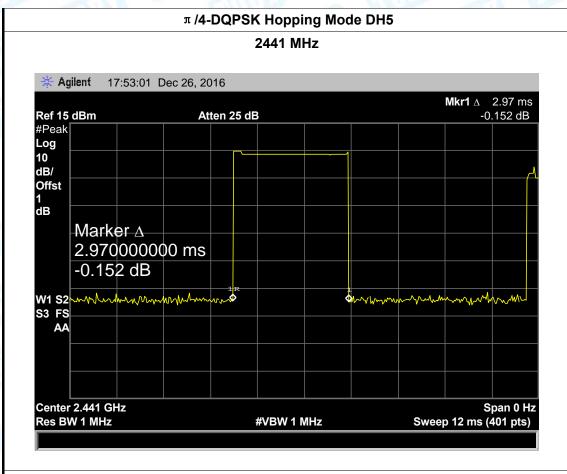
2.970

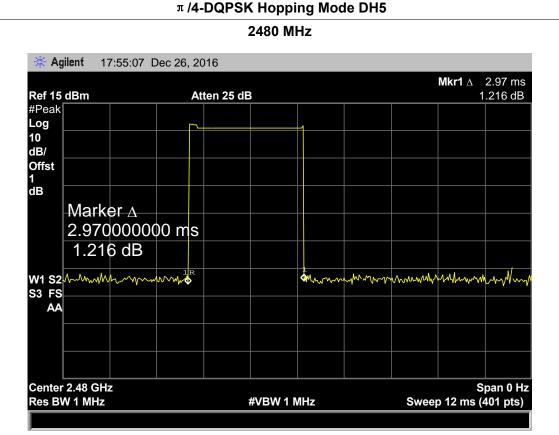
# $\pi$ /4-DQPSK Hopping Mode DH5

316.80









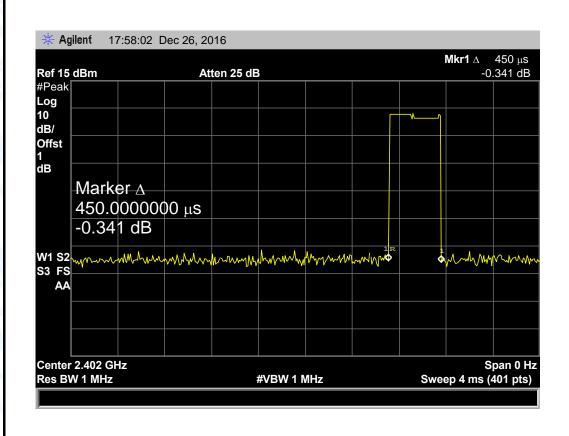


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EUT:	True Wirele	True Wireless Earbuds		Model Name :	
Temperature	: <b>25</b> ℃	25℃		Relative Humidity:	
Test Voltage:	DC 3.7V		CHILD		MARINE
Test Mode:	Hopping M	ode (8-DPSK DH1)	1	TO B	
Channel	Pulse Time	Total of Dwell	Period Time	Limit	Result
(MHz)	(ms)	(ms)	(s)	(ms)	Result
2402	0.450	144.00			
2441	0.450	144.00	31.60	400	PASS
2480	0.450	144.00			

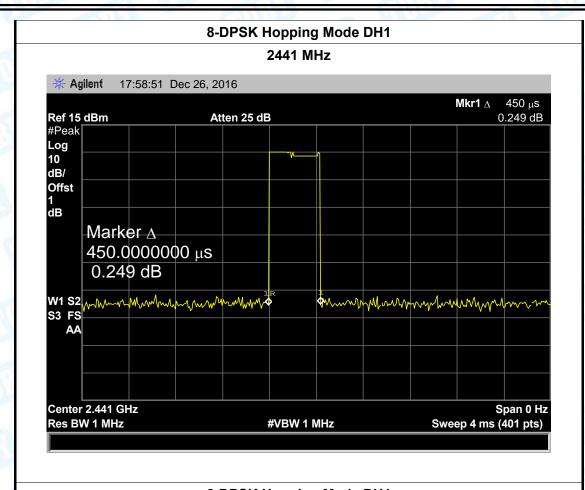
Note: Dwell time=Pulse Time (ms)  $\times$  (1600  $\div$  2  $\div$  79)  $\times$ 31.6

# 8-DPSK Hopping Mode DH1

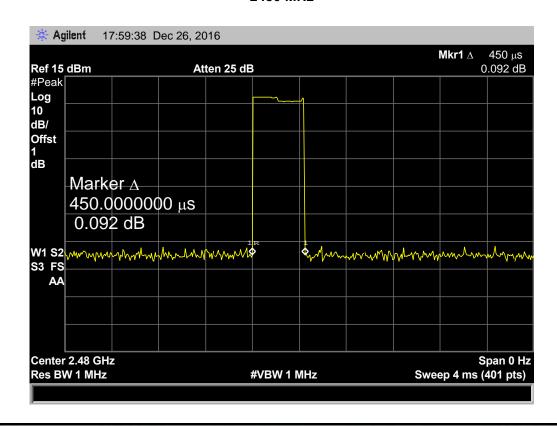




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# 8-DPSK Hopping Mode DH1



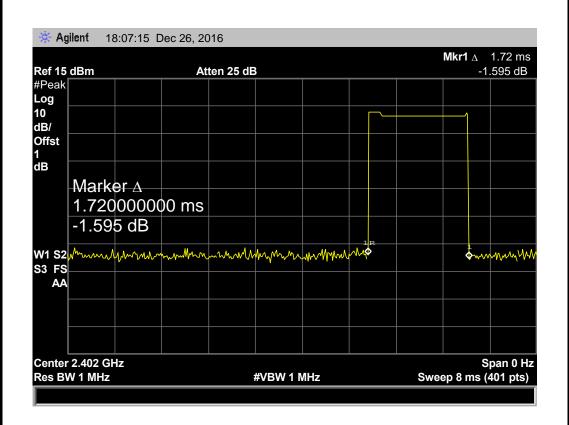


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EUT:	True Wirele	True Wireless Earbuds		Model Name :	
Temperature:	25℃	25℃		Relative Humidity:	
Test Voltage:	DC 3.7V		1		
Test Mode:	Hopping M	ode (8-DPSK DH3)		100	
Channel	Pulse Time	Total of Dwell	Period Time	Limit	Result
(MHz)	(ms)	(ms)	(s)	(ms)	Result
2402	1.720	275.20			
2441	1.720	275.20	31.60	400	PASS
2480	1.720	275.20			

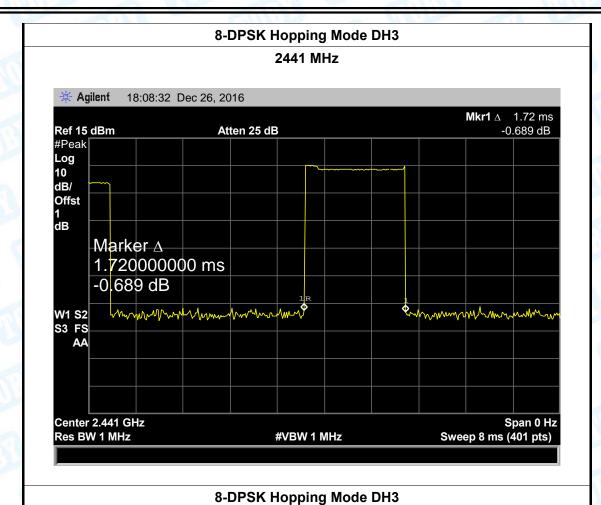
Note: Dwell time=Pulse Time (ms)  $\times$  (1600  $\div$  4  $\div$  79)  $\times$ 31.6

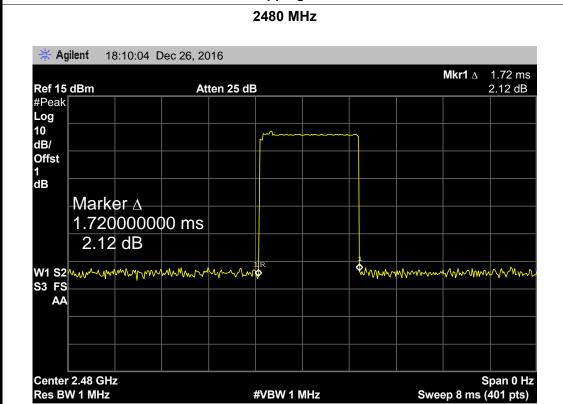
## 8-DPSK Hopping Mode DH3





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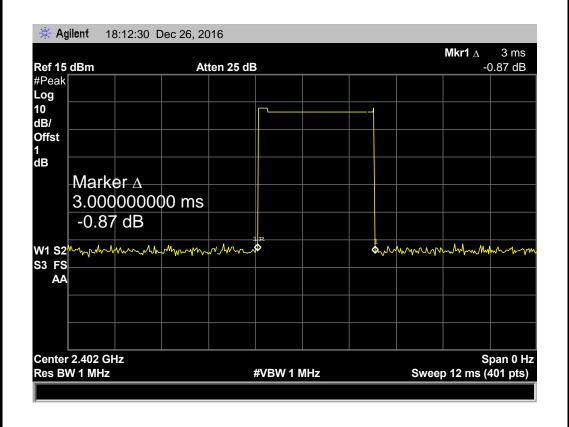


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True Wirele	True Wireless Earbuds		Model Name :	
<b>25</b> ℃	25℃		Relative Humidity:	
DC 3.7V		1		
Hopping M	ode (8-DPSK DH5)		F. Brand	
Pulse Time	Total of Dwell	Period Time	Limit	Result
(ms)	(ms)	(s)	(ms)	Resuit
3.000	320.00			
3.000	320.00	31.60	400	PASS
3.000	320.00			
	25°C DC 3.7V Hopping M Pulse Time (ms) 3.000 3.000	25℃  DC 3.7V  Hopping Mode (8-DPSK DH5)  Pulse Time (ms) (ms)  3.000 320.00  3.000 320.00	25°C Relative Hum  DC 3.7V Hopping Mode (8-DPSK DH5)  Pulse Time (ms) (ms) (s)  3.000 320.00  3.000 320.00  31.60	25°C Relative Humidity:  DC 3.7V Hopping Mode (8-DPSK DH5)  Pulse Time (ms) (ms) (s) (ms)  3.000 320.00  3.000 320.00  31.60 400

Note: Dwell time=Pulse Time (ms)  $\times$  (1600  $\div$  6  $\div$  79)  $\times$ 31.6

# 8-DPSK Hopping Mode DH5

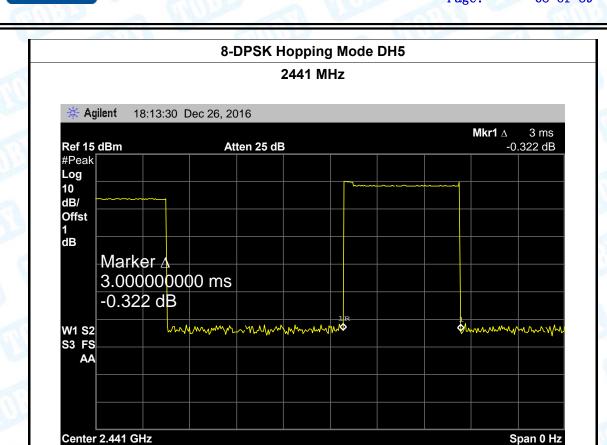




Res BW 1 MHz

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Sweep 12 ms (401 pts)



#VBW 1 MHz

## 8-DPSK Hopping Mode DH5 2480 MHz * Agilent 18:14:27 Dec 26, 2016 Mkr1 $\Delta$ 3 ms 1.523 dB Ref 15 dBm Atten 25 dB #Peak Log 10 dB/ Offst 1 dB Marker ∧ 3.000000000 ms 1.523 dB grahmman management and the second W1 S2 S3 FS AA Center 2.48 GHz Span 0 Hz Res BW 1 MHz #VBW 1 MHz Sweep 12 ms (401 pts)



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# 9. Channel Separation and Bandwidth Test

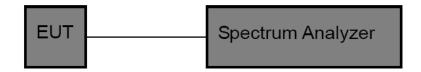
#### 9.1 Test Standard and Limit

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.

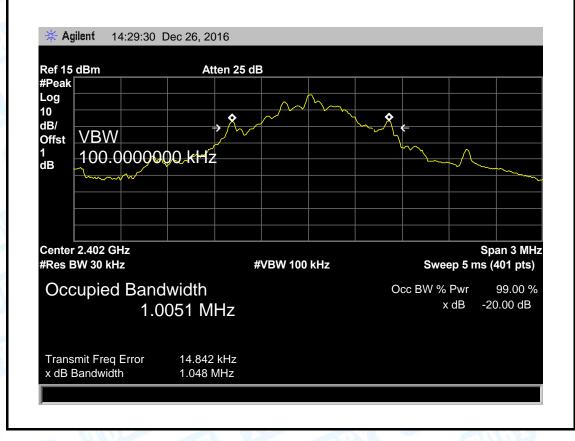


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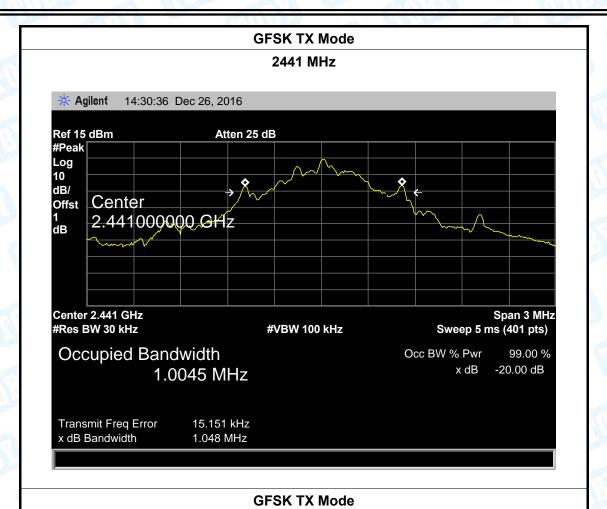
# 9.5 Test Data

EUT:	True Wireless Earbuds		Model Name :	7198-04	
Temperature:	25℃		Relative Humidity:	55%	
Test Voltage:	DC 3.7V				
Test Mode:	TX Mode (GFSK)				
Channel freque	псу	99% OBW (kHz)	20dB Bandwidth (kHz)	20dB Bandwidth *2/3 (kHz)	
2402		1005.10	1048.00	698.67	
2441		1004.50	1048.00	698.67	
2480		1005.10	1048.00	698.67	

## **GFSK TX Mode**









2480 MHz

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 1.0051 MHz

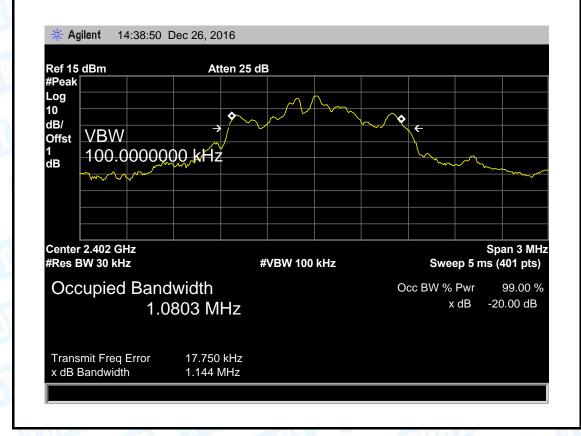
Transmit Freq Error 15.480 kHz x dB Bandwidth 1.048 MHz



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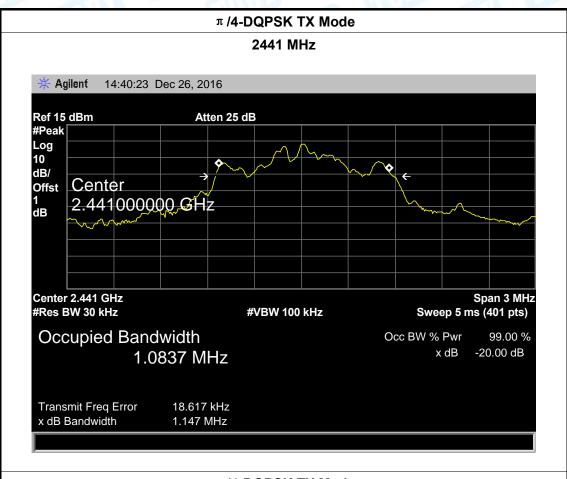
EUT:	True Wireless Earbuds		7198-04			
Temperature:	25℃	Relative Humidity:	55%			
Test Voltage:	DC 3.7V					
Test Mode: ΤΧ Mode ( π /4-DQPSK)						
Channel frequence	99% OBW (kHz)	20dB Bandwidth (kHz)	20dB Bandwidth *2/3 (kHz)			
2402	1080.30	1144.00	762.67			
2441	2441 1083.70 1147.00		764.67			
2480	2480 1083.60		766.00			
T /A DODSK TY Mode						

#### π/4-DQPSK TX Mode

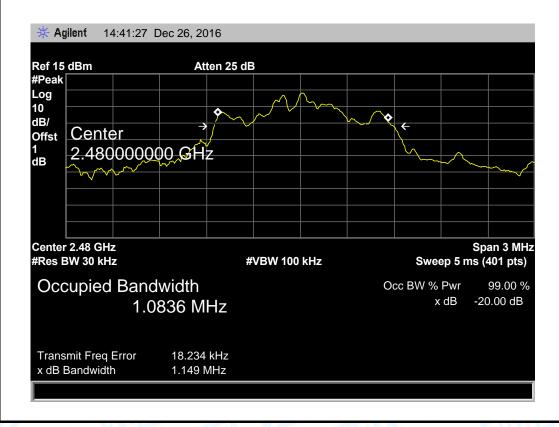




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## $\pi$ /4-DQPSK TX Mode



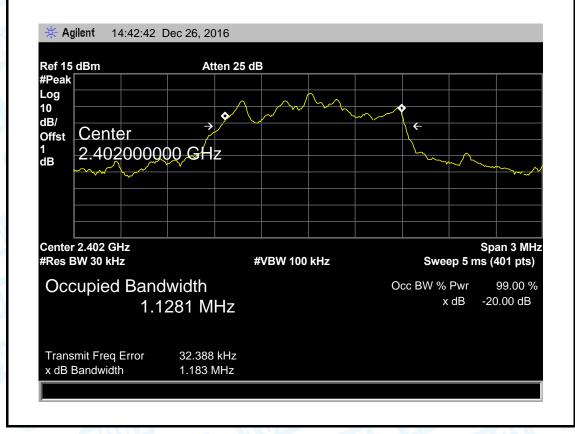


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EUT:	True Wireless Earbuds	Model Name :	7198-04
Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		
Test Mode:	TX Mode (8-DPSK)	1.1.10	

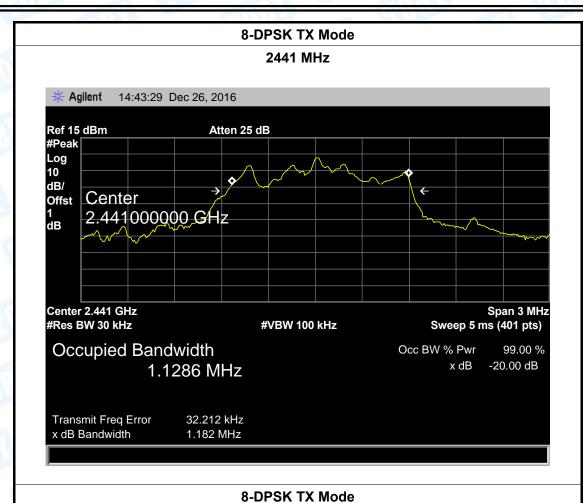
Channel frequency (MHz)	99% OBW (kHz)	20dB Bandwidth (kHz)	20dB Bandwidth *2/3 (kHz)
2402	1128.10	1183.00	788.67
2441	1128.60	1182.00	788.00
2480	1129 50	1184 00	789.33

#### 8-DPSK TX Mode





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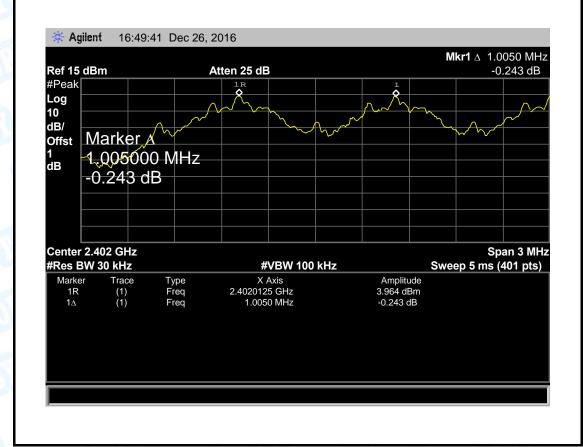
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EUT:	True Wireless Earbuds	Model Name :	7198-04
Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		
			W. I.

Test Mode: Hopping Mode (GFSK)

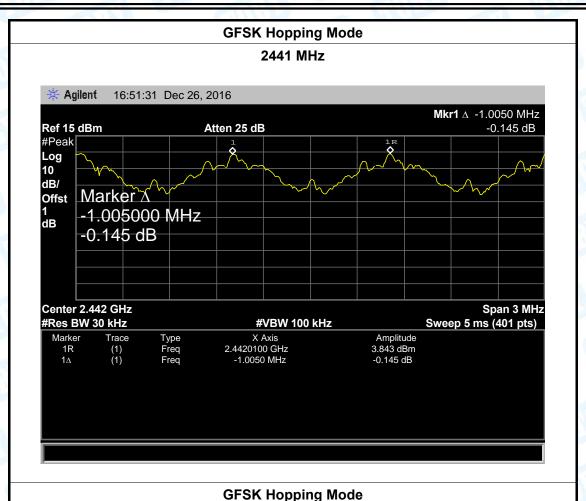
Channel frequency	Separation Read Value	Separation Limit
(MHz)	(kHz)	(kHz)
2402	1005.00	698.67
2441	1005.00	698.67
2480	1005.00	698.67

### **GFSK Hopping Mode**





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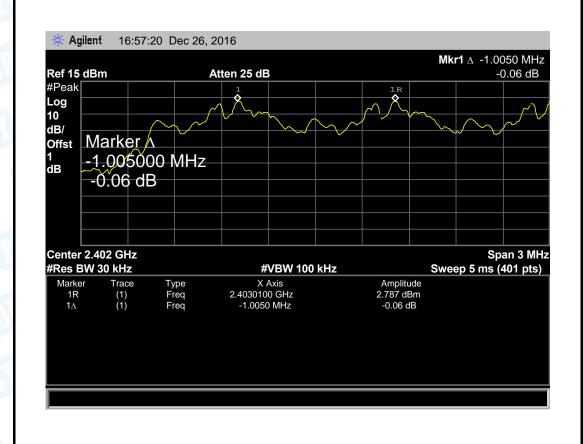
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True Wireless Earbuds	Model Name :	7198-04
25℃	Relative Humidity:	55%
DC 3.7V		
2	25℃	Relative Humidity:

Test Mode: Hopping Mode ( π /4-DQPSK)

Channel frequency	Separation Read Value	Separation Limit
(MHz)	(kHz)	(kHz)
2402	1005.00	762.67
2441	1005.00	764.67
2480	1005.00	766.00

### π /4-DQPSK Hopping Mode





π /4-DQPSK Hopping Mode 2441 MHz * Agilent 16:59:58 Dec 26, 2016 **Mkr1** ∆ 1.0050 MHz 0.25 dB Ref 15 dBm Atten 25 dB #Peak Log 10 dB/ Marker ∧ Offst 1.005000 MHz dΒ 0.25 dB Center 2.442 GHz #Res BW 30 kHz Span 3 MHz **#VBW 100 kHz** Sweep 5 ms (401 pts) Amplitude 2.925 dBm 0.25 dB X Axis 2.4410125 GHz (1) (1) 1.0050 MHz

#### π /4-DQPSK Hopping Mode 2480 MHz # Agilent 17:02:45 Dec 26, 2016 **Mkr1** $\Delta$ 1.0050 MHz Ref 15 dBm Atten 25 dB 0.028 dB #Peak Log 10 dB/ Marker ∧ Offst 1 dB 1.005000 MHz

0.028 dB

		L								
Center	2.479 GI	-lz							Sp	an 3 MHz
#Res E	30 kH	z		#\	<b>VBW 100</b>	kHz		Swe	ep 5 ms (4	401 pts)
Marke	r Trac	се Тур	ре	X A	\xis		Amplitu	ıde		
1R	(1)	Fre	eq 2	.479012	5 GHz		2.869 dE	3m		
1∆	(1)		eq.	1.0050	) MHz		0.028	dB		



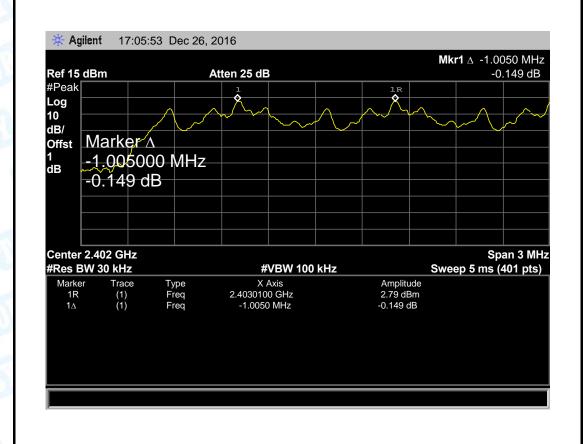
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EUT:	True Wireless Earbuds	Model Name:	7198-04
Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		

Test Mode: Hopping Mode (8-DPSK)

Channel frequency	Separation Read Value	Separation Limit					
(MHz)	(kHz)	(kHz)					
2402	1005.00	788.67					
2441	1005.00	788.00					
2480	1005.00	789.33					

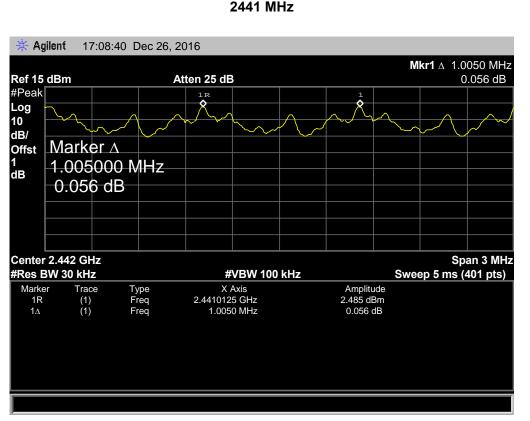
### 8-DPSK Hopping Mode



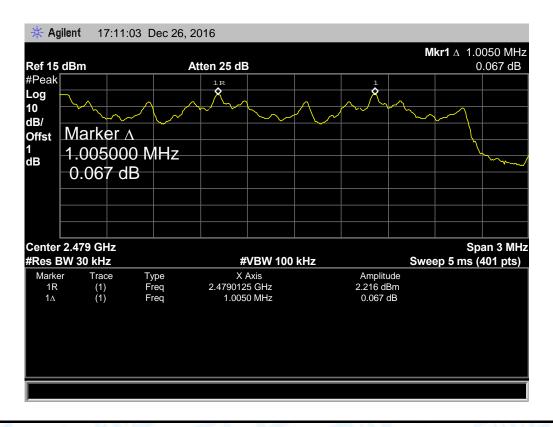


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8-DPSK Hopping Mode
2441 MHz



# 8-DPSK Hopping Mode





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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.

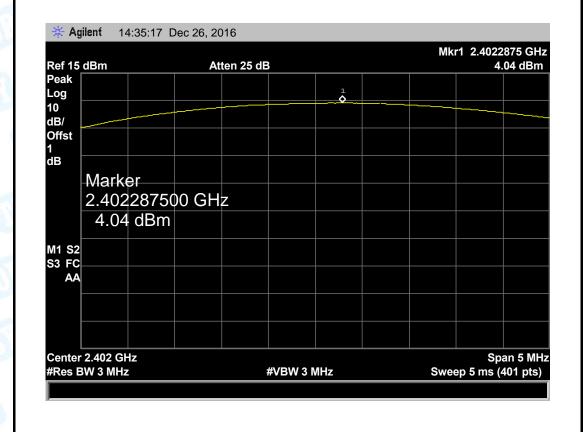


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## 10.5 Test Data

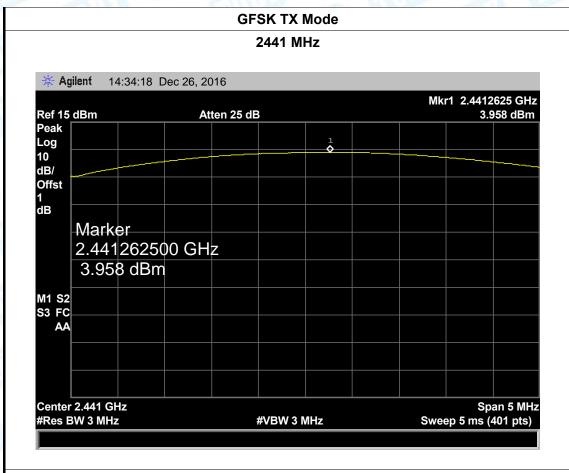
True Wireless Earbuds		Mode	l Name :	7198-04
25℃	THU	Relativ	e Humidity:	55%
DC 3.7V		TIME		MILL
TX Mode	(GFSK)		COURS !	
Channel frequency		ılt Limit		nit
	(dBm)		(dB	m)
	4.040			
2441 2480			2	1
	GFSK TX Mod	е		
	25℃ DC 3.7V TX Mode	25°C  DC 3.7V  TX Mode (GFSK)  lency  Test Result (dBm)  4.040  3.958  3.817	25°C Relative DC 3.7V TX Mode (GFSK) Test Result (dBm) 4.040 3.958	25°C Relative Humidity:  DC 3.7V  TX Mode (GFSK)  Iency Test Result (dBm) (dB  4.040  3.958  3.817



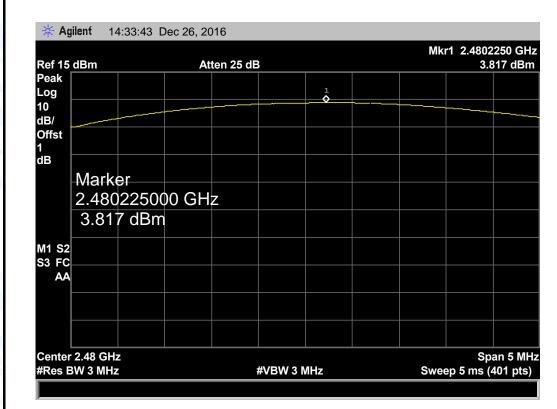




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### **GFSK TX Mode**

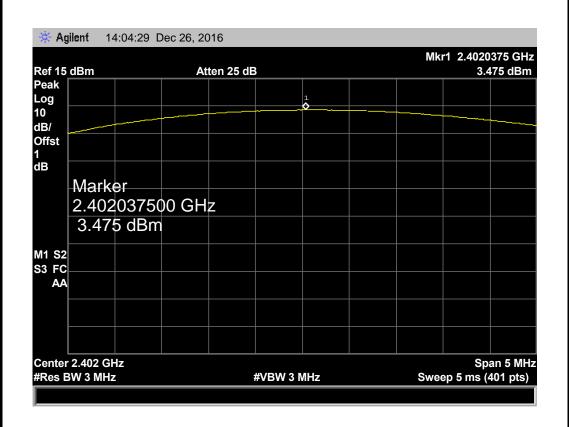




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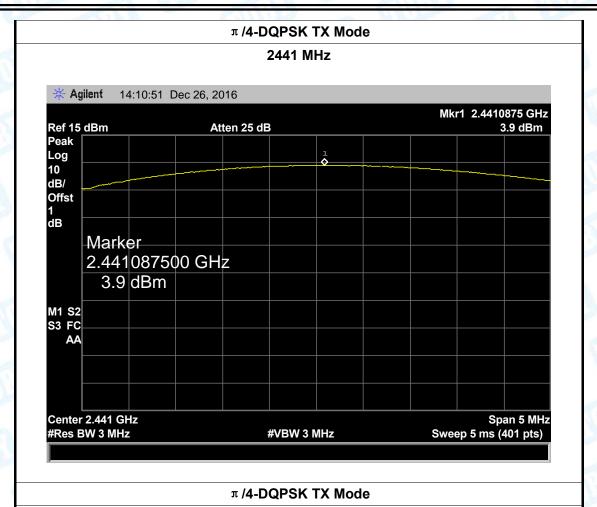
EUT:	True Wireless Earbuds		Model Name :		7198-04
Temperature:	25℃		Relativ	e Humidity:	55%
Test Voltage:	DC 3.7V				
Test Mode: ΤΧ Mode ( π /4-DQPSK)				1 ADD	
Channel frequency		Test Result		Li	mit
(MHz)	(MHz)			(d	Bm)
2402	2402				
2441 2480		3.900 3.793		21	
π /4-DQPSK TX Mode					







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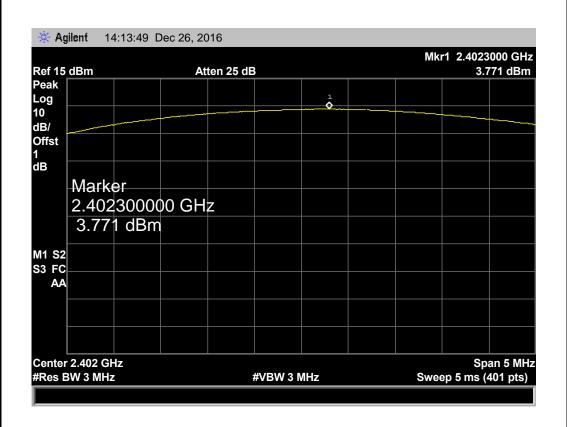






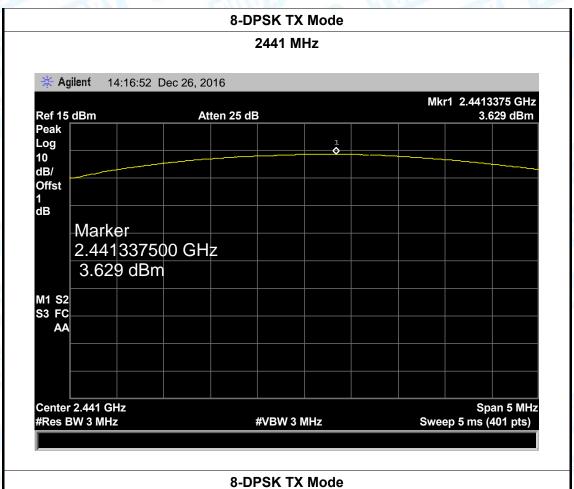
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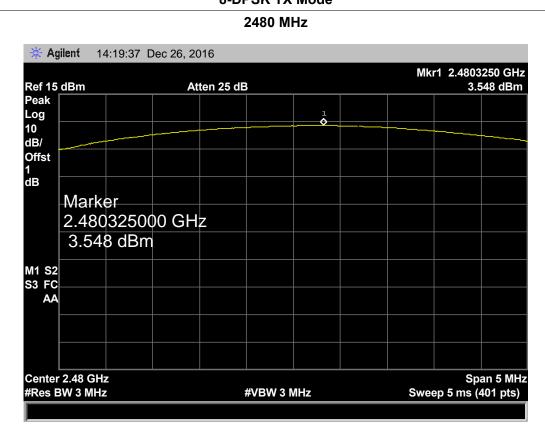
EUT:	True Wireless Earbuds		Model Name :	7198-04	
Temperature:	25℃		Relative Humidity:	55%	
Test Voltage:	DC 3.7V				
Test Mode:	TX Mode (8-DPSK)				
Channel frequency		Test Result	Limit		
(MHz)		(dBm)		(dBm)	
2402		3.771			
2441		3.629		21	
2480		3.548			
8-DPSK TX Mode					





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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 0dBi, 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
ed Em	▼ Permanent attached antenna
	□ Unique connector antenna
1	□ Professional installation antenna

----END OF REPORT----