

APPLICATION CERTIFICATION FCC Part 15C On Behalf of THUMBS UK(UK)LTD

Bluetooth Neckband Sports Earphones Model No.: BTNCKEPPKPRM, BTNCKEPBKPRM

FCC ID: 2AHHEBTNCKEPPRM

Prepared for Address	:	THUMBS UK(UK)LTD Unit L, Braintree Industrial Estate, Braintree Road HA4 0EJ, Ruislip, London, United Kingdom
Prepared by Address	:	Shenzhen Accurate Technology Co., Ltd. 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China.
		Tel: (0755) 26503290 Fax: (0755) 26503396

Report No.	:	ATE20190963
Date of Test	:	June 19-June 24, 2019
Date of Report	:	June 28, 2019



TABLE OF CONTENTS

Descrip	tion	Page
Test Re	port Certification	
	- NERAL INFORMATION	
1.1.	Description of Device (EUT)	
1.1.	General Disclaimer	
1.3.	Accessory and Auxiliary Equipment	
1.4.	Description of Test Facility	
1.5.	Measurement Uncertainty	
2. ME	ASURING DEVICE AND TEST EQUIPMENT	
3. OP	ERATION OF EUT DURING TESTING	
3.1.	Operating Mode	8
3.2.	Configuration and peripherals	
4. TES	ST PROCEDURES AND RESULTS	
	DB BANDWIDTH TEST	
5.1.	Block Diagram of Test Setup	
5.2.	The Requirement For Section 15.247(a)(1)	
5.3.	EUT Configuration on Measurement	
5.4.	Operating Condition of EUT	
5.5.	Test Procedure	
5.6.	Test Result	
6. CA	RRIER FREQUENCY SEPARATION TEST	15
6.1.	Block Diagram of Test Setup	
6.2.	The Requirement For Section 15.247(a)(1)	
6.3.	EUT Configuration on Measurement	
6.4.	Operating Condition of EUT	15
6.5.	Test Procedure	16
6.6.	Test Result	16
7. NU	MBER OF HOPPING FREQUENCY TEST	
7.1.	Block Diagram of Test Setup	
7.2.	The Requirement For Section 15.247(a)(1)(iii)	
7.3.	EUT Configuration on Measurement	
7.4.	Operating Condition of EUT	20
7.5.	Test Procedure	
7.6.	Test Result	
8. DW	ELL TIME TEST	
8.1.	Block Diagram of Test Setup	
8.2.	The Requirement For Section 15.247(a)(1)(iii)	
8.3.	EUT Configuration on Measurement	22
8.4.	Operating Condition of EUT	
8.5.	Test Procedure	
8.6.	Test Result	
9. MA	XIMUM PEAK OUTPUT POWER TEST	
9.1.	Block Diagram of Test Setup	
9.2.	The Requirement For Section 15.247(b)(1)	
9.3.	EUT Configuration on Measurement	
9.4.	Operating Condition of EUT	
9.5.	Test Procedure	
9.6.	Test Result	

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10. RA	DIATED EMISSION TEST	
10.1.	Block Diagram of Test Setup	
10.2.	The Requirement For Section 15.247(d)	
10.3.	Transmitter Emission Limit	
10.4.	Restricted bands of operation	
10.5.	Configuration of EUT on Measurement	41
10.6.	Test Procedure	
10.7.	Data Sample	
10.8.	Test Result	
11. BA	ND EDGE COMPLIANCE TEST	71
11.1.	Block Diagram of Test Setup	71
11.2.	The Requirement For Section 15.247(d)	
11.3.	EUT Configuration on Measurement	
11.4.	Operating Condition of EUT	71
11.5.	Test Procedure	
11.6.	Test Result	72
12. AC	C POWER LINE CONDUCTED EMISSION TEST	
12.1.	Block Diagram of Test Setup	
12.2.	Test System Setup	
12.3.	Test Limits	
12.4.	Configuration of EUT on Measurement	
12.5.	Operating Condition of EUT	
12.6.	Test Procedure	
12.7.	Data Sample	
12.8.	Test Result	
13. CC	ONDUCTED SPURIOUS EMISSION COMPLIANCE TEST	
13.1.	Block Diagram of Test Setup	
13.2.	The Requirement For Section 15.247(d)	
13.3.	EUT Configuration on Measurement	
13.4.	Operating Condition of EUT	
13.5.	Test Procedure	
13.6.	Test Result	
14. AN	TENNA REQUIREMENT	
14.1.	The Requirement	
14.2.	Antenna Construction	



Test Report Certification

Applicant	:	THUMBS UK(UK)LTD
Address	:	Unit L, Braintree Industrial Estate, Braintree Road HA4 0EJ, Ruislip, London, United Kingdom
Product	:	Bluetooth Neckband Sports Earphones
Model No.	:	BTNCKEPPKPRM, BTNCKEPBKPRM

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247 ANSI C63.10: 2013

The device described above is tested by Shenzhen Accurate Technology Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.247 limits. The measurement results are contained in this test report and Shenzhen Accurate Technology Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Shenzhen Accurate Technology Co., Ltd.

Date of Test :	June 19-June 24, 2019
Date of Report :	June 28, 2019
Prepared by :	(S Yang Former)
Approved &	Same
Authorized Signer :	

(Sean Liu, Manager)



1. GENERAL INFORMATION

1.1.Description of Device (EUT)

Product	:	Bluetooth Neckband Sports Earphones
Model Number	:	BTNCKEPPKPRM, BTNCKEPBKPRM (Note: We hereby state that these models are identical in interior structure, electrical circuits and components, It's just that the appearance is different in color, Therefore, only model BTNCKEPBKPRM is for tested.)
Bluetooth version	:	V5.0+EDR
Frequency Range	:	2402-2480MHz
Channel Spacing	:	1MHz
Number of Channels	:	79
Antenna Gain(Max)	:	-0.68dBi
Antenna type	:	Integral Antenna
Modulation mode	:	GFSK, $\pi/4$ DQPSK
Rating	:	DC 3.7V

1.2.General Disclaimer

The test results presented in this report relate only to the object tested. The information supplied by the customer can affect the validity of results.

1.3. Accessory and Auxiliary Equipment

Notebook PC:	Manufacturer: Lenovo
	M/N: ThinkPad X240
	S/N: n.a



1.4.Description of Test Facility

EMC Lab		Recognition of accreditation by Federal Communications Commission (FCC) The Designation Number is CN1189 The Registration Number is 708358
		Listed by Innovation, Science and Economic Development Canada (ISEDC)
		The Registration Number is 5077A-2
		Accredited by China National Accreditation Service for Conformity Assessment (CNAS)
		The Registration Number is CNAS L3193
		Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 4297.01
		The certificate Number 15 4277.01
Name of Firm	:	Shenzhen Accurate Technology Co., Ltd.
Site Location	:	1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China

1.5.Measurement Uncertainty

Radiated Emission Expanded Uncertainty (9kHz-30MHz)	:	U=2.66dB, k=2
Radiated Emission Expanded Uncertainty (30MHz-1000MHz)	:	U=4.28dB, k=2
Radiated Emission Expanded Uncertainty (1G-18GHz)	:	U=4.98dB, k=2
Radiated Emission Expanded Uncertainty (18G-26.5GHz)	:	U=5.06dB, k=2
Conduction Emission Expanded Uncertainty (Mains ports, 9kHz-30MHz)	:	U=2.72dB, k=2



2. MEASURING DEVICE AND TEST EQUIPMENT

Kind of equipment	Manufacturer	Туре	S/N	Calibrated dates	Cal. Interval
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 05, 2019	One Year
EMI Test Receiver	Rohde&Schwarz	ESR	101817	Jan. 05, 2019	One Year
Spectrum Analyzer	Rohde&Schwarz	FSV-40	101495	Jan. 05, 2019	One Year
Pre-Amplifier (Radiated Emission)	Compliance Direction	RSU-M2	38322	Jan. 05, 2019	One Year
Pre-Amplifier (Radiated Emission)	Agilent	8447D	294A10619	Jan. 05, 2019	One Year
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 05, 2019	One Year
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 05, 2019	One Year
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 05, 2019	One Year
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	Jan. 05, 2019	One Year
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 05, 2019	One Year
Highpass Filter	Wainwright Instruments	WHKX3.6/18 G-10SS	N/A	Jan. 05, 2019	One Year
Band Reject Filter	Wainwright Instruments	WRCG2400/2 485-2375/2510 -60/11SS	N/A	Jan. 05, 2019	One Year
RF Coaxial Cable (Conducted Emission)	SUHNER	N-2m	No.2	Jan. 05, 2019	One Year
RF Coaxial Cable (Radiated Emission)	RESENBERGER	N-12m	No.11	Jan. 05, 2019	One Year
RF Coaxial Cable (Radiated Emission)	RESENBERGER	N-0.5m	No.12	Jan. 05, 2019	One Year
RF Coaxial Cable (Radiated Emission)	SUHNER	N-2m	No.13	Jan. 05, 2019	One Year
RF Coaxial Cable (Radiated Emission)	SUHNER	N-0.5m	No.15	Jan. 05, 2019	One Year
RF Coaxial Cable (Radiated Emission)	SUHNER	N-2m	No.16	Jan. 05, 2019	One Year
RF Coaxial Cable (Radiated Emission)	RESENBERGER	N-6m	No.17	Jan. 05, 2019	One Year
Conducted Emission M	easurement Software	e: ES-K1 V1.71			
Radiated Emission Mea	asurement Software:	EZ_EMC V1.1.4	.2		

Table 1: List of Test and Measurement Equipment



3. OPERATION OF EUT DURING TESTING

3.1.Operating Mode

The mode is used: Transmitting mode Low Channel: 2402MHz Middle Channel: 2441MHz High Channel: 2480MHz Hopping

3.2. Configuration and peripherals

EUT
Figure 1 Setup: Transmitting mode



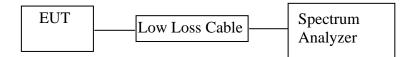
4. TEST PROCEDURES AND RESULTS

FCC Rules	Description of Test	Result
Section 15.247(a)(1)	20dB Bandwidth Test	Compliant
Section 15.247(a)(1)	Carrier Frequency Separation Test	Compliant
Section 15.247(a)(1)(iii)	Number Of Hopping Frequency Test	Compliant
Section 15.247(a)(1)(iii)	Dwell Time Test	Compliant
Section 15.247(b)(1)	Maximum Peak Output Power Test	Compliant
Section 15.247(d)	Radiated Emission Test	Compliant
Section 15.209		
Section 15.247(d)	Band Edge Compliance Test	Compliant
Section 15.207	AC Power Line Conducted Emission Test	Compliant
Section 15.247(d)	Conducted Spurious Emission Test	Compliant
Section 15.203	Antenna Requirement	Compliant



5. 20DB BANDWIDTH TEST

5.1.Block Diagram of Test Setup



5.2. The Requirement For Section 15.247(a)(1)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

5.3.EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

5.4.Operating Condition of EUT

- 5.4.1.Setup the EUT and simulator as shown as Section 5.1.
- 5.4.2.Turn on the power of all equipment.
- 5.4.3.Let the EUT work in TX (Hopping off) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

5.5.Test Procedure

- 5.5.1.Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 5.5.2. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.
- 5.5.3.RBW shall be in the range of 1% to 5% of the OBW and VBW shall be approximately three times RBW.
- 5.5.4.The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

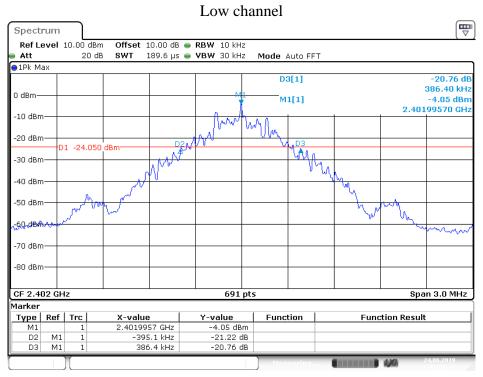


5.6.Test Result

Channel	Frequency (MHz)	GFSK mode 20dB Bandwidth (MHz)	π /4 DQPSK mode 20dB Bandwidth (MHz)	Result
Low	2402	0.782	1.246	Pass
Middle	2441	0.782	1.250	Pass
High	2480	0.782	1.250	Pass

The spectrum analyzer plots are attached as below.

GFSK Mode



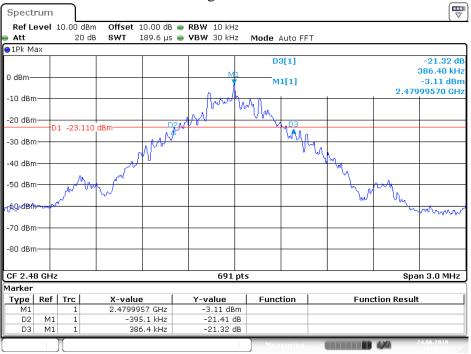
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Middle channel ඐ Spectrum Offset 10.00 dB ● RBW 10 kHz SWT 189.6 µs ● VBW 30 kHz Ref Level 10.00 dBm 20 dB Mode Auto FFT Att ●1Pk Ma> D3[1] -21.28 dB 386.40 kHz 0 dBm M1[1] -3.41 dBm 2.44099570 GHz -10 dBm Wy Mm 10 - PZAH -20 dBm D1 -23.410 dBm MAG -30 dBm M 40 dBm -50 dBm _{Ma} h 60-d8m why -70 dBm--80 dBm-CF 2.441 GHz 691 pts Span 3.0 MHz Marker Type Ref Trc Y-value -3.41 dBm Function Function Result X-value 2.4409957 GHz Μ1 1 -21.22 dB -21.28 dB D2 M1 -395.1 kHz D3 M1 386.4 kHz 1

Date: 24.JUN.2019 11:38:08

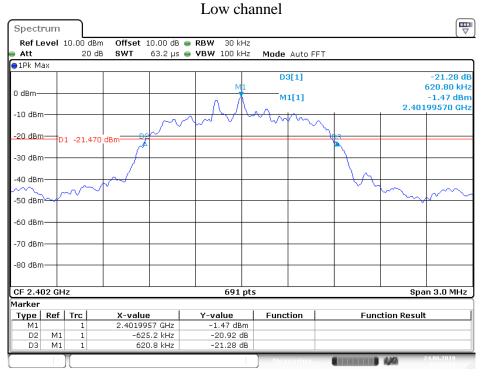
High channel



Date: 24.JUN.2019 11:39:11

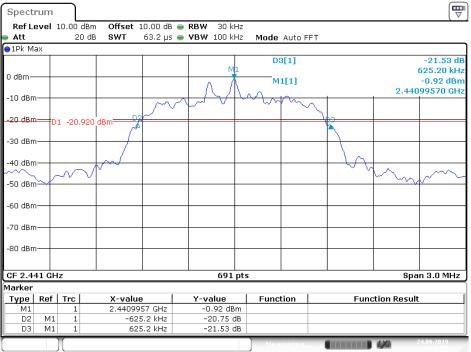


π /4 DQPSK Mode



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Middle channel



Date: 24.JUN.2019 11:41:50



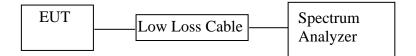
High channel Spectrum Ref Level 10.00 dBm Att 20 dB Offset 10.00 dB ■ RBW 30 kHz SWT 63.2 µs ■ VBW 100 kHz Mode Auto FFT Att 🔵 1 Pk Max D3[1] -21.38 dB 625.20 kHz 0 dBm-M1[1] -0.68 dBm 2.47999570 GHz -10 dBm -20 dBm-D1 -20.680 dBm -30 dBm--40 dBm \sim \sim -50 dBm -60 dBm--70 dBm--80 dBm-691 pts CF 2.48 GHz Span 3.0 MHz Marker **Y-value** -0.68 dBm -20.81 dB -21.38 dB TypeRefTrcM11 X-value 2.4799957 GHz Function Function Result M1 M1 D2 -625.2 kHz 625.2 kHz 1 DЗ 1

Date: 24.JUN.2019 11:40:31



6. CARRIER FREQUENCY SEPARATION TEST

6.1.Block Diagram of Test Setup



6.2. The Requirement For Section 15.247(a)(1)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

6.3.EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

6.4. Operating Condition of EUT

- 6.4.1.Setup the EUT and simulator as shown as Section 6.1.
- 6.4.2.Turn on the power of all equipment.
- 6.4.3.Let the EUT work in TX (Hopping on) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.



6.5.Test Procedure

- 6.5.1.The transmitter output was connected to the spectrum analyzer through a low loss cable.
- 6.5.2.Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz. Adjust Span to 3MHz.
- 6.5.3.Set the adjacent channel of the EUT Maxhold another trace.
- 6.5.4. Measurement the channel separation

6.6.Test Result

GFSK mode

Channel	Frequency	Channel	Limit	Result
Channel	(MHz)	Separation(MHz)	(MHz)	Result
Low	2402	1.0029	25KHz or 2/3*20dB	Pass
LOW	2403	1.0029	bandwidth	rass
Middle	2440	1.0020	25KHz or 2/3*20dB	Daga
Middle	2441	1.0029	bandwidth	Pass
High	2479	1.0029	25KHz or 2/3*20dB	Daga
High	2480	1.0029	bandwidth	Pass

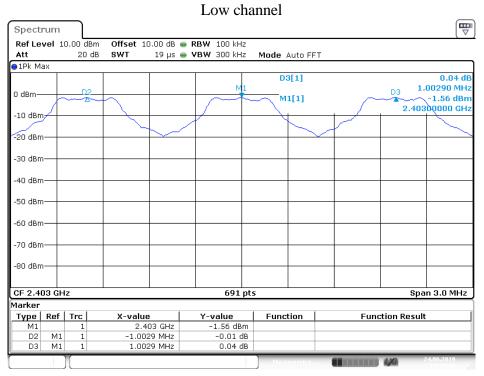
π /4 DQPSK Mode

Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	2402		25KHz or 2/3*20dB	Daga
Low	2403	1.0029	bandwidth	Pass
Middle	2440	1.0029	25KHz or 2/3*20dB	Pass
Wildule	2441	1.0029	bandwidth	1 855
High	2479	1.0029	25KHz or 2/3*20dB	Pass
Ingli	2480	1.0029	bandwidth	1 855

The spectrum analyzer plots are attached as below.

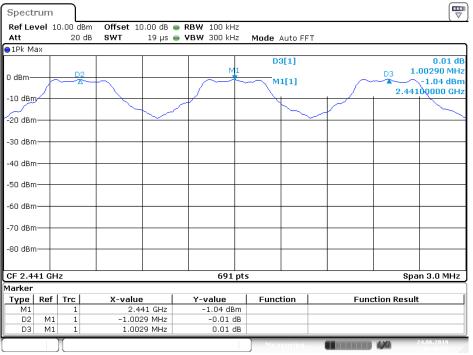


GFSK Mode



Date: 24.JUN.2019 10:35:12

Middle channel



Date: 24.JUN.2019 10:36:07

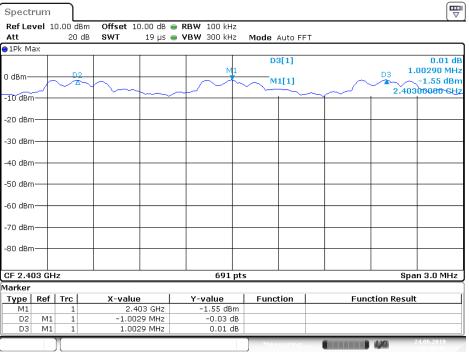


High channel ඐ Spectrum Ref Level 10.00 dBm Att 20 dB Offset 10.00 dB ● RBW 100 kHz SWT 19 µs ● VBW 300 kHz Mode Auto FFT ⊖1Pk Max D3[1] 0.02 dB 1.00290 MHz D3 0 dBm -0.81 dBm M1[1] 2.4790000 GHz -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm· -60 dBm -70 dBm--80 dBm-691 pts CF 2.479 GHz Span 3.0 MHz Marker X-value 2.479 GHz -1.0029 MHz Type Ref Trc Y-value -0.81 dBm Function Function Result Μ1 1 Μ1 D2 0.00 dB D3 M1 1.0029 MHz 0.02 dB 1 **IIII** 1/0

Date: 24.JUN.2019 10:36:52

π /4 DQPSK Mode

Low channel



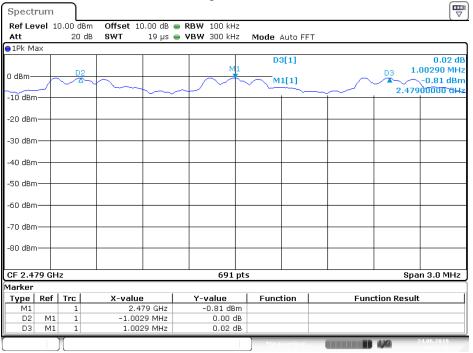
Date: 24.JUN.2019 10:40:42



				Middle ch	annel		
Spect	rum						
Ref Le	vel 1	0.00 d	Bm Offset 10.00 dB 🖲	• RBW 100 kHz			
Att		20	dB SWT 19 µs 🧉	🕨 VBW 300 kHz	Mode Auto FFT	•	
⊖1Pk M	ax						
		_		M1	D3[1]		0.02 dB
0 dBm–	+			$+\sim$	M1[1]	\sim	1.04 dBm
-10 dBn	~+			~ ~		\sim	2.44100000 GHz
-20 dBn	η						
-30 dBn	<u></u>						
-40 dBn	<u></u>						
-50 dBn	n						
-60 dBn	<u>ו</u> רי						
-70 dBn	η						
-80 dBn	η						
CF 2.4	41 GH	z		691 pts	5		Span 3.0 MHz
Marker	Ref	Tur	X-value	Y-value	Function	F	ction Result
Type M1	Ker	1	2.441 GHz	-1.04 dBm	Function	Fun	ction Result
D2	M1	1	-1.0029 MHz	-0.01 dB			
D3	M1	1	1.0029 MHz	0.02 dB			
					Measuring		24.06.2019

Date: 24.JUN.2019 10:39:35

High channel

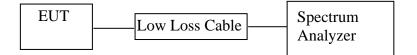


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7. NUMBER OF HOPPING FREQUENCY TEST

7.1.Block Diagram of Test Setup



7.2. The Requirement For Section 15.247(a)(1)(iii)

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

7.3.EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

7.4. Operating Condition of EUT

7.4.1.Setup the EUT and simulator as shown as Section 7.1.

7.4.2.Turn on the power of all equipment.

7.4.3.Let the EUT work in TX (Hopping on) modes measure it.

7.5.Test Procedure

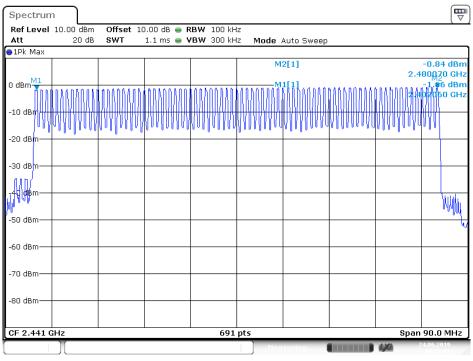
- 7.5.1.The transmitter output was connected to the spectrum analyzer through a low loss cable.
- 7.5.2.Set the spectrum analyzer as Span=90MHz, RBW=100 kHz, VBW=300 kHz.
- 7.5.3.Max hold, view and count how many channel in the band.



7.6.Test Result

Total number of	Measurement result(CH)	Limit(CH)	Result
hopping channel	79	≥15	Pass

The spectrum analyzer plots are attached as below.



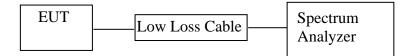
Number of hopping channels (GFSK Mode)

Date: 24.JUN.2019 10:33:41



8. DWELL TIME TEST

8.1.Block Diagram of Test Setup



8.2. The Requirement For Section 15.247(a)(1)(iii)

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

8.3.EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

8.4. Operating Condition of EUT

- 8.4.1.Setup the EUT and simulator as shown as Section 8.1.
- 8.4.2.Turn on the power of all equipment.
- 8.4.3.Let the EUT work in TX (Hopping on) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

8.5.Test Procedure

- 8.5.1.The transmitter output was connected to the spectrum analyzer through a low loss cable.
- 8.5.2.Set center frequency of spectrum analyzer = operating frequency.
- 8.5.3.Set the spectrum analyzer as RBW=1MHz, VBW=3MHz, Span=0Hz, Adjust Sweep=5ms, 10ms, 15ms. Get the pulse time.
- 8.5.4.Repeat above procedures until all frequency measured were complete.



8.6.Test Result

GFSK Mode

Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
	2402	0.428	136.96	400
DH1	2441	0.428	136.96	400
	2480	0.428	136.96	400
A period to	ransmit time = $0.4 \times 79 =$	31.6 Dwell time = pu	llse time \times (1600/(2*7	79))×31.6
	2402	1.696	271.36	400
DH3	2441	1.696	271.36	400
	2480	1.696	271.36	400
A period to	ransmit time = 0.4×79 =	31.6 Dwell time = pu	lse time \times (1600/(4*)	79))×31.6
	2402	2.957	315.41	400
DH5	2441	2.957	315.41	400
	2480	2.957	315.41	400
A period transr	nit time = $0.4 \times 79 = 31.6$	5 Dwell time = pulse t	ime × (1600/(6*79))>	×31.6

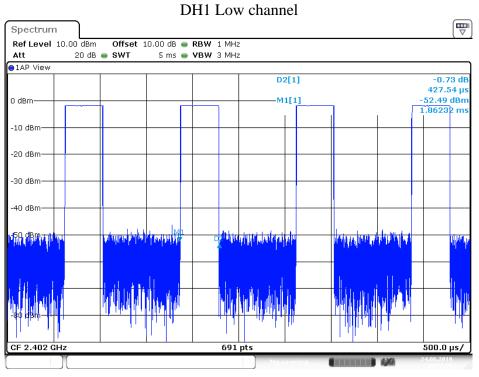
π /4 DQPSK Mode

Mode	Channel Frequency	Pulse Time	Dwell Time	Limit
	(MHz)	(ms)	(ms)	(ms)
	2402	0.435	139.20	400
2DH1	2441	0.442	141.44	400
	2480	0.435	139.20	400
A period t	ransmit time = $0.4 \times 79 =$	31.6 Dwell time = pt	llse time \times (1600/(2*)	79))×31.6
	2402	1.696	271.36	400
2DH3	2441	1.710	273.60	400
	2480	1.710	273.60	400
A period t	ransmit time = 0.4×79 =	31.6 Dwell time = pt	llse time \times (1600/(4*)	79))×31.6
	2402	2.978	317.65	400
2DH5	2441	2.978	317.65	400
	2480	2.978	317.65	400
A period trans	mit time = $0.4 \times 79 = 31.6$	5 Dwell time = pulse t	$ime \times (1600/(6*79))$	×31.6

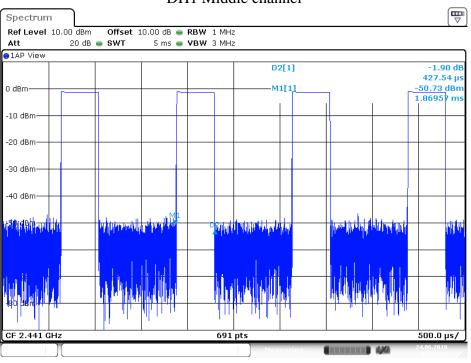
The spectrum analyzer plots are attached as below.



GFSK Mode



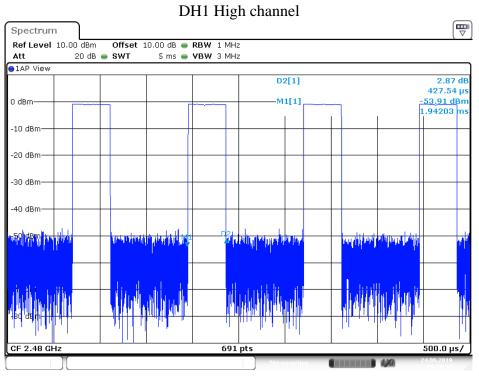
Date: 24.JUN.2019 10:57:59



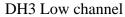
DH1 Middle channel

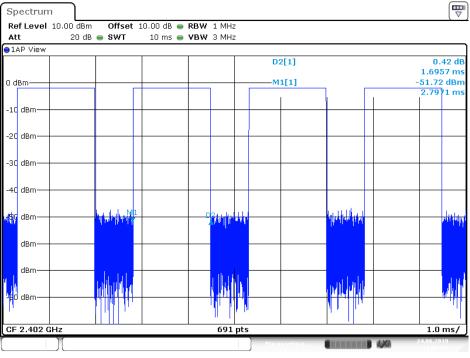
Date: 24.JUN.2019 10:58:37





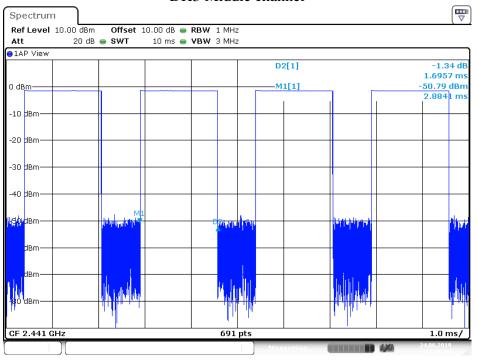
Date: 24.JUN.2019 10:59:14





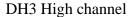
Date: 24.JUN.2019 11:01:30

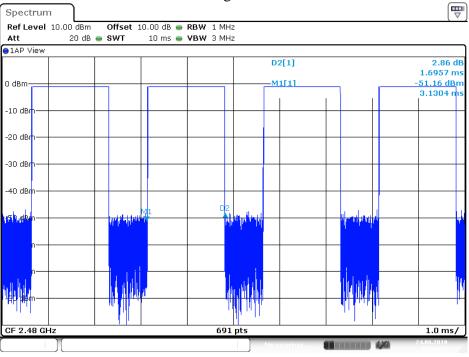




DH3 Middle channel

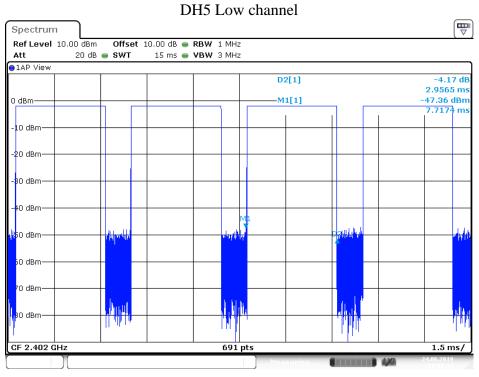
Date: 24.JUN.2019 11:00:55



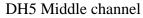


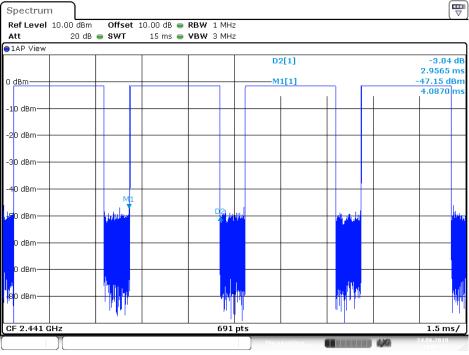
Date: 24.JUN.2019 10:59:54





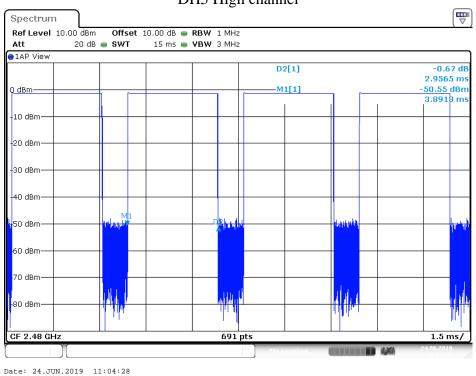
Date: 24.JUN.2019 11:02:34





Date: 24.JUN.2019 11:03:37

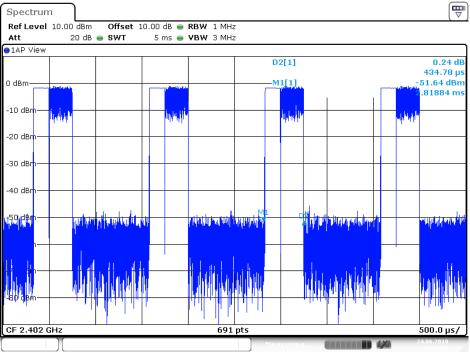




DH5 High channel

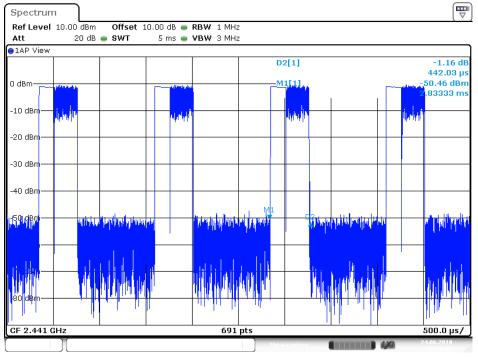


2DH1 Low channel



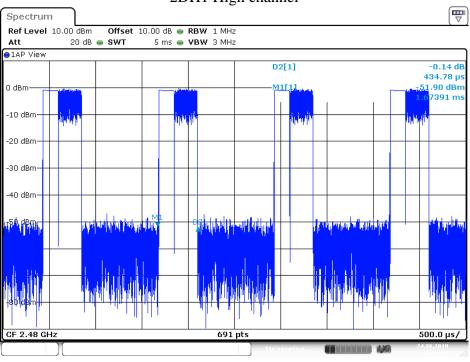
Date: 24.JUN.2019 11:12:00





2DH1 Middle channel

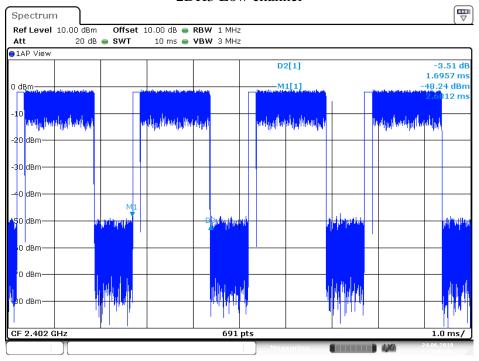
Date: 24.JUN.2019 11:11:08



2DH1 High channel

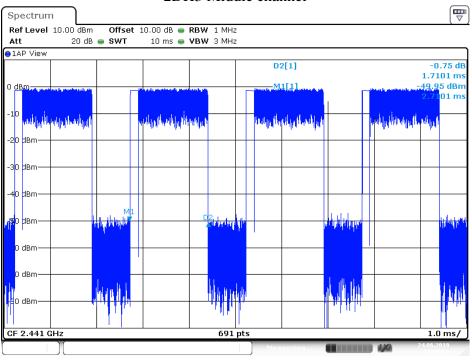
Date: 24.JUN.2019 11:10:29





2DH3 Low channel

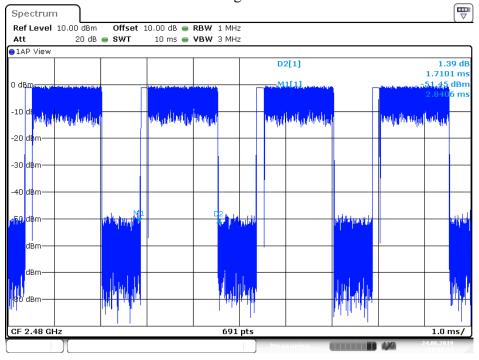
Date: 24.JUN.2019 11:08:11



2DH3 Middle channel

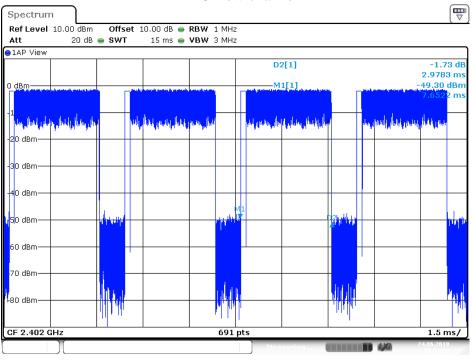
Date: 24.JUN.2019 11:09:06





2DH3 High channel

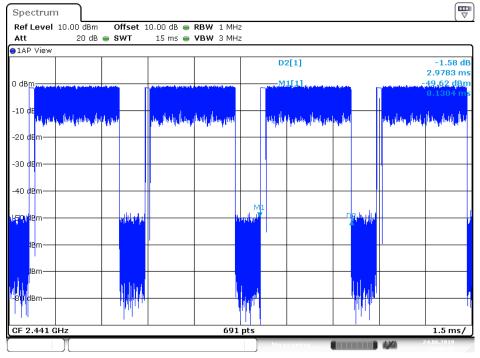
Date: 24.JUN.2019 11:09:51



2DH5 Low channel

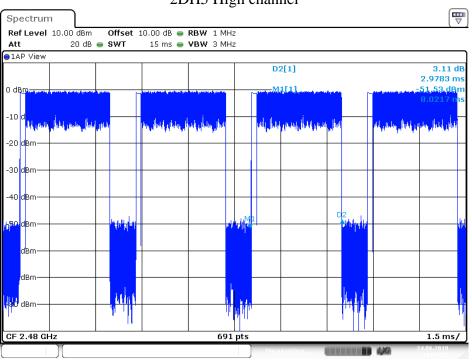
Date: 24.JUN.2019 11:07:29





2DH5 Middle channel

Date: 24.JUN.2019 11:06:26



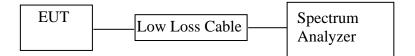
2DH5 High channel

Date: 24.JUN.2019 11:05:21



9. MAXIMUM PEAK OUTPUT POWER TEST

9.1.Block Diagram of Test Setup



9.2. The Requirement For Section 15.247(b)(1)

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

9.3.EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

9.4. Operating Condition of EUT

9.4.1.Setup the EUT and simulator as shown as Section 9.1.

- 9.4.2.Turn on the power of all equipment.
- 9.4.3.Let the EUT work in TX (Hopping off) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

9.5.Test Procedure

- 9.5.1.The transmitter output was connected to the spectrum analyzer through a low loss cable.
- 9.5.2.Set RBW of spectrum analyzer to 1MHz and VBW to 3MHz for GFSK mode
- 9.5.3.Set RBW of spectrum analyzer to 3MHz and VBW to 10MHz for other mode
- 9.5.4. Measurement the maximum peak output power.



9.6.Test Result

GFSK Mode

Frequency (MHz)	Maximum peak conducted output power (dBm / W)	Limits (dBm / W)	Result
2402	-1.30/0.007	21 / 0.125	Pass
2441	-0.78/0.0008	21 / 0.125	Pass
2480	-0.54/0.0009	21 / 0.125	Pass

π /4 DQPSK Mode

Frequency (MHz)	Maximum peak conducted output power (dBm/W)	Limits dBm / W	Result
2402	0.00/0.0010	21 / 0.125	Pass
2441	0.53/0.0011	21 / 0.125	Pass
2480	0.78/0.0012	21 / 0.125	Pass

The spectrum analyzer plots are attached as below.

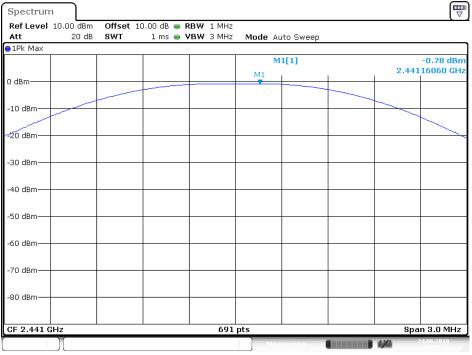


GFSK Mode

	Low c	hannel	
Spectrum			
Ref Level 10.00 dBm Att 20 dB		Mode Auto Sweep	x
∋1Pk Max			
- I-		M1[1]	-1.30 dBn 2.40216500 GH:
0 dBm			
-10 dBm			
-20 dBm			
-30 dBm			
-40 dBm			
-50 dBm			
-60 dBm			
-70 dBm			
-80 dBm			
CF 2.402 GHz	691	pts	Span 3.0 MHz
-80 dBm	691	pts Measuring	Span 3.0 MH:

Date: 24.JUN.2019 11:16:25

Middle channel



Date: 24.JUN.2019 11:15:45

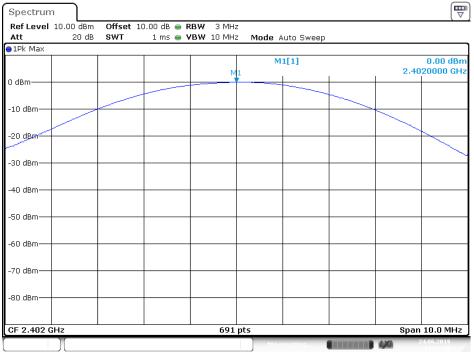


High channel Spectrum Ref Level 10.00 dBm Att 20 dB Offset 10.00 dB ■ RBW 1 MHz SWT 1 ms ■ VBW 3 MHz Mode Auto Sweep ⊖1Pk Max -0.54 dBm 2.48013460 GHz M1[1] М1 0 dBm· -10 dBm--20 dBm -30 dBm -40 dBm--50 dBm -60 dBm--70 dBm -80 dBm-Span 3.0 MHz CF 2.48 GHz 691 pts

Date: 24.JUN.2019 11:15:07

π /4 DQPSK Mode

Low channel



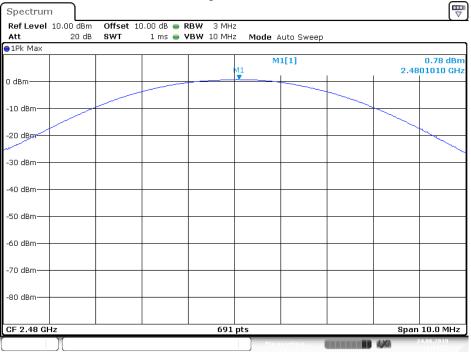
Date: 24.JUN.2019 11:13:00



	Ν	Middle channel	
Spectrum			
Ref Level 10.00 dBm Att 20 dB	Offset 10.00 dB R SWT 1 ms V	BW 3 MHz BW 10 MHz Mode Auto Swee	
1Pk Max	341 1115 - 1	DW IO MILZ HIDLE AUTO SWEE	ч Ч
		M1[1]	0.53 dBm 2.4411160 GHz
0 dBm			
-10 dBm			
-20 dBm			
-30 dBm			
-40 dBm			
-50 dBm			
-60 dBm			
-70 dBm			
-80 dBm			
CF 2.441 GHz		691 pts	Span 10.0 MHz
		Measuring	24.05.2019

Date: 24.JUN.2019 11:13:53

High channel



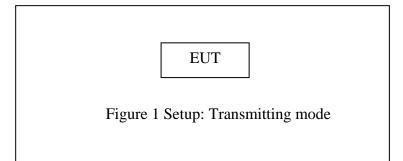
Date: 24.JUN.2019 11:14:27



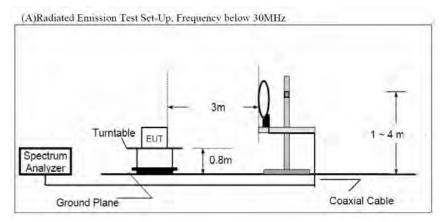
10.RADIATED EMISSION TEST

10.1.Block Diagram of Test Setup

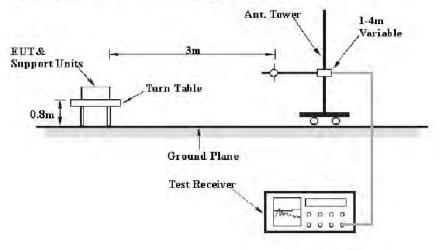
10.1.1.Block diagram of connection between the EUT and peripherals



10.1.2.Semi-Anechoic Chamber Test Setup Diagram

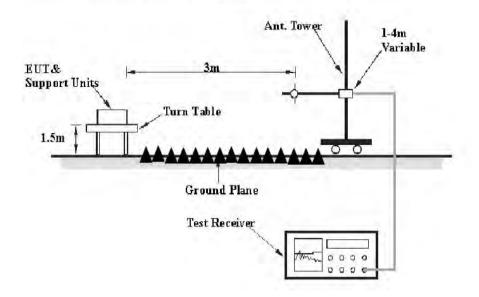


(B)Radiated Emission Test Set-Up, Frequency 30MHz-1GHz





(C) Radiated Emission Test Set-Up. Frequency above 1GHz



10.2. The Requirement For Section 15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).



10.3.Transmitter Emission Limit

Radiated emissions shall comply with the field strength limits shown in table 5 and table 6. Additionally, the level of any transmitter unwanted emission shall not exceed the level of the transmitter's fundamental emission.

Frequency	Field strength
(MHz)	(µV/m at 3 m)
30 - 88	100
88 - 216	150
216 - 960	200
Above 960	500

Table 5 – General field strength limits at frequencies above 30 MHz

Table 6 – General field strength limits at frequencies below 30 MHz

Frequency	Magnetic field strength (H- Field) (μA/m)	Measurement distance (m)	
9 - 490 kHz ¹	6.37/F (F in kHz)	300	
490 - 1705 kHz	63.7/F (F in kHz)	30	
1.705 - 30 MHz	0.08	30	

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.



10.4.Restricted bands of operation

10.4.1.FCC Part 15.205 Restricted bands of operation

(a) Except as shown in paragraph (d) of this section, Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	$(^{2})$
13.36-13.41			

 1 Until February 1, 1999, this restricted band shall be 0.490-0.510

²Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emission appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000MHz, Compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, compliance with the emission limits in Section15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

10.5.Configuration of EUT on Measurement

The equipment is installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.



10.6.Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground(Below 1GHz). The EUT and its simulators are placed on a turntable, which is 1.5 meter high above ground(Above 1GHz). The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bi-log antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the EUT location must be manipulated according to ANSI C63.10:2013 on radiated emission measurement. This EUT was tested in 3 orthogonal positions and the worst case position data was reported.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

- 1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak at frequency below 1GHz.
- 2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for peak measurement with peak detector at frequency above 1GHz.
- 3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average measurement with peak detection at frequency above 1GHz.
- 4. All modes of operation were investigated and the worst-case emissions are reported.



10.7.Data Sample

Frequency	Reading	Factor	Result	Limit	Margin	Remark
(MHz)	(dBµv)	(dB/m)	(dBµv/m)	(dBµv/m)	(dB)	
X.XX	48.69	-13.35	35.34	46	-10.66	QP

$$\label{eq:Frequency(MHz)} \begin{split} & = \text{Emission frequency in MHz} \\ & \text{Reading(dB}\mu\nu) = \text{Uncorrected Analyzer/Receiver reading} \\ & \text{Factor (dB/m)} = \text{Antenna factor + Cable Loss - Amplifier gain} \\ & \text{Result(dB}\mu\nu/m) = \text{Reading(dB}\mu\nu) + \text{Factor(dB/m)} \\ & \text{Limit (dB}\mu\nu/m) = \text{Limit stated in standard} \\ & \text{Margin (dB)} = \text{Result(dB}\mu\nu/m) - \text{Limit (dB}\mu\nu/m) \\ & \text{QP} = \text{Quasi-peak Reading} \end{split}$$

Calculation Formula: Margin(dB) = Result ($dB\mu V/m$)–Limit($dB\mu V/m$) Result($dB\mu V/m$)= Reading($dB\mu V$)+ Factor(dB/m)

The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the limit.

10.8.Test Result

Pass.

The frequency range from 9KHz to 26.5GHz is investigated.

Note: 1.We tested GFSK mode, $\pi/4$ DQPSK Mode, and recorded the worse case data ($\pi/4$ DQPSK mode) for all test mode.

The spectrum analyzer plots are attached as below.



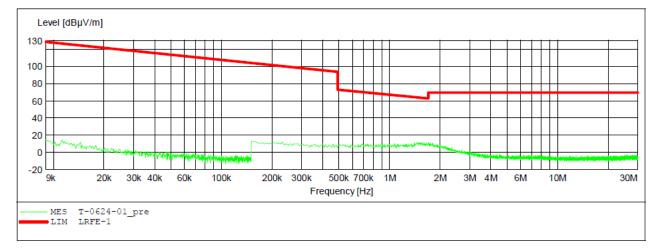
9kHz-30MHz test data

ACCURATE TECHNOLOGY CO., LTD

FCC Part 15C 3M Radiated

EUT: Bluetooth Neckband Sports Earphones M/N:BTNCKEPBKPRM Manufacturer: THUMBS UK(UK)LTD Operating Condition: TX 2402MHz Test Site: 2# Chamber Operator: WADE Test Specification: DC 3.7V Comment: X Start of Test: 2019-6-24 /

Short Desc			UB_STD_VTE			
Start	Stop	Step –	Detector	Meas.	IF	Transducer
Frequency	Frequency	Width		Time	Bandw.	
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak	1.0 s	200 Hz	1516M
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	1516M

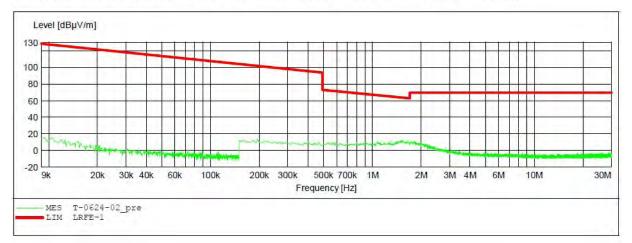




FCC Part 15C 3M Radiated

Operating Condition:	Bluetooth Neckband THUMBS UK(UK)LTD TX 2402MHz 2# Chamber	Sports	Earphones	M/N:BTNCKEPBKPRM
Operator: Test Specification:	WADE DC 3.7V			
Comment:	Y 2019-6-24 /			

Short Desc	ription:		SUB STD VTEN	RM2 1.70		
Start	Stop	Step -	Detector	Meas.	IF	Transducer
Frequency	Frequency	Width		Time	Bandw.	
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak	1.0 s	200 Hz	1516M
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	1516M

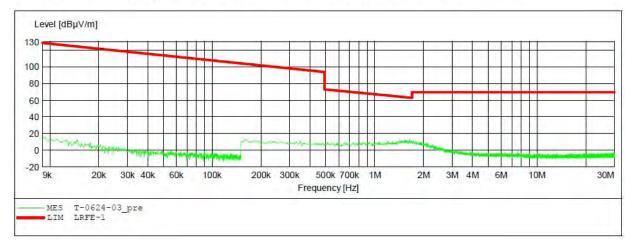




FCC Part 15C 3M Radiated

TITIT.			_	
EUT:	Bluetooth Neckband	Sports	Earphones	M/N:BTNCKEPBKPRM
Manufacturer:	THUMBS UK (UK) LTD	1		
Operating Condition:	TX 2402MHz			
	2# Chamber			
Operator:	WADE			
Test Specification:	DC 3.7V			
Comment:	Z			
Start of Test:	2019-6-24 /			

Short Desc	ription:		SUB STD VTE	RM2 1.70		
Start	Stop	Step -	Detector	Meas.	IF	Transducer
Frequency	Frequency	Width		Time	Bandw.	
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak	1.0 s	200 Hz	1516M
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	1516M

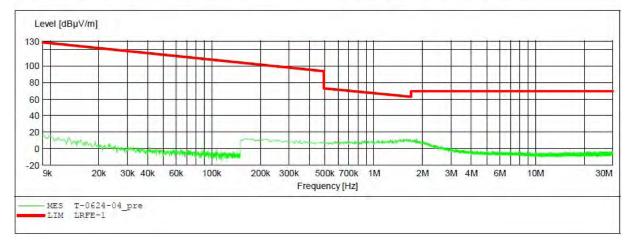




FCC Part 15C 3M Radiated

Operating Condition:	Bluetooth Neckband THUMBS UK(UK)LTD TX 2441MHz 2# Chamber	Sports	Earphones	M/N:BTNCKEPBKPRM
Operator: Test Specification: Comment:	WADE			

Sho	ort Desc	ription:		SUB STD VTER	RM2 1.70		
Sta	art	Stop	Step	Detector	Meas.	IF	Transducer
Fre	equency	Frequency	Width		Time	Bandw.	
9.0) kHz	150.0 kHz	100.0 Hz	QuasiPeak	1.0 s	200 Hz	1516M
150	0.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	1516M

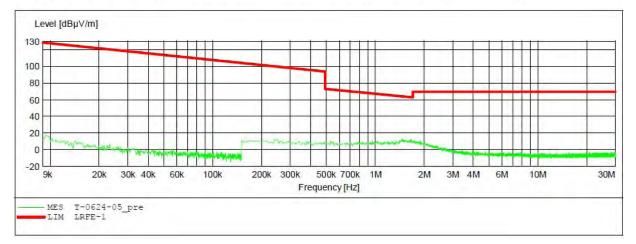




FCC Part 15C 3M Radiated

EUT:	Bluetooth Neckband	Sports	Earphones	M/N:BTNCKEPBKPRM
Manufacturer:	THUMBS UK (UK) LTD	-	2010 C 120 C 1	
Operating Condition:	TX 2441MHz			
Test Site:	2# Chamber			
Operator:	WADE			
Test Specification:	DC 3.7V			
Comment:	Y			
Start of Test:	2019-6-24 /			

Short Desc			SUB STD VTER	RM2 1.70		
Start	Stop	Step -	Detector	Meas.	IF	Transducer
Frequency	Frequency	Width		Time	Bandw.	
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak	1.0 s	200 Hz	1516M
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	1516M

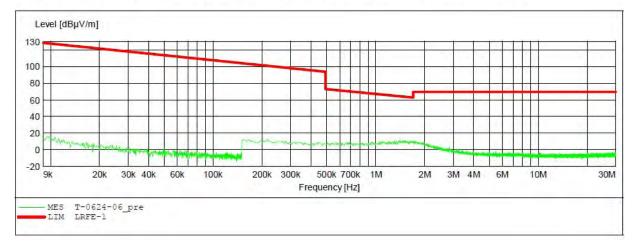




FCC Part 15C 3M Radiated

Operating Condition:	Bluetooth Neckband Sports Earphones M, THUMBS UK(UK)LTD TX 2441MHz 2# Chamber	/N:BTNCKEPBKPRM
Operator: Test Specification: Comment:	WADE	

Transducer
1516M
1516M

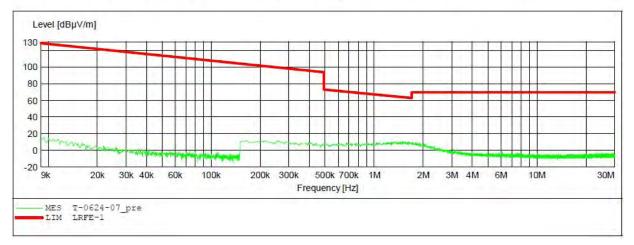




FCC Part 15C 3M Radiated

EUT:	Bluetooth Neckband	Sports	Earphones	M/N:BTNCKEPBKPRM
Manufacturer:	THUMBS UK (UK) LTD		100.000.0	
Operating Condition:	TX 2480MHz			
Test Site:	2# Chamber			
Operator:	WADE			
Test Specification:	DC 3.7V			
Comment:	X			
Start of Test:	2019-6-24 /			

Short Desc	ription:	5	SUB STD VTE	RM2 1.70		
Start	Stop	Step -	Detector	Meas.	IF	Transducer
Frequency	Frequency	Width		Time	Bandw.	
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak	1.0 s	200 Hz	1516M
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	1516M

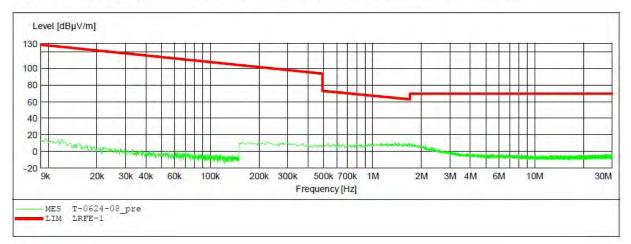




FCC Part 15C 3M Radiated

Operating Condition:	Bluetooth Neckband THUMBS UK(UK)LTD TX 2480MHz 2# Chamber	Sports	Earphones	M/N:BTNCKEPBKPRM
Operator: Test Specification: Comment: Start of Test:	WADE DC 3.7V Y			

Short Desc	ription:	5	SUB STD VTE	RM2 1.70		
Start	Stop	Step _	Detector	Meas.	IF	Transducer
Frequency	Frequency	Width		Time	Bandw.	
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak	1.0 s	200 Hz	1516M
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	1516M

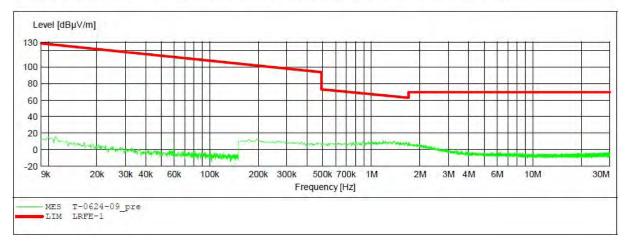




FCC Part 15C 3M Radiated

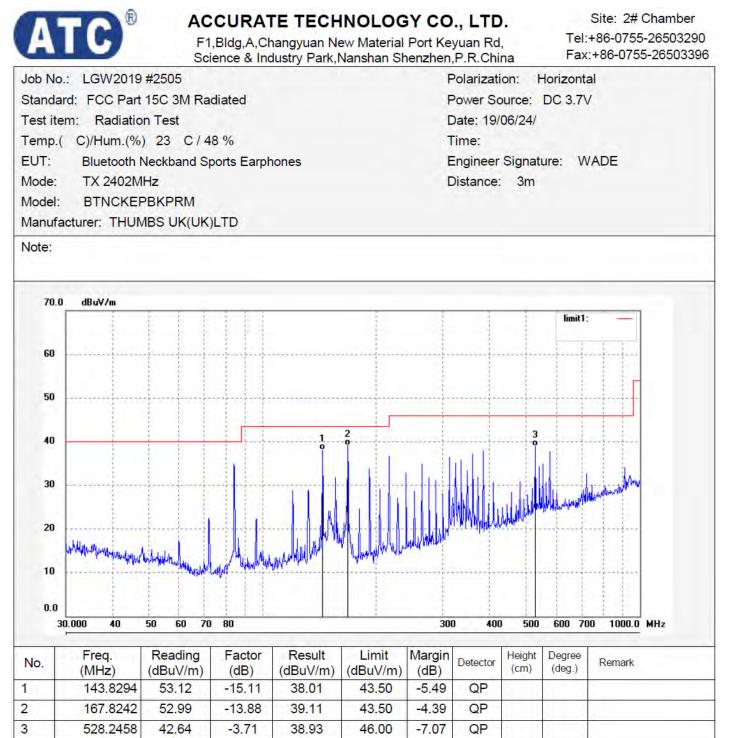
Operating Condition:		Sports	Earphones	M/N:BTNCKEPBKPRM
Test Site: Operator: Test Specification:				
Comment:	z 2019-6-24 /			

Short Des	cription:		SUB STD VTE	RM2 1.70		
Start	Stop	Step -	Detector	Meas.	IF	Transducer
Frequency	Frequency	Width		Time	Bandw.	
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak	1.0 s	200 Hz	1516M
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak	1.0 s	9 kHz	1516M





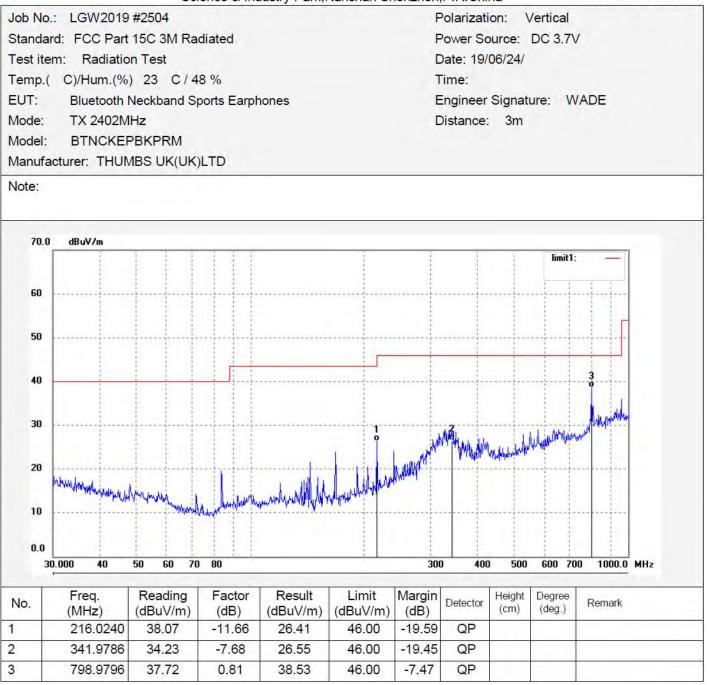
30MHz-1GHz Test data







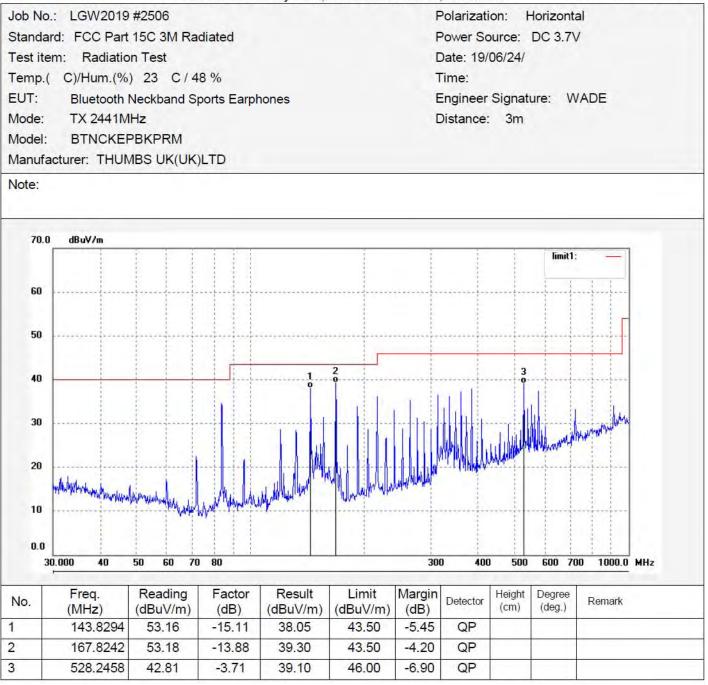
F1,Bldg,A,Changyuan New Material Port Keyuan Rd, Science & Industry Park,Nanshan Shenzhen,P.R.China







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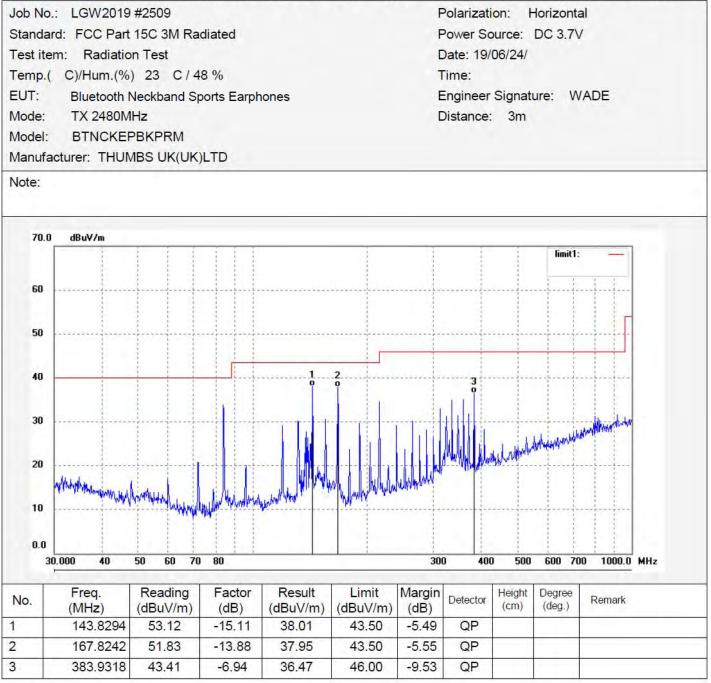
			ence a m	dustry Park,	Valisian Si						-2000000
							Polarization: Vertical				
	ard: FCC Part		diated				Power Sc		DC 3.7V	/	
	em: Radiatio						Date: 19/	06/24/			
	(C)/Hum.(%) 23 C/4	8 %				Time:				
UT:		Neckband Sp	orts Earpl	nones			Engineer		ure: W	ADE	
lode:						0	Distance:	3m			
lodel:											
lanufa	acturer: THUN	MBS UK(UK)	LTD								
lote:											
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3	80.000 40	50 60 70	80			300	D 400) 500	600 70	0 1000.0	MHz
No.	Freq.	Reading	Factor	Result	Limit	Margin	Detector	Height	Degree	Remark	
06	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)		(cm)	(deg.)	100 m 100 m 10	
	216.0240	44.68	-11.66	33.02	46.00	-12.98	QP				
	383.9318	38.07	-6.94	31.13	46.00	-14.87	QP				
ð - 1	798.9796	33.94	0.81	34.75	46.00	-11.25	QP		, I.S. 11		



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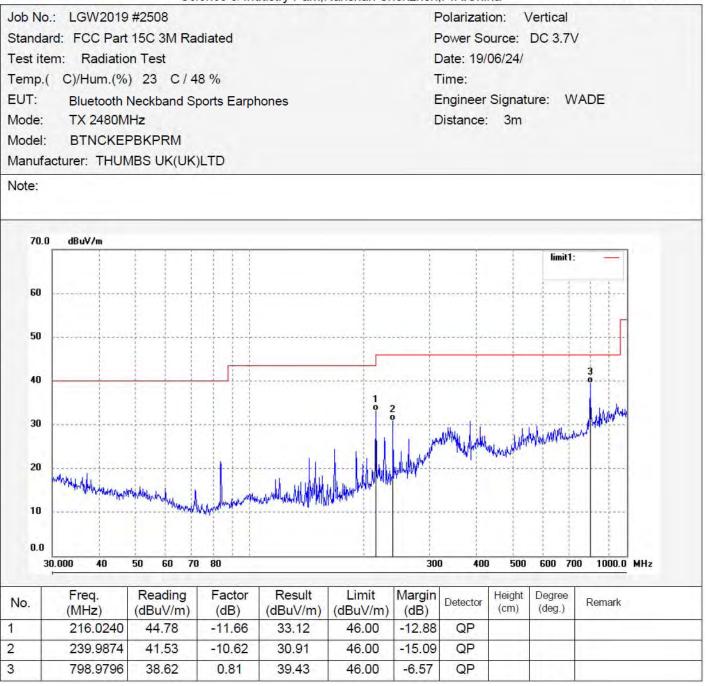
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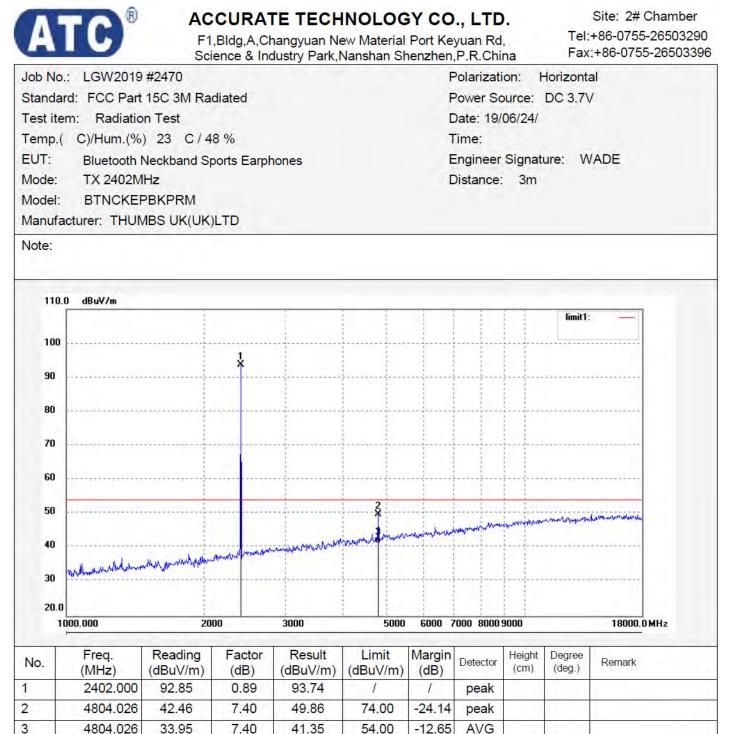


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ob No.	: LGW2019	#2471				F	Polarizati	ion: \	/ertical			
tandar	rd: FCC Part	15C 3M Rad	diated			Power Source: DC 3.7V						
est ite	m: Radiatio	n Test				Date: 19/06/24/						
emp.(C)/Hum.(%) 23 C/4	8 %			Time:						
UT:	Bluetooth I	Neckband Sp	oorts Earpl	hones		E	Engineer	Signat	ure: W	ADE		
lode:	TX 2402M					C	Distance:	3m				
lodel:	BTNCKER	BKPRM										
lanufa	cturer: THUN	BS UK(UK)	LTD									
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No.	Freq.	Reading	Factor	Result	Limit	Margin	Detector	Height (cm)	Degree	Remark		
	(MHz) 2402.000	(dBuV/m) 90.29	(dB) 0.89	(dBuV/m) 91.18	(dBuV/m)	(dB)	peak	(cm)	(deg.)			
	2702.000	00.20	0.05	01.10	1	1	pean	1	1	for the second s		
	4804.025	43.03	7.40	50.43	74.00	-23.57	peak					





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	.: LGW2019						Polarizati		Horizonta				
	rd: FCC Part		diated				Power Source: DC 3.7V						
	m: Radiatio						Date: 19/06/24/						
	C)/Hum.(%	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					Time:						
UT:	Bluetooth N	Veckband Sp	oorts Earph	nones		E	Engineer	Signat	ure: W	/ADE			
lode:	TX 2441M					C	Distance:	3m					
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lanufa	cturer: THUN	IBS UK(UK)	LTD										
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No.	Freq.	Reading	Factor	Result	Limit	Margin	Detector	Height	Degree	Remark			
· · · · ·	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)		(cm)	(deg.)				
	2441.000	93.17	1.06	94.23	/	/	peak						
	4882.027	41.61 33.21	8.11 8.11	49.72 41.32	74.00 54.00	-24.28							
	4882.027												



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ob No.:	LGW2019	#2475				F	Polarizati	on: \	/ertical			
Standar	d: FCC Part	15C 3M Ra	diated			Power Source: DC 3.7V						
est iter	n: Radiatio	n Test				Date: 19/06/24/						
emp.(C)/Hum.(%) 23 C/4	8 %			1	Time:					
UT:	Bluetooth I	Neckband Sp	oorts Earph	nones		E	Engineer	Signat	ure: W	/ADE		
/lode:	TX 2441M	Hz				0	Distance:	3m				
/lodel:	BTNCKER	BKPRM										
lanufad	turer: THUN	BS UK(UK)	LTD									
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No.	Freq.	Reading	Factor	Result	Limit	Margin	Detector	Height	Degree	Remark		
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)		(cm)	(deg.)			
	2441.000	89.74	1.06	90.80	/	/	peak					
	4882.029	41.93	8.11	50.04	74.00	-23.96	peak					
1.1	4882.029	34.25	8.11	42.36	54.00	-11.64	AVG					





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ob No.	.: LGW2019	#2477				F	Polarizati	on: H	orizonta	al			
Standa	rd: FCC Part	15C 3M Ra	diated			F	Power Source: DC 3.7V						
	m: Radiatio						Date: 19/06/24/						
	C)/Hum.(%		8 %				Time:						
UT:		veckband S		nones			Engineer	Signat	ure: W	ADE			
/lode:	TX 2480M						Distance:						
/lodel:	BTNCKEF												
	cturer: THUN		LTD										
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1	From	Reading	Factor	Result	Limit	Margin		Hoight	Dograa				
No.	Freq. (MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark			
	2480.000	90.77	1.10	91.87	/	/	peak						
	4960.028	41.31	8.60	49.91	74.00	-24.09	peak			-			
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Job No.:	LGW2019	#2476				F	Polarizati	ion: \	/ertical				
standard:	FCC Part	15C 3M Ra	diated			F	Power Source: DC 3.7V						
est item:	Radiatio	n Test				C	Date: 19/06/24/						
emp.((C)/Hum.(%) 23 C/4	8 %			٦	Time:						
UT:	Bluetooth I	Neckband Sp	orts Earph	nones		E	Engineer	Signat	ure: W	/ADE			
lode:	TX 2480M	Hz				C	Distance:	3m					
lodel:	BTNCKER	BKPRM											
lanufactu	irer: THUN	BS UK(UK)	LTD										
lote:													
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1000.	000	20	00	3000	5000	6000 7	7000 8000	9000		18000.0 MHz			
	Freq.	Reading	Factor	Result	Limit	Margin	Detector	Height (cm)	Degree	Remark			
	(MHz) 2480.000	(dBuV/m) 90.31	(dB) 1.10	(dBuV/m) 91.41	(dBuV/m)	(dB) /	peak	(cm)	(deg.)				
	4960.027	41.36	8.60	49.96	74.00	-24.04							
				49.96	54.00	-24.04	AVG						
	4960.027	32.88	8.60	41.40	54.00	-12.52	AVG						



18GHz-26.5GHz test data



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		Sci	ence & In	dustry Park,	Nanshan Sh	nenzhen,	P.R.Chi	na	гах	.+00-0700-2000000			
ob No.	.: LGW2019	#2481				F	Polarizati	ion: I	Horizonta	al			
tanda	rd: FCC Part	15C 3M Ra	diated			Power Source: DC 3.7V							
est ite	m: Radiatio	n Test				Date: 19/06/24/							
emp.(C)/Hum.(%) 23 C/4	8 %			Time:							
UT:	Bluetooth I	Neckband Sp	oorts Earp	hones		E	Engineer	Signat	ure: W	ADE			
lode:	TX 2402M	Hz				E	Distance:	3m					
lodel:	BTNCKER	PBKPRM											
lanufa	acturer: THUN	ABS UK(UK)LTD										
lote:													
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	8000.000												
11	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark			
	Freq.		Factor				Detector	_	_	Remark			





F1,Bldg,A,Changyuan New Material Port Keyuan Rd, Science & Industry Park, Nanshan Shenzhen, P.R. China

Job No	.: LGW2019	#2480				F	Polarizati	on: \	/ertical				
Standa	rd: FCC Part	15C 3M Ra	diated			Power Source: DC 3.7V							
Test ite	em: Radiatio	n Test				Date: 19/06/24/							
Temp.(C)/Hum.(%) 23 C/4	8 %			Time:							
EUT:	Bluetooth	Neckband Sp	oorts Earp	hones		Engineer Signature: WADE							
Mode:	TX 2402M	the second second second second					Distance						
Model:	BTNCKE	PBKPRM											
Manufa	acturer: THUN	ABS UK(UK)	LTD										
Note:													
90.0	dBuV/m												
									limit1:				
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0.0													
1	8000.000		20000							26500.0 MHz			
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark			
1	22517.962	17.69	32.08	49.77	74.00	-24.23	peak	1					
2	22517.962	7.46	32.08	39.54	54.00	-14.46	AVG						



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Job No	.: LGW2019	#2482				F	Polarizati	on: H	Horizonta	al			
Standa	rd: FCC Part	15C 3M Ra	diated			Power Source: DC 3.7V							
Test ite	em: Radiatio	n Test				Date: 19/06/24/							
Temp.(C)/Hum.(%) 23 C/4	8 %			Time:							
EUT:	Bluetooth	Neckband S	oorts Earp	hones		E	Ingineer	Signat	ure: W	ADE			
Mode:	TX 2441M						Distance:						
Model:													
	acturer: THUN		LTD										
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1	8000.000		20000							26500.0 MHz			
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark			
1	23297.576	17.35	32.40	49.75	74.00	-24.25	peak						
2	23297.576	7.05	32.40	39.45	54.00	-14.55	AVG						





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Job No	.: LGW2019	#2483				F	Polarizati	ion: \	/ertical				
Standa	rd: FCC Part	15C 3M Ra	diated			Power Source: DC 3.7V							
Test ite	em: Radiatio	on Test				Date: 19/06/24/							
Temp.(C)/Hum.(%) 23 C/4	8 %		Time:								
EUT:	Bluetooth	Neckband Sp	orts Earpl	hones		Engineer Signature: WADE							
Mode:	TX 2441M	IHz				Distance: 3m							
Model:	BTNCKE	PBKPRM											
Manufa	acturer: THUN	ABS UK(UK)	LTD										
Note:													
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	8000.000		20000							26500.0 MHz			
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark			
1	23279.561	17.60	32.31	49.91	74.00	-24.09	peak	1					
2	23279.561	7.14	32.31	39.45	54.00	-14.55	AVG	1					





F1,Bldg,A,Changyuan New Material Port Keyuan Rd, Science & Industry Park, Nanshan Shenzhen, P.R. China

Job N	b.: LGW2019	#2485				F	Polarizati	on: H	Horizonta	al		
Stand	ard: FCC Part	15C 3M Ra	diated			Power Source: DC 3.7V						
Test it	em: Radiatio	on Test				Date: 19/06/24/						
Temp	(C)/Hum.(%) 23 C/4	8 %			Т	Time:					
EUT:	Bluetooth	Neckband Sp	orts Earpl	nones		E	Engineer	Signat	ure: W	ADE		
Mode:						C	Distance:	3m				
Model	BTNCKE	PBKPRM										
Manuf	acturer: THUN	ABS UK(UK)	LTD									
Note:												
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	18000.000		20000							26500.0 MHz		
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No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark		
1	21215.887	18.46	31.38	49.84	74.00	-24.16	peak					
2	21215.887	8.07	31.38	39.45	54.00	-14.55	AVG					





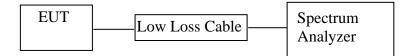
F1,Bldg,A,Changyuan New Material Port Keyuan Rd, Science & Industry Park, Nanshan Shenzhen, P.R. China

Job No	.: LGW2019	#2484				F	Polarizati	on: \	/ertical				
Standa	rd: FCC Part	15C 3M Rad	diated			Power Source: DC 3.7V							
Test ite	em: Radiatio	n Test				Date: 19/06/24/							
Temp.	C)/Hum.(%) 23 C/4	3 %			Time:							
EUT:	Bluetooth I	Neckband Sp	orts Earph	nones		Engineer Signature: WADE							
Mode:	TX 2480M	Hz				C	Distance:	3m					
Model:	BTNCKE	PBKPRM											
Manufa	acturer: THUN	BS UK(UK)	LTD										
Note:													
90.0	dBu¥/m								limit1:				
80				*******									
70													
~0			1										
60	••••••			******	******				*********				
50	and the state of the	and the second second	and any of the second	mmunit	He the server and the second second	Network and the new	manipulik	in an	an anno	n promotion and the			
40													
30													
20													
10													
0.0													
1	8000.000		20000							26500.0 MHz			
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark			
1	21273.405	17.84	32.24	50.08	74.00	-23.92	peak						
2	21273.405	8.30	32.24	40.54	54.00	-13.46	AVG	- 1					



11.BAND EDGE COMPLIANCE TEST

11.1.Block Diagram of Test Setup



11.2. The Requirement For Section 15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

11.3.EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

11.4.Operating Condition of EUT

- 11.4.1.Setup the EUT and simulator as shown as Section 11.1.
- 11.4.2.Turn on the power of all equipment.
- 11.4.3.Let the EUT work in TX (Hopping off, Hopping on) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2480MHz TX frequency to transmit.



11.5.Test Procedure

- 11.5.1.The transmitter output was connected to the spectrum analyzer via a low loss cable.
- 11.5.2.Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz with convenient frequency span including 100 kHz bandwidth from band edge.
- 11.5.3.The band edges was measured and recorded.

11.6.Test Result

Non-hopping mode

Non-nopping mode			
Frequency	Result of Band Edge	Limit of Band Edge	Result
(MHz)	(dBc)	(dBc)	
	GFSK mo	de	
2400.00	32.69	> 20dBc	Pass
2483.50	39.85	> 20dBc	Pass
	π /4 DQPSK	mode	
2400.00	32.60	> 20dBc	Pass
2483.50	40.07	> 20dBc	Pass

Hopping mode

mout in the second seco			
Frequency	Result of Band Edge	Limit of Band Edge	Result
(MHz)	(dBc)	(dBc)	
(MITZ)	(ubc)	(ubc)	
GFSK mode			
2400.00	33.56	> 20dBc	Pass
2100.00	55.50	> 200DC	1 455
2483.94	40.71	> 20dBc	Pass
2100.91	10171	/ 20020	I USS
π /4 DQPSK mode			
2400.00	33.40	>20dBc	Pass
2483.91	40.43	> 20dBc	Pass

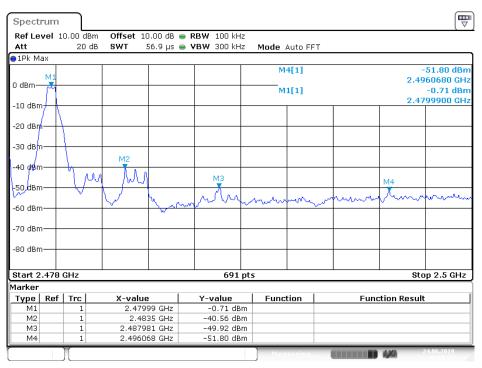
The spectrum analyzer plots are attached as below.



Spectrum						
Ref Level 🔅			RBW 100 kHz			
Att	20 dE	3 SWT 1 ms	👄 VBW 300 kHz	Mode Auto S	weep	
⊖1Pk Max						
				M4[1]		-39.88 dBm
						2.394050 GM
				M1[1]		-1.73 dBr
-10 dBm						2.401990 GH
-20 dBm						
-30 dBm						
						M4
-40 dBm-+						
						M . A U
-50 dBm				, sublative	MARINA AND AND	A 11011.
munder	Renderliker	never and hear	mallower water	manna	· · · · · · · · · · · · · · · · · · ·	Manun VWW
-60 dBm						
-70 dBm						
-70 ubiii						
-80 dBm						
Start 2.31 (211-2		691 pts	-		Stop 2.403 GHz
Marker	302		oar hu	5		3tup 2.403 GH2
	1	X	1 v	[1	· PIt
Type Ref M1	Trc 1	2.40199 GHz	Y-value -1.73 dBm	Function	Funct	ion Result
M1 M2	1	2.40199 GH2 2.4 GHz	-1.73 uBm			
M2 M3	1	2.39822 GHz	-34.42 dBm			
M4	1	2.39405 GHz	-39.88 dBm			
)[Measuring		24.06.2019
						11:26:25

Non-hopping mode (GFSK Mode)

Date: 24.JUN.2019 11:26:25



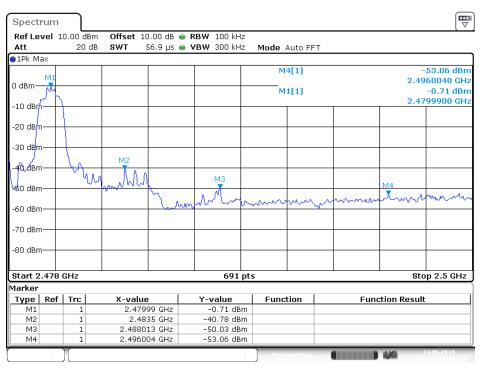
Date: 24.JUN.2019 11:25:23



Spectrum						
Ref Level 1 Att	0.00 dB 20 c		 RBW 100 kHz VBW 300 kHz 	Mada Auto C		
Att 1Pk Max	20 0	ab SWI 1 ms	S S YBW 300 KHZ	Mode Auto St	weep	
				M4[1]		-40.22 dBn
						2.394050 GM
				M1[1]		-1.70 dBr
-10 dBm						2.401990 GH
-20 dBm						
-30 dBm						M3
-40 dBm						NI4
-50 dBm				, Miro	n Maria Madalan	
-60 dBm	when	www.www.hades	hand			housen u.
-70 dBm						
-80 dBm						
Start 2.31 G	Hz		691 pts	5		Stop 2.403 GHz
larker						
Type Ref		X-value	Y-value	Function	Fun	ction Result
M1	1	2.40199 GHz				
M2 M3	1	2.4 GHz 2.39822 GHz				
M4	1	2.39622 GHz				
				Measuring.		24.06.2019

Non-hopping mode (π /4 DQPSK Mode)

Date: 24.JUN.2019 11:23:28



Date: 24.JUN.2019 11:24:33



Spectrum Ref Level 10.00 dBm Offset 10.00 dB 👄 RBW 100 kHz 20 dB SWT 1.1 ms 👄 VBW 300 kHz Att Mode Auto Sweep ●1Pk Max -50.83 dBn 2.350080\@H: M4[1] 0 dBm--1.76 dar 2.402040 da M1[1] -10 dBm-M -20 dBm--30 dBm--40 dBmмз ма mmuntummuntummuntummuntum -50 dBm -60 dBm--70 dBm· -80 dBm-691 pts Stop 2.405 GHz Start 2.31 GHz Marker Y-value -1.76 dBm -35.32 dBm -50.27 dBm -50.83 dBm Type Ref Trc Function Function Result X-value 2.40204 GHz 2.4 GHz 2.37001 GHz 2.35008 GHz M1 M2 1 1 ΜЗ 1 M4 1 LXI

Hopping mode (GFSK Mode)

Date: 24.JUN.2019 11:27:52

Spectrum										
Ref Level 1	0.00 dBm	Offset 10.00	D dB 😑 I	RBW 100 kHz	:					
Att	20 dB	SWT 56.3	8 µs 👄 '	VBW 300 kHz	Mode	Auto FF	τ			
●1Pk Max										
	М1				M	4[1]				52.41 dBm 09300 GHz
	X.			+ +	N	1[1]				-1.72 dBm
	Λ					1[1]				99460 GHz
-20 dBm										
-30 dBm										
-40 dBm		M2								
	- "L	አለል እ. እ. እ	h i	МЗ		ма				
-50 dBm	¥*	- A Prod a	In	Lohrm	A 64 (2)	Low	1	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	www.ww	on nated a
-60 dBm			Current	ha and he			Andrea	r ~www.w	WWW 1. M	100MA
-00 0011										
-70 dBm				++						
-80 dBm										
Start 2.477	GHz			691 p	ots		I		Sto	p 2.5 GHz
Marker										
Type Ref	Trc	X-value		Y-value	Func	tion		Fund	tion Result	
M1	1	2.479946		-1.72 dBn						
M2	1	2.4835		-42.43 dBn						
M3	1	2.487002		-51.21 dBn						
M4	1	2.49093	GHZ	-52.41 dBn						
	Л				Mea				1/1	4.05.2019

Date: 24.JUN.2019 11:28:46



-80 dBm·

Marker

МЗ

M4

Start 2.31 GHz

 Type
 Ref
 Trc

 M1
 1

 M2
 1

Stop 2.405 GHz

Function Result

			°rr8-		/ ·				
Spectrun	n								
Ref Level	10.00 dBm	Offset 1	0.00 dB 👄 F	RBW 100 kH	Z				
Att	20 dB	SWT	1.1 ms 👄 🎙	/BW 300 kH	z Mode	Auto Sweep			
😑 1Pk Max									
					IV	14[1]		-	51.56 dBm
0 dBm								2.3	60110/GHz
o ubin					M	11[1]			-1.91 dem
-10 dBm							1	2.4	01770 🖏
-20 dBm									
-30 dBm									1712
10.10								M	₽ MNN/
-40 dBm								الم.	M
-50 dBm					M4			וטין	կիկ
-SO dBill			NUMARA	human	NakaAhnW	MUMMUM	workfluch	with	
-60 dBm	active beau								
-70 dBm—									
1			1			1	1	1	

691 pts

Function

Y-value -1.91 dBm -35.31 dBm -40.67 dBm -51.56 dBm

Hopping mode (**π**/4 DQPSK Mode)

Date: 24.JUN.2019 11:31:12

1

1

X-value

2.40177 GHz 2.4 GHz 2.39503 GHz

2.36011 GHz

Spectrum	ı)									
Ref Level	10.00 dBm	Offset 10.00) dB 😑 F	RBW 100 kH	Z					
Att	20 dB	SWT 56.8	3 µs 😐 🕻	/BW 300 kH	z Mode	Auto FF	т			
●1Pk Max										
0 dBm	M1					4[1]				52.42 dBm 14290 GHz
₩ 10 dBm	M				М	1[1]			2.47	-0.71 dBm 99790 GHz
-20 dBm										
-30 dBm										
-40 dBm	hi	Mr. AN	3							
-50 dBm—			tun	mm	mym	M4 MM	m	mm	www	mmw
-60 dBm										
-70 dBm										
-80 dBm										
Start 2.47	7 GHz	1		691	pts				Sto	p 2.5 GHz
Marker										<u> </u>
Type Ref	f Trc	X-value		Y-value	Func	tion		Func	tion Result	.
M1	1	2.479979 (-0.71 dB						
M2	1	2.4835 (-41.14 dB						
M3	1	2.484473 (-43.85 dB						
M4	1	2.491429 (GHZ	-52.42 dB	m					
	J				Mea	suring.			170	24.06.2019

Date: 24.JUN.2019 11:30:10



Radiated Band Edge Result

Note:

Emissions attenuated more than 20 dB below the permissible value are not reported.
 The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

3. Display the measurement of peak values.

Test Procedure:

The EUT and its simulators are placed on a turntable, which is 1.5 meter high above ground(Above 1GHz). The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bi-log antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the EUT location must be manipulated according to ANSI C63.10:2013 on radiated emission measurement. This EUT was tested in 3 orthogonal positions and the worst case position data was reported.

Let the EUT work in TX (Hopping off, Hopping on) modes measure it. We select 2402MHz, 2480MHz TX frequency to transmit(Hopping off mode). We select 2402-2480MHz TX frequency to transmit(Hopping on mode).

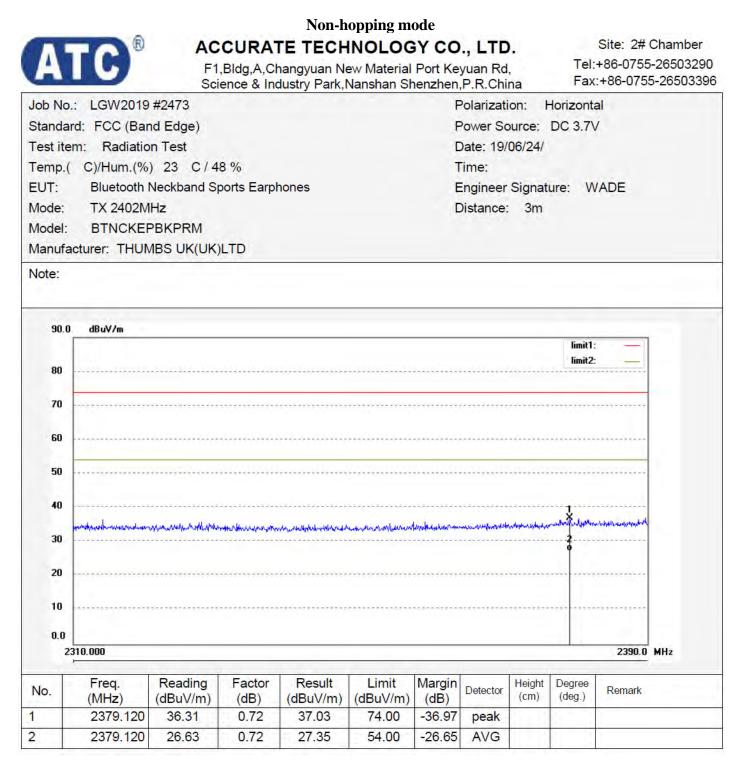
During the radiated emission test, the spectrum analyzer was set with the following configurations:

1. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for peak measurement with peak detector at frequency above 1GHz.

2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average measurement with peak detection at frequency above 1GHz.

3.All modes of operation were investigated and the worse case($\pi/4$ DQPSK Mode) emissions are reported.







ATC®

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F1,Bldg,A,Changyuan New Material Port Keyuan Rd, Science & Industry Park,Nanshan Shenzhen,P.R.China Site: 2# Chamber Tel:+86-0755-26503290 Fax:+86-0755-26503396

ob No.	.: LGW2019	#2472				F	olarizati	on: \	/ertical		
tandar	rd: FCC (Bar	nd Edge)				F	ower So	urce:	DC 3.7\	1	
est ite	m: Radiatio	n Test				C	ate: 19/0	06/24/			
emp.(C)/Hum.(%) 23 C/4	8 %			т	ime:				
UT:	Bluetooth I	Neckband Sp	orts Earph	nones		E	ngineer	Signati	ure: W	ADE	
lode:	TX 2402M	Hz				D)istance:	3m			
lodel:	BTNCKER	PBKPRM									
lanufa	cturer: THUN	BS UK(UK)	LTD								
ote:											
90.0	dBu¥/m										_
									limit1: limit2:		-
80		*****			******		*********			*******	

80 70											
70 60											
70											
70 60											
70 60 50 40		Multunkilian	Mininflanansway	h.W.m.Aspanikarspolya	um alu dana	housedapser	~~M~~~~	dayina	nghapaddagagae	lan mu	
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70 60 50 40	Apin A. L. Mar Mar Mar Mar	Mutudulum	Mihrien/Handerviewa	Minudipanti organijan	um alay kayawa	huwadapum	white	dayinaa	nghapaddagay	lan an a	
70 60 50 40 30	Autor Lana Marana	nyahandalan	Minsythinany	h.M.m.Menerikanpetiyar	um alu da man	hunnaharun	white the the	hallon with	eritisheldiyiyar	Law man	
70 60 50 40 30	aluin a La a a a a a a a a a a a a a a a a a	NWYWYWY	м.н.и.Маклани	h.M.m.direntraspetiera	um ala dagana	humulum	Murality	dayinaa	mbuhalaya	l minuni	
70 60 50 40 30 20	Ann Lannaan	nyuhunhulumuhan	Miningtinanying	h.M. madana and the company on	um alu danna	hunnaharun	n Muris (Myr		nybishelduquyar	1,41/4,	
70 60 50 40 30 20 10	Ашалана 10.000	Multur Martin	Minseytianannoog	Minudownikasyntym	ur-Malinghawaa	hinnidapun		Lappin with	nyhiyooddayayoo		1 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
70 60 50 40 30 20 10		Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	۲ ۲ Margin (dB)	MM MM	Height. (cm)	Degree (deg.)		30.0 MHz
70 60 50 40 30 20 10 0.0 23	310.000 Freq.	Reading	Factor	Result	Limit	Margin	Detector	Height	Degree	239	30.0 MHz





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Site: 2# Chamber Tel:+86-0755-26503290 Fax:+86-0755-26503396

Job No	.: LGW2019	#2478				F	olarizati	ion: H	Horizonta	al		
Standa	ard: FCC (Bar	nd Edge)				F	ower So	ource:	DC 3.7	/		
Test ite	em: Radiatio	n Test				C	Date: 19/	06/24/				
Temp.	(C)/Hum.(%) 23 C/4	8 %			т	ime:					
EUT:	Bluetooth	Neckband Sp	oorts Earpl	hones		Engineer Signature: WADE						
Mode:	TX 2480M	Hz				Distance: 3m						
Model:	BTNCKE	PBKPRM										
Manufa	acturer: THUN	BS UK(UK)	LTD									
Note:	0 dBuV/m									_		
50.0									limit1:	-		
80									limit2:			
								100000				
70												
60								********				
50												
40			×	unertedon where the			- Luti a		1. Alexandra da	alitable based we do no		
30	an the state of the second	CHANNEL ACTION	111116-[-11]0164242-1401	when a support of the second of the	and and a large device produced and	and a for shifting	ALT AN	1944/1979/1977				
			ē									
20		*******	******			*****				****		
10												
10				**************				1000000		******		
0.0												
2	2483.500									2500.0 MHz		
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark		
1						1		1	1			
1	2488.516	36.24	1.10	37.34	74.00	-36.66	peak					





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Site: 2# Chamber Tel:+86-0755-26503290 Fax:+86-0755-26503396

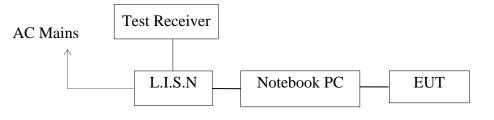
Job N	o.: LGW2019	#2479				F	Polarizati	on: \	/ertical			
Stand	ard: FCC (Bar	nd Edge)				F	Power Sc	ource:	DC 3.7	1		
Test it	tem: Radiatio	n Test				0	Date: 19/	06/24/				
Temp	.(C)/Hum.(%) 23 C/4	8 %			Т	ime:					
EUT:	Bluetooth	Neckband Sp	orts Earpl	hones		Engineer Signature: WADE						
Mode:	TX 2480M	Hz				0	Distance:	3m				
Model	BTNCKE	PBKPRM										
Manuf	facturer: THUN	BS UK(UK)	LTD									
Note:												
90.	.0 dBuV/m											
									limit1: limit2:			
80									limit2:			
70												
70												
70 60												

60					\					x x x x x		
60 50 40	Manahahar	muhum	homorphone	handari	, Ånter	1.n.n.n.	ndar	MA	nhhh	NAM		
60 50	Manahahar	unuhan	hanara	handar	n in the second	1.n.A.A.	nhhr	MM	nh.h.h.	NAAA		
60 50 40	muthnotherhor	unuhara	hourseling	handars	n je na	A.N.A.A.	nhhn	MM	nhhh	N.A.A.		
60 50 40 30	muthnotherhor	www.horm	hanar	handan	Manna.	1nn.	nAAn	MA	uhita	NAM		
60 50 40 30	MMMM	unuhan	hours	handars	n je na	A.N.A.A.	nhhn	MM	nh.h.h.h	NAAA		
60 50 40 30 20	MMMM	www.horm	hana	handar	Manna	1.n.A.n.	nAn	MM	rhili.	XAAA		
60 50 40 30 20 10	MMMM	yuuduru	hunn	handar	Manna	hnhh.	nAAn	MM	1. H.M.A.	2500.0 МНг		
60 50 40 30 20 10		Reading (dBuV/m)	Factor	Result (dBuV/m)	Limit (dBuV/m)	Margin	A.M.A. Detector	Height (cm)	Degree (deg.)	2500.0 MHz Remark		
60 50 40 30 20 10 0.0	2483.500 Freq.	Reading		Result	Limit			Height	Degree			

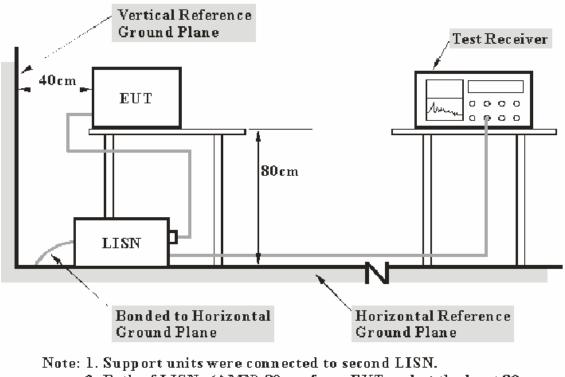


12.AC POWER LINE CONDUCTED EMISSION TEST

12.1.Block Diagram of Test Setup



12.2.Test System Setup



2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.



12.3.Test Limits

Frequency	Limit d	B(µV)						
(MHz)	Quasi-peak Level	Average Level						
0.15 - 0.50	66.0 - 56.0 *	56.0 - 46.0 *						
0.50 - 5.00	56.0	46.0						
5.00 - 30.00	60.0	50.0						
NOTE1: The lower limit shall apply at the transition frequencies.								
NOTE2: The limit decreases linearly with the logarithm of the frequency in the range								
0.15MHz to 0.501	MHz.							

12.4.Configuration of EUT on Measurement

The equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner, which tends to maximize its emission characteristics in a normal application.

12.5.Operating Condition of EUT

12.5.1.Setup the EUT and simulator as shown as Section 12.1.

12.5.2.Turn on the power of all equipment.

12.5.3.Let the EUT work in test mode and measure it.

12.6.Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.4: 2014 on Conducted Emission Measurement.

The bandwidth of test receiver (R & S ESCS30) is set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.



12.7.Data Sample

ſ	Frequency	Transducer	QuasiPeak	Average	QuasiPeak	Average	QuasiPeak	Average	Remark
	(MHz)	value	Level	Level	Limit	Limit	Margin	Margin	(Pass/Fail)
		(dB)	(dBµV)	(dBµV)	(dBµV)	(dBµV)	(dB)	(dB)	
	X.XX	10.5	51.1	34.2	56.0	46.0	4.9	11.8	Pass

$$\label{eq:Frequency} \begin{split} Frequency(MHz) &= Emission \ frequency \ in \ MHz \\ Transducer \ value(dB) &= Insertion \ loss \ of \ LISN + Cable \ Loss \\ Level(dB\mu V) &= Quasi-peak \ Reading/Average \ Reading + Transducer \ value \\ Limit \ (dB\mu V) &= Limit \ stated \ in \ standard \end{split}$$

Calculation Formula: Margin = Limit ($dB\mu V$) - Level ($dB\mu V$)

12.8.Test Result

Pass.

The frequency range from 150kHz to 30MHz is checked.

Emissions attenuated more than 20 dB below the permissible value are not reported.

All data was recorded in the Quasi-peak and average detection mode.

The spectral diagrams are attached as below.



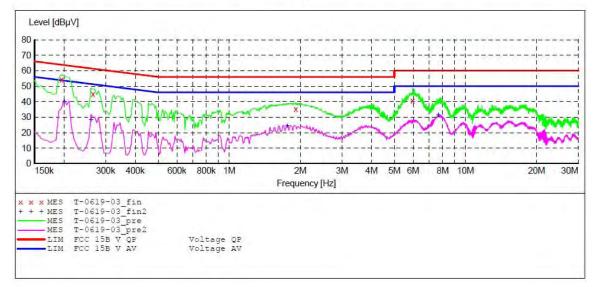
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15 C

EUT: Bluetooth Neckband Sports Earphones M/N:BTNCKEPBKPRM Manufacturer: THUMBS UK(UK)LTD Operating Condition: BT Communication Test Site: 1#Shielding Room Operator: WADE Test Specification: L 120V/60Hz Comment: Start of Test: 6/19/2019 /

SCAN TABLE: "V 9K-30MHz fin"

Short Desc	ription:	_S	UB_STD_VTE	RM2 1./0		
Start	Stop	Step	Detector	Meas.	IF	Transducer
Frequency	Frequency	Width		Time	Bandw.	
	150.0 kHz			1.0 s	200 Hz	NSLK8126 2008
			Average			
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak Average	1.0 s	9 kHz	NSLK8126 2008



MEASUREMENT RESULT: "T-0619-03 fin"

6/19/2019 Frequency Level Transd Limit Margin Detector Line PE MHz dBµV dB dBuV dB 0.195000 54.40 10.5 64 9.4 QP GND L1 16.3 QP 0.265000 45.00 10.6 61 L1 GND 1.910000 35.30 11.0 56 20.7 QP L1 GND 5.970000 40.50 11.2 19.5 60 OP L1 GND

MEASUREMENT RESULT: "T-0619-03 fin2"

Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
39.90	10.5	54	13.7	AV	L1	GND
28.10	10.6	51	23.3	AV	L1	GND
24.30	11.0	46	21.7	AV	L1	GND
31.40	11.2	50	18.6	AV	L1	GND
	dBµV 39.90 28.10 24.30	dBµV dB 39.90 10.5 28.10 10.6 24.30 11.0	dBµV dB dBµV 39.90 10.5 54 28.10 10.6 51 24.30 11.0 46	dBμV dB dBμV dB 39.90 10.5 54 13.7 28.10 10.6 51 23.3 24.30 11.0 46 21.7	dBµV dB dBµV dB 39.90 10.5 54 13.7 AV 28.10 10.6 51 23.3 AV 24.30 11.0 46 21.7 AV	dBµV dB dBµV dB 39.90 10.5 54 13.7 AV L1 28.10 10.6 51 23.3 AV L1 24.30 11.0 46 21.7 AV L1



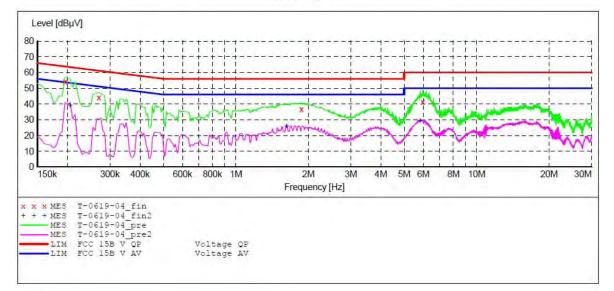
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15 C

EUT: Bluetooth Neckband Sports Earphones M/N:BTNCKEPBKPRM Manufacturer: THUMBS UK(UK)LTD Operating Condition: BT Communication Test Site: 1#Shielding Room Operator: WADE Test Specification: N 120V/60Hz Comment: Start of Test: 6/19/2019 /

SCAN TABLE: "V 9K-30MHz fin"

7	Short Desc	ription:	S	UB STD VTE	RM2 1.70		
	Start		Step Width	Detector	Meas. Time	IF Bandw.	Transducer
		150.0 kHz		QuasiPeak Average	1.0 s	200 Hz	NSLK8126 2008
	150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak Average	1.0 s	9 kHz	NSLK8126 2008



MEASUREMENT RESULT: "T-0619-04 fin"

6/19/2019 Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.195000	54.20	10.5	64	9.6	QP	N	GND
0.270000	44.30	10.6	61	16.8	QP	N	GND
1.870000	36.90	11.0	56	19.1	QP	N	GND
5.970000	41.20	11.2	60	18.8	QP	N	GND

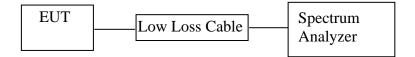
MEASUREMENT RESULT: "T-0619-04 fin2"

6/19/2019 Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.205000	39.10	10.5	53	14.3	AV	N	GND
1.625000	25.80	10.9	46	20.2	AV	N	GND
5.820000	29.40	11.2	50	20.6	AV	N	GND



13.CONDUCTED SPURIOUS EMISSION COMPLIANCE TEST

13.1.Block Diagram of Test Setup



13.2. The Requirement For Section 15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

13.3.EUT Configuration on Measurement

The equipment is installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

13.4.Operating Condition of EUT

- 13.4.1.Setup the EUT and simulator as shown as Section 13.1.
- 13.4.2.Turn on the power of all equipment.
- 13.4.3.Let the EUT work in TX modes measure it. The transmit frequency are 2402-2480 MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.



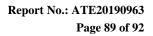
13.5.Test Procedure

- 13.5.1.The transmitter output was connected to the spectrum analyzer via a low loss cable.
- 13.5.2.Set RBW of spectrum analyzer to 100kHz and VBW to 300kHz
- 13.5.3. The Conducted Spurious Emission was measured and recorded.

13.6.Test Result

Pass.

The spectrum analyzer plots are attached as below.





GFSK mode

				Low Ch	annel					
Spectrum										
Ref Level 1	0.00 de	Im Offset 10).00 dB	RBW 100 kHz						
Att	20	dB SWT	265 ms	🔵 VBW 300 kHz	Mode A	uto Sv	veep			
⊜1Pk Max										
					M4	[1]				-49.60 dBm
0 dBm									1	8.0917 GHz
					M1	[1]				-1.56 dBm
-10 dBm										2.3860 GHz
-20 dBm										+
-30 dBm										
-40 dBm										
-50 dBm	N	12 M3					M4			
n	المحاصرين	In work were	de marte	undermourner	worden	unn	and beneved	when	proterresponde	Hennerth
-60 dBm										
-70 dBm										-
-80 dBm										
Start 30.0 M	Hz			691 pt	s				Sto	p 26.5 GHz
Marker										
Type Ref	Trc	X-value	.	Y-value	Functi	on		Fund	tion Resu	lt
M1	1	2.3	36 GHz	-1.56 dBm						
M2	1		99 GHz	-50.55 dBm						
MЗ	1		78 GHz	-50.26 dBm						
M4	1	18.09	17 GHz	-49.60 dBm						
					Mong		6		4.46	24.06.2019

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Middle Channel

Spectrum)					
Ref Level 10.00	dBm Offse	et 10.00 dB 👄	RBW 100 kHz			· · · · · ·
Att :	20 dB SWT	265 ms 👄	VBW 300 kHz	Mode Auto Sv	weep	
1Pk Max						
				M4[1]		-49.45 dBr
						26.0595 GH
				M1[1]		-1.21 dBr
-10 dBm						2.4240 GH
-20 dBm						
-30 dBm						
-40 dBm						
50 Jp	M2			M3		M
-50 dBm	well and the	hundenwood	up my walautor pro-	www.	we relight the when	when when when the
-60 dBm						
-70 dBm						
-80 dBm						
Start 30.0 MHz			691 pts	I		Stop 26.5 GHz
1arker			· · ·			•
Type Ref Tr	cl X-v	alue	Y-value	Function	Eunc	tion Result
M1 M1	1	2.424 GHz	-1.21 dBm			
M2	1	6.676 GHz	-50.10 dBm			
M3		16.023 GHz	-49.47 dBm			
M4	1 2	6.0595 GHz	-49.45 dBm		<u> </u>	

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High Channel

Spectr	um											
Ref Lev	el 1			t 10.00 dB								
Att		20	dB SWT	265 ms	e vbw	300 kHz	Mode /	Auto S [.]	weep			
∎1Pk Ma	X											
	М1						M	2[1]				-51.24 dBr
0 dBm—	T							1[1]				5.2590 GH -0.66 dBr
							IVI.	1[1]				2.4620 GH
-10 dBm												2.4020 GI
-20 dBm												
-30 dBm												
00 00111												
-40 dBm												
			M2 M	3						M4		
-50 dBm		with	manun		umn		unin	Nophie	what	and your and	- Myrul	and and a second
-60 dBm	Myon	and the		mound	and the second						1	
-60 dBm												
-70 dBm												
-70 abiii												
-80 dBm												
Start 30).0 M	Hz				691 pt	s				Si	top 26.5 GHz
1arker												
	Ref	Trc	X-va			/alue	Funct	tion		Fun	ction Res	ult
M1		1		2.462 GHz		0.66 dBm						
M2		1		5.259 GHz		1.24 dBm						
M3 M4		1		6.983 GHz 0.007 GHz		0.94 dBm 9.55 dBm						
T			2		- 4	9.55 UBII	·	_	-	_		24.05 2040
							Mea				170	24.06.2019

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π /4 DQPSK mode

Low Channel

Spectrum								
Ref Level	10.00 d	Bm Offset	10.00 dB (■ RBW 100 kH	z			
Att	20	dB SWT	265 ms (● VBW 300 kH	z Mode	Auto S	weep	
●1Pk Max								
						M4[1]		-49.34 dBm
0 dBm								19.4320 GHz
						M1[1]		-1.60 dBm
-10 dBm								2.3860 GHz
-20 dBm								
-20 00111								
-30 dBm								
-40 dBm								
-40 0811		M2				МЗ	M4	
-50 dBm		¥					•	
	What are adered	www.	when when	when and the second of	when	we we use	mo versus a size	Land Man Manual Contraction
-50 dBm								
-70 dBm								
-80 dBm								
-80 UBIII								
					l .			
Start 30.0 M	MHZ			691	pts			Stop 26.5 GHz
Marker	1				1 -			
Type Ref	<u>Trc</u>	X-val	ue .386 GHz	<u>Y-value</u> -1.60 dB		iction	Fur	iction Result
M1 M2	1		.386 GHZ	-49.57 dB				
M3	1		.713 GHz	-49.14 dE				
M4	1		.432 GHz	-49.34 dE				
)[sacuring		24.06.2019
								11:22:06

Date: 24.JUN.2019 11:22:06



Middle Channel Spectrum Ref Level 10.00 dBm Att 20 dB Offset 10.00 dB ● RBW 100 kHz SWT 265 ms ● VBW 300 kHz Mode Auto Sweep 🔵 1 Pk Max M4[1] -49.85 dBm 18.0530 GHz 0 dBm M1[1] -2.91 dBm 2.4240 GHz -10 dBm -20 dBm· -30 dBm· -40 dBm M3 M4 M2 -50 dBm w white June monun Mr. -60 dBm -70 dBm -80 dBm-Stop 26.5 GHz Start 30.0 MHz 691 pts Marker Type Ref Trc M1 1 M2 1 X-value 2.424 GHz 6.906 GHz Y-value -2.91 dBm Function Function Result -50.92 dBm M3 M4 16.751 GHz 18.053 GHz -49.36 dBm -49.85 dBm 1

Date: 24.JUN.2019 11:21:16

High Channel

			8			_
Spectrum						
Ref Level 1	.0.00 dB	im Offset 10.00 dB	😑 RBW 100 kHz			
Att	20 d	dB SWT 265 ms	🔵 VBW 300 kHz	Mode Auto S	weep	
●1Pk Max						
				M4[1]		-50.39 dBn
						19.4320 GH
				M1[1]		-1.93 dBn
-10 dBm						2.4620 GH
-20 dBm						
-30 dBm 🕂						
-40 dBm						
		M2		M3	M4	
-50 dBm	manuted	WHI WINDOWN I WIND WAR BY	mun much market when	weather man	unun	phannen mound
-60 dBm	J					
-70 dBm						
-80 dBm——						
Start 30.0 M	1Hz		691 pt	s		Stop 26.5 GHz
larker				-		
Type Ref	Trc	X-value	Y-value	Function	Eup	ction Result
M1	1	2,462 GHz	-1.93 dBm	ranction	- Tun	Scion Result
M2	1	6.178 GHz	-50.76 dBm			
M3	1	16.713 GHz	-49.78 dBm			
M4	1	19.432 GHz	-50.39 dBm			
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14.ANTENNA REQUIREMENT

14.1.The Requirement

According to Section 15.203, 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.

14.2.Antenna Construction

Device is equipped with permanent attached antenna, which isn't displaced by other antenna. The Max Antenna gain of EUT is -0.68dBi. Therefore, the equipment complies with the antenna requirement of Section 15.203.

***** End of Test Report *****