



TEST REPORT

Applicant Name : Address :

Report Number : FCC ID:

Test Standard (s) FCC PART 15.247

Sample Description

Product Type: Test Model: Multi Model: Date Received: Date of Test: Report Date: Guangzhou Modeng Intelligent Technology Co.,Ltd A1-23, Dabancang 1904 Innovation Industry Park,No.36, Xinmin Eight St, Gexin Rd, Haizhu Dist, Guangzhou, Guangdong, China SZNS1220719-32605E-RF 2AZ9BSPK-AMPFY

ZIZO AMPLIFY SPK-AMPFY SPK-AMPFY-BKBK, SPK-AMPFY-BKOR 2022-07-19 2022-07-28 to 2022-08-03 2022-08-09

Test Result:

Pass*

* In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:

Jeff Jiang EMC Engineer

Approved By:

Candy . Li

Candy Li EMC Engineer

Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk " \star ".

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Shenzhen Accurate Technology Co., Ltd.

1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China Tel: +86 755-26503290 Fax: +86 755-26503396 Web: www.atc-lab.com

Version 11: 2021-11-09

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Shenzhen Accurate Technology Co., Ltd.	Report No.: SZNS1220719-32605E-RF
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GENERAL INFORMATION

Product	ZIZO AMPLIFY
Tested Model	SPK-AMPFY
Multi Model	SPK-AMPFY-BKBK, SPK-AMPFY-BKOR
Frequency Range	2402~2480MHz
Maximum conducted Peak output power	-7.77dBm
Modulation Technique	BDR(GFSK)/EDR(π/4-DQPSK)
Antenna Specification*	Internal Antenna: -0.58dBi(provided by the applicant)
Voltage Range	DC 5V from adapter or DC 3.7V from battery
Sample number	SZNS1220719-32605E-RF-S1 (RF Radiated Test) SZNS1220719-32605E-RF-S2 (RF Conducted Test)
Sample/EUT Status	Good condition

Objective

This test report is in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commission rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All emissions measurement was performed at Shenzhen Accurate Technology Co., Ltd. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Chai	nnel Bandwidth	5%
RF Fre	quency	$0.082*10^{-7}$
RF output pov	wer, conducted	0.73dB
Unwanted Emis	ssion, conducted	1.6dB
AC Power Lines Co	onducted Emissions	2.72dB
Audio Freque	ency Response	0.1dB
Low Pass Filter Response		1.2dB
Modulation Limiting		1%
9kHz - 30MHz		2.66dB
.	30MHz - 1GHz	4.28dB
Emissions, Radiated	1GHz - 18GHz	4.98dB
Rudiucu	18GHz - 26.5GHz	5.06dB
	26.5GHz - 40GHz	4.72dB
Temperature		1 °C
Humidity		6%
Supply voltages		0.4%

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The test site used by Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 708358, the FCC Designation No.: CN1189.

Accredited by American Association for Laboratory Accreditation (A2LA). The Certificate Number is 4297.01

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0016. The Registration Number is 5077A.

Shenzhen Accurate Technology Co., Ltd.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in an engineering mode.

EUT Exercise Software

Software "FCC Assist 2.4"* was used during testing and the power level was 10*.

Special Accessories

N/A.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

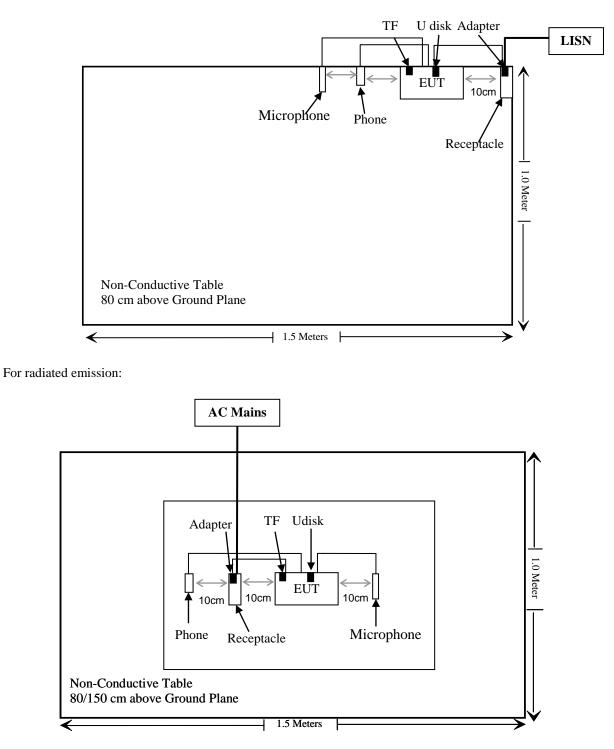
Manufacturer	Description	Model	Serial Number
LIYIN	Microphone	HF-557	Unknown
OPPO	Mobile phone	Pclm10	5b285983b
KINGSTON	TF card	SDCS2/32GB	Unknown
KINGSTON	USB flash disk	Datatraveler G3	Unknown
MEIZU	Adapter	UP0830	162600278502

External I/O Cable

Cable Description	Length (m)	From/Port	То
Un-shielding Detachable USB Cable	0.5	EUT	Adapter
Unshielded Un-detachable AC Cable	1.2	LISN	Receptacle
Unshielded Detachable Audio Cable	1.5	EUT	Microphone
Unshielded Detachable Audio Cable	0.6	EUT	Mobile phone

Block Diagram of Test Setup

For conducted emission:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247(i), §1.1307(b)	RF exposure	Compliant
§15.203	Antenna Requirement	Compliant
§15.207(a)	AC Line Conducted Emissions	Compliant
§15.205, §15.209 & §15.247(d)	Radiated Emissions	Compliant
§15.247(a)(1)	20 dB Emission Bandwidth & 99% Occupied Bandwidth	Compliant
§15.247(a)(1)	Channel Separation Test	Compliant
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliant
§15.247(a)(1)(iii)	Quantity of hopping channel Test	Compliant
§15.247(b)(1)	Peak Output Power Measurement	Compliant
§15.247(d)	Band edges	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emissions Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	100784	2021/12/13	2022/12/12
Rohde & Schwarz	L.I.S.N.	ENV216	101314	2021/12/13	2022/12/12
Anritsu Corp	50 Coaxial Switch	MP59B	6100237248	2021/12/13	2022/12/12
Unknown	RF Coaxial Cable	No.17	N0350	2021/12/14	2022/12/13
	Conducted E	mission Test Soft	tware: e3 19821b (V9)	
		Radiated Emissi	ons Test		
Rohde & Schwarz	Test Receiver	ESR	102725	2021/12/13	2022/12/12
Rohde & Schwarz	Spectrum Analyzer	FSV40	101949	2021/12/13	2022/12/12
SONOMA INSTRUMENT	Amplifier	310 N	186131	2021/11/09	2022/11/08
Quinstar	Amplifier	QLW-184055 36-J0	15964001002	2021/11/11	2022/11/10
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2021/07/06	2024/07/05
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-1067	2020/01/05	2023/01/04
Schwarzbeck	HORN ANTENNA	BBHA9170	9170-359	2020/01/05	2023/01/04
Wainwright	High Pass Filter	WHKX3.6/18 G-10SS	5	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.12	N040	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.13	N300	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.14	N800	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.15	N600	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.16	N650	2021/12/14	2022/12/13
Radiated Emission Test Software: e3 19821b (V9)					
RF Conducted Test					
Rohde & Schwarz	Spectrum Analyzer	FSV-40	101495	2021/12/13	2022/12/12
Rohde & Schwarz	Open Switch and Control Unit	OSP120 + OSP-B157	101244 + 100866	2021/12/13	2022/12/12
WEINSCHEL	10dB Attenuator	5324	AU 3842	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.33	RF-03	Each time	

* **Statement of Traceability:** Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC§15.247 (i), §1.1307 (b) – RF EXPOSURE

Applicable Standard

According to FCC §2.1093 and §1.1307(b), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB 447498 D04 Interim General RF Exposure Guidance v01, clause 2.1.2 – 1-mW test Exemption:

Per § 1.1307(b)(3)(i)(A), a single RF source is exempt RF device (from the requirement to show data demonstrating compliance to RF exposure limits, as previously mentioned) if the available maximum time-averaged power is no more than 1 mW, regardless of separation distance.

This exemption applies to all operating configurations and exposure conditions, for the frequency range 100 kHz to 100 GHz, regardless of fixed, mobile, or portable device exposure conditions. This is a standalone exemption, and it cannot be applied in conjunction with any other test exemption.

Test Result

For worst case:

Mode	Frequency	Maximum Conducte	-	1-mW test
	(MHz)	(dBm)	(mW)	Exemption
BDR/EDR	2402-2480	-7.0	0.2	Yes

Note: The tune-up power was declared by the applicant.

Result: Compliant.

FCC §15.203 – ANTENNA REQUIREMENT

Applicable Standard

According to FCC § 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. 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.

Antenna Connector Construction

The EUT has one Internal PCB Antenna arrangement, which was permanently attached and the antenna gain is -0.58 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

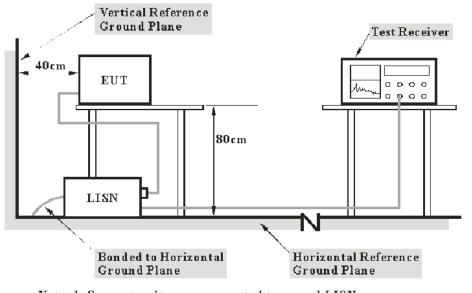
Result: Compliant.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207(a)

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The measurement procedure of EUT setup is according with ANSI C63.10-2013. The related limit was specified in FCC Part 15.207.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

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

Factor & Margin Calculation

The factor is calculated by adding LISN VDF (Voltage Division Factor) and Cable Loss. The basic equation is as follows:

Factor = LISN VDF + Cable Loss

The "**Over limit**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over limit of -7 dB means the emission is 7 dB below the limit. The equation for calculation is as follows:

Over Limit = Level – Limit Level = Read Level + Factor

Test Data

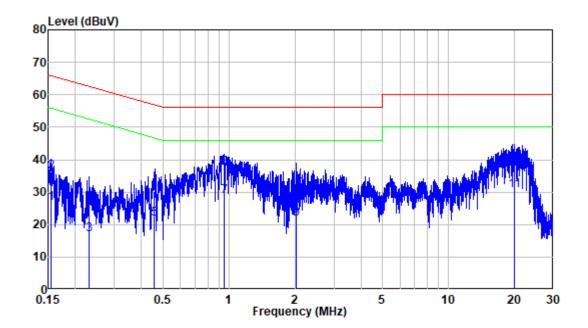
Environmental Conditions

Temperature:	24 °C	
Relative Humidity:	42 %	
ATM Pressure:	101.1 kPa	

The testing was performed by Jason Liu on 2022-08-03.

EUT operation mode: Charging + BT Transmitting

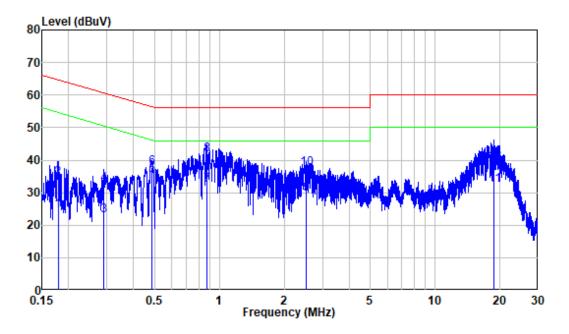
AC 120V/60 Hz, Line



Site	:	Shielding Room
Condition	:	Line
Job No.	:	SZNS1220719-32605E-RF
Mode	:	Charging + BT
Power	:	AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.155	9.80	16.85	26.65	55.75	-29.10	Average
2	0.155	9.80	26.36	36.16	65.75	-29.59	QP
3	0.230	9.80	7.13	16.93	52.44	-35.51	Average
4	0.230	9.80	16.02	25.82	62.44	-36.62	QP
5	0.457	9.80	12.00	21.80	46.75	-24.95	Average
6	0.457	9.80	20.49	30.29	56.75	-26.46	QP
7	0.948	9.81	18.85	28.66	46.00	-17.34	Average
8	0.948	9.81	27.64	37.45	56.00	-18.55	QP
9	2.029	9.82	11.82	21.64	46.00	-24.36	Average
10	2.029	9.82	20.87	30.69	56.00	-25.31	QP
11	19.845	10.00	20.46	30.46	50.00	-19.54	Average
12	19.845	10.00	28.53	38.53	60.00	-21.47	QP -

AC 120V/60 Hz, Neutral



Site :	Shielding Room
Condition:	Neutral
Job No. :	SZNS1220719-32605E-RF
Mode :	Charging + BT
Power :	AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.178	9.80	14.54	24.34	54.56	-30.22	Average
2	0.178	9.80	24.51	34.31	64.56	-30.25	QP
3	0.290	9.80	13.26	23.06	50.52	-27.46	Average
4	0.290	9.80	22.66	32.46	60.52	-28.06	QP
5	0.485	9.80	25.42	35.22	46.26	-11.04	Average
6	0.485	9.80	28.03	37.83	56.26	-18.43	QP
7	0.874	9.81	22.57	32.38	46.00	-13.62	Average
8	0.874	9.81	31.91	41.72	56.00	-14.28	QP
9	2.527	9.83	19.84	29.67	46.00	-16.33	Average
10	2.527	9.83	27.50	37.33	56.00	-18.67	QP
11	18.758	10.09	22.16	32.25	50.00	-17.75	Average
12	18.758	10.09	29.02	39.11	60.00	-20.89	QP

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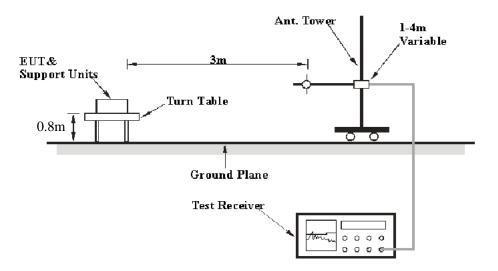
FCC §15.205, §15.209 & §15.247(d) – RADIATED EMISSIONS

Applicable Standard

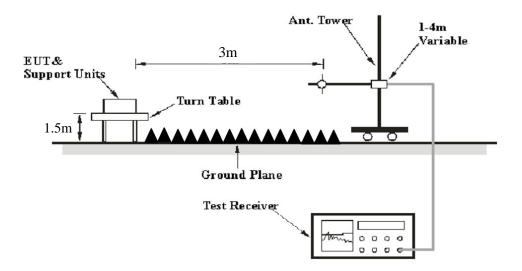
FCC §15.205; §15.209; §15.247(d)

EUT Setup

Below 1 GHz:



Above 1GHz:



The radiated emission performed in the 3 meters, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, FCC 15.247 limits.

EMI Test Receiver & Spectrum Analyzer Setup

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1 MHz	3 MHz	/	РК
	1 MHz	10 Hz	/	Average

The EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All final data was recorded in Quasi-peak detection mode for frequency range of 30 MHz -1 GHz and peak and Average detection modes for frequencies above 1 GHz.

If the maximized peak measured value complies with the limit, then it is unnecessary to perform an QP/Average measurement

Factor & Margin Calculation

The Factor is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain. The basic equation is as follows:

Factor = Antenna Factor + Cable Loss - Amplifier Gain

The "**Over Limit/Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over Limit/margin of -7dB means the emission is 7dB below the limit. The equation for calculation is as follows:

Over Limit/Margin = Level / Corrected Amplitude – Limit Level / Corrected Amplitude = Read Level + Factor

Test Data

Environmental Conditions

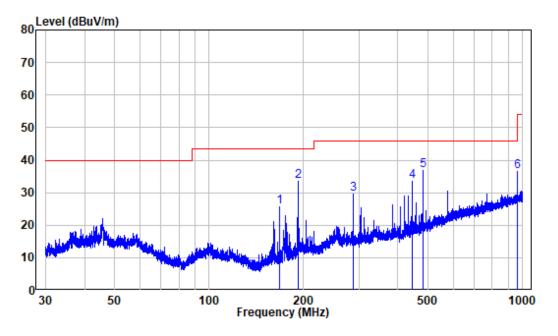
Temperature:	28 °C
Relative Humidity:	56 %
ATM Pressure:	101.1 kPa

The testing was performed by Level Li on 2022-08-02.

EUT operation mode: BT Transmitting

(Scan with GFSK, $\pi/4$ -DQPSK mode at X axis, Y axis, Z axis, the worst case is GFSK Mode at Y axis)

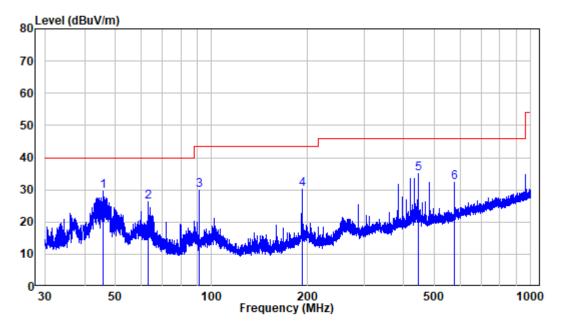
Below 1GHz: GFSK, High Channel:



Horizontal

Site : chamber Condition: 3m HORIZONTAL Job No. : SZNS1220719-32605E-RF Test Mode: BT

	Freq	Factor			Limit Line		Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	168.045	-13.78	39.55	25.77	43.50	-17.73	Peak
2	191.997	-11.25	44.77	33.52	43.50	-9.98	Peak
3	287.990	-9.36	38.89	29.53	46.00	-16.47	Peak
4	444.072	-5.64	39.15	33.51	46.00	-12.49	Peak
5	480.107	-5.00	41.87	36.87	46.00	-9.13	Peak
6	960.056	2.36	34.12	36.48	54.00	-17.52	Peak



Vertical

Site : chamber Condition: 3m VERTICAL Job No. : SZNS1220719-32605E-RF Test Mode: BT

	Freq	Factor			Limit Line		Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	45.775	-9.98	39.62	29.64	40.00	-10.36	Peak
2	63.202	-11.86	37.98	26.12	40.00	-13.88	Peak
3	91.415	-13.51	43.34	29.83	43.50	-13.67	Peak
4	191.997	-11.25	41.57	30.32	43.50	-13.18	Peak
5	444.072	-5.64	40.51	34.87	46.00	-11.13	Peak
6	576.139	-3.70	36.04	32.34	46.00	-13.66	Peak

Above 1GHz (worst case for GFSK):

Frequency	Receiver		Turntable Rx An Angle		ntenna	Factor	Absolute Level	Limit	Margin	
(MHz)	Reading (dBuV)	PK/Ave	Degree	Height (m)	Polar (H/V)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
	Low Channel									
2310	45.87	РК	159	1.8	Н	-7.23	38.64	74	-35.36	
2310	44.71	РК	31	1.6	V	-7.23	37.48	74	-36.52	
2390	50.01	РК	235	1.4	Н	-7.21	42.8	74	-31.20	
2390	46.03	РК	240	1.5	V	-7.21	38.82	74	-35.18	
4804	45.74	РК	55	2.0	Н	-3.52	42.22	74	-31.78	
4804	44.83	РК	67	1.9	V	-3.52	41.31	74	-32.69	
				Middle Ch	annel					
4882	45.83	РК	228	1.6	Н	-3.37	42.46	74	-31.54	
4882	44.8	РК	196	1.9	V	-3.37	41.43	74	-32.57	
				High Cha	nnel					
2483.5	53.3	РК	3	1.5	Н	-7.2	46.1	74	-27.90	
2483.5	45.74	РК	114	1.3	V	-7.2	38.54	74	-35.46	
2500	45.86	РК	224	2.0	Н	-7.18	38.68	74	-35.32	
2500	45.07	РК	237	1.5	V	-7.18	37.89	74	-36.11	
4960	48.47	РК	90	1.5	Н	-3.01	45.46	74	-28.54	
4960	47.76	РК	247	1.4	V	-3.01	44.75	74	-29.25	

Note:

Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor

Absolute Level (Corrected Amplitude) = Factor + Reading

Margin = Absolute Level (Corrected Amplitude) – Limit

The other spurious emission which is in the noise floor level was not recorded. For above 1GHz, the test result of peak was 20dB below to the limit of peak, which can be compliant to the average limit, so just peak value was recorded.

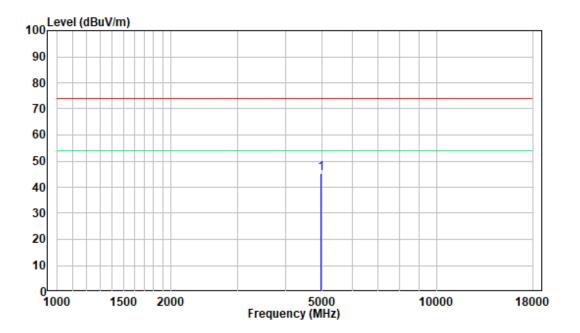
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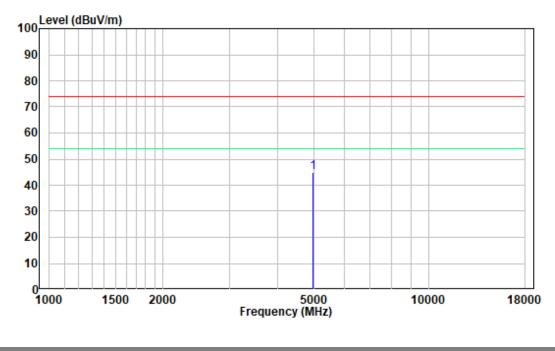
1 GHz - 18 GHz: (Pre-Scan plots)

Worst case for GFSK, High Channel:

Horizontal



Vertical



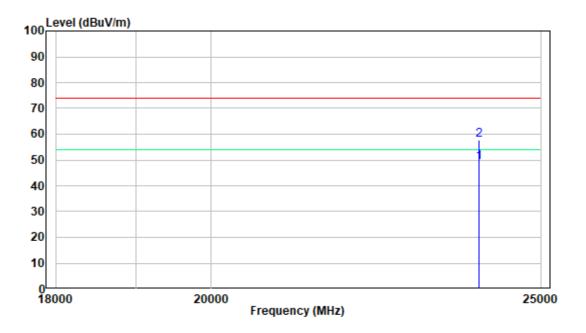
Shenzhen Accurate Technology Co., Ltd.

Report No.: SZNS1220719-32605E-RF

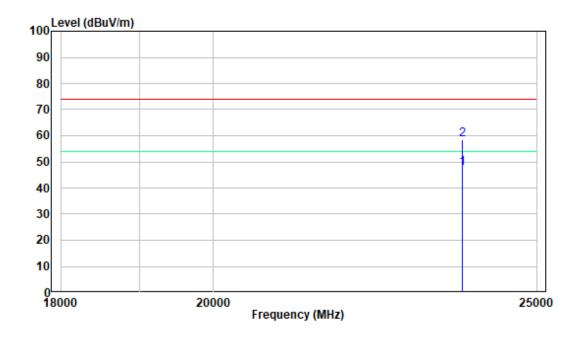
18-25GHz: (Pre-Scan plots)

Worst case for GFSK, High Channel:

Horizontal







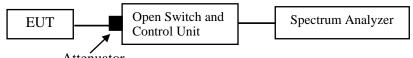
FCC §15.247(a) (1)-CHANNEL SEPARATION TEST

Applicable Standard

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.

Test Procedure

- 1. Set the EUT in TX mode, maxhold the channel.
- 2. Set the adjacent channel of the EUT and maxhold another trace.
- 3. Measure the channel separation.



Attenuator

Test Data

Environmental Conditions

Temperature:	23°C
Relative Humidity:	51%
ATM Pressure:	101.1kPa

The testing was performed by Glenn. Jiang on 2022-07-28.

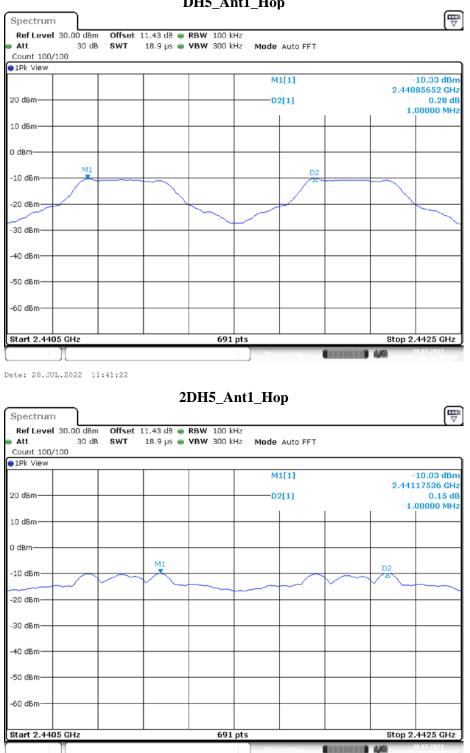
EUT operation mode: Transmitting

Test Result: Compliant.

Test Mode	Antenna	Channel	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Нор	1	>=0.634	PASS
2DH5	Ant1	Нор	1	>=0.876	PASS

Note: The limit = (2/3) * 20dB bandwidth

Please refer to the below plots:



DH5_Ant1_Hop

Date: 28.JUL.2022 11:53:18

FCC §15.247(a) (1) – 20 dB EMISSION BANDWIDTH & 99% OCCUPIED BANDWIDTH

Applicable Standard

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.

Test Procedure

The following conditions shall be observed for measuring the occupied bandwidth and 20 dB bandwidth:

• The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

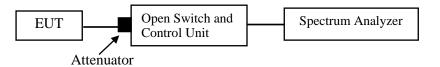
• The span of the spectrum analyzer shall be set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency, but small enough to avoid having other emissions (e.g. on adjacent channels) within the span.

• The detector of the spectrum analyzer shall be set to "Sample". However, a peak, or peak hold, may be used in place of the sampling detector since this usually produces a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold (or "Max Hold") may be necessary to determine the occupied / 20 dB bandwidth if the device is not TX continuously.

• The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / 20 dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. Video averaging is not permitted.

Note: It may be necessary to repeat the measurement a few times until the RBW and VBW are in compliance with the above requirement.

For the 99% emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99% emission bandwidth).



Test Data

Environmental Conditions

Temperature:	23°C
Relative Humidity:	51 %
ATM Pressure:	101.1kPa

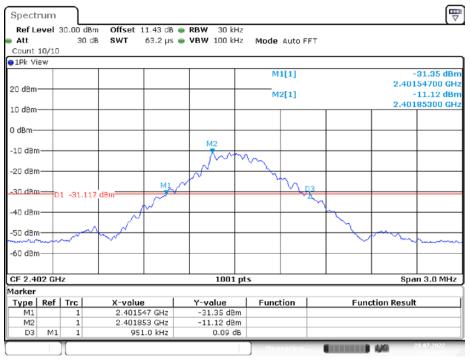
The testing was performed by Glenn. Jiang on 2022-07-28.

EUT operation mode: Transmitting

Test Result: Compliant.

Test Mode	Antenna	Channel	20db EBW[MHz]	99% OCCUPIED BANDWIDTH[MHz]	Verdict
		2402	0.951	0.857	PASS
DH5	Ant1	2441	0.951	0.86	PASS
		2480	0.951	0.875	PASS
2DH5 Ant		2402	1.314	1.181	PASS
	Ant1	2441	1.314	1.184	PASS
		2480	1.314	1.196	PASS

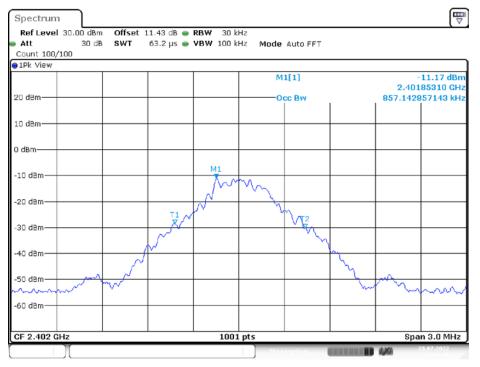
Please refer to the below plots:



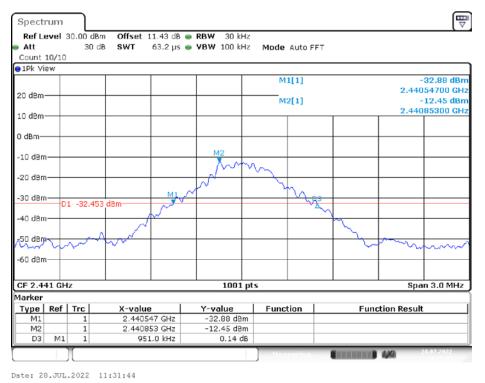
20 dB EMISSION BANDWIDTH_DH5_Ant1_2402

Date: 28.JUL.2022 11:30:29



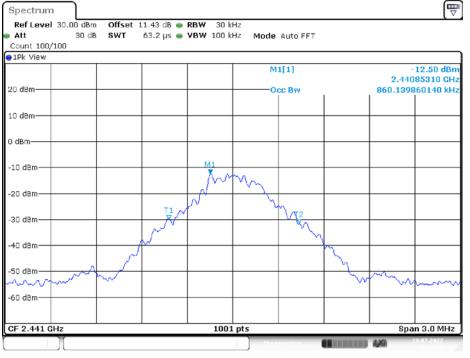


Date: 28.JUL.2022 11:30:46

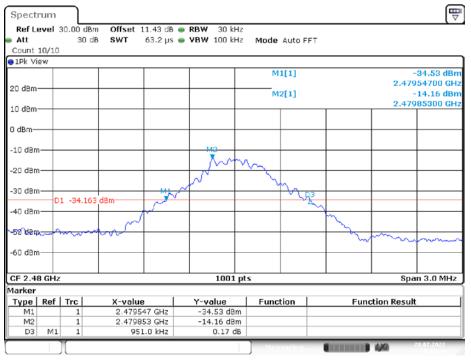


20 dB EMISSION BANDWIDTH_DH5 _Ant1_2441





Date: 28.JUL.2022 11:32:00



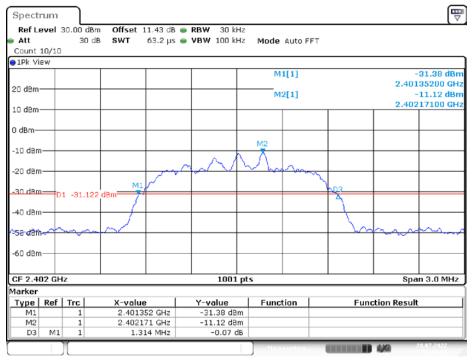
20 dB EMISSION BANDWIDTH_DH5 _Ant1_2480

Date: 28.JUL.2022 11:33:15





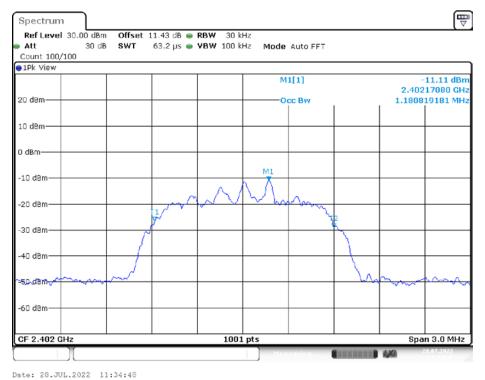
Date: 28.JUL.2022 11:33:31

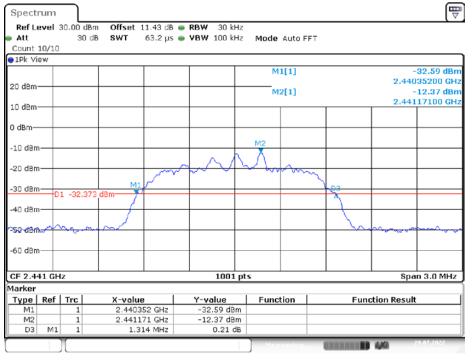


20 dB EMISSION BANDWIDTH_2DH5 _Ant1_2402

Date: 28.JUL.2022 11:34:31

99% OCCUPIED BANDWIDTH_2DH5 _Ant1_2402

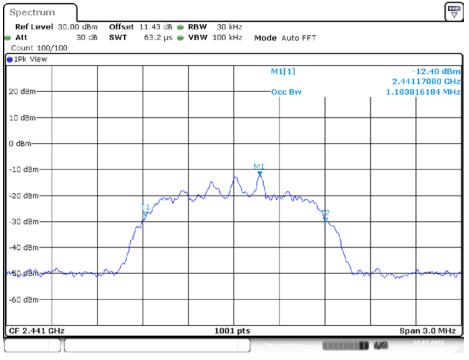




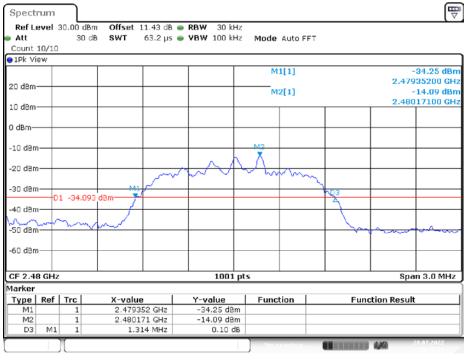
20 dB EMISSION BANDWIDTH_2DH5 _Ant1_2441

Date: 28.JUL.2022 11:36:03





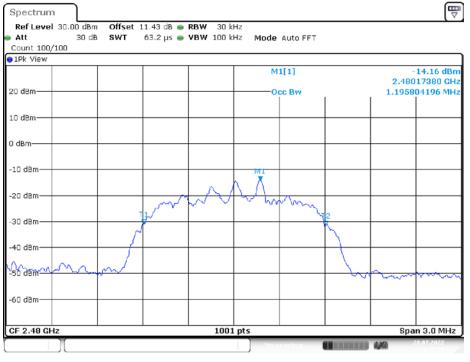
Date: 28.JUL.2022 11:36:20



20 dB EMISSION BANDWIDTH _2DH5_Ant1_2480

Date: 28.JUL.2022 11:37:23





Date: 28.JUL.2022 11:37:40

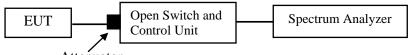
FCC §15.247(a) (1) (iii)-QUANTITY OF HOPPING CHANNEL TEST

Applicable Standard

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.

Test Procedure

- 1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- 2. Set the EUT in hopping mode from first channel to last.
- 3. By using the max-hold function record the quantity of the channel.



Attenuator

Test Data

Environmental Conditions

Temperature:	23°C
Relative Humidity:	51%
ATM Pressure:	101.1kPa

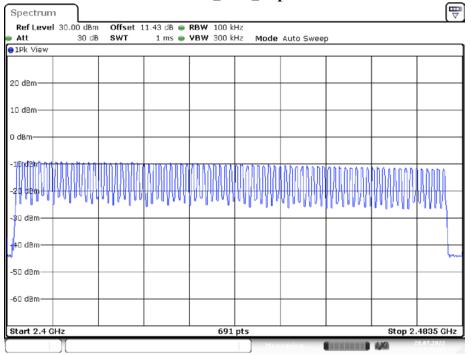
The testing was performed by Glenn. Jiang on 2022-07-28.

EUT operation mode: Transmitting

Test Result: Compliant.

Test Mode	Antenna	Channel	Result[Num]	Limit[Num]	Verdict
DH5	Ant1	Нор	79	>=15	PASS
2DH5	Ant1	Нор	79	>=15	PASS

Please refer to the below plots:



DH5_Ant1_Hop

Date: 28.JUL.2022 11:42:34

2DH5_Ant1_Hop

Att	30.00 dBm 30 dB		11.43 dB 🖷 1 ms 🖷	RBW 100 k VBW 300 k		Auto Sweej	р		
1Pk View			1	1	1	1	1	1	
20 dBm									
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dBm									
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20 dBm									
									4
40 dBm									
40 d8m									

Date: 28.JUL.2022 13:04:30

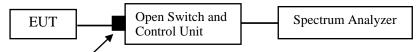
FCC §15.247(a) (1) (iii) - TIME OF OCCUPANCY (DWELL TIME)

Applicable Standard

Frequency hopping systems in the 2400-2483.5 MHz 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.

Test Procedure

- 1. The EUT was worked in channel hopping.
- 2. Set the RBW to: 1MHz.
- 3. Set the VBW \geq 3×RBW.
- 4. Set the span to 0Hz.
- 5. Detector = peak.
- 6. Sweep time = auto couple.
- 7. Trace mode = max hold.
- 8. Allow trace to fully stabilize.
- 9. Recorded the time of single pulses



Attenuator

Test Data

Environmental Conditions

Temperature:	23°C
Relative Humidity:	51%
ATM Pressure:	101.1kPa

The testing was performed by Glenn. Jiang on 2022-07-28.

EUT operation mode: Transmitting

Test Result: Compliant.

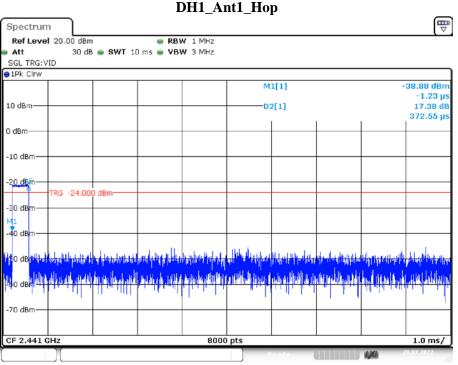
Test Mode	Antenna	Channel	Burst Width [ms]	Total Hops [Num]	Result[s]	Limit[s]	Verdict
DH1	Ant1	Нор	0.37	330	0.123	<=0.4	PASS
DH3	Ant1	Нор	1.62	120	0.292	<=0.4	PASS
DH5	Ant1	Нор	2.86	120	0.315	<=0.4	PASS
2DH1	Ant1	Нор	0.38	320	0.122	<=0.4	PASS
2DH3	Ant1	Нор	1.63	150	0.211	<=0.4	PASS
2DH5	Ant1	Нор	2.87	130	0.258	<=0.4	PASS

Note 1: A period time=0.4*79=31.6(s), Result=Burst Width*Total Hops

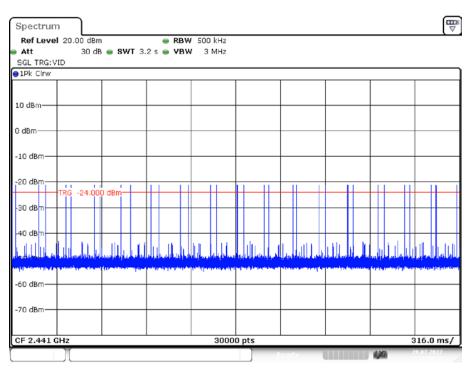
Note 2: Total Hops =Hopping Number in 3.16s*10

Note 3: Hoping Number in 3.16s=Total of highest signals in 3.16s (Second high signals were other channel)

Shenzhen Accurate Technology Co., Ltd.



Date: 28.JUL.2022 11:49:13

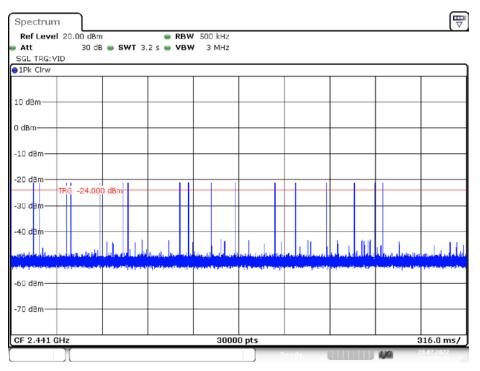


Date: 28.JUL.2022 11:49:19

		1	JII3_A	1111_110	Р			_
Spectrum)							[₩
Ref Level 20.0			M/1 MHz					
	30 dB 🥌 SWT :	10 ms 👄 VB	W/3 MHz					
SGL TRG:VID 1Pk Clrw								
				M	1[1]			-30.31 dBr
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						I	I	1.02143 m
0 dBm								
-10 d8m								
-10 0800								
-20 dBm	D2							
	24.000 dBm							-
-30 d8m								
-40 dBm								
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CF 2.441 GHz			8000	J pt s				1.0 ms/

DH3_Ant1_Hop

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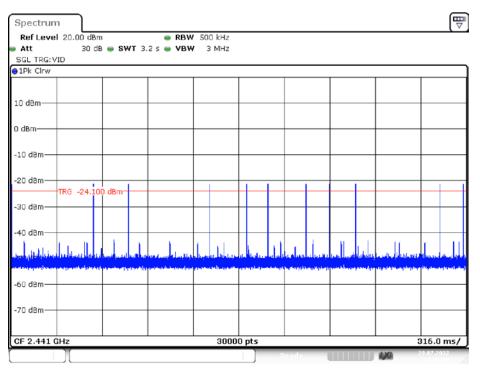


Date: 28.JUL.2022 11:48:45

	-	/115_/11	111_110	Р			_
Spectrum							₩
Ref Level 20.00 dBm		VI MHz					
Att 30 dB 👄 SWT 1	.0 ms 👄 VB\	N/ 3 MHz					
SGL TRG:VID 1Pk Cirw							
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0 dBm						l í	
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-10 d8m							ļ
-20 dBm	02						
M1 TRG -24.100 dBm							
-30 d8m							
-40 dBm							
-40 dBm							
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-70 dBm							
CF 2.441 GHz		8000	pts				1.0 ms/

DH5 Ant1 Hop

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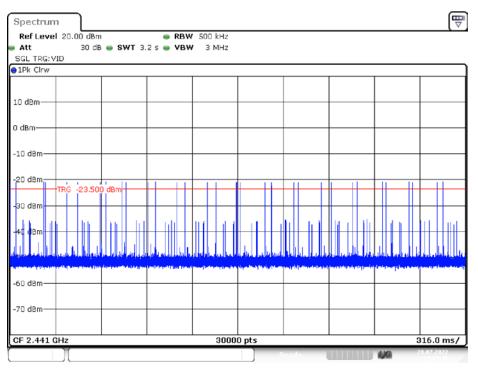


Date: 28.JUL.2022 11:43:00

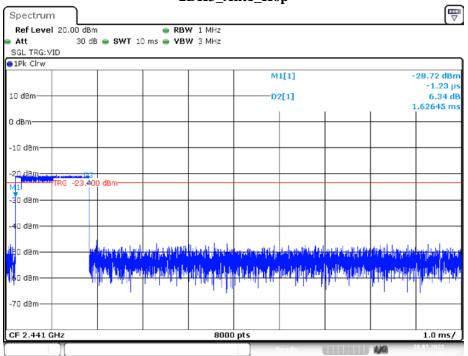
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Spectrum								[₩
Ref Level 20.00 dBn	n	RB1	₩ 1 MHz					
	B 👄 SWT 10) ms 🥌 VB1	A/3 MHz					
SGL TRG: VID								
1Pk Clrw				M	1[1]			27.58 dBn
					41			-1.23 µ
10 dBm				D	2[1]			5.23 di
					1	I	1	382.55 μ
0 dBm								
-10 dBm								
00 48-5								
-20.d8m M1 TRG -23.50	0 dBm							
-30 dBm								
-30 000								
-40 dBm								
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-70 dBm								
CF 2.441 GHz	1	1	8000	pts	1	1	I	1.0 ms/
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2DH1_Ant1_Hop

Date: 28.JUL.2022 13:13:44

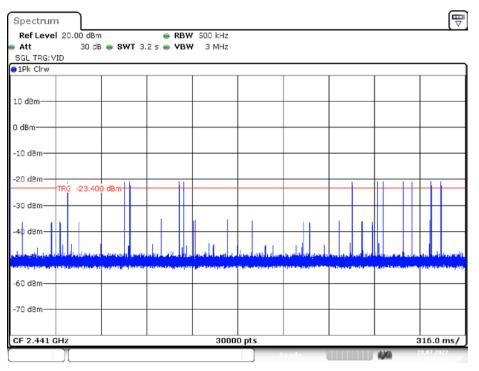


Date: 28.JUL.2022 13:13:49



2DH3_Ant1_Hop

Date: 28.JUL.2022 13:13:11

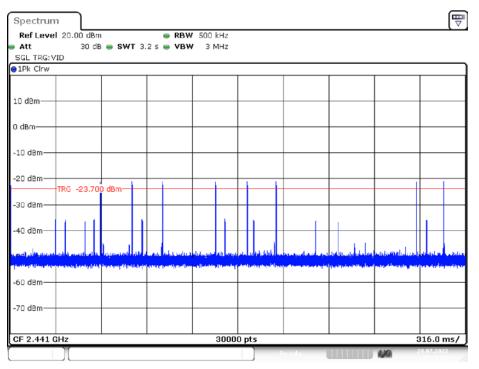


Date: 28.JUL.2022 13:13:17

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2DH5_Ant1_Hop

Date: 28.JUL.2022 13:21:36



Date: 28.JUL.2022 13:21:41

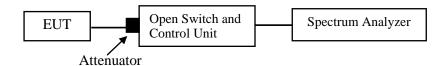
FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT

Applicable Standard

According to §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. And for all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

Test Procedure

- 1. Place the EUT on a bench and set in TX mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
- 3. Add a correction factor to the display.



Test Data

Environmental Conditions

Temperature:	23°C
Relative Humidity:	51 %
ATM Pressure:	101.1kPa

The testing was performed by Glenn. Jiang on 2022-07-28.

EUT operation mode: Transmitting

Test Result: Compliant.

Test Mode	Antenna	Channel	Conducted peak output power [dBm]	Limit[dBm]	Verdict
		2402	-8.42	<=20.97	PASS
DH5	Ant1	2441	-9.54	<=20.97	PASS
		2480	-10.89	<=20.97	PASS
		2402	-7.77	<=20.97	PASS
2DH5	Ant1	2441	-8.99	<=20.97	PASS
		2480	-10.6	<=20.97	PASS

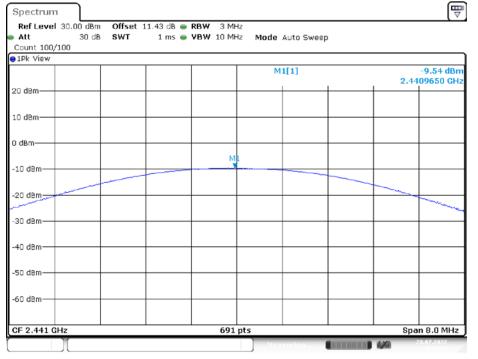
Please refer to the below plots:

Spectrum				U ↓
Ref Level 30.00 dBm Att 30 dB Count 100/100		Mode Auto Sweep		
1Pk View				
		M1[1]		-8.42 dBn 18840 GH
20 dBm				
10 dBm				
0 dBm				
-10 dBm	M1			
-20 dBm				
-30 dBm				
-40 dBm				
-50 dBm				
-60 dBm				
CF 2.402 GHz	691 pts		Sna	n 8.0 MHz
Ĭ		Measuring	AM (1111)	8.07.2022

DH5_Ant1_2402

Date: 28.JUL.2022 11:24:18

DH5_Ant1_2441



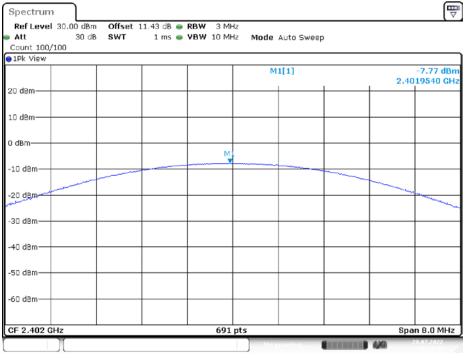
Date: 28.JUL.2022 11:25:01

Spectrum								
Ref Level 30 Att Count 100/100	30 dB	11.43 dB 👄 1 ms 👄	RBW 3 MH VBW 10 MH		Auto Sweep)		
1Pk View								
				M	1[1]			10.89 dBn 000000 GH
20 dBm								
10 dBm								
0 dBm								
-10 dBm		 	M	1				
-20 d8m								
-30 dBm								
-40 dBm								
-50 dBm								
-60 dBm								
CF 2.48 GHz			691	pts			Spa	n 8.0 MHz
11				Mo	scuping		100	28.07.2022

DH5_Ant1_2480

Date: 28.JUL.2022 11:25:35

2DH5_Ant1_2402



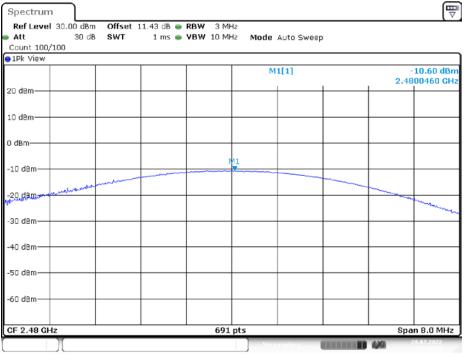
Date: 28.JUL.2022 11:27:42

Att 30	dB SWT	1 ms 👄 VBW 10 MH	z Mode Auto Swee	∋p	
Count 100/100 1Pk View					
			M1[1]		-8.99 dBn 2.4409310 GH:
20 dBm					<u> </u>
10 dBm					
0 dBm					
-10 dBm		EW.		~~~	
-20 dBm					
-30 dBm					
-40 dBm					
-50 dBm					
-60 dBm					
CF 2.441 GHz		691	pts		Span 8.0 MHz

2DH5 Ant1 2441

Date: 28.JUL.2022 11:28:05

2DH5_Ant1_2480



Date: 28.JUL.2022 11:28:36

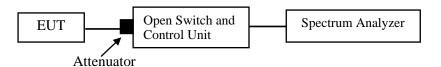
FCC §15.247(d) - BAND EDGES TESTING

Applicable Standard

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 §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Procedure

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in TX mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
- 3. Set RBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
- 4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
- 5. Repeat above procedures until all measured frequencies were complete.



Test Data

Environmental Conditions

Temperature:	23°C
Relative Humidity:	51%
ATM Pressure:	101.1kPa

The testing was performed by Glenn. Jiang on 2022-07-28.

EUT operation mode: Transmitting

Test Result: Compliant

Please refer to the below plots:

DH5: Band Edge-Left Side Hopping

Spectrum							
Ref Level Att Count 300/3	30			 RBW 100 kH VBW 300 kH 	z Z Mode Auto F	FT	· · · · · · · · · · · · · · · · · · ·
1Pk View							
10 dBm					M1[1]		-8.76 dBr 2.404920 GH -37.67 dBr
0 dBm							2.400000 GH
-10 dBm							
-20 dBm							
-30 dBm—(01 -28.	760 dBm					M2
-40 dBm				M4			M3 M3
-so dam	and a strate of the	Mar markene	man	(particular de	moninteries.	and the second sec	Lalm participal 2000
-60 dBm							
-70 dBm							
Start 2.3 G	Ηz				ts	I	Stop 2.405 GHz
/larker				•			•
Type Ref	Trc	X-value		Y-value	Function	Fu	nction Result
M1	1	2.4049	92 GHz	-8.76 dBm			
M2	1		.4 GHz	-37.67 dBm			
M3	1		39 GHz	-49.02 dBm			
M4	1	2.34367	74 GHz	-46.48 dBm			

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Single

	evel	20.00 dB		🖷 RBW 100 kHz			
Att Count :	200/2	30 c	iB SWT 246.5 μs	💿 VBW 300 kHz	Mode Auto F	FT	
1Pk Vi	<u> </u>	00					
ALK AL					M1[1]		-8.83 dBn
10 dBm-						2.	401880 GH
tu asm-					M2[1]		-37.25 dBn
0 dBm—						2.	400000 GH
o abin							M1
-10 d8m	∩—						- T
							1
-20 d8m)-+-						
30 d8m		1 -28.83	0 dBm				
30 aam	ידי	1 -20.00					M2
-40 dBm	<u> </u>						
	.					M3	1 . 11
50, deh	week-	and the second second	Martin martin	والمريحة والمستحد وال	www.caagual.go	and the second of the second s	show lever h
60 d8m	ا – ۱						
70 d8m							
o uan	·						
Start 2	2.01				-	Cter	2.405 GHz
larker	.3 GH	12		691 pt	5	stup	2.403 GHZ
Type	Def	Trol	X-value	Y-value	Function	Function Resu	I 4
M1	Kei	1	2.40188 GHz	-8.83 dBm	Function	Function Resu	n
M2		1	2.4 GHz	-37.25 dBm			
M3		1	2.39 GHz	-50.92 dBm			
M4		1	2.399978 GHz	-38.70 dBm			

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Spectrum								E
Ref Level	20.00 dB	m Offset 11	.43 dB 🔵	• RBW 100 kHz				
Att	30 0			• VBW 300 kHz		Sweep		
Count 300/3	300							
1Pk View								
· · · · · · · · · · · · · · · · · · ·					M1[1]			-10.95 dBn
								2.470870 GH
10 dBm					M2[1]			-44.65 dBn
) dBm								2.483500 GH
1								
10.d8m								
LABAKAAAA	8.8							
20/49/(11)//	- 11	+		+			-	
antarrah	η.							
30_d8mD	1 -30.95	0_dBm						
30 d8m 0		0 d8m	MB	M4				
	M2		M	'	mighting	an and the second	walukan	un Art ministration
40 dBm				'	minterest	mana	welves	un the second
40 dBm	M2			'	mitohana	martine	welves	un Museuria
40 dBm	M2			'	- iphanet - and		avelution	
40 dBm	M2			'		na ya kata kata wa sa	webser	
40 dBm	M2			'	- total and the second s		and have	
40 dBm	M2			'			welwitz-s	
40 d8m 50 d8m 60 d8m 70 d8m	M2						aurdurka-t	
40 dBm 50 dBm 60 dBm 70 dBm 51 dBm	M2			'			aurdurka-t	
40 dBm 50 dBm 60 dBm 70 dBm 5tart 2.47 G larker	SHz			691 p	:5			Stop 2.55 GHz
40 dBm 50 dBm 60 dBm 70 dBm 3tart 2.47 G larker Type Ref	GHz	X-value		691 pt				Stop 2.55 GHz
40 dBm 50 dBm 60 dBm 70 dBm	GHz Trc	X-value 2.47087	7 GHz	691 pt 	:5			Stop 2.55 GHz
40 dBm 50 dBm 60 dBm 70 dBm 70 dBm 5tart 2.47 G larker Type Ref	HIZ SHZ	X-value 2.47087 2.4835	7 GHz 5 GHz	691 pt -10.95 dBm -44.65 dBm	:5			Stop 2.55 GHz
40 dBm 50 dBm 60 dBm 70 dBm 70 dBm 8tart 2.47 G 1arker Type Ref M1 M2	GHz Trc	X-value 2.47087 2.4835	7 GHz 5 GHz 5 GHz	691 pt 	:5			Stop 2.55 GHz

DH5: Band Edge- Right Side Hopping

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₽ Spectrum Ref Level 20.00 dBm Offset 11.43 dB 🖷 RBW 100 kHz 1.1 ms 🖷 VBW 300 kHz Mode Auto Sweep Att 30 dB SWT Count 300/300 ●1Pk View -11.68 dBm 2.479900 GHz M1[1] 10 dBm M2[1] -44.35 dBm 2.483500 GHz 0 dBm-М1 -10 dBm--20 d8m--30 dBm--31.680 dBm M 6.42 -40 dBm W milles untre unruran unment when www -50 d8m -60 dBm--70 d8m-Start 2.47 GHz 691 pts Stop 2.55 GHz Marker Type Ref Trc Function Function Result X-value Y-value 2.4799 GHz 2.4835 GHz 2.5 GHz 2.54571 GHz -11.68 dBm Μ1 1 M2 -44.35 dBm 1 МЗ -45.22 dBm 1 M4 -43.25 dBm 1 4/9

Single

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2DH5: Band Edge-Left Side Hopping

Spectrum						
Ref Level Att Count 300/3	3		dB 👄 RBW 100 µs 👄 VBW 300		o FFT	
1Pk View						
				M1[1]		-8.78 dBr
10 dBm				<u> </u>		2.402800 GH
				M2[1]		-37.04 dBr
) dBm				<u> </u>	1	2.400000 GH
						MI
-10 dBm						
-20 d8m						
30 dBm-0	1 -28.	780 dBm				
So dom						M2
-40 d8m		N14				
	hadada No		my plenning me	Mart	the state of the state	M3
50 08m				1		- Provide and the second secon
-60 dBm						
-70 d8m						
Start 2.3 GH	łz		691	pts	I	Stop 2.405 GHz
1arker						
Type Ref	Trc	X-value	Y-value	Function	Fu	nction Result
M1	1	2.4028 GH				
M2	1	2.4 GH				
M3 M4	1	2.39 GF 2.321609 GF				
TA14	1 1	2.321009 GF	-40.730			

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Single

Ref Li	evel	20.00 d		B - RBW 100 ki			
Count	300/3		UB 3WI 240.5 µ	is 👄 VBW 300 kł	Hz Mode Auto F	FI	
1Pk Vi							
					M1[1]		-9.11 dBn
10 dBm·	_						2.402040 GH:
					M2[1]		-36.84 dBn
0 dBm—	-						2.400000 GH
							M1
-10 dBm	·						
-20 d8m	<u> </u>						
-30 d8n		1 -29.1	.10 dBm				M2
10 10-							
-40 d8m							мз , м
60-dBr			when when and and	mon and a day	U.M. Carrier and the second		The All
	•						
-60 d8m							
-70 dBm							
Start 2	.3 GH	IZ		691	pts		Stop 2.405 GHz
1arker				1	1		
Type M1	Ref	Trc 1	2.40204 GHz	-9.11 dB	Function	Funct	ion Result
M2		1	2.4 GHz				
M3		1	2.39 GHz				
M4		1	2.399978 GHz	-38.54 dB	m		

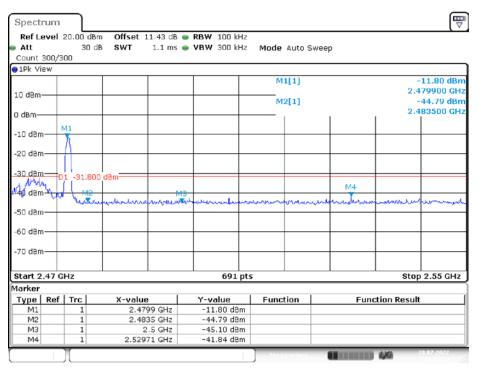
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2DH5: Band Edge- Right Side Hopping

Spectrum Ref Level	20.00 dB	m Offset 11.43	B - RBW 10	0 kHz			
Att	20.00 GD 30 c		ns 🔵 VBW 30		Mode Auto S	Sween	
Count 300/3			• • • • • • • • • •	D RITE	Mode Adio	oweep	
1Pk View							
					M1[1]		-10.69 d
10 dBm							2.470870 0
					M2[1]		-44.15 d
) dBm							2.483500 0
1							
Endem to				_			
	N						
20 d8m				+			
00.40.0							
30 d8m - 0	1 -30.69	0 dBm					
40 d8m	M2		ма		M4		
	Unite		mention	enner	a the second	er and the second	who and the second
50 d8m				\rightarrow			
60 dBm —				+			
70 dBm							
Start 2.47 G	Hz		6	91 pts			Stop 2.55 Gł
larker							
	Trc	X-value	Y-value		Function	F	unction Result
M1	1	2.47087 GH					
M2	1	2.4835 GH					
M3 M4	1	2.5 GH 2.515101 GH					
1×1+	<u>+</u>	2.515101 GH	-42.10	ubm			

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Single



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***** END OF REPORT *****