

SZEMC-TRF-01 Rev. A/1 Report No.: SZCR240100037703

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# TEST REPORT

Application No.: SZCR2401000377AT

Applicant: Shenzhen Skyworth Digital Technology Co., LTD.

Address of Applicant: Unit A14/F.Skyworth Bldg., Gaoxin Ave.1s., Nanshan District, Shenzhen,

518057 China

Manufacturer: Shenzhen Skyworth Digital Technology Co., LTD.

Address of Manufacturer: Unit A14/F.Skyworth Bldg., Gaoxin Ave.1s., Nanshan District, Shenzhen,

518057 China

Factory: Shenzhen Skyworth Digital Technology Co., LTD. Baoan Branch Factory

Address of Factory: 2-5F, Integration Multi-Storied Building, Skyworth Science and Technology

Industrial Park, Tangtou Industrial Zone, Shiyan Street, Baoan District,

Shenzhen city, China.

**Equipment Under Test (EUT):** 

**EUT Name:** 4K TV Stick

Model No.: Leap-S2, HP4609, HP46D, KD3, 4K TV Stick, LB2106, Leap-S2C,

RSG-11B, GT1, Meta-C1, LEAP-S2

Please refer to section 2 of this report which indicates which model was

actually tested and which were electrically identical.

Trade Mark: SKYWORTH FCC ID: WNA-LEAPS2

Standard(s): 47 CFR Part 15, Subpart C 15.247

**Date of Receipt:** 2024-01-29

**Date of Test:** 2024-02-01 to 2024-03-14

Date of Issue: 2024-03-22

Test Result: Pass\*

Keny Xu EMC Laboratory Manager

Ceny. Ku

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<sup>\*</sup> In the configuration tested, the EUT complied with the standards specified above.



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	Revision Record						
Version	Chapter	Date	Modifier	Remark			
01		2024-03-22		Original			

Authorized for issue by:			
	Bris Cherr		
	Bill Chen/Project Engineer	-	
	Exic Fu		
	Eric Fu/Reviewer	-	



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# **Test Summary**

Radio Spectrum Technical Requirement							
Item Standard Method Requirement Result							
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)	Pass			

Radio Spectrum Matter Part						
Item	Standard	Method	Requirement	Result		
Conducted Emissions at AC Power Line (150kHz-30MHz)		ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass		
Conducted Peak Output Power		ANSI C63.10 (2013) Section 11.9.1	47 CFR Part 15, Subpart C 15.247(b)(3)	Pass		
Minimum 6dB Bandwidth		ANSI C63.10 (2013) Section 11.8.1	47 CFR Part 15, Subpart C 15.247a(2)	Pass		
Power Spectrum Density		ANSI C63.10 (2013) Section 11.10.2	47 CFR Part 15, Subpart C 15.247(e)	Pass		
Conducted Band Edges Measurement	47 CFR Part 15,	ANSI C63.10 (2013) Section 11.13.3.2	47 CFR Part 15, Subpart C 15.247(d)	Pass		
Conducted Spurious Emissions	Subpart C 15.247	ANSI C63.10 (2013) Section 11.11	47 CFR Part 15, Subpart C 15.247(d)	Pass		
Radiated Emissions which fall in the restricted bands		ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass		
Radiated Spurious Emissions Below 1GHz		ANSI C63.10 (2013) Section 6.4,6.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass		
Radiated Spurious Emissions Above 1GHz		ANSI C63.10 (2013) Section 6.6	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass		

### **Declaration of EUT Family Grouping:**

Model No.: Leap-S2, HP4609, HP46D, KD3, 4K TV Stick, LB2106, Leap-S2C,

RSG-11B, GT1, Meta-C1, LEAP-S2

Only the model HP46D was tested, since according to the declaration from the applicant, the electrical circuit design, PCB layout, components used and internal wiring and functions were identical for the above models, with only difference on trade mark and mode No..



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### **General Information**

#### Details of E.U.T. 4.1

Power supply:	Adapter 1:
	Model: UT-236A-5100
	Input: AC 100-240V 50/60Hz 0.2A
	Output: DC 5.0V 1.0A 5.0W
	Adapter 2:
	Model: F05L5-050100SPAU-U
	Input: AC 100-240V 50/60Hz 0.2A
	Output: DC 5.0V 1.0A 5.0W
	3.0V DC (1.5V x 2 "AAA" Size Batteries) for remote controller
Cable(s):	USB cable: 100cm unshielded
	HDMI cable: 6cm shielded
Cable Loss (for RF conducted test):	0.4dB
Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	V5.0 Dual mode
Modulation Type:	GFSK
Number of Channels:	40
Channel Spacing:	2MHz
Rate data:	1Mbps and 2Mbps
Antenna Type:	PCB Antenna
Antenna Gain:	4.83dBi

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### 4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
		-	-
The EUT has been tested as	an independent unit.		

### 4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Emissions at AC Power Line (150kHz-30MHz)	± 3.1dB
Conducted Peak Output Power	± 0.75dB
Minimum 6dB Bandwidth	± 3%
Power Spectrum Density	± 2.84dB
Conducted Band Edges Measurement	± 0.75dB
Conducted Spurious Emissions	± 0.75dB
Radiated Emissions which fall in the restricted bands	± 6.0dB (Below 1GHz);± 4.6dB (Above 1GHz)
Radiated Spurious Emissions Below 1GHz	± 6.0dB for 3m; ± 5.0dB for 10m
Radiated Spurious Emissions Above 1GHz	± 4.6dB (1-18GHz);± 4.8dB (18- 40GHz)

#### Remark:

The Ulab (lab Uncertainty) is less than Ucispr/ETSI (CISPR/ETSI Uncertainty), so the test results

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.



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#### 4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

### 4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

### • A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

### VCCI (Member No. 1937)

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz. Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen EMC laboratory have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

### • FCC -Designation Number: CN1336

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1336. Test Firm Registration Number: 787754.

#### Innovation, Science and Economic Development Canada

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

#### 4.6 Deviation from Standards

None

#### 4.7 Abnormalities from Standard Conditions

None



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#### 5 **Equipment List**

Conducted Emissions at AC Power Line (150kHz-30MHz)						
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date	
Shielding Room	ZhongYu Electron	GB-88	SEM001-06	2022-05-14	2025-05-13	
EMI Test Receiver	Rohde&Schwarz	ESCI	SEM004-02	2024-03-14	2025-03-13	
Measurement Software	AUDIX	e3 V8.2014-6- 27a	N/A	N/A	N/A	
Coaxial Cable	SGS	N/A	SEM024-01	2023-07-07	2024-07-06	
LISN	Rohde&Schwarz	ENV216	SEM007-01	2023-09-19	2024-09-18	
LISN	ETS-LINDGREN	3816/2	SEM007-02	2024-03-14	2025-03-13	

Minimum 6dB Bandwidt	h				
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
DC Power Supply	Chroma	62012P-80-60	SEM011-11	2023-10-19	2024-10-18
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-19	2024-03-14	2025-03-13
Measurement Software	TST PASS	TST PASS V2.0	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-01	2023-07-07	2024-07-06
Attenuator	Huber+Suhner	6620_SMA-50- 1	SEM021-09	2023-03-31	2024-03-30

Power Spectrum Density						
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date	
DC Power Supply	Chroma	62012P-80-60	SEM011-11	2023-10-19	2024-10-18	
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-19	2024-03-14	2025-03-13	
Measurement Software	TST PASS	TST PASS V2.0	N/A	N/A	N/A	
Coaxial Cable	SGS	N/A	SEM031-01	2023-07-07	2024-07-06	
Attenuator	Huber+Suhner	6620_SMA-50- 1	SEM021-09	2023-03-31	2024-03-30	

Conducted Band Edges Measurement						
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date	
DC Power Supply	Chroma	62012P-80-60	SEM011-11	2023-10-19	2024-10-18	
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-19	2024-03-14	2025-03-13	
Measurement Software	TST PASS	TST PASS V2.0	N/A	N/A	N/A	
Coaxial Cable	SGS	N/A	SEM031-01	2023-07-07	2024-07-06	
Attenuator	Huber+Suhner	6620_SMA-50- 1	SEM021-09	2023-03-31	2024-03-30	



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Conducted Spurious Emissions						
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date	
DC Power Supply	Chroma	62012P-80-60	SEM011-11	2023-10-19	2024-10-18	
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-19	2024-03-14	2025-03-13	
Measurement Software	TST PASS	TST PASS V2.0	N/A	N/A	N/A	
Coaxial Cable	SGS	N/A	SEM031-01	2023-07-07	2024-07-06	
Attenuator	Huber+Suhner	6620_SMA-50- 1	SEM021-09	2023-03-31	2024-03-30	

Radiated Emissions which fall in the restricted bands						
Equipment Manufacturer Model No. Inventor		Inventory No.	Cal Date	Cal Due Date		
3m Fully-Anechoic Chamber	AUDIX	N/A	SEM001-02	2023-04-01	2026-03-31	
Signal Analyzer	Rohde & Schwarz	FSV40	SEM008-04	2024-03-15	2025-03-14	
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2023-07-23	2025-07-22	
Microwave system amplifier	Agilent	83017A	SEM005-25	2023-09-19	2024-09-18	
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A	
Coaxial Cable	SGS	N/A	SEM026-01	2023-07-07	2024-07-06	
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	SEM003-15	2022-08-10	2024-08-09	
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2024-03-15	2025-03-14	

Radiated Spurious Emissions Below 1GHz						
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date	
Loop Antenna	ETS-Lindgren	6502	SEM003-08	2023-11-20	2025-11-19	
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2023-06-19	2026-06-18	
MXE EMI Receiver	Agilent Technologies	N9038A	SEM004-15	2023-10-19	2024-10-18	
BiConiLog Antenna	ETS-LINDGREN	3142C	SEM003-01	2023-09-16	2025-09-15	
Pre-Amplifier	Agilent Technologies	8447D	SEM005-01	2024-03-14	2025-03-13	
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A	
Coaxial Cable	SGS	N/A	SEM025-01	2023-07-07	2024-07-06	



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Radiated Spurious Emissions Above 1GHz						
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date	
3m Fully-Anechoic Chamber	AUDIX	N/A	SEM001-02	2023-04-01	2026-03-31	
Signal Analyzer	Rohde & Schwarz	FSV40	SEM008-04	2024-03-15	2025-03-14	
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2023-07-23	2025-07-22	
Microwave system amplifier	Agilent	83017A	SEM005-25	2023-09-19	2024-09-18	
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A	
Coaxial Cable	SGS	N/A	SEM026-01	2023-07-07	2024-07-06	
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	SEM003-15	2022-08-10	2024-08-09	
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2024-03-15	2025-03-14	

General used equipmen	t				
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Humidity/ Temperature Indicator	deli	8838	SEM002-32	2023-07-28	2024-07-27
Humidity/ Temperature Indicator	deli	8838	SEM002-33	2023-07-28	2024-07-27
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2023-03-23	2024-03-22



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#### Radio Spectrum Technical Requirement 6

### 6.1 Antenna Requirement

#### 6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)

#### 6.1.2 Conclusion

Standard Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, 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.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi. **EUT Antenna:** 

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 4.83 dBi.

Antenna location: Refer to internal photo.



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#### **Radio Spectrum Matter Test Results** 7

### 7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)

47 CFR Part 15, Subpart C 15.207 Test Requirement Test Method: ANSI C63.10 (2013) Section 6.2

Limit:

Francisco (MIL)	Conducted limit(dBµV)				
Frequency of emission(MHz)	Quasi-peak	Average			
0.15-0.5	66 to 56*	56 to 46*			
0.5-5	56	46			
5-30	60	50			
*Decreases with the logarithm of the frequency.					
Detector: Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz					

#### 7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 23.2 °C Humidity: 50.5 % RH Atmospheric Pressure: 1020 mbar

7.1.2 Test Mode Description

	This root mode soothphon						
Pre-scan / Final test	Mode Code	Description					
Pre-scan	02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.					
Final test	03	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.					



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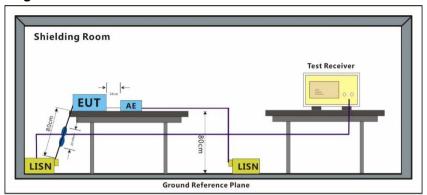
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#### 7.1.3 Test Setup Diagram



#### 7.1.4 Measurement Procedure and Data

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50uH + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane.
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m. from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Remark: Level=Read Level+ Cable Loss+ LISN Factor



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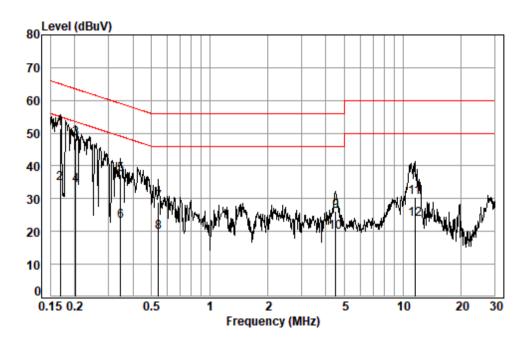


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Test Mode: 03: Line: Live line



: Shielding Room

Condition: Line Job No. : 00377AT

Test mode: 03

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	* 0.1685	0.02	9.51	41.89	51.42	65.03	-13.61	QP
2	0.1685	0.02	9.51	25.02	34.55	55.03	-20.48	Average
3	0.2029	0.02	9.47	38.73	48.22	63.49	-15.27	QP
4	* 0.2029	0.02	9.47	24.60	34.09	53.49	-19.40	Average
5	0.3465	0.03	9.53	27.89	37.45	59.05	-21.60	QP
6	0.3465	0.03	9.53	13.44	23.00	49.05	-26.05	Average
7	0.5436	0.04	9.67	19.34	29.05	56.00	-26.95	QP
8	0.5436	0.04	9.67	10.03	19.74	46.00	-26.26	Average
9	4.5015	0.09	9.56	16.61	26.26	56.00	-29.74	QP
10	4.5015	0.09	9.56	10.20	19.85	46.00	-26.15	Average
11	11.5594	0.19	9.97	20.14	30.30	60.00	-29.70	QP
12	11.5594	0.19	9.97	13.56	23.72	50.00	-26.28	Average



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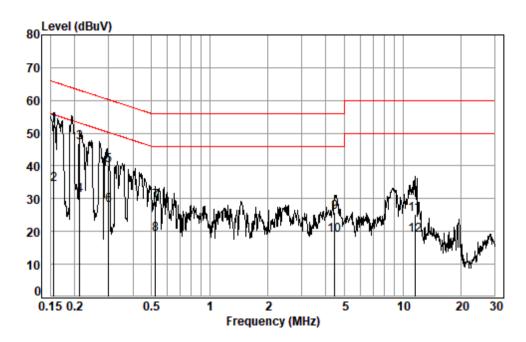


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Test Mode: 03; Line: Neutral Line



: Shielding Room

Condition: Neutral Job No. : 00377AT

Test mode: 03

		Cable	LISN	Read		Limit	0ver	
	Freq	Loss	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1 *	0.1557	0.02	9.63	42.92	52.57	65.69	-13.12	QP
2 *	0.1557	0.02	9.63	24.63	34.28	55.69	-21.41	Average
3	0.2128	0.03	9.66	37.55	47.24	63.10	-15.86	QP
4	0.2128	0.03	9.66	21.21	30.90	53.10	-22.20	Average
5	0.3003	0.03	9.70	30.34	40.07	60.24	-20.17	QP
6	0.3003	0.03	9.70	18.19	27.92	50.24	-22.32	Average
7	0.5238	0.04	9.85	19.31	29.20	56.00	-26.80	QP
8	0.5238	0.04	9.85	9.38	19.27	46.00	-26.73	Average
9	4.4305	0.09	9.72	16.04	25.85	56.00	-30.15	QP
10	4.4305	0.09	9.72	9.20	19.01	46.00	-26.99	Average
11	11.5594	0.19	10.11	14.84	25.14	60.00	-34.86	QP
12	11.5594	0.19	10.11	8.52	18.82	50.00	-31.18	Average



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### 7.2 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(3) Test Method: ANSI C63.10 (2013) Section 11.9.1

#### Limit:

Frequency range(MHz)	Output power of the intentional radiator(watt)
	1 for ≥50 hopping channels
902-928	0.25 for 25≤ hopping channels <50
	1 for digital modulation
	1 for ≥75 non-overlapping hopping channels
2400-2483.5	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

### 7.2.1 E.U.T. Operation

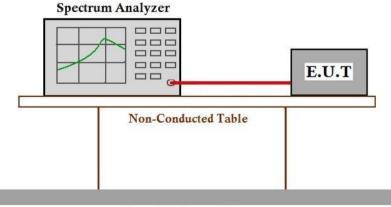
**Operating Environment:** 

Temperature: 21.9 °C Atmospheric Pressure: 1020 mbar Humidity: 48.3 % RH

#### 7.2.2 Test Mode Description

1.2.2 Test wode bescription						
Pre-scan / Final test	Mode Code	Description				
Final test	02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.				
Final test	03	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.				

### 7.2.3 Test Setup Diagram



**Ground Reference Plane** 



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#### 7.2.4 Measurement Procedure and Data

Note: Since the verify power the same operating range bandwidth and smaller power can be covered by the higher power.

Please Refer to Appendix for Details



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### 7.3 Minimum 6dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.247a(2) Test Method: ANSI C63.10 (2013) Section 11.8.1

Limit:

≥500 kHz

### 7.3.1 E.U.T. Operation

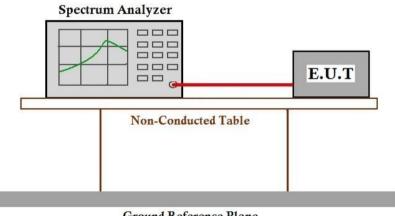
Operating Environment:

Atmospheric Pressure: 1020 mbar Temperature: 21.9 °C Humidity: 48.3 % RH

### 7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	03	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

### 7.3.3 Test Setup Diagram



**Ground Reference Plane** 

#### 7.3.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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### 7.4 Power Spectrum Density

Test Requirement 47 CFR Part 15, Subpart C 15.247(e) Test Method: ANSI C63.10 (2013) Section 11.10.2

Limit:

≤8dBm in any 3 kHz band during any time interval of continuous transmission

### 7.4.1 E.U.T. Operation

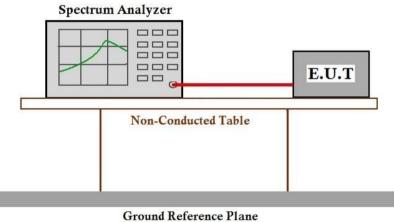
Operating Environment:

Temperature: 21.9 °C Humidity: 48.3 % RH Atmospheric Pressure: 1020 mbar

#### 7.4.2 Test Mode Description

11.12 1001 illude 2000 pilot										
Pre-scan / Final test	Mode Code	Description								
Final test	02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.								
Final test	03	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.								

#### 7.4.3 Test Setup Diagram



#### 7.4.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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### 7.5 Conducted Band Edges Measurement

Test Requirement 47 CFR Part 15, Subpart C 15.247(d) Test Method: ANSI C63.10 (2013) Section 11.13.3.2

Limit:

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).

### 7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 21.9 °C Humidity: 48.3 % RH Atmospheric Pressure: 1020 mbar

#### 7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	03	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.



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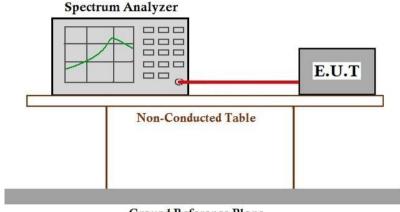
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### 7.5.3 Test Setup Diagram



**Ground Reference Plane** 

### 7.5.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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### 7.6 Conducted Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.247(d) Test Method: ANSI C63.10 (2013) Section 11.11

Limit:

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).

### 7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 21.9 °C Humidity: 48.3 % RH Atmospheric Pressure: 1020 mbar

#### 7.6.2 Test Mode Description

7.0.2 Test IV	7.0.2 Test mode Description											
Pre-scan / Final test	Mode Code	Description										
Final test	02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.										
Final test	03	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.										



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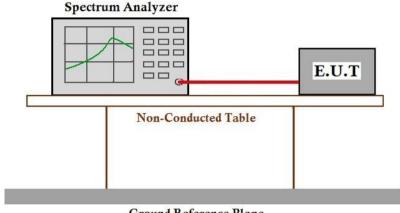
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### 7.6.3 Test Setup Diagram



**Ground Reference Plane** 

#### 7.6.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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#### 7.7 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

Test Method: ANSI C63.10 (2013) Section 6.10.5

Measurement Distance: 3m

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.



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### 7.7.1 E.U.T. Operation

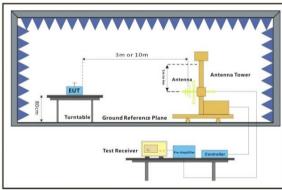
Operating Environment:

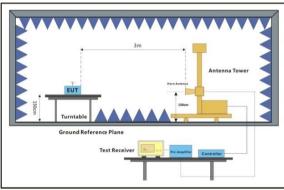
Temperature: 23.2 °C Humidity: 51.3 % RH Atmospheric Pressure: 1020 mbar

#### 7.7.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	03	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

### 7.7.3 Test Setup Diagram





30MHz-1GHz Above 1GHz



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#### 7.7.4 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- i. Repeat above procedures until all frequencies measured was complete.
- Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
- Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.



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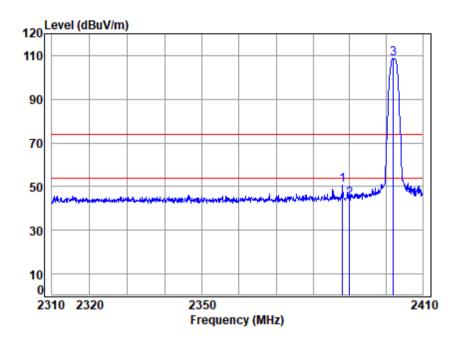


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Test Mode: 02; Polarity: Horizontal; Modulation: GFSK; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL

: 00377AT

: 2402 Band edge Mode

Note : BLE 1M

,,,,	. DLL	T1.1								
		Cable	Ant	Preamp	Read		Limit	0ver		
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark	
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2388.04	5.07	29.10	37.44	54.02	50.75	74.00	-23.25	Peak	
2	2390.00	5.08	29.10	37.44	47.67	44.41	74.00	-29.59	Peak	
3	2402.00	5.09	29.09	37.41	111.85	108.62	74.00	34.62	Peak	



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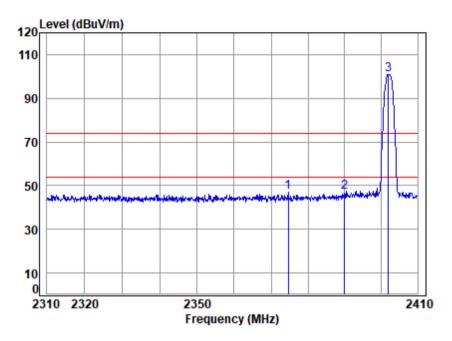


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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber Condition: 3m VERTICAL : 00377AT

: 2402 Band edge Mode

: BLE 1M Note

,,,,		±111								
		Cable	Ant	Preamp	Read		Limit	0ver		
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark	
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2374.62	5.06	29.10	37.47	50.09	46.78	74.00	-27.22	Peak	
2	2390.00	5.08	29.10	37.44	50.04	46.78	74.00	-27.22	Peak	
3	2402 00	5 09	29 09	37 41	103 99	100 76	74 00	26 76	Peak	



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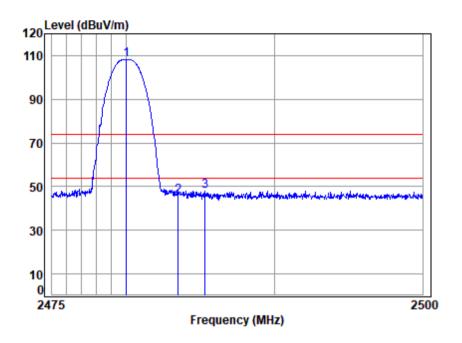


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Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; Channel:High



Site : chamber

Condition: 3m HORIZONTAL

: 00377AT

: 2480 Band edge Mode

Note : BLE 1M

,,,,	. DLL	TIT								
		Cable	Ant	Preamp	Read		Limit	0ver		
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark	
_										
	MHz	dB	dB/m	dB	dBuV	d Bu V/m	dBuV/m	dB		
1	2480.00	5.16	28.90	37.22	111.22	108.06	74.00	34.06	Peak	
2	2483.50	5.16	28.90	37.22	48.74	45.58	74.00	-28.42	Peak	
3	2485.32	5.16	28.90	37.21	51.24	48.09	74.00	-25.91	Peak	



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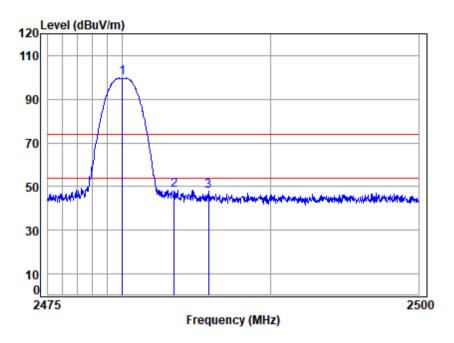


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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:High



Site : chamber Condition: 3m VERTICAL : 00377AT

: 2480 Band edge Mode

Note : BLE 1M

OCC	. DLL	T1.1								
		Cable	Ant	Preamp	Read		Limit	0ver		
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark	
_										
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2480.00	5.16	28.90	37.22	102.87	99.71	74.00	25.71	Peak	
2	2483.50	5.16	28.90	37.22	51.64	48.48	74.00	-25.52	Peak	
3	2485 82	5 16	28 90	37 21	51 14	47 99	74 00	-26 01	Peak	



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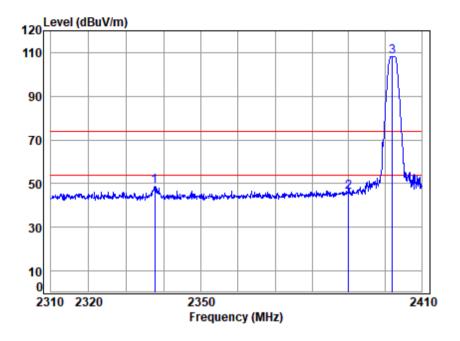


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Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL

: 00377AT

: 2402 Band edge Mode

Note : BLE 2M

IO CC	. DLL	211								
		Cable	Ant	Preamp	Read		Limit	0ver		
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark	
_										
	MHz	dB	dB/m	dB	dBuV	dBuV/m	d Bu V/m	dB		
1	2337.57	5.03	28.93	37.56	52.42	48.82	74.00	-25.18	Peak	
2	2389.96	5.08	29.10	37.44	49.45	46.19	74.00	-27.81	Peak	
3	2402 00	5 09	29 09	37 41	111 58	108 35	74 00	34 35	Peak	



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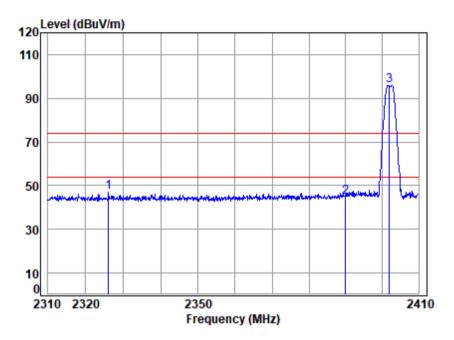


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Test Mode: 03; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber Condition: 3m VERTICAL : 00377AT

: 2402 Band edge Mode

Note : BLE 2M

,,,,		211								
		Cable	Ant	Preamp	Read		Limit	0ver		
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark	
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2326.11	5.02	28.77	37.59	50.80	47.00	74.00	-27.00	Peak	
2	2390.00	5.08	29.10	37.44	47.90	44.64	74.00	-29.36	Peak	
3	2402 00	5 09	29 09	37 41	99 03	95 80	74 00	21 80	Peak	



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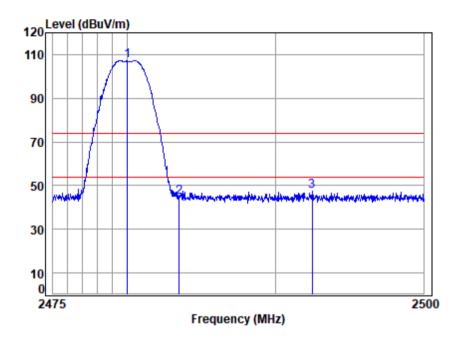


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Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; Channel:High



Site : chamber

Condition: 3m HORIZONTAL

: 00377AT

: 2480 Band edge Mode

Note . BLF 2M

JLE	. DLL	211								
		Cable	Ant	Preamp	Read		Limit	0ver		
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark	
_										
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2480.00	5.16	28.90	37.22	110.40	107.24	74.00	33.24	Peak	
2	2483.50	5.16	28.90	37.22	48.07	44.91	74.00	-29.09	Peak	
3	2492.47	5.17	28.90	37.20	50.52	47.39	74.00	-26.61	Peak	



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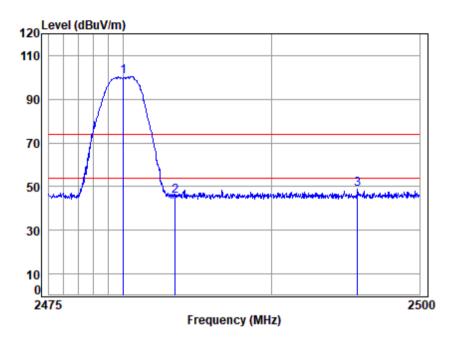


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Test Mode: 03; Polarity: Vertical; Modulation:GFSK; Channel:High



Site : chamber Condition: 3m VERTICAL : 00377AT

Mode : 2480 Band edge

Note : BLE 2M

	Freq					Level			Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2480.00	5.16	28.90	37.22	103.74	100.58	74.00	26.58	Peak
2	2483.50	5.16	28.90	37.22	48.97	45.81	74.00	-28.19	Peak
3	2495.81	5.17	28.90	37.19	51.72	48.60	74.00	-25.40	Peak



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### 7.8 Radiated Spurious Emissions Below 1GHz

47 CFR Part 15, Subpart C 15.205 & 15.209 Test Requirement

Test Method: ANSI C63.10 (2013) Section 6.4,6.5

Measurement Distance: 3m

#### Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)		
0.009-0.490	2400/F(kHz)	300		
0.490-1.705	24000/F(kHz)	30		
1.705-30.0	30	30		
30-88	100	3		
88-216	150	3		
216-960	200	3		
960-1000	500	3		

### 7.8.1 E.U.T. Operation

Operating Environment:

Temperature: 23.2 °C Humidity: 45.8 % RH Atmospheric Pressure: 1020 mbar

#### 7.8.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description							
Final test	02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.							
Final test	03	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.							



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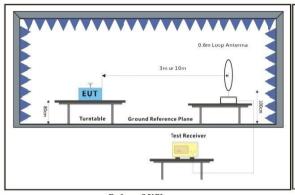
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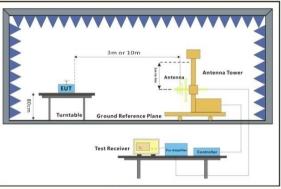


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#### 7.8.3 Test Setup Diagram





30MHz-1GHz

#### 7.8.4 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using quasi-peak method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- i. Repeat above procedures until all frequencies measured was complete.

#### Remark:

- 1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
- 2. Scan from 9kHz to 30MHz, the disturbance below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.



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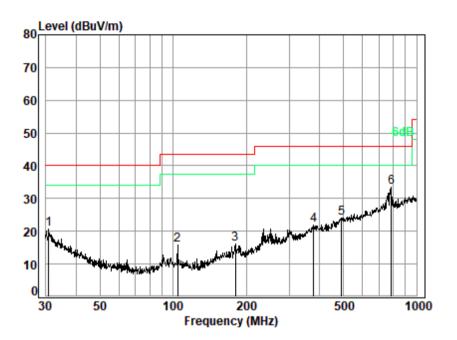


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Test Mode: 02; Polarity: Horizontal



Site : chamber

Condition: 3m HORIZONTAL

Job No. : 00377AT

Test Mode: 02

		Ant	Cable	Preamp	Read		Limit	0ver	
	Freq	Factor	Loss	Factor	Level	Level	Line	Limit	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	——dB	
1	30.85	20.81	0.65	27.80	26.88	20.54	40.00	-19.46	
2	104.17	12.22	1.21	27.59	30.08	15.92	43.50	-27.58	
3	180.65	14.11	1.63	27.32	27.65	16.07	43.50	-27.43	
4	377.26	20.80	2.46	27.24	25.80	21.82	46.00	-24.18	
5	490.74	22.84	2.86	27.74	26.11	24.07	46.00	-21.93	
6	787.85	27.15	3.79	27.65	30.10	33.39	46.00	-12.61	



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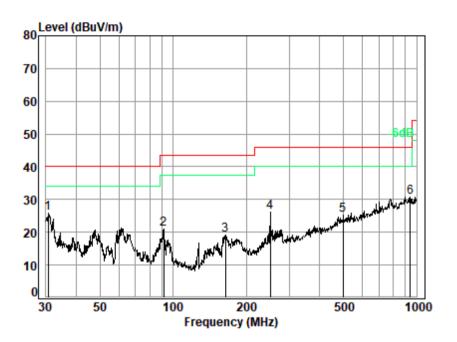


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Test Mode: 02; Polarity: Vertical



Site : chamber

Condition: 3m VERTICAL

Job No. : 00377AT

Test Mode: 02

				Cable Preamp Read Loss Factor Level					Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	——dB	
1	30.64	20.90	0.65	27.80	32.18	25.93	40.00	-14.07	
2	91.49	11.86	1.14	27.63	35.65	21.02	43.50	-22.48	
3	163.76	13.28	1.53	27.38	31.89	19.32	43.50	-24.18	
4	250.30	17.24	1.95	27.07	34.05	26.17	46.00	-19.83	
5	499.42	22.90	2.89	27.78	27.34	25.35	46.00	-20.65	
6	942.13	28.19	4.20	26.93	25.16	30.62	46.00	-15.38	



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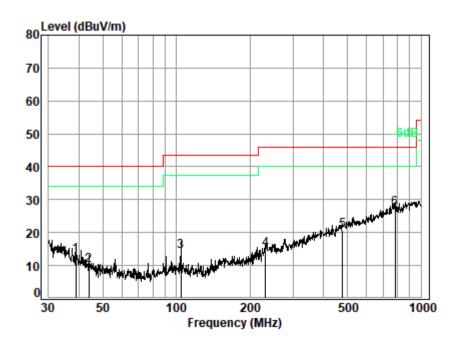


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Test Mode: 03; Polarity: Horizontal



Site : chamber

Condition: 3m HORIZONTAL

Job No. : 00377AT

Test Mode: 03

		Ant	Cable	Preamp	Read		Limit	0ver	
	Freq	Factor	Loss Factor		Level	Level	Line	Limit	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
1	38.75	16.95	0.74	27.78	23.15	13.06	40.00	-26.94	QP
2	43.81	14.62	0.78	27.77	22.53	10.16	40.00	-29.84	QP
3	104.17	12.22	1.21	27.59	28.46	14.30	43.50	-29.20	QP
4	231.72	16.66	1.87	27.14	23.47	14.86	46.00	-31.14	QP
5	477.17	22.60	2.81	27.68	23.06	20.79	46.00	-25.21	QP
6 q	785.09	27.13	3.78	27.66	24.00	27.25	46.00	-18.75	QP



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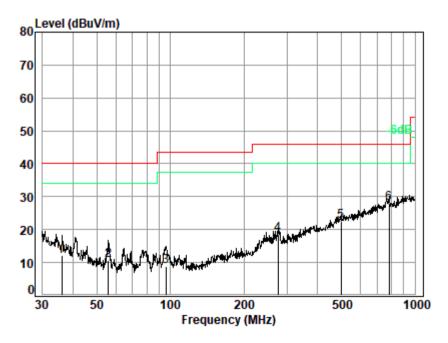


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Test Mode: 03; Polarity: Vertical



Site : chamber Condition: 3m VERTICAL : 00377AT Job No.

Test Mode: 03

		Ant	Cable	Preamp	Read		Limit	0ver	
	Freq	Factor	Loss	Factor	Level	Level	Line	Limit	Remark
	MHz	dB/m	dB	dB	dBuV	dBuV/m	dBuV/m	dB	
	26.42		. 74			40.00			
1	36.13	18.24	0./1	27.79	21.12	12.28	40.00	-2/./2	QР
2	55.80	11.87	0.88	27.73	25.68	10.70	40.00	-29.30	QP
3	96.10	12.17	1.17	27.62	23.24	8.96	43.50	-34.54	QP
4	275.16	17.06	2.06	26.98	26.38	18.52	46.00	-27.48	QP
5	499.42	22.90	2.89	27.78	24.52	22.53	46.00	-23.47	QP
6 q	785.09	27.13	3.78	27.66	24.83	28.08	46.00	-17.92	QP



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### 7.9 Radiated Spurious Emissions Above 1GHz

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

Test Method: ANSI C63.10 (2013) Section 6.6

Measurement Distance: 3m

#### Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
Above 1000	500	3

#### 7.9.1 E.U.T. Operation

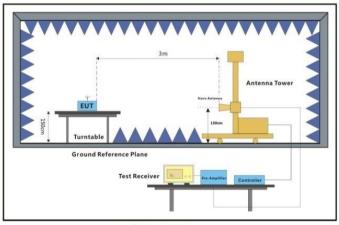
**Operating Environment:** 

Temperature: 23.2 °C Humidity: 52.3 % RH Atmospheric Pressure: 1020 mbar

#### 7.9.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description										
Final test	02	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.										
Final test	03	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.										

### 7.9.3 Test Setup Diagram





Above 1GHz

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#### 7.9.4 Measurement Procedure and Data

- a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak or average method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- i. Repeat above procedures until all frequencies measured was complete.

### Remark:

- 1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
- 2. Scan from 1GHz to 25GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
- 3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.



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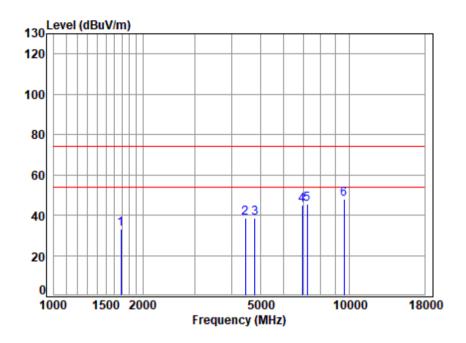


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Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL

: 00377AT : 2402 TX RSE Mode

: BLE 1M Note

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1687.35	4.31	26.23	38.41	40.89	33.02	74.00	-40.98	peak
2	4456.32	7.09	34.12	35.76	33.07	38.52	74.00	-35.48	peak
3	4804.00	7.31	34.32	35.52	32.65	38.76	74.00	-35.24	peak
4	6934.78	8.87	35.74	35.53	36.07	45.15	74.00	-28.85	peak
5	7206.00	9.18	35.70	35.79	36.40	45.49	74.00	-28.51	peak
6	9608.00	12.36	37.42	37.46	35.77	48.09	74.00	-25.91	peak



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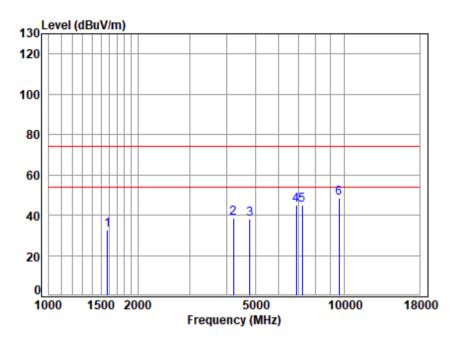


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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber Condition: 3m VERTICAL : 00377AT : 2402 TX RSE Mode

: BLE 1M Note

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1578.82	4.17	26.88	38.40	39.94	32.59	74.00	-41.41	peak
2	4218.19	6.93	33.80	35.93	33.56	38.36	74.00	-35.64	peak
3	4804.00	7.31	34.32	35.52	32.13	38.24	74.00	-35.76	peak
4	6874.91	8.83	35.55	35.49	36.20	45.09	74.00	-28.91	peak
5	7206.00	9.18	35.70	35.79	35.88	44.97	74.00	-29.03	peak
6	9608.00	12.36	37.42	37.46	36.36	48.68	74.00	-25.32	peak



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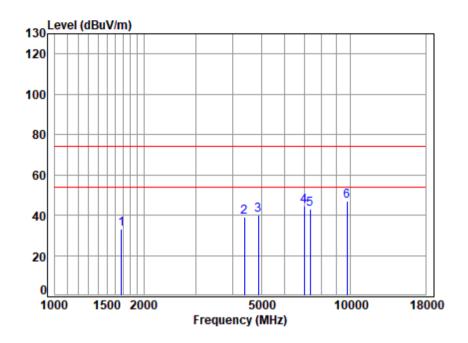


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Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; Channel:middle



Site : chamber

Condition: 3m HORIZONTAL

: 00377AT : 2440 TX RSE Mode

: BLE 1M Note

	Freq			Preamp Factor		Level			Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1677.62	4.30	26.24	38.41	40.98	33.11	74.00	-40.89	peak
2	4392.38	7.05	34.74	35.80	33.26	39.25	74.00	-34.75	peak
3	4880.00	7.36	34.62	35.47	33.61	40.12	74.00	-33.88	peak
4	6974.98	8.90	35.75	35.55	35.53	44.63	74.00	-29.37	peak
5	7320.00	9.32	35.70	35.90	34.03	43.15	74.00	-30.85	peak
6	9760.00	12.47	37.38	37.43	34.72	47.14	74.00	-26.86	peak



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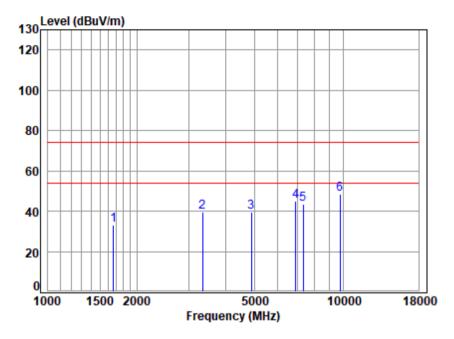


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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:middle



Site : chamber Condition: 3m VERTICAL : 00377AT

Mode : 2440 TX RSE

: BLE 1M Note

	Freq			Preamp Factor					Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1667.95	4.29	26.26	38.41	41.18	33.32	74.00	-40.68	peak
2	3347.37	6.04	32.05	36.12	37.60	39.57	74.00	-34.43	peak
3	4880.00	7.36	34.62	35.47	33.03	39.54	74.00	-34.46	peak
4	6914.76	8.86	35.66	35.52	36.09	45.09	74.00	-28.91	peak
5	7320.00	9.32	35.70	35.90	34.18	43.30	74.00	-30.70	peak
6	9760.00	12.47	37.38	37.43	35.89	48.31	74.00	-25.69	peak



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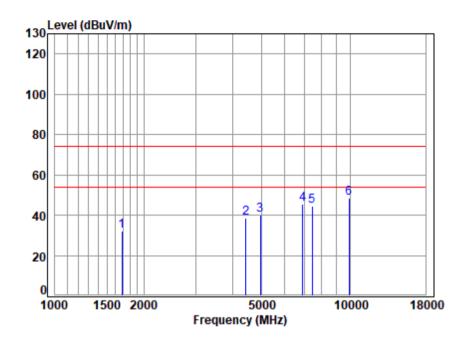


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Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; Channel:High



Site : chamber

Condition: 3m HORIZONTAL

: 00377AT Mode : 2480 TX RSE

: BLE 1M Note

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1687.35	4.31	26.23	38.41	39.79	31.92	74.00	-42.08	peak
2	4430.63	7.08	34.43	35.77	32.91	38.65	74.00	-35.35	peak
3	4960.00	7.41	34.56	35.42	33.37	39.92	74.00	-34.08	peak
4	6914.76	8.86	35.66	35.52	36.60	45.60	74.00	-28.40	peak
5	7440.00	9.46	35.96	36.02	35.05	44.45	74.00	-29.55	peak
6	9920.00	12.58	37.30	37.39	35.76	48.25	74.00	-25.75	peak



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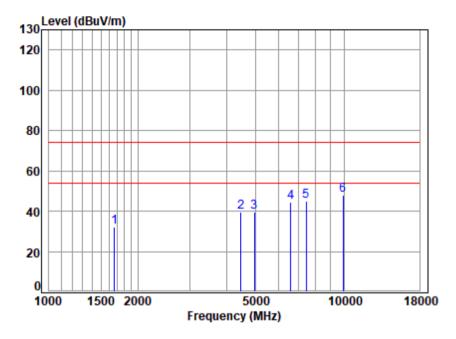


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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:High



Site : chamber Condition: 3m VERTICAL : 00377AT Mode : 2480 TX RSE

: BLE 1M Note

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1667.95	4.29	26.26	38.41	39.86	32.00	74.00	-42.00	peak
2	4469.21	7.10	33.97	35.75	34.24	39.56	74.00	-34.44	peak
3	4960.00	7.41	34.56	35.42	33.23	39.78	74.00	-34.22	peak
4	6602.27	8.64	35.30	35.32	35.64	44.26	74.00	-29.74	peak
5	7440.00	9.46	35.96	36.02	35.35	44.75	74.00	-29.25	peak
6	9920.00	12.58	37.30	37.39	35.64	48.13	74.00	-25.87	peak



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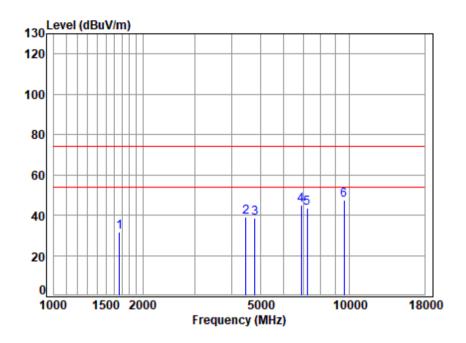


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Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL

: 00377AT : 2402 TX RSE Mode

Note : BLE 2M

	Freq			Preamp Factor					Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1667.95	4.29	26.26	38.41	39.72	31.86	74.00	-42.14	peak
2	4469.21	7.10	33.97	35.75	33.80	39.12	74.00	-34.88	peak
3	4804.00	7.31	34.32	35.52	32.31	38.42	74.00	-35.58	peak
4	6874.91	8.83	35.55	35.49	35.91	44.80	74.00	-29.20	peak
5	7206.00	9.18	35.70	35.79	34.39	43.48	74.00	-30.52	peak
6	9608.00	12.36	37.42	37.46	35.04	47.36	74.00	-26.64	peak



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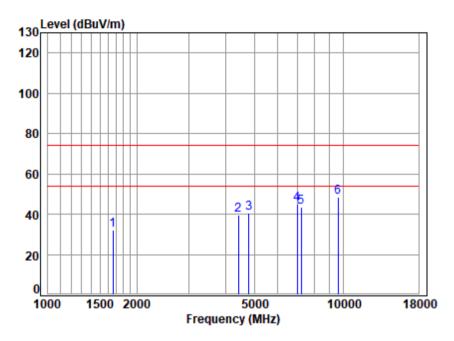


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Test Mode: 03; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber Condition: 3m VERTICAL : 00377AT : 2402 TX RSE Mode

: BLE 2M Note

	Freq			Preamp Factor					Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1663.14	4.28	26.27	38.41	40.22	32.36	74.00	-41.64	peak
2	4417.84	7.07	34.59	35.78	33.79	39.67	74.00	-34.33	peak
3	4804.00	7.31	34.32	35.52	34.18	40.29	74.00	-33.71	peak
4	6995.17	8.92	35.71	35.57	35.76	44.82	74.00	-29.18	peak
5	7206.00								•
6	9608.00	12.36	37.42	37.46	35.90	48.22	74.00	-25.78	peak



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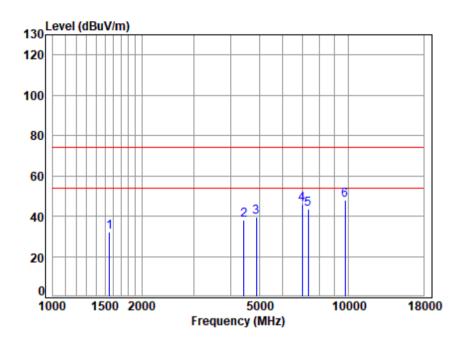


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Test Mode: 03; Polarity: Horizontal; Modulation: GFSK; Channel: middle



Site : chamber

Condition: 3m HORIZONTAL

: 00377AT : 2440 TX RSE Mode

: BLE 2M Note

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1556.17	4.14	26.97	38.40	39.37	32.08	74.00	-41.92	peak
2	4443.45	7.09	34.28	35.77	32.57	38.17	74.00	-35.83	peak
3	4880.00	7.36	34.62	35.47	33.02	39.53	74.00	-34.47	peak
4	6974.98	8.90	35.75	35.55	36.90	46.00	74.00	-28.00	peak
5	7320.00	9.32	35.70	35.90	34.30	43.42	74.00	-30.58	peak
6	9760.00	12.47	37.38	37.43	35.64	48.06	74.00	-25.94	peak



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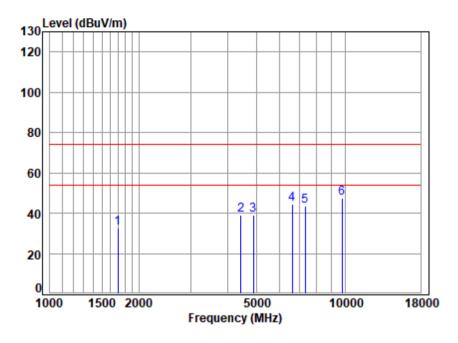


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Test Mode: 03; Polarity: Vertical; Modulation:GFSK; Channel:middle



Site : chamber Condition: 3m VERTICAL : 00377AT

: 2440 TX RSE Mode

: BLE 2M Note

	Frea			Preamp Factor					Romank	
	rreq	LUSS	ractor	ractor	rever	rever	Line	LIMIT	Kelliark	
-	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	1697.13	4.33	26.21	38.41	40.56	32.69	74.00	-41.31	peak	
2	4443.45	7.09	34.28	35.77	33.50	39.10	74.00	-34.90	peak	
3	4880.00	7.36	34.62	35.47	32.33	38.84	74.00	-35.16	peak	
4	6621.38	8.65	35.26	35.33	36.03	44.61	74.00	-29.39	peak	
5	7320.00	9.32	35.70	35.90	34.46	43.58	74.00	-30.42	peak	
6	9760.00	12.47	37.38	37.43	35.25	47.67	74.00	-26.33	peak	



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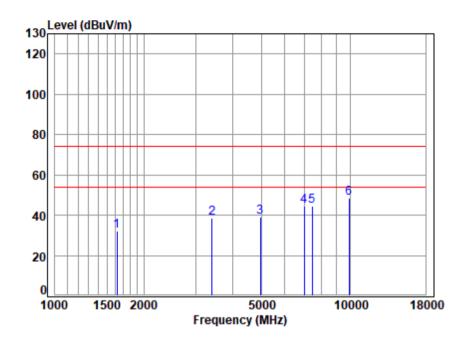


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Test Mode: 03; Polarity: Horizontal; Modulation: GFSK; Channel: High



Site : chamber

Condition: 3m HORIZONTAL

: 00377AT Mode : 2480 TX RSE

Note : BLE 2M

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1625.12	4.23	26.55	38.41	39.70	32.07	74.00	-41.93	peak
2	3405.93	6.11	32.33	36.12	36.35	38.67	74.00	-35.33	peak
3	4960.00	7.41	34.56	35.42	32.54	39.09	74.00	-34.91	peak
4	6974.98	8.90	35.75	35.55	35.42	44.52	74.00	-29.48	peak
5	7440.00	9.46	35.96	36.02	34.92	44.32	74.00	-29.68	peak
6	9920.00	12.58	37.30	37.39	35.95	48.44	74.00	-25.56	peak



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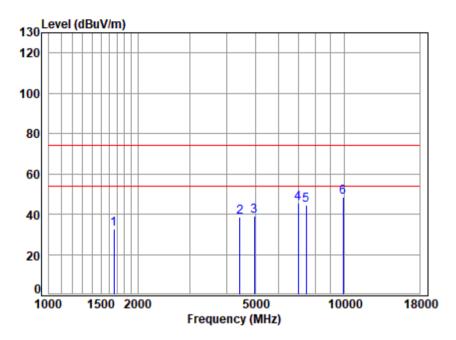


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Test Mode: 03; Polarity: Vertical; Modulation:GFSK; Channel:High



Site : chamber Condition: 3m VERTICAL : 00377AT Mode : 2480 TX RSE

Note : BLE 2M

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
_									
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1658.34	4.28	26.28	38.41	40.42	32.57	74.00	-41.43	peak
2	4430.63	7.08	34.43	35.77	32.85	38.59	74.00	-35.41	peak
3	4960.00	7.41	34.56	35.42	32.55	39.10	74.00	-34.90	peak
4	6974.98	8.90	35.75	35.55	36.13	45.23	74.00	-28.77	peak
5	7440.00	9.46	35.96	36.02	34.97	44.37	74.00	-29.63	peak
6	9920.00	12.58	37.30	37.39	36.00	48.49	74.00	-25.51	peak



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#### **Test Setup Photo** 8

Refer to Setup Photo for SZCR2401000377AT

#### **EUT Constructional Details (EUT Photos)** 9

Refer to External and Internal Photos for SZCR2401000377AT



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# 10 Appendix

1. Duty Cycle

1.1 Ant1

#### 1.1.1 Test Result

	Ant1									
Mode	TX Type	Frequency (MHz)	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)			
		2402	0.425	0.625	68.00	1.67	0.00			
1M	SISO	2440	0.427	0.627	68.10	1.67	0.53			
		2480	0.425	0.625	68.00	1.67	0.00			



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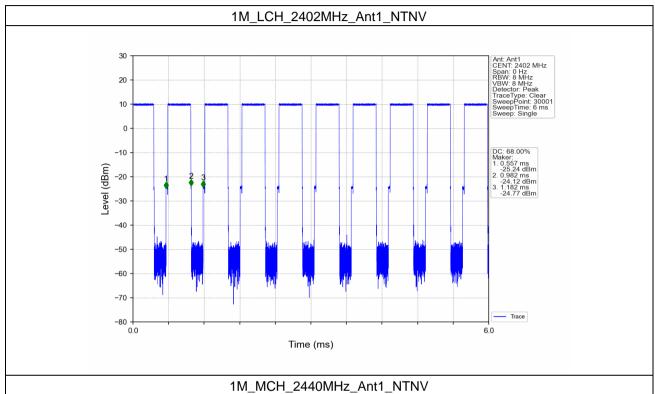


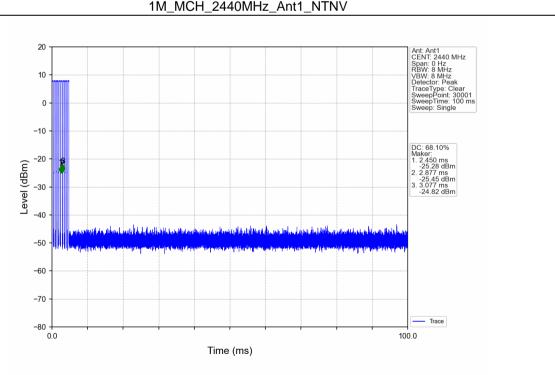
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### 1.1.2 Test Graph







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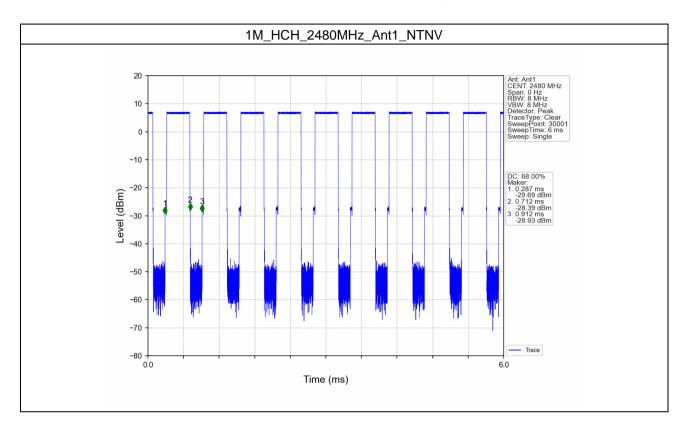
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### 2. Bandwidth

2.1 OBW

### 2.1.1 Test Result

Mada	TX	Frequency	A NIT	99% Occupied E	Bandwidth (MHz)	Vardiat
Mode	Type	(MHz)	ANT	Result	Limit	Verdict
		2402	1	1.026	/	Pass
1M	SISO	2440	1	1.024	/	Pass
		2480	1	1.023	/	Pass



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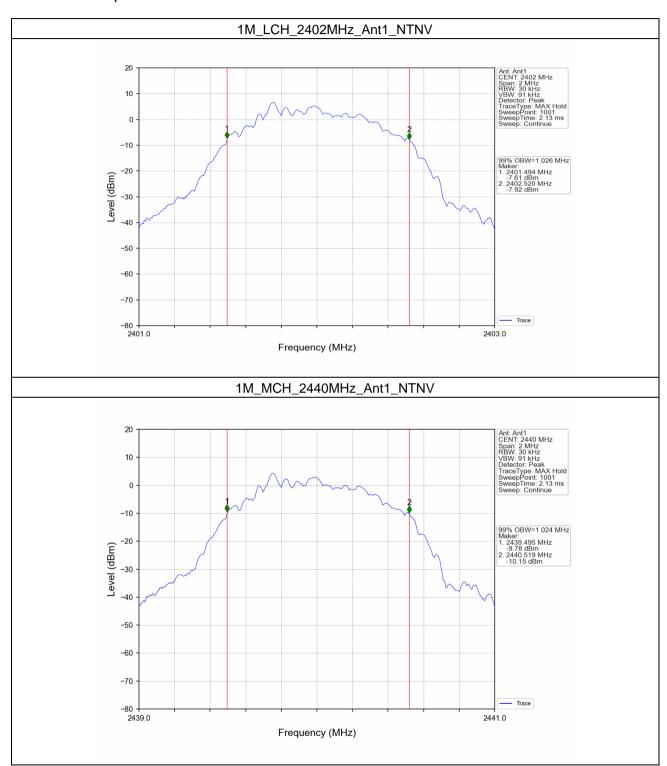


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### 2.1.2 Test Graph





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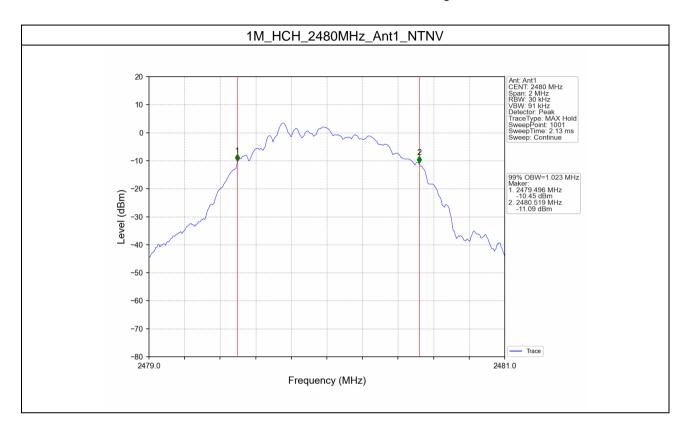
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#### 2.2 6dB BW

#### 2.2.1 Test Result

Mode	TX	Frequency	ANIT	6dB Bandv	vidth (MHz)	Verdict
Mode	Type	(MHz)	ANT	Result	Limit	verdict
		2402	1	0.664	>=0.5	Pass
1M	SISO	2440	1	0.661	>=0.5	Pass
		2480	1	0.662	>=0.5	Pass



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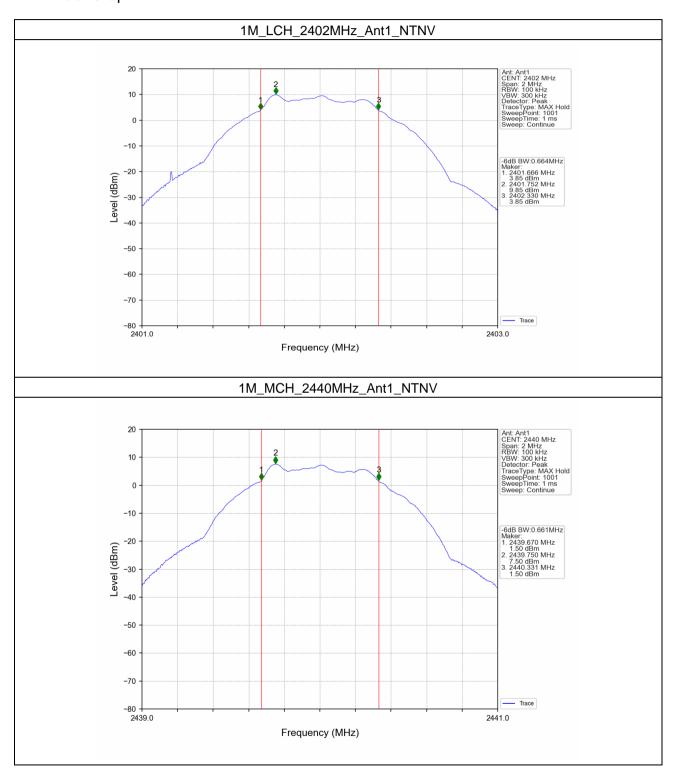


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### 2.2.2 Test Graph





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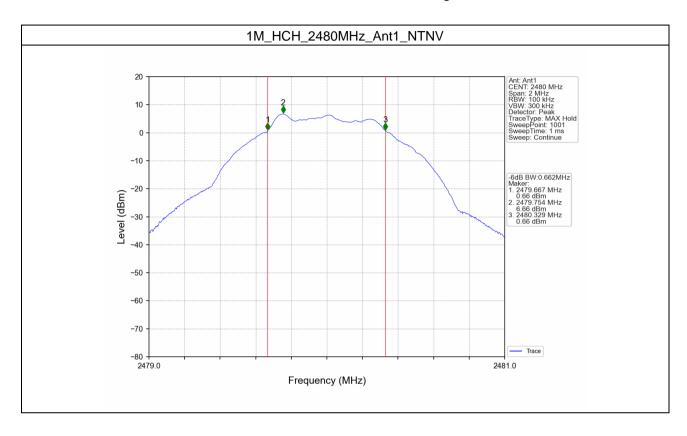
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### 3. Maximum Conducted Output Power

### 3.1 Power

### 3.1.1 Test Result

Mada	TX	Frequency	Maximum Peak Conduc	ted Output Power (dBm)	Vardiet
Mode	Type	(MHz)	ANT1	Limit	Verdict
		2402	10.10	<=30	Pass
1M	SISO	2440	7.80	<=30	Pass
		2480	6.92	<=30	Pass

### 4. Maximum Power Spectral Density

#### 4.1 PSD

#### 4.1.1 Test Result

Mada	TX	Frequency	Maximum PS	D (dBm/3kHz)	Vardiet
Mode	Type	(MHz)	ANT1	Limit	Verdict
		2402	-6.23	<=8	Pass
1M	SISO	2440	-8.60	<=8	Pass
		2480	-9.51	<=8	Pass



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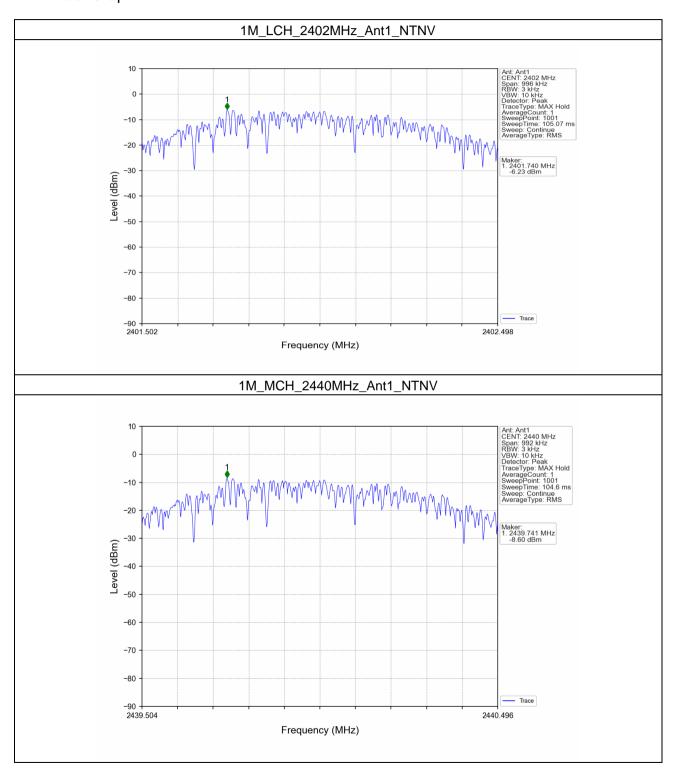


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### 4.1.2 Test Graph





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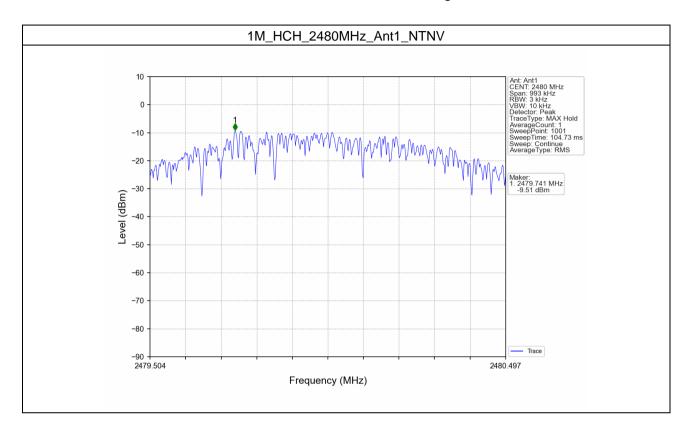
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### 5. Unwanted Emissions In Non-restricted Frequency Bands

#### 5.1 Ref

#### 5.1.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)
		2402	1	9.84
1M	SISO	2440	1	7.53
		2480	1	6.68

Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maximum PSD level was used to establish the reference level.



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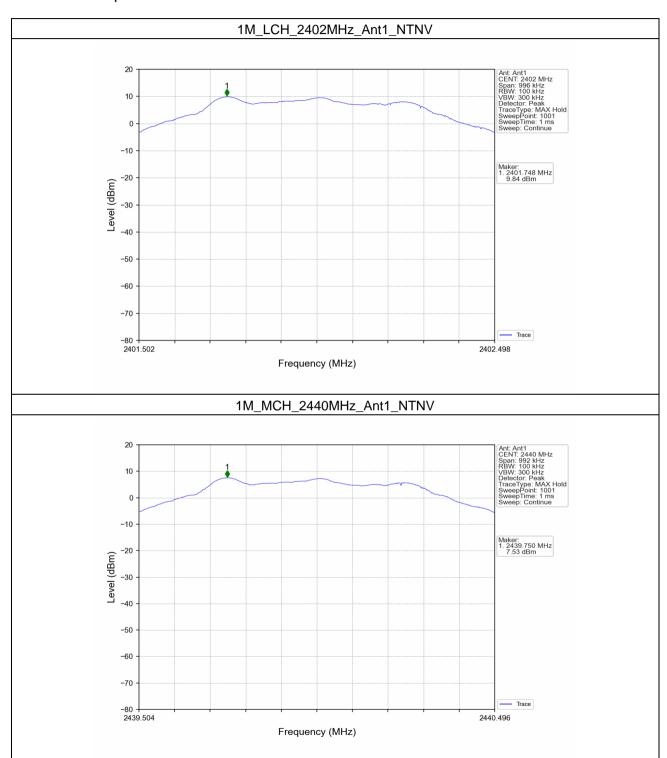


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### 5.1.2 Test Graph





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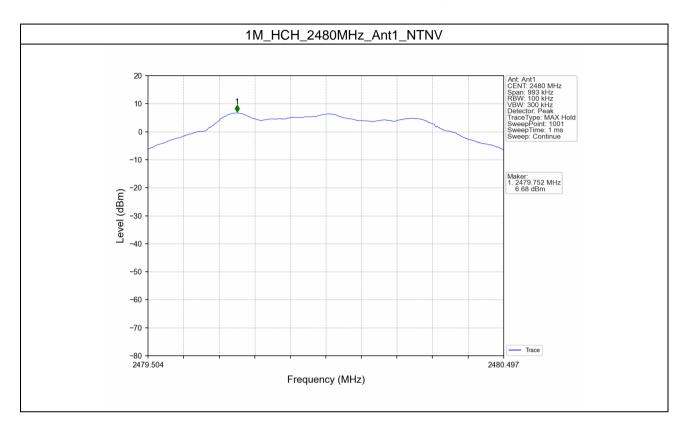
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### 5.2 CSE

#### 5.2.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
1M	SISO	2402	1	9.84	-10.16	Pass
		2440	1	9.84	-10.16	Pass
		2480	1	9.84	-10.16	Pass

Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maximum PSD level was used to establish the reference level.



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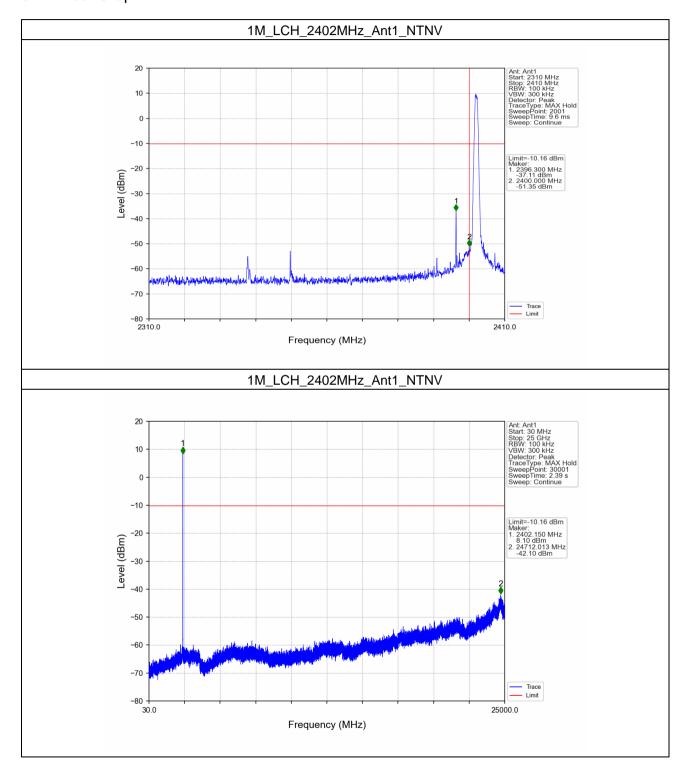


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### 5.2.2 Test Graph





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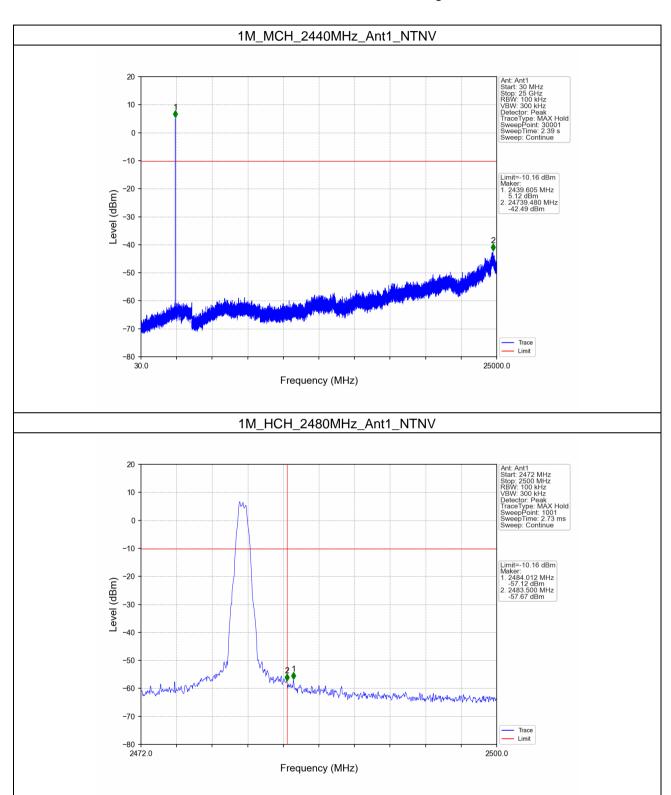
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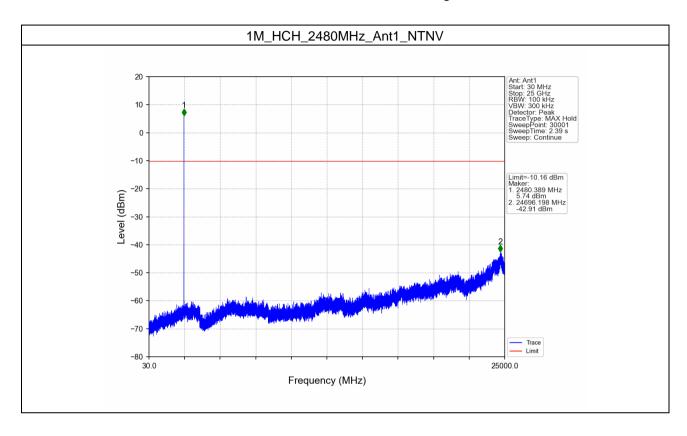
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