

SZEMC-TRF-01 Rev. A/1 Report No.: SZCR240900354102

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TEST REPORT

Application No.: SZCR2409003541ME

Applicant: Guangzhou Longest Medical Technology Co., Ltd.

Address of Applicant: 301 of Building 1, No. 96, Chuangqiang Road, Ningxi Street, Zengcheng

District, Guangzhou, Guangdong Province, 511399, P.R. China

Manufacturer: Guangzhou Longest Medical Technology Co., Ltd.

Address of Manufacturer: 301 of Building 1, No. 96, Chuangqiang Road, Ningxi Street, Zengcheng

District, Guangzhou, Guangdong Province, 511399, P.R. China

Factory: Guangzhou Longest Medical Technology Co., Ltd.

Address of Factory: 301&401 of Building 2&Building 3, No.96, Chuanggiang Road, Ningxi Street,

Zengcheng District, Guangzhou, Guangdong, 511399, China

Equipment Under Test (EUT):

EUT Name: Active Passive Trainer for Upper and Lower Limbs

Model No.: LGT-5100P
Trade Mark: Longest*

FCC ID: 2BL4VLGT-5100P

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

Date of Receipt: 2024-09-13

Date of Test: 2024-09-20 to 2024-11-19

Date of Issue: 2024-11-19

Test Result: Pass*

Keny Xu EMC Laboratory Manager

Ceny. Ku



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^{*} In the configuration tested, the EUT complied with the standards specified above.



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	Revision Record							
Version	Chapter	Date	Modifier	Remark				
01		2024-11-19		Original				

Authorized for issue by:		
	Bolisonti	
	Edison Li/Project Engineer	
	Exic Fu	
	Eric Fu/Reviewer	



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2 **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		



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General Information

Details of E.U.T. 4.1

Power supply:	AC 120V, 60Hz
Cable(s):	AC cable:2.5m unshielded
Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	V4.2
Modulation Type:	GFSK
Number of Channels:	40
Channel Spacing:	2MHz
Data rate:	1Mbps, 2Mbps
Antenna Type:	PCB Antenna
Antenna Gain:	-1.73dBi

Remark: The information in this section is provided by the applicant or manufacturer, SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
RF Cable	SGS	N/A(Cable loss:0.8dB)	N/A

4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Emissions at AC Power Line (150kHz-30MHz)	± 3.1dB
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)
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

The U_{lab} (lab Uncertainty) is less than U_{cispr/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	ESR	SZ-WRG-M- 047	2024-01-30	2025-01-29	
Measurement Software	AUDIX	e3 V8.2014-6- 27a	N/A	N/A	N/A	
Coaxial Cable	SGS	N/A	SEM024-01	2024-07-06	2025-07-05	
LISN	Rohde&Schwarz	ENV216	SEM007-01	2024-08-15	2025-08-14	
LISN	ETS-LINDGREN	3816/2	SEM007-02	2024-03-14	2025-03-13	

Radiated Emissions which fall in the restricted bands						
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date	
3m Fully-Anechoic Chamber	AUDIX	N/A	SEM001-02	2024-05-11	2027-05-10	
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	2024-09-14	2025-09-13	
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A	
Coaxial Cable	SGS	N/A	SEM026-01	2024-07-06	2025-07-05	
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	SEM003-15	2024-08-10	2025-08-09	
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	2024-08-14	2025-08-13
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	2024-07-06	2025-07-05



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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	2024-05-11	2027-05-10	
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	2024-09-14	2025-09-13	
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A	
Coaxial Cable	SGS	N/A	SEM026-01	2024-07-06	2025-07-05	
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	SEM003-15	2024-08-10	2025-08-09	
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2024-03-15	2025-03-14	

RF Conducted Test					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Power Sensor	TST PASS	TSPS2023R	SEM009-26	2024-03-27	2025-03-26
Power Sensor	KEYSIGHT	U2021XA	SEM009-16	2024-03-14	2025-03-13
DC Power Supply	Chroma	62012P-80-60	SEM011-11	2024-08-14	2025-08-13
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	2024-07-06	2025-07-05
Attenuator	Huber+Suhner	6620_SMA-50- 1	SEM021-09	2024-03-27	2025-03-26

General used equipmen	t				
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Humidity/ Temperature Indicator	deli	8838	SEM002-32	2024-07-24	2025-07-23
Humidity/ Temperature Indicator	deli	8838	SEM002-33	2024-07-24	2025-07-23
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2024-03-18	2025-03-17



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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 -1.73 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:

Frequency of	Conducted limit(dBμV)				
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 (9kh	Iz resolution bandwidth) 0.15M to 30	MHz			

7.1.1 E.U.T. Operation

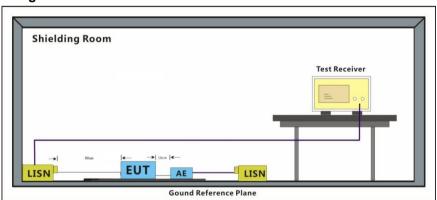
Operating Environment:

Temperature: 25.5 °C Humidity: 45.5 % RH Atmospheric Pressure: 1020 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Pre-scan	01	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	02	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.1.3 Test Setup Diagram



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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/50µH + 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
- 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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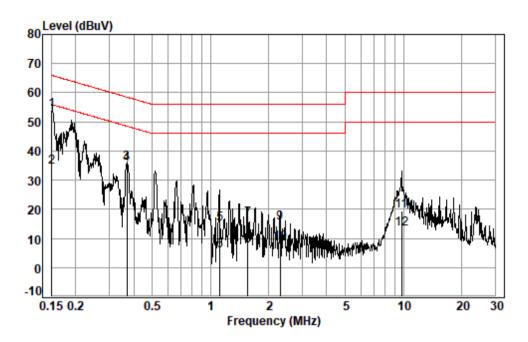


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Test Mode: 02; Line: Live line



: Shielding Room

Condition: Line Job No. : 03541ME

Test mode: 02

	mouc. oz							
		Cable	LISN	Read		Limit	0ver	
	Freq	Loss	Factor	Level	Level	Line	Limit	Remark
-	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
	PHIZ	ub	ub	ubuv	ubuv	ubuv	ub	
1 *	0.1508	0.06	9.81	44.26	54.13	65.96	-11.83	QP
2	0.1508	0.06	9.81	24.74	34.61	55.96	-21.35	Average
3	0.3692	0.07	9.73	26.03	35.83	58.52	-22.69	QP
4 *	0.3692	0.07	9.73	25.66	35.46	48.52	-13.06	Average
5	1.1173	0.09	9.70	5.19	14.98	56.00	-41.02	QP
6	1.1173	0.09	9.70	-4.00	5.79	46.00	-40.21	Average
7	1.5601	0.10	9.68	7.06	16.84	56.00	-39.16	QP
8	1.5601	0.10	9.68	-2.35	7.43	46.00	-38.57	Average
9	2.2968	0.11	9.66	5.49	15.26	56.00	-40.74	QP
10	2.2968	0.11	9.66	-1.24	8.53	46.00	-37.47	Average
11	9.8085	0.20	9.91	9.39	19.50	60.00	-40.50	QP
12	9.8085	0.20	9.91	3.28	13.39	50.00	-36.61	Average

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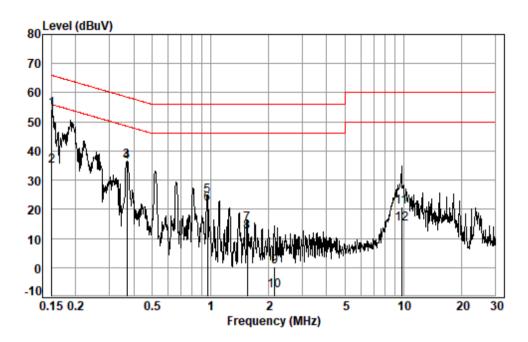


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Test Mode: 02; Line: Neutral Line



: Shielding Room

Condition: Neutral Job No. : 03541ME

Test mode: 02

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1 *	0.1508	0.06	9.82	44.34	54.22	65.96	-11.74	QP
2	0.1508	0.06	9.82	24.85	34.73	55.96	-21.23	Average
3	0.3692	0.07	9.76	26.70	36.53	58.52	-21.99	QP
4 *	0.3692	0.07	9.76	26.39	36.22	48.52	-12.30	Average
5	0.9633	0.09	9.73	14.68	24.50	56.00	-31.50	QP
6	0.9633	0.09	9.73	11.87	21.69	46.00	-24.31	Average
7	1.5518	0.10	9.70	5.32	15.12	56.00	-40.88	QP
8	1.5518	0.10	9.70	2.60	12.40	46.00	-33.60	Average
9	2.1553	0.10	9.69	-9.46	0.33	56.00	-55.67	QP
10	2.1553	0.10	9.69	-17.64	-7.85	46.00	-53.85	Average
11	9.8085	0.20	9.98	10.60	20.78	60.00	-39.22	QP
12	9.8085	0.20	9.98	4.75	14.93	50.00	-35.07	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

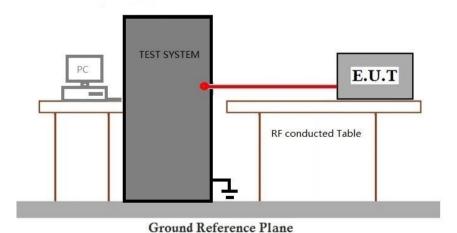
Operating Environment:

Temperature: 25.1 °C Humidity: 39.1 % RH Atmospheric Pressure: 1020 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	02	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.2.3 Test Setup Diagram





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7.2.4 Measurement Procedure and Data

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

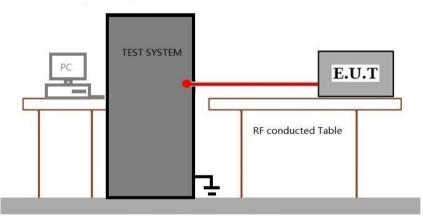
Operating Environment:

Atmospheric Pressure: 1020 mbar Temperature: 25.1 °C Humidity: 39.1 % RH

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description					
Final test	01	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.					
Final test	02	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

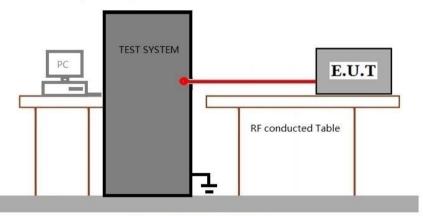
Operating Environment:

Temperature: 25.1 °C Humidity: 39.1 % RH Atmospheric Pressure: 1020 mbar

7.4.2 Test Mode Description

	The state of the s						
Pre-scan / Final test	Mode Code	Description					
Final test	01	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.					
Final test	02	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.					

7.4.3 Test Setup Diagram



Ground Reference Plane

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

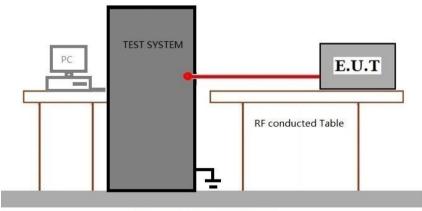
Operating Environment:

25.1 °C Atmospheric Pressure: 1020 mbar Temperature: Humidity: 39.1 % RH

7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	02	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.5.3 Test Setup Diagram



Ground Reference Plane



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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

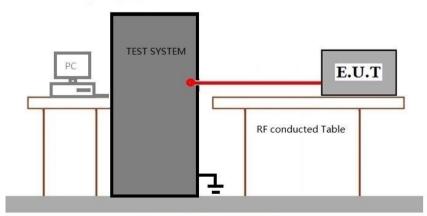
Operating Environment:

25.1 °C Atmospheric Pressure: 1020 mbar Temperature: Humidity: 39.1 % RH

7.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	02	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.6.3 Test Setup Diagram



Ground Reference Plane



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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.

7.7.1 E.U.T. Operation

Operating Environment:

Temperature: 22.8 °C Humidity: 62.9 % RH Atmospheric Pressure: 1020 mbar

7.7.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Pre-scan	02	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.



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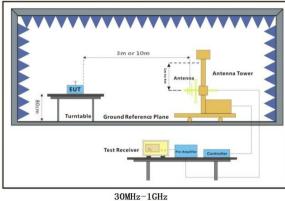
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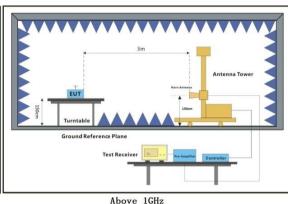


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7.7.3 Test Setup Diagram





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 or 10 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.
- q. 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.
- j. 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.

Remark 3: Only record the worst test result.



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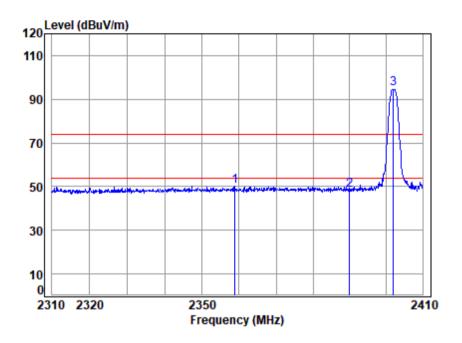


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Test Mode: 01; Polarity: Horizontal; Modulation: GFSK; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL

Job No : 03541ME

Mode : 2402 Band edge

· RIF

		. DLI									
					Preamp						
		Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark	
	-										
		MHz	ав	aB/m	dB	aBuv	aBuv/m	aBuv/m	dB		
1		2358.870	15 70	20 10	37 51	12 67	50 05	7/ 00	23 95	Dook	
_		2330.070	13.75	25.10	37.31	42.07	30.03	74.00	-23.33	reak	
2		2390.000	15.81	29.10	37.44	40.80	48.27	74.00	-25.73	peak	
3	n	2402 000	15 82	29 09	37 41	87 21	94 71	74 00	20 71	neak	



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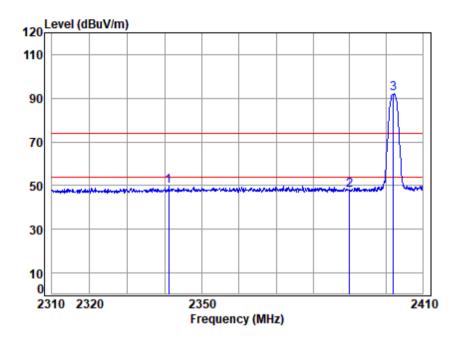


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Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber

Condition: 3m VERTICAL

Job No : 03541ME

: 2402 Band edge Mode

: BLE

	Freq			Preamp Factor					Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2341.044	15.78	28.97	37.55	42.36	49.56	74.00	-24.44	Peak
2	2390.000	15.81	29.10	37.44	40.43	47.90	74.00	-26.10	peak
3	p 2402.000	15.82	29.09	37.41	84.46	91.96	74.00	17.96	peak



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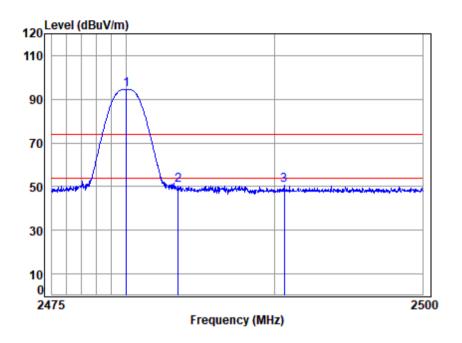


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Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:High



Site : chamber

Condition: 3m HORIZONTAL

Job No : 03541ME

Mode : 2480 Band edge

: BLE

	Freq			Preamp Factor					
-	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 p	2480.000	15.86	28.90	37.22	86.93	94.47	74.00	20.47	peak
2	2483.500	15.86	28.90	37.22	42.97	50.51	74.00	-23.49	peak
3	2490.646	15.86	28.90	37.20	43.16	50.72	74.00	-23.28	Peak



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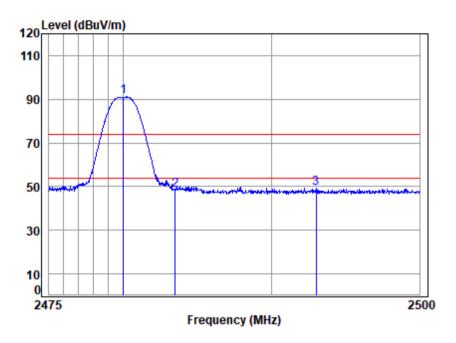


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Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:High



Site : chamber

Condition: 3m VERTICAL Job No : 03541ME

Mode : 2480 Band edge

: BLE

Cable Ant Preamp Read Limit 0ver Loss Factor Factor Line Limit Remark Freq Level Level dBuV dBuV/m dBuV/m MHz dB dB/m 1 p 2480.000 37.22 83.60 15.86 28.90 91.14 74.00 17.14 peak 2483.500 15.86 28.90 37.22 41.01 48.55 74.00 -25.45 peak 2493.000 15.87 28.90 37.19 41.91 49.49 74.00 -24.51 Peak



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7.8 Radiated Spurious Emissions Below 1GHz

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

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

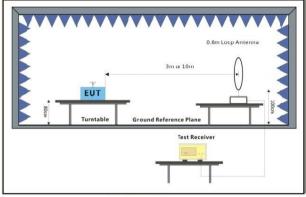
Operating Environment:

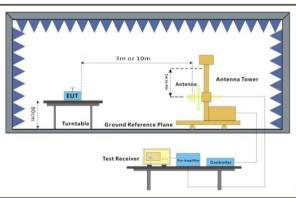
Temperature: 20.2 °C Humidity: 45.2 % RH Atmospheric Pressure: 1020 mbar

7.8.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.
Pre-scan	02	TX mode(2Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.8.3 Test Setup Diagram





30MHz-1GHz Below 30MHz



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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 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. 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.
- 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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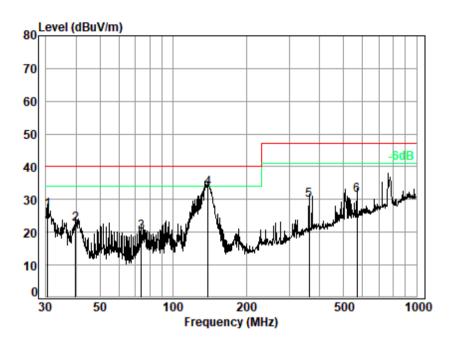


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Test Mode: 01; Polarity: Horizontal



Site : chamber

Condition: 3m HORIZONTAL

Job No. : 03541ME

Test Mode: 01

		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	30.531	20.95	0.65	27.79	32.89	26.70	40.00	-13.30	QP
2	39.715	16.54	0.75	27.76	32.94	22.47	40.00	-17.53	QP
3	74.135	10.39	1.02	27.66	36.36	20.11	40.00	-19.89	QP
4 q	138.874	11.70	1.40	27.43	47.88	33.55	40.00	-6.45	QP
5	361.714	20.25	2.40	27.00	34.01	29.66	47.00	-17.34	QP
6	568.613	23.59	3.11	27.84	32.53	31.39	47.00	-15.61	OP



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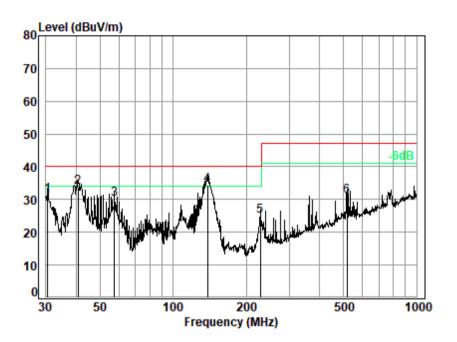


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Test Mode: 01; Polarity: Vertical



Site : chamber

Condition: 3m VERTICAL

Job No. : 03541ME

Test Mode: 01

		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	30.531	20.95	0.65	27.79	37.50	31.31	40.00	-8.69	QP
2	40.702	16.05	0.76	27.76	44.81	33.86	40.00	-6.14	QP
3	57.392	11.73	0.90	27.71	45.34	30.26	40.00	-9.74	QP
4 q	138.387	11.66	1.40	27.43	48.84	34.47	40.00	-5.53	QP
5	227.691	16.12	1.85	27.05	34.04	24.96	40.00	-15.04	QP
6	517.248	23.31	2.95	27.63	32.38	31.01	47.00	-15.99	OP



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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

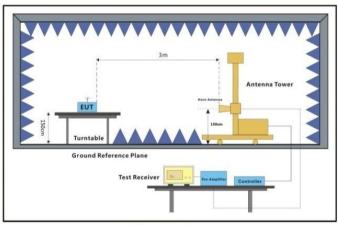
Operating Environment:

Temperature: 22.8 °C Humidity: 62.5 % RH Atmospheric Pressure: 1020 mbar

7.9.2 Test Mode Description

Tiol2 Tool Mode Bookington									
Pre-scan / Final test	Mode Code	Description							
Final test	01	TX mode(1Mbps)_Keep the EUT in continuously transmitting mode with GFSK modulation.							
Pre-scan	02	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.
- 4. Only record the worst test result.



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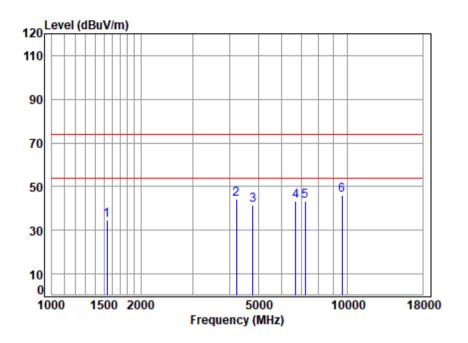


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Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL

Job No : 03541ME

Mode : 2402 TX RSE

: BLE

	Freq			Preamp Factor					Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1538.281	4.65	26.95	61.67	64.61	34.54	74.00	-39.46	peak
2	4218.186	8.24	33.80	61.38	63.38	44.04	74.00	-29.96	peak
3	4804.000	8.00	34.32	61.88	61.01	41.45	74.00	-32.55	peak
4	6698.373	9.30	35.20	62.33	61.27	43.44	74.00	-30.56	peak
5	7206.000	9.32	35.70	62.04	60.43	43.41	74.00	-30.59	peak
	9608.000	11.41	37.42	62.15	59.24	45.92	74.00	-28.08	peak



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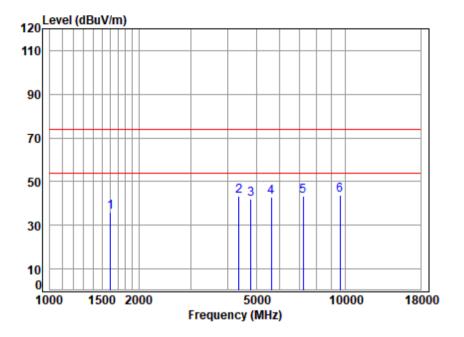


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Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber

Condition: 3m VERTICAL

Job No : 03541ME

Mode : 2402 TX RSE

: BLE

	Freq			Preamp Factor					Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1601.804	4.79	26.78	61.69	66.26	36.14	74.00	-37.86	peak
2	4367.058	8.04	34.54	61.51	62.35	43.42	74.00	-30.58	peak
3	4804.000	8.00	34.32	61.88	61.70	42.14	74.00	-31.86	peak
4	5615.620	9.35	34.61	62.49	61.61	43.08	74.00	-30.92	peak
5	7206.000	9.32	35.70	62.04	60.23	43.21	74.00	-30.79	peak
6 p	9608.000	11.41	37.42	62.15	56.99	43.67	74.00	-30.33	peak



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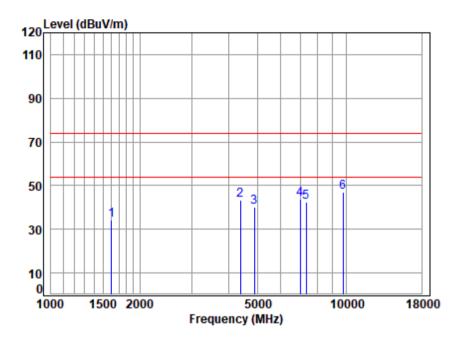


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Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:middle



Site : chamber

Condition: 3m HORIZONTAL

Job No : 03541ME

Mode : 2440 TX RSE

: BLE

	Freq			Preamp Factor					Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1601.804	4.79	26.78	61.69	64.55	34.43	74.00	-39.57	peak
2	4392.376	8.00	34.74	61.53	62.35	43.56	74.00	-30.44	peak
3	4880.000	8.03	34.62	61.94	59.36	40.07	74.00	-33.93	peak
4	6995.172	9.53	35.71	62.16	60.69	43.77	74.00	-30.23	peak
5	7320.000	9.21	35.70	61.98	59.52	42.45	74.00	-31.55	peak
6 r	9760.000	11.32	37.38	62.19	60.33	46.84	74.00	-27.16	peak



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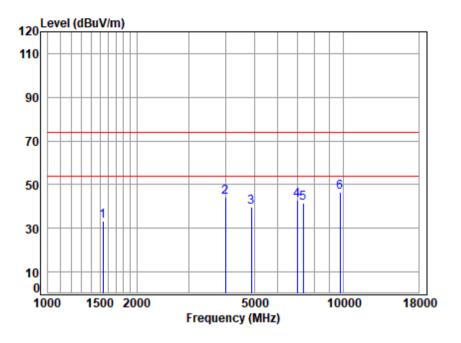


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Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:middle



Site : chamber

Condition: 3m VERTICAL

Job No : 03541ME

Mode : 2440 TX RSE

: BLE

			_							
			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		1533.841	4.65	26.94	61.67	63.48	33.40	74.00	-40.60	peak
2		3992.781	8.54	33.07	61.17	63.74	44.18	74.00	-29.82	peak
3		4880.000	8.03	34.62	61.94	59.20	39.91	74.00	-34.09	peak
4		6995.172	9.53	35.71	62.16	59.86	42.94	74.00	-31.06	peak
5		7320.000	9.21	35.70	61.98	58.78	41.71	74.00	-32.29	peak
6	р	9760.000	11.32	37.38	62.19	60.23	46.74	74.00	-27.26	peak



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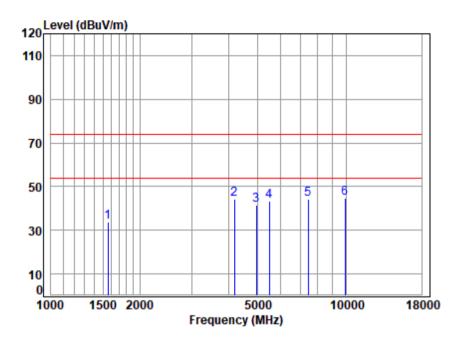


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Test Mode: 01; Polarity: Horizontal; Modulation: GFSK; Channel: High



Site : chamber

Condition: 3m HORIZONTAL

Job No : 03541ME

Mode : 2480 TX RSE

: BLE

	Freq			Preamp Factor					Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1560.673	4.70	26.96	61.68	63.91	33.89	74.00	-40.11	peak
2	4181.768	8.30	33.80	61.34	63.29	44.05	74.00	-29.95	peak
3	4960.000	8.06	34.56	62.01	60.76	41.37	74.00	-32.63	peak
4	5487.260	9.27	34.55	62.40	61.72	43.14	74.00	-30.86	peak
5	7440.000	9.09	35.96	61.92	61.23	44.36	74.00	-29.64	peak
6 p	9920.000	11.23	37.30	62.24	58.43	44.72	74.00	-29.28	peak



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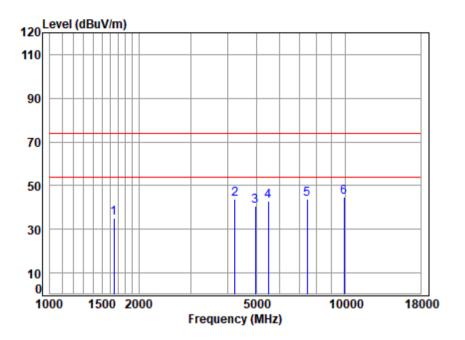


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Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:High



Site : chamber

Condition: 3m VERTICAL

Job No : 03541ME

Mode : 2480 TX RSE

: BLE

		_							
		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	1648.778	4.89	26.31	61.70	65.47	34.97	74.00	-39.03	peak
2	4230.396	8.23	33.80	61.39	62.97	43.61	74.00	-30.39	peak
3	4960.000	8.06	34.56	62.01	60.17	40.78	74.00	-33.22	peak
4	5487.260	9.27	34.55	62.40	61.41	42.83	74.00	-31.17	peak
5	7440.000	9.09	35.96	61.92	60.63	43.76	74.00	-30.24	peak
6	p 9920.000	11.23	37.30	62.24	58.28	44.57	74.00	-29.43	peak



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8 **Test Setup Photo**

Refer to Appendix - Test Setup Photo for SZCR2409003541ME

EUT Constructional Details (EUT Photos) 9

Please Refer to external and internal photos for details for SZCR2409003541ME



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10 Appendix

1. Duty Cycle

1.1 Test Result

1.1.1 Ant1

	Ant1									
Mode	TX Type	Frequency (MHz)	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)			
		2402	0.395	0.625	63.20	1.99	0.03			
1M	SISO	2440	0.395	0.626	63.10	2.00	0.05			
		2480	0.394	0.625	63.04	2.00	0.03			
	SISO	2402	0.210	0.625	33.60	4.74	0.01			
2M		2440	0.209	0.625	33.44	4.76	0.04			
		2480	0.209	0.625	33.44	4.76	0.04			



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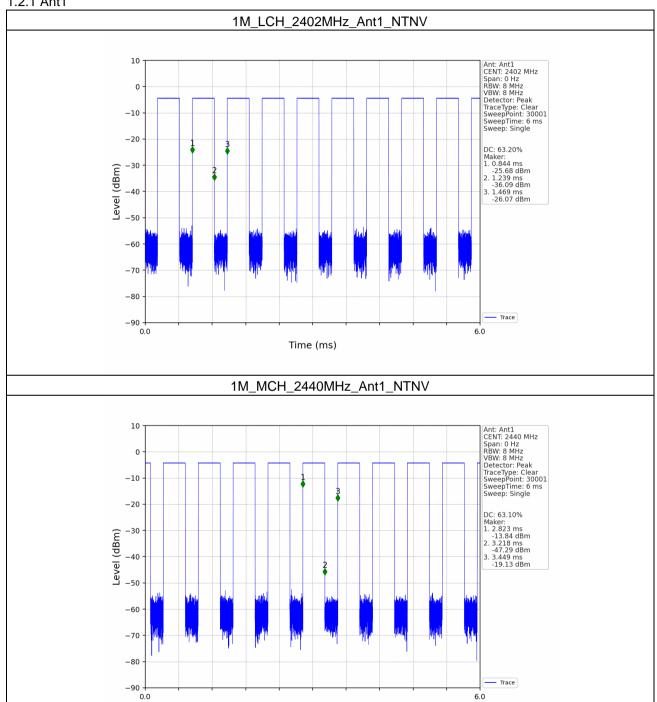
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1.2 Test Graph

1.2.1 Ant1





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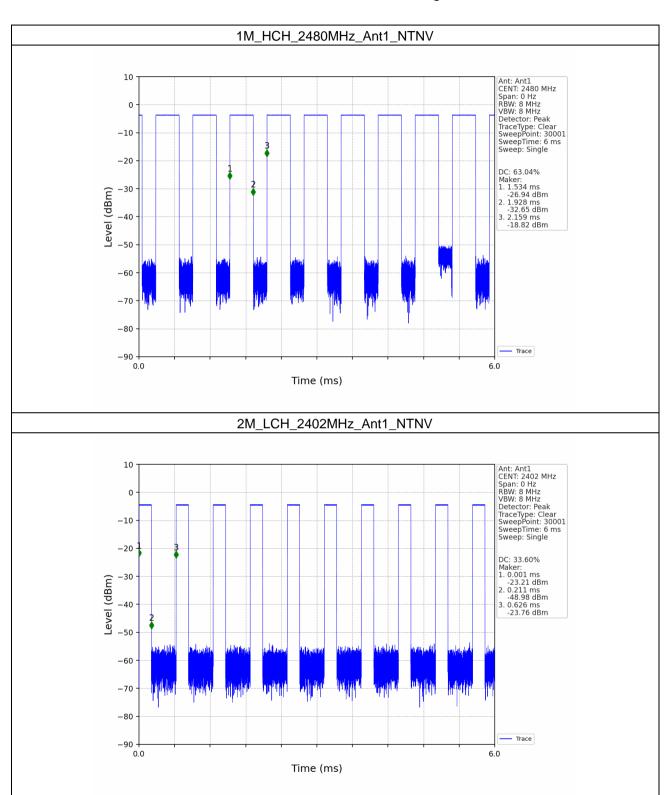
Time (ms)



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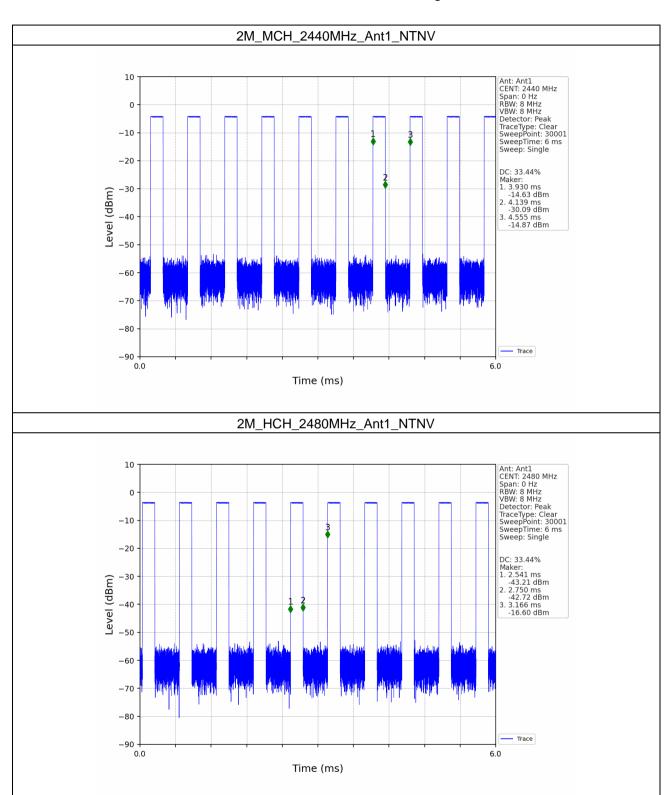
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2. Bandwidth

2.1 Test Result

2.1.1 6dB BW

Mada	TX	Frequency	ANIT	6dB Bandv	vidth (MHz)	Vordict
Mode	Type	(MHz)	ANT	Result	Limit	Verdict
	SISO	2402	1	0.649	>=0.5	Pass
1M		2440	1	0.649	>=0.5	Pass
		2480	1	0.648	>=0.5	Pass
	SISO	2402	1	1.153	>=0.5	Pass
2M		2440	1	1.149	>=0.5	Pass
		2480	1	1.152	>=0.5	Pass



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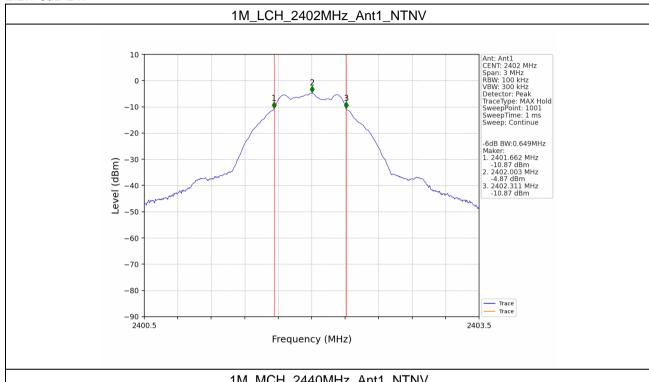


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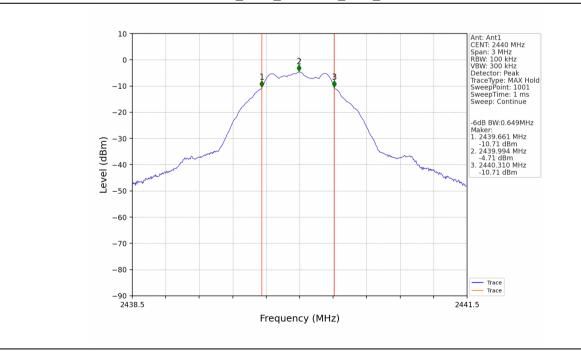
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2.2 Test Graph 2.2.1 6dB BW



1M_MCH_2440MHz_Ant1_NTNV





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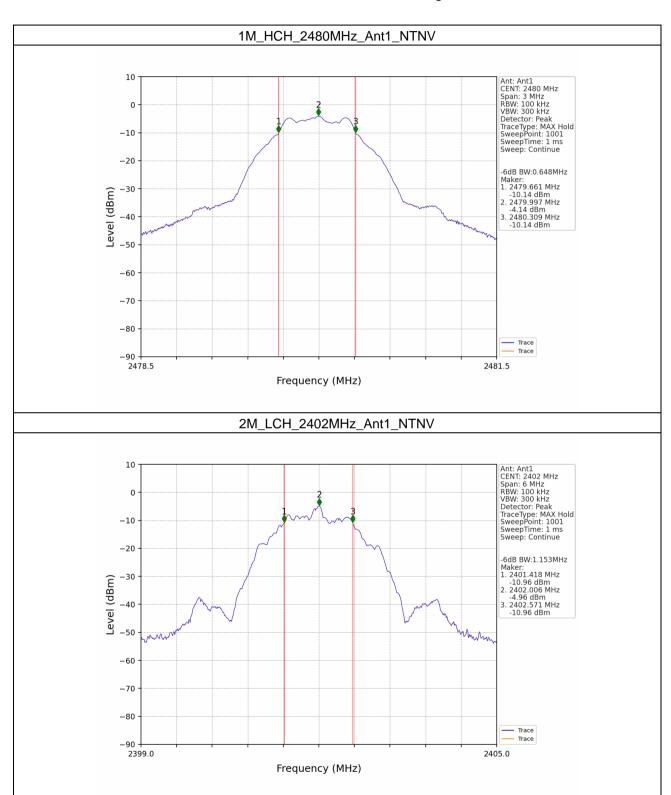
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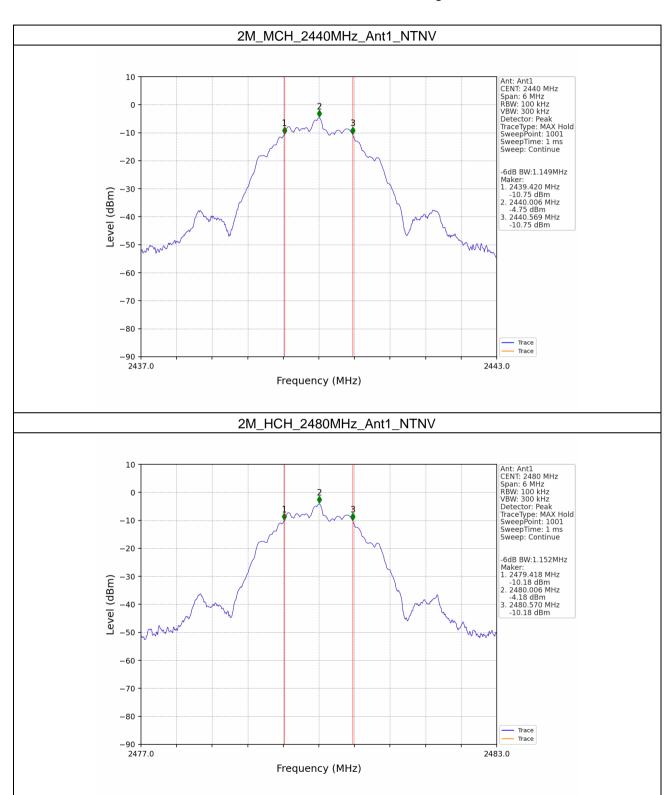
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3. Maximum Conducted Output Power

3.1 Test Result

3.1.1 Power

Mada	TX	Frequency	Maximum Peak Conduc	Vordict		
Mode	Туре	(MHz)	ANT1	Limit	Verdict	
	SISO	2402	-4.36	<=30	Pass	
1M		2440	-4.27	<=30	Pass	
		2480	-3.66	<=30	Pass	
		2402	-4.34	<=30	Pass	
2M	SISO	2440	-4.22	<=30	Pass	
		2480	-3.66	<=30	Pass	

4. Maximum Power Spectral Density

4.1 Test Result

4.1.1 PSD

Mode	TX	Frequency	Maximum PS	D (dBm/3kHz)	Verdict
Mode	Type	(MHz)	ANT1	Limit	verdict
		2402	-19.30	<=8	Pass
1M	SISO	2440	-19.18	<=8	Pass
		2480	-18.59	<=8	Pass
		2402	-22.82	<=8	Pass
2M	SISO	2440	-22.61	<=8	Pass
		2480	-22.04	<=8	Pass



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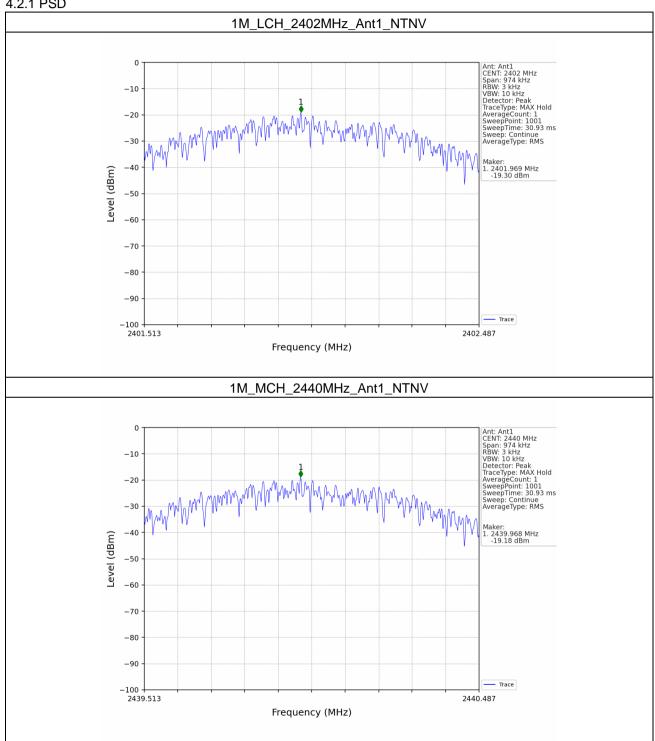
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4.2 Test Graph

4.2.1 PSD





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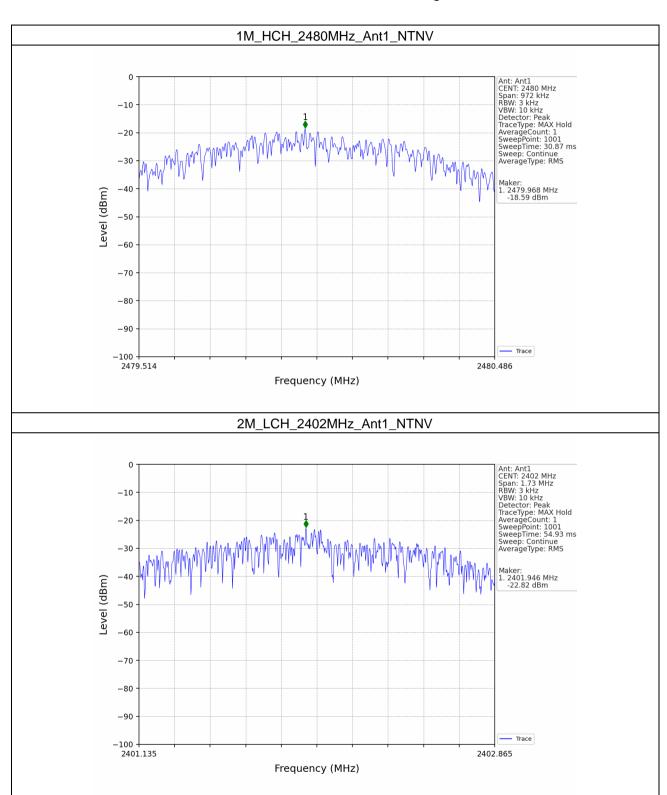
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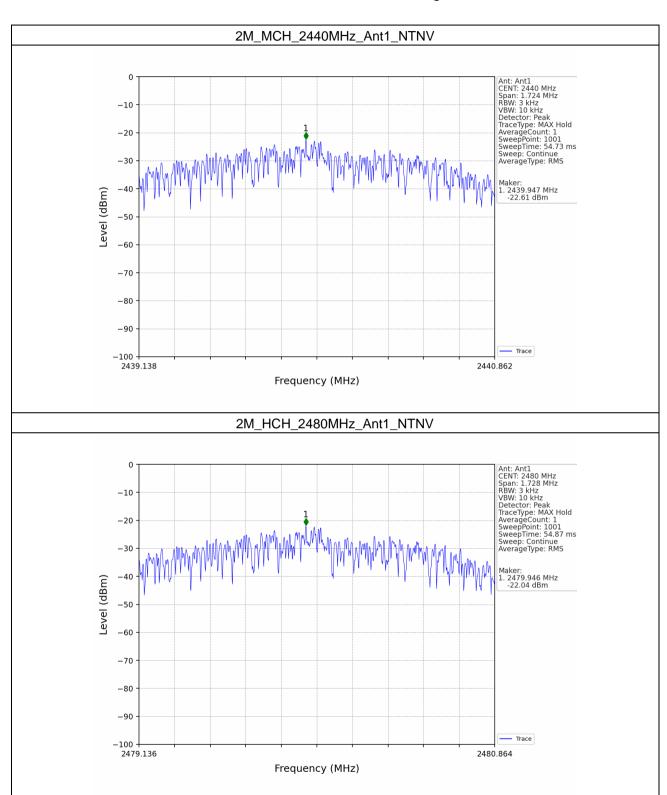
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5. Unwanted Emissions In Non-restricted Frequency Bands

5.1 Test Result

5.1.1 Ref

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)
		2402	1	-4.86
1M	SISO	2440	1	-4.72
		2480	1	-4.15
	SISO	2402	1	-4.96
2M		2440	1	-4.77
		2480	1	-4.21

5.1.2 CSE

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
		2402	1	-4.15	-24.15	Pass
1M	SISO	2440	1	-4.15	-24.15	Pass
		2480	1	-4.15	-24.15	Pass
		2402	1	-4.21	-24.21	Pass
2M	SISO	2440	1	-4.21	-24.21	Pass
		2480	1	-4.21	-24.21	Pass



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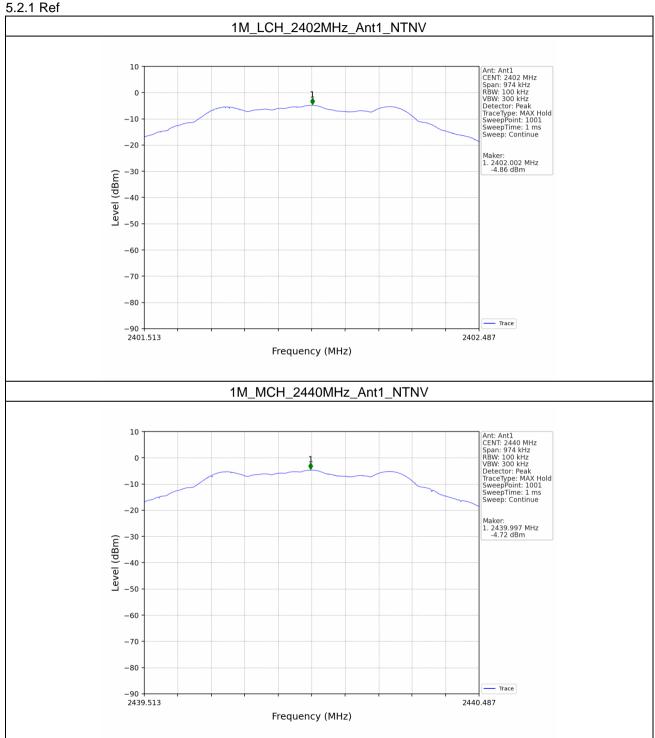


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5.2 Test Graph





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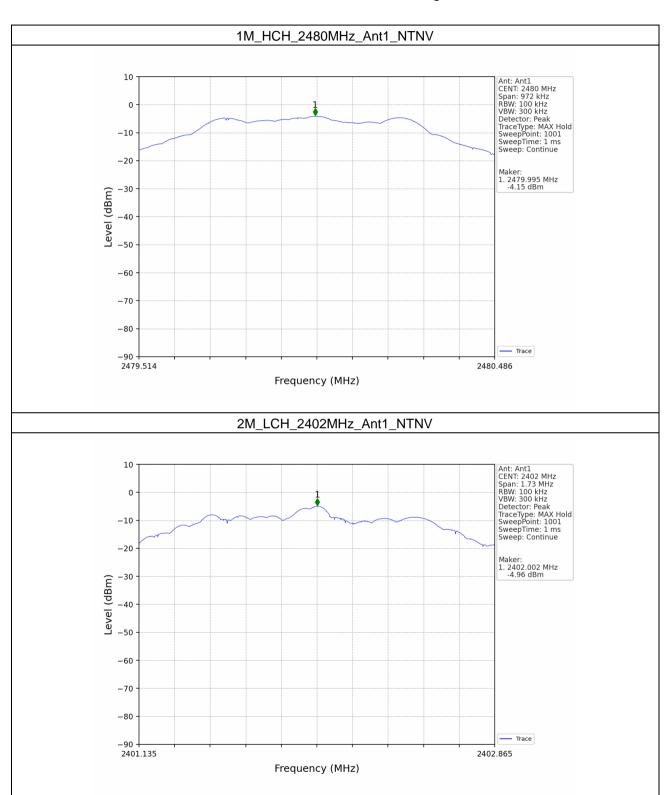
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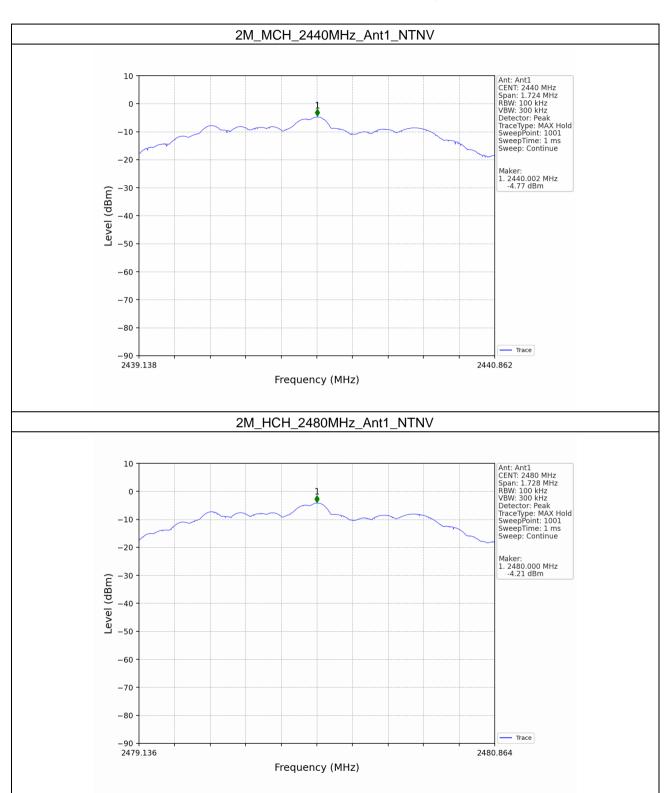
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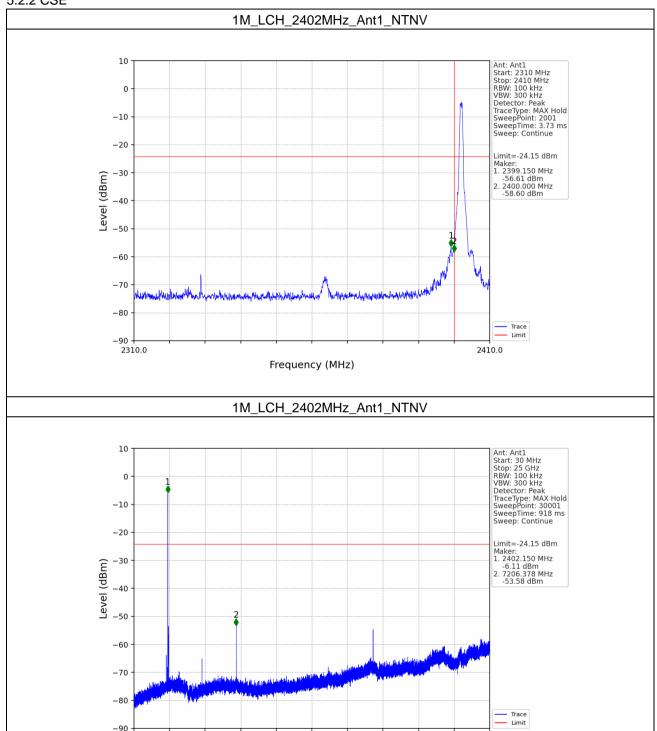


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5.2.2 CSE





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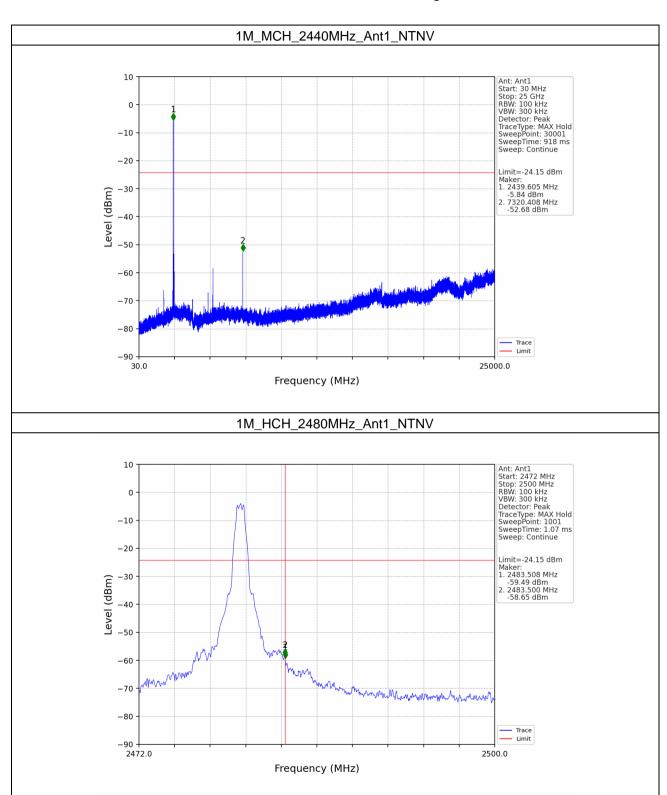
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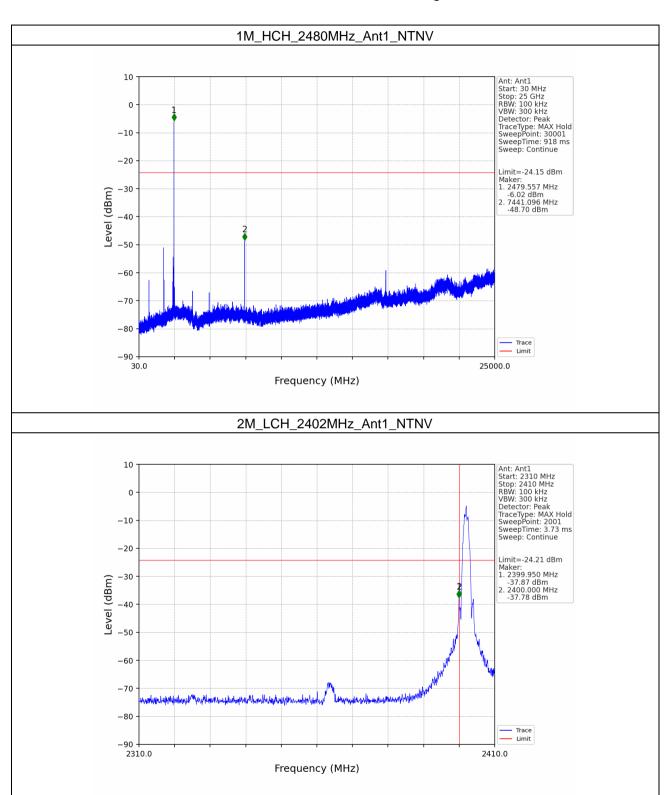
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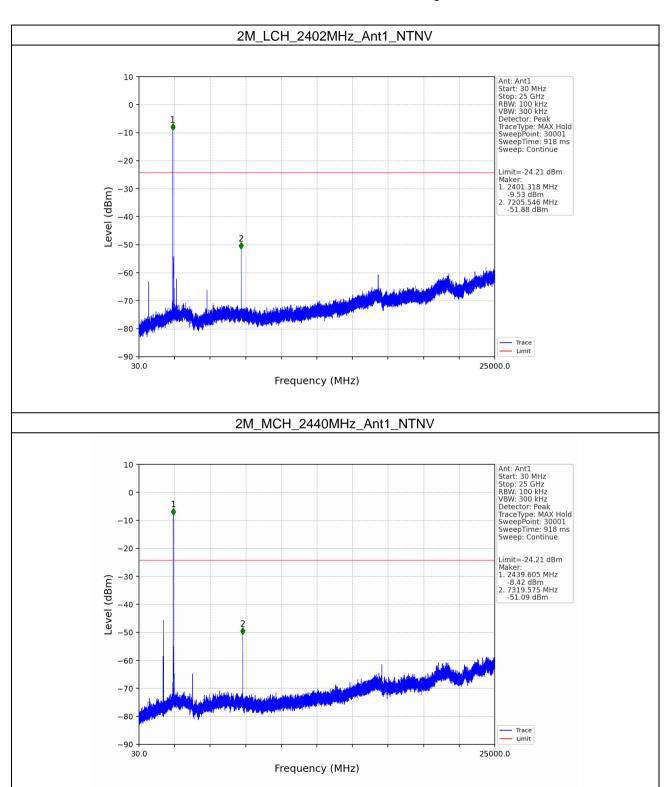
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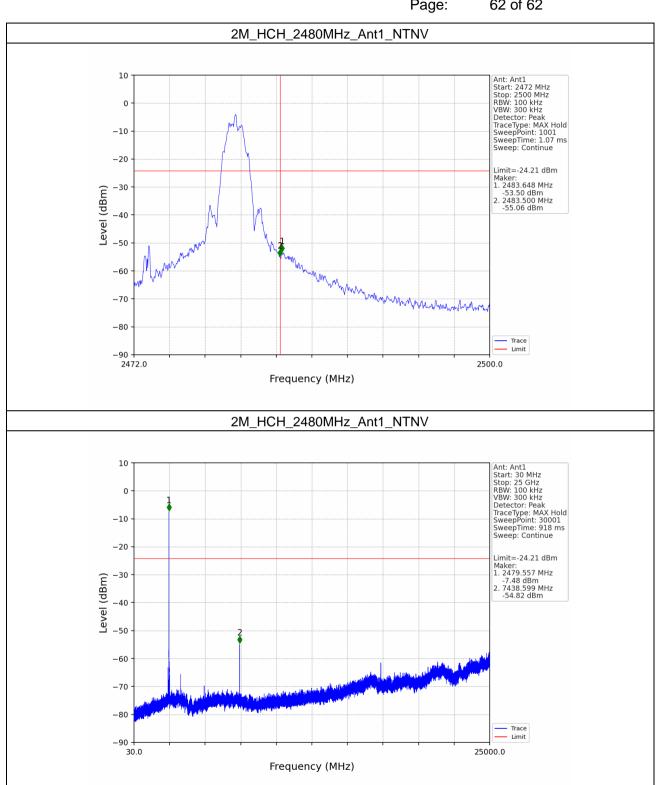
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