

Report No.: GZCR220300030402

Page: 1 of 59 FCC ID: OU9MIO-HUB01

## TEST REPORT

Application No.: GZCR2203000304AT

Applicant: Guangdong Transtek Medical Electronics CO., Ltd

Address of Applicant: Zone A, No.105, Dongli Road, Torch Development District, 528437

Zhongshan, Guangdong, China

Manufacturer: Guangdong Transtek Medical Electronics CO., Ltd

Address of Manufacturer: Zone A, No.105, Dongli Road, Torch Development District, 528437

Zhongshan, Guangdong, China

Factory: Guangdong Transtek Medical Electronics CO., Ltd

Address of Factory: Zone A, No.105, Dongli Road, Torch Development District, 528437

Zhongshan, Guangdong, China

**Equipment Under Test (EUT):** 

EUT Name: AnyHub

Model No.: MIO-HUB01

Trade Mark: MioConnect

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

**Date of Receipt:** 2022-03-24

**Date of Test:** 2022-04-18 to 2022-04-28

**Date of Issue:** 2022-04-29

Test Result: Pass\*

Kobe Jian EMC Laboratory Manager

Unit over sub Atter adv sub A

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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	Report No.	Date	Remark			
01	GZCR220300030402	2022-04-29	Original			

Authorized for issue by			
	Cof Vlu		
	Curry Wu/Project Engineer		
	Riday Liu		
	Ricky Liu/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			

### Note:

E.U.T./EUT means Equipment Under Test.

Pass means the test result passed the test standard requirement, please find the detailed decision rule in the report relative section.



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### 4 General Information

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

Power supply: DC 5 V power supply by adaptor

model: KA12C-0502000US

input:AC100-240V 50/60Hz 0.35A MAX

Cable(s): about 0.8m unscreened USB type c cable

Operation Frequency: 2402MHz to 2480MHz

Modulation Type: GFSK Number of Channels: 40 Channel Spacing: 2MHz

Antenna Type: Integral Antenna

Antenna Gain: 2.97dBi

### 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)	±2.76dB		
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	±5.00dB (30MHz-1GHz; 3m);±4.38dB (30MHz-1GHz; 10m);± 4.52dB (1GHz- 6GHz);± 4.54dB (above 6GHz)		
Radiated Spurious Emissions Below 1GHz	±5.00dB (3m); ±4.38dB (10m)		
Radiated Spurious Emissions Above 1GHz	±4.52dB (1GHz-6GHz);±4.54dB(above 6GHz)		

### 4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory, 198 Kezhu Road, Scientech Park, Guangzhou Economic & Technology Development District, Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.



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### 4.5 Test Facility

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

#### • NVLAP (Lab Code: 200611-0)

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

#### ACMA

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian/New Zealand Regulatory Compliance Mark (RCM).

#### SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

### CNAS (Lab Code: L0167)

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2018 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of Testing Laboratories.

#### • FCC Recognized Accredited Test Firm(Registration No.: 486818)

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818.

#### • ISED (Registration No.: 4620B, CAB identifier: CN0052)

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

#### VCCI (Registration No.: R-12460, C-12584, G-20107 and T-11179)

The 10m Semi-anechoic chamber, 966 Anechoic Chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-20107 and T-11179 respectively.

### • CBTL (Lab Code: TL129)

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2017, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.

#### 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	
Coaxial Cable	HangTianXing	2m	EMC0107	2020-09-09	2022-09-08	
Shielding Room	ChangZhou ZhongYu	8m x 3m x 3.8m	EMC0306	2019-10-20	2022-10-19	
Two-Line V-Network-GZ	Rohde & Schwarz	ENV216	EMC2135	2021-09-24	2022-09-23	
EMI Test Receiver (9kHz-3.6GHz)	Rohde & Schwarz	ESR3	EMC2221	2021-06-01	2022-05-31	
Test Software E3r	Audix	Ver.6.11812	GZE100-77	N/A	N/A	

Conducted Peak Output Power						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
MI CABLE	SGS-EMC	0.8M	EMC2137	2021-11-02	2023-11-01	
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2021-09-20	2022-09-19	
4X4 Power sensor Unit	TST	TSPS2023R	EMC2226	2021-08-30	2022-08-29	
Test Software	TST	V2.0	GZE100-78	N/A	N/A	

Minimum 6dB Bandwidt	h				
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
MI CABLE	SGS-EMC	0.8M	EMC2137	2021-11-02	2023-11-01
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2021-09-20	2022-09-19
4X4 Power sensor Unit	TST	TSPS2023R	EMC2226	2021-08-30	2022-08-29
Test Software	TST	V2.0	GZE100-78	N/A	N/A

Power Spectrum Density						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
MI CABLE	SGS-EMC	0.8M	EMC2137	2021-11-02	2023-11-01	
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2021-09-20	2022-09-19	
4X4 Power sensor Unit	TST	TSPS2023R	EMC2226	2021-08-30	2022-08-29	
Test Software	TST	V2.0	GZE100-78	N/A	N/A	

Conducted Band Edges Measurement						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
MI CABLE	SGS-EMC	0.8M	EMC2137	2021-11-02	2023-11-01	
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2021-09-20	2022-09-19	
4X4 Power sensor Unit	TST	TSPS2023R	EMC2226	2021-08-30	2022-08-29	
Test Software	TST	V2.0	GZE100-78	N/A	N/A	



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Conducted Spurious Emissions							
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date		
MI CABLE	SGS-EMC	M8.0	EMC2137	2021-11-02	2023-11-01		
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2021-09-20	2022-09-19		
4X4 Power sensor Unit	TST	TSPS2023R	EMC2226	2021-08-30	2022-08-29		
Test Software	TST	V2.0	GZE100-78	N/A	N/A		

Radiated Emissions which fall in the restricted bands						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
1GHz-26.5 GHz Pre- Amplifier	Agilent	8449B	EMC0521	2021-12-17	2022-12-16	
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2021-12-17	2022-12-16	
Chamber cable (Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2020-09-09	2022-09-08	
Horn Antenna (1GHz- 18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2019-09-25	2022-09-24	
Horn Antenna (14- 40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2020-06-28	2023-06-27	
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2021-09-20	2022-09-19	
MXE EMI Receiver (10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2021-11-01	2022-10-31	
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-20	2023-12-19	
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A	

Radiated Spurious Emissions Below 1GHz						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2019-10-20	2022-10-19	
Chamber cable	HangTianXing	N/A	EMC0542	2020-09-09	2022-09-08	
Amplifier (9kHz-1.3GHz)	HP	8447F	EMC2065	2021-05-19	2022-05-18	
Active Loop Antenna- RED	ETS-Lindgren	6502	EMC2190	2022-04-06	2024-04-05	
EMI Test Receiver (1Hz- 8GHz)	Rohde & Schwarz	ESW8	EMC2220	2021-05-26	2022-05-25	
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A	
Trilog Broadband Antenna (25MHz-1GHz)	SCHWARZBECK MESS-ELEKTRONIK	VULB 9168	SEM003-18	2022-03-03	2025-03-02	



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Radiated Spurious Emissions Above 1GHz						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
1GHz-26.5 GHz Pre- Amplifier	Agilent	8449B	EMC0521	2021-12-17	2022-12-16	
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2021-12-17	2022-12-16	
Chamber cable (Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2020-09-09	2022-09-08	
Horn Antenna (1GHz- 18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2019-09-25	2022-09-24	
Horn Antenna (14- 40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2020-06-28	2023-06-27	
2.4GHz Filter	Micro-Tronics	BRM 50702	EMC2069	2021-12-17	2022-12-16	
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2021-09-20	2022-09-19	
MXE EMI Receiver (10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2021-11-01	2022-10-31	
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-20	2023-12-19	
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A	

General used equipmen	t				
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
DMM	Fluke	73	EMC0006	2021-07-05	2022-07-05



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### 6 Radio Spectrum Technical Requirement

### 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 2.97 dBi.

Antenna location: Refer to internal photo.



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## 7 Radio Spectrum Matter Test Results

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

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

Limit:

Frequency of emission	Conducted limit (dBµV)				
(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: 23.4 °C Humidity: 56.4 % RH Atmospheric Pressure: 1020 mbar

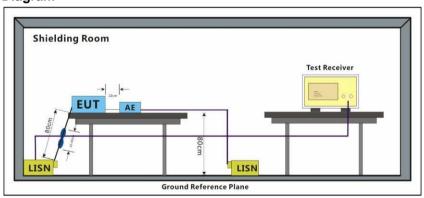
### 7.1.2 Test Mode Description

Pre-scan / Mode Final test Code Description

Final test 00 TX mode\_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  $50 \text{ohm}/50 \mu\text{H} + 5 \text{ohm}$  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

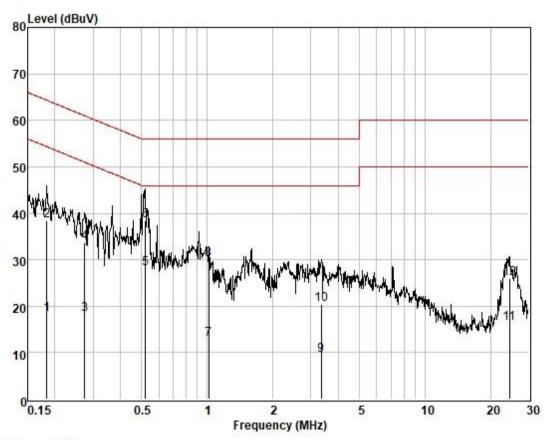




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Test Mode: 00; Line: Live line



Condition: LINE Mode : Model :

	F	Read	Cable		Laura	Limit	Over	Remark
	Freq	Level	LOSS	Factor	rever	Line	Limit	Remark
92	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.183	8.70	0.06	9.56	18.32	54.33	-36.01	Average
2	0.183	28.74	0.06	9.56	38.36	64.33	-25.97	QP
2 3 4 5	0.274	8.55	0.06	9.57	18.18	50.98	-32.80	Average
4	0.274	23.95	0.06	9.57	33.58	60.98	-27.40	QP
5	0.521	18.37	0.07	9.59	28.03	46.00	-17.97	Average
6	0.521	28.78	0.07	9.59	38.44	56.00	-17.56	QP
7	1.016	3.24	0.07	9.60	12.91	46.00	-33.09	Average
8	1.016	20.37	0.07	9.60	30.04	56.00	-25.96	QP
9	3.346	-0.36	0.15	9.62	9.41	46.00	-36.59	Average
10	3.346	10.55	0.15	9.62	20.32	56.00	-35.68	QP
11	24.529	6.21	0.40	9.79	16.40	50.00	-33.60	Average
12	24.529	15.68	0.40	9.79	25.87	60.00	-34.13	QP



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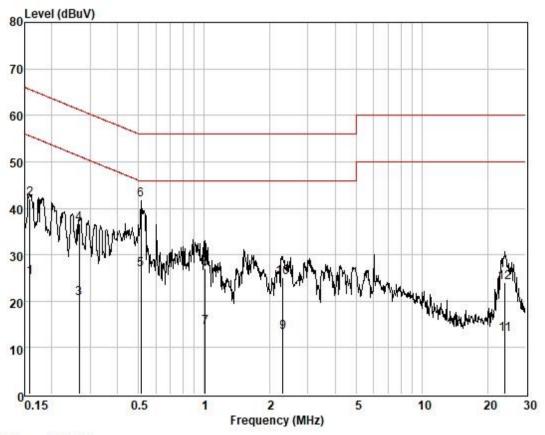
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Test Mode: 00; Line: Neutral Line



Condition: NEUTRAL

Mode : Model :

1670	Read	Cable	LISN		Limit	Over	
Freq	Level			Level			Remark
MHz	dBuV	dB	dB	dBuV	dBuV	dB	
0.158	15.46	0.06	9.53	25.05	55.56	-30.51	Average
0.158	32.44	0.06	9.53	42.03	65.56	-23.53	QP
0.267	11.02	0.06	9.56	20.64	51.20	-30.56	Average
0.267	27.05	0.06	9.56	36.67	61.20	-24.53	QP
0.513	17.08	0.07	9.58	26.73	46.00	-19.27	Average
0.513	32.14	0.07	9.58	41.79	56.00	-14.21	QP
1.010	4.64	0.07	9.59	14.30	46.00	-31.70	Average
1.010	17.38	0.07	9.59	27.04	56.00	-28.96	QP
2.297	3.63	0.13	9.60	13.36	46.00	-32.64	Average
2.297	15.26	0.13	9.60	24.99	56.00	-31.01	QP
24.142	2.66	0.40	9.90	12.96	50.00	-37.04	Average
24.142	13.81	0.40	9.90	24.11	60.00	-35.89	QP
	MHz 0.158 0.158 0.267 0.267 0.513 0.513 1.010 1.010 2.297 2.297 24.142	MHz dBuV  0.158 15.46 0.158 32.44 0.267 11.02 0.267 27.05 0.513 17.08 0.513 32.14 1.010 4.64 1.010 17.38 2.297 3.63 2.297 15.26 24.142 2.66	MHz dBuV dB  0.158 15.46 0.06 0.158 32.44 0.06 0.267 11.02 0.06 0.267 27.05 0.06 0.513 17.08 0.07 0.513 32.14 0.07 1.010 4.64 0.07 1.010 17.38 0.07 2.297 3.63 0.13 2.297 15.26 0.13 24.142 2.66 0.40	Freq         Level         Loss Factor           MHz         dBuV         dB         dB           0.158         15.46         0.06         9.53           0.158         32.44         0.06         9.53           0.267         11.02         0.06         9.56           0.267         27.05         0.06         9.56           0.513         17.08         0.07         9.58           0.513         32.14         0.07         9.58           1.010         4.64         0.07         9.59           1.010         17.38         0.07         9.59           2.297         3.63         0.13         9.60           24.142         2.66         0.40         9.90	Freq         Level         Loss Factor         Level           MHz         dBuV         dB         dB         dBuV           0.158         15.46         0.06         9.53         25.05           0.158         32.44         0.06         9.53         42.03           0.267         11.02         0.06         9.56         20.64           0.267         27.05         0.06         9.56         36.67           0.513         17.08         0.07         9.58         26.73           0.513         32.14         0.07         9.58         41.79           1.010         4.64         0.07         9.59         14.30           1.010         17.38         0.07         9.59         27.04           2.297         3.63         0.13         9.60         13.36           2.297         15.26         0.13         9.60         24.99           24.142         2.66         0.40         9.90         12.96	Freq         Level         Loss Factor         Level         Line           MHz         dBuV         dB         dB         dBuV         dBuV           0.158         15.46         0.06         9.53         25.05         55.56           0.158         32.44         0.06         9.53         42.03         65.56           0.267         11.02         0.06         9.56         20.64         51.20           0.267         27.05         0.06         9.56         36.67         61.20           0.513         17.08         0.07         9.58         26.73         46.00           0.513         32.14         0.07         9.58         41.79         56.00           1.010         4.64         0.07         9.59         14.30         46.00           1.010         17.38         0.07         9.59         27.04         56.00           2.297         3.63         0.13         9.60         13.36         46.00           2.297         15.26         0.13         9.60         24.99         56.00           24.142         2.66         0.40         9.90         12.96         50.00	Freq         Level         Loss Factor         Level         Line         Limit           MHz         dBuV         dB         dB         dBuV         dBuV         dB           0.158         15.46         0.06         9.53         25.05         55.56         -30.51           0.158         32.44         0.06         9.53         42.03         65.56         -23.53           0.267         11.02         0.06         9.56         20.64         51.20         -30.56           0.267         27.05         0.06         9.56         36.67         61.20         -24.53           0.513         17.08         0.07         9.58         26.73         46.00         -19.27           0.513         32.14         0.07         9.58         41.79         56.00         -14.21           1.010         4.64         0.07         9.59         14.30         46.00         -31.70           1.010         17.38         0.07         9.59         27.04         56.00         -28.96           2.297         3.63         0.13         9.60         13.36         46.00         -32.64           2.297         15.26         0.13         9.60         <



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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: 23.8 °C Humidity: 58.6 % RH Atmospheric Pressure: 1020 mbar

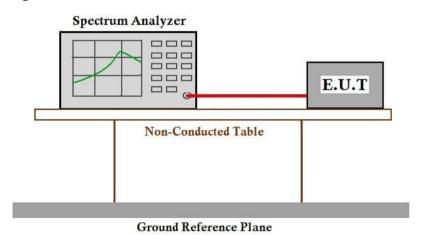
### 7.2.2 Test Mode Description

Pre-scan / Mode Final test Code Description

Final test 00 TX mode\_Keep the EUT in continuously transmitting mode with GFSK

modulation.

### 7.2.3 Test Setup Diagram



#### 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:

Temperature: 23.8 °C Humidity: 58.6 % RH Atmospheric Pressure: 1020 mbar

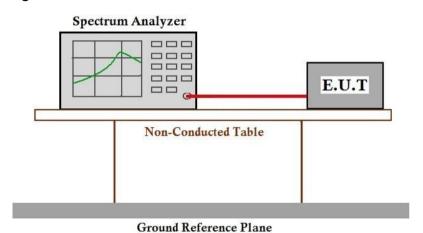
### 7.3.2 Test Mode Description

Pre-scan / Mode Final test Code Description

Final test 00 TX mode\_Keep the EUT in continuously transmitting mode with GFSK

modulation.

### 7.3.3 Test Setup Diagram



#### 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: 23.8 °C Humidity: 58.6 % RH Atmospheric Pressure: 1020 mbar

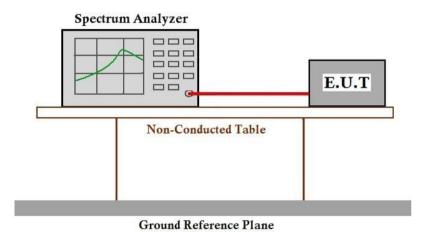
#### 7.4.2 Test Mode Description

Pre-scan / Mode Final test Code Description

Final test 00 TX mode\_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: 23.8 °C Humidity: 58.6 % RH Atmospheric Pressure: 1020 mbar

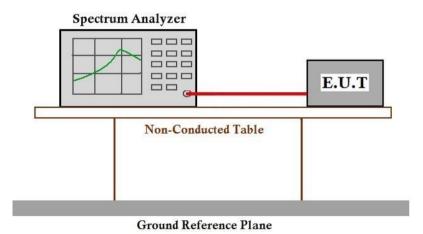
#### 7.5.2 Test Mode Description

Pre-scan / Mode Final test Code Description

Final test 00 TX mode\_Keep the EUT in continuously transmitting mode with GFSK

modulation.

### 7.5.3 Test Setup Diagram



#### 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: 23.8 °C Humidity: 58.6 % RH Atmospheric Pressure: 1020 mbar

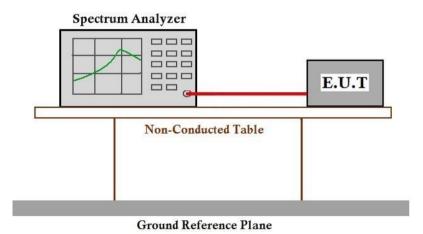
#### 7.6.2 Test Mode Description

Pre-scan / Mode Final test Code Description

Final test 00 TX mode\_Keep the EUT in continuously transmitting mode with GFSK

modulation.

### 7.6.3 Test Setup Diagram



#### 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

Test Distance: 3 m

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: 22.2 °C Humidity: 62.6 % RH Atmospheric Pressure: 1020 mbar

### 7.7.2 Test Mode Description

Pre-scan / Mode

Final test Code

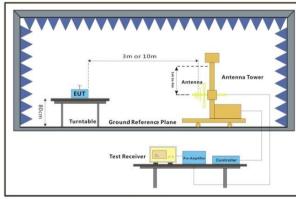
**Description** 

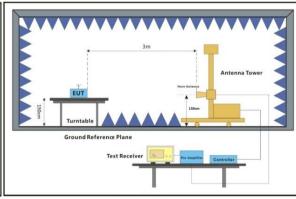
Final test 00

 $\mathsf{TX}\ \mathsf{mode}\ \mathsf{Keep}\ \mathsf{the}\ \mathsf{EUT}\ \mathsf{in}\ \mathsf{continuously}\ \mathsf{transmitting}\ \mathsf{mode}\ \mathsf{with}\ \mathsf{GFSK}$ 

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 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.
- 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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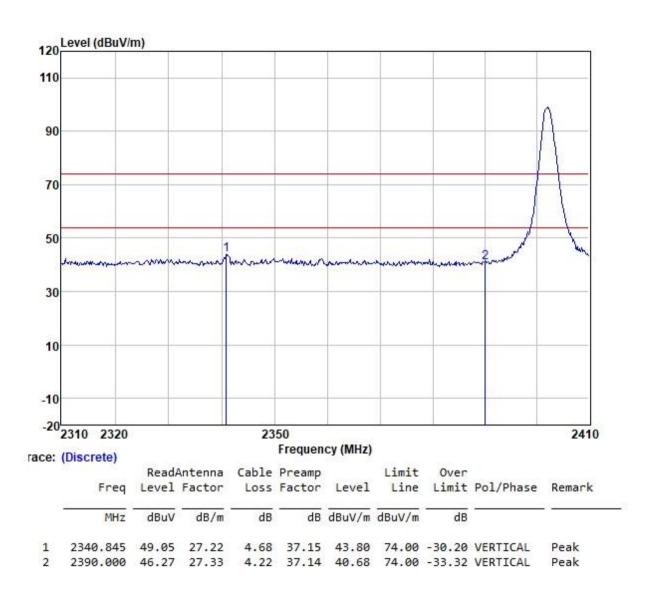
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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:Low





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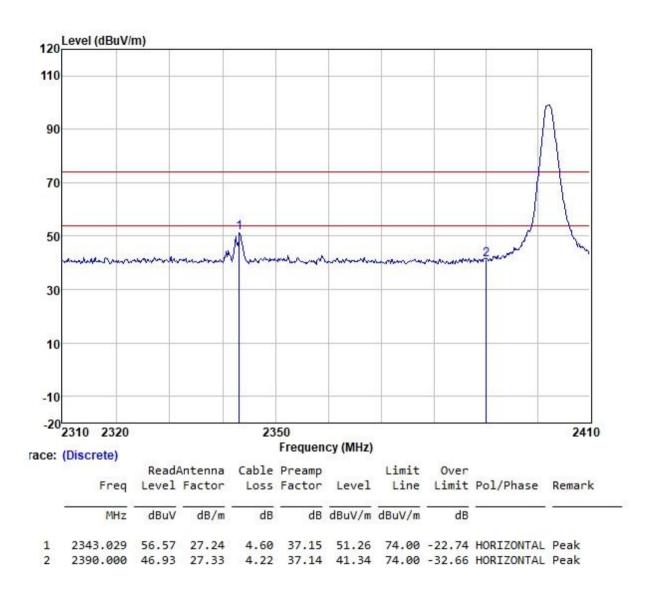
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Test Mode: 00; Polarity: Horizontal; Modulation: GFSK; Channel: Low





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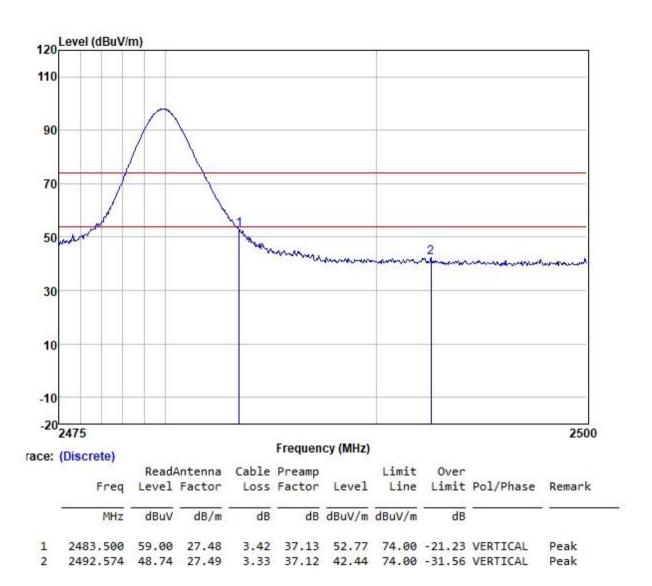
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Test Mode: 00; Polarity: Vertical; Modulation: GFSK; Channel: High





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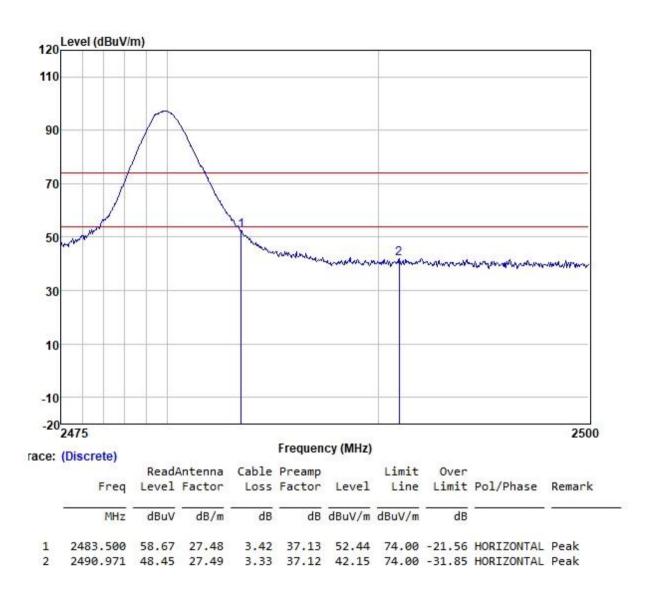
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Test Mode: 00; Polarity: Horizontal; Modulation: GFSK; Channel: High





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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

Test Distance: 3 m

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: 24 Humidity: % RH Atmospheric Pressure: 1020 mbar 54

#### 7.8.2 Test Mode Description

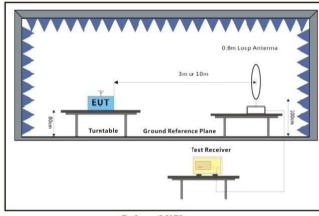
Mode Pre-scan / Final test

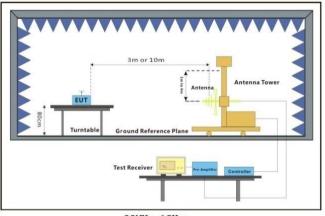
Code

Description

Final test 00 TX mode\_Keep the EUT in continuously transmitting mode with GFSK modulation.

### 7.8.3 Test Setup Diagram





Below 30MHz

30MHz-1GHz



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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.
- 3. The disturbance below 1GHz was very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.



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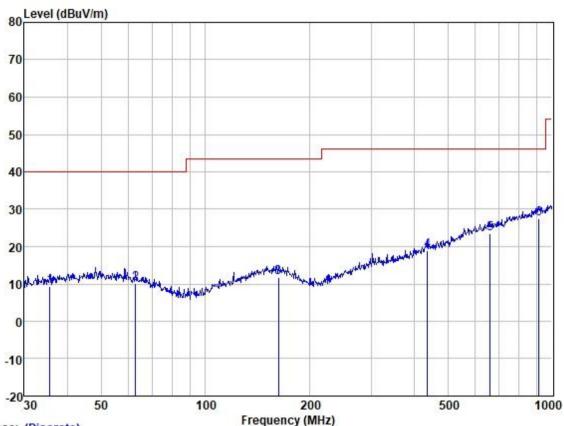
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Test Mode: 00; Polarity: Horizontal



Trace: (Discrete)

Site : SGS Job : Model : Power : Test Mode : BT

	Freq				The second second second	Measured Level			Pol/ Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	<del></del>	
1	35.624	22.96	12.58	1.07	27.18	9.43	40.00	-30.57	HORIZONTAL	QP
2	62.871	23.53	12.49	1.31	27.15	10.18	40.00	-29.82	HORIZONTAL	QP
3	162.611	23.04	13.21	2.35	26.79	11.81	43.50	-31.69	HORIZONTAL	QP
4	437.120	25.78	16.52	4.13	27.54	18.89	46.00	-27.11	HORIZONTAL	QP
5	663.473	25.54	20.46	5.61	28.17	23.44	46.00	-22.56	HORIZONTAL	QP
6	916.069	24.58	23.73	6.96	27.82	27.45	46.00	-18.55	HORIZONTAL	QP



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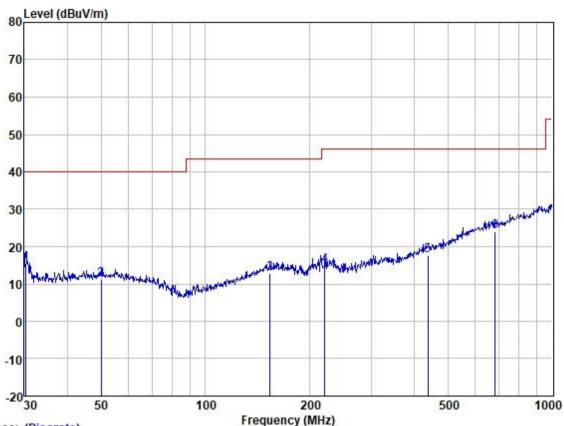
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Test Mode: 00; Polarity: Vertical



Trace: (Discrete)

Site : SGS Job : Model : Power : Test Mode : BT

	Freq				- C	Measured Level			Pol/ Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		-
1	30.317	30.13	11.61	1.02			40.00	-24.44	VERTICAL	QP
2	50.057	23.60	13.63	1.14	27.17	11.20	40.00	-28.80	VERTICAL	QP
3	153.739	24.08	13.32	2.28	26.82	12.86	43.50	-30.64	VERTICAL	QP
4	220.617	29.19	9.70	2.65	26.70	14.84	46.00	-31.16	VERTICAL	QP
5	438.655	24.37	16.55	4.13	27.56	17.49	46.00	-28.51	VERTICAL	QP
6	684.745	25.86	20.48	5.70	28.17	23.87	46.00	-22.13	VERTICAL	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

Limit:

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

### 7.9.1 E.U.T. Operation

Operating Environment:

Temperature: 22.2 °C Humidity: 62.6 % RH Atmospheric Pressure: 1020 mbar

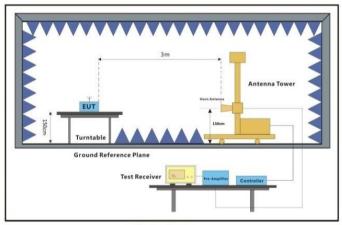
### 7.9.2 Test Mode Description

Pre-scan / Mode Final test Code Description

Final test 00 TX mode\_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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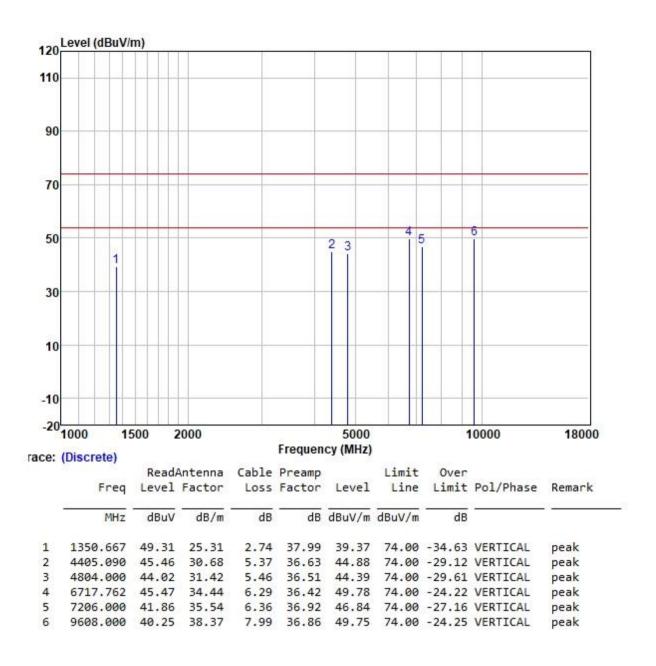
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Test Mode: 00; Polarity: Vertical; Modulation: GFSK; Channel:Low





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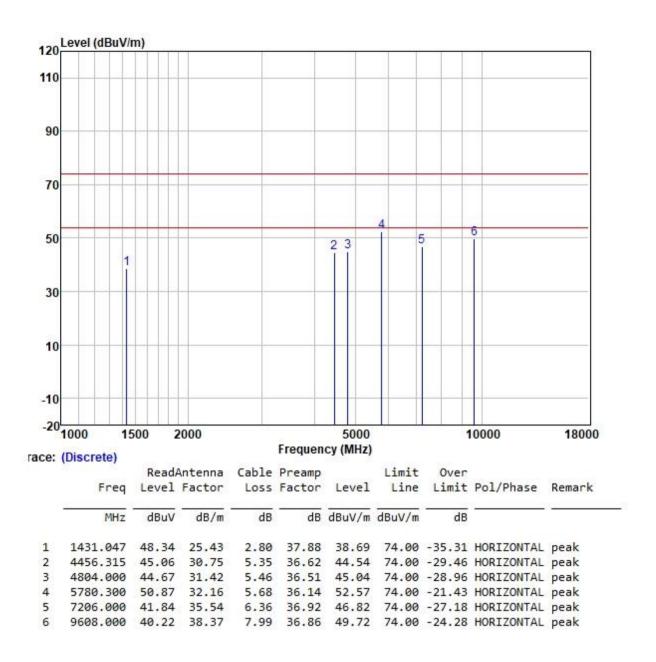
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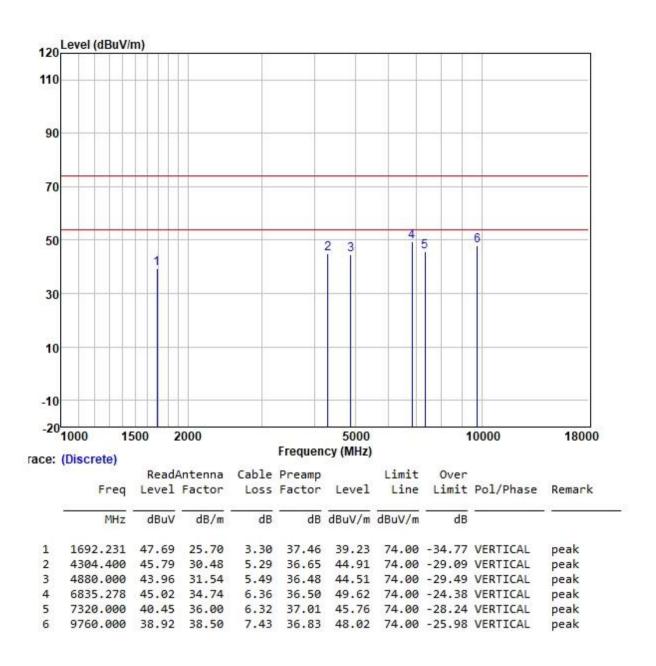
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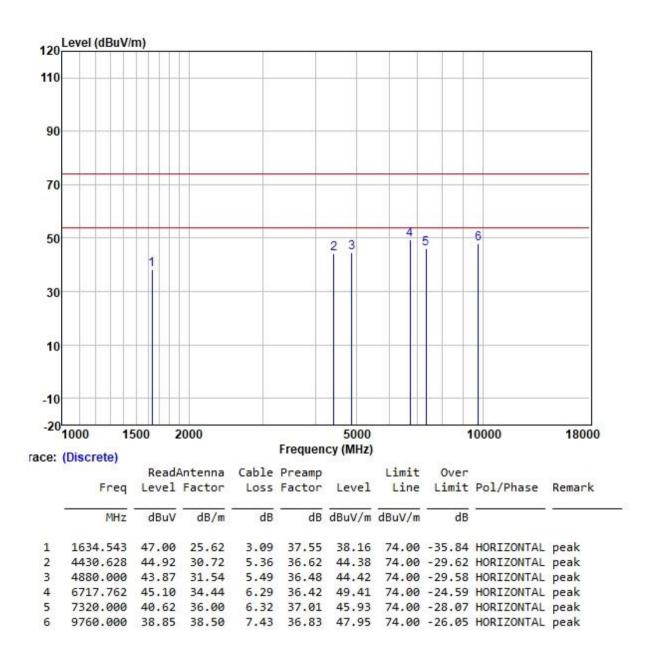
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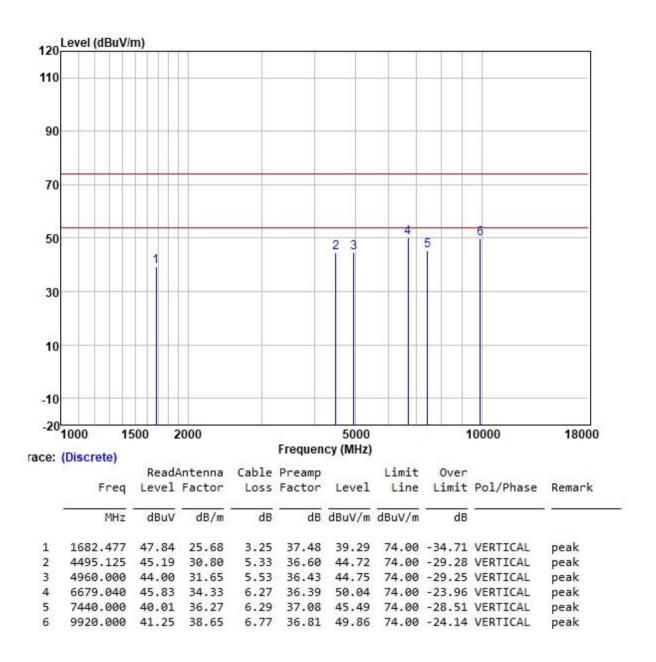
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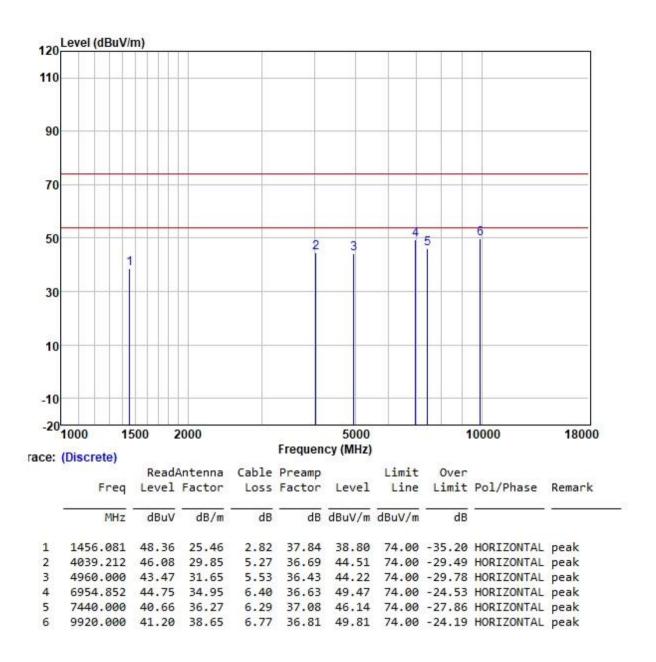
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#### **Test Setup Photo** 8

Refer to Appendix\_Test Setup Photo for GZCR220300030402



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### 9 EUT Constructional Details (EUT Photos)

Refer to External and Internal Photos for GZCR2203000304AT



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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 (%)		
1M	SISO	2402	0.198	0.625	31.68	4.99	0.02		
		2440	0.197	0.625	31.52	5.01	0.02		
		2480	0.197	0.625	31.52	5.01	0.03		

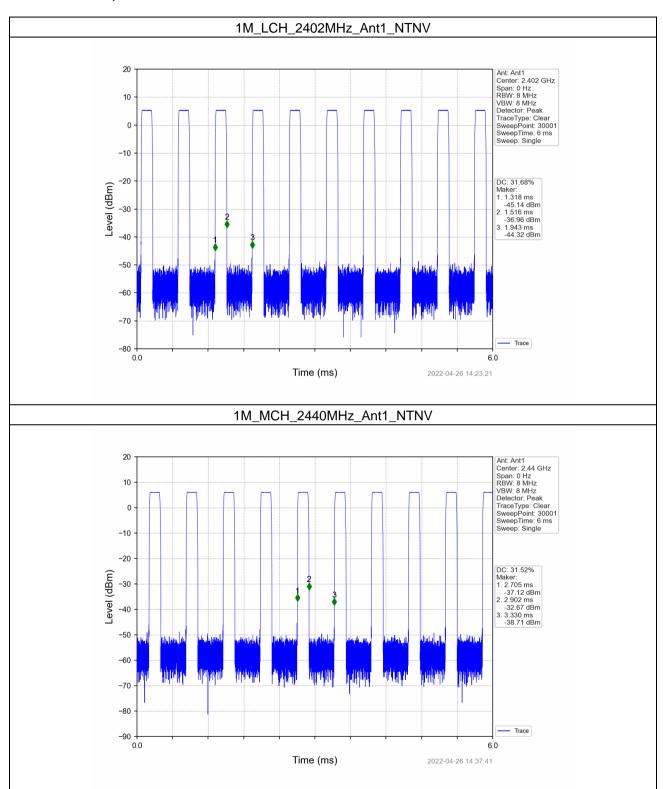




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#### 1.1.2 Test Graph





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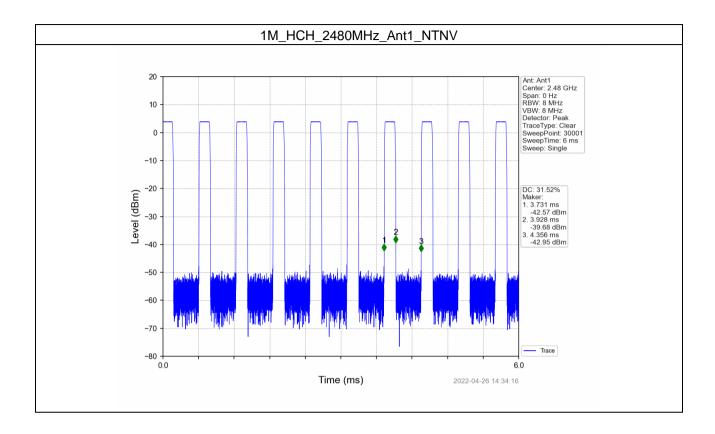
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#### 2. Bandwidth

#### 2.1 6dB BW

#### 2.1.1 Test Result

Mode	TX	Frequency (MHz)	ANT	6dB Bandv	Manaliat	
	Type			Result	Limit	Verdict
1M		2402	1	0.627	>=0.5	Pass
	SISO	2440	1	0.627	>=0.5	Pass
		2480	1	0.627	>=0.5	Pass

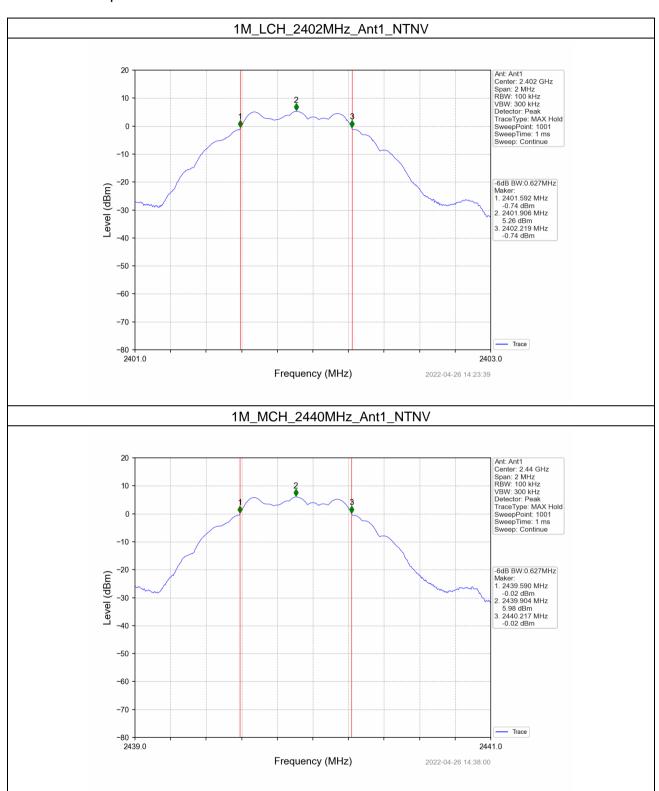




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#### 2.2.2 Test Graph





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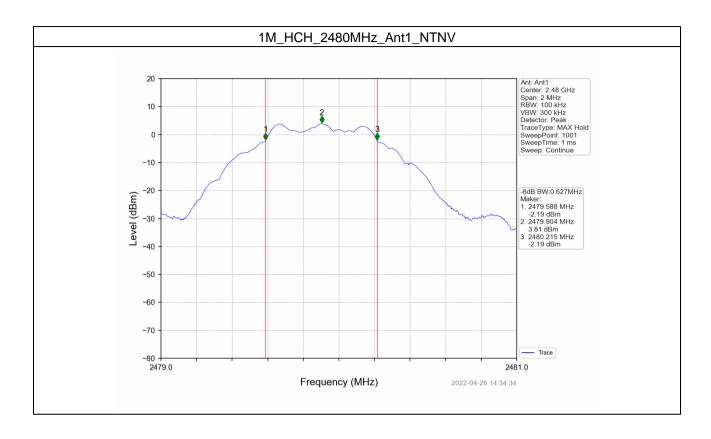
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#### 3. Maximum Conducted Output Power

#### 3.1 Power

#### 3.1.1 Test Result

Mode	TX	Frequency (MHz)	Maximum Peak Conduc	\/a rdi at			
	Туре		ANT1	Limit	Verdict		
	SISO	2402	5.32	<=30	Pass		
1M		2440	6.06	<=30	Pass		
		2480	3.96	<=30	Pass		
Note1: Ant	Note1: Antenna Gain: Ant1: 2.97dBi;						



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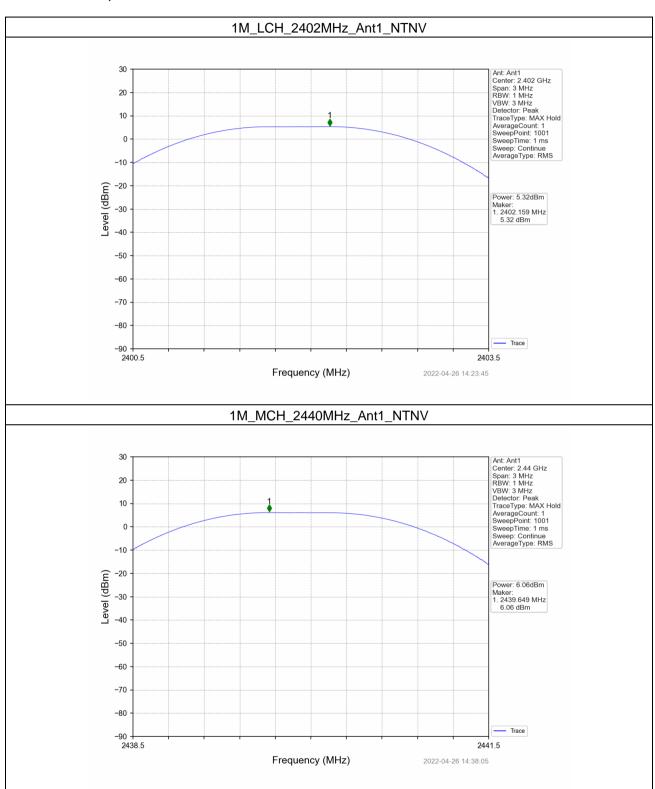
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#### 3.1.2 Test Graph

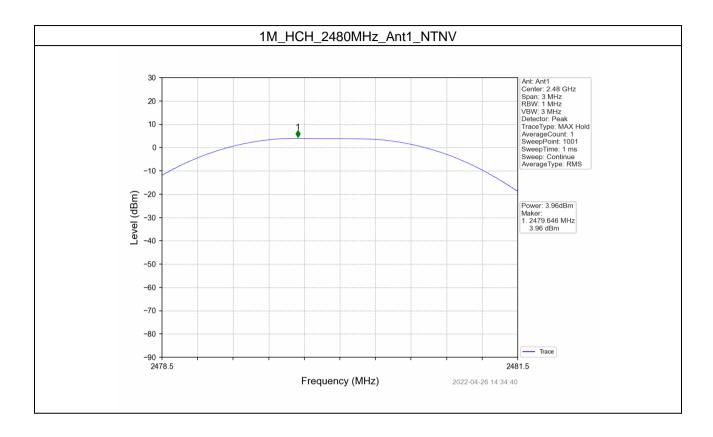






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#### 4. Maximum Power Spectral Density

#### 4.1 PSD

#### 4.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Maximum PS	Verdict			
			ANT1	Limit	verdict		
1M		2402	-9.29	<=8	Pass		
	SISO	2440	-8.52	<=8	Pass		
		2480	-10.70	<=8	Pass		
Note1: Antenna Gain: Ant1: 2.97dBi;							

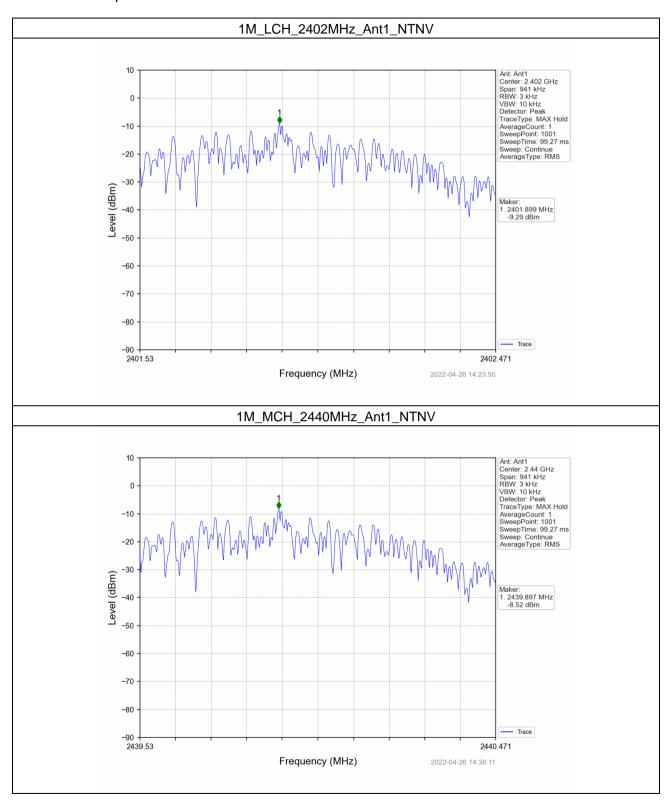




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#### 4.1.2 Test Graph





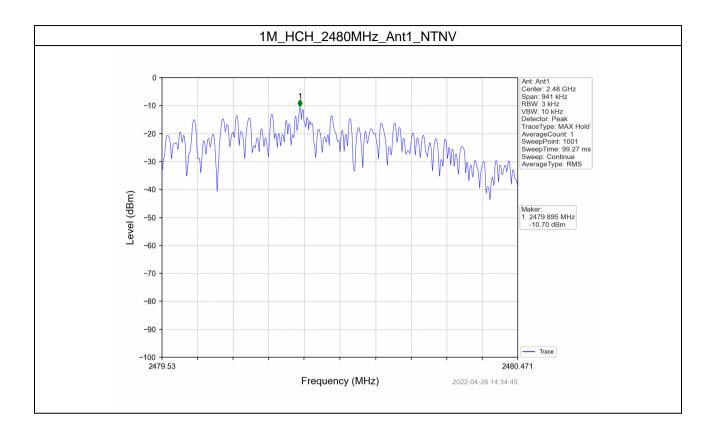
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#### 5. Unwanted Emissions In Non-restricted Frequency Bands

#### 5.1 Ref

#### 5.1.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)	
1M	SISO	2402	1	5.25	
		2440	1	5.99	
		2480	1	3.80	

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.

Note2: RBW = 1MHz was used during the pre-test. The final test will be performed at RBW=100kHz while the margin is less than 3dB.



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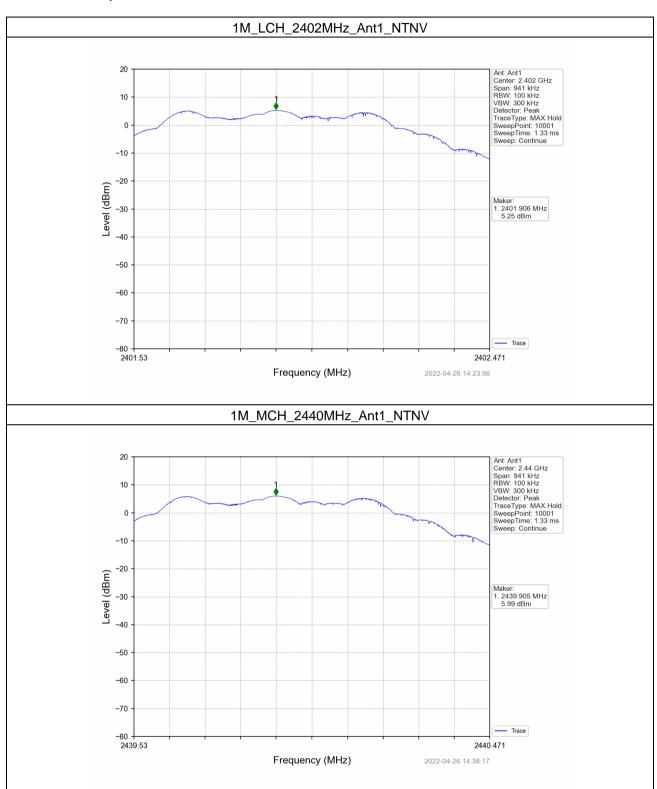
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#### 5.1.2 Test Graph





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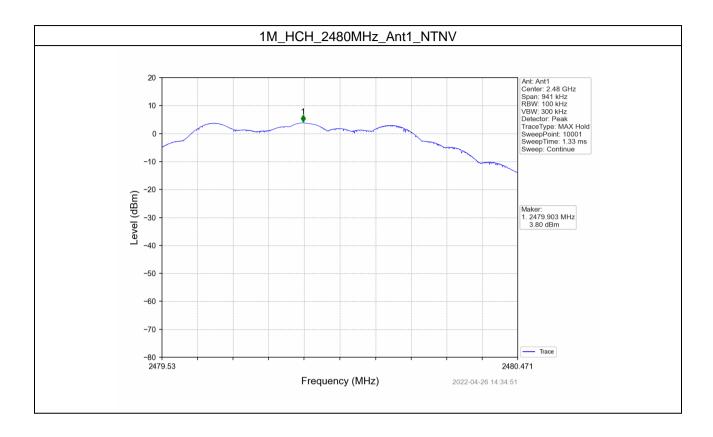
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#### 5.2 CSE

#### 5.2.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
1M	SISO	2402	1	5.99	-24.01	Pass
		2440	1	5.99	-14.01	Pass
		2480	1	5.99	-14.01	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.

Note2: RBW = 1MHz was used during the pre-test. The final test will be performed at RBW=100kHz while the margin is less than 3dB.



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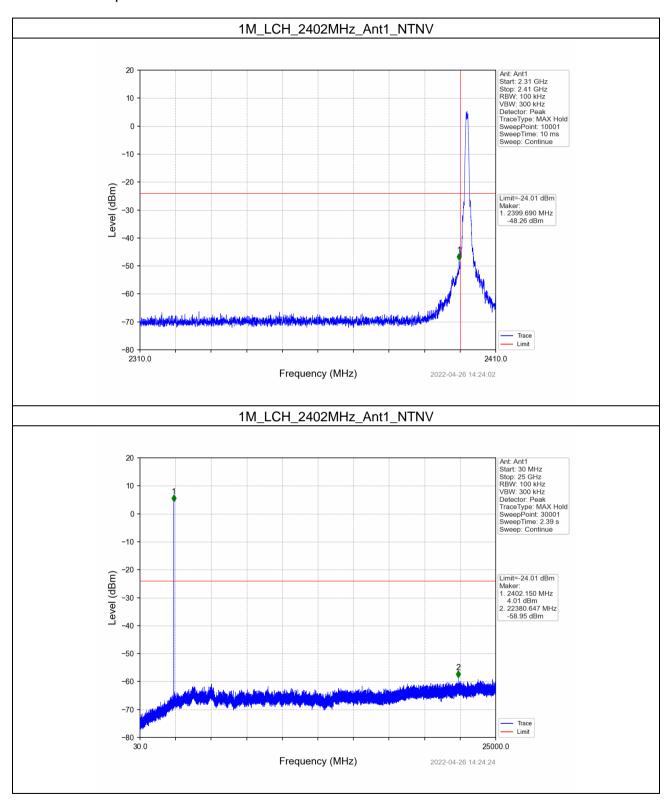
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#### 5.2.2 Test Graph

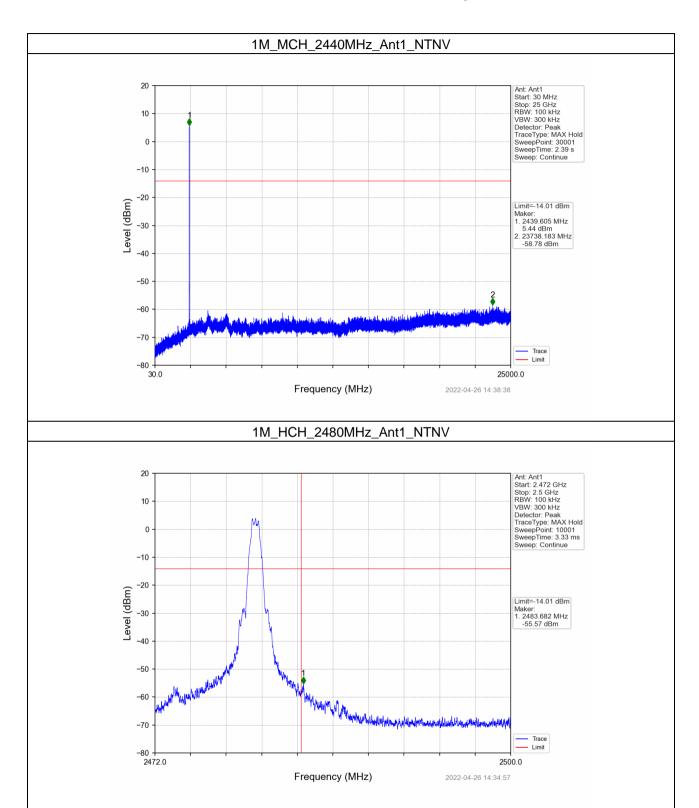






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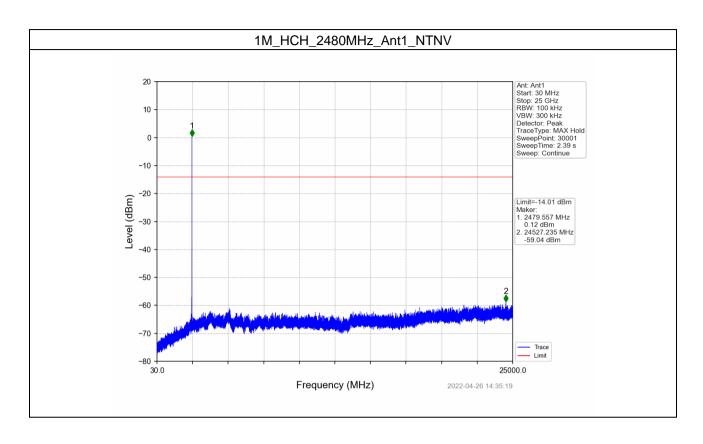
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