



FCC PART 15 SUBPART C TEST REPORT

FCC PART 15.247

Report Reference No......: **HTT202208355F01**

FCC ID.....: **2A8MM-LT-DS814**

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Date of issue.....: Aug.31,2022

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District, Shenzhen, Guangdong, China

Applicant's name: **Guangdong Elfday Intelligent Technology Co., Ltd.**

Address: 6th Floor, Building B, District 2, Dongsheng Science and
Technology Park, No. 116, Dongpu Xincun Road, Yangwu,
Dalingshan Town, Dongguan City, Guangdong Province

Test specification

Standard: **FCC Part 15.247**

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Test item description: **RFID Reader**

Trade Mark: N/A

Manufacturer: Guangdong Elfday Intelligent Technology Co., Ltd.

Model/Type reference.....: LT-DS814

Listed Models: N/A

Frequency.....: From 902.75MHz-927.25MHz

Rating: DC 9.0V From External Circuit

Result.....: **PASS**

TEST REPORT

Equipment under Test : RFID Reader

Model /Type : LT-DS814

Listed Models : N/A

Applicant : Guangdong Elfday Intelligent Technology Co., Ltd.

Address : 6th Floor, Building B, District 2, Dongsheng Science and Technology Park, No. 116, Dongpu Xincun Road, Yangwu, Dalingshan Town, Dongguan City, Guangdong Province

Manufacturer : Guangdong Elfday Intelligent Technology Co., Ltd.

Address : 6th Floor, Building B, District 2, Dongsheng Science and Technology Park, No. 116, Dongpu Xincun Road, Yangwu, Dalingshan Town, Dongguan City, Guangdong Province

Test Result:	PASS
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The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1 TEST STANDARDS

The tests were performed according to following standards:

[FCC Rules Part 15.247](#): Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

[ANSI C63.10-2013](#): American National Standard for Testing Unlicensed Wireless Devices

2 SUMMARY

2.1 General Remarks

Date of receipt of test sample	:	Aug.25,2022
Testing commenced on	:	Aug.25,2022
Testing concluded on	:	Aug.31,2022

2.2 Product Description

Product Description:	RFID Reader
Model/Type reference:	LT-DS814
Power supply:	DC 9.0V From External Circuit
Adapter:	Model:JYH32-0903000 Input:AC 100-240V 50/60Hz 1.5A Output:DC 12V 3A
Testing sample ID:	HTT202208355-1# (Engineer sample), HTT202208355-2# (Normal sample)
RF ID	
Modulation Technology:	GFSK
Operation frequency:	902.75MHz-927.25MHz
Channel spacing:	500KHz
Channel number:	50
Antenna type:	External antenna
Antenna gain:	5.0dBi
Note:	RFID Reader has 4 antennas and only one antenna is transmitting at the same time

2.3 Equipment Under Test

Power supply system utilised

Power supply voltage	:	☐ 230V / 50 Hz	☐ 120V / 60Hz
		☐ 12 V DC	☐ 24 V DC
		☒ Other (specified in blank below)	

DC 9.0V

2.4 Short description of the Equipment under Test (EUT)

This is a RFID Reader
For more details, refer to the user's manual of the EUT.

2.5 EUT operation mode

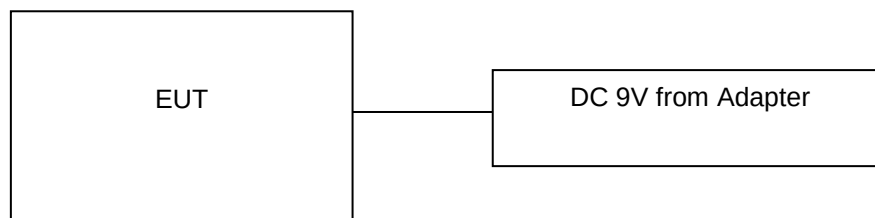
The Applicant provides communication tools software(Engineer mode) to control the EUT for staying in continuous transmitting (Duty Cycle more than 98%) and receiving mode for testing .There are 64 channels provided to the EUT and Channel 00/31/63 were selected to test.

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	902.75MHz	16	910.25MHz	31	917.75MHz	46	925.25MHz
2	903.25MHz	17	910.75MHz	32	918.25MHz	47	925.75MHz
3	903.75MHz	18	911.25MHz	33	918.75MHz	48	926.25MHz
4	904.25MHz	19	911.75MHz	34	919.25MHz	49	926.75MHz
5	904.75MHz	20	912.25MHz	35	919.75MHz	50	927.25MHz
6	905.25MHz	21	912.75MHz	36	920.25MHz		
7	905.75MHz	22	913.25MHz	37	920.75MHz		
8	906.25MHz	23	913.75MHz	38	921.25MHz		
9	906.75MHz	24	914.25MHz	39	921.75MHz		
10	907.25MHz	25	914.75MHz	40	922.25MHz		
11	907.75MHz	26	915.25MHz	41	922.75MHz		
12	908.25MHz	27	915.75MHz	42	923.25MHz		
13	908.75MHz	28	916.25MHz	43	923.75MHz		
14	909.25MHz	29	916.75MHz	44	924.25MHz		
15	909.75MHz	30	917.25MHz	45	924.75MHz		

Trsting Frequency

Channel	Frequency
Low	902.75MHz
Mid	915.25MHz
High	927.25MHz

2.6 Block Diagram of Test Setup



2.7 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for the device filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

2.8 Modifications

No modifications were implemented to meet testing criteria.

3 TEST ENVIRONMENT

3.1 Address of the test laboratory

Shenzhen HTT Technology Co.,Ltd.

1F, Building B, Huafeng International Robotics Industrial Park, Hangcheng Road, Nanchang Community, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China

3.2 Test Facility

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

FCC-Registration No.: 779513 Designation Number: CN1319

Shenzhen HTT Technology Co.,Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

A2LA-Lab Cert. No.: 6435.01

Shenzhen HTT Technology Co.,Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2010.

3.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Radiated Emission:

Temperature:	25 ° C
Humidity:	45 %
Atmospheric pressure:	950-1050mbar

AC Power Conducted Emission:

Temperature:	25 ° C
Humidity:	44 %
Atmospheric pressure:	950-1050mbar

Conducted testing:

Temperature:	25 ° C
Humidity:	44 %
Atmospheric pressure:	950-1050mbar

3.4 Summary of measurement results

Test Specification clause	Test case	Test Mode	Test Channel	Recorded In Report		Test result
§15.247(a)(1)	Carrier Frequency separation	FHSS system	☒ Lowest ☒ Middle ☒ Highest	FHSS system	☒ Middle	Compliant
§15.247(a)(1)	Number of Hopping channels	FHSS system	☒ Full	FHSS system	☒ Full	Compliant
§15.247(a)(1)	Time of Occupancy (dwell time)	FHSS system	☒ Lowest ☒ Middle ☒ Highest	FHSS system	☒ Middle	Compliant
§15.247(a)(1)	Spectrum bandwidth of a FHSS system 20dB bandwidth	FHSS system	☒ Lowest ☒ Middle ☒ Highest	FHSS system	☒ Lowest ☒ Middle ☒ Highest	Compliant
§15.247(b)(1)	Maximum output peak power	FHSS system	☒ Lowest ☒ Middle ☒ Highest	FHSS system	☒ Lowest ☒ Middle ☒ Highest	Compliant
§15.247(d)	Band edge compliance conducted	FHSS system	☒ Lowest ☒ Highest	FHSS system	☒ Lowest ☒ Highest	Compliant
§15.205	Band edge compliance radiated	FHSS system	☒ Lowest ☒ Highest	FHSS system	☒ Lowest ☒ Highest	Compliant
§15.247(d)	TX spurious emissions conducted	FHSS system	☒ Lowest ☒ Middle ☒ Highest	FHSS system	☒ Lowest ☒ Middle ☒ Highest	Compliant
§15.247(d)	TX spurious emissions radiated	FHSS system	☒ Lowest ☒ Middle ☒ Highest	FHSS system	☒ Lowest ☒ Middle ☒ Highest	Compliant
§15.209(a)	TX spurious Emissions radiated Below 1GHz	FHSS system	☒ Lowest ☒ Middle ☒ Highest	FHSS system	☒ Middle	Compliant
§15.107(a) §15.207	Conducted Emissions 9KHz-30 MHz	FHSS system	☒ Lowest ☒ Middle ☒ Highest	FHSS system	☒ Middle	Compliant

Remark:

1. The measurement uncertainty is not included in the test result.
2. We tested all test mode and recorded worst case in report

3.5 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2" and is documented in the Shenzhen HTT Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen HTT Technology Co., Ltd. :

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10 dB	(1)
Radiated Emission	1~18GHz	4.32 dB	(1)
Radiated Emission	18-40GHz	5.54 dB	(1)
Conducted Disturbance	0.15~30MHz	3.12 dB	(1)

- (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

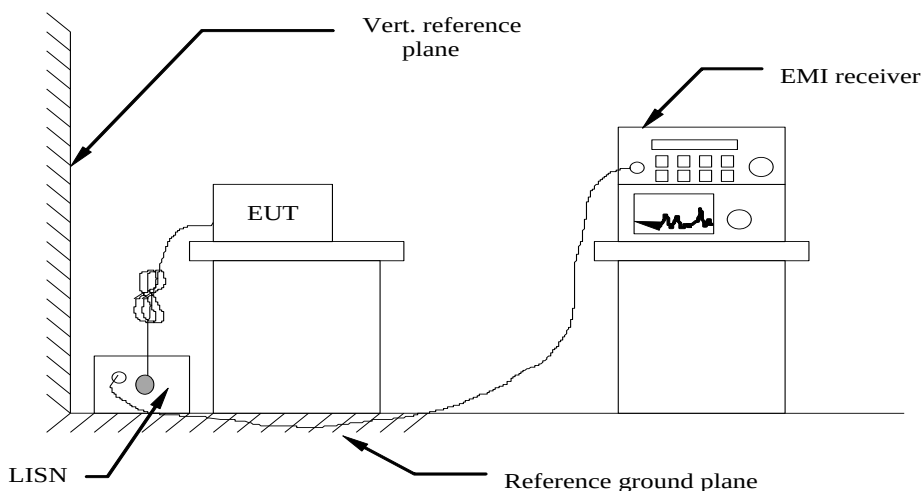
3.6 Equipments Used during the Test

Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	Shenzhen C.R.T technology co., LTD	9*6*6	HTT-E028	Aug. 10 2020	Aug. 09 2024
2	Control Room	Shenzhen C.R.T technology co., LTD	4.8*3.5*3.0	HTT-E030	Aug. 10 2020	Aug. 09 2024
3	EMI Test Receiver	Rohde&Schwarz	ESCI7	HTT-E022	May 23 2022	May 22 2023
4	Spectrum Analyzer	Rohde&Schwarz	FSP	HTT-E037	May 23 2022	May 22 2023
5	Coaxial Cable	ZDecl	ZT26-NJ-NJ-0.6M	HTT-E018	May 23 2022	May 22 2023
6	Coaxial Cable	ZDecl	ZT26-NJ-SMAJ-2M	HTT-E019	May 23 2022	May 22 2023
7	Coaxial Cable	ZDecl	ZT26-NJ-SMAJ-0.6M	HTT-E020	May 23 2022	May 22 2023
8	Coaxial Cable	ZDecl	ZT26-NJ-SMAJ-8.5M	HTT-E021	May 23 2022	May 22 2023
9	Composite logarithmic antenna	Schwarzbeck	VULB 9168	HTT-E017	May 23 2022	May 22 2023
10	Horn Antenna	Schwarzbeck	BBHA9120D	HTT-E016	May 23 2022	May 22 2023
11	Loop Antenna	Zhinan	ZN30900C	HTT-E039	May 23 2022	May 22 2023
12	Horn Antenna	Beijing Hangwei Dayang	OBH100400	HTT-E040	May 23 2022	May 22 2023
13	low frequency Amplifier	Sonoma Instrument	310	HTT-E015	May 23 2022	May 22 2023
14	high-frequency Amplifier	HP	8449B	HTT-E014	May 23 2022	May 22 2023
15	Variable frequency power supply	Shenzhen Anbiao Instrument Co., Ltd	ANB-10VA	HTT-082	May 23 2022	May 22 2023
16	EMI Test Receiver	Rohde & Schwarz	ESCS30	HTT-E004	May 23 2022	May 22 2023
17	Artificial Mains	Rohde & Schwarz	ESH3-Z5	HTT-E006	May 23 2022	May 22 2023
18	Artificial Mains	Rohde & Schwarz	ENV-216	HTT-E038	May 23 2022	May 22 2023
19	Cable Line	Robinson	Z302S-NJ-BNCJ-1.5M	HTT-E001	May 23 2022	May 22 2023
20	Attenuator	Robinson	6810.17A	HTT-E007	May 23 2022	May 22 2023
21	Variable frequency power supply	Shenzhen Yanghong Electric Co., Ltd	YF-650 (5KVA)	HTT-E032	May 23 2022	May 22 2023
22	Control Room	Shenzhen C.R.T technology co., LTD	8*4*3.5	HTT-E029	May 23 2022	May 22 2023
23	DC power supply	Agilent	E3632A	HTT-E023	May 23 2022	May 22 2023
24	EMI Test Receiver	Agilent	N9020A	HTT-E024	May 23 2022	May 22 2023
25	Analog signal generator	Agilent	N5181A	HTT-E025	May 23 2022	May 22 2023
26	Vector signal generator	Agilent	N5182A	HTT-E026	May 23 2022	May 22 2023
27	Power sensor	Keysight	U2021XA	HTT-E027	May 23 2022	May 22 2023
28	Temperature and humidity meter	Shenzhen Anbiao Instrument Co., Ltd	TH10R	HTT-074	May 23 2022	May 22 2023
29	Radiated Emission Test Software	Farad	EZ-EMC	N/A	N/A	N/A
30	Conducted Emission Test Software	Farad	EZ-EMC	N/A	N/A	N/A
31	RF Test Software	panshanrf	TST	N/A	N/A	N/A

4 TEST CONDITIONS AND RESULTS

4.1 AC Power Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

- 1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013.
- 2 Support equipment, if needed, was placed as per ANSI C63.10-2013
- 3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013
- 4 The EUT received power from adapter, the adapter received AC120V/60Hz and AC 240V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5 All support equipments received AC power from a second LISN, if any.
- 6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
- 8 During the above scans, the emissions were maximized by cable manipulation.

AC Power Conducted Emission Limit

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following :

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

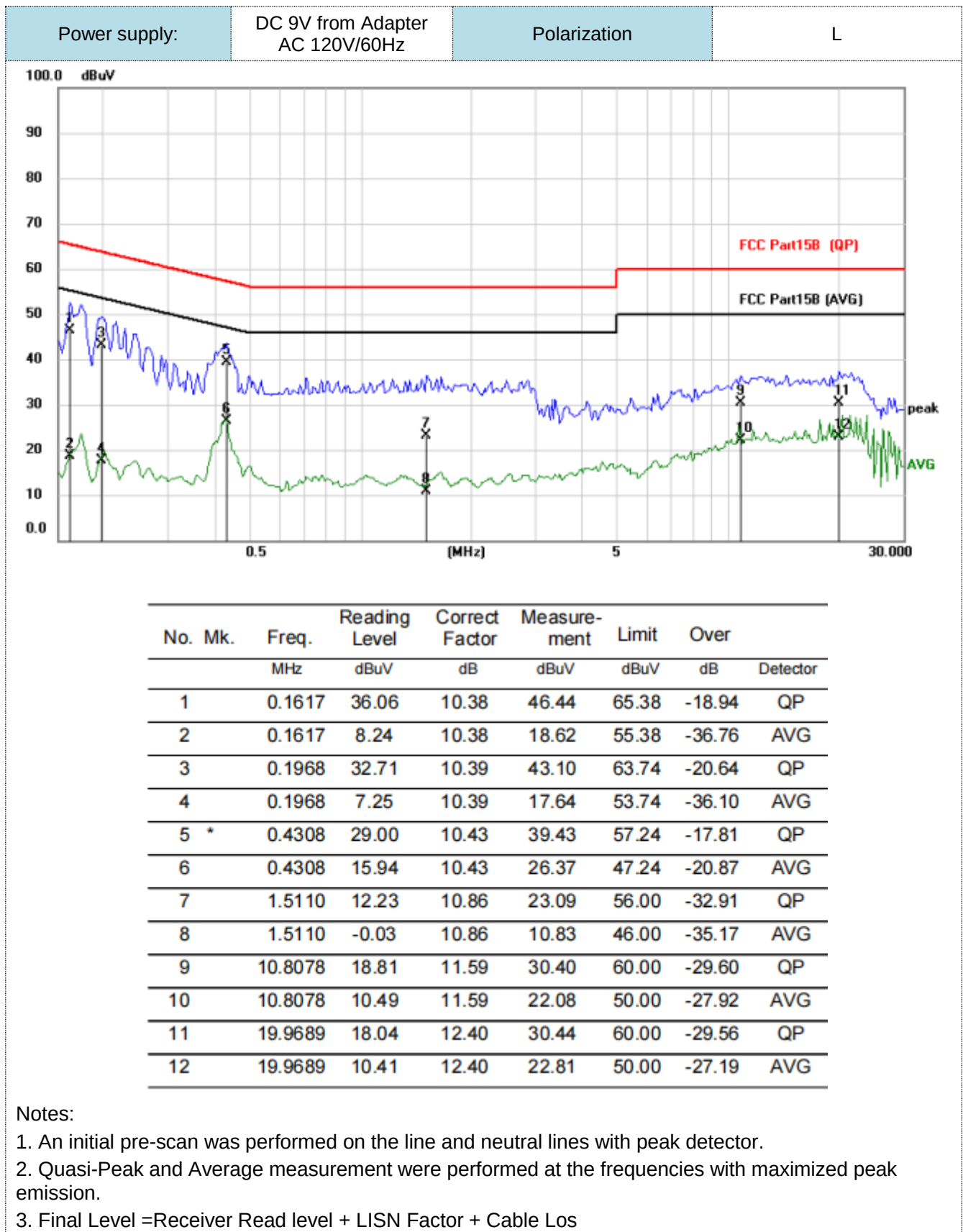
* Decreases with the logarithm of the frequency.

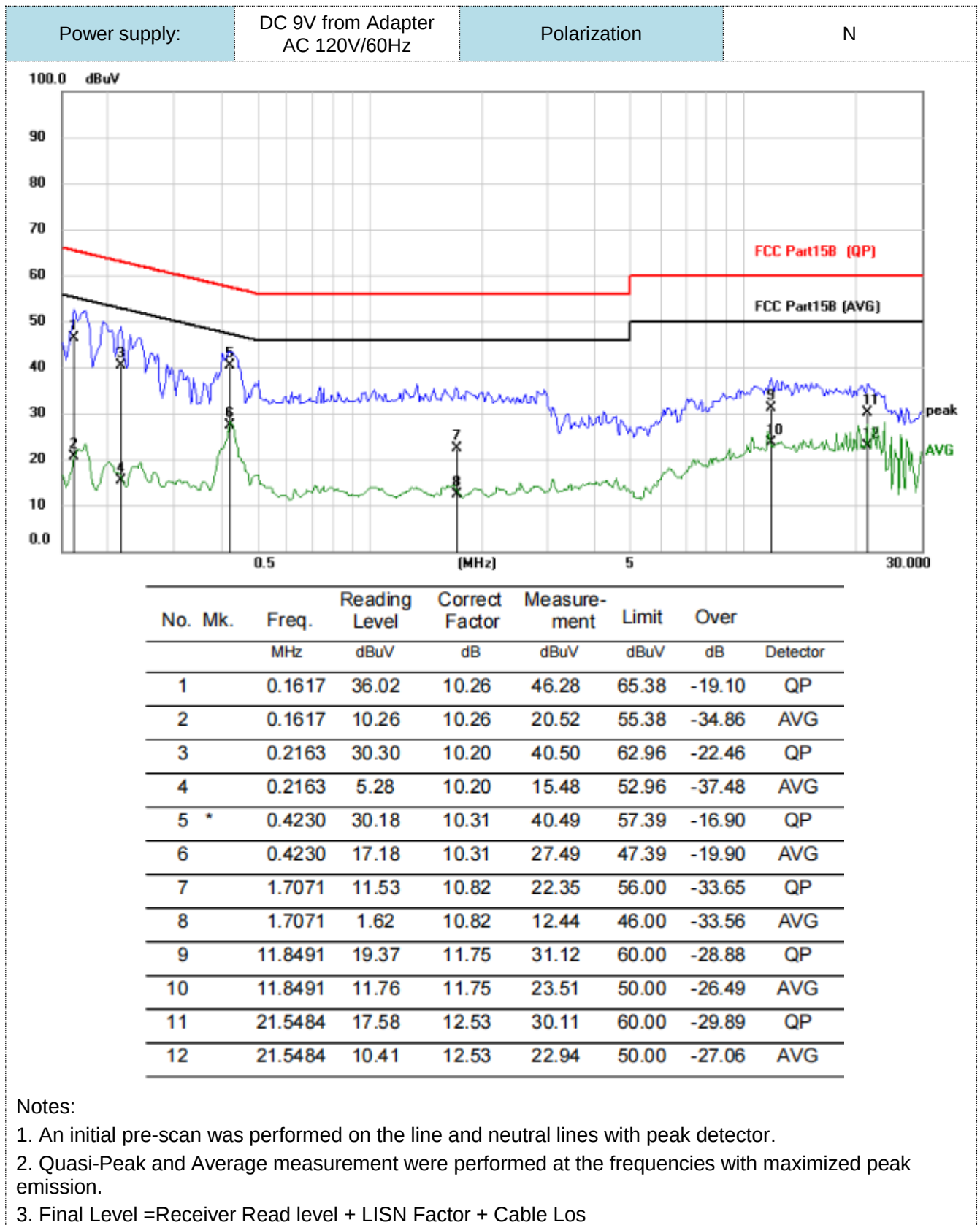
TEST RESULTS

Remark:

1. Lora were test at Low, Middle, and High channel; only the worst result of Lora Middle Channel was reported as below:

2. Both 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz power supply have been tested, only the worst result of 120 VAC, 60 Hz was reported as below:

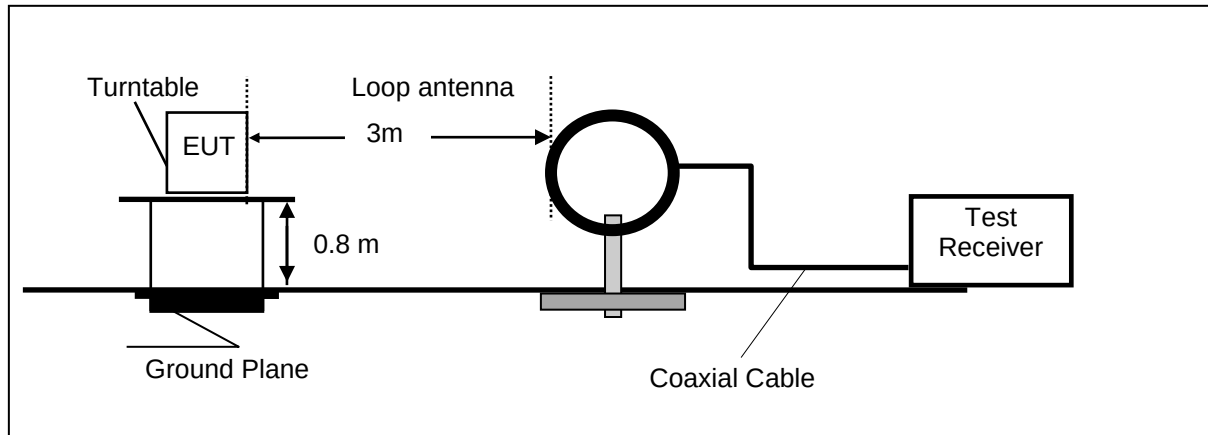




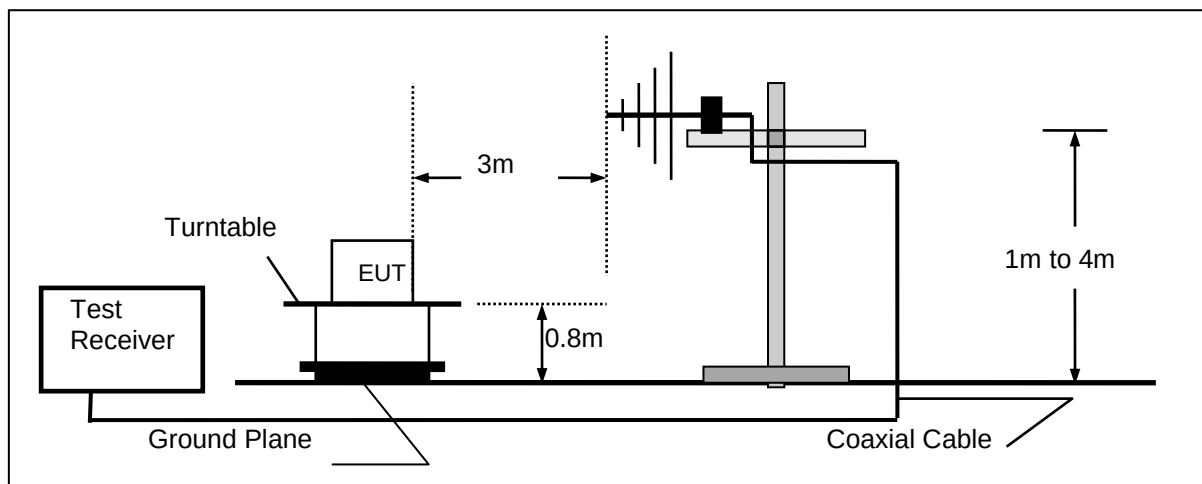
4.2 Radiated Emission

TEST CONFIGURATION

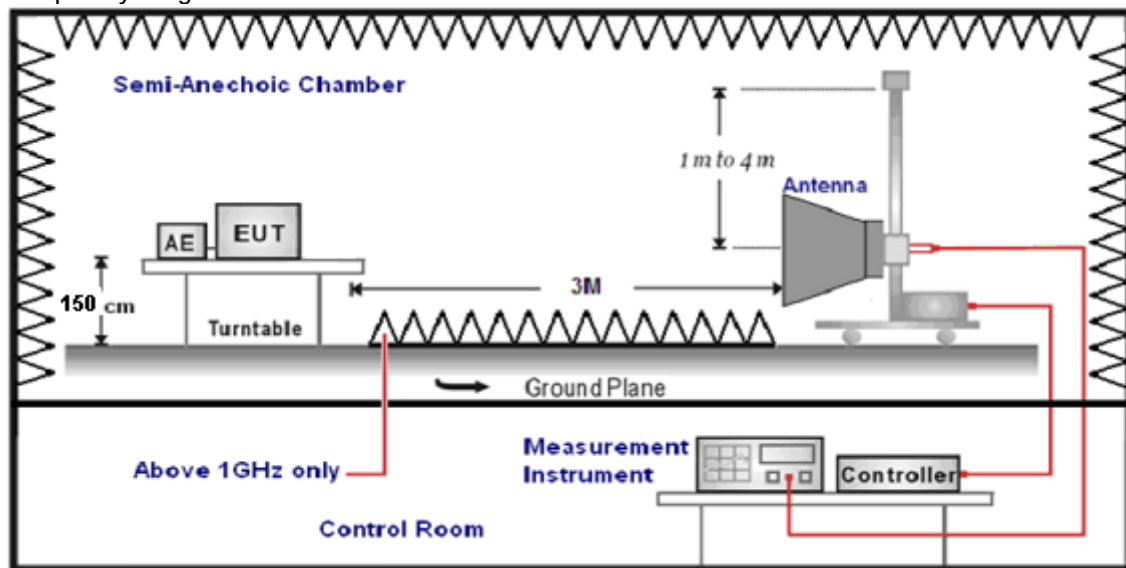
Frequency range 9 KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



TEST PROCEDURE

Shenzhen HTT Technology Co.,Ltd.

1F, Building B, Huafeng International Robotics Industrial Park, Hangcheng Road, Nanchang Community, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China Tel: 0755-23595200 Fax: 0755-23595201

1. The EUT was placed on a turn table which is 0.8m above ground plane when testing frequency range 9 KHz –1GHz;the EUT was placed on a turn table which is 1.5m above ground plane when testing frequency range 1GHz – 25GHz.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. Radiated emission test frequency band from 9KHz to 25GHz.
6. The distance between test antenna and EUT as following table states:

Test Frequency range	Test Antenna Type	Test Distance
9KHz-30MHz	Active Loop Antenna	3
30MHz-1GHz	Ultra-Broadband Antenna	3
1GHz-18GHz	Double Ridged Horn Antenna	3
18GHz-25GHz	Horn Antenna	1

7. Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
9KHz-150KHz	RBW=200Hz/VBW=3KHz,Sweep time=Auto	QP
150KHz-30MHz	RBW=9KHz/VBW=100KHz,Sweep time=Auto	QP
30MHz-1GHz	RBW=120KHz/VBW=1000KHz,Sweep time=Auto	QP
1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto	Peak

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

$$\text{Transd}=AF +CL-AG$$

RADIATION LIMIT

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed the following table. According to § 15.247(d), in any 100kHz bandwidth outside the frequency band in which the EUT is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of desired power.

The pre-test have done for the EUT in three axes and found the worst emission at position shown in test setup photos.

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	$20\log(2400/F(KHz))+40\log(300/3)$	$2400/F(KHz)$
0.49-1.705	3	$20\log(24000/F(KHz))+40\log(30/3)$	$24000/F(KHz)$
1.705-30	3	$20\log(30)+40\log(30/3)$	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST RESULTS

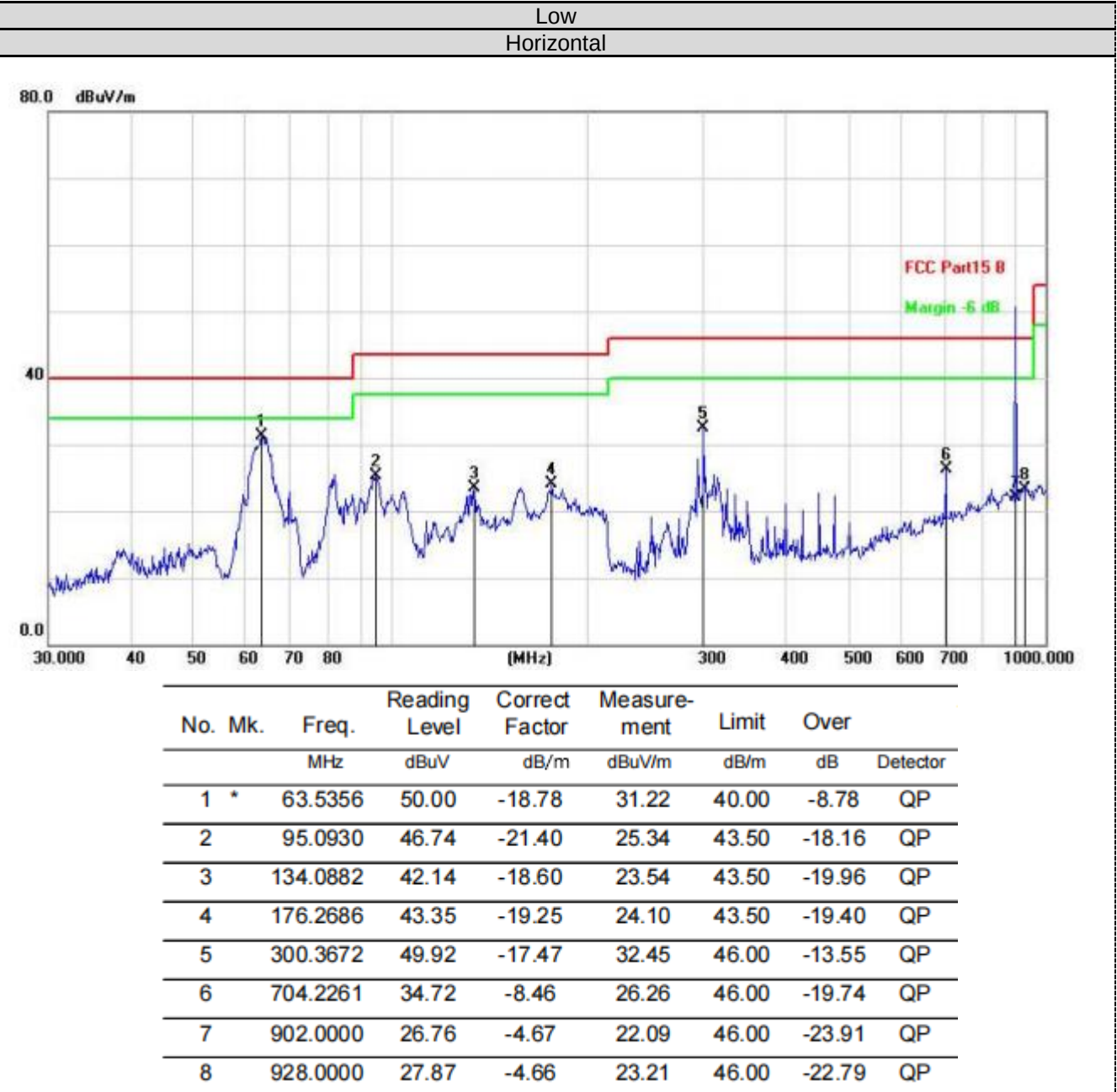
Shenzhen HTT Technology Co.,Ltd.

1F, Building B, Huafeng International Robotics Industrial Park, Hangcheng Road, Nanchang Community, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China Tel: 0755-23595200 Fax: 0755-23595201

Remark:

1. This test was performed with EUT in X, Y, Z position and the worse case was found when EUT in X position.
2. For below 1GHz testing recorded worst at Lora middle channel.
3. Radiated emission test from 9 KHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9 KHz to 30MHz and not recorded in this report.

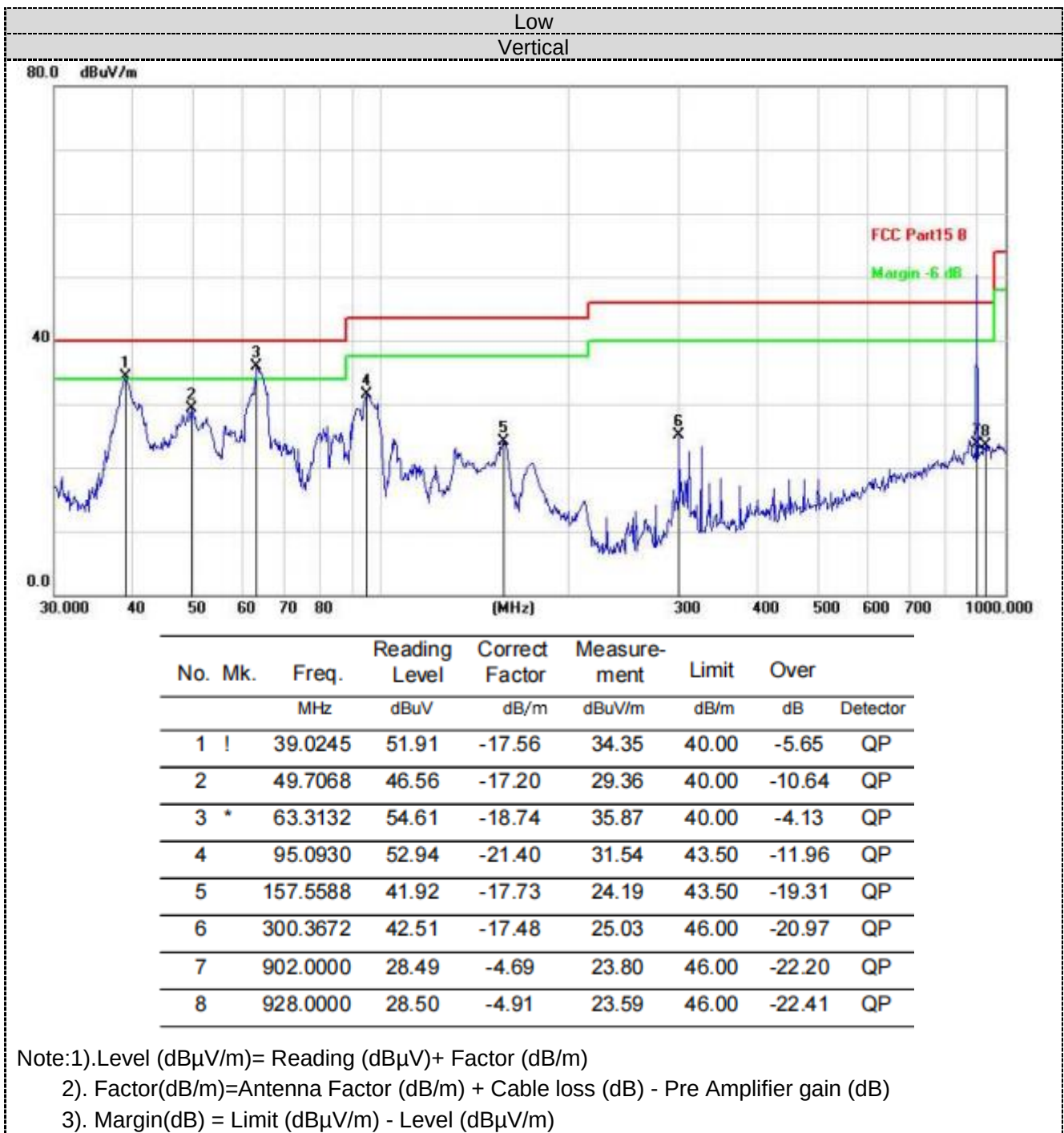
For 30MHz-1GHz

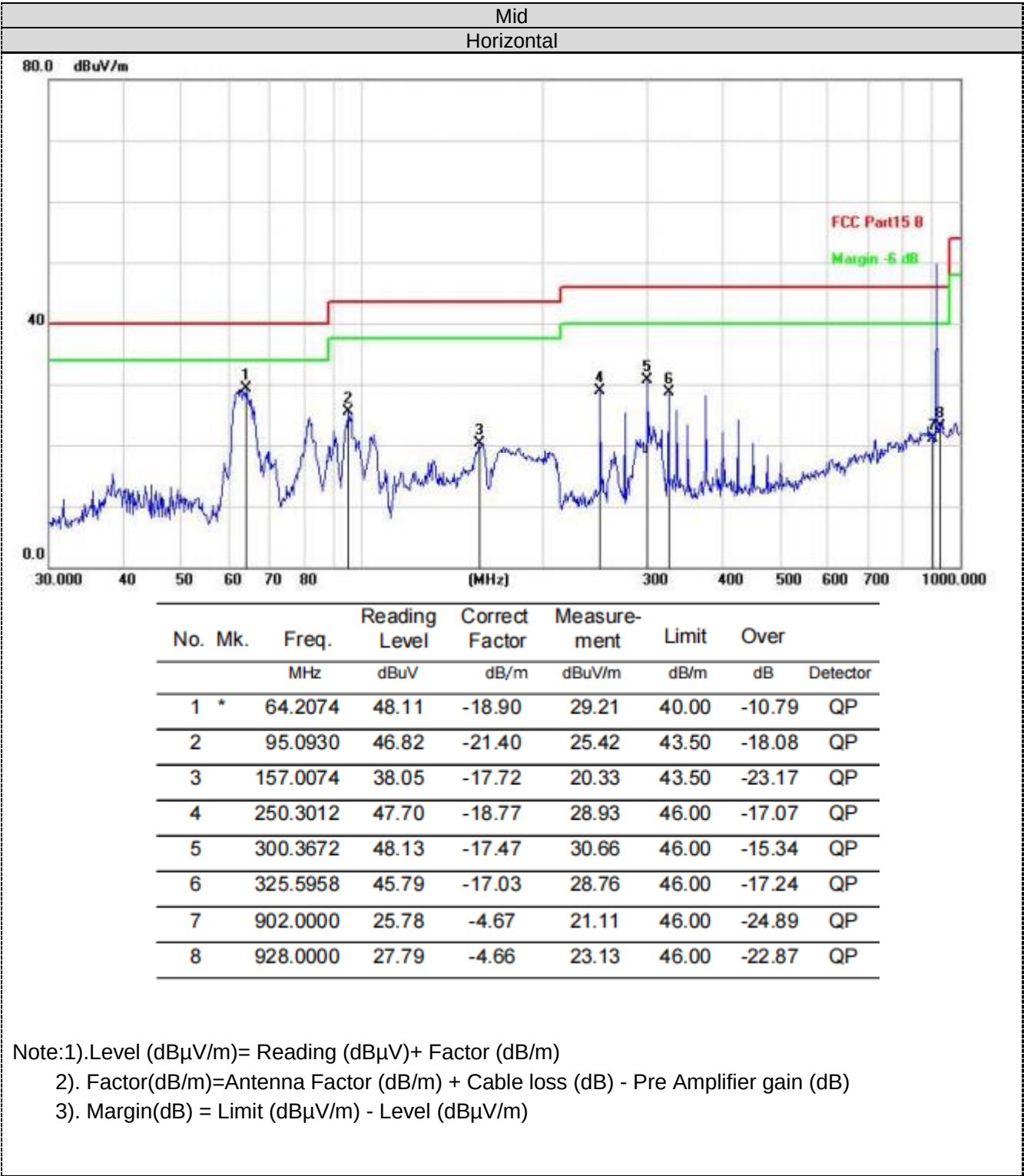


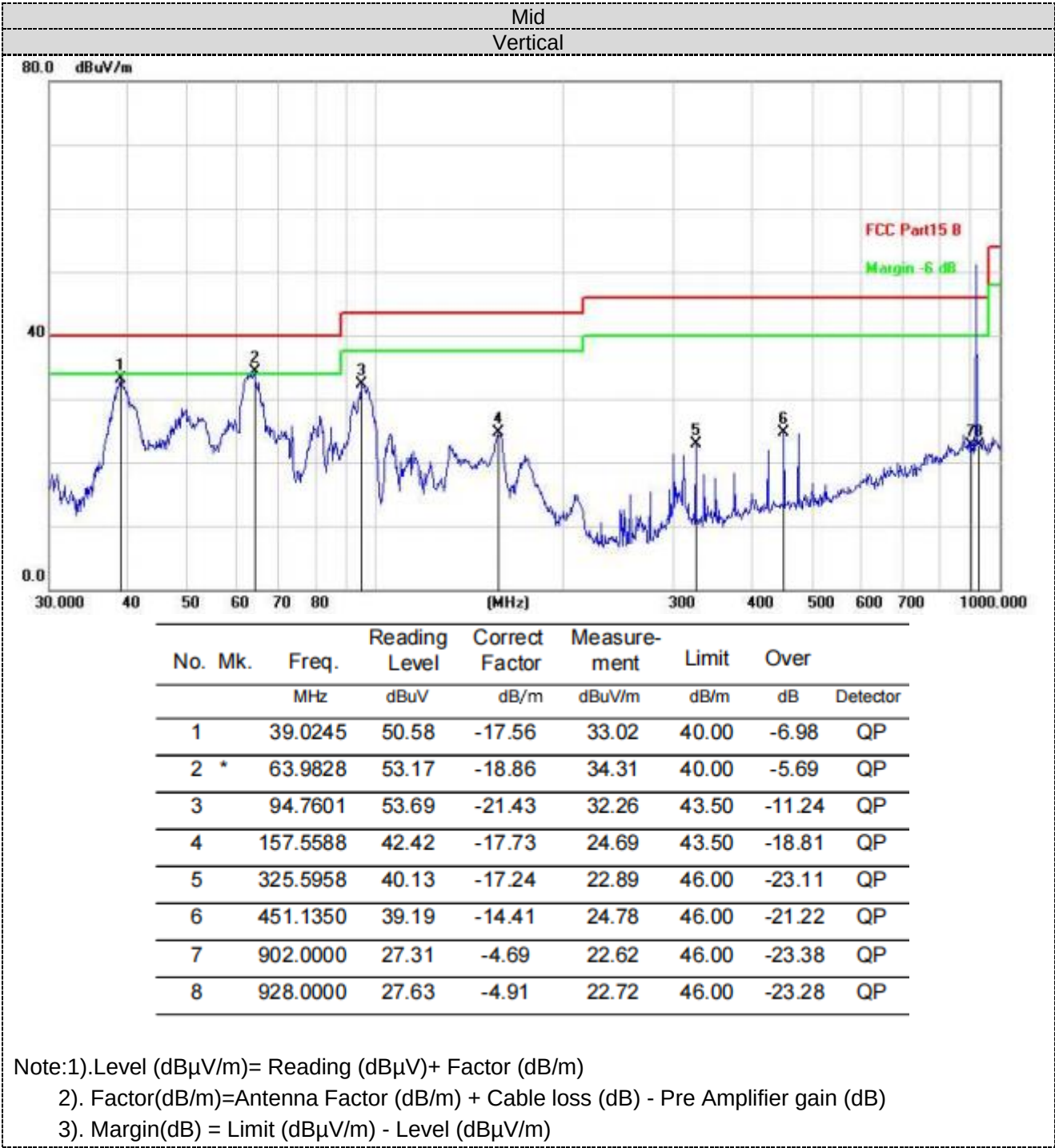
Note:1).Level (dBuV/m)= Reading (dBuV)+ Factor (dB/m)

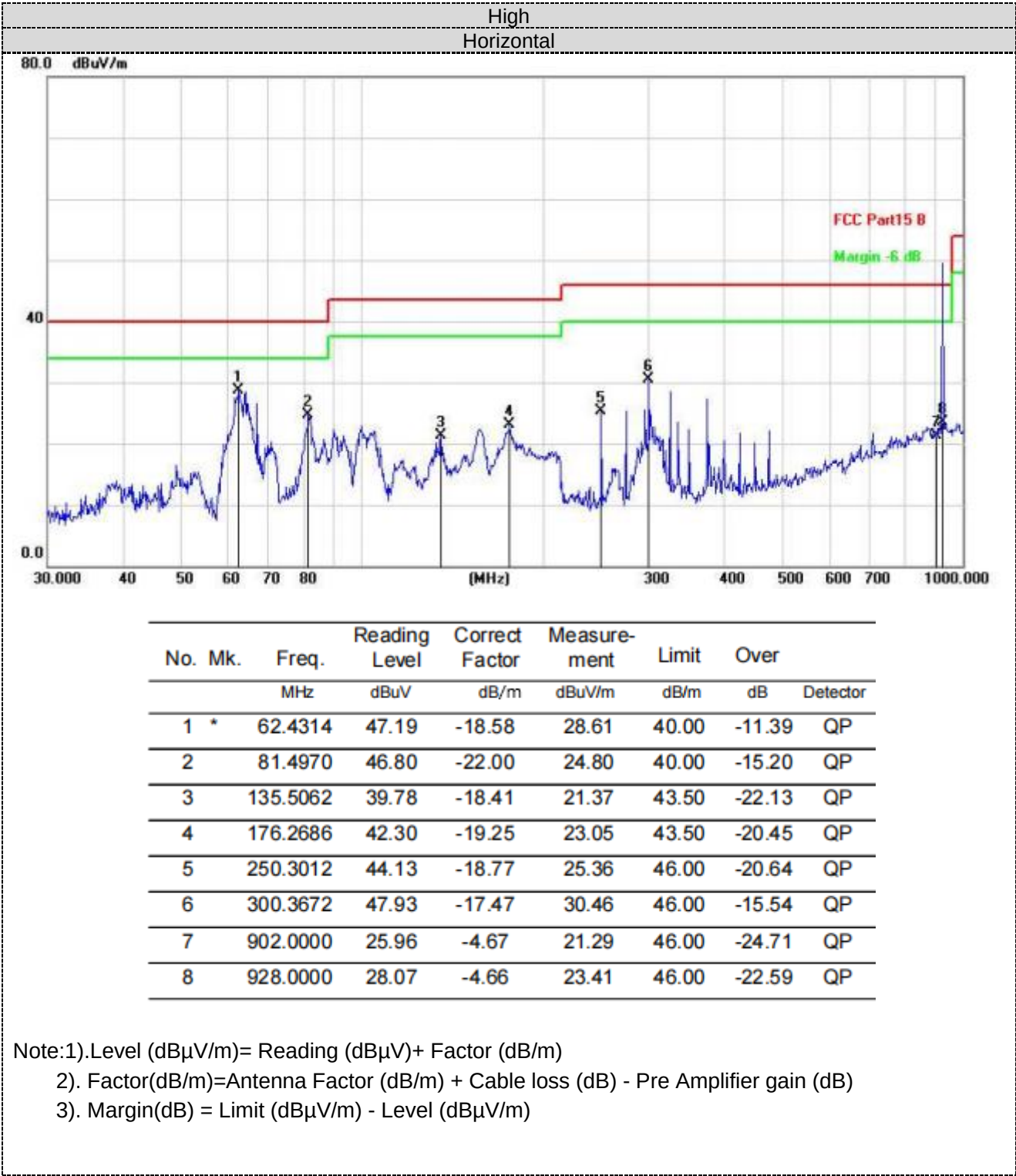
2). Factor(dB/m)=Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB)

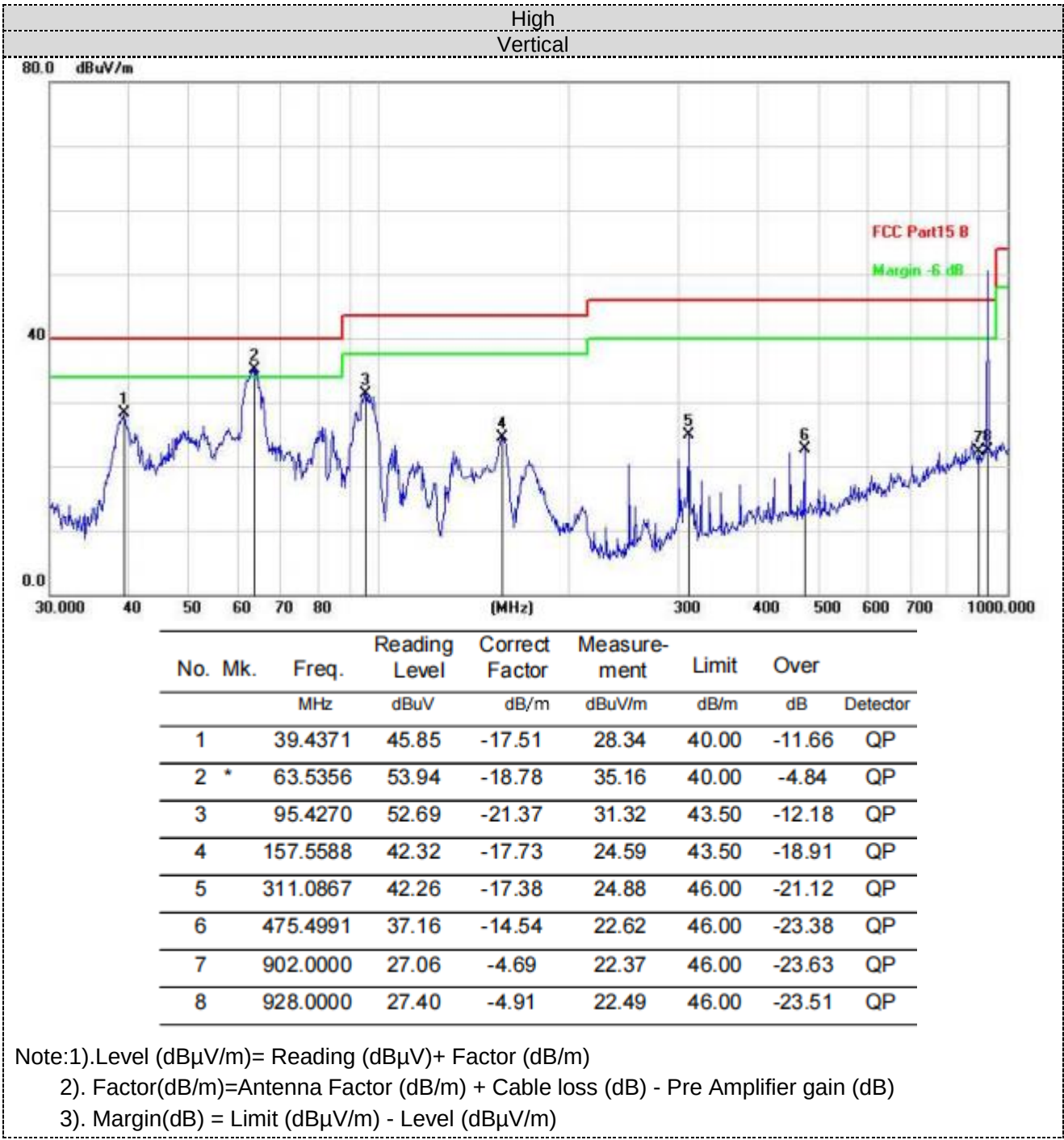
3). Margin(dB) = Limit (dBuV/m) - Level (dBuV/m)











For 1GHz to 10GHz

Frequency(MHz):			902.75		Polarity:		HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1805.5	59.15	PK	74	14.85	53.26	25	3.9	33.5	-4.6
1805.5	44.61	AV	54	9.39	38.15	25	3.9	33.5	-4.6
2708.25	52.65	PK	74	21.35	40.22	28.1	4.82	33.1	-0.18
2708.25	42.66	AV	54	11.34	32.61	28.1	4.82	33.1	-0.18

Frequency(MHz):			902.75		Polarity:		VERTICAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1805.5	60.11	PK	74	13.89	53.26	25	3.9	33.5	-4.6
1805.5	45.61	AV	54	8.39	38.15	25	3.9	33.5	-4.6
2708.25	54.12	PK	74	19.88	40.22	28.1	4.82	33.1	-0.18
2708.25	44.08	AV	54	9.92	32.61	28.1	4.82	33.1	-0.18

Frequency(MHz):			915.25		Polarity:		HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1828.4	57.18	PK	74	16.82	53.26	24.9	3.95	33.45	-4.6
1828.4	45.33	AV	54	8.67	38.15	24.9	3.95	33.45	-4.6
2742.6	54.36	PK	74	19.64	40.22	27.6	4.85	33.05	-0.6
2742.6	45.39	AV	54	8.61	32.61	27.6	4.85	33.05	-0.6

Frequency(MHz):			915.25		Polarity:		VERTICAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1830.10	58.88	PK	74	15.12	53.26	24.9	3.95	33.45	-4.6
1830.10	46.31	AV	54	7.69	38.15	24.9	3.95	33.45	-4.6
2745.15	55.6	PK	74	18.4	40.22	27.6	4.85	33.05	-0.6
2745.15	44.79	AV	54	9.21	32.61	27.6	4.85	33.05	-0.6

Frequency(MHz):			927.25		Polarity:		HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1854.50	60.12	PK	74	13.88	53.26	24.8	4.06	33.3	-4.44
1854.50	45.82	AV	54	8.18	38.15	24.8	4.06	33.3	-4.44
2781.75	53.26	PK	74	20.74	40.22	27.55	4.95	32.9	-0.4
2781.75	45.37	AV	54	8.63	32.61	27.55	4.95	32.9	-0.4

Frequency(MHz):			927.25		Polarity:		VERTICAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1854.50	59.55	PK	74	14.45	53.26	24.8	4.06	33.3	-4.44
1854.50	46.14	AV	54	7.86	38.15	24.8	4.06	33.3	-4.44
2781.75	54.38	PK	74	19.62	40.22	27.55	4.95	32.9	-0.4
2781.75	44.96	AV	54	9.04	32.61	27.55	4.95	32.9	-0.4

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier
3. Margin value = Limit value - Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.

4.3 Maximum Peak Output Power

Limit

The Maximum Peak Output Power Measurement is 125mW (20.97).

Test Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the powersensor.

Test Configuration



Test Results

Channel	Output power (dBm)	Limit (dBm)	Result
Low	16.146	20.97	Pass
Mid	16.204		
High	16.180		

Note: 1.The test results including the cable lose.

4.4 20dB Bandwidth

Limit

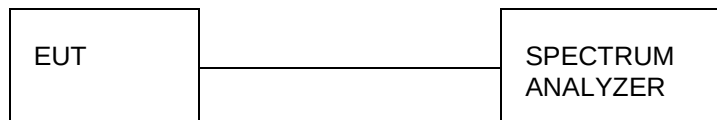
For frequency hopping systems operating in the 902MHz-928MHz no limit for 20dB bandwidth.

Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30 KHz RBW and 100 KHz VBW.

The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

Test Configuration

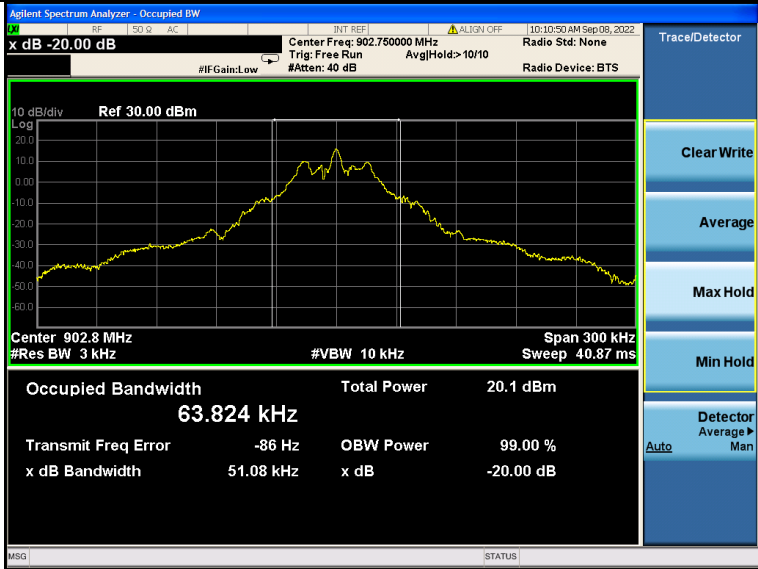


Test Results

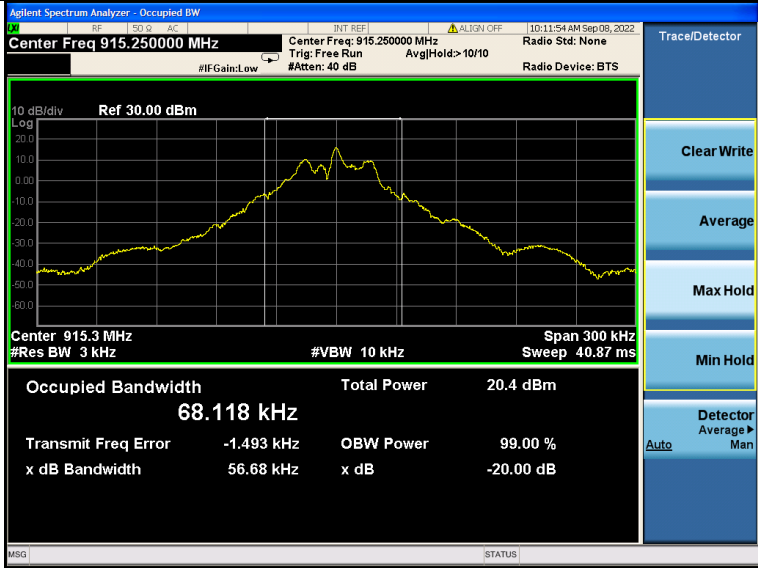
Channel	20dB bandwidth (KHz)	Result
Low	51.08	Pass
Mid	56.68	
High	56.47	

Test plot as follows:

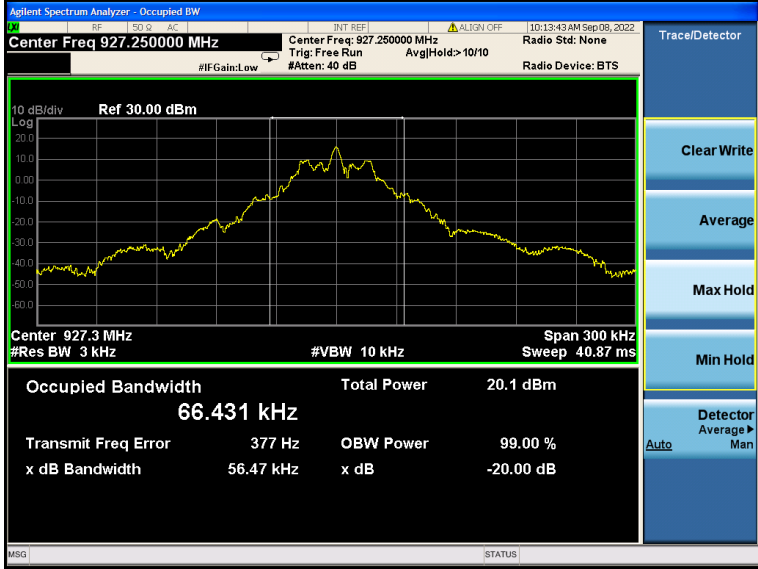
GFSK



Low



Mid



High

4.5 Frequency Separation

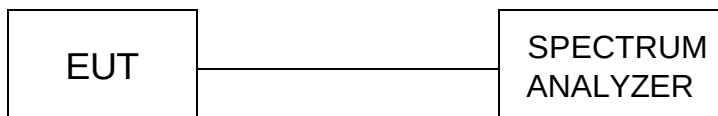
LIMIT

According to 15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25KHz or the $2/3 \times 20\text{dB}$ bandwidth of the hopping channel, whichever is greater.

TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30 KHz RBW and 100 KHz VBW.

TEST CONFIGURATION



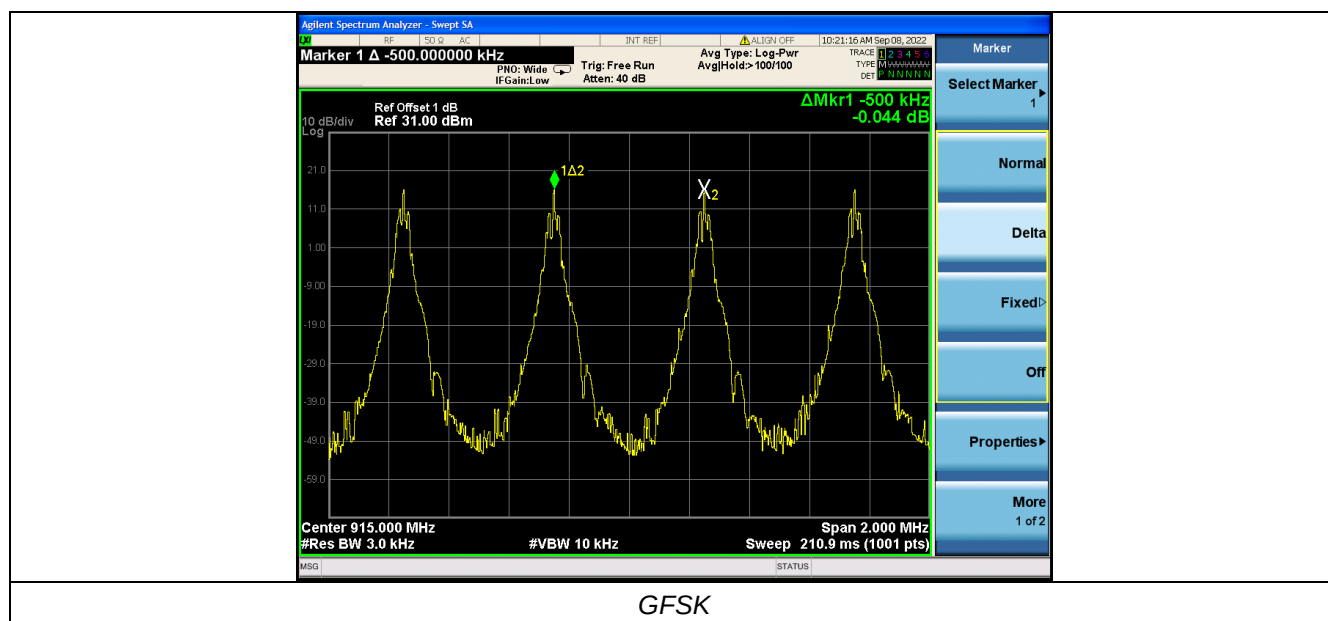
TEST RESULTS

Channel	Channel Separation (KHz)	Limit(MHz)	Result
CH25	500	25KHz or $2/3 \times 20\text{dB}$ bandwidth	Pass
CH26			

Note:

We have tested all mode at high, middle and low channel, and recorded worst case at middle

Test plot as follows:



4.6 Number of hopping frequency

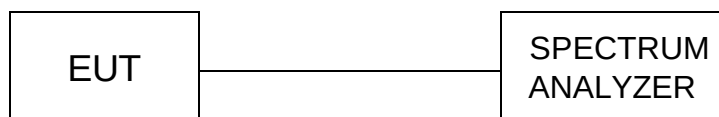
Limit

≥ 15 For Frequency hopping systems in the 902–928MHz band

Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. Set spectrum analyzer start 903MHz to 906MHz with 100 KHz RBW and 300 KHz VBW.

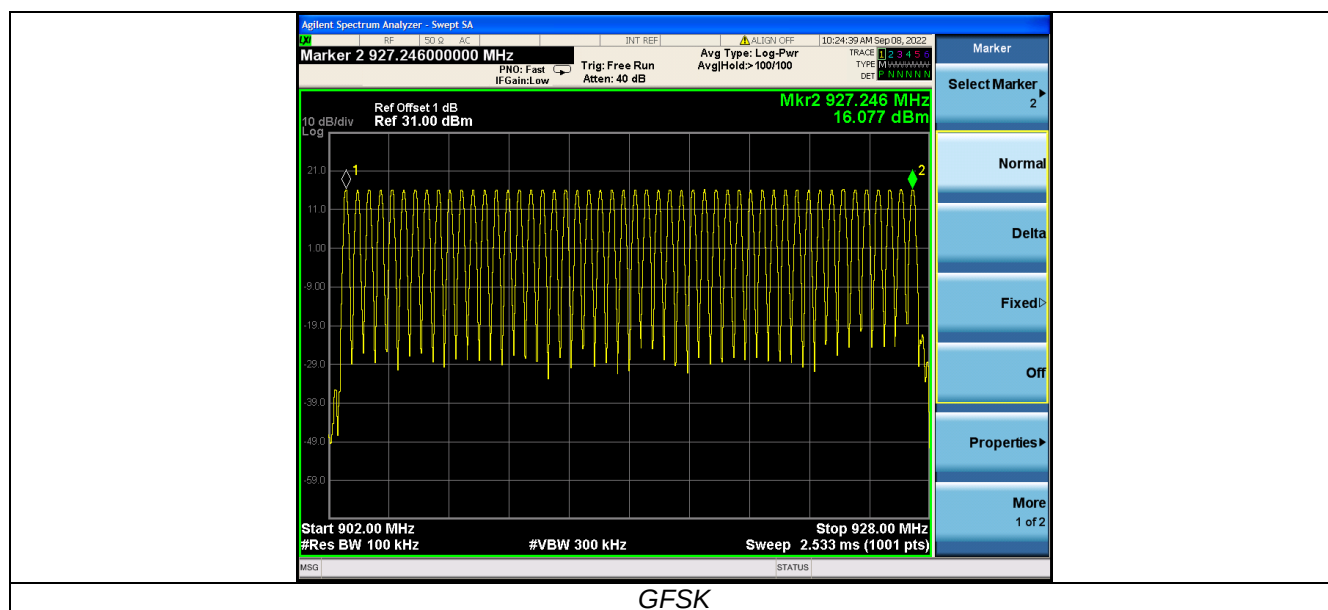
Test Configuration



Test Results

Number of Hopping Channel	Limit	Result
50	≥ 15	Pass

Test plot as follows:



GFSK

4.7 Time of Occupancy (Dwell Time)

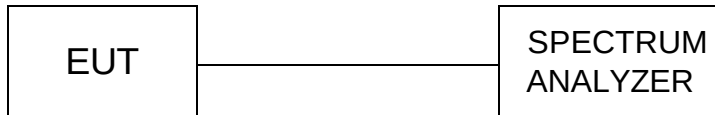
Limit

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 20 seconds multiplied by the number of hopping channels employed.

Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. Set center frequency of spectrum analyzer=operating frequency with 1MHz RBW and 1MHz VBW, Span 0Hz.

Test Configuration



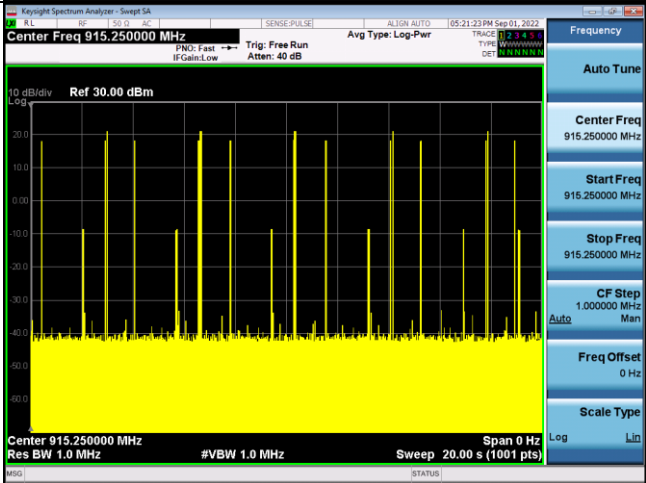
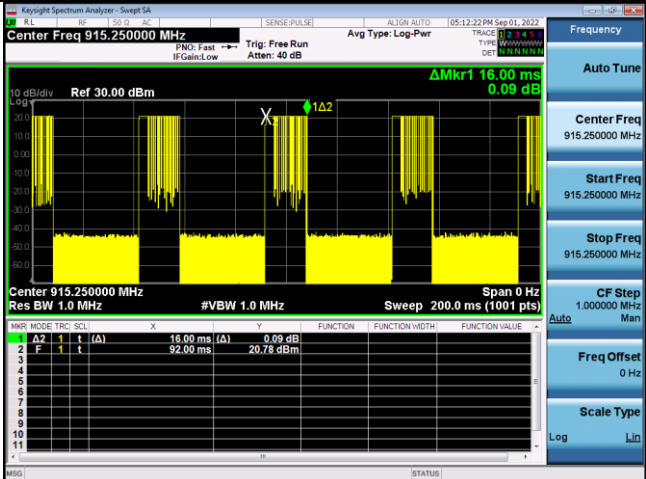
Test Results

CH	Burst time (ms)	Dwell time (s)	Limit (s)	Result
Mid	16	0.320	0.40	Pass

Note: We have tested all mode at high, middle and low channel, and recorded worst case at middle channel.

Test plot as follows:

GFSK



4.8 Out-of-band Emissions

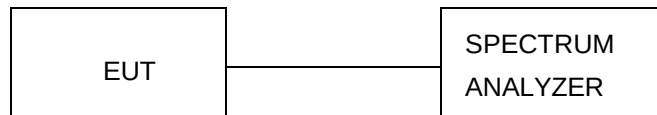
Limit

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.

Test Procedure

Connect the transmitter output to spectrum analyzer using a low loss RF cable, and set the spectrum analyzer to RBW=100 kHz, VBW= 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, band edge and out-of-band emissions.

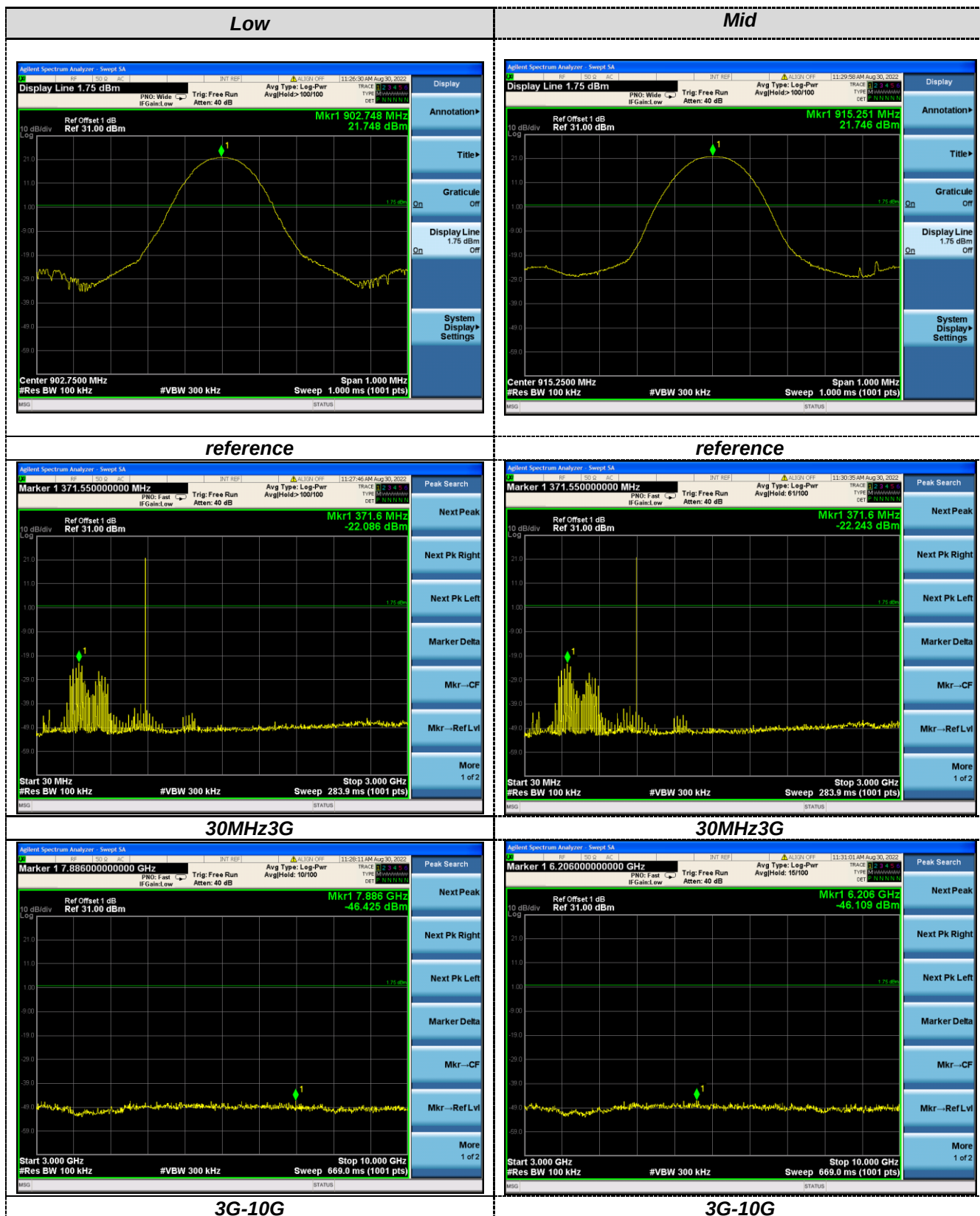
Test Configuration

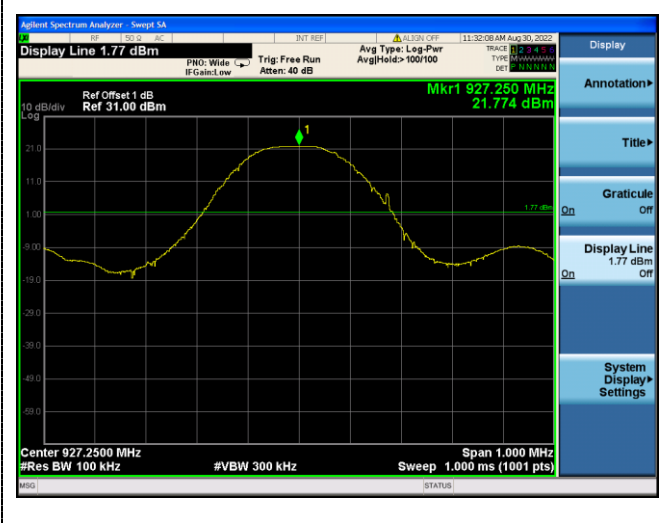
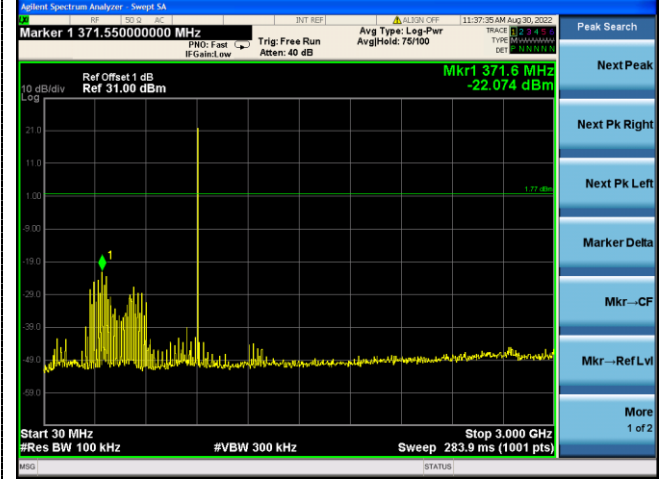
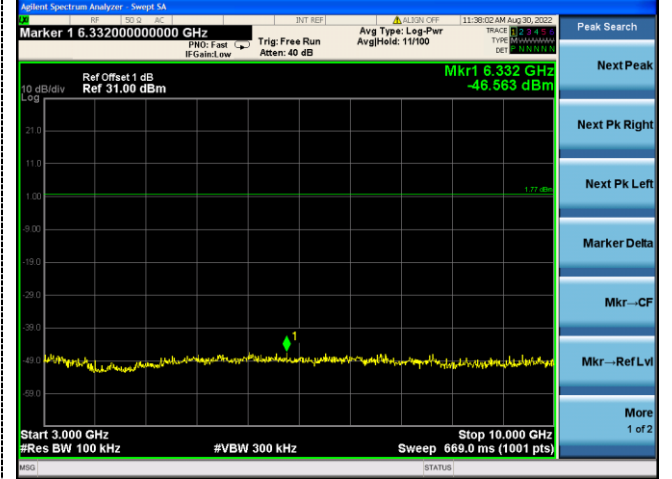


Test Results

Remark: The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and band edge measurement data.

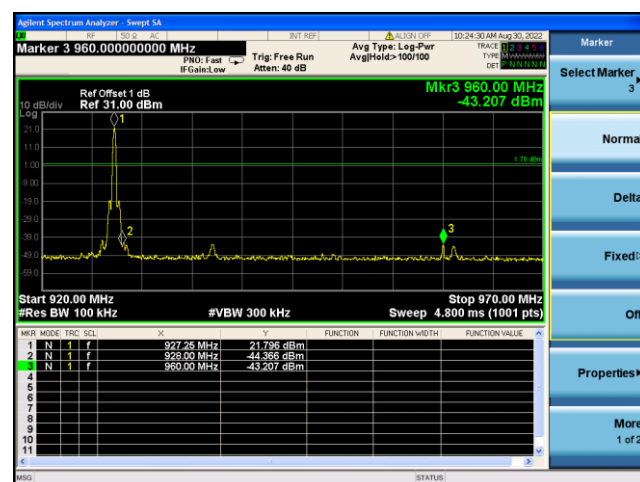
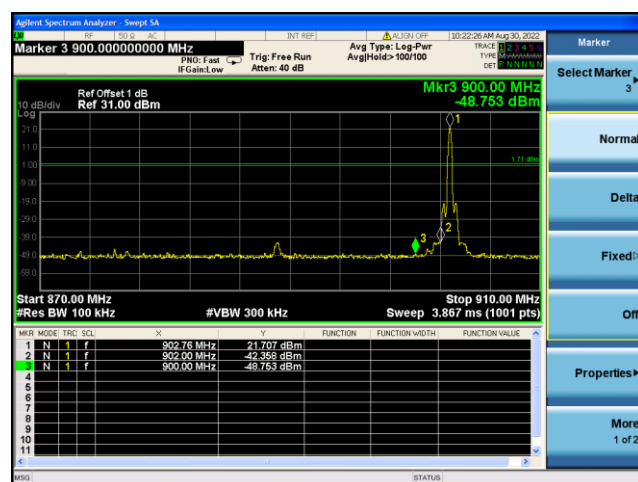
Test plot as follows:



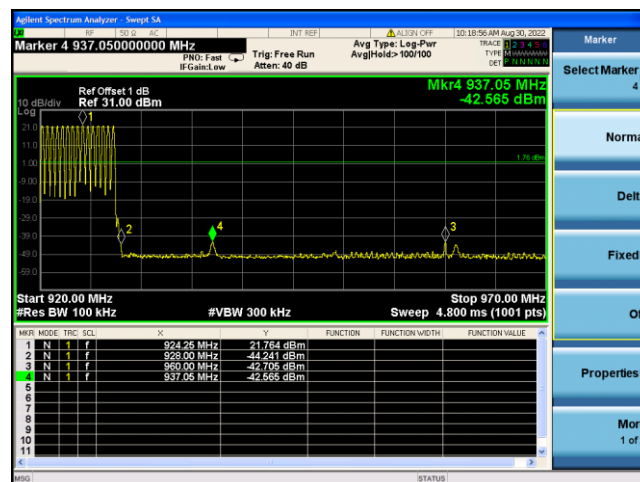
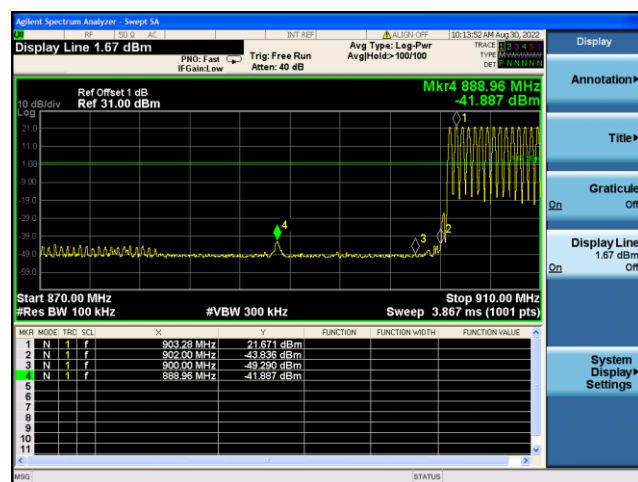
High 	
reference 	
30MHz3G 	
3G-10G	

Band-edge Measurements for RF Conducted Emissions:

GFSK



Left Band edge hopping off



Left Band edge hopping on

Right Band edge hopping off

Right Band edge hopping on

4.9 Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Refer to statement below for compliance

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

Antenna Connected Construction

The maximum gain of antenna was 5.0dBi.

Remark: The antenna gain is provided by the customer, if the data provided by the customer is not accurate, Shenzhen HTT Technology Co., Ltd. does not assume any responsibility.

5 Test Setup Photos of the EUT

Reference to the **appendix I** for details.

6 Photos of the EUT

Reference to the **appendix II** for details.

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