TEST REPORT

Applicant:	Guangzhou Ruifengde Information Technology Co., Ltd
Address of Applicant:	3642, 3644, Huangpu East Road, Huangpu District Guangzhou China
Manufacturer:	Guangzhou Ruifengde Information Technology Co., Ltd
Address of Manufacturer:	3642, 3644, Huangpu East Road, Huangpu District Guangzhou China

Equipment Under Test (EUT)

Product Name:	Radio frequency identification reader
Model No.:	RFD-L50A
Serial No.:	RBLE50-A, RFD-L70A, RFD-L80A, RFD-L90A, RFD-UHF020, RFD-BJ12V, RFD-1610-H, RFD-9917, RFD-U8622, L300e+, RFD-K9525, RFD-N4836, RFD-T9662, RFD-T7025, RFD-UHF020
Trade Mark:	N/A
FCC ID:	**2AZWR- RFD-L50A**
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247
Date of sample receipt:	May.11,2021
Date of Test:	May.11,2021- May.21,2021
Date of report issued:	May.21,2021
Test Result :	PASS *

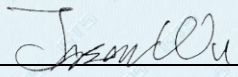
* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

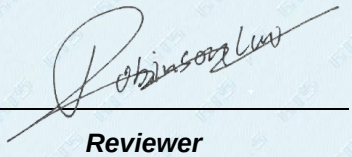
Robinson Luo
Laboratory Manager

2 Version

Version No.	Date	Description
00	*May.21,2021*	*Original*

Tested/Prepared By:  ***Date:*** ***May.21,2021***

Project Engineer

Check By:  ***Date:*** ***May.21,2021***

Reviewer

3 Contents

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4 Test Summary

Test Item	Section in CFR 47	Result
Antenna Requirement	15.203	Pass
AC Power Line Conducted Emission	15.207(a)	Pass
Conducted Peak Output Power	15.247 (b)(2)	Pass
20dB Occupied Bandwidth	15.247 (a)(1)(i)	Pass
Carrier Frequencies Separation	15.247 (a)(1)(i)	Pass
Hopping Channel Number	15.247 (a)(1)(i)	Pass
Dwell Time	15.247 (a)(1)(i)	Pass
Pseudorandom Frequency Hopping Sequence	15.247 (a)(1)(i)	Pass
Radiated Emission	15.205/15.209(a)	Pass
Band Edge	15.247(d)	Pass

Remarks:

1. *Pass: The EUT complies with the essential requirements in the standard.*
2. *Test according to ANSI C63.10:2013*
3. *there are 16 antenna ports, every port has been tested, and list the worst result(Antenna 1) in this report.*

Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	30MHz-200MHz	3.8039dB	(1)
Radiated Emission	200MHz-1GHz	3.9679dB	(1)
Radiated Emission	1GHz-18GHz	4.29dB	(1)
Radiated Emission	18GHz-40GHz	3.30dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	3.44dB	(1)
Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.			

5 General Information

5.1 General Description of EUT

Product Name:	Radio frequency identification reader
Model No.:	RFD-L50A
Serial No.:	RBLE50-A, RFD-L70A, RFD-L80A, RFD-L90A, RFD-UHF020, RFD-BJ12V, RFD-1610-H, RFD-9917, RFD-U8622, L300e+, RFD-K9525, RFD-N4836, RFD-T9662, RFD-T7025, RFD-UHF020
Test sample(s) ID:	GTSL202105000069-1(Engineer sample) GTSL202105000069-2(Normal sample)
Operation Frequency:	902.75MHz~927.25MHz
Channel numbers:	50
Channel separation:	0.5MHz
Modulation type:	GFSK
Antenna Type:	Ceramic Antenna
Antenna gain:	2.0dBi
Power supply:	DC 3.7V From Battery and DC 5V From External Circuit
Adapter Information (Auxiliary test provided by the lab):	Mode: CD122 Input: AC100-240V, 50/60Hz, 500mA Output: DC 5V, 2A

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		

Test CH

Channel	Frequency
The lowest channel	902.75MHz
The middle channel	915.25MHz
The Highest channel	927.25MHz

5.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode.
Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.	

5.3 Description of Support Units

None.

5.4 Deviation from Standards

None.

5.5 Abnormalities from Standard Conditions

None.

5.6 Test Facility

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

● **FCC —Registration No.: 381383**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 381383.

● **IC —Registration No.: 9079A**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A

● **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). LAB CODE:600179-0

5.7 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.
Address: No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102
Tel: 0755-27798480
Fax: 0755-27798960

5.8 Additional Instructions

Test Software	Special test AT command provided by manufacturer
Power level setup	Default

6 Test Instruments list

Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 02 2020	July. 01 2025
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 25 2020	June. 24 2021
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 25 2020	June. 24 2021
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 25 2020	June. 24 2021
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 25 2020	June. 24 2021
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 25 2020	June. 24 2021
9	Coaxial Cable	GTS	N/A	GTS211	June. 25 2020	June. 24 2021
10	Coaxial cable	GTS	N/A	GTS210	June. 25 2020	June. 24 2021
11	Coaxial Cable	GTS	N/A	GTS212	June. 25 2020	June. 24 2021
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 25 2020	June. 24 2021
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 25 2020	June. 24 2021
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 25 2020	June. 24 2021
15	Band filter	Amindeon	82346	GTS219	June. 25 2020	June. 24 2021
16	Power Meter	Anritsu	ML2495A	GTS540	June. 25 2020	June. 24 2021
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 25 2020	June. 24 2021
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 25 2020	June. 24 2021
19	Splitter	Agilent	11636B	GTS237	June. 25 2020	June. 24 2021
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 25 2020	June. 24 2021
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	GTS579	Oct. 18 2020	Oct. 17 2021
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 18 2020	Oct. 17 2021
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 18 2020	Oct. 17 2021
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June. 25 2020	June. 24 2021

Conducted Emission						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	May.15 2019	May.14 2022
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 25 2020	June. 24 2021
3	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June. 25 2020	June. 24 2021
4	ENV216 2-L-V-NETZNACHB.DE	ROHDE&SCHWARZ	ENV216	GTS226	June. 25 2020	June. 24 2021
5	Coaxial Cable	GTS	N/A	GTS227	N/A	N/A
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Thermo meter	KTJ	TA328	GTS233	June. 25 2020	June. 24 2021
8	Absorbing clamp	Elektronik-Feinmechanik	MDS21	GTS229	June. 25 2020	June. 24 2021
9	ISN	SCHWARZBECK	NTFM 8158	GTS565	June. 25 2020	June. 24 2021

RF Conducted Test:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	June. 25 2020	June. 24 2021
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 25 2020	June. 24 2021
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June. 25 2020	June. 24 2021
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	June. 25 2020	June. 24 2021
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	June. 25 2020	June. 24 2021
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	June. 25 2020	June. 24 2021
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	June. 25 2020	June. 24 2021
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	June. 25 2020	June. 24 2021

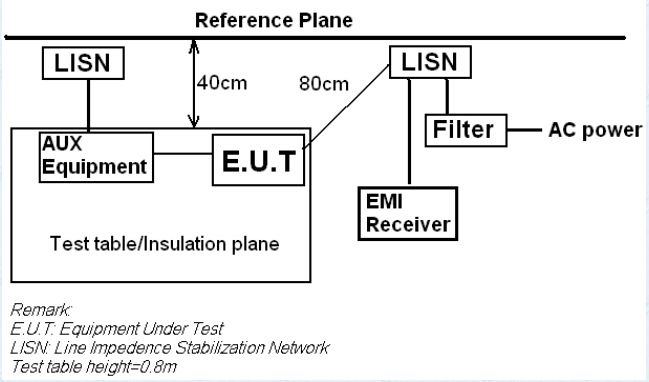
General used equipment:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	June. 25 2020	June. 24 2021
2	Barometer	ChangChun	DYM3	GTS255	June. 25 2020	June. 24 2021

7 Test results and Measurement Data

7.1 Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203 /247(c)
15.203 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.	
E.U.T Antenna:	
The antenna is Ceramic Antenna, the best case gain of the is 2.00dBi, reference to the appendix II for details	

7.2 Conducted Emissions

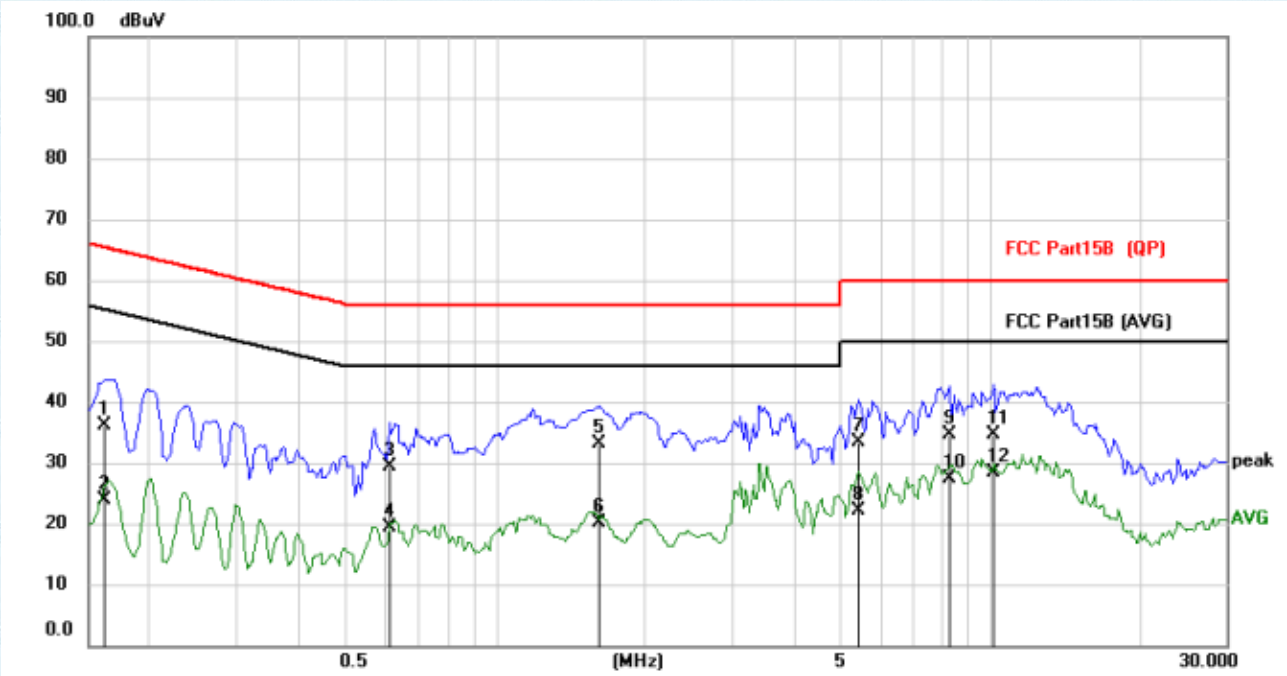
Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10:2013
Test Frequency Range:	150KHz to 30MHz
Class / Severity:	Class B
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto
Limit:	Frequency range (MHz) / Limit (dBuV): Quasi-peak / Average 0.15-0.5: 66 to 56* / 56 to 46* 0.5-5: 56 / 46 5-30: 60 / 50 * Decreases with the logarithm of the frequency.
Test setup:	 *Remark:* *E.U.T: Equipment Under Test* *LISN: Line Impedence Stabilization Network* *Test table height=0.8m*
Test procedure:	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test environment:	Temp.: 24 °C / Humid.: 54% / Press.: 1012mbar
Test voltage:	AC 120V, 60Hz
Test results:	Pass

Remark: Both high and low voltages have been tested to show only the worst low voltage test data.

Pre-scan all channels, found worst case at 915.25MHz, and so only show the test result of 915.25MHz

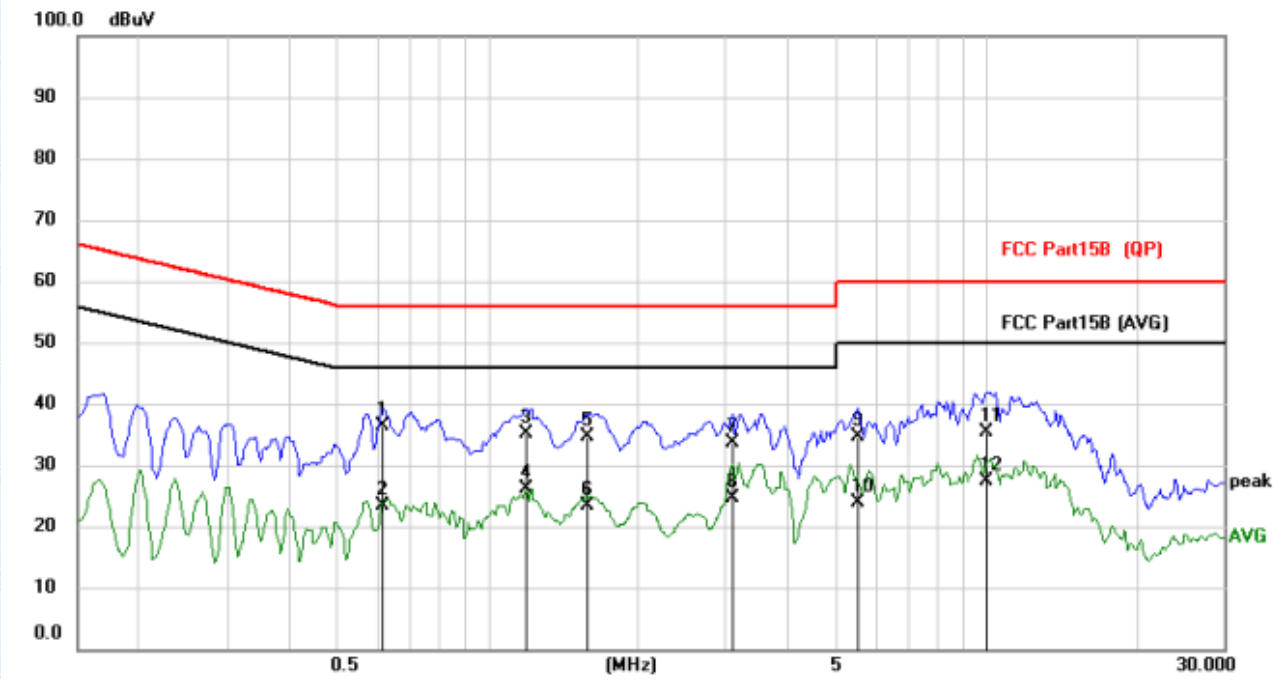
Measurement data:

Test mode:	915.25MHz mode	Phase Polarity:	Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1617	25.17	10.92	36.09	65.38	-29.29	QP
2		0.1617	12.95	10.92	23.87	55.38	-31.51	AVG
3		0.6102	18.55	10.92	29.47	56.00	-26.53	QP
4		0.6102	8.53	10.92	19.45	46.00	-26.55	AVG
5		1.6164	22.12	10.94	33.06	56.00	-22.94	QP
6		1.6164	9.18	10.94	20.12	46.00	-25.88	AVG
7		5.3944	22.33	11.12	33.45	60.00	-26.55	QP
8		5.3944	11.06	11.12	22.18	50.00	-27.82	AVG
9		8.2494	23.26	11.27	34.53	60.00	-25.47	QP
10		8.2494	16.00	11.27	27.27	50.00	-22.73	AVG
11		10.1409	23.23	11.37	34.60	60.00	-25.40	QP
12	*	10.1409	17.00	11.37	28.37	50.00	-21.63	AVG

Test mode:	915.25MHz mode	Phase Polarity:	Neutral

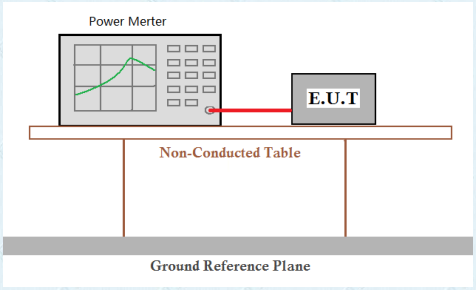


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1	*	0.6141	25.54	10.92	36.46	56.00	-19.54	QP
2		0.6141	12.40	10.92	23.32	46.00	-22.68	AVG
3		1.1913	24.21	10.92	35.13	56.00	-20.87	QP
4		1.1913	15.09	10.92	26.01	46.00	-19.99	AVG
5		1.5890	23.59	10.94	34.53	56.00	-21.47	QP
6		1.5890	12.42	10.94	23.36	46.00	-22.64	AVG
7		3.0975	22.56	11.02	33.58	56.00	-22.42	QP
8		3.0975	13.49	11.02	24.51	46.00	-21.49	AVG
9		5.5076	23.56	11.13	34.69	60.00	-25.31	QP
10		5.5076	12.78	11.13	23.91	50.00	-26.09	AVG
11		10.0161	23.96	11.36	35.32	60.00	-24.68	QP
12		10.0161	16.00	11.36	27.36	50.00	-22.64	AVG

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level =Receiver Read level + LISN Factor + Cable Loss

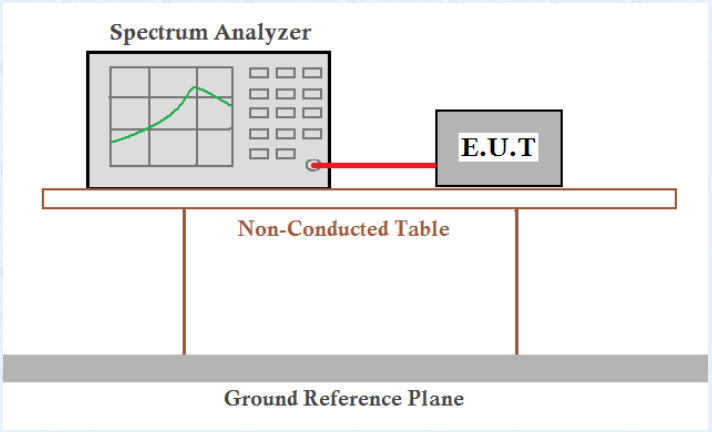
7.3 Conducted Peak Output Power

Test Requirement:	FCC Part15 C Section 15.247 (b)(2)					
Test Method:	ANSI C63.10:2013					
Limit:	30dBm(for GFSK)					
Test setup:						
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test environment:	Temp.:	25 °C	Humid.:	53%	Press.:	1012mbar
Test voltage:	AC 120V, 60Hz					
Test results:	Pass					

Measurement Data

Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	9.288	30.00	Pass
Middle	9.104		
Highest	8.761		

7.4 20dB Emission Bandwidth

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)(i)
Test Method:	ANSI C63.10:2013
Limit:	N/A
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details

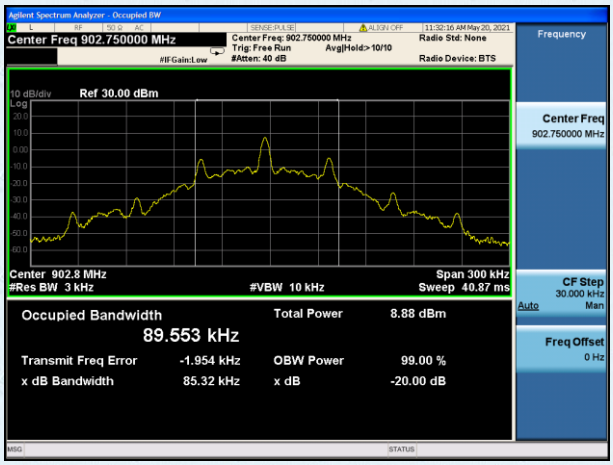
Test environment:	Temp.:	25 °C	Humid.:	53%	Press.:	1012mbar
Test voltage:	AC 120V, 60Hz					
Test results:	Pass					

Measurement Data

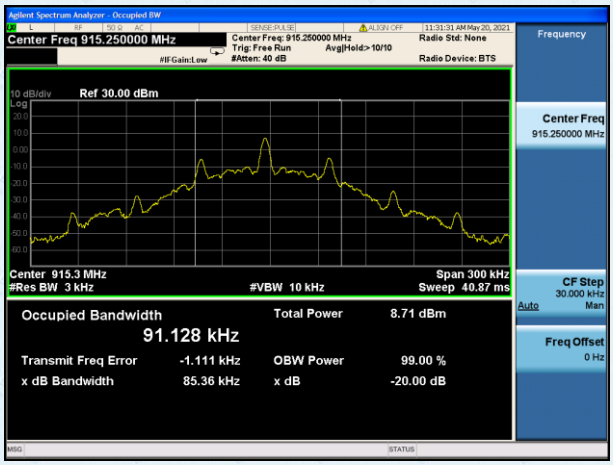
Test channel	20dB Emission Bandwidth (KHz)	Result
Lowest	85.32	Pass
Middle	85.36	
Highest	85.38	

Test plot as follows:

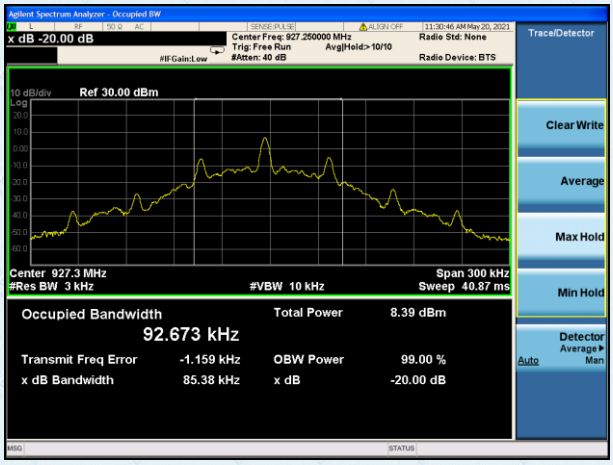
Test mode:	GFSK mode



Lowest channel

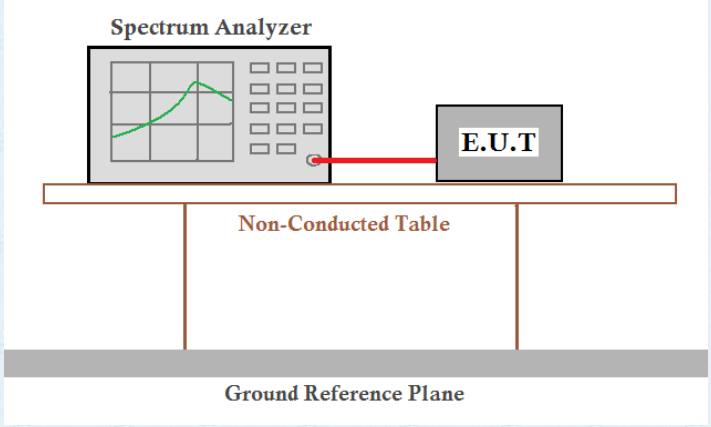


Middle channel



Highest channel

7.5 Carrier Frequencies Separation

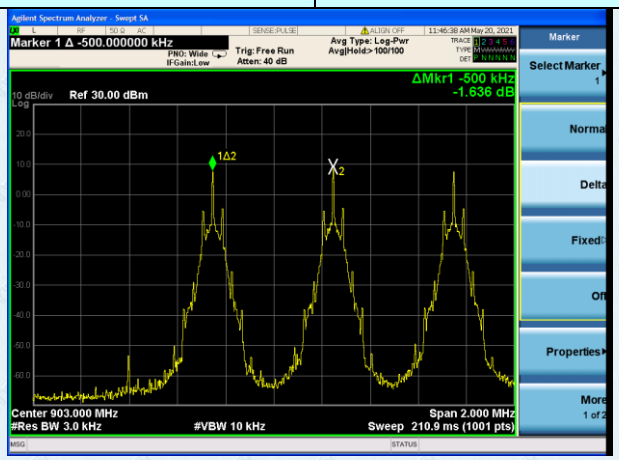
Test Requirement:	FCC Part15 C Section 15.247 (a)(1)(i)					
Test Method:	ANSI C63.10:2013					
Receiver setup:	RBW=30KHz, VBW=100KHz, detector=Peak					
Limit:	20dB bandwidth					
Test setup:						
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test environment:	Temp.:	25 °C	Humid.:	53%	Press.:	1012mbar
Test voltage:	AC 120V, 60Hz					
Test results:	Pass					

Measurement Data

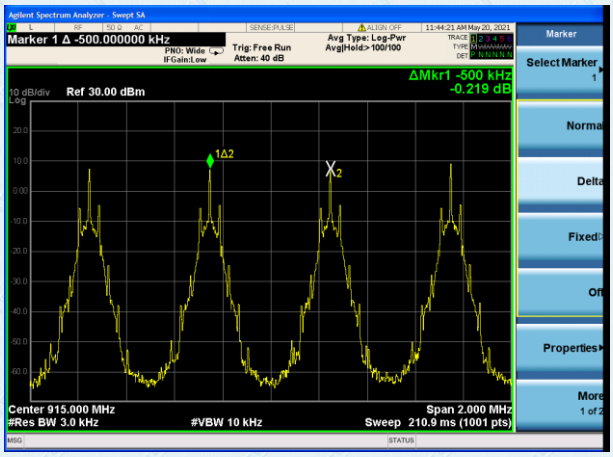
Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Lowest	500	0.025MHz or 20dB bandwidth	Pass
Middle	500	0.025MHz or 20dB bandwidth	Pass
Highest	498	0.025MHz or 20dB bandwidth	Pass

Test plot as follows:

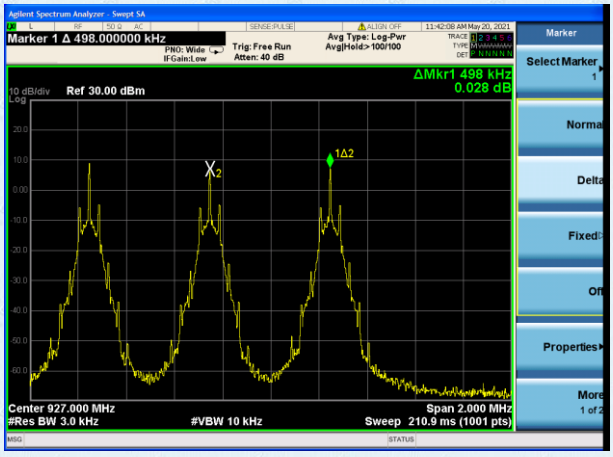
Modulation mode:	GFSK



Lowest channel

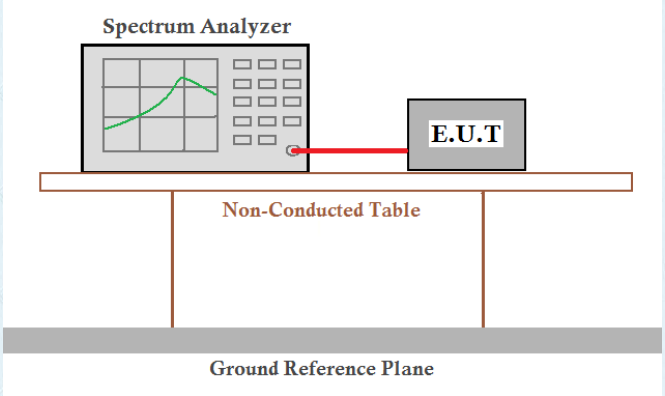


Middle channel



Highest channel

7.6 Hopping Channel Number

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)(i)					
Test Method:	ANSI C63.10:2013					
Receiver setup:	RBW=30kHz, VBW=100kHz, Frequency range=916.5MHz-922.5MHz, Detector=Peak					
Limit:	50 channels					
Test setup:						
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test environment:	Temp.:	25 °C	Humid.:	53%	Press.:	1012mbar
Test voltage:	AC 120V, 60Hz					
Test results:	Pass					

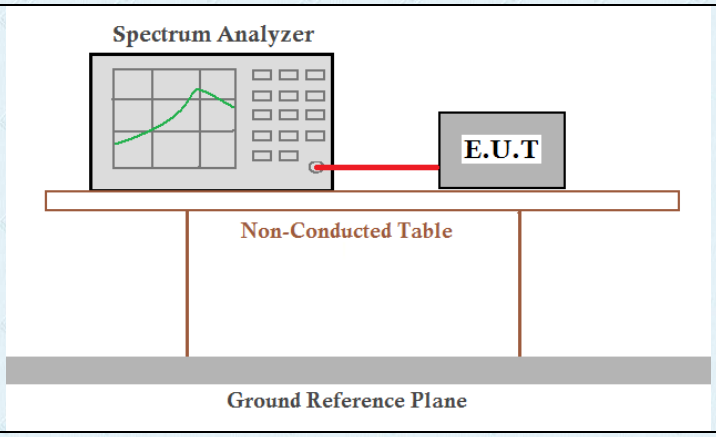
Measurement Data:

Mode	Hopping channel numbers	Limit	Result
GFSK	50	50	Pass

Test plot as follows:

Test mode:	GFSK

7.7 Dwell Time

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)(i)					
Test Method:	ANSI C63.10:2013					
Receiver setup:	RBW=10kHz, VBW=30kHz, Span=0Hz, Detector=Peak					
Limit:	0.4 Second					
Test setup:						
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test environment:	Temp.:	25 °C	Humid.:	53%	Press.:	1012mbar
Test voltage:	AC 120V, 60Hz					
Test results:	Pass					

Measurement Data

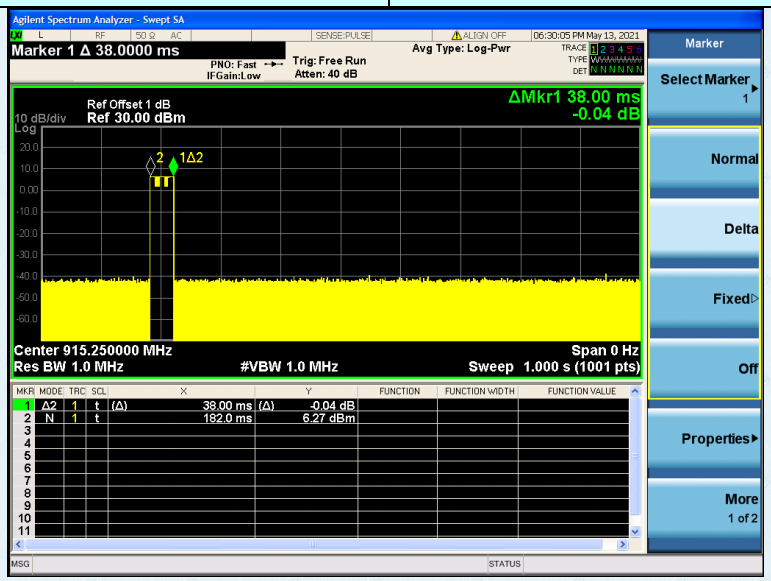
Frequency(MHz)	Pulse Width (s)	Number of hopping channels in 20s	Dwell time (s)	Limit (s)
915.25	0.038	10	0.380	0.4

Note: For frequency hopping systems operating in the 902–928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period.

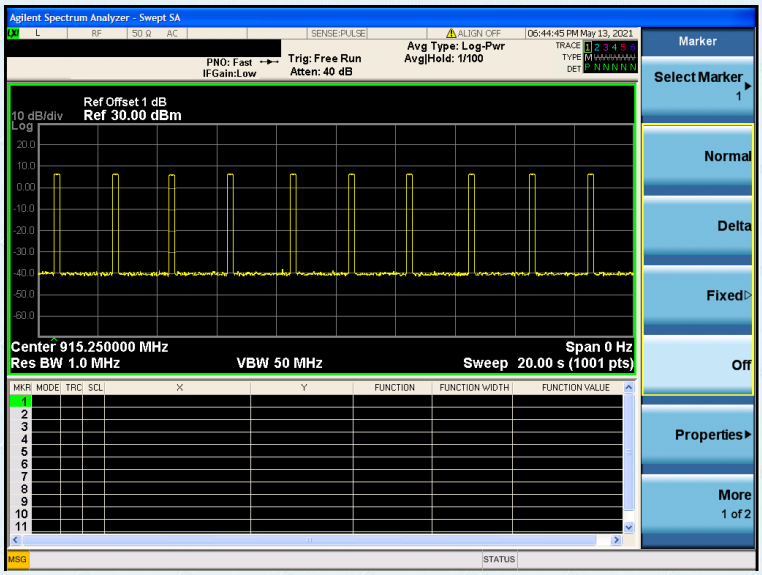
Dwell Time = Number of hopping channels in 20s * Pulse Width

Test plot as follows:

Test channel	Middle



Ton



Ton times in 20s

7.8 Band Edge

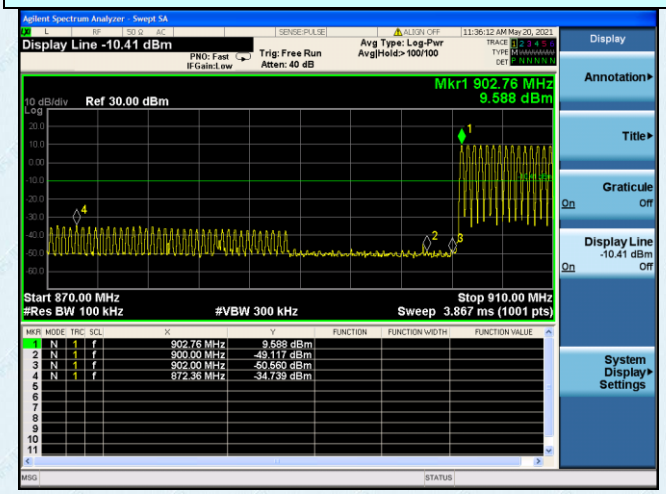
Test Requirement:	FCC Part15 C Section 15.247 (d)					
Test Method:	ANSI C63.10:2013					
Receiver setup:	RBW=100kHz, VBW=300kHz, Detector=Peak					
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test environment:	Temp.:	25 °C	Humid.:	53%	Press.:	1012mbar
Test voltage:	AC 120V, 60Hz					
Test results:	Pass					

Out of Band Conducted Emissions, FCC Rule 15.247(d):

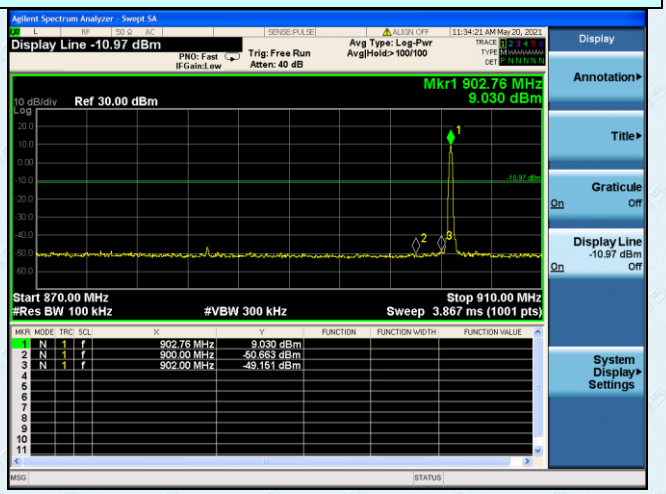
In any 100 KHz bandwidth outside the EUT passband, the RF power produced by the modulation products of the spreading sequence, the information sequence, and the carrier frequency shall be at least 20 dB below that of the maximum in-band 100 kHz emission.

Test plot as follows:

Test channel:	Lowest channel

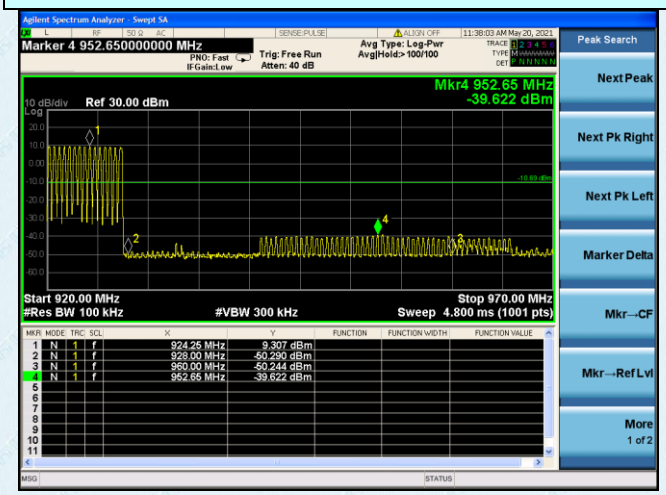


Hopping mode

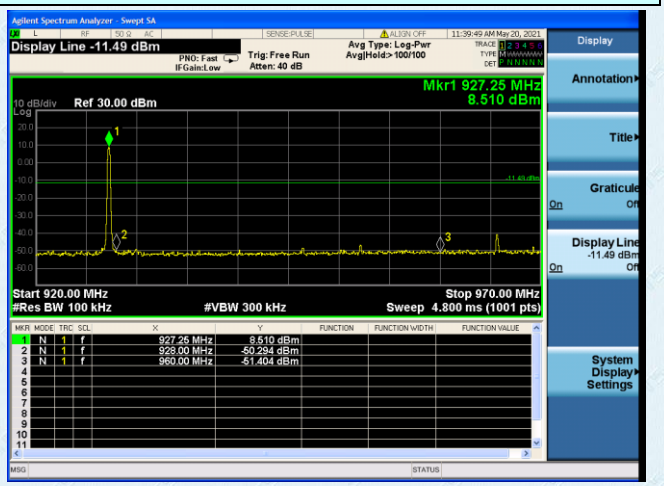


No-hopping mode

Test channel:	Highest channel



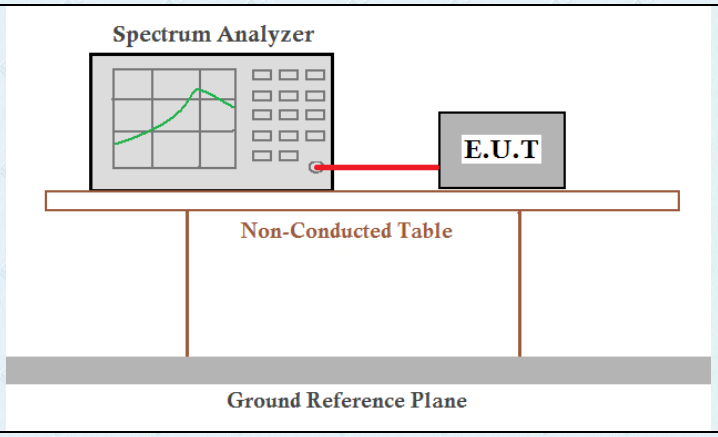
Hopping mode



No-hopping mode

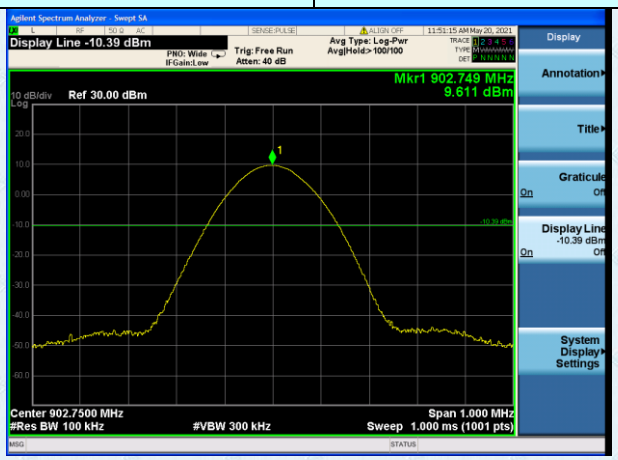
7.9 Spurious Emission

7.9.1 Conducted Emission Method

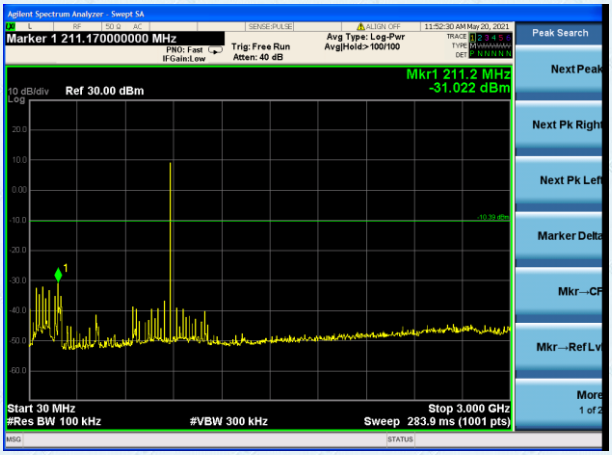
Test Requirement:	FCC Part15 C Section 15.247 (d)					
Test Method:	ANSI C63.10:2013					
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 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.					
Test setup:						
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test environment:	Temp.:	25 °C	Humid.:	53%	Press.:	1012mbar
Test voltage:	AC 120V, 60Hz					
Test results:	Pass					

All spurious emission and up to the tenth harmonic was measured and they were found to be at least 20 dB below the highest level of the desired power in the passband.

Test channel:	Lowest channel



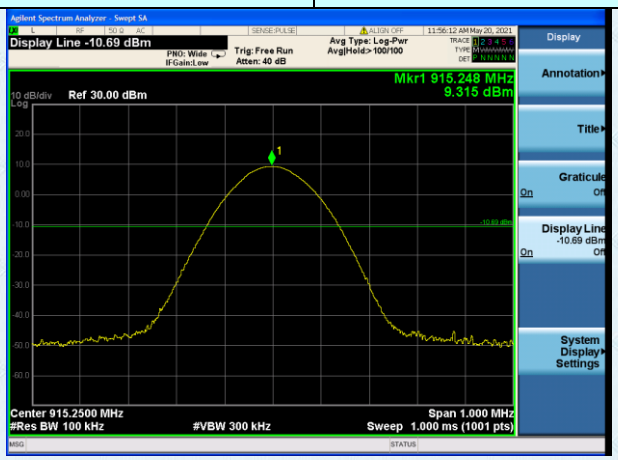
902.75



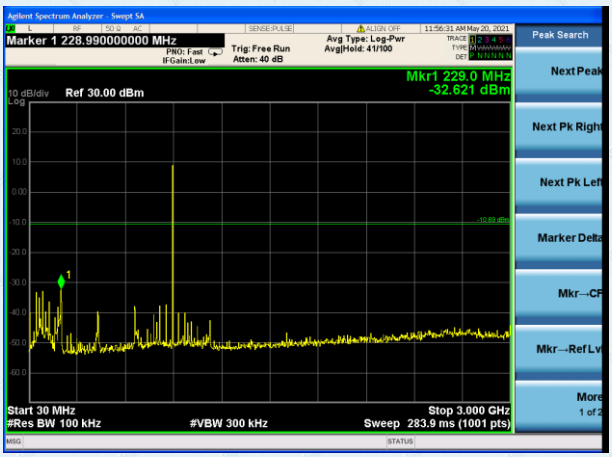
30MHz-3G

3G -10G

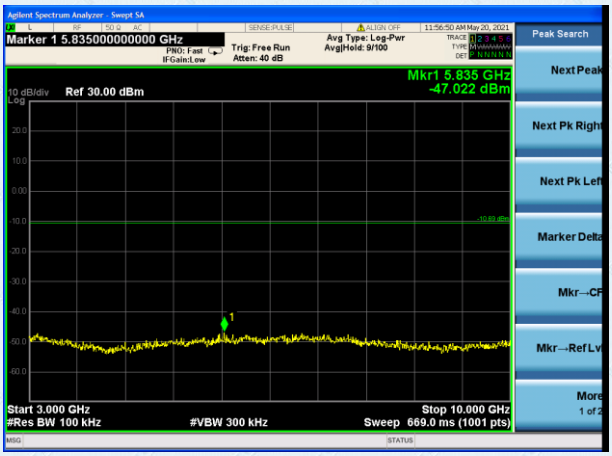
Test channel:	Middle channel



915.25

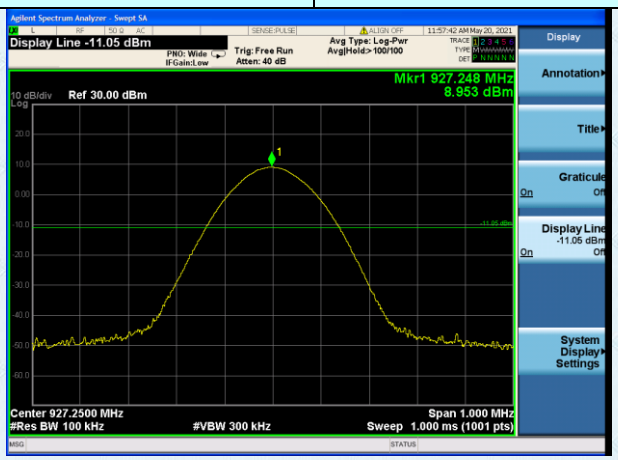


30MHz-3G

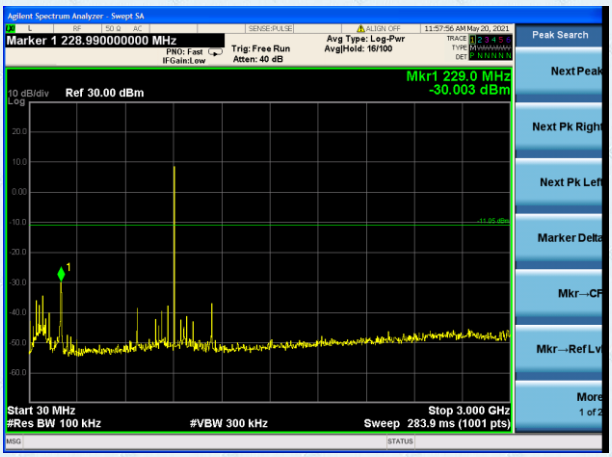


3G -10G

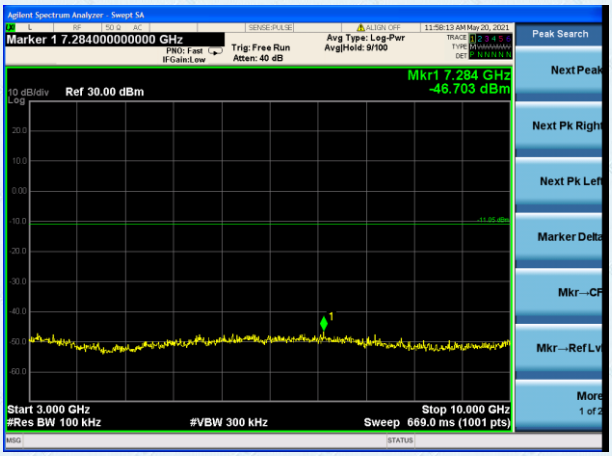
Test channel:	Highest channel



927.25



30M-3G



3G -10G

7.9.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209
Test Method:	ANSI C63.10:2013
Test Frequency Range:	9kHz to 25GHz
Test site:	Measurement Distance: 3m

Receiver setup:

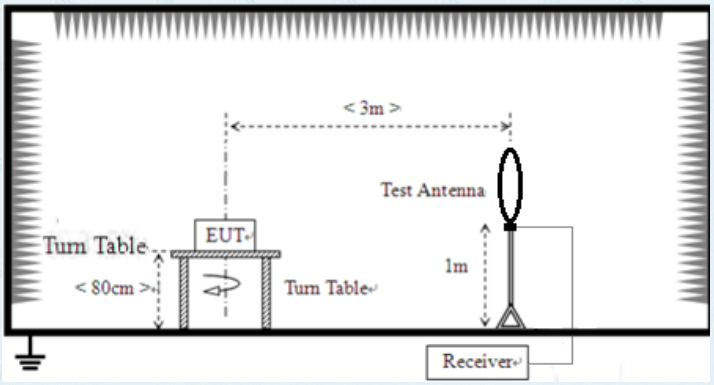
Frequency	Detector	RBW	VBW	Value
9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

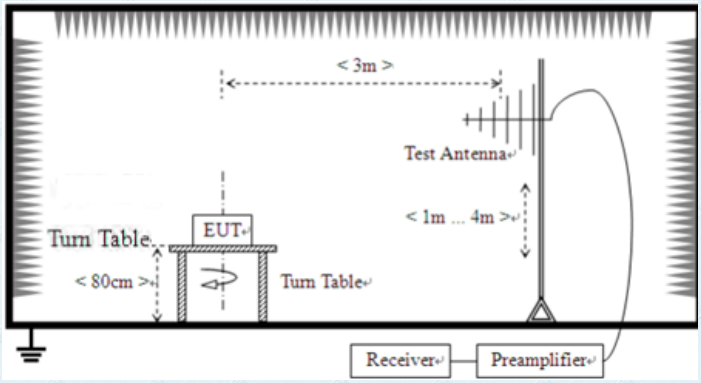
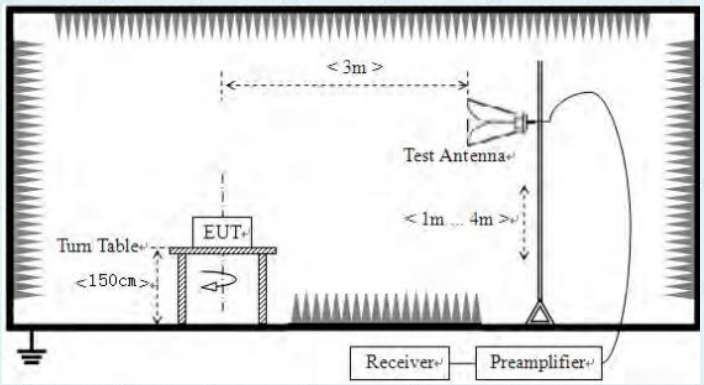
Limit:

Frequency	Limit (uV/m)	Value	Measurement Distance
0.009MHz-0.490MHz	2400/F(KHz)	QP	300m
0.490MHz-1.705MHz	24000/F(KHz)	QP	30m
1.705MHz-30MHz	30	QP	30m
30MHz-88MHz	100	QP	3m
88MHz-216MHz	150	QP	
216MHz-960MHz	200	QP	
960MHz-1GHz	500	QP	
Above 1GHz	500	Average	
	5000	Peak	

Test setup:

For radiated emissions from 9kHz to 30MHz



	For radiated emissions from 30MHz to1GHz  For radiated emissions above 1GHz 
Test Procedure:	1. The EUT was placed on the top of a rotating table (0.8m for below 1G and 1.5m for above 1G) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. 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. 4. 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 and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. 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.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details

Test environment:	Temp.:	24-25 °C	Humid.:	48-49%	Press.:	1012mbar
Test voltage:	AC 120V, 60Hz					
Test results:	Pass					

Measurement data:

Remarks:

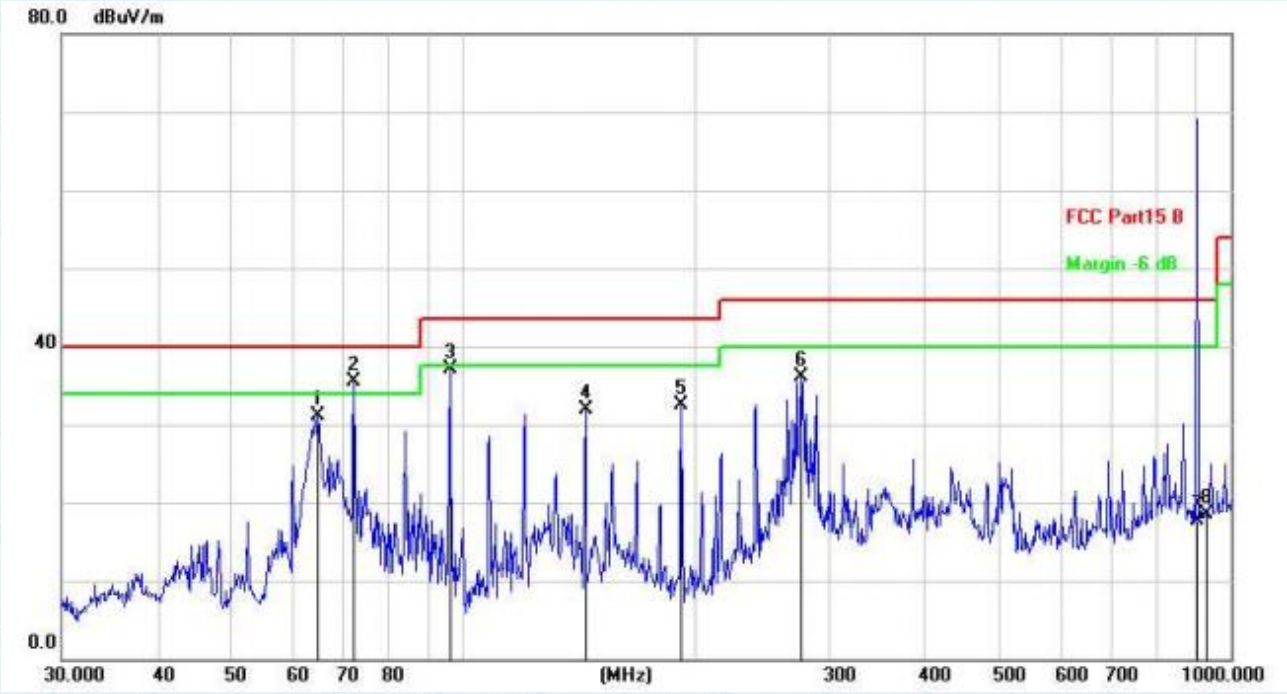
1. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.

■ **9kHz~30MHz**

The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

■ **Below 1GHz**

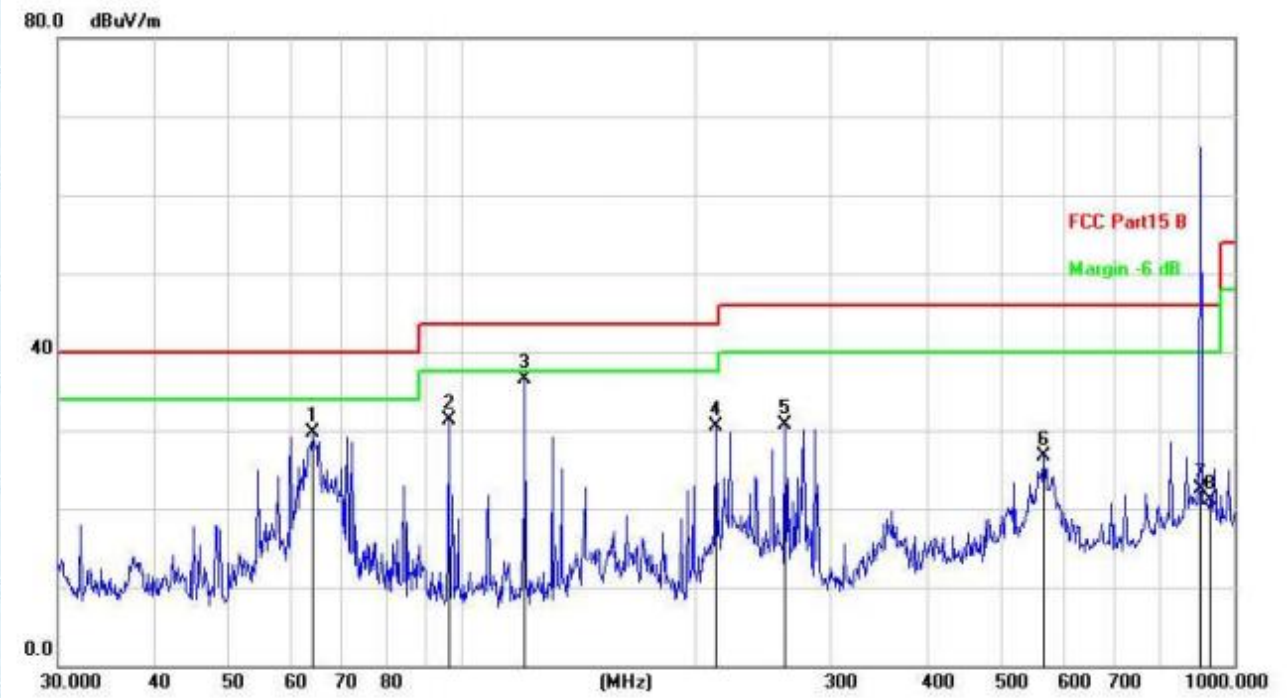
Antenna Polarity:	Horizontal	Test channel:	Lowest



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		64.6594	50.34	-19.30	31.04	40.00	-8.96	QP
2	*	72.0843	55.60	-20.12	35.48	40.00	-4.52	QP
3		96.0986	57.99	-20.82	37.17	43.50	-6.33	QP
4		144.3348	49.99	-18.11	31.88	43.50	-11.62	QP
5		192.4186	52.55	-19.96	32.59	43.50	-10.91	QP
6		276.1235	55.12	-19.00	36.12	46.00	-9.88	QP
7		902.0000	27.18	-9.55	17.63	46.00	-28.37	QP
8		928.0000	27.77	-9.25	18.52	46.00	-27.48	QP

Final Level =Receiver Read level + Correct Factor

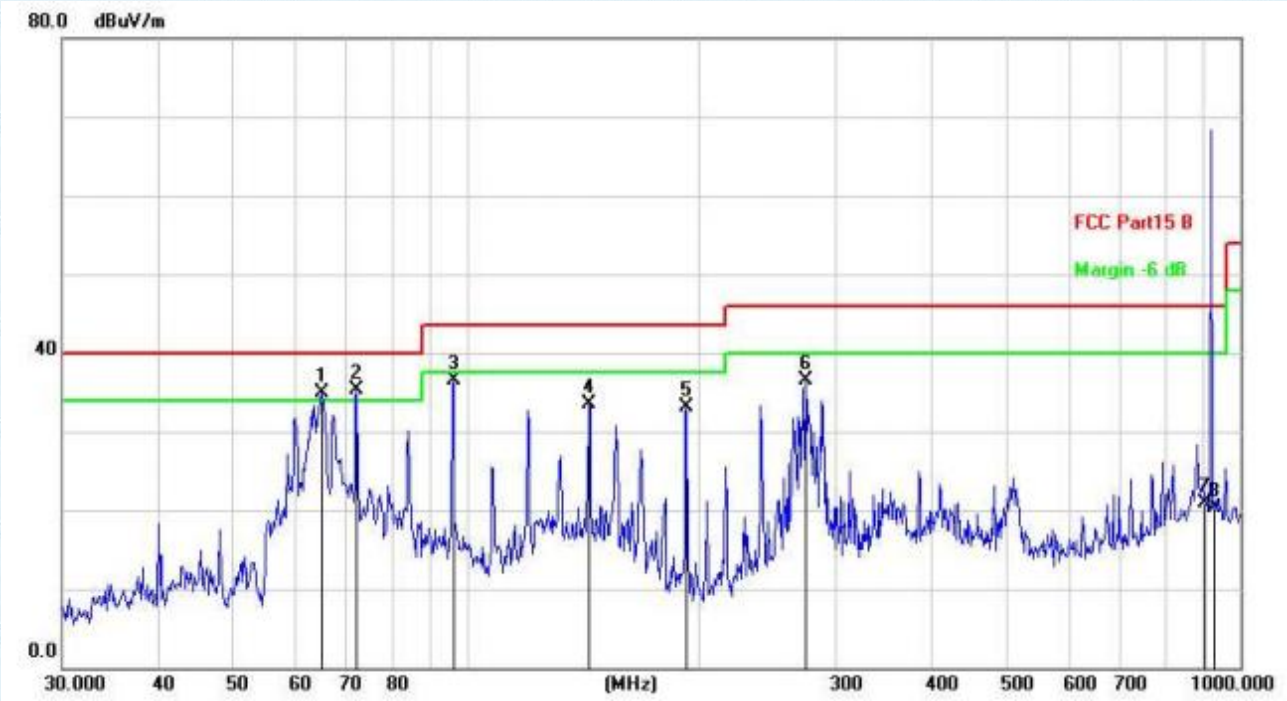
Antenna Polarity:	Vertical	Test channel:	Lowest



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		63.9828	48.95	-19.22	29.73	40.00	-10.27	QP
2		96.0986	52.16	-20.82	31.34	43.50	-12.16	QP
3	*	120.6991	56.37	-19.87	36.50	43.50	-7.00	QP
4		213.0151	50.13	-19.67	30.46	43.50	-13.04	QP
5		261.9753	49.96	-19.21	30.75	46.00	-15.25	QP
6		566.6223	40.61	-13.89	26.72	46.00	-19.28	QP
7		902.0000	32.07	-9.55	22.52	46.00	-23.48	QP
8		928.0000	30.48	-9.31	21.17	46.00	-24.83	QP

Final Level =Receiver Read level + Correct Factor

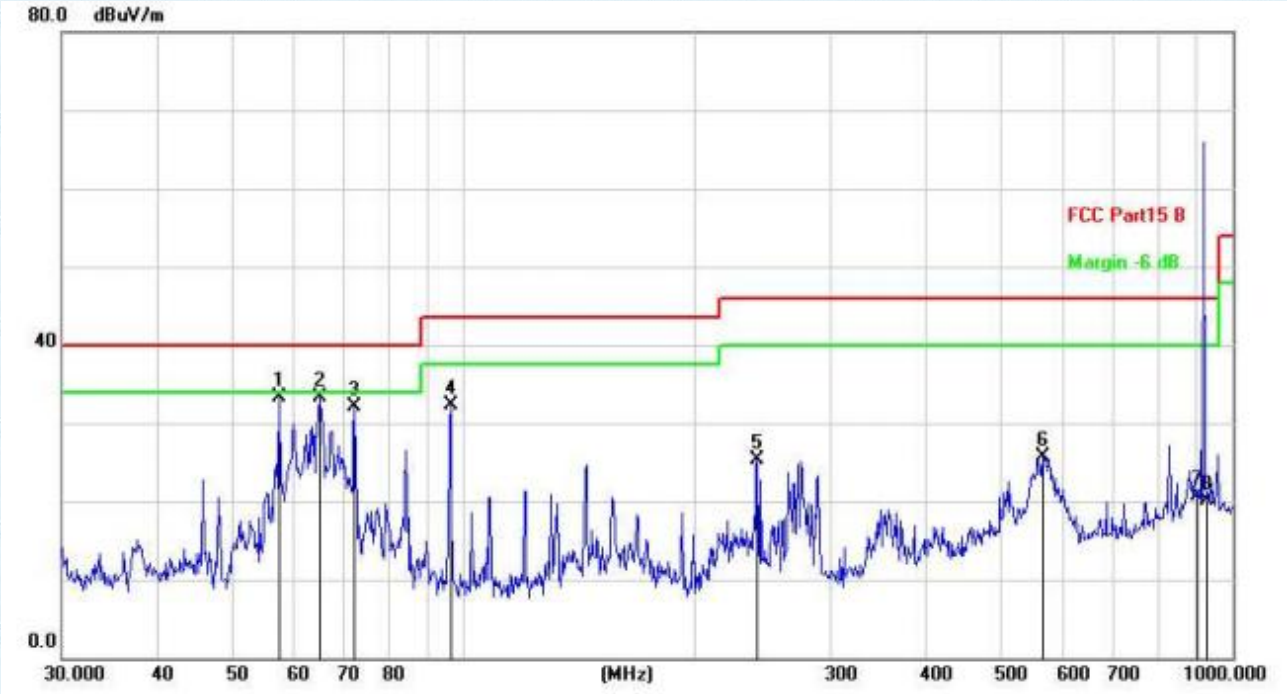
Antenna Polarity:	Horizontal	Test channel:	Middle



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1	!	65.1145	54.19	-19.35	34.84	40.00	-5.16	QP
2	*	72.0841	55.48	-20.12	35.36	40.00	-4.64	QP
3		96.0986	57.39	-20.82	36.57	43.50	-6.93	QP
4		143.8294	51.74	-18.16	33.58	43.50	-9.92	QP
5		192.4185	53.02	-19.96	33.06	43.50	-10.44	QP
6		274.1938	55.50	-19.01	36.49	46.00	-9.51	QP
7		902.0000	30.49	-9.55	20.94	46.00	-25.06	QP
8		928.0000	29.55	-9.25	20.30	46.00	-25.70	QP

Final Level =Receiver Read level + Correct Factor

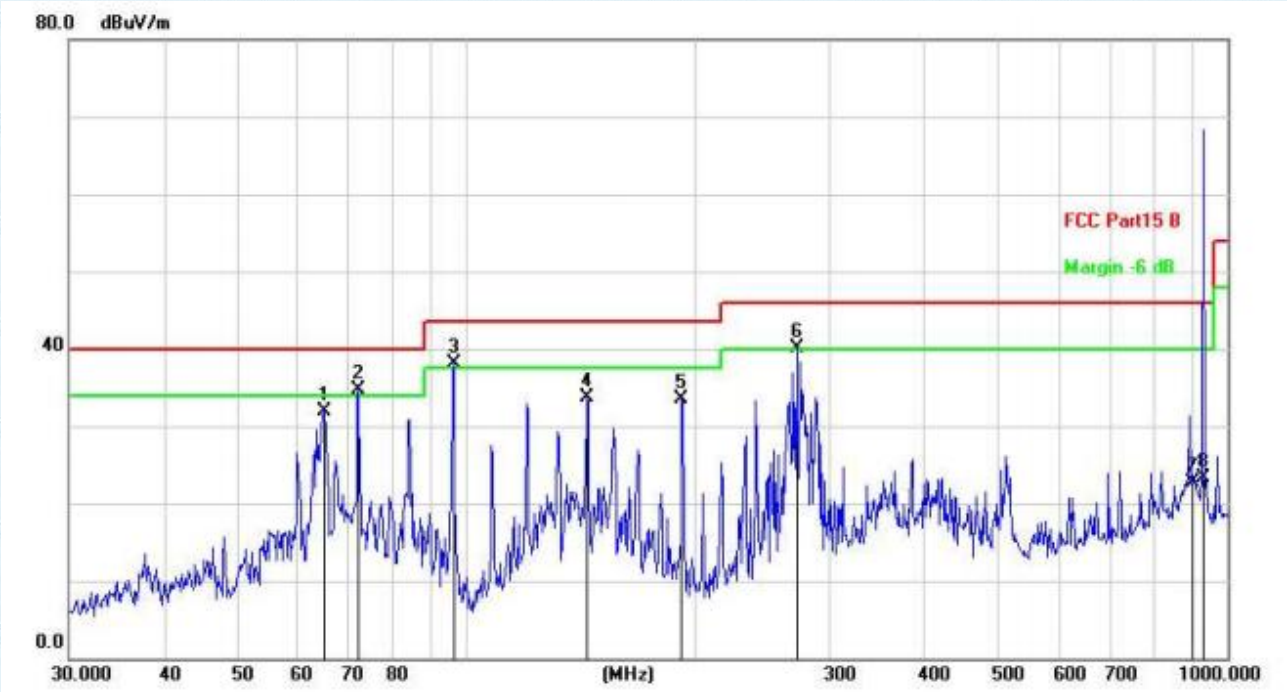
Antenna Polarity:	Vertical	Test channel:	Middle



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1	*	57.5939	52.04	-18.69	33.35	40.00	-6.65	QP
2		65.1145	52.61	-19.35	33.26	40.00	-6.74	QP
3		72.0843	52.20	-20.12	32.08	40.00	-7.92	QP
4		96.0986	53.14	-20.82	32.32	43.50	-11.18	QP
5		240.8304	44.93	-19.57	25.36	46.00	-20.64	QP
6		566.6223	39.56	-13.89	25.67	46.00	-20.33	QP
7		902.0000	30.27	-9.55	20.72	46.00	-25.28	QP
8		928.0000	29.38	-9.31	20.07	46.00	-25.93	QP

Final Level =Receiver Read level + Correct Factor

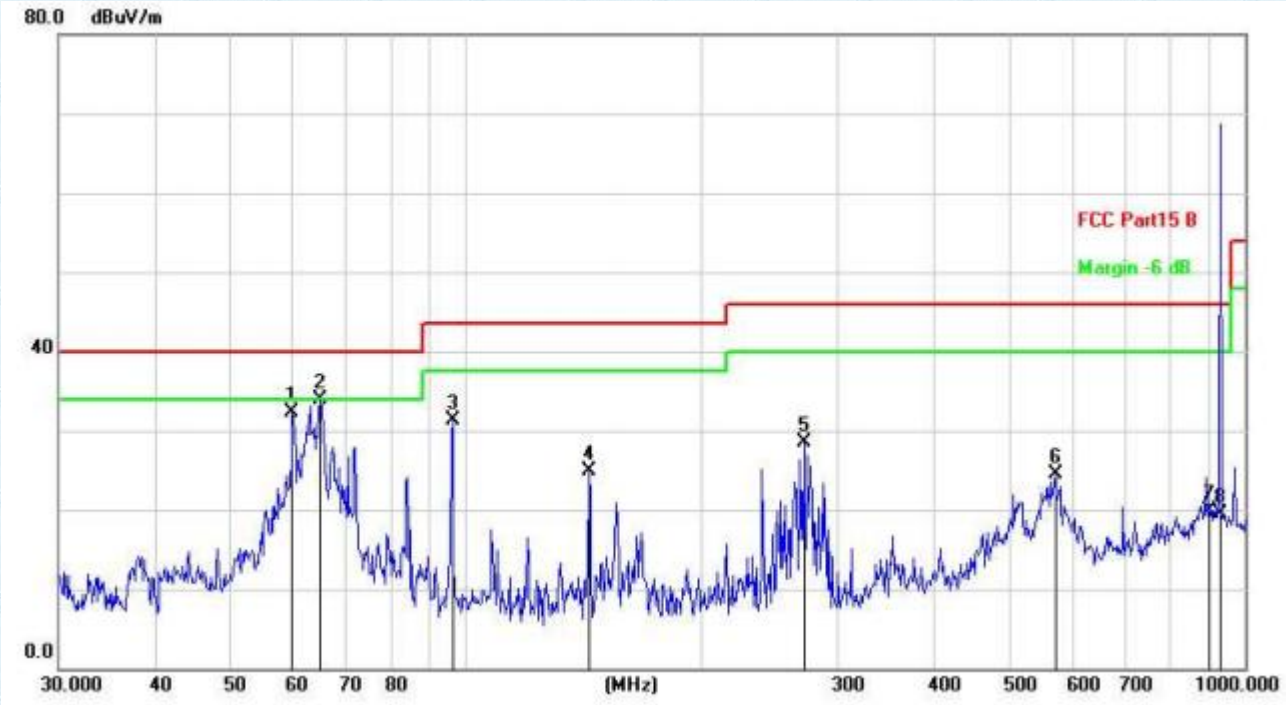
Antenna Polarity:	Horizontal	Test channel:	Highest



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		64.8865	51.19	-19.33	31.86	40.00	-8.14	QP
2	*	72.0843	54.84	-20.12	34.72	40.00	-5.28	QP
3	!	96.0986	58.92	-20.82	38.10	43.50	-5.40	QP
4		143.8295	51.82	-18.16	33.66	43.50	-9.84	QP
5		191.7450	53.35	-19.94	33.41	43.50	-10.09	QP
6	!	271.3246	59.13	-19.02	40.11	46.00	-5.89	QP
7		902.0000	32.24	-9.55	22.69	46.00	-23.31	QP
8		928.0000	32.50	-9.25	23.25	46.00	-22.75	QP

Final Level =Receiver Read level + Correct Factor

Antenna Polarity:	Vertical	Test channel:	Highest



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		59.8588	50.96	-18.75	32.21	40.00	-7.79	QP
2	*	65.1145	53.29	-19.35	33.94	40.00	-6.06	QP
3		96.0986	52.19	-20.82	31.37	43.50	-12.13	QP
4		143.8295	43.00	-18.16	24.84	43.50	-18.66	QP
5		271.3246	47.76	-19.35	28.41	46.00	-17.59	QP
6		570.6100	38.41	-13.82	24.59	46.00	-21.41	QP
7		902.0000	29.41	-9.55	19.86	46.00	-26.14	QP
8		928.0000	28.82	-9.31	19.51	46.00	-26.49	QP

Final Level =Receiver Read level + Correct Factor

■ **Above 1GHz**

Low channel

Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
1240	56.74	-9.08	47.66	74	-26.34	peak
1240	45.96	-9.08	36.88	54	-17.12	AVG
1805.5	60.35	-8.67	51.68	74	-22.32	peak
1805.5	47.55	-8.67	38.88	54	-15.12	AVG
2708.25	54.63	-4.12	50.51	74	-23.49	peak
2708.25	42.36	-4.12	38.24	54	-15.76	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
1240	58.12	-9.08	49.04	74	-24.96	peak
1240	45.62	-9.08	36.54	54	-17.46	AVG
1805.5	63.55	-8.67	54.88	74	-19.12	peak
1805.5	45.86	-8.67	37.19	54	-16.81	AVG
2708.25	55.93	-4.12	51.81	74	-22.19	peak
2708.25	43.21	-4.12	39.09	54	-14.91	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Mid channel

Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
1240	57.36	-9.08	48.28	74	-25.72	peak
1240	46.25	-9.08	37.17	54	-16.83	AVG
1830.5	60.32	-8.79	51.53	74	-22.47	peak
1830.5	45.72	-8.79	36.93	54	-17.07	AVG
2745.75	56.82	-4.05	52.77	74	-21.23	peak
2745.75	41.22	-4.05	37.17	54	-16.83	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
1240	58.63	-9.08	49.55	74	-24.45	peak
1240	44.22	-9.08	35.14	54	-18.86	AVG
1830.5	62.35	-8.79	53.56	74	-20.44	peak
1830.5	46.59	-8.79	37.8	54	-16.2	AVG
2745.75	54.22	-4.05	50.17	74	-23.83	peak
2745.75	41.39	-4.05	37.34	54	-16.66	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

High channel

Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
1240	59.36	-9.08	50.28	74	-23.72	peak
1240	42.26	-9.08	33.18	54	-20.82	AVG
1854.5	60.22	-8.85	51.37	74	-22.63	peak
1854.5	44.79	-8.85	35.94	54	-18.06	AVG
2781.75	56.83	-4.01	52.82	74	-21.18	peak
2781.75	42.66	-4.01	38.65	54	-15.35	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
1240	57.49	-9.08	48.41	74	-25.59	peak
1240	44.25	-9.08	35.17	54	-18.83	AVG
1854.5	60.39	-8.85	51.54	74	-22.46	peak
1854.5	46.25	-8.85	37.4	54	-16.6	AVG
2781.75	55.36	-4.01	51.35	74	-22.65	peak
2781.75	44.72	-4.01	40.71	54	-13.29	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Remarks:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
3. *There are measurements in 18~25GHz, but they are not recorded in the report due to only the bottom noise*

8 Test Setup Photo

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

9 EUT Constructional Details

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

------End------