TEST REPORT

Application No.:	GZCR2410001188AT
Applicant:	Comba Telecom Network Systems Limited
Address of Applicant:	Flat/Rm 10.3/F. Bio-Informatics Ctr, 2 Science Park West Avenue, HK Science Park, Pak Shek Kok, N.T. Hong Kong
Manufacturer:	Comba Telecom Network Systems Limited
Address of Manufacturer:	Flat/Rm 10.3/F. Bio-Informatics Ctr, 2 Science Park West Avenue, HK Science Park, Pak Shek Kok, N.T. Hong Kong
Product Name:	Antenna Monitoring System V2
Model No.:	CP-AMS-V2-MCU
Standard(s) :	47 CFR Part 15, Subpart C 15.247
Date of Receipt:	2024-10-11
Date of Test:	2024-10-22 to 2024-11-13
Date of Issue:	2025-01-03
Test Result:	**Pass***

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

Ricky Liu

Manager

Revision Record			
Version	**Report No.**	**Date**	**Remark**
01	GZCR241000118802	2025-01-03	Original

Authorized for issue by:				
		Luke Lin **Luke Lin/Project Engineer**		
		Vico Cui **Vico Cui/Reviewer**		

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**
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.12	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
Conducted Peak Output Power		ANSI C63.10 (2013) Section 7.8.5	47 CFR Part 15, Subpart C 15.247(b)(2)	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		ANSI C63.10 (2013) Section 7.8.6	47 CFR Part 15, Subpart C 15.247(d)	Pass
Conducted Spurious Emissions		ANSI C63.10 (2013) Section 7.8.8	47 CFR Part 15, Subpart C 15.247(d)	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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3 Contents

4 General Information

4.1 Details of E.U.T.

Power supply:	DC 18-72V
Test voltage:	AC 120V, 60Hz powered by DC Power Supply refer to section 4.2
Cable(s):	Aviation interface port*1pcs
Modulation type:	ASK
Operation Frequency:	902-928MHz
Number of Channels:	1
Antenna Type:	Dedicated antenna
Antenna Gain:	12.5dBi or less required by applicant
Antenna Number:	1

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

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Comba antenna	supplied by applicant	710001-000318-0000	202403010002
DC Power Supply	GWINSTEK	GPS-3030DD (Input: AC100-240V, 50/60Hz;Output: DC Max.30V, 3A)	EMC0008

4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Radiated Emissions which fall in the restricted bands	±5.14dB (3m); ±4.90dB (10m);±4.88dB (1GHz-6GHz);±5.06dB (6GHz-18GHz); ±5.30dB (18GHz-40GHz)
Radiated Spurious Emissions Below 1GHz	±3.08dB (9kHz to 150kHz);±3.19dB(150kHz to 30MHz);±5.14dB (30MHz-1GHz) (3m); ±4.90dB (30MHz-1GHz) (10m)
Radiated Spurious Emissions Above 1GHz	±4.88dB (1GHz-6GHz);±5.06dB (6GHz-18GHz); ±5.30dB (18GHz-40GHz)
Conducted Peak Output Power	± 0.75dB
Minimum 6dB Bandwidth	± 0.274%
Power Spectrum Density	± 2.84dB
Conducted Band Edges Measurement	± 0.75dB
Conducted Spurious Emissions	± 0.75dB

Remark:

The U_{lab} (lab Uncertainty) is less than U_{cispr} (CISPR Uncertainty) or U_{ETSI}(ETSI Uncertainty).

Emission decision rule:

– Compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit, marked as Pass in the report.

– Non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit, marked as Fail in the report.

4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,

No.198, Kezhu Road, Science City, Economic & Technological Development Area, Guangzhou, Guangdong, China 510663

Tel: +86 20 82155555

No tests were sub-contracted.

4.5 Test Facility

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

- **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.

- **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

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	2024-10-14	2025-10-13
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2024-09-02	2025-09-01
Chamber cable (Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2024-08-19	2026-08-18
Horn Antenna (1GHz-18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2022-09-23	2025-09-22
Horn Antenna (14-40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2023-06-18	2026-06-17
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2024-08-19	2025-08-18
MXE EMI Receiver (10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2024-10-14	2025-10-13
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2023-12-20	2026-12-19
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**
966 Anechoic Chamber	Shenzhen C.R.T	CRTSGSSAC966	EMC2230	2022-04-12	2025-04-11
EMI Test Receiver(1Hz-8GHz)	Rohde & Schwarz	ESW8	EMC2229	2024-02-19	2025-02-18
Amplifier(9k-1000MHz)	SONOMA	310	EMC2237	2024-03-22	2025-03-21
Trilog Broadband Antenna (25MHz-2GHz)	Schwarzbeck Mess-Elektronik	VULB 9168	EMC2238	2022-04-20	2025-04-19
Coaxial Cable	Mirco-COAX UTIFLEX ve	LA2-C125-8000	EMC2239	2023-06-14	2025-06-13
Test Software E3	Audix	Ver.6.191211	GZE100-81	N/A	N/A
Active Loop Antenna-RED	ETS-Lindgren	6502	EMC2190	2024-04-08	2026-04-07

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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	2024-10-14	2025-10-13
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2024-09-02	2025-09-01
Chamber cable (Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2024-08-19	2026-08-18
Horn Antenna (1GHz-18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2022-09-23	2025-09-22
Horn Antenna (14-40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2023-06-18	2026-06-17
2.4GHz Filter	Micro-Tronics	BRM 50702	EMC2069	2024-10-14	2025-10-13
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2024-08-19	2025-08-18
MXE EMI Receiver (10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2024-10-14	2025-10-13
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2023-12-20	2026-12-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A

RF Conducted Test					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
MI CABLE	SGS-EMC	0.8M	EMC2136	2023-11-02	2025-11-01
4X4 Power sensor Unit	TST	TSPS2023R	EMC2257	2024-08-19	2025-08-18
MXG Vector Signal Generator	Keysight	N5182B	EMC2258	2024-08-19	2025-08-18
Test Software	TST	V2.0	GZE100-82	N/A	N/A
EXA Signal Analyzer	Agilent Technologies	N9010A	EMC2222	2024-06-17	2025-06-16

General used equipment					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
DMM	Fluke	73	EMC0006	2024-06-13	2025-06-12

6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203

6.1.2 Conclusion

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 shall be considered sufficient to comply with the provisions of this section. 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§ 15.211, 15.213, 15.217, 15.219, 15.221, or § 15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

Remark:

Professional equipment, the installer shall be responsible for ensuring that the proper antenna with max antenna gain 12.5dBi and frequency range 806 to 960MHz is employed so that the limits in this part are not exceeded.

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7 Radio Spectrum Matter Test Results

7.1 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 11.12

Limit:

Test Distance: 3 m

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.		

7.1.1 E.U.T. Operation

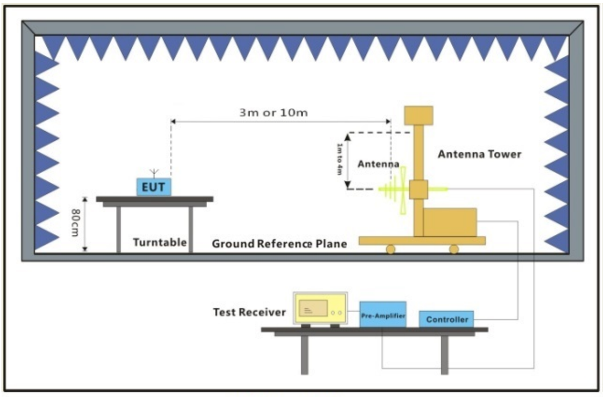
Operating Environment:

Temperature: 24.8 °C Humidity: 54.6 % RH Atmospheric Pressure: 1013 mbar

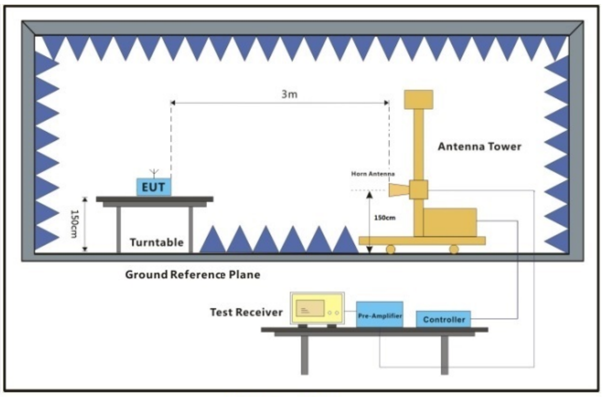
7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with ASK modulation.

7.1.3 Test Setup Diagram



30MHz-1GHz



Above 1GHz

7.1.4 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 Highest channel.

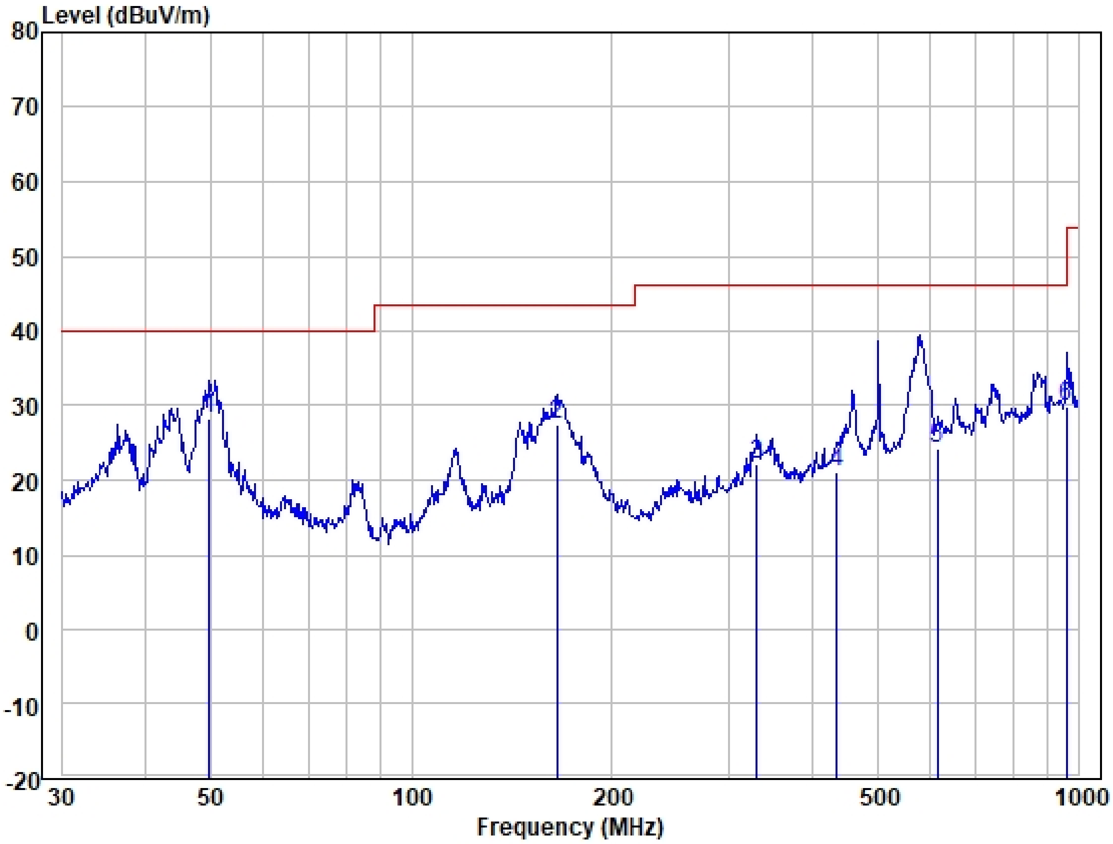
i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

Test Mode: 02; Polarity: Horizontal




```
Site        : 966 Chamber
Job         :
Model       :
Power       :
Test Mode:
```

	Freq	Read Level	Anterna Factor	Cable Loss	Preamp Factor	Measured Level	Limit Line	Over Limit	Pol/ Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	49.881	41.24	19.53	0.39	32.88	28.28	40.00	-11.72	HORIZONTAL	QP
2	165.487	40.72	18.99	0.71	32.83	27.59	43.52	-15.93	HORIZONTAL	QP
3	330.195	33.73	20.19	1.01	32.89	22.04	46.02	-23.98	HORIZONTAL	QP
4	433.920	30.47	22.25	1.19	32.97	20.94	46.02	-25.08	HORIZONTAL	QP
5	614.000	29.69	25.92	1.44	32.86	24.19	46.02	-21.83	HORIZONTAL	QP
6	960.000	29.93	29.74	1.82	31.71	29.78	46.02	-16.24	HORIZONTAL	QP

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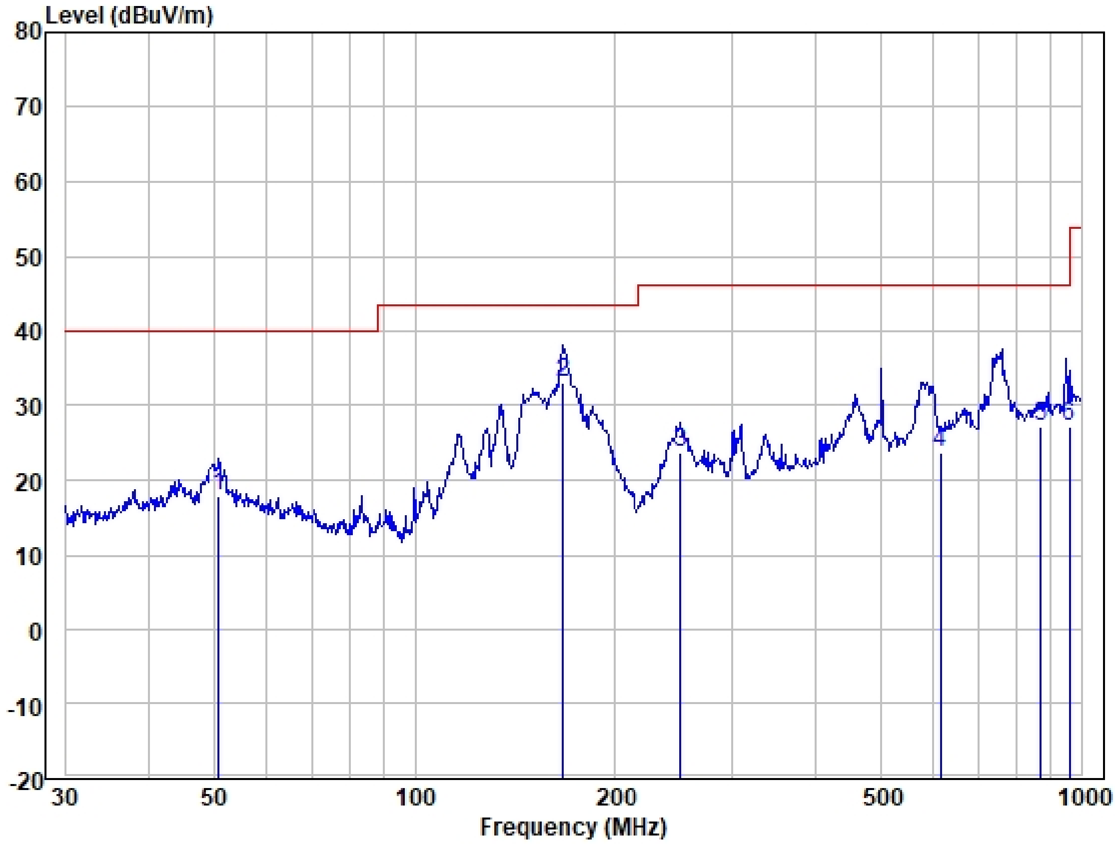
Test Mode: 02; Polarity: Vertical




```
Site        : 966 Chamber
Job         :
Model       :
Power       :
Test Mode:
```

	Freq	Read Level	Anterna Factor	Cable Loss	Preamp Factor	Measured Level	Limit Line	Over Limit	Pol/ Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	50.942	30.82	19.50	0.39	32.88	17.83	40.00	-22.17	VERTICAL	QP
2	167.237	46.26	18.93	0.72	32.83	33.08	43.52	-10.44	VERTICAL	QP
3	250.301	38.11	17.62	0.88	32.86	23.75	46.02	-22.27	VERTICAL	QP
4	614.000	29.29	25.92	1.44	32.86	23.79	46.02	-22.23	VERTICAL	QP
5	867.850	28.60	29.01	1.74	32.27	27.08	46.02	-18.94	VERTICAL	QP
6	960.000	27.43	29.74	1.82	31.71	27.28	46.02	-18.74	VERTICAL	QP

7.2 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

Limit:

Test Distance: 3 m

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

7.2.1 E.U.T. Operation

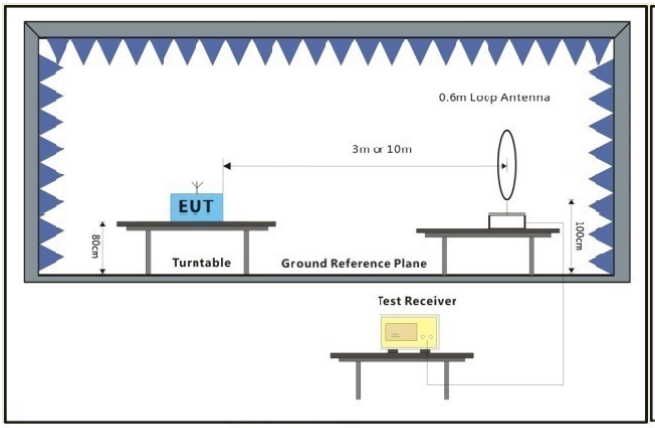
Operating Environment:

Temperature: 23.0 °C Humidity: 57.6 % RH Atmospheric Pressure: 1013 mbar

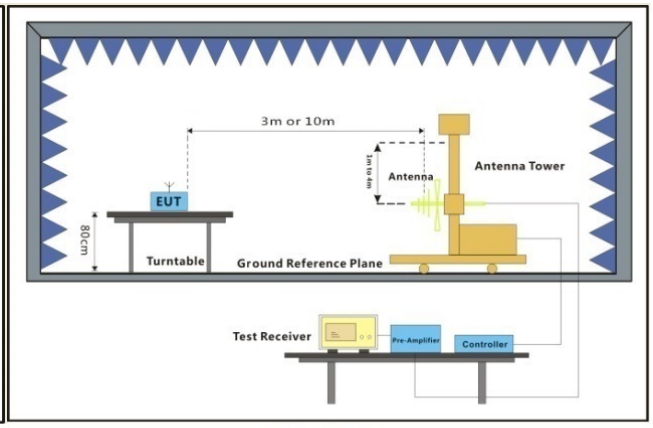
7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with ASK modulation.

7.2.3 Test Setup Diagram



Below 30MHz



30MHz-1GHz

7.2.4 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.

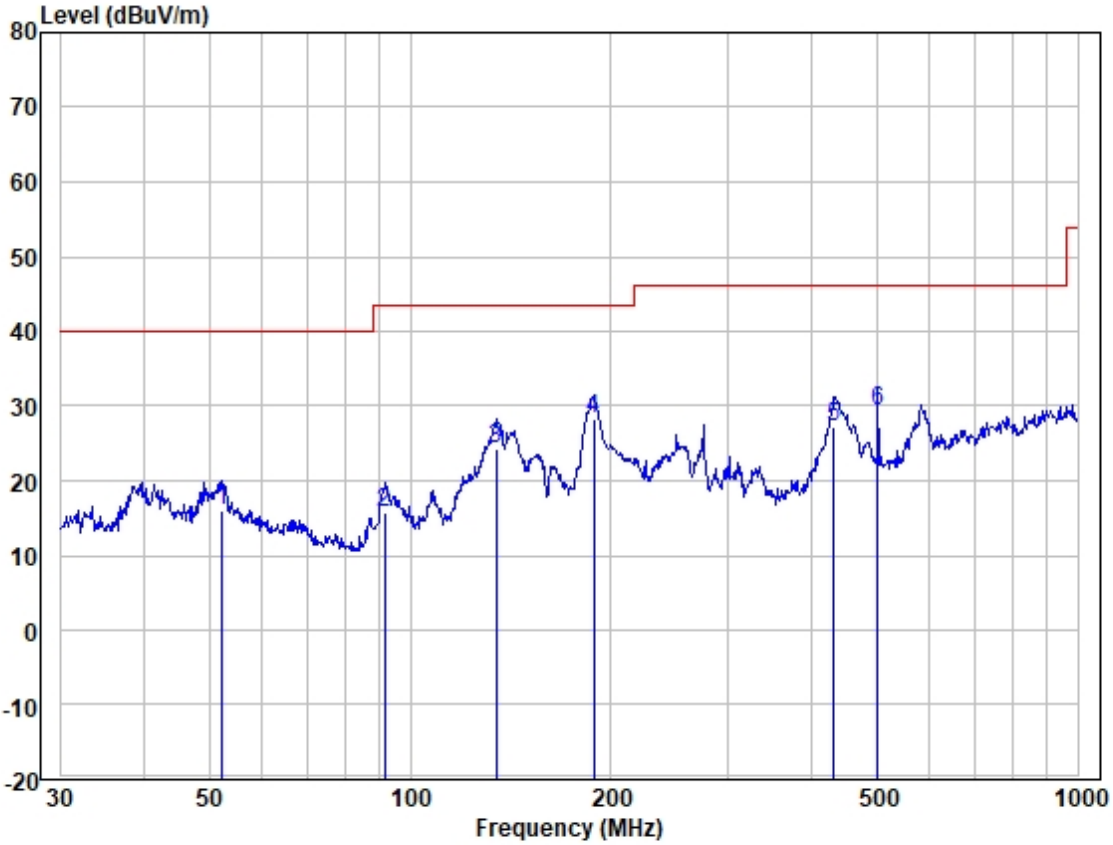
i. Repeat above procedures until all frequencies measured was complete.

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.

Test Mode: 00; Polarity: Horizontal



Site : 966 Chamber
Job :
Model :
Power :
Test Mode:

	Freq	Read Level	Anterna Factor	Cable Loss	Preamp Factor	Measured Level	Limit Line	Over Limit	Pol/ Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	52.391	28.93	19.44	0.39	32.88	15.88	40.00	-24.12	HORIZONTAL	QP
2	91.495	34.24	13.72	0.52	32.81	15.67	43.52	-27.85	HORIZONTAL	QP
3	134.559	37.95	18.41	0.63	32.81	24.18	43.52	-19.34	HORIZONTAL	QP
4	188.413	43.91	16.57	0.76	32.84	28.40	43.52	-15.12	HORIZONTAL	QP
5	431.032	36.88	22.16	1.19	32.97	27.26	46.02	-18.76	HORIZONTAL	QP
6	501.179	37.42	23.58	1.29	32.99	29.30	46.02	-16.72	HORIZONTAL	QP

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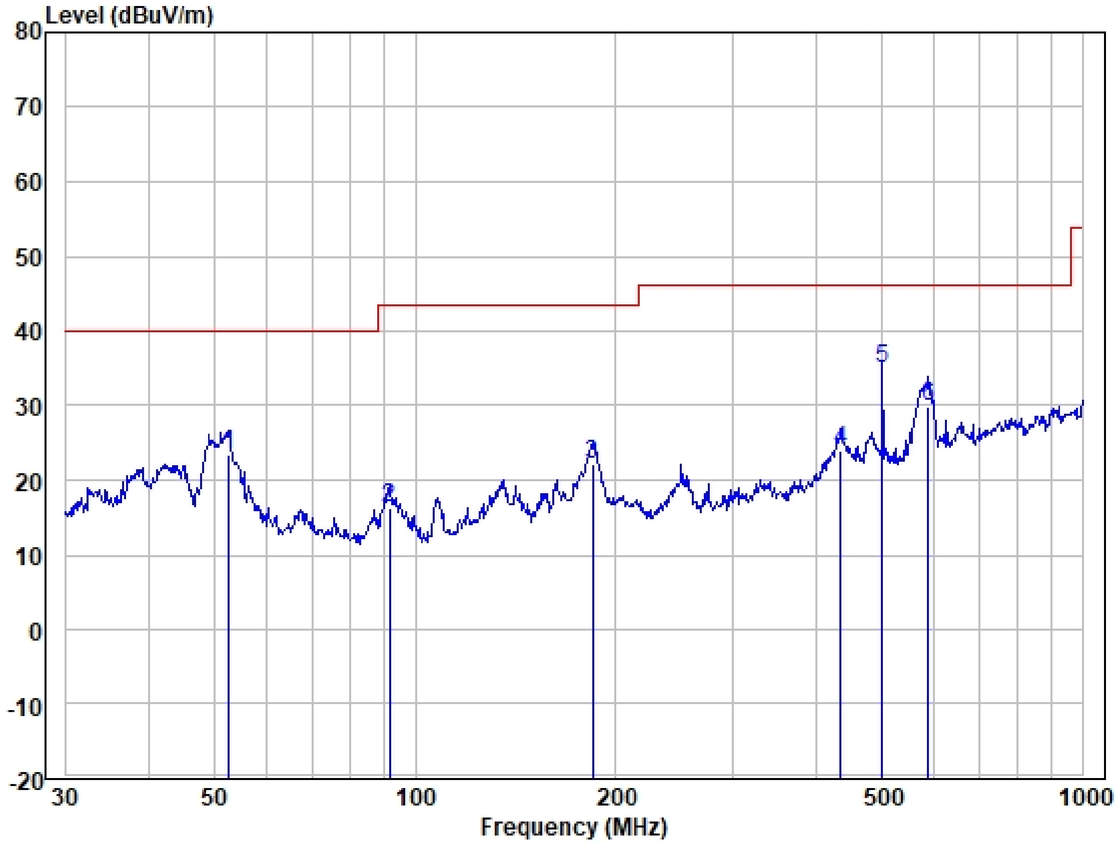
Test Mode: 00; Polarity: Vertical




```
Site        : 966 Chamber
Job         :
Model       :
Power       :
Test Mode:
```

	Freq	Read Level	Anterna Factor	Cable Loss	Preamp Factor	Measured Level	Limit Line	Over Limit	Pol/ Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	52.760	36.61	19.44	0.40	32.88	23.57	40.00	-16.43	VERTICAL	QP
2	91.495	34.89	13.72	0.52	32.81	16.32	43.52	-27.20	VERTICAL	QP
3	184.490	37.00	17.09	0.76	32.84	22.01	43.52	-21.51	VERTICAL	QP
4	434.065	33.54	22.28	1.19	32.97	24.04	46.02	-21.98	VERTICAL	QP
5	501.179	43.15	23.58	1.29	32.99	35.03	46.02	-10.99	VERTICAL	QP
6	586.844	36.10	25.33	1.42	32.91	29.94	46.02	-16.08	VERTICAL	QP

7.3 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

7.3.1 E.U.T. Operation

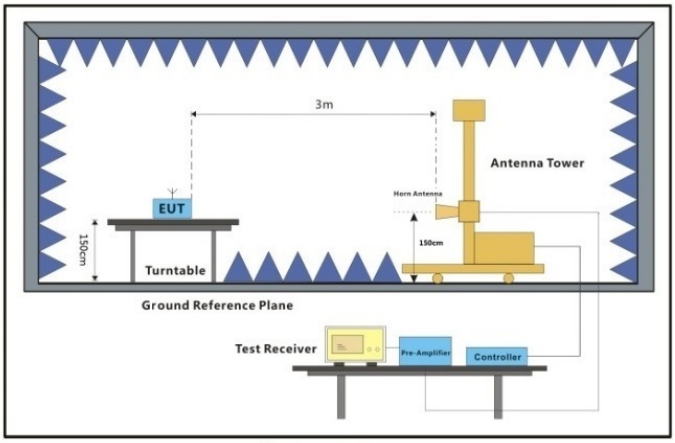
Operating Environment:

Temperature: 24.9 °C Humidity: 55.3 % RH Atmospheric Pressure: 1013 mbar

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with ASK modulation.

7.3.3 Test Setup Diagram



Above 1GHz

7.3.4 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.

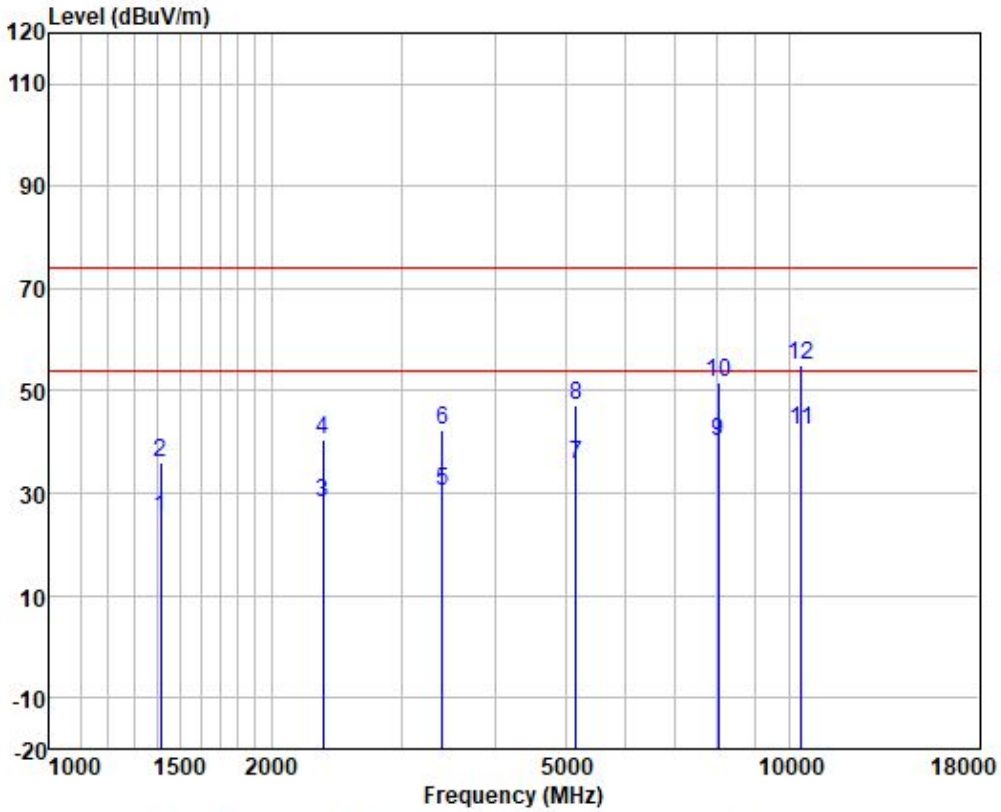
Remark:

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.

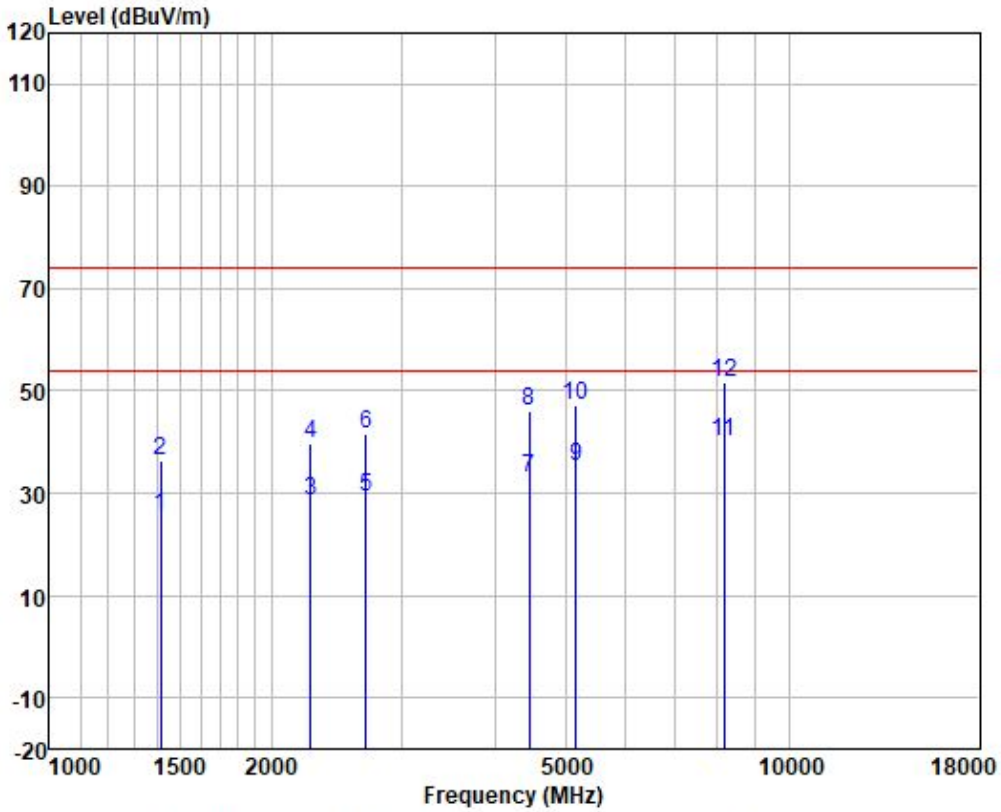
3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

Test Mode: 00; Polarity: Vertical; Modulation:ASK



	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1414.597	36.63	24.29	2.67	38.47	25.12	54.00	-28.88	VERTICAL	Average
2	1414.597	47.65	24.29	2.67	38.47	36.14	74.00	-37.86	VERTICAL	Peak
3	2345.878	35.07	27.59	3.42	37.77	28.31	54.00	-25.69	VERTICAL	Average
4	2345.878	47.22	27.59	3.42	37.77	40.46	74.00	-33.54	VERTICAL	Peak
5	3396.098	35.04	28.99	4.06	37.56	30.53	54.00	-23.47	VERTICAL	Average
6	3396.098	46.77	28.99	4.06	37.56	42.26	74.00	-31.74	VERTICAL	Peak
7	5149.197	34.26	33.79	4.96	37.23	35.78	54.00	-18.22	VERTICAL	Average
8	5149.197	45.81	33.79	4.96	37.23	47.33	74.00	-26.67	VERTICAL	Peak
9	8036.214	33.99	37.09	6.22	37.20	40.10	54.00	-13.90	VERTICAL	Average
10	8036.214	45.53	37.09	6.22	37.20	51.64	74.00	-22.36	VERTICAL	Peak
11	10393.710	32.60	39.69	7.25	37.08	42.46	54.00	-11.54	VERTICAL	Average
12	10393.710	45.00	39.69	7.25	37.08	54.86	74.00	-19.14	VERTICAL	Peak

Test Mode: 00; Polarity: Horizontal; Modulation:ASK



	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1414.597	37.21	24.29	2.67	38.47	25.70	54.00	-28.30	HORIZONTAL	Average
2	1414.597	47.88	24.29	2.67	38.47	36.37	74.00	-37.63	HORIZONTAL	Peak
3	2252.846	35.62	27.25	3.34	37.78	28.43	54.00	-25.57	HORIZONTAL	Average
4	2252.846	46.75	27.25	3.34	37.78	39.56	74.00	-34.44	HORIZONTAL	Peak
5	2679.464	35.12	28.12	3.59	37.73	29.10	54.00	-24.90	HORIZONTAL	Average
6	2679.464	47.80	28.12	3.59	37.73	41.78	74.00	-32.22	HORIZONTAL	Peak
7	4456.315	31.90	34.00	4.61	37.45	33.06	54.00	-20.94	HORIZONTAL	Average
8	4456.315	44.92	34.00	4.61	37.45	46.08	74.00	-27.92	HORIZONTAL	Peak
9	5149.197	33.66	33.79	4.96	37.23	35.18	54.00	-18.82	HORIZONTAL	Average
10	5149.197	45.58	33.79	4.96	37.23	47.10	74.00	-26.90	HORIZONTAL	Peak
11	8176.795	34.11	36.92	6.29	37.20	40.12	54.00	-13.88	HORIZONTAL	Average
12	8176.795	45.60	36.92	6.29	37.20	51.61	74.00	-22.39	HORIZONTAL	Peak

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7.4 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(2)

Test Method: ANSI C63.10 (2013) Section 7.8.5

Limit:

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

7.4.1 E.U.T. Operation

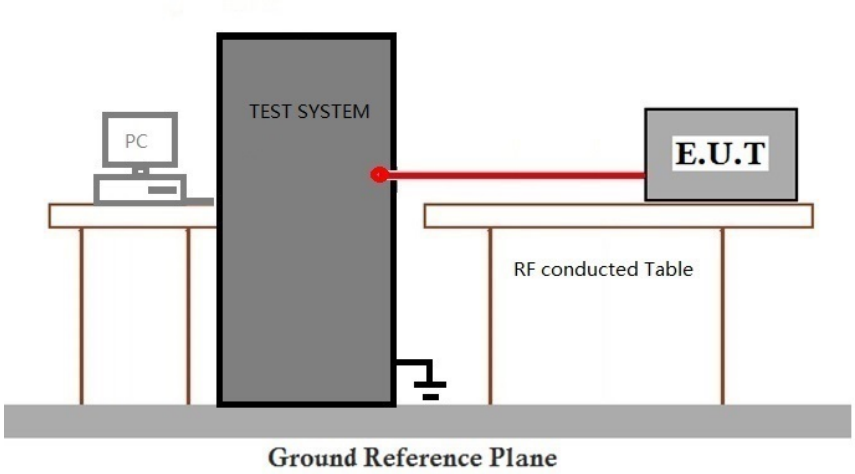
Operating Environment:

Temperature: 23.9 °C Humidity: 58.3 % RH Atmospheric Pressure: 1013 mbar

7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with ASK modulation.

7.4.3 Test Setup Diagram



7.4.4 Measurement Procedure and Data

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

Please Refer to Appendix for Details

7.5 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

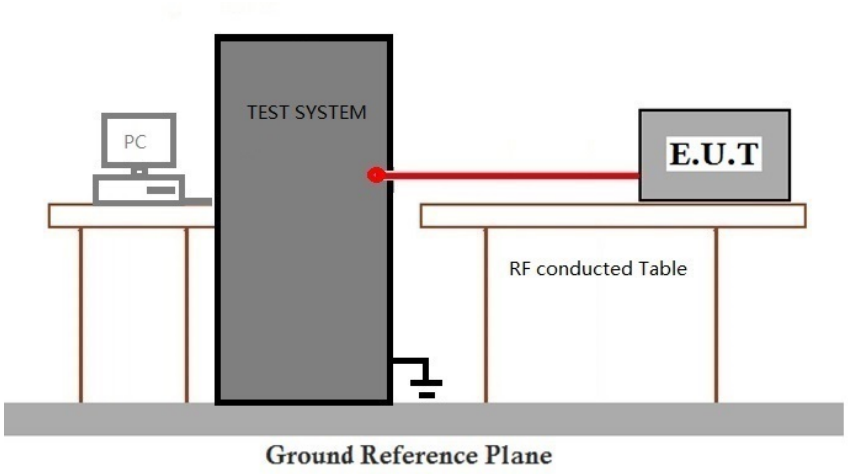
7.5.1 E.U.T. Operation

Operating Environment:
Temperature: 23.9 °C Humidity: 58.3 % RH Atmospheric Pressure: 1013 mbar

7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with ASK modulation.

7.5.3 Test Setup Diagram



7.5.4 Measurement Procedure and Data

Please Refer to Appendix for Details

7.6 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

7.6.1 E.U.T. Operation

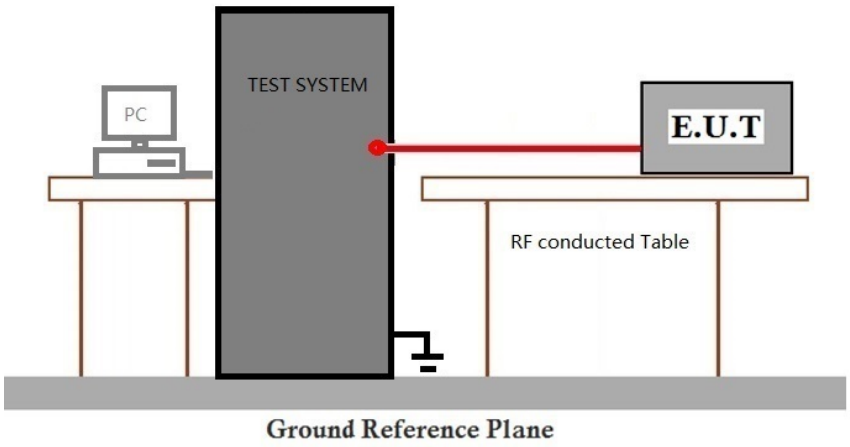
Operating Environment:

Temperature: 23.9 °C Humidity: 58.3 % RH Atmospheric Pressure: 1013 mbar

7.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with ASK modulation.

7.6.3 Test Setup Diagram



7.6.4 Measurement Procedure and Data

Please Refer to Appendix for Details

7.7 Conducted Band Edges Measurement

Test Requirement 47 CFR Part 15, Subpart C 15.247(d)

Test Method: ANSI C63.10 (2013) Section 7.8.6

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).

7.7.1 E.U.T. Operation

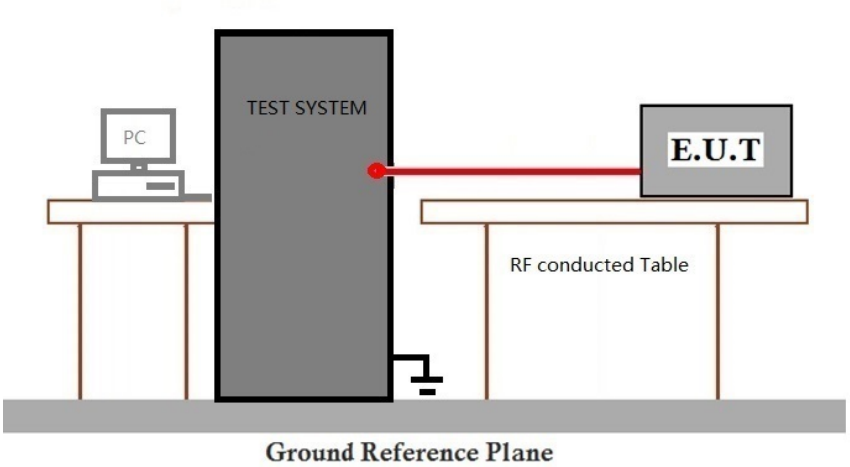
Operating Environment:

Temperature: 23.9 °C Humidity: 58.3 % RH Atmospheric Pressure: 1013 mbar

7.7.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with ASK modulation.

7.7.3 Test Setup Diagram



7.7.4 Measurement Procedure and Data

Please Refer to Appendix for Details

7.8 Conducted Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.247(d)

Test Method: ANSI C63.10 (2013) Section 7.8.8

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).

7.8.1 E.U.T. Operation

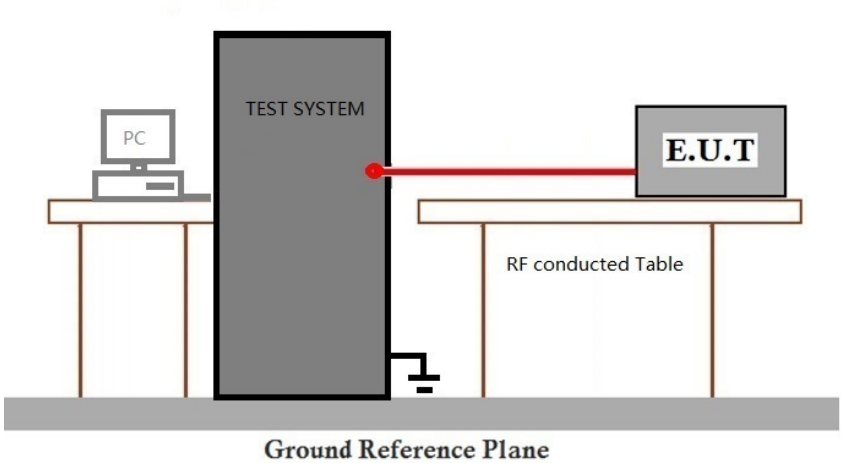
Operating Environment:

Temperature: 23.9 °C Humidity: 58.3 % RH Atmospheric Pressure: 1013 mbar

7.8.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with ASK modulation.

7.8.3 Test Setup Diagram



7.8.4 Measurement Procedure and Data

Please Refer to Appendix for Details

8 Test Setup Photo

Refer to Appendix - Test Setup Photo for GZCR241000118802

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9 EUT Constructional Details (EUT Photos)

Refer to External and Internal Photos for GZCR2410001188AT

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10 Appendix

1. Duty Cycle

1.1 Test Result

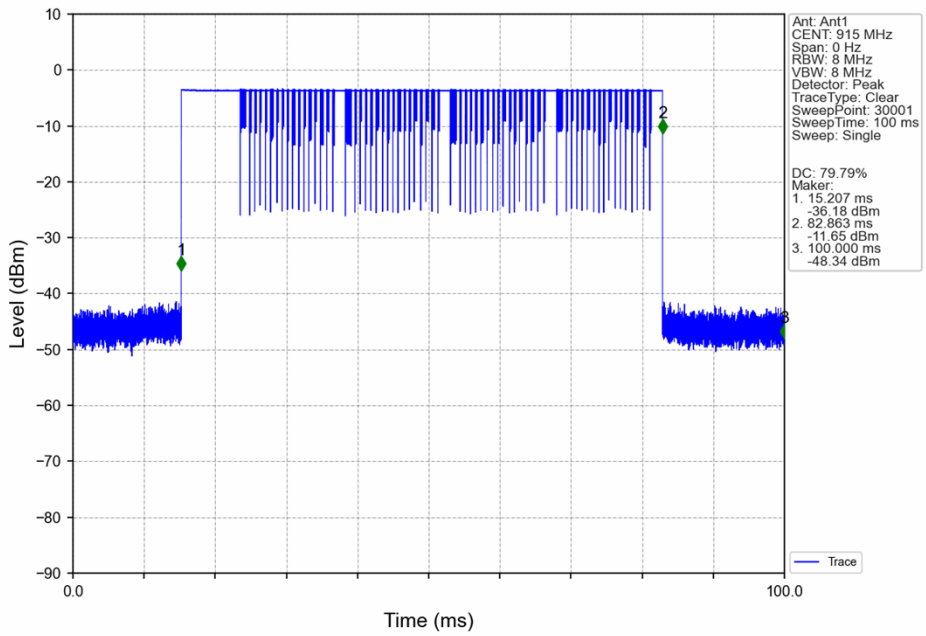
1.1.1 Ant1

Ant1							
Mode	TX Type	Frequency (MHz)	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
ASK	SISO	902-928	67.656	84.793	79.79	0.98	0.00

1.2 Test Graph

1.2.1 Ant1

ASK _HCH_915MHz_Ant1_NTNV



2. Bandwidth

2.1 Test Result

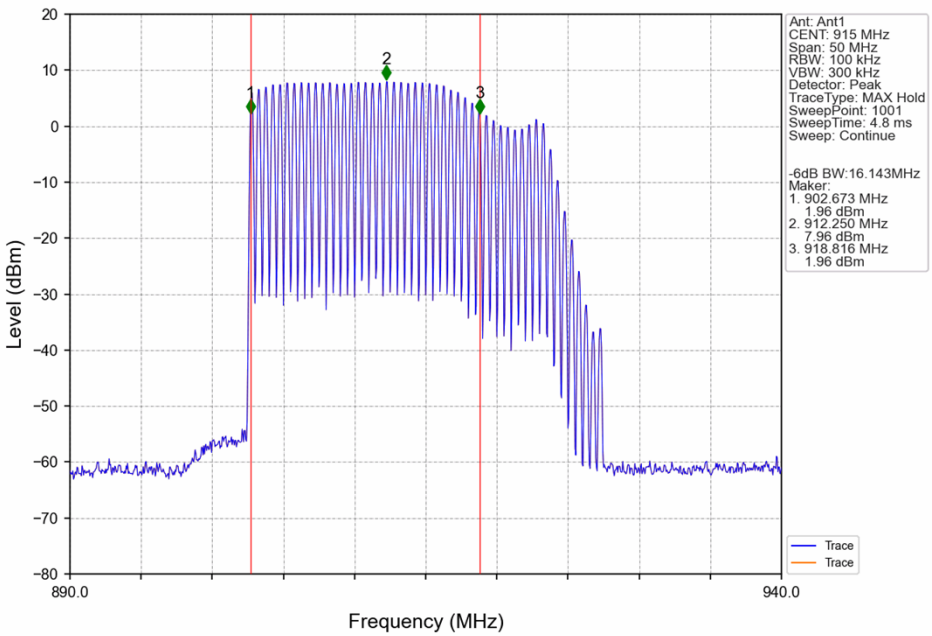
2.1.2 6dB BW

Mode	TX Type	Frequency (MHz)	ANT	6dB Bandwidth (MHz)		Verdict
				Result	Limit	
ASK	SISO	902-928	1	16.143	>=0.5	Pass

2.2 Test Graph

2.2.1 6dB BW

ASK _HCH_902-928MHz_Ant1_NTNV



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3. Maximum Conducted Output Power

3.1 Test Result

3.1.1 Power

Mode	TX Type	Frequency (MHz)	Maximum Peak Conducted Output Power (dBm)		Verdict
			ANT1	Limit	
ASK	SISO	902-928	8.36	<=17.5	Pass
Note1: Antenna Gain: Ant1: 12.5dBi;					

4. Maximum Power Spectral Density

4.1 Test Result

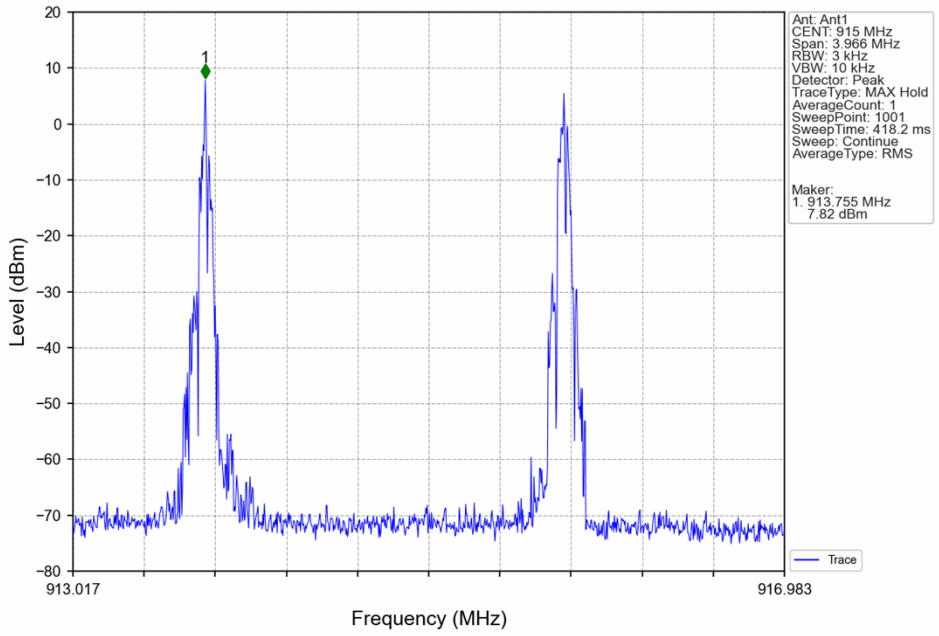
4.1.1 PSD

Mode	TX Type	Frequency (MHz)	Maximum PSD (dBm/3kHz)		Verdict
			ANT1	Limit	
ASK	SISO	902-928	7.82	<=8	Pass
Note1: Antenna Gain: Ant1: 12.5dBi;					

4.2 Test Graph

4.2.1 PSD

ASK _HCH_902-928MHz_Ant1_NTNV



5. Unwanted Emissions In Non-restricted Frequency Bands

5.1 Test Result

5.1.1 Ref

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)
ASK	SISO	902-928	1	7.85
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.				

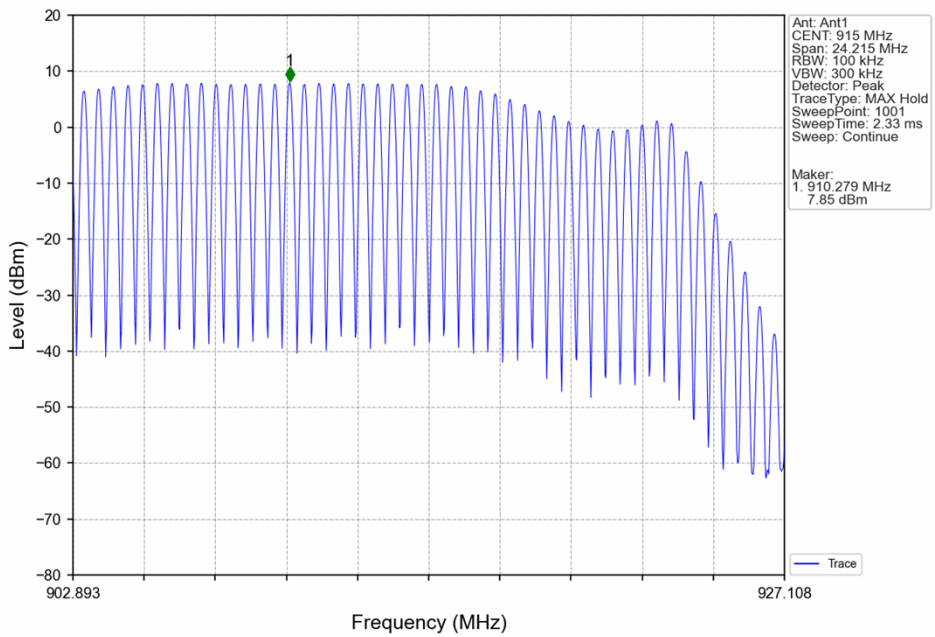
5.1.2 CSE and Band Edges

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
ASK	SISO	902-928	1	7.85	-12.15	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.						

5.2 Test Graph

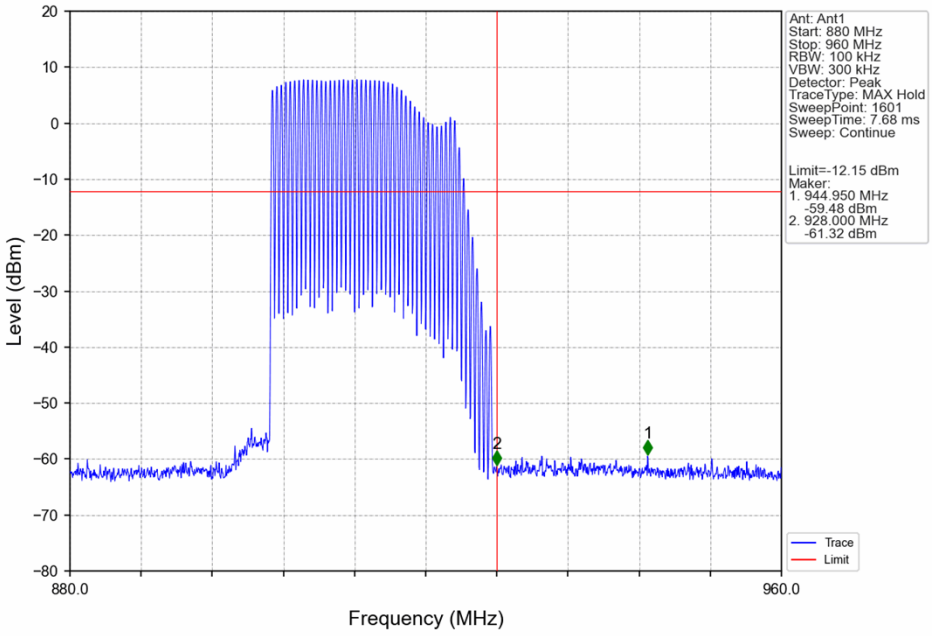
5.2.1 Ref

ASK_HCH_902-928MHz_Ant1_NTNV

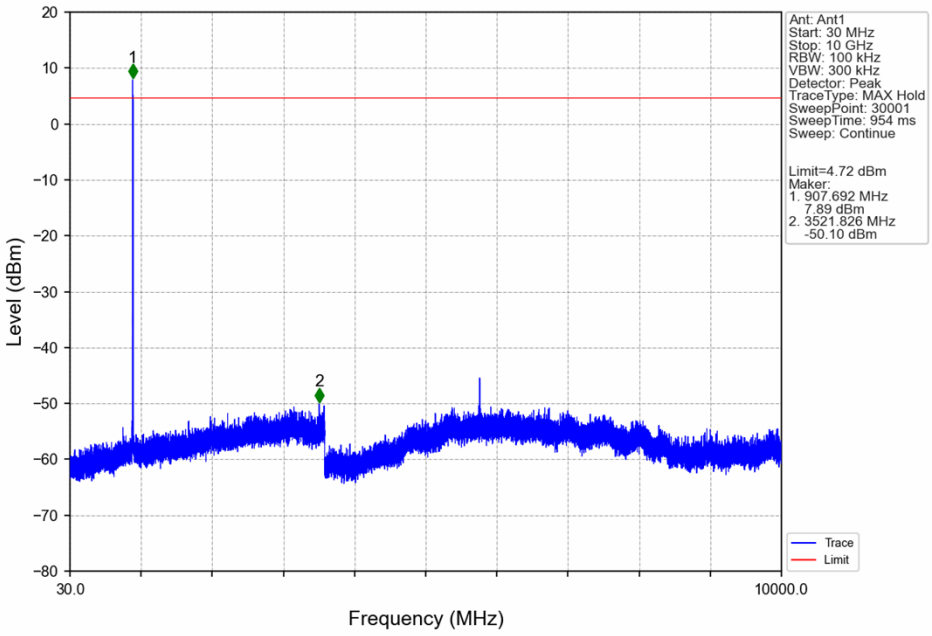


5.2.2 CSE and Band Edges

ASK _HCH_902-928MHz_Ant1_NTNV



ASK _HCH_902-928MHz_Ant1_NTNV



- End of the Report -