



TEST REPORT

FCC ID:2A55L-RC522

Applicant: Shenzhenshi Saiweilakejiyouxiangongsi
Address: Longhuaxinqu Guanlanjiedao Dahelu 99 Hao, Guanlanshangwudasha A Zuo 710 Shi, Shenzhen, Guangdong, 518000, China
Manufacturer: shenzhenshi shizhandeng maoyiyouxiangongsi
Address: 310hao C zuo 601 longhuqu guanghujiedao luhushequ wuhedadao Shenzhen Guangdong china
EUT: RFID Module RF IC Card
Trade Mark: N/A
Model Number: RC522
Date of Receipt: Mar. 25, 2022
Test Date: Mar. 25, 2022 - Mar. 31, 2022
Date of Report: Mar. 31, 2022
Prepared By: Shenzhen DL Testing Technology Co., Ltd.
Address: 101-201, Building C, Shuanghuan, No.8, Baoqing Road, Baolong Industrial Zone, Baolong Street, Longgang District, Shenzhen, Guangdong, China
Applicable Standards: FCC PART 15.225
ANSI C63.10:2013
Test Result: Pass
Report Number: DL-20220401012E

Prepared (Engineer): Lily Fu

Reviewer (Supervisor): Jack Bu

Approved (Manager): Jade Yang



This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Shenzhen DL Testing Technology Co., Ltd.

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**1. VERSION**

Version No.	Date	Description
00	Mar. 31, 2022	Original

2. TEST SUMMARY

EMC Emission			
Test Item	Section in CFR 47	Result	Remark
AC Power Line Conducted Emission	15.207	PASS	
Radiated Spurious Emission	15.209, 15.225	PASS	
20dB Bandwidth	15.225 15.215(c)	PASS	
Frequency Tolerance	15.225(e)	PASS	
Antenna requirement	15.203	PASS	

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

(2) Test Facility: Shenzhen DL Testing Technology Co., Ltd.

Address: 101-201, Building C, Shuanghuan, No.8, Baoqing Road, Baolong Industrial Zone, Baolong Street, Longgang District, Shenzhen, Guangdong, China



3. GENERAL INFORMATION

3.1 Description of Device (EUT)

Product Name: RFID Module RF IC Card

Model No.: RC522

Model Difference: N/A

Hardware version: H1.0

Software version: S1.0

Operation Frequency: 13.56MHz

Modulation type: ASK

Antenna Type: Internal Antenna

Antenna gain: 0dBi

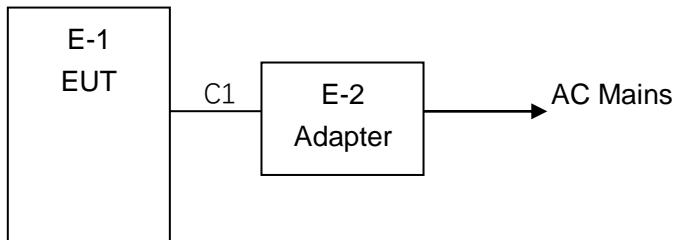
Power supply: Input: DC 3.3V

3.2 Tested System Details

None.



3.3 Block Diagram of Test Set-up



3.4 Test Mode Description

Mode1. Running Mode

3.5 Test Auxiliary Equipment

Item	Equipment	Model/Type No.	Series No.	Note
E-1	RFID Module RF IC Card	RC522	N/A	EUT
E-2	Adapter	HW-0330500E	N/A	Input: AC 100-240V 50/60Hz Output: DC 3.3V 0.5A

Item	Shielded Type	Ferrite Core	Length	Note
C1	No	No	0.5m	Mini USB Line

3.6 Test Uncertainty

Conducted Emission Uncertainty : $\pm 2.56\text{dB}$
(150KHz-30MHz)

Radiated Emission Uncertainty : $\pm 3.24\text{dB}$
(9KHz-1GHz)

**4. TEST INSTRUMENT USED****For Conducted Emission Test (843 Shielded Room)**

Equipment	Manufacturer	Model	Serial	Last Cal.	Next Cal.
843 Shielded Room	ChengYu	843 Room	843	Nov. 25, 2019	Nov. 24, 2022
EMI Receiver	R&S	ESR	101421	Dec. 07, 2021	Dec. 06, 2022
LISN	R&S	ENV216	102417	Dec. 07, 2021	Dec. 06, 2022
Clamp	COM-POWER	CLA-050	431071	Dec. 05, 2021	Dec. 04, 2022
3-Loop Antenna	DAZE	ZN30401	13021	Dec. 07, 2021	Dec. 06, 2022
ISN T8	Schwarzbeck	NTFM 8158	101135	Dec. 07, 2021	Dec. 06, 2022
ISN T5	Schwarzbeck	NTFM 8158	101136	Dec. 07, 2021	Dec. 06, 2022
843 Cable 1#	ChengYu	CE Cable	001	Dec. 07, 2021	Dec. 06, 2022
843 Cable 1#	ChengYu	CE Cable	002	Dec. 07, 2021	Dec. 06, 2022

For Radiated Emission Test (966 chamber)

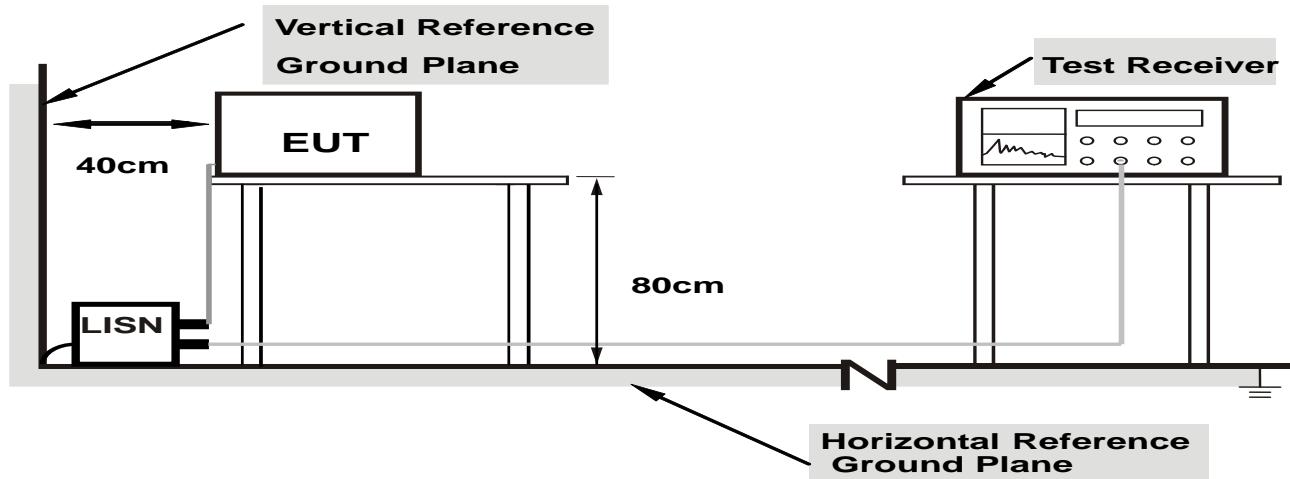
Equipment	Manufacturer	Model	Serial	Last Cal.	Next Cal.
966 Chamber	ChengYu	966 Room	966	Nov. 25, 2019	Nov. 24, 2022
Spectrum Analyzer	Agilent	E4408B	MY50140780	Dec. 07, 2021	Dec. 06, 2022
EMI Receiver	R&S	ESRP7	101393	Dec. 07, 2021	Dec. 06, 2022
Amplifier	Schwarzbeck	BBV9743B	00153	Dec. 07, 2021	Dec. 06, 2022
Amplifier	EMEC	EM01G8GA	00270	Dec. 07, 2021	Dec. 06, 2022
Broadband Trilog Antenna	Schwarzbeck	VULB9162	00306	Nov. 28, 2021	Nov. 27, 2022
Horn Antenna	Schwarzbeck	BBHA9120D	02139	Nov. 28, 2021	Nov. 27, 2022
966 Cable 1#	ChengYu	966	004	Dec. 07, 2021	Dec. 06, 2022
966 Cable 2#	ChengYu	966	003	Dec. 07, 2021	Dec. 06, 2022



5. CONDUCTED EMISSION TEST

5.1 Block Diagram of Test Setup

For Mains Terminals Test



Note: 1. Support units were connected to second LISN.

2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

5.2 Test Standard and Limit

FCC Part 15 Subpart B

Frequency MHz	Limits dB(μ V)	
	Quasi-peak Level	Average Level
0.15~0.50	66 ~ 56*	55 ~ 46*
0.50~5.00	56	46
5.00~30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.

2. The lower limit shall apply at the transition frequencies.

5.3 EUT Configuration on Test

The following equipment's are installed on conducted emission test to meet FCC Part 15 Subpart B requirement and operating in a manner which tends to maximize its emission characteristics in a normal application.

5.4 Operating Condition of EUT

- 5.4.1 Setup the EUT and simulators as shown in Section 5.1.
- 5.4.2 Turn on the power of all equipments.
- 5.4.3 Let the EUT work in test modes and test it.



5.5 Test Procedure

The EUT is put on the table and connected to the AC mains through a Artificial Mains Network (AMN) or ISN. This provided a 50ohm coupling impedance for the tested equipments. Both sides of AC line are checked to find out the maximum conducted emission levels according to the **ANSI C63.4** regulations during conducted emission test.

The bandwidth of the test receiver (R&S Test Receiver ESR) is set at 10KHz.

The frequency range from 150 KHz to 30 MHz is investigated.

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.Mesurement Level = Reading level + Correct Factor

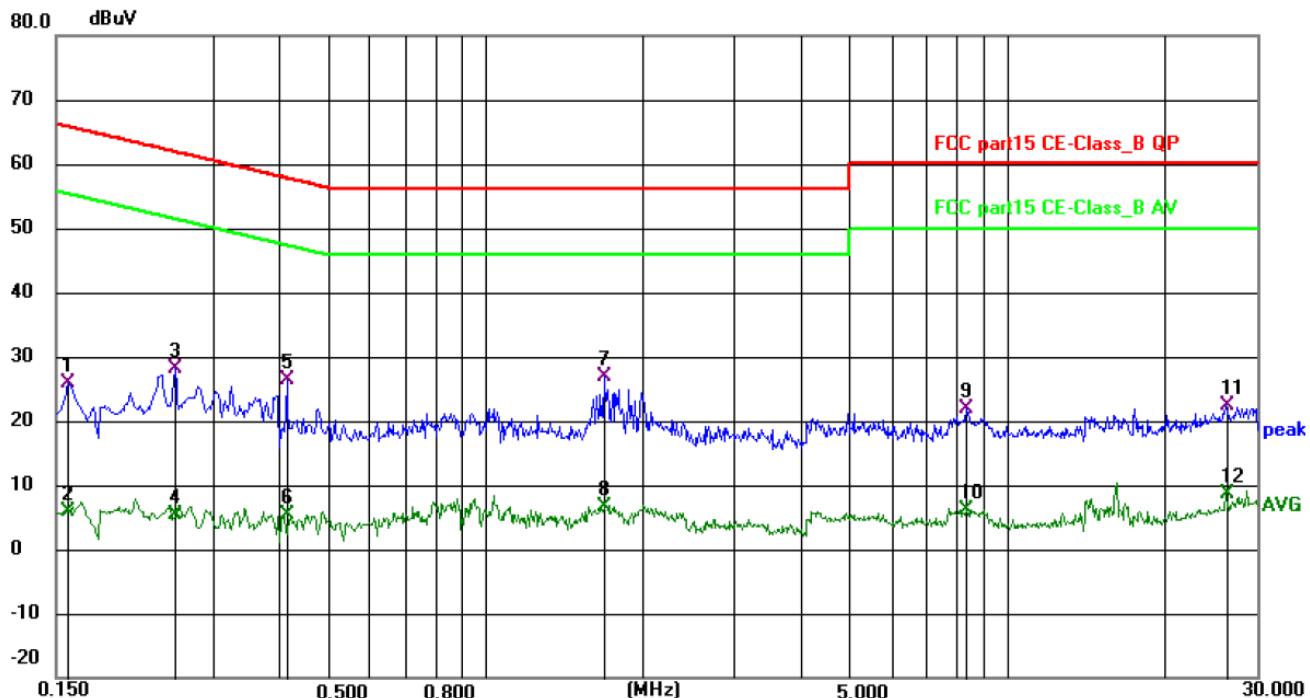
5.6 Test Result

PASS

Please refer to the following page.



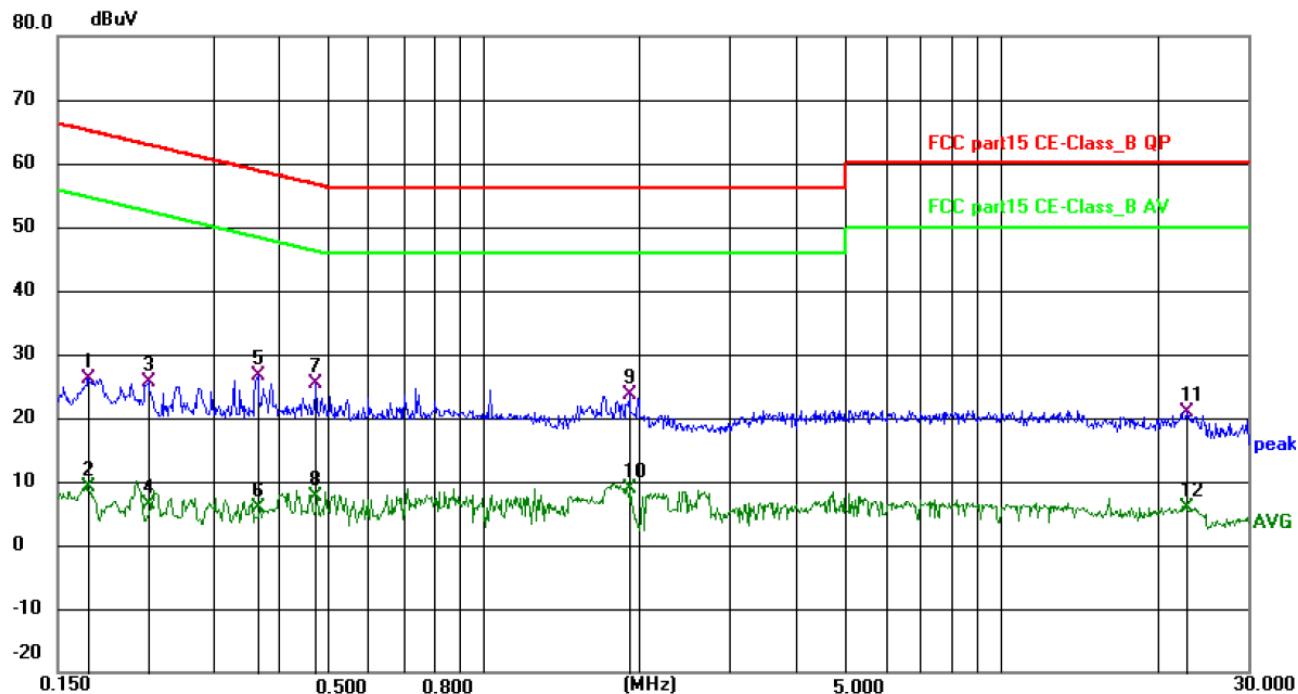
Conducted Emission Test Data			
Temperature:	24.5 °C	Relative Humidity:	54%
Pressure:	1009hPa	Phase:	Line
Test Voltage:	AC 120V/60Hz	Test Mode:	ON Mode



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1590	15.56	10.31	25.87	65.52	39.65	QP	P	
2	0.1590	-4.39	10.31	5.92	55.52	49.60	AVG	P	
3	0.2535	18.86	9.32	28.18	61.64	33.46	QP	P	
4	0.2535	-3.93	9.32	5.39	51.64	46.25	AVG	P	
5	0.4155	17.29	9.15	26.44	57.54	31.10	QP	P	
6	0.4155	-3.88	9.15	5.27	47.54	42.27	AVG	P	
7 *	1.6889	17.20	9.69	26.89	56.00	29.11	QP	P	
8	1.6889	-2.94	9.69	6.75	46.00	39.25	AVG	P	
9	8.3580	11.99	9.81	21.80	60.00	38.20	QP	P	
10	8.3580	-3.64	9.81	6.17	50.00	43.83	AVG	P	
11	26.2320	11.11	11.22	22.33	60.00	37.67	QP	P	
12	26.2320	-2.50	11.22	8.72	50.00	41.28	AVG	P	



Conducted Emission Test Data			
Temperature:	24.5 °C	Relative Humidity:	54%
Pressure:	1009hPa	Phase:	Neutral
Test Voltage:	AC 120V/60Hz	Test Mode:	ON Mode

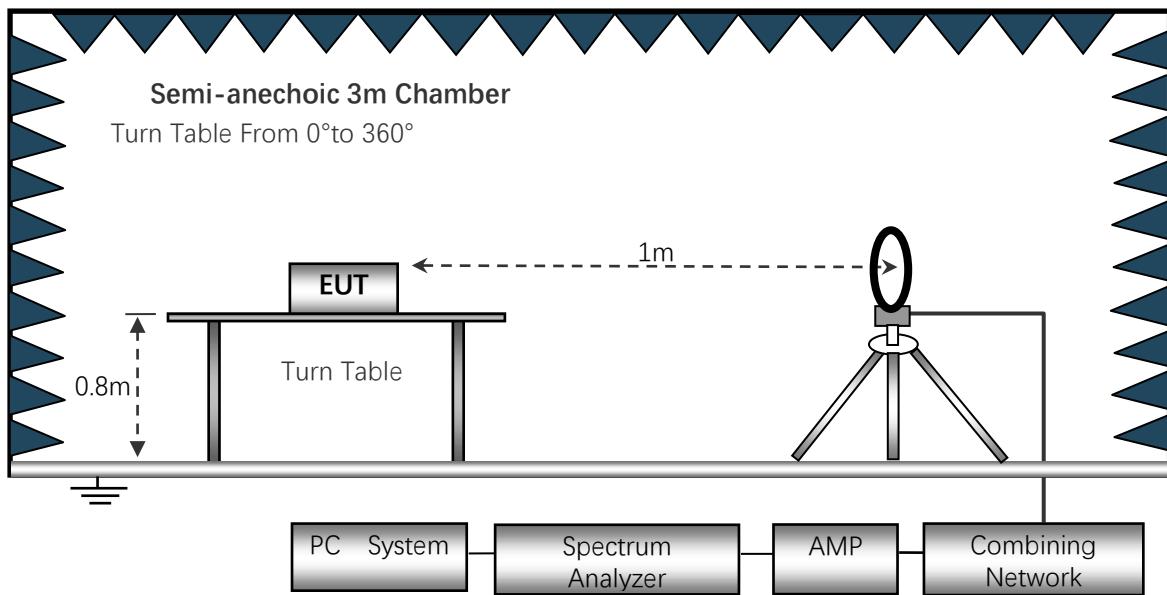


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1723	16.43	9.68	26.11	64.85	38.74	QP	P	
2	0.1723	-0.53	9.68	9.15	54.85	45.70	AVG	P	
3	0.2242	16.66	8.90	25.56	62.66	37.10	QP	P	
4	0.2242	-2.63	8.90	6.27	52.66	46.39	AVG	P	
5	0.3659	17.47	9.17	26.64	58.59	31.95	QP	P	
6	0.3659	-3.35	9.17	5.82	48.59	42.77	AVG	P	
7 *	0.4737	16.01	9.34	25.35	56.45	31.10	QP	P	
8	0.4737	-1.62	9.34	7.72	46.45	38.73	AVG	P	
9	1.9135	13.74	9.80	23.54	56.00	32.46	QP	P	
10	1.9135	-0.84	9.80	8.96	46.00	37.04	AVG	P	
11	22.8567	9.93	10.95	20.88	60.00	39.12	QP	P	
12	22.8567	-5.14	10.95	5.81	50.00	44.19	AVG	P	

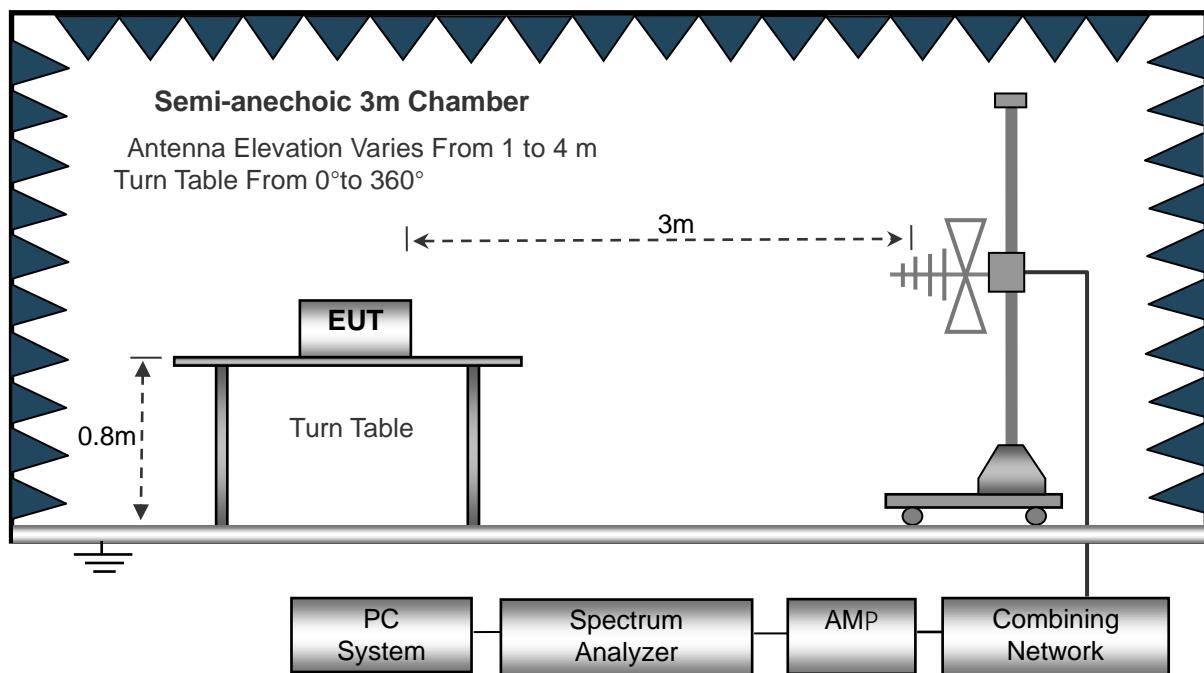
6. RADIATION EMISSION TEST

6.1 Block Diagram of Test Setup

Radiated Emission Test-Up Frequency Below 30MHz



Below 1GHz



6.2 Test Standard and Limit

FCC Part 15 Subpart B



Limits for frequency below 30MHz

Frequency	Limit (uV/m)	Measurement Distance(m)	Remark
0.009-0.490	2400/F(kHz)	300	Quasi-peak Value
0.490-1.705	24000/F(kHz)	30	Quasi-peak Value
1.705-30	30	30	Quasi-peak Value

LIMITS OF RADIATED EMISSION MEASUREMENT (FCC 15.225)

(a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters, equal to 124dBuV/m at 3 meters.

(b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters, equal to 90.5dBuV/m at 3 meters.

(c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters, equal to 80.5dBuV/m at 3 meters.

(d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

Above 30MHz

Frequency (MHz)	Distance (Meters)	Field Strengths Limits (dB μ V/m)	Remark
30 ~ 88	3	40.0	Quasi-peak Value
88 ~ 216	3	43.5	Quasi-peak Value
216 ~ 960	3	46.0	Quasi-peak Value
960 ~ 1000	3	54.0	Quasi-peak Value
Above 1000	3	74.0	PEAK
		54.0	AVERAGE

Remark:

- (1) The smaller limit shall apply at the cross point between two frequency bands.
- (2) Distance refers to the distance in meters between the measuring instrument, antenna and the closed point of any part of the device or system.

6.3 EUT Configuration on Test

The FCC Part 15 Subpart B regulations test method must be used to find the maximum emission during radiated emission test.

The configuration of EUT is the same as used in conducted emission test.

Please refer to Section 5.3.

6.4 Operating Condition of EUT

Same as conducted emission test, which is listed in Section 5.4 except the test set up replaced as Section 6.2.

6.5 Test Procedure

- 1) The radiated emissions test was conducted in a semi-anechoic chamber.
- 2) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
- 3) Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emissions spectrum plots of the EUT.



4) The frequencies of maximum emission were determined in the final radiated emissions measurement. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization.

5) The bandwidth setting on the field strength meter (R&S Test Receiver ESCI) is set at 120KHz.

6) The frequency range from 30MHz to 1000MHz is checked.

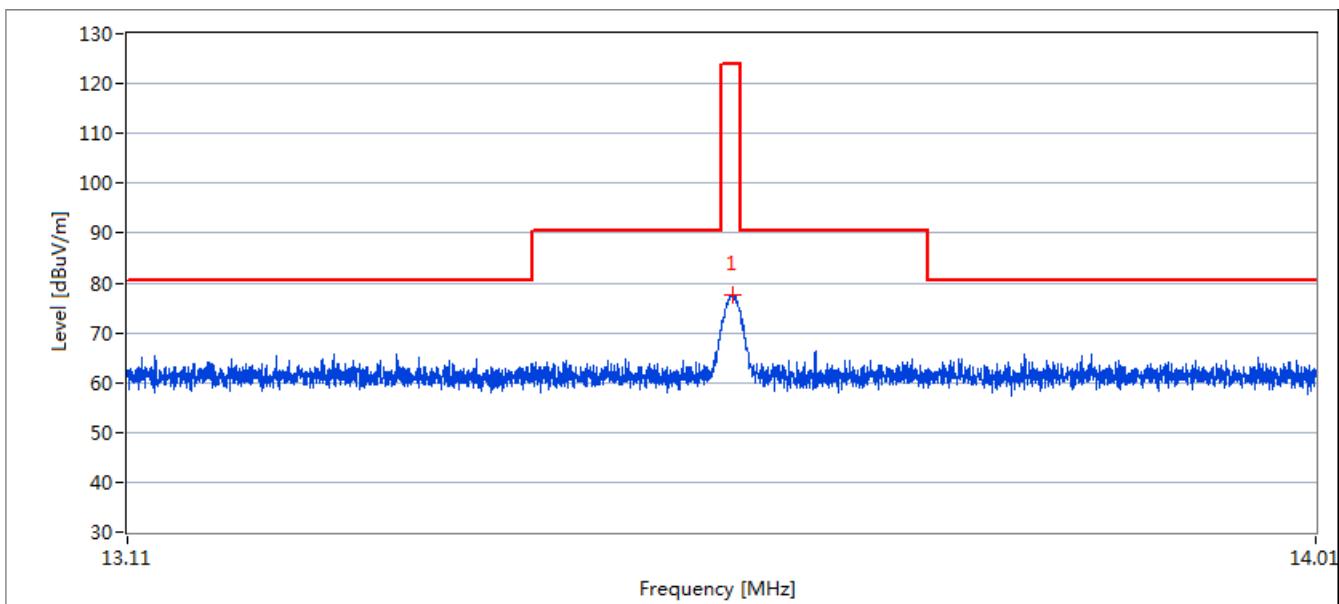
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions was X axis and the data were reported

6.6 Test Result

PASS

Please refer to the following page.

Radiation Emission Test Data below 30 MHz (Polarity: X):			
Temperature:	24.5 °C	Relative Humidity:	54%
Pressure:	1009hPa	Polarization:	Horizontal
Test Voltage:	DC 3.3V	Test Mode:	Mode 1



Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB μ V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)	
13.56	48.09	30.47	78.56	124.0	-45.44	Peak

Note:

Pre-scan in the all of mode, the worst case in of was recorded.

Factor = antenna factor + cable loss – pre-amplifier.

Margin = Emission Level(Meter Reading+ Factor) - Limit.



Spurious emissions at 9KHz~13.110MHz & 14.010MHz~30MHz

Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
0.315	38.43	28.12	66.55	99.64	-33.09	Peak
1.392	31.45	28.68	60.13	64.73	-4.60	Peak
7.419	31.56	29.34	60.90	69.54	-8.64	Peak
10.467	30.92	29.85	60.77	69.54	-8.77	Peak
16.574	30.23	30.81	61.04	69.54	-8.50	Peak
27.118	33.98	31.13	65.11	69.54	-4.43	Peak



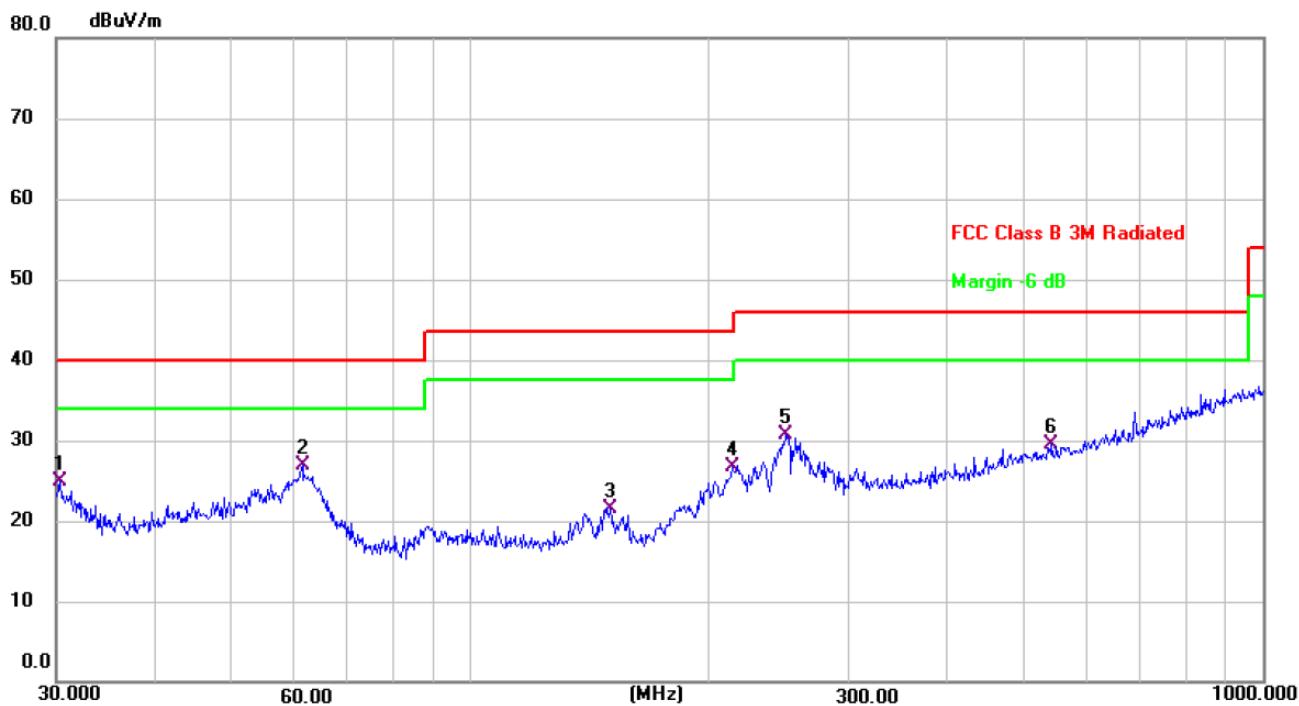
Radiation Emission Test Data			
Temperature:	24.5 °C	Relative Humidity:	54%
Pressure:	1009hPa	Polarization:	Horizontal
Test Voltage:	DC 3.3V	Test Mode:	Mode 1



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin	Detector
		MHz	dBuV	dB	dBuV/m	dB/m	dB	
1		47.9940	34.10	-11.62	22.48	40.00	-17.52	QP
2		87.4177	33.32	-15.83	17.49	40.00	-22.51	QP
3		198.5880	36.08	-13.39	22.69	43.50	-20.81	QP
4		249.4250	42.76	-11.77	30.99	46.00	-15.01	QP
5		361.7139	37.29	-9.84	27.45	46.00	-18.55	QP
6	*	601.4265	36.84	-5.68	31.16	46.00	-14.84	QP



Radiation Emission Test Data			
Temperature:	24.5 °C	Relative Humidity:	54%
Pressure:	1009hPa	Polarization:	Vertical
Test Voltage:	DC 3.3V	Test Mode:	Mode 1



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin	Detector
		MHz	dBuV	dB	dBuV/m	dB/m	dB	
1		30.3173	39.63	-14.73	24.90	40.00	-15.10	QP
2	*	61.3463	39.21	-12.37	26.84	40.00	-13.16	QP
3		150.0108	38.05	-16.50	21.55	43.50	-21.95	QP
4		213.7634	39.13	-12.44	26.69	43.50	-16.81	QP
5		250.3012	41.57	-10.94	30.63	46.00	-15.37	QP
6		541.3725	34.81	-5.38	29.43	46.00	-16.57	QP

Remarks:

- 1.Final Level =Receiver Read level + Correct factor (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.



7. BANDWIDTH TEST

7.1 TEST SETUP

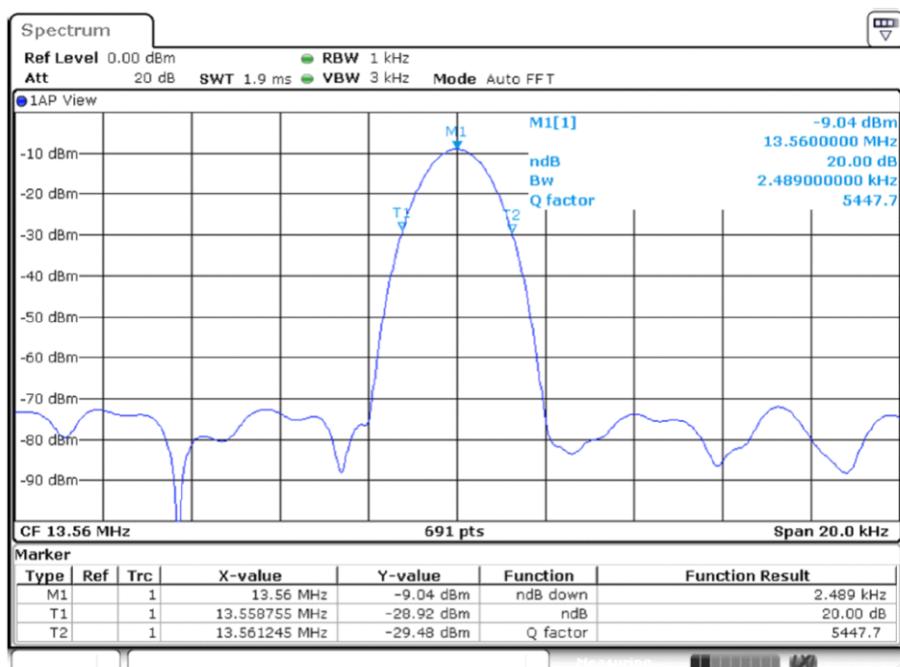
1. Set RBW = 1 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

7.2 TEST SETUP



7.3 TEST Result

Frequency (MHz)	20dB bandwidth (kHz)	Result
13.56	2.489	Pass





8. FREQUENCY TOLERANCE

8.1 Requirement

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

8.2 TEST SETUP

1. Set RBW = 10 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

8.3 TEST SETUP



8.4 TEST Result

Power Supply (DC)	Temperature (°C)	Measured Frequency(MHz)	Frequency Error (MHz)	Result (ppm)	Limits (ppm)	Result
3.3V	-20	13.56078	0.00078	57.52	± 100	Pass
	20	13.56056	0.00056	41.30	± 100	
	50	13.56046	0.00046	33.92	± 100	
2.81V	-20	13.56063	0.00063	46.46	± 100	Pass
	20	13.56057	0.00057	42.04	± 100	
	50	13.56074	0.00074	54.57	± 100	
3.80	-20	13.56055	0.00055	40.56	± 100	Pass
	20	13.56063	0.00063	46.46	± 100	
	50	13.56081	0.00081	59.73	± 100	



9. SETUP PHOTOGRAPHS

Reference to the setup photo for details.

10. EUT PHOTOGRAPHS

Reference to the external and internal photo for details.

***** END OF REPORT *****