

# TEST REPORT

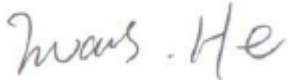
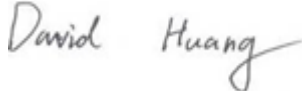
Applicant	PAX Technology Limited
Address	Room 2416, 24/F., Sun Hung Kai Centre, 30 Harbour Hong Kong, China

Manufacturer or Supplier	PAX Computer Technology(Shenzhen) Co. Ltd.
Address	4/F, No.3 Building, Software Park, Second Central Science-Tech Road, High-Tech industrial Park, Shenzhen, Guangdong, P.R.C.
Product	IM10 Unattended Payment Terminal
Brand Name	PAX
Model	IM10
Additional Model & Model Difference	N/A
Date of tests	Mar. 06, 2020~ Apr. 29, 2020

the tests have been carried out according to the requirements of the following standards:

☒ FCC Part 15, Subpart C, Section 15.225

**CONCLUSION: The submitted sample was found to COMPLY with the test requirement**

Tested by Evans He Project Engineer / EMC Department	Approved by David Huang Supervisor / EMC Department
	  Date: Apr. 30, 2020

This report is governed by, and incorporates by reference, CPS Conditions of Service as posted at the date of issuance of this report at <http://www.bureauveritas.com/home/about-us/our-business/cps/about-us/terms-conditions/> and is intended for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. Measurement uncertainty is only provided upon request for accredited tests. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence or if you require measurement uncertainty; provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute you unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents.

## TABLE OF CONTENTS

<b>RELEASE CONTROL RECORD .....</b>	<b>4</b>
<b>1 SUMMARY OF TEST RESULTS.....</b>	<b>5</b>
<b>2 MEASUREMENT UNCERTAINTY.....</b>	<b>5</b>
<b>3 GENERAL INFORMATION.....</b>	<b>6</b>
3.1 GENERAL DESCRIPTION OF EUT.....	6
3.2 DESCRIPTION OF TEST MODES.....	7
3.2.1. CONFIGURATION OF SYSTEM UNDER TEST .....	7
3.2.2. TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL .....	7
3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS.....	9
3.4 DESCRIPTION OF SUPPORT UNITS.....	9
<b>4 TEST TYPES AND RESULTS .....</b>	<b>10</b>
4.1. CONDUCTED EMISSION MEASUREMENT .....	10
4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT.....	10
4.1.2 TEST INSTRUMENTS .....	10
4.1.3 TEST PROCEDURES.....	11
4.1.4 DEVIATION FROM TEST STANDARD.....	11
4.1.5 TEST SETUP .....	12
4.1.6 EUT OPERATING CONDITIONS .....	12
4.1.7 TEST RESULTS.....	13
4.2. RADIATED EMISSION AND BANDEDGE MEASUREMENT .....	15
4.2.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT .....	15
4.2.2 TEST INSTRUMENTS .....	16
4.2.3 TEST PROCEDURES.....	17
4.2.4 DEVIATION FROM TEST STANDARD.....	17
4.2.5 TEST SETUP .....	18
4.2.6 EUT OPERATING CONDITIONS .....	19
4.2.7 TEST RESULTS.....	19
4.3. FREQUENCY TOLERANCE.....	22
4.3.1. LIMIT OF FREQUENCY TOLERANCE .....	22
4.3.2. TEST INSTRUMENTS .....	22
4.3.3. TEST PROCEDURES.....	23
4.3.4. DEVIATION FROM TEST STANDARD.....	23
4.3.5. TEST SETUP .....	23
4.3.6. EUT OPERATING CONDITIONS .....	24
4.3.7. TEST RESULTS.....	24
4.4. 20dB BANDWIDTH .....	25



## Test Report No.: RF200306S018

4.4.1	LIMITS OF 20dB BANDWIDTH .....	25
4.4.2	TEST INSTRUMENTS .....	25
4.4.3	TEST PROCEDURE .....	26
4.4.4	DEVIATION FROM TEST STANDARD.....	26
4.4.5	TEST SETUP .....	26
4.4.6	EUT OPERATING CONDITION.....	27
4.4.7	TEST RESULTS.....	27
5.	PHOTOGRAPHS OF THE TEST CONFIGURATION .....	28
6.	APPENDIX A - MODIFICATIONS RECORDERS FOR     ENGINEERING CHANGES TO THE EUT BY THE LAB.....	29



Test Report No.: RF200306S018

## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF200306S018	Original release	Apr. 30, 2020

## 1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit.
15.225 (a)&(b)&(c)	The field strength of any emissions within the band	PASS	Meet the requirement of limit.
15.225 (d)	The field strength of any emissions appearing outside of the 13.110-14.010 MHz band	PASS	Meet the requirement of limit.
15.225 (e)	Frequency tolerance	PASS	Meet the requirement of limit.
15.215 (c)	20dB Bandwidth	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used.

## 2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.70dB
Radiated emissions	9KHz ~ 30MHz	2.16dB
	30MHz ~ 1GMHz	3.74dB
	1GHz ~ 18GHz	4.66dB
	18GHz ~ 40GHz	4.67dB

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

### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	IM10 Unattended Payment Terminal
MODEL NO.	IM10
ADDITIONAL MODELS	N/A
FCC ID	V5PIM10BW
POWER SUPPLY	DC 5V From USB Host Unit
MODULATION TECHNOLOGY	NFC
MODULATION TYPE	ASK
OPERATING FREQUENCY	13.56MHz
NUMBER OF CHANNEL	1
ANTENNA TYPE	Loop Antenna
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	N/A

**NOTE:**

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.
3. Please refer to the EUT photo document (Reference No.: 200221W004) for detailed product photo.

### 3.2 DESCRIPTION OF TEST MODES

The EUT only have one channel.

CHANNEL	FREQUENCY (MHz)
1	13.56

#### 3.2.1. CONFIGURATION OF SYSTEM UNDER TEST

Please see section 5 photograph of the test configuration for reference.

#### 3.2.2. TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports. The worst case was found when positioned on X axis for radiated emission. Following channel(s) was (were) selected for the final test as listed below:

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE	FT	PLC	BW	
A	√	√	√	√	DC 5V from Adapter

Where RE: Radiated Emission

PLC: Power Line Conducted Emission

FT: Frequency tolerance

BW: 20dB Bandwidth

#### RADIATED EMISSION TEST:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis, antenna ports (if EUT with antenna diversity architecture) and packet type.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	TESTED CHANNEL	TESTED FREQUENCY (MHZ)	MODULATION TYPE	AXIS
A	1	13.56	ASK	X

**FREQUENCY TOLERANCE:**

- ☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture), and packet types.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	TESTED CHANNEL	TESTED FREQUENCY (MHZ)	MODULATION TYPE	AXIS
A	1	13.56	ASK	X

**POWER LINE CONDUCTED EMISSION TEST:**

- ☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture), and packet types.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	TESTED CHANNEL	TESTED FREQUENCY (MHZ)	MODULATION TYPE	AXIS
A	1	13.56	ASK	X

**20dB BANDWIDTH:**

- ☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture), and packet types.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	TESTED CHANNEL	TESTED FREQUENCY (MHZ)	MODULATION TYPE	AXIS
A	1	13.56	ASK	X



**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	TEST VOLTAGE (SYSTEM)	TESTED BY
RE	21deg. C, 63%RH	DC 5V From Adapter	Aaron liang
FT	25deg. C, 60%RH	DC 5V From Adapter	Aaron liang
PLC	25deg. C, 55%RH	DC 5V From Adapter	Aaron liang
BW	25deg. C, 60%RH	DC 5V From Adapter	Aaron liang

### 3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart C. Section 15.225**  
**ANSI C63.10-2013**

All test items have been performed and recorded as per the above standards.

**NOTE:** 1. All test items have been performed and recorded as per the above standards.  
2. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (sDOC). The test report has been issued separately.

### 3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as a dependent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	-	-	-	-	-
2	-	-	-	-	-
3	-	-	-	-	-

NO.	DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	N/A

## 4 TEST TYPES AND RESULTS

### 4.1. CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB $\mu$ V)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56	56 to 46
0.5 ~ 5	56	46
5 ~ 30	60	50

**NOTE:** 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

#### 4.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCS30	8471241027	Mar. 24,20	Mar. 24,21
Artificial Mains Network	SCHWARZBECK	8127	8127713	Mar. 24,20	Mar. 24,21
ISN	Com-Power	ISN T800	34373	Mar. 24,20	Mar. 24,21
EMI Test Receiver	Rohde&Schwarz	ESCS30	8471241027	Mar. 24,20	Mar. 24,21
Test software	EZ-EMC	ICP-03A1	N/A	N/A	N/A

**NOTE:**

1. The test was performed in shielded room 553.

2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

#### 4.1.3 TEST PROCEDURES

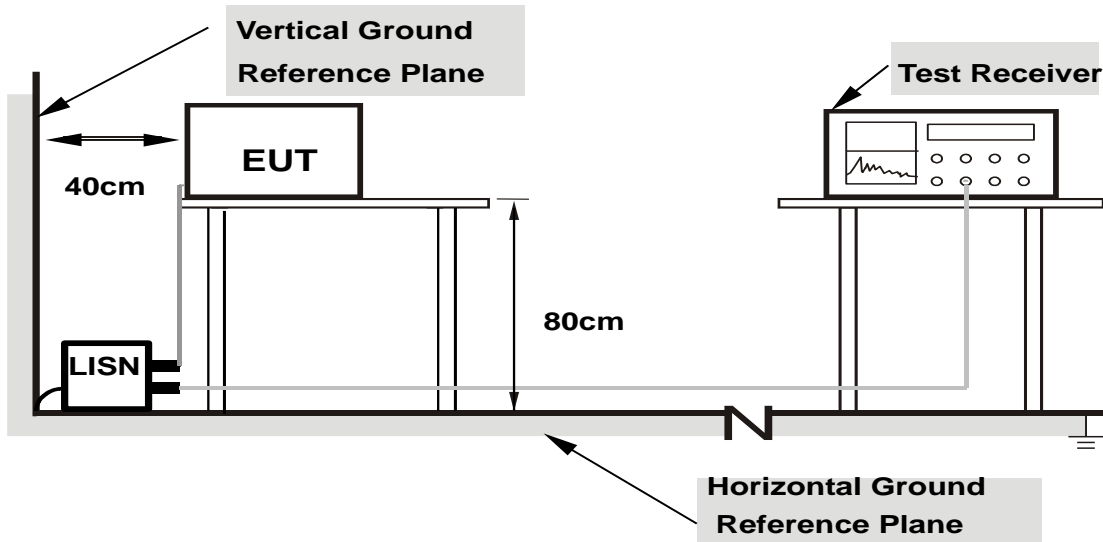
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

**NOTE:** All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.1.5 TEST SETUP



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

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

For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.1.6 EUT OPERATING CONDITIONS

- a. Turned on the power and connected of all equipment.
- b. EUT was operated according to the type used was description in manufacturer's specifications or the User's Manual.

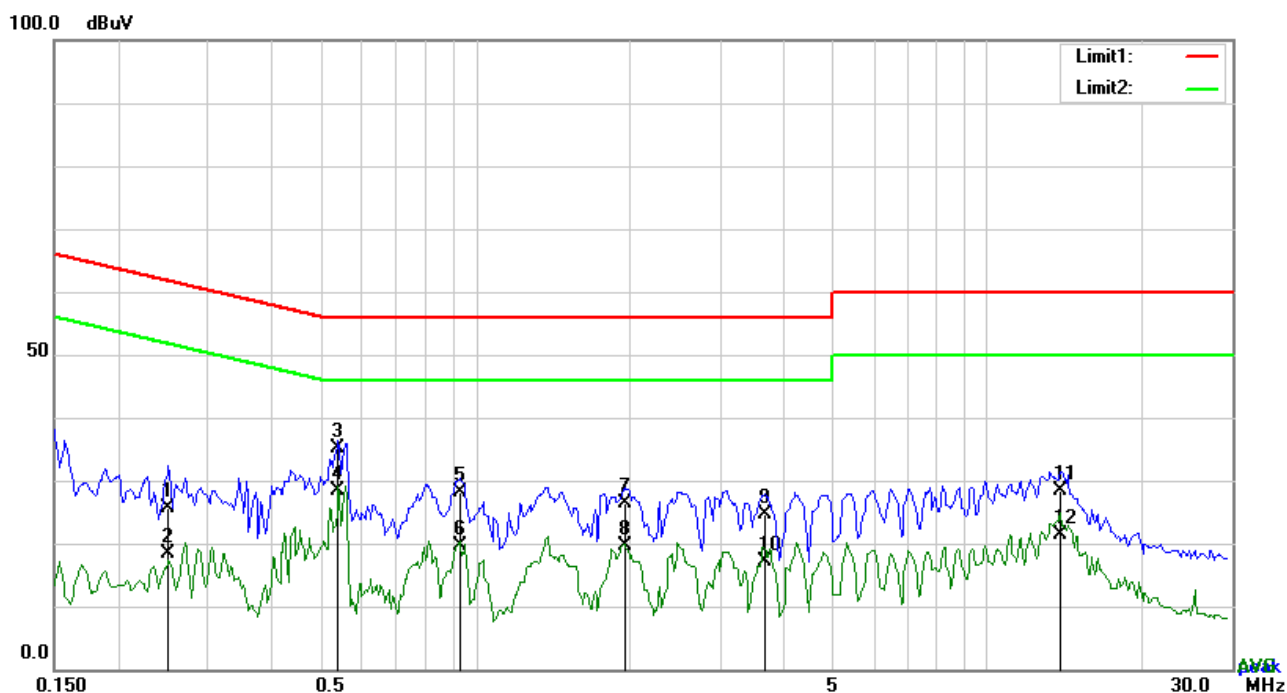
#### 4.1.7 TEST RESULTS

##### CONDUCTED WORST-CASE DATA:

PHASE	Line	6dB BANDWIDTH	9kHz
-------	------	---------------	------

No.	P/L	Frequency (MHz)	Reading (dBuV)	Detector	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)
1	L1	0.2514	15.48	QP	10.11	25.59	61.71	-36.12
2	L1	0.2514	8.22	AVG	10.11	18.33	51.71	-33.38
3	L1	0.5400	25.08	QP	10.10	35.18	56.00	-20.82
4	L1	0.5400	18.32	AVG	10.10	28.42	46.00	-17.58
5	L1	0.9300	17.95	QP	10.13	28.08	56.00	-27.92
6	L1	0.9300	9.41	AVG	10.13	19.54	46.00	-26.46
7	L1	1.9635	16.31	QP	10.15	26.46	56.00	-29.54
8	L1	1.9635	9.58	AVG	10.15	19.73	46.00	-26.27
9	L1	3.6669	14.48	QP	10.18	24.66	56.00	-31.34
10	L1	3.6669	7.00	AVG	10.18	17.18	46.00	-28.82
11	L1	13.8576	18.05	QP	10.31	28.36	60.00	-31.64
12	L1	13.8576	11.06	AVG	10.31	21.37	50.00	-28.63

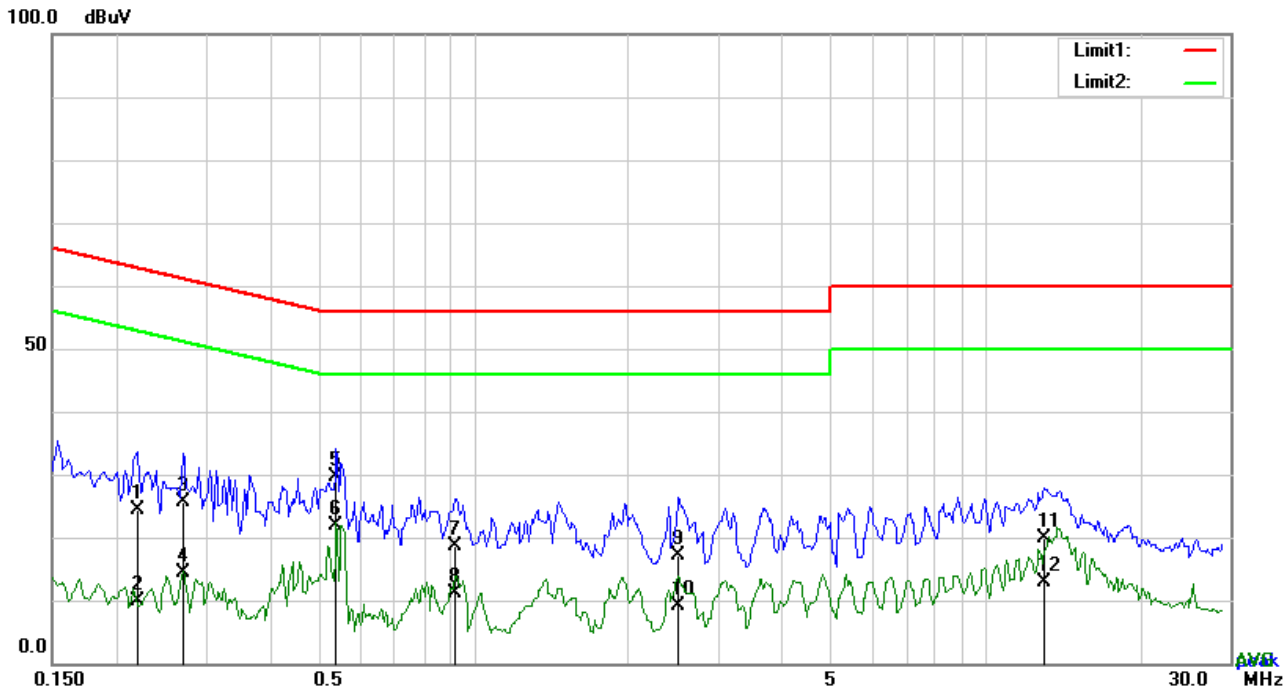
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.



PHASE	Neutral	6dB BANDWIDTH	9kHz
-------	---------	---------------	------

No.	P/L	Frequency (MHz)	Reading (dBuV)	Detector	Corrected (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)
1	N	0.2202	14.22	QP	10.11	24.33	62.81	-38.48
2	N	0.2202	-0.12	AVG	10.11	9.99	52.81	-42.82
3	N	0.2709	15.47	QP	10.11	25.58	61.09	-35.51
4	N	0.2709	4.38	AVG	10.11	14.49	51.09	-36.60
5	N	0.5400	19.51	QP	10.10	29.61	56.00	-26.39
6	N	0.5400	11.84	AVG	10.10	21.94	46.00	-24.06
7	N	0.9222	8.46	QP	10.12	18.58	56.00	-37.42
8	N	0.9222	0.91	AVG	10.12	11.03	46.00	-34.97
9	N	2.5056	6.94	QP	10.16	17.10	56.00	-38.90
10	N	2.5056	-1.04	AVG	10.16	9.12	46.00	-36.88
11	N	13.0230	9.70	QP	10.30	20.00	60.00	-40.00
12	N	13.0230	2.70	AVG	10.30	13.00	50.00	-37.00

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.



## 4.2. RADIATED EMISSION AND BANDEDGE MEASUREMENT

### 4.2.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT

The field strength of any emissions shall not exceed the following limits:

- (a) 15.848mV/m(84dBuV/m) at 30m, within the band 13.553-13.567 MHz;
- (b) 334uV/m(50.5dBuV/m) at 30m, within the band 13.410-13.553 MHz and 13.567-13.710MHz;
- (c) 106uV/m(40.5dBuV/m) at 30m, within the band 13.110-13.410 MHz and 13.710-14.010MHz;

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.

FREQUENCIES (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

**NOTE:**

- The lower limit shall apply at the transition frequencies.
- Emission level (dBuV/m) = 20 log Emission level (uV/m).
- As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.
- The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

$$\begin{aligned}
 13.56\text{MHz} &= 15848\text{uV/m} & 30\text{m} \\
 &= 84\text{dBuV/m} & 30\text{m} \\
 &= 84+20\log(30/3)^2 & 3\text{m} \\
 &= 124\text{dBuV/m}
 \end{aligned}$$

## 4.2.2 TEST INSTRUMENTS

### FREQUENCY RANGE BELOW 1GHz

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESL6	1300.5001K06-100262-eQ	Mar. 24,20	Mar. 24,21
Bilog Antenna	Sunol Sciences	JB6	A110712	Apr. 08, 20	Apr. 07, 21
Active Antenna	CMO-POWER	AL-130	121031	Mar. 27, 20	Mar. 26, 21
Signal Amplifier	HP	8447E	443008	Mar. 24, 20	Mar. 24, 21
3m Semi-anechoic Chamber	SAEMC	9m*6m*6m	N/A	Oct. 18,18	Oct. 17,21
Test Software	EZ-EMC	ICP-03A1	N/A	N/A	N/A

#### NOTE:

1. The test was performed in 966 Chamber (a 3m Semi-anechoic chamber).
2. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
3. The horn antenna is used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 535293.



#### 4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3x10 meter semi-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 is a broadband antenna, and its 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 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 quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, For battery operated equipment, the equipment tests shall be performed using fresh batteries. The turntable was rotated to maximize the emission level.
- g. For below 30MHz, a loop antenna with its plane is placed 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1m above the ground.

#### NOTE:

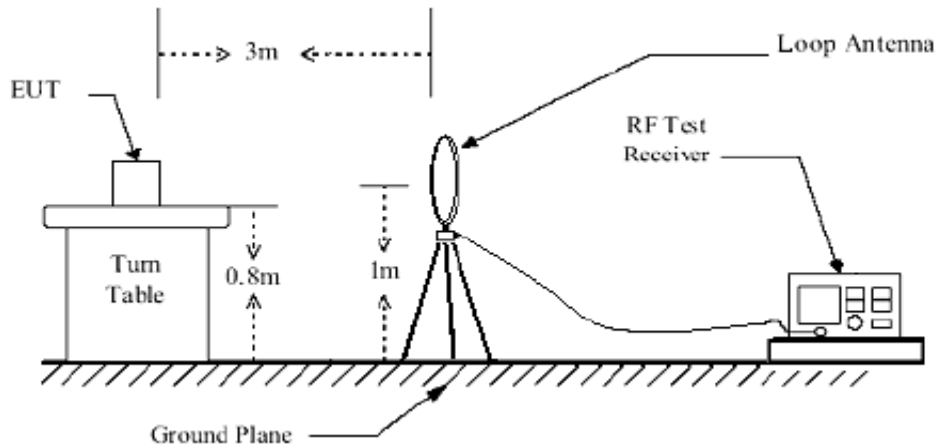
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.2.4 DEVIATION FROM TEST STANDARD

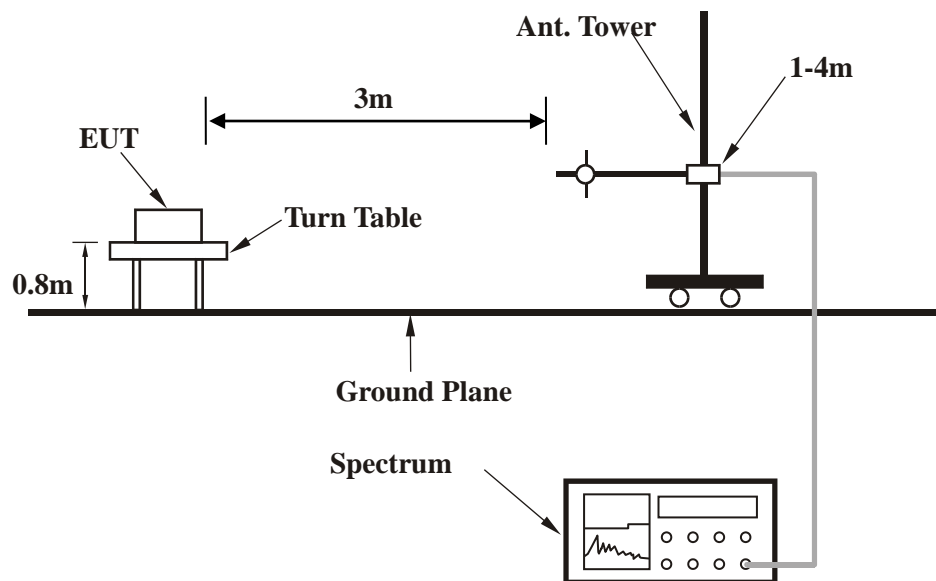
No deviation.

#### 4.2.5 TEST SETUP

##### Below 30MHz test setup



##### Below 1GHz test setup



**Note:** For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.2.6 EUT OPERATING CONDITIONS

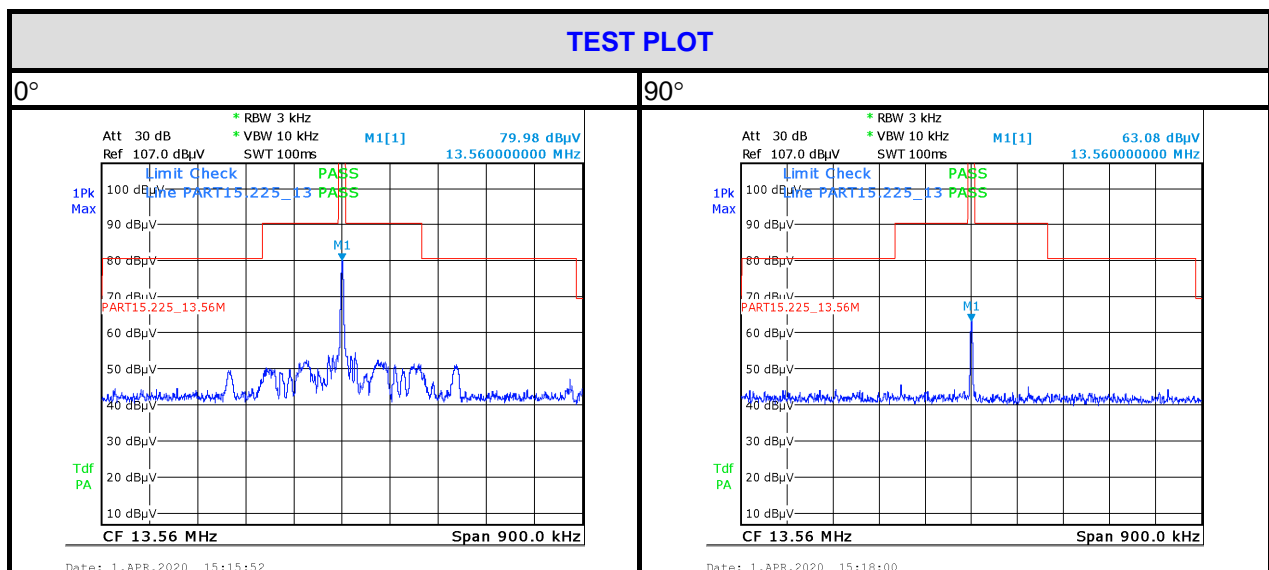
Set the EUT under transmission condition continuously at specific channel frequency.

#### 4.2.7 TEST RESULTS

##### FIELD STRENGTH (BELOW 30MHz AT 3M)

No.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value (dBuV)	Emission Level (dBuV/m)	Polarity (0° / 90°)	Limit (dBuV/m)	Margin (dB)
1	*13.56(QP)	20.87	59.11	79.98	0°	124	-44.02
2	*16.95(QP)	19.01	18.2	37.21	0°	69.5	-32.29
3	27.12(QP)	19.71	16.49	36.2	0°	69.5	-33.3
4	*13.56(QP)	20.87	42.21	63.08	90°	124	-60.92
5	*16.95(QP)	19.01	19.65	38.66	90°	69.5	-30.84
6	27.12(QP)	19.71	15.09	34.8	90°	69.5	-34.7

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
  2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.
  5. " \* " : Fundamental frequency.
  6. For the test results, both 0° and 360° ( Parallel, perpendicular, parallel to the ground ) of the antenna are set to make the measurement, All emissions are greater than 20dB below the limit.



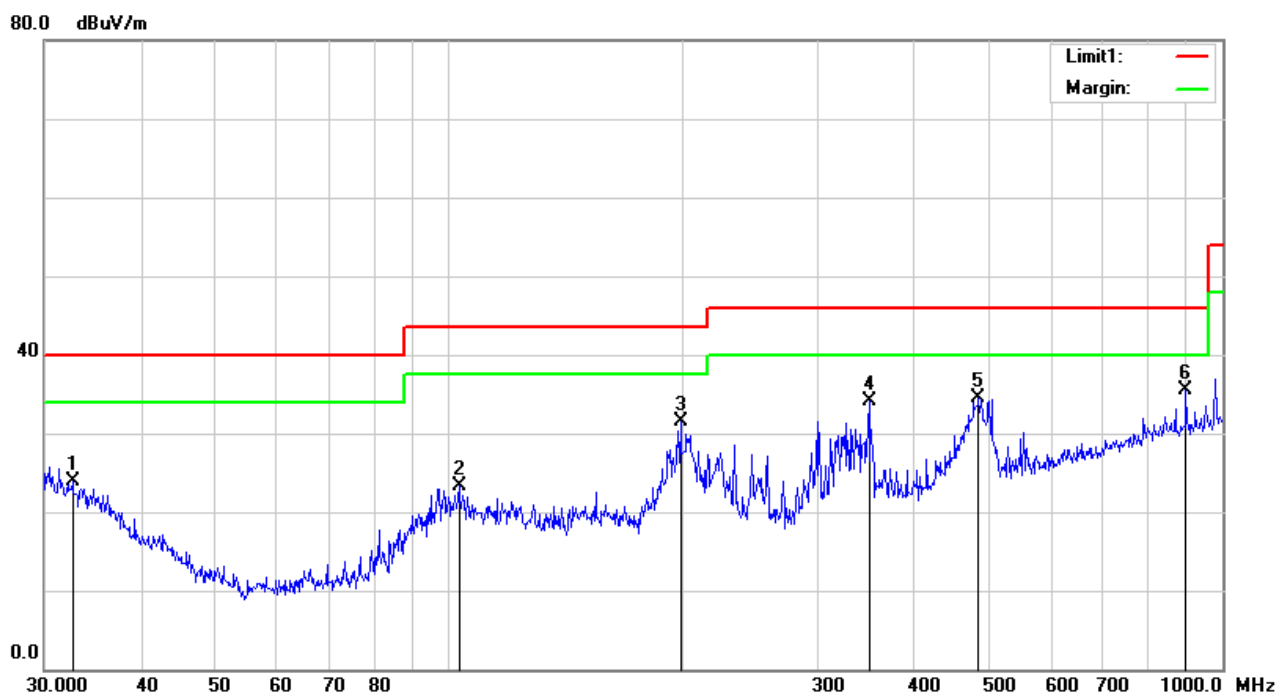
**BELOW 1GHz WORST-CASE DATA:**

<b>CHANNEL</b>	13.56MHz	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	9KHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 m										
No.	Frequency (MHz)	Reading (dBuV/m)	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	32.6340	26.68	19.37	22.26	0.14	23.93	40.00	-16.07	100	5
2	103.0800	33.93	10.94	22.33	0.84	23.38	43.50	-20.12	100	186
3	199.2855	40.36	12.06	22.38	1.55	31.59	43.50	-11.91	100	183
4	349.2500	39.72	14.63	22.15	1.85	34.05	46.00	-11.95	100	78
5	483.9094	36.78	17.38	21.84	2.09	34.41	46.00	-11.59	100	16
6	896.9965	31.22	22.47	20.89	2.65	35.45	46.00	-10.55	100	128

**REMARK:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Gain (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. Margin value = Emission level – Limit value.





BUREAU  
VERITAS

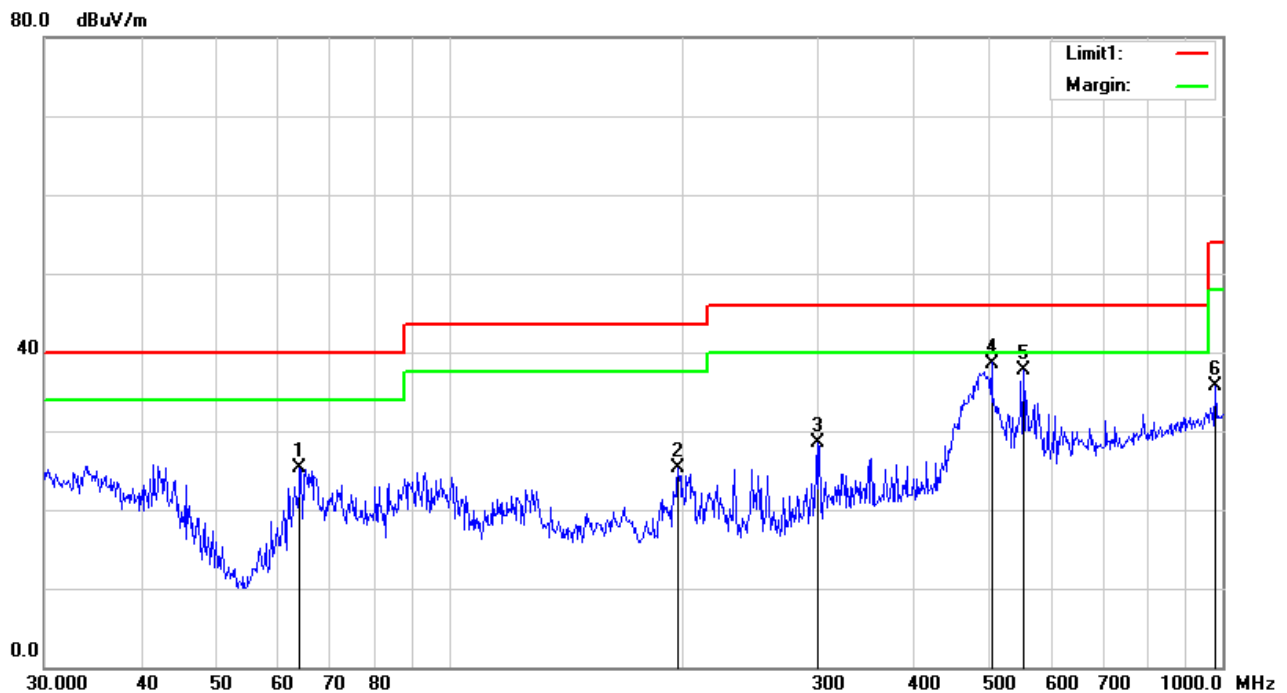
Test Report No.: RF200306S018

CHANNEL	13.56MHz	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9KHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 m										
No.	Frequency	Reading	Ant_F	PA_G	Cab_L	Result	Limit	Margin	Height	Degree
	(MHz)	(dBuV/m)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)
1	64.2075	39.88	7.51	22.40	0.29	25.28	40.00	-14.72	100	37
2	197.8928	34.15	11.98	22.37	1.54	25.30	43.50	-18.20	100	131
3	299.3158	35.42	13.57	22.29	1.72	28.42	46.00	-17.58	100	161
4	502.9395	40.52	17.74	21.80	2.14	38.60	46.00	-7.40	100	41
5	552.8833	38.62	18.44	21.69	2.27	37.64	46.00	-8.36	100	37
6	979.1804	30.77	22.90	20.73	2.74	35.68	54.00	-18.32	100	277

REMARK:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Gain (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. Margin value = Emission level – Limit value.



### 4.3. FREQUENCY TOLERANCE

#### 4.3.1. LIMIT OF FREQUENCY TOLERANCE

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  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.

#### 4.3.2. TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Wireless Connectivity Tester	R&S	CMW270	1201.0002K75	Dec. 18, 19	Dec. 17, 20
MXA VEXTOR SIGNAL	Agilent	n5182a	MY50140530	Mar. 24,20	Mar. 24,21
MXA signal analyzer	Agilent	n9020a	MY49100060	Mar. 24,20	Mar. 24,21
RF Control Unit	Tonscend	JS0806-2	188060112	Mar. 24,20	Mar. 24,21
Signal Generation	Agilent	E4421B	US40051152	Dec. 18, 19	Dec. 17, 20
DC Power Supply	Agilent	E3640A	MY40004013	Mar. 28,20	Mar. 27,21
Programmable Temperature & Humidity Chamber	Hongjin	HYC-TH-225 DH	DG-180746	Mar. 24,20	Mar. 24,21
Test System	Tonscend	JS 1120-3	N/A	N/A	N/A
Power Splitter	Weinschel	1580-1	TL177	Mar. 20,20	Mar. 19,21

**NOTE:**

1. The test was performed in RF Oven room.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

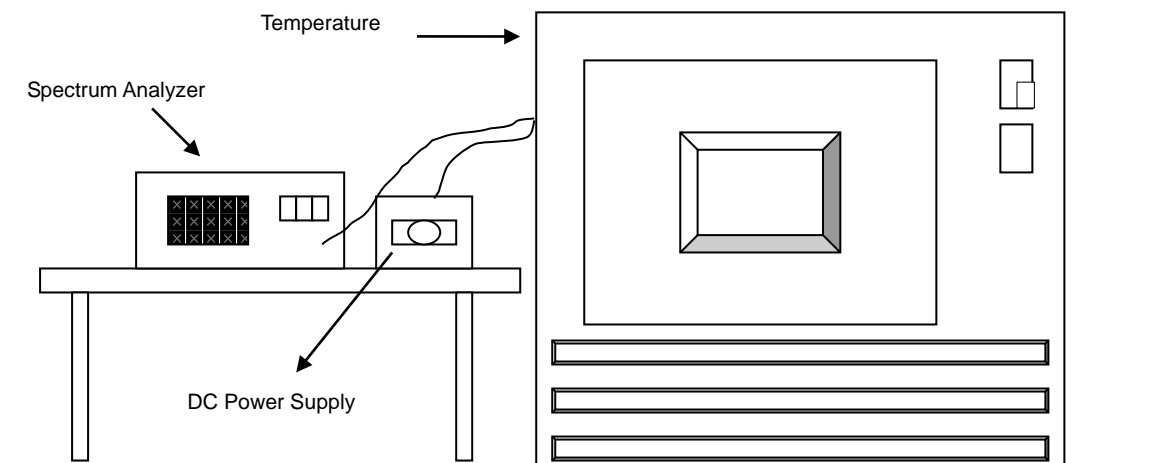
#### 4.3.3. TEST PROCEDURES

- a) The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
- b) Turn the EUT on and couple its output to a spectrum analyzer.
- c) Turn the EUT off and set the chamber to the highest temperature specified.
- d) Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
- e) Repeat step c) and d) with the temperature chamber set to the lowest temperature.
- f) The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

#### 4.3.4. DEVIATION FROM TEST STANDARD

No deviation.

#### 4.3.5. TEST SETUP



#### 4.3.6. EUT OPERATING CONDITIONS

Set the EUT under transmission condition continuously at specific channel frequency.

#### 4.3.7. TEST RESULTS

FREQUENCY STABILITY VERSUS TEMP.									
TEMP. (°C)	POWER SUPPLY (V)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	%	(MHz)	%	(MHz)	%	(MHz)	%
40	5V	13.56018	0.00133	13.56053	0.00391	13.56036	0.00265	13.56034	0.00251
30	5V	13.56050	0.00369	13.56031	0.00229	13.56032	0.00236	13.56035	0.00258
20	5V	13.56059	0.00435	13.56017	0.00125	13.56055	0.00406	13.56055	0.00406
10	5V	13.56018	0.00133	13.56011	0.00081	13.56020	0.00147	13.56019	0.00140
0	5V	13.56013	0.00096	13.56045	0.00332	13.56052	0.00383	13.56013	0.00096

FREQUENCY STABILITY VERSUS VOLTAGE									
TEMP. (°C)	POWER SUPPLY (V)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	%	(MHz)	%	(MHz)	%	(MHz)	%
20	4.5V	13.56043	0.00317	13.56036	0.00265	13.56032	0.00236	13.56053	0.00391
	5V	13.56045	0.00332	13.56034	0.00251	13.56048	0.00354	13.56042	0.00310
	5.5V	13.56039	0.00288	13.56036	0.00265	13.56036	0.00265	13.56012	0.00088



#### 4.4. 20dB BANDWIDTH

##### 4.4.1 LIMITS OF 20dB BANDWIDTH

The 20dB bandwidth shall be specified in operating frequency band.(13.11MHz – 14.01MHz)

##### 4.4.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Wireless Connectivity Tester	R&S	CMW270	1201.0002K75	Dec. 18, 19	Dec. 17, 20
MXA VEXTOR SIGNAL	Agilent	n5182a	MY50140530	Mar. 24,20	Mar. 24,21
MXA signal analyzer	Agilent	n9020a	MY49100060	Mar. 24,20	Mar. 24,21
RF Control Unit	Tonscend	JS0806-2	188060112	Mar. 24,20	Mar. 24,21
Signal Generation	Agilent	E4421B	US40051152	Dec. 18, 19	Dec. 17, 20
DC Power Supply	Agilent	E3640A	MY40004013	Mar. 28,20	Mar. 27,21
Programmable Temperature & Humidity Chamber	Hongjin	HYC-TH-225 DH	DG-180746	Mar. 24,20	Mar. 24,21
Test System	Tonscend	JS 1120-3	N/A	N/A	N/A
Power Splitter	Weinschel	1580-1	TL177	Mar. 20,20	Mar. 19,21

**NOTE:**

1. The test was performed in RF Oven room.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

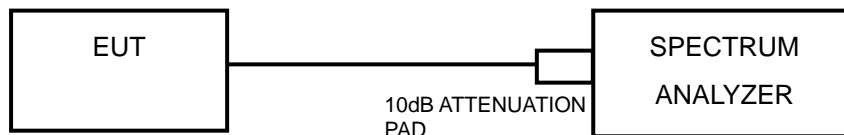
#### 4.4.3 TEST PROCEDURE

- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- c. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
- d. Repeat above procedures until all frequencies measured were complete.

#### 4.4.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.4.5 TEST SETUP



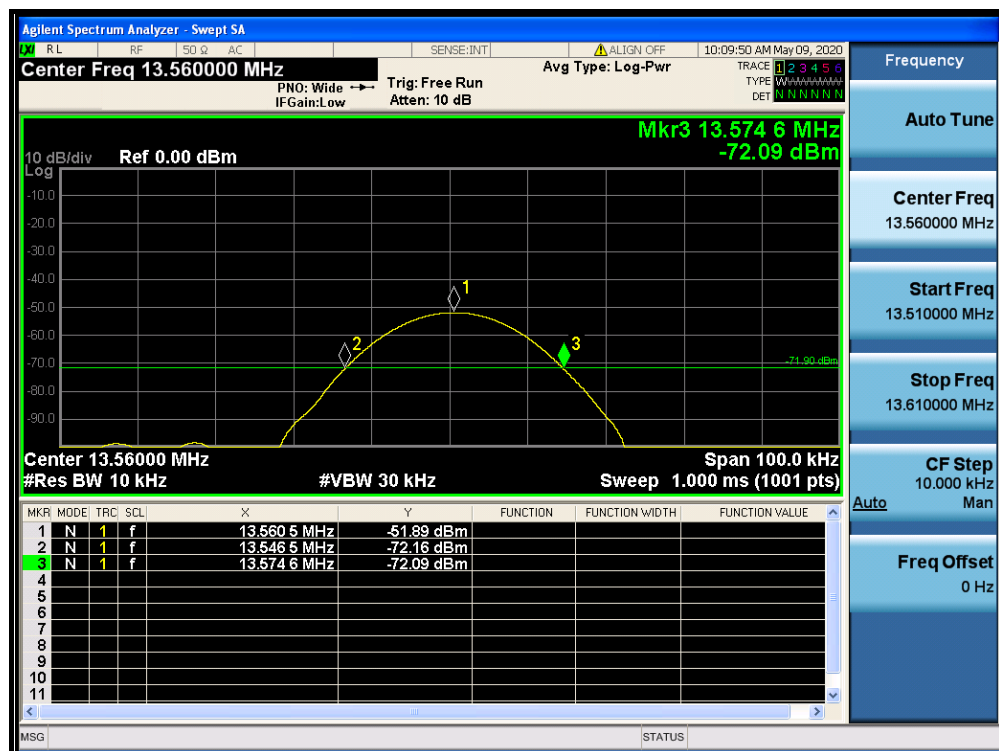
#### 4.4.6 EUT OPERATING CONDITION

The software provided by client to enable the EUT under transmission condition continuously.

#### 4.4.7 TEST RESULTS

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (KHz)
1	13.56	28

Lower & Upper Test Frequency Point (MHz)	Test Frequency (MHz)	P/F
Lower	13.5465	PASS
Upper	13.5746	PASS





Test Report No.: RF200306S018

## 5. PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).

## **6. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

No any modifications are made to the EUT by the lab during the test.

**---END---**