

FCC PART 15.225
EMI MEASUREMENT AND TEST REPORT
For
SHENZHEN RDM TAG MASTER CO., LTD.
4F, 25#Bld, KeZhi West Road, High-Tech Park, Nanshan Shenzhen, China

FCC ID:U7NM28

Jun. 9, 2010

This Report Concerns: Original Report	Equipment Type : AFC Reader
Test Engineer: <u>Eric Li</u>	
Report No.: <u>BST10050055R-3</u>	
Receive EUT Date/Test Date: <u>May 07,2010/ May 27- Jun. 9, 2010</u>	
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The test site used to collect the data is located on the address of
emitel (Shenzhen) Limited

(FCC Registered Test Site Number: 746887) on
Building 2, 171 Meihua Road, Futian District, Shenzhen, 518049 China
The Test Site is constructed and calibrated to meet the FCC requirements.
The test was performed by Eric Li from BST and supervised by Wilson Loke and Christina Deng at
emitel (Shenzhen) Limited

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1. GENERAL INFORMATION

1.1. Report information

1.1.1. This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that BST approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that BST in any way guarantees the later performance of the product/equipment.

1.1.2. The sample/s mentioned in this report is/are supplied by Applicant, BST therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture or any information supplied.

Additional copies of the report are available to the Applicant at an additional fee. No third part can obtain a copy of this report through BST, unless the applicant has authorized BST in writing to do so.

Test Facility -

The test site used to collect the radiated data is located on the address of
emitel (Shenzhen) Limited

(FCC Registered Test Site Number: 746887) on
Building 2, 171 Meihua Road, Futian District, Shenzhen, 518049 China
The Test Site is constructed and calibrated to meet the FCC requirements.

1.1.3. The test was performed by Eric Li from BST and supervised by Wilson Loke and Christina Deng at emitel (Shenzhen) Limited

1.2. Measurement Uncertainty

Available upon request.

2. PRODUCT DESCRIPTION

2.1. EUT Description

Description : AFC Reader

Applicant : SHENZHEN RDM TAG MASTER CO., LTD.

Model Number : M28, M18, R18

Additonal Information

Frequency : 13.56MHz

Power Supply : DC5V (Supplied by PC)

Maximum : N/A

Range

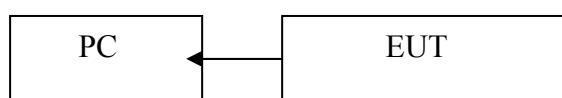
Transmitter : -

Antenna

Current N/A

Consumption

2.2. Block Diagram of EUT Configuration



2.3. Support Equipment List

Manufacturer	Description	Model	Serial Number
DELL	PC	DELL 162L	CN-0TC672-71521-610-F4Q5

2.4. Test Conditions

Temperature: 23~25

Relative Humidity: 55~63 %

3. FCC ID LABEL

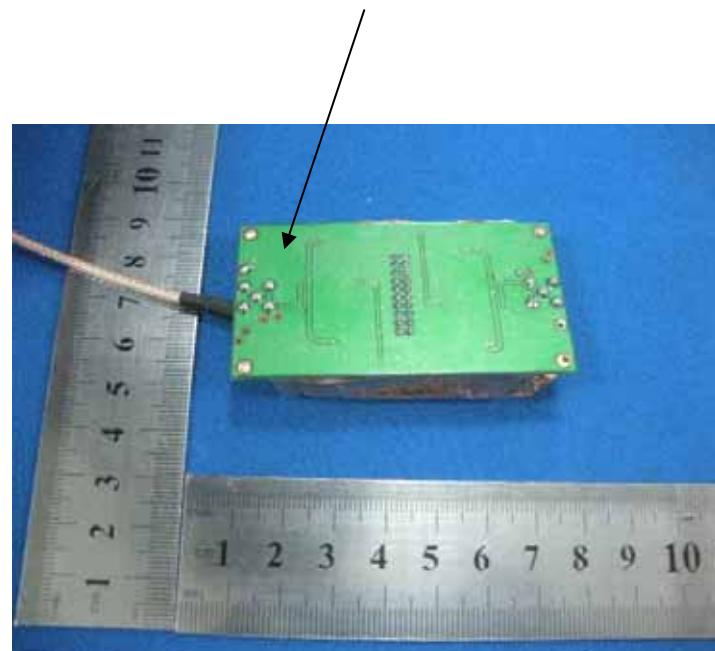
FCC ID:U7NM28

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- 1. This device may not cause harmful interference, and**
- 2. This device must accept any interference received, including interference that may cause undesired operation.**

Label Location on EUT

EUT Bottom View/ FCC ID Label Location



4. TEST RESULTS SUMMARY

FCC 15 Subpart C,Paragraph 15.231

Test Standards	Test Items	Test Results
§15.207	Conducted test	Pass
§15.35/15.205/15.209/15.225	Radiated Emission	Pass
§15.225 (e)	Frequency Stability	Pass
§15.203	ANTENNA REQUIREMENT	Pass

Remark: "N/A" means "Not applicable."

Modifications

No modification was made.

5. TEST EQUIPMENT USED

EQUIPMENT/FACILITIES	MANUFACTURER	MODEL #	SERIAL NO.	DATE OF CAL.	CAL. INTERVAL
Cable	Resenberger	N/A	NO.1	Mar 10 , 2010	1 Year
Cable	SCHWARZBECK	N/A	NO.2	Mar 10 , 2010	1 Year
Cable	SCHWARZBECK	N/A	NO.3	Mar 10 , 2010	1 Year
LISN	Rohde & Schwarz	ESH3-Z5	100305	Mar 10 , 2010	1 Year
50 Coaxial Switch	ANRITSU CORP	MP59B	6200283933	Mar 10, 2010	1 Year
EMI Test Receiver	Rohde & Schwarz	ESP13	100180	Oct.11,2009	1 Year
Spectrum Analyzer	Rohde & Schwarz	FSP40	100273	Sep.10,2009	1 Year
3m Semi-Anechoic Chamber	Albatross Projects	9mx6mx6m	N/A	Feb.20,2010	1 Year
Signal Generator	FLUKE	PM5418 + Y/C	LO747012	Feb.20,2010	1 Year
Signal Generator	FLUKE	PM5418TX	LO738007	Feb.20,2010	1 Year
Loop Antenna	SCHWARZBECK	FMZB1516	113	Jan.30,2010	1 Year
Trilog-Super Broadband Antenna	SCHWARZBECK	VULB9161	9161-4079	Sep.22,2009	1 Year
Broad-Band Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-564	Sep.22,2009	1 Year
Ultra Broadband Antenna	Rohde & Schwarz	HL-562	100110	June.15,2009	1 Year
AMN	Rohde & Schwarz	ESH3-Z5	100196	Oct.11,2009	1 Year
AMN	Rohde & Schwarz	ESH3-Z5	100197	Oct.11,2009	1 Year
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	N/A	N/A	N/A
Power Meter	Rohde & Schwarz	NRVD	100041	Feb.20,2010	1 Year
EMI Test Receiver	Rohde & Schwarz	ESCS30	100003	Feb.20,2010	1 Year
Coaxial Cable with N-connectors	SCHWARZBECK	AK9515H	95549	Sep.22,2009	1 Year
Radio Communication Test Set	Rohde & Schwarz	CMS 54	846621/024	Feb.20,2010	1 Year
Modulation Analyzer	Hewlett-Packard	8901B	2303A00362	Feb.20,2010	1 Year
Absorbing clamp	Rohde & Schwarz	MDS-21	N/A	Oct.11,2009	1 Year
Passive Loop Antenna	ETS	6512	00029604	June.15,2009	1 Year

6. CONDUCTED POWER LINE TEST

6.1. Test Equipment

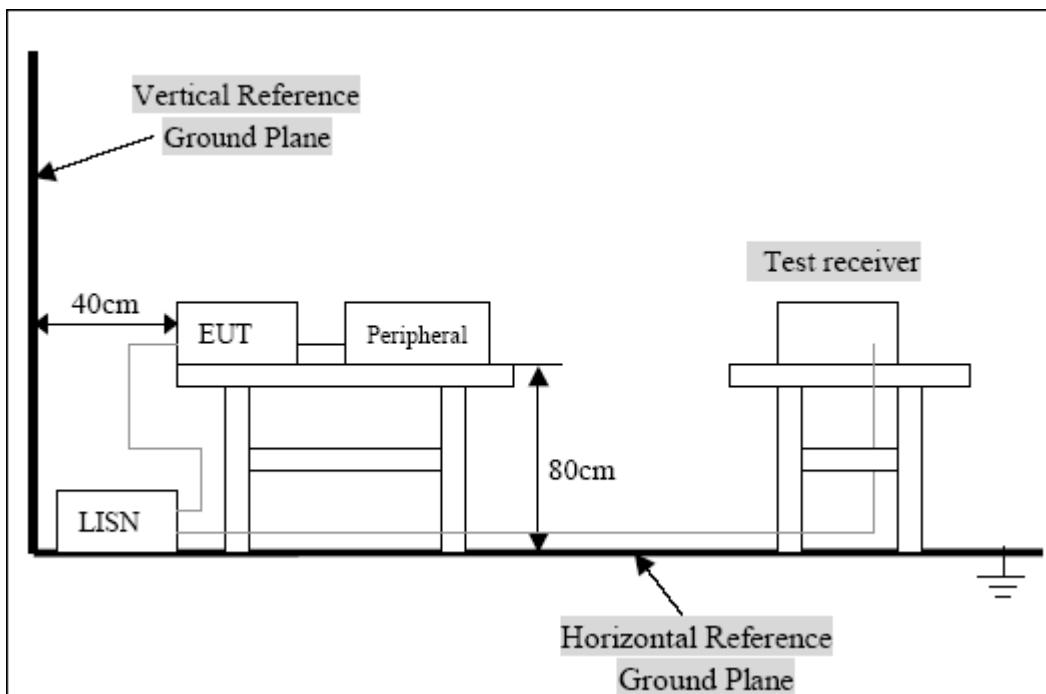
Please refer to section 4 this report.

6.2. Test Procedure

The EUT 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.The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uh coupling impedance with 50ohm termination.

Both sides of A.C. Line are check 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 ASIN C63.4:2003 on conducted measurement .Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9Khz.

6.3. Test Setup



For the actual test configuration,Please refer to the related items-Photos of testing

6.4. Configuring of the EUT

The EUT was configured according to ASIN C63.4:2003. Enable the signal transmitted from the external antenna from EUT to receiver. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

Note:

Below 1GHZ, the channel low, middle, high were pre-tested, The channel low, worst case one, was chosen for conducted and radiated emission test.

Above 1GHZ, the channel low ,middle, high were tested individually.

A.EUT

Device	Manufacturer	Model #	FCC ID
AFC Reader	SHENZHEN RDM TAG MASTER CO., LTD.	M28, M18, R18	U7NM28

B.Internal Devices

Device	Manufacturer	Model #	FCC ID
N/A			

C.Peripherals

Device	Manufacturer	Model # Serial #	FCC ID/ Doc	Cable
N/A				

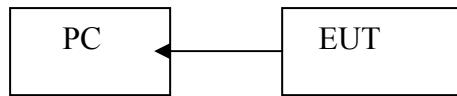
6.5. EUT Operating Condition

Operating condition is according to ANSI C63.4-2003.

Setup the EUT and simulators as shown on follow.

Enable RF signal and confirm EUT active.

Modulate output capacity of EUT up to specification.



6.6. Conducted Power line Emission Limits

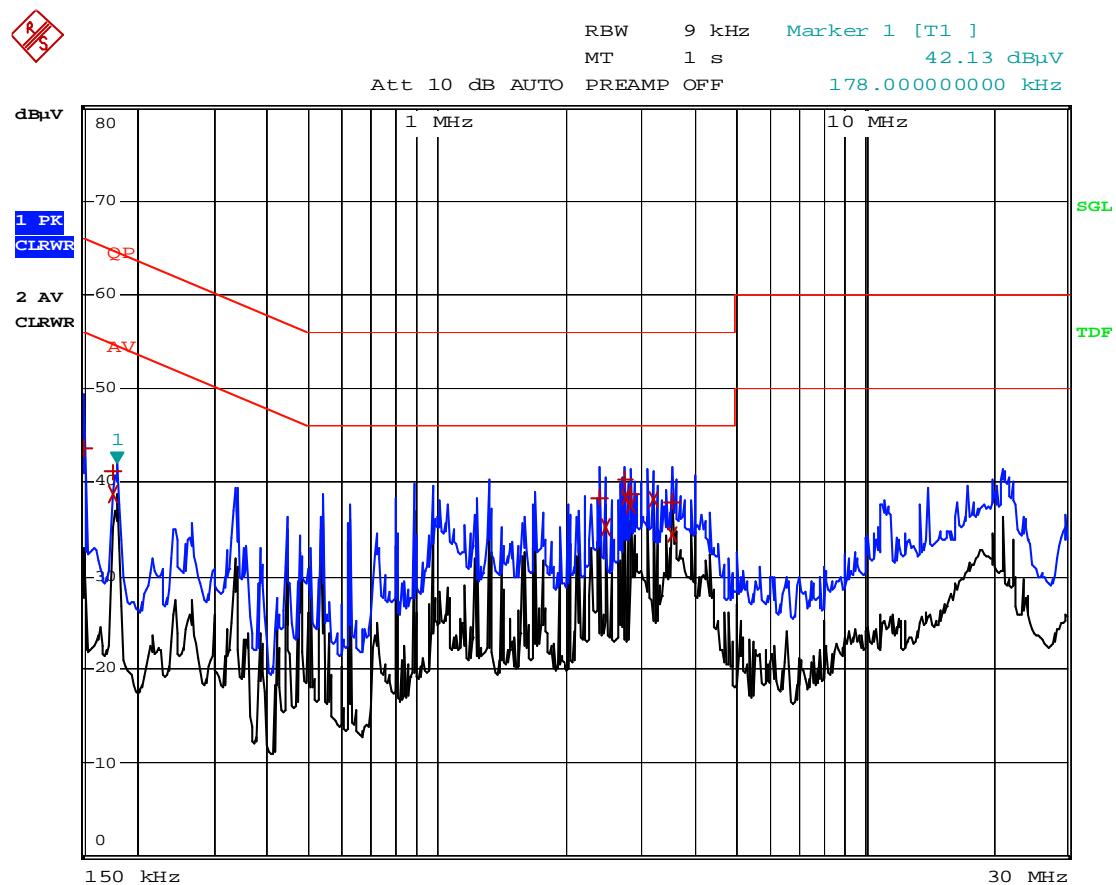
FCC Part 15 Paragraph 15.207 (dBuv)		
Frequency Range (MHZ)	Class A QP/AV	Class B QP/AV
0.15-0.5	79/66	65-56/56-46
0.5-5.0	73/60	56/46
5.0-30	73/60	60/50

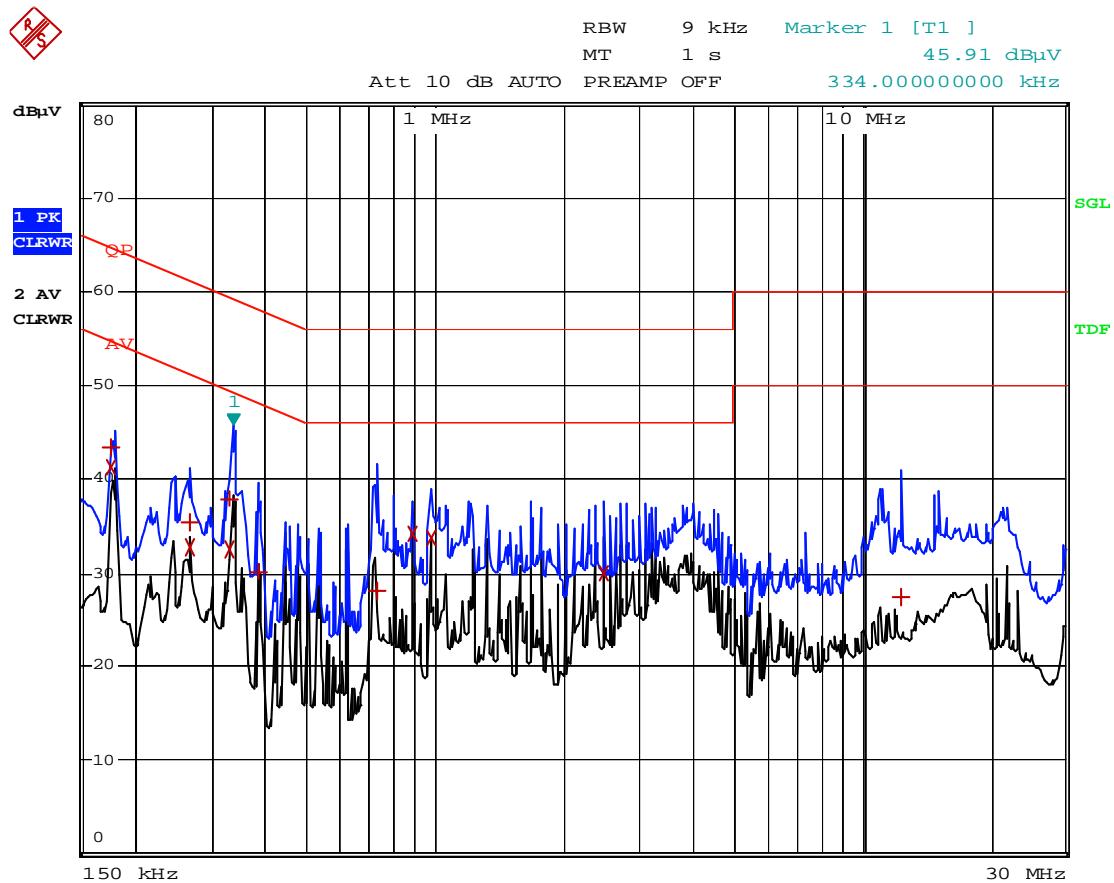
Note: In the above table, the tighter limit applies at the band edges.

6.7. Conducted Power Line Test Result

Test Mode: operating

LINE CONDUCTED EMISSIONS				FCC PART 15.207	
Frequency MHz	Amplitude dB μ V	Detector QP/AV	Phase Live/Neutral	Limit dB μ V	Margin dB
2.750	38.32	AV	Live	46.00	-7.68
3.194	38.19	AV	Live	46.00	-7.81
2.838	37.54	AV	Live	46.00	-8.46
2.482	35.10	AV	Live	46.00	-10.90
3.546	34.43	AV	Live	46.00	-11.57
0.886	34.07	AV	Neutral	46.00	-11.93
0.974	33.70	AV	Neutral	46.00	-12.30
0.178	41.29	AV	Neutral	54.58	-13.29
2.750	40.25	QP	Live	56.00	-15.75
0.178	38.70	AV	Live	54.58	-15.88
2.478	29.95	AV	Neutral	46.00	-16.05
0.334	32.48	AV	Neutral	49.35	-16.87
2.838	38.64	QP	Live	56.00	-17.36
2.394	38.30	QP	Live	56.00	-17.70
3.546	37.90	QP	Live	56.00	-18.10
0.266	32.56	AV	Neutral	51.24	-18.68
0.178	43.30	QP	Neutral	64.58	-21.28
0.334	37.99	QP	Neutral	59.35	-21.36
0.150	43.57	QP	Live	66.00	-22.43
0.178	40.95	QP	Live	64.58	-23.63
0.266	35.47	QP	Neutral	61.24	-25.77
0.386	30.20	QP	Neutral	58.15	-27.95
0.734	28.03	QP	Neutral	56.00	-27.97
12.342	27.42	QP	Neutral	60.00	-32.58





7. RADIATION EMISSIONS

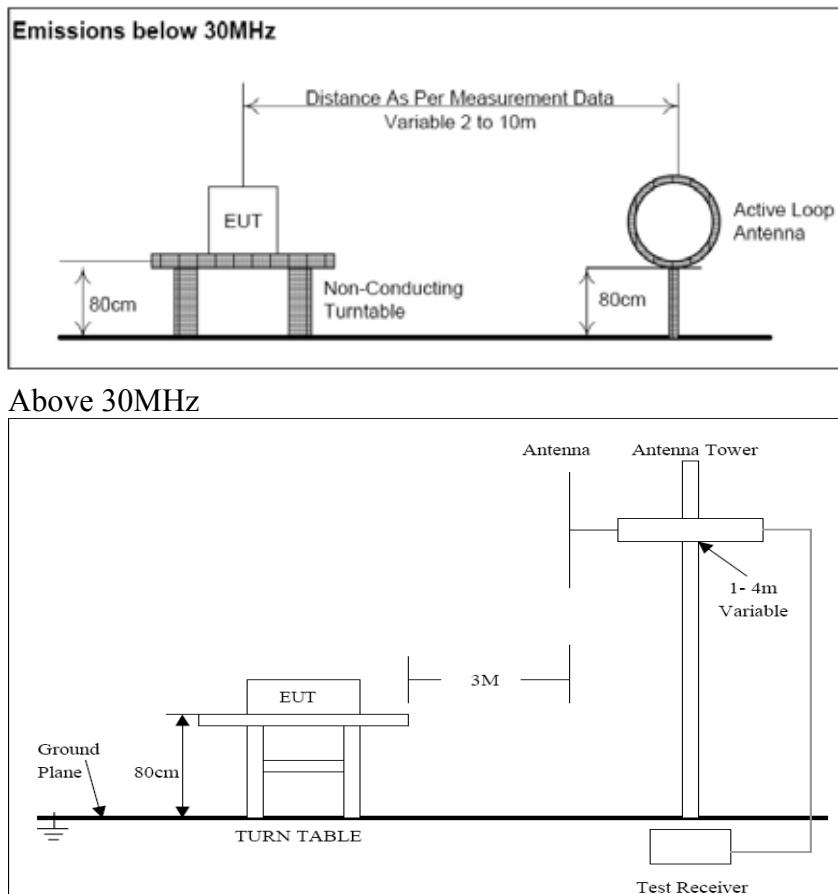
7.1. Test Equipment

EQUIPMENT/FACILITIES	MANUFACTURER	MODEL #	SERIAL NO.	DATE OF CAL.	CAL. INTERVAL
3m Semi-Anechoic Chamber	Albatross Projects	9mx6mx6m	N/A	Feb.20,2010	1 Year
Ultra Broadband Antenna	Rohde & Schwarz	HL-562	100110	June.15,2009	1 Year
EMI Test Receiver	Rohde & Schwarz	ESCI30	100003	Feb.20,2010	1 Year
Loop Antenna	ETS	6512	00029604	June.15,2009	1 Year

7.2. Test Procedure

The emission tests were performed in the 3-meter chamber test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC Part Subpart C limits. through three orthogonal axes to determine which attitude and equipment arrangement produces the highest emission relative to the limit.

7.3. Radiated Test Setup



Setup below 3mMHz, refer to 7.3; For the accrual test configuration, please refer to the related items-photos of Testing.

7.4. Radiated Emission Limit

According to §15.225, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

- (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.
- (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.
- (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.
- (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.

7.5. Radiated Emission Test Result

Temperature: 25

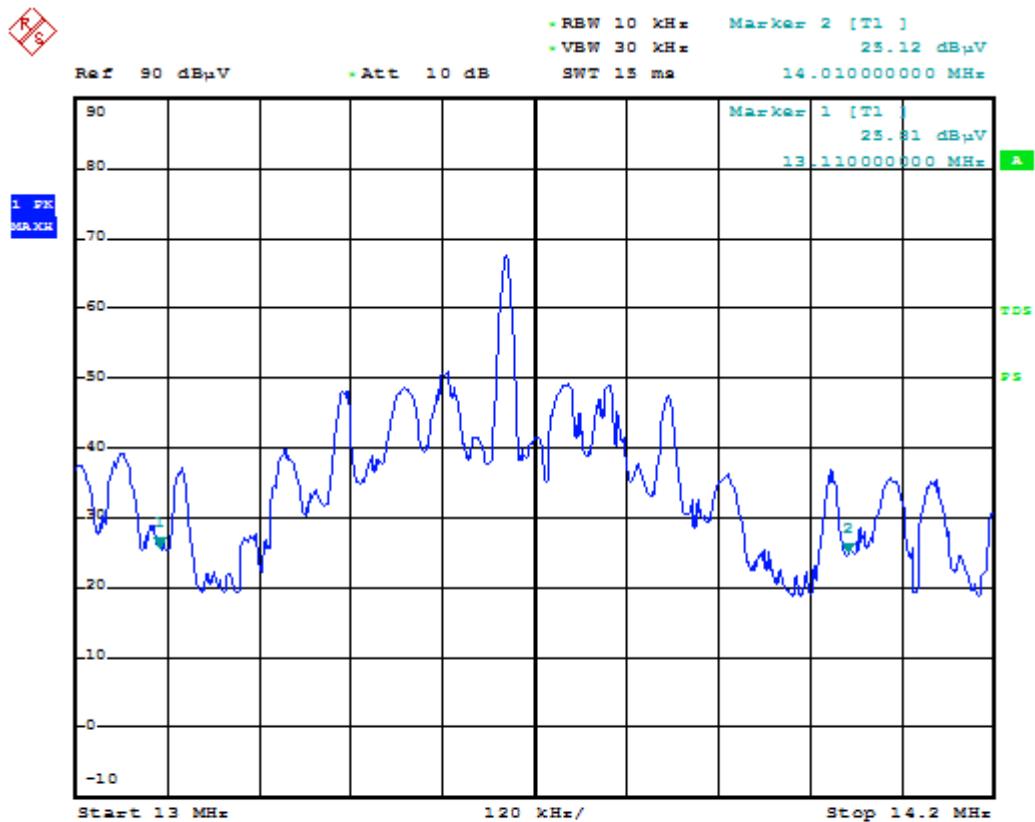
Humidity: 56%RH

Test Result: PASS

Frequency (MHz)	Antenna Polarization	Emission Level (PK)(dBuV/m)	FCC 15 Subpart C Limit (AV)(dBuV/m)
13.49	-	-----	70.5
13.35	-	-----	60.5
13.77	-	-----	60.5
13.64	-	-----	70.5
13.43	-	-----	70.5
13.70	-	-----	70.5
13.56	-	68.3	124.0
27.12	-	26.9	69.0
531.96	V	-----	46.00
570.61	H	-----	46.00
47.99	V	-----	40.00
499.55	H	-----	46.00
299.31	V	-----	46.00
299.31	H	-----	46.00
108.26	V	-----	43.50
232.53	H	-----	46.00
422.05	V	-----	46.00
234.16	H	-----	46.00
47.99	V	-----	40.00
162.61	H	-----	43.50

Note: The Emission Level is at 3 mtrs.

-----means the emission is too low,more than 20dB from the limit.



13.110MHz-14.01MHz

8. FREQUENCY STABILITY

8.1. Test Equipment

Please refer to Section 4 this report.

8.2. FCC 15.225 FREQUENCY STABILITY Limit

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. For battery operated equipment, the equipment tests shall be performed using a new battery.

8.3. Test Result

Reference Frequency: 13.56MHz, Limit: 100 ppm			
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed	PPM Error
		MCF (MHz)	
50	5	13.559822	-13.2368
40	5	13.559820	-13.3843
30	5	13.559818	-13.5318
20	5	13.559802	-14.7118
10	5	13.559791	-15.523
0	5	13.559772	-16.9242
-10	5	13.559743	-18.9628
-20	5	13.559720	-20.759

Frequency Stability Versus Input Voltage

Reference Frequency: 13.56 MHz, Limit: 100 ppm		
Power Supplied (Vdc)	Frequency Measure with Time Elapsed	
	Frequency (MHz)	PPM Error
4.25	13.559795	-15.228
5.75	13.559803	-14.638

9. ANTENNA REQUIREMENT

9.1. STANDARD APPLICABLE

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

9.2. ANTENNA CONNECTED CONSTRUCTION

According to § 15.203, An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. 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.

The antenna was SMA plug reverse connector and a unique, fulfill the requirement of this section.

9.3. Result

Compliance