

TEST REPORT

Product : Card Reader
Trade mark : N/A
Model/Type reference : CRT-603
Serial Number : N/A
FCC ID : 2ACAA CRT-603
Ratings : DC 5V 300mA
Report Number : EESZG04100008
Date : Apr. 21, 2014
Regulations : See below

Standards	Results
☒ 47 CFR FCC Part 15 Subpart C 15.225:2013	PASS

Prepared for

CREATOR (CHINA) TECH CO., LTD
2F, M-10 Building, Center Area, Hi-tech Industrial Park, Nanshan District,
Shenzhen, Guangdong Province, China

Prepared by

Centre Testing International (Shenzhen) Corporation
Hongwei Industrial Zone, 70 Area, Bao'an District,
Shenzhen, Guangdong, China
TEL: +86-755-3368 3668
FAX: +86-755-3368 3385

Tested by: Jimmy P.

Reviewed by: Louise L.

Approved by: Jimmy P.

Date: Apr. 21, 2014



Check No.: 1702035248

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(Note: N/A means not applicable)	

1. GENERAL INFORMATION

Applicant: CREATOR (CHINA) TECH CO., LTD
2F, M-10 Building, Center Area, Hi-tech Industrial Park,
Nanshan District, Shenzhen, Guangdong Province, China

Manufacturer: CREATOR (CHINA) TECH CO., LTD
2F, M-10 Building, Center Area, Hi-tech Industrial Park,
Nanshan District, Shenzhen, Guangdong Province, China

Product: Card Reader

Trade mark: N/A

Model/Type reference: CRT-603

FCC ID: 2ACAACRT-603

Report Number: EESZG04100008

Sample Received Date: Apr. 11, 2014

Date of Test: Apr. 11, 2014 to Apr. 21, 2014

The above equipment was tested by Centre Testing International (Shenzhen) Corporation for compliance with the requirements set forth in the FCC Rules and the measurement procedure according to ANSI C63.4:2009.

2. TEST SUMMARY

The complete list of measurements is given below:

No.	Test Item	Rule	Result
1	AC Conducted Emissions	Part 15.207	PASS
2	Transmitter Fundamental Field Strength	Part 15.225(a)(b)(c)(d)	PASS
3	Transmitter Radiated Spurious Emissions	Part 15.209(a), 15.225(d)	PASS
4	Transmitter Band Edge Radiated Emissions	Part 15.209(a), 15.225(c)(d)	PASS
5	Transmitter 20 dB Bandwidth	Part 2.1049	PASS
6	Transmitter Frequency Stability (Temperature & Voltage Variation)	Part 15.225(e)	PASS
7	Antenna Requirements *	Part 15.203	PASS

*: According to 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. The EUT has a built in antenna which is a short wire solder on the PCB, this is permanently attached antenna and meets the requirements of this section.

3. MEASUREMENT UNCERTAINTY

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

Measurement items	Uncertainty
Conducted Emission Test	3.2 dB
Radiated Emissions / Bandedge Emission	4.5 dB
Temperature	± 1 %

4. PRODUCT INFORMATION

Items	Description
Rating	DC 5V 300mA
Product type	Intentional Transmitter
Modulation	ASK
Operated Frequency	13.56MHz

5. TEST EQUIPMENT LIST

Equipment	Manufacturer	Model	Serial No.	Due Date
Receiver	R&S	ESCI	100009	07/19/2014
LISN	R&S	ENV216	100098	07/19/2014
3M Chamber & Accessory Equipment	ETS-LINDGREN	FACT-3	3510	07/12/2016
Spectrum Analyzer	Agilent	E4440A	MY46185649	07/06/2014
Spectrum Analyzer	R&S	FSP40	100416	07/06/2014
Receiver	R&S	ESCI	100435	07/19/2014
TRILOG Broadband Antenna	schwarzbeck	VULB 9163	618	06/25/2014
Loop Antenna	ETS-LINDGREN	6502	00071730	08/24/2014
Multi device Controller	ETS-LINGREN	2090	00057230	N/A
Temperature & Humidity Chamber	ESPEC	EL-04KA	N/A	08/03/2014

6. SUPPORT EQUIPMENT LIST

No.	Device Type	Brand	Model	Series No.	Data Cable	Remark
1.	Notebook	DELL	Vostro 3400	GYQTVP1	N/A	FCC DOC
2.	Mouse	L.Selectron	M004	02284699	Un-shielded 1.2M	FCC DOC

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

7. AC CONDUCTED EMISSIONS

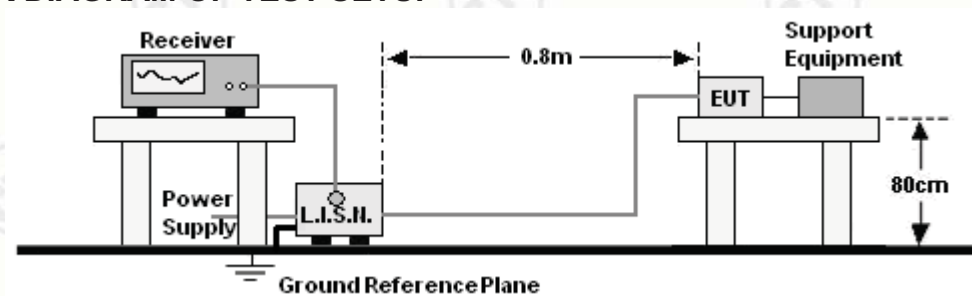
7.1 LIMITS

Frequency range (MHz)	Limits dB(μV)	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz.

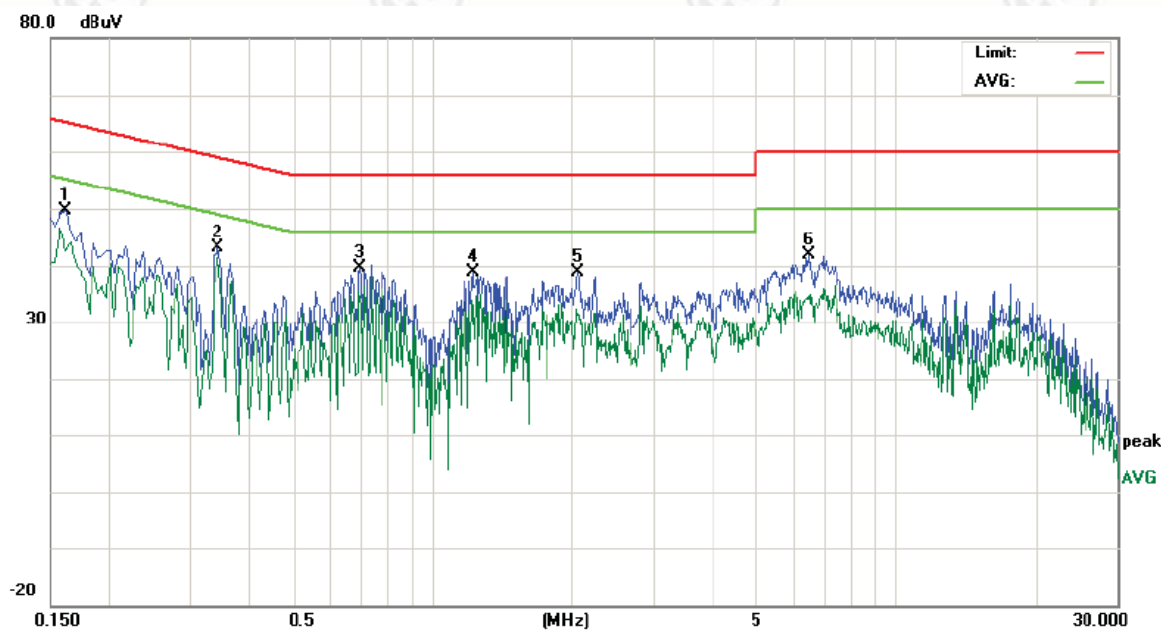
7.2 BLOCK DIAGRAM OF TEST SETUP



7.3 TEST PROCEDURE

- a. The Product was placed on a nonconductive table above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).
- b. The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with Peak and AVG detector in Max Hold mode. Run the receiver's pre-scan to record the maximum disturbance generated from Product in all power lines in the full band.
- c. For each frequency whose maximum record was higher or close to limit, measure its QP and AVG values and record.

7.4 TEST RESULT



Site site #1

Phase: L1

Temperature: 18

Limit: FCC CE

Power: AC 120V/60Hz

Humidity: 51 %

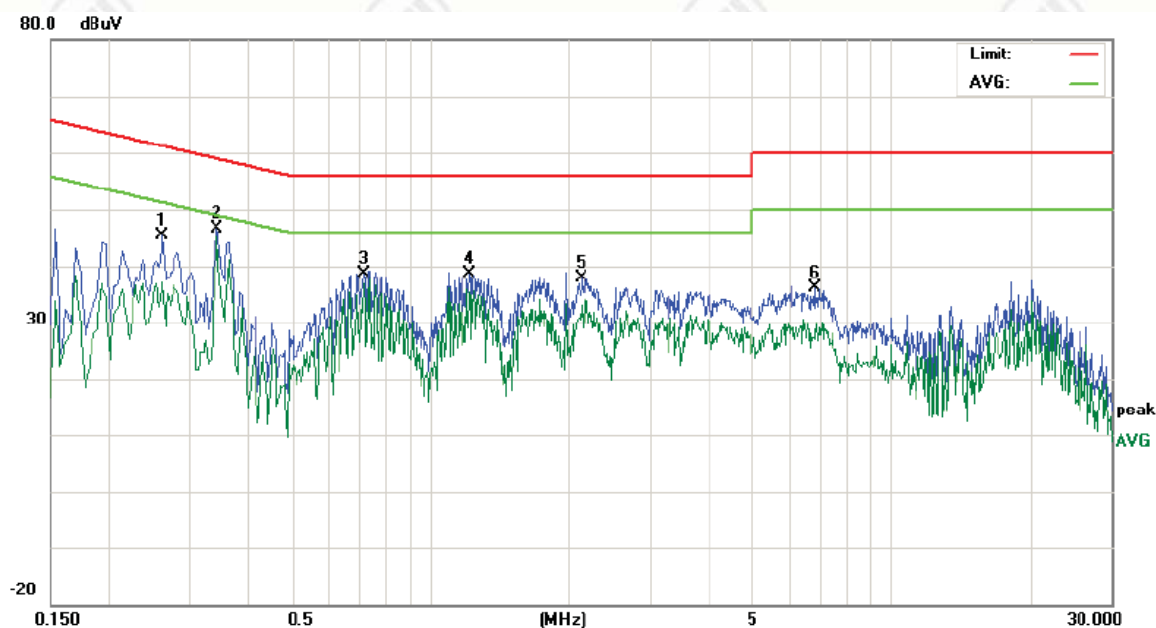
EUT: Card Reader Module

M/N: CRT-603

Mode: TX

Note:

No.	Freq. MHz	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1620	39.88		32.95	9.76	49.64		42.71	65.36	55.36	-15.72	-12.65	P	
2	0.3460	33.21		31.66	9.80	43.01		41.46	59.06	49.06	-16.05	-7.60	P	
3	0.6980	29.90		24.63	9.80	39.70		34.43	56.00	46.00	-16.30	-11.57	P	
4	1.2260	29.11		23.12	9.82	38.93		32.94	56.00	46.00	-17.07	-13.06	P	
5	2.0620	29.06		21.57	9.90	38.96		31.47	56.00	46.00	-17.04	-14.53	P	
6	6.5100	38.41		30.44	10.00	48.41		40.44	60.00	50.00	-11.59	-9.56	P	



Site site #1

Phase: **N**

Temperature: 18

Limit: FCC CE

Power: AC 120V/60Hz

Humidity: 51 %

EUT: Card Reader Module

M/N: CRT-603

Mode: TX

Note:

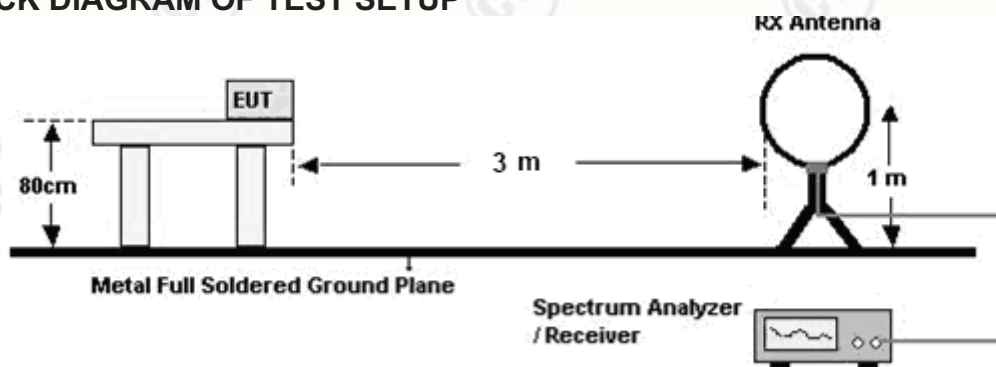
No.	Freq. MHz	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		peak	QP	AVG	QP	AVG	QP	AVG		
1	0.2620	35.59		27.37	9.80	45.39		37.17	61.36	51.36	-15.97	-14.19	P	
2	0.3460	36.84		35.25	9.80	46.64		45.05	59.06	49.06	-12.42	-4.01	P	
3	0.7180	28.94		26.98	9.80	38.74		36.78	56.00	46.00	-17.26	-9.22	P	
4	1.2220	28.70		25.52	9.82	38.52		35.34	56.00	46.00	-17.48	-10.66	P	
5	2.1380	28.06		23.34	9.90	37.96		33.24	56.00	46.00	-18.04	-12.76	P	
6	6.8100	26.16		17.09	10.00	36.16		27.09	60.00	50.00	-23.84	-22.91	P	

8. TRANSMITTER FUNDAMENTAL FIELD STRENGTH

8.1 LIMITS

The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/ meter at 30 meters

8.2 BLOCK DIAGRAM OF TEST SETUP



8.3 TEST PROCEDURE

- The Product is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the Product and rotated about its vertical axis for maximum response at each azimuth about the Product. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the Product.
- For each suspected emission, the Product was arranged to its worst case and then turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test frequency analyzer system was set to Peak Detect (300Hz RBW in 9kHz to 150kHz and 10kHz RBW in 150kHz to 30MHz) Function and Specified Bandwidth with Maximum Hold Mode.

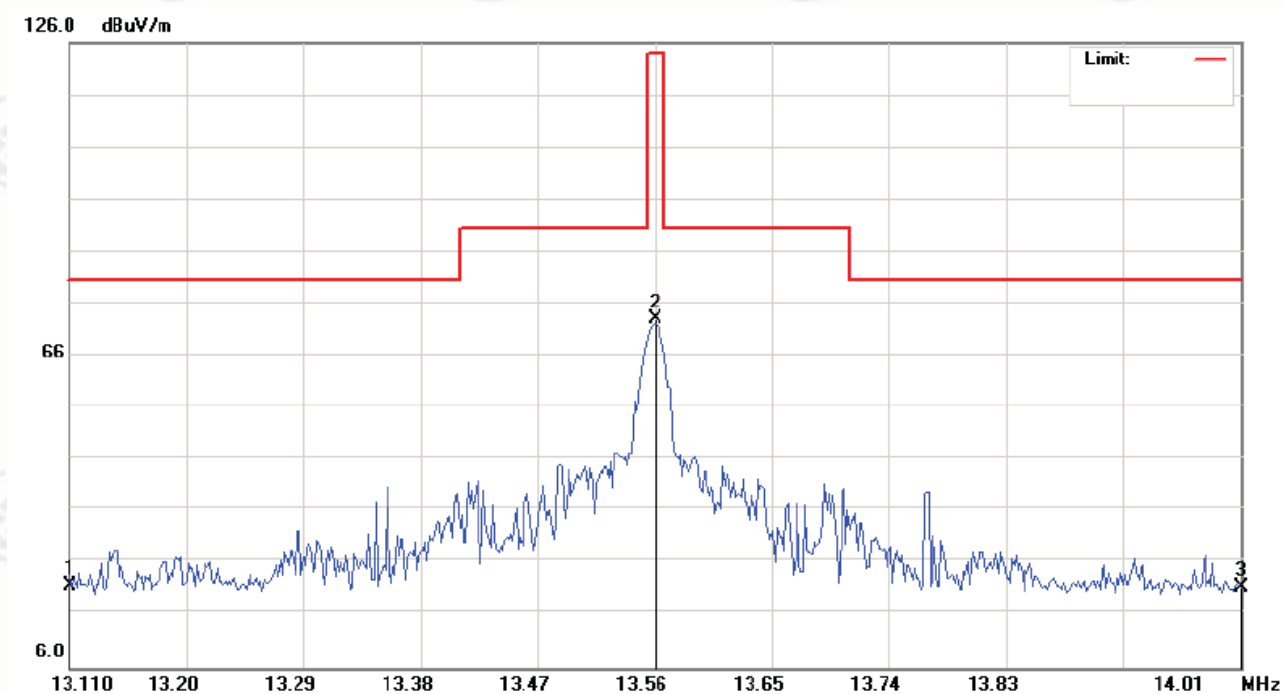
TEST RESULT

The worst data are below:

Frequency (MHz)	Antenna Polarity	PK Level (dBμV/m)	QP Level (dBμV/m)	Test limit_QP (dBμV/m)	Test distance (m)	Result
13.56	90° to EUT	73.0	70.8	124	3	Pass

- Measurements were performed at 3 metres and results extrapolated to 30 metres.
- The limit is specified at a test distance of 30 metres. However, as specified by FCC Section 15.31 (f)(2), measurements may be performed at a closer distance and the measured level corrected to the specified measurement distance by making the measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor.

The worst test Graph is below:



9. TRANSMITTER RADIATED SPURIOUS EMISSIONS

9.1 LIMITS

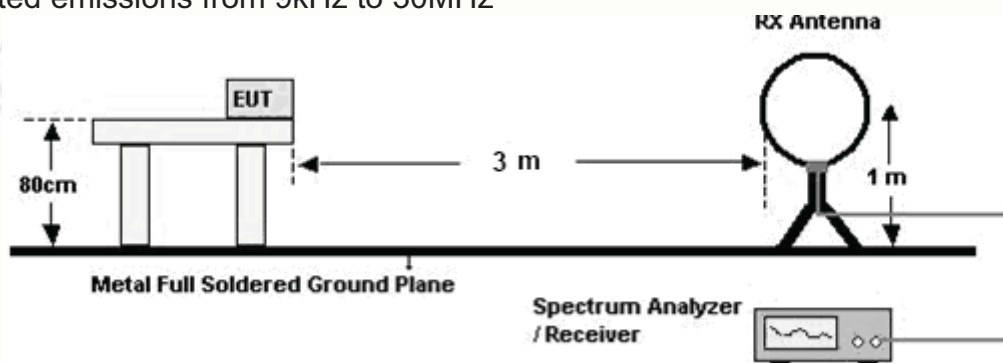
The field strength of any emissions, which appear outside of operating frequency band specified in 15.225, shall not exceed the general radiated emission limits as below.

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Distance (m)
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

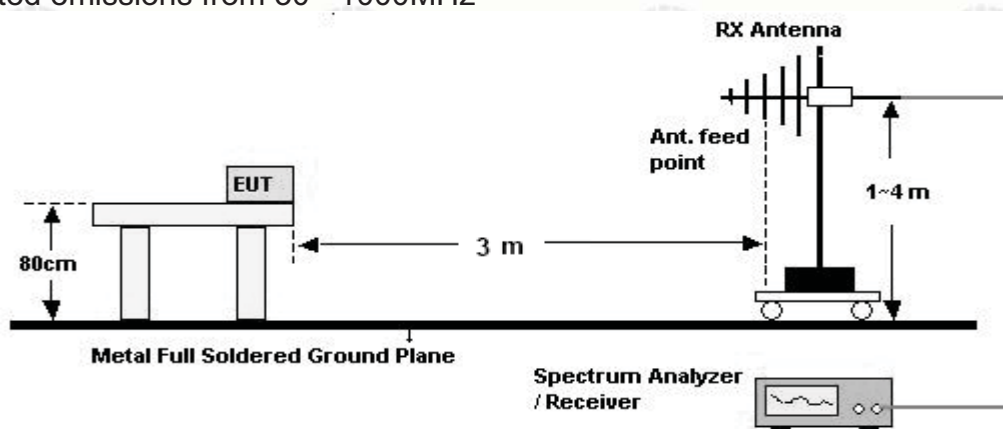
Note: the tighter limit applies at the band edges.

9.2 BLOCK DIAGRAM OF TEST SETUP

For radiated emissions from 9kHz to 30MHz



For radiated emissions from 30 - 1000MHz



9.3 TEST PROCEDURE

A. Above 30MHz

- a. The Product was placed on the non-conductive turntable 0.8m above the ground at a chamber.
- b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 100 kHz RBW/ 300 kHz VBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
- c. For each frequency whose maximum record was higher or close to limit, measure its QP value (120 kHz RBW/ 300 kHz VBW): vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.

B. Below 30MHz

- a. The Product is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The maximum values of the field strength are recorded by adjusting the polarizations of the test antenna and rotating the turntable.
- b. For each suspected emission, the Product was arranged to its worst case and then turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
- c. The test frequency analyzer system was set to Peak Detect (300Hz RBW in 9kHz to 150kHz and 10kHz RBW in 150kHz to 30MHz) Function and Specified Bandwidth with Maximum Hold Mode.

9.4 TEST RESULT

The worst test data are below:

Below 30MHz:

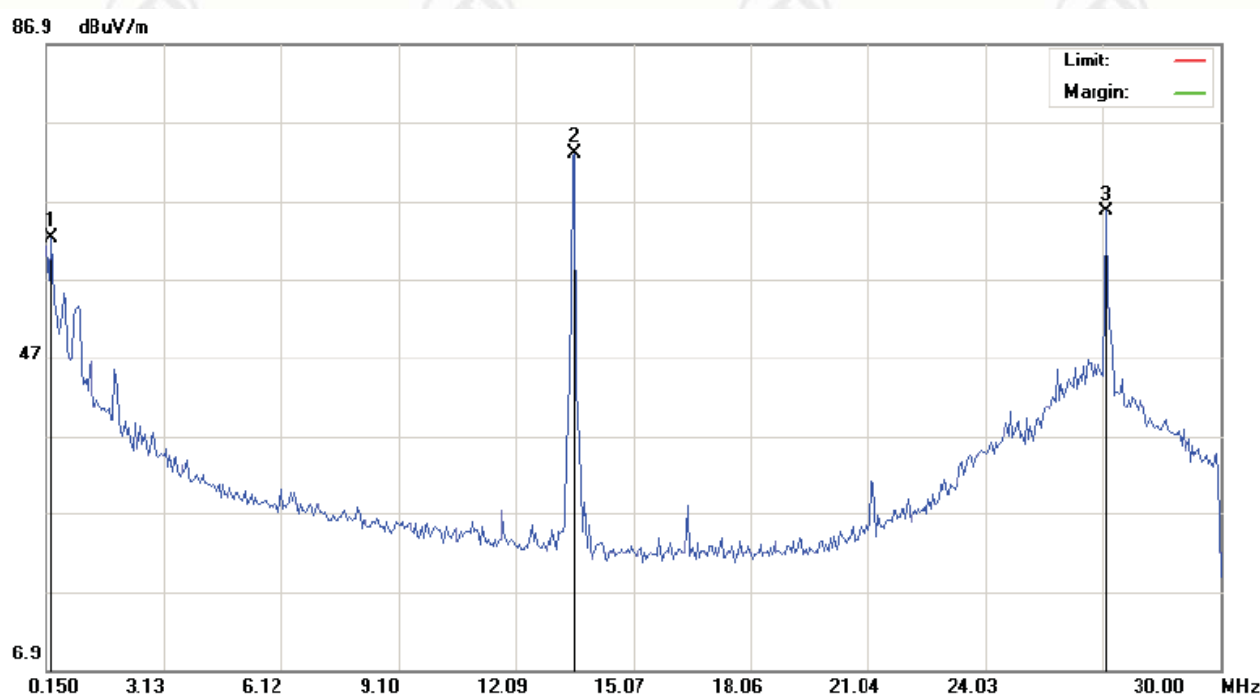
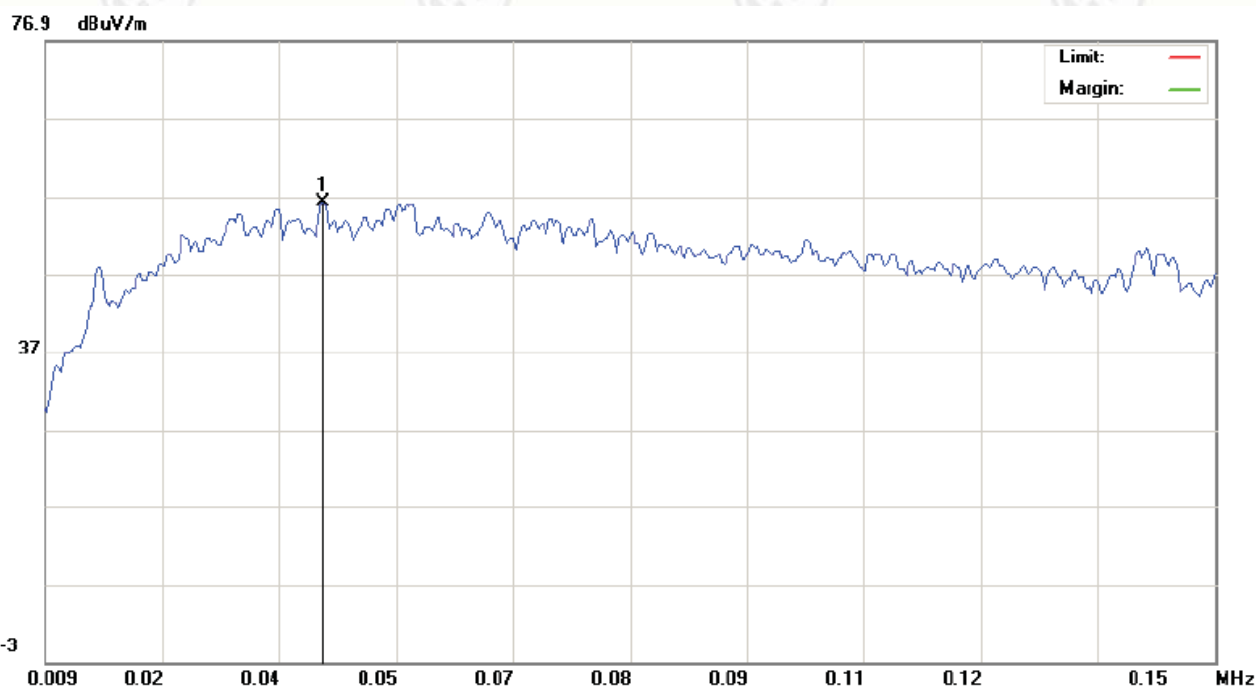
Frequency (MHZ)	Polarization (H/V)	Emission_PK (dBμV/m) @3M	Emission (dBμV/m) @3M		Limit (dBμV/m) @3M		Results (P/F)
			QP	AV	QP	AV	
0.04	H	56.2	---	---	---	115.6	Pass
0.30	H	62.2	---	---	---	98.1	Pass
13.56*	H	73.0	---	---	124.0	---	Pass
27.12	H	65.6	---	---	69.5	---	Pass

0.04	V	55.7	---	---	---	115.6	Pass
0.15	V	59.0	---	---	---	104.1	Pass
13.56*	V	68.0	---	---	124.0	---	Pass
27.12	V	59.7	---	---	69.5	---	Pass

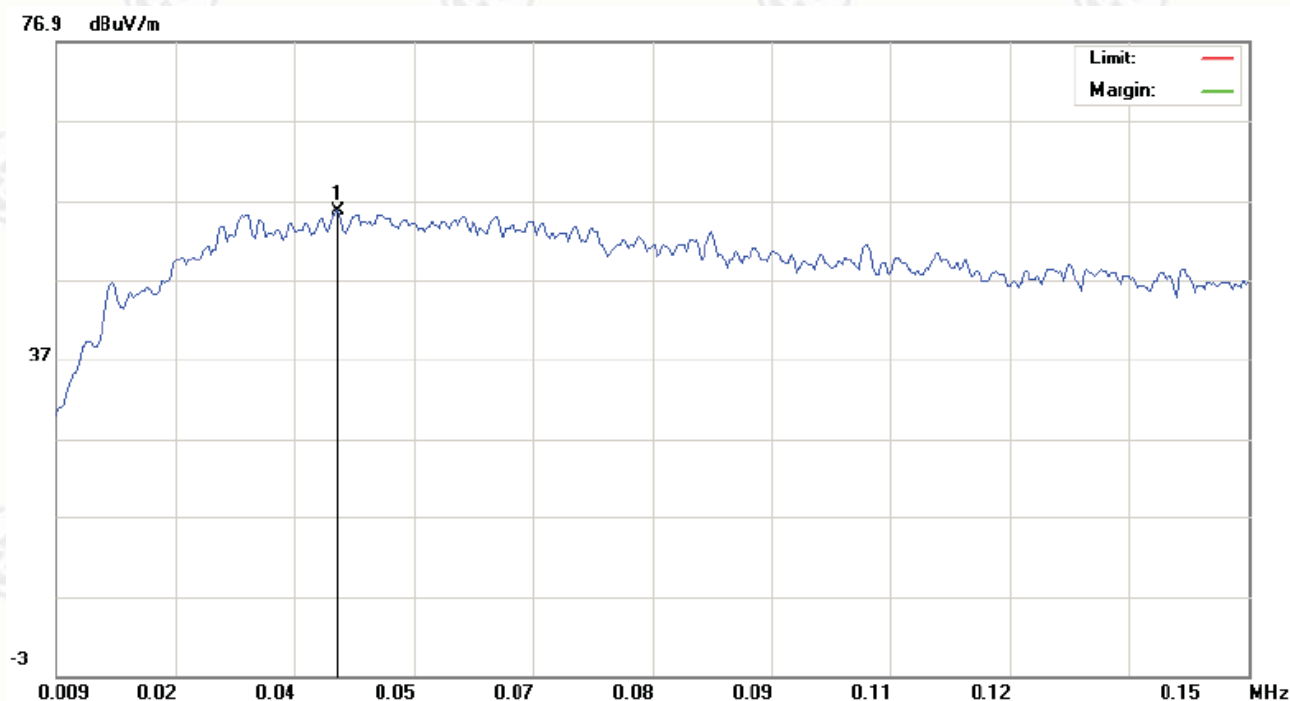
Note:

1. The emissions below 150kHz are not reported for they are much lower than the limits.
2. *: Operated frequency
3. Measurements were performed at 3 metres and results extrapolated to 30 metres and 300 metres.
4. The limit is specified at a test distance of 30 metres and 300 metres. However, as specified by FCC Section 15.31 (f)(2), measurements may be performed at a closer distance and the measured level corrected to the specified measurement distance by making the measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor.

H:

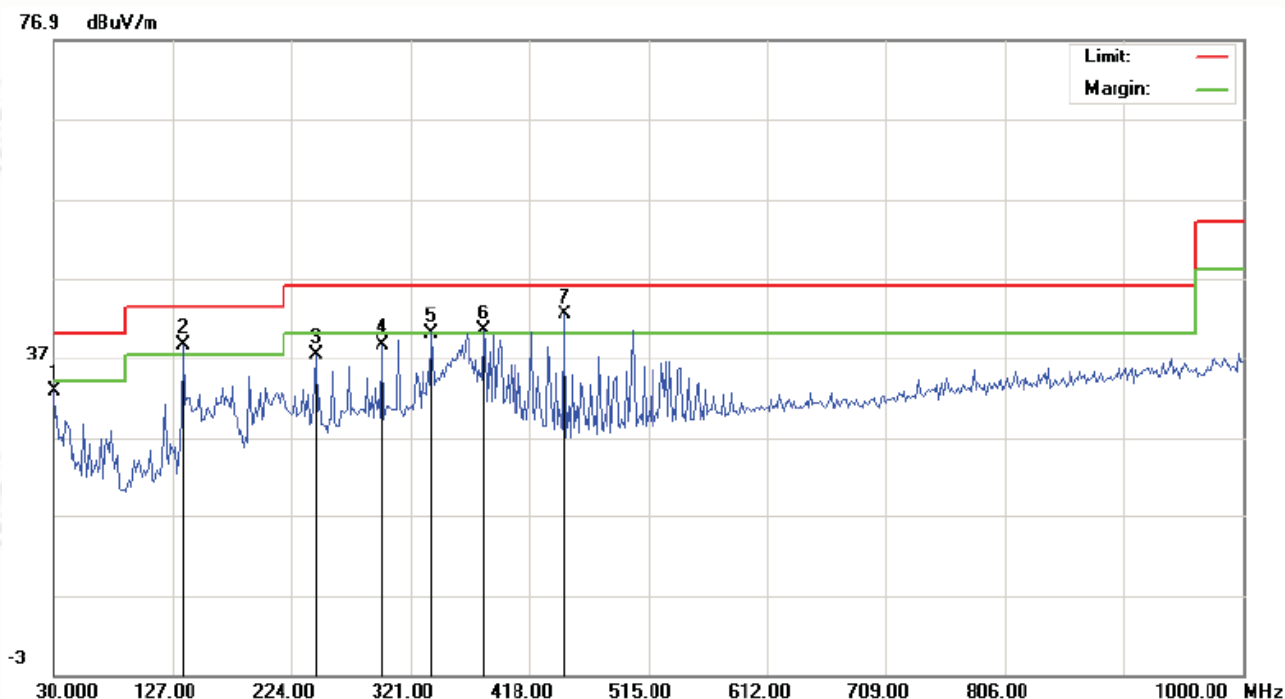


V:



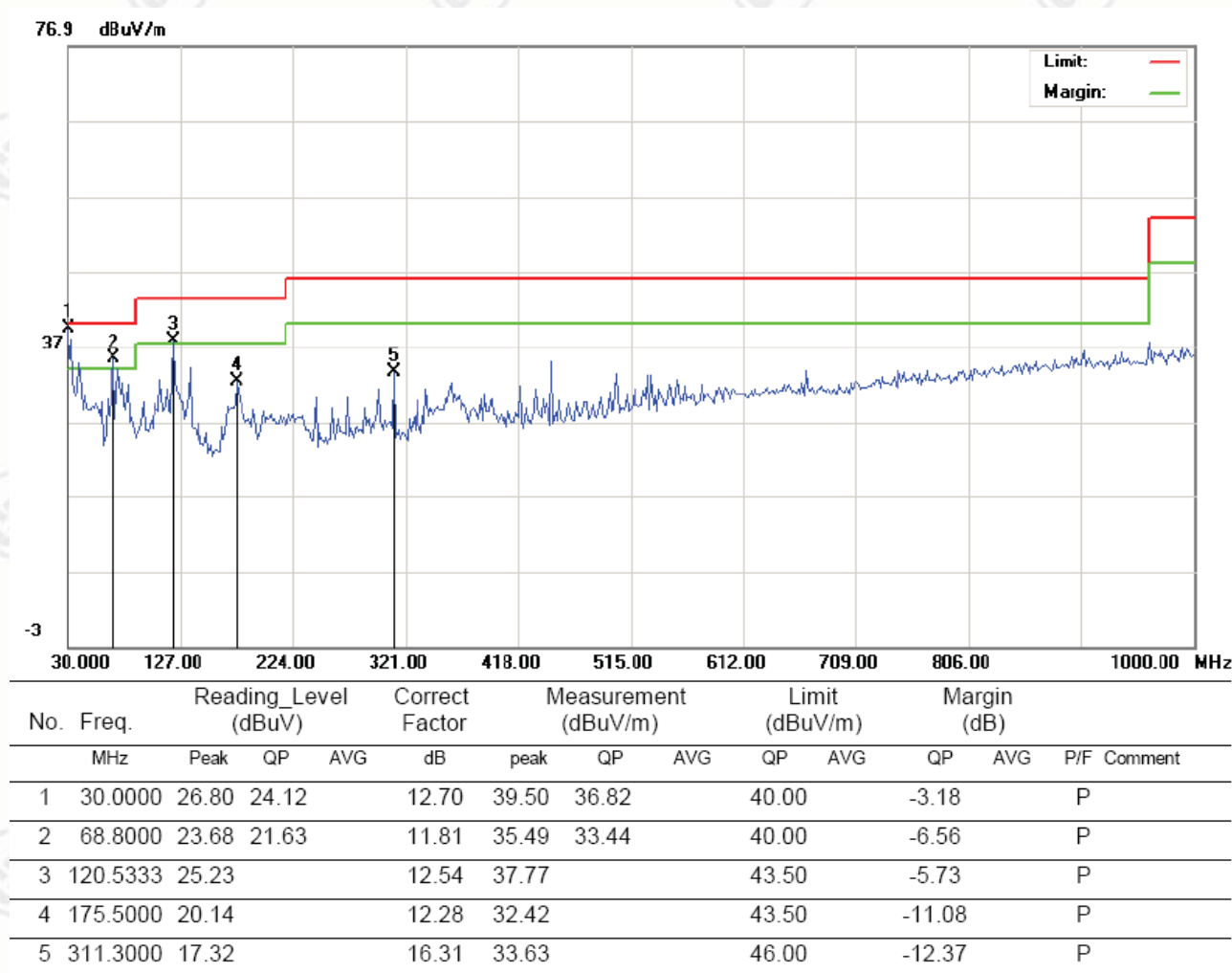
Above 30MHz:

H:



No.	Freq. MHz	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV/m)			Limit (dBuV/m)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		peak	QP	AVG	QP	AVG	QP	AVG		
1	30.0000	20.03			12.70	32.73			40.00		-7.27		P	
2	135.0833	27.06			11.58	38.64			43.50		-4.86		P	
3	243.4000	22.48			14.85	37.33			46.00		-8.67		P	
4	298.3667	22.80			15.87	38.67			46.00		-7.33		P	
5	338.7833	22.80			17.30	40.10			46.00		-5.90		P	
6	380.8167	22.18			18.13	40.31			46.00		-5.69		P	
7	447.1000	23.35	21.36		19.06	42.41	40.42		46.00		-5.58		P	

V:



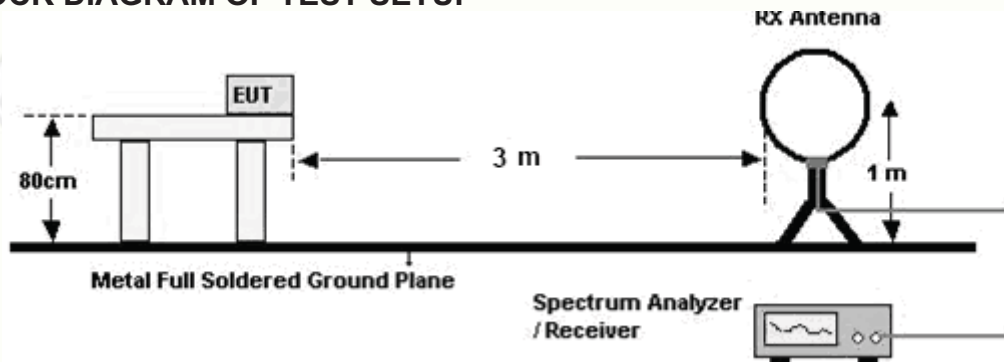
10 TRANSMITTER BAND EDGE RADIATED EMISSIONS

10.1 LIMITS

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.

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.

10.2 BLOCK DIAGRAM OF TEST SETUP



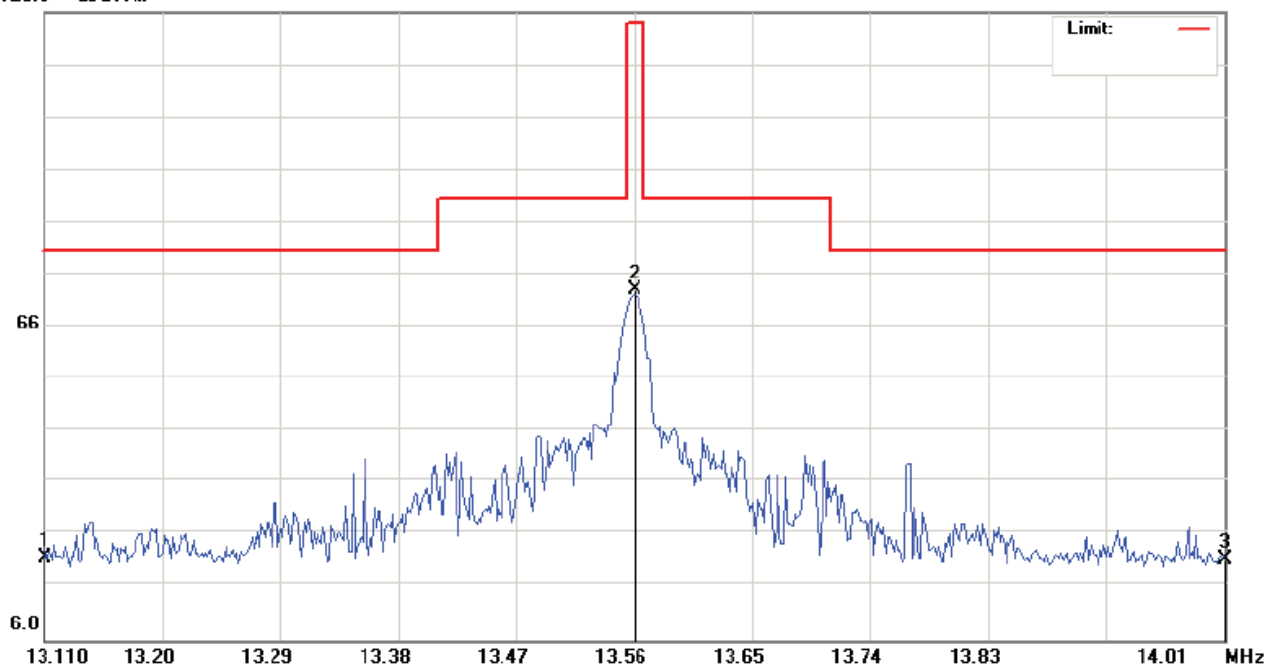
10.3 TEST PROCEDURE

- The Product is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The maximum values of the field strength are recorded by adjusting the polarizations of the test antenna and rotating the turntable.
- For each suspected emission, the Product was arranged to its worst case and then turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test frequency analyzer system was set to Peak Detect (300Hz RBW in 9kHz to 150kHz and 10kHz RBW in 150kHz to 30MHz) Function and Specified Bandwidth with Maximum Hold Mode.

10.4 TEST RESULT

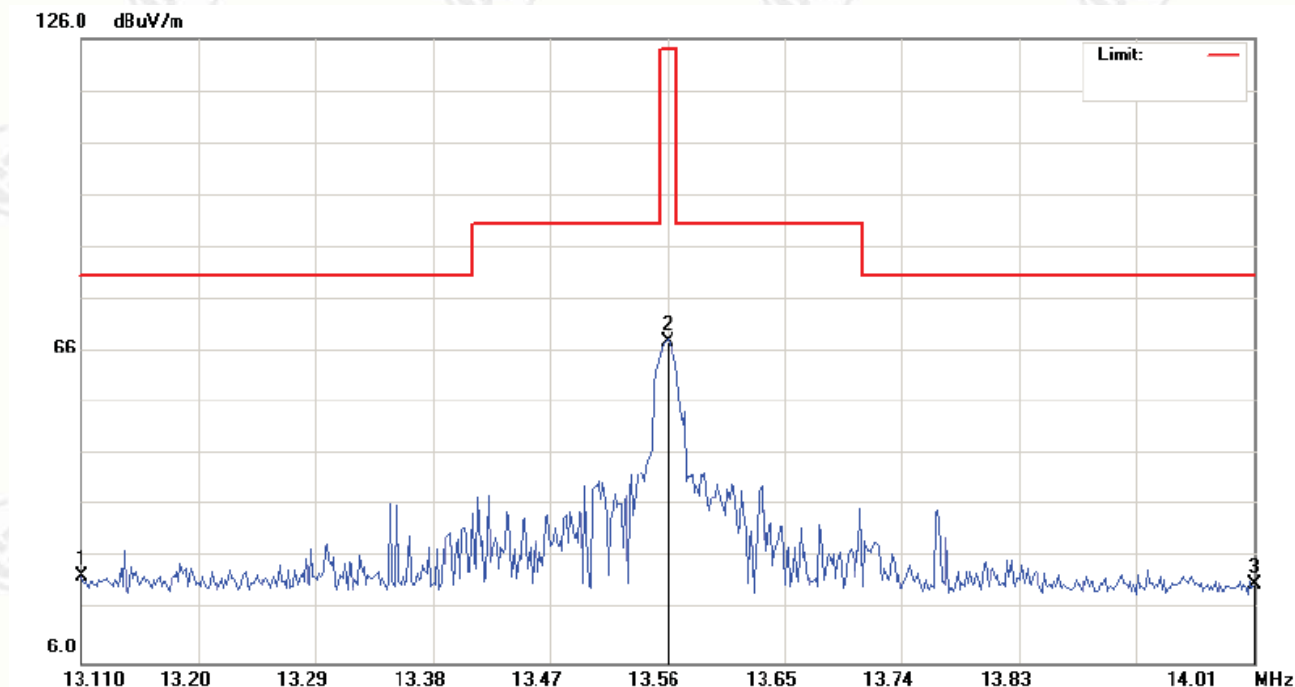
H:

126.0 dB μ V/m



Frequency (MHz)	Measurement value		Limit	Antenna	Result
	PK (dB μ V/m) @3m	QP (dB μ V/m) @3m	QP (dB μ V/m) @3m	(H/V)	(P/F)
13.11	21.88	---	69.5	H	P
14.01	21.43	---	69.5	H	P

V:



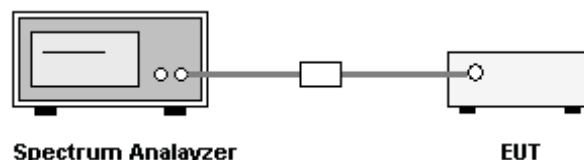
Frequency (MHz)	Measurement value		Limit	Antenna	Result
	PK (dBμV/m) @3m	QP (dBμV/m) @3m	QP (dBμV/m) @3m	(H/V)	(P/F)
13.11	21.57	---	69.5	V	P
14.01	21.23	---	69.5	V	P

11. TRANSMITTER 20 DB BANDWIDTH

11.1 LIMITS

None

11.2 BLOCK DIAGRAM OF TEST SETUP

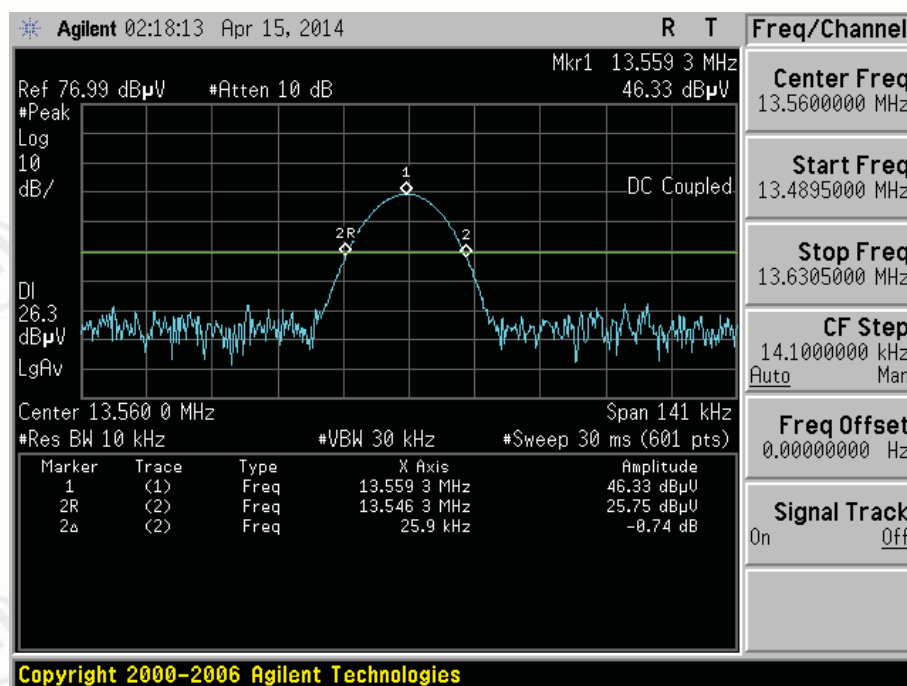


11.3 TEST PROCEDURE

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Set spectrum analyzer's RBW and VBW to applicable value with Peak in Max Hold.
3. A PEAK output reading was taken, a DISPLAY line was drawn 20 dB lower than PEAK level.
4. The 20dB bandwidth was determined from where the channel output spectrum intersected the display line.

11.4 TEST RESULT

Frequency (MHz)	20 dB BW (kHz)
13.56	25.9

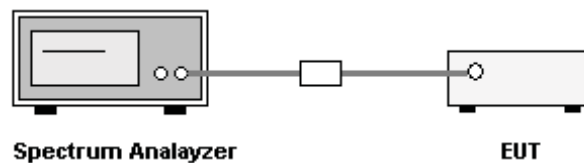


12. TRANSMITTER FREQUENCY STABILITY

12.1 LIMITS

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.

12.2 BLOCK DIAGRAM OF TEST SETUP



12.3 TEST PROCEDURE

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Set spectrum analyzer's RBW and VBW to applicable value with Peak in Max Hold.

12.4 TEST RESULT

Environmental Conditions:

Temperature (°C):	20
Relative Humidity (%):	51

Maximum frequency error of the EUT with variations in ambient temperature:

Temperature (°C)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (%)	Limit (%)	Result
-20	13.56	13.559978	-22	0.000162	0.01	Pass
-10	13.56	13.559979	-21	0.000155	0.01	Pass
0	13.56	13.560000	0	0	0.01	Pass
10	13.56	13.559980	-20	0.000147	0.01	Pass
20	13.56	13.560000	0	0	0.01	Pass
30	13.56	13.559979	-21	0.000155	0.01	Pass
40	13.56	13.559980	-20	0.000147	0.01	Pass
50	13.56	13.559927	-73	0.000538	0.01	Pass

Maximum frequency error of the EUT with variations in nominal operating voltage at an ambient temperature of 20 °C (the power supply of PC is AC 120V):

Supply Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (%)	Limit (%)	Result
102	13.56	13.559978	-22	0.000162	0.01	Pass
120	13.56	13.560000	0	0	0.01	Pass
138	13.56	13.559981	-19	0.000140	0.01	Pass

APPENDIX 1 PHOTOGRAPHS OF TEST SETUP



TEST SETUP OF CONDUCTED EMISSION

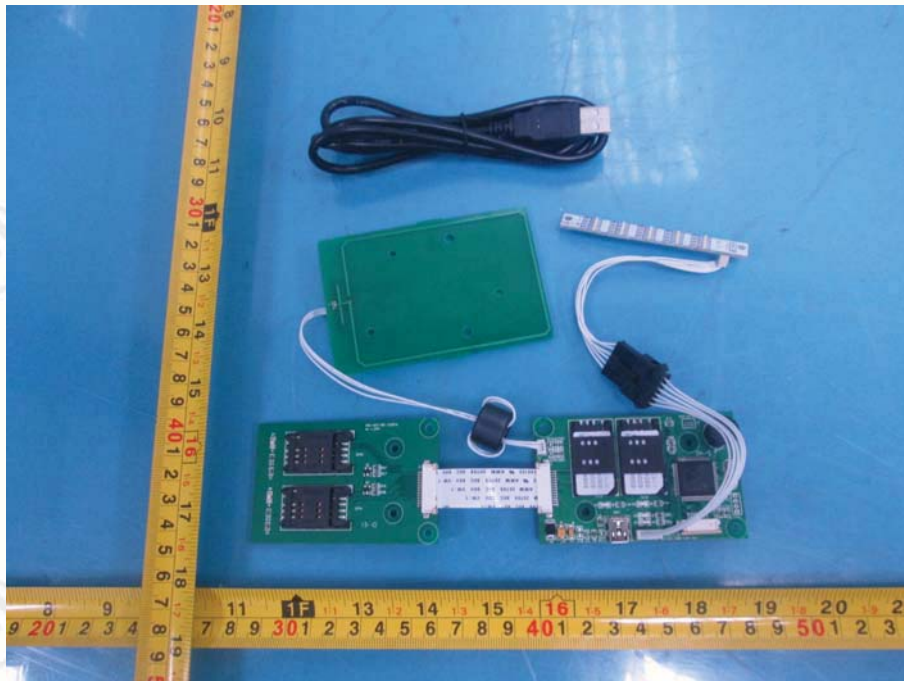


TEST SETUP OF RADIATED EMISSION (Below 30MHz)



TEST SETUP OF RADIATED EMISSION (30MHz~1GHz)

APPENDIX 2 PHOTOGRAPHS OF EUT



View of EUT-1



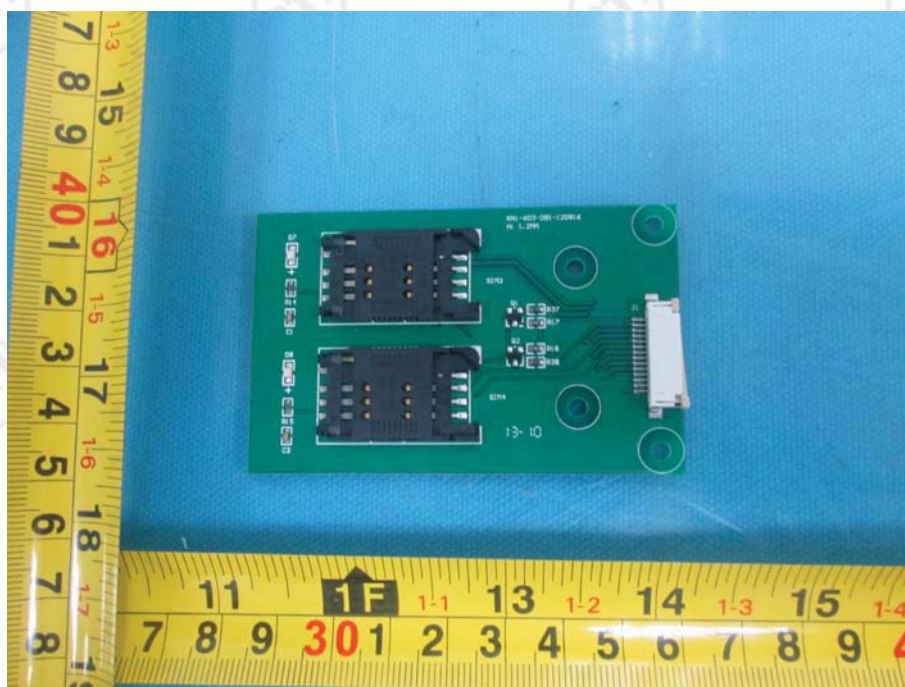
View of EUT-2



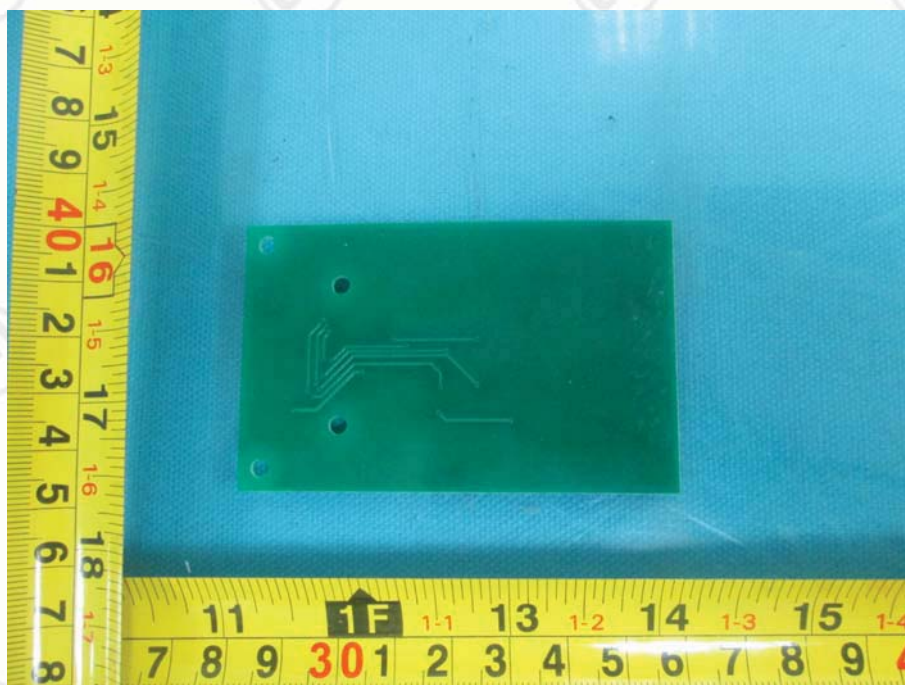
View of EUT-3



View of EUT-4



View of EUT-5



View of EUT-6



View of EUT-7



View of EUT-8

*** End of Report ***

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