FCC Test Report

for

POS Terminal

Trade Name	**:**	**VeriFone**
Model Number	**:**	**UX300**
FCC ID	**:**	**B32UX400CTLS**
Report Number	**:**	**RF-V040-1305-849**
Date of Receipt	**:**	**June 7, 2013**
Date of Report	**:**	**June 28, 2013**

Prepared for

VeriFone Inc.

1400 West Stanford Ranch Road, Suite 200, Rocklin, CA, 95765, UNITED STATES

Prepared by

Central Research Technology Co.

EMC Test Laboratory

11, Lane 41, Fushuen St., Jungshan Chiu, Taipei, Taiwan, 104, R.O.C.

NVLAP LAB CODE 200575-0

Certification

Equipment Under Test	:	POS Terminal
Model No.	:	UX300
FCC ID	:	B32UX400CTLS
Applicant	:	VeriFone Inc.
Address	:	1400 West Stanford Ranch Road, Suite 200, Rocklin, CA, 95765, UNITED STATES
Applicable Standards	:	**FCC Part 15, Subpart C**
Date of Testing	:	June 7~19, 2013
Deviation	:	N/A
Condition of Test Sample	:	Mass Production

We, **Central Research Technology Co**., hereby certify that one sample of the designated product was tested in our facility during the period mentioned above. The test records, data evaluation and Equipment Under Test (EUT) configurations shown in the present report are true and accurate representation of the measurements of the sample's RF characteristics under the conditions herein specified.

The test results show that the EUT as described in the present report is in compliance with the requirements set forth in the standards mentioned above and apply to the tested sample identified in the present report only. The test report shall not be reproduced, except in its entirety, without the written approval of Central Research Technology Co.

PREPARED BY : Cathy Chen , **DATE :** June 28, 2013
(Cathy Chen/ Technical Manager)

APPROVED BY : J. Y. Shih , **DATE :** June 28, 2013
(Tsun-Yu Shih/General Manager)

Contents

1. General Description

1.1 General Description of EUT

Equipment Under Test	:	POS Terminal
Model No.	:	UX300
Power in	:	Supplied by the power adaptor or 9Vdc~43Vdc
Power Specification	:	1. Trade Name: VeriFone Model No.: DSA-42D-12 2 120330 P/N: PWR159-001-01-A Input : 100-240V~, 50/60Hz, 1.2A Output : 12Vdc, 3.3A 2. Trade Name: TRACO Model No.: TSP 090-124N-A P/N: CPS12490-4A-R Input : 115-240V~, 50/60Hz, 2.1/1.0A Output : 24Vdc, 3.75A
Test Voltage	:	120Vac/60Hz to the power adaptor
Antenna	:	Trade Name : VeriFone Model No. : UX400
Frequency Range	:	13.56MHz
Channel Numbers	:	1
Function Modulation	:	ASK
Function Description	:	

The EUT is used to transmit and receive signal both. Please refer to the user's manual for the details.

Since the EUT shall be installed horizontally or vertically on the table, it was pre-tested on the two axis. Therefor only the test data of the worse case- vertical was used for Radiated test.

1.2 Test Methodology

For this E.U.T., the radiated emissions and conducted emission measurement performed according to the procedures illustrated in ANSI C63.4:2009 and other required are illustrated in separate sections of this test report for detail.

1.3 Test Mode

Pre-scan Mode

Test Mode	Test Voltage	UX300 Module Type
Mode 1	Power Adaptor: DSA-42D-12 2 120330	PSTN
Mode 2	Power supply: TSP 090-124N-A	
Mode 3	9Vdc	
Mode 4	43Vdc	

According to the preliminary test, It was found that the Mode 1 is the worst. It was taken as the representative condition for test and its data are recorded in the present document.

1.4 Applied standards

(1) Field strength of Fundametal

According to 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.

(2) Band Edge

According to 15.225(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. According to 15.225(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.

(3) Radiation emission

According to 15.225(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.

(4) Frequency tolerance

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.

(5) Radiated emission limits, general requirements.

According to 15.209, except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (uV/m)	Measurement 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

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

(6) 20dB Bandwidth

According to 15.215(c) requires the device must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates.

(7) Conduction Emission Requirement

For intentional device, according to §15.207(a) line conduction emission limit is as below table.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 - 5	56	46
5 - 30	60	50

* Decreases with the logarithm of the frequency.

(8) Restricted Band

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
[2]1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(2)
13.36 - 13.41			

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2] Above 38.6

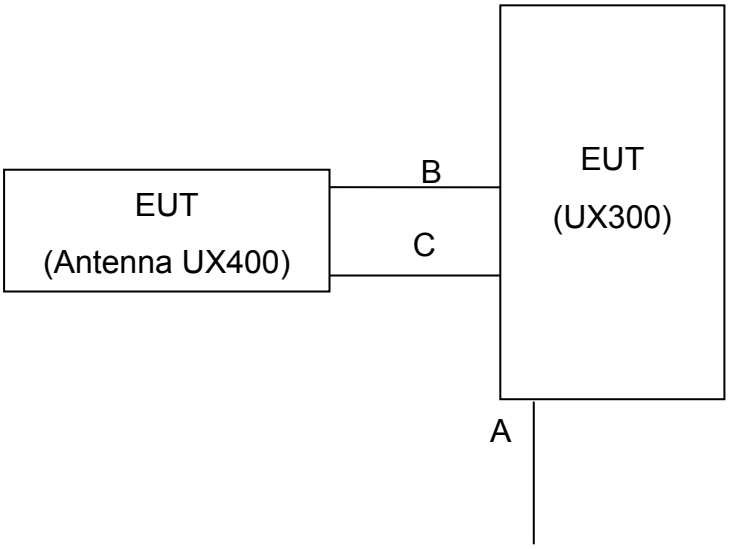
(9) Antenna Requirement

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 Sections 15.211, 15.213, 15.217, 15.219, or 15.221. 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 Section 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.

1.5 The Support Units

No.	Unit	Model No.	FCC ID	Trade Name	Power Cord	Supported by lab.
1.	SAM Card	N/A	N/A	N/A	N/A	
2.	USB flash Disk	SDCZ50-008G	DoC	Cruzer Blade	N/A	
		SDCZ50-004G	DoC	Cruzer Blade	N/A	
3.	Smart IC Card	N/A	N/A	N/A	N/A	

1.6 Layout of Setup



Connecting Cables :

No.	Cable	Length	Shielded	Core	Shielded Backshell	Supported by lab.
A	RJ11 Cable	2.0m				
B	RJ45 Cable (CBL159-301-01-A)	0.5m	✓			
C	SMA Cable (CBL159-302-02-A)	0.5m	✓			

Justification:

For both conducted and radiated emission below 1GHz, the system was configured for typical fashion as a customer could use it normally.

For radiated emission, measurement of radiated emission from digital circuit is performed with normal transmitting.

1.7 Test Capability

Test Facility

The test facility used for evaluating the conformance of the EUT with each standard in the present report meets what required in CISPR16-1-4, CISPR16-2-3 and ANSI C63.4: 2003.

Test Room	Type of Test Room	Descriptions
TR1	10m semi-anechoic chamber (23m×14m×9m)	Complying with the NSA requirements set in documents CISPR 22 and ANSI C63.4:2003. For the radiated emission measurement.
TR11	3m semi-anechoic chamber (9m × 6m × 6m)	
TR13	Test site	For the RF conducted emission measurement.
TR5	Shielding Room (8m×5m×4m)	For the conducted emission measurement.

Test Laboratory Competence Information

Central Research Technology Co. has been accredited / filed / authorized by the agencies listed in the following table.

Certificate	Nation	Agency	Code	Mark
Accreditation Certificate	USA	NVLAP	200575-0	ISO/IEC 17025
	R.O.C. (Taiwan)	TAF	0905	ISO/IEC 17025
	R.O.C. (Taiwan)	BSMI	SL2-IN-E-0033, SL2-IS-E-0033, SL2-R1/R2-E-0033, SL2-A1-E-0033 SL2-L1-E-0033	ISO/IEC 17025
Site Filing Document	USA	FCC	474046,TW1053	Test facility list & NSA Data
	Canada	IC	4699A-1,-3	Test facility list & NSA Data
	Japan	VCCI	R-1527,C-1609, C-4400, T-1441, T-1334, G-10, G-614	Test facility list & NSA Data
Authorization Certificate	Germany	TUV	10021687	ISO/IEC 17025
	Norway	Nemko	ELA 212	ISO/IEC 17025

The copy of each certificate can be downloaded from our web site: www.crc-lab.com

1.8 Measurement Uncertainty

The assessed measurement uncertainty with a suitable coverage factor K to ensure 95% confidence level for the normal distribution are shown as below, the values are less than U_{cispr} in table 1 of CISPR 16-4-2.

Test Item	Measurement Uncertainty	
Frequency error	4.2Hz	
Radiated Emission: (30MHz~200MHz)	Horizontal: 3.5dB；Vertical: 3.9dB	
Radiated Emission: (200MHz~1GHz)	Horizontal: 3.9dB；Vertical: 3.9dB	
Conducted Emission	ESH2-Z5	3.1dB
	ENV 4200	2.8dB

2. Field Strength of fundamental Measurement

Test Result : PASS

2.1 Applied Standard

According to 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.

According to 15.225(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.

According to 15.225(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.

2.2 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESCI/ 100019	March 1, 2013	March 1, 2014
Loop Antenna	EMCO	6502/ 20558	Aug. 11, 2011	Aug. 11, 2013
TR11 Semi – anechoic Chamber	ETS. LINDGREN	TR11/ 906-A	May 11, 2013	May 11, 2014

Note:
1. The calibrations are traceable to NML/ROC.
2. NCR : No Calibration Required.
3. The calibration date of the semi-anechoic chamber listed above is the date of NSA measurement.

Instrument Setting

RBW	VBW	Detector	Trace	Comment
9kHz	N/A	Quasi-Peak	Maxhold	

Climatic Condition

Ambient Temperature：26°C ； Relative Humidity ：66%

2.3 Measurement Procedure

a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.

b. If the EUT is tabletop equipment, it should be placed on a wooden table with a height of 0.8 meters above the reference ground plane in the semi-anechoic chamber. If the EUT is floor-standing equipment, it should be placed on a non-conducted support with a height of 12 millimeters above the reference ground plane in the semi-anechoic chamber.

c. The EUT is set at 3m away from the receiving antenna.

d. Rapidly sweep the signal in the test frequency range by using the receiver through the Quasi-Peak detector.

e. Rotate the EUT from 0° to 360° and position the receiving loop antenna at 1~4 meters above the reference ground plane to determine the fundamental frequency and and bandedge and record them.

f. Then measure each frequency found from step e. by using the receiver with rotating the EUT and positioning the receiving antenna height to determine the maximum level.

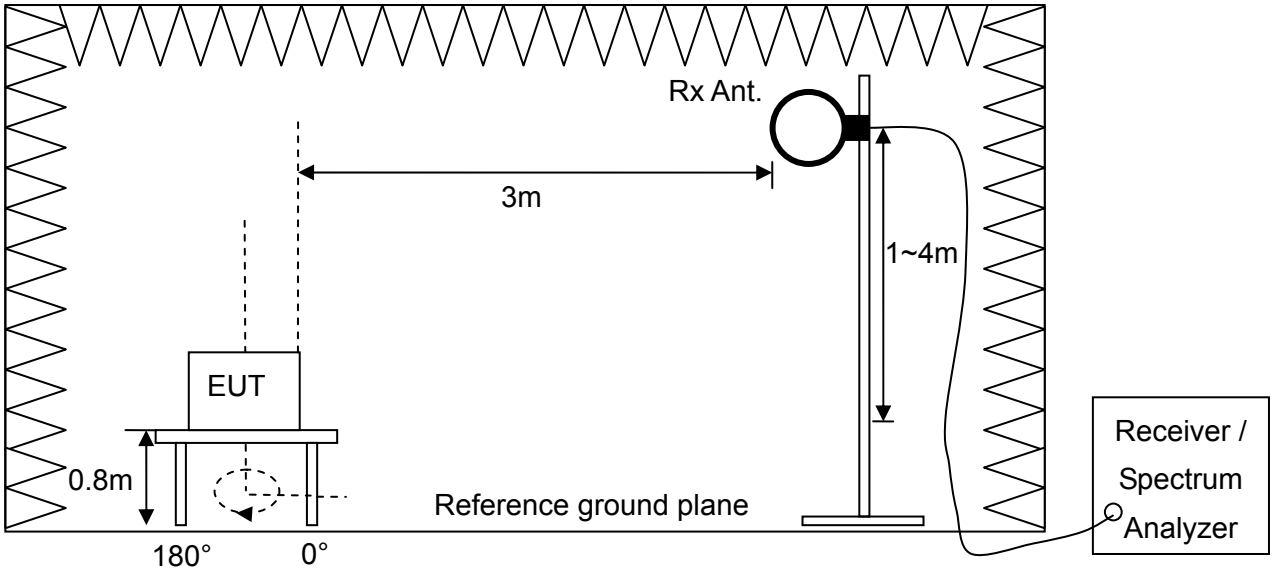
g. Finely tune the antenna and turntable around the recorded position of each frequency found from step e.

h. Record and compare the maximum level with the required limit.

i. Change the receiving antenna to another polarization to measure field strength of fundamental by following step d. to g. again.

Layout

2.4 Test Configuration



2.5 Test Results

Field strength of fundamental

Test Mode : Mode 1, Continuous Transmitting

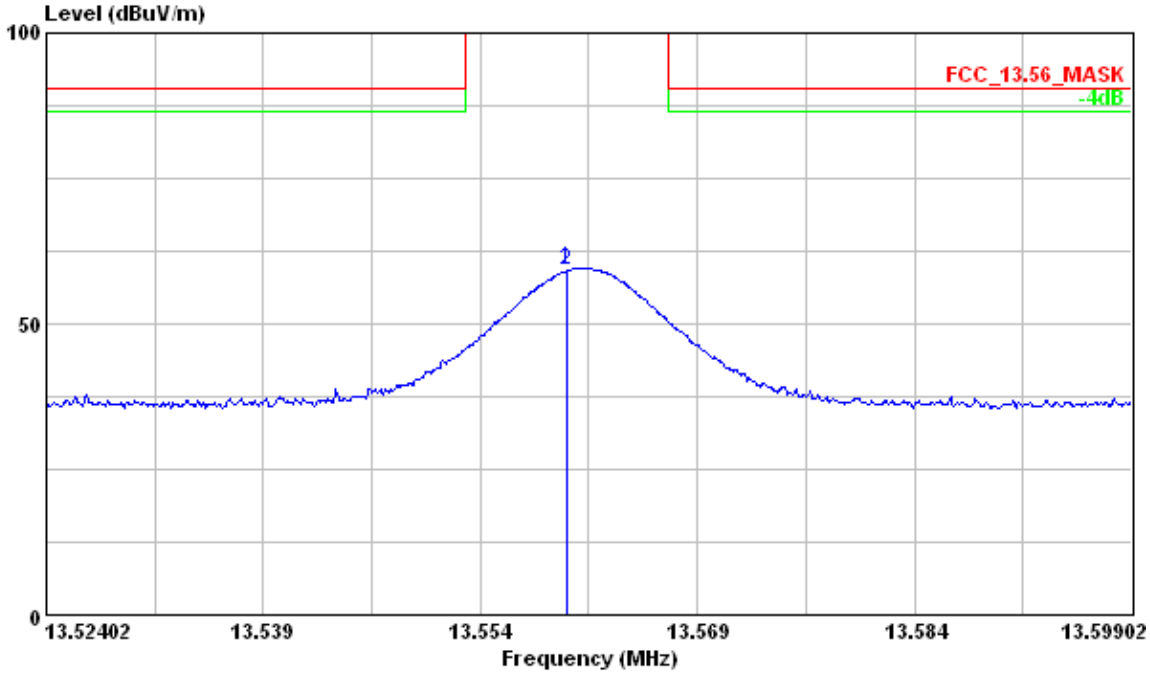
Tester : Liu

Freq. (MHz)	Polarization	Reading Data (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
13.56	H	44.73	14.33	59.06	124	64.94
13.56	V	43.29	14.33	57.62	124	66.38

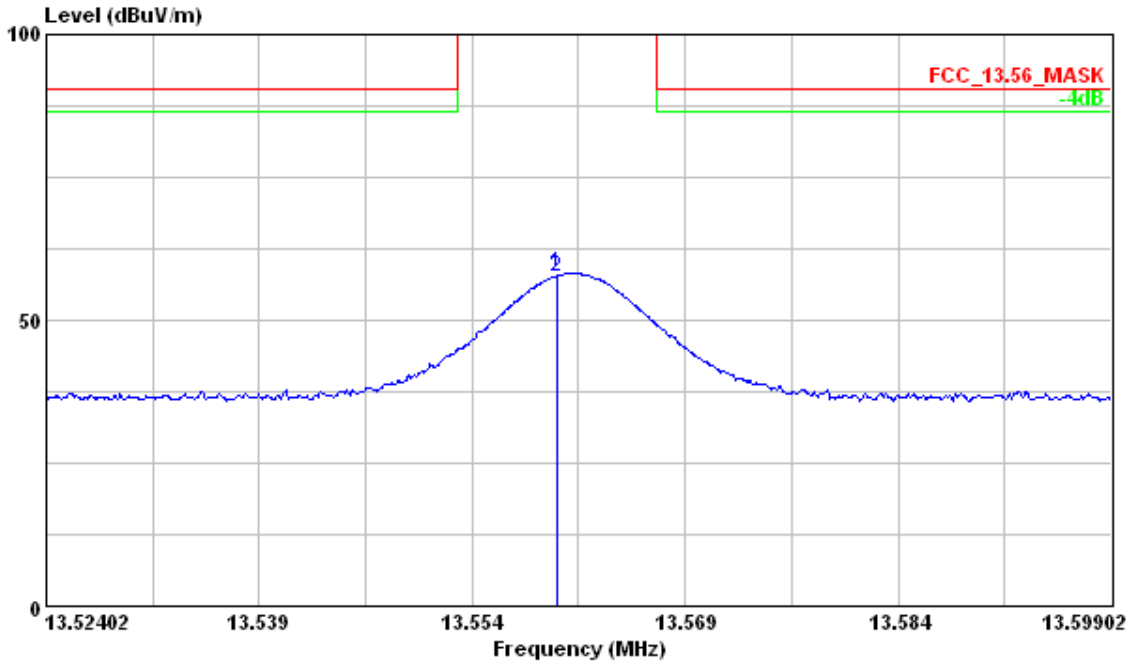
Note：

1. Correction Factor (dB/m) = Cable Loss + Antenna Factor
2. Output Field Strength (dBuV/m) = Reading Data + Correction Factor
3. The limit is 15848 (uV/m)=84dBuV/m @ 30 m , for main frequency < 30MHz, the formula transfers the limit at 30 m to 3m is L_{30}(dBuV/m) + 40 =124 dBuV/m
4. Margin (dB) = Limit – Output Field Strength

H Polarization



V Polarization



Band Edge

Test Mode : Mode 1, Continuous Transmitting

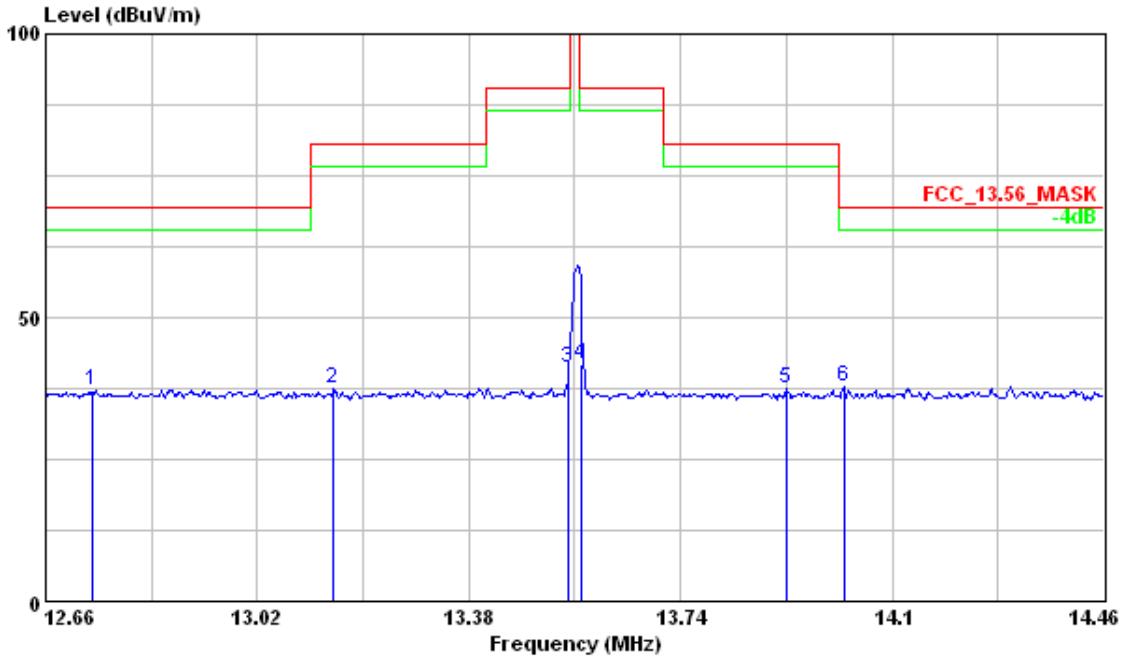
Tester : Liu

Emission Freq. (MHz)	Polarizontal	Reading Data (dBuV)	Correction Factor (dB/m)	Maximum Emission within the band (dBuV/m)	Limit (dBuV/m)	Margin (dB)
13.15	H	23.20	14.35	37.55	80.51	42.96
13.14	V	22.98	14.35	37.33	80.51	43.18
13.55	H	26.80	14.33	41.13	90.47	49.34
13.55	V	25.49	14.33	39.82	90.47	50.65
13.57	H	27.54	14.33	41.87	90.47	48.60
13.57	V	26.70	14.33	41.03	90.47	49.44
13.92	H	23.08	14.31	37.39	80.51	43.12
13.83	V	23.45	14.31	37.76	80.51	42.75

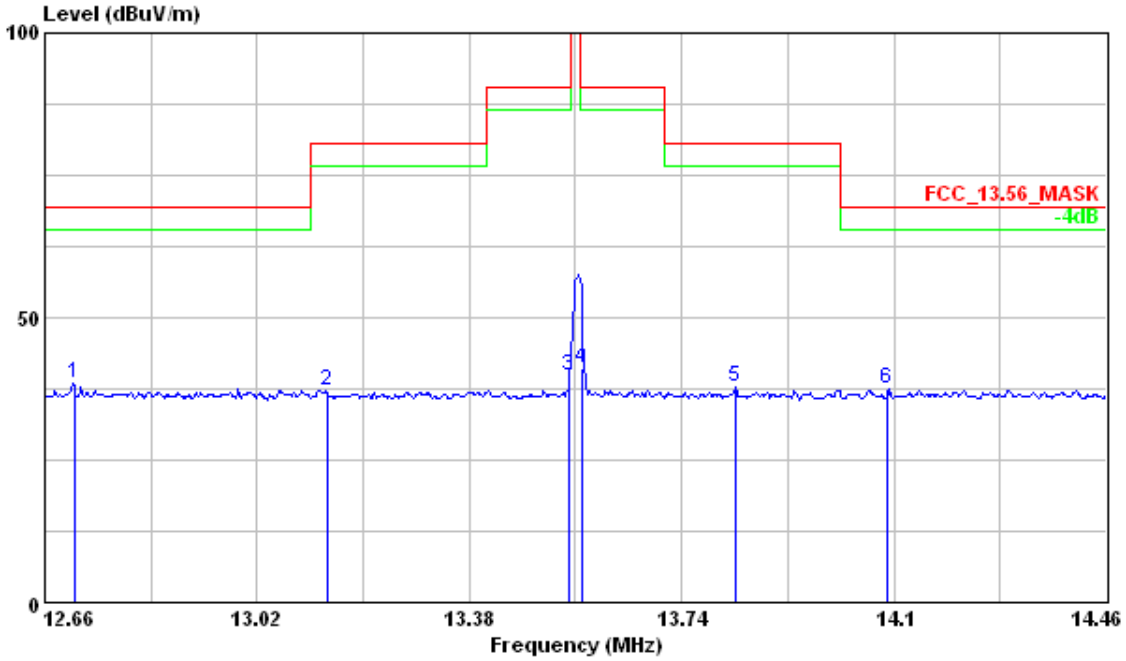
Note：

1. Correction Factor (dB/m) = Cable Loss + Antenna Factor
2. Output Field Strength (dBuV/m) = Reading Data + Correction Factor
3. For main frequency < 30MHz, the formula transfers the limit at 30 m to 3m is L_{30}(dBuV/m) + 40
4. Margin (dB) = Limit – Output Field Strength

H Polarization



V Polarization



3. Radiated Emission

Test Result : PASS

3.1 Applied Standard

According to 15.225(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.

Frequency (MHz)	Field Strength (uV/m)	Measurement 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

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

3.2 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESCI/ 100019	March 1, 2013	March 1, 2014
Spectrum Analyzer	Agilent	E4407B/ MY45106795	May 29, 2013	May 29, 2014
Loop Antenna	EMCO	6502/ 20558	Aug. 11, 2011	Aug. 11, 2013
Bi-Log Antenna	EMCO	3142C/ 52088	May 27, 2013	May 27, 2014
Pre-Amplifier	Mini-circuit	ZKL-2/ 004	Feb. 4, 2013	Feb. 4, 2014
RF Cable	N/A	N/A/ C0080	Feb. 4, 2013	Feb. 4, 2014
TR11 Semi - anechoic Chamber	ETS. LINDGREN	TR11/ 906-A	May 11, 2013	May 11, 2014

Note:

1. The calibrations are traceable to NML/ROC.
2. NCR:No Calibration Required.
3. The calibration date of the semi-anechoic chamber listed above is the date of NSA measurement.

Instrument Setting

RBW	VBW	Detector	Trace	Comment
9kHz	N/A	Quasi-Peak	Maxhold	Below 30MHz
120kHz	N/A	Quasi-Peak	Maxhold	Below 1GHz

Climatic Condition

Ambient Temperature：26°C; Relative Humidity ：66%

3.3 Measurement Procedure

a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.

b. A software provided by client enabled the EUT to transmit and receive data at specified channel frequencies individually.

c. If the EUT is tabletop equipment, it was placed on a non-conducted table with a height of 0.8 meters above the reference ground plane in the semi-anechoic chamber. If the EUT is floor-standing equipment, it was placed on a non-conducted support with a height of 12 millimeters above the reference ground plane in the semi-anechoic chamber.

d. The EUT is set at 3m away from the interference receiving antenna.

e. Rapidly sweep the signal in the test frequency range by using the spectrum through the Maximum-peak detector.

f. Rotate the EUT from 0° to 360° and position the receiving antenna at heights from 1 to 4 meters above the reference ground plane continuously to determine at least six frequencies associated with higher emission levels and record them.

g. For measurement of frequency above 1000MHz, the beamwidth of receiving horn antenna should keep covering EUT when the receiving horn antenna height varied.

h. Then measure each frequency found from step e. by using the spectrum with rotating the EUT and positioning the receiving antenna height to determine the maximum level.

i. Finely tune the antenna and turntable around the recorded position of each frequency found from step g.

j. For measurement of frequency below 1000MHz, set the receiver detector to be Quasi-Peak per CISPR 16-1 to find out the maximum level occurred.

k. For measurement of frequency above 1000MHz, set the spectrum detector to be Peak or Average to find out the maximum level occurred, if any.

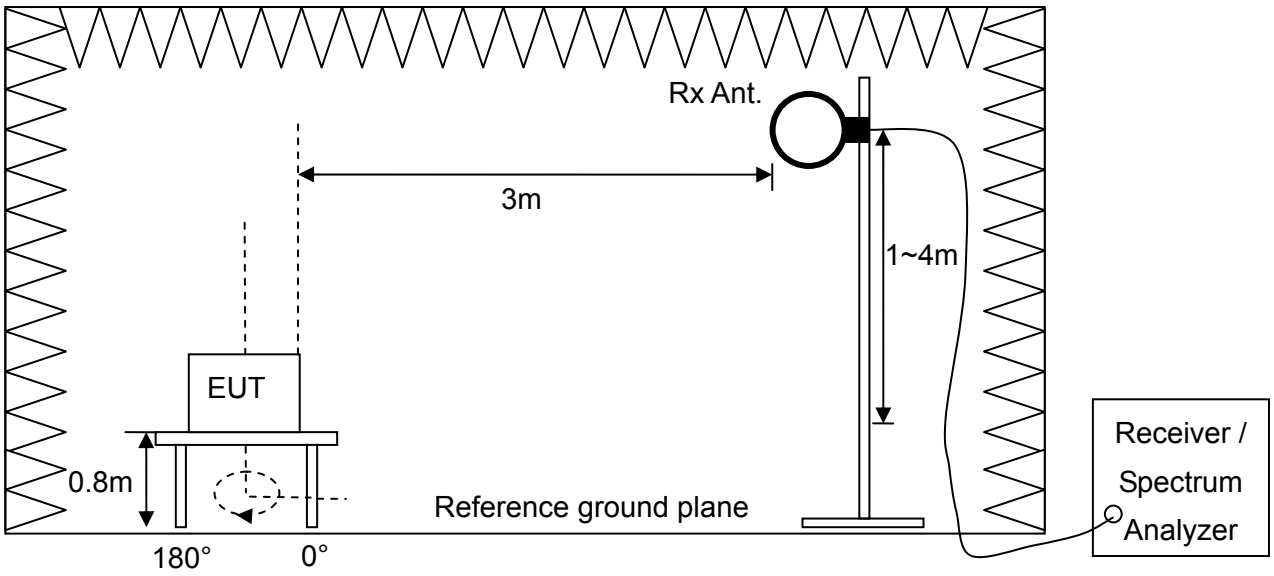
l. Record frequency, azimuth angle of the turntable, height, and polarization of the receiving antenna and compare the maximum level with the required limit.

m. Change the receiving antenna to another polarization to measure radiated emission by following step e. to l. again.

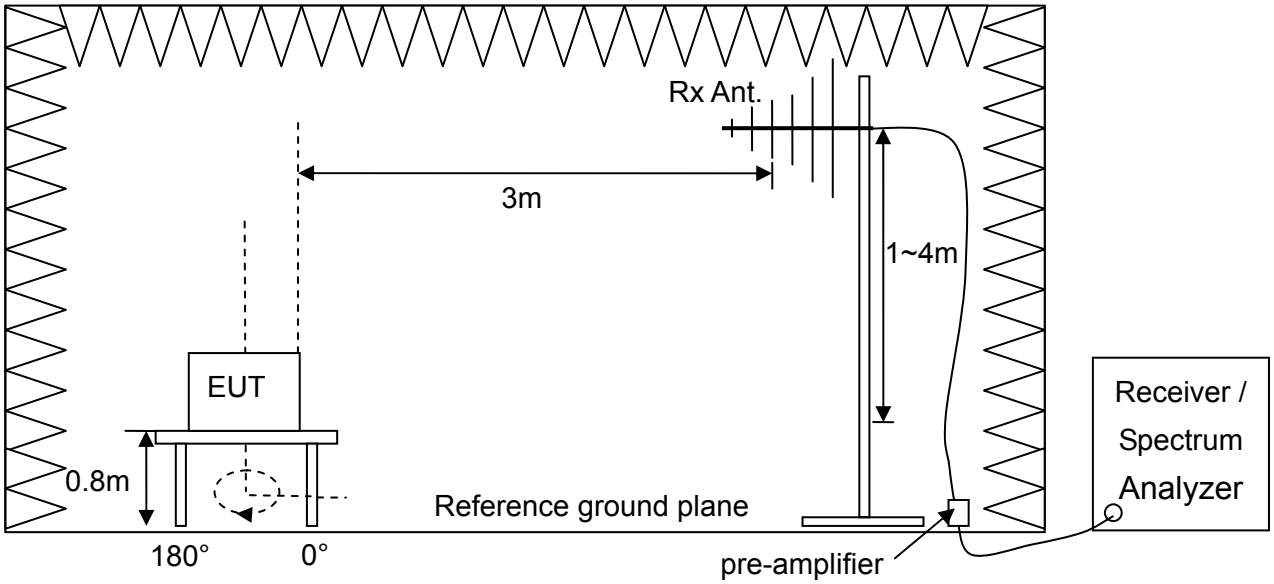
n. If the peak emission level measured from step e. is 4dB lower than the limit specified, then the emission values presented will be the peak value only. Otherwise, accurate Q.P. value will be measured and presented.

3.4 Test Configuration

Radiated Emission Measurement below 30MHz



Radiated Emission Measurement above 30MHz

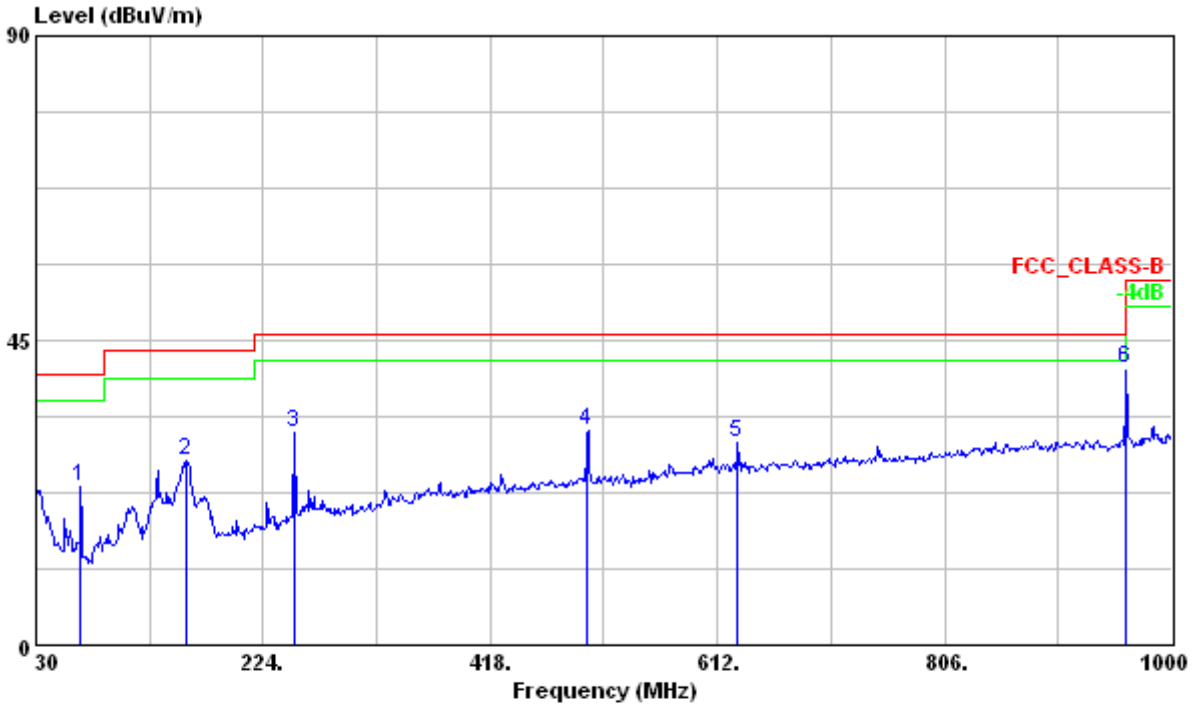


3.5 Test Results

Test Mode : **Mode 1, Continuous Transmitting**

Tester : Liu **Frequency Range** : 9kHz~1GHz

Polarization : **Horizontal**



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Pos	Table Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	67.800	23.37	42.95	-19.58	40.00	-16.63	---	---	HORIZONTAL	Peak
2	157.710	27.29	44.10	-16.81	43.50	-16.21	---	---	HORIZONTAL	Peak
3	250.320	31.43	44.45	-13.02	46.00	-14.57	---	---	HORIZONTAL	Peak
4	500.900	31.55	38.00	-6.45	46.00	-14.45	---	---	HORIZONTAL	Peak
5	629.000	30.03	34.57	-4.54	46.00	-15.97	---	---	HORIZONTAL	Peak
6 @	959.951	40.93	41.28	-0.35	46.00	-5.07	100	179	HORIZONTAL	QP

Note：

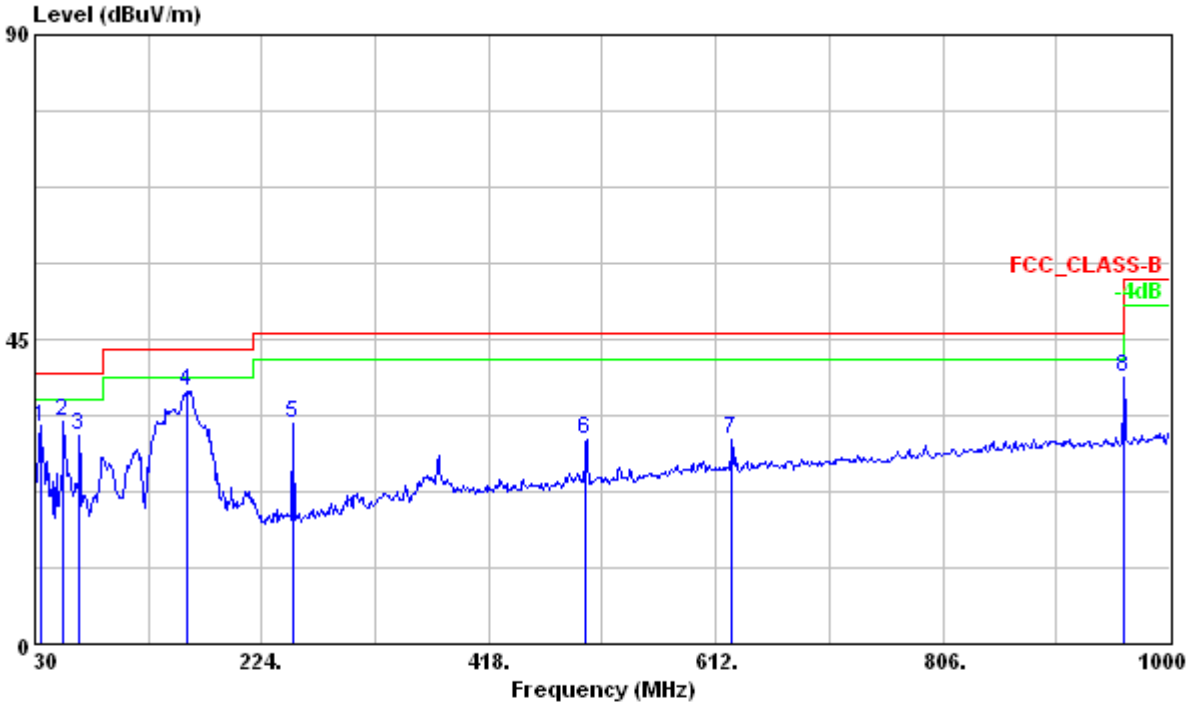
1. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier
2. Emission Level (dBuV/m) = Reading Data + Correction Factor

No signal can be detected from 9kHz to 30MHz, so the graphs are omitted below 30MHz.

Test Mode : **Mode 1, Continuous Transmitting**

Tester : Liu **Frequency Range** : 9kHz~1GHz

Polarization : **Vertical**



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Pos	Table Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	34.590	32.12	43.25	-11.13	40.00	-7.88	---	---	VERTICAL	Peak
2	54.030	32.83	51.26	-18.43	40.00	-7.17	---	---	VERTICAL	Peak
3	67.800	30.75	50.33	-19.58	40.00	-9.25	---	---	VERTICAL	Peak
4	159.463	37.22	53.94	-16.72	43.50	-6.28	101	43	VERTICAL	QP
5	250.320	32.63	45.65	-13.02	46.00	-13.37	---	---	VERTICAL	Peak
6	500.900	30.08	36.53	-6.45	46.00	-15.92	---	---	VERTICAL	Peak
7	625.500	30.24	34.81	-4.57	46.00	-15.76	---	---	VERTICAL	Peak
8	960.800	39.34	39.68	-0.34	54.00	-14.66	---	---	VERTICAL	Peak

Note：

1. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier
2. Emission Level (dBuV/m) = Reading Data + Correction Factor

No signal can be detected from 9kHz to 30MHz, so the graphs are omitted below 30MHz.

4. Frequency Tolerence

Test Result : PASS

4.1 Applied Standard

According to 15.225(e), 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.

4.2 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
Spectrum Analyzer	Agilent	E4405B/ MY45106706	March 1, 2013	March 1, 2014
Temperature Chamber	Terchy	MHG-800LF/ 920224	Aug. 13, 2012	Aug. 13, 2013
Adjustable DC Power Supply	instek	PSP-405/ C120177	NCR	NCR
Voltage Meter	FLUKE	187/ 91050091	July 2, 2012	July 2, 2013
Test Site	N.A.	TR13	NCR	NCR

Note:

1. The calibrations are traceable to NML/ROC.
2. NCR:No Calibration Required.

Instrument Setting

RBW	VBW	Detector	Trace	Comment
300Hz	1kHz	Peak	Maxhold	

Climatic Condition

Ambient Temperature：25°C; Relative Humidity ：55%

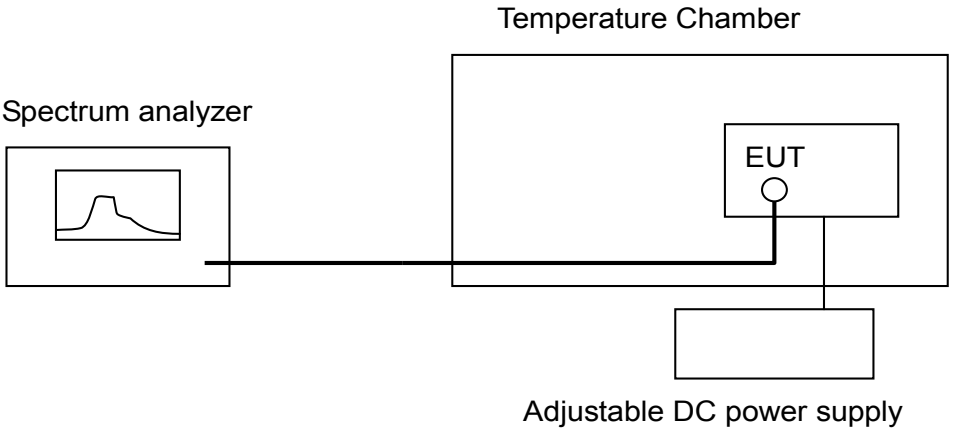
4.3 Measurement Procedure

a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage described in the user's manual supported by the manufacturer in test site TR13.

b. Measure the frequency tolerence by using the spectrum analyzer and following the test conditions described in FCC 15.225(e) to perform the normal and extreme conditions test.

c. Record the value and compare with the required limit.

4.4 Test Configuration



4.5 Test Results

Test Mode : Mode 1, Continuous Transmitting

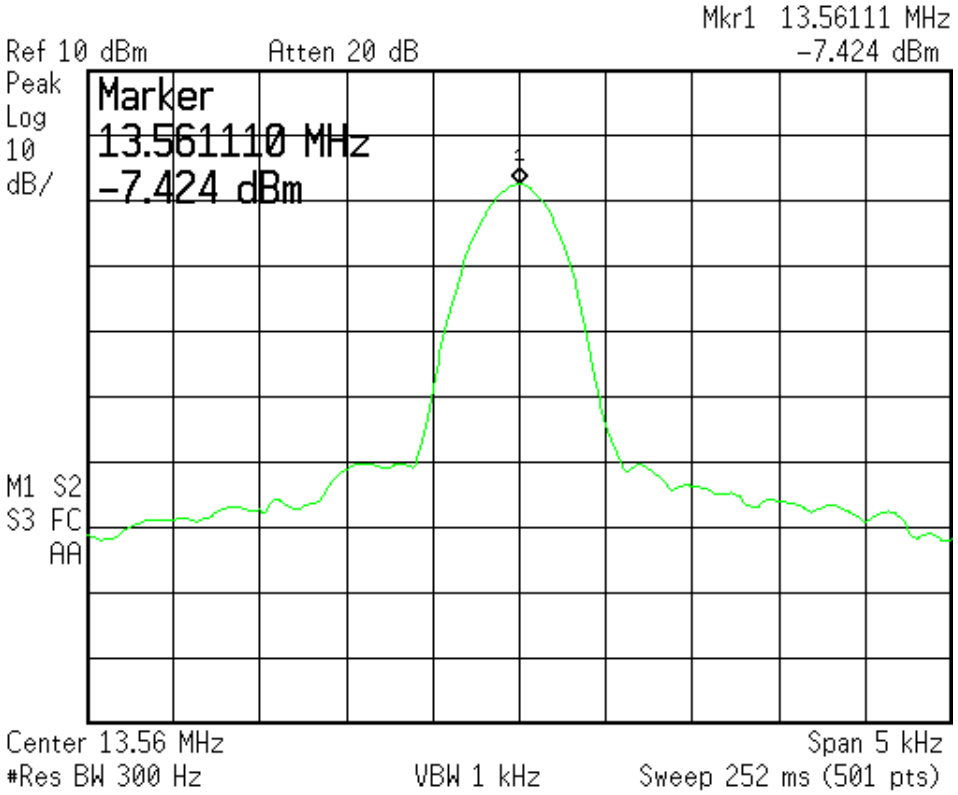
Tester : Jun

Temperature (ºC)	DC Voltage (Volt)	Meas. Frequency (MHz)	Deviation (kHz)	Limit (kHz)	Margin (kHz)
20ºC	9	13.56111	N/A	N/A	N/A
	10.35	13.56111	0.0000	1.356	1.35600
	8.41(Note 3)	13.56111	0.0000	1.356	1.35600
-20ºC	9	13.56127	0.0012	1.356	1.35482
50ºC	9	13.56107	0.0003	1.356	1.35571
20ºC	43	13.56110	0.0001	1.356	1.35593
	49.45	13.56110	0.0001	1.356	1.35593
	36.55	13.56110	0.0001	1.356	1.35593
-20ºC	43	13.56127	0.0012	1.356	1.35482
50ºC	43	13.56108	0.0002	1.356	1.35578
20ºC	24	13.56111	0.0000	1.356	1.35600
	27.6	13.56111	0.0000	1.356	1.35600
	20.4	13.56111	0.0000	1.356	1.35600
-20ºC	24	13.56127	0.0012	1.356	1.35482
50ºC	24	13.56111	0.0000	1.356	1.35600

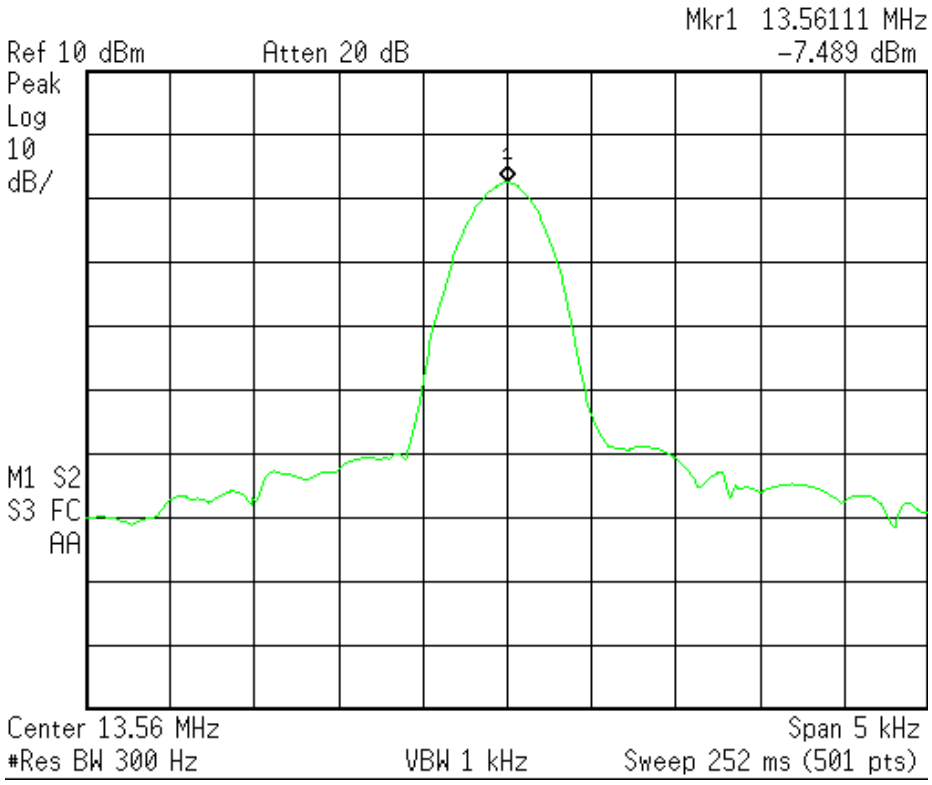
Note:

1. Deviation(kHz) = ｜Meas. Frequency – Meas. Frequency @20ºC/120Vac｜
2. Margin (kHz)= Limit – Deviation
3. Input voltage below 8.41 Vdc , device can’t work.

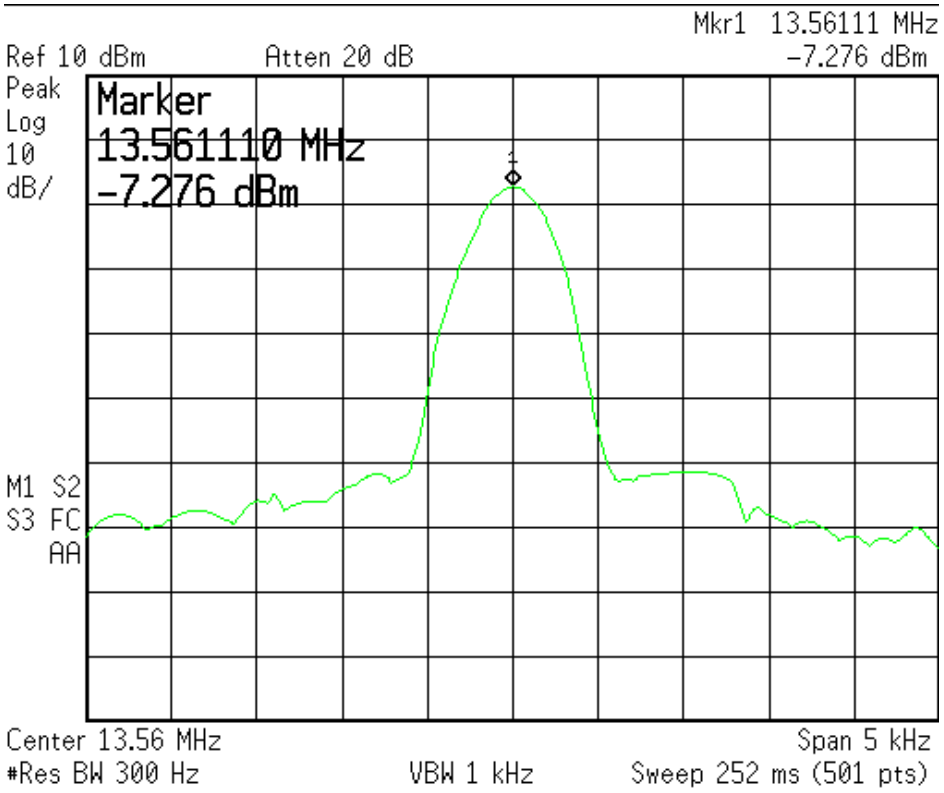
20ºC, 9Vdc



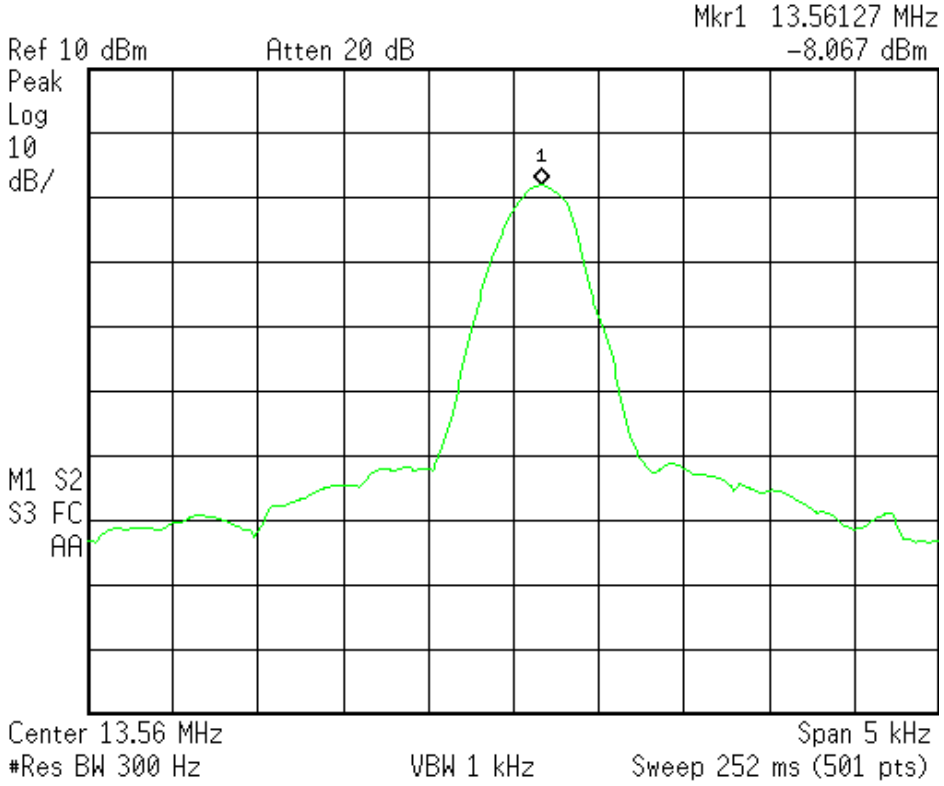
20ºC, 10.35Vdc



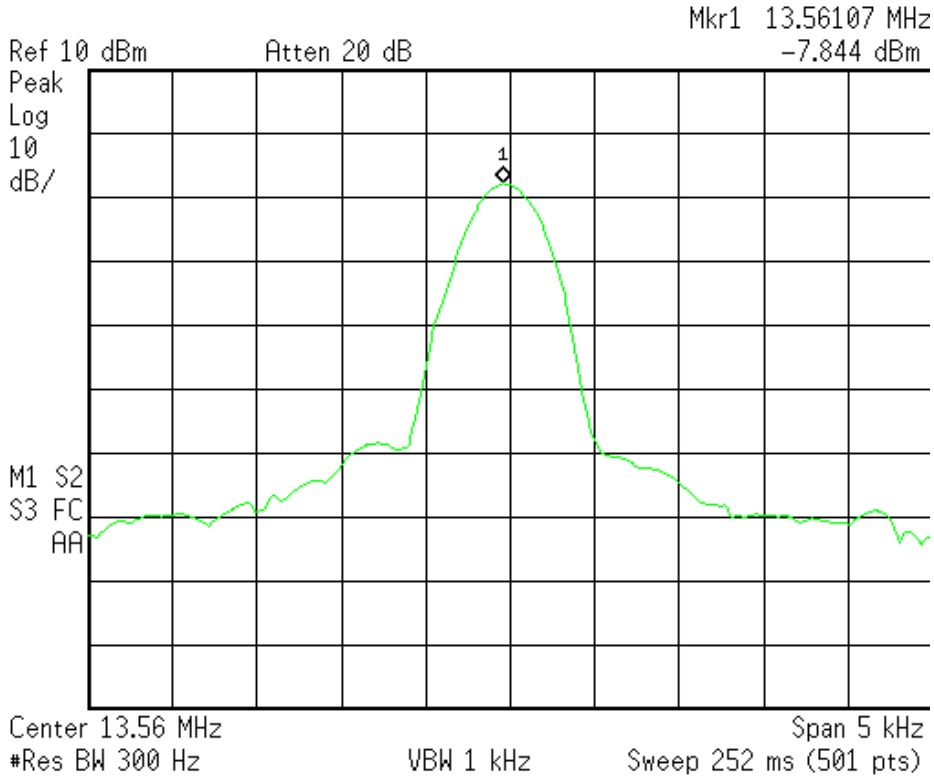
20ºC, 8.41Vdc



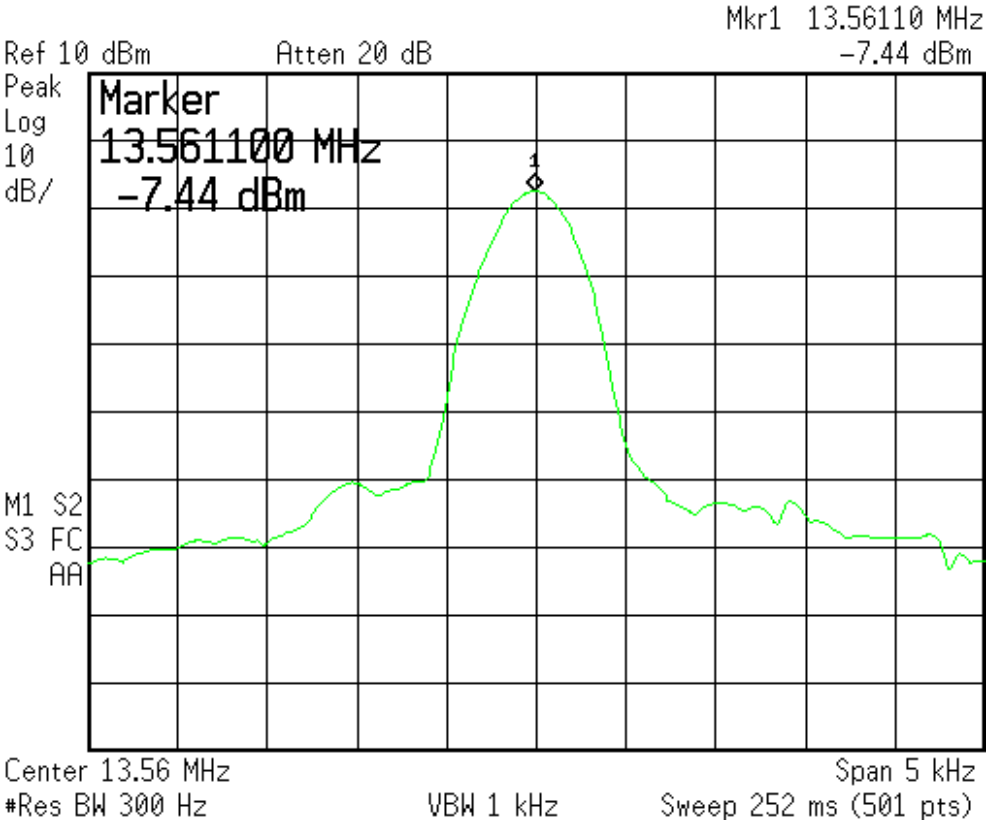
-20ºC, 9Vdc



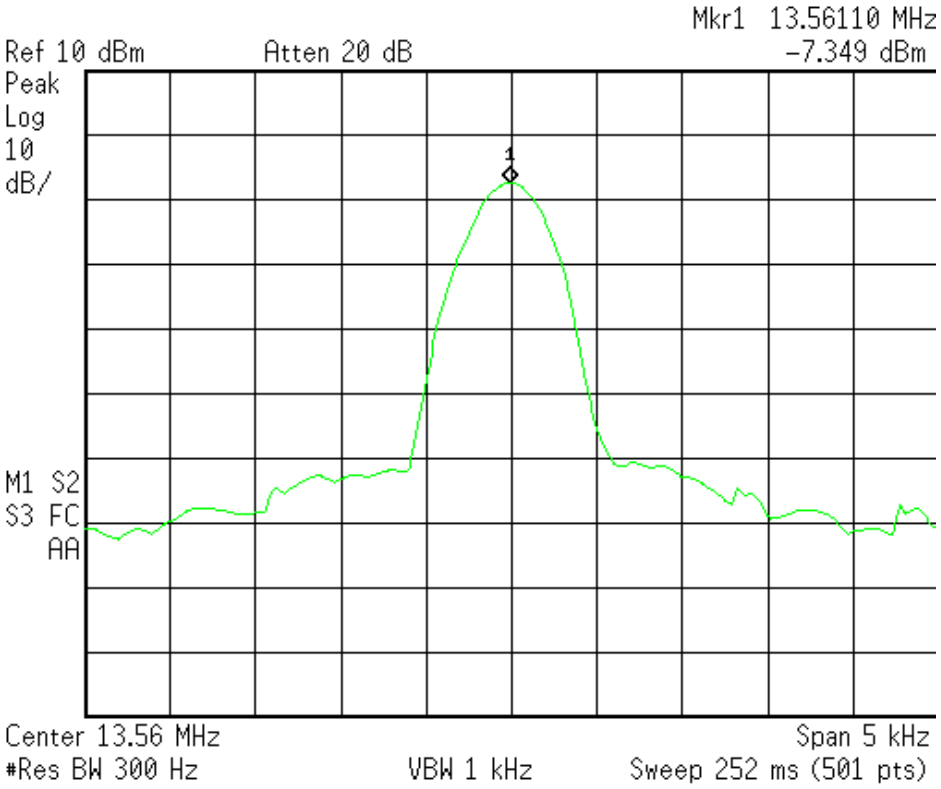
50ºC, 9Vdc



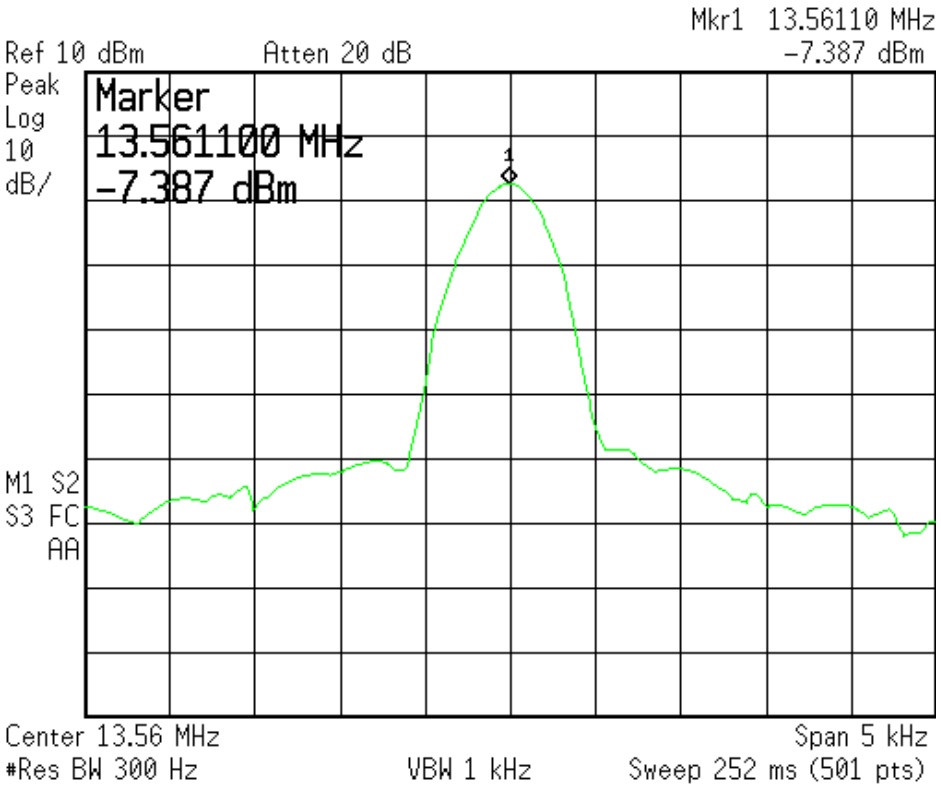
20ºC, 43Vdc



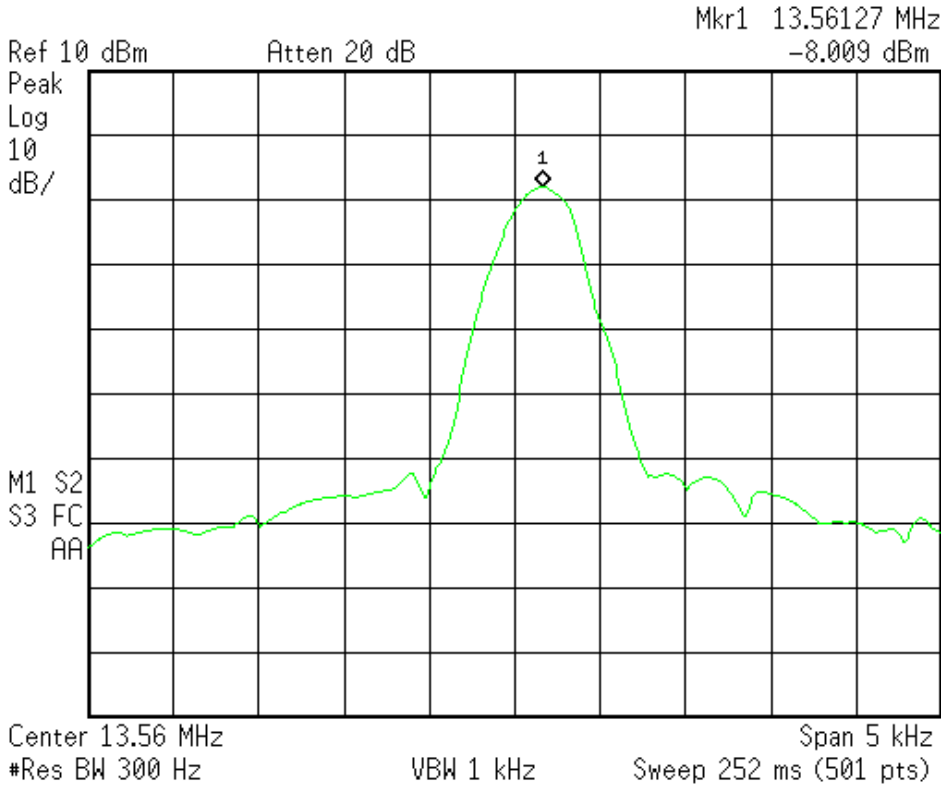
20ºC, 49.45Vdc



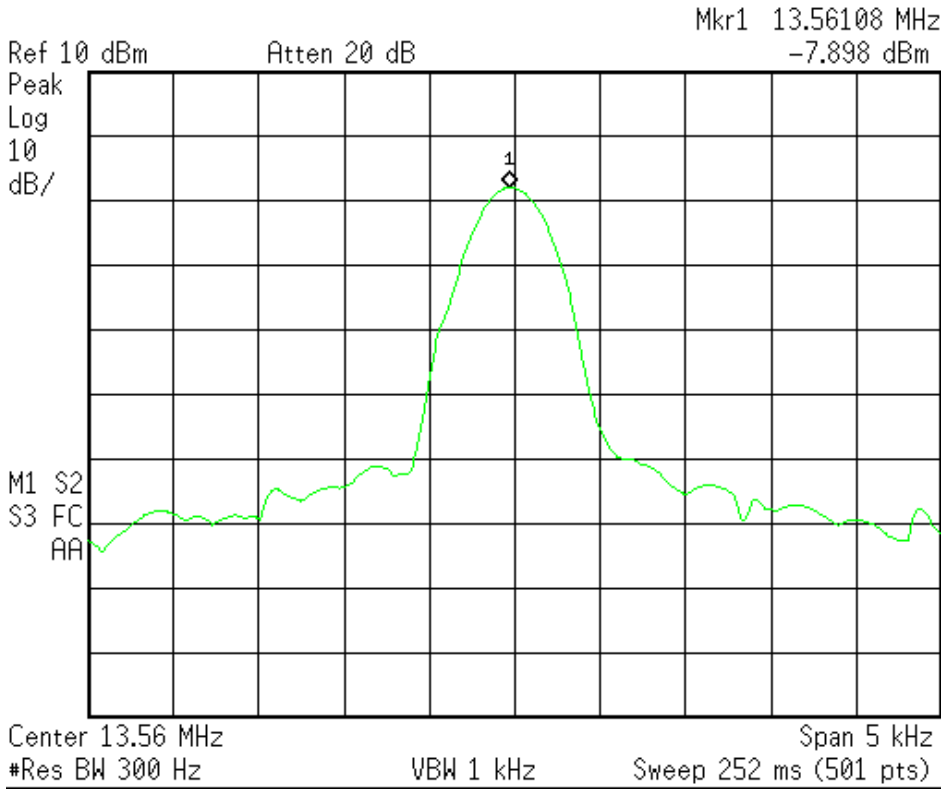
20ºC, 36.55Vdc



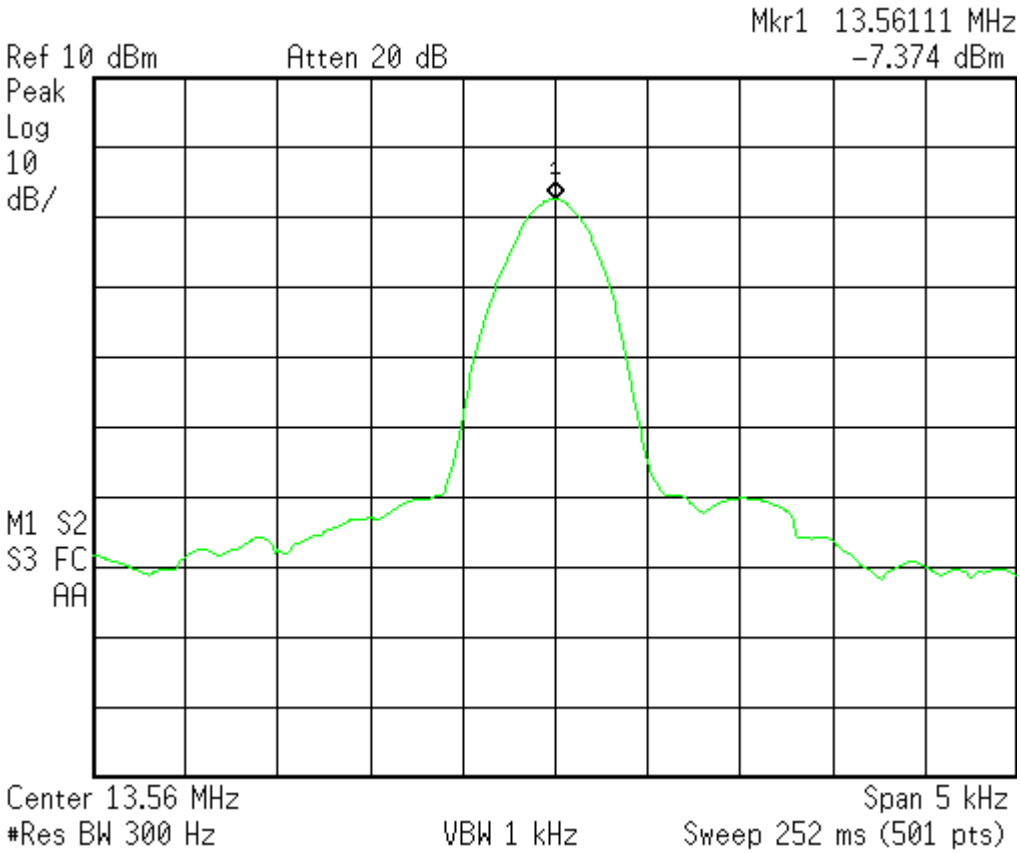
-20ºC, 43Vdc



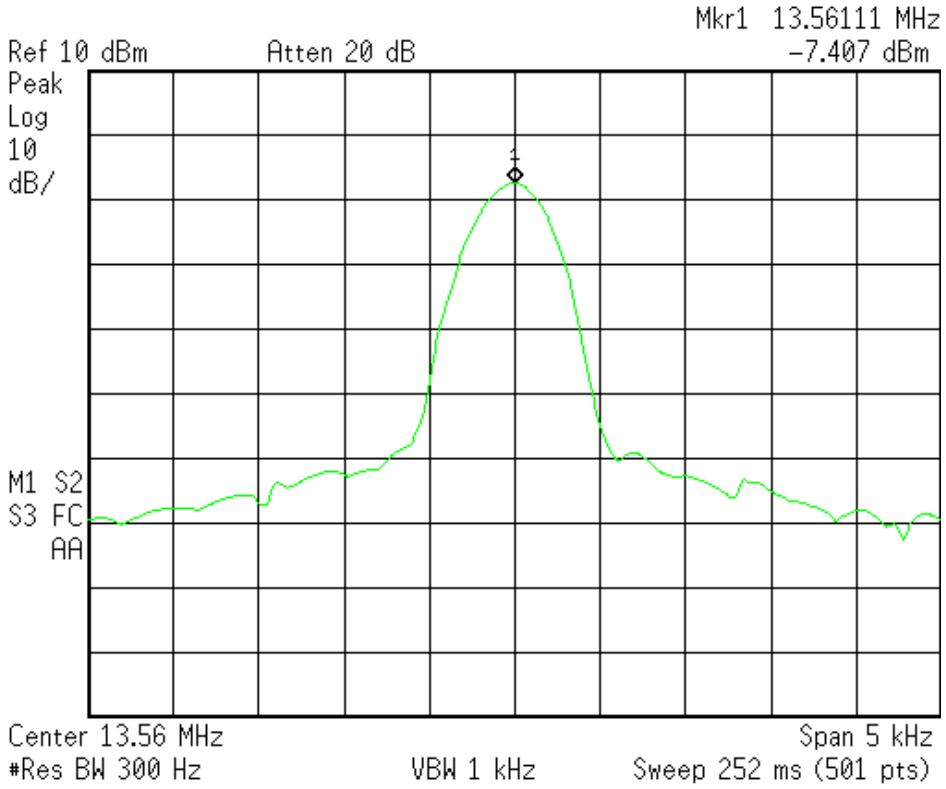
50ºC, 43Vdc



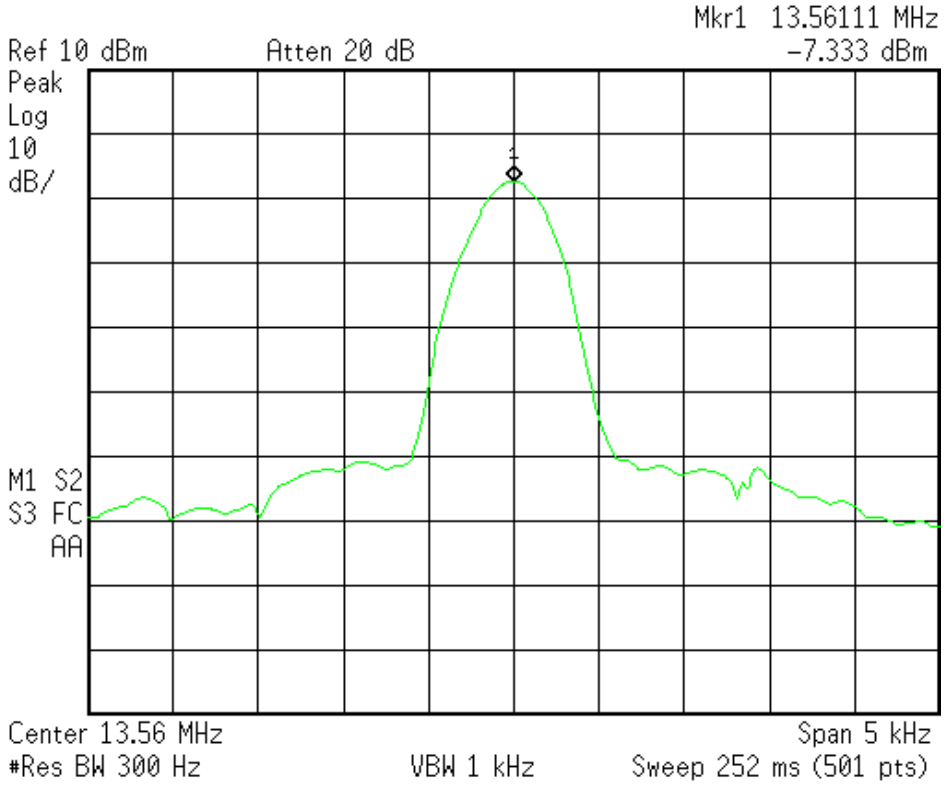
20ºC, 24Vdc



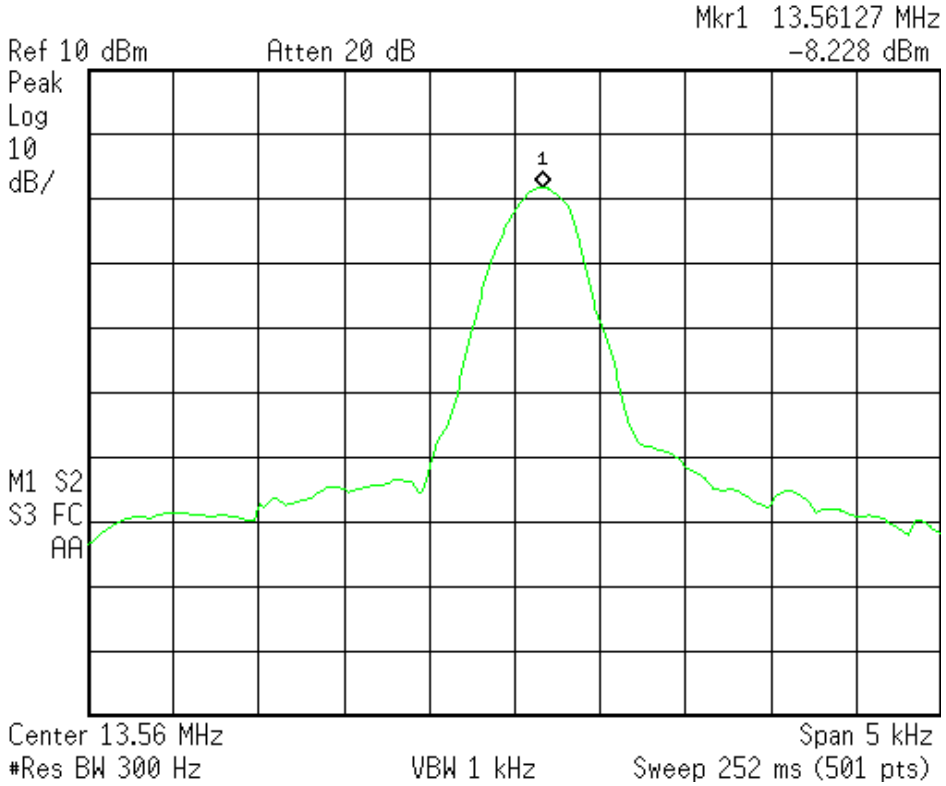
20ºC, 27.6Vdc


Mkr1 13.56111 MHz
Ref 10 dBm
Atten 20 dB
-7.407 dBm
Peak
Log
10
dB/
M1 S2
S3 FC
AA
Center 13.56 MHz
Span 5 kHz
#Res BW 300 Hz
VBW 1 kHz
Sweep 252 ms (501 pts)

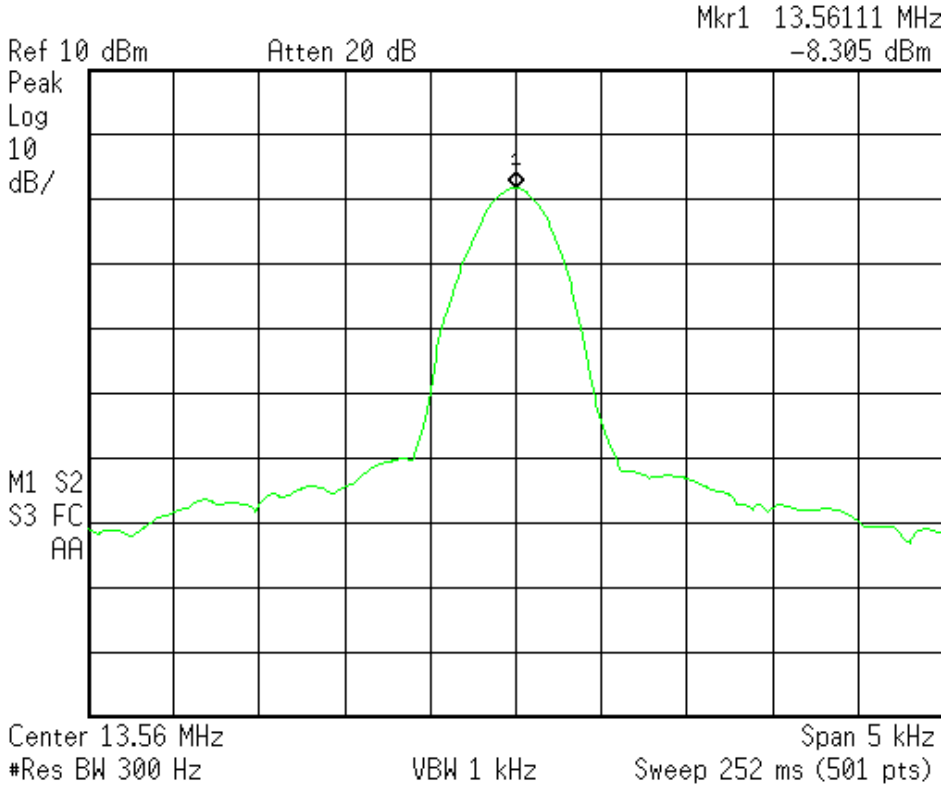
20ºC, 20.4Vdc



-20ºC, 24Vdc



50ºC, 24Vdc


Mkr1 13.56111 MHz
Ref 10 dBm
Atten 20 dB
-8.305 dBm
Peak
Log
10
dB/
M1 S2
S3 FC
AA
Center 13.56 MHz
Span 5 kHz
#Res BW 300 Hz
VBW 1 kHz
Sweep 252 ms (501 pts)

5. 20dB Bandwidth

Test Result : PASS

5.1 Applied Standard

According to 15.215(c) requires the device must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates.

According to 15.225, Operation should within the band 13.110 – 14.010 MHz.

5.2 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
Spectrum Analyzer	Agilent	E4405B/ MY45106706	March 1, 2013	March 1, 2014
Test Site	N.A.	TR13	NCR	NCR

Note:

1.The calibrations are traceable to NML/ROC.

2.NCR : No Calibration Required.

Instrument Setting

RBW	VBW	Detector	Trace	Comment
300Hz	1kHz	Peak	Maxhold	

Climatic Condition

Ambient Temperature：25°C; Relative Humidity ：55%

5.3 Measurement Procedure

a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage described in the user's manual supported by the manufacturer in test site TR13.

b. Measure the 20dB bandwidth by using the spectrum analyzer and following the test conditions described in FCC 15.215.

c. Record the frequency and compare with the required limit.

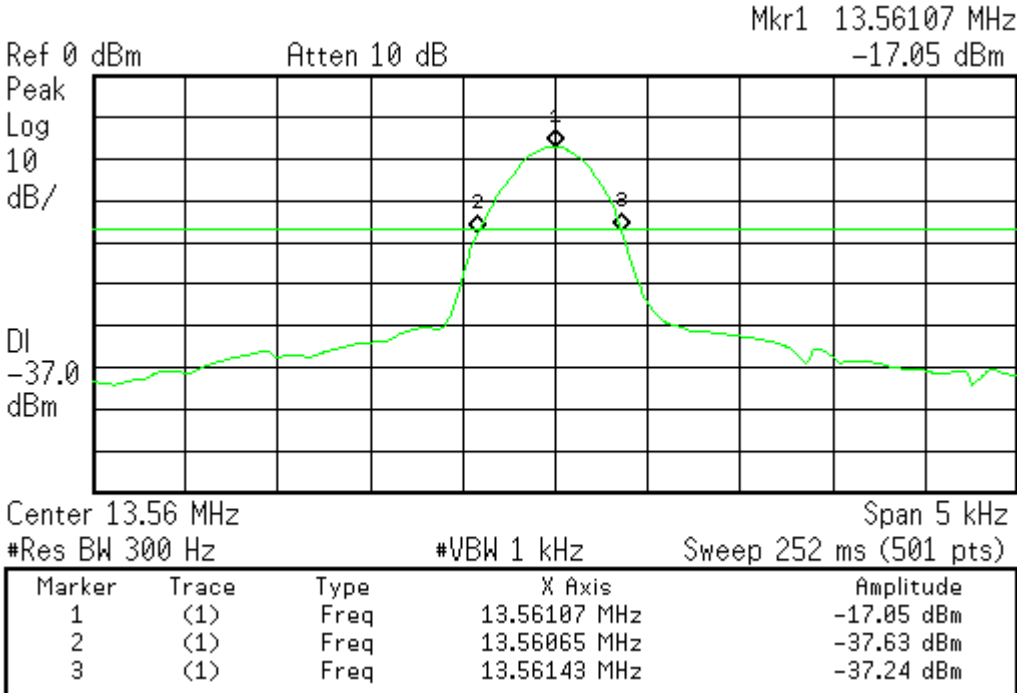
5.4 Test Configuration

5.5 Test Results

Test Mode : Mode 1, Continuous Transmitting

Tester : Bill

Operating Frequency (MHz)	Limit (MHz)
13.56	13.110~14.01



6. Conducted Emission Measurement

Test Result : PASS

6.1 Applied Standard

For intentional device, according to §15.207(a) line conduction emission limit is as below table.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 - 5	56	46
5 - 30	60	50

* Decreases with the logarithm of the frequency.

Note:

For a device with a permanent antenna operating at or below 30 MHz, the FCC will accept measurements done with a suitable dummy load, in lieu of the permanent antenna under the following conditions: (1) perform the AC line conducted tests with the permanent antenna to determine compliance with the Section 15.207 limits outside the transmitter's fundamental emission band; (2) retest with a dummy load in lieu of the permanent antenna to determine compliance with the Section 15.207 limits within the transmitter's fundamental emission band.

6.2 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
Test Receiver	R&S	ESCS 30/ 836858/021	Jan. 14, 2013	Jan. 14, 2014
LISN	R&S	ESH2-Z5/ 880669/039	March 15, 2013	March 15, 2014
2nd LISN	R&S	ENV4200/ 833209/010	March 29, 2013	March 29, 2014
50Ω terminator	R&S	N/A/ 001	Aug. 20, 2012	Aug. 20, 2013
RF Switch	N/A	RSU28/ 338965/002	Feb. 20, 2013	Aug. 20, 2013
RF Cable	N/A	N/A/ C0052 ~ 56	Feb. 20, 2013	Aug. 20, 2013
Test Software	Audix	e3/ Ver. 5.2004-2-19k	NCR	NCR
TR5 shielded room	ETS LINDGREN	TR5/ 15353-F	NCR	NCR

Note:
1. The calibrations are traceable to NML/ROC.
2. NCR : No Calibration Required.

Instrument Setting

IF BW	Measurement Time	Detector	Trace	Comment
9kHz	1 second	Quasi-Peak / Average	Maxhold	

Climatic Condition

Ambient Temperature：26°C; Relative Humidity : 67%

6.3 Test Procedures

a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.

b. If the EUT is tabletop equipment, it was placed on a non-conducted table with a height of 0.8 meters above the reference ground plane and 0.4 meters from the conducting wall of the shielded room. Also if the EUT is floor-standing equipment, it was placed on a non-conducted support with a height of 12 millimeters above the reference ground plane.

c. Connect the EUT's power source to the appropriate power mains through the LISN.

d. All the other peripherals are connected to the 2nd LISN, if any.

e. The LISN was placed 0.8 meters from the EUT and at least 0.8 meters from other units and other metal planes.

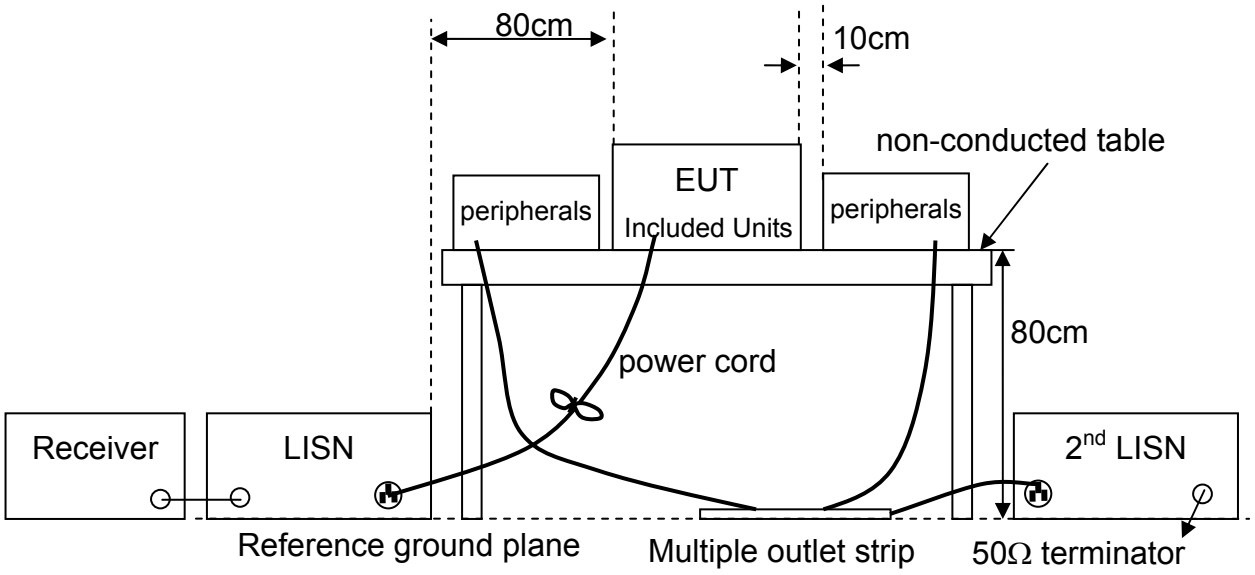
f. Measure the conducted emissions on each power line (Neutral Line and Line 1 – Hot side) of the EUT's power source by using the test receiver connected to the coupling RF output port of LISN.

g. Rapidly scan the signal from 150kHz to 30MHz by using the receiver through the Maximum-Peak detector to determine those frequencies associated with higher emission levels for each measured line.

h. Then measure the maximum level of conducted disturbance for each frequency found from step g. by using the receiver through the Quasi-Peak and Average detectors per CISPR 16-1.

i. Record the level for each frequency and compare with the required limit.

6.4 Test Configurations

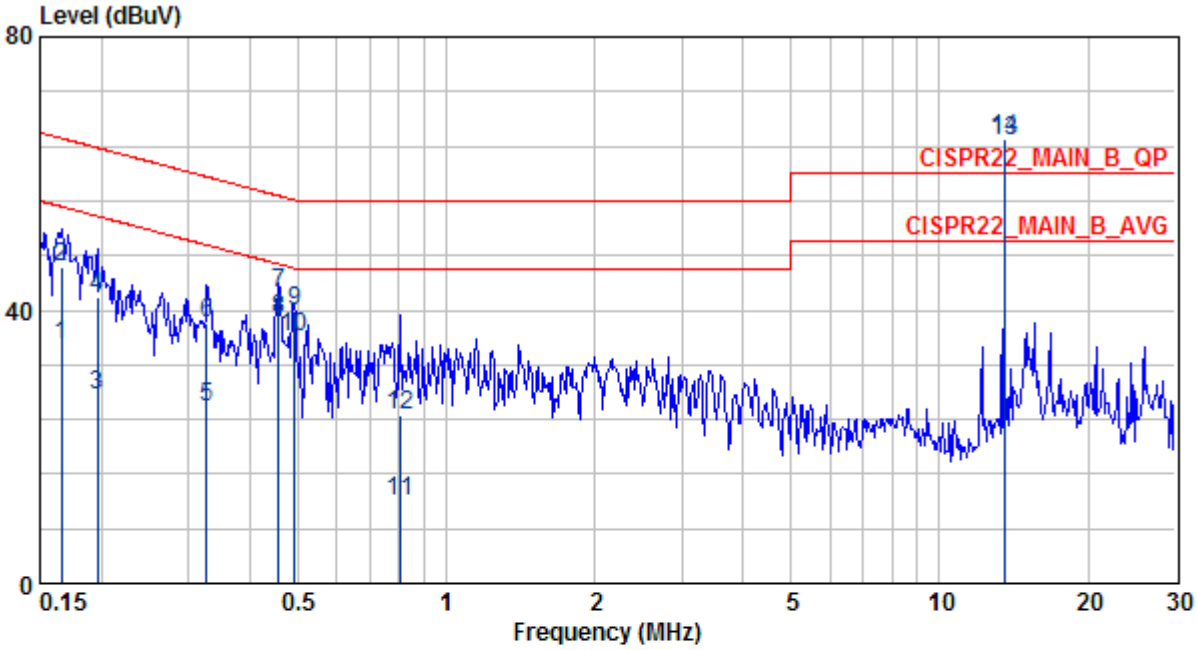


6.5 Test Results

Test Mode : **Mode 1, Continuous Transmitting, with antenna**

Tester : Der-Jan Ken **Frequency Range** : 150kHz~30MHz

Phase : **Line**



	Freq	Level	Factor	Read Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.166	34.98	0.28	34.70	55.16	-20.18	LINE	AVERAGE
2	0.166	46.29	0.28	46.01	65.16	-18.87	LINE	QP
3	0.197	27.48	0.28	27.20	53.76	-26.28	LINE	AVERAGE
4	0.197	41.89	0.28	41.61	63.76	-21.87	LINE	QP
5	0.327	25.64	0.30	25.34	49.53	-23.89	LINE	AVERAGE
6	0.327	38.04	0.30	37.74	59.53	-21.49	LINE	QP
7	0.456	42.52	0.31	42.21	56.76	-14.24	LINE	QP
8	0.456	38.82	0.31	38.51	46.76	-7.94	LINE	AVERAGE
9	0.491	39.93	0.31	39.62	56.14	-16.21	LINE	QP
10	0.491	35.93	0.31	35.62	46.14	-10.21	LINE	AVERAGE
11	0.804	12.13	0.34	11.79	46.00	-33.87	LINE	AVERAGE
12	0.804	24.71	0.34	24.37	56.00	-31.29	LINE	QP
13 @	13.560	64.84	0.68	64.16	60.00	4.84	LINE	QP
14 @	13.560	65.11	0.68	64.43	50.00	15.11	LINE	AVERAGE

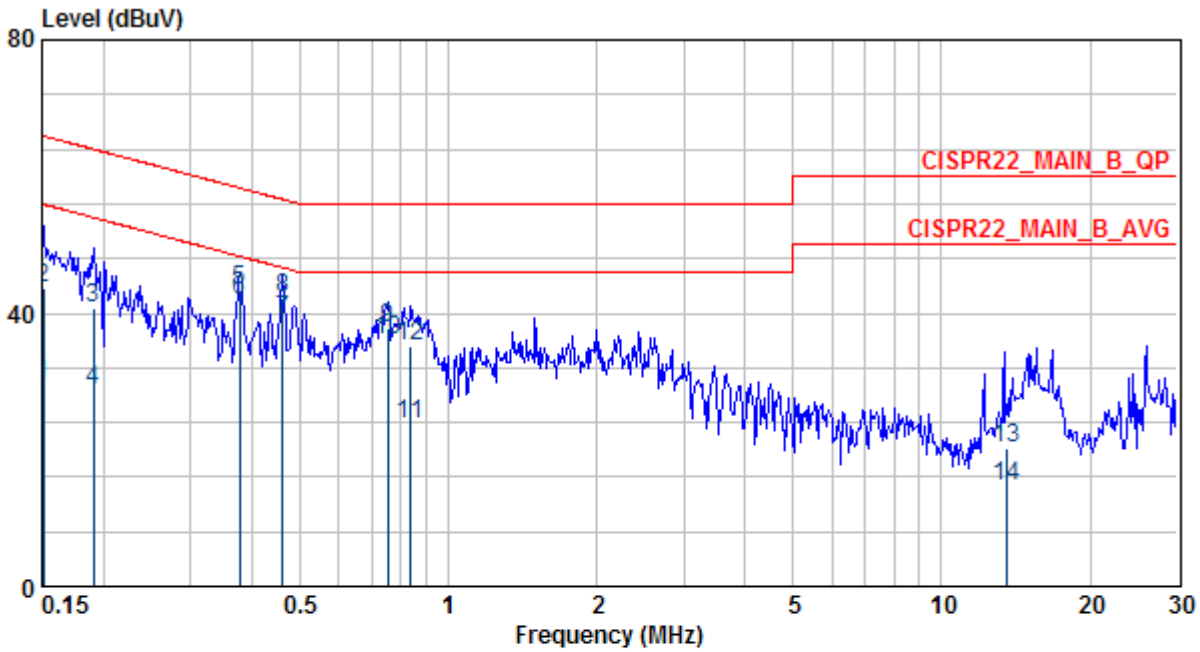
Note:

1. Emission Level = reading value + correction factor.
2. Correction factor = cable loss + insertion loss of LISN.
3. Q.P. is abbreviation of quasi-peak.
4. Tx Fundamental(markered 23, 24), for reference only. Please refer to next page.

Test Mode : **Mode 1, Continuous Transmitting, with dummy load**

Tester : Der-Jan Ken **Frequency Range** : 150kHz~30MHz

Phase : **Line**

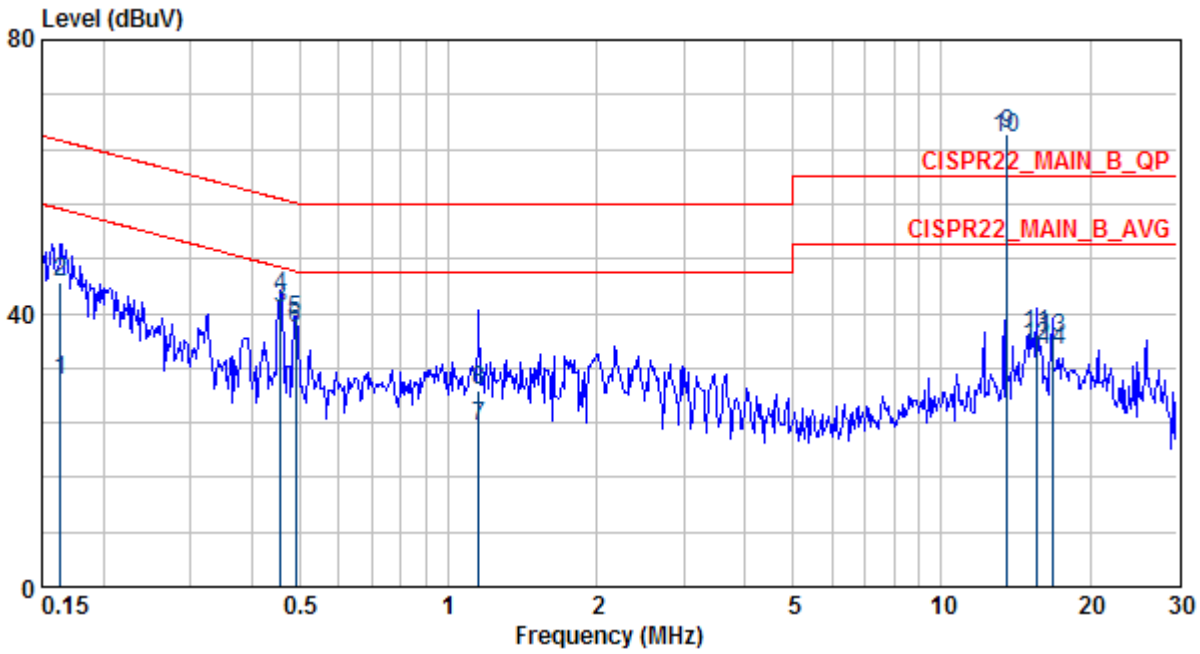


	Freq	Level	Factor	Read Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.151	29.56	0.28	29.28	55.96	-26.40	LINE	AVERAGE
2	0.151	43.56	0.28	43.28	65.96	-22.40	LINE	QP
3	0.190	40.66	0.28	40.38	64.02	-23.36	LINE	QP
4	0.190	28.80	0.28	28.52	54.02	-25.22	LINE	AVERAGE
5	0.377	43.51	0.30	43.21	58.34	-14.83	LINE	QP
6	0.377	42.04	0.30	41.74	48.34	-6.30	LINE	AVERAGE
7	0.461	38.98	0.31	38.67	46.67	-7.69	LINE	AVERAGE
8	0.461	42.31	0.31	42.00	56.67	-14.36	LINE	QP
9	0.755	37.92	0.34	37.58	56.00	-18.08	LINE	QP
10	0.755	36.04	0.34	35.70	46.00	-9.96	LINE	AVERAGE
11	0.839	23.84	0.34	23.50	46.00	-22.16	LINE	AVERAGE
12	0.839	35.25	0.34	34.91	56.00	-20.75	LINE	QP
13	13.560	20.12	0.68	19.44	60.00	-39.88	LINE	QP
14	13.560	14.74	0.68	14.06	50.00	-35.26	LINE	AVERAGE

Test Mode : **Mode 1, Continuous Transmitting, with antenna**

Tester : Der-Jan Ken **Frequency Range** : 150kHz~30MHz

Phase : Neutral



		Freq	Level	Factor	Read Level	Limit Line	Over Limit	Pol/Phase	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.163	30.15	0.18	29.97	55.30	-25.15	NEUTRAL	AVERAGE
2		0.163	44.66	0.18	44.48	65.30	-20.64	NEUTRAL	QP
3	@	0.457	40.85	0.19	40.66	46.75	-5.90	NEUTRAL	AVERAGE
4		0.457	42.36	0.19	42.17	56.75	-14.39	NEUTRAL	QP
5		0.490	38.84	0.20	38.64	56.17	-17.33	NEUTRAL	QP
6		0.490	37.86	0.20	37.66	46.17	-8.31	NEUTRAL	AVERAGE
7		1.153	23.43	0.24	23.19	46.00	-22.57	NEUTRAL	AVERAGE
8		1.153	28.59	0.24	28.35	56.00	-27.41	NEUTRAL	QP
9	@	13.560	66.15	0.87	65.28	50.00	16.15	NEUTRAL	AVERAGE
10	@	13.560	65.69	0.87	64.82	60.00	5.69	NEUTRAL	QP
11		15.558	36.85	0.98	35.87	60.00	-23.15	NEUTRAL	QP
12		15.558	35.23	0.98	34.25	50.00	-14.77	NEUTRAL	AVERAGE
13		16.779	36.31	1.03	35.28	60.00	-23.69	NEUTRAL	QP
14		16.779	34.59	1.03	33.56	50.00	-15.41	NEUTRAL	AVERAGE

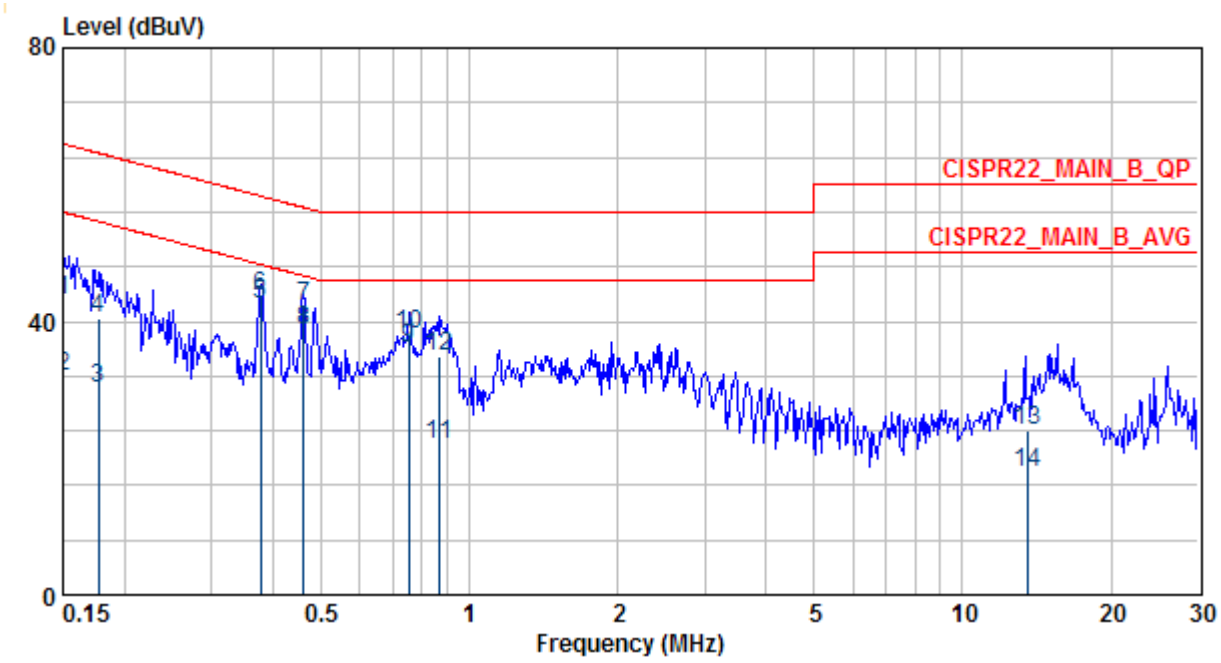
Note:

1. Emission Level = reading value + correction factor.
2. Correction factor = cable loss + insertion loss of LISN.
3. Q.P. is abbreviation of quasi-peak.
4. Tx Fundamental(markered 15, 16), for reference only. Please refer to next page.

Test Mode : **Mode 1, Continuous Transmitting, with dummy load**

Tester : Der-Jan Ken **Frequency Range** : 150kHz~30MHz

Phase : Neutral



	Freq	Level	Factor	Read Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.150	42.96	0.18	42.78	66.00	-23.04	NEUTRAL	QP
2	0.150	31.82	0.18	31.64	56.00	-24.18	NEUTRAL	AVERAGE
3	0.177	30.28	0.17	30.11	54.64	-24.35	NEUTRAL	AVERAGE
4	0.177	40.55	0.17	40.38	64.64	-24.08	NEUTRAL	QP
5	0.377	42.49	0.18	42.31	48.34	-5.85	NEUTRAL	AVERAGE
6	0.377	43.72	0.18	43.54	58.34	-14.62	NEUTRAL	QP
7	0.461	42.07	0.19	41.88	56.67	-14.60	NEUTRAL	QP
8	0.461	38.70	0.19	38.51	46.67	-7.97	NEUTRAL	AVERAGE
9	0.755	36.19	0.23	35.96	46.00	-9.81	NEUTRAL	AVERAGE
10	0.755	37.97	0.23	37.74	56.00	-18.03	NEUTRAL	QP
11	0.871	21.96	0.22	21.74	46.00	-24.04	NEUTRAL	AVERAGE
12	0.871	34.74	0.22	34.52	56.00	-21.26	NEUTRAL	QP
13	13.560	24.15	0.87	23.28	60.00	-35.85	NEUTRAL	QP
14	13.560	17.86	0.87	16.99	50.00	-32.14	NEUTRAL	AVERAGE

Note:

1. Emission Level = reading value + correction factor.
2. Correction factor = cable loss + insertion loss of LISN.
3. Q.P. is abbreviation of quasi-peak.

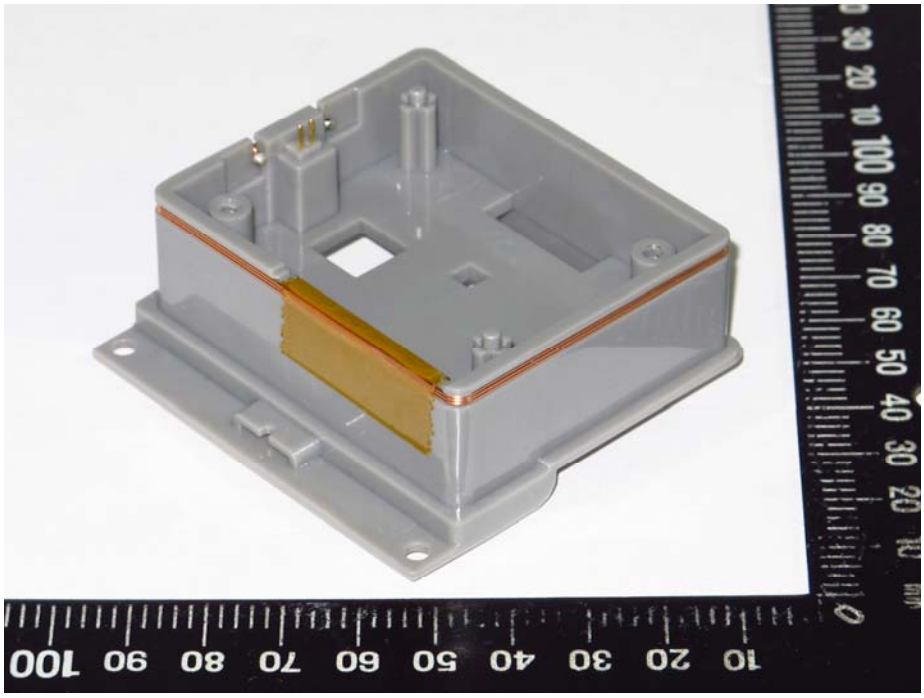
7. Antenna Requirement

7.1 Applied Standard

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 Sections 15.211, 15.213, 15.217, 15.219, or 15.221. 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 Section 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.

7.2 Antenna Type

The EUT use a permanently attached antenna



7.3 Applicable Result

Comply the requirement.