FCC Test Report

for

Contactless & Signature Pad

Brand Name	**:**	**Uniform**
Model Number	**:**	**SP195 Series**
FCC ID	**:**	**TFJSP195**
Report Number	**:**	**RF-U010-1203-050**
Date of Receipt	**:**	**February 29, 2012**
Date of Report	**:**	**March 30, 2012**

Prepared for

Uniform Industrial Corp.

47436 Fremont Blvd., Fremont, CA 94538-6512, USA

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	**:**	Contactless & Signature Pad
Model No.	**:**	SP195 Series
FCC ID	**:**	TFJSP195
Applicant	**:**	Uniform Industrial Corp.
Address	**:**	47436 Fremont Blvd., Fremont, CA 94538-6512, USA
Applicable Standards	**:**	**FCC Part 15, Subpart C**
Date of Testing	**:**	February 29 ~ March 14, 2012
Deviation	**:**	N/A
Condition of Test Sample	**:**	Production Sample

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 (Cathy Chen/Technical Manager) , **DATE :** Mar. 30, 2012

APPROVED BY : T. Y. Shih (Tsun-Yu Shih/General Manager) , **DATE :** Mar. 30, 2012

Contents

1. General Description

1.1 General Description of EUT

Equipment Under Test	:	Contactless & Signature Pad
Model No.	:	SP195 Series
Power in	:	Supplied by the power adaptor
Power Adapter Specification	:	(1)Trade Name: Uniform Industrial Corp. Model No.: M6-7US05R-A Input : 100-240Vac~50-60Hz, 0.3A Output : 5Vdc, 1.44A (2)Trade Name: Powertron Electronics Corp. Model No.: PA1008-1DU Input : 100-240Vac~50-60Hz, 0.3A Output : 5Vdc, 1.0A.
Test Voltage	:	110Vac/60Hz to the adaptor
Manufacturer	:	Uniform Industrial Corp
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.

1.2 Test Mode

Pre-Scan Mode

Test Mode	Connect Port Type	Power Adaptor
Mode 1	RS-232	M6-7US05R-A
Mode 2	RS-232	PA1008-1DU
Mode 3	USB	M6-7US05R-A

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

1.3 Test Methodology

For this E.U.T., the radiated emissions and conducted emission measurement performed according to the procedures illustrated in ANSI C63.4:2003 and other required were illustrated in separate sections of this test report for detail.

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) 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			

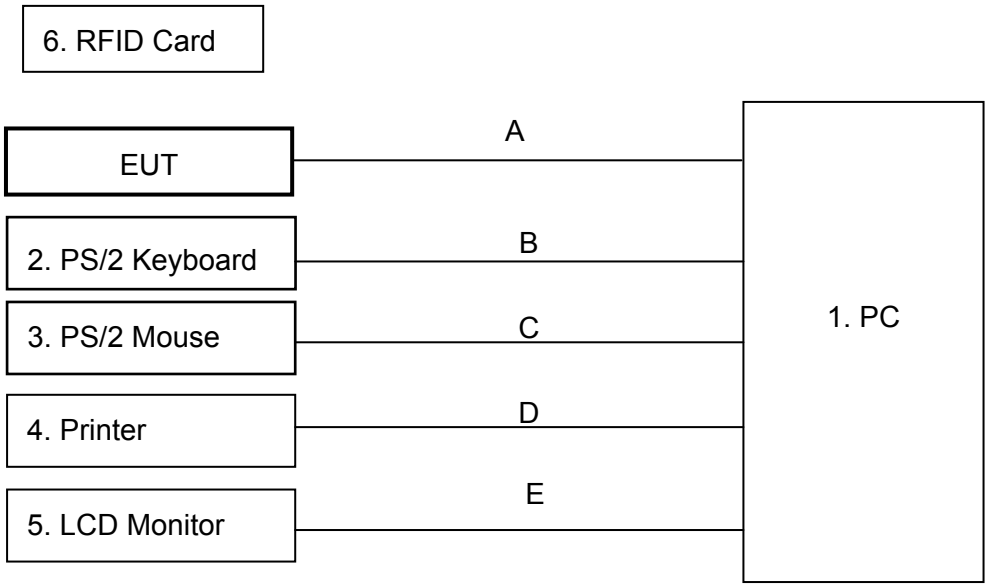
[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2] Above 38.6

1.5 The Support Units

No.	Unit	Model No./ Serial No.	FCC ID	Trade Name	Power Cord	Supported by lab.
1	PC	Precision 490/2435M1S	DoC	DELL	1.8m	✓
2	PS/2 Mouse	MO71KC/ 515044941	N/A	DELL	1.8m	✓
3	PS/2 Keyboard	SK-8110/MY-05N456-7 1619-53A-0206	N/A	DELL	2.1m	✓
4	Printer	LQ-300+/ DCGY083745	N/A	EPSON	1.8m	✓
5	LCD Monitor	1703FP/CN04Y279716 1843UD057	DoC	DELL	1.8m	✓
6	RF ID Card	N/A	N/A	N/A	N/A	

1.6 Layout of the Setup



Connecting Cables

No.	Cable	Length	Shielded	Core	Shielded Backshell	Supported by lab.	Note
A	RS232 Cable	1.8m	✓				
B	PS/2 Mouse Cable	1.8m	✓			✓	
C	PS/2 Keyboard Cable	2.1m	✓			✓	
D	Printer Cable	1.8m	✓	✓		✓	
E	D-SUB Cable	1.8m	✓	✓		✓	

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: 2009.

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 C63.4:2009. For the radiated emission measurement.
TR11	3m semi-anechoic chamber (9m × 6m × 6m)	
TR300	3m fully-anechoic chamber (8m × 5m × 5m)	
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,T-1441,G-10	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: 2.8dB；Vertical: 3.5dB	
Radiated Emission: (200MHz~1GHz)	Horizontal: 3.4dB；Vertical: 2.8dB	
Conducted Emission	ESH2-Z5	3.1dB
	ENV 4200	2.7dB

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©, 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	May 25, 2011	May 25, 2012
Loop Antenna	EMCO	6502/ 20558	Aug. 11, 2011	Aug. 11, 2014
TR11 Semi – anechoic Chamber	ETS. LINDGREN	TR11/ 906-A	April 17, 2011	April 17, 2012

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 ：62%

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 spectrum through the Maximum-peak detector.

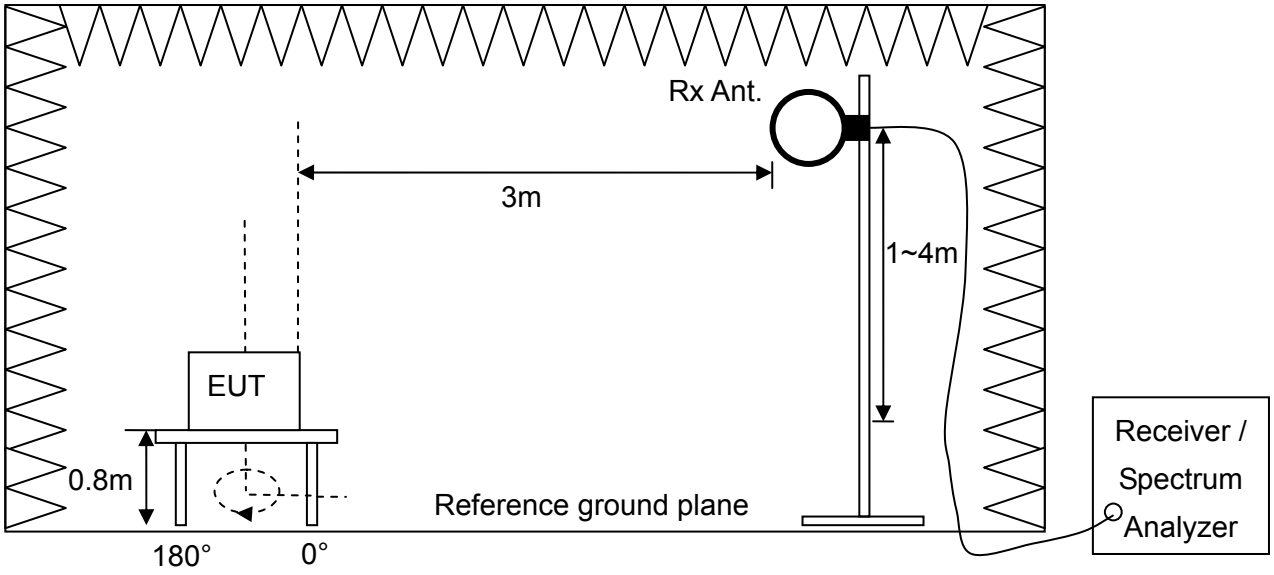
e. Rotate the EUT from 0° to 360° and position the receiving loop antenna at 1~4 meters above the reference ground plane to determine the fundamental frequency and record them.

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

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

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

2.4 Test Configuration



2.5 Test Results

Field strength of fundamental

Test Mode : Mode 1, Continuous Transmitting

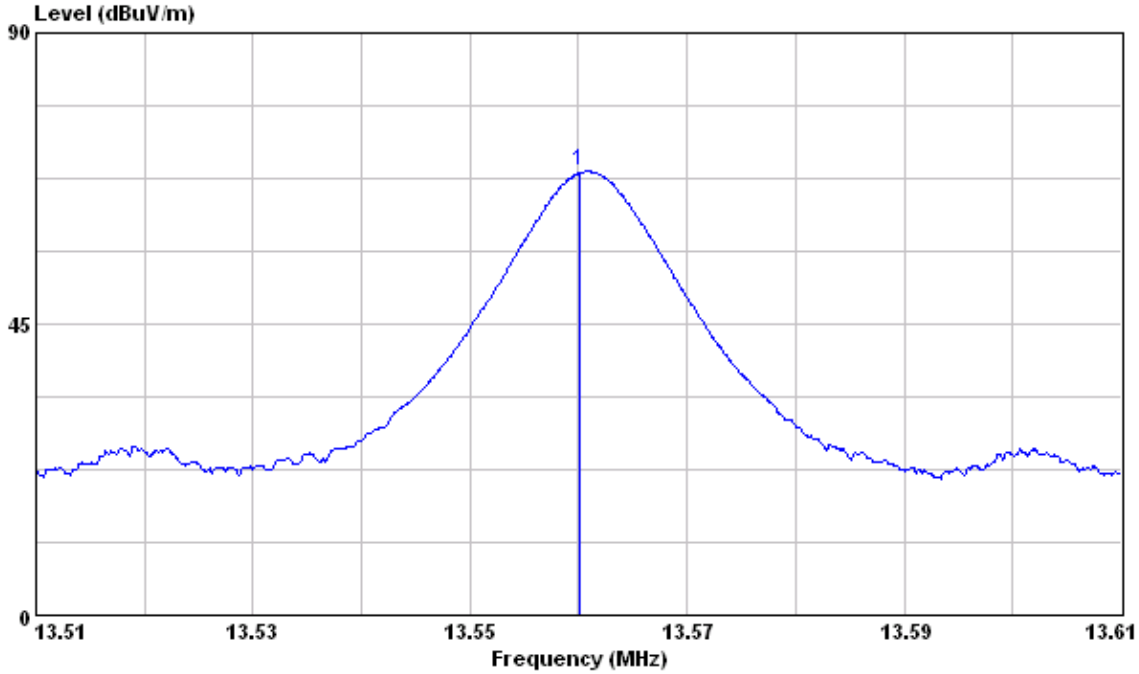
Tester : Liu

Freq. (MHz)	Polarization	Reading Data (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
13.56	H	54.28	14.26	68.54	124	55.46
13.56	V	57.45	14.26	71.71	124	52.29

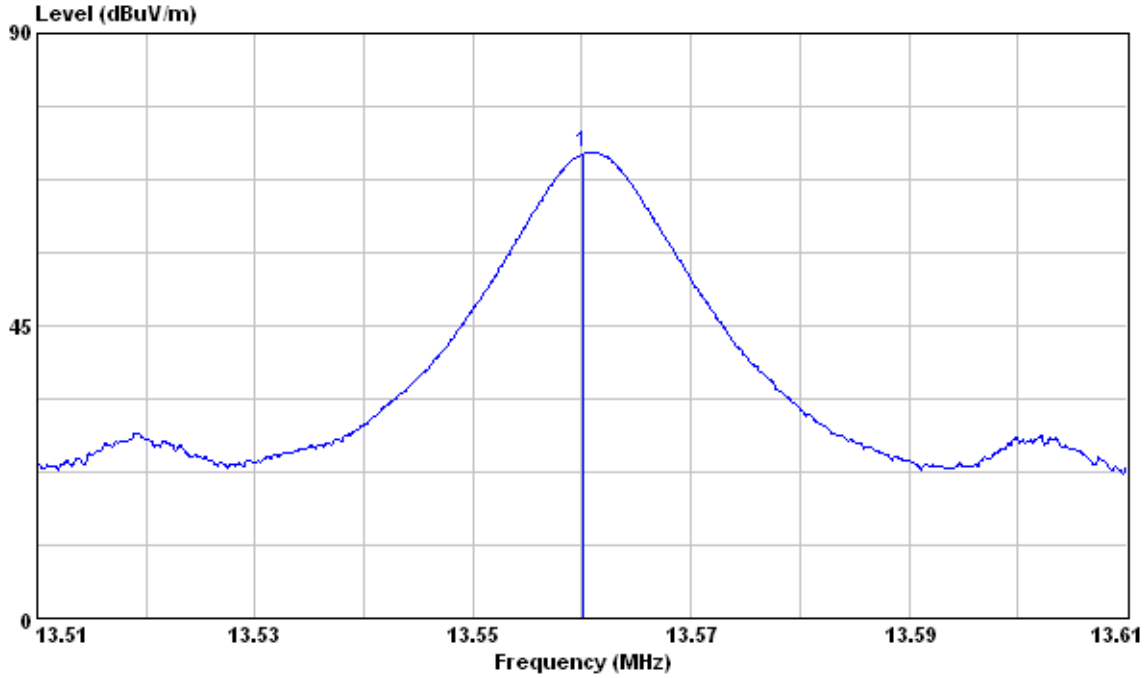
Note：

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

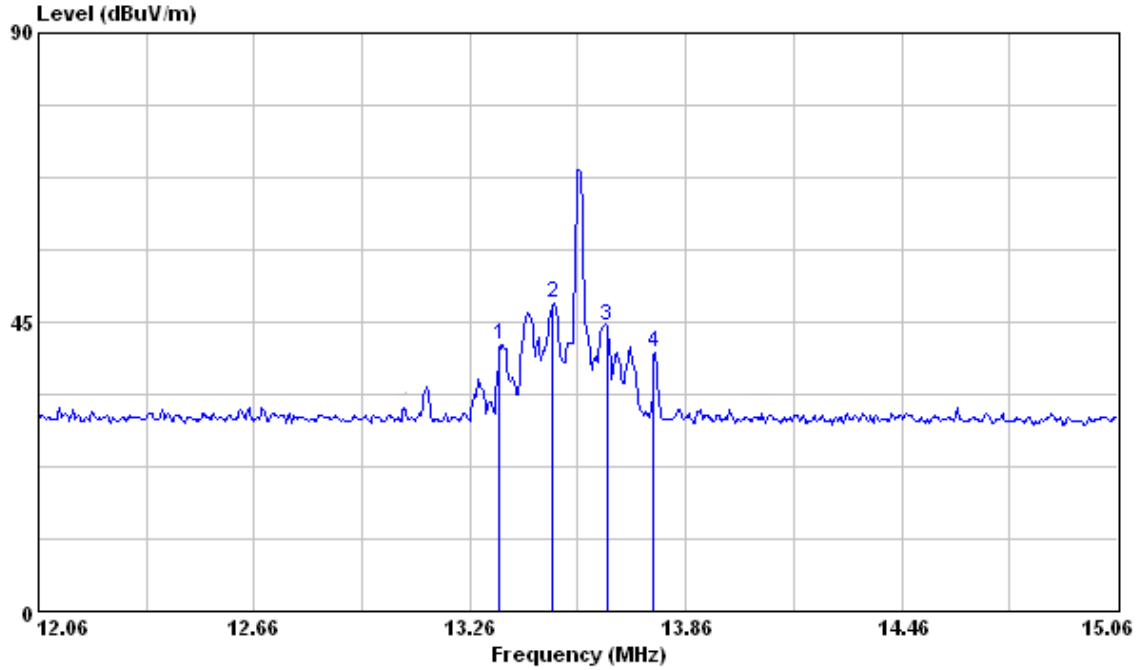
Tester : Liu

Emission Freq. (MHz)	Polarizontal	Reading Data (dBuV)	Correction Factor (dB/m)	Maximum Emission within the band (dBuV/m)	Limit (dBuV/m)	Margin (dB)
13.34	H	27.31	14.28	41.59	80.51	38.92
13.35	V	33.51	14.28	47.79	80.51	32.72
13.49	H	33.62	14.27	47.89	90.47	42.58
13.49	V	35.28	14.27	49.55	90.47	40.92
13.64	H	30.49	14.26	44.75	90.47	45.72
13.64	V	32.33	14.26	46.59	90.47	43.88
13.77	H	26.14	14.25	40.39	80.51	40.12
13.78	V	26.56	14.25	40.81	80.51	39.70

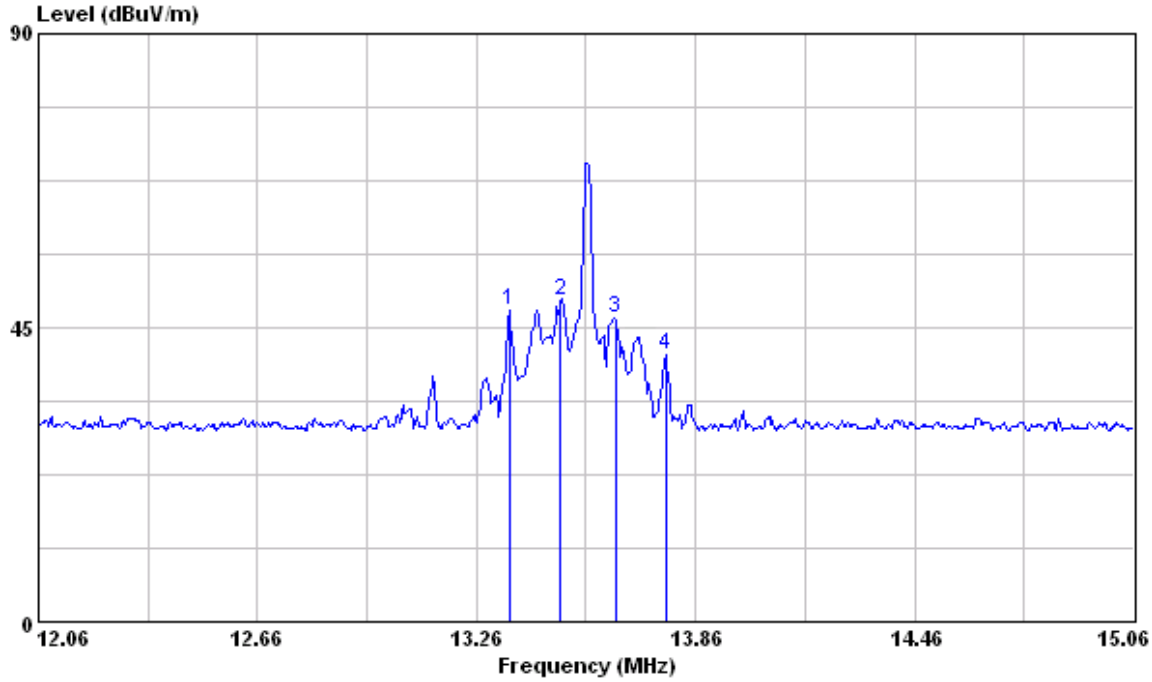
Note：

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	May 25, 2011	May 25, 2012
Spectrum Analyzer	Agilent	E4407B/ MY45106795	May 2, 2011	May 2, 2012
Loop Antenna	EMCO	6502/ 20558	Aug. 11, 2011	Aug. 11, 2014
Bi-Log Antenna	EMCO	3142C/ 52088	May 19, 2011	May 19, 2012
Pre-Amplifier	Mini-circuit	ZKL-2/ 004	Feb. 6, 2012	Aug. 6, 2012
RF Cable	N/A	N/A/ C0080	Feb. 6, 2012	Aug. 6, 2012
TR11 Semi - anechoic Chamber	ETS. LINDGREN	TR11/ 906-A	April 17, 2011	April 17, 2012

Note:

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

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 ：62%

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 was set 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.

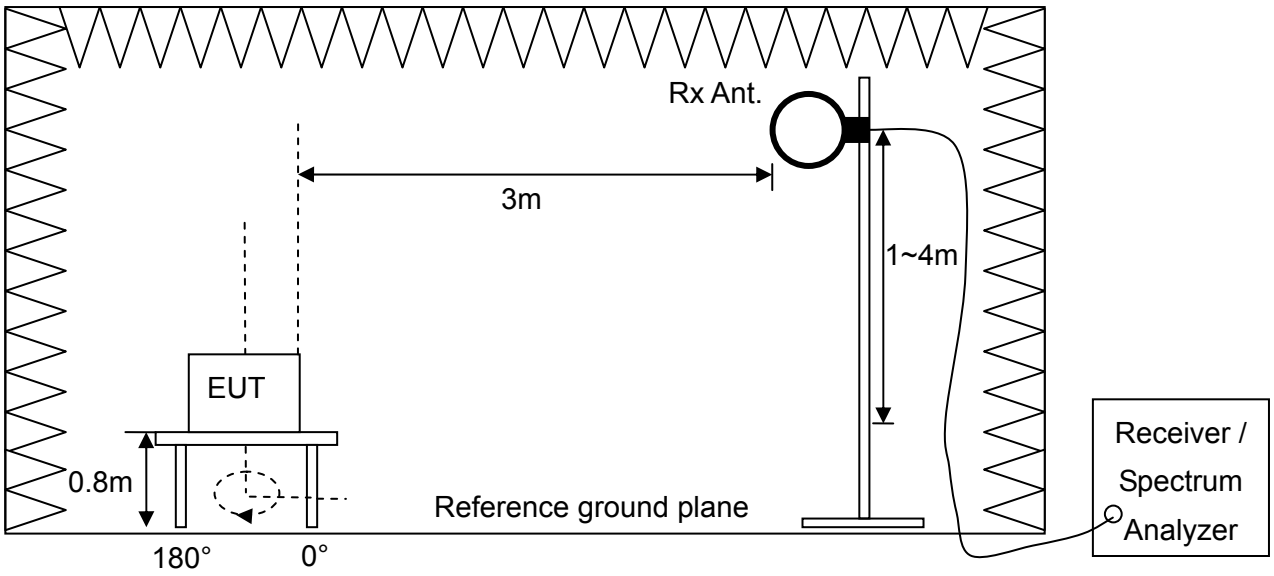
l. Record frequency, azimuth angle of the turntable, height, and polarization of the receiving antenna and compare the maximum level with the required limit.

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

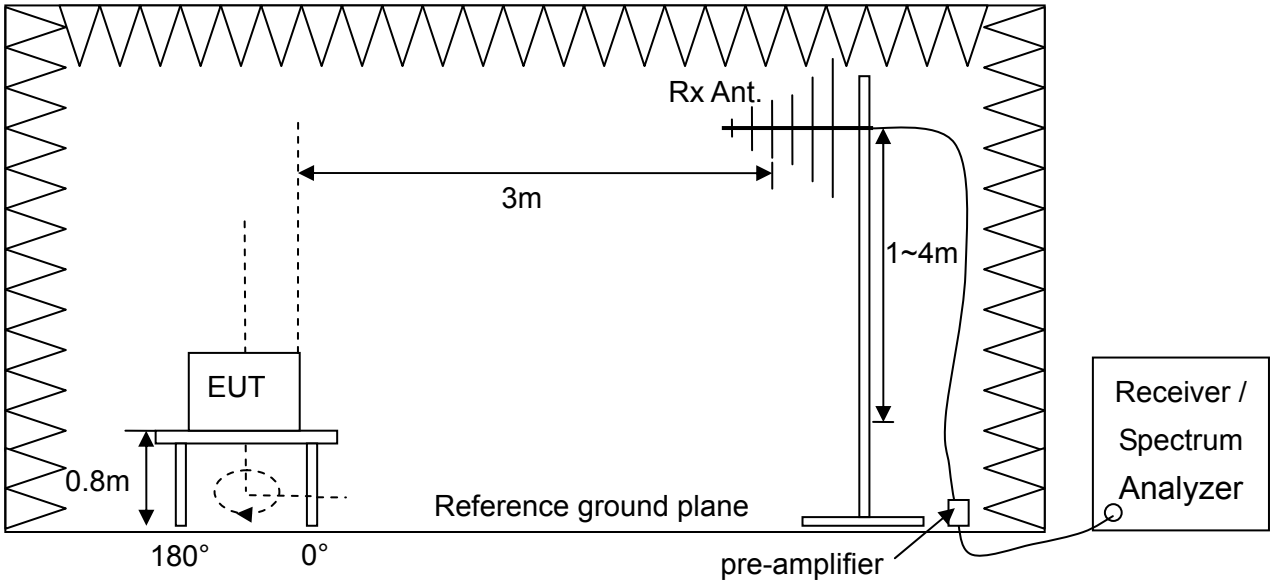
n. If the peak emission level measured from step e. is 4dB lower than the limit specified, then the emission values presented will be the peak value only. Otherwise, accurate Q.P. value will be measured and presented.

3.4 Test Configuration

Radiated Emission Measurement below 30MHz



Radiated Emission Measurement above 30MHz



3.5 Test Results

Test Mode : Mode 1, Continuous Transmitting

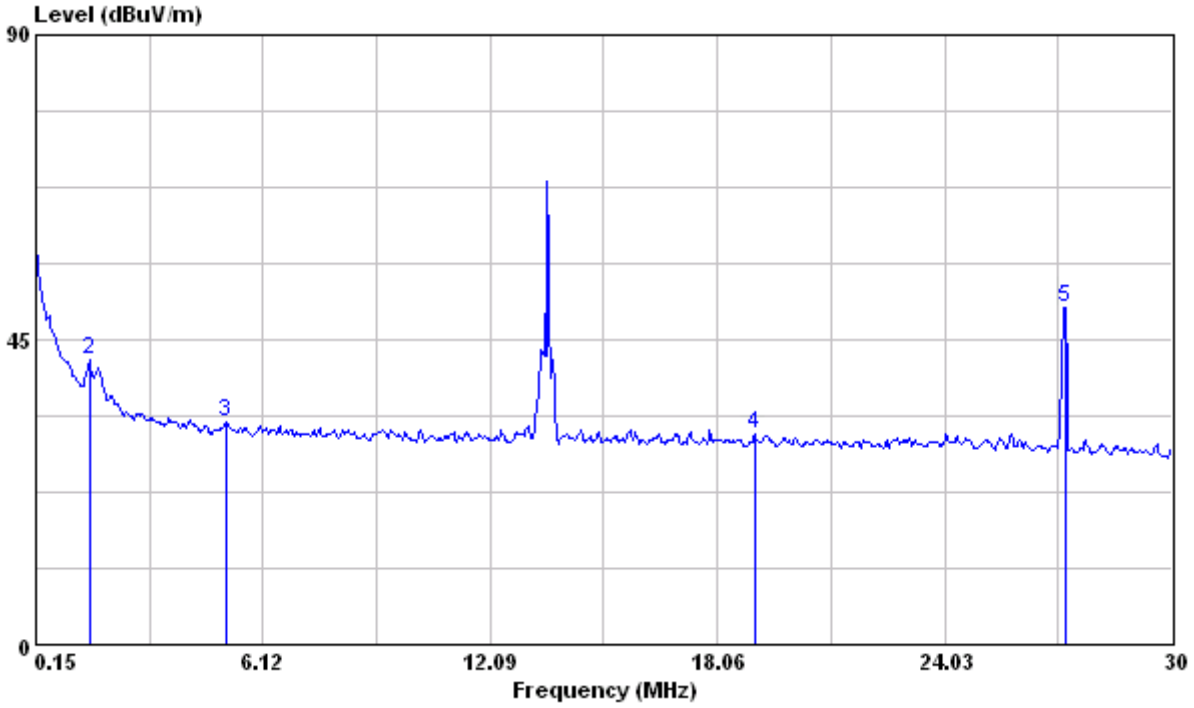
Tester : Liu **Frequency Range** : 9kHz~30MHz

Polarization : **Horizontal**

	Freq. (MHz)	Reading Data (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	0.15	42.88	15.80	58.68	104.08	45.40
2	1.55	26.78	15.22	42.00	69.54	27.54
3	5.13	18.55	14.38	32.93	69.54	36.61
4	19.05	17.16	13.91	31.07	69.54	38.47
5	27.22	37.27	12.56	49.83	69.54	19.71

Note:

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



No signal can be detected from 9kHz to 150kHz, so the graphs are omitted below 150kHz.

Test Mode : Mode 1, Continuous Transmitting

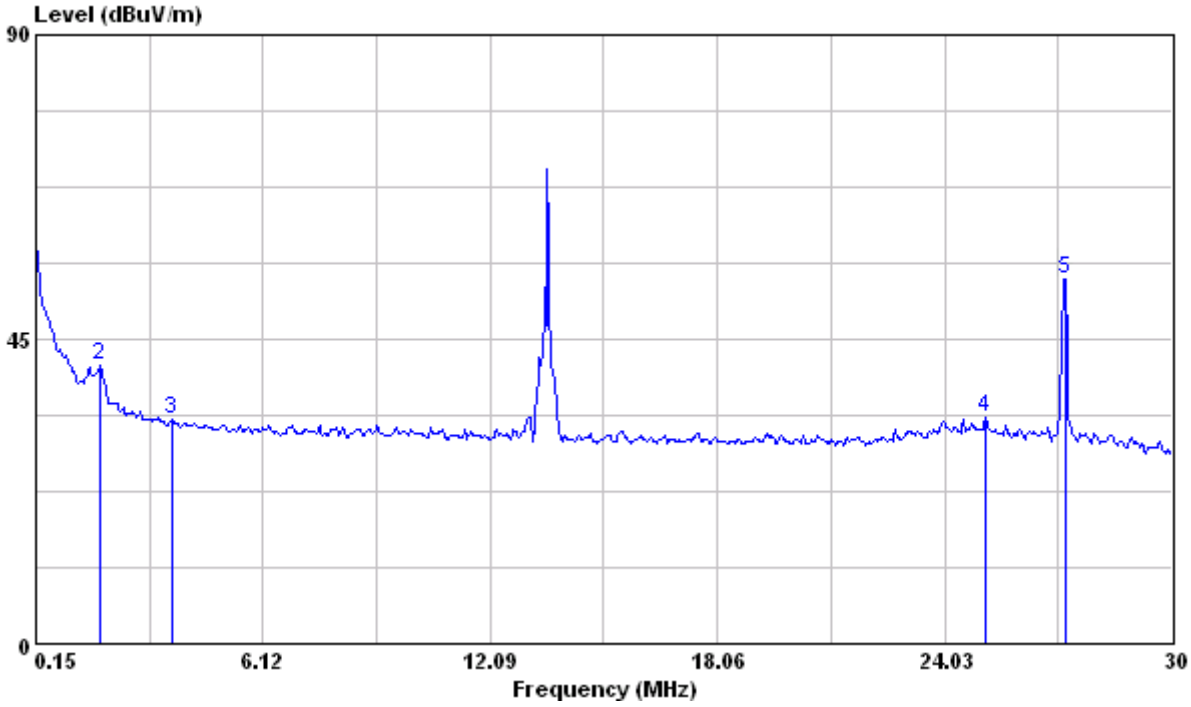
Tester : Liu **Frequency Range** : 9kHz~30MHz

Polarization : **Vertical**

	Freq. (MHz)	Reading Data (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	0.15	43.41	15.80	59.21	104.08	44.87
2	1.85	25.99	15.09	41.08	69.54	28.46
3	3.73	18.62	14.51	33.13	69.54	36.41
4	25.10	20.60	12.93	33.53	69.54	36.01
5	27.22	41.41	12.56	53.97	69.54	15.57

Note:

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

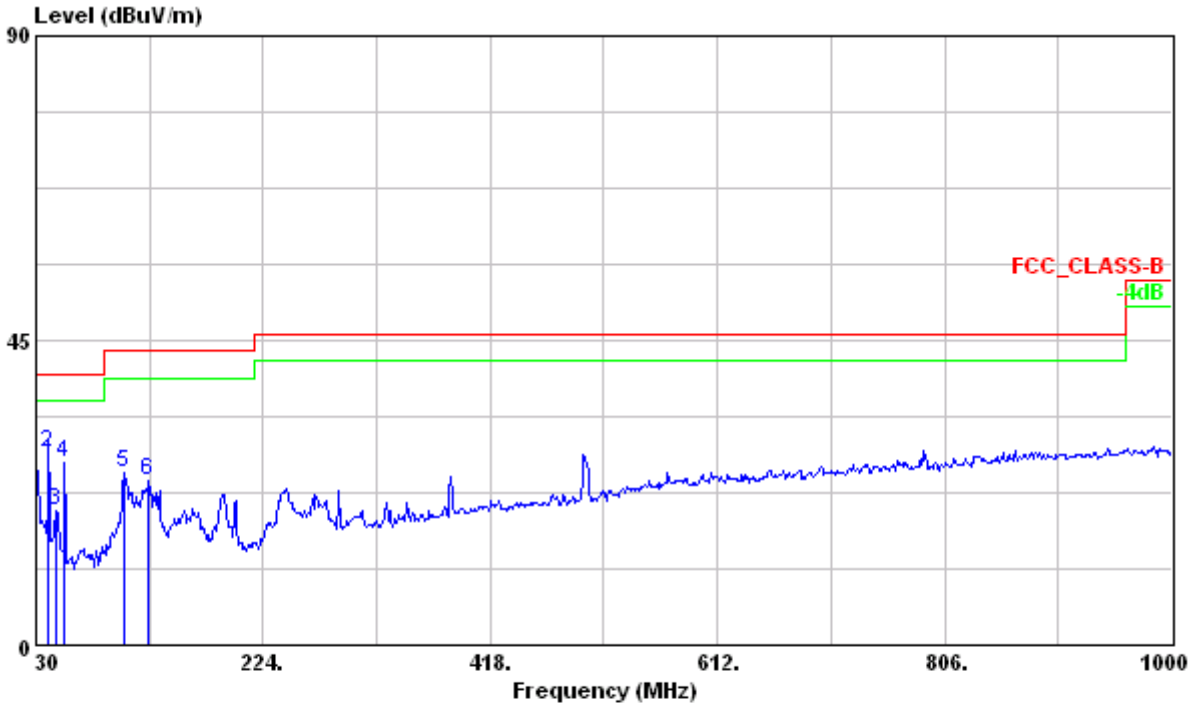


No signal can be detected from 9kHz to 150kHz, so the graphs are omitted below 150kHz.

Test Mode : Mode 1, Continuous Transmitting

Tester : Liu **Frequency Range** : 30MHz~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	30.000	26.34	34.48	-8.14	40.00	-13.66	---	---	HORIZONTAL	Peak
2	40.530	28.45	42.43	-13.98	40.00	-11.55	100	162	HORIZONTAL	QP
3	46.740	19.95	36.31	-16.36	40.00	-20.05	---	---	HORIZONTAL	Peak
4	54.030	26.99	44.98	-17.99	40.00	-13.01	---	---	HORIZONTAL	Peak
5	104.790	25.50	44.03	-18.53	43.50	-18.00	---	---	HORIZONTAL	Peak
6	125.310	24.25	43.39	-19.14	43.50	-19.25	---	---	HORIZONTAL	Peak

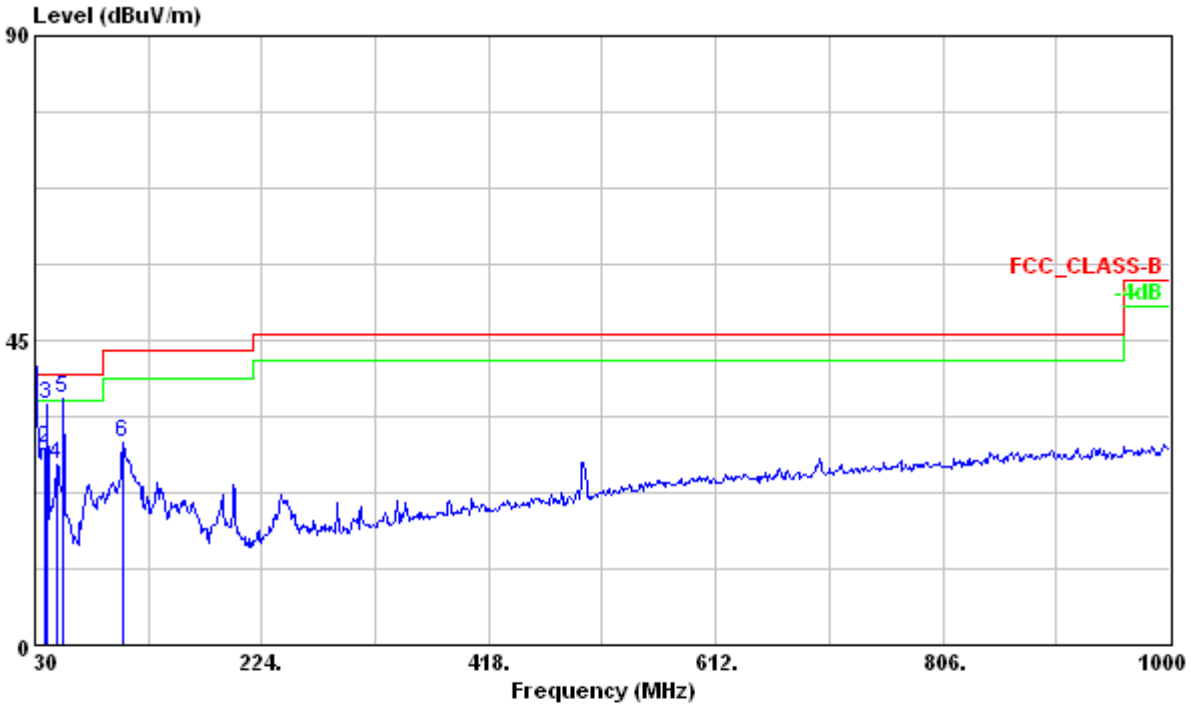
Note：

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

Test Mode : Mode 1, Continuous Transmitting

Tester : Liu **Frequency Range** : 30MHz~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 @	30.000	39.87	48.01	-8.14	40.00	-0.13	100	106	VERTICAL	QP
2	37.830	28.96	41.60	-12.64	40.00	-11.04	---	---	VERTICAL	Peak
3	40.530	35.56	49.54	-13.98	40.00	-4.44	---	---	VERTICAL	Peak
4	49.440	26.65	43.85	-17.20	40.00	-13.35	---	---	VERTICAL	Peak
5 !	54.030	36.52	54.51	-17.99	40.00	-3.48	---	---	VERTICAL	Peak
6	105.600	29.97	48.53	-18.56	43.50	-13.53	---	---	VERTICAL	Peak

Note：

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

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 29, 2011	March 29, 2012
Temperature Chamber	Terchy	MHG-800LF/ 920224	Aug. 8, 2011	Aug. 8, 2012
Adjustable AC Power Supply	EXTECH	6110/1102108	NCR	NCR
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	300Hz	Peak	Maxhold	

Climatic Condition

Ambient Temperature：24°C; Relative Humidity ：55%

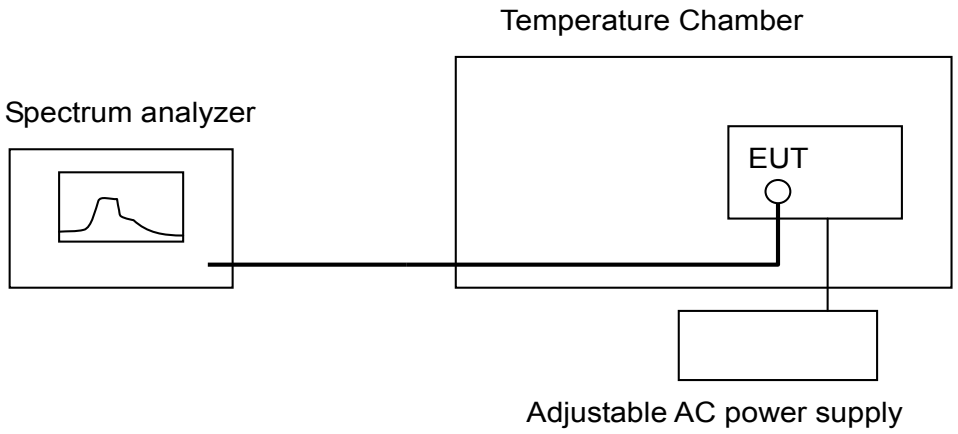
4.3 Measurement Procedure

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

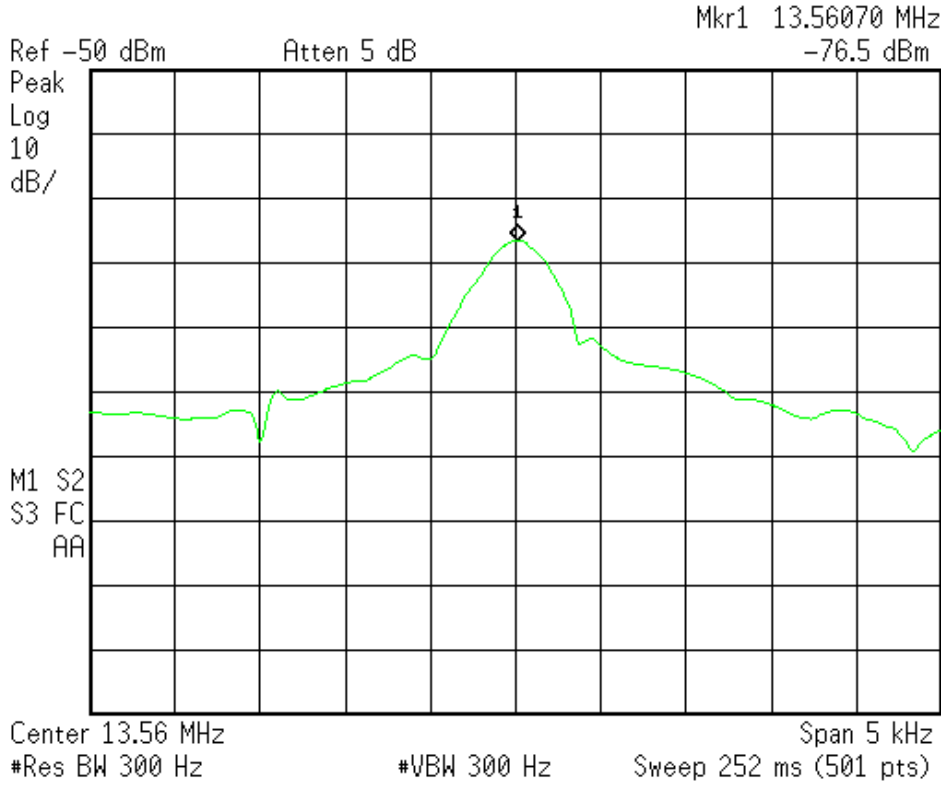
Tester : Liu

Temperature (ºC)	AC Voltage (Volt)	Meas. Frequency (MHz)	Deviation (kHz)	Limit (kHz)	Margin (kHz)
20ºC	120	13.56070	NA	1.356	NA
	138	13.56070	0.00	1.356	1.356
	102	13.56070	0.00	1.356	1.356
-20ºC	120	13.56070	0.00	1.356	1.356
50ºC	120	13.56072	0.02	1.356	1.336

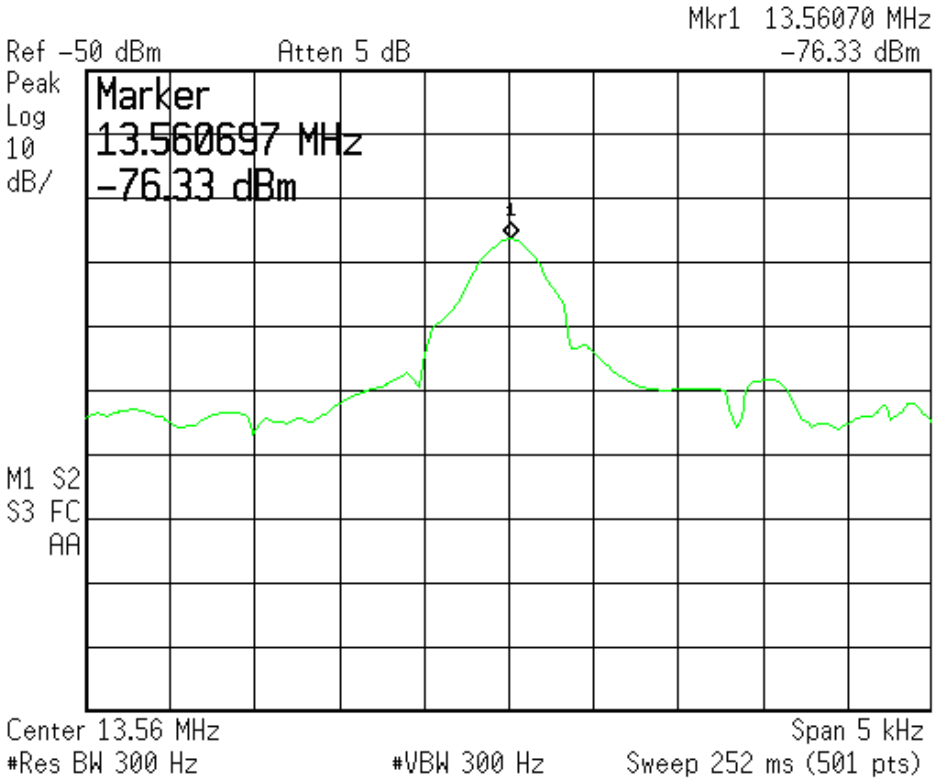
Note:

1. Deviation(kHz) = ｜Meas. Frequency – Meas. Frequency @20ºC/120Vac｜
2. Margin (kHz)= Limit – Deviation

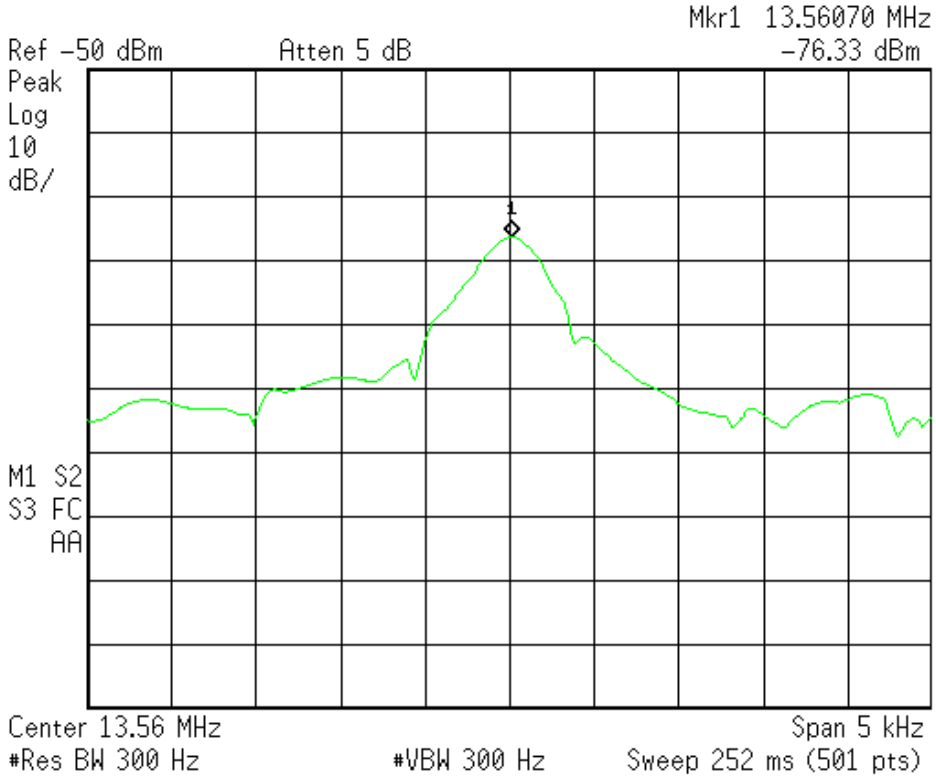
20ºC, 120Vac



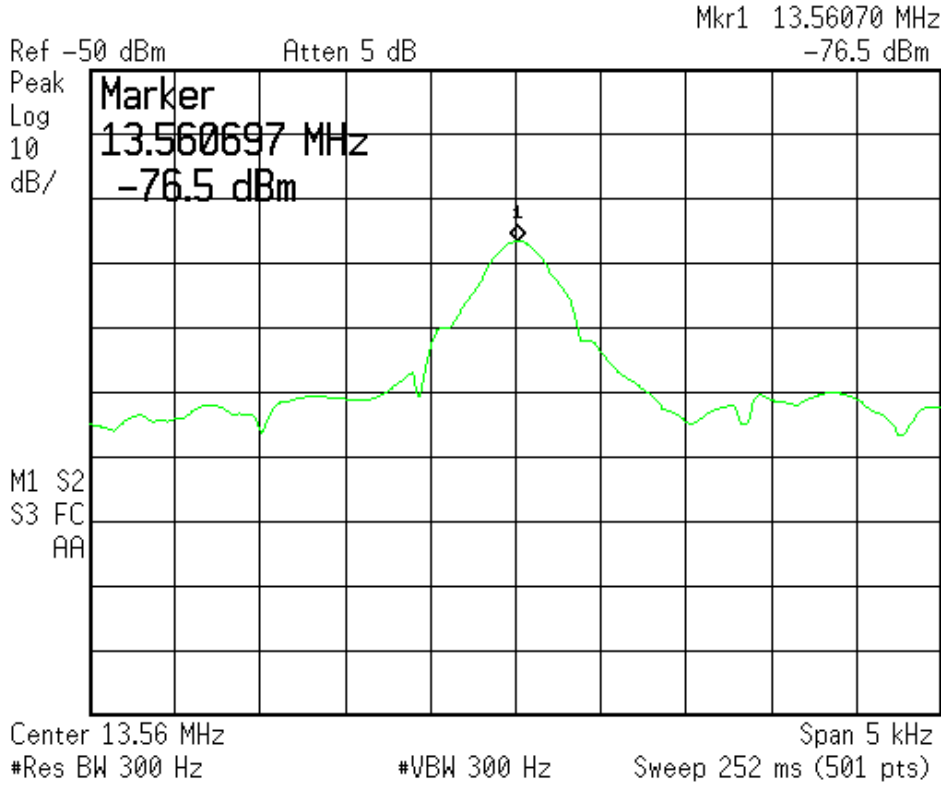
20ºC, 138Vac



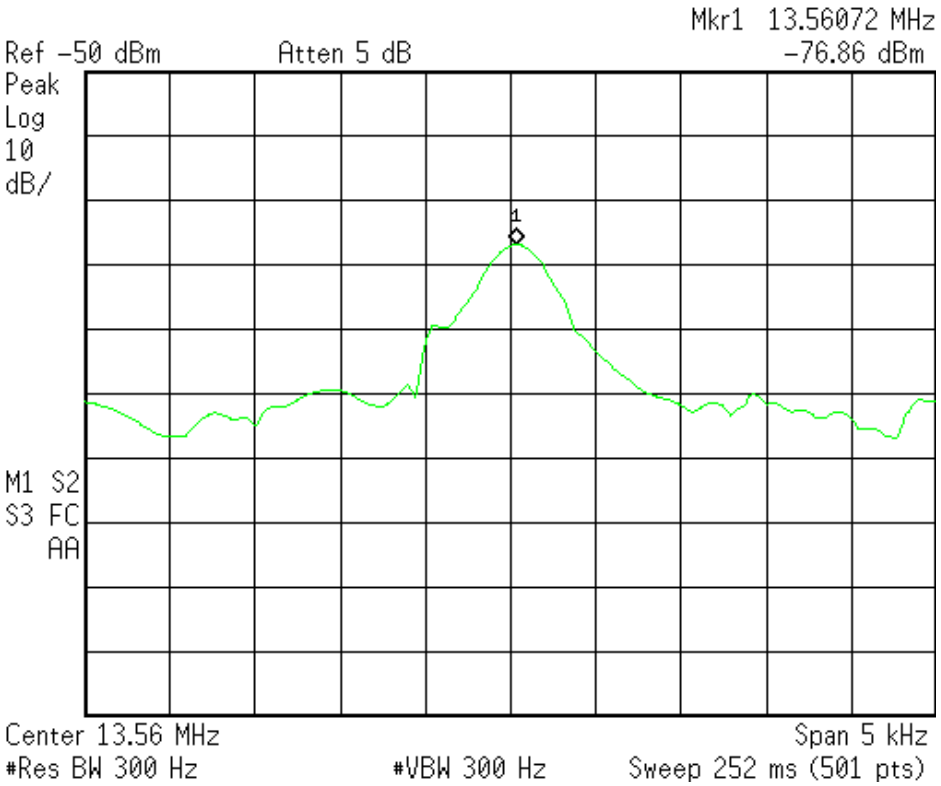
20ºC, 102Vac



-20ºC, 120Vac



50ºC, 120Vac


Mkr1 13.56072 MHz
Ref -50 dBm
Atten 5 dB
-76.86 dBm
Peak
Log
10
dB/
1
M1 S2
S3 FC
AA
Center 13.56 MHz
Span 5 kHz
#Res BW 300 Hz
#VBW 300 Hz
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 29, 2011	March 29, 2012
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	Sample	Maxhold	

Climatic Condition

Ambient Temperature：24°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.

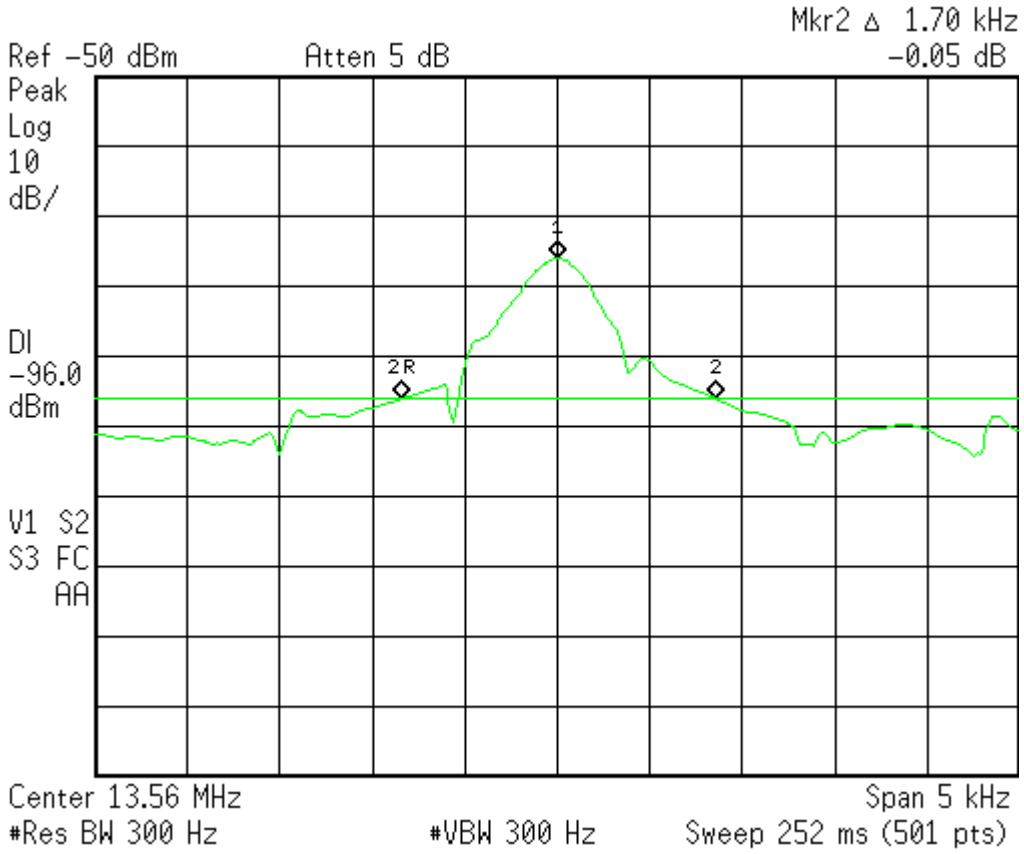
5.4 Test Configuration

5.5 Test Results

Test Mode : Mode 1, Continuous Transmitting

Tester : Bill

Operating Frequency (MHz)	The lowest frequency (MHz)	The highest frequency (MHz)	Limit (MHz)
13.56	13.5590	13.5610	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. 11, 2012	Jan. 11, 2013
LISN	R&S	ESH2-Z5/ 836613/001	June 2, 2011	June 2, 2012
2nd LISN	R&S	ENV4200/ 833209/010	Jan. 14, 2012	Jan. 14, 2013
50Ω terminator	N/A	N/A/ 001	Aug. 20, 2011	Aug. 20, 2012
RF Switch	N/A	RSU28/ 338965/002	Feb. 20, 2012	Aug. 20, 2012
RF Cable	N/A	N/A/ C0052 ~ 56	Feb. 20, 2012	Aug. 20, 2012
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：22°C; Relative Humidity : 55%

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.

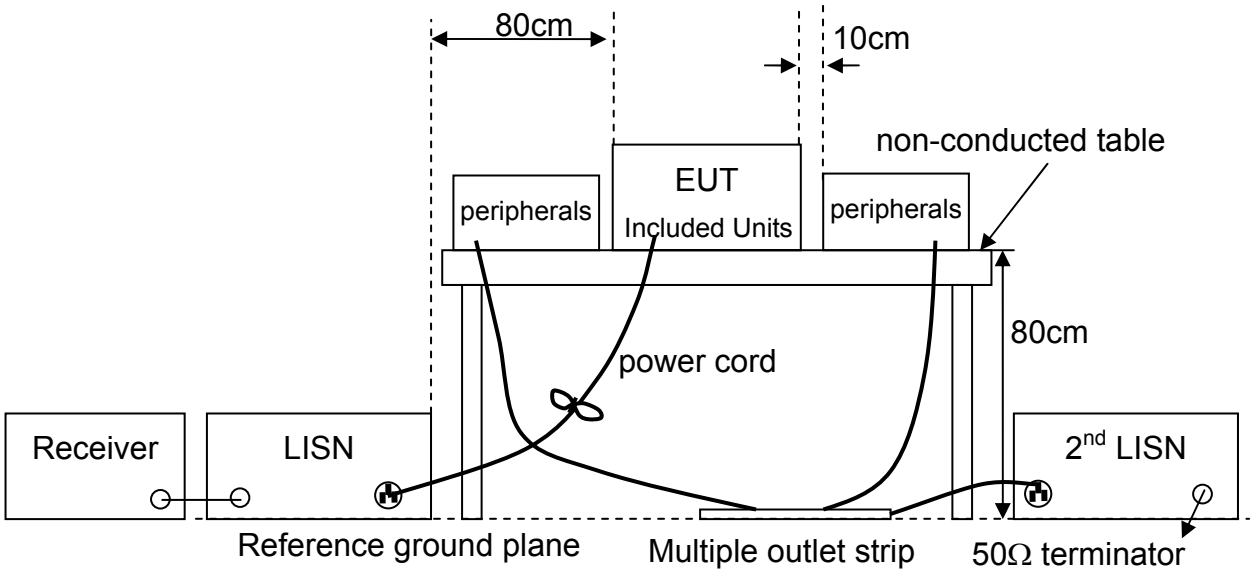
f. Measure the conducted emissions on each power line (Neutral Line and Line 1 – Hot side) of the EUT's power source by using the test receiver connected to the coupling RF output port of LISN.

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

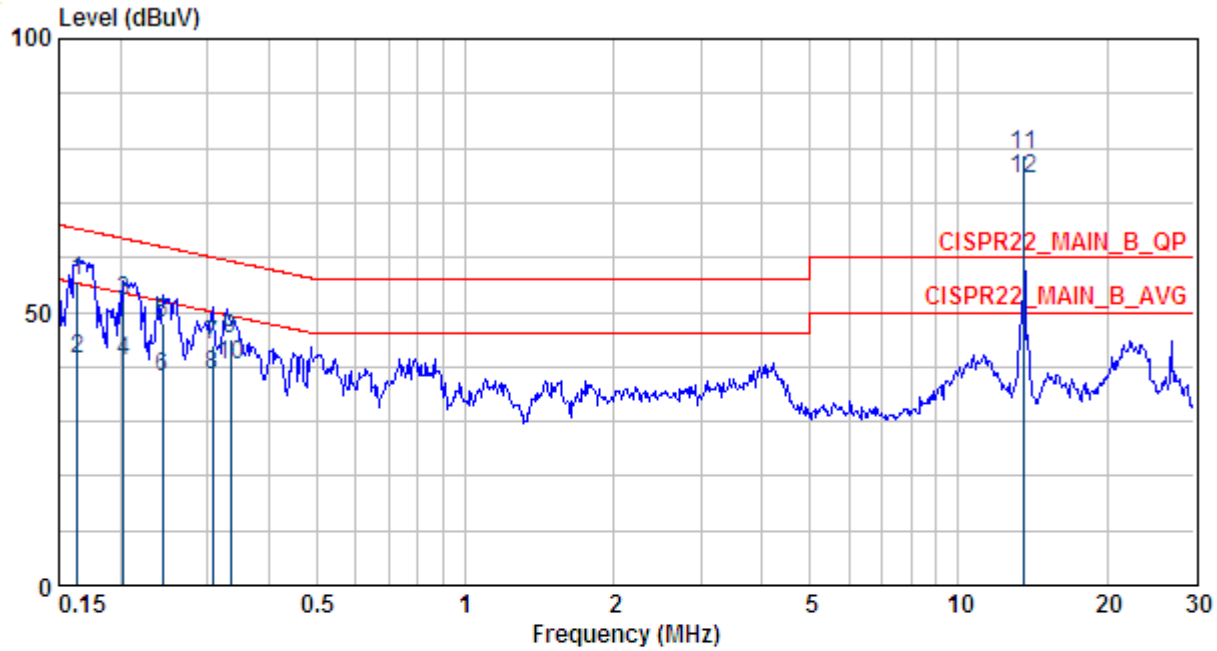


6.5 Test Results

Test Mode : Mode 1, Continuous Transmitting, with atenna

Tester : CDC **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	0.163	55.81	0.17	55.64	65.30	-9.49	LINE	QP
2	0.163	41.47	0.17	41.30	55.30	-13.83	LINE	AVERAGE
3	0.203	51.89	0.17	51.72	63.49	-11.60	LINE	QP
4	0.203	41.06	0.17	40.89	53.49	-12.43	LINE	AVERAGE
5	0.243	47.99	0.17	47.81	62.00	-14.01	LINE	QP
6	0.243	38.08	0.17	37.90	52.00	-13.92	LINE	AVERAGE
7	0.307	43.94	0.18	43.76	60.06	-16.12	LINE	QP
8	0.307	38.40	0.18	38.22	50.06	-11.66	LINE	AVERAGE
9	0.334	44.89	0.19	44.70	59.34	-14.46	LINE	QP
10	0.334	40.43	0.19	40.24	49.34	-8.92	LINE	AVERAGE
11 @	13.561	78.91	0.81	78.10	60.00	18.91	LINE	QP
12 @	13.561	74.29	0.81	73.48	50.00	24.29	LINE	AVERAGE

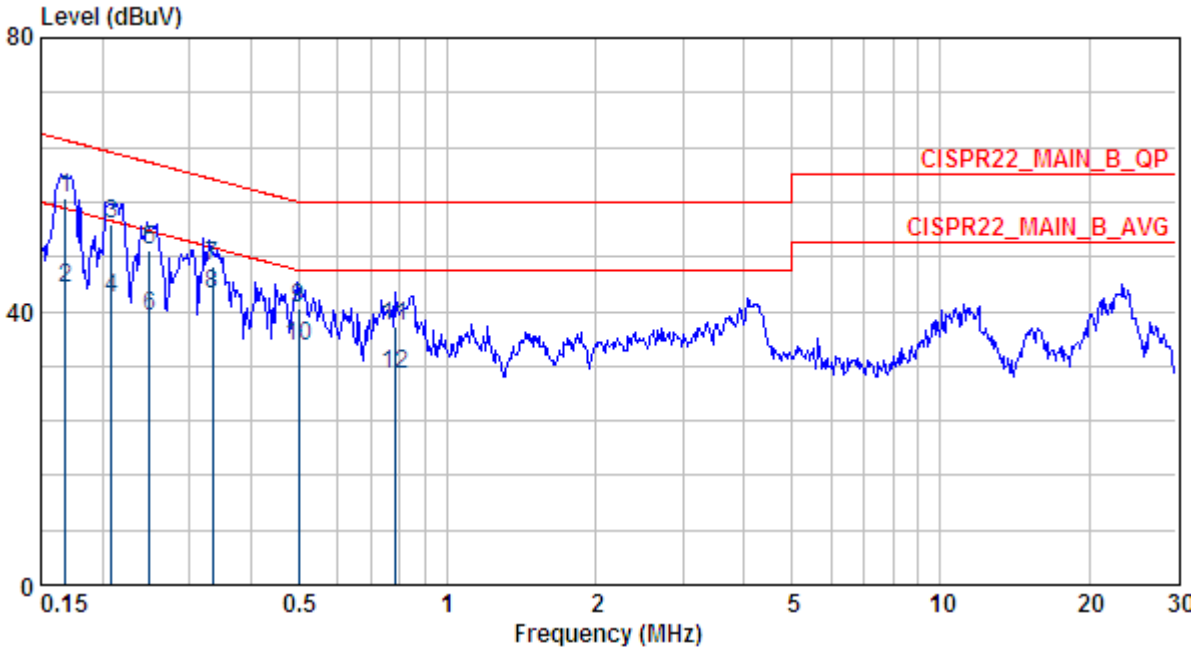
Note:

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 11, 12), for reference only. Please refer to next page.

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

Tester : CDC **Frequency Range** : 150kHz~30MHz

Phase : **Line**

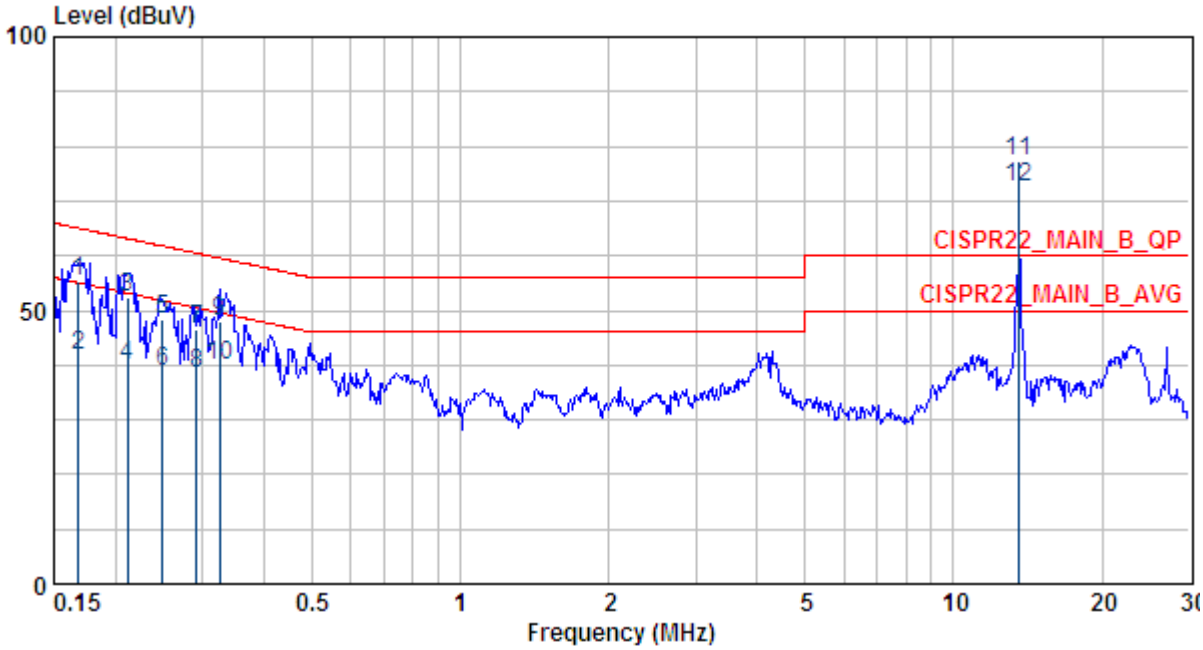


	Freq	Level	Factor	Read Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.168	56.64	0.17	56.47	65.06	-8.42	LINE	QP
2	0.168	43.47	0.17	43.30	55.06	-11.59	LINE	AVERAGE
3	0.209	52.78	0.17	52.61	63.25	-10.47	LINE	QP
4	0.209	41.89	0.17	41.72	53.25	-11.36	LINE	AVERAGE
5	0.250	48.99	0.17	48.82	61.77	-12.78	LINE	QP
6	0.250	39.37	0.17	39.20	51.77	-12.40	LINE	AVERAGE
7	0.334	46.63	0.19	46.44	59.35	-12.72	LINE	QP
8 @	0.334	42.35	0.19	42.16	49.35	-7.00	LINE	AVERAGE
9	0.499	40.51	0.21	40.30	56.01	-15.50	LINE	QP
10	0.499	34.89	0.21	34.68	46.01	-11.12	LINE	AVERAGE
11	0.788	37.67	0.23	37.44	56.00	-18.33	LINE	QP
12	0.788	30.65	0.23	30.42	46.00	-15.35	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.

Test Mode	:	Mode 1, Continuous Transmitting, with antenna			
Tester	:	CDC	**Frequency Range**	:	150kHz~30MHz
Phase	:	Neutral			



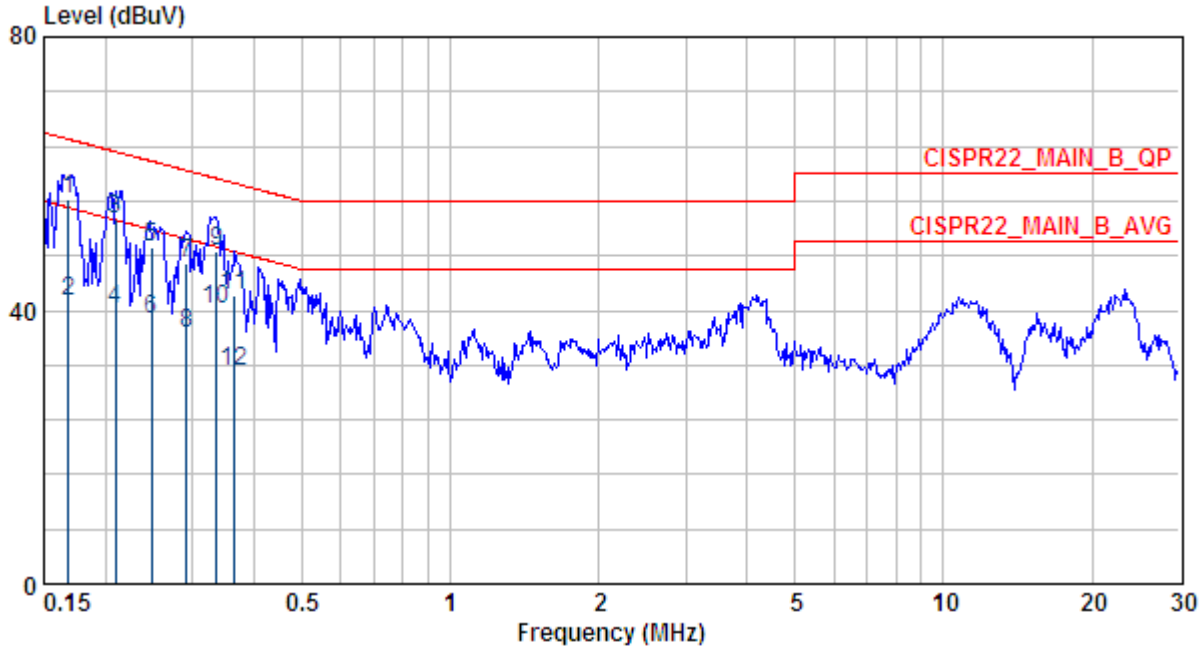
	Freq	Level	Factor	Read Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.168	55.43	0.16	55.27	65.05	-9.61	NEUTRAL	QP
2	0.168	41.83	0.16	41.67	55.05	-13.21	NEUTRAL	AVERAGE
3	0.212	52.46	0.17	52.29	63.13	-10.67	NEUTRAL	QP
4	0.212	39.82	0.17	39.65	53.13	-13.31	NEUTRAL	AVERAGE
5	0.250	48.22	0.17	48.05	61.77	-13.55	NEUTRAL	QP
6	0.250	38.87	0.17	38.70	51.77	-12.90	NEUTRAL	AVERAGE
7	0.292	46.40	0.18	46.22	60.46	-14.06	NEUTRAL	QP
8	0.292	38.49	0.18	38.31	50.46	-11.97	NEUTRAL	AVERAGE
9	0.325	47.97	0.19	47.78	59.57	-11.61	NEUTRAL	QP
10	0.325	39.88	0.19	39.69	49.57	-9.70	NEUTRAL	AVERAGE
11 @	13.561	77.37	0.65	76.72	60.00	17.37	NEUTRAL	QP
12 @	13.561	72.65	0.65	72.00	50.00	22.65	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 11, 12), for reference only. Please refer to next page.

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

Tester : CDC **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	0.168	56.14	0.16	55.98	65.04	-8.90	NEUTRAL	QP
2	0.168	41.38	0.16	41.22	55.04	-13.66	NEUTRAL	AVERAGE
3	0.209	53.35	0.17	53.18	63.23	-9.88	NEUTRAL	QP
4	0.209	40.22	0.17	40.05	53.23	-13.01	NEUTRAL	AVERAGE
5	0.248	49.13	0.17	48.96	61.84	-12.71	NEUTRAL	QP
6	0.248	38.77	0.17	38.60	51.84	-13.07	NEUTRAL	AVERAGE
7	0.292	46.91	0.18	46.73	60.46	-13.55	NEUTRAL	QP
8	0.292	36.51	0.18	36.33	50.46	-13.95	NEUTRAL	AVERAGE
9	0.336	48.56	0.19	48.37	59.31	-10.75	NEUTRAL	QP
10	0.336	40.24	0.19	40.05	49.31	-9.07	NEUTRAL	AVERAGE
11	0.365	42.25	0.19	42.06	58.61	-16.35	NEUTRAL	QP
12	0.365	31.05	0.19	30.86	48.61	-17.55	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.