

FCC TEST REPORT

Product : Lenovo USI Pen
Trade mark : Lenovo
Model/Type reference : SPEN-USI-02
Serial Number : N/A
Report Number : EED32M000792
FCC ID : 2ABWESPEN-USI-02
Date of Issue : May. 09, 2020
Test Standards : 47 CFR Part 15 Subpart C
Test result : PASS

Prepared for:

Sunwoda Electronic Co., Ltd.

**1/F, 2/F of Area A & B & D, 3-9F, Administration Building, No.2, Yihe Rd,
Shilong Community, Shiyan Street, Bao' an District, Shenzhen, China**

Prepared by:

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May. 09, 2020

Check No.: 3096343540



2 Version

Version No.	Date	Description
00	May. 09, 2020	Original

3 Test Summary

Test Item	Test Requirement	Test method	Result
Spurious Emissions	47 CFR Part 15 Subpart C Section 15.209	ANSI C63.10-2013	PASS

Remark:

The tested sample(s) and the sample information are provided by the client.

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5 General Information

5.1 Client Information

Applicant:	Sunwoda Electronic Co., Ltd.
Address of Applicant:	1/F, 2/F of Area A & B & D, 3-9F, Administration Building, No.2, Yihe Rd, Shilong Community, Shiyao Street, Bao'an District, Shenzhen, China
Manufacturer:	Sunwoda Electronic Co., Ltd.
Address of Manufacturer:	1/F, 2/F of Area A & B & D, 3-9F, Administration Building, No.2, Yihe Rd, Shilong Community, Shiyao Street, Bao'an District, Shenzhen, China
Factory:	Shenzhen Sunwoda Intelligent Hardware Co., Ltd.
Address of Factory:	101, No. 6-6, Yanshan Road, Yanchuan Community, Yanluo Street, Bao'an District, Shenzhen City, Guangdong Province, P.R. China

5.2 General Description of EUT

Product Name:	Lenovo USI Pen
Model No.(EUT):	SPEN-USI-02
Trade Mark:	Lenovo
EUT Supports Radios application:	SRD:100KHz-500KHz
Power Supply:	AAAA battery / DC 1.5V/600mAh

5.3 Product Specification subjective to this standard

Frequency Range:	100KHz-500KHz
Operation Frequency	102KHz,250KHz,500KHz
Modulation Type:	D-BPSK
Test Power Grade:	Default
Test Software of EUT:	Default
Test voltage:	DC 1.5V
Sample Received Date:	Apr. 10, 2020
Sample tested Date:	Apr. 10, 2020 to Apr. 30, 2020

5.4 Test Environment and Mode

Operating Environment:	
Temperature:	24.0 °C
Humidity:	54 % RH
Atmospheric Pressure:	1010mbar
Test mode:	
Transmitting mode:	Keep the EUT in transmitting mode with modulation.

5.5 Description of Support Units

The EUT has been tested independently

5.6 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd

Building C, Hongwei Industrial Park Block 70, Bao'an District, Shenzhen, China

Telephone: +86 (0) 755 33683668 Fax: +86 (0) 755 33683385

No tests were sub-contracted.

FCC Designation No.: CN1164

5.7 Deviation from Standards

None.

5.8 Abnormalities from Standard Conditions

None.

5.9 Other Information Requested by the Customer

None.

5.10 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.9×10^{-8}
2	RF power, conducted	0.46dB (30MHz-1GHz)
		0.55dB (1GHz-18GHz)
3	Radiated Spurious emission test	4.3dB (30MHz-1GHz)
		4.5dB (1GHz-12.75GHz)
4	Conduction emission	3.5dB (9kHz to 150kHz)
		3.1dB (150kHz to 30MHz)
5	Temperature test	0.64°C
6	Humidity test	3.8%
7	DC power voltages	0.026%

6 Equipment List

3M Semi/full-anechoic Chamber					
Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
3M Chamber & Accessory Equipment	TDK	SAC-3	---	05-24-2019	05-23-2022
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-618	07-26-2019	07-25-2020
Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-076	04-25-2018	04-24-2021
Receiver	R&S	ESC17	100938-003	10-21-2019	10-20-2020
Multi device Controller	maturo	NCD/070/107 11112	---	---	---
Temperature/ Humidity Indicator	Shanghai qixiang	HM10	1804298	07-26-2019	07-25-2020
Cable line	Fulai(7M)	SF106	5219/6A	---	---
Cable line	Fulai(6M)	SF106	5220/6A	---	---
Cable line	Fulai(3M)	SF106	5216/6A	---	---
Cable line	Fulai(3M)	SF106	5217/6A	---	---

7 Test results and Measurement Data

7.1 Radiated Spurious Emissions

Test Requirement: 47 CFR Part 15C Section 15.209

Test Method: ANSI C63.10

Test Site: Measurement Distance: 3m (Semi-Anechoic Chamber)

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Test Setup:

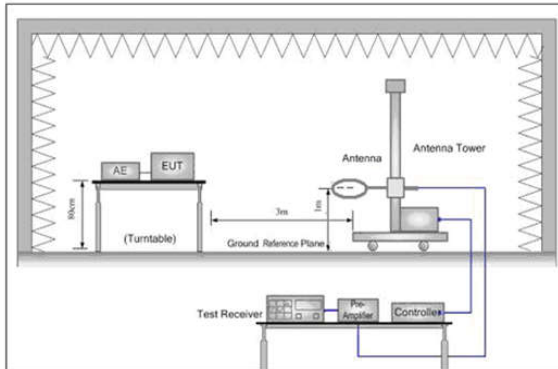


Figure 1. Below 30MHz

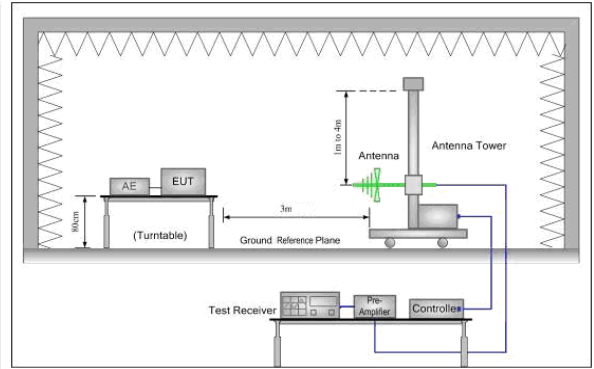


Figure 2. 30MHz to 1GHz

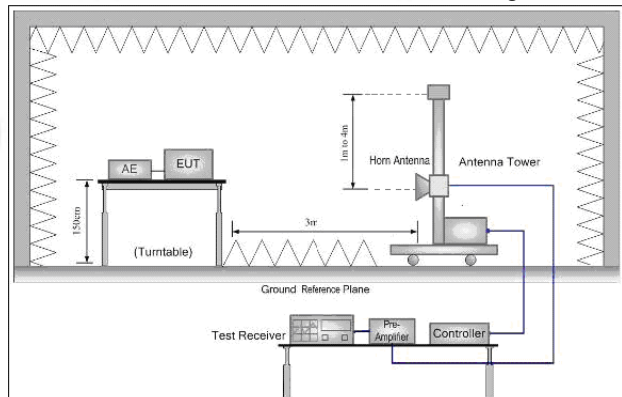


Figure 3. Above 1GHz

Test Procedure:

Below 1GHz test procedure as below:

The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rota table table was turned from 0 degrees to 360 degrees to find the maximum reading.

The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).

Test the EUT in the lowest channel ,middle channel, the Highest channel

The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.

Repeat above procedures until all frequencies measured was complete.

Limit:

(Spurious Emissions)

Frequency	Field strength (microvolt/meter)	Limit (dBµV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	54.0	Average	3

Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

Limit:

(Field strength of the fundamental signal)

Frequency	Limit (dBµV/m @3m)	Remark
102KHz	107.36	Average Value
	127.36	Peak Value
250KHz	99.61	Average Value
	119.61	Peak Value
500KHz	73.62	Average Value
	93.62	Peak Value

Test Setup:

Exploratory Test Mode:

Transmitting mode

Final Test Mode:

Transmitting mode

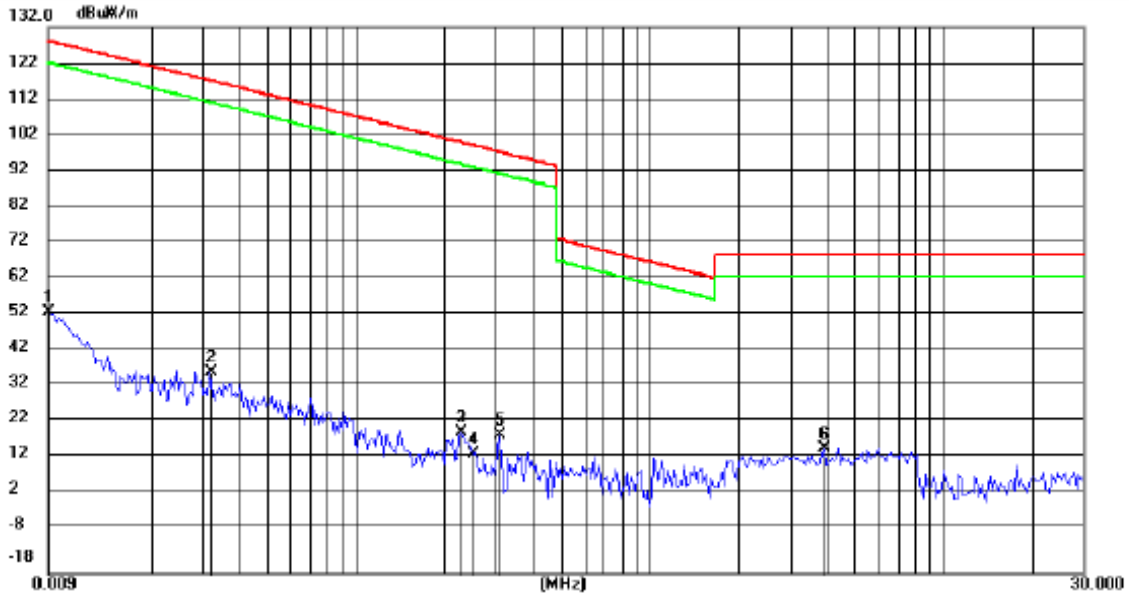
Instruments Used:

Refer to section 6 for details

Test Results:

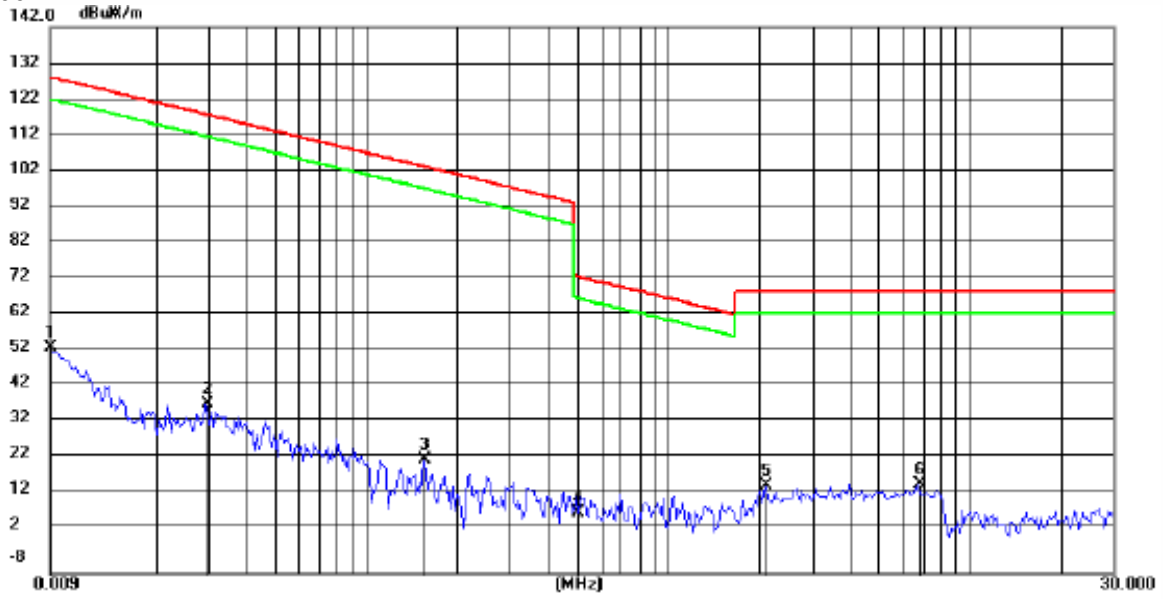
Pass

250KHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Antenna Height cm	Table Degree degree	Comment
1		0.0090	53.75	0.03	53.78	128.33	-74.55	peak			
2		0.0320	37.14	0.15	37.29	117.37	-80.08	peak			
3		0.2286	20.28	0.48	20.76	100.39	-79.63	peak			
4		0.2500	14.41	0.51	14.92	99.61	-84.69	peak			
5		0.3064	19.59	0.42	20.01	97.86	-77.85	peak			
6	*	3.9322	16.42	0.04	16.46	69.54	-53.08	QP			

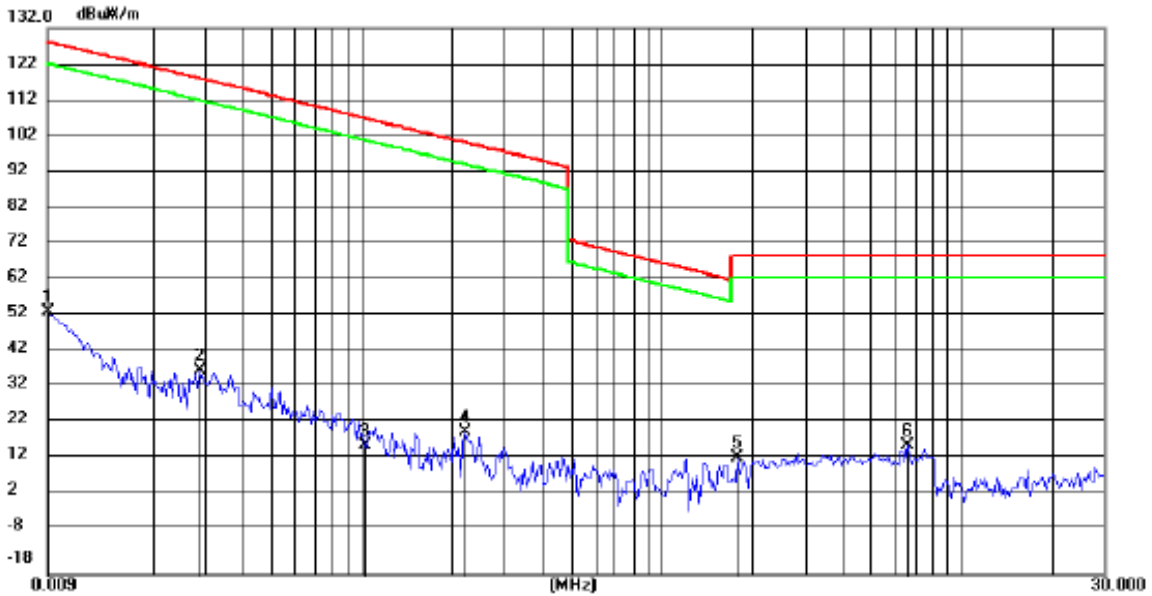
500KHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Antenna Height cm	Table Degree degree	Comment
1		0.0090	54.09	0.03	54.12	128.33	-74.21	peak			
2		0.0295	38.54	0.15	38.69	118.07	-79.38	peak			
3		0.1573	22.80	0.37	23.17	103.61	-80.44	peak			
4		0.5000	8.53	0.10	8.63	73.62	-64.99	QP			
5		2.1201	16.07	0.06	16.13	69.54	-53.41	QP			
6	*	6.7238	16.63	0.04	16.67	69.54	-52.87	QP			

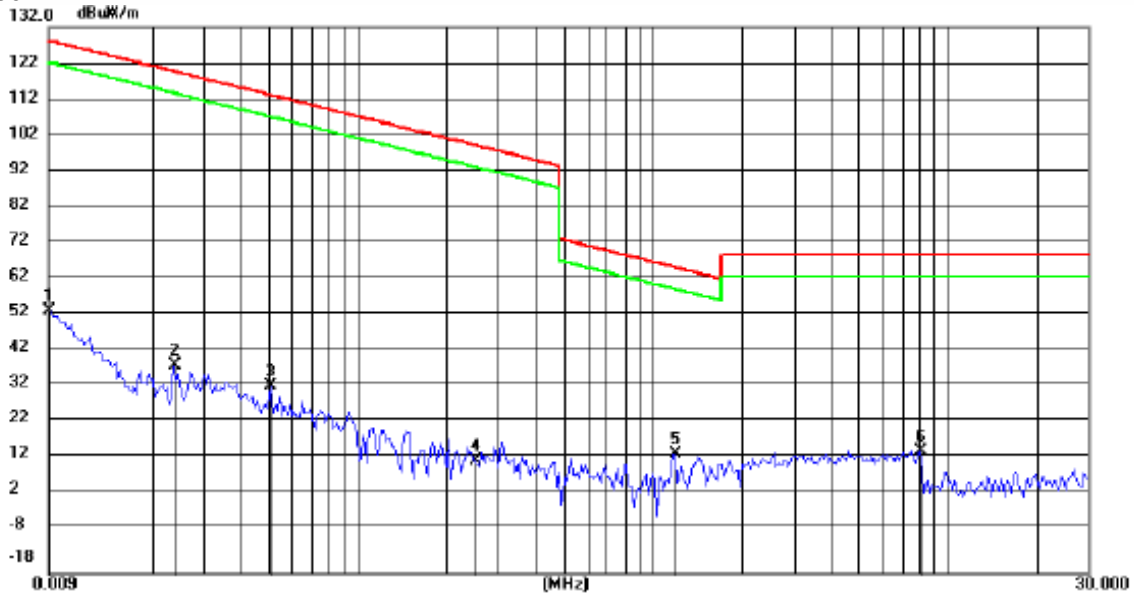
Note:
Polarization:X

102KHz



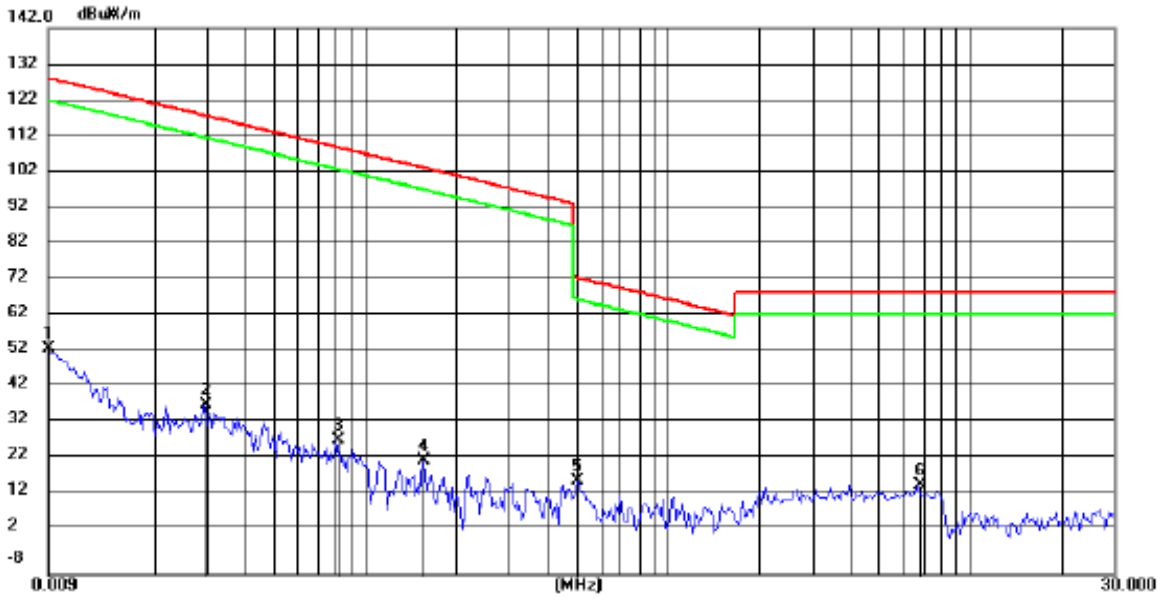
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Antenna Height cm	Table Degree degree	Comment
1		0.0090	54.01	0.03	54.04	128.33	-74.29	peak		
2		0.0290	37.93	0.15	38.08	118.22	-80.14	peak		
3		0.1020	17.11	0.28	17.39	107.36	-89.97	peak		
4		0.2213	20.81	0.47	21.28	100.67	-79.39	peak		
5		1.8020	14.00	0.07	14.07	69.54	-55.47	QP		
6	*	6.6153	17.23	0.04	17.27	69.54	-52.27	QP		

250KHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Antenna Height cm	Table Degree	Comment
1		0.0090	54.09	0.03	54.12	128.33	-74.21	peak			
2		0.0239	39.04	0.11	39.15	119.89	-80.74	peak			
3		0.0512	33.39	0.18	33.57	113.31	-79.74	peak			
4		0.2500	12.45	0.51	12.96	99.61	-86.65	peak			
5	*	1.1809	14.74	0.08	14.82	66.16	-51.34	QP			
6		8.0403	15.53	0.05	15.58	69.54	-53.96	QP			

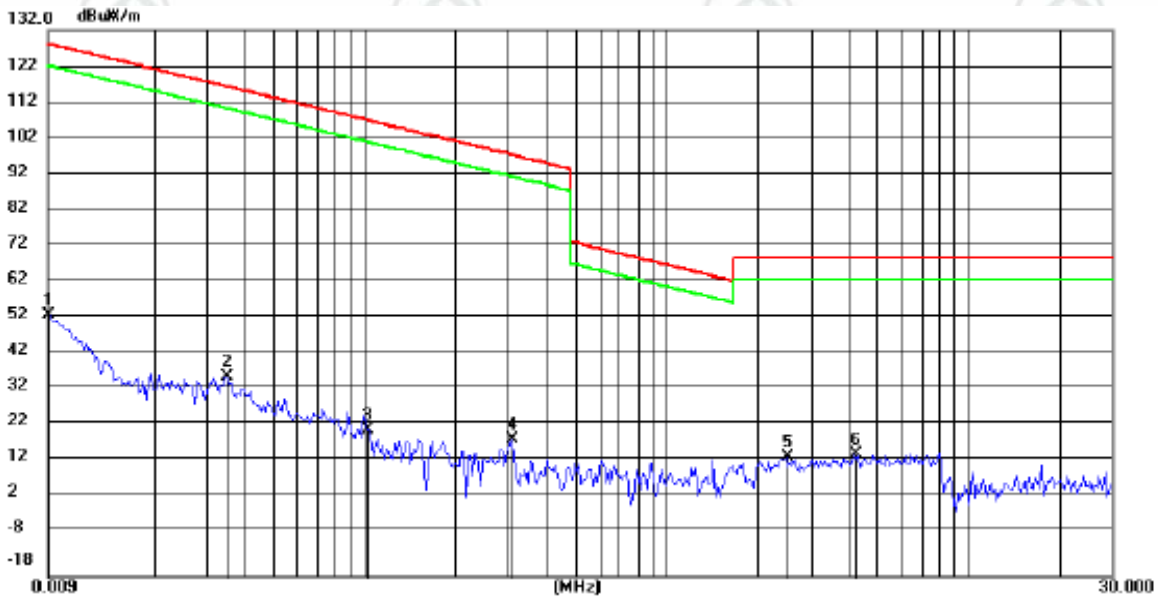
500KHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Antenna Height cm	Table Degree	Detector	Comment
1		0.0090	54.09	0.03	54.12	128.33	-74.21			peak	
2		0.0295	38.54	0.15	38.69	118.07	-79.38			peak	
3		0.0808	28.67	0.21	28.88	109.37	-80.49			peak	
4		0.1573	22.80	0.37	23.17	103.61	-80.44			peak	
5		0.5000	17.53	0.10	17.63	73.62	-55.99			QP	
6	*	6.7238	16.63	0.04	16.67	69.54	-52.87			QP	

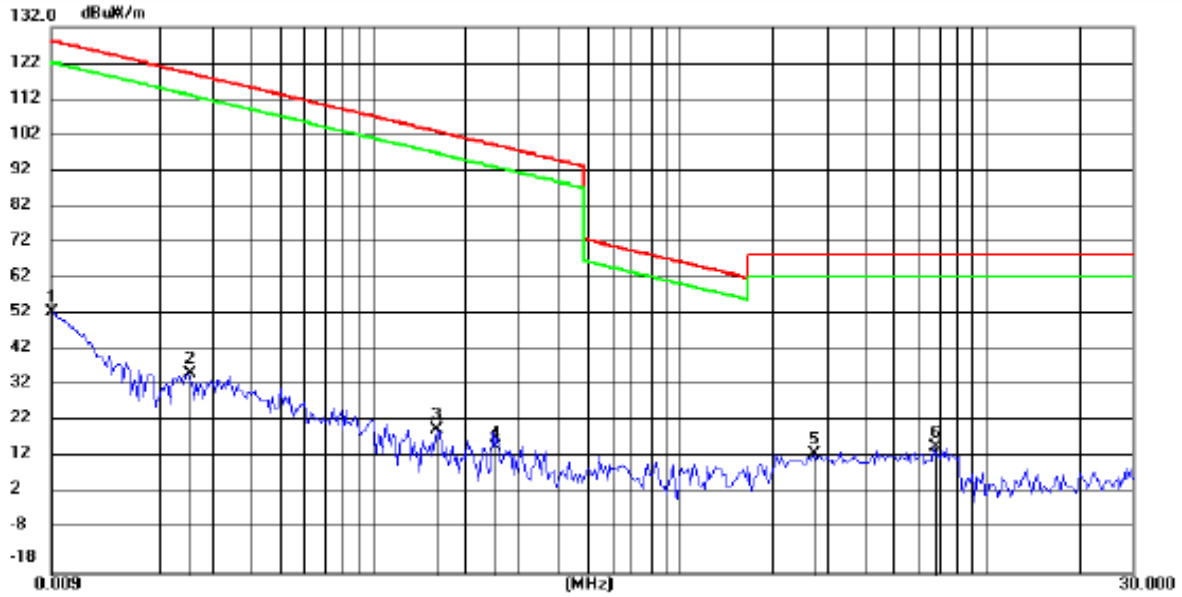
Note:
Polarization:Y

102KHz



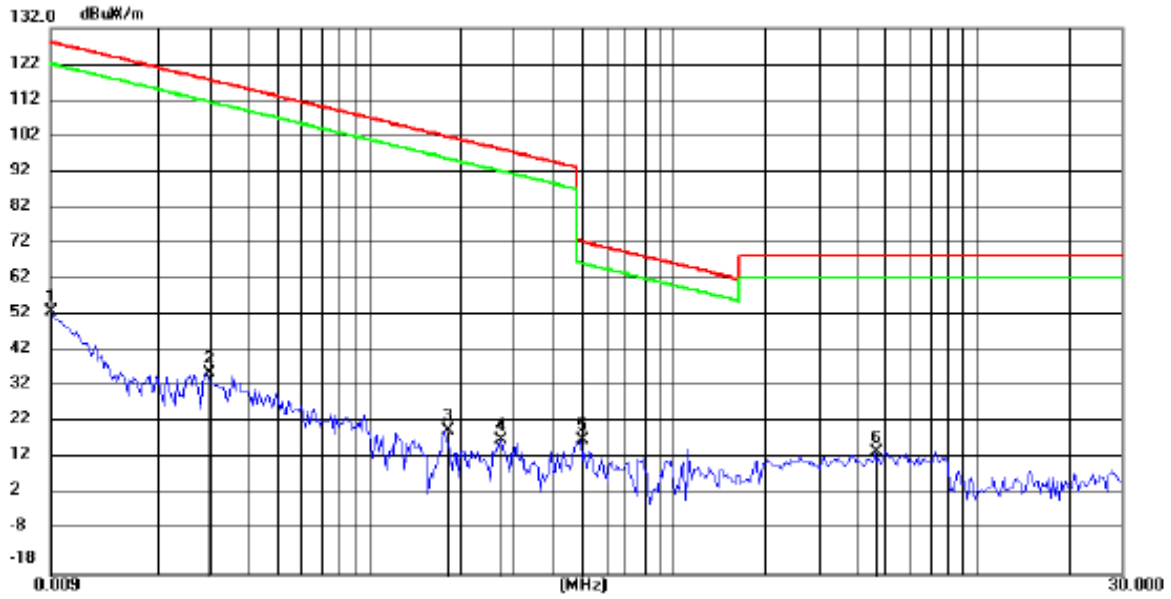
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		0.0090	53.80	0.03	53.83	128.33	-74.50			peak
2		0.0347	36.81	0.16	36.97	116.67	-79.70			peak
3		0.1020	21.93	0.28	22.21	107.36	-85.15			peak
4		0.3064	19.31	0.42	19.73	97.86	-78.13			peak
5		2.4944	14.81	0.06	14.87	69.54	-54.67			QP
6	*	4.1964	15.69	0.03	15.72	69.54	-53.82			QP

250KHz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Antenna Height cm	Table Degree	Comment
1		0.0091	53.62	0.03	53.65	128.23	-74.58	peak			
2		0.0251	36.96	0.12	37.08	119.47	-82.39	peak			
3		0.1625	21.36	0.38	21.74	103.33	-81.59	peak			
4		0.2500	16.36	0.51	16.87	99.61	-82.74	peak			
5		2.7499	14.78	0.05	14.83	69.54	-54.71	QP			
6	*	6.7238	16.57	0.04	16.61	69.54	-52.93	QP			

500KHz



No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Antenna Height cm	Table Degree	Comment
1	0.0090	54.21	0.03	54.24	128.33	-74.09	peak			
2	0.0295	37.00	0.15	37.15	118.07	-80.92	peak			
3	0.1792	21.28	0.40	21.68	102.49	-80.81	peak			
4	0.2734	18.55	0.47	19.02	98.84	-79.82	peak			
5	0.5000	18.88	0.10	18.98	73.62	-54.64	QP			
6 *	4.7021	15.64	0.02	15.66	69.54	-53.88	QP			

Note:
Polarization:Z