EMC
TEST REPORT

Report No. : EME-070093
Model No. : C120, C110, C115
Issued Date : Feb. 13, 2007

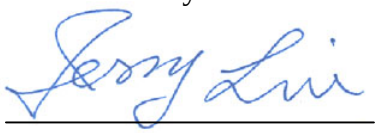
Applicant : Clarity, a division of Plantronics
4289 Bonny Oaks Drive, Suit 106, Chattanooga TN37406

Test By : Intertek Testing Services Taiwan Ltd.
No. 11, Ko-Tze-Nan Chia-Tung Li, Shiang-Shan District,
Hsinchu, Taiwan

Project Engineer

Kevin Chen

Reviewed By



Jerry Liu

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Summary of Tests

TV Listener -Model: C120
FCC ID: ACEC120A

Test	Reference	Results
Conducted Emission of AC Power	15.207	Pass
Radiated Emission test	15.223, 15.209	Pass

1. General information

1.1 Identification of the EUT

Manufacturer	: Clarity, a division of Plantronics
Product	: TV Listener
Model No.	: C120
FCC ID.	: ACEC120A
Frequency Range	: 2.3MHz & 2.8MHz
Channel Number	: 2 channels
Frequency of each channel	: 2.3MHz & 2.8MHz
Type of Modulation	: FM
Power Supply	: 100-240Vac, 50/60Hz with adapter (Model: DSA-5P-12FUS 120030)
Power Cord	: N/A
Sample Received	: Feb. 05, 2007
Test Date(s)	: Feb. 09, 2007 ~ Feb. 13, 2007

1.2 Additional information about the EUT

The EUT is a TV Listener, and was defined as information technology equipment.

Intertek verified the model listed as below is series model to C120 (EUT). The difference please refer to the following table:

Model Number	Difference
C120	Earphone with switch, 2.3MHz, 2.8MHz
C110	Earphone without switch, 2.3MHz, 2.8MHz
C115	Earphone with switch, 2.3MHz, 2.8MHz

For more detail features, please refer to User's manual as file name “Installation guide.pdf”

1.3 Peripherals equipment

Peripherals	Manufacturer	Product No.	Serial No.	FCC ID
Telephone	TENTEL	K-903S	0514000940	FCC DoC Approved
Telephone	TENTEL	K-903S	0514000477	FCC DoC Approved
iPOD	Apple	5U606C4KUPR	N/A	FCC DoC Approved
Exchange Board	Teltone	250-00193-07	94948	FCC DoC Approved

2. Test specifications

2.1 Test standard

The EUT was performed according to the procedures in FCC Part 15 Subpart C Section 15.223.

2.2 Operation mode

The EUT was operated in continuously transmitting mode.

2.3 Test equipment

Equipment	Brand	Frequency range	Model No.	Intertek ID No.	Next Cal. Date
EMI Test Receiver	Rohde & Schwarz	9kHz~2.75GHz	ESCS 30	EC303	04/27/2007
Spectrum Analyzer	Rohde & Schwarz	9kHz~30GHz	FSP 30	EC353	08/06/2007
Spectrum Analyzer	Rohde & Schwarz	20Hz~40GHz	FSEK 30	EC365	11/12/2007
Loop Antenna	RolfHeine	20Hz~30MHz	LA-285	EC357	05/29/2007
Bilog Antenna	SCHWARZBECK	25MHz~1.7GHz	VULB 9160	EC368	05/07/2009
Pre-Amplifier	MITEQ	100MHz~26.5GHz	919981	EC373	02/13/2008
Controller	HDGmbH	N/A	HD 100	EP317-1	N/A
Antenna Tower	HDGmbH	N/A	MA 240	EP317-2	N/A
Turn Table	HDGmbH	N/A	DS 420S	EP317-3	N/A
LISN	Rohde & Schwarz	9KHz~30MHz	ESH3-Z5	EC344	01/15/2008

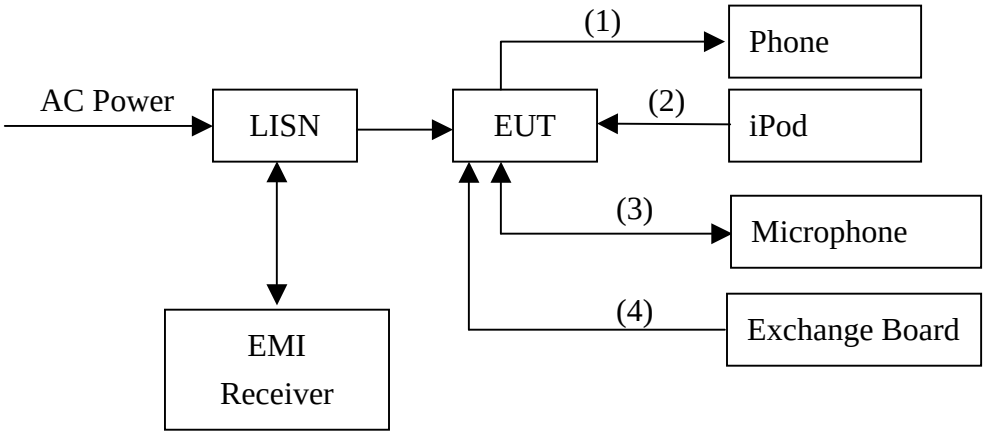
Note: The above equipments are within the valid calibration period.

3. Conducted emission test FCC 15.207

3.1 Operating environment

Temperature:	23	℃
Relative Humidity:	54	%
Atmospheric Pressure:	1023	hPa

3.2 Test setup & procedure



(1) RJ11 10m x 1 (2) Audio cable 1.5m x 1
(3) Microphone Line 2m x1 (4) RJ11 10m x1

The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50 ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination.
Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4/1992 on conducted measurement.
The bandwidth of the field strength meter (R & S Test Receiver ESCS 30) is set at 9kHz.

3.3 Emission limit

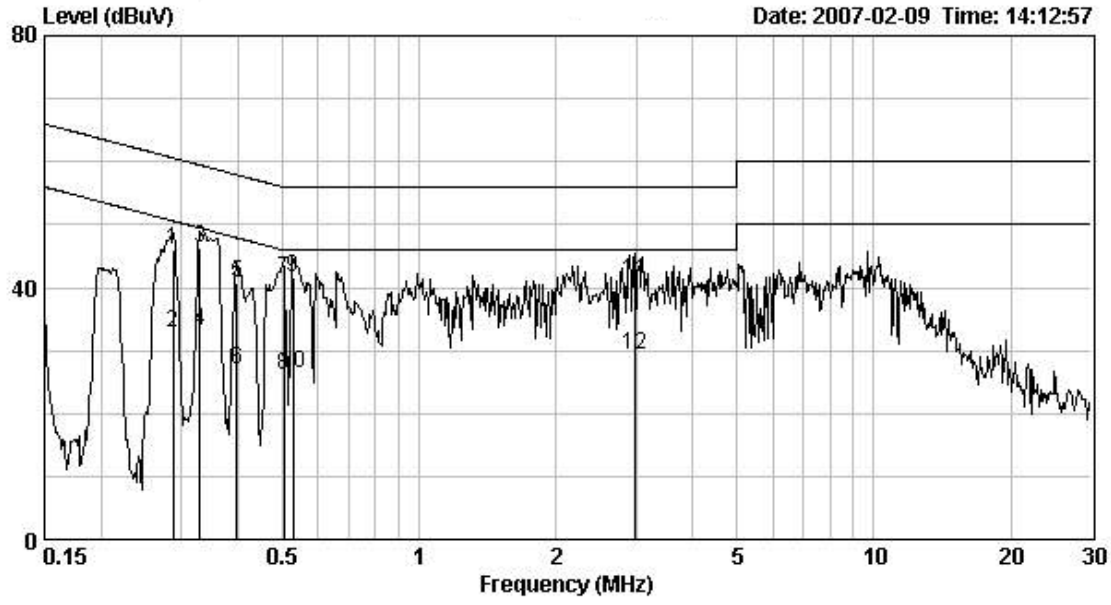
Freq. (MHz)	Maximum RF Line Voltage			
	Class A (dB μ V)		Class B (dB μ V)	
	Q.P.	Ave.	Q.P.	Ave.
0.15~0.50	79	66	66~56	56~46
0.50~5.00	73	60	56	46
5.00~30.0	73	60	60	50

3.4 Conducted emission data FCC 15.207

Phase : Line
EUT : C120
Test Condition : Normal operating mode

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level AV (dBuV)	Limit Av (dBuV)	Margin (dB) Qp	Margin (dB) Av
0.288	0.10	46.07	60.57	32.89	50.57	-14.50	-17.68
0.330	0.10	46.33	59.45	33.23	49.45	-13.12	-16.22
0.397	0.10	40.85	57.93	27.03	47.93	-17.08	-20.90
0.504	0.10	41.23	56.00	25.95	46.00	-14.77	-20.05
0.528	0.10	41.65	56.00	26.29	46.00	-14.35	-19.71
2.977	0.17	41.11	56.00	29.37	46.00	-14.89	-16.63

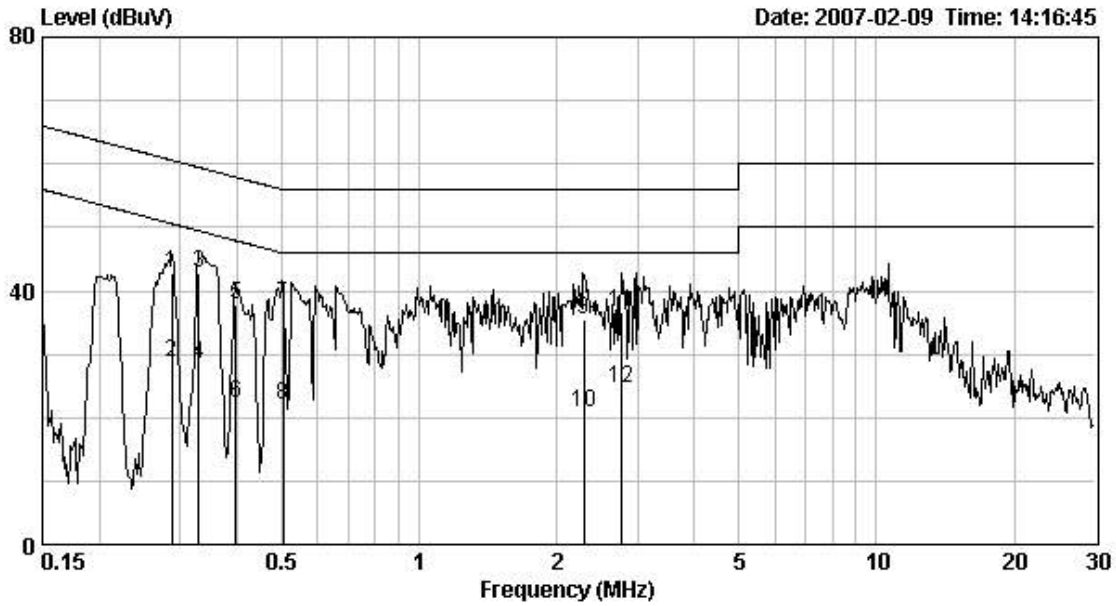
Remark:
1. Correction Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)



Phase : Neutral
EUT : C120
Test Condition : Normal operating mode

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level AV (dBuV)	Limit Av (dBuV)	Margin (dB) Qp	Av
0.288	0.10	42.74	60.57	28.67	50.57	-17.83	-21.90
0.330	0.10	42.75	59.45	28.52	49.45	-16.70	-20.93
0.397	0.10	37.73	57.93	22.38	47.93	-20.20	-25.55
0.504	0.10	37.66	56.00	22.02	46.00	-18.34	-23.98
2.289	0.13	35.41	56.00	20.84	46.00	-20.59	-25.16
2.771	0.16	36.64	56.00	24.55	46.00	-19.36	-21.45

Remark:
1. Correction Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)



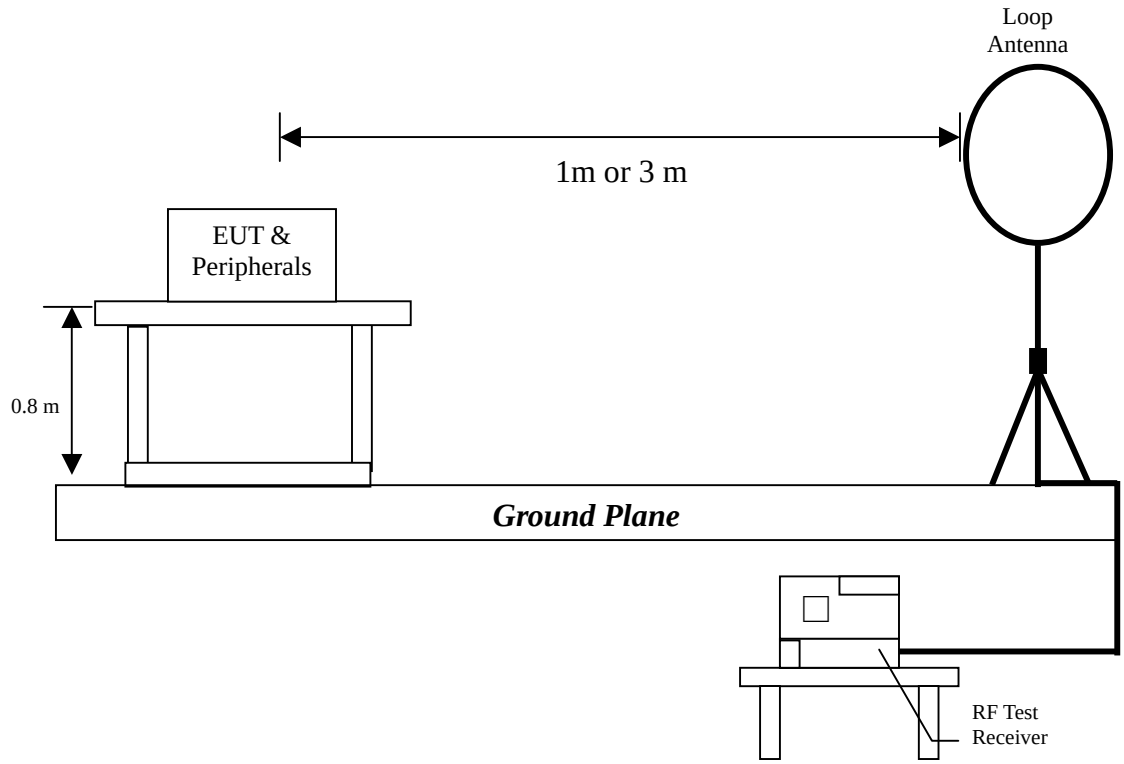
4. Radiated emission test FCC 15.223

4.1 Operating environment

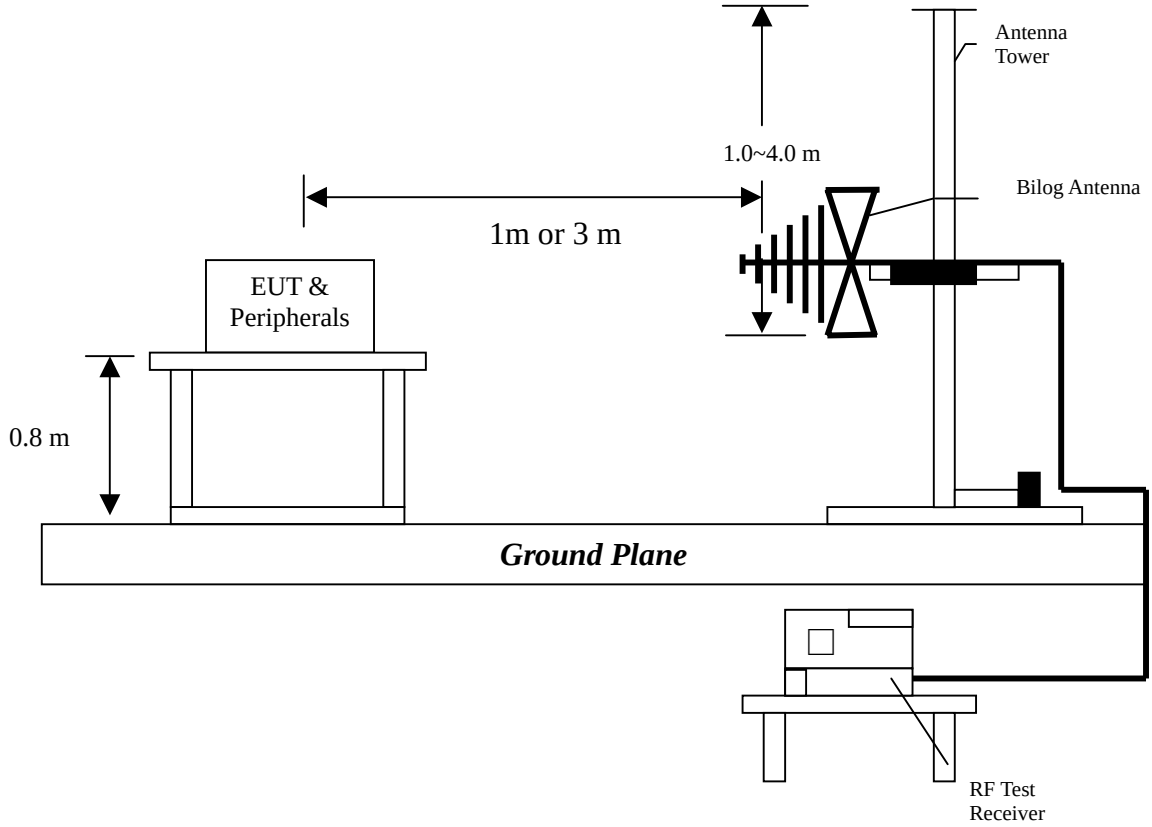
Temperature:	22	℃
Relative Humidity:	58	%
Atmospheric Pressure	1023	hPa

4.2 Test setup & procedure

(a) Below 30MHz



(b) Above 30MHz



The test methodology used is based on the requirements of 47 CFR Part 15, sections 15.207, 15.205, 15.209.

The test methods, which have been used, are based on ANSI C63.4: 2003.

Below 30 MHz the radiated emission tests were carried out at measurement distances of 1 and 3 meters. The test results regarding the radiated emission tests on frequencies below 30 MHz have been extrapolated in order to determine the field strength of the measured values at measurement distances of 30 meters (as required by 47 CFR Part 15).

Radiated emission tests above 30 MHz were performed at a measurement distance of 3 meters.

During the test, the receive antenna were used LOOP antenna for frequency below 30MHz and BiLog antenna for frequency above 30MHz.

The EUT for testing is arranged on a non-conducted turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

4.3 Radiated emission limit

The field strength of any emission within the band 1.705-10.0 MHz shall not exceed 100 microvolts/meter at a distance of 30 meters. However, if the bandwidth of the emission is less than 10% of the center frequency, the field strength shall not exceed 15 microvolts/meter or (the bandwidth of the device in kHz) divided by (the center frequency of the device in MHz) microvolts/meter at a distance of 30 meters, whichever is the higher level. For the purposes of this Section, bandwidth is determined at the points 6 dB down from the modulated carrier. The emission limits in this paragraph are based on measurement instrumentation employing an average detector. The provisions in Section 15.35(b) for limiting peak emissions apply.

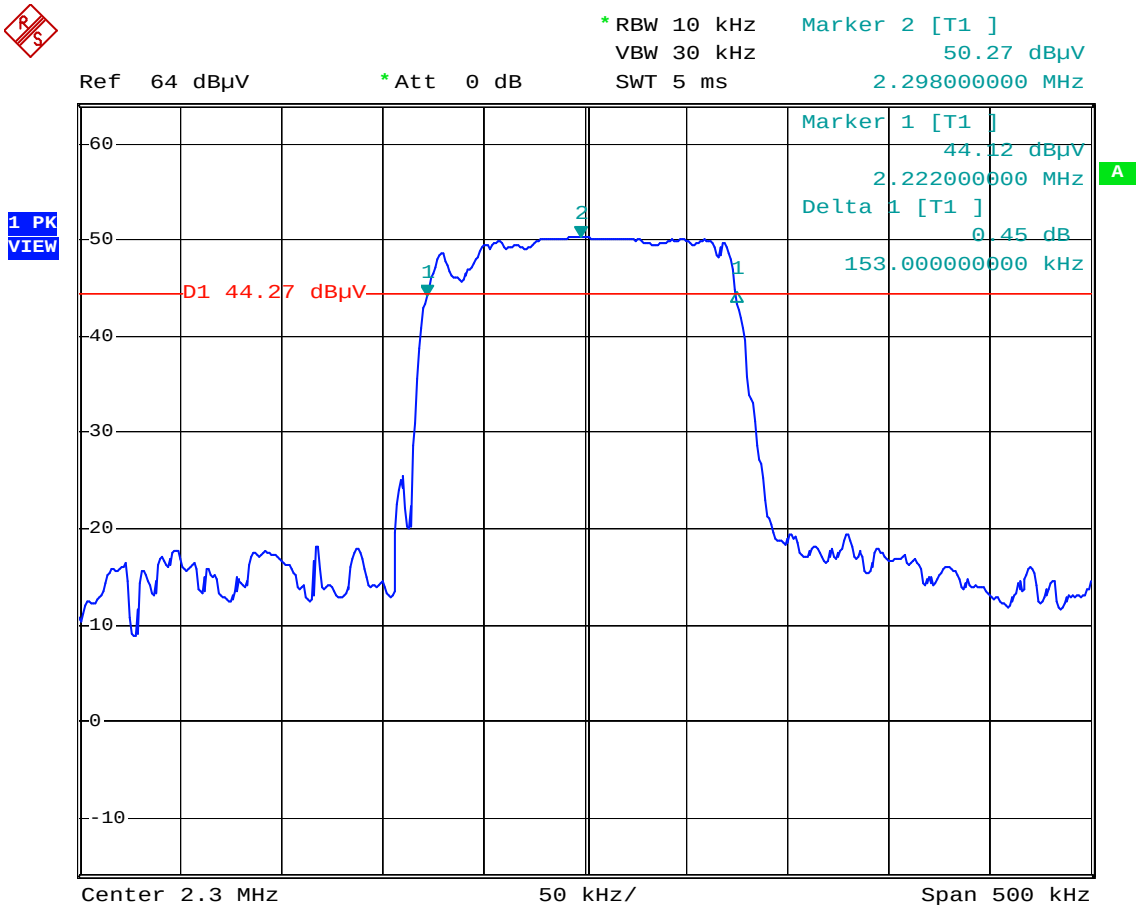
4.3.1 Emission bandwidth of fundamental bandwidth

Frequency (MHz)	Bandwidth (kHz)	10% of the center frequency (kHz)
2.3	153.0000	230
2.8	156.0000	280

Remark:
Audio input was generated from an iPOD to the device and tested under normal operating conditions. The maximum audio input from this iPOD was 800mVp-p.

Please see the plot below.

6 dB bandwidth of 2.3MHz



Comment: 6dB B-W at 2.3MHz
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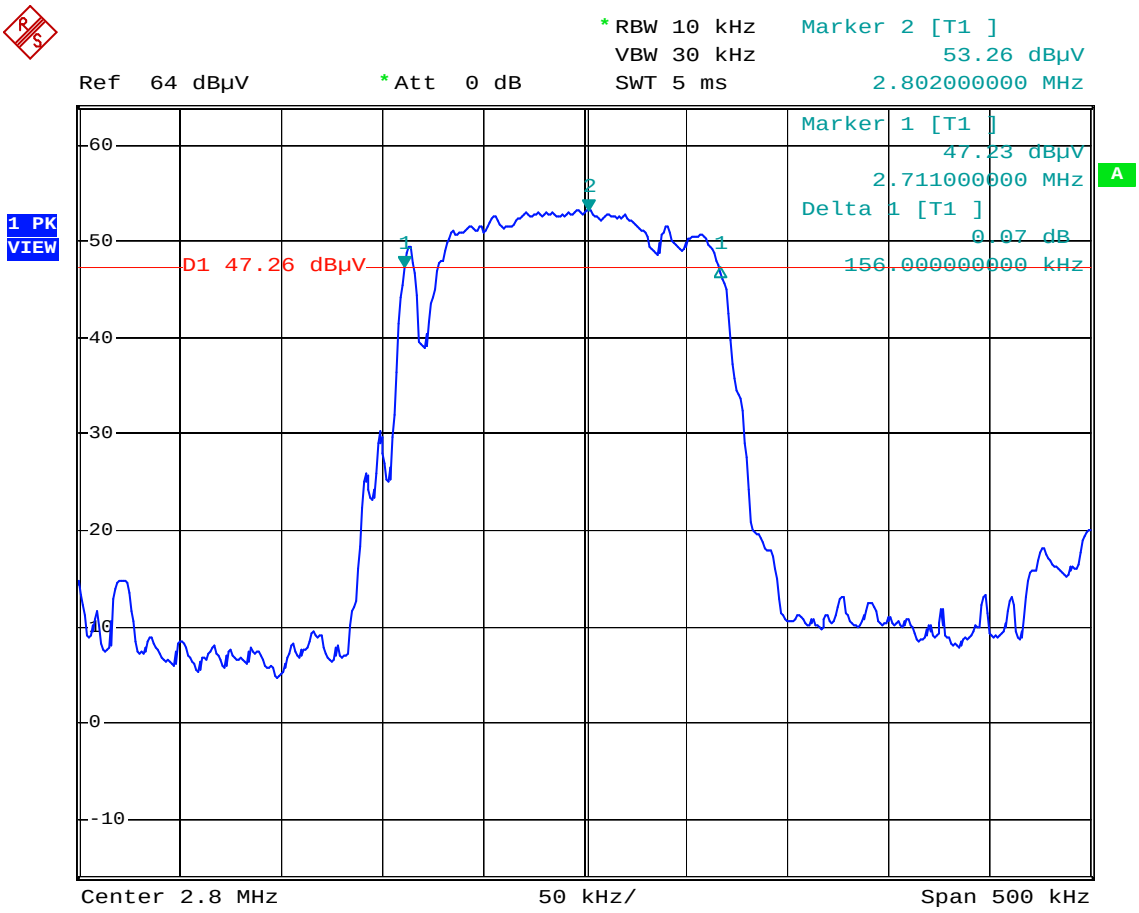
6 dB bandwidth of 2.8MHz



Comment: 6dB B-W at 2.8MHz
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4.3.2 General radiated emission limit

The spurious Emission shall test through the 10th harmonic. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

Frequency MHz	15.209 Limits (dB μ V/m@3m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

Remark:
1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

   Uncertainty was calculated in accordance with NAMAS NIS 81. Expanded uncertainty (k=2) of radiated emission measurement is ±3.078 dB.

4.3.3 Radiated emission test data FCC 15.223

4.3.3.1 Measurement results: Frequency range of 30-1000 MHz, E-field

EUT : C120
Test Condition : Normal operaing mode

Antenna Polariz. (V/H)	Freq. (MHz)	Receiver Detector	Corr. Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
V	30.00	QP	12.60	24.26	36.85	40.00	-3.15
V	49.40	QP	12.84	18.77	31.61	40.00	-8.39
V	64.92	QP	12.23	17.73	29.96	40.00	-10.04
V	227.88	QP	12.08	20.48	32.56	46.00	-13.44
V	406.36	QP	16.47	17.46	33.93	46.00	-12.07
V	431.58	QP	17.64	15.38	33.02	46.00	-12.98
H	251.16	QP	12.64	16.90	29.54	46.00	-16.46
H	334.58	QP	14.40	20.28	34.67	46.00	-11.33
H	359.80	QP	15.48	21.30	36.77	46.00	-9.23
H	383.08	QP	16.74	16.96	33.70	46.00	-12.30
H	755.56	QP	23.02	12.46	35.48	46.00	-10.52
H	827.34	QP	24.04	9.22	33.25	46.00	-12.75

Remark:

1. Corr. Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Corr. Factor

4.3.3.2 Measurement results: Frequency range of 0.009-30 MHz, H-field

EUT : C120
Test Condition : Normal operaing mode

Frequency	Measuement results dBuV Quasi-Peak		Antenna Factor	Cable loss	Measurement reaults Quasi-peak (calculated) dBuV/m	Limites Part 15.209 & 223 dBuV/m
MHz	1m	3m	dB	dB	30m	30m
2.3	51.43	n.a.	18.60	0.5	-	23.52
2.8	53.46	23.54	18.70	0.5	-20.06	23.52
3.277	32.80	n.a.	18.80	0.5	-	30
4.125	26.23	n.a.	19.10	0.5	-	30
5.1	41.49	n.a.	19.60	0.5	-	30
6.07	31.35	n.a.	20.10	0.5	-	30
6.92	35.89	n.a.	19.60	0.5	-	30
7.88	31.92	n.a.	20.10	0.5	-	30
8.37	37.21	n.a.	20.20	0.5	-	30
9.71	36.65	n.a.	20.80	0.5	-	30
10.6	45.49	n.a.	21.20	0.5	-	30
11.52	33.05	n.a.	21.60	0.5	-	30
11.65	29.65	n.a.	21.60	0.50	-	30

4.3.3.3 Calculated measurements results radiated field strength, H-Field

Calculated measurements results radiated field strength, H-Field

General Formula:

ds = short distance; Hs is field strength at short distance

dl = long distance; Hl is field strength at long distance

$(ds/dl)^n = Hl/Hs$ .....[eq1]

$n \log(ds/dl) = \log(Hl/Hs)$ or $n = \log(Hl/Hs) / \log(ds/dl)$

Calculation of n, for measured field strengths

Hs = 53.46 dBµV + 0.5 dB + 18.6 dB/m = 72.56 dBµV/m = 4246.2 µV/m

Hl = 23.54 dBµV + 0.5 dB + 19.61dB/m = 42.64 dBµV/m = 135.52 µV/m

n = log(135.52/4246.2) / log(1/3)

n = 3.135

Calculated field strength at new distance, from the 3 meter value:

Hs now becomes Hs = 135.52 µV/m and ds=3

Assume dl =30

Now from [eq1] Hl becomes:

$Hl = Hs * (dl/ds)^{-n}$

So $Hl = 135.52 * (30/3)^{-3.135}$ = 0.099 uV/m

or = -20.06 dBuV/m