EMC
TEST REPORT

Report No.: EME-051209
Model No.: EF6216
Issued Date: Dec. 22, 2005

Applicant: **Procare International Co.**
11F. –6, 410, Chung Hsiao E. Rd., Sec. 5, Taipei, Taiwan

Test By: **Intertek Testing Services Taiwan Ltd.**
No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li,
Shiang-Shan District, Hsinchu City, Taiwan

Project Engineer

Kevin Chen

Reviewed By

Jerry Liu

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Summary of Tests

USB FM Transmitter -Model: EF6216
FCC ID: POSEF6216

Test	Reference	Results
Bandwidth of fundamental frequency	15.239(a)	Complies
Field strength of fundamental frequency	15.239(b)	Complies
Radiated emission	15.239(c), 15.209	Complies
Power Line Conducted Emission test	15.207	Complies

1. General information

1.1 Identification of the EUT

Applicant:	Procare International Co.
Product:	USB FM Transmitter
Model No.:	EF6216
FCC ID.:	POSEF6216
Frequency Range:	88.1MHz to 88.7MHz
Channel Number:	4 channels
Frequency of Each Channel:	88.1 + 0.2k MHz, k=0-3
Type of Modulation:	FM
Power Supply:	1. 12Vdc from vehicle charger 2. 5Vdc from Notebook PC
Power Cord:	N/A
Data Cable:	Mini USB cable 1meter × 1
Sample Received:	Oct. 28, 2005
Test Date(s):	Nov. 2, 2005 ~ Dec. 22, 2005

A DoC report has been generated for the client.

1.2 Additional information about the EUT

The EUT is a USB FM Transmitter, and was defined as information technology equipment.

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

1.3 Antenna description

The EUT uses a permanently connected antenna.

Antenna Gain: 0dBi
Antenna Type: Integral
Connector Type: N/A

1.4 Peripherals equipment

Peripherals	Manufacturer	Product No.	Serial No.	FCC ID
Notebook PC	IBM	1860	L3BTAG6	FCC DoC Approved
PRINTER	HP	DeskJet 400	TH86I1K30S	FCC DoC Approved
EAR PHONE	N/A	N/A	N/A	FCC DoC Approved
MP3 Player	N/A	N/A	N/A	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 §15.239、§15.207 and ANSI C63.4/2001.

The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of this frequency band were all meet limit requirement, thus we evaluate the EUT pass the specified test.

2.2 Operation mode

The EUT was supplied with 12Vdc from vehicle charger or 5Vdc from Notebook PC. In radiated emission test, the EUT was tested in the status of continuously transmitting.

During the conducted emission test, it worked in normal operating mode.

The configuration of EUT was setup by the Client.

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	04/17/2006
EMI Test Receiver	Rohde & Schwarz	20Hz~26.5GHz	ESMI	EC317	08/07/2006
Spectrum Analyzer	Rohde & Schwarz	9kHz~30GHz	FSP 30	EC353	07/24/2006
Bilog Antenna	SCHWARZBECK	25MHz~1.7GHz	VULB 9160	EC368	02/20/2006
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	01/13/2006

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

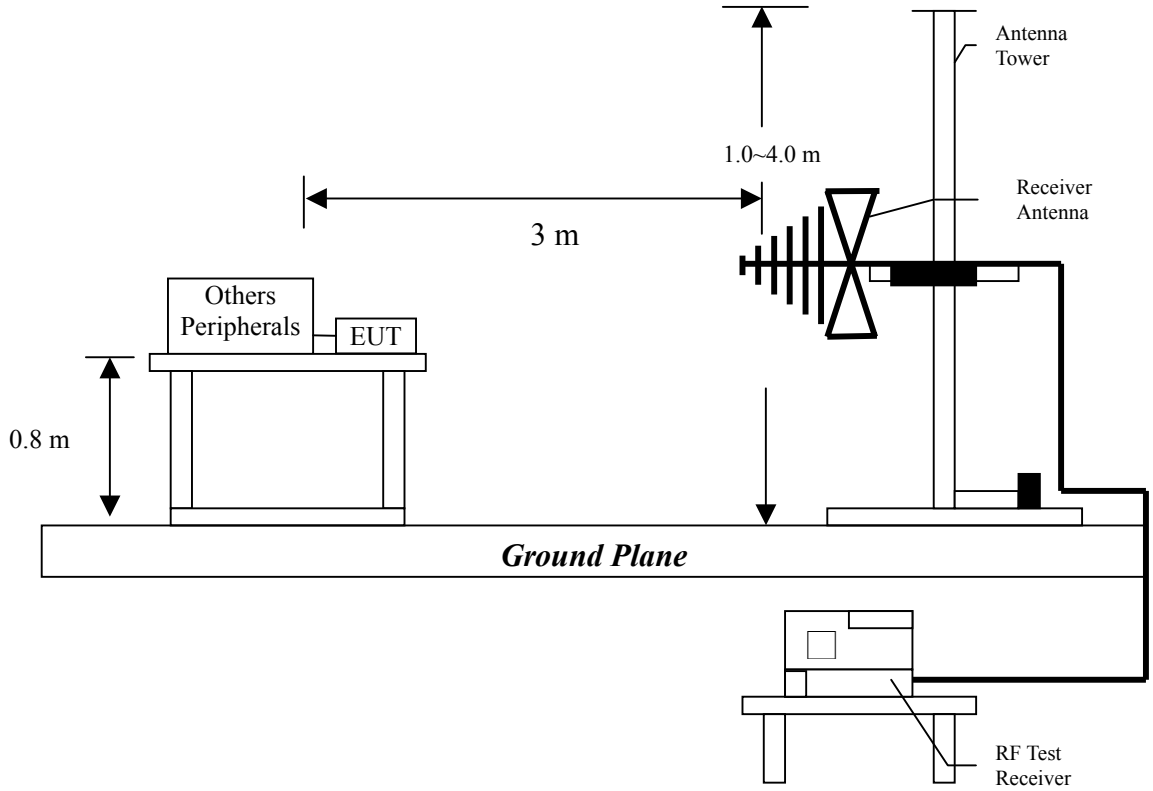
3. Radiated emission test FCC 15.239 (b)/(c)

3.1 Operating environment

Temperature:	23	℃
Relative Humidity:	58	%
Atmospheric Pressure:	1022	hPa

3.2 Test setup & procedure

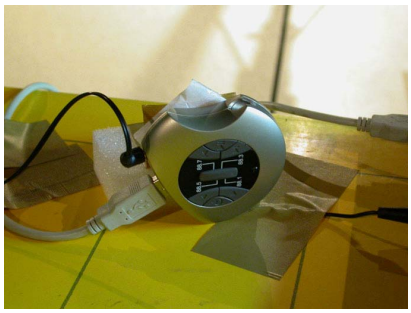
The Diagram below shows the test setup, which is utilized to make these measurements.



The signal is maximized through rotation and placement in the two orthogonal axes. Radiated emissions were invested cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 10Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1MHz RBW/VBW) recorded also on the report.
The EUT for testing is arranged on a wooden 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.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

The signal is maximized through rotation and placement in the two orthogonal axes.



Setup 1

Setup 2

The EUT configuration please refer to the "Spurious set-up photo.pdf".

3.3 Emission limit

3.3.1 Fundamental and harmonics emission limits

Frequency (MHz)	Field Strength of Fundamental	
	(uV/m@3m)	(dBuV/m@3m)
88-108	250	48

The emission limit above is based on measurement instrumentation employing an average detector. The provisions in Section 15.35 for limiting peak emissions apply.

3.3.2 General radiated emission limits

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 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 ±4.98 dB.

3.4 Radiated emission test data

3.4.1 Fundamental Radiated Emission Data

EUT : EF6216
Worst Case Condition : Setup 2 Tx at 88.1MHz, 88.3MHz, 88.5MHz, 88.7MHz

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
88.486	PK	V	9.50	31.05	40.55	48.00	-7.45	169.5	137
88.454	PK	H	9.50	31.82	41.32	48.00	-6.68	179	210

Remark:
1.Corrected Level = Reading + Correction Factor
2.Correction Factor = Antenna Factor + Cable Loss

3.4.2 Radiated Emission Data

The radiated emissions at

Frequency(MHz)	Margin
33.880	-3.76

are less than uncertainty. This is within the stated measurement uncertainty, this may affect compliance determined in other test arrangements.

EUT : EF6216
Worst Case : Setup 2 Tx at 88.5MHz by STD USB connect provide power (5Vdc from Notebook PC)

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
33.880	QP	V	12.60	23.65	36.25	40.00	-3.76	123	49
64.920	QP	V	12.23	22.34	34.57	40.00	-5.43	154	38
88.500	QP	V	8.50	32.05	40.55	48.00	-7.46	170	137
123.120	QP	V	9.47	27.75	37.22	43.50	-6.29	189	166
198.780	QP	V	12.00	19.68	31.68	43.50	-11.82	143	254
354.000	QP	V	15.06	8.81	23.87	46.00	-22.13	131	179
442.500	QP	V	17.64	13.20	30.84	46.00	-15.16	169	32
619.500	QP	V	20.75	9.38	30.13	46.00	-15.87	185	319
59.10000	QP	H	14.11	17.78	31.89	40.00	-8.12	159	75
88.50000	QP	H	9.45	31.87	41.32	48.00	-6.69	179	210
125.06000	QP	H	11.62	25.93	37.55	43.50	-5.96	181	233
198.78000	QP	H	11.27	23.24	34.51	43.50	-9.00	125	59
227.88000	QP	H	11.63	18.99	30.62	46.00	-15.39	201	27
265.50000	QP	H	12.88	14.48	27.36	46.00	-18.64	140	186
299.66000	QP	H	14.17	14.60	28.77	46.00	-17.24	167	298
408.30000	QP	H	16.81	17.80	34.61	46.00	-11.39	199	169
442.50000	QP	H	18.12	18.15	36.27	46.00	-9.73	185	67

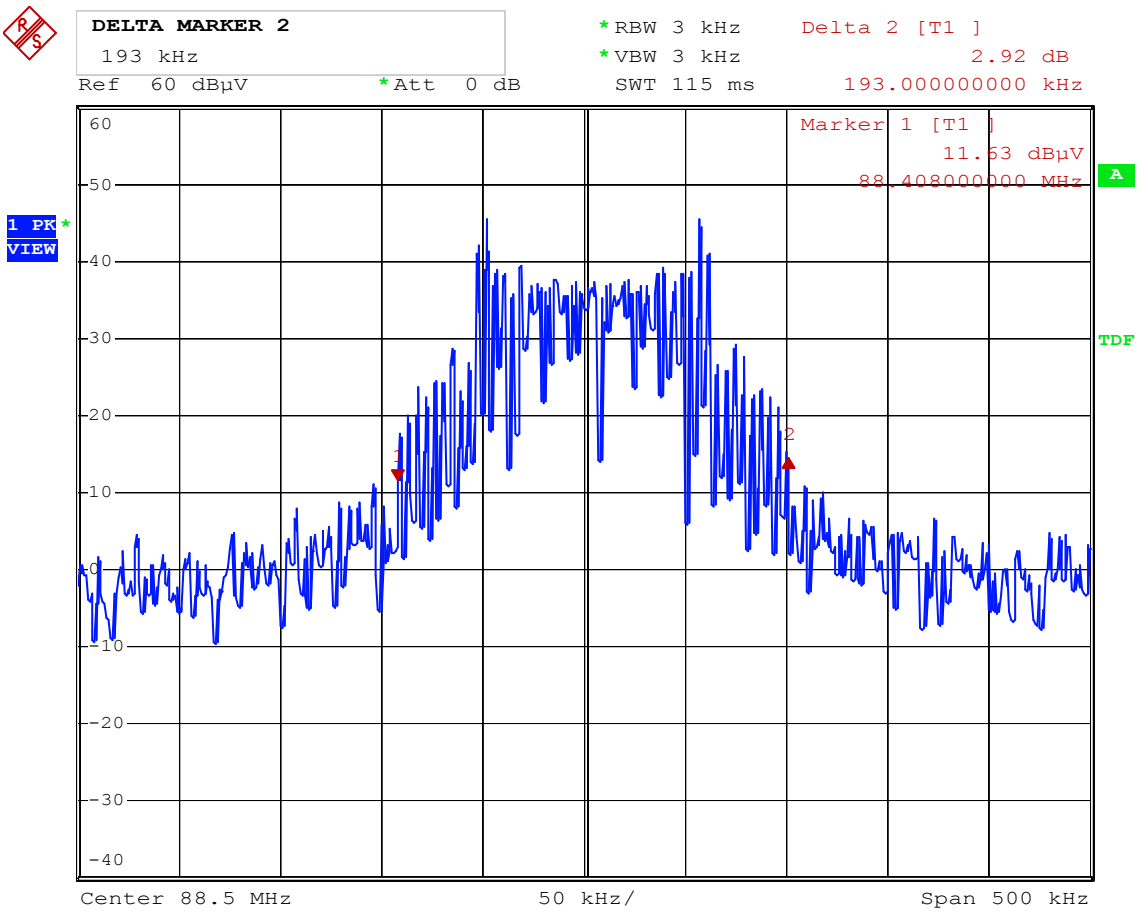
Remark:
1.Corrected Level = Reading Level + Correction Factor
2.Correction Factor = Antenna Factor + Cable Loss

4. Bandwidth of fundamental frequency FCC 15.239(a)

Emissions from the intentional radiator shall be confined within a band 200 kHz wide centered on the operation frequency. The 200 kHz band shall lie wholly within the frequency range of 88-108 MHz.

The fundamental frequency is modulated by 1kHz sinewave with input level equals to the limiting threshold 500mV.

Please see the plot below.



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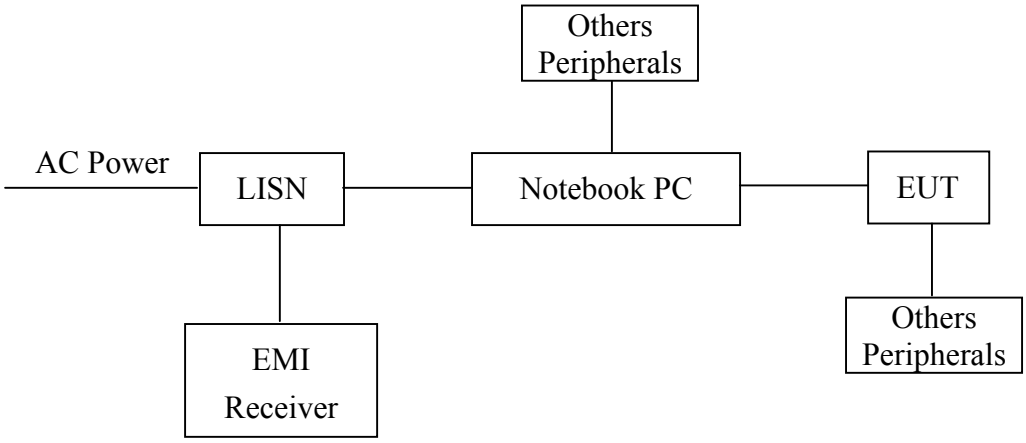
5.Power Line Conducted Emission test §FCC 15.207

5.1 Operating environment

Temperature:	25	℃
Relative Humidity:	59	%
Atmospheric Pressure	1022	hPa

5.2 Test setup & procedure



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 AC power conducted emissions was invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz. (15.207 paragraph)

The EUT configuration please refer to the “Conducted set-up photo.pdf”.

Please see the plot below.

5.3 Emission limit

Freq. (MHz)	Conducted Limit (dBuV)	
	Q.P.	Ave.
0.15~0.50	66 – 56*	56 – 46*
0.50~5.00	56	46
5.00~30.0	60	50

*Decreases with the logarithm of the frequency.

5.4 Uncertainty of Conducted Emission

Expanded uncertainty (k=2) of conducted emission measurement is ±2.6 dB.

5.5 Power Line Conducted Emission test data

(1) Line

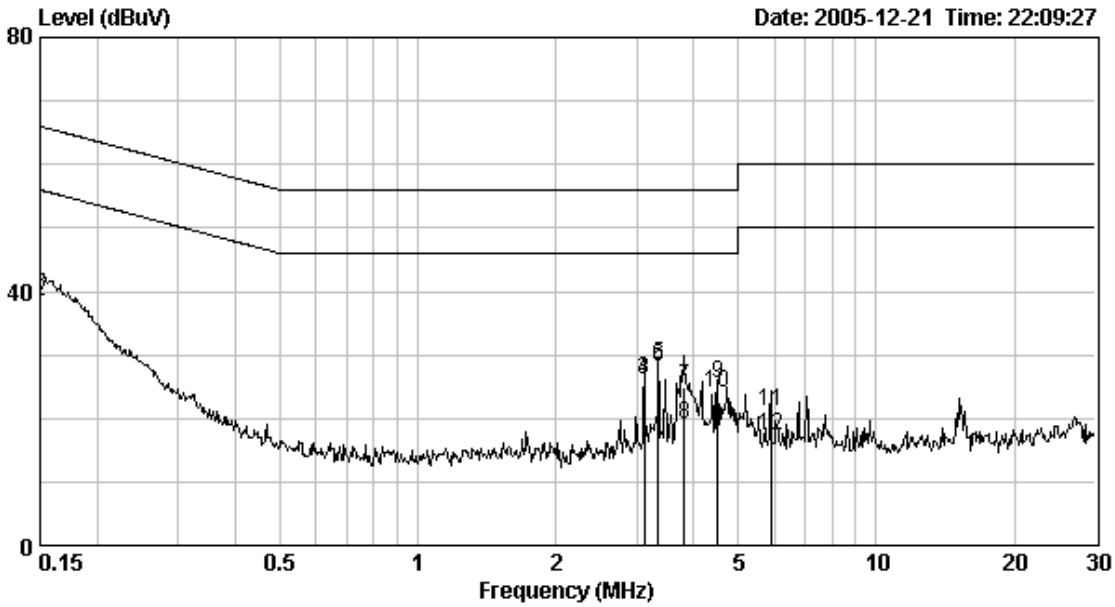
EUT : EF6216

Test Condition : Normal operating mode (12Vdc from vehicle charger)

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level AV (dBuV)	Limit Av (dBuV)	Margin (dB) Qp	Margin (dB) Av
0.150	0.10	40.90	66.00	38.45	56.00	-25.10	-17.55
3.122	0.16	26.11	56.00	26.01	46.00	-29.89	-19.99
3.353	0.17	28.34	56.00	28.11	46.00	-27.66	-17.89
3.811	0.19	25.03	56.00	19.03	46.00	-30.97	-26.97
4.509	0.22	25.52	56.00	24.01	46.00	-30.48	-21.99
5.907	0.26	21.01	60.00	17.17	50.00	-38.99	-32.83

Remark:

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



(2) Neutral

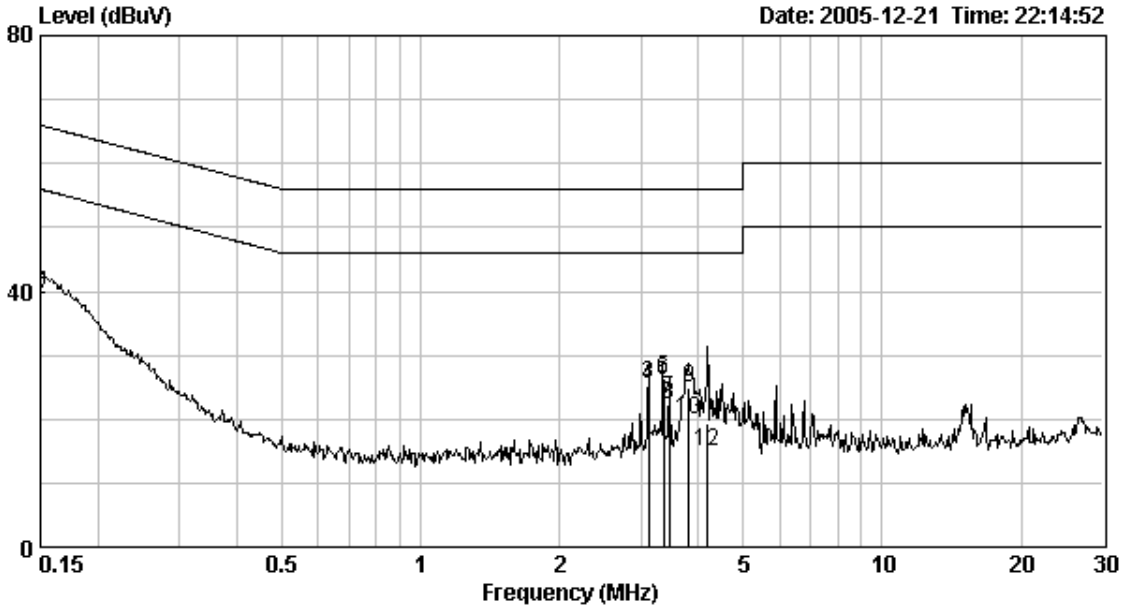
EUT : EF6216

Test Condition : Normal operating mode (12Vdc from vehicle charger)

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level AV (dBuV)	Limit Av (dBuV)	Margin (dB) Qp	Margin (dB) Av
0.150	0.10	41.13	66.00	38.67	56.00	-24.87	-17.33
3.123	0.16	25.58	56.00	25.26	46.00	-30.42	-20.74
3.355	0.17	26.52	56.00	26.07	46.00	-29.48	-19.93
3.464	0.17	23.27	56.00	22.30	46.00	-32.73	-23.70
3.811	0.19	24.97	56.00	19.96	46.00	-31.03	-26.04
4.194	0.20	19.48	56.00	14.85	46.00	-36.52	-31.15

Remark:

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



(1) Line

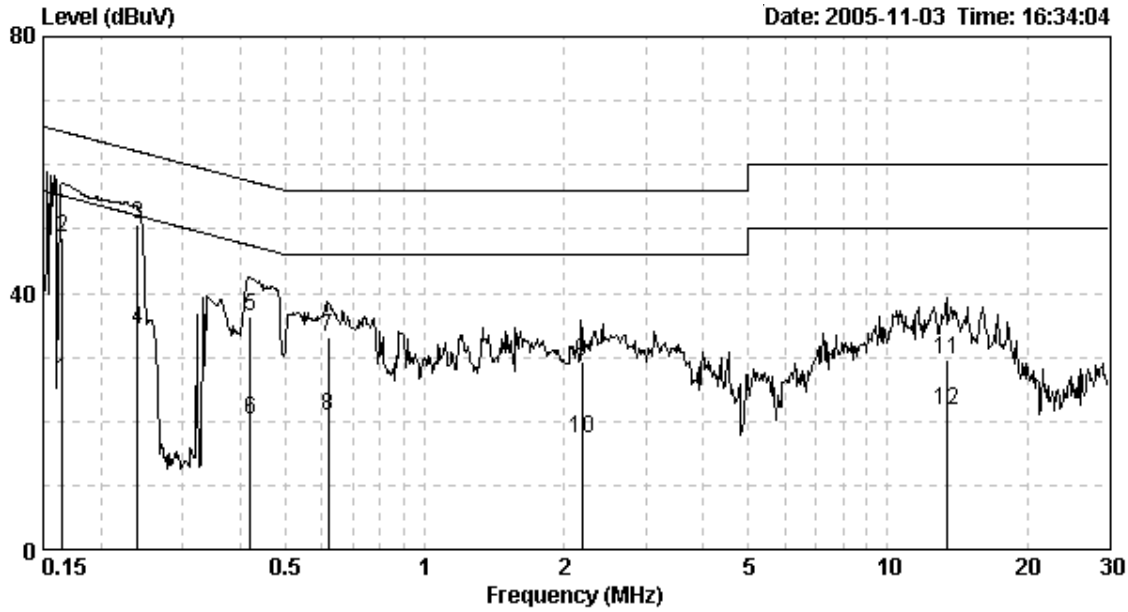
EUT : EF6216

Test Condition : Normal operation mode (5Vdc from Notebook PC)

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level AV (dBuV)	Limit Av (dBuV)	Margin (dB) Qp	Margin (dB) Av
0.17	0.10	48.56	65.21	26.32	55.21	-16.65	-28.89
0.24	0.10	50.60	62.10	34.21	52.10	-11.50	-17.89
0.42	0.10	36.43	57.46	20.20	47.46	-21.03	-27.26
0.62	0.10	33.05	56.00	20.82	46.00	-22.95	-25.18
2.18	0.11	29.28	56.00	17.43	46.00	-26.72	-28.57
13.42	0.60	29.63	60.00	21.70	50.00	-30.37	-28.30

Remark:

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



(2) Neutral

EUT : EF6216

Test Condition : Normal operation mode (5Vdc from Notebook PC)

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level AV (dBuV)	Limit Av (dBuV)	Margin (dB) Qp	Av
0.16	0.10	43.88	65.27	23.30	55.27	-21.39	-31.97
0.22	0.10	43.10	62.96	26.67	52.96	-19.86	-26.29
0.44	0.10	30.90	57.13	13.99	47.13	-26.23	-33.14
0.64	0.10	30.94	56.00	23.01	46.00	-25.06	-22.99
1.59	0.10	29.34	56.00	15.83	46.00	-26.66	-30.17
13.75	0.35	32.37	60.00	22.55	50.00	-27.63	-27.45

Remark:

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