



IST Co., Ltd.  
TEST REPORT NO.: 11-IST-0554

# Certification of Compliance

## CFR 47 Part 15 Subpart B

Test Report File No.	11-IST-0554	<input checked="" type="checkbox"/> Basic	<input type="checkbox"/> Alternate
Date of Receipt	Sep. 5, 2011	Begin of test date	Sep. 7, 2011
Date of Issue	Sep. 20, 2011	End of test date	Sep. 15, 2011

Kind of Product	PT-PEN (DONGLE)
Basic Model (s)	PMNA-02

Applicant	PENANDFREE CO., LTD
Address	801 Keumkang Hightech Valley 2nd 138-1, Sangdaewon-dong, Jungwon-gu, Seongnam-si, South Korea
Manufacturer	PENANDFREE CO., LTD
Address	801 Keumkang Hightech Valley 2nd 138-1, Sangdaewon-dong, Jungwon-gu, Seongnam-si, South Korea

Standard	Section 15.107, Section 15.109 [Class B Equipment]
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Test Result

☒ Positive

☐ Negative

Tested By

Reviewed By

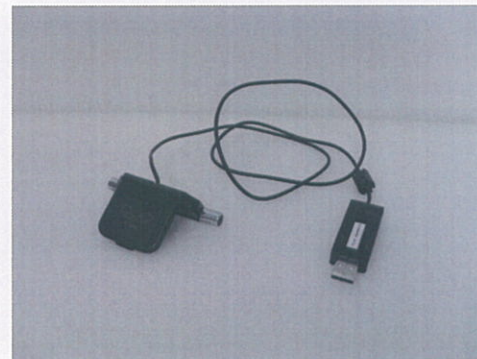
for

H.K.LEE

S.K.LEE

### Comment (s)

- Investigations requested : Measurement to the relevant clauses of FCC rules and regulations Part 15 Subpart B - Unintentional Radiators, Class B.
- The test report with appendix consists of 14 pages.
- The test result only responds to the tested sample.
- It is not allowed to copy this report even partly without the allowance of IST EMC Laboratory.
- This equipment as for has been shown to be capable of continued compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4 2003.





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 <b>■ Test Conditions and Data - Emissions</b>	
◆ Conducted Emissions	0.15 MHz - 30 MHz      Applicable
Test Conditions / Data and Plots	9-11
◆ Radiated Emissions	30 MHz - 1 GHz      Applicable
Test Conditions / Data and Plots	12-14

Note:



IST Co., Ltd.  
TEST REPORT NO. : 11-IST-0554

## INFORMATIONS OF TEST LABORATORY

IST Co., Ltd.

400-19, Singal-dong, Giheung-gu, Yongin-si,

Kyonggi-Do, 446-599, Korea

TEL : +82 31 326 6700

FAX : +82 31 326 6797

KOLAS Testing No. : 118

RRA Designation No. : KR0018

FCC Registration No. : 400603

FCC(DoC) Registration No. : 801060

VCCI Member No. : 1739



## POWER SUPPLY SYSTEM USED

Power supply system

120 V, 60 Hz

(Refer to the product information)

## PRODUCT INFORMATION

Station size	77 mm x 59 mm
Sampling rate	Over 70 Hz
Windows OS	Windows XP/Vista(32 bit)
Interface	USB port
Pen	Optional
Power consumption	320 mW(Station)
Power source	DC 5 V for USB(Station)

\* Internal clock frequency is less than 108 MHz.

- EMC suppression device is not used during the test.
- Please refer to user's manual.

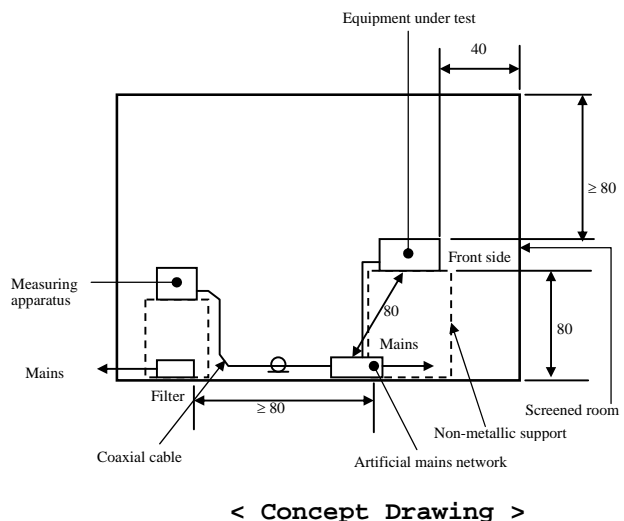
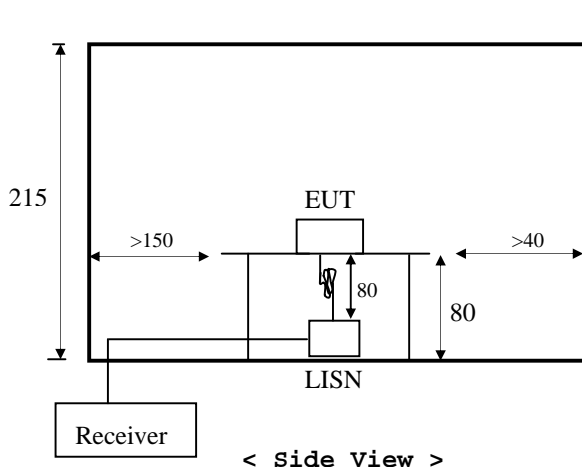
## DESCRIPTIONS OF TEST

**Conducted Emissions:**

The measurement were performed over the frequency range of 0.15 MHz to 30 MHz using a 50  $\Omega$ /50uH LISN as the input transducer to a Spectrum Analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Peak" amplitude within a bandwidth of 10KHz or for "quasi-peak" & "Average" within a bandwidth of 9 KHz.

### -Procedure of Test

The line-conducted facility is located inside a shielded room No.1. A 1 m X 1.5 m wooden table 80 cm height is placed 40 cm away from the vertical wall and 1.5 m away from the other wall of the shielded room. The R/S ESH3-Z5 and Hyup-Rip KNW-407 LISN are bonded to bottom of the shielded room. The EUT is located on the wooden table with distance more than 80 cm from the LISN and powered from the Hyup-Rip LISN. The peripheral equipment is powered from the other LISN. Power to the LISNs are filtered by a noise cut power line filters. All electrical cables are shielded by braided tinned steel tubing with inner  $\phi$  1.2 cm. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the Hyup-Rip LISN. All interconnected cables more than 1 m were shortened by non-inductive bundling to a 1 m length. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating conditions. The RF output of the LISN was connected to the R/S receiver to determine the frequency producing the maximum emission from the EUT. The frequency producing the maximum level was reexamined using Quasi-Peak mode by manual measurement, after scanned by automatic Peak mode for frequency range from 0.15 to 30 MHz. The bandwidth of the receiver was set to 10 kHz. The EUT, peripheral equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission.





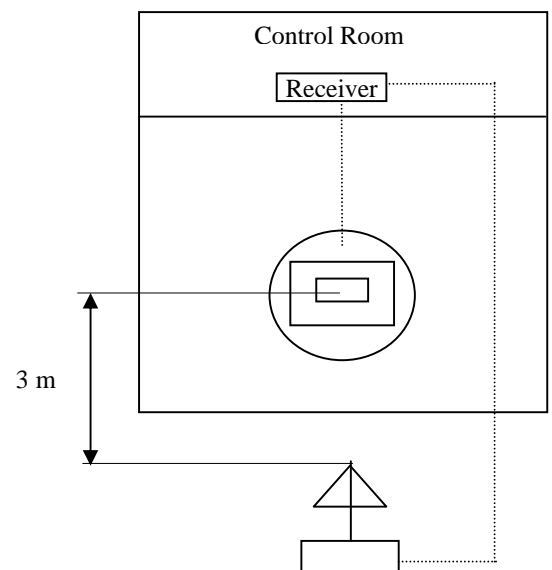
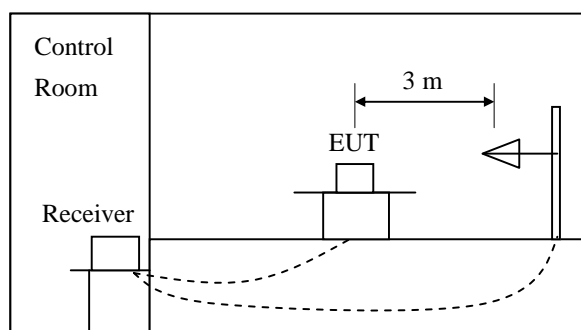
## DESCRIPTION OF TEST

### Radiated Emissions:

The measurement was performed over the frequency range of 30 MHz to 1 GHz using antenna as the input transducer to a Spectrum analyzer or a Field Intensity Meter. The measurement was made with the detector set for "quasi-peak" within a bandwidth of 120 KHz.

#### -Procedure of Test

Preliminary measurements were made at 3 meter using bi-conical and log-periodic antennas, and spectrum analyzer to determine the frequency producing the max. emission in anechoic chamber. Appropriate precaution was taken to ensure that all emission from the EUT were maximized and investigated. The system configuration, mode of operation, turn-table azimuth and height with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30 MHz to 300 MHz using S/B bi-conical antenna and 300 to 1000 MHz using S/B log-periodic antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used. Final measurements were made at open site with 10-meters test distance using S/B bi-log antenna or horn antenna. The OATS have been verified in regular for its normalized site attenuation. The test equipment was placed on a wooden table. Sufficient time for the EUT, peripheral equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined by manual. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 120 kHz or 1 MHz depending on the frequency of type of signal. The EUT, peripheral equipment and interconnecting cables were re-configured to the set-up producing the max. emission for the frequency and were placed on top of a 0.8-meter high nonmetallic 1 x 1.5 meter table. The EUT, peripheral equipment, and interconnecting cables were re-arranged and manipulated to maximize each emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation to the EUT and/or peripheral equipment and changing the polarity of the antenna, whichever determined the worst-case emission.







## Equipment Under Test

### EUT Type :

- ☒ Table-Top. ☐ Floor-Standing.  
☐ Table-Top and Floor-Standing(Combination).

### Operation - mode of the E.U.T. :

The equipment under test was operated during the measurement under following conditions :

- ☐ Standby Mode  
☒ Operational Condition : Normal operating mode

### Configuration of the equipment under test :

Following peripheral devices and interface cables were connected during the measurement :

Equipment	Type	Brand	Serial No.
Pen	-	PENANDFREE CO.,LTD	N/A
Notebook PC	LGR51	LG Electronics	903QTAF020768
Adapter	PA-1900-08	Dongguang Lite Power 2nd Plant.	N/A

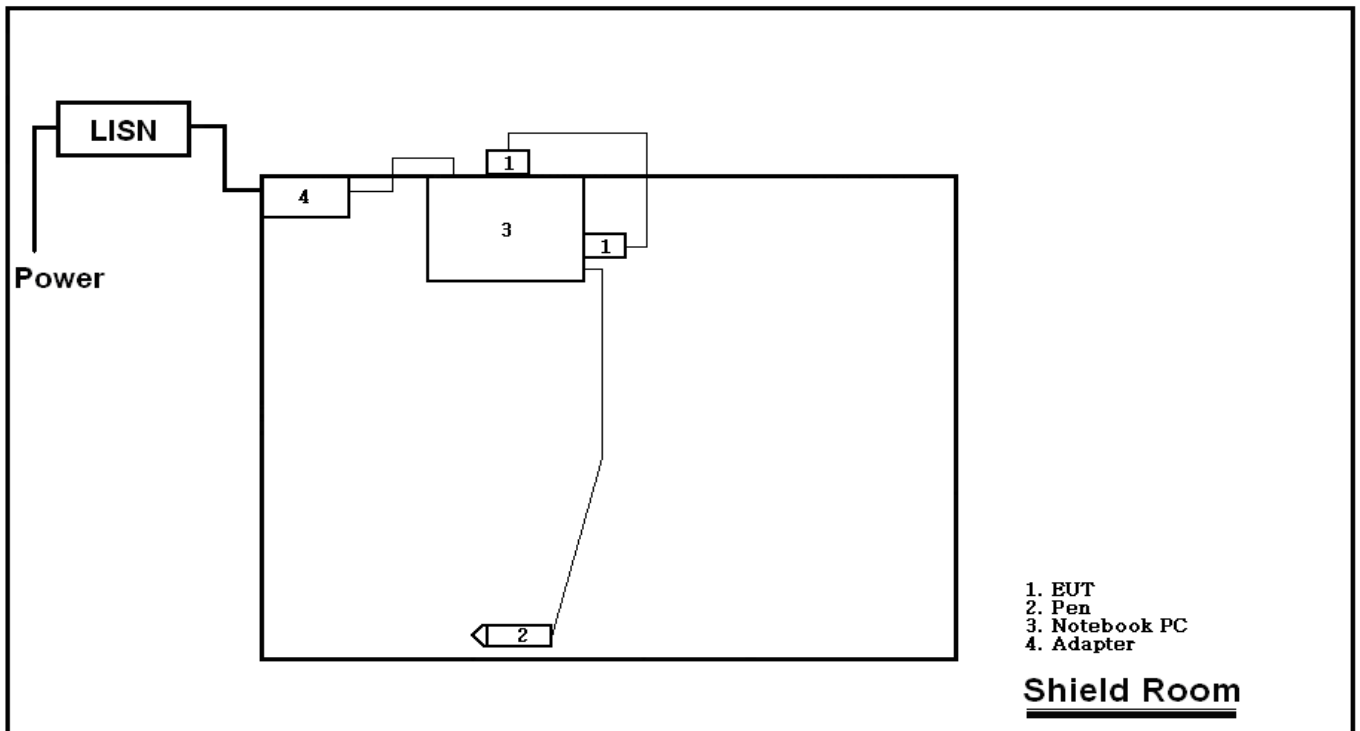
### Connecting Interface Cables :

- Unshielded Pen's USB charging cable(without ferrite core): 0.8 m

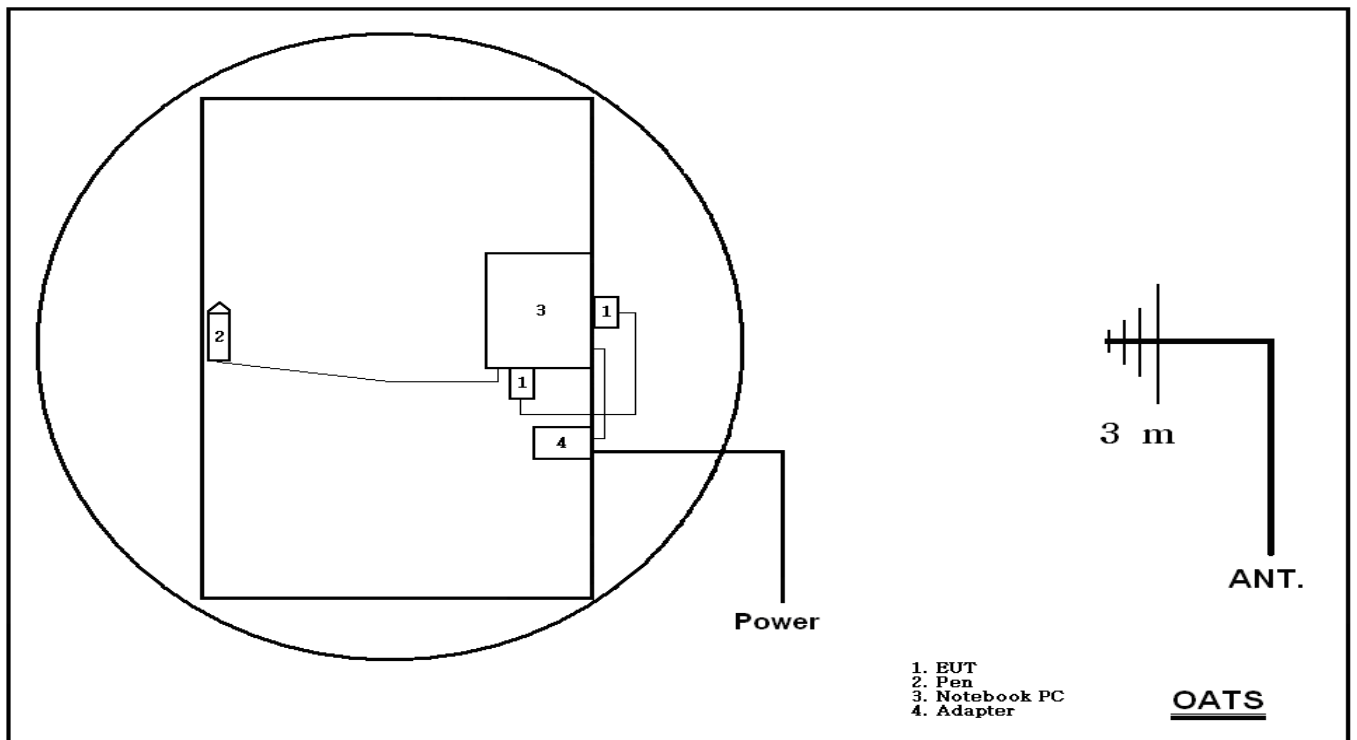
Note :



## Test Set-Up



## Conducted Emissions



## Radiated Emissions



## SUMMARY

### Emissions

#### ■ Conducted Emission

The requirements are ☒ MET ☐ Not MET  
Minimum limit margin 5.25 dB at 4.343 MHz  
Maximum limit exceeding

**Remarks : Limits are kept with more than 3 dB margin.**

Find the test data in following page 10 to 11.

#### ■ Radiated Emission

The requirements are ☒ MET ☐ Not MET  
Minimum limit margin 5.20 dB at 480.001 MHz  
Maximum limit exceeding

**Remarks : Limits are kept with more than 3 dB margin.**

Find the test data in following page 13 to 14.





## TEST CONDITIONS AND DATA

### Conducted Emissions

[Applicable]

#### ◆ Test Equipment Used

Model Name	Description	Manufacture	Due Calibration	Serial No.
ESCI	Test Receiver	Rohde & Schwarz	Jul. 19, 2012	100373
KNW-407	LISN	Hyup-Rip	Oct. 13, 2011	8-883-10
ESH3-Z2	Pulse Limiter	Rohde & Schwarz	May 19, 2012	357.8810.52

#### ◆ Test Accessories Used

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

#### ◆ Environmental Conditions

Temperature	(22.5 ± 0.2) °C
Humidity	(47.1 ± 0.1) % R.H.
Atmosphere pressure	994 hPa

◆ Test Program            See the operational condition page 6.

◆ Test Date                Sep. 7, 2011

◆ Test Area                Conducted room No.1

#### Note : **Conducted Emissions Calculation**

$$\text{Result} = VR + IL + CL$$

VR = Measured Voltage at the Receiver (Measurement)

IL = Insertion Loss

CL = Cable Loss



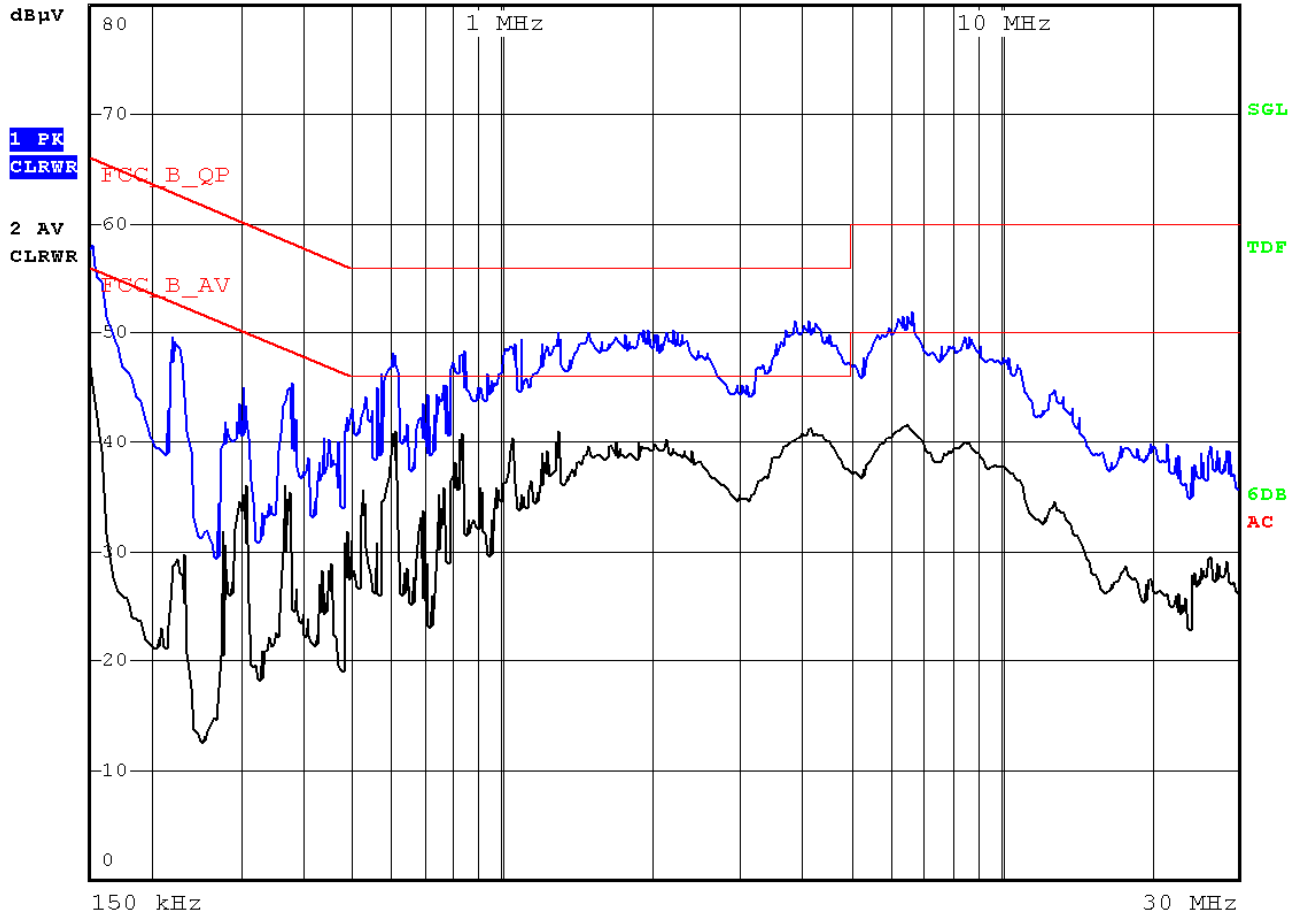
## Conducted Emissions

Live Phase



RBW 9 kHz  
MT 160 ms  
PREAMP OFF

Att 10 dB



Model Name : PMNA-02 120 Vac, 60 Hz Phase : Live

Freq. [MHz]	Measurement [dB $\mu V$ ]		Limit [dB $\mu V$ ]		Insertion Loss	Cable Loss	Result [dB $\mu V$ ]		Margin [dB]	
	Q-peak	Average	Q-peak	Average			Q-peak	Average	Q-peak	Average
0.150	51.44	34.08	66.00	56.00	0.37	0.01	51.82	34.46	14.18	21.54
0.842	44.21	39.60	56.00	46.00	0.11	0.03	44.35	39.74	11.65	6.26
1.367	45.11	39.61	56.00	46.00	0.12	0.04	45.27	39.77	10.73	6.23
2.242	43.83	37.04	56.00	46.00	0.13	0.06	44.02	37.23	11.99	8.78
4.180	45.93	40.21	56.00	46.00	0.15	0.08	46.16	40.44	9.84	5.56
6.411	45.64	40.23	60.00	50.00	0.19	0.10	45.93	40.52	14.07	9.48

Note :



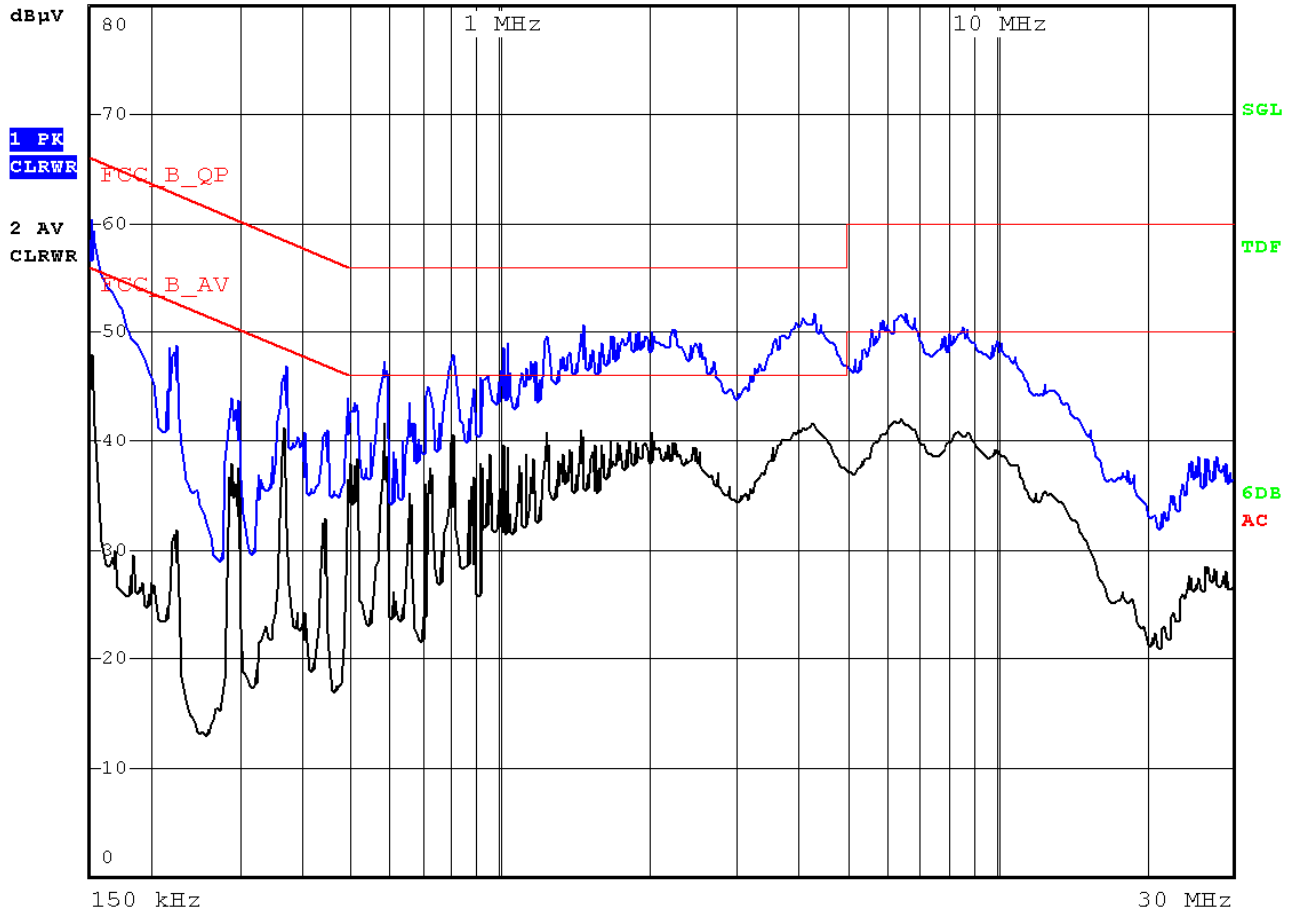
## Conducted Emissions

Neutral Phase



RBW 9 kHz  
MT 160 ms  
PREAMP OFF

Att 10 dB



Model Name : PMNA-02 120 Vac, 60 Hz Phase : Neutral

Freq. [MHz]	Measurement [dB $\mu$ V]		Limit [dB $\mu$ V]		Insertion Loss	Cable Loss	Result [dB $\mu$ V]		Margin [dB]	
	Q-peak	Average	Q-peak	Average			Q-peak	Average	Q-peak	Average
0.150	53.22	40.14	66.00	56.00	0.36	0.01	53.59	40.51	12.41	15.49
0.369	43.24	35.82	58.52	48.52	0.16	0.02	43.42	36.00	15.11	12.53
0.800	45.25	36.37	56.00	46.00	0.11	0.03	45.39	36.51	10.61	9.49
1.476	45.27	38.01	56.00	46.00	0.13	0.05	45.44	38.18	10.56	7.82
4.343	46.01	40.51	56.00	46.00	0.16	0.08	46.25	40.75	9.75	5.25
6.587	46.29	41.45	60.00	50.00	0.18	0.11	46.57	41.73	13.43	8.27

Note :



## TEST CONDITIONS AND DATA

### Radiated Emission

[Applicable]

#### ◆ Test Equipment Used

Model Name	Description	Manufacture	Due Calibration	Serial No.
ESCS 30	Test Receiver	Rohde & Schwarz	Sep. 17, 2011	100171
VULB9161SE	Antenna	Schwarzbeck	Oct. 28, 2011	4088

#### ◆ Test Accessories Used

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

#### ◆ Environmental Conditions

Temperature	(24.2 ± 0.5) °C
Humidity	(63.8 ± 0.8) % R.H.
Atmosphere pressure	994 hPa

◆ Test Program                      See the operational condition page 6.

◆ Test Date                              Sep. 7, 2011

◆ Test Area                              Open Area Test site No.2 (3 m)

Note :



### Radiated Emissions

[Applicable]

Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Limit [dBuV/m]	Result [dBuV/m]	Margin [dB]
30.961	9.70	10.76	0.96	V	40.00	21.42	18.58
167.184	11.20	14.99	2.09	V	43.50	28.28	15.22
192.005	15.60	12.43	2.27	V	43.50	30.30	13.20
347.401	7.00	14.59	2.86	V	46.00	24.45	21.55
384.013	13.50	15.28	3.20	V	46.00	31.98	14.02
480.001	20.20	16.88	3.72	V	46.00	40.80	5.20

End of data

**Note : Radiated Emissions Calculation**

$$\text{Result} = \text{VR} + \text{AF} + \text{CL}$$

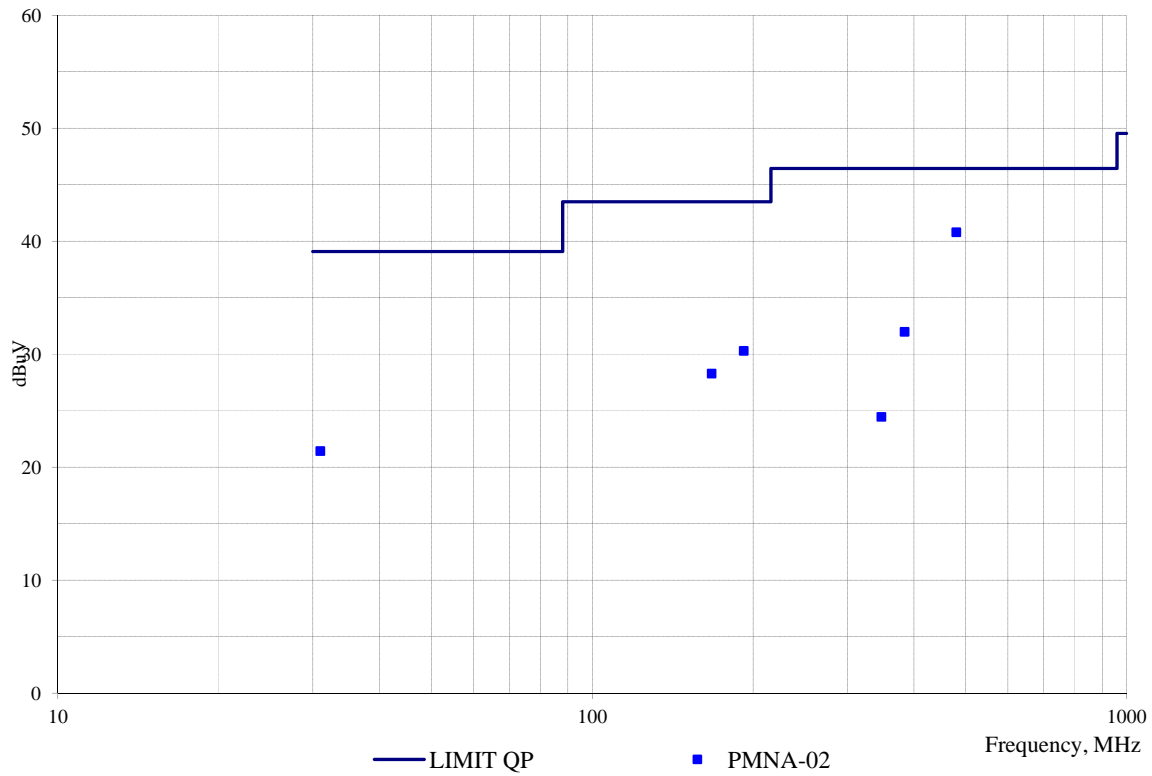
VR = Measured Voltage at the Receiver (Reading)

AF = Antenna Factor

CL = Cable Loss



### MEASUREMENT OF DISTURBANCE RADIATION



Note :