



# EMC TEST REPORT

(Certification of Compliance)

CFR 47 Part 15 Subpart B

Test Report File No.	13-IST-0050	<input checked="" type="checkbox"/> Basic	<input type="checkbox"/> Alternate
Date of Receipt	Dec 27, 2012	Begin of test date	Jan 07, 2013
Date of Issue	Jan 16, 2013	End of test date	Jan 14, 2013

Kind of Product	Serialgate
Basic Model (s)	SG-1010w/ALL
Buyer Model (s)	-

Applicant / Manufacturer	SystemBase Co., Ltd.
Address	16F, Daerung Post Tower-1, 212-8, Guro-dong, Seoul, Korea

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

**Positive**

**Negative**

Tested By

Reviewed By

J.H. PARK

S.J. CHO

**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 22 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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■ Test Conditions and Data - Emissions			
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Note:



IST Co., Ltd.  
TEST REPORT NO. : 13-IST-0050

## 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 & FCC (DoC) Designation No. : KR0018  
FCC Registration No. : 400603  
VCCI Member No. : 1739



## POWER SUPPLY SYSTEM USED

Power supply system AC 120 V, 60 Hz  
(Refer to the product information)

## Measurement Uncertainty

Conducted Emissions	$U = 2.86$ [dB] (Confidence level approximately 95 %, $k = 2$ )
Radiated Emissions (Antenna - Horizontal)	$U = 2.90$ [dB] (Confidence level approximately 95 %, $k = 2$ )
Radiated Emissions (Antenna - Vertical)	$U = 3.75$ [dB] (Confidence level approximately 95 %, $k = 2$ )

## PRODUCT INFORMATION

Adapter Power	IN PUT : 100~240 (Vac) 50/60 (Hz) 1.8 A OUT PUT : 12 V 1000mA 12VA
LAN Port	10/100 Mbps RJ-45 Port * 1EA
Number of serial port	2 port (RS232/RS422/RS485)
serial Max Speed	Max 921.6 Kbps
Signal	Port1 : TX, RX, DTR, DSR, RTS, CTS, DCD Port2 : TX, RX, RTS, CTS
Size	80.9 (W) * 110.5 (L) * 24.3 (H) mm
Weight	256 g
Clock Freq.	Max. 400 MHz

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



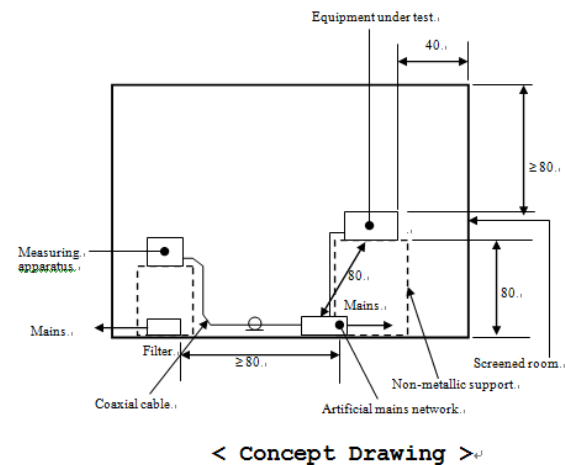
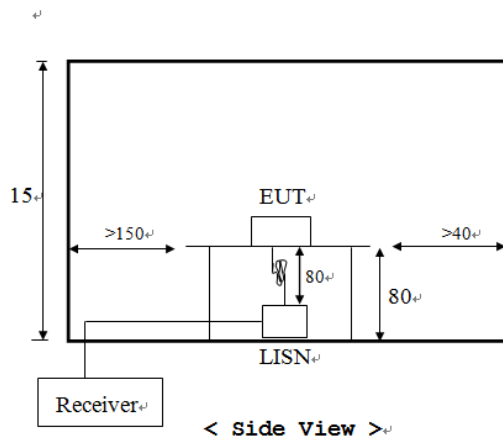
## DESCRIPTIONS OF TEST

### Conducted Emissions:

The measurement were performed over the frequency range of 0.15 MHz to 30 MHz using a  $50 \Omega/50\mu\text{H}$  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 R/S ESH2-Z5 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.





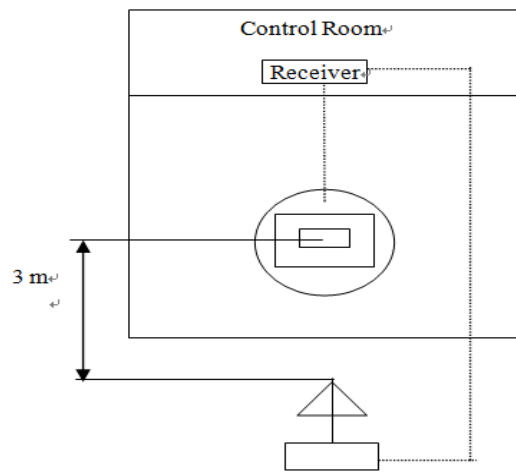
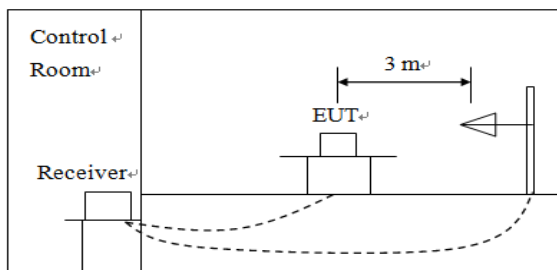
## DESCRIPTION OF TEST

### 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-log 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 1000 MHz using S/B bi-log antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used. Final measurements were made at open site with 3-meters test distance using S/B bi-log 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 :  Serialgate Test Program

**Configuration of the equipment under test :**

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

Equipment	Type	Brand	Serial No.
Srialgate[EUT]	SG-1010w/ALL	SystemBase Co., Ltd	N/A
Adapter[EUT]	SWPP-12001000 -US/JPA1	POWER-TEK	N/A
NoteBook PC	LVK-TP00003B	LENOVO	R9-KV905 11/12
Adapter	42T4432	LENOVO	N/A

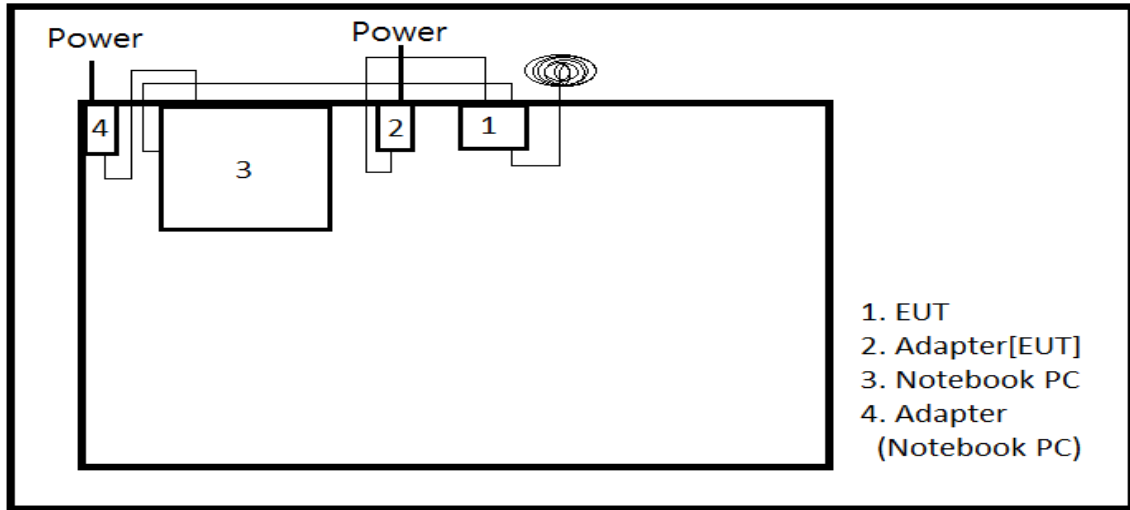
Connecting Interface Cables :

- Unshielded Adapter Cable : 1.5 m
- Unshielded AC Power Cable : 1.8 m
- Unshielded DC Power cable : 1.8 m
- Unshielded LAN Cable : 4.0 m
- Unshielded RS422/RS485 Cable : 4.0 m

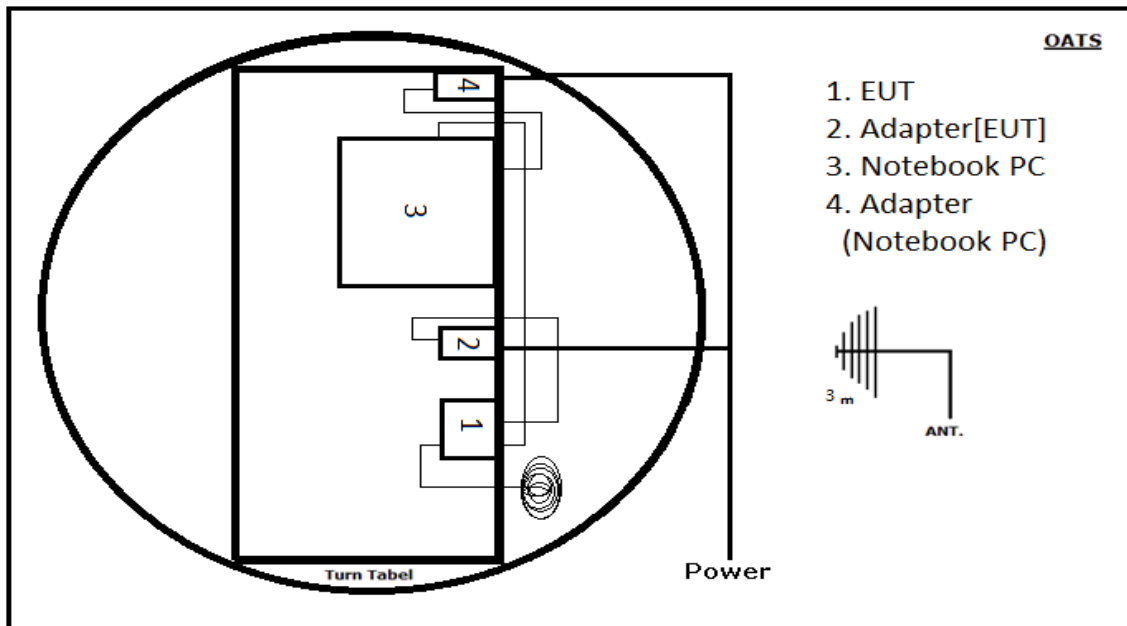
Note :



## Test Set-Up



## Conducted Emissions



## Radiated Emissions



## SUMMARY

### Emissions

#### ■ Conducted Emission

The requirements are  MET  Not MET  
Minimum limit margin 16.52 dB at 2.142 MHz  
Maximum limit exceeding

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

#### ■ Radiated Emission(Limits Below 1 GHz)

The requirements are  MET  Not MET  
Minimum limit margin 4.06 dB at 661.466 MHz  
Maximum limit exceeding

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

#### ■ Radiated Emission(Limits above 1 GHz)

The requirements are  MET  Not MET  
Minimum limit margin 14.26 dB at 1.980 GHz  
Maximum limit exceeding

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





## Sample Calculation

### Conducted Emission

#### Sample Signal Strength Calculation

$$S(\text{Result}) = \text{Measurement} + \text{IL} + \text{CL}$$

$$\text{Margin} = \text{Limit} - S(\text{Result})$$

$$S(\text{Result}) = \text{Signal Strength}$$

$$\text{Measurement} = \text{Voltage at the Receiver}$$

$$\text{IL} = \text{LISN Insertion Loss}$$

$$\text{CL} = \text{Cable Loss}$$

For example at 15.402 MHz if the measured voltage is 45.35 dBuV, the Cable loss is 0.15 dB, the insertion loss is 0.74 dB, the signal strength would be calculated:

$$S(\text{Result}) = 45.35 + 0.15 + 0.74 = 46.24 \text{ dBuV}$$

$$\text{Margin} = 60 \text{ dBuV} - 46.24 \text{ dBuV} = 13.76 \text{ dB}$$

### Radiated Emission

#### Sample Field Strength Calculation

$$FS(\text{Result}) = \text{Reading} + \text{AF} + \text{CL}$$

$$\text{Margin} = \text{Limit} - FS(\text{Result})$$

$$FS(\text{Result}) = \text{Field Strength}$$

$$\text{Reading} = \text{Measured Voltage at the Receiver}$$

$$\text{AF} = \text{Antenna Factor}$$

$$\text{CL} = \text{Cable Loss}$$

For example at 240.000 MHz if the measured voltage is 21.70 dBuV with an antenna Distance of 3 meters, the field intensity would be calculated:

$$\text{Limit} [\text{dBuV/m}] = 200 [\text{uV/m}] = 20 \log(200) = 46.00 \text{ dBuV/m}$$

$$FS(\text{Result}) = 21.70 + 10.71 + 2.28 = 34.69 \text{ dBuV/m}$$

$$\text{Margin} = 46.00 \text{ dBuV/m} - 34.69 \text{ dBuV/m} = 11.31 \text{ dB}$$



## TEST CONDITIONS AND DATA

### Conducted Emissions

[Applicable]

#### ◆ Test Equipment Used

Model Name	Description	Manufacture	Due Calibration	Serial No.
ESCI	Test Receiver	Rohde & Schwarz	May 11, 2013	100374
ESH2-Z5	LISN	Rohde & Schwarz	May 11, 2013	842966/007
ESH3-Z2	Pulse Limiter	Rohde & Schwarz	May 11, 2013	357.8810.52

#### ◆ Test Accessories Used

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

#### ◆ Environmental Conditions

Temperature	(16.2 ± 0.3) °C
Humidity	(30.2 ± 0.2) % R.H.
Atmosphere pressure	1018 mbar

◆ Test Program                      See the operation mode on page 6

◆ Test Area                              Conducted Room #2

◆ Test Date                              Jan 08, 2013

Note :

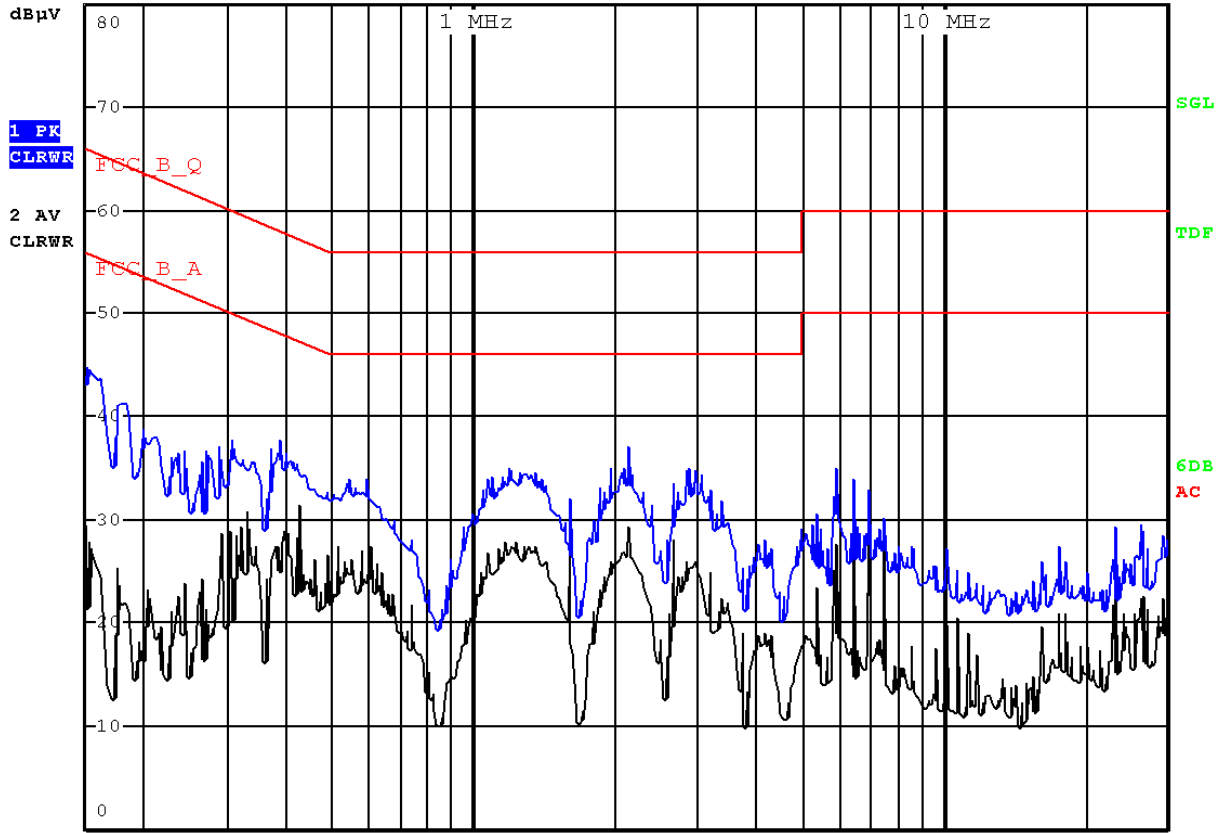


### Conducted Emissions



RBW 9 kHz  
MT 160 ms  
PREAMP OFF

Att 10 dB



150 kHz Model Name : SG-1010W/ALL 120 Vac 60 Hz Phase : Live 30 MHz

Freq. [MHz]	Measurement [dB µV]		Limit [dB µV]		Insertion Loss [dB]	Cable Loss [dB]	Result [dB µV]		Margin [dB]	
	Q-peak	Average	Q-peak	Average			Q-peak	Average	Q-peak	Average
0.162	40.18	24.96	65.36	55.36	0.15	0.03	40.36	25.14	25.00	30.22
0.386	34.22	27.88	58.15	48.15	0.16	0.05	34.43	28.09	23.72	20.06
1.270	32.18	26.76	56.00	46.00	0.20	0.07	32.45	27.03	23.55	18.97
2.142	33.86	29.18	56.00	46.00	0.24	0.07	34.17	29.49	21.84	16.52
2.962	30.45	25.48	56.00	46.00	0.27	0.07	30.79	25.82	25.21	20.18
5.898	30.75	27.65	60.00	50.00	0.38	0.09	31.22	28.12	28.78	21.88

Note :

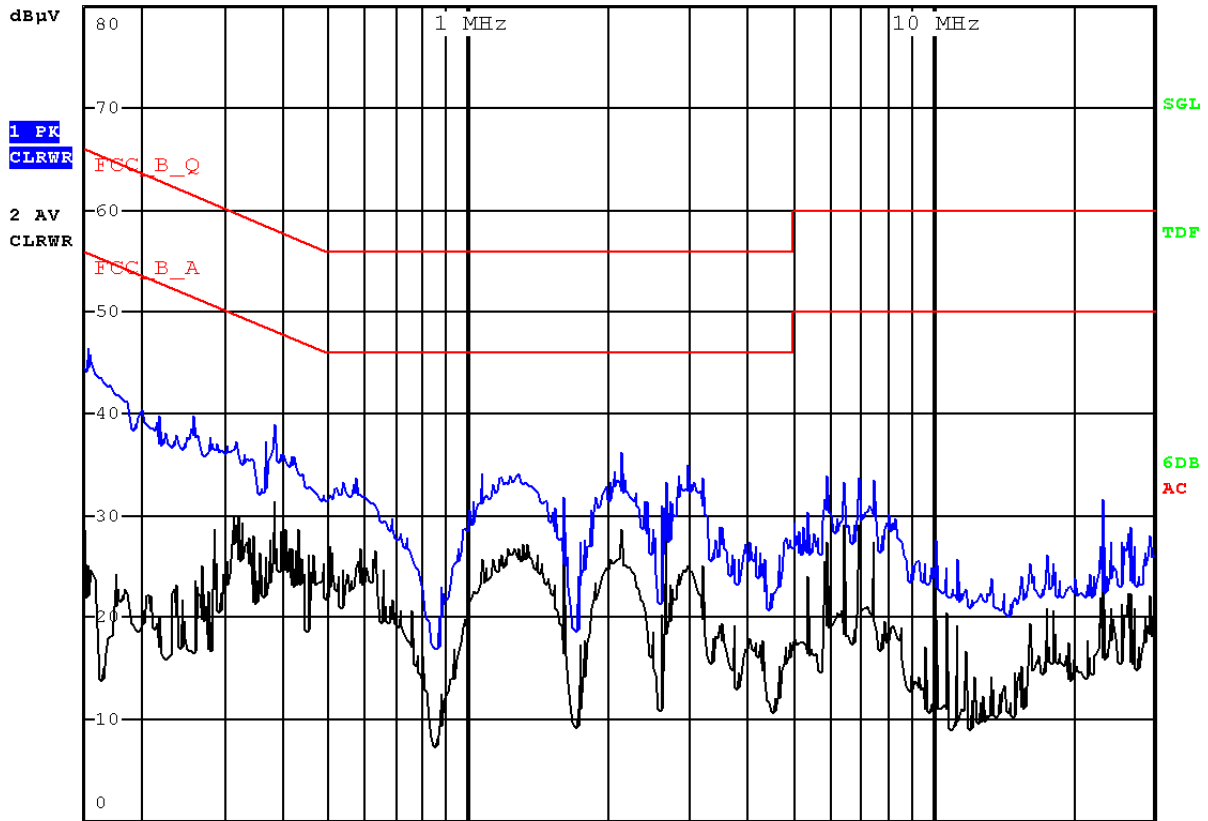


**Conducted Emissions**



RBW 9 kHz  
MT 160 ms  
PREAMP OFF

Att 10 dB



150 kHz 30 MHz  
Model Name : SG-1010W/ALL 120 Vac 60 Hz Phase : Neutral

Freq. [MHz]	Measurement [dB µV]		Limit [dB µV]		Insertion Loss [dB]	Cable Loss [dB]	Result [dB µV]		Margin [dB]	
	Q-peak	Average	Q-peak	Average			Q-peak	Average	Q-peak	Average
0.154	42.35	27.16	65.78	55.78	0.12	0.03	42.50	27.31	23.28	28.47
0.382	35.07	28.94	58.24	48.24	0.13	0.05	35.25	29.12	22.99	19.12
1.282	31.45	26.53	56.00	46.00	0.17	0.07	31.69	26.77	24.31	19.23
2.142	33.65	28.94	56.00	46.00	0.21	0.07	33.93	29.22	22.08	16.79
2.966	29.37	24.68	56.00	46.00	0.24	0.07	29.68	24.99	26.32	21.01
7.506	30.25	27.48	60.00	50.00	0.41	0.11	30.77	28.00	29.23	22.00

Note :



## TEST CONDITIONS AND DATA

### Radiated Emission(Limits below 1GHz)

[Applicable]

#### ◆ Test Equipment Used

Model Name	Description	Manufacture	Due Calibration	Serial No.
ESCS30	Test Receiver	Rohde & Schwarz	May 10, 2013	100171
VULB 9160	Antenna	Schwarzbeck	July 19, 2013	3071

#### ◆ Test Accessories Used

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

#### ◆ Environmental Conditions

Temperature	(-8.0 ± 0.2) °C
Humidity	( 0.0 ± 0.2) % R.H.
Atmosphere pressure	1016 mbar

◆ Test Program                      See the operational condition page 6.

◆ Test Area                            Open Area Test Site #2(3 m)

◆ Test Date                            Jan 07, 2013

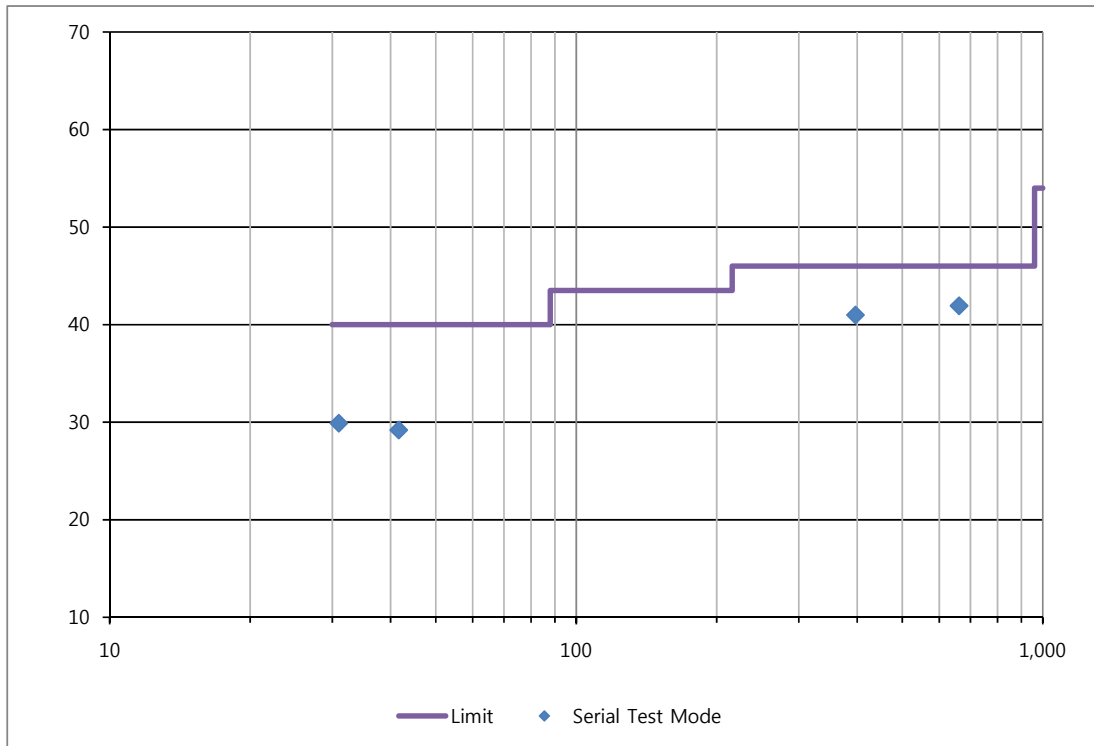
Note :



### 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]
30.970	18.50	10.46	0.94	H	40.00	29.90	10.10
41.640	16.60	11.50	1.10	H	40.00	29.20	10.80
396.660	22.54	15.14	3.31	V	46.00	40.99	5.01
661.466	17.43	19.98	4.53	V	46.00	42.94	4.06



Note : Limits Below 1 GHz (3 m method)



## TEST CONDITIONS AND DATA

### Radiated Emissions (Limits above 1 GHz)

[Applicable]

#### ◆ Test Equipment Used

Model Name	Description	Manufacture	Due Calibration	Serial No.
ESCI7	Test Receiver	Rohde & Schwarz	Jul. 16, 2013	100872
8449B OPT H02	Pre Amplifier	HP	Oct. 11, 2013	3008A0530
3115	Horn Ant.	EMCO	Nov. 21, 2013	9012-3602

#### ◆ Environmental Conditions

Temperature	(17.5 ± 0.2) °C
Humidity	(31.1 ± 0.2) % R.H.
Atmosphere pressure	1016 mbar

◆ Test Program                      See the operational condition page 6..

◆ Test Area                              Full-Anechoic Room (3 m)

◆ Test Date                              Jan 07, 2013

Note:



### Radiated Emissions

(Disturbance Radiation)

[Run normal data during test]

Freq. [GHz]	Reading[dBuV]		Ant. Height [cm]	Polar. [H/V]	Limit[dBuV/m]		Margin [dB]	
	Peak	Average			Peak	Average	Peak	Average
1.250	49.07	32.58	100	H	70.00	50.00	20.93	17.42
1.580	47.27	31.93	100	H	70.00	50.00	22.73	18.07
1.980	47.43	34.35	100	H	70.00	50.00	22.57	15.65
3.210	48.26	36.36	100	H	74.00	54.00	25.74	17.64
5.170	50.53	38.34	100	H	74.00	54.00	23.47	15.66
5.870	51.45	39.22	100	H	74.00	54.00	22.55	14.78
1.450	48.84	34.60	100	V	70.00	50.00	21.16	15.40
1.850	51.21	34.89	100	V	70.00	50.00	18.79	15.11
1.980	49.04	35.74	100	V	70.00	50.00	20.96	14.26
3.220	48.58	37.13	100	V	74.00	54.00	25.42	16.87
3.930	48.71	36.74	100	V	74.00	54.00	25.29	17.26
5.180	50.42	38.85	100	V	74.00	54.00	23.58	15.15

[RX at 2.412GHz]

Freq. [GHz]	Reading[dBuV]		Ant. Height [cm]	Polar. [H/V]	Limit[dBuV/m]		Margin [dB]	
	Peak	Average			Peak	Average	Peak	Average
1.250	50.11	34.99	100	H	70.00	50.00	19.89	15.01
1.580	46.55	32.18	100	H	70.00	50.00	23.45	17.82
1.980	47.74	34.32	100	H	70.00	50.00	22.26	15.68
3.210	47.43	36.38	100	H	74.00	54.00	26.57	17.62
4.460	49.61	37.37	100	H	74.00	54.00	24.39	16.63
5.690	50.72	39.57	100	H	74.00	54.00	23.28	14.43
1.450	48.34	34.69	100	V	70.00	50.00	21.66	15.31
1.980	48.83	35.14	100	V	70.00	50.00	21.17	14.86
2.240	45.90	33.10	100	V	70.00	50.00	24.10	16.90
3.190	49.05	36.69	100	V	74.00	54.00	24.95	17.31
3.880	48.98	36.99	100	V	74.00	54.00	25.02	17.01
5.720	51.09	39.06	100	V	74.00	54.00	22.91	14.94





### Radiated Emissions

(Disturbance Radiation)

**[RX at 2.442GHz]**

Freq. [GHz]	Reading [dBuV]		Ant. Height [cm]	Polar. [H/V]	Limit [dBuV/m]		Margin [dB]	
	Peak	Average			Peak	Average	Peak	Average
1.250	48.81	34.25	100	H	70.00	50.00	21.19	15.75
1.580	46.40	32.01	100	H	70.00	50.00	23.60	17.99
1.980	47.55	34.22	100	H	70.00	50.00	22.45	15.78
3.070	47.86	35.83	100	H	74.00	54.00	26.14	18.17
4.520	50.28	37.38	100	H	74.00	54.00	23.72	16.62
5.700	51.28	39.37	100	H	74.00	54.00	22.72	14.63
1.450	48.06	35.09	100	V	70.00	50.00	21.94	14.91
1.860	45.94	33.30	100	V	70.00	50.00	24.06	16.70
1.980	48.84	35.24	100	V	70.00	50.00	21.16	14.76
3.190	49.02	36.59	100	V	74.00	54.00	24.98	17.41
4.460	49.96	37.75	100	V	74.00	54.00	24.04	16.25
5.770	51.45	39.12	100	V	74.00	54.00	22.55	14.88

**[RX at 2.462GHz]**

Freq. [GHz]	Reading [dBuV]		Ant. Height [cm]	Polar. [H/V]	Limit [dBuV/m]		Margin [dB]	
	Peak	Average			Peak	Average	Peak	Average
1.250	48.81	34.25	100	H	70.00	50.00	21.19	15.75
1.580	46.40	32.00	100	H	70.00	50.00	23.60	18.00
1.980	47.55	34.22	100	H	70.00	50.00	22.45	15.78
3.190	47.61	36.70	100	H	74.00	54.00	26.39	17.30
4.520	50.28	37.38	100	H	74.00	54.00	23.72	16.62
5.700	51.28	39.37	100	H	74.00	54.00	22.72	14.63
1.450	48.15	34.18	100	V	70.00	50.00	21.85	15.82
1.650	47.90	32.72	100	V	70.00	50.00	22.10	17.28
1.980	50.24	35.77	100	V	70.00	50.00	19.76	14.23
3.170	48.21	36.72	100	V	74.00	54.00	25.79	17.28
5.000	51.93	37.73	100	V	74.00	54.00	22.07	16.27
5.710	50.96	39.26	100	V	74.00	54.00	23.04	14.74

Note : Limits above 1 GHz (3 m method)