



EMC TEST REPORT

Electromagnetic Compatibility

☒ Emission ☐ Immunity

Test Report File No.	13-IST-0118	☒ Basic	☐ Alternate
Date of Receipt	Nov. 15, 2012	Begin of test date	Jan. 10, 2013
Date of Issue	Feb. 18, 2013	End of test date	Jan. 17, 2013

Kind of Product	I.V.C System
Basic Model (s)	ACU-M-V01
Buyer Model (s)	ACU-R-V01

Applicant/Manufacturer	UREATac Co., Ltd
Address	974-7, Yangdeok-Dong, Masan Hoewon-Gu, Changwon-si
	Kyungsangnam-Do, Korea

Standard (2004/108/EC)	EN61000-6-2:2005
	EN61000-6-4:2007
	EN61000-3-2:2006 +A1:2009, +A2:2009, EN61000-3-3:2008

Test Result

☒ Positive

☐ Negative

Tested By

Reviewed By

H.S. CHOI

S.J. CHO

Comment(s)

- This test report consists of 44 pages with appendix.
- The test result only responds to the tested sample. This report shall not be reproduced except in full, without the allowance of the test laboratory.



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■ Test Conditions and Data - Immunity

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◆ Variations, Voltage Dips, interruptions	Applicable
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INFORMATION OF TEST LABORATORY

IST Co., Ltd.

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

Kyonggi-Do, 446-599, Korea

TEL : +82 31 326 6700

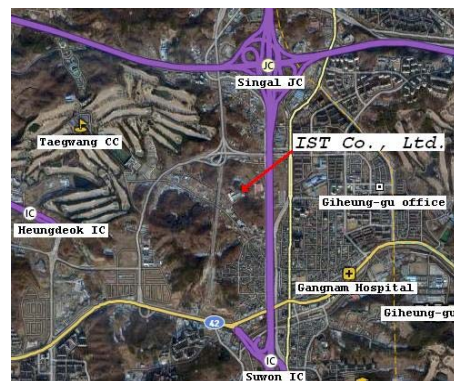
FAX : +82 31 326 6797

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 230 V, 50 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

Frame Material	Stainless Steel (SUS304)
Cage Deflection Temperature (°C)	174 °C
Electric	100 Vac ~ 240 Vac, (50/ 60) Hz, 4.2 A
Cage Material	Polysulfone
Hepa Filter	0.3 μ m, 99.97 %
Internal clock frequency	667 MHz

-EMC suppression device is not used during the test.

-Find information in user manual.



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.
☒ Operational Condition : FAN discharge Operation mode
FAN indraft Operation mode

Configuration of the equipment under test :

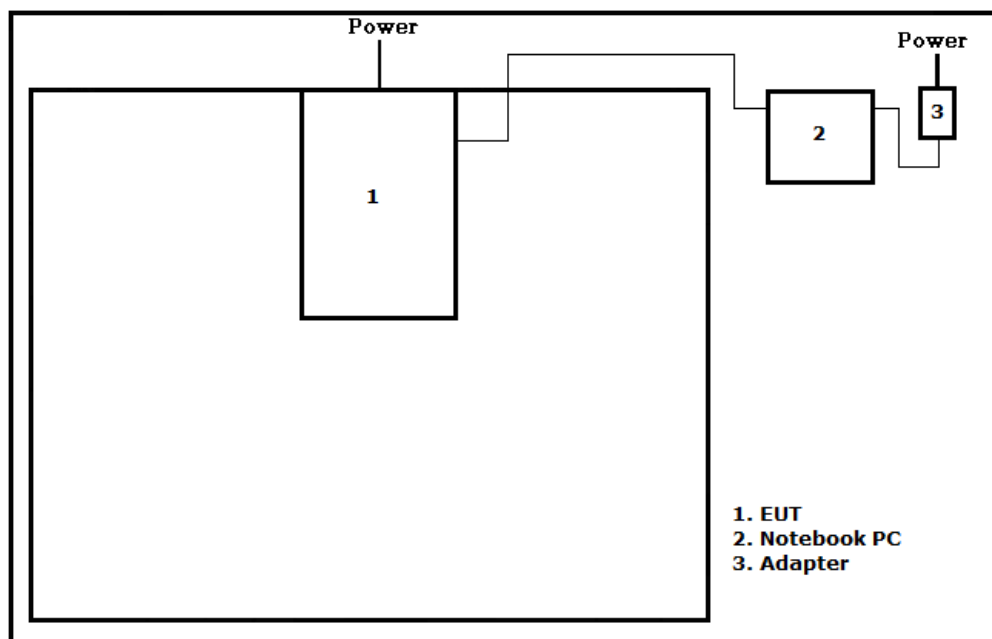
Following peripheral devices and interface cables were connected during the measurement :

Equipment	Type	Brand	Serial No.
Notebook PC	X16-96072	LG electronics	N/A
Adapter	ADP-65JH DB	DELTA ELECTRONICS INC.	68MW2190053

Connecting Interface Cables :

- UnShielded RJ-45 (LAN) cable (with Out ferrite core) : 3.0 m

The drawing of general test setup :





SUMMARY

Emissions

■ Conducted Emissions

The requirements are
Minimum limit margin
Maximum limit exceeding

● MET ○ Not MET ○ N/A
3.44 dB at 26.602 MHz

Remarks: Limits are kept with more than 3 dB margin

■ Radiated Emissions(Limits Below 1 GHz)

The requirements are
Minimum limit margin
Maximum limit exceeding

● MET ○ Not MET ○ N/A
3.40 dB at 193.930 MHz

Remarks: Limits are kept with more than 3 dB margin

■ Radiated Emissions(Limits Above 1 GHz)

The requirements are
Minimum limit margin
Maximum limit exceeding

● MET ○ Not MET ○ N/A
16.21 dB at 1.862 GHz

Remarks: Limits are kept with more than 3 dB margin

Generic Test

■ Harmonic Current

The requirements are

● MET ○ Not MET ○ N/A

■ Voltage Flicker

The requirements are

● MET ○ Not MET ○ N/A

Immunity

- Electrostatic Discharge
- Radiated Electromagnetic Fields
- Electrical Fast Transient (Burst)
- Surge Transient
- Conducted Susceptibility
- Power Frequency Magnetic
- Voltage Dips, interruption

● MET ○ Not MET ○ N/A
● MET ○ Not MET ○ N/A
● MET ○ Not MET ○ N/A
● MET ○ Not MET ○ N/A
● MET ○ Not MET ○ N/A
○ MET ○ Not MET ● N/A
● MET ○ Not MET ○ N/A



TEST CONDITIONS AND DATA

Conducted Emissions

[Applicable]

◆ Test Equipment Used

The test equipment used is calibrated in regular for every year.

Model Name	Description	Manufacture	Due Calibration	Serial No.
ESCI	Test Receiver	Rohde & Schwarz	Jul. 16, 2013	100373
ESH2-Z5	LISN	Rohde & Schwarz	Oct. 10, 2013	842966/014
ESH3-Z2	Pulse Limiter	Rohde & Schwarz	May 11, 2013	357.8810.52
ISN T800	ISN	TESEQ	May 14, 2013	26107

◇ Auxiliary Equipment Used

Model Name	Description	Manufacture	Serial No.
------------	-------------	-------------	------------

◇ Accessories including cables

Name	Length	Port and Descriptions
------	--------	-----------------------

◆ Environmental Conditions

Temperature	(20.1± 0.2) °C
Humidity	(37.0 ± 0.1) % R.H.
Atmosphere pressure	1020 mbar

◆ Test Program See the operation mode on page 4.

◆ Test Area Conducted Room #1

◆ Test Date Jan. 10, 2013

Note :



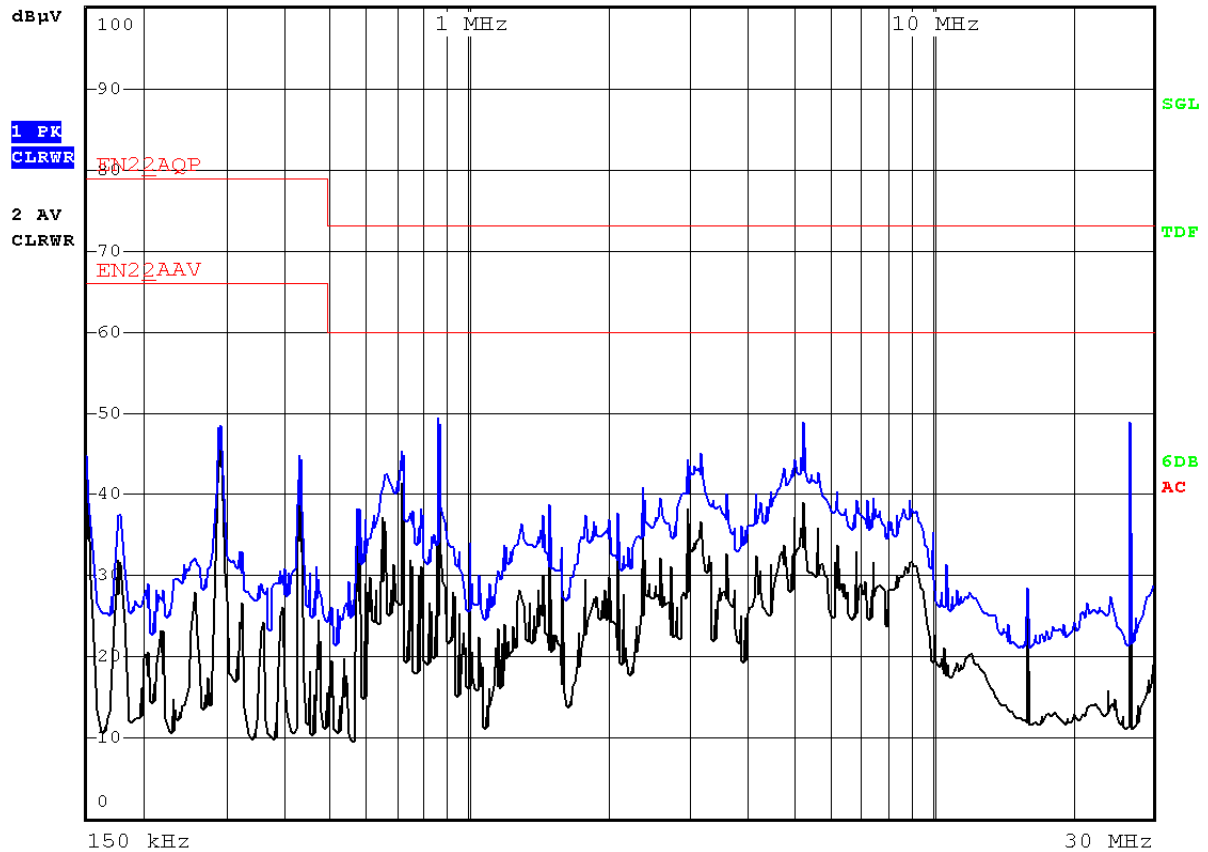
Conducted Emissions

<Live>



RBW 9 kHz
MT 160 ms
PREAMP OFF

Att 10 dB



Model Name : ACU-M-V01 230 Vac 50 Hz Phase : Live

Freq. [MHz]	Measurement [dB μ V]		Limit [dB μ V]		Insertion Loss	Cable Loss	Result [dB μ V]		Margin [dB]	
	Q-peak	Average	Q-peak	Average			Q-peak	Average	Q-peak	Average
0.150	37.64	26.15	79.00	66.00	0.10	0.03	37.77	26.28	41.23	39.72
0.290	44.23	44.34	79.00	66.00	0.10	0.03	44.36	44.47	34.64	21.53
0.430	43.35	42.85	79.00	66.00	0.11	0.04	43.51	43.01	35.49	22.99
0.862	45.87	43.54	73.00	60.00	0.13	0.05	46.05	43.72	26.95	16.28
5.290	37.08	30.57	73.00	60.00	0.26	0.10	37.45	30.94	35.56	29.07
26.602	48.45	30.84	73.00	60.00	0.34	0.23	49.02	31.41	23.98	28.59

Note :



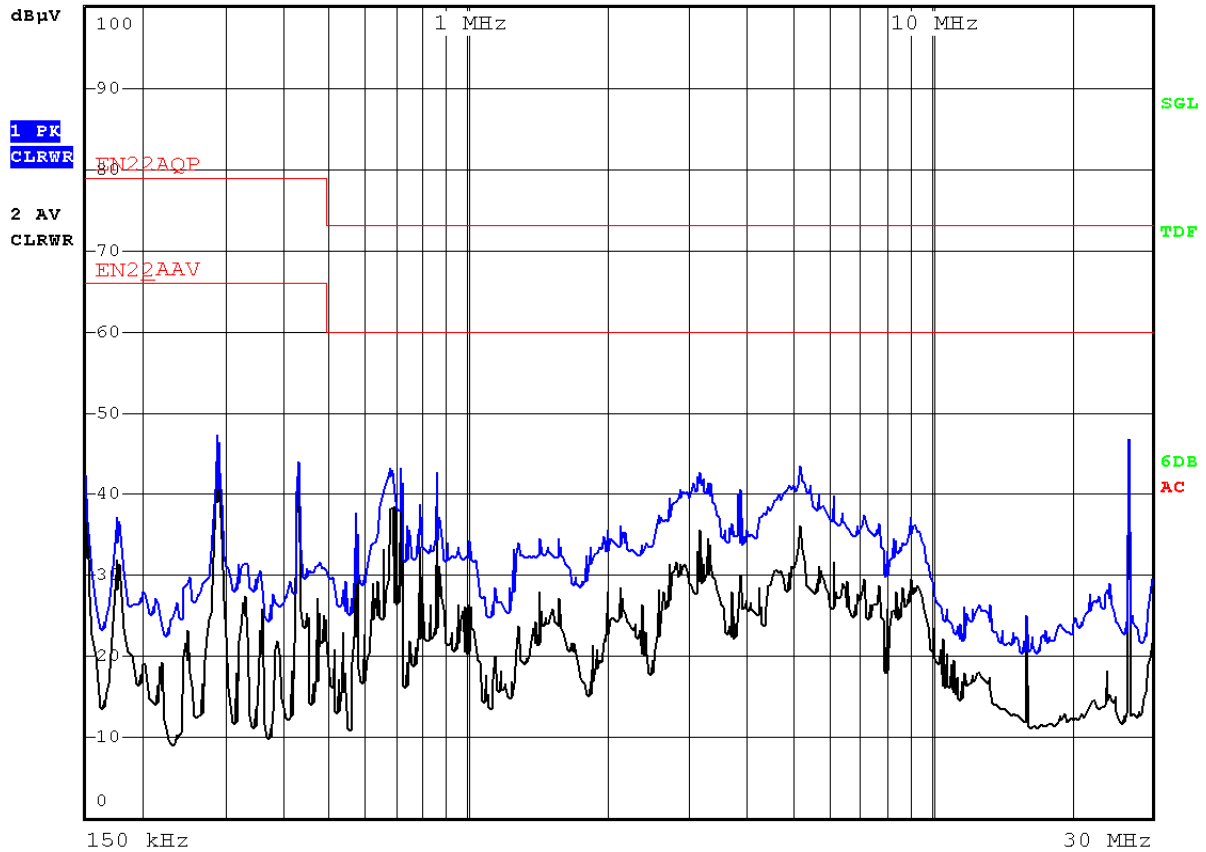
Conducted Emissions

<Neutral>



RBW 9 kHz
MT 160 ms
PREAMP OFF

Att 10 dB



Model Name : ACU-M-V01 230 Vac 50 Hz Phase : Neutral

Freq. [MHz]	Measurement [dB μ V]		Limit [dB μ V]		Insertion Loss [dB]	Cable Loss [dB]	Result [dB μ V]		Margin [dB]	
	Q-peak	Average	Q-peak	Average			Q-peak	Average	Q-peak	Average
0.150	37.28	35.87	79.00	66.00	0.11	0.03	37.42	36.01	41.58	29.99
0.286	46.79	29.57	79.00	66.00	0.12	0.03	46.93	29.71	32.07	36.29
0.430	42.78	42.47	79.00	66.00	0.12	0.04	42.95	42.64	36.05	23.36
0.862	47.26	47.02	73.00	60.00	0.15	0.05	47.46	47.22	25.54	12.78
5.234	41.47	36.48	73.00	60.00	0.28	0.11	41.86	36.87	31.14	23.13
26.602	46.25	46.27	73.00	60.00	0.30	0.23	46.78	46.80	26.22	13.20

Note :



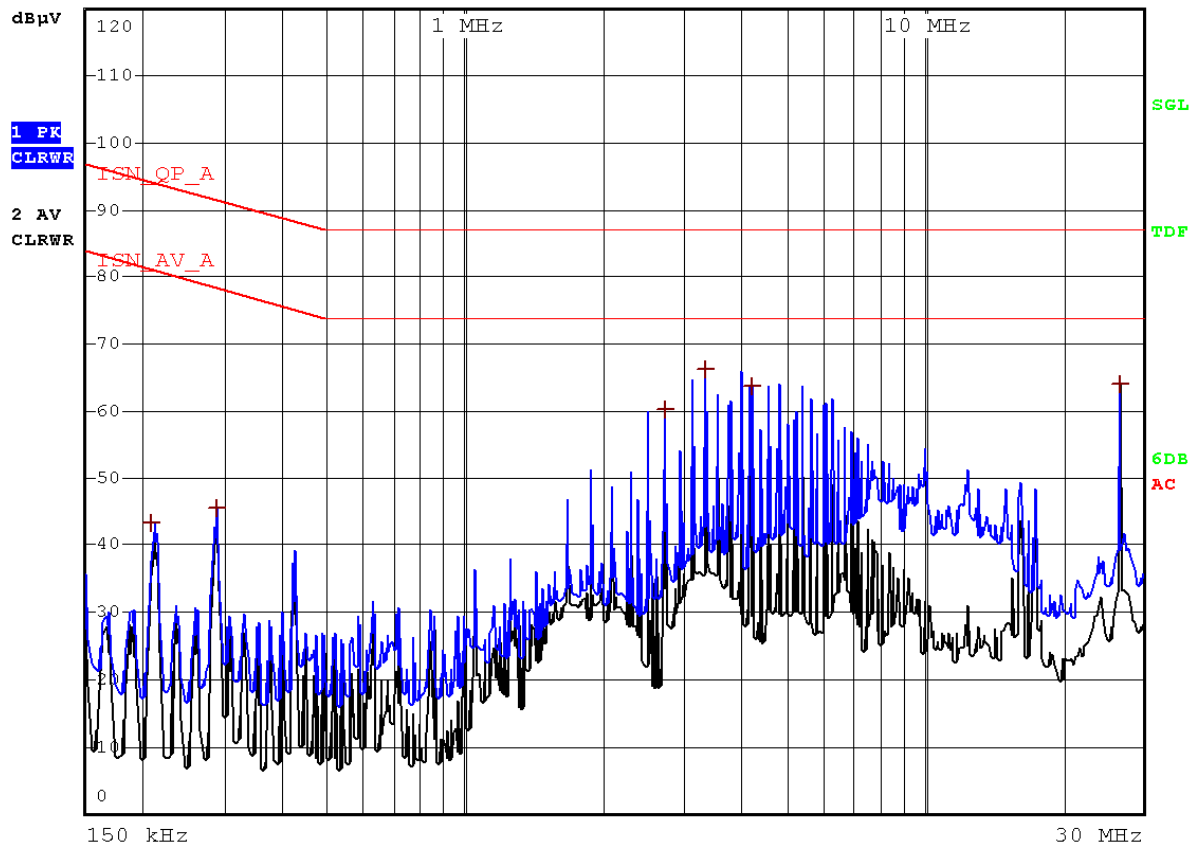
Conducted Emissions

<10 Mbps>



RBW 9 kHz
MT 160 ms
PREAMP OFF

Att 10 dB



Model Name : ACU-M-V01 230 Vac 50 Hz 10 Mbps

Freq. [MHz]	Measurement [dB μ V]		Limit [dB μ V]		Insertion Loss [dB]	Cable Loss [dB]	Result [dB μ V]		Margin [dB]	
	Q-peak	Average	Q-peak	Average			Q-peak	Average	Q-peak	Average
0.210	42.37	40.85	94.21	81.21	9.98	0.02	52.38	50.86	41.83	30.35
0.286	44.47	44.59	91.64	78.64	9.91	0.03	54.40	54.52	37.24	24.12
2.726	60.35	50.07	87.00	74.00	9.87	0.06	70.29	60.01	16.72	14.00
3.358	65.27	54.65	87.00	74.00	9.92	0.08	75.27	64.65	11.73	9.35
4.198	62.65	51.97	87.00	74.00	9.95	0.08	72.68	62.00	14.32	12.00
26.602	63.84	61.09	87.00	74.00	9.24	0.23	73.31	70.56	13.69	3.44

Note : Telecommunication ports(10 Mbps)



TEST CONDITIONS AND DATA

Radiated Emissions(Below 1 GHz)

[Applicable]

◆ Test Equipment Used

The test equipment used is calibrated in regular for every year.

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

◇ Auxiliary Equipment Used

Model Name	Description	Manufacture	Serial No.
------------	-------------	-------------	------------

◇ Accessories including cables

Name	Length	Port and Descriptions
------	--------	-----------------------

◆ Environmental Conditions

Temperature	(-5.5 ± 0.5) °C
Humidity	(41.1 ± 0.8) % R.H.
Atmosphere pressure	1018 mbar

◆ Test Program See the operation mode on page 4.

◆ Test Area Open Test Site #2 (10 m)

◆ Test Date Jan. 11, 2013

Note :



Radiated Emissions

(Disturbance Radiation)

Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Limit [dBuV/m]	Result [dBuV/m]	Margin [dB]
55.220	21.87	11.16	1.27	H	40.00	34.30	5.70
159.980	20.74	13.34	2.12	H	40.00	36.20	3.80
193.930	24.64	9.58	2.38	H	40.00	36.60	3.40
213.330	23.46	9.63	2.51	V	40.00	35.60	4.40

Note :



TEST CONDITIONS AND DATA

Radiated Emissions(Limits above 1 GHz)

[Applicable]

◆ Test Equipment Used

The test equipment used is calibrated in regular for every year.

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	(19.8 ± 1.0) °C
Humidity	(41.1 ± 1.5) % R.H.
Atmosphere pressure	1018 mbar

◆ Test Program See the operation mode on page 4.

◆ Test Area Full-Anechoic Room (3 m)

◆ Test Date Jan. 11, 2013

Note :

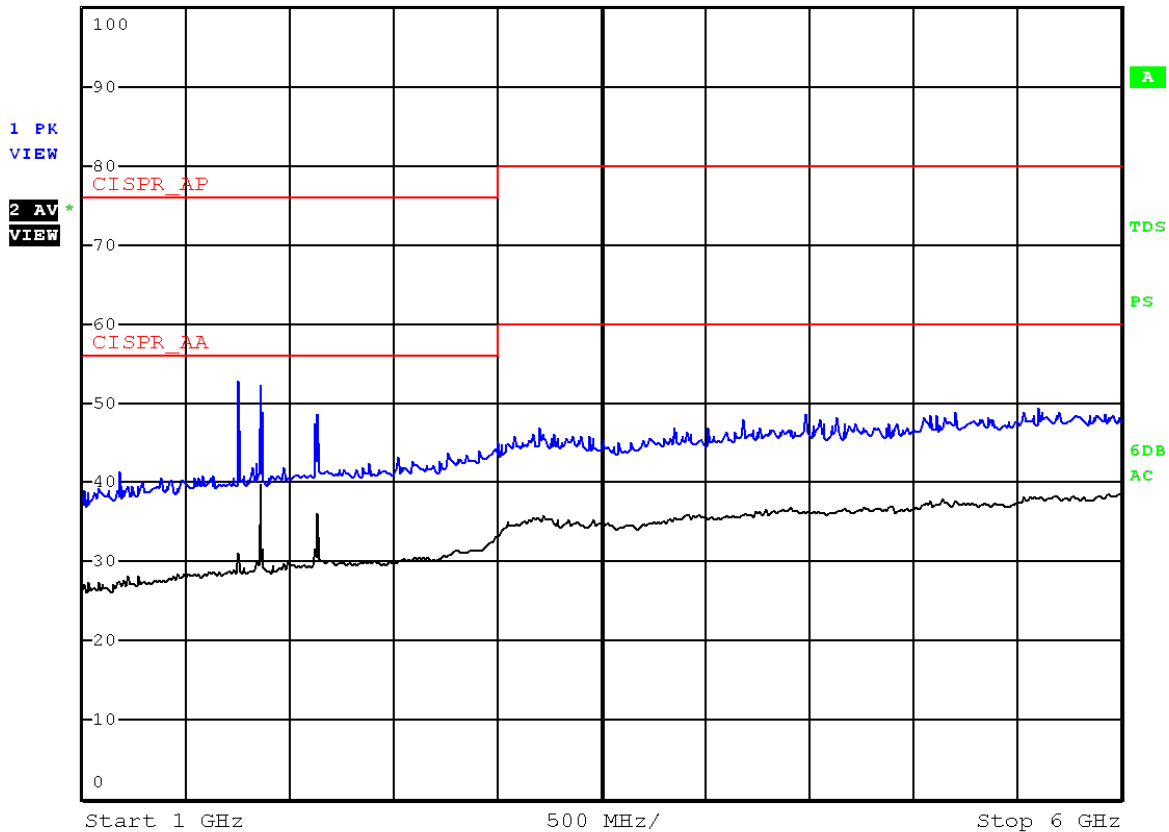


Radiated Emissions

(Disturbance Radiation)



Ref 100 dB μ V/m *Att 10 dB *RBW 1 MHz
*VBW 3 MHz *SWT 70 ms



Model name : ACU-M-V01 230 Vac 50 Hz Hor.

Freq. (GHz)	Reading (dB μ V/m)		Pol. (H/V)	Limits (dB μ V/m)		Margin (dB)	
	Peak	Average		Peak	Average	Peak	Average
1.752	53.02	31.10	H	76.00	56.00	22.98	24.90
1.862	52.43	39.79	H	76.00	56.00	23.57	16.21
2.131	48.61	36.08	H	76.00	56.00	27.39	19.92
4.182	47.97	35.86	H	80.00	60.00	32.03	24.14
4.483	48.57	36.14	H	80.00	60.00	31.43	23.86
5.203	48.91	37.67	H	80.00	60.00	31.09	22.33

End of Data

Note :



Radiated Emissions

(Disturbance Radiation)



*RBW 1 MHz

*VBW 3 MHz

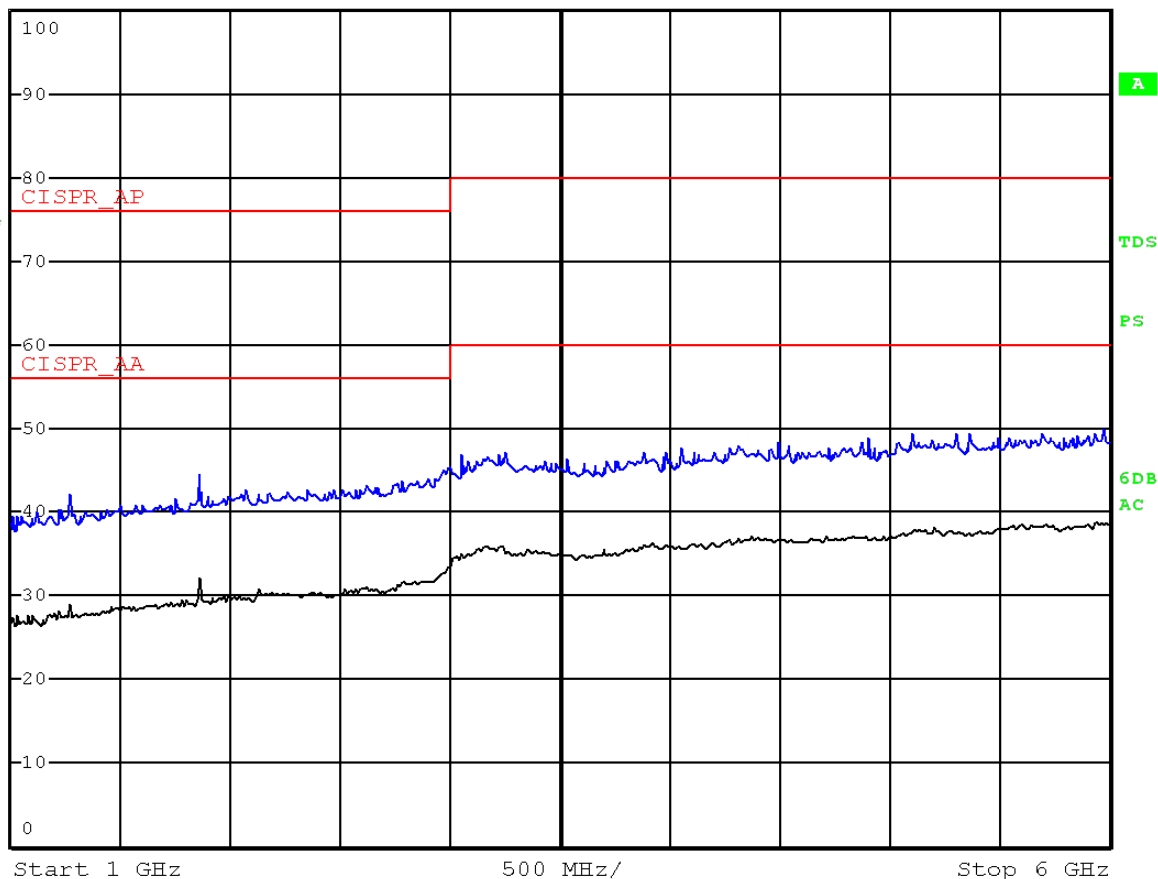
*SWT 70 ms

Ref 100 dBμV/m

*Att 10 dB

1 PK
VIEW

2 AV
VIEW



Model name : ACU-M-V01 230 Vac 50 Hz Ver.

Freq. (GHz)	Reading (dBuV/m)		Pol. (H/V)	Limits (dBuV/m)		Margin (dB)	
	Peak	Average		Peak	Average	Peak	Average
1.271	42.00	29.03	V	76.00	56.00	34.00	26.97
1.863	44.46	32.24	V	76.00	56.00	31.54	23.76
3.052	46.75	34.92	V	80.00	60.00	33.25	25.08
3.251	47.02	35.00	V	80.00	60.00	32.98	25.00
3.883	47.05	36.14	V	80.00	60.00	32.95	23.86
5.105	49.48	37.69	V	80.00	60.00	30.52	22.31

End of Data

Note :



TEST CONDITIONS AND DATA

Harmonic Current/Voltage Flicker

[Applicable]

◆ Test Equipment Used

The test equipment used is calibrated in regular for every year.

Model Name	Description	Manufacturer	Due Calibration	Serial No.
PM6000	Power Analyzer	Voltech	Feb. 9, 2013	100006700213
IEC Standard 555	Impedance Network	Voltech	Feb. 9, 2013	1B0318251
4500L	AC Power Source	California	May 11, 2013	HK51408

◇ Auxiliary Equipment Used

Model Name	Description	Manufacture	Serial No.
------------	-------------	-------------	------------

◇ Accessories including cables

Name	Length	Port and Descriptions
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◆ Environmental Conditions

Temperature	(19.2 ± 0.2) °C
Humidity	(39.4 ± 0.1) % R.H.
Atmosphere pressure	1016 mbar

◆ Test Program See the operation mode on page 4.

◆ Test Area EMI Test Room

◆ Test Date Jan. 15, 2013

Note :



Product: ACU-M-V01		2013 Jan 15 1:45pm
Serial no: N/A		Page 1 of 1
Description:		
Test Date: 2013 Jan 15 1:34pm		
Result Name: ACU-M-V01		
Type of Test: EN61000:2006 Harmonics inc. interharmonics to EN61000-4-7:2002		
Limits: Class A		
Power Analyzer: Voltech PM6000 SN: 100006700213 Firmware version: v1.19.06RC4		
Channel(s):		
1. SN: 090015500856, 25 Adjusted Date:None 2. SN:None Adjusted Date:None		
3. SN:None Adjusted Date:None 4. SN:None Adjusted Date:None		
5. SN:None Adjusted Date:None 6. SN:None Adjusted Date:None		
Shunt(s):		
1. SN: 091024300594, 4 Adjusted Date:None 2. SN:None Adjusted Date:None		
3. SN:None Adjusted Date:None 4. SN:None Adjusted Date:None		
5. SN:None Adjusted Date:None 6. SN:None Adjusted Date:None		
AC Source: Mains / Manual Source		
Harmonic Results Against Chosen Limits:		Notes:
PASS		
Test Parameter Details		
User Entered		Measured
Operating Frequency:	50	50.0000
Operating Voltage:	230	229.4243
Specified Power:	0.0000	91.1467
Fundamental Current:	0.0000	0.4060
Power Factor:	0.0000	0.9142
Average Input Current:		0.4331
Maximum POHC:		0.0115
POHC Limit:		0.2514
Maximum THC:		0.1542
Minimum Power:	75	
Class Multiplier:	1.0000	
Test Duration:	00:02:30	

Note :



Product: ACU-M-V01
Serial no: N/A
Description:
Result Name: ACU-M-V01

2013 Jan 15 1:46pm
Page 1 of 1

Voltech IEC61000-3 Windows Software 1.14.06RC1

Test Date: 2013 Jan 15 1:34pm

Type of Test: Fluctuating Harmonics Test - Worst Case Table (2006)

Power Analyzer: Voltech PM6000 SN: 100006700213 Firmware version: v1.19.06RC4

Channel(s):

1. SN: 090015500856, 25 Adjusted Date:None 2. SN:None Adjusted Date:None

3. SN:None Adjusted Date:None 4. SN:None Adjusted Date:None

5. SN:None Adjusted Date:None 6. SN:None Adjusted Date:None

Shunt(s):

1. SN: 091024300594, 4 Adjusted Date:None 2. SN:None Adjusted Date:None

3. SN:None Adjusted Date:None 4. SN:None Adjusted Date:None

5. SN:None Adjusted Date:None 6. SN:None Adjusted Date:None

AC Source: Mains / Manual Source

Overall Result:

PASS

Notes:

Class Class A

Class Multiplier 1

Harm	Limit 1	Limit 2	Average Reading	<L1 <L2	Max Reading	<L2	Pass FAIL	Harm	Limit 1	Limit 2	Average Reading	<L1 <L2	Max Reading	<L2	Pass FAIL
2	1.0800A	1.6200A	10.52mA	✓ ✓	11.77mA	✓	Pass	3	2.3000A	3.4500A	145.0mA	✓ ✓	145.7mA	✓	Pass
4	430.0mA	645.0mA	4.220mA	✓ ✓	4.660mA	✓	Pass	5	1.1400A	1.7100A	39.95mA	✓ ✓	40.27mA	✓	Pass
6	300.0mA	450.0mA	1.709mA	✓ ✓	2.084mA	✓	Pass	7	770.0mA	1.1550A	21.78mA	✓ ✓	22.06mA	✓	Pass
8	230.0mA	345.0mA	1.211mA	✓ ✓	1.486mA	✓	Pass	9	400.0mA	600.0mA	8.596mA	✓ ✓	8.821mA	✓	Pass
10	184.0mA	276.0mA	1.095mA	✓ ✓	1.356mA	✓	Pass	11	330.0mA	495.0mA	6.151mA	✓ ✓	6.335mA	✓	Pass
12	153.3mA	230.0mA	0.829mA	✓ ✓	1.054mA	✓	Pass	13	210.0mA	315.0mA	6.230mA	✓ ✓	6.404mA	✓	Pass
14	131.4mA	197.1mA	0.663mA	✓ ✓	0.899mA	✓	Pass	15	150.0mA	225.0mA	1.196mA	✓ ✓	1.392mA	✓	Pass
16	115.0mA	172.5mA	0.636mA	✓ ✓	0.871mA	✓	Pass	17	132.3mA	198.5mA	2.213mA	✓ ✓	2.398mA	✓	Pass
18	102.2mA	153.3mA	1.094mA	✓ ✓	1.291mA	✓	Pass	19	118.4mA	177.6mA	0.623mA	✓ ✓	0.900mA	✓	Pass
20	92.00mA	138.0mA	1.160mA	✓ ✓	1.398mA	✓	Pass	21	107.1mA	160.7mA	6.909mA	✓ ✓	7.078mA	✓	Pass
22	83.63mA	125.4mA	1.227mA	✓ ✓	1.419mA	✓	Pass	23	97.82mA	146.7mA	3.018mA	✓ ✓	3.218mA	✓	Pass
24	76.66mA	115.0mA	1.615mA	✓ ✓	1.883mA	✓	Pass	25	90.00mA	135.0mA	1.468mA	✓ ✓	1.659mA	✓	Pass
26	70.76mA	106.1mA	1.455mA	✓ ✓	1.689mA	✓	Pass	27	83.33mA	125.0mA	5.535mA	✓ ✓	5.713mA	✓	Pass
28	65.71mA	98.57mA	1.183mA	✓ ✓	1.369mA	✓	Pass	29	77.58mA	116.3mA	2.547mA	✓ ✓	2.724mA	✓	Pass
30	61.33mA	92.00mA	1.455mA	✓ ✓	1.699mA	✓	Pass	31	72.58mA	108.8mA	1.328mA	✓ ✓	1.501mA	✓	Pass
32	57.50mA	86.25mA	1.358mA	✓ ✓	1.565mA	✓	Pass	33	68.18mA	102.2mA	3.822mA	✓ ✓	3.991mA	✓	Pass
34	54.11mA	81.17mA	1.185mA	✓ ✓	1.392mA	✓	Pass	35	64.28mA	96.42mA	1.475mA	✓ ✓	1.664mA	✓	Pass
36	51.11mA	76.66mA	1.358mA	✓ ✓	1.607mA	✓	Pass	37	60.81mA	91.21mA	1.041mA	✓ ✓	1.290mA	✓	Pass
38	48.42mA	72.63mA	1.270mA	✓ ✓	1.474mA	✓	Pass	39	57.69mA	86.53mA	2.620mA	✓ ✓	2.847mA	✓	Pass
40	46.00mA	69.00mA	1.434mA	✓ ✓	1.647mA	✓	Pass								

Note :



Product:	ACU-M-V01	2013 Jan 15 1:48pm
Serial no:	N/A	Page 1 of 1
Description:		
Result Name:	ACU-M-V01	
Voltech IEC61000-3 Windows Software 1.14.06RC1		Test Date: 2013 Jan 15 1:34pm
Type of Test:	Fluctuating Harmonics Test - Source Qualification (2006)	
Power Analyzer:	Voltech PM6000 SN: 100006700213 Firmware version: v1.19.06RC4	
Channel(s):	1. SN: 090015500856, 25 Adjusted Date:None 2. SN:None Adjusted Date:None 3. SN:None Adjusted Date:None 4. SN:None Adjusted Date:None 5. SN:None Adjusted Date:None 6. SN:None Adjusted Date:None	
Shunt(s):	1. SN: 091024300594, 4 Adjusted Date:None 2. SN:None Adjusted Date:None 3. SN:None Adjusted Date:None 4. SN:None Adjusted Date:None 5. SN:None Adjusted Date:None 6. SN:None Adjusted Date:None	
AC Source:	Mains / Manual Source	
Overall Result:	PASS	

	Nominal	Measured	Deviation	Allowed Deviation	Result
Supply Voltage	230.00V	229.79V	0.21V	4.60V	Pass
Supply Frequency	50.00Hz	49.98Hz	0.02Hz	0.25Hz	Pass
Crest Factor	1.4100	1.4166	0.0066	+/- 0.01	Pass

Harmonic	Reading	Limit	Result	Harmonic	Reading	Limit	Result
2	0.11%	0.20%	Pass	3	0.07%	0.90%	Pass
4	0.04%	0.20%	Pass	5	0.03%	0.40%	Pass
6	0.03%	0.20%	Pass	7	0.04%	0.30%	Pass
8	0.04%	0.20%	Pass	9	0.03%	0.20%	Pass
10	0.02%	0.20%	Pass	11	0.02%	0.10%	Pass
12	0.01%	0.10%	Pass	13	0.01%	0.10%	Pass
14	0.02%	0.10%	Pass	15	0.02%	0.10%	Pass
16	0.01%	0.10%	Pass	17	0.02%	0.10%	Pass
18	0.01%	0.10%	Pass	19	0.01%	0.10%	Pass
20	0.01%	0.10%	Pass	21	0.01%	0.10%	Pass
22	0.01%	0.10%	Pass	23	0.01%	0.10%	Pass
24	0.01%	0.10%	Pass	25	0.01%	0.10%	Pass
26	0.01%	0.10%	Pass	27	0.01%	0.10%	Pass
28	0.01%	0.10%	Pass	29	0.01%	0.10%	Pass
30	0.01%	0.10%	Pass	31	0.01%	0.10%	Pass
32	0.01%	0.10%	Pass	33	0.01%	0.10%	Pass
34	0.01%	0.10%	Pass	35	0.01%	0.10%	Pass
36	0.01%	0.10%	Pass	37	0.02%	0.10%	Pass
38	0.01%	0.10%	Pass	39	0.01%	0.10%	Pass
40	0.01%	0.10%	Pass				



Product:	ACU-M-V01	2013 Jan 15 2:35pm
Serial no:	N/A	Page 1 of 1
Description:		
Result Name:	ACU-M-V01	
Voltech IEC61000-3 Windows Software 1.14.06RC1	Test Date:	2013 Jan 15 2:02pm
Type of Test:	Flickermeter Test - Table	
Power Analyzer:	Voltech PM6000 SN: 100006700213 Firmware Version: v1.19.06RC4	
Channel(s):	1. SN: 090015500856, 25 Adjusted Date:None 2. SN:None Adjusted Date:None 3. SN:None Adjusted Date:None 4. SN:None Adjusted Date:None 5. SN:None Adjusted Date:None 6. SN:None Adjusted Date:None	
Shunt(s):	1. SN: 091024300594, 4 Adjusted Date:None 2. SN:None Adjusted Date:None 3. SN:None Adjusted Date:None 4. SN:None Adjusted Date:None 5. SN:None Adjusted Date:None 6. SN:None Adjusted Date:None	
AC Source:	Mains / Manual Source	
Overall Result:	Notes: Plt test duration only 30 minutes Measurement method - Voltage	
PASS		

	Plt
Limit	0.650
Reading	0.054

	Pst	dc (%)	dmax (%)	d(t) > 3.3%(ms)
Limit	1.000	3.300	4.000	500
Reading 1	0.086	0.002	0.122	0
Reading 2	0.086	0.008	0.146	0
Reading 3	0.086	0.002	0.151	0

Product: ACU-M-V01		2013 Jan 15 3:13pm
Serial no: N/A		Page 1 of 1
Description:		
Result Name: ACU-M-V01		
Voltech IEC61000-3 Windows Software 1.14.06RC1		Test Date: 2013 Jan 15 2:40pm
Type of Test:	Manual Switching - Table	
Power Analyzer:	Voltech PM6000 SN: 100006700213 Firmware Version: v1.19.06RC4	
	Channel(s):	
	1. SN: 090015500856, 25 Adjusted Date:None 2. SN:None Adjusted Date:None	
	3. SN:None Adjusted Date:None 4. SN:None Adjusted Date:None	
	5. SN:None Adjusted Date:None 6. SN:None Adjusted Date:None	
	Shunt(s):	
	1. SN: 091024300594, 4 Adjusted Date:None 2. SN:None Adjusted Date:None	
	3. SN:None Adjusted Date:None 4. SN:None Adjusted Date:None	
	5. SN:None Adjusted Date:None 6. SN:None Adjusted Date:None	
AC Source:	Mains / Manual Source	
Overall Result:	Notes:	
PASS	Measurement method - Voltage	

Average dmax	0.1712	dmax limit	6
--------------	--------	------------	---

Result	dc	dt > dc	dmax	dmax pass / fail	included
1	0.064	0.000	0.223	Pass	✓
2	0.064	0.000	0.191	Pass	✓
3	0.064	0.000	0.194	Pass	✓
4	0.066	0.000	0.108	Pass	✓
5	0.064	0.000	0.108	Pass	✓
6	0.002	0.000	0.095	Pass	✓
7	0.064	0.000	0.140	Pass	✓
8	0.064	0.000	0.134	Pass	✓
9	0.064	0.000	0.166	Pass	✓
10	0.064	0.000	0.206	Pass	✓
11	0.064	0.000	0.201	Pass	✓
12	0.064	0.000	0.238	Pass	✓
13	0.064	0.000	0.249	Pass	x
14	0.064	0.000	0.227	Pass	✓
15	0.064	0.000	0.215	Pass	✓
16	0.064	0.000	0.208	Pass	✓
17	0.064	0.000	0.214	Pass	✓
18	0.064	0.000	0.189	Pass	✓
19	0.064	0.000	0.185	Pass	✓
20	0.064	0.000	0.154	Pass	✓
21	0.066	0.000	0.102	Pass	✓
22	0.066	0.000	0.092	Pass	x
23	0.066	0.000	0.131	Pass	✓
24	0.064	0.000	0.137	Pass	✓



TEST CONDITIONS AND DATA

Electrostatic Discharge

[Applicable]

◆ Test Equipment Used

The test equipment used is calibrated in regular for every year.

Model Name	Description	Manufacture	Due Calibration	Serial No.
ESS-2000	ESD Simulator	NoiseKen	Jul. 17, 2013	ESS0442747
TC-815P	ESD Tip	NoiseKen	Jul. 17, 2013	ESS0442694

◇ Auxiliary Equipment Used

Model Name	Description	Manufacture	Serial No.
------------	-------------	-------------	------------

◇ Accessories including cables

Name	Length	Port and Descriptions
------	--------	-----------------------

◆ Environmental Conditions

Temperature	(20.2 ± 0.2) °C
Humidity	(38.0 ± 0.1) % R.H.
Atmosphere pressure	1010 mbar

◆ Test Program See the operation mode on page 4.

◆ Test Area EMS Test Room

◆ Test Date Jan. 14, 2013

Note :



Electrostatic Discharge(ESD)

[Applicable]

◆ Test Specification:

Discharge Voltage (Air): ☒ 2 kV ☐ 6 kV ☐ 15 kV
☒ 4 kV ☒ 8 kV ☐ kV

Discharge Voltage : ☐ 2 kV ☐ 6 kV ☐ kV
(Contact) ☒ 4 kV ☐ 8 kV

Discharge Impedance: ☒ 330 Ω / 150 pF ☐ 150 Ω / 150 pF

Discharge Repetition Rate : ☒ 1 s

Number of Discharges: ☒ ≥ 10 times at all locations (Air discharge)
☒ ≥ 25 times at all locations (Contact discharge)

Kind of Discharges: ☒ Air discharge ☒ Contact discharge
☒ Direct ☒ Indirect (HCP/VCP)

Polarity: ☒ Positive ☒ Negative

Location of Discharge: ☒ Each location on the surface accessible by hand
☒ See drawing in page 33-34

◆ Result

☒ No degradation of function	Met Criterion A
☐ Distortion of function	Met Criterion B
☐ Error of function	Met Criterion C
☐ Loss of function	Unrecoverable Failure

Note : During the performed test there was no change and damage of operation mode.



Electrostatic Discharge (ESD)

List of ESD Points

Discharge Voltage (V) Test Point	Test Result (s)		
	±2 kV	±4 kV	±8 kV
HCP (C)	-	A	-
VCP (C)	-	A	-
Front Surface (C)	-	A	-
Front panel/Buttons (A)	A	A	A
Rear Surface/Screw (C)	-	A	-
Side Surface/Port (C)	-	A	-

(A): Air Discharge (C): Contact Discharge

Note :



TEST CONDITIONS AND DATA

Radiated Susceptibility

[Applicable]

◆ Test Equipment Used

The test equipment used is calibrated in regular for every year.

Model Name	Description	Manufacture	Due Calibration	Serial No.
SML03	Signal Generator	Rohde & Schwarz	May 10, 2013	102212
NRVD	Power Meter	Rohde & Schwarz	May 10, 2013	101242
NRV-Z51	Power Sensor	Rohde & Schwarz	May 10, 2013	100330
NRV-Z51	Power Sensor	Rohde & Schwarz	May 10, 2013	100331
HL046	Log-periodic Ant.	Rohde & Schwarz	-	100030
AT4002A	Microwave Horn Ant.	Amplifier Research	-	312314
AR500W	Amplifier	Amplifier Research	-	19701

◇ Auxiliary Equipment Used

Model Name	Description	Manufacture	Serial No.
------------	-------------	-------------	------------

◇ Accessories including cables

Name	Length	Port and Descriptions
------	--------	-----------------------

◆ Environmental Conditions

Temperature	(19.0 ± 0.2) °C
Humidity	(42.7 ± 0.1) % R.H.
Atmosphere pressure	1021 mbar

◆ Test Program See the operation mode on page 4.

◆ Test Area Full anechoic chamber

◆ Test Date Jan. 16, 2013

Note :



Radiated Susceptibility

[Applicable]

◆ Test Specification

Frequency Range: ☒ 80 MHz - 1 GHz (10 V/m) ☒ 1.4 GHz - 2 GHz (3 V/m)
☒ 2 GHz - 2.7 GHz (1 V/m)

Field Strength: ☒ 1 V/m ☒ 3 V/m
☒ 10 V/m ☐ V/m

Distance Antenna - EUT: ☐ 1 m ☒ 3 m

Modulation: ☒ AM : 80 %
☐ FM : kHz dev.
☒ Sine wave: 1 kHz
☐ Unmodulated
☐ Pulse : Hz
☐ Duty Cycle: %

Step: ☐ ≤ 0.0015 decades/s
☐ 1 % / 3 s ☒ log 1 % / 3 s

Polarization of Antenna: ☒ Horizontal ☒ Vertical

Position ☒ Front ☒ Left
☒ Right ☒ Rear

◆ Result

☒ No degradation of function	Met Criterion A
☐ Distortion of function	Met Criterion B
☐ Error of function	Met Criterion C
☐ Loss of function	Unrecoverable Failure

Note : During the performed test there was no change and damage of operation mode.



TEST CONDITIONS AND DATA

Electrical Fast Transient

[Applicable]

◆ Test Equipment Used

The test equipment used is calibrated in regular for every year.

Model Name	Description	Manufacture	Due Calibration	Serial No.
PHV41.2	Burst Generator	Heafely	May 11, 2013	083057-18
IP4A	Capacitive Clamp	Heafely	May 11, 2013	083-078-32

◇ Auxiliary Equipment Used

Model Name	Description	Manufacture	Serial No.
------------	-------------	-------------	------------

◇ Accessories including cables

Name	Length	Port and Descriptions
------	--------	-----------------------

◆ Environmental Conditions

Temperature	(20.2 ± 0.2) °C
Humidity	(38.0 ± 0.1) % R.H.
Atmosphere pressure	1010 mbar

◆ Test Program See the operation mode on page 4.

◆ Test Area EMS Test Room

◆ Test Date Jan. 14, 2013

Note :



Electrical Fast Transient (Burst)

[Applicable]

◆ Test Specification

Pulse Amplitude - AC Power Port:	☐ 0.5 kV	☐ 1.0 kV
	☒ 2.0 kV	
Pulse Amplitude - DC Power Port:	☐ 1.0 kV	☐ 2.0 kV
	☐ 4.0 kV	
Pulse Amplitude - Signal/Data	☐ 0.5 kV	☒ 1.0 kV
Non control Port:	☐ 2.0 kV	☐ 0.25 kV
Pulse Amplitude - Process:	☐ 0.5 kV	☐ 1.0 kV
Measurement & Control Port	☐ 2.0 kV	
Burst Frequency:	☐ 2.5 kHz	☒ 5.0 kHz
Time of Coupling:	☒ 60 s	☐ 120 s
Coupling Method:	☒ Coupling/decoupling network	☒ Coupling clamp
Polarity:	☒ Positive	☒ Negative

Location of Coupling:

name of lines:	Power cable	length : 0.5 m
type of lines	☐ shielded	☒ unshielded
status of lines:	☐ passive	☒ active
kind of transmission:	☒ analog	☐ digital

name of lines:	LAN cable	length : 3.0 m
type of lines	☐ shielded	☒ unshielded
status of lines:	☐ passive	☒ active
kind of transmission:	☒ analog	☐ digital

name of lines:		length :
type of lines	☐ shielded	☐ unshielded
status of lines:	☐ passive	☐ active
kind of transmission:	☐ analog	☐ digital

◆ Result :

☒ No degradation of function	Met Criterion A
☐ Distortion of function	Met Criterion B
☐ Error of function	Met Criterion C
☐ Loss of function	Unrecoverable Failure

Note: During the performed test there was no change and damage of operation mode.



TEST CONDITIONS AND DATA

Surge Transient

[Applicable]

◆ Test Equipment Used

The test equipment used is calibrated in regular for every year.

Model Name	Description	Manufacture	Due Calibration	Serial No.
PSURGE 4.1	Surge Generator	Heafely	May 11, 2013	082876-05
IP6.2	COUPLING NETWORK	Heafely	-	082876-02

◇ Auxiliary Equipment Used

Model Name	Description	Manufacture	Serial No.
------------	-------------	-------------	------------

◇ Accessories including cables

Name	Length	Port and Descriptions
------	--------	-----------------------

◆ Environmental Conditions

Temperature	(20.2 ± 0.2) °C
Humidity	(38.0 ± 0.1) % R.H.
Atmosphere pressure	1010 mbar

◆ Test Program See the operation mode on page 4.

◆ Test Area EMS Test Room

◆ Test Date Jan. 14, 2013

Note :



Surge Transient

[Applicable]

◆ Test Specification

Pulse amplitude	☐ 0.5 kV	☒ 1.0 kV : Line to line
- Power line :	☒ 2.0 kV : Line to ground	☐ 4.0 kV
Pulse amplitude	☐ 0.5 kV	☐ 1.0 kV
- Data line :	☐ 2.0 kV	
Source impedance :	☒ 18 μ F : Line to line	☒ 10 Ω + 9 μ F: Line to ground
	☐ 40 Ω + 0.1 μ F	☐ 40 Ω + 0.5 μ F
Number of surges :	☐ 3 surges/angle	☒ 5 surges/polarity
Angle	☒ 0°	☒ 90°
	☒ 180°	☒ 270°
Repetition rate :	☐ 10 s	☒ 60 s
Polarity :	☒ Positive	☒ Negative

Location of Coupling:

name of lines:	Power cable	length : 1.5 m
type of lines	☐ shielded	☒ unshielded
status of lines:	☐ passive	☒ active
kind of transmission:	☒ analog	☐ digital

name of lines:		length :
type of lines	☐ shielded	☐ unshielded
status of lines:	☐ passive	☐ active
kind of transmission:	☐ analog	☐ digital

name of lines:		length :
type of lines	☐ shielded	☐ unshielded
status of lines:	☐ passive	☐ active
kind of transmission:	☐ analog	☐ digital

◆ Result :

☒ No degradation of function	Met Criterion A
☐ Distortion of function	Met Criterion B
☐ Error of function	Met Criterion C
☐ Loss of function	Unrecoverable Failure

Note : During the performed test there was no change and damage of operation mode.



TEST CONDITIONS AND DATA

Conducted Susceptibility

[Applicable]

◆ Test Equipment Used

The test equipment used is calibrated in regular for every year.

Model Name	Description	Manufacture	Due Calibration	Serial No.
SMT 02	Signal Generator	Rohde & Schwarz	Oct. 11, 2013	833414/019
250LM1	Amplifier	Amplifier Research	-	14229
URV5	AC Milivoltmeter	Rohde & Schwarz	Oct. 10, 2013	836671/003
URV-Z2	INSERTION UNIT 50 Ω	Rohde & Schwarz	Oct. 10, 2013	DE105101
URV-Z2	INSERTION UNIT 50 Ω	Rohde & Schwarz	Oct. 10, 2013	DE105102
50FH-006-50	Attenuator	JFW	May 10, 2013	-
FCC-150-50-CDN	(50-150) Ω Adapter	FCC	Oct. 9, 2013	05041
FCC-150-50-CDN	(50-150) Ω Adapter	FCC	Oct. 9, 2013	05042
FCC-801-M3-50	CDN	FCC	May 10, 2013	28
FCC-203I	EM Clamp	FCC	Feb. 7, 2013	2
FCC-205ADC	Decoupling Clamp	FCC	Feb. 7, 2013	1

◇ Auxiliary Equipment Used

Model Name	Description	Manufacture	Serial No.
------------	-------------	-------------	------------

◆ Environmental Conditions

Temperature	(19.4 $\pm$ 0.2) $^{\circ}$ C
Humidity	(35.1 $\pm$ 0.1) % R.H.
Atmosphere pressure	1024 mbar

◆ Test Program See the operation mode on page 4.

◆ Test Area Full anechoic chamber

◆ Test Date Jan. 17, 2013

Note :



Conducted Susceptibility

[Applicable]

◆ Test Specification

Frequency - range : ☐ 0.01 - 150 MHz ☒ 0.15 - 80 MHz
☐ 80 - 230 MHz
Voltage level (EMF) : ☐ 1 V ☒ 3 V
☒ 10 V
Modulation : ☒ AM : 80 % ☐ FM : kHz
☒ Sine wave : 1 kHz ☐ Unmodulated
Frequency step : ☐ 0.015 oct/s ☒ Log 1 %
Dwell Time : ☒ 3 s ☐ 2 s ☐ 1 s

Location of Coupling:

name of lines: Power cable length : 0.5 m
type of lines ☐ shielded ☒ unshielded
status of lines: ☐ passive ☒ active
kind of transmission: ☒ analog ☐ digital

name of lines: LAN cable length : 3.0 m
type of lines ☐ shielded ☒ unshielded
status of lines: ☐ passive ☒ active
kind of transmission: ☒ analog ☐ digital

name of lines: _____ length :
type of lines ☐ shielded ☐ unshielded
status of lines: ☐ passive ☐ active
kind of transmission: ☐ analog ☐ digital

◆ Result :

☒ No degradation of function	Met Criterion A
☐ Distortion of function	Met Criterion B
☐ Error of function	Met Criterion C
☐ Loss of function	Unrecoverable Failure

Note : During the performed test there was no change and damage of operation mode.



TEST CONDITIONS AND DATA

Variations, Voltage Dips, Interruptions

[Applicable]

◆ Test Equipment Used

The test equipment used is calibrated in regular for every year.

Model Name	Description	Manufacture	Due Calibration	Serial No.
PLINE 1610	Dips Generator	Haefely	May 11, 2013	083690-19

◇ Auxiliary Equipment Used

Model Name	Description	Manufacture	Serial No.
------------	-------------	-------------	------------

◇ Accessories including cables

Name	Length	Port and Descriptions
------	--------	-----------------------

◆ Environmental Conditions

Temperature	(20.2± 0.2) °C
Humidity	(38.0 ± 0.1) % R.H.
Atmosphere pressure	1010 mbar

◆ Test Program See the operation mode on page 4.

◆ Test Area EMS Test Room

◆ Test Date Jan. 14, 2013

Note :



Voltage dips/ Interruptions

[Applicable]

◆ Test Specification

Normal Voltage/frequency: ☒ 100 Vac/50 Hz ☒ 230 Vac/50 Hz

Test: ☒ Dips (100 %)
☒ Dips (60 %)
☒ Dips (30 %)
☒ Interruption (100 %)

Event time: ☒ 1 P ☒ 10 P ☒ 25 P ☒ 250 P

Phase: ☒ 0 ° ☐ 45 ° ☐ 90 ° ☐ 135 °
☐ 180 ° ☐ 225 ° ☐ 270 ° ☐ 315 °

◆ Result :

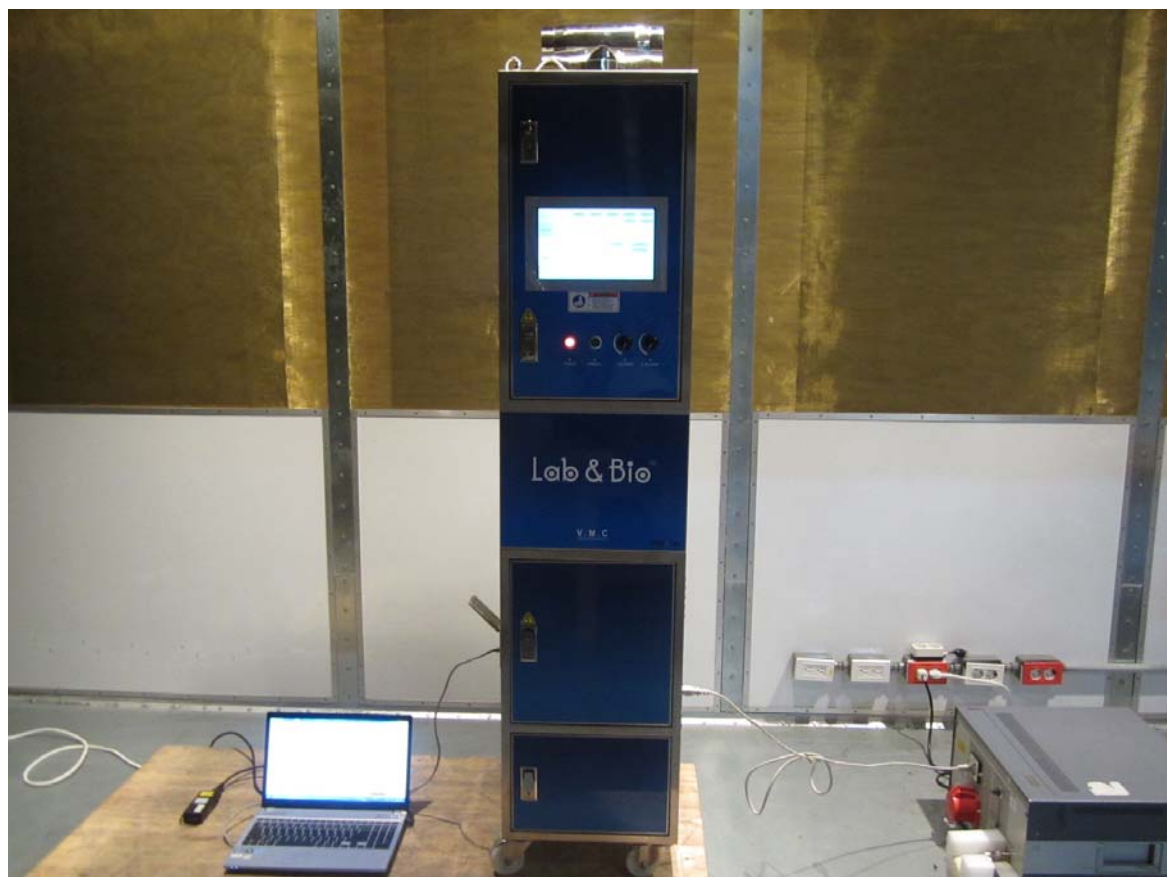
100 Vac, 50 Hz/230 Vac, 50 Hz

Test	Dips (100 %) 1 period	Dips (60 %) 10 period	Dips (30 %) 25 period	Interruptions (100 %) 250 period
Criteria	☒ A ☐ B ☐ C	☒ A ☐ B ☐ C	☒ A ☐ B ☐ C	☒ A ☐ B ☐ C

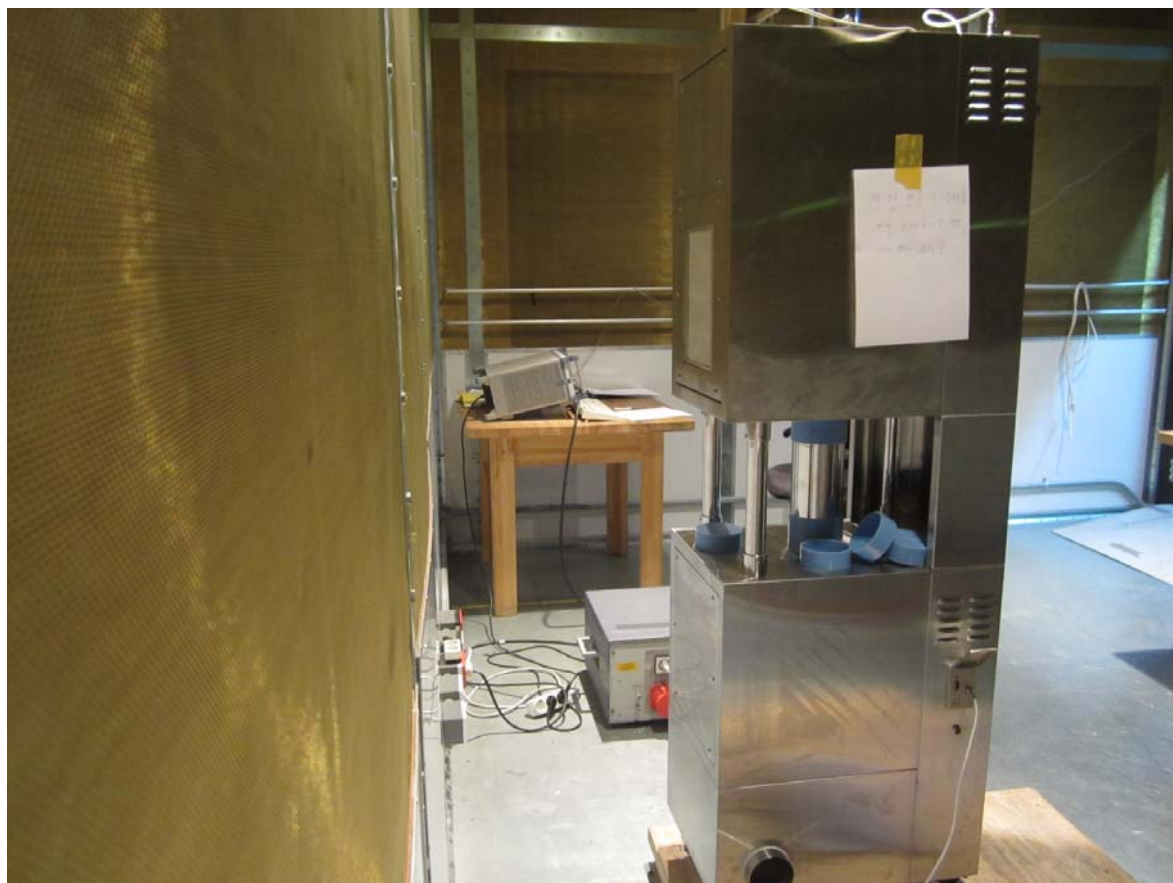
Note: During the performed test there was no change and damage of operation mode.



Appendix A. Test Setup Photos



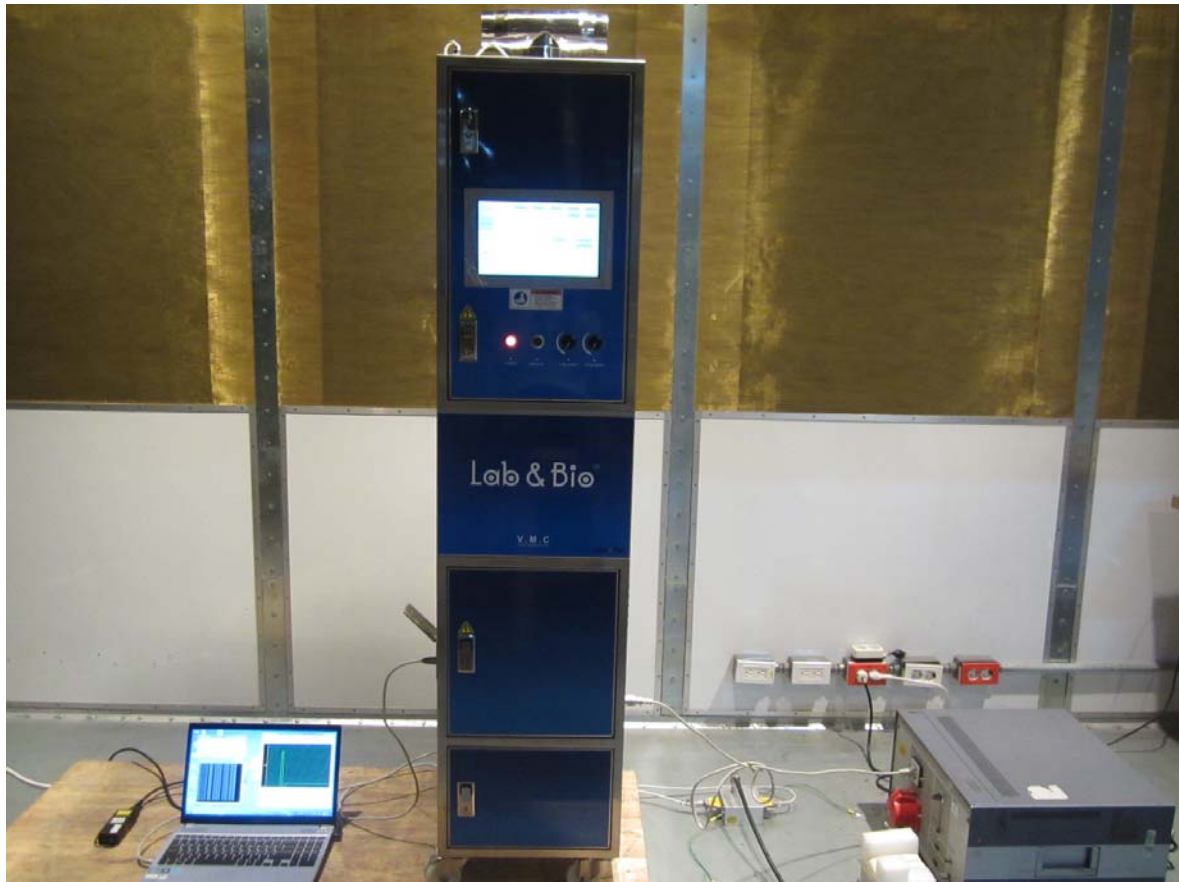
Conducted Emissions(LISN) - Front View



Conducted Emissions(LISN) - Rear View



Appendix A. Test Setup Photos



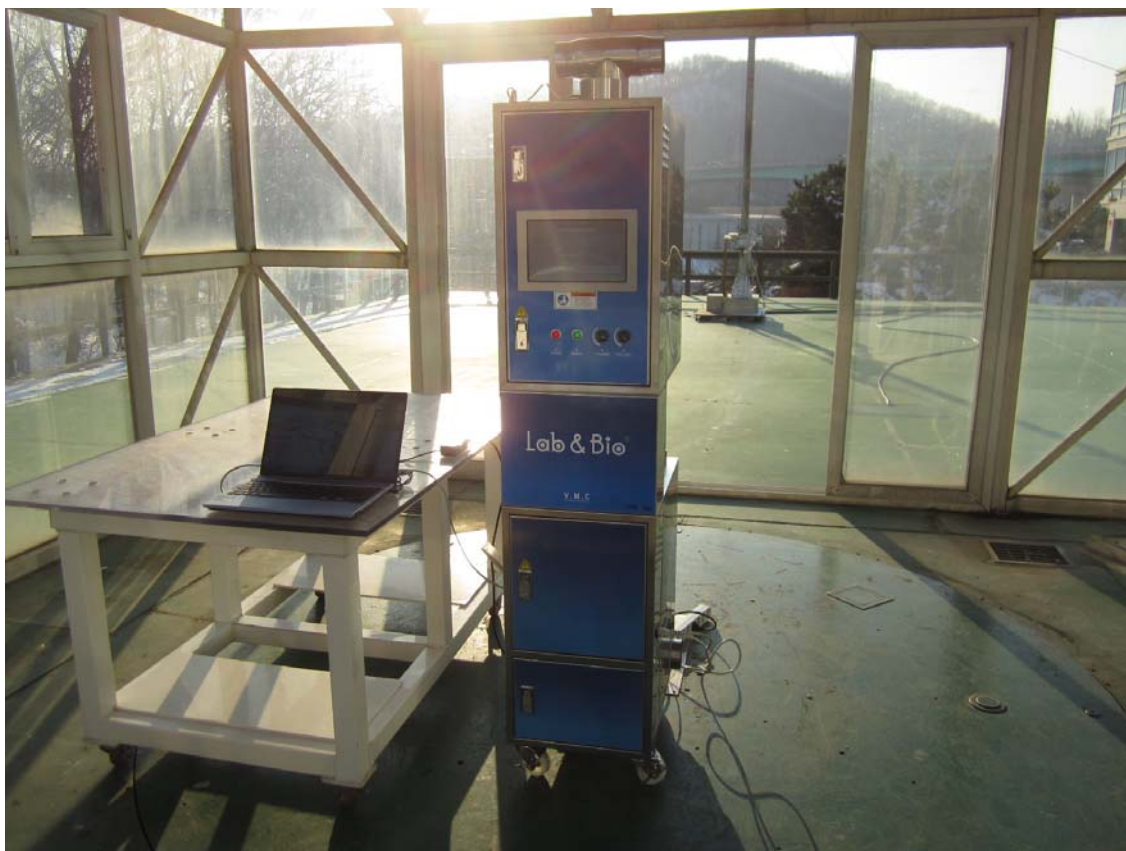
Conducted Emissions(ISN) - Front View



Conducted Emissions(ISN) - Rear View



Appendix A. Test Setup Photos



Radiated Emissions - Front View



Radiated Emissions - Rear View



Appendix A. Test Setup Photos



H&F



Electro-Static Discharge



Appendix A. Test Setup Photos



Radiated Susceptibility



Electrical Fast Transient



Appendix A. Test Setup Photos



Surge Transient



Conducted Susceptibility



Appendix A. Test Setup Photos



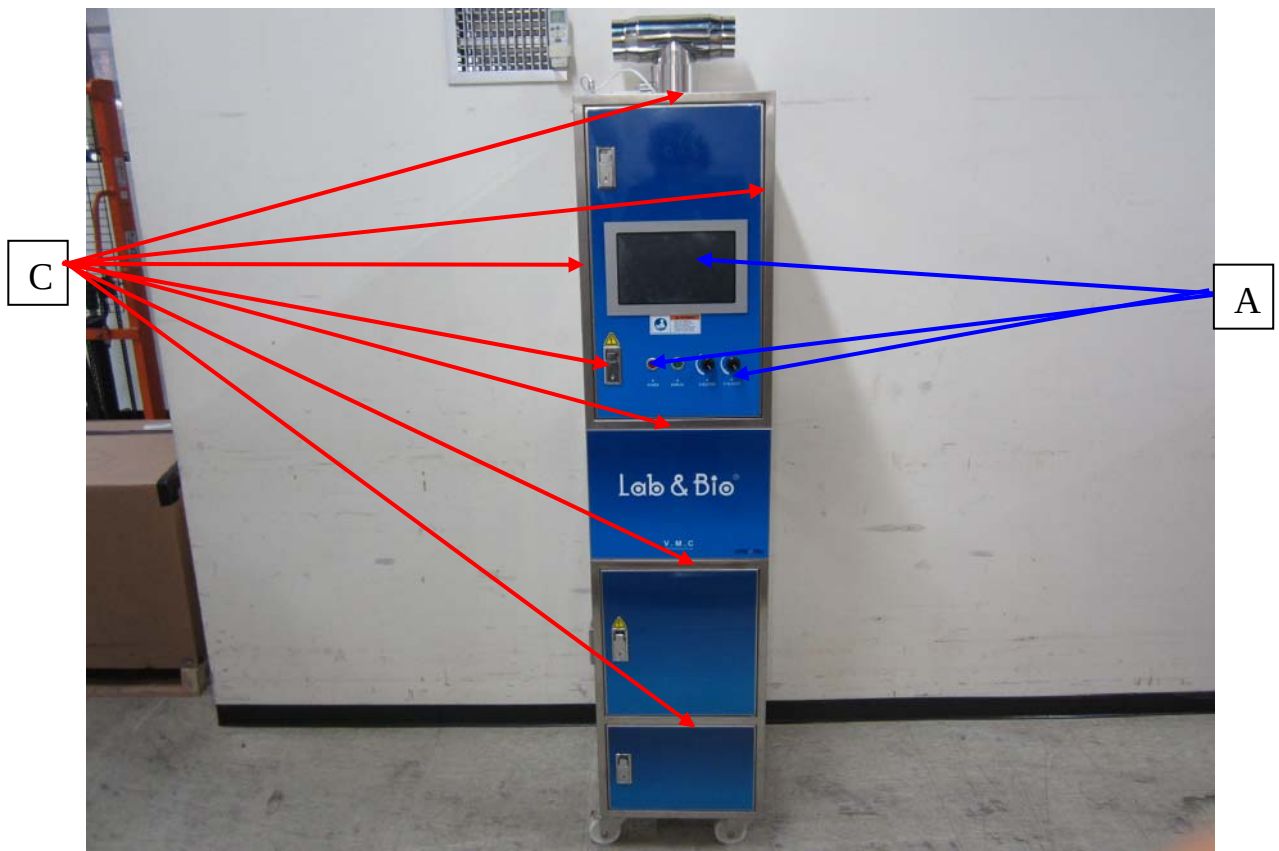
Variations, Voltage Dips, Interruptions



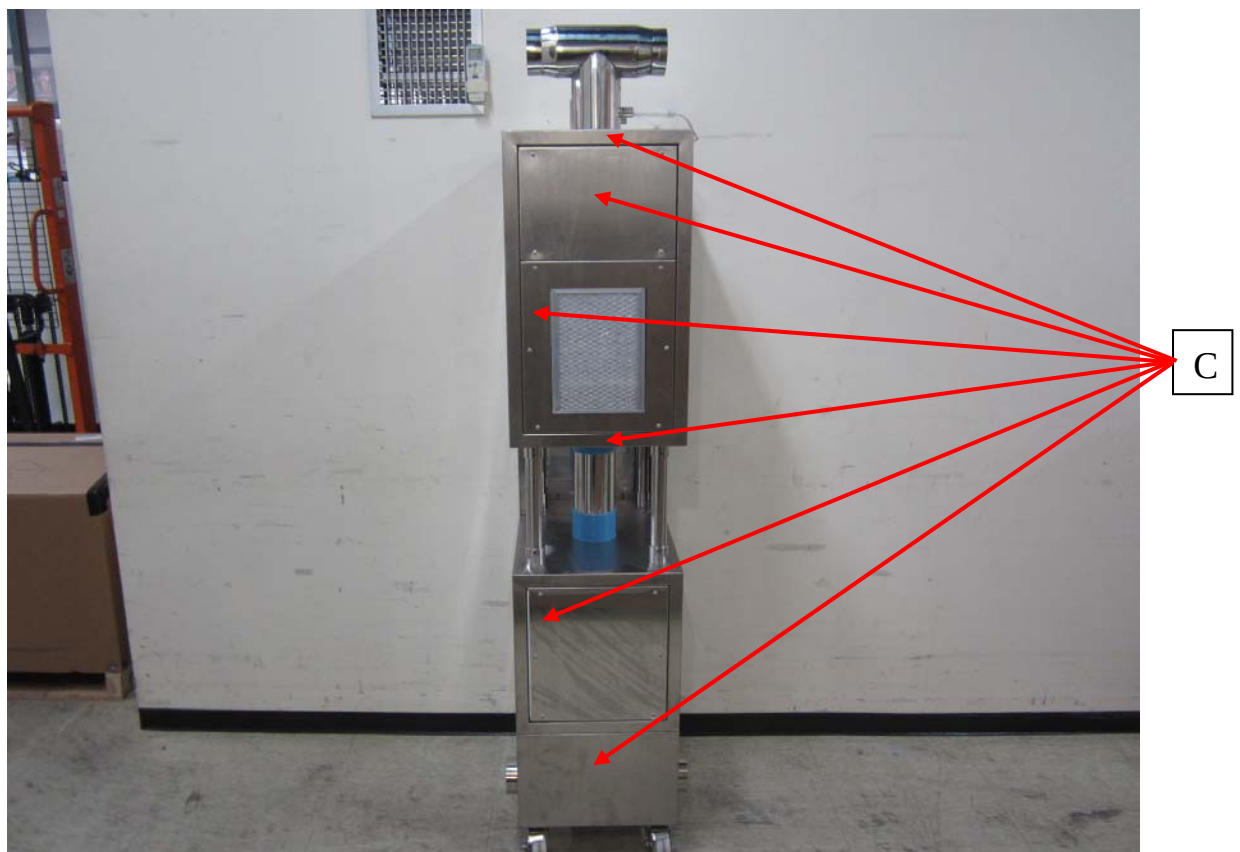
Appendix B. The Photos of ESD Measurement

Discharge (Air) 

Discharge (Contact) 



ESD Point





Discharge (Air) 

Discharge (Contact) 

Appendix B. The Photos of ESD Measurement



ESD Point





Appendix C. The EUT Photos



Front View



Rear View



Appendix C. The EUT Photos



Inner View