

 ESTECH Co., Ltd. Rm 1015, World Venture Center II, 426-5 Gasan-dong, Guncheon-gu, Seoul, 158-803, Korea	   		Electromagnetic Interference Test Report

Test Report for FCC

FCC ID : TKWBEWMOC

Report Number		ESTF151205-002			
Applicant	Company name	Suprema Inc.			
	Address	16F Parkview Tower, Jeongja-dong, Bundang-gu, Seongnam, Gyeonggi, 463-863 Korea			
	Telephone	+82-31-710-2494			
Product	Product name	BioEntry W			
	Model No.	BEWM-OC	Manufacturer	Suprema Inc.	
	Serial No.	N/A	Country of origin	KOREA	
Test date	26-Apr-12 ~ 26-Apr-12		Date of issue	16-May-12	
Testing location	ESTECH Co., Ltd. 58-1 OSan-Ri Kanam-Myon, Yeosu-Gun, KyungKi-Do, Korea 97-1 Hoiuk-Ri Majang-Myon, Icheon-Si, KyungKi-Do, Korea				
Standard	FCC PART 15 (2010) , ANSI C 63.4 2003				
Test item	☒ Conducted Emission	☐ Class A	☒ Class B	Test result	OK
	☒ Radiated Emission	☐ Class A	☒ Class B	Test result	OK
Measurement facility registration number		659627			
Tested by	Engineer K.H. Jeong (Signature)				
Reviewed by	Engineering Manager J.M.Yang (Signature)				
Abbreviation	OK, Pass = Complied, Fail = Failed, N/A = not applicable				
* Note - This test report is not permitted to copy partly without our permission - This test result is dependent on only equipment to be used - This test result based on a single evaluation of one sample of the above mentioned					

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Appendix 1. Special diagram

1. Laboratory Information

1.1 General

This EUT (Equipment Under Test) has been shown to be capable of compliance with the applicable technical standards and is tested in accordance with the measurement procedures as indicated in this report. ESTECH Lab attests to accuracy of test data. All measurement reported herein were performed by ESTECH Co., Ltd.

ESTECH Lab assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

1.2 Test Lab.

Corporation Name : ESTECH Co., Ltd.

Head Office : Rm 1015, World Venture Center II, 426-5, Gasan-dong, Geumcheon-gu, Seoul, Korea
(Safety & Telecom. Test Lab)

EMC Test Lab : 58-1 OSan-Ri Kanam-Myon, Yeosu-Gun, KyungKi-Do, Korea
97-1 Hoiuk-Ri Majang-Myon, Icheon-Si, KyungKi-Do, Korea

1.3 Official Qualification(s)

KCC : Granted Accreditation from Ministry of Information & Communication for EMC, Safety and Telecommunication

KOLAS : Accredited Lab By Korea Laboratory Accreditation Schema base on CENELEC requirements

FCC : Filed Laboratory at Federal Communications Commission

VCCI : Granted Accreditation from Voluntary Control Council for Interference from ITE



2. Description of EUT

2.1 Summary of Equipment Under Test

Product	:	BioEntry W
Model Number	:	BEWM-OC
Serial Number	:	N/A
Manufacturer	:	Suprema Inc.
Country of origin	:	KOREA
Rating	:	Adapter A.C Input : (100 ~ 240) Va.c., 1.0 A (50 / 60) Hz Adapter EUT Input Power : 12 Vd.c., 2.5 A
Receipt Date	:	19-Apr-12
X-tal list(s) or Frequencies generated	:	The highest operating frequency is 400 MHz in the system.

2.2 General descriptions of EUT

Item	Specification
CPU	400MHz DSP
Fingerprint sensor	500dpi Optical / Capacitive sensor
User capacity	5000 users (10,000 templates)
Log capacity	50,000 events
Matching speed	Less than 1 second
Operation mode	Fingerprint, RF Card, RF card + Fingerprint
Network Interface	TCP/IP, RS485
Internal relay	Deadbolt, EM lock, door strike, automatic door
TTL I/O	2 inputs for exit switch and door sensor
Wiegand In/Out	1 Port (Wiegand Input or Wiegand Output is used according to the configuration.)
Sound and Interface	Multi-color LED and multi-tone buzzer
Rated Voltage	DC 12V (Min. 500mA and above) (When sharing the power with a device such as electric door lock, enough power is required considering the power requirement for the connected device.)
Card option	13.56MHz Mifare Card
Size	50 x 160 x 37 mm (Width x Height x Depth)
Certified	KCC, CE, FCC

3. Test Standards

Test Standard : FCC PART 15 (2010)

This Standard sets out the regulations under which an intentional, unintentional, or incidental radiator may be operated without an individual license. It also contains the technical specifications, administrative requirements and other conditions relating to the marketing of Part 15 devices.

Test Method : ANSI C 63.4 (2003)

This standard sets forth uniform methods of measurement of radio-frequency (RF) signals and noise emitted from both unintentional and intentional emitters of RF energy in the frequency range 9 kHz to 40 GHz. Methods for the measurement of radiated and AC power-line conducted radio noise are covered and may be applied to any such equipment unless otherwise specified by individual equipment requirements. These methods cover measurement of certain devices that deliberately radiate energy, such as intentional emitters, but does not cover licensed transmitters. This standard is not intended for certification/approval of avionic equipment or for industrial, scientific, and medical (ISM) equipment. These methods apply to the measurement of individual units or systems comprised of multiple units.

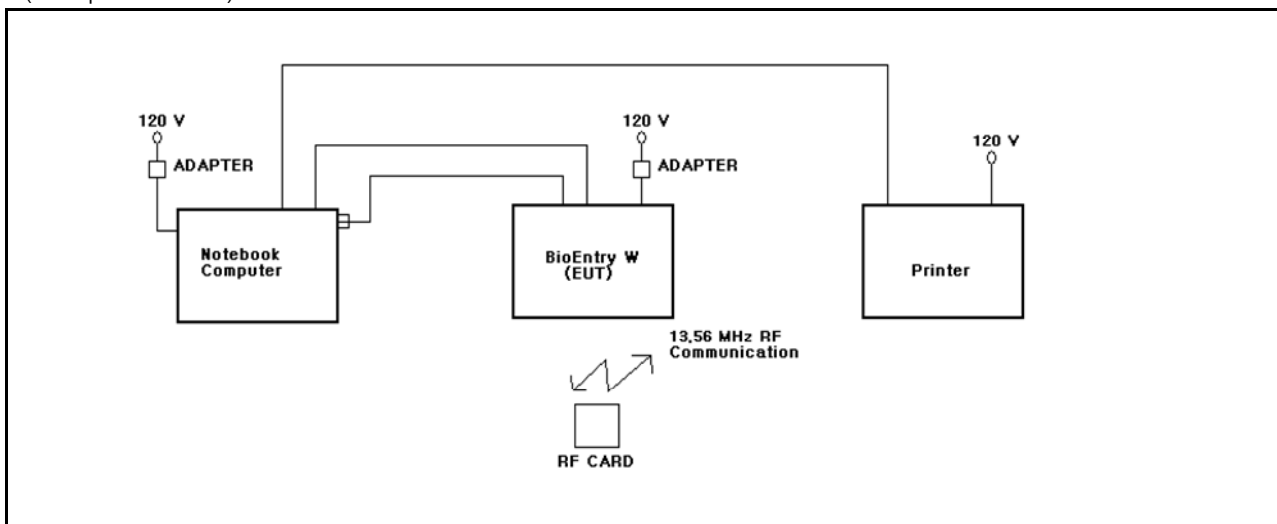
4. Measurement Condition

4.1 EUT Operation.

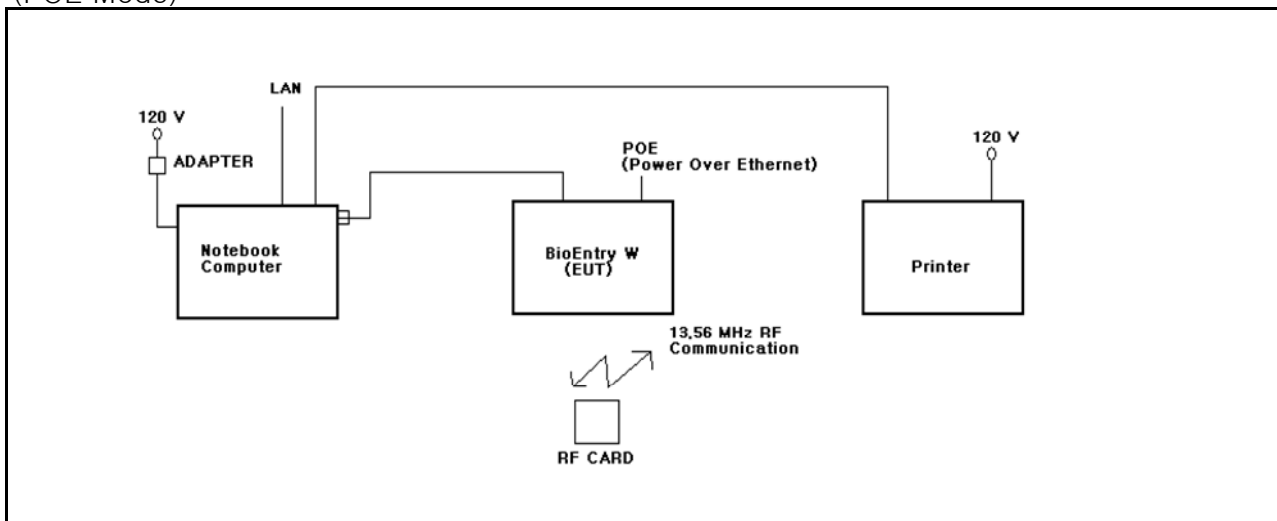
- The EUT was in the following operation mode during all testing
- * Install the EUT in the Notebook Computer and It is self-monitoring program.
- * Connect the LAN Port and Ping Data read/write.
- * After setting as test arrangement diagram, we tested the EUT under continuous displaying "H" character.

4.2 Configuration and Peripherals

(Adapter Mode)



(POE Mode)



4.3 EUT and Support equipment (Adapter Mode)

Equipment Name	Model Name	S/N	Manufacturer	Remark (ECC ID)
BioEntry W	BEWM-OC	N/A	Suprema Inc.	EUT
Adapter	JPW128KA1200N05	N/A	Bridge Power Corp.	
Adapter	PPP009D	WBGSV0ADDZ3O6N	DELTA ELECTRONICS (JIANG SU), LTD	
Notebook Computer	GW687AV	CNU0295RBD	HEWLETT-PACKARD COMPANY	
RS232 to RS422/485 Converter	CS-428	CBA06D2702	SystemBase Co., Ltd.	
Printer	K10299	N/A	CANON VIETNAM CO., LTD.	
RF CARD	NONE	N/A	Suprema Inc.	

4.4 Cable Connecting (Adapter Mode)

Start Equipment		End Equipment		Cable Standard		Remark
Name	I/O port	Name	I/O port	Length	Shielded	
BioEntry W	RS-485 x 3 Port	RS232 to RS422/485 Converter	RS-485 x 3 Port	3	Shielded	
BioEntry W	LAN	Notebook Computer	LAN	3	Unshielded	
BioEntry W	Power	Adapter	-	2	Unshielded	
Notebook Computer	Serial	RS232 to RS422/485 Converter	Serial	-	-	
Notebook Computer	USB	PRINTER	USB	2	Shielded	
BioEntry W	Line (Relay)	-	-	3	Shielded	
BioEntry W	Line (Switch)	-	-	3	Shielded	
BioEntry W	Line (Wiegand)	-	-	3	Shielded	
BioEntry W	13.56 MHz RF Signal	RF CARD	13.56 MHz RF Signal	-	-	

*Note : To meet the radiated emission RFID antenna board's cable added one ferrite bead.
(M/N : EP1806C, Manufacturer : E-tech electronics)

4.3 EUT and Support equipment (POE Mode)

Equipment Name	Model Name	S/N	Manufacturer	Remark (ECC ID)
BioEntry W	BEWM-OC	N/A	Suprema Inc.	EUT
Adapter	PPP009D	WBGSV0ADDZ3O6N	DELTA ELECTRONICS (JIANG SU), LTD	
Notebook Computer	GW687AV	CNU0295RBD	HEWLETT-PACKARD COMPANY	
RS232 to RS422/485 Converter	CS-428	CBA06D2702	SystemBase Co., Ltd.	
Printer	K10299	N/A	CANON VIETNAM CO., LTD.	
RF CARD	NONE	N/A	Suprema Inc.	

4.4 Cable Connecting (POE Mode)

Start Equipment		End Equipment		Cable Standard		Remark
Name	I/O port	Name	I/O port	Length	Shielded	
BioEntry W	RS-485 x 3 Port	RS232 to RS422/485 Converter	RS-485 x 3 Port	3	Shielded	
BioEntry W	POE	POE Switch	POE	20	Unshielded	
Notebook Computer	Serial	RS232 to RS422/485 Converter	Serial	-	-	
Notebook Computer	LAN	External Network	LAN	20	Unshielded	
Notebook Computer	Power	Adapter	-	2	Shielded	
Notebook Computer	USB	Printer	USB	2	Shielded	
BioEntry W	Line (Relay)	-	-	3	Shielded	
BioEntry W	Line (Switch)	-	-	3	Shielded	
BioEntry W	Line (Wiegand)	-	-	3	Shielded	
BioEntry W	13.56 MHz RF Signal	RF CARD	13.56 MHz RF Signal	-	-	

5. Measurement of radiated disturbance

Above 30 MHz Electric Field strength was measured in accordance with FCC PART 15 (2010) The test setup was made according to ANSI C 63.4 (2003) on an open test site, which allows a 3 m distance measurement. The EUT was placed in the center of wooden turntable. The height of this table was 0.8 m. The measurement was conducted with both horizontal and vertical antenna polarization. The turntable has fully rotated. For further description of the configuration refer to the picture of the test setup.

5.1 Measurement equipments

Equipment Name	Type	Manufacturer	Serial No.	Next Calibration date
TEST Receiver	ESVS10	Rohde & Schwarz	838562/002	25-Jan-13
TEST RECEIVER	ESPI	Rohde & Schwarz	100005	25-Jan-13
Pre Amplifier	8447F	HP	2944A03711	25-Jan-13
Logbicon Antenna	VULB 9168	SCHWARZBECK	9168-193	13-May-12
Turn Table	2081-1.2M	EMCO	NONE	-
Antenna Mast	2070-1	EMCO	0005-2205	-
ANT Mast Controller	2090	EMCO	9612-1202	-
Horn Antenna	BBHA9120D	SCHWARZBECK	469	6-Sep-12
PREAMPLIFIER	8449B	AGILENT	3008A00595	25-Jan-13
Test Receiver	ESPI7	Rohde & Schwarz	100185	25-Jan-13

5.2 Environmental Condition

*Test Place : Open site(3 m)

[Adapter Mode]

Temperature (°C) : 22 °C

Humidity (% R.H.) : 38 % R.H.

[POE Mode]

Temperature (°C) : 23 °C

Humidity (% R.H.) : 41 % R.H.

5.3 Test data (Below 1 GHz) – Adapter MODE

Test Date : 26-Apr-12

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Result Value(Quasi-peak)		
				Ant Factor (dB)	Cable (dB)	Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
38.52	38.80	V	1.0	11.12	-25.48	40.00	24.44	15.56
48.00	37.60	V	1.0	12.28	-25.10	40.00	24.79	15.21
121.52	34.00	H	3.4	10.62	-23.84	43.50	20.78	22.72
188.00	35.00	V	1.0	10.41	-23.32	43.50	22.08	21.42
212.00	32.70	V	1.0	9.99	-23.27	43.50	19.42	24.08
232.04	34.20	V	1.0	10.80	-23.04	46.00	21.96	24.04
286.00	34.10	H	2.2	13.08	-23.08	46.00	24.10	21.90
312.01	32.90	H	1.4	14.07	-22.68	46.00	24.29	21.71
375.00	36.20	H	1.4	15.37	-22.91	46.00	28.66	17.34
433.00	34.20	H	1.8	17.06	-23.45	46.00	27.81	18.19
Remark	H : Horizontal, V : Vertical *Reading = receiver reading + Amplifier Gain *CL = Cable Loss-Amplifier Gain *The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection							

5.3 Test data (Below 1 GHz) – POE MODE

Test Date : 26-Apr-12

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Result Value(Quasi-peak)		
				Ant Factor (dB)	Cable (dB)	Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
30.18	38.20	V	1.0	11.23	-25.14	40.00	24.29	15.71
48.01	35.20	V	1.0	12.28	-25.10	40.00	22.38	17.62
125.00	34.50	H	2.1	11.05	-23.84	43.50	21.72	21.79
176.01	35.00	H	2.4	11.59	-23.44	43.50	23.16	20.34
225.00	33.80	V	1.0	10.73	-23.16	46.00	21.37	24.63
240.01	36.60	V	1.0	11.09	-22.96	46.00	24.73	21.27
250.00	37.20	V	1.0	11.54	-22.96	46.00	25.79	20.22
300.01	34.00	H	1.2	13.30	-23.04	46.00	24.26	21.74
375.01	37.80	V	1.0	15.37	-22.91	46.00	30.26	15.74
400.00	32.00	V	1.0	15.58	-23.16	46.00	24.42	21.58
Remark	H : Horizontal, V : Vertical *Reading = receiver reading + Amplifier Gain *CL = Cable Loss-Amplifier Gain *The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection							

5.3 Test data (Above 1 GHz)–Adapter Mode

Test Date : 26-Apr-12

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Result Value		
				Ant Factor (dB)	Cable (dB)	Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
Peak(RBW:1 MHz VBW:1 MHz)								
1200.02	56.01	H	1.3	25.22	-33.79	74.00	47.44	26.56
1200.02	62.21	V	1.2	25.22	-33.79	74.00	53.64	20.36
1616.02	53.31	H	1.1	25.77	-33.05	74.00	46.03	27.97
1616.02	58.52	V	1.2	25.77	-33.05	74.00	51.24	22.76
2912.22	54.47	H	1.1	28.23	-31.59	74.00	51.11	22.89
2912.22	50.61	V	1.1	28.23	-31.59	74.00	47.25	26.75
5512.00	51.64	H	1.2	32.32	-28.58	74.00	55.38	18.62
5512.00	47.76	V	1.1	32.32	-28.58	74.00	51.50	22.50
Average(RBW:1 MHz VBW:10 Hz)								
1200.02	35.16	H	1.3	25.22	-33.79	54.00	26.59	27.41
1200.02	34.02	V	1.2	25.22	-33.79	54.00	25.45	28.55
1616.02	36.17	H	1.1	25.77	-33.05	54.00	28.89	25.11
1616.02	34.01	V	1.2	25.77	-33.05	54.00	26.73	27.27
2912.22	34.54	H	1.1	28.23	-31.59	54.00	31.18	22.82
2912.22	32.24	V	1.1	28.23	-31.59	54.00	28.88	25.12
5512.00	32.72	H	1.2	32.32	-28.58	54.00	36.46	17.54
5512.00	34.78	V	1.1	32.32	-28.58	54.00	38.52	15.48
Remark	H : Horizontal, V : Vertical *Reading = receiver reading + Amplifier Gain *CL = Cable Loss-Amplifier Gain *The resolution bandwidth and video bandwidth of spectrum analyzer is 1 MHz and 10 Hz for average detection at frequency above 1 GHz. *Application method of the highest frequency is in the following *Highest frequency of the EUT is less than 108 MHz, the measurement shall only be made up to 1 GHz. *Highest frequency of the EUT is between 108 MHz and 500 MHz, the measurement shall only be made up to 2 GHz. *Highest frequency of the EUT is between 500 MHz and 1 GHz, the measurement shall only be made up to 5 GHz. *Highest frequency of the EUT is above 1 GHz, the measurement shall be made up to 5 times the highest frequency or 40 GHz,							

5.3 Test data (Above 1 GHz)–POE Mode

Test Date : 26-Apr-12

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Result Value		
				Ant Factor (dB)	Cable (dB)	Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
Peak(RBW:1 MHz VBW:1 MHz)								
997.81	52.32	H	1.2	25.06	-20.36	74.00	57.03	16.97
997.81	53.34	V	1.1	25.06	-20.36	74.00	58.05	15.95
1200.00	54.21	H	1.2	25.22	-33.79	74.00	45.64	28.36
1200.00	62.40	V	1.2	25.22	-33.79	74.00	53.83	20.17
2912.21	54.81	H	1.1	28.23	-31.59	74.00	51.45	22.55
2912.21	51.76	V	1.2	28.23	-31.59	74.00	48.40	25.60
5625.20	51.52	H	1.1	32.42	-28.70	74.00	55.24	18.76
5625.20	48.54	V	1.1	32.42	-28.70	74.00	52.26	21.74
Average(RBW:1 MHz VBW:10 Hz)								
997.81	32.96	H	1.2	25.06	-20.36	54.00	37.67	16.33
997.81	31.18	V	1.1	25.06	-20.36	54.00	35.89	18.11
1200.00	35.54	H	1.2	25.22	-33.79	54.00	26.97	27.03
1200.00	34.01	V	1.2	25.22	-33.79	54.00	25.44	28.56
2912.21	34.52	H	1.1	28.23	-31.59	54.00	31.16	22.84
2912.21	31.78	V	1.2	28.23	-31.59	54.00	28.42	25.58
5625.20	32.72	H	1.1	32.42	-28.70	54.00	36.44	17.56
5625.20	33.60	V	1.1	32.42	-28.70	54.00	37.32	16.68
Remark	H : Horizontal, V : Vertical *Reading = receiver reading + Amplifier Gain *CL = Cable Loss-Amplifier Gain *The resolution bandwidth and video bandwidth of spectrum analyzer is 1 MHz and 10 Hz for average detection at frequency above 1 GHz. *Application method of the highest frequency is in the following *Highest frequency of the EUT is less than 108 MHz, the measurement shall only be made up to 1 GHz. *Highest frequency of the EUT is between 108 MHz and 500 MHz, the measurement shall only be made up to 2 GHz. *Highest frequency of the EUT is between 500 MHz and 1 GHz, the measurement shall only be made up to 5 GHz. *Highest frequency of the EUT is above 1 GHz, the measurement shall be made up to 5 times the highest frequency or 40 GHz,							

6. Measurement of conducted disturbance

The continuous disturbance voltage of AC Mains in the frequency from 0.15 MHz to 30 MHz was measured in accordance to FCC PART 15 (2010) The test setup was made according to ANSI C 63.4 (2003) in a shielded room. The EUT was placed on a non-conductive table at least 0.8 m above the ground plan. A grounded vertical reference plane was positioned in a distance of 0.4 m from the EUT. The distance from the EUT to other metal surfaces was at least 0.8 m. The EUT was only earthen by its power cord through the line impedance stabilizing network. The power cord has been bundled to a length of 1.0 m. The test receiver with Quasi Peak detector complies with CISPR 16.

6.1 Measurement equipments

Equipment Name	Type	Manufacturer	Serial No.	Next Calibration date
LISN	ENV 216	ROHDE & SCHWARZ	101231	9-Sep-12
LISN	ESH3-Z5	Rohde & Schwarz	836679/025	27-Sep-12
Pulse Limiter	ESH3-Z2	Rohde & Schwarz	NONE	25-Jan-13
TEST Receiver	ESHS 30	Rohde & Schwarz	828765/002	16-Dec-12

6.2 Environmental Condition

Test Place : Shielded Room

(Adapter Mode)

Temperature (°C) : 21 °C

Humidity (% R.H.) : 34 % R.H.

(POE Mode)

Temperature (°C) : 21 °C

Humidity (% R.H.) : 39 % R.H.

6.3 Test data

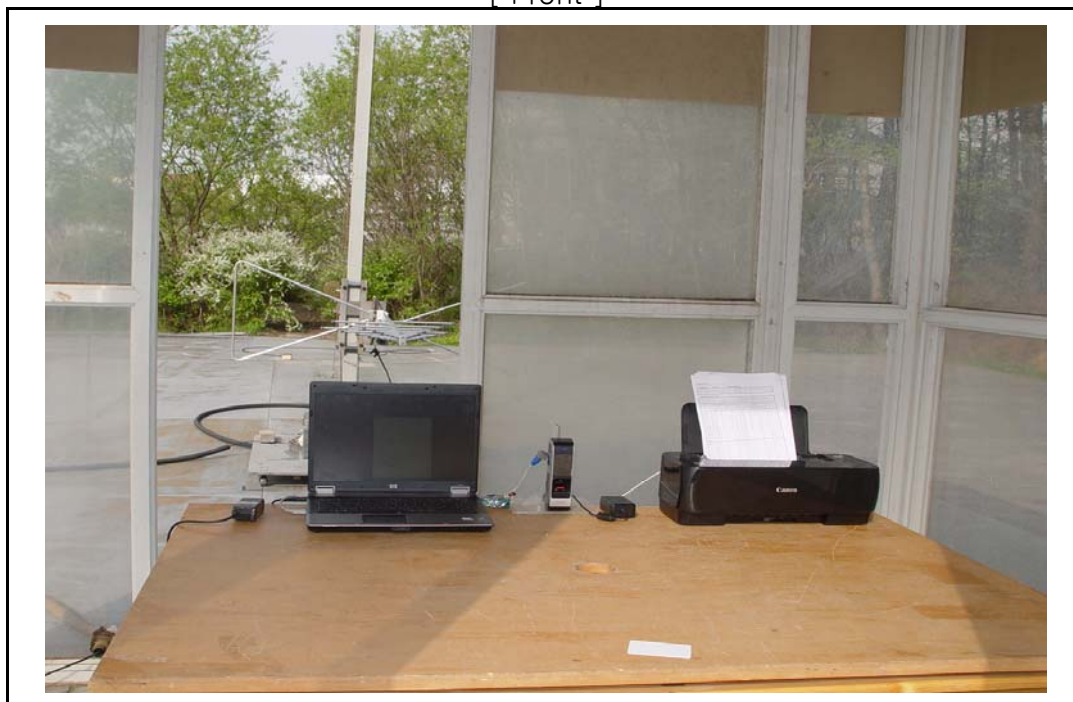
Test Date : 26-Apr-12

Frequency (MHz)	Correction Factor		Line (H/N)	Quasi-peak Value			Average Value		
	Lisn (dB)	Cable (dB)		Limit (dB μ V)	Reading (dB μ V)	Result (dB μ V)	Limit (dB μ V)	Reading (dB μ V)	Result (dB)
0.20	0.13	0.28	N	63.61	39.76	40.17	53.61		
0.27	0.13	0.30	N	61.12	32.90	33.33	51.12		
1.19	0.18	0.48	N	56.00	30.53	31.19	46.00		
12.69	0.84	0.54	H	60.00	36.74	38.11	50.00		
12.89	0.67	0.54	N	60.00	38.03	39.24	50.00		
13.52	0.72	0.54	N	60.00	32.14	33.40	50.00		
Remark	H : Hot Line, N : Neutral Line *Correction Factor = Lisn + Cable *Result = Correction Factor + Reading								

7. Photographs of test setup (Adapter Mode)

7.1 Setup for Radiated Test : 30 MHz ~ 1000 MHz

[Front]



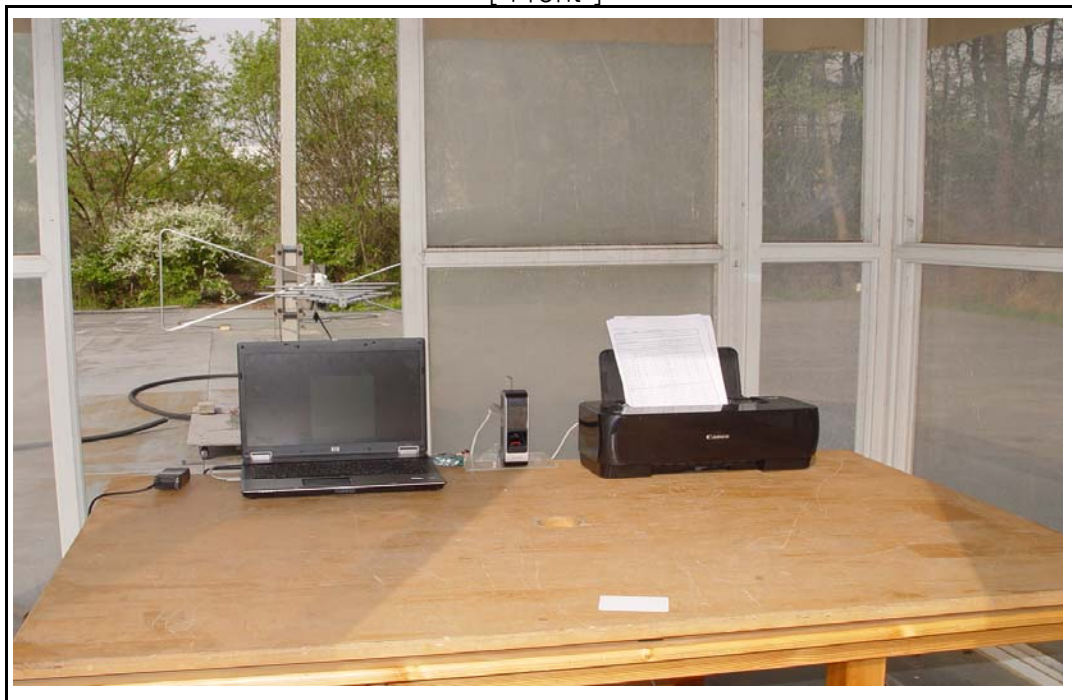
[Rear]



7. Photographs of test setup (POE Mode)

7.1 Setup for Radiated Test : 30 MHz ~ 1000 MHz

[Front]



[Rear]



7.2 Setup for Radiated Test : Above 1 GHz (Adapter Mode)

[Front]



[Rear]



7.2 Setup for Radiated Test : Above 1 GHz (POE Mode)

[Front]



[Rear]



7.3 Setup for Conducted Test : 0.15 MHz ~ 30 MHz

[Front]



[Rear]



8. Photographs of EUT

[Front]



[Rear]



Appendix 1. Special diagram

*HOT

ES TECH

26 Apr 2012 16:07

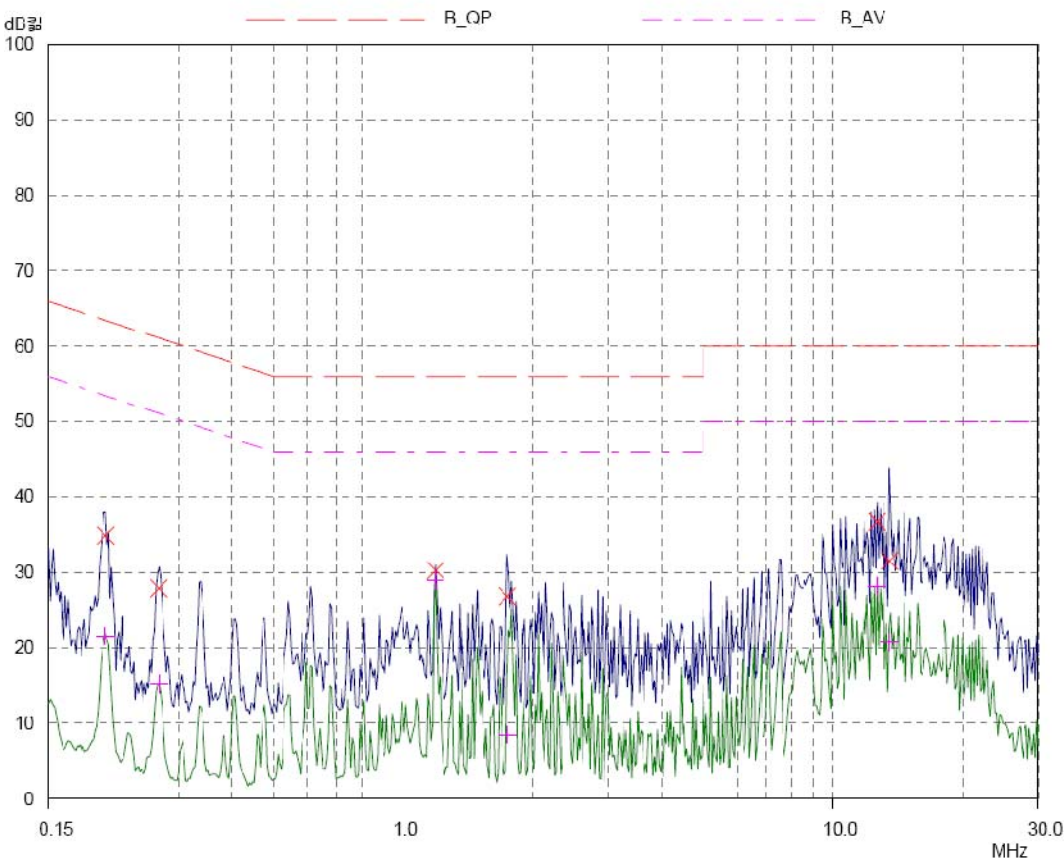
HOT

EUT: BEWM-OC
Maruf:
Op Cond: 120 V
Operator: K.H JEONG
Test Spec: CLASS B
Comment:

Result File: 120502_h.dat :

Scan Settings			Receiver Settings			
(1 Range)						
Start	Stop	Step	IF BW	Detector	M-Time	Atten
150kHz	30MHz	0.6%	10kHz	PK+AV	10msec	Auto
						Preamp
						OFF
						OpRge
						60dB

Final Measurement: Detectors: X QP / + AV
Meas Time: 1sec
Subranges: 25
Acc Margin: 0 dB



*NEUTRAL

ES TECH
NEUTRAL

26 Apr 2012 15:59

EUT: BEWM-OC
Manuf:
Op Cond: 120 V
Operator: K.H JEONG
Test Spec: CLASS B
Comment:

Result File: 120502_n.dat :

Scan Settings			Receiver Settings						
(1 Range)									
Frequencies			IF BW	Detector	M-Time	Atten	Preamp	OpRge	
Start	Stop	Step	10kHz	PK+AV	10msec	Auto	OFF	60dB	
150kHz	30MHz	0.8%							

Final Measurement: Detectors: X QP / + AV
Meas Time: 1sec
Subranges: 25
Acc Margin: 0 dB

