ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR FCC CLASS B CERTIFICATION

Test report file number	**: E028R-015**
Applicant	**: HBrain Inc.**
Address	**: #702 Kwanglim Bldg 179 Kumi Dong, Bundang Gu, Seongnam, Gyeonggi Do, Korea**
Manufacturer	**: Meungsung Electronics**
Address	**: #293-18, Gongdan-Dong, Gumi-City, Kyung –Buk, Korea**
Type of Equipment	**: E-SolyGate**
FCC ID	**: QI5SOLYREF2002C09**
Model Name	**: SOLY-REF2002-C**
Serial number	**: N/A**
Total page of Report	**: 14 pages (including this page)**
Date of Incoming	**: August 9, 2002**
Date of issuing	**: August 10, 2002**

SUMMARY

The equipment complies with the regulation; ***FCC CFR 47 PART 15 SUBPART B, Class B***.

This test report contains only the result of a single test of the sample supplied for the examination.

It is not a general valid assessment of the features of the respective products of the mass-production.

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1. VERIFICATION OF COMPLIANCE

APPLICANT : HBrain Inc.

ADDRESS : #702 Kwanglim Bldg 179 Kumi Dong, Bundang Gu, Seongnam, Gyeonggi Do, Korea

CONTACT PERSON : Tae-woo Kim / Division Manager

TELEPHONE NO : +82-31-726-1188

FCC ID : QI5SOLYREF2002C09

MODEL NO/NAME : SOLY-REF2002-C

SERIAL NUMBER : N/A

DATE : August 10, 2002

DEVICE TYPE	Peripheral Device for Class B Computing Device -Unintentional Radiator
E.U.T. DESCRIPTION	E-SolyGate
THIS REPORT CONCERNS	ORIGINAL GRANT
MEASUREMENT PROCEDURES	ANSI C63.4/2000
TYPE OF EQUIPMENT TESTED	PRE-PRODUCTION
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	CERTIFICATION
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SECTION 15.101
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	Yes
FINAL TEST WAS CONDUCTED ON	3 METER OPEN AREA TEST SITE

The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

2. GENERAL INFORMATION

2.1 Product Description

The HBrain Inc., Model SOLY-REF2002-C (referred to as the EUT in this report) is an E-SolyGate, which is trade name of the Hbrain Inc., and EUT can control and monitor power line communication remotely with power line and ethernet. The EUT has an AC100-240V Power line port for power line communication and controlling control device through power line. It is only for communication, not supply electrical power to another system. Product specification described herein was obtained from product data sheet or user' s manual.

CHASSIS TYPE	Plastic - Coated
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1MHz)	25.0MHz, and 10.0MHz on the main board, 3.6864MHz, 10.00MHz on the network interface module.
POWER REQUIREMENT	1. AC Input for Power Line Communication: 100-240 V ac, 50/60 Hz 2. DC Input Voltage for Operation: +5V/1.5, +12V/0.8A
NUMBER OF LAYERS	4Layers: main board, 2Layers: network interface module
SIZE	250 x 180 x 40 (mm)
EXTERNAL CONNECTOR	LAN 2Ports, RS-232C Port, DC Input, AC 100-240V Power Port.
MEMORY	64MB Flash / 64MB RAM
PROCESSOR	MPC850DCZT50A-50MHz
LED	RUN, EXT, INT, PKD

Model Differences:

-. None

2.2 Related Submittal(s) / Grant(s)

-. Original submittal only.

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2.3 Test System Details

The model numbers for all the equipments, which were used in the tested system is:

Model	Manufacturer	FCC ID	Description	Connected to
SOLY-REF2002-C	HBrain Inc.	QI5SOLYREF2002C09	E-SolyGate (EUT)	NOTEBOOK PC
SOLY-REF2002-C	HBrain Inc.	QI5SOLYREF2002C09	E-SolyGate (AE)	EUT
CMP-65S	CAMEL Tech.	N/A	SMPS	EUT
CMP-65S	CAMEL Tech.	N/A	SMPS	AE
SENS V10	Samsung Elec.	DoC	NOTEBOOK PC	EUT
AD-601P	Samsung Elec.	N/A	AC/DC ADAPTOR	NOTEBOOK PC
2225C	HP	DSI6XU2225	PRINTER	NOTEBOOK PC

2.4 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4/2000.

Radiated testing was performed at a distance of 3 meters from EUT to the antenna.

2.5 Test Facility

The open area test site and conducted measurement facilities are located on at 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Si, Kyunggi-Do 464-080, Korea. Description details of test facilities were submitted to the Commission on January 18, 2002. (Registration Number: 92819)

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3. SYSTEM TEST CONFIGURATION

3.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
CPU Board	HBrain Inc.	N/A	N/A

3.2 EUT exercise Software

The EUT and peripheral equipments were connected as follows;

The external ports on the EUT were 2 LAN Ports, a RS-232C Port, a DC Input port and a Power line port.

The LAN and/or RS-232C ports on the EUT were connected to LAN and/or RS-232C ports on the Note PC for transferring data and the other LAN port on the EUT was terminated as a resistor by using proper cable, and AC Power line cable for communication and the other equipment (same as EUT) were connected to together for communication through power line cable. During the test, continuously communicated between the EUT and the other equipment (same as EUT) under above condition.

3.3 Cable Description

	Power Cord Shielded (Y/N)	I/O cable Shielded (Y/N)	Length (M)
E-SolyGate (EUT)	N	Y	1.5(P), 1.8 (D)
E-SolyGate (AE)	N	Y	1.5(P), 1.8 (D)
SMPS	N	N/A	1.5(P)
NOTEBOOK PC	N	Y	1.5(P), 1.2(D)
AC/DC ADAPTOR	N	N/A	1.5(P)
PRINTER	N	Y	1.5(P), 1.2 (D)

* The marked “(P)” means the Power Cable, “(D)” means the Data Cable.

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3.4 Noise Suppression Parts on Cable

	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
E-SolyGate (EUT)	N	N/A	Y	BOTH END
E-SolyGate (AE)	N	N/A	Y	BOTH END
SMPS	Y	AC LINE	N	N/A
NOTEBOOK PC	N	N/A	Y	BOTH END
AC/DC ADAPTOR	Y	NOTEPC END	Y	NOTEPC END
PRINTER	N	N/A	Y	BOTH END

3.5 Equipment Modifications

To achieve compliance to CLASS B levels, the following change(s) was made by Hbrain during compliance testing:

-. Added an inductor L7 (10uH/1A) between 1pin of the transformer (T3) and 1pin of the J6 connector.

-. Added a capacitor C60 (4.7nF/275VAC-X2) between 1pin and 3pin of the J6 connector.

3.6 Configuration of Test System

Line Conducted Test: The power Line of the EUT, the SMPS for DC power of the EUT and the power line of another equipment (same as EUT) were connected to LISN, all supporting equipment was connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.4/2000 7.2.3 to determine the worse operating conditions.

Radiated Emission Test: Preliminary radiated emission test was conducted using the procedure in ANSI C63.4/2000 8.3.1.1 to determine the worse operating conditions. Final radiated emission test was conducted at 3 meters open area test site.

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4. PRELIMINARY TEST

4.1 Conducted Emission Test

During Preliminary Test, the following operating mode was investigated.

Operation Mode	**The Worse operating condition (Please check one only)**
Stand by mode	
Continuously communication through the power line between an EUT and the other equipment (such as EUT)	X

4.2 Radiated Emission Test

During Preliminary Test, the following operating mode was investigated.

Operation Mode	**The Worse operating condition (Please check one only)**
Stand by mode	
Continuously communication through the power line between an EUT and the other equipment (such as EUT)	X

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5. FINAL RESULT OF MEASURMENT

Preliminary test was done in normal operation mode. And the final measurement was selected for the maximized emission level.

5.1 Conducted Emission Test

Humidity Level : 50 % Temperature : 25°C

Limits apply to : FCC CFR 47, PART 15, SUBPART B

Type of Test : CLASS B

Result : PASSED BY –7.15 dB at 8.82 MHz

EUT : E-SolyGate Date: August 9, 2002

Operating Condition : Continuously communication through power line between an EUT and the equipment such as EUT.

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)

Power Line Conducted Emission			FCC CLASS B	
Frequency (MHz)	**Amplitude (dBuV)**	**Conductor**	**Limit (dBuV)**	**Margin (dB)**
0.51	29.67	NEUTRAL	48.00	-19.33
0.66	43.99	HOT	60.00	-16.01
0.92	32.67	HOT	60.00	-27.33
1.32	30.43	HOT	60.00	-29.57
7.02	37.75	NEUTRAL	48.00	-10.25
8.82	40.85	HOT	48.00	-7.15
13.16	34.74	NEUTRAL	48.00	-13.26
21.66	33.38	HOT	48.00	-14.62

Line Conducted Emission Tabulated Data

Tested by: Soung-Chel, You / Test Engineer

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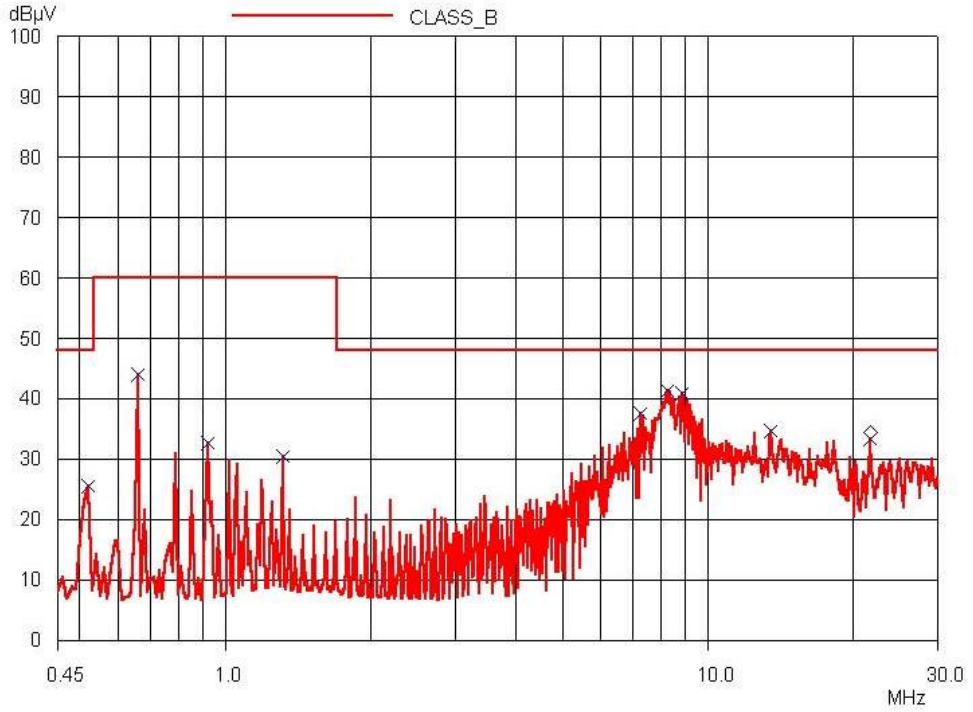
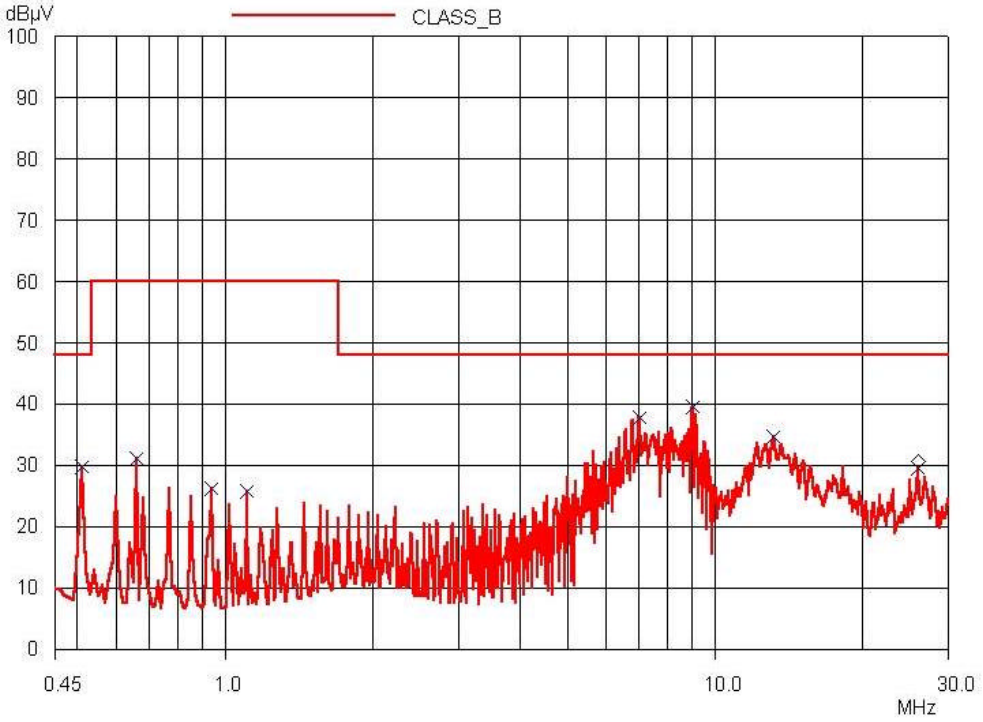


HOT LINE



NEUTRAL LINE

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5.2 Radiated Emission Test for frequency range (0.15 ~ 30MHz)

The following table shows the highest levels of radiated emission on both polarizations of horizontal and vertical.

Humidity Level : 50 % Temperature : 25 °C

Limits apply to : FCC CFR 47, PART 15, SUBPART C

Type of Test : CLASS B

Result : PASSED

EUT : E-SolyGate Date: August 9, 2002

Operating Condition : Continuously communication through power line between an EUT and the equipment such as EUT.

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)

Distance : 3 Meter

Radiated Emission		Ant	Correction Factors		Total	FCC CLASS B	
Freq. (MHz)	Amp. (dBuV)	Pol.	Ant. (dBuV/m)	Cable (dB)	Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
	It was not observed any emission noise during the test.						

Radiated Emission Tabulated Data

Testde by: Soung-Chel, You / Test Engineer

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5.3 Radiated Emission Test for frequency range (30 ~ 1000MHz)

The following table shows the highest levels of radiated emission on both polarizations of horizontal and vertical.

Humidity Level : 50 % Temperature : 25°C

Limits apply to : FCC CFR 47, PART 15, SUBPART B

Type of Test : CLASS B

Result : PASSED BY –5.40 dB at 650.00 MHz

EUT : E-SolyGate Date: August 9, 2002

Operating Condition : Continuously communication through power line between an EUT and the equipment such as EUT.

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)

Distance : 3 Meter

Radiated Emission		Ant	Correction Factors		Total	FCC CLASS B	
Freq. (MHz)	Amp. (dBuV)	Pol.	Ant. (dBuV/m)	Cable (dB)	Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
50.00	19.10	V	11.20	0.93	31.23	40.00	-8.77
75.00	23.70	V	7.02	1.00	31.72	40.00	-8.28
125.00	21.60	V	13.37	1.25	36.22	43.50	-7.28
150.00	18.20	V	13.92	1.35	33.47	43.50	-10.03
224.80	18.10	V	10.79	1.70	30.59	46.00	-15.41
250.00	21.70	V	11.87	1.83	35.40	46.00	-10.60
275.20	14.40	H	13.35	1.89	29.64	46.00	-16.36
300.20	16.50	H	14.77	2.00	33.27	46.00	-12.73
350.20	17.60	H	16.20	2.28	36.08	46.00	-9.92
375.40	14.90	H	15.13	2.39	32.42	46.00	-13.58
450.00	18.60	H	16.69	2.55	37.84	46.00	-8.16
575.60	11.10	H	18.39	2.87	32.36	46.00	-13.64
650.00	17.80	H	19.72	3.08	40.60	46.00	-5.40

Radiated Emission Tabulated Data

Testde by: Soung-Chel, You / Test Engineer

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6. FIELD STRENGTH CALCULATION

Meter readings are compared to the specification limit correcting for antenna and cable losses

+	Meter reading	(dBuV)
+	Cable Loss	(dB)
+	Antenna Factor (Loss)	(dB/meter)
=	Corrected Reading	(dBuV/meter)
-	Specification Limit	(dBuV/meter)
=	dB Relative to Spec	(+/- dB)

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7. LIST OF TEST EQUIPMENT

No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUE CAL	USE
1.	Test receiver	R/S	ESVS 10	827864/005	OCT/01	12MONTH	■
2.	Test receiver	R/S	ESHS10	834467/007	APR/02	12MONTH	■
3.	Spectrum analyzer	HP	8568B	3026A0226	APR/02	12MONTH	■
4.	RF preselector	HP	85685A	3107A01264	APR/02	12MONTH	■
5.	Quasi-Peak Adapter	HP	85650A	3107A01542	APR/02	12MONTH	■
6.	Loop antenna	EMCO	6502	991220	APR/02	12MONTH	■
7.	Biconical antenna	EMCO	3104C	9109-4441 9109-4443 9109-4444	APR/02	12MONTH	■
8.	Log Periodic antenna	EMCO	3146	9109-3213 9109-3214 9109-3217	APR/02	12MONTH	■
9.	LISN	EMCO	3825/2	9109-1867 9109-1869	JUL/02	12MONTH	■
10.	Computer System Hard disk drive	HP	98581C 9153C	98543A CMC762Z9153	N/A N/A	N/A N/A	■ ■
11.	Plotter	HP	7475A	30052 22986	N/A	N/A	■
12.	Position Controller	EMCO	1090	9107-1038	N/A	N/A	■
13.	Turn Table	EMCO	1080-1.21	9109-1576	N/A	N/A	■
14.	Antenna Master	EMCO	1070-1	9109-1624	N/A	N/A	■

* Mark ■ mean used equipment.

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