

Electromagnetic Emission Compliance Report for FCC Class B Certification

Test Report No. : E12OR-020

AGR No. : A129A-196

Applicant : SYM Technology, Inc.
Address : 234 E. Colorado Blvd., Suite 410, Pasadena, CA 91101 USA

Manufacturer : SYM Technology, Inc.
Address : 234 E. Colorado Blvd., Suite 410, Pasadena, CA 91101 USA

Type of Equipment : iSpectrum Uplink Guard (Part 15 Class B Computing Device Peripheral)

Model Name : ISUG-01

FCC ID. : W74-ISUG01

Serial number : N/A

Total page of Report : 15 pages (including this page)

Date of Incoming : September 04, 2012

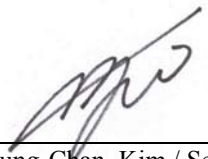
Date of Issuing : October 11, 2012

SUMMARY


The equipment complies with the requirement of *FCC CFR 47 PART 15 SUBPART B, Section 15.101*.

This test report contains only the results 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.

Prepared by:


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Approved by:


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ONETECH Corp.

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Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
E12OR-020	October 11, 2012	Initial Issue	All

1. VERIFICATION OF COMPLIANCE

APPLICANT : SYM Technology, Inc.
ADDRESS : 234 E. Colorado Blvd., Suite 410, Pasadena, CA 91101 USA
CONTACT PERSON : Peter Son
TELEPHONE NO : 1-213-281-8874
FCC ID : W74-ISUG01
MODEL NO/NAME : ISUG-01
SERIAL NUMBER : N/A
DATE : October 11, 2012

EQUIPMENT CLASS	JBP - Part 15 Class B Computing Device Peripheral
E.U.T. DESCRIPTION	iSpectrum Uplink Guard - Unintentional Radiator
THIS REPORT CONCERNS	ORIGINAL GRANT
MEASUREMENT PROCEDURES	ANSI C63.4: 2009
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	No
FINAL TEST WAS CONDUCTED ON	Semi anechoic chamber

-. 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 SYM Technology, Inc. , Model ISUG-01 (referred to as the EUT in this report) is an iSpectrum Uplink Guard. Product specification described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	Metal & Plastic
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1 MHz)	10 MHz, 25 MHz, 48 MHz, 200 MHz, 133 MHz, 400 MHz
ELECTRICAL RATING	DC 27 V, 24 W, 1 A
USED AC/AC ADAPTOR	Input : 100-240 V~, 50/60 Hz, 1.5 A, Output : 24 V, 2.5 A
EXTERNAL CONNECTOR	RF Input, LAN, WAN, Debug, Power

2.2 Model Differences

-. None

2.3 Related Submittal(s) / Grant(s)

-. Original submittal only

2.4 Test System Details

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

Model	Manufacturer	FCC ID	Description	Connected to
ISUG-01	SYM Technology, Inc.	W74-ISUG01	iSpectrum Uplink Guard (EUT)	-
SW60-24002500-W	Power-Tek	N/A	Adaptor	EUT
N/A	N/A	N/A	Notebook PC	EUT
E4432B	HP	N/A	Signal Generator	EUT

2.5 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4: 2009. Radiated testing was performed at a distance of 3/10 m from EUT to the antenna up to 2 GHz.

2.6 Test Facility

The Electromagnetic compatibility measurement facilities are located on at 301-14, Daessangryung-ri, Chowol-eup, Gwangju-si, Gyeonggi-do, 464-862, Korea. The Onetech Corp. has been accredited as a Conformity Assessment Body (CAB) with designation Number, KR0013.

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
MCU Board	N/A	N/A	N/A
RF switch Board	N/A	N/A	N/A
PLL Board	N/A	N/A	N/A

3.2 Mode of operation during the test

-. The input signal of the EUT was supported from a signal generator and then the output signal of the EUT was monitored on a notebook PC continuously during the test.

3.3 Cable Description for the EUT

Cable	Shielded	Ferrite Bead	Metal Shell	Length (m)	Connected to
POWER	N	N	N/A	1.5	Adaptor
LAN	N	N	N/A	3.0	Notebook PC
WAN	N	N	N/A	3.0	Internet
RF INPUT	Y	N	BOTH END	3.0	Signal generator

3.4 Equipment Modifications

-. None

3.5 Configuration of Test System

Line Conducted Test : The EUT was connected to adaptor and the power of adaptor was connected to LISN. All supporting equipments were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.4: 2009 7.3.3 to determine the worse operating conditions.

Radiated Emission Test : Preliminary radiated emission test was conducted using the procedure in ANSI C63.4: 2009 8.3.1.1 to determine the worse operating conditions. Final radiated emission test was conducted at 3/10 m semi anechoic chamber.

4. PRELIMINARY TEST

4.1 AC Power line Conducted Emission Test

During Preliminary Test, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
The input signal analyzing mode	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)
The input signal analyzing mode	X

5. FINAL RESULT OF MEASUREMENT

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 : 47 % R.H.

Temperature: 21 °C

Limits apply to : FCC CFR 47, PART 15, SUBPART B, SECTION 15.107(a)

Type of Test : CLASS B

Result : PASSED BY 9.33 dB at 16.11 MHz under peak detector mode

EUT : iSpectrum Uplink Guard

Date: September 04, 2012

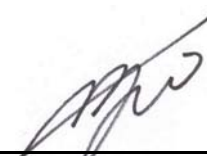
Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)

Frequency (MHz)	Line	Peak (dBμV)		Margin (dB)
		Emission level	Q.P Limits	
0.15	H	55.13	66.00	10.87
0.17	H	53.82	65.21	11.39
15.45	N	48.62	60.00	11.38
15.60	H	49.87	60.00	10.13
16.09	N	48.74	60.00	11.26
16.11	H	50.67	60.00	9.33
Frequency (MHz)	Line	Average (dBμV)		Margin (dB)
		Emission level	Limits	
15.45	N	34.95	50.00	15.05
15.60	H	35.43	50.00	14.57
16.09	N	35.33	50.00	14.67
16.11	H	35.98	50.00	14.02

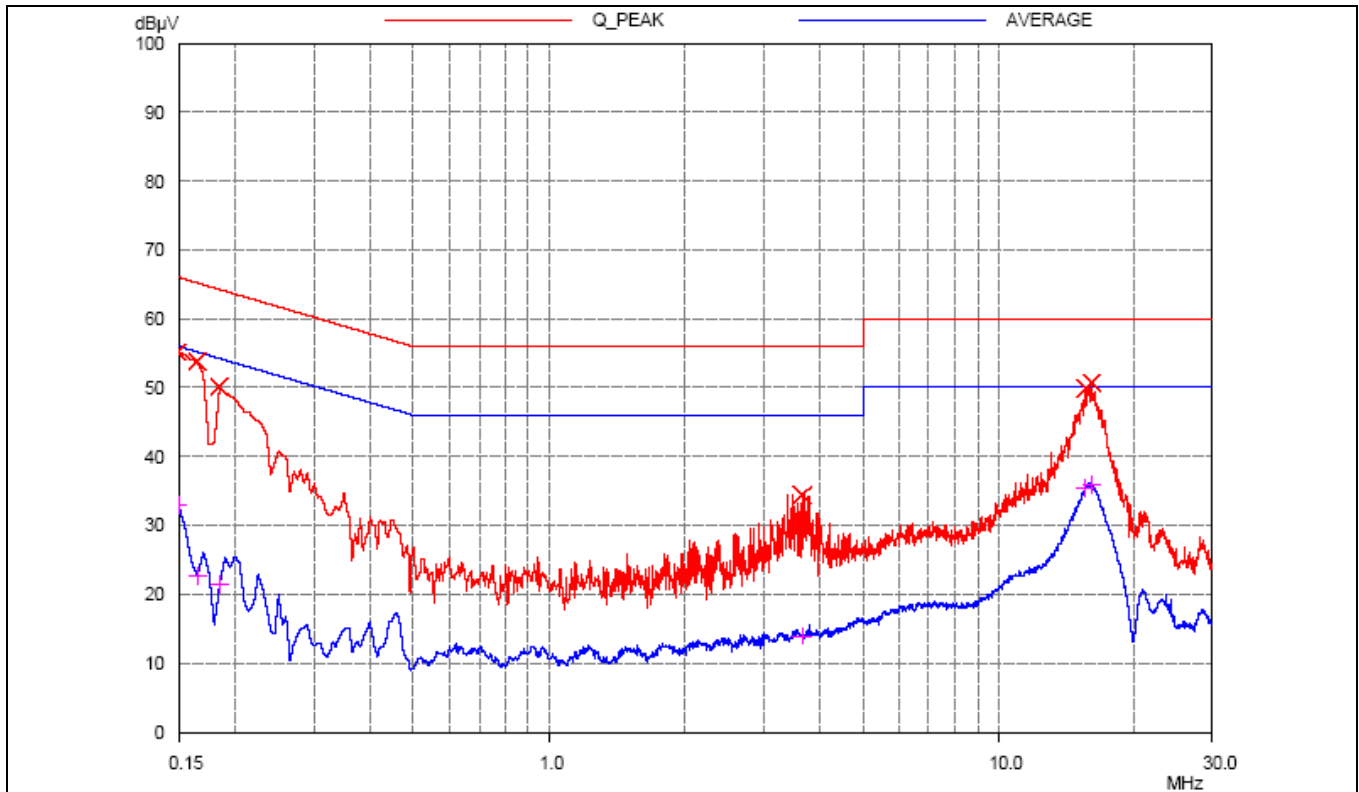
Line Conducted Emissions Tabulated Data

Remark: "H": Hot Line, "N": Neutral Line.

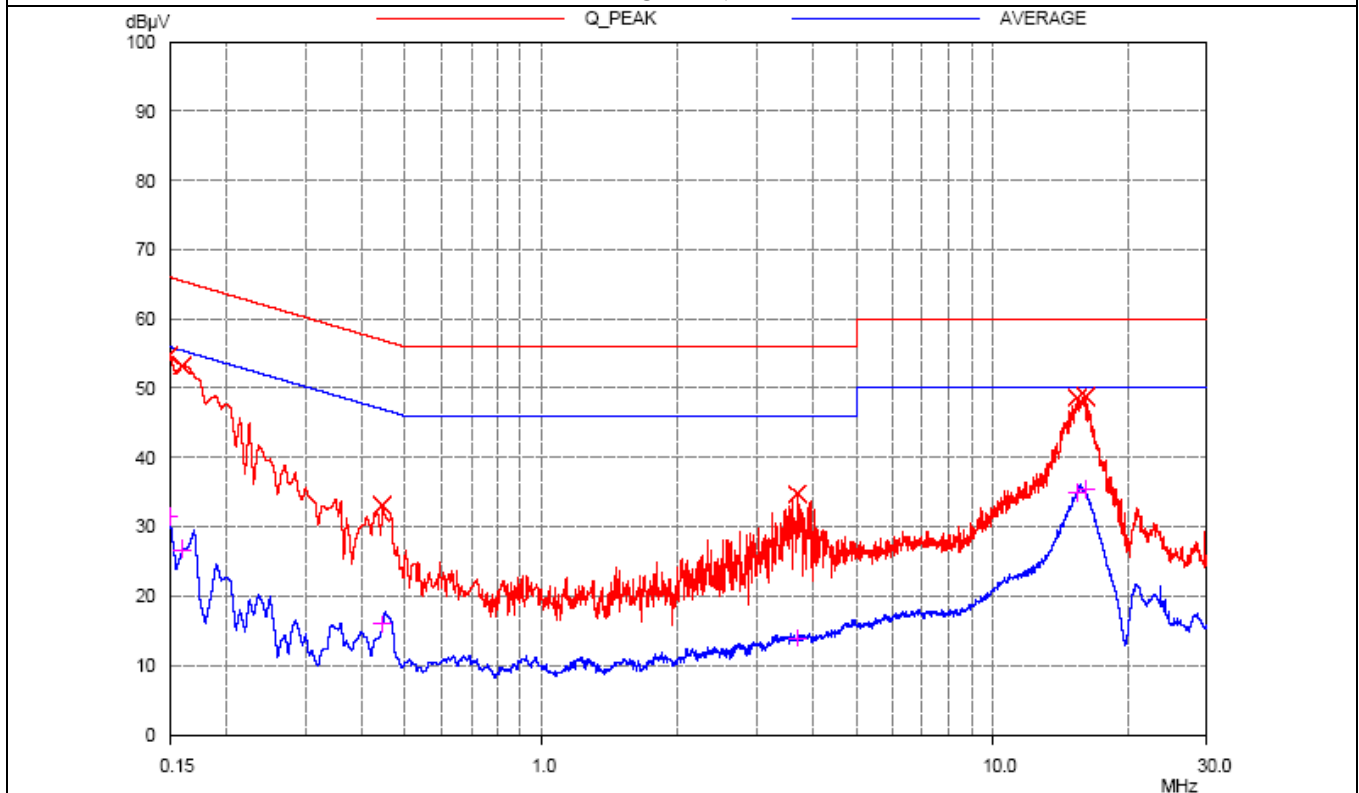
See next page for an overview sweep performed with peak and average detector.



Tested by: Eung-Chan, Kim / Senior Engineer



HOT LINE



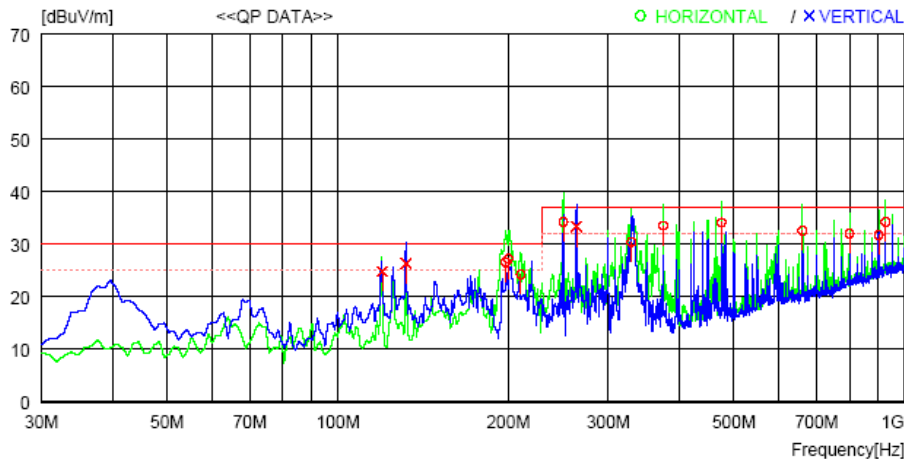
NEUTRAL LINE

5.2 Radiated Emission Tests

5.2.1 Test Data for under 1 GHz

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

Humidity Level	: 45 %	Temperature: 24 °C
Limits apply to	: FCC CFR 47, PART 15, SUBPART B, SECTION 15.109 (g)	
Type of Test	: CLASS B	
Result	: PASSED BY 2.8 dB at 200 MHz/925.3 MHz under quasi-peak detector mode	
EUT	: iSpectrum Uplink Guard	Date: September 12, 2012
Detector	: CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)	
Distance	: 10 Meter	



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	197.810	46.0	10.6	2.9	33.0	26.5	30.0	3.5	300	68
2	200.000	46.6	10.7	2.9	33.0	27.2	30.0	2.8	300	75
3	210.420	43.2	11.1	3.0	33.0	24.3	30.0	5.7	300	225
4	250.190	51.2	12.6	3.3	32.9	34.2	37.0	2.8	400	0
5	329.730	45.1	14.4	3.8	32.9	30.4	37.0	6.6	300	359
6	375.320	47.0	15.4	4.1	33.0	33.5	37.0	3.5	400	0
7	475.231	45.6	16.8	4.8	33.1	34.1	37.0	2.9	300	123
8	660.496	40.3	19.7	5.5	32.9	32.6	37.0	4.5	400	169
9	800.172	37.1	21.0	6.4	32.5	32.0	37.0	5.0	400	0
10	901.049	34.6	22.4	6.8	32.1	31.7	37.0	5.3	300	359
11	925.298	36.7	22.5	6.9	31.9	34.2	37.0	2.8	300	359
----- Vertical -----										
12	120.000	46.0	8.8	2.6	32.6	24.8	30.0	5.2	100	161
13	131.850	48.0	8.1	2.8	32.6	26.3	30.0	3.7	100	0
14	263.770	49.3	12.4	4.0	32.4	33.3	37.0	3.7	100	308

Remark: Margin (dB) = Limit – Result and Result = Reading QP - Antenna Factor - Loss - Gain

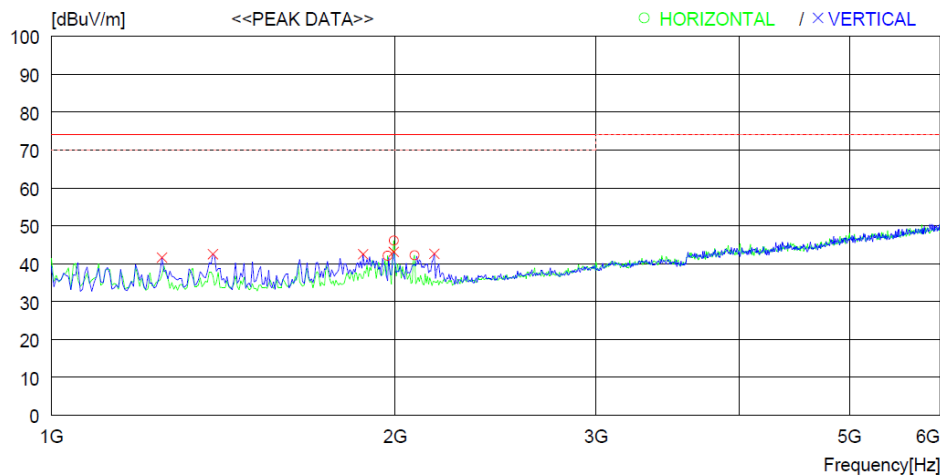
Loss and Gain in above table means Cable Loss and Pre-amplifier gain.

Tested by: Eung-Chan, Kim / Senior Engineer

5.2.2 Test Data for over 1GHz (Peak detector mode)

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

Humidity Level	: 45 %	Temperature: 24 °C
Limits apply to	: FCC CFR 47, PART 15, SUBPART B, SECTION 15.109 (g)	
Type of Test	: CLASS B	
Result	: PASSED BY 27.9 dB at 1 995 MHz under peak detector mode	
EUT	: iSpectrum Uplink Guard	Date: September 12, 2012
Detector	: CISPR Peak (6 dB Bandwidth: 1 MHz)	
Distance	: 3 Meter	



No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	1970.000	52.4	26.3	6.2	42.8	42.1	74.0	31.9	100	0
2	1995.000	56.3	26.3	6.3	42.8	46.1	74.0	27.9	100	0
3	2080.000	52.1	26.5	6.5	42.9	42.2	74.0	31.8	100	0
----- Vertical -----										
4	1250.000	53.3	26.0	4.9	42.6	41.6	74.0	32.4	100	6
5	1385.000	54.1	26.0	5.1	42.7	42.5	74.0	31.5	100	359
6	1875.000	53.0	26.2	6.1	42.8	42.5	74.0	31.5	100	359
7	1995.000	53.3	26.3	6.3	42.8	43.1	74.0	30.9	100	133
8	2165.000	52.3	26.6	6.6	42.9	42.6	74.0	31.4	100	359

Remark: Margin (dB) = Limit – Result and Result = Reading Peak - Antenna Factor - Loss - Gain

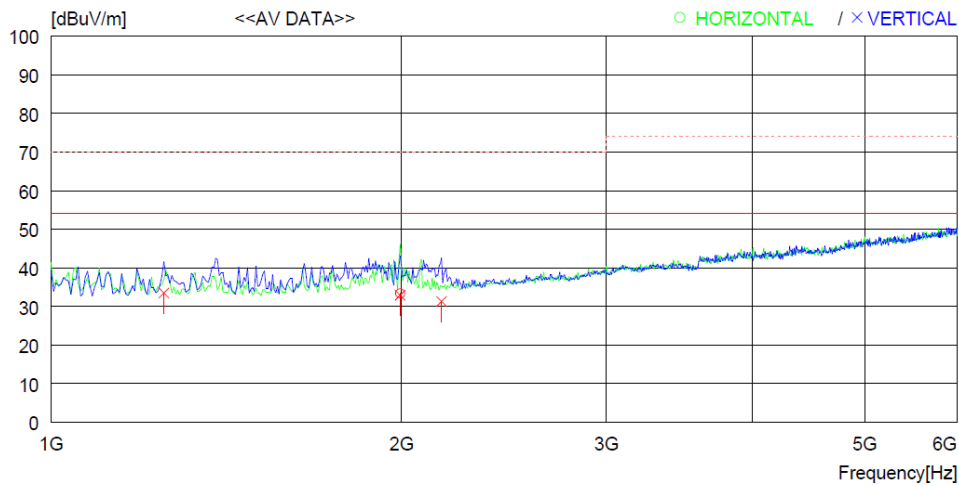
Loss and Gain in above table means Cable Loss and Pre-amplifier gain.

Tested by: Eung-Chan, Kim / Senior Engineer

5.2.3 Test Data for over 1GHz (Average detector mode)

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

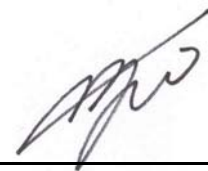
Humidity Level	: 45 %	Temperature: 24 °C
Limits apply to	: FCC CFR 47, PART 15, SUBPART B, SECTION 15.109 (g)	
Type of Test	: CLASS B	
Result	: PASSED BY 20.5 dB at 1 250 MHz under average detector mode	
EUT	: iSpectrum Uplink Guard	Date: September 12, 2012
Detector	: CISPR Average (6 dB Bandwidth: 1 MHz)	
Distance	: 3 Meter	



No.	FREQ	READING	ANT	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE
	[MHz]	[dBuV]	FACTOR	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[cm]	[DEG]
----- Horizontal -----										
1	1995.000	43.6	26.3	6.3	42.8	33.4	54.0	20.6	100	0
----- Vertical -----										
2	1250.000	45.2	26.0	4.9	42.6	33.5	54.0	20.5	100	6
3	1995.000	43.1	26.3	6.3	42.8	32.9	54.0	21.1	100	133
4	2165.000	41.0	26.6	6.6	42.9	31.3	54.0	22.7	100	359

Remark: Margin (dB) = Limit – Result and Result = Reading Average - Antenna Factor - Loss - Gain

Loss and Gain in above table means Cable Loss and Pre-amplifier gain.



Tested by: Eung-Chan, Kim / Senior Engineer

6. FIELD STRENGTH CALCULATION

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

+	Meter reading	(dB μ V)
+	Cable Loss	(dB)
+	Antenna Factor	(dB/m)
		<hr/>
=	Corrected Reading	(dB μ V/m)
-	Specification Limit	(dB μ V/m)
		<hr/>
=	dB Relative to Spec	(\pm dB)

7. LIST OF TEST EQUIPMENT

No.	Equipment	Manufacturer	Model Name	Serial No.	Last Cal.	Interval Cal.	Used
1.	Test receiver	Rohde & Schwarz	ESCI	101013	Oct. 21, 2011	One Year	
2.			ESU	100261	Sep. 24, 2012	One Year	■
3.			ESiB26	100296	Apr. 13, 2012	One Year	
4.			ESHS 10	834467/007	Jun. 21, 2012	One Year	■
5.	Amplifier	Sonoma Instrument	310N	312544	May 30, 2012	One Year	■
6.			310N	312545	May 30, 2012	One Year	
7.		Rohde & Schwarz	SCU 18	10041	Apr. 11, 2012	One Year	■
8.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-255	Apr. 24, 2012	Two years	■
9.			VULB9163	9163-420	Mar. 27, 2012	Two years	
10.	Horn Antenna	Schwarzbeck	BBHA9120D	294	Aug. 23, 2011	Two years	■
11.	LISN	EMCO	3825/2	9109-1867	May 30, 2012	One Year	
12.				9109-1869	May 30, 2012	One Year	■
13.		Schwarzbeck	NSLK 8126	8126-404	Jun. 11, 2012	One Year	■
14.			NSLK 8128	8128-216	Jun. 11, 2012	One Year	
15.	Controller	Innco System	CO2000	619/27030611/L	N/A	N/A	■
16.	Turn Table	Innco System	DT3000	930611	N/A	N/A	■
17.	Antenna Master	Innco System	MA4000-EP	3320611	N/A	N/A	■
18.			MA4000-EP	3350611	N/A	N/A	
19.	Tripod	EMCO	N/A	N/A	N/A	N/A	■

Remark: Mark ■ mean used equipment.