

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT

Test Report No. : E124R-003
AGR No. : A122A-153
Applicant : HOSEOTELNET CO., LTD.
Address : 680-3 Deungchon-3dong, Kangseo-gu, Seoul, Korea
Manufacturer : HOSEOTELNET CO., LTD.
Address : 680-3 Deungchon-3dong, Kangseo-gu, Seoul, Korea
Type of Equipment : Transmitter
FCC ID. : R2SSMT1000
Model Name : SMT1000
Serial number : N/A
Total page of Report : 31 pages (including this page)
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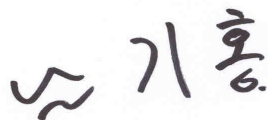
SUMMARY

The equipment complies with the regulation; **FCC Part 90 Subpart I.**

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

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

Prepared by:



Ki-Hong, Nam / Senior Engineer
ONETECH Corp.

Reviewed by:



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ONETECH Corp.

CONTENTS

	PAGE
1. VERIFICATION OF COMPLIANCE	5
2. TEST SUMMARY	6
2.1 TEST ITEMS AND RESULTS.....	6
2.2 ADDITIONS, DEVIATIONS, EXCLUSIONS FROM STANDARDS	6
2.3 RELATED SUBMITTAL(S) / GRANT(S)	6
2.4 PURPOSE OF THE TEST	6
2.5 TEST METHODOLOGY	6
2.6 TEST FACILITY	6
3. GENERAL INFORMATION	7
3.1 PRODUCT DESCRIPTION	7
3.2 ALTERNATIVE TYPE(S)/MODEL(S); ALSO COVERED BY THIS TEST REPORT.	7
4. SYSTEM TEST CONFIGURATION.....	8
4.1 JUSTIFICATION	8
4.2 PERIPHERAL EQUIPMENT	8
4.3 MODE OF OPERATION DURING THE TEST	8
4.4 EQUIPMENT MODIFICATIONS	8
4.5 CONFIGURATION OF TEST SYSTEM.....	8
4.6 ANTENNA REQUIREMENT	9
5. PRELIMINARY TEST	9
5.1 AC POWER LINE CONDUCTED EMISSIONS TESTS.....	9
5.2 RADIATED EMISSIONS TESTS.....	9
6. RF POWER OUTPUT AT ANTENNA TERMINAL	10
6.1 OPERATING ENVIRONMENT	10
6.2 TEST SET-UP	10
6.3 TEST EQUIPMENT USED.....	10
6.4 TEST DATA.....	11
7. OCCUPIED BANDWIDTH AND EMISSION MASK	13
7.1 OPERATING ENVIRONMENT	13

7.2 TEST SET-UP	13
7.3 TEST EQUIPMENT USED.....	13
7.4 TEST DATA.....	14
8. SPURIOUS EMISSION AT ANTENNA TERMINAL	16
8.1 OPERATING ENVIRONMENT	16
8.2 TEST SET-UP FOR CONDUCTED MEASUREMENT	16
8.3 TEST EQUIPMENT USED.....	16
8.4. TEST DATA.....	17
9. FIELD STRENGTH OF SPURIOUS RADIATION	19
9.1 OPERATING ENVIRONMENT	19
9.2 TEST SET-UP	19
9.3 TEST EQUIPMENT USED.....	19
9.4 TEST DATA FOR FUNDAMENTAL AND HARMONIC FREQUENCY	20
9.5 TEST DATA FOR OTHER FREQUENCY	21
9.6 TEST DATA FOR RECEIVING MODE	22
10. FREQUENCY STABILITY WITH TEMPERATURE VARIATION.....	23
10.1 OPERATING ENVIRONMENT	23
10.2 TEST SET-UP	23
10.3 TEST EQUIPMENT USED.....	23
10.4 TEST DATA.....	24
11. FREQUENCY STABILITY WITH VOLTAGE VARIATION	25
11.1 OPERATING ENVIRONMENT	25
11.2 TEST SET-UP	25
11.3 TEST EQUIPMENT USED.....	25
11.4 TEST DATA FOR CHARGING MODE.....	26
11.5 TEST DATA FOR BATTERY MODE	26
12. CONDUCTED EMISSION TEST	27
12.1 OPERATING ENVIRONMENT	27
12.2 TEST SET-UP	27
12.3 TEST EQUIPMENT USED.....	27
12.4 TEST DATA FOR TRANSMITTING AND CHARGING MODE	28

12.5 TEST DATA FOR RECEIVING AND CHARGING MODE	30
13. MAXIMUM PERMISSIBLE EXPOSURE	32
13.1 RF EXPOSURE CALCULATION.....	32
13.2. CALCULATED MPE SAFE DISTANCE AND DENSITY	32

1. VERIFICATION OF COMPLIANCE

APPLICANT : HOSEOTELNET CO., LTD.
 ADDRESS : 680-3 Deungchon-3dong, Kangseo-gu, Seoul, Korea
 CONTACT PERSON : Mr. jae-Youn, Shin / Principal Engineer
 TELEPHONE NO : +82-2-2659-7345
 FCC ID : R2SSMT1000
 MODEL NO/NAME : SMT1000
 SERIAL NUMBER : N/A
 DATE : April 03, 2012

EQUIPMENT CLASS	PCS Private Land Mobile Data Transceiver
EQUIPMENT DESCRIPTION	Transmitter
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.4: 2009, EIA/TIA-603-C
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC Part 90 Subpart I
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	No
FINAL TEST WAS CONDUCTED ON	3 m, 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. TEST SUMMARY

2.1 Test items and results

SECTION	TEST ITEMS	RESULTS
2.1046, 90.205	RF Power Output at Antenna Terminals	Met the Limit / PASS
2.1049, 90.209(b), 90.210	Occupied Bandwidth, Bandwidth Limitation, Emission Masks	Met the Limit / PASS
2.1051, 90.210	Spurious Emissions at Antenna Terminals	Met the Limit / PASS
2.1053, 90.210	Field strength of Spurious Radiation	Met the Limit / PASS
2.1055, 90.213	Frequency Stability with Temperature variation	Met the Limit / PASS
2.1055, 90.213	Frequency stability with primary voltage variation	Met the Limit / PASS
15.109 and 15.209	Radiated Emission Limits	Met the Limit / PASS
15.107 and 15.207	Conducted Limits	Met the Limit / PASS
2.1093	RF Exposure	Met the Limit / PASS

2.2 Additions, deviations, exclusions from standards

No additions, deviations or exclusions have been made from standard.

2.3 Related Submittal(s) / Grant(s)

Original submittal only

2.4 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in section 2.1.

2.5 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4: 2009 & EIA/TIA-603-C: 2004. Radiated testing was performed at a distance of 3 m from EUT to the antenna.

2.6 Test Facility

The measurement facilities are located on at 301-14, Daessangnyeong-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. GENERAL INFORMATION

3.1 Product Description

The HOSEOTELNET CO., LTD., Model SMT1000 (referred to as the EUT in this report) is a Transmitter. The port for computing peripheral device shall be subject to DoC procedure and issued by another test report. The product specification described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	PCS Private Land Mobile Data Transceiver
OPERATING FREQUENCY	464.60 MHz ~ 464.75 MHz
RATED RF OUTPUT POWER	33.63 dBm (2.31 W)
MODULATION	FSK
DATA RATE	4 800 bps / 6.25 kHz
CHANNEL BANWIDTH	12.5 kHz
CHANNEL SPACING	50 kHz
NUMBER OF CHANNEL	4
ANTENNA	Fixed Helical Antenna, Model No: HW-T464H-RSMA2-127
ANTENNA GAIN	(-3 ± 1) dBi
TEMPERATURE RANGE	-30 °C to +50 °C
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1MHz)	14.745 6 MHz
NUMBER OF LAYER	4 Layers
POWER REQUIREMENT	DC 5 V, 3 A from an adaptor and DC 3.7 V from a rechargeable battery
USED AC/DC ADAPTOR	Manufacturer: DONGGUAN DONGSONG ELECTRONIC CO LTD Model Name: DYS182-050300W-1 Input rating: 100-240 V~, 50/60 Hz, Max. 0.45 A Output rating: DC 5 V, 3.0 A
EXTERNAL CONNECTOR	DC In, USB

3.2 Alternative type(s)/model(s); also covered by this test report.

-. None

4. SYSTEM TEST CONFIGURATION

4.1 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
Main Board	N/A	GUEST_PAGER MAIN-2W	N/A
Keypad Board	N/A	GUEST_PAGER KEY-10mW	N/A
LCD	N/A	YMCT0030BECYDTL	N/A

4.2 Peripheral equipment

Defined as equipment needed for correct operation of the EUT, but not considered as tested:

Model	Manufacturer	FCC ID	Description	Connected to
SMT1000	HOSEOTELNET CO., LTD.	DoC & R2SSMT1000	Transmitter (EUT)	-
Wired Desktop 600	Microsoft	DoC	Keyboard	EUT

4.3 Mode of operation during the test

-. The EUT was operated with RF transmitting, receiving and charging modes continuously during the test.

The operating frequency range is less than 1 MHz, so the middle channel was selected for the testing.

4.4 Equipment Modifications

-. None

4.5 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 tests were performed by using the procedure in ANSI C63.4: 2009 7.3.3 to determine the worse operating conditions..

Radiated Emission Test: Preliminary radiated emissions test were conducted using the procedure in ANSI C63.4: 2009 8.3.1.1 and 13.4.1 to determine the worse operating conditions. The radiated emissions measurements were performed on the 3 m semi anechoic chamber. The turntable was rotated through 360 degrees and the EUT was tested by positioned three orthogonal planes to obtain the highest reading on the field strength meter. Once maximum reading was determined, the search antenna was raised and lowered in both vertical and horizontal polarization.

4.6 Antenna Requirement

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna Construction:

The transmitter antenna of the EUT is a fixed helical antenna in the EUT, so there is no consideration of replacement by the user.

5. PRELIMINARY TEST

5.1 AC Power line Conducted Emissions Tests

During Preliminary Tests, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
RF transmitting and charging modes	X
RF Receiving and charging modes	-

5.2 Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

Operation Mode	The Worse operating condition (Please check one only)
RF transmitting and charging modes	X
RF Receiving and charging modes	-

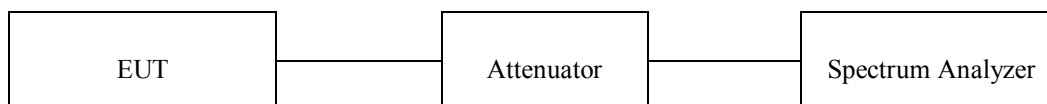
6. RF POWER OUTPUT at ANTENNA TERMINAL

6.1 Operating environment

Temperature : 27 °C
Relative humidity : 47 %R.H.

6.2 Test set-up

The RF output port of the EUT was connected to the input of the spectrum analyzer through sufficient attenuation. The resolution bandwidth was set to 3 MHz and video bandwidth of the spectrum analyzer was set at 3 MHz and the spectrum as recorded in the frequency band ± 5 MHz from the carrier frequency.



6.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
☐ -	E4432B	HP	Signal Generator	US38440950	June 10, 2011 (1Y)
☐ -	SMJ100A	R/S	Signal Generator	101038	Feb. 02, 2012 (1Y)
☐ -	FSP	R/S	Spectrum Analyzer	100017	Mar. 15, 2011 (1Y)
☒ -	67-30-43	Aeroflex Weinschel, Inc.,	POWER ATTENUATOR	CA5760	Nov. 30, 2012 (1Y)
☐ -	8564E	HP	Spectrum Analyzer	3650A00756	Jun. 10, 2011 (1Y)
☒ -	FSV30	R/S	Spectrum Analyzer	101372	Aug. 29, 2011 (1Y)

All test equipment used is calibrated on a regular basis.

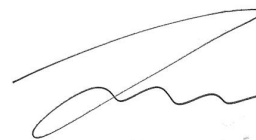
6.4 Test data

- Test Date : March 20, 2012

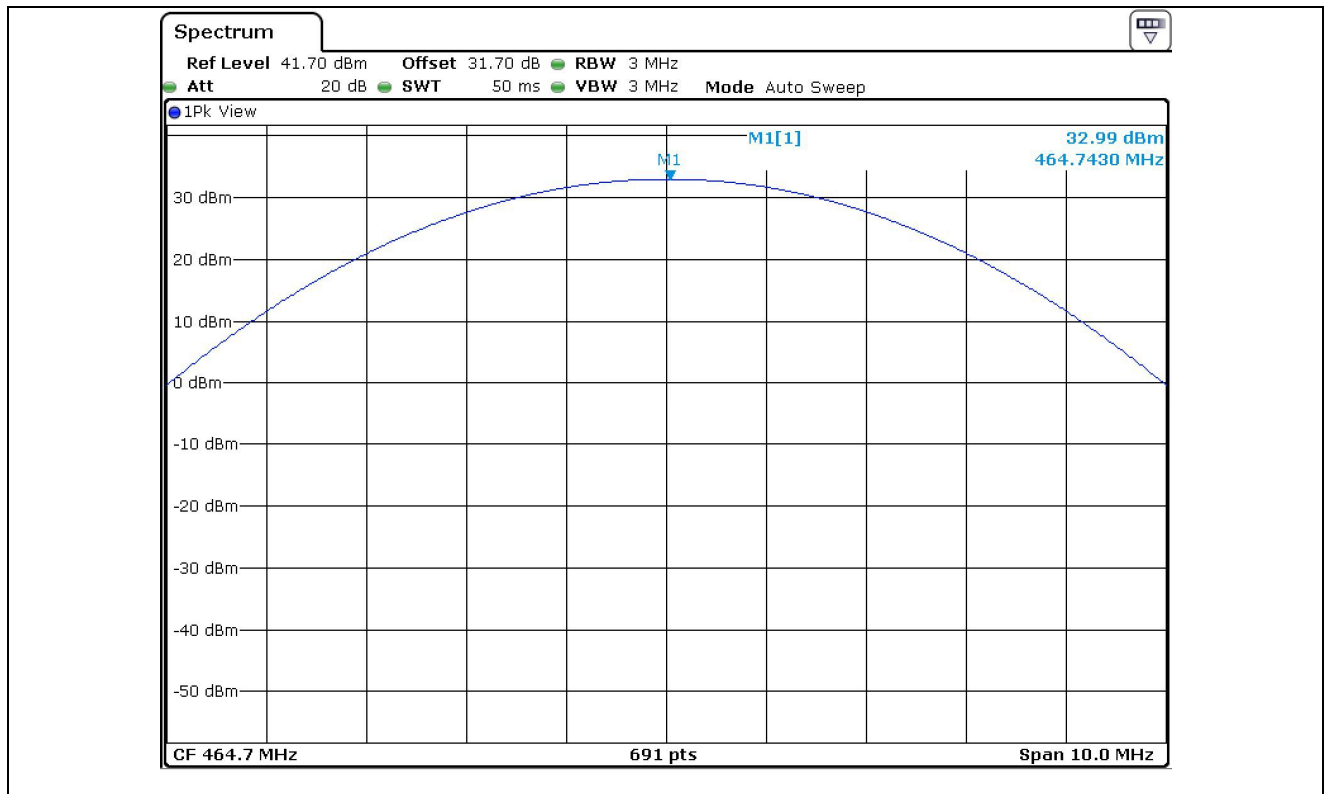
- Test Result : Pass

FREQUENCY (MHz)	Detector Mode	MEASURED VLAUE (dBm)	LOSS (dB)	TOTAL (dBm)	RESULT (W)
464.70	Peak	32.99	0.64	33.63	2.31

Remark: See next page for an overview sweep performed with peak detector and spectrum analyzer offset function was used for attenuator.



Tested by: Chang-Uk, Jun / Engineer



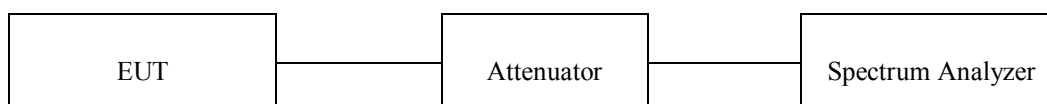
7. OCCUPIED BANDWIDTH AND EMISSION MASK

7.1 Operating environment

Temperature : 27 °C
Relative humidity : 47 %R.H.

7.2 Test set-up

The RF output port of the EUT was connected to the input of the spectrum analyzer through sufficient attenuation. The resolution bandwidth was set at 100 Hz and video bandwidth of the spectrum analyzer was set at 300 Hz for emission mask, 1 kHz for 99 % occupied bandwidth and the spectrum was recorded in the frequency band ± 25 kHz from the carrier frequency.



7.3 Test equipment used

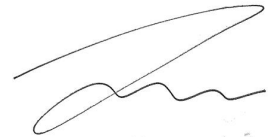
	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
□ -	E4432B	HP	Signal Generator	US38440950	June 10, 2011 (1Y)
□ -	SMJ100A	R/S	Signal Generator	101038	Feb. 02, 2012 (1Y)
□ -	FSP	R/S	Spectrum Analyzer	100017	Mar. 15, 2011 (1Y)
■ -	67-30-43	Aeroflex Weinschel, Inc.,	POWER ATTENUATOR	CA5760	Nov. 30, 2012 (1Y)
□ -	8564E	HP	Spectrum Analyzer	3650A00756	Jun. 10, 2011 (1Y)
■ -	FSV30	R/S	Spectrum Analyzer	101372	Aug. 29, 2011 (1Y)

All test equipment used is calibrated on a regular basis.

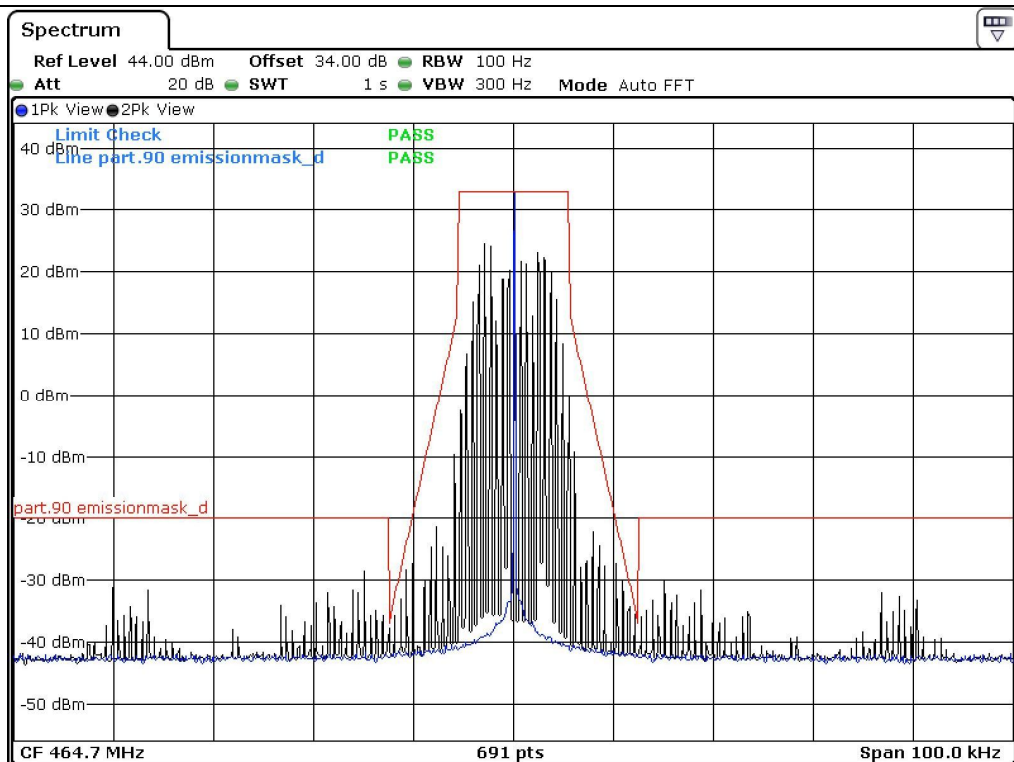
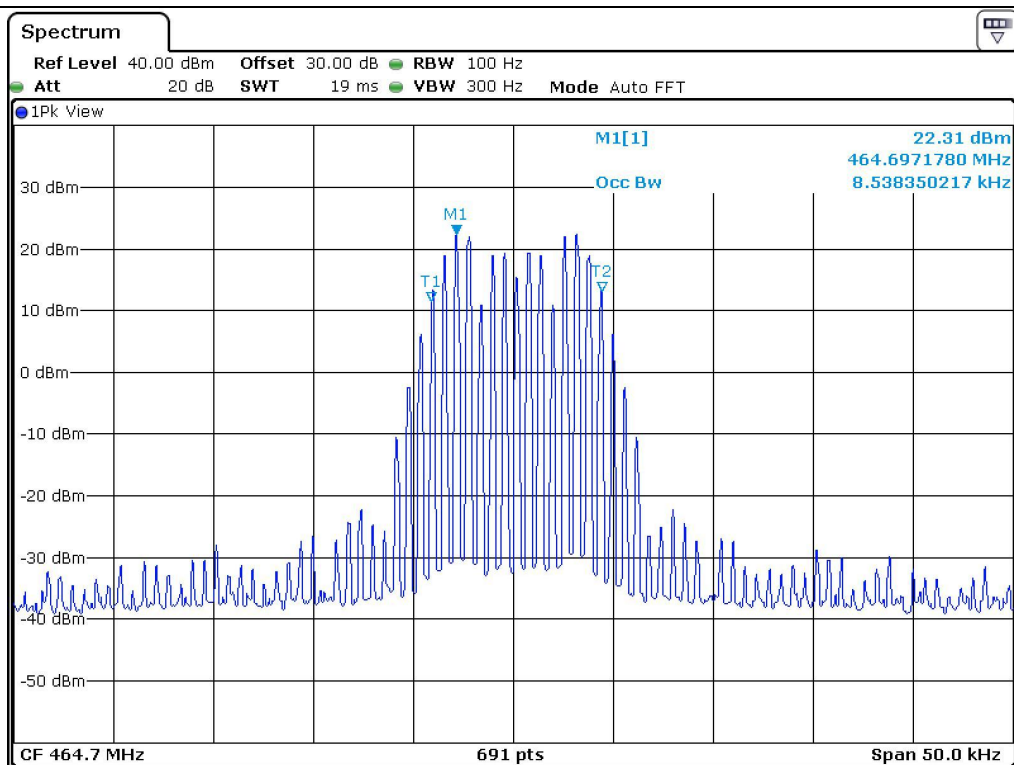
7.4 Test data

- Test Date : March 20, 2012
- Test Result : Pass

FREQUENCY(MHz)	MEASURED VLAUE (kHz)	LIMIT (kHz)	MARGIN (kHz)
464.70	8.54	11.25	-2.71



Tested by: Chang-Uk, Jun / Engineer



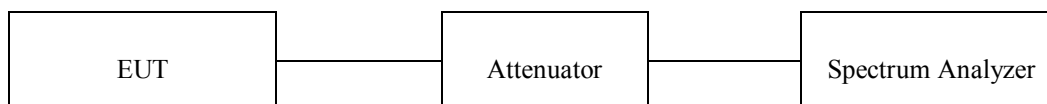
8. SPURIOUS EMISSION AT ANTENNA TERMINAL

8.1 Operating environment

Temperature : 27 °C
Relative humidity : 47 %R.H.

8.2 Test set-up for conducted measurement

The RF output port of the EUT was connected to the input of the spectrum analyzer through sufficient attenuation. The resolution bandwidth and video bandwidth of the spectrum analyzer was set at 100 kHz and sufficient scans were taken to show any out of band emissions up to 5 GHz.



8.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
☐ -	E4432B	HP	Signal Generator	US38440950	June 10, 2011 (1Y)
☐ -	SMJ100A	R/S	Signal Generator	101038	Feb. 02, 2012 (1Y)
☒ -	FSP	R/S	Spectrum Analyzer	100017	Mar. 15, 2011 (1Y)
☒ -	67-30-43	Aeroflex Weinschel, Inc.,	POWER ATTENUATOR	CA5760	Nov. 30, 2012 (1Y)
☐ -	8564E	HP	Spectrum Analyzer	3650A00756	Jun. 10, 2011 (1Y)
☐ -	FSV30	R/S	Spectrum Analyzer	101372	Aug. 29, 2011 (1Y)

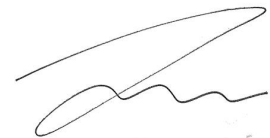
All test equipment used is calibrated on a regular basis.

8.4. Test data

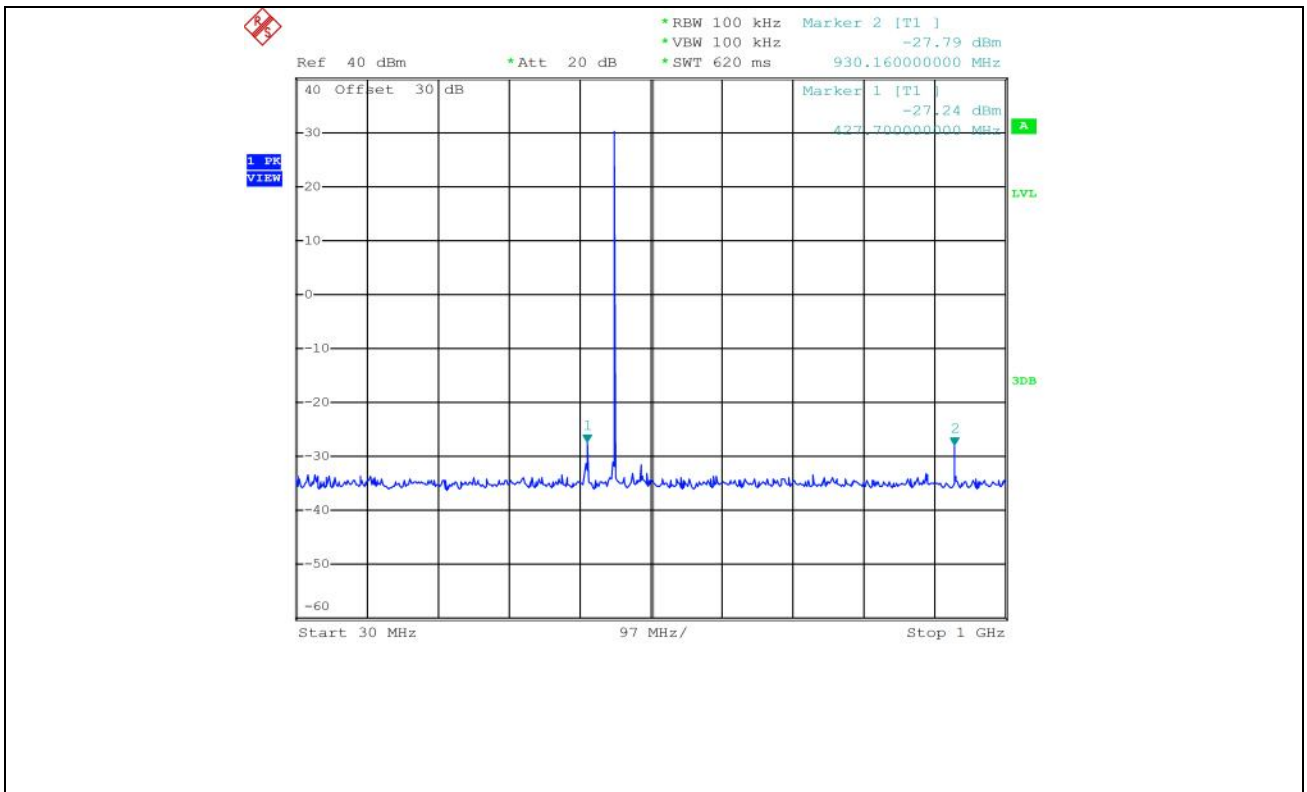
- Test Date : March 20, 2012
- Frequency range : 30 MHz ~ 5 GHz
- Result : PASSED BY -13.60 dB

Carrier Freq. (MHz)	Harmonic Freq. (MHz)	Measured Value (dBm)	Cable Loss (dB)	TOTAL (dBm)	Limit (dBm)	Margin (dB)
464.70	427.70	-27.24	0.64	-26.60	-13.00	-13.60
	930.16	-27.79	0.98	-26.81		-26.81
	3 072.00	-31.02	1.85	-29.17		-29.17

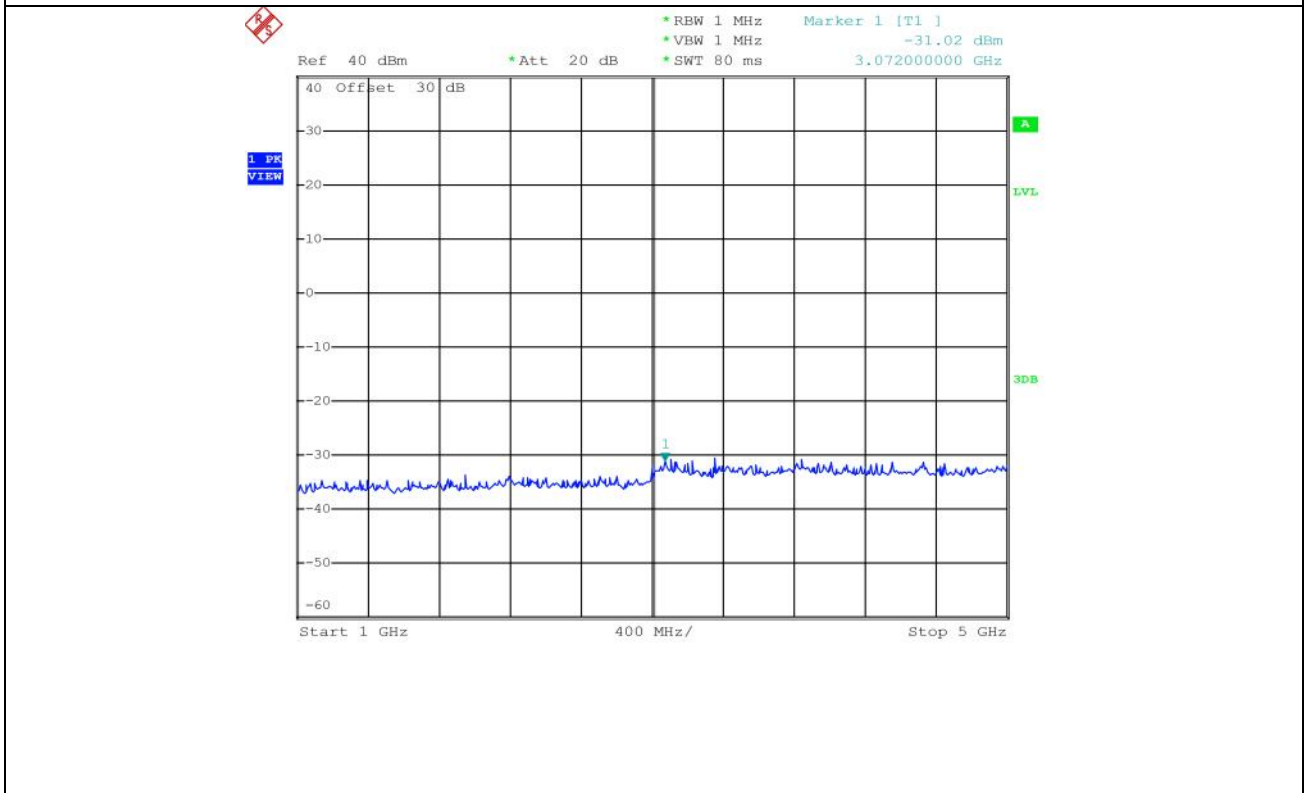
According to Part 90I, out of band emission shall be attenuated by $43 + 10 \log (P)$ dBc, equates to -13.0 dBm.



Tested by: Chang-Uk, Jun / Engineer



30 MHz ~ 1 GHz



1 GHz ~ 5 GHz

9. FIELD STRENGTH OF SPURIOUS RADIATION

9.1 Operating environment

Temperature : 27 °C
Relative humidity : 47 %R.H.

9.2 Test set-up

The radiated emissions measurements were on the 3 m, semi anechoic chamber. The EUT and other support equipment were placed on a non-conductive turntable above the ground plane. The interconnecting cables from outside test site were inserted into ferrite clamps at the point where the cables reach the turntable.

The frequency spectrum from 30 MHz to up to 10th harmonic of the fundamental frequency was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in height between 1.0 and 4.0 meters in order to determine the maximum emission levels. The test was performed by placing the EUT on 3-orthogonal axis. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

9.3 Test equipment used

Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ - ESCI	R/S	EMI Test Receiver	101013	Oct. 23, 2011 (1Y)
■ - ESU	R/S	EMI Test Receiver	100261	Sep. 27, 2011(1Y)
■ - 310N	Sonoma Instrument	Amplifier	312544	Oct. 12, 2011(1Y)
■ - 310N	Sonoma Instrument	Amplifier	312545	Oct. 12, 2011(1Y)
■ - VULB9163	Schwarzbeck	TRILOG Broadband Antenna	9163-420	Mar. 23, 2011(1Y)
■ - VULB9163	Schwarzbeck	TRILOG Broadband Antenna	9163-422	Mar. 23, 2011(1Y)
■ - CO2000	Innco System	Controller	619/27030611/L	N/A
■ - DT3000	Innco System	Turn Table	930611	N/A
■ - MA4000-EP	Innco System	Antenna Master	3320611	N/A
■ - MA4000-EP	Innco System	Antenna Master	3350611	N/A
■ - BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D295	Aug. 23, 2011(2Y)
■ - HFH2-Z2	Rohde & Schwarz	Loop Antenna	889 285 / 26	Nov. 08, 2010(2Y)
■ - SCU 18	Rohde & Schwarz	Signal Conditioning Unit	10041	Dec. 15, 2011(1Y)

All test equipment used is calibrated on a regular basis.

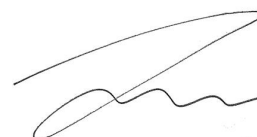
9.4 Test data for Fundamental and Harmonic Frequency

- . Test Date : March 20, 2012
- . Resolution bandwidth : 120 kHz (below 1 GHz), 1 MHz (above 1 GHz)
- . Video bandwidth : 300 kHz (below 1 GHz), 1 MHz (above 1 GHz)
- . Frequency range : 10 MHz ~ 5 GHz
- . Measurement distance : 3 m
- . Result : PASSED

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
464.70	87.41	11.10	16.70	H	4.20	32.00	-	-
464.70	87.40	11.30	16.70	V	4.20	32.20	-	-
929.40	75.70	-48.62	22.20	H	6.20	-20.22	-13.00	-7.22
929.40	76.19	-48.59	22.20	V	6.20	-20.19	-13.00	-7.19
1 394.10	39.16	-53.14	26.00	H	5.10	-22.04	-13.00	-9.04
1 394.10	43.75	-57.26	26.00	V	5.10	-26.16	-13.00	-13.16
It was not observed any emission from the EUT up to 5 000 MHz								

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical,



Tested by: Chang-Uk, Jun / Engineer

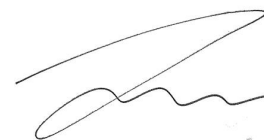
9.5 Test data for Other Frequency

- Test Date : March 20, 2012
- Resolution bandwidth : 120 kHz (below 1 GHz), 1 MHz (above 1 GHz)
- Video bandwidth : 300 kHz (below 1 GHz), 1 MHz (above 1 GHz)
- Frequency range : 10 MHz ~ 5 000 MHz
- Measurement distance : 3 m

Frequency (MHz)	Reading (dBuV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBuV/m)	Limits (dBuV/m)	Margin (dB)
36.33	46.44	H	12.70	1.00	34.74	40.00	-5.26
211.99	42.06	V	11.00	2.70	33.76	43.52	-9.76
428.06	52.49	H	16.20	4.00	40.29	46.02	-5.73
501.12	51.67	H	17.30	4.30	38.67	46.02	-7.35
892.85	50.41	V	21.90	6.10	34.61	46.02	-11.41
967.47	51.55	H	22.40	6.30	35.45	53.97	-18.52
It was not observed any emission from the EUT up to 5 000 MHz.							

Tabulated test data for Radiated Electromagnetic Field

Remark: "H": Horizontal, "V": Vertical



Tested by: Chang-Uk, Jun / Engineer

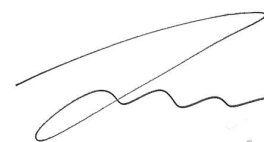
9.6 Test data for Receiving Mode

- Test Date : March 20, 2012
- Resolution bandwidth : 120 kHz
- Frequency range : 30 MHz ~ 1 000 MHz
- Measurement distance : 3 m

Frequency (MHz)	Reading (dBuV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBuV/m)	Limits (dBuV/m)	Margin (dB)
43.58	34.25	H	13.70	1.20	21.75	40.00	-18.25
175.26	31.48	V	9.00	2.70	25.18	43.52	-18.34
452.58	38.62	H	16.50	4.60	26.72	46.02	-19.30
493.36	37.56	H	17.10	4.80	25.26	46.02	-20.76
629.48	38.92	V	19.00	5.40	25.32	46.02	-20.70
684.36	39.48	H	19.40	5.60	25.68	46.02	-20.34
It was not observed any emission from the EUT up to 5 000 MHz.							

Tabulated test data for Radiated Electromagnetic Field

Remark: "H": Horizontal, "V": Vertical



Tested by: Chang-Uk, Jun / Engineer

10. FREQUENCY STABILITY WITH TEMPERATURE VARIATION

10.1 Operating environment

Temperature : 27 °C
Relative humidity : 47 %R.H.

10.2 Test set-up

The EUT was connected to an external adaptor and the RF output port of the EUT was connected to a frequency counter via feed-through attenuators. The EUT was placed inside of the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

Turn EUT off and set chamber temperature to -30 °C and then allow sufficient time (approximately 20 to 30 minutes after chamber reach the assigned temperature) for EUT to stabilize. Turn ON EUT and measure the EUT operating frequency and then turn off the EUT after the measurement.

Repeat above method emission measurements at +50 °C and then record all measured frequencies on each temperature step.

10.3 Test equipment used

Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
□ - E4432B	HP	Signal Generator	US38440950	June 10, 2011 (1Y)
□ - SMJ100A	R/S	Signal Generator	101038	Feb. 01, 2012 (1Y)
□ - FSP	R/S	Spectrum Analyzer	100017	Mar. 15, 2011 (1Y)
■ - 67-30-43	Aeroflex Weinschel, Inc.,	POWER ATTENUATOR	CA5760	Nov. 30, 2012 (1Y)
□ - 8564E	HP	Spectrum Analyzer	3650A00756	Jun. 10, 2011 (1Y)
■ - FSV30	R/S	Spectrum Analyzer	101372	Aug. 29, 2011 (1Y)
■ - 53152A	R/S	CW Microwave Frequency Counter	US39270295	Dec. 30, 2011 (1Y)

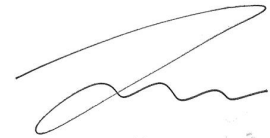
All test equipment used is calibrated on a regular basis.

10.4 Test data

-. Test Date : March 20, 2012

-. Result : PASSED

Temperature (°C)	Center Freq. (Hz)	Measured Freq.(Hz)	Result (PPM)	Limit
-30	464 700 000	464 700 325	0.699 4	1 PPM
-20		464 700 242	0.520 8	
-10		464 700 185	0.398 1	
0		464 700 060	0.129 1	
10		464 699 845	-0.333 5	
20		464 699 821	-0.385 2	
30		464 699 814	-0.400 3	
40		464 699 798	-0.434 7	
50		464 699 782	-0.469 1	



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11. FREQUENCY STABILITY WITH VOLTAGE VARIATION

11.1 Operating environment

Temperature : 27 °C
Relative humidity : 47 %R.H.

11.2 Test set-up

An external DC adaptor was connected to the EUT. The voltage of EUT set to 115 % of the nominal value and was then decreased until the EUT light no longer illuminated; i.e., the battery end point. The output frequency was recorded for each battery voltage.

11.3 Test equipment used

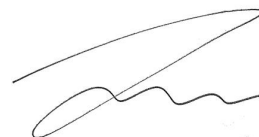
Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
□ - E4432B	HP	Signal Generator	US38440950	June 10, 2011 (1Y)
□ - SMJ100A	R/S	Signal Generator	101038	Feb. 01, 2012 (1Y)
□ - FSP	R/S	Spectrum Analyzer	100017	Mar. 15, 2011 (1Y)
■ - DRP-305DN	DIGITAL Elec.	DC Power supply	4030191	Sep. 03, 2011
□ - 8564E	HP	Spectrum Analyzer	3650A00756	Jun. 10, 2011 (1Y)
■ - FSV30	R/S	Spectrum Analyzer	101372	Aug. 29, 2011 (1Y)
■ - 53152A	R/S	CW Microwave Frequency Counter	US39270295	Dec. 30, 2011 (1Y)

All test equipment used is calibrated on a regular basis.

11.4 Test data for charging mode

- Test Date : March 20, 2012
- Rated Supply Voltage : 5 Vdc
- Result : PASSED

Voltage (Vdc)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
5.75	464 700 000	464 700 256	0.550 9	1 PPM
4.90		464 700 134	0.288 4	

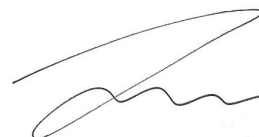


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11.5 Test data for battery mode

- Test Date : March 20, 2012
- Rated Supply Voltage : 3.7 Vdc
- Result : PASSED

Voltage (Vdc)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Result (PPM)	Limit
4.26	464 700 000	464 700 157	0.337 9	1 PPM
3.15		464 700 068	0.146 3	



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12. CONDUCTED EMISSION TEST

12.1 Operating environment

Temperature : 20 °C
Relative humidity : 36 % R.H.

12.2 Test set-up

The EUT was placed on a wooden table, 0.8 m height above the floor. The EUT was connected to adaptor and power of adaptor was fed to the EUT through a 50 Ω / 50 μ H + 5 Ω Artificial Mains Network (AMN). The ground plane was electrically bonded to the reference ground system and all power lines were filtered from ambient.

12.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.(Interval)
☐ -	ESiB26	R&S	Test Receiver	100296	Apr. 11, 2011 (1Y)
☒ -	ESHS10	Rohde & Schwarz	Test Receiver	834467/007	Jun. 13, 2011 (1Y)
☐ -	NSLK 8126	Schwarzbeck	AMN	8126-404	Jun. 10, 2011 (1Y)
☒ -	NSLK 8128	Schwarzbeck	AMN	8128-216	Jun. 10, 2011 (1Y)
☐ -	3825/2	EMCO	AMN	9109-1867	Jun. 10, 2011 (1Y)
☐ -	3825/2	EMCO	AMN	9109-1869	Jun. 10, 2011 (1Y)
☐ -	N/A	KNORR-BREMSE	Artificial Hand	12844	N/A

All test equipment used is calibrated on a regular basis.

12.4 Test data for Transmitting and Charging Mode

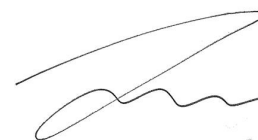
- Test Date : March 19, 2012
- Resolution bandwidth : 9 kHz
- Frequency range : 0.15 MHz ~ 30 MHz

Frequency (MHz)	Line	Peak (dBμV)		Margin (dB)
		Emission level	Q.P Limits	
0.18	N	54.11	64.49	-10.38
0.24	N	47.87	62.10	-14.23
0.38	N	44.83	58.28	-13.45
0.48	N	41.71	56.25	-14.54
0.53	H	43.39	56.00	-12.61
2.95	N	42.44	56.00	-13.56
Frequency (MHz)	Line	Average (dBμV)		Margin (dB)
		Emission level	Limits	
0.18	N	34.61	54.49	-19.88
0.24	N	26.07	52.10	-26.03
0.38	N	22.36	48.28	-25.92
0.53	H	20.17	46.00	-25.83

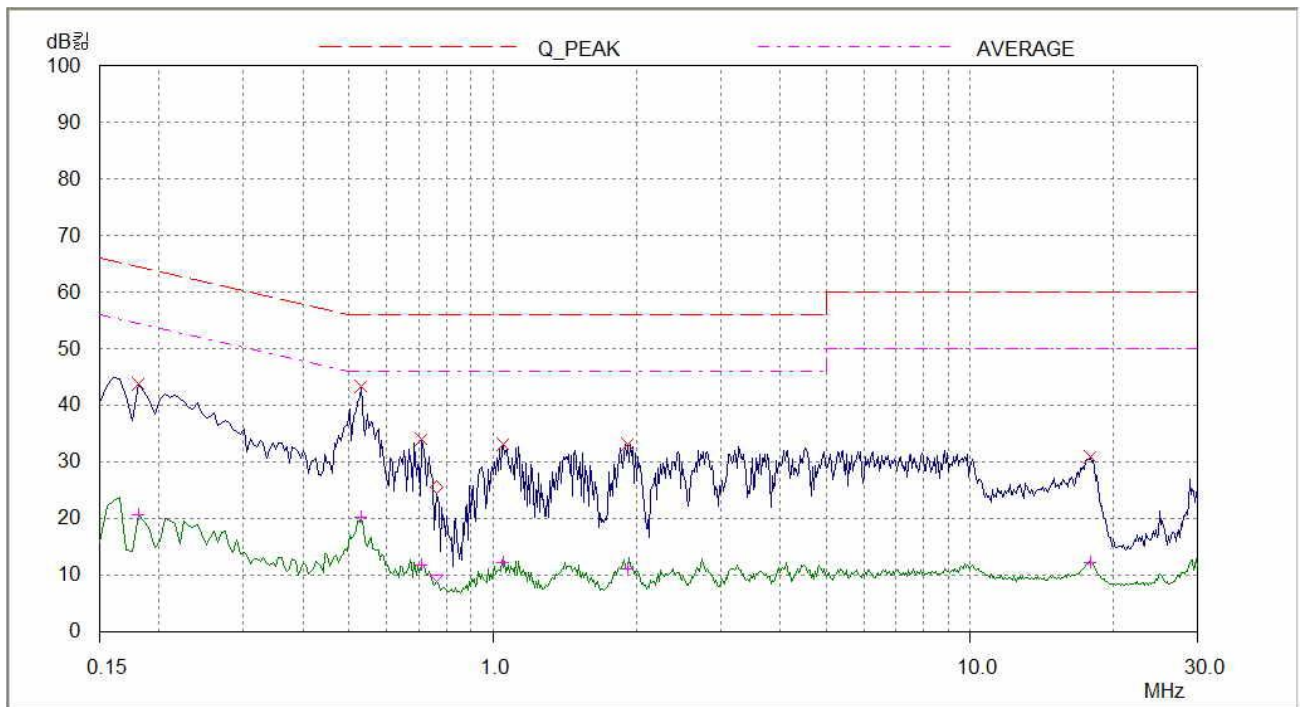
Line Conducted Emissions Tabulated Data

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

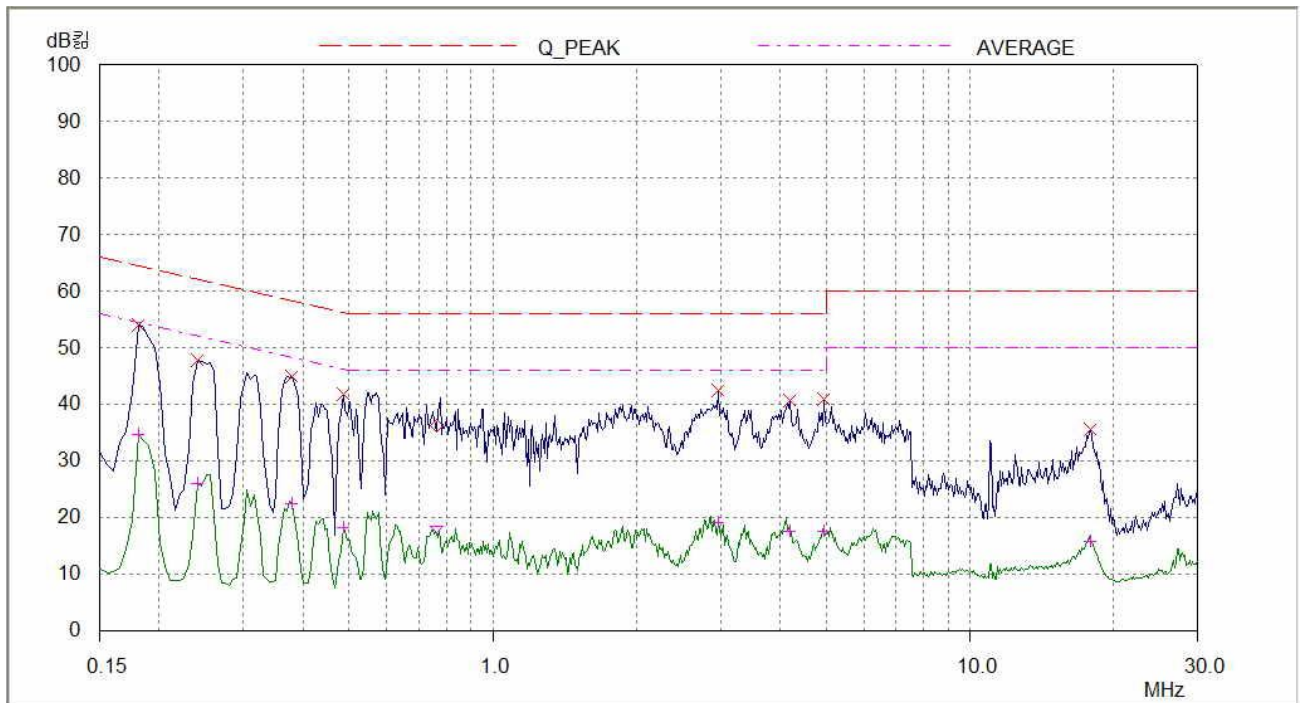
See next page for an overview sweep performed with peak and average detector mode.



Tested by: Chang-Uk, Jun / Engineer



HOT LINE



NEUTRAL LINE

12.5 Test data for Receiving and Charging Mode

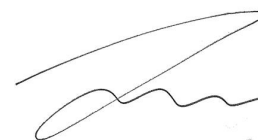
- Test Date : March 19, 2012
 - Resolution bandwidth : 9 kHz
 - Frequency range : 0.15 MHz ~ 30 MHz

Frequency (MHz)	Line	Peak (dBμV)		Margin (dB)
		Emission level	Q.P Limits	
0.16	H	44.27	65.46	-21.19
0.17	N	43.11	64.72	-21.61
0.52	H	40.85	56.00	-15.15
0.67	H	28.00	56.00	-28.00
0.99	H	29.40	56.00	-26.60
1.85	H	28.59	56.00	-27.41
Frequency (MHz)	Line	Average (dBμV)		Margin (dB)
		Emission level	Limits	
0.52	N	24.84	46.00	-21.16
0.67	H	11.93	46.00	-34.07
0.97	N	11.98	46.00	-34.02
1.83	N	12.19	46.00	-33.81

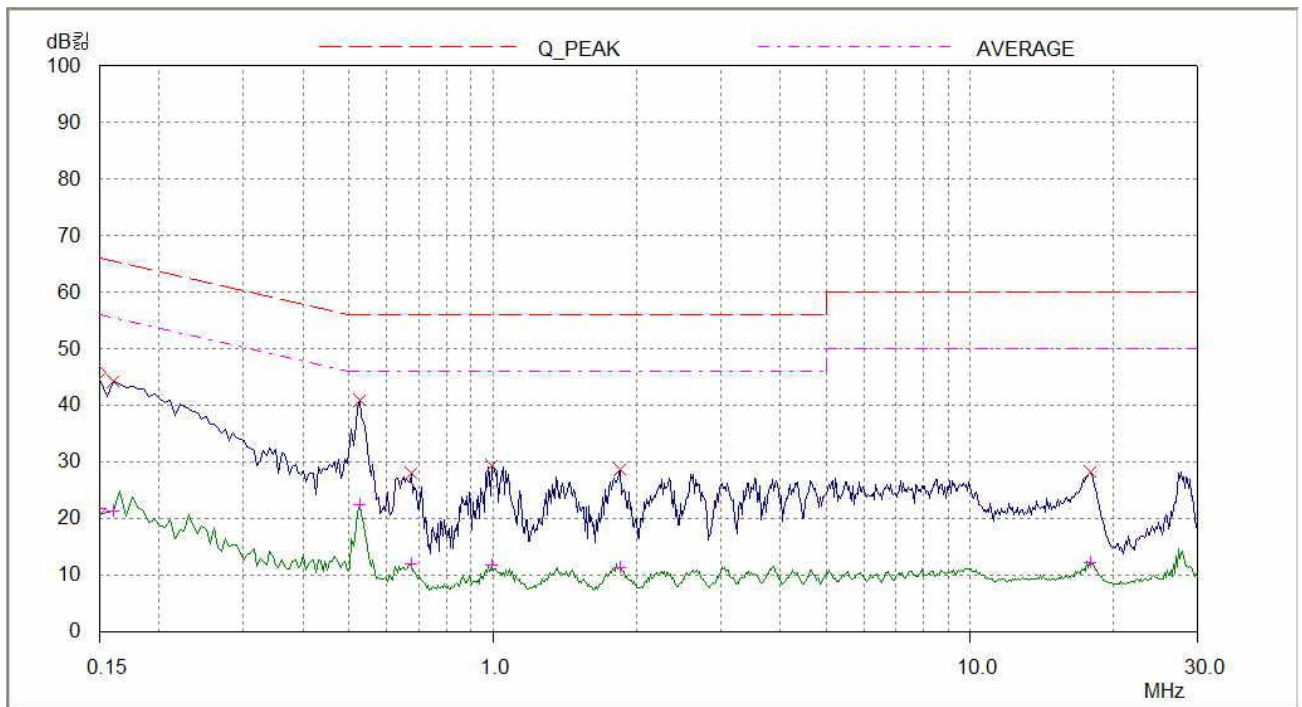
Line Conducted Emissions Tabulated Data

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

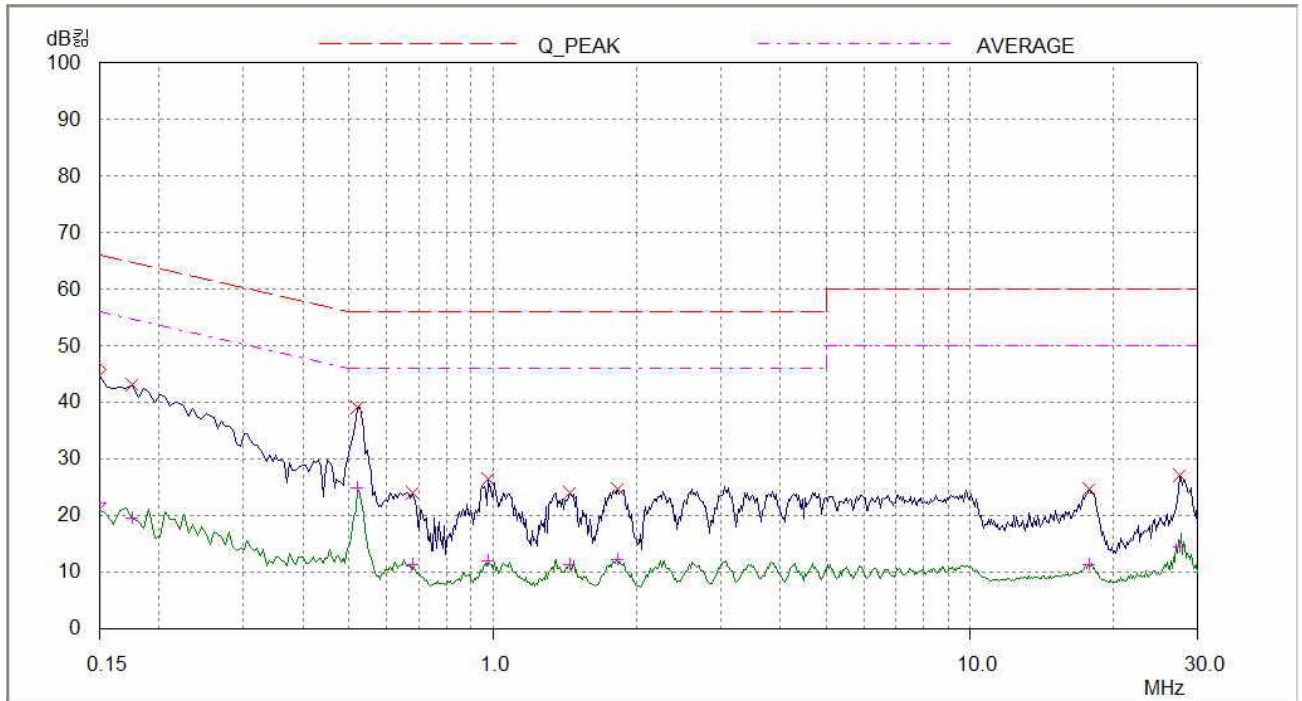
See next page for an overview sweep performed with peak and average detector mode.



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HOT LINE



NEUTRAL LINE

13. MAXIMUM PERMISSIBLE EXPOSURE

13.1 RF Exposure Calculation

According to the FCC rule 1.1310 table 1B, the limit for the maximum permissible RF exposure for an uncontrolled environment is $f/1500 \text{ mW/cm}^2$ ($=0.485$) for the frequency range between 300 MHz and 1500 MHz.

The electric field generated for a 1 mW/cm^2 exposure is calculated as follows:

$$E = \sqrt{(30 * P * G) / d}, \text{ and } S = E^2 / Z = E^2 / 377, \text{ because } 1 \text{ mW/cm}^2 = 10 \text{ W/m}^2$$

Where

S = Power density in mW/cm^2 , Z = Impedance of free space, 377Ω

E = Electric field strength in Volts/m, G = Numeric antenna gain, and d = distance in meter

Combining equations and rearranging the terms to express the distance as a function of the remaining variable

$$d = \sqrt{(30 * P * G) / (377 * S)}$$

Changing to units of mW and cm, using $P (\text{mW}) = P (\text{W}) / 1000$, $d (\text{cm}) = 100 * d (\text{m})$

$$d = 0.282 * \sqrt{(P * G) / S}$$

Where

d = distance in cm, P = Power in mW, G = Numeric antenna gain, and S = Power density in mW/cm^2

13.2. Calculated MPE Safe Distance and Density

According to above equation, the following result was obtained.

Peak Output Power		Antenna Gain		Safe Distance	Power Density (mW/cm^2) @ 20 cm Separation	FCC Limit (mW/cm^2)
(dBm)	(mW)	Log	Linear			
33.63	2 306.75	-2.00	0.01	1.945	0.0046	0.485

According to above table, safe distance, $D = 0.282 * \sqrt{(2 306.75 * 0.01) / 0.485} = 1.945 \text{ cm}$.

For getting power density at 20 cm separation in above table, following formula was used.

$$S = P * G / (4\pi * R^2) = 2 306.75 * 0.01 / (4 * 3.14 * 20^2) = 0.0046$$

Where:

S = Power Density,

P = Power input to the external antenna (Output power from the EUT antenna port (dBm) – cable loss (dB)),

G = Gain of Transmit Antenna (linear gain), R = Distance from Transmitting Antenna