# ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LOW-POWER, NON-LICENSED TRANSMITTER

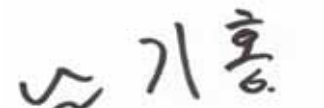
| | |
|---|---|
| **Test Report No.** | **: E12NR-031** |
| **AGR No** | **: A12OA-243** |
| **Applicant** | **: G.S. Trading Co., Ltd.** |
| **Address** | **: Rm 301, Sang bo B/D, 396-223, Sindorim-Dong, Kuro-Ku, Seoul, Korea** |
| **Manufacturer** | **: G.S. Trading Co., Ltd.** |
| **Address** | **: Rm 301, Sang bo B/D, 396-223, Sindorim-Dong, Kuro-Ku, Seoul, Korea** |
| **Type of Equipment** | **: Single Modular Transmitter** |
| **FCC ID.** | **: R6G-GSRMI24-1** |
| **Model Name** | **: GSRMI24-1** |
| **Serial number** | **: None** |
| **Total page of Report** | **: 28 pages (including this page)** |
| **Date of Incoming** | **: November 06, 2012** |
| **Date of issue** | **: November 16, 2012** |

## SUMMARY

The equipment complies with the regulation; **FCC Part 15 Subpart C Section 15.249.**

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: 
Y. K. Kwon / Exe. Managing Director
ONETECH Corp.



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## Revision History

| Issue Report No. | Issued Date | Revisions | Effect Section |
|---|---|---|---|
| E12NR-031 | November 16, 2012 | Initial Release | All |
| | | | |
| | | | |



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# 1. VERIFICATION OF COMPLIANCE

| | |
|---|---|
| APPLICANT | : G.S. Trading Co., Ltd. |
| ADDRESS | : Rm 301, Sang bo B/D, 396-223, Sindorim-Dong, Kuro-Ku, Seoul, Korea |
| CONTACT PERSON | : Mr. Young-Cheol Na / CEO |
| TELEPHONE NO | : +82-2-858-1255 |
| FCC ID | : R6G-GSRMI24-1 |
| MODEL NAME | : GSRMI24-1 |
| BRAND NAME | : N/A |
| SERIAL NUMBER | : N/A |
| DATE | : November 16, 2012 |

| | |
|---|---|
| EQUIPMENT CLASS | **DXX – Low Power Communications Transmitter** |
| KIND OF EQUIPMENT | Single Modular Transmitter |
| 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 SUBPART C Section 15.249 |
| 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.

 

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# 2. TEST SUMMARY

## 2.1 Test items and results

| SECTION | TEST ITEMS | RESULTS |
|---|---|---|
| 15.215(c) | 20 dB BANDWIDTH | Met the Limit / PASS |
| 15.249 (a) | Field Strength of Emission | Met the Limit / PASS |
| 15.249 (c) | Measurement distance | Met the Requirement / PASS |
| 15.249 (d) | Emissions Radiated Outside of the Specified Frequency Band | Met the Limit / PASS |
| 15.249 (e) | Radiated Emissions above 1 000 MHz | Met the Limit / PASS |
| 15.209 | Radiated Emission Limits, General Requirement | Met the Limit / PASS |
| 15.207 | Conducted Limits | Met the Limit / PASS |
| 15.203 | Antenna Requirement | Met the Requirement / 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

Radiated testing was performed according to the procedures in ANSI C63.4: 2009 at a distance of 3 m from EUT to the antenna.

## 2.6 Test Facility

The semi anechoic chamber and conducted 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



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# 3. GENERAL INFORMATION

## 3.1 Product Description

The G.S. Trading Co., Ltd., Model: GSRMI24-1 (referred to as the EUT in this report) is a Single Modular Transmitter. Product specification information described herein was obtained from product data sheet or user's manual.

| | |
|---|---|
| DEVICE TYPE | Single Modular Transmitter |
| OPERATING FREQUENCY | 2 402 MHz ~ 2 480 MHz |
| RATED RF OUTPUT POWER | 0 dBm |
| ANTENNA TYPE | PCB Pattern Antenna |
| MODULATION | FSK |
| Tx DATA SPEED | 1.6 Mbps |
| USED RF CHIP | Maker: ELAN MICROELECTRONICS CORPORATION<br>Model Name: EM198850AW |
| LIST OF EACH OSC. OR CRY. FREQ.(FREQ. >= 1 MHz) | 12 MHz |
| RATED SUPPLY VOLTAGE | DC 3 V |

## 3.2 Model Differences

-. None

# 4. EUT MODIFICATIONS

-. None


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# 5. SYSTEM TEST CONFIGURATION

## 5.1 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 | N/A | N/A |

## 5.2 Peripheral equipment

Defined as equipment needed for correct operation of the EUT, but not considered as tested: None

## 5.3 Mode of operation during the test

For the testing, software used to control the EUT for staying in continuous transmitting is programmed.
For final testing, the EUT was set at Low Channel (2 402 MHz), Middle Channel (2 441 MHz), and High Channel (2 480 MHz). To get a maximum emission levels from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes and the worst case is “XY” axis.

## 5.4 Configuration of Test System

**Line Conducted Test** **:** The EUT was connected to DC power supply 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. Final radiated emission tests were conducted at 10 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.

## 5.5 Antenna Requirement

According to section 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 antenna of the EUT is a pattern antenna on the main board in the EUT, so no consideration of replacement by the user.



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# 6. PRELIMINARY TEST

## 6.1 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) |
|---|---|
| Tx Mode | X |

## 6.2 General Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

| Operation Mode | The Worse operating condition (Please check one only) |
|---|---|
| TX Mode | X |


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# 7. CARRIER FREQUENCY SEPARATION

## 7.1. 20 dB BANDWIDTH

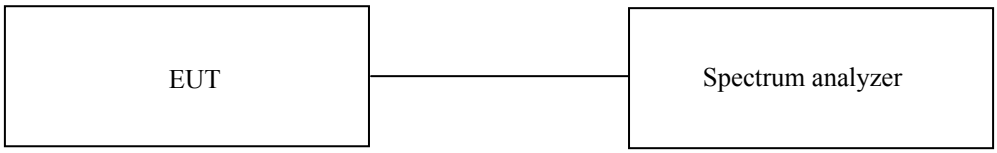
### 7.1.1 Operating environment

Temperature : 25 °C

Relative humidity : 54 % R.H.

### 7.1.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz, and peak detection was used. The 20 dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 20 dB is defined.




### 7.1.3 Test equipment used

| | Model Number | Manufacturer | Description | Serial Number | Last Cal. (Interval) |
|---|---|---|---|---|---|
| ■ - | FSV30 | Rohde & Schwarz | Signal Analyzer | 101372 | May 31, 2012(1Y) |

All test equipment used is calibrated on a regular basis.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### 7.1.4 20 dB Bandwidth

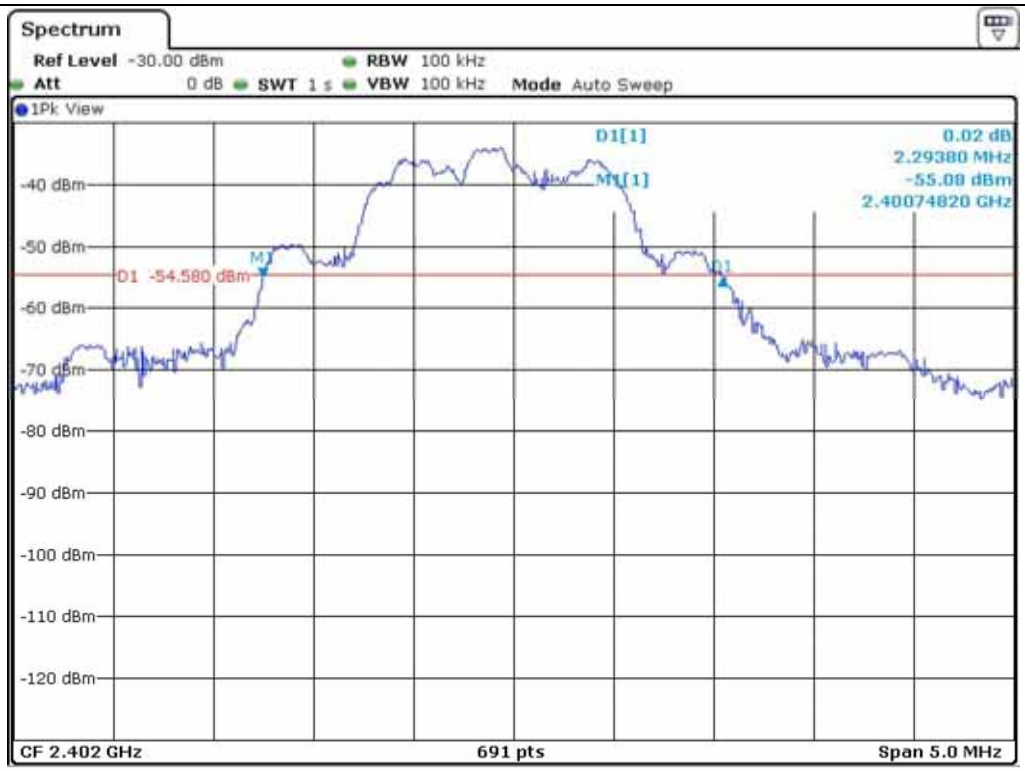
-. Test Date : November 13, 2012

-. Test Result : Pass

| Frequency(MHz) | Occupied Bandwidth(MHz) | Result |
|---|---|---|
| 2 402.00 | 2.293 8 | Pass |
| 2 441.00 | 2.286 5 | Pass |
| 2 480.00 | 2.351 7 | Pass |

Remark: See next page for an overview sweep performed with peak detector.

**Tested by: Hong-Kyu, Lee/ Engineer**




Low Channel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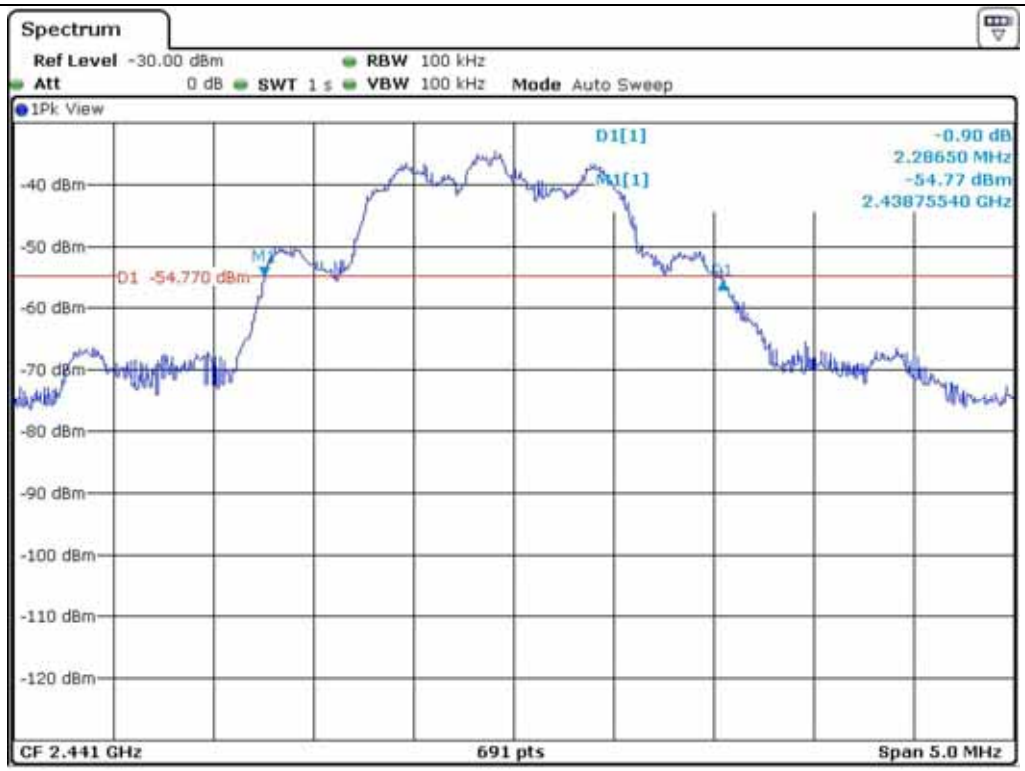
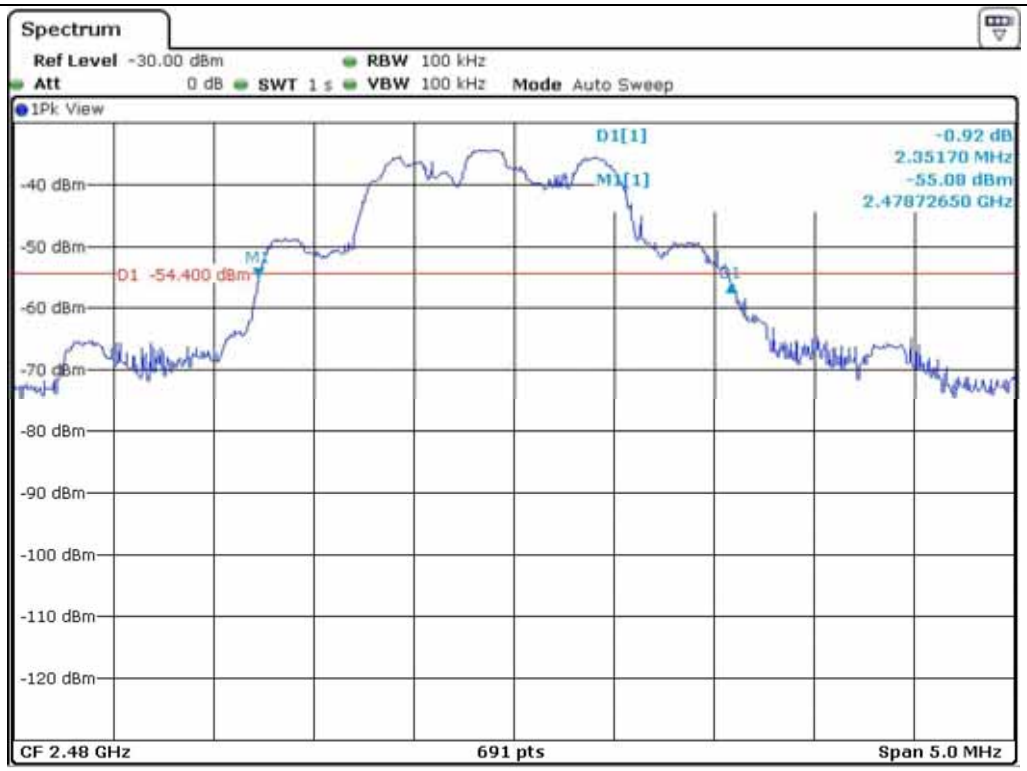



Middle Channel




High Channel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# 8. RADIATED EMISSION TEST

## 8.1 Test set-up

The radiated emissions measurements were on the 3 m, open-field test site. 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 up to 25 GHz 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 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

Test set-up photos are included in appendix I.

## 8.2 Measurement uncertainty

Radiated emission electric field intensity, 30 MHz ~ 300 MHz : ± 4.43 dB

Radiated emission electric field intensity, 300 MHz ~ 1 000 MHz : ± 3.80 dB

Radiated emission electric field intensity, 1 000 MHz ~ 3 000 MHz: ± 4.4 dB

Measurement uncertainty is calculated in accordance with CISPR 16-4-2. The measurement uncertainty is given with a confidence of 95 % with the coverage factor, $k = 2$.

## 8.3 Test equipment used

| | Model Number | Manufacturer | Description | Serial Number | Last Cal. (Interval) |
|---|---|---|---|---|---|
| ☐ - | ESCI | Rohde & Schwarz | EMI Test Receiver | 101012 | Feb. 06, 2012 (1Y) |
| ■ - | ESU | Rohde & Schwarz | EMI Test Receiver | 100261 | Sep. 11, 2012 (1Y) |
| ☐ - | 8564E | HP | Spectrum Analyzer | 3650A00756 | Apr. 04, 2012 (1Y) |
| ☐ - | FSP | Rohde & Schwarz | Spectrum Analyzer | 100017 | Mar 12, 2012(1Y) |
| ■ - | 310N | Sonoma Instrument | AMPLIFIER | 312544 | Oct. 11, 2012(1Y) |
| ■ - | FSV30 | Rohde & Schwarz | Signal Analyzer | 101372 | May 31, 2012(1Y) |
| ■ - | SCU-18 | Rohde & Schwarz | PRE-AMPLIFIER | 10041 | Dec. 15, 2011 (1Y) |
| ■ - | MA240 | HD GmbH | Antenna Master | N/A | N/A |
| ■ - | HD100 | HD GmbH | Position Controller | N/A | N/A |
| ■ - | DS420S | HD GmbH | Turn Table | N/A | N/A |
| ■ - | VULB9163 | Schwarzbeck | TRILOG Broadband Antenna | VULB9163-255 | Apr. 24, 2012(2Y) |
| ■ - | BBHA9120D | Schwarzbeck | Horn Antenna | BBHA9120D294 | Jun. 17, 2011 (2Y) |
| ■ - | BBHA9170 | Schwarzbeck | Horn Antenna | BBHA9170178 | Jun. 17, 2011 (2Y) |

All test equipment used is calibrated on a regular basis.



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## 8.4 Final Result of Measurement

### 8.4.1 Field Strength of the Fundamental Frequency

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

Humidity Level : 54 % R.H. Temperature: 25 °C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.249(a)

Result : PASSED

EUT : Single Modular Transmitter Date: November 13, 2012

Operating Condition : TX mode

Distance : 3 m

| Channel | Radiated Emissions | | | Ant | Correction Factors | | | Total | FCC Limit | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Carrier Freq. (MHz) | Amplitude (dBµV) | Detect Mode | Pol. | Antenna (dB/m) | Cable (dB) | Pre-Amp (dB) | Amplitude (dBµV/m) | Limit (dBµV/m) | Margin (dB) |
| Low | 2 402.00 | 98.62 | Peak | H | 27.15 | 5.02 | 43.10 | 87.69 | 113.98 | -26.29 |
| | | 96.79 | Average | H | | | | 85.86 | 93.98 | -8.12 |
| | | 93.16 | Peak | V | | | | 82.23 | 113.98 | -31.75 |
| | | 92.62 | Average | V | | | | 81.69 | 93.98 | -12.29 |
| Middle | 2 441.00 | 98.43 | Peak | H | 27.22 | 5.04 | 43.10 | 87.59 | 113.98 | -26.39 |
| | | 97.95 | Average | H | | | | 87.11 | 93.98 | -6.87 |
| | | 93.91 | Peak | V | | | | 83.07 | 113.98 | -30.91 |
| | | 92.76 | Average | V | | | | 81.92 | 93.98 | -12.06 |
| High | 2 480.00 | 98.08 | Peak | H | 27.28 | 5.06 | 43.10 | 87.32 | 113.98 | -26.66 |
| | | 96.15 | Average | H | | | | 85.39 | 93.98 | -8.59 |
| | | 93.56 | Peak | V | | | | 82.80 | 113.98 | -31.18 |
| | | 91.22 | Average | V | | | | 80.46 | 93.98 | -13.52 |

*Remark: To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes, but the worst plane data were recorded in the report.

**Tested by: Hong-Kyu, Lee/ Engineer**



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## 8.4.2 Emissions Radiated Outside of the Specified Frequency Bands

### 8.4.2.1 Test Data for Harmonic

Humidity Level : 54 % R.H. Temperature: 25 °C
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.249(a)
Result : PASSED

EUT : Single Modular Transmitter Date: November 13, 2012
Operating Condition : TX mode
Distance : 3 m

| Channel | Frequency (MHz) | Reading (dBµV) | Detector Mode | Ant. Pol. (H/V) | Ant. Factor | Cable Loss | Amp Gain | Total (dBµV/m) | Limits (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| Low | 4 804.00* | 55.26 | Peak | H | 31.14 | 6.90 | 42.80 | 50.50 | 73.98 | -23.48 |
| | | 45.85 | Average | H | | | | 41.09 | 53.98 | -12.89 |
| | | 55.81 | Peak | V | | | | 51.05 | 73.98 | -22.93 |
| | | 51.04 | Average | V | | | | 46.28 | 53.98 | -7.70 |
| | Other frequencies were not found up to 25 GHz. | | | | | | | | | |
| Middle | 4 882.00* | 54.32 | Peak | H | 31.22 | 6.93 | 42.80 | 49.67 | 73.98 | -24.31 |
| | | 48.18 | Average | H | | | | 43.53 | 53.98 | -10.45 |
| | | 53.93 | Peak | V | | | | 49.28 | 73.98 | -24.70 |
| | | 51.10 | Average | V | | | | 46.45 | 53.98 | -7.53 |
| | Other frequencies were not found up to 25 GHz. | | | | | | | | | |
| High | 4 960.00* | 54.87 | Peak | H | 31.30 | 6.97 | 42.80 | 50.34 | 73.98 | -23.64 |
| | | 52.70 | Average | H | | | | 48.17 | 53.98 | -5.81 |
| | | 52.39 | Peak | V | | | | 47.86 | 73.98 | -26.12 |
| | | 50.05 | Average | V | | | | 45.52 | 53.98 | -8.46 |
| | Other frequencies were not found up to 25 GHz. | | | | | | | | | |

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical, “*” Frequency fall in restricted band

**Tested by: Hong-Kyu, Lee/ Engineer**



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### 8.4.2.2 Test Data for Below 1 GHz

Humidity Level : 54 % R.H. Temperature: 25 °C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.249 (d)

Result : PASSED

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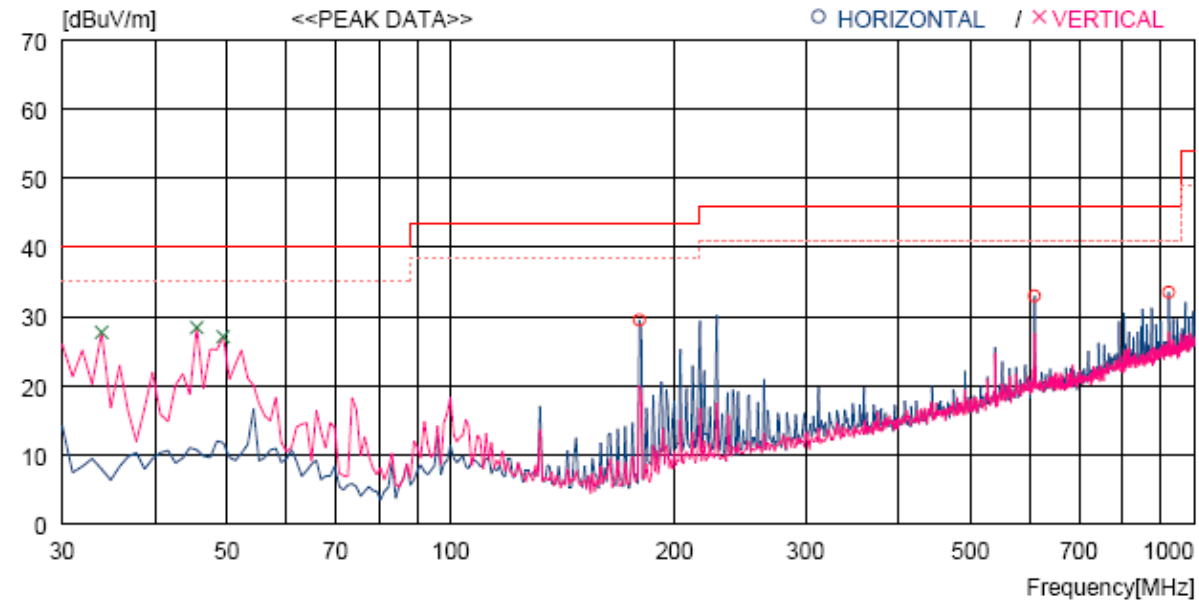
EUT : Single Modular Transmitter Date: November 13, 2012

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

Operating condition : Low Channel

**Graphical representation of Radiated Emission**




**Tabulated Results for Radiated Emission**

| 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 | 179.380 | 50.4 | 9.7 | 2.4 | 33.0 | 29.5 | 43.5 | 14 | 100 | 0 |
| 2 | 610.058 | 40.9 | 20.4 | 4.8 | 33.1 | 33.0 | 46.0 | 13 | 100 | 161 |
| 3 | 924.328 | 35.6 | 23.6 | 6.2 | 31.9 | 33.5 | 46.0 | 12.5 | 100 | 38 |
| ----- Vertical ------ | | | | | | | | | | |
| 4 | 33.880 | 46.6 | 13.3 | 0.9 | 33.1 | 27.7 | 40.0 | 12.3 | 100 | 359 |
| 5 | 45.520 | 45.1 | 15.3 | 1.1 | 33.1 | 28.4 | 40.0 | 11.6 | 100 | 220 |
| 6 | 49.400 | 43.9 | 15.1 | 1.2 | 33.1 | 27.1 | 40.0 | 12.9 | 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.

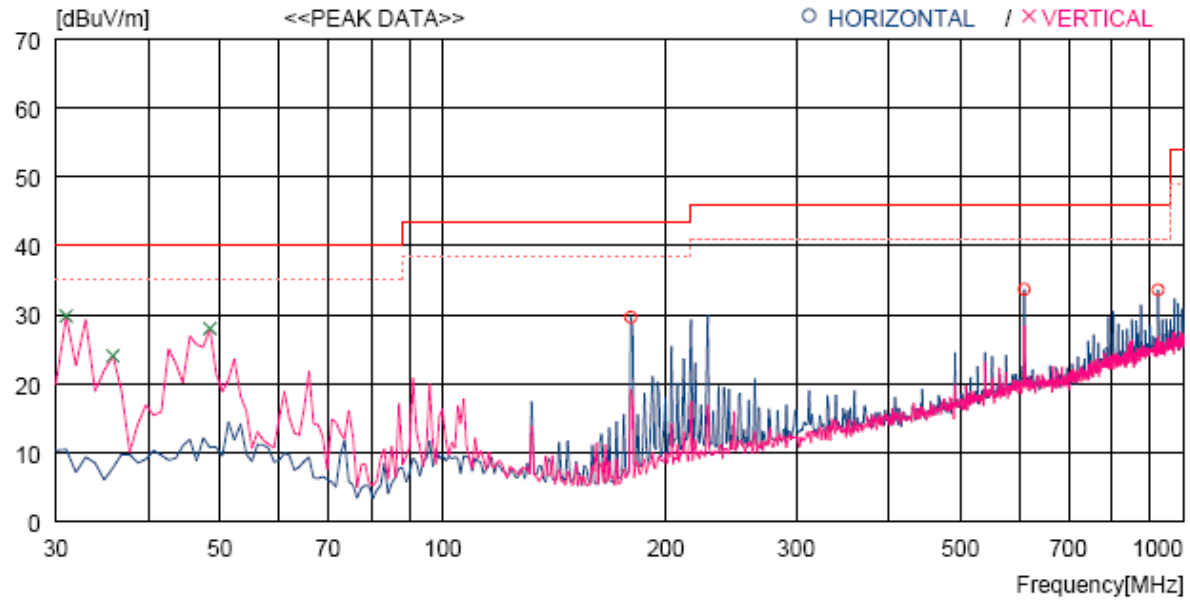
**Tested by: Hong-Kyu, Lee/ Engineer**



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

Operating condition : Middle Channel

**Graphical representation of Radiated Emission**




**Tabulated Results for Radiated Emission**

| 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 | 179.380 | 50.5 | 9.7 | 2.4 | 33.0 | 29.6 | 43.5 | 13.9 | 100 | 0 |
| 2 | 610.058 | 41.6 | 20.4 | 4.8 | 33.1 | 33.7 | 46.0 | 12.3 | 100 | 0 |
| 3 | 924.328 | 35.7 | 23.6 | 6.2 | 31.9 | 33.6 | 46.0 | 12.4 | 100 | 0 |
| ----- Vertical ------ | | | | | | | | | | |
| 4 | 30.970 | 49.0 | 13.0 | 0.9 | 33.1 | 29.8 | 40.0 | 10.2 | 100 | 359 |
| 5 | 35.820 | 42.6 | 13.6 | 0.9 | 33.1 | 24.0 | 40.0 | 16 | 100 | 359 |
| 6 | 48.430 | 44.7 | 15.2 | 1.2 | 33.1 | 28.0 | 40.0 | 12 | 100 | 47 |

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: Hong-Kyu, Lee/ Engineer**



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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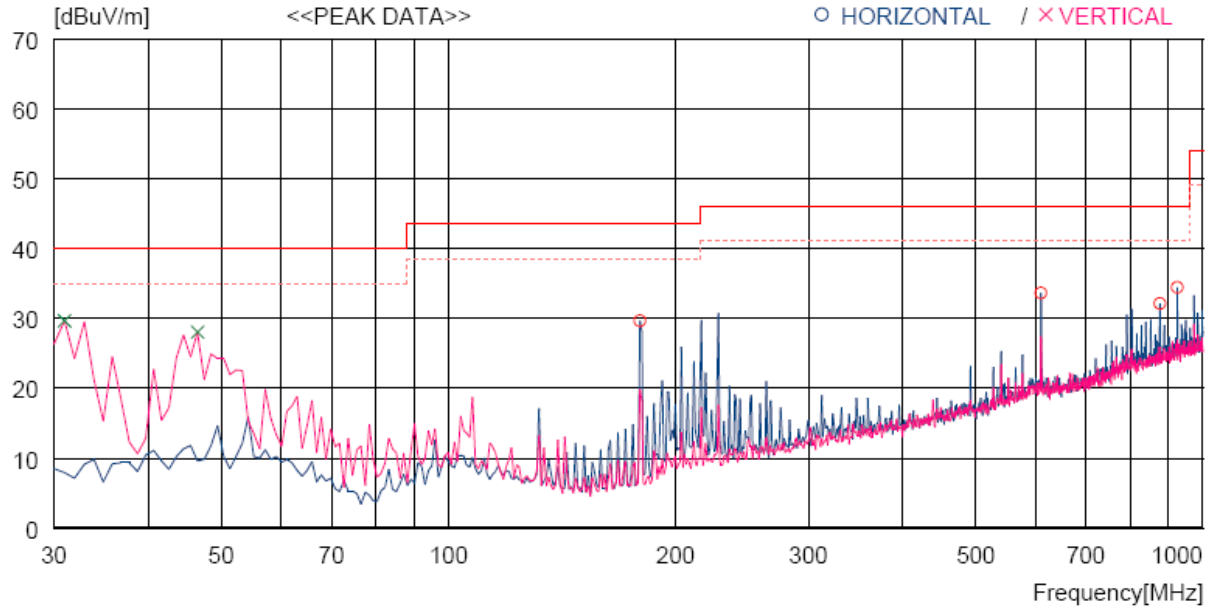
Operating condition : High Channel

**Graphical representation of Radiated Emission**




**Tabulated Results for Radiated Emission**

| 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 | 179.380 | 50.5 | 9.7 | 2.4 | 33.0 | 29.6 | 43.5 | 13.9 | 100 | 0 |
| 2 | 610.058 | 41.5 | 20.4 | 4.8 | 33.1 | 33.6 | 46.0 | 12.4 | 100 | 0 |
| 3 | 876.800 | 35.2 | 23.1 | 6.0 | 32.2 | 32.1 | 46.0 | 13.9 | 100 | 0 |
| 4 | 924.328 | 36.5 | 23.6 | 6.2 | 31.9 | 34.4 | 46.0 | 11.6 | 100 | 0 |
| ----- Vertical ------ | | | | | | | | | | |
| 5 | 30.970 | 48.8 | 13.0 | 0.9 | 33.1 | 29.6 | 40.0 | 10.4 | 100 | 359 |
| 6 | 46.490 | 44.8 | 15.2 | 1.1 | 33.1 | 28.0 | 40.0 | 12 | 100 | 190 |

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: Hong-Kyu, Lee/ Engineer**



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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**8.4.2.3 Test Data for Below 30 MHz**

Humidity Level : 54 % R.H. Temperature: 25 °C

Resolution bandwidth : 200 Hz (from 9 **kHz** to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)

Frequency range : 9 kHz ~ 30 MHz

Measurement distance : 3 m

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.249 (d)

Result : PASSED

EUT : Single Modular Transmitter Date: November 13, 2012

Detector : CISPR Quasi-Peak (Resolution Bandwidth: 9 kHz)

| Frequency (MHz) | Reading (dBμV) | Ant. Pol. (H/V) | Ant. Height (m) | Angle (°) | Ant. Factor (dB/m) | Cable Loss | Emission Level(dBμV/m) | Limits (dBμV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| It was not observed any emissions from the EUT. | | | | | | | | | |

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**Tested by: Hong-Kyu, Lee/ Engineer**



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

**8.4.2.3 Test Data above 1 GHz except for harmonic**

-. Test Date : November 13, 2012

- . Humidity Level : 54 % R.H.

-. Temperature : 25 °C

-. Resolution bandwidth : 1 MHz for Peak and Average Mode

-. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode

-. Frequency range : 1 GHz ~ 25 GHz

-. Measurement distance : 3 m

-. Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.249 (d)

- Result : PASSED

| Frequency (MHz) | Reading (dBμV) | Ant. Pol. (H/V) | Ant. Height (m) | Angle (°) | Ant. Factor (dB/m) | Cable Loss | Emission Level(dBμV/m) | Limits (dBμV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| It was not observed any emissions from the EUT. | | | | | | | | | |

**Tested by: Hong-Kyu, Lee/ Engineer**



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

**8.4.2.4 Band Edge**

-. Test Date : November 13, 2012

-. Resolution bandwidth : 1 MHz for Peak and Average Mode

-. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode

-. Measurement distance : 3 m

-. Operating Condition : Low / High Channel

-. Result : PASSED

| Frequency (MHz) | Reading (dBµV) | Detector Mode | Ant. Pol. (H/V) | Ant. Factor | Cable Loss | Amp Gain | Total (dBµV/m) | Limits (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| **Test Data for Low Channel** | | | | | | | | | |
| 2 340.87 | 54.46 | Peak | H | 27.05 | 3.14 | 43.10 | 41.55 | 74.00 | -32.45 |
| | 47.95 | Average | H | | | | 35.04 | 54.00 | -18.96 |
| 2 340.96 | 51.64 | Peak | V | | | | 38.73 | 74.00 | -35.27 |
| | 46.75 | Average | V | | | | 33.84 | 54.00 | -20.16 |
| **Test Data for High Channel** | | | | | | | | | |
| 2 486.90 | 61.42 | Peak | H | 27.31 | 3.17 | 43.10 | 48.80 | 74.00 | -25.20 |
| | 60.22 | Average | H | | | | 47.60 | 54.00 | -6.40 |
| 2 486.92 | 58.44 | Peak | V | | | | 45.82 | 74.00 | -28.18 |
| | 54.94 | Average | V | | | | 42.32 | 54.00 | -11.68 |

**Tested by: Hong-Kyu, Lee/ Engineer**



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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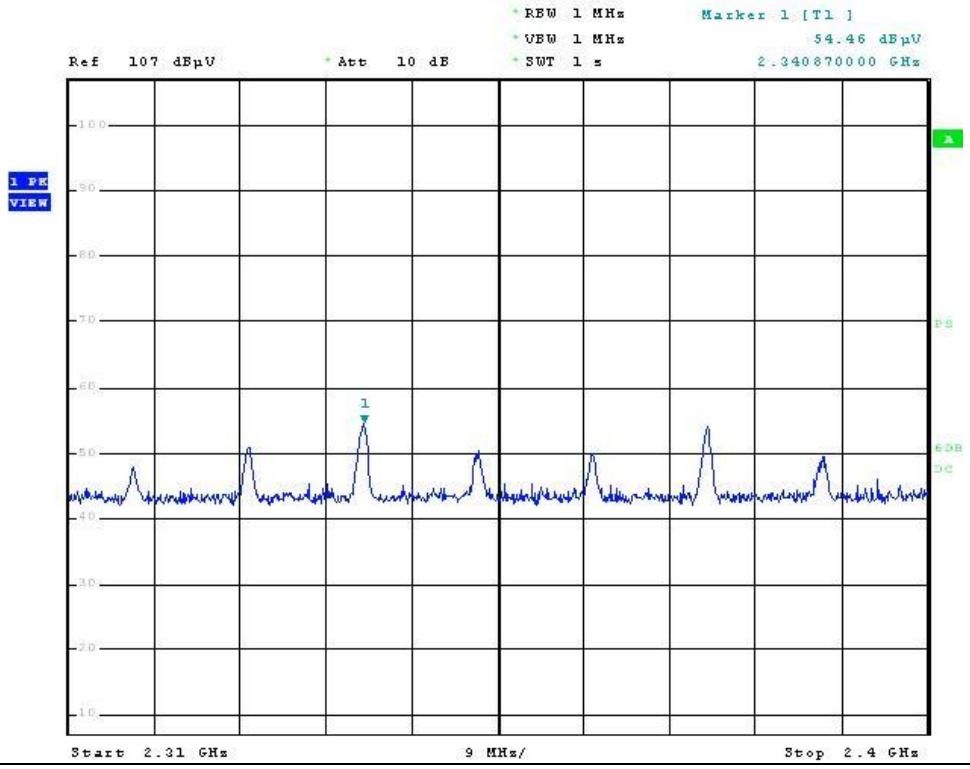
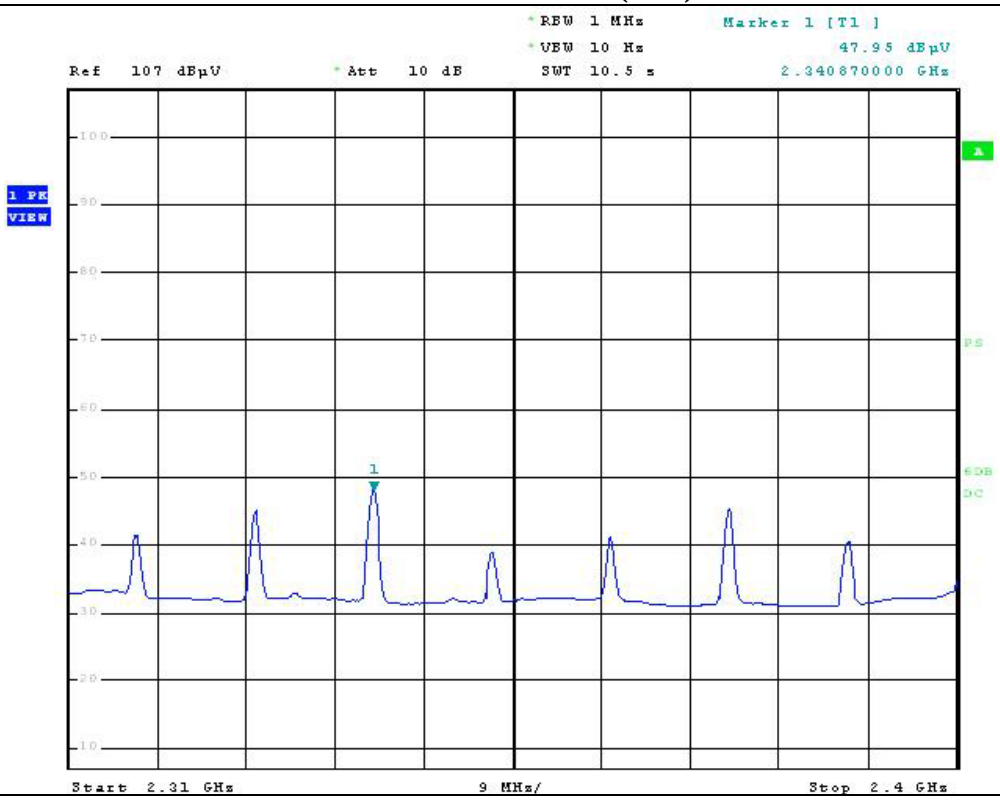
## Graphical representation of Radiated Emission



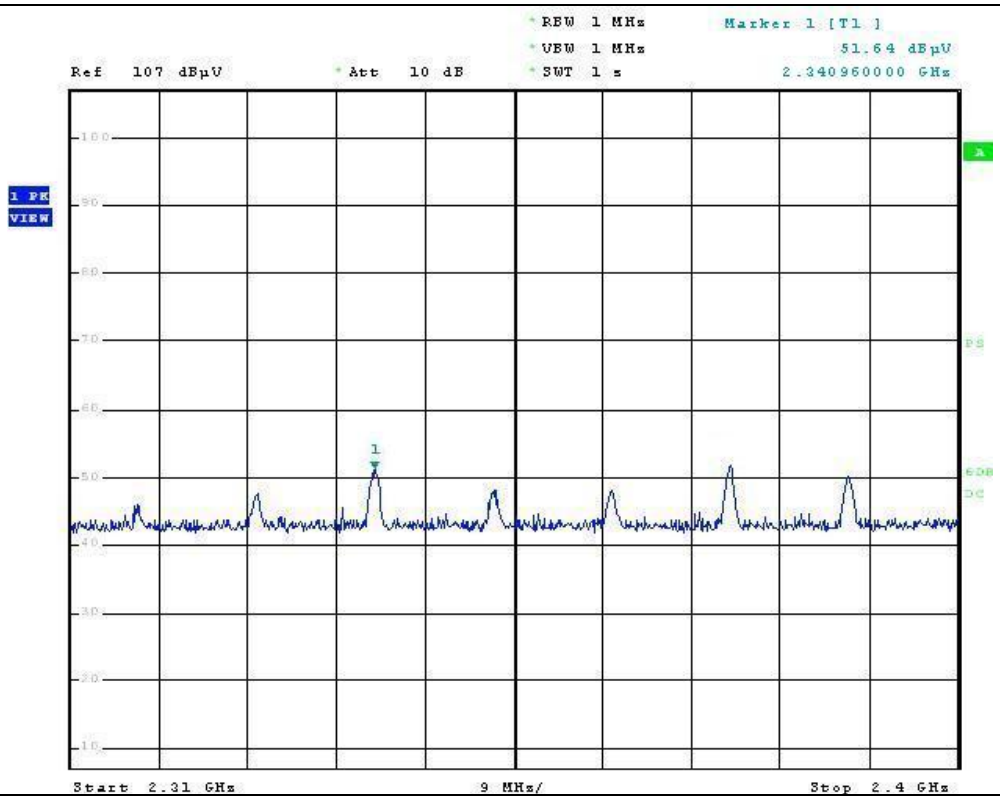

**Low Channel – Horizontal (Peak)**



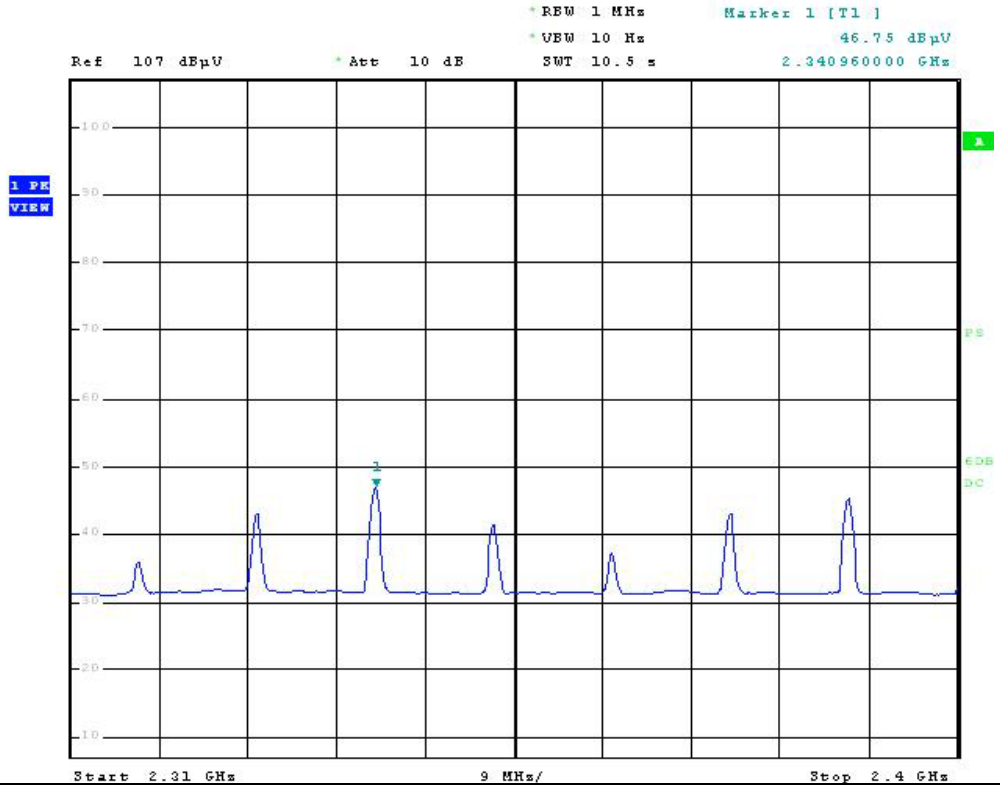

**Low Channel – Horizontal (Average)**



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)




**Low Channel – Vertical (Peak)**




**Low Channel – Vertical (Average)**



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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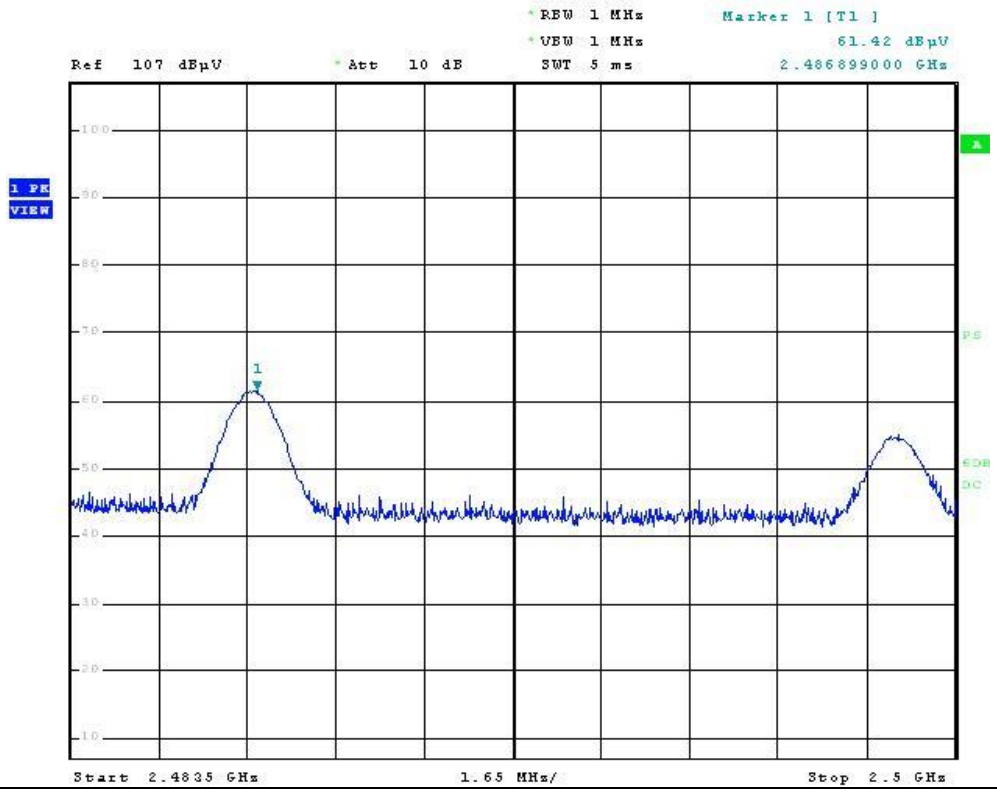
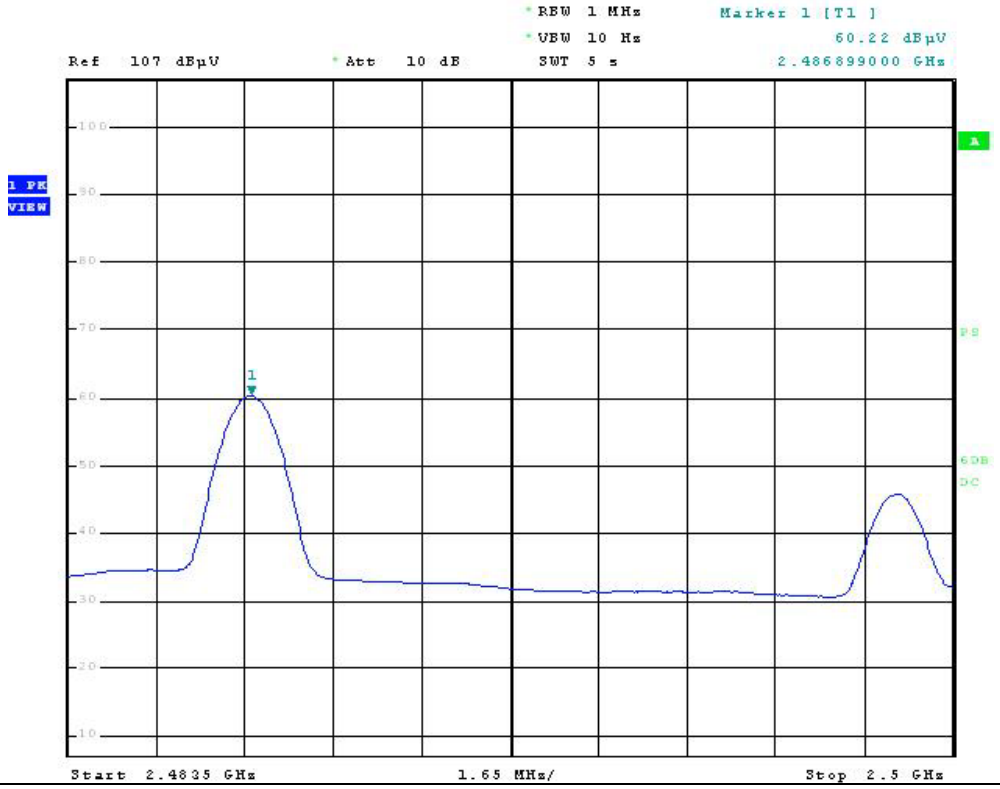


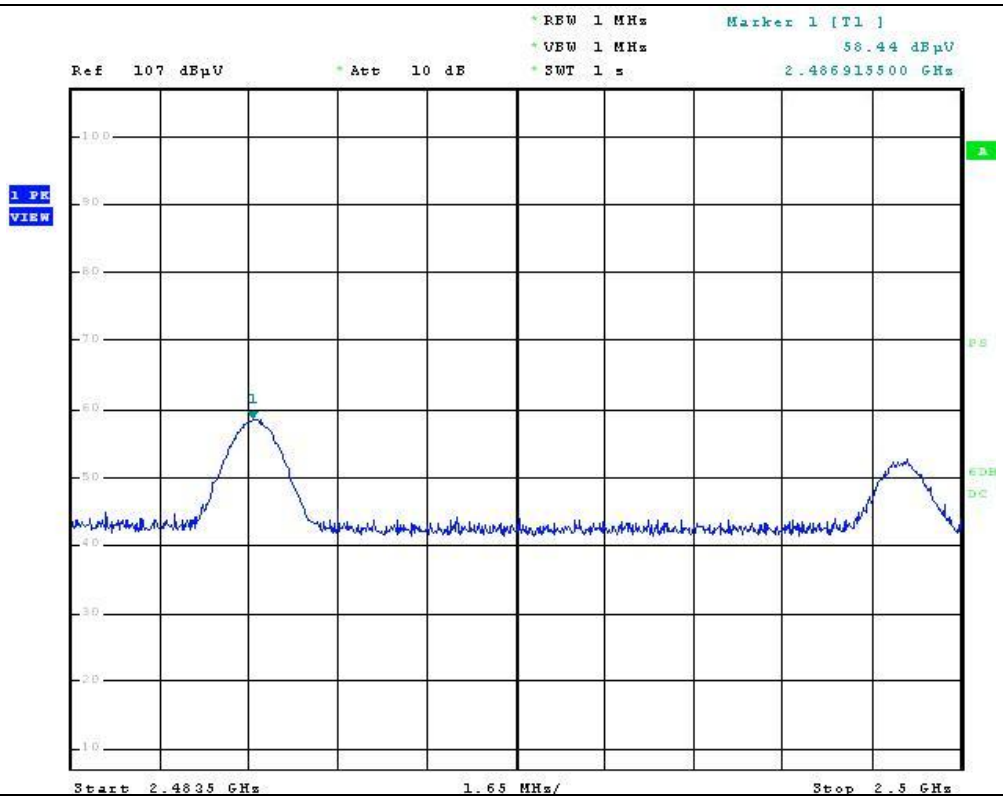

**High Channel – Horizontal (Peak)**



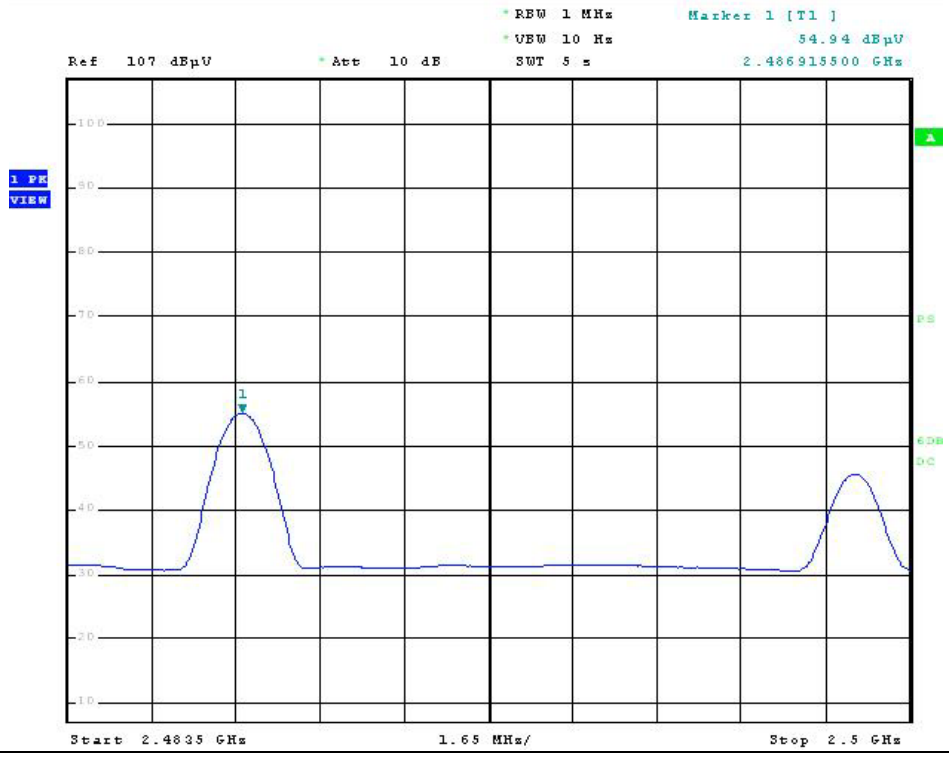

**High Channel – Horizontal (Average)**



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
**EMC Testing Div.** : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)




**High Channel – Vertical (Peak)**




**High Channel – Vertical (Average)**



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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# 9. CONDUCTED EMISSION TEST

## 9.1 Operating environment

Temperature : 21 °C

Relative humidity : 43 % R.H.

## 9.2 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 μH + 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.

## 9.3 Test equipment used

| | Model Number | Manufacturer | Description | Serial Number | Last Cal.(Interval) |
|---|---|---|---|---|---|
| ☐ - | ESiB26 | R&S | Test Receiver | 100296 | Apr. 13, 2012 (1Y) |
| ■ - | ESHS10 | Rohde & Schwarz | Test Receiver | 834467/007 | Jun. 21, 2012 (1Y) |
| ☐ - | NSLK 8126 | Schwarzbeck | AMN | 8126-404 | Jun. 11, 2012 (1Y) |
| ■ - | NSLK 8128 | Schwarzbeck | AMN | 8128-216 | Jun. 11, 2012 (1Y) |
| ☐ - | 3825/2 | EMCO | AMN | 9109-1867 | May 30, 2012 (1Y) |
| ☐ - | 3825/2 | EMCO | AMN | 9109-1869 | May 30, 2012 (1Y) |
| ☐ - | N/A | KNORR-BREMSE | Artificial Hand | 12844 | N/A |

All test equipment used is calibrated on a regular basis.

 

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## 9.4 Test data

-. Test Date : November 16, 2012

-. Resolution bandwidth : 9 kHz

-. Frequency range : 0.15 MHz ~ 30 MHz

-. Test Result : PASSED

| Frequency (MHz) | Line | Peak (dBµV) | | Margin (dB) |
|---|---|---|---|---|
| | | Emission level | Q.P Limits | |
| 0.15 | N | 42.11 | 66.00 | 23.89 |
| 0.50 | N | 32.85 | 56.08 | 23.23 |
| 0.80 | N | 38.34 | 56.00 | 17.66 |
| 9.55 | N | 38.81 | 60.00 | 21.19 |
| 22.00 | H | 38.63 | 60.00 | 21.37 |
| 23.07 | N | 40.05 | 60.00 | 19.95 |
| **Frequency (MHz)** | **Line** | **Average (dBµV)** | | **Margin (dB)** |
| | | **Emission level** | **Limits** | |
| - | - | - | - | - |
| - | - | - | - | - |
| - | - | - | - | - |
| - | - | - | - | - |

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: Hong-Kyu, Lee/ Engineer**



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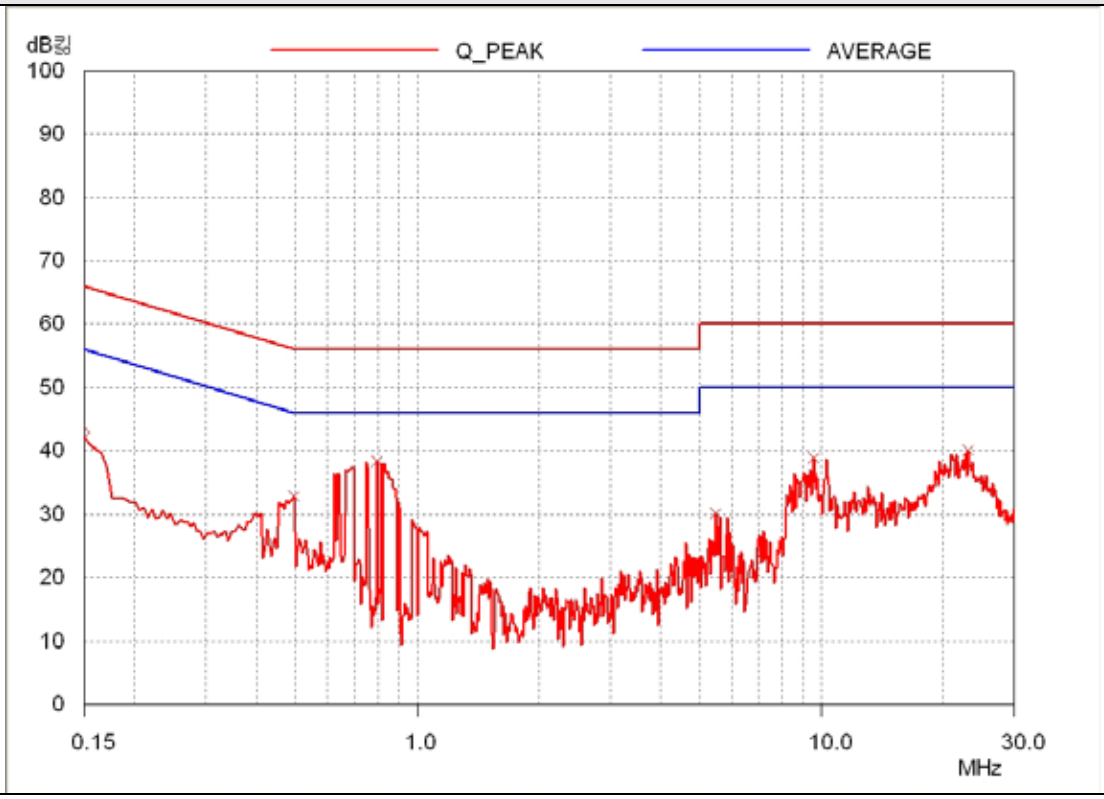
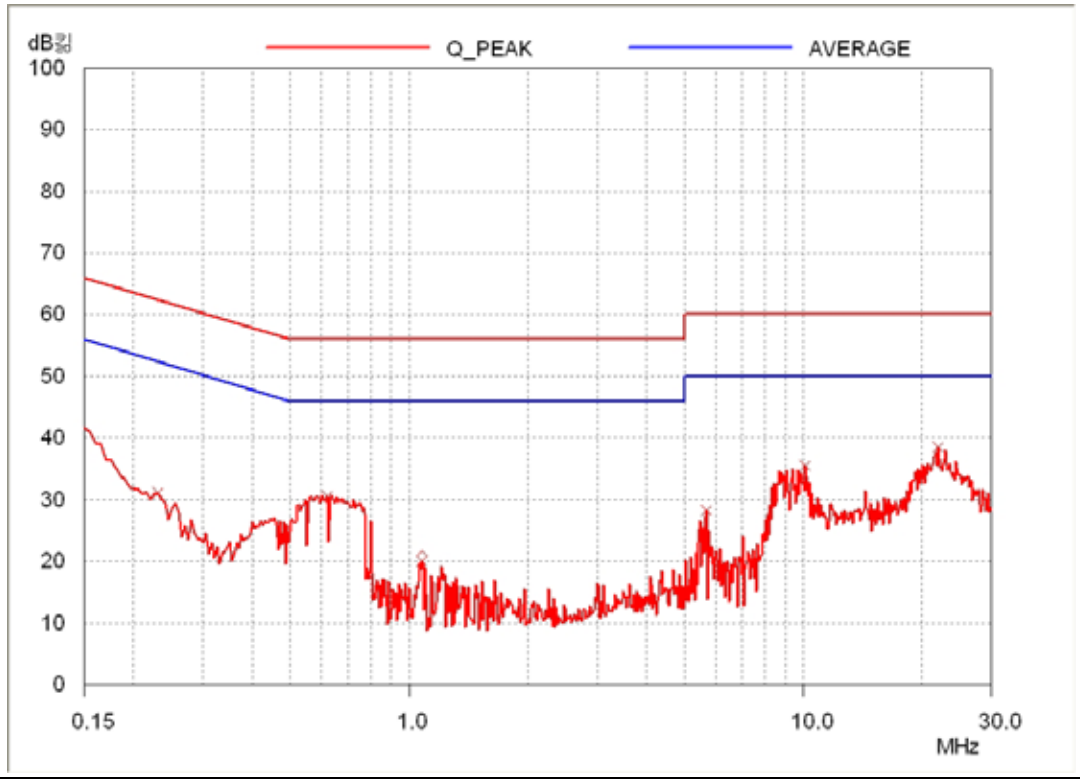
## Graphical representation of Conducted Emission




**HOT LINE**




**NEUTRAL LINE**



**HEAD OFFICE** : 301-14 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)
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