



Dates of Tests: November 16 ~ 23, 2011

Test Report S/N: LR500111111N

Test Site : LTA CO., LTD.

## CERTIFICATION OF COMPLIANCE

FCC ID.

**UNTRP-M100A**

APPLICANT

**Radiopulse Inc.**

|                                  |   |   |
|----------------------------------|---|---|
| <b>Equipment Class</b>           | : | <b>Digital Transmission System (DTS)</b>            |
| <b>Manufacturing Description</b> | : | <b>Zigbee Module</b>                                |
| <b>Manufacturer</b>              | : | <b>Radiopulse Inc.</b>                              |
| <b>Model name</b>                | : | <b>RP-M100A</b>                                     |
| <b>Variant Model name</b>        | : | <b>RP-M110A</b>                                     |
| <b>Test Device Serial No.:</b>   | : | <b>Identical prototype</b>                          |
| <b>Rule Part(s)</b>              | : | <b>FCC Part 15.247 Subpart C ; ANSI C-63.4-2003</b> |
| <b>Frequency Range</b>           | : | <b>2405MHz ~ 2480MHz</b>                            |
| <b>Max. Output Power</b>         | : | <b>Max 9.23dBm – Conducted</b>                      |
| <b>Data of issue</b>             | : | <b>November 23, 2011</b>                            |

This test report is issued under the authority of:

The test was supervised by:




Hyun-Chae You, Manager

Ki-Hun Cho, Test Engineer

**This test result only responds to the tested sample. It is not allowed to copy this report even partly without the allowance of the test laboratory. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.**



NVLAP LAB Code.: 200723-0

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## 1. General information's

### **1-1 Test Performed**

Company name : LTA Co., Ltd.  
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 Web site : <http://www.ltalab.com>  
 E-mail : [chahn@ltalab.com](mailto:chahn@ltalab.com)  
 Telephone : +82-31-323-6008  
 Facsimile : +82-31-323-6010

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the “General requirements for the competents of calibration and testing laboratory”.

### **1-2 Accredited agencies**

LTA Co., Ltd. is approved to perform EMC testing by the following agencies:

| Agency | Country | Accreditation No. | Validity   | Reference           |
|--------|---------|-------------------|------------|---------------------|
| NVLAP  | U.S.A   | 200723-0          | 2012-09-30 | ECT accredited Lab. |
| KCC    | KOREA   | KR0049            | 2013-04-24 | EMC accredited Lab. |
| FCC    | U.S.A   | 610755            | 2014-04-27 | FCC filing          |
| FCC    | U.S.A   | 649054            | 2013-04-13 | FCC CAB             |
| VCCI   | JAPAN   | R-2133, C-2307    | 2014-06-21 | VCCI registration   |
| VCCI   | JAPAN   | T-2009            | 2013-12-23 | VCCI registration   |
| IC     | CANADA  | 5799A             | 2012-05-14 | IC filing           |

## 2. Information's about test item

### 2-1 Client & Manufacturer

Company name : Radiopulse Inc.  
 Address : 3rd Fl., Hans B/D II, 111-6 Seongnae-Dong, Gangdong-Gu, Seoul, Korea,  
 134-883  
 Tel / Fax : TEL : +82-2-478-2963 / FAX : +82-2-478-2967

### 2-2 Equipment Under Test (EUT)

Trade name : Zigbee Module  
 FCC ID : UNTRP-M100A  
 Model name : RP-M100A  
 Variant Model name : RP-M110A  
 Serial number : Identical prototype  
 Date of receipt : November 15, 2011  
 EUT condition : Pre-production, not damaged  
 Antenna type : Chip antenna (M/N: ISM-SWC-01) Max Gain -0.97 dBi  
 Diople antenna (M/N: WE-2400TO) Max Gain 1.98 dBi  
 Frequency Range : 2405MHz ~ 2480MHz (DSSS)  
 RF output power : Max 9.23dBm - Conducted  
 Number of channels : 16  
 Type of Modulation : O-QPSK  
 Channel spacing : 5MHz  
 Power Source : 3.0Vdc by Main System

### 2-3 Tested frequency

|                 | LOW  | MID  | HIGH |
|-----------------|------|------|------|
| Frequency (MHz) | 2405 | 2445 | 2480 |

### 2-4 Ancillary Equipment

| Equipment | Model No.   | Serial No. | Manufacturer |
|-----------|-------------|------------|--------------|
| Notebook  | Vostro 1015 | DN9RBN1    | DELL         |
| Printer   | STYLUS C65  | FXSY002205 | EPSON        |

### 2-5 Model Description

| M/N      | Antenna connector Type |
|----------|------------------------|
| RP-M100A | Chip                   |
| RP-M110A | U.FL                   |

### 3. Test Report

#### 3.1 Summary of tests

| FCC Part Section(s) | Parameter                          | Limit         | Test Condition | Status (note 1) |
|---------------------|------------------------------------|---------------|----------------|-----------------|
| 15.247(a)           | 6 dB Bandwidth                     | > 500kHz      | Conducted      | C               |
| 15.247(b)           | Transmitter Peak Output Power      | < 1Watt       |                | C               |
| 15.247(d)           | Transmitter Power Spectral Density | < 8dBm @ 3kHz |                | C               |
| 15.247(d)           | Band Edge & Spurious               | > 20 dBc      |                | C               |
| 15.209              | Field Strength of Harmonics        | Emission      | Radiated       | C               |
| 15.207              | AC Conducted Emissions             | Emissions     | Conducted      | C               |
| 15.203              | Antenna requirement                | -             | -              | C               |

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

Note 2: The data in this test report are traceable to the national or international standards.

#### → Antenna Requirement

The Firmtech co., Ltd. FCC ID: UNTRP-M100A unit complies with the requirement of §15.203.

The antenna connector is the reverse SMA connector.

The sample was tested according to the following specification:

FCC Parts 15.247; ANSI C-63.4-2003

### 3.2 Technical Characteristics Test

#### 3.2.1 6 dB Bandwidth

##### Procedure:

The bandwidth at 6dB below the highest in-band spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate frequencies.

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 6dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is ( as close as possible to ) even with the reference marker level. The marker-delta reading at this point is the 6 dB bandwidth of the emission.

##### The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 100 kHz

Span = 10 MHz

VBW = 100 kHz (VBW  $\geq$  RBW)

Sweep = auto

Trace = max hold

Detector function = peak

##### Measurement Data:

| Frequency<br>(MHz) | Test Results             |          |
|--------------------|--------------------------|----------|
|                    | Measured Bandwidth (MHz) | Result   |
| 2405               | 1.563                    | Complies |
| 2445               | 1.556                    | Complies |
| 2480               | 1.570                    | Complies |

- See next pages for actual measured spectrum plots.

##### Minimum Standard:

6 dB Bandwidth  $>$  500kHz

##### Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

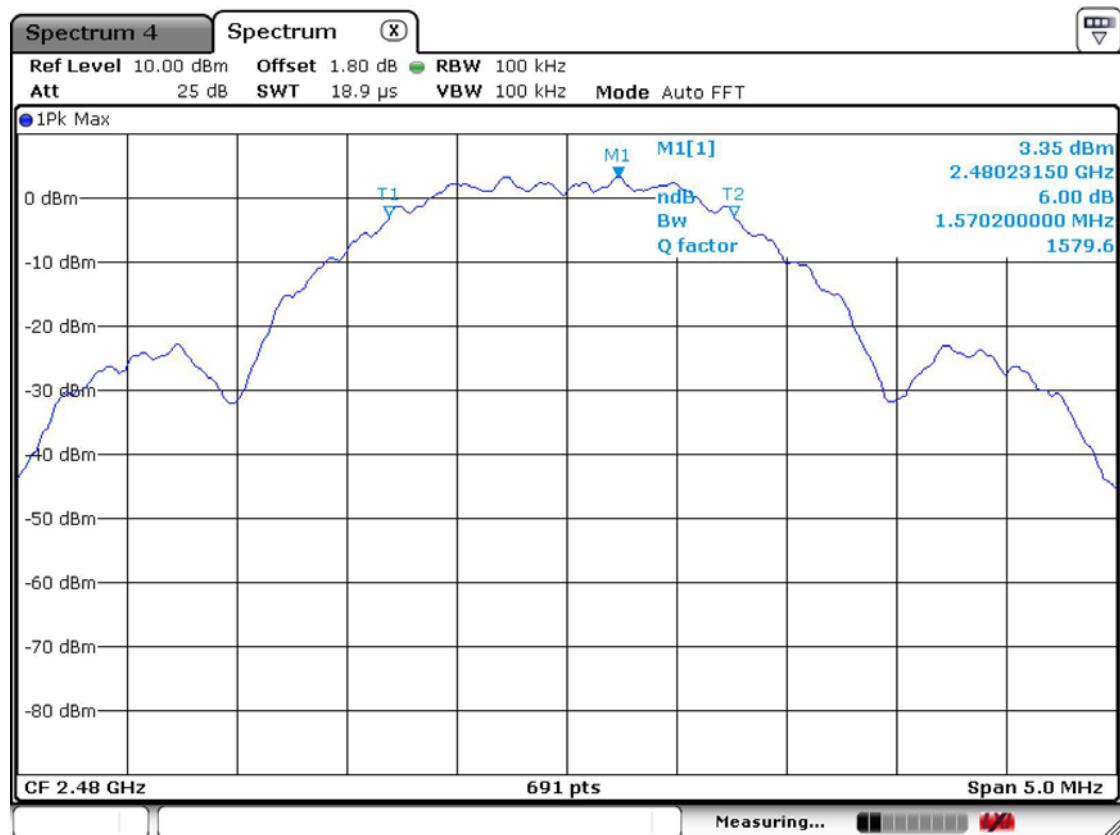
## Low Channel



## Mid Channel



## High Channel



### 3.2.2 Peak Output Power Measurement

#### Procedure:

The maximum peak output power was measured with the spectrum analyzer connected to the antenna output of the EUT. The spectrum analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99% bandwidth. The EUT was operating in transmit mode at the appropriate center frequency.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 1MHz

Span = auto

VBW = 1MHz (VBW  $\geq$  RBW)

Sweep = auto

Detector function = peak

#### Measurement Data:

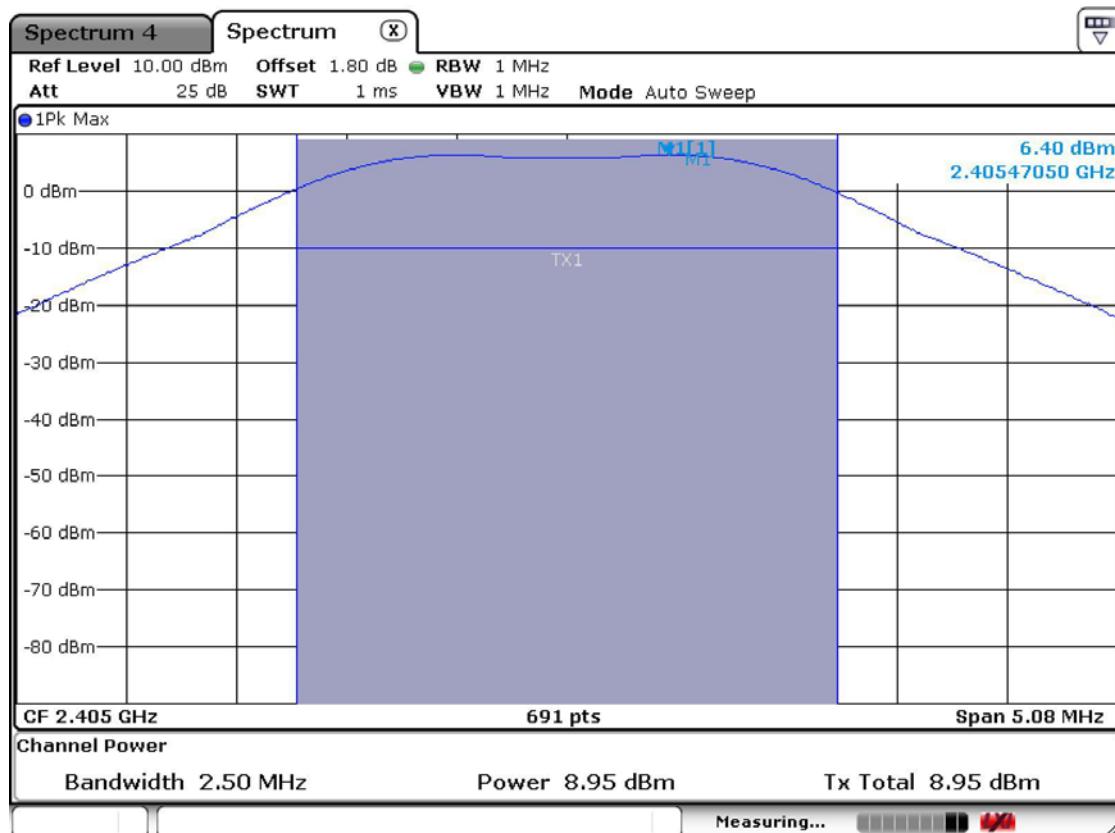
| Frequency<br>(MHz) | Test Results |      |          |
|--------------------|--------------|------|----------|
|                    | dBm          | mW   | Result   |
| 2405               | 8.95         | 7.85 | Complies |
| 2445               | 9.23         | 8.38 | Complies |
| 2480               | 8.74         | 7.48 | Complies |

- See next pages for actual measured spectrum plots.

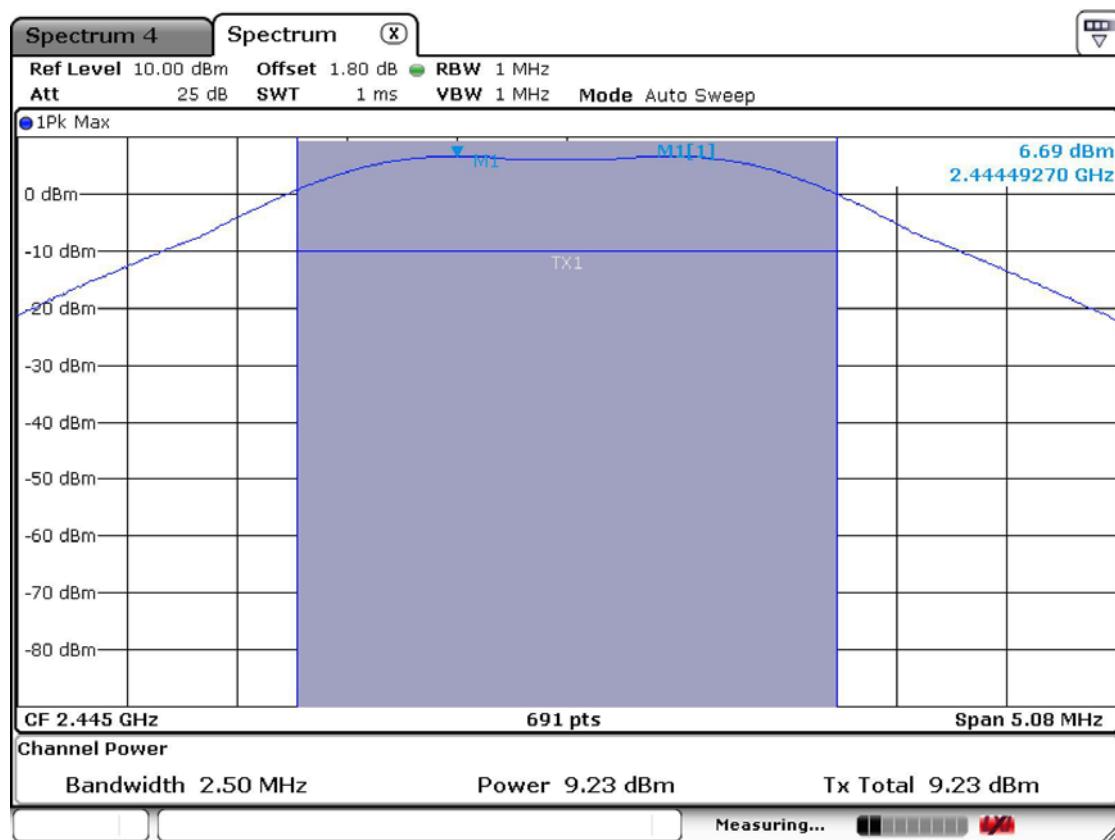
#### Minimum Standard:

|                   |      |
|-------------------|------|
| Peak output power | < 1W |
|-------------------|------|

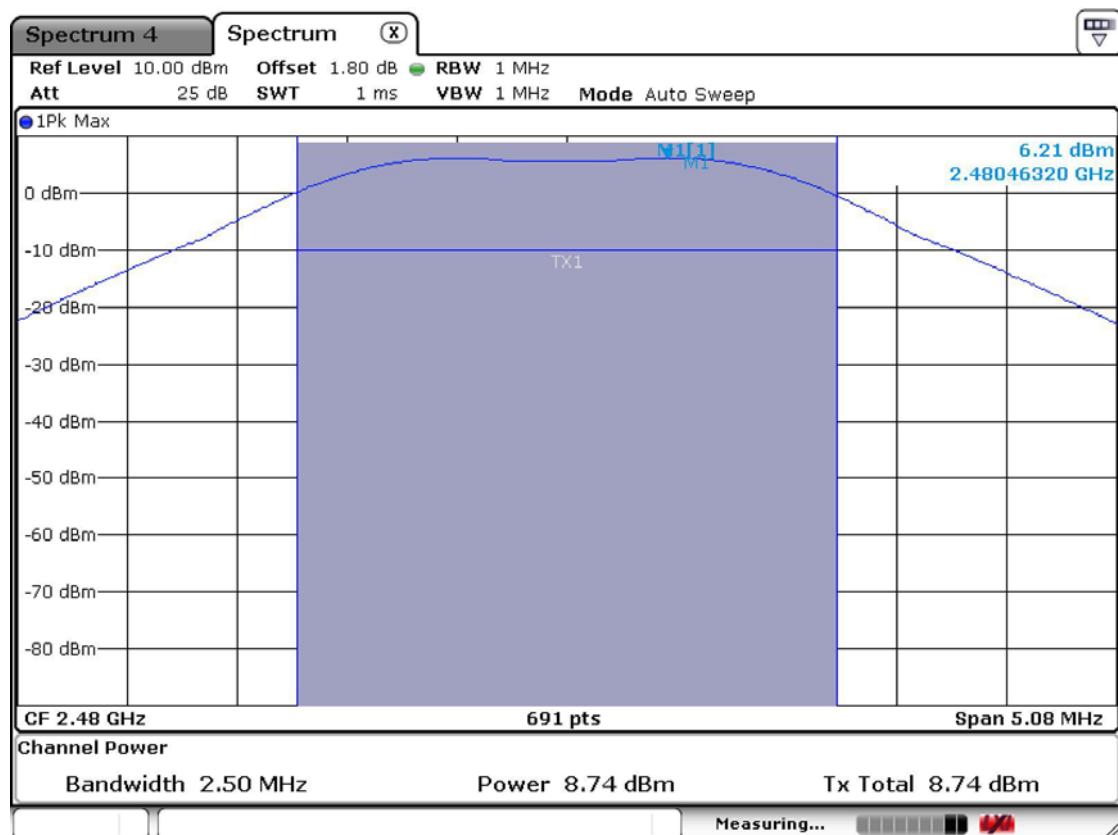
## Low Channel



## Mid Channel



## High Channel



### 3.2.3 Power Spectral Density

#### Procedure:

The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

The spectrum analyzer is set to:

|                          |                  |
|--------------------------|------------------|
| RBW = 3 kHz              | Span = 300 kHz   |
| VBW = 10 kHz             | Sweep = 100 sec  |
| Detector function = peak | Trace = max hold |

#### Measurement Data:

| Frequency<br>(MHz) | Test Results |          |
|--------------------|--------------|----------|
|                    | dBm          | Result   |
| 2405               | -6.64        | Complies |
| 2445               | -5.08        | Complies |
| 2480               | -5.79        | Complies |

- See next pages for actual measured spectrum plots.

#### Minimum Standard:

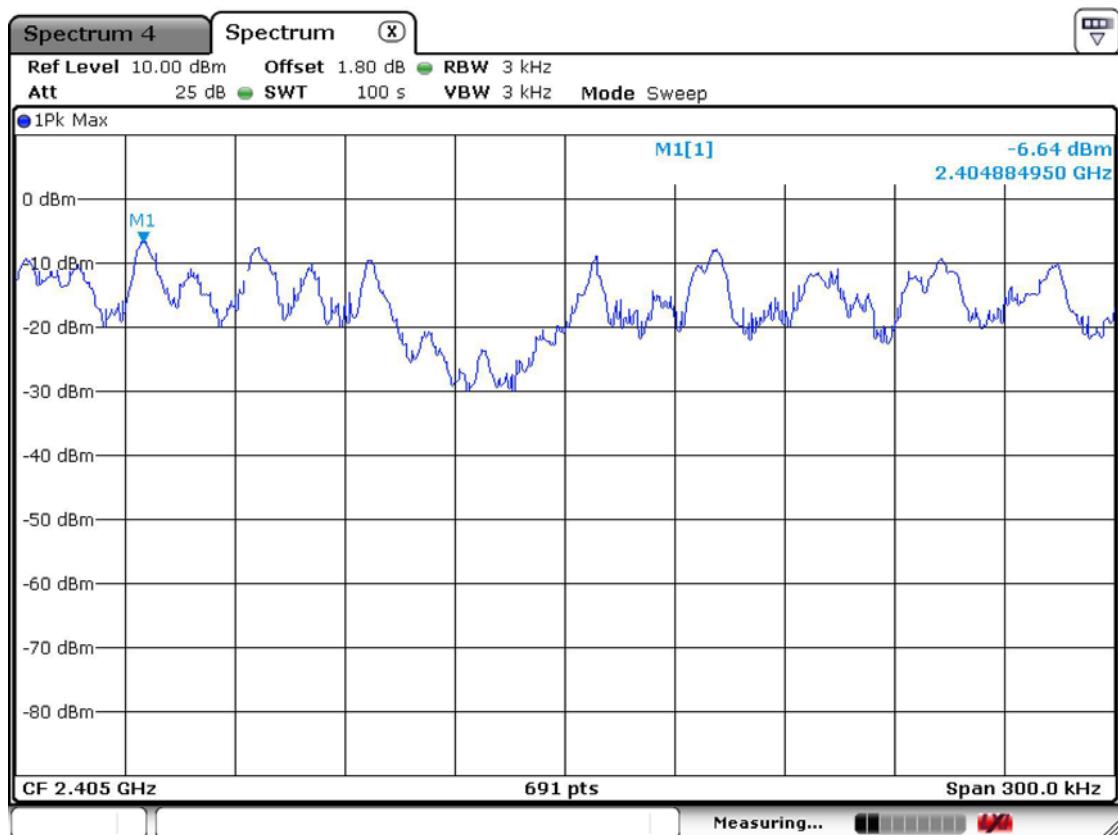
|                        |                  |
|------------------------|------------------|
| Power Spectral Density | < 8dBm @ 3kHz BW |
|------------------------|------------------|

#### Measurement Setup

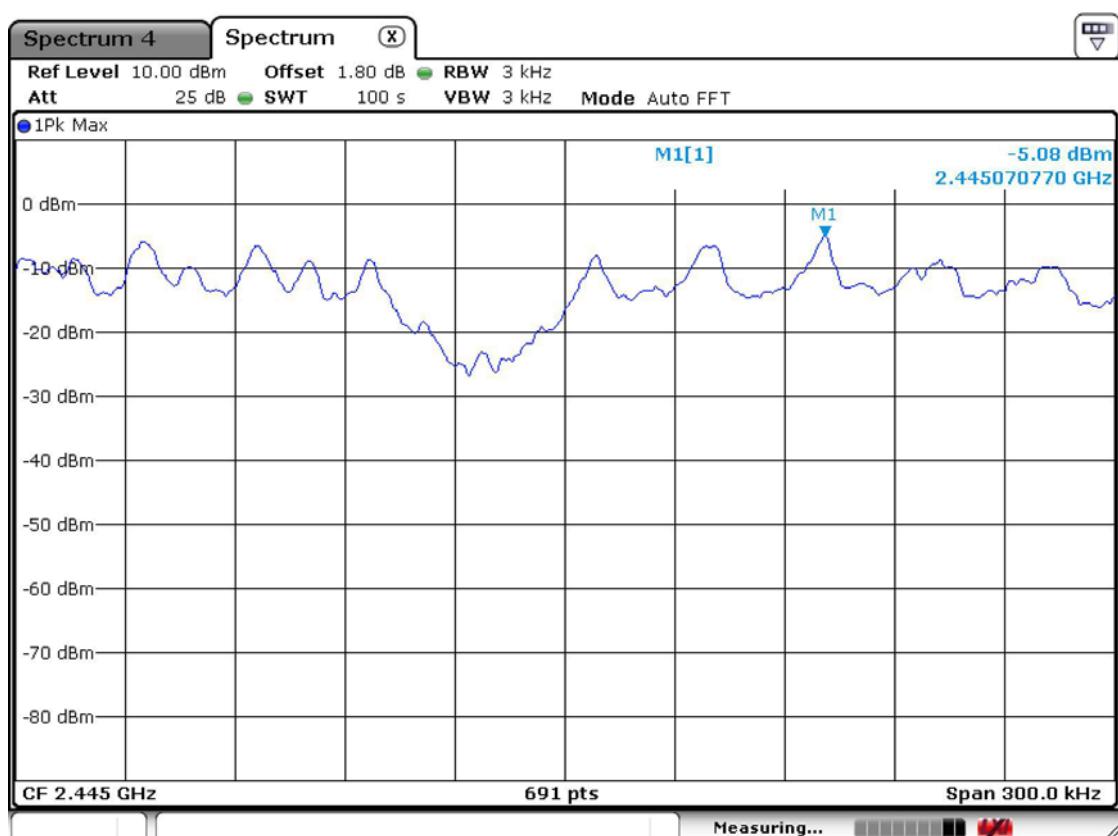
Same as the Chapter 3.2.1 (Figure 1)

## **Power Density Measurement**

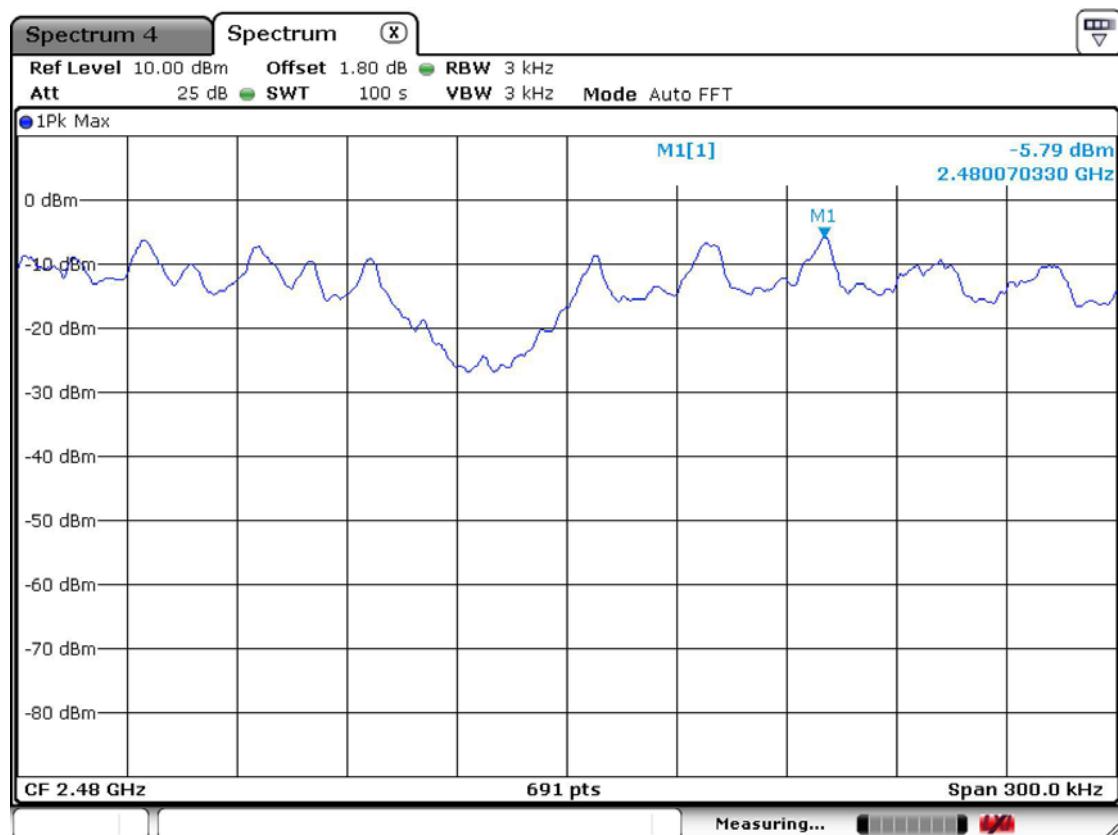
### **Low Channel**



## Mid Channel



## High Channel



### 3.2.4 Band - edge & Spurious

## Procedure:

The bandwidth at 20dB down from the highest inband spectral density is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate frequencies.

After the trace being stable, Use the marker-to-peak function to measure 20 dB down both sides of the intentional emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

Span = 50 MHz      Detector function = peak

Radiated emissions which fall in the restricted bands, as defined in 15.205(a), must also comply with the radiated emission limits specified in 15.209(a)

The spectrum analyzer is set to:

Center frequency = the highest, the lowest channels

PEAK: RBW = VBW = 1MHz. Sweep = Auto

Average: RBW = 1MHz, VBW = 10Hz, Sweep = Auto

Measurement Distance: 3m

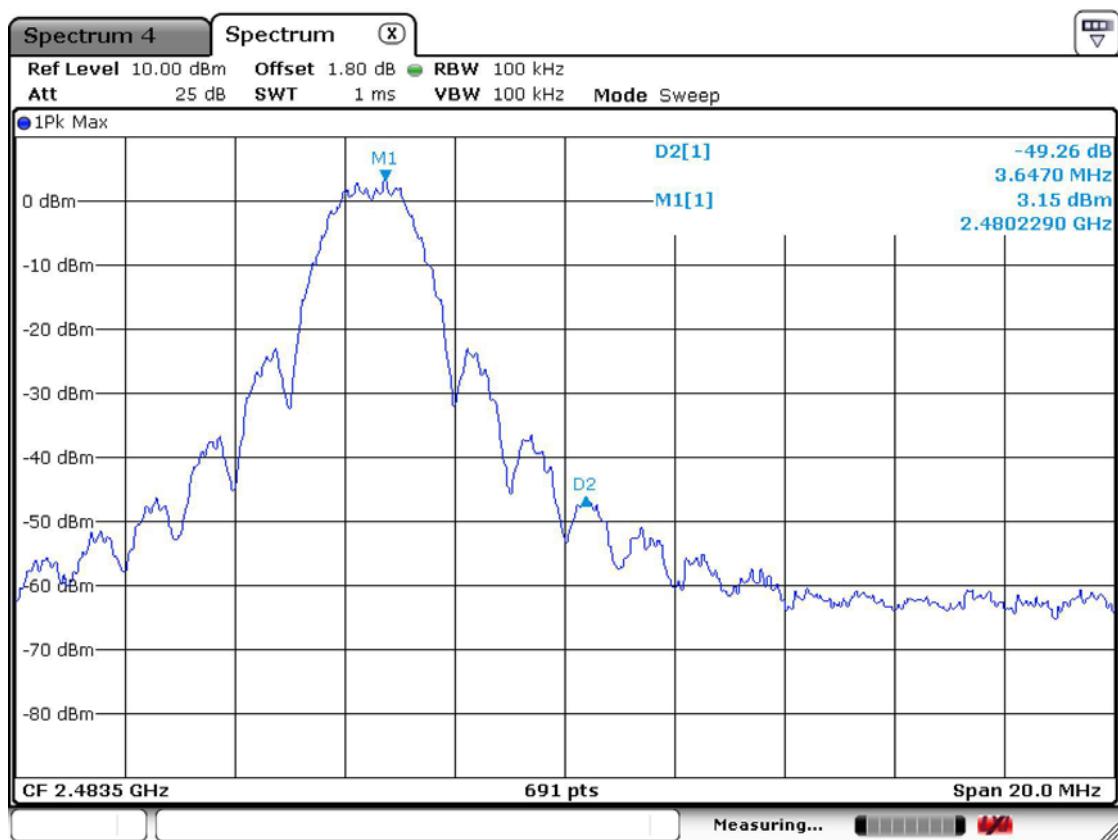
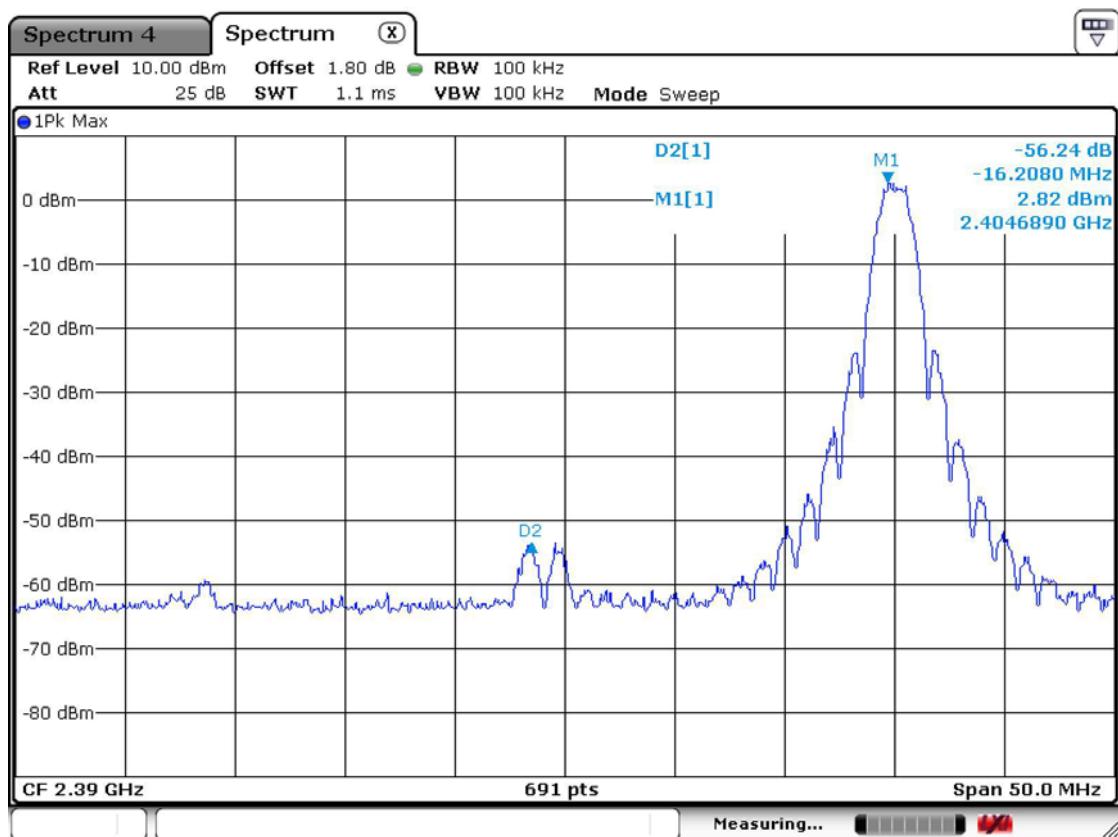
Polarization: Horizontal / Vertical

#### Measurement Data: Complies

- All conducted emission in any 100kHz bandwidth outside of the spread spectrum band was at least 20dB lower than the highest inband spectral density. Therefore the applying equipment meets the requirement.
- See next pages for actual measured spectrum plots.

---

|                          |          |
|--------------------------|----------|
| <b>Minimum Standard:</b> | > 20 dBc |
|--------------------------|----------|

Band-edge

### Band-edges in the restricted band 2310-2390 MHz measurement

#### Measurement Data:RP-M100A(Chip Antenna)

| Frequency<br>[MHz] | Reading<br>[dBuV/m]<br>AV / Peak | Pol. | Correction<br>Factor |              |       | Limits<br>[dBuV/m] |           | Result<br>[dBuV/m] |           | Margin<br>[dB] |           |      |
|--------------------|----------------------------------|------|----------------------|--------------|-------|--------------------|-----------|--------------------|-----------|----------------|-----------|------|
|                    |                                  |      | Antenna              | Amp.<br>Gain | Cable | AV / Peak          | AV / Peak | AV / Peak          | AV / Peak | AV / Peak      | AV / Peak |      |
| 2389.6             | 40.8                             | 56.3 | V                    | 25.4         | 37.1  | 4.0                | 54.0      | 74.0               | 33.0      | 48.6           | 21.0      | 25.5 |

#### Measurement Data:RP-M110A(Dipole Antenna)

| Frequency<br>[MHz] | Reading<br>[dBuV/m]<br>AV / Peak | Pol. | Correction<br>Factor |              |       | Limits<br>[dBuV/m] |           | Result<br>[dBuV/m] |           | Margin<br>[dB] |           |      |
|--------------------|----------------------------------|------|----------------------|--------------|-------|--------------------|-----------|--------------------|-----------|----------------|-----------|------|
|                    |                                  |      | Antenna              | Amp.<br>Gain | Cable | AV / Peak          | AV / Peak | AV / Peak          | AV / Peak | AV / Peak      | AV / Peak |      |
| 2390.0             | 31.5                             | 44.7 | V                    | 25.4         | 37.1  | 4.0                | 54.0      | 74.0               | 23.8      | 37.0           | 30.3      | 37.1 |

### Band-edges in the restricted band 2483.5-2500 MHz measurement

#### Measurement Data:RP-M100A(Chip Antenna)

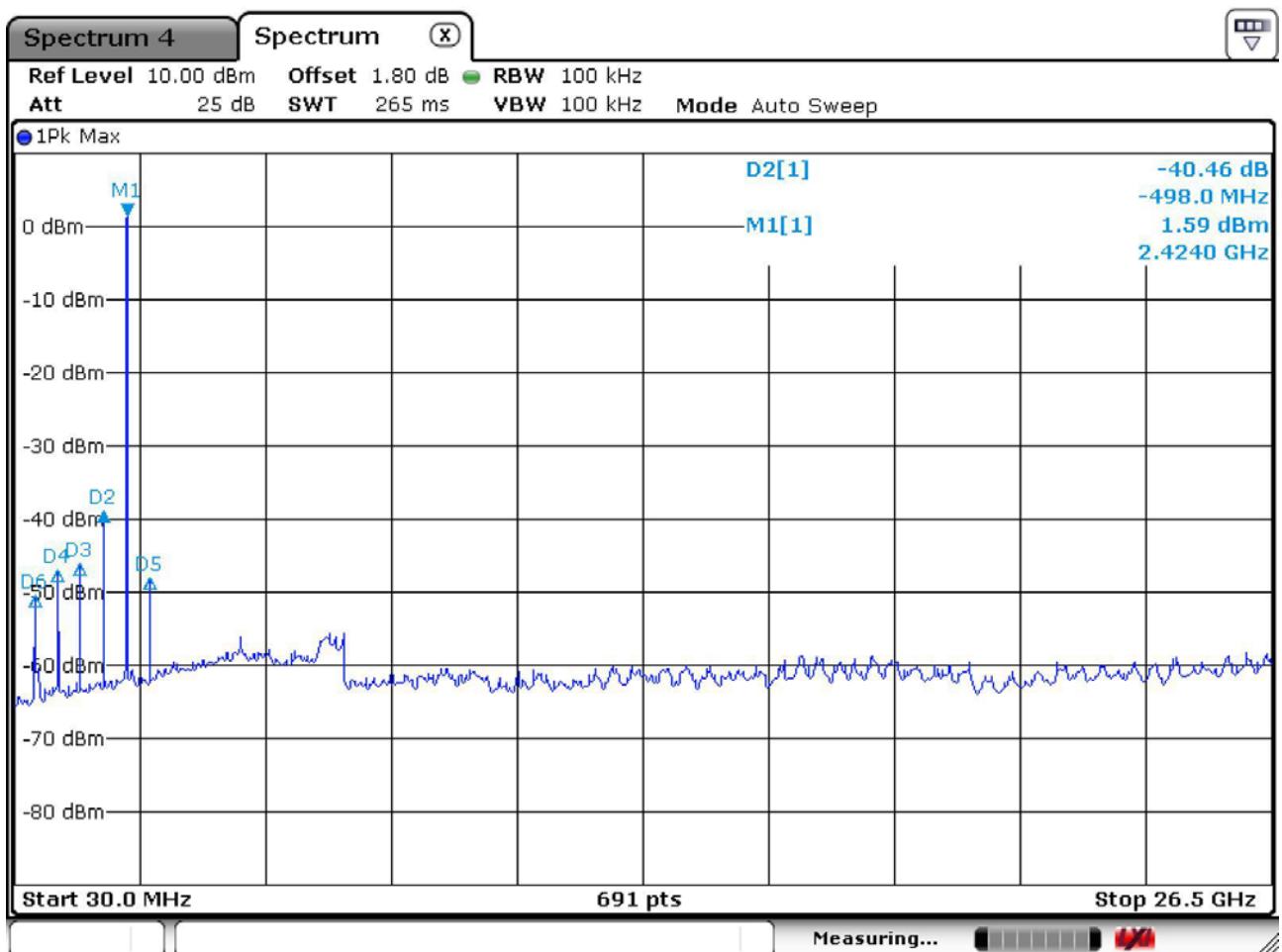
| Frequency<br>[MHz] | Reading<br>[dBuV/m]<br>AV / Peak | Pol. | Correction<br>Factor |              |       | Limits<br>[dBuV/m] |           | Result<br>[dBuV/m] |           | Margin<br>[dB] |           |      |
|--------------------|----------------------------------|------|----------------------|--------------|-------|--------------------|-----------|--------------------|-----------|----------------|-----------|------|
|                    |                                  |      | Antenna              | Amp.<br>Gain | Cable | AV / Peak          | AV / Peak | AV / Peak          | AV / Peak | AV / Peak      | AV / Peak |      |
| 2483.9             | 42.7                             | 57.9 | V                    | 25.4         | 37.1  | 4.0                | 54.0      | 74.0               | 35.0      | 50.2           | 19.1      | 23.9 |

#### Measurement Data:RP-M110A(Dipole Antenna)

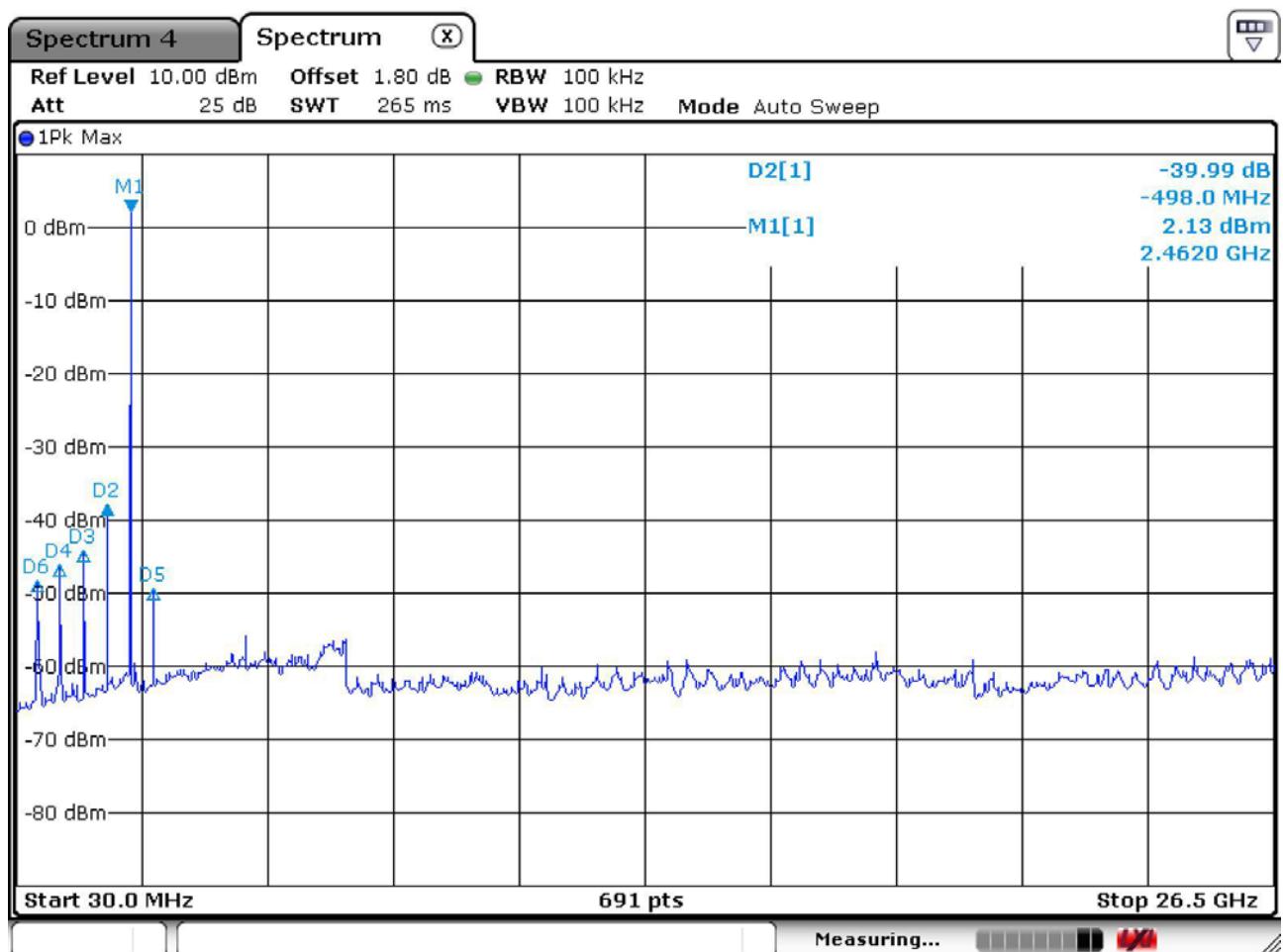
| Frequency<br>[MHz] | Reading<br>[dBuV/m]<br>AV / Peak | Pol. | Correction<br>Factor |              |       | Limits<br>[dBuV/m] |           | Result<br>[dBuV/m] |           | Margin<br>[dB] |           |      |
|--------------------|----------------------------------|------|----------------------|--------------|-------|--------------------|-----------|--------------------|-----------|----------------|-----------|------|
|                    |                                  |      | Antenna              | Amp.<br>Gain | Cable | AV / Peak          | AV / Peak | AV / Peak          | AV / Peak | AV / Peak      | AV / Peak |      |
| 2483.9             | 31.9                             | 58.5 | V                    | 25.4         | 37.1  | 4.0                | 54.0      | 74.0               | 24.2      | 50.8           | 29.9      | 23.3 |

**Note : This EUT was tested in 3 orthogonal positions and the worst-case data was presented.**

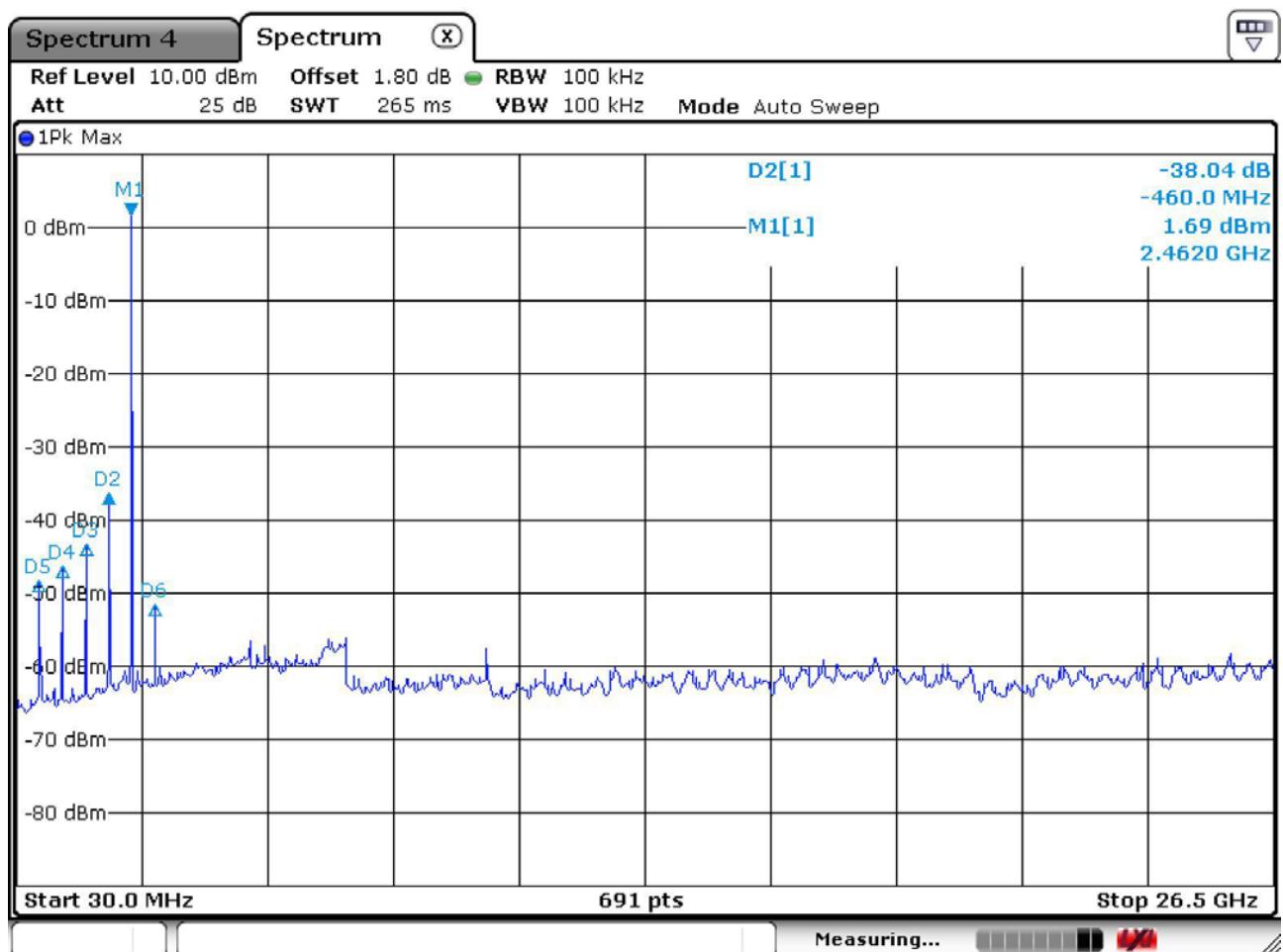
## Low channel

Frequency Range = 30 MHz ~ 10<sup>th</sup> harmonic.

## Mid channel

Frequency Range = 30 MHz ~ 10<sup>th</sup> harmonic.

**High channel**  
**Frequency Range = 30 MHz ~ 10<sup>th</sup> harmonic.**



### 3.2.5 Field Strength of Harmonics

#### Procedure:

The EUT was placed on a 0.8m high wooden table inside a shielded enclosure. An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed in OATS. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions.

The spectrum analyzer is set to:

Center frequency = the worst channel

Frequency Range = 30 MHz ~ 10<sup>th</sup> harmonic.

RBW = 100 kHz ( 30MHz ~ 1 GHz)  
= 1 MHz (1 GHz ~ 10<sup>th</sup> harmonic )

VBW ≥ RBW

Span = 100 MHz

Detector function = peak

Trace = max hold

Sweep = auto

#### Measurement Data: Complies

- See next pages for actual measured data.

#### Minimum Standard: FCC Part 15.209(a)

| Frequency (MHz) | Limit (uV/m) @ 3m    |
|-----------------|----------------------|
| 0.009 ~ 0.490   | 2400/F(kHz) (@ 300m) |
| 0.490 ~ 1.705   | 24000/F(kHz) (@ 30m) |
| 1.705 ~ 30      | 30(@ 30m)            |
| 30 ~ 88         | 100 **               |
| 88 ~ 216        | 150 **               |
| 216 ~ 960       | 200 **               |
| Above 960       | 500                  |

\*\* Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

**Measurement Data:RP-M100A(Chip Antenna)**

| Frequency<br>[MHz] | Reading<br>[dBuV/m] |      | Pol. | Correction<br>Factor |              |       | Limits<br>[dBuV/m] |      | Result<br>[dBuV/m] |      | Margin<br>[dB] |      |
|--------------------|---------------------|------|------|----------------------|--------------|-------|--------------------|------|--------------------|------|----------------|------|
|                    |                     |      |      | Antenna              | Amp.<br>Gain | Cable |                    |      |                    |      |                |      |
|                    | AV                  | Peak |      |                      |              |       | AV                 | Peak | AV                 | Peak | AV             | Peak |
| 4810.0             | 39.1                | 50.9 | V    | 31.4                 | 36.5         | 5.7   | 54.0               | 74.0 | 39.8               | 51.6 | 14.2           | 22.4 |
| -                  | -                   | -    | -    | -                    | -            | -     | -                  | -    | -                  | -    | -              | -    |
| -                  | -                   | -    | -    | -                    | -            | -     | -                  | -    | -                  | -    | -              | -    |
| -                  | -                   | -    | -    | -                    | -            | -     | -                  | -    | -                  | -    | -              | -    |
| Frequency<br>[MHz] | Reading<br>[dBuV/m] |      | Pol. | Correction<br>Factor |              |       | Limits<br>[dBuV/m] |      | Result<br>[dBuV/m] |      | Margin<br>[dB] |      |
|                    |                     |      |      | Antenna              | Amp.<br>Gain | Cable |                    |      |                    |      |                |      |
|                    | AV                  | Peak |      |                      |              |       | AV                 | Peak | AV                 | Peak | AV             | Peak |
| 4890.0             | 40.2                | 52.6 | V    | 31.4                 | 36.5         | 5.7   | 54.0               | 74.0 | 40.9               | 53.3 | 13.1           | 20.7 |
| -                  | -                   | -    | -    | -                    | -            | -     | -                  | -    | -                  | -    | -              | -    |
| -                  | -                   | -    | -    | -                    | -            | -     | -                  | -    | -                  | -    | -              | -    |
| -                  | -                   | -    | -    | -                    | -            | -     | -                  | -    | -                  | -    | -              | -    |
| Frequency<br>[MHz] | Reading<br>[dBuV/m] |      | Pol. | Correction<br>Factor |              |       | Limits<br>[dBuV/m] |      | Result<br>[dBuV/m] |      | Margin<br>[dB] |      |
|                    |                     |      |      | Antenna              | Amp.<br>Gain | Cable |                    |      |                    |      |                |      |
|                    | AV                  | Peak |      |                      |              |       | AV                 | Peak | AV                 | Peak | AV             | Peak |
| 4960.00            | 38.5                | 49.2 | V    | 31.4                 | 36.5         | 5.7   | 54.0               | 74.0 | 39.2               | 49.9 | 14.8           | 24.1 |
| -                  | -                   | -    | -    | -                    | -            | -     | -                  | -    | -                  | -    | -              | -    |
| -                  | -                   | -    | -    | -                    | -            | -     | -                  | -    | -                  | -    | -              | -    |
| -                  | -                   | -    | -    | -                    | -            | -     | -                  | -    | -                  | -    | -              | -    |

No other emissions were detected at a level greater than 20dB below limit.

**Measurement Data:RP-M110A(Dipole Antenna)**

| Frequency<br>[MHz] | Reading<br>[dBuV/m] |      | Pol. | Correction<br>Factor |              |       | Limits<br>[dBuV/m] |      | Result<br>[dBuV/m] |      | Margin<br>[dB] |      |
|--------------------|---------------------|------|------|----------------------|--------------|-------|--------------------|------|--------------------|------|----------------|------|
|                    |                     |      |      | Antenna              | Amp.<br>Gain | Cable |                    |      |                    |      |                |      |
|                    | AV                  | Peak |      |                      |              |       | AV                 | Peak | AV                 | Peak | AV             | Peak |
| 4810.0             | 34.1                | 45.0 | V    | 31.4                 | 36.5         | 5.7   | 54.0               | 74.0 | 34.8               | 45.7 | 19.2           | 28.3 |
| -                  | -                   | -    | -    | -                    | -            | -     | -                  | -    | -                  | -    | -              | -    |
| -                  | -                   | -    | -    | -                    | -            | -     | -                  | -    | -                  | -    | -              | -    |
| -                  | -                   | -    | -    | -                    | -            | -     | -                  | -    | -                  | -    | -              | -    |
| Frequency<br>[MHz] | Reading<br>[dBuV/m] |      | Pol. | Correction<br>Factor |              |       | Limits<br>[dBuV/m] |      | Result<br>[dBuV/m] |      | Margin<br>[dB] |      |
|                    |                     |      |      | Antenna              | Amp.<br>Gain | Cable |                    |      |                    |      |                |      |
|                    | AV                  | Peak |      |                      |              |       | AV                 | Peak | AV                 | Peak | AV             | Peak |
| 4890.0             | 32.7                | 45.1 | V    | 31.4                 | 36.5         | 5.7   | 54.0               | 74.0 | 33.4               | 45.8 | 20.6           | 28.2 |
| -                  | -                   | -    | -    | -                    | -            | -     | -                  | -    | -                  | -    | -              | -    |
| -                  | -                   | -    | -    | -                    | -            | -     | -                  | -    | -                  | -    | -              | -    |
| -                  | -                   | -    | -    | -                    | -            | -     | -                  | -    | -                  | -    | -              | -    |
| Frequency<br>[MHz] | Reading<br>[dBuV/m] |      | Pol. | Correction<br>Factor |              |       | Limits<br>[dBuV/m] |      | Result<br>[dBuV/m] |      | Margin<br>[dB] |      |
|                    |                     |      |      | Antenna              | Amp.<br>Gain | Cable |                    |      |                    |      |                |      |
|                    | AV                  | Peak |      |                      |              |       | AV                 | Peak | AV                 | Peak | AV             | Peak |
| 4960.00            | 34.2                | 46.8 | V    | 31.4                 | 36.5         | 5.7   | 54.0               | 74.0 | 34.9               | 47.5 | 19.1           | 26.5 |
| -                  | -                   | -    | -    | -                    | -            | -     | -                  | -    | -                  | -    | -              | -    |
| -                  | -                   | -    | -    | -                    | -            | -     | -                  | -    | -                  | -    | -              | -    |
| -                  | -                   | -    | -    | -                    | -            | -     | -                  | -    | -                  | -    | -              | -    |

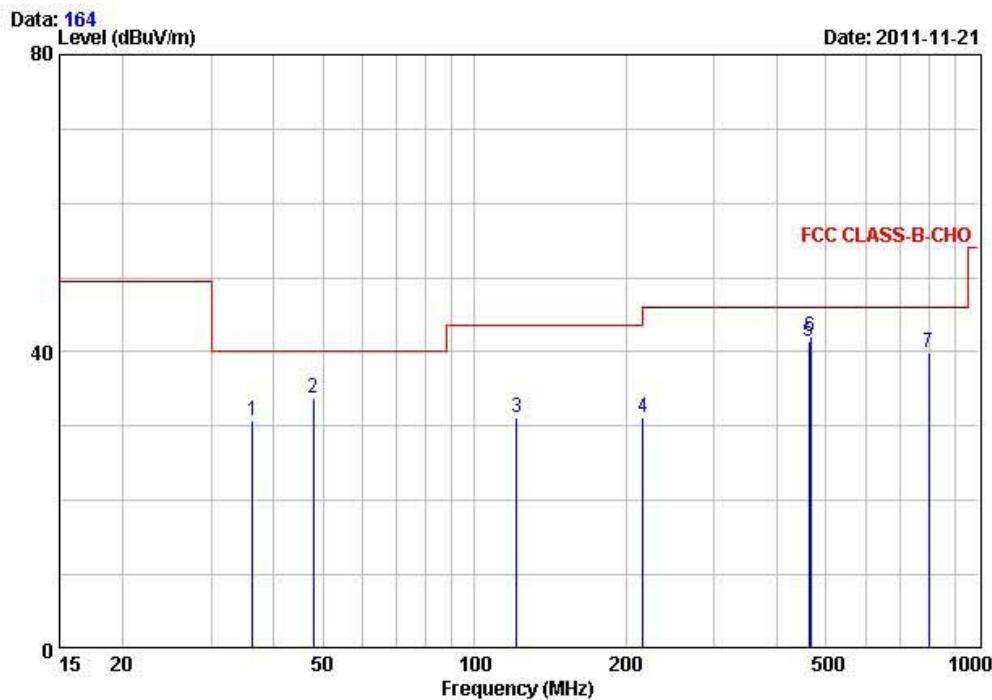
No other emissions were detected at a level greater than 20dB below limit.

Radiated Emissions – Zigbee

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EUT/Model No.: Radiopulse(RP-M100A) TEST MODE: ZigBee

Temp Humi : 16 / 41 Tested by: CHO.K.H



Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

### 3.2.6 AC Conducted Emissions

#### Procedure:

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. While the measurement, EUT had its hopping function disabled at the middle channels in line with Section 15.31(m). Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

#### Measurement Data: Complies

- See next pages for actual measured spectrum plots.
- No emissions were detected at a level greater than 20dB below limit.

#### Minimum Standard: FCC Part 15.207(a)/EN 55022

Class B

| Frequency Range | quasi-peak | Average    |
|-----------------|------------|------------|
| 0.15 ~ 0.5      | 66 to 56 * | 56 to 46 * |
| 0.5 ~ 5         | 56         | 46         |
| 5 ~ 30          | 60         | 50         |

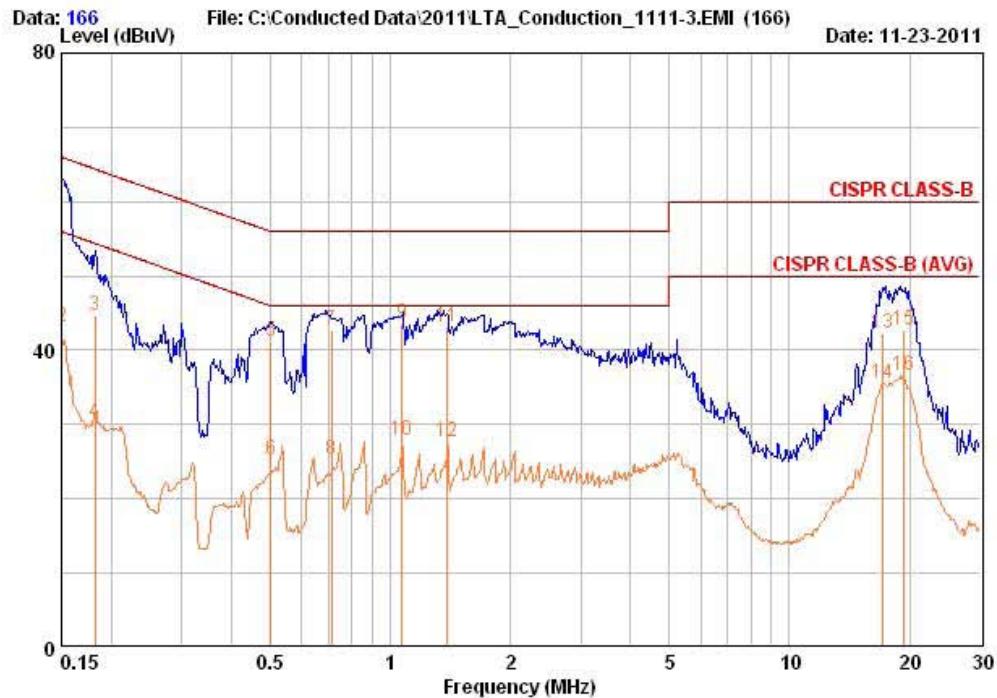
\* Decreases with the logarithm of the frequency

## **AC Conducted Emissions – Zigbee – Line**



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|                   |                      |         |               |            |
|-------------------|----------------------|---------|---------------|------------|
| EUT / Model No. : | Radiopulse(RP-M100A) | Phase   | :             | LINE       |
| Test Mode         | :                    | ZigBee  | Test Power    | : 120 / 60 |
| Temp./Humi.       | :                    | 18 / 43 | Test Engineer | : CHO.K.H  |



| Freq   | RD    |       | C.F   | Result |       | Limit |       | Margin |       |
|--------|-------|-------|-------|--------|-------|-------|-------|--------|-------|
|        | QP    | AV    |       | QP     | AV    | QP    | AV    | QP     | AV    |
| MHz    | dBuV  | dBuV  | dB    | dBuV   | dBuV  | dBuV  | dBuV  | dB     | dB    |
| 0.150  | 50.34 | 33.34 | 9.72  | 60.06  | 43.06 | 66.00 | 56.00 | 5.94   | 12.94 |
| 0.182  | 35.04 | 20.64 | 9.68  | 44.72  | 30.32 | 64.39 | 54.39 | 19.67  | 24.07 |
| 0.503  | 31.62 | 15.62 | 9.61  | 41.23  | 25.23 | 56.00 | 46.00 | 14.77  | 20.77 |
| 0.712  | 32.92 | 15.62 | 9.71  | 42.63  | 25.33 | 56.00 | 46.00 | 13.37  | 20.67 |
| 1.071  | 33.73 | 18.23 | 9.76  | 43.49  | 27.99 | 56.00 | 46.00 | 12.51  | 18.01 |
| 1.393  | 33.34 | 17.84 | 9.74  | 43.08  | 27.58 | 56.00 | 46.00 | 12.92  | 18.42 |
| 17.198 | 32.19 | 25.39 | 10.04 | 42.23  | 35.43 | 60.00 | 50.00 | 17.77  | 14.57 |
| 19.328 | 32.67 | 26.57 | 10.09 | 42.76  | 36.66 | 60.00 | 50.00 | 17.24  | 13.34 |

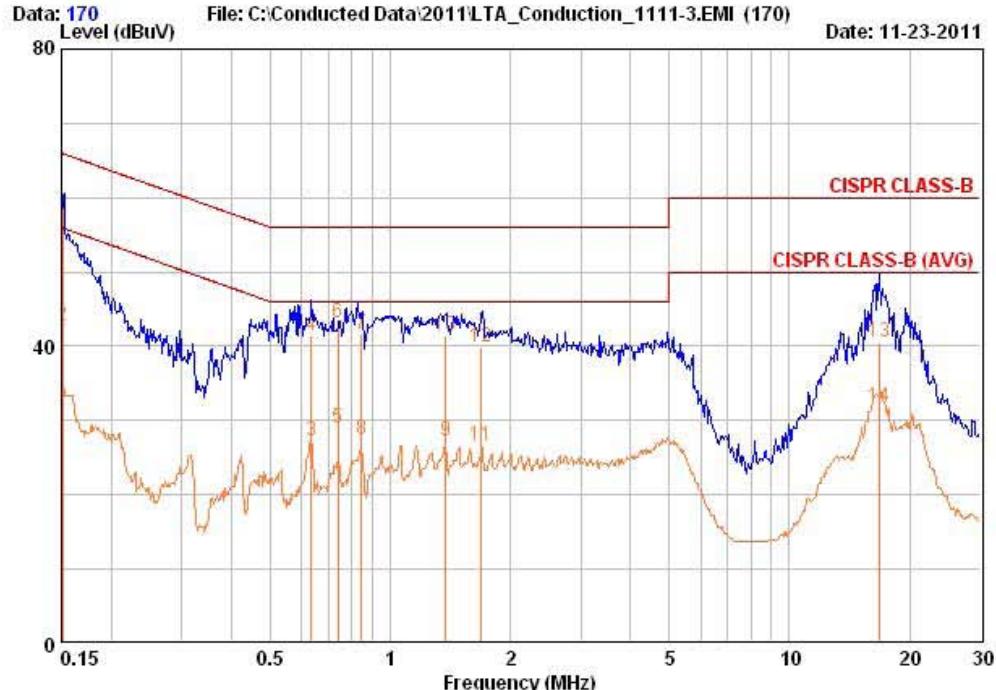
Remarks: C.F (Correction Factor) = Insertion loss + Cable loss

AC Conducted Emissions – Zigbee – Neutral

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Laboratory for Test & Approval Co.,Ltd.

EUT / Model No. : Radiopulse(RP-M100A) Phase : NEUTRAL  
 Test Mode : ZigBee Test Power : 120 / 60  
 Temp./Humi. : 18 / 43 Test Engineer : CHO.K.H



| Freq<br>MHz | RD<br>dBuV | RD<br>dBuV | C.F<br>dB | Result     |            | Result     |            | Limit      |            | Margin   |          |
|-------------|------------|------------|-----------|------------|------------|------------|------------|------------|------------|----------|----------|
|             |            |            |           | QP<br>dBuV | AV<br>dBuV | QP<br>dBuV | AV<br>dBuV | QP<br>dBuV | AV<br>dBuV | QP<br>dB | AV<br>dB |
| 0.151       | 49.04      | 33.14      | 9.65      | 58.69      | 42.79      | 65.94      | 55.94      | 7.26       | 13.16      |          |          |
| 0.634       | 31.82      | 17.62      | 9.65      | 41.47      | 27.27      | 56.00      | 46.00      | 14.53      | 18.73      |          |          |
| 0.738       | 33.62      | 19.32      | 9.64      | 43.26      | 28.96      | 56.00      | 46.00      | 12.74      | 17.04      |          |          |
| 0.848       | 32.03      | 17.83      | 9.66      | 41.69      | 27.49      | 56.00      | 46.00      | 14.31      | 18.51      |          |          |
| 1.377       | 31.84      | 17.64      | 9.67      | 41.50      | 27.30      | 56.00      | 46.00      | 14.50      | 18.70      |          |          |
| 1.694       | 30.34      | 16.94      | 9.65      | 40.00      | 26.60      | 56.00      | 46.00      | 16.00      | 19.40      |          |          |
| 16.846      | 30.59      | 21.89      | 9.93      | 40.52      | 31.82      | 60.00      | 50.00      | 19.48      | 18.18      |          |          |

Remarks: C.F (Correction Factor) = Insertion loss + Cable loss

## APPENDIX

### TEST EQUIPMENT USED FOR TESTS

|    | <b>Description</b>                      | <b>Model No.</b> | <b>Serial No.</b> | <b>Manufacturer</b>    | <b>Interval</b> | <b>Last Cal. Date</b> |
|----|---|------------------|-------------------|------------------------|-----------------|-----------------------|
| 1  | Spectrum Analyzer (~30GHz)              | FSV-30           | 100757            | R&S                    | 1 year          | 2011-01-24            |
| 2  | Signal Generator (~3.2GHz)              | 8648C            | 3623A02597        | HP                     | 1 year          | 2011-03-30            |
| 3  | Signal Generator (1~20GHz)              | 83711B           | US34490456        | HP                     | 1 year          | 2011-03-30            |
| 4  | Attenuator (3dB)                        | 8491A            | 37822             | HP                     | 2 year          | 2010-10-08            |
| 5  | Attenuator (10dB)                       | 8491A            | 63196             | HP                     | 2 year          | 2010-10-08            |
| 6  | Attenuator (30dB)                       | 8498A            | 3318A10929        | HP                     | 2 year          | 2011-01-05            |
| 7  | Test Receiver (~30MHz)                  | ESHS10           | 828404/009        | R&S                    | 1 year          | 2011-03-30            |
| 8  | EMI Test Receiver (~1GHz)               | ESCI7            | 100722            | R&S                    | 1 year          | 2011-10-07            |
| 9  | RF Amplifier (~1.3GHz)                  | 8447D            | 2439A09058        | HP                     | 2 year          | 2010-10-08            |
| 10 | RF Amplifier (1~18GHz)                  | 8449B            | 3008A02126        | HP                     | 2 year          | 2010-03-29            |
| 11 | Horn Antenna (1~18GHz)                  | BBHA 9120D       | 9120D122          | SCHWARZBECK            | 2 year          | 2010-12-24            |
| 12 | Horn Antenna (18 ~ 40GHz)               | SAS-574          | 154               | Schwarzbeck            | 2 year          | 2010-11-25            |
| 13 | Horn Antenna (18 ~ 40GHz)               | SAS-574          | 155               | Schwarzbeck            | 2 year          | 2010-11-25            |
| 14 | TRILOG Antenna                          | VULB 9160        | 9160-3172         | SCHWARZBECK            | 2 year          | 2010-10-07            |
| 15 | Dipole Antenna                          | VHA9103          | 2116              | SCHWARZBECK            | 2 year          | 2010-11-25            |
| 16 | Dipole Antenna                          | VHA9103          | 2117              | SCHWARZBECK            | 2 year          | 2010-11-25            |
| 17 | Dipole Antenna                          | VHA9105          | 2261              | SCHWARZBECK            | 2 year          | 2010-11-25            |
| 18 | Dipole Antenna                          | VHA9105          | 2262              | SCHWARZBECK            | 2 year          | 2010-11-25            |
| 19 | Hygro-Thermograph                       | THB-36           | 0041557-01        | ISUZU                  | 2 year          | 2010-04-12            |
| 20 | Splitter (SMA)                          | ZFSC-2-2500      | SF617800326       | Mini-Circuits          | -               | -                     |
| 21 | Power Divider                           | 11636A           | 6243              | HP                     | 2 year          | 2010-10-08            |
| 22 | DC Power Supply                         | 6622A            | 3448A03079        | HP                     | -               | -                     |
| 23 | Frequency Counter                       | 5342A            | 2826A12411        | HP                     | 1 year          | 2011-03-30            |
| 24 | Power Meter                             | EPM-441A         | GB32481702        | HP                     | 1 year          | 2011-03-30            |
| 25 | Power Sensor                            | 8481A            | US41030291        | HP                     | 1 year          | 2011-10-07            |
| 26 | Audio Analyzer                          | 8903B            | 3729A18901        | HP                     | 1 year          | 2011-10-07            |
| 27 | Modulation Analyzer                     | 8901B            | 3749A05878        | HP                     | 1 year          | 2011-10-07            |
| 28 | TEMP & HUMIDITY Chamber                 | YJ-500           | LTAS06041         | JinYoung Tech          | 1 year          | 2011-10-07            |
| 29 | Stop Watch                              | HS-3             | 601Q09R           | CASIO                  | 2 year          | 2010-03-31            |
| 30 | LISN                                    | ENV216           | 100408            | R&S                    | 1 year          | 2011-10-07            |
| 31 | UNIVERSAL RADIO<br>COMMUNICATION TESTER | CMU200           | 106243            | R&S                    | 2 year          | 2010-05-13            |
| 32 | Highpass Filter                         | WHKX1.5/15G-10SS | 74                | Wainwright Instruments | -               | -                     |
| 33 | Highpass Filter                         | WHKX3.0/18G-10SS | 118               | Wainwright Instruments | -               | -                     |