



Dates of Tests: November 16 ~ 23, 2011

Test Report S/N: LR50011111N

Test Site : LTA CO., LTD.

## CERTIFICATION OF COMPLIANCE

FCC ID.

**UNTRP-M100A**

APPLICANT

**Radiopulse Inc.**

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

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.  
 Address : 243, Jubug-ri, Yangji-Myeon, Youngin-Si, Kyunggi-Do, Korea. 449-822  
 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  
 Dipole 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 (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

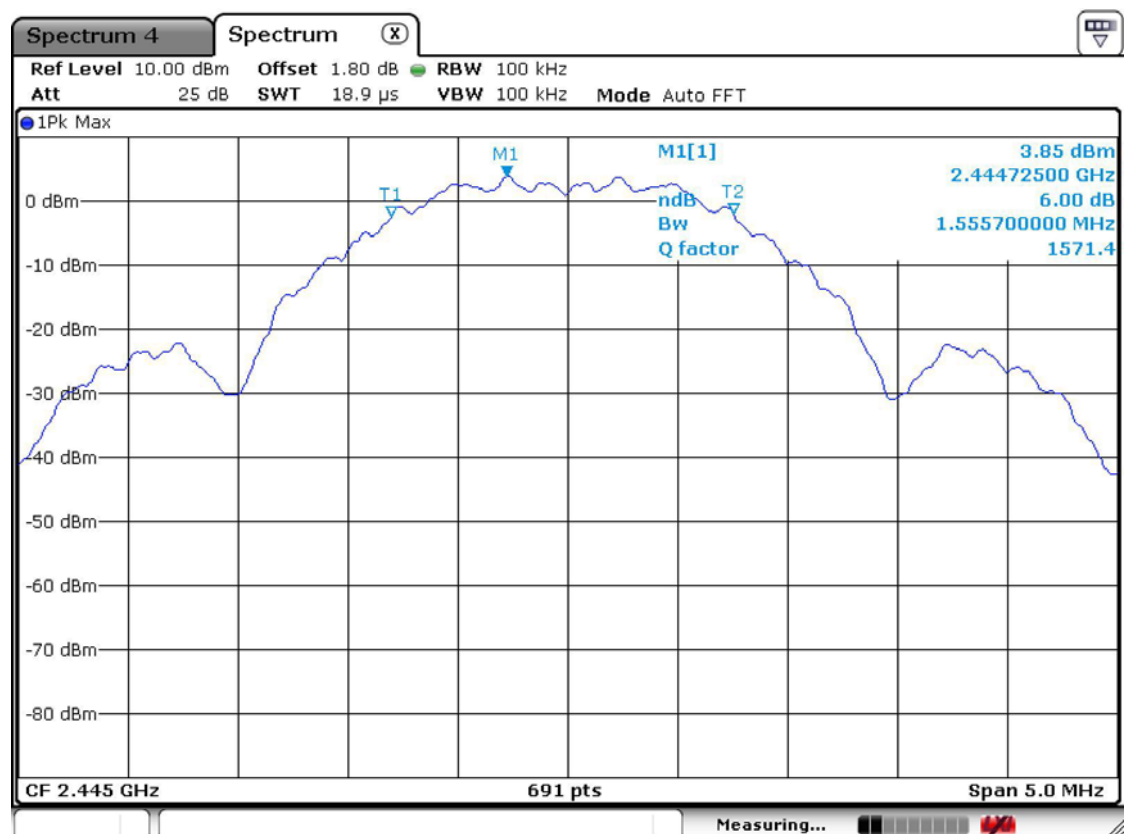
#### Measurement Setup

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:

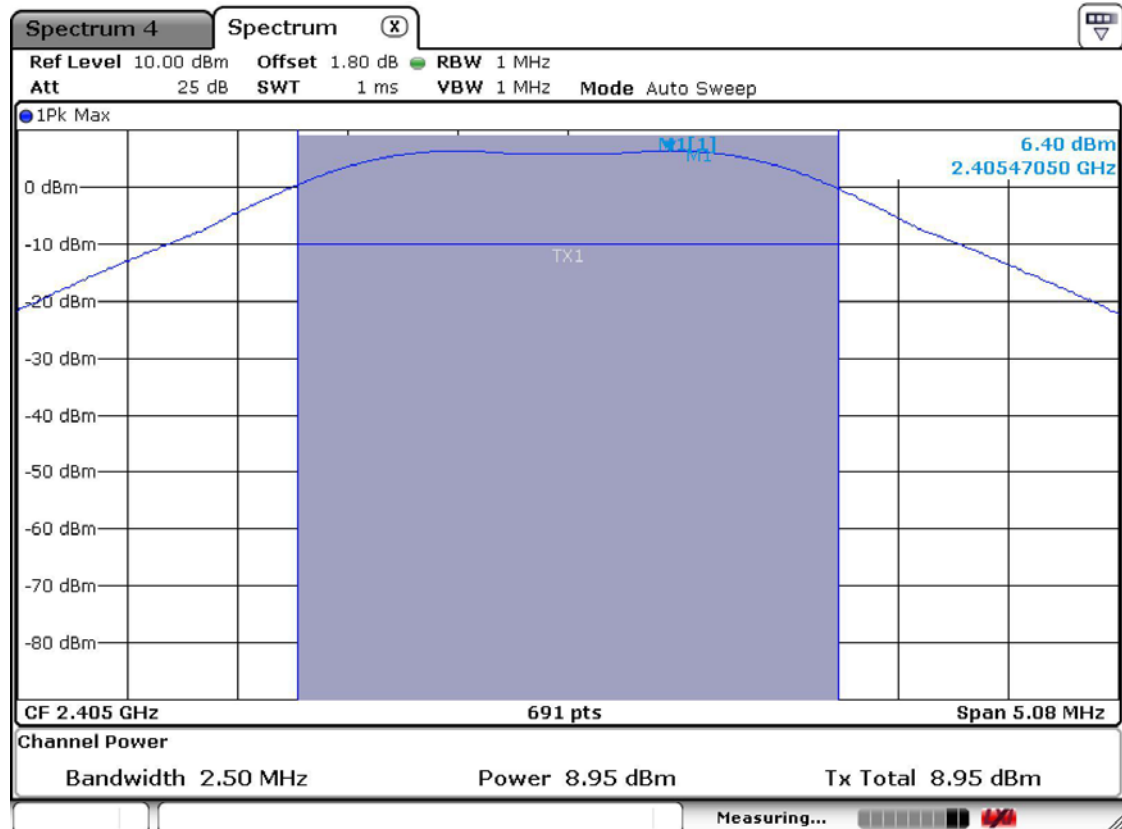
Frequency (MHz)	Test Results		
	dBm	mW	Result
2405	8.95	7.85	Complies
2445	9.23	8.38	Complies
2480	8.74	7.48	Complies

- See next pages for actual measured spectrum plots.

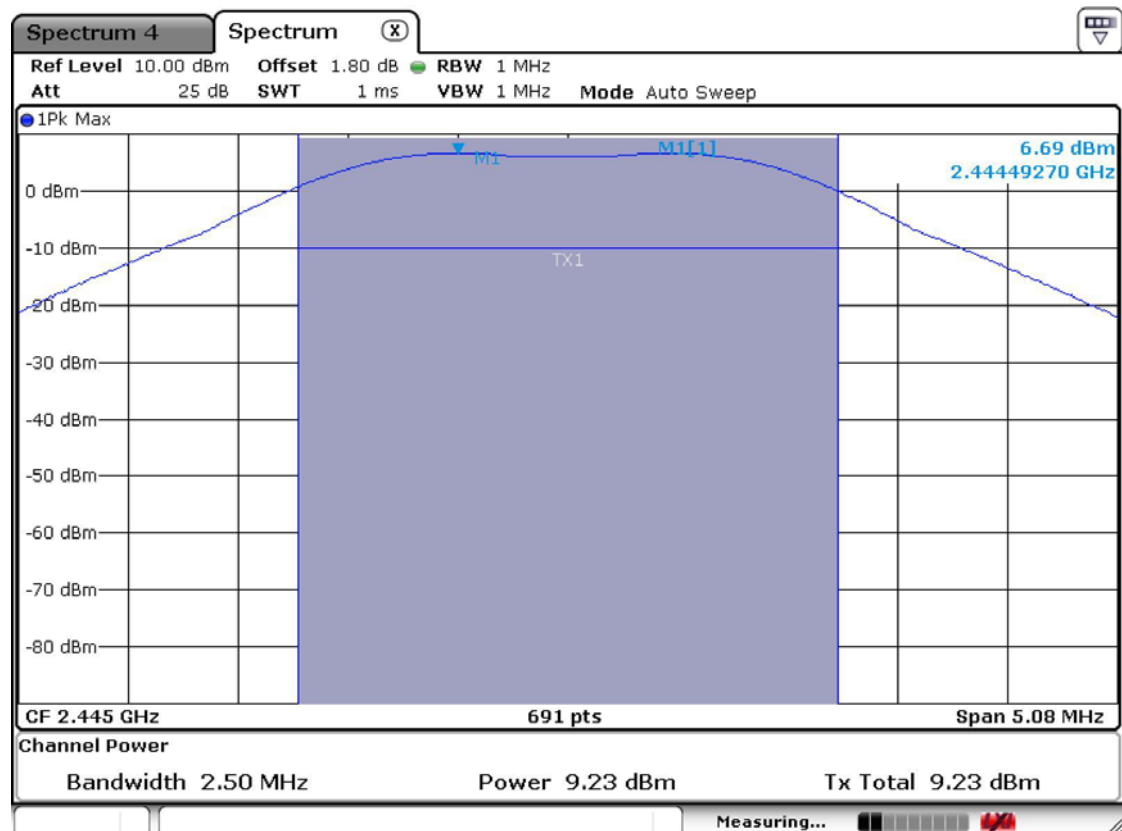
#### Minimum Standard:

Peak output power	< 1W
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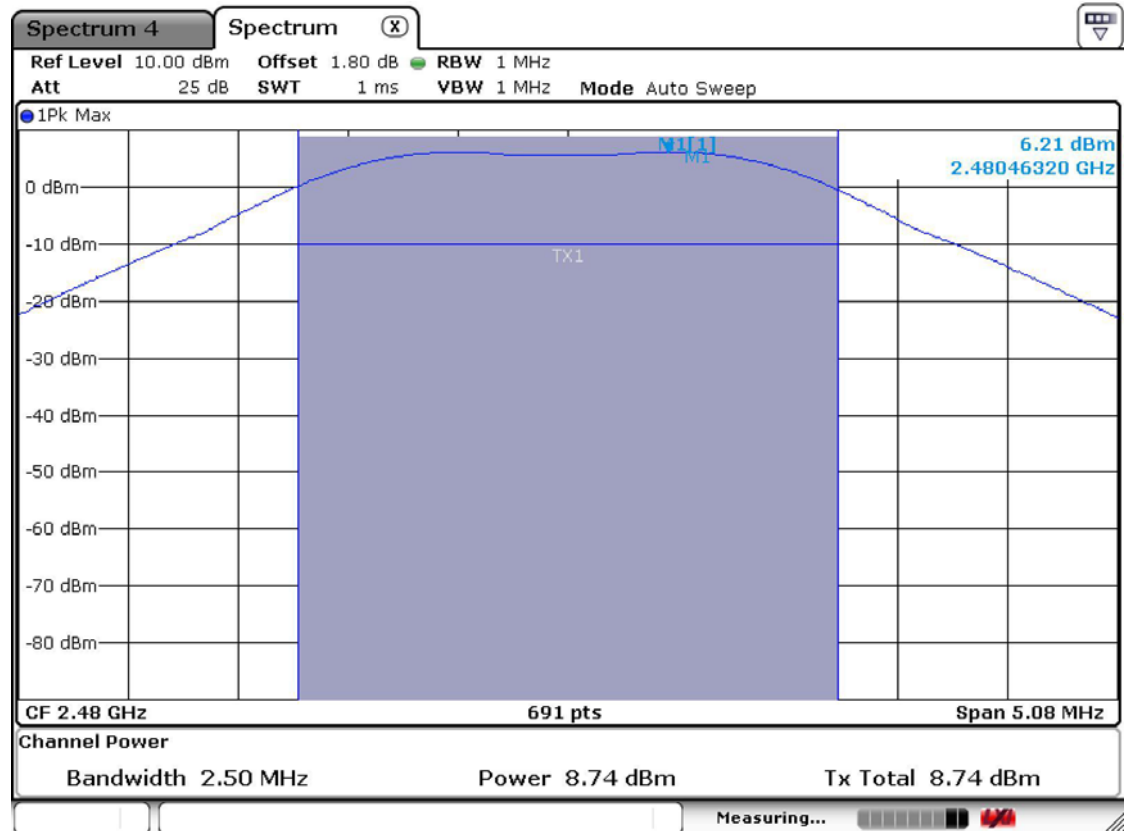
## Low Channel



## 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 (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:

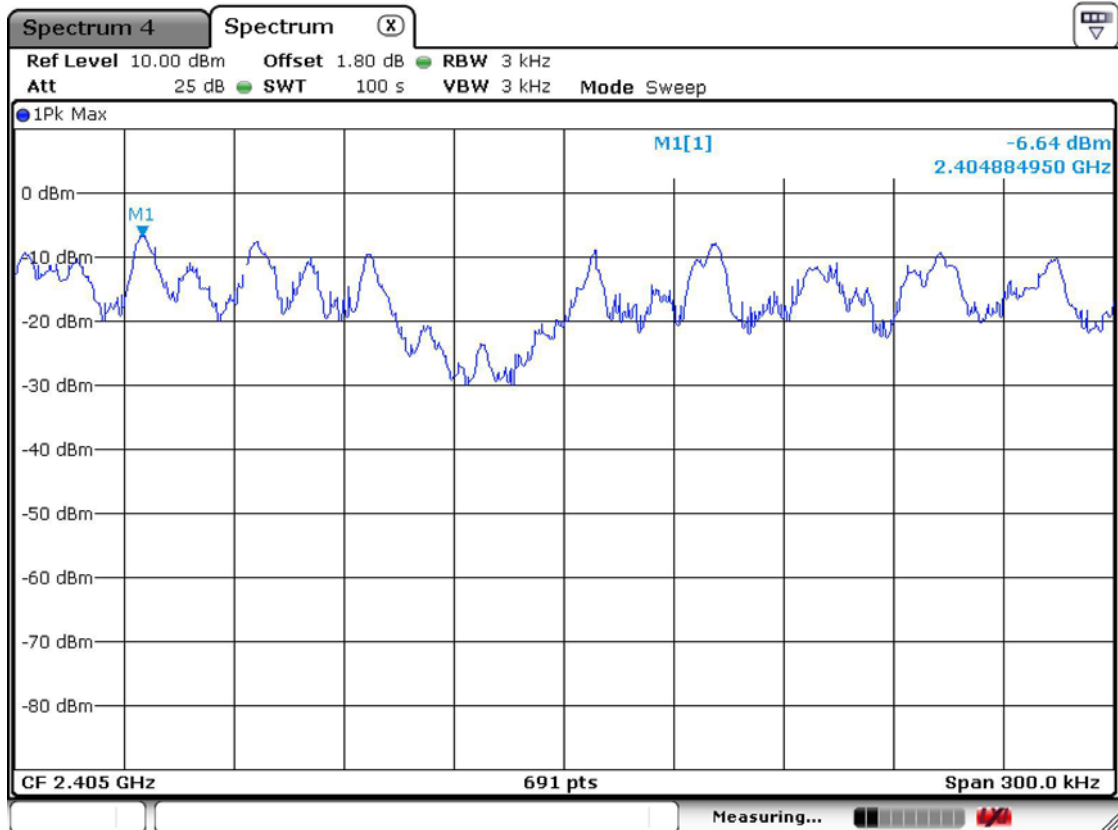
Power Spectral Density	< 8dBm @ 3kHz BW
------------------------	------------------

#### Measurement Setup

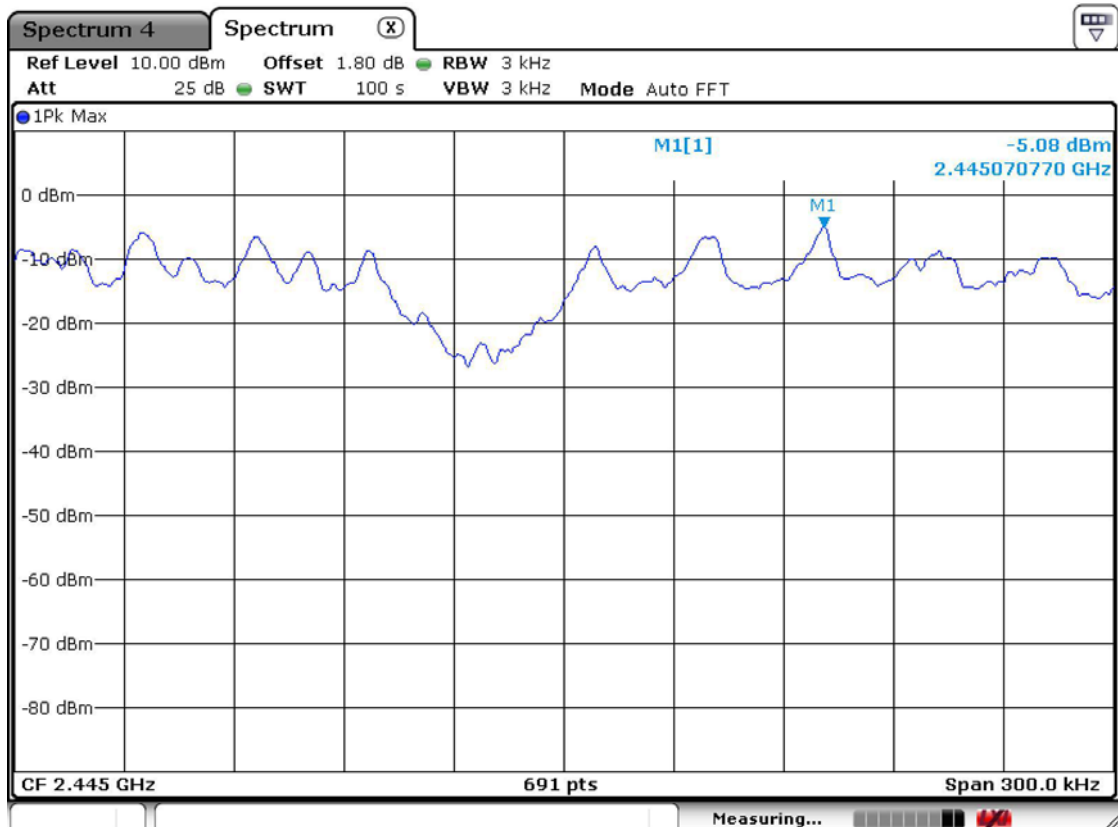
Same as the Chapter 3.2.1 (Figure 1)

## Power Density Measurement

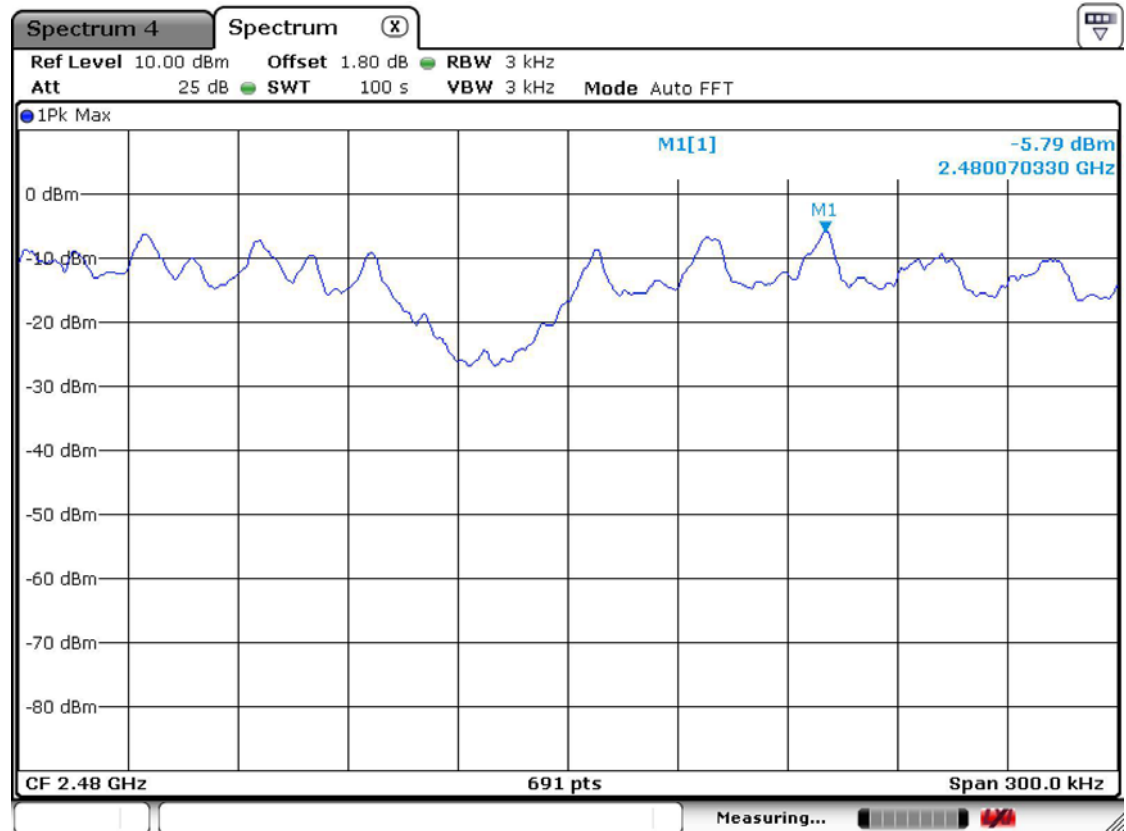
### Low Channel



### 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

RBW = 100 kHz

VBW = 100 kHz

Span = 50 MHz

Detector function = peak

Trace = max hold

Sweep = auto

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:

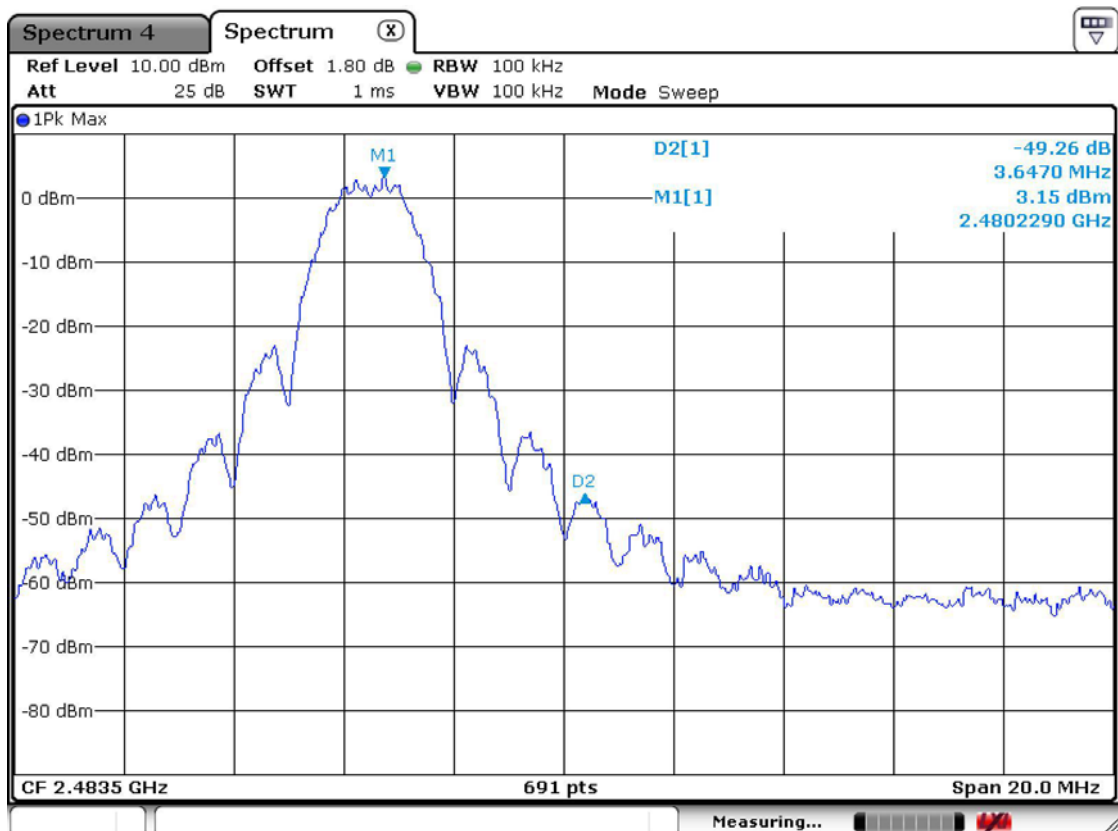
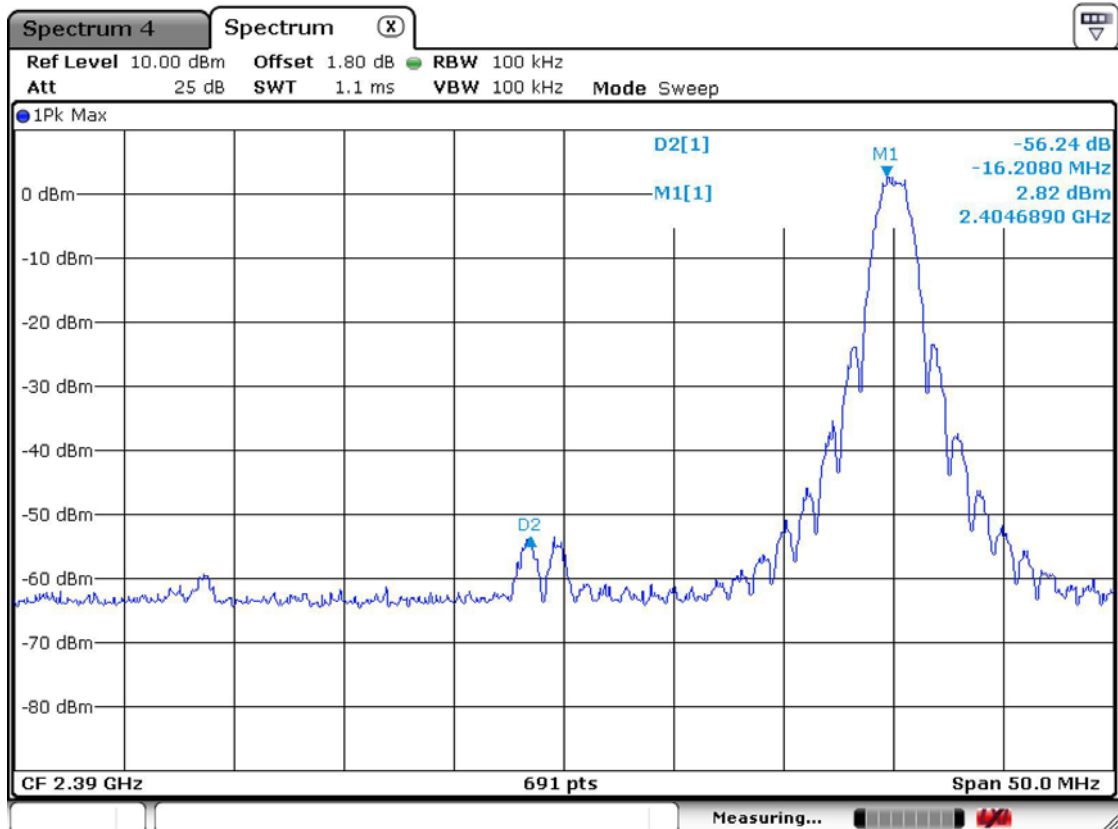
Horizontal / Vertical

#### 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
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## Band-edge





**Band-edges in the restricted band 2310-2390 MHz measurement****Measurement Data:RP-M100A(Chip Antenna)**

Frequency  [MHz]	Reading [dBuV/m]		Pol.	Correction Factor			Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
	AV / Peak			Antenna	Amp. Gain	Cable	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  [MHz]	Reading [dBuV/m]		Pol.	Correction  Factor			Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
	AV / Peak			Antenna	Amp. Gain	Cable	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)**

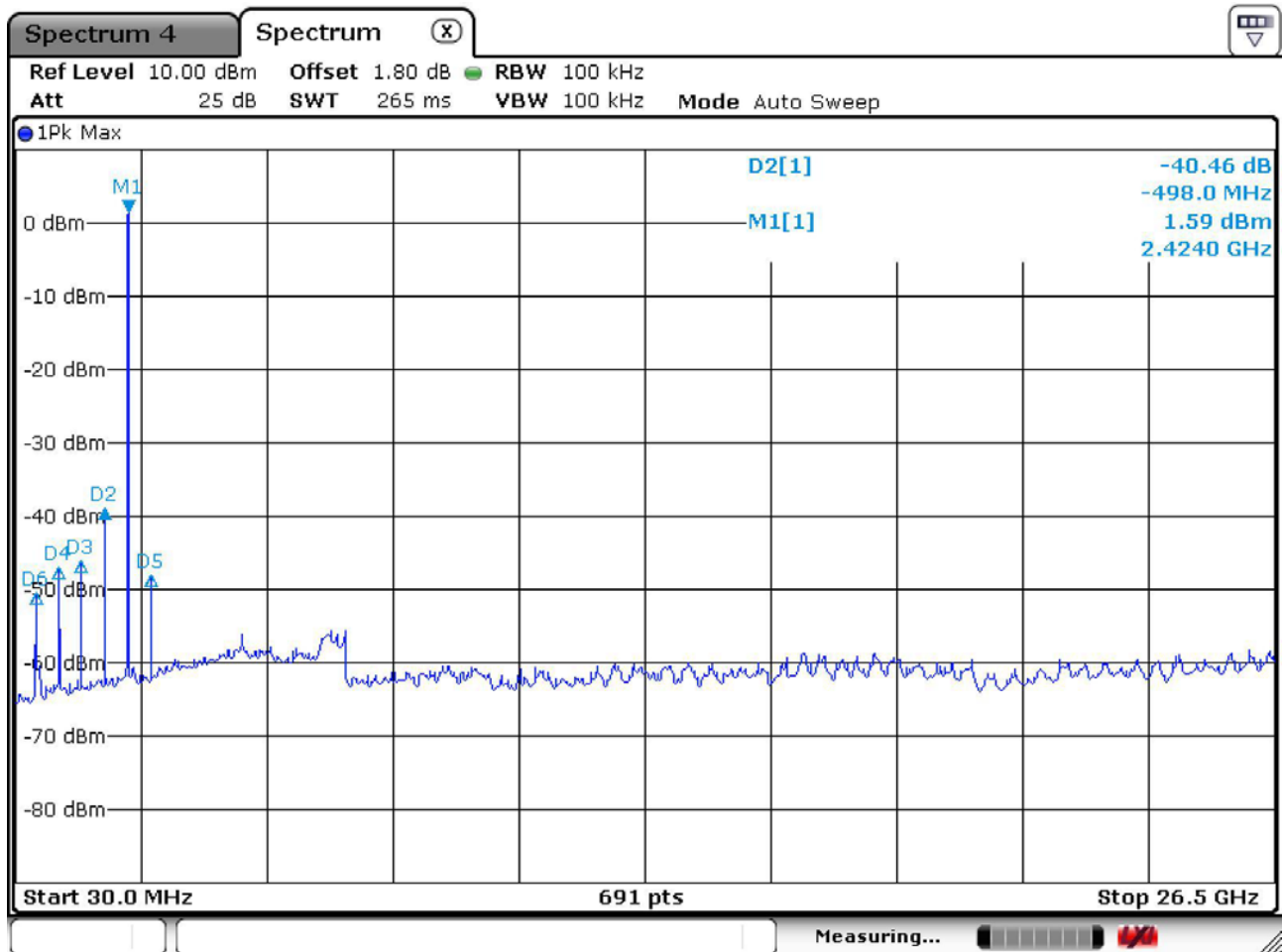
Frequency  [MHz]	Reading [dBuV/m]		Pol.	Correction Factor			Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
	AV / Peak			Antenna	Amp. Gain	Cable	AV / Peak		AV / Peak		AV / Peak	
2483.9	42.7	57.9	V	25.4	37.1	4.0	54.0	74.0	35.0	50.2	19.1	23.9

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

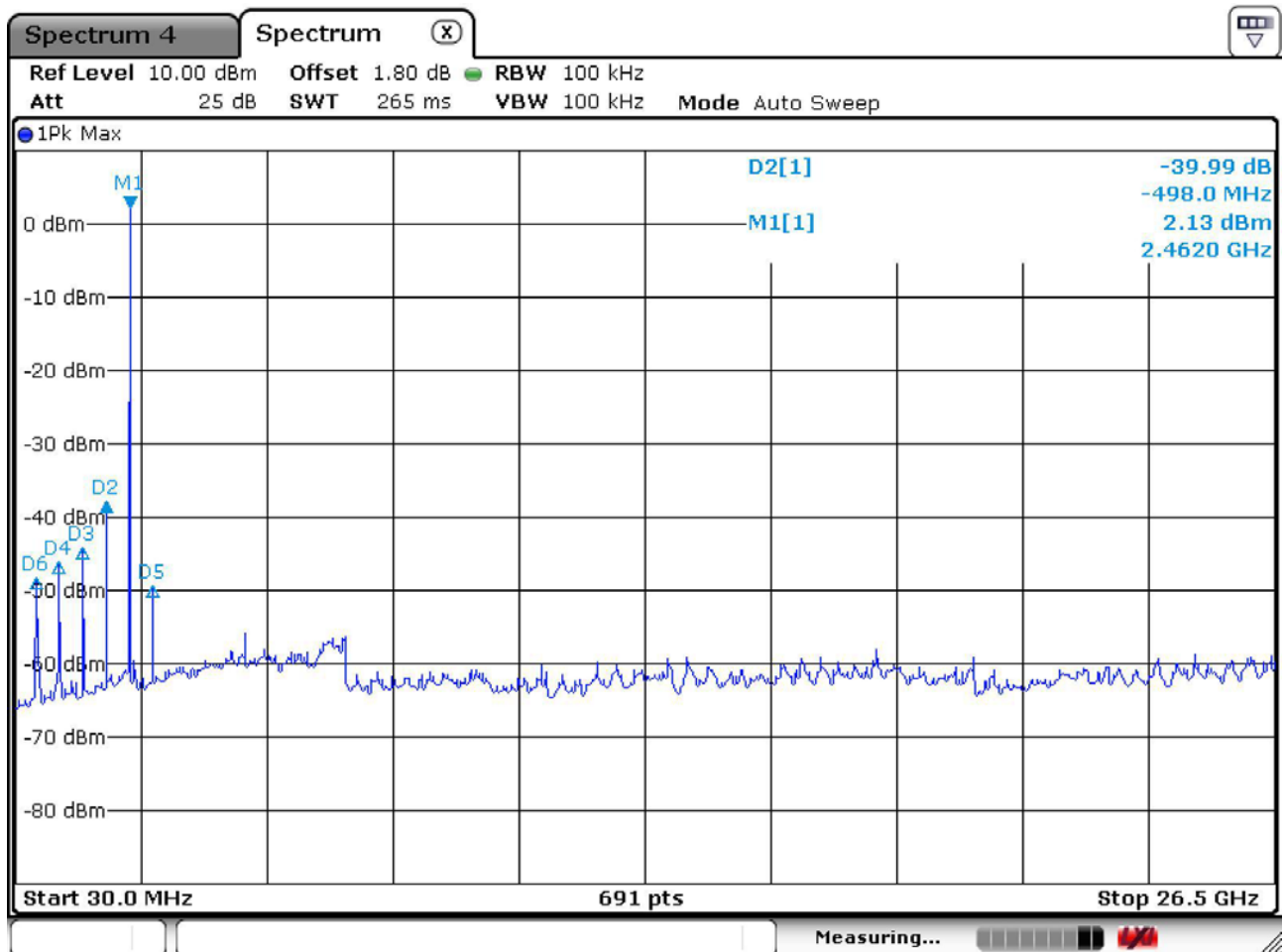
Frequency  [MHz]	Reading [dBuV/m]		Pol.	Correction Factor			Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
	AV / Peak			Antenna	Amp. Gain	Cable	AV / Peak		AV / Peak		AV / Peak	
2483.9	31.9	58.5	V	25.4	37.1	4.0	54.0	74.0	24.2	50.8	29.9	23.3

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

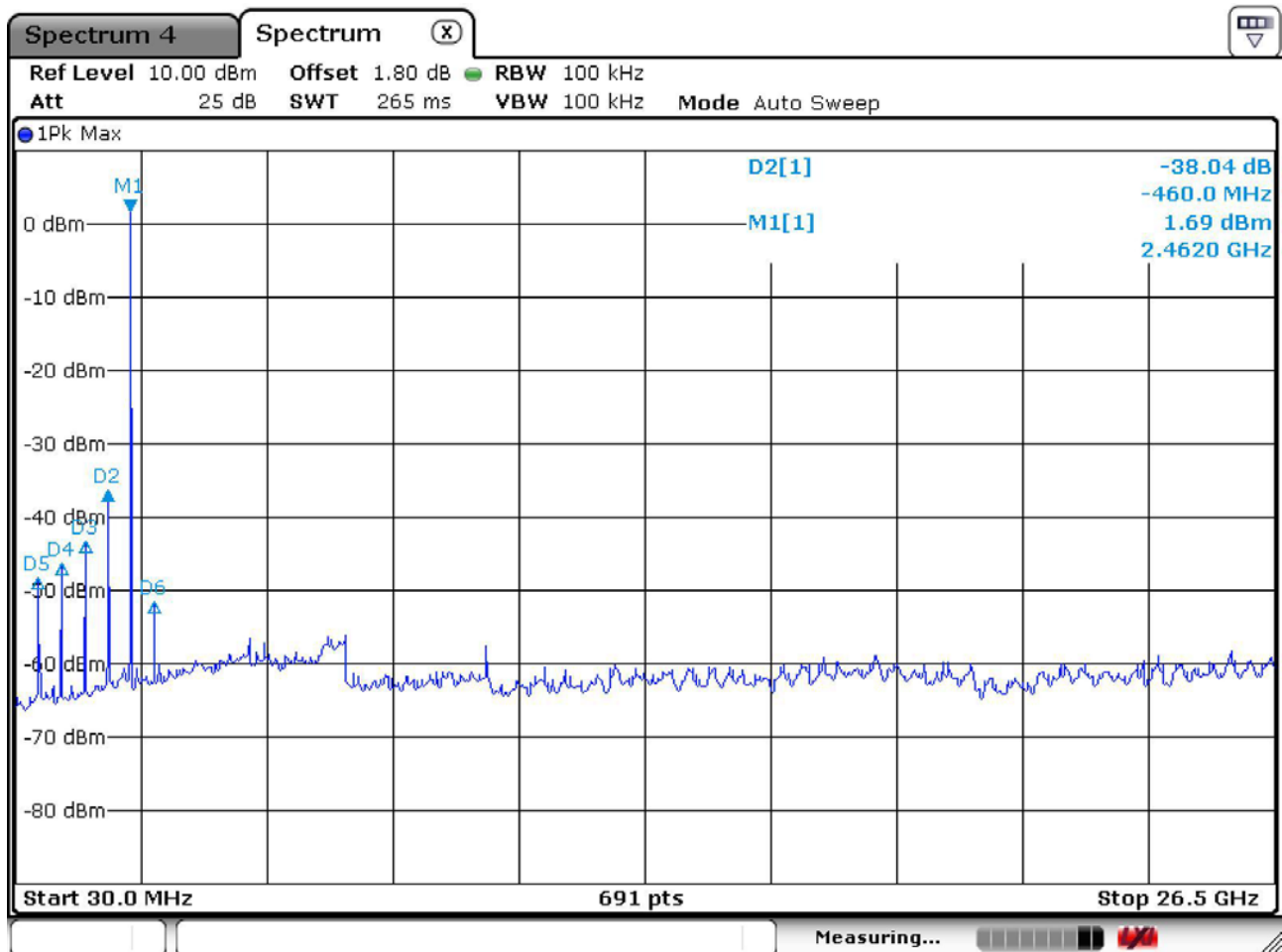
**Low channel**  
**Frequency Range = 30 MHz ~ 10<sup>th</sup> harmonic.**



**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)

VBW ≥ RBW

= 1 MHz (1 GHz ~ 10<sup>th</sup> harmonic )

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  [MHz]	Reading [dBuV/m]		Pol.	Correction Factor			Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
	AV / Peak			Antenna	Amp. Gain	Cable	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  [MHz]	Reading [dBuV/m]		Pol.	Correction Factor			Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
	AV / Peak			Antenna	Amp. Gain	Cable	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  [MHz]	Reading [dBuV/m]		Pol.	Correction Factor			Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
	AV / Peak			Antenna	Amp. Gain	Cable	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  [MHz]	Reading [dBuV/m]		Pol.	Correction Factor			Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
	AV / Peak			Antenna	Amp. Gain	Cable	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  [MHz]	Reading [dBuV/m]		Pol.	Correction Factor			Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
	AV / Peak			Antenna	Amp. Gain	Cable	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  [MHz]	Reading [dBuV/m]		Pol.	Correction Factor			Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
	AV / Peak			Antenna	Amp. Gain	Cable	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**

243 Jibug-ri, yangji-Myeon, Youngin-si,  
Gyeonggi-do 449-822 Korea  
Tel :+82-31-3236008,9  
Fax: +82-31-3236010

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

TEST MODE: ZigBee

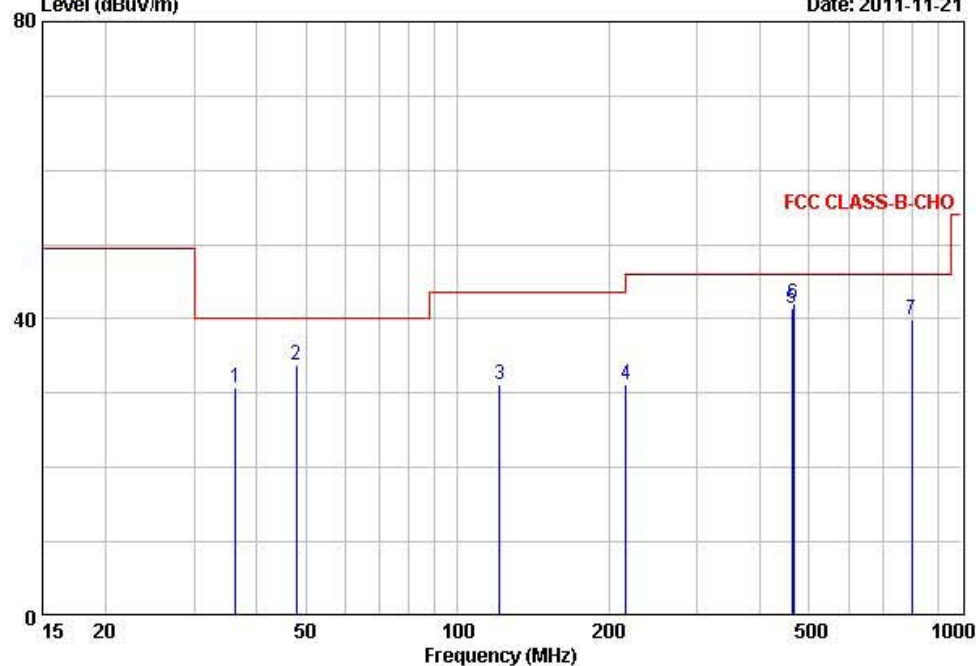
Temp Humi : 16 / 41

Tested by: CHO.K.H

Data: 164

Level (dBuV/m)

Date: 2011-11-21



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

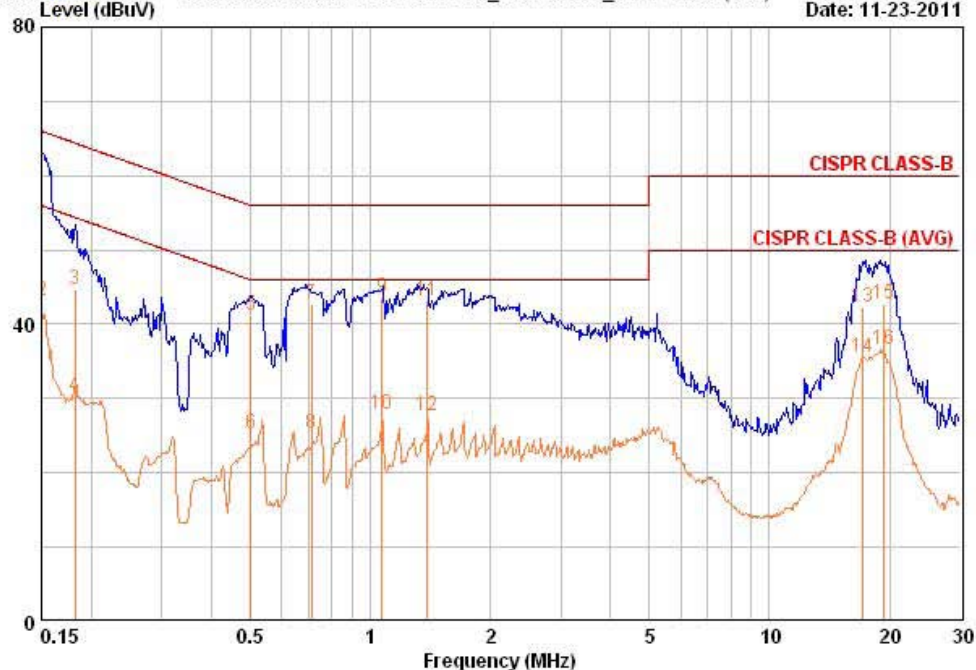
\* Decreases with the logarithm of the frequency

**AC Conducted Emissions – Zigbee – Line**

243 Jubug-ri, yangji-Myeon, Youngin-si,  
Gyeonggi-do 449-822 Korea  
Tel +82-31-3236008,9  
Fax:+82-31-3236010

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

Data: 166 File: C:\Conducted Data\2011\LTA\_Conduction\_1111-3.EMI (166) Date: 11-23-2011



Freq	RD	RD	C.F	Result	Result	Limit	Limit	Margin	Margin
MHz	QP	AV	dB	QP	AV	QP	AV	QP	AV
	dBuV	dBuV		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

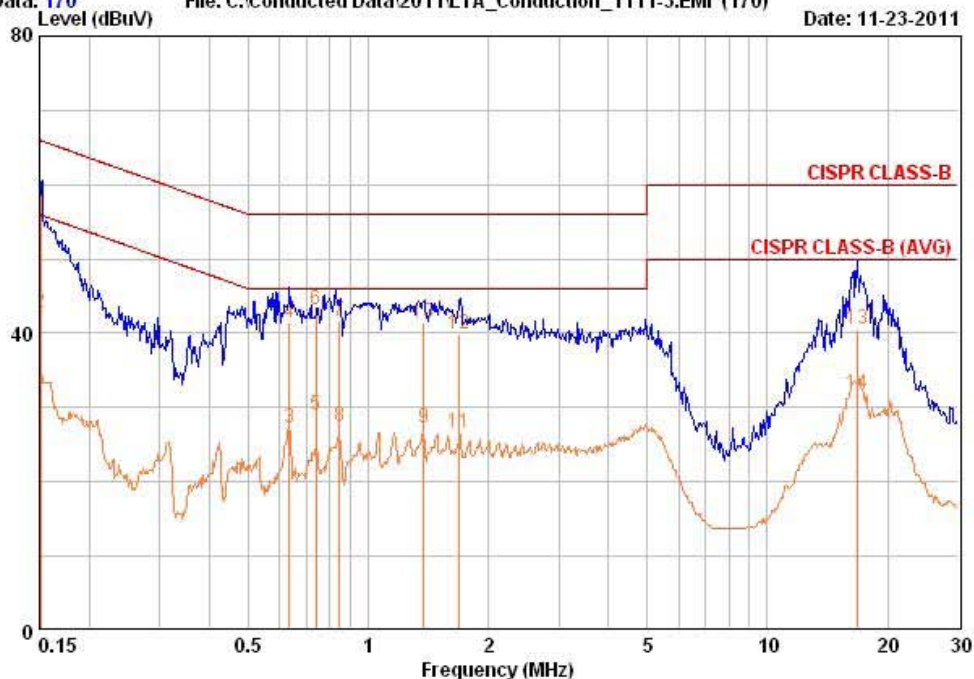
Remarks: C.F (Correction Factor) = Insertion loss + Cable loss

**AC Conducted Emissions – Zigbee – Neutral**

243 Jubug-ri, yangji-Myeon, Youngin-si,  
Gyeonggi-do 449-822 Korea  
Tel +82-31-3236008,9  
Fax: +82-31-3236010

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

Data: 170 File: C:\Conducted Data\2011\LTA\_Conduction\_1111-3.EMI (170) Date: 11-23-2011



Freq	RD	RD	C.F	Result	Result	Limit	Limit	Margin	Margin
MHz	QP	AV	dB	QP	AV	QP	AV	QP	AV
	dBuV	dBuV		dBuV	dBuV	dBuV	dBuV	dB	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**

	Description	Model No.	Serial No.	Manufacturer	Interval	Last Cal. Date
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 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	-	-