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Dates of Tests: September 06~ October 15, 2013

Test Report S/N: LR500111310K

Test Site : LTA CO., LTD

## CERTIFICATION OF COMPLIANCE

FCC ID

**PBN- ET28KH**

APPLICANT

**ENTER TECH CO.,LTD.**

|                           |   |                                             |
|---------------------------|---|---------------------------------------------|
| Equipment Class           | : | Part 15 Spread Spectrum Transmitter (DSS)   |
| Manufacturing Description | : | HD MULTIMEDIA KARAOKE (Main Device)         |
| Manufacturer              | : | ENTER TECH CO.,LTD.                         |
| Model name                | : | ET28KH                                      |
| Test Device Serial No.:   | : | Identical prototype                         |
| Rule Part(s)              | : | FCC Part 15.247 Subpart C; ANSI C-63.4-2003 |
| Frequency Range           | : | 2406 ~ 2474MHz                              |
| RF power                  | : | Max 8.27 dBm – Conducted                    |
| Data of issue             | : | October 18, 2013                            |

This test report is issued under the authority of:

Jae-Ho Lee, Manager

The test was supervised by:

Young-Jin Lee, 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

### 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           | UPDATING   | ECT accredited Lab. |
| RRA    | KOREA   | KR0049             | 2015-03-06 | EMC accredited Lab. |
| FCC    | U.S.A   | 610755             | 2014-04-27 | FCC filing          |
| FCC    | U.S.A   | 649054             | UPDATING   | FCC CAB             |
| VCCI   | JAPAN   | R2133(10 m), C2307 | 2014-06-21 | VCCI registration   |
| VCCI   | JAPAN   | T-2009             | 2013-12-23 | VCCI registration   |
| VCCI   | JAPAN   | G-563              | 2015-05-28 | VCCI registration   |
| IC     | CANADA  | 5799A-1            | 2015-06-21 | IC filing           |

## 2. Information about test item

### 2-1 Client

Company name : ENTER TECH CO.,LTD.  
 Address : 156-7, Ojeong-dong, Ojeong-gu, Bucheon-city, Kyunggi-do, KOREA  
 Telephone / Facsimile : +82-32-680-9072 / +82-32-678-0818

### 2-2 Manufacturer

Company name : ENTER TECH CO.,LTD.  
 Address(Factory in Korea) : 156-7, Ojeong-dong, Ojeong-gu, Bucheon-city, Kyunggi-do, KOREA  
 Address(Factory in China) : Baolai Area, 46 Xinhe Road, Shangmugu-Cun, Pinghu-Zhen,  
 Longgang-Qu, Shenzhen, China  
 Telephone / Facsimile : +82-32-680-9072 / +82-32-678-0818

### 2-3 Equipment Under Test (EUT)

Trade name : MAGICSING  
 Model name : ET28KH  
 Serial number : Identical prototype  
 Date of receipt : September 02, 2013  
 EUT condition : Pre-production, not damaged  
 Antenna type : Radi antenna, Max Gain 4.75 dBi  
 Frequency Range : 2406 ~ 2474MHz  
 RF output power : Max. 8.27dBm - Conducted  
 Number of channels : 18  
 Channel spacing : 4MHz  
 Channel Access Protocol : Frequency Hopping Spread Spectrum (FHSS)  
 Power Source : 9.0 Vdc by Adapter  
 Firmware Version : V1.0.0

### 2-4 Tested frequency

| Bluetooth       | LOW  | MID  | HIGH |
|-----------------|------|------|------|
| Frequency (MHz) | 2406 | 2442 | 2474 |

### 3. Test Report

#### 3.1 Summary of tests

| FCC Part<br>Section(s) | Parameter                        | Limit             | Test<br>Condition | Status<br>(note 1) |
|------------------------|----------------------------------|-------------------|-------------------|--------------------|
| 15.247(a)              | Carrier Frequency Separation     | > 25 kHz          | Conducted         | C                  |
| 15.247(a)              | Number of Hopping Frequencies    | > 15 hops         |                   | C                  |
| 15.247(a)              | 20 dB Bandwidth<br>99% Bandwidth | > 1.5 MHz         |                   | C                  |
| 15.247(a)              | Dwell Time                       | < 0.4 seconds     |                   | C                  |
| 15.247(b)              | Transmitter Output Power         | < 250 mWatt       |                   | C                  |
| 15.247(d)              | Conducted Spurious emission      | > 20 dBc          |                   | C                  |
| 15.247(d)              | Band Edge                        | > 20 dBc          |                   | C                  |
| 15.249 / 15.209        | Field Strength of Harmonics      | < 54 dBuV (at 3m) | Radiated          | C                  |
| 15.109                 | Field Strength                   | -                 |                   | C                  |
| 15.207 /15.107         | AC Conducted Emissions           | EN 55022          | Line 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.

#### Note 1: Antenna Requirement

→ The **ENTER TECH CO.,LTD.** FCC ID:**PBN- ET28KH** unit complies with the requirement of §15.203.

The antenna type is Radi antenna.

**Note 2:** This Product is operated by Adapter.

**Note 3:** The sample was tested according to the following specification:  
FCC Parts 15.247; ANSI C-63.4-2003

#### Note 4: TEST METHODOLOGY

The measurement procedure described in the American National Standard for Testing Unlicensed Wireless Devices(ANSI C63.10-2009) and FCC Public Notice DA 00-705 dated March 30, 2000 entitled “Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems” were used in the measurement of the **ENTER TECH CO.,LTD.** FCC ID: **PBN- ET28KH**

## **3.2 Information about the FHSS characteristics:**

### **3.2.1 Pseudorandom Frequency Hopping Sequence**

The channel is represented by a pseudo-random hopping sequence hopping through the 18 RF channels. The hopping sequence is unique for the piconet and is determined by this device address of the master; the phase in the hopping sequence is determined by the RF Chip clock of the master. The channel is divided into time slots where each slot corresponds to an RF hop frequency. Consecutive hops correspond to different RF hop frequencies.

### **3.2.2 Equal Hopping Frequency Use**

All units participating in the piconet are time and hop-synchronized to the channel.

### **3.2.3 System Receiver Input Bandwidth**

Each channel bandwidth is 4MHz

### **3.2.4 Equipment Description**

#### **15.247(a)(1):**

The hopping sequence must be pseudorandom. All Channels are used equally on average. The receiver input bandwidth is approximately equal to the transmit bandwidth. The receiver hops in sequence with the transmitted signal.

#### **15.247(g):**

The system is designed to comply with all of the regulations in Section 15.247 when the transmitter is presented with a continuous data (or information).

#### **15.247(h):**

The system does not coordinate its channel selection/hopping sequence with other frequency hopping systems for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters.

### 3.3 Transmitter requirements

#### 3.3.1 Carrier Frequency Separation

##### Procedure:

The test follows DA00-705. The carrier frequency separation was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

After the trace being stable, the reading value between the peaks of the adjacent channels using the marker-delta function was recorded as the measurement results.

The spectrum analyzer is set to:

Span = 15 MHz (wide enough to capture the peaks of two adjacent channels)

RBW = 30 kHz

Sweep = auto

VBW = 30 kHz

Detector function = peak

Trace = max hold

##### Measurement Data:

| Test Results                       |          |
|------------------------------------|----------|
| Carrier Frequency Separation (MHz) | Result   |
| 3.994                              | Complies |

- See next pages for actual measured spectrum plots.

##### Minimum Standard:

The EUT shall have hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of 20dB bandwidth of the hopping channel, whichever is greater.

##### Measurement Setup

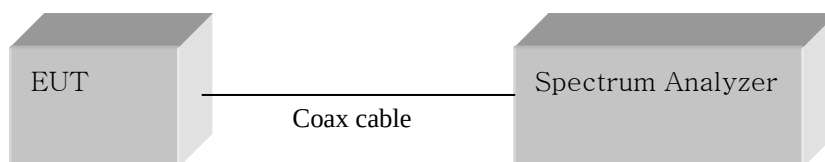
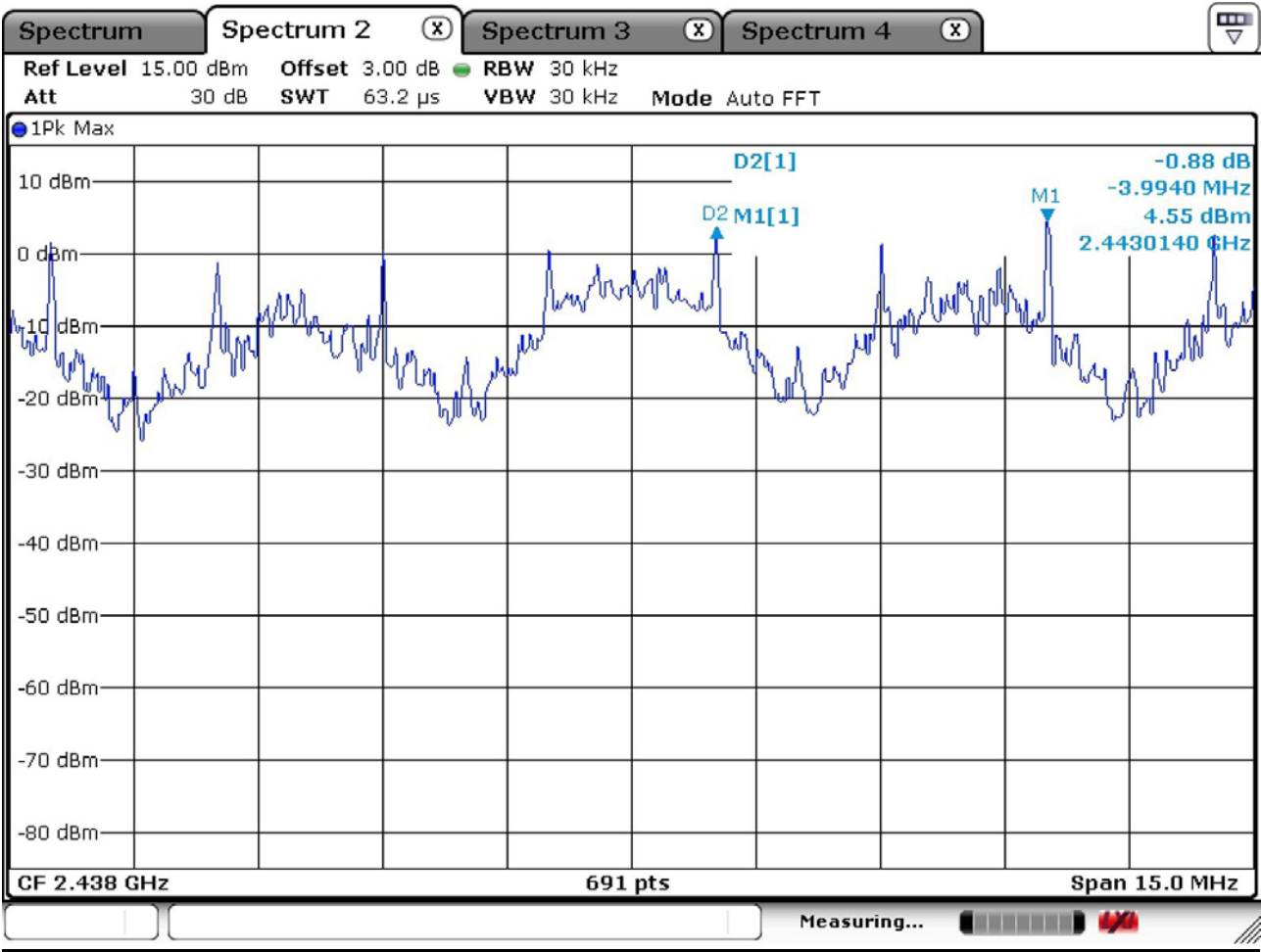


Figure 1: Measurement setup for the carrier frequency separation

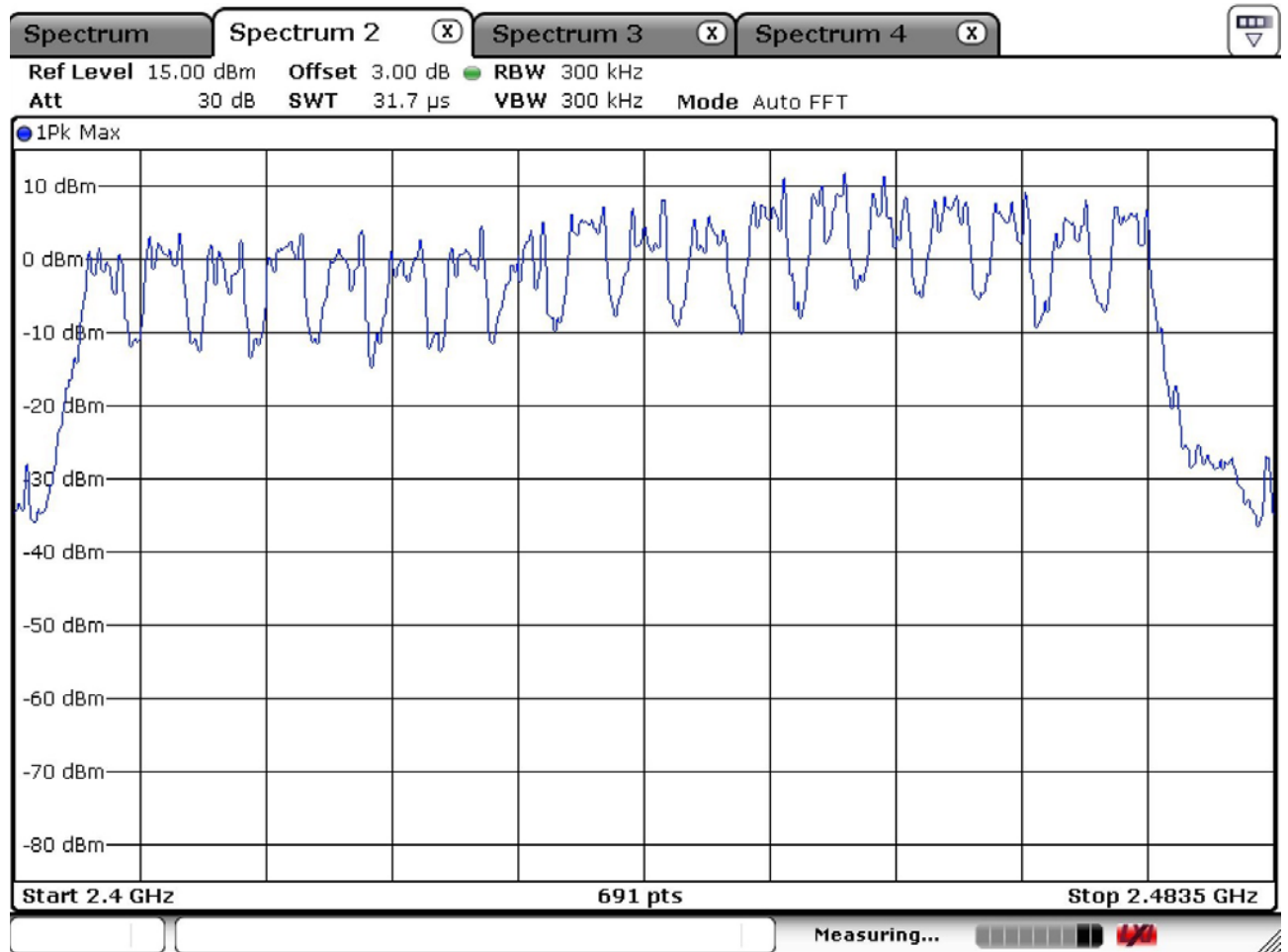
Carrier Frequency Separation







### Number of Hopping Frequencies



### 3.3.3 20 dB Bandwidth

#### Procedure:

The bandwidth at 20 dB below the highest in band spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels.

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 20dB 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 20 dB bandwidth of the emission.

The spectrum analyzer is set to (Bluetooth):

Center frequency = the highest, middle and the lowest channels

Span = 5 MHz (approximately 2 or 3 times of the 20 dB bandwidth)

RBW = 30 kHz

Sweep = auto

VBW = 30 kHz (VBW  $\geq$  RBW)

Detector function = peak

Trace = max hold

#### Measurement Data :

| Frequency<br>(MHz) | Channel No. | Test Results(MHz) |
|--------------------|-------------|-------------------|
|                    |             | 20dB Bandwidth    |
| 2406               | 1           | 3.89              |
| 2442               | 10          | 3.81              |
| 2474               | 18          | 3.90              |

- See next pages for actual measured spectrum plots.

#### Minimum Standard:

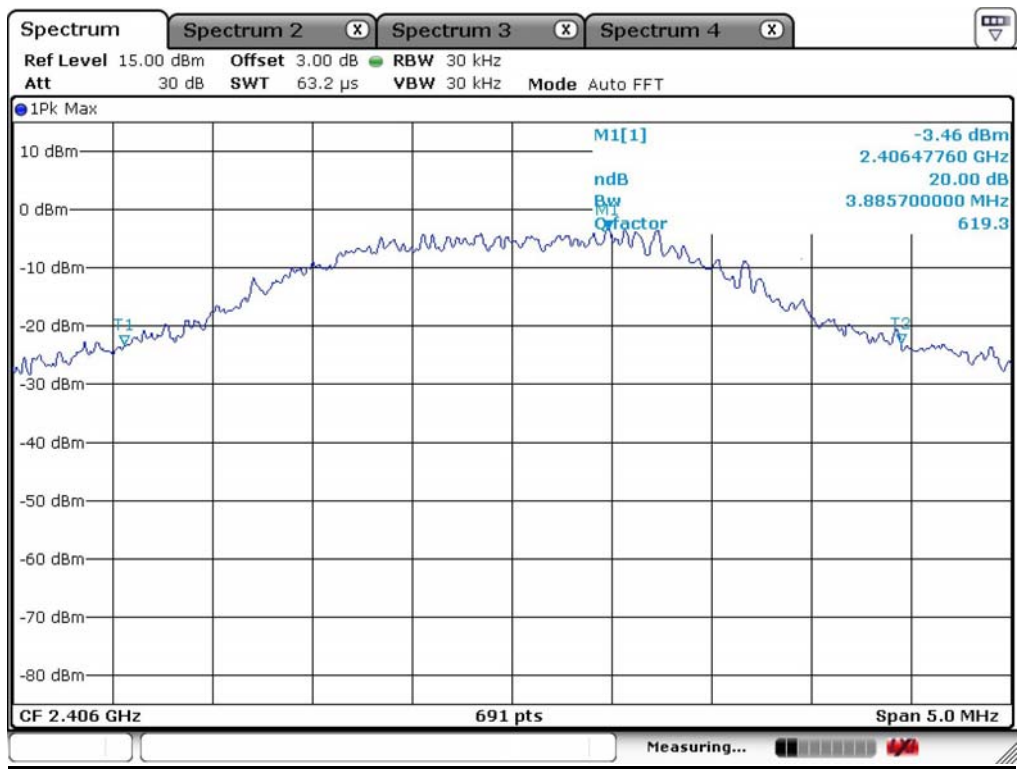
N/A

#### Measurement Setup

Same as the Chapter 3.3.1 (Figure 1)

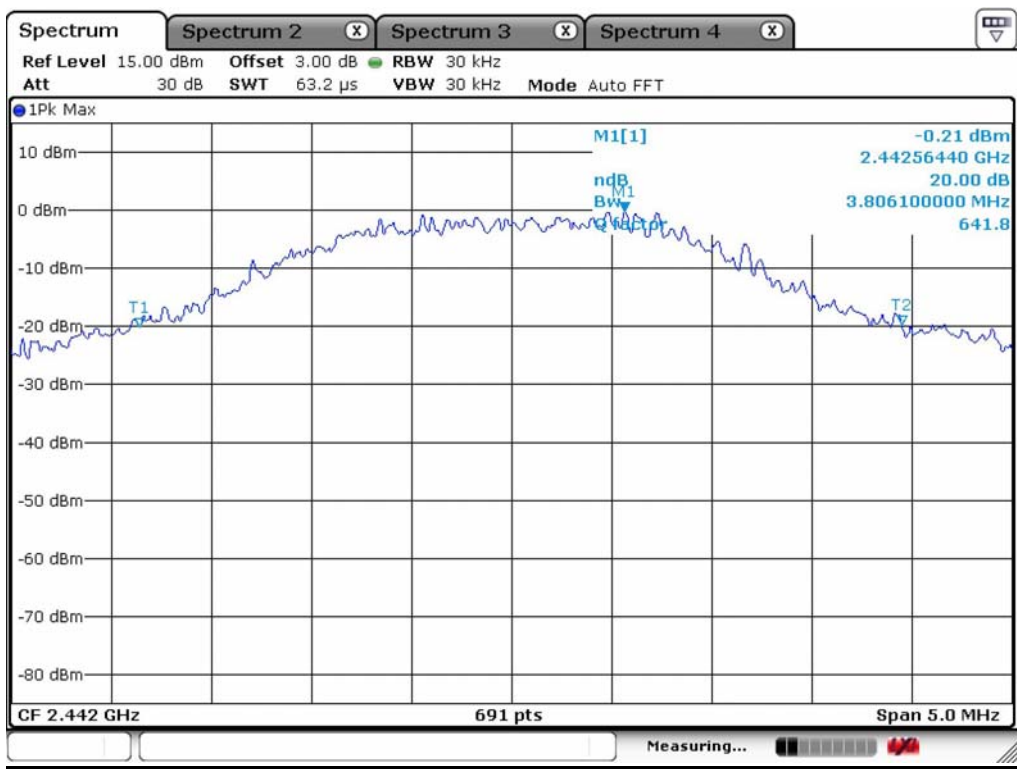
Channel 1 of basic mode

20 dB Bandwidth

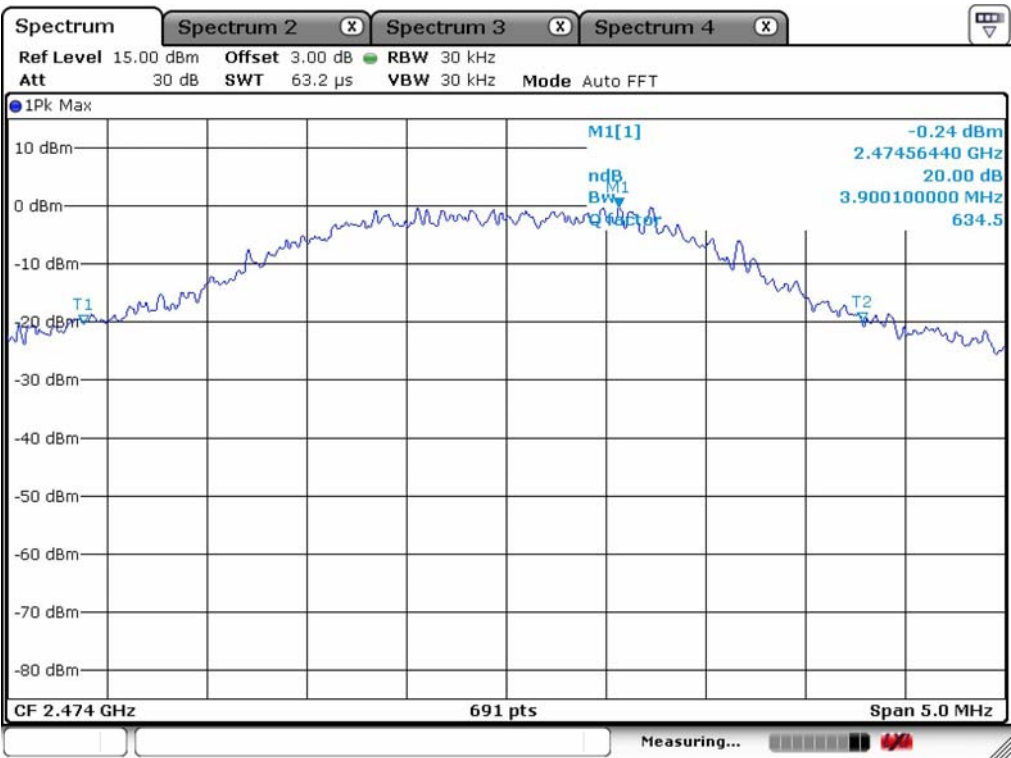


Channel 2 of basic mode

20 dB Bandwidth



**Channel 3 of basic mode**  
**20 dB Bandwidth**



### 3.3.4 Time of Occupancy (Dwell Time)

#### Procedure:

The test follows DA00-705. The dwell time was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

The spectrum analyzer is set to :

Center frequency = 2438 MHz

Span = zero

RBW = 1 MHz

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

Trace = single sweep

Detector function = peak

#### Measurement Data:

| Number of transmission in a<br>7.2s ( 18 Hopping*0.4) | Length of Transmission<br>Time (msec) | Result<br>(msec) | Limit<br>(msec) |
|-------------------------------------------------------|---------------------------------------|------------------|-----------------|
| (Times / 7.2sec) = 41                                 | 0.196                                 | 8.036            | 400             |

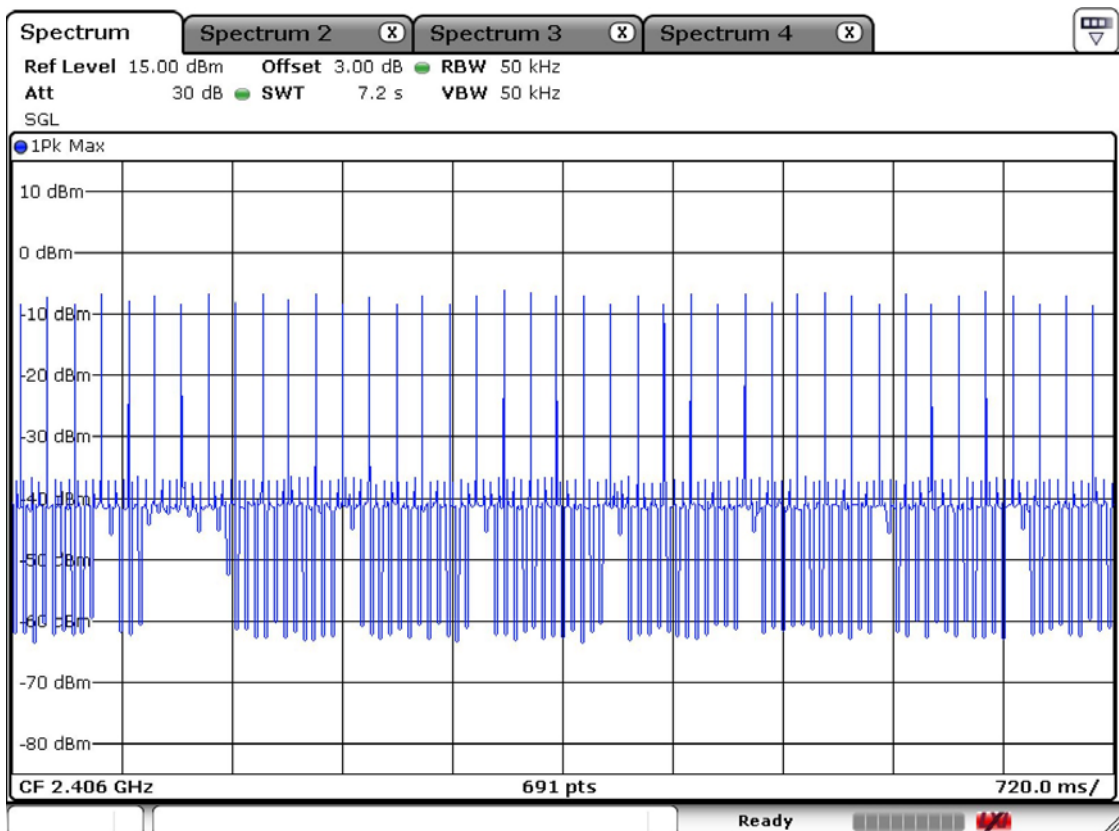
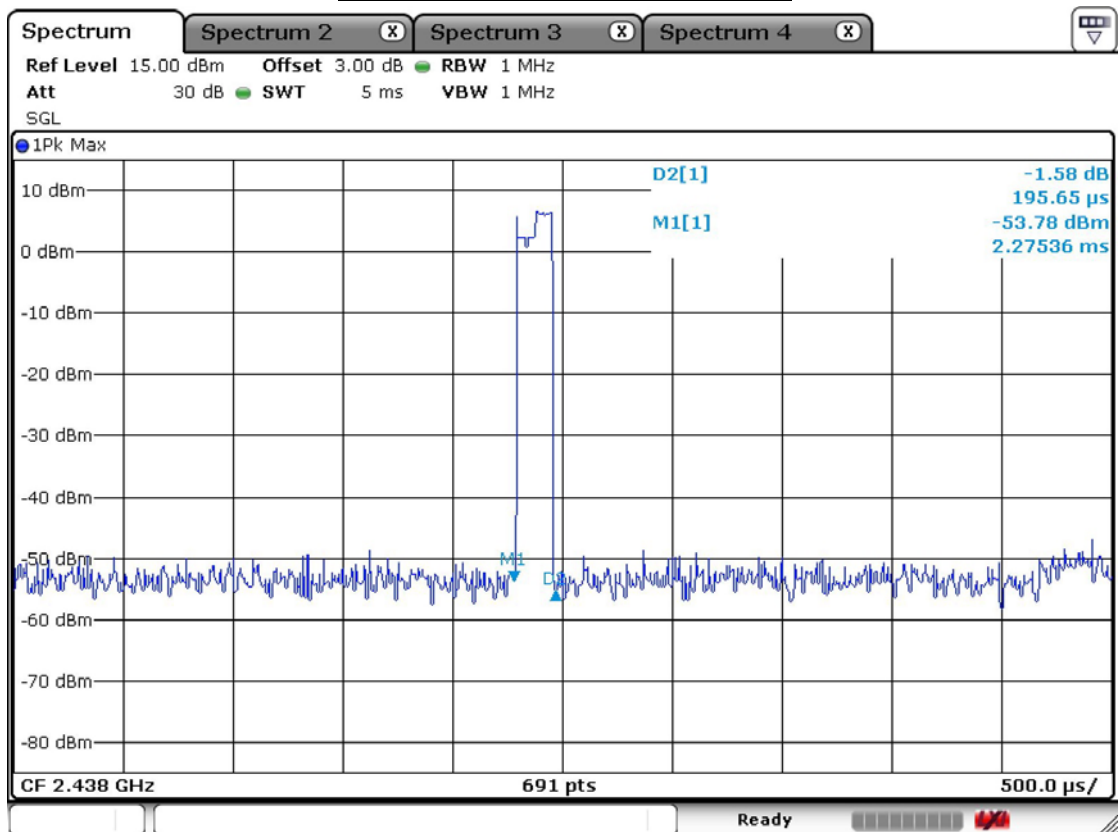
- See next pages for actual measured spectrum plots.
- dwell time = {(number of hopping per second / number of slot ) x duration time per channel} x 0.4 ms

#### Minimum Standard:

0.4 seconds within a 30 second period per any frequency

#### Measurement Setup

Same as the Chapter 3.3.1 (Figure 1)

**Time of Occupancy for PACKET**

### 3.3.5 Transmitter Output Power

#### Procedure:

The test follows DA00-705. The peak output power was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels..

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.

#### The spectrum analyzer is set to :

Center frequency = the highest, middle and the lowest channels

Span = 10 MHz (approximately 5 times of the 20 dB bandwidth)

RBW = 3 MHz (greater than the 20dB bandwidth of the emission being measured)

VBW = 3 MHz (VBW  $\geq$  RBW)

Detector function = peak

Trace = max hold

Sweep = auto

#### Measurement Data :

| Frequency (MHz) | Ch. | Test Results |      |          |
|-----------------|-----|--------------|------|----------|
|                 |     | dBm          | mW   | Result   |
| 2406            | 1   | 4.60         | 2.88 | Complies |
| 2442            | 10  | 7.49         | 5.61 | Complies |
| 2474            | 18  | 8.27         | 6.71 | Complies |

- See next pages for actual measured spectrum plots.

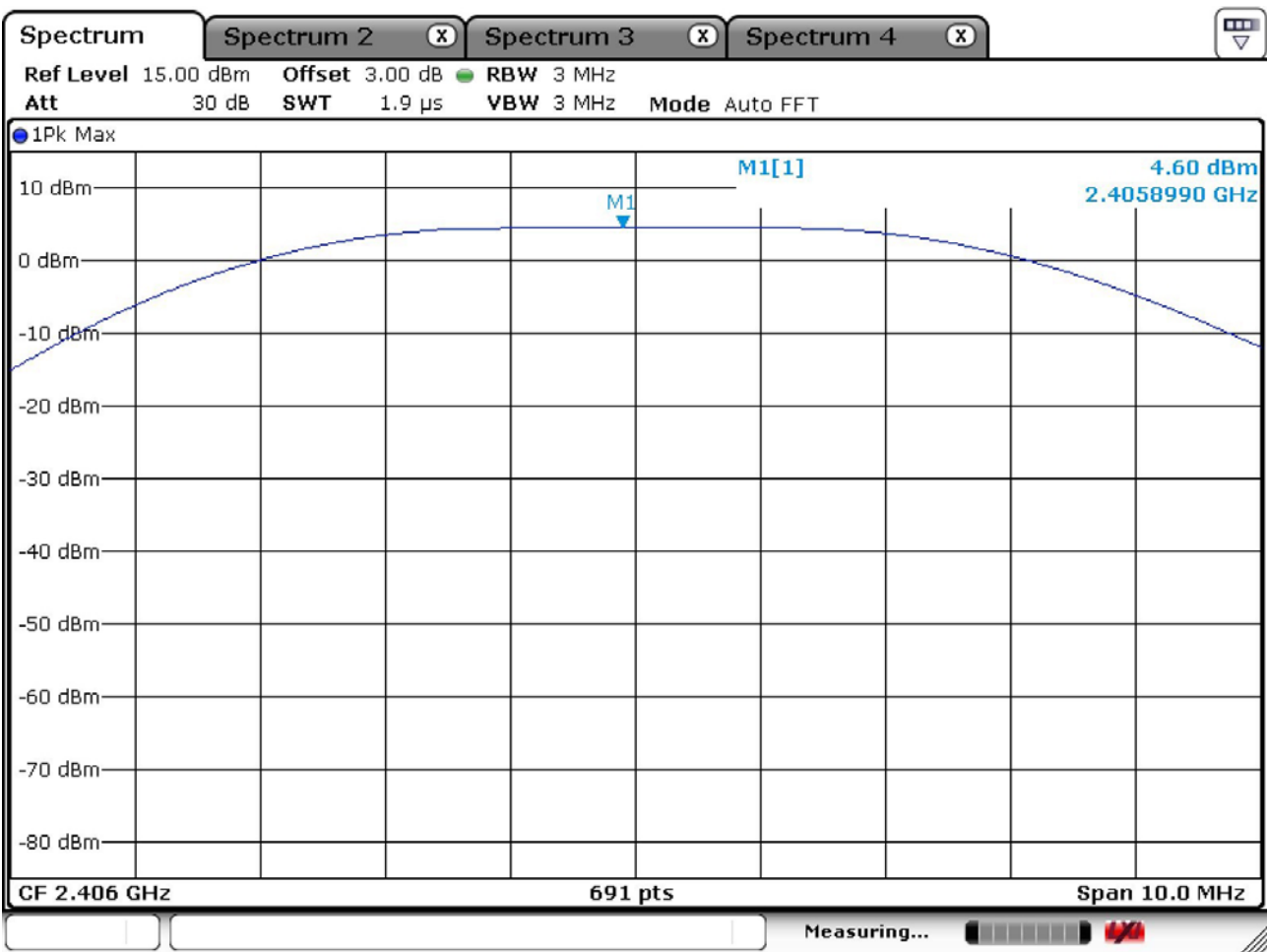
|                   |          |
|-------------------|----------|
| Minimum Standard: | < 250 mW |
|-------------------|----------|

#### Measurement Setup

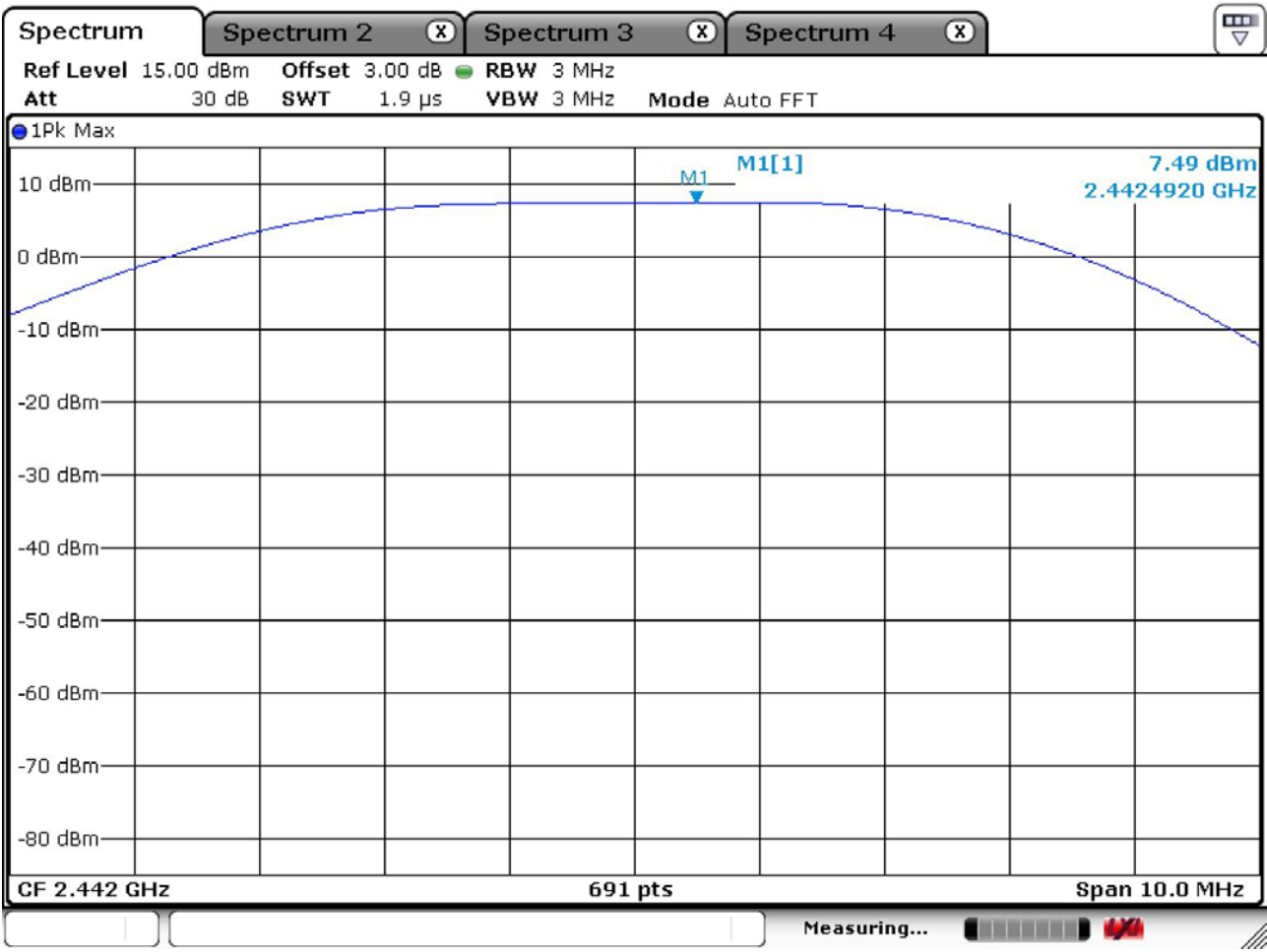
Same as the Chapter 3.3.1 (Figure 1)



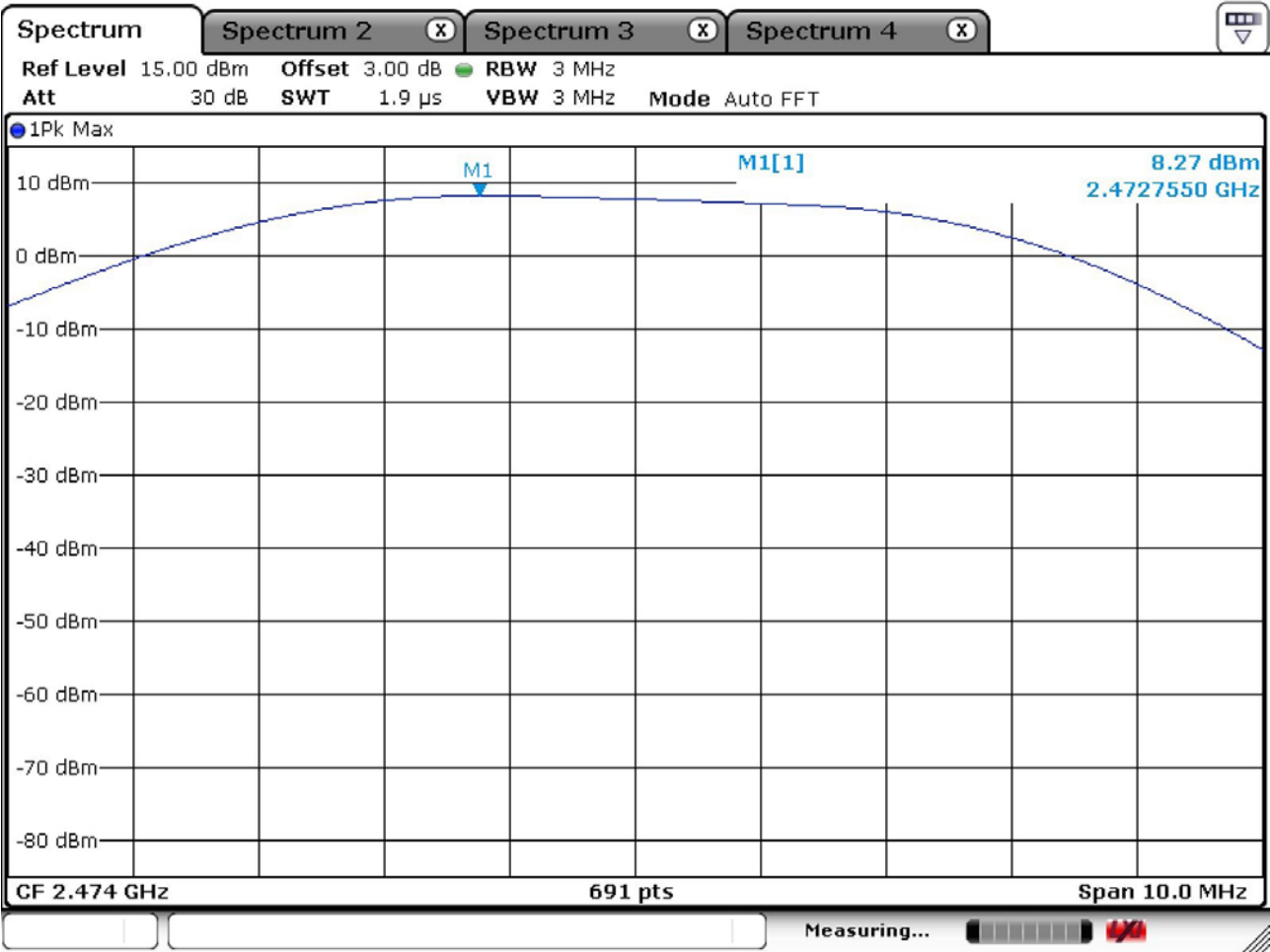
Channel 1



Channel 2



Channel 3



### 3.3.6 Band Edge

#### 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 had its hopping function disabled at the highest, middle and the lowest available channels.

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 = 30-50 MHz

Detector function = peak

Trace = max hold

Sweep = auto

#### Measurement Data: **Complies**

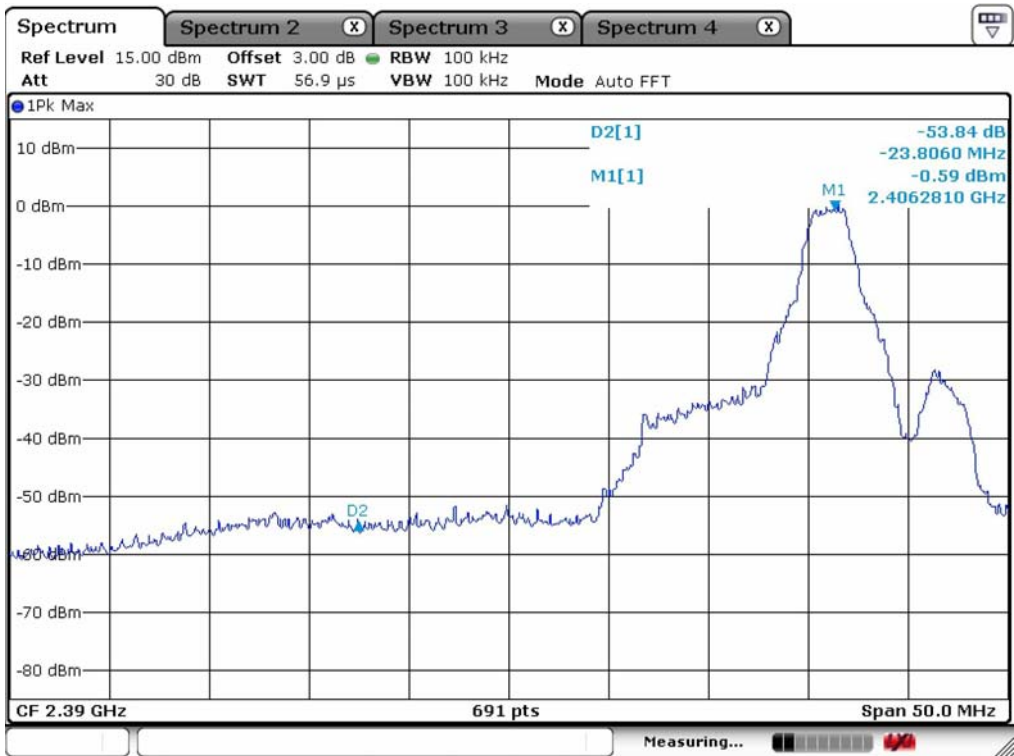
- All conducted emission in any 100kHz bandwidth outside of the spread spectrum band was at least 20dB lower than the highest inband spectral density. Therefore the applying equipment meets the requirement.
- See next pages for actual measured spectrum plots.

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

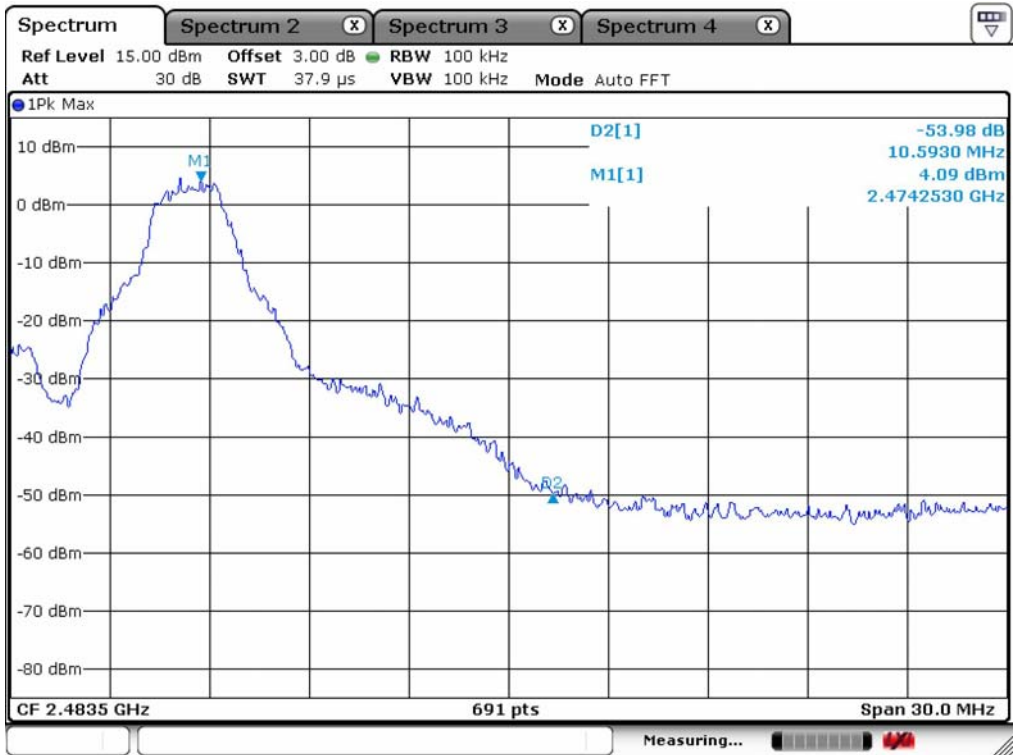
#### Measurement Setup

Same as the Chapter 3.3.1 (Figure 1)

**Band – edge**  
**Lower edge**



**Upper edge**



**Radiated Band-edges in the restricted band 2310-2390 MHz measurement**

| Frequency<br><br>[MHz] | Reading<br>[dBuV / m] |      | Pol. | Correction<br><br>Factor |                           | Limits<br>[dBuV / m] |           | Result<br>[dBuV / m] |           | Margin<br>[dB] |      |
|------------------------|-----------------------|------|------|--------------------------|---------------------------|----------------------|-----------|----------------------|-----------|----------------|------|
|                        | AV / Peak             |      |      | Antenna                  | Amp. Gain<br>+ Cable Loss | AV / Peak            | AV / Peak | AV / Peak            | AV / Peak |                |      |
|                        |                       |      |      |                          |                           |                      |           |                      |           |                |      |
| 2385.9                 | 55.7                  | 68.4 | V    | 27.9                     | 33.4                      | 54.0                 | 74.0      | 50.2                 | 62.9      | 3.8            | 11.1 |

**Radiated Band-edges in the restricted band 2483.5-2500 MHz measurement**

| Frequency<br><br>[MHz] | Reading<br>[dBuV / m] |      | Pol. | Correction<br>Factor |                           | Limits<br>[dBuV / m] |           | Result<br>[dBuV / m] |           | Margin<br>[dB] |      |
|------------------------|-----------------------|------|------|----------------------|---------------------------|----------------------|-----------|----------------------|-----------|----------------|------|
|                        | AV / Peak             |      |      | Antenna              | Amp. Gain<br>+ Cable Loss | AV / Peak            | AV / Peak | AV / Peak            | AV / Peak |                |      |
| 2493.2                 | 50.3                  | 64.5 | V    | 27.9                 | 33.4                      | 54.0                 | 74.0      | 44.8                 | 59.0      | 9.2            | 15.0 |

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

### 3.3.7 Conducted Spurious Emissions

**Procedure:**

The test follows DA00-705. The conducted spurious emissions were measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels..

After the trace being stable, set the marker on the peak of any spurious emission recorded.

The spectrum analyzer is set to:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions

RBW = 100 kHz

Sweep = auto

VBW = 100 kHz

Detector function = peak

Trace = max hold

**Measurement Data: Complies**

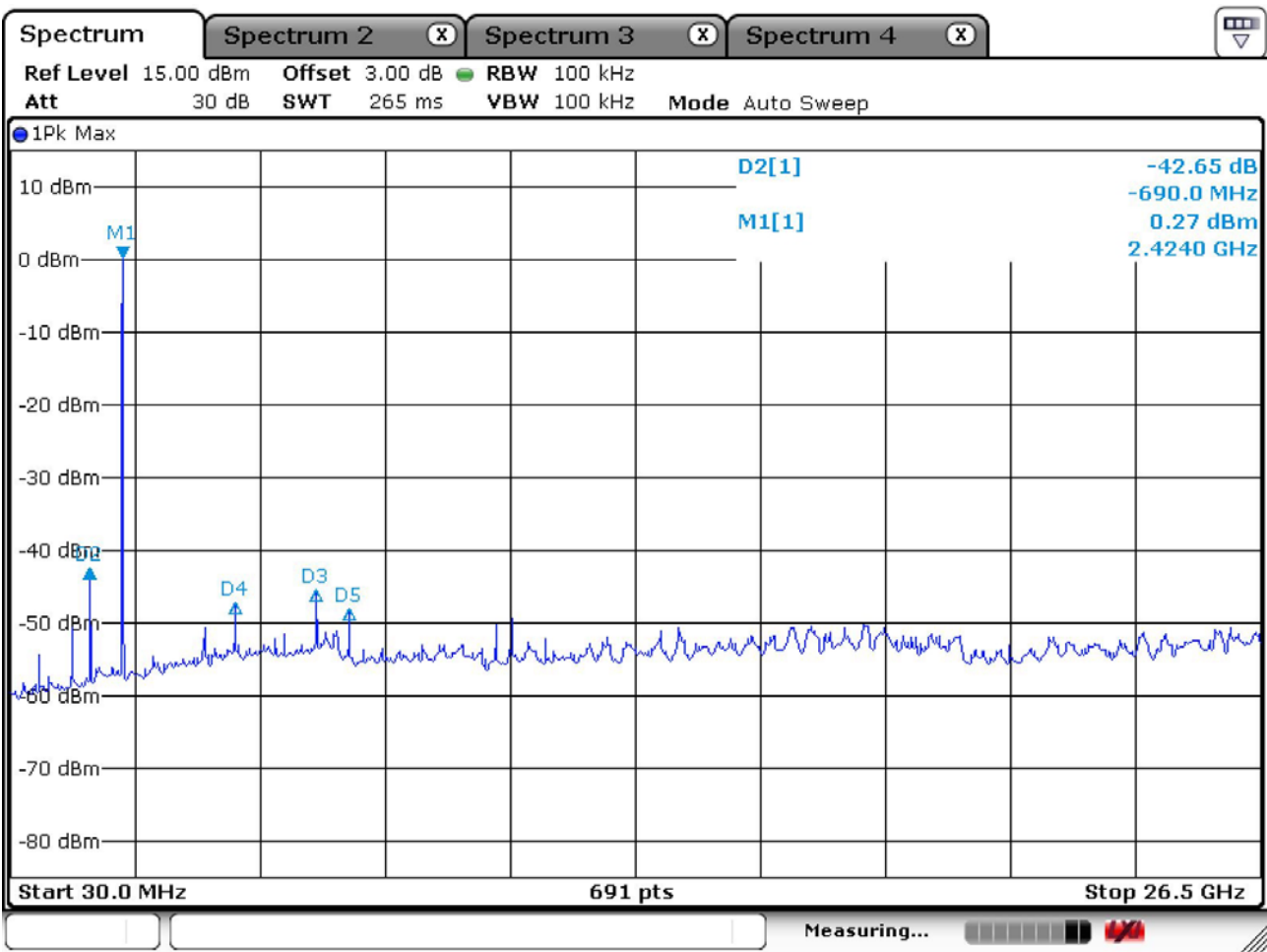
- All conducted emission in any 100kHz bandwidth outside of the spread spectrum band was at least 20dB lower than the highest inband spectral density. Therefore the applying equipment meets the requirement.
- See next pages for actual measured spectrum plots.

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

**Measurement Setup**

Same as the Chapter 3.3.1 (Figure 1)

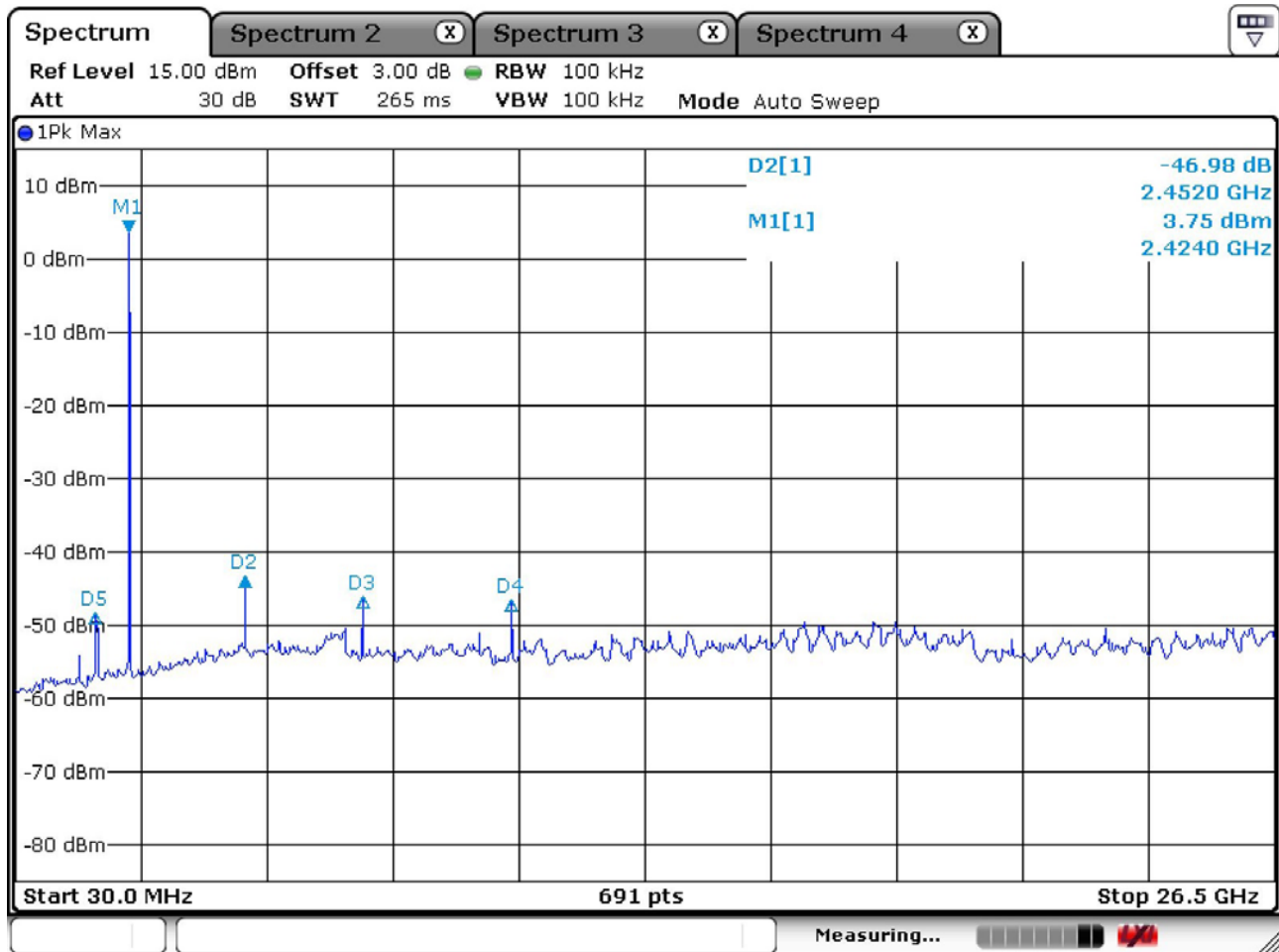
**Unwanted Emission – Low channel**  
**Frequency Range = 30 MHz ~ 26.5 GHz**



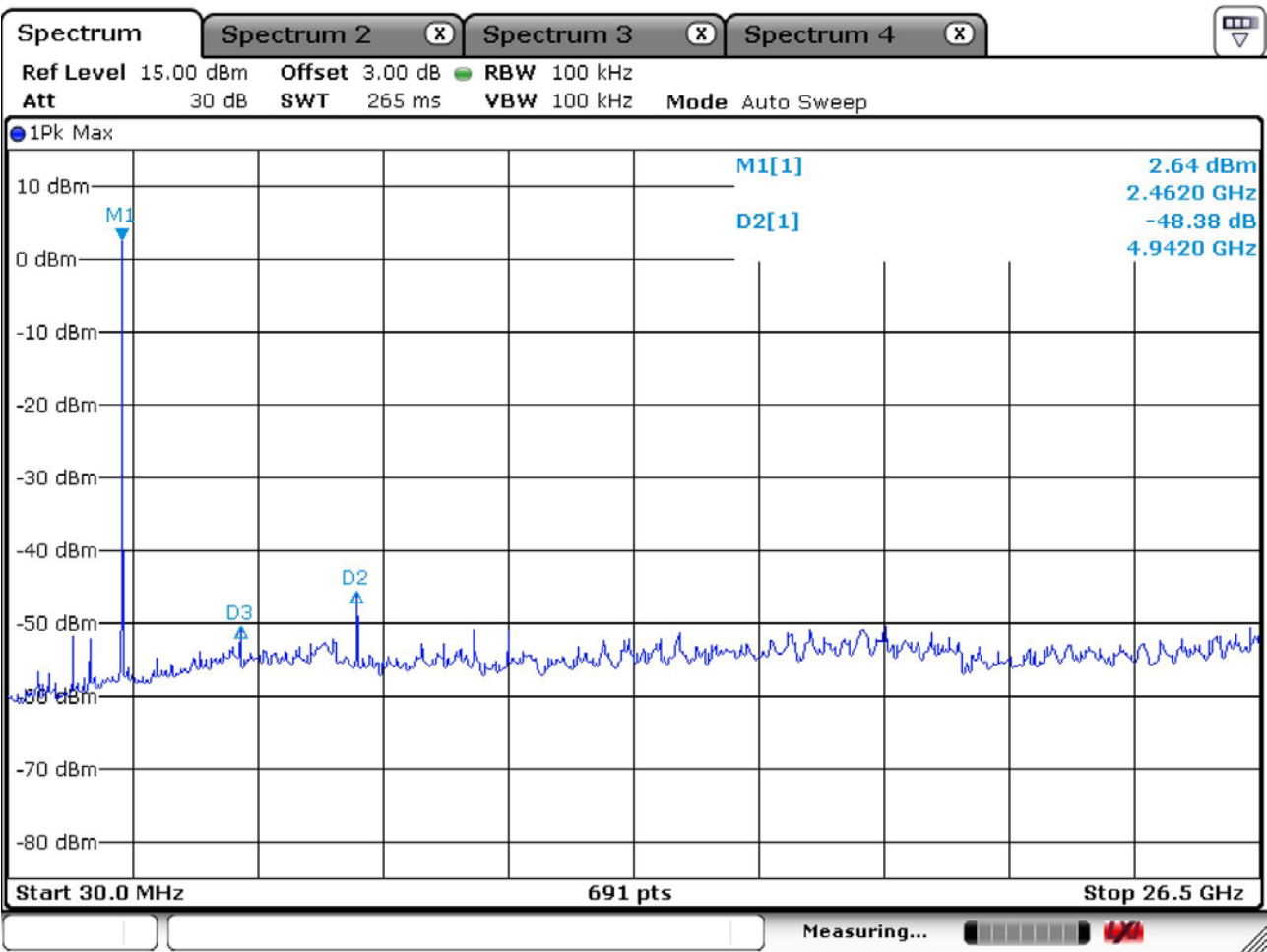


### Unwanted Emission – Middle channel

Frequency Range = 30 MHz ~ 26.5 GHz



**Unwanted Emission – High channel**  
**Frequency Range = 30 MHz ~ 26.5 GHz**



### 3.3.8 Field Strength of Harmonics

#### Procedure:

Radiated emissions from the EUT were measured according to the dictates of DA000705. 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.

- In the frequency range of 9kHz to 30 MHz, magnetic field is measured with Loop Test Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
- In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is carried from 1m to 4m above the ground to determine the maximum value of the field strength. The emission levels at both horizontal and vertical polarizations should be tested.

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 )

Span = 100 MHz

Trace = max hold

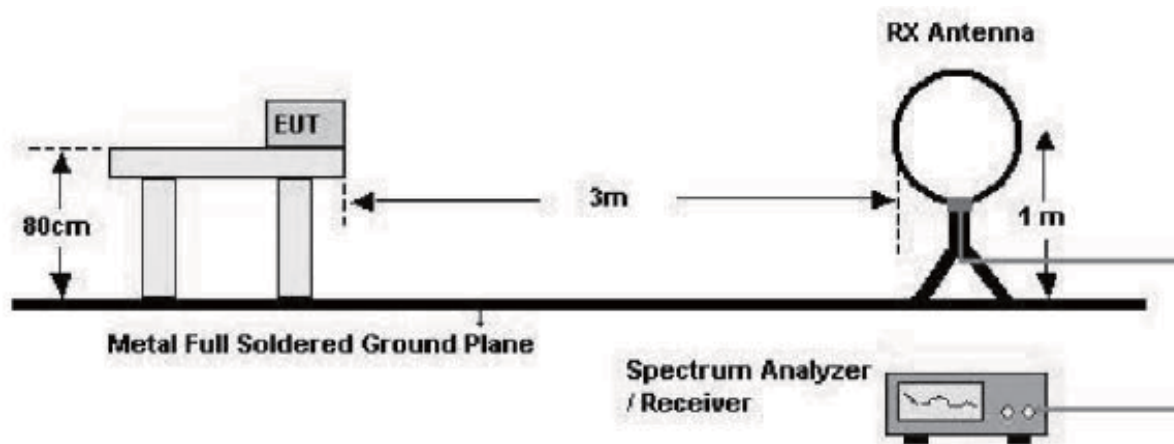
Peak: VBW  $\geq$  RBW

Average: VBW=10Hz

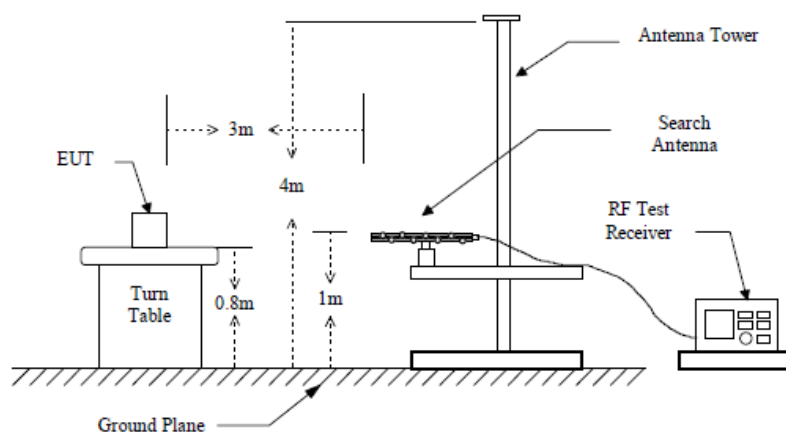
Detector function = peak

Sweep = auto

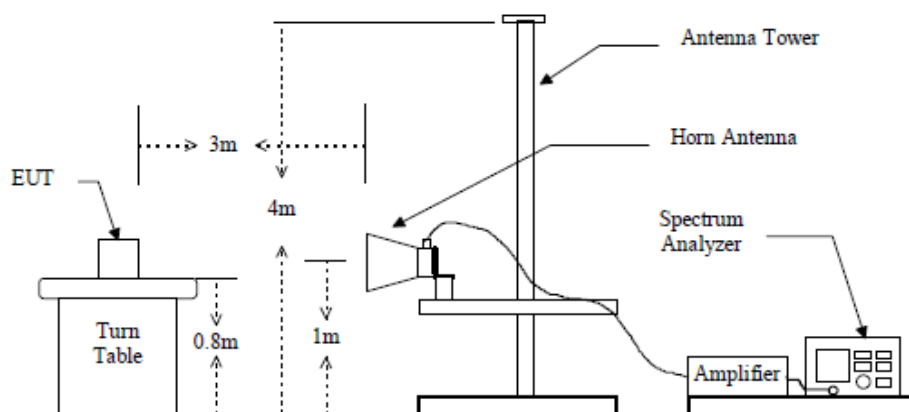
**below 30MHz**



below 1GHz (30MHz to 1GHz)



above 1GHz



#### Measurement Data: Complies

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

#### 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 :

| Frequency<br>[MHz] | Reading<br>[dBuV / m]<br>AV / Peak |      | Pol. | Correction<br>Factor |                | Limits<br>[dBuV / m]<br>AV / Peak |      | Result<br>[dBuV / m]<br>AV / Peak |      | Margin<br>[dB]<br>AV / Peak |      |
|--------------------|------------------------------------|------|------|----------------------|----------------|-----------------------------------|------|-----------------------------------|------|-----------------------------|------|
|                    |                                    |      |      | Antenna              | Amp.Gain+Cable |                                   |      |                                   |      |                             |      |
| 4805.8             | 49.1                               | 57   | V    | 25.1                 | 33.7           | 54.0                              | 74.0 | 40.5                              | 48.4 | 13.5                        | 25.6 |
| Frequency<br>[MHz] | Reading<br>[dBuV / m]<br>AV / Peak |      | Pol. | Correction<br>Factor |                | Limits<br>[dBuV / m]<br>AV / Peak |      | Result<br>[dBuV / m]<br>AV / Peak |      | Margin<br>[dB]<br>AV / Peak |      |
|                    |                                    |      |      | Antenna              | Amp.Gain+Cable |                                   |      |                                   |      |                             |      |
| 4883.3             | 51.3                               | 60.5 | V    | 25.1                 | 33.7           | 54.0                              | 74.0 | 42.7                              | 51.9 | 11.3                        | 22.1 |
| Frequency<br>[MHz] | Reading<br>[dBuV / m]<br>AV / Peak |      | Pol. | Correction<br>Factor |                | Limits<br>[dBuV / m]<br>AV / Peak |      | Result<br>[dBuV / m]<br>AV / Peak |      | Margin<br>[dB]<br>AV / Peak |      |
|                    |                                    |      |      | Antenna              | Amp.Gain+Cable |                                   |      |                                   |      |                             |      |
| 4952.4             | 52.5                               | 62.9 | V    | 25.1                 | 33.7           | 54.0                              | 74.0 | 43.9                              | 54.3 | 10.1                        | 19.7 |

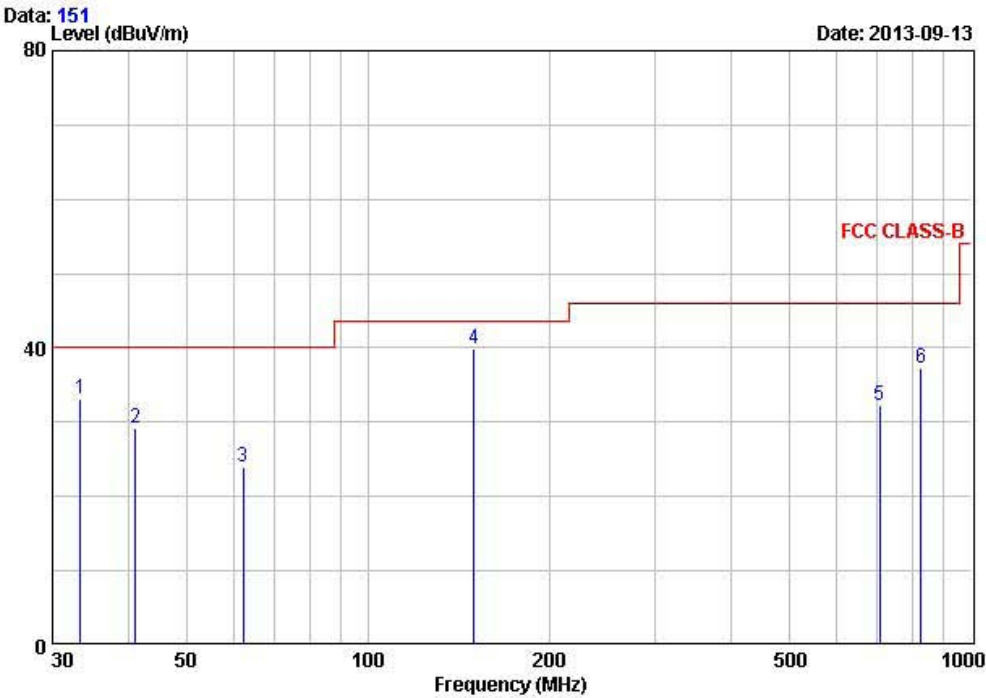
- No other emissions were detected at a level greater than 20dB below limit.

Radiated Emissions – Play mode



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Gyeonggi-do 449-822 Korea  
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EUT/Model No.: ET28KH                      TEST MODE: Play mode  
Temp Humi : 25 / 55                      Tested by: PARK H W



|   | Freq   | Reading | C.F    | Result | Limit | Margin | Height | Angle | Polarity   |
|---|--------|---------|--------|--------|-------|--------|--------|-------|------------|
|   | MHz    | dBuV/m  | dB/m   | dBuV/m | QP    | dB     | cm     | deg   |            |
| 1 | 33.40  | 50.40   | -17.18 | 33.22  | 40.00 | 6.78   | 100    | 21    | VERTICAL   |
| 2 | 41.20  | 45.50   | -16.31 | 29.19  | 40.00 | 10.81  | 100    | 69    | VERTICAL   |
| 3 | 62.10  | 40.70   | -16.74 | 23.96  | 40.00 | 16.04  | 245    | 44    | VERTICAL   |
| 4 | 150.01 | 54.10   | -14.27 | 39.83  | 43.50 | 3.67   | 100    | 342   | VERTICAL   |
| 5 | 706.70 | 36.50   | -4.32  | 32.18  | 46.00 | 13.82  | 100    | 64    | HORIZONTAL |
| 6 | 827.40 | 39.20   | -1.90  | 37.30  | 46.00 | 8.70   | 100    | 188   | HORIZONTAL |

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

**Radiated Emissions – Wireless mode**

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EUT/Model No.: ET28KH

TEST MODE: Wireless mode

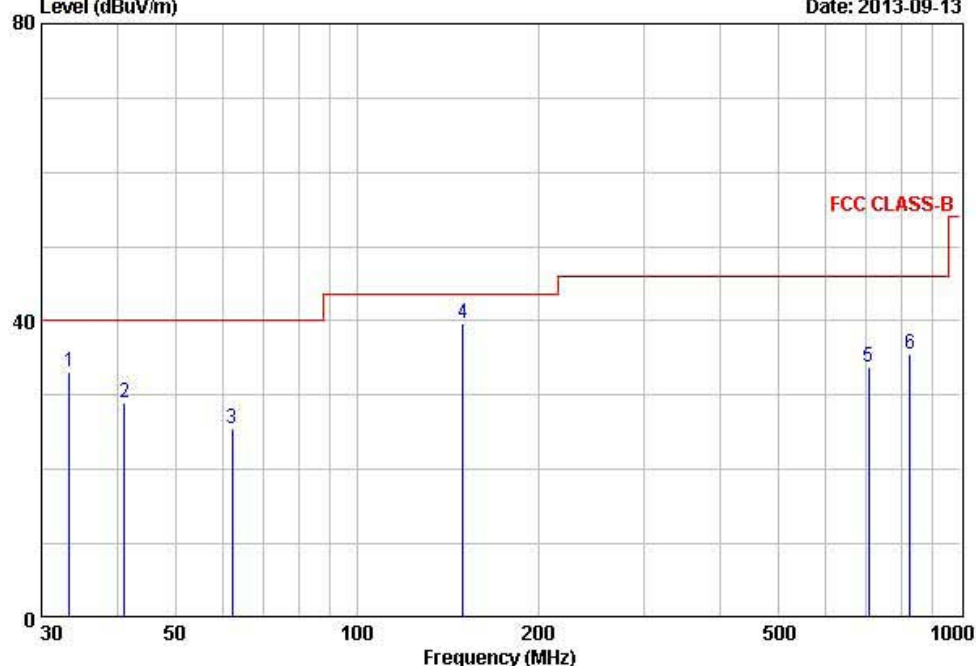
Temp Humi : 25 / 55

Tested by: PARK H W

Data: 152

Level (dBuV/m)

Date: 2013-09-13



|   | Freq   | Reading | C.F    | Result | Limit | Margin | Height | Angle | Polarity   |
|---|--------|---------|--------|--------|-------|--------|--------|-------|------------|
|   | MHz    | dBuV/m  | dB/m   | dBuV/m | QP    | dB     | cm     | deg   |            |
| 1 | 33.40  | 50.40   | -17.18 | 33.22  | 40.00 | 6.78   | 100    | 21    | VERTICAL   |
| 2 | 41.20  | 45.40   | -16.31 | 29.09  | 40.00 | 10.91  | 100    | 100   | VERTICAL   |
| 3 | 62.10  | 42.20   | -16.74 | 25.46  | 40.00 | 14.54  | 336    | 140   | VERTICAL   |
| 4 | 150.01 | 54.00   | -14.27 | 39.73  | 43.50 | 3.77   | 100    | 342   | VERTICAL   |
| 5 | 706.20 | 38.10   | -4.33  | 33.77  | 46.00 | 12.23  | 100    | 99    | HORIZONTAL |
| 6 | 827.50 | 37.50   | -1.90  | 35.60  | 46.00 | 10.40  | 100    | 10    | HORIZONTAL |

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

### 3.3.9 AC Conducted Emissions

**Procedure:**

AC power line conducted emissions from the EUT were measured according to the dictates of ANSI C63.4:2003.

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**

- Refer to the next page.
- No other emissions were detected at a level greater than 20dB below limit
- It gave the worse case emissions

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

| Frequency Range<br>(MHz) | Conducted Limit (dBuV) |            |
|--------------------------|------------------------|------------|
|                          | Quasi-Peak             | Average    |
| 0.15 ~ 0.5               | 66 to 56 *             | 56 to 46 * |
| 0.5 ~ 5                  | 56                     | 46         |
| 5 ~ 30                   | 60                     | 50         |

\* Note: The limits will decrease with the frequency logarithmically within 0.15MHz to 0.5MHz

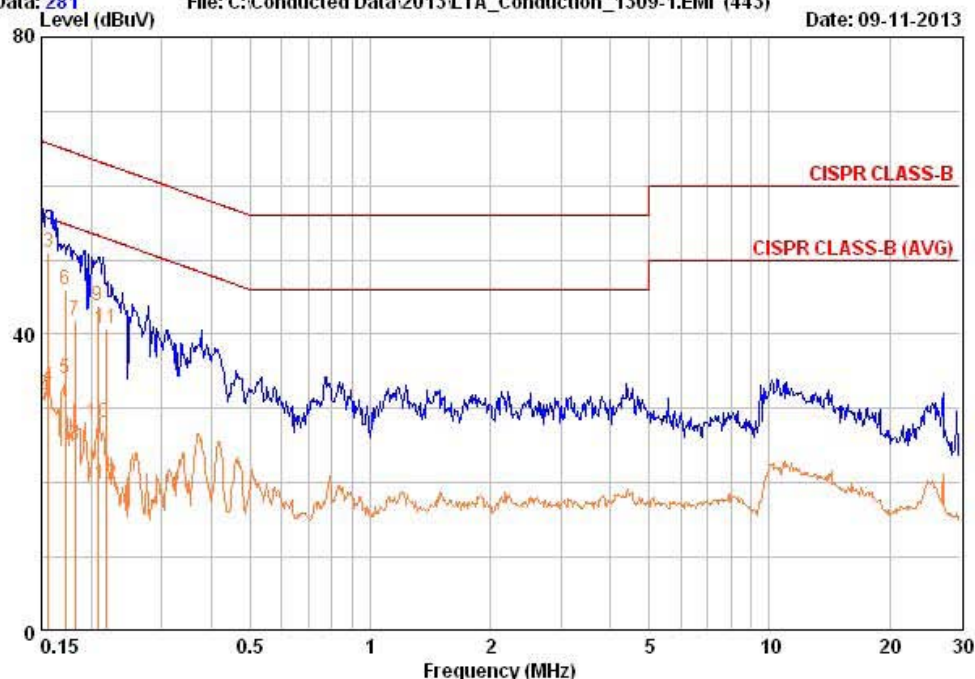


**Radiated Emissions –Play mode - LINE**

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Fax:+82-31-3236010

|                   |           |                 |          |
|-------------------|-----------|-----------------|----------|
| EUT / Model No. : | ET28KH    | Phase :         | LINE     |
| Test Mode :       | Play mode | Test Power :    | 120 / 60 |
| Temp./Humi. :     | 25 / 57   | Test Engineer : | PARK H W |

Data: 281 File: C:\Conducted Data\2013\LTA\_Conduction\_1309-1.EMI (443) Date: 09-11-2013



| Freq  | RD    | RD    | C.F  | Result | Result | Limit | Limit | Margin | Margin |
|-------|-------|-------|------|--------|--------|-------|-------|--------|--------|
| MHz   | QP    | AV    |      | QP     | AV     | QP    | AV    | QP     | AV     |
|       | dBuV  | dBuV  | dB   | dBuV   | dBuV   | dBuV  | dBuV  | dB     | dB     |
| 0.150 | 40.14 | 22.24 | 9.58 | 49.72  | 31.82  | 66.00 | 56.00 | 16.28  | 24.18  |
| 0.156 | 41.44 | 23.34 | 9.58 | 51.02  | 32.92  | 65.67 | 55.67 | 14.65  | 22.75  |
| 0.172 | 36.44 | 24.44 | 9.58 | 46.02  | 34.02  | 64.86 | 54.86 | 18.84  | 20.84  |
| 0.182 | 32.25 | 15.45 | 9.58 | 41.83  | 25.03  | 64.39 | 54.39 | 22.57  | 29.37  |
| 0.208 | 34.25 | 18.45 | 9.58 | 43.83  | 28.03  | 63.28 | 53.28 | 19.45  | 25.25  |
| 0.218 | 31.25 | 10.25 | 9.58 | 40.83  | 19.83  | 62.89 | 52.89 | 22.06  | 33.06  |

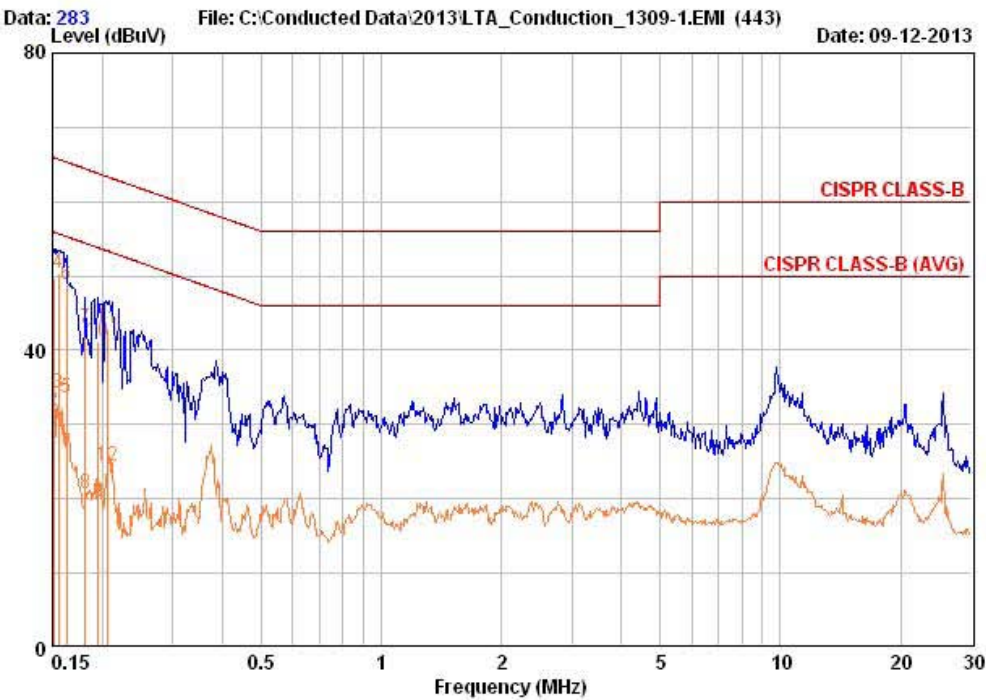
Remarks: C.F (Correction Factor) = Insertion loss + Cable loss

Radiated Emissions – Play mode - NEUTRAL



243 Jubug-ri, yangji-Myeon, Youngin-si,  
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Fax:+82-31-3236010

|                   |             |               |            |
|-------------------|-------------|---------------|------------|
| EUT / Model No. : | ET28KH      | Phase         | : NEUTRAL  |
| Test Mode         | : Play mode | Test Power    | : 120 / 60 |
| Temp./Humi.       | : 25 / 57   | Test Engineer | : PARK H W |



| Freq  | RD    | RD    | C.F  | Result | Result | Limit | Limit | Margin | Margin |
|-------|-------|-------|------|--------|--------|-------|-------|--------|--------|
| MHz   | QP    | AV    |      | QP     | AV     | QP    | AV    | QP     | AV     |
|       | dBuV  | dBuV  | dB   | dBuV   | dBuV   | dBuV  | dBuV  | dB     | dB     |
| 0.151 | 40.14 | 22.24 | 9.62 | 49.76  | 31.86  | 65.94 | 55.94 | 16.19  | 24.09  |
| 0.155 | 40.84 | 24.54 | 9.62 | 50.46  | 34.16  | 65.73 | 55.73 | 15.27  | 21.57  |
| 0.163 | 39.14 | 24.04 | 9.61 | 48.75  | 33.65  | 65.31 | 55.31 | 16.56  | 21.66  |
| 0.181 | 33.35 | 11.05 | 9.59 | 42.94  | 20.64  | 64.44 | 54.44 | 21.50  | 33.80  |
| 0.195 | 31.65 | 10.15 | 9.58 | 41.22  | 19.72  | 63.82 | 53.82 | 22.60  | 34.10  |
| 0.207 | 33.45 | 14.95 | 9.57 | 43.02  | 24.52  | 63.32 | 53.32 | 20.30  | 28.80  |

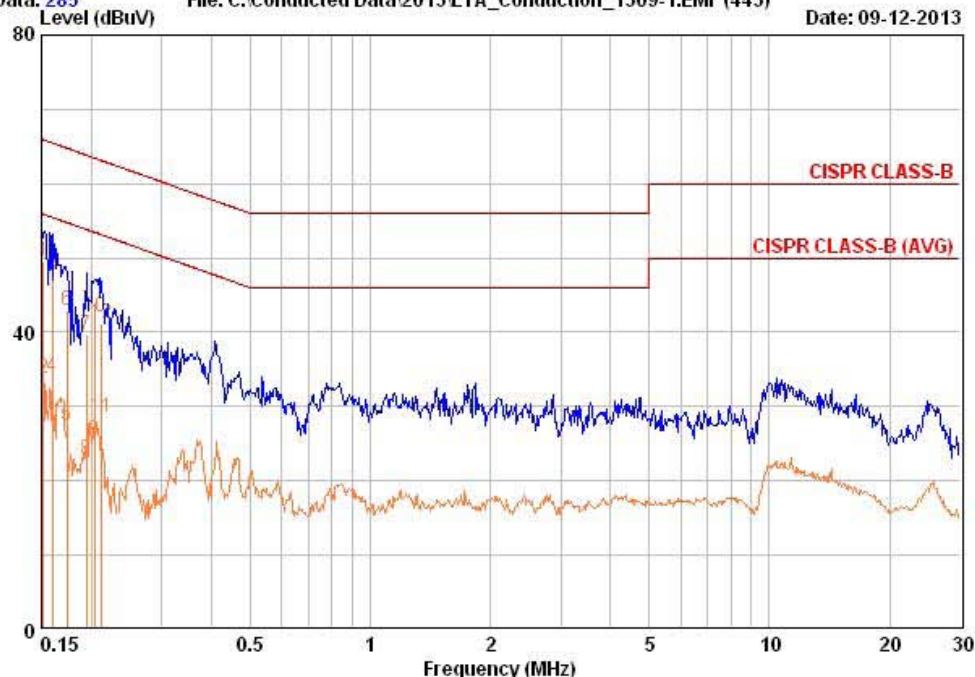
Remarks: C.F (Correction Factor) = Insertion loss + Cable loss

**Radiated Emissions –Wireless mode - LINE**

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Fax:+82-31-3236010

|                   |               |                 |          |
|-------------------|---------------|-----------------|----------|
| EUT / Model No. : | ET28KH        | Phase :         | LINE     |
| Test Mode :       | Wireless mode | Test Power :    | 120 / 60 |
| Temp./Humi. :     | 25 / 57       | Test Engineer : | PARK H W |

Data: 285 File: C:\Conducted Data\2013\LTA\_Conduction\_1309-1.EMI (443) Date: 09-12-2013



| 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     |
| 0.152 | 39.84 | 24.24 | 9.58 | 49.42  | 33.82  | 65.89 | 55.89 | 16.47  | 22.07  |
| 0.160 | 37.84 | 24.34 | 9.58 | 47.42  | 33.92  | 65.46 | 55.46 | 18.04  | 21.54  |
| 0.174 | 33.45 | 17.85 | 9.58 | 43.03  | 27.43  | 64.77 | 54.77 | 21.74  | 27.34  |
| 0.194 | 30.15 | 13.25 | 9.58 | 39.73  | 22.83  | 63.86 | 53.86 | 24.13  | 31.03  |
| 0.204 | 32.45 | 15.85 | 9.58 | 42.03  | 25.43  | 63.45 | 53.45 | 21.42  | 28.02  |
| 0.212 | 31.65 | 18.95 | 9.58 | 41.23  | 28.53  | 63.13 | 53.13 | 21.90  | 24.60  |

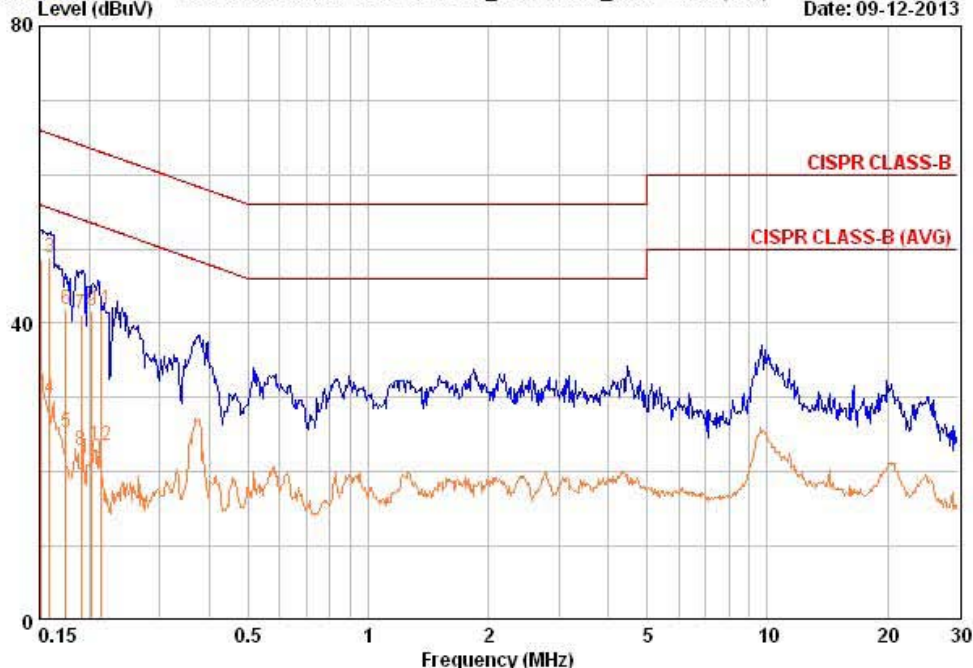
Remarks: C.F (Correction Factor) = Insertion loss + Cable loss

**Radiated Emissions – Wireless mode - NEUTRAL**

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Fax:+82-31-3236010

|                           |                          |
|---------------------------|--------------------------|
| EUT / Model No. : ET28KH  | Phase : NEUTRAL          |
| Test Mode : Wireless mode | Test Power : 120 / 60    |
| Temp./Humi. : 25 / 57     | Test Engineer : PARK H W |

Data: 287 File: C:\Conducted Data\2013\LTA\_Conduction\_1309-1.EMI (443) Date: 09-12-2013



| Freq  | RD    | RD    | C.F  | Result | Result | Limit | Limit | Margin | Margin |
|-------|-------|-------|------|--------|--------|-------|-------|--------|--------|
| MHz   | QP    | AV    |      | QP     | AV     | QP    | AV    | QP     | AV     |
|       | dBuV  | dBuV  | dB   | dBuV   | dBuV   | dBuV  | dBuV  | dB     | dB     |
| 0.151 | 39.04 | 20.24 | 9.62 | 48.66  | 29.86  | 65.94 | 55.94 | 17.29  | 26.09  |
| 0.159 | 39.24 | 20.24 | 9.61 | 48.85  | 29.85  | 65.52 | 55.52 | 16.66  | 25.66  |
| 0.175 | 32.25 | 15.65 | 9.59 | 41.84  | 25.24  | 64.72 | 54.72 | 22.88  | 29.48  |
| 0.191 | 31.65 | 13.25 | 9.58 | 41.23  | 22.83  | 63.99 | 53.99 | 22.76  | 31.16  |
| 0.203 | 32.05 | 12.25 | 9.57 | 41.62  | 21.82  | 63.49 | 53.49 | 21.87  | 31.67  |
| 0.213 | 32.35 | 14.05 | 9.57 | 41.92  | 23.62  | 63.09 | 53.09 | 21.17  | 29.47  |

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  | Signal Analyzer (9kHz~30GHz)         | FSV-30           | 100757      | R&S                    | 1 year   | 2013-01-15     |
| 2  | Spectrum Analyzer (9kHz~2.9GHz)      | 8594E            | 3649A03649  | HP                     | 2 year   | 2012-03-26     |
| 3  | Signal Generator (~3.2GHz)           | 8648C            | 3623A02597  | HP                     | 1 year   | 2013-03-25     |
| 4  | SYNTHESIZED CW GENERATOR             | 83711B           | US34490456  | HP                     | 1 year   | 2013-03-25     |
| 5  | Attenuator (3dB)                     | 8491A            | 37822       | HP                     | 2 year   | 2012-09-22     |
| 6  | Attenuator (10dB)                    | 8491A            | 63196       | HP                     | 2 year   | 2012-09-22     |
| 7  | Test Receiver (~30MHz)               | ESHS10           | 828404/009  | R&S                    | 1 year   | 2013-03-25     |
| 8  | EMI Test Receiver (~7GHz)            | ESCI7            | 100722      | R&S                    | 1 year   | 2013-09-16     |
| 9  | RF Amplifier (~1.3GHz)               | 8447D OPT 010    | 2944A07684  | HP                     | 1 year   | 2013-09-16     |
| 10 | RF Amplifier (1~26.5GHz)             | 8449B            | 3008A02126  | HP                     | 1 year   | 2013-03-25     |
| 11 | Horn Antenna (1~18GHz)               | 3115             | 00114105    | ETS                    | 2 year   | 2013-05-13     |
| 12 | DRG Horn (Small)                     | 3116B            | 81109       | ETS-Lindgren           | 2 year   | 2012-03-15     |
| 13 | DRG Horn (Small)                     | 3116B            | 133350      | ETS-Lindgren           | 2 year   | 2012-03-15     |
| 14 | TRILOG Antenna                       | VULB 9160        | 9160-3237   | SCHWARZBECK            | 2 year   | 2013-05-03     |
| 15 | Temp.Humidity Data Logger            | SK-L200TH II A   | 00801       | SATO                   | 1 year   | 2013-03-14     |
| 16 | Splitter (SMA)                       | ZFSC-2-2500      | SF617800326 | Mini-Circuits          | -        | -              |
| 17 | Power Divider                        | 11636A           | 06243       | HP                     | 2 year   | 2012-09-22     |
| 18 | DC Power Supply                      | 6674A            | 3637A01657  | Agilent                | -        | -              |
| 19 | Frequency Counter                    | 5342A            | 2826A12411  | HP                     | 1 year   | 2013-03-25     |
| 20 | Power Meter                          | EPM-441A         | GB32481702  | HP                     | 1 year   | 2013-03-25     |
| 21 | Power Sensor                         | 8481A            | US41030291  | HP                     | 1 year   | 2013-09-16     |
| 22 | Audio Analyzer                       | 8903B            | 3729A18901  | HP                     | 1 year   | 2013-09-16     |
| 23 | Modulation Analyzer                  | 8901B            | 3749A05878  | HP                     | 1 year   | 2013-09-16     |
| 24 | TEMP & HUMIDITY Chamber              | YJ-500           | LTAS06041   | JinYoung Tech          | 1 year   | 2013-09-16     |
| 25 | Stop Watch                           | HS-3             | 601Q09R     | CASIO                  | 1 year   | 2013-03-15     |
| 26 | LISN                                 | KNW-407          | 8-1430-1    | Kyoritsu               | 1 year   | 2013-09-16     |
| 27 | Two-Lime V-Network                   | ESH3-Z5          | 893045/017  | R&S                    | 1 year   | 2013-04-25     |
| 28 | UNIVERSAL RADIO COMMUNICATION TESTER | CMU200           | 106243      | R&S                    | 1 year   | 2013-07-25     |
| 29 | Highpass Filter                      | WHKX1.5/15G-10SS | 74          | Wainwright Instruments | -        | -              |
| 30 | Highpass Filter                      | WHKX3.0/18G-10SS | 118         | Wainwright Instruments | -        | -              |
| 31 | Active Loop Antenna                  | FMZB 1519        | 1519-031    | SCHWARZBECK            | 1 year   | 2012-12-14     |