

# *Certification of Compliance*

## CFR 47 Part 15 Subpart B, C

Order No. : SB-1108042  
Test Report No. : E11WD-160  
Applicant : BYUCKSAN POWER CO.,LTD.  
Address of Applicant : 197-21, Guro-dong, Guro-gu, Seoul, Korea

### Equipment Under Test (EUT)

Kind of Product : GATEWAY  
Model Name : DPG1000A  
FCC ID : Z3ODPG1000A  
Grantee Code : Z3O

Standards : FCC Part 15 Subpart B,C(Section 15.247):2009  
ANSI C63.4:2009

Date of Receipt : 09 August, 2011  
Date of Test : 09 August, 2011~ 30 September, 2011  
Date of Issue : 04 October, 2011

Test Result : ☒ Positive ☐ Negative



Byung Geol, Chu / Testing By Engineer



Chang Woo, Kim / General Manager

*In the configuration tested, the EUT complied with the standards specified above.*

### Remarks :

This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.  
This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

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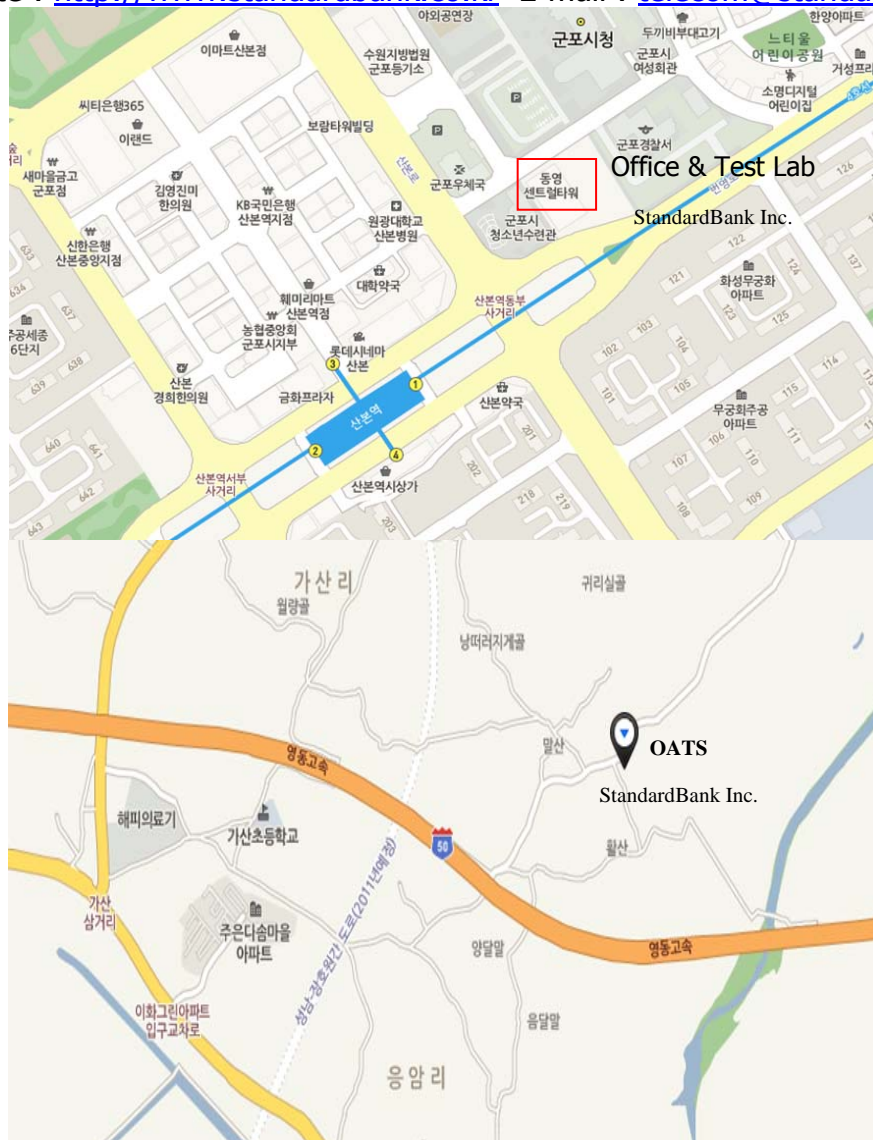
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## 1. General Information

### 1.1 Information of Test Laboratory.

FCC E-Filing : Registration Number:323115

Name	:	Standard Bank Inc.
Address Office & Test Lab	:	#507,508 Dongyoung Central Tower, 847-2 Keumjeong-dong, Kunpo City, Kyunggi-Do, Korea
OATS	:	#584 Sanghwal-Ri, Ganam-Mveon, Yeosu-Gun, Gyeonggi-Do Korea
Tel/Fax	:	+82-31-393-9394 / +82-31-393-9392

Web site : <http://www.standardbank.co.kr> E-mail : [telecom@standardbank.co.kr](mailto:telecom@standardbank.co.kr)


We , Standardbank Co.,Ltd. are an independent EMC and RF consultancy that was established the whole facility in our laboratories. The test facility has been accredited by the following accreditation Bodies in compliance with ISO 17025:

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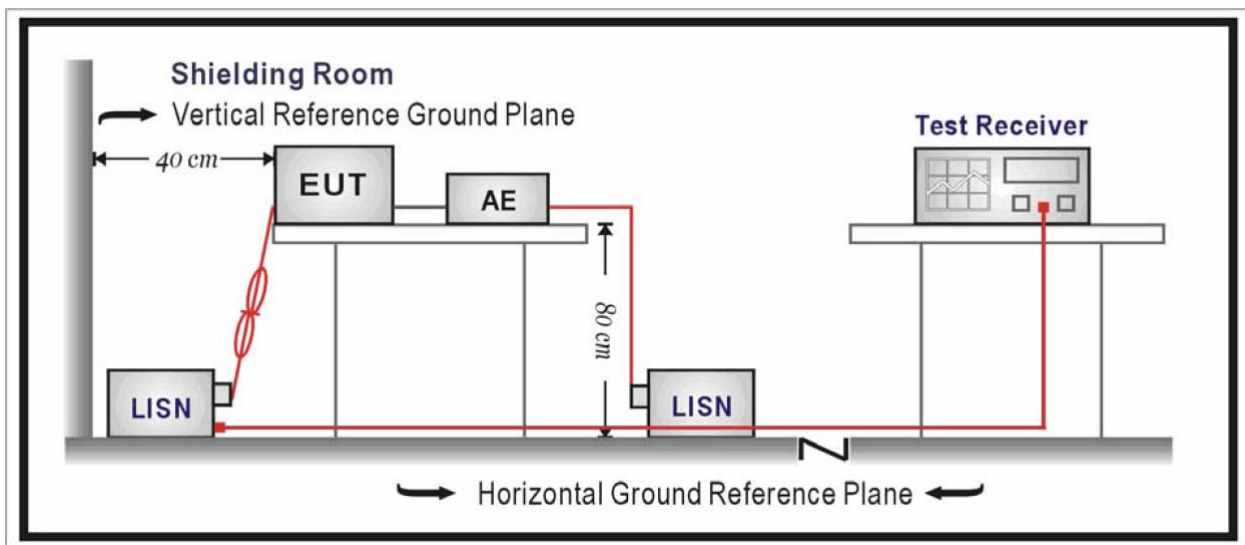
## 1.2 Description of Test

### Conducted Emissions:

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination.(Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed on conducted measurement.

Conducted emissions were measured over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.



### Limit Of Conducted Emission:

#### Test Specification

: According to FCC CFR Title 47 Part 15 Subpart B Section 15.109

According to FCC CFR Title 47 Part 15 Subpart B Section 15.207

FREQUENCY (MHz)	Limit	
	Quasi-peak	Average
0.15 to 0.5	66 to 56 *	56 to 46
0.5 to 5	56	46
5 to 30	60	50

\*Decrease with the logarithm of the frequency

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**Radiated Emissions:**

The measurement was performed over the frequency range of 30MHz to 1GHz using antenna as the input transducer to a Spectrum analyzer or a Field Intensity Meter. The measurement was made with the detector set for "quasi-peak" within a bandwidth of 120kHz.

Procedure of Test Preliminary measurements were made at 3 meter using bi-log antennas, and spectrum analyzer to determine the frequency producing the max. emission in anechoic chamber. Appropriate precaution was taken to ensure that all emission from the EUT were maximized and investigated. The system configuration, mode of operation, turn-table azimuth and height with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30MHz to 1000MHz using bi-log antenna. Above 1GHz, linearly polarized double ridge horn antennas were used. Final measurements were made at open site with 3-meters test distance using bi-log antenna or horn antenna. The OATS have been verified in regular for its normalized site attenuation. The test equipment was placed on a wooden table. Sufficient time for the EUT, peripheral equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined by manual. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 120kHz or 1MHz depending on the frequency of type of signal. The EUT, peripheral equipment and interconnecting cables were re-configured to the set-up producing the max. emission for the frequency and were placed on top of a 0.8-meter high nonmetallic 1 x 1.5 meter table. The EUT, peripheral equipment, and interconnecting cables were re-arranged and manipulated to maximize each emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation to the EUT and/or peripheral equipment and changing the polarity of the antenna, whichever determined the worst-case emission.(The bandwidth below 1GHz setting on the field strength meter is 120kHz and above 1GHz is 1MHz.)

**Radiated Emissions Test, 9 kHz to 30 MHz(Magnetic Field Test):**

1. The preliminary radiated measurements were performed to determine the frequency producing the maximum emissions at a distance of 3 meters according to Section 15.31(f)(2).
2. The EUT was placed on the top of the 0.8-meter height, 1 x 1.5 meter non-metallic table.
3. Emissions from the EUT are maximized by adjusting the orientation of the Loop antenna and rotating the EUT on the turntable. Manipulating the system cables also maximizes EUT emissions if applicable.
4. To obtain the final measurement data, each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector with specified bandwidth.

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## Limit Of Radiated Emission :

### Test Specification

: According to FCC CFR Title 47 Part 15 Subpart B Section 15.109

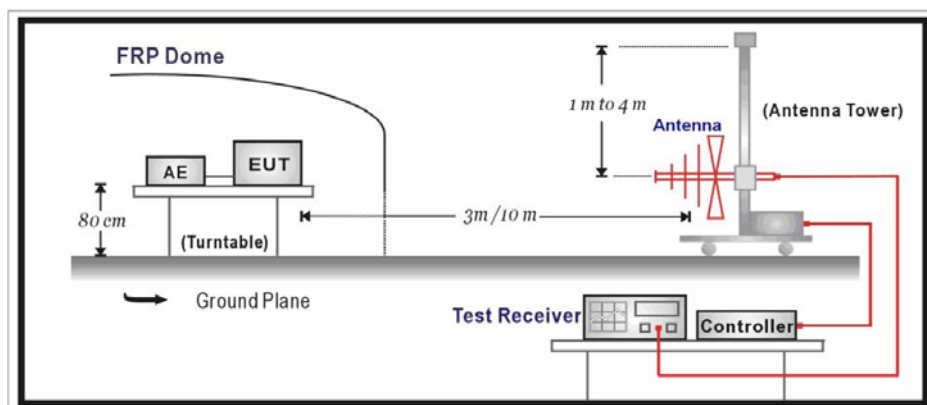
According to FCC CFR Title 47 Part 15 Subpart B Section 15.209

Limits		
Frequency (MHz)	$\mu\text{V}/\text{meter}$	$\text{dB}\mu\text{V}/\text{meter}$
30-88	100	40.00
88-216	150	43.52
216-960	200	46.02
Above 960	500	53.98

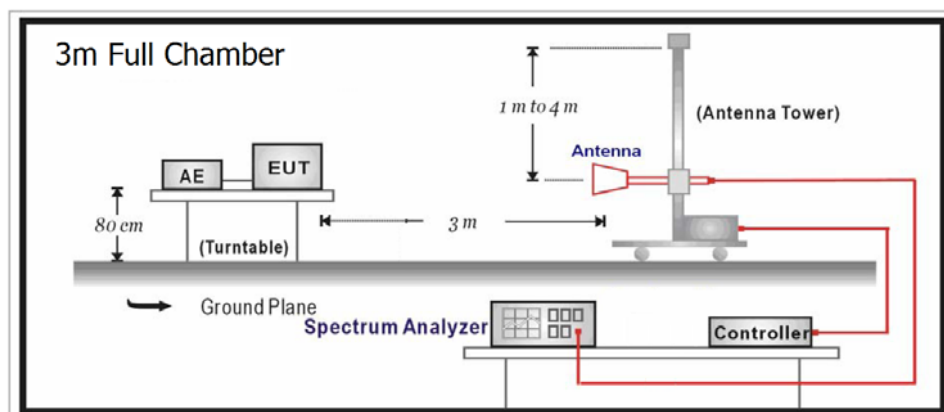
#### Remarks :

1.  $\text{RF Voltage}(\text{dB}\mu\text{V}) = 20 \log \text{RF Voltage}(\mu\text{V})$
2. In the Above Table, the tighter limit applies at the band edges.
3. Distance refers to the distance in meters between the measuring Instrument antenna and the closed point of any part of the device or System.

#### Below 1GHz Test Setup:



#### Above 1GHz Test Setup:



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### 1.3 Measurement Uncertainty Calculations

Conducted

TYPE	Contribution	Probability Distribution	Uncertainty H-polarity of Xi	Uncertainty H-polarity of U(Xi)	Symbol
B	Receiver Level	normal(k=1)	±0.1 dB	±0.0577 dB	RLevel
	LISN				
	Attenuation : AMN-receiver	rectangular	±0.1 dB	±0.0577 dB	Aatt
	AMN voltage division factor	rectangular	±0.2 dB	±0.1154 dB	Ddivision
	Cable loss	normal(k=2)	±0.5 dB	±0.025 dB	Ccable
	Receiver				
	Input Impedance	Normal (k=1.64)	±0.0070	±0.004	Iimpedance
	QP Sine-Wave Voltage Accuracy	normal(k=2)	±0.20 dB	±0.3290 dB	Aaccuracy
	QP-Pulse Amplitude Sensibility	normal(k=2)	±0.40 dB	±0.1154 dB	Ssensitivity
	QP-Pulse Frequency Response	normal(k=2)	±0.57 dB	±0.2309 dB	Rresponse
	Random Noise	normal(k=2)	±0.35 dB	±0.202 dB	Rrandom
	Mismatch : AMN – receiver	U-Shaped	+0.7 / -0.8 dB	+0.0441 / -0.4618 dB	Mmismatch
	AMN impedance	Triangular	+3.1 / -3.6 dB	+1.2655 / -1.4696 dB	Iimpedance
A	System repeatability	Std deviation	±0.0721 dB		Ssystem
Combined standard Uncertainty		normal	±1.6169 [dB]		
Expanded Uncertainty U		Reading level ± 3.2338 dB (k=2 95.45%)			

$$V = R_{\text{Level}} + A_{\text{att}} + D_{\text{division}} + C_{\text{cable}} + I_{\text{impedance}} + A_{\text{accuracy}} + S_{\text{sensitivity}} + R_{\text{response}} + R_{\text{random}} + M_{\text{mismatch}} + S_{\text{systeme}} + I_{\text{impedance}}$$

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## Radiated Emission

TYP E	Contribution	Probability Distribution	Uncertainty H-polarity 10 m of Xi	Uncertainty H-polarity 10 m of $U(Xi)$	Symbol
B	Disturbance Level				CDL
	Antenna				
	Factor Calibration				Afactor
	frequency interpolation	normal(k=2)	±0.5 dB	±0.288 dB	Iinterpolati on
	height variation	rectangular	±2.0 dB	±1.1547 dB	Hheight
	directivity difference	rectangular	+1.0 dB	+0.5773 dB	Ddirect
	phase center location	rectangular	±1.0 dB	±0.5773 dB	Pphase
	Cable loss	normal(k=2)	±0.5 dB	±0.025 dB	Ccable
	Receiver				
	Input Impedance	Normal (k=1.64)	±0.0070	±0.004	Iimpedanc e
	QP Sine-Wave Voltage Accuracy	normal(k=2)	±0.20 dB	±0.3290 dB	Aaccuracy
	QP-Pulse Amplitude Sensibility	normal(k=2)	±0.40 dB	±0.1154 dB	Ssensitivity
	QP-Pulse Frequency Response	normal(k=2)	±0.57 dB	±0.2309 dB	Rresponse
Random Noise	normal(k=2)	±0.35 dB	±0.202 dB	Rrandom	
A	Mismatch : Antenna – receiver	U-Shaped	+0.9 / -1.0 dB	+0.5196 / - 0.5773 dB	Mmismatch h
	Site imperfection	Triangular	±4.00 dB	±1.6329 dB	Ssite
	Table height	Normal (K=2)	±0.1 dB	±0.0577 dB	Stable
A	System repeatability	Std deviation	±0.037 dB		Ssystem
Combined standard Uncertainty		normal	± 2.3028 [dB]		
Expanded Uncertainty U		Reading level ± 4.6056 dB (k=2 95.45%)			

$$F = CDL + Afactor + Iinterpolation + Hheight + Ddirect + Pphase + Ccable + Iimpedance + Aaccuracy + Ssensitivity + Rresponse + Rrandom + Mmismatch + Ssystem + Ssite + Stable$$

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**1.4 Manufacturer Information**

Manufacturer	:	BYUCKSAN POWER CO.,LTD.
Address	:	197-21, Guro-dong, Guro-gu, Seoul, Korea

**1.5 General Description of EUT**

Name : GATEWAY  
Model No. : DPG1000A  
Alt. Name : N/A  
FCC ID : Z3ODPG1000A  
Serial No. : N/A

**1.6 Details of EUT**

Index	Function
CPU	Intel Single Core Atom D410
Memory RAM	1GB
O/S	Linux
HDD	320GB
Wireless Module	XBee Pro Series 2
Power	Input : AC 100~240V 50/60 Hz 1.5A Output:DC12V 5A

- Please refer to user's manual.

**1.7 Description of Support Units**

Product	Model No.	Serial No.	Manufacturer	Certification
GATEWAY	DPG1000A	N/A	BYUCKSAN POWER CO.,LTD.	EUT
Adaptor	FJ-SW1205000T	N/A	SHENZHEN FUJIA APPLIANCE CO.,LTD.	EUT
Energle smartmeter	BSP-PB1	N/A	BYUCKSAN POWER CO.,LTD.	-
LCD Monitor	SEC-MC19WS	NC72HVGSC01513H	SAMSUNG	-
PRINT	TTP-243 Plus	N/A	TSC	-
Headset	LGH-400	N/A	LG	-
Mouse	MQCALLY	N/A	N/A	-
Keyborad	Y-SM48	N/A	Suzhou Logitech Electronics	-

*Note : The Energle smartmeter Wireless(2.4GHz) was used the termination of the COM1 port.*

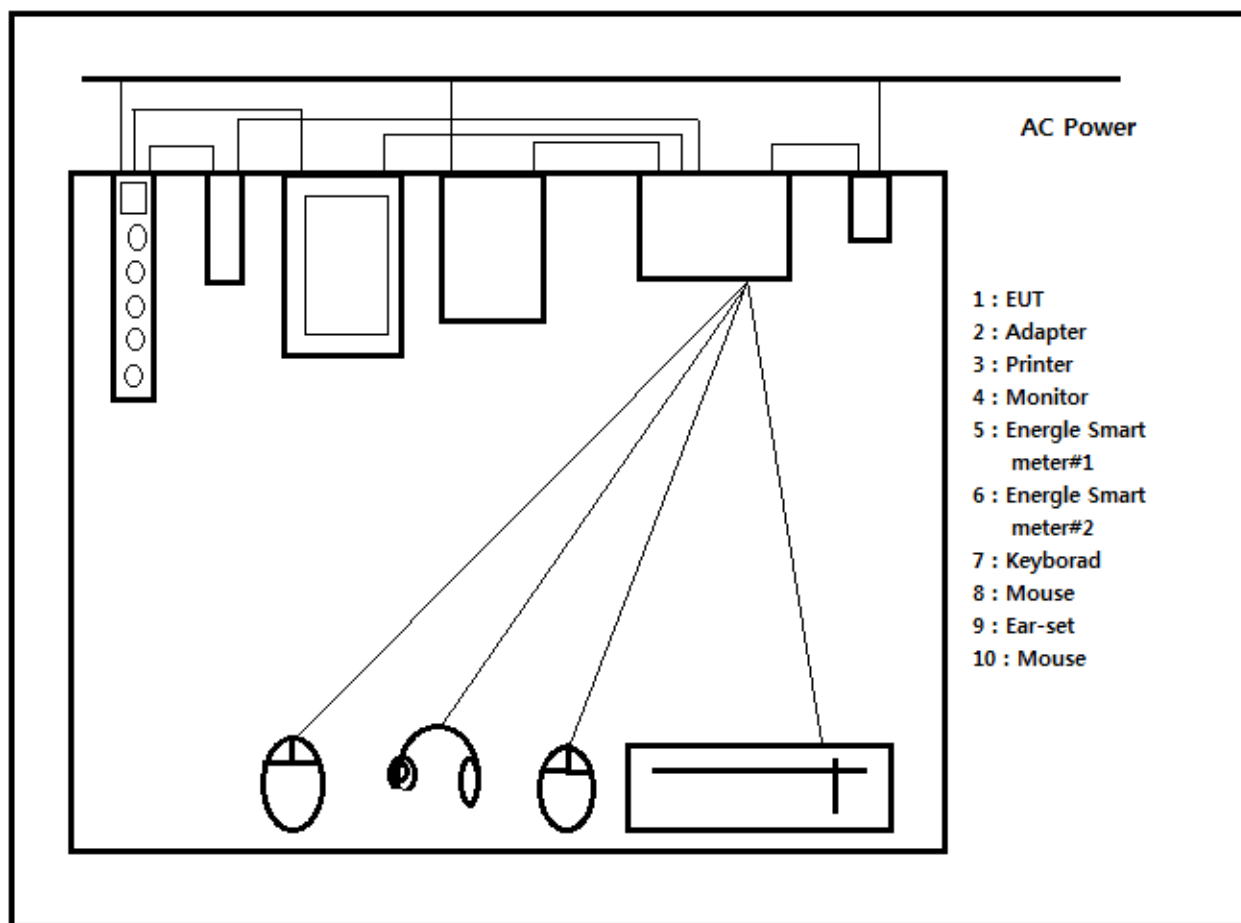
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**1.8 Cable List**

Device Form		Device To		Cable Spec.	
Name	I/O Port	Name	I/O port	Length(m)	Shield
EUT	USB	Memory Stick	USB	-	-
	USB	USB MOUSE	USB	1.5	Shielded
	Serial(RS485)	Energle smartmeter	Serial	2.0	Unshielded
	LAN(RJ-45)	Inter-net	LAN(RJ-45)	5.0	Unshielded
	Parallel	Printer	Parallel	1.5	Shielded
	PS/2	Keyborad	PS/2	1.5	Shielded
	VGA	Monitor	VGA	1.5	Shielded
	Audio	Ear-set	Audio	1.5	Unshielded
	DC IN	Adapter	AC Power	1.5	Shielded
Monitor	VGA	EUT	VGA	1.5	Shielded
	Energle smartmeter	AC IN	AC Power	1.5	Unshielded
Energle smartmeter	AC	AC Out	AC Power	2.0	Unshielded
	RS485	Serial	EUT	2.0	Unshielded
Keyborad	PS/2	EUT	PS/2	1.5	Shielded
USB Mouse	USB	EUT	USB	1.5	Shielded

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## 1.10 Test Set-Up Configuration



## 1.11 Test Methodology And Configuration

Energle Smart meter(2.4GHz),WireLAN all device activating state.

## 1.12 Standards Applicable for Testing

Table of tests to be carried out under FCC Part 15 Subpart B,C

Test Standards	Status
FCC Part 15 Subpart B, C	A
Deviation from Standard	No Deviation

Note) N/A : Indicates that the test is not applicable  
A : Indicates that the test is applicable

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## 2. SUMMARY

### Zigbee Mode(2405 ~ 2470 MHz)

#### Test Descriptions

- Conducted Emission	PASS
-Conducted Emission result	
- Radiated Emission	PASS
- Radiated Emission Result	
- Peak power output	PASS
- Test result	
- Band edge	PASS
- Test result	
- 6dB Band	PASS
- Test Result	
- Power Density	PASS
- Test Result	

### 3. Equipment Under Test

#### 3.1 Conducted Emission

##### 3.1.1 Test Instruments

Description	Manufacturer	Model No.	Serial No.	Next of Calibration
Test Receiver	LIG NEX1	ER-30	L08A007	2012-09-09
LISN	PMM	L2-6B	000WX10306	2012-05-04
LISN	EMCIS	LN2-16	LN10032	2011-10-21
Transient Limiter	EMCIS	TL-B930M	A-008	2012-02-01
Shielded Room	KETM	N/A	N/A	-

*Note :* 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to RRA, KRISS, KTL and HCT.

2. The calibration interval of horn ant. and loop ant. is 24 months

##### 3.1.2 Test Area

Conducted Room(Shielded Room)

##### 3.1.3 Operation of EUT

Operating Environment

Temperature : 22 °C

Humidity : 37 %

Atmospheric Pressure : 1013 Kpa

##### 3.1.4 Test Date

14,Sep. 2011

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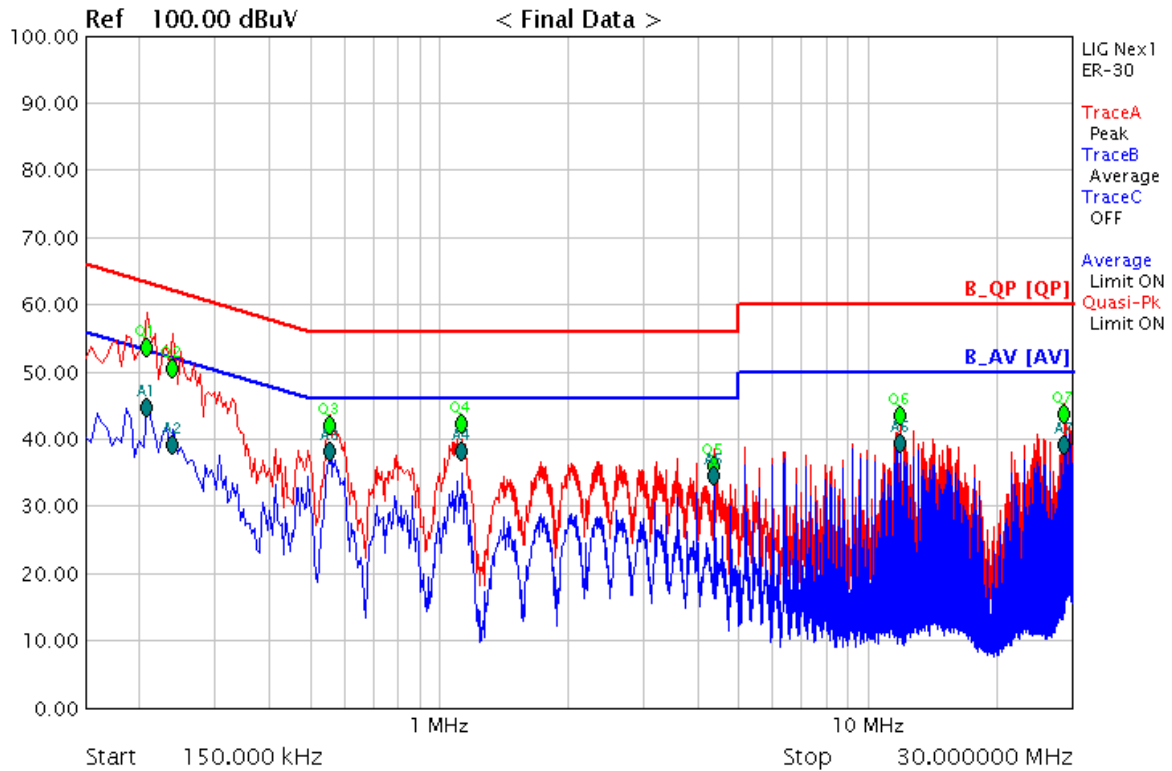


**3.1.5 Conducted Emissions Result(Subpart B(15.109),C(15.207))**

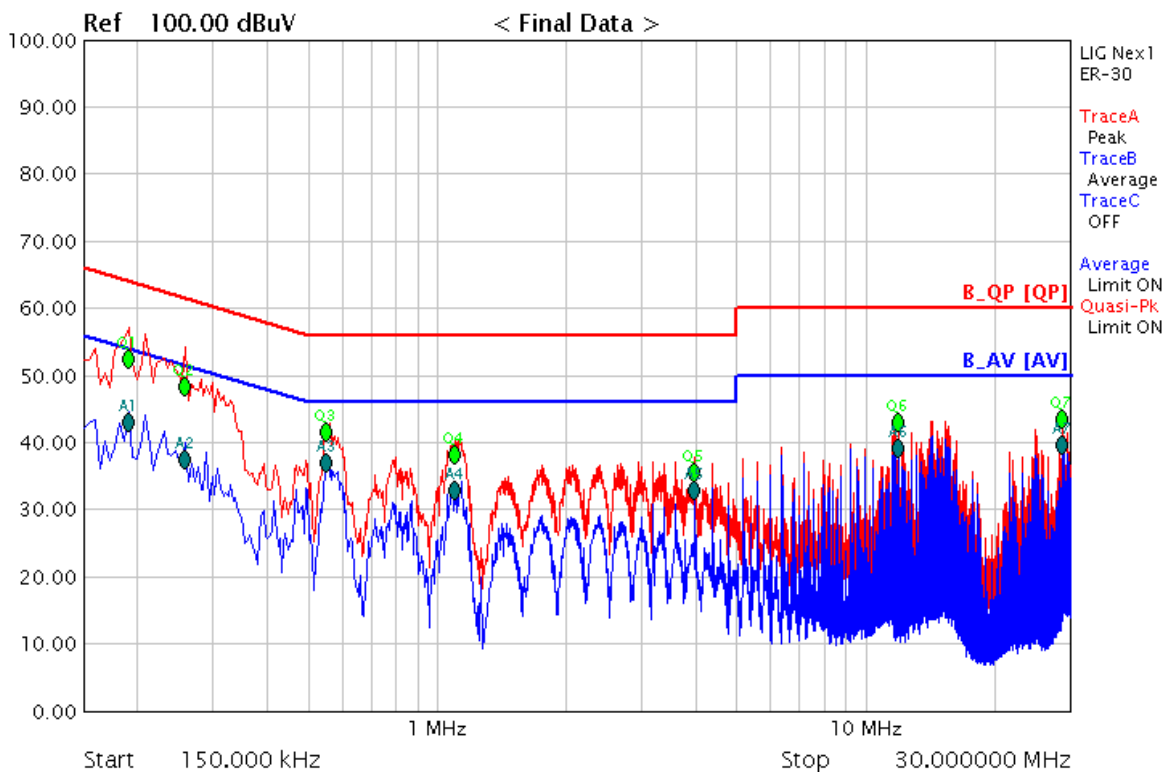
Frequency	Loss		Por	QP			AV		
				Limit	Measure	Result	Limit	Measure	Result
[MHz]	LISN	Cable	[H/N]	[dB $\mu$ V]	[dB $\mu$ V]	[dB $\mu$ V]	[dB $\mu$ V]	[dB $\mu$ V]	[dB $\mu$ V]
0.21	10.18	0.00	HOT	63.26	43.30	53.47	53.26	34.48	44.65
0.24	10.18	0.00	HOT	62.10	40.23	50.41	52.10	28.92	39.10
0.56	10.23	0.00	HOT	56.00	31.76	41.99	46.00	27.85	38.08
1.13	10.16	0.04	HOT	56.00	31.84	42.04	46.00	27.77	37.97
4.38	10.47	0.24	HOT	56.00	25.24	35.95	46.00	23.82	34.53
11.95	11.13	0.44	HOT	60.00	31.80	43.37	50.00	27.79	39.36
28.69	13.75	0.74	HOT	60.00	29.12	43.60	50.00	24.57	39.05

*Note : Energle Smart meter(2.4GHz),WireLAN all device activating state.*

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*Neutral*



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## 3.2 Radiated Emission

### 3.2.1 Test Instruments

Description	Manufacturer	Model No.	Serial No.	Next of Calibration
Test Receiver	LIG NEX1	ER-265	L0811B009	2012.04.12
BICONILOG ANT.	SCHWARZBECK	WLD 960	9160-3292	2012.04.05
Horn Antenna	Schwarzbeck	BBHA9170	BBHA9170152	2012.09.28
Horn Antenna	Schwarzbeck	BBHA 9120D	00123879	2011.12.29
LOOP ANT.	EMCO	6502	00123879	2011.12.29
Turn Table	Daeil	N/A	N/A	-
Ant. Mast	Daeil	N/A	N/A	-
Controller	Daeil	N/A	N/A	-
T-TABLE CONTROLLER	Daeil	N/A	N/A	-
CHAMBER	KETM	N/A	N/A	-

*Note : 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to RRL, KRISS, KTL and HCT.*

*2. The calibration interval of horn ant. and loop ant. is 24 months*

### Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. For the limit is employed average value, therefore the peak value can be transferred to average value by subtracting the duty factor. The basic equation with a sample calculation is as follows:

$$\text{Peak} = \text{Reading} + \text{Corrected Factor}$$

Where

Corr. Factor = Antenna Factor + Cable Factor - Amplifier Gain (if any)

### 3.2.2 Test Area

### 3.2.3 Operation of EUT

#### Operating Environment

Temperature : 22°C  
 Humidity : 37 %  
 Atmospheric Pressure : 1013 kPa

### 3.2.4 Test Date

Start 14 Sep, 2011  
 End 30 Sep, 2011

### 3.2.5 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto shall not exceed the level of field strength specified below:

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**FCC Part 15 Subpart C paragraph 15.247 Limit**
**Frequencies in restricted band are complied to limit on Paragraph 15.209**

Frequency Range (MHz)	Distance (m)	Field strength ( dBuV/m)
0.009-0.490	3	$20\log 2400/F \text{ (kHz)} + 80$
0.490-1.705	3	$20\log 24000/F \text{ (kHz)} + 40$
1.705-30	3	$20\log 30 + 40$
30-88	10	40.0
88-216	10	43.5
216-960	10	46.0
Above 960	10	54.0

*Note : 1. RF voltage (dBuV) = 20 log RF Voltage (uV)*

*2. In the Above Table, the tighter limit applies at the band edges.*

*3. Distance refers to the distance in meters between the measuring instrument antenna and the EUT*

*4. This device used to install a wall device. The location of EUT measurements has the Y-plane(Stand).*

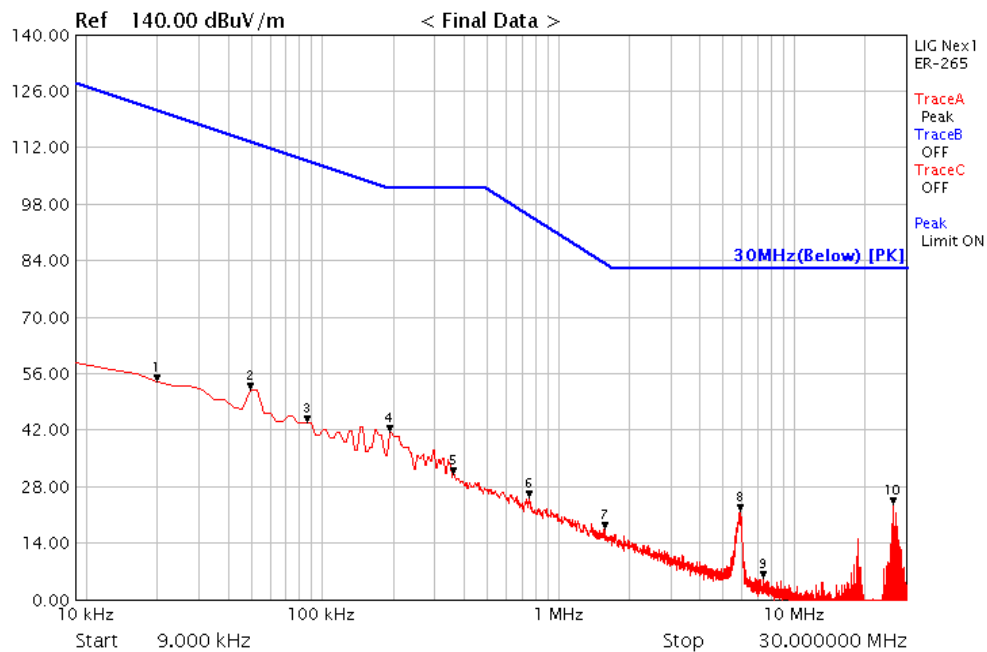
*5. All scanning using PK detector. And the final emission level was get using QP detector for frequency range from 30 – 1000 MHz. As to 1 - 26 GHz, the final emission level got using PK and AV detector.*

*6. If measurement is made at 3m distance.*

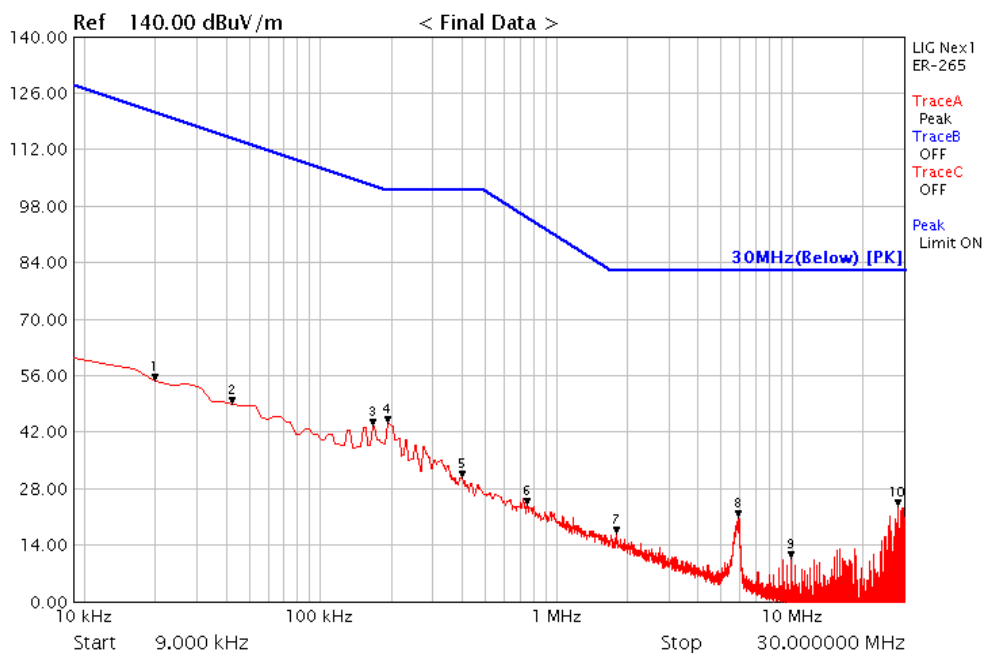
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### 3.2.5.1 Radiated Emission Result(0.09 to 30 MHz)

Hor



Ver



Note : other emissions don't exceed the level of 20dB below the applicable Limit.

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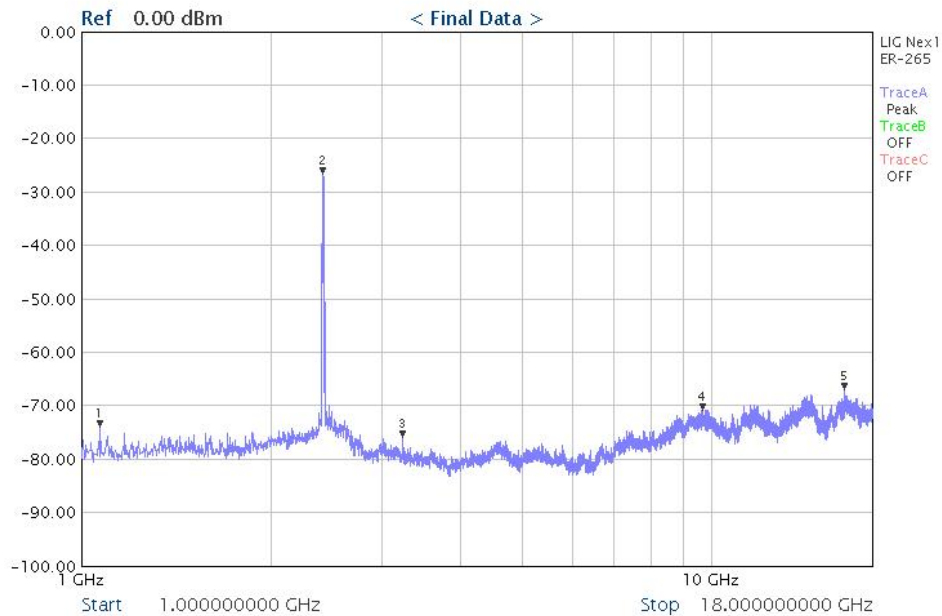
**Radiated Emission Result(30 to 1000 MHz)**

Frequency (MHz)	Reading (dBuV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Limits (dBuV/m)	Emission Level (dBuV/m)	Margin (dB)
30.71	11.98	V	11.40	0.90	40.00	24.28	15.72
36.51	15.31	V	11.80	0.96	40.00	28.07	11.93
37.22	15.52	V	11.86	0.99	40.00	28.37	11.63
130.66	21.75	H	12.25	2.40	40.00	36.40	3.60
143.09	18.74	V	12.79	2.43	40.00	33.96	6.04
149.61	20.34	V	12.97	2.50	40.00	35.81	4.19
173.17	21.02	H	12.16	2.80	40.00	35.98	4.02
194.73	22.99	V	10.15	2.97	40.00	36.11	3.89
220.07	21.70	V	10.47	3.20	46.00	35.37	10.63
225.28	19.70	V	10.69	3.25	46.00	33.64	12.36
250.62	25.24	V	11.74	3.50	46.00	40.48	5.52

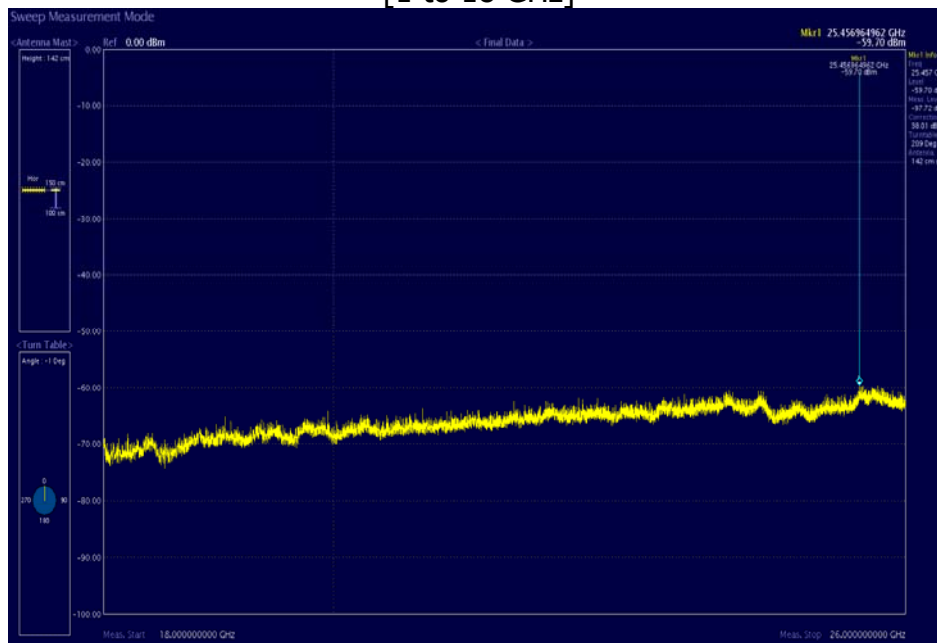
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## 3.2.5.2 Fundamental &amp; Harmonics Radiated Emission Result(1 to 26 GHz)

Test Mode	Zigbee	Test Channel	1 CH (2405 MHz)
Test Item	Fundamental & Harmonics Radiated Emission Test Result	Polarization	Hor.
Test Result	PASS		



[1 to 18 GHz]



[18 to 26 GHz]

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Frequency (MHz)	Emission PK/AV (dBuV/m)	Polarization	Limits PK/AV (dBuV/m)	Margin (dB)
2405	80.26(PK)	Hor.	114/94	33.74
1068	32.97(PK)	Hor.	74/54	41.03
3220	37.24(PK)	Hor.	74/54	36.76
9667	36.20(PK)	Hor.	74/54	37.80
16227	39.88(PK)	Hor.	74/54	34.12
25456	47.29(PK)	Hor.	74/54	26.71
-	-	-	-	-

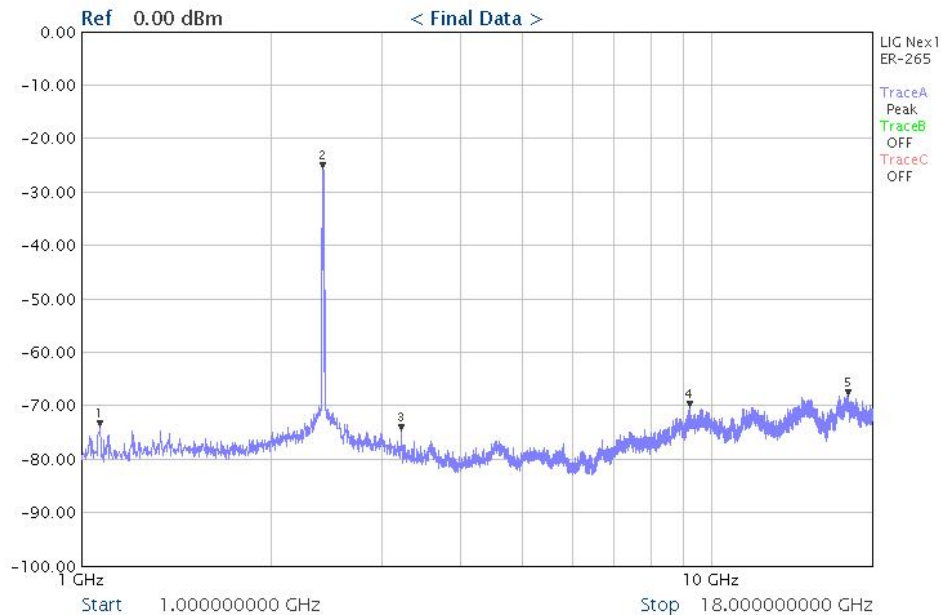
*Note : 1. Other emissions don't exceed the level of 20 dB below the applicable Limit.*

*2. Measurement level = reading level + correct factor*

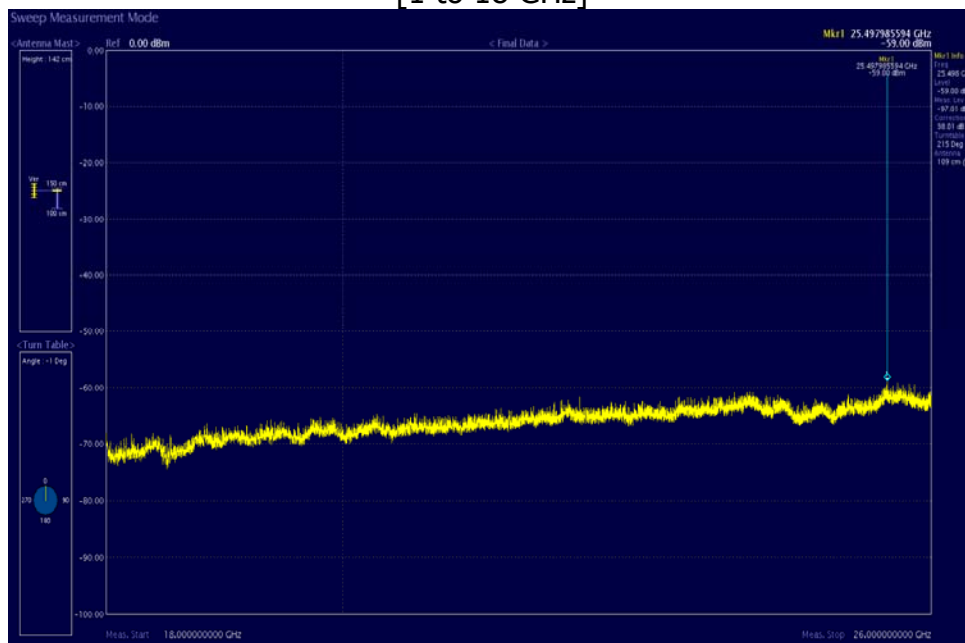
*3. This device used to install a wall device. The location of EUT measurements has the Y-Plnae.*

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Test Mode	Zigbee	Test Channel	1 CH (2405 MHz)
Test Item	Fundamental & Harmonics Radiated Emission Test Result	Polarization	Ver.
Test Result	PASS		



[1 to 18 GHz]



[18 to 26 GHz]

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Frequency (MHz)	Emission PK/AV (dBuV/m)	Polarization	Limits PK/AV (dBuV/m)	Margin (dB)
2405	81.27(PK)	Ver.	114/94	32.73
1066	32.90(PK)	Ver.	74/54	41.10
3220	32.06(PK)	Ver.	74/54	41.94
9214	36.68(PK)	Ver.	74/54	37.32
16453	38.79(PK)	Ver.	74/54	35.21
25497	47.99(PK)	Ver.	74/54	26.01
-	-	-	-	-

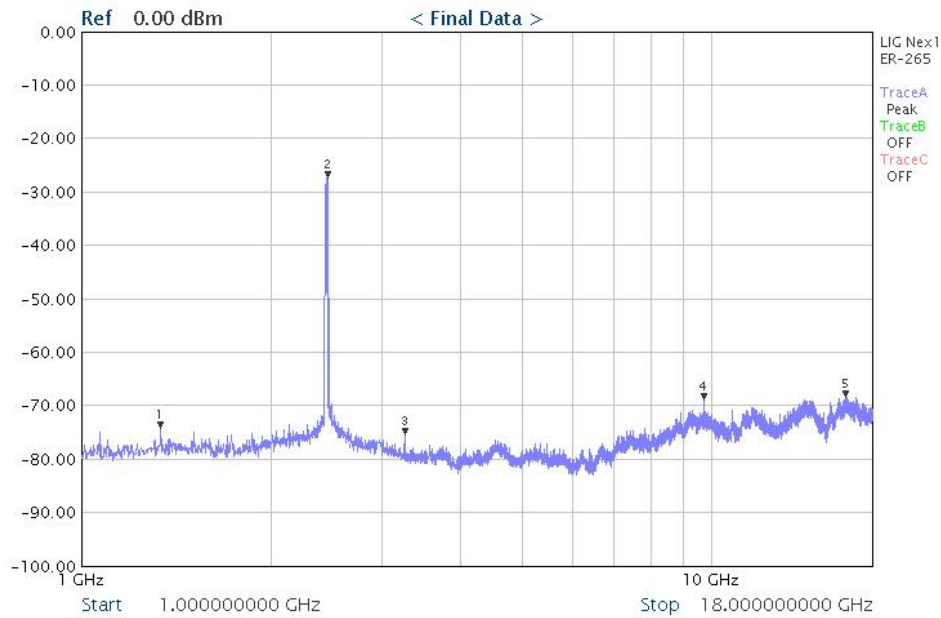
*Note : 1. Other emissions don't exceed the level of 20 dB below the applicable Limit.*

*2. Measurement level = reading level + correct factor*

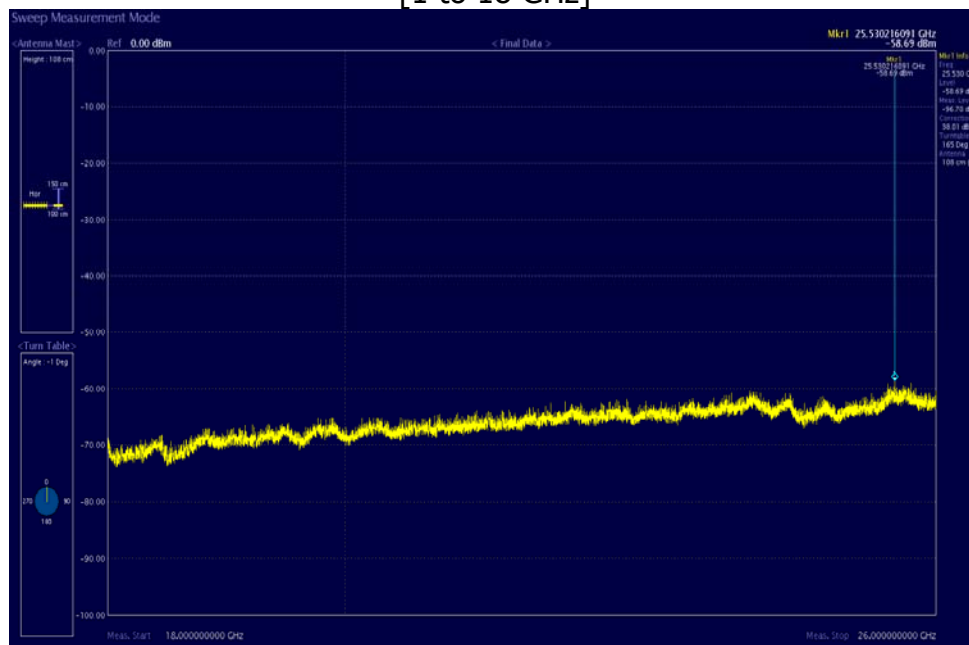
*3. This device used to install a wall device. The location of EUT measurements has the Y-Plnae.*

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Test Mode	Zigbee	Test Channel	8 CH (2440 MHz)
Test Item	Fundamental & Harmonics Radiated Emission Test Result	Polarization	Hor.
Test Result	PASS		



[1 to 18 GHz]



[18 to 26 GHz]

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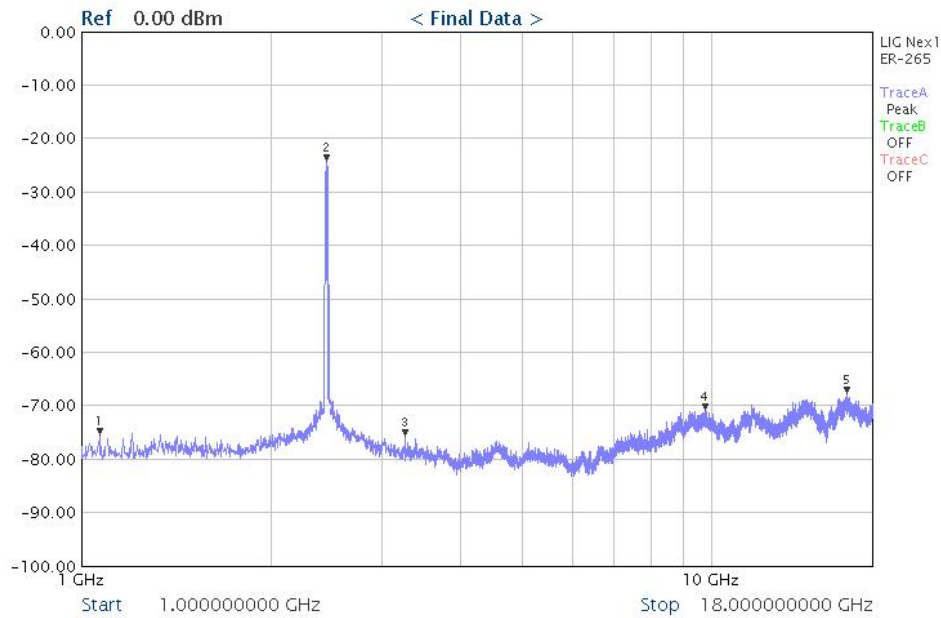
Frequency (MHz)	Emission PK/AV (dBuV/m)	Polarization	Limits PK/AV (dBuV/m)	Margin (dB)
2440	79.64(PK)	Hor.	114/94	34.36
1329	32.34(PK)	Hor.	74/54	41.66
3260	31.74(PK)	Hor.	74/54	42.26
9735	38.05(PK)	Hor.	74/54	35.95
16316	38.59(PK)	Hor.	74/54	35.50
25530	48.30(PK)	Hor.	74/54	25.70
-	-	-	-	-

*Note :*

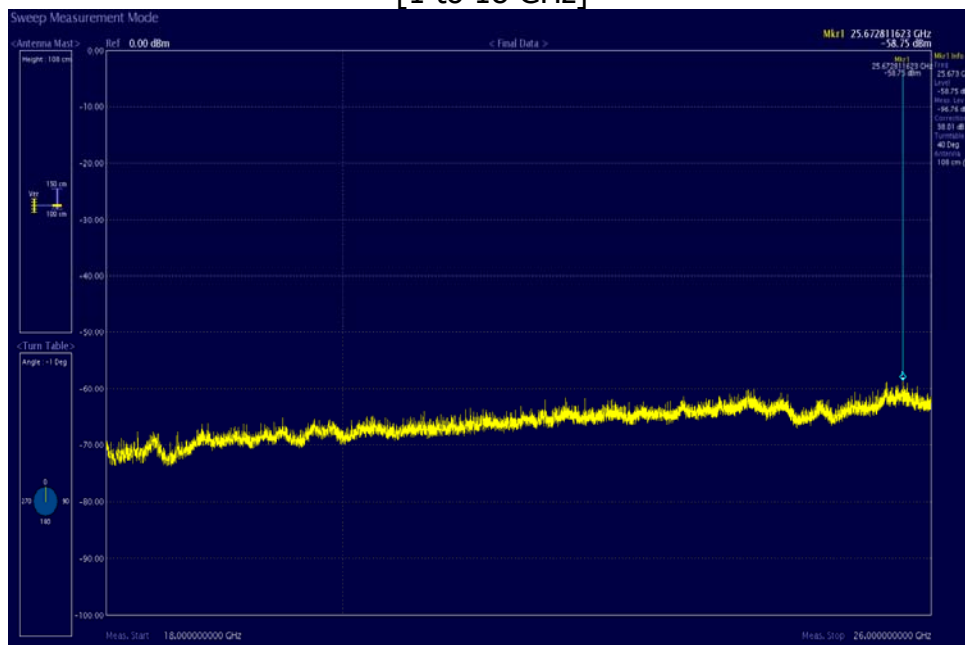
- 1. Other emissions don't exceed the level of 20 dB below the applicable Limit.*
- 2. Measurement level = reading level + correct factor*
- 3. This device used to install a wall device. The location of EUT measurements has the Y-Plane.*

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Test Mode	Zigbee	Test Channel	8 CH (2440 MHz)
Test Item	Fundamental & Harmonics Radiated Emission Test Result	Polarization	Ver.
Test Result	PASS		



[1 to 18 GHz]



[18 to 26 GHz]

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Frequency (MHz)	Emission PK/AV (dBuV/m)	Polarization	Limits PK/AV (dBuV/m)	Margin (dB)
2440	82.75(PK)	Ver.	114/94	34.25
1068	35.52(PK)	Ver.	74/54	38.48
3260	31.84(PK)	Ver.	74/54	42.16
9741	35.98(PK)	Ver.	74/54	38.02
16420	39.34(PK)	Ver.	74/54	34.66
25672	48.24(PK)	Ver.	74/54	25.76
-	-	-	-	-

*Note : 1. Other emissions don't exceed the level of 20 dB below the applicable Limit.*

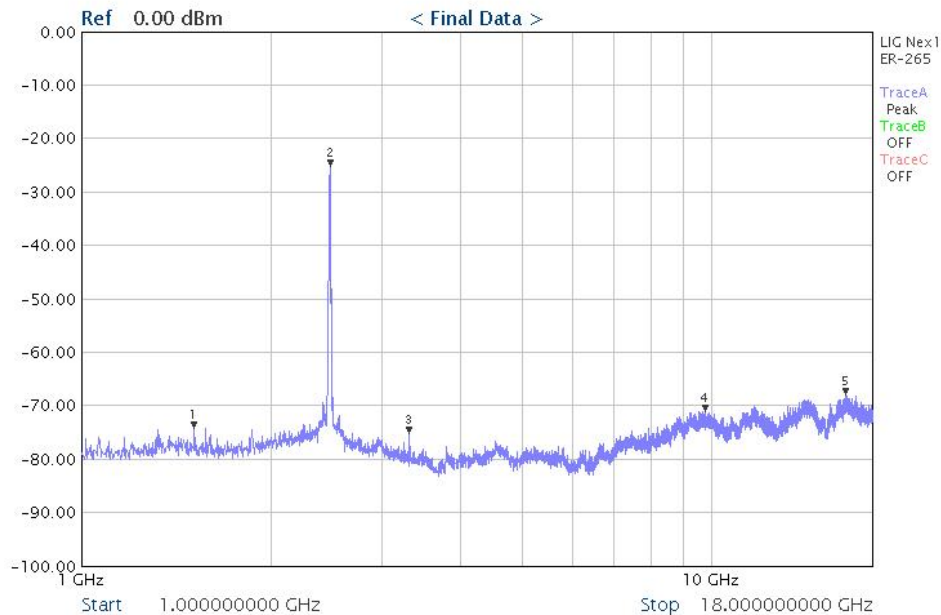
*2. Measurement level = reading level + correct factor*

*3. This device used to install a wall device. The location of EUT measurements has the Y-Plane.*

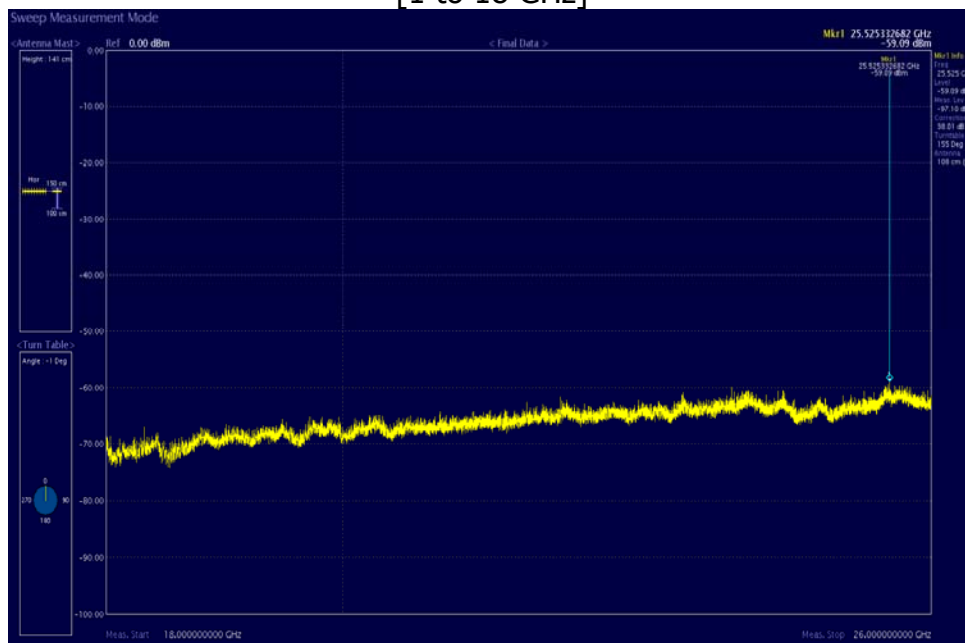
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Test Mode	Zigbee	Test Channel	14 CH (2470 MHz)
Test Item	Fundamental & Harmonics Radiated Emission Test Result	Polarization	Hor.
Test Result	PASS		



[1 to 18 GHz]



[18 to 26 GHz]

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Frequency (MHz)	Emission PK/AV (dBuV/m)	Polarization	Limits PK/AV (dBuV/m)	Margin (dB)
2470	81.72(PK)	Hor.	114/94	32.28
1504	33.17(PK)	Hor.	74/54	40.83
3299	32.47(PK)	Hor.	74/54	41.53
9762	35.87(PK)	Hor.	74/54	38.13
16281	39.06(PK)	Hor.	74/54	34.94
25525	47.90(PK)	Hor.	74/54	26.10
-	-	-	-	-

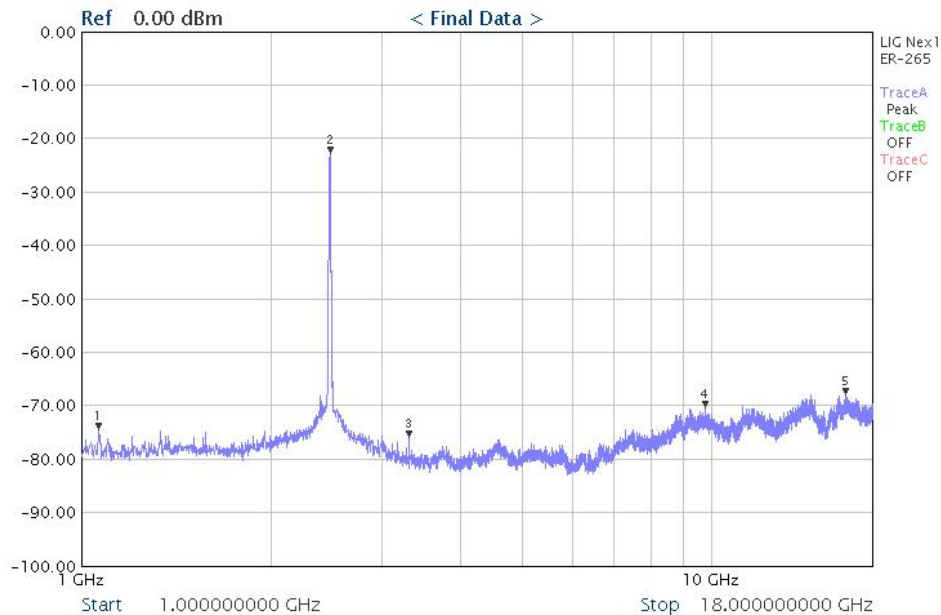
*Note : 1. Other emissions don't exceed the level of 20 dB below the applicable Limit.*

*2. Measurement level = reading level + correct factor*

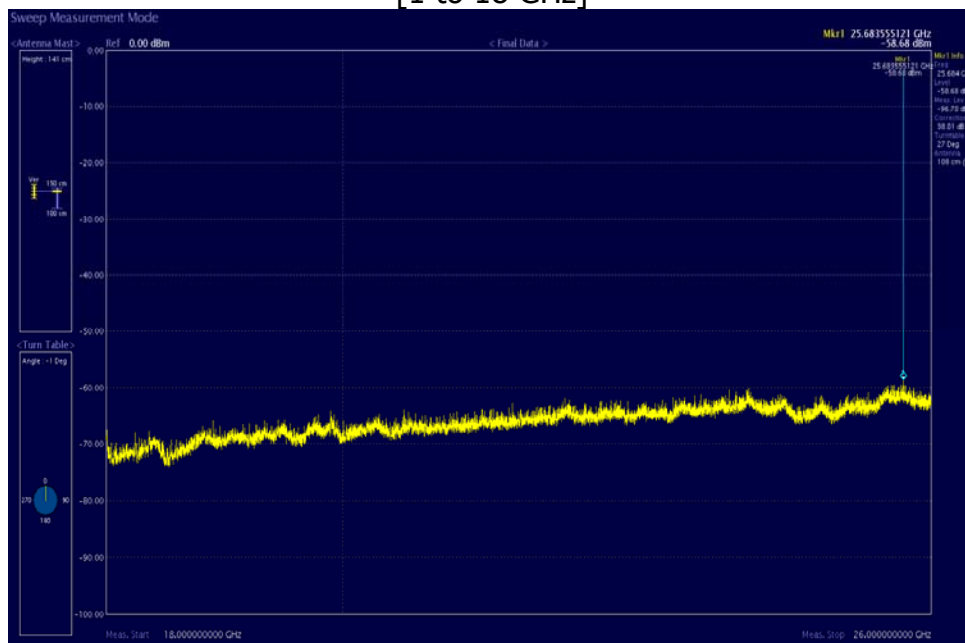
*3. This device used to install a wall device. The location of EUT measurements has the Y-Plnae.*

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Test Mode	Zigbee	Test Channel	14 CH (2470 MHz)
Test Item	Fundamental & Harmonics Radiated Emission Test Result	Polarization	Ver.
Test Result	PASS		



[1 to 18 GHz]



[18 to 26 GHz]

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Frequency (MHz)	Emission PK/AV (dBuV/m)	Polarization	Limits PK/AV (dBuV/m)	Margin (dB)
2470	84.13(PK)	Ver.	114/94	29.87
1064	33.10(PK)	Ver.	74/54	40.90
3299	31.75(PK)	Ver.	74/54	42.25
9752	36.58(PK)	Ver.	74/54	37.42
16298	39.08(PK)	Ver.	74/54	34.92
25683	48.31(PK)	Ver.	74/54	25.69
-	-	-	-	-

*Note : 1. Other emissions don't exceed the level of 20 dB below the applicable Limit.*

*2. Measurement level = reading level + correct factor*

*3. This device used to install a wall device. The location of EUT measurements has the Y-Plnae.*

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### 3.3 Peak Power Output

#### 3.3.1 Test Instruments

Description	Manufacturer	Model No.	Serial No.	Next of Calibration
Spectrum Analyzer	Advantest	R3273	130900034	Dec. 06, 2011
Attenuator	Agilent	8495B	MY42140745	Dec. 06, 2011

*Note :* 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to KRISS, KTL and HCT.

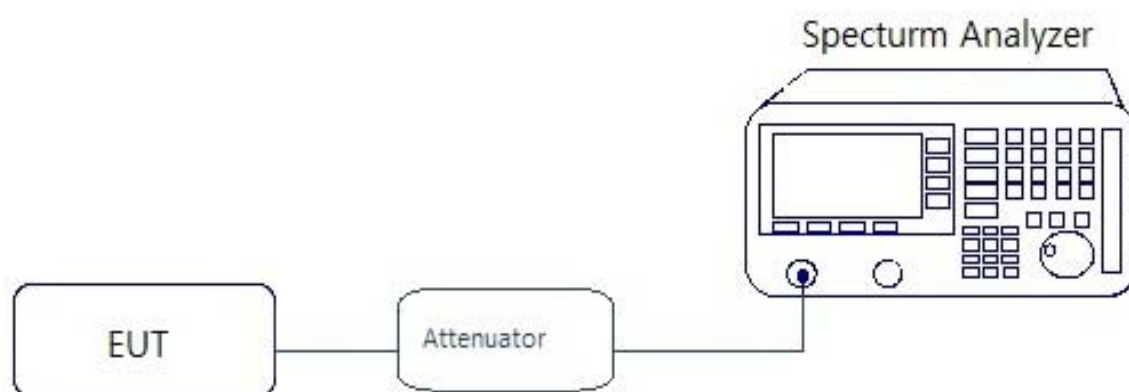
2. The calibration interval of horn ant. and loop ant. is 24 months

#### 3.3.2 Limit

The maximum peak output power of the intentional radiator shall not exceed the following :

1. According to § 15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz : 1Watt.
2. According to § 15.247(b)(4), the conducted output power limit specified in paragraph(b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph(c) of this section, is transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs(b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi

#### 3.3.3 Test Configuration



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### 3.3.4 Test Procedure

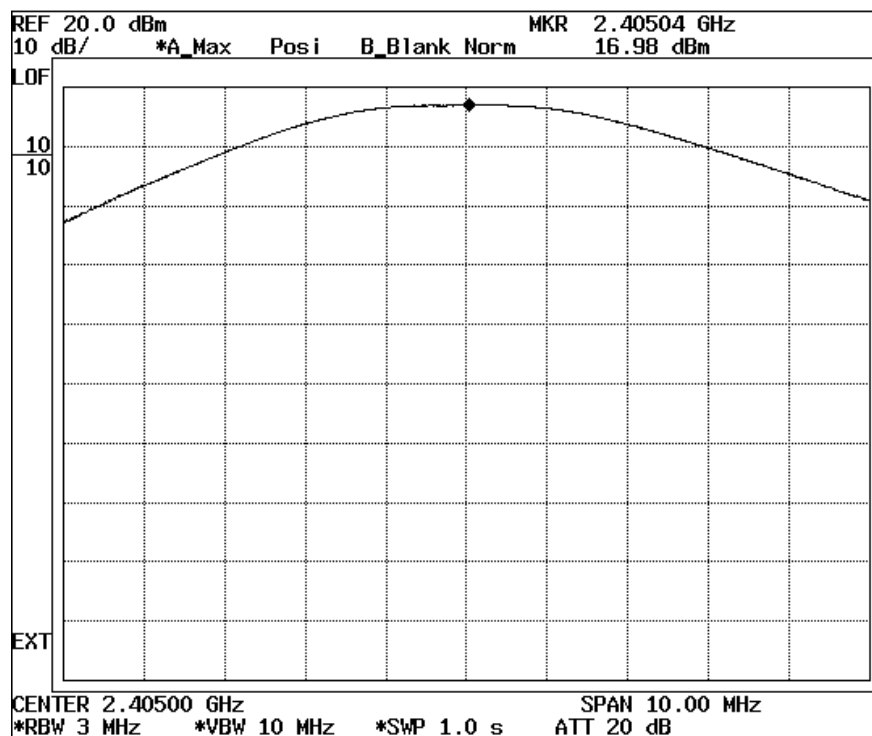
The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the peak power detection.

### 3.3.5 Peak Power Test Result

Test Item	Peak Power Output
Test Mode	Zigbee
Test Site	RF Room
Measurement Method	Conducted

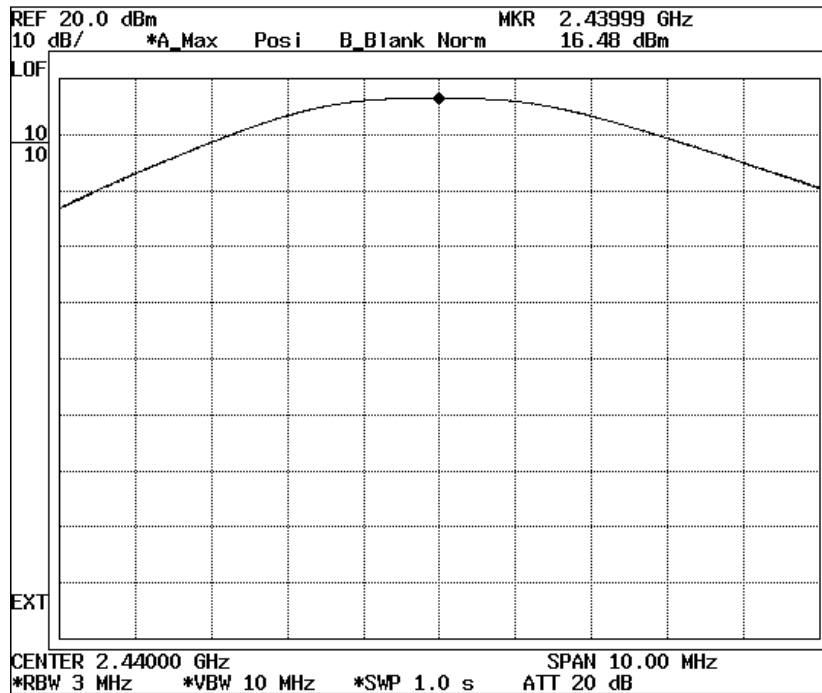
Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
1	2405	16.98	1Watt=30dBm	Pass
8	2440	16.48	1Watt=30dBm	Pass
14	2470	16.66	1Watt=30dBm	Pass

Channel 1.

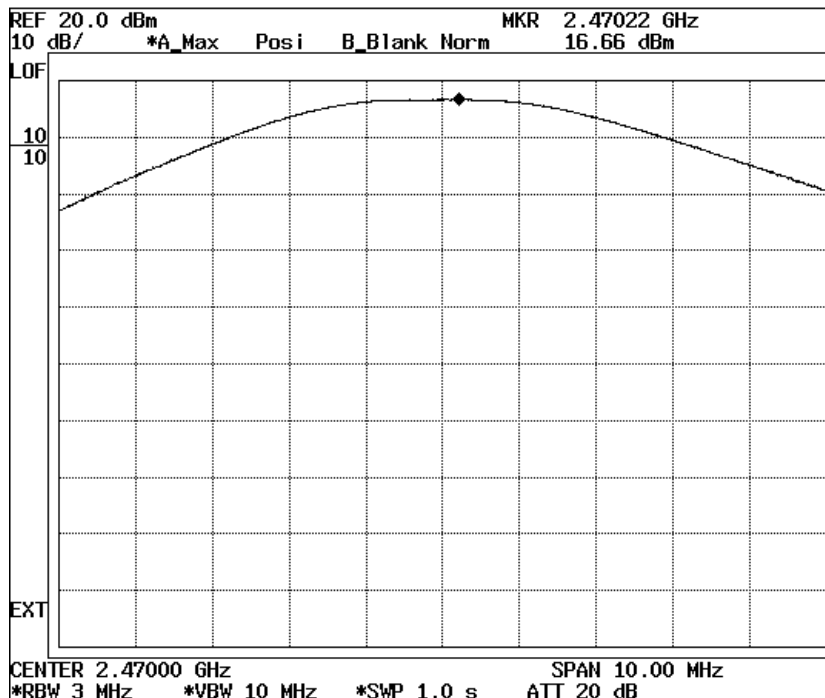


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Channel 8.



Channel 14.



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### 3.4 Band Edge

#### 3.4.1 Test Instruments

Description	Manufacturer	Model No.	Serial No.	Next of Calibration
Spectrum Analyzer	Advantest	R3273	130900034	Dec. 06, 2011
Attenuator	Agilent	8495B	MY42140745	Dec. 06, 2011

*Note :* 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to KRISS, KTL and HCT.

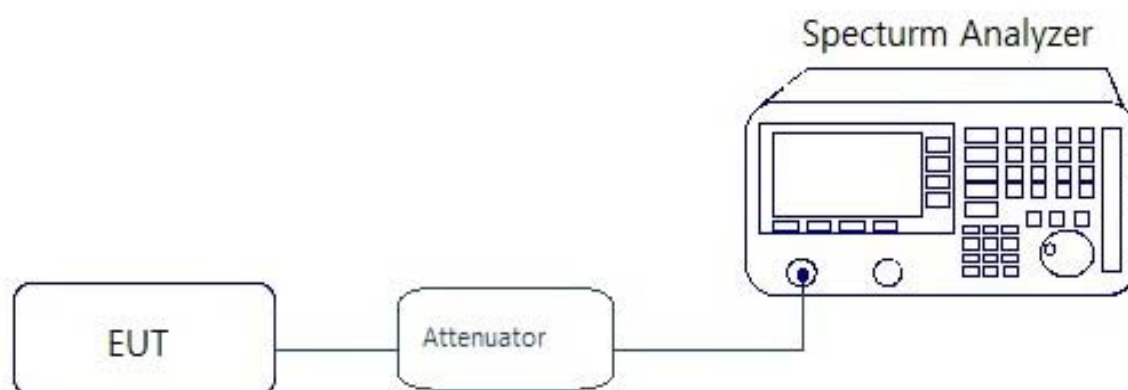
2. The calibration interval of horn ant. and loop ant. is 24 months

#### 3.4.2 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio Frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within The band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

Attenuation below the general limits specified in section 15.209(a) is not required. In addition, radiated emission which fall in the restricted bands, as defined in section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a)(see Section 15.205(c)).

#### 3.4.3 Test Configuration

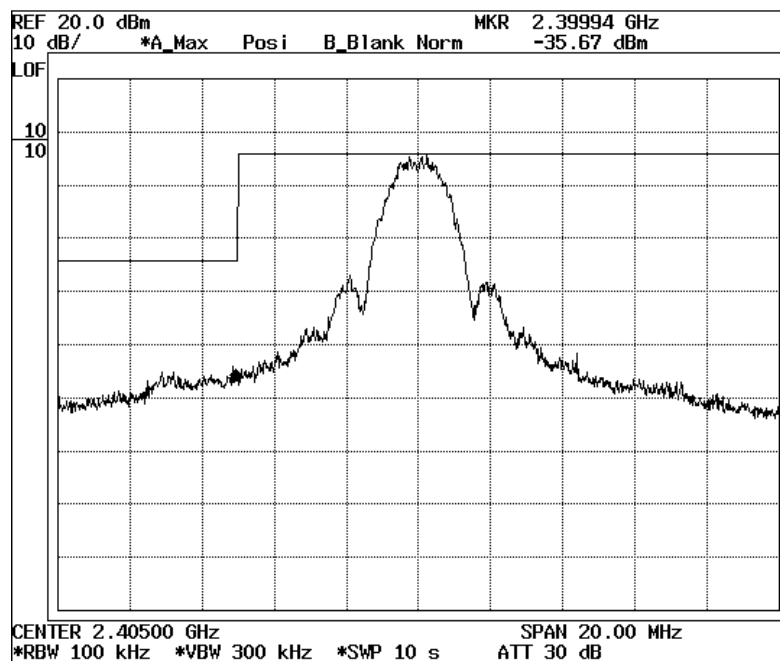


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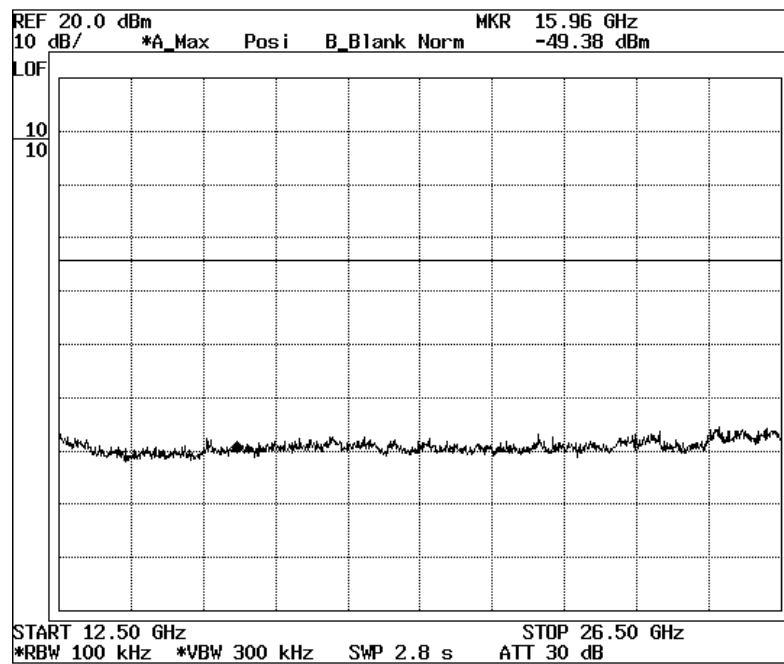
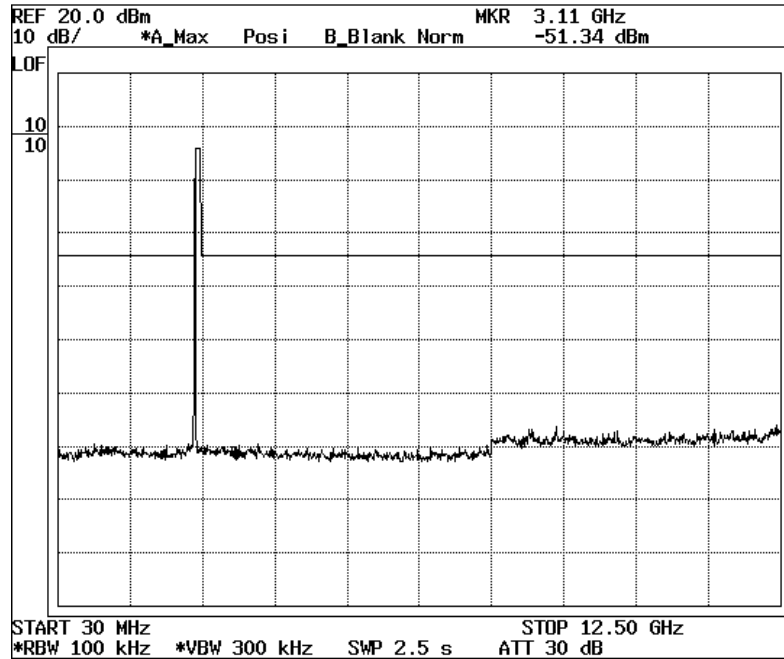
The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the Band Edge.

### 3.4.5 Band Edge Test Result

Detect mode	Peak Mode	Test Site	RF Room
Mode/CH	Zigbee- CH1 (2405 MHz)		

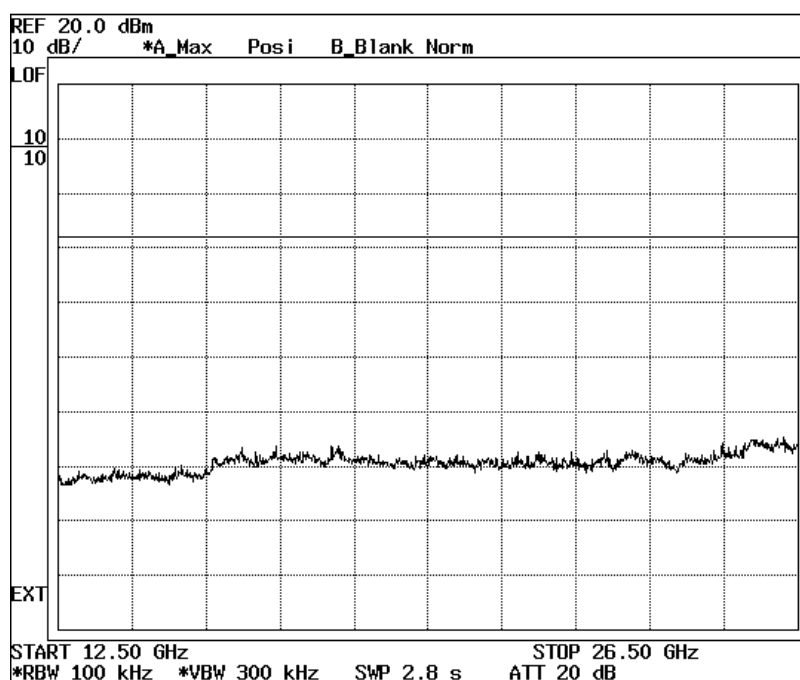
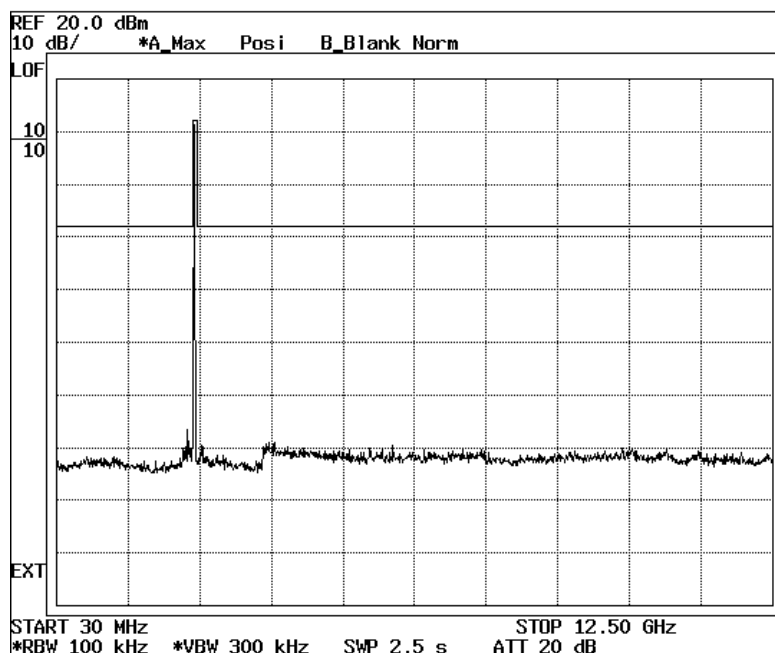


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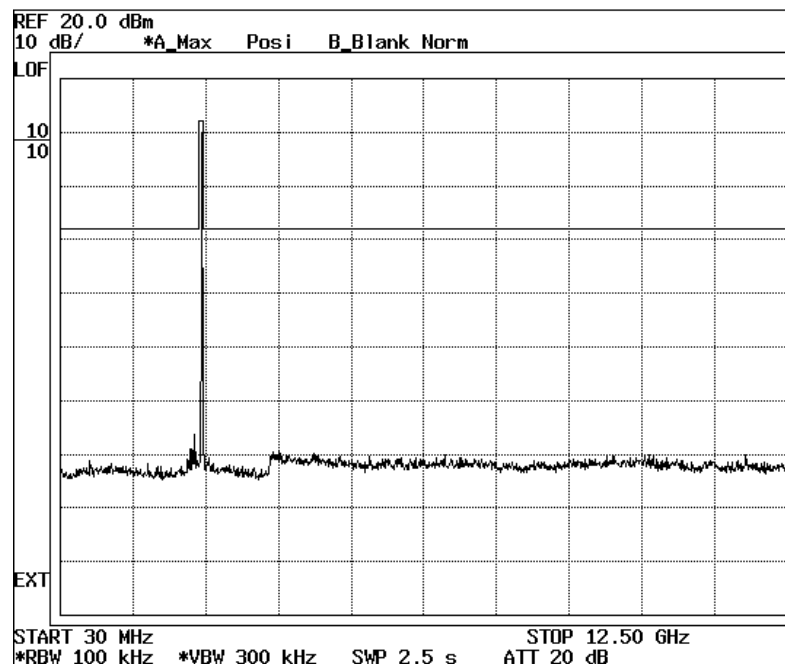
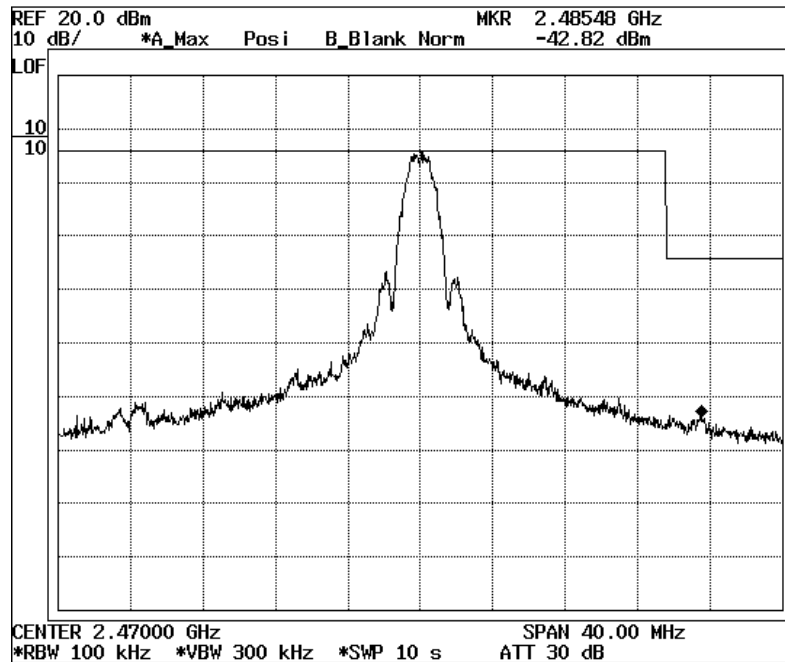
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Detect mode	Peak Mode	Test Site	RF Room
Mode/CH	Zigbee- CH8 (2440 MHz)		

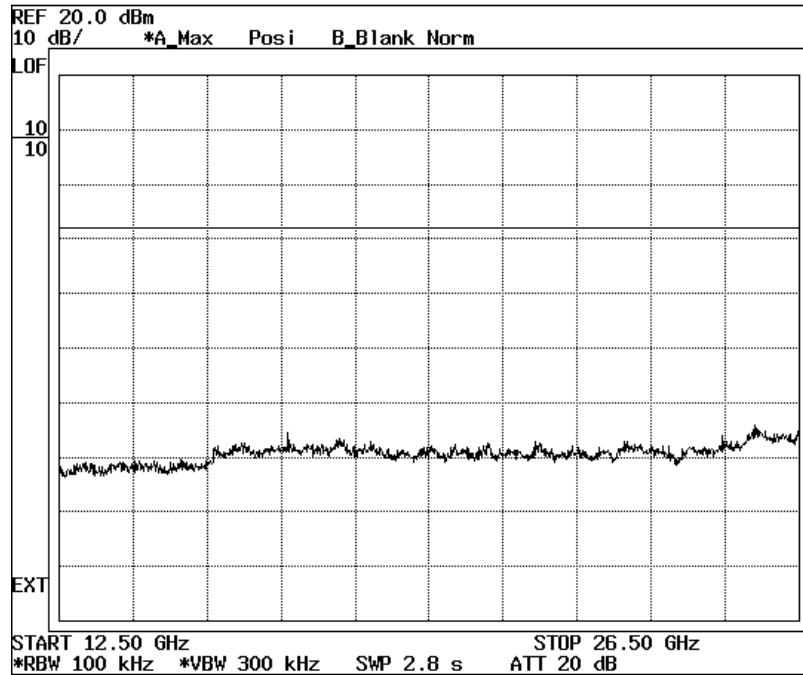


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Detect mode	Peak Mode	Test Site	RF Room
Mode/CH	Zigbee- CH14 (2470 MHz)		



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### 3.5 6 dB Band

#### 3.5.1 Test Instruments

Description	Manufacturer	Model No.	Serial No.	Next of Calibration
Spectrum Analyzer	Advantest	R3273	130900034	Dec. 06, 2011
Attenuator	Agilent	8495B	MY42140745	Dec. 06, 2011

*Note :*

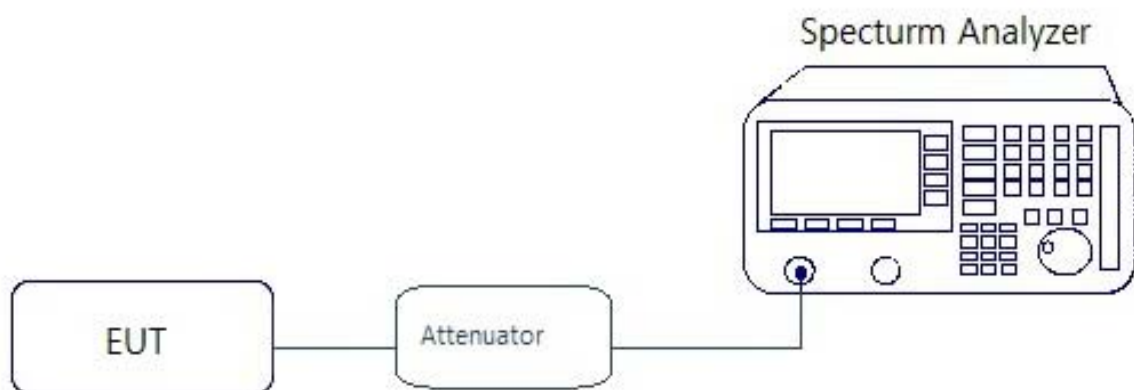
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to KRISS, KTL and HCT.
2. The calibration interval of horn ant. and loop ant. is 24 months

#### 3.5.2 Limit

(a) Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions :

(2) systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

#### 3.5.3 Test Configuration



#### 3.5.4 Test Procedure

The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the 6dB Band.

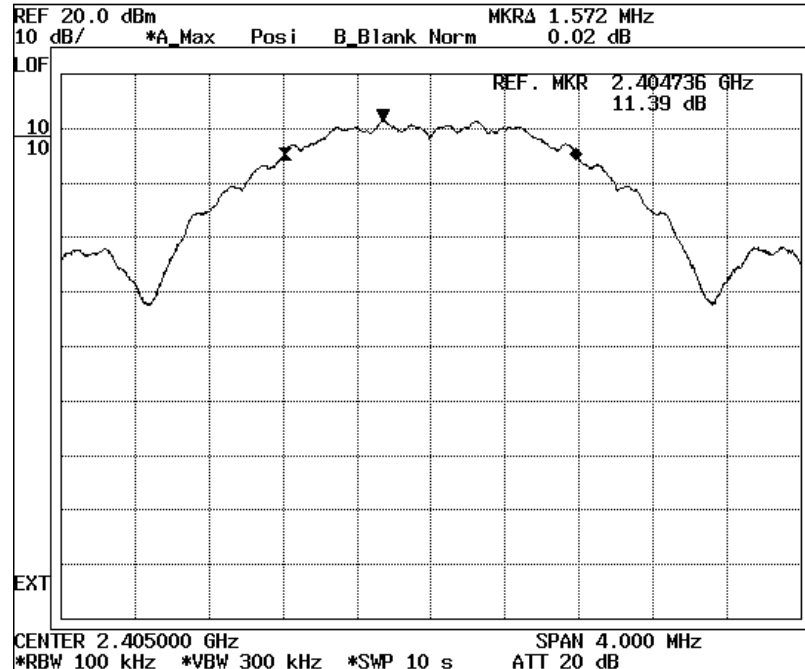
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### 3.5.5 6 dB Band Test Result

Test Item	6 dB Band
Test Mode	Zigbee
Test Site	RF Room
Measurement Method	Conducted

Channel No.	Frequency (MHz)	Measure (kHz)	Limit (kHz)	Result
1	2405	1572	>500	Pass
8	2440	1608	>500	Pass
14	2470	1592	>500	Pass

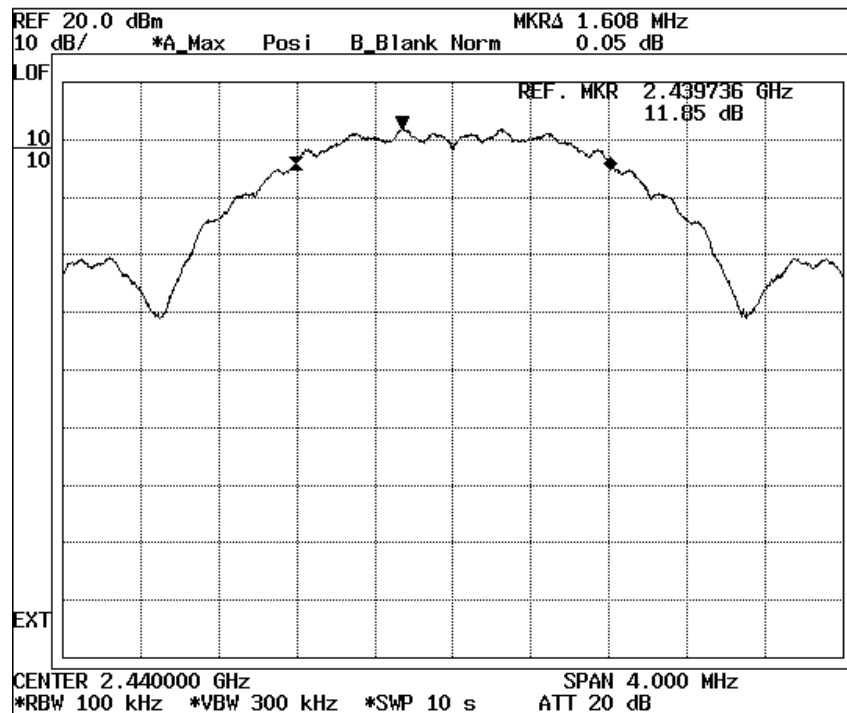
Channel 1.



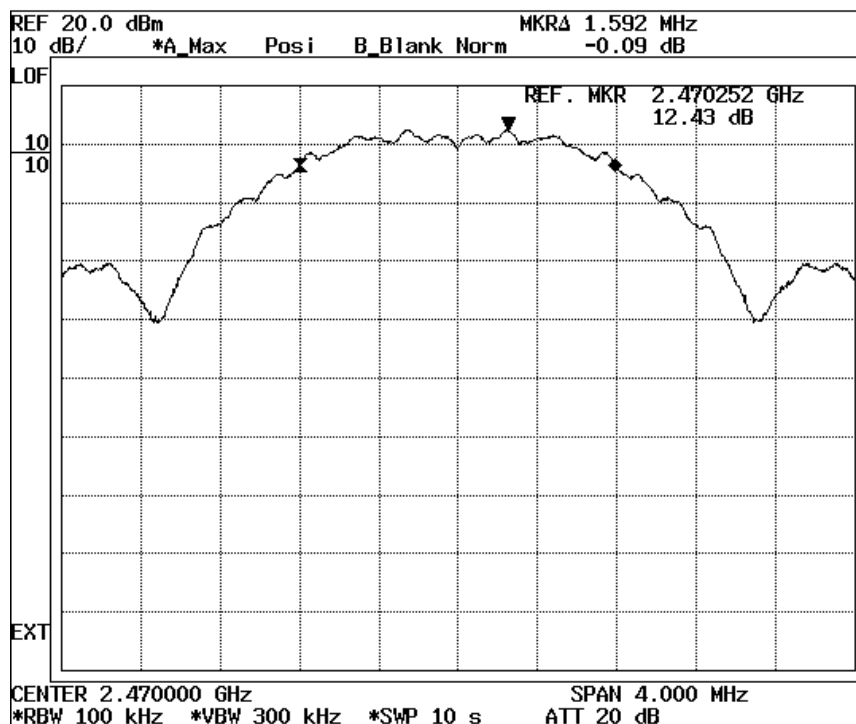
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Channel 8.



Channel 14.



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## 3.6 Power Density

### 3.6.1 Test Instruments

Description	Manufacturer	Model No.	Serial No.	Next of Calibration
Spectrum Analyzer	Advantest	R3273	130900034	Dec. 06, 2011
Attenuator	Agilent	8495B	MY42140745	Dec. 06, 2011

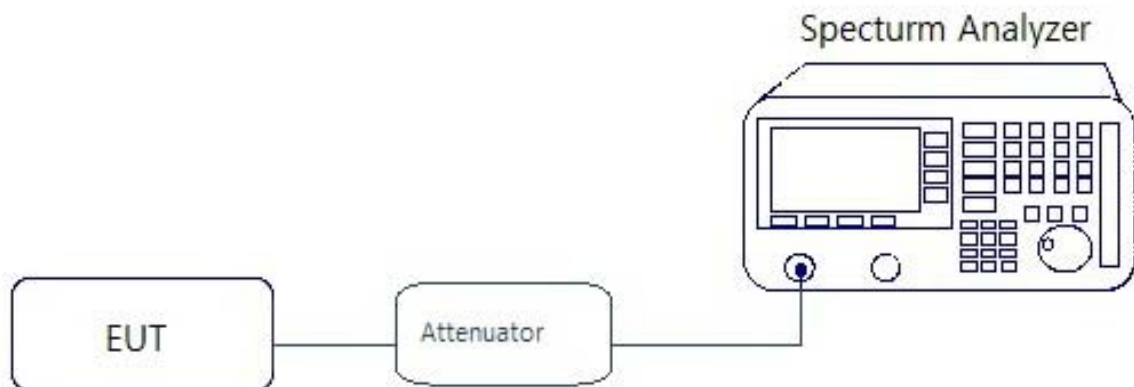
*Note :*

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to KRISS, KTL and HCT.
2. The calibration interval of horn ant. and loop ant. is 24 months

### 3.6.2 Limit

Section 15.247 (e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (v) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

### 3.6.3 Test Configuration



### 3.6.4 Test Procedure

The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the Power Density.

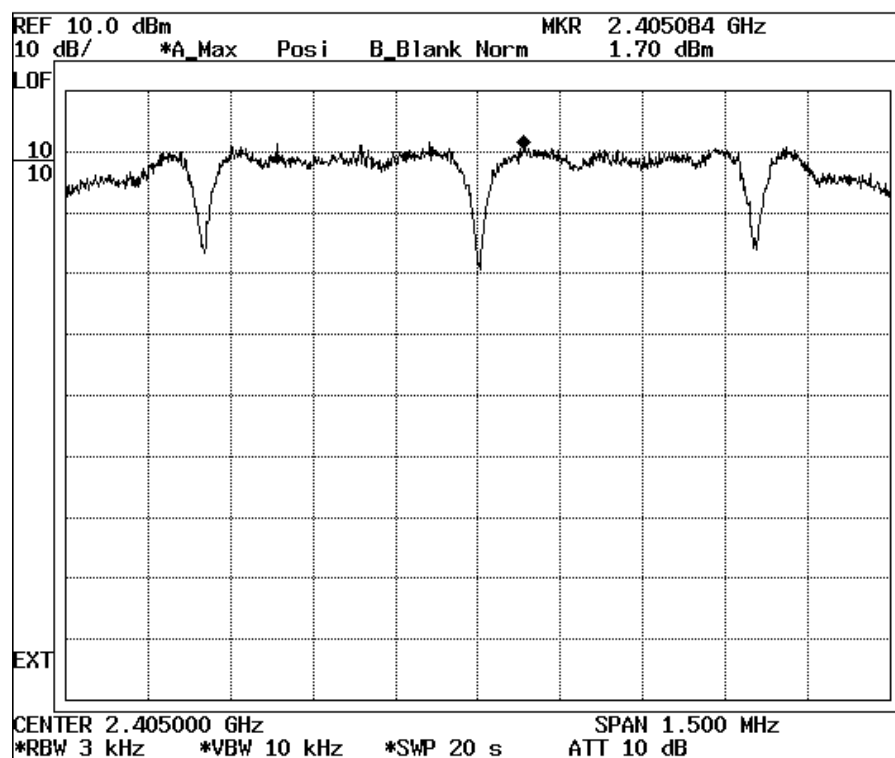
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### 3.6.5 Power Density Test Result

Test Item	Power Density
Test Mode	Zigbee
Test Site	RF Room
Measurement Method	Conducted

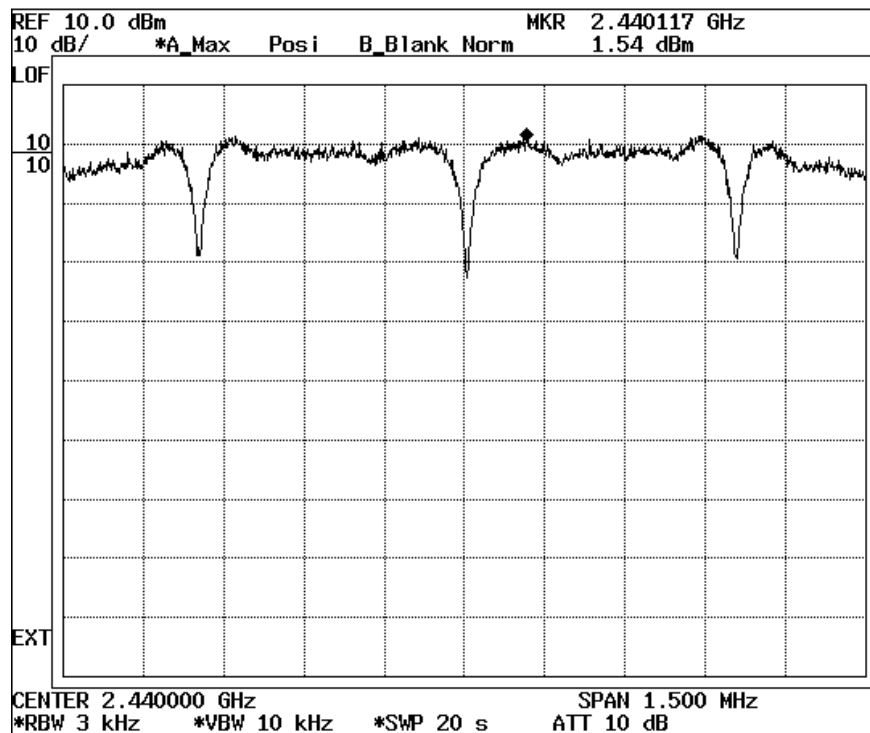
Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
1	2405	1.70	< 8	Pass
8	2440	1.54	< 8	Pass
14	2470	1.16	< 8	Pass

Channel 1.

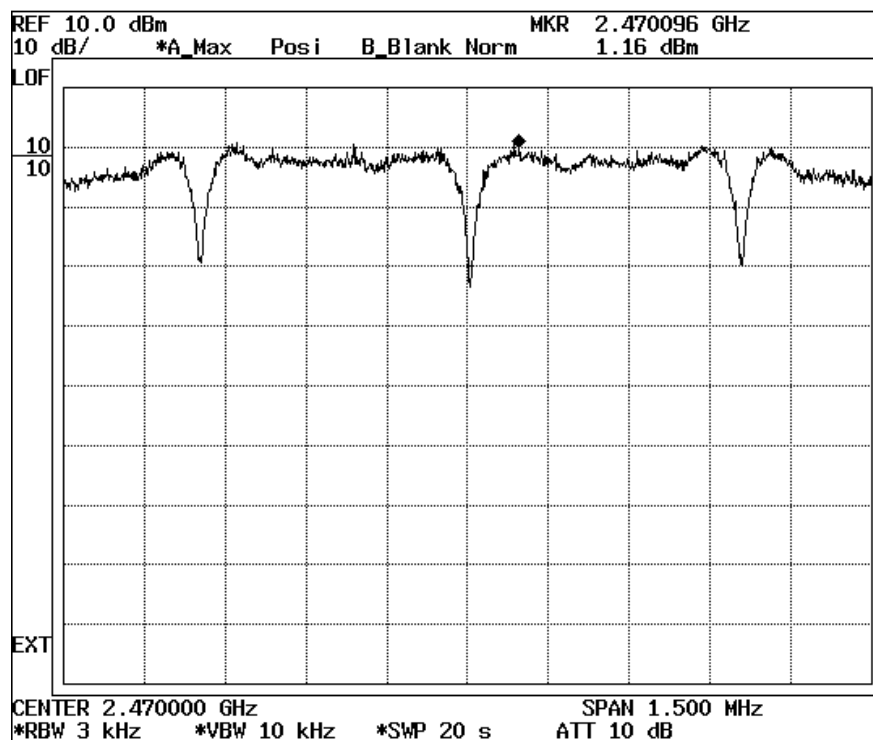


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Channel 8.



Channel 14.



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## **4.0 ANTENNA REQUIREMENT**

### **4.1 Zigbee Antenna**

#### **4.1.1 Applicable Standard**

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached or an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of section

#### **4.1.2 Antenna Construction**

The antenna of EUT is a unique (SMA Female) and the Maximum gain of the antennas is 2.0 dBi.

#### **4.1.3 Test Result : Pass**

## Appendix A. The Photo of Test Setup

- Front View of Conducted Emission



- Rear View of Conducted Emission



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- View of Radiated Emission (9 kHz to 30 MHz)



- View of Radiated Emission (30 MHz to 1GHz)



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- View of Radiated Emission (Above 1GHz)



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## Appendix B. The Photo of Equipment Under Test

Front View of EUT

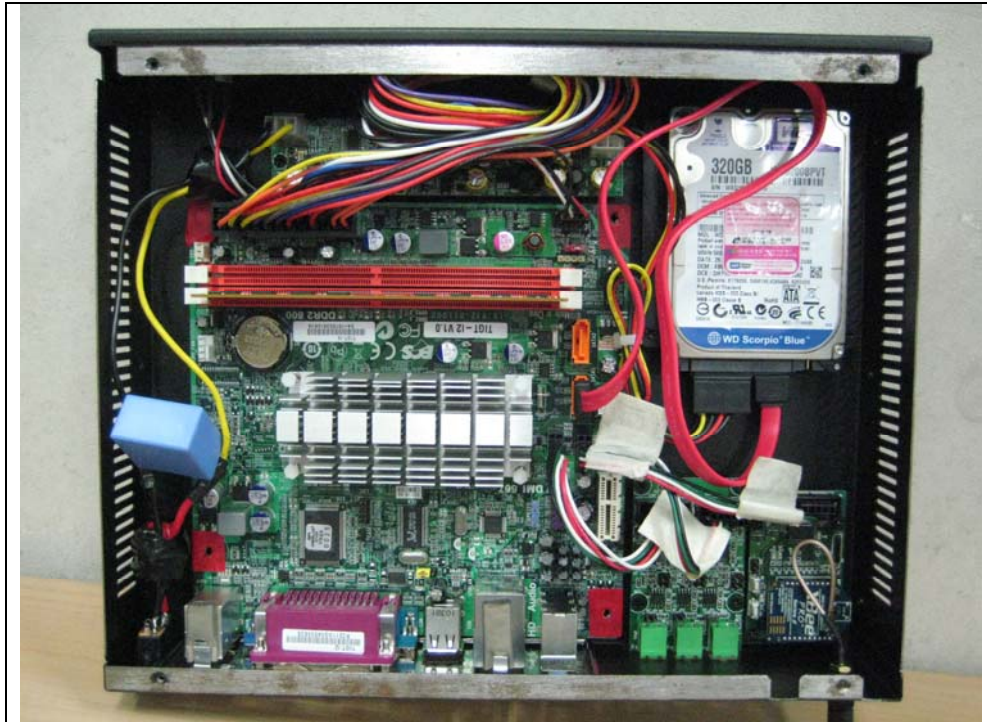


Rear View of EUT



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**Inside View of EUT**



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