Certification of Compliance

CFR 47 Part 15 Subpart C

Order No.	:	**CSTS-C1101-061**
Test Report No.	:	**CSTS-A11-FCC012**
Applicant	:	**Namsung Corporation.**
Address of Applicant	:	**13F Crown Plaza, 197-22, Guro-dong, Guro-gu, Seoul, Korea (152-050)**

Equipment Under Test (EUT)

Kind of Product	:	**RF Remote Controller for Marine Head Units**
Model Name	:	**RF30**
FCC ID	:	**GJWRF30**
Standards	:	**FCC Part 15 Subpart C(Section 15.247):2008 ANSI C63.4:2003**

Date of Receipt : 25 January, 2011
Date of Test : 03 March, 2011
Date of Issue : 09 March, 2011

Test Result : ■ **Positive** □ **Negative**

Jae Yeon, Choi / 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.

Contents

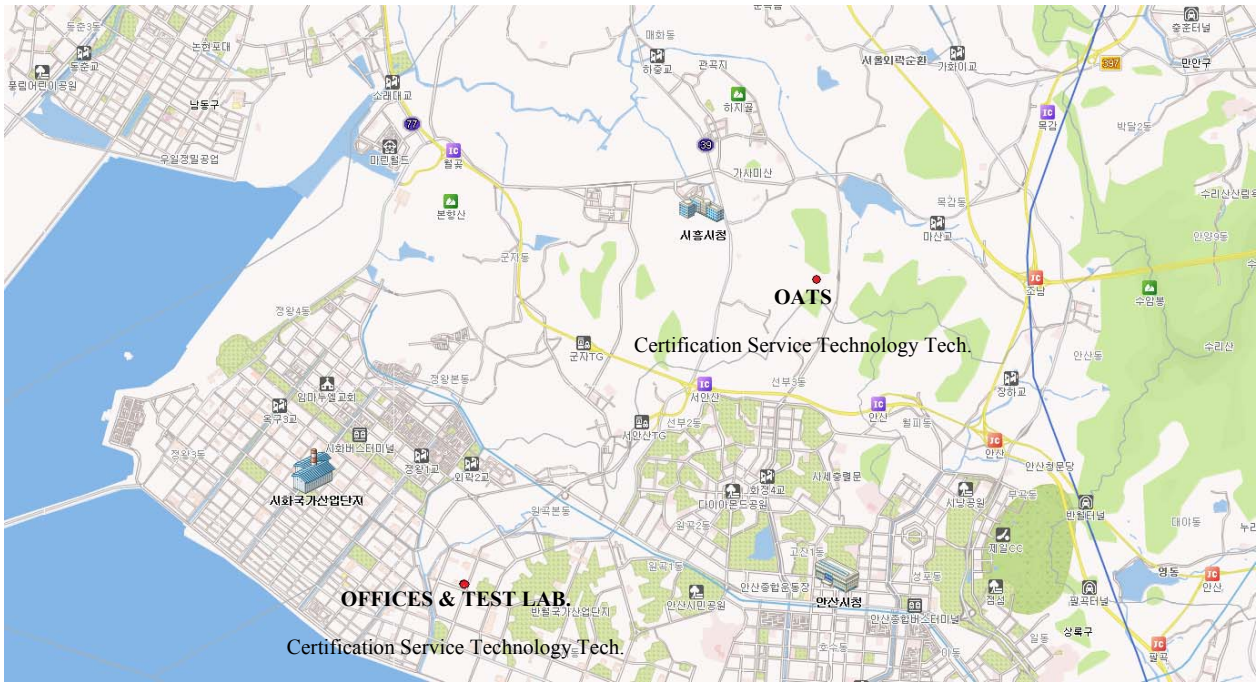
1. General Information

1.1 Information of Test Laboratory.

FCC E-Failing : Registration Number:289252

Name	:	Certification Service Technology Inc.
Address Radiated Emission (3m Full Chamber) Conducted Emission	:	2F/1055, Shingil-Dong, Danwon-Gu, Ansan-City, Gyeonggi-Do Korea, 425-839
Radiated Emission (OATS)	:	456 Sanhyeun-Dong, Sihung-City, Gyeonggi-Do Korea
Tel/Fax	:	+82-31-493-2001 / +82-31-493-2055

Web site : http://www.cstlab.co.kr E-mail : jychoi@cstlab.co.kr

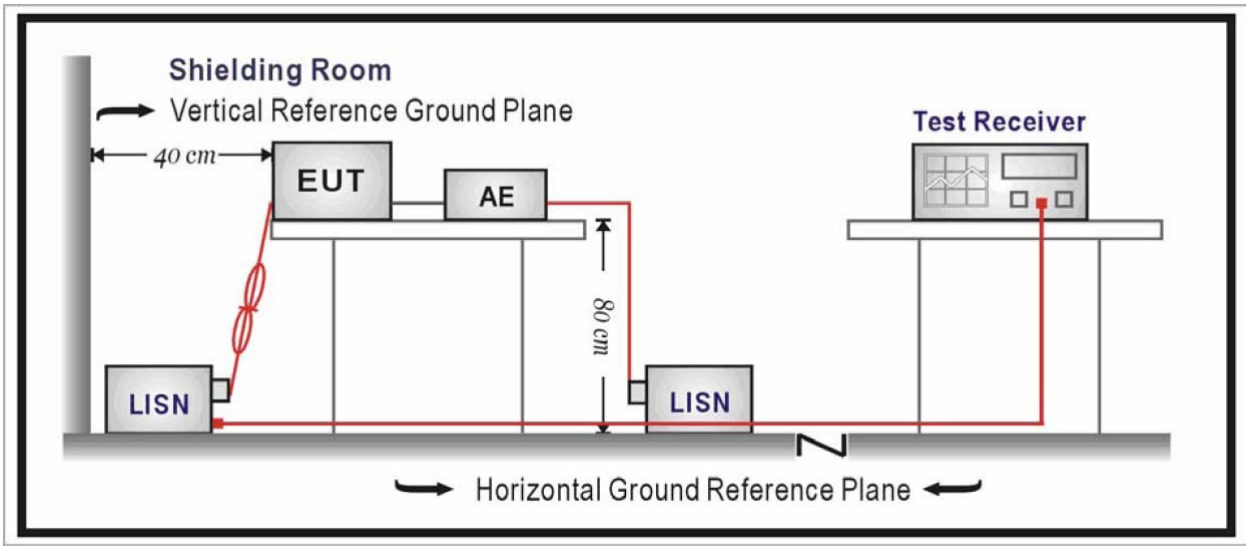


We , Certification Service Technology Inc. are an independent EMC and RF consultancy that was established the whole facility in our laboratories. The test facility has been accredited by the following accreditation Bodies in compliance with ISO 17025:

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 /50 uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50 ohm/50 uH coupling impedance with 50 ohm 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 invested over the frequency range from 0.15 MHz to 30 MHz using a receiver bandwidth of 9 kHz.



Limit Of Conducted Emission:

Test Specification
: According to FCC CFR Title 47 Part 15 Subpart C Section 15.207

FREQUENCY (MHz)	Limit	
	Quasi-peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5.0	56	46
5.0 to 30.0	60	50

*Decreases with the logarithm of the frequency.

Radiated Emissions:

The measurement was performed over the frequency range of 30 MHz to 1 GHz 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 120 kHz.

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 30 MHz to 1000 MHz using bi-log antenna. Above 1 GHz, 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 120 kHz or 1 MHz 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 1 GHz setting on the field strength meter is 120 kHz and above 1 GHz is 1 MHz.)

Limit Of Radiated Emission :

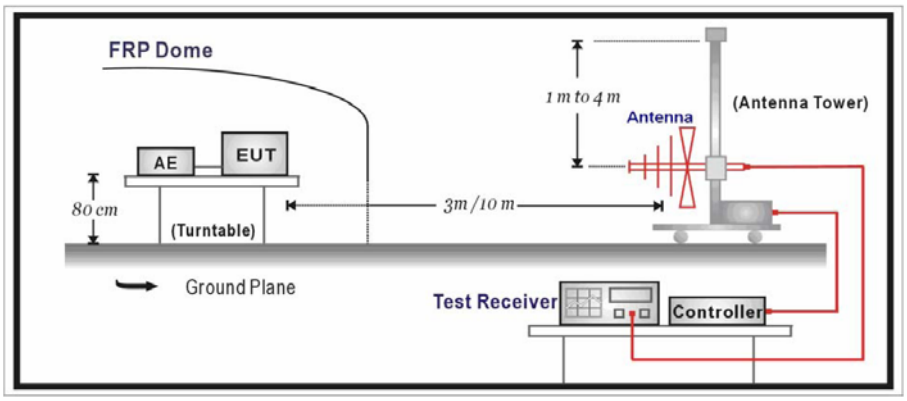
Test Specification
: According to FCC CFR Title 47 Part 15 Subpart C Section 15.209, 15.247

Limits		
Frequency (MHz)	μV/meter	dBμV/meter
0.009 – 0.490	2400/F (kHz)	300
0.190 – 1.705	24000/F (kHz)	30
1.705 – 30.0	30	30
30 – 88	100	40
88 – 216	150	43.52
216 – 960	200	46.02
Above 960	500	53.98

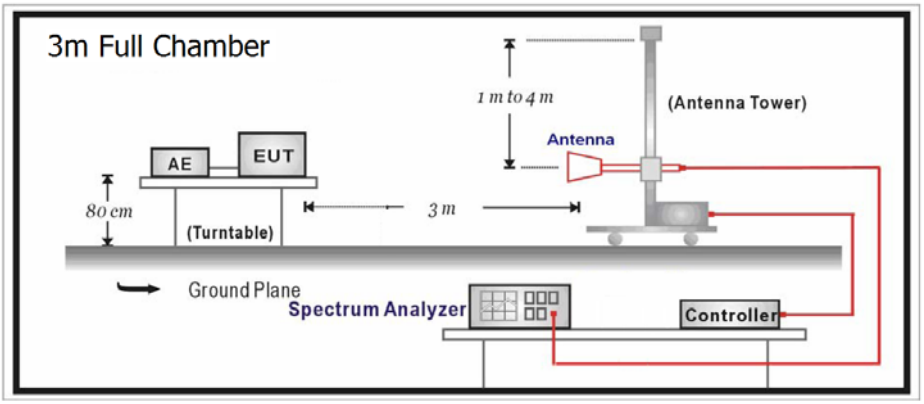
Remarks :

1. RF Voltage(dBuv)=20log 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 closed point of any part of the device or System.

Below 1GHz Test Setup:



Above 1GHz Test Setup:



1.3 Measurement Uncertainty Calculations

Conducted Emissions

TYPE	Contribution	Probability Distribution	Uncertainty	Remark
B	LISN Impedance Voltage Division Factor	 normal(k=2) normal(k=2)	 ±1.3 ±0.12	 CAL. CAL.
	cable	normal (k=2)	±0.2	NONCAL.
	Receiver Input Impedance QP Sine-Wave Voltage Accuracy QP-Pulse Amplitude Sensibility QP-Pulse Frequency Response Random Noise	 normal(k=1.64) normal(k=2) normal(k=2) normal(k=2) normal(k=2)	 ±0.0070 ±0.20 dB ±0.40 dB ±0.57 dB ±0.35 dB	CAL.
	Mismatch AMN to Receiver	U-Shaped	+0.7/-0.8	CISPR Theory
A	System Repeatability	Std deviation	±0.0721	
Combined Standard Uncertainty		normal	± 1.1155 [dB]	
Expanded Uncertainty U		normal(k=2)	*± 2.23*	*95.45 %*

Radiated Emission

TYPE	Contribution	Probability Distribution	Uncertainty 3/10m	Remark
B	Antenna factor frequency interpolation height variation direcvalupsy difference phase center location	 normal(k=2) rectangular rectangular rectangular	 ±0.5 dB ±0.1039 dB +1.5/-2.6 dB +0/-1.0 dB ±1.0 dB	 NPL NAMAS NAMAS
	Cable loss	normal(k=2)	±0.5 dB	
	Receiver Input Impedance QP Sine-Wave Voltage Accuracy QP-Pulse Amplitude Sensibility QP-Pulse Frequency Response Random Noise	 normal(k=1.64) normal(k=2) normal(k=2) normal(k=2) normal(k=2)	 ±0.0070 ±0.20 dB ±0.40 dB ±0.57 dB ±0.35 dB	
	Mismatch : AMN – receiver $\lvert\Gamma_{antenna}\rvert$ =0.33 $\lvert\Gamma_{receiver}\rvert$ =0.33	U-Shaped	+0.9/-1.0 dB	CISPR
A	System repeatibility	Std deviation	±0.1149 dB	
Combined standard Uncertainty		normal	±1.3193 [dB]	
Expanded Uncertainty U		normal(k=2)	*± 2.63*	*95.45 %*

1.4 Manufacturer Information

Manufacturer	:	Namsung Electronics (Shenzhen) Ltd.
Address	:	No.11 Workshop, Area 34, Bao'an District, Shenzhen, Guangdong 518133, China

1.5 General Description of EUT

Name : RF Remote Controller for Marine Head Units
Model No. : RF30
FCC ID : GJWRF30
Serial No. : N/A

1.6 Details of EUT

Section	Specification
Operating Frequency	2415.4 MHz, 2420 .4MHz, 2425.4 MHz, 2430.4 MHz, 2435.4 MHz
The Number of Channels	5 Channels
Input Voltage	Remote : DC 3.0 V (Lithium Battery)
	Receiver : DC 12.0 V
Operating Tem.	-10 °C ~ 50 °C
Communication Mode	Simplex
Modulation	GFSK

- Please refer to user's manual.

1.7 Description of Support Units

Product	Model No.	Serial No.	Manufacturer	Certification
RF Remote Controller for Marine Head Units	RF30(Remote)	N/A	Namsung Electronics (Shenzhen) Ltd.	EUT
	RF30(Receiver)	N/A	Namsung Electronics (Shenzhen) Ltd.	EUT

1.8 Cable List

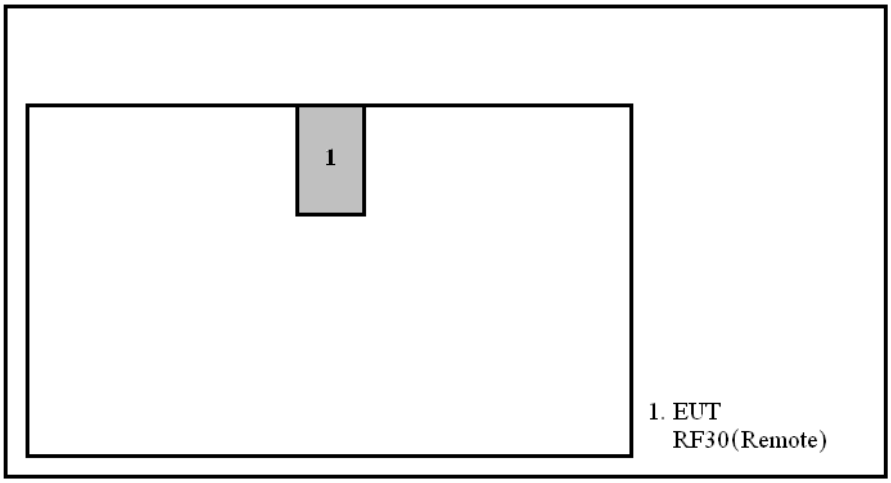
Start		END		Cable Spec	
Name	I/O Port	Name	I/O Port	Lenth	Shield
-	-	-	-	-	-

1.9 System Configuration

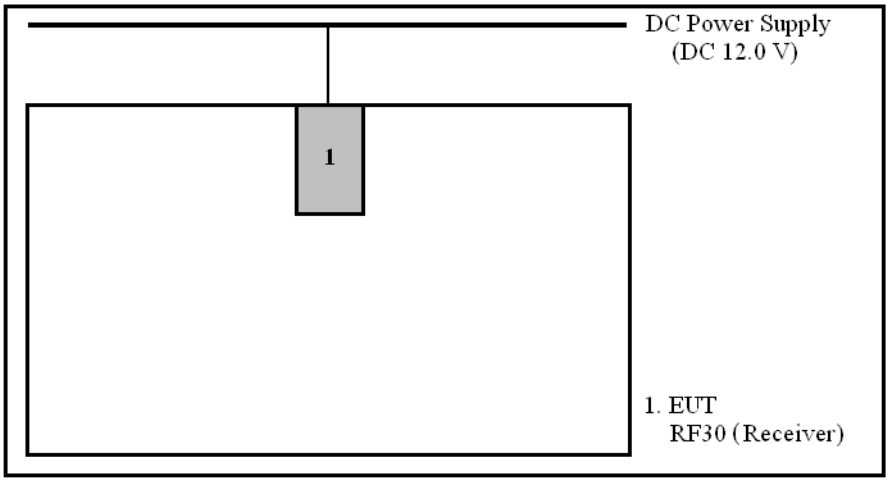
Description	Model	Serial No.	Manufacturer
-	-	-	-

1.10 Test Set-Up Configuration

1.10.1 RF30 (Remote)



1.10.2 RF30 (Receiver)



1.11 Test Methodology And Configuration

RF30 (Remote) : Continuous Tx Mode
RF30 (Receiver) : Continuous Rx Mode

1.12 Standards Applicable for Testing

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

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

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

2. SUMMARY

Test Descriptions	
- Conducted Emission -Conducted Emission Result	N/A
- Radiated Emission Radiated Emission Result	PASS
- Peak power output - Test Result	PASS
- Band edge - Test Result	PASS
- 6 dB Band Test Result	PASS
- Power Density Test Result	PASS

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	L0804A003	Sep. 17, 2011
LISN	EMCIS	LN2-16	LN10010	Apr. 13, 2011
LISN	EMCO	3825/2	9006-1666	Apr. 19, 2011
Transient Limiter	HAMEG	HZ560	N/A	Jul. 30, 2011
Shielded Room	BRADEN	N/A	DAC-60-005	-

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

3.1.2 Test Area

Conducted Room (Shielded Room)

3.1.3 Operation of EUT

Operating Environment

Temperature	:	degree C
Humidity	:	%RH
Atmospheric Pressure	:	kPa

3.1.4 Test Date

3.1.5 Conducted Emissions Result

Phase : Live

Freq. [MHz]	Measurement [dBµV]		Limit [dBµV]		Insertion Loss	Cable Loss	Result [dBµV]		Margin [dB]	
	Q-peak	Average	Q-peak	Average	[dB]	[dBµV]	Q-peak	Average	Q-peak	Average

Note :

Phase : Neutral

Freq. [MHz]	Measurement [dBµV]		Limit [dBµV]		Insertion Loss	Cable Loss	Result [dBµV]		Margin [dB]	
	Q-peak	Average	Q-peak	Average	[dB]	[dBµV]	Q-peak	Average	Q-peak	Average

Note :

3.2 Radieted Emission

3.2.1 Test Instruments

Description	Manufacturer	Model No.	Serial No.	Next of Calibration
Test Receiver	LIG NEX1	ER-265	L0804B002	Jul. 15, 2011
LOOP ANT.	Schwarz beck	HFH2-Z2	100187	Jul. 22, 2011
BICONILOG ANT.	EMCO	3142	9107-1128	Apr. 27, 2012
Horn Antenna	Schwarzbeck	BBHA9120D	0501	Aug. 31 2012
Horn Antenna	Schwarzbeck	BBHA9170	BBHA9170152	Aug. 31. 2012
BICONICAL ANT.	EMCO	3104C	9012-4380	Mar. 26, 2012
LOGPERIODIC ANT.	EMCO	3146	9008-2863	Mar. 28, 2010
Turn Table	EMCO	D-TT 06	N/A	-
Ant. Mast	EMCO	D-AM 06	N/A	-
Controller	EMCO	D-CTR 06	N/A	-
T-TABLE CONTROLLER	EMCO	1060-1.511	9101-1517	-
CHAMBER	BRADEN	RF Shielded door Assembly	DAC-60-004	-
DC Power Supply	HAN IL T&M CO.	HPS-305D	804025	Jul. 14, 2011

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:

Peak = Reading + Corrected Factor

Where

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

3.2.2 Test Area

3m Full Chamber

3.2.3 Operation of EUT

Operating Environment

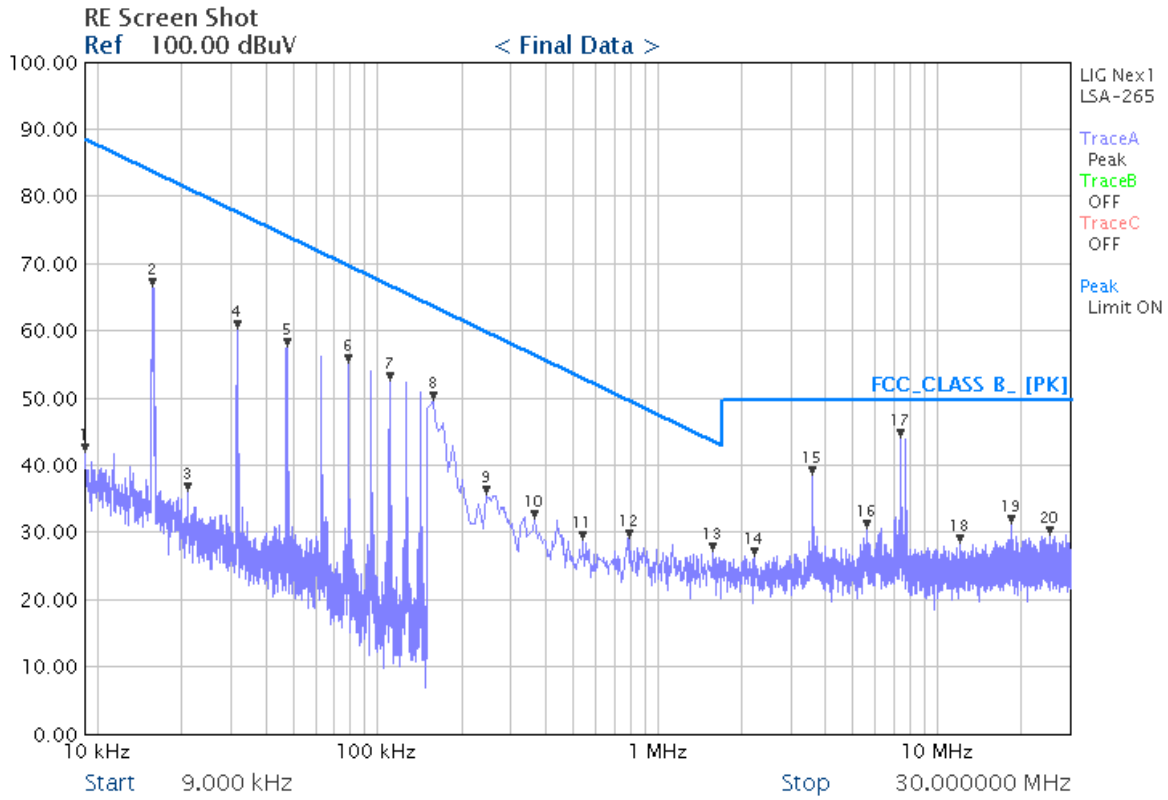
Temperature	:	22.0	degree C
Humidity	:	50	%RH
Atmospheric Pressure	:	98.7	kPa

3.2.4 Test Date

Mar. 04, 2011

3.2.5 Radiated Emission Result (9 kHz ~ 30 MHz)

Test Frequency	9 kHz to 30 MHz	Polarization	Horizontal
Test Mode	Continuous Tx	Test Channel	Normal Operating Mode
Test Result	PASS		



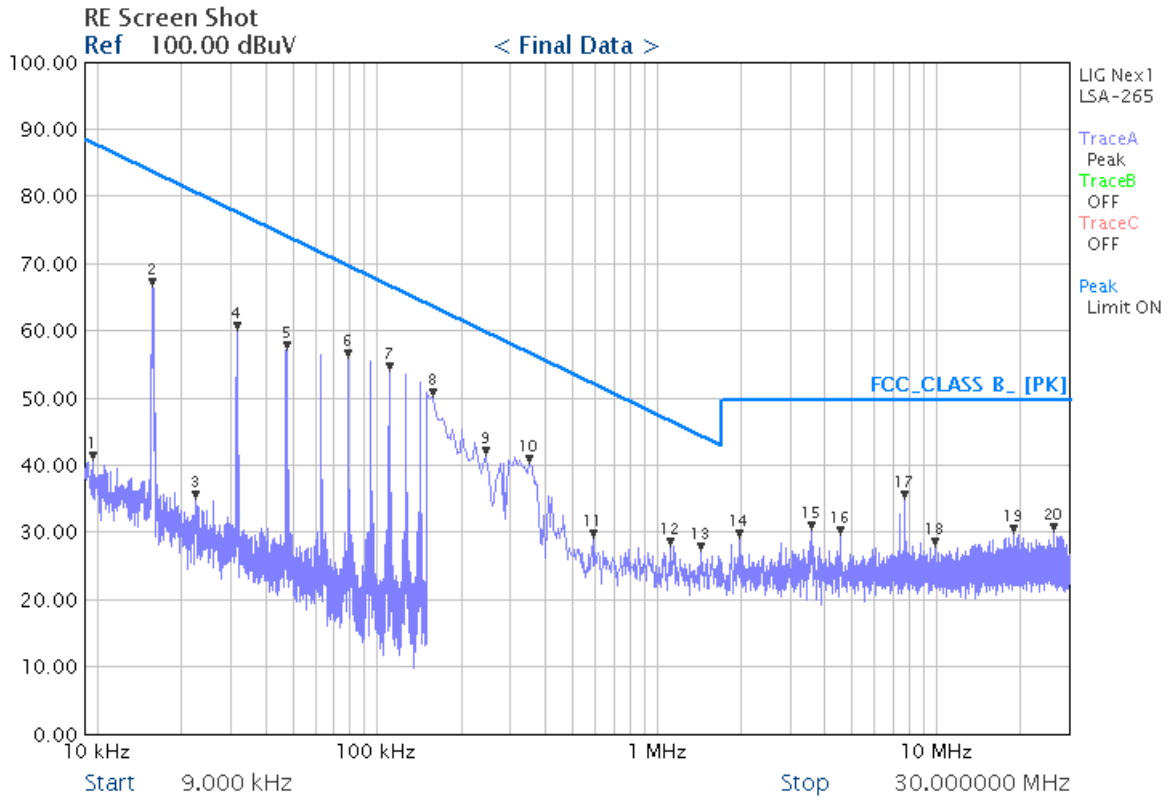
Frequency MHz	Reading dBuV	P (H, V)	Ant. Factor dB	Cable Loss dB	AMP GAIN dB	Limit dBuV	Total dBuV	Margin dB
3.58	13.74	H	18.80	0.51	-	49.54	33.05	16.49
7.41	16.68	H	18.68	1.070	-	49.54	36.43	13.11
7.69	15.95	H	18.67	1.090	-	49.54	35.71	13.83

Note : 1. All reading levels are Quasi-peak value.

2. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

3. X axis plane was the worst test result than Y axis plane and Z axis plane.

Test Frequency	9 kHz to 30 MHz	Polarization	Vertical
Test Mode	Continuous Tx	Test Channel	Normal Operating Mode
Test Result	PASS		



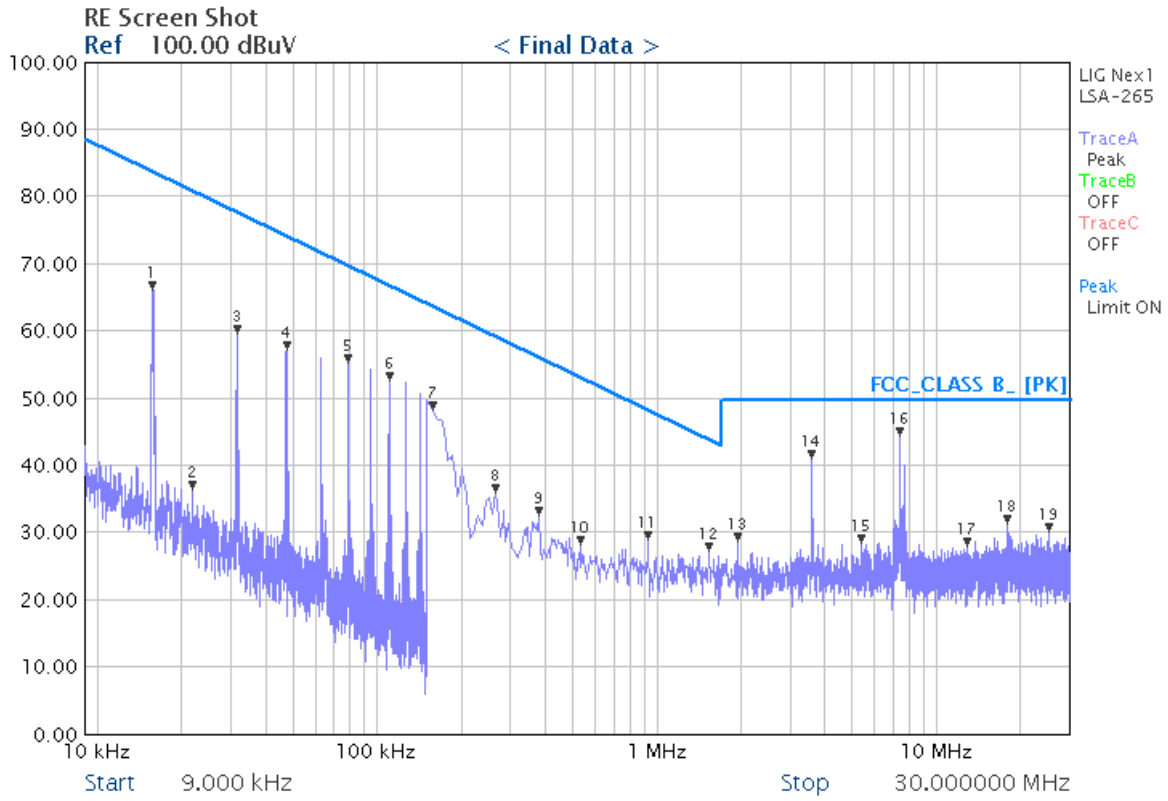
Frequency MHz	Reading dBuV	P (H, V)	Ant. Factor dB	Cable Loss dB	AMP GAIN dB	Limit dBuV	Total dBuV	Margin dB
0.11	34.98	V	18.92	0.11	-	66.77	54.01	12.75
7.70	15.10	V	18.67	1.09	-	49.54	34.86	14.68

Note : 1. All reading levels are Quasi-peak value.

2. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

3. X axis plane was the worst test result than Y axis plane and Z axis plane.

Test Frequency	9 kHz to 30 MHz	Polarization	Horizontal
Test Mode	Continuous Rx	Test Channel	Normal Operating Mode
Test Result	PASS		

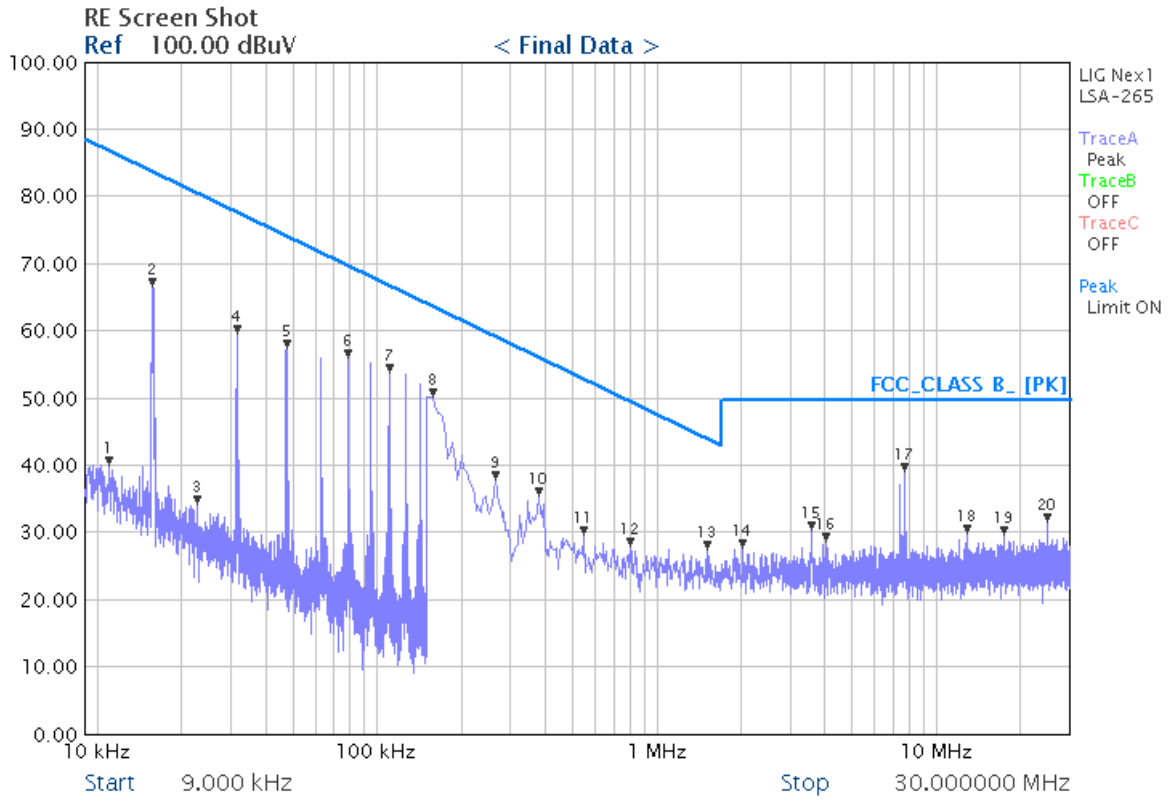


Frequency MHz	Reading dBuV	P (H, V)	Ant. Factor dB	Cable Loss dB	AMP GAIN dB	Limit dBuV	Total dBuV	Margin dB
3.59	16.48	H	18.80	0.51	-	49.54	35.79	13.75
7.41	18.76	H	18.68	1.07	-	49.54	38.51	11.03

Note : 1. All reading levels are Quasi-peak value.

2. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

Test Frequency	9 kHz to 30 MHz	Polarization	Vertical
Test Mode	Continuous Rx	Test Channel	Normal Operating Mode
Test Result	PASS		



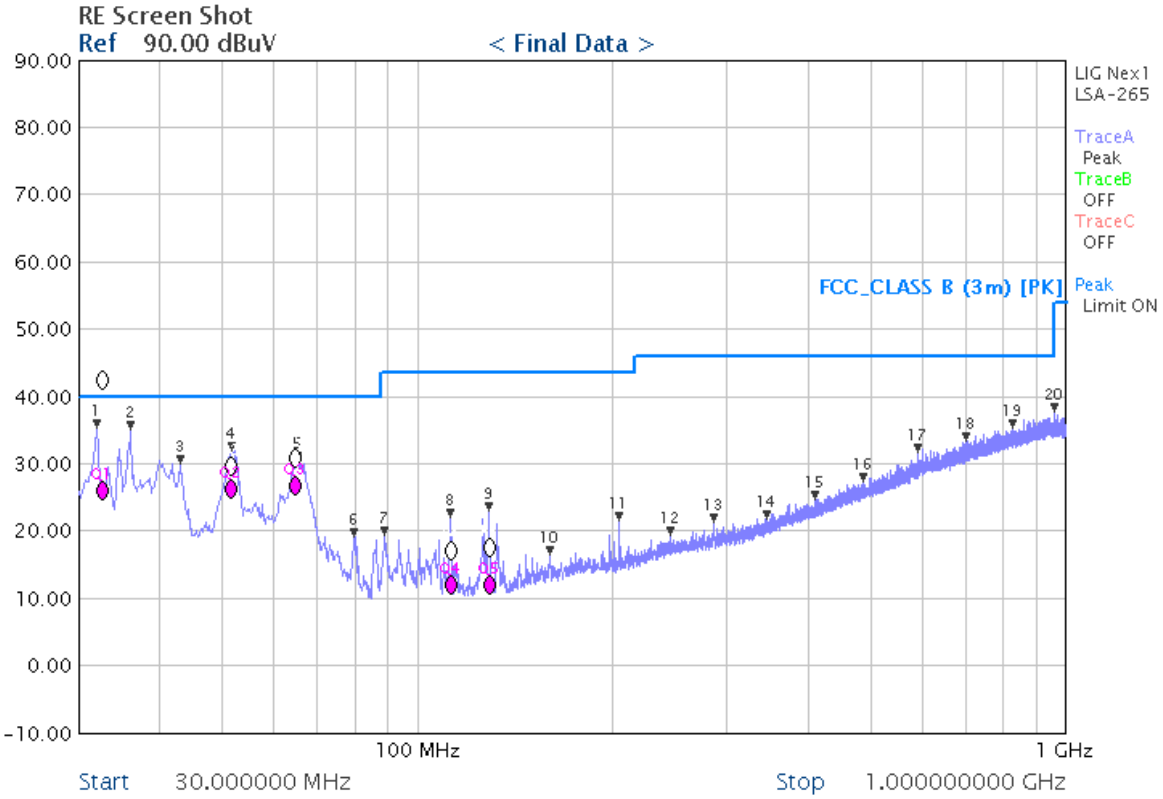
Frequency MHz	Reading dBuV	P (H, V)	Ant. Factor dB	Cable Loss dB	AMP GAIN dB	Limit dBuV	Total dBuV	Margin dB
0.16	31.13	V	18.91	0.12	-	63.67	50.16	13.51
7.70	19.16	V	18.67	1.09	-	49.54	38.92	10.62

Note : 1. All reading levels are Quasi-peak value.

2. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

3.2.6 Radiated Emission Result (30 MHz ~ 1000 MHz)

Test Frequency	30 to 1000 MHz	Polarization	X-Plane
Test Mode	Continuous Tx	Test Channel	F1 (2415.4 MHz)
Test Result	PASS		



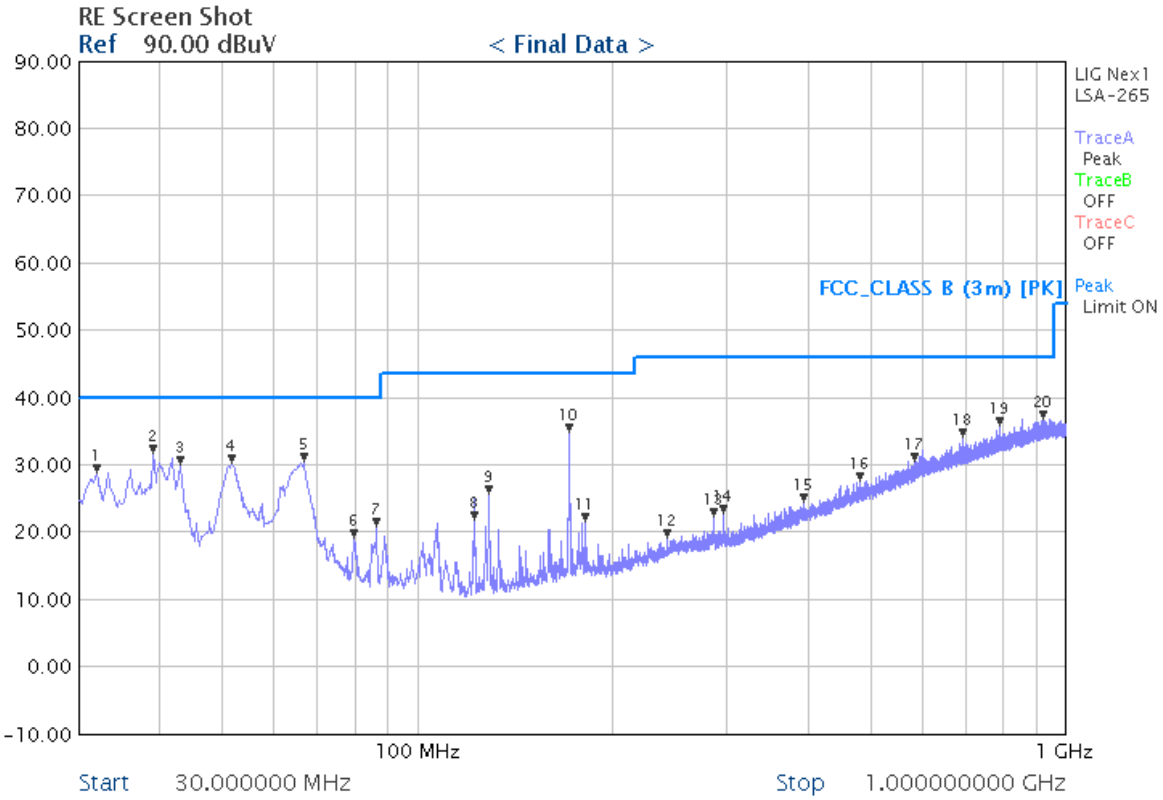
Frequency MHz	Reading dBuV	P (H, V)	Ant. Factor dB	Cable Loss dB	AMP GAIN dB	Limit dBuV	Total dBuV	Margin dB
32.61	9.71	V	16.31	0.95	-	40.00	26.97	13.03
51.69	16.48	V	8.46	1.13	-	40.00	26.07	13.93
64.86	18.39	H	6.96	1.25	-	40.00	26.60	13.40

Note : 1. All reading levels are Quasi-peak value.

2. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

3. X axis plane was the worst test result than Y axis plane and Z axis plane.

Test Frequency	30 to 1000 MHz	Polarization	X-Plane
Test Mode	Continuous Tx	Test Channel	F2 (2425.4 MHz)
Test Result	PASS		



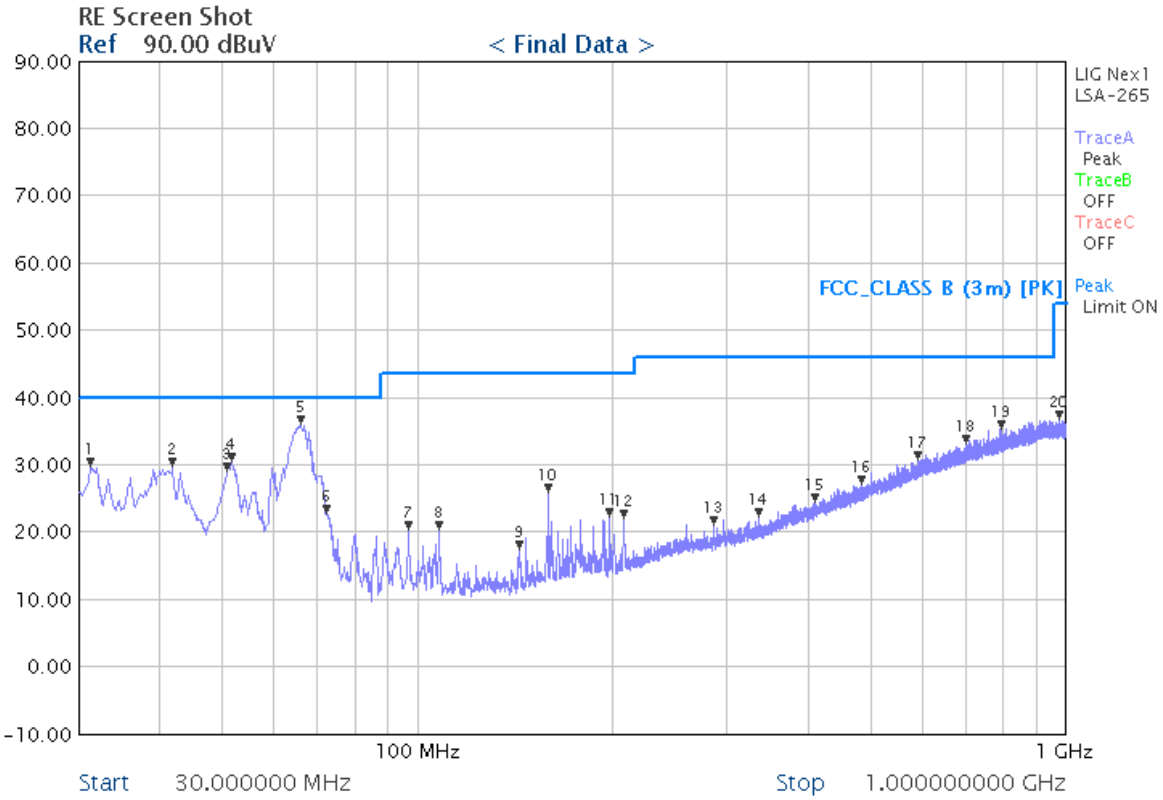
Frequency MHz	Reading dBuV	P (H, V)	Ant. Factor dB	Cable Loss dB	AMP GAIN dB	Limit dBuV	Total dBuV	Margin dB
39.12	17.55	V	13.18	1.02	-	40.00	31.75	8.25
43.03	17.61	V	11.25	1.08	-	40.00	29.94	10.06
51.55	20.64	H	8.48	1.13	-	40.00	30.25	9.75
66.59	22.47	H	6.84	1.24	-	40.00	30.55	9.45
171.28	23.27	V	9.64	1.98	-	43.52	34.89	8.63

Note : 1. All reading levels are Quasi-peak value.

2. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

3. X axis plane was the worst test result than Y axis plane and Z axis plane.

Test Frequency	30 to 1000 MHz	Polarization	X-Plane
Test Mode	Continuous Tx	Test Channel	F3 (2435.4 MHz)
Test Result	PASS		



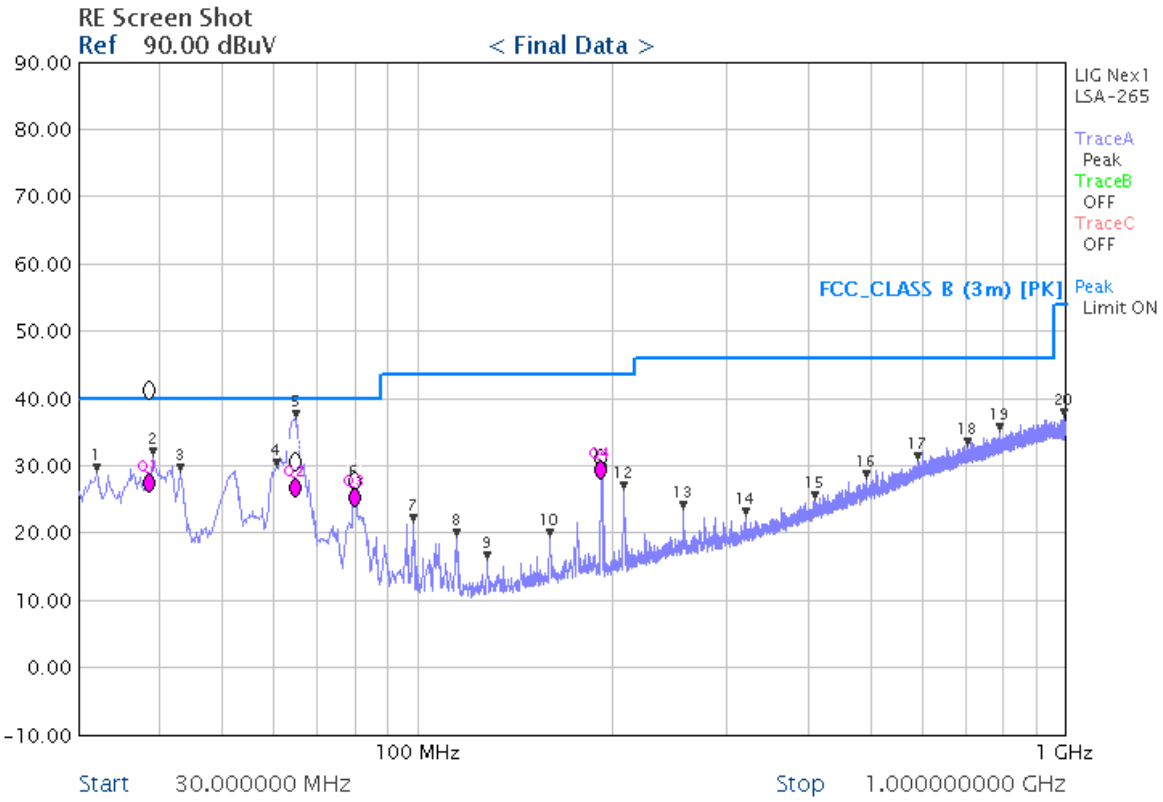
Frequency MHz	Reading dBuV	P (H, V)	Ant. Factor dB	Cable Loss dB	AMP GAIN dB	Limit dBuV	Total dBuV	Margin dB
31.30	11.94	V	16.80	0.94	-	40.00	29.68	10.32
41.72	16.71	V	11.87	1.06	-	40.00	29.64	10.36
50.84	19.28	V	8.58	1.12	-	40.00	28.98	11.02
51.55	20.78	V	8.48	1.13	-	40.00	30.39	9.61
66.00	27.78	V	6.88	1.24	-	40.00	35.90	4.1

Note : 1. All reading levels are Quasi-peak value.

2. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

3. X axis plane was the worst test result than Y axis plane and Z axis plane.

Test Frequency	30 to 1000 MHz	Polarization	-
Test Mode	Continuous Rx	Test Channel	Normal Operation Mode
Test Result	PASS		



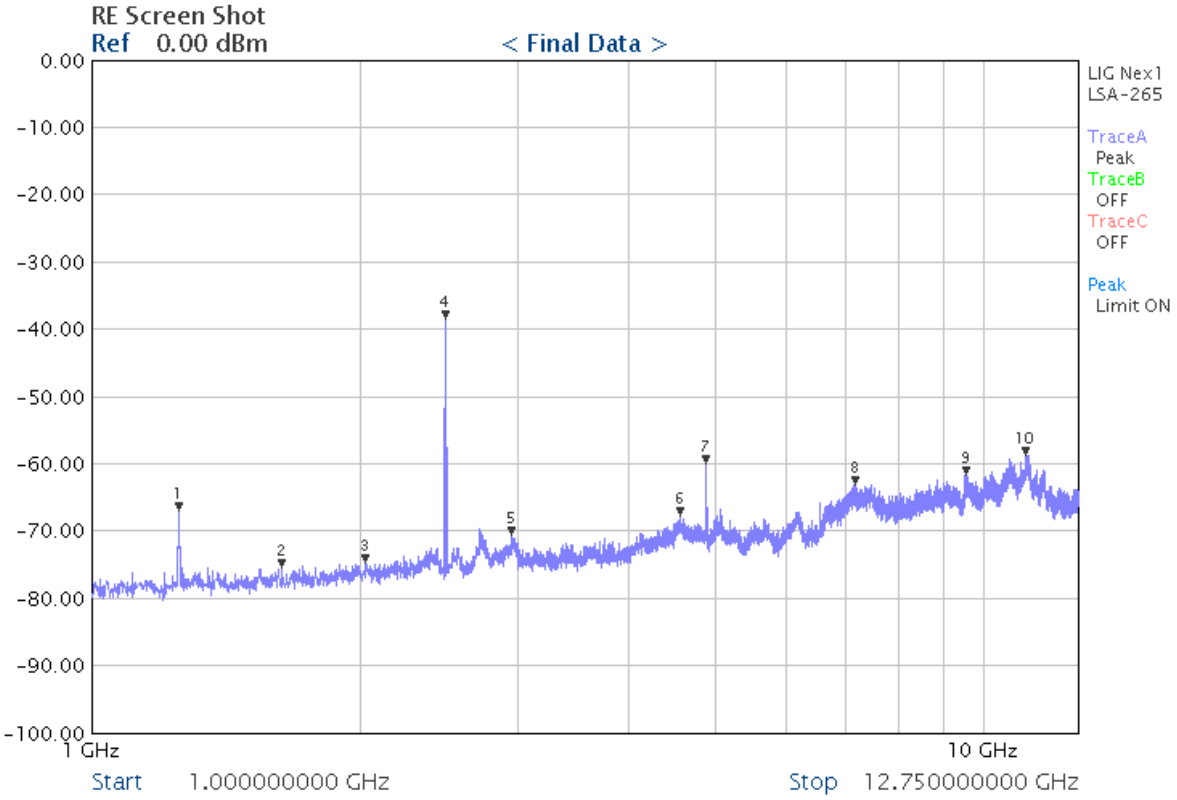
Frequency MHz	Reading dBuV	P (H, V)	Ant. Factor dB	Cable Loss dB	AMP GAIN dB	Limit dBuV	Total dBuV	Margin dB
39.12	13.07	V	13.18	1.02	-	40.00	27.27	12.73
43.03	16.57	V	11.25	1.08	-	40.00	28.90	11.10
64.70	18.44	V	6.97	1.25	-	40.00	26.66	13.34
79.74	17.40	V	6.41	1.36	-	40.00	25.17	14.83
192.71	17.24	H	9.90	2.12	-	43.52	29.26	14.26

Note : 1. All reading levels are Quasi-peak value.

2. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

3.2.6 Fundamental & Hamonics Radiated Emission Result (1 GHz ~ 12.75 GHz)

Test Frequency	1 to 12.75 GHz	Polarization	Horizontal
Test Mode	Continuous Tx	Test Channel	F1 (2415.4 MHz)
Test Result	PASS		



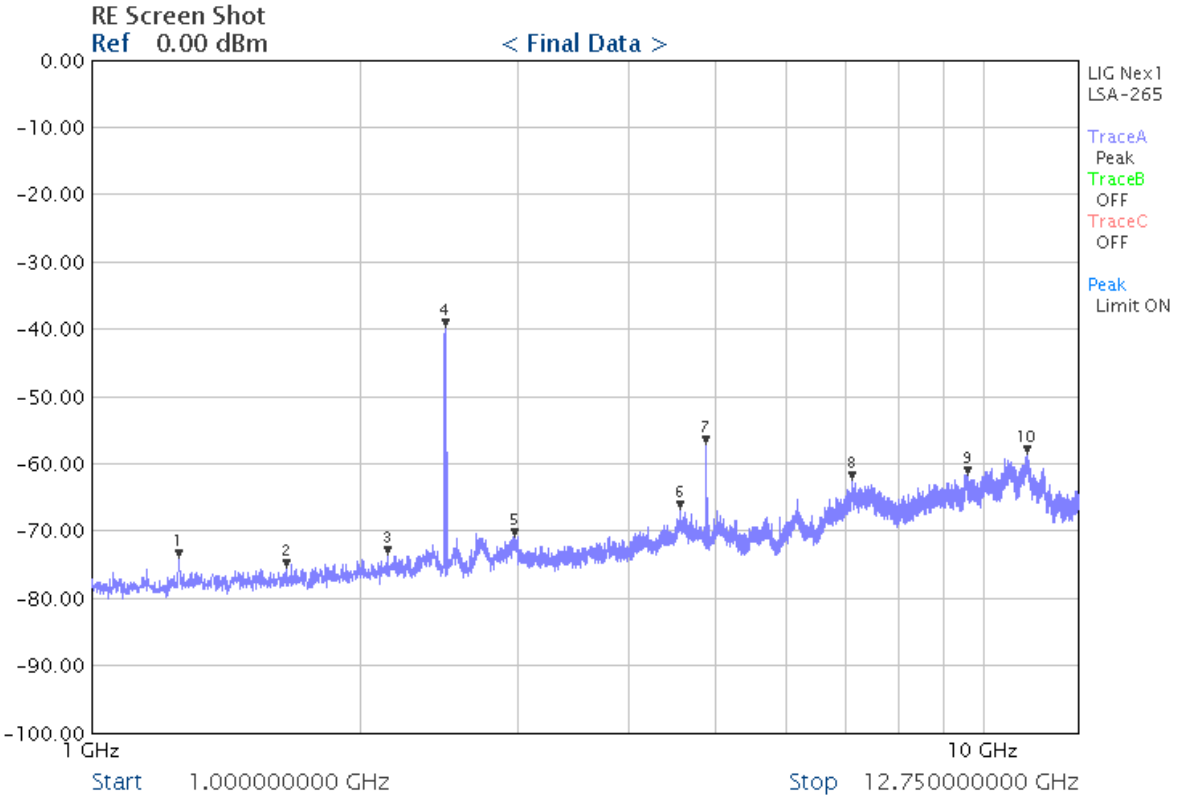
Frequency MHz	Reading (PK/AV) dBuV/m	P (H, V)	Correction Factor dB	Limit (PK/AV) dBuV	Total (PK/AV) dBuV	Margin (PK/AV) dB
1251.04	12.31/10.05	H	27.77	74/54	40.08/37.82	33.92/16.18
2415.40	34.69/33.57	H	33.71	114/94	68.40/67.28	45.60/26.72
4874.56	6.43/5.56	H	40.43	74/54	46.86/45.99	27.14/8.01

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

2. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

3. X axis plane was the worst test result than Y axis plane and Z axis plane.

Test Frequency	1 to 12.75 GHz	Polarization	Vertical
Test Mode	Continuous Tx	Test Channel	F1 (2415.4 MHz)
Test Result	PASS		



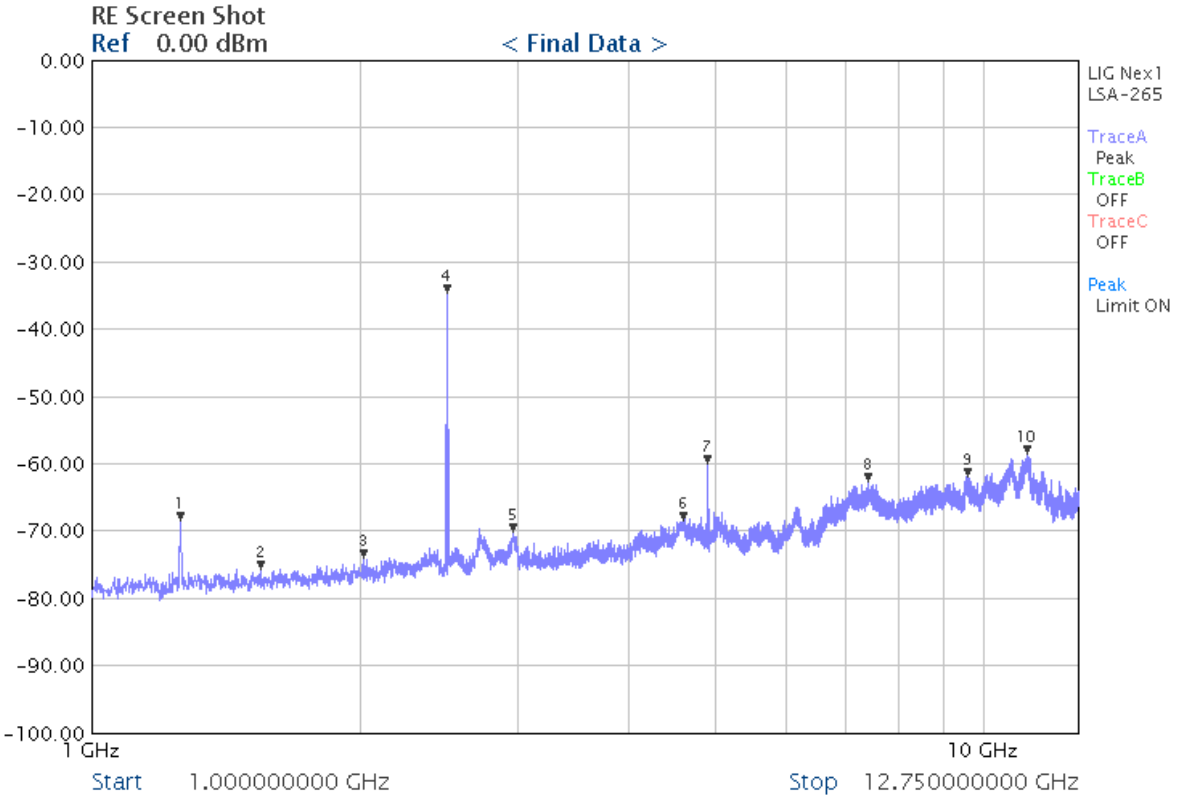
Frequency MHz	Reading (PK/AV) dBuV/m	P (H, V)	Correction Factor dB	Limit (PK/AV) dBuV	Total (PK/AV) dBuV	Margin (PK/AV) dB
2415.40	33.43/32.14	V	33.71	114/94	67.14/65.85	46.86/28.15
4874.56	9.36/5.39	V	40.43	74/54	49.79/45.82	24.21/8.18

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

2. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

3. X axis plane was the worst test result than Y axis plane and Z axis plane.

Test Frequency	1 to 12.75 GHz	Polarization	Horizontal
Test Mode	Continuous Tx	Test Channel	F2 (2425.4 MHz)
Test Result	PASS		



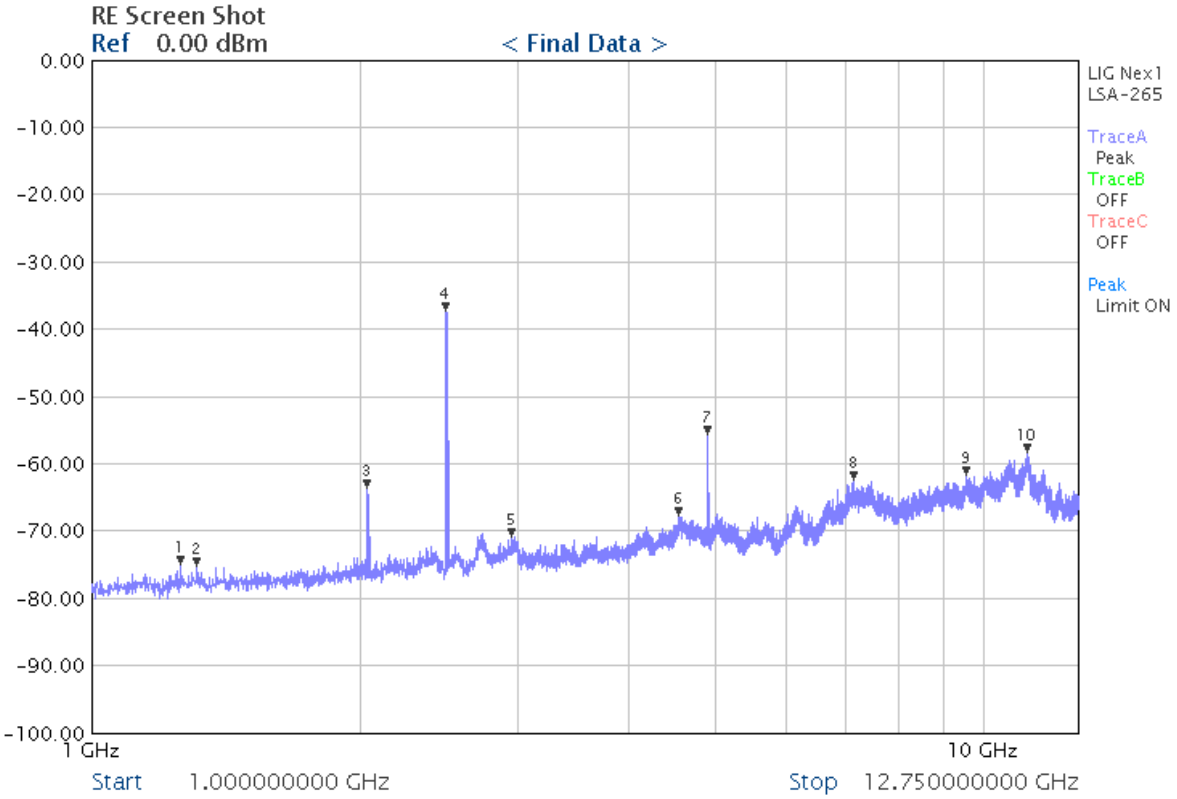
Frequency MHz	Reading (PK/AV) dBuV/m	P (H, V)	Correction Factor dB	Limit (PK/AV) dBuV	Total (PK/AV) dBuV	Margin (PK/AV) dB
1258.21	8.87/6.43	H	29.58	74/54	38.45/36.01	35.55/17.99
2425.40	38.58/37.40	H	33.78	114/94	72.36/71.18	41.64/22.82
4897.54	6.33/2.87	H	40.51	74/54	46.84/43.38	27.16/10.62

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

2. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

3. X axis plane was the worst test result than Y axis plane and Z axis plane.

Test Frequency	1 to 12.75 GHz	Polarization	Vertical
Test Mode	Continuous Tx	Test Channel	F2 (2425.4 MHz)
Test Result	PASS		



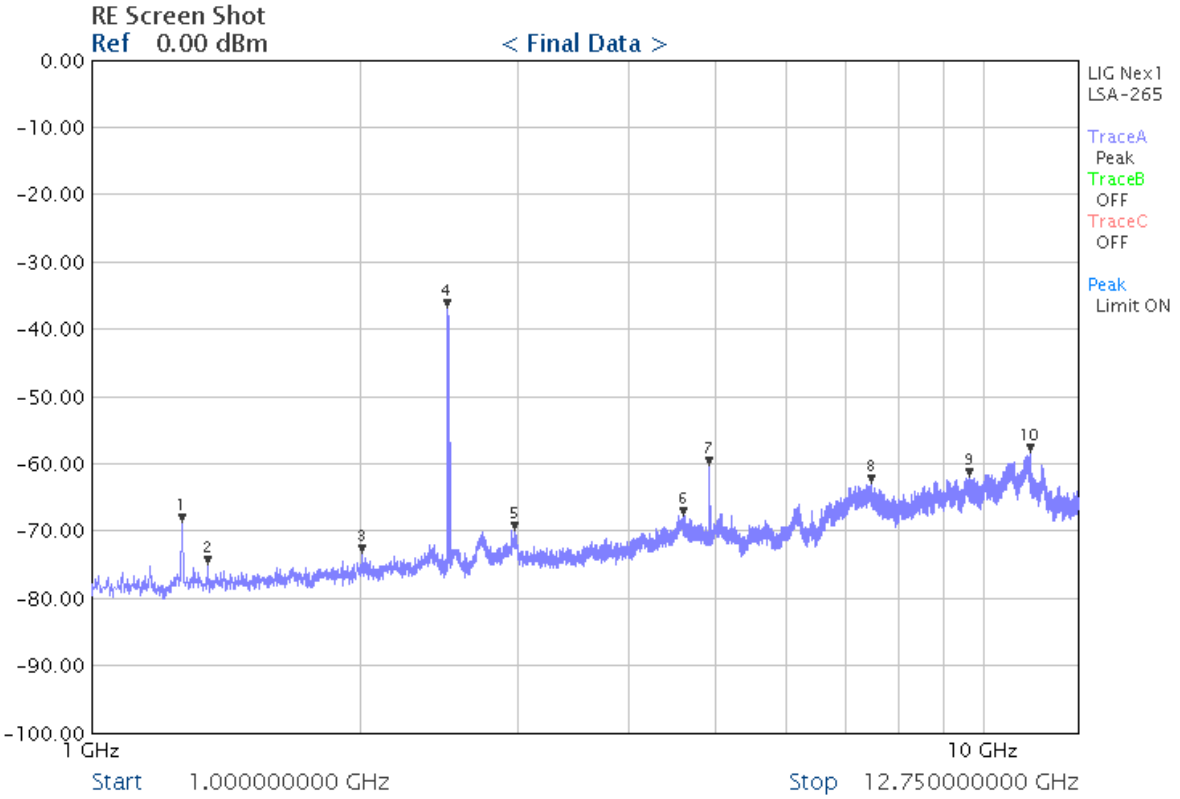
Frequency MHz	Reading (PK/AV) dBuV/m	P (H, V)	Correction Factor dB	Limit (PK/AV) dBuV	Total (PK/AV) dBuV	Margin (PK/AV) dB
2034.28	11.17/10.02	V	32.09	74/54	43.26/42.11	30.74/11.89
2425.40	35.92/35.14	V	33.78	114/94	69.70/68.92	44.30/25.08
4897.54	10.86/7.77	V	40.51	74/54	51.37/48.28	22.63/5.72

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

2. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

3. X axis plane was the worst test result than Y axis plane and Z axis plane.

Test Frequency	1 to 12.75 GHz	Polarization	Horizontal
Test Mode	Continuous Tx	Test Channel	F3 (2435.4 MHz)
Test Result	PASS		



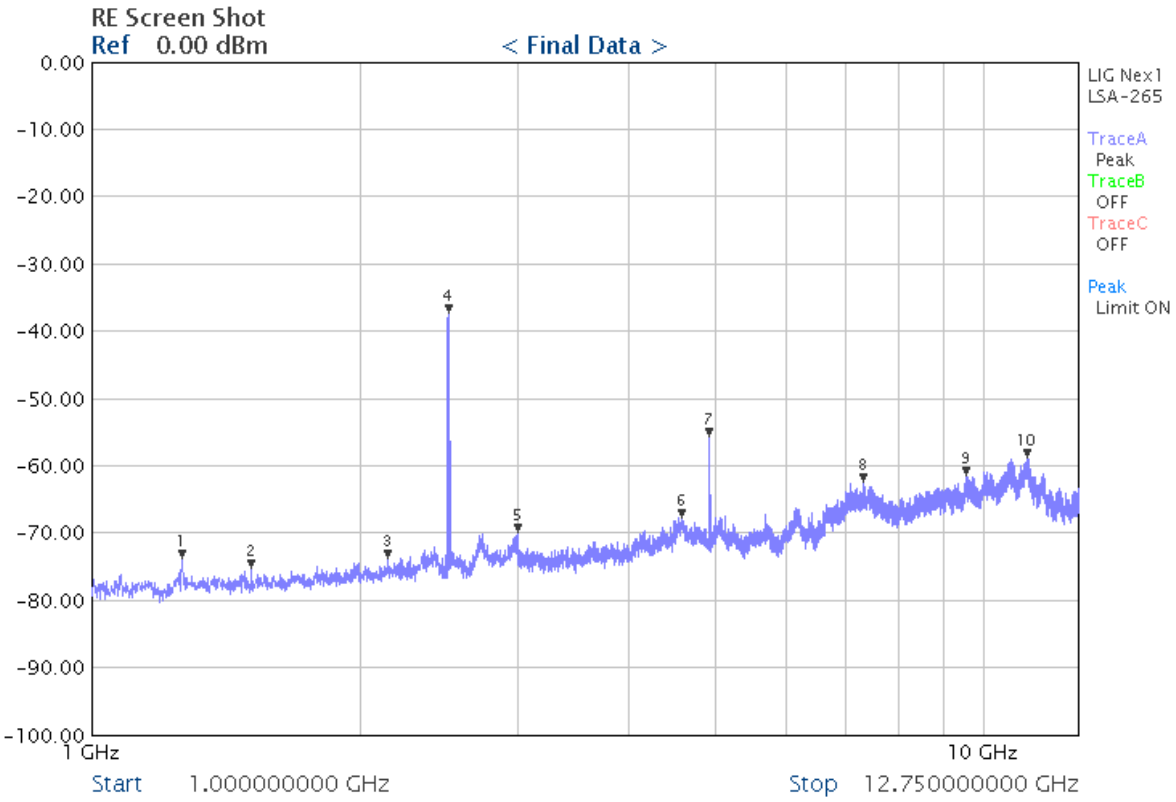
Frequency MHz	Reading (PK/AV) dBuV/m	P (H, V)	Correction Factor dB	Limit (PK/AV) dBuV	Total (PK/AV) dBuV	Margin (PK/AV) dB
1261.08	8.75/7.15	H	29.59	74/54	38.34/36.74	35.66/17.26
2435.40	36.37/35.66	H	33.82	114/94	70.19/69.48	43.81/24.52
4914.75	6.11/2.48	H	40.55	74/54	46.66/43.03	27.34/10.97

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

2. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

3. X axis plane was the worst test result than Y axis plane and Z axis plane.

Test Frequency	1 to 12.75 GHz	Polarization	Vertical
Test Mode	Continuous Tx	Test Channel	F3 (2415.4 MHz)
Test Result	PASS		



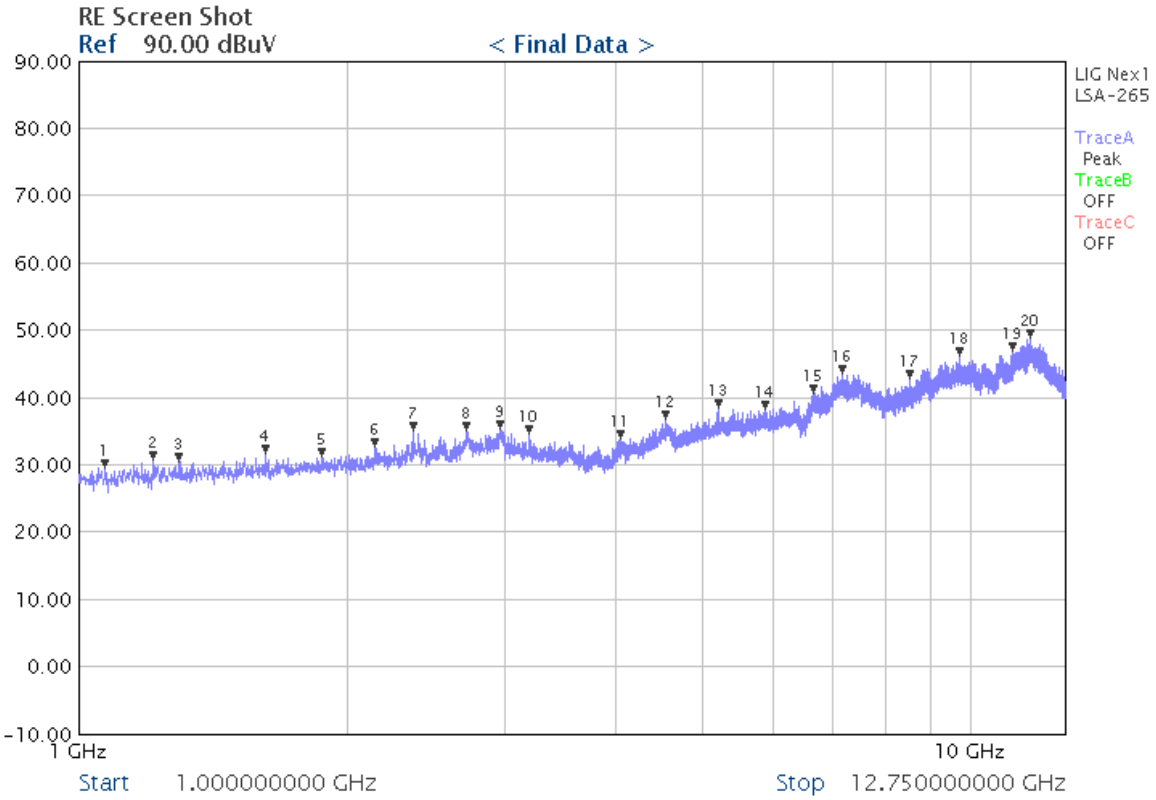
Frequency MHz	Reading (PK/AV) dBuV/m	P (H, V)	Correction Factor dB	Limit (PK/AV) dBuV	Total (PK/AV) dBuV	Margin (PK/AV) dB
2435.40	35.74/34.76	V	33.82	114/94	69.56/68.58	44.44/25.42
4914.75	10.68/7.34	V	40.55	74/54	51.23/47.89	22.77/6.11

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

2. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

3. X axis plane was the worst test result than Y axis plane and Z axis plane.

Test Frequency	1 to 12.75 GHz	Polarization	Horizontal / Vertical
Test Mode	Continuous Rx	Test Channel	Normal Operating Mode
Test Result	PASS		



Frequency MHz	Reading (PK/AV) dBuV/m	P (H, V)	Correction Factor dB	Limit (PK/AV) dBuV	Total (PK/AV) dBuV	Margin (PK/AV) dB
-	-	-	-	-	-	-

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

2. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

3.3 Peak Power Output

3.3.1 Test Instruments

Description	Manufacturer	Model No.	Serial No.	Next of Calibration
Spectrum Analyzer	Advantest	R3273	121100554	Jun. 14, 2011
RF Test Room	-	-	-	-

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

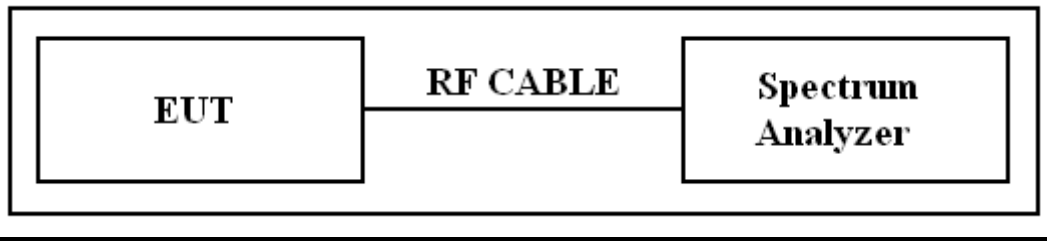
2. The calibration interval of horn ant. and loop ant. is 24 months

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



3.3.4 Test Procedure

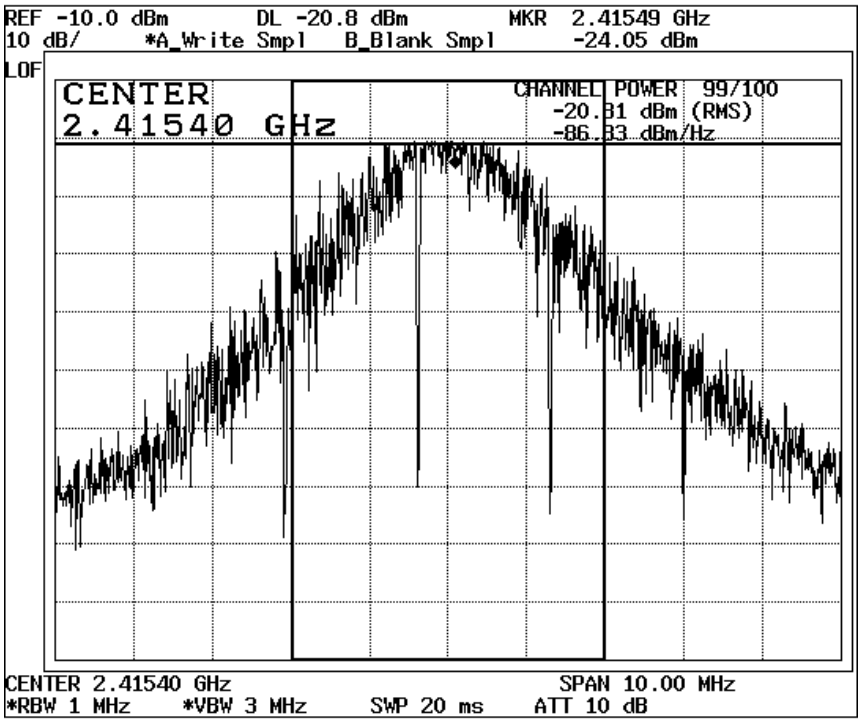
The Remote output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the peak power detection.

3.3.5 Peak Power Test Result

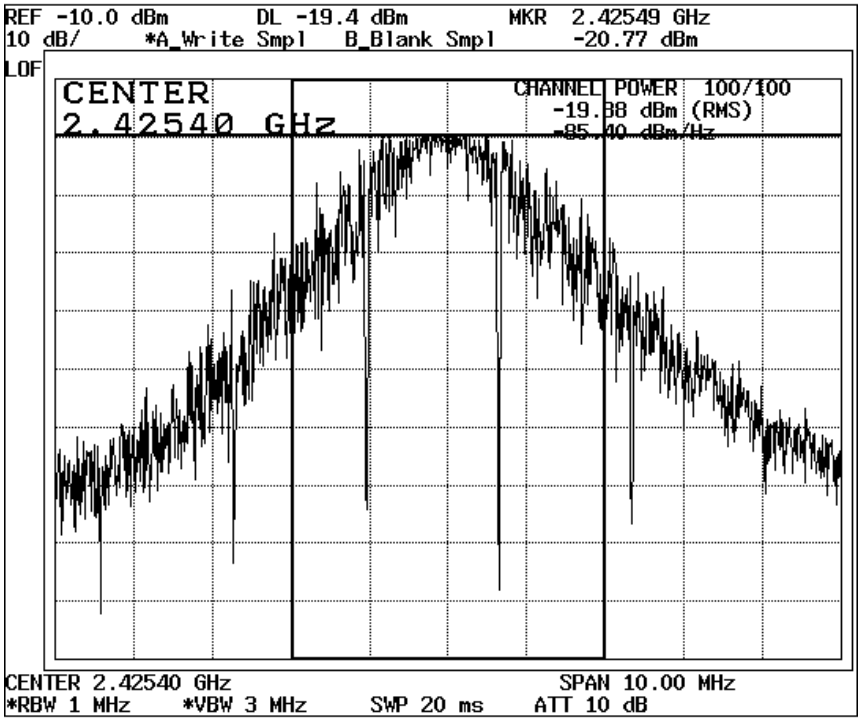
Test Item	Peak Power Output
Test Mode	Continuous Tx Mode
Test Site	RF Room
Measurement Method	Conducted

Channels No.	Frequency [MHz]	Measure Level [dBm]	Limit [dBm]	Result
1	2415.4	-20.31	1 Watt = 30 dBm	PASS
2	2425.4	-19.88	1 Watt = 30 dBm	PASS
3	2435.4	-19.35	1 Watt = 30 dBm	PASS

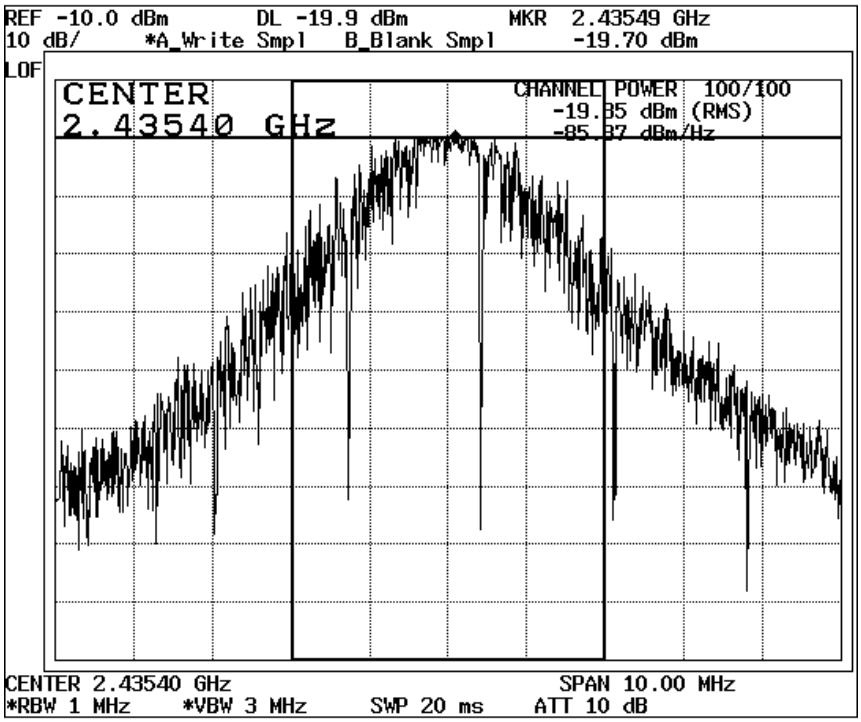
Channel 1.



Channel 7.



Channel 13.



3.4 Band Edge

3.4.1 Test Instruments

Description	Manufacturer	Model No.	Serial No.	Next of Calibration
Test Receiver	LIG NEX1	ER-265	L0804B002	Jul. 15, 2011
Horn Antenna	Schwarzbeck	BBHA9120D	0501	Aug. 31 2012
Horn Antenna	Schwarzbeck	BBHA9170	BBHA9170152	Aug. 31. 2012

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

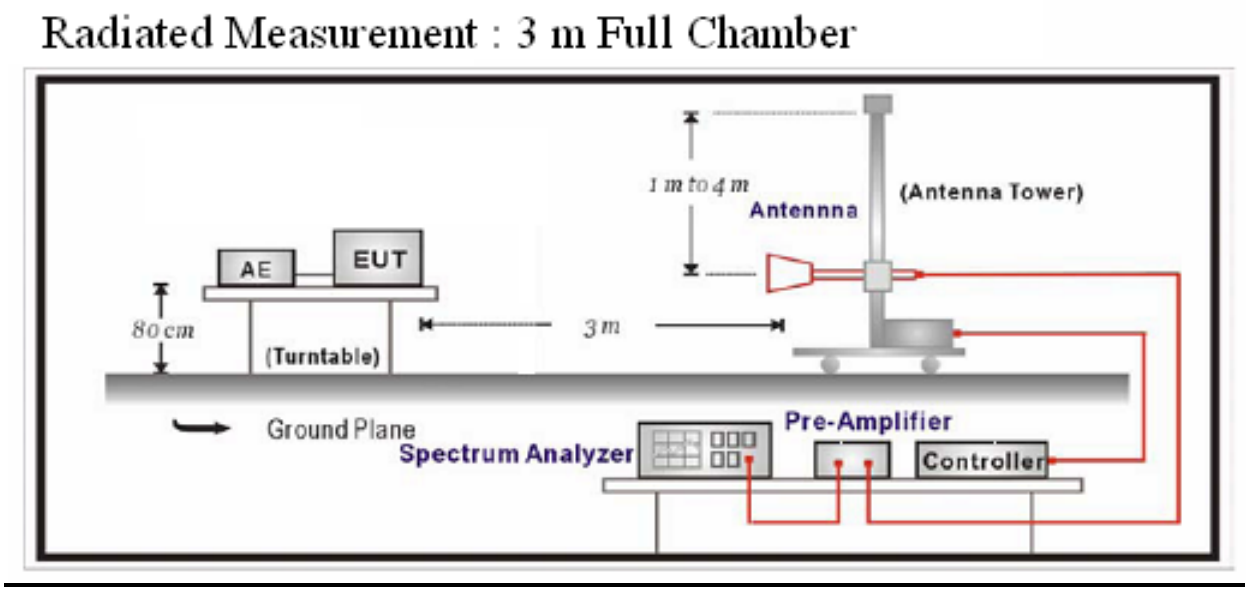
2. The calibration interval of horn ant. and loop ant. is 24 months

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



3.4.4 Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters. The antenna can move up and down between 1 meter and 4 meters to fine out the maximum emission level.

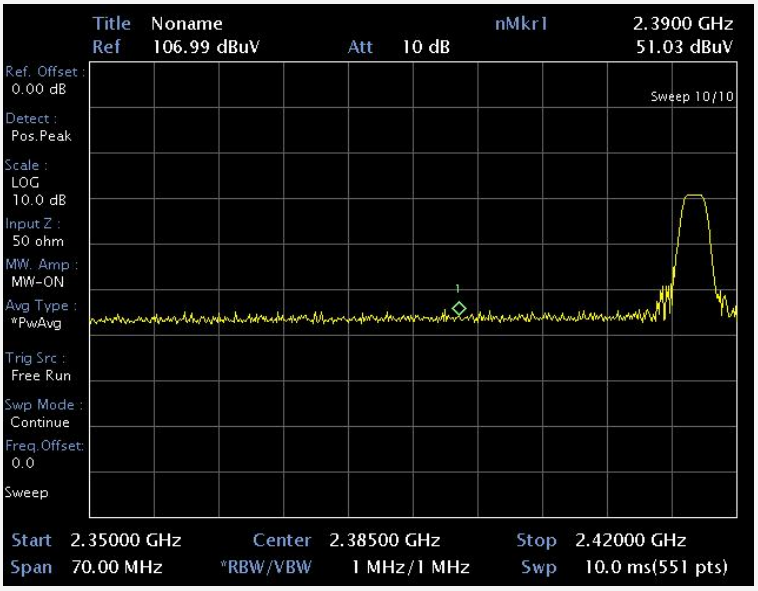
Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4:2003 on radiated measurement.

The bandwidth below 1 GHz setting on the field strength meter is 120 kHz, above 1GHz are 1MHz.

3.4.5 Band Edge Test Result

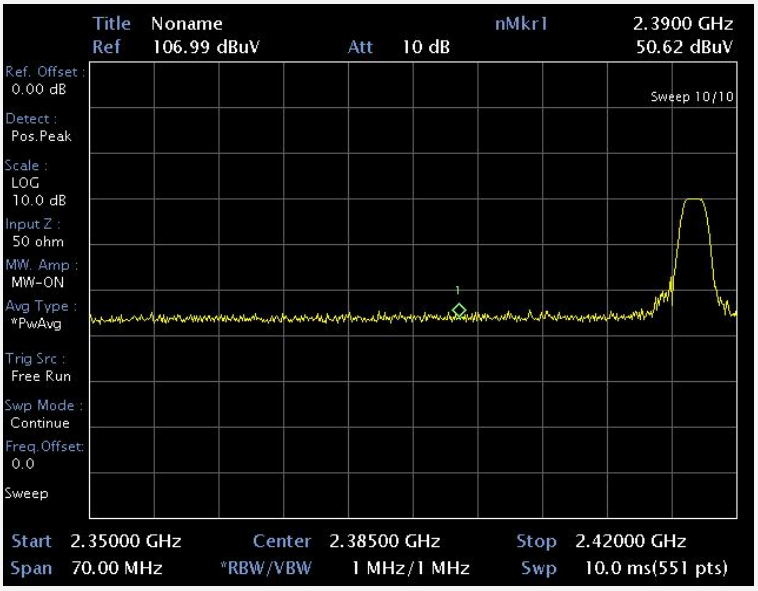
Detect mode	Peak	Axis	X-Plane
Note	F1 (2415.4 MHz)		

HOR



Frequency (MHz)	Reading PK (dBuV/m)	Factor(dB) CL+AF	Limits PK (dBuV/m)	Result PK (dBuV/m)	Margin PK (dB)
2390	17.91	33.12	74	51.03	22.97

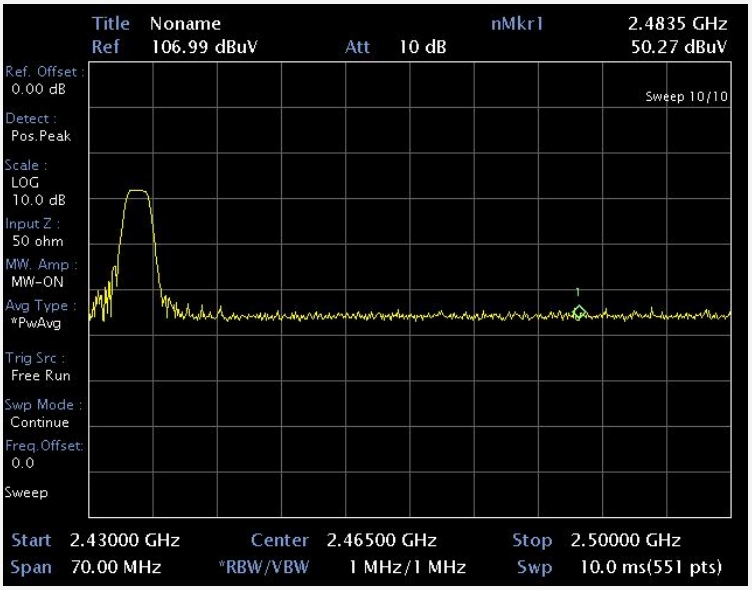
VER



Frequency (MHz)	Reading PK (dBuV/m)	Factor(dB) CL+AF	Limits PK (dBuV/m)	Result PK (dBuV/m)	Margin PK (dB)
2390	17.50	33.12	74	50.62	23.38

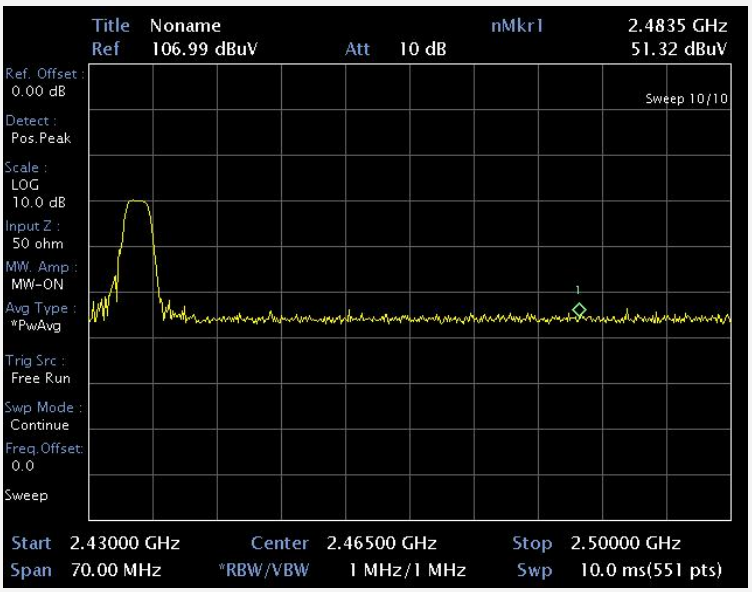
Detect mode	Peak	Axis	X-Plane
Note	F3 (2435.4 MHz)		

HOR



Frequency (MHz)	Reading PK (dBuV/m)	Factor(dB) CL+AF	Limits PK (dBuV/m)	Result PK (dBuV/m)	Margin PK (dB)
2483.5	15.44	34.83	74	50.27	23.73

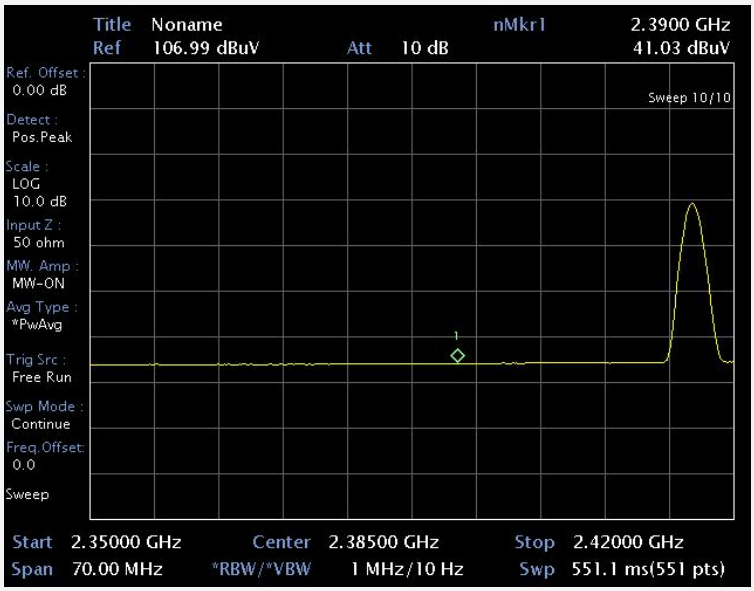
VER



Frequency (MHz)	Reading PK (dBuV/m)	Factor(dB) CL+AF	Limits PK (dBuV/m)	Result PK (dBuV/m)	Margin PK (dB)
2483.5	16.49	34.83	74	51.32	22.68

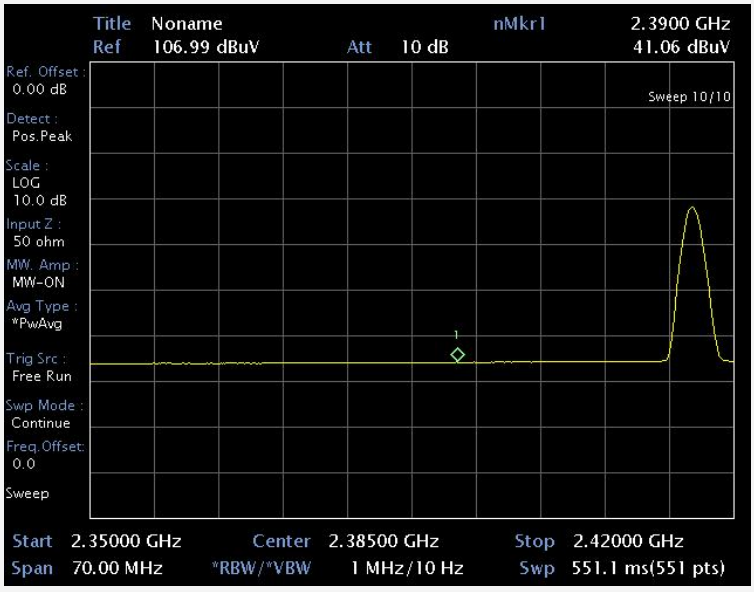
Detect mode	Average	Axis	X-Plane
Note	F1 (2415.4 MHz)		

HOR



Frequency (MHz)	Reading AV (dBuV/m)	Factor(dB) CL+AF	Limits AV (dBuV/m)	Result AV (dBuV/m)	Margin AV (dB)
2390	7.91	33.12	54	41.03	12.97

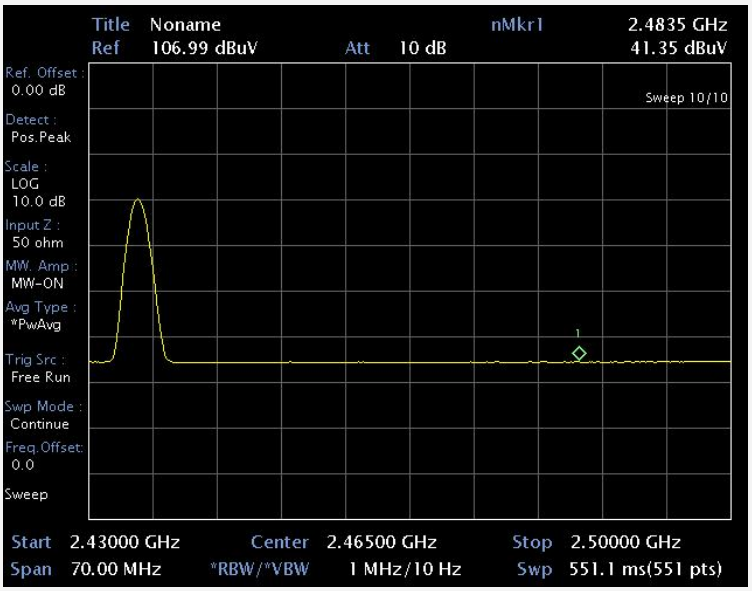
VER



Frequency (MHz)	Reading AV (dBuV/m)	Factor(dB) CL+AF	Limits AV (dBuV/m)	Result AV (dBuV/m)	Margin AV (dB)
2390	7.94	33.12	54	41.06	12.94

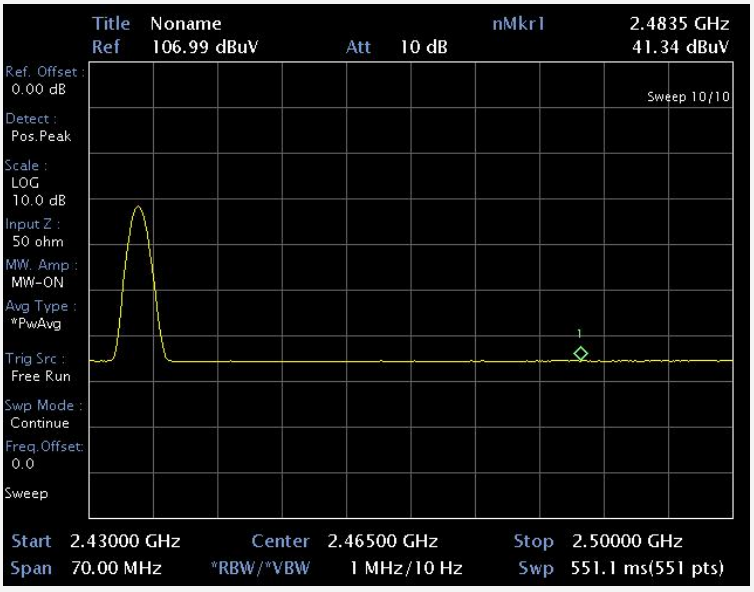
Detect mode	Average	Axis	X-Plane
Note	F3 (2435.4 MHz)		

HOR



Frequency (MHz)	Reading AV (dBuV/m)	Factor(dB) CL+AF	Limits AV (dBuV/m)	Result AV (dBuV/m)	Margin AV (dB)
2483.5	6.52	34.83	54	41.35	12.65

VER



Frequency (MHz)	Reading AV (dBuV/m)	Factor(dB) CL+AF	Limits AV (dBuV/m)	Result AV (dBuV/m)	Margin AV (dB)
2483.5	6.51	34.83	54	41.34	12.66

3.5 6 dB Band

3.5.1 Test Instruments

Description	Manufacturer	Model No.	Serial No.	Next of Calibration
Spectrum Analyzer	Advantest	R3273	121100554	Jun. 14, 2011
RF Test Room	-	-	-	-

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

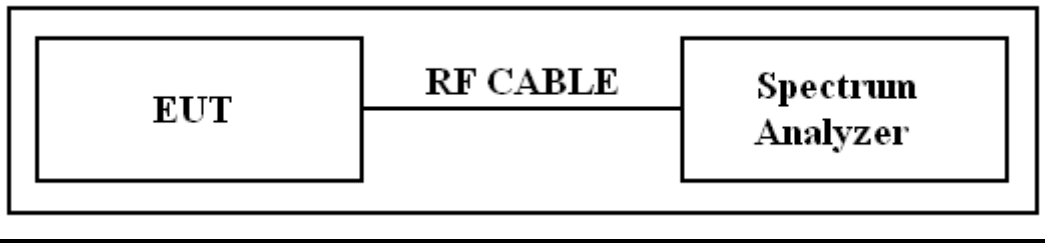
2. The calibration interval of horn ant. and loop ant. is 24 months

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

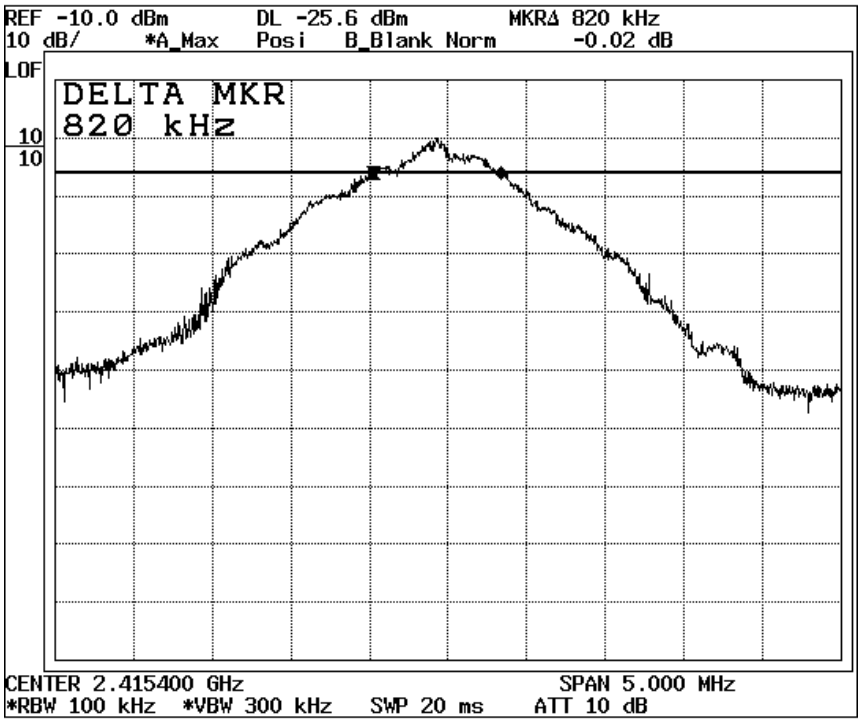
The Remote output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the 6 dB Band.

3.5.5 6 dB Band Test Result

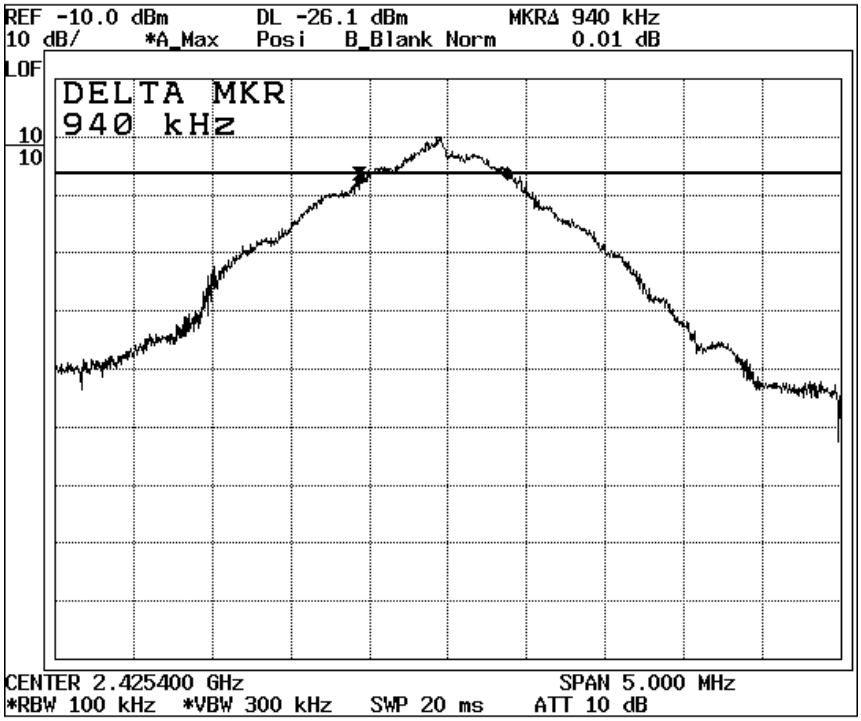
Test Item	6 dB Band
Test Mode	Continuous Tx Mode
Test Site	RF Room
Measurement Method	Conducted

Channels No.	Frequency [MHz]	Measure Level [kHz]	Limit [kHz]	Result
1	2415.4	820	> 500	PASS
2	2425.4	940	> 500	PASS
3	2435.4	870	> 500	PASS

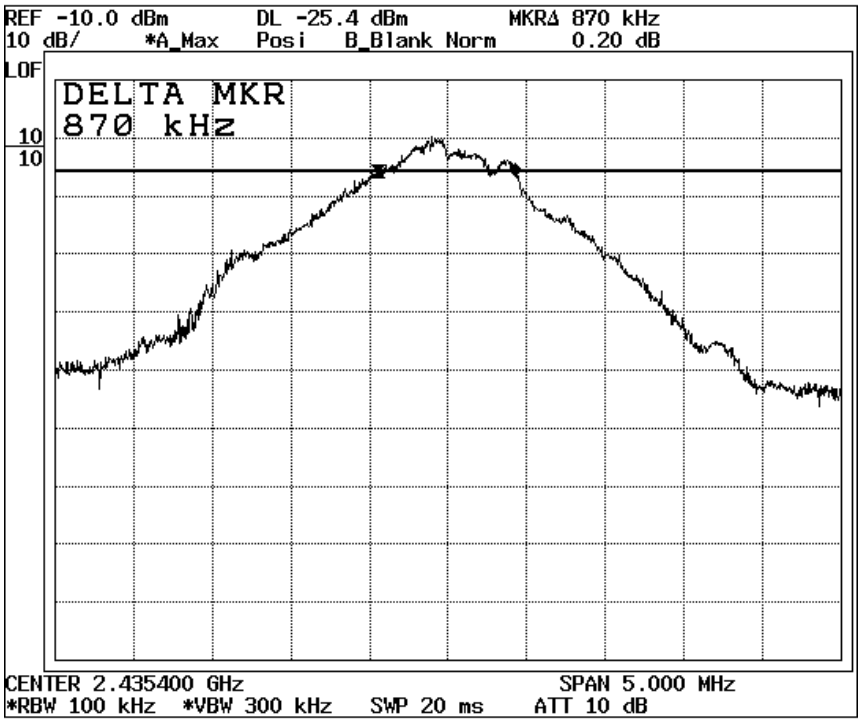
Channel 1.



Channel 7.



Channel 13.



3.6 Power Density

3.6.1 Test Instruments

Description	Manufacturer	Model No.	Serial No.	Next of Calibration
Spectrum Analyzer	Advantest	R3273	121100554	Jun. 14, 2011
RF Test Room	-	-	-	-

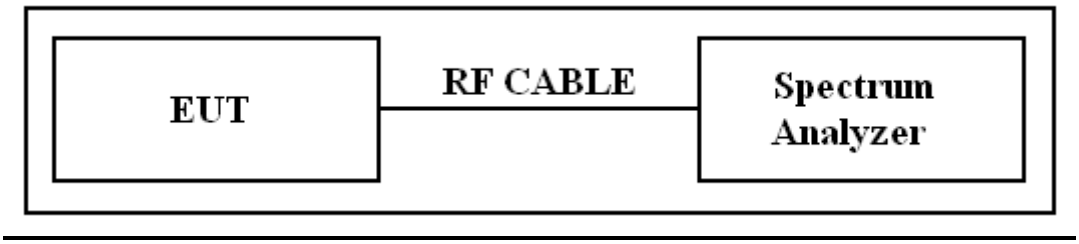
Note : 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to RRL, KRISS, KTL and HCT.

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

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

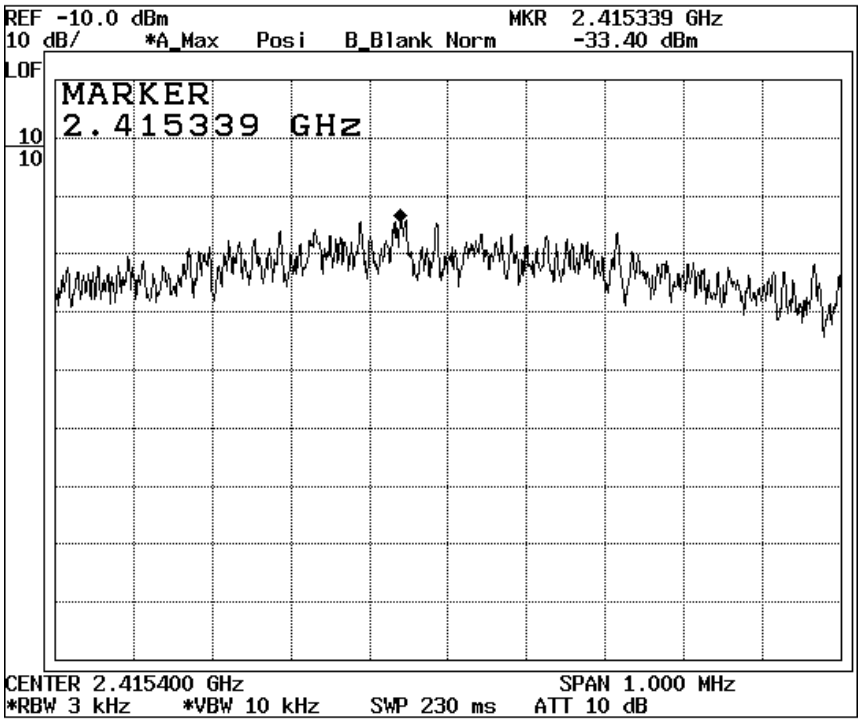
The Remote output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the Power Density.

3.6.5 Power Density Test Result

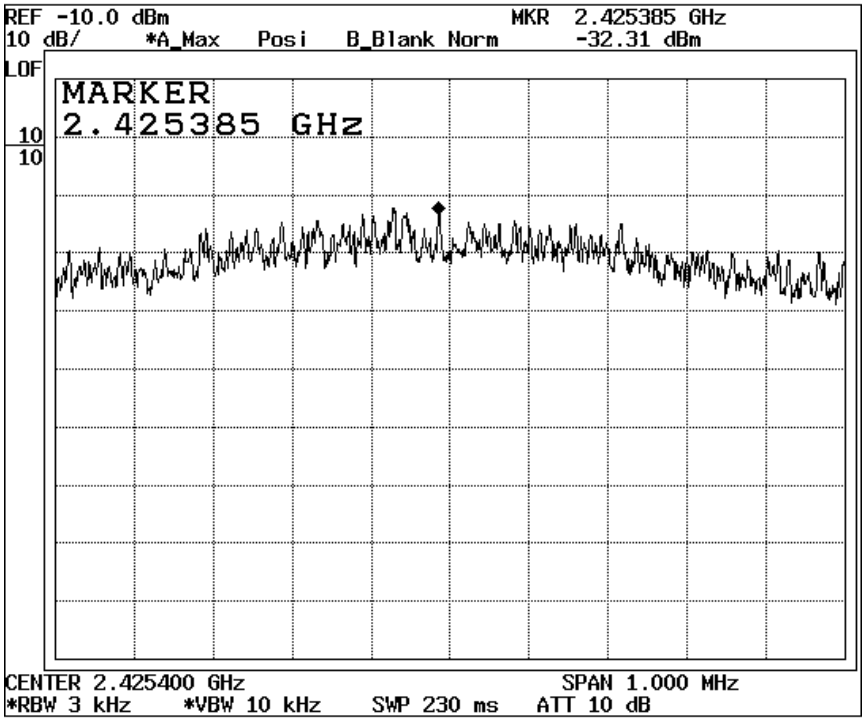
Test Item	6 dB Band
Test Mode	Continuous Tx Mode
Test Site	RF Room
Measurement Method	Conducted

Channels No.	Frequency [MHz]	Measure Level [dBm]	Limit [dBm]	Result
1	2415.4	-33.40	< 8	PASS
2	2425.4	-32.31	< 8	PASS
3	2435.4	-31.88	< 8	PASS

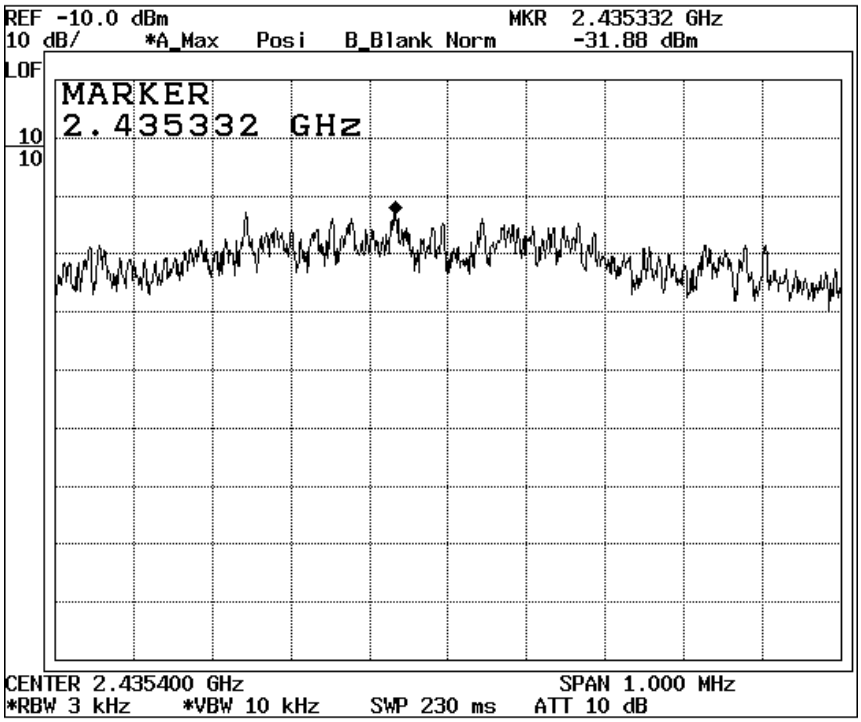
Channel 1.



Channel 7.



Channel 13.



4.0 Antenna Requirement

Applicalbe Standard

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 antenna or of an antenna that uses the intentional radiator shall be considered sufficient to comply with the provisions of this section.
The antennas type used in this product is CHIP antenna without connector and it is considered to meet antenna requirement. The antenna peak gain of EUT is less than 6 dBi. The antenna peak gain is 0 dBi.

Test Result : Pass

Appendix A. The Photo of Test Setup

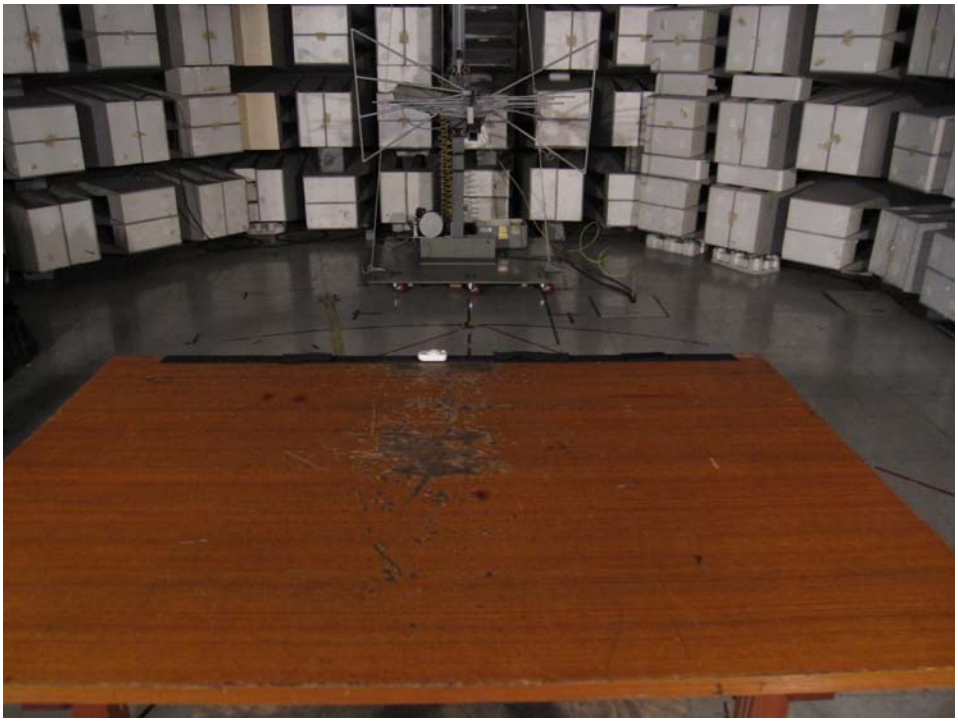
Front View of Conducted Emission

Rear View of Conducted Emission

Front View of Radiated Emission (Below 30 MHz) – RF30 (Remote)

Front View of Radiated Emission (Below 30 MHz) – RF30 (Receiver)

Front View of Radiated Emission (Below 1GHz) – RF30 (Remote)



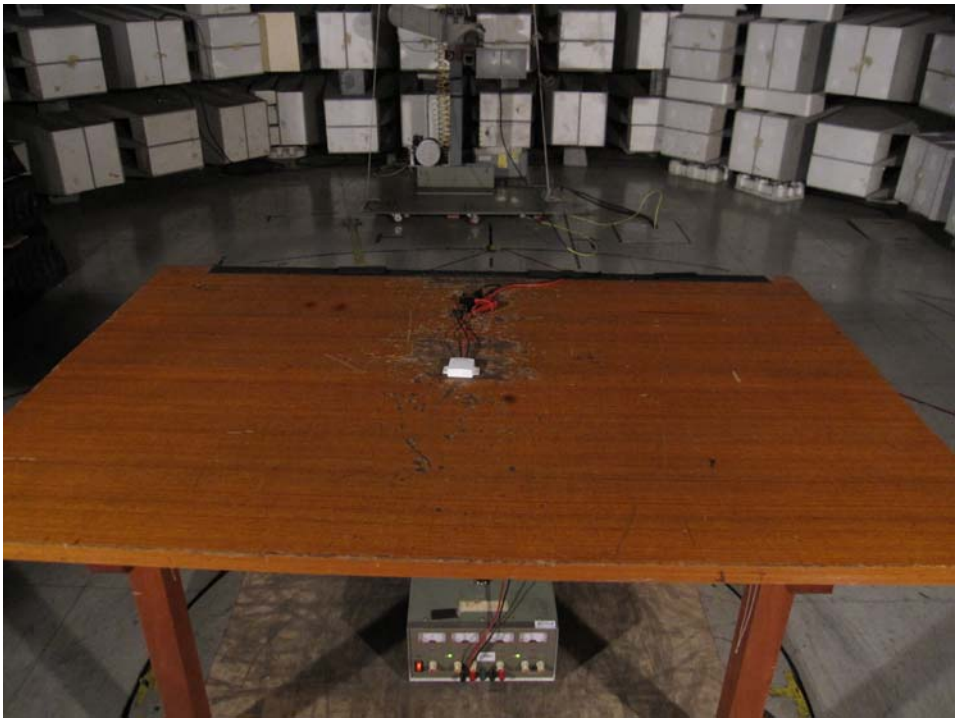
Front View of Radiated Emission (Below 1GHz) – RF30 (Receiver)

Radiated Emission (Above 1GHz-X Plane) – RF30 (Remote)

Radiated Emission (Above 1GHz-Y Plane) – RF30 (Remote)

Radiated Emission (Above 1GHz-Z Plane) – RF30 (Remote)

Radiated Emission (Above 1GHz-Z Plane) – RF30 (Receiver)



Appendix B. The Photo of Equipment Under Test

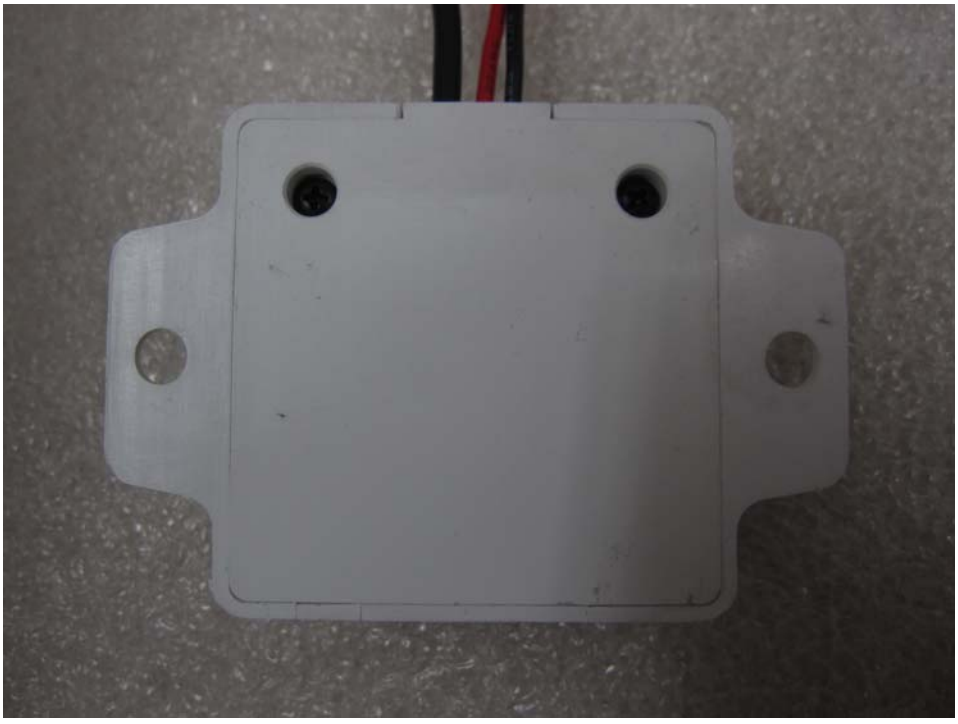
Front View of EUT– RF30 (Remote)

Rear View of EUT– RF30 (Remote)

Inside View of EUT– RF30 (Remote)

Front View of EUT– RF30 (Receiver)

Rear View of EUT– RF30 (Receiver)



Inside View of EUT– RF30 (Receiver)