Certification of Compliance

CFR 47 Part 15 Subpart B, Subpart C

Order No. : **CSTS-C1003-032**
Test Report No. : **CSTS-A10-FCC007**
Applicant : **N&P TECHNOLOGIES.Co.,Ltd.**
Address of Applicant : **Smasung Leader Tower 707, 60-15, Gasan-dong, Geumcheon-Gu, Seoul, Korea**

Equipment Under Test (EUT)

Kind of Product : **Wall Mount POS System**
Model Name : **NP-3100K**
FCC ID : **X8MNP-3100K**
Buyer Model(s) : **N/A**

Standards : **FCC CFR Part 15 Subpart B, C :2006**
ANSI C63.4:2003

Date of Receipt : 04 March, 2010
Date of Test : 5~30 March, 2010
Date of Issue : 30 March, 2010

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

Ji Hwan Kim / 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

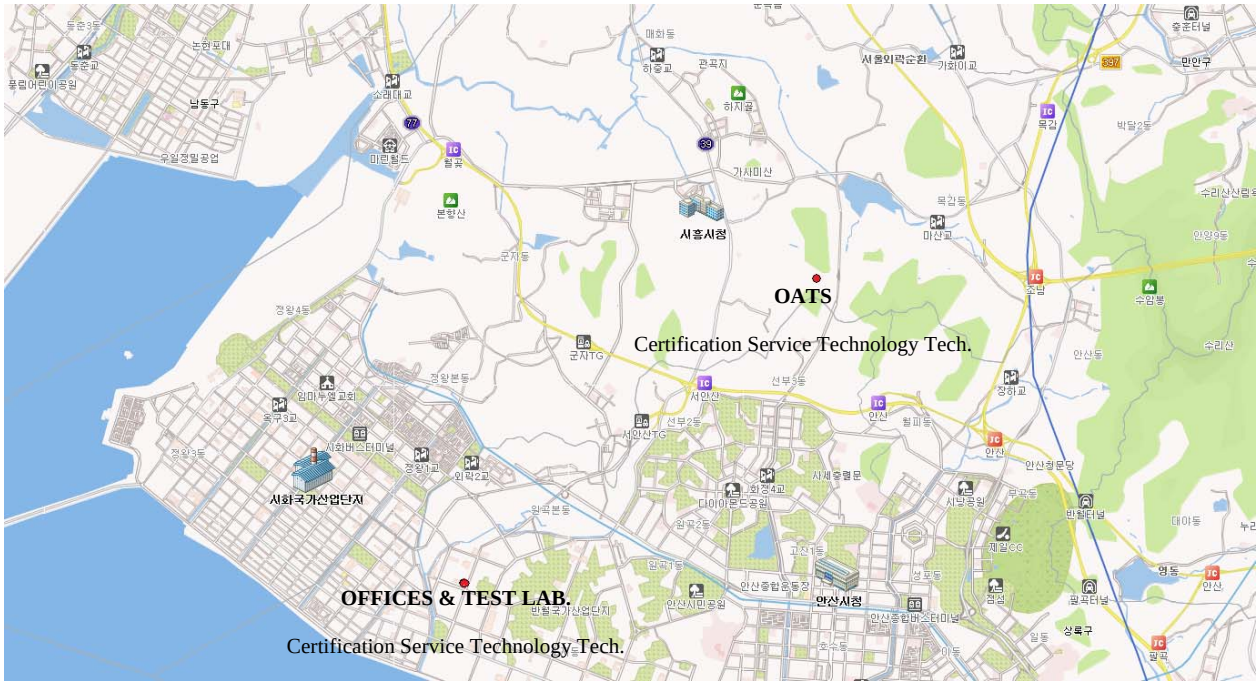
1. General Information

1.1 Information of Test Laboratory.

FCC E-Failing : Registration Number:289252

Name	:	Certification Service Technology Inc.
Address 3mFullChamber 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 : wwkim@cstlab.co.kr

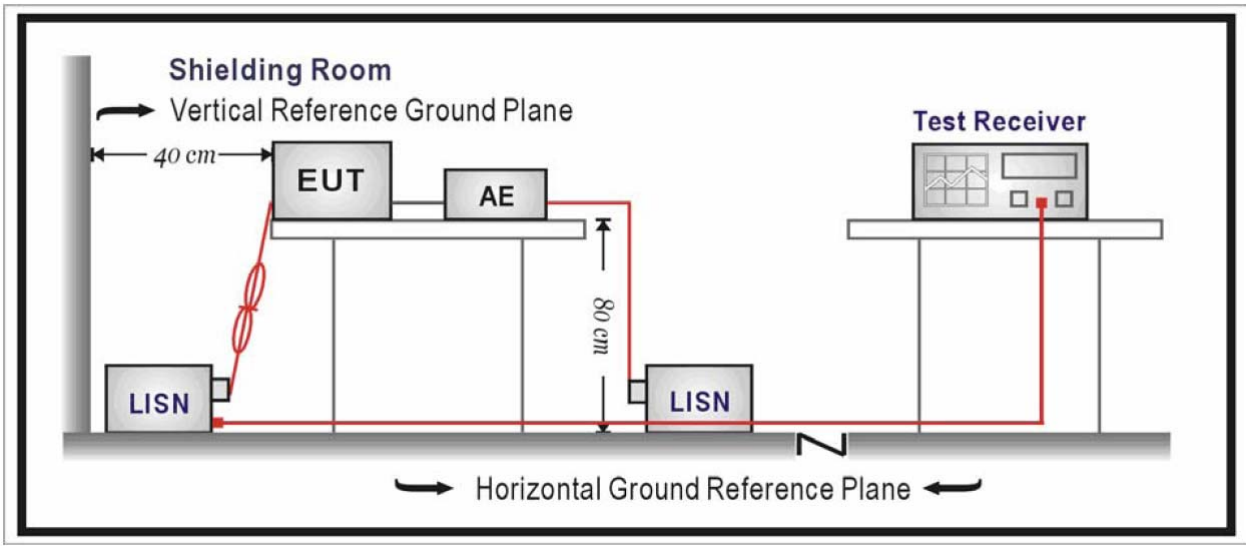


We , Certification Service Technology Inc. are an independent EMC and RF consultancy that was established the whole facility in our laboratories. The test facility has been accredited by the following accreditation Bodies in compliance with ISO 17025:

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 /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 invested 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 15.107
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.

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.

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)	μV/meter	dBμV/meter
30-88	100	40.00
88-216	150	43.52
216-960	200	46.02
Above 960	500	53.98

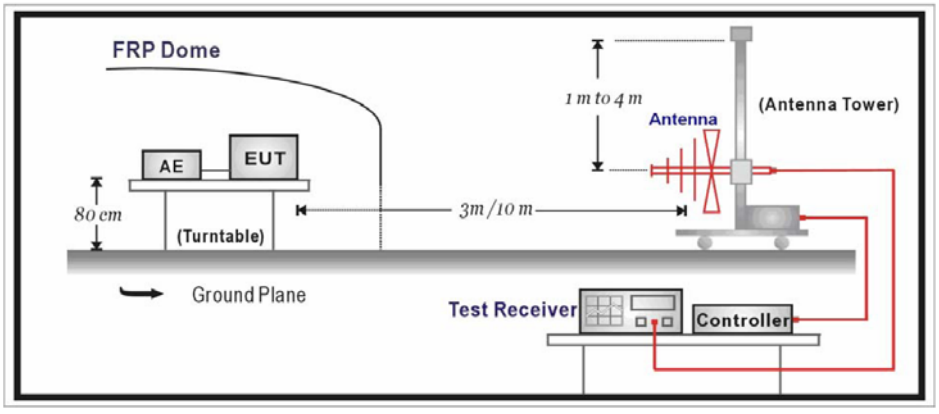
Remarks :

1. RF Voltage(dBuv)=20log RF Voltage(uV)

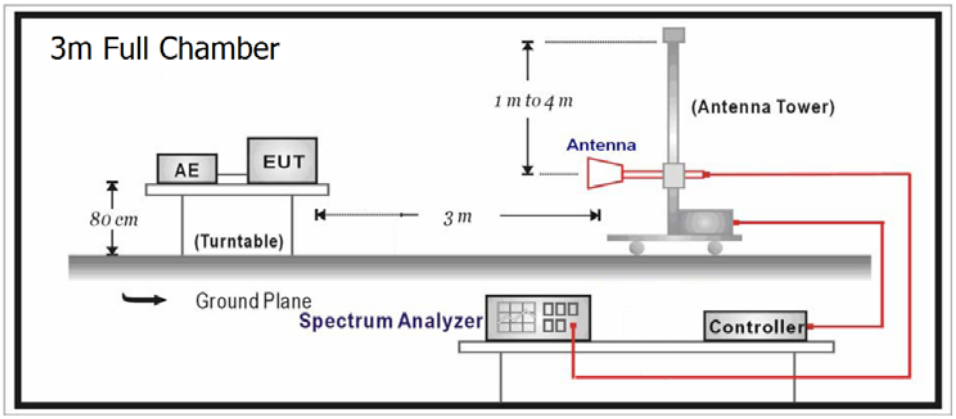
2. In the Above Table, the tighter limit applies at the band edges.

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	:	N&P TECHNOLOGIES.Co.,Ltd.
Address	:	Samsung Leader Tower 707, 60-15, Gasan-dong, Geumcheon-Gu, Seoul, Korea

1.5 General Description of EUT

Name : Wall Mount POS System
Model No. : NP-3100K
Alt. Name : N/A
FCC ID : X8MNP-3100K
Serial No. : N/A

1.6 Details of EUT

System		
CPU	AMD Geode LX 800(500MHz)	
Chipset	AMD Geode CS5530AC	
Display	TFT 15" LCD/LVDS	
Memory	DDR 512MB on board(Default)	
ROM BIOS	Phoenix/Award	
Storage	SSD(Solid State Disk)/2.5” HDD	
Sound	AC97 2.1 Compatibility	
I/O	2 USB 2.0 Ports	
	4 Serial Ports	
Ethernet	RTL8139D 10/100 Base-T	
O/S	Window XP Embedded/WEPOS/Linux	
Power Supply	24V/2.5A(60W) SMPS	
Display		
Display	Interface	LVDS
	Panel size	15"(38Cm)
	Resolution	1024*768
	Luminance	250cd
	Contrast Ratio	450:1
	Response time	16ms
Touch	Touch type	5Wire Resistive
	Interface	Internal USB
	Linearity	±3 LSB
	Input Response Time	10.5ms
	Durability	10,000,000 Times
Option devices		
MSR	I/II Multi tracks(Internal USB)	
WIFI	Modulation type	IEEE 802.11b, IEEE802.11g
	Power	USB BUS POWER
	Dimension	82 X 32 X 10 mm
	Interface	USB1.1 / USB 2.0

- Please refer to user’s manual.

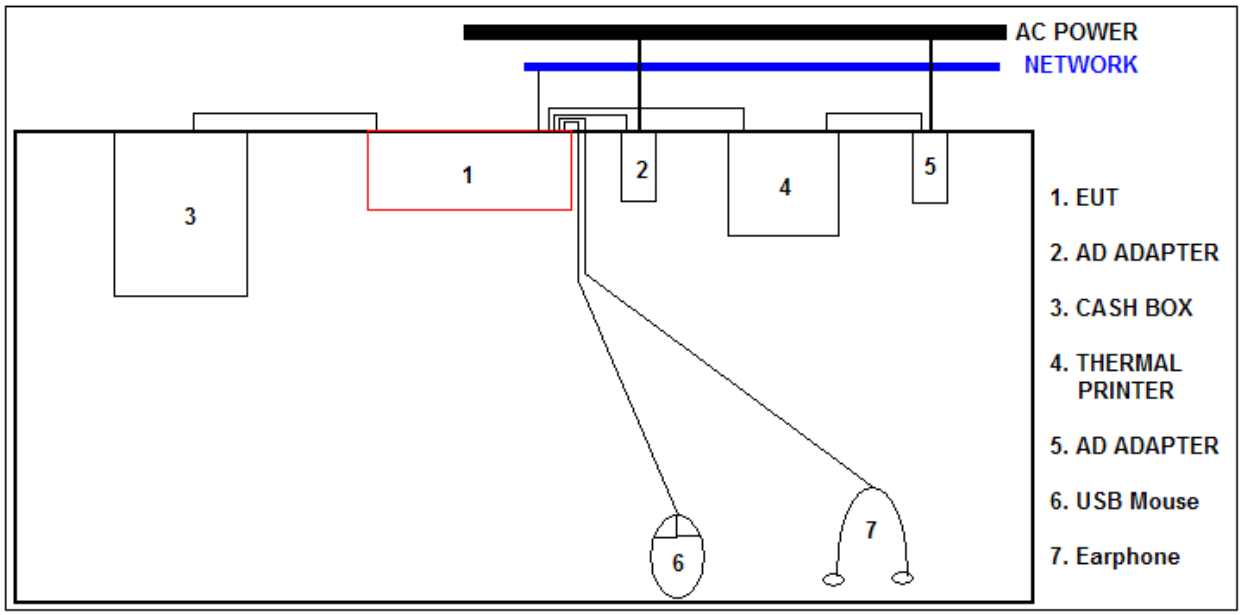
1.7 Description of Support Units

Product	Model No.	Serial No.	Manufacturer	Certification
Wall Mount POS System	NP-3100K	N/A	N&P TECHNOLOGIES.Co.,Ltd.	EUT
AC ADAPTER (EUT)	PPA060M	001041	Channel Well Technology	-
CASH BOX	N/A	N/A	N&P TECHNOLOGIES.Co.,Ltd.	-
THERMAL PRINTER	NRP-2000	N/A	N&P TECHNOLOGIES.Co.,Ltd.	-
AD ADAPTER (THERMAL PRINTER)	LSE9901B2460	A30741065528	LI SHIN INTERNATIONAL ENTERPRISE CORP.	-
Earphone	N/A	N/A	N/A	-
USB Mouse	TGM-7000	1590470802005360	PRIMAX ELECTRONIC LTD.	-

1.8 Cable List

Start		END		Cable Spec	
Name	I/O Port	Name	I/O Port	Lenth	Shield
EUT	COM Port	THERMAL PRINTER	RS-232	0.9	Unshielded
	Audio out	Earphone	-	1.2	Unshielded
	USB	USB Mouse	-	1.6	Unshielded
	Drawer	CASH BOX	-	1.8	Unshielded
	DC-IN	AD ADAPTER	DC-OUT	1.5	Unshielded
	LAN Port	Network	-	-	Unshielded
AD ADAPTER (EUT)	AC-IN	AC-LINE	AC-POWER	2.0	Unshielded
AD ADAPTER (THERMAL PRINTER)	AC-IN	AC-LINE	AC-POWER	2.0	Unshielded
THERMAL PRINTER	DC-IN	AD ADAPTER	DC-OUT	1.5	Unshielded

1.10 Test Set-Up Configuration



1.11 Test Methodology And Configuration

Normal operating.

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

2. SUMMARY

Test Descriptions

– **Conducted Emission** **-Conducted Emission result**	PASS
– **Radiated Emission** **- Radiated Emission Result**	PASS
– **Peak power output** **- Test result**	PASS
– **Band edge** **- Test result**	PASS
– **6dB 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. 24, 2010
LISN	EMCO	3825/2	8912-1576	Oct. 06, 2010
LISN	EMCO	3825/2	9006-1666	Mar. 30, 2011
Transient Limiter	HAMEG	HZ560	N/A	Jul. 30, 2010
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

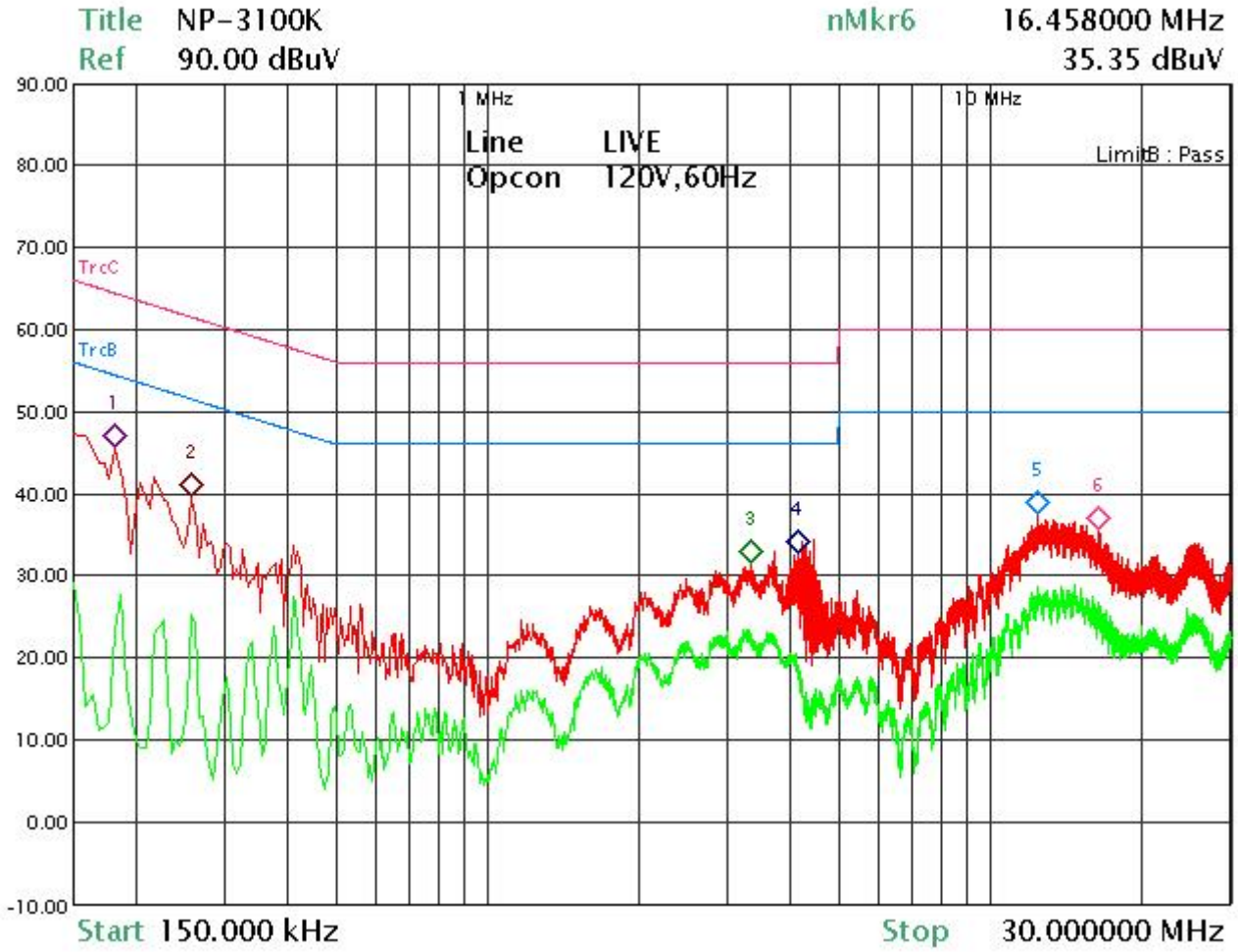
Temperature : 24.4 degree C
Humidity : 47 %RH
Atmospheric Pressure : 986 mBar

3.1.4 Test Date

March 29, 2010

3.1.5 Conducted Emissions Result(According to 15.107, 15.207)

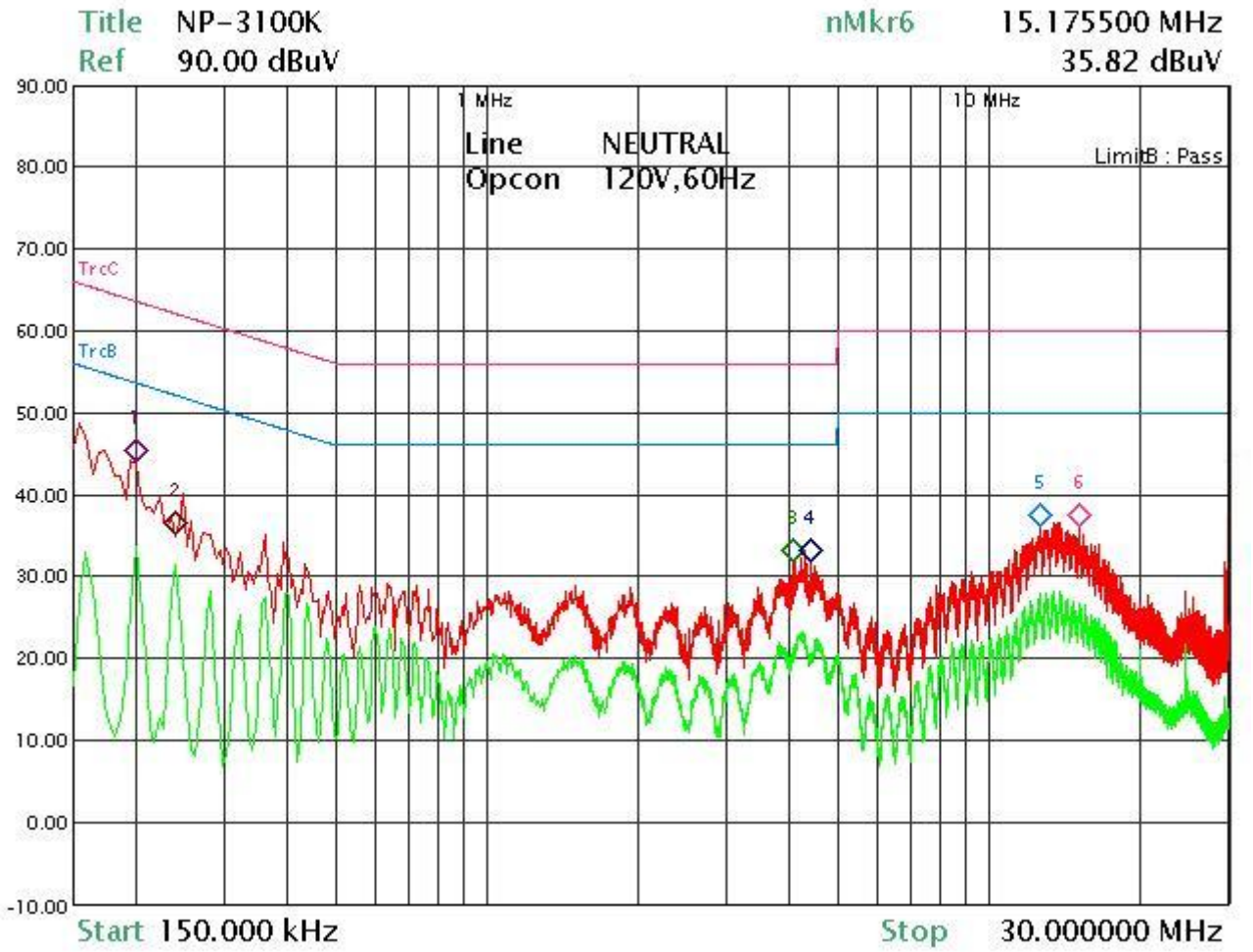
Phase : Live



Freq. [MHz]	Measurement [dB μV]		Limit [dB μV]		Insertion Loss	Cable Loss	Result [dB μV]		Margin [dB]	
	Q-peak	Average	Q-peak	Average	[dB]	[dB μV]	Q-peak	Average	Q-peak	Average
0.182	37.04	37.23	64.39	54.39	0.13	0.06	37.23	26.21	27.16	28.18
0.258	32.51	32.68	61.50	51.50	0.10	0.07	32.68	24.29	28.82	27.21
3.350	28.33	28.42	56.00	46.00	0.04	0.05	28.42	22.99	27.58	23.01
4.146	26.31	26.41	56.00	46.00	0.04	0.06	26.41	19.72	29.59	26.28
12.453	32.27	32.87	60.00	50.00	0.07	0.53	32.87	26.80	27.13	23.20
16.458	31.58	32.26	60.00	50.00	0.08	0.60	32.26	26.76	27.74	23.24

Note : Normal operating Mode

Phase : Neutral



Freq. [MHz]	Measurement [dB μV]		Limit [dB μV]		Insertion Loss	Cable Loss	Result [dB μV]		Margin [dB]	
	Q-peak	Average	Q-peak	Average	[dB]	[dB μV]	Q-peak	Average	Q-peak	Average
0.200	40.81	32.79	63.61	53.61	0.10	0.07	40.98	32.96	22.63	20.65
0.240	37.94	32.31	62.10	52.10	0.09	0.07	38.10	32.47	24.00	19.63
4.070	26.61	20.74	56.00	46.00	0.02	0.06	26.69	20.82	29.31	25.18
4.421	26.37	20.41	56.00	46.00	0.02	0.09	26.48	20.52	29.52	25.48
12.611	32.89	27.46	60.00	50.00	0.06	0.53	33.48	28.05	26.52	21.95
15.176	31.94	26.33	60.00	50.00	0.06	0.58	32.58	26.97	27.42	23.03

Note : Normal operating Mode

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. 10, 2010
BICONILOG ANT.	EMCO	3142	9701-1128	Nov. 13, 2010
Horn Antenna	R&S	BBHA9120D233	0501	Sep. 10, 2010
Horn Antenna	R&S	BBHA9170	BBHA9170152	Sep. 16, 2010
BICONICAL ANT.	EMCO	3104C	9012-4380	Feb. 28, 2012
LOGPERIODIC ANT.	EMCO	3146	91071232	Feb. 28, 2012
LOOP ANT.	R&S	HFH2-Z2	100187	Jul. 07, 2011
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	N/A
CHAMBER	BRADEN	RF Shielded door Assembly	DAC-60-004	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:

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 : 24.4 degree C
Humidity : 46 %RH
Atmospheric Pressure : 986 mBar

3.2.4 Test Date

March 29, 2010

3.2.5 Radiated Emission Limit

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

FCC Part 15 Subpart C paragraph 15.249(a) Limit

Fundamental Frequency (MHz)	Field Strength of Fundamental (3m)			Field Strength of Harmonics (3m)		
	mV/m	dBuV/m		uV/m	dBuV/m	
2400-2483.5	50	94(Average)	114(Peak)	500	54(Average)	74(Peak)

Note : 1. RF Field Strength (dBuV) = 20log RF Voltage(uV)
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
3. The emission limit in this paragraph is based on measurement instrumentation employing an average detector

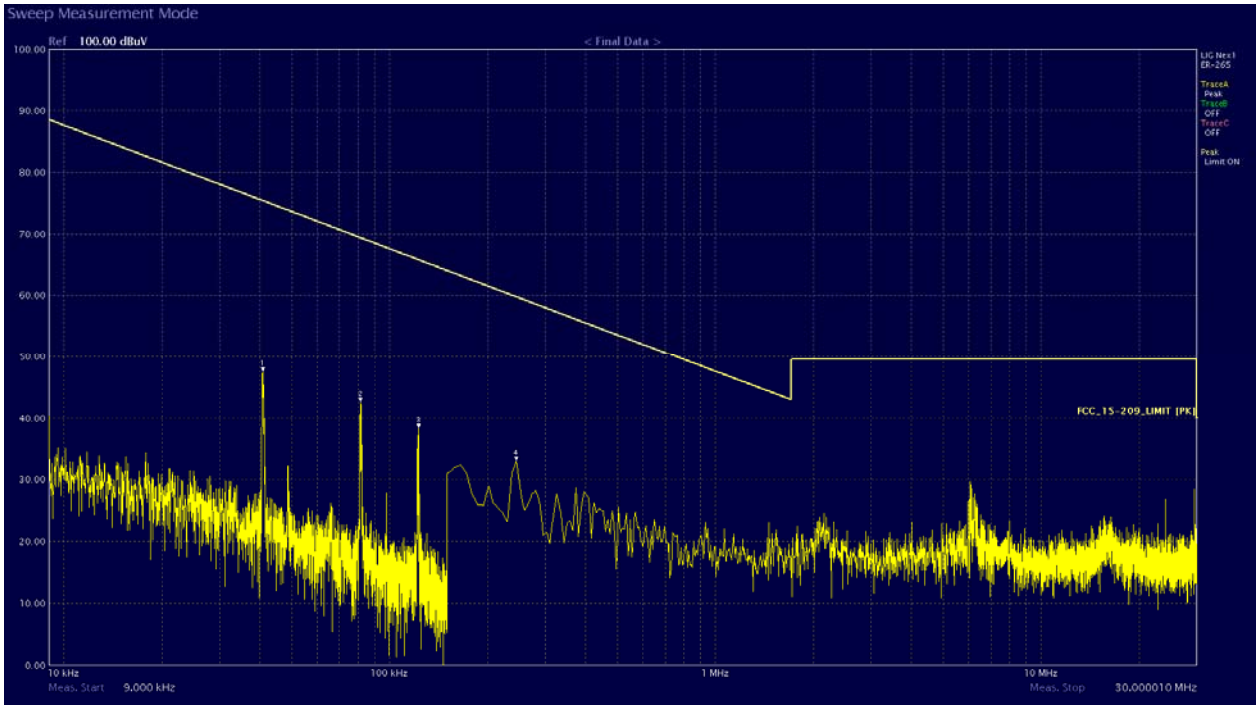
Frequencies in restricted band are complied to limit on Paragraph 15.209

Frequency Range (MHz)	Distance (m)	Field strength (dBuV/m)
0.009-0.490	3	20log 2400/F (kHz) + 80
0.490-1.705	3	20log 24000/F (kHz) + 40
1.705-30	3	20log 30 + 40
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	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 1G-26G, the final emission level got using PK and AV detector.
6. If measurement is made at 3m distance.

3.2.5 .1Radiated Emission Result(0.009 to 30 MHz)

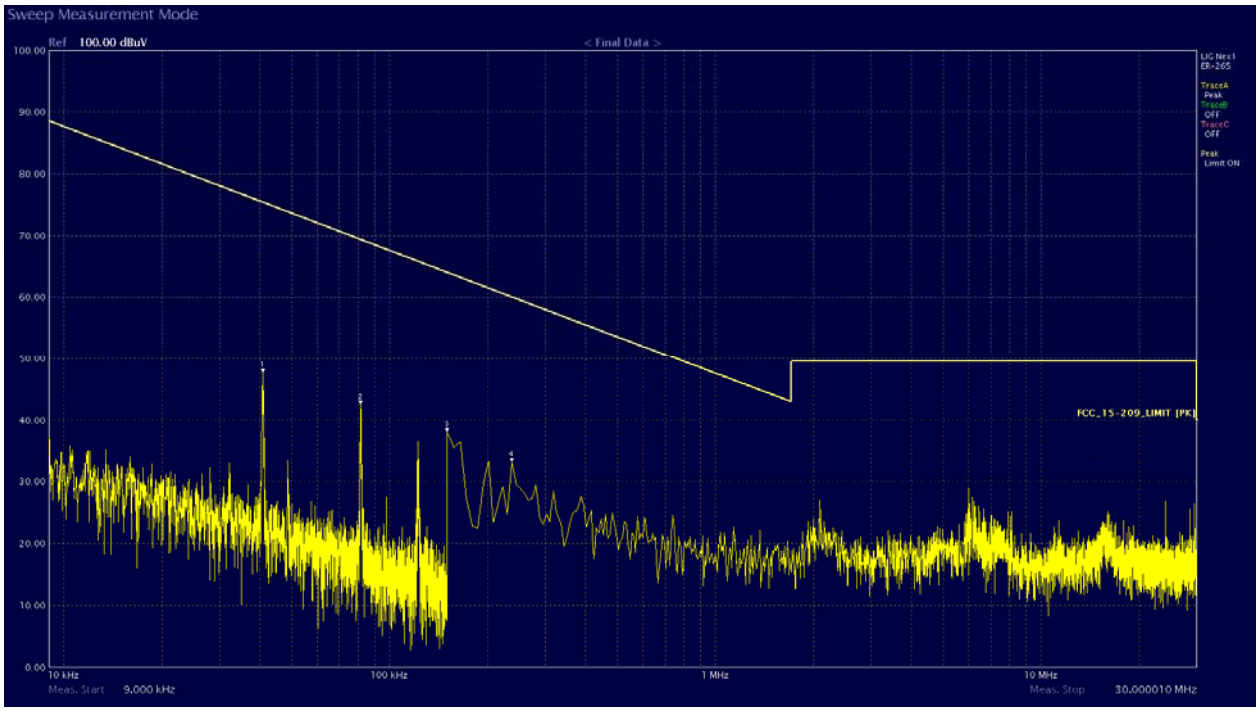
Radiated Emission from 0.009 – 30 MHz
EUT set Condition : Normal operating Mode
Antenna Polarity : Hor.
Results : Pass



Frequency MHz	Reading dBuV/m	P (H, V)	Ant. Factor dB	Cable Loss dB	AMP GAIN dB	Limit dBuV/m	Total dBuV/m	Margin dB
-	-	-	-	-	-	-	-	-

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.

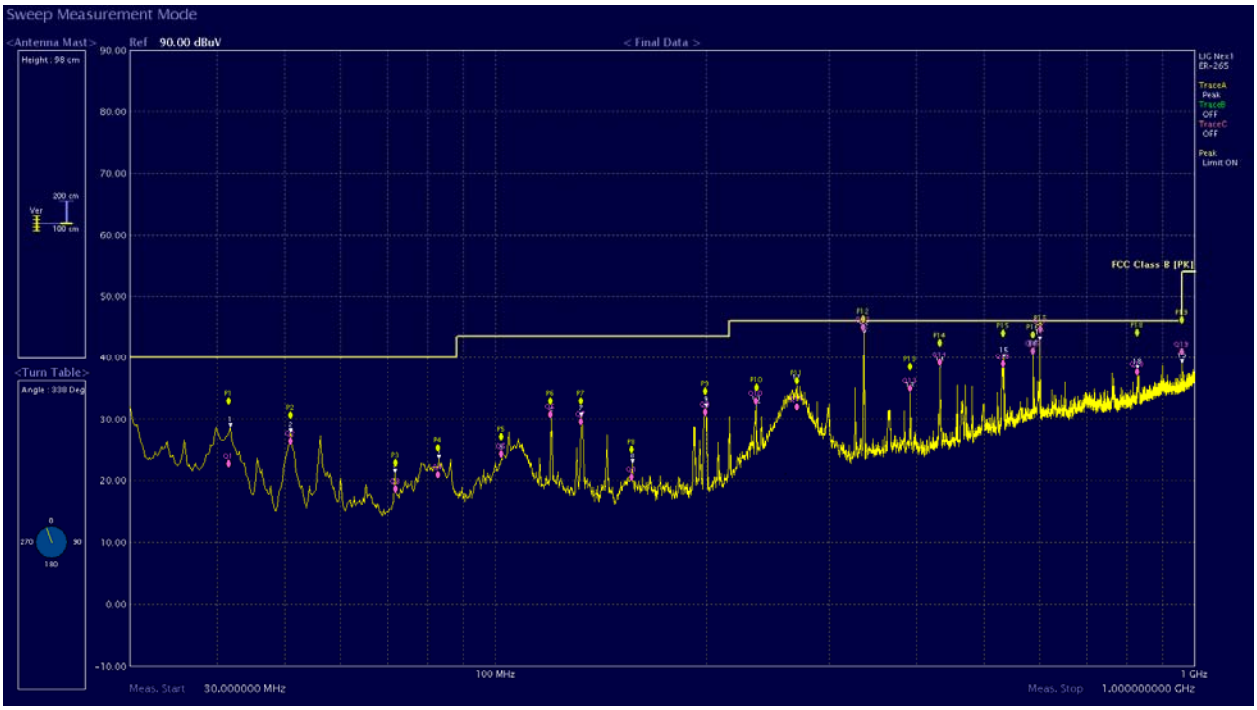
Radiated Emission from 0.009 – 30 MHz
EUT set Condition : Normal operating Mode
Antenna Polarity : Ver.
Results : Pass



Frequency MHz	Reading dBuV/m	P (H, V)	Ant. Factor dB	Cable Loss dB	AMP GAIN dB	Limit dBuV/m	Total dBuV/m	Margin dB
-	-	-	-	-	-	-	-	-

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.

3.2.5.2 Radiated Emission Result(30 MHz to 1000 MHz)-(According to 15.107, 15.207)



Frequency MHz	Reading dBuV/m	P (H, V)	Ant. Factor dB	Cable Loss dB	AMP GAIN dB	Limit dBuV/m	Total dBuV/m	Margin dB
41.63	12.80	V	10.65	1.13	0.0	40.00	24.58	15.42
51.00	16.10	V	10.52	1.32	0.0	40.00	27.94	12.06
71.98	11.02	V	7.28	1.54	0.0	40.00	19.84	20.16
82.91	12.76	V	7.04	1.76	0.0	40.00	21.56	18.44
101.89	11.10	V	11.89	2.04	0.0	43.50	25.03	18.47
120.01	16.83	H	13.63	2.40	0.0	43.50	32.86	10.64
132.48	15.76	H	12.67	2.40	0.0	43.50	30.83	12.67
156.69	4.02	H	14.58	2.57	0.0	43.50	21.17	22.33
199.66	12.92	H	16.52	3.00	0.0	43.50	32.44	11.06
235.23	15.47	V	15.66	3.35	0.0	46.00	34.48	11.52
262.82	11.30	V	17.26	3.60	0.0	46.00	32.16	13.84
336.01	26.39	H	13.79	4.12	0.0	46.00	44.30	1.70

Frequency MHz	Reading dBuV/m	P (H, V)	Ant. Factor dB	Cable Loss dB	AMP GAIN dB	Limit dBuV/m	Total dBuV/m	Margin dB
391.68	16.19	H	14.69	4.53	0.0	46.00	35.41	10.59
431.99	19.42	H	15.47	4.92	0.0	46.00	39.81	6.19
532.65	16.26	H	17.56	5.63	0.0	46.00	39.45	6.55
587.56	18.71	H	18.01	6.00	0.0	46.00	42.72	3.28
600.03	20.49	H	18.16	6.10	0.0	46.00	44.75	1.25
828.08	7.30	H	21.31	7.51	0.0	46.00	36.12	9.88
959.98	11.20	H	22.78	8.19	0.0	46.00	42.17	3.83

Note :

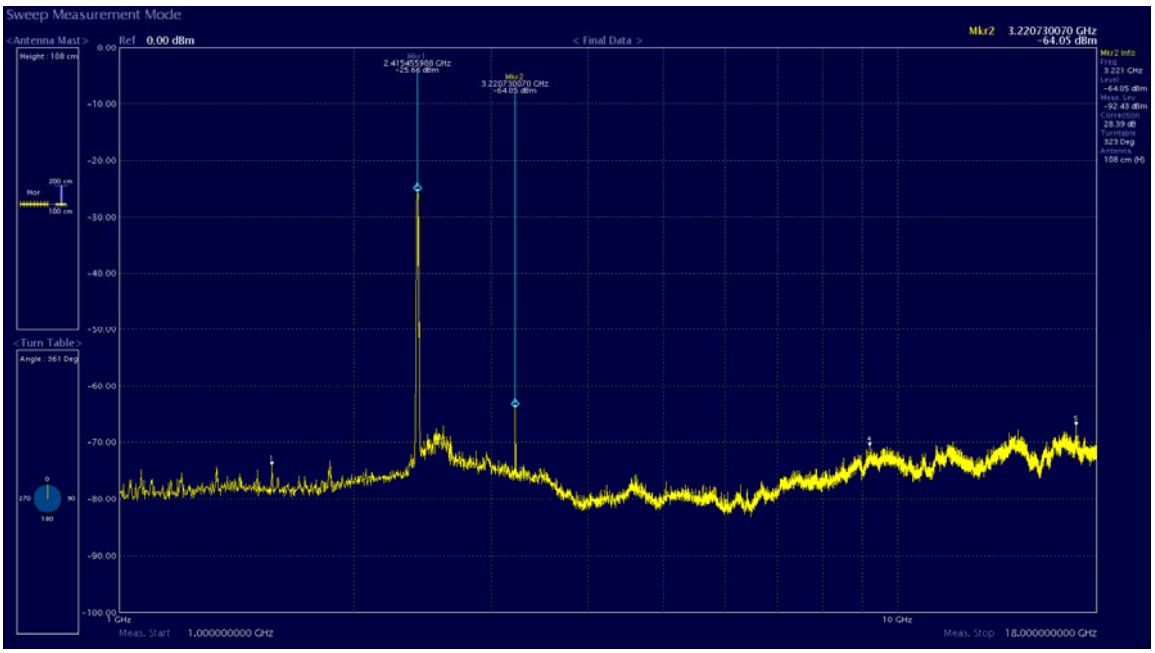
1. All reading levels are Quasi-peak value.

2. Measurement level = reading level + correct factor

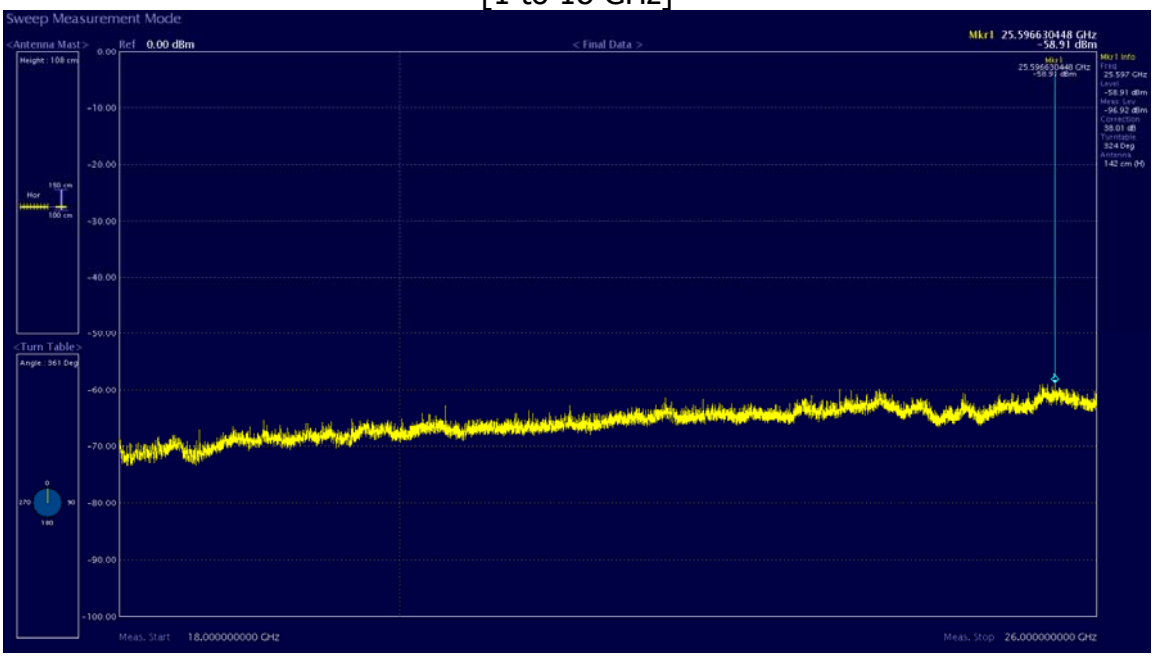
3. This device used to install a wall device. The location of EUT measurements has the Y-Plnae.

3.2.5.3 Fundamental & Harmonics Radiated Emission Result(1 GHz to 26 GHz)

Test Mode	IEEE802.11b	Test Channel	1 CH (2412 MHz)
Test Item	Fundamental & Harmonics Radiated Emission Test Result	Polarization	Hor.
Test Result	PASS		



[1 to 18 GHz]



[18 to 26 GHz]

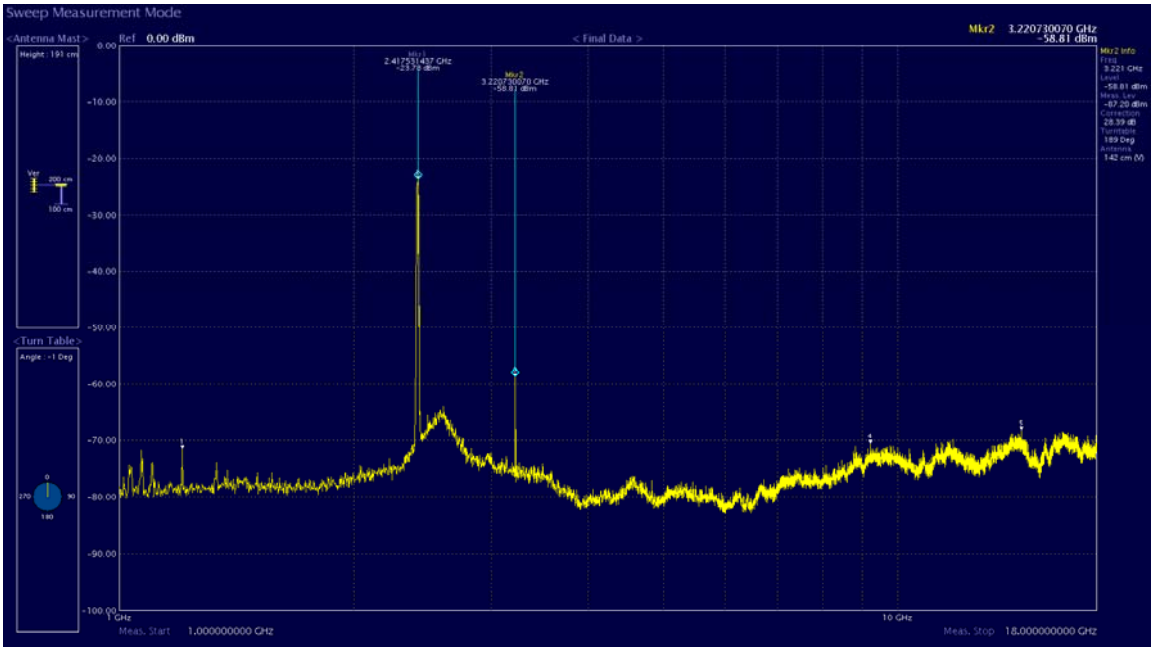
Frequency (MHz)	Emission PK/AV (dBuV/m)	Polarization	Limits PK/AV (dBuV/m)	Margin (dB)
2412	81.32(PK)	Hor.	114/94	32.68
3221	42.94(PK)	Hor.	74/54	31.06
25596	48.08(PK)	Hor.	74/54	25.92
-	-	-	-	-

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

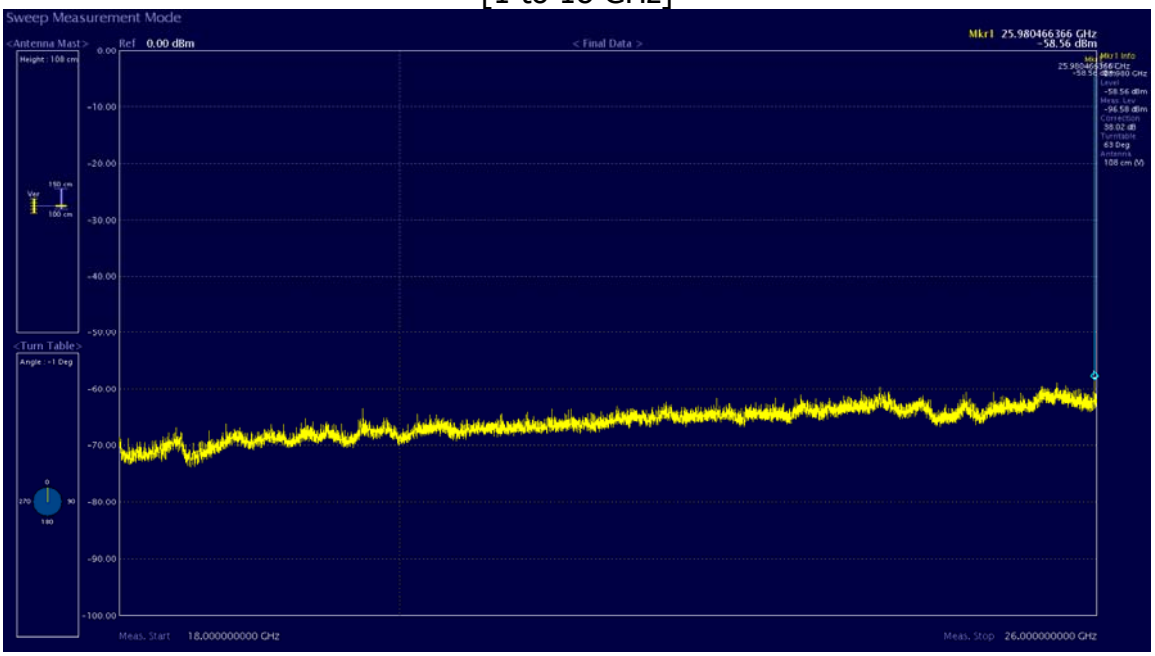
2. Measurement level = reading level + correct factor

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

Test Mode	IEEE802.11b	Test Channel	1 CH (2412 MHz)
Test Item	Fundamental & Harmonics Radiated Emission Test Result	Polarization	Ver.
Test Result	PASS		



[1 to 18 GHz]



[18 to 26 GHz]

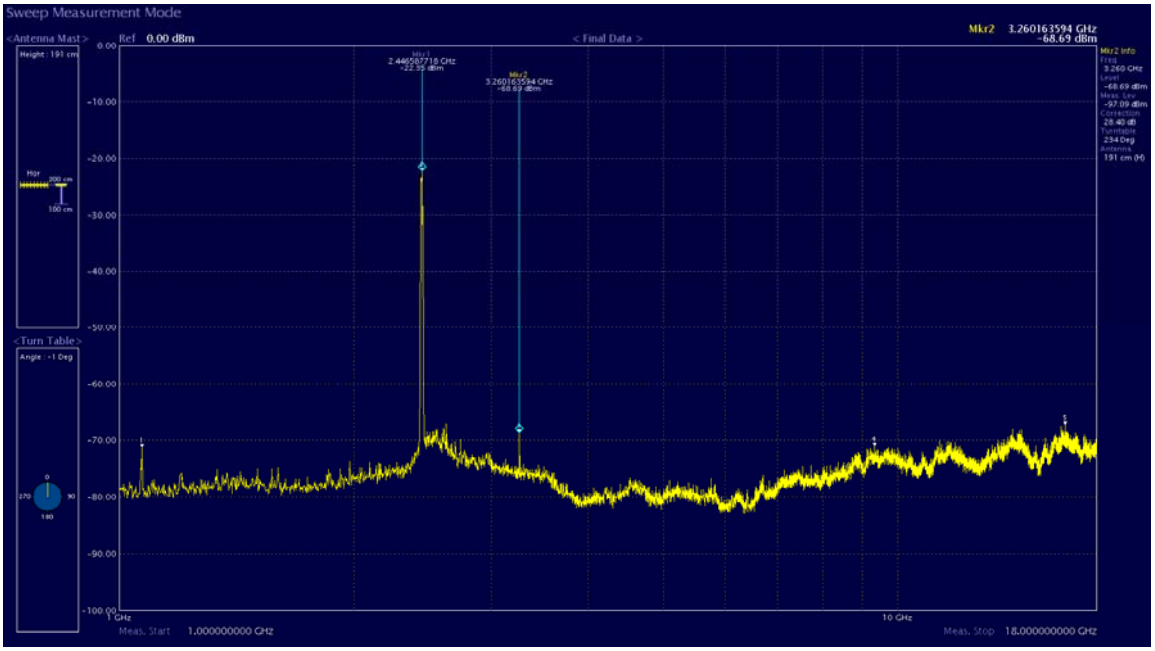
Frequency (MHz)	Emission PK/AV (dBuV/m)	Polarization	Limits PK/AV (dBuV/m)	Margin (dB)
2412	83.21(PK)	Ver.	114/94	30.79
3220	48.18(PK)	Ver.	74/54	25.82
25980	48.43(PK)	Ver.	74/54	25.57
-	-	-	-	-

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

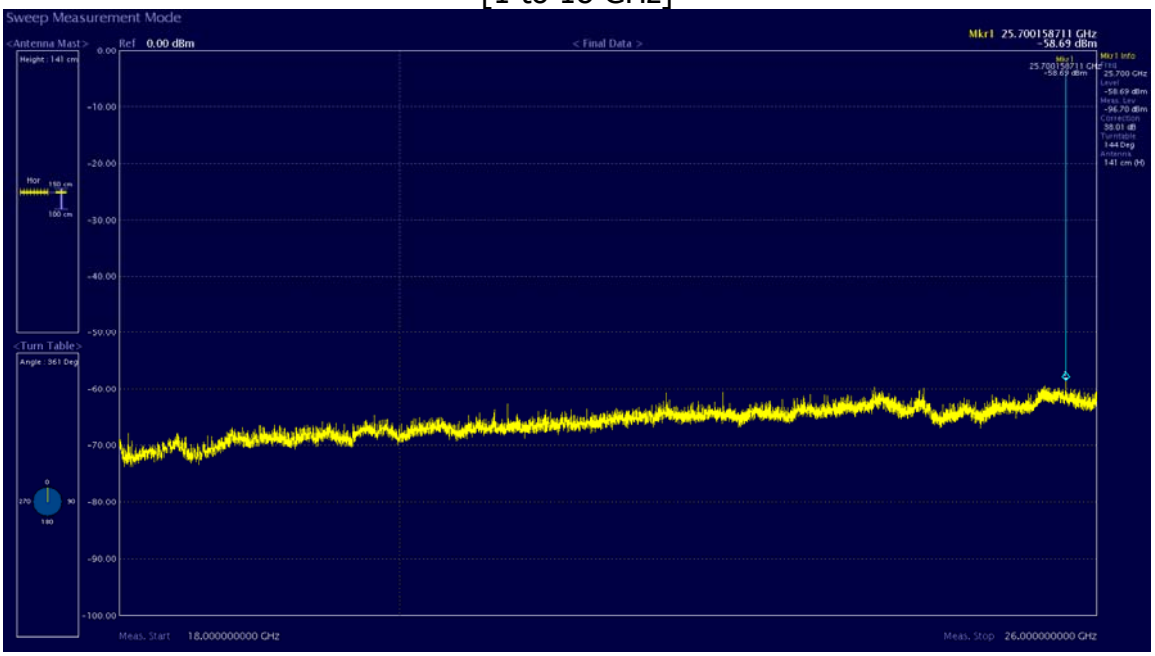
2. Measurement level = reading level + correct factor

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

Test Mode	IEEE802.11b	Test Channel	7 CH (2442 MHz)
Test Item	Fundamental & Harmonics Radiated Emission Test Result	Polarization	Hor.
Test Result	PASS		



[1 to 18 GHz]



[18 to 26 GHz]

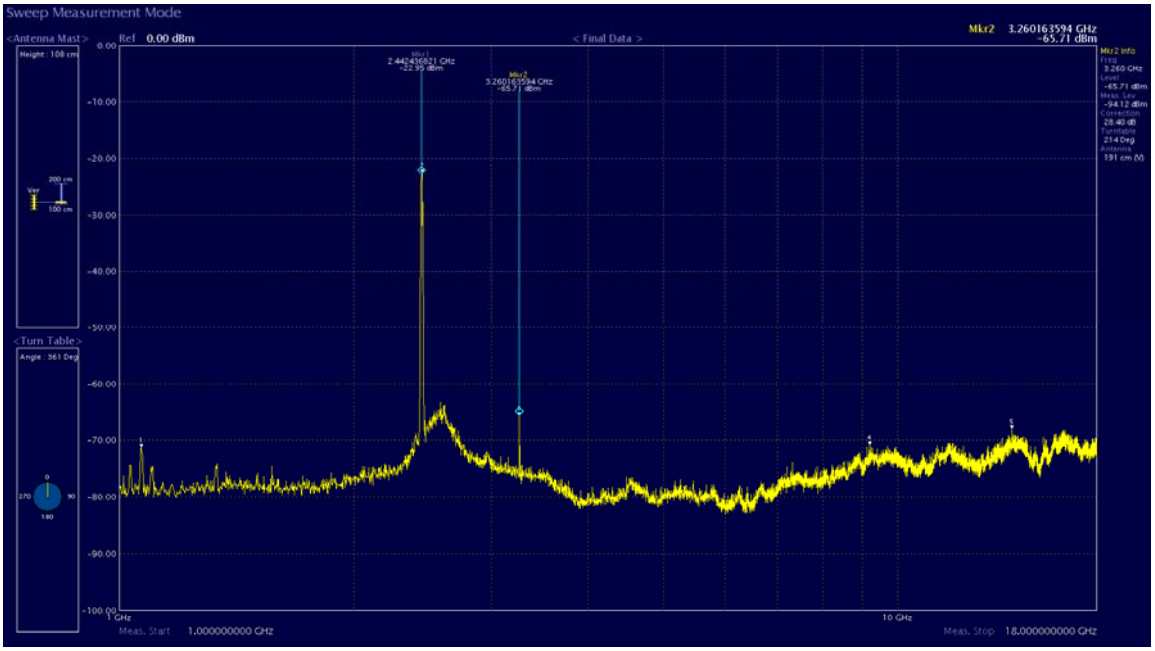
Frequency (MHz)	Emission PK/AV (dBuV/m)	Polarization	Limits PK/AV (dBuV/m)	Margin (dB)
2442	84.64(PK)	Hor.	114/94	29.36
3260	38.30(PK)	Hor.	74/54	35.70
25700	48.30(PK)	Hor.	74/54	25.70
-	-	-	-	-

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

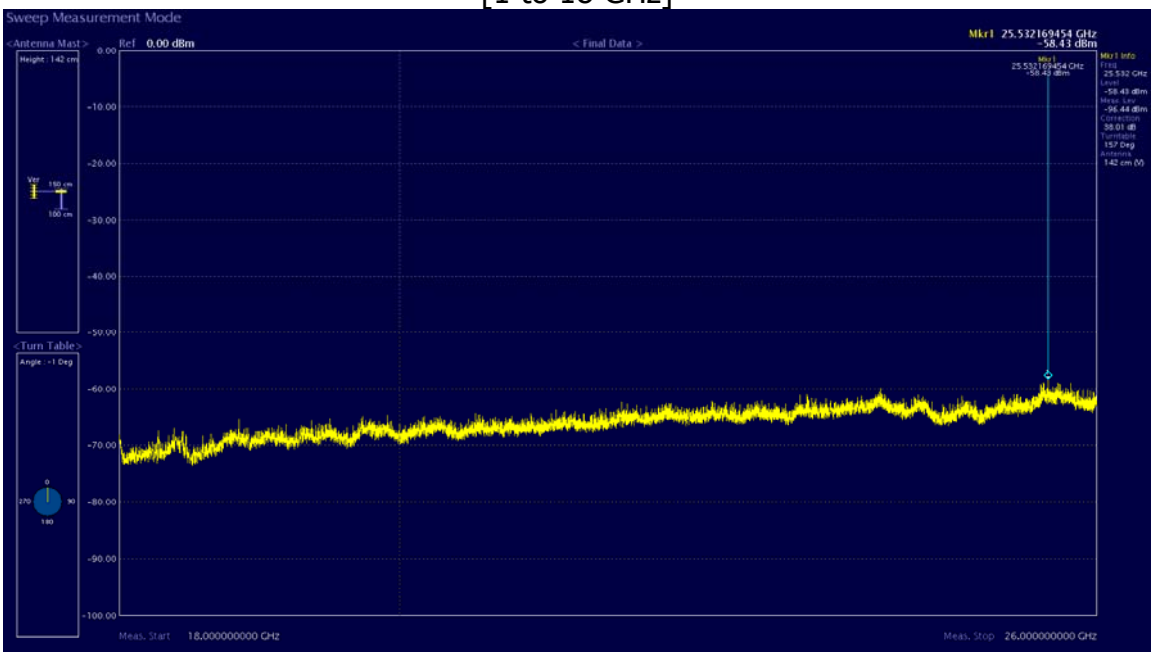
2. Measurement level = reading level + correct factor

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

Test Mode	IEEE802.11b	Test Channel	7 CH (2442 MHz)
Test Item	Fundamental & Harmonics Radiated Emission Test Result	Polarization	Ver.
Test Result	PASS		



[1 to 18 GHz]



[18 to 26 GHz]

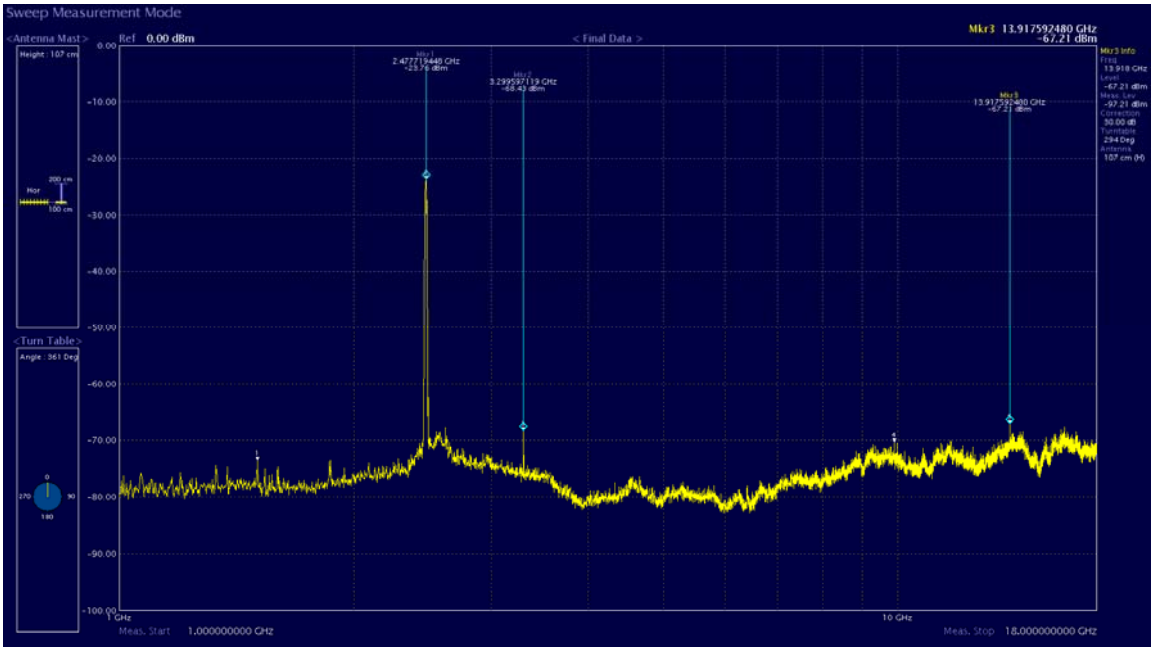
Frequency (MHz)	Emission PK/AV (dBuV/m)	Polarization	Limits PK/AV (dBuV/m)	Margin (dB)
2442	84.04(PK)	Ver.	114/94	29.96
3260	41.28(PK)	Ver.	74/54	32.72
25532	48.56(PK)	Ver.	74/54	25.44
-	-	-	-	-

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

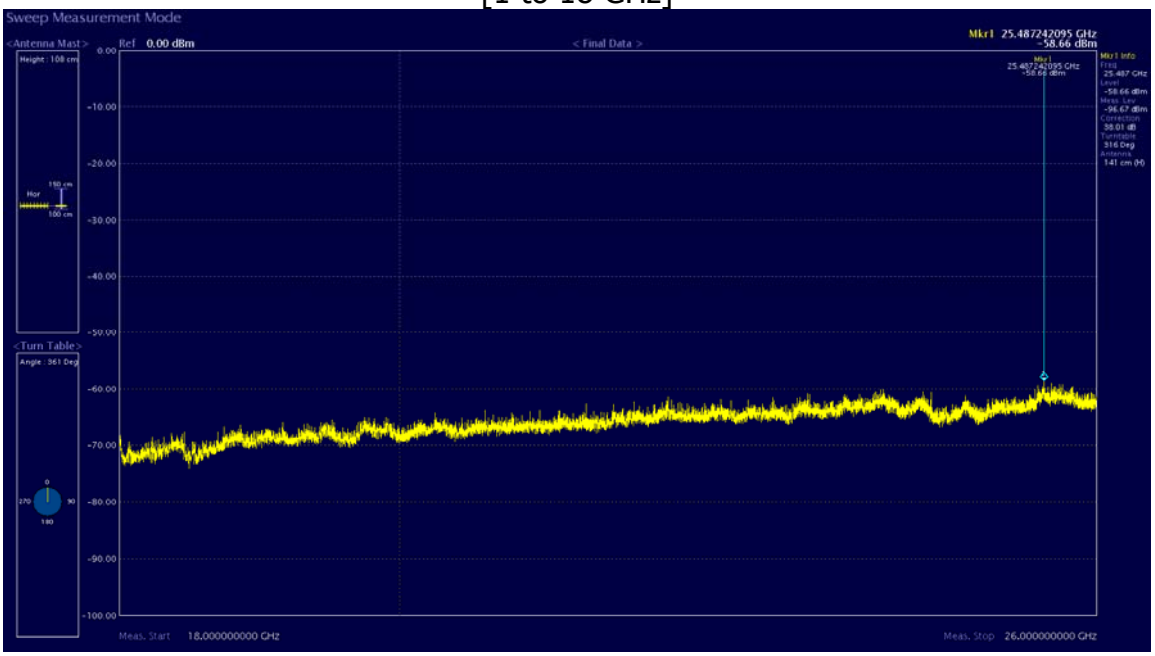
2. Measurement level = reading level + correct factor

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

Test Mode	IEEE802.11b	Test Channel	13 CH (2472 MHz)
Test Item	Fundamental & Harmonics Radiated Emission Test Result	Polarization	Hor.
Test Result	PASS		



[1 to 18 GHz]



[18 to 26 GHz]

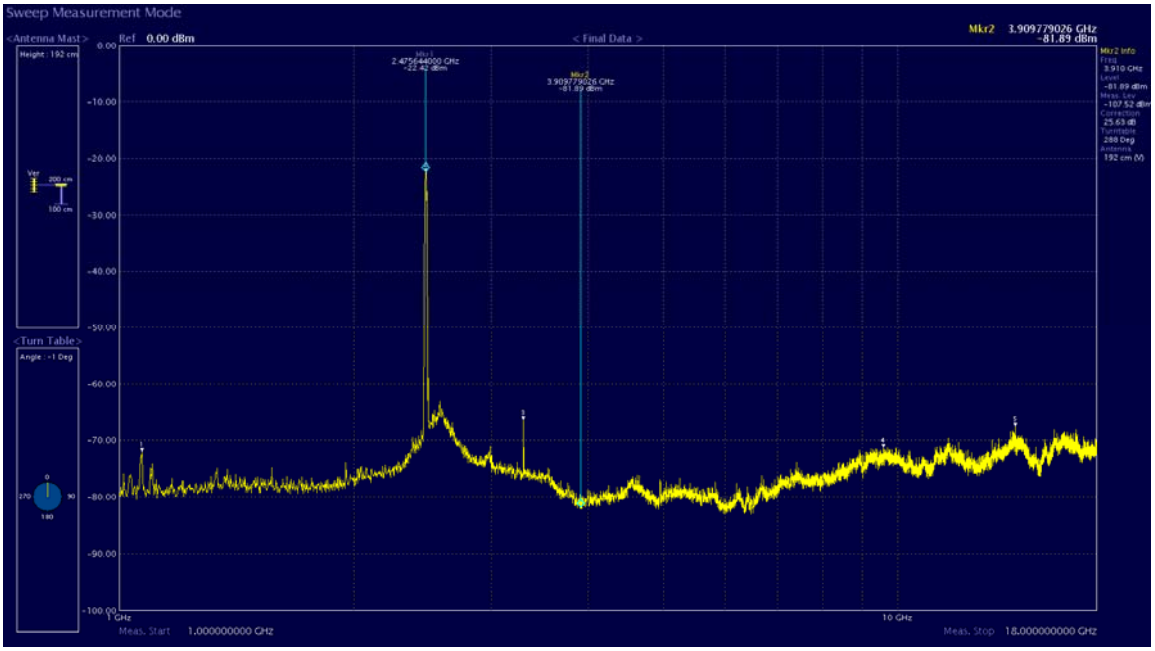
Frequency (MHz)	Emission PK/AV (dBuV/m)	Polarization	Limits PK/AV (dBuV/m)	Margin (dB)
2472	83.23(PK)	Hor.	114/94	30.77
3299	38.56(PK)	Hor.	74/54	35.44
13917	39.78(PK)	Hor.	74/54	34.22
25487	48.33(PK)	Hor.	74/54	25.67
-	-	-	-	-

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

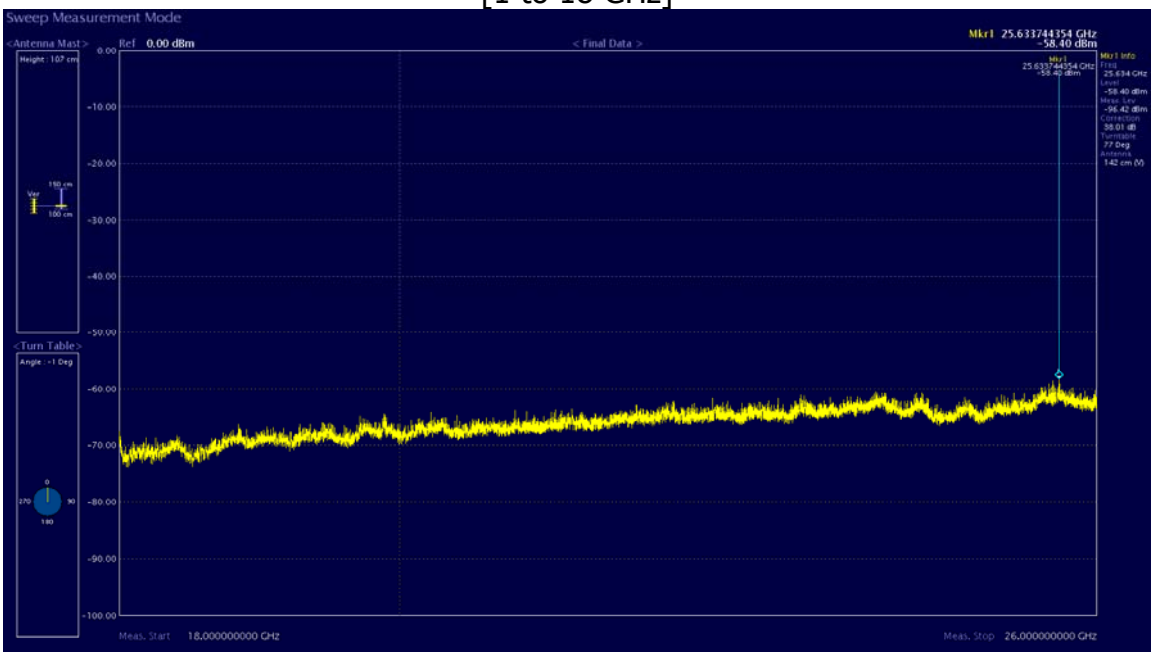
2. Measurement level = reading level + correct factor

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

Test Mode	IEEE802.11b	Test Channel	13 CH (2472 MHz)
Test Item	Fundamental & Harmonics Radiated Emission Test Result	Polarization	Ver.
Test Result	PASS		



[1 to 18 GHz]



[18 to 26 GHz]

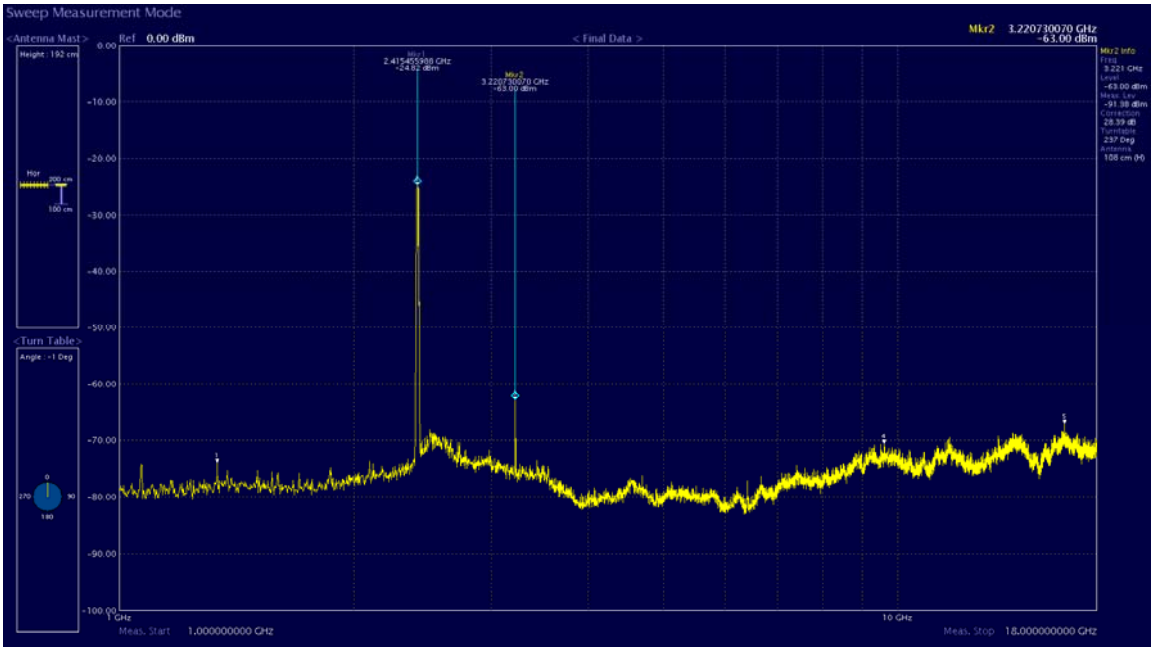
Frequency (MHz)	Emission PK/AV (dBuV/m)	Polarization	Limits PK/AV (dBuV/m)	Margin (dB)
2472	83.23(PK)	Ver.	114/94	30.77
3299	40.52(PK)	Ver.	74/54	33.48
25633	48.59(PK)	Ver.	74/54	25.41
-	-	-	-	-

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

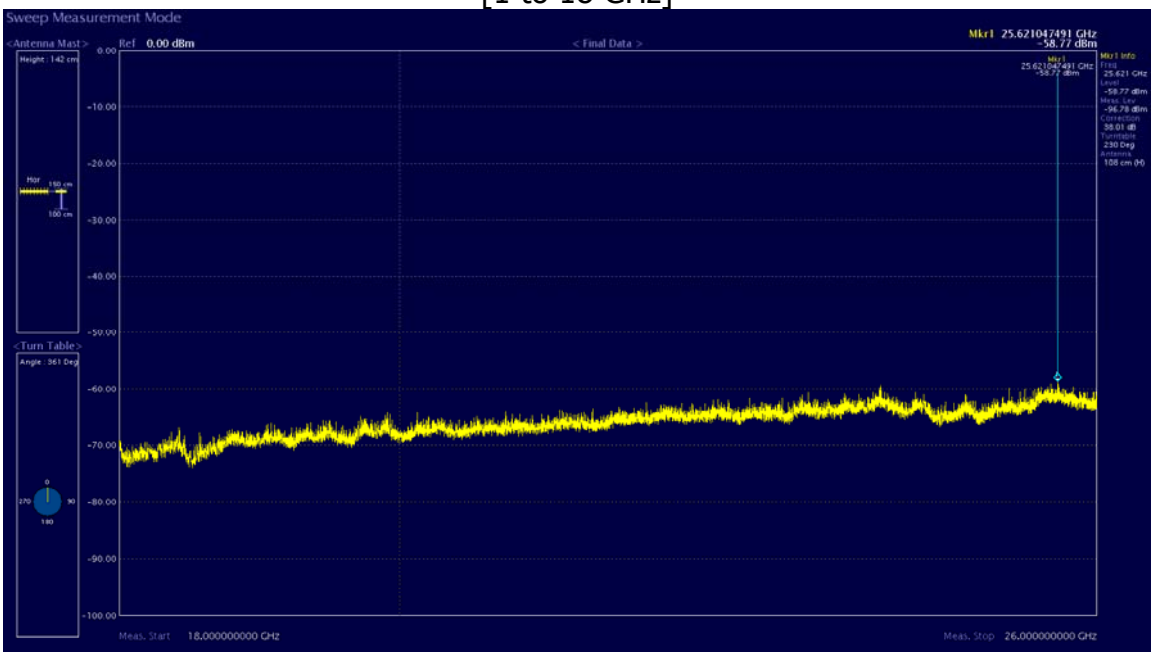
2. Measurement level = reading level + correct factor

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

Test Mode	IEEE802.11g	Test Channel	1 CH (2412 MHz)
Test Item	Fundamental & Harmonics Radiated Emission Test Result	Polarization	Hor.
Test Result	PASS		



[1 to 18 GHz]



[18 to 26 GHz]

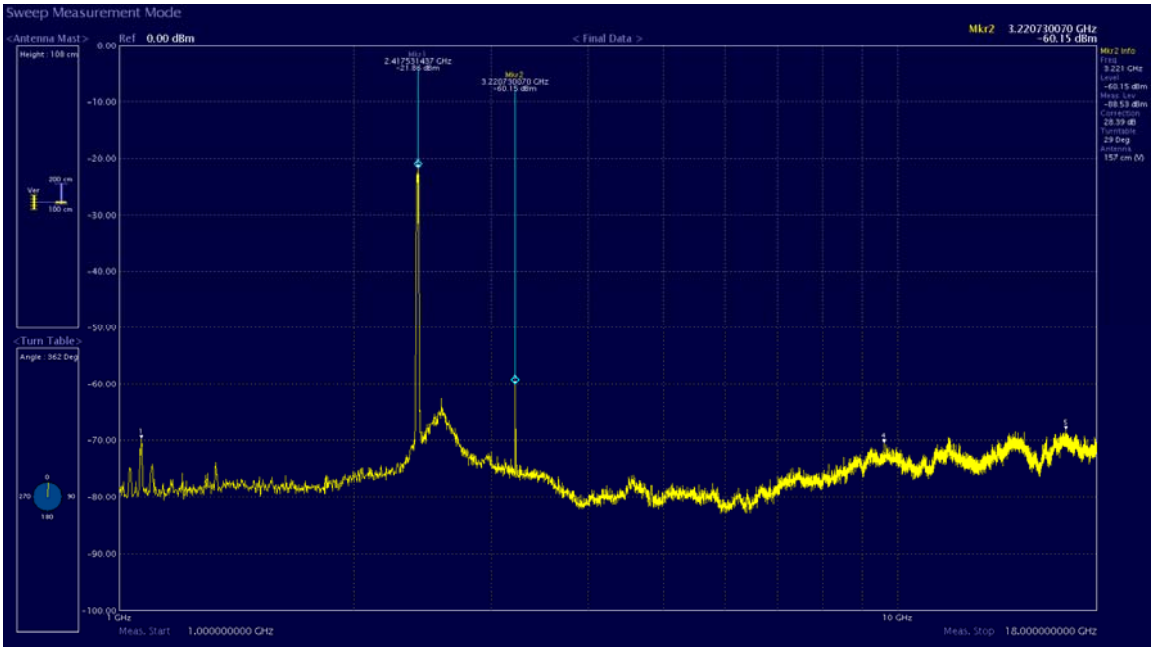
Frequency (MHz)	Emission PK/AV (dBuV/m)	Polarization	Limits PK/AV (dBuV/m)	Margin (dB)
2412	82.17(PK)	Hor.	114/94	31.83
3220	49.99(PK)	Hor.	74/54	24.01
25621	48.22(PK)	Hor.	74/54	25.78
-	-	-	-	-

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

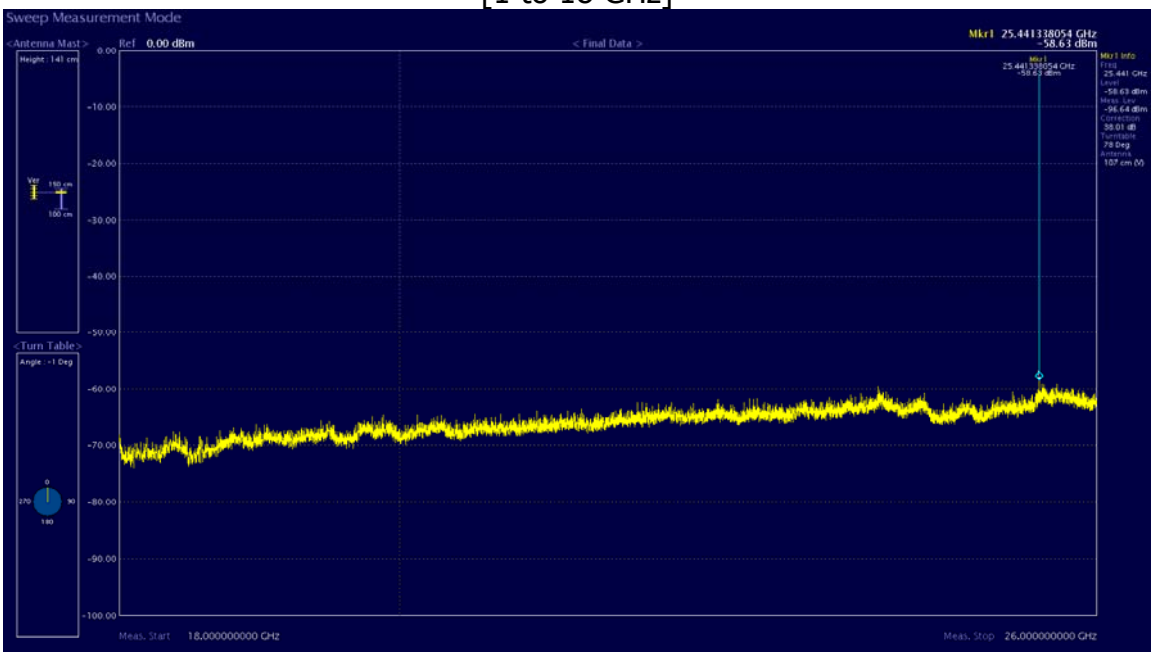
2. Measurement level = reading level + correct factor

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

Test Mode	IEEE802.11g	Test Channel	1 CH (2412 MHz)
Test Item	Fundamental & Harmonics Radiated Emission Test Result	Polarization	Ver.
Test Result	PASS		



[1 to 18 GHz]



[18 to 26 GHz]

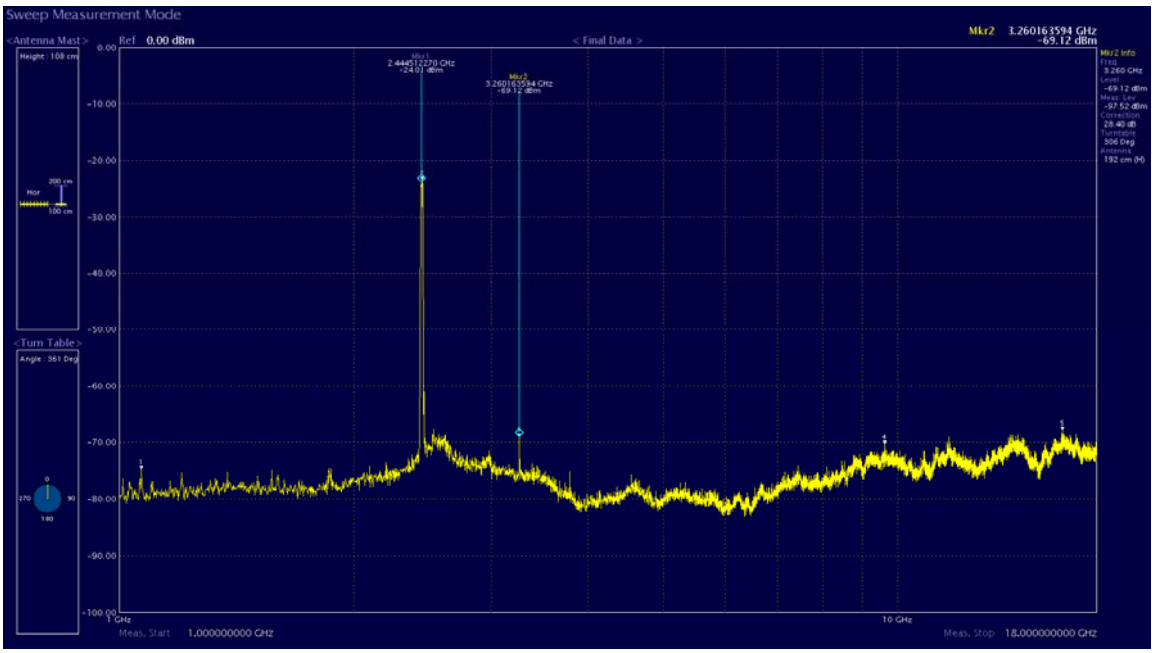
Frequency (MHz)	Emission PK/AV (dBuV/m)	Polarization	Limits PK/AV (dBuV/m)	Margin (dB)
2412	85.13(PK)	Ver.	114/94	28.87
3220	46.84(PK)	Ver.	74/54	27.16
25441	48.36(PK)	Ver.	74/54	25.64
-	-	-	-	-

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

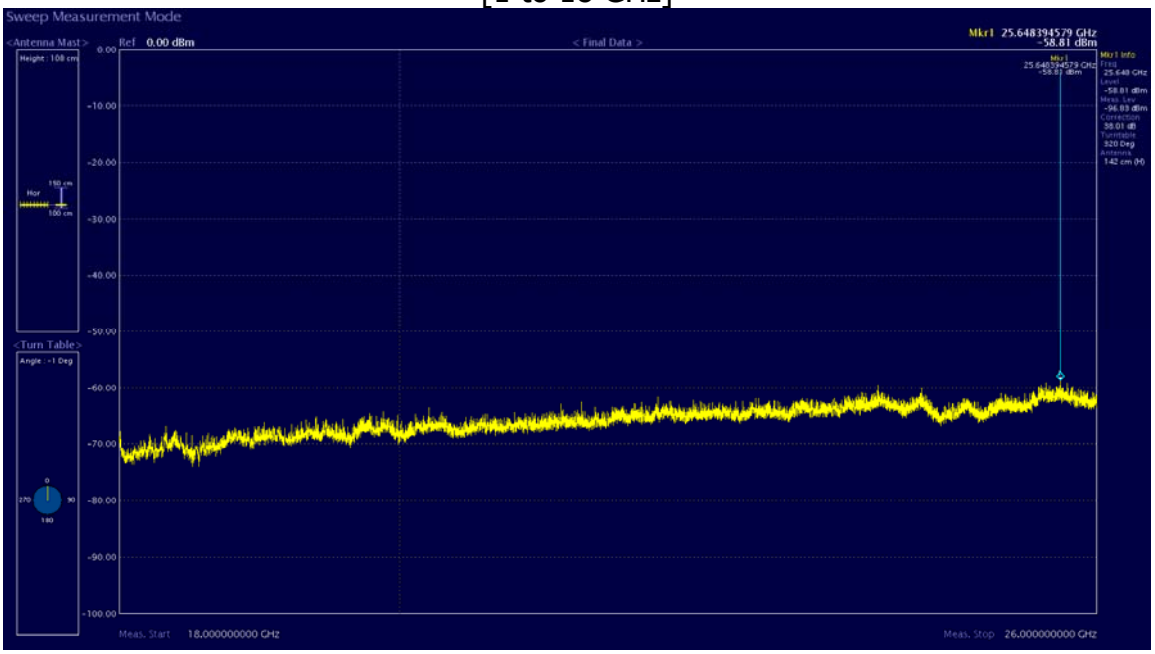
2. Measurement level = reading level + correct factor

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

Test Mode	IEEE802.11g	Test Channel	7 CH (2442 MHz)
Test Item	Fundamental & Harmonics Radiated Emission Test Result	Polarization	Hor.
Test Result	PASS		



[1 to 18 GHz]



[18 to 26 GHz]

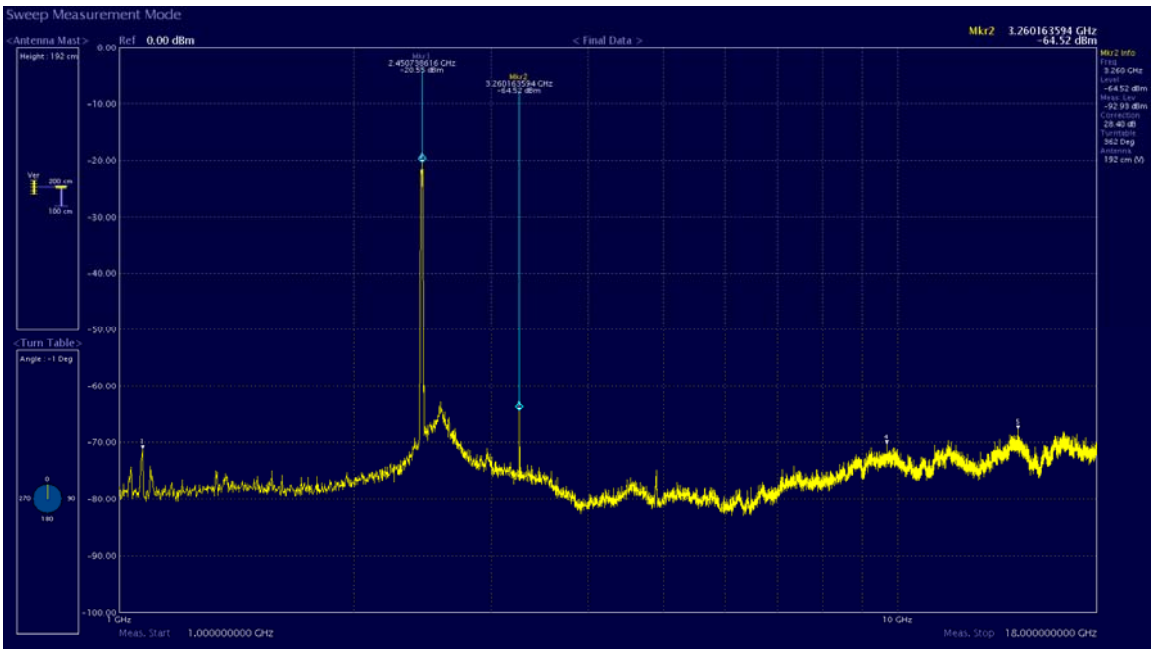
Frequency (MHz)	Emission PK/AV (dBuV/m)	Polarization	Limits PK/AV (dBuV/m)	Margin (dB)
2442	82.98(PK)	Hor.	114/94	34.02
3260	37.87(PK)	Hor.	74/54	36.13
25648	48.18(PK)	Hor.	74/54	25.82
-	-	-	-	-

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

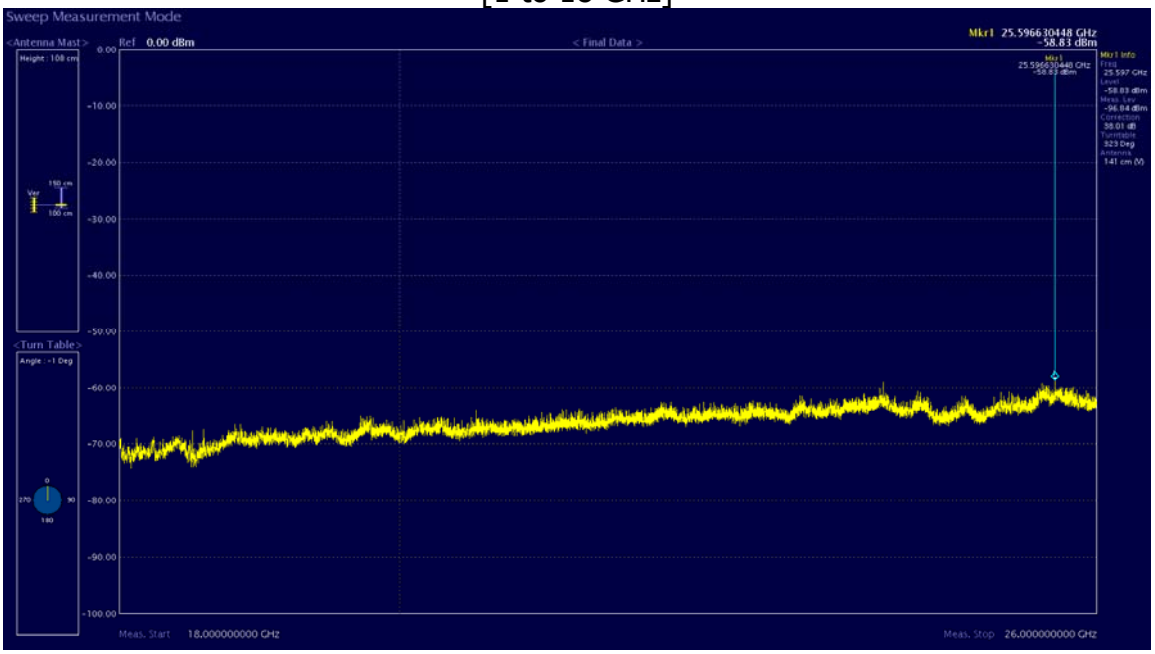
2. Measurement level = reading level + correct factor

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

Test Mode	IEEE802.11g	Test Channel	7 CH (2442 MHz)
Test Item	Fundamental & Harmonics Radiated Emission Test Result	Polarization	Ver.
Test Result	PASS		



[1 to 18 GHz]



[18 to 26 GHz]

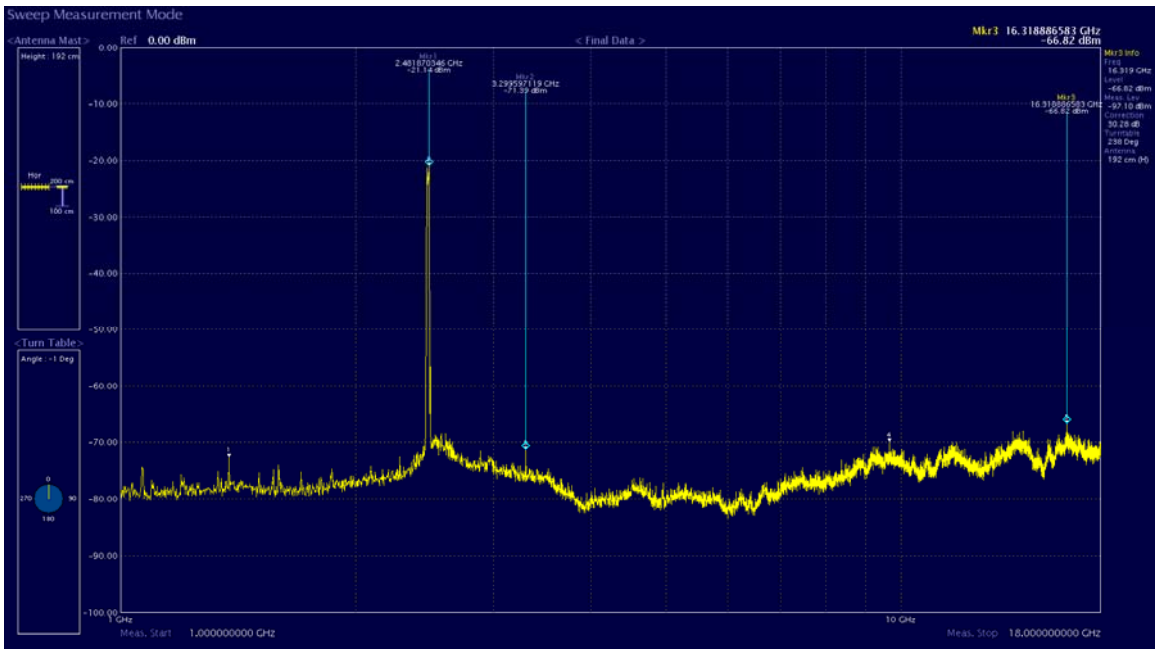
Frequency (MHz)	Emission PK/AV (dBuV/m)	Polarization	Limits PK/AV (dBuV/m)	Margin (dB)
2442	86.44(PK)	Ver.	114/94	27.56
3260	42.47(PK)	Ver.	74/54	31.53
25596	48.16(PK)	Ver.	74/54	25.84
-	-	-	-	-

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

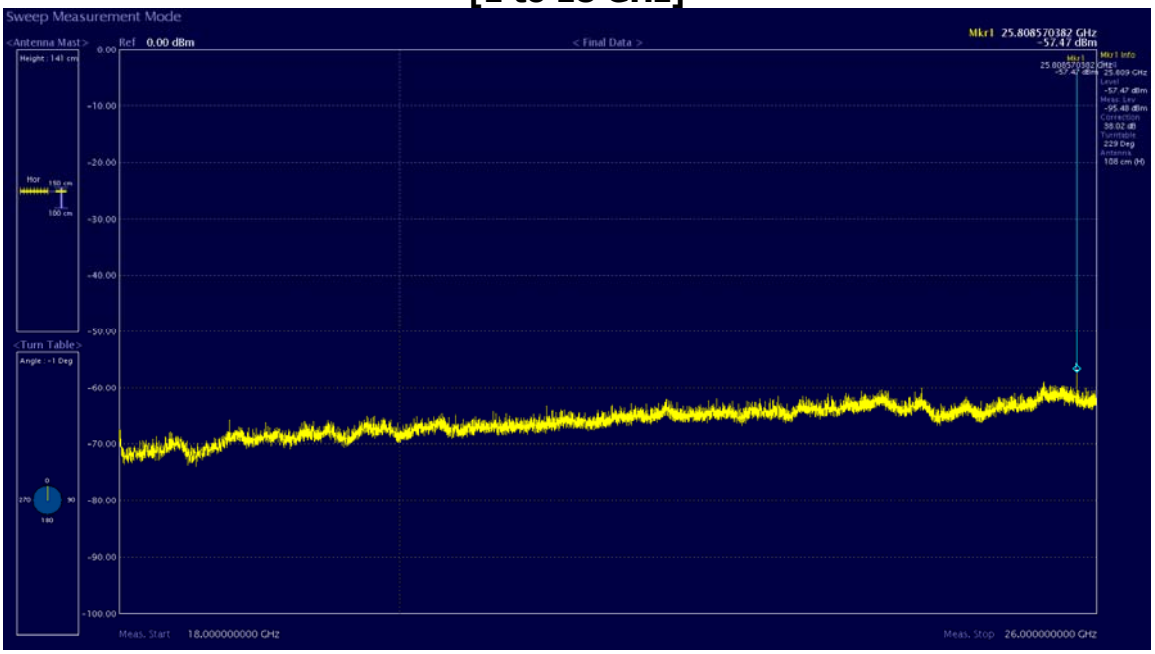
2. Measurement level = reading level + correct factor

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

Test Mode	IEEE802.11g	Test Channel	13 CH (2472 MHz)
Test Item	Fundamental & Harmonics Radiated Emission Test Result	Polarization	Hor.
Test Result	PASS		



[1 to 18 GHz]



[18 to 26 GHz]

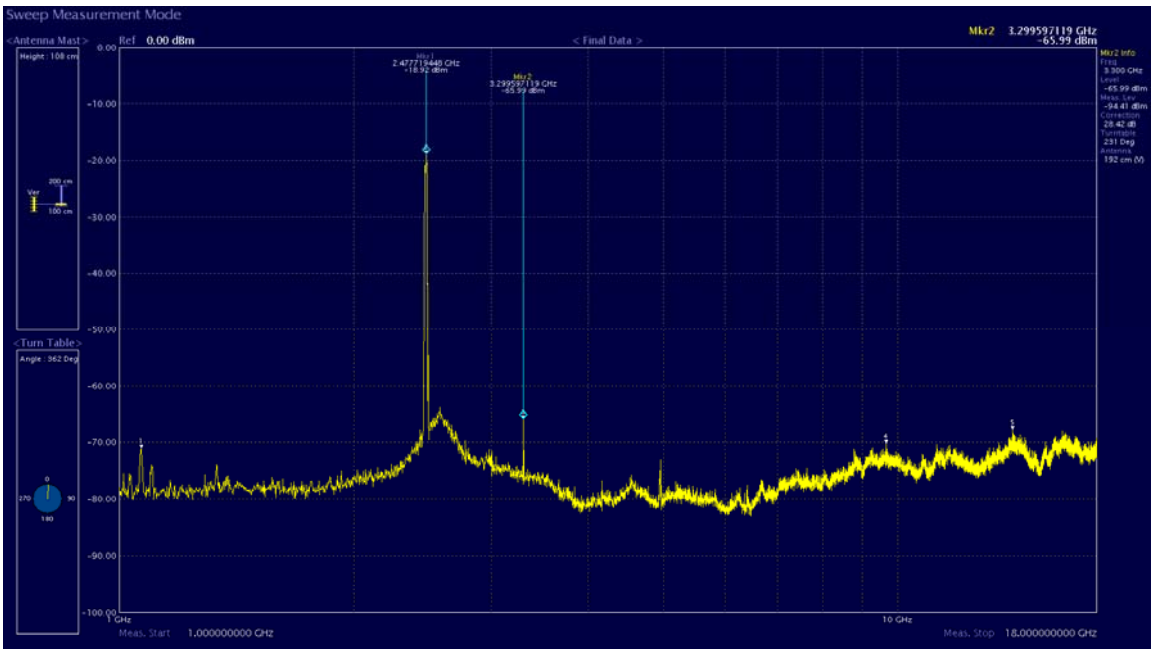
Frequency (MHz)	Emission PK/AV (dBuV/m)	Polarization	Limits PK/AV (dBuV/m)	Margin (dB)
2472	85.85(PK)	Hor.	114/94	28.15
3299	35.60(PK)	Hor.	74/54	38.40
16318	40.17(PK)	Hor.	74/54	33.83
25808	49.52(PK)	Hor.	74/54	24.48
-	-	-	-	-

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

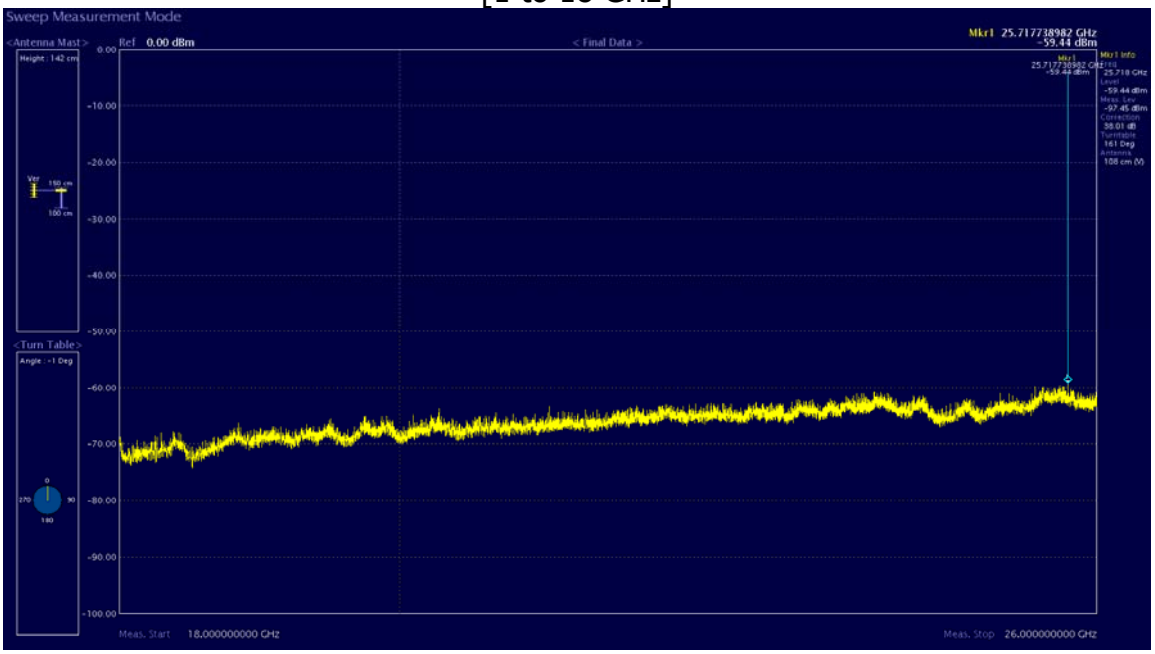
2. Measurement level = reading level + correct factor

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

Test Mode	IEEE802.11g	Test Channel	13 CH (2472 MHz)
Test Item	Fundamental & Harmonics Radiated Emission Test Result	Polarization	Ver.
Test Result	PASS		



[1 to 18 GHz]



[18 to 26 GHz]

Frequency (MHz)	Emission PK/AV (dBuV/m)	Polarization	Limits PK/AV (dBuV/m)	Margin (dB)
2472	88.07(PK)	Ver.	114/94	28.93
3299	41.00(PK)	Ver.	74/54	33.00
25717	47.55(PK)	Ver.	74/54	26.45
-	-	-	-	-

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.

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. 15, 2010
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

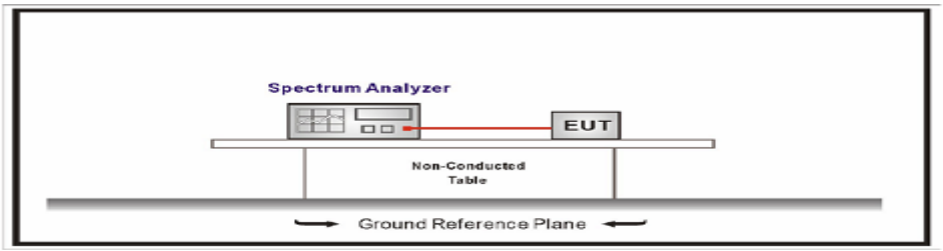
3.3.2 Limit

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

RF Conducted Measurement:



3.3.4 Test Procedure

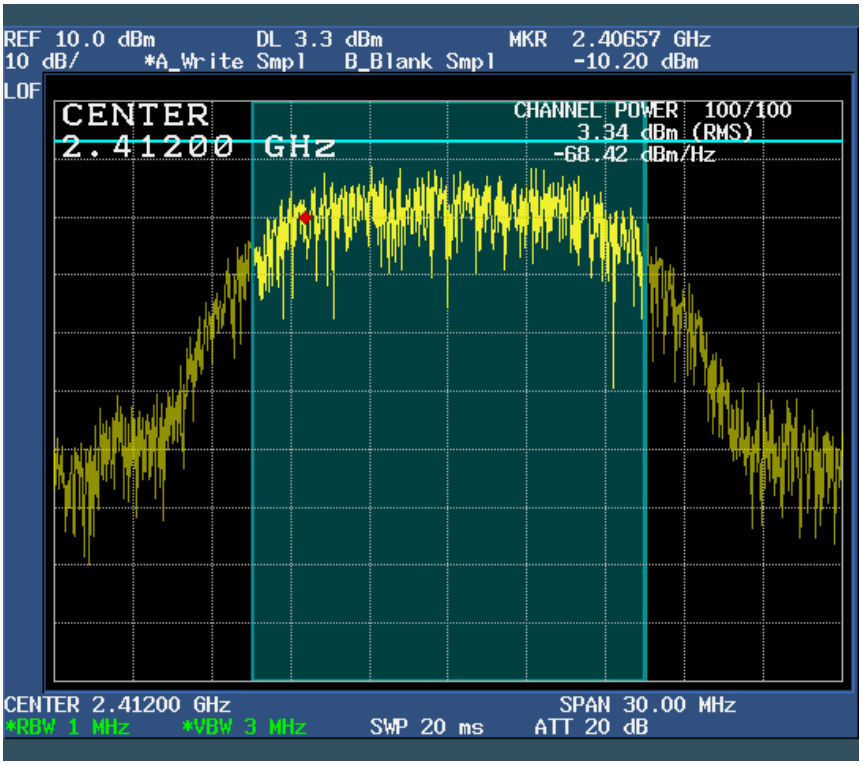
The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the peak power detection.

3.3.5 Peak Power Test Result

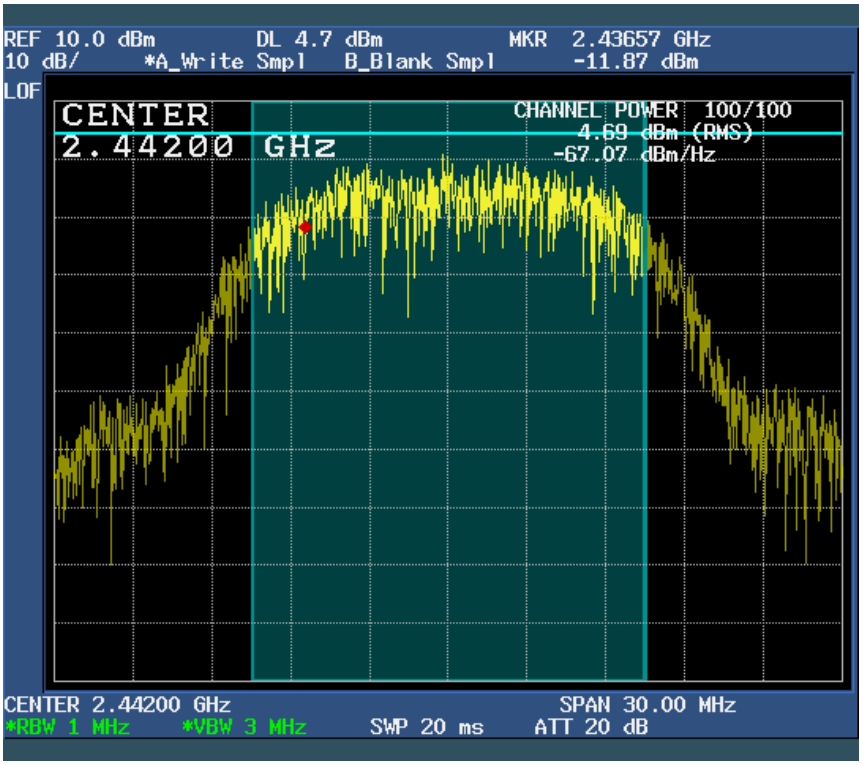
Test Item	Peak Power Output
Test Mode	802.11b
Test Site	RF Room
Measurement Method	Conducted

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
1	2412	3.34	1Watt=30dBm	Pass
7	2442	4.69	1Watt=30dBm	Pass
13	2472	5.86	1Watt=30dBm	Pass

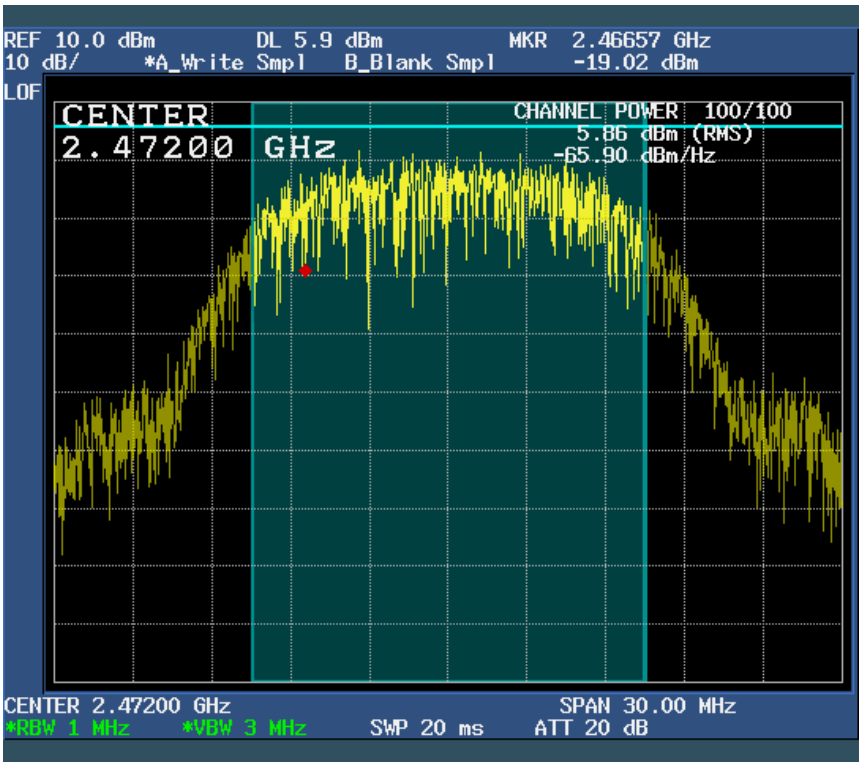
Channel 1.



Channel 7.



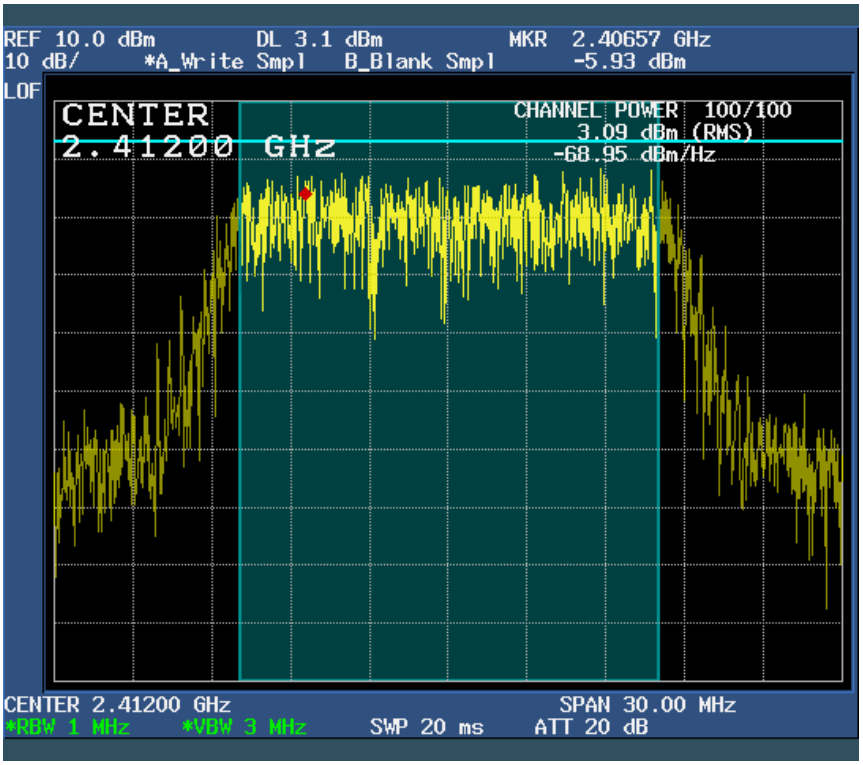
Channel 13.



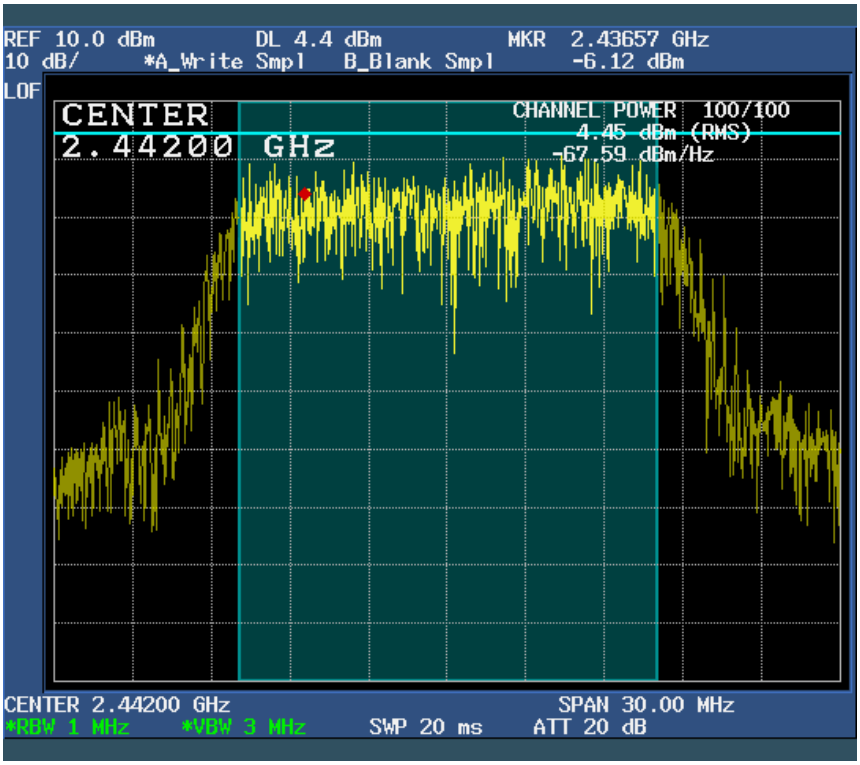
Test Item	Peak Power Output
Test Mode	802.11g
Test Site	RF Room
Measurement Method	Conducted

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
1	2412	3.09	1Watt=30dBm	Pass
7	2442	4.45	1Watt=30dBm	Pass
13	2472	5.64	1Watt=30dBm	Pass

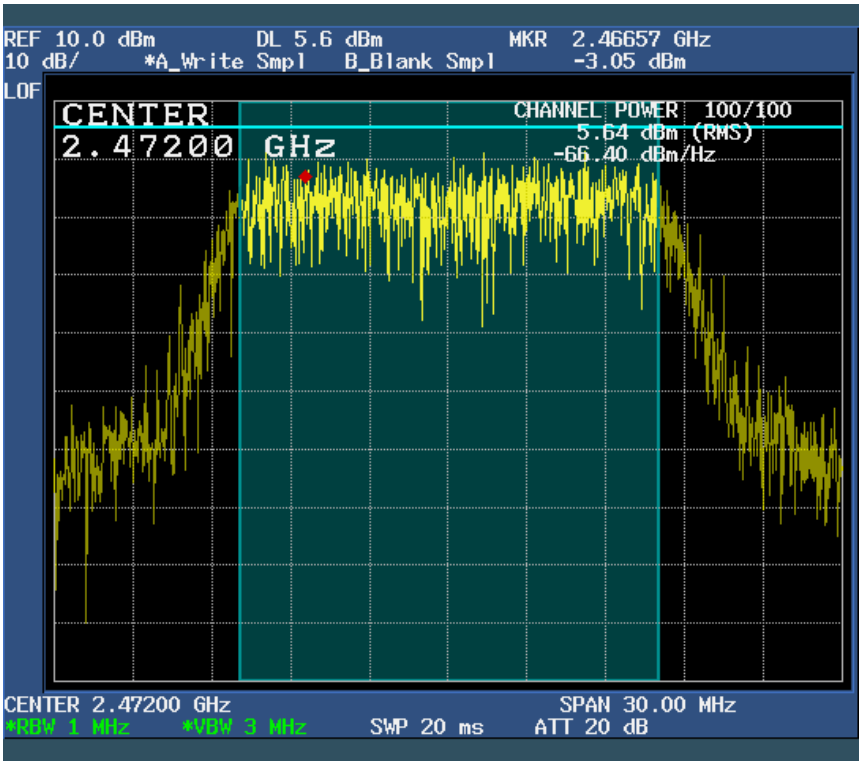
Channel 1.



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	L0804A002	Jul. 10, 2010
Horn Antenna	R&S	BBHA9120D233	0501	Sep. 10. 2010
Horn Antenna	R&S	BBHA9170	BBHA9170152	Sep. 16. 2010
Spectrum Analyzer	Advantest	R3273	121100554	Jun. 15, 2010

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

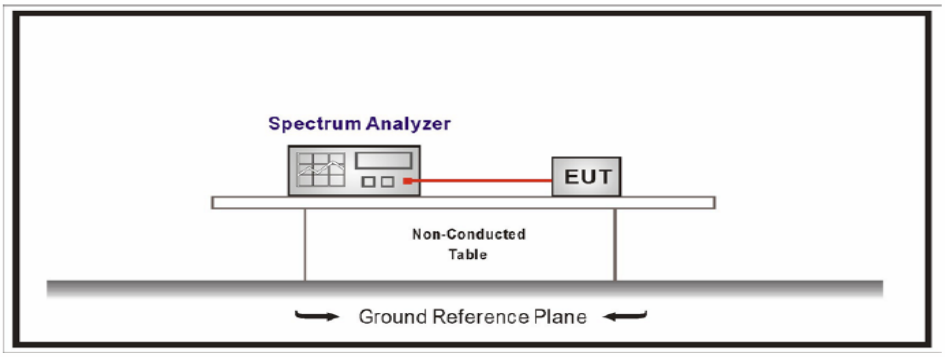
3.4.2 Limit

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.

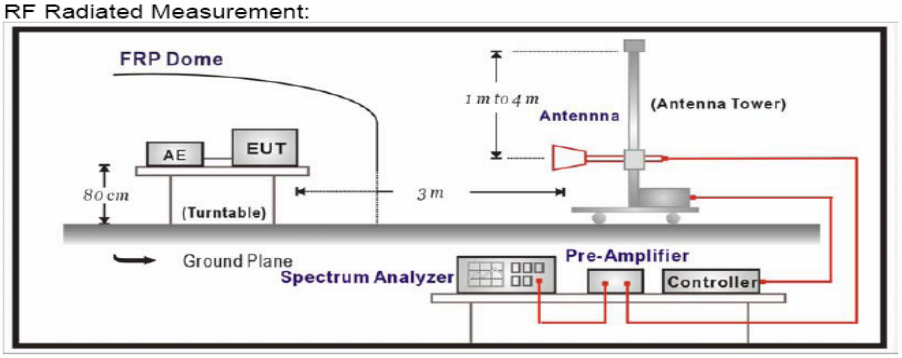
Attenuation below the general limits specified in section 15.209(a) is not required. In addition, radiated emission which fall in the restricted bands, as defined in section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a)(see Section 15.205(c)).

3.4.3 Test Configuration

RF Conducted Measurement:



RF Radiated Measurement:



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 100 kHz, above 1GHz are 1MHz.

3.4.5 Test Result Method of Band Edge Test Result of Radiated Test.

Emission Level(dBuV/m) = Reading Level + Correct Factor.

Test Frequency (MHz)	Correct Factor (dB)
2390	27.38
2483.5	27.54

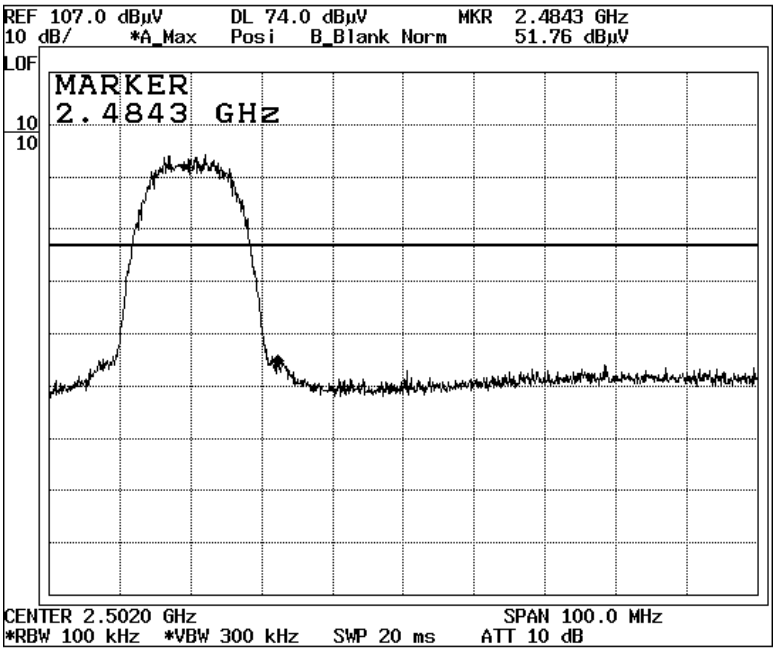
Note : Correct Factor = AF + CL

AF – Antenna Factor , CL-Cable Loss

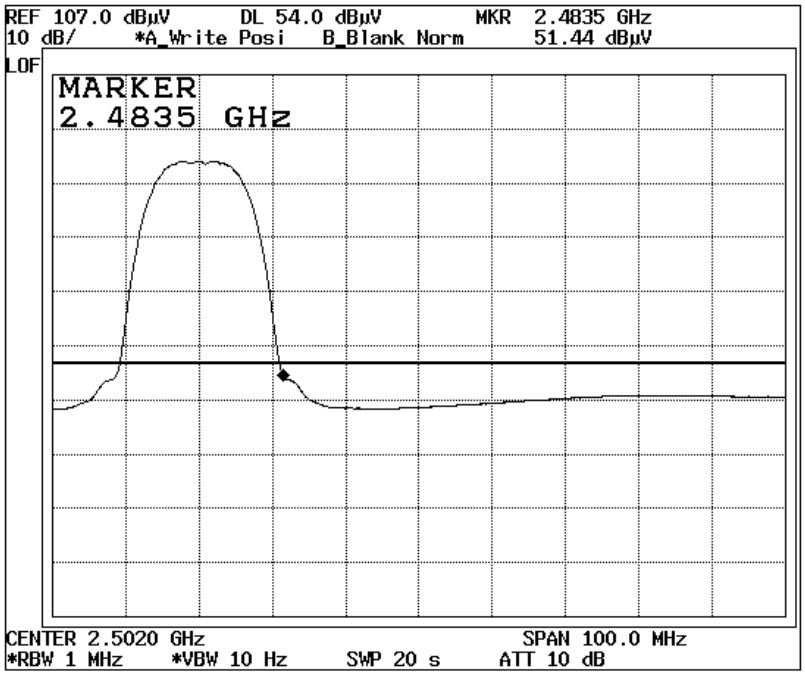
3.4.6.1 Band Edge Test Result (Conducted Test)

Detect mode	Peak / Average Mode	Test Site	RF Room
Note	IEEE802.11b – CH1 (2412 MHz)		

Detect mode : PK

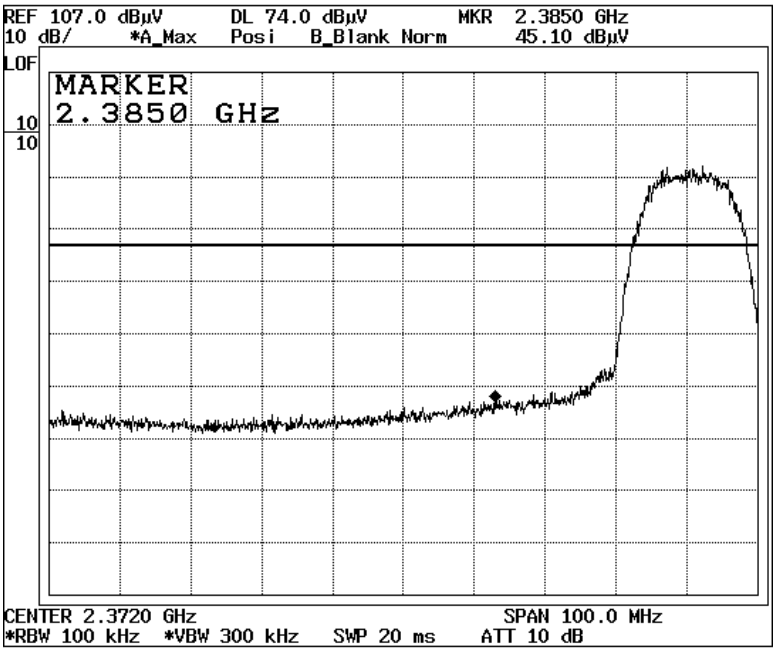


Detect mode : AV

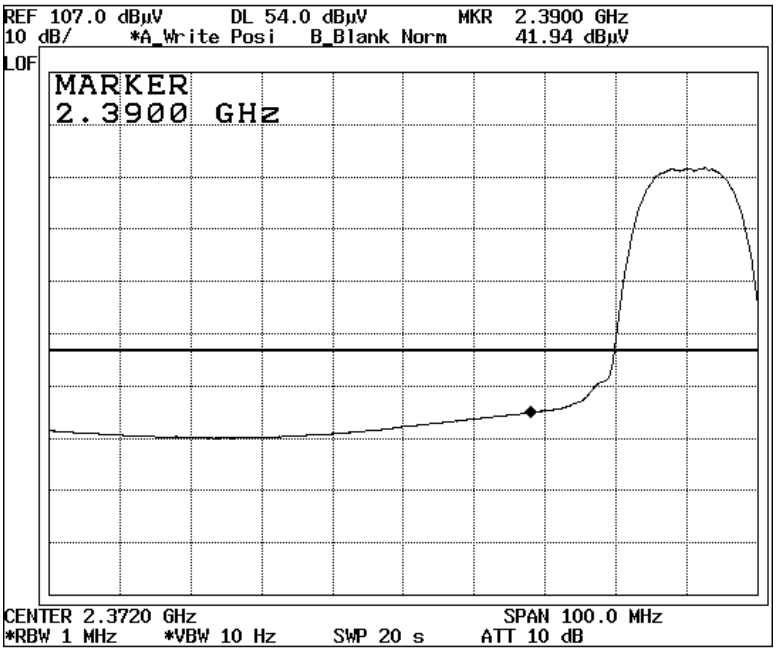


Detect mode	Peak / Average Mode	Test Site	RF Room
Note	IEEE802.11b – CH13 (2472 MHz)		

Detect mode : PK

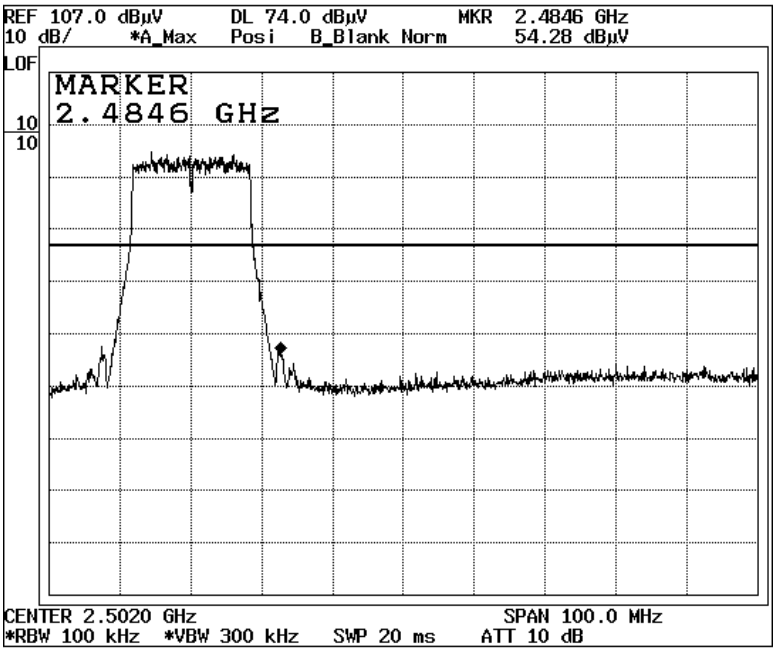


Detect mode : AV

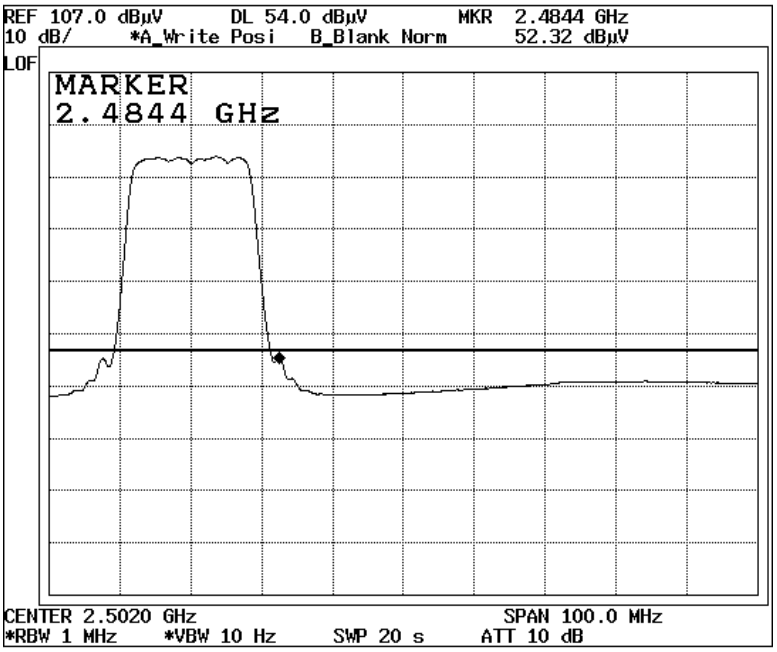


Detect mode	Peak / Average Mode	Test Site	RF Room
Note	IEEE802.11g – CH1 (2412 MHz)		

Detect mode : PK

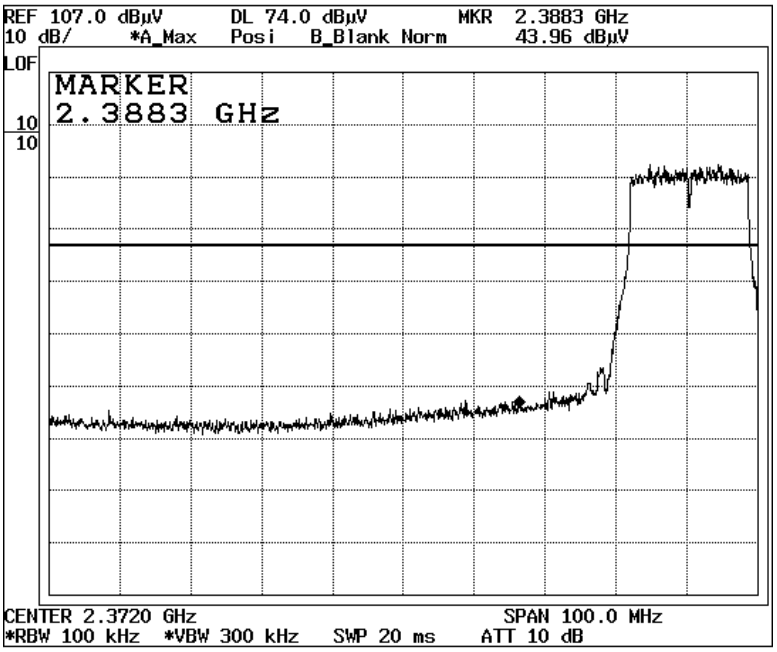


Detect mode : AV

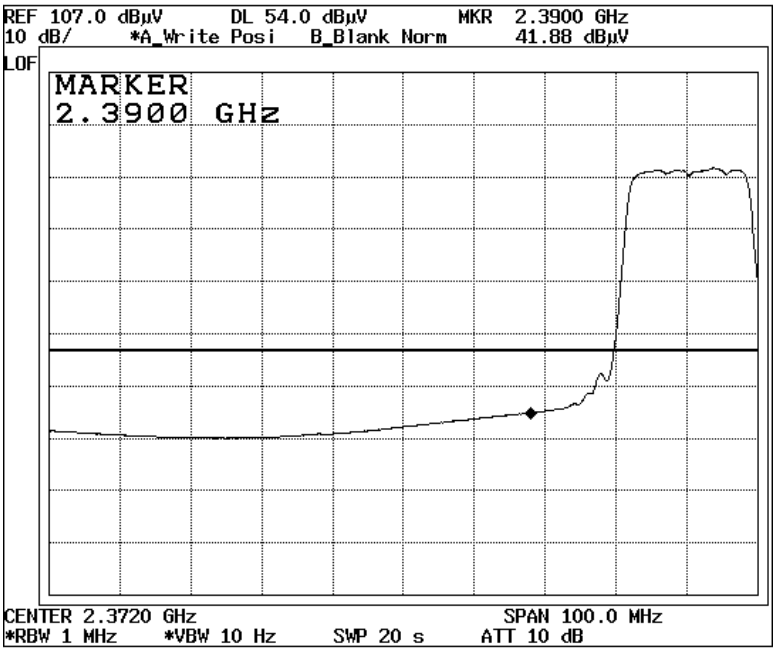


Detect mode	Peak / Average Mode	Test Site	RF Room
Note	IEEE802.11g – CH13 (2472 MHz)		

Detect mode : PK

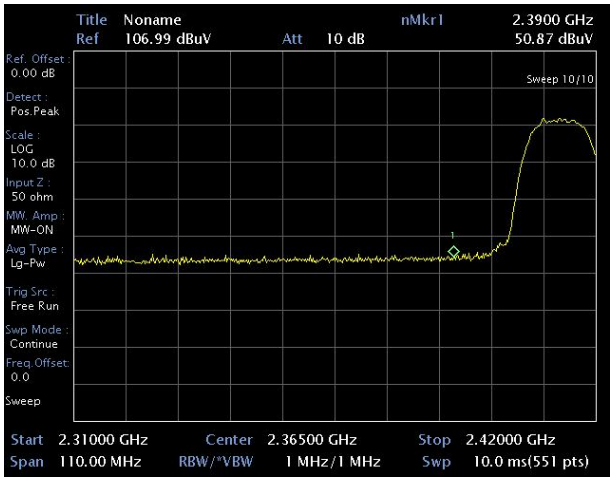


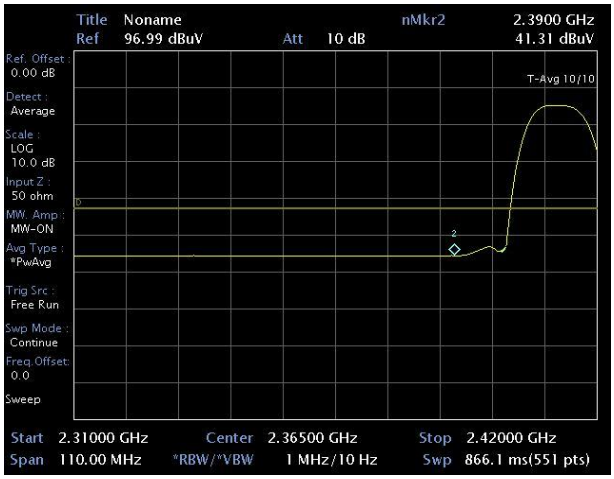
Detect mode : AV



3.4.6.2 Band Edge Test Result (Radiated Test)

Detect mode	Peak / Average Mode	Test Site	3m Full Chamber
Note	IEEE802.11b– CH1 (2412 MHz)		
Ant. Pol.	Vertical		

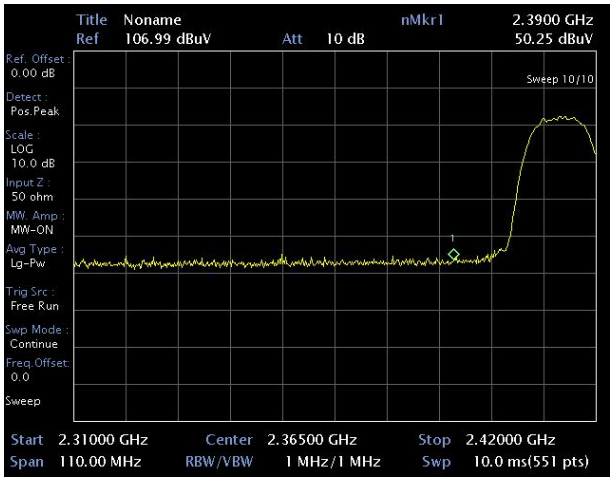


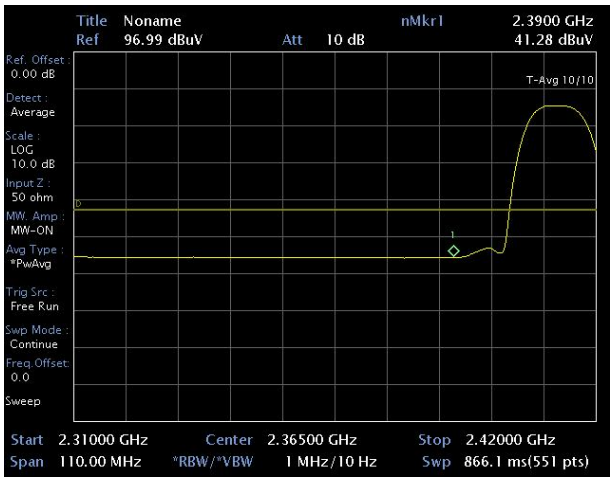


Frequency (MHz)	Reading PK/AV (dBuV/m)	Factor(dB) CL+AF	Limits PK/AV (dBuV/m)	Result PK/AV (dBuV/m)	Margin PK/AV (dB)
2390	23.49/13.93	27.38	74/54	50.87/41.31	23.13/12.69

Note : Emission Level(dBuV/m) = Reading Level + Correct Factor

Detect mode	Peak / Average Mode	Test Site	3m Full Chamber
Note	IEEE802.11b– CH1 (2412 MHz)		
Ant. Pol.	Horizontal		

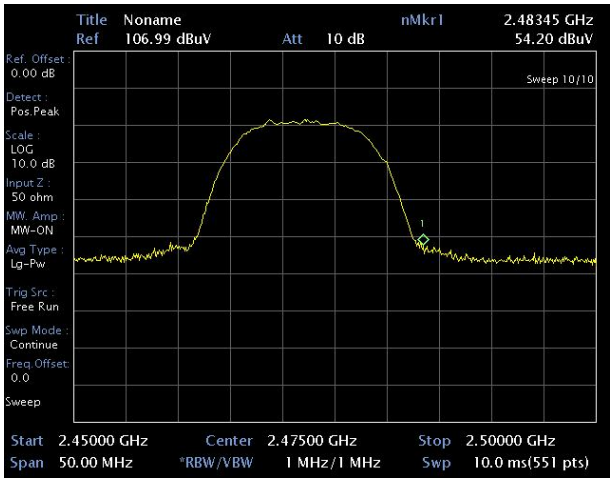


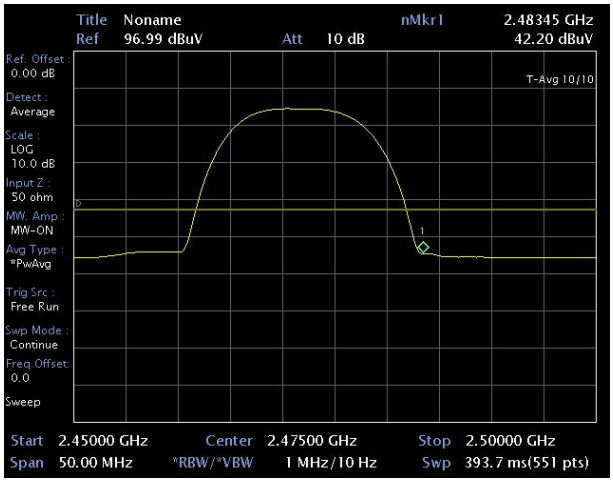


Frequency (MHz)	Reading PK/AV (dBuV/m)	Factor(dB) CL+AF	Limits PK/AV (dBuV/m)	Result PK/AV (dBuV/m)	Margin PK/AV (dB)
2390	22.87/13.90	27.38	74/54	50.25/41.28	23.75/12.72

Note : Emission Level(dBuV/m) = Reading Level + Correct Factor

Detect mode	Peak / Average Mode	Test Site	3m Full Chamber
Note	IEEE802.11b– CH13 (2472 MHz)		
Ant. Pol.	Vertical		

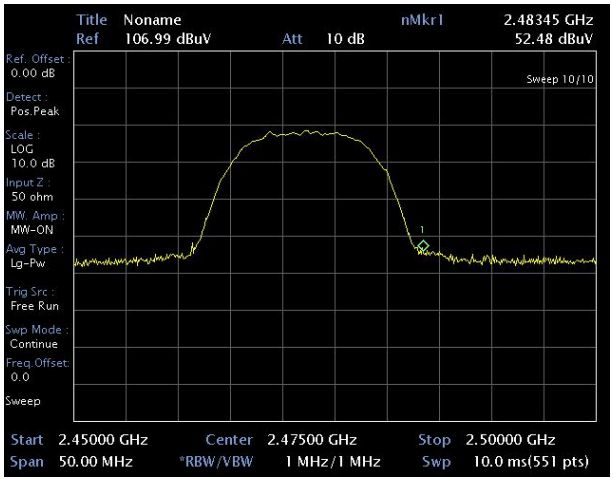


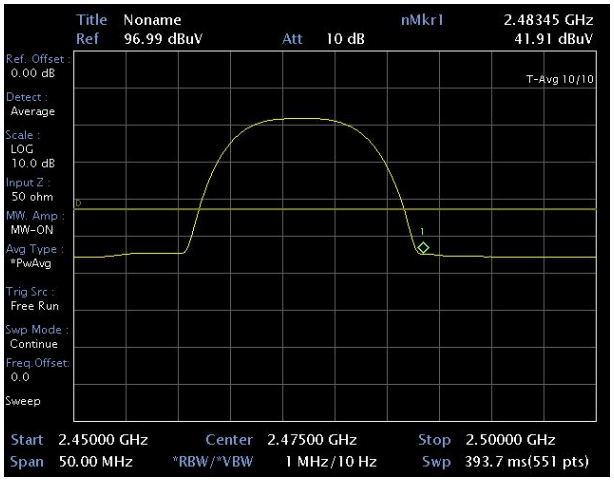


Frequency (MHz)	Reading PK/AV (dBuV/m)	Factor(dB) CL+AF	Limits PK/AV (dBuV/m)	Result PK/AV (dBuV/m)	Margin PK/AV (dB)
2483.5	26.66/14.66	27.54	74/54	54.20/42.20	19.80/11.80

Note : Emission Level(dBuV/m) = Reading Level + Correct Factor

Detect mode	Peak / Average Mode	Test Site	3m Full Chamber
Note	IEEE802.11b– CH13 (2472 MHz)		
Ant. Pol.	Horizontal		

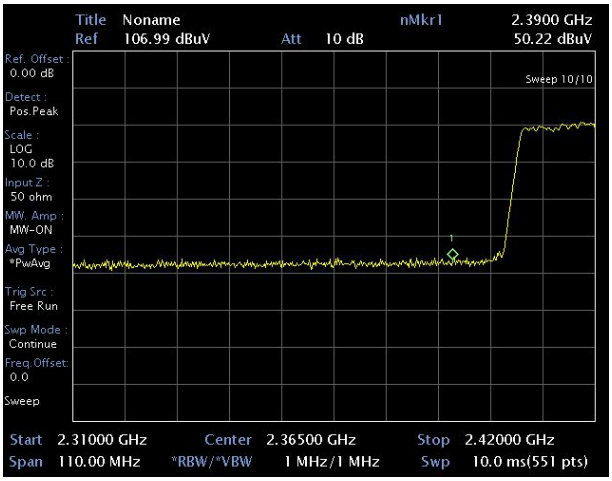


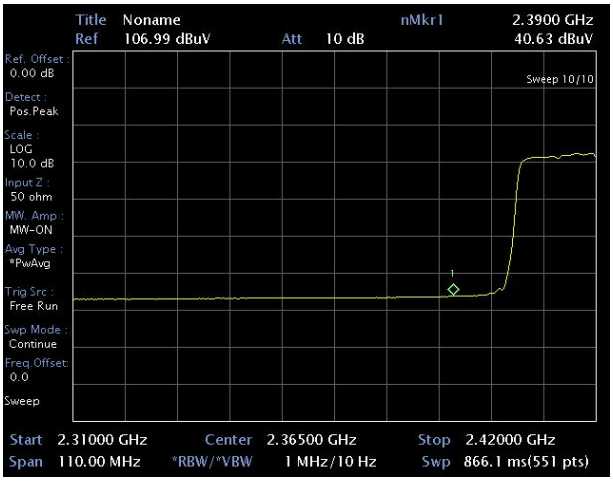


Frequency (MHz)	Reading PK/AV (dBuV/m)	Factor(dB) CL+AF	Limits PK/AV (dBuV/m)	Result PK/AV (dBuV/m)	Margin PK/AV (dB)
2483.5	24.93/14.37	27.54	74/54	52.48/41.91	21.52/12.09

Note : Emission Level(dBuV/m) = Reading Level + Correct Factor

Detect mode	Peak / Average Mode	Test Site	3m Full Chamber
Note	IEEE802.11g– CH1 (2412 MHz)		
Ant. Pol.	Vertical		

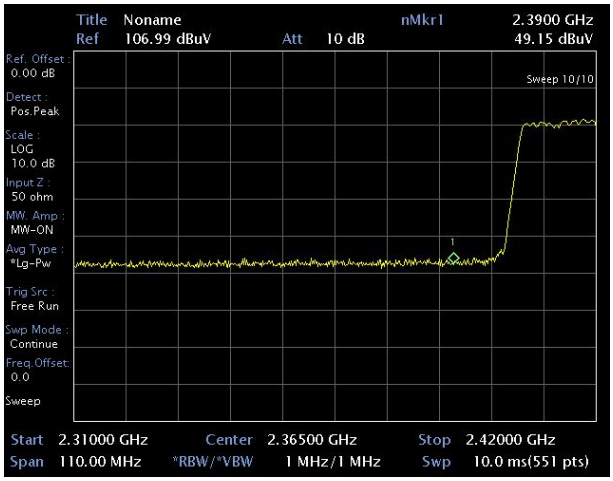


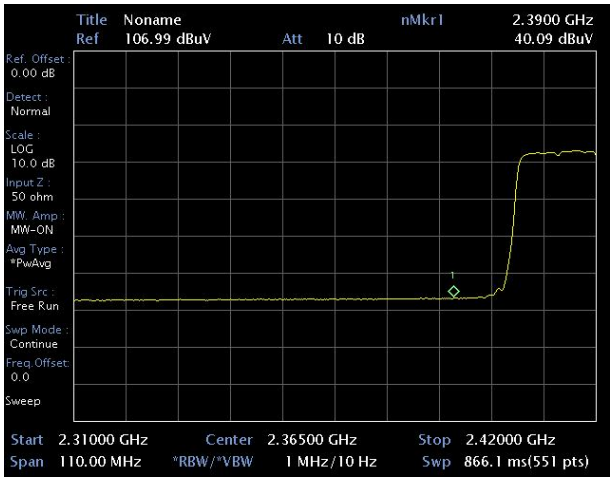


Frequency (MHz)	Reading PK/AV (dBuV/m)	Factor(dB) CL+AF	Limits PK/AV (dBuV/m)	Result PK/AV (dBuV/m)	Margin PK/AV (dB)
2390	22.84/13.25	27.38	74/54	50.22/40.63	23.78/13.37

Note : Emission Level(dBuV/m) = Reading Level + Correct Factor

Detect mode	Peak / Average Mode	Test Site	3m Full Chamber
Note	IEEE802.11g– CH1 (2412 MHz)		
Ant. Pol.	Horizontal		

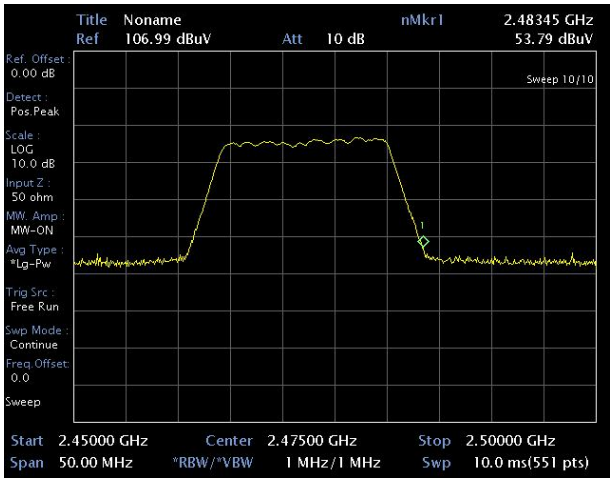


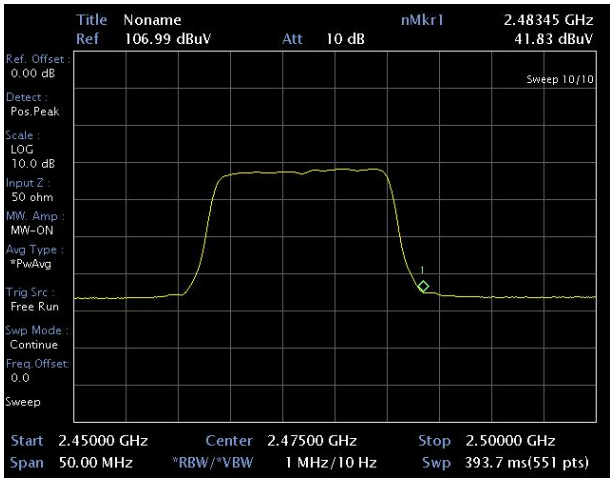


Frequency (MHz)	Reading PK/AV (dBuV/m)	Factor(dB) CL+AF	Limits PK/AV (dBuV/m)	Result PK/AV (dBuV/m)	Margin PK/AV (dB)
2390	21.77/12.71	27.38	74/54	49.15/40.09	24.85/13.91

Note : Emission Level(dBuV/m) = Reading Level + Correct Factor

Detect mode	Peak / Average Mode	Test Site	3m Full Chamber
Note	IEEE802.11g– CH13 (2472 MHz)		
Ant. Pol.	Vertical		

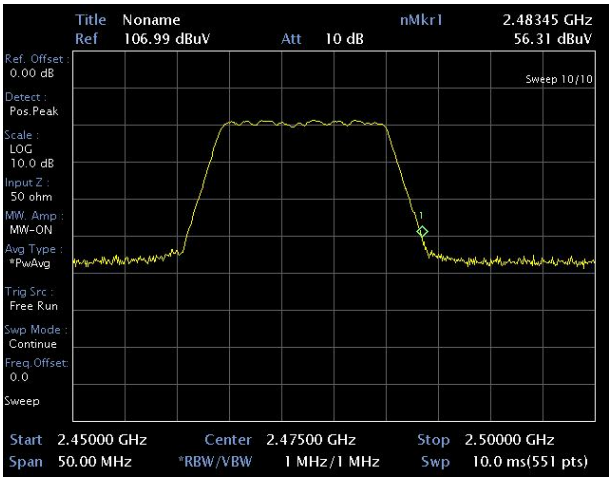


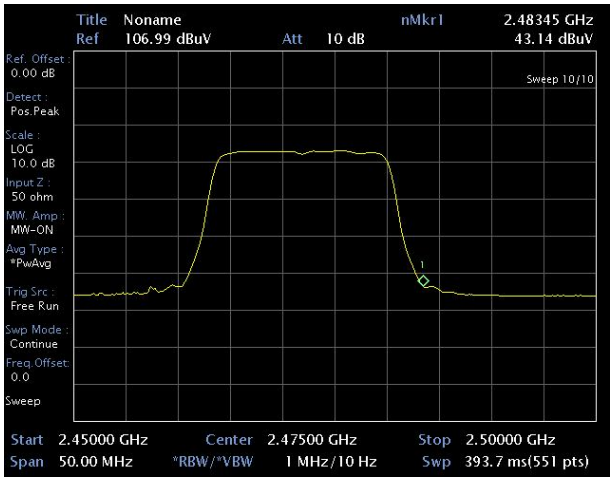


Frequency (MHz)	Reading PK/AV (dBuV/m)	Factor(dB) CL+AF	Limits PK/AV (dBuV/m)	Result PK/AV (dBuV/m)	Margin PK/AV (dB)
2483.5	26.25/14.29	27.54	74/54	53.79/41.83	20.21/12.17

Note : Emission Level(dBuV/m) = Reading Level + Correct Factor

Detect mode	Peak / Average Mode	Test Site	3m Full Chamber
Note	IEEE802.11g– CH13 (2472 MHz)		
Ant. Pol.	Horizontal		





Frequency (MHz)	Reading PK/AV (dBuV/m)	Factor(dB) CL+AF	Limits PK/AV (dBuV/m)	Result PK/AV (dBuV/m)	Margin PK/AV (dB)
2483.5	28.77/15.60	27.54	74/54	56.31/43.14	17.69/10.86

Note : Emission Level(dBuV/m) = Reading Level + Correct Factor

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. 15, 2010
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

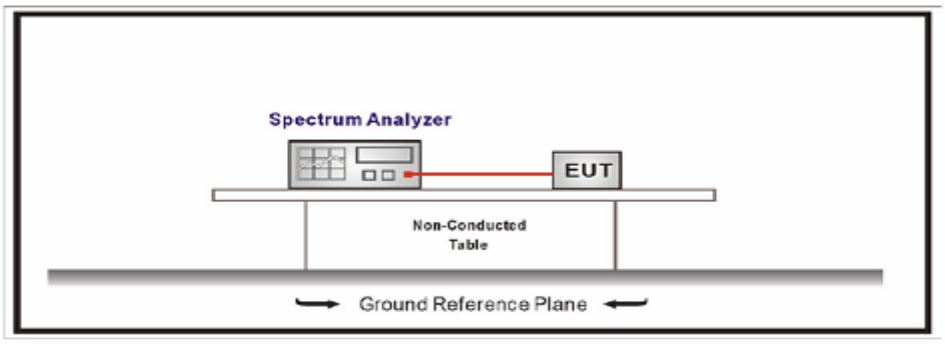
3.5.2 Limit

(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

RF Conducted Measurement:



3.5.4 Test Procedure

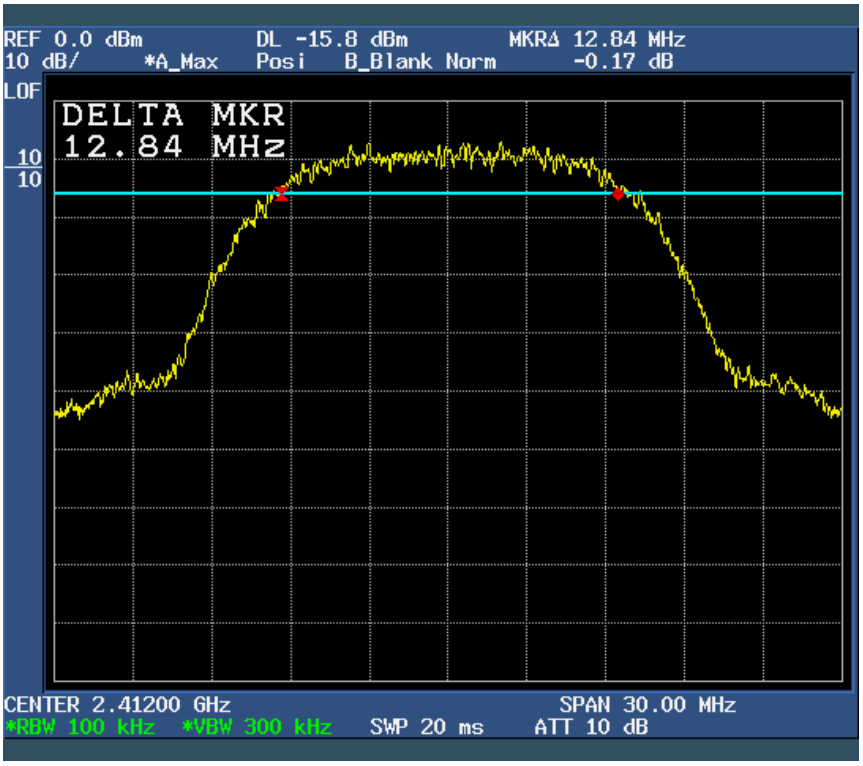
The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the 6dB Band.

3.5.5 6 dB Band Test Result

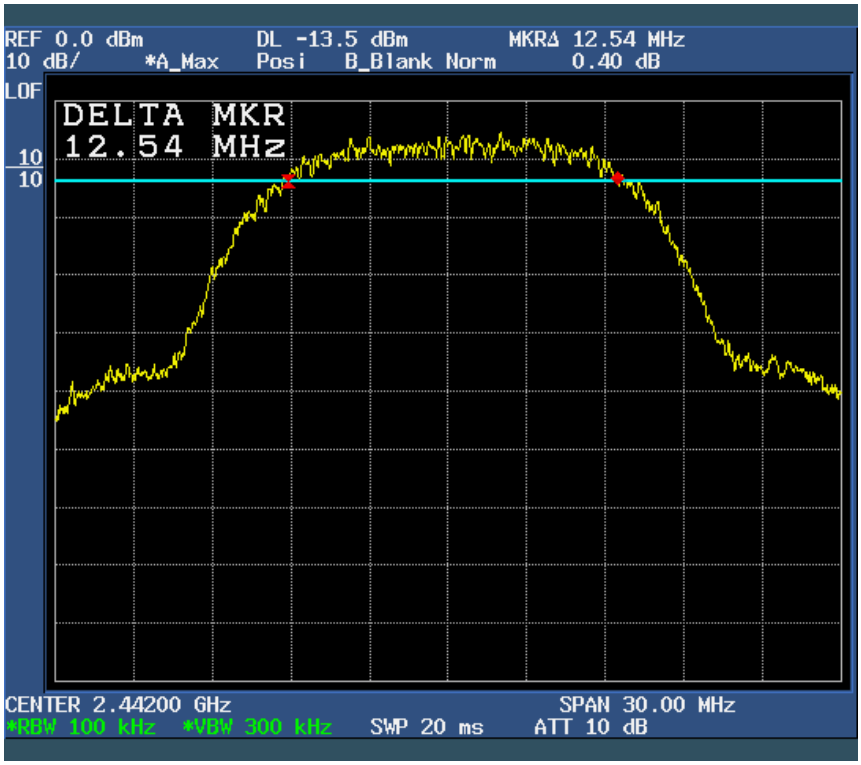
Test Item	6 dB Band
Test Mode	802.11b
Test Site	RF Room
Measurement Method	Conducted

Channel No.	Frequency (MHz)	Measure (kHz)	Limit (kHz)	Result
1	2412	12840	>500	Pass
7	2442	12540	>500	Pass
13	2472	13170	>500	Pass

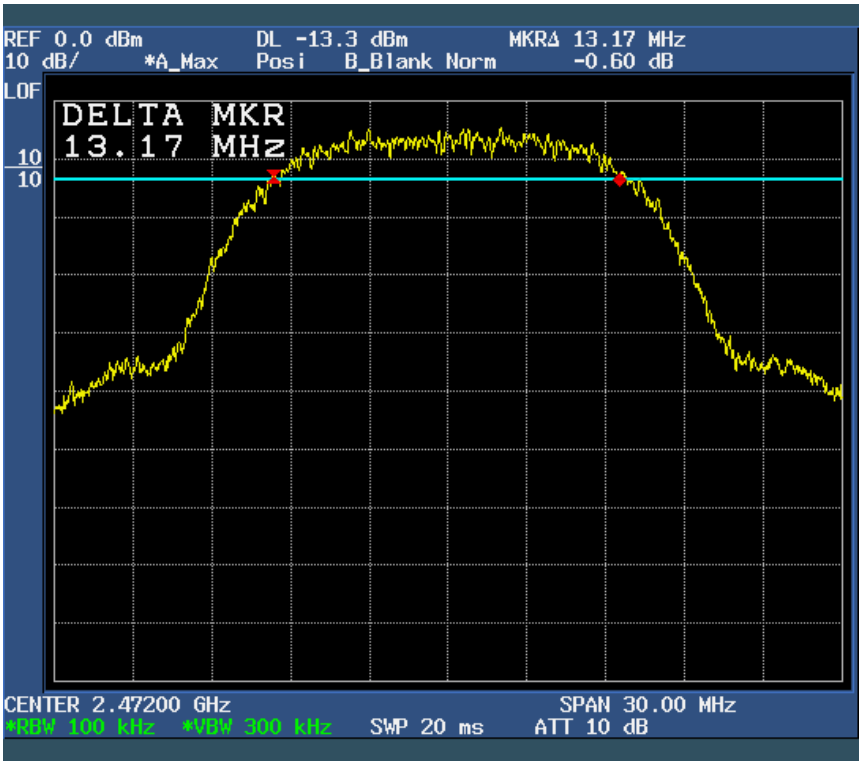
Channel 1.



Channel 7.



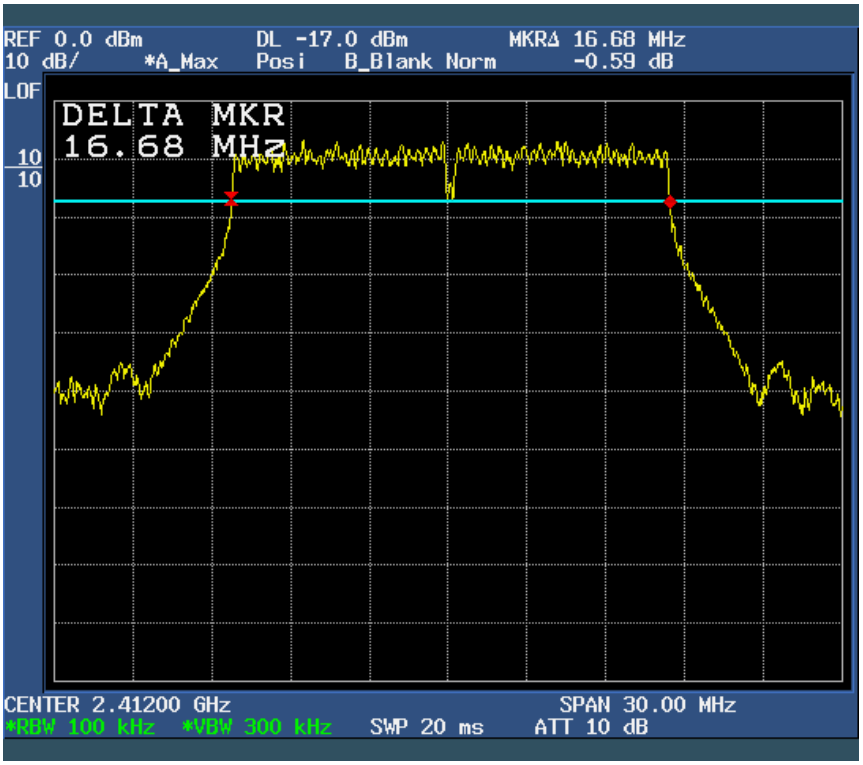
Channel 13.



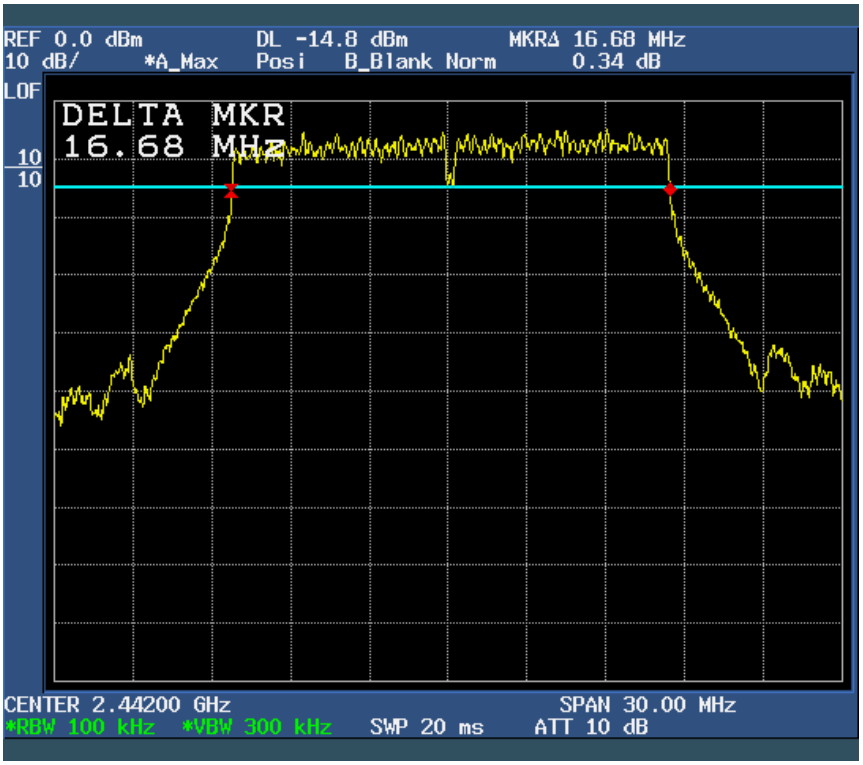
Test Item	6 dB Band
Test Mode	802.11g
Test Site	RF Room
Measurement Method	Conducted

Channel No.	Frequency (MHz)	Measure (kHz)	Limit (kHz)	Result
1	2412	16680	>500	Pass
7	2442	16680	>500	Pass
13	2472	16620	>500	Pass

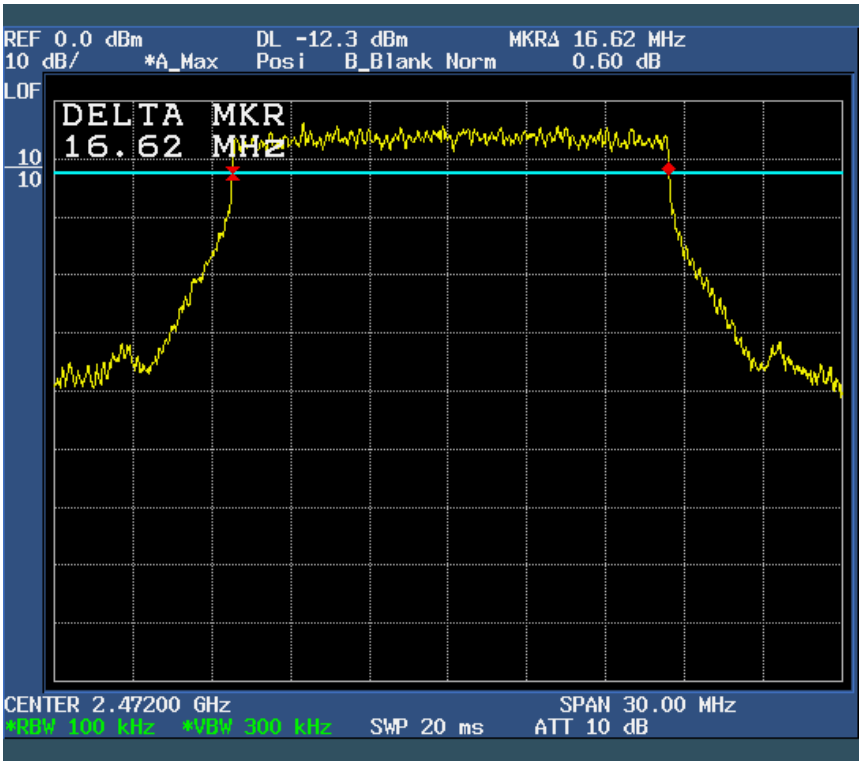
Channel 1.



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. 15, 2010
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.

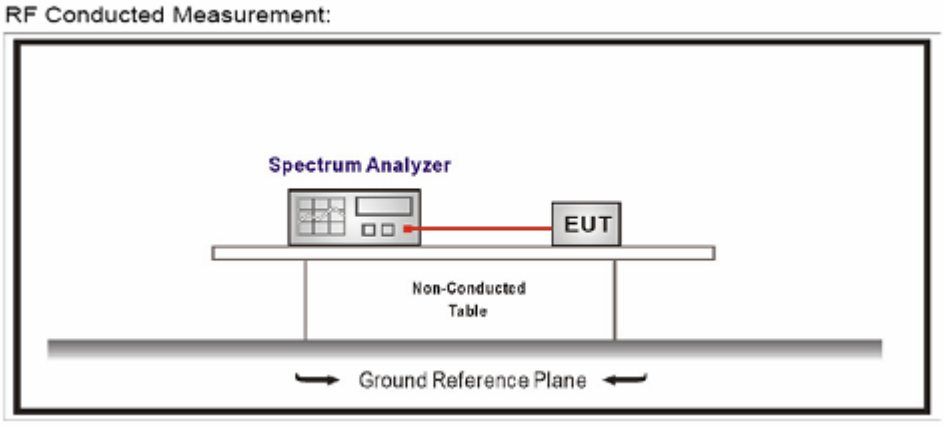
2. The calibration interval of horn ant. and loop ant. is 24 months

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

RF Conducted Measurement:



3.6.4 Test Procedure

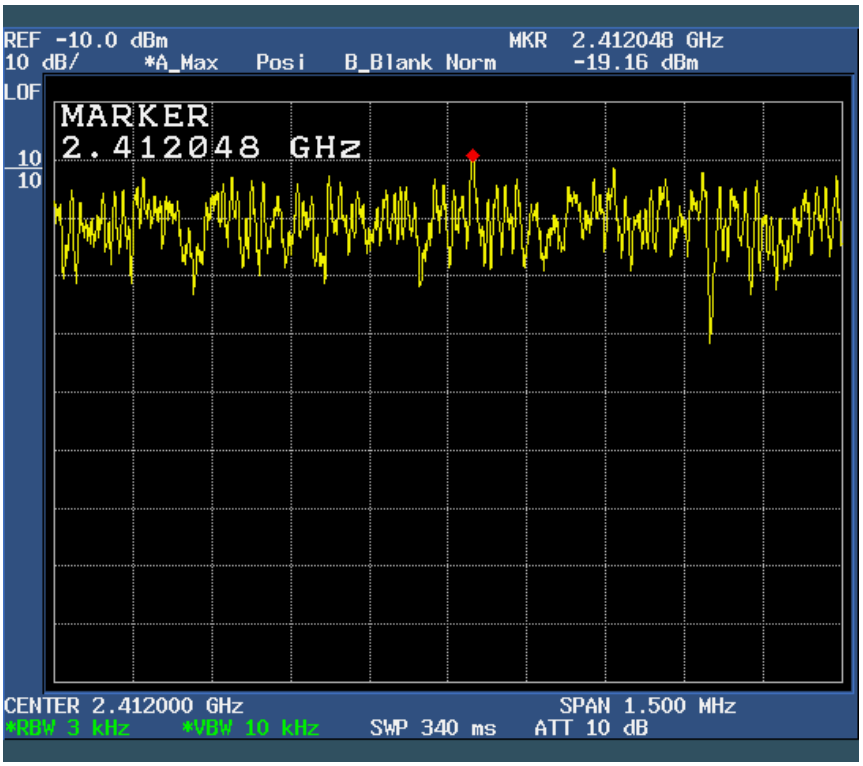
The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the Power Density.

3.6.5 Power Density Test Result

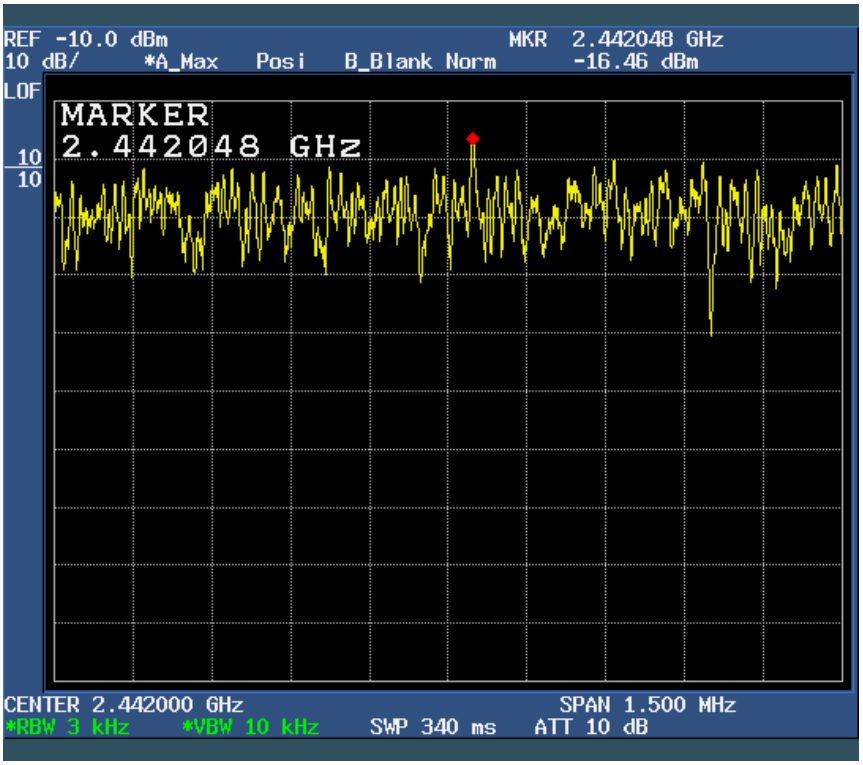
Test Item	Power Density
Test Mode	802.11b
Test Site	RF Room
Measurement Method	Conducted

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
1	2412	-19.16	< 8	Pass
7	2442	-16.46	< 8	Pass
13	2472	-15.51	< 8	Pass

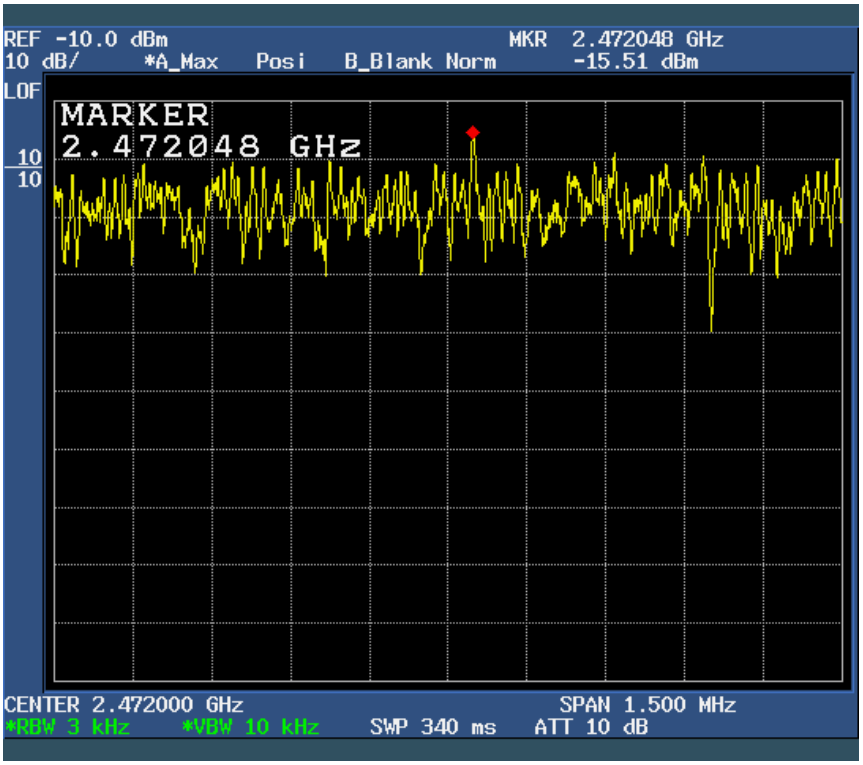
Channel 1.



Channel 7.



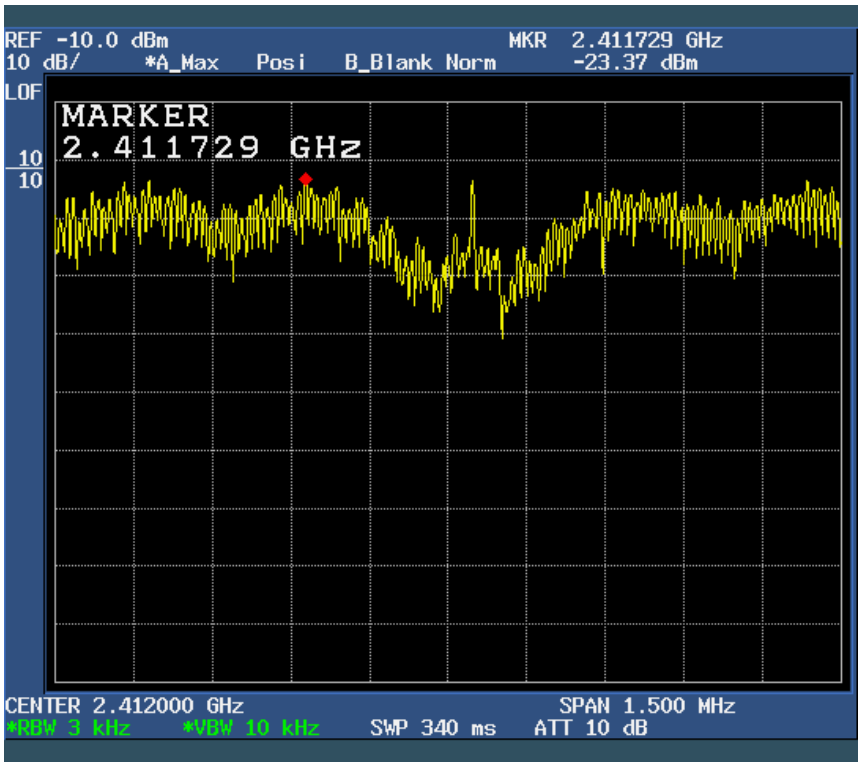
Channel 13.



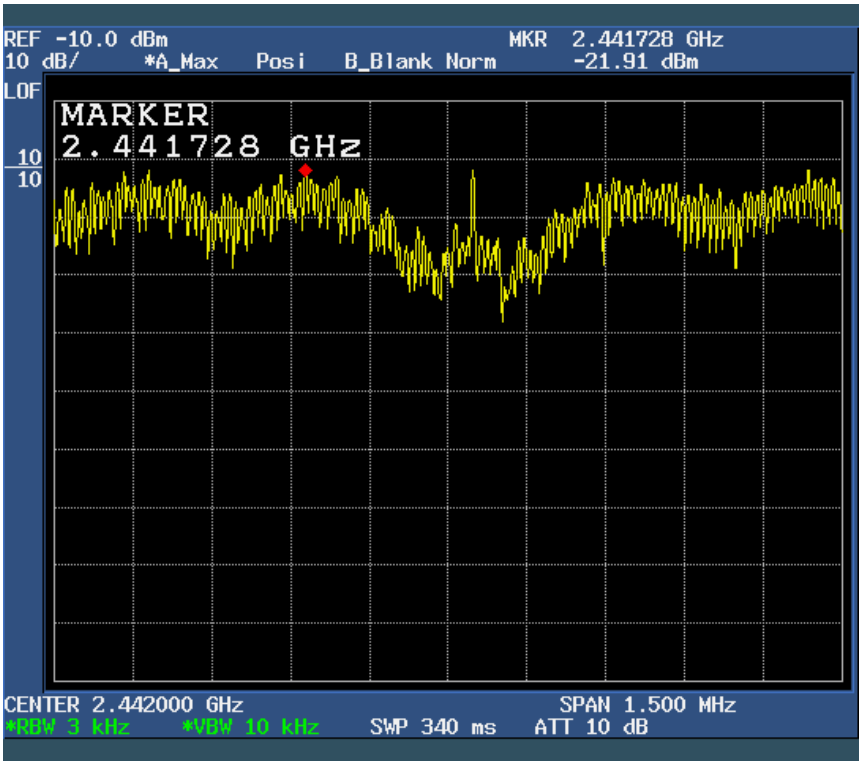
Test Item	Power Density
Test Mode	802.11g
Test Site	RF Room
Measurement Method	Conducted

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
1	2412	-23.37	< 8	Pass
7	2442	-21.91	< 8	Pass
13	2472	-20.52	< 8	Pass

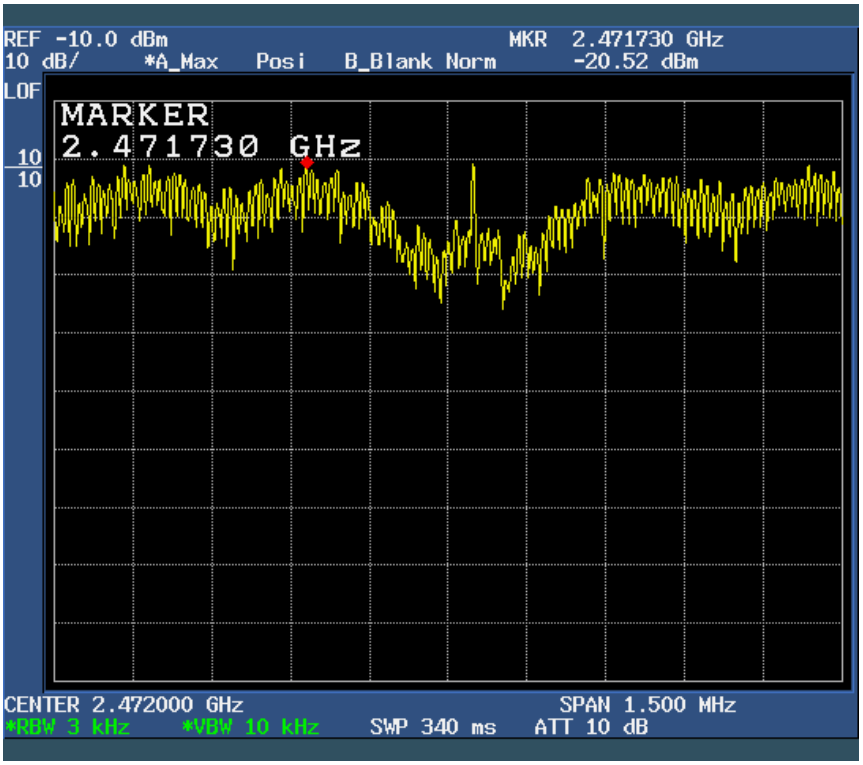
Channel 1.



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.
An RF connected SMA Straight Plug Reverse connector and the maximum gain of the antennas is 2.0 dBi
Test Result : Pass

Appendix A. The Photo of Test Setup

- **Front View of Conducted Emission**

- **Rear View of Conducted Emission**

- **View of Radiated Emission (0.009 ~ 30 MHz-Hor.)**

- **View of Radiated Emission (0.009 ~ 30 MHz-Ver.)**

- **Front View of Radiated Emission (Below 1GHz-Front of view)**

- **Rear View of Radiated Emission (Below 1GHz-Front of view)**

- **Radiated Emission (Above 1GHz-Front of view)**

- **Radiated Emission (Above 1GHz-Rear of view)**

Appendix B. The Photo of Equipment Under Test

Front View of EUT

Rear View of EUT

Inside View of EUT