

# ***Certification of Compliance***

## ***CFR 47 Part 15 Subpart C***

**Order No.** : CSTS-C1107-048  
**Test Report No.** : CSTS-A11-FCC026  
**Applicant** : EXELWAY Inc.  
**Address of Applicant** : 1204 Ace Highend Tower 5 Cha, 505-18, Gasan-dong,  
Geumcheon-gu, Seoul, Korea

### **Equipment Under Test (EUT)**

**Kind of Product** : Mobile Speaker  
**Model Name** : EXB100  
**FCC ID** : ZVWEXB100  
**Standards** : FCC CFR Part 15 Subpart C : 2008  
ANSI C63.4:2003

Date of Receipt : 22 July, 2011  
Date of Test : 22 August, 2011  
Date of Issue : 23 August, 2011

**Test Result :**  Positive

Negative

Ji Hwan, Kim / Testing By Engineer

Jae Yeon, Choi / Senior Engineer

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

#### **Remarks :**

This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

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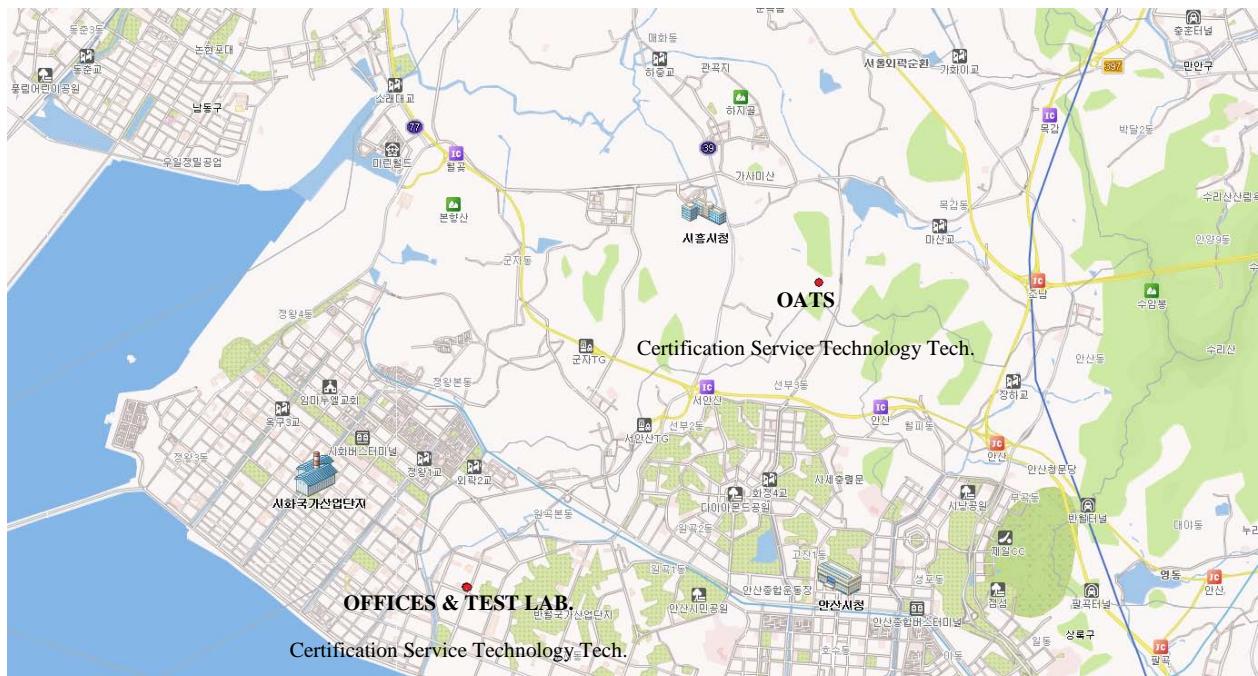
## **1. General Information**

### **1.1 Information of Test Laboratory.**

FCC E-Failing : Registration Number:289252

Name : Certification Service Technology Inc.  
Address  
Radiated Emission (3m Full Chamber) : 2F/1055, Shingil-dong, Danwon-gu, Ansan-City, Gyeonggi-do Korea, 425-839  
Conducted Emission  
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](mailto: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:

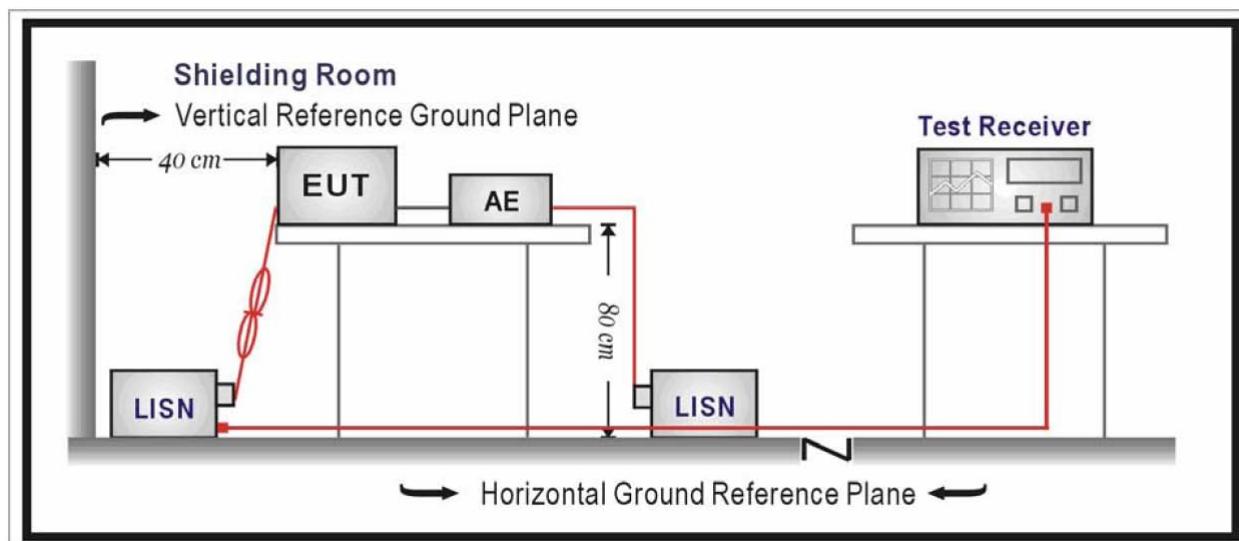
## 1.2 Description of Test

### 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 15.107

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.)

**Radiated Emissions: , 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 C Section 15.109

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

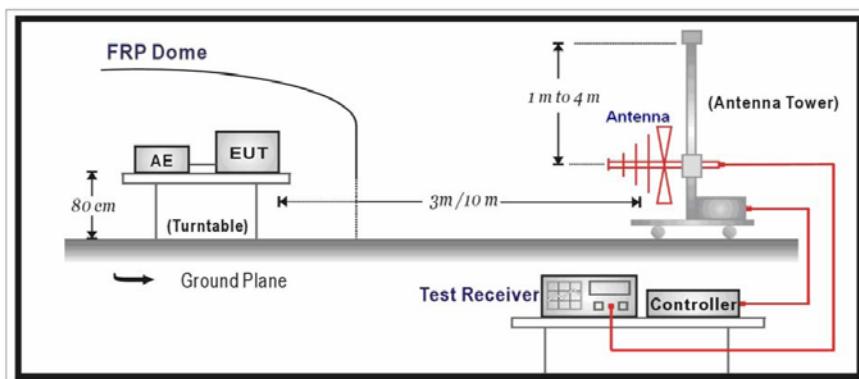
Limits			
Frequency (MHz)	Field Strength ( $\mu$ V/meter)	Measurement Distance (meters)	dB $\mu$ V/meter
0.009 – 0.490	2400/F (kHz)	300	88.52 – 53.80
0.490 – 1.705	24000/F (kHz)	30	53.80 – 42.97
1.705 – 30.0	30	30	49.54 – 49.54
30 – 88	100	3	40.00
88 – 216	150	3	43.52
216 – 960	200	3	46.02
Above 960	500	3	53.98

Remarks :

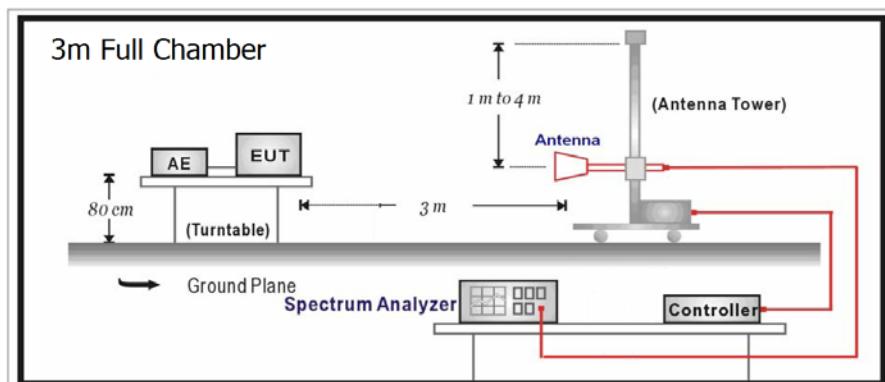
1. RF Voltage(dBuv)=20log RF Voltage(uV)
2. In the Above Table, the tighter limit applies at the band edges.
3. Distance refers to the distance in meters between the measuring

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	normal(k=2)	±1.3	CAL.
	Voltage Division Factor	normal(k=2)	±0.12	CAL.
	cable	normal (k=2)	±0.2	NONCAL.
	Receiver			
	Input Impedance	normal(k=1.64)	±0.0070	CAL.
	QP Sine-Wave Voltage Accuracy	normal(k=2)	±0.20 dB	
	QP-Pulse Amplitude Sensibility	normal(k=2)	±0.40 dB	
	QP-Pulse Frequency Response	normal(k=2)	±0.57 dB	
	Random Noise	normal(k=2)	±0.35 dB	
A	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	normal(k=2)	±0.5 dB	NPL
	frequency interpolation			
	height variation	rectangular	±0.1039 dB	
	direcvalupsy difference	rectangular	+1.5/-2.6 dB	NAMAS
	phase center location	rectangular	+0/-1.0 dB ±1.0 dB	NAMAS
	Cable loss	normal(k=2)	±0.5 dB	
	Receiver			
	Input Impedance	normal(k=1.64)	±0.0070	
	QP Sine-Wave Voltage Accuracy	normal(k=2)	±0.20 dB	
	QP-Pulse Amplitude Sensibility	normal(k=2)	±0.40 dB	
A	QP-Pulse Frequency Response	normal(k=2)	±0.57 dB	
	Random Noise	normal(k=2)	±0.35 dB	
	Mismatch : AMN – receiver $\left  \frac{\Gamma_{\text{antenna}}}{\Gamma_{\text{receiver}}} \right  = 0.33$	U-Shaped	+0.9/-1.0 dB	CISPR
A	System repeatability	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	:	EXELWAY Inc.
Address		1204 Ace Highend Tower 5 Cha, 505-18, Gasan-dong, Geumcheon-gu, Seoul, Korea

**1.5 General Description of EUT**

Name : Mobie Speaker  
Model No. : EXB100  
FCC ID : ZVWEXB100  
Serial No. : N/A

**1.6 Details of EUT**

Section	Specification
Operating Frequency	2 402 MHz ~ 2 480 MHz
The Number of Channels	79 Channels
Antenna	Chip Antenna
Interface	USB (Only Charging Mode) Aux (Stereo Jack)
Power Source	DC 3.7 V / 1 100 mAh (Rechargeable Lithium Battery)
Charging Power Source	DC 5.0 V (USB Type )
Output Power	RMS 5W / CH×2 Stereo
Impedance	4 ohms
Frequency Response	250 Hz ~ 15 kHz
Dimension	121 mm (W) × 69 mm (H) × 18 mm (D)
Weight	120 g
Running Time	8 Hours
Wireless	Bluetooth 2.1 + EDR
Operating Temperature.	-10 °C ~ +50 °C
Modulation Method	FHSS (Frequency Hopping Spread Spectrum)
Modulation Type	GFSK, 8-DQPSK
Communication Mode	Duplex

- Please refer to user's manual.

**1.7 Description of Support Units**

Product	Model No.	Serial No.	Manufacturer	Certification
Mobile Speaker	EXB100	N/A	EXELWAY Inc.	EUT
Personal Computer	DM-V189	ZW7C97AZC90312H	Samsung Electronics	DoC
LCD Monitor	BX2231	NFB5HMCZ900215V	SAMSUNG ELECTRONICS DISPLAY(M) SDN.BHD	DoC
LCD Monitor AC/DC Adapter	AD-3014	CN07BN4400394B SE38Z9ED297	Samsung Electronics	CoC
USB Keyboard	Y-BP62a	N/A	Logitech Inc.	DoC
USB Mouse	M-BP82	N/A	SUZHOU LOGITECH ELECTORNICS CO.,LTD.	DoC

**1.8 Cable List**

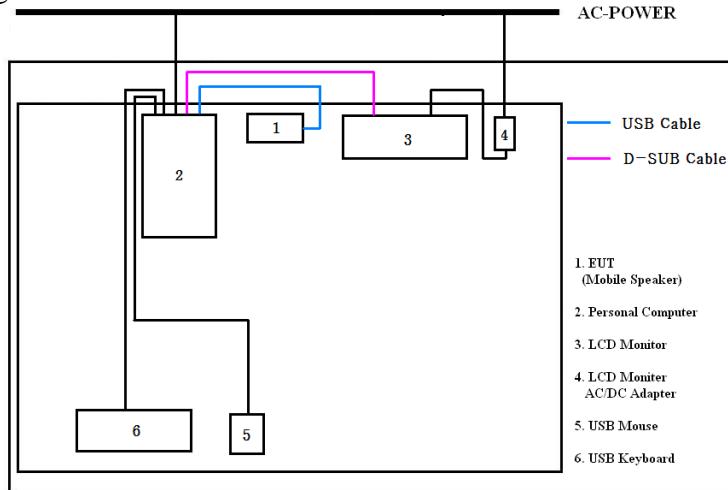
Start		END		Cable Spec	
Name	I/O Port	Name	I/O Port	Lenth	Shield
EUT	USB	Personal Computer	USB	1.2	Shield
Personal Computer	AC IN	AC-LINE	AC POWER	2.0	Unshielded
	D-SUB	LCD Monitor	D-SUB	1.8	Shield
	USB	Mouse	-	1.8	Shield
	USB	KeyBoard	-	1.8	Shield
LCD Monitor	DC-IN	LCD Monitor AC/DC Adapter	DC-OUT	1.5	Unshielded
LCD Monitor AC/DC Adapter	AC-IN	AC-LINE	AC-POWER	1.0	Unshielded

**1.9 System Configuration**

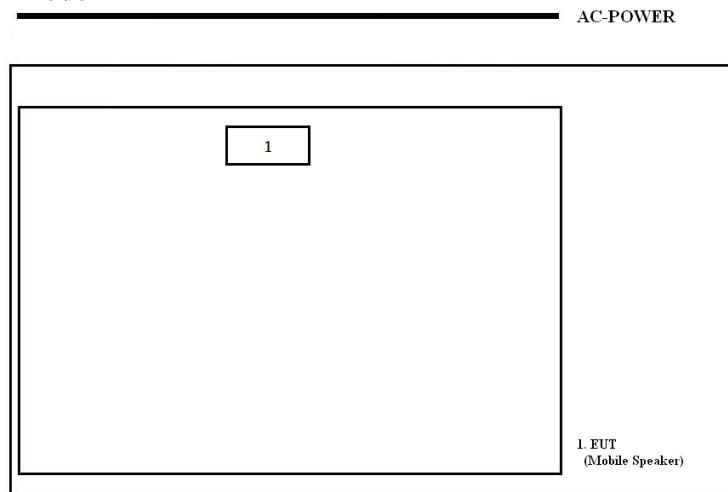
Description	Model	Serial No.	Manufacturer
-	-	-	-

### 1.10 Test Set-Up Configuration

#### 1.10.1 USB Charging & Continous Tx Mode



#### 1.10.2 Continuous Tx mode



### 1.11 Test Methodology And Configuration

1. The EUT was tested charging mode through USB Port.
2. Test Program used to control the EUT for staying in continuous Tx and Rx mode is programmed.

### 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 PASS
- **Radiated Emission**  
Radiated Emission Result PASS
- **Number of Hopping Frequency Used**  
Test Result PASS
- **Dwell Time in Each Channels**  
Test Result PASS
- **Channel Bandwidth**  
Test Result PASS
- **Hopping Channel Separation**  
Test Result PASS
- **Maximum Peak Output Power Test Result**  
Test Result PASS
- **Band Edge**  
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	Mar. 30, 2012
LISN	EMCO	3825/2	9006-1666	Mar. 30, 2012
Transient Limiter	HP	11947A	3107A00640	Jul. 20, 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

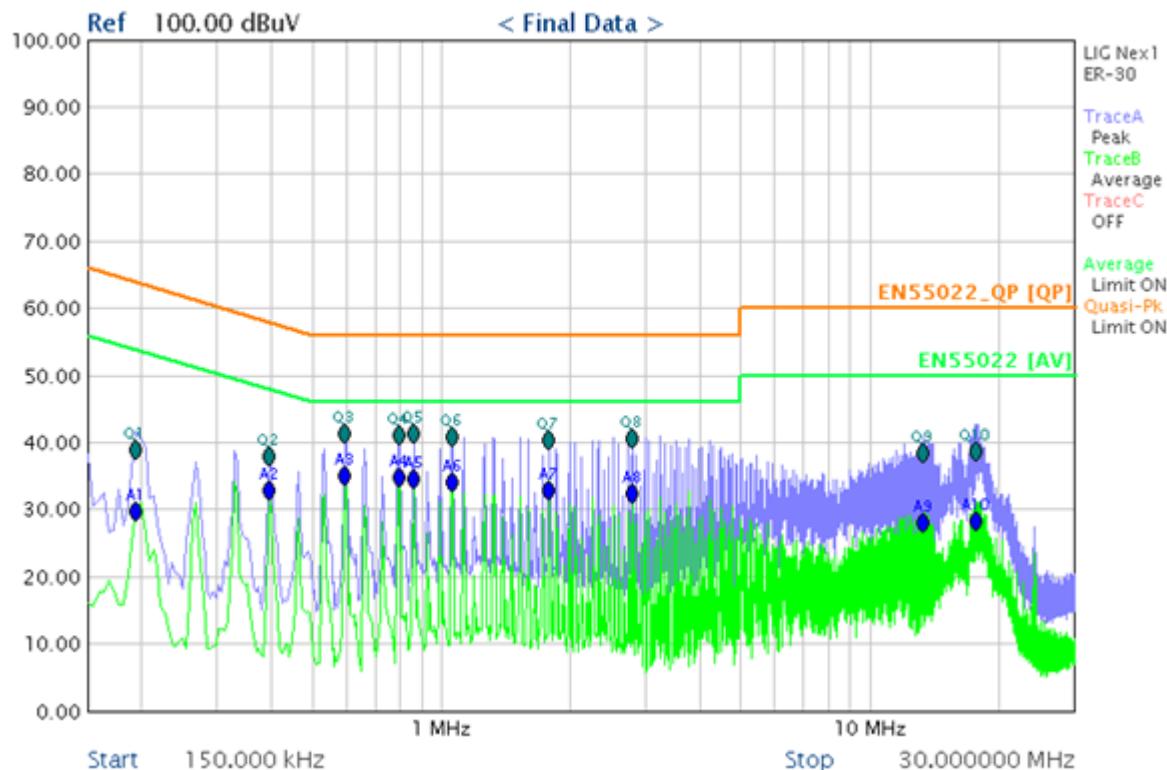
Temperature           :     22.1   degree C  
Humidity            :     50   %R.H.  
Atmospheric Pressure   :     98.0   kPa

##### 3.1.4 Test Date

27 July, 2011

## 3.1.5 Conducted Emissions Result

Phase : LIVE



Freq. [MHz]	Measurement [dB $\mu$ V]		Limit [dB $\mu$ V]		Insertion Loss	Cable Loss	Result [dB $\mu$ V]		Margin [dB]	
	Q-peak	Average	Q-peak	Average			Q-peak	Average	Q-peak	Average
0.596	41.05	34.75	56.00	46.00	0.06	0.08	41.19	34.89	14.81	11.11
0.798	40.70	34.55	56.00	46.00	0.06	0.09	40.85	34.70	15.15	11.30
0.861	41.03	34.26	56.00	46.00	0.05	0.10	41.18	34.41	14.82	11.59
1.064	40.45	33.88	56.00	46.00	0.05	0.11	40.61	34.04	15.39	11.96
1.793	40.16	32.65	56.00	46.00	0.03	0.13	40.32	32.81	15.68	13.19
2.787	40.23	31.94	56.00	46.00	0.04	0.15	40.42	32.13	15.58	13.87

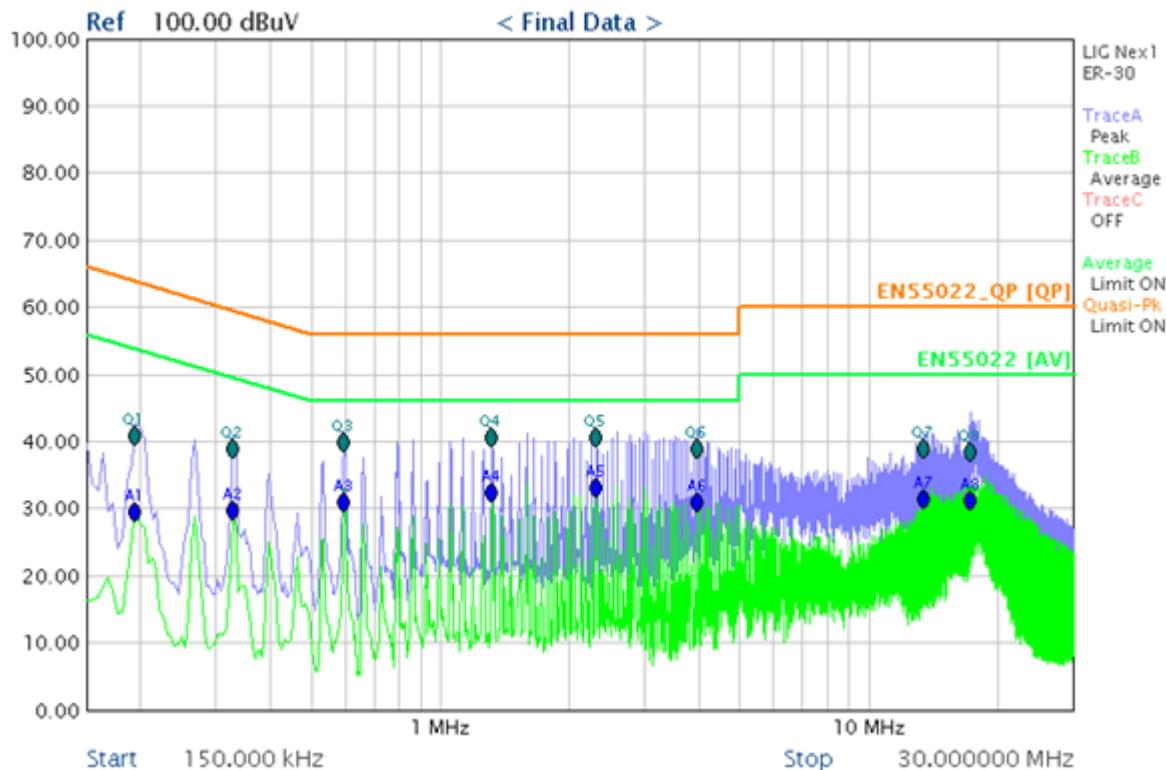
Note :

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Phase : NEUTRAL



Freq. [MHz]	Measurement [dB $\mu$ V]		Limit [dB $\mu$ V]		Insertion Loss [dB]	Cable Loss [dB $\mu$ V]	Result [dB $\mu$ V]		Margin [dB]	
	Q-peak	Average	Q-peak	Average			Q-peak	Average	Q-peak	Average
0.330	38.65	29.42	59.45	49.45	0.08	0.06	38.79	29.56	20.66	19.89
0.596	39.60	30.65	56.00	46.00	0.05	0.08	39.73	30.78	16.27	15.22
1.325	40.35	31.99	56.00	46.00	0.03	0.12	40.50	32.14	15.50	13.86
2.319	40.37	32.81	56.00	46.00	0.03	0.14	40.54	32.98	15.46	13.02
3.975	38.48	30.54	56.00	46.00	0.04	0.18	38.70	30.76	17.30	15.24
13.389	38.32	30.68	60.00	50.00	0.26	0.23	38.81	31.17	21.19	18.83

Note :

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## **3.2 Radiated Emission**

### **3.2.1 Test Instruments**

Description	Manufacturer	Model No.	Serial No.	Next of Calibration
Test Receiver	LIG NEX1	ER-265	L0804B002	Jul. 14, 2012
BICONILOG ANT.	EMCO	3142	9107-1128	Apr. 27, 2012
LOOP ANT.	Schwarz beck	HFH2-Z2	100187	Jul. 21, 2013
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, 2012
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	-

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

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

### **Field Strength Calculation**

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

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

Where

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

### **3.2.2 Test Area**

3m Full Chamber

### **3.2.3 Operation of EUT**

Operating Environment

Temperature : 20.9 degree C

Humidity : 48 %RH

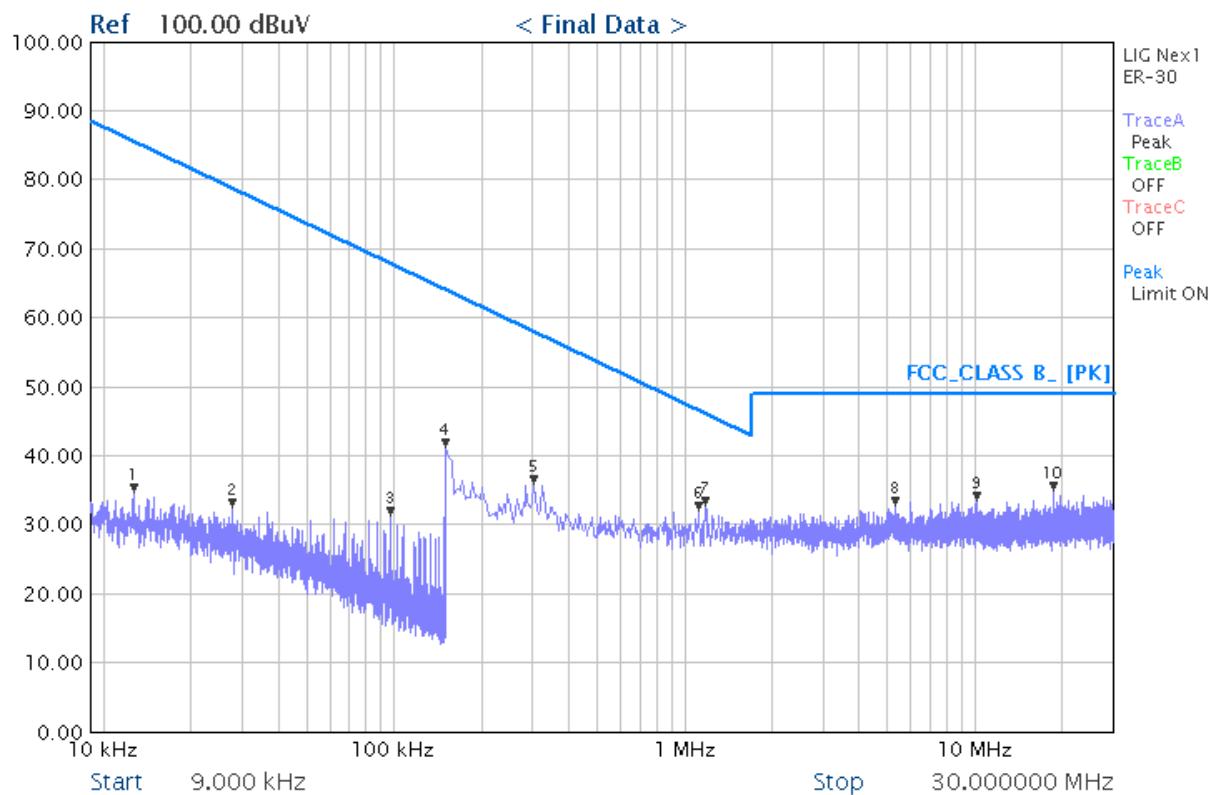
Atmospheric Pressure : 97.6 kPa

### **3.2.4 Test Date**

22 August, 2011

## 3.2.5 Radiated Emission Result (9 kHz ~ 30 MHz)

Test Frequency	9 kHz to 30 MHz	Polarization	Horizontal
Test Mode	Portable - Continuous Tx	Modulation	GFSK
Test Result	PASS		



Frequency (MHz)	Reading (dBuV)	P (H, V)	Correct Factor (dB)	Amp Gain (dB)	Limit (dBuV)	Total (dBuV)	Margin (dB)
1.116	12.87	H	19.15	-	46.65	32.02	14.63
1.181	13.47	H	19.15	-	46.16	32.62	13.54
5.292	13.20	H	19.64	-	49.54	32.84	16.70
10.153	13.53	H	19.92	-	49.54	33.45	16.09
18.532	14.35	H	20.54	-	49.54	34.89	14.65

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

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

3. Other emissions don't exceed the level of 20 dB below the applicable Limit.

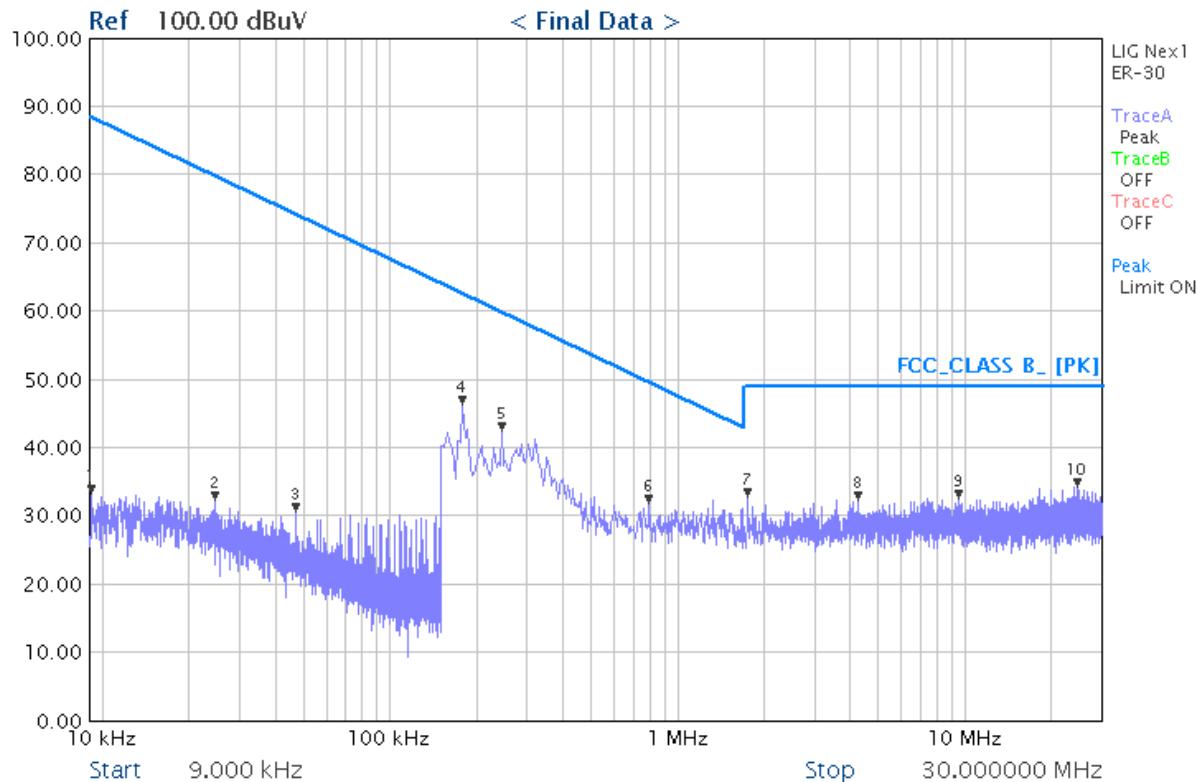
4. X axis plane was the worst test result than Y axis plane and Z axis plane.

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Test Frequency	9 kHz to 30 MHz	Polarization	Vertical
Test Mode	Portable - Continuous Tx	Modulation	GFSK
Test Result	PASS		



Frequency (MHz)	Reading (dBuV)	P (H, V)	Correct Factor (dB)	Amp Gain (dB)	Limit (dBuV)	Total (dBuV)	Margin (dB)
0.179	27.17	V	19.03	-	62.54	46.20	16.34
1.750	13.42	V	19.19	-	49.54	32.61	16.93
4.242	12.84	V	19.51	-	49.54	32.35	17.19
9.512	12.53	V	19.91	-	49.54	32.44	17.10
24.523	12.97	V	21.26	-	49.54	34.23	15.31

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

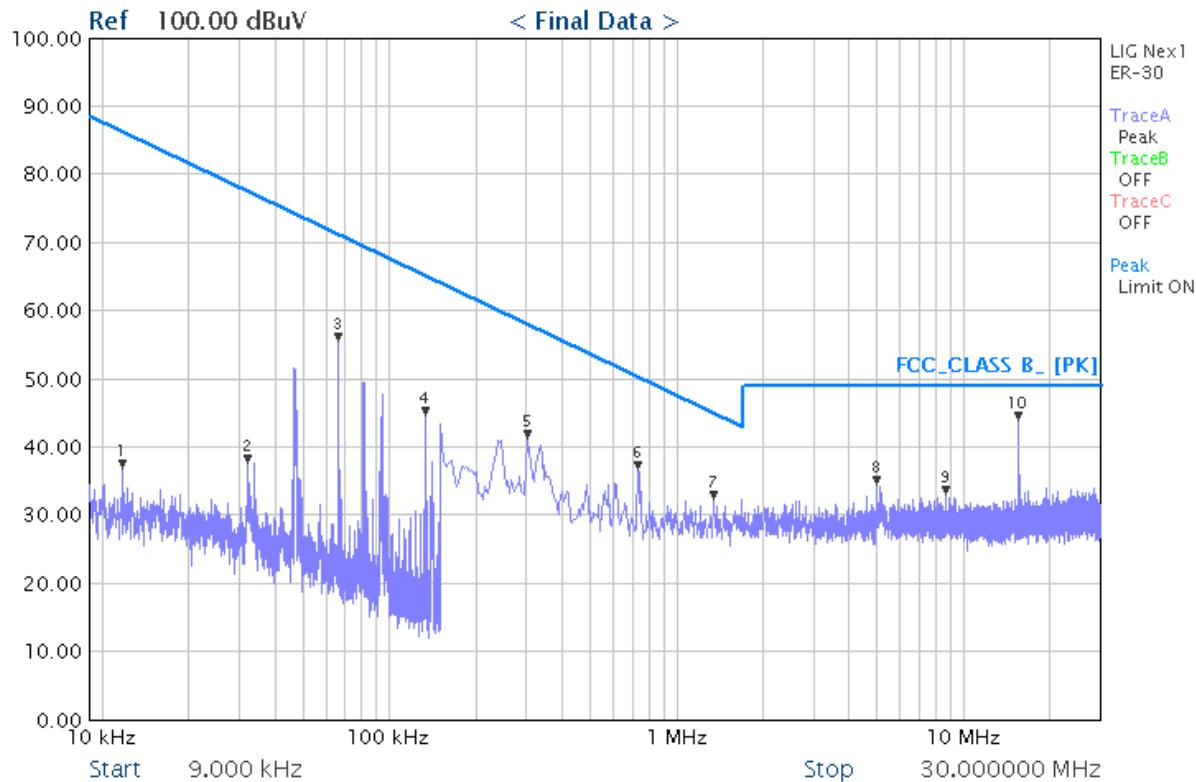
2. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)
3. X axis plane was the worst test result than Y axis plane and Z axis plane.

**Certification Service Technology Inc.**

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Test Frequency	9 kHz to 30 MHz	Polarization	Horizontal
Test Mode	USB Charging - Continuous Tx	Modulation	GFSK
Test Result	PASS		



Frequency (MHz)	Reading (dBuV)	P (H, V)	Correct Factor (dB)	Amp Gain (dB)	Limit (dBuV)	Total (dBuV)	Margin (dB)
0.066	36.41	H	19.09	-	71.17	55.50	15.67
0.733	17.39	H	19.10	-	50.30	36.49	13.81
1.345	13.02	H	19.17	-	45.03	32.19	12.84
4.997	14.70	H	19.60	-	49.54	34.30	15.24
15.434	23.66	H	20.22	-	49.54	43.88	5.66

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

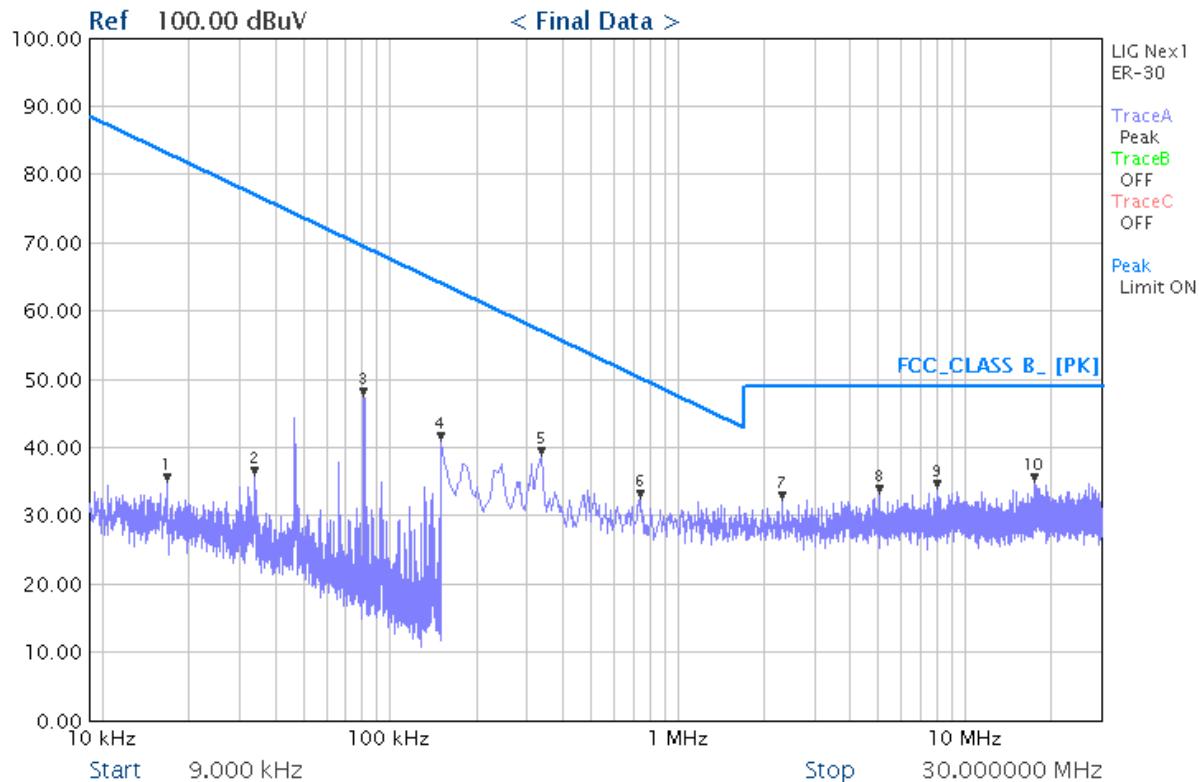
2. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)
3. X axis plane was the worst test result than Y axis plane and Z axis plane.

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Test Frequency	9 kHz to 30 MHz	Polarization	Vertical
Test Mode	USB Charging - Continuous Tx	Modulation	GFSK
Test Result	PASS		



Frequency (MHz)	Reading (dBuV)	P (H, V)	Correct Factor (dB)	Amp Gain (dB)	Limit (dBuV)	Total (dBuV)	Margin (dB)
0.740	13.48	V	19.10	-	50.22	32.58	17.64
2.304	13.02	V	19.21	-	49.54	32.23	17.31
5.019	13.55	V	19.60	-	49.54	33.15	16.39
8.011	14.15	V	19.88	-	49.54	34.03	15.51
17.340	14.47	V	20.42	-	49.54	34.89	14.65

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

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

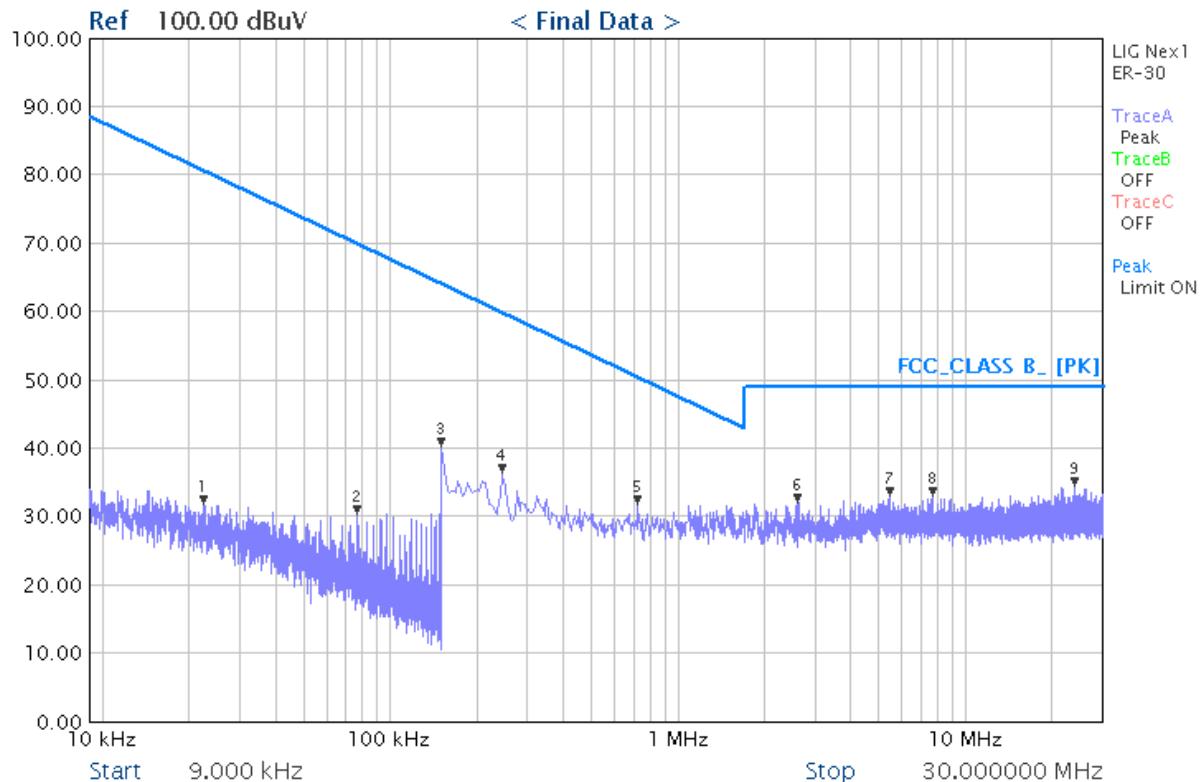
3. X axis plane was the worst test result than Y axis plane and Z axis plane.

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Test Frequency	9 kHz to 30 MHz	Polarization	Horizontal
Test Mode	Portable - Continuous Tx	Modulation	8-DQPSK
Test Result	PASS		



Frequency (MHz)	Reading (dBuV)	P (H, V)	Correct Factor (dB)	Amp Gain (dB)	Limit (dBuV)	Total (dBuV)	Margin (dB)
0.719	12.71	H	19.10	-	50.48	31.81	18.67
2.621	12.84	H	19.21	-	49.54	32.05	17.49
5.445	13.29	H	19.66	-	49.54	32.95	16.59
7.675	13.17	H	19.86	-	49.54	33.03	16.51
23.929	13.16	H	21.20	-	49.54	34.36	15.18

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

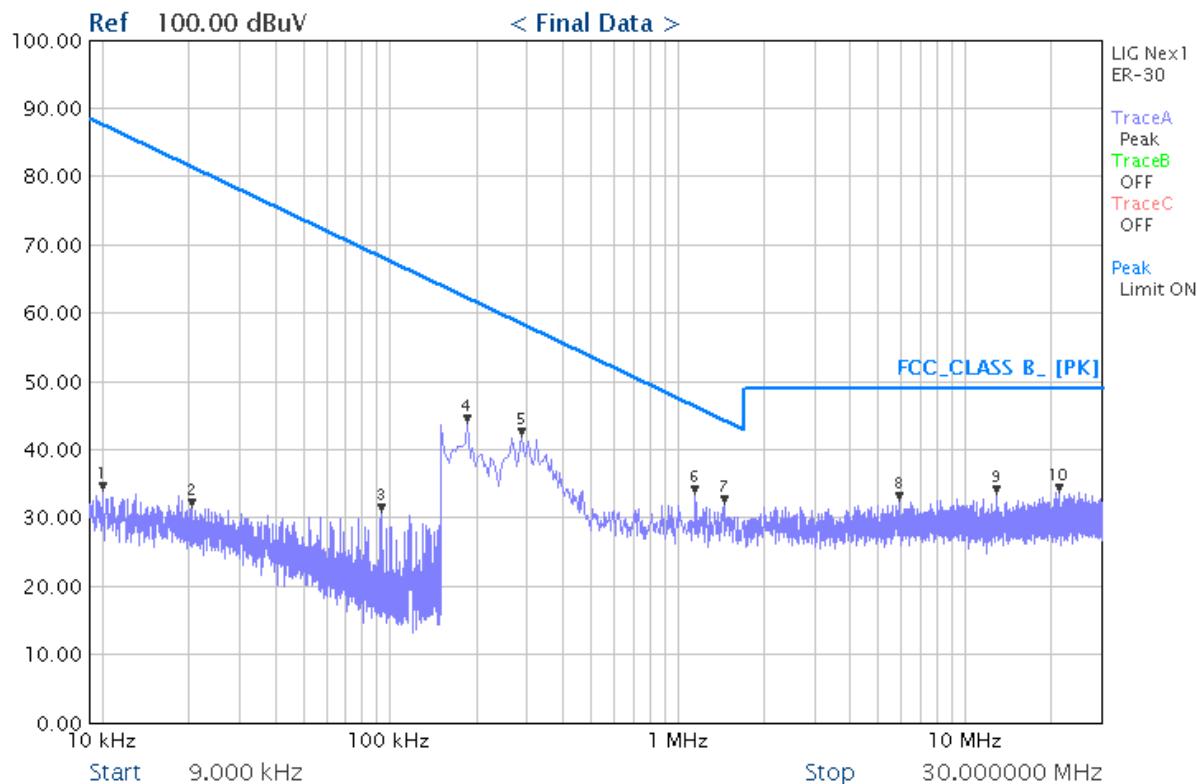
2. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)
3. Other emissions don't exceed the level of 20 dB below the applicable Limit.
4. X axis plane was the worst test result than Y axis plane and Z axis plane.

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Test Frequency	9 kHz to 30 MHz	Polarization	Vertical
Test Mode	Portable - Continuous Tx	Modulation	8-DQPSK
Test Result	PASS		



Frequency (MHz)	Reading (dBuV)	P (H, V)	Correct Factor (dB)	Amp Gain (dB)	Limit (dBuV)	Total (dBuV)	Margin (dB)
0.288	22.96	V	19.02	-	58.40	41.98	16.42
1.152	14.31	V	19.15	-	46.37	33.46	12.91
1.447	12.81	V	19.18	-	44.39	31.99	12.40
12.949	13.41	V	20.06	-	49.54	33.47	16.07
21.221	12.77	V	20.85	-	49.54	33.62	15.92

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

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

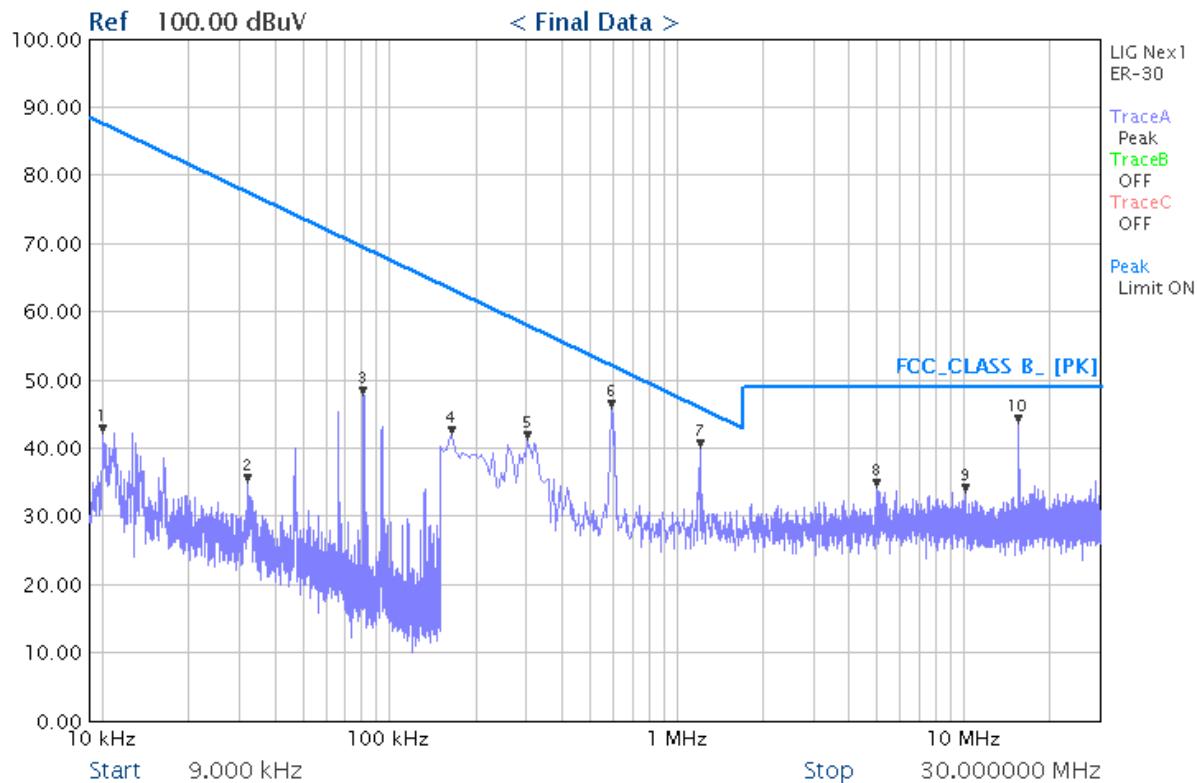
3. X axis plane was the worst test result than Y axis plane and Z axis plane.

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Test Frequency	9 kHz to 30 MHz	Polarization	Horizontal
Test Mode	USB Charging - Continuous Tx	Modulation	8-DQPSK
Test Result	PASS		



Frequency (MHz)	Reading (dBuV)	P (H, V)	Correct Factor (dB)	Amp Gain (dB)	Limit (dBuV)	Total (dBuV)	Margin (dB)
0.591	26.80	H	19.07	-	52.17	45.87	6.30
1.203	20.72	H	19.16	-	46.00	39.88	6.12
5.004	14.49	H	19.60	-	49.54	34.09	15.45
10.110	13.53	H	19.92	-	49.54	33.45	16.09
15.434	25.63	H	20.22	-	49.54	45.85	3.69

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

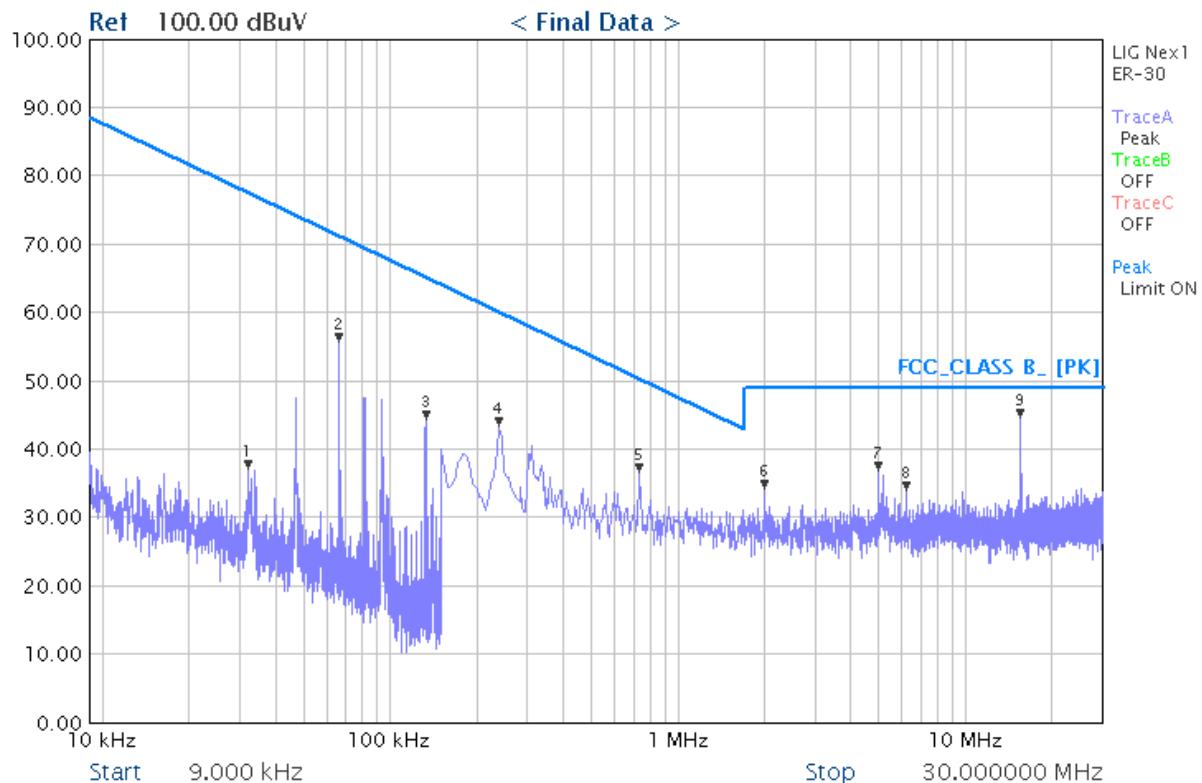
2. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)
3. X axis plane was the worst test result than Y axis plane and Z axis plane.

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Test Frequency	9 kHz to 30 MHz	Polarization	Vetical
Test Mode	USB Charging - Continuous Tx	Modulation	8-DQPSK
Test Result	PASS		



Frequency (MHz)	Reading (dBuV)	P (H, V)	Correct Factor (dB)	Amp Gain (dB)	Limit (dBuV)	Total (dBuV)	Margin (dB)
0.733	17.40	V	19.10	-	50.30	36.50	13.80
2.012	15.09	V	19.20	-	49.54	34.29	15.25
4.990	17.13	V	19.60	-	49.54	36.73	12.81
6.214	14.11	V	19.75	-	49.54	33.86	15.68
15.434	25.62	V	20.22	-	49.54	45.84	3.70

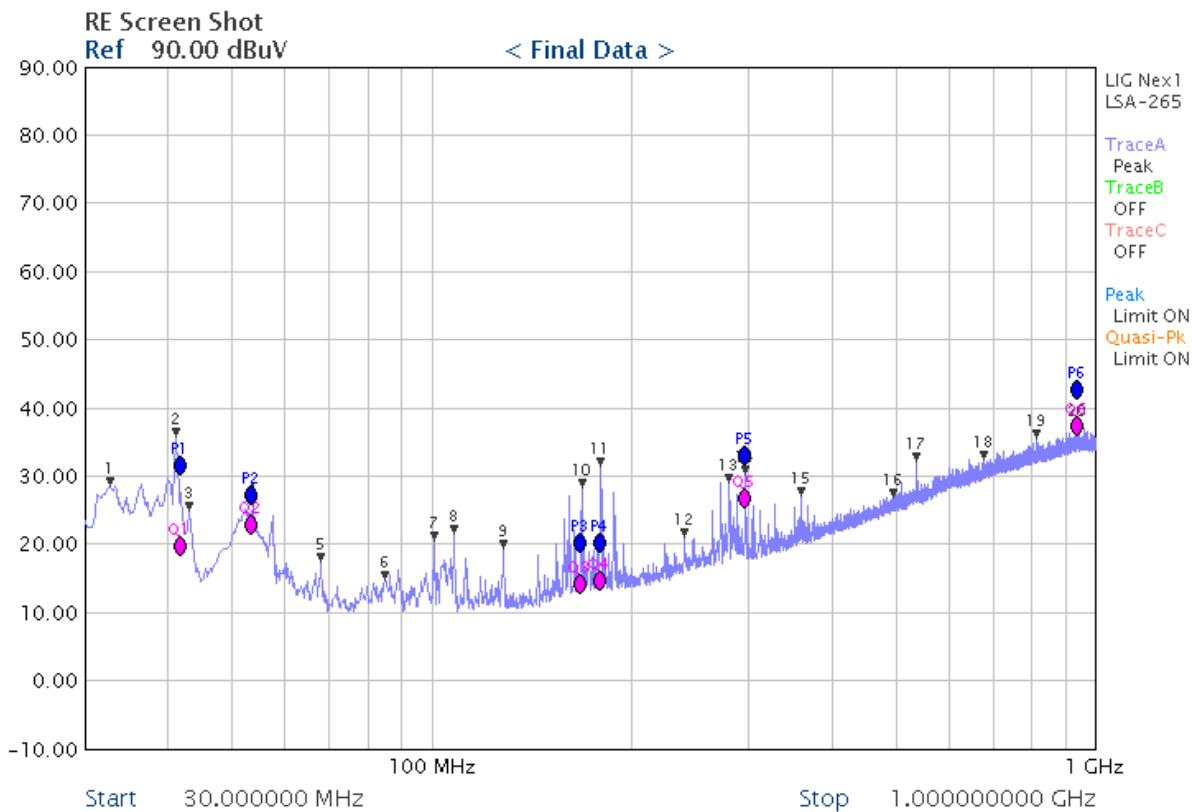
Note : 1. All reading levels are Quasi-peak value.

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.

## 3.2.6 Radiated Emission Result (30 MHz ~ 1000 MHz)

Test Frequency	30 MHz to 1000 MHz	Polarization	Horizontal+Vertical
Test Mode	Protable - Continuous Tx	Modulation	GFSK
Test Result	PASS	Test Channel	CH 00 (2 402 MHz)

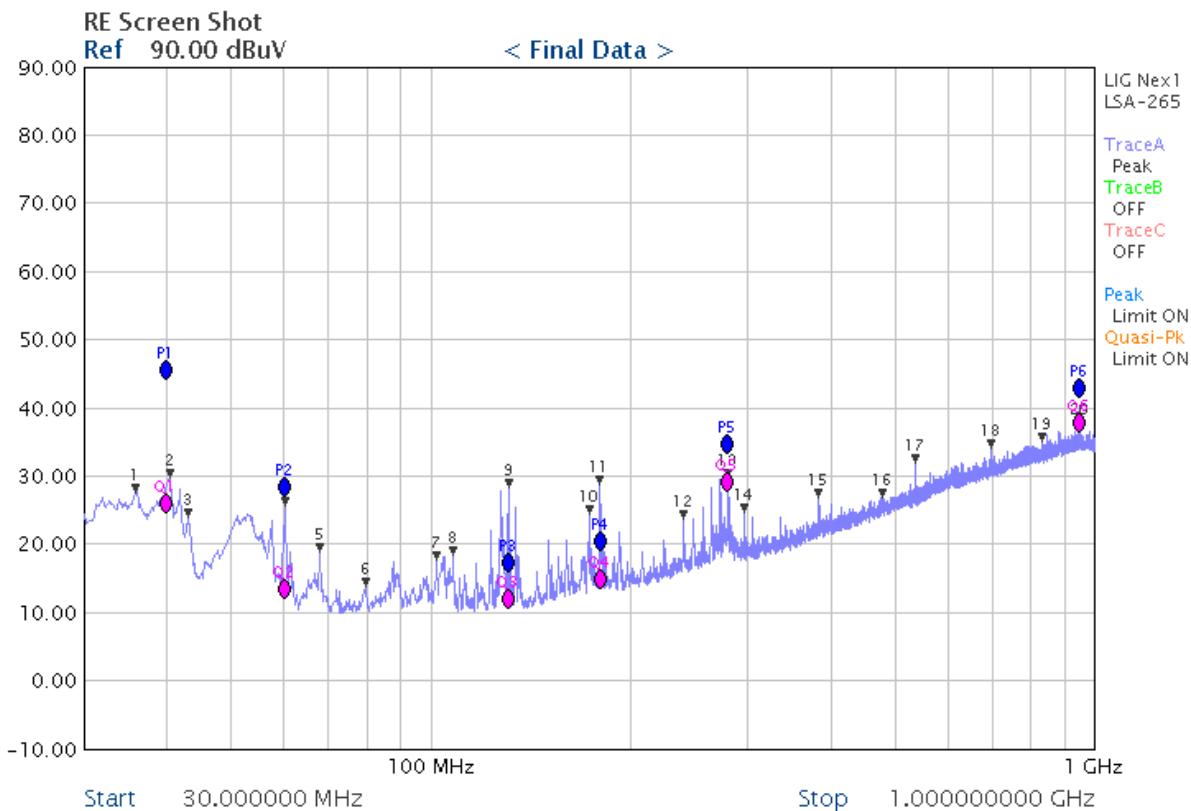


Frequency (MHz)	Reading (dBuV)	P (H, V)	Correct Factor (dB)	Amp Gain (dB)	Limit (dBuV)	Total (dBuV)	Margin (dB)
41.73	18.45	H	13.00	-	40.00	31.45	8.55
53.531	17.58	H	9.58	-	40.00	27.16	12.84
167.962	16.11	V	12.22	-	43.52	28.33	15.19
179.686	18.74	V	12.78	-	43.52	31.52	12.00
937.435	11.48	H	31.04	-	46.02	42.52	3.50

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 MHz to 1000 MHz	Polarization	Horizontal+Vertical
Test Mode	Portable - Continuous Tx	Modulation	GFSK
Test Result	PASS	Test Channel	CH 39 (2 441 MHz)



Frequency (MHz)	Reading (dBuV)	P (H, V)	Correct Factor (dB)	Amp Gain (dB)	Limit (dBuV)	Total (dBuV)	Margin (dB)
40.01	11.97	V	13.80	-	40.00	25.77	14.23
130.659	18.33	V	9.91	-	43.52	28.24	15.28
179.686	16.09	V	12.78	-	43.52	28.87	14.65
279.970	18.22	H	16.36	-	46.02	34.58	11.44
951.734	11.74	H	31.09	-	46.02	42.83	3.19

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

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

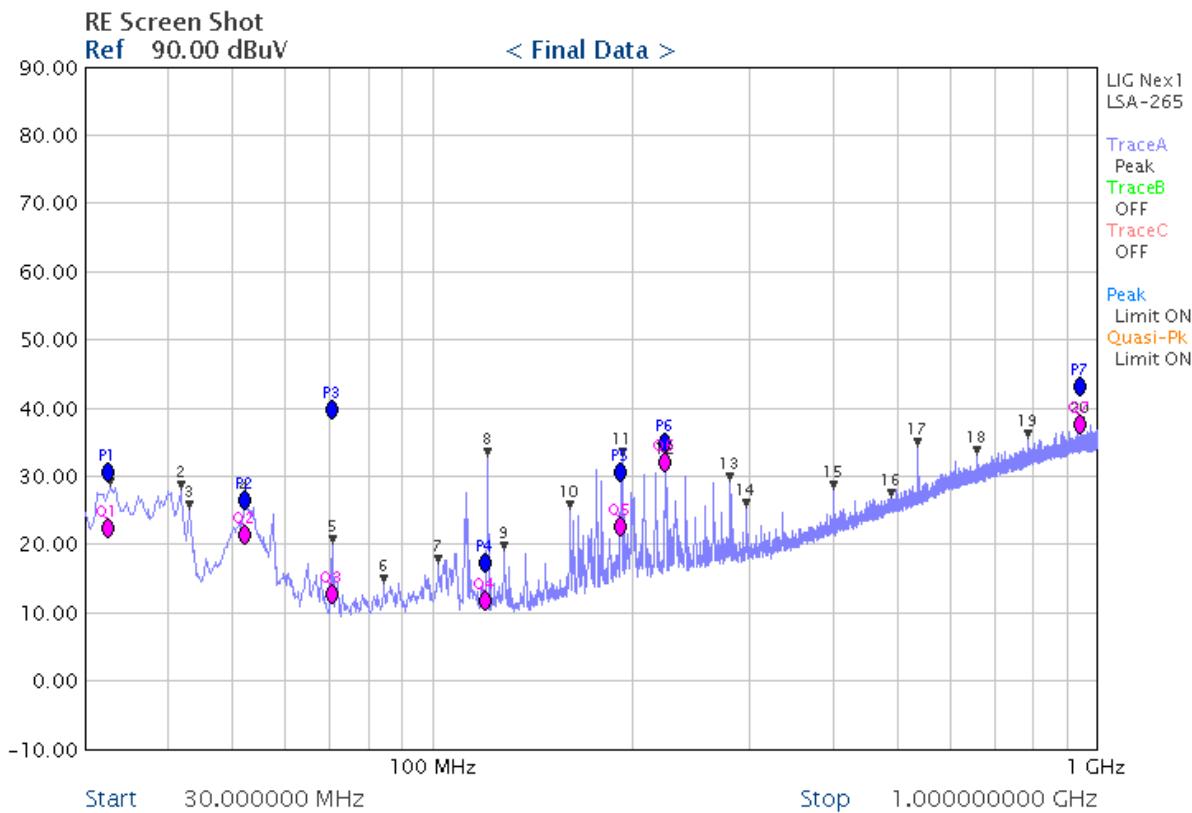
3. X axis plane was the worst test result than Y axis plane and Z axis plane.

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Test Frequency	30 MHz to 1000 MHz	Polarization	Horizontal+Vertical
Test Mode	Portable - Continuous Tx	Modulation	GFSK
Test Result	PASS	Test Channel	CH 78 (2 480 MHz)



Frequency (MHz)	Reading (dBuV)	P (H, V)	Correct Factor (dB)	Amp Gain (dB)	Limit (dBuV)	Total (dBuV)	Margin (dB)
32.567	13.16	V	17.22	-	40.00	30.38	9.62
52.263	16.19	V	9.73	-	40.00	25.92	14.08
192.713	19.99	V	12.83	-	43.52	32.82	10.70
224.009	20.68	H	14.24	-	46.02	34.92	11.10
943.184	11.86	H	31.07	-	46.02	42.93	3.09

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

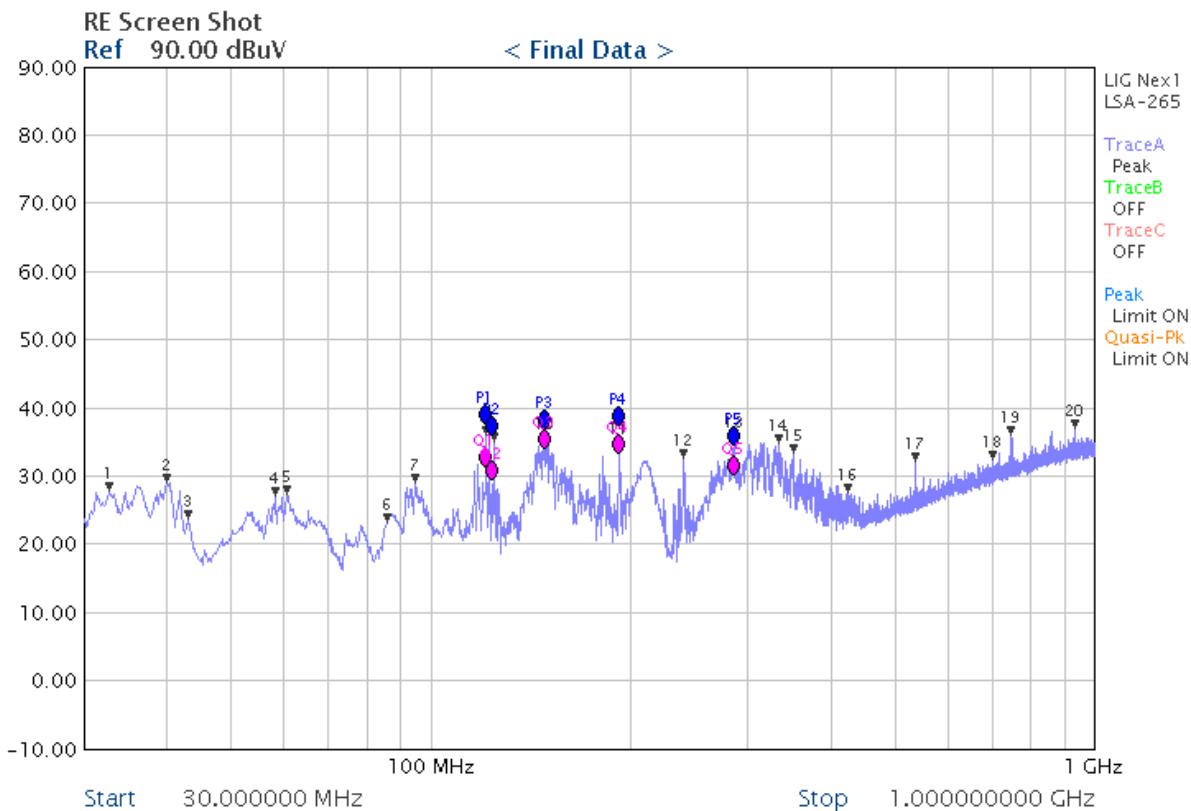
2. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)
3. X axis plane was the worst test result than Y axis plane and Z axis plane.

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Test Frequency	30 MHz to 1000 MHz	Polarization	Horizontal+Vertical
Test Mode	USB Charging - Continuous Tx	Modulation	GFSK
Test Result	PASS		



Frequency (MHz)	Reading (dBuV)	P (H, V)	Correct Factor (dB)	Amp Gain (dB)	Limit (dBuV)	Total (dBuV)	Margin (dB)
120.756	29.26	H	9.72	-	43.52	38.98	4.54
124.146	25.24	H	9.78	-	43.52	35.02	8.50
148.645	27.30	H	10.88	-	43.52	38.18	5.34
192.005	25.97	H	12.82	-	43.52	38.79	4.73
285.793	18.68	H	16.49	-	46.02	35.17	10.85

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

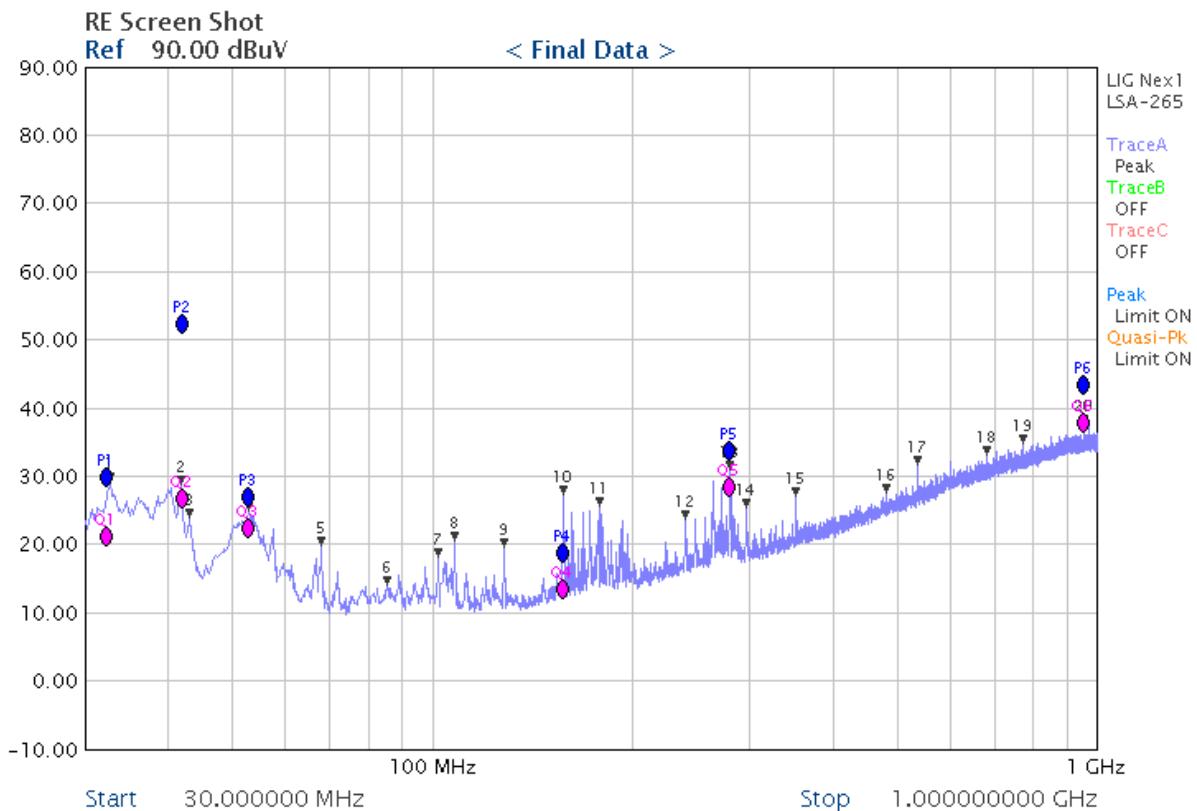
2. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

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Test Frequency	30 MHz to 1000 MHz	Polarization	Horizontal+Vertical
Test Mode	Protable - Continuous Tx	Modulation	8-DQPSK
Test Result	PASS	Test Channel	CH 00 (2 402 MHz)



Frequency (MHz)	Reading (dBuV)	P (H, V)	Correct Factor (dB)	Amp Gain (dB)	Limit (dBuV)	Total (dBuV)	Margin (dB)
32.605	12.08	V	17.21	-	40.00	29.29	10.71
42.038	13.71	V	12.86	-	40.00	26.57	13.43
52.856	15.13	V	9.66	-	40.00	24.79	15.21
280.017	17.14	H	16.36	-	46.02	33.50	12.52
957.495	11.32	V	31.06	-	46.02	42.38	3.64

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

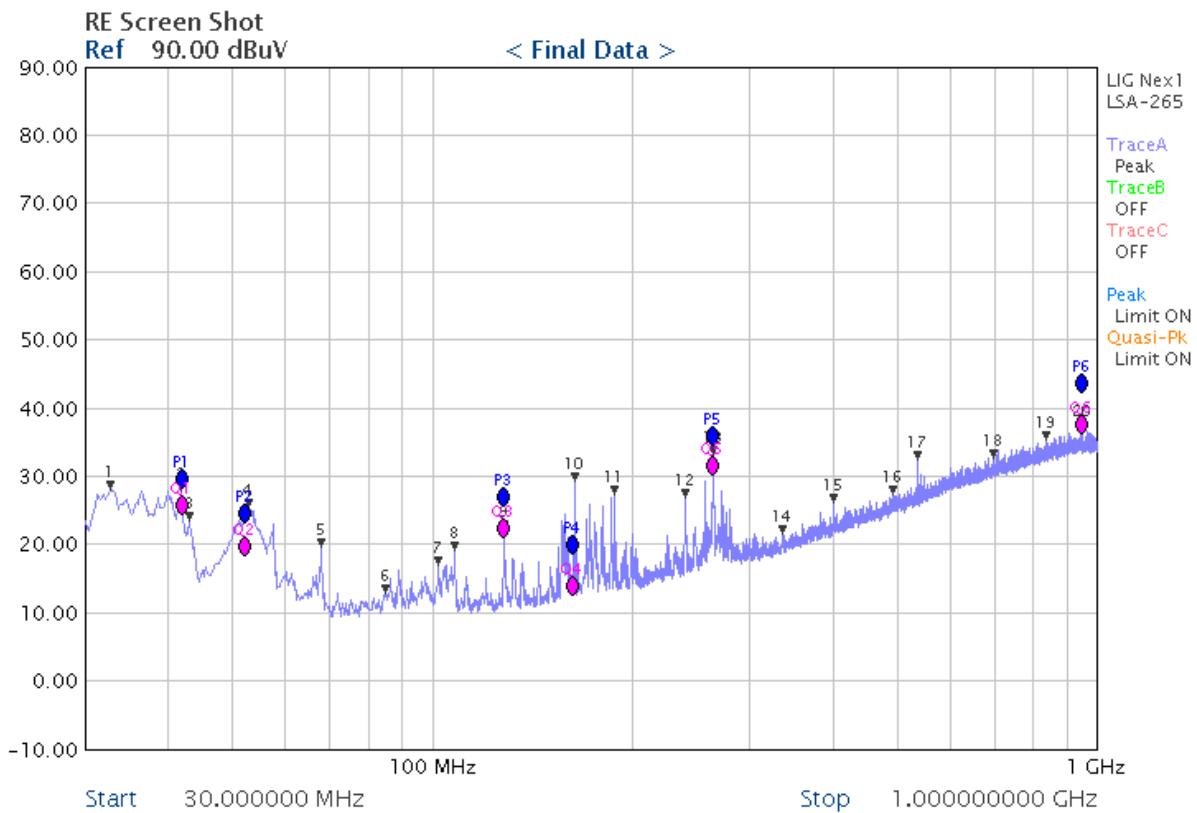
2. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)
3. X axis plane was the worst test result than Y axis plane and Z axis plane.

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Test Frequency	30 MHz to 1000 MHz	Polarization	Horizontal+Vertical
Test Mode	Protable - Continuous Tx	Modulation	8-DQPSK
Test Result	PASS	Test Channel	CH 39 (2 441 MHz)



Frequency (MHz)	Reading (dBuV)	P (H, V)	Correct Factor (dB)	Amp Gain (dB)	Limit (dBuV)	Total (dBuV)	Margin (dB)
42.077	16.68	V	12.84	-	40.00	29.52	10.48
163.462	17.30	V	12.04	-	43.52	29.34	14.18
187.502	14.48	V	12.80	-	43.52	27.28	16.24
263.981	19.80	H	16.01	-	46.02	35.81	10.21
949.679	11.32	H	31.10	-	46.02	42.42	3.60

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

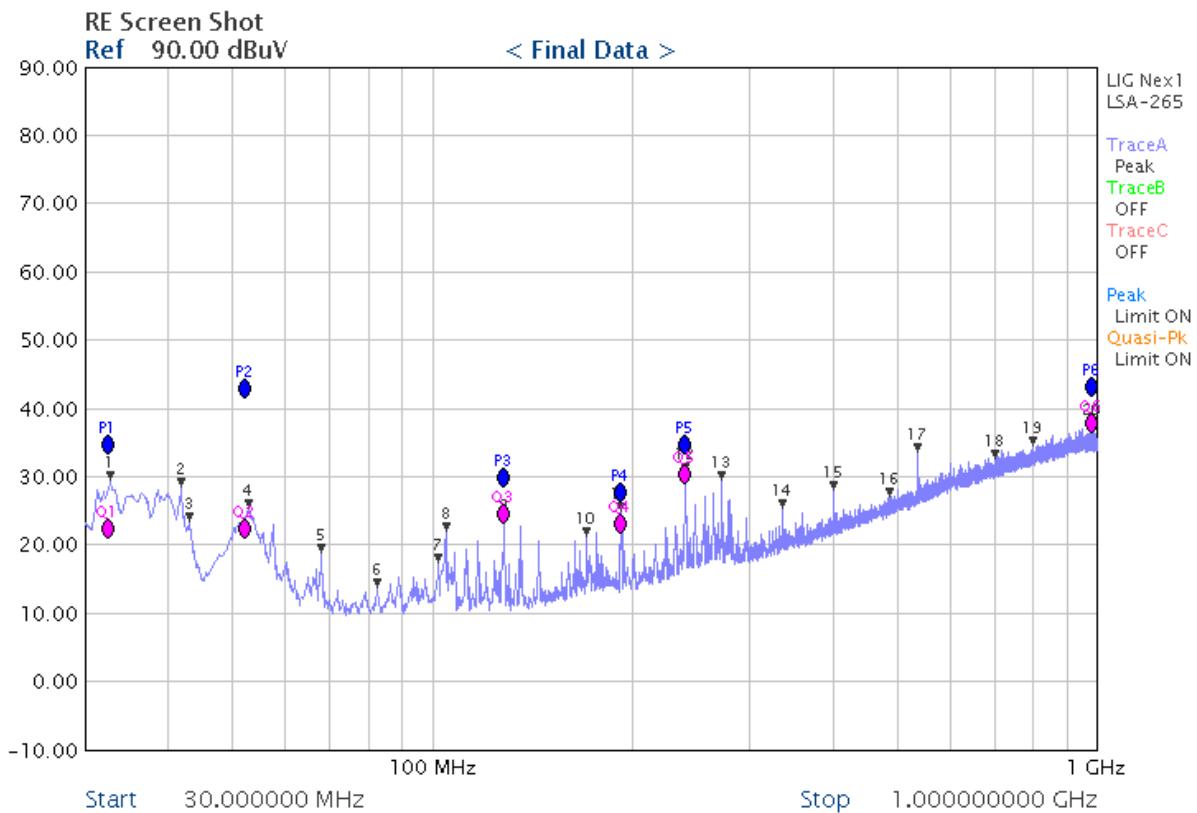
2. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)
3. X axis plane was the worst test result than Y axis plane and Z axis plane.

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Test Frequency	30 MHz to 1000 MHz	Polarization	Horizontal+Vertical
Test Mode	Protable - Continuous Tx	Modulation	8-DQPSK
Test Result	PASS	Test Channel	CH 78 (2 480 MHz)



Frequency (MHz)	Reading (dBuV)	P (H, V)	Correct Factor (dB)	Amp Gain (dB)	Limit (dBuV)	Total (dBuV)	Margin (dB)
32.587	17.41	V	17.22	-	40.00	34.63	5.37
128.054	13.29	H	9.86	-	43.52	23.15	20.37
192.121	12.08	H	12.82	-	43.52	24.90	18.62
239.999	19.35	H	15.14	-	46.02	34.49	11.53
981.822	12.10	H	30.94	-	53.98	43.04	10.94

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

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

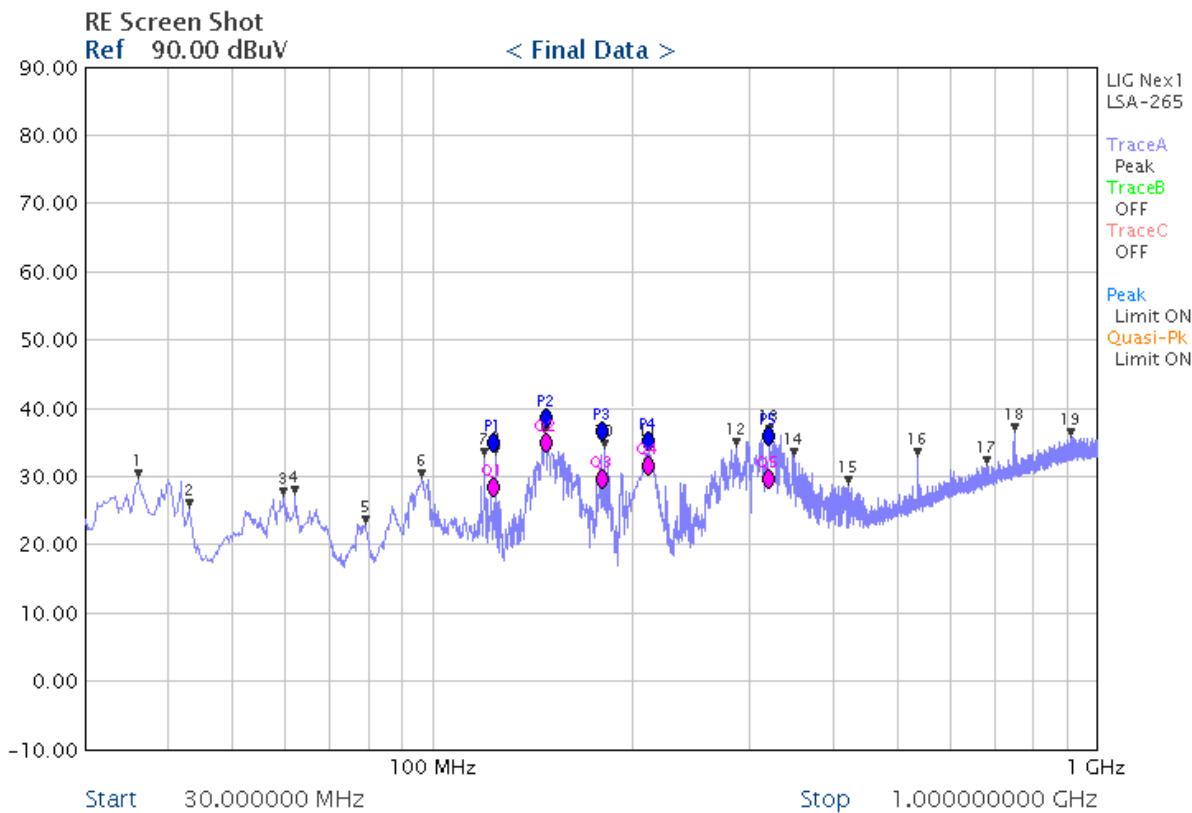
3. X axis plane was the worst test result than Y axis plane and Z axis plane.

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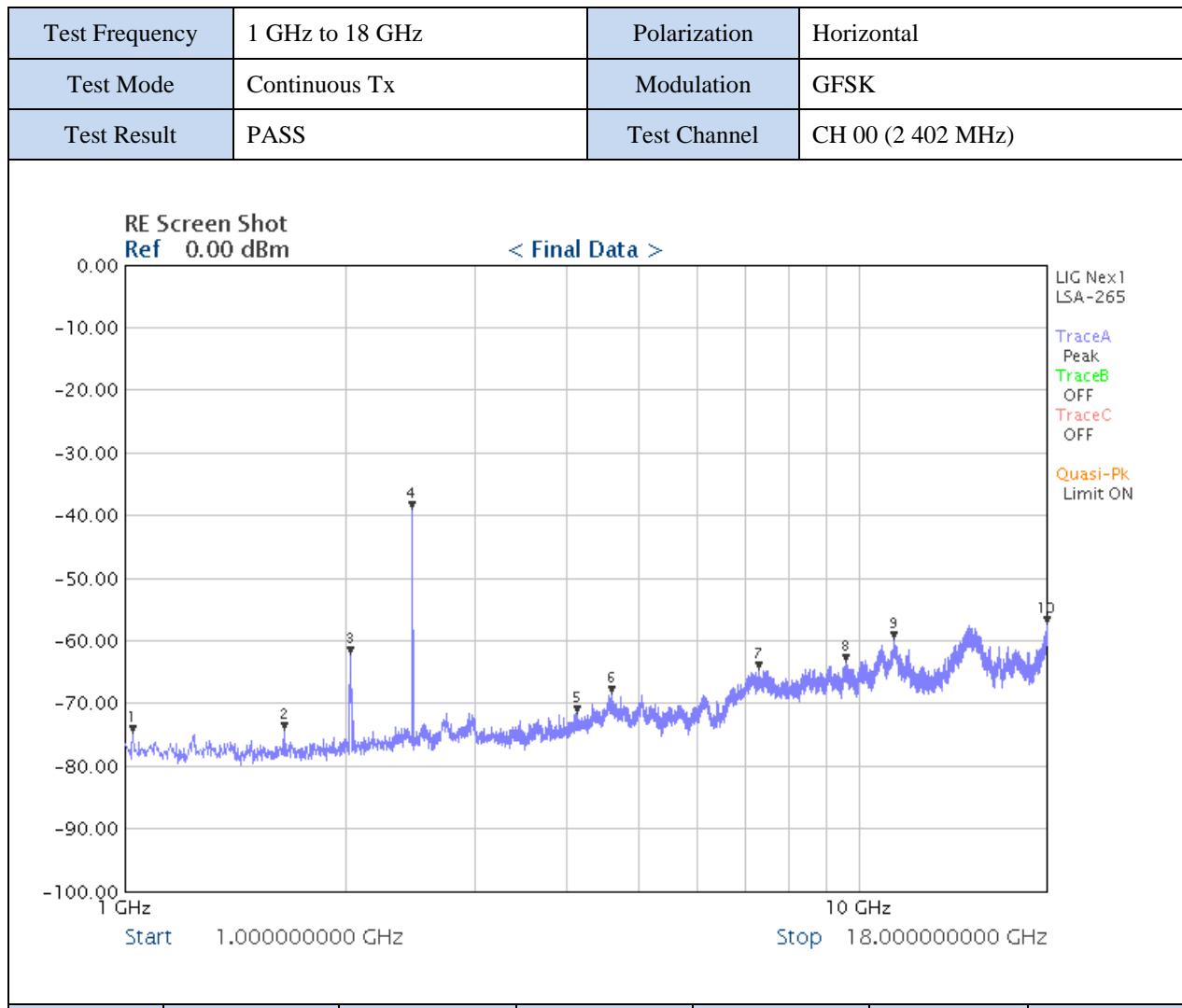
Test Frequency	30 MHz to 1000 MHz	Polarization	Horizontal+Vertical
Test Mode	USB Charging - Continuous Tx	Modulation	8-DQPSK
Test Result	PASS		



Frequency (MHz)	Reading (dBuV)	P (H, V)	Correct Factor (dB)	Amp Gain (dB)	Limit (dBuV)	Total (dBuV)	Margin (dB)
124.146	25.35	H	9.78	-	43.52	35.13	8.39
147.712	25.43	H	10.79	-	43.52	36.22	7.30
180.989	21.21	H	12.8	-	43.52	34.01	9.51
211.542	20.43	V	13.55	-	43.52	33.98	9.54
320.964	18.58	H	17.58	-	46.02	36.16	9.86

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

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

**3.2.7 Fundamental & Harmonics Radiated Emission Result (1 GHz ~ 18 GHz)**

Frequency (MHz)	Reading (PK/AV) (dBuV)	P (H, V)	Correct Factor (dB)	Limit (PK/AV) (dBuV)	Total (PK/AV) (dBuV)	Margin (PK/AV) (dB)
2 025.27	13.74/1.80	H	31.02	74/54	44.76/32.82	29.24/21.18
2 402.00	34.54/22.16	H	33.53	114/94	68.07/55.69	45.93/38.31

*Note :* 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

2. Other emissions don't exceed the level of 20 dB below the applicable Limit.

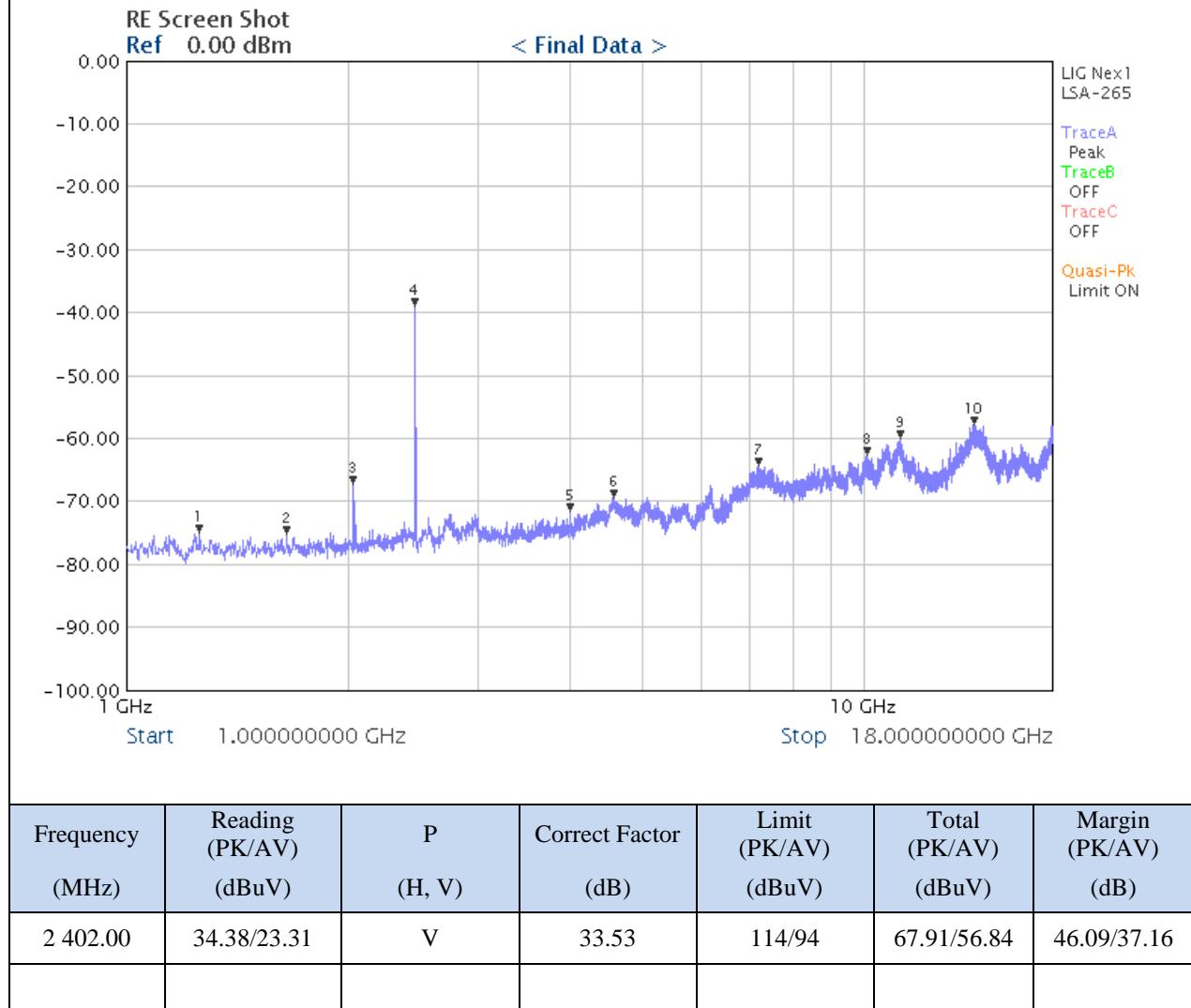
3. X axis plane was the worst test result than Y axis plane and Z axis plane.

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Test Frequency	1 GHz to 18 GHz	Polarization	Vertical
Test Mode	Continuous Tx	Modulation	GFSK
Test Result	PASS	Test Channel	CH 00 (2 402 MHz)



*Note :* 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

2. Other emissions don't exceed the level of 20 dB below the applicable Limit.

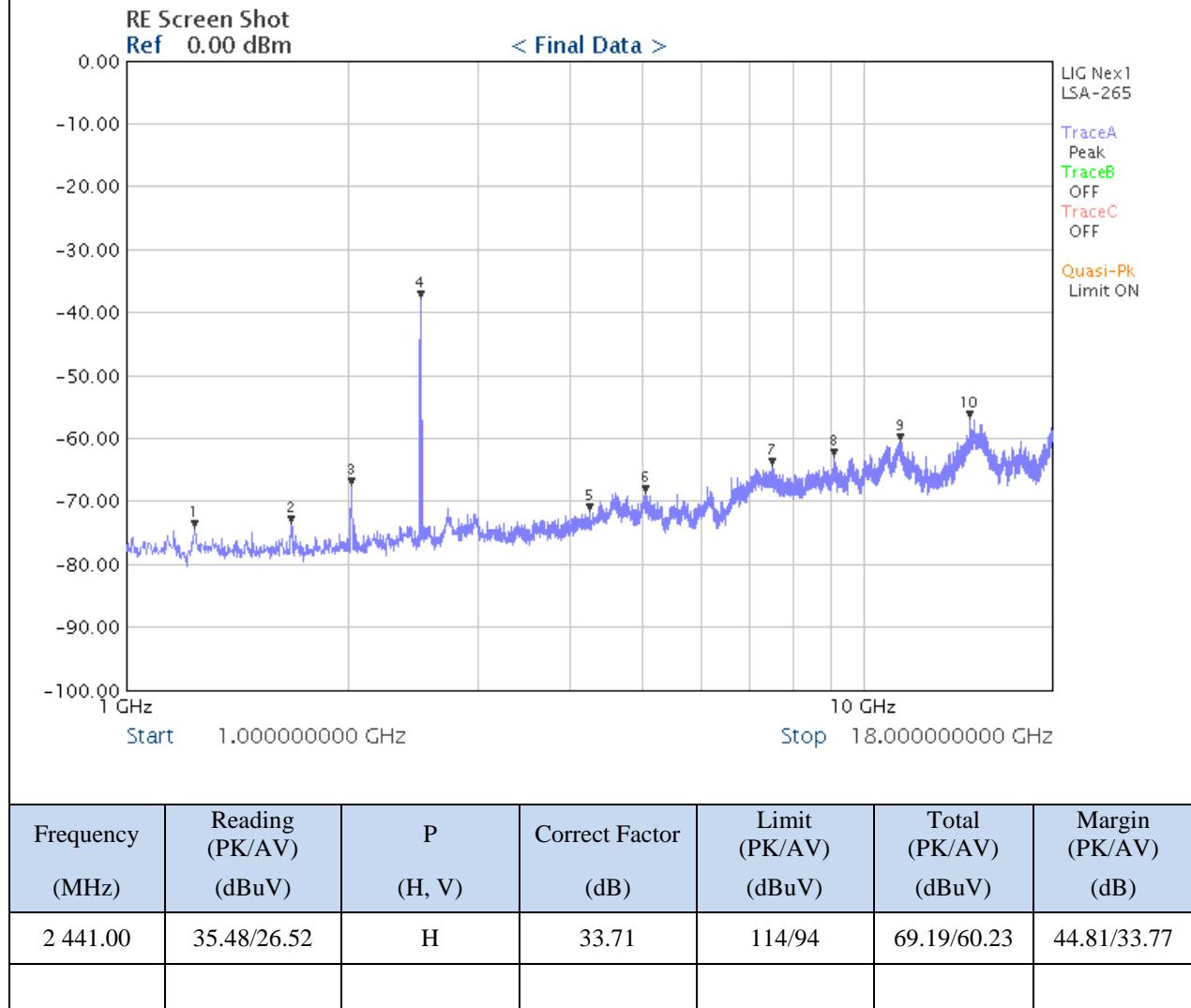
3. X axis plane was the worst test result than Y axis plane and Z axis plane.

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Test Frequency	1 GHz to 18 GHz	Polarization	Horizontal
Test Mode	Continuous Tx	Modulation	GFSK
Test Result	PASS	Test Channel	CH 39 (2 441 MHz)



*Note :* 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

2. Other emissions don't exceed the level of 20 dB below the applicable Limit.

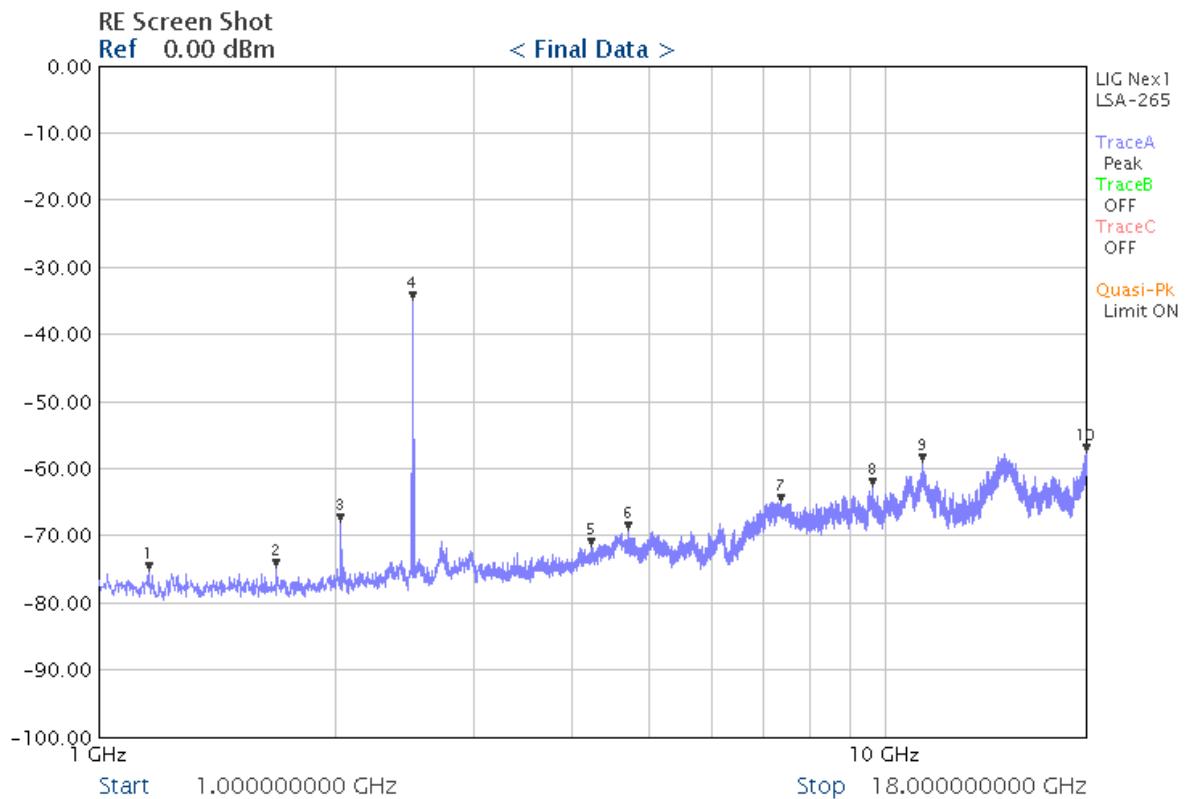
3. X axis plane was the worst test result than Y axis plane and Z axis plane.

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Test Frequency	1 GHz to 18 GHz	Polarization	Vertical
Test Mode	Continuous Tx	Modulation	GFSK
Test Result	PASS	Test Channel	CH 39 (2 441 MHz)



Frequency (MHz)	Reading (PK/AV) (dBuV)	P (H, V)	Correct Factor (dB)	Limit (PK/AV) (dBuV)	Total (PK/AV) (dBuV)	Margin (PK/AV) (dB)
2 441.00	38.28/27.91	V	33.71	114/94	71.99/61.62	42.01/32.38

Note : 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

2. Other emissions don't exceed the level of 20 dB below the applicable Limit.

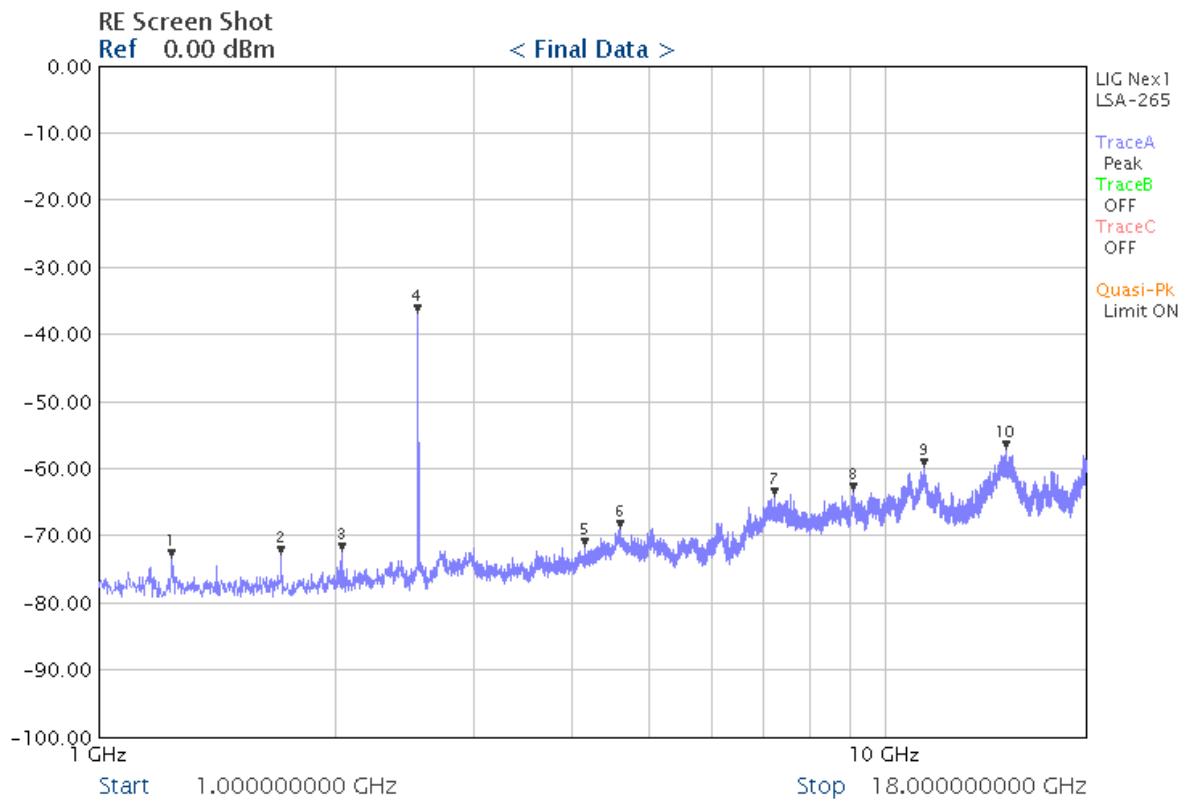
3. X axis plane was the worst test result than Y axis plane and Z axis plane.

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Test Frequency	1 GHz to 18 GHz	Polarization	Horizontal
Test Mode	Continuous Tx	Modulation	GFSK
Test Result	PASS	Test Channel	CH 78 (2 480 MHz)



Frequency (MHz)	Reading (PK/AV) (dBuV)	P (H, V)	Correct Factor (dB)	Limit (PK/AV) (dBuV)	Total (PK/AV) (dBuV)	Margin (PK/AV) (dB)
2 480.00	29.90/19.34	V	40.18	114/94	70.08/59.52	43.92/34.48

Note : 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

2. Other emissions don't exceed the level of 20 dB below the applicable Limit.

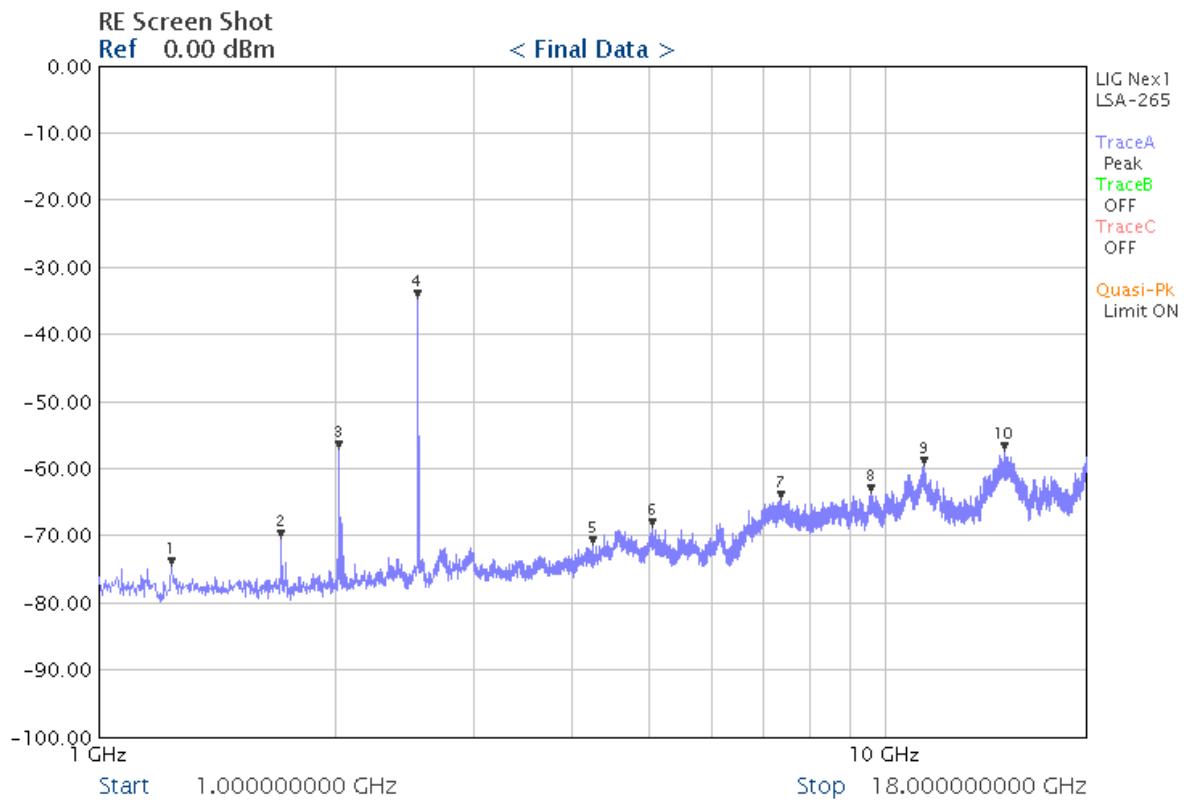
3. X axis plane was the worst test result than Y axis plane and Z axis plane.

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Test Frequency	1 GHz to 18 GHz	Polarization	Vertical
Test Mode	Continuous Tx	Modulation	GFSK
Test Result	PASS	Test Channel	CH 78 (2 480 MHz)



Frequency (MHz)	Reading (PK/AV) (dBuV)	P (H, V)	Correct Factor (dB)	Limit (PK/AV) (dBuV)	Total (PK/AV) (dBuV)	Margin (PK/AV) (dB)
2 021.12	20.19/5.12	V	29.77	74/54	49.96/34.89	24.04/19.11
2 480.00	32.21/21.40	V	40.18	114/94	72.39/61.58	41.61/32.42

Note : 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

2. Other emissions don't exceed the level of 20 dB below the applicable Limit.

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

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Test Frequency	1 GHz to 18 GHz	Polarization	Horizontal
Test Mode	Continuous Tx	Modulation	8-DQPSK
Test Result	PASS	Test Channel	CH 00 (2 402 MHz)

RE Screen Shot  
Ref 0.00 dBm      < Final Data >

Start 1.000000000 GHz      Stop 18.000000000 GHz

Frequency (MHz)	Reading (PK/AV) (dBuV)	P (H, V)	Correct Factor (dB)	Limit (PK/AV) (dBuV)	Total (PK/AV) (dBuV)	Margin (PK/AV) (dB)
2 025.27	9.81/5.25	H	31.02	74/54	40.83/36.27	33.17/17.73
2 402.00	35.93/25.08	H	33.53	114/94	69.46/58.61	44.54/35.39

*Note :* 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

2. Other emissions don't exceed the level of 20 dB below the applicable Limit.

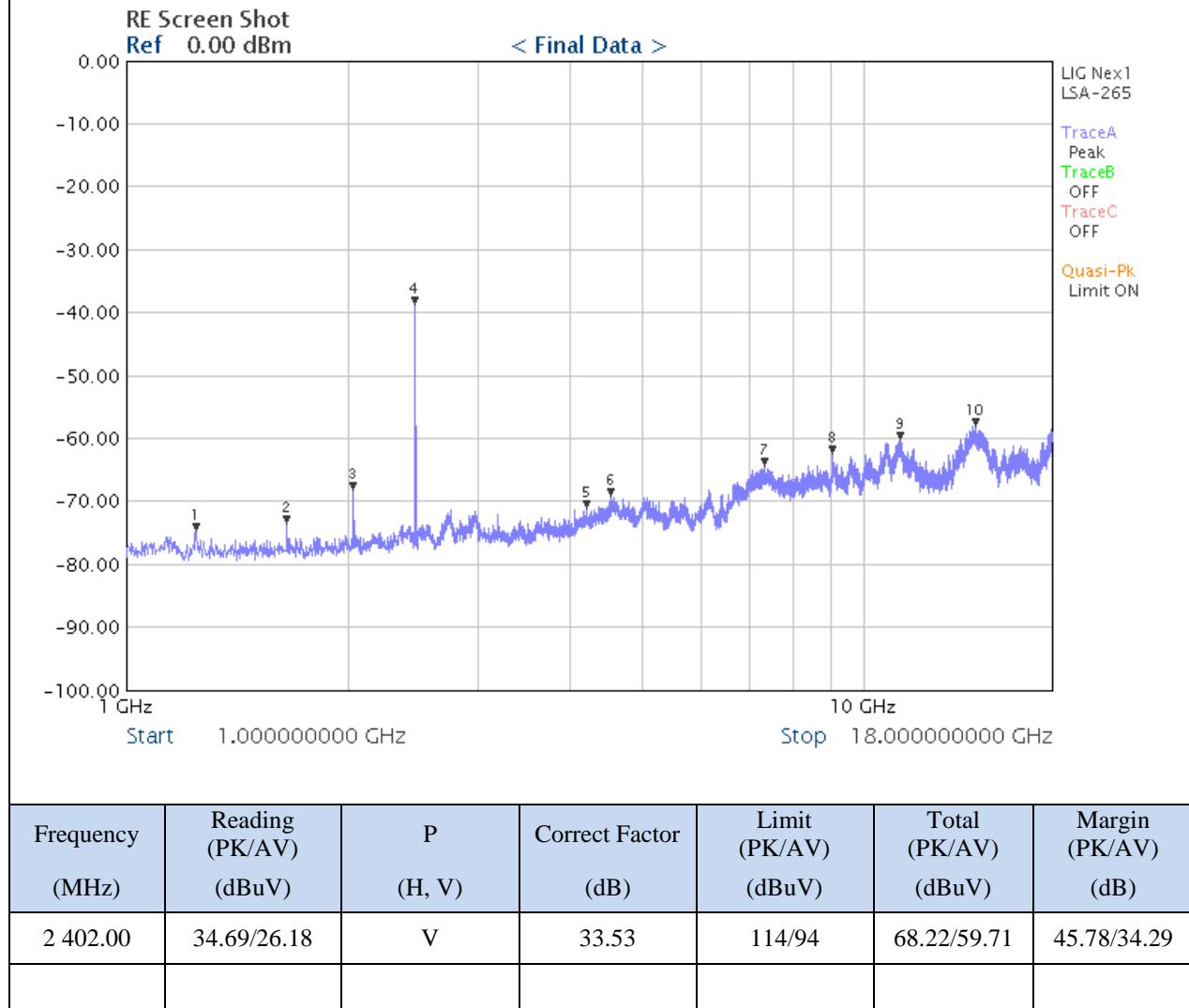
3. X axis plane was the worst test result than Y axis plane and Z axis plane.

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Test Frequency	1 GHz to 18 GHz	Polarization	Vertical
Test Mode	Continuous Tx	Modulation	8-DQPSK
Test Result	PASS	Test Channel	CH 00 (2 402 MHz)



*Note :* 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

2. Other emissions don't exceed the level of 20 dB below the applicable Limit.

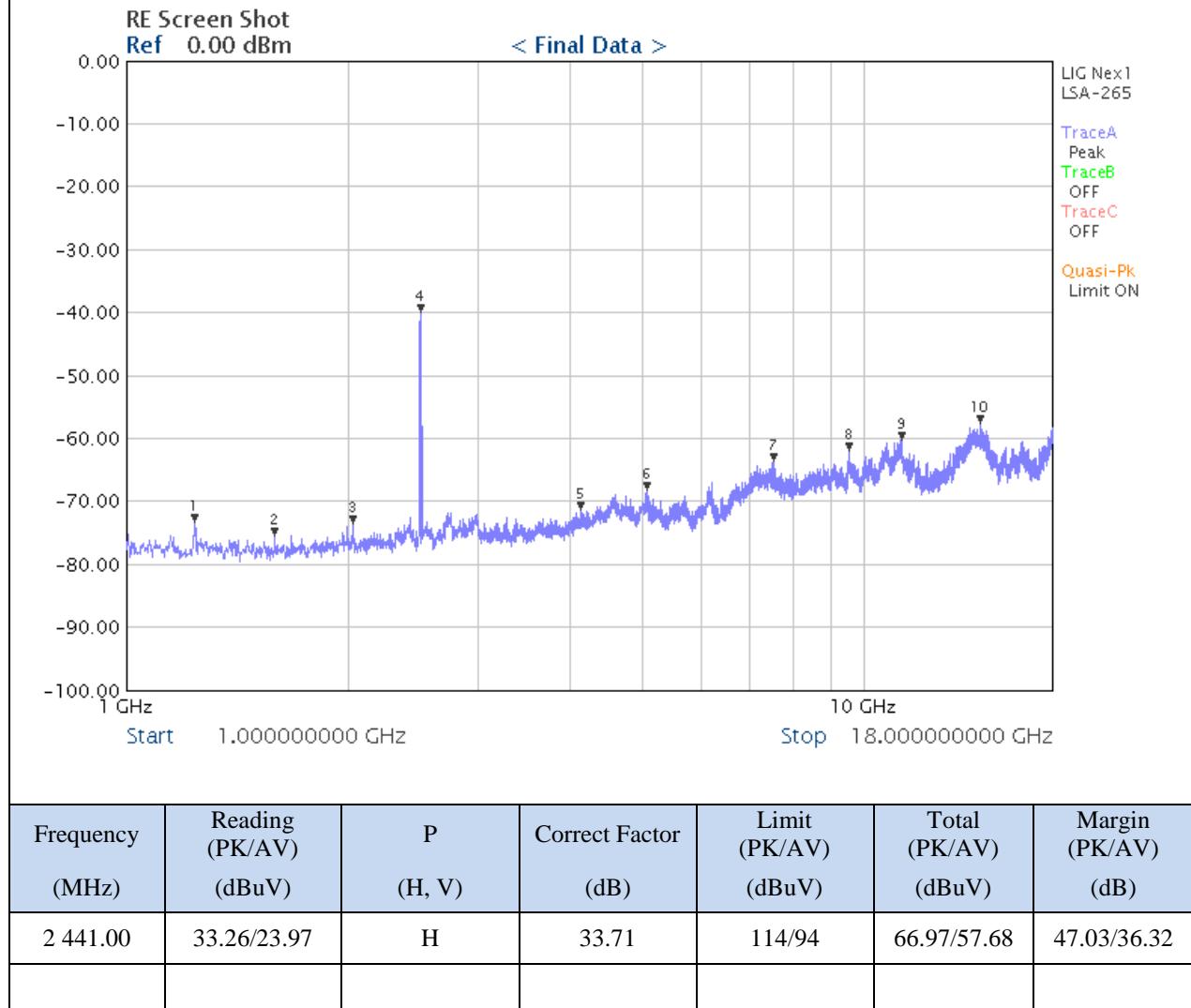
3. X axis plane was the worst test result than Y axis plane and Z axis plane.

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Test Frequency	1 GHz to 18 GHz	Polarization	Horizontal
Test Mode	Continuous Tx	Modulation	8-DQPSK
Test Result	PASS	Test Channel	CH 39 (2 441 MHz)



*Note :* 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

2. Other emissions don't exceed the level of 20 dB below the applicable Limit.

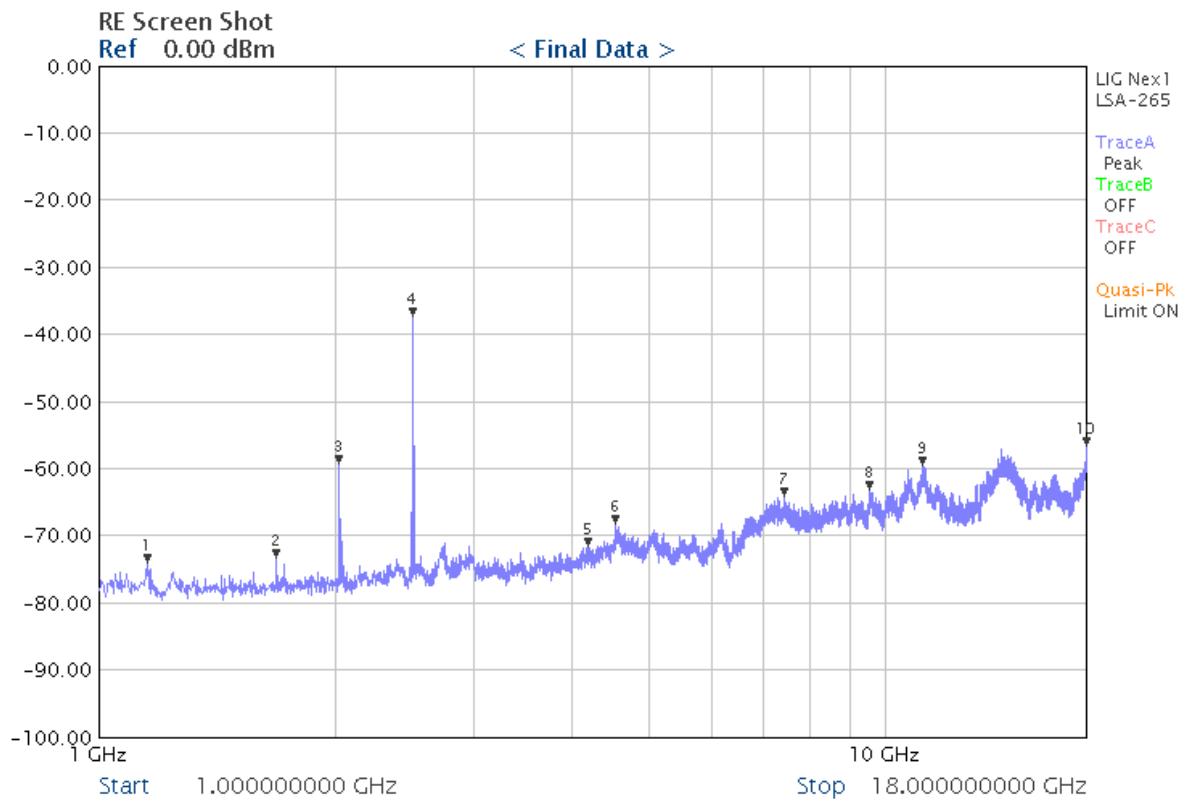
3. X axis plane was the worst test result than Y axis plane and Z axis plane.

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Test Frequency	1 GHz to 18 GHz	Polarization	Vertical
Test Mode	Continuous Tx	Modulation	8-DQPSK
Test Result	PASS	Test Channel	CH 39 (2 441 MHz)



Frequency (MHz)	Reading (PK/AV) (dBuV)	P (H, V)	Correct Factor (dB)	Limit (PK/AV) (dBuV)	Total (PK/AV) (dBuV)	Margin (PK/AV) (dB)
2 014.89	20.00/8.46	H	27.62	74/54	47.62/36.08	26.38/17.92
2 441.00	33.26/23.97	H	33.71	114/94	66.97/57.68	47.03/36.32

Note : 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

2. Other emissions don't exceed the level of 20 dB below the applicable Limit.

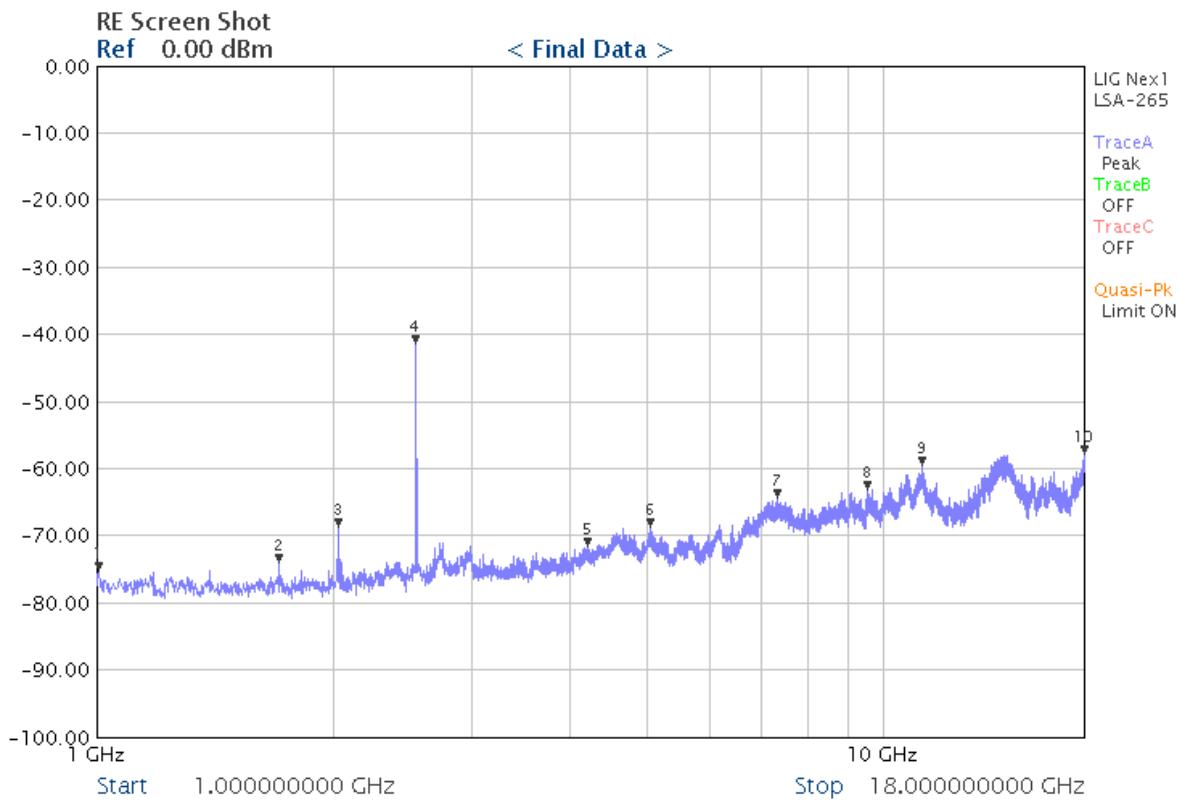
3. X axis plane was the worst test result than Y axis plane and Z axis plane.

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Test Frequency	1 GHz to 18 GHz	Polarization	Horizontal
Test Mode	Continuous Tx	Modulation	8-DQPSK
Test Result	PASS	Test Channel	CH 78 (2 480 MHz)



Frequency (MHz)	Reading (PK/AV) (dBuV)	P (H, V)	Correct Factor (dB)	Limit (PK/AV) (dBuV)	Total (PK/AV) (dBuV)	Margin (PK/AV) (dB)
2 480.00	25.42/16.19	H	40.18	114/94	65.60/56.37	48.40/37.63

Note : 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

2. Other emissions don't exceed the level of 20 dB below the applicable Limit.

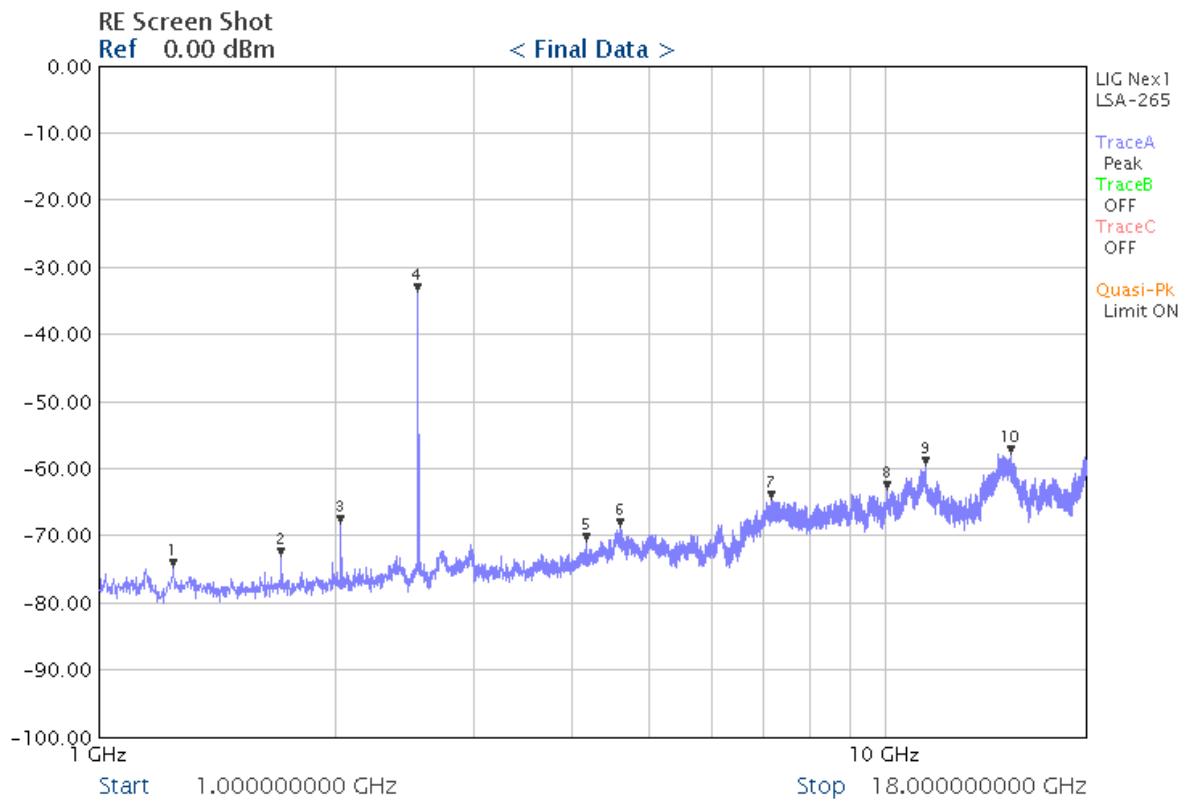
3. X axis plane was the worst test result than Y axis plane and Z axis plane.

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Test Frequency	1 GHz to 18 GHz	Polarization	Vertical
Test Mode	Continuous Tx	Modulation	8-DQPSK
Test Result	PASS	Test Channel	CH 78 (2 480 MHz)



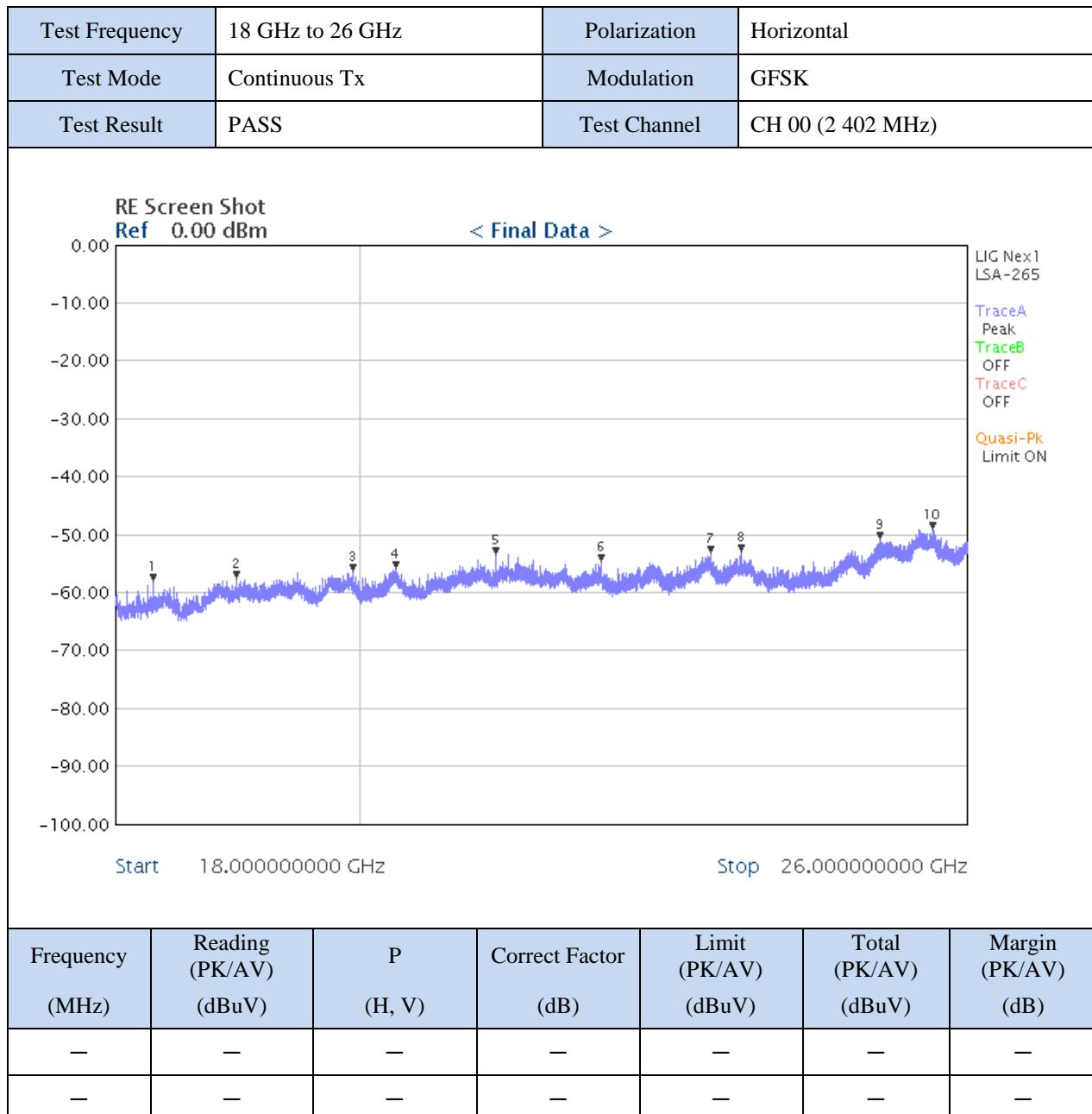
Frequency (MHz)	Reading (PK/AV) (dBuV)	P (H, V)	Correct Factor (dB)	Limit (PK/AV) (dBuV)	Total (PK/AV) (dBuV)	Margin (PK/AV) (dB)
2 480.00	33.19/23.30	V	40.18	114/94	73.37/63.48	40.63/30.52

Note : 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

2. Other emissions don't exceed the level of 20 dB below the applicable Limit.

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

**3.2.8 Fundamental & Harmonics Radiated Emission Result (18 GHz ~ 26 GHz)**



*Note :* 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

2. Other emissions don't exceed the level of 20 dB below the applicable Limit.

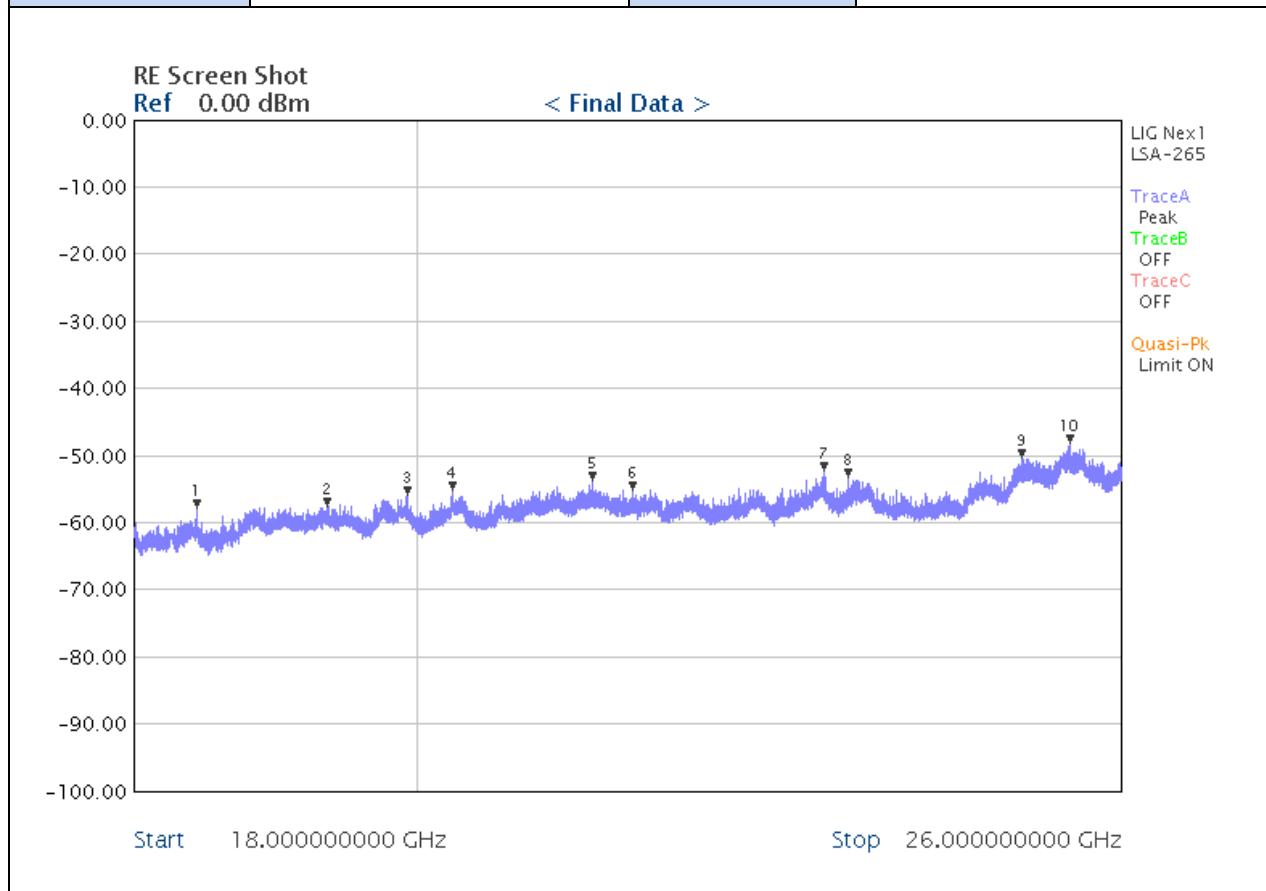
3. X axis plane was the worst test result than Y axis plane and Z axis plane.

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Test Frequency	18 GHz to 26 GHz	Polarization	Vertical
Test Mode	Continuous Tx	Modulation	GFSK
Test Result	PASS	Test Channel	CH 00 (2 402 MHz)



Frequency (MHz)	Reading (PK/AV) (dBuV)	P (H, V)	Correct Factor (dB)	Limit (PK/AV) (dBuV)	Total (PK/AV) (dBuV)	Margin (PK/AV) (dB)
—	—	—	—	—	—	—
—	—	—	—	—	—	—

Note : 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

2. Other emissions don't exceed the level of 20 dB below the applicable Limit.

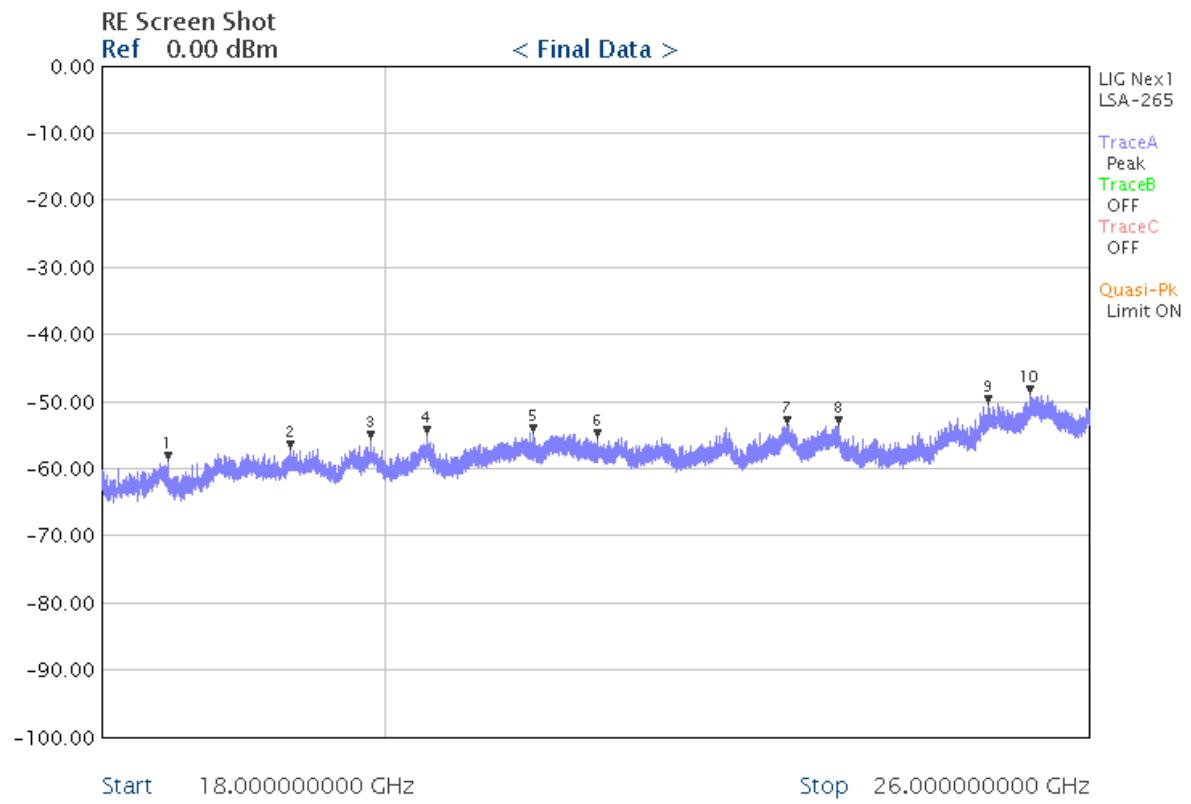
3. X axis plane was the worst test result than Y axis plane and Z axis plane.

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Test Frequency	18 GHz to 26 GHz	Polarization	Horizontal
Test Mode	Continuous Tx	Modulation	GFSK
Test Result	PASS	Test Channel	CH 39 (2 441 MHz)



Frequency (MHz)	Reading (PK/AV) (dBuV)	P (H, V)	Correct Factor (dB)	Limit (PK/AV) (dBuV)	Total (PK/AV) (dBuV)	Margin (PK/AV) (dB)
—	—	—	—	—	—	—
—	—	—	—	—	—	—

Note : 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

2. Other emissions don't exceed the level of 20 dB below the applicable Limit.

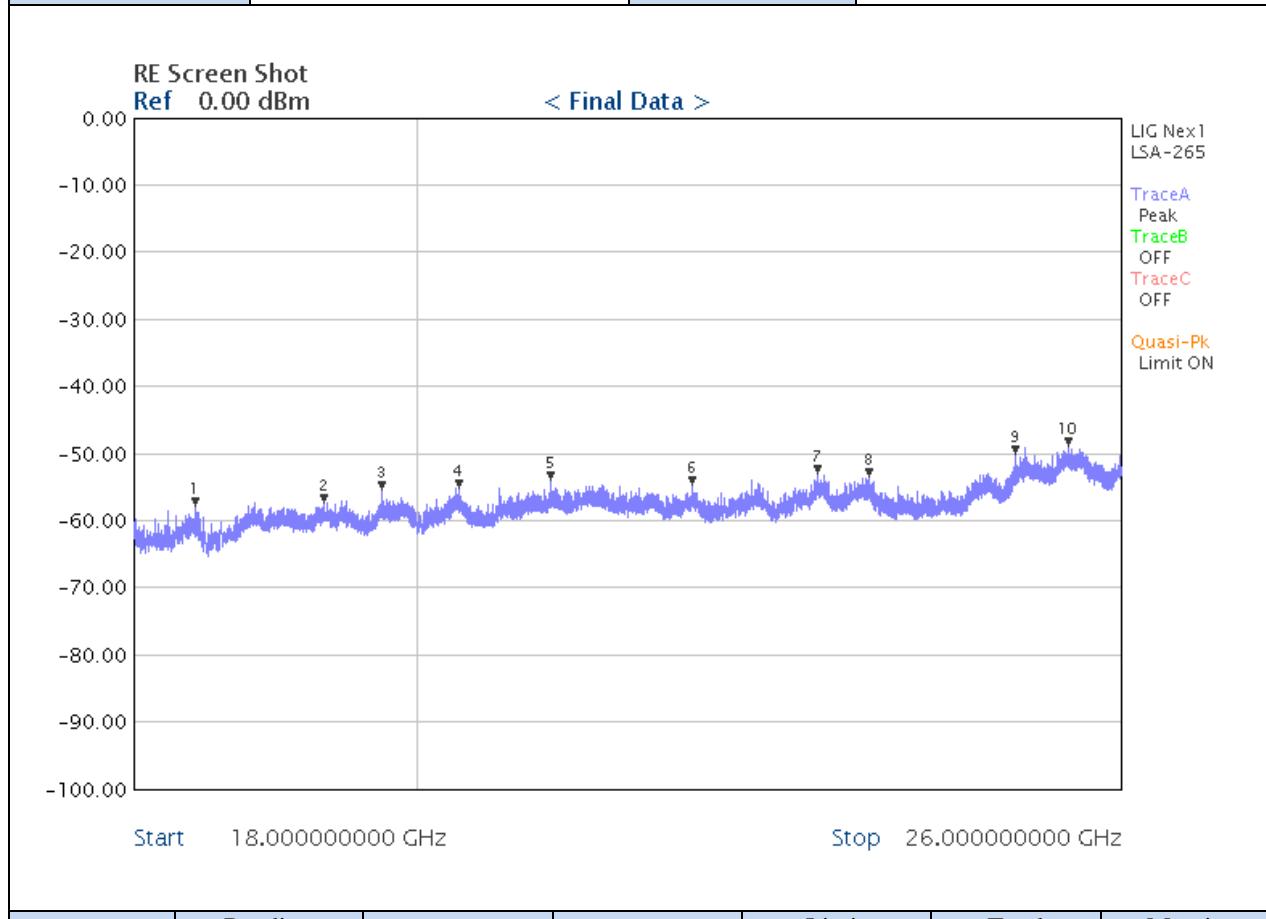
3. X axis plane was the worst test result than Y axis plane and Z axis plane.

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Test Frequency	18 GHz to 26 GHz	Polarization	Vertical
Test Mode	Continuous Tx	Modulation	GFSK
Test Result	PASS	Test Channel	CH 39 (2 441 MHz)



Frequency (MHz)	Reading (PK/AV) (dBuV)	P (H, V)	Correct Factor (dB)	Limit (PK/AV) (dBuV)	Total (PK/AV) (dBuV)	Margin (PK/AV) (dB)
—	—	—	—	—	—	—
—	—	—	—	—	—	—

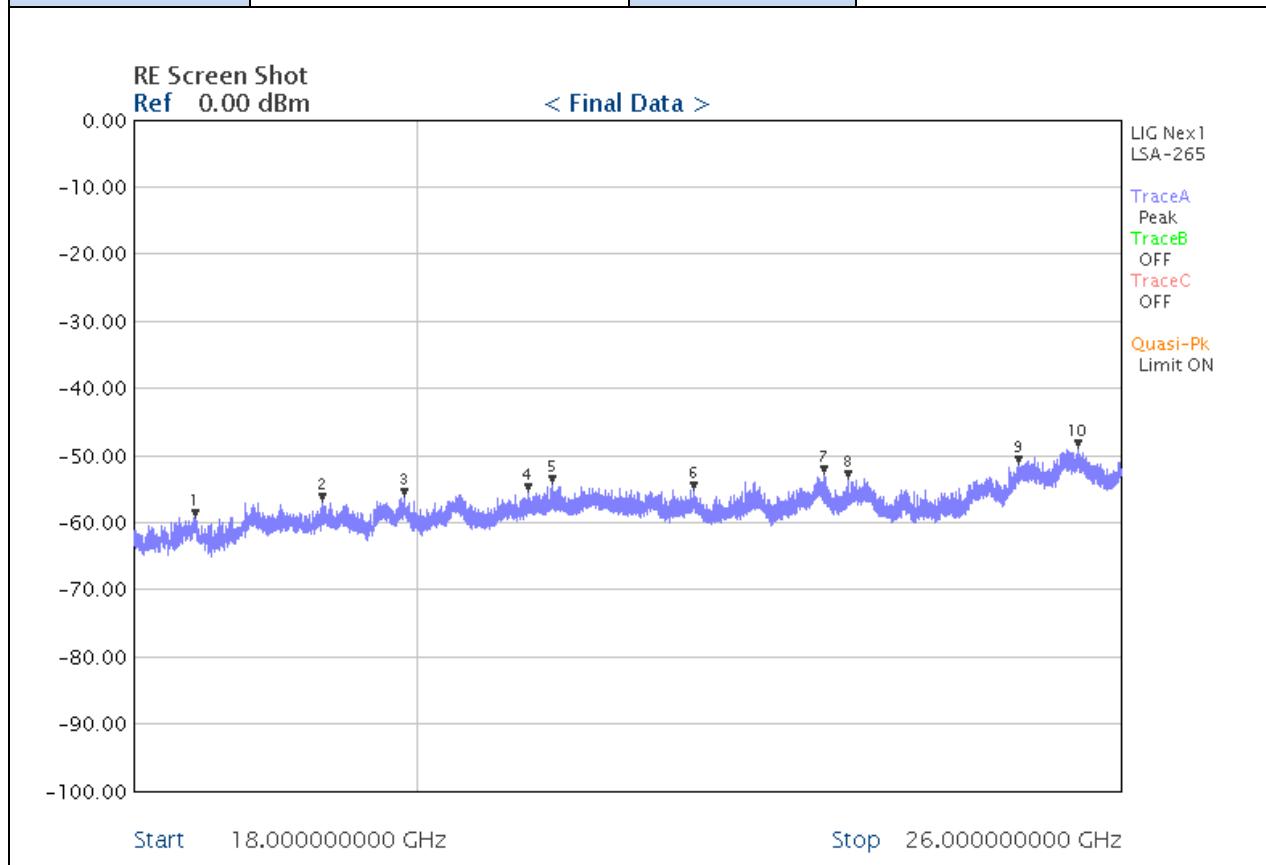
Note : 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

2. Other emissions don't exceed the level of 20 dB below the applicable Limit.

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

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Test Frequency	18 GHz to 26 GHz	Polarization	Horizontal
Test Mode	Continuous Tx	Modulation	GFSK
Test Result	PASS	Test Channel	CH 78 (2 480 MHz)



Frequency (MHz)	Reading (PK/AV) (dBuV)	P (H, V)	Correct Factor (dB)	Limit (PK/AV) (dBuV)	Total (PK/AV) (dBuV)	Margin (PK/AV) (dB)
—	—	—	—	—	—	—
—	—	—	—	—	—	—

*Note :* 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

2. Other emissions don't exceed the level of 20 dB below the applicable Limit.

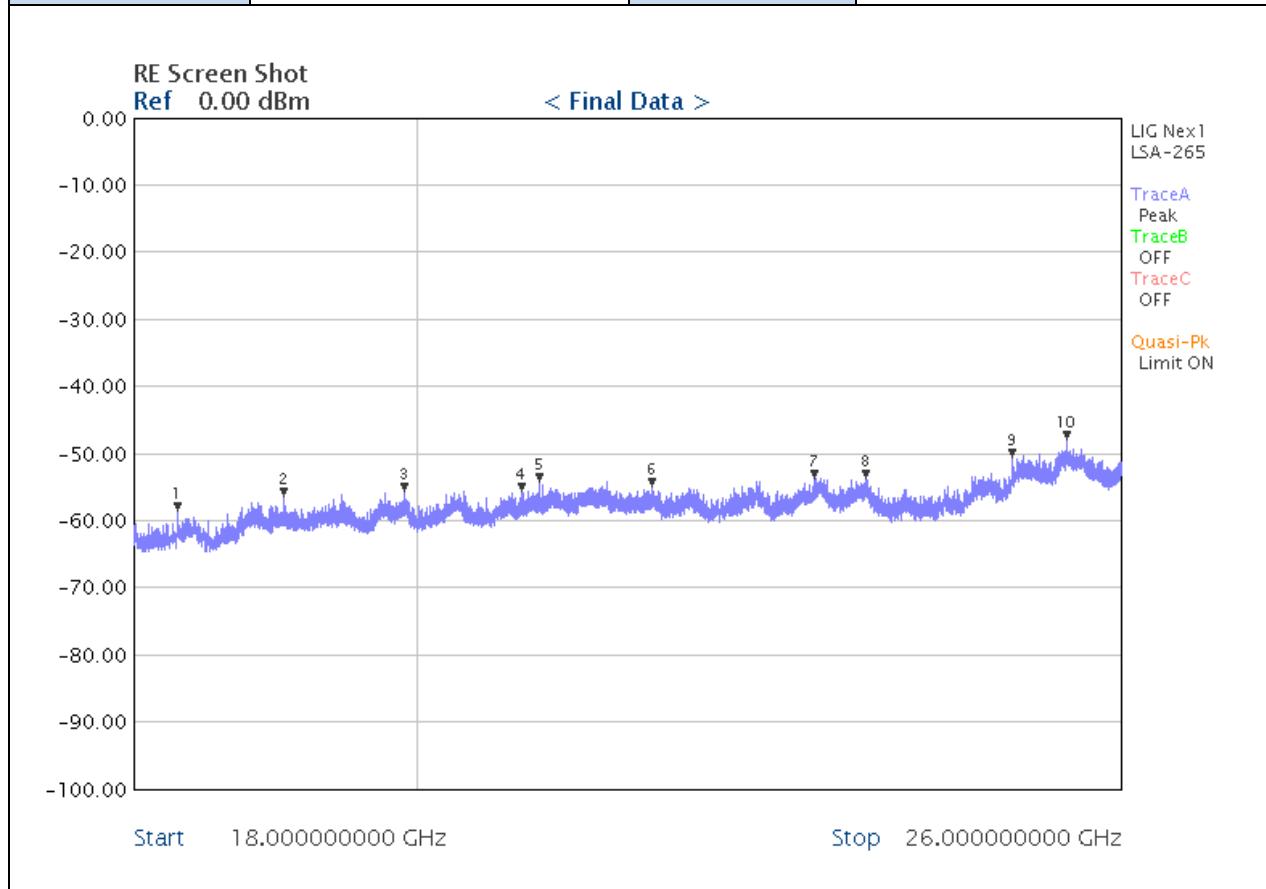
3. X axis plane was the worst test result than Y axis plane and Z axis plane.

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Test Frequency	18 GHz to 26 GHz	Polarization	Vertical
Test Mode	Continuous Tx	Modulation	GFSK
Test Result	PASS	Test Channel	CH 78 (2 480 MHz)



Frequency (MHz)	Reading (PK/AV) (dBuV)	P (H, V)	Correct Factor (dB)	Limit (PK/AV) (dBuV)	Total (PK/AV) (dBuV)	Margin (PK/AV) (dB)
—	—	—	—	—	—	—
—	—	—	—	—	—	—

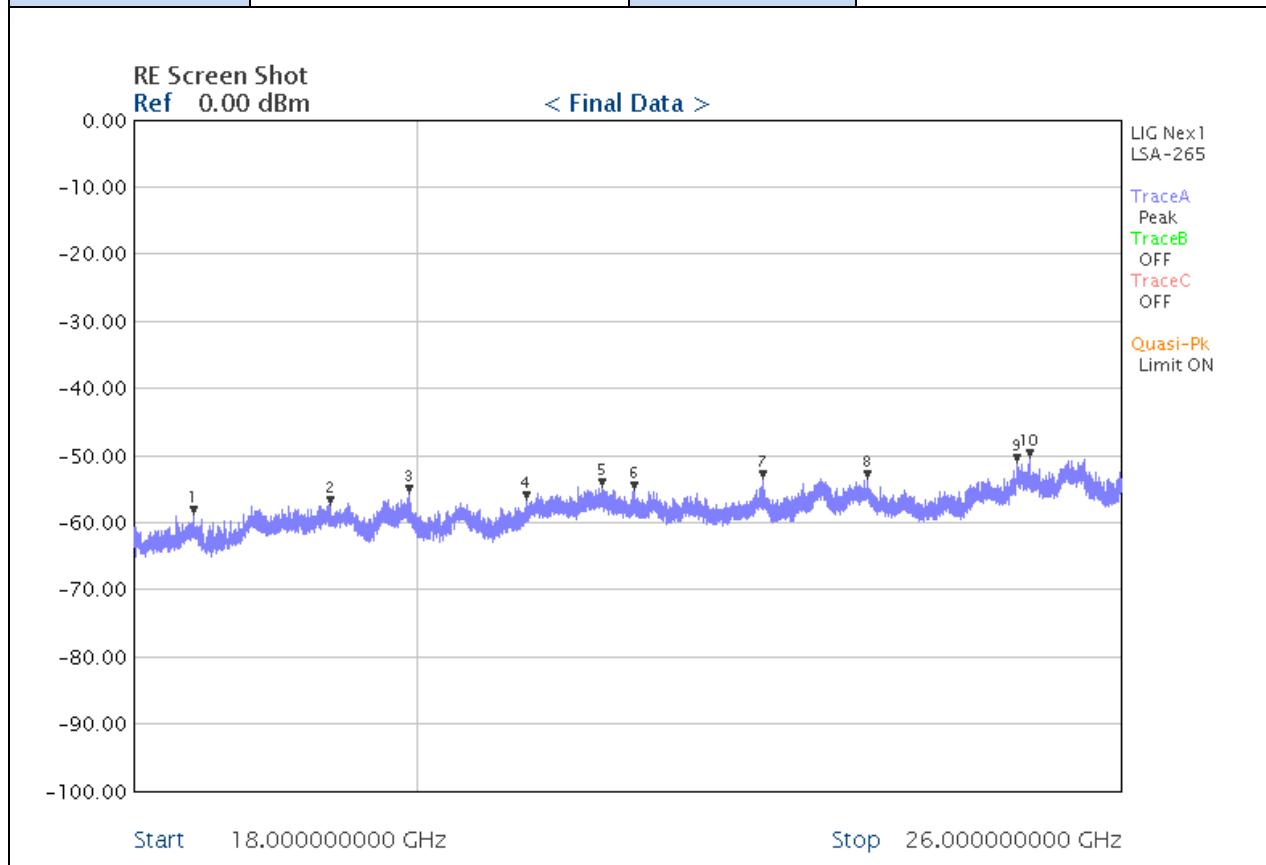
Note : 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

2. Other emissions don't exceed the level of 20 dB below the applicable Limit.

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

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Test Frequency	18 GHz to 26 GHz	Polarization	Horizontal
Test Mode	Continuous Tx	Modulation	8-DQPSK
Test Result	PASS	Test Channel	CH 00 (2 402 MHz)



Frequency (MHz)	Reading (PK/AV) (dBuV)	P (H, V)	Correct Factor (dB)	Limit (PK/AV) (dBuV)	Total (PK/AV) (dBuV)	Margin (PK/AV) (dB)
—	—	—	—	—	—	—
—	—	—	—	—	—	—

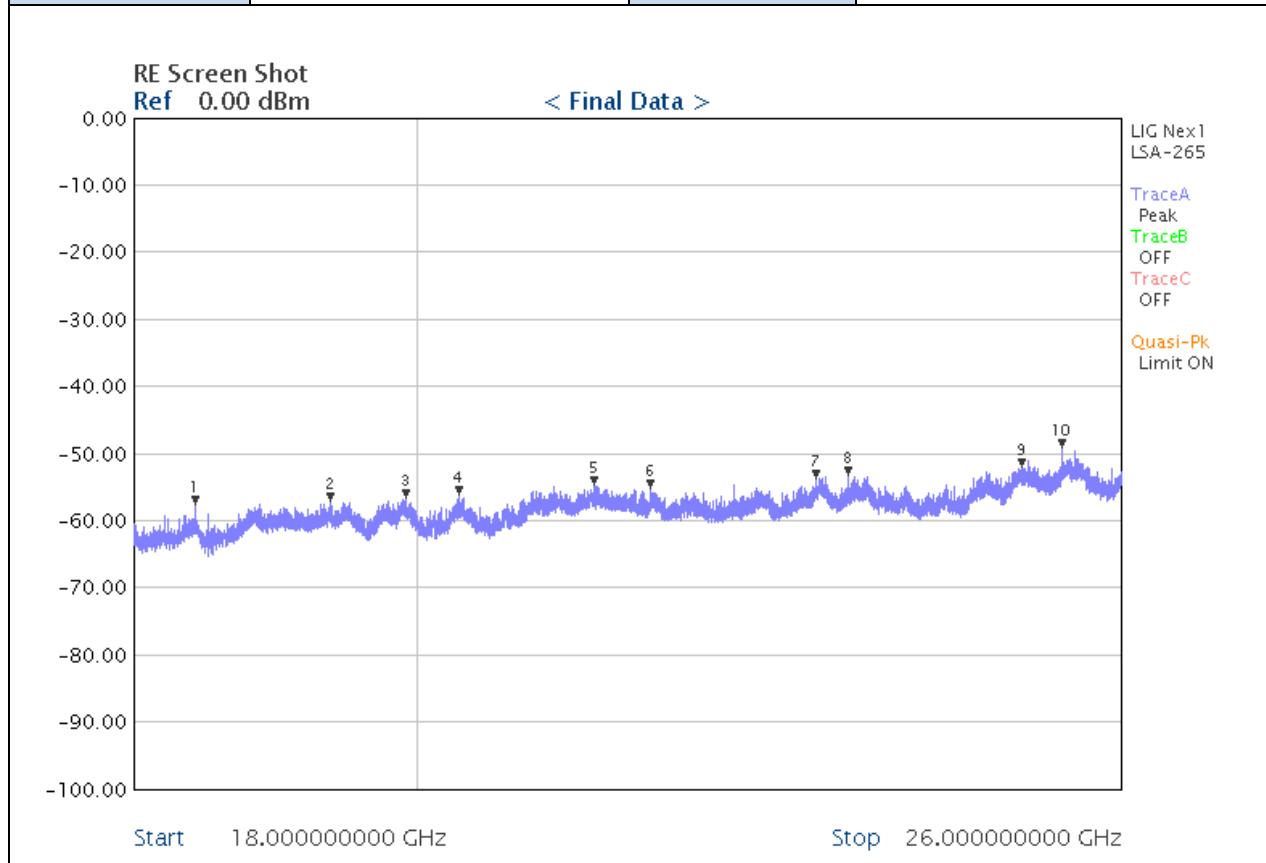
*Note :* 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

2. Other emissions don't exceed the level of 20 dB below the applicable Limit.

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

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Test Frequency	18 GHz to 26 GHz	Polarization	Vertical
Test Mode	Continuous Tx	Modulation	8-DQPSK
Test Result	PASS	Test Channel	CH 00 (2 402 MHz)



Frequency (MHz)	Reading (PK/AV) (dBuV)	P (H, V)	Correct Factor (dB)	Limit (PK/AV) (dBuV)	Total (PK/AV) (dBuV)	Margin (PK/AV) (dB)
—	—	—	—	—	—	—
—	—	—	—	—	—	—

*Note :* 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

2. Other emissions don't exceed the level of 20 dB below the applicable Limit.

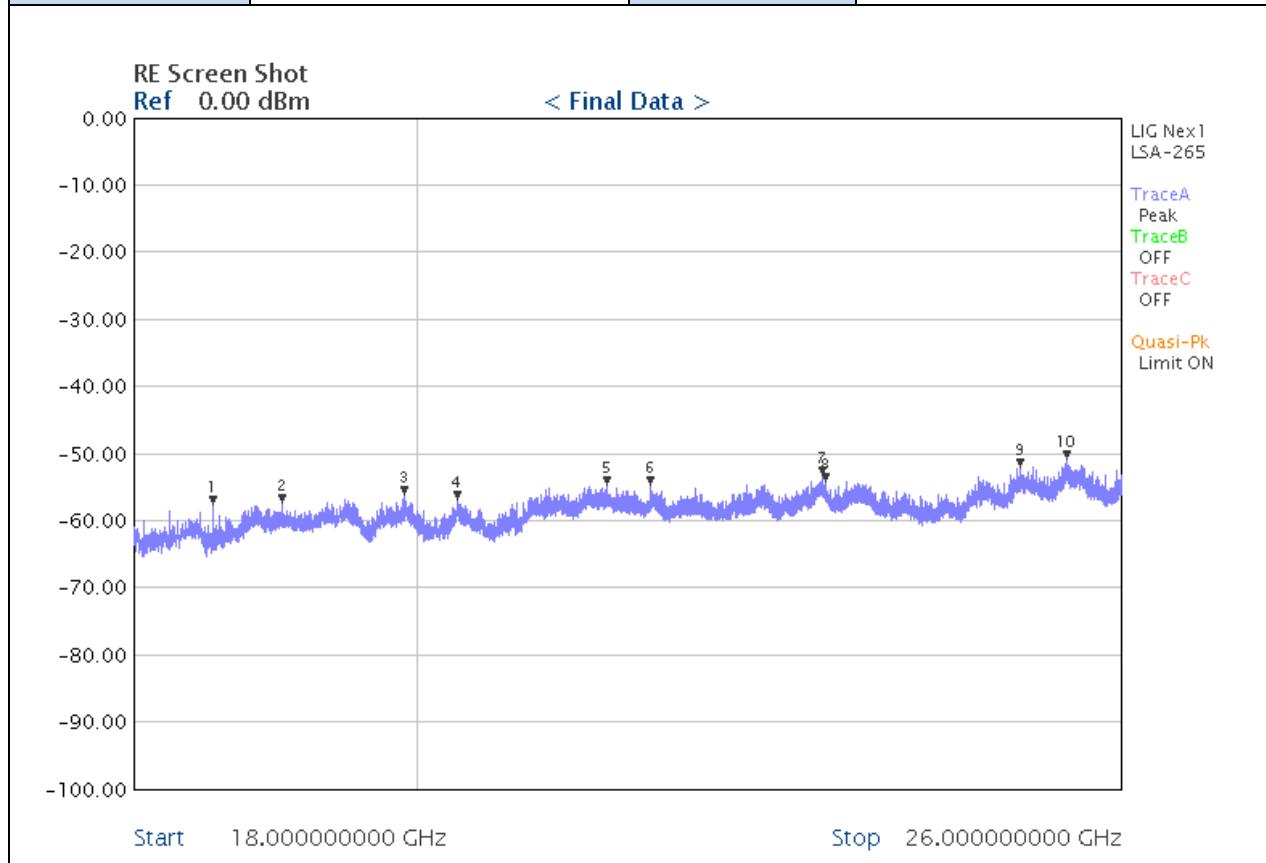
3. X axis plane was the worst test result than Y axis plane and Z axis plane.

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Test Frequency	18 GHz to 26 GHz	Polarization	Horizontal
Test Mode	Continuous Tx	Modulation	8-DQPSK
Test Result	PASS	Test Channel	CH 39 (2 441 MHz)



Frequency (MHz)	Reading (PK/AV) (dBuV)	P (H, V)	Correct Factor (dB)	Limit (PK/AV) (dBuV)	Total (PK/AV) (dBuV)	Margin (PK/AV) (dB)
—	—	—	—	—	—	—
—	—	—	—	—	—	—

Note : 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

2. Other emissions don't exceed the level of 20 dB below the applicable Limit.

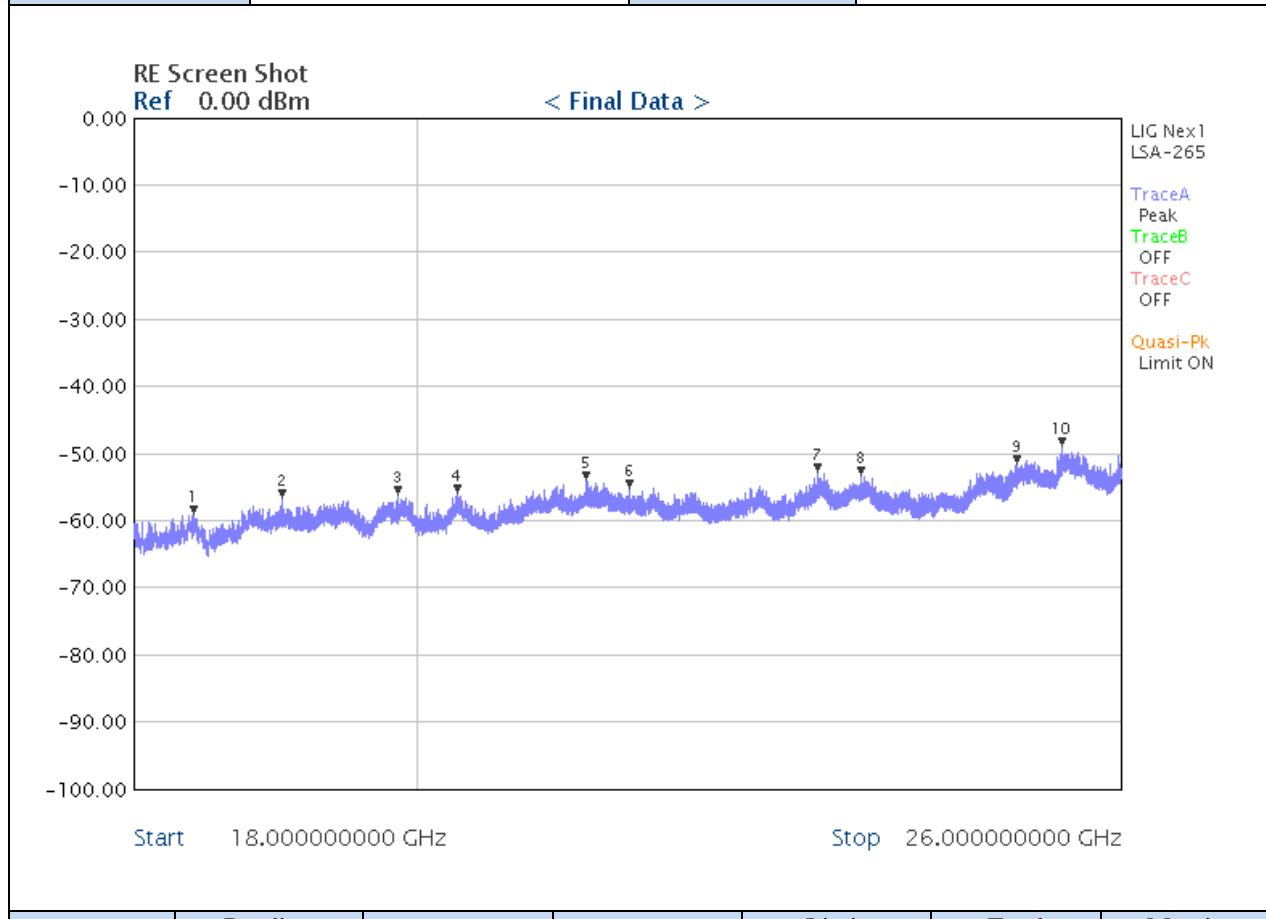
3. X axis plane was the worst test result than Y axis plane and Z axis plane.

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Test Frequency	18 GHz to 26 GHz	Polarization	Vertical
Test Mode	Continuous Tx	Modulation	8-DQPSK
Test Result	PASS	Test Channel	CH 39 (2 441 MHz)



Frequency (MHz)	Reading (PK/AV) (dBuV)	P (H, V)	Correct Factor (dB)	Limit (PK/AV) (dBuV)	Total (PK/AV) (dBuV)	Margin (PK/AV) (dB)
—	—	—	—	—	—	—
—	—	—	—	—	—	—

Note : 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

2. Other emissions don't exceed the level of 20 dB below the applicable Limit.

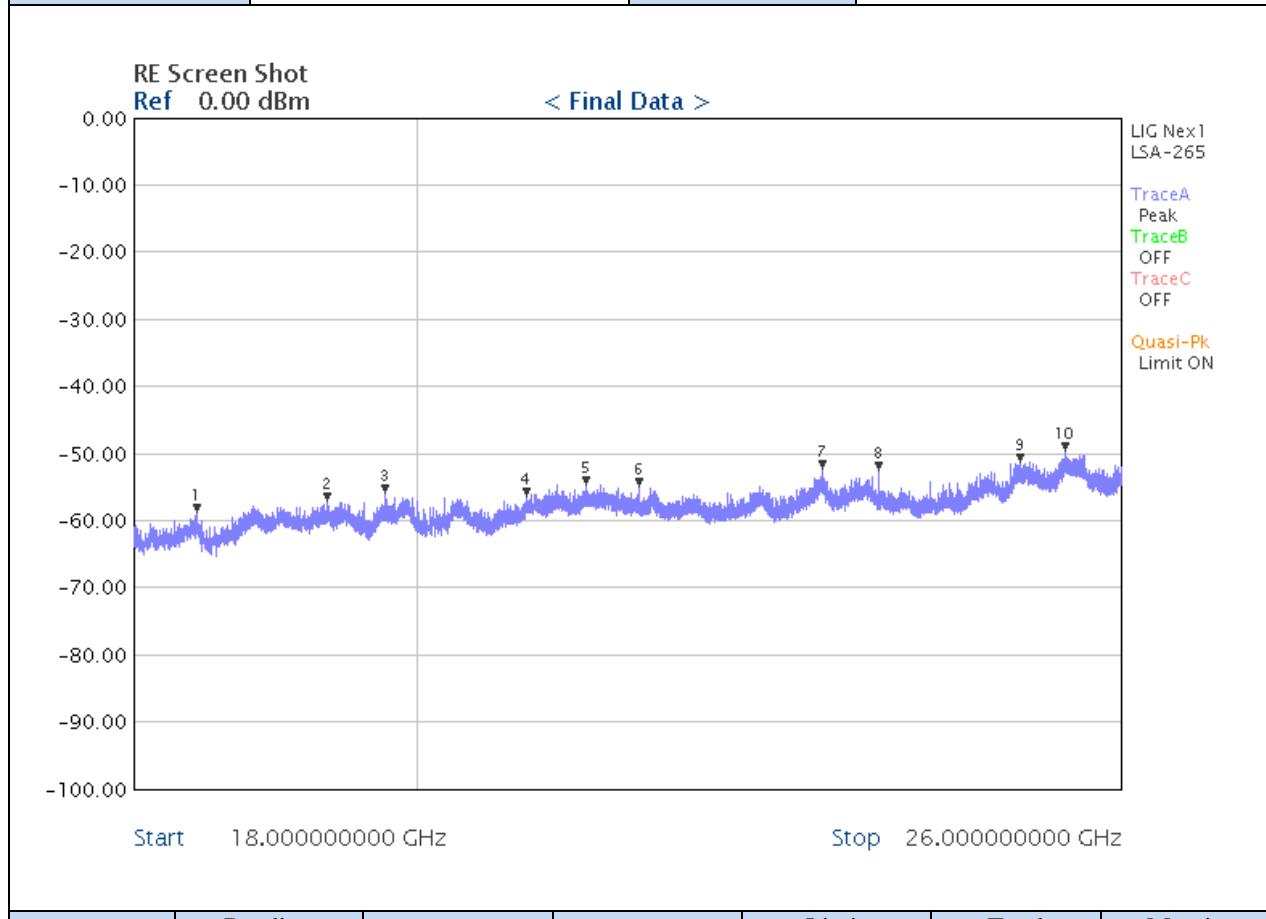
3. X axis plane was the worst test result than Y axis plane and Z axis plane.

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Test Frequency	18 GHz to 26 GHz	Polarization	Horizontal
Test Mode	Continuous Tx	Modulation	8-DQPSK
Test Result	PASS	Test Channel	CH 78 (2 480 MHz)



Frequency (MHz)	Reading (PK/AV) (dBuV)	P (H, V)	Correct Factor (dB)	Limit (PK/AV) (dBuV)	Total (PK/AV) (dBuV)	Margin (PK/AV) (dB)
—	—	—	—	—	—	—
—	—	—	—	—	—	—

Note : 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

2. Other emissions don't exceed the level of 20 dB below the applicable Limit.

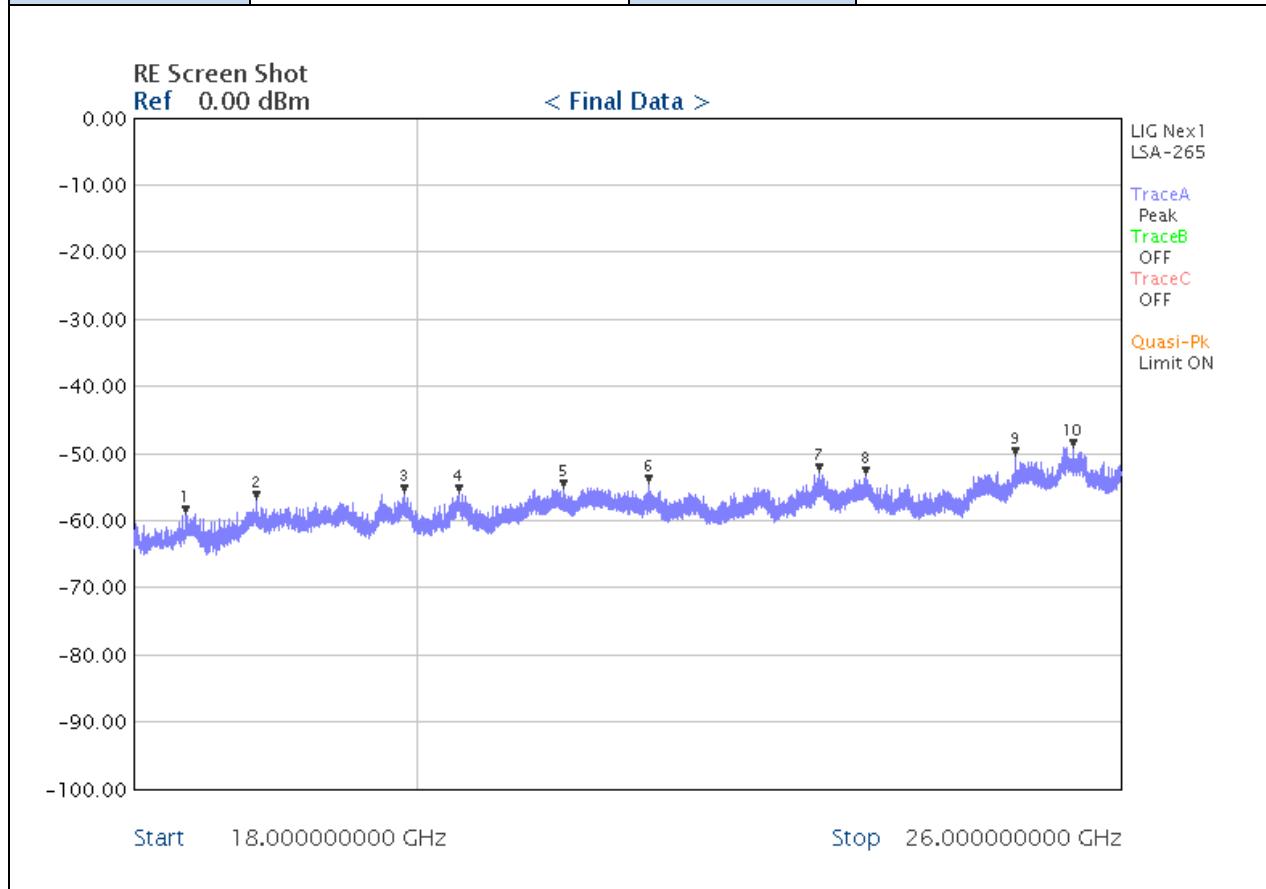
3. X axis plane was the worst test result than Y axis plane and Z axis plane.

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Test Frequency	18 GHz to 26 GHz	Polarization	Vertical
Test Mode	Continuous Tx	Modulation	8-DQPSK
Test Result	PASS	Test Channel	CH 78 (2 480 MHz)



Frequency (MHz)	Reading (PK/AV) (dBuV)	P (H, V)	Correct Factor (dB)	Limit (PK/AV) (dBuV)	Total (PK/AV) (dBuV)	Margin (PK/AV) (dB)
—	—	—	—	—	—	—
—	—	—	—	—	—	—

Note : 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)

2. Other emissions don't exceed the level of 20 dB below the applicable Limit.

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

### 3.3 Number of Hopping Frequency Used

#### 3.3.1 Test Instruments

Description	Manufacturer	Model No.	Serial No.	Next of Calibration
Spectrum Analyzer	Advantest	R3273	121100554	Jun. 15, 2012
RF Test Room	-	-	-	-

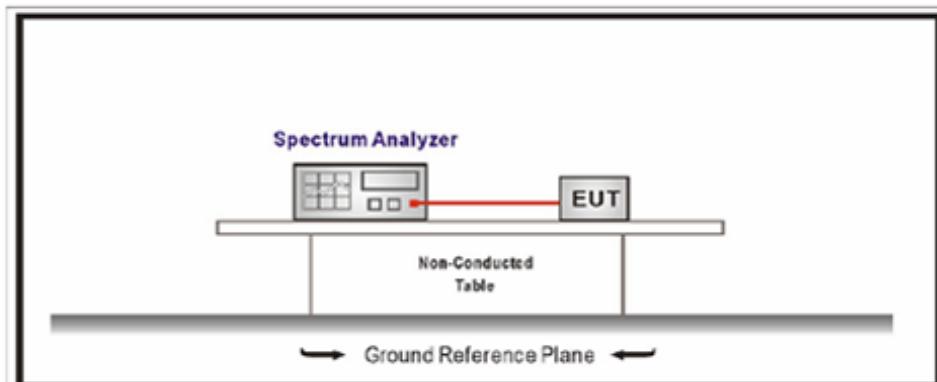
Note : *1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to RRL, KRISS, KTL and HCT.*  
*2. The calibration interval of horn ant. and loop ant. is 24 months*

#### 3.3.2 Limit

At least 15 channels frequencies, and should be equally spaced.

#### 3.3.3 Test Configuration

RF Conducted Measurement:

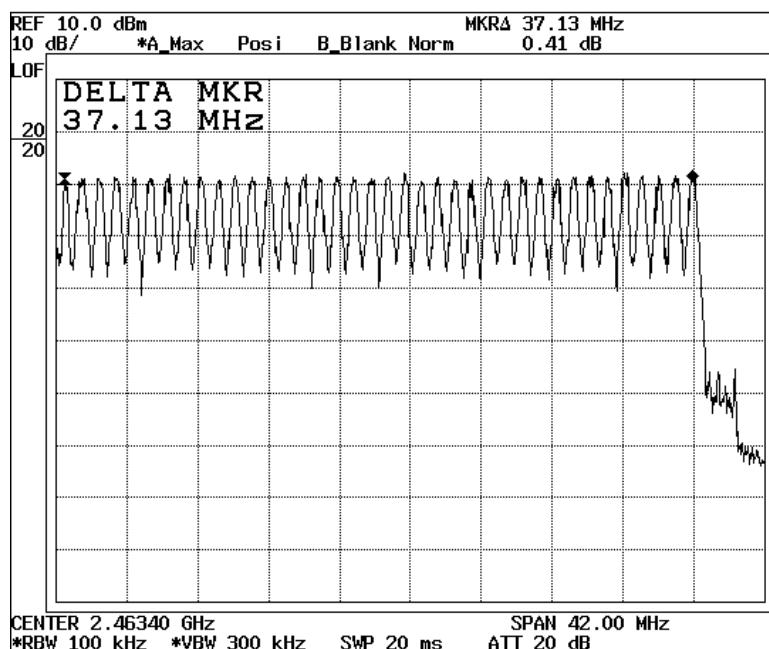
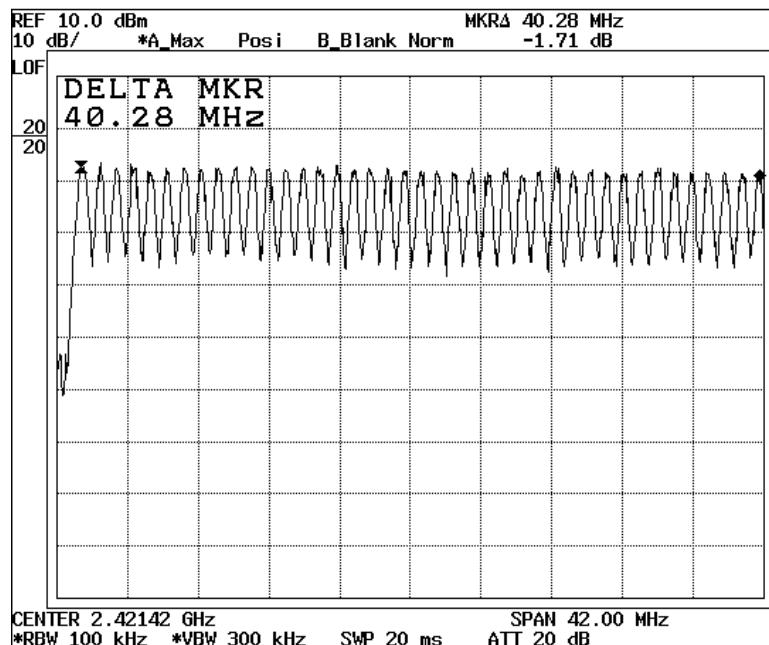


#### 3.3.4 Test Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from a external generator.
2. Turn ofthe EUT and connect its antenna terminal to measurement via a low loss calbe. Then set it to any one measured frequency within its oprerating range and make sur the instrument is operating range and make sure the instrument is operated in its linear range.
3. Set the SA on MaxHold Mode, and the keep the EUT is hoping mdoe. Record all the signals from each channel until each one has been recorded.
4. Set th SA on View Mode and the plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

## 3.3.5 Number of Hopping Frequency Test Result

Test Mode	GFSK	Test Site	RF Test Room
Test Result	PASS		

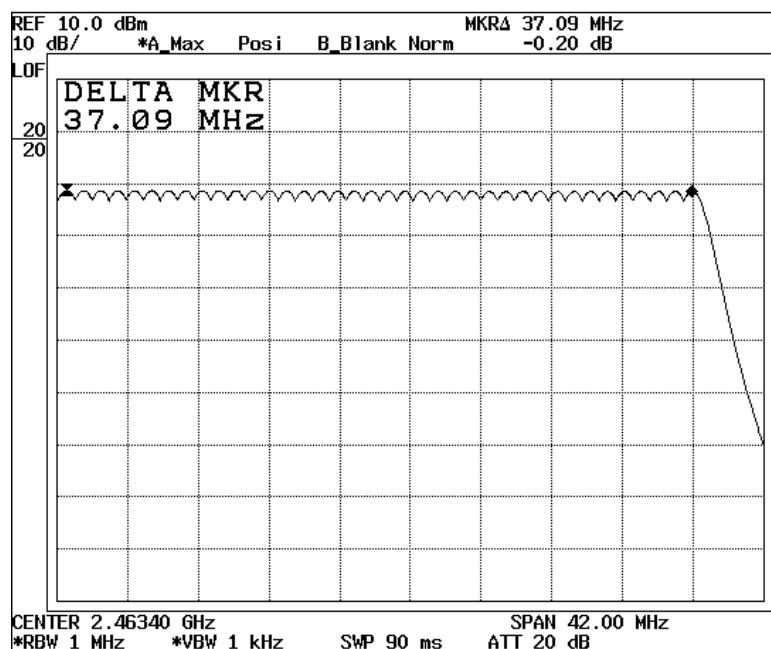
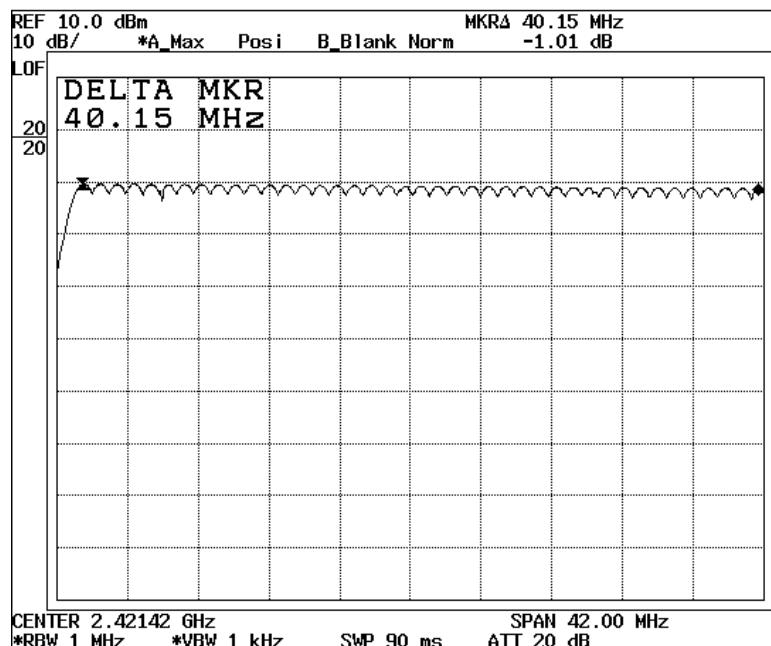


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Test Mode	8-DQPSK	Test Site	RF Test Room
Test Result	PASS		

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Tel: +82 31 493 2001 Fax: +82 31 493 2055 www.cstlab.co.kr

## 3.4 Dwell Time On Each Channel

### 3.4.1 Test Instruments

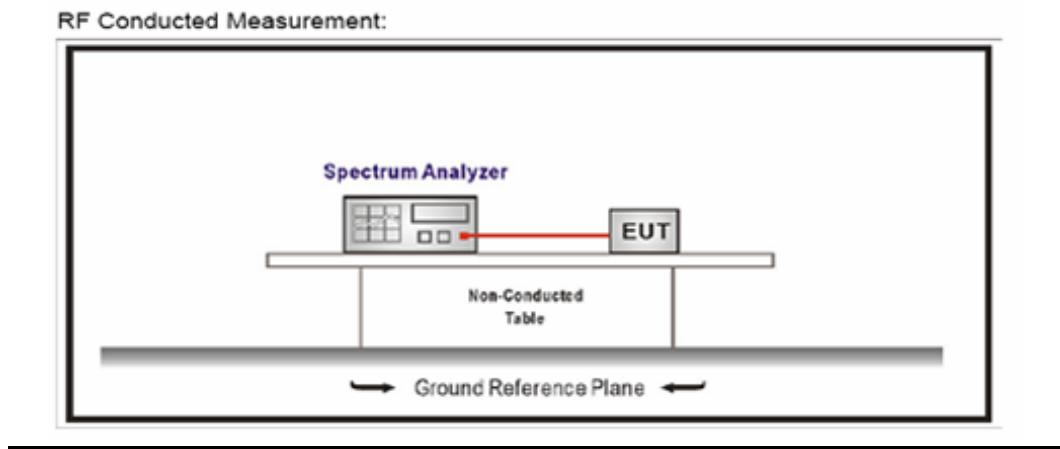
Description	Manufacturer	Model No.	Serial No.	Next of Calibration
Spectrum Analyzer	Advantest	R3273	121100554	Jun. 15, 2012
RF Test Room	-	-	-	-

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*

### 3.4.2 Limit

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

### 3.4.3 Test Configuration



### 3.4.4 Test Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal
2. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operating in its linear range.
3. Adjust the center frequency of SA on any frequency to be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Measure the time duration of one transmission in the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all different time-slot modes have been completed.

**3.4.5 Dwell Time Test Result**

Test Mode	GFSK	Test Site	RF Test Room
Test Result	PASS		

Mode	Number of transmission in a 31.6 (79 Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	51 (times / 5 sec)*6.32 = 322.32times	0.535	172.44	400
DH3	26 (times / 5 sec)*6.32 = 164.32times	1.790	294.13	400
DH5	17 (times / 5 sec)*6.32 = 107.44times	3.105	333.60	400

Test Mode	8-DQPSK	Test Site	RF Test Room
Test Result	PASS		

Mode	Number of transmission in a 31.6 (79 Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	51 (times / 5 sec)*6.32 = 322.32times	0.560	180.50	400
DH3	26 (times / 5 sec)*6.32 = 164.32times	1.800	295.78	400
DH5	17 (times / 5 sec)*6.32 = 107.44times	3.045	327.15	400

Note) 1. Test plots of the transmitting time slot are shown on next 6 pages.

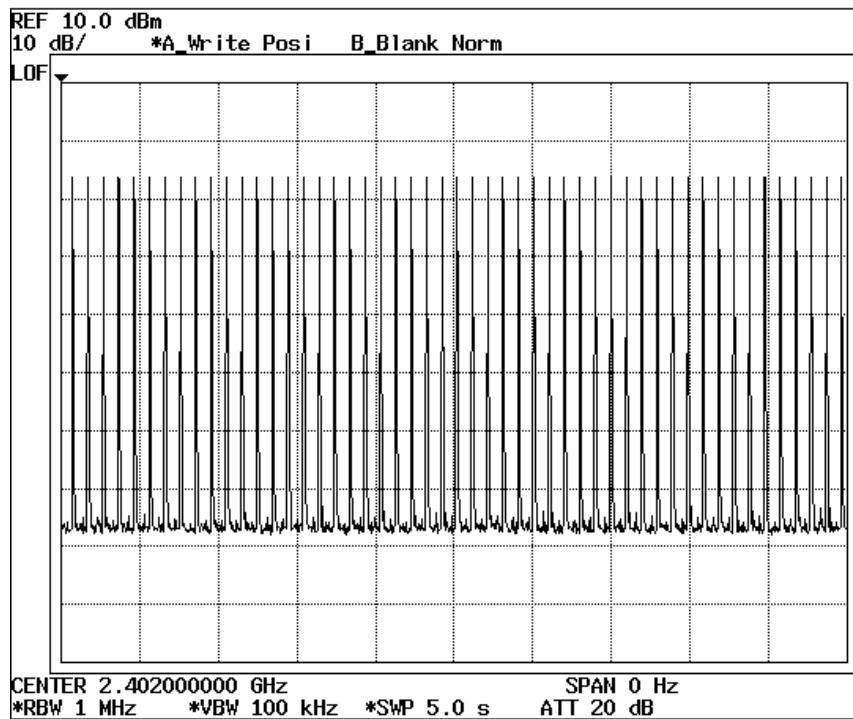
2. Dwell Time = 79(Channel) x 0.4(s) x average hopping channel x package transfer time

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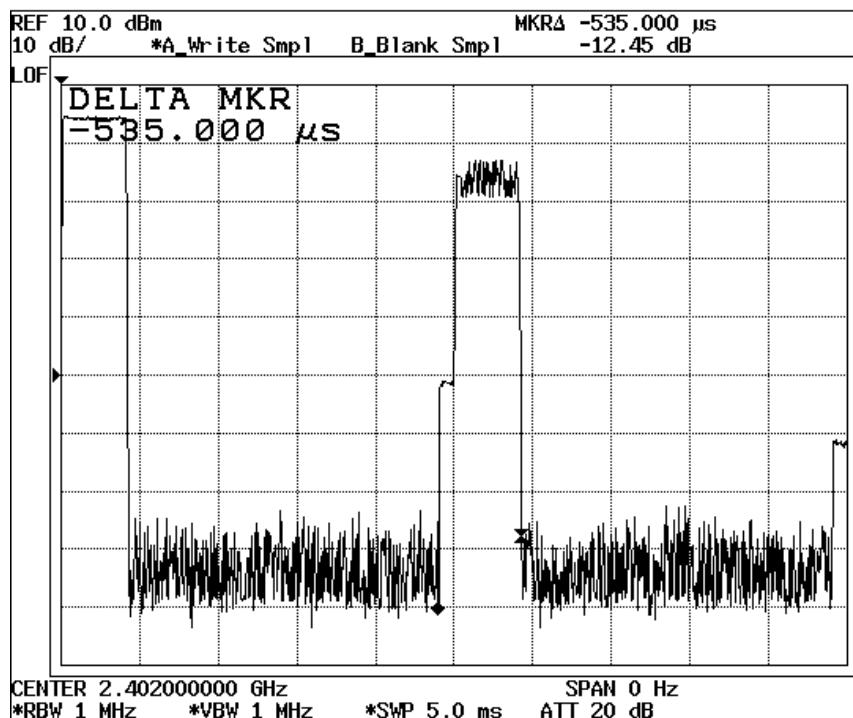
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## GFSK-DH1



## GFSK-Dwell Time

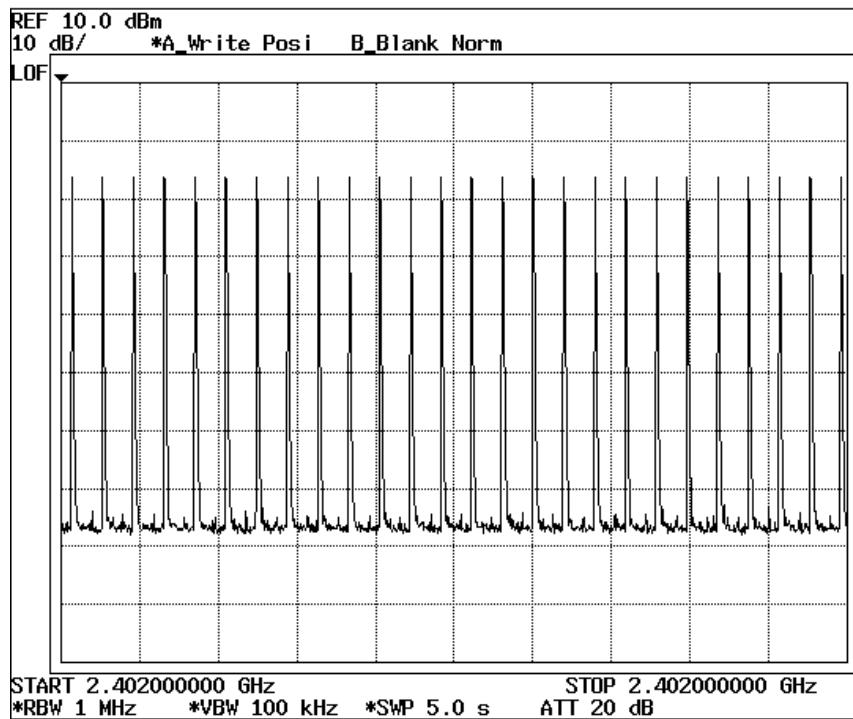


# Certification Service Technology Inc.

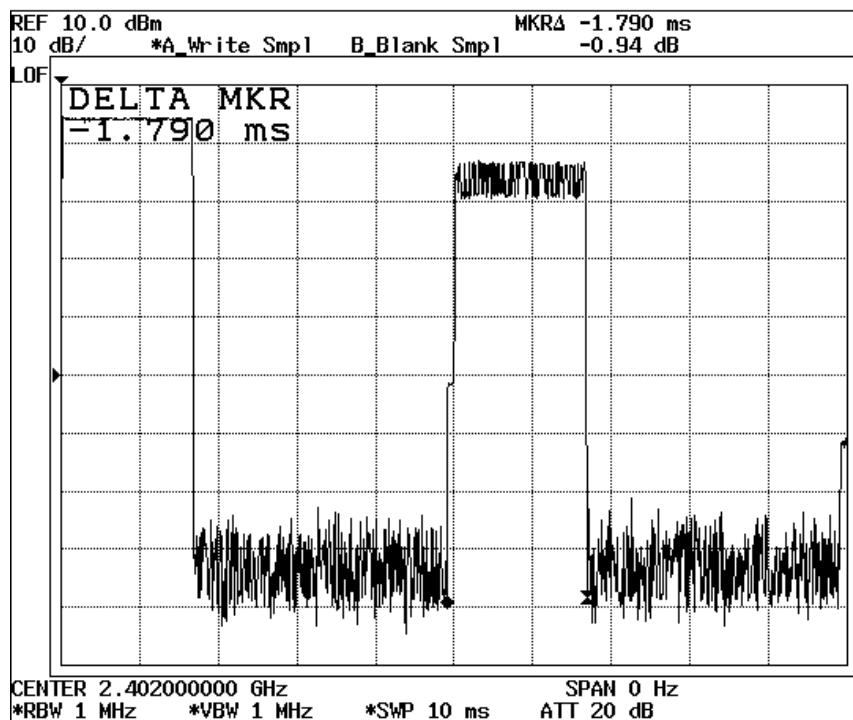
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## GFSK-DH3



## GFSK-Dwell Time

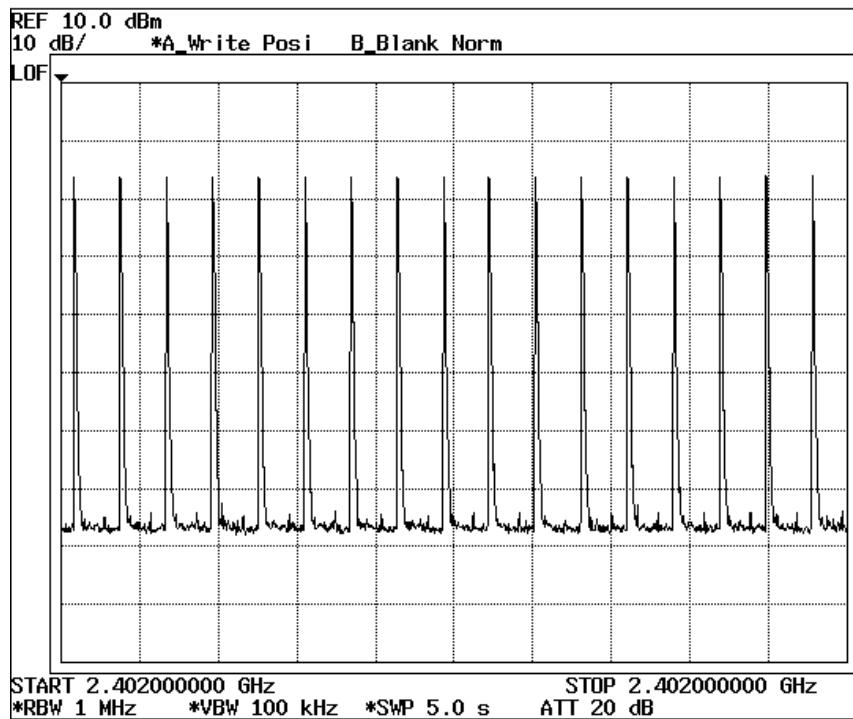


# Certification Service Technology Inc.

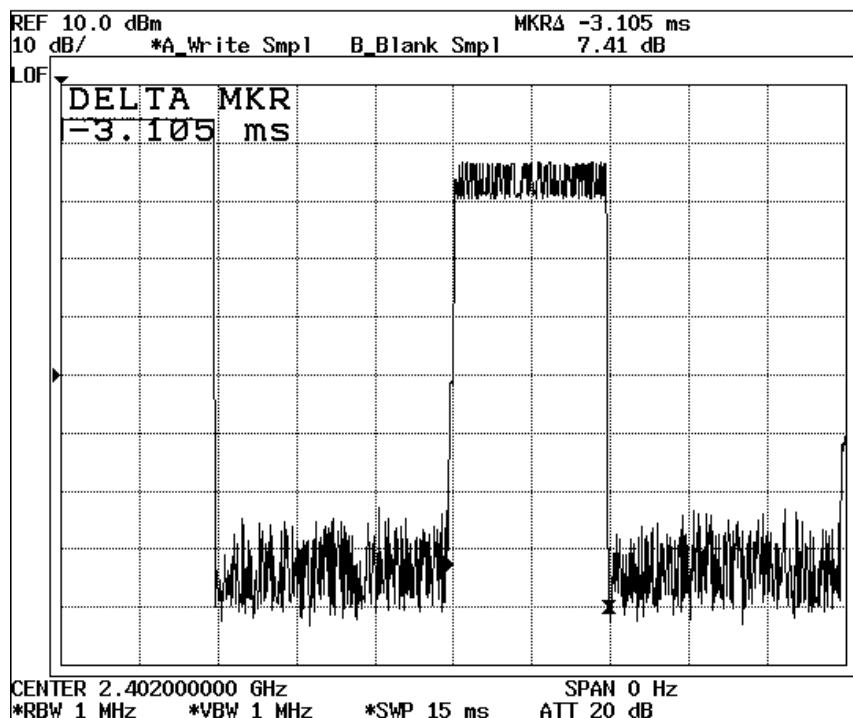
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## GFSK-DH5



## GFSK-Dwell Time

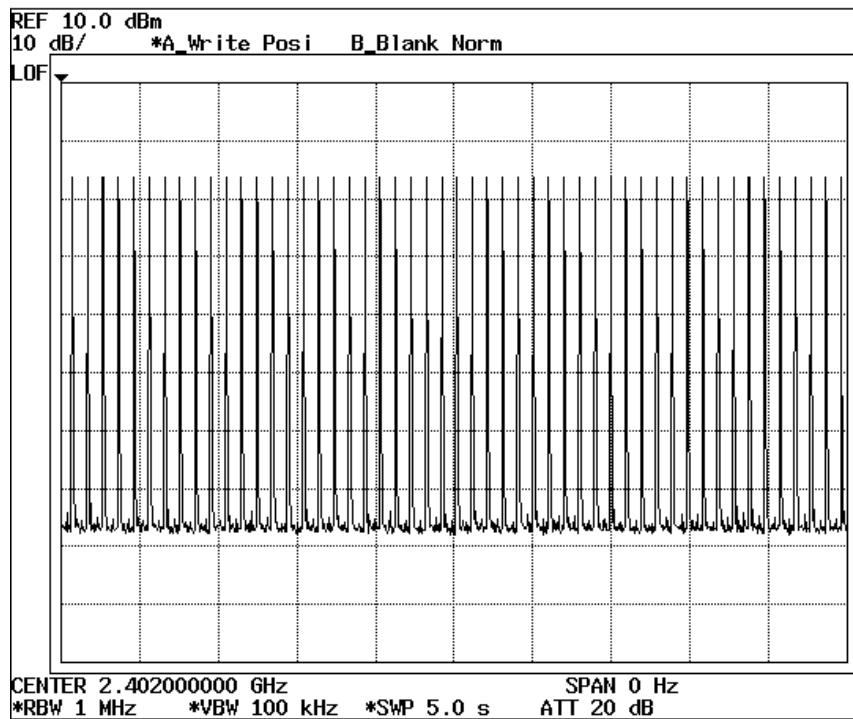


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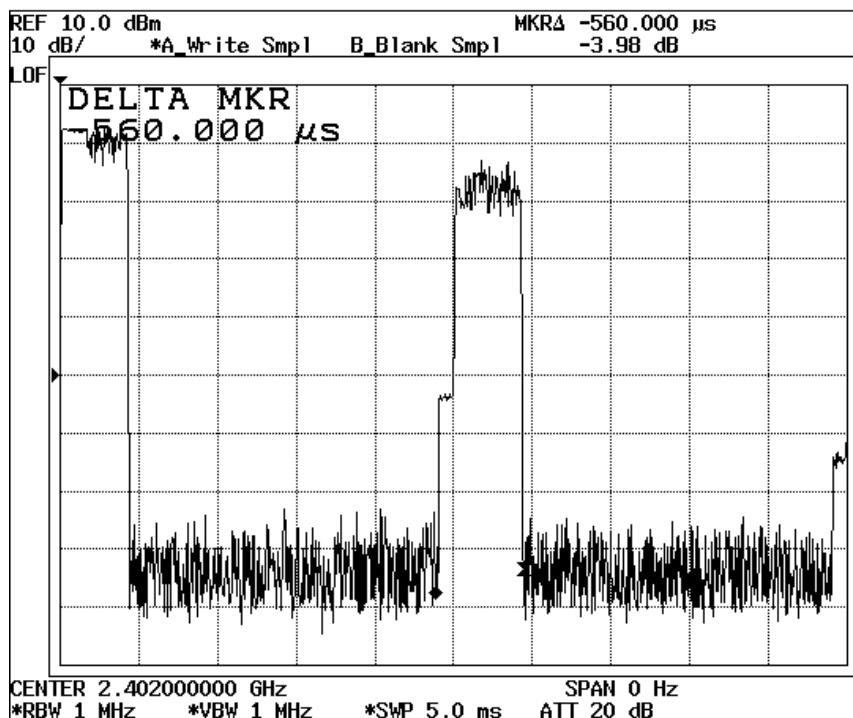
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**8-DQPSK-DH1**



**8-DQPSK Dwell Time**

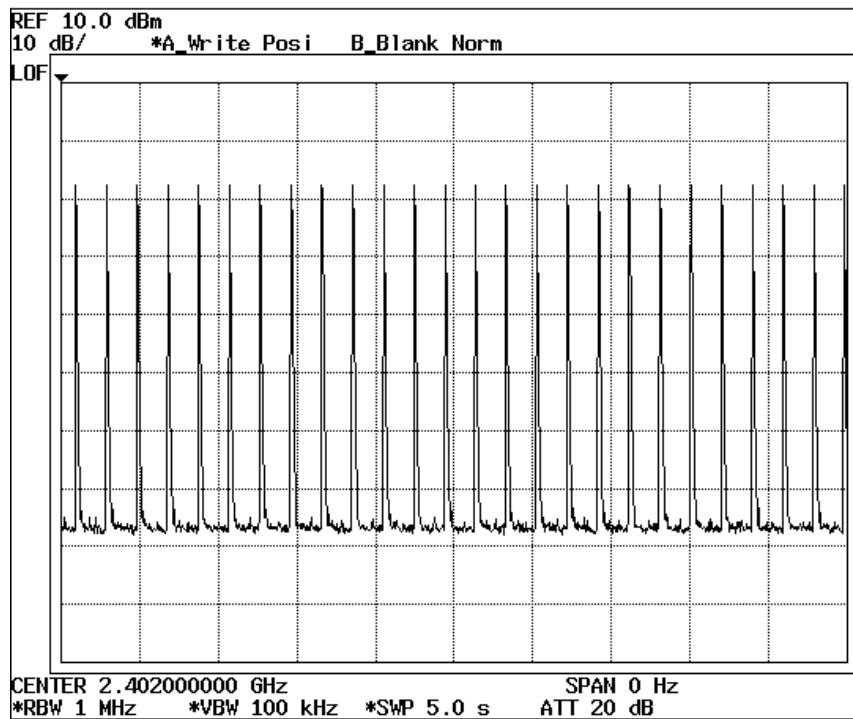


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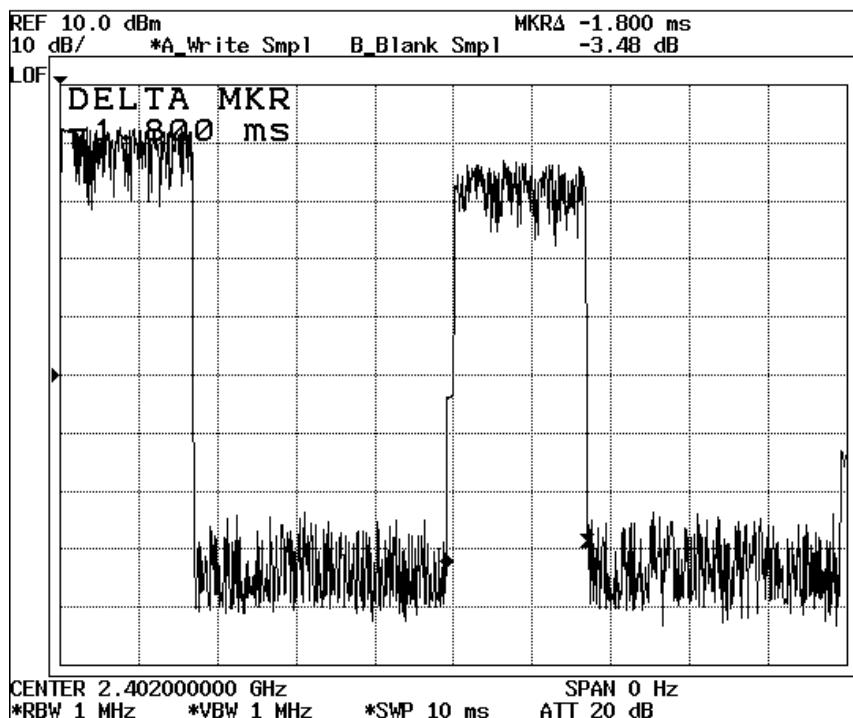
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**8-DQPSK-DH3**



**8-DQPSK-Dwell Time**

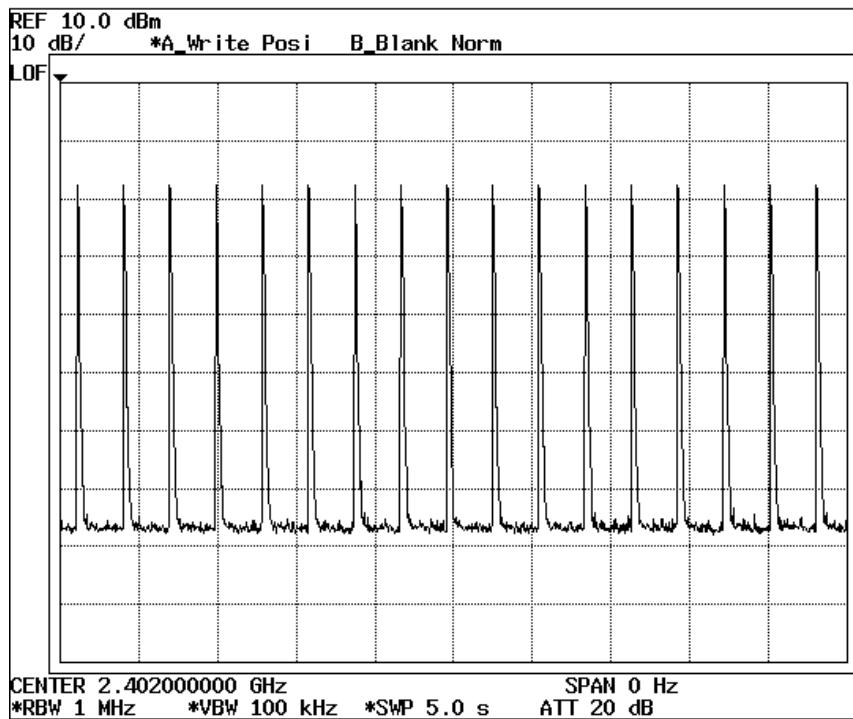


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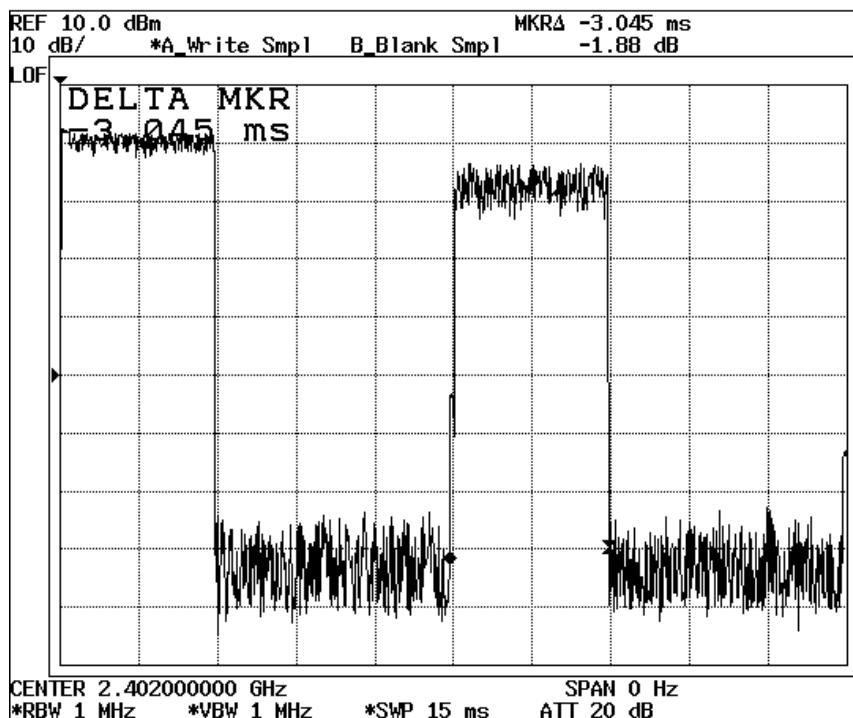
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## 8-DQPSK-DH5



## 8-DQPSK-Dwell Time



## 3.5 Channel Bandwidth

### 3.5.1 Test Instruments

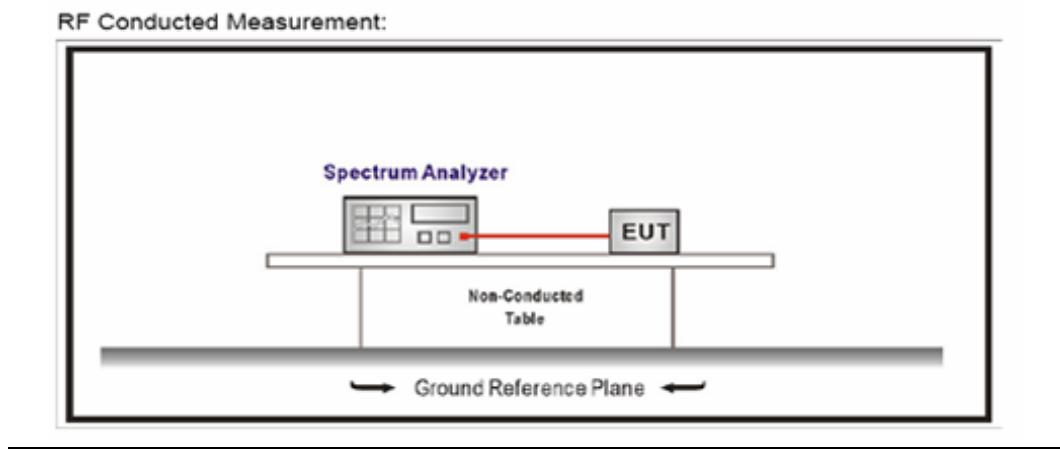
Description	Manufacturer	Model No.	Serial No.	Next of Calibration
Spectrum Analyzer	Advantest	R3273	121100554	Jun. 15, 2012
RF Test Room	-	-	-	-

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

For frequency hopping system operating in the 2400-2483.5 MHz, if the 20 dB bandwidth of hopping channel is greater than 25 kHz, two-thirds 20 dB bandwidth of hopping channel shall be a minimum limit for the hopping channel separation.

### 3.5.3 Test Configuration



### 3.5.4 Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

**3.5.5 Channel Bandwidth Test Result**

Test Mode	GFSK	Test Site	RF Test Room
Test Result	PASS		

Channels	CHANNEL FREQUENCY (MHz)	20 dB bandwidth (MHz)
00	2 402	0.935
39	2 441	0.938
78	2 480	0.935

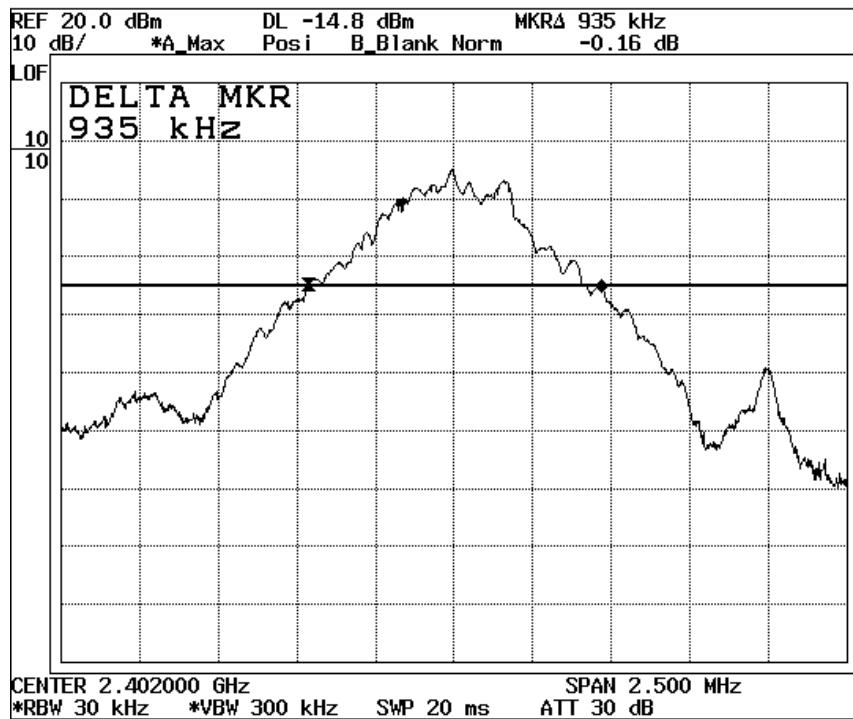
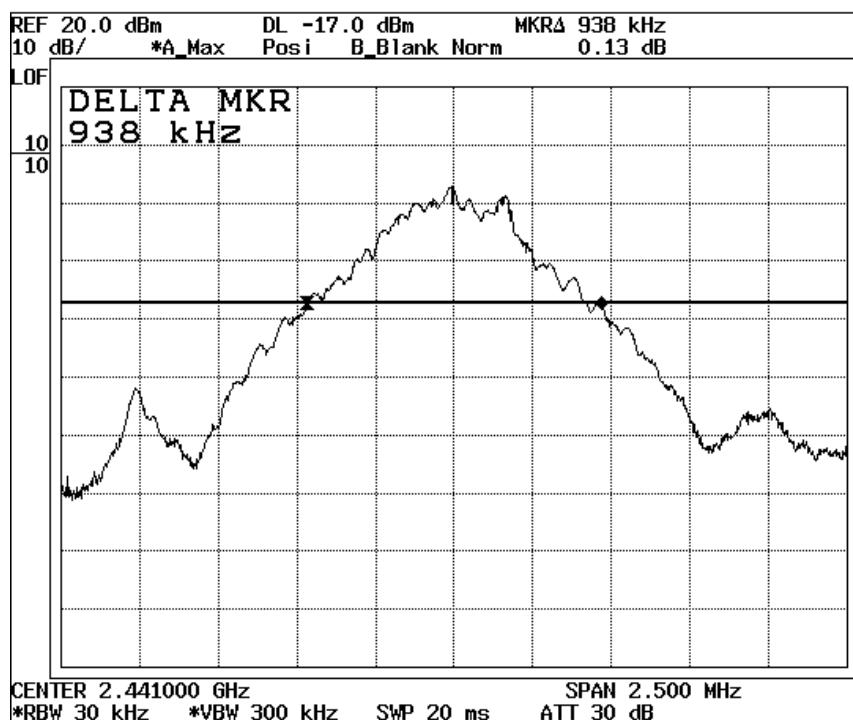
Test Mode	8-DQPSK	Test Site	RF Test Room
Test Result	PASS		

Channels	CHANNEL FREQUENCY (MHz)	20 dB bandwidth (MHz)
00	2 402	1.283
39	2 441	1.285
78	2 480	1.290

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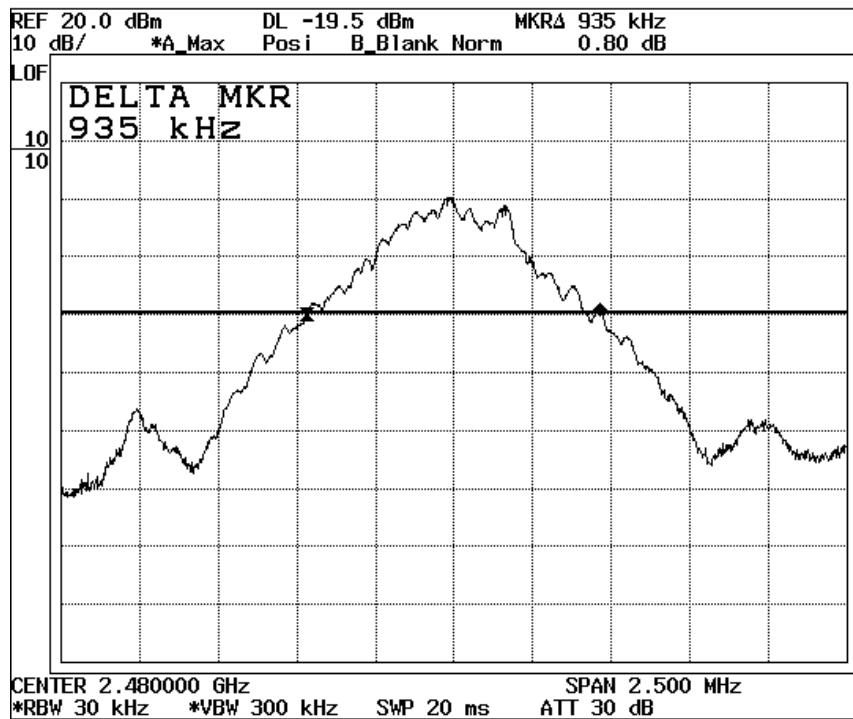
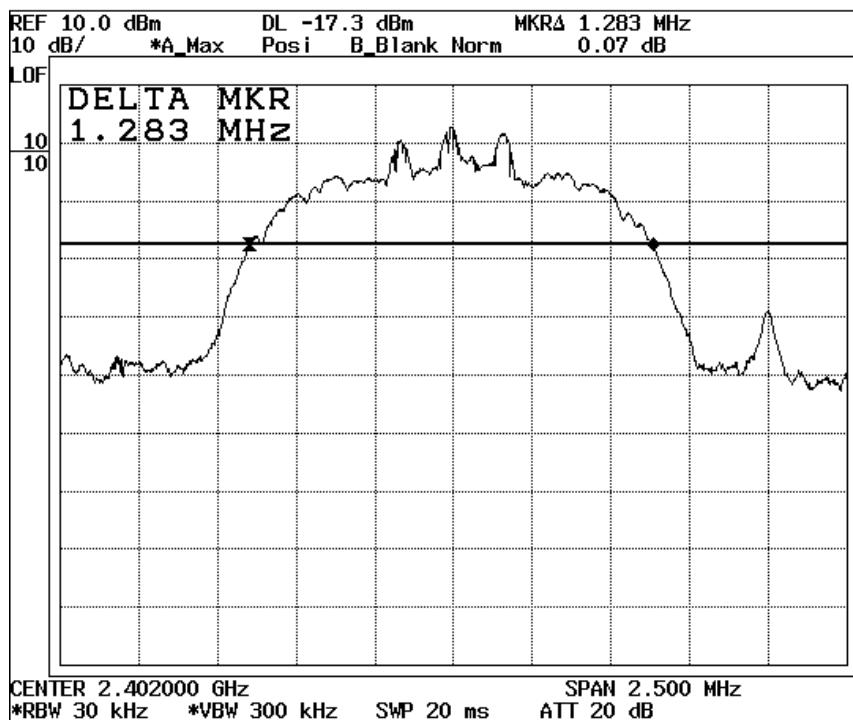
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**GFSK-CH 00 (2 402 MHz)****GFSK-CH 39 (2 441 MHz)**

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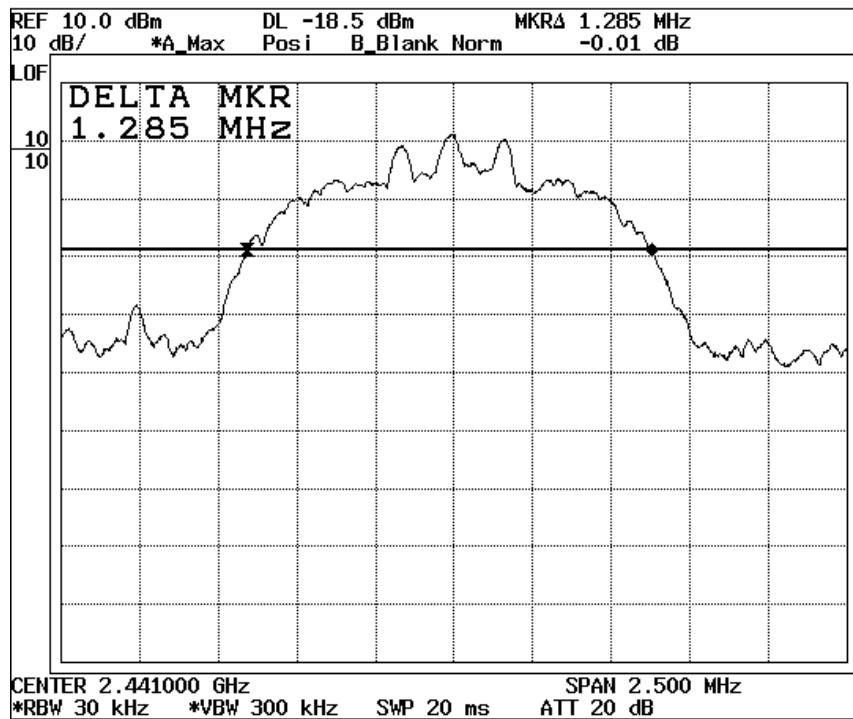
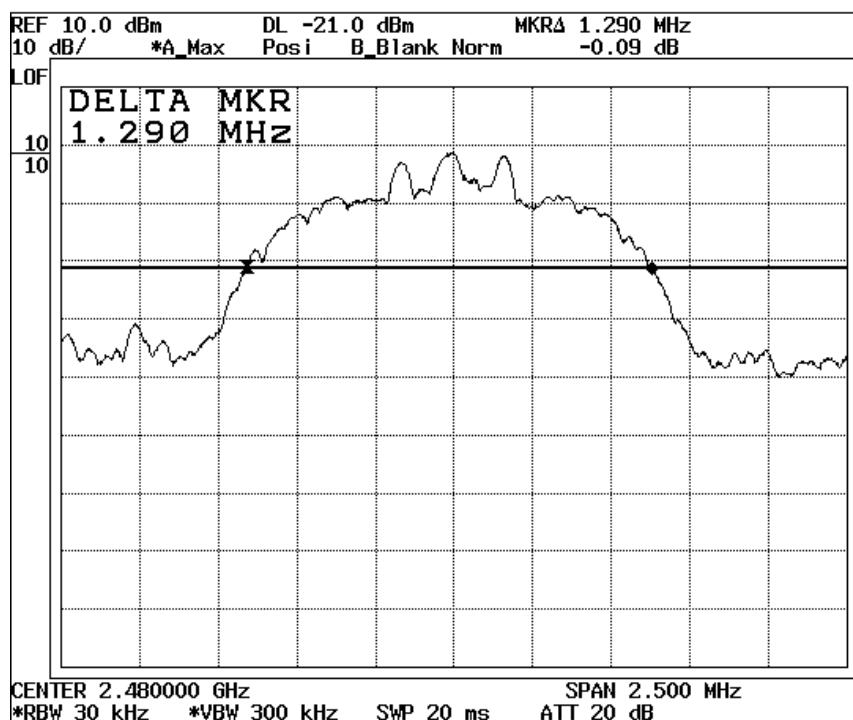
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**GFSK-CH 78 (2 480 MHz)****8-DQPSK-CH 00 (2 402 MHz)**

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**8-DQPSK-CH 39 (2441 MHz)****8-DQPSK-CH 78 (2480 MHz)**

## 3.6 Hopping Channel Separation

### 3.6.1 Test Instruments

Description	Manufacturer	Model No.	Serial No.	Next of Calibration
Spectrum Analyzer	Advantest	R3273	121100554	Jun. 15, 2012
RF Test Room	-	-	-	-

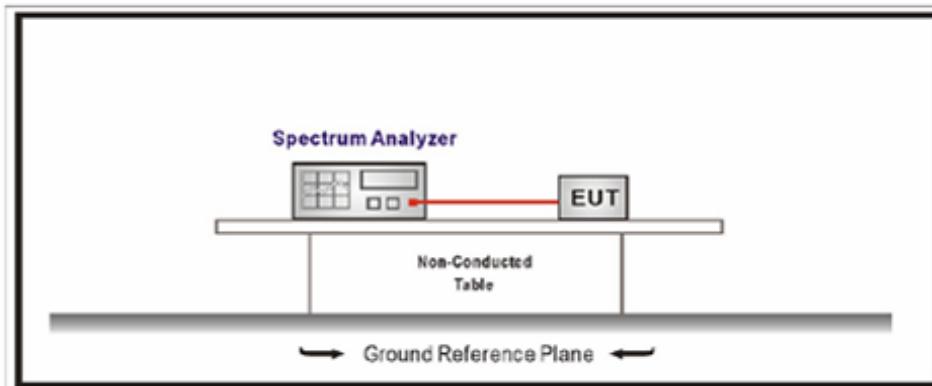
Note : *1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to RRL, KRISS, KTL and HCT.*  
*2. The calibration interval of horn ant. and loop ant. is 24 months*

### 3.6.2 Limit

At least 25 kHz or two-third of 20 dB hopping Channel bandwidth (whichever is greater).

### 3.6.3 Test Configuration

RF Conducted Measurement:



### 3.6.4 Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. By using the Maxhold function record the separation of two adjacent channels.
4. Measure the frequency difference of these two adjacent channels by SA mark function. And then plot the result on SA screen.

**3.6.5 Hopping Channel Separation Test Result**

Test Mode	GFSK	Test Site	RF Test Room
Test Result	PASS		

Channels	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (MHz)	Result
00	2 402	1.000	PASS
39	2 441	1.000	PASS
78	2 480	1.000	PASS

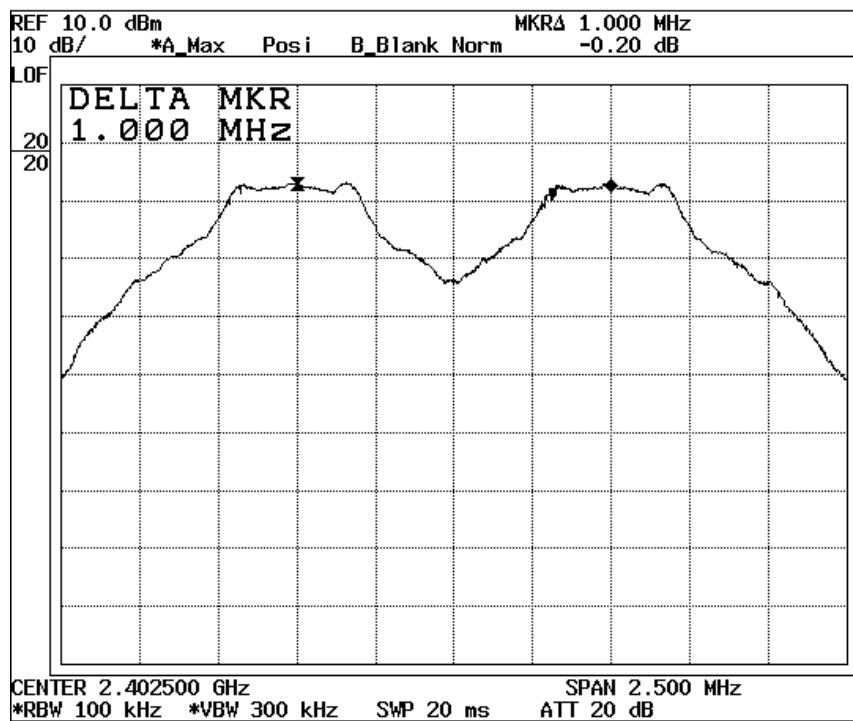
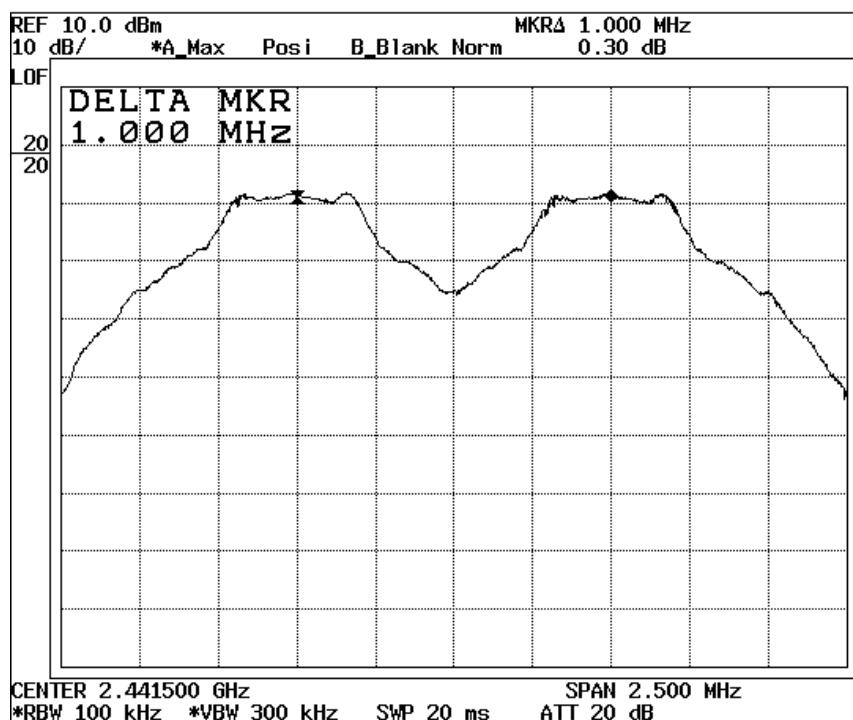
Test Mode	8-DQPSK	Test Site	RF Test Room
Test Result	PASS		

Channels	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (MHz)	Result
00	2 402	1.000	PASS
39	2 441	1.000	PASS
78	2 480	1.000	PASS

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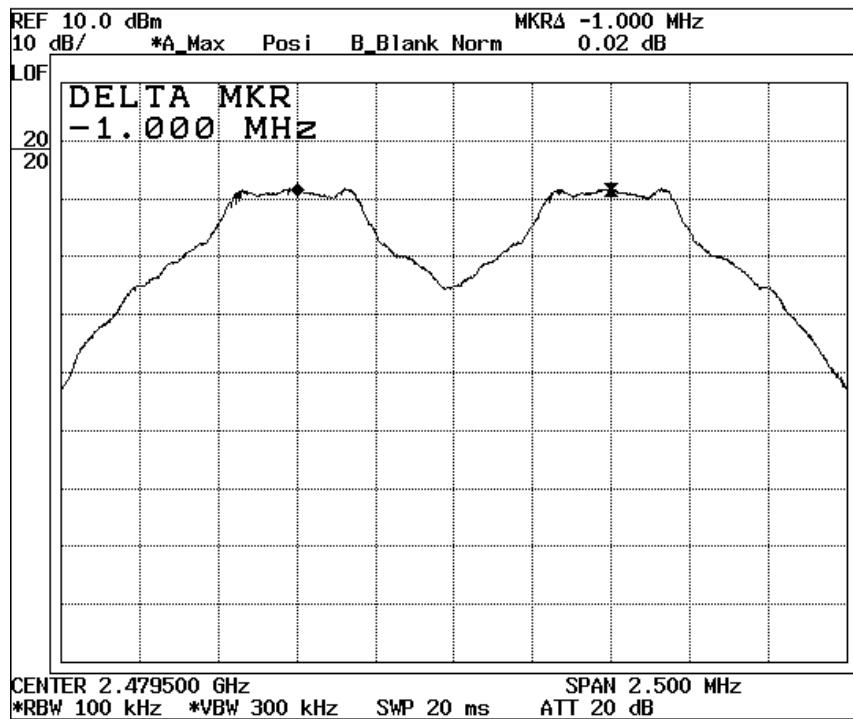
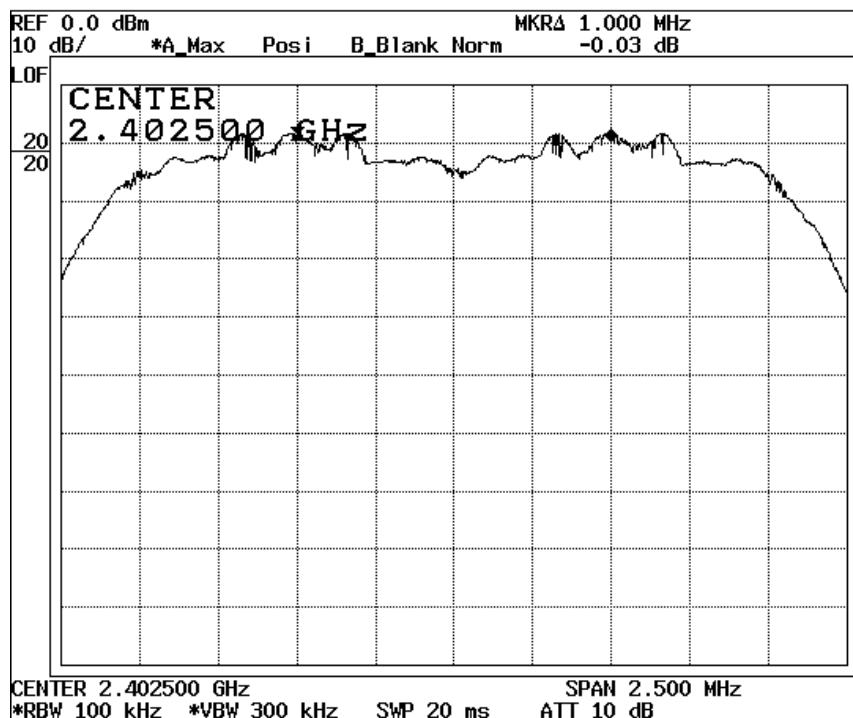
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**GFSK-CH 00 (2 402 MHz)****GFSK-CH 39 (2 441 MHz)**

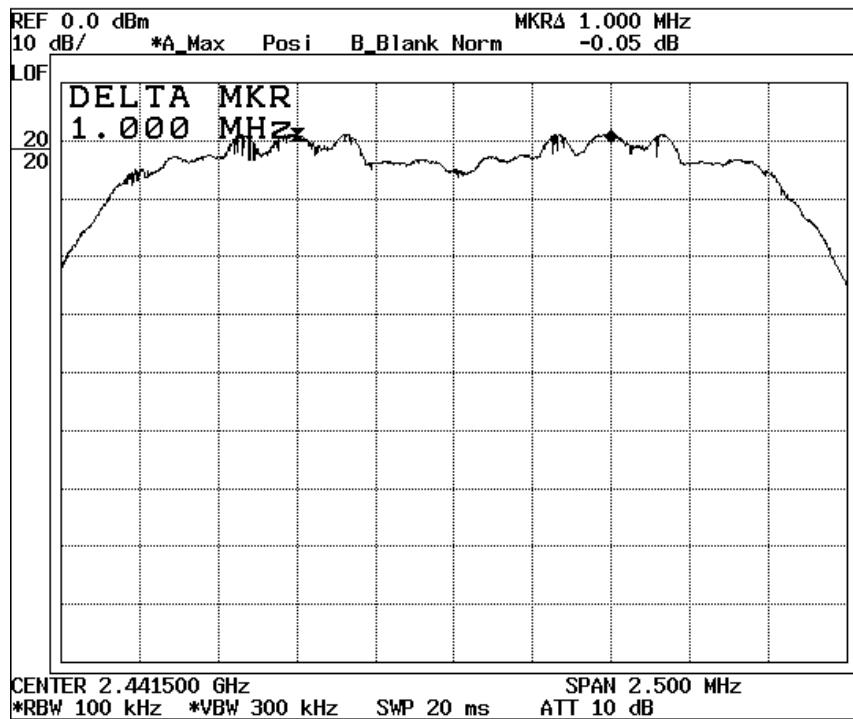
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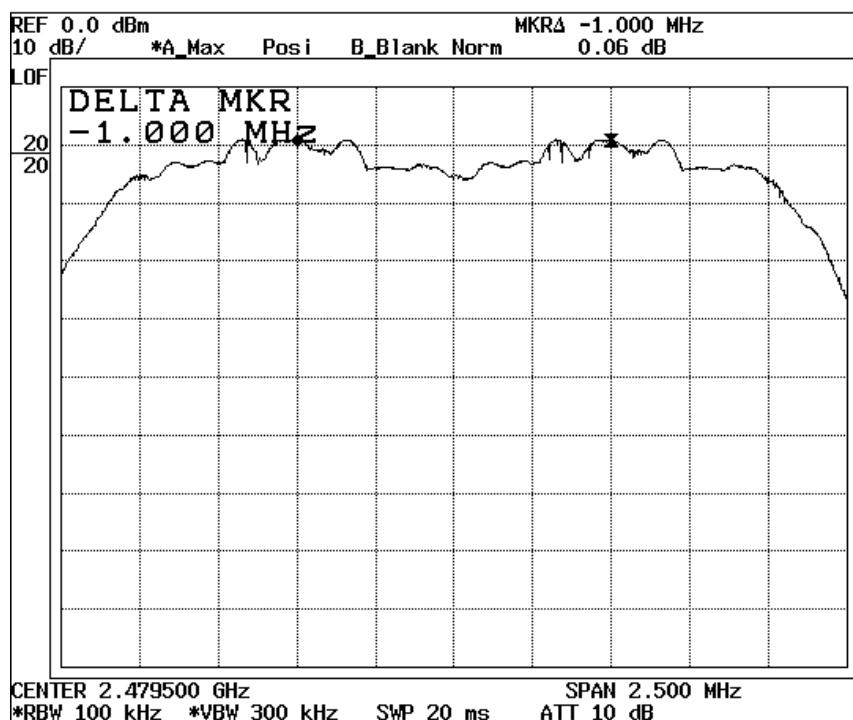
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**GFSK-CH 78 (2 480 MHz)****8-DQPSK-CH 00 (2 402 MHz)**

8-DQPSK-CH 39 (2441 MHz)



8-DQPSK-CH 78 (2480 MHz)



## 3.7 Maximum Peak Output Power

### 3.7.1 Test Instruments

Description	Manufacturer	Model No.	Serial No.	Next of Calibration
Spectrum Analyzer	Advantest	R3273	121100554	Jun. 15, 2012
RF Test Room	-	-	-	-

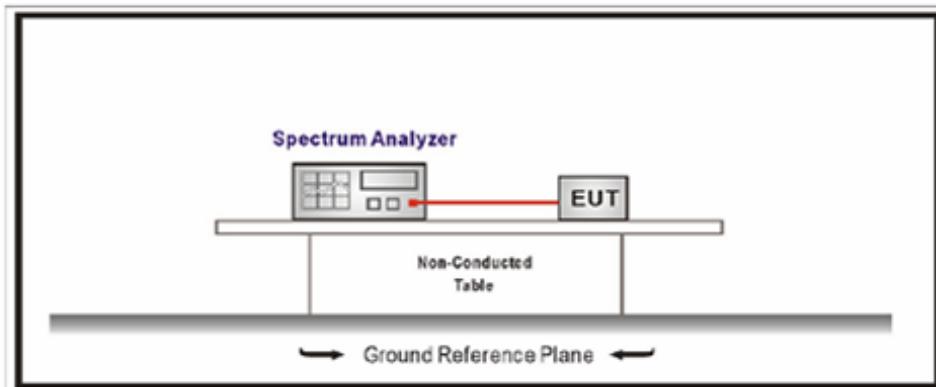
Note :     1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to RRL, KRISS, KTL and HCT.  
              2. The calibration interval of horn ant. and loop ant. is 24 months

### 3.7.2 Limit

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm.

### 3.7.3 Test Configuration

RF Conducted Measurement:



### 3.7.4 Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operation rage. Set a reference level on the measuring instrument equal to the highest peak value.
3. The center frequency og the spectrum analyzer is set to the fundamental frequency and using 3 MHz RBW and 3 MHz VBW.
4. Measure the captured power within the band and recording the plot.
5. Repeat above procedures until all frequencies required were complete.

**Certification Service Technology Inc.****Report No. : CSTS-A11-FCC026****Page: 79 of 99****3.7.5 Maximum Peak Output Power Test Result**

Test Mode	GFSK	Test Site	RF Test Room
Test Result	PASS		

Channel No.	Frequency (MHz)	Measue Leve (dBm)	Limit (dBm)	Result
00	2 402	3.80	1Watt = 30 dBm	PASS
39	2 441	4.14	1Watt = 30 dBm	PASS
78	2 480	4.40	1Watt = 30 dBm	PASS

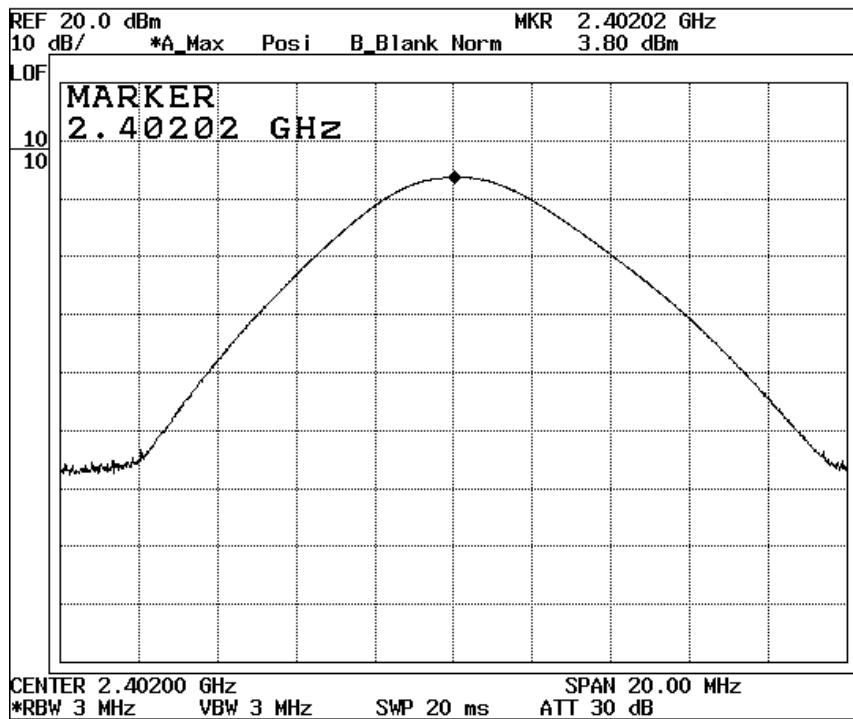
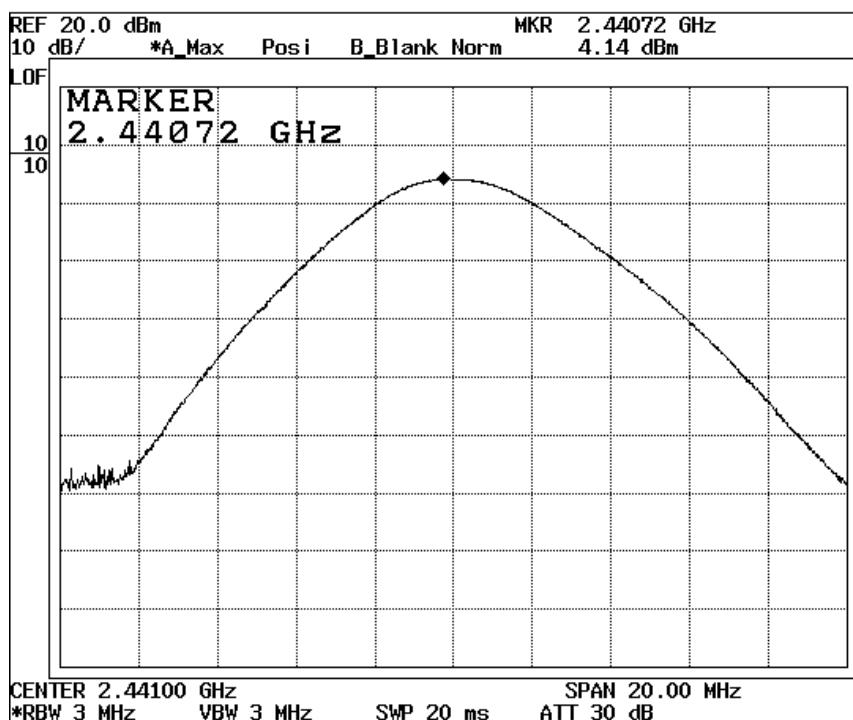
Test Mode	8-DQPSK	Test Site	RF Test Room
Test Result	PASS		

Channel No.	Frequency (MHz)	Measue Leve (dBm)	Limit (dBm)	Result
00	2 402	2.05	1Watt = 30 dBm	PASS
39	2 441	3.25	1Watt = 30 dBm	PASS
78	2 480	3.48	1Watt = 30 dBm	PASS

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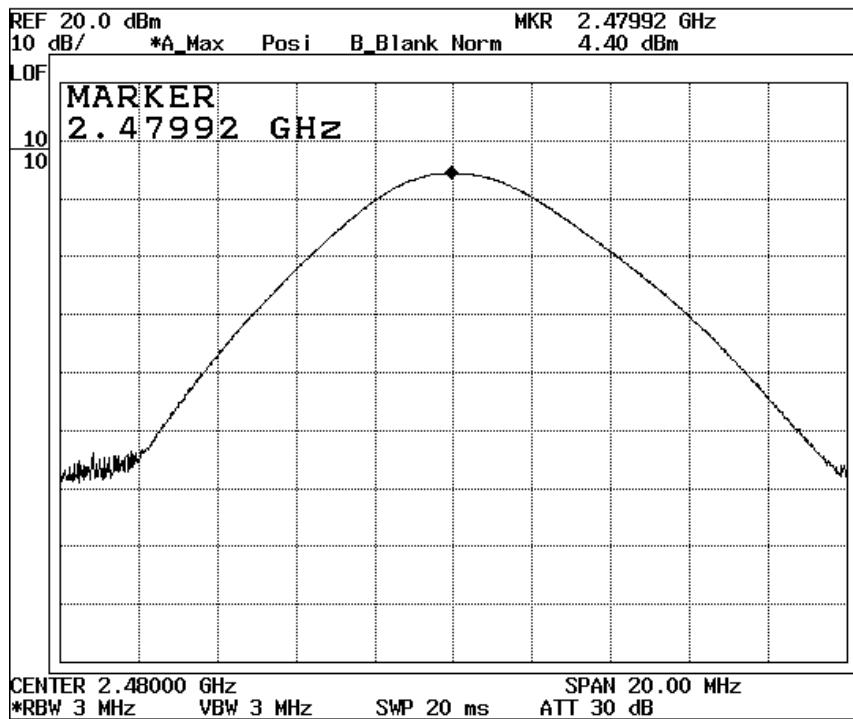
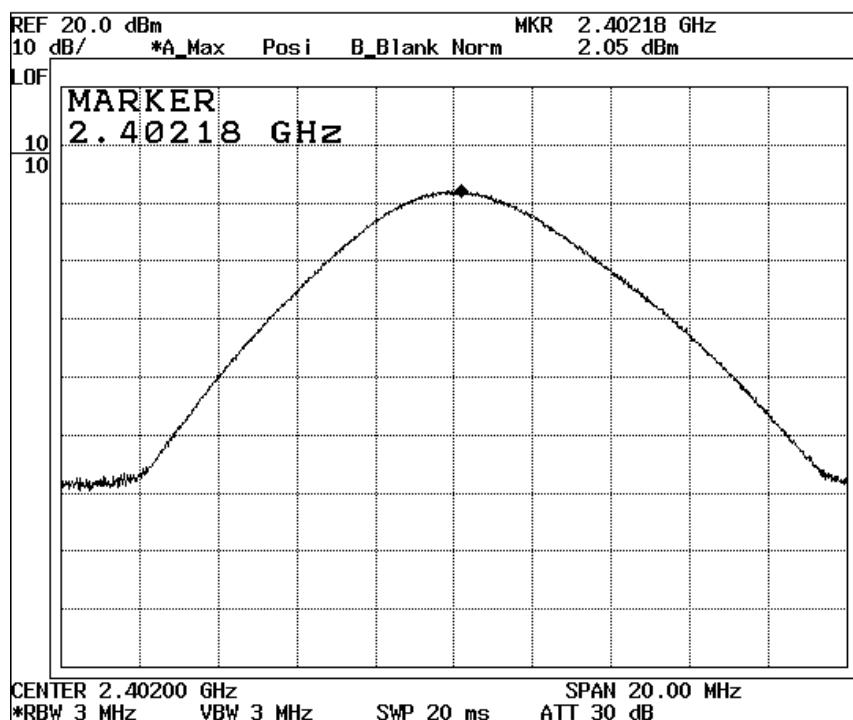
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**GFSK-CH 00 (2 402 MHz)****GFSK-CH 39 (2 441 MHz)**

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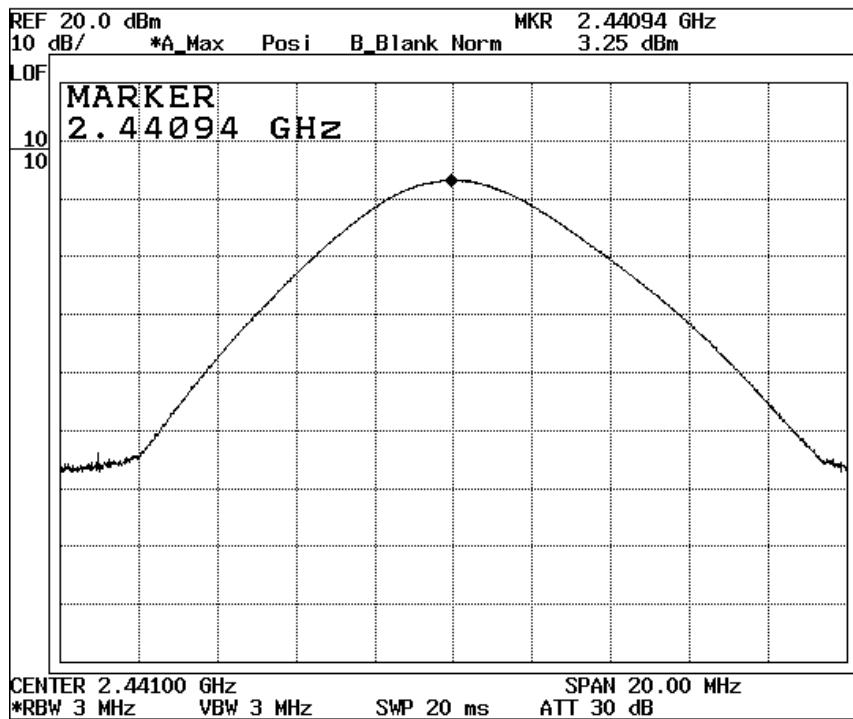
**GFSK-CH 78 (2 480 MHz)****8-DQPSK-CH 00 (2 402 MHz)**

**Certification Service Technology Inc.**

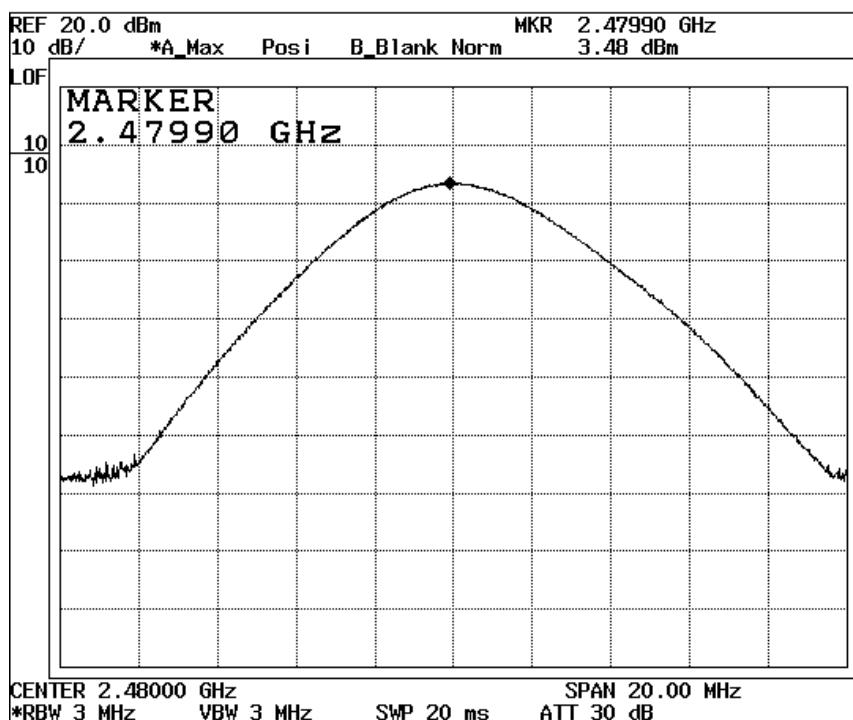
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**8-DQPSK-CH 39 (2441 MHz)**



**8-DQPSK-CH 78 (2480 MHz)**



## 3.8 Band Edge

### 3.8.1 Test Instruments

Description	Manufacturer	Model No.	Serial No.	Next of Calibration
Test Receiver	LIG NEX1	ER-265	L0804B002	Jul. 14, 2012
Horn Antenna	Schwarzbeck	BBHA9120D	0501	Sep. 10 2012
Horn Antenna	Schwarzbeck	BBHA9170	BBHA9170152	Sep. 16. 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

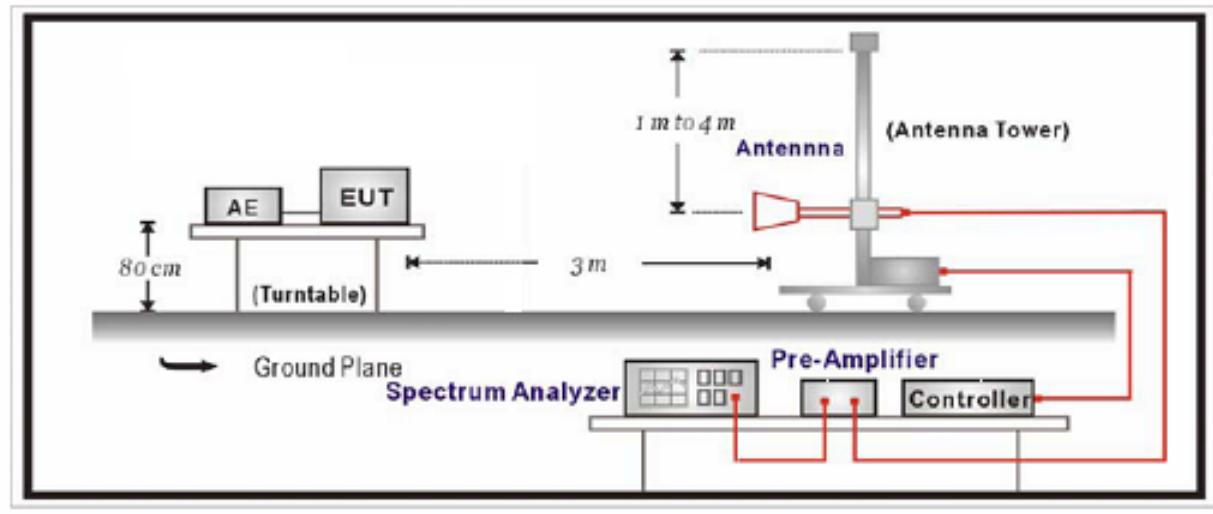
### 3.8.2 Limit

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)).

### 3.8.3 Test Configuration

#### Radiated Measurement : 3 m Full Chamber



### 3.8.4 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.

### 3.8.5 Test Result Method of Band Edge Test Result of Radiated Test.

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

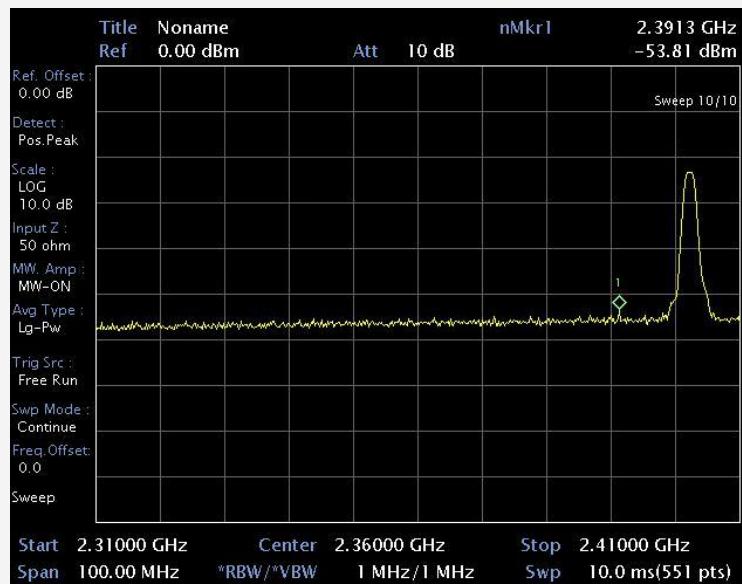
Note : Correct Factor = AF + CL

AF – Antenna Factor , CL-Cable Loss

**3.8.6 Band Edge Test Result**

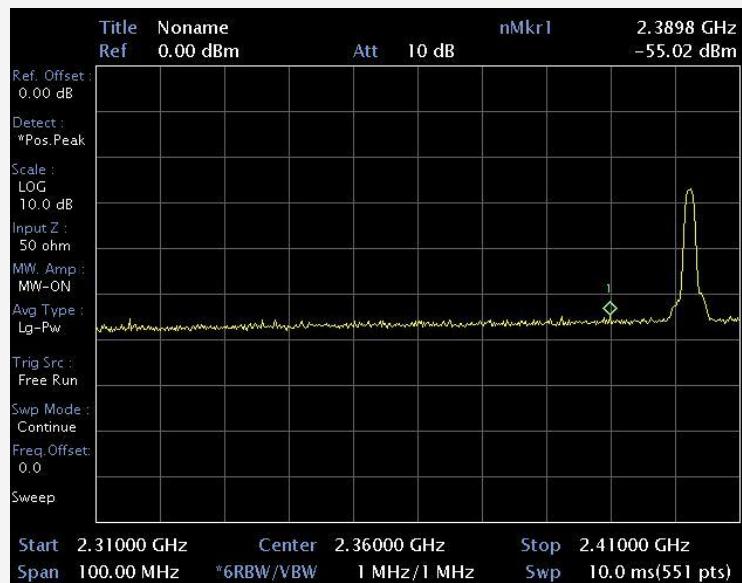
Detect mode	Peak	Mode	Continuous Tx
Note	F1 (2 402 MHz)	Modulation	GFSK

**HOR**



Frequency (MHz)	Reading PK (dBuV/m)	Factor(dB) CL+AF	Limits PK (dBuV/m)	Result PK (dBuV/m)	Margin PK (dB)
2390	19.79	33.39	74	53.18	20.82

**VER**



Frequency (MHz)	Reading PK (dBuV/m)	Factor(dB) CL+AF	Limits PK (dBuV/m)	Result PK (dBuV/m)	Margin PK (dB)
2390	18.58	33.39	74	51.97	22.03

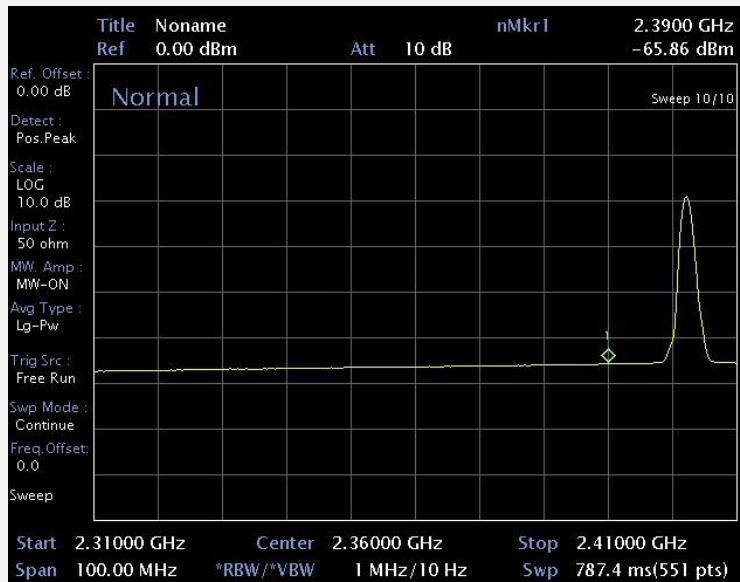
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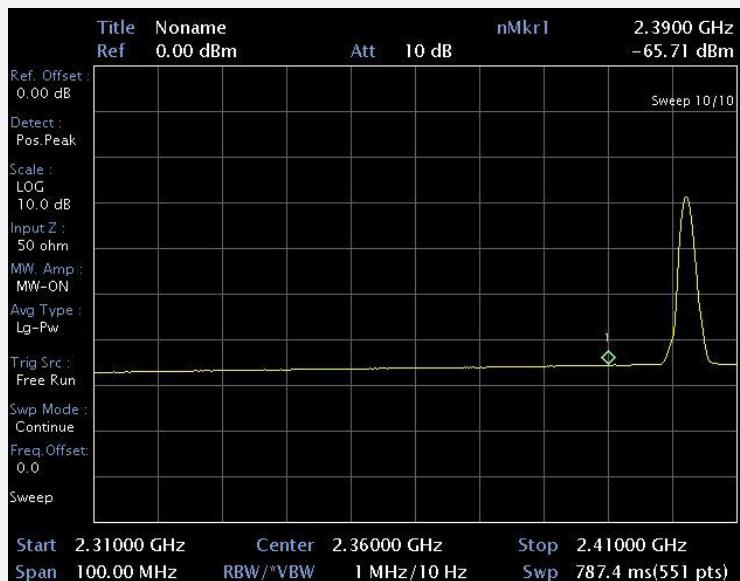
Detect mode	Average	Mode	Continuous Tx
Note	F1 (2 402 MHz)	Modulation	GFSK

**HOR**



Frequency (MHz)	Reading PK (dBuV/m)	Factor(dB) CL+AF	Limits PK (dBuV/m)	Result PK (dBuV/m)	Margin PK (dB)
2390	7.74	33.39	54	41.13	12.87

**VER**



Frequency (MHz)	Reading PK (dBuV/m)	Factor(dB) CL+AF	Limits PK (dBuV/m)	Result PK (dBuV/m)	Margin PK (dB)
2390	7.89	33.39	54	41.28	12.72

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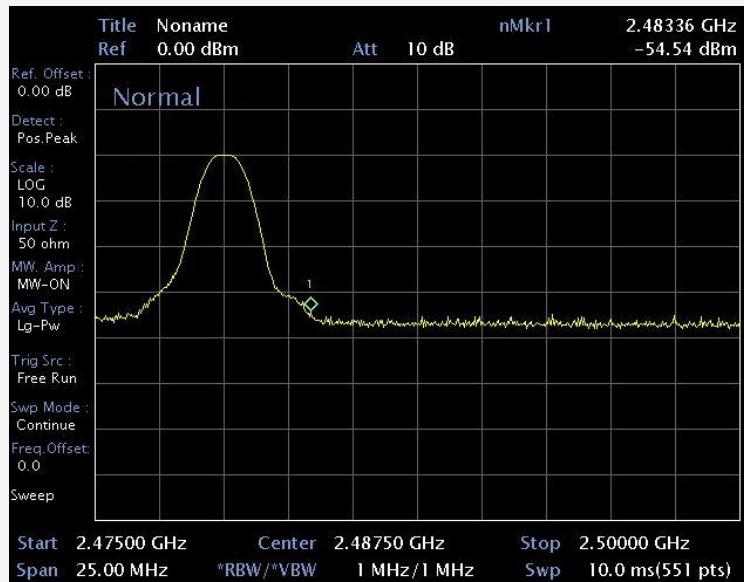
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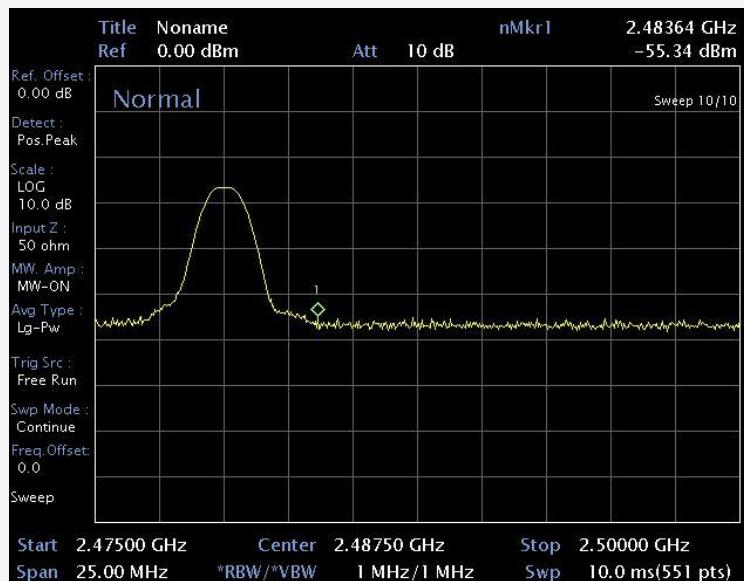
Detect mode	Peak	Mode	Continuous Tx
Note	F3 (2480 MHz)	Modulation	GFSK

**HOR**



Frequency (MHz)	Reading PK (dBuV/m)	Factor(dB) CL+AF	Limits PK (dBuV/m)	Result PK (dBuV/m)	Margin PK (dB)
2483.5	18.72	33.73	74	52.45	21.55

**VER**



Frequency (MHz)	Reading PK (dBuV/m)	Factor(dB) CL+AF	Limits PK (dBuV/m)	Result PK (dBuV/m)	Margin PK (dB)
2483.5	17.92	33.73	74	51.65	22.35

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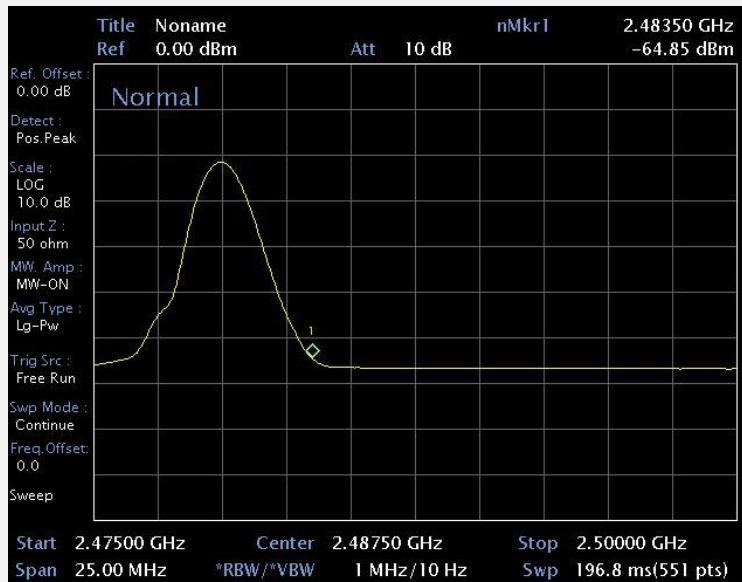
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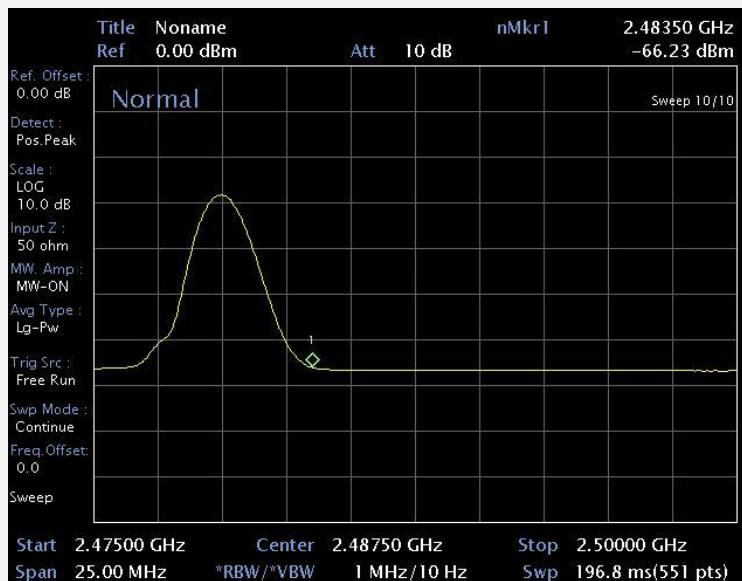
Detect mode	Average	Mode	Continuous Tx
Note	F3 (2480 MHz)	Modulation	GFSK

**HOR**



Frequency (MHz)	Reading PK (dBuV/m)	Factor(dB) CL+AF	Limits PK (dBuV/m)	Result PK (dBuV/m)	Margin PK (dB)
2483.5	8.41	33.73	54	42.14	11.86

**VER**



Frequency (MHz)	Reading PK (dBuV/m)	Factor(dB) CL+AF	Limits PK (dBuV/m)	Result PK (dBuV/m)	Margin PK (dB)
2483.5	7.03	33.73	54	40.76	13.24

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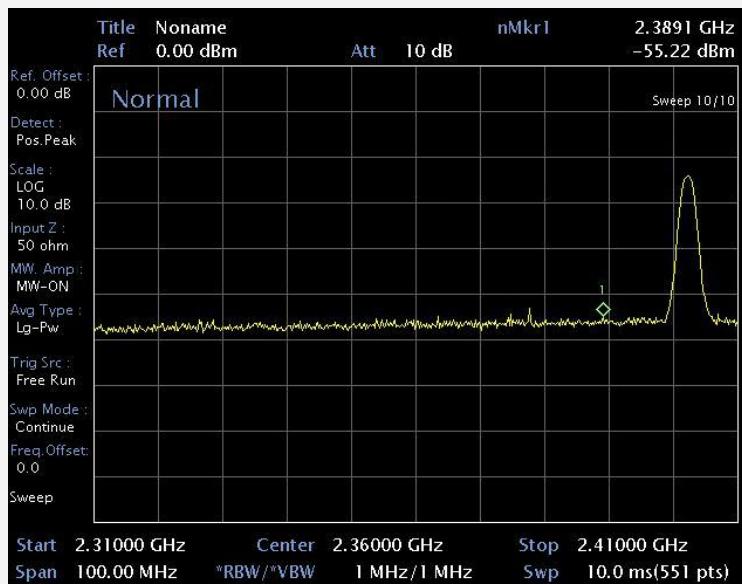
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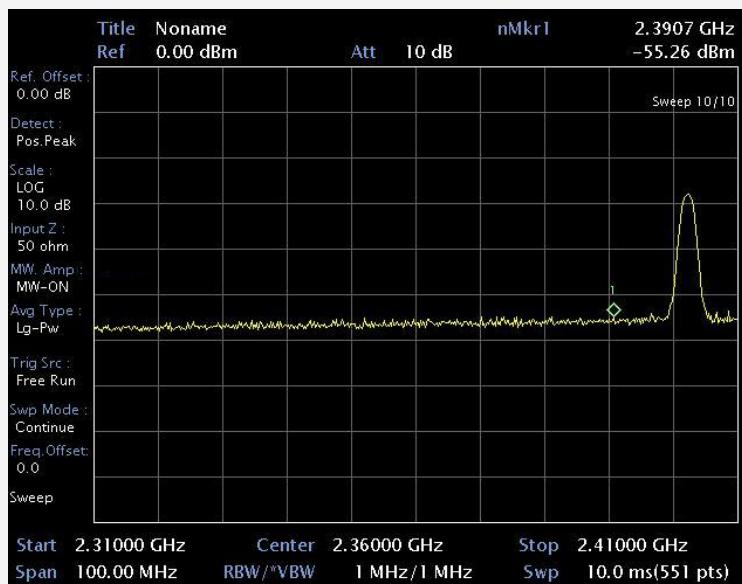
Detect mode	Peak	Mode	Continuous Tx
Note	F1 (2 402 MHz)	Modulation	8-DQPSK

**HOR**



Frequency (MHz)	Reading PK (dBuV/m)	Factor(dB) CL+AF	Limits PK (dBuV/m)	Result PK (dBuV/m)	Margin PK (dB)
2390	18.38	33.39	74	51.77	22.23

**VER**



Frequency (MHz)	Reading PK (dBuV/m)	Factor(dB) CL+AF	Limits PK (dBuV/m)	Result PK (dBuV/m)	Margin PK (dB)
2390	18.34	33.39	74	51.73	22.27

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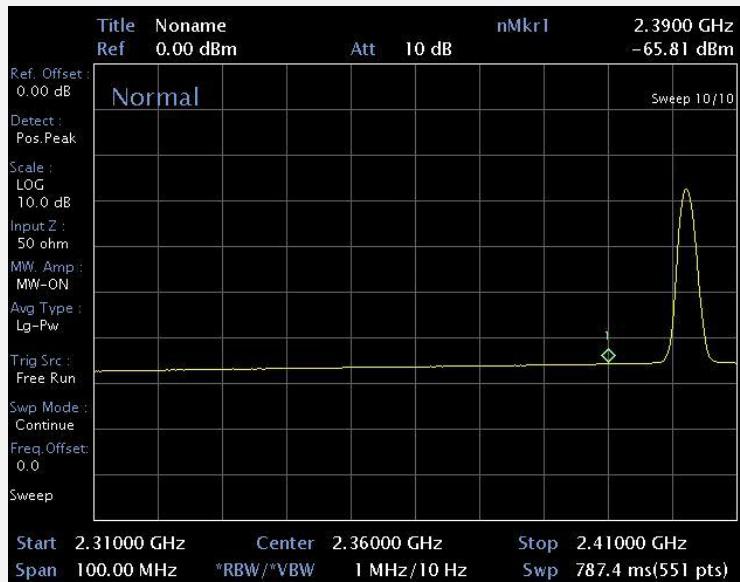
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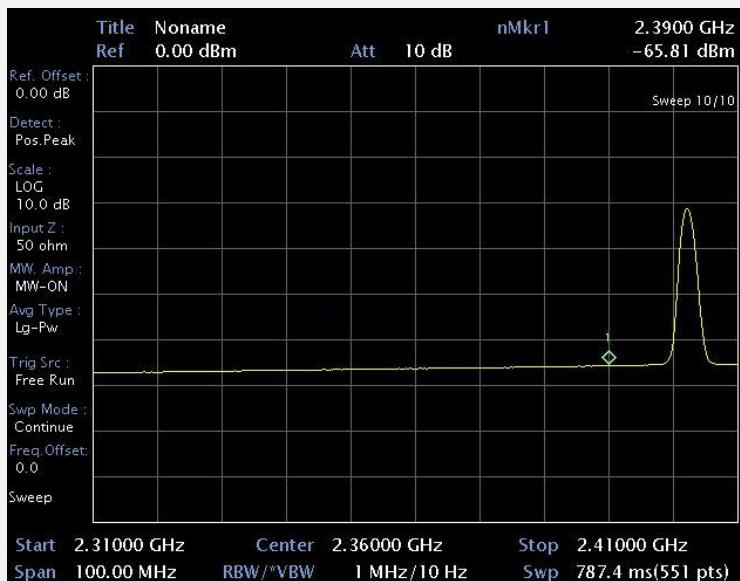
Detect mode	Average	Mode	Continuous Tx
Note	F1 (2 402 MHz)	Modulation	8-DQPSK

**HOR**



Frequency (MHz)	Reading PK (dBuV/m)	Factor(dB) CL+AF	Limits PK (dBuV/m)	Result PK (dBuV/m)	Margin PK (dB)
2390	7.79	33.39	54	41.18	12.82

**VER**



Frequency (MHz)	Reading PK (dBuV/m)	Factor(dB) CL+AF	Limits PK (dBuV/m)	Result PK (dBuV/m)	Margin PK (dB)
2390	7.79	33.39	54	41.18	12.82

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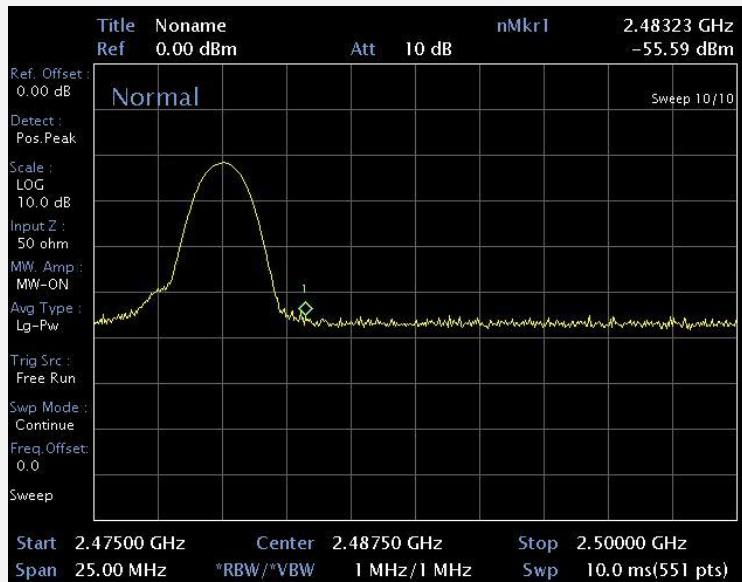
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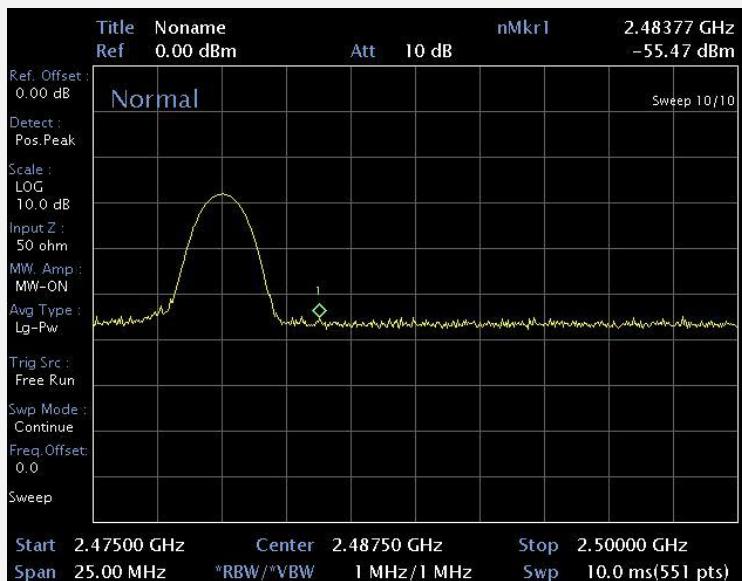
Detect mode	Peak	Mode	Continuous Tx
Note	F3 (2480 MHz)	Modulation	8-DQPSK

**HOR**



Frequency (MHz)	Reading PK (dBuV/m)	Factor(dB) CL+AF	Limits PK (dBuV/m)	Result PK (dBuV/m)	Margin PK (dB)
2483.5	17.67	33.73	74	51.40	22.60

**VER**



Frequency (MHz)	Reading PK (dBuV/m)	Factor(dB) CL+AF	Limits PK (dBuV/m)	Result PK (dBuV/m)	Margin PK (dB)
2483.5	17.79	33.73	74	51.52	22.48

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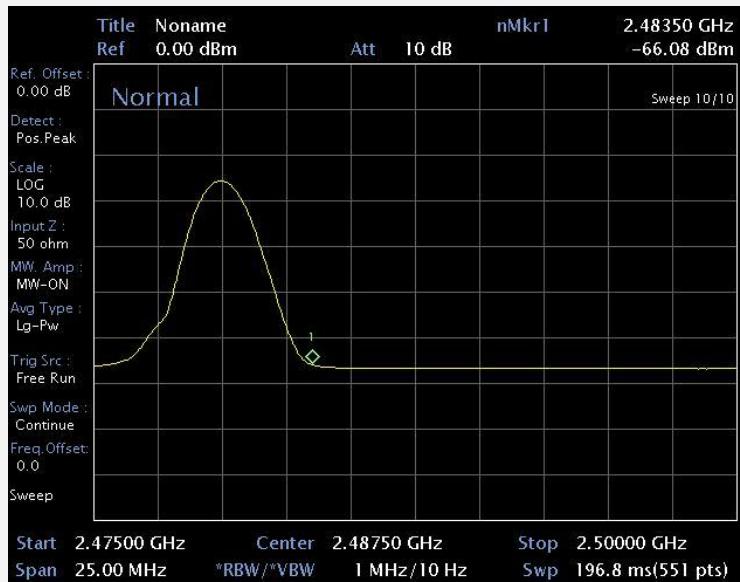
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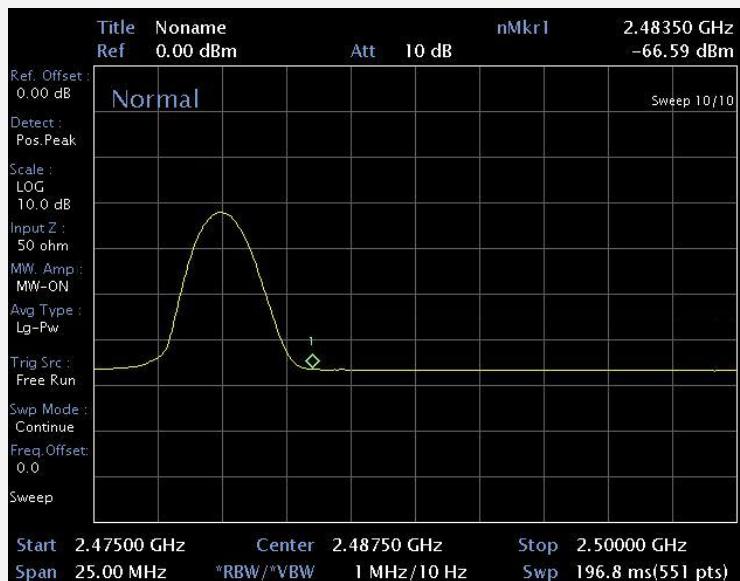
Detect mode	Average	Mode	Continuous Tx
Note	F3 (2480 MHz)	Modulation	8-DQPSK

**HOR**



Frequency (MHz)	Reading PK (dBuV/m)	Factor(dB) CL+AF	Limits PK (dBuV/m)	Result PK (dBuV/m)	Margin PK (dB)
2483.5	7.18	33.73	54	40.91	13.09

**VER**



Frequency (MHz)	Reading PK (dBuV/m)	Factor(dB) CL+AF	Limits PK (dBuV/m)	Result PK (dBuV/m)	Margin PK (dB)
2483.5	6.67	33.73	54	40.40	13.60

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## **4.0 Antenna Requirement**

Applicable Standard

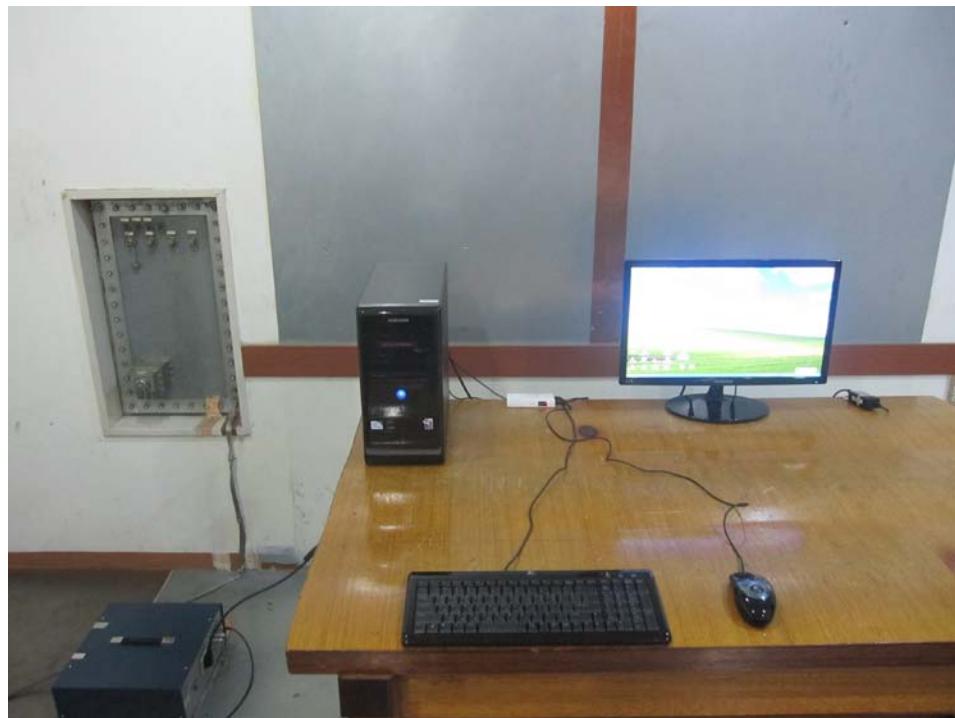
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses the intentional radiator shall be considered sufficient to comply with the provisions 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**



**Radiated Emission (Below 30 MHz) – USB Charging Status**



**Radiated Emission (Below 30 MHz) – Continuous Tx Mode**



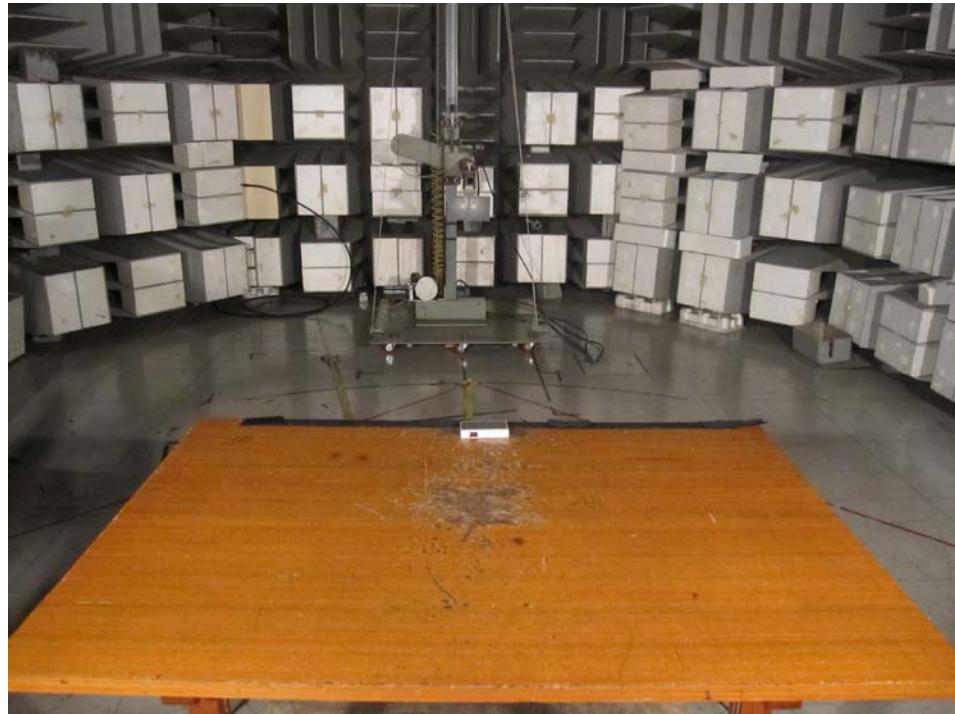
**Radiated Emission (Below 1 GHz) – USB Charging Status**



**Radiated Emission (Below 1 GHz) – Continuous Tx Mode**



**Radiated Emission (Above 1 GHz)**



## Appendix B. The Photo of Equipment Under Test

**Front View of EUT**



**Rear View of EUT**



**Inside View of EUT**

