TEST REPORT

According to

CFR 47 Part 15 Subpart C-15.247

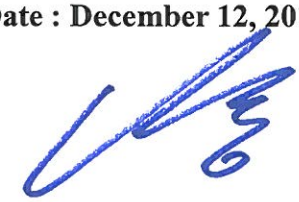
Test Report No : CSTPOC13-FCC0049

EQUIPMENT NAME	:	OCU (On-board Controller Unit)
MODEL NO.	:	SAM-OCU-14
APPLICANT	:	SAMSUNG SDS Co., Ltd.
MANUFACTURER	:	SAMSUNG SDS Co., Ltd.
TEST STANDARD	:	FCC CFR 47, Part 15. Subpart C-15.247
TEST METHOD	:	ANSI C63.4(2003)
FCC ID	:	P4YSAM-OCU-14

This report applies only to the product named in the title of this report manufactured at the location indicated.
Test results apply only to the particular equipment and functionality described in this test report.

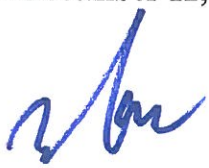
This is the result of test that was carried out from the submitted type-samples of a product in conformity with the specification of the respective standards.

Date : December 12, 2013



Tested by
S.J. Yang

Date : December 12, 2013



Approved by
Ik Seon, Jeong

CERTIFICATION SERVICE TECHNOLOGY INC.

181, Manhaero, Danwan-gu, Ansan-city, Kyeonggi-do, 425-839, Korea
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Table of Contents

1. General Information

1.1 General Description of EUT

Applicant's Information	
Company Name	Samsung SDS Co., Ltd..
Address	707-19, Yoksam 2-dong, Gangnam-gu, Seoul, Korea, 135-918
Name For Contact Purposes	Kim Dal-Young
E-mail	dalyoung81.kim@samsung.com
Telephone no.	+82-2-6484-0756
Fax no.	+82-2-6484-1301

Manufacturer Information	
Company Name	SAMSUNG SDS Co., Ltd.
Address	707-19, Yoksam 2-dong, Gangnam-gu, Seoul, Korea, 135-918

1.2 Basic Description of EUT

Basic Description of EUT		
Equipment Name	:	OCU (On-board Controller Unit)
Model NO.	:	SAM-OCU-14
Serial NO.	:	-
Operating Frequency	:	2402 MHz ~ 2480 MHz (Tx / Rx)
Channel	:	79
Communication Access Method	:	FHSS (Frequency Hopping Spread Spectrum)
Emission Type	:	F1D, G1D
Communication Type	:	Half duplex
Modulation Type	:	GFSK (BDR), 8-DQPSK (EDR)
Oscillation Type	:	PLL
RF Output Power	:	10.63 dBm (GFSK mode), 4.68 dBm (8-DQPSK mode) *It is maximum peak conducted power in band
Power Source	:	DC 24V (C a r b a t t e r y)
Dimension	:	230mm x 176.2 mm x 46.9 mm
FCC ID	:	P4YSAM-OCU-14

1.3 Antenna Description

Antenna Description		
Type of Antenna	:	CHIP ANT.
Connector Type	:	-
Center Frequency	:	2.4 GHz ~ 2.5 GHz
Model Name	:	W5I-BF-XX
Gain	:	2.5 dBi max
Polarization	:	Linear
Length	:	10 x 4 x 1.2 mm

2. Summary of test results

The EUT has been tested according to the follow specification:

Description of Test	FCC Rule	Reference Clause	Pass/Fail	Test Result
Carrier frequency separation (20 dB bandwidth)	15.247(a)(1)	Clause 5.1	Pass	Compliance
Number of hopping frequencies	15.247(a)(1)(iii)	Clause 5.2	Pass	Compliance
Time of occupancy (Dwell Time)	15.247(a)(1)(iii)	Clause 5.3	Pass	Compliance
Max. Conducted peak output power	15.247(b)(1)	Clause 5.4	Pass	Compliance
Conducted peak output power spectrum density	15.247(e)	Clause 5.5	Pass	Compliance
Band edge compliance of RF conducted emissions	15.247(d)	Clause 5.6	Pass	Compliance
Band edge compliance of RF radiated emissions	15.247(d) 15.205 & 15.209	Clause 5.7	Pass	Compliance
Spurious RF conducted emissions	15.247(d)	Clause 5.8	Pass	Compliance
Spurious RF radiated emissions	15.247(d), 15.209	Clause 5.9	Pass	Compliance
Antenna requirement	15.203, 15.247	Clause 5.10	Pass	Compliance

Compliance : The EUT complies with the essential requirements in the standard.
Not Compliance : The EUT does not comply with the essential requirements in the standard.
N/A : The test was not applicable in the standard.

- The measurement report and tested in accordance with measurement procedures specified in ANSI C 63.4-2003.

I hereby declare that I am entitled to sign on behalf of the applicant and that the information supplied is correct and complete.

Name	***S.J. Yang***
Position held	***Engineer / RF Team***
Date	***December 12, 2013***

Begin Test : December 3, 2013
End Test : December 11, 2013

2.1 Measurement uncertainty

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 %*

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of $k = 2$.

2.2 Testing Facility

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:

Test laboratory and address	Certification Service Technology Inc. (CSTech) 1055, Singil-dong ,Danwon-gu ,Ansan-si, Gyeonggi-do, Korea 425-839
FCC registration number	289252
IC registration number	10024A
KCC registration number (Korea Communication Commission)	KR0074
Contact Person	Ik Seon Jeong Testing Manager
e-mail	isjeong@cstlab.co.kr
Tel	82-31-493-2001
Fax	82-31-493-2055

3. TEST Instruments

No	Description	Model	Manufacturer	S/N	Next Calibration
1	Receiver	ER-265	LIG Nex 1	L0804B002	2014.07.04
2	Receiver	ER-30	LIG Nex 1	861743/024	2014.08.30
3	Bi-Log	3142	EMCO	9701-1128	2014.02.14
4	Biconical ANT.	3104C	EMCO	9012-4380	2014.03.13
5	Log Periodic ANT.	3146	EMCO	9008-2863	2014.03.13
6	LOOP ANT.	HFH2-Z2	Schwarz beck	100187	2015.07.29
7	DC Power Supply	6674A	Agilent	US36372373	2014.01.03
8	Dual Directional Coupler	778D	H.P	18592	2014.01.03
9	Signal Generator	E8257D	Agilent	MY47461024	2014.01.03
10	Signal Generator	E4432B	Agilent	US38441383	2014.01.03
11	Pulse/Pattern Generator	81110A	Agilent	DE41B02781	2014.01.03
12	Universal Radio Communication Tester	CMU200	Rohde &Schwarz	110665	2014.05.16
13	Modulation Analyzer	8901B	H.P	3438A05141	2014.05.16
14	Audio Analyzer	8903B	H.P	3514A16134	2014.05.16
15	Spectrum Analyzer	R3273	Advantest	121100554	2014.05.16
16	Spectrum Analyzer	E7405A	Agilent	US41110271	2014.01.03
17	Attenuator	8498A	H.P	1801A07058	2014.01.03
18	Horn Antenna	BBHA9120D	SCHWARZBECK	0501	2014.10.19
19	Horn Antenna	BBHA9170	SCHWARZBECK	BBHA9170152	2014.10.19
20	Digital Multimeter	45	FLUKE	76669036	2014.07.04
21	Digital Power Meter	ML2495A	Anritsu	824015	2014.01.03
22	High Accuracy Sensor	MA2445D	Anritsu	738191	2014.11.26
23	Highpass Filter	WHKX3.0/18G-10SS	WAINWRIGHT	84	2014.07.04
24	Highpass Filter	WHKX1.0/15G-10SS	WAINWRIGHT	2	2014.07.04
25	Band Reject Filter	WRCG824/849-814/859-80/16SS	WAINWRIGHT	1	2014.07.04
26	Band Reject Filter	WRCG890/915-880/925-80/16SS	WAINWRIGHT	2	2014.07.04
27	Band Reject Filter	WRCG1749.9/1784.9-1730/1805-90/14SS	WAINWRIGHT	6	2014.07.04

28	Band Reject Filter	WRCG1920/1980-1900/2000-80/14SS	WAINWRIGHT	42	2014.07.04
29	Band Reject Filter	WRCJ5125/5825-4950/6000-80/16SS	WAINWRIGHT	1	2014.07.04
30	TURN TABLE	Dail EMC	D-TT 06	N/A	N/A
31	ANT. MASTER	Dail EMC	D-AM 06	N/A	N/A
32	Controller	Dail EMC	D-CTR	N/A	N/A
33	TEMP&HUMID CHAMBER	KR-3001C	GOREAENG.	20080204-01	2014.02.28
34	TEMP&HUMID CHAMBER	SE-CT-02	SukSan Tech.	CST-RF-078	2014.01.03
35	Signal Generator	Agilent	E4438C	MY45093719	2014.11.21
36	POWER DIVIDER	KRYTAR	6010265	111194	2014.07.04
37	POWER DIVIDER	KRYTAR	6010265	111195	2014.07.04
38	POWER DIVIDER	KRYTAR	6010265	111196	2014.07.04

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

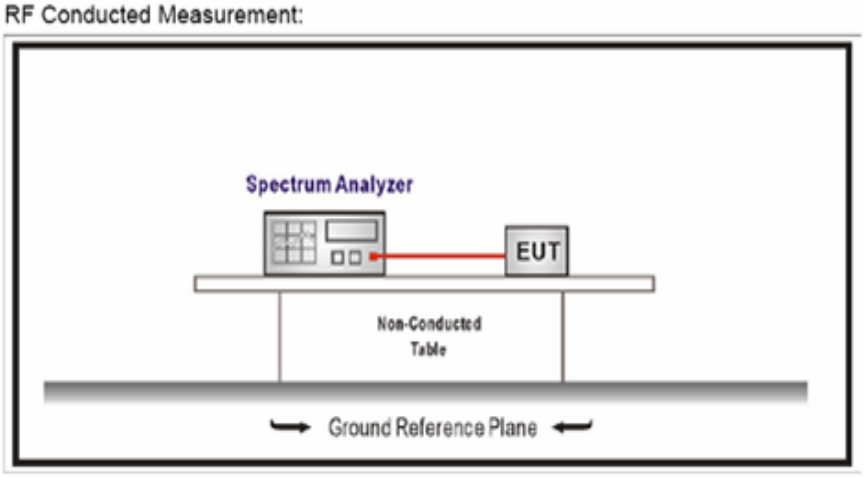
2. The calibration interval of Horn ant. and Loop, Dipol ant. is 24 months

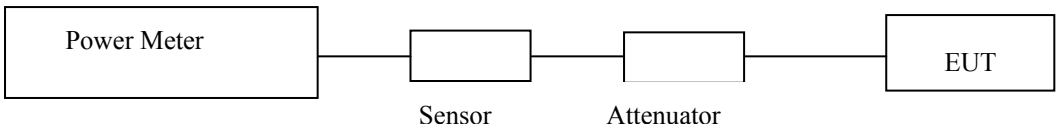
4. Configuration of system under test

4.1 Conducted Test Setup

RF Conducted Test

RF Conducted Measurement:

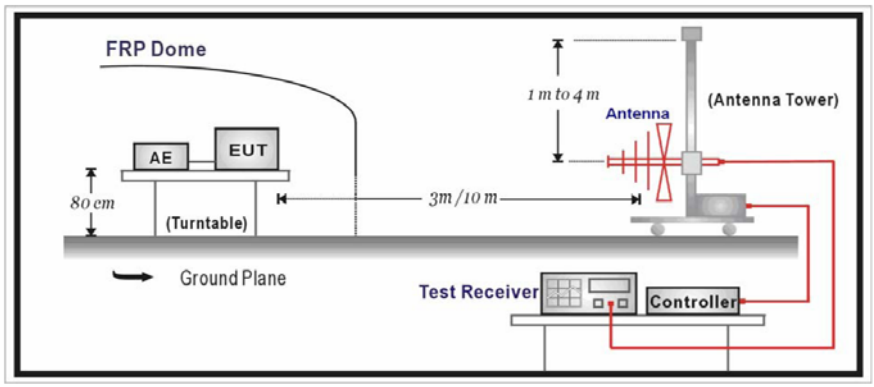




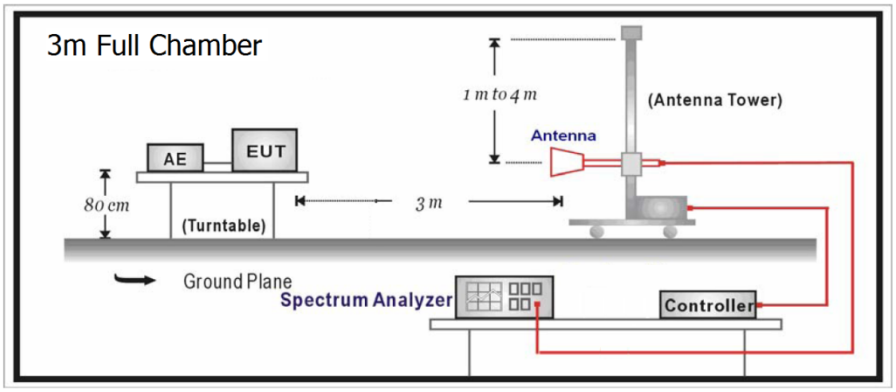
- Power Meter : ML2495A (Anritsu)
- Power Sensor : MA2445D (Anritsu)
- Detector mode : peak

4.2 Radiated Test Setup

Below 1GHz Test Setup:



Above 1GHz Test Setup:



Limit Of Radiated Emission :

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

Limits			
Frequency (MHz)	Field Strength (μV/meter)	Measurement Distance (meters)	dBμV/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

4.3 Description of support units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO	PRODUCT	MODEL NO.	SERIAL NO.	Mnufacture
1	Note Book PC	PP04X	05098	DELL
2	USB Cable	E166307	-	-

4.4 Test Software Power Setting. (Power Parameters of GFSK / 8-DQPSK)

EST Mode		2402 MHz(1CH)	2441 MHz(40CH)	2480 MHz(79CH)
Target Power	GFSK	N/A	N/A	N/A
	8-DQPSK	N/A	N/A	N/A

The parameter Power control in the test software was set to the values in the table below for GFSK(BDR) and 8-DQPSK(EDR) mode.

5.Test mode applicability and tested channel detail

Test Items	Channel No	Frequency (MHz)	Operated Condition
Carrier frequency separation	1, 2	2402, 2403	Hopping on and continuous modulation setting mode
	40, 41	2441, 2442	
	78, 79	2479, 2480	
Number of hopping frequencies	1 ~ 79	2402 ~ 2480	Hopping on mode
Time of occupancy (Dwell Time)	40	2441	Hopping on mode
Conducted peak output power	1	2402	Hopping off and continuous modulation setting mode
	40	2441	
	79	2480	
Band-edge Compliance	1	2402	Hopping off and continuous modulation setting mode
	79	2480	
Spurious RF conducted emissions	1~79	2402 ~ 2480	Frequency band setting by required standard (FCC Rules)*
Spurious radiated emissions	1~79	2402 ~ 2480	

*Note : Channel number is selected lowest, middle, highest channel and also hopping on/off mode operation

6. Measurement Results

6.1 Carrier Frequency Separation

6.1.1 Standard Applicable [FCC §15.247(a),(1)]

Frequency hopping systems operating in the (2400 ~ 2483.5) MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

6.1.2 Test Environment conditions

Ambient temperature : 23℃,

Relative Humidity : (54 ~ 55) % R.H

6.1.3 Measurement Procedure

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna terminal while EUT had its hopping function enabled.

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

The spectrum analyzer is set to the as follows :

- Span : wide enough to capture the peak of two adjacent channels
- RBW : ≥ 1% of the span
- VBW : ≥ RBW
- Sweep : auto
- Detector function : peak
- Trace : max hold

6.1.4 Measurement Result

1) GFSK

Channel No.	Frequency (MHz)	Test Results		
		Measured Value [MHz]	Result	Limit
1, 2	2402, 2403	1.003	Pass	≥ 25 kHz or 2/3 20dB bandwidth
40, 41	2441, 2442	1.003	Pass	
78, 79	2479, 2480	1.003	Pass	

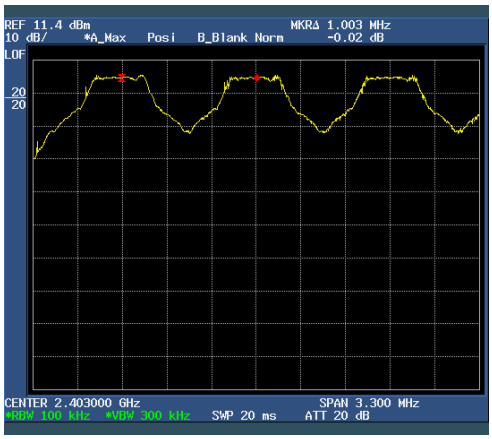
2) 8-DQPSK

Channel No.	Frequency (MHz)	Test Results		
		Measured Value [MHz]	Result	Limit
1, 2	2402, 2403	1.002	Pass	≥ 25 kHz or 2/3 20dB bandwidth
40, 41	2441, 2442	1.002	Pass	
78, 79	2479, 2480	1.002	Pass	

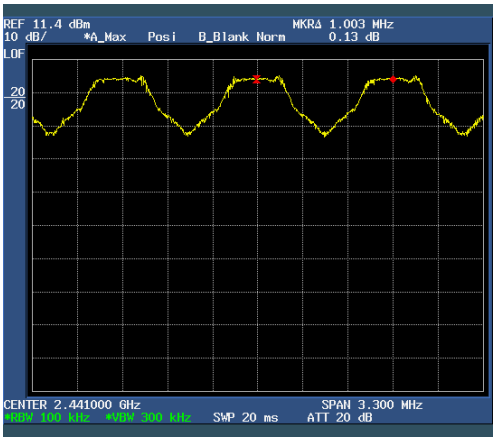
6.1.5 Test Plot (Carrier Frequency Separation)

1) GFSK

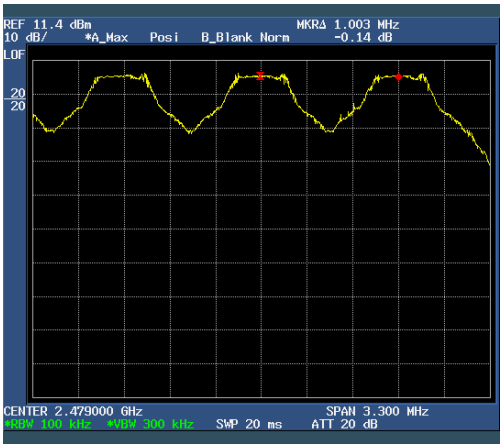
2402 MHz / 2403 MHz



2441 MHz / 2442 MHz



2479 MHz / 2480 MHz



2) 8-DQPSK

2402 MHz / 2403 MHz

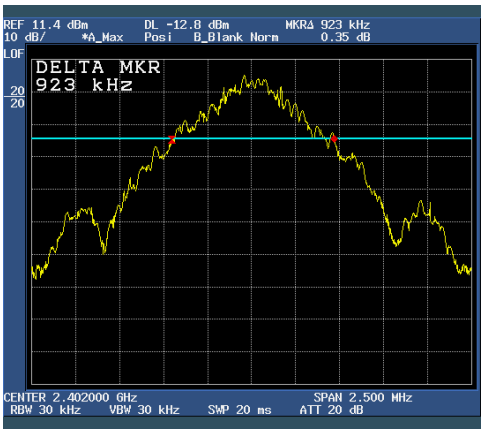
2441 MHz / 2442 MHz

2479 MHz / 2480 MHz

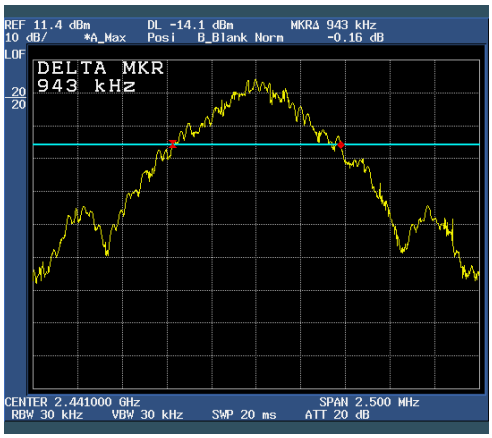
6.1.6 Test Plot (20dB Occupied bandwidth)

1) GFSK

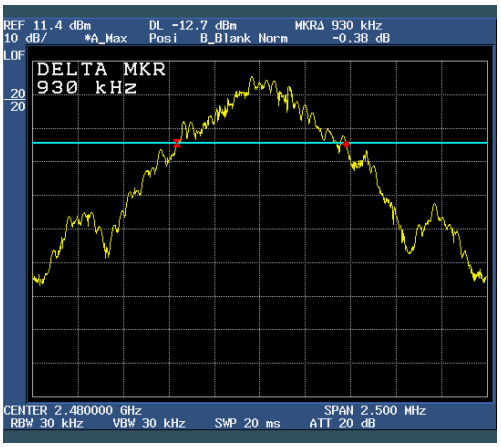
2402 MHz



2441 MHz

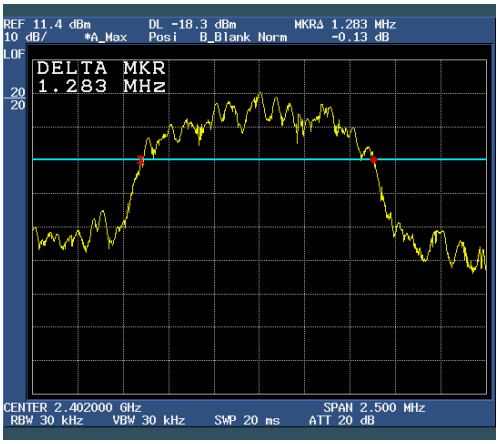


2480 MHz

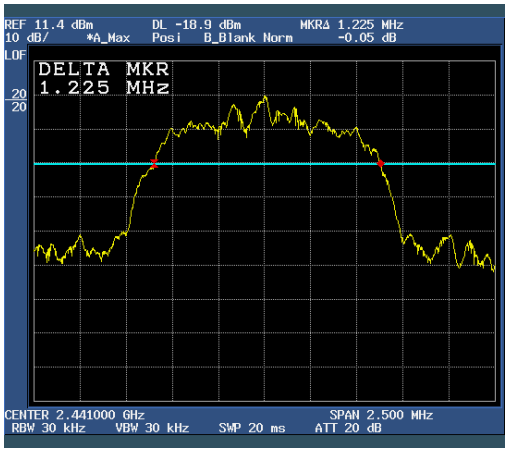


2) 8-DQPSK

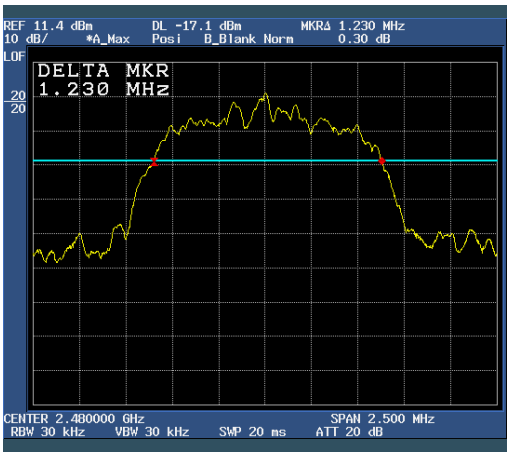
2402 MHz



2441 MHz



2480 MHz



* Note : above the 20dB Bandwidth measurement method is described FCC Public Notice (DA 00-705), and setting method on spectrum analyzer is as follows ;

- Span : approximately 2 to 3 times the 20dB bandwidth, centered on a hopping channel
- RBW : ≥ 1% of the 20dB bandwidth
- VBW : ≥ RBW
- Sweep : auto
- Detector function : peak
- Trace : max hold

6.2 Number of hopping frequencies

6.2.1 Standard Applicable [FCC §15.247(a),(1)(iii)]

Frequency hopping systems in the 2400 MHz ~ 2483.5 MHz band shall use at least 15 channels

6.2.2 Test Environment conditions

• Ambient temperature : 22 ℃,

• Relative Humidity : (54 ~ 55) % R.H.

6.2.3 Measurement Procedure

The number of hopping frequencies was measured with a spectrum analyzer connected to the antenna terminal to get higher resolution, two frequency ranges within the 2400 MHz ~ 2483.5 MHz Frequency hopping band were examined. The EUT must have its hoping function enabled.

After the trace being stable, it may prove necessary to break the span up to sections, in order to clearly show All of the hopping frequencies.

The spectrum analyzer is set to the as follows :

• Span : the frequency band of operation

• Resolution (or IF) Bandwidth(RBW) : ≥ 1% of the span

• Video (or Average) Bandwidth(VBW) : ≥ RBW

• Sweep : auto

• Detector function : peak

• Trace : max hold

6.2.4 Measurement Result

1) GFSK

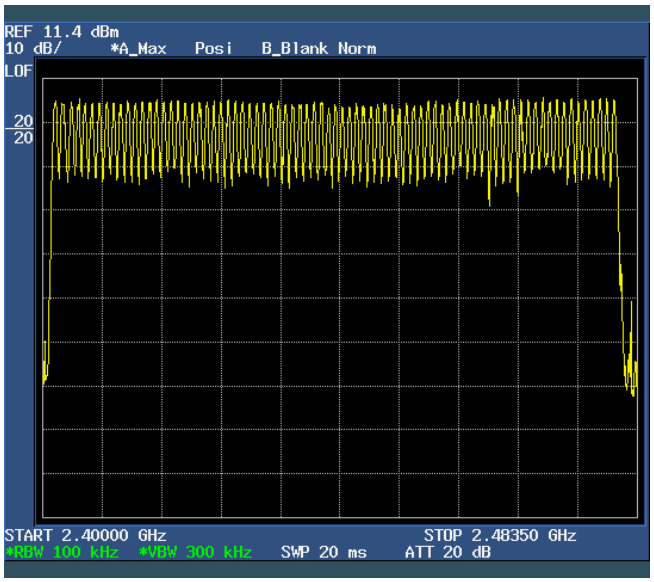
Channel Number	Hopping frequency band (MHz)	Test Results		
		Measured total number of Hopping Channels	Limit	Result
1 ~ 79	2402 ~ 2480	79	≥ 15	Pass

2) 8-DQPSK

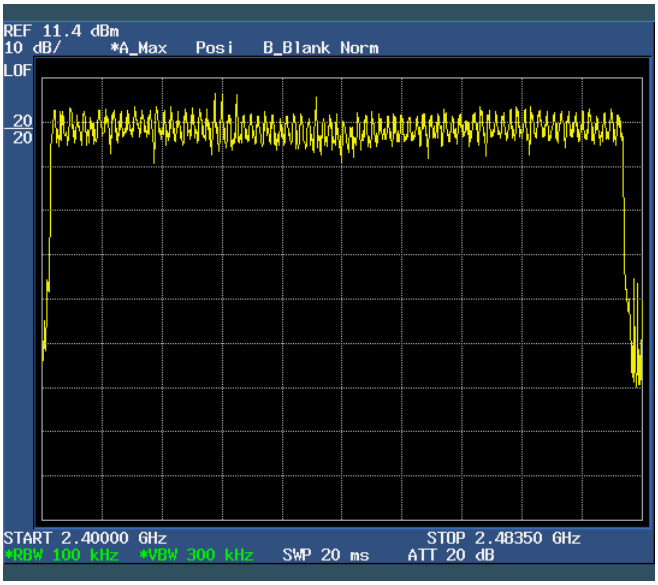
Channel Number	Hopping frequency band (MHz)	Test Results		
		Measured total number of Hopping Channels	Limit	Result
1 ~ 79	2402 ~ 2480	79	≥ 15	Pass

6.2.5 Test Plot

1) GFSK



2) 8-DQPSK



6.3 Time of occupancy (Dwell Time)

6.3.1 Standard Applicable [FCC §15.247(a),(1)(iii)]

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.

6.3.2 Test Environment conditions

• Ambient temperature : 22 ℃,

• Relative Humidity : (54 ~ 55) % R.H.

6.3.3 Measurement Procedure

The dwell time was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled. After used the marker-delta function to determine the dwell time.

The spectrum analyzer is set to the as follows :

• Span : Zero , Centered on a hopping channel

• Resolution (or IF) Bandwidth(RBW) : 1 MHz

• Video (or Average) Bandwidth(VBW) : ≥ RBW

• Sweep : auto

• Detector function : peak

• Trace : max hold

6.3.4 Measurement Result

1) GFSK

Bust width per one hop (㎲)	Test Results		
	Measured dwell time (ms)	Limit (sec)	Result
476.0	152.32	≤ 0.4	Pass

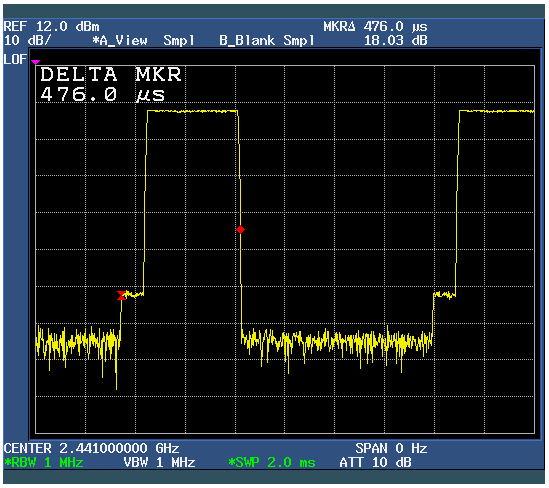
2) 8-DQPSK

Bust width per one hop (㎲)	Test Results		
	Measured dwell time (ms)	Limit (sec)	Result
522.0	167.09	≤ 0.4	Pass

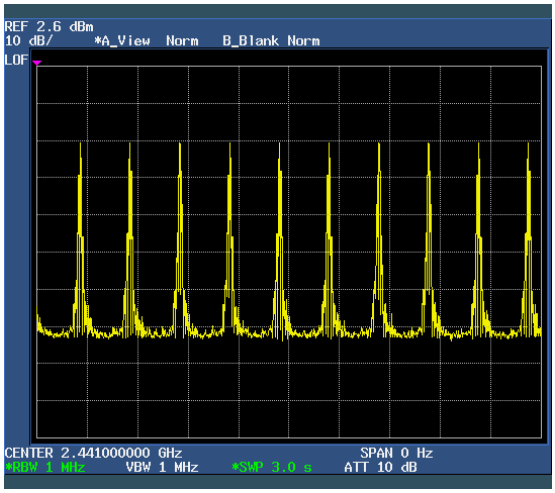
6.3.5 Test Plot

1) GFSK

Burst width in one hop (㎲)



Number of hop channel per 1 sec



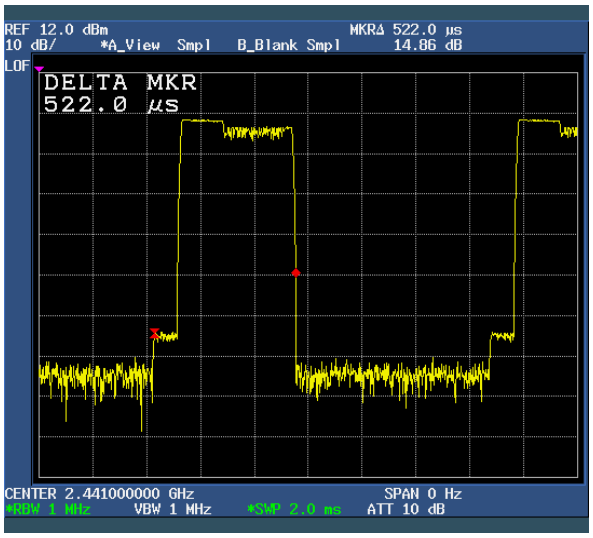
The system makes worst case 1 600 hops per second or 1 time slot has a length of 625㎲ with 79 channels. one Packet need 1 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 1600/2 = 800 hops per second with 79 channels. so have a each channel 800/79 = 10.13 times per total time of occupancy is get by multiplying the measured number of transmissions occurred during second and so for a period of 0.4 x 79 = 31.6 seconds. According to it has 10.13 x 31.6 = 320.11 times of appearance. so we have 320.11 x 476.0 ㎲ = 152.32 ms per 31.6 second.

Dwell time = time slot x hop rate / number of hopping channels x 31.6 s

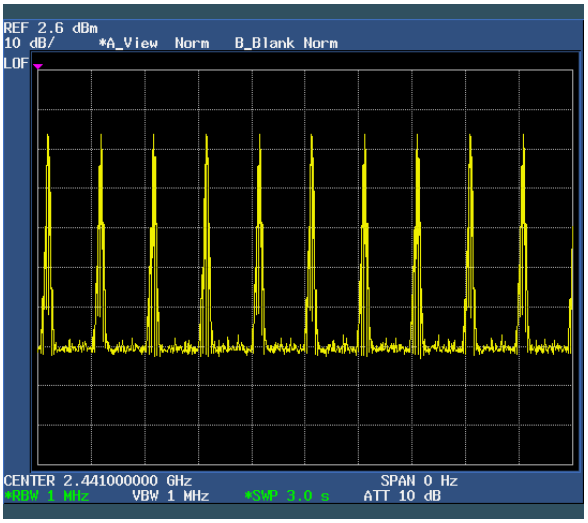
DH 1 time slot = time slot x (1600/2) / 79 x 31.6 s

2) 8-DQPSK

Burst width in one hop (㎲)



Number of hop channel per 1 sec



The system makes worst case 1 600 hops per second or 1 time slot has a length of 625㎲ with 79 channels. one Packet need 1 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 1600/2 = 800 hops per second with 79 channels. so have a each channel 800/79 = 10.13 times per total time of occupancy is get by multiplying the measured number of transmissions occurred during second and so for a period of 0.4 x 79 = 31.6 seconds. According to it has 10.13 x 31.6 = 320.11 times of appearance.
so we have 320.11 x 522.0 ㎲ = 167.09 ms per 31.6 second.
Dwell time = time slot x hop rate / number of hopping channels x 31.6 s
DH 1 time slot = time slot x (1600/2) / 79 x 31.6 s

6.4 Max. Conducted peak output power

6.4.1 Standard Applicable [FCC §15.247(b)(1)]

For systems using digital modulation in the 2400 MHz ~ 2 483.5 MHz bands : 1 Watt.

As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power.

6.4.2 Test Environment conditions

• Ambient temperature : 22 ℃,

• Relative Humidity : (54 ~ 55) % R.H.

The maximum peak conducted output power can be measured using a broadband peak RF power meter. The power meter must have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast, average-responding diode type sensor.

6.4.3 Measurement Procedure

① Reference frequency generated from the signal generator is supply to power meter input port via RF cable and attenuator, and then, it's apply to offset value on power meter as follows ;

② Remove the antenna from the EUT and then connected to power meter via a suitable low loss RF cable and attenuator.

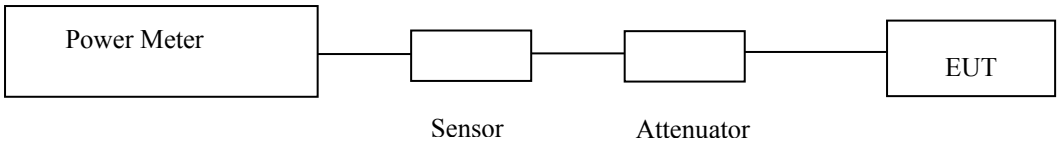
③ Place the EUT on the table and set it function disable at the lowest, middle and the highest available channels.

④ Power meter was used to directly measure the output power from RF output port on the EUT in continuously transmitting modulation

⑤ The indicated level is the peak output power.

⑥ Please refer to the detailed procedure method FCC Public Notice(KDB 558074 D01)

6.4.4 Test Setup Configuration



• Power Meter : ML2495A (Anritsu)

• Power Sensor : MA2445D (Anritsu)

• Detector mode : peak

6.4.5 Measurement Result

1) GFSK

Channel No.	Frequency [MHz]	Test Results		
		Measured power [dBm] *	Limit [mW]	Result
1	2 402	9.82	≤ 125	Pass
40	2 441	9.65		Pass
79	2 480	10.63		Pass

* it is conducted power

2) 8-DQPSK

Channel No.	Frequency [MHz]	Test Results		
		Measured power [dBm] *	Limit [mW]	Result
1	2 402	4.07	≤ 125	Pass
40	2 441	3.58		Pass
79	2 480	4.68		Pass

* it is conducted power

6.5 Conducted peak power spectral density

6.5.1 Standard Applicable [FCC §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 transmit

6.5.2 Test Environment conditions

• Ambient temperature : 22 ℃,

• Relative Humidity : (54 ~ 55) % R.H.

6.5.3 Measurement Procedure

The power spectral density conducted from the intentional radiator was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disable at the highest, middle and the lowest available channels. After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak power spectral density.

The spectrum analyzer is set to the as follows :

• Span : 900 kHz

• RBW : 3 kHz

• VBW : 10 kHz (≥ RBW)

• Sweep : auto

• Detector function : peak

• Trace : max hold

6.5.4 Measurement Result

1) GFSK

Channel NO.	Frequency [MHz]	Test Results		
		Measured PSD [dBm]	Limit	Result
1	2 402	5.83	8 dBm	Pass
40	2 441	5.17		Pass
79	2 480	6.03		Pass

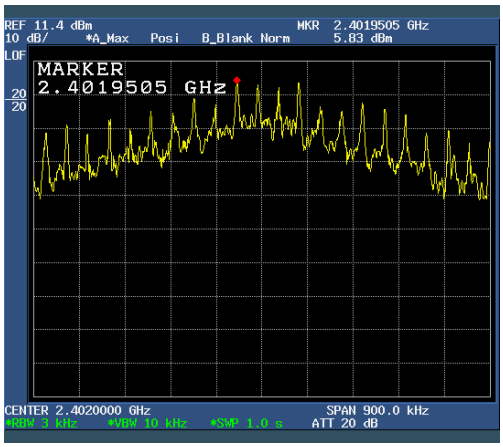
2) 8-DQPSK

Channel NO.	Frequency [MHz]	Test Results		
		Measured PSD [dBm]	Limit	Result
1	2 402	-1.80	8 dBm	Pass
40	2 441	1.51		Pass
79	2 480	-3.06		Pass

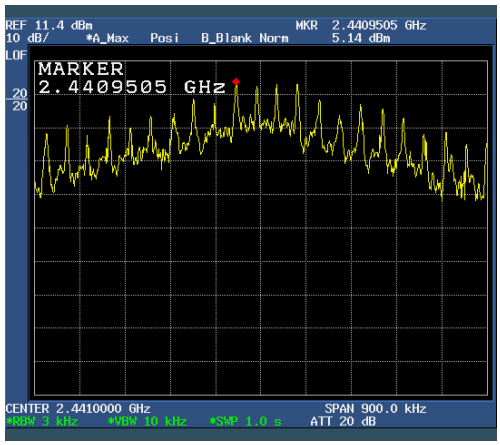
6.5.5 Test Plot

1) GFSK

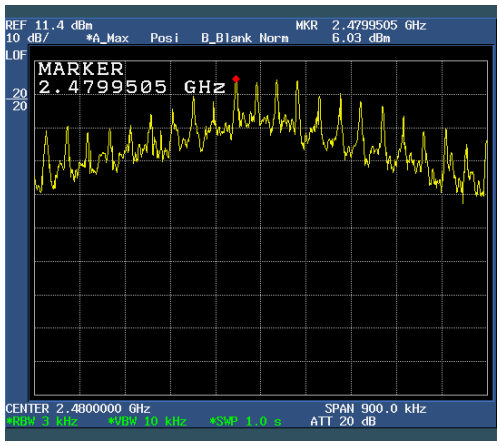
CH 1



CH 40

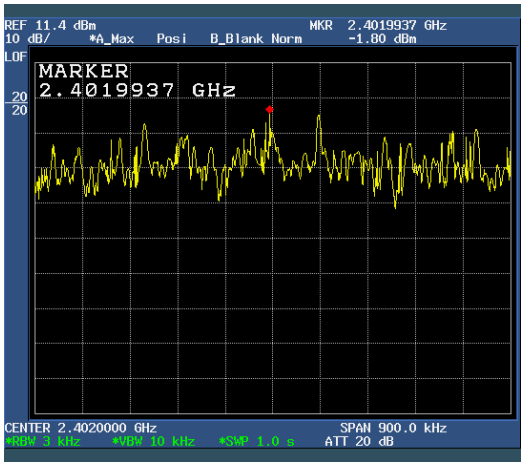


CH 79

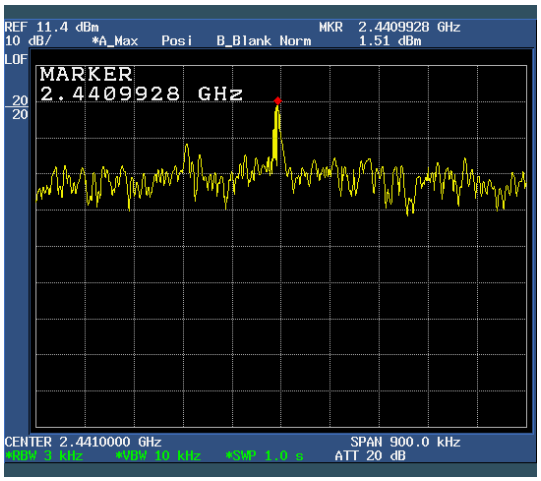


2)8-DQPSK

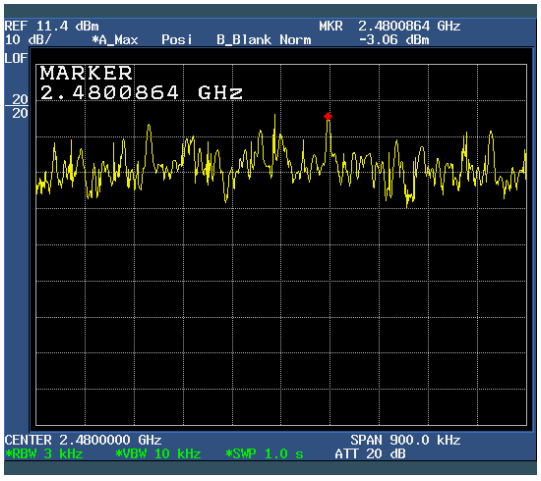
CH 1



CH 40



CH 79



6.6 Band-edge Compliance of RF Conducted emissions

6.6.1 Standard Applicable [FCC §15.247(d)]

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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 RF conducted.

6.6.2 Test Environment conditions

• Ambient temperature : 21 ℃,
• Relative Humidity : (55 ~ 56) % R.H.

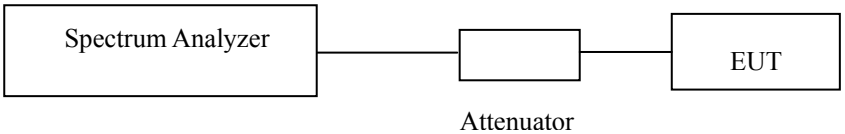
6.6.3 Measurement Procedure

① Pre-calibration for the spectrum analyzer has to be done first through a reference CW signal from CAL OUT (-10 dBm)
② Reference frequency generated from the signal generator is supply to spectrum analyzer input port via RF cable and attenuator, and then, it's apply to offset value on spectrum analyzer as follows ;
③ Remove the antenna from the EUT and then, connected to spectrum analyzer via a dc Block, suitable low loss RF cable and attenuator.
④ Place the EUT on the table and set on the emission at the band-edge,
⑤ After the trace being stable, Use the marker-to-peak function to move the marker to the peak of the in-band emission.
⑥ The marker-delta value now displayed must comply with the limit specified in above standard.
⑦ please refer to the detailed procedure method FCC Public Notice(DA 00-705)

The spectrum analyzer is set to the as follows :

• Span : Wide enough to capture the peak level of the emission operating on the channel closet to the Band-edge, as well as any modulation products which fall outside of the authorized band of operation
• RBW : ≥ 1 % of the span
• VBW : ≥ RBW
• Sweep : auto
• Detector function : peak
• Trace : Max hold

6.6.4 Test Setup Configuration



Attenuator

6.6.5 Measurement Result

1) GFSK

Setting Channel [MHz]	Frequency Range [MHz]	Test Results		
		Measured value [dBc]	Limit [dBc]	Result
Lowest channel (2402)	2400. 000 ~ 2403. 200	-67.94	≤ - 20	Pass
Highest channel (2480)	2478. 500 ~ 2483. 500	-71.15		Pass

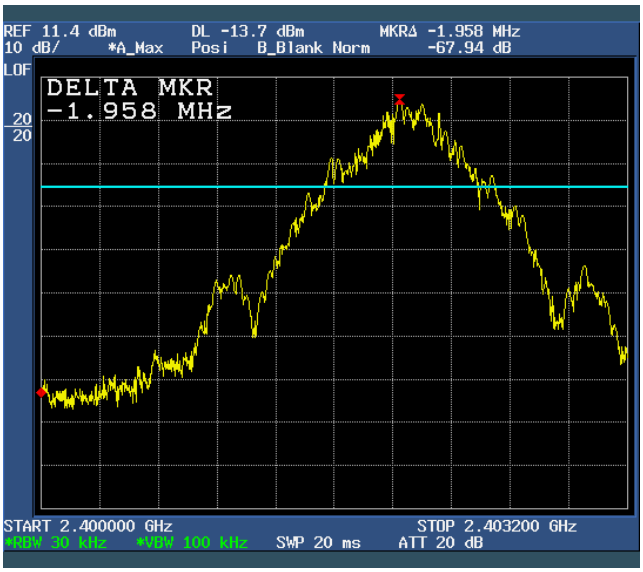
2) 8-DQPSK

Setting Channel [MHz]	Frequency Range [MHz]	Test Results		
		Measured value [dBc]	Limit [dBc]	Result
Lowest channel (2402)	2400. 000 ~ 2403. 200	-57.38	≤ - 20	Pass
Highest channel (2480)	2478. 500 ~ 2483. 500	-63.91		Pass

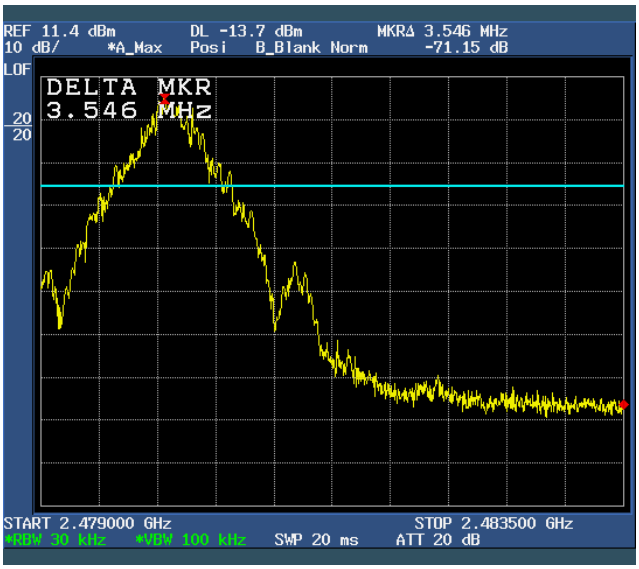
6.6.6 Test Plot

1) GFSK

Lowest channel (2402 MHz)



Highest channel (2480MHz)



2) 8-DQPSK

Lowest channel (2402 MHz)

Highest channel (2480MHz)

6.7 Band-edge Compliance of RF Radiated emissions

6.7.1 Standard Applicable [FCC §15.247]

The band-edge emissions outside these bands 2400 MHz ~ 2 483.5 MHz in which operating the hopping modulated intentional radiator is required comply with the provisions in above Required standard with respect to emission falling within restricted frequency bands. as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) Above limitation value is refer to Table [1] & [2] of Clause 5.9.1

6.7.2 Test Environment conditions

• Ambient temperature : 21 ℃,

• Relative Humidity : (55 ~ 56) % R.H.

6.7.3 Measurement Procedure

please refer to the clause 5.9.3

6.7.4 Test Setup Configuration

please refer to the clause 5.9.5

6.7.5 Measurement Result

- Non Hopping mode

1) GFSK

▣ Low band (2310 MHz ~ 2400 MHz)

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Result (dBuV/m)	Result	Mode
2391.18	25.18	30.19	74	55.37	Pass	Peak
2391.18	10.31	30.19	54	40.50	Pass	Average

▣ High band (2483.5 MHz ~ 2500 MHz)

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Result (dBuV/m)	Result	Mode
2484.32	24.73	30.60	74	55.33	Pass	Peak
2484.32	9.51	30.60	54	40.11	Pass	Average

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

Note : Correct Factor = AF + CL

AF : Antenna Factor

CL : Cable Loss

2) 8-DQPSK

▣ Low band (2310 MHz ~ 2400 MHz)

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Result (dBuV/m)	Result	Mode
2399.25	25.31	30.47	74	55.78	Pass	Peak
2399.25	10.04	30.47	54	40.51	Pass	Average

▣ High band (2483.5 MHz ~ 2500 MHz)

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Result (dBuV/m)	Result	Mode
2484.15	25.19	30.58	74	55.77	Pass	Peak
2484.15	9.17	30.58	54	39.75	Pass	Average

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

Note : Correct Factor = AF + CL

AF : Antenna Factor

CL : Cable Loss

- Hopping mode

1) GFSK

▣ Low band (2310 MHz ~ 2400 MHz)

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Result (dBuV/m)	Result	Mode
2389.73	25.31	30.17	74	55.48	Pass	Peak
2389.73	10.37	30.17	54	40.54	Pass	Average

▣ High band (2483.5 MHz ~ 2500 MHz)

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Result (dBuV/m)	Result	Mode
2484.32	24.73	30.60	74	55.33	Pass	Peak
2484.32	9.51	30.60	54	40.11	Pass	Average

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

Note : Correct Factor = AF + CL

AF : Antenna Factor

CL : Cable Loss

2) 8-DQPSK

▣ Low band (2310 MHz ~ 2400 MHz)

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Result (dBuV/m)	Result	Mode
2396.43	24.97	30.45	74	55.42	Pass	Peak
2396.43	10.01	30.45	54	40.46	Pass	Average

▣ High band (2483.5 MHz ~ 2500 MHz)

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Result (dBuV/m)	Result	Mode
2487.79	25.03	30.63	74	55.66	Pass	Peak
2487.79	10.46	30.63	54	41.09	Pass	Average

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

Note : Correct Factor = AF + CL

AF : Antenna Factor

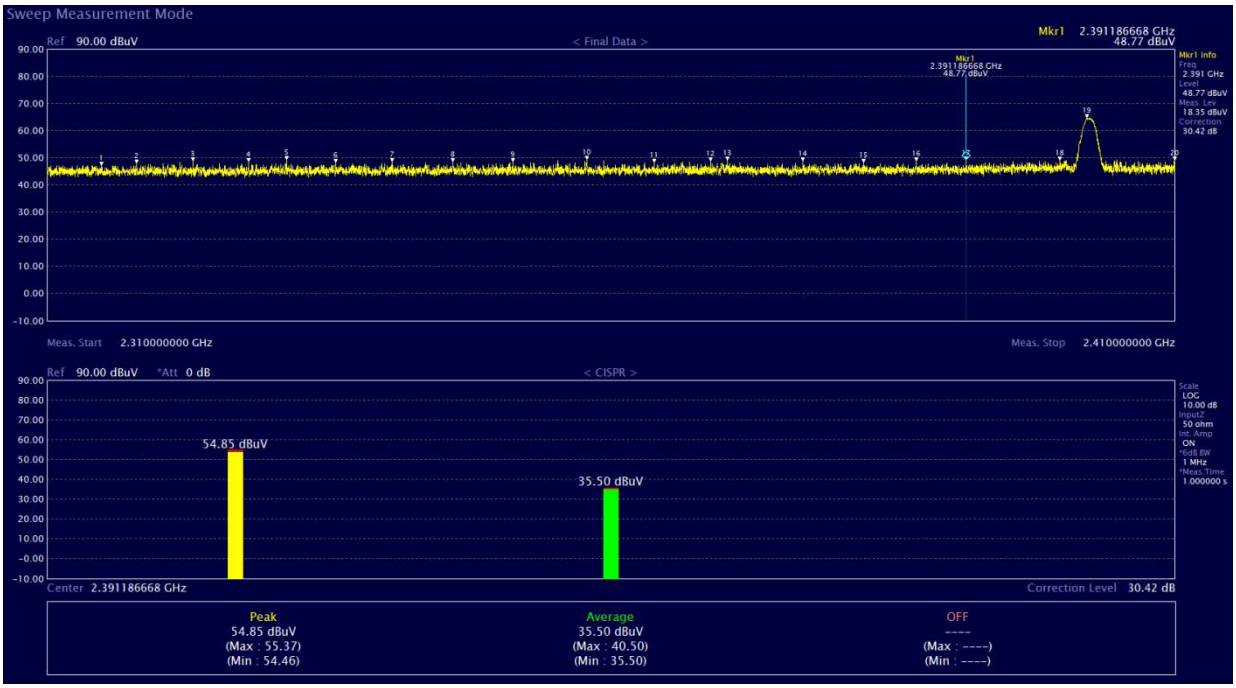
CL : Cable Loss

6.7.6 Test Plot

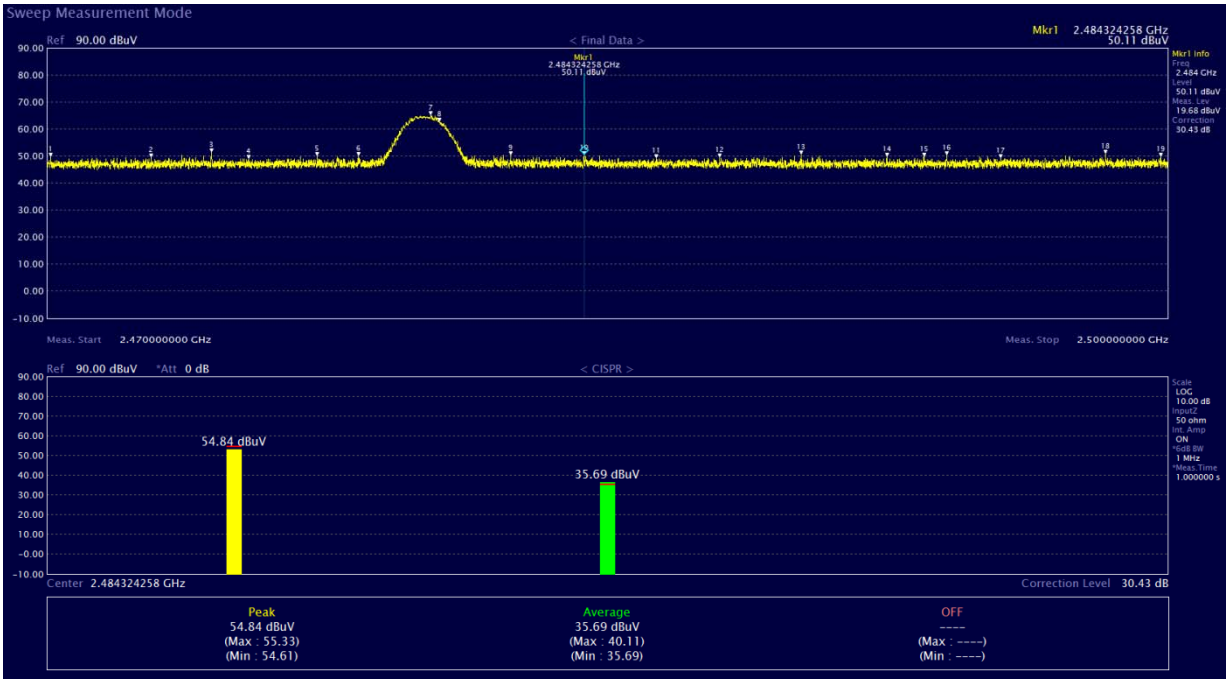
- Non Hopping mode

1) GFSK

Low Band-edge

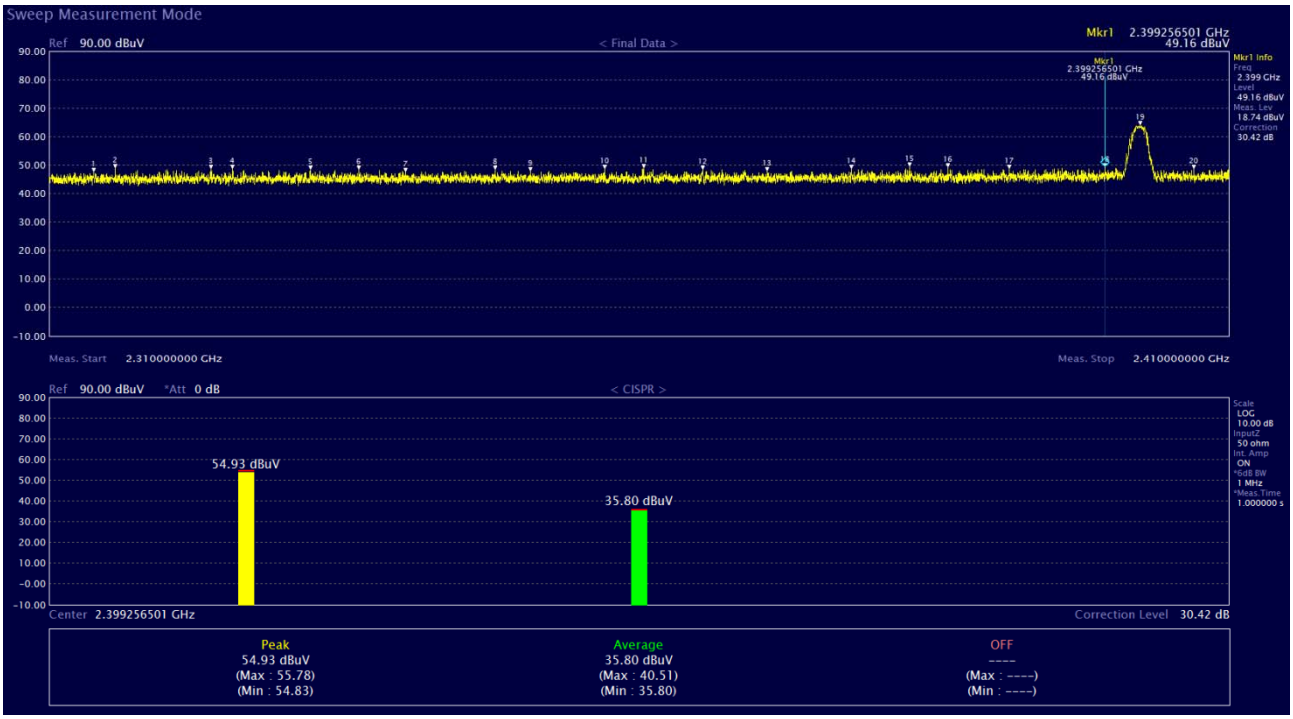


High Band-edge

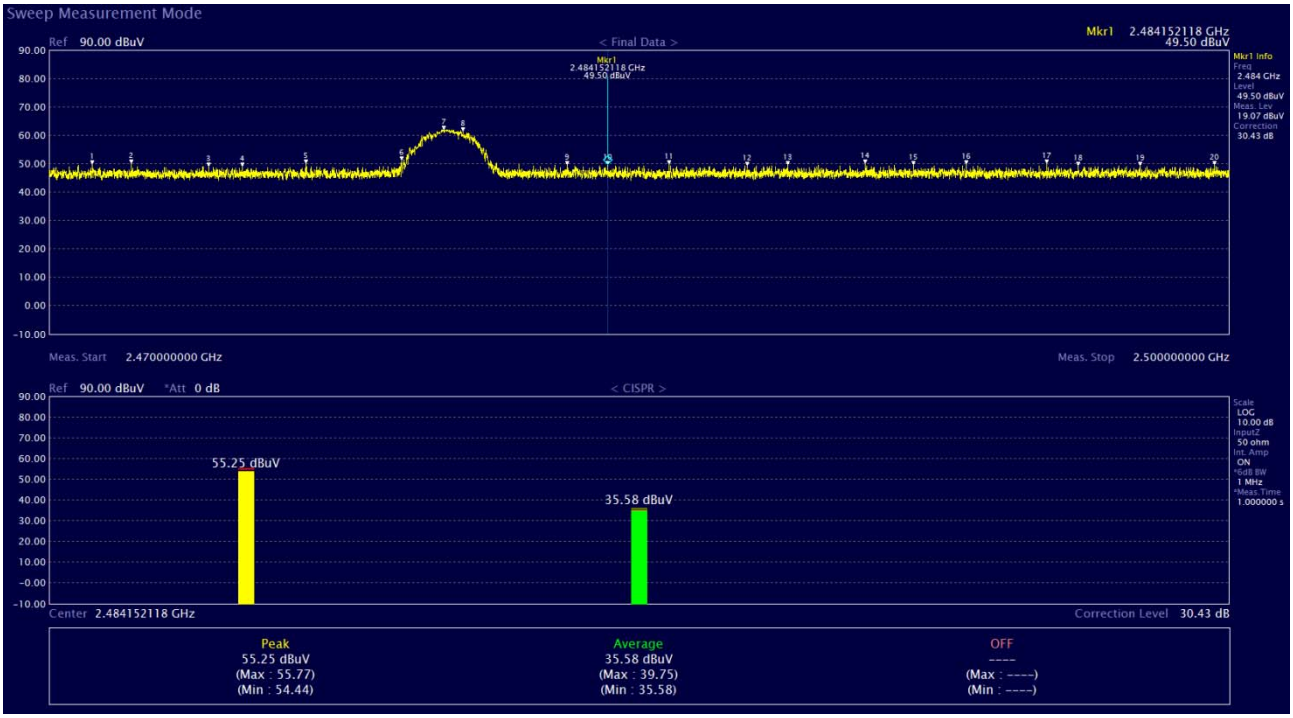


2) 8-DQPSK

Low Band-edge



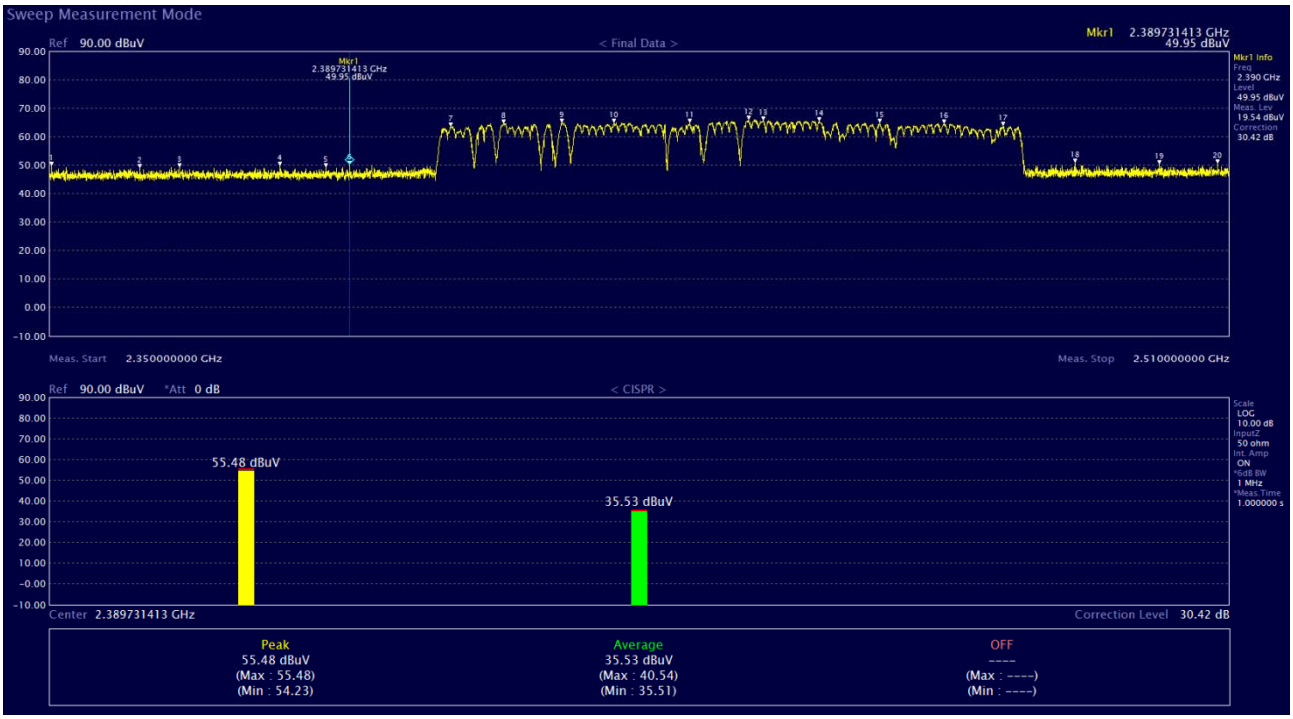
High Band-edge



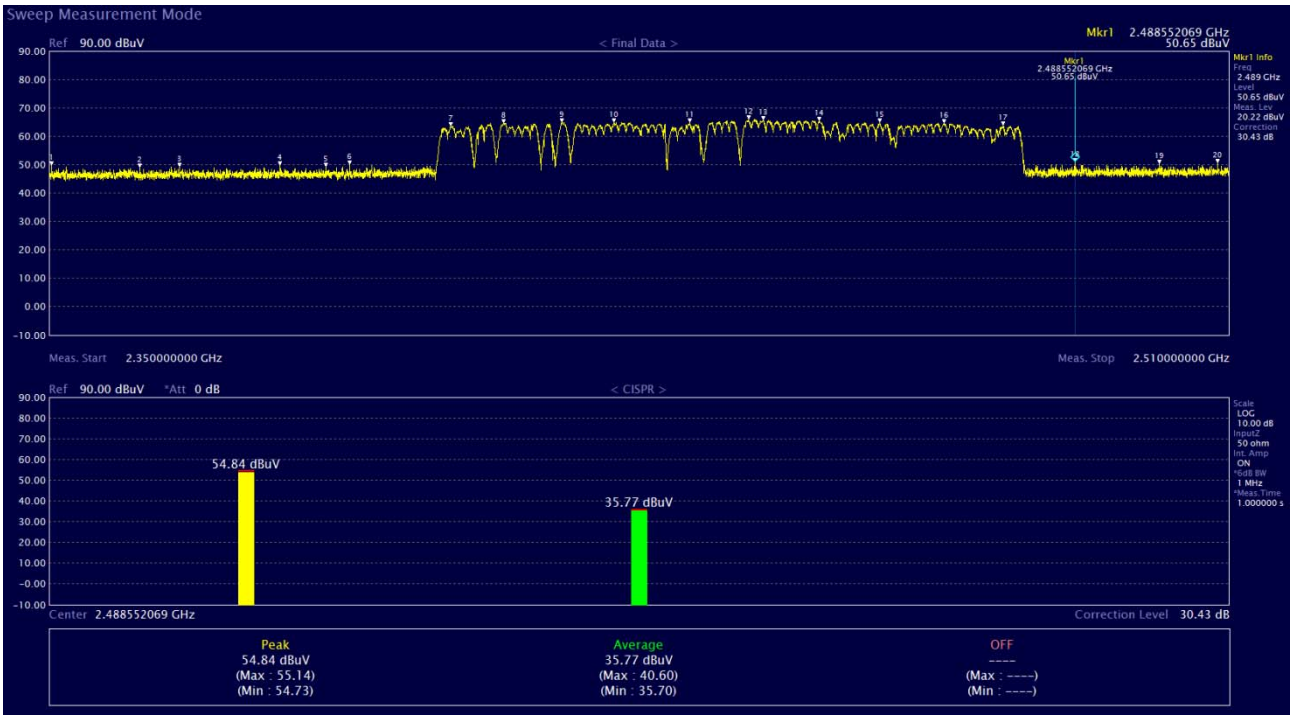
- Hopping mode

1) GFSK

Low Band-edge

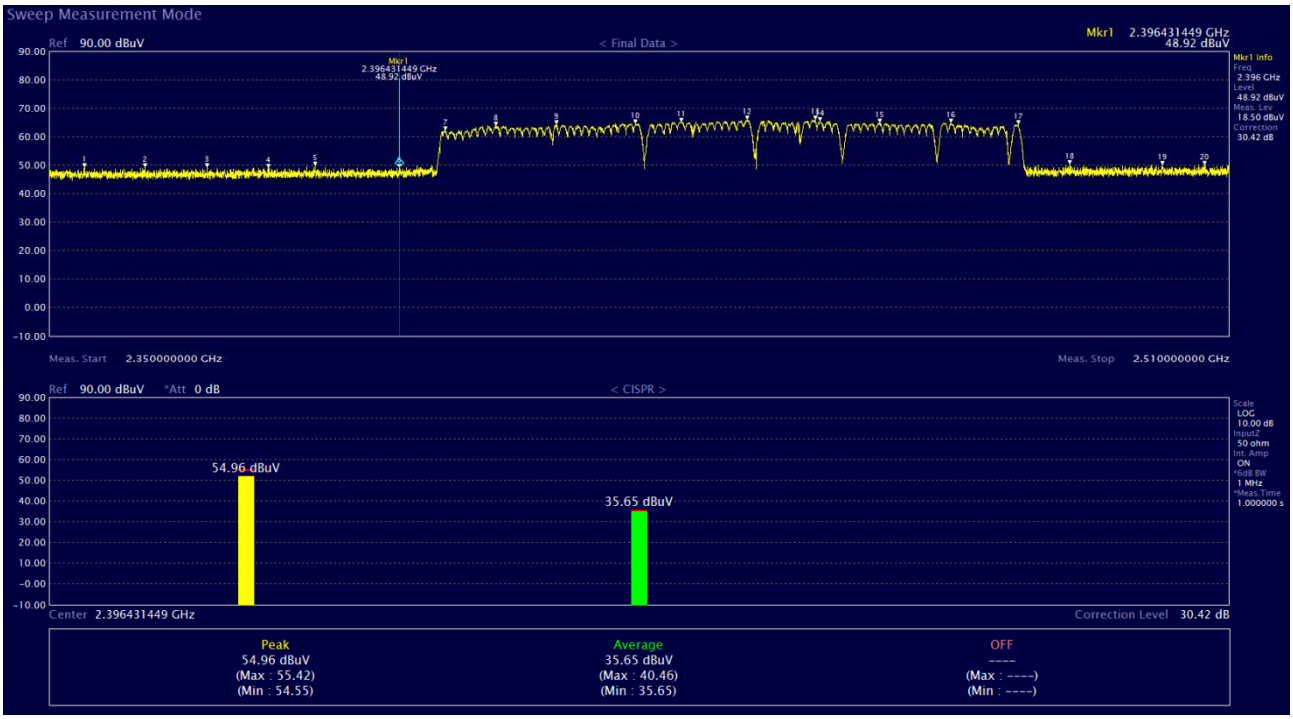


High Band-edge

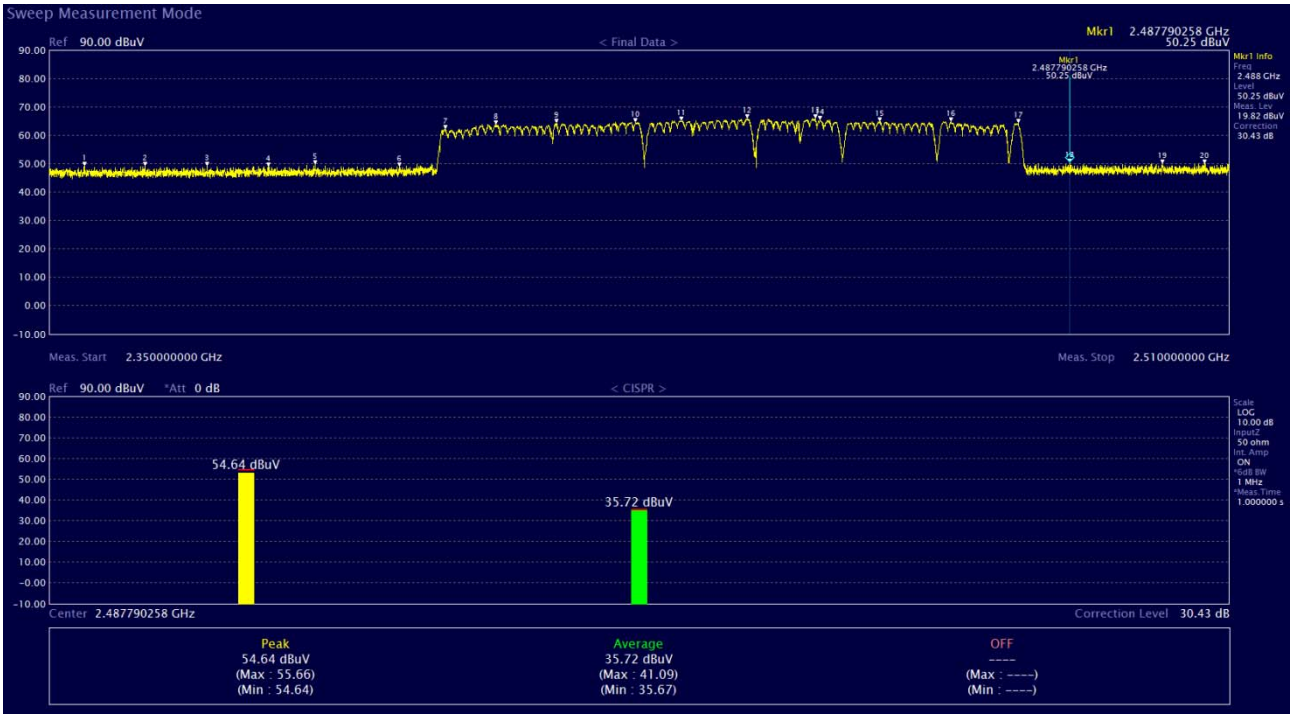


1) 8-DQPSK

Low Band-edge



High Band-edge



6.8 Spurious RF Conducted emissions

6.8.1 Standard Applicable [FCC §15.247(d)]

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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.

6.8.2 Test Environment conditions

• Ambient temperature : 22 ℃,

• Relative Humidity : (54 ~ 55) % R.H.

6.8.3 Measurement Procedure

① Pre-calibration for the spectrum analyzer has to be done first through a reference CW signal from CAL OUT(-10 dBm)

② Reference frequency generated from the signal generator is supply to spectrum analyzer input port via RF cable and attenuator, and then, it's apply to offset value on spectrum analyzer as follows ;

③ Remove the antenna from the EUT and then, connected to spectrum analyzer via a dc Block, suitable low loss RF cable and attenuator.

④ Place the EUT on the table and set on the emission at the out band

⑤ After the trace being stable, Use the marker-to-peak function to move the marker to the peak of the in-band emission.

⑥ The marker-delta value now displayed spurious emission must comply with the limit specified in above standard.

⑦ please refer to the detailed procedure method FCC Public Notice(DA 00-705)

The spectrum analyzer is set to the as follows :

• Span : wide enough to capture the peak level of the in-band emission and all spurious emissions from the Lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.

• RBW : 100 kHz

• VBW : ≥ RBW

• Sweep : Auto

• Detector function : Peak

• Trace : Max hold

6.8.4 Measurement Result

1) GFSK

Hopping mode	Channel	Frequency Range	Test Results		
			Measured value [dBc]	Limit [dBc]	Result
Hopping off	Lowest channel 1 (2402 MHz)	30 MHz ~ 2.5 GHz	-57.66	≤ - 20	Pass
		2 GHz ~ 26.5 GHz	-63.87		Pass
	Middle channel 40 (2441 MHz)	30 MHz ~ 2.5 GHz	-57.14		Pass
		2 GHz ~ 26.5 GHz	-63.89		Pass
	Highest channel 79 (2480 MHz)	30 MHz ~ 3.0 GHz	-60.19		Pass
		2 GHz ~ 26.5 GHz	-64.46		Pass
Hopping on	Hopping ch (1~ 79)	30 MHz ~ 3.0 GHz	-55.52		Pass
		2 GHz ~ 26.5 GHz	-64.00		Pass

*Note : Hopping mode and Harmonic level is 20dB below within the band that contains the highest level of the desired power

2) 8-DQPSK

Hopping mode	Channel	Frequency Range	Test Results		
			Measured value [dBc]	Limit [dBc]	Result
Hopping off	Lowest channel 1 (2402 MHz)	30 MHz ~ 2.5 GHz	-56.20	≤ - 20	Pass
		2 GHz ~ 26.5 GHz	-57.96		Pass
	Middle channel 40 (2441 MHz)	30 MHz ~ 2.5 GHz	-60.76		Pass
		2 GHz ~ 26.5 GHz	-60.95		Pass
	Highest channel 79 (2480 MHz)	30 MHz ~ 3.0 GHz	-60.65		Pass
		2 GHz ~ 26.5 GHz	-60.30		Pass
Hopping on	Hopping ch (1~ 79)	30 MHz ~ 3.0 GHz	-52.33		Pass
		2 GHz ~ 26.5 GHz	-47.63		Pass

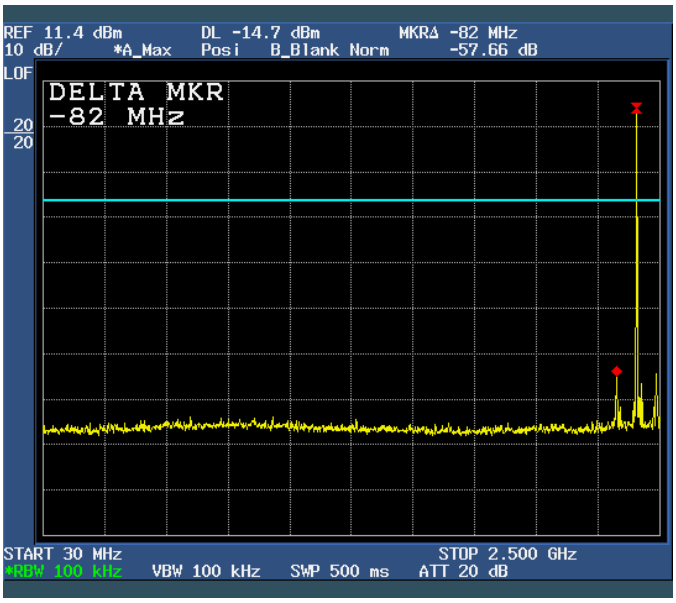
*Note : Hopping mode and Harmonic level is 20 dB below within the band that contains the highest level of the desired power

6.8.5 Test Plot (Hopping off)

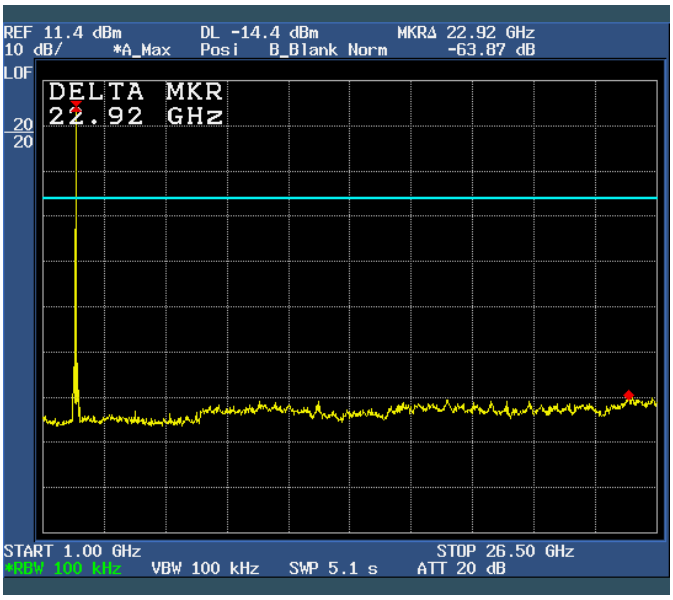
1) GFSK

▣ Setting Channel (2402 MHz)

⇒ Frequency Range (30 MHz ~ 2.5 GHz)

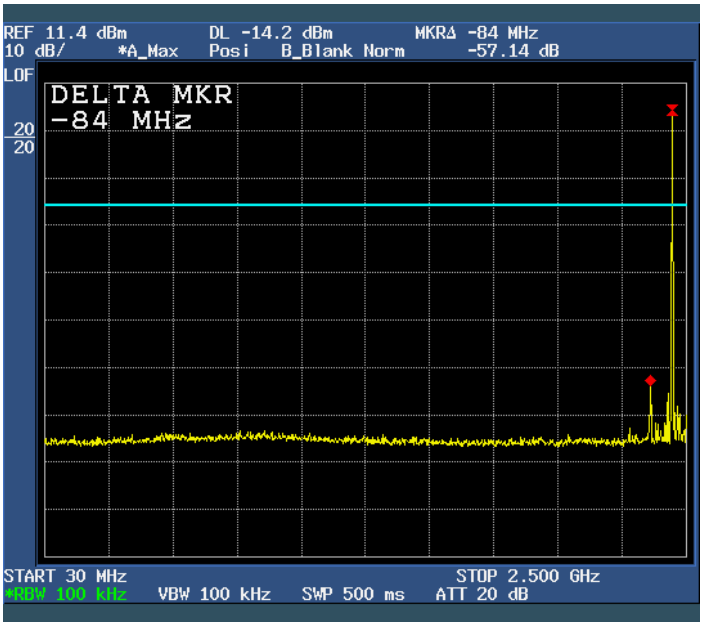


⇒ Frequency Range (2 GHz ~ 26.5 GHz)

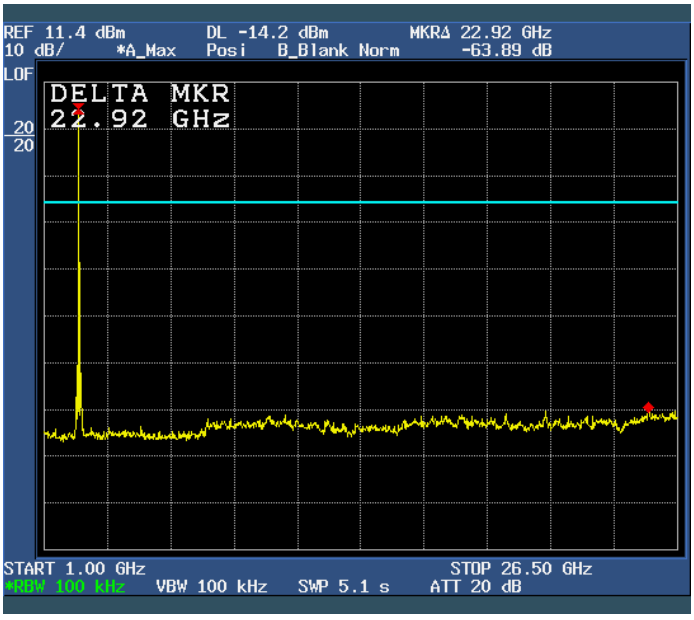


▣ Setting Channel (2441 ㎒)

⇒ Frequency Range (30 MHz ~ 2.5 GHz)

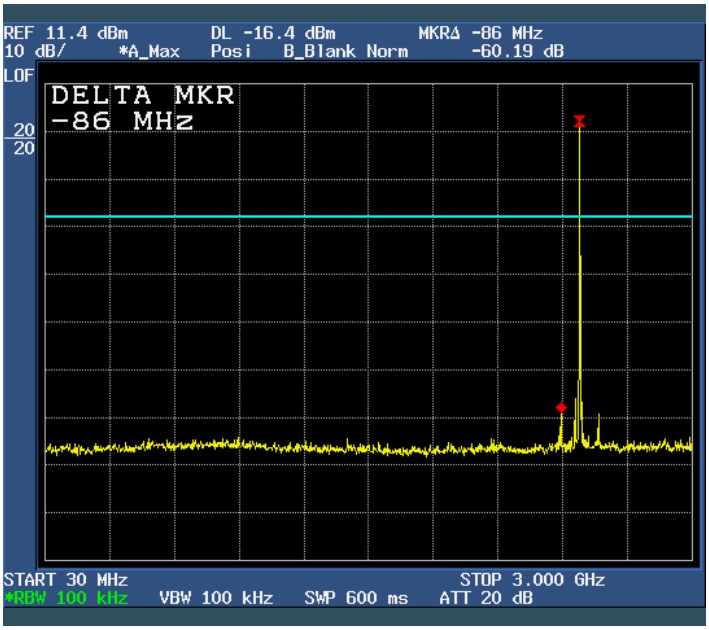


⇒ Frequency Range (2 GHz ~ 26.5 GHz)

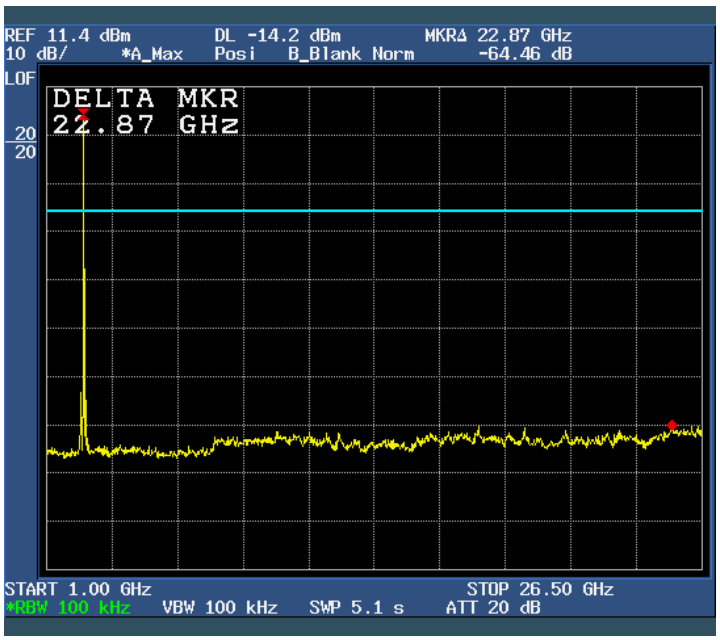


▣ Setting Channel (2480 MHz)

⇒ Frequency Range (30 MHz ~ 3.0 GHz)



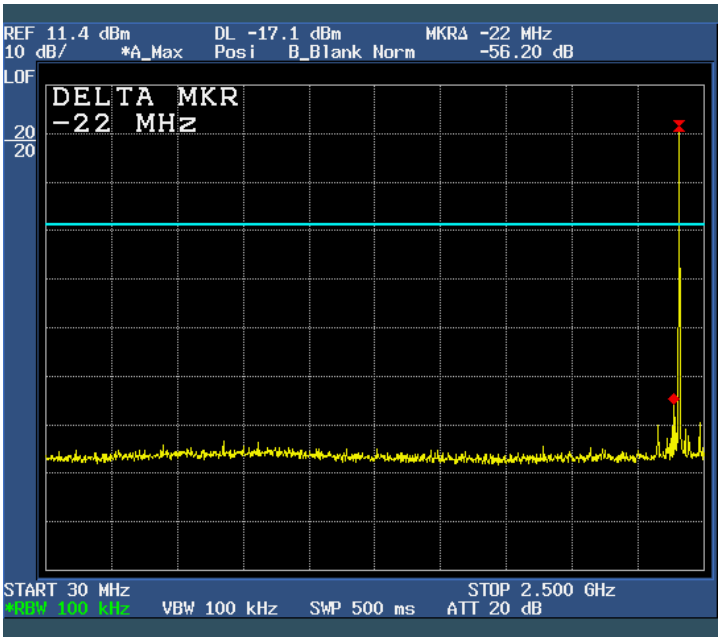
⇒ Frequency Range (2 GHz ~ 26.5 GHz)



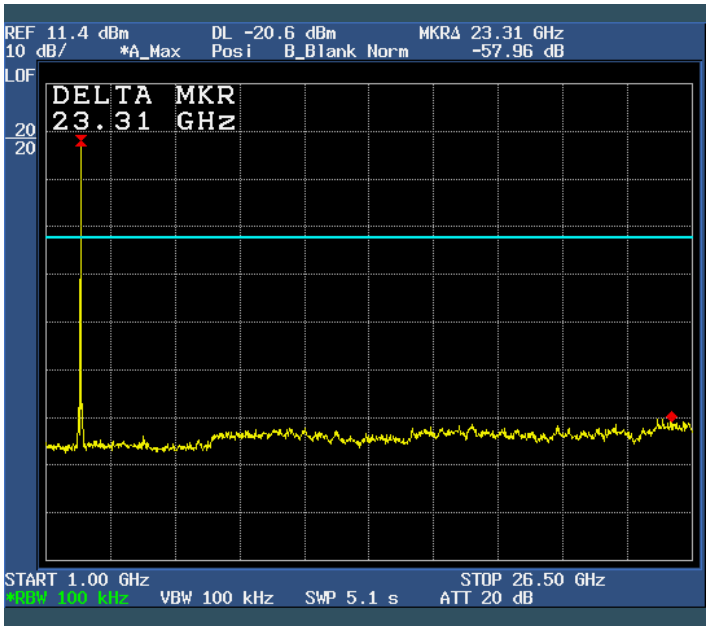
2) 8-DQPSK

▣ Setting Channel (2402 MHz)

⇒ Frequency Range (30 MHz ~ 2.5 GHz)

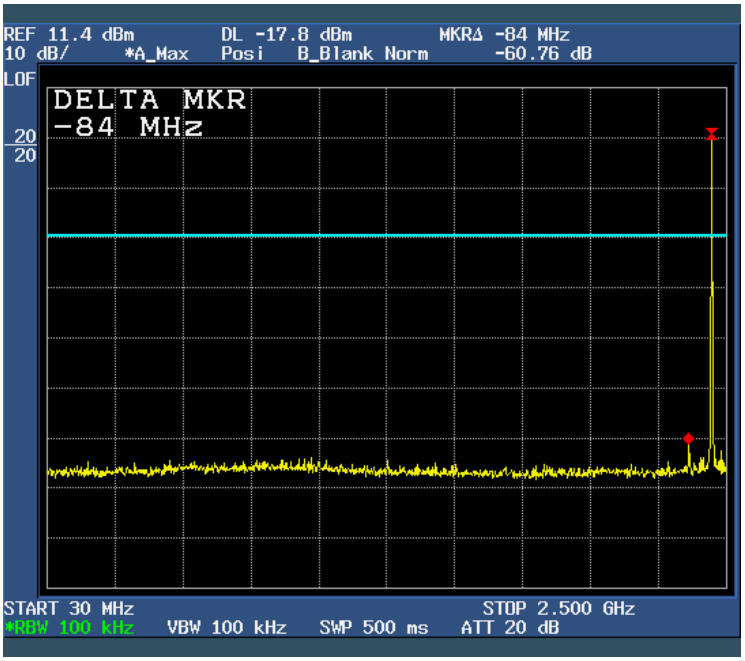


⇒ Frequency Range (2 GHz ~ 26.5 GHz)

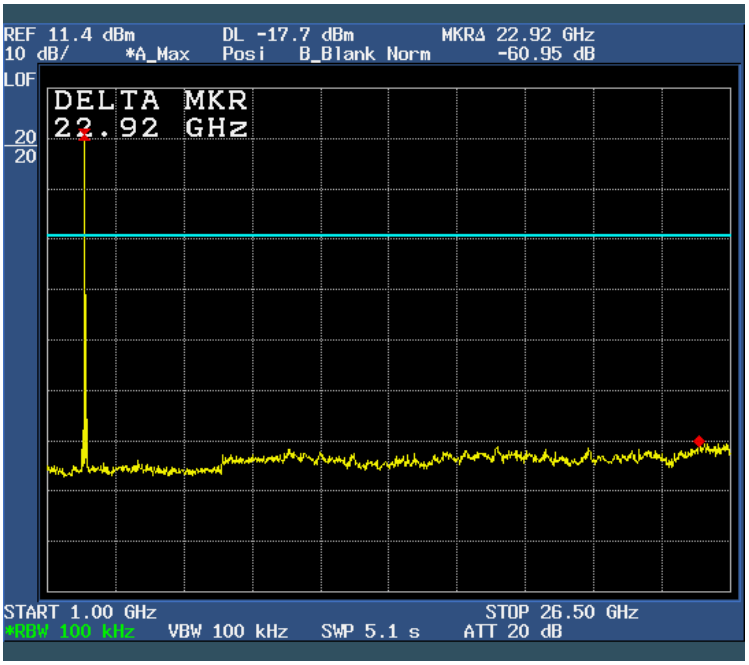


▣ Setting Channel (2441 MHz)

⇒ Frequency Range (30 MHz ~ 2.5 GHz)

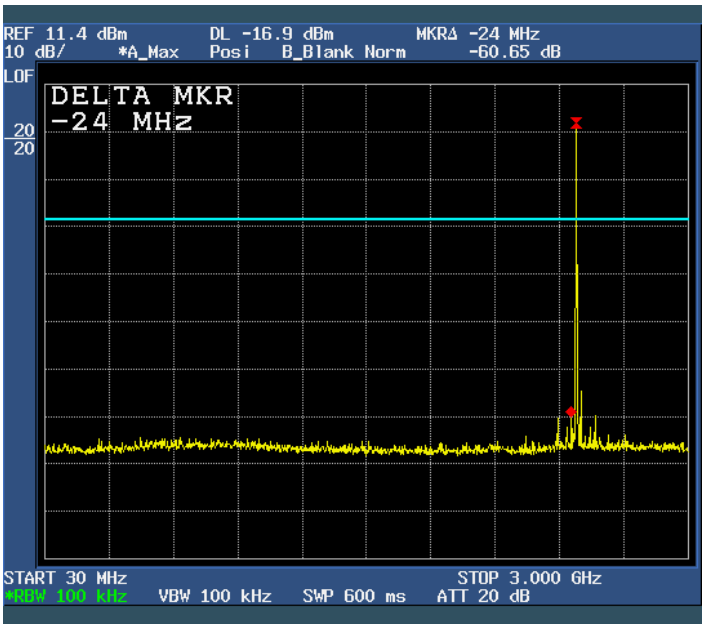


⇒ Frequency Range (2 GHz ~ 26.5 GHz)

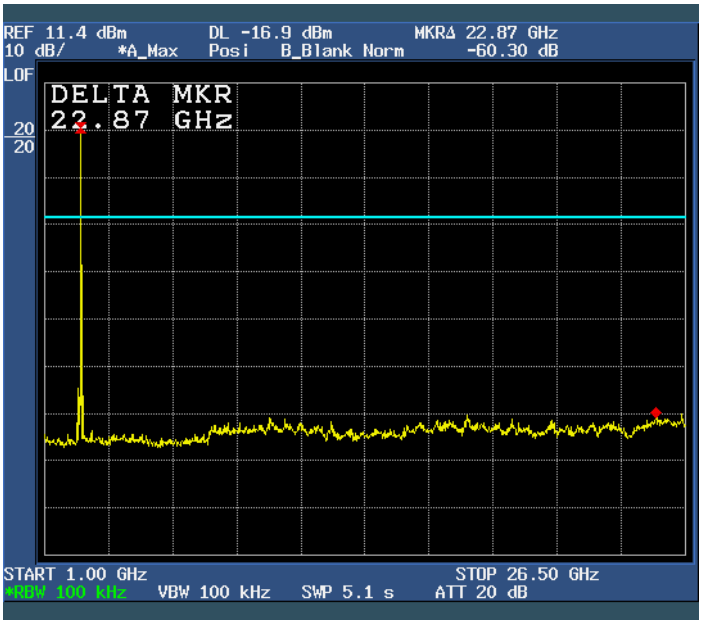


▣ Setting Channel (2480 MHz)

⇒ Frequency Range (30 MHz ~ 3 GHz)



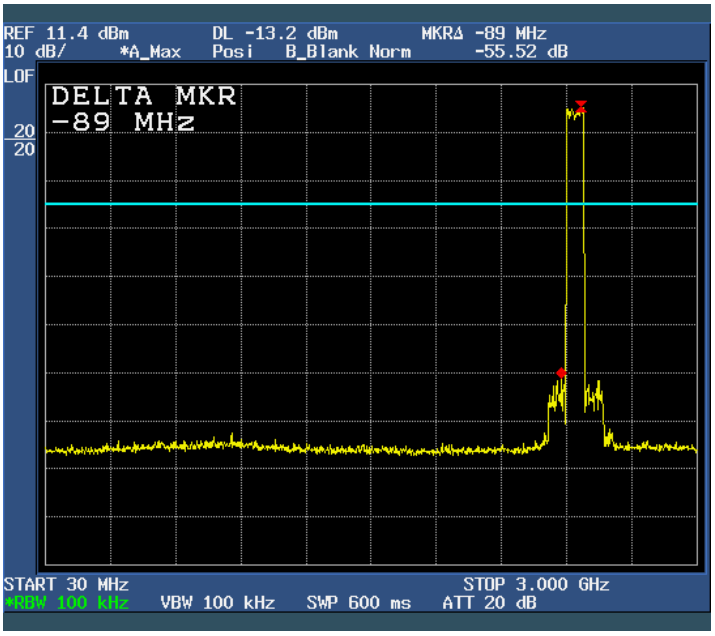
⇒ Frequency Range (2 GHz ~ 26.5 GHz)



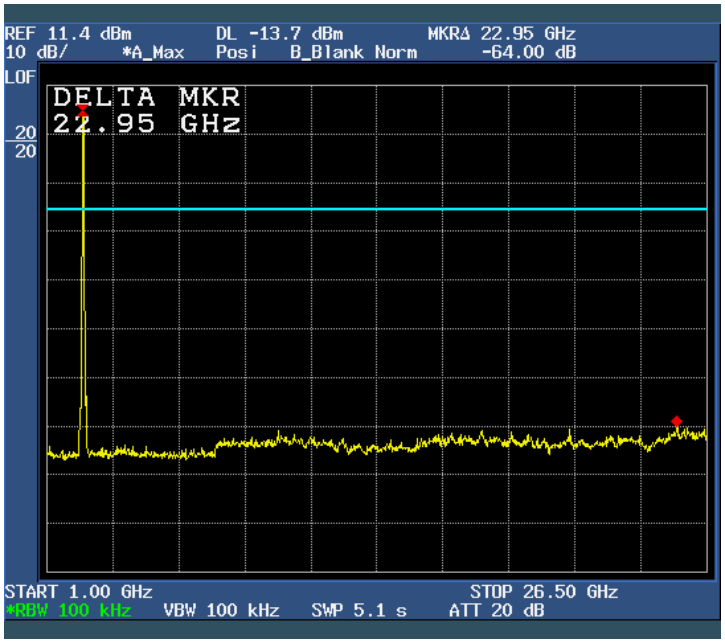
5.8.7 Test Plot (Hopping on)

1) GFSK

⇒ Frequency band (30 MHz ~ 3 GHz)

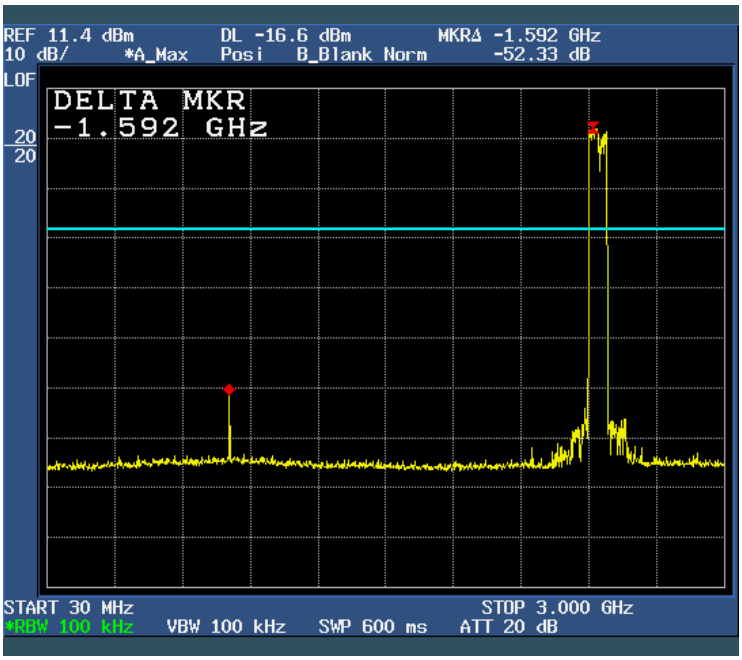


⇒ Frequency band (2 GHz ~ 26.5 GHz)

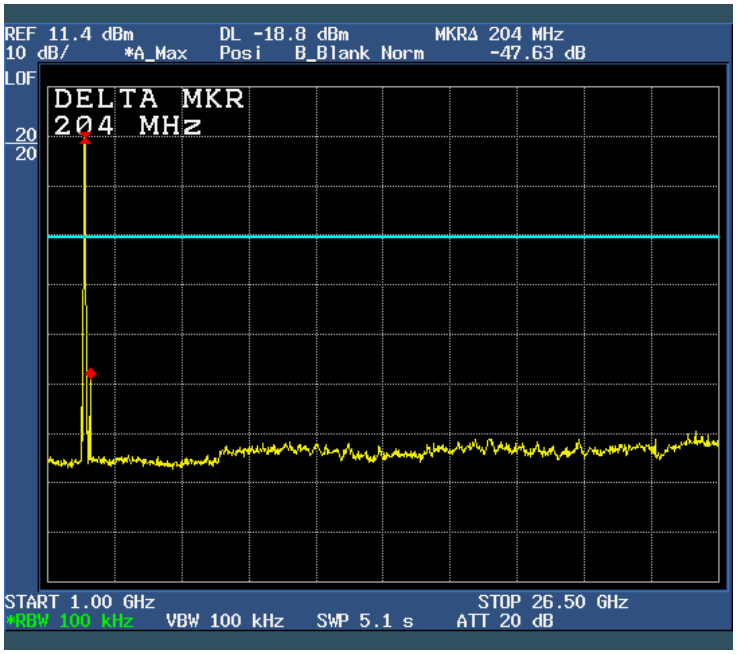


2) 8-DQPSK

⇒ Frequency band (30 MHz ~ 3 GHz)



⇒ Frequency band (2 GHz ~ 26.5 GHz)



6.9 Spurious RF Radiated emissions

6.9.1 Standard Applicable [FCC §15.247(d)]

All other emissions outside these bands shall not exceed the general radiated emission limits specified in §15.209(a). And according to §15.33(a)(1), for an intentional radiator operates below 10 GHz, the frequency Range of measurements : to the tenth harmonic of the highest fundamental frequency or to 40 GHz, Whichever is lower. In addition, radiated emissions which fall in the restricted bands, as defined inSec.15.205(a), must also comply with the radiated emission limits specified in Sec. 15.209(a)

§15.209. [Table 1] limits for radiated emissions measurements (distance at 3m)

Frequency Band [MHz]	Limit [μV/m]	Limit [dBμV/m]	Detector
30 - 88	100 **	40.00	Quasi peak
88 - 216	150 **	43.52	Quasi peak
216 - 960	200 **	46.02	Quasi peak
Above 960	500	54.00	Average

** fundamental emissions from intentional radiators operation under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz, or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part Section 15.231 and 15.241

§15.205. [Table 2] Restrict Band of Operation

Only spurious emissions are permitted in any of the frequency bands listed below ;			
[MHz]	[MHz]	[MHz]	[GHz]
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505**	16.694 75 - 16.695 25	608 - 614	5.35 - 5.46
2.173 5 - 2.190 5	16.804 25 - 16.804 75	960 – 1 240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1 300 – 1 427	8.025 - 8.
4.177 25 - 4.177 75	37.5 -38.25	1 435 – 1 626.5	9.0 - 9.2
4.207 25 - 4.207 75	73 - 74.6	1 645.5 – 1 646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1 660 – 1 710	10.6 - 12.7
6.267 75 - 6.268 25	108 - 121.94	1 718.8 -1 722.2	13.25 - 13.
6.311 75 - 6.312 25	123 - 138	2 200 – 2 300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2 310 – 2 390	15.35 - 16.2
8.362 - 8.366	156.524 75 - 156.525 25	2 483.5 – 2 500	17.7 - 21.4
8.376 25 - 8.38 6 75	156.7 - 156.9	2 690 – 2 900	22.01 - 23.12
8.414 25 - 8.414 75	162.012 5 - 167.17	3 260 – 3 267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3 332 – 3 339	31.2 - 31.8
12.519 75 - 12.520 25	240 - 285	3 345.8 – 3 358	36.43 - 36.5
12.576 75 - 12.577 25	322 - 335.4	3 600 – 4 400	Above 38.6

** Until February 1, 1999, this restricted band shall be 0.490-0.510

6.9.2 Test Environment conditions

• Ambient temperature : 21 ℃,

• Relative Humidity : (54 ~ 55) % R.H.

6.9.3 Measurement Procedure

The measurements procedure of the transmitter radiated E-field is as following describe method.

A pre-scan is performed in a Shield chamber to determine the accurate frequencies before final test, after maximum emissions level will be checked on a open test site and measuring distance is 3 m from EUT to test antenna.(O.A.T.S is ensured that comply with at least 6 dB above the ambient noise level)

① The EUT was powered ON with normal operating mode and placed on a 0.8 meter high non-conductive table on the reference ground plane. If EUT is connected to cables, that were fixed to cause maximum emission.

② For above 1 GHz, the test antenna is used on Horn antenna, and if the below 1 GHz, loop and broad- band antenna were used. It made with the antenna positioned in both the horizontal and vertical plane of polarization.

③ The output of the test antenna will be connected to a measuring receiver, and it is set to tuned over the frequency range according to required standard

④ For emission frequencies measured below 1 GHz, The measuring bandwidth and detector type of the measurement receiver is set on using measurement instrumentation employing a CISPR Quasi Peak detector, and for above 1GHz, set the spectrum analyzer on a 1 MHz resolution bandwidth with average and peak detector for each frequency.

⑤ The frequencies at which a relevant radiated signal component is detected, the test antenna will be raised and lowered through the specified heights range(from 1 to 4 meters) in horizontal polarized orientation, until an maximum signal level is detected on the measuring receiver(or spectrum analyzer).

⑥ Repeat step ⑤ with antennal in vertical polarized orientations.

⑦ The transmitter is position x, y, z axis on turn table rotating through 360 degrees, until the maximum signal level is detected by the measuring receiver.

⑧ The receiver is scanned from requested measuring frequency band and then the maximum meter reading is recorded. The radiated emissions were record the test result.

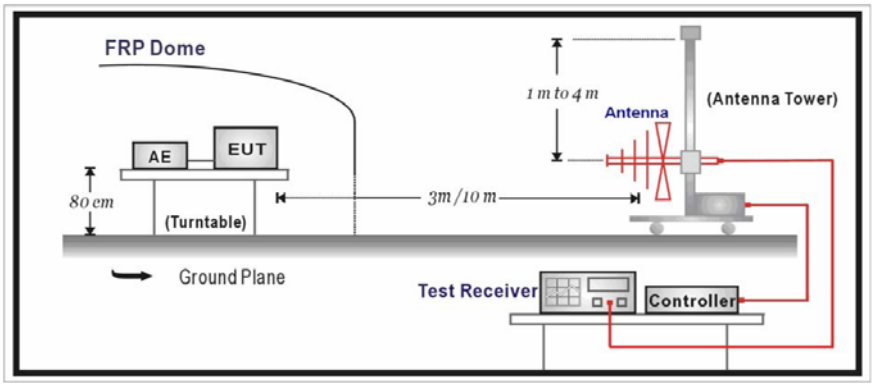
• The measurement results are obtained as described below:

Result(dBμA/m) = Reading(dBμA) + Antenna factor(dB/m)+ CL(dB) + other applicable factor (dB)

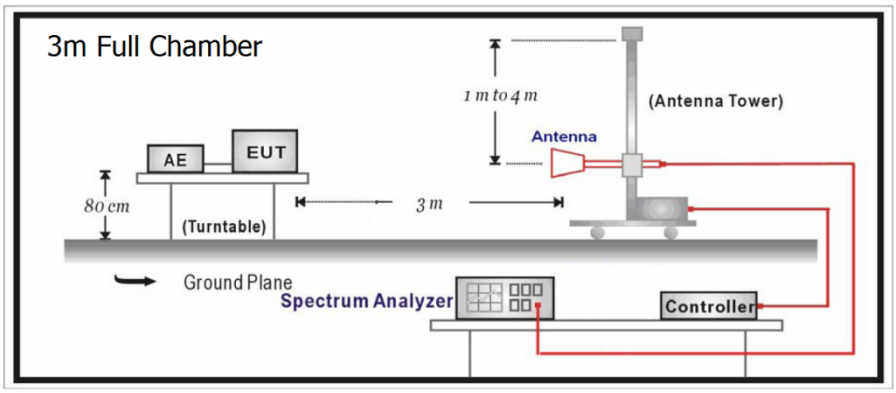
※ if necessary, additionally receiver is adopted high-pass filter and preamp because lower radiated signal

6.9.4 Test Configuration

Below 1GHz Test Setup:



Above 1GHz Test Setup:



6.9.5 Measurement Result

1) GFSK

▣ Lowest Channel 1 (2402 MHz)

Below 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
250.14	25.24	14.12	46.02	39.36	H	Pass
541.95	18.01	22.95	46.02	40.96	H	Pass
625.34	19.13	24.60	46.02	43.73	H	Pass

Above 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
9108.75	18.03	9.64	54	27.67	H	Pass
9108.75	29.16	9.64	74	38.80	H	Pass
14005.30	18.09	15.43	54	33.52	H	Pass
14005.30	29.73	15.43	74	45.16	H	Pass

▣ Middle Channel 40 (2441 MHz)

Below 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
291.82	26.95	15.94	46.02	42.89	H	Pass
541.96	18.11	22.95	46.02	41.06	H	Pass
625.35	19.05	24.60	46.02	43.65	H	Pass

Above 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
1765.05	18.48	0.06	54	18.54	V	Pass
1765.05	30.20	0.06	74	30.26	V	Pass
14821.00	18.11	14.56	54	32.67	V	Pass
14821.00	29.69	14.56	74	44.25	V	Pass

▣ Highest Channel 79 (2480 MHz)

Below 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
208.45	26.60	13.61	43.52	40.21	H	Pass
625.34	18.32	24.60	46.02	42.92	H	Pass
833.81	13.22	28.19	46.02	41.41	H	Pass

Above 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
7756.82	18.10	8.50	54	26.60	V	Pass
7756.82	29.91	8.50	74	38.41	V	Pass
13801.60	17.84	15.05	54	32.89	V	Pass
13801.60	29.68	15.05	74	44.73	V	Pass

Note : 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)
2. X axis plane was the worst test result than Y axis plane and Z axis plane.
3. Above 1 GHz is measured average and peak detector mode in accordance with FCC Rule15.35
4. Limit: 54 dBμV/m(Average), 74 dBμV/m(Peak)

2) 8-DQPSK

▣ Lowest Channel 1 (2402 MHz)

Below 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
291.82	27.05	15.94	46.02	42.99	H	Pass
541.96	18.35	22.95	46.02	41.30	H	Pass
625.34	15.97	24.60	46.02	40.57	H	Pass

Above 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
10996.20	16.94	13.13	54	30.07	H	Pass
10996.20	28.11	13.13	74	41.24	H	Pass
14209.80	17.97	14.87	54	32.84	H	Pass
14209.80	29.30	14.87	74	44.17	H	Pass

▣ Middle Channel 40 (2441 MHz)

Below 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
208.44	26.92	13.61	43.52	40.53	H	Pass
250.15	22.67	14.22	46.02	36.89	H	Pass
625.34	15.50	24.60	46.02	40.10	H	Pass

Above 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
1714.34	18.34	-0.02	54	18.32	V	Pass
1714.34	31.37	-0.02	74	31.35	V	Pass
14387.60	17.96	15.15	54	33.11	V	Pass
14387.60	30.22	15.15	74	45.37	V	Pass

▣ Highest Channel 79 (2480 MHz)

Below 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
291.82	26.09	15.94	46.02	42.03	H	Pass
625.33	18.54	24.60	46.02	43.14	H	Pass
917.14	9.89	29.50	46.02	39.39	V	Pass

Above 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
1892.25	18.54	0.24	54	18.78	H	Pass
1892.25	30.40	0.24	74	30.64	H	Pass
14515.60	18.29	14.93	54	33.22	H	Pass
14515.60	29.61	14.93	74	44.54	H	Pass

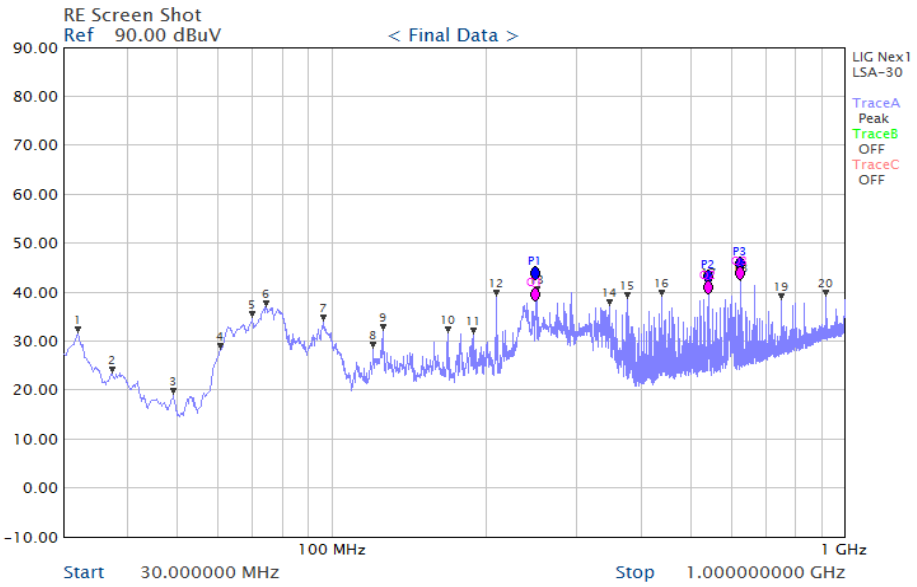
Note : 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss)
2. X axis plane was the worst test result than Y axis plane and Z axis plane.
3. Above 1 GHz is measured average and peak detector mode in accordance with FCC Rule15.35
4. Limit: 54 dBμV/m(Average), 74 dBμV/m(Peak)

6.9.6 Test Plot

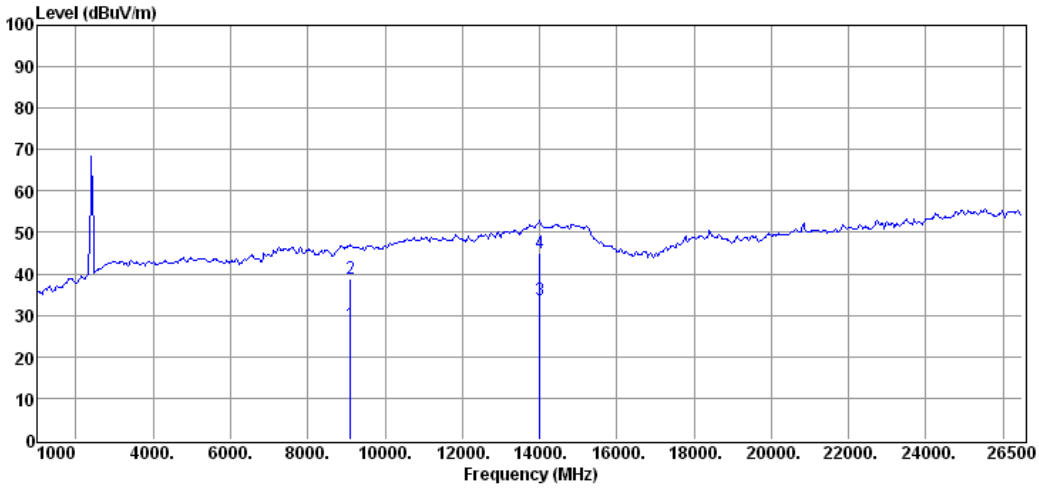
1) GFSK

▣ Lowest Channel 1 (2402 MHz)

Below 1 GHz

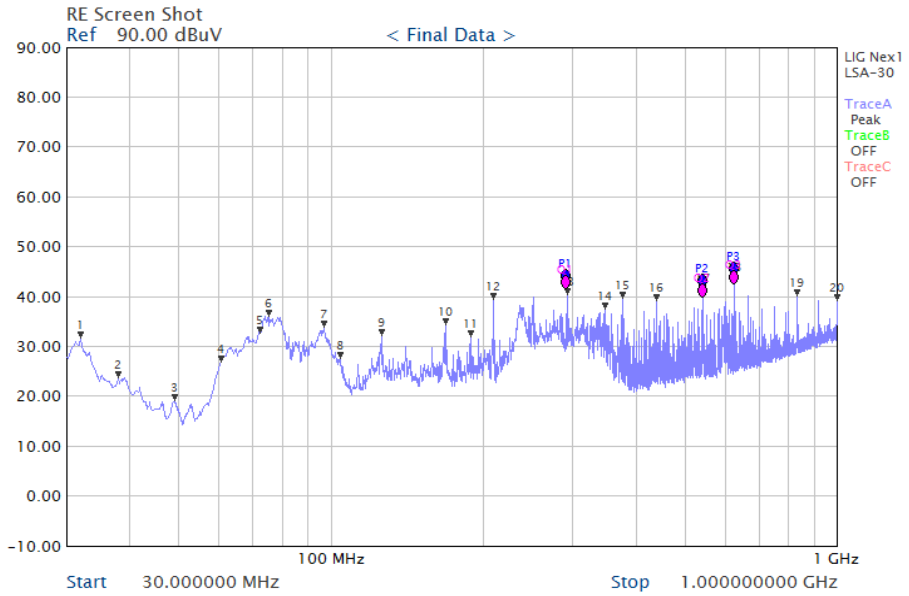


Above 1 GHz

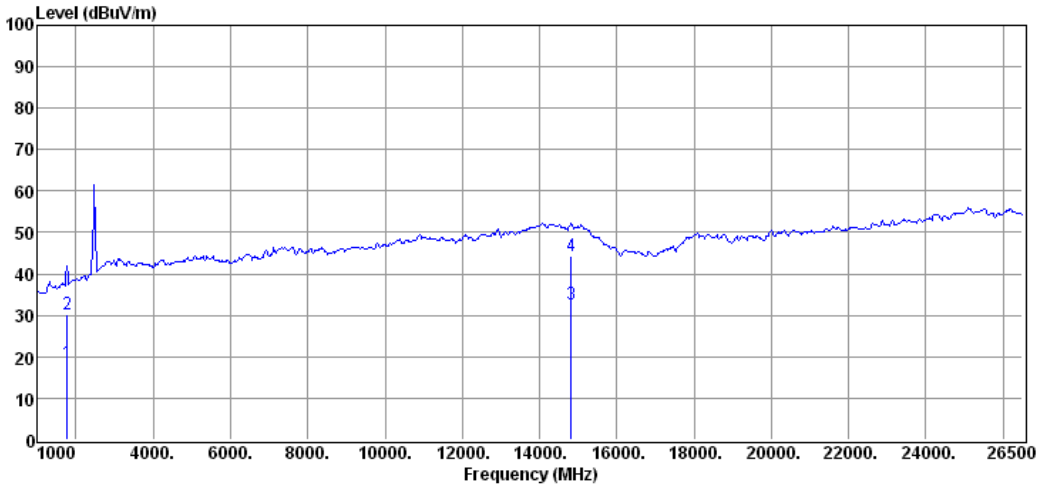


▣ Middle Channel 40 (2441 MHz)

Below 1 GHz

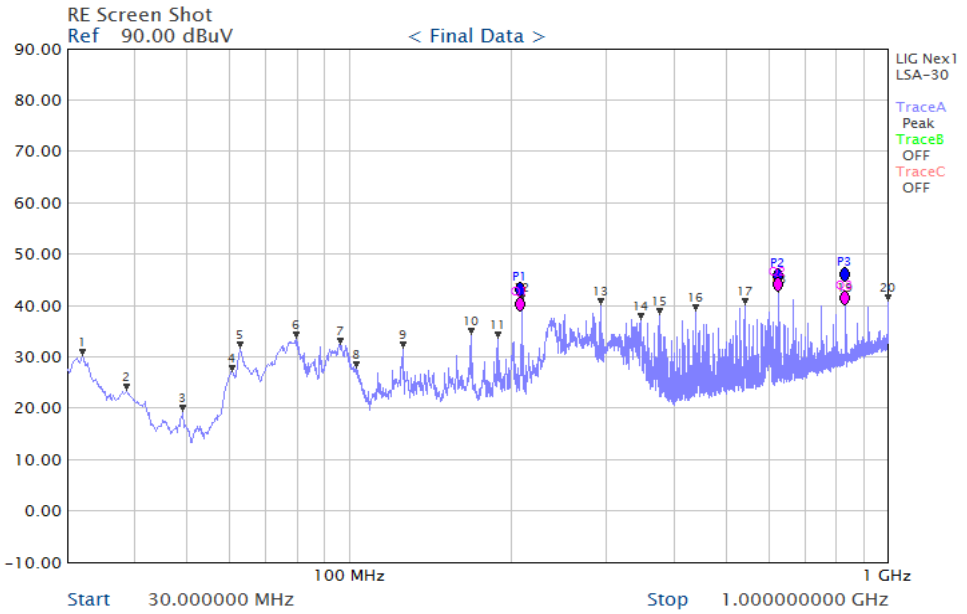


Above 1 GHz

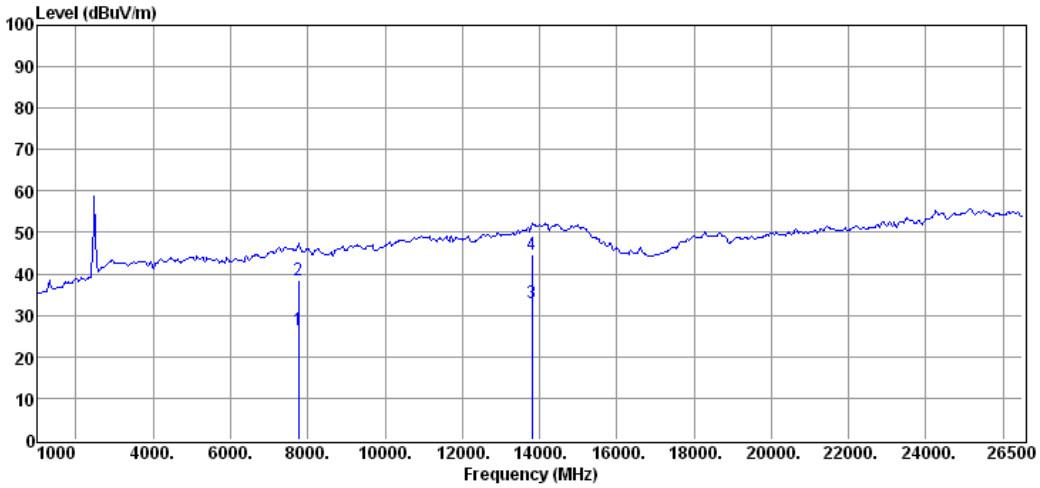


▣ Highst Channel 79 (2480 MHz)

Below 1 GHz



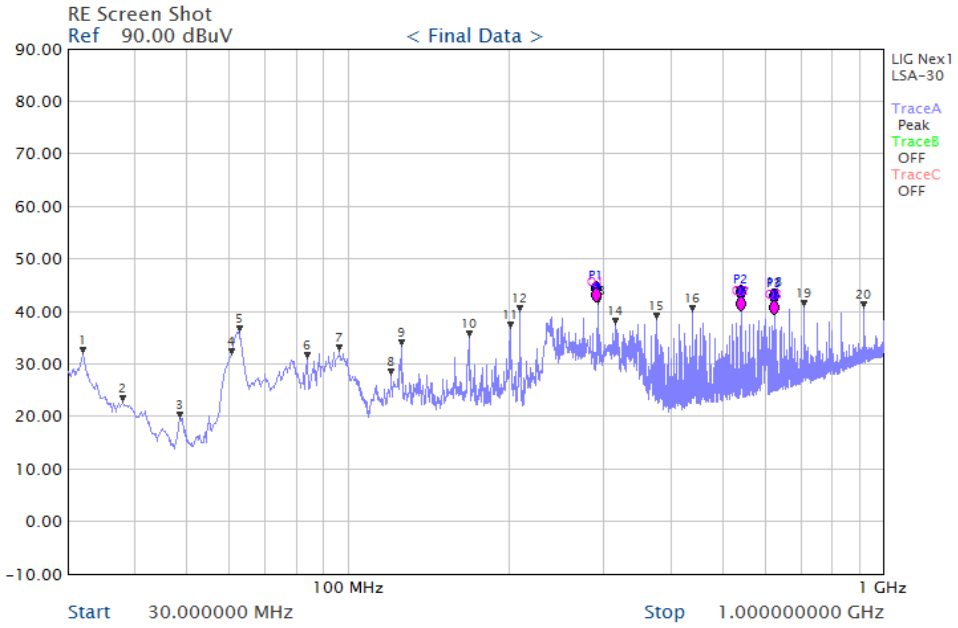
Above 1 GHz



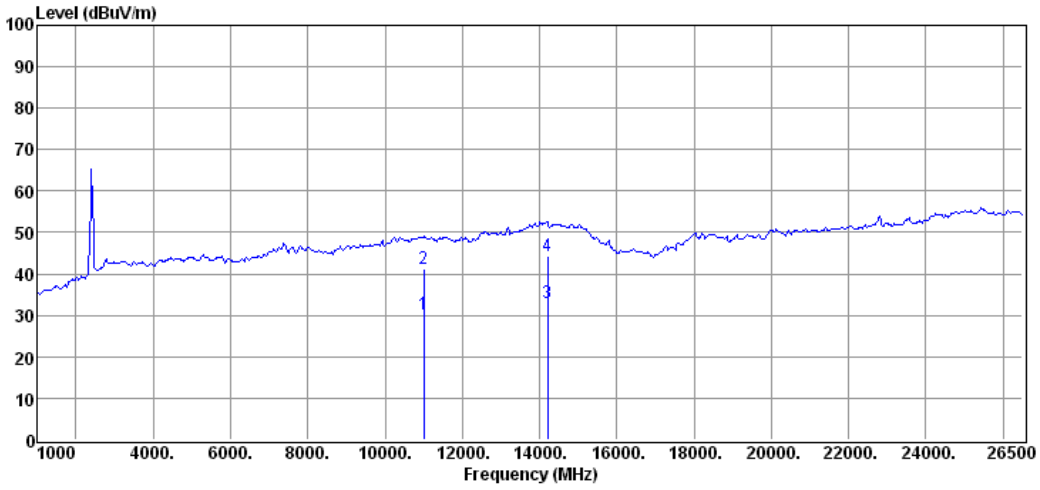
2) 8-DQPSK

▣ Lowest Channel 1 (2402 MHz)

Below 1 GHz

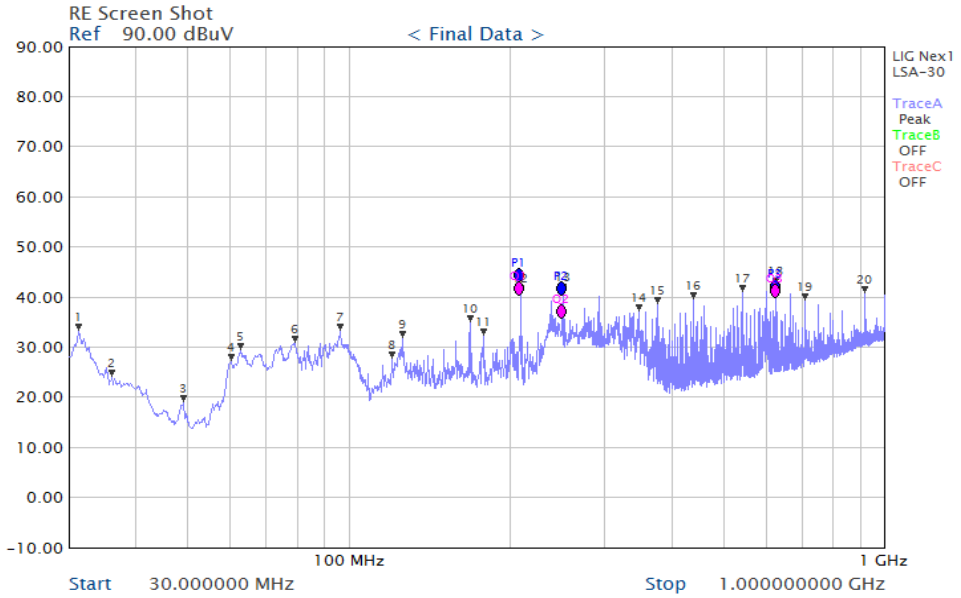


Above 1 GHz

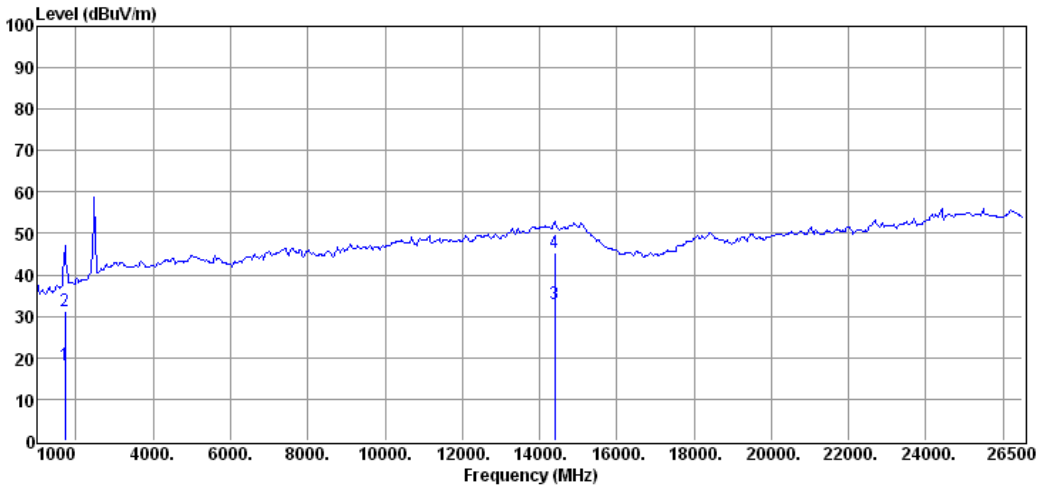


▣ Middle Channel 40 (2441 MHz)

Below 1 GHz

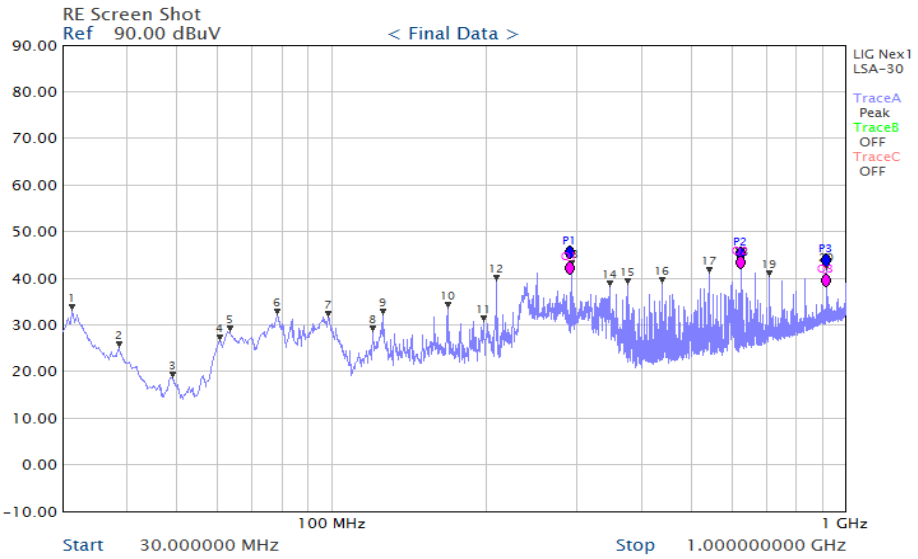


Above 1 GHz

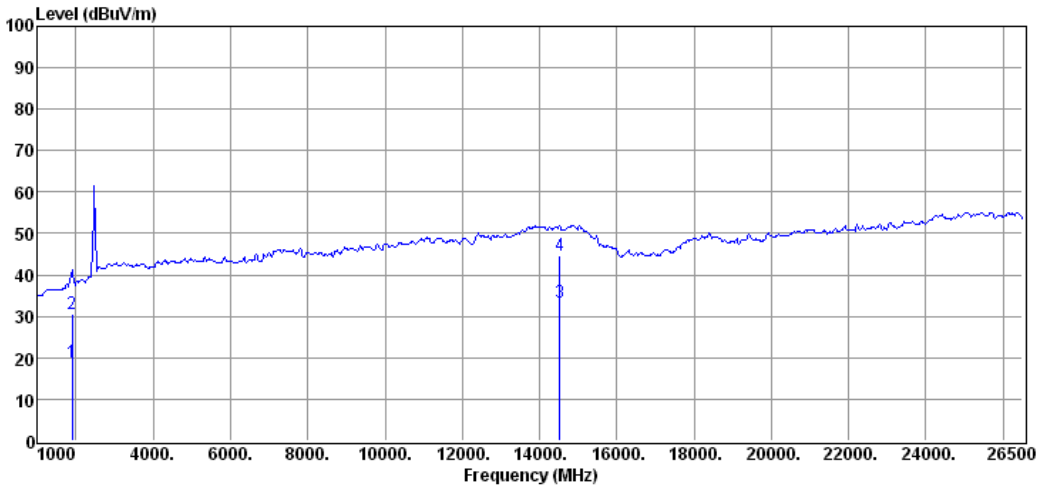


▣ Highst Channel 79 (2480 MHz)

Below 1 GHz



Above 1 GHz



6.10 Antenna requirement

6.10.1 Standard applicable [FCC §15.203, §15.247(4)(1)]

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by responsible party shall be used with the device.

The use of a permanently attached antenna or of an antenna that user a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

The manufacturer may design the unit So that broken antenna can be replaced by the user, but the Use of a standard antenna jack or electrical connector is prohibited.

And according to §15.247(4)(1), 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 6dBi.

According to above requirement standard's This product's antenna type is an Chip type and it's gain is 0 dBi, So radiated emission field strength from EUT is below requirement standard limit

6.10.2 Antenna gain

Frequency Range	Gain [dBi]	Limit [dBi]	Results
2400 MHz ~ 2483.5 MHz	2.5	≤ 6	Pass