



# RADIO TEST REPORT

Report No.: SHATBL2206027W02

Applicant:

FrSky Electronic Co., Ltd.

Address:

F-4, Building C, Zhongxiu Technology Park, No.3 Yuanxi Road, Wuxi,  
214125, Jiangsu, China

Product Name : TWIN Digital Radio System

Brand Name : FRSKY

Model Name : TWIN XLite

Series Model : TWIN XLite S; TWIN XLite Pro; TWIN Lite  
Module; TWIN Lite Pro Module;  
TWMX;TWR18;TWR8;TWSR8;TWGR8;TWGR6;

Test Standard : FCC Part 15.247

FCC ID : XYFTWINXLITE

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### TEST RESULT CERTIFICATION

Applicant.....: FrSky Electronic Co., Ltd.  
Address.....: F-4, Building C, Zhongxiu Technology Park, No.3 Yuanxi Road,  
Wuxi, 214125, Jiangsu, China  
Manufacturer's Name.....: FrSky Electronic Co., Ltd.  
Address.....: F-4, Building C, Zhongxiu Technology Park, No.3 Yuanxi Road,  
Wuxi, 214125, Jiangsu, China  
Product Description  
Product Name.....: TWIN Digital Radio System  
Brand Name .....: FRSKY  
Model Name.....: TWIN XLite  
Series Model.....: TWIN XLite S; TWIN XLite Pro; TWIN Lite Module; TWIN Lite Pro  
Module; TWMX;TWR18;TWR8;TWSR8;TWGR8;TWGR6;  
Test Standards.....: FCC Part 15.247  
Test Procedure.....: ANSI C63.10-2013

This device described above has been tested by ATBL, the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Date of receipt of test item.....: 27Jun. 2022  
Date (s) of performance of tests. : 27Jun. 2022~05Jul. 2022  
Date of Issue.....: 11Aug. 2022  
Test Result.....: Pass

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(Eric liu)

Report Approved by :

*Ghost Li.*

(GhostLi)

Authorized Signatory :

*Terry yang*

(Terry yang)



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**Revision History**

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	11Aug. 2022	SHATBL2206027W02	ALL	Initial Issue

### 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:  
KDB 558074 D01 15.247 Meas Guidance v05r02.

FCC Part15.247,Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	--
15.247(a)(1)	Hopping Channel Separation	PASS	--
15.247(a)(1)&(b)(1)	Output Power	PASS	--
15.209	Radiated Spurious Emission	PASS	--
15.247(d)	Conducted Spurious & Band Edge Emission	PASS	--
15.247(a)(1)(iii)	Number of Hopping Frequency	PASS	--
15.247(a)(1)(iii)	Dwell Time	PASS	--
15.247(a)(1)	Bandwidth	PASS	--
15.205	Restricted bands of operation	PASS	--
Part 15.247(d)/part 15.209(a)	Band Edge Emission	PASS	--
15.203	Antenna Requirement	PASS	--

**NOTE:**

- (1) 'N/A' denotes test is not applicable in this Test Report.
- (2) All tests are according to ANSI C63.10-2013.



## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF THE EUT

Product Name	TWIN Digital Radio System	
Trade Name	FRSKY	
Model Name	TWIN XLite	
Series Model	TWIN XLite S; TWIN XLite Pro; TWIN Lite Module; TWIN Lite Pro Module; TWMX;TWR18;TWR8;TWSR8;TWGR8;TWGR6;	
Model Difference	All are the same except color and shape	
Product Description	The EUT is a TWIN Digital Radio System	
	Frequency range	2400-2483.5MHz
	Modulation Type:	LoRa
	Number Of Channel:	17
	Antenna Designation:	Please refer to the Note 3.
	Antenna Gain (dBi):	1.5 dBi
Channel List	Please refer to the Note 2.	
Power Rating	DC 7.4v	
Hardware version number	V1.0	
Software version number	ETHOS 1.2	
Connecting I/O Port(s)	Please refer to the Note 1.	

**Note:**

1. For a more detailed features description, please refer to the manufacturer's specifications or the User Manual.

2.

Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2402.5	7	2432.5	13	2462.5
2	2407.5	8	2437.5	14	2467.5
3	2412.5	9	2442.5	15	2472.5
4	2417.5	10	2447.5	16	2477.5
5	2422.5	11	2452.5	17	2482.5
6	2427.5	12	2457.5		

3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	FRSKY	TWIN XLite	Patch antenna	N/A	1.5	2.4G Antenna



### 2.2 DESCRIPTION OF THE TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Worst Mode	Description	Modulation
Mode 1	TX CH1	LoRa
Mode 2	TX CH9	LoRa
Mode 3	TX CH17	LoRa
Mode 4	Hopping	LoRa

Note:

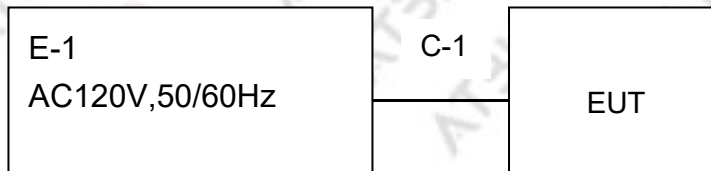
(1) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported.

For Conducted Emission

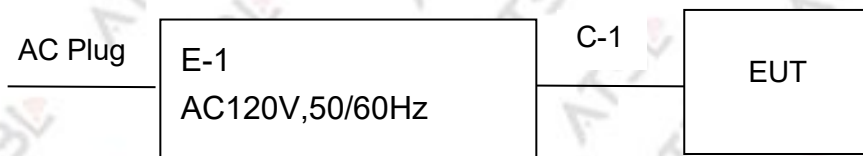
Test Case	
Conducted Emission	Mode 5 : Keeping TX

### 2.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious Emission Test



Conduction Emission Test



## 2.4 LABORATORY INFORMATION

Company Name:	Shanghai ATBL Technology Co., Ltd.
Address:	Building 8, No.160 Basheng Road, Waigaoqiao Free Trade Zone, Pudong New Area, Shanghai
Telephone:	+86(0)21-51298625
The FCC Registration Number (FRN):	0031025281
A2LA Number:	6184.01
CNAS Number:	CNAS L14531

## 2.5 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately **95** %.

No.	Item	Uncertainty
1	RF output power, conducted	$\pm 0.962\text{dB}$
2	Conducted spurious emissions	$\pm 2.986\text{dB}$
3	All emissions, radiated 30MHz-1GHz	$\pm 2.49\text{dB}$
4	All emissions, radiated 1GHz-18GHz	$\pm 3.50\text{dB}$
5	Occupied bandwidth	$\pm 2.336\text{dB}$
6	Power spectral density	$\pm 0.866\text{dB}$

2.6 DESCRIPTION OF NECESSARY ACCESSORIES AND 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.

Necessary accessories

Item	Equipment	Mfr/Brand	Model/Type No.	Length	Note
1-1	Adapter	Huizhou Xihu Industrial Development Co. LTD	VC54JBCH	N/A	N/A
1-2	DC cable	N/A	N/A	1m	N/A

Support units

Item	Equipment	Mfr/Brand	Model/Type No.	Length	Note
N/A	N/A	N/A	N/A	N/A	N/A

Note:

(1) For detachable type I/O cable should be specified the length in cm in 『Length』 column.



## 2.7EQUIPMENTS LIST

### 2.7.1 Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Management number	Calibrated until
Test Receiver	R&S	ESCI	100469	SHATBL-E003	2023.05.20
Spectrum Analyzer	Agilent	N9020A	MY50200811	SHATBL-E017	2023.05.20
Active ring antenna (9kHz-30MHz)	Daze	ZN30900C	20077	SHATBL-E042	2023.05.20
Bilog Antenna	SCHWARZBECK	VLUB 9168	01174	SHATBL-E008	2023.05.20
Horn Antenna	SCHWARZBECK	BBHA 9120D	02014	SHATBL-E009	2023.05.20
Horn Antenna	COM-POWER	AH-1840	10100008	SHATBL-E043	2023.05.20
Pre-Amplifier (0.1M-3GHz)	JPT	JPA-10M1G35	21010100035001	SHATBL-E005	2023.05.20
Pre-Amplifier (1G-18GHz)	JPT	JPA0118-55-303A	1910001800055000	SHATBL-E006	2023.05.20
Temperature & Humidity	DeLi	DeLi	N/A	SHATBL-E016	2023.05.20
Antenna/Turntable Controller	Brilliant	N/A	N/A	SHATBL-E007	N/A
Test SW	FALA	EMC-RI(Ver.4A2)		SHATBL-E046	N/A

### 2.7.2 Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Management number	Calibration date
Test Receiver	R&S	ESPI	101679	SHATBL-E012	2023.05.20
LISN	R&S	ENV216	101300	SHATBL-E013	2023.05.20
LISN	R&S	ENV216	100333	SHATBL-E041	2023.05.20
Temperature & Humidity	DeLi	DeLi	N/A	SHATBL-E015	2023.05.20
Test SW	FALA	EZ-EMC(Ver.EMC-CON3A1.1)		SHATBL-E044	N/A

### 2.7.3 RF Connected Test

Kind of Equipment	Manufacturer	Type No.	Serial No.	equipment number	Calibrated until
MIMO Power measurement test Set	DARE	RPR3006W	16I00054SN016	SHATBL-W006	2022.10.07
			RPR6W-20001005	SHATBL-W013	2022.10.07
Signal Analyzer	Agilent	N9020A	MY57300196	SHATBL-W004	2022.10.07
Signal Generator	Agilent	N5182B	MY46240556	SHATBL-W005	2022.10.07
Wireless Communications Test Set	R&S	CMW500	101331	SHATBL-W007	2022.10.07
Temperature & Humidity	Deli	deli	N/A	SHATBL-W011	2022.10.07
Attenuator	Agilent	8494B	DC-18G	SHATBL-W009	2022.10.07
Attenuator	Agilent	8496B	DC-18G	SHATBL-W010	2022.10.07
power splitter	MNK	MPD-DC/6-2S	62315 G51	SHATBL-W015	2022.10.07
			62315 G52	SHATBL-W016	2022.10.07
Filter	Chengdu kangmaiwei	ZBSF-C2400-2483.5-T3	N/A	SHATBL-W021	N/A
Constant temperature and humidity box	KSON	THS-B6C-150	6159K	SHATBL-W019	2023.01.17
Test SW	FALA	LZ-RF(Ver.LzRF-03A3.1)		SHATBL-W020	N/A

### 3. EMC EMISSION TEST

#### 3.1 CONDUCTED EMISSION MEASUREMENT

##### 3.1.1 POWER LINE CONDUCTED EMISSION LIMITS

The radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table.

FREQUENCY (MHz)	Conducted Emissionlimit (dBuV)	
	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of “ \* ” marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

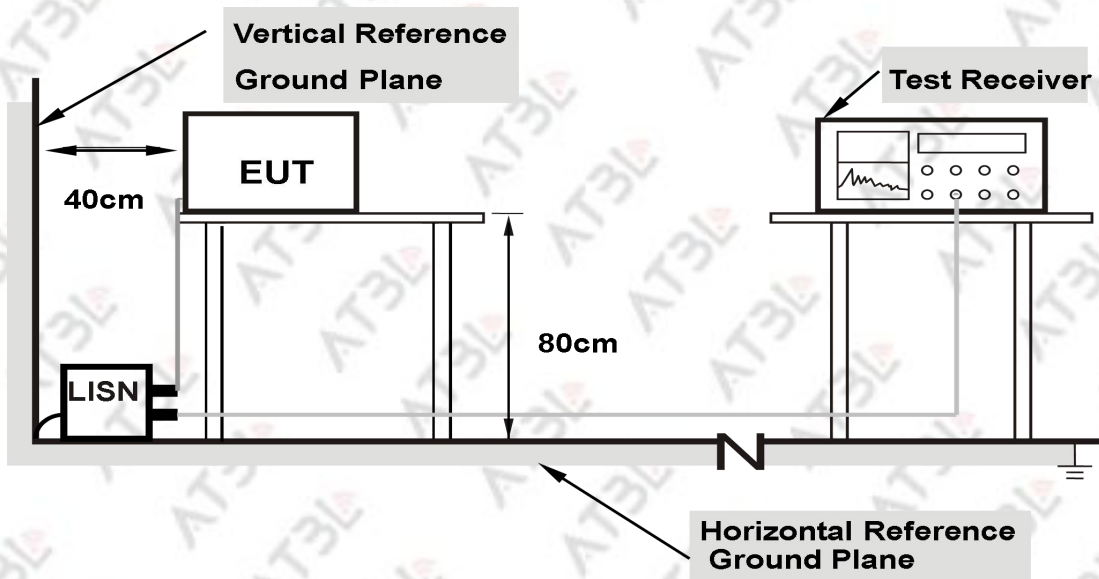
The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

### 3.1.2 TEST PROCEDURE

- a. The EUT is 0.8 m from the horizontal ground plane and 0.4 m from the vertical ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment are powered from additional LISN(s). The LISN provides 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN is at least 80 cm from the nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 3.1.3 TEST SETUP



- Note: 1. Support units were connected to second LISN.**
- 2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes support units.**

### 3.1.4 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.



3.1.5 TEST RESULT

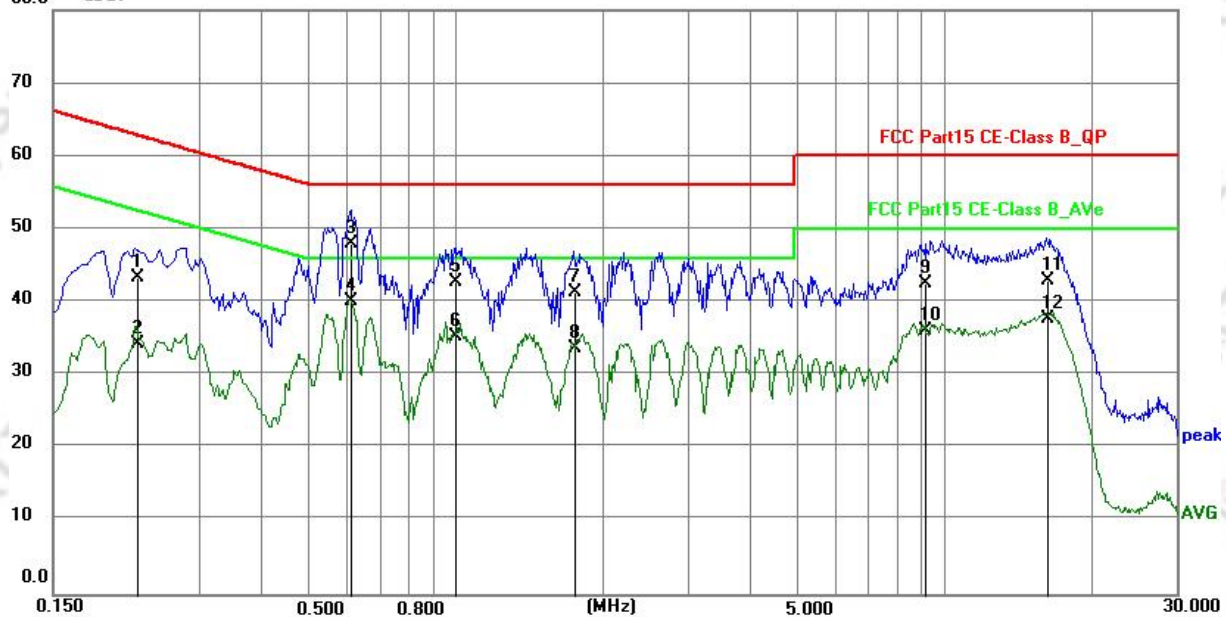
Temperature:	25°C	Relative Humidity:	50%RH
Test Voltage:	AC 120V/60Hz	Phase:	L
Test Mode:	Mode 5		

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.2150	33.63	10.08	43.71	63.01	-19.30	QP
2	0.2150	20.60	10.08	30.68	53.01	-22.33	AVG
3	0.6100	38.37	10.01	48.38	56.00	-7.62	QP
4	0.6100	26.42	10.01	36.43	46.00	-9.57	AVG
5	1.3930	32.81	9.96	42.77	56.00	-13.23	QP
6	1.3930	21.27	9.96	31.23	46.00	-14.77	AVG
7	2.5880	32.02	9.99	42.01	56.00	-13.99	QP
8	2.5880	20.39	9.99	30.38	46.00	-15.62	AVG
9	3.8140	30.80	10.03	40.83	56.00	-15.17	QP
10	3.8140	19.76	10.03	29.79	46.00	-16.21	AVG
11	9.9090	31.89	10.33	42.22	60.00	-17.78	QP
12	9.9090	23.79	10.33	34.12	50.00	-15.88	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Margin = Result (Result = Reading + Factor) – Limit.
3. Factor = LISN factor + Cable loss + Limiter (10dB)

80.0 dBuV

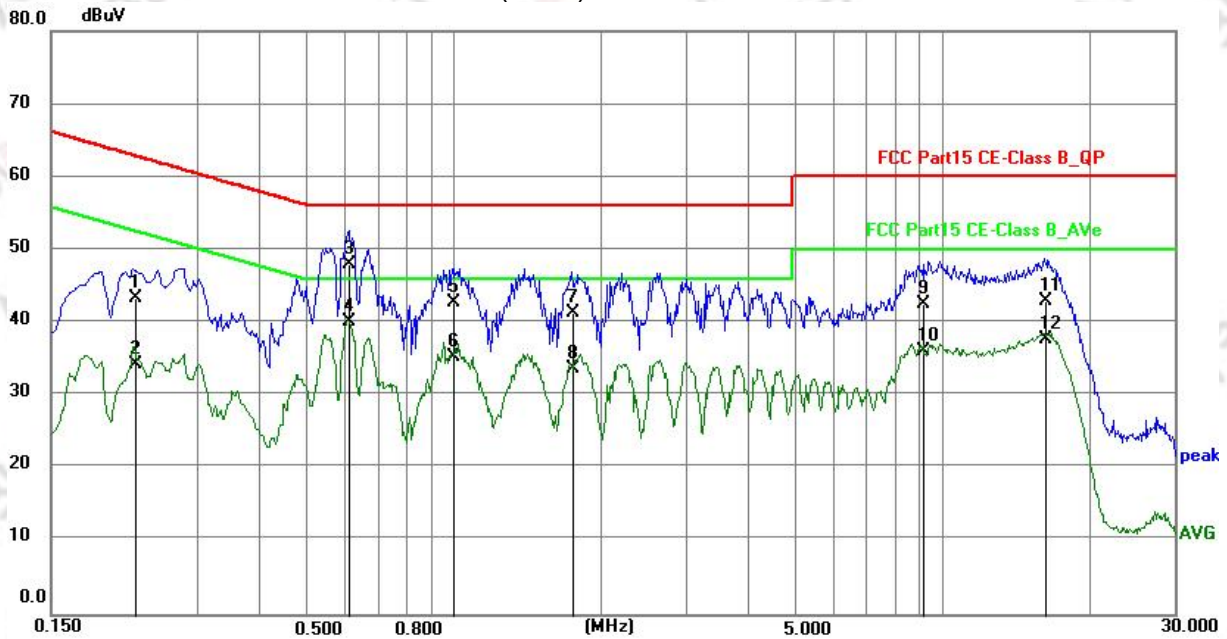


Temperature:	25°C	Relative Humidity:	50%RH
Test Voltage:	AC 120V/60Hz	Phase:	N
Test Mode:	Mode 5		

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.2230	33.05	10.36	43.41	62.71	-19.30	QP
2	0.2230	24.08	10.36	34.44	52.71	-18.27	AVG
3	0.6120	37.99	10.16	48.15	56.00	-7.85	QP
4	0.6120	29.98	10.16	40.14	46.00	-5.86	AVG
5	0.9950	32.70	10.15	42.85	56.00	-13.15	QP
6	0.9950	25.29	10.15	35.44	46.00	-10.56	AVG
7	1.7560	31.29	10.20	41.49	56.00	-14.51	QP
8	1.7560	23.48	10.20	33.68	46.00	-12.32	AVG
9	9.1450	32.55	10.15	42.70	60.00	-17.30	QP
10	9.1450	25.98	10.15	36.13	50.00	-13.87	AVG
11	16.2930	32.73	10.34	43.07	60.00	-16.93	QP
12	16.2930	27.44	10.34	37.78	50.00	-12.22	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Margin = Result (Result = Reading + Factor) – Limit.
3. Factor = LISN factor + Cable loss + Limiter (10dB)



### 3.2 RADIATED EMISSION MEASUREMENT

#### 3.2.1 RADIATED EMISSION LIMITS

In any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the Restricted band specified on Part15.205 (a)&209(a) limit in the table and according to ANSI C63.10-2013 below has to be followed.

#### LIMITS OF RADIATED EMISSION MEASUREMENT (0.009MHz - 1000MHz)

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

#### LIMITS OF RADIATED EMISSION MEASUREMENT (1GHz-25 GHz)

FREQUENCY (MHz)	(dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

#### LIMITS OF RESTRICTED FREQUENCY BANDS

FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (GHz)
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			



## For Radiated Emission

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/QP/AV
Start Frequency	9 KHz/150KHz(Peak/QP/AV)
Stop Frequency	150KHz/30MHz(Peak/QP/AV)
RB / VB (emission in restricted band)	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz); 200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/QP
Start Frequency	30 MHz(Peak/QP)
Stop Frequency	1000 MHz (Peak/QP)
RB / VB (emission in restricted band)	120 KHz / 300 KHz

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/AV
Start Frequency	1000 MHz(Peak/AV)
Stop Frequency	10th carrier hamonic(Peak/AV)
RB / VB (emission in restricted band)	1MHz / 3MHz(Peak) 1 MHz/1/T MHz(AVG)

## For Restricted band

Spectrum Parameter	Setting
Detector	Peak/AV
Start/Stop Frequency	Lower Band Edge: 2310 to 2410 MHz Upper Band Edge: 2475to 2500 MHz
RB / VB	1 MHz / 3 MHz(Peak) 1 MHz/1/T MHz(AVG)

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~90kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	90kHz~110kHz / RB 200Hz for QP
Start ~ Stop Frequency	110kHz~490kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	490kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

**3.2.2 TEST PROCEDURE**

- a. The measuring distance at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz, and above 1GHz.
- b. The EUT was placed on the top of a rotating table 0.8 m (above 1GHz is 1.5 m) above the ground at a 3 m anechoic chamber test site. The table was rotated 360 degree to determine the position of the highest radiation.
- c. The height of the equipment shall be 0.8 m (above 1GHz is 1.5 m); the height of the test antenna shall vary between 1 m to 4 m. Horizontal and vertical polarization of the antenna are set to make the measurement.
- d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and Quasi Peak detector mode will be re-measured.
- e. If the Peak Mode measured value is compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and no additional QP Mode measurement was performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

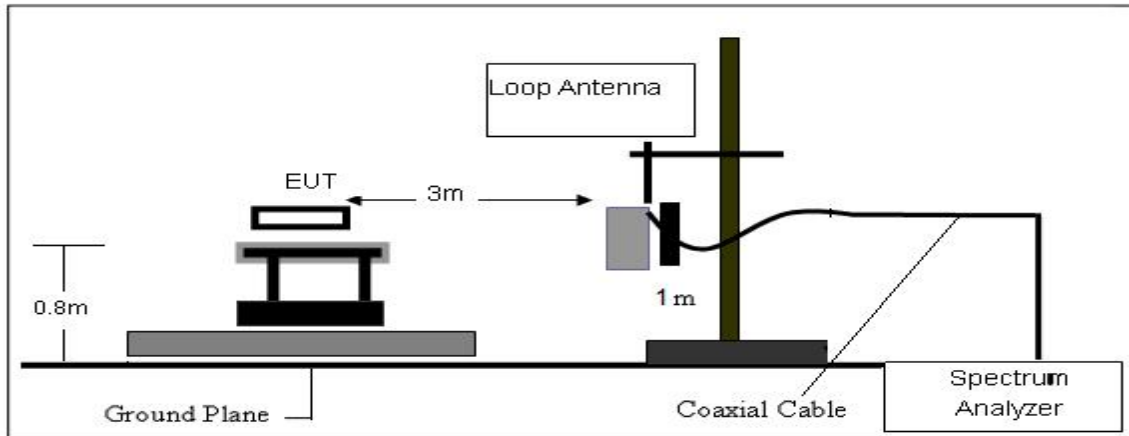
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

**3.2.3 DEVIATION FROM TEST STANDARD**

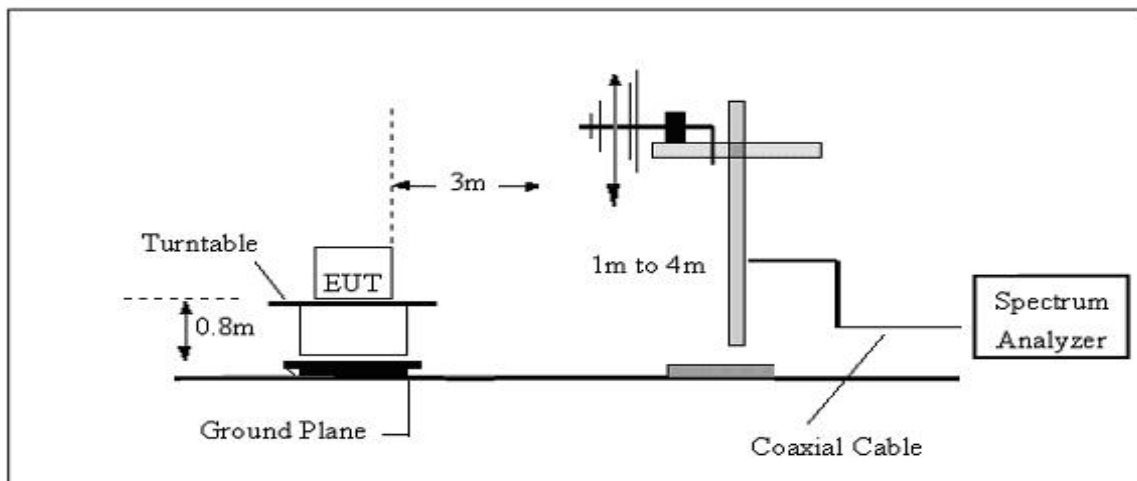
No deviation.

### 3.2.4 TEST SET UP

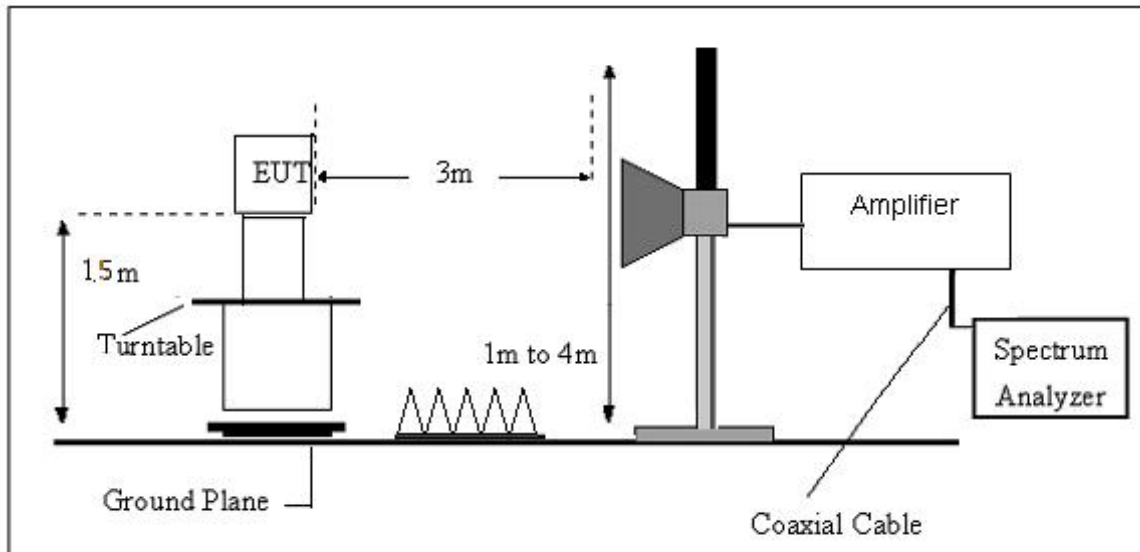
#### (A) Radiated Emission Test-Up Frequency Below 30MHz



#### (B) Radiated Emission Test-Up Frequency 30MHz~1GHz



#### (C) Radiated Emission Test-Up Frequency Above 1GHz



### 3.2.5 EUT OPERATING CONDITIONS

Please refer to section 3.1.4 of this report.



### 3.2.6 FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where

FS = Field Strength

CL = Cable Attenuation Factor (Cable Loss)

RA = Reading Amplitude

AG = Amplifier Gain

AF = Antenna Factor

For example

Frequency (MHz)	FS (dB $\mu$ V/m)	RA (dB $\mu$ V/m)	AF (dB)	CL (dB)	AG (dB)	Factor (dB)
300	40	58.1	12.2	1.6	31.9	-18.1

$$\text{Factor} = \text{AF} + \text{CL} - \text{AG}$$

### 3.2.7 TEST RESULTS

(9KHz-30MHz)

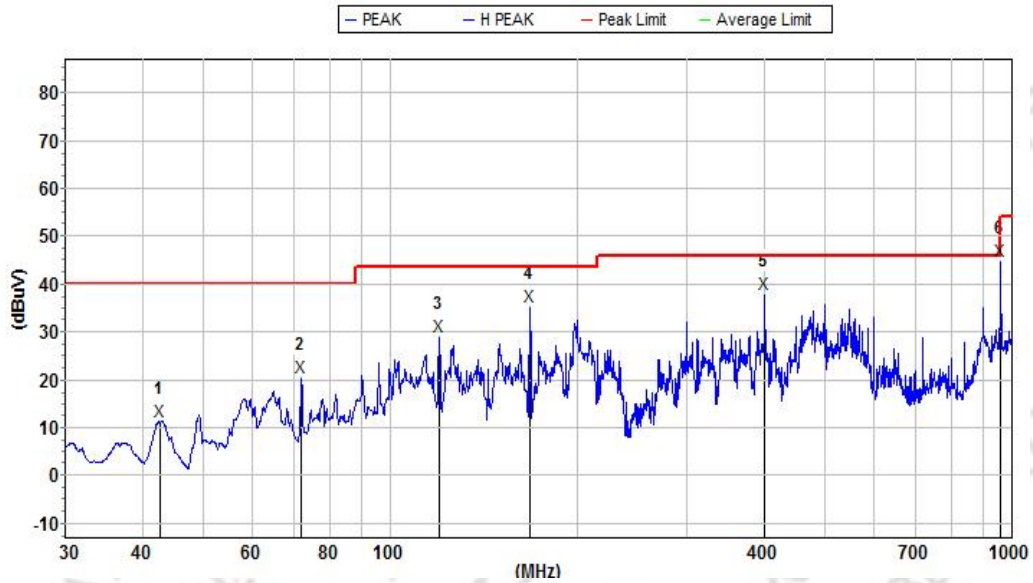
The low frequency, which started from 9kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

(30MHz-1000MHz)

Temperature:	25°C	Relative Humidity:	50%RH
Test Voltage:	DC 7.4V	Phase:	Horizontal
Test Mode:	Mode 1		

Remark:

- Margin = Result (Result = Reading + Factor) - Limit
- Factor = Antenna factor + Cable attenuation factor (cable loss) - Amplifier gain  
Horizontal



Mk.	Freq. (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
1	42.599954	11.3	40.0	28.7	13.9	32.4	0.8	H
2	72.084342	20.4	40.0	19.6	10.5	32.8	0.8	H
3	120.065933	29.1	43.5	14.4	12.2	32.9	1.4	H
4	167.824251	35.2	43.5	8.3	13.4	32.9	1.7	H
5	399.730428	38.0	46.0	8.0	13.8	32.3	2.7	H
6	958.794326	44.8	46.0	1.2	20.3	31.2	3.8	H

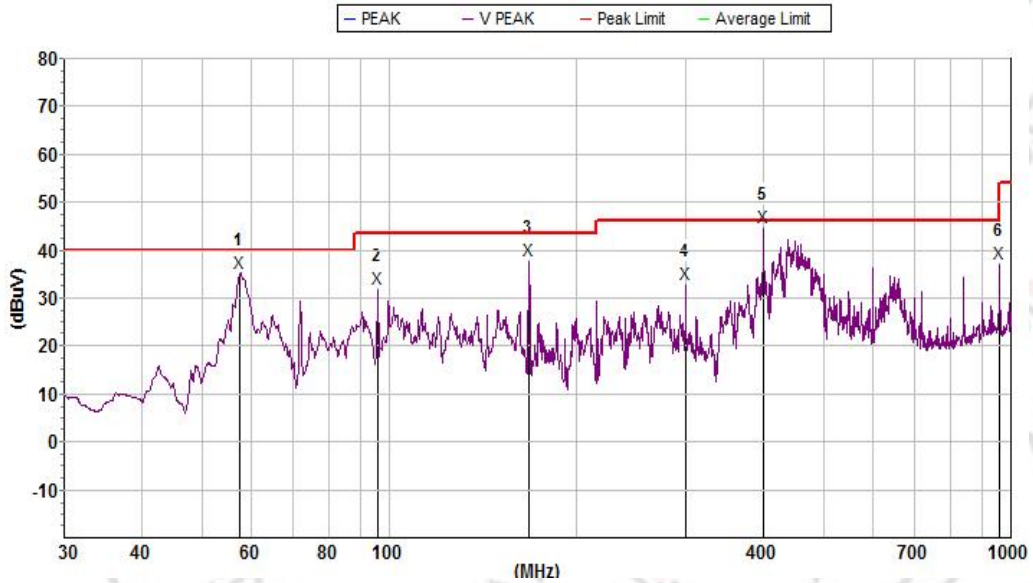
(30MHz-1000MHz)

Temperature:	25°C	Relative Humidity:	50%RH
Test Voltage:	DC 7.4V	Phase:	Vertical
Test Mode:	Mode 1		

Remark:

1.Margin = Result (Result =Reading + Factor )–Limit

2.Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain  
Horizontal



Mk.	Freq. (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
1	57.593928	35.3	40.0	4.7	12.9	32.7	0.8	V
2	95.930246	32.0	43.5	11.5	9.9	32.9	1.3	V
3	168.118752	37.9	43.5	5.6	13.4	32.9	1.7	V
4	299.841092	32.8	46.0	13.2	12.8	32.7	2.7	V
5	399.730428	44.9	46.0	1.1	14.7	32.3	2.7	V
6	958.794326	37.2	46.0	8.8	22.2	31.2	3.8	V

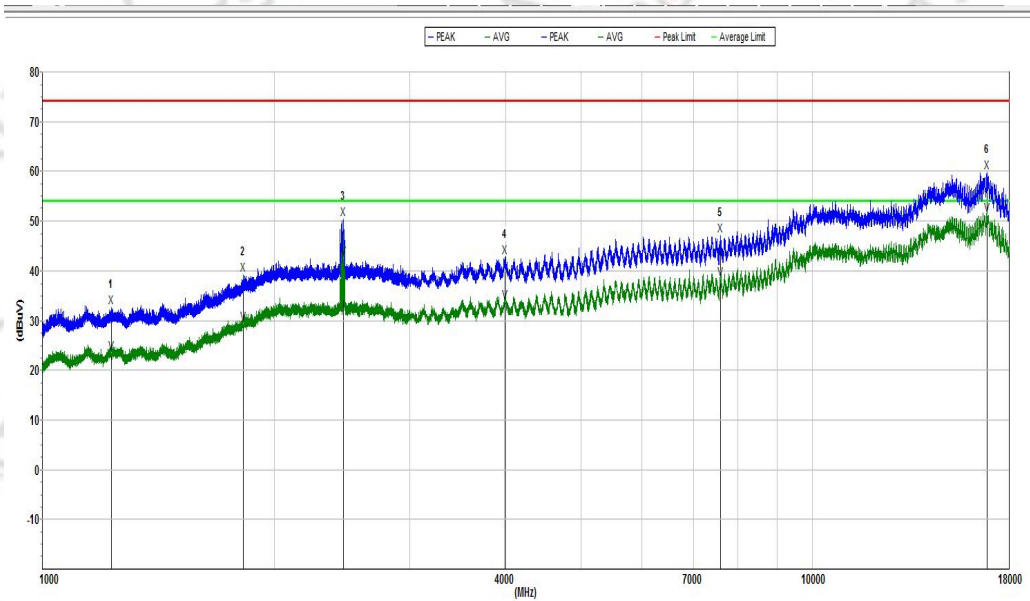


1000MHz-18000MHz)

Temperature:	25°C	Relative Humidity:	50%RH
Test Voltage:	DC 7.4V	Phase:	Horizontal
Test Mode:	Mode 1		

Remark:

- 1.Margin = Result (Result =Reading + Factor )-Limit
- 2.Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain  
Horizontal



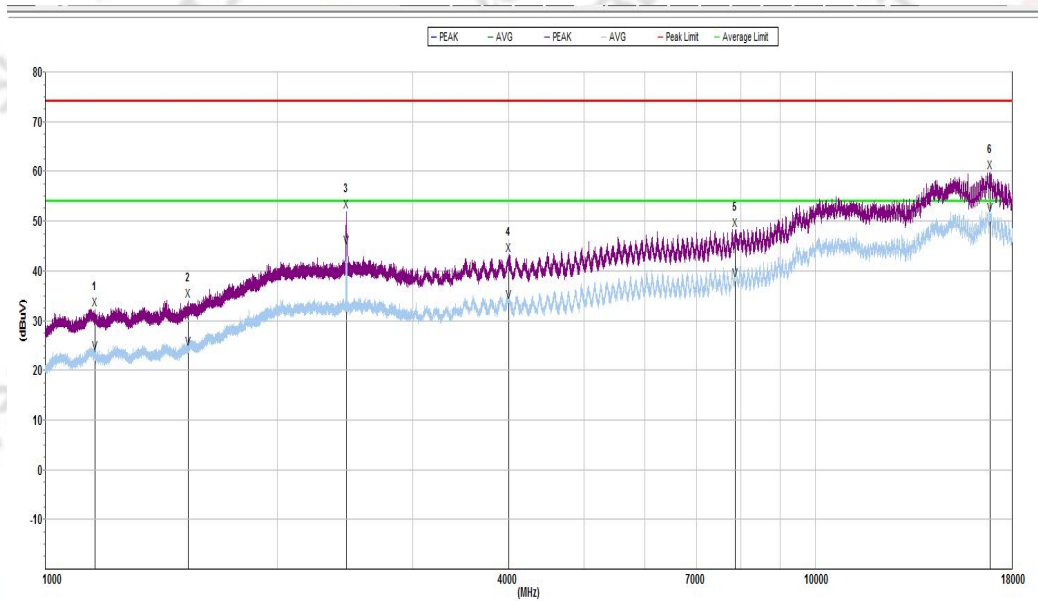
Mk.	Freq.(MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
<b>Peak:</b>								
1	1229.400000	32.8	74.0	41.2	20.7	57.3	2.3	H
2	1825.200000	39.3	74.0	34.7	21.7	52.6	2.6	H
3	2461.100000	50.4	74.0	23.6	22.8	50.2	2.8	H
4	3991.500000	42.9	74.0	31.1	24.3	50.1	3.3	H
5	7587.750000	47.2	74.0	26.8	25.8	48.7	4.7	H
6	16844.250000	59.8	74.0	14.2	30.9	47.4	6.8	H
<b>Avg</b>								
1	1229.400000	23.6	54.0	30.4	20.7	57.3	2.3	H
2	1825.200000	29.4	54.0	24.6	21.7	52.6	2.6	H
3	2461.100000	42.5	54.0	11.5	22.8	50.2	2.8	H
4	3991.500000	33.9	54.0	20.1	24.3	50.1	3.3	H
5	7587.750000	38.4	54.0	15.6	25.8	48.7	4.7	H
6	16844.250000	51.3	54.0	2.7	30.9	47.4	6.8	H

(1000MHz-18000MHz)

Temperature:	25°C	Relative Humidity:	50%RH
Test Voltage:	DC 7.4V	Phase:	Vertical
Test Mode:	Mode 1		

Remark:

- 1.Margin = Result (Result =Reading + Factor )–Limit
  - 2.Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain
- Vertical



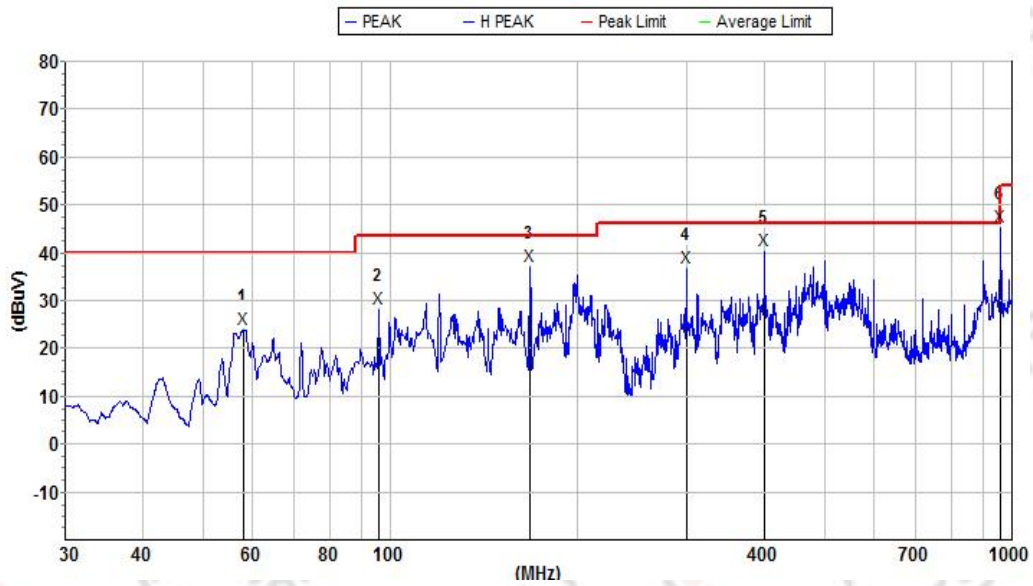
Mk.	Freq.(MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
<b>Peak:</b>								
1	1160.100000	32.3	74.0	41.7	20.8	57.3	2.2	V
2	1533.100000	34.0	74.0	40.0	21.1	56.8	2.5	V
3	2460.300000	52.1	74.0	21.9	23.3	50.2	2.8	V
4	3993.750000	43.3	74.0	30.7	24.8	50.1	3.3	V
5	7862.250000	48.3	74.0	25.7	26.8	48.6	4.8	V
6	16835.250000	59.9	74.0	14.1	31.4	47.4	6.8	V
<b>Avg</b>								
1	1160.100000	23.5	54.0	30.5	20.8	57.3	2.2	V
2	1533.100000	24.5	54.0	29.5	21.1	56.8	2.5	V
3	2460.300000	44.7	54.0	9.3	23.3	50.2	2.8	V
4	3993.750000	33.8	54.0	20.2	24.8	50.1	3.3	V
5	7862.250000	38.1	54.0	15.9	26.8	48.6	4.8	V
6	16835.250000	51.3	54.0	2.7	31.4	47.4	6.8	V

(30MHz-1000MHz)

Temperature:	25°C	Relative Humidity:	50%RH
Test Voltage:	DC 7.4V	Phase:	Horizontal
Test Mode:	Mode 2		

Remark:

1. Margin = Result (Result =Reading + Factor )-Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain  
Horizontal



Mk.	Freq. (MHz)	Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
1	58.101039	24.1	40.0	15.9	12.9	32.7	0.8	H
2	95.930246	28.4	43.5	15.1	9.9	32.9	1.3	H
3	168.118752	37.3	43.5	6.2	13.4	32.9	1.7	H
4	299.841092	36.8	46.0	9.2	12.8	32.7	2.7	H
5	399.730428	40.4	46.0	5.6	13.8	32.3	2.7	H
6	958.794326	45.3	46.0	0.7	20.3	31.2	3.8	H



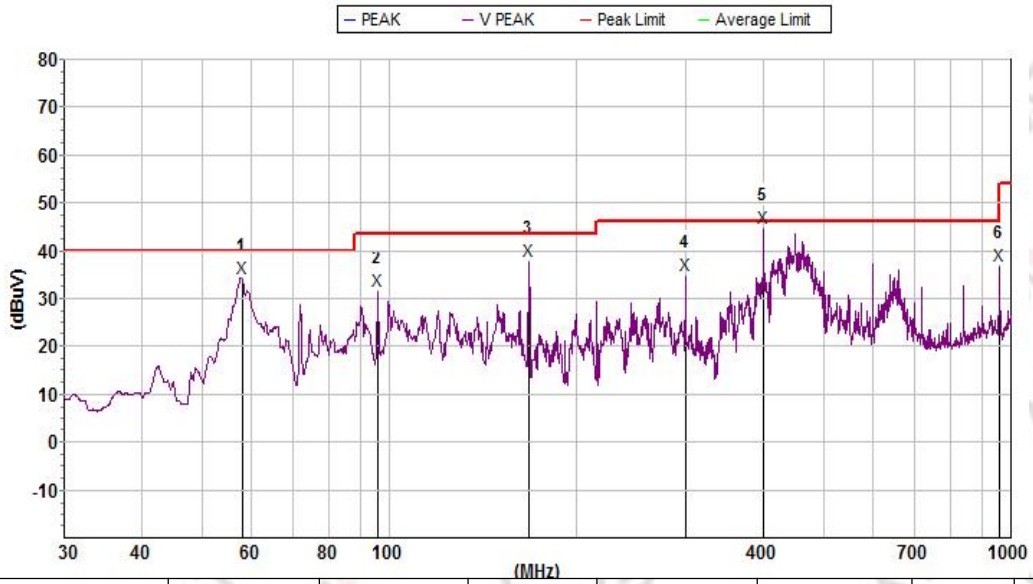
(30MHz-1000MHz)

Temperature:	25°C	Relative Humidity:	50%RH
Test Voltage:	DC 7.4V	Phase:	Vertical
Test Mode:	Mode 2		

Remark:

3. Margin = Result (Result =Reading + Factor )–Limit

4. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain  
Vertical



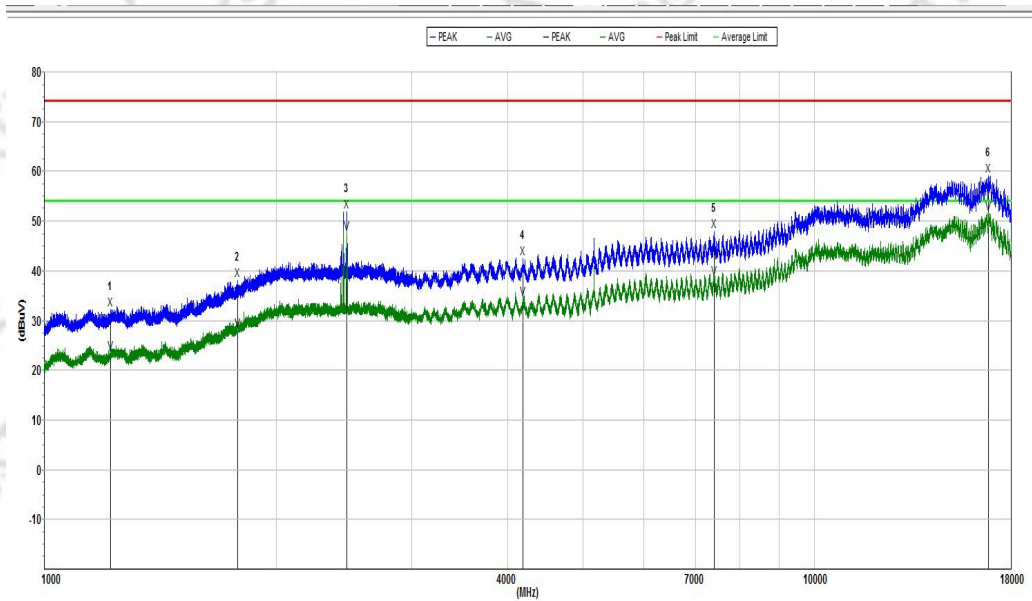
Mk.	Freq.(MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
1	57.999261	34.4	40.0	5.6	12.9	32.7	0.8	V
2	95.930246	31.8	43.5	11.7	9.9	32.9	1.3	V
3	168.118752	38.0	43.5	5.5	13.4	32.9	1.7	V
4	299.841092	34.9	46.0	11.1	12.8	32.7	2.7	V
5	399.730428	44.8	46.0	1.2	14.7	32.3	2.7	V
6	958.794326	36.8	46.0	9.2	22.2	31.2	3.8	V

(1000MHz-18000MHz)

Temperature:	25°C	Relative Humidity:	50%RH
Test Voltage:	DC 7.4V	Phase:	Horizontal
Test Mode:	Mode 2		

Remark:

- 1.Margin = Result (Result =Reading + Factor )–Limit
  - 2.Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain
- Horizontal



Mk.	Freq.(MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
<b>Peak:</b>								
1	1220.200000	32.2	74.0	41.8	20.7	57.3	2.3	H
2	1784.100000	38.2	74.0	35.8	21.7	53.2	2.6	H
3	2470.300000	51.9	74.0	22.1	22.8	50.2	2.8	H
4	4185.000000	42.6	74.0	31.4	24.5	50.1	3.4	H
5	7401.000000	48.0	74.0	26.0	25.7	48.8	4.6	H
6	16824.750000	59.2	74.0	14.8	30.9	47.4	6.8	H
<b>Avg</b>								
1	1220.200000	23.5	54.0	30.5	20.7	57.3	2.3	H
2	1784.100000	28.1	54.0	25.9	21.7	53.2	2.6	H
3	2470.300000	47.7	54.0	6.3	22.8	50.2	2.8	H
4	4185.000000	34.4	54.0	19.6	24.5	50.1	3.4	H
5	7401.000000	38.7	54.0	15.3	25.7	48.8	4.6	H
6	16824.750000	51.6	54.0	2.4	30.9	47.4	6.8	H

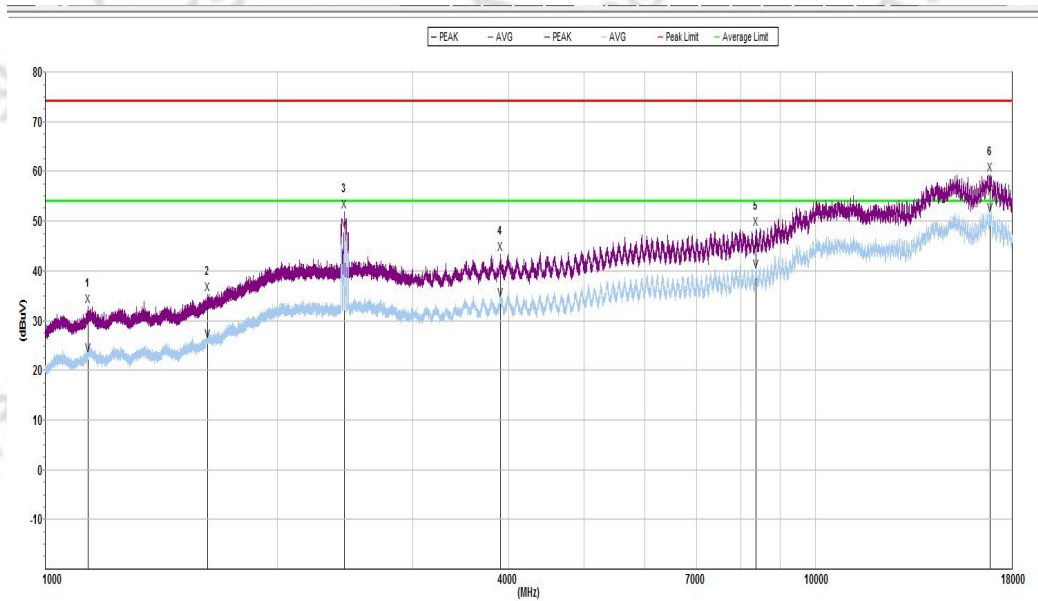
(1000MHz-18000MHz)

Temperature:	25°C	Relative Humidity:	50%RH
Test Voltage:	DC 7.4V	Phase:	Vertical
Test Mode:	Mode 2		

Remark:

1.Margin = Result (Result =Reading + Factor )–Limit

2.Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain  
Vertical



Mk.	Freq.(MHz)	Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
Peak:								
1	1137.100000	32.9	74.0	41.1	20.7	57.3	2.2	V
2	1624.700000	35.3	74.0	38.7	21.3	55.5	2.5	V
3	2443.400000	52.0	74.0	22.0	23.2	50.2	2.8	V
4	3900.000000	43.5	74.0	30.5	24.7	50.2	3.2	V
5	8360.250000	48.4	74.0	25.6	27.1	48.6	5.0	V
6	16835.250000	59.5	74.0	14.5	31.4	47.4	6.8	V
Avg								
1	1137.100000	23.0	54.0	31.0	20.7	57.3	2.2	V
2	1624.700000	26.0	54.0	28.0	21.3	55.5	2.5	V
3	2443.400000	48.3	54.0	5.7	23.2	50.2	2.8	V
4	3900.000000	34.2	54.0	19.8	24.7	50.2	3.2	V
5	8360.250000	39.9	54.0	14.1	27.1	48.6	5.0	V
6	16835.250000	51.3	54.0	2.7	31.4	47.4	6.8	V

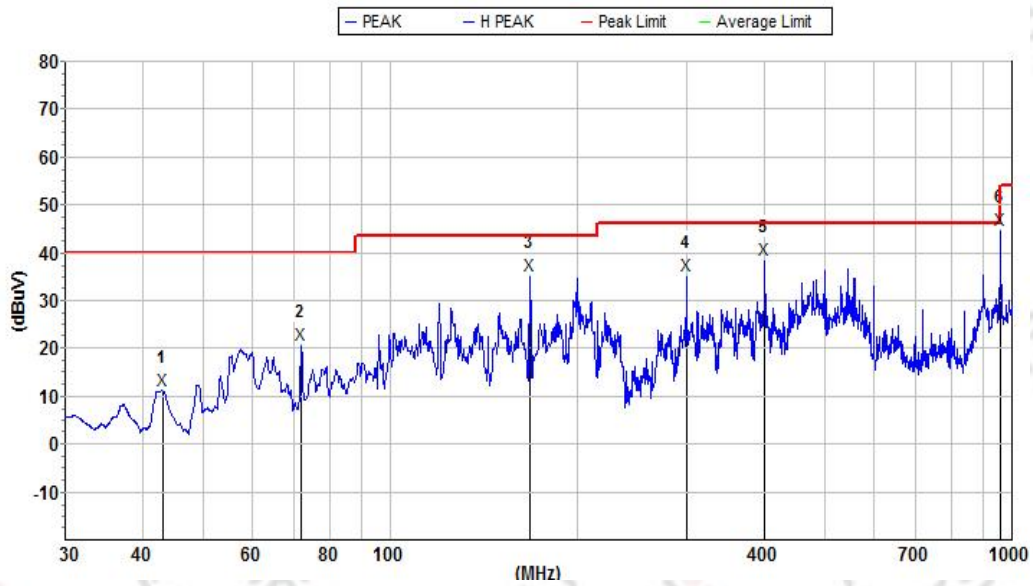


(30MHz-1000MHz)

Temperature:	25°C	Relative Humidity:	50%RH
Test Voltage:	DC 7.4V	Phase:	Horizontal
Test Mode:	Mode 3		

Remark:

- Margin = Result (Result =Reading + Factor) –Limit
- Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain  
Horizontal



Mk.	Freq.(MHz)	Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
1	43.050457	11.4	40.0	28.6	13.9	32.5	0.8	H
2	72.084342	20.9	40.0	19.1	10.5	32.8	0.8	H
3	168.118752	35.3	43.5	8.2	13.4	32.9	1.7	H
4	299.841092	35.1	46.0	10.9	12.8	32.7	2.7	H
5	399.730428	38.5	46.0	7.5	13.8	32.3	2.7	H
6	958.794326	44.8	46.0	1.2	20.3	31.2	3.8	H

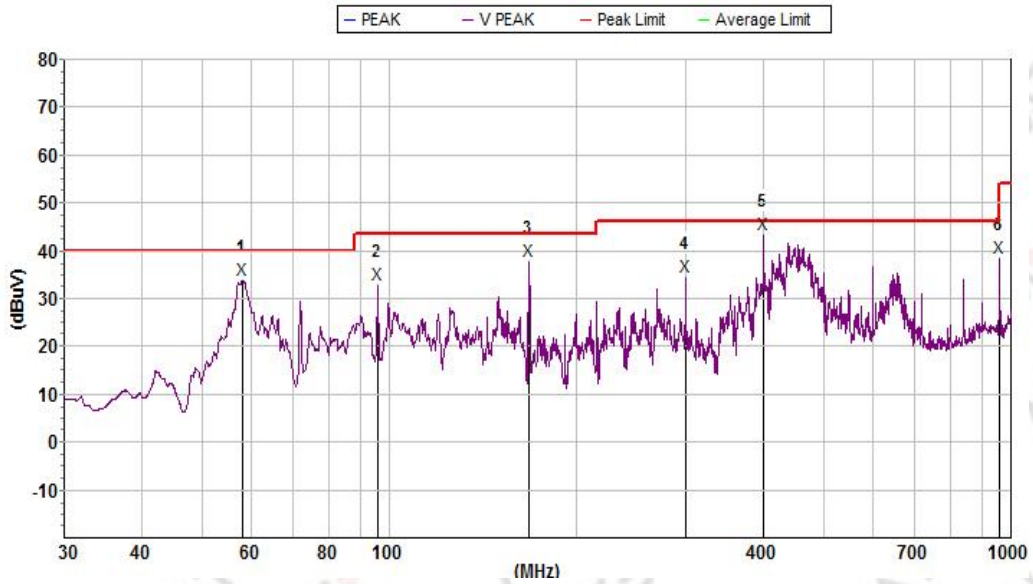
(30MHz-1000MHz)

Temperature:	25°C	Relative Humidity:	50%RH
Test Voltage:	DC 7.4V	Phase:	Vertical
Test Mode:	Mode 3		

Remark:

1.Margin = Result (Result =Reading + Factor )–Limit

2.Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain  
Vertical



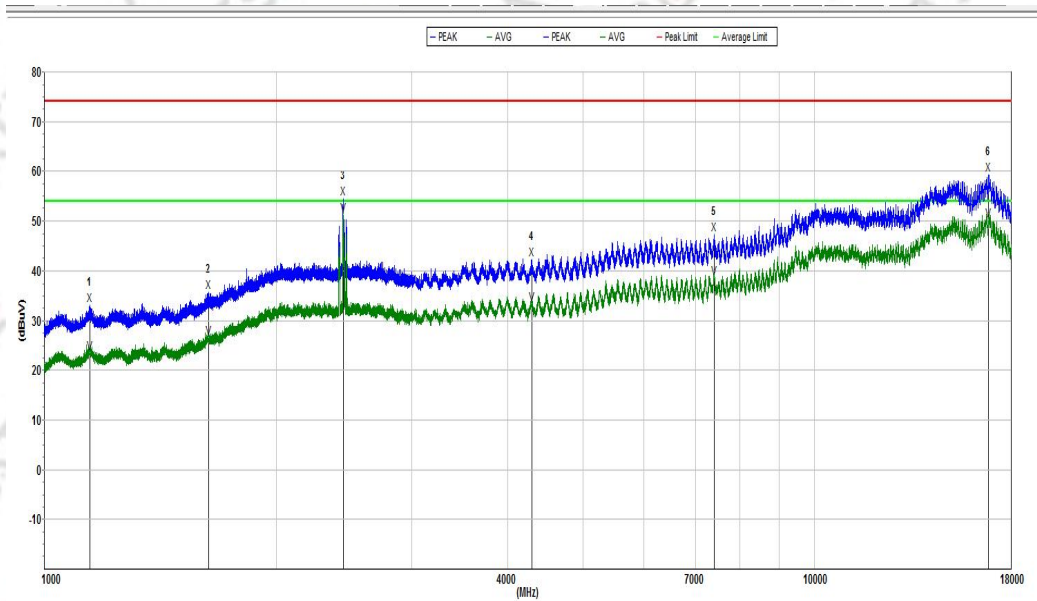
Mk.	Freq.(MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
1	58.101039	34.0	40.0	6.0	12.9	32.7	0.8	V
2	95.930246	32.9	43.5	10.6	9.9	32.9	1.3	V
3	168.118752	37.9	43.5	5.6	13.4	32.9	1.7	V
4	299.841092	34.6	46.0	11.4	12.8	32.7	2.7	V
5	399.730428	43.6	46.0	2.4	14.7	32.3	2.7	V
6	958.794326	38.4	46.0	7.6	22.2	31.2	3.8	V

(1000MHz-18000MHz)

Temperature:	25°C	Relative Humidity:	50%RH
Test Voltage:	DC 7.4V	Phase:	Horizontal
Test Mode:	Mode 3		

Remark:

- 1.Margin = Result (Result =Reading + Factor )–Limit
- 2.Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain  
Horizontal



Mk.	Freq.(MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L (dB)	Pol.
<b>Peak:</b>								
1	1145.100000	33.2	74.0	40.8	20.7	57.3	2.2	H
2	1633.800000	35.8	74.0	38.2	21.3	55.4	2.5	H
3	2443.700000	54.7	74.0	19.3	22.8	50.2	2.8	H
4	4291.500000	42.4	74.0	31.6	24.5	50.1	3.4	H
5	7401.000000	47.5	74.0	26.5	25.7	48.8	4.6	H
6	16815.000000	59.4	74.0	14.6	30.9	47.4	6.8	H
<b>Avg</b>								
1	1145.100000	23.6	54.0	30.4	20.7	57.3	2.2	H
2	1633.800000	26.7	54.0	27.3	21.3	55.4	2.5	H
3	2443.700000	51.3	54.0	2.7	22.8	50.2	2.8	H
4	4291.500000	33.3	54.0	20.7	24.5	50.1	3.4	H
5	7401.000000	38.6	54.0	15.4	25.7	48.8	4.6	H
6	16815.000000	50.2	54.0	3.8	30.9	47.4	6.8	H

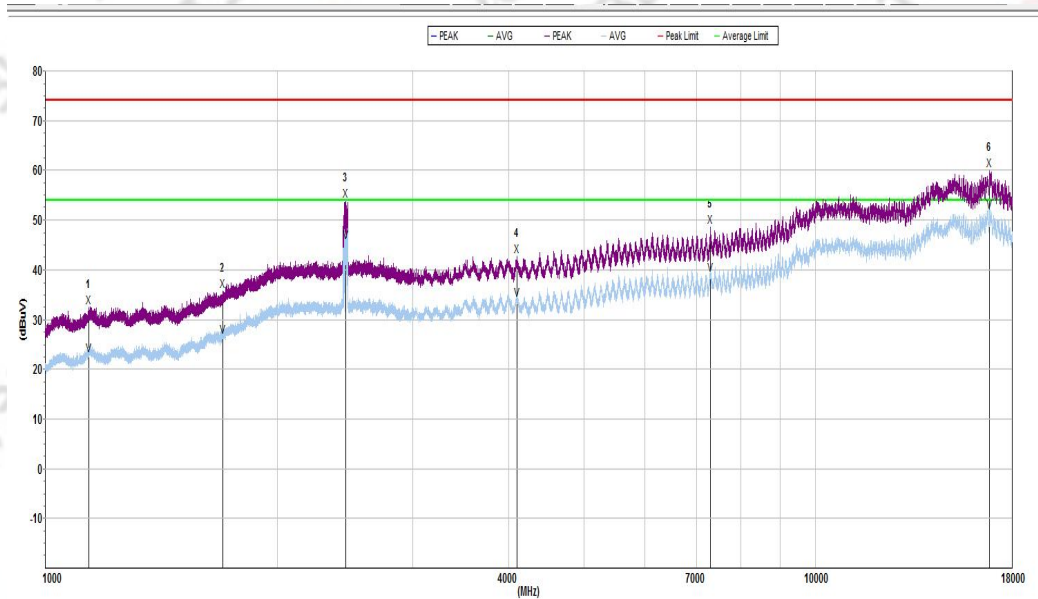


(1000MHz-18000MHz)

Temperature:	25°C	Relative Humidity:	50%RH
Test Voltage:	DC 7.4V	Phase:	Vertical
Test Mode:	Mode 3		

Remark:

- 1.Margin = Result (Result =Reading + Factor )-Limit
  - 2.Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain
- Vertical



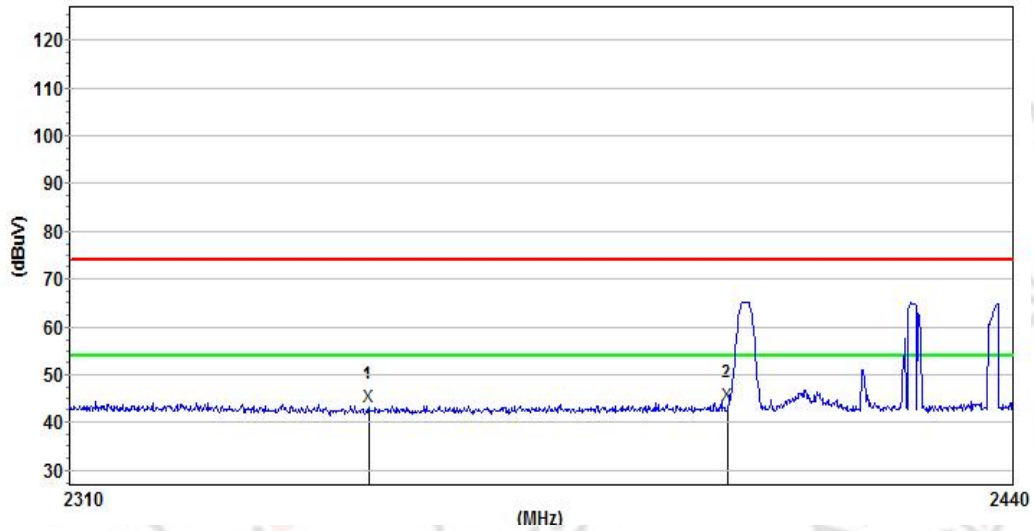
Mk.	Freq.(MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
<b>Peak:</b>								
1	1139.500000	32.5	74.0	41.5	20.7	57.3	2.2	V
2	1698.400000	35.8	74.0	38.2	21.4	54.4	2.5	V
3	2453.500000	53.9	74.0	20.1	23.3	50.2	2.8	V
4	4092.750000	42.7	74.0	31.3	24.8	50.1	3.3	V
5	7306.500000	48.6	74.0	25.4	26.4	48.8	4.5	V
6	16828.500000	60.0	74.0	14.0	31.4	47.4	6.8	V
<b>Avg</b>								
1	1139.500000	22.8	54.0	31.2	20.7	57.3	2.2	V
2	1698.400000	26.6	54.0	27.4	21.4	54.4	2.5	V
3	2453.500000	45.6	54.0	8.4	23.3	50.2	2.8	V
4	4092.750000	34.0	54.0	20.0	24.8	50.1	3.3	V
5	7306.500000	39.0	54.0	15.0	26.4	48.8	4.5	V
6	16828.500000	51.8	54.0	2.2	31.4	47.4	6.8	V

Note:

- 1.Other 18G-25G Emission detected are more than 20dB below the limit.

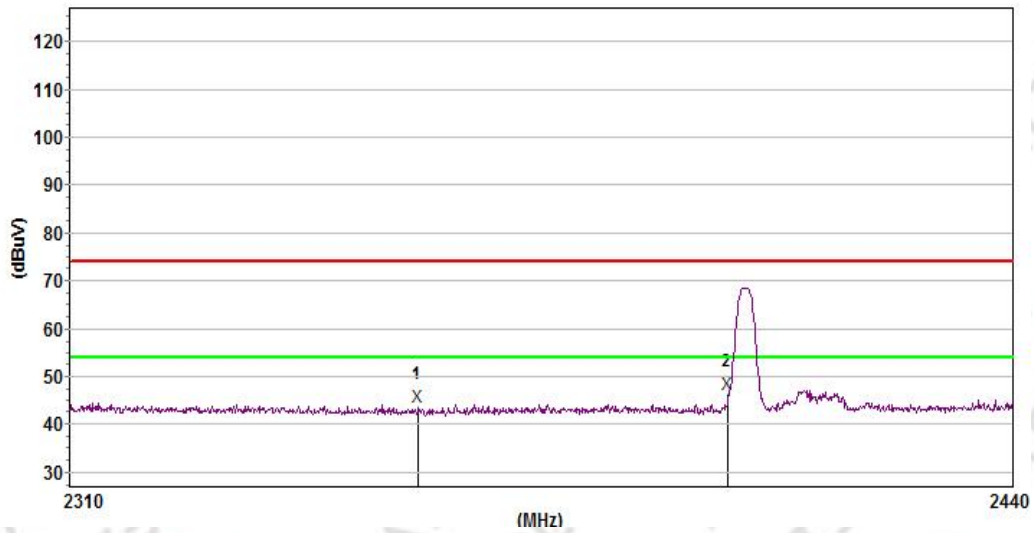
3.2.6 TEST RESULTS (BAND EDGEREQUIREMENTS)

Low  
Horizontal



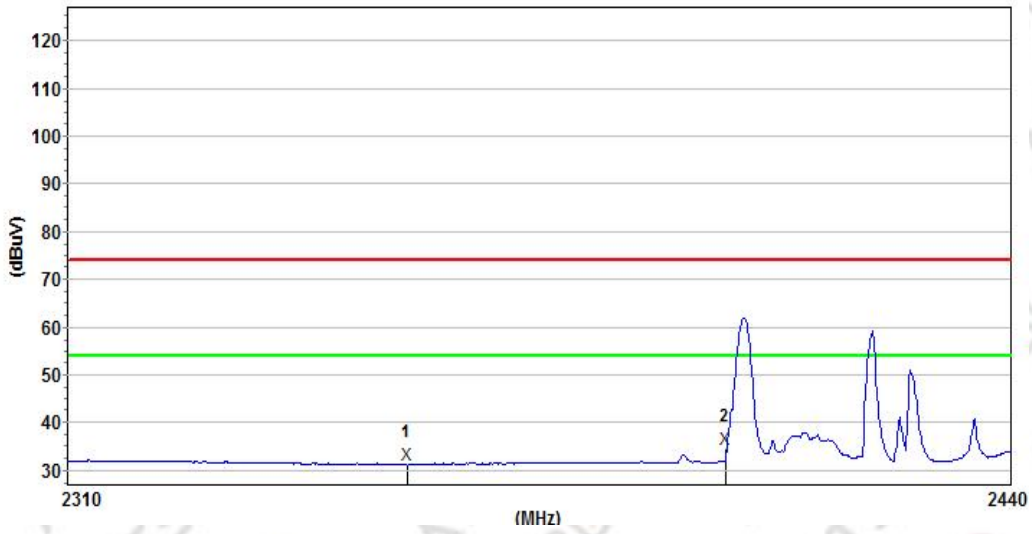
Mk.	Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
Peak								
1	2350.442099	43.3	74.0	30.7	22.7	50.2	2.8	H
2	2400.000000	43.7	74.0	30.3	22.8	50.2	2.8	H

Vertical



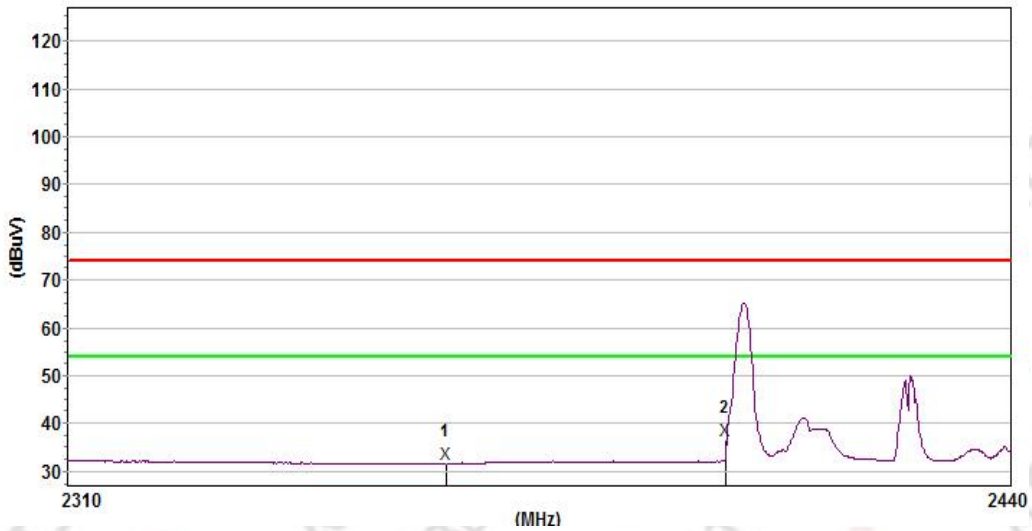
Mk.	Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
Peak								
1	2357.272464	43.7	74.0	30.3	23.0	50.2	2.8	V
2	2400.000000	46.3	74.0	27.7	23.1	50.2	2.8	V

Low  
Horizontal



Mk.	Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
AVG								
1	2356.111193	31.4	54.0	22.6	22.7	50.2	2.8	H
2	2400.000000	34.5	54.0	19.5	22.8	50.2	2.8	H

Vertical

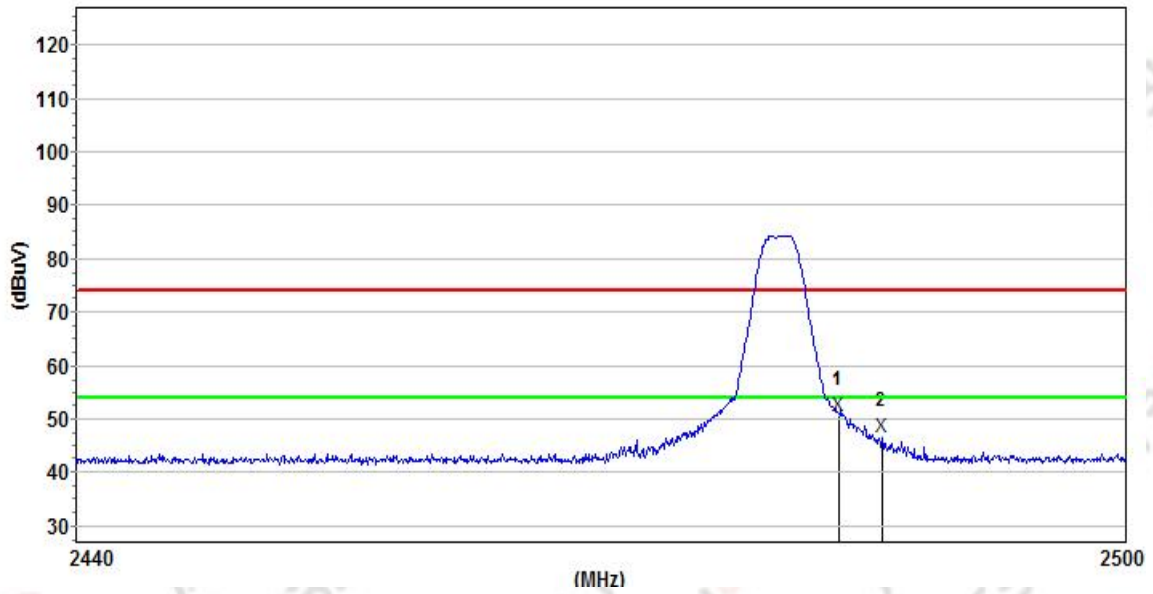


Mk.	Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
AVG								
1	2361.276779	31.7	54.0	22.3	23.0	50.2	2.8	V
2	2400.000000	36.6	54.0	17.4	23.1	50.2	2.8	V

Remark: All modes have been tested, and only the worst modes are shown in this report.

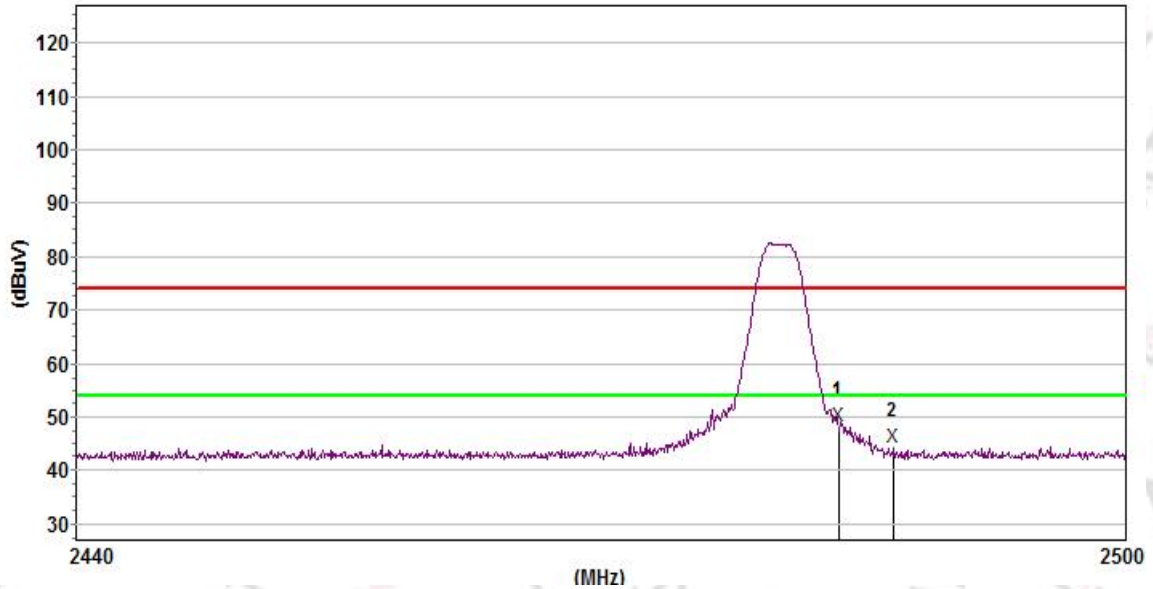


High  
Horizontal



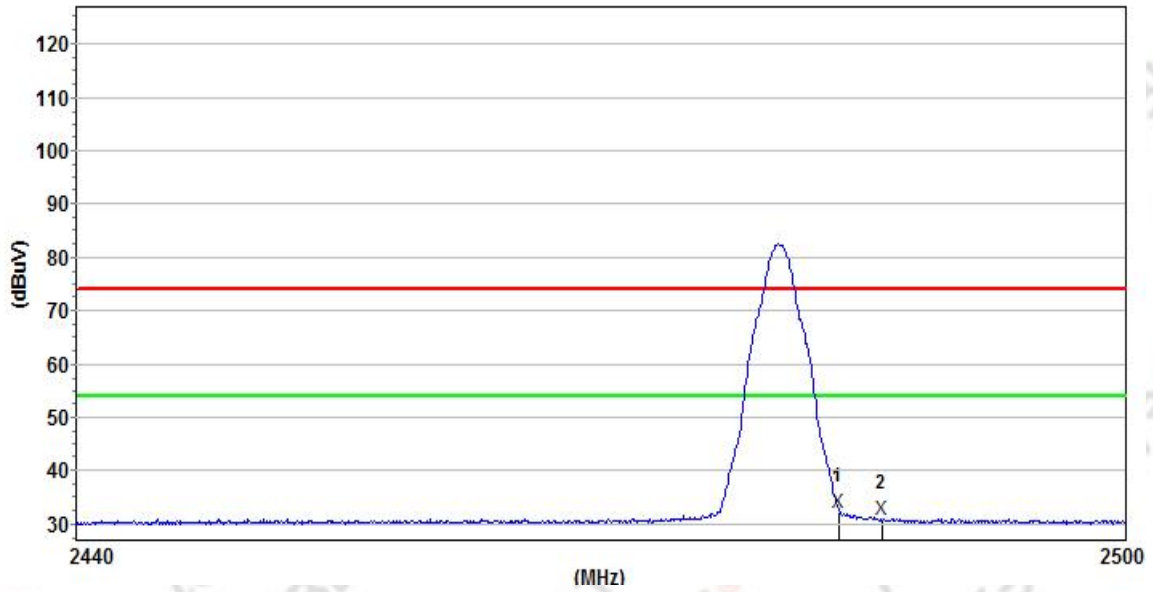
Mk.	Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
Peak								
1	2483.500000	50.8	74.0	23.2	22.9	50.2	2.8	H
2	2485.949868	46.6	74.0	27.4	22.9	50.2	2.8	H

Vertical



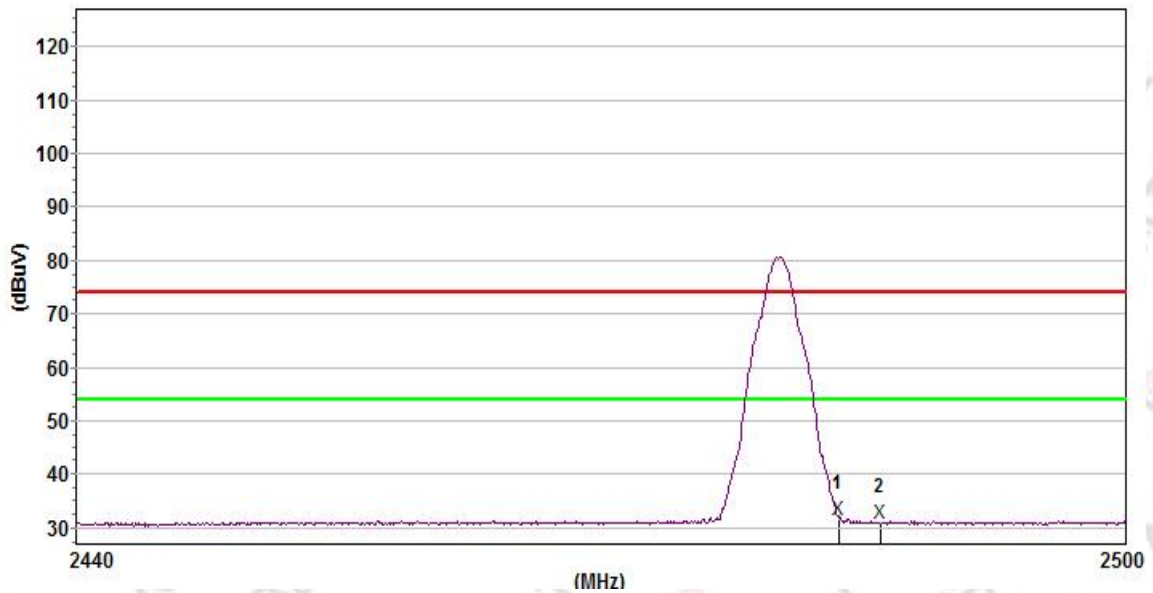
Mk.	Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
Peak								
1	2483.500000	48.3	74.0	25.7	23.3	50.2	2.8	V
2	2486.614251	44.4	74.0	29.6	23.3	50.2	2.8	V

High  
Horizontal



Mk.	Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
AVG								
1	2483.500000	32.2	54.0	21.8	22.9	50.2	2.8	H
2	2485.949868	31.1	54.0	22.9	22.9	50.2	2.8	H

Vertical



Mk.	Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.F/G. (dB/m)	Amp.G. (dB)	Cbl.L. (dB)	Pol.
AVG								
1	2483.500000	31.6	54.0	22.4	23.3	50.2	2.8	V
2	2485.829090	31.0	54.0	23.0	23.3	50.2	2.8	V

Remark: All modes have been tested, and only the worst modes are shown in this report.

#### 4. CONDUCTED SPURIOUS & BAND EDGE EMISSION

##### 4.1 LIMIT

According to FCC section 15.247(d), in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

##### 4.2 TEST PROCEDURE

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	30 MHz to 10th carrier harmonic
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

For Band edge

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	Lower Band Edge: 2300 – 2407 MHz Upper Band Edge: 2475 – 2500 MHz
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

For Hopping Band edge

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	Lower Band Edge: 2300– 2403 MHz Upper Band Edge: 2479 – 2500 MHz
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold



#### 4.3 TEST SETUP



The EUT is connected to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. Tune the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, the span is set to be greater than RBW.

#### 4.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.

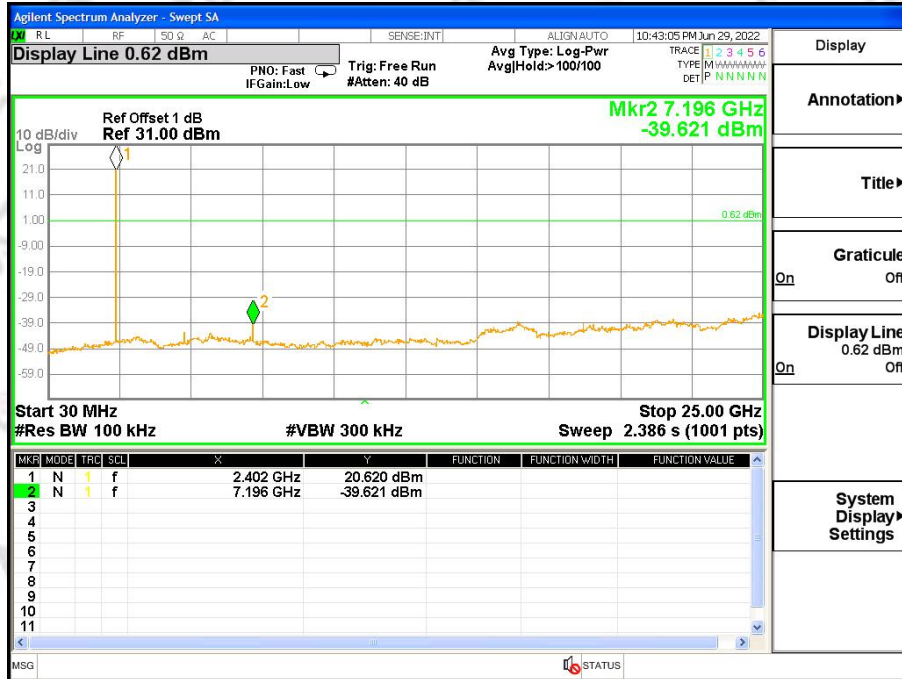
### 4.5 TEST RESULTS

(9kHz-30MHz)

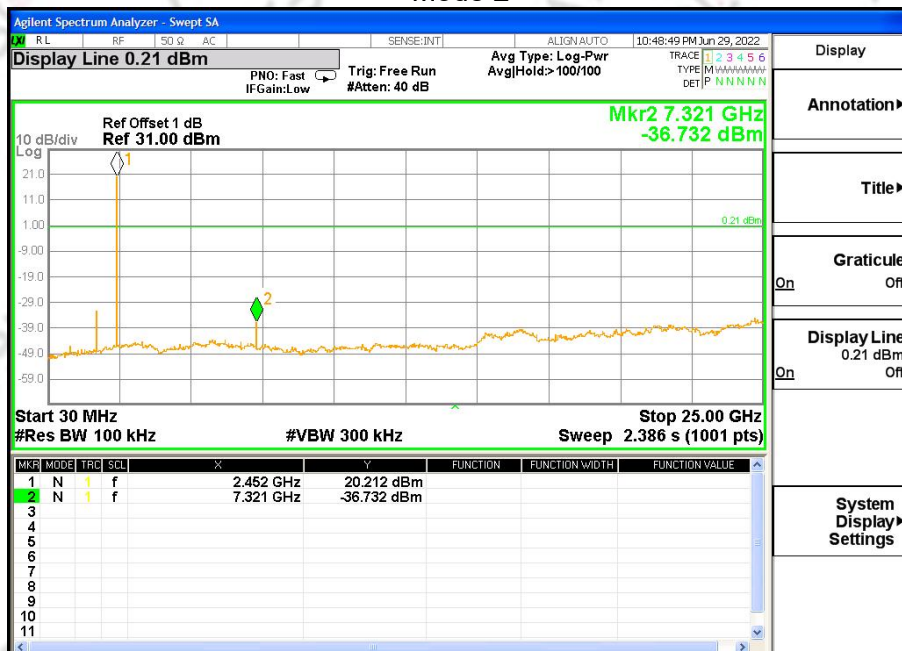
The low frequency, which started from 9kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

Temperature:	25°C	Relative Humidity:	50%
Test Mode:	Mode1/2/3	Test Voltage:	DC 7.4V

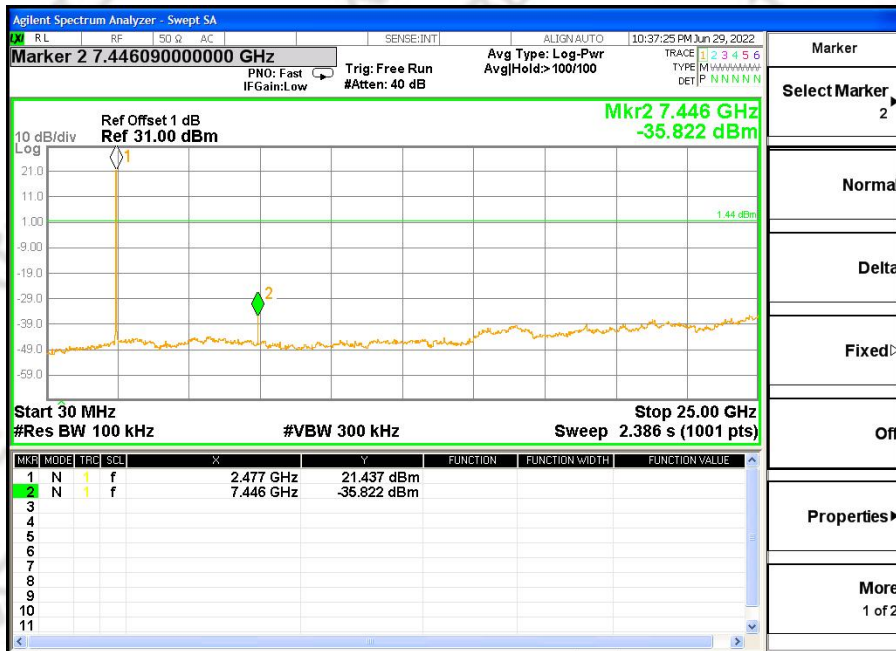
Mode 1



Mode 2

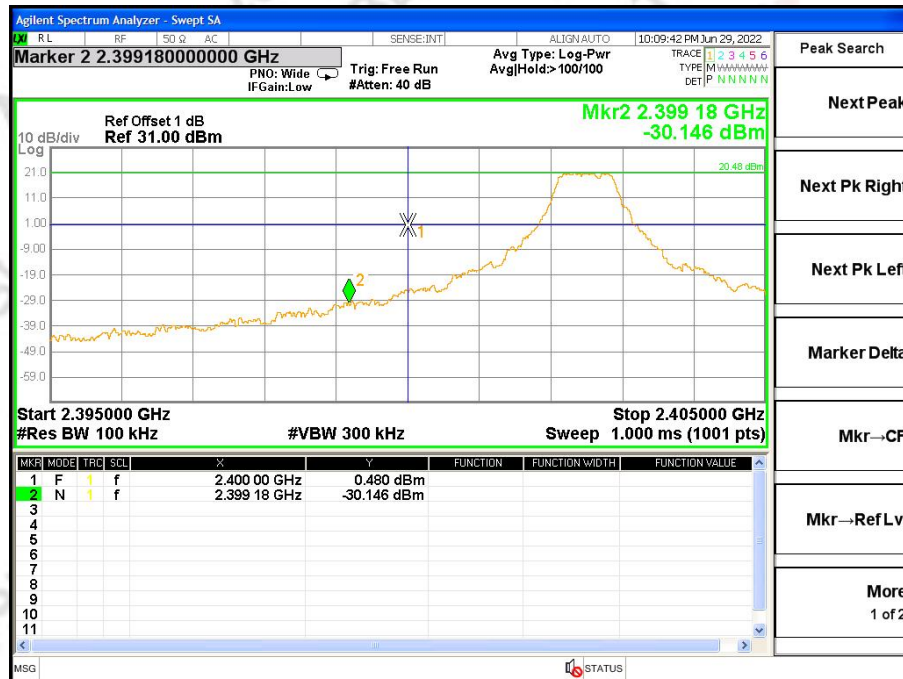


Mode 3



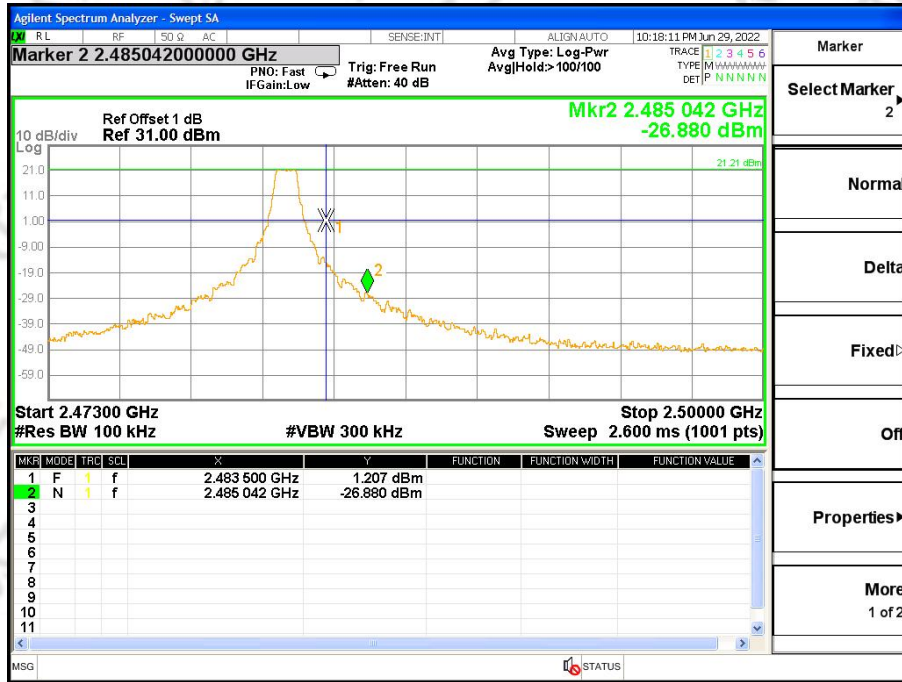
For Band edge(it's also the reference level for conducted spurious emission)

Mode 1



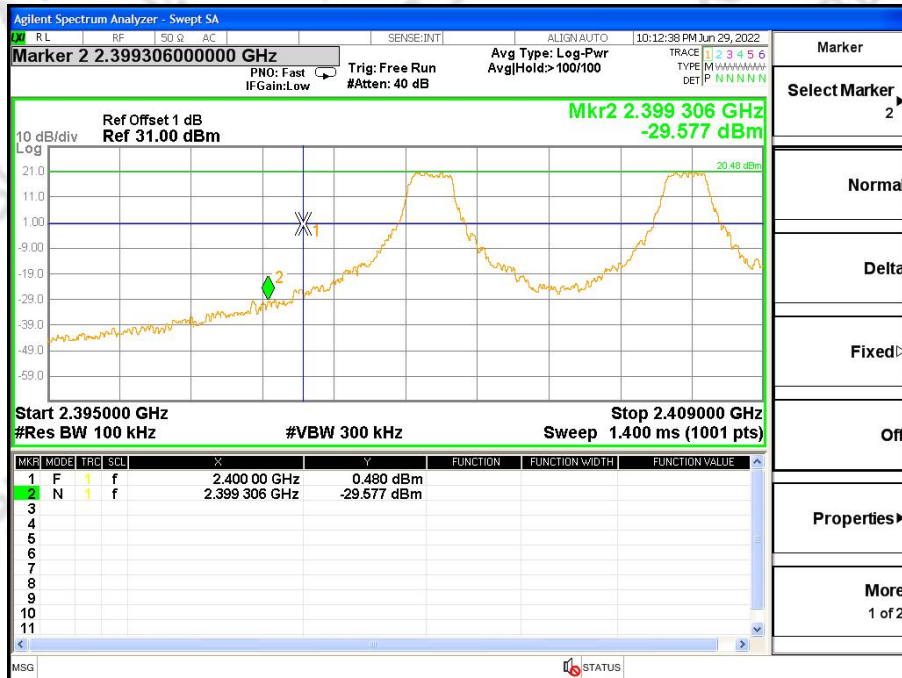


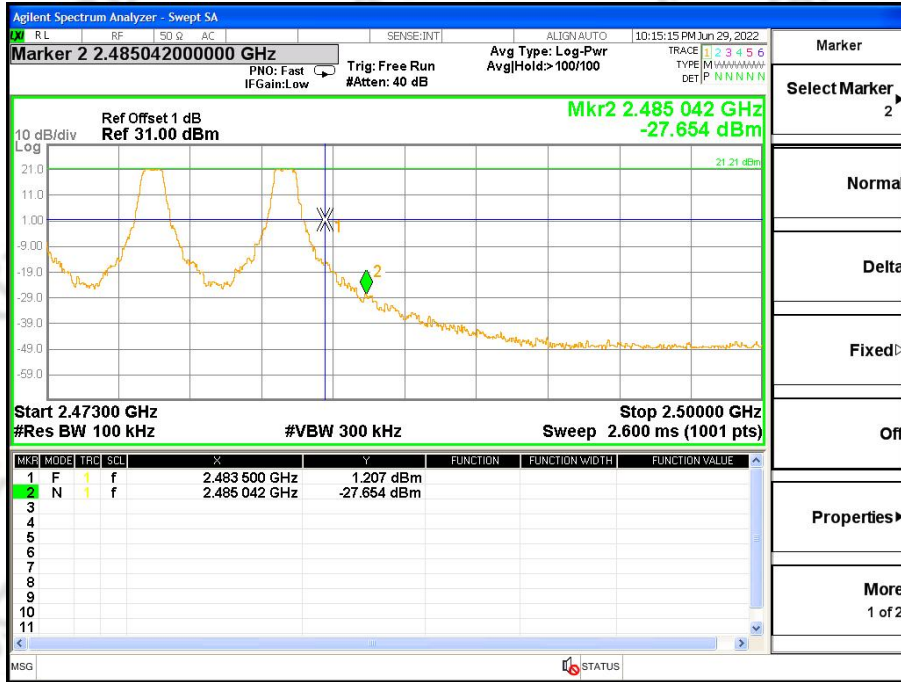
Mode 3



For Hopping Band edge

Mode 4





## 5. NUMBER OF HOPPING CHANNEL

### 5.1 LIMIT

FCC Part 15.247, Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Number of Hopping Channel	≥15	2400-2483.5	PASS

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> Operating Frequency Range
RB	300KHz
VB	300KHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

### 5.2 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting: RBW= 300KHz, VBW=300KHz, Sweep time = Auto.

### 5.3 TEST SETUP



### 5.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.

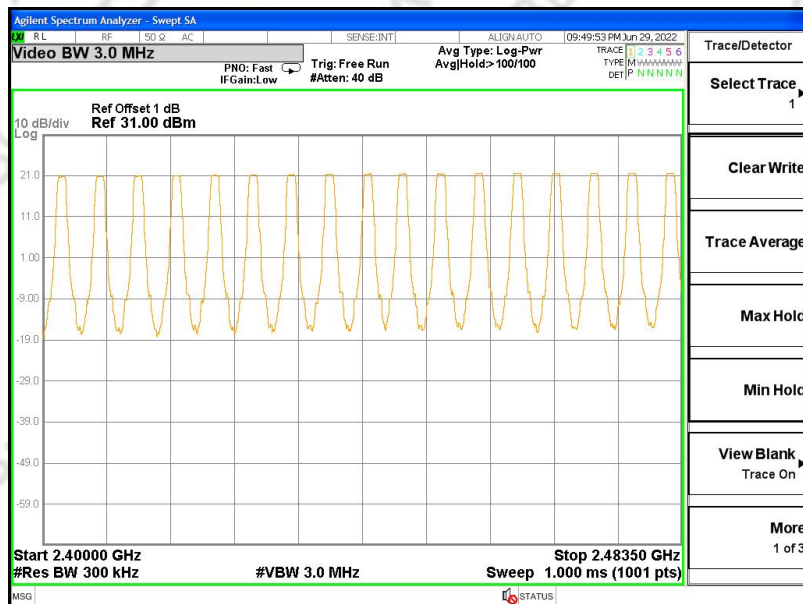


5.5 TEST RESULTS

Temperature:	25°C	Relative Humidity:	60%
Test Mode:	Mode 4	Test Voltage:	DC 7.5V

Number of Hopping Channel 17

Hopping channel



## 6. AVERAGE TIME OF OCCUPANCY

### 6.1 LIMIT

FCC Part 15.247, Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Average Time of Occupancy	0.4sec	2400-2483.5	PASS

### 6.2 TEST PROCEDURE

- a. The transmitter output (antenna port) was connected to the spectrum analyzer.
- b. Set RBW = 1MHz/VBW = 3MHz.
- c. Use a video trigger with the trigger level set to enable triggering only on full pulses.
- d. Sweep Time is more than once pulse time.
- e. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
- f. Measure the maximum time duration of one single pulse.
- g. Set the EUT for DH5, DH3 and DH1 packet transmitting.
- h. Measure the maximum time duration of one single pulse.
- i. DH5 Packet permit maximum  $1600 / 79 / 6 = 3.37$  hops per second in each channel (5 time slots RX, 1 time slot TX). So the dwell time is the time duration of the pulse times  $3.37 \times 31.6 = 106.6$  within 31.6 seconds.
- j. DH3 Packet permit maximum  $1600 / 79 / 4 = 5.06$  hops per second in each channel (3 time slots RX, 1 time slot TX). So the dwell time is the time duration of the pulse times  $5.06 \times 31.6 = 160$  within 31.6 seconds.
- k. DH1 Packet permit maximum  $1600 / 79 / 2 = 10.12$  hops per second in each channel (1 time slot RX, 1 time slot TX). So the dwell time is the time duration of the pulse times  $10.12 \times 31.6 = 320$  within 31.6 seconds.

### 6.3 TEST SETUP



### 6.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.

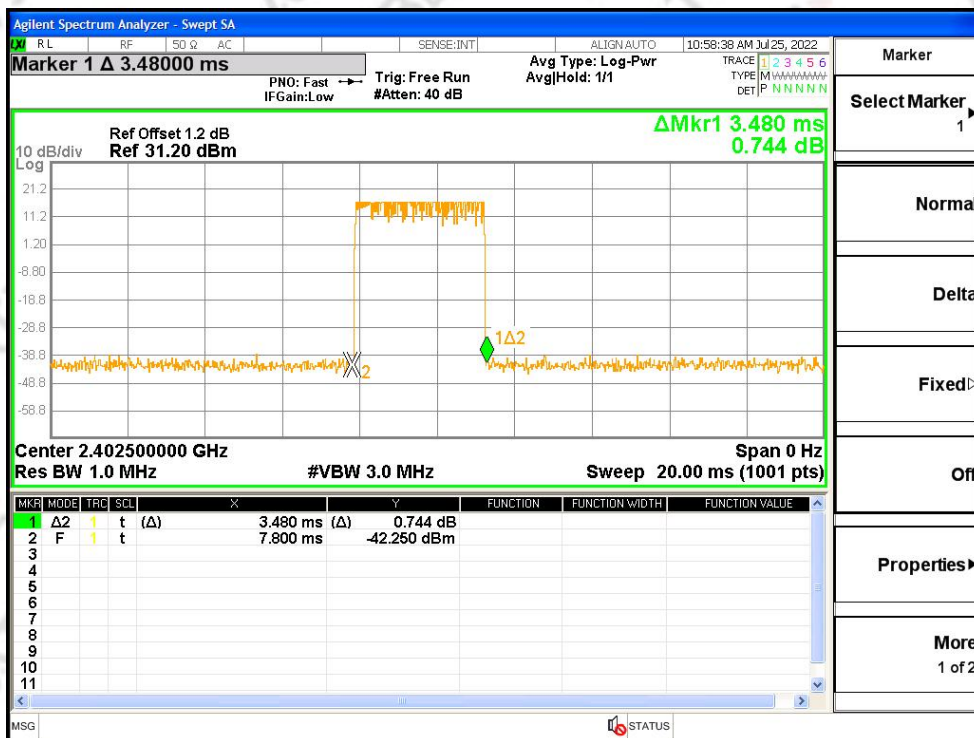
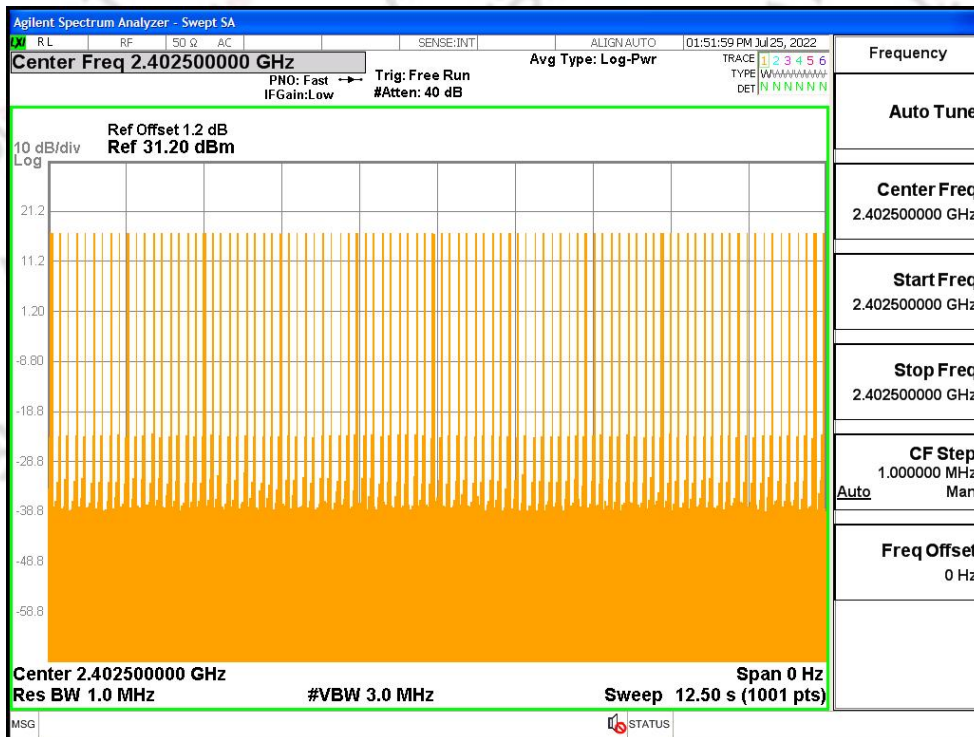
6.5 TEST RESULTS

Temperature:	25°C	Relative Humidity:	50%
Test Mode:	Mode 1/2/3	Test Voltage:	DC 7.4V

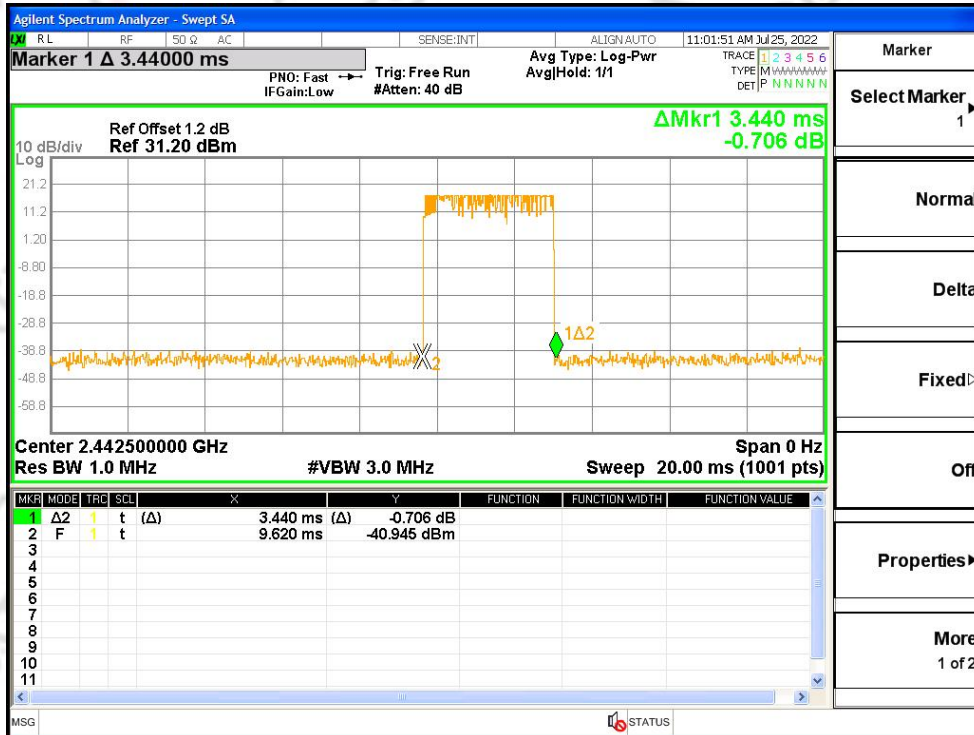
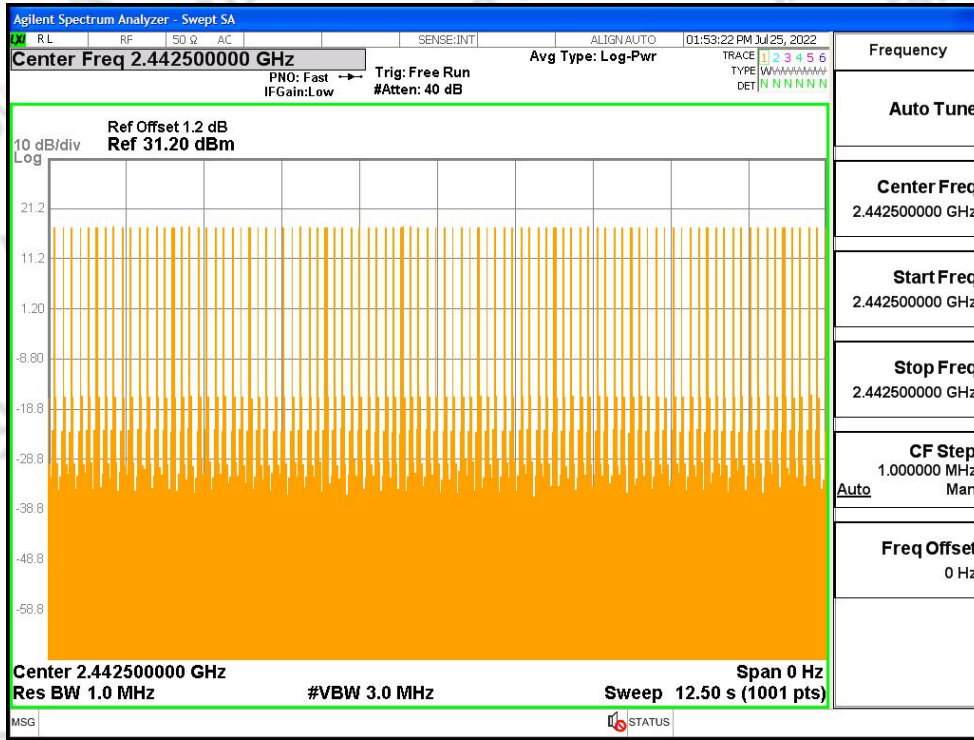
Frequency (MHz)	Pulse time(ms)	Number of pulses	Pulse Number	Dwell Time(s)	Limits(s)
2402.5	3.480	17	92	0.320	0.4
2442.5	3.440	17	92	0.317	0.4
2482.5	3.480	17	92	0.320	0.4



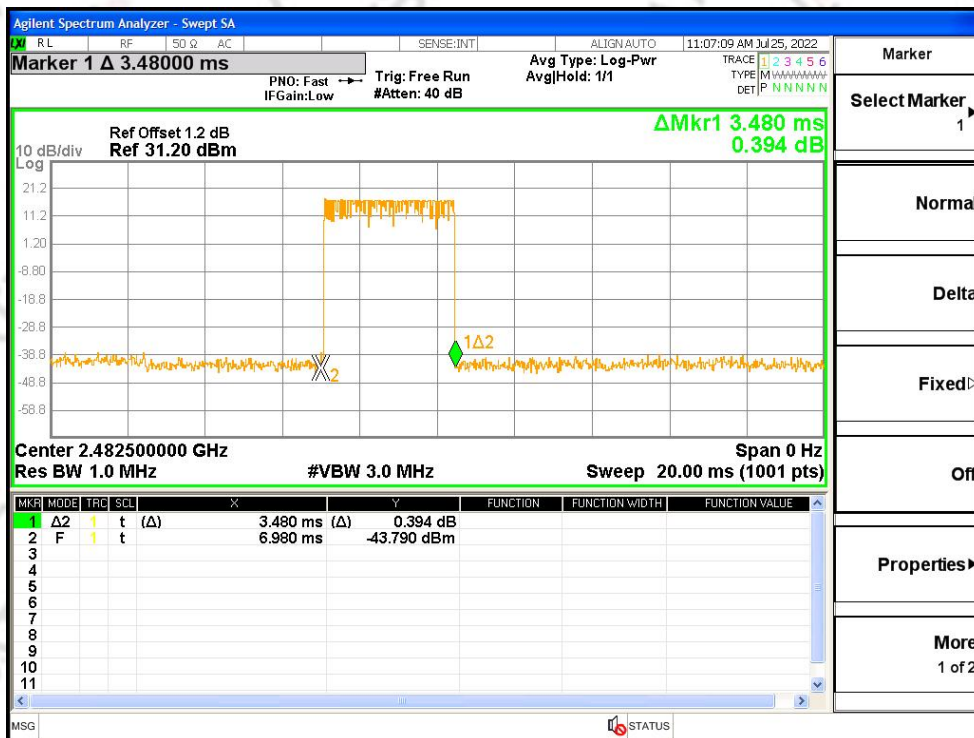
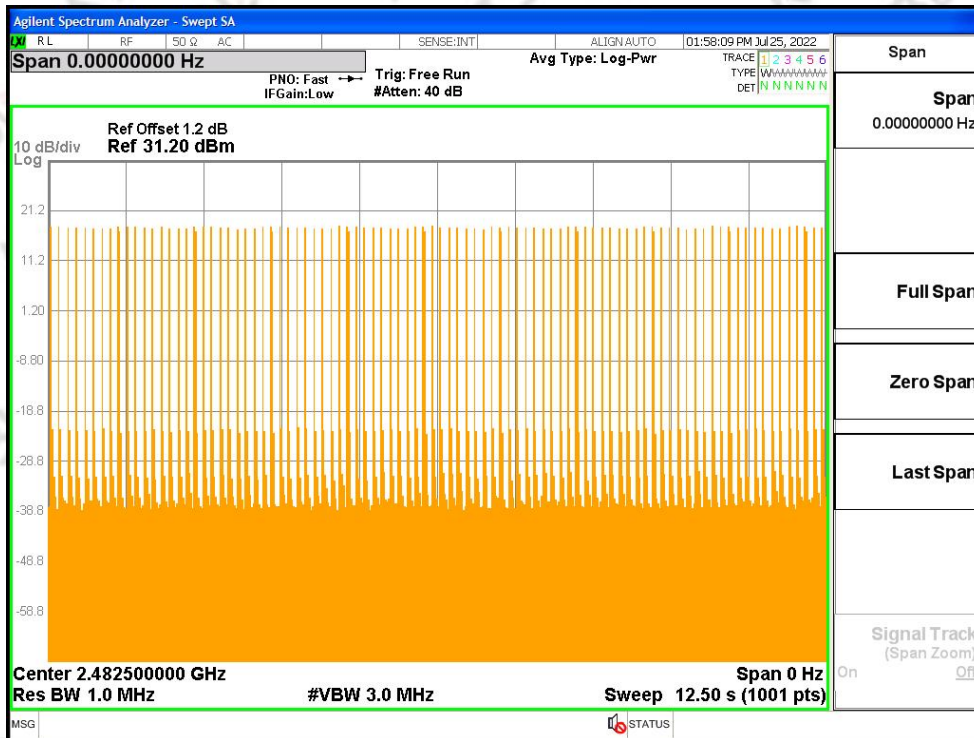
Mode 1



Mode 2



Mode 3





## 7. HOPPING CHANNEL SEPARATION MEASUREMENT

### 7.1 LIMIT

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, 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, provided the systems operate with an output power no greater than 125 mW.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> 20 dB Bandwidth or Channel Separation
RB	30 kHz (20dB Bandwidth) / 30 kHz (Channel Separation)
VB	100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

### 7.2 TEST PROCEDURE

- a. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
- b. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for 20 dB bandwidth measurement.
- c. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for channel separation measurement.

### 7.3 TEST SETUP



### 7.4 EUT OPERATION CONDITIONS

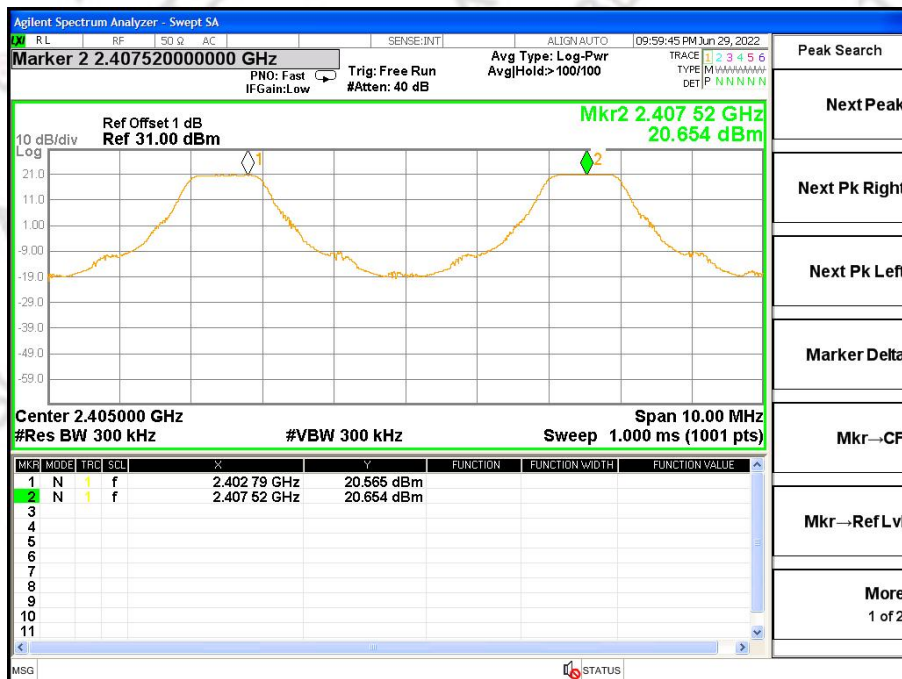
The EUT was programmed to be in continuously transmitting mode.

7.5 TEST RESULTS

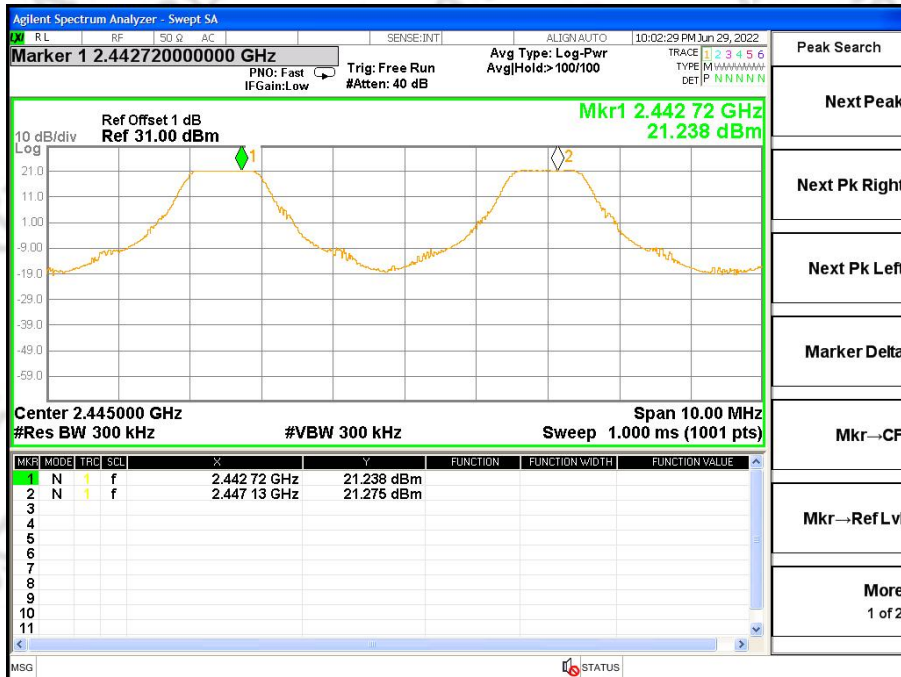
Temperature:	25°C	Relative Humidity:	50%
Test Mode:	Mode 4	Test Voltage:	DC 7.5V

Frequency	Mark1 Frequency (MHz)	Mark2 Frequency (MHz)	Ch. Separation (MHz)	Limit (MHz)	Result
2402.5 MHz	2402.79	2407.52	4.73	1.189	Complies
2442.5 MHz	2442.72	2447.13	4.41	1.190	Complies
2482.5 MHz	2477.00	2482.01	5.01	1.191	Complies

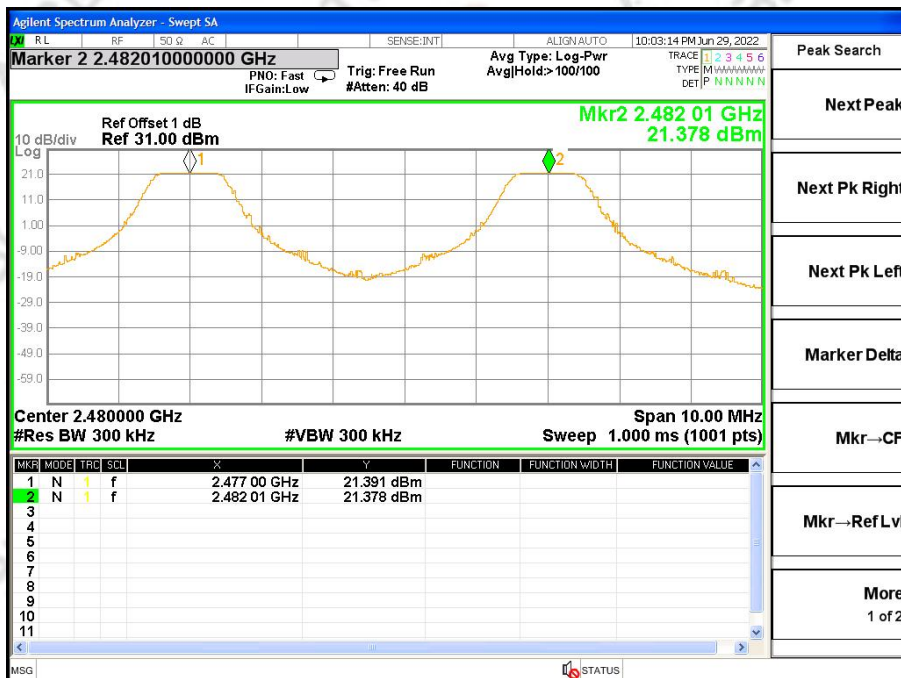
For FSK: Ch. Separation Limits: > 20dB bandwidth  
2402.5 MHz



2442.5 MHz



2482.5 MHz





## 8. BANDWIDTH TEST

### 8.1 LIMIT

FCC Part1515.247,Subpart C				
Section	Test Item	Limit	FrequencyRange (MHz)	Result
15.247(a)(1)	Bandwidth	(20 dB Bandwidth)	2400-2483.5	PASS

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	30 kHz (20dB Bandwidth) / 30 kHz (Channel Separation) For 99% Bandwidth :1% to 5% of the occupied bandwidth
VB	100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation) For 99% Bandwidth : approximately 3×RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

### 8.2 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting: RBW= 30KHz, VBW=100KHz, Sweep time = Auto.

### 8.3 TEST SETUP



### 8.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.