FCC PART 15 SUBPART C TEST REPORT

FCC PART 15.247

Report Reference No.....:	**JTT20150500204**	
FCC ID.....:	**2AEP7N451**	
Compiled by (position+printed name+signature)..:	File administrators Kevin Liu	kevin.Liu
Supervised by (position+printed name+signature)..:	Project Engineer Kevin Liu	kevin.Liu
Approved by (position+printed name+signature)..:	RF Manager Eric Wang	Eric Wang
Date of issue.....:	May 23, 2015	

Representative Laboratory Name .:	**SHENZHEN JIETONG INFORMATION TECHNOLOGY CO., LTD**
Address .....:	No.12 Building Shangsha, Innovation & Technology Park, Futian District, Shenzhen, P.R.China
Testing Laboratory Name .....:	**Shenzhen Academy of Metrology and Quality Inspection**
Address .....:	No.4 TongFa Road, Xili TownNanshan District, Shenzhen, China
Applicant's name.....:	**Noblex Argentina S.A.**
Address .....:	Jaramillo 3670 – CIUDAD AUTONOMA DE BUENOS AIRES – ARGENTINA
Test specification .....**:**	
Standard .....:	**FCC Part 15.247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz**
TRF Originator.....:	SHENZHEN JIETONG INFORMATION TECHNOLOGY CO., LTD

Test item description .....:	Smart Phone
Trade Mark .....:	NOBLEX
Manufacturer.....:	**AMER MOBILE CO.,LIMITED**
Model/Type reference.....:	N451
Listed Models .....:	N/A
Modulation Type .....:	GFSK
Operation Frequency.....:	From 2402MHz to 2480MHz
Rating .....:	DC 3.70V
Hardware version .....:	G316_MAIN_PCB_V2.2
Software version .....:	Newsan_NOBLEX_AR_SW_V1.0_HW_V1.0_20150421
Result.....:	**PASS**

T E S T R E P O R T

Test Report No. :	JTT20150500204	May 23, 2015 Date of issue

Equipment under Test	:	Smart Phone
Model /Type	:	N451
Listed Models	:	N/A
Applicant	:	**Noblex Argentina S.A.**
Address	:	Jaramillo 3670 – CIUDAD AUTONOMA DE BUENOS AIRES – ARGENTINA
Manufacturer		**AMER MOBILE CO.,LIMITED**
Address	:	Room A30, 9th floor,Silvercorp International Tower No 707-713,Nathan Road, mongkok, Kowloon, Hong Kong

Test Result	PASS

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Contents

1. TEST STANDARDS 4

2. SUMMARY 5

2.1. General Remarks 5
2.2. Product Description 5
2.3. Equipment Under Test 5
2.4. Description of the test mode 6
2.5. Short description of the Equipment under Test (EUT) 6
2.6. EUT operation mode 7
2.7. EUT configuration 7
2.8. Internal Identification of AE used during the test 7
2.9. Related Submittal(s) / Grant (s) 7
2.10. Modifications 7
2.11. NOTE 7

3. TEST ENVIRONMENT 8

3.1. Address of the test laboratory 8
3.2. Test Facility 8
3.3. Environmental conditions 8
3.4. Test Description 8
3.5. Summary of measurement results 9
3.6. Test Conditions 9
3.7. Equipments Used during the Test 10

4. TEST CONDITIONS AND RESULTS 11

4.1. AC Power Conducted Emission 11
4.2. Radiated Emission 13
4.3. Maximum Peak Output Power 22
4.4. Power Spectral Density 23
4.5. Band Edge Compliance of RF Emission 26
4.6. Spurious RF Conducted Emission 33
4.7. 6dB Bandwidth 39
4.8. Antenna Requirement 42

5. TEST SETUP PHOTOS OF THE EUT 43

1. TEST STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

ANSI C63.10:2009: American National Standard for Testing Unlicensed Wireless Devices

KDB558074 D01 V03: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

2 . SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	Apr 21, 2015
Testing commenced on	:	Apr 22, 2015
Testing concluded on	:	May 23, 2015

2.2. Product Description

The **Noblex Argentina S.A.**'s Model: N451 or the "EUT" as referred to in this report; more general information as follows, for more details, refer to the user's manual of the EUT.

Name of EUT	Smart Phone
Model Number	N451
Modilation Type	GMSK for GSM/GPRS/EDGE, 8-PSK for EDGE only Downlink,QPSK for UMTS
Antenna Type	Internal
UMTS Operation Frequency Band	Device supported UMTS FDD Band II and FDD Band V
WLAN FCC Operation frequency	IEEE 802.11b:2412-2462MHz IEEE 802.11g:2412-2462MHz IEEE 802.11n HT20:2412-2462MHz IEEE 802.11n HT40:2422-2452MHz
BT FCC Operation frequency	2402MHz-2480MHz
HSDPA Release Version	Release 10
HSUPA Release Version	Release 6
DC-HSUPA Release Version	Not Supported
WCDMA Release Version	R99
WLAN FCC Modulation Type	IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK) IEEE 802.11n HT40: OFDM (64QAM, 16QAM, QPSK,BPSK)
BT Modulation Type	GFSK (BT 4.0)/GFSK,8DPSK,π/4DQPSK(BT 3.0+EDR)
Hardware version	G316_MAIN_PCB_V2.2
Software version	Newsan_NOBLEX_AR_SW_V1.0_HW_V1.0_20150421
Android version	Android 4.4.2
GPS function	Supported
WLAN	Supported 802.11b/802.11g/802.11n
Bluetooth	Supported BT 4.0/BT 3.0+EDR
GSM/EDGE/GPRS	Supported GSM/GPRS/EDGE
GSM/EDGE/GPRS Power Class	GSM900:Power Class 4/DCS1800:Power Class 1
GSM/EDGE/GPRS Operation Frequency	GSM900 :880MHz-915MHz/DCS1800:1710MHz-1785MHz
GSM/EDGE/GPRS Operation Frequency Band	GSM900/DCS1800/GPRS900/ GPRS 1800/EDGE900/EDGE1800
GSM Release Version	R99
GPRS/EDGE Multislot Class	GPRS/EDGE: Multi-slot Class 12
Extreme temp. Tolerance	-30°C to +50°C
Extreme vol. Limits	3.40VDC to 4.20VDC (nominal: 3.70VDC)
GPRS operation mode	Class B

2.3. Equipment Under Test

Power supply system utilised

Power supply voltage	:	○	120V / 60 Hz	○	115V / 60Hz
		○	12 V DC	○	24 V DC
		●	Other (specified in blank below)		

DC 3.70V

2.4. Description of the test mode

The application provider specific test software to control sample in continuous TX and RX (Duty Cycle >98%)

For testing meet KDB558074 test requirement.

The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing. There are 40 channels of EUT, and the test carried out at the lowest channel, middle channel and highest channel

Channel	Frequency(MHz)	Channel	Frequency(MHz)
00	**2402**	**20**	**2442**
01	2404	21	2444
02	2406	22	2446
03	2408	23	2448
04	2410	24	2450
05	2412	25	2452
06	2414	26	2454
07	2416	27	2456
08	2418	28	2458
09	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
19	2440	**39**	**2480**

2.5. Short description of the Equipment under Test (EUT)

2.5.1 General Description

N451 is subscriber equipment in the WCDMA/GSM system. The HSPA/UMTS frequency band is Band II, Band V; The GSM/GPRS/EDGE (EDGE downlink only) frequency and includes GSM850 and GSM900 and DCS1800 and PCS1900, but only Band II and Band V and GSM850 and PCS1900 bands test data included in this report. The Smart Phone implements such functions as RF signal receiving/transmitting, HSPA/UMTS and GSM/GPRS/EDGE protocol processing, voice, video MMS service, GPS, and WIFI etc. Externally it provides micro SD card interface, earphone port (to provide voice service) and SIM card interface. It also provides Bluetooth module to synchronize data between a PC and the phone, or to use the built-in modem of the phone to access the Internet with a PC, or to exchange data with other Bluetooth devices.

NOTE: Unless otherwise noted in the report, the functional boards installed in the units shall be selected from the below list, but not means all the functional boards listed below shall be installed in one unit.

Note: The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.

2.5.2 Customized Configurations

#EUT Conf.	Signal Description	Operating Frequency
TM1_ Ch00	GFSK modulation	Ch No. 00/2402MHz
TM1_ Ch20	GFSK modulation	Ch No. 20/ 2442MHz
TM1_ Ch39	GFSK modulation	Ch No. 39/ 2480MHz

2.5.3 Test Environments

NOTE: The values used in the test report maybe stringent than the declared.

Environment Parameter	Selected Values During Tests		
NTNV	Temperature	Voltage	Relative Humidity
	Ambient	3.7VDC	Ambient

2.6. EUT operation mode

The EUT has been tested under typical operating condition. The Applicant provides command

to control the EUT for staying in continuous transmitting (Duty Cycle >98%) and receiving mode for testing.

2.7. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer

○ - supplied by the lab

○	Power Cable	Length (m) :	/
		Shield :	/
		Detachable :	/
○	Multimeter	Manufacturer :	/
		Model No. :	/

2.8. Internal Identification of AE used during the test

AE ID*	Description
AE1	Charger and USB cable

AE1

Model: S005UA0500100

INPUT: 100-240V 50/60Hz 0.15A

OUTPUT: DC 5.0V,1000mAh

*AE ID: is used to identify the test sample in the lab internally.

2.9. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: 2AEP7N451** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

2.10. Modifications

No modifications were implemented to meet testing criteria.

2.11. NOTE

1. The EUT is a Mobile Phone with WCDMA/GSM/GPRS/EDGE, WiFi and Bluetooth function, The functions of the EUT listed as below:

	Test Standards	Reference Report
GSM/GPRS/EDGE	FCC Part 22/FCC Part 24	JTT20150500201
WCDMA	FCC Part 22/FCC Part 24	JTT20150500202
Bluetooth	FCC Part 15 C 15.247	JTT20150500203
BLE	FCC Part 15 C 15.247	JTT20150500204
WiFi	FCC Part 15 C 15.247	JTT20150500205
USB Port	FCC Part 15 B	JTT20150500206
SAR	FCC Part 2 §2.1093	JTT20150500207

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen Academy of Metrology and Quality Inspection

No.4 TongFa Road, Xili TownNanshan District, Shenzhen, China
The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 (2003) and CISPR Publication 22.

3.2. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration information:

Shenzhen Academy of Metrology and Quality Inspection
No.4 TongFa Road, Xili TownNanshan District, Shenzhen, China
Test Firm FCC Registration number: 806614

3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature: 15-35 ° C

Humidity: 30-60 %

Atmospheric pressure: 950-1050mbar

3.4. Test Description

Test Item	FCC Part No.	Requirements	Verdict
DTS (6 dB) Bandwidth	15.247(a)(2)	≥ 500 kHz.	PASS
Maximum Peak Conducted Output Power	15.247(b)(3)	For directional gain:< 30dBm – (G[dBi] –6 [dB]),peak; Otherwise :< 30dBm, peak.	PASS
Maximum Power Spectral Density Level	15.247(e)	For directional gain :< 8dBm/3 kHz – (G[dBi] –6[dB]), peak. Otherwise :< 8dBm/3 kHz, peak.	PASS
Band Edges Compliance	15.247(d)	< -20dBr/100 kHz if total peak power ≤power limit.	PASS
Unwanted Emissions into Non-Restricted Frequency Bands	15.247(d)	< -20dBr/100 kHz if total peak power ≤power limit.	PASS
Unwanted Emissions into Restricted Frequency Bands (Conducted)	15.247(d) 15.209	< -20dBr/100 kHz if total peak power ≤power limit.	PASS
Unwanted Emissions into Restricted Frequency Bands (Radiated)	15.247(d) 15.209	FCC Part 15.209 field strength limit;	PASS
AC Power Line Conducted Emissions	15.207	FCC Part 15.207 conducted limit;	PASS

Remark: The measurement uncertainty is not included in the test result.

3.5. Summary of measurement results

Test Specification clause	Test case	Test Mode	Test Channel	Recorded In Report		Pass	Fail	NA	NP	Remark
§15.247(b)(4)	Antenna gain	GFSK	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒	☐	☐	☐	complies
§15.247(e)	Power spectral density	GFSK	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒	☐	☐	☐	complies
§15.247(a)(1)	Spectrum bandwidth – 6 dB bandwidth	GFSK	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒ ☒	☐	☐	☐	complies
§15.247(b)(1)	Maximum output power	GFSK	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒ ☒ ☒	☐	☐	☐	complies
§15.247(d)	Band edge compliance conducted	GFSK	☒ Lowest ☒ Highest	GFSK	☒ Lowest ☒ Highest	☒ ☒	☐	☐	☐	complies
§15.205	Band edge compliance radiated	GFSK	☒ Lowest ☒ Highest	GFSK	☒ Lowest ☒ Highest	☒	☐	☐	☐	complies
§15.247(d)	TX spurious emissions conducted	GFSK	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒ ☒	☐	☐	☐	complies
§15.247(d)	TX spurious emissions radiated	GFSK	☒ Lowest ☒ Middle ☒ Highest	GFSK	☒ Lowest ☒ Middle ☒ Highest	☒	☐	☐	☐	complies
§15.109	RX spurious emissions radiated	-/-	-/-	-/-	-/-	☒	☐	☐	☐	complies
§15.209(a)	TX spurious Emissions radiated < 30 MHz	GFSK	-/-	GFSK	-/-	☒	☐	☐	☐	complies
§15.107(a) §15.207	Conducted Emissions < 30 MHz	GFSK	-/-	GFSK	-/-	☒	☐	☐	☐	complies

Remark:
1. The measurement uncertainty is not included in the test result.
2. NA = Not Applicable; NP = Not Performed

3.6. Test Conditions

Test Case	Test Conditions	
	Configuration	Description
DTS (6 dB) Bandwidth	Measurement Method	FCC KDB 558074 §8.2 Option2.
	Test Environment	NTNV
	EUT Configuration	TM1_ Ch00 TM1_ Ch20 TM1_ Ch39
Maximum Peak Conducted Output Power	Measurement Method	FCC KDB 558074§9.1.2
	Test Environment	NTNV
	EUT Configuration	TM1_ Ch00 TM1_ Ch20 TM1_ Ch39
Maximum Power Spectral Density Level	Measurement Method	FCC KDB 558074 §10.2 (peak PSD).
	Test Environment	NTNV
	EUT Configuration	TM1_ Ch00 TM1_ Ch20 TM1_ Ch39
Unwanted Emissions into Non-Restricted Frequency Bands	Measurement Method	FCC KDB 558074§11.0.
	Test Environment	NTNV
	EUT Configuration	TM1_ Ch00 TM1_ Ch20

		TM1_ Ch39
Unwanted Emissions into Restricted Frequency Bands (Conducted)	Measurement Method	FCC KDB 558074§11.2, Conducted (antenna-port).
	Test Environment	NTNV
	EUT Configuration	TM1_ Ch00 TM1_ Ch20 TM1_ Ch39
Unwanted Emissions into Restricted	Measurement Method	FCC KDB 558074§12.1,Radiated(cabinet/case emissions with Impedance matching for antenna-port).
	EUT Configuration	TM1_ Ch00 TM1_ Ch20 TM1_ Ch39

Test Case	Test Conditions	
	Configuration	Description
AC Power Line Conducted Emissions	Measurement Method	AC mains conducted.
	Test Environment	NTNV
	EUT Configuration	TM1_ Ch20 (Worst Conf.).

Note: For Radiated Emissions, By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that “Z axis” position was the worst, then the final test was executed the worst condition and test data were recorded in this report.

3.7. Equipments Used during the Test

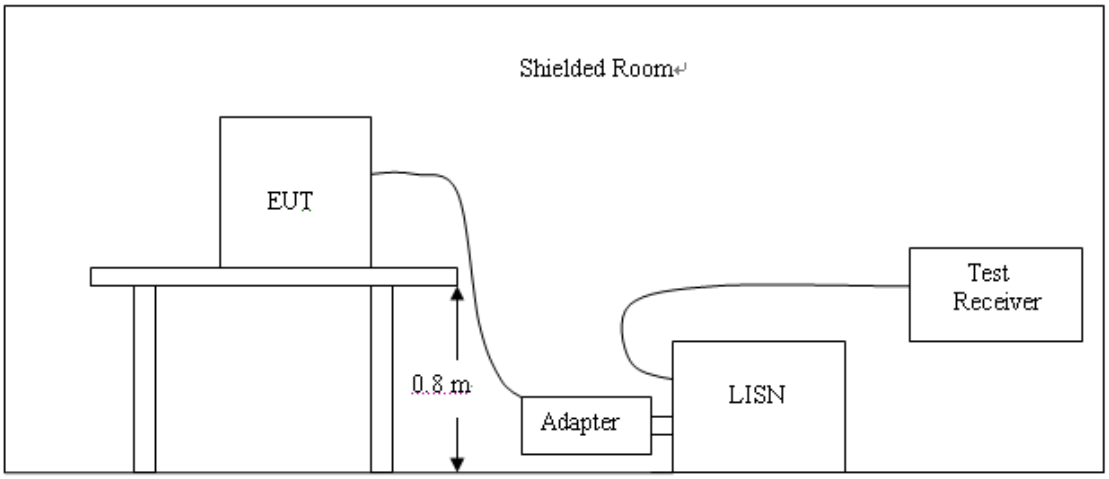
No.	Equipment	Manufacturer	Model No.	Last Cal.
SB2603	EMI Test Receiver	Rohde & Schwarz	ESCS30	Dec.19, 2014
SB3321	AMN	Rohde & Schwarz	ESH2-Z5	Jan.18, 2015
SB2604	AMN	Rohde & Schwarz	ESH3-Z5	Nov.18, 2014
SB8501/09	EMI Test Receiver	Rohde & Schwarz	ESU40	Mar.19, 2015
SB8501/04	Bilog Antenna	Schwarzbeck	VULB9163	Mar.19, 2015
SB3435	Horn Antenna	Rohde & Schwarz	HF906	Jan.19, 2015
SB3435/01	Amplifier(1-18GHz)	Rohde & Schwarz	---	Jan.19, 2015
SB3435/02	Amplifier(18-40GHz)	Rohde & Schwarz	---	Jan.19, 2015
SB5392/02	Horn Antenna	Amplifier Research	AT4560	Jan.19, 2015
SB3450/01	3m Semi-anechoic chamber	Albatross Projects	9X6X6	Oct.09, 2014
SB3345	Loop Antenna	Schwarzbeck	FMZB1516	Jan.20,2015
SB3437	Power meter	Rohde & Schwarz	NRVD	Jul.03,2014
SB3437/01	Power sensor	Rohde & Schwarz	URV5-Z2	Jul.03,2014
SB9721/02	Signal Analyzer	Agilent	N9020A	Jan.05,2014
N/A	EMI TEST Software	Rohde&Schwarz	ESK1	N/A
N/A	EMI TEST Software	Rohde&Schwarz	EMC32	N/A

The Cal. Interval was one year

4. TEST CONDITIONS AND RESULTS

4.1. AC Power Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2009.
2. Support equipment, if needed, was placed as per ANSI C63.10-2009
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2009
4. The EUT received DC5V power from the adapter, the adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.

AC Power Conducted Emission Limit

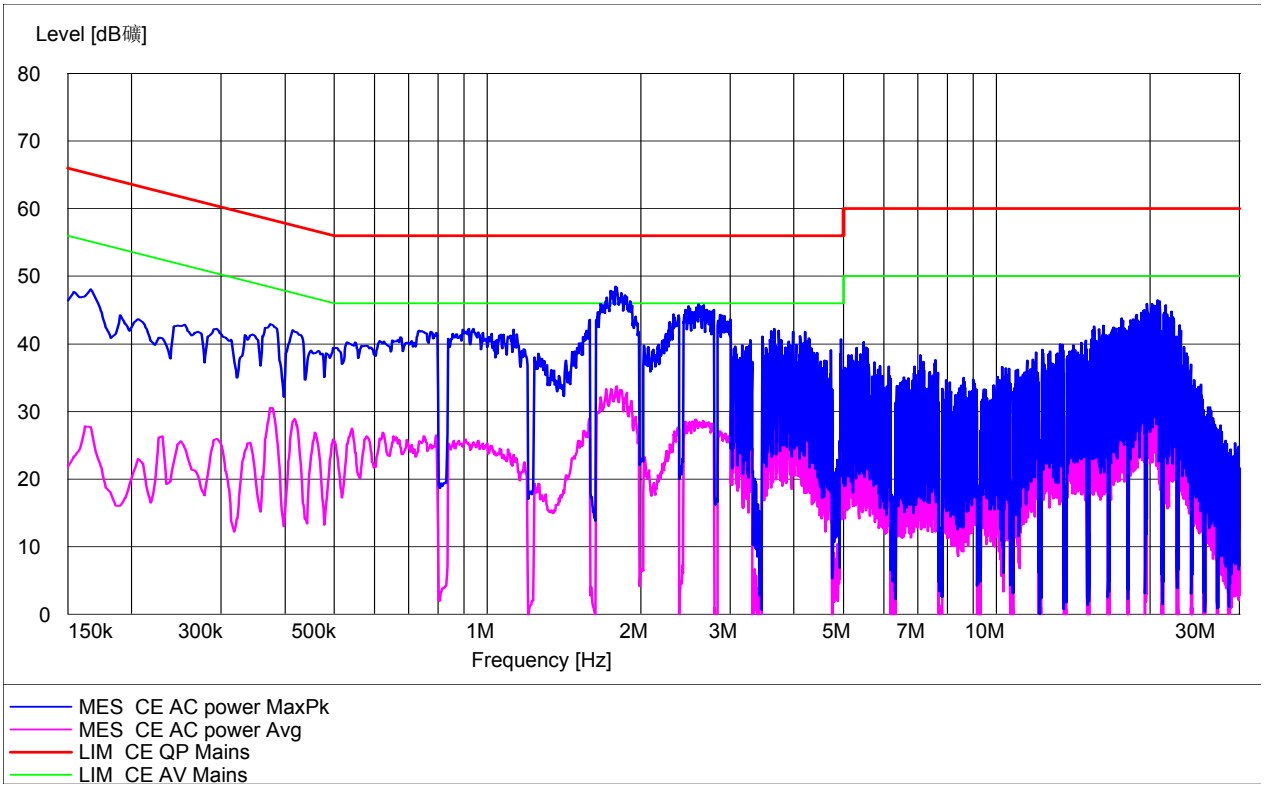
For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following:

Frequency (MHz)	Maximum RF Line Voltage (dBμV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

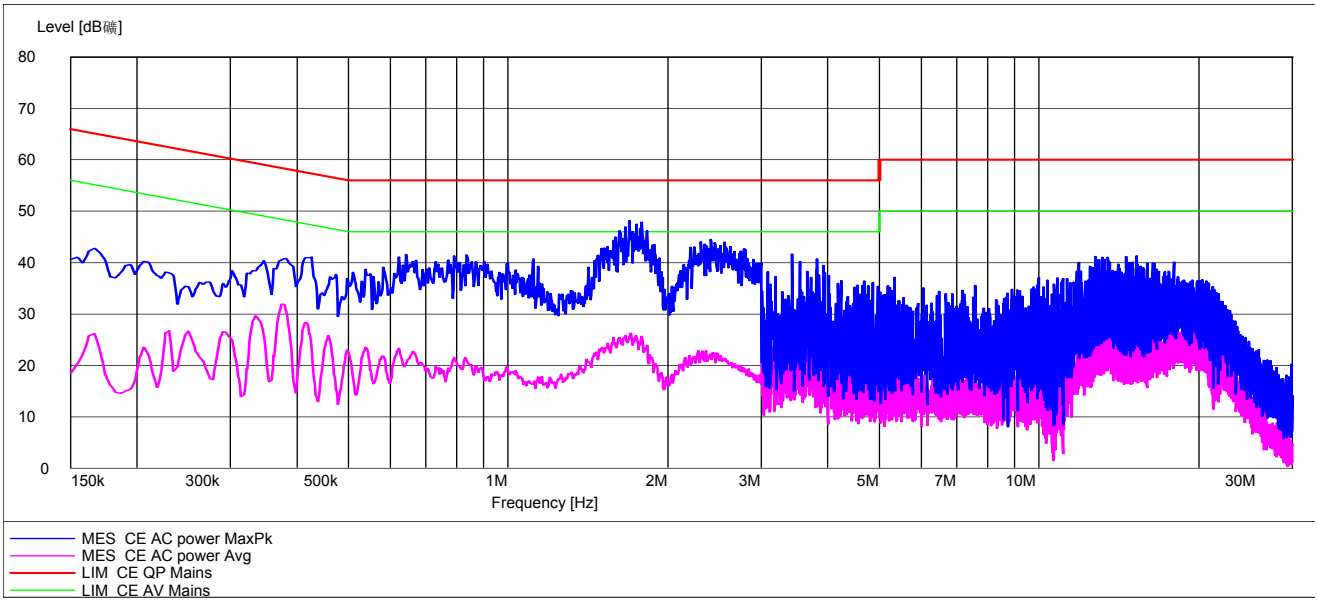
* Decreasing linearly with the logarithm of the frequency

TEST RESULTS

The AC Power Conducted Emission measurement is performed at both TX and RX (Idle) mode, recorded worst case at TX mode..



Frequency	QP level	QP Limit	AV level	AV Limit	QP read	AV read	Factor	QP margin	AV margin	Phase
0.166	41.2	65.2	25.1	55.2	31.8	15.4	9.7	24	30.1	LINE
0.374	39.3	58.4	30.4	48.4	29.7	20.7	9.7	19.1	18.0	LINE
1.798	40.2	56	30.9	46	30.7	21.1	9.8	15.8	15.1	LINE
2.598	39.4	56	28.2	46	29.5	18.3	9.9	16.6	17.8	LINE
20.724	39	60	29.1	50	29.1	18.9	10.2	21.0	20.9	LINE
21.512	39.2	60	26.5	50	29.6	16.3	10.2	20.8	23.5	LINE

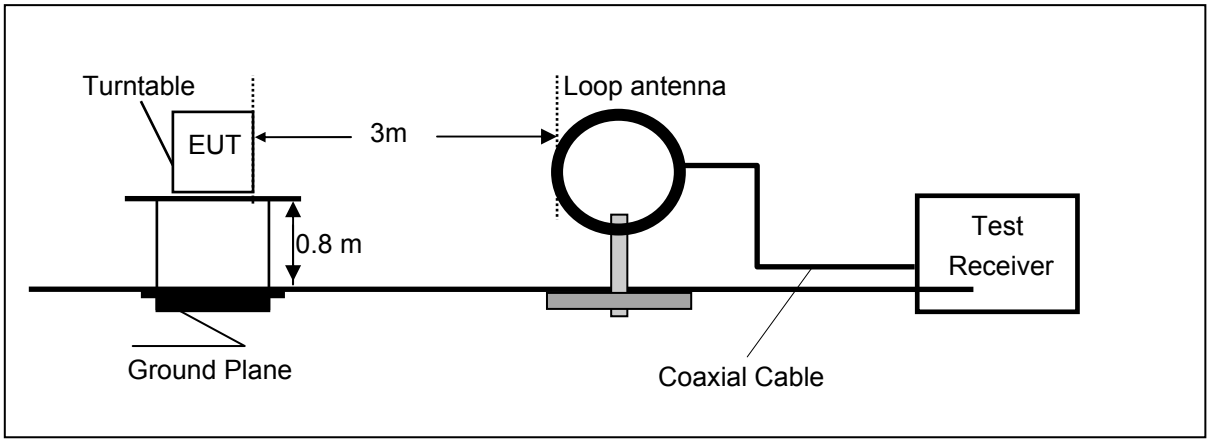


Frequency	QP level	QP Limit	AV level	AV Limit	QP read	AV read	Factor	QP margin	AV margin	Phase
0.166	37.9	65.2	25.1	55.2	28.2	15.4	9.7	27.3	30.1	NEUTRAL
0.418	33.2	57.5	28.9	47.5	23.5	19.2	9.7	24.3	18.6	NEUTRAL
1.694	35.3	56	24.2	46	25.5	14.4	9.8	20.7	21.8	NEUTRAL
1.786	35.4	56	21.9	46	25.6	12.1	9.8	20.6	24.1	NEUTRAL
2.41	34.1	56	22	46	24.2	12.1	9.9	21.9	24	NEUTRAL
15.264	31.4	60	19.5	50	21.5	9.6	9.9	28.6	30.5	NEUTRAL

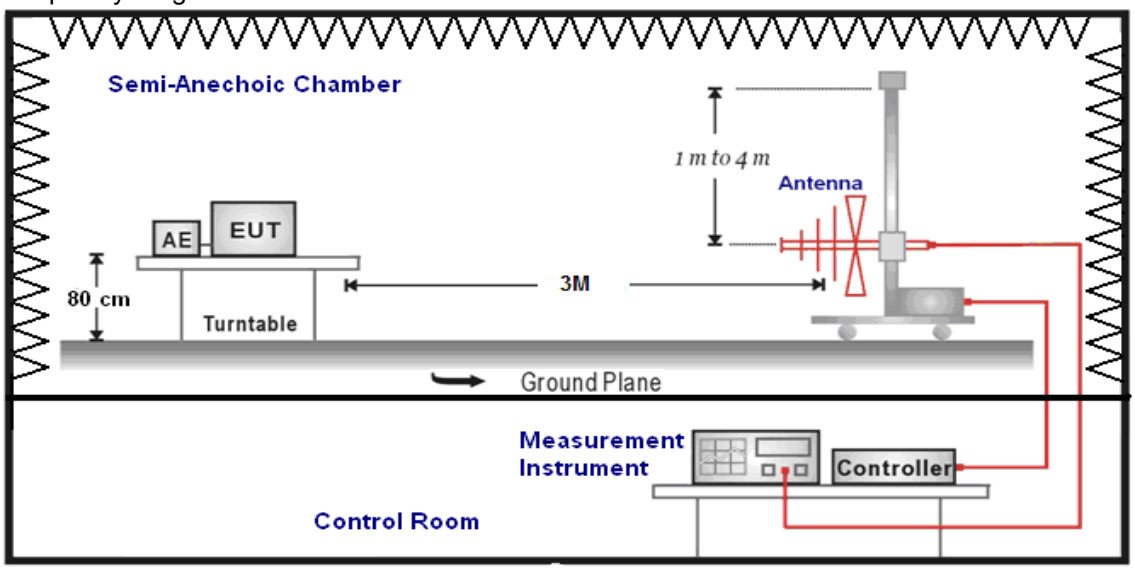
4.2. Radiated Emission

TEST CONFIGURATION

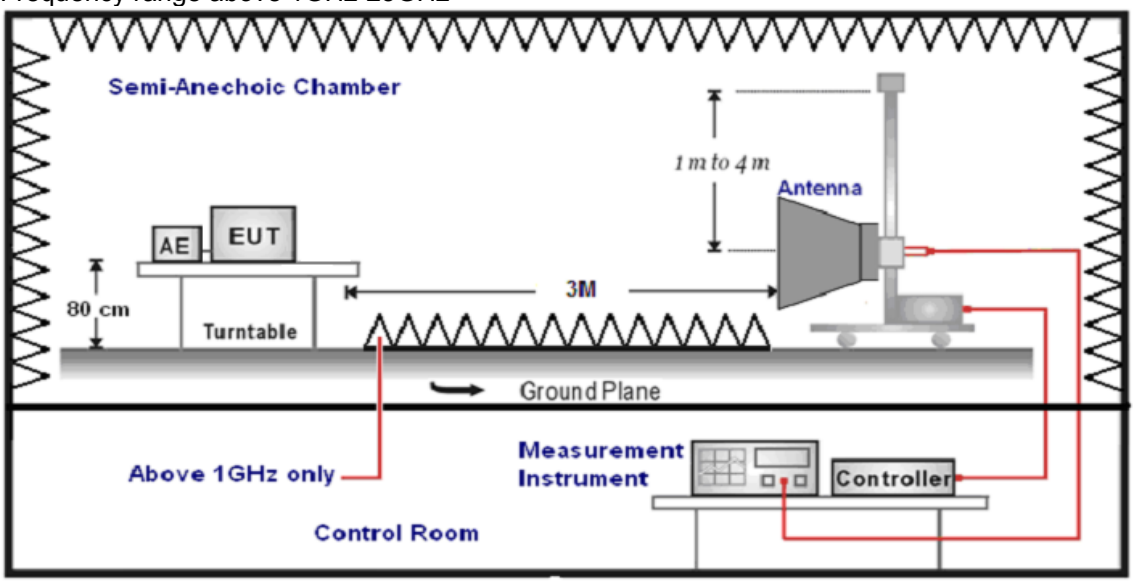
Frequency range 9 KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



TEST PROCEDURE

1. 1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0℃ to 360℃ to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. The EUT minimum operation frequency was 32.768 KHz and maximum operation frequency was 2480MHz.so radiated emission test frequency band from 9 KHz to 25GHz.
6. The distance between test antenna and EUT as following table states:

Test Frequency range	Test Antenna Type	Test Distance
9KHz-30MHz	Active Loop Antenna	3
30MHz-1GHz	Ultra-Broadband Antenna	3
1GHz-18GHz	Double Ridged Horn Antenna	3
18GHz-25GHz	Horn Anternna	1

7. Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
9KHz-150KHz	RBW=200Hz/VBW=3KHz,Sweep time=Auto	QP
150KHz-30MHz	RBW=9KHz/VBW=100KHz,Sweep time=Auto	QP
30MHz-1GHz	RBW=120KHz/VBW=1000KHz,Sweep time=Auto	QP
1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto	Peak (Receiver)
	Average Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto	Average (Receiver)

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	

RADIATION LIMIT

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed the following table. According to § 15.247(d), in any 100kHz bandwidth outside the frequency band in which the EUT is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the100kHz bandwidth within the band that contains the highest level of desired power.

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	300	20log(2400/F(KHz))+80	2400/F(KHz)
0.49-1.705	30	20log(24000/F(KHz))+40	24000/F(KHz)
1.705-30	30	20log(30)+40	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST RESULTS

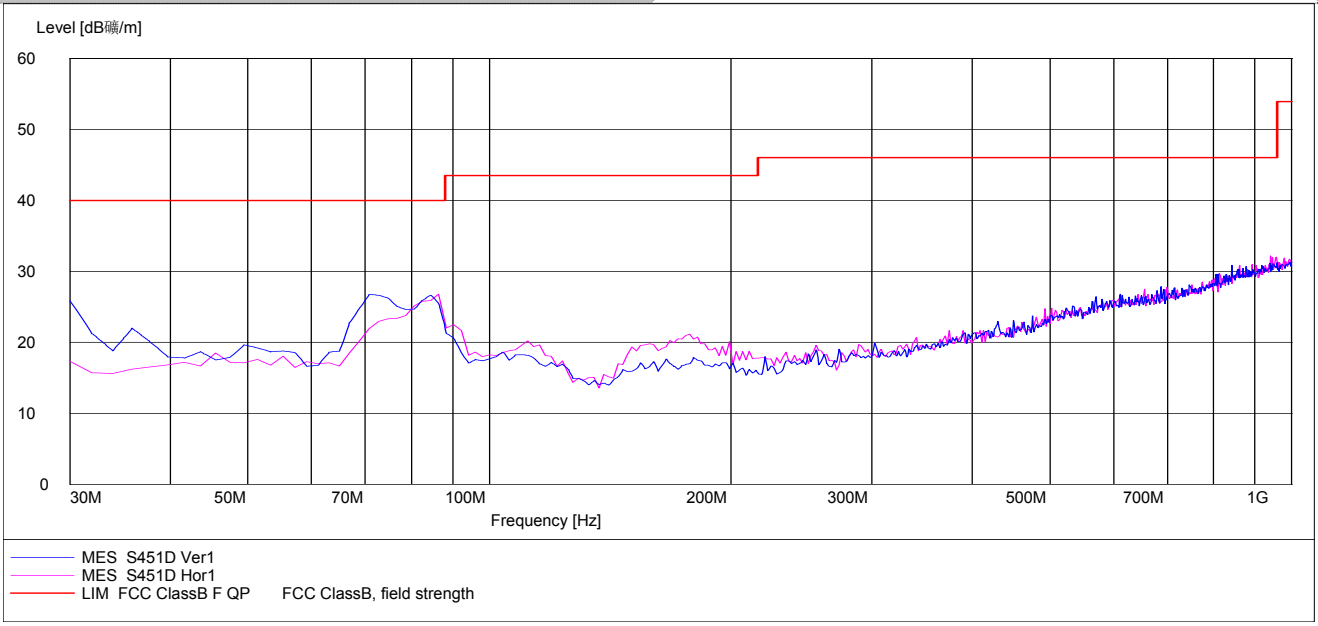
Remark:
1. The radiated measurement are performed the each channel (low/mid/high), the datum recorded below (the middle channel) is the worst case for all test channels.
2. ULTRA-BROADBAND ANTENNA for the radiation emission test below 1G.
3. HORN ANTENNA for the radiation emission test above 1G.
4. We tested both battery powered and powered by adapter charging mode at three orientations, recorded worst case at powered by adapter charging mode.
5. "---" means not recorded as emission levels lower than limit.
6. Margin= Limit - Level

For 9KHz to 30MHz

Frequency (MHz)	Corrected Reading (dBμV/m)@3m	FCC Limit (dBμV/m) @3m	Margin (dB)	Detector	Result
12.00	42.89	69.54	26.65	QP	PASS
24.00	40.65	69.54	28.89	QP	PASS

For 30MHz to 1000MHz

Polarization	*Horizontal& Vertical*

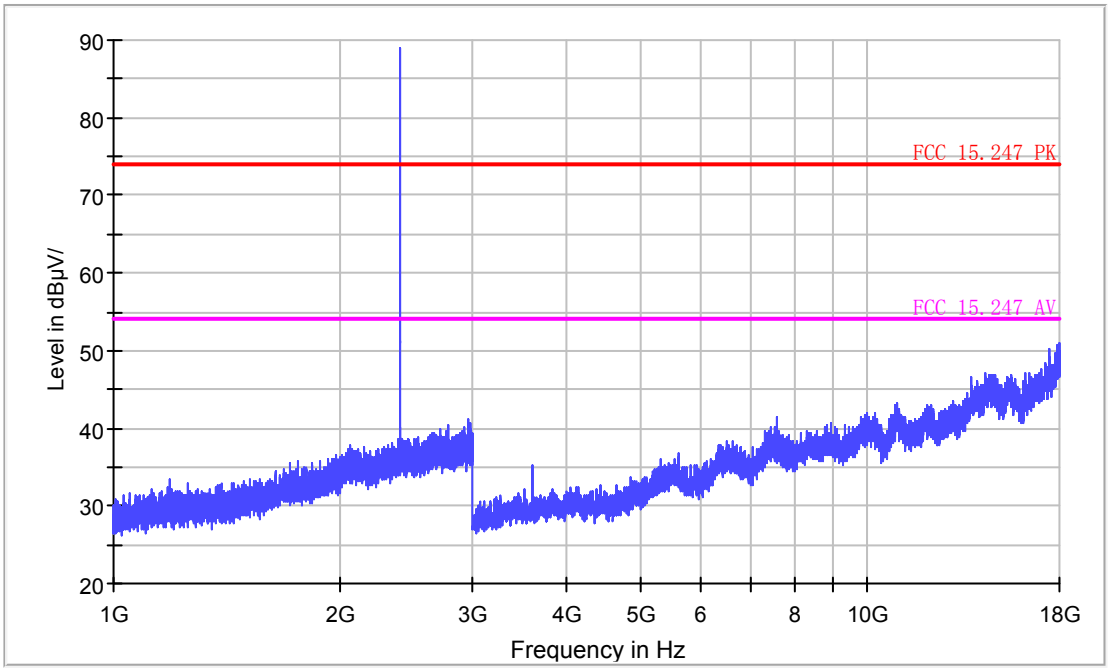


Frequency (MHz)	Polarity	cable loss (dB)	Antenna factor (dB)	Readings (dBuV/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
45.551	Horizontal	0.8	13.6	35.7	22.9	40.0	17.1
74.707	Horizontal	1.0	8.7	27.4	19.7	40.0	20.3
86.372	Horizontal	1.1	10.3	26	16.8	40.0	23.2
111.643	Horizontal	1.1	12.3	35.9	24.7	43.5	18.8
158.296	Horizontal	1.4	8.3	30.7	23.8	43.5	19.7
177.735	Horizontal	1.6	9.0	23.9	16.5	43.5	27
30	Vertical	0.6	12.3	29.2	17.5	40.0	22.5
35.831	Vertical	0.6	12.3	32.9	21.2	40.0	18.8
49.438	Vertical	0.7	13.6	36.5	23.6	40.0	16.4
70.821	Vertical	0.9	8.7	25.4	17.6	40.0	22.4
84.428	Vertical	0.9	8.5	26.7	19.1	40.0	20.9
109.699	Vertical	1.2	13.2	31.4	19.4	43.5	24.1

For 1GHz to 25GHz

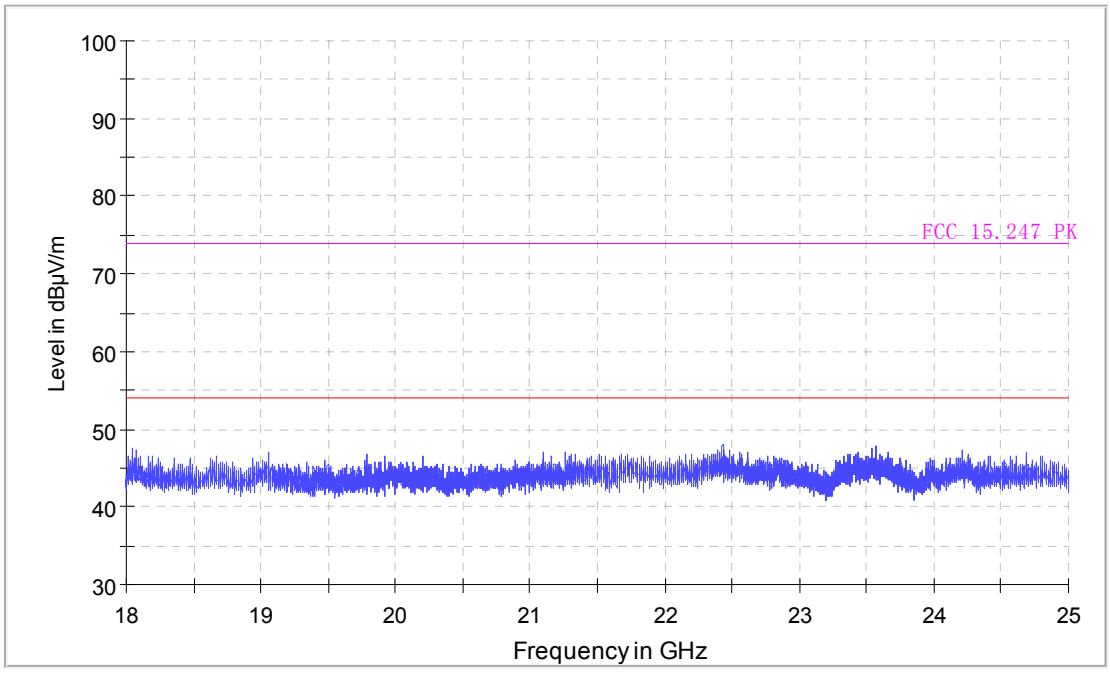
Test mode:	**Low Channel (GFSK)**	*Polarization*	*Horizontal*

FCC Electric Field Strength 1-18GHz operate on 2.4GHz



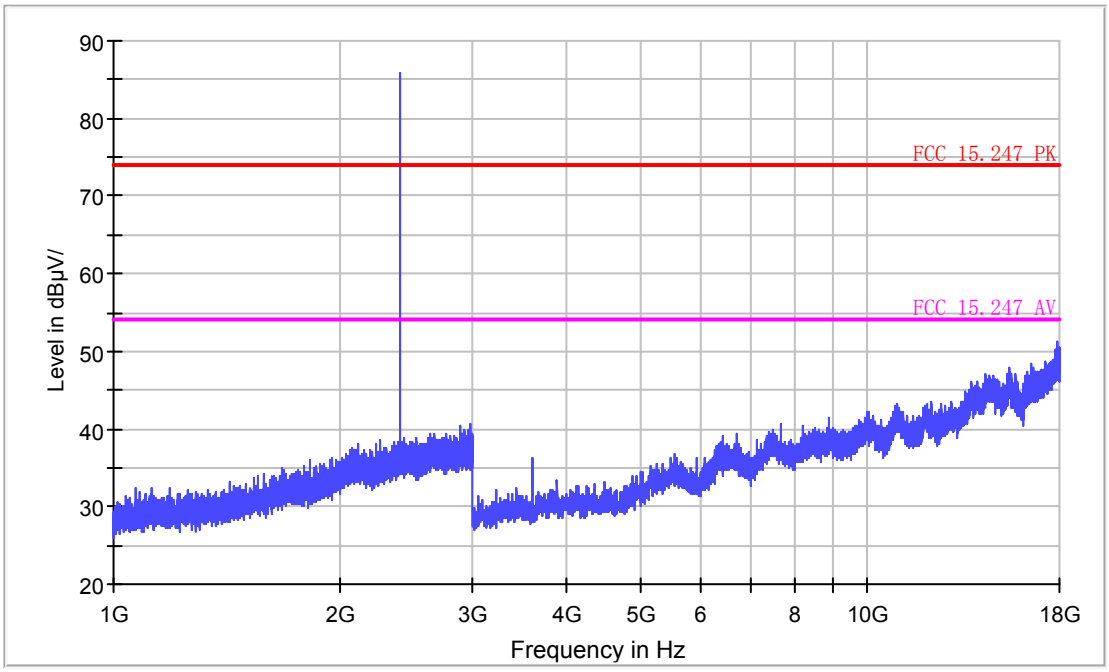
Test mode:	**Low Channel (GFSK)**	*Polarization*	*Horizontal*

FCC Electric Field Strength 18-26.5GHz



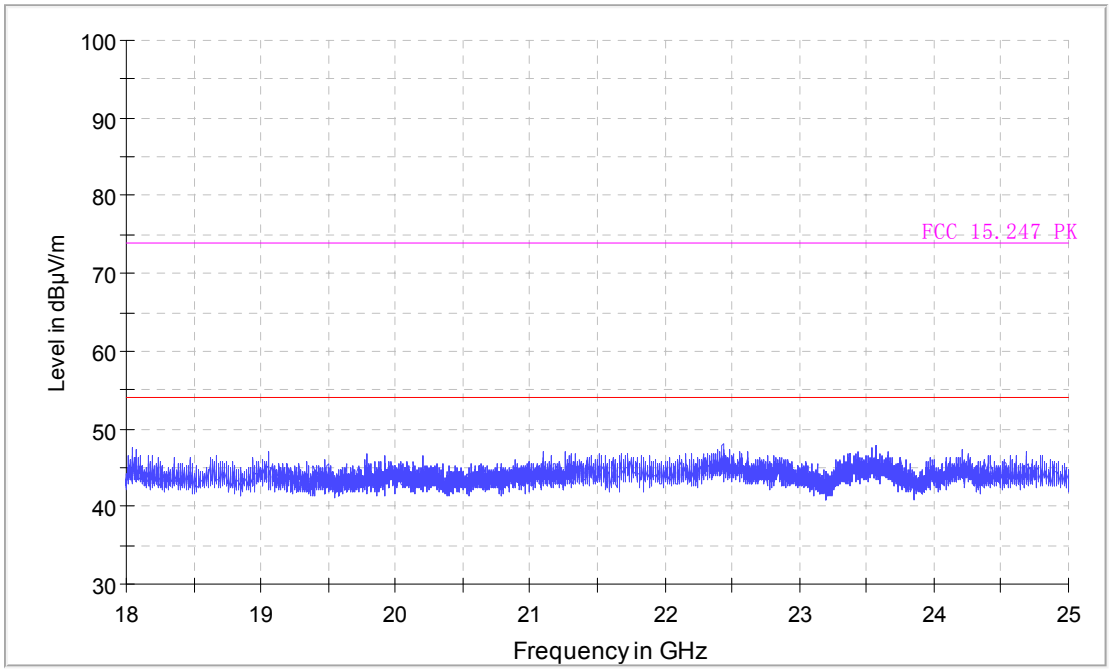
Test mode:	Low Channel (GFSK)	Polarization	Vertical

FCC Electric Field Strength 1-18GHz operate on 2.4GHz



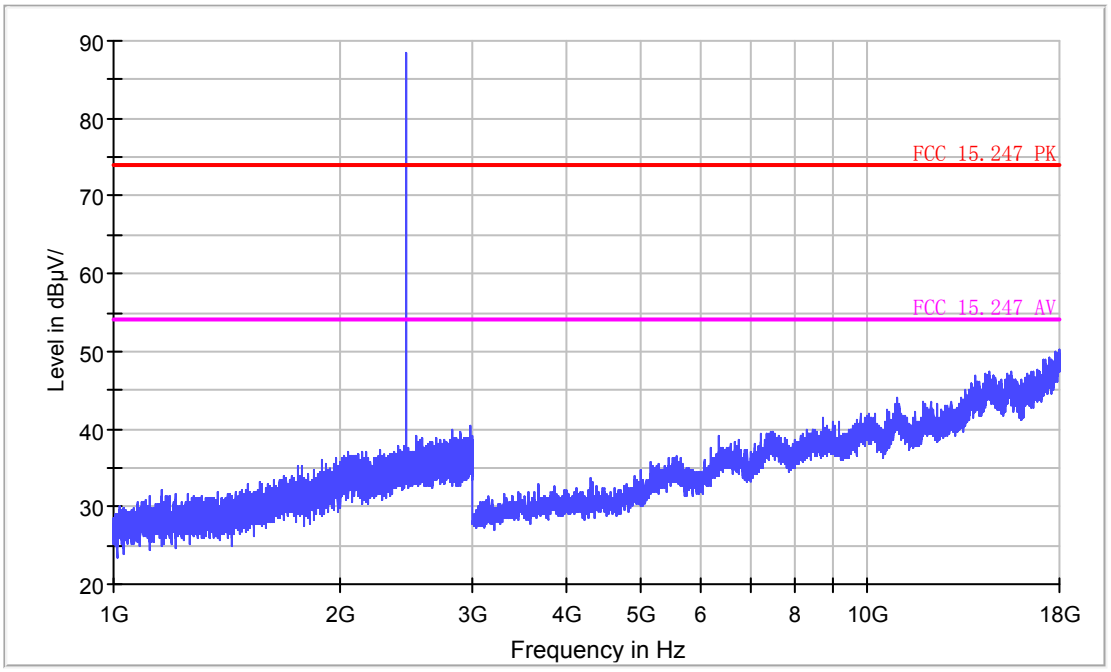
Test mode:	Low Channel (GFSK)	Polarization	Vertical

FCC Electric Field Strength 18-26.5GHz



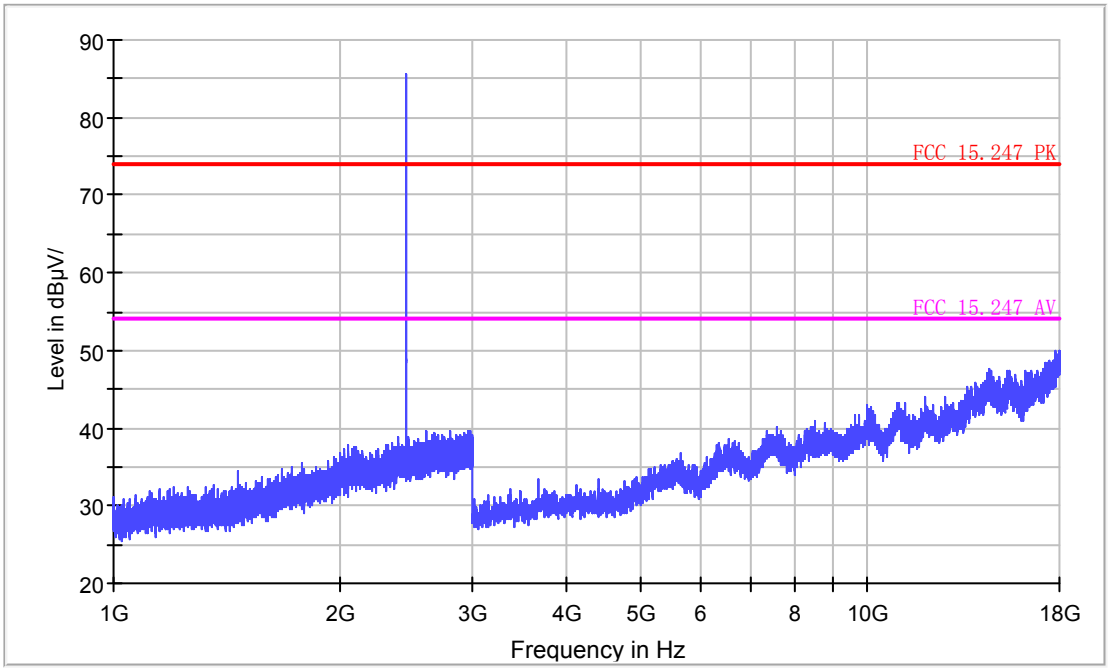
Test mode:	Mid Channel (GFSK)	Polarization	Horizontal

FCC Electric Field Strength 1-18GHz operate on 2.4GHz



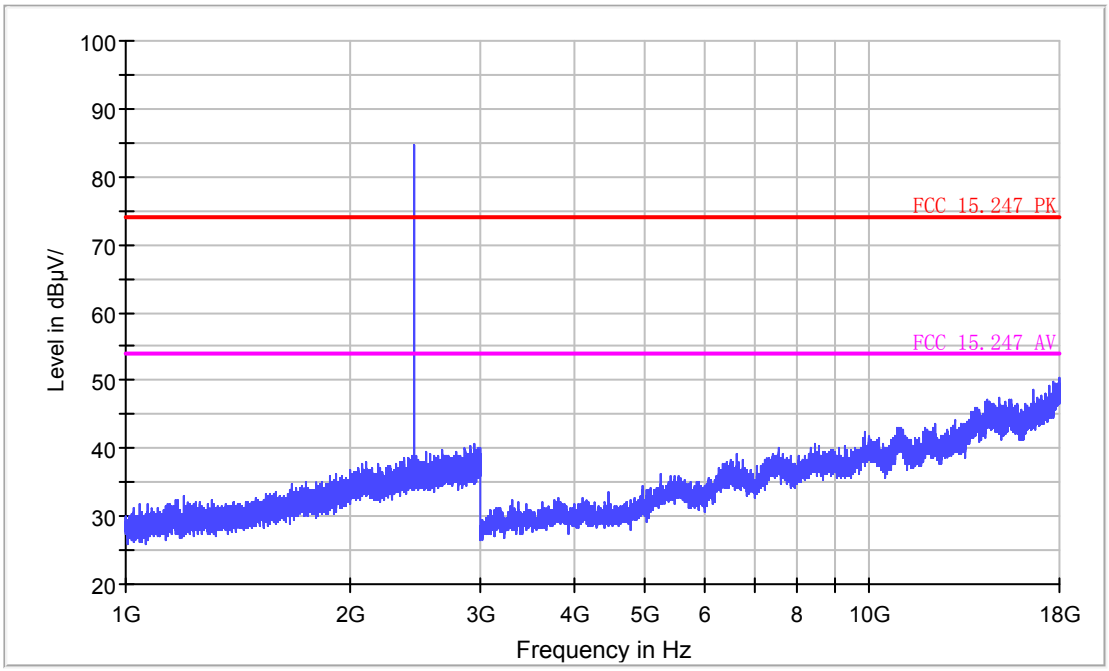
Test mode:	Mid Channel (GFSK)	Polarization	Horizontal

FCC Electric Field Strength 1-18GHz operate on 2.4GHz



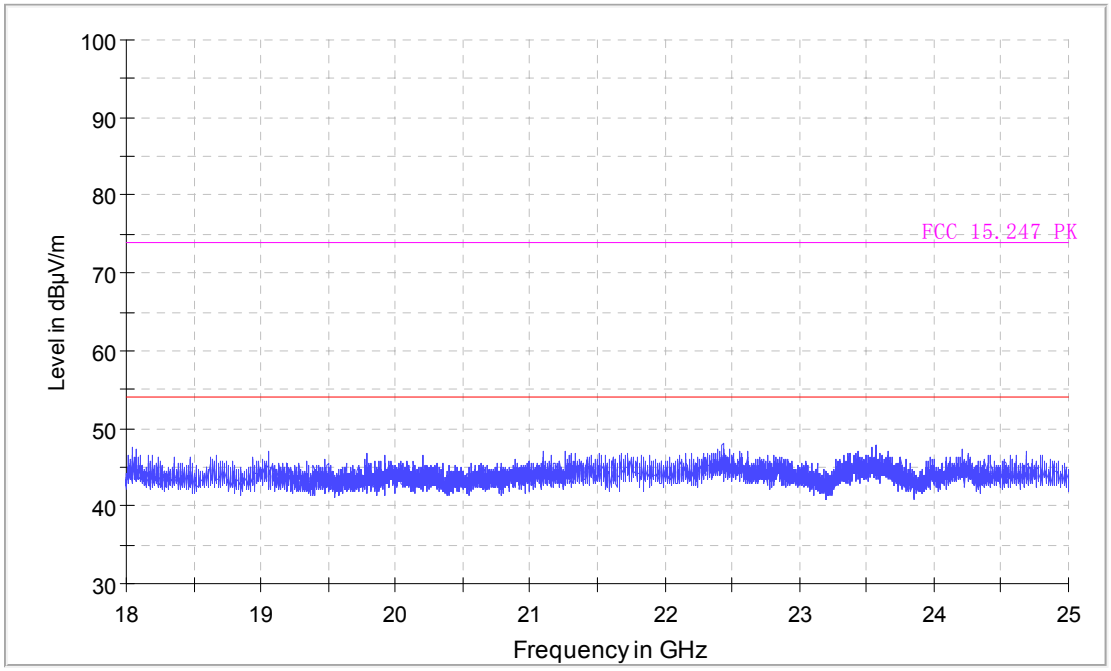
Test mode:	Mid Channel (GFSK)	Polarization	Vertical

FCC Electric Field Strength 1-18GHz operate on 2.4GHz



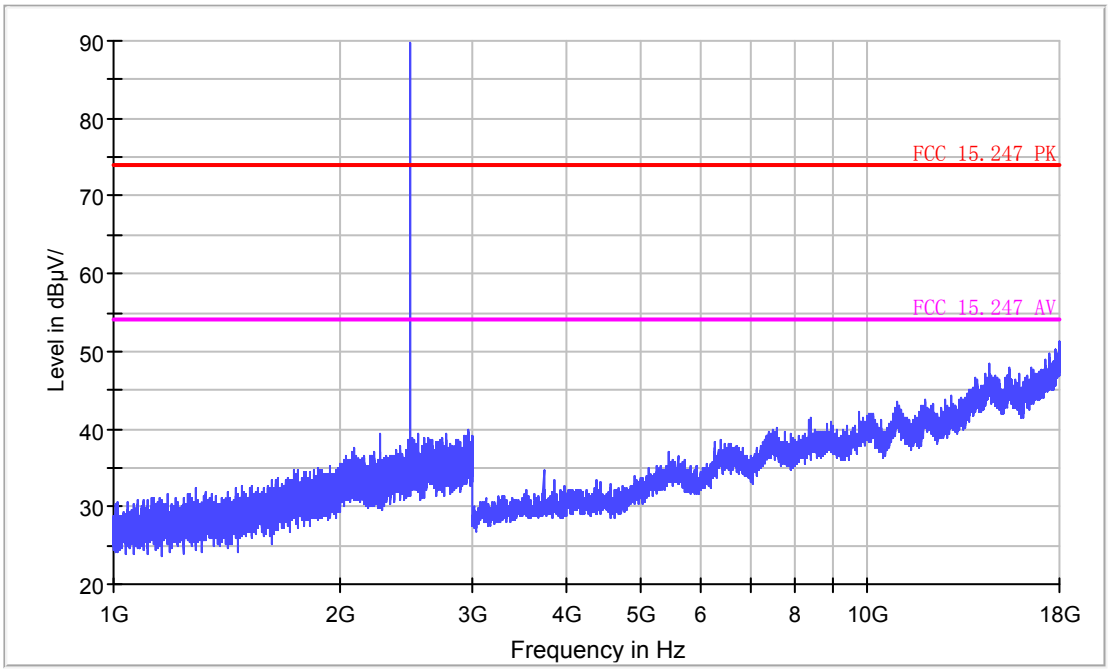
Test mode:	Mid Channel (GFSK)	Polarization	Vertical

FCC Electric Field Strength 18-26.5GHz



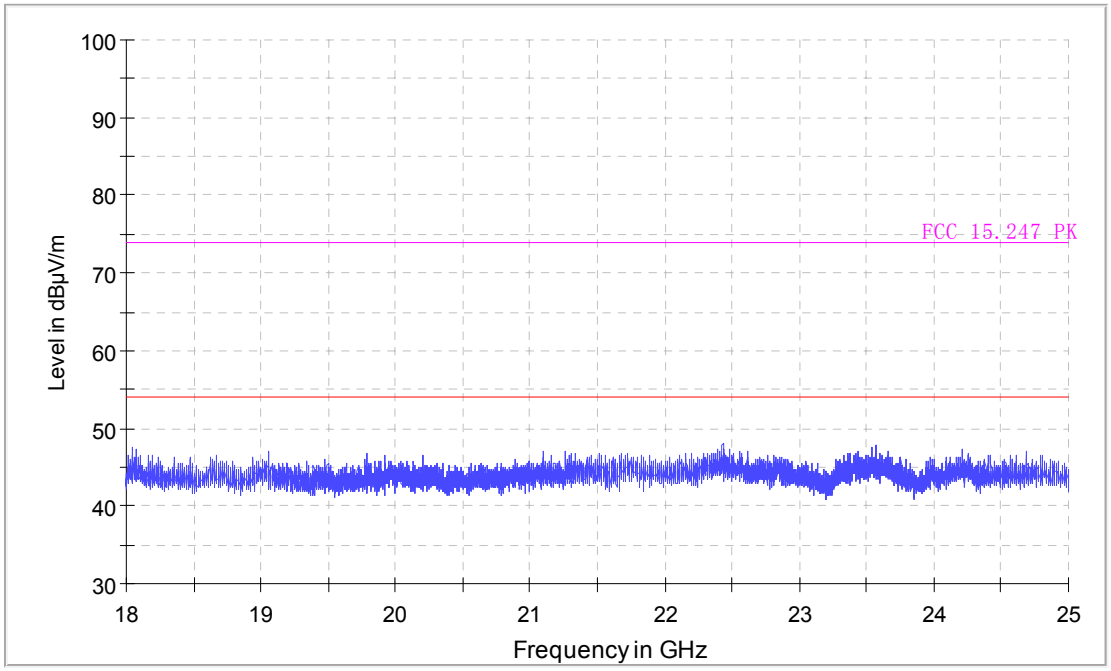
Test mode:	High Channel(GFSK)	Polarization	Horizontal

FCC Electric Field Strength 1-18GHz operate on 2.4GHz



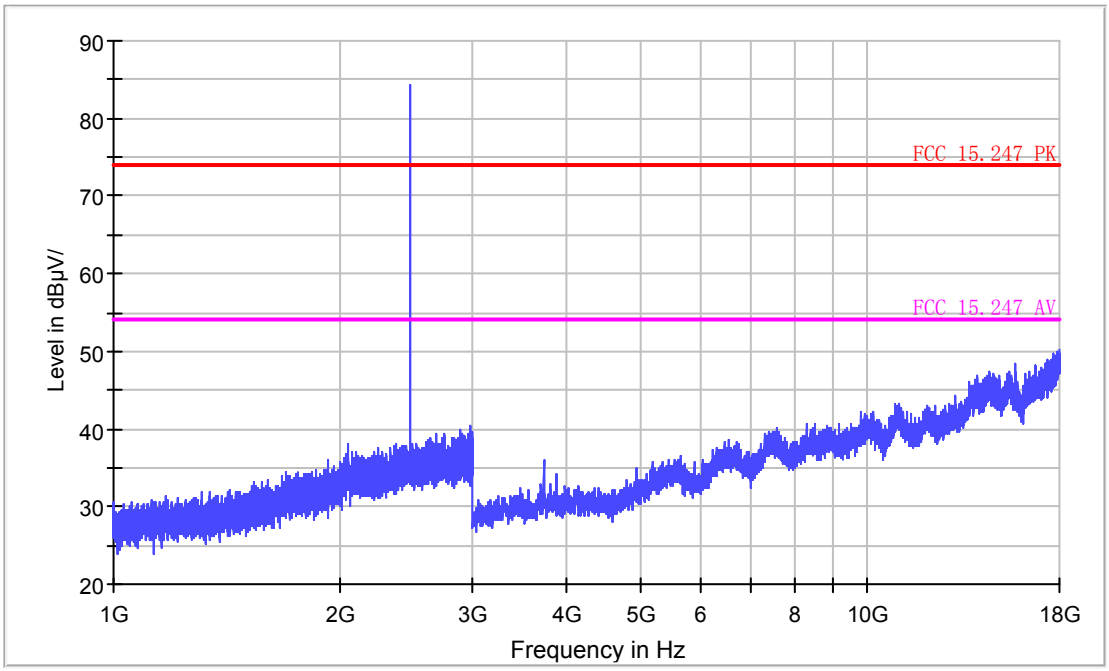
Test mode:	High Channel GFSK)	Polarization	Horizontal

FCC Electric Field Strength 18-26.5GHz



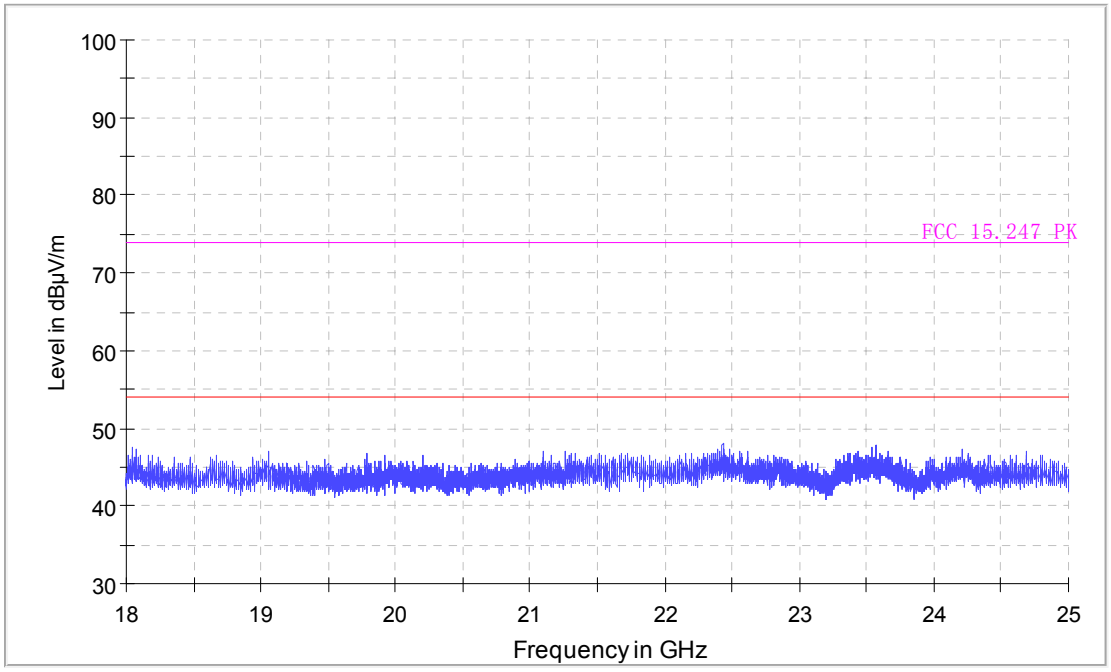
Test mode:	High Channel GFSK)	Polarization	Vetical

FCC Electric Field Strength 1-18GHz operate on 2.4GHz



Test mode:	High Channel GFSK)	Polarization	Vetical

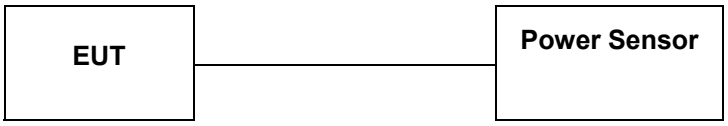
FCC Electric Field Strength 18-26.5GHz



REMARKS:
1. Emission level (dBuV/m) =Raw Value (dBuV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. The other emission levels were very low against the limit.
4. Margin value = Limit value- Emission level.
5. The average measurement was not performed when the peak measured data under the limit of average detection.

4.3. Maximum Peak Output Power

TEST CONFIGURATION



TEST PROCEDURE

According to KDB558074 D01 DTS Mea Guidance v03r02 9.1.2 PKPM1 Peak power meter method “The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.”

LIMIT

The Maximum Peak Output Power Measurement is 30dBm.

TEST RESULTS

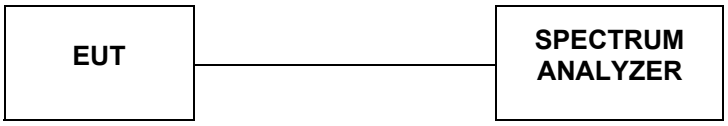
A. Test Verdict

Channel	Frequency (MHz)	Measured Output Peak Power (dBm)	Limits (dBm)	Verdict
00	2402	-7.748	30	PASS
20	2442	-7.666	30	PASS
39	2480	-7.504	30	PASS

Note:
1. The test results including the cable lose.

4.4. Power Spectral Density

TEST CONFIGURATION



TEST PROCEDURE

According to KDB 558074 D01 V03 Method PKPSD (peak PSD) this procedure shall be used if maximum peak conducted output power was used to demonstrate compliance, and is optional if the maximum conducted (average) output power was used to demonstrate compliance.
1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
4. Set the VBW ≥ 3 RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

LIMIT

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST RESULTS

A. Test Verdict

Channel	Frequency (MHz)	Report PSD (dBm/100kHz)	Refer to Plot	Limits (dBm/3KHz)	Verdict
00	2402	-7.787	Plot 4.4.1 A	8	PASS
20	2442	-7.987	Plot 4.4.1 B	8	PASS
39	2480	-7.652	Plot 4.4.1 C	8	PASS

Note
1.The test results including the cable lose.

B. Test Plots

(Plot 4.4.1 A: Channel 00: 2402 MHz @ GFSK)

(Plot 4.4.1 B: Channel 20: 2442 MHz @ GFSK)

(Plot 4.4.1 C: Channel 39: 2480 MHz @ GFSK

4.5. Band Edge Compliance of RF Emission

TEST REQUIREMENT

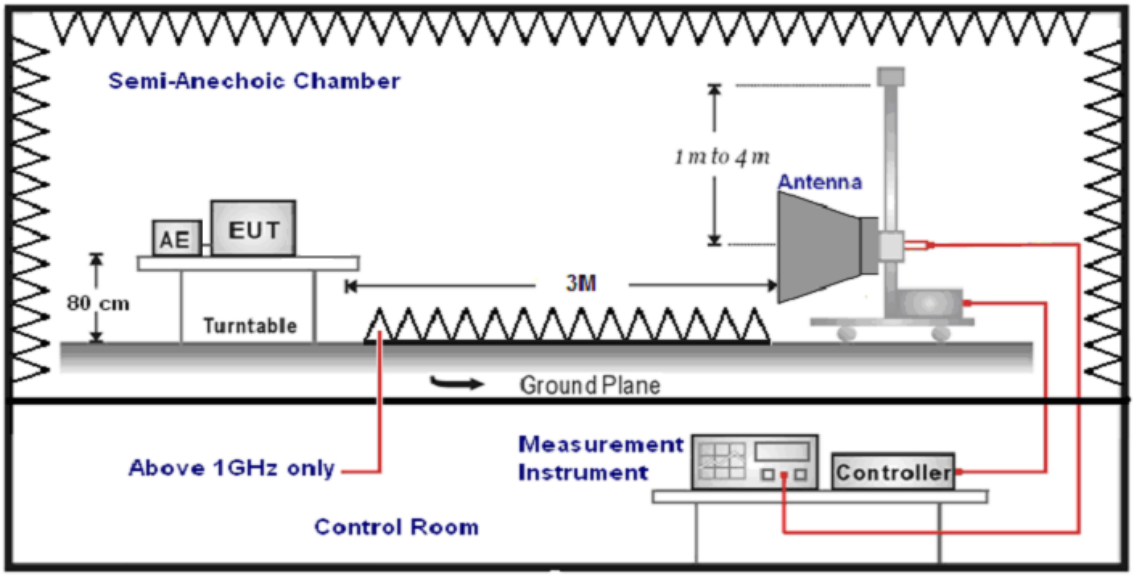
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

TEST PROCEDURE

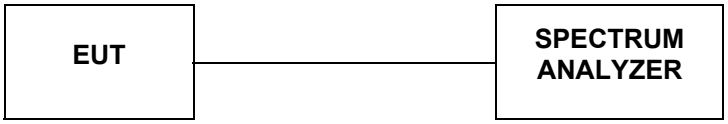
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, for Radiated emissions restricted band RBW=1MHz, VBW=3MHz.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

TEST CONFIGURATION

For Radiated



For Conducted



TEST PROCEDURE

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0℃ to 360℃ to acquire the highest emissions from EUT.

3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed..
5. The distance between test antenna and EUT was 3 meter:
6. Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto	Peak (Receiver)
1GHz-40GHz	Average Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto	Average (Receiver)

LIMIT

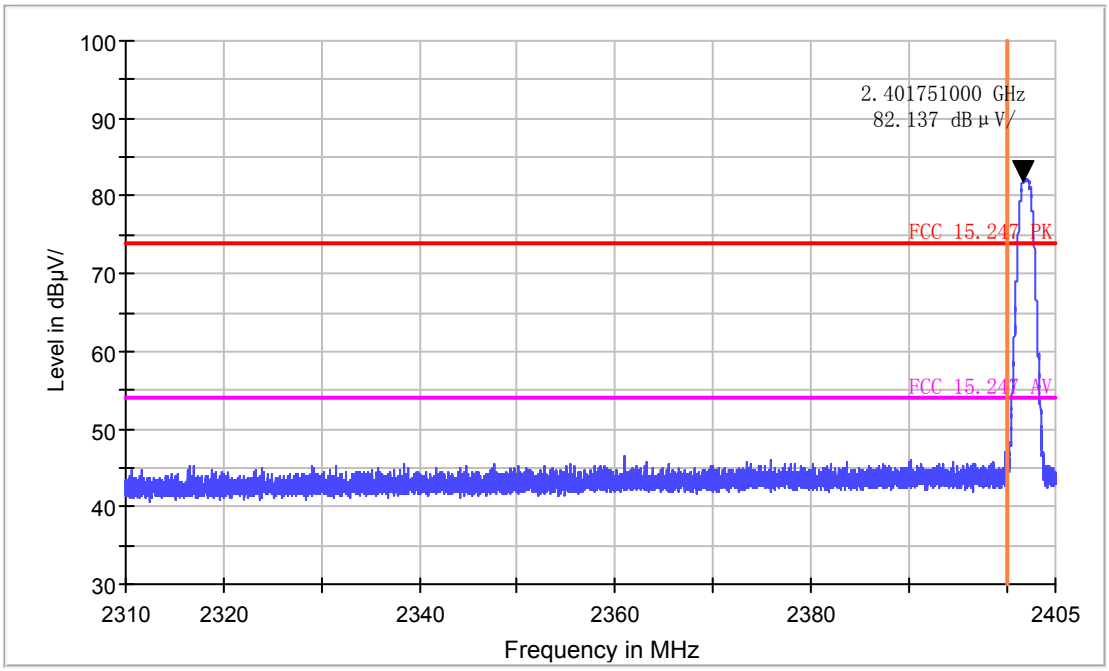
Below -20dB of the highest emission level in operating band.
Radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)

TEST RESULTS

4.5.1 For Radiated Bandedge Measurement

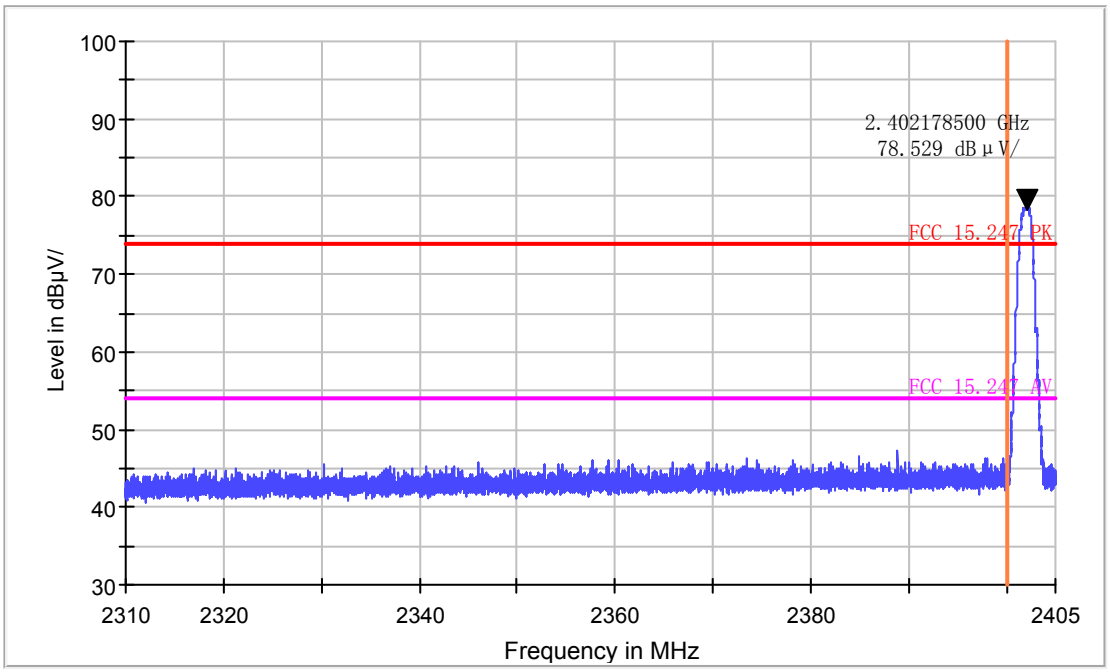
Test mode:	Low Channel (Peak)	Polarization	Horizontal

FCC Electric Field Strength 2.4GHz Bandedge-PK



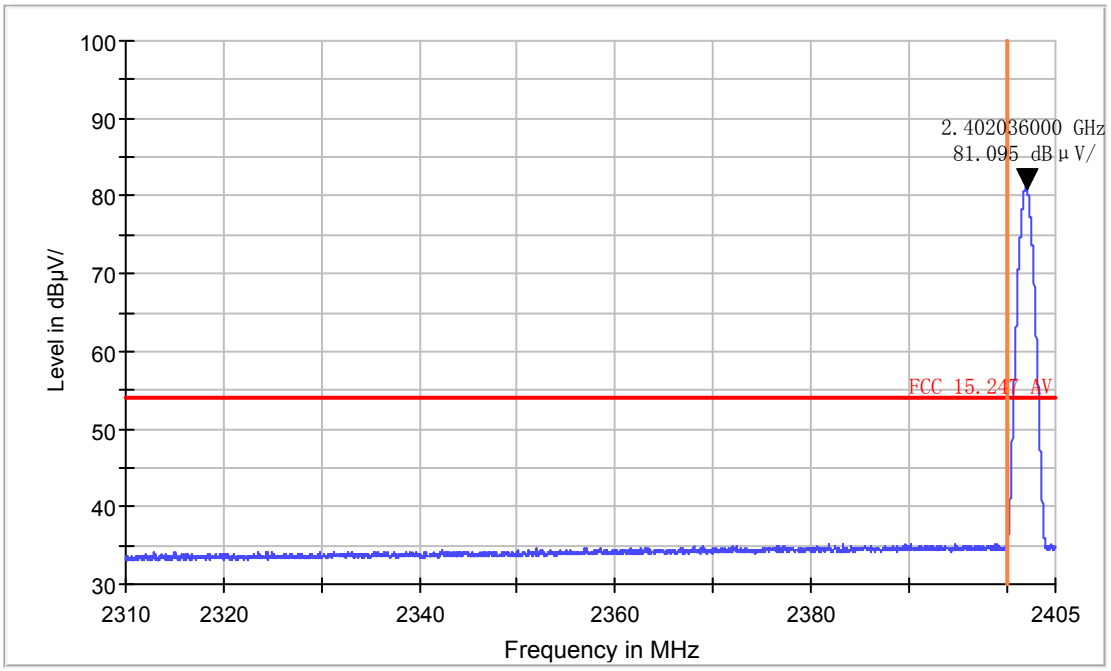
Test mode:	Low Channel (Peak)	Polarization	Vertical

FCC Electric Field Strength 2.4GHz Bandedge-PK



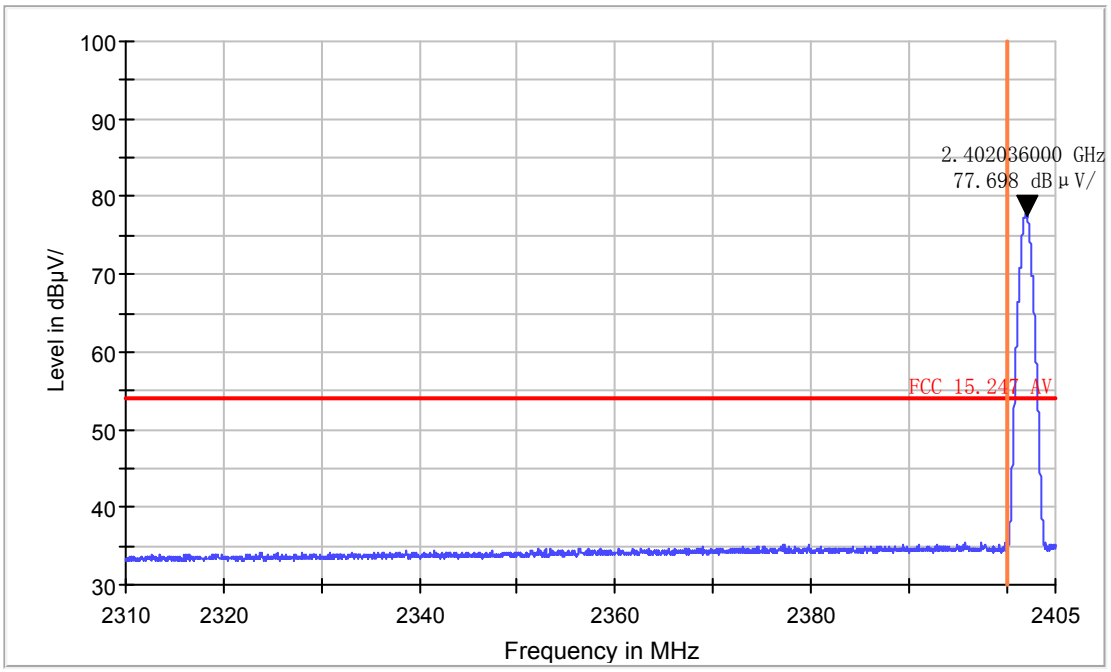
Test mode:	Low Channel (AV)	Polarization	Horizontal

FCC Electric Field Strength 2.4GHz Bandedge-AV



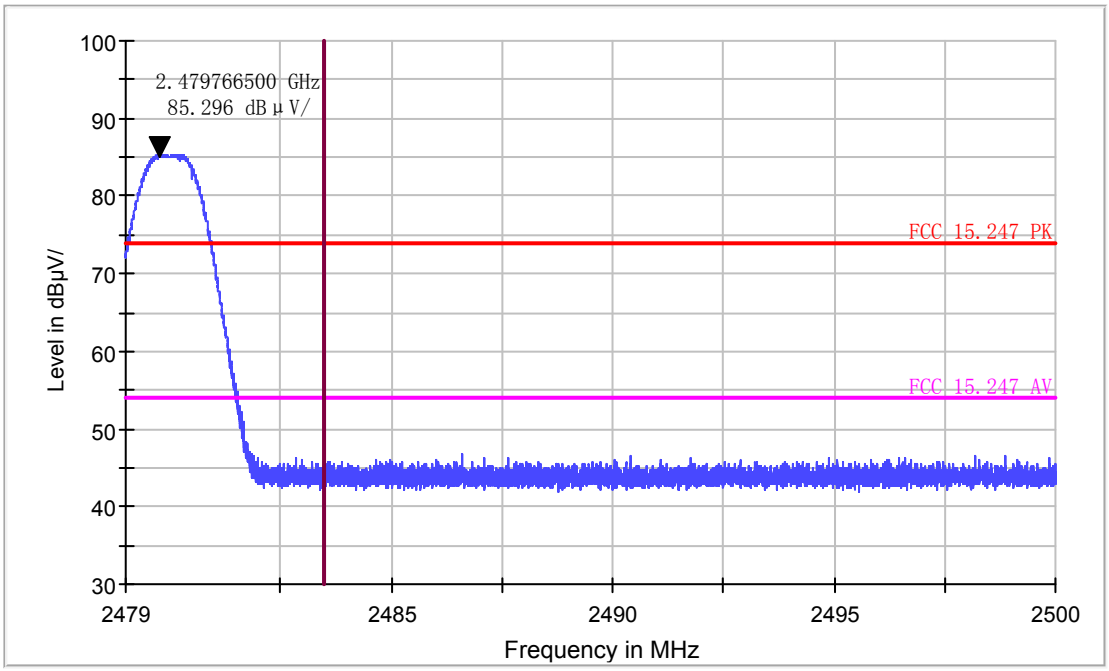
Test mode:	Low Channel (AV)	Polarization	Vertical

FCC Electric Field Strength 2.4GHz Bandedge-AV



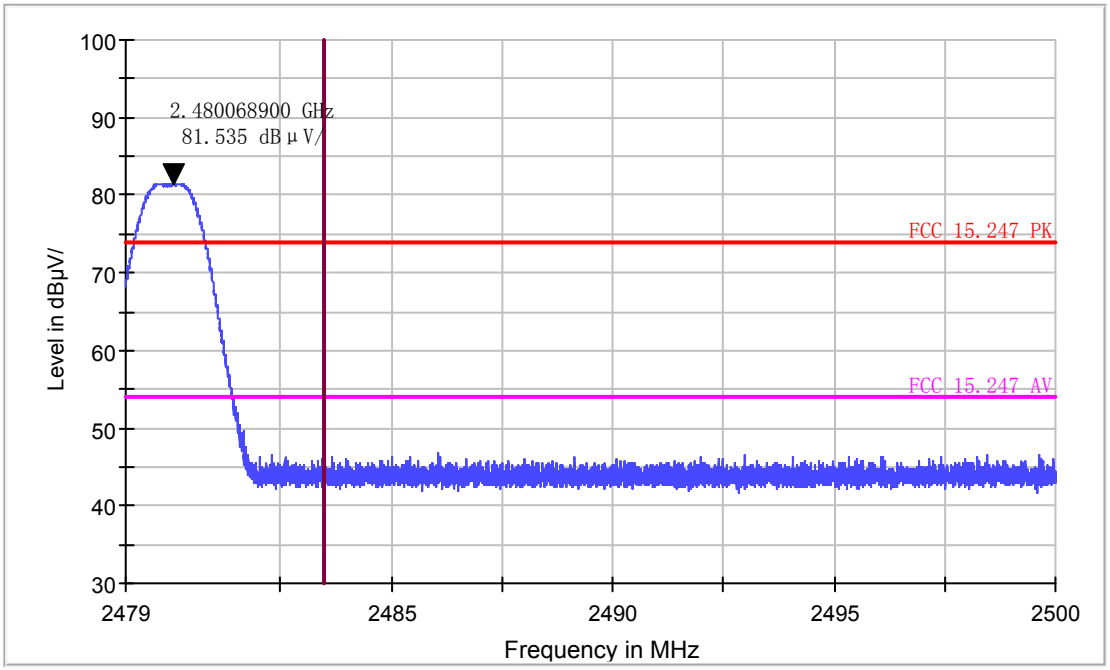
Test mode:	High Channel (Peak)	Polarization	Horizontal

FCC Electric Field Strength 2.4GHz Bandedge-PK



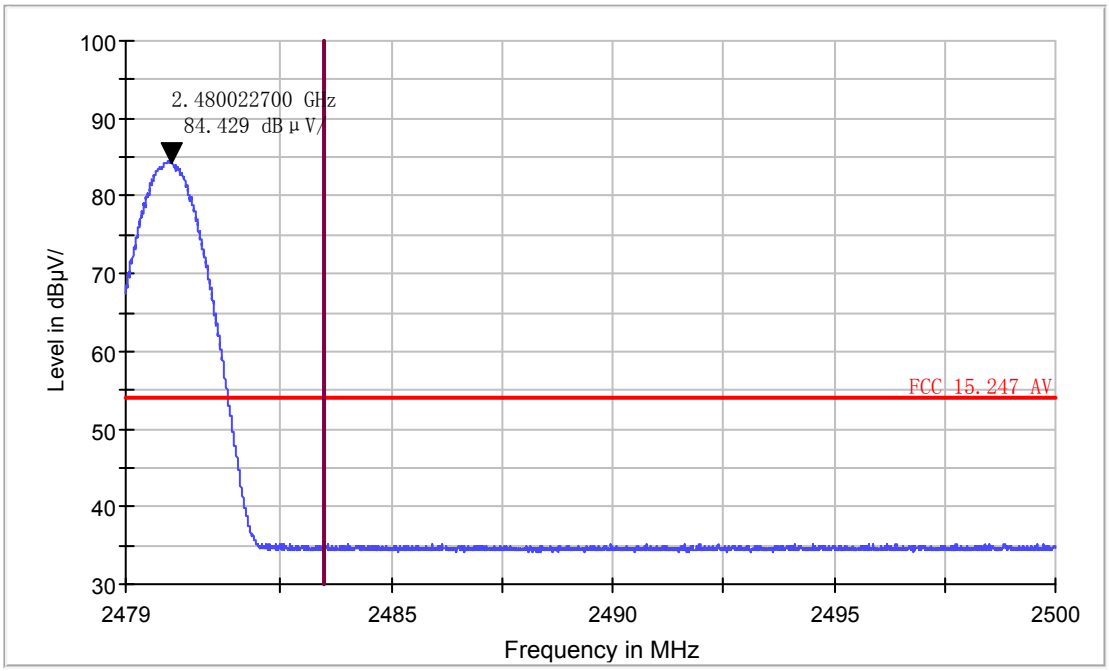
Test mode:	High Channel (Peak)	Polarization	Vertical

FCC Electric Field Strength 2.4GHz Bandedge-PK



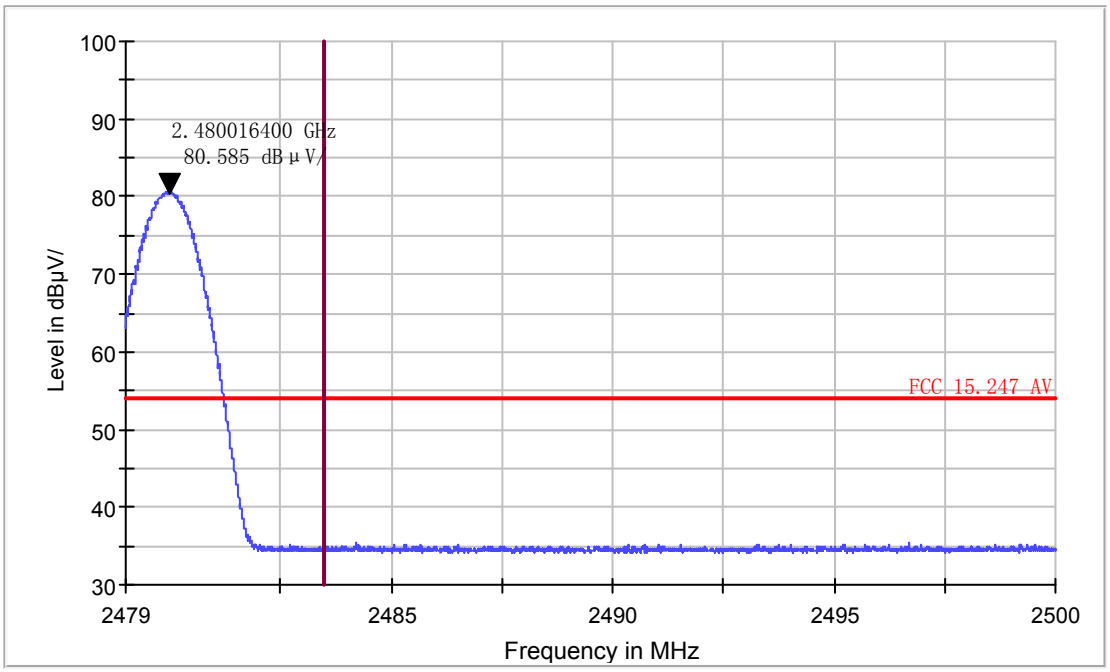
Test mode:	Low Channel (AV)	Polarization	Horizontal

FCC Electric Field Strength 2.4GHz Bandedge-AV



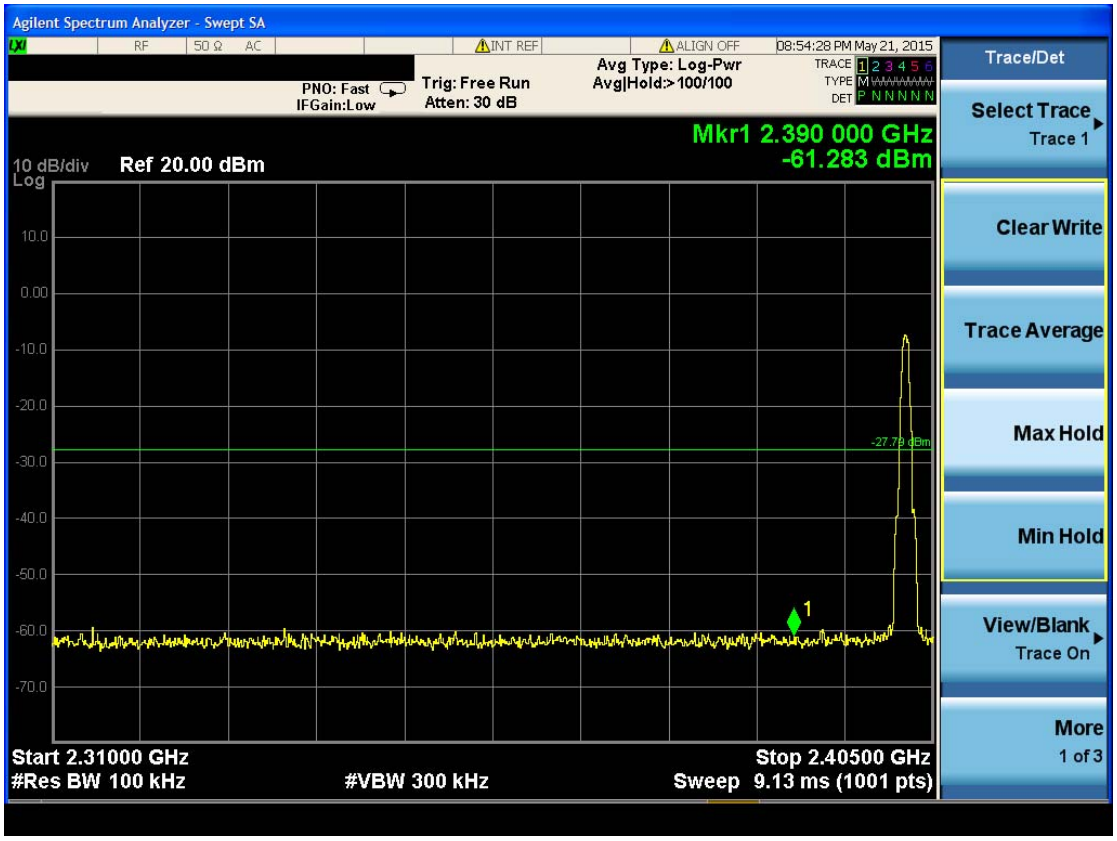
Test mode:	Low Channel (AV)	Polarization	Vertical

FCC Electric Field Strength 2.4GHz Bandedge-AV

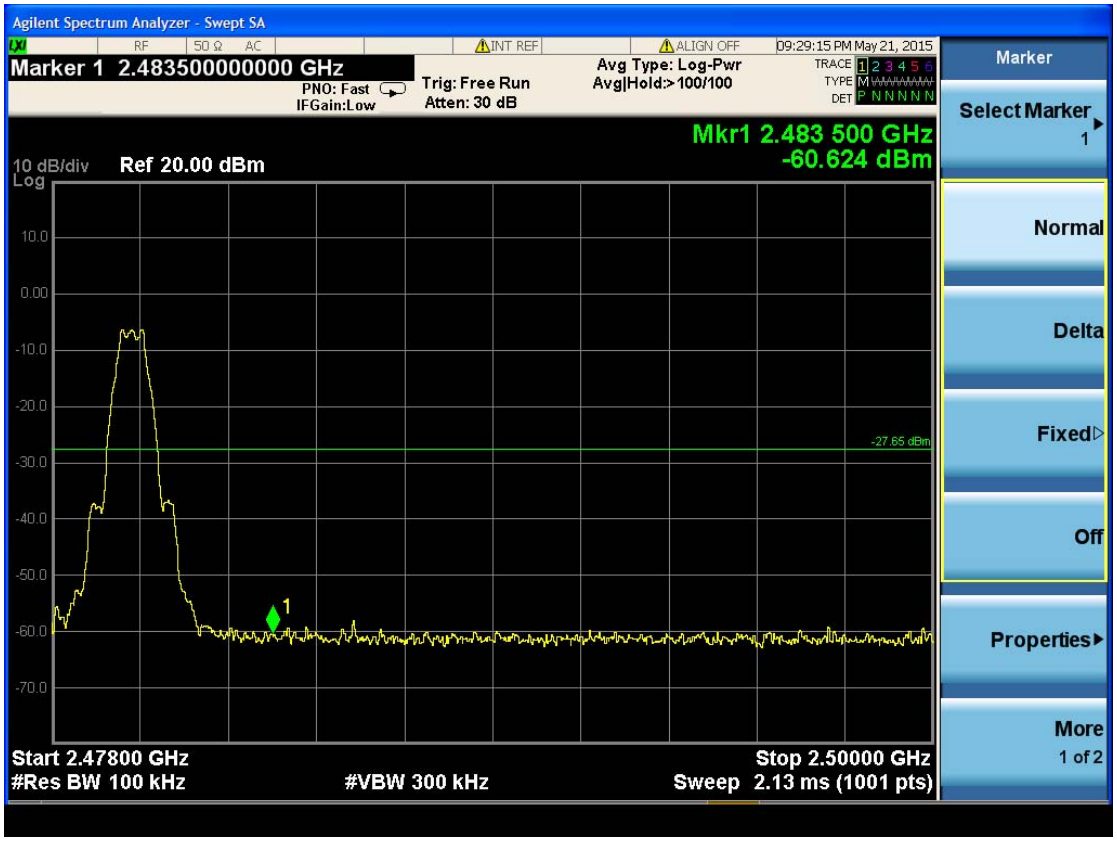


4.5.2 For Conducted Bandedge Measurement

A. Test Plots



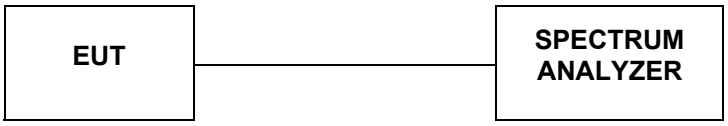
(Plot 4.5.2.1 A: Channel 00: 2402MHz @ GFSK)



(Plot 4.5.2.1 B: Channel 39: 2402MHz @ GFSK)

4.6. Spurious RF Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2009 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=100 kHz and VBW= 300 KHz to measure the peak field strength, and measure frequency range from 9 KHz to 26.5GHz.

LIMIT

1. Below -20dB of the highest emission level in operating band.
2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

TEST RESULTS

Remark: The measurement frequency range is from 9KHz to the 10^{th} harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandege measurement data.

TEST RESULTS

Remark: The measurement frequency range is from 9 KHz to the 10^{th} harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandege measurement data.

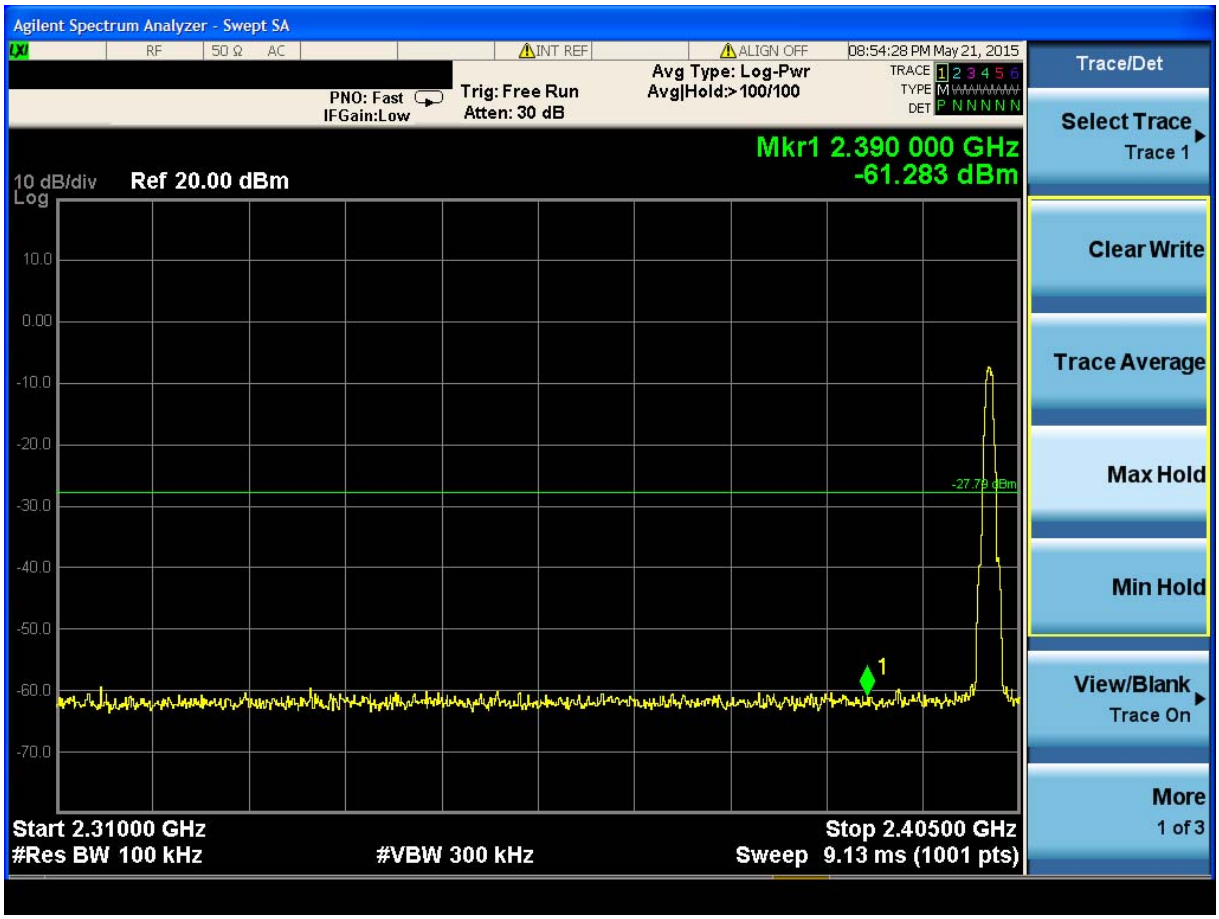
A. Test Verdict

Channel	Frequency (MHz)	Frequency Range	Refer to Plot	Limit (dBc)	Verdict
00	2402	2.402 GHz	Plot 4.6.1 A1	---	PASS
		30MHz-3 GHz	Plot 4.6.1 A2	-20	PASS
		3 GHz-26.5GHz	Plot 4.6.1 A3	-20	PASS
20	2442	2.440 GHz	Plot 4.6.1 B1	---	PASS
		30MHz-3GHz	Plot 4.6.1 B2	-20	PASS
		3 GHz-26.5GHz	Plot 4.6.1 B3	-20	PASS
39	2480	2.480 GHz	Plot 4.6.1 C1	---	PASS
		30MHz-3 GHz	Plot 4.6.1 C2	-20	PASS
		3 GHz-26.5GHz	Plot 4.6.1 C3	-20	PASS

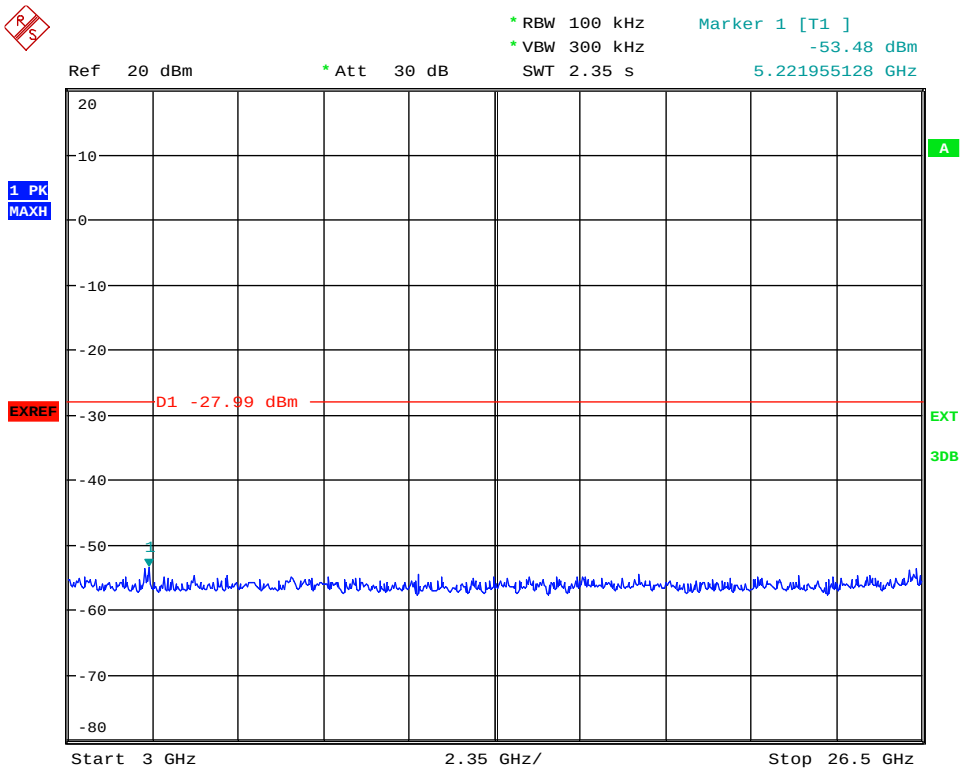
Note:
1. The test results including the cable lose.
2. For 9KHz -30MHz,Because there was only background, So We did not recorded data.

B. Test Plots

(Plot 4.6.1 A1: Channel 00: 2402MHz @ GFSK)

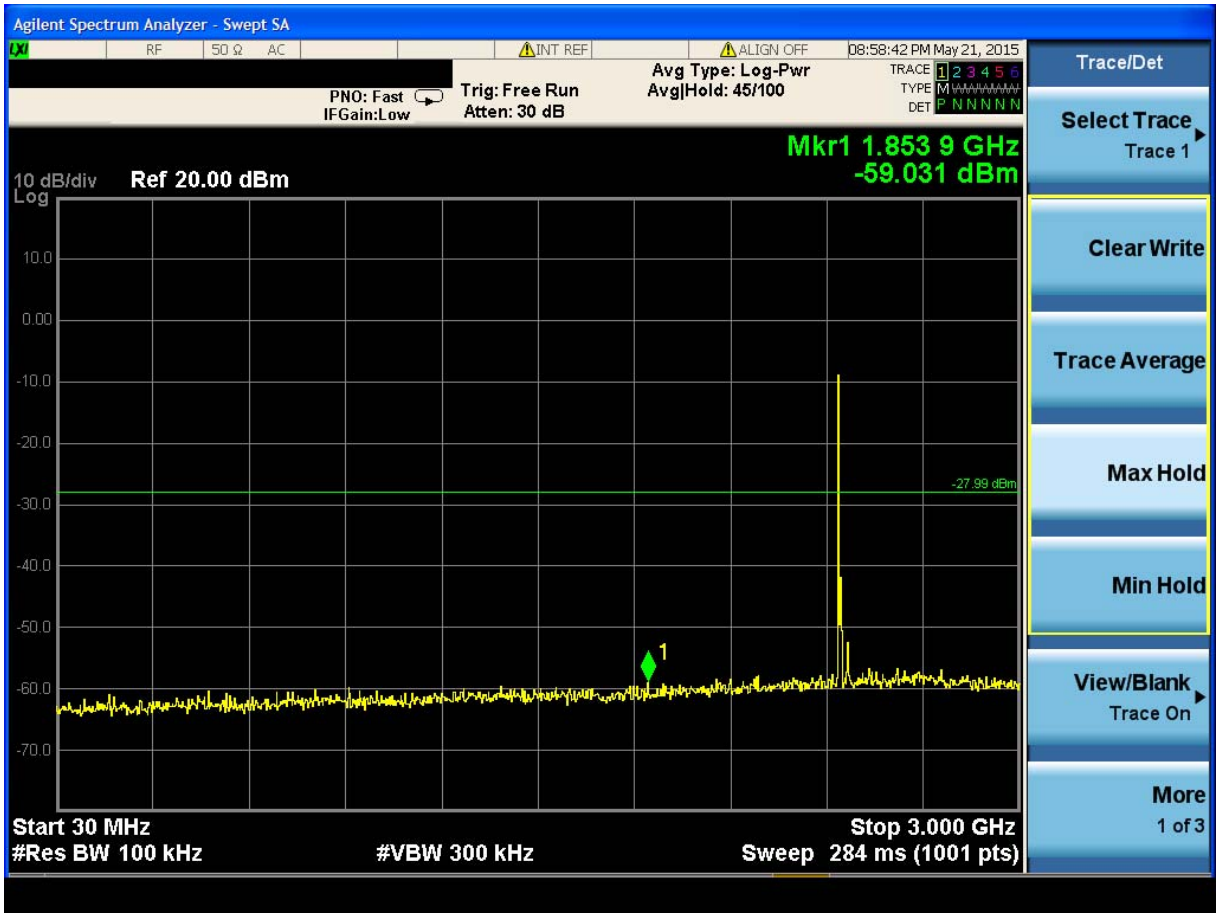


(Plot 4.6.1 A2: Channel 00: 2402MHz @ GFSK)

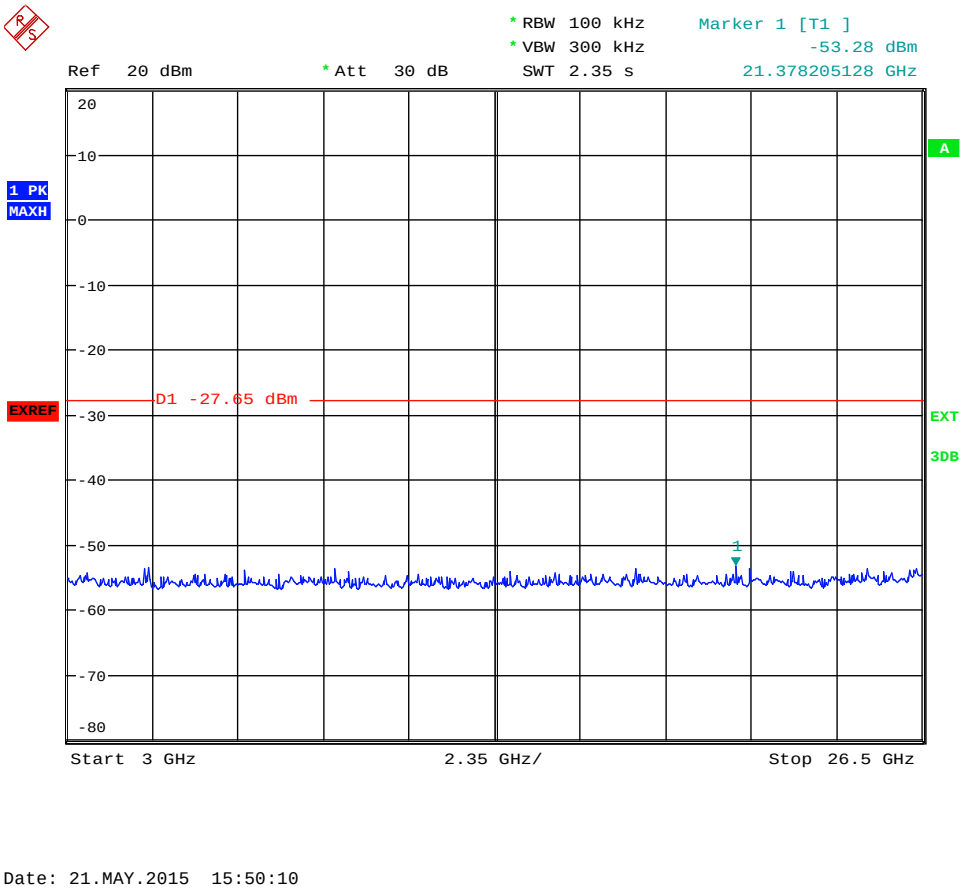


(Plot 4.6.1 A3: Channel 00: 2402MHz @ GFSK)

(Plot 4.6.1 B1: Channel 20: 2442MHz @ GFSK)

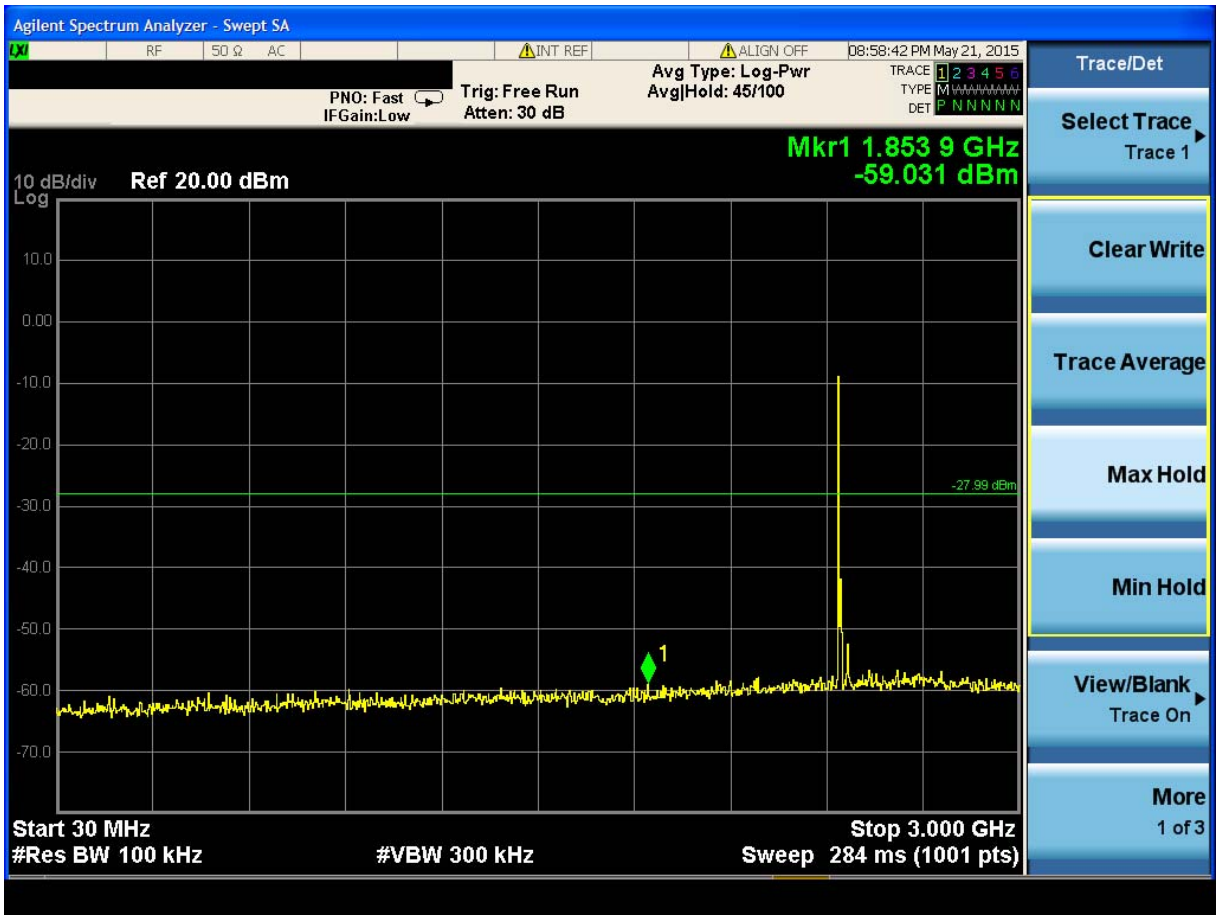


(Plot 4.6.1 B2: Channel 20: 2442MHz @ GFSK)

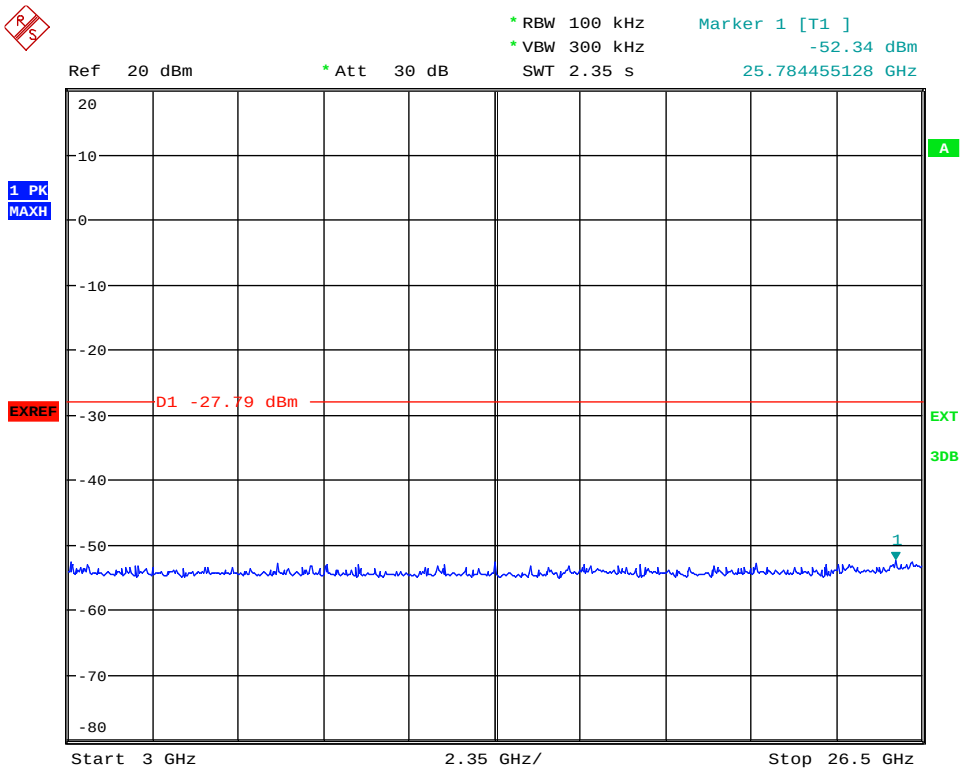


(Plot 4.6.1 B3: Channel 20: 2442MHz @ GFSK)

(Plot 4.6.1 C1: Channel 39: 2480MHz @ GFSK)



(Plot 4.6.1 C2: Channel 39: 2480MHz @ GFSK)

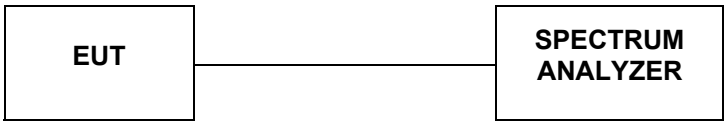


Date: 21.MAY.2015 16:44:48

(Plot 4.6.1 C3: Channel 39: 2480MHz @ GFSK)

4.7. 6dB Bandwidth

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with100 KHz RBW and 300KHz VBW.
The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.
According to KDB558074 D01 V03 for one of the following procedures may be used to determine the modulated DTS device signal bandwidth.
1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

LIMIT

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

TEST RESULTS

A. Test Verdict

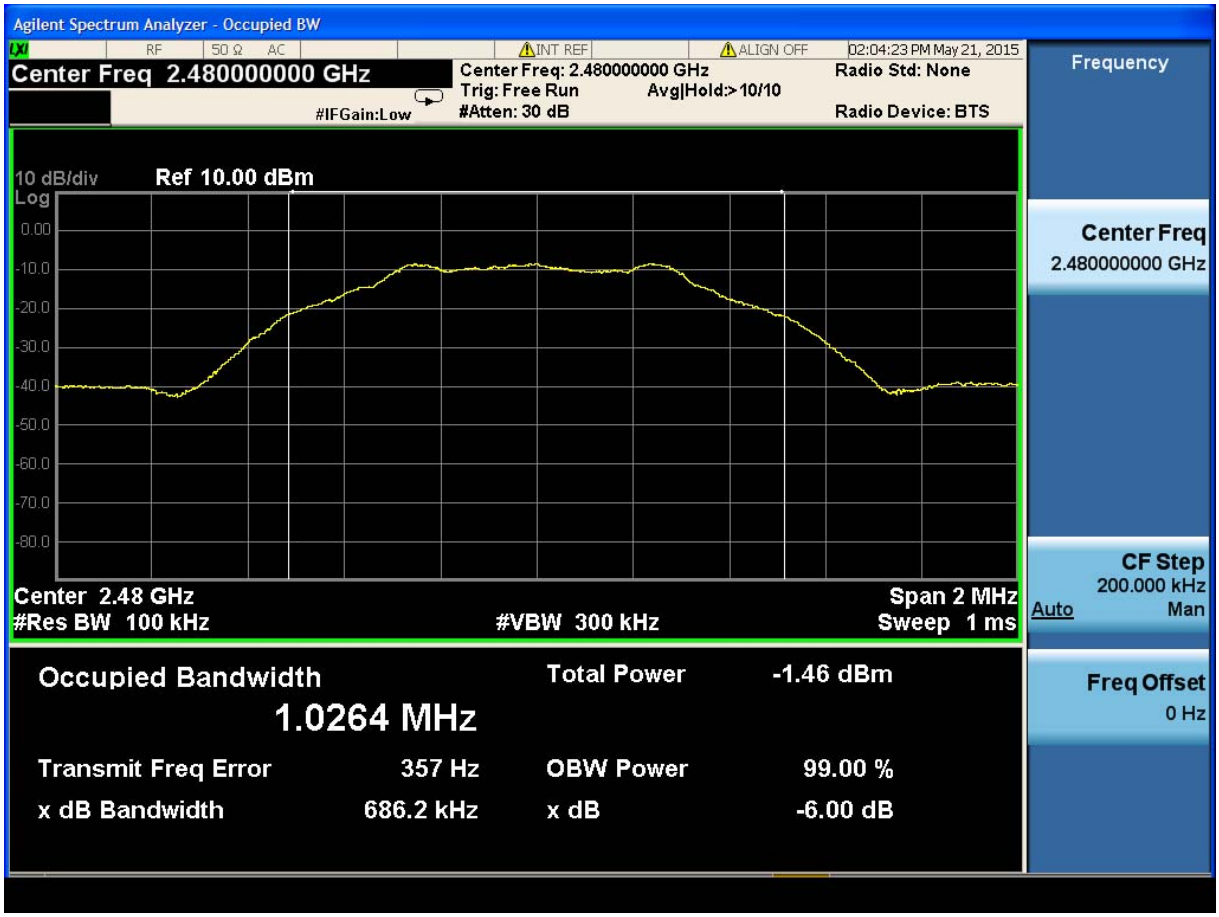
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Refer to Plot	Limits (kHz)	Verdict
00	2402	0.685	Plot 4.7.1 A	≥500	PASS
20	2442	0.698	Plot 4.7.1 B	≥500	PASS
39	2480	0.686	Plot 4.7.1 C	≥500	PASS

Note:
1.The test results including the cable lose.

B. Test Plots

(Plot 4.7.1 A: Channel 00: 2402MHz @ GFSK)

(Plot 4.7.1 B: Channel 20: 2442MHz @ GFSK)



(Plot 4.7.1 C: Channel 39: 2480MHz @ GFSK)

4.8. Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Refer to statement below for compliance

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

Measurement

The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module.

Measurement parameters

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1MHz
Video bandwidth:	3MHz
Trace-Mode:	Max hold

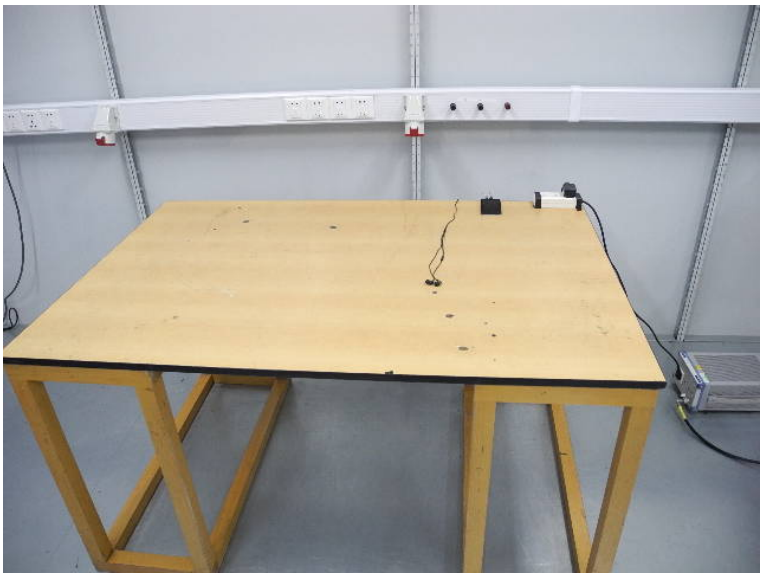
Limits

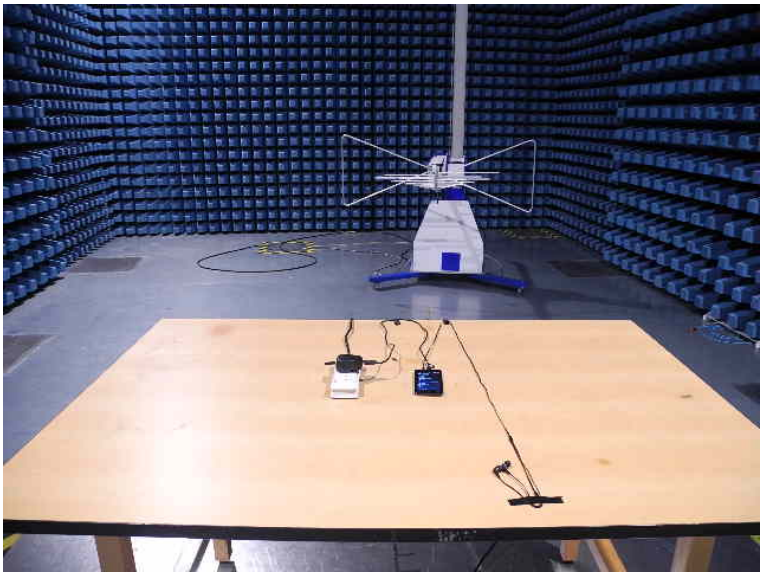
FCC	IC
Antenna Gain	
6 dBi	

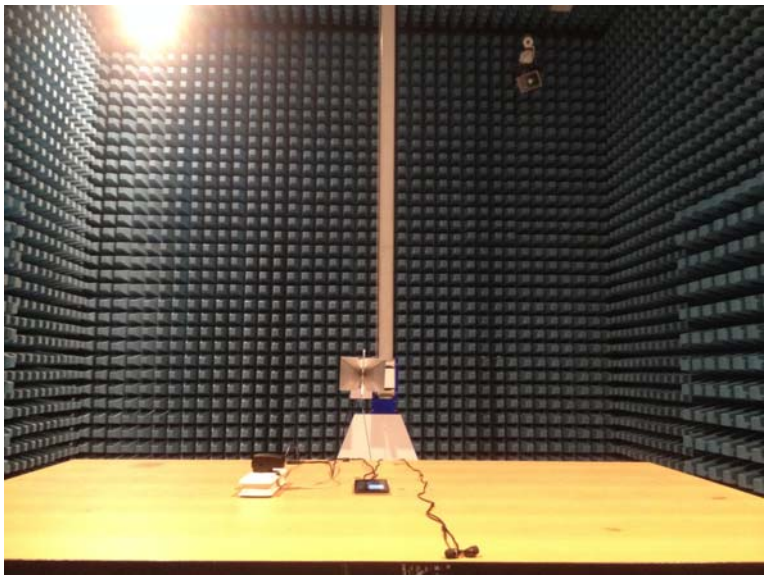
Results

T_{nom}	V_{nom}	Lowest Channel 2402 MHz	Middle Channel 2442 MHz	Highest Channel 2480 MHz
Conducted power [dBm] Measured with GFSK modulation		-7.79	-7.99	-6.09
Radiated power [dBm] Measured with GFSK modulation		-5.39	-5.81	-6.65
Gain [dBi] Calculated		2.40	2.18	1.56
Measurement uncertainty		± 0.6 dB (cond.) / ± 2.56 dB (rad.)		

5. Test Setup Photos of the EUT







.....End of Report.....