



**FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS-247 ISSUE 2**

CERTIFICATION TEST REPORT

For

**Cubinote
MODEL NUMBER: CG1-80**

**FCC ID: 2AL4X0000G3
IC: 22723-0000G3**

REPORT NUMBER: 4788064175.1-2

ISSUE DATE: August 23, 2017

Prepared for

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Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
--	08/23/2017	Initial Issue	

Summary of Test Results			
Clause	Test Items	FCC/IC Rules	Test Results
1	20dB Bandwidth	FCC 15.247 (a) (1) IC RSS-247 Clause 5.1 (1)	Complied
2	Peak Conducted Output Power	FCC 15.247 (b) (1) IC RSS-247 Clause 5.4 (2)	Complied
3	Carrier Hopping Channel Separation	FCC 15.247 (a) (1) IC RSS-247 Clause 5.1 (2)	Complied
4	Number of Hopping Frequency	15.247 (a) (1) III IC RSS-247 Clause 5.1 (4)	Complied
5	Time of Occupancy (Dwell Time)	15.247 (a) (1) III IC RSS-247 Clause 5.1 (4)	Complied
6	Conducted Bandedge	FCC 15.247 (d) IC RSS-247 Clause 5.5	Complied
7	Radiated Bandedge and Spurious	FCC 15.247 (d) FCC 15.209 FCC 15.205 IC RSS-247 Clause 5.5 IC RSS-GEN Clause 8.9	Complied
8	Conducted Emission Test For AC Power Port	FCC 15.207 RSS-GEN Clause 8.8	Complied
9	Antenna Requirement	FCC 15.203 RSS-GEN Clause 8.3	Complied

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name: Knectek Labs Inc.
Address: 9225 Leslie Street, Suite 201 Richmond Hill, ON. L4B 3H6
Canada

Manufacturer Information

Company Name: Knectek Labs Inc.
Address: 9225 Leslie Street, Suite 201 Richmond Hill, ON. L4B 3H6
Canada

EUT Description

Product Name Cubinote
Brand Name N/A
Model Name CG1-80
Serial Number N/A
Model Difference N/A
Date Tested July 20, 2017 ~ August 27, 2017

APPLICABLE STANDARDS

STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	PASS
INDUSTRY CANADA RSS-247 Issue 2	PASS
INDUSTRY CANADA RSS-GEN Issue 4	PASS

Tested By:



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Engineer Project Associate
Approved By:



Stephen Guo
Laboratory Manager

Check By:



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Laboratory Leader

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with DA 00-705, ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 4, and RSS-247 Issue 2.

3. FACILITIES AND ACCREDITATION

Test Location	UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch.
Address	Building 10, Innovation Technology Park, Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China
Accreditation Certificate	<p>UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. The Certificate Registration Number is 4102.01.</p> <p>UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The Designation Number is CN1187.</p> <p>UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. EMC Laboratory has been registered and fully described in a report filed with Industry Canada. The Company Number is 21320.</p>

Note: The test anechoic chamber in UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Uncertainty
Uncertainty for Conduction emission test	2.90dB
Uncertainty for Radiation Emission test(include Fundamental emission) (30MHz-1GHz)	4.52dB
Uncertainty for Radiation Emission test (1GHz to 26GHz)(include Fundamental emission)	5.04dB(1-6GHz) 5.30dB (6GHz-18Gz) 5.23dB (18GHz-26Gz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

Equipment	Cubinote				
Model Name	CG1-80				
Product Description (Bluetooth)	Operation Frequency	2402 MHz ~ 2480 MHz			
	Modulation Type	Data Rate			
	GFSK	1Mbps			
	$\sqrt{2}$ -DQPSK	2Mbps			
	8DPSK	3Mbps			
Power Adapter	Model:PS65B120Y4000S INPUT:100-240V~,50/60Hz,1.5A OUTPUT:12.0V/4000mA				
Bluetooth Version	BT4.0LE+EDR				
Hardware Version	N/A				
Software Version	N/A				

5.2. MAXIMUM OUTPUT POWER

Frequency Range (MHz)	Number of Transmit Chains (NTX)	Bluetooth Mode	Frequency (MHz)	Channel Number	Max EIRP (dBm)
2402-2480	1	GFSK	2402-2480	0-78[79]	7.741
2402-2480	1	8-DPSK	2402-2480	0-78[79]	9.198

5.3. PACKET TYPE CONFIGURATION

Test Mode	Packet Type	Setting
GFSK	DH1	27
	DH3	183
	DH5	339
$\sqrt{2}$ -DQPSK	2-DH1	54
	2-DH3	367
	2-DH5	679
8-DPSK	3-DH1	83
	3-DH3	552
	3-DH5	1021

5.4. CHANNEL LIST

Channel	Frequency (MHz)						
00	2402	20	2422	40	2442	60	2462
01	2403	21	2423	41	2443	61	2463
02	2404	22	2424	42	2444	62	2464
03	2405	23	2425	43	2445	63	2465
04	2406	24	2426	44	2446	64	2466
05	2407	25	2427	45	2447	65	2467
06	2408	26	2428	46	2448	66	2468
07	2409	27	2429	47	2449	67	2469
08	2410	28	2430	48	2450	68	2470
09	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		

5.5. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel Number	Test Channel
GFSK	CH 00, CH 39, CH 78	Low, Middle, High
8-DPSK	CH 00, CH 39, CH 78	Low, Middle, High

5.6. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band				
Test Software		RTLBTAPP		
Modulation Type	Transmit Antenna Number	Test Channel		
		CH 00	CH 39	CH 78
GFSK	1	6	6	6
8-DPSK	1	6	6	6

5.7. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
1	2402-2480	PCB Antenna	2.7

Test Mode	Transmit and Receive Mode	Description
GFSK	<input checked="" type="checkbox"/> 1TX, 1RX	Chain 1 can be used as transmitting/receiving antenna.
8-DPSK	<input checked="" type="checkbox"/> 1TX, 1RX	Chain 1 can be used as transmitting/receiving antenna.

5.8. WORST-CASE CONFIGURATIONS

Bluetooth Mode	Modulation Technology	Modulation Type	Data Rate (Mbps)
BR	FHSS	GFSK	1Mbit/s
EDR	FHSS	8-DPSK	3Mbit/s

Note: Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates.

5.9. TEST ENVIRONMENT

Environment Parameter	Selected Values During Tests	
Relative Humidity	55 ~ 65%	
Atmospheric Pressure:	1025Pa	
Temperature	TN	23 ~ 28 °C
Voltage :	VL	N/A
	VN	AC120V/60Hz
	VH	N/A

Note: VL= Lower Extreme Test Voltage

VN= Nominal Voltage.

VH= Upper Extreme Test Voltage

TN= Normal Temperature

5.10. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	FCC ID
1	Laptop	ThinkPad	T460S	SL10K24796 JS
2	USB serial board	N/A	N/A	N/A

I/O CABLES

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	USB	USB	shielded	1.2	N/A

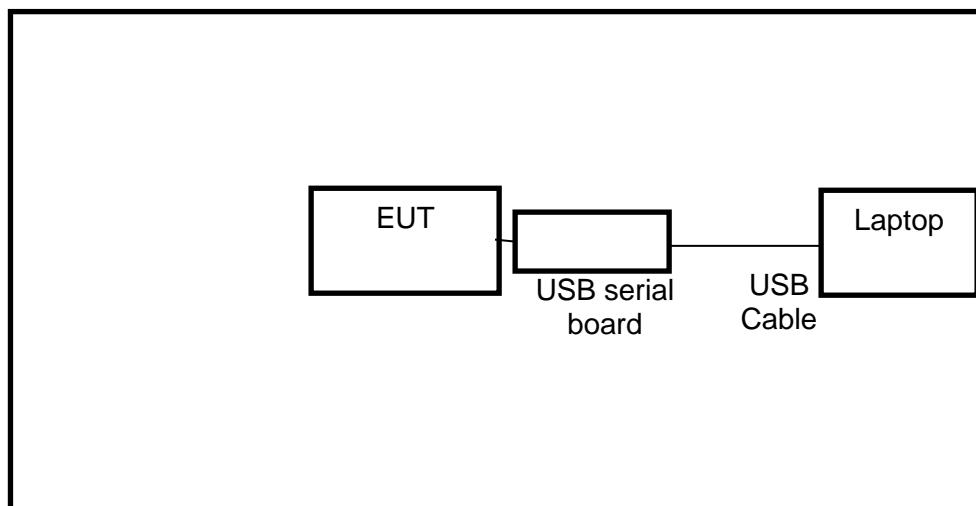
ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	Switching Adapter	N/A	PS65B120Y4000S	INPUT:100-240V~,50/60Hz,1.5A OUTPUT:12.0V/4000mA

TEST SETUP

The EUT can work in an engineer mode with a software through a Laptop.

SETUP DIAGRAM FOR TESTS



5.11. MEASURING INSTRUMENT AND SOFTWARE USED

Conducted Emissions										
Instrument										
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.				
<input checked="" type="checkbox"/>	EMI Test Receiver	R&S	ESR3	101961	Dec.20, 2016	Dec.19, 2017				
<input checked="" type="checkbox"/>	Two-Line V-Network	R&S	ENV216	101983	Dec.20, 2016	Dec.19, 2017				
<input checked="" type="checkbox"/>	Artificial Mains Networks	Schwarzbeck	NSLK 8126	8126465	Feb.10, 2017	Feb.10, 2018				
Software										
Used	Description		Manufacturer	Name	Version					
<input checked="" type="checkbox"/>	Test Software for Conducted disturbance		Farad	EZ-EMC	Ver. UL-3A1					
Radiated Emissions										
Instrument										
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.				
<input checked="" type="checkbox"/>	MXE EMI Receiver	KESIGHT	N9038A	MY56400 036	Feb. 24, 2017	Feb. 24, 2018				
<input checked="" type="checkbox"/>	Hybrid Log Periodic Antenna	TDK	HLP-3003C	130960	Jan.09, 2016	Jan.09, 2019				
<input checked="" type="checkbox"/>	Preamplifier	HP	8447D	2944A090 99	Feb. 13, 2017	Feb. 13, 2018				
<input checked="" type="checkbox"/>	EMI Measurement Receiver	R&S	ESR26	101377	Dec. 20, 2016	Dec. 20, 2017				
<input checked="" type="checkbox"/>	Horn Antenna	TDK	HRN-0118	130939	Jan. 09, 2016	Jan. 09, 2019				
<input checked="" type="checkbox"/>	High Gain Horn Antenna	Schwarzbeck	BBHA-9170	691	Jan.06, 2016	Jan.06, 2019				
<input checked="" type="checkbox"/>	Preamplifier	TDK	PA-02-0118	TRS-305-00066	Jan. 14, 2017	Jan. 14, 2018				
<input checked="" type="checkbox"/>	Preamplifier	TDK	PA-02-2	TRS-307-00003	Dec. 20, 2016	Dec. 20, 2017				
<input checked="" type="checkbox"/>	Loop antenna	Schwarzbeck	1519B	00008	Mar. 26, 2016	Mar. 25, 2019				
Software										
Used	Description		Manufacturer	Name	Version					
<input checked="" type="checkbox"/>	Test Software for Radiated disturbance		Farad	EZ-EMC	Ver. UL-3A1					
Other instruments										
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.				
<input checked="" type="checkbox"/>	Spectrum Analyzer	Keysight	N9030A	MY55410 512	Dec. 20, 2016	Dec. 20, 2017				
	Power Meter	Keysight	N9031A	MY55416 024	Feb. 13, 2017	Feb. 13, 2018				
	Power Sensor	Keysight	N9323A	MY55440 013	Feb. 13, 2017	Feb. 13, 2018				

	DC Supply	Keysight	E36103A	MY55350 020	Feb. 10, 2017	Feb. 10, 2018
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6. ANTENNA PORT TEST RESULTS

6.1. ON TIME AND DUTY CYCLE

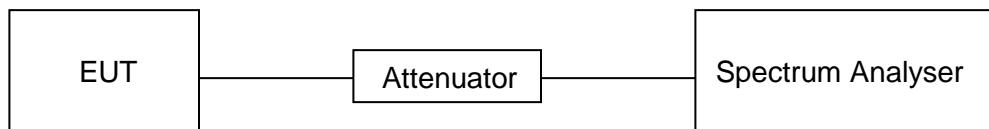
LIMITS

None; for reporting purposes only

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method

TEST SETUP



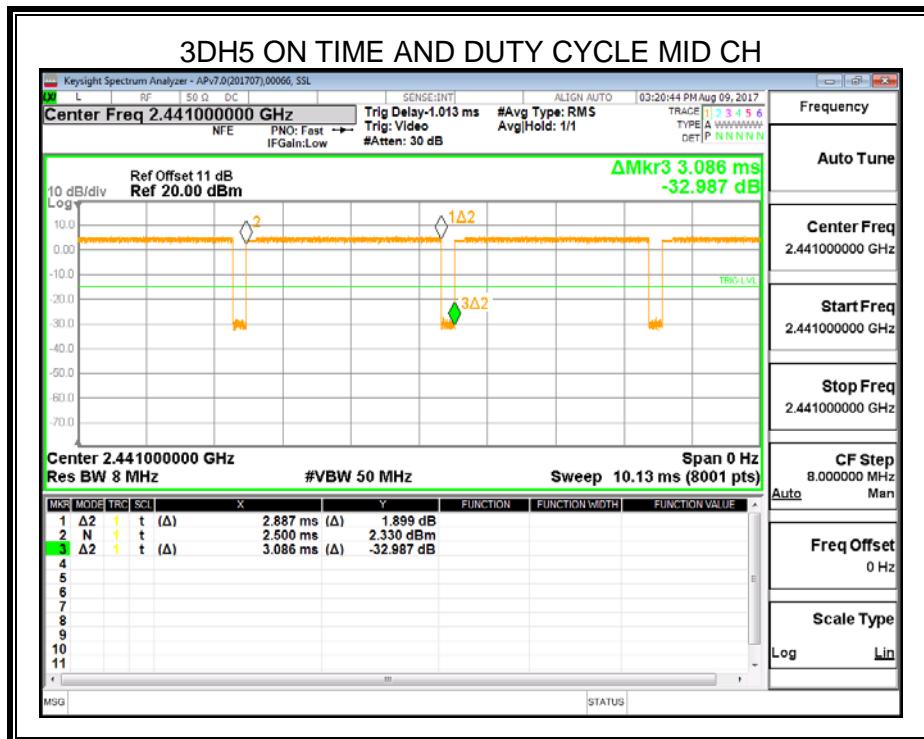
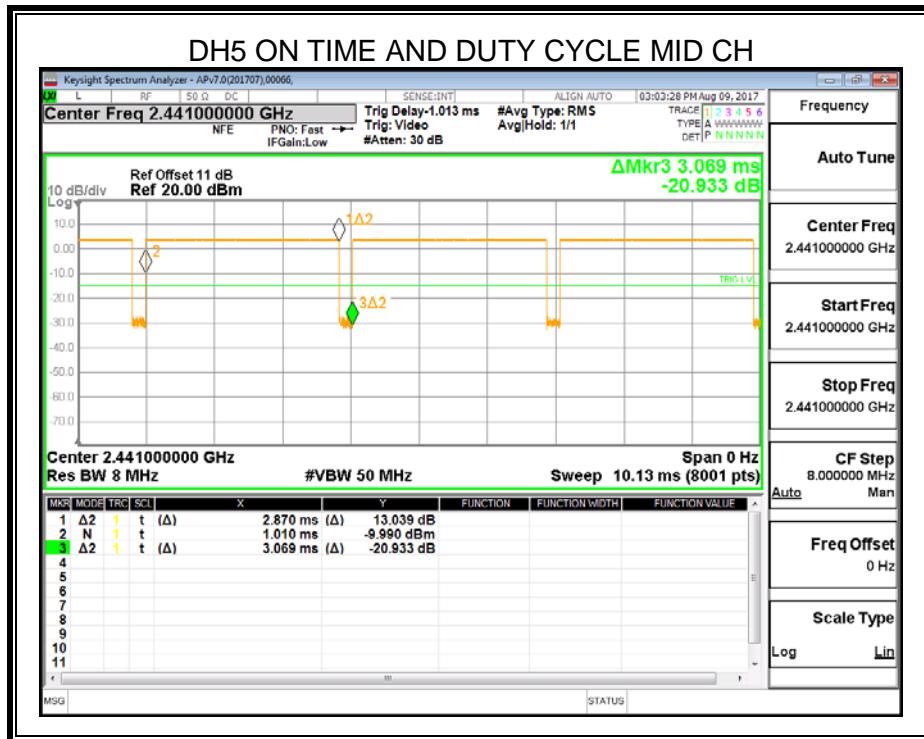
RESULTS

Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (db)	1/B Minimum VBW (KHz)
GFSK	2.87	3.069	0.935158032	94	0.29	0.35
8-DPSK	2.887	3.086	0.93551523	94	0.29	0.35

Note: Duty Cycle Correction Factor=10log(1/x).

Where: x is Duty Cycle(Linear)

Where: B is On Time



6.2. 20 dB BANDWIDTH & 99% DTS BANDWIDTH

LIMITS

FCC Part15 (15.247) Subpart C RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.247(a)(2) RSS-247 5.2 (a)	6dB Bandwidth	$\geq 500\text{KHz}$	2400-2483.5
RSS-Gen Clause 6.6	99% Bandwidth	For reporting purposes only.	2400-2483.5

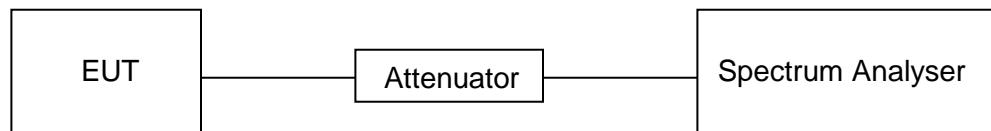
TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	For 6 dB Bandwidth :100K For 99% Bandwidth :1% to 5% of the occupied bandwidth
VBW	For 6dB Bandwidth : $\geq 3 \times \text{RBW}$ For 99% Bandwidth : approximately $3 \times \text{RBW}$
Trace	Max hold
Sweep	Auto couple

Allow the trace to stabilize and 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 and 99% relative to the maximum level measured in the fundamental emission.

TEST SETUP

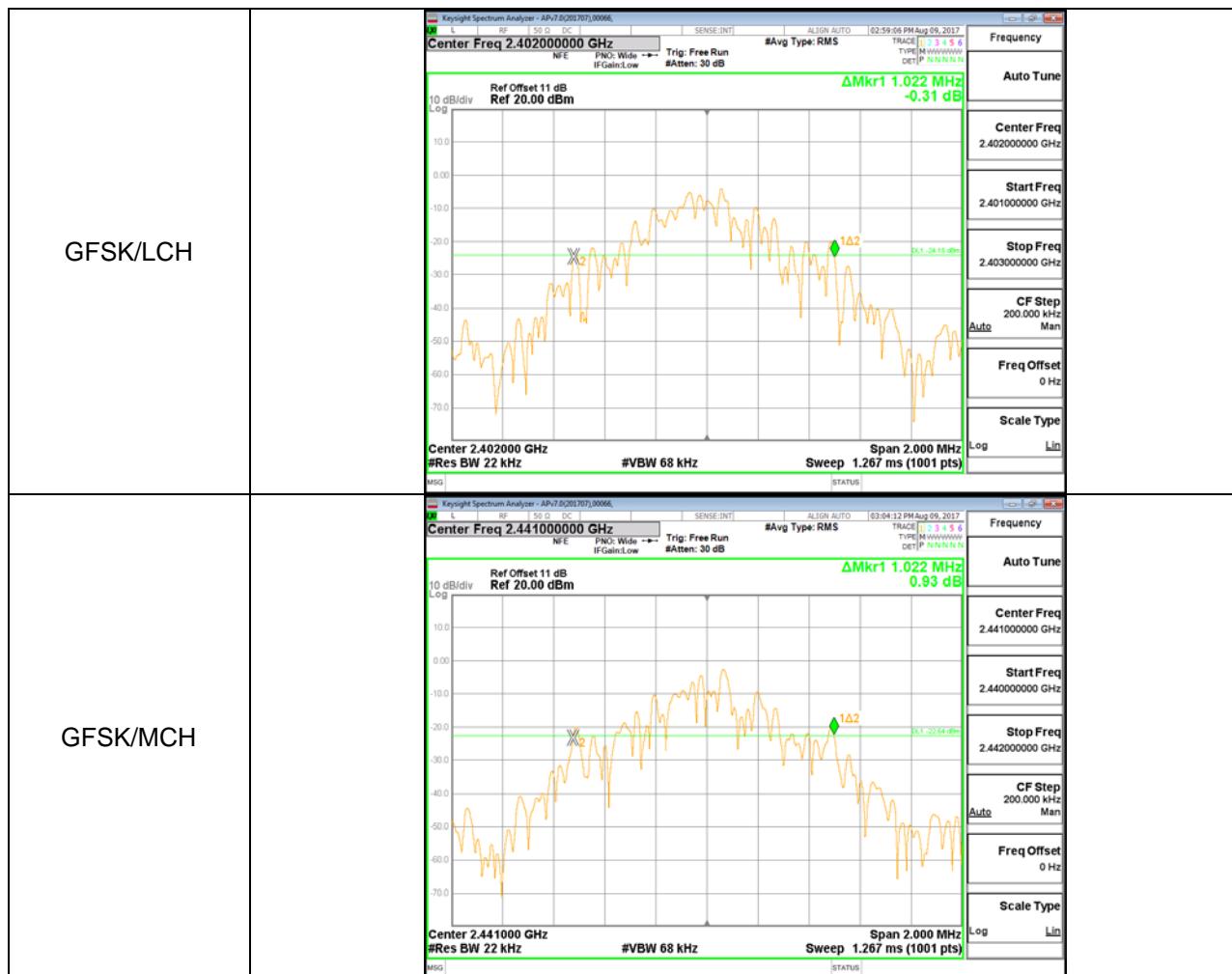


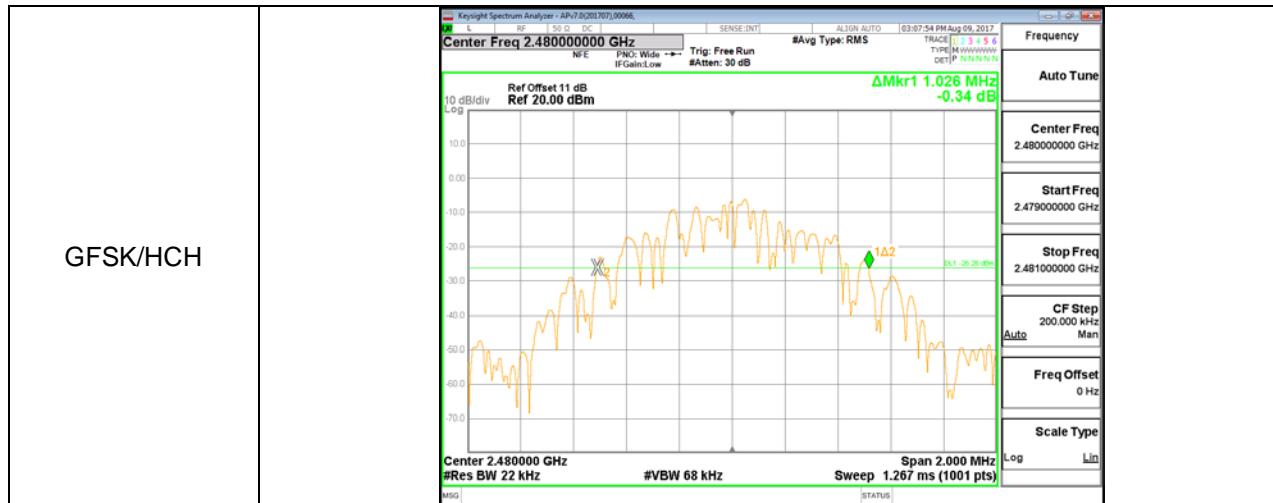
RESULTS

6.2.1. GFSK MODE

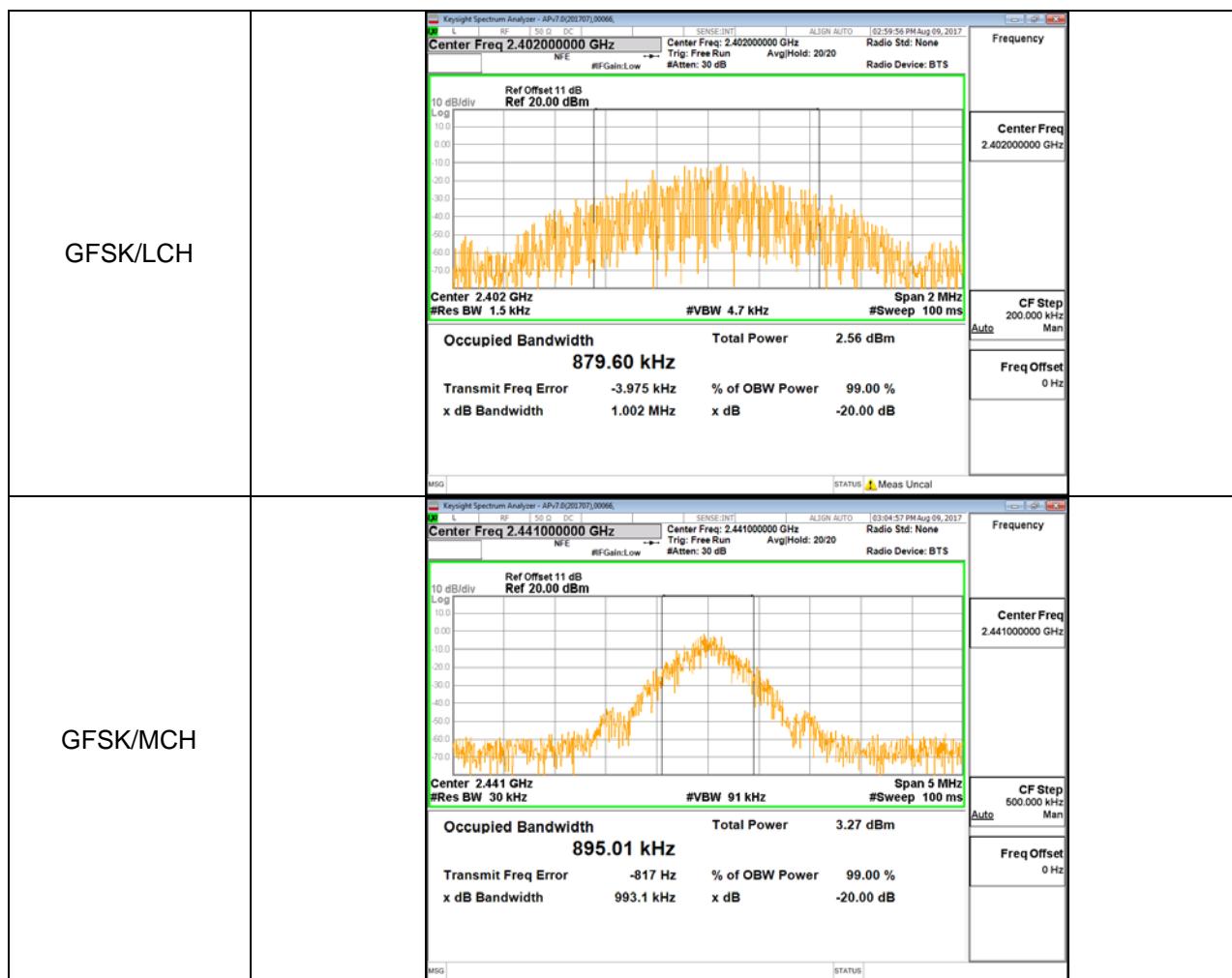
Channel	Frequency (MHz)	20dB bandwidth (MHz)	99% Bandwidth (MHz)	Result
Low	2402	1.02	0.88	PASS
Middle	2441	1.02	0.895	PASS
High	2480	1.03	0.897	PASS

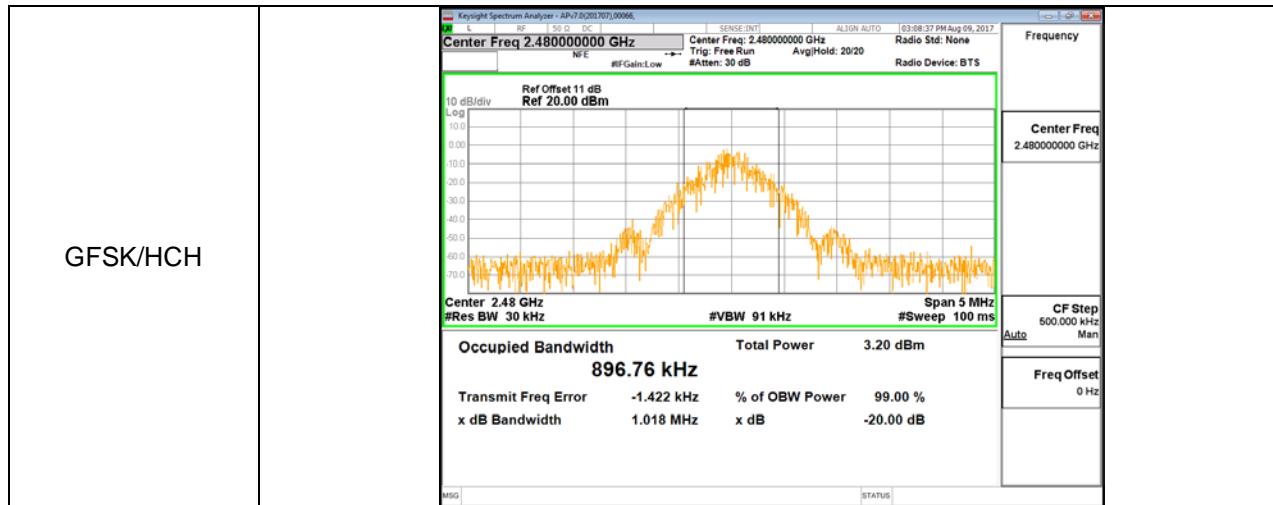
Test Graph: 20dB bandwidth





Test Graph: 99% Bandwidth





6.2.2. 8-DPSK MODE

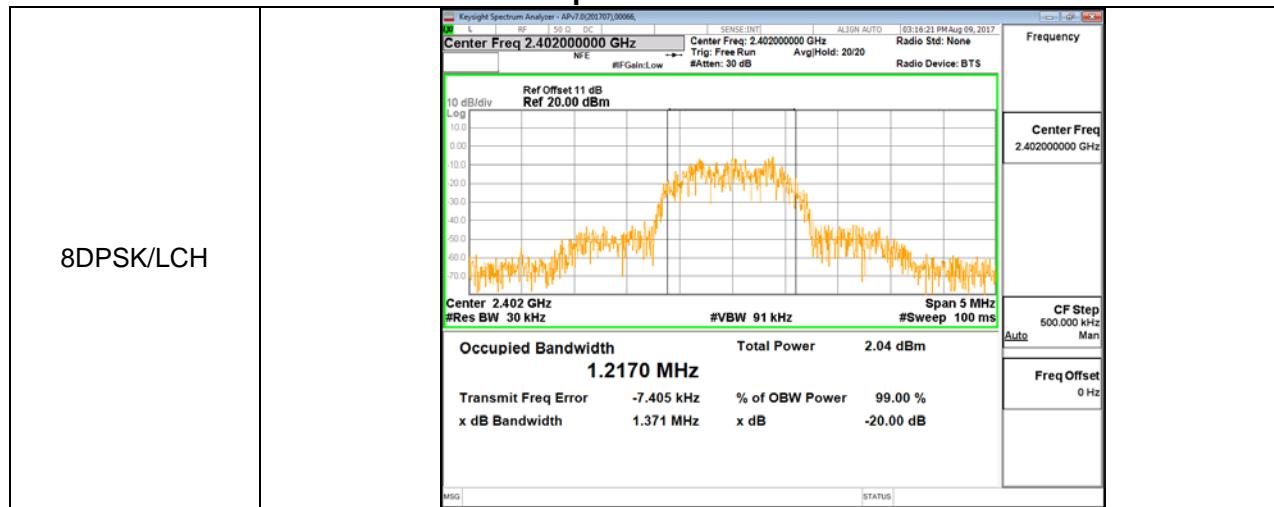
Channel	Frequency (MHz)	20dB bandwidth (MHz)	99% Bandwidth (MHz)	Result
Low	2402	1.27	1.217	Pass
Middle	2441	1.35	1.233	Pass
High	2480	1.34	1.223	Pass

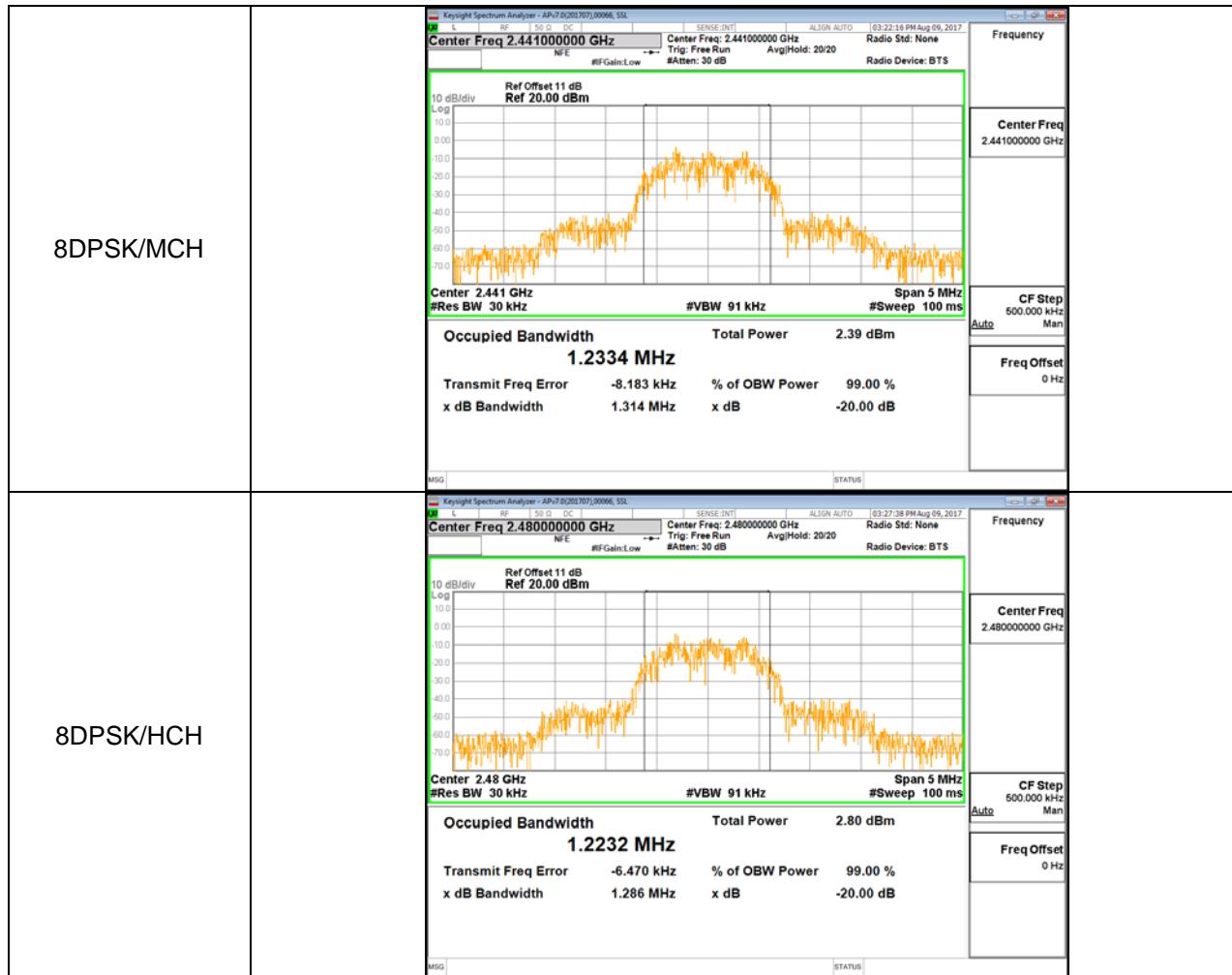
Test Graph: 20dB bandwidth





Test Graph: 99% Bandwidth





6.3. PEAK CONDUCTED OUTPUT POWER

LIMITS

FCC Part15 (15.247) , Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.247 (b) (1)	Peak Conducted Output Power	1 watt or 30dBm	2400-2483.5

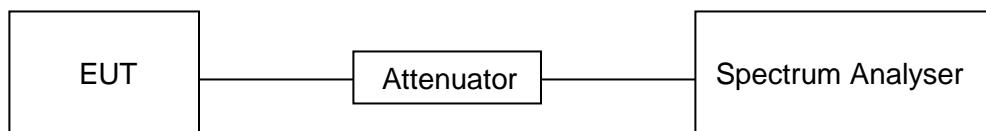
TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	> the 20 dB bandwidth of the emission being measured (e.g. 1 MHz for BT)
VBW	\geq RBW
Span	approximately 5 times the 20 dB bandwidth, centered on a hopping channel
Trace	Max hold
Sweep time	Auto couple

Allow trace to fully stabilize and use peak marker function to determine the peak amplitude level.

TEST SETUP



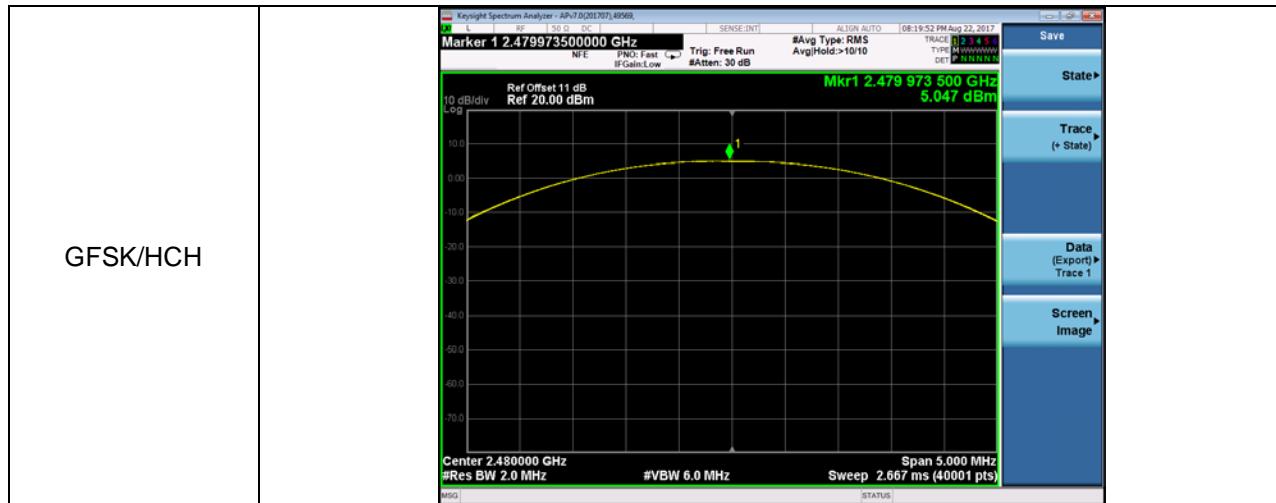
RESULTS

6.3.1. GFSK MODE

Channel	Frequency	Maximum Conducted Output Power(PK)	EIRP	Result
	(MHz)	(dBm)	(dBm)	
Low	2402	4.345	7.045	Pass
Middle	2441	5.004	7.704	Pass
High	2480	5.047	7.747	Pass

Note: EIRP = Maximum Conducted Output Power (PK) + Antenna Gain

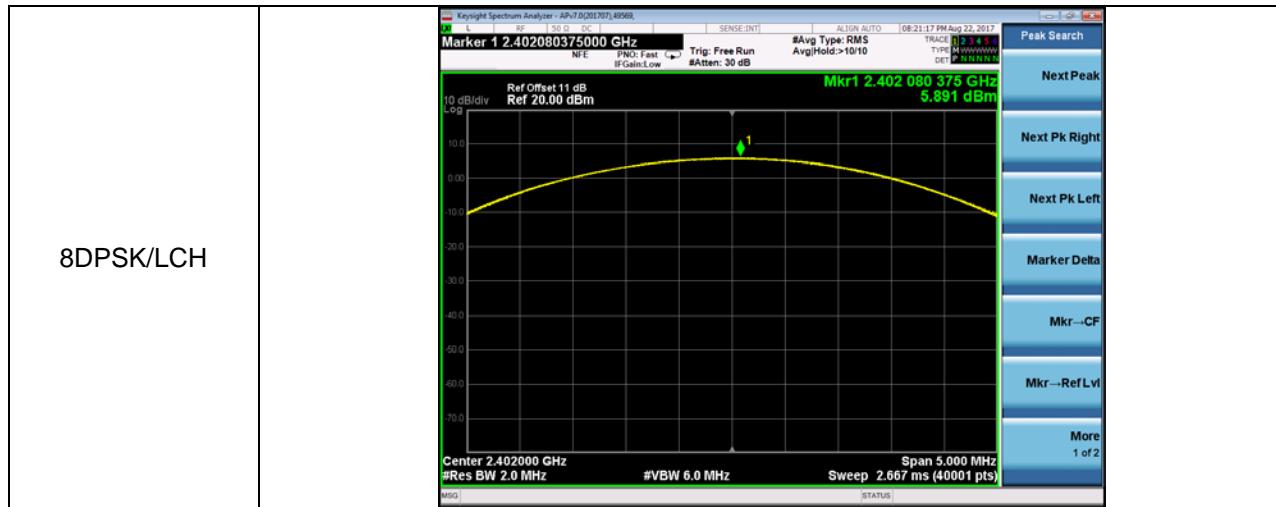


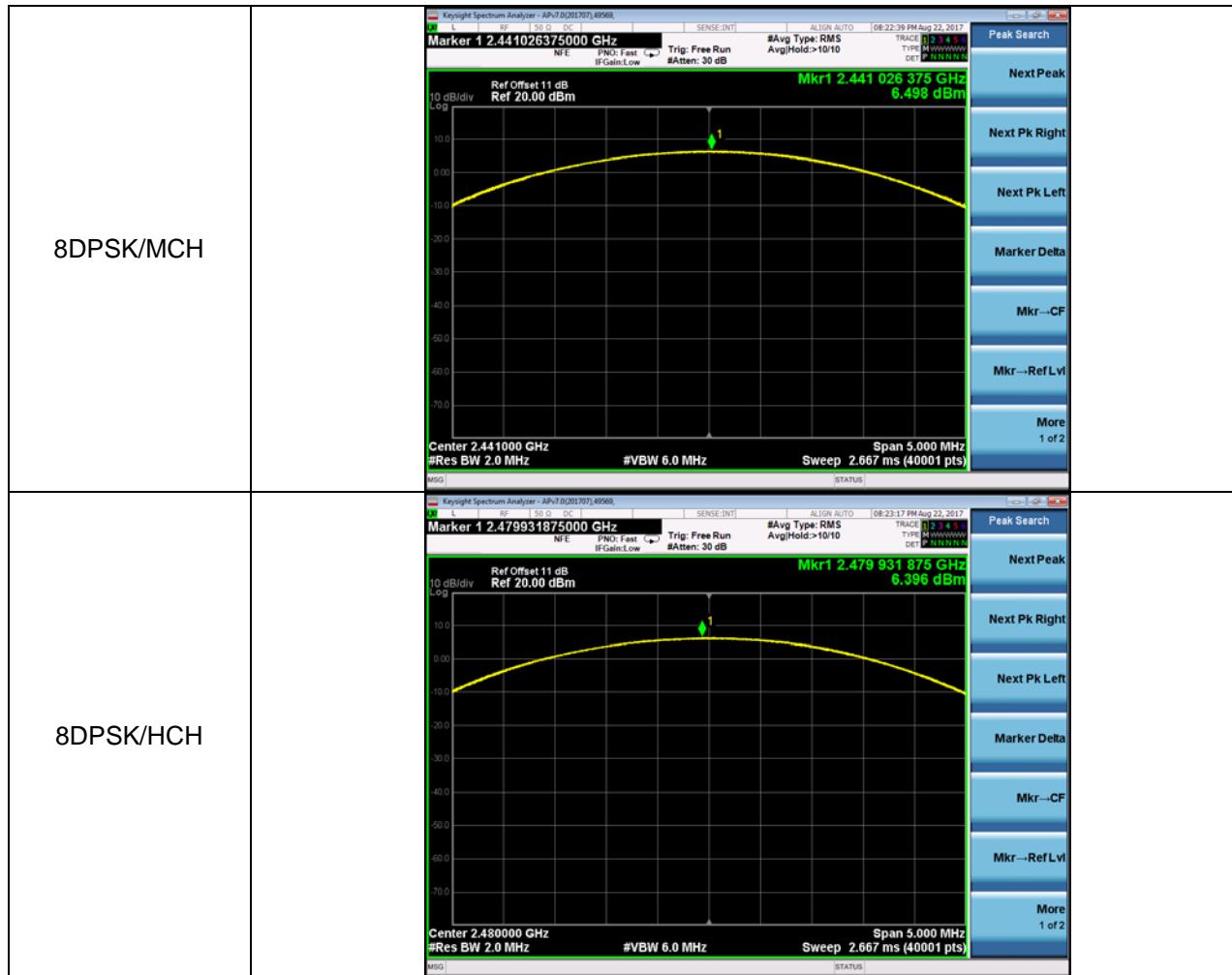


6.3.1. 8-DPSK MODE

Channel	Frequency (MHz)	Maximum Conducted Output Power(PK)		EIRP (dBm)	Result
		(dBm)	(dBm)		
Low	2402	5.891	8.591	Pass	
Middle	2441	6.498	9.198	Pass	
High	2480	6.396	9.091	Pass	

Note: EIRP = Maximum Conducted Output Power (PK) + Antenna Gain





6.4. CARRIER HOPPING CHANNEL SEPARATION

LIMITS

FCC Part15 (15.247) , Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.247 (a) (1)	Carrier Hopping Channel Separation	25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.	2400-2483.5

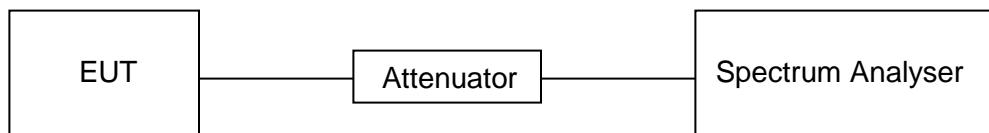
TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Span	wide enough to capture the peaks of two adjacent channels
Detector	Peak
RBW	$\geq 1\%$ of the span
VBW	\geq RBW
Trace	Max hold
Sweep time	Auto couple

Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section. Submit this plot.

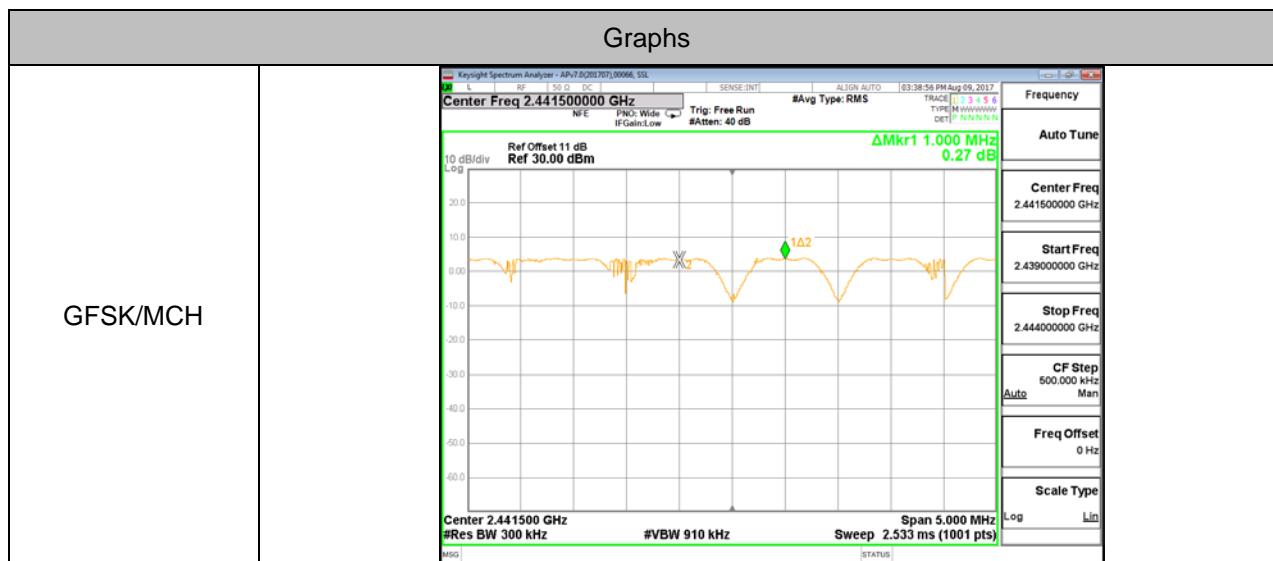
TEST SETUP



RESULTS

6.4.1. GFSK MODE

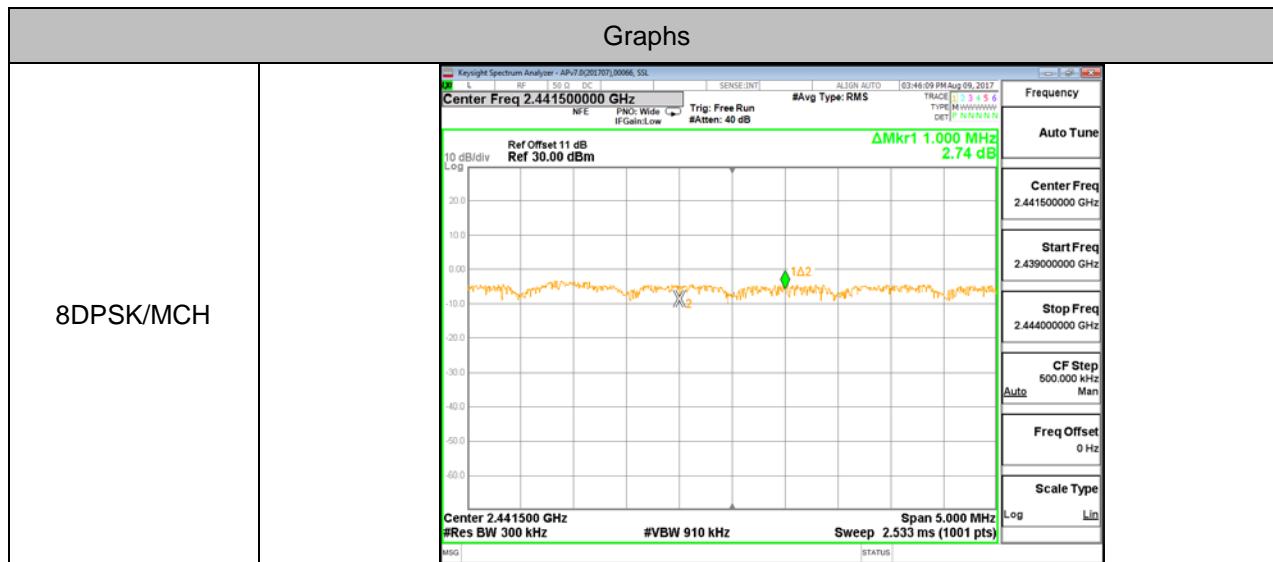
Channel	Carrier Hopping Channel Separation (MHz)	Limit (MHz)	Result
Middle	1.00	\geq two-thirds of the 20 dB Bandwidth Of The Hopping Channel	PASS



Note: For 20 dB Bandwidth of The Hopping Channel, please refer to clause 6.2.1.

6.4.2. 8-DPSK MODE

Channel	Carrier Hopping Channel Separation (MHz)	Limit (MHz)	Result
Middle	1.00	\geq two-thirds of the 20 dB Bandwidth Of The Hopping Channel	PASS



Note: For 20 dB Bandwidth of The Hopping Channel, please refer to clause 6.2.2.

6.5. NUMBER OF HOPPING FREQUENCY

LIMITS

FCC Part15 (15.247) , Subpart C		
Section	Test Item	Limit
15.247 (a) (1) III	Number of Hopping Frequency	at least 15 hopping channels

TEST PROCEDURE

Connect the EUT to the spectrum analyser and use the following settings:

Detector	Peak
RBW	1% of the span
VBW	\geq RBW
Span	The frequency band of operation
Trace	Max hold
Sweep time	Auto couple

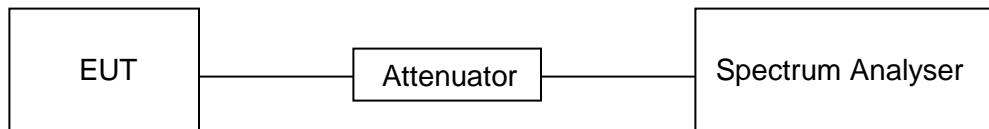
Set EUT to transmit maximum output power and switch on frequency hopping function. then set enough count time (larger than 5000 times) to get all the hopping frequency channel displayed on the screen of spectrum analyzer.

Count the quantity of peaks to get the number of hopping channels.

Normal Mode: 79 Channels observed.

AFH Mode: 20 Channels declared.

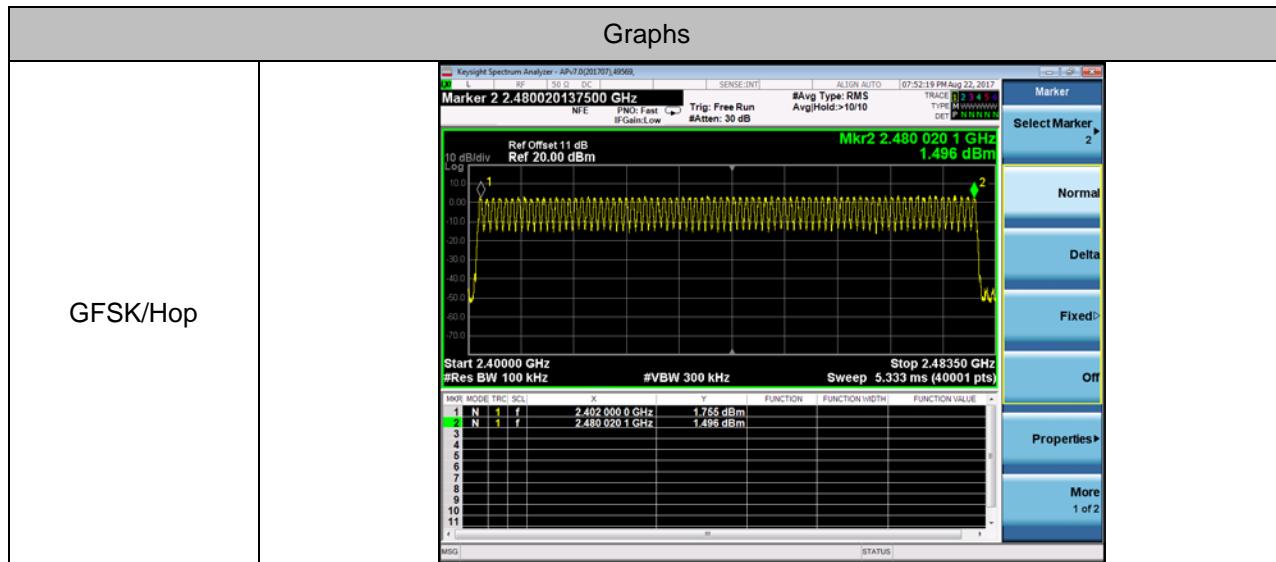
TEST SETUP



RESULTS

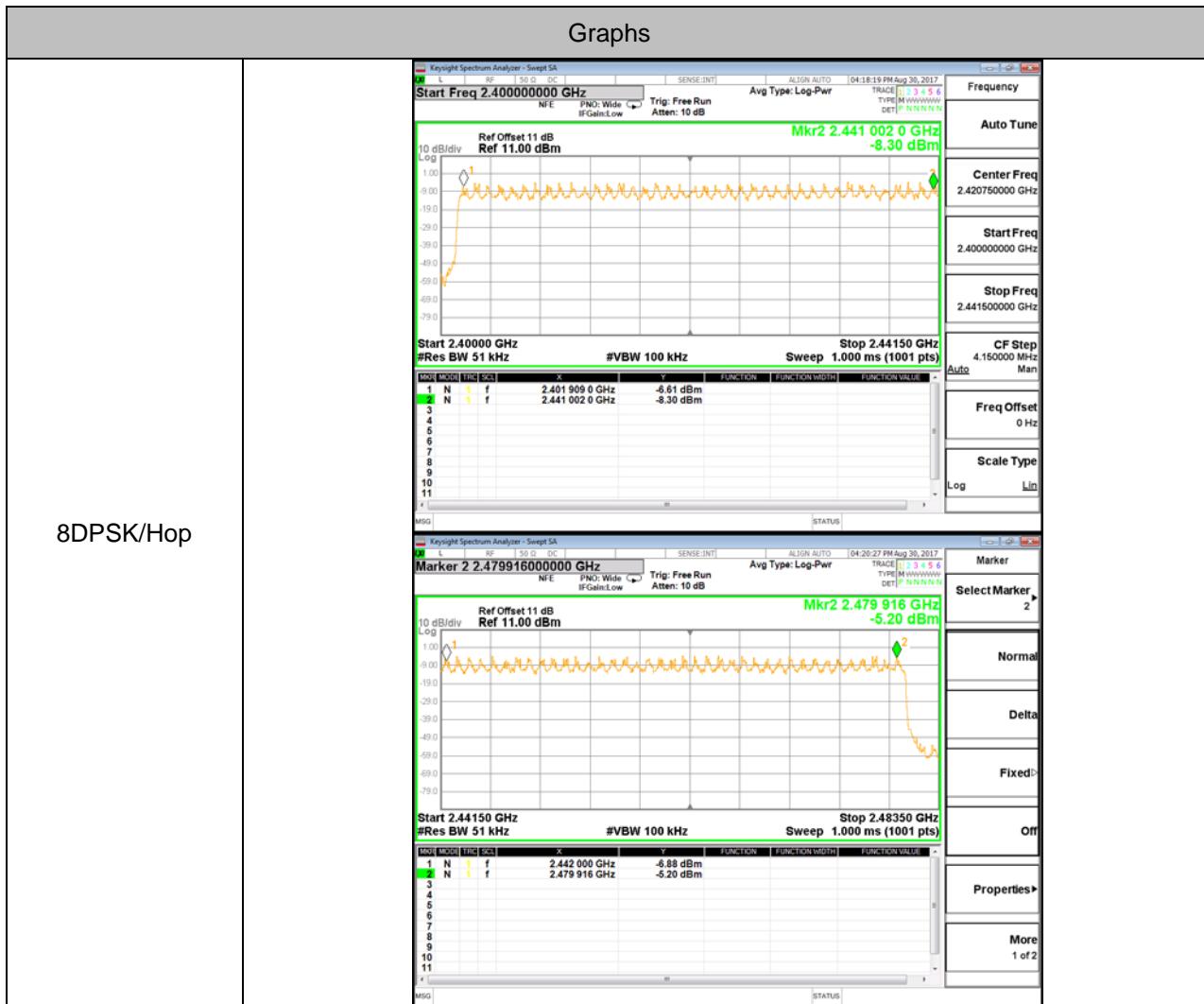
6.5.1. GFSK MODE

Hopping numbers	Limit	Results
79	>15	Pass



6.5.2. 8-DPSK MODE

Hopping numbers	Limit	Results
79	>15	Pass



6.6. TIME OF OCCUPANCY (DWELL TIME)

LIMITS

FCC Part15 (15.247) , Subpart C		
Section	Test Item	Limit
15.247 (a) (1) III	Time of Occupancy (Dwell Time)	The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds, multiplied by the number of hopping channels employed.

TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	1 MHz
VBW	\geq RBW
Span	zero span
Trace	Max hold
Sweep time	As necessary to capture the entire dwell time per hopping channel

- a. The transmitter output (antenna port) was connected to the spectrum analyzer
- b. Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz.
- 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.

A Period Time = (channel number)*0.4

For Normal Mode (79 Channel):

DH1 Time Slot: Reading * (1600/2)*31.6/(channel number)

DH3 Time Slot: Reading * (1600/4)*31.6/(channel number)

DH5 Time Slot: Reading * (1600/6)*31.6/(channel number)

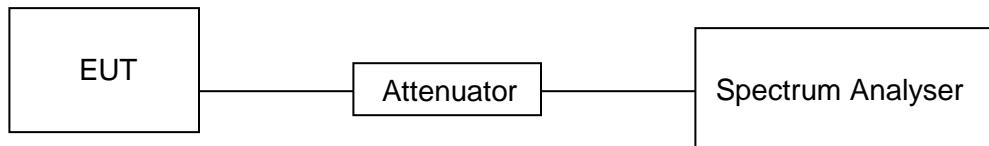
For AFH Mode (20 Channel):

DH1 Time Slot: Reading * (1600/2)*8/(channel number)

DH3 Time Slot: Reading * (1600/4)*8/(channel number)

DH5 Time Slot: Reading * (1600/6)*8/(channel number)

TEST SETUP



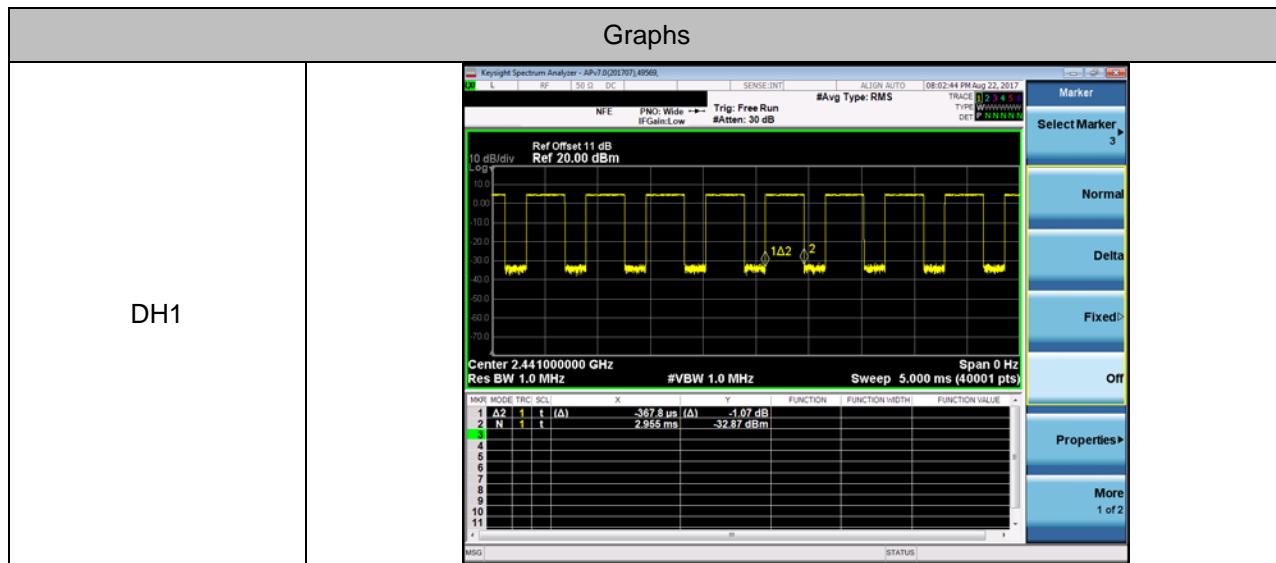
RESULTS

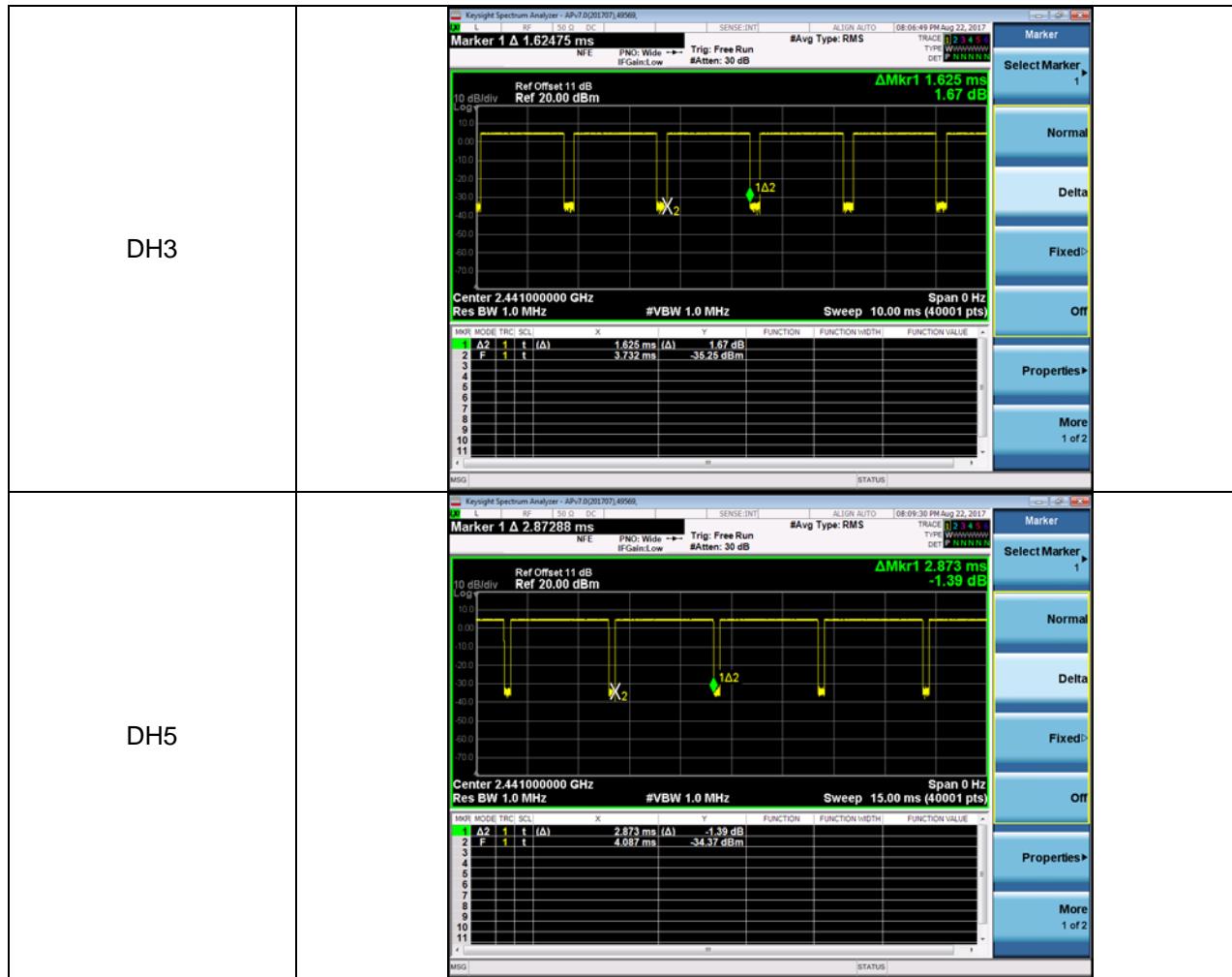
6.6.1. GFSK MODE

Normal Mode				
Packet	Channel	Burst Width [ms/hop/ch]	Dwell Time [ms]	Results
DH1	MCH	0.3678	0.1177	PASS
DH3	MCH	1.6250	0.2600	PASS
DH5	MCH	2.8730	0.3065	PASS

AFH Mode				
Packet	Channel	Burst Width	Dwell Time	Results
DH1	MCH	0.3678	0.1177	PASS
DH3	MCH	1.6250	0.2600	PASS
DH5	MCH	2.8730	0.3065	PASS

Test Graph





6.6.2. 8-DPSK MODE

Normal Mode				
Packet	Channel	Burst Width [ms/hop/ch]	Dwell Time [ms]	Results
DH1	MCH	0.3894	0.1246	PASS
DH3	MCH	1.6400	0.2624	PASS
DH5	MCH	2.8890	0.3082	PASS
AFH Mode				
DH1	MCH	0.3894	0.1246	PASS
DH3	MCH	1.6400	0.2624	PASS
DH5	MCH	2.8890	0.3082	PASS

Test Graph



6.7. CONDUCTED BANDEDGE

LIMITS

FCC Part15 (15.247) , Subpart C		
Section	Test Item	Limit
FCC §15.247 (d)	Conducted Bandedge	at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

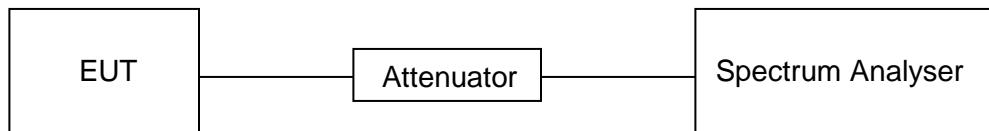
TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Span	Set the center frequency and span to encompass frequency range to be measured
Detector	Peak
RBW	100K
VBW	\geq RBW
measurement points	\geq span/RBW
Trace	Max hold
Sweep time	Auto couple.

Use the peak marker function to determine the maximum amplitude level.

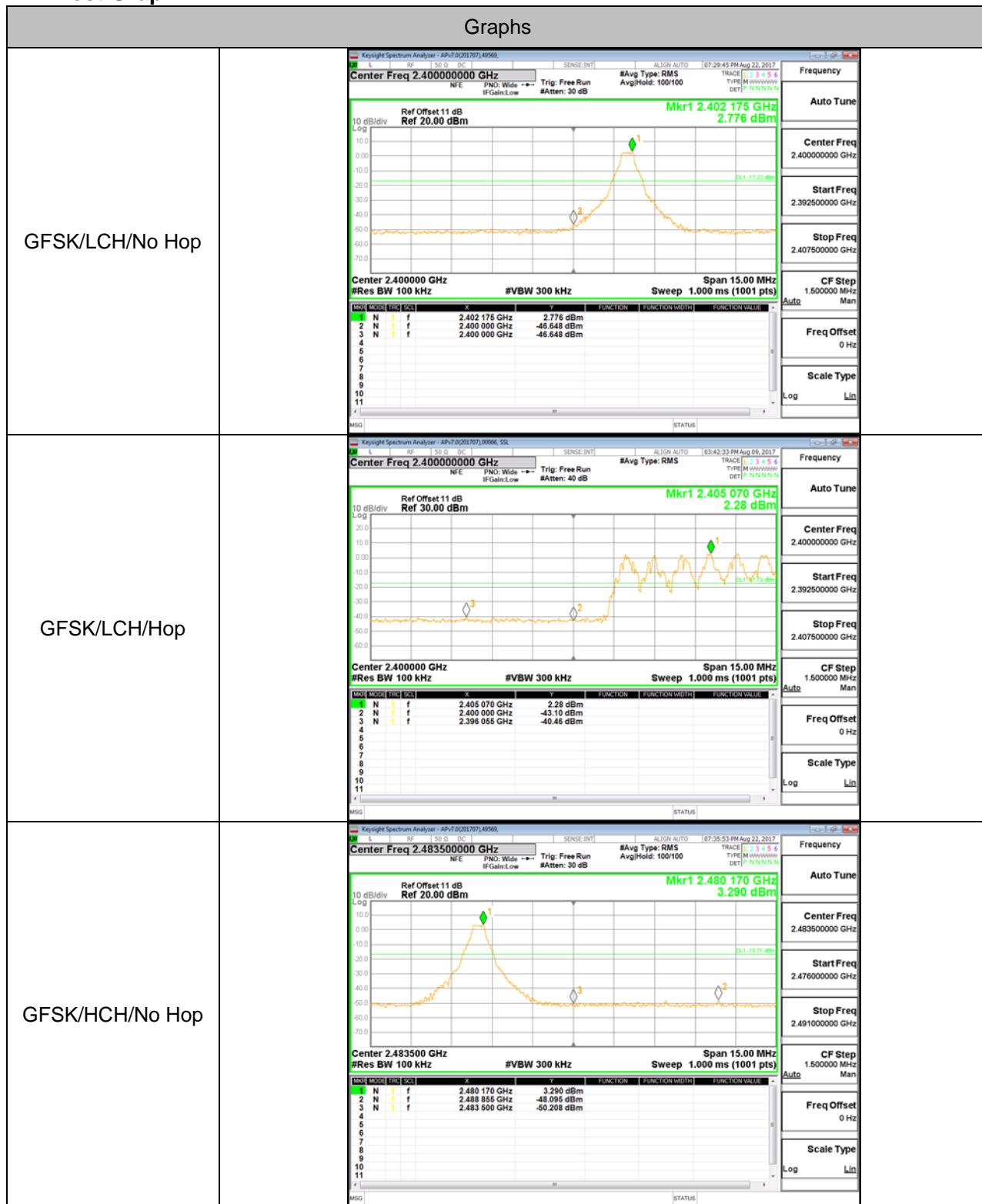
TEST SETUP

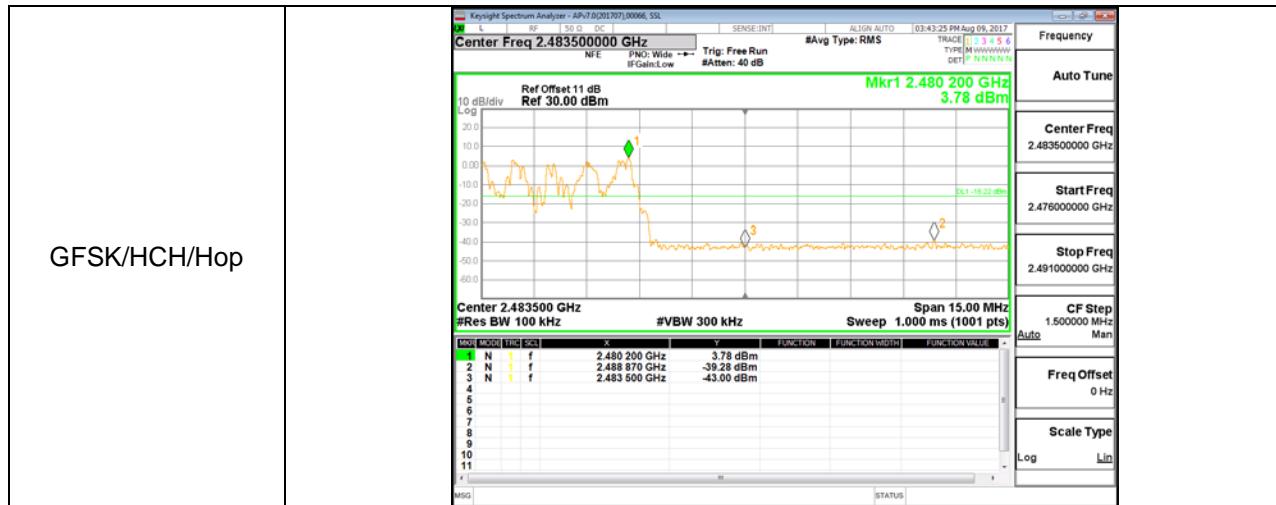


RESULTS

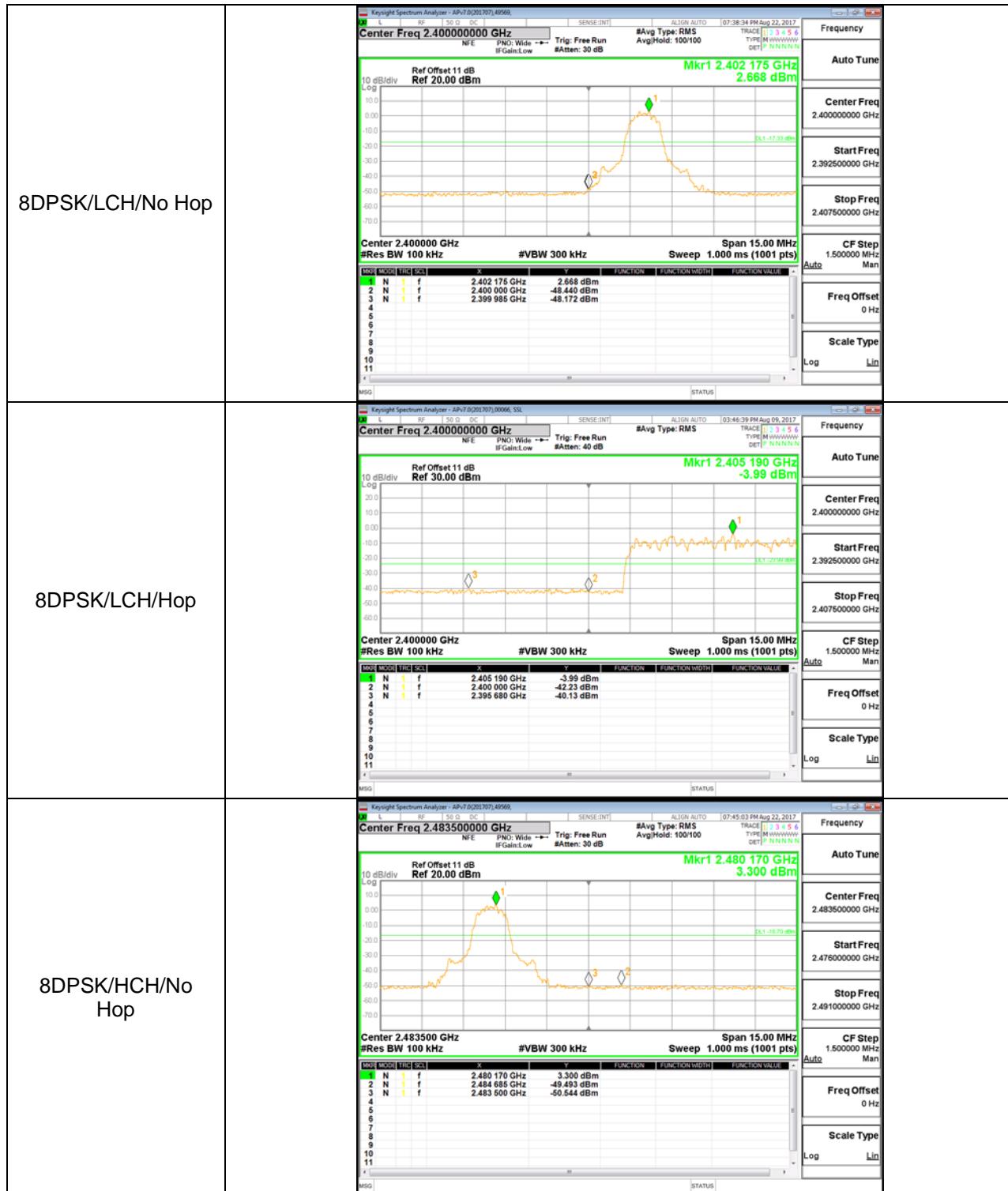
6.7.1. GFSK MODE

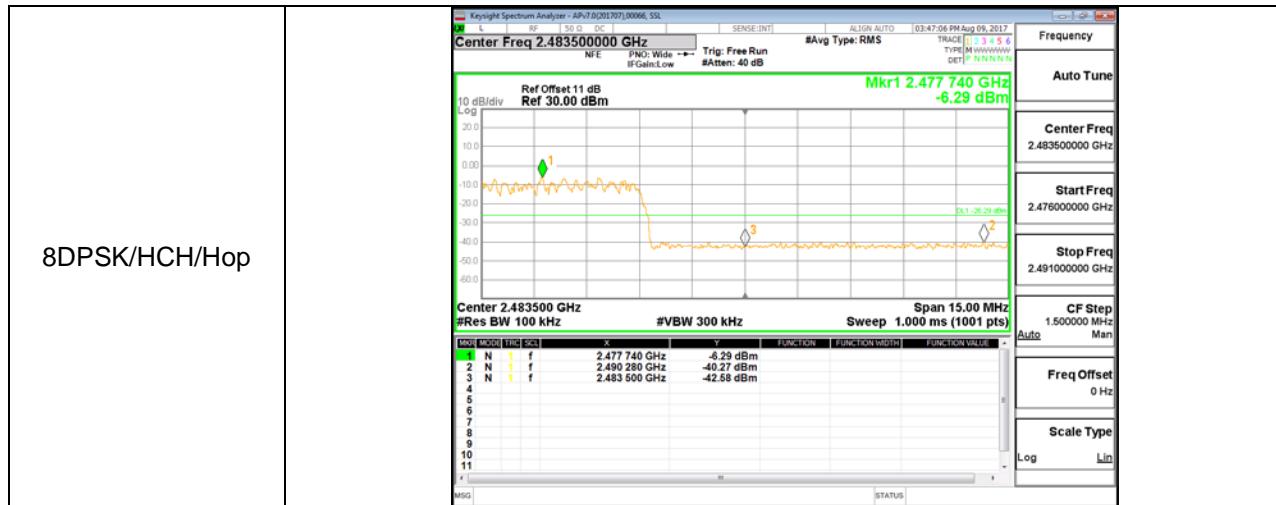
Test Graph





6.7.1. 8-DPSK MODE





6.8. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC Part15 (15.247) , Subpart C		
Section	Test Item	Limit
FCC §15.247 (d)	Conducted Bandedge	at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

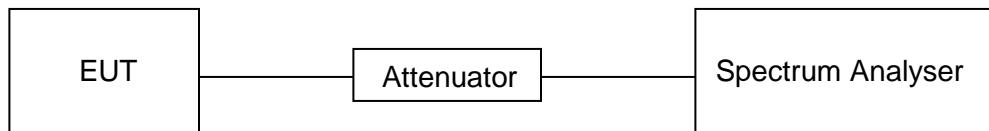
TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Span	Set the center frequency and span to encompass frequency range to be measured
Detector	Peak
RBW	100K
VBW	\geq RBW
measurement points	\geq span/RBW
Trace	Max hold
Sweep time	Auto couple.

Use the peak marker function to determine the maximum amplitude level.

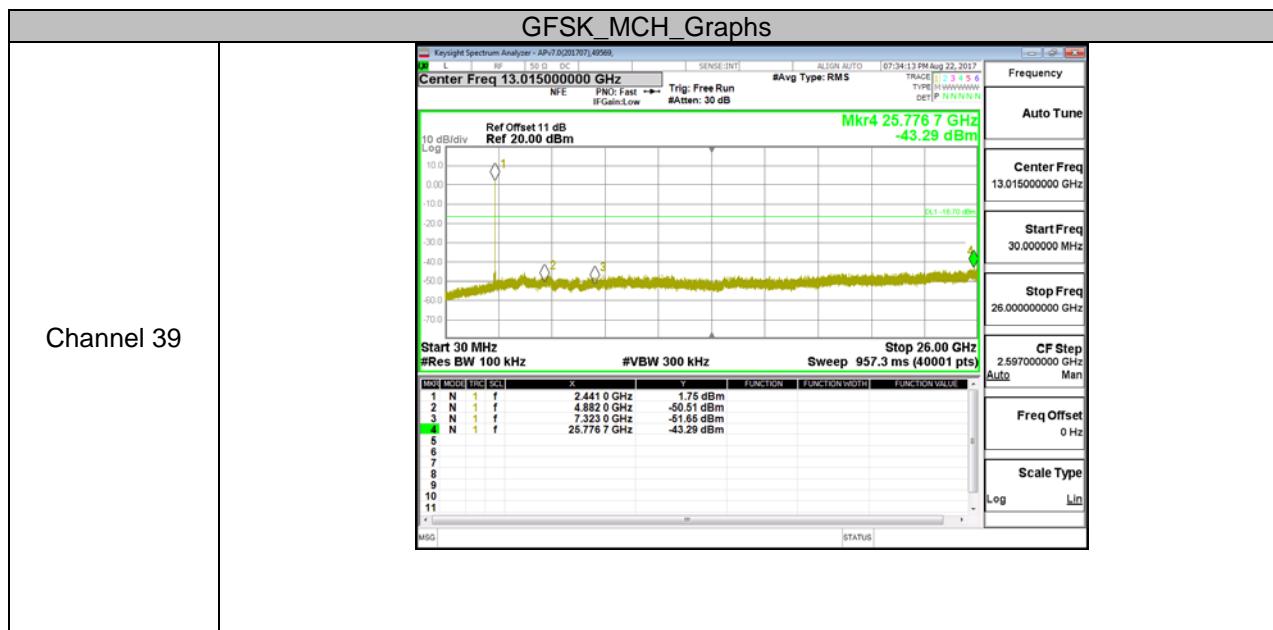
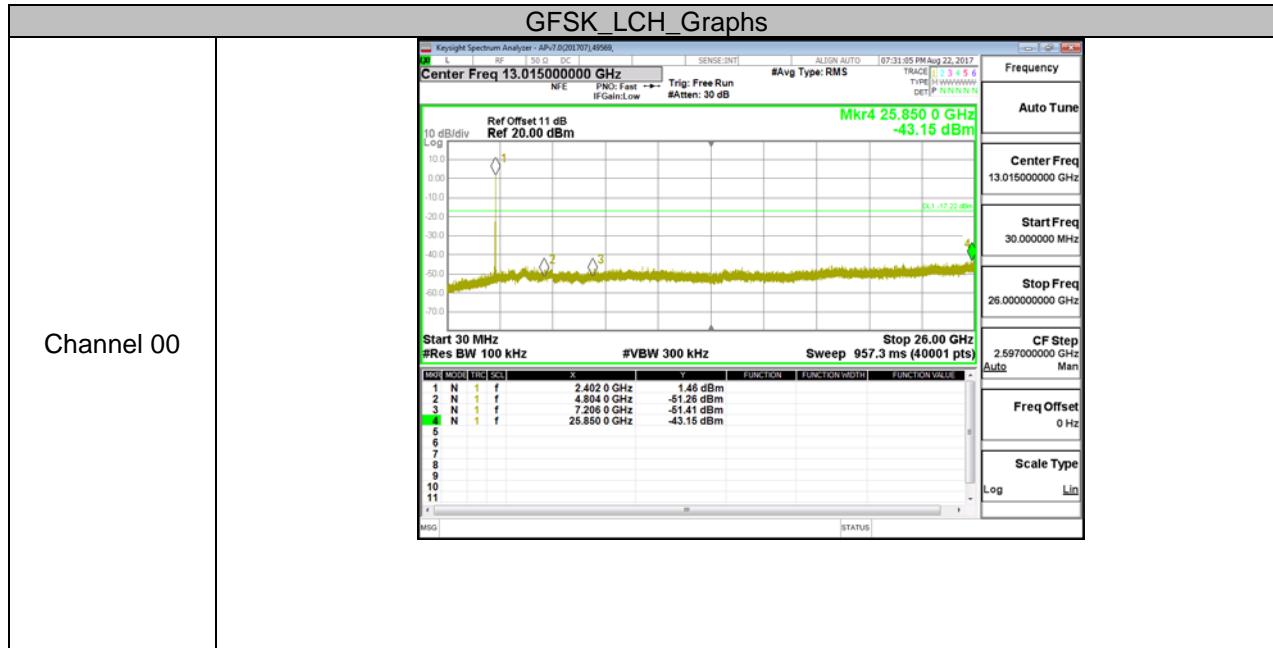
TEST SETUP

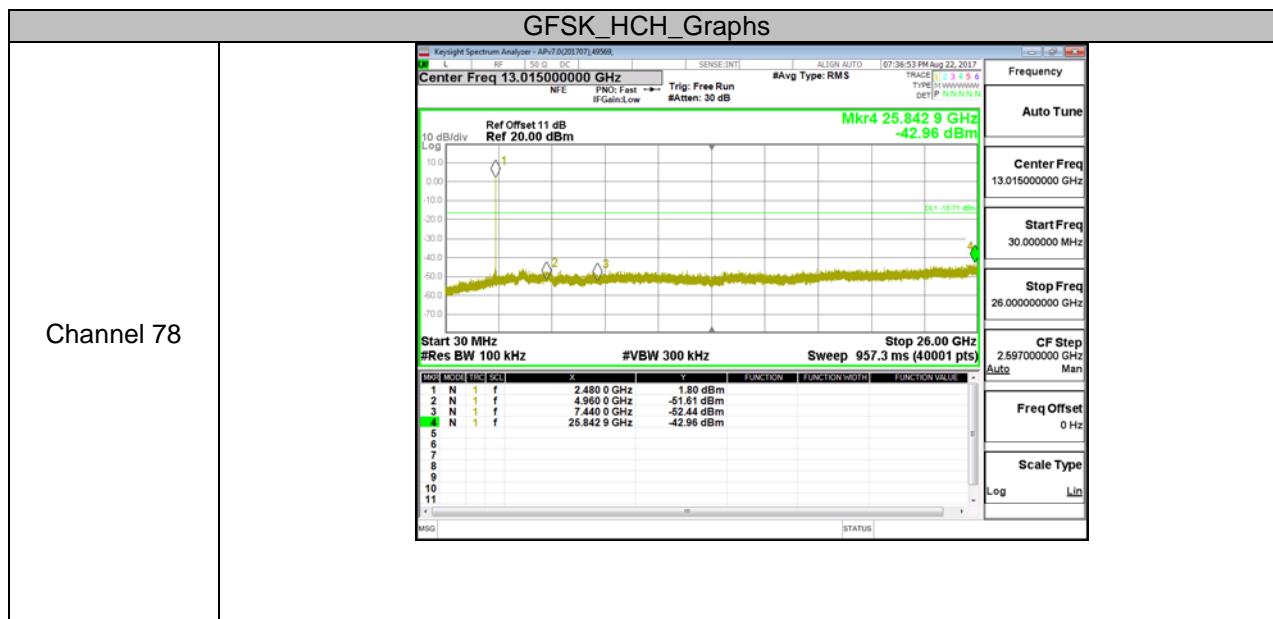


RESULTS

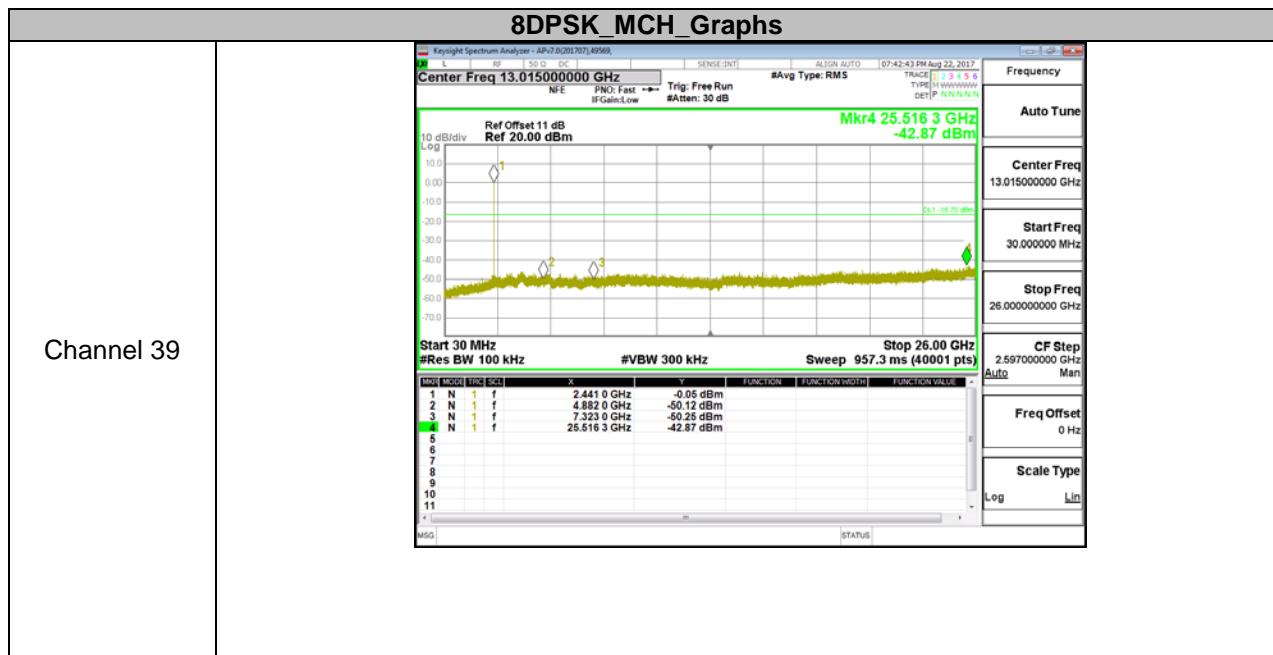
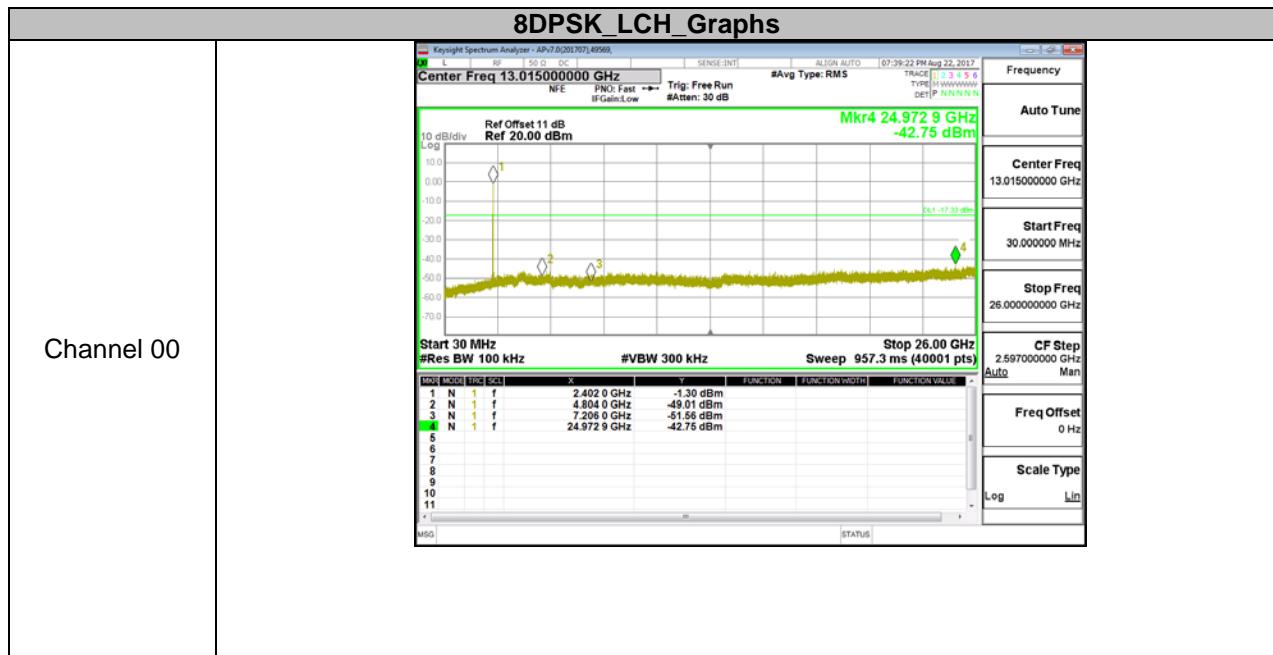
6.8.1. GFSK MODE

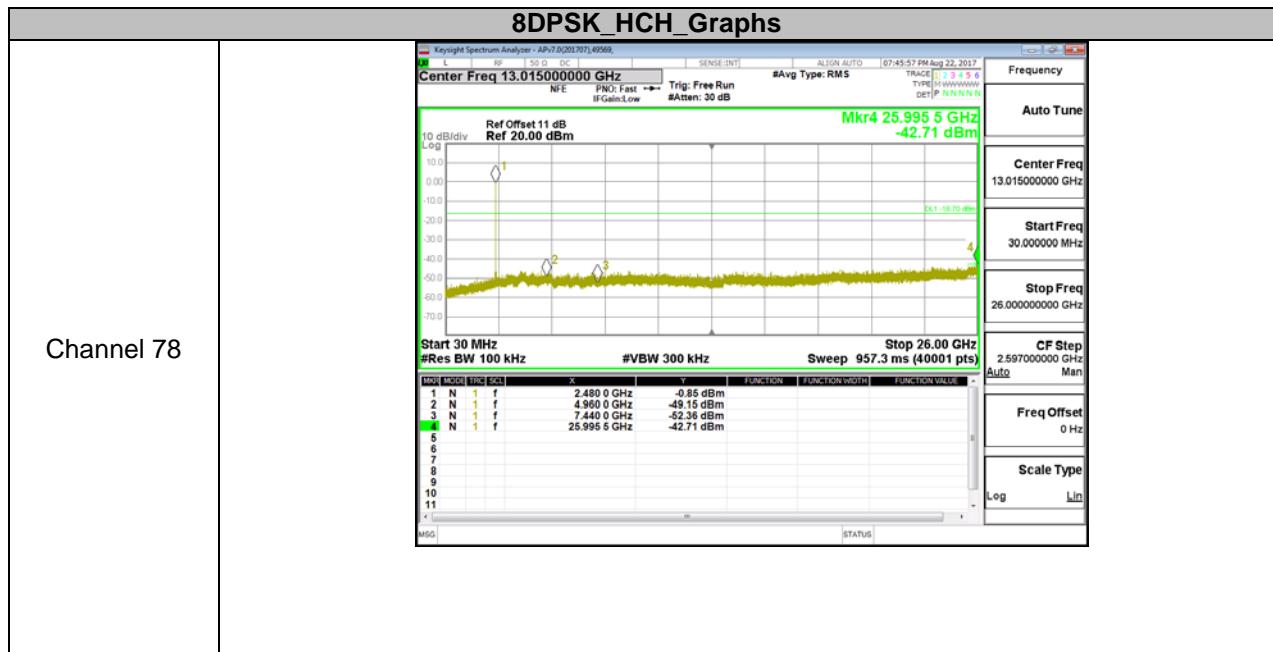
Test Graph





6.8.2. 8-DPSK MODE





7. RADIATED TEST RESULTS

7.1. LIMITS AND PROCEDURE

LIMITS

Please refer to FCC §15.205 and §15.209

Radiation Disturbance Test Limit for FCC (Class B)(9KHz-1GHz)

Frequency (MHz)	Field Strength (microvolts/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
960~1000	500	3

Radiation Disturbance Test Limit for FCC (Above 1G)

Frequency (MHz)	dB(uV/m) (at 3 meters)	
	Peak	Average
Above 1000	74	54

Restricted bands of operation

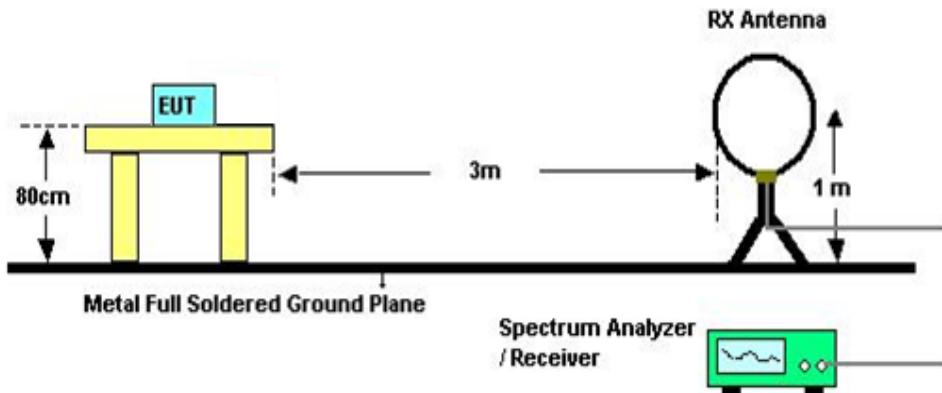
MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	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	(²)
13.36-13.41			

Note: ¹Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

²Above 38.6

TEST SETUP AND PROCEDURE

Below 30MHz

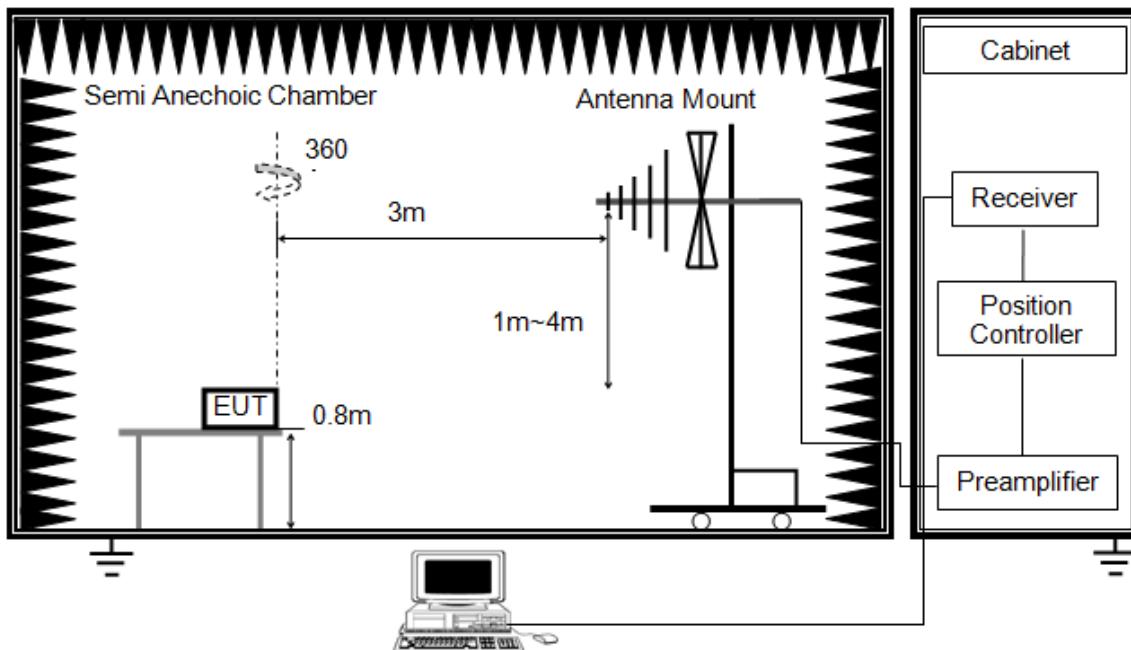


The setting of the spectrum analyser

RBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
VBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
Sweep	Auto
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013
2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 0.8m meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, 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 then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

Below 1G

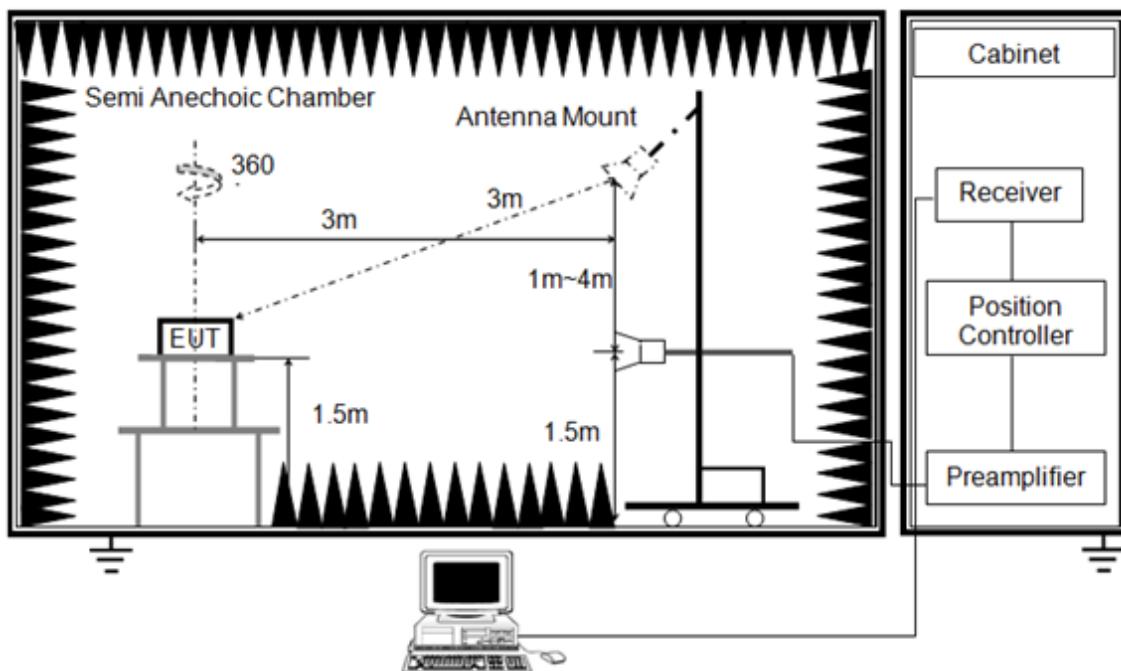


The setting of the spectrum analyser

RBW	120K
VBW	300K
Sweep	Auto
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 0.8m above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, 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 then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. For the actual test configuration, please refer to the related Item in this test report.

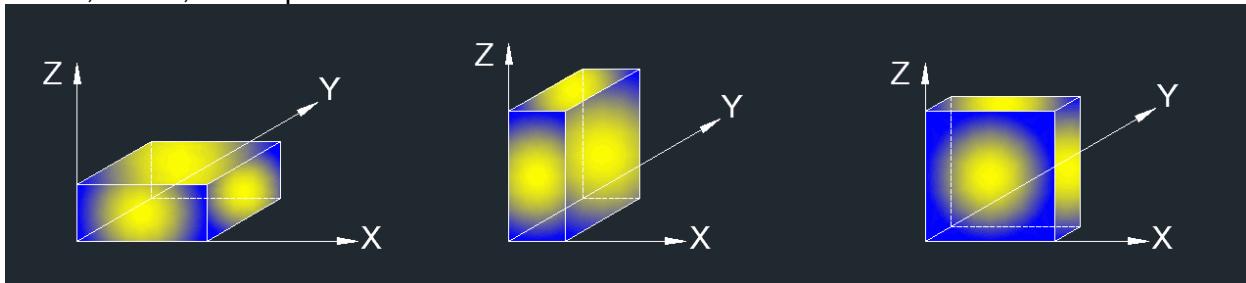
Above 1G



RBW	1M
VBW	PEAK: 3M AVG: see note 6
Sweep	Auto
Detector	Peak
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 1.5m above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. For measurement above 1GHz, the emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the limit specified in Section 15.209.
6. For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with $1/T \leq 350\text{Hz}$ for average measurements.
8. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

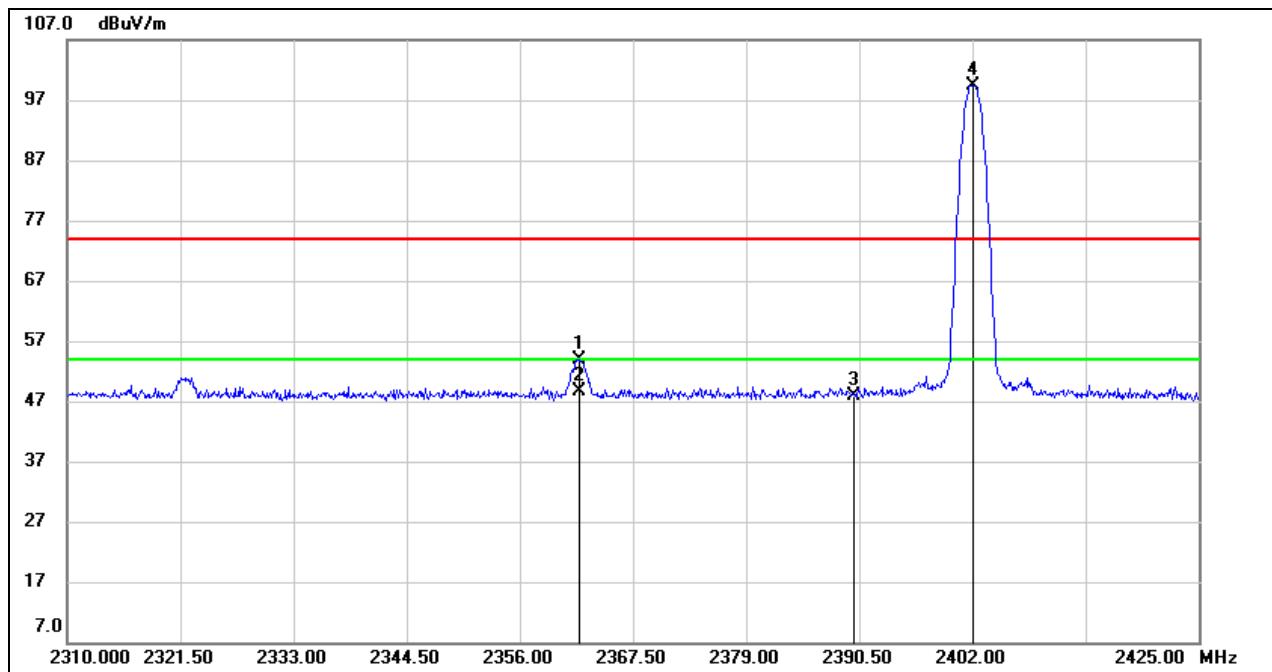
X axis, Y axis, Z axis positions:



7.2. RESTRICTED BANDEDGE

7.2.1. GFSK MODE

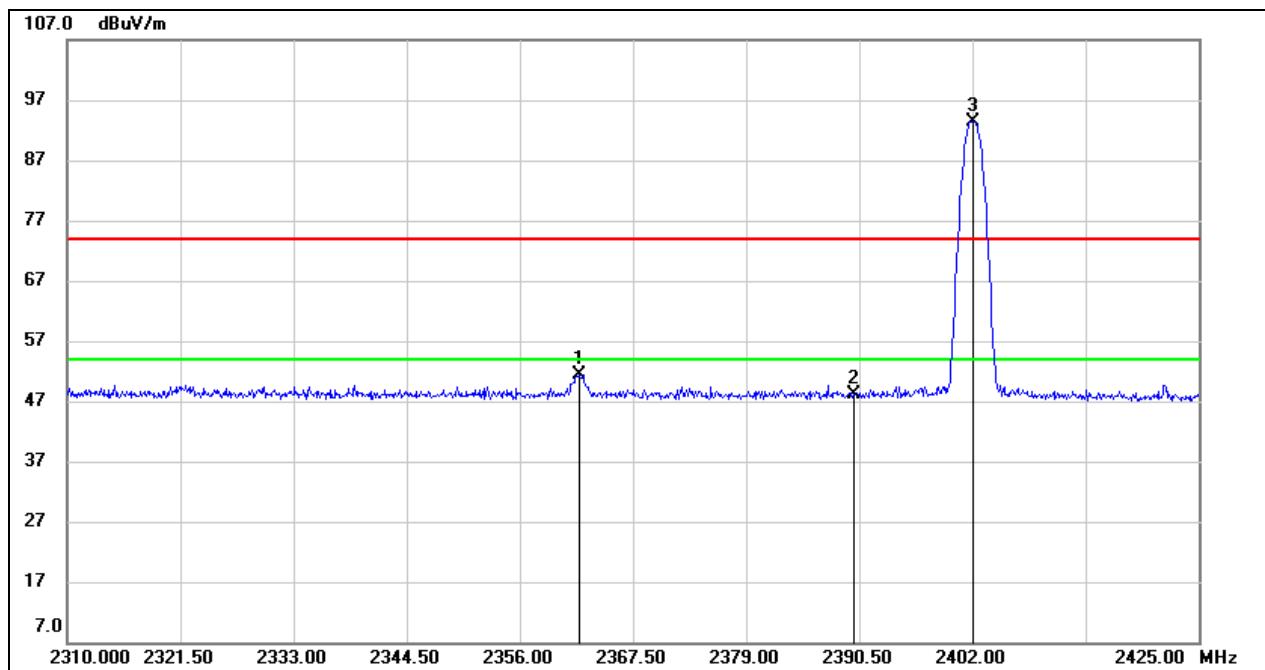
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2362.009	20.49	33.34	53.83	74.00	-20.17	peak
2	2362.009	15.23	33.34	48.57	54.00	-5.43	AVG
3	2390.000	14.64	33.14	47.78	74.00	-26.22	peak
4	2402.000	66.35	33.06	99.41			peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton where: ton is transmit duration.

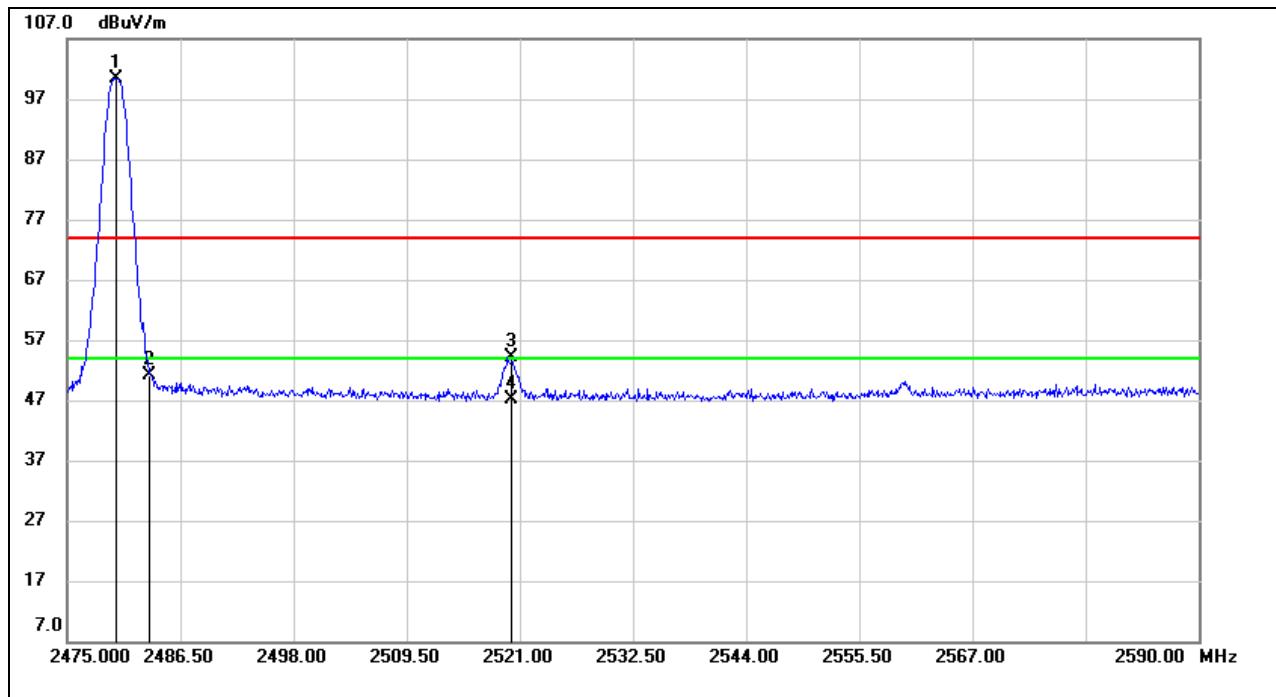
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2362.095	17.92	33.44	51.36	74.00	-22.64	peak
2	2390.000	14.83	33.24	48.07	74.00	-25.93	peak
3	2402.000	60.30	33.16	93.46			peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton where: ton is transmit duration.

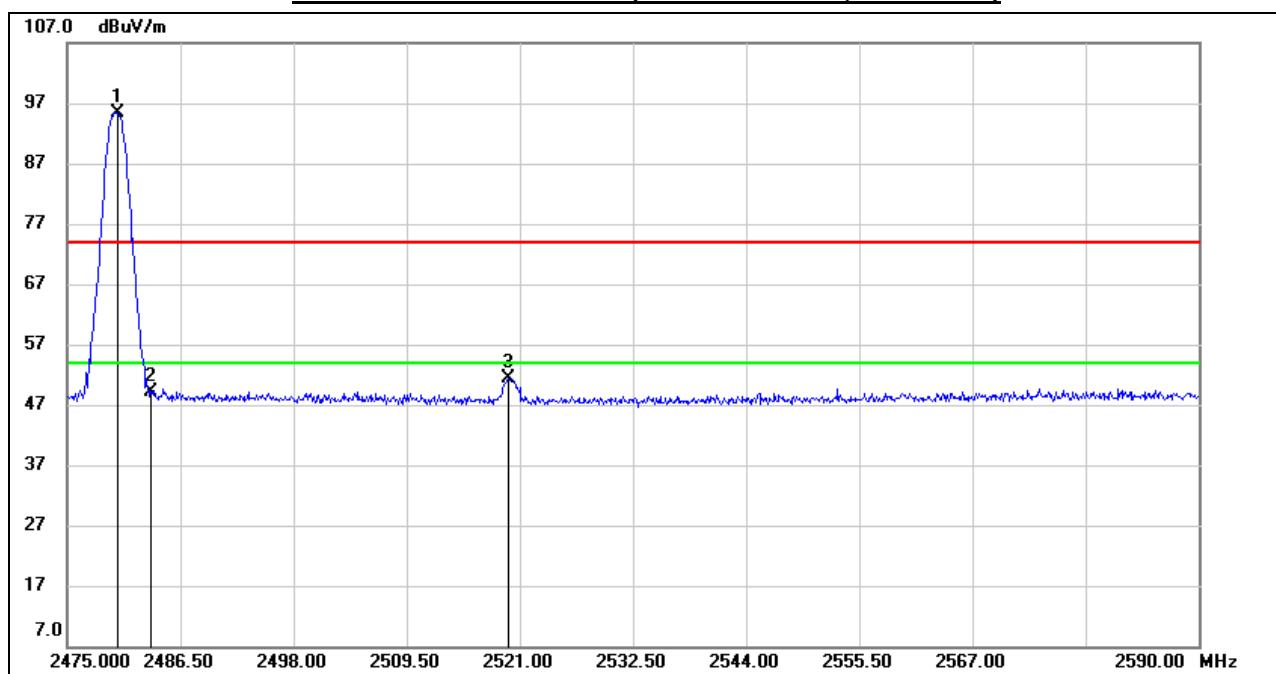
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2480.000	67.60	32.79	100.39			peak
2	2483.500	18.34	32.78	51.12	74.00	-22.88	peak
3	2519.995	21.30	32.80	54.10	74.00	-19.90	peak
4	2519.995	14.36	32.80	47.16	54.00	-6.84	AVG

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton where: ton is transmit duration.

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

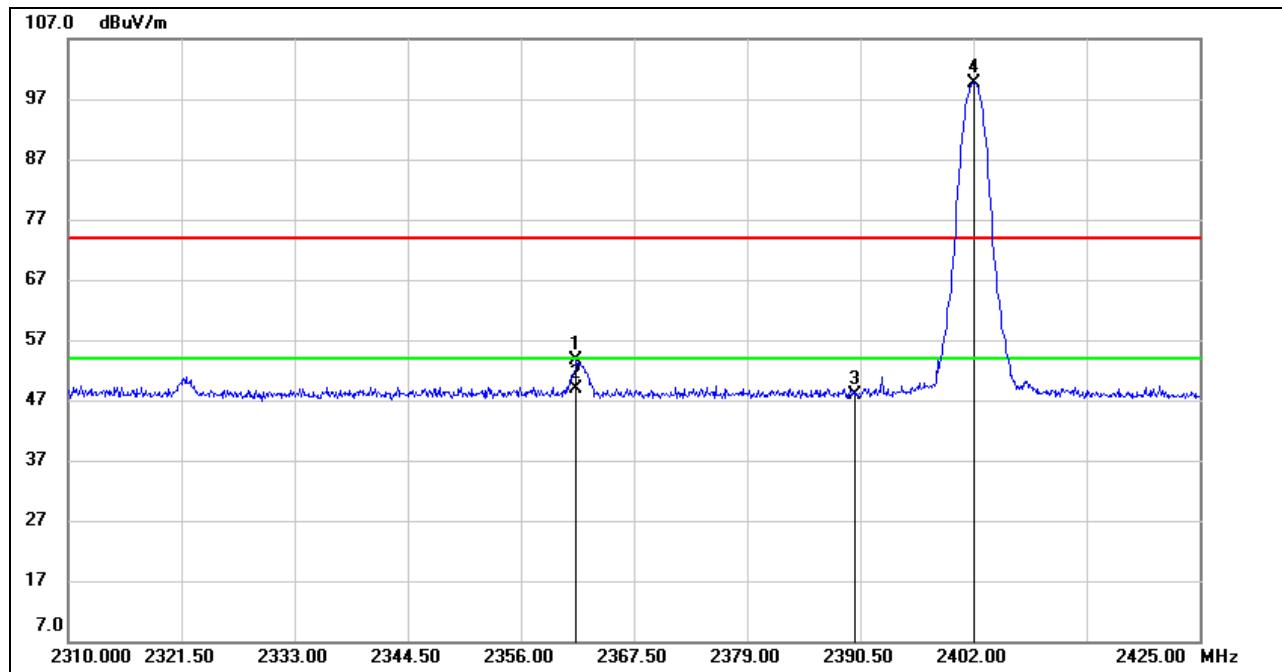


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2480.000	62.44	32.89	95.33			peak
2	2483.500	16.29	32.88	49.17	74.00	-24.83	peak
3	2519.850	18.60	32.90	51.50	74.00	-22.50	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton where: ton is transmit duration.

7.2.2. 8-DPSK MODE

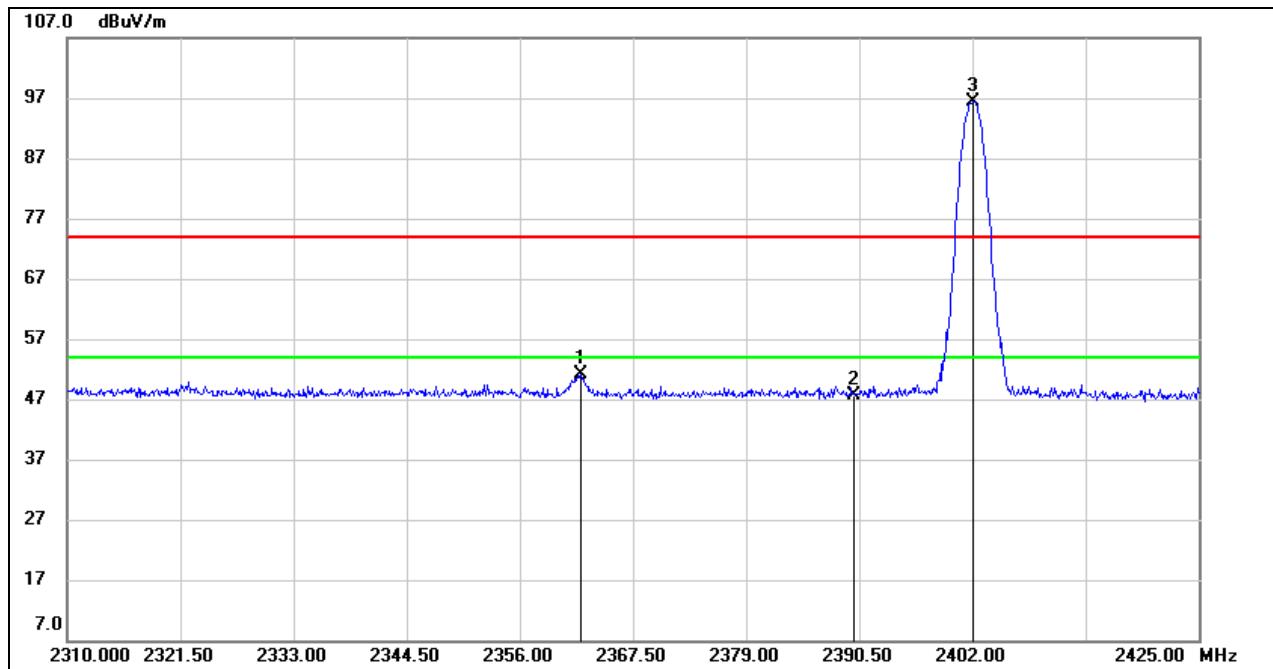
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2361.635	20.18	33.35	53.53	74.00	-20.47	peak
2	2361.635	15.51	33.35	48.86	54.00	-5.14	AVG
3	2390.000	14.80	33.14	47.94	74.00	-26.06	peak
4	2402.000	66.45	33.06	99.51			peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton where: ton is transmit duration.

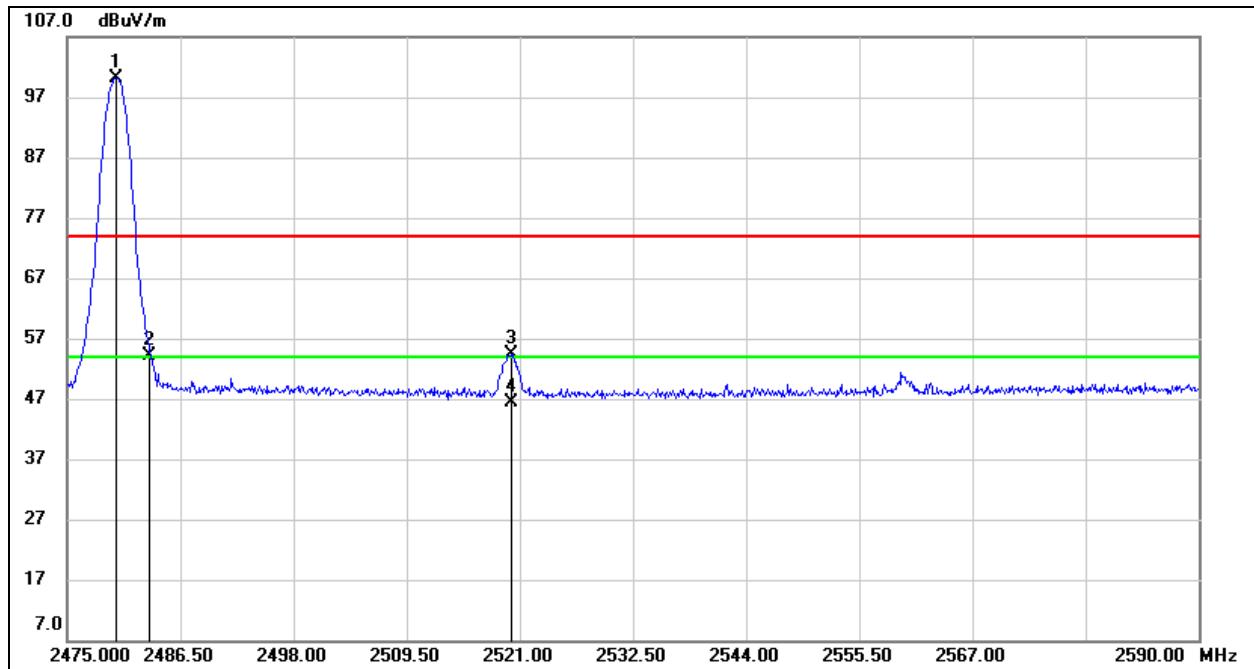
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2362.210	17.77	33.44	51.21	74.00	-22.79	peak
2	2390.000	14.51	33.24	47.75	74.00	-26.25	peak
3	2402.000	63.25	33.16	96.41			peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton where: ton is transmit duration.

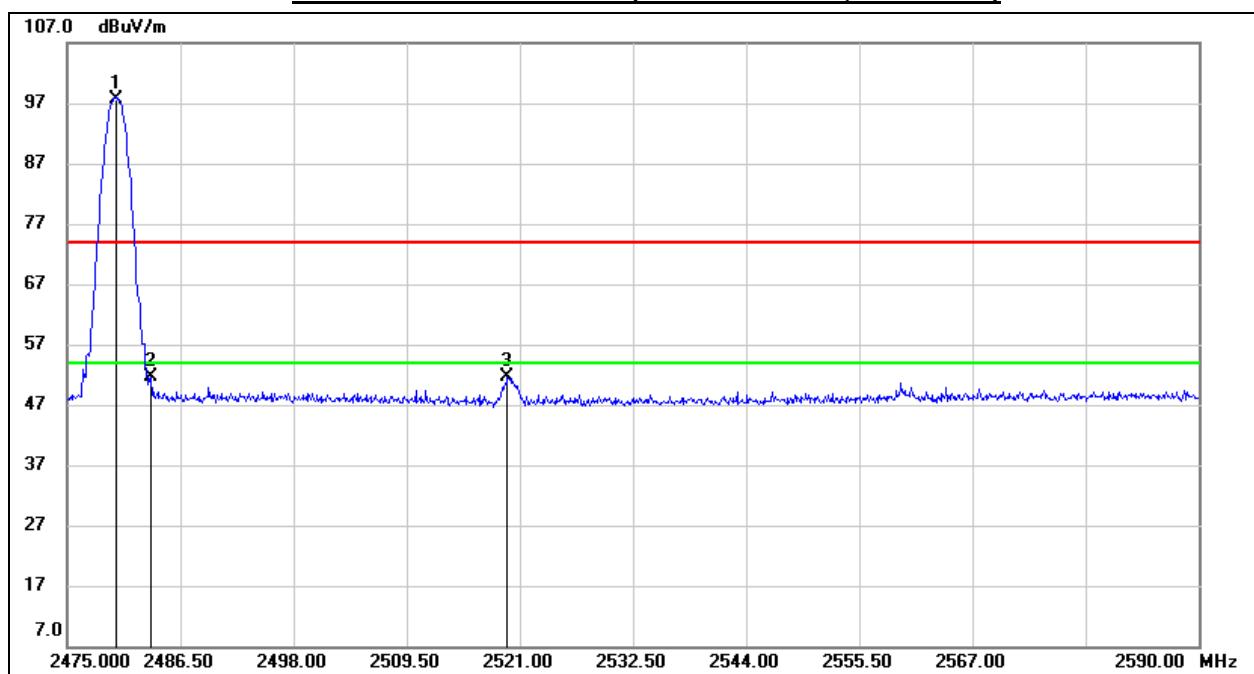
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2480.000	67.36	32.79	100.15			peak
2	2483.500	21.28	32.78	54.06	74.00	-19.94	peak
3	2520.080	21.67	32.80	54.47	74.00	-19.53	peak
4	2520.080	13.48	32.80	46.28	54.00	-7.72	AVG

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton where: ton is transmit duration.

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2480.000	64.67	32.89	97.56			peak
2	2483.500	18.67	32.88	51.55	74.00	-22.45	peak
3	2519.735	18.62	32.90	51.52	74.00	-22.48	peak

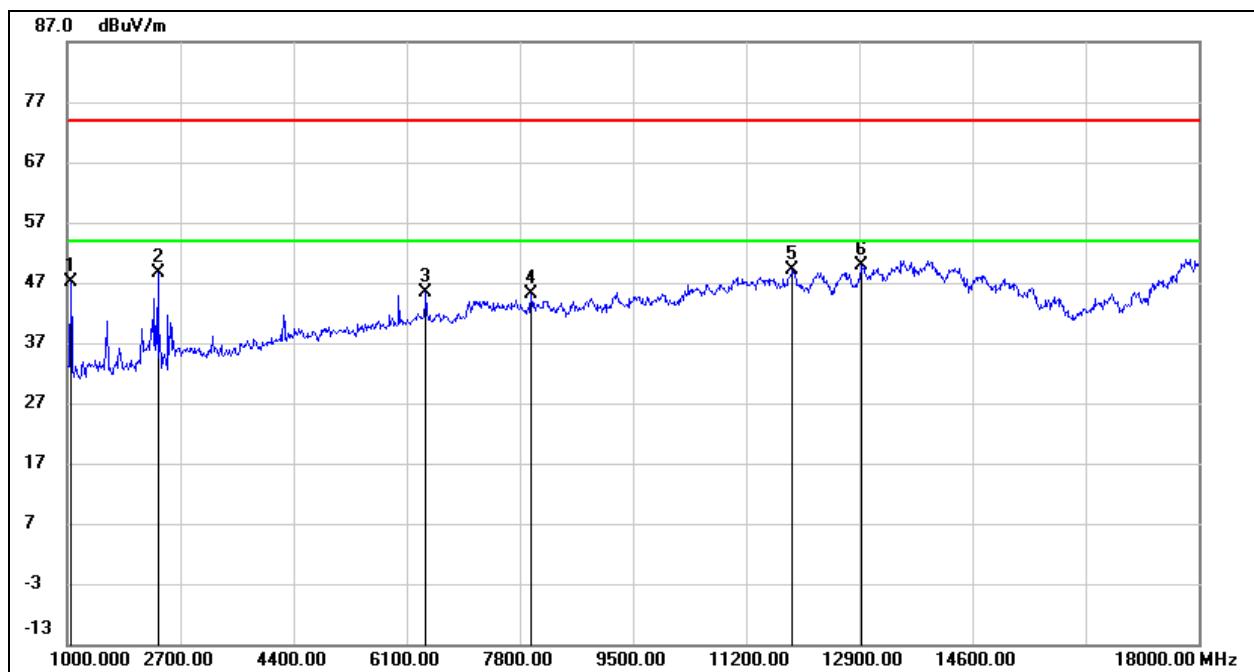
Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton where: ton is transmit duration.

7.3. SPURIOUS EMISSIONS (1~18GHz)

7.3.1. GFSK MODE

HARMONICS AND SPURIOUS EMISSIONS

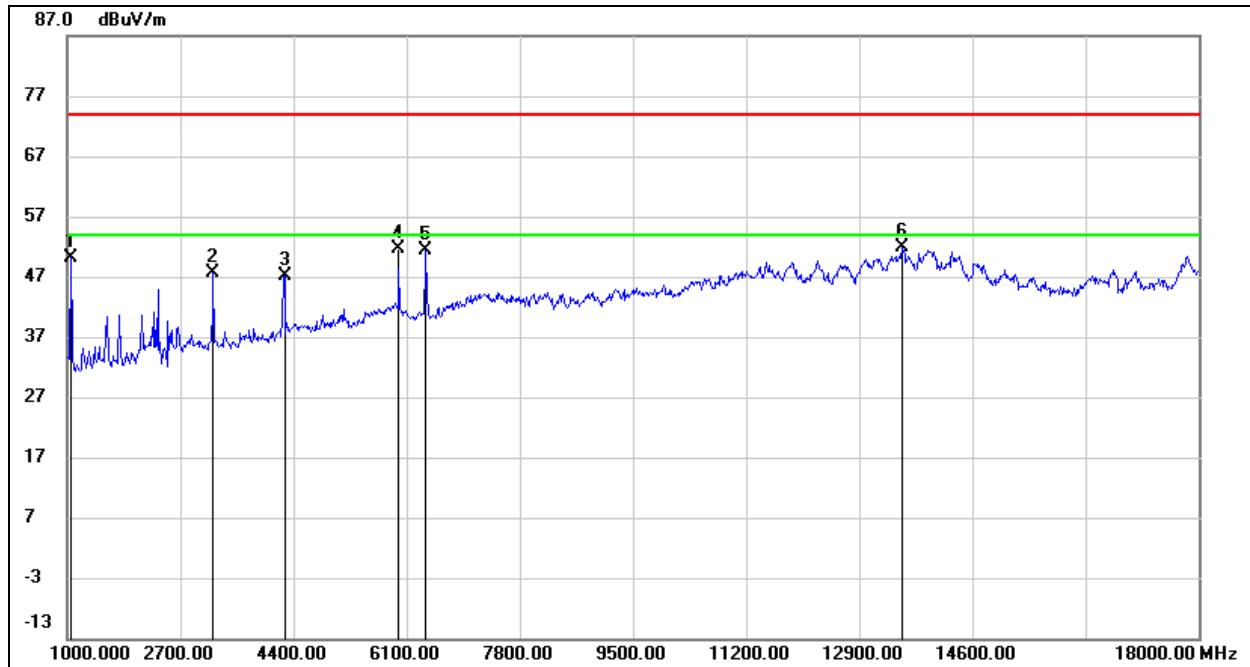
EUT:	Cubinote	Polarization :	Horizontal
Test Mode:	GFSK(DH5) Mode Low Chanel		



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1051.000	61.13	-14.11	47.02	74.00	-26.98	peak
2	2360.000	57.41	-8.72	48.69	74.00	-25.31	peak
3	6389.000	42.30	3.03	45.33	74.00	-28.67	peak
4	7970.000	38.52	6.50	45.02	74.00	-28.98	peak
5	11897.000	33.48	15.53	49.01	74.00	-24.99	peak
6	12934.000	32.55	17.22	49.77	74.00	-24.23	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton where: ton is transmit duration.

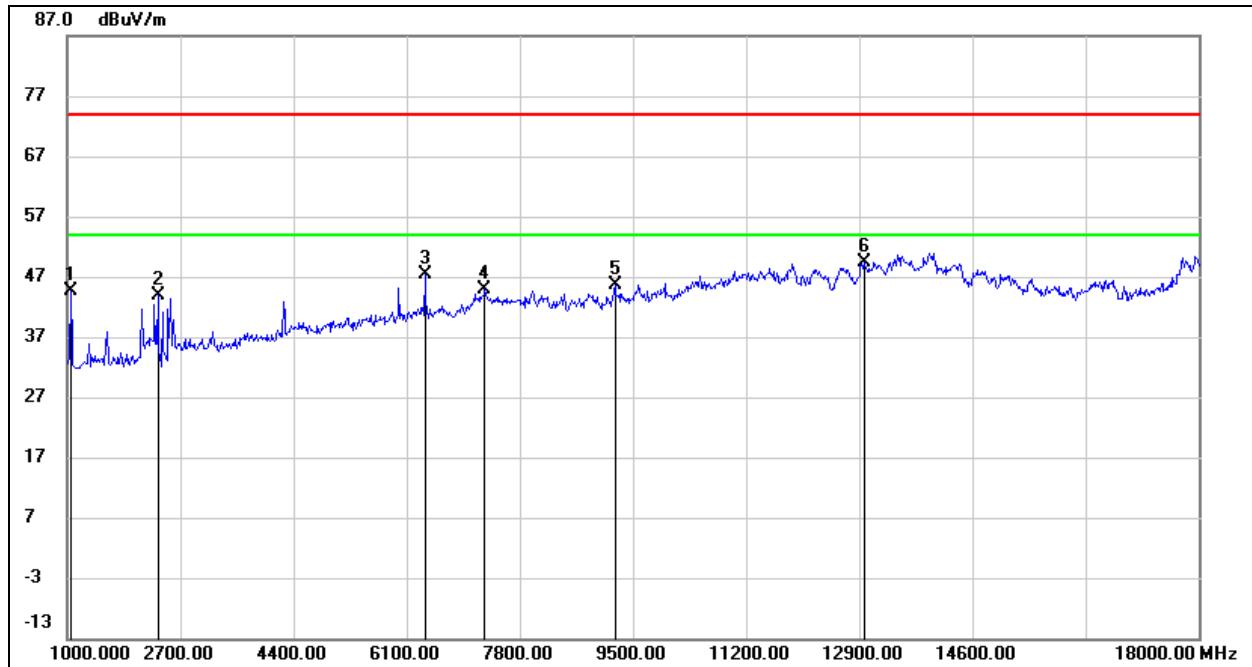
EUT:	Cubinote	Polarization :	Vertical
Test Mode:	GFSK(DH5) Mode Low Chanel		



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1051.000	64.57	-14.41	50.16	74.00	-23.84	peak
2	3193.000	54.09	-6.35	47.74	74.00	-26.26	peak
3	4264.000	50.21	-3.15	47.06	74.00	-26.94	peak
4	5981.000	49.76	1.99	51.75	74.00	-22.25	peak
5	6389.000	48.35	3.11	51.46	74.00	-22.54	peak
6	13546.000	32.56	19.38	51.94	74.00	-22.06	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton where: ton is transmit duration.

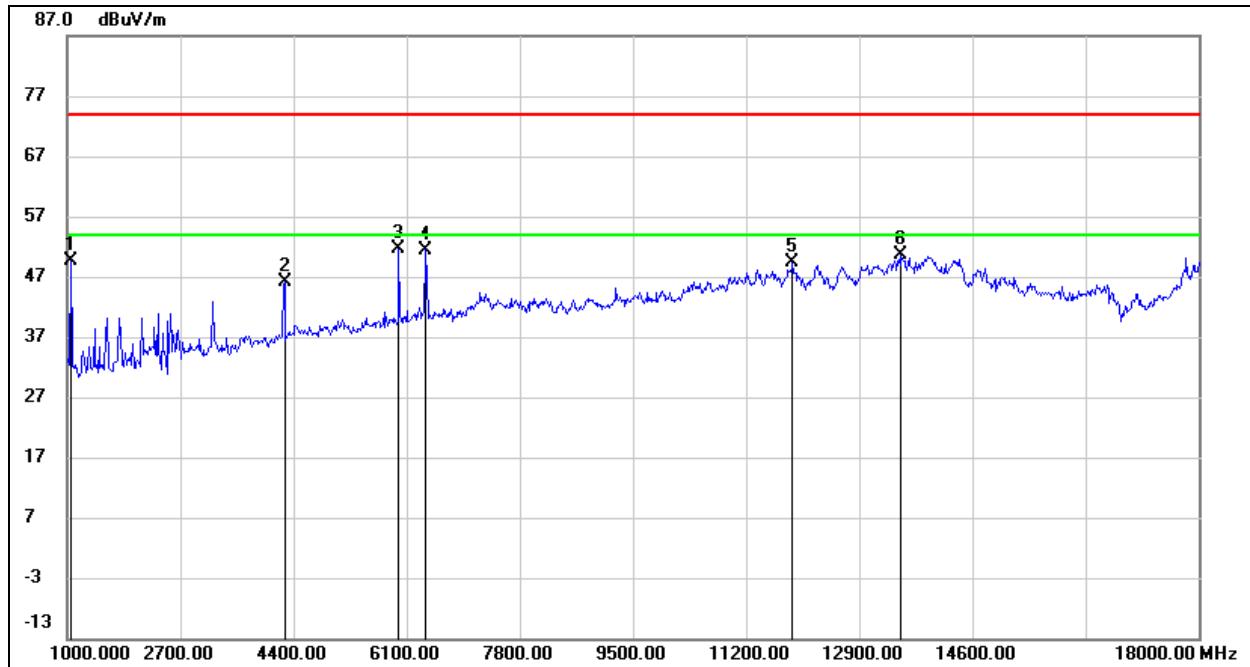
EUT:	Cubinote	Polarization :	Horizontal
Test Mode:	GFSK(DH5) Mode Middle Chanel		



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1051.000	58.63	-14.11	44.52	74.00	-29.48	peak
2	2360.000	52.60	-8.72	43.88	74.00	-30.12	peak
3	6372.000	44.42	3.03	47.45	74.00	-26.55	peak
4	7273.000	38.88	5.96	44.84	74.00	-29.16	peak
5	9228.000	37.21	8.42	45.63	74.00	-28.37	peak
6	12968.000	32.17	17.32	49.49	74.00	-24.51	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton where: ton is transmit duration.

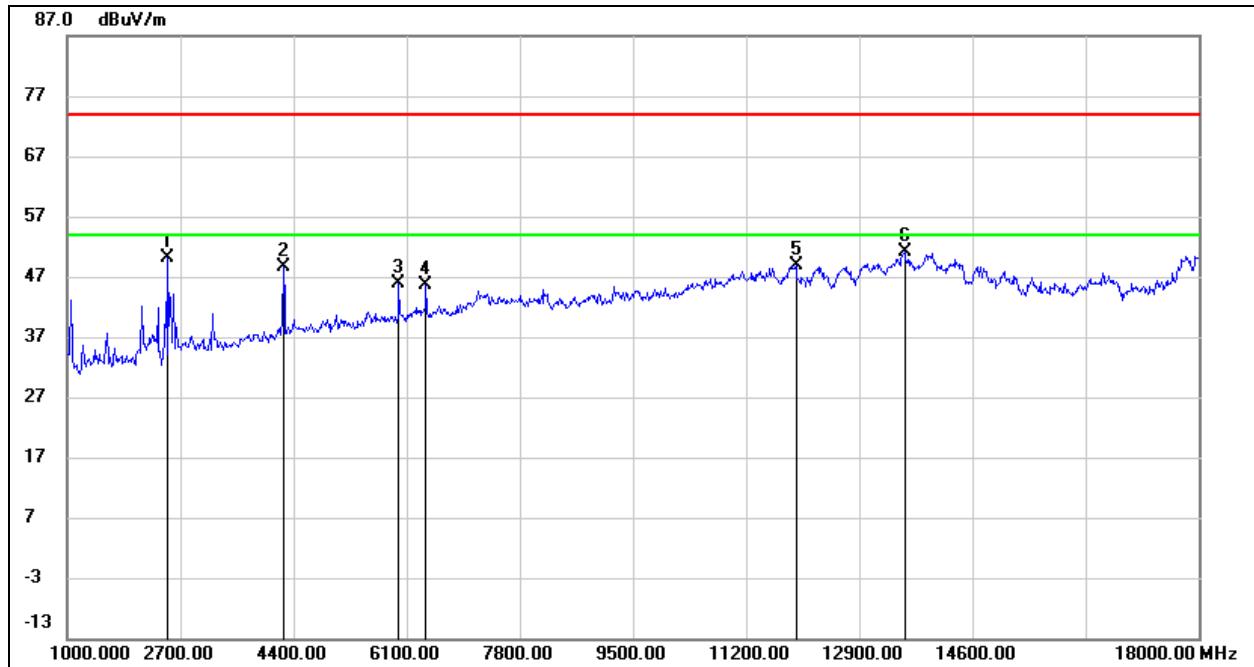
EUT:	Cubinote	Polarization :	Vertical
Test Mode:	GFSK(DH5) Mode Middle Chanel		



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1051.000	64.01	-14.41	49.60	74.00	-24.40	peak
2	4264.000	49.35	-3.15	46.20	74.00	-27.80	peak
3	5981.000	49.58	1.99	51.57	74.00	-22.43	peak
4	6389.000	48.39	3.11	51.50	74.00	-22.50	peak
5	11897.000	34.20	15.09	49.29	74.00	-24.71	peak
6	13529.000	31.39	19.26	50.65	74.00	-23.35	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton where: ton is transmit duration.

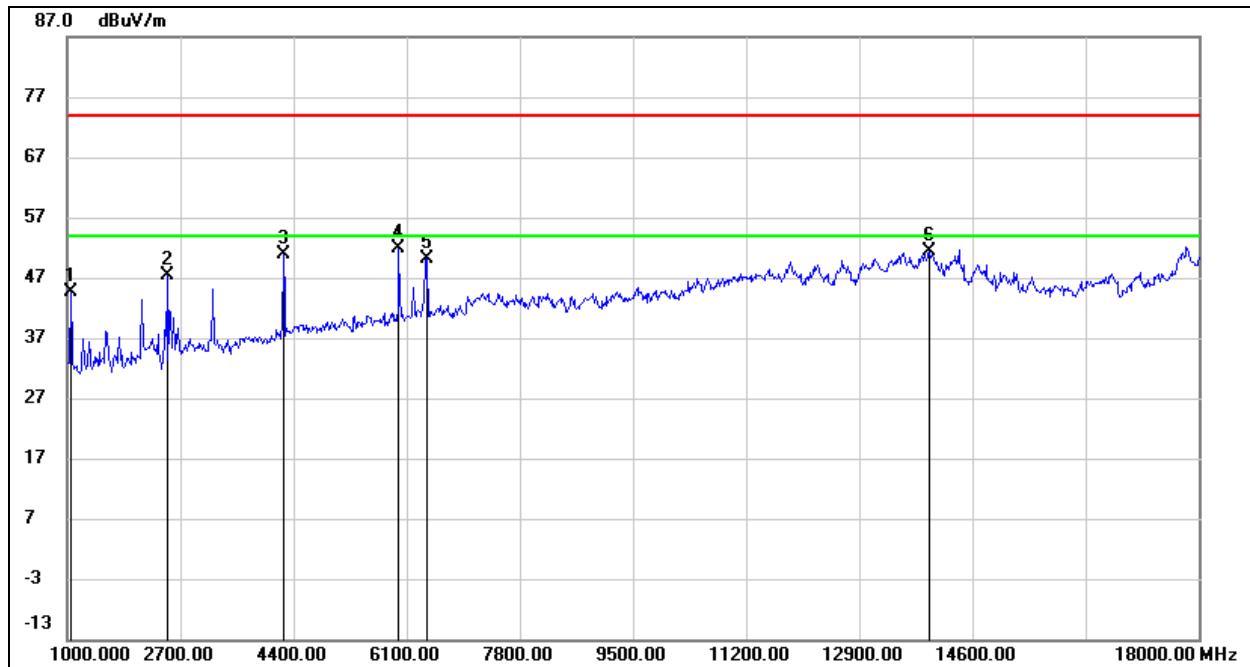
EUT:	Cubinote	Polarization :	Horizontal
Test Mode:	GFSK(DH5) Mode High Chanel		



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2513.000	59.20	-9.19	50.01	74.00	-23.99	peak
2	4247.000	51.87	-3.36	48.51	74.00	-25.49	peak
3	5981.000	44.02	1.89	45.91	74.00	-28.09	peak
4	6389.000	42.71	3.03	45.74	74.00	-28.26	peak
5	11948.000	34.12	14.83	48.95	74.00	-25.05	peak
6	13580.000	32.21	18.94	51.15	74.00	-22.85	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton where: ton is transmit duration.

EUT:	Cubinote	Polarization :	Vertical
Test Mode:	GFSK(DH5) Mode High Chanel		



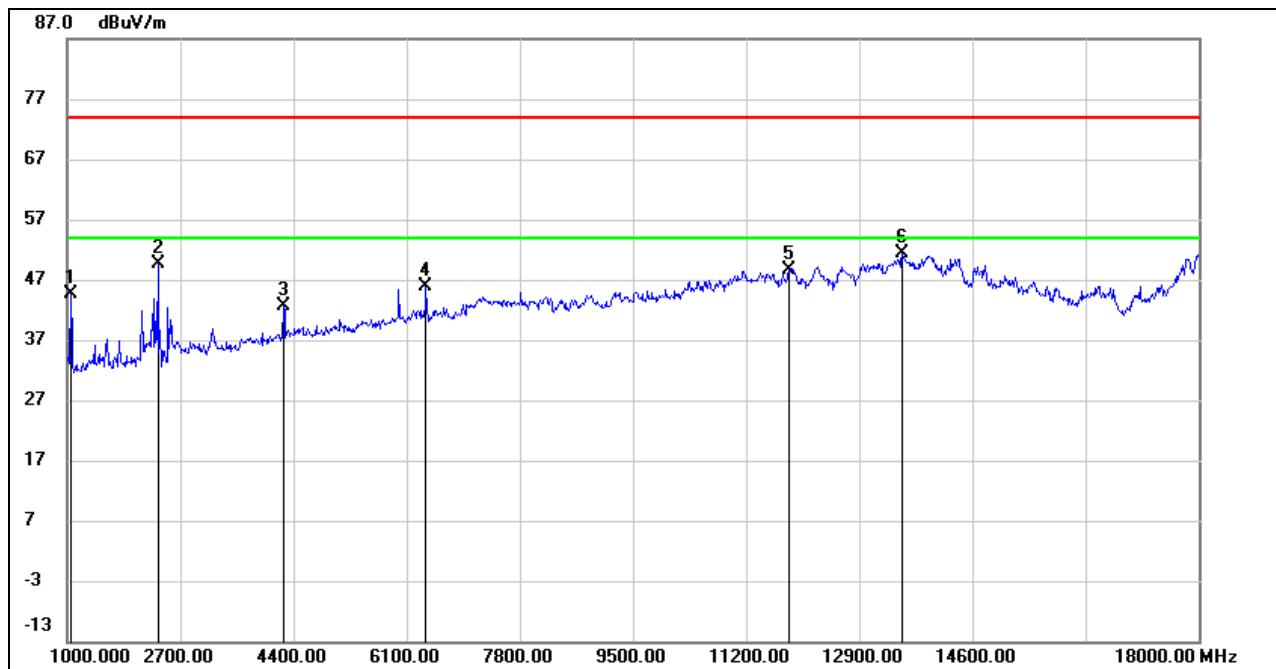
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1051.000	59.03	-14.41	44.62	74.00	-29.38	peak
2	2513.000	56.36	-9.09	47.27	74.00	-26.73	peak
3	4247.000	54.05	-3.26	50.79	74.00	-23.21	peak
4	5981.000	49.97	1.99	51.96	74.00	-22.04	peak
5	6406.000	47.04	3.11	50.15	74.00	-23.85	peak
6	13954.000	32.27	19.06	51.33	74.00	-22.67	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton where: ton is transmit duration.

7.3.2. 8-DPSK MODE

HARMONICS AND SPURIOUS EMISSIONS

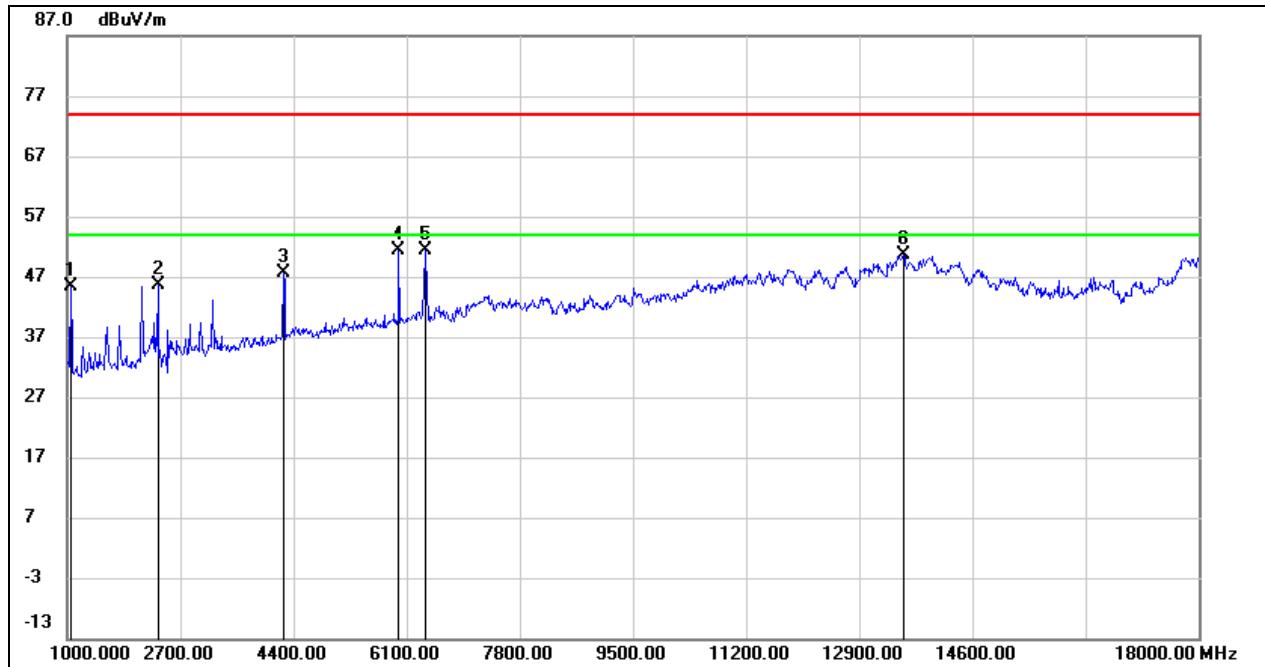
EUT:	Cubinote	Polarization :	Horizontal
Test Mode:	8-DPSK(DH5) Mode Low Chanel		



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1051.000	58.65	-14.11	44.54	74.00	-29.46	peak
2	2360.000	58.26	-8.72	49.54	74.00	-24.46	peak
3	4247.000	46.06	-3.36	42.70	74.00	-31.30	peak
4	6389.000	42.95	3.03	45.98	74.00	-28.02	peak
5	11846.000	34.22	14.52	48.74	74.00	-25.26	peak
6	13546.000	32.53	18.78	51.31	74.00	-22.69	peak

Note: 1. Measurement = Reading Level + Correct Factor.
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 3. Peak: Peak detector.
 4. AVG: VBW=1/Ton where: ton is transmit duration.

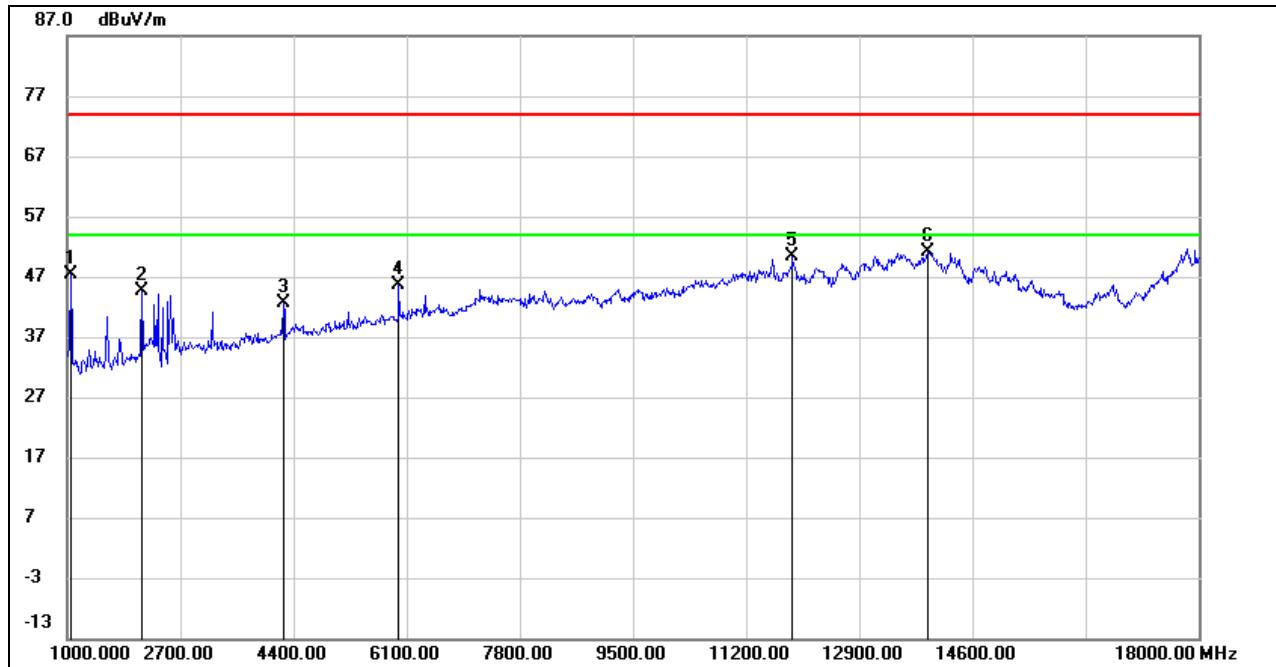
EUT:	Cubinote	Polarization :	Vertical
Test Mode:	8-DPSK(DH5) Mode Low Chanel		



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1051.000	59.89	-14.41	45.48	74.00	-28.52	peak
2	2360.000	54.14	-8.62	45.52	74.00	-28.48	peak
3	4247.000	50.92	-3.26	47.66	74.00	-26.34	peak
4	5981.000	49.41	1.99	51.40	74.00	-22.60	peak
5	6389.000	48.32	3.11	51.43	74.00	-22.57	peak
6	13563.000	31.37	19.25	50.62	74.00	-23.38	peak

Note: 1. Measurement = Reading Level + Correct Factor.
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 3. Peak: Peak detector.
 4. AVG: VBW=1/Ton where: ton is transmit duration.

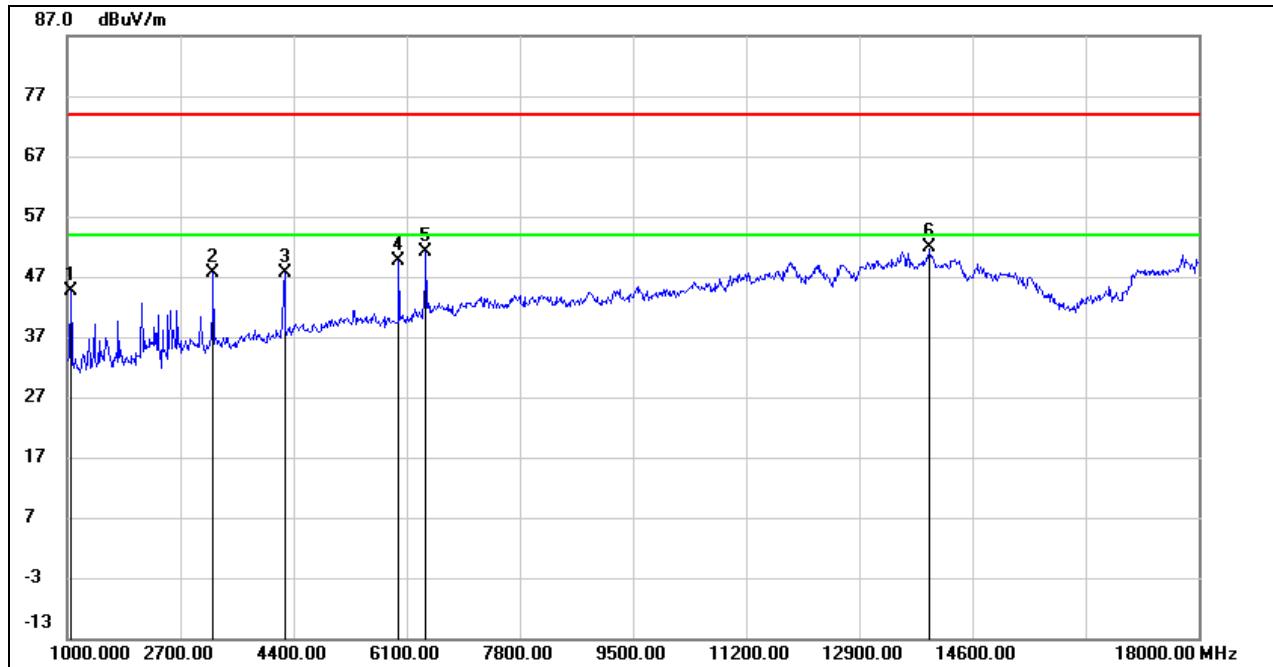
EUT:	Cubinote	Polarization :	Horizontal
Test Mode:	8-DPSK (DH5) Mode Middle Chanel		



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1051.000	61.38	-14.11	47.27	74.00	-26.73	peak
2	2122.000	54.53	-9.93	44.60	74.00	-29.40	peak
3	4247.000	46.04	-3.36	42.68	74.00	-31.32	peak
4	5981.000	43.80	1.89	45.69	74.00	-28.31	peak
5	11897.000	34.91	15.53	50.44	74.00	-23.56	peak
6	13920.000	32.23	18.97	51.20	74.00	-22.80	peak

Note: 1. Measurement = Reading Level + Correct Factor.
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 3. Peak: Peak detector.
 4. AVG: VBW=1/Ton where: ton is transmit duration.

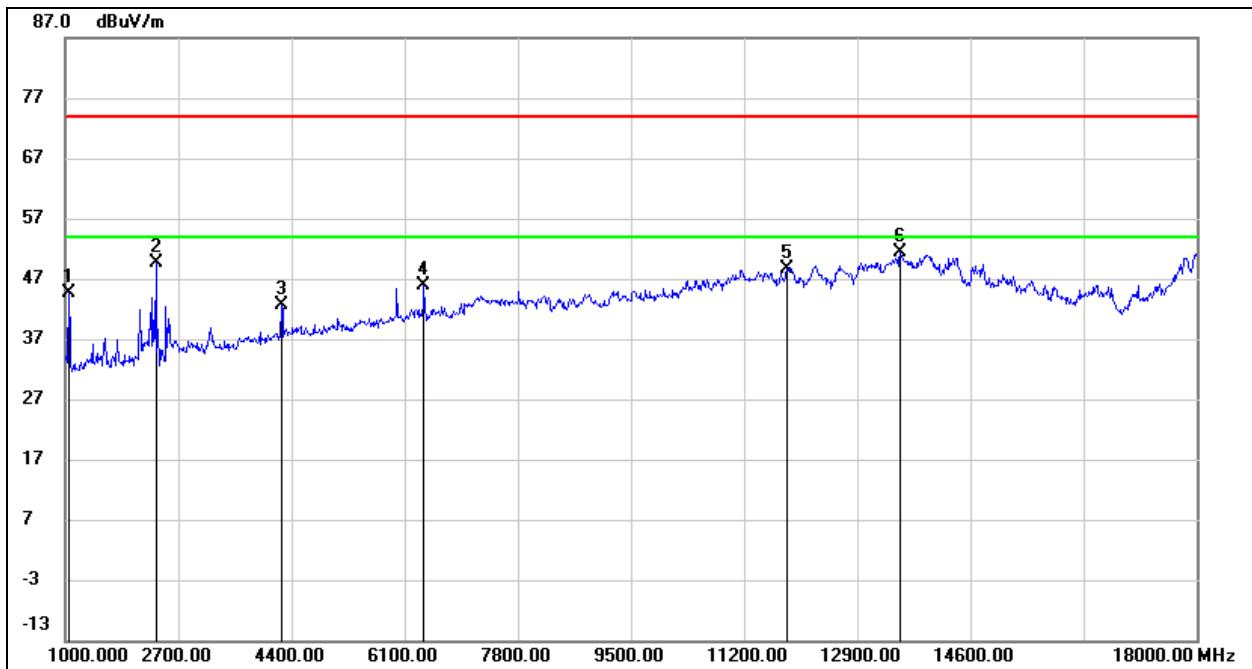
EUT:	Cubinote	Polarization :	Vertical
Test Mode:	8-DPSK (DH5) Mode Middle Chanel		



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1051.000	59.08	-14.41	44.67	74.00	-29.33	peak
2	3193.000	54.04	-6.35	47.69	74.00	-26.31	peak
3	4264.000	50.80	-3.15	47.65	74.00	-26.35	peak
4	5981.000	47.76	1.99	49.75	74.00	-24.25	peak
5	6389.000	47.94	3.11	51.05	74.00	-22.95	peak
6	13954.000	32.83	19.06	51.89	74.00	-22.11	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton where: ton is transmit duration.

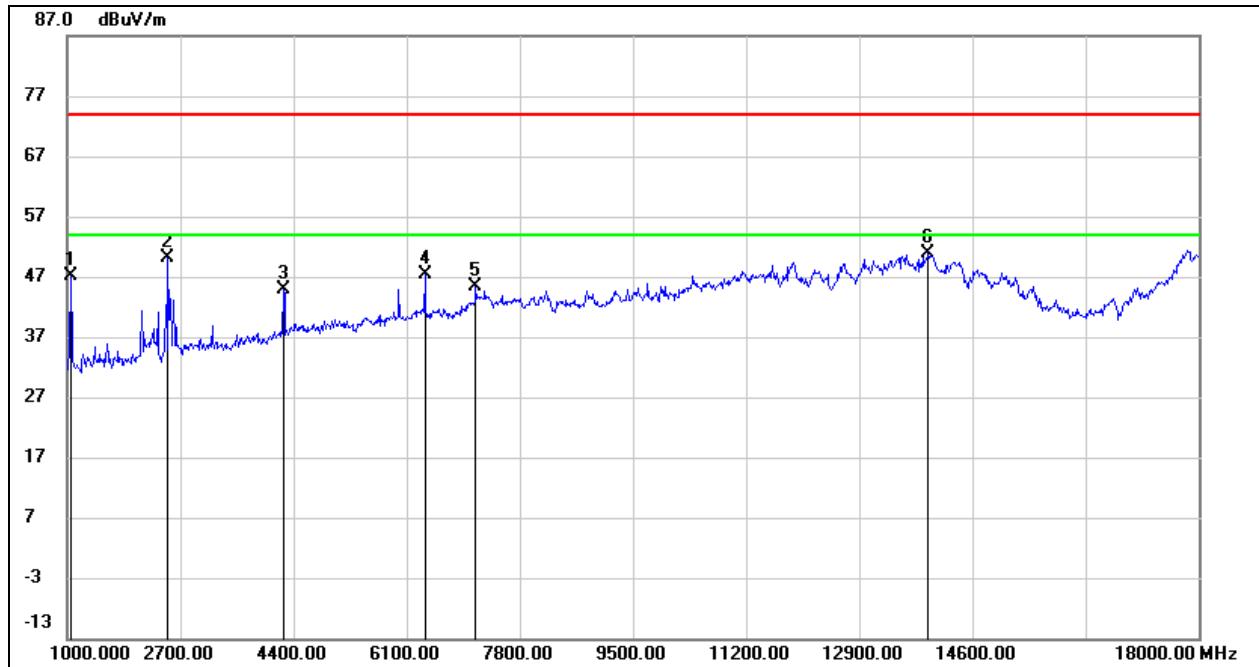
EUT:	Cubinote	Polarization :	Horizontal
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1051.000	58.65	-14.11	44.54	74.00	-29.46	peak
2	2360.000	58.26	-8.72	49.54	74.00	-24.46	peak
3	4247.000	46.06	-3.36	42.70	74.00	-31.30	peak
4	6389.000	42.95	3.03	45.98	74.00	-28.02	peak
5	11846.000	34.22	14.52	48.74	74.00	-25.26	peak
6	13546.000	32.53	18.78	51.31	74.00	-22.69	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton where: ton is transmit duration.

EUT:	Cubinote	Polarization :	Vertical
Test Mode:	8-DPSK(DH5) Mode High Chanel		



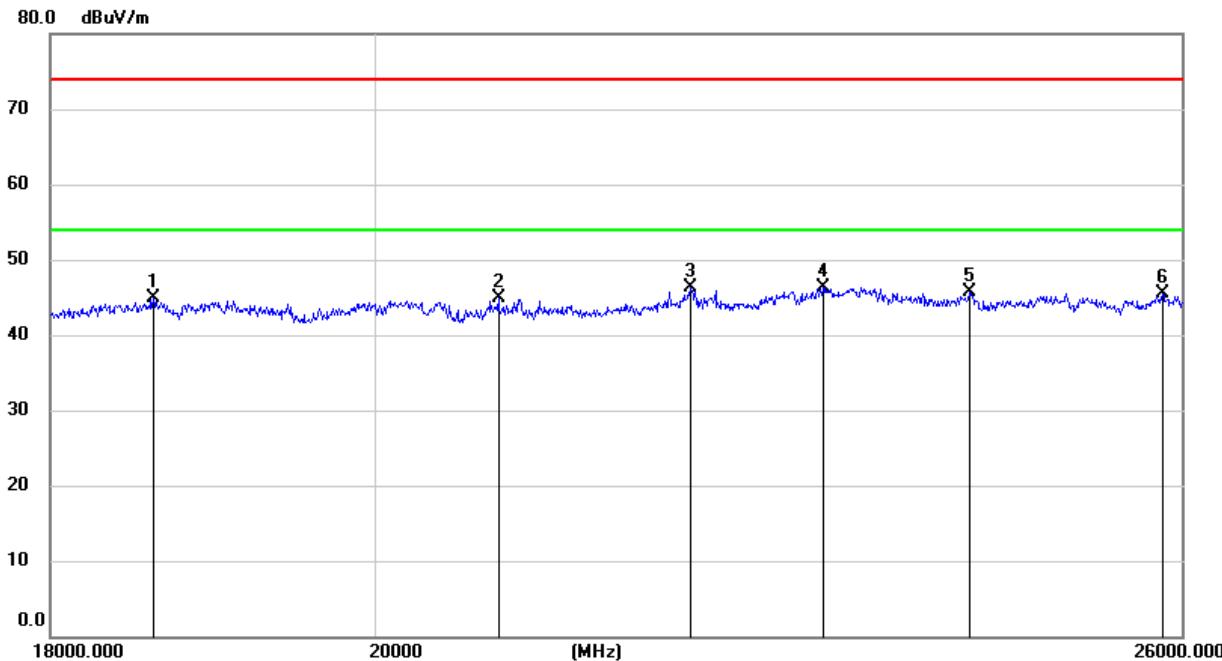
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1051.000	61.24	-14.11	47.13	74.00	-26.87	peak
2	2513.000	59.38	-9.19	50.19	74.00	-23.81	peak
3	4247.000	48.21	-3.36	44.85	74.00	-29.15	peak
4	6372.000	44.31	3.03	47.34	74.00	-26.66	peak
5	7137.000	39.71	5.74	45.45	74.00	-28.55	peak
6	13937.000	31.86	18.97	50.83	74.00	-23.17	peak

Note: 1. Measurement = Reading Level + Correct Factor.
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 3. Peak: Peak detector.
 4. AVG: VBW=1/Ton where: ton is transmit duration.

7.4. SPURIOUS EMISSIONS (18~25GHz)

HARMONICS AND SPURIOUS EMISSIONS

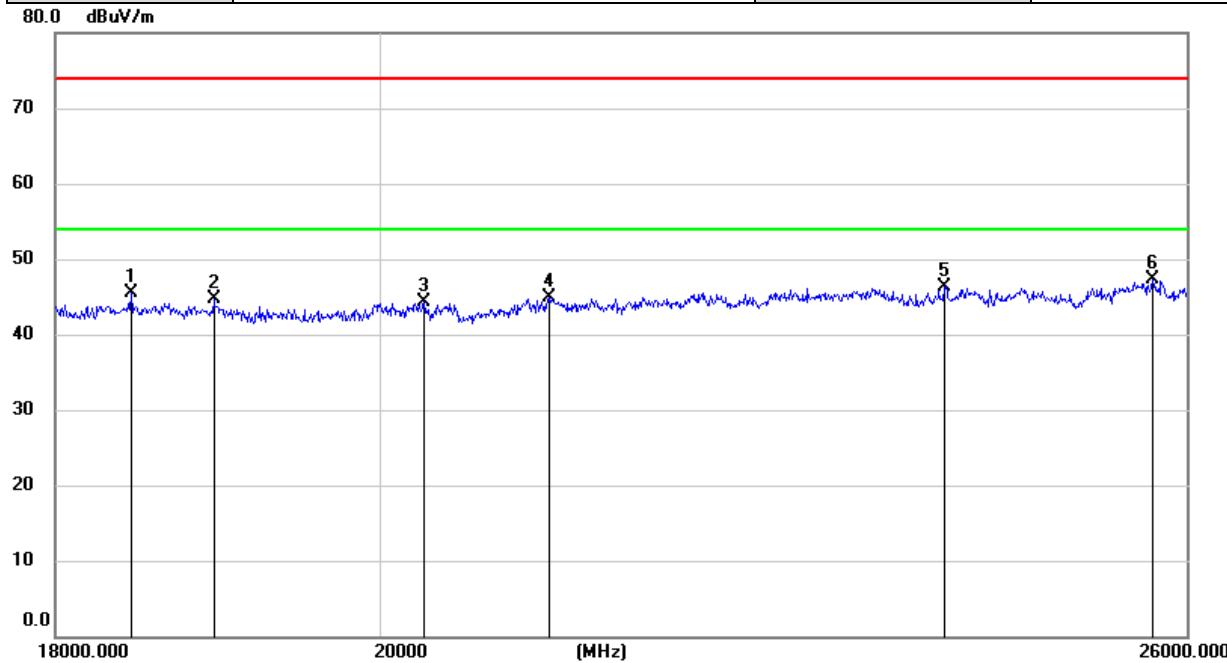
EUT:	Cubinote	Polarization :	Horizontal
Test Mode:	Middle Chanel		



No.	Frequency (MHz)	Reading (dB _{uV/m})	Correct dB/m	Result (dB _{uV/m})	Limit (dB _{uV/m})	Margin (dB)	Remark
1	18612.524	50.24	-5.34	44.90	74.00	-29.10	peak
2	20821.597	49.97	-5.04	44.93	74.00	-29.07	peak
3	22164.768	50.64	-4.31	46.33	74.00	-27.67	peak
4	23139.192	49.65	-3.40	46.25	74.00	-27.75	peak
5	24263.284	48.61	-2.81	45.80	74.00	-28.20	peak
6	25837.973	46.26	-0.76	45.50	74.00	-28.50	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton where: ton is transmit duration.

EUT:	Cubinote	Polarization :	Vertical
Test Mode:	Middle Chanel		



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	18448.984	50.77	-5.32	45.45	74.00	-28.55	peak
2	18950.934	49.99	-5.26	44.73	74.00	-29.27	peak
3	20292.473	49.95	-5.57	44.38	74.00	-29.62	peak
4	21137.897	49.63	-4.82	44.81	74.00	-29.19	peak
5	24032.412	49.12	-2.75	46.37	74.00	-27.63	peak
6	25714.751	48.15	-0.77	47.38	74.00	-26.62	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton where: ton is transmit duration.

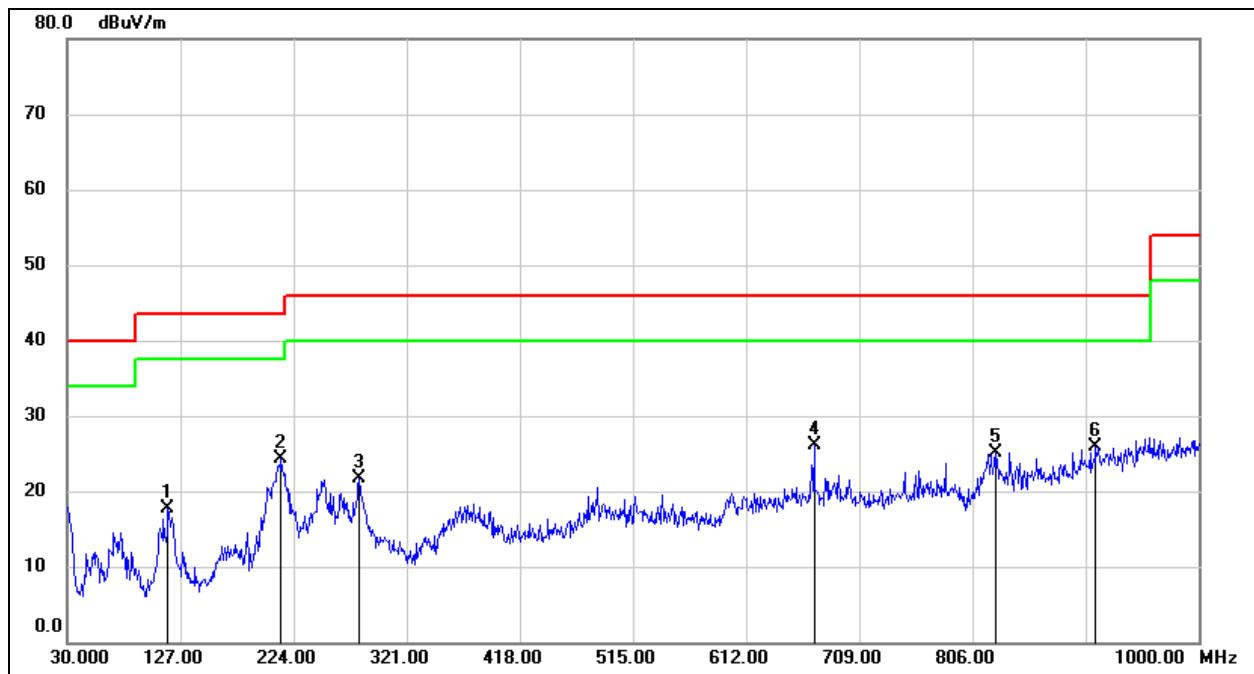
Note: All the modulation and channels had been tested, but only the worst data recorded in the report.

7.5. SPURIOUS EMISSIONS 30M ~ 1 GHz

7.5.1. GFSK MODE

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)

EUT:	Cubinote	Polarization :	Horizontal
Test Mode:	GFSK Mode Middle Channel		



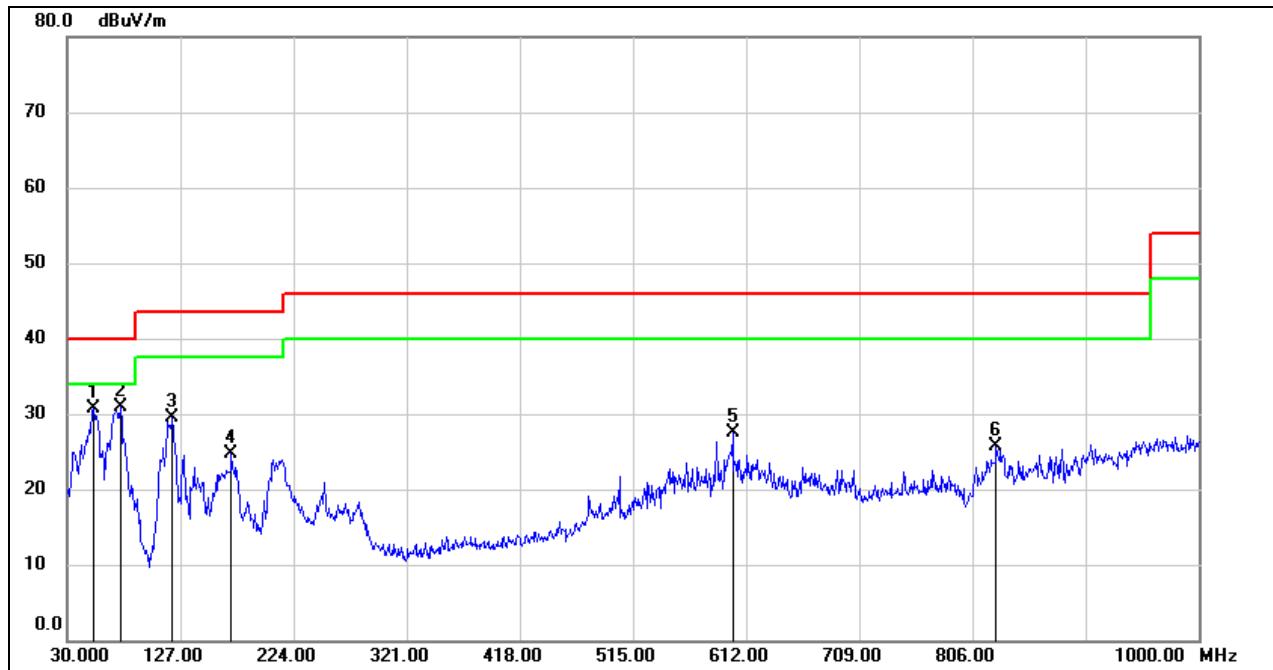
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	116.3300	34.05	-16.42	17.63	43.50	-25.87	QP
2	213.3300	37.08	-12.79	24.29	43.50	-19.21	QP
3	280.2600	34.18	-12.39	21.79	46.00	-24.21	QP
4	670.2000	31.67	-5.63	26.04	46.00	-19.96	QP
5	825.4000	0.12	25.02	25.14	46.00	-20.86	QP
6	911.7300	0.39	25.46	25.85	46.00	-20.15	QP

Note: 1. Result = Reading +Correct Factor.

2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

EUT:	Cubinote	Polarization :	Vertical
Test Mode:	GFSK Mode Middle Channel		



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	52.3100	47.18	-16.45	30.73	40.00	-9.27	QP
2	75.5899	48.00	-17.04	30.96	40.00	-9.04	QP
3	120.2100	45.32	-15.86	29.46	43.50	-14.04	QP
4	170.6500	37.86	-13.13	24.73	43.50	-18.77	QP
5	600.3600	33.36	-5.88	27.48	46.00	-18.52	QP
6	826.3700	0.69	25.05	25.74	46.00	-20.26	QP

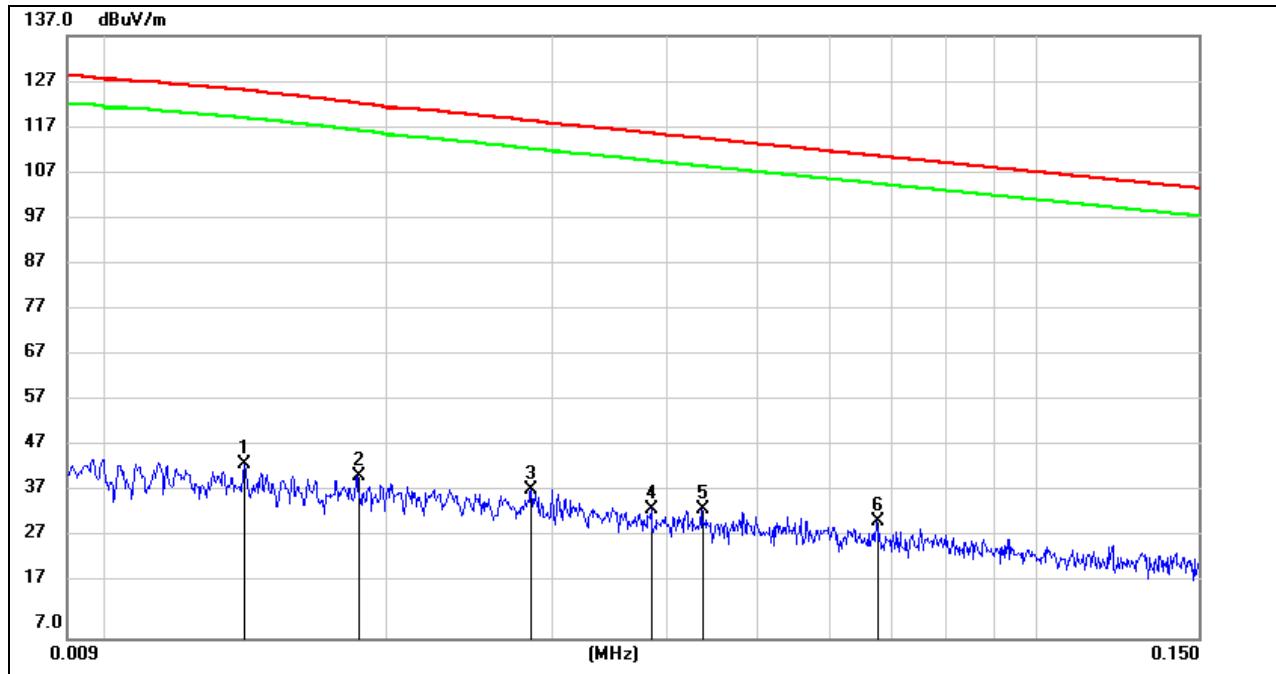
Note: 1. Result = Reading +Correct Factor.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto

Note: All the modulation and channels had been tested, but only the worst data recorded in the report.

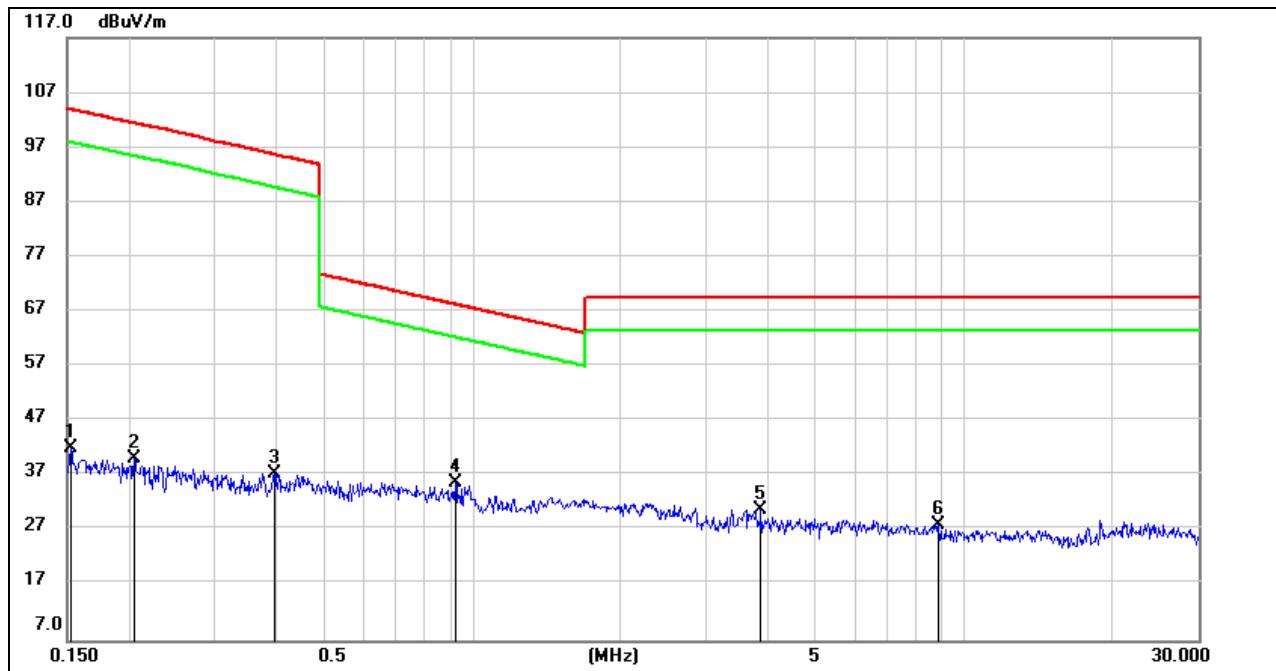
7.6. SPURIOUS EMISSIONS BELOW 30M

SPURIOUS EMISSIONS Below 30MHz (WORST-CASE CONFIGURATION)

EUT:	Cubinote	Polarization :	Horizontal
Test Mode:	GFSK Mode Middle Channel		

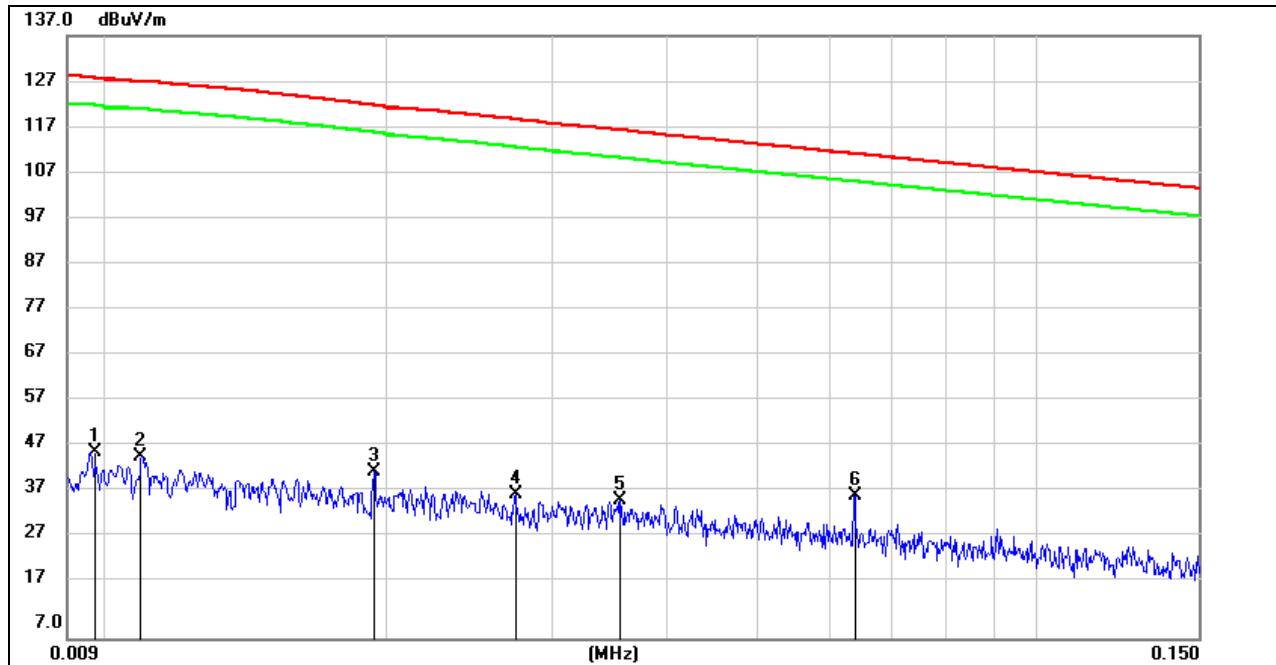


No.	Frequency (KHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.0140	24.24	20.25	44.49	125.19	-80.70	QP
2	0.0185	21.66	20.29	41.95	122.48	-80.53	QP
3	0.0285	18.83	20.31	39.14	118.59	-79.45	QP
4	0.0384	14.52	20.31	34.83	115.96	-81.13	QP
5	0.0435	14.40	20.31	34.71	114.88	-80.17	QP
6	0.0675	11.98	20.31	32.29	111.03	-78.74	QP

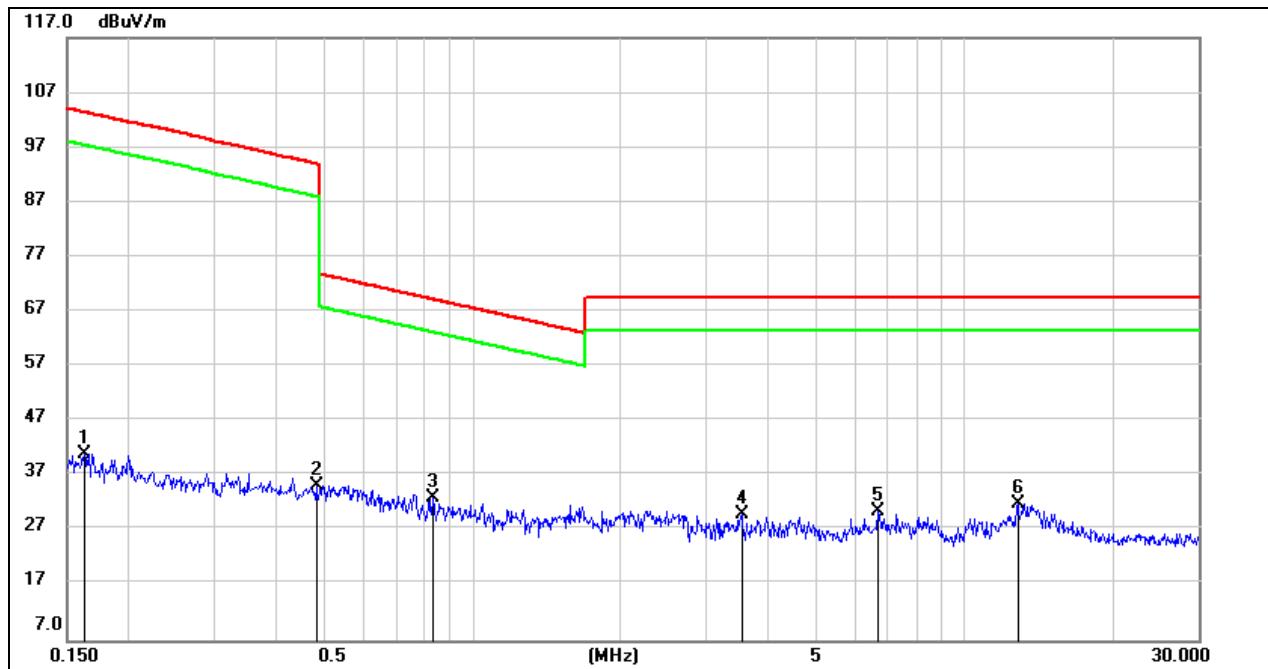


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.1524	21.66	20.42	42.08	103.95	-61.87	QP
2	0.2048	19.70	20.36	40.06	101.41	-61.35	QP
3	0.3955	16.99	20.27	37.26	95.67	-58.41	QP
4	0.9233	15.32	20.37	35.69	68.31	-32.62	QP
5	3.8603	9.74	21.04	30.78	69.54	-38.76	QP
6	8.8688	6.94	21.01	27.95	69.54	-41.59	QP

EUT:	Cubinote	Polarization :	Horizontal
Test Mode:	GFSK Mode Middle Channel		



No.	Frequency (KHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.0095	26.98	20.25	47.23	127.98	-80.75	QP
2	0.0108	25.81	20.22	46.03	127.12	-81.09	QP
3	0.0193	22.53	20.30	42.83	122.00	-79.17	QP
4	0.0274	17.67	20.31	37.98	118.98	-81.00	QP
5	0.0355	16.54	20.31	36.85	116.69	-79.84	QP
6	0.0640	17.45	20.31	37.76	111.50	-73.74	QP



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.1621	20.61	20.41	41.02	103.41	-62.39	QP
2	0.4812	14.97	20.25	35.22	93.97	-58.75	QP
3	0.8305	12.54	20.36	32.90	69.23	-36.33	QP
4	3.5278	8.97	20.98	29.95	69.54	-39.59	QP
5	6.6623	9.71	20.90	30.61	69.54	-38.93	QP
6	12.8513	10.88	20.99	31.87	69.54	-37.67	QP

Note 1: All the channels and polarization had been tested, but only the worst data recorded in the report.

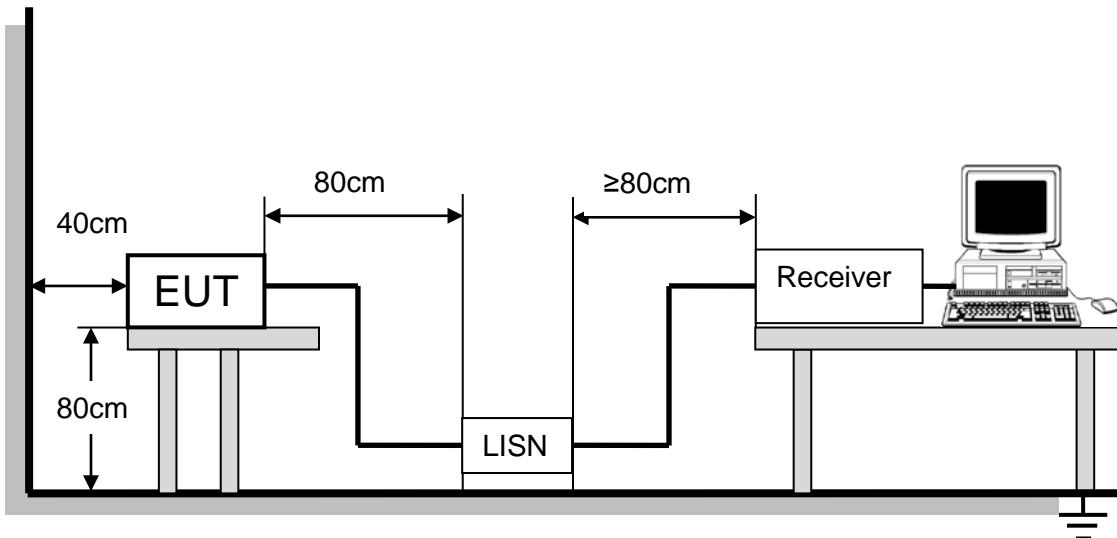
8. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

Please refer to FCC §15.207 (a)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *
0.50 -5.0	73.00	60.00	56.00	46.00
5.0 -30.0	73.00	60.00	60.00	50.00

TEST SETUP AND PROCEDURE

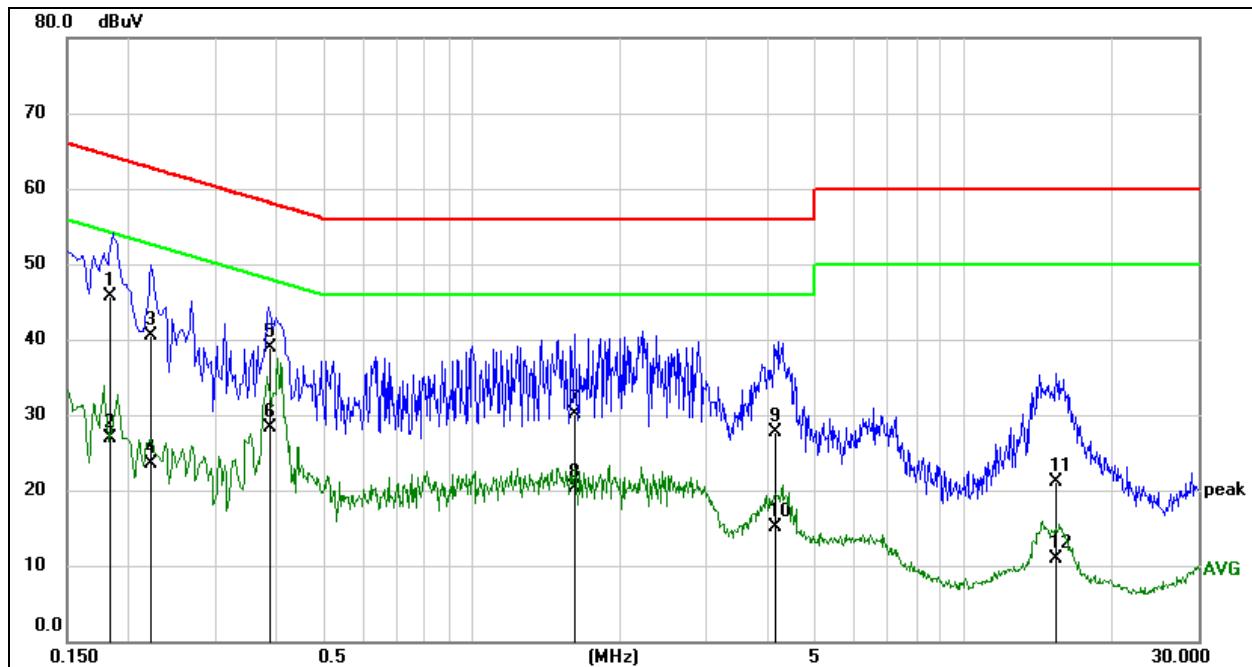


The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) is used to test the emissions from both sides of AC line. According to the requirements in Section 6.2 of ANSI C63.10 -2013. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9kHz.

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

TEST RESULTS (WORST-CASE CONFIGURATION)

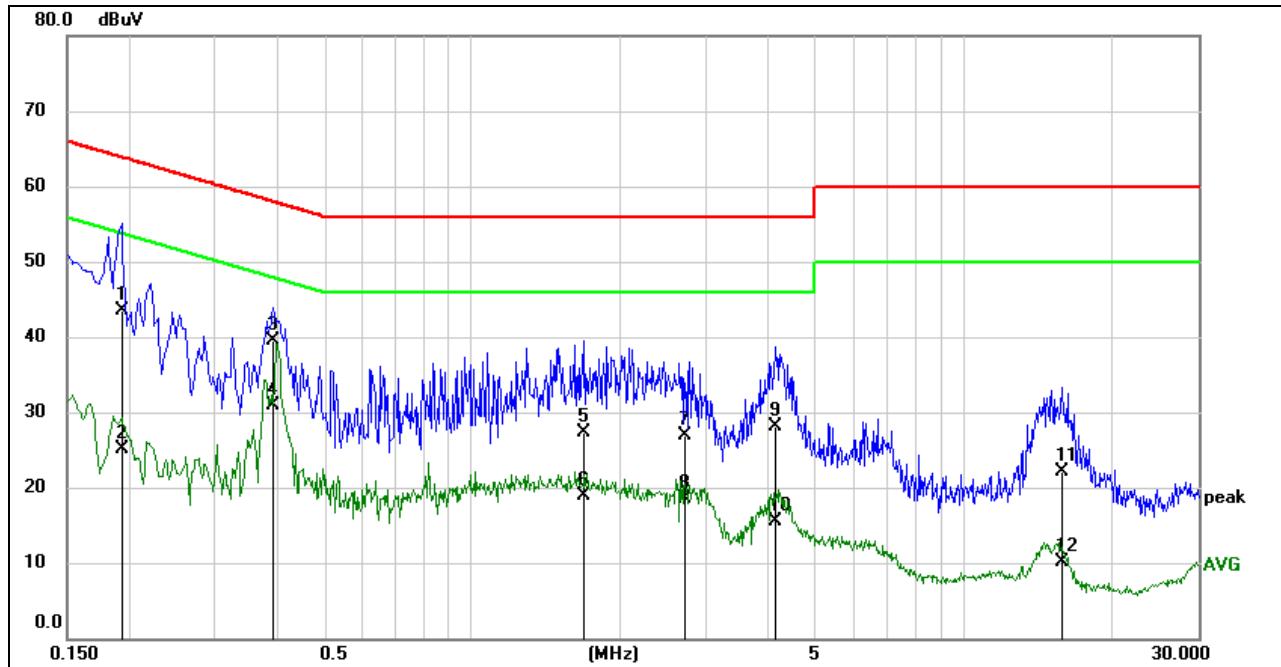
EUT:	Cubinote	Phase :	L
Test Mode:	GFSK Mode Middle Channel		



No.	Frequency (MHz)	Reading (dBuV)	Correct dB	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1830	36.05	9.66	45.71	64.35	-18.64	QP
2	0.1830	17.17	9.66	26.83	54.35	-27.52	AVG
3	0.2229	30.77	9.65	40.42	62.71	-22.29	QP
4	0.2229	13.88	9.65	23.53	52.71	-29.18	AVG
5	0.3871	29.29	9.65	38.94	58.13	-19.19	QP
6	0.3871	18.57	9.65	28.22	48.13	-19.91	AVG
7	1.6177	20.51	9.68	30.19	56.00	-25.81	QP
8	1.6177	10.53	9.68	20.21	46.00	-25.79	AVG
9	4.1470	17.90	9.71	27.61	56.00	-28.39	QP
10	4.1470	5.33	9.71	15.04	46.00	-30.96	AVG
11	15.4378	11.34	9.82	21.16	60.00	-38.84	QP
12	15.4378	1.17	9.82	10.99	50.00	-39.01	AVG

Note: 1. Result = Reading +Correct Factor.
 2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
 3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).
 4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

EUT:	Cubinote	Phase :	N
Test Mode:	GFSK Mode Middle Channel		



No.	Frequency (MHz)	Reading (dBuV)	Correct dB	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1934	33.88	9.64	43.52	63.89	-20.37	QP
2	0.1934	15.48	9.64	25.12	53.89	-28.77	AVG
3	0.3940	29.82	9.65	39.47	57.98	-18.51	QP
4	0.3940	21.22	9.65	30.87	47.98	-17.11	AVG
5	1.6947	17.63	9.68	27.31	56.00	-28.69	QP
6	1.6947	9.14	9.68	18.82	46.00	-27.18	AVG
7	2.7177	17.28	9.69	26.97	56.00	-29.03	QP
8	2.7177	8.77	9.69	18.46	46.00	-27.54	AVG
9	4.1410	18.49	9.70	28.19	56.00	-27.81	QP
10	4.1410	5.86	9.70	15.56	46.00	-30.44	AVG
11	15.8144	12.24	9.85	22.09	60.00	-37.91	QP
12	15.8144	0.21	9.85	10.06	50.00	-39.94	AVG

Note: 1. Result = Reading +Correct Factor.
 2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
 3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).
 4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

Note: All the modulation and channels had been tested, but only the worst data recorded in the report.

9. ANTENNA REQUIREMENTS

APPLICABLE REQUIREMENTS

Please refer to FCC §15.203

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

ANTENNA CONNECTOR

EUT has a PCB antenna without antenna connector.

ANTENNA GAIN

The antenna gain of EUT is less than 6 dBi.

END OF REPORT