FCC TEST REPORT

Product Name:	ANDROID SET TOP BOX
Trade Mark:	LSP.mini, GIEC
Model No.:	LSPs912-G1-1703
Report Number:	170329002RFC-1
Test Standards:	FCC 47 CFR Part 15 Subpart C
FCC ID:	2AF98-LSPMINIS912
Test Result:	PASS
Date of Issue:	May 31, 2017

Prepared for:

LIFE STYLE PANEL PTY LTD
7 7Logistics Place,Larapinta,Queensland,Australia

Prepared by:

Shenzhen UnionTrust Quality and Technology Co., Ltd.
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Tested by: _____ Kevin Liang, Senior Engineer

Reviewed by: _____ Jim Long, Senior Engineer

Approved by: _____ Billy Li, Technical Director

Date: May 31, 2017

Version

Version No.	Date	Description
V1.0	May 31, 2017	Original

CONTENTS

1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	LIFE STYLE PANEL PTY LTD
Address of Applicant:	7 7Logistics Place,Larapinta,Queensland,Australia
Manufacturer:	SHENZHEN GIEC DIGITAL CO., LTD
Address of Manufacturer:	No.1 Building,Factory,No.7 District,Dayang Development Areas,FuYongStreet,Baoan,Shenzhen,Guangdong,China

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	ANDROID SET TOP BOX		
Model No.:	LSPs912-G1-1703		
Add. Model No.:	GK-MP1125, GK-MP1129 (see note 1)		
Trade Mark:	LSP.mini , GIEC		
DUT Stage:	Production Unit		
EUT Supports Function:	2.4 GHz ISM Band:	IEEE 802.11b/g/n	
		Bluetooth: V4.1	
	5 GHz U-NII Bands:	5 180 MHz to 5 240 MHz	IEEE 802.11a/n/ac
		5 260 MHz to 5 320 MHz	IEEE 802.11a/n/ac
		5 500 MHz to 5 700 MHz	IEEE 802.11a/n/ac
		5 745 MHz to 5 805 MHz	IEEE 802.11a/n/ac
Software Version:	V1.0.1.20161201		
Hardware Version:	RM-MPEG-172G VER1.0-1		
Sample Received Date:	March 30, 2017		
Sample Tested Date:	April 1, 2017 to May 4, 2017		

Note 1: Following are the diffrences of these three models. After evaluation, the differences between these models have no influence for RF test.

Model name	Trade name	Description
GK-MP1125	GIEC	All three models are with the same circuit and PCB layout. Color, silk screen and trademark of these three models are different. Model LSPs912-G1-1703 has no AV interface, and model GK-MP1129 has different shell with that of the other two models.
LSPs912-G1-1703	LSP.mini	
GK-MP1129	GIEC	

1.2.2 Description of Accessories

Adapter	
Trade Mark:	LSP.
Model No.:	TY0500420A1mn
Input:	100-240 V~50/60 Hz 0.8 A
Output:	5.0 V ⎓ 4.2 A
AC Cable:	N/A
DC Cable:	1.50 Meter, Unshielded without ferrite

Cable	
Trade Mark:	N/A
Model No.:	N/A
Description:	HDMI Cable
Cable Type:	Shielded without ferrite
Length:	1.50 Meter

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Frequency Range:	2402 MHz to 2480 MHz
Bluetooth Version:	Bluetooth EDR
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Type of Modulation:	GFSK, π/4DQPSK, 8DPSK
Number of Channels:	79
Channel Separation:	1 MHz
Hopping Channel Type:	Adaptive Frequency Hopping Systems
Antenna Type:	Integral Antenna
Antenna Gain:	2 dBi
Maximum Peak Power:	9.38 dBm
Normal Test Voltage:	120V~60Hz

1.4 OTHER INFORMATION

Operation Frequency Each of Channel							
Channel	**Frequency**	**Channel**	**Frequency**	**Channel**	**Frequency**	**Channel**	**Frequency**
0	2402 MHz	20	2422 MHz	40	2442 MHz	60	2462 MHz
1	2403 MHz	21	2423 MHz	41	2443 MHz	61	2463 MHz
2	2404 MHz	22	2424 MHz	42	2444 MHz	62	2464 MHz
3	2405 MHz	23	2425 MHz	43	2445 MHz	63	2465 MHz
4	2406 MHz	24	2426 MHz	44	2446 MHz	64	2466 MHz
5	2407 MHz	25	2427 MHz	45	2447 MHz	65	2467 MHz
6	2408 MHz	26	2428 MHz	46	2448 MHz	66	2468 MHz
7	2409 MHz	27	2429 MHz	47	2449 MHz	67	2469 MHz
8	2410 MHz	28	2430 MHz	48	2450 MHz	68	2470 MHz
9	2411 MHz	29	2431 MHz	49	2451 MHz	69	2471 MHz
10	2412 MHz	30	2432 MHz	50	2452 MHz	70	2472 MHz
11	2413 MHz	31	2433 MHz	51	2453 MHz	71	2473 MHz
12	2414 MHz	32	2434 MHz	52	2454 MHz	72	2474 MHz
13	2415 MHz	33	2435 MHz	53	2455 MHz	73	2475 MHz
14	2416 MHz	34	2436 MHz	54	2456 MHz	74	2476 MHz
15	2417 MHz	35	2437 MHz	55	2457 MHz	75	2477 MHz
16	2418 MHz	36	2438 MHz	56	2458 MHz	76	2478 MHz
17	2419 MHz	37	2439 MHz	57	2459 MHz	77	2479 MHz
18	2420 MHz	38	2440 MHz	58	2460 MHz	78	2480 MHz
19	2421 MHz	39	2441 MHz	59	2461 MHz	N/A	

Modulation Configure			
Modulation	**Packet**	**Packet Type**	**Packet Size**
GFSK	1-DH1	4	27
	1-DH3	11	183
	1-DH5	15	339
π/4 DQPSK	2-DH1	20	54
	2-DH3	26	367
	2-DH5	30	679
8DPSK	3-DH1	24	83
	3-DH3	27	552
	3-DH5	31	1021

1.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	Supplied by
LCD monitor	DELL	P2416Db	CN-ONDY73-74261-5C9-OLVS	UnionTrust
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2) Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	Antenna Cable	SMA	0.30 Meter	UnionTrust
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1.6 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China 518109
Telephone: +86 (0) 755 2823 0888
Fax: +86 (0) 755 2823 0886

Tests were sub-contracted.
Compliance Certification Services (Shenzhen) Inc.

Address: No.10-1 Mingkeda Logistics Park, No.18 Huanguan South RD. Guan lan Town, Baoan Distr, Shenzhen, Guangdong, China.
Telephone: +86 (0) 755 28055000 Fax: +86 (0) 755 29055221

1.7 TEST FACILITY

Shenzhen UnionTrust Quality and Technology Co., Ltd.

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

CNAS-Lab Code: L9069

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC/EN 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

IC-Registration No.: 21600-1

The 3m Semi-anechoic chamber of Shenzhen UnionTrust Quality and Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 21600-1.

Compliance Certification Services (Shenzhen) Inc.

FCC Registration Number is 441872.

1.8 DEVIATION FROM STANDARDS

None.

1.9 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.10 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.11 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty
1	Conducted emission 9KHz-150KHz	±3.2878 dB
2	Conducted emission 150KHz-30MHz	±3.2878 dB
3	Radiated emission 30MHz-200Hz	±3.8928 dB
4	Radiated emission 200MHz-1GHz	±3.8753 dB
5	Radiated emission 1GHz-8GHz	±5.3112 dB
6	Radiated emission Above 8GHz	±5.3493 dB

2. TEST SUMMARY

FCC 47 CFR Part 15 Subpart C Test Cases			
Test Item	**Test Requirement**	**Test Method**	**Result**
Antenna Requirement	FCC 47 CFR Part 15 Subpart C Section 15.203/15.247 (c)	ANSI C63.10-2013	PASS
AC Power Line Conducted Emission	FCC 47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013	PASS*
Conducted Peak Output Power	FCC 47 CFR Part 15 Subpart C Section 15.247 (b)(1)	DA 00-705	PASS*
20 dB Bandwidth	FCC 47 CFR Part 15 Subpart C Section 15.247 (a)(1)	DA 00-705	PASS
Carrier Frequencies Separation	FCC 47 CFR Part 15 Subpart C Section 15.247 (a)(1)	DA 00-705	PASS
Number of Hopping Channel	FCC 47 CFR Part 15 Subpart C Section 15.247 (b)(1)	DA 00-705	PASS
Dwell Time	FCC 47 CFR Part 15 Subpart C Section 15.247 (a)(1)	DA 00-705	PASS
Pseudorandom Frequency Hopping Sequence	FCC 47 CFR Part 15 Subpart C Section 15.247(a)(1)(g)(h)	DA 00-705	PASS
Conducted Out of Band Emission	FCC 47 CFR Part 15 Subpart C Section 15.247(d)	DA 00-705	PASS
Radiated Emissions	FCC 47 CFR Part 15 Subpart C Section 15.205/15.209	DA 00-705	PASS*
Band Edge Measurement	FCC 47 CFR Part 15 Subpart C Section 15.205/15.209	DA 00-705	PASS*

Note:

1) N/A: In this whole report not application.
2) "*": In this whole report "*" means tests were sub-contracted Item.

3. EQUIPMENT LIST

Radiated Emission Test Equipment List 966(1)						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☑	Amplifier	HP	8447D	2944A08999	Feb. 12, 2017	Feb. 11, 2018
☑	Antenna	SCHAFFNER	CBL6143	5082	Feb. 12, 2017	Feb. 11, 2018
☑	Turn Table	N/A	N/A	N/A	N.C.R	N.C.R
☑	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESPI	101026	Feb. 12, 2017	Feb. 11, 2018
☑	Temp. / Humidity Meter	Anymetre	JR913	N/A	Feb. 15, 2017	Feb. 14, 2018
☑	Test S/W	FARAD	EZ-EMC/ CCS-03A1			

Radiated Emission Test Equipment List 966(2)						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☑	PSA Series Spectrum Analyzer	Agilent	E4446A	US44300399	Feb. 17, 2017	Feb. 16, 2018
☑	High Noise Amplifier	Agilent	8449B	3008A01838	Feb. 11, 2017	Feb. 10, 2018
☑	Horn Antenna	SCHWARZBECK	BBHA9120	D286	Feb. 12, 2017	Feb. 11, 2018
☑	Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170-497	Feb. 11, 2017	Feb. 10, 2018
☑	Turn Table	N/A	N/A	N/A	N.C.R	N.C.R
☑	Controller	Sunol Sciences	SC104V	022310-1	N.C.R	N.C.R
☑	Controller	CT	N/A	N/A	N.C.R	N.C.R
☑	Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
☑	Temp. / Humidity Meter	Anymetre	JR913	N/A	Feb. 15, 2017	Feb. 14, 2018
☑	Test S/W	FARAD	LZ-RF / CCS-SZ-3A2			

Conducted Emission Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☑	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	Feb. 11, 2017	Feb. 10, 2018
☑	LISN(EUT)	ROHDE&SCHWARZ	ENV216	101543-WX	Feb. 11, 2017	Feb. 10, 2018
☑	LISN	EMCO	3825/2	8901-1459	Feb. 12, 2017	Feb. 11, 2018
☑	Temp. / Humidity Meter	VICTOR	HTC-1	N/A	Feb. 15, 2017	Feb. 14, 2018
☑	Test S/W	FARAD	EZ-EMC/ CCS-3A1-CE			

Conducted RF test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☑	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	Dec. 22, 2016	Dec. 22, 2017
☑	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430035	Dec. 22, 2016	Dec. 22, 2017
☑	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430023	Dec. 22, 2016	Dec. 22, 2017

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

4.1.1 Normal or Extreme Test Conditions

Environment Parameter	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage (V)	Relative Humidity (%)
NT/NV	+15 to +35	120V~60Hz	20 to 75
Remark: 1) NV: Normal Voltage; NT: Normal Temperature			

4.1.2 Record of Normal Environment

Test Item	Temperature (°C)	Relative Humidity (%)	Pressure (Kpa)	Tested by
AC Power Line Conducted Emission	23.6	54	100.2	Tiny You
Conducted Peak Output Power	25.2	62	99.8	Tiny You
20 dB Bandwidth	24.9	57	99.9	Tiny You
Carrier Frequencies Separation	24.9	57	99.9	Tiny You
Number of Hopping Channel	24.9	57	99.9	Tiny You
Dwell Time	24.9	57	99.9	Tiny You
Pseudorandom Frequency Hopping Sequence	24.9	57	99.9	Tiny You
Conducted Out of Band Emission	24.9	57	99.9	Tiny You
Radiated Emissions	24.8	59	99.8	Tiny You
Band Edge Measurement	24.8	59	99.8	Tiny You

4.2 TEST CHANNELS

Mode	Tx/Rx Frequency	Test RF Channel Lists		
		Lowest(L)	Middle(M)	Highest(H)
GFSK (DH1, DH3, DH5)	2402 MHz to 2480 MHz	Channel 0	Channel 39	Channel 78
		2402 MHz	2441 MHz	2480 MHz
π/4DQPSK (DH1, DH3, DH5)	2402 MHz to 2480 MHz	Channel 0	Channel 39	Channel 78
		2402 MHz	2441 MHz	2480 MHz
8DPSK (DH1, DH3, DH5)	2402 MHz to 2480 MHz	Channel 0	Channel 39	Channel 78
		2402 MHz	2441 MHz	2480 MHz

4.3 EUT TEST STATUS

Type of Modulation	Tx/Rx Function	Description
GFSK/π/4DQPSK/ 8DPSK	1Tx/1Rx	1. Keep the EUT in continuously transmitting with Modulation test single 2. Keep the EUT in continuously transmitting with Modulation test Hopping Frequency.

4.4 PRE-SCAN

4.4.1 Pre-scan under all packets at middle channel

Conducted Average Power (dBm) for packets									
Type of Modulation	GFSK			π/4DQPSK			8DPSK		
Packets	1-DH1	1-DH3	1-DH5	2-DH1	2-DH3	2-DH5	3-DH1	3-DH3	3-DH5
Power (dBm)	**8.13**	8.10	8.06	**4.44**	4.41	4.41	**4.46**	4.42	4.43

4.4.2 Worst-case data packets

Type of Modulation	Worst-case data rates
GFSK	1-DH1
π/4DQPSK	2-DH1
8DPSK	3-DH1

4.4.3 Tested channel detail

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data packets and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.

Type of Modulation	GFSK			π/4DQPSK			8DPSK		
Data Packets	1-DH1	1-DH3	1-DH5	2-DH1	2-DH3	2-DH5	3-DH1	3-DH3	3-DH5
Available Channel	0 to 78								
Test Item	**Test channel and choose of data packets**								
AC Power Line Conducted Emission	Frequency Hopping Channel 0 to 78								
	Link								
Conducted Peak Output Power	Channel 0 & 39 & 78								
	☑	☐	☐	☑	☐	☐	☑	☐	☐
20 dB Bandwidth	Channel 0 & 39 & 78								
	☑	☐	☐	☑	☐	☐	☑	☐	☐
Carrier Frequencies Separation	Frequency Hopping Channel 0 to 78								
	☑	☐	☐	☑	☐	☐	☑	☐	☐
Number of Hopping Channel	Frequency Hopping Channel 0 to 78								
	☑	☐	☐	☐	☐	☐	☑	☐	☐
Dwell Time	Channel 0 & 39 & 78								
	☑	☑	☑	☐	☐	☐	☑	☑	☑
Pseudorandom Frequency Hopping Sequence	Frequency Hopping Channel 0 to 78								
	☑	☐	☐	☐	☐	☐	☑	☐	☐
Conducted Out of Band Emission	Channel 0 & 39 & 78								
	☑	☐	☐	☐	☐	☐	☑	☐	☐
Radiated Emissions	Channel 0 & 39 & 78								
	☑	☐	☐	☐	☐	☐	☐	☐	☐
Band Edge Measurements (Radiated)	Channel 0 & 78								
	☑	☐	☐	☐	☐	☐	☐	☐	☐

Remark:
1. The mark "☑" means selecting worst mode through by Pre-test recorded on report.
2. The mark "☐" means is not chosen for testing.

4.5 TEST SETUP

4.5.1 For Radiated Emissions test setup

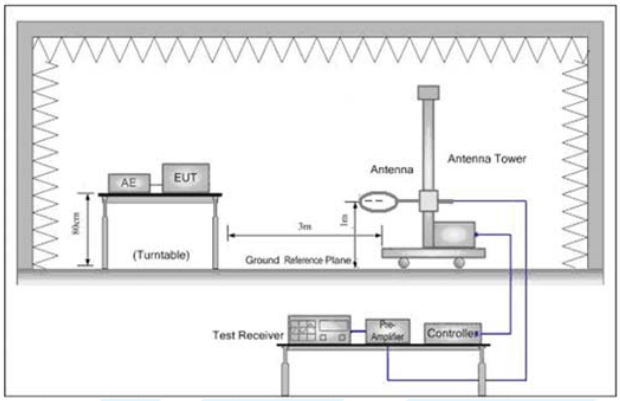


Figure 1. Below 30MHz

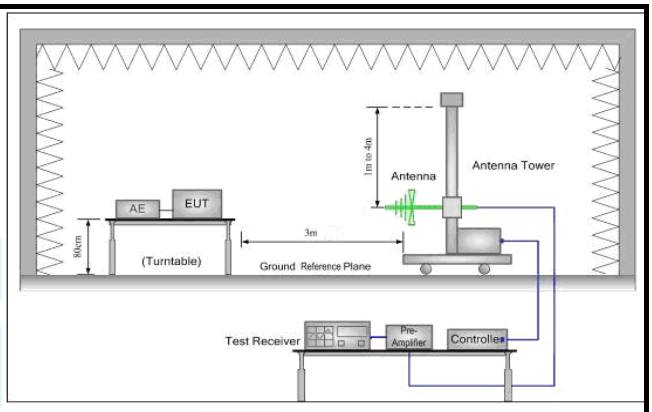


Figure 2. 30MHz to 1GHz

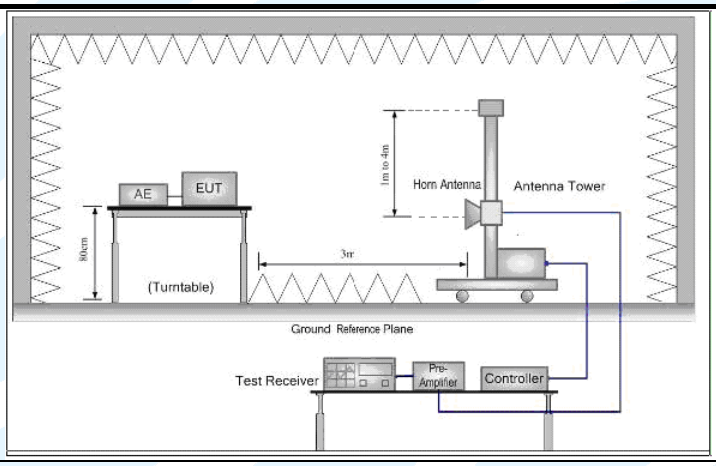
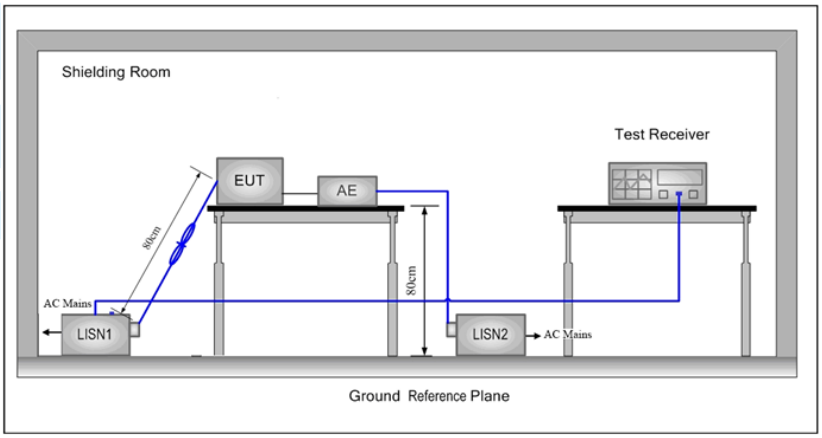


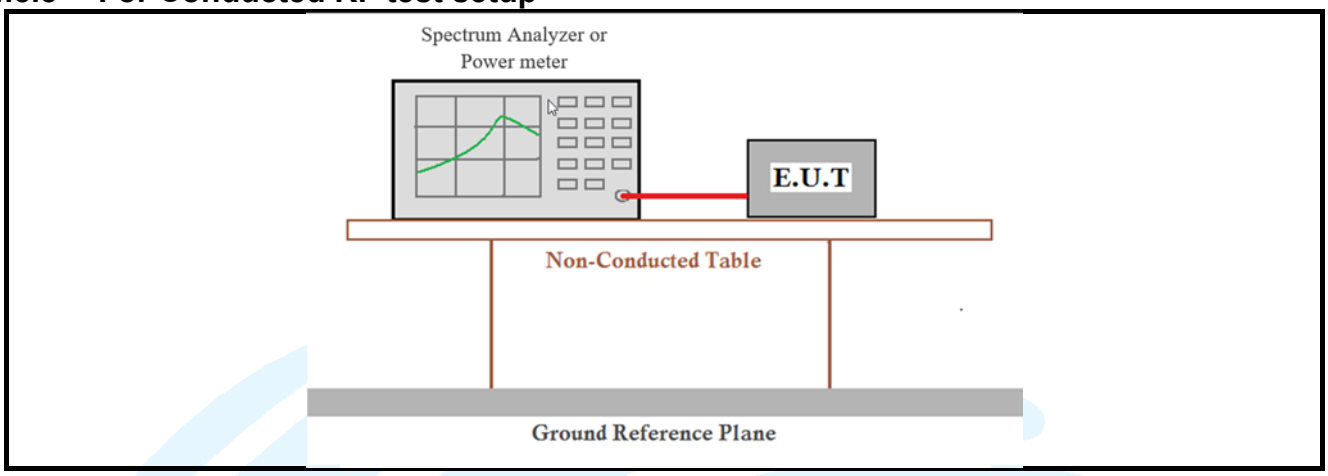
Figure 3. Above 1GHz

4.5.2 For Conducted Emissions test setup

Figure 3. Conducted Emissions setup



4.5.3 For Conducted RF test setup



4.6 SYSTEM TEST CONFIGURATION

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. It was powered by a 120V~60Hz. Only the worst case data were recorded in this test report.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. Therefore, all final radiated testing was performed with the EUT in (see table below) orientation.

Frequency	Mode	Antenna Port	Worst-case axis positioning
Above 1GHz	1TX	Chain 0	Z axis

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

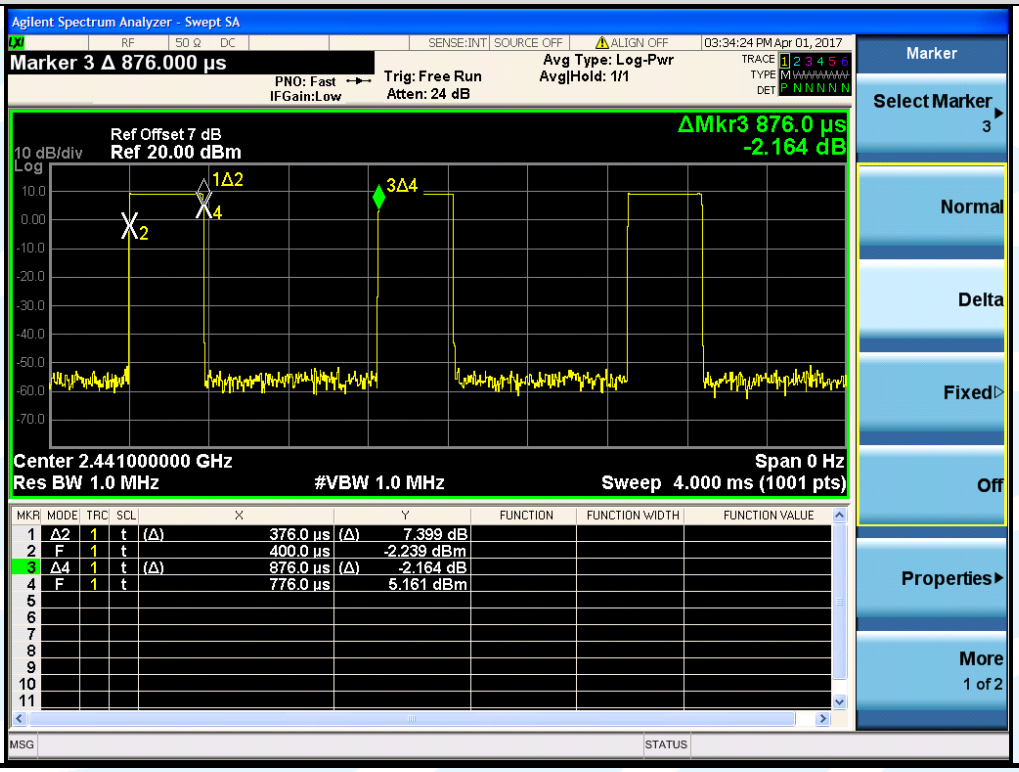
4.7 DUTY CYCLE

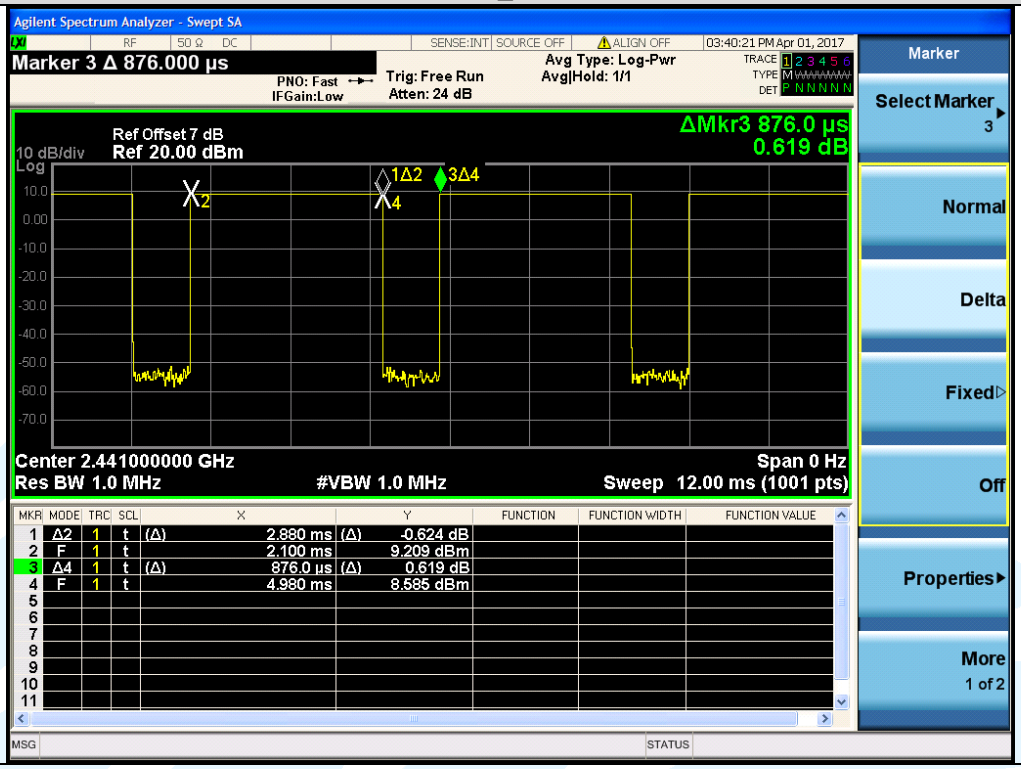
Type of Modulation	Packets	On Time (msec)	Period (msec)	Duty Cycle (linear)	Duty Cycle (%)	Duty Cycle Factor (dB)	1/ T Minimum VBW (kHz)	Average Factor (dB)
GFSK	1-DH1	0.376	1.252	0.30	30.03	5.22	2.66	-10.45
	1-DH5	2.88	3.756	0.77	76.68	1.15	0.35	-2.31

Remark:
1) Duty cycle= On Time/ Period;
2) Duty Cycle factor = 10 * log(1/ Duty cycle);
3) Average factor = 20 $\log_{10}$ Duty Cycle.

The test plot as follows

GFSK_ 1-DH1



GFSK_ 1-DH5


Agilent Spectrum Analyzer - Swept SA
Marker 3 Δ 876.000 µs
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 24 dB
Avg Type: Log-Pwr
Avg|Hold: 1/1
03:40:21 PM Apr 01, 2017
Ref Offset 7 dB
10 dB/div
Log
Ref 20.00 dBm
ΔMkr3 876.0 µs
0.619 dB
Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 1.0 MHz
Span 0 Hz
Sweep 12.00 ms (1001 pts)
1 Δ2 2.880 ms (Δ) -0.624 dB
2 F 1 t 2.100 ms 9.209 dBm
3 Δ4 1 t (Δ) 876.0 µs (Δ) 0.619 dB
4 F 1 t 4.980 ms 8.585 dBm
Marker
Select Marker
3
Normal
Delta
Fixed
Off
Properties
More
1 of 2

5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION

5.1 REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 15	Radio Frequency Devices
3	ANSI C63.10-2013	American National Standard for Testing Unlicesed Wireless Devices
4	FCC Public Notice DA 00-705	Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems

5.2 ANTENNA REQUIREMENT

Standard Requirement
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. **15.247(b) (4) requirement:** The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
EUT Antenna:
Antenna in the interior of the equipment and no consideration of replacement. The gain of the antenna is 2 dBi.

5.3 PSEUDORANDOM FREQUENCY HOPPING SEQUENCE

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.247(b)(g)(h)

Test Method: DA 00-705

Frequency Hopping System:

This transmitter device is frequency hopping device, and complies with FCC part 15.247 rule.

This device uses Bluetooth radio which operates in 2400-2483.5 MHz band. Bluetooth uses a radio technology called frequency-hopping spread spectrum, which chops up the data being sent and transmits chunks of it on up to 79 bands (1 MHz each; centred from 2402 to 2480 MHz) in the range 2,400-2,483.5 MHz. The transmitter switches hop frequencies 1,600 times per second to assure a high degree of data security. All Bluetooth devices participating in a given piconet are synchronized to the frequency-hopping channel for the piconet. The frequency hopping sequence is determined by the master's device address and the phase of the hopping sequence (the frequency to hop at a specific time) is determined by the master's internal clock. Therefore, all slaves in a piconet must know the master's device address and must synchronize their clocks with the master's clock.

Adaptive Frequency Hopping (AFH) was introduced in the Bluetooth specification to provide an effective way for a Bluetooth radio to counteract normal interference. AFH identifies "bad" channels, where either other wireless devices are interfering with the Bluetooth signal or the Bluetooth signal is interfering with another device. The AFH-enabled Bluetooth device will then communicate with other devices within its piconet to share details of any identified bad channels. The devices will then switch to alternative available "good" channels, away from the areas of interference, thus having no impact on the bandwidth used.

EUT Pseudorandom Frequency Hopping Sequence:

Pseudorandom Frequency Hopping Sequence Table as below:

Channel: 08, 24, 40, 56, 40, 56, 72, 09, 01, 09, 33, 41, 33, 41, 65, 73, 53, 69, 06, 22, 04, 20, 36, 52, 38, 46, 70, 78, 68, 76, 21, 29, 10, 26, 42, 58, 44, 60, 76, 13, 03, 11, 35, 43, 37, 45, 69, 77, 55, 71, 08, 24, 08, 24, 40, 56, 40, 48, 72, 01, 72, 01, 25, 33, 12, 28, 44, 60, 42, 58, 74, 11, 05, 13, 37, 45 etc.

The system receiver have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

5.4 CONDUCTED PEAK OUTPUT POWER

Test Requirement: FCC 47 CFR Part 15 Subpart C Section15.247 (b)(1)

Test Method: DA 00-705

Limit: For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt.
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Test Procedure:
a) Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter.
b) Measure out each test modes' peak or average output power, record the power level.
Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.5.3 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Transmitter mode

Test Results: Pass

Test Data:

Type of Modulation	Peak Output Power (dBm)			Peak Output Power (mW)		
	Channel 0	Channel 39	Channel 78	Channel 0	Channel 39	Channel 78
GFSK	9.08	9.24	**9.38**	8.09	8.39	**8.67**
π/4 DQPSK	7.58	7.94	8.10	5.73	6.22	6.46
8DPSK	7.87	8.24	8.31	6.12	6.67	6.78

Note: The antenna gain of 2 dBi less than 6dBi maximum permission antenna gain value based on 1 watt peak output power limit.

5.5 20 DB BANDWIDTH

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.247 (a)(1)

Test Method: DA 00-705

Limit: None; for reporting purposes only.

Test Procedure: Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
Use the following spectrum analyzer settings:

a) Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel
b) RBW ≥ 1% of the 20 dB bandwidth
c) VBW ≥ RBW
d) Sweep = auto;
e) Detector function = peak
f) Trace = max hold
g) All the trace to stabilize, use the marker-to-peak function to set the marker to the peak of the emission, use the marker-delta function to measure and record the 20dB down bandwidth of the emission.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.5.3 for details.

Instruments Used: Refer to section 3 for details

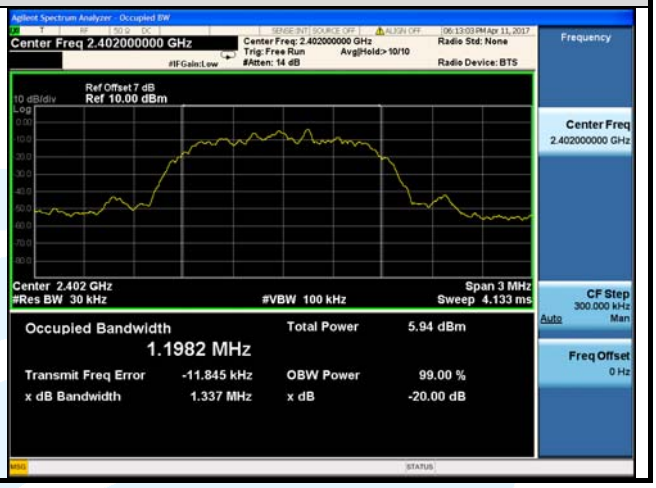
Test Mode: Transmitter mode

Test Results: Pass

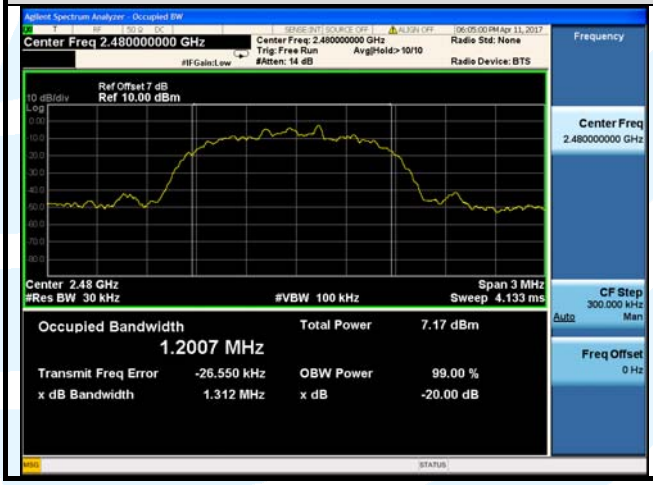
Test Data:

Type of Modulation	20 dB Bandwidth (MHz)			99% Bandwidth (MHz)		
	Channel 0	Channel 39	Channel 78	Channel 0	Channel 39	Channel 78
GFSK	0.9445	0.9437	0.9437	0.88616	0.88493	0.88552
π/4 DQPSK	1.337	1.338	1.338	1.1982	1.1999	1.1977
8DPSK	1.339	1.312	1.312	1.2137	1.2010	1.2007

The test plot as follows:

GFSK	π/4 DQPSK
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

8DPSK	
Lowest Channel	Middle Channel
	

Highest Channel


5.6 CARRIER FREQUENCIES SEPARATION

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.247 (a)(1)

Test Method: DA 00-705

Limit: Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Test Procedure: Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
Use the following spectrum analyzer settings:

a) Set span = wide enough to capture the peaks of two adjacent channels
b) Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span
c) Video (or Average) Bandwidth (VBW) ≥ RBW
d) Sweep = auto;
e) Detector function = peak;
f) Trace = max hold
g) 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.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.5.3 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Hopping Frequencies Transmitter mode

Test Results: Pass

Test Data:

Type of Modulation	Adjacent Channel Separation (MHz)			Minimum Limit (MHz)		
	Channel 0	Channel 39	Channel 78	Channel 0	Channel 39	Channel 78
GFSK	0.999	0.999	0.999	0.6297	0.6291	0.6291
π/4 DQPSK	0.999	1.002	1.002	0.8913	0.8920	0.8920
8DPSK	0.999	0.996	0.999	0.8927	0.8747	0.8747
Note: The minimum limit is two-third 20 dB bandwidth.						

The test plot as follows:

GFSK	π/4 DQPSK
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

8DPSK	
Lowest Channel	Middle Channel
	

Highest Channel


5.7 NUMBER OF HOPPING CHANNEL

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.247(b)(1)

Test Method: DA 00-705

Limit: Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

Test Procedure: Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
Use the following spectrum analyzer settings:

a) Span = the frequency band of operation
b) RBW ≥ 1% of the span
c) VBW ≥ RBW
d) Sweep = auto
e) Detector function = peak
f) Trace mode = max hold
g) Allow the trace to stabilize, observed the band of 2400MHz to 2483.5MHz, than count it out the number of channels for comparing with the FCC rules.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.5.3 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Hopping Frequencies Transmitter mode

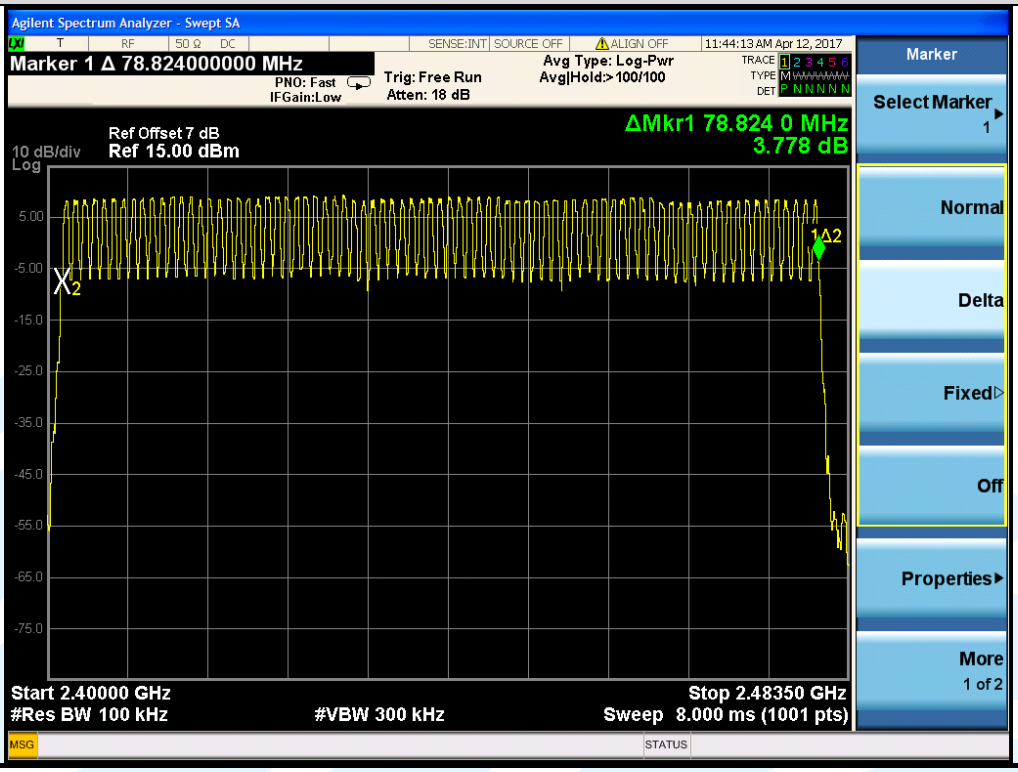
Test Results: Pass

Test Data:

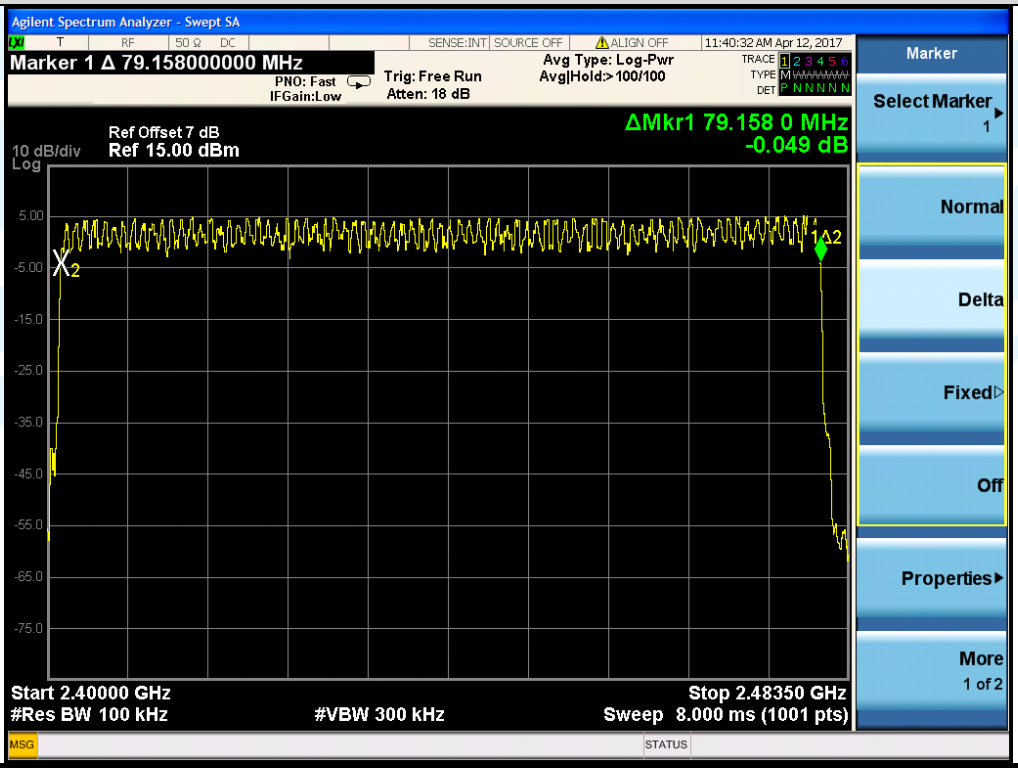
Type of Modulation	Number of Hopping Channel
GFSK	79
8DPSK	79

The worst test plot as follows:

GFSK



8DPSK



5.8 DWELL TIME

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.247(a)(1)

Test Method: DA 00-705

Limit: Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. 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: Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
Use the following spectrum analyzer settings:

a) Span = zero span, centered on a hopping channel
b) RBW = 1 MHz
c) VBW ≥ RBW
d) Sweep = as necessary to capture the entire dwell time per hopping channel
e) Detector function = peak
f) Trace = max hold
g) Use the marker-delta function to determine the dwell time

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.5.3 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Hopping Frequencies Transmitter mode

Test Results: Pass

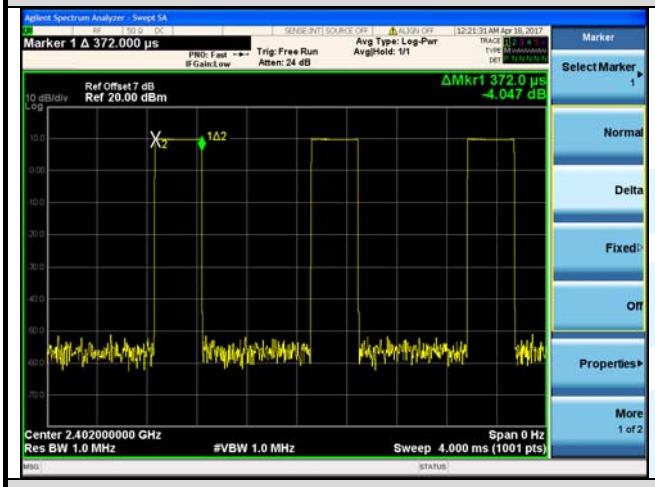
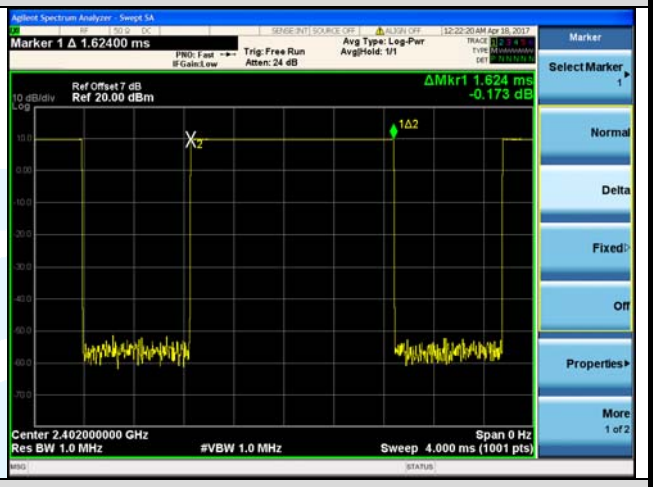
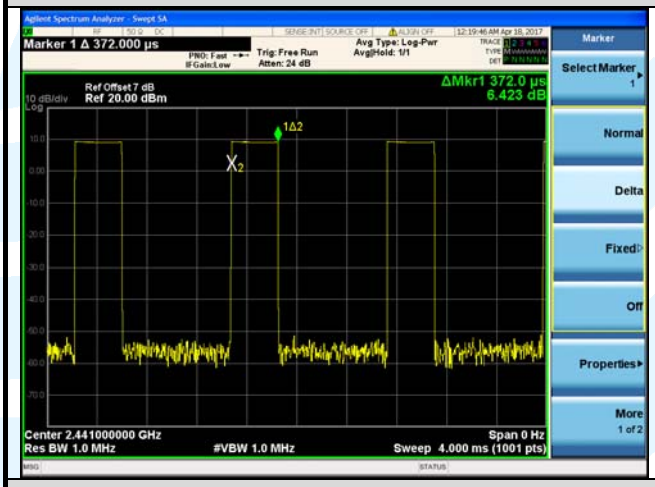
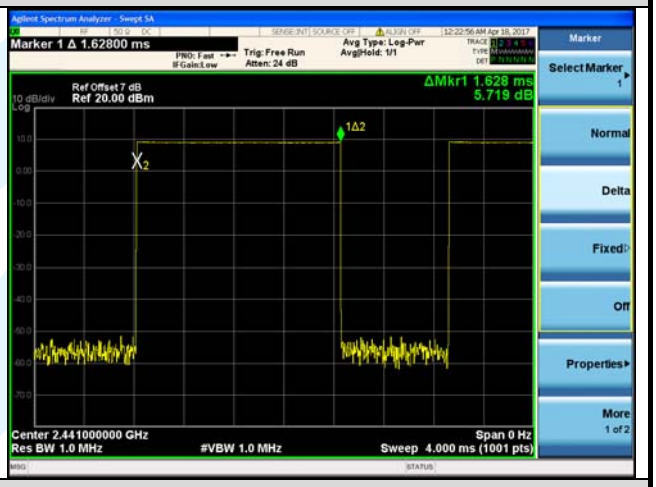
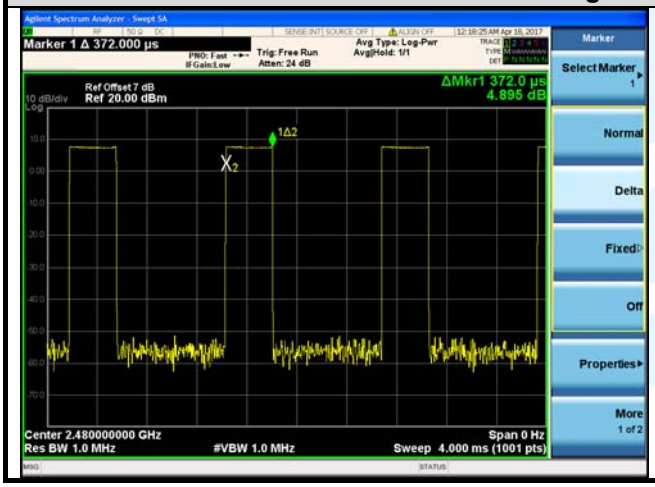
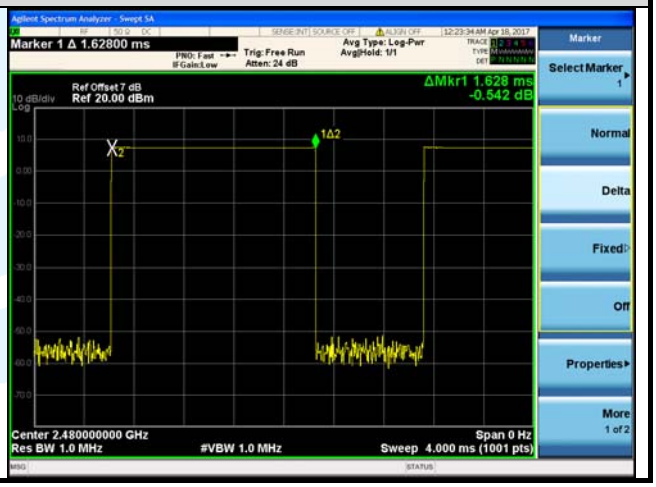
Test Data:

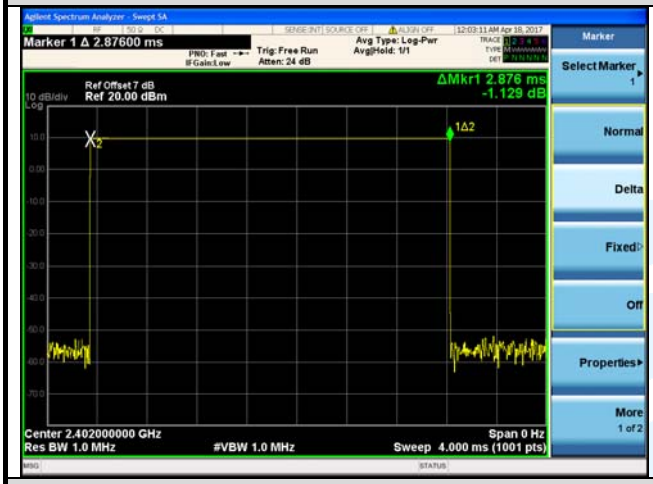
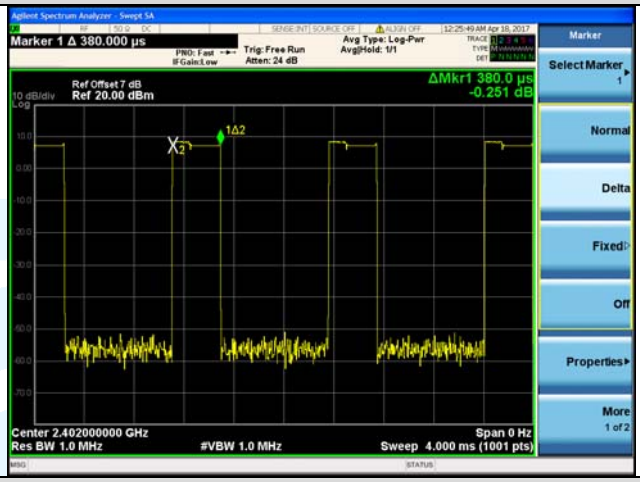
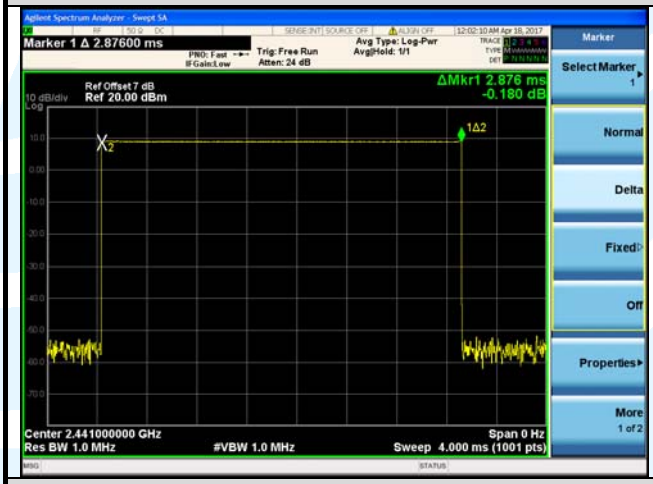
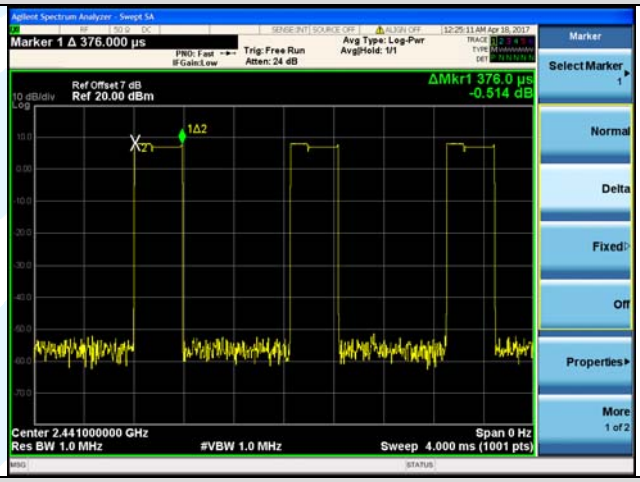
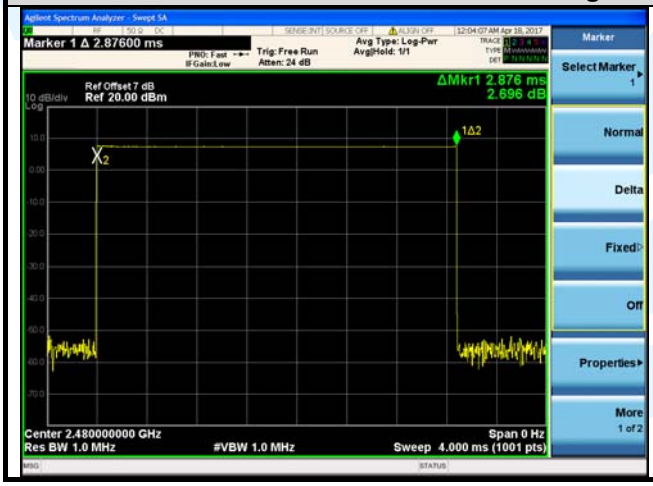
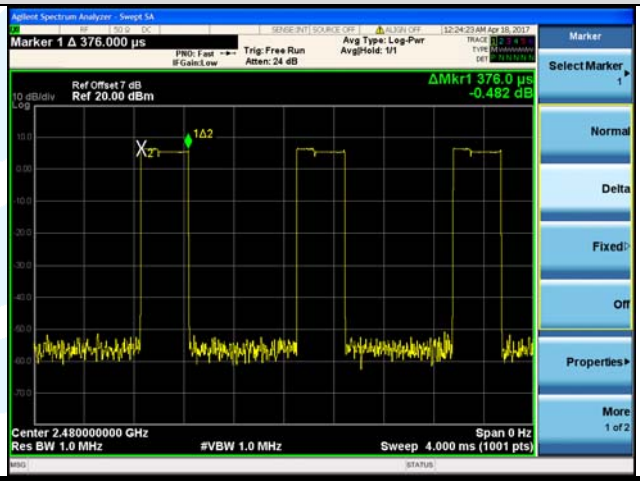
Type of Modulation	Test Frequency	Packet	Time Slot Length	Dwell Time	Limit
			ms	ms	ms
GFSK	2402MHz	1-DH1	0.372	119.04	< 400
		1-DH3	0.372	119.04	< 400
		1-DH5	0.372	119.04	< 400
	2441MHz	1-DH1	1.624	259.84	< 400
		1-DH3	1.628	260.48	< 400
		1-DH5	1.628	260.48	< 400
	2480MHz	1-DH1	2.876	306.77	< 400
		1-DH3	2.876	306.77	< 400
		1-DH5	2.876	306.77	< 400
8DPSK	2402MHz	3-DH1	0.380	121.60	< 400
		3-DH3	0.376	120.32	< 400
		3-DH5	0.376	120.32	< 400
	2441MHz	3-DH1	1.628	260.48	< 400
		3-DH3	1.628	260.48	< 400
		3-DH5	1.628	260.48	< 400
	2480MHz	3-DH1	2.880	307.20	< 400
		3-DH3	2.880	307.20	< 400
		3-DH5	2.876	306.77	< 400

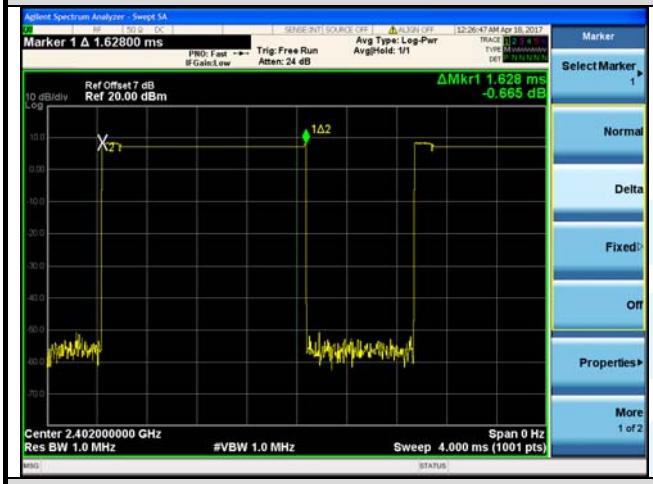
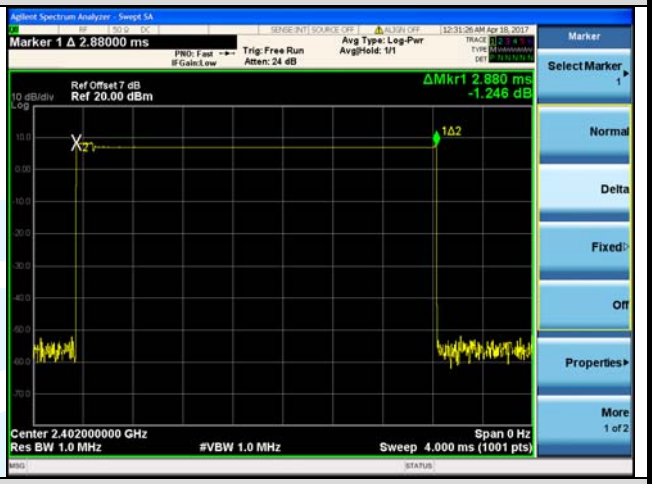
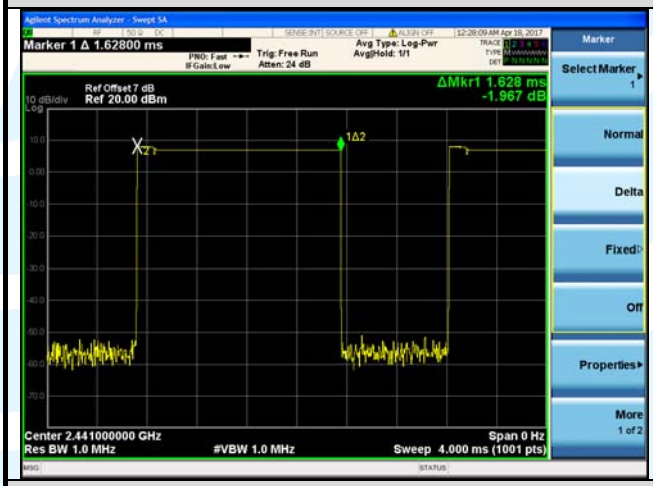
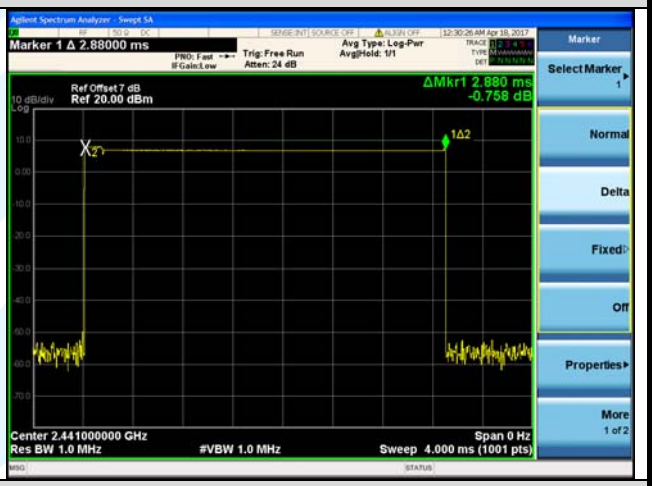
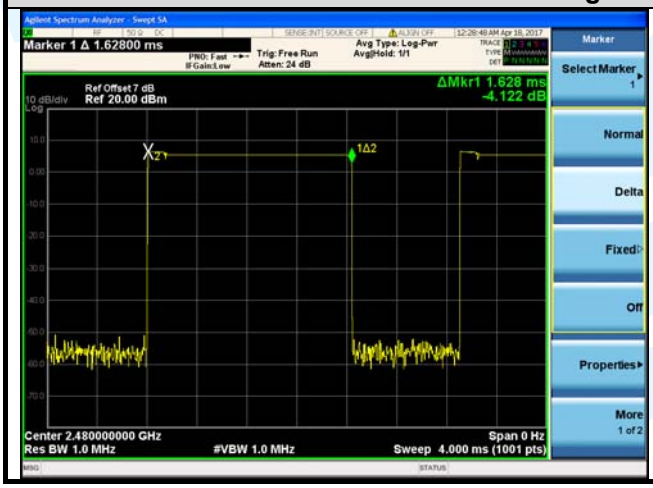
Remark:

1. The test period: T = 0.4 Second * 79 Channel = 31.6 s
2. Dwell time = time slot length * (Hopping rate / Number of hopping channels) * Period

The worst test plot as follows:

GFSK_1-DH1	GFSK_1-DH3
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

GFSK_1-DH5	8DPSK_3-DH1
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

8DPSK_3-DH3	8DPSK_3-DH5
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

5.9 CONDUCTED OUT OF BAND EMISSION

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.247(d)

Test Method: DA 00-705

Limit: In any 100kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

Test Procedure: Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
Use the following spectrum analyzer settings:

a) Suitable frequency span
b) RBW = 100 KHz
c) VBW ≥ RBW
d) Sweep = auto
e) Detector function = peak
f) Trace = max hold
g) The band edges was measured and recorded.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.5.3 for details.

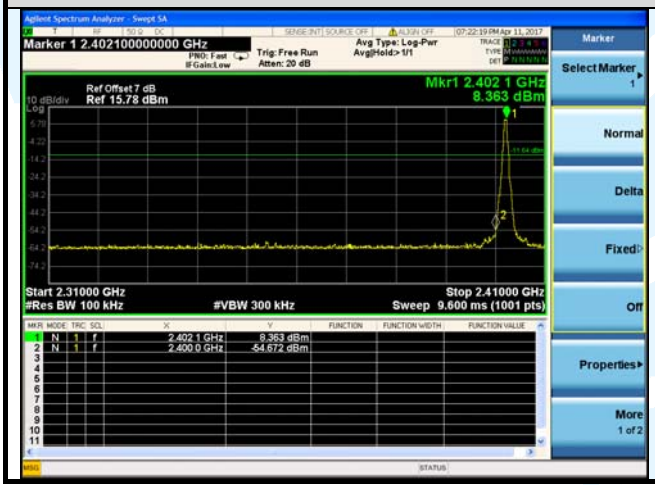
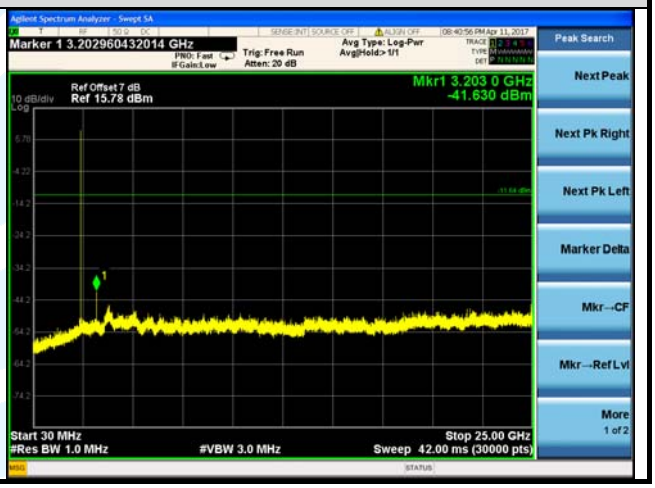
Instruments Used: Refer to section 3 for details

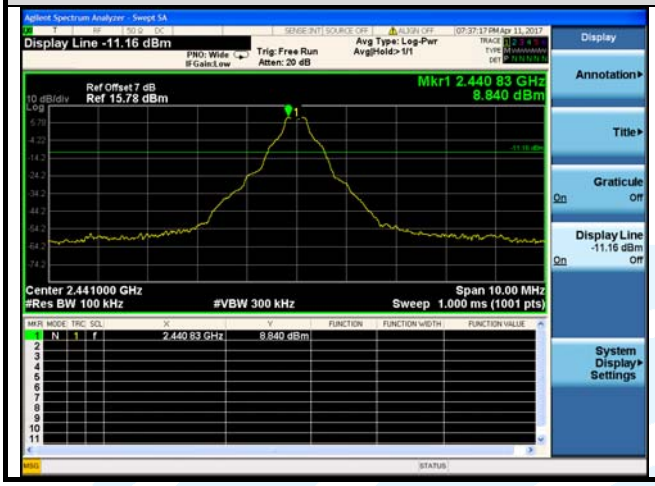
Test Mode: Hopping Frequencies Transmitter mode

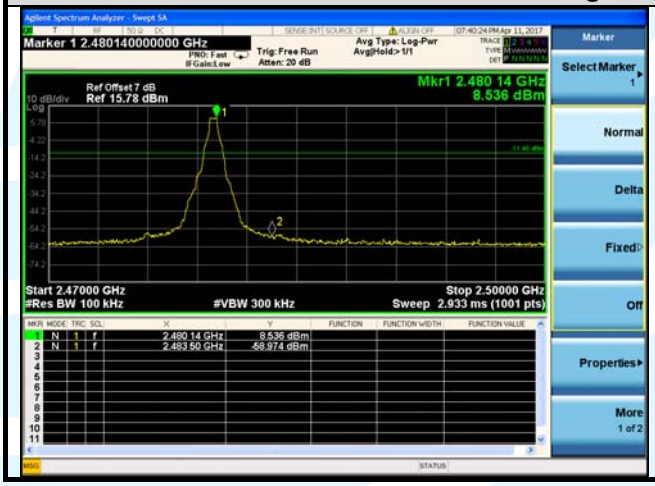
Test Results: Pass

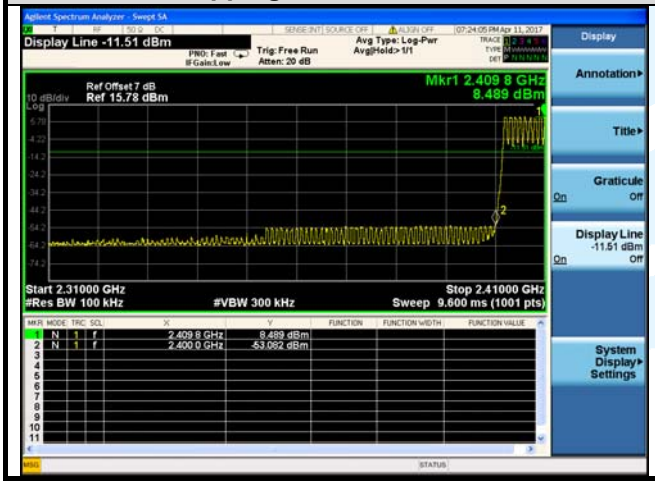
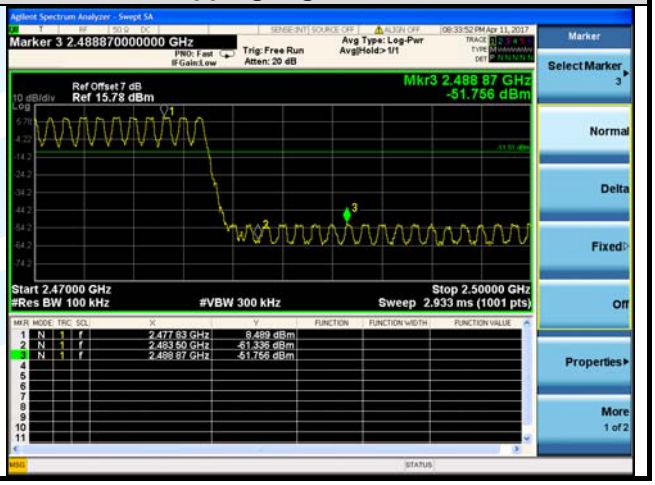
Test Data:

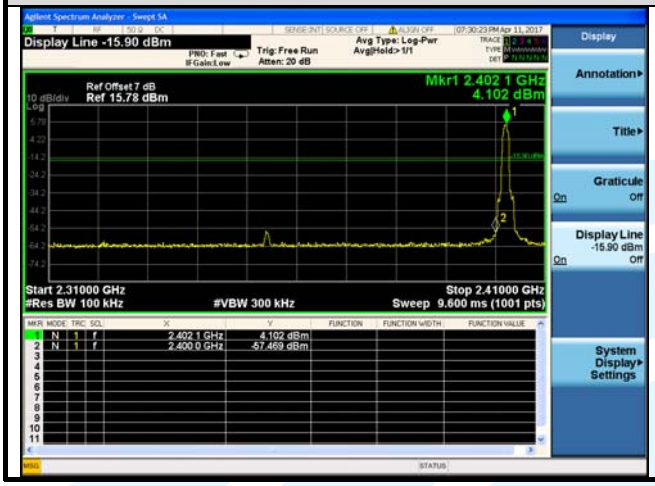
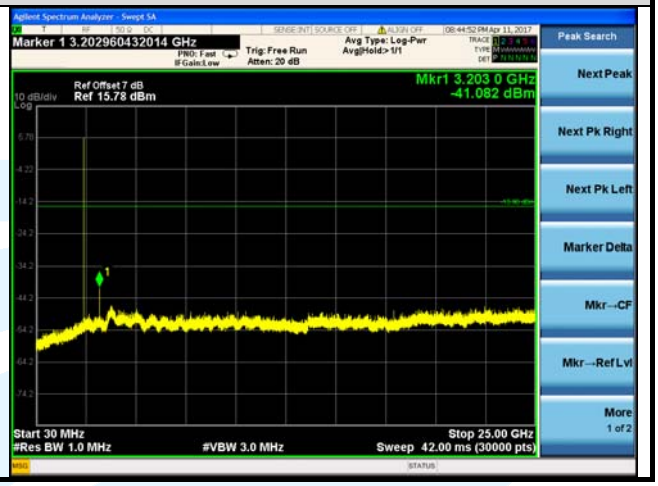
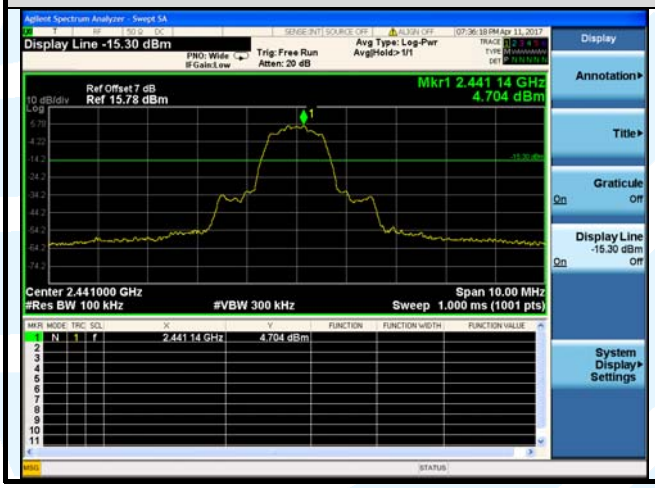
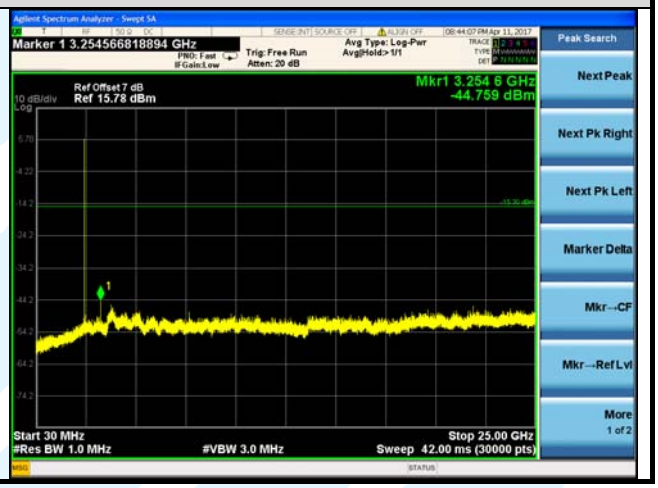
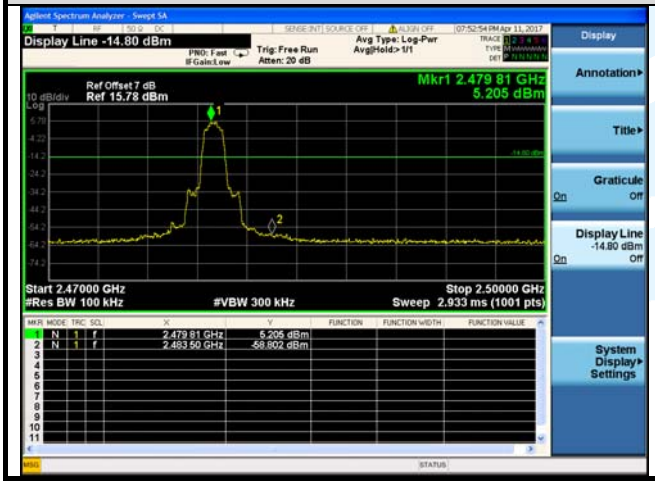
The worst test plot as follows:

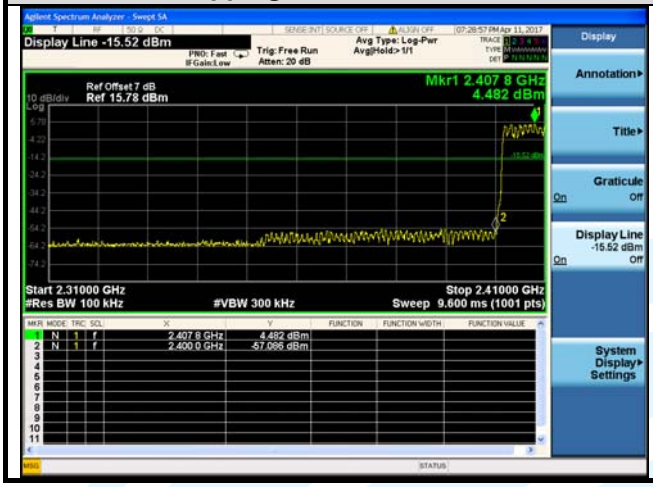
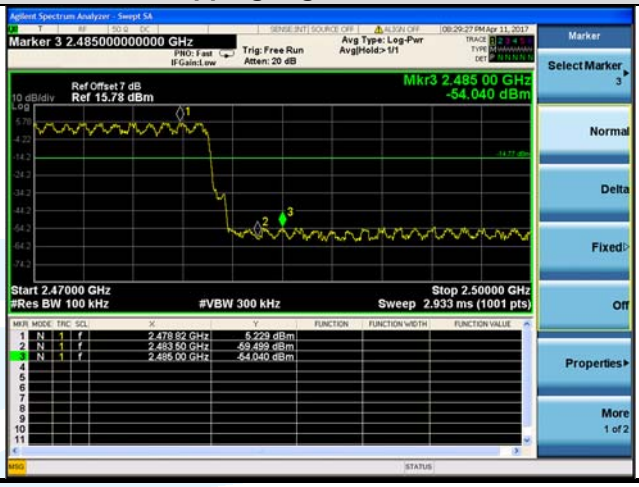
GFSK_1-DH1	
In-Band Reference Level	**Out of Band Emission**
Lowest Channel	
	

Middle Channel	
	

Highest Channel	
	

Hopping Lowest Channel	Hopping Highest Channel
	

8DPSK_3-DH1	
In-Band Reference Level	**Out of Band Emission**
Lowest Channel	
	
Middle Channel	
	
Highest Channel	
	

Hopping Lowest Channel	Hopping Highest Channel
	

5.10 RADIATED SPURIOUS EMISSIONS

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.205/15.209

Test Method: ANSI C63.10-2013

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
0.009 MHz-0.090 MHz	Peak	10 kHz	30 KHz	Peak
0.009 MHz-0.090 MHz	Average	10 kHz	30 KHz	Average
0.090 MHz-0.110 MHz	Quasi-peak	10 kHz	30 KHz	Quasi-peak
0.110 MHz-0.490 MHz	Peak	10 kHz	30 KHz	Peak
0.110 MHz-0.490 MHz	Average	10 kHz	30 KHz	Average
0.490 MHz -30 MHz	Quasi-peak	10 kHz	30 kHz	Quasi-peak
30 MHz-1 GHz	Quasi-peak	100 kHz	300 KHz	Quasi-peak
Above 1 GHz	Peak	1 MHz	3 MHz	Peak
	Peak	1 MHz	10 Hz or 1/T	Average

Limits:

Spurious Emissions

Frequency	Field strength (microvolt/meter)	Limit (dBμV/m)	Remark	Measurement distance (m)
0.009 MHz-0.490 MHz	2400/F(kHz)	--	--	300
0.490 MHz-1.705 MHz	24000/F(kHz)	--	--	30
1.705 MHz-30 MHz	30	--	--	30
30 MHz-88 MHz	100	40.0	Quasi-peak	3
88 MHz-216 MHz	150	43.5	Quasi-peak	3
216 MHz-960 MHz	200	46.0	Quasi-peak	3
Above 1 GHz	500	54.0	Average	3

Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

Remark:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

Test Setup: Refer to section 4.5.1 for details.

Test Procedures:

1. From 30 MHz to 1GHz test procedure as below:

1) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3) The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rota table table was turned from 0 degrees to 360 degrees to find the maximum reading.
5) The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6) If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could

be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

2. Above 1GHz test procedure as below:

1) Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 meter to 1.5 meter(Above 18GHz the distance is 1 meter and table is 1.5 meter).
2) Test the EUT in the lowest channel ,middle channel, the Highest channel
3) The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the Z axis positioning which it is worse case.
4) Repeat above procedures until all frequencies measured was complete.

Equipment Used: Refer to section 3 for details.

Test Result: Pass

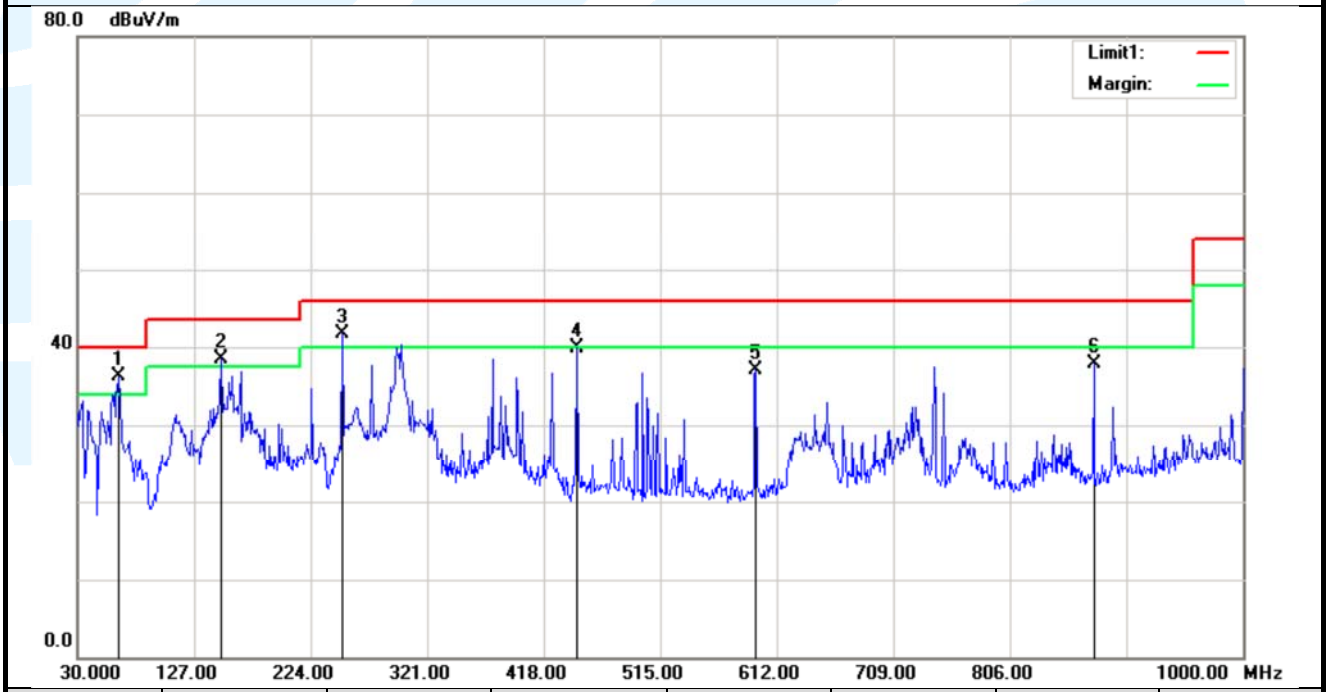
The measurement data as follows:

Radiated Emission Test Data (9 KHz ~ 30 MHz):

The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

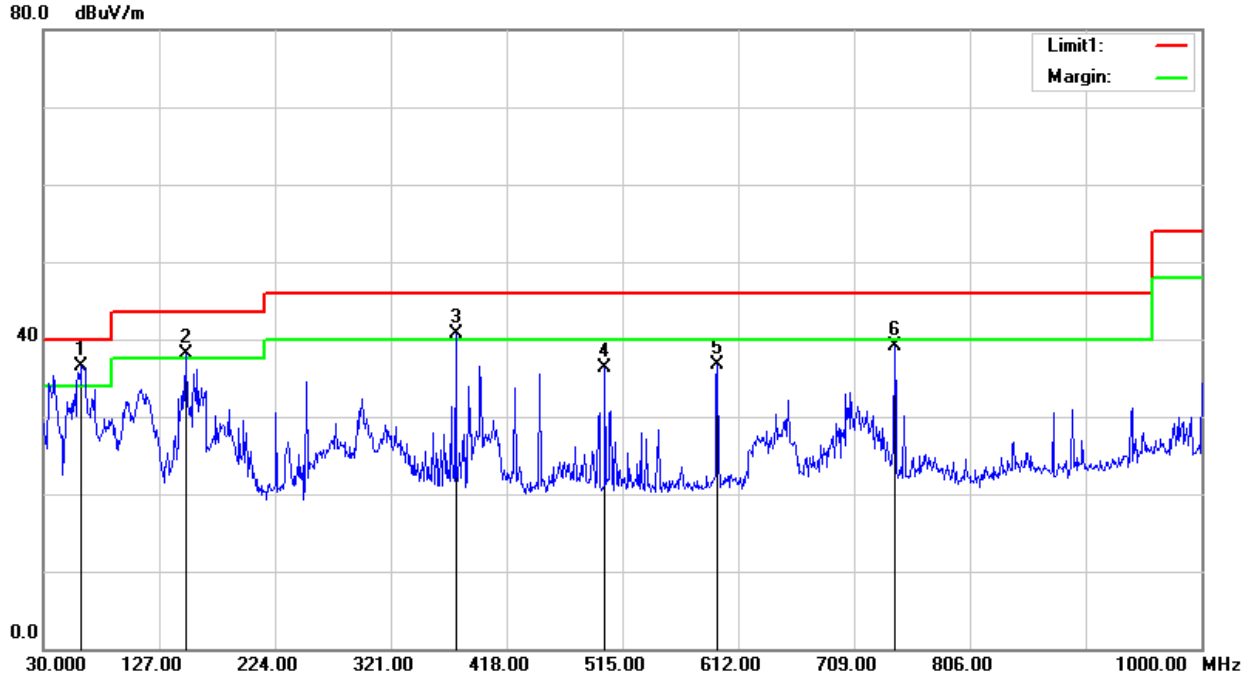
Radiated Emission Worst Test Data_GFSK_DH1_Highest Channel(30 MHz ~ 1 GHz):

Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	63.9500	50.12	-13.84	36.28	40.00	-3.72	QP
2!	149.3100	50.38	-11.87	38.51	43.50	-4.99	QP
3!	250.1900	52.45	-10.79	41.66	46.00	-4.34	QP
4	446.1300	48.84	-8.89	39.95	46.00	-6.05	QP
5	594.5400	43.21	-6.03	37.18	46.00	-8.82	QP
6	875.8400	40.35	-2.45	37.90	46.00	-8.10	QP

Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	62.0100	49.98	-13.57	36.41	40.00	-3.59	QP
2!	149.3100	50.00	-11.87	38.13	43.50	-5.37	QP
3!	375.3200	49.23	-8.53	40.70	46.00	-5.30	QP
4	500.4500	43.27	-6.88	36.39	46.00	-9.61	QP
5	594.5400	42.67	-6.03	36.64	46.00	-9.36	QP
6	742.9500	42.71	-3.56	39.15	46.00	-6.85	QP

Radiated Emission Test Data_GFSK_DH1 (Above 1 GHz):

Lowest Channel:

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polaxis	Remark
1	4804.00	47.50	74.00	-26.50	Peak	Horizontal
2	4804.00	38.64	54.00	-15.36	Average	Horizontal
3	7206.00	47.57	74.00	-26.43	Peak	Horizontal
4	7206.00	38.92	54.00	-15.08	Average	Horizontal
5	4804.00	46.51	74.00	-27.49	Peak	Vertical
6	4804.00	37.84	54.00	-16.16	Average	Vertical
7	7206.00	48.97	74.00	-25.03	Peak	Vertical
8	7206.00	38.06	54.00	-15.94	Average	Vertical

Middle Channel:

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polaxis	Remark
1	4882.00	47.93	74.00	-26.07	Peak	Horizontal
2	4882.00	38.78	54.00	-15.22	Average	Horizontal
3	7323.00	47.63	74.00	-26.37	Peak	Horizontal
4	7323.00	38.89	54.00	-15.11	Average	Horizontal
5	4882.00	46.52	74.00	-27.48	Peak	Vertical
6	4882.00	37.93	54.00	-16.07	Average	Vertical
7	7323.00	48.82	74.00	-25.18	Peak	Vertical
8	7323.00	37.79	54.00	-16.21	Average	Vertical

Highest Channel:

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polaxis	Remark
1	4960.00	47.69	74.00	-26.31	Peak	Horizontal
2	4960.00	38.53	54.00	-15.47	Average	Horizontal
3	7440.00	47.84	74.00	-26.16	Peak	Horizontal
4	7440.00	38.99	54.00	-15.01	Average	Horizontal
5	4960.00	47.63	74.00	-26.37	Peak	Vertical
6	4960.00	37.89	54.00	-16.11	Average	Vertical
7	7440.00	48.42	74.00	-25.58	Peak	Vertical
8	7440.00	38.53	54.00	-15.47	Average	Vertical

5.11 BAND EDGE MEASUREMENTS (RADIATED)

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.205/15.209

Test Method: DA 00-705

Limits:

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Frequency	Limit (dBμV/m @3m)	Remark
30 MHz-88 MHz	40.0	Quasi-peak Value
88 MHz-216 MHz	43.5	Quasi-peak Value
216 MHz-960 MHz	46.0	Quasi-peak Value
960 MHz-1 GHz	54.0	Quasi-peak Value
Above 1 GHz	54.0	Average Value
	74.0	Peak Value

Test Setup: Refer to section 4.5.1 for details.

Test Procedures:

Radiated band edge measurements at 2390 MHz and 2483.5 MHz were made with the unit transmitting in the low end of the channel range and the high end closest to the restricted bands respectively. The emissions were made on the 966 Semi-Chamber. Use (resolution bandwidth (RBW) = 1 MHz, video bandwidth (VBW) = 3 MHz for peak levels and RBW = 1 MHz and VBW = 10 Hz or 1/T for average levels).

1. Use radiated spurious emission test procedure described in clause 5.10. The transmitter output (antenna port) was connected to the test receiver.
2. Set the PK and AV limit line.
3. Record the fundamental emission and emissions out of the band-edge.
4. Determine band-edge compliance as required.

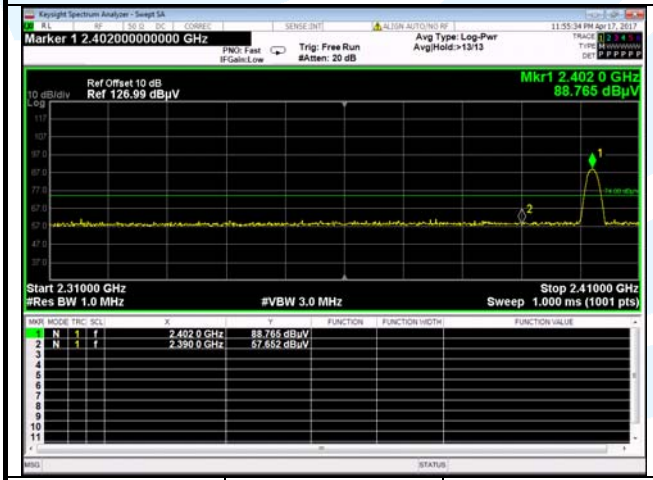
Equipment Used: Refer to section 3 for details.

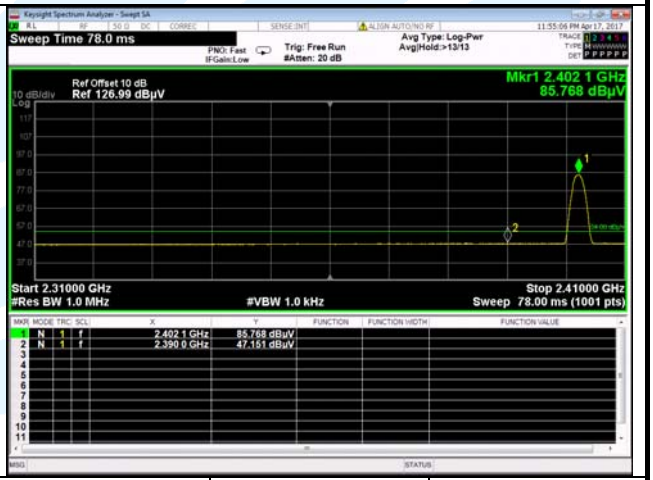
Test Result: Pass

The measurement data as follows:

Worst Test Data _GFSK_DH1

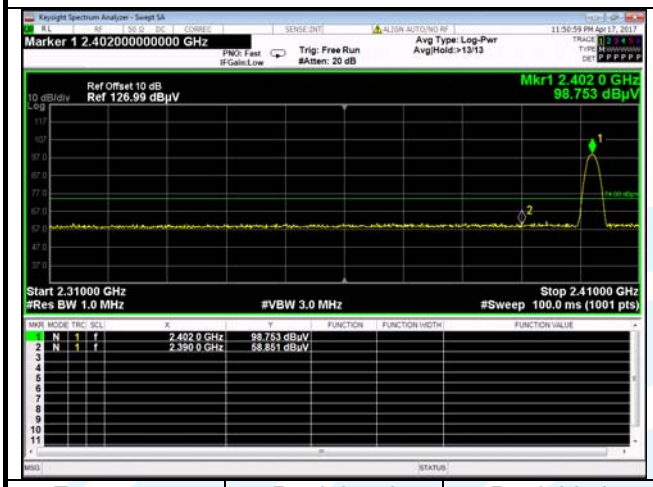
Test Channel:	Lowest Channel	Ant. Polar. :	Horizontal
Detector: Peak		Detector: AV	

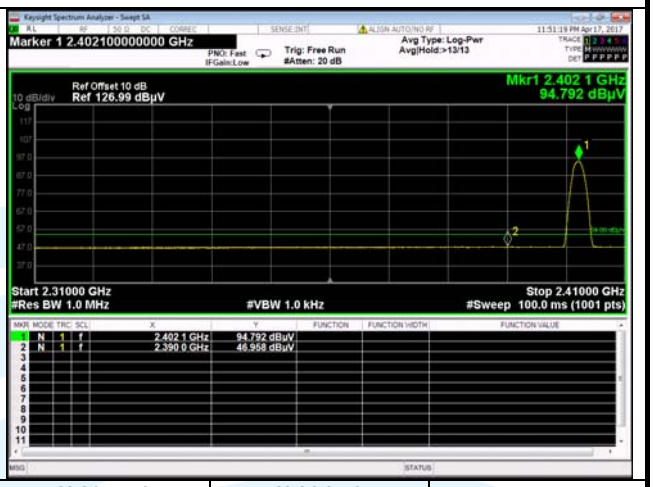




Frequency (MHz)	Peak level (dBuv/m)	Peak Limit (dBuv/m)	AV level (dBuv/m)	AV Limit (dBuv/m)	Conclusion
2390	57.652	74	47.151	54	Pass

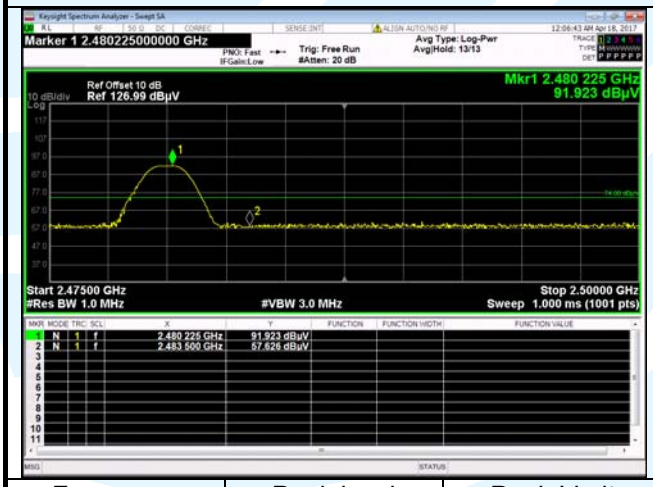
Test Channel:	Lowest Channel	Ant. Polar. :	Vertical
Detector: Peak		Detector: AV	

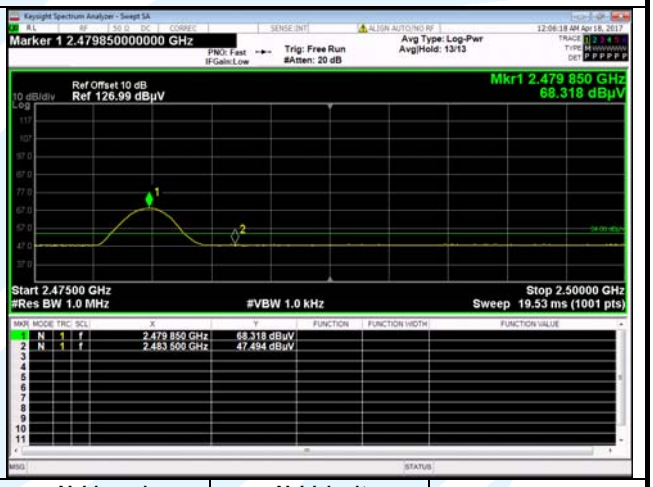




Frequency (MHz)	Peak level (dBuv/m)	Peak Limit (dBuv/m)	AV level (dBuv/m)	AV Limit (dBuv/m)	Conclusion
2390	58.851	74	46.958	54	Pass

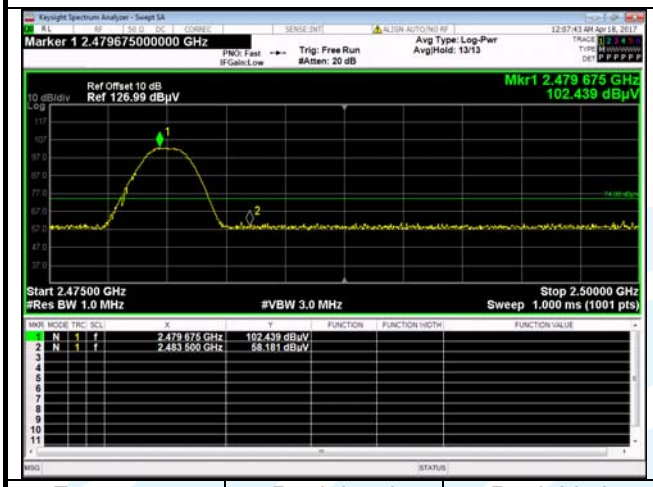
Test Channel:	Highest Channel	Ant. Polar. :	Horizontal
Detector: Peak		Detector: AV	

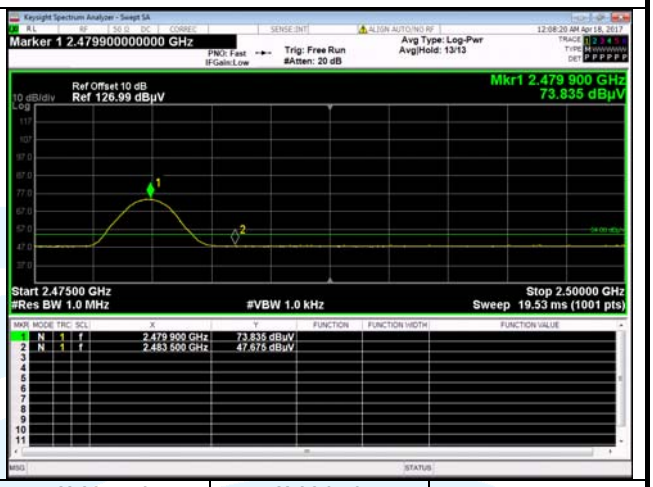




Frequency (MHz)	Peak level (dBuv/m)	Peak Limit (dBuv/m)	AV level (dBuv/m)	AV Limit (dBuv/m)	Conclusion
2390	57.626	74	47.494	54	Pass

Test Channel:	Highest Channel	Ant. Polar. :	Vertical
Detector: Peak		Detector: AV	





Frequency (MHz)	Peak level (dBuv/m)	Peak Limit (dBuv/m)	AV level (dBuv/m)	AV Limit (dBuv/m)	Conclusion
2390	58.181	74	47.675	54	Pass

5.12 CONDUCTED EMISSION

Test Requirement: 47 CFR Part 15C Section 15.207

Test Method: ANSI C63.10-2013

Limits:

Frequency range (MHz)	Limits (dB(μV))	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50

Remark:

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz.

Test Setup: Refer to section 4.5.2 for details.

Test Procedures:

Test frequency range :150KHz-30MHz

1) The mains terminal disturbance voltage test was conducted in a shielded room.
2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

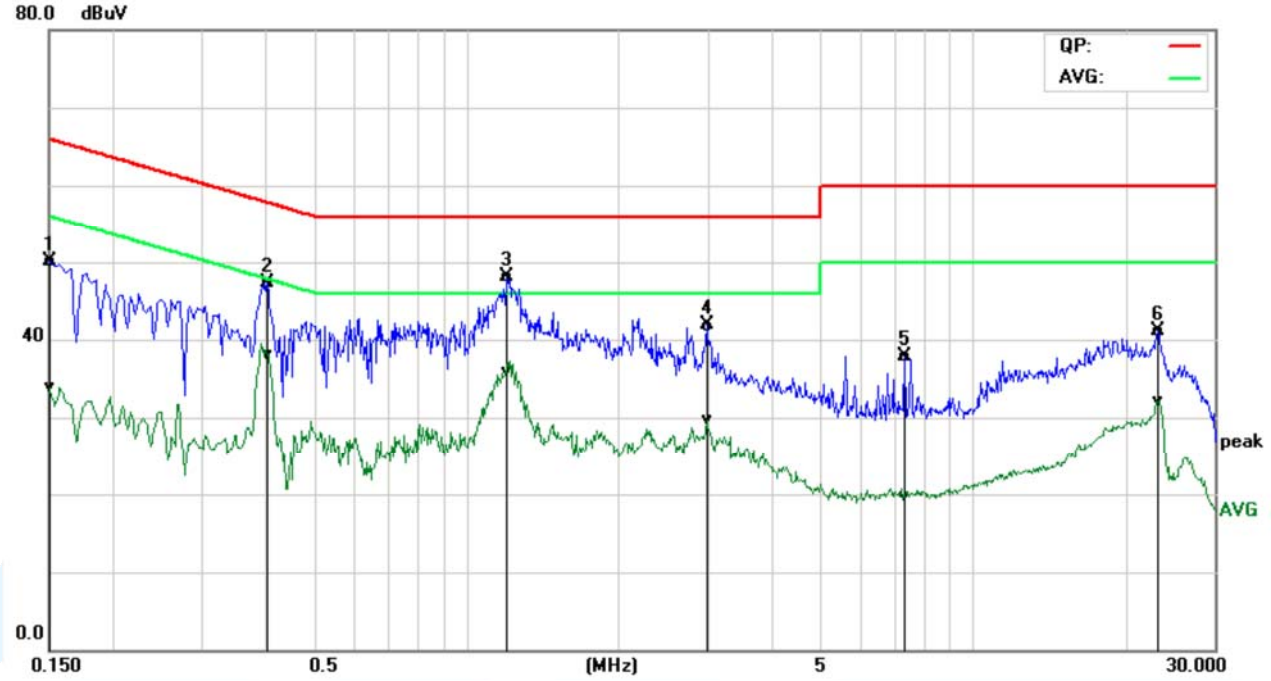
Equipment Used: Refer to section 3 for details.

Test Result: Pass

The measurement data as follows:

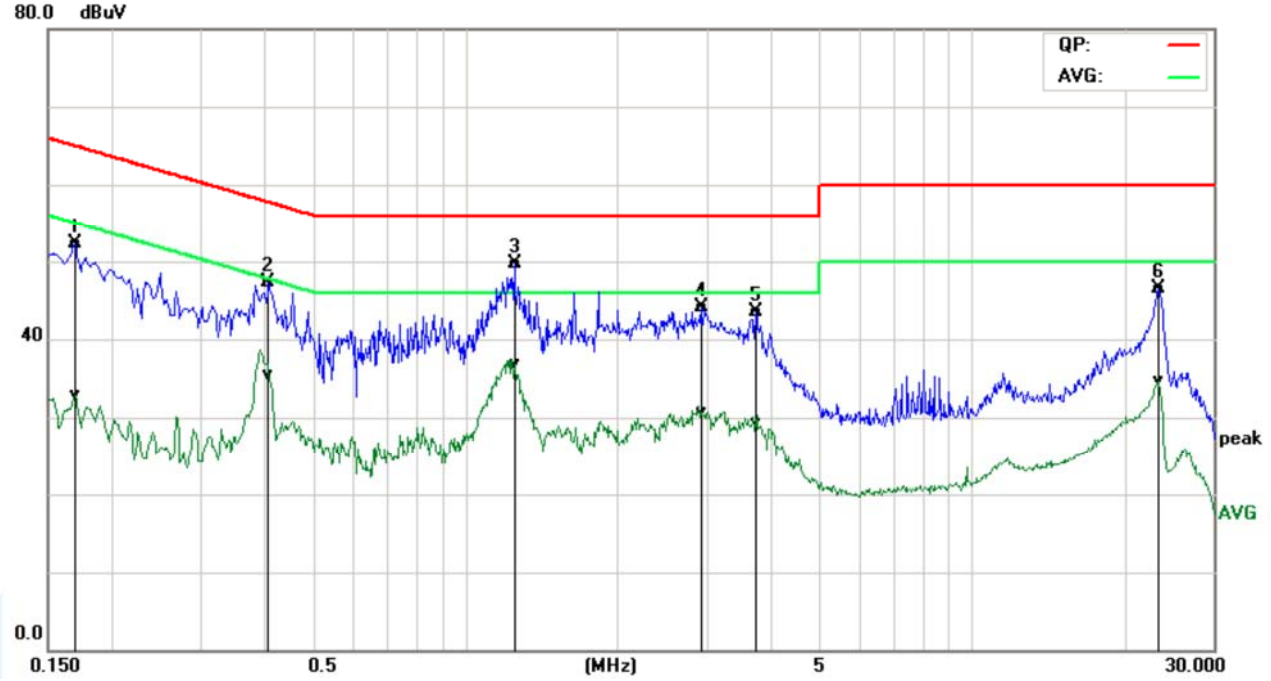
Quasi Peak:

Live Line



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1P	0.1500	30.47	14.28	19.62	50.09	33.90	65.99	56.00	-15.90	-22.10	Pass
2P	0.4060	27.81	18.64	19.56	47.37	38.20	57.73	47.73	-10.36	-9.53	Pass
3*	1.2059	28.56	16.24	19.58	48.14	35.82	56.00	46.00	-7.86	-10.18	Pass
4P	2.9860	22.08	9.92	19.72	41.80	29.64	56.00	46.00	-14.20	-16.36	Pass
5P	7.3300	18.07	-0.08	19.87	37.94	19.79	60.00	50.00	-22.06	-30.21	Pass
6P	23.1860	20.64	11.65	20.39	41.03	32.04	60.00	50.00	-18.97	-17.96	Pass

Neutral Line



No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1P	0.1700	32.69	13.38	19.53	52.22	32.91	64.96	54.96	-12.74	-22.05	Pass
2P	0.4100	27.74	16.03	19.53	47.27	35.56	57.65	47.65	-10.38	-12.09	Pass
3*	1.2500	30.15	17.35	19.59	49.74	36.94	56.00	46.00	-6.26	-9.06	Pass
4P	2.9180	24.28	10.90	19.75	44.03	30.65	56.00	46.00	-11.97	-15.35	Pass
5P	3.7540	23.64	9.42	19.79	43.43	29.21	56.00	46.00	-12.57	-16.79	Pass
6P	23.3100	26.00	14.23	20.49	46.49	34.72	60.00	50.00	-13.51	-15.28	Pass

Remark:
1. An initial pre-scan was performed on the Phase and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

APPENDIX 1 PHOTOGRAPHS OF TEST SETUP

See test photographs attached in Appendix 1 for the actual connections between Product and support equipment.

APPENDIX 2 PHOTOGRAPHS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photographs.

*** End of Report ***