TEST REPORT

Product	:	Yanshee
Trade mark	:	UBTECH
Model/Type reference	:	Yanshee
Serial Number	:	N/A
Report Number	:	EED32K00127802
FCC ID	:	2AHJX-YANSHEE
Date of Issue	:	Jul. 19, 2018
Test Standards	:	47 CFR Part 15 Subpart C
Test result	:	PASS

Prepared for:

UBTECH ROBOTICS CORP

16th and 22nd Floor, Block C1, Nanshan I Park, No.1001 Xueyuan Road, Nanshan District, Shenzhen City, P.R.CHINA

Prepared by:

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Tested By:	Tom chen (Test Project)	Compiled by:	Max Liang (Project Engineer)
Reviewed by:	Kevin yang (Reviewer)	Approved by:	Sheek Luo (Lab supervisor)
Date:	Jul. 19, 2018		Check No.:3096333402

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2 Version

Version No.	Date	Description
00	Jul. 19, 2018	Original

3 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15 Subpart C Section 15.203/15.247 (c)	ANSI C63.10-2013	PASS
AC Power Line Conducted Emission	47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013	PASS
Conducted Peak Output Power	47 CFR Part 15 Subpart C Section 15.247 (b)(1)	ANSI C63.10-2013	PASS
20dB Occupied Bandwidth	47 CFR Part 15 Subpart C Section 15.247 (a)(1)	ANSI C63.10-2013	PASS
Carrier Frequencies Separation	47 CFR Part 15 Subpart C Section 15.247 (a)(1)	ANSI C63.10-2013	PASS
Hopping Channel Number	47 CFR Part 15 Subpart C Section 15.247 (b)	ANSI C63.10-2013	PASS
Dwell Time	47 CFR Part 15 Subpart C Section 15.247 (a)(1)	ANSI C63.10-2013	PASS
Pseudorandom Frequency Hopping Sequence	47 CFR Part 15 Subpart C Section 15.247(b)(4)&TCB Exclusion List (7 July 2002)	ANSI C63.10-2013	PASS
RF Conducted Spurious Emissions	47 CFR Part 15 Subpart C Section 15.247(d)	ANSI C63.10-2013	PASS
Radiated Spurious emissions	47 CFR Part 15 Subpart C Section 15.205/15.209	ANSI C63.10-2013	PASS

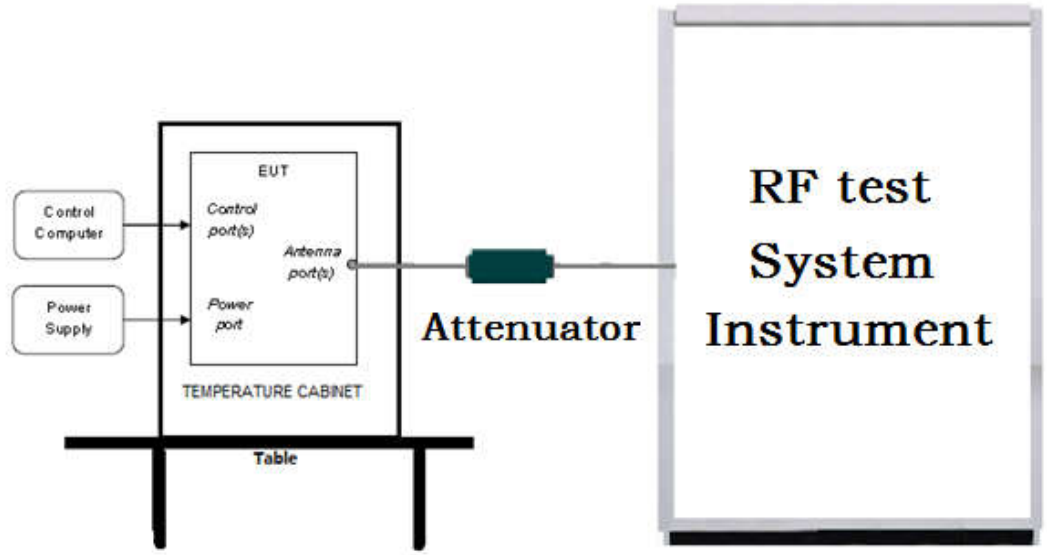
Remark:
Test according to ANSI C63.4-2014 & ANSI C63.10-2013.
The tested samples and the sample information are provided by the client.

4 Content

5 Test Requirement

5.1 Test setup

5.1.1 For Conducted test setup



5.1.2 For Radiated Emissions test setup

Radiated Emissions setup:

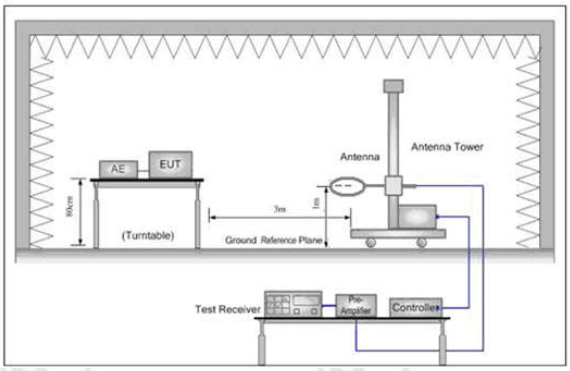


Figure 1. Below 30MHz

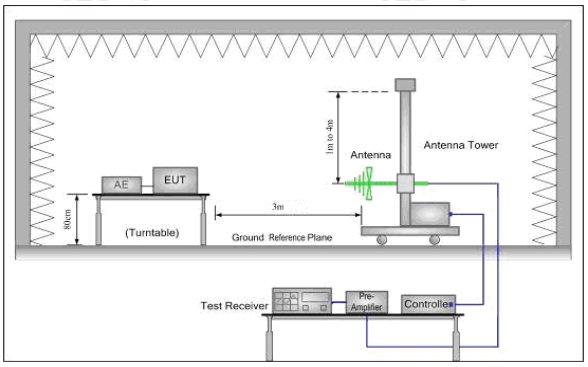


Figure 2. 30MHz to 1GHz

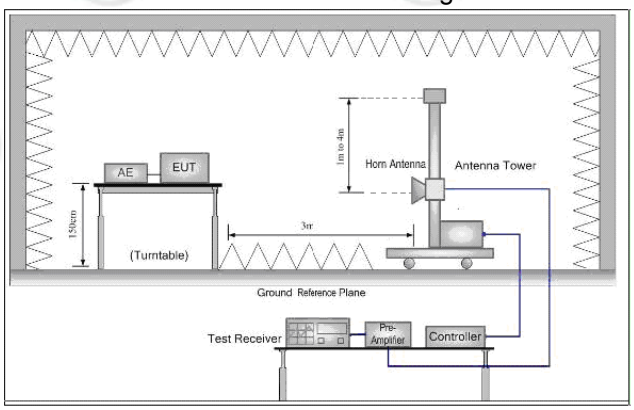
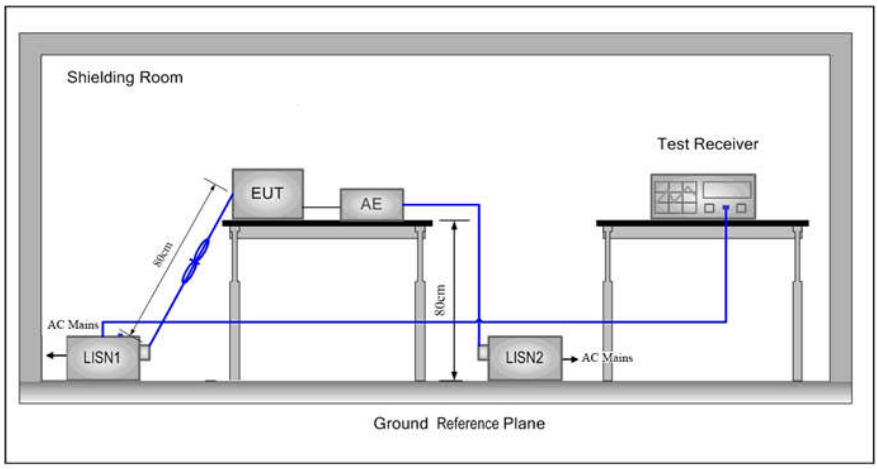


Figure 3. Above 1GHz

5.1.3 For Conducted Emissions test setup

Conducted Emissions setup



5.2 Test Environment

Operating Environment:	
Temperature:	24.8 °C
Humidity:	55 % RH
Atmospheric Pressure:	1010mbar

5.3 Test Condition

Test Mode	Tx	RF Channel		
		Low(L)	Middle(M)	High(H)
GFSK/π/4DQPSK/ 8DPSK(DH1,DH3, DH5)	2402MHz ~2480 MHz	Channel 1	Channel 40	Channel79
		2402MHz	2441MHz	2480MHz
TX mode: The EUT transmitted the continuous signal at the specific channel(s).				

Test mode:

Pre-scan under all rate at Lowest channel 1

Mode	**GFSK**		
packets	**1-DH1**	**1-DH3**	**1-DH5**
Power(dBm)	-1.122	0.012	0.582

Mode	π/4DQPSK		
packets	**2-DH1**	**2-DH3**	**2-DH5**
Power(dBm)	-1.522	-1.000	0.162
Mode	8DPSK		
packets	**3-DH1**	**3-DH3**	**3-DH5**
Power(dBm)	-1.780	-1.250	0.417

Through Pre-scan, 1-DH5 packet the power is the worst case of GFSK, 2-DH5 packet the power is the worst case of π/4DQPSK, 3-DH5 packet the power is the worst case of 8DPSK.

6 General Information

6.1 Client Information

Applicant:	UBTECH ROBOTICS CORP
Address of Applicant:	16th and 22nd Floor, Block C1, Nanshan I Park, No.1001 Xueyuan Road, Nanshan District, Shenzhen City, P.R.CHINA
Manufacturer:	UBTECH ROBOTICS CORP
Address of Manufacturer:	16th and 22nd Floor, Block C1, Nanshan I Park, No.1001 Xueyuan Road, Nanshan District, Shenzhen City, P.R.CHINA
Factory:	UBTECH ROBOTICS CORP BAOAN BRANCH
Address of Factory:	1-2 Floor, B Block, Huilongda Industry Park, Shilongzai, Shiyan Street, Baoan District, Shenzhen City, P.R.CHINA

6.2 General Description of EUT

Product Name:	Yanshee	
Model No.(EUT):	Yanshee	
Trade mark:	UBTECH	
EUT Supports Radios application:	BT 4.1 BT Dual mode, 2402MHz to 2480MHz WiFi IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz	
Power Supply:	Adapter	Model: HKA03609640-8A Input: 100-240V~50/60Hz, 1.5A Output: 9.6V⎓4.0A
	Battery	Rechargable Li-ion Battery 7.24V, 2750mAh, 19.91Wh
Sample Received Date:	May 24, 2018	
Sample tested Date:	May 24, 2018 to Jul. 19, 2018	

6.3 Product Specification subjective to this standard

Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	3.0
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, π/4DQPSK, 8DPSK
Number of Channel:	79
Hopping Channel Type:	Adaptive Frequency Hopping systems
Firmware version:	Linux 9(manufacturer declare)
Hardware version:	V1.0(manufacturer declare)
Antenna Type:	Ceramic antenna
Antenna Gain:	1.8dBi
Test Voltage:	AC 120V, 60Hz

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	21	2422MHz	41	2442MHz	61	2462MHz
2	2403MHz	22	2423MHz	42	2443MHz	62	2463MHz
3	2404MHz	23	2424MHz	43	2444MHz	63	2464MHz
4	2405MHz	24	2425MHz	44	2445MHz	64	2465MHz
5	2406MHz	25	2426MHz	45	2446MHz	65	2466MHz
6	2407MHz	26	2427MHz	46	2447MHz	66	2467MHz
7	2408MHz	27	2428MHz	47	2448MHz	67	2468MHz
8	2409MHz	28	2429MHz	48	2449MHz	68	2469MHz
9	2410MHz	29	2430MHz	49	2450MHz	69	2470MHz
10	2411MHz	30	2431MHz	50	2451MHz	70	2471MHz
11	2412MHz	31	2432MHz	51	2452MHz	71	2472MHz
12	2413MHz	32	2433MHz	52	2453MHz	72	2473MHz
13	2414MHz	33	2434MHz	53	2454MHz	73	2474MHz
14	2415MHz	34	2435MHz	54	2455MHz	74	2475MHz
15	2416MHz	35	2436MHz	55	2456MHz	75	2476MHz
16	2417MHz	36	2437MHz	56	2457MHz	76	2477MHz
17	2418MHz	37	2438MHz	57	2458MHz	77	2478MHz
18	2419MHz	38	2439MHz	58	2459MHz	78	2479MHz
19	2420MHz	39	2440MHz	59	2460MHz	79	2480MHz
20	2421MHz	40	2441MHz	60	2461MHz		

6.4 Description of Support Units

The EUT has been tested independently.

6.5 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd

Building C, Hongwei Industrial Park Block 70, Bao'an District, Shenzhen, China

Telephone: +86 (0) 755 33683668 Fax:+86 (0) 755 33683385

No tests were sub-contracted.

FCC Designation No.: CN1164

6.6 Deviation from Standards

None.

6.7 Abnormalities from Standard Conditions

None.

6.8 Other Information Requested by the Customer

None.

6.9 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.9×10^{-8}
2	RF power, conducted	0.31dB (30MHz-1GHz)
		0.57dB (1GHz-18GHz)
3	Radiated Spurious emission test	4.5dB (30MHz-1GHz)
		4.8dB (1GHz-12.75GHz)
4	Conduction emission	3.6dB (9kHz to 150kHz)
		3.2dB (150kHz to 30MHz)
5	Temperature test	0.64°C
6	Humidity test	2.8%
7	DC power voltages	0.025%

7 Equipment List

Conducted disturbance Test					
Equipment	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm-dd-yyyy)**	**Cal. Due date (mm-dd-yyyy)**
Receiver	R&S	ESCI	100435	05-26-2017 05-25-2018	05-25-2018 05-24-2019
Temperature/ Humidity Indicator	Belida	TT-512	A19	01-24-2018	01-23-2019
LISN	R&S	ENV216	100098	05-11-2018	05-10-2019

RF Conducted test					
Equipment	**Manufacturer**	**Mode No.**	**Serial Number**	**Cal. Date (mm-dd-yyyy)**	**Cal. Due date (mm-dd-yyyy)**
Signal Generator	Keysight	E8257D	MY53401106	03-13-2018	03-12-2019
Spectrum Analyzer	Keysight	N9010A	MY54510339	03-13-2018	03-12-2019
Signal Generator	Keysight	N5182B	MY53051549	03-13-2018	03-12-2019
High-pass filter	Sinoscite	FL3CX03WG18 NM12-0398-002	---	01-10-2018	01-09-2019
High-pass filter	Sinoscite	FL3CX03WG18 NM12-0398-002	---	01-10-2018	01-09-2019
power meter & power sensor	R&S	OSP120	101374	04-11-2018	04-10-2019
RF control unit	JS Tonscend	JS0806-2	2015860006	03-13-2018	03-12-2019

3M Semi/full-anechoic Chamber					
Equipment	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm-dd-yyyy)**	**Cal. Due date (mm-dd-yyyy)**
3M Chamber & Accessory Equipment	TDK	SAC-3	---	06-04-2016	06-03-2019
TRILOG Broadband Antenna	SCHWARZBECK	VULB9163	9163-617	03-29-2018	03-28-2019
Preamplifier	JS Tonscend	EMC051845SE	980380	01-19-2018	01-18-2019
Horn Antenna	ETS-LINDGREN	3117	00057407	07-10-2018	07-08-2021
Double Ridge Horn Antenna	A.H.SYSTEMS	SAS-574	374	06-07-2015 06-05-2018	06-05-2018 06-03-2021
Loop Antenna	ETS	6502	00071730	06-22-2017	06-21-2019
Spectrum Analyzer	R&S	FSP40	100416	05-11-2018	05-10-2019
Receiver	R&S	ESCI	100435	05-26-2017 05-25-2018	05-25-2018 05-24-2019
LISN	schwarzbeck	NNBM8125	81251547	05-11-2018	05-10-2019
LISN	schwarzbeck	NNBM8125	81251548	05-11-2018	05-10-2019
Signal Generator	Agilent	E4438C	MY45095744	03-13-2018	03-12-2019
Signal Generator	Keysight	E8257D	MY53401106	03-13-2018	03-12-2019
Temperature/ Humidity Indicator	TAYLOR	1451	1905	05-02-2018	05-01-2019
Communication test set	Agilent	E5515C	GB47050534	03-16-2018	03-15-2019
Cable line	Fulai(7M)	SF106	5219/6A	01-10-2018	01-09-2019
Cable line	Fulai(6M)	SF106	5220/6A	01-10-2018	01-09-2019
Cable line	Fulai(3M)	SF106	5216/6A	01-10-2018	01-09-2019
Cable line	Fulai(3M)	SF106	5217/6A	01-10-2018	01-09-2019
Communication test set	R&S	CMW500	152394	03-16-2018	03-15-2019
High-pass filter	Sinoscite	FL3CX03WG18NM1 2-0398-002	---	01-10-2018	01-09-2019
band rejection filter	Sinoscite	FL5CX01CA09CL12 -0395-001	---	01-10-2018	01-09-2019
band rejection filter	Sinoscite	FL5CX01CA08CL12 -0393-001	---	01-10-2018	01-09-2019
band rejection filter	Sinoscite	FL5CX02CA04CL12 -0396-002	---	01-10-2018	01-09-2019
band rejection filter	Sinoscite	FL5CX02CA03CL12 -0394-001	---	01-10-2018	01-09-2019

8 Radio Technical Requirements Specification

Reference documents for testing:

No.	Identity	Document Title
1	FCC Part 15C	Subpart C-Intentional Radiators
2	ANSI C63.10-2013	American National Standard for Testing Unlicesed Wireless Devices

Test Results List:

Test requirement	Test method	Test item	Verdict	Note
Part15C Section 15.247 (a)(1)	ANSI 63.10	20dB Occupied Bandwidth	PASS	Appendix A)
Part15C Section 15.247 (a)(1)	ANSI 63.10	Carrier Frequencies Separation	PASS	Appendix B)
Part15C Section 15.247 (a)(1)	ANSI 63.10	Dwell Time	PASS	Appendix C)
Part15C Section 15.247 (b)	ANSI 63.10	Hopping Channel Number	PASS	Appendix D)
Part15C Section 15.247 (b)(1)	ANSI 63.10	Conducted Peak Output Power	PASS	Appendix E)
Part15C Section 15.247(d)	ANSI 63.10	Band-edge for RF Conducted Emissions	PASS	Appendix F)
Part15C Section 15.247(d)	ANSI 63.10	RF Conducted Spurious Emissions	PASS	Appendix G)
Part15C Section 15.247 (a)(1)	ANSI 63.10	Pseudorandom Frequency Hopping Sequence	PASS	Appendix H)
Part15C Section 15.203/15.247 (c)	ANSI 63.10	Antenna Requirement	PASS	Appendix I)
Part15C Section 15.207	ANSI 63.10	AC Power Line Conducted Emission	PASS	Appendix J)
Part15C Section 15.205/15.209	ANSI 63.10	Restricted bands around fundamental frequency (Radiated) Emission)	PASS	Appendix K)
Part15C Section 15.205/15.209	ANSI 63.10	Radiated Spurious Emissions	PASS	Appendix L)

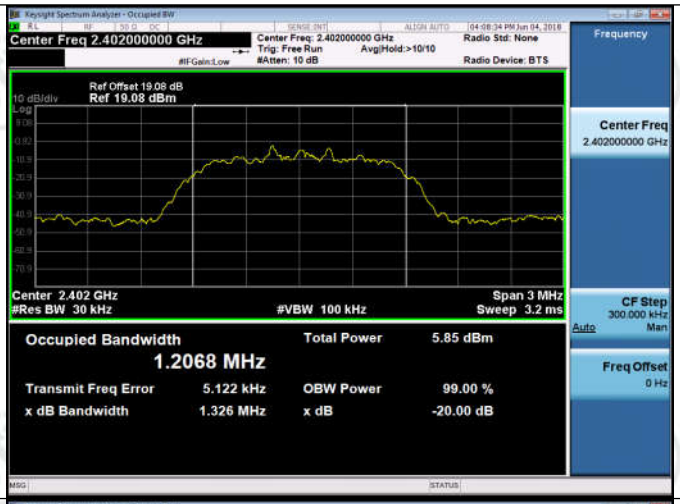
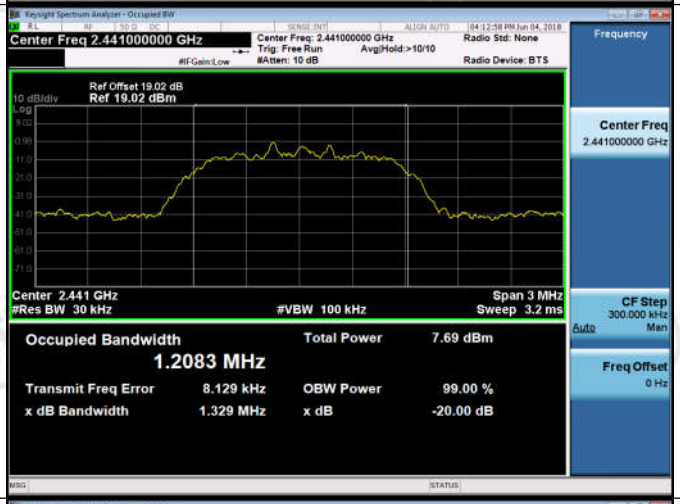
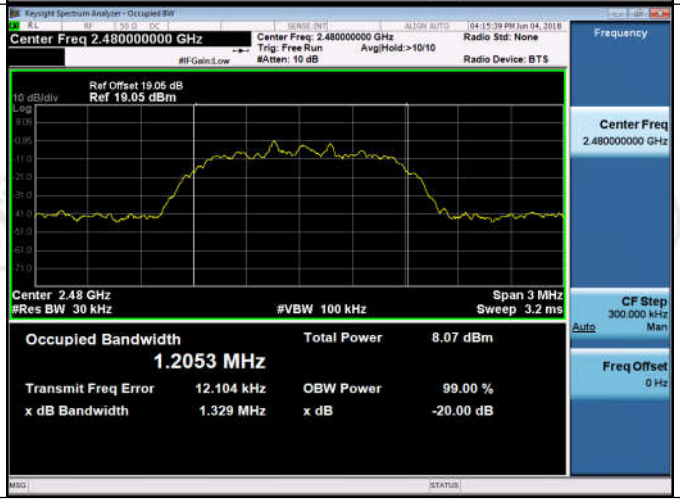
Appendix A): 20dB Occupied Bandwidth

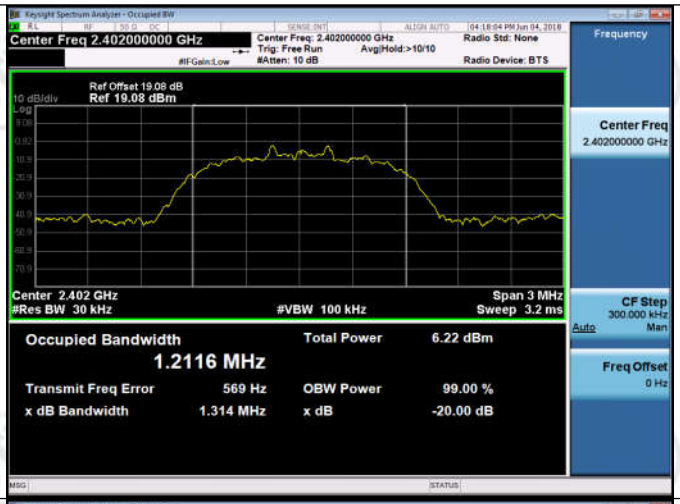
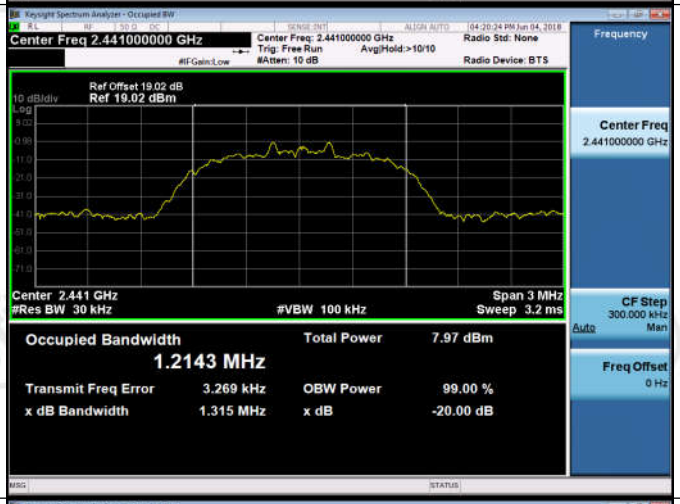
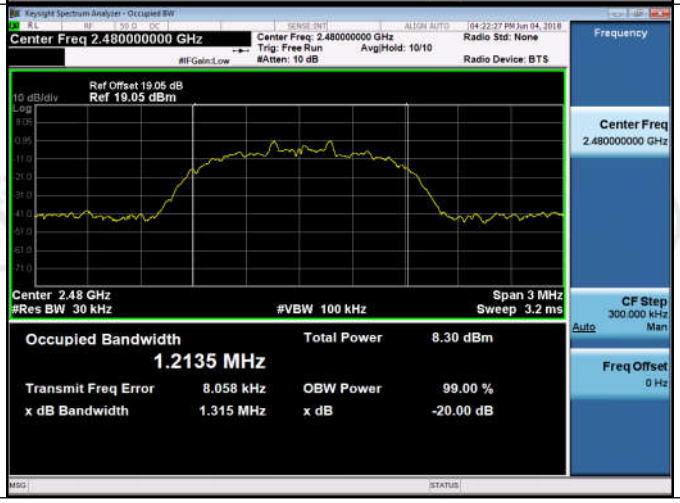
Test Result

Mode	Channel.	20dB Bandwidth [MHz]	99% OBW [MHz]	Verdict	Remark
GFSK	LCH	0.9610	0.89167	PASS	Peak detector
GFSK	MCH	0.9641	0.88737	PASS	
GFSK	HCH	0.9678	0.88647	PASS	
π/4DQPSK	LCH	1.326	1.2068	PASS	
π/4DQPSK	MCH	1.329	1.2083	PASS	
π/4DQPSK	HCH	1.329	1.2053	PASS	
8DPSK	LCH	1.314	1.2116	PASS	
8DPSK	MCH	1.315	1.2143	PASS	
8DPSK	HCH	1.315	1.2135	PASS	

Test Graph

Graphs		
GFSK/LCH		
GFSK/MCH		
GFSK/HCH		

π/4DQPSK/LCH			
π/4DQPSK/MCH			
π/4DQPSK/HCH			

8DPSK/LCH		
8DPSK/MCH		
8DPSK/HCH		

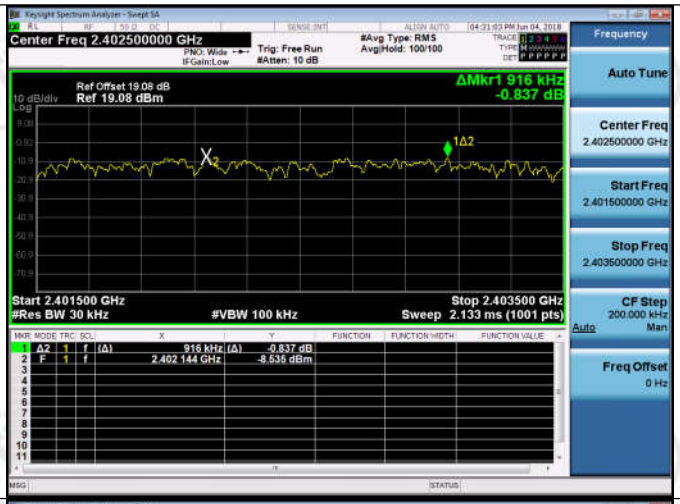
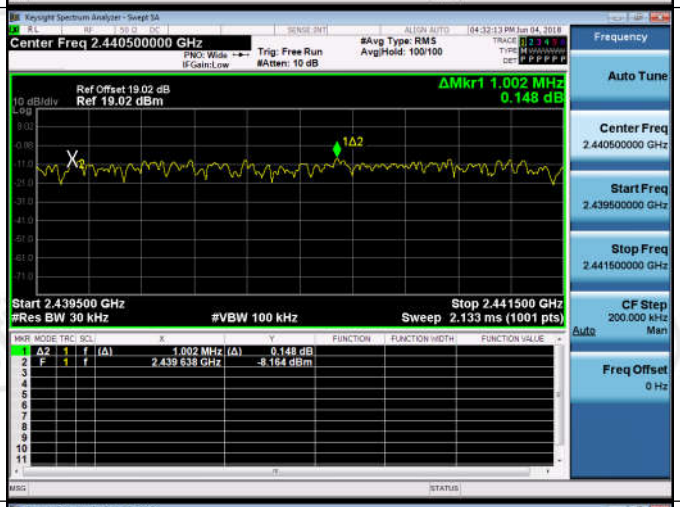
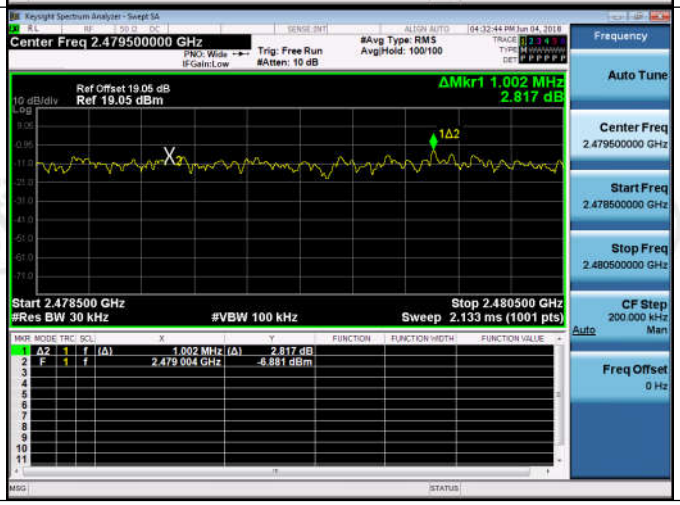
Appendix B): Carrier Frequency Separation

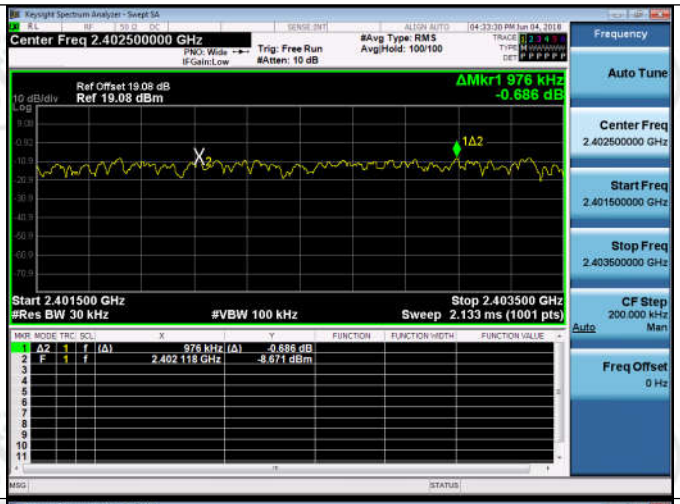
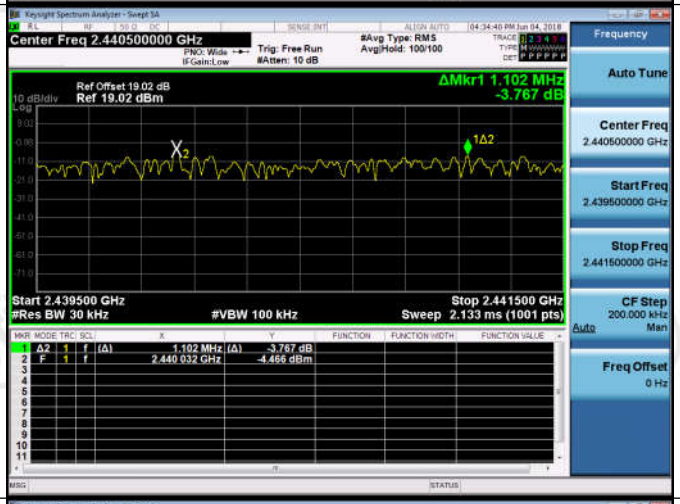
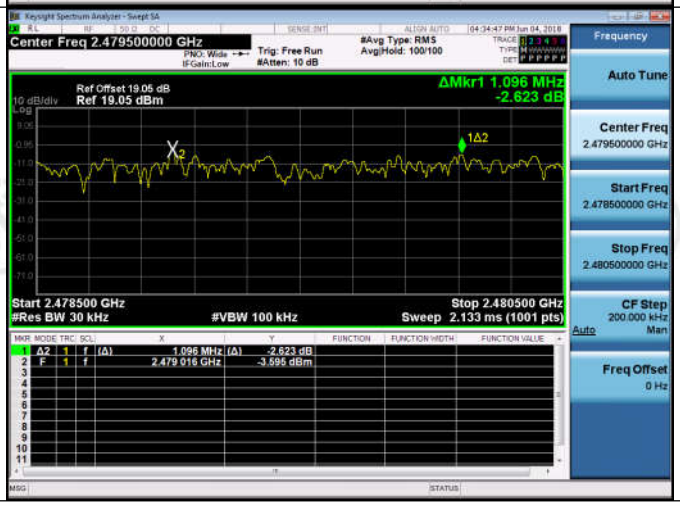
Result Table

Mode	Channel.	Carrier Frequency Separation [MHz]	Verdict
GFSK	LCH	0.916	PASS
GFSK	MCH	1.000	PASS
GFSK	HCH	1.000	PASS
π/4DQPSK	LCH	0.916	PASS
π/4DQPSK	MCH	1.002	PASS
π/4DQPSK	HCH	1.002	PASS
8DPSK	LCH	0.976	PASS
8DPSK	MCH	1.102	PASS
8DPSK	HCH	1.096	PASS

Test Graph

Graphs		
GFSK/LCH		
GFSK/MCH		
GFSK/HCH		

π/4DQPSK/LCH		
π/4DQPSK/MCH		
π/4DQPSK/HCH		

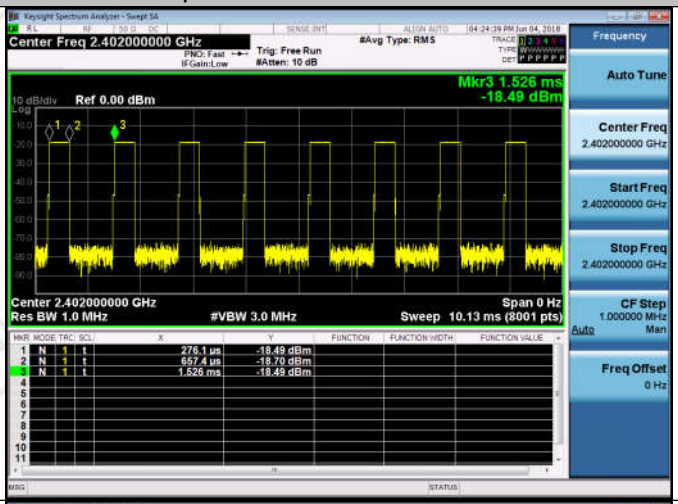
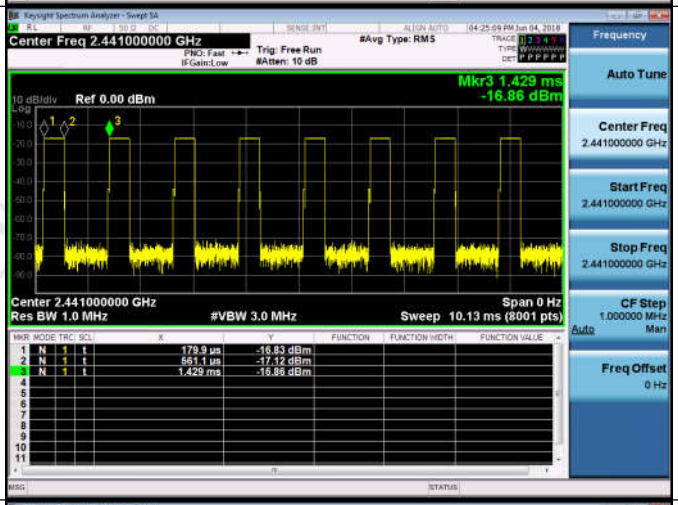
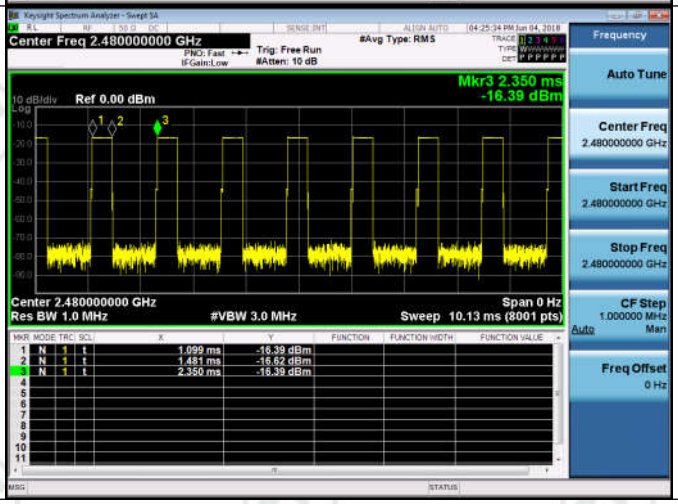
8DPSK/LCH		
8DPSK/MCH		
8DPSK/HCH		

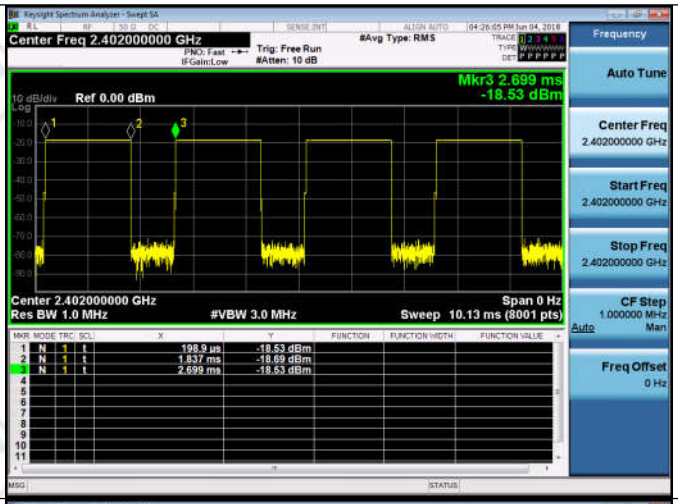
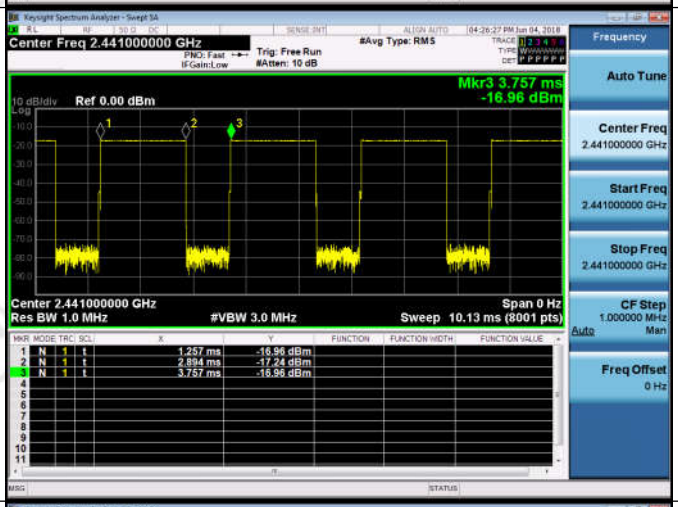
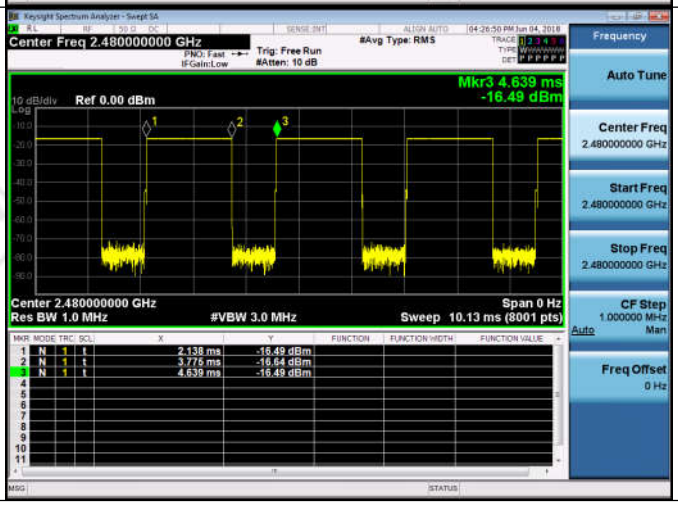
Appendix C): Dwell Time

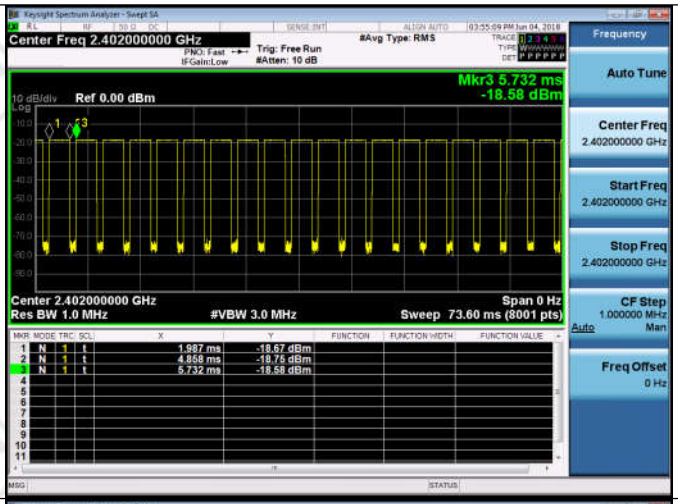
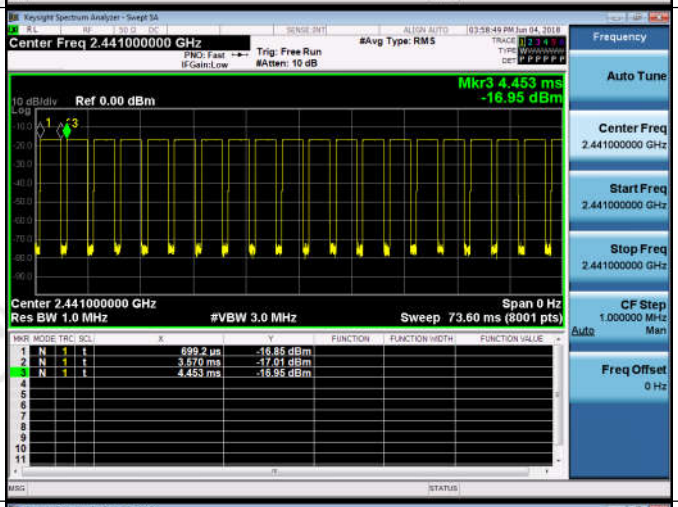
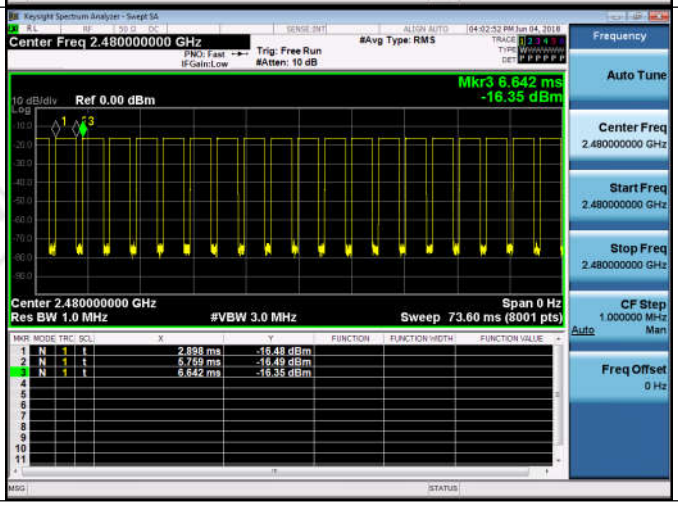
Result Table

Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Duty Cycle [%]	Verdict
GFSK	DH1	LCH	0.381267	320	0.122	0.30	PASS
GFSK	DH1	MCH	0.381266	320	0.122	0.31	PASS
GFSK	DH1	HCH	0.38126	320	0.122	0.30	PASS
GFSK	DH3	LCH	1.637803	160	0.262	0.66	PASS
GFSK	DH3	MCH	1.6378	160	0.262	0.66	PASS
GFSK	DH3	HCH	1.63654	160	0.262	0.65	PASS
GFSK	DH5	LCH	2.8704	106.7	0.306	0.77	PASS
GFSK	DH5	MCH	2.8704	106.7	0.306	0.76	PASS
GFSK	DH5	HCH	2.8612	106.7	0.305	0.76	PASS

Test Graph

Graphs			
GFSK_DH1/LCH			
GFSK_DH1/MCH			
GFSK_DH1/HCH			

GFSK_DH3/LCH			
GFSK_DH3/MCH			
GFSK_DH3/HCH			

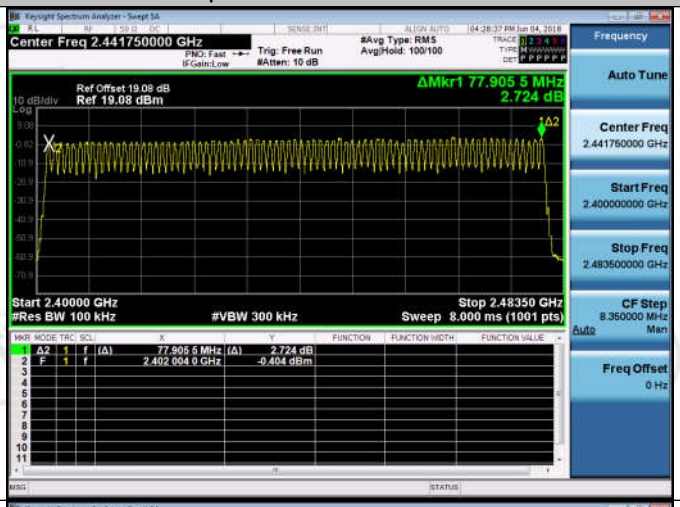
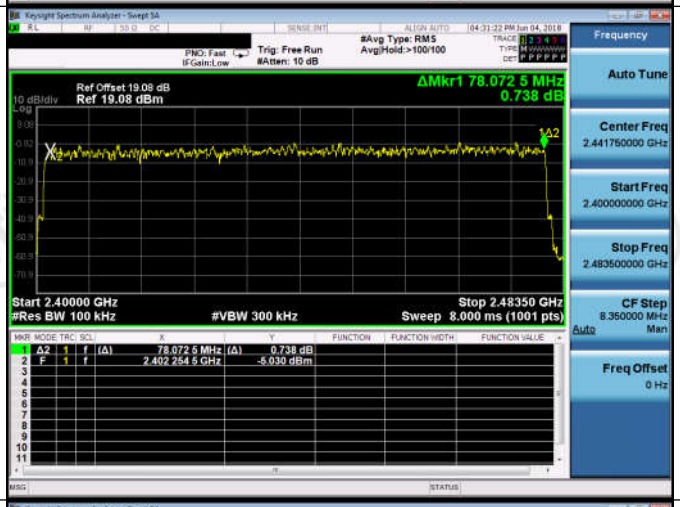
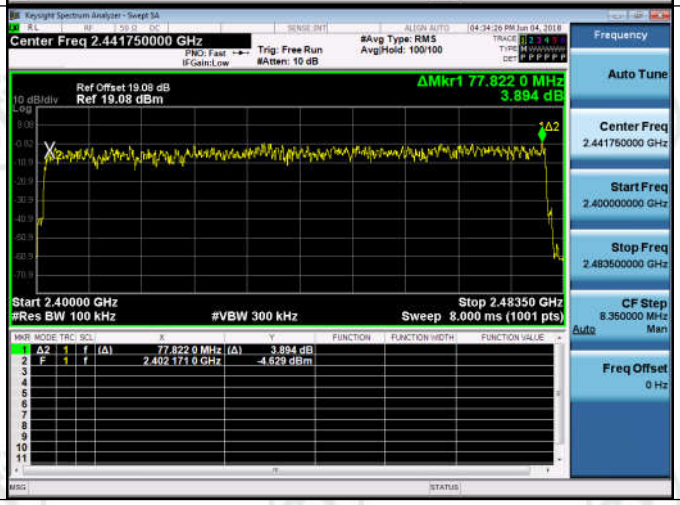
GFSK_DH5/LCH			
GFSK_DH5/MCH			
GFSK_DH5/HCH			

Appendix D): Hopping Channel Number

Result Table

Mode	Channel.	Number of Hopping Channel	Verdict
GFSK	Hop	79	PASS
π/4DQPSK	Hop	79	PASS
8DPSK	Hop	79	PASS

Test Graph

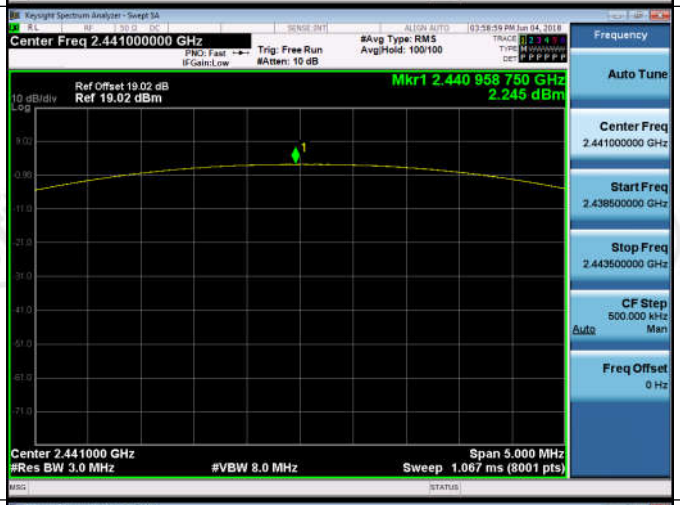
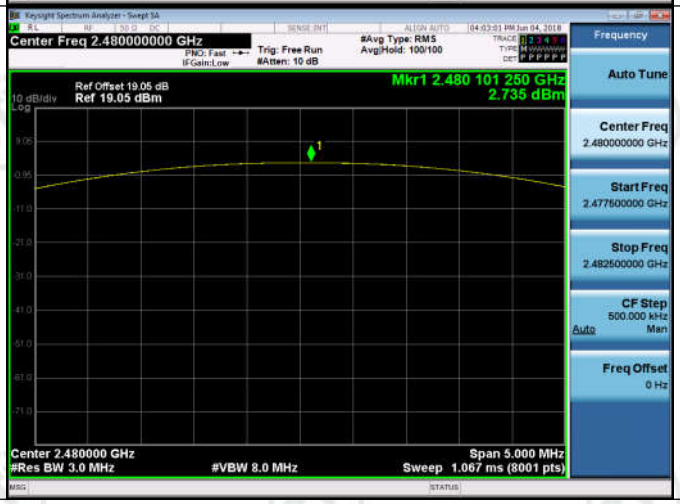
Graphs			
GFSK/Hop			
π/4DQPSK/Hop			
8DPSK/Hop			

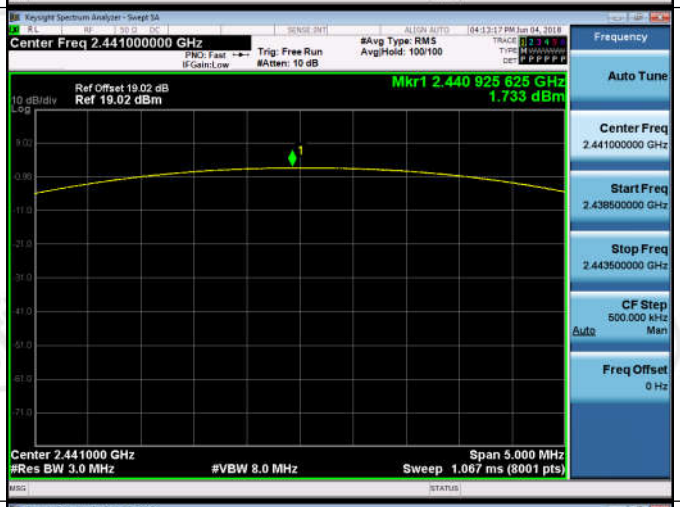
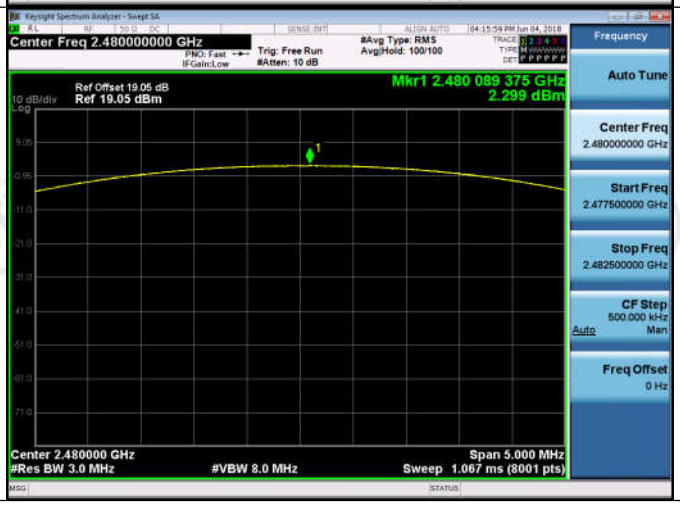
Appendix E): Conducted Peak Output Power

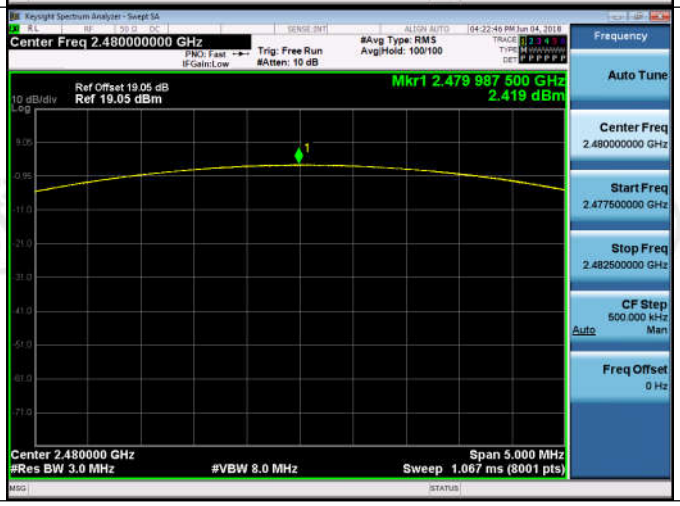
Result Table

Mode	Channel.	Maximum Peak Output Power [dBm]	Verdict
GFSK	LCH	0.582	PASS
GFSK	MCH	2.245	PASS
GFSK	HCH	2.735	PASS
π/4DQPSK	LCH	0.162	PASS
π/4DQPSK	MCH	1.733	PASS
π/4DQPSK	HCH	2.299	PASS
8DPSK	LCH	0.417	PASS
8DPSK	MCH	1.975	PASS
8DPSK	HCH	2.419	PASS

Test Graph

Graphs			
GFSK/LCH			
GFSK/MCH			
GFSK/HCH			

π/4DQPSK/LCH			
π/4DQPSK/MCH			
π/4DQPSK/HCH			

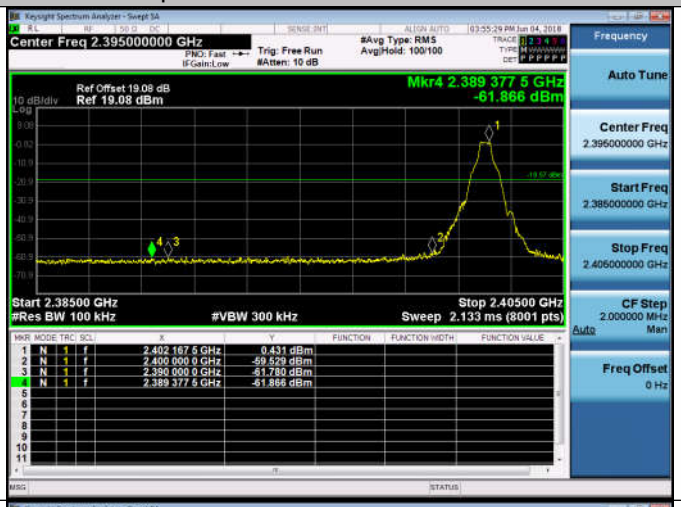
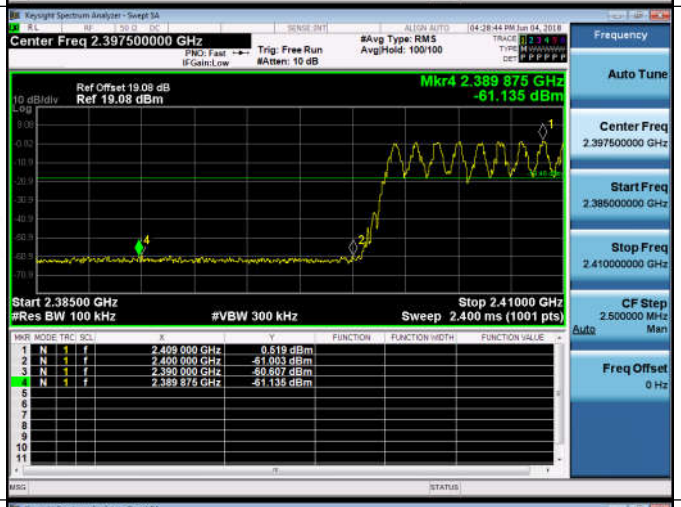
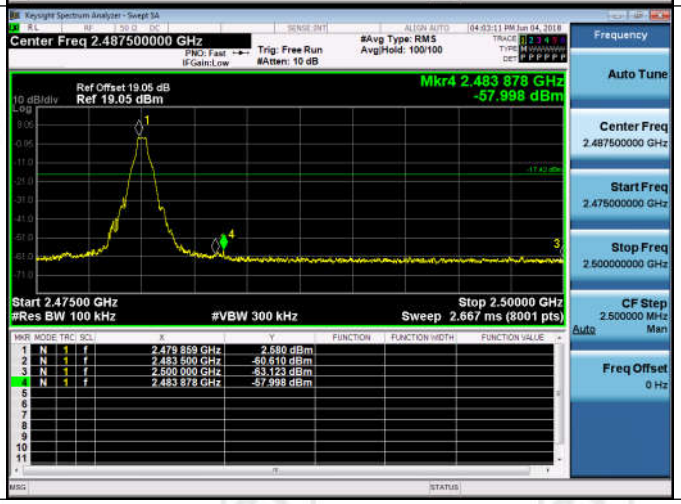
8DPSK/LCH		
8DPSK/MCH		
8DPSK/HCH		

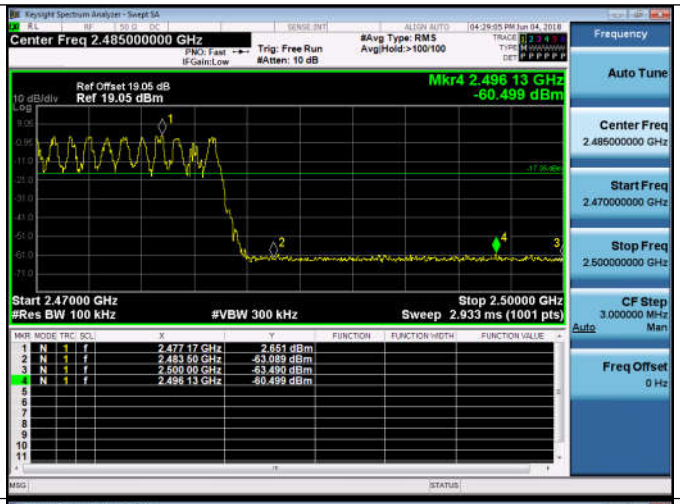
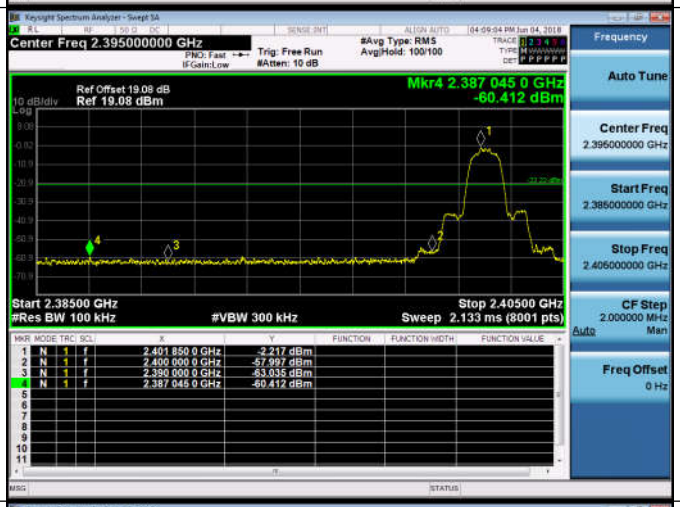
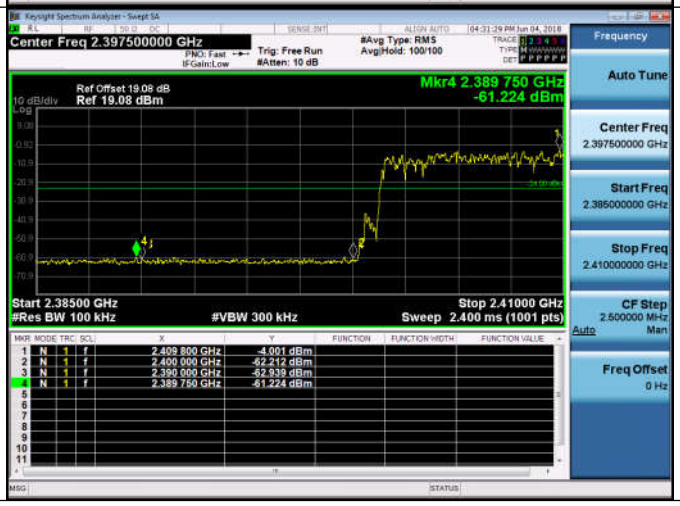
Appendix F): Band-edge for RF Conducted Emissions

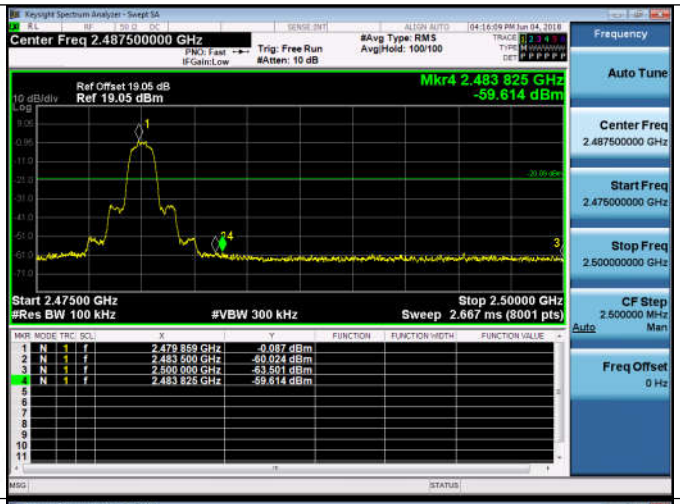
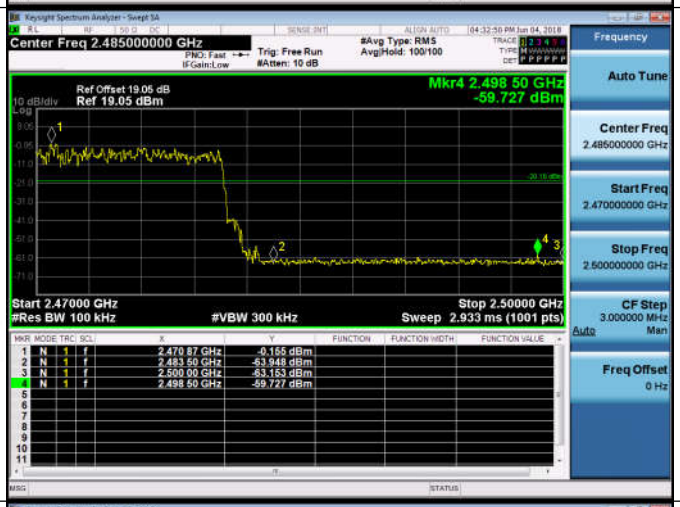
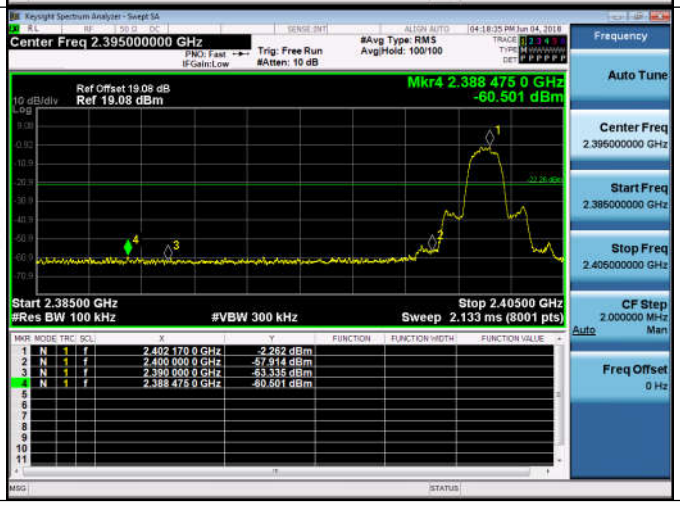
Result Table

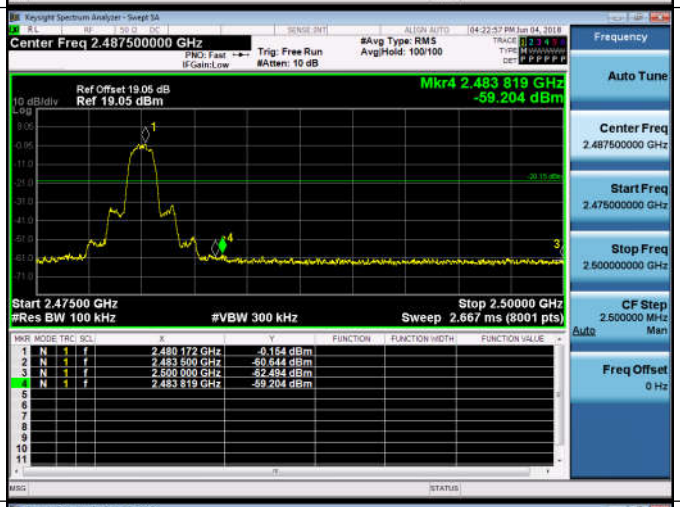
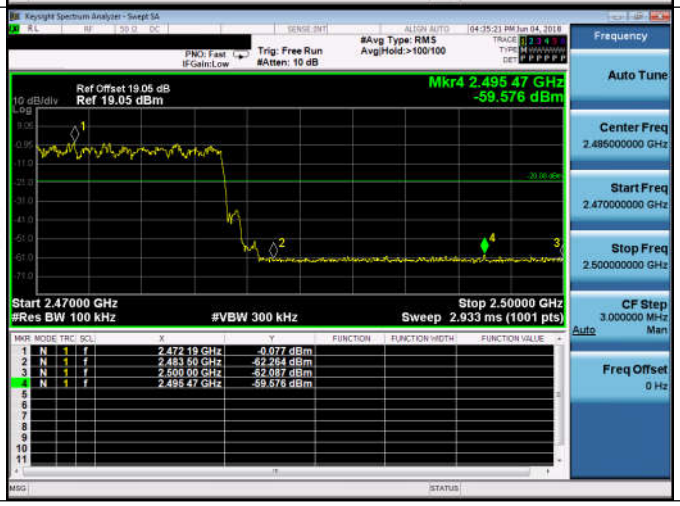
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	0.431	Off	-61.866	-19.57	PASS
			0.519	On	-61.135	-19.48	PASS
GFSK	HCH	2480	2.580	Off	-57.998	-17.42	PASS
			2.651	On	-60.499	-17.35	PASS
π/4DQPSK	LCH	2402	-2.217	Off	-60.412	-22.22	PASS
			-4.001	On	-61.224	-24	PASS
π/4DQPSK	HCH	2480	-0.087	Off	-59.614	-20.09	PASS
			-0.155	On	-59.727	-20.16	PASS
8DPSK	LCH	2402	-2.262	Off	-60.501	-22.26	PASS
			-3.459	On	-60.806	-23.46	PASS
8DPSK	HCH	2480	-0.154	Off	-59.204	-20.15	PASS
			-0.077	On	-59.576	-20.08	PASS

Test Graph

Graphs		
GFSK/LCH/No Hop		
GFSK/LCH/Hop		
GFSK/HCH/No Hop		

GFSK/HCH/Hop			
π/4DQPSK/LCH/No Hop			
π/4DQPSK/LCH/Hop			

π/4DQPSK/HCH/No Hop			
π/4DQPSK/HCH/Hop			
8DPSK/LCH/No Hop			

8DPSK/LCH/Hop			
8DPSK/HCH/No Hop			
8DPSK/HCH/Hop			

Appendix G): RF Conducted Spurious Emissions

Result Table

Mode	Channel	Pref [dBm]	Puw[dBm]	Verdict
GFSK	LCH	0.45	<Limit	PASS
GFSK	MCH	1.997	<Limit	PASS
GFSK	HCH	2.495	<Limit	PASS
π/4DQPSK	LCH	-2.288	<Limit	PASS
π/4DQPSK	MCH	-0.645	<Limit	PASS
π/4DQPSK	HCH	-0.041	<Limit	PASS
8DPSK	LCH	-2.347	<Limit	PASS
8DPSK	MCH	-0.612	<Limit	PASS
8DPSK	HCH	-0.219	<Limit	PASS

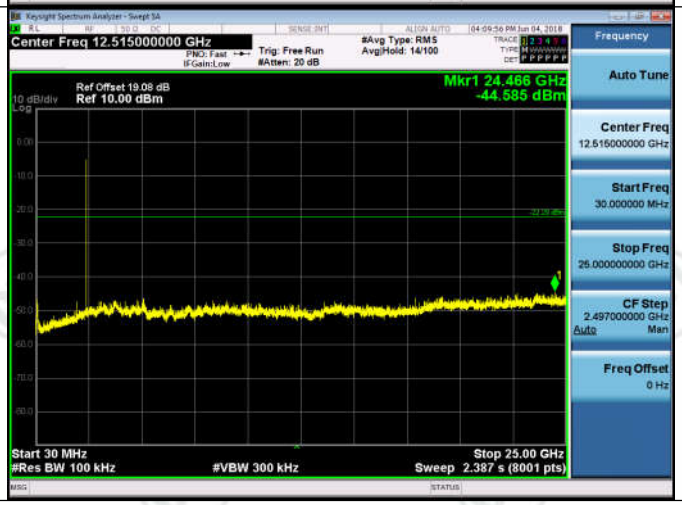
Test Graph

GFSK_LCH_Graphs		
Pref		
Puw		

GFSK_MCH_Graphs		
Pref		

Puw	

GFSK_HCH_Graphs	
Pref	
Puw	

π/4DQPSK_LCH_Graphs		
Pref		
Puw		

π/4DQPSK_MCH_Graphs		
Pref		

Puw	

π/4DQPSK_HCH_Graphs	
Pref	
Puw	

8DPSK_LCH_Graphs		
Pref		
Puw		

8DPSK_MCH_Graphs		
Pref		

Puw	

8DPSK_HCH_Graphs	
Pref	
Puw	

Appendix H): Pseudorandom Frequency Hopping Sequence

Test Requirement:	47 CFR Part 15**C Section 15.247 (a)(1) requirement:**

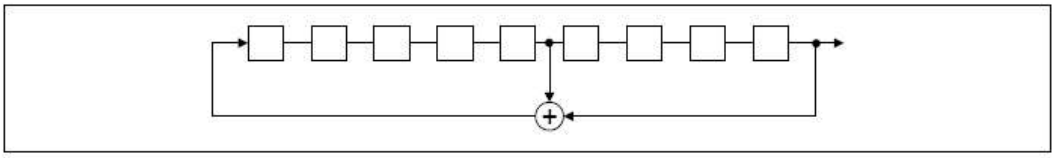
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Alternatively. Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

EUT Pseudorandom Frequency Hopping Sequence

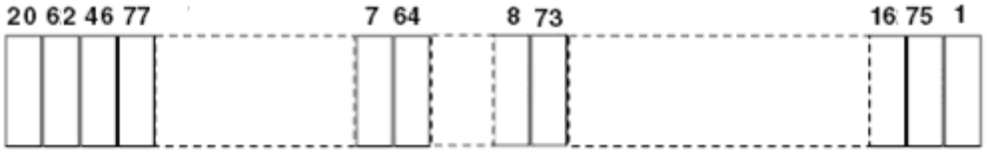
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized with nine ones.

- Number of shift register stages: 9
- Length of pseudo-random sequence: 2^9 -1 = 511 bits
- Longest sequence of zeros: 8 (non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:



Each frequency used equally on the average by each transmitter.

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

The device does not have the ability to be coordinated with other FHSS systems in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitters.

Appendix I): Antenna Requirement

15.203 requirement:

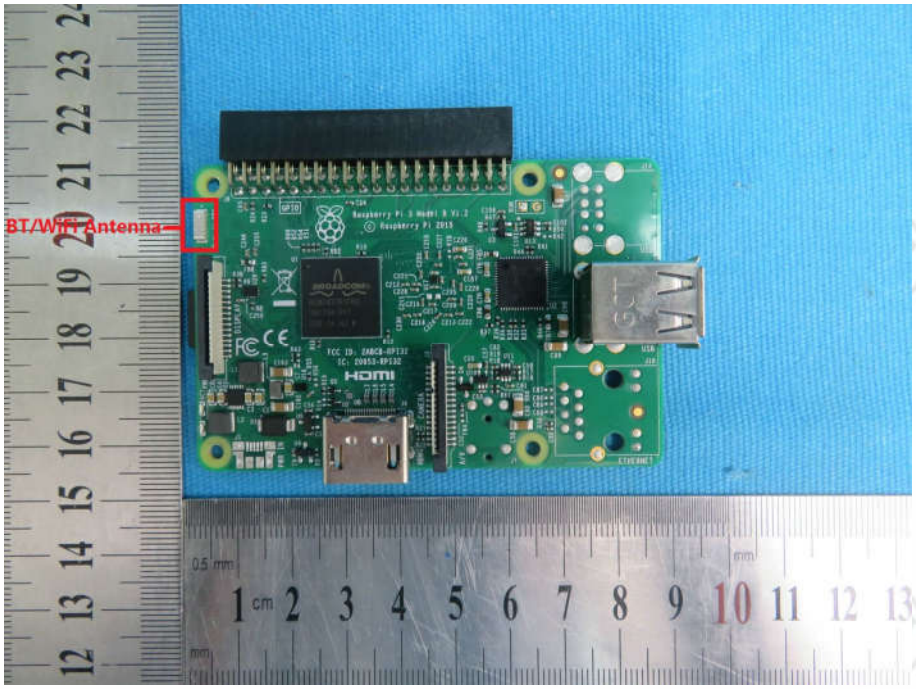
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit 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:	

The antenna is ceramic antenna and no consideration of replacement. The best case gain of the antenna is 1.8dBi.



Appendix J): AC Power Line Conducted Emission

Test Procedure:	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.
Limit:	

Frequency range (MHz)	Limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

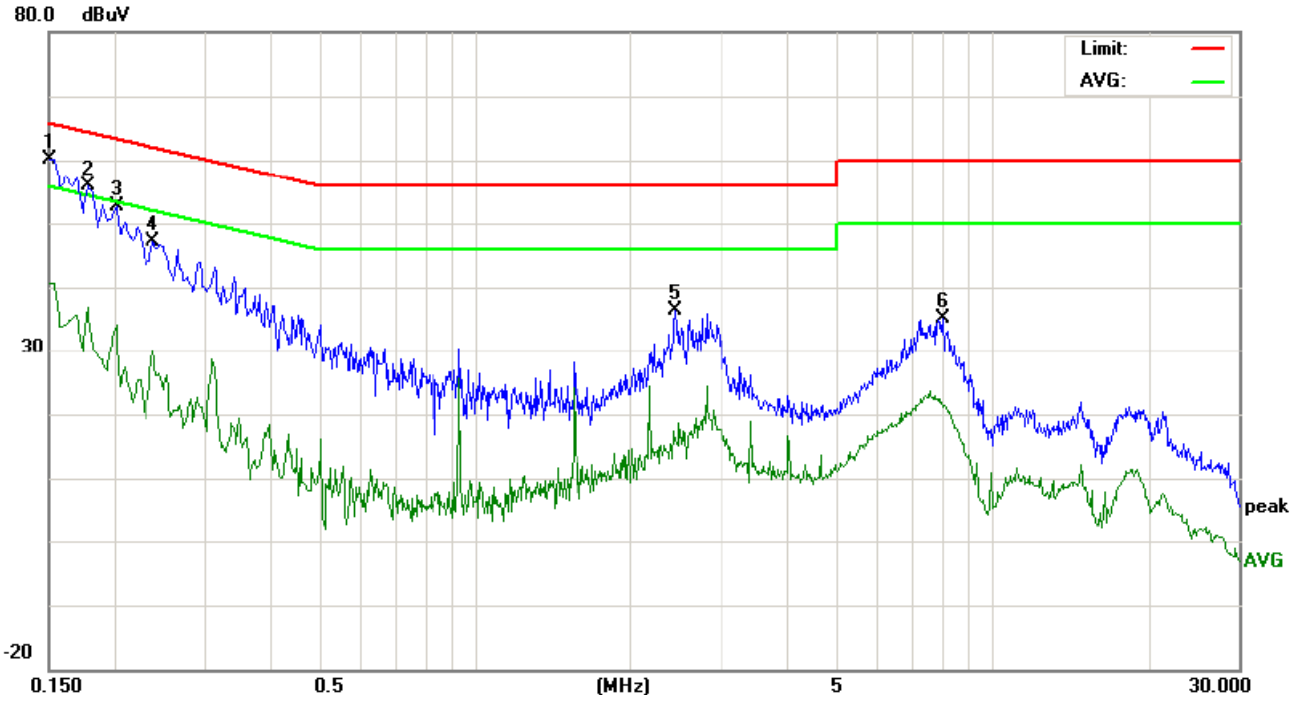
NOTE : The lower limit is applicable at the transition frequency

Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

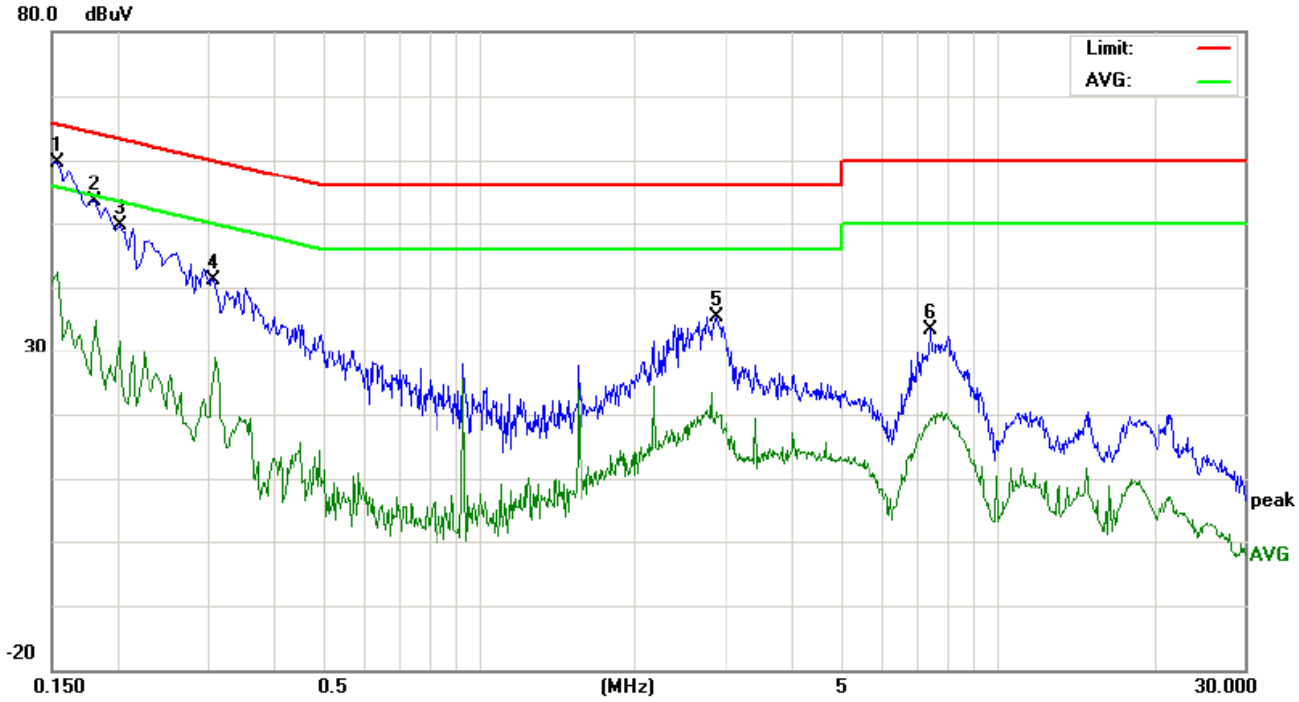
Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Live line:



No.	Freq.	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)			
	MHz	Peak	QP	AVG	dB	peak	QP	AVG	QP	AVG	QP	AVG	P/F	Comment
1	0.1500	50.24	47.39	30.83	9.80	60.04	57.19	40.63	65.99	55.99	-8.80	-15.36	P	
2	0.1780	46.08	43.16	27.22	9.76	55.84	52.92	36.98	64.57	54.57	-11.65	-17.59	P	
3	0.2020	42.97	40.26	24.47	9.73	52.70	49.99	34.20	63.52	53.52	-13.53	-19.32	P	
4	0.2380	37.33	35.07	20.38	9.68	47.01	44.75	30.06	62.16	52.16	-17.41	-22.10	P	
5	2.4420	26.53	24.52	6.50	9.72	36.25	34.24	16.22	56.00	46.00	-21.76	-29.78	P	
6	8.0420	25.59	23.18	11.75	9.48	35.07	32.66	21.23	60.00	50.00	-27.34	-28.77	P	

Neutral line:



No.	Freq.	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)			
	MHz	Peak	QP	AVG	dB	peak	QP	AVG	QP	AVG	QP	AVG	P/F	Comment
1	0.1539	49.93	47.21	32.63	9.79	59.72	57.00	42.42	65.78	55.78	-8.78	-13.36	P	
2	0.1819	43.47	41.35	25.11	9.76	53.23	51.11	34.87	64.39	54.39	-13.28	-19.52	P	
3	0.2020	39.81	37.22	21.78	9.73	49.54	46.95	31.51	63.52	53.52	-16.57	-22.01	P	
4	0.3100	30.49	28.15	19.26	9.60	40.09	37.75	28.86	59.97	49.97	-22.22	-21.11	P	
5	2.8699	25.64	22.34	10.36	9.78	35.42	32.12	20.14	56.00	46.00	-23.88	-25.86	P	
6	7.4820	23.94	21.20	9.79	9.50	33.44	30.70	19.29	60.00	50.00	-29.30	-30.71	P	

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.

Appendix K): Restricted bands around fundamental frequency (Radiated)

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Test Procedure:

Below 1GHz test procedure as below:

a. 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.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. 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.
d. 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 and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel

Above 1GHz test procedure as below:

g. 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).
h. b. Test the EUT in the lowest channel , the Highest channel
i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.
j. Repeat above procedures until all frequencies measured was complete.

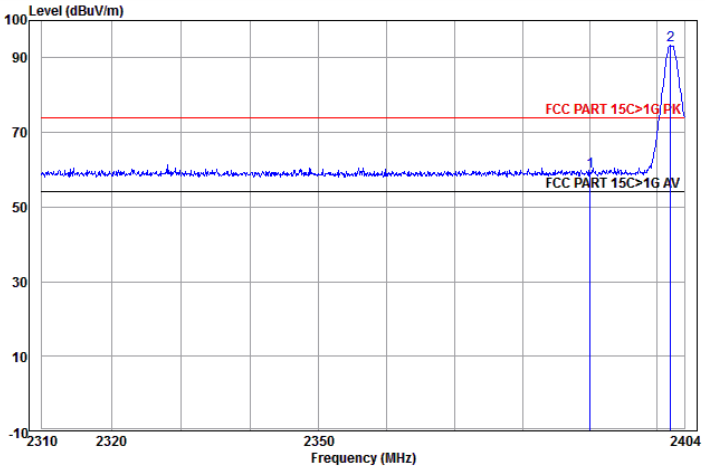
Limit:

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

Test plot as follows:

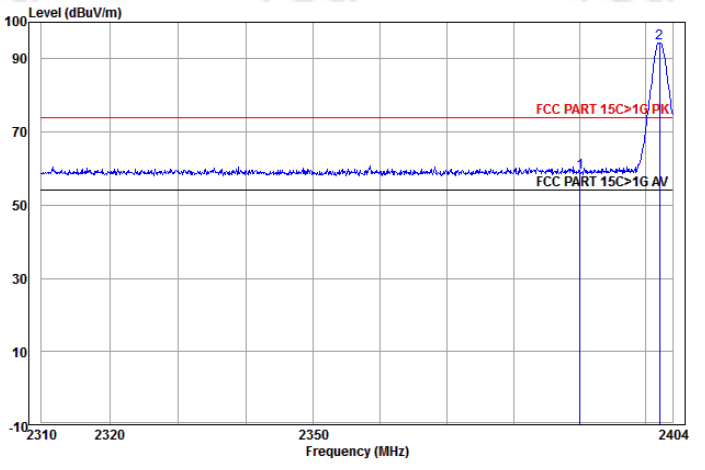
GFSK:

Worse case mode:	GFSK (DH5)	Test channel:	Lowest	Remark:	Peak	Vertical



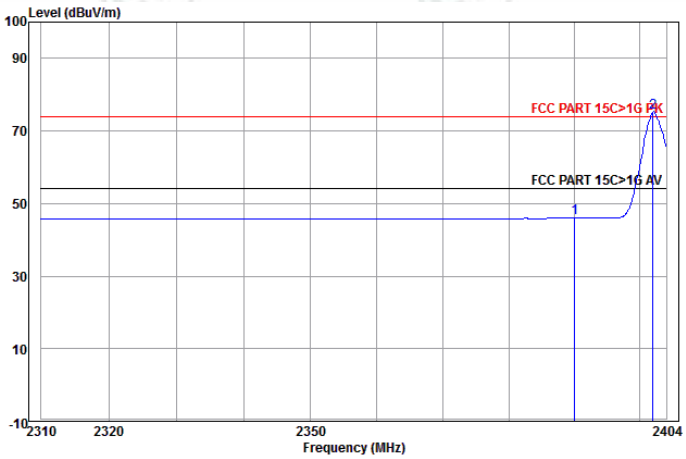
	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	3.07	23.92	59.52	74.00	-14.48	Vertical	Peak
2 pp	2401.987	32.56	3.07	57.68	93.31	74.00	19.31	Vertical	Peak

Worse case mode:	GFSK (DH5)	Test channel:	Lowest	Remark:	Peak	Horizontal



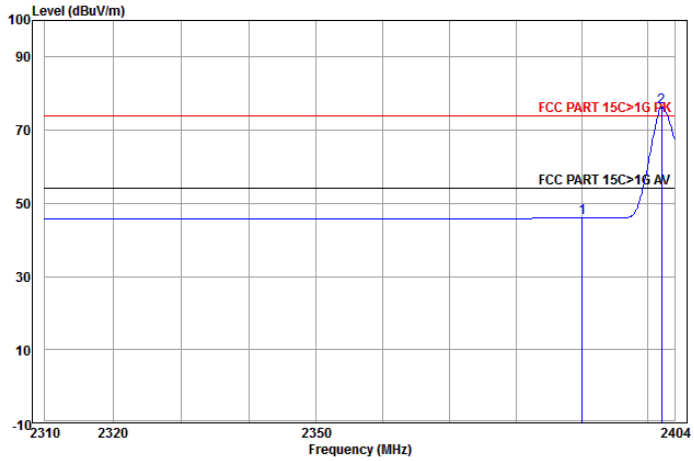
	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	3.07	23.39	58.99	74.00	-15.01	Horizontal	Peak
2 pp	2402.083	32.56	3.07	58.69	94.32	74.00	20.32	Horizontal	Peak

Worse case mode:	GFSK (DH5)	Test channel:	Lowest	Remark:	Average	Vertical



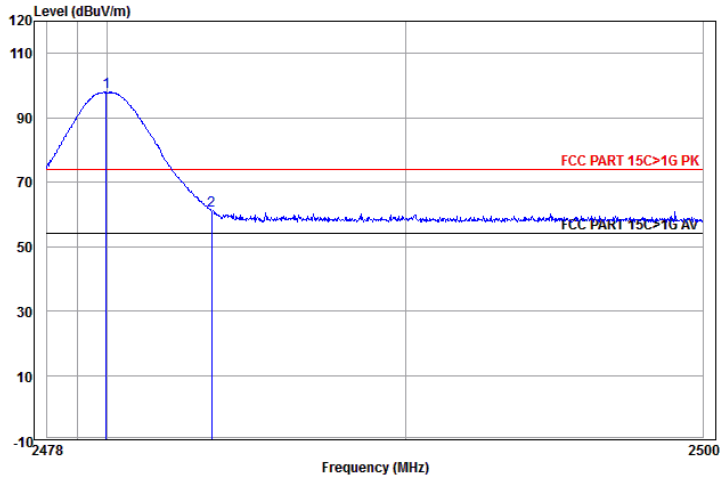
	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	3.07	10.35	45.95	54.00	-8.05	Vertical	Average
2 pp	2401.987	32.56	3.07	39.62	75.25	54.00	21.25	Vertical	Average

Worse case mode:	GFSK (DH5)	Test channel:	Lowest	Remark:	Average	Horizontal



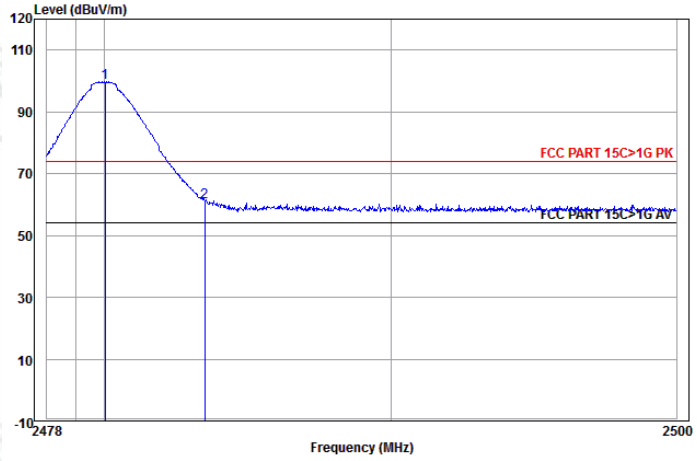
	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	3.07	10.36	45.96	54.00	-8.04	Horizontal	Average
2 pp	2402.083	32.56	3.07	40.77	76.40	54.00	22.40	Horizontal	Average

Worse case mode:	GFSK (DH5)	Test channel:	Highest	Remark:	Peak	Vertical



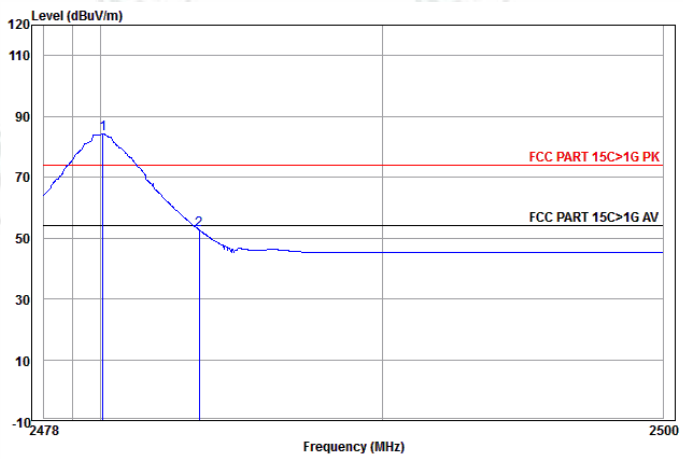
	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2479.972	32.71	3.12	62.23	98.06	74.00	24.06	Vertical	Peak
2	2483.500	32.71	3.12	25.31	61.14	74.00	-12.86	Vertical	Peak

Worse case mode:	GFSK (DH5)	Test channel:	Highest	Remark:	Peak	Horizontal



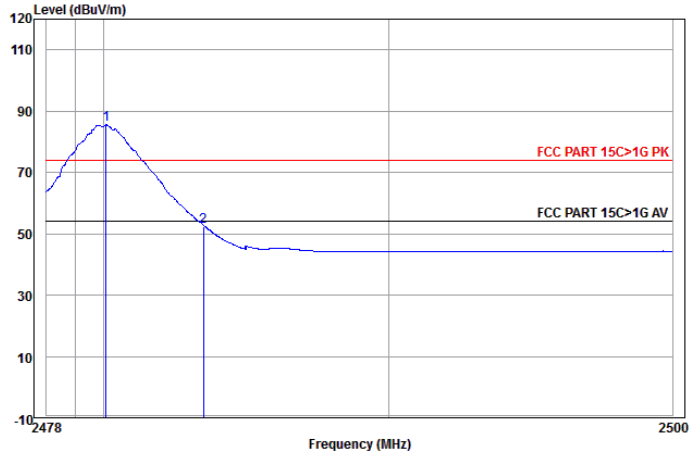
	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2480.038	32.71	3.12	63.68	99.51	74.00	25.51	Horizontal	Peak
2	2483.500	32.71	3.12	24.89	60.72	74.00	-13.28	Horizontal	Peak

Worse case mode:	GFSK (DH5)	Test channel:	Highest	Remark:	Average	Vertical



	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2480.082	32.71	3.12	48.51	84.34	54.00	30.34	Vertical	Average
2	2483.500	32.71	3.12	16.82	52.65	54.00	-1.35	Vertical	Average

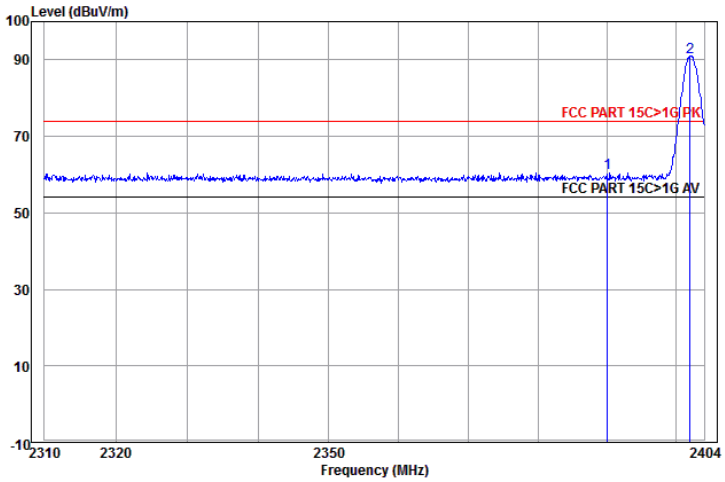
Worse case mode:	GFSK (DH5)	Test channel:	Highest	Remark:	Average	Horizontal



	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2480.082	32.71	3.12	49.75	85.58	54.00	31.58	Horizontal	Average
2	2483.500	32.71	3.12	16.36	52.19	54.00	-1.81	Horizontal	Average

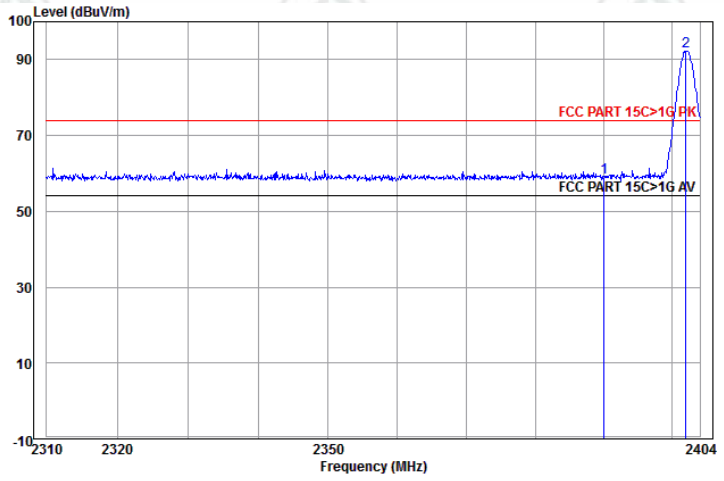
π/4DQPSK:

Worse case mode:	π/4DQPSK (2DH5)	Test channel:	Lowest	Remark:	Peak	Vertical



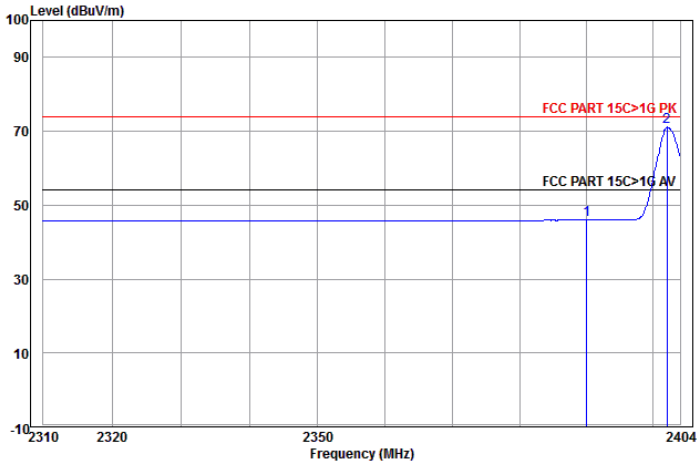
	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	3.07	24.72	60.32	74.00	-13.68	Vertical	Peak
2 pp	2401.987	32.56	3.07	55.17	90.80	74.00	16.80	Vertical	Peak

Worse case mode:	π/4DQPSK (2DH5)	Test channel:	Lowest	Remark:	Peak	Horizontal



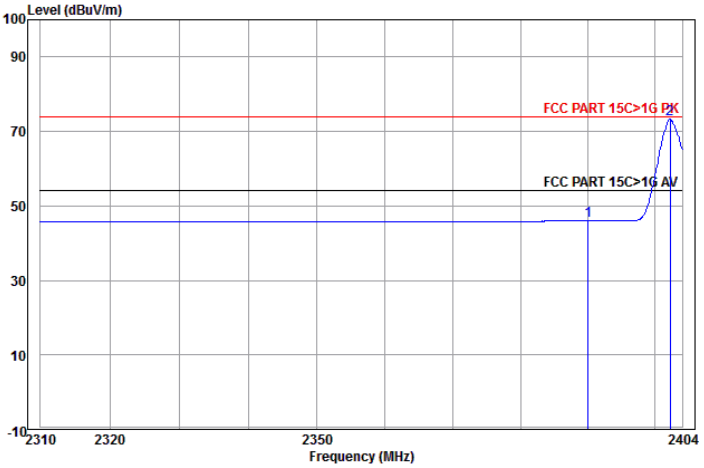
	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	3.07	23.26	58.86	74.00	-15.14	Horizontal	Peak
2 pp	2401.987	32.56	3.07	56.56	92.19	74.00	18.19	Horizontal	Peak

Worse case mode:	π/4DQPSK (2DH5)	Test channel:	Lowest	Remark:	Average	Vertical



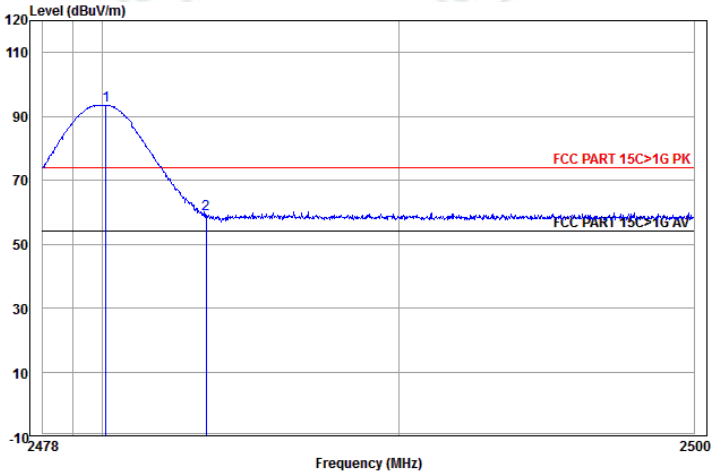
	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	3.07	10.34	45.94	54.00	-8.06	Vertical	Average
2 pp	2402.083	32.56	3.07	35.53	71.16	54.00	17.16	Vertical	Average

Worse case mode:	π/4DQPSK (2DH5)	Test channel:	Lowest	Remark:	Average	Horizontal



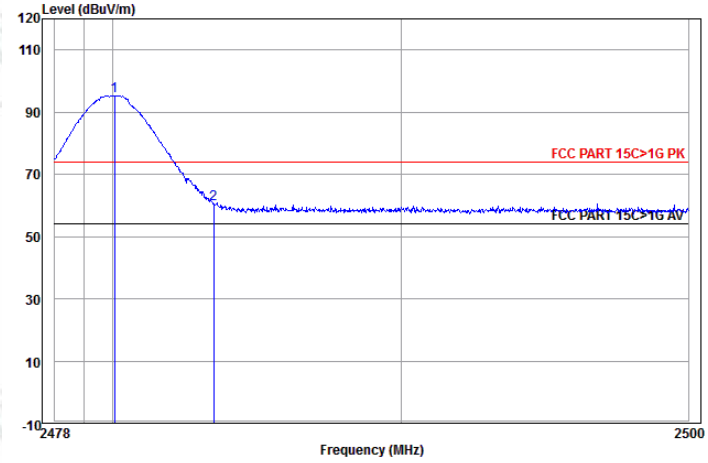
	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	3.07	10.37	45.97	54.00	-8.03	Horizontal	Average
2 pp	2402.179	32.56	3.07	37.57	73.20	54.00	19.20	Horizontal	Average

Worse case mode:	π/4DQPSK (2DH5)	Test channel:	Highest	Remark:	Peak	Vertical



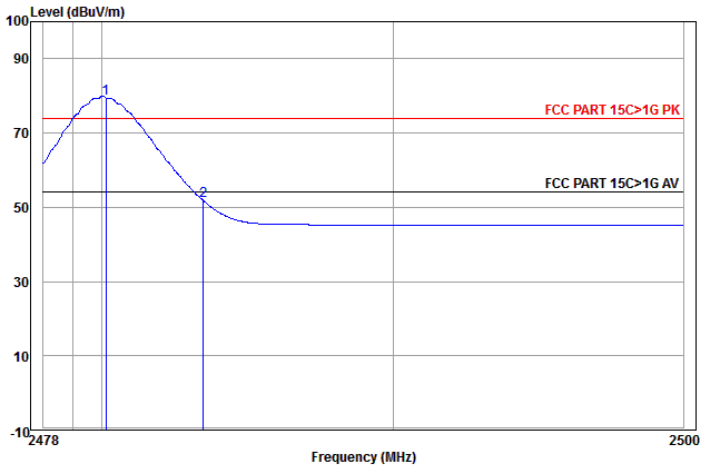
	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2480.125	32.71	3.12	57.78	93.61	74.00	19.61	Vertical	Peak
2	2483.500	32.71	3.12	23.70	59.53	74.00	-14.47	Vertical	Peak

Worse case mode:	π/4DQPSK (2DH5)	Test channel:	Highest	Remark:	Peak	Horizontal



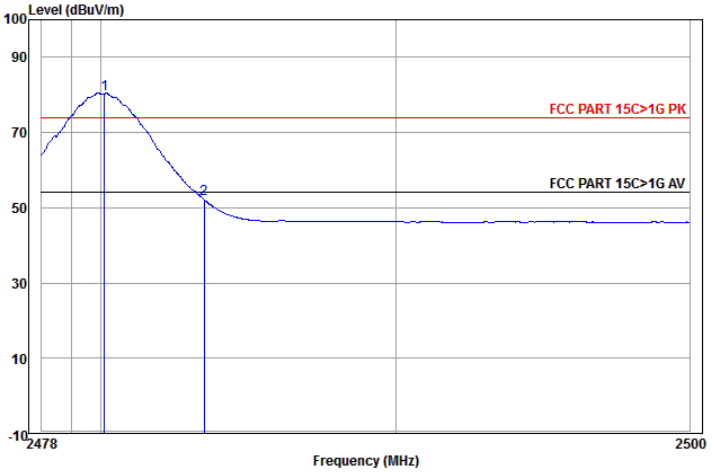
	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2480.060	32.71	3.12	59.46	95.29	74.00	21.29	Horizontal	Peak
2	2483.500	32.71	3.12	24.79	60.62	74.00	-13.38	Horizontal	Peak

Worse case mode:	π/4DQPSK (2DH5)	Test channel:	Highest	Remark:	Average	Vertical



	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2480.147	32.71	3.12	43.61	79.44	54.00	25.44	Vertical	Average
2	2483.482	32.71	3.12	15.93	51.76	54.00	-2.24	Vertical	Average

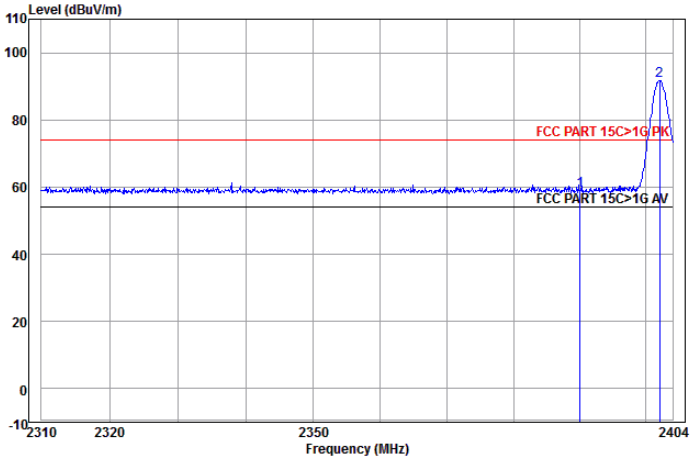
Worse case mode:	π/4DQPSK (2DH5)	Test channel:	Highest	Remark:	Average	Horizontal



	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2480.125	32.71	3.12	44.39	80.22	54.00	26.22	Horizontal	Average
2	2483.500	32.71	3.12	16.41	52.24	54.00	-1.76	Horizontal	Average

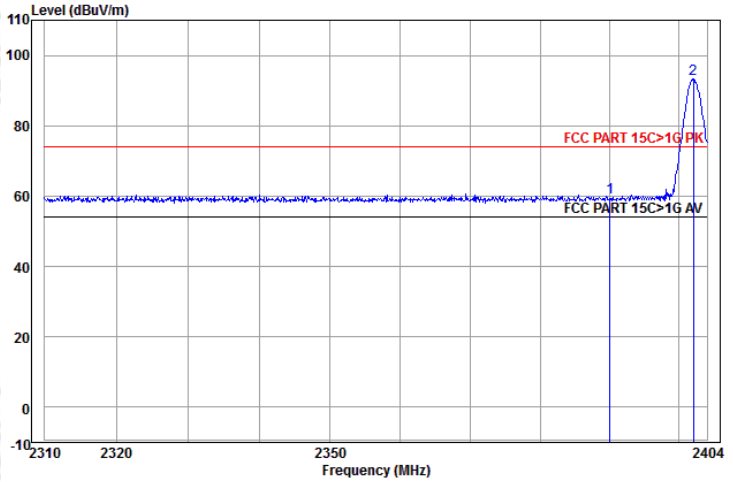
8DPSK:

Worse case mode:	8DPSK (3DH5)	Test channel:	Lowest	Remark:	Peak	Vertical



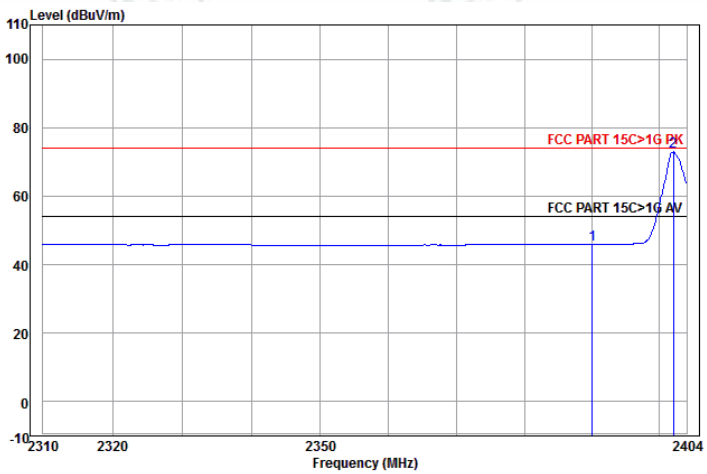
	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	3.07	23.40	59.00	74.00	-15.00	Vertical	Peak
2 pp	2402.083	32.56	3.07	56.09	91.72	74.00	17.72	Vertical	Peak

Worse case mode:	8DPSK (3DH5)	Test channel:	Lowest	Remark:	Peak	Horizontal



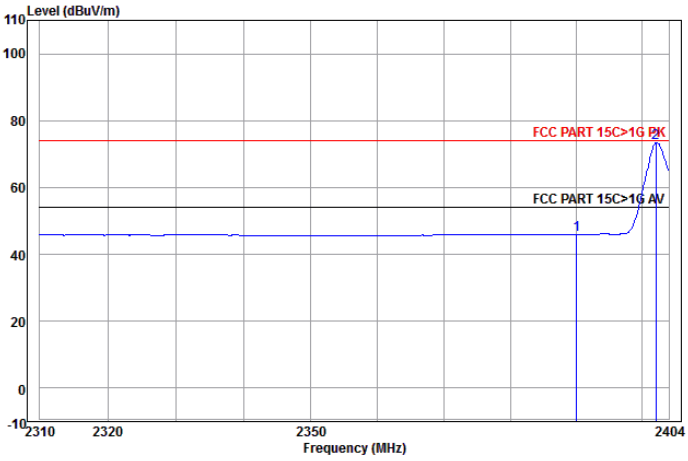
	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	3.07	23.98	59.58	74.00	-14.42	Horizontal	Peak
2 pp	2402.083	32.56	3.07	57.58	93.21	74.00	19.21	Horizontal	Peak

Worse case mode:	8DPSK (3DH5)	Test channel:	Lowest	Remark:	Average	Vertical



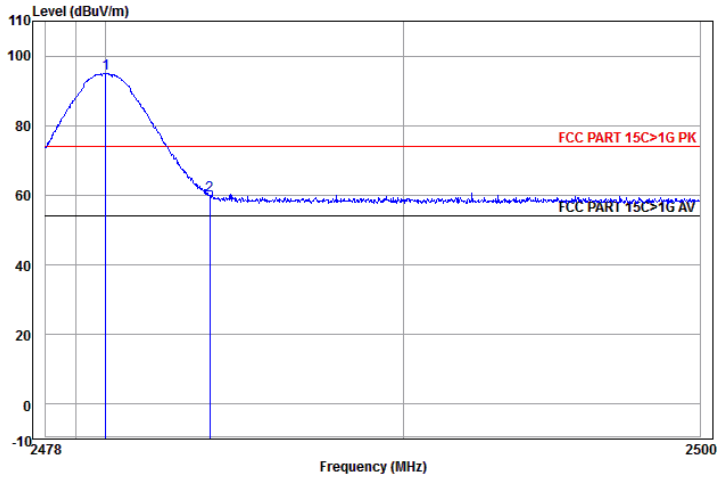
	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	3.07	10.35	45.95	54.00	-8.05	Vertical	Average
2 pp	2402.083	32.56	3.07	37.27	72.90	54.00	18.90	Vertical	Average

Worse case mode:	8DPSK (3DH5)	Test channel:	Lowest	Remark:	Average	Horizontal



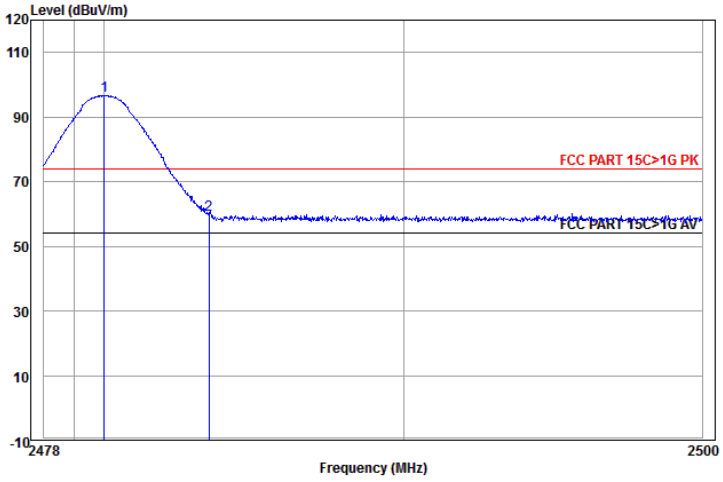
	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	2390.000	32.53	3.07	10.38	45.98	54.00	-8.02	Horizontal	Average
2 pp	2402.083	32.56	3.07	37.78	73.41	54.00	19.41	Horizontal	Average

Worse case mode:	8DPSK (3DH5)	Test channel:	Highest	Remark:	Peak	Vertical



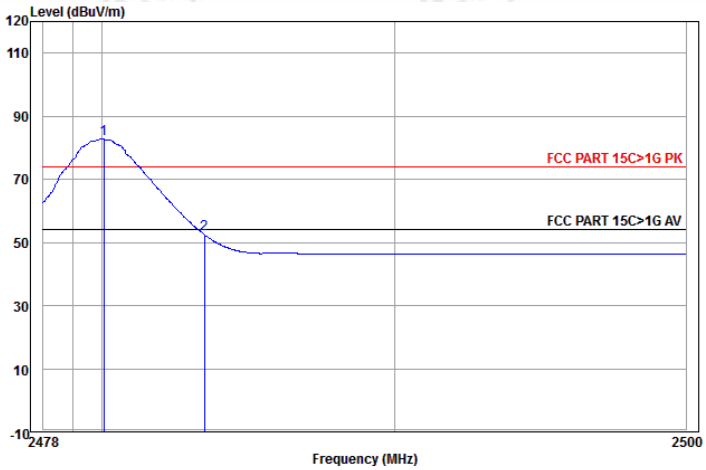
	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2480.016	32.71	3.12	59.16	94.99	74.00	20.99	Vertical	Peak
2	2483.500	32.71	3.12	24.28	60.11	74.00	-13.89	Vertical	Peak

Worse case mode:	8DPSK (3DH5)	Test channel:	Highest	Remark:	Peak	Horizontal



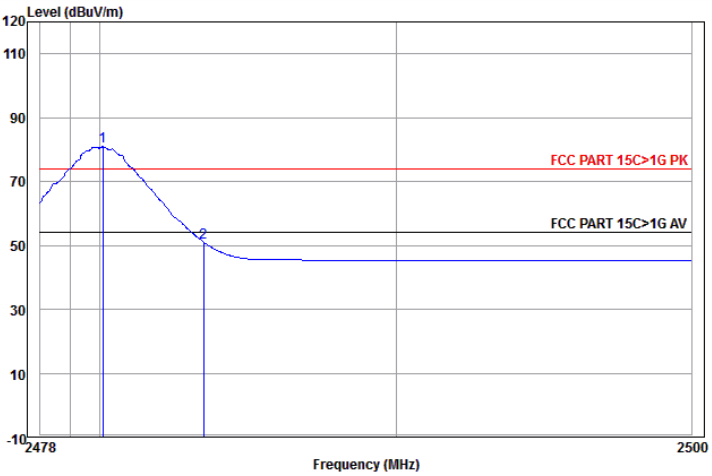
	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2480.016	32.71	3.12	60.84	96.67	74.00	22.67	Horizontal	Peak
2	2483.500	32.71	3.12	24.05	59.88	74.00	-14.12	Horizontal	Peak

Worse case mode:	8DPSK (3DH5)	Test channel:	Highest	Remark:	Average	Vertical



	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2480.060	32.71	3.12	46.84	82.67	54.00	28.67	Vertical	Average
2	2483.500	32.71	3.12	16.79	52.62	54.00	-1.38	Vertical	Average

Worse case mode:	8DPSK (3DH5)	Test channel:	Highest	Remark:	Average	Horizontal



	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	2480.104	32.71	3.12	45.22	81.05	54.00	27.05	Horizontal	Average
2	2483.504	32.71	3.12	15.22	51.05	54.00	-2.95	Horizontal	Average

Note:
1) Through Pre-scan transmitter mode with all kind of modulation and all kind of data type, find the 1-DH5 of data type is the worse case of GFSK modulation type, the 2-DH5 of data type is the worse case of π/4DQPSK modulation type, the 3-DH5 of data type is the worse case of 8DPSK modulation type in charge + transmitter mode.
2) As shown in this section, the field strength limits are based on average limits. 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. So, only the peak values are measured.
3) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level =Receiver Reading -Correct Factor
Correct Factor = Preamplifier Factor– Antenna Factor–Cable Factor

Appendix L): Radiated Spurious Emissions

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Test Procedure:

Below 1GHz test procedure as below:

a. 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.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. 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.
d. 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 rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. 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.

Above 1GHz test procedure as below:

g. 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).
h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel
i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.
j. Repeat above procedures until all frequencies measured was complete.

Limit:

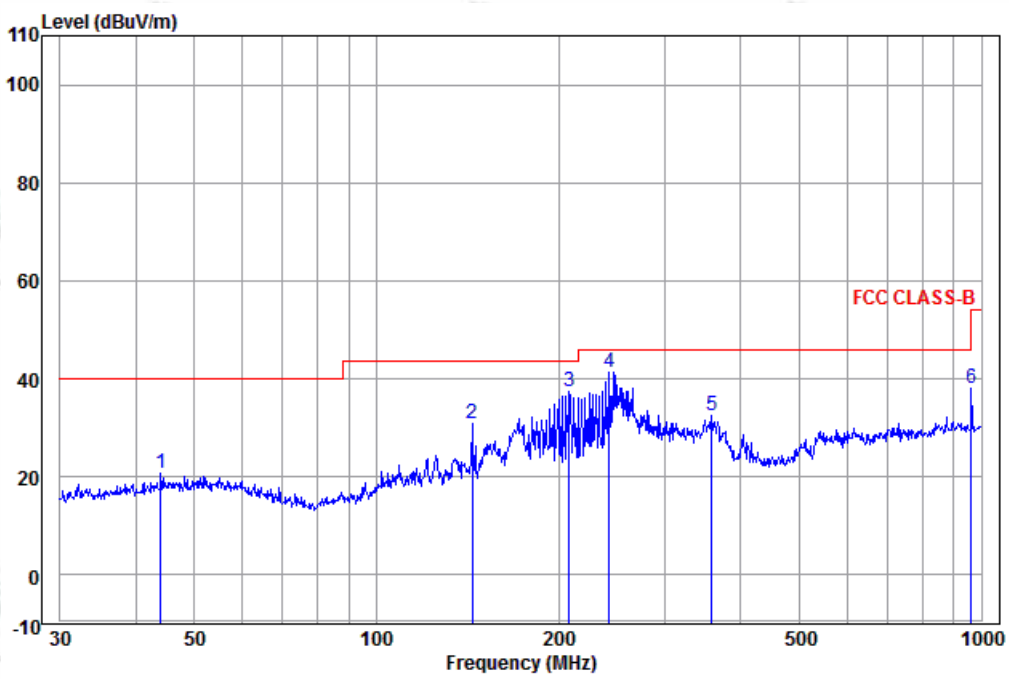
Frequency	Field strength (microvolt/meter)	Limit (dBμV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz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

Radiated Spurious Emissions test Data:

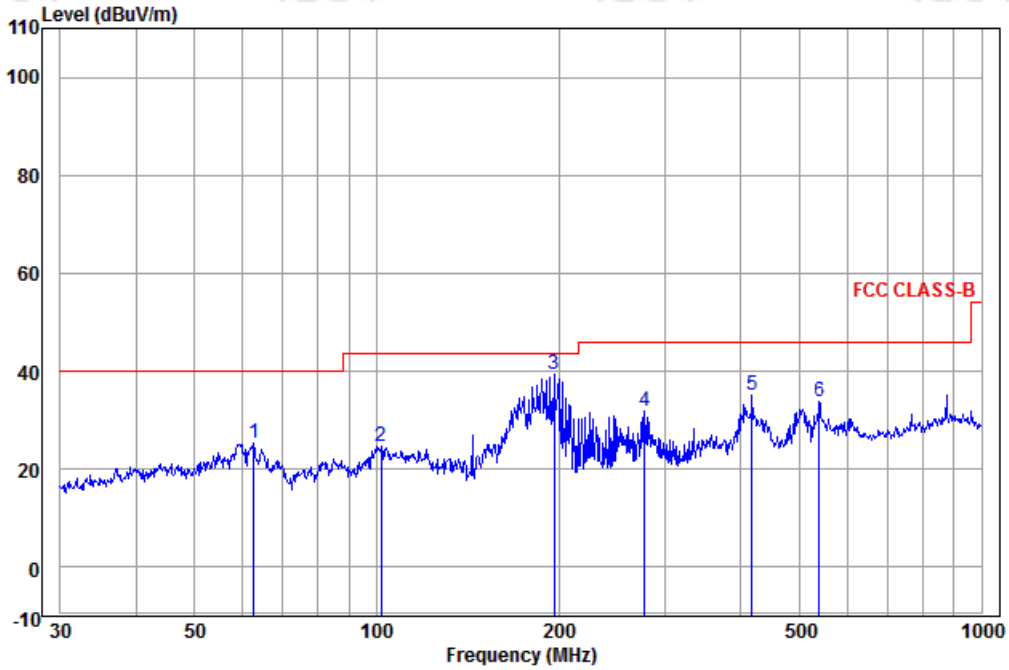
Radiated Emission below 1GHz

30MHz~1GHz (QP)		
Test mode:	Transmitting	Horizontal



	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	43.966	14.14	0.08	6.50	20.72	40.00	-19.28	Horizontal	QP
2	143.830	9.18	0.61	20.95	30.74	43.50	-12.76	Horizontal	QP
3	208.580	11.71	1.15	24.40	37.26	43.50	-6.24	Horizontal	QP
4 pp	242.525	12.45	1.31	27.57	41.33	46.00	-4.67	Horizontal	QP
5	357.929	14.53	1.32	16.62	32.47	46.00	-13.53	Horizontal	QP
6	962.162	21.95	2.14	14.03	38.12	54.00	-15.88	Horizontal	QP

Test mode:	Transmitting	Vertical



	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	62.651	12.34	0.22	12.64	25.20	40.00	-14.80	Vertical	QP
2	101.644	12.35	0.59	11.81	24.75	43.50	-18.75	Vertical	QP
3 pp	196.510	11.33	1.07	26.89	39.29	43.50	-4.21	Vertical	QP
4	277.094	13.05	1.19	17.61	31.85	46.00	-14.15	Vertical	QP
5	417.641	15.57	1.37	18.29	35.23	46.00	-10.77	Vertical	QP
6	539.478	17.62	1.54	14.68	33.84	46.00	-12.16	Vertical	QP

Transmitter Emission above 1GHz

Worse case mode:		GFSK(1-DH5)		Test channel:		Lowest	Remark: Peak		
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1273.572	30.40	1.97	44.28	48.27	36.36	74.00	-37.64	Pass	H
1823.477	31.43	2.66	43.66	48.56	38.99	74.00	-35.01	Pass	H
4804.000	34.69	5.98	44.60	47.86	43.93	74.00	-30.07	Pass	H
5865.832	35.80	7.31	44.51	49.30	47.90	74.00	-26.10	Pass	H
7206.000	36.42	6.97	44.77	46.63	45.25	74.00	-28.75	Pass	H
9608.000	37.88	6.98	45.58	46.57	45.85	74.00	-28.15	Pass	H
1247.899	30.34	1.93	44.32	47.60	35.55	74.00	-38.45	Pass	V
1577.198	31.01	2.38	43.91	48.15	37.63	74.00	-36.37	Pass	V
4804.000	34.69	5.98	44.60	48.05	44.12	74.00	-29.88	Pass	V
6094.137	35.95	7.41	44.51	48.67	47.52	74.00	-26.48	Pass	V
7206.000	36.42	6.97	44.77	46.42	45.04	74.00	-28.96	Pass	V
9608.000	37.88	6.98	45.58	46.92	46.20	74.00	-27.80	Pass	V

Worse case mode:		GFSK(1-DH5)		Test channel:		Middle	Remark: Peak		
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1270.334	30.39	1.97	44.29	48.32	36.39	74.00	-37.61	Pass	H
1832.785	31.45	2.67	43.65	47.85	38.32	74.00	-35.68	Pass	H
4882.000	34.85	6.14	44.60	47.15	43.54	74.00	-30.46	Pass	H
5689.360	35.67	7.13	44.53	48.62	46.89	74.00	-27.11	Pass	H
7323.000	36.43	6.85	44.87	46.90	45.31	74.00	-28.69	Pass	H
9764.000	38.05	7.12	45.55	46.39	46.01	74.00	-27.99	Pass	H
1263.883	30.38	1.96	44.29	47.83	35.88	74.00	-38.12	Pass	V
1589.289	31.04	2.40	43.90	47.49	37.03	74.00	-36.97	Pass	V
4882.000	34.85	6.14	44.60	47.50	43.89	74.00	-30.11	Pass	V
5504.170	35.52	6.93	44.55	49.78	47.68	74.00	-26.32	Pass	V
7323.000	36.43	6.85	44.87	47.10	45.51	74.00	-28.49	Pass	V
9764.000	38.05	7.12	45.55	47.42	47.04	74.00	-26.96	Pass	V

Worse case mode:		GFSK(1-DH5)		Test channel:		Highest	Remark: Peak		
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1289.885	30.43	2.00	44.26	47.78	35.95	74.00	-38.05	Pass	H
1565.200	30.99	2.37	43.92	47.88	37.32	74.00	-36.68	Pass	H
4960.000	35.02	6.29	44.60	46.87	43.58	74.00	-30.42	Pass	H
6109.670	35.96	7.41	44.51	48.21	47.07	74.00	-26.93	Pass	H
7440.000	36.45	6.73	44.97	46.34	44.55	74.00	-29.45	Pass	H
9920.000	38.22	7.26	45.52	46.49	46.45	74.00	-27.55	Pass	H
1150.279	30.10	1.78	44.46	48.75	36.17	74.00	-37.83	Pass	V
1413.674	30.70	2.17	44.10	48.19	36.96	74.00	-37.04	Pass	V
4960.000	35.02	6.29	44.60	47.49	44.20	74.00	-29.80	Pass	V
6109.670	35.96	7.41	44.51	48.32	47.18	74.00	-26.82	Pass	V
7440.000	36.45	6.73	44.97	46.91	45.12	74.00	-28.88	Pass	V
9920.000	38.22	7.26	45.52	46.18	46.14	74.00	-27.86	Pass	V

Worse case mode:		π/4DQPSK(2-DH5)		Test channel:		Lowest	Remark: Peak		
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1367.659	30.60	2.11	44.16	48.87	37.42	74.00	-36.58	Pass	H
1805.005	31.40	2.64	43.68	47.72	38.08	74.00	-35.92	Pass	H
4804.000	34.69	5.98	44.60	50.75	46.82	74.00	-27.18	Pass	H
5703.861	35.68	7.14	44.53	49.34	47.63	74.00	-26.37	Pass	H
7206.000	36.42	6.97	44.77	46.69	45.31	74.00	-28.69	Pass	H
9608.000	37.88	6.98	45.58	46.03	45.31	74.00	-28.69	Pass	H
1280.072	30.41	1.98	44.27	48.31	36.43	74.00	-37.57	Pass	V
1589.289	31.04	2.40	43.90	47.76	37.30	74.00	-36.70	Pass	V
4804.000	34.69	5.98	44.60	48.12	44.19	74.00	-29.81	Pass	V
6125.242	35.97	7.41	44.51	48.74	47.61	74.00	-26.39	Pass	V
7206.000	36.42	6.97	44.77	46.57	45.19	74.00	-28.81	Pass	V
9608.000	37.88	6.98	45.58	45.80	45.08	74.00	-28.92	Pass	V

Worse case mode:		π/4DQPSK(2-DH5)		Test channel:		Middle	Remark: Peak		
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1283.335	30.42	1.99	44.27	48.08	36.22	74.00	-37.78	Pass	H
1814.218	31.42	2.65	43.67	47.69	38.09	74.00	-35.91	Pass	H
4882.000	34.85	6.14	44.60	47.81	44.20	74.00	-29.80	Pass	H
6445.156	36.13	7.32	44.55	49.09	47.99	74.00	-26.01	Pass	H
7323.000	36.43	6.85	44.87	46.67	45.08	74.00	-28.92	Pass	H
9764.000	38.05	7.12	45.55	45.45	45.07	74.00	-28.93	Pass	H
1299.773	30.46	2.01	44.25	48.22	36.44	74.00	-37.56	Pass	V
1764.123	31.34	2.60	43.72	47.58	37.80	74.00	-36.20	Pass	V
4882.000	34.85	6.14	44.60	47.32	43.71	74.00	-30.29	Pass	V
6063.190	35.93	7.42	44.51	48.07	46.91	74.00	-27.09	Pass	V
7323.000	36.43	6.85	44.87	47.35	45.76	74.00	-28.24	Pass	V
9764.000	38.05	7.12	45.55	45.59	45.21	74.00	-28.79	Pass	V

Worse case mode:		π/4DQPSK(2-DH5)		Test channel:		Highest	Remark: Peak		
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1280.072	30.41	1.98	44.27	47.77	35.89	74.00	-38.11	Pass	H
1630.264	31.11	2.45	43.85	48.99	38.70	74.00	-35.30	Pass	H
4960.000	35.02	6.29	44.60	50.01	46.72	74.00	-27.28	Pass	H
6032.401	35.92	7.43	44.50	48.58	47.43	74.00	-26.57	Pass	H
7440.000	36.45	6.73	44.97	47.04	45.25	74.00	-28.75	Pass	H
9920.000	38.22	7.26	45.52	45.61	45.57	74.00	-28.43	Pass	H
1263.883	30.38	1.96	44.29	47.80	35.85	74.00	-38.15	Pass	V
1521.981	30.91	2.32	43.97	48.32	37.58	74.00	-36.42	Pass	V
4960.000	35.02	6.29	44.60	49.60	46.31	74.00	-27.69	Pass	V
5865.832	35.80	7.31	44.51	48.85	47.45	74.00	-26.55	Pass	V
7440.000	36.45	6.73	44.97	46.81	45.02	74.00	-28.98	Pass	V
9920.000	38.22	7.26	45.52	46.59	46.55	74.00	-27.45	Pass	V

Worse case mode:		8DPSK(3-DH5)		Test channel:		Lowest	Remark: Peak		
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1267.104	30.38	1.96	44.29	48.70	36.75	74.00	-37.25	Pass	H
1561.221	30.99	2.36	43.93	48.57	37.99	74.00	-36.01	Pass	H
4804.000	34.69	5.98	44.60	47.57	43.64	74.00	-30.36	Pass	H
6063.190	35.93	7.42	44.51	48.80	47.64	74.00	-26.36	Pass	H
7206.000	36.42	6.97	44.77	47.35	45.97	74.00	-28.03	Pass	H
9608.000	37.88	6.98	45.58	46.12	45.40	74.00	-28.60	Pass	H
1176.935	30.17	1.82	44.42	47.68	35.25	74.00	-38.75	Pass	V
1303.086	30.46	2.02	44.24	48.06	36.30	74.00	-37.70	Pass	V
4804.000	34.69	5.98	44.60	47.08	43.15	74.00	-30.85	Pass	V
6187.929	36.00	7.39	44.52	48.45	47.32	74.00	-26.68	Pass	V
7206.000	36.42	6.97	44.77	47.45	46.07	74.00	-27.93	Pass	V
9608.000	37.88	6.98	45.58	45.63	44.91	74.00	-29.09	Pass	V

Worse case mode:		8DPSK(3-DH5)		Test channel:		Middle	Remark: Peak		
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1286.606	30.43	1.99	44.26	48.70	36.86	74.00	-37.14	Pass	H
1601.472	31.06	2.41	43.88	47.75	37.34	74.00	-36.66	Pass	H
4882.000	34.85	6.14	44.60	48.03	44.42	74.00	-29.58	Pass	H
6047.776	35.93	7.43	44.51	48.87	47.72	74.00	-26.28	Pass	H
7323.000	36.43	6.85	44.87	47.10	45.51	74.00	-28.49	Pass	H
9764.000	38.05	7.12	45.55	45.71	45.33	74.00	-28.67	Pass	H
1192.011	30.21	1.85	44.40	48.10	35.76	74.00	-38.24	Pass	V
1521.981	30.91	2.32	43.97	47.59	36.85	74.00	-37.15	Pass	V
4882.000	34.85	6.14	44.60	47.22	43.61	74.00	-30.39	Pass	V
6094.137	35.95	7.41	44.51	48.19	47.04	74.00	-26.96	Pass	V
7323.000	36.43	6.85	44.87	47.31	45.72	74.00	-28.28	Pass	V
9764.000	38.05	7.12	45.55	45.01	44.63	74.00	-29.37	Pass	V

Worse case mode:		8DPSK(3-DH5)		Test channel:		Highest	Remark: Peak		
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Result	Antenna Polaxis
1260.670	30.37	1.95	44.30	49.64	37.66	74.00	-36.34	Pass	H
1651.146	31.15	2.47	43.83	47.85	37.64	74.00	-36.36	Pass	H
4960.000	35.02	6.29	44.60	47.21	43.92	74.00	-30.08	Pass	H
5865.832	35.80	7.31	44.51	48.59	47.19	74.00	-26.81	Pass	H
7440.000	36.45	6.73	44.97	46.27	44.48	74.00	-29.52	Pass	H
9920.000	38.22	7.26	45.52	46.60	46.56	74.00	-27.44	Pass	H
1082.109	29.93	1.66	44.56	48.35	35.38	74.00	-38.62	Pass	V
1521.981	30.91	2.32	43.97	47.69	36.95	74.00	-37.05	Pass	V
4960.000	35.02	6.29	44.60	47.15	43.86	74.00	-30.14	Pass	V
6428.771	36.12	7.33	44.54	49.14	48.05	74.00	-25.95	Pass	V
7440.000	36.45	6.73	44.97	46.32	44.53	74.00	-29.47	Pass	V
9920.000	38.22	7.26	45.52	46.30	46.26	74.00	-27.74	Pass	V

Note:

1) Through Pre-scan transmitter mode with all kind of modulation and all kind of data type, find the 1-DH5 of data type is the worse case of GFSK modulation type, the 2-DH5 of data type is the worse case of π/4DQPSK modulation type, he 3-DH5 of data type is the worse case of 8DPSKmodulation type in transmitter mode.

2) As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. H owever, the peak field strength of any emission shall not exceed the maximum permitted average limits specifie d above by more than 20 dB under any condition of modulation. So, only the peak values are measured.

3) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading -Correct Factor

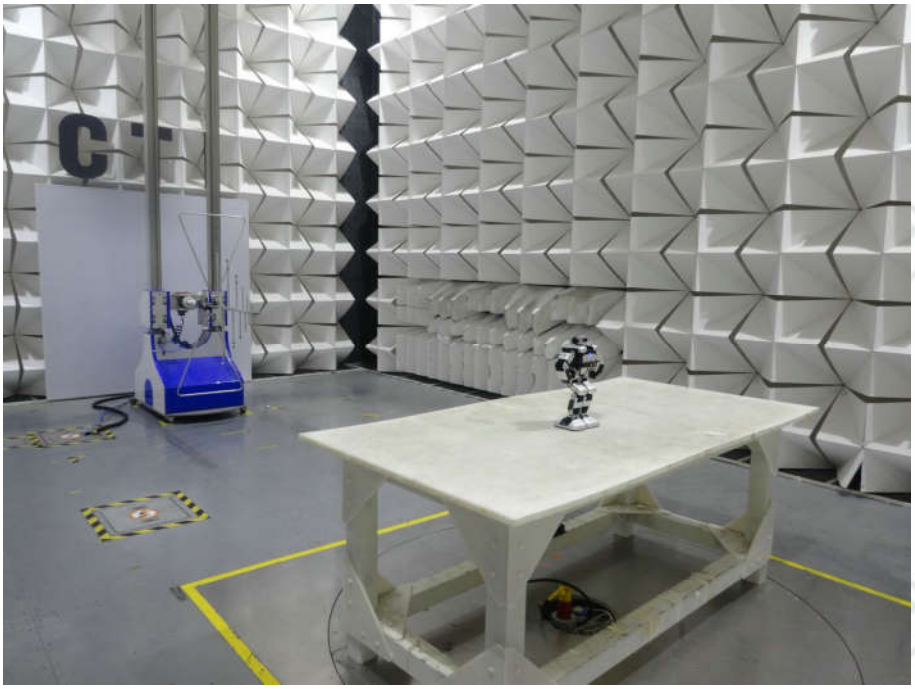
Correct Factor = Preamplifier Factor– Antenna Factor–Cable Factor

4) Scan from 9kHz to 25GHz, the disturbance above 13GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

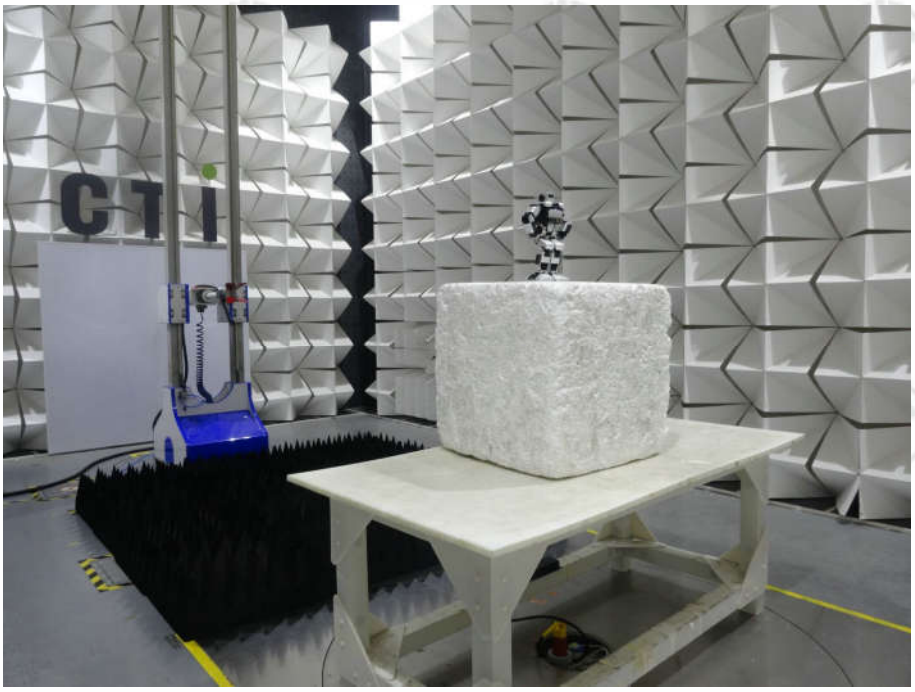
PHOTOGRAPHS OF TEST SETUP

Test model No.: Yanshee

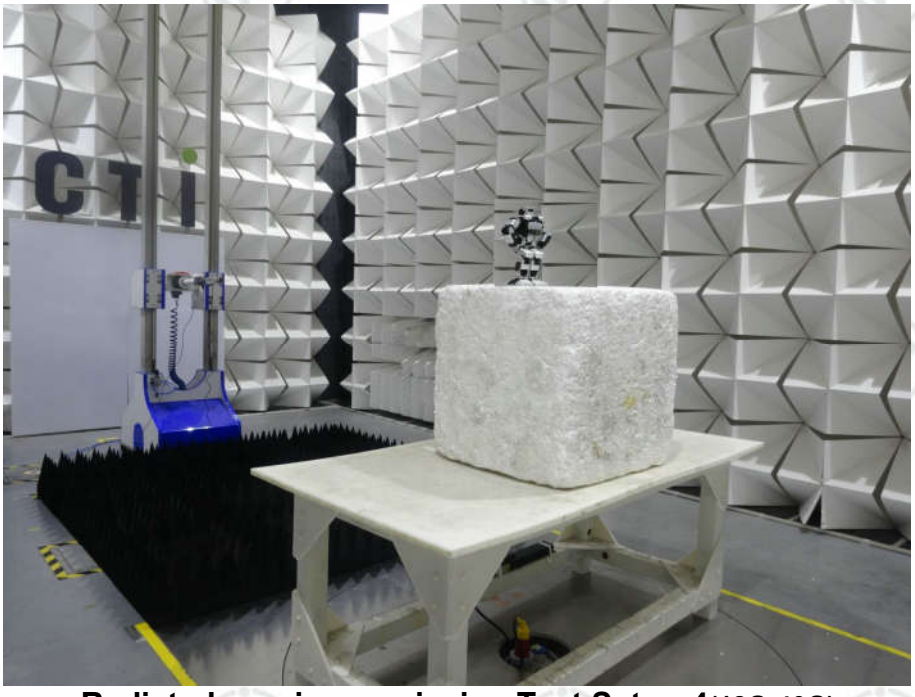
Radiated spurious emission Test Setup-1(9K-30M)



Radiated spurious emission Test Setup-2(30M-1G)



Radiated spurious emission Test Setup-3(1G-18G)



Radiated spurious emission Test Setup-4(18G-40G)

Conducted Emissions Test Setup

PHOTOGRAPHS OF EUT Constructional Details

Refer to Report No.EED32K00127801 for EUT external and internal photos.6

*** End of Report ***