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# **FCC REPORT**

Application No:	SZEM1311006145AV
Applicant:	iLuv Creative Technology
Manufacturer:	iLuv Creative Technology
Factory:	Dong Guan Matestar Electronics Ltd
Product Name:	Portable Outdoor Bluetooth Speaker
Model No.(EUT):	SYRENPRO
FCC ID:	ATLMST-2013
Standards:	47 CFR Part 15, Subpart C (2012)
Date of Receipt:	2013-11-15
Date of Test:	2013-11-21 to 2013-12-06
Date of Issue:	2013-12-10
Test Result:	PASS *

\* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Jack Zhang EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.



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# 2 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 (2009)	PASS
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10 (2009)	PASS
Conducted Peak Output Power	47 CFR Part 15, Subpart C Section 15.247 (b)(1)	ANSI C63.10 (2009)	PASS
20dB Occupied Bandwidth	47 CFR Part 15, Subpart C Section 15.247 (a)(1)	ANSI C63.10 (2009)	PASS
Carrier Frequencies Separation	47 CFR Part 15, Subpart C Section 15.247 (a)(1)	ANSI C63.10 (2009)	PASS
Hopping Channel Number	47 CFR Part 15, Subpart C Section 15.247 (b)	ANSI C63.10 (2009)	PASS
Dwell Time	47 CFR Part 15, Subpart C Section 15.247 (a)(1)	ANSI C63.10 (2009)	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 (2009)	PASS
Band-edge for RF Conducted Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	ANSI C63.10 (2009)	PASS
RF Conducted Spurious Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	ANSI C63.10 (2009)	PASS
Radiated Spurious emissions	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 (2009)	PASS
Band Edge (Radiated Emission)	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 (2009)	PASS

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•			



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# 4 General Information

### 4.1 Client Information

Applicant:	iLuv Creative Technology
Address of Applicant:	2 Harbor Park Drive, Port Washington, NY11050
Manufacturer:	iLuv Creative Technology
Address of Manufacturer: 2 Harbor Park Drive, Port Washington, NY11050	
Factory:	Dong Guan Matestar Electronics Ltd
Address of Factory:	Chen Wu Bei District Chang Ping Town,Dong Guan City, China

# 4.2 General Description of EUT

Name:	Portable Outdo	oor Bluetooth Speaker	
Model No.:	SYRENPRO		
Trade mark:	iLuv		
Operation Frequency:	2402MHz~248	0MHz	
Bluetooth Version:	V3.0		
Modulation Technique:	Frequency Hop	oping Spread Spectrum(FHSS)	
Modulation Type:	GFSK, π/4DQI	PSK, 8DPSK	
Number of Channel:	79		
Hopping Channel Type:	Adaptive Frequ	uency Hopping systems	
Sample Type:	mobile product	ion	
Test Power Grade:	46(manufacturer declare)		
Test Software of EUT:	CSR(manufacturer declare)		
Antenna Type	Integral		
Antenna Gain	0dBi		
Power Supply:	AC Adapter :	AC ADAPTER	
		MODEL:NSA25EU-120180	
		INPUT:100-240V~ 50/60Hz 1A	
		OUTPUT:12.0V=1.8A	
	Battery : BFN Li-ion		
	2200mAh 7.4V		
DC Cable:	186cm		
Test Voltage:	3.7V		

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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		

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency		
The Lowest channel	2402MHz		
The Middle channel	2441MHz		
The Highest channel	2480MHz		

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### 4.3 Test Environment

Operating Environment:		
Temperature:	24.0 °C	
Humidity:	52 % RH	
Atmospheric Pressure:	1020 mbar	

# 4.4 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	
iPhone5	Apple	A1429	
AUX in cable	Supply by SGS	N/A	

### 4.5 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch E&E Lab,

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594 No tests were sub-contracted.

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### 4.6 Test Facility

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

### • CNAS (No. CNAS L2929)

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• VCCI

The 3m Semi-anechoic chamber, Full-anechoic Chamber and Shielded Room (7.5m x 4.0m x 3.0m) of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2197, G-416, T-1153 and C-2383 respectively.

### • FCC – Registration No.: 556682

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 556682.

### Industry Canada (IC)

Two 3m Semi-anechoic chambers of SGS-CSTC Standards Technical Services Co., Ltd. have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1 & 4620C-2.

### 4.7 Deviation from Standards

None.

### 4.8 Abnormalities from Standard Conditions

None.

### 4.9 Other Information Requested by the Customer

None.



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# 4.10 Equipment List

	Conducted Emission						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Due date (yyyy-mm-dd)		
1	Shielding Room	ZhongYu Electron	GB-88	SEL0042	2014-06-10		
2	LISN	Rohde & Schwarz	ENV216	SEL0152	2014-10-24		
3	LISN	ETS-LINDGREN	3816/2	SEL0021	2014-05-16		
4	8 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN- T8-02	SEL0162	2014-11-10		
5	4 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN- T4-02	SEL0163	2014-11-10		
6	2 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN- T2-02	SEL0164	2014-11-10		
7	EMI Test Receiver	Rohde & Schwarz	ESCI	SEL0022	2014-05-16		
8	Coaxial Cable	SGS	N/A	SEL0025	2014-05-29		
9	DC Power Supply	Zhao Xin	RXN-305D	SEL0117	2014-10-24		
10	Humidity/ Temperature Indicator	Shanhai Qixiang	ZJ1-2B	SEL0103	2014-10-24		
11	Barometer	Chang Chun	DYM3	SEL0088	2014-05-24		

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	RE in Chamber						
ltem	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Due date (yyyy-mm-dd)		
1	3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEL0017	2014-06-10		
2	EMI Test Receiver	Rohde & Schwarz	ESIB26	SEL0023	2014-05-16		
3	EMI Test software	AUDIX	E3	SEL0050	N/A		
4	BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEL0015	2014-10-24		
5	Double-ridged horn (1-18GHz)	ETS-LINDGREN	3117	SEL0006	2014-10-24		
6	Horn Antenna (18-26GHz)	ETS-LINDGREN	3160	SEL0076	2014-10-24		
7	Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEL0053	2014-05-16		
8	Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEL0168	2014-10-24		
9	Coaxial cable	SGS	N/A	SEL0027	2014-05-29		
10	Coaxial cable	SGS	N/A	SEL0189	2014-05-29		
11	Coaxial cable	SGS	N/A	SEL0121	2014-05-29		
12	Coaxial cable	SGS	N/A	SEL0178	2014-05-29		
13	Band filter	Amindeon	82346	SEL0094	2014-05-16		
14	Barometer	Chang Chun	DYM3	SEL0088	2014-05-24		
15	DC Power Supply	Zhao Xin	RXN-305D	SEL0117	2014-10-24		
16	Humidity/ Temperature Indicator	Shanhai Qixiang	ZJ1-2B	SEL0103	2014-10-24		
17	Signal Generator (10M-27GHz)	Rohde & Schwarz	SMR27	SEL0067	2014-05-16		
18	Signal Generator	Rohde & Schwarz	SMY01	SEL0155	2014-10-24		
19	Loop Antenna	Beijing Daze	ZN30401	SEL0203	2014-06-04		

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	RF connected test				
ltem	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Due date (yyyy-mm-dd)
1	DC Power Supply	Zhao Xin	RXN-305D	SEL0117	2014-10-24
2	Humidity/ Temperature Indicator	HYGRO	ZJ1-2B	SEL0033	2014-10-24
3	Spectrum Analyzer	Rohde & Schwarz	FSP	SEL0154	2014-10-24
4	Coaxial cable	SGS	N/A	SEL0178	2014-05-29
5	Coaxial cable	SGS	N/A	SEL0179	2014-05-29
6	Barometer	ChangChun	DYM3	SEL0088	2014-05-24
7	Signal Generator	Rohde & Schwarz	SML03	SEL0068	2014-05-16
8	Band filter	amideon	82346	SEL0094	2014-05-16
9	POWER METER	R & S	NRVS	SEL0144	2014-10-24
10	Attenuator	Beijin feihang taida	TST-2-6dB	SEL0205	2014-05-16
11	Power Divider(splitter)	Agilent Technologies	11636B	SEL0130	2014-10-24

Note: The calibration interval is one year, all the instruments are valid.

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# 5 Test results and Measurement Data

### 5.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203 /247(c)
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### 15.203 requirement:

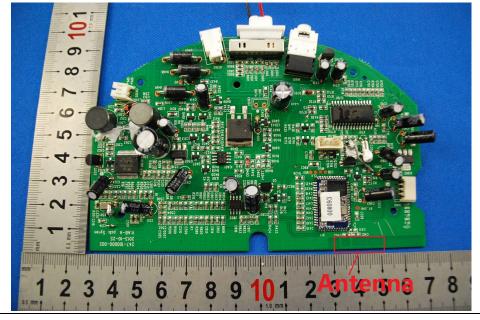
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit 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 integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0dBi.





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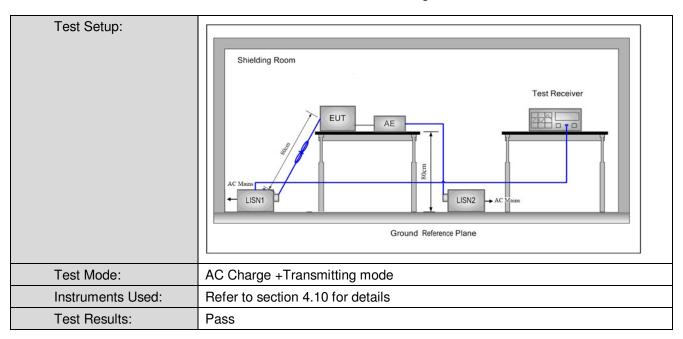
Test Requirement:	47 CFR Part 15C Section 15.2	47 CFR Part 15C Section 15.207		
Test Method:	ANSI C63.10: 2009	ANSI C63.10: 2009		
Test Frequency Range	: 150kHz to 30MHz			
Limit:		Limit (c	lBuV)	
	Frequency range (MHz)	Quasi-peak	Average	
	0.15-0.5	66 to 56*	56 to 46*	
	0.5-5	56	46	
	5-30	60	50	
	* Decreases with the logarithm	n of the frequency.		
Test Procedure:				

### 5.2 Conducted Emissions





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### **Measurement Data**

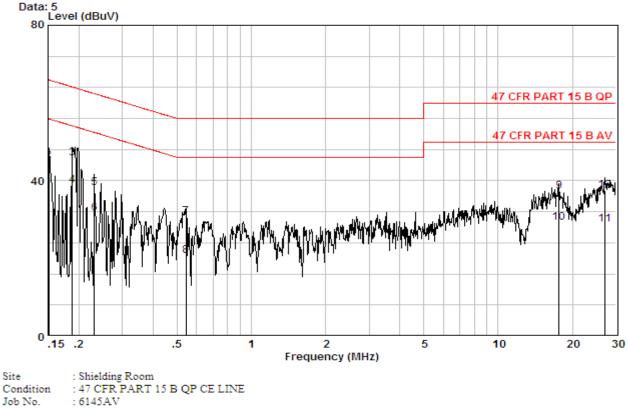
An initial pre-scan was performed on the live and neutral lines with peak detector.

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



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Live line:



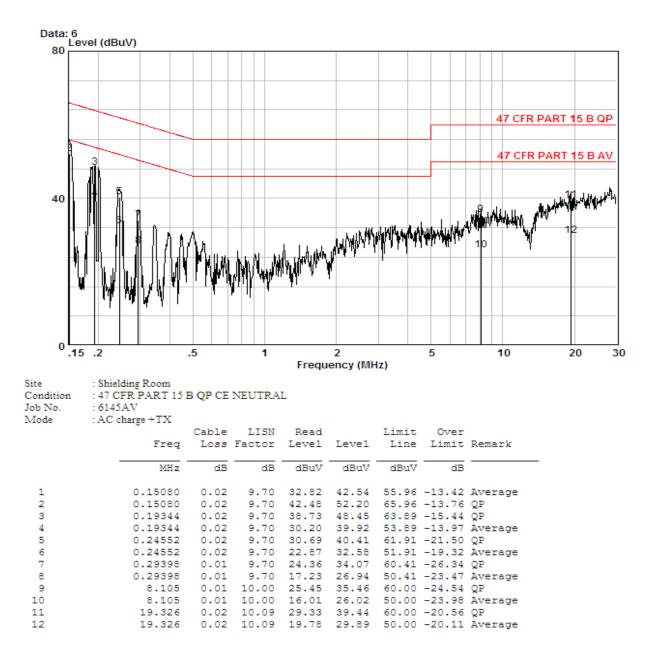
Mode : AC charge +TX

Iviode	: AC charge +1X			_		_	_	
		Cable		Read		Limit	Over	
	Freq	Loss	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.15080	0.02	9.70	27.68	37.40	55.96	-18.55	Average
2	0.15080	0.02	9.70	35.43	45.15	65.96	-20.81	QP
3	0.18838	0.02	9.70	36.02	45.74	64.11	-18.37	QP
4	0.18838	0.02	9.70	28.98	38.70	54.11	-15.41	Average
5	0.23162	0.02	9.70	28.42	38.14	62.39	-24.25	QP
6	0.23162	0.02	9.70	21.81	31.53	52.39	-20.86	Average
7	0.54355	0.01	9.80	20.92	30.73	56.00	-25.27	QP
8	0.54355	0.01	9.80	10.93	20.75	46.00	-25.25	Average
9	17.661	0.02	10.10	27.17	37.29	60.00	-22.71	QP
10	17.661	0.02	10.10	19.18	29.30	50.00	-20.70	Average
11	26.984	0.03	10.10	18.71	28.84	50.00	-21.16	Average
12	26.984	0.03	10.10	27.27	37.40	60.00	-22.60	QP



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### Neutral line:



#### Notes:

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



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### 5.3 Conducted Peak Output Power

Test Requirement:	47 CFR Part 15C Section 15.247 (b)(1)	
Test Method:	ANSI C63.10:2009	
Test Setup:	Spectrum Analyzer E.U.T Non-Conducted Table Ground Reference Plane Remark: Offset the High-Frequency cable loss 1.5dB in the spectrum analyzer.	
Limit:	20dBm	
Exploratory Test Mode:	Non-hopping transmitting with all kind of modulation and all kind of data type	
Final Test Mode:	Through Pre-scan, find the DH1 of data type is the worse case of GFSK modulation type, 2-DH1 of data type is worse case of $\pi$ /4DQPSK modulation type, 3-DH1 of data type is worse case of 8DPSK modulation type.	
Instruments Used:	Refer to section 4.10 for details	
Test Results:	Pass	



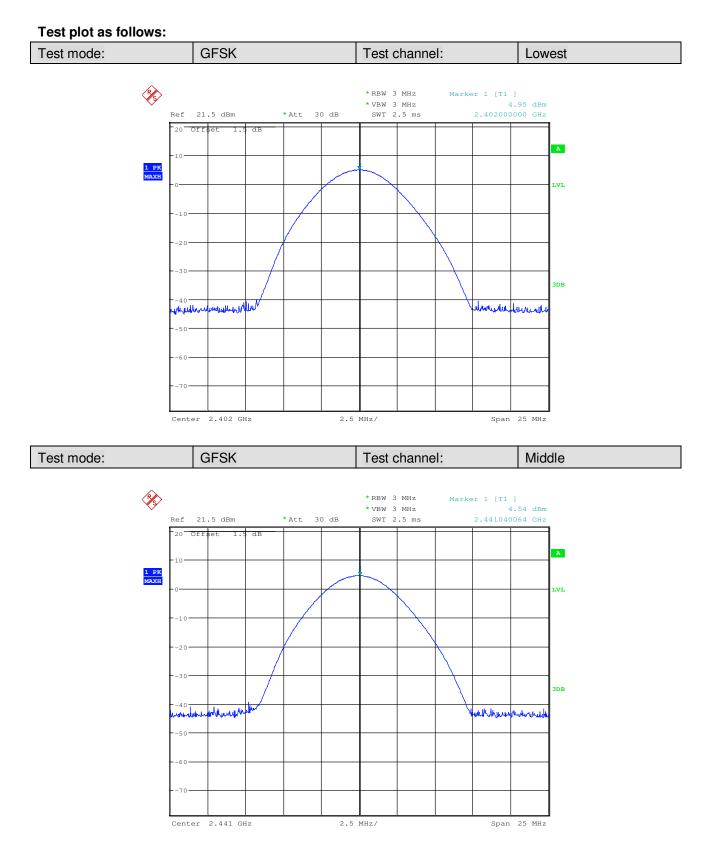
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Measurement Data					
	GFSK mode				
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result		
Lowest	4.95	20.00	Pass		
Middle	4.54	20.00	Pass		
Highest	4.16	20.00	Pass		
	π/4DQPSK m	ode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result		
Lowest	3.94	20.00	Pass		
Middle	3.50	20.00	Pass		
Highest	3.05	20.00	Pass		
	8DPSK mode				
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result		
Lowest	4.08	20.00	Pass		
Middle	3.85	20.00	Pass		
Highest	4.20	20.00	Pass		

### Measurement Data

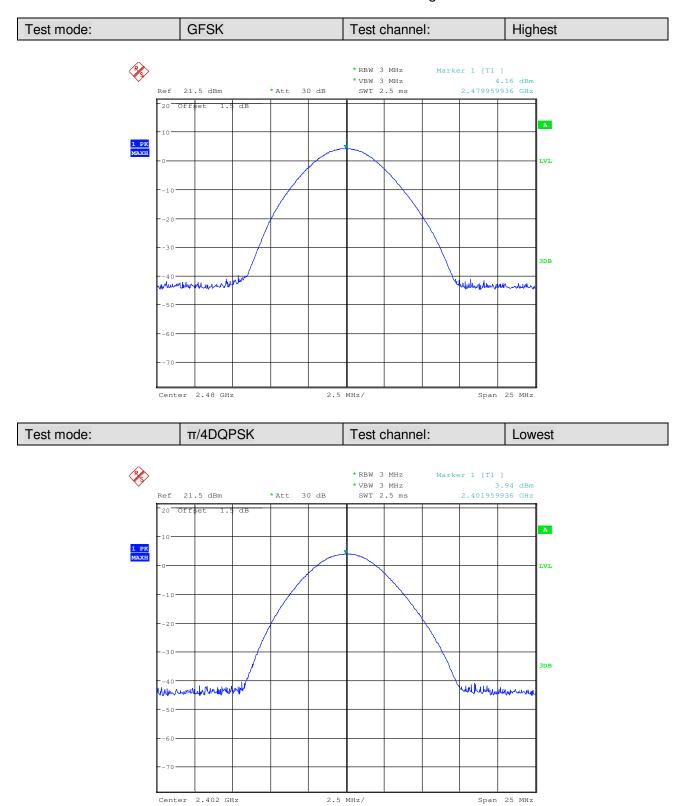


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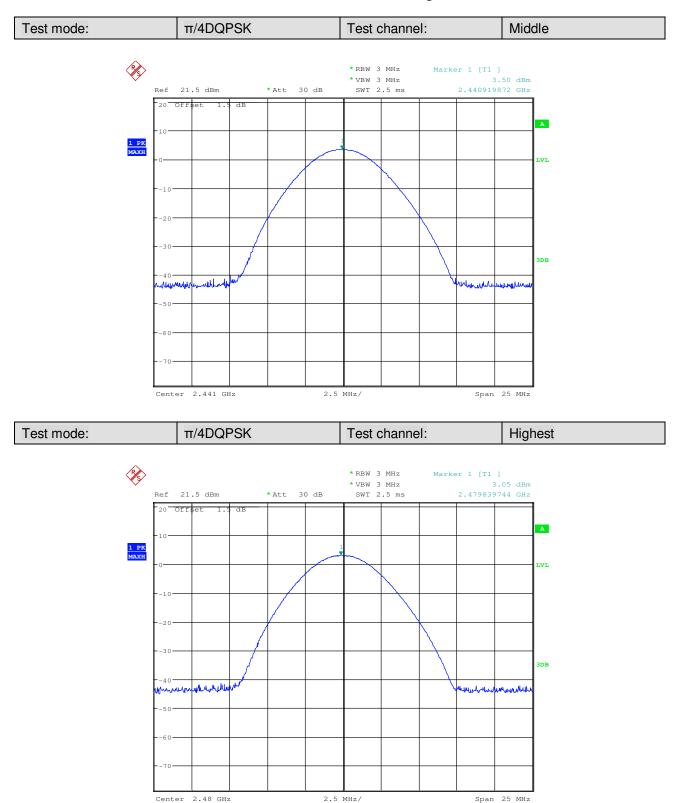


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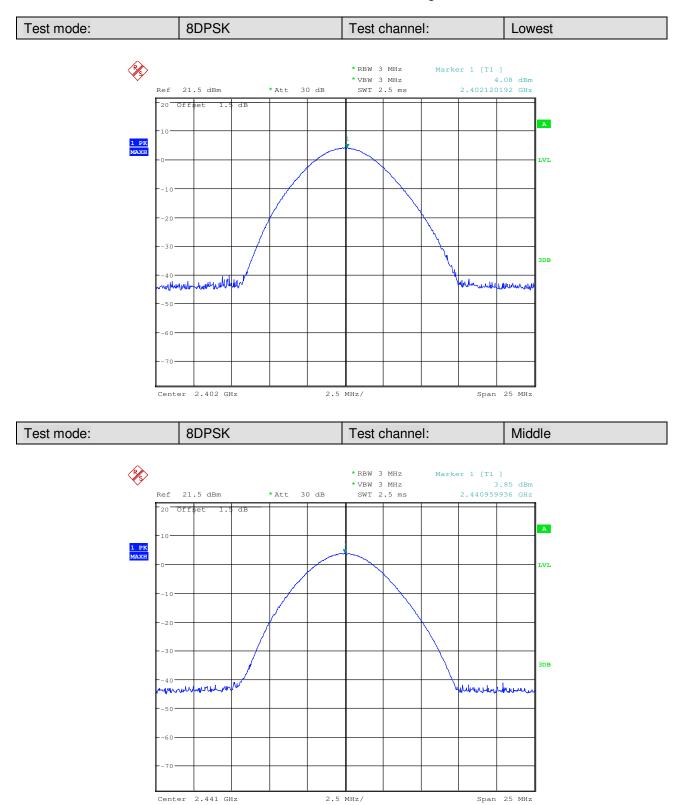


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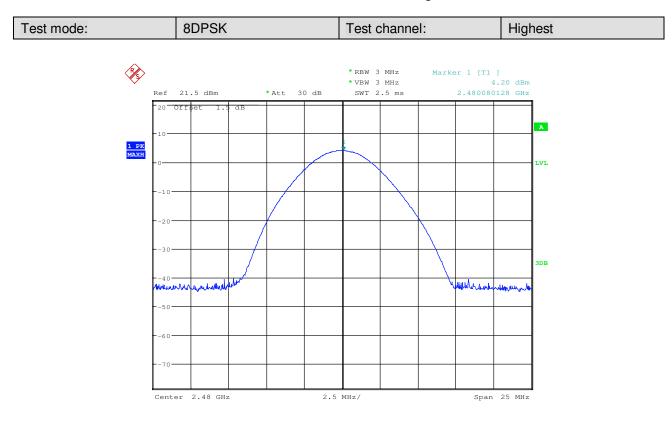


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### 5.4 20dB Occupy Bandwidth

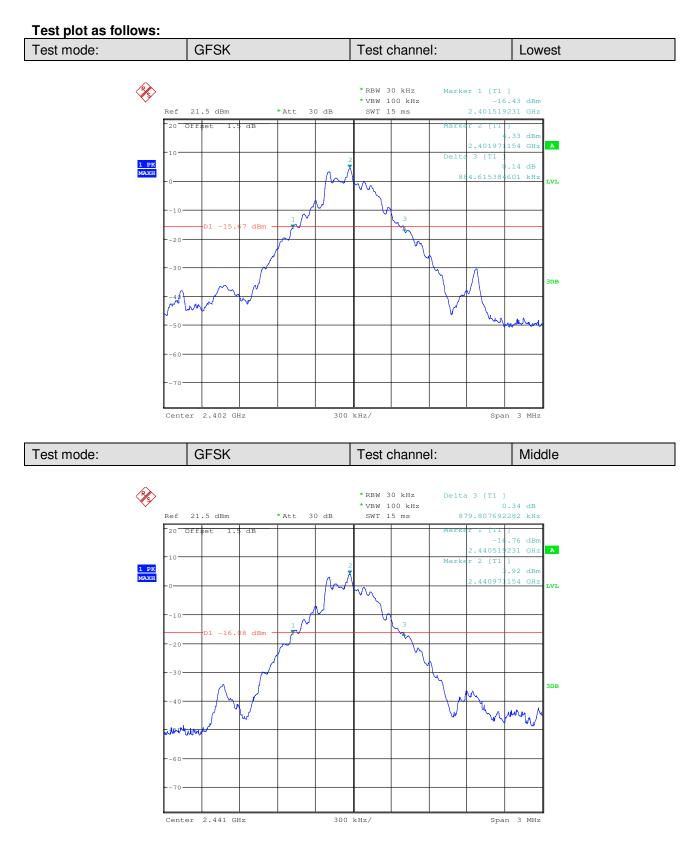
Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)	
Test Method:	ANSI C63.10:2009	
Test Setup:	Spectrum Analyzer E.U.T Non-Conducted Table Ground Reference Plane	
Limit:	NA	
Exploratory Test Mode:	Non-hopping transmitting with all kind of modulation and all kind of data type	
Final Test Mode:	Through Pre-scan, find the DH1 of data type is the worse case of GFSK modulation type, 2-DH1 of data type is worse case of $\pi$ /4DQPSK modulation type, 3-DH1 of data type is worse case of 8DPSK modulation type	
Instruments Used:	Refer to section 4.10 for details	
Test Results:	Pass	

### **Measurement Data**

Test shannel	20dB Occupy Bandwidth (kHz)			
Test channel	GFSK π/4DQPSK 8DPSK			
Lowest	884.615384601	1221.153846	1216.346154	
Middle	879.807692282	1230.769231	1221.153846	
Highest	879.807692290	1221.153846	1221.153846	

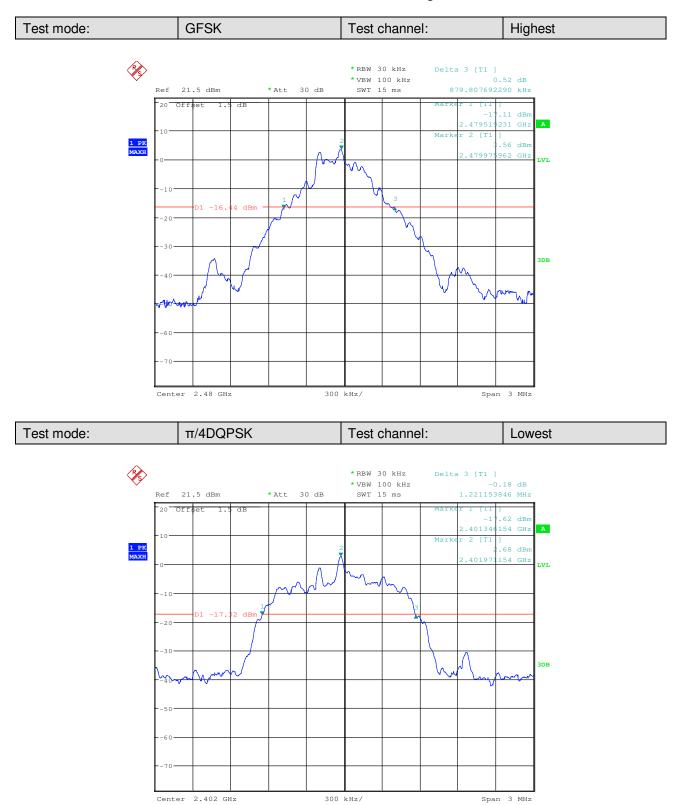


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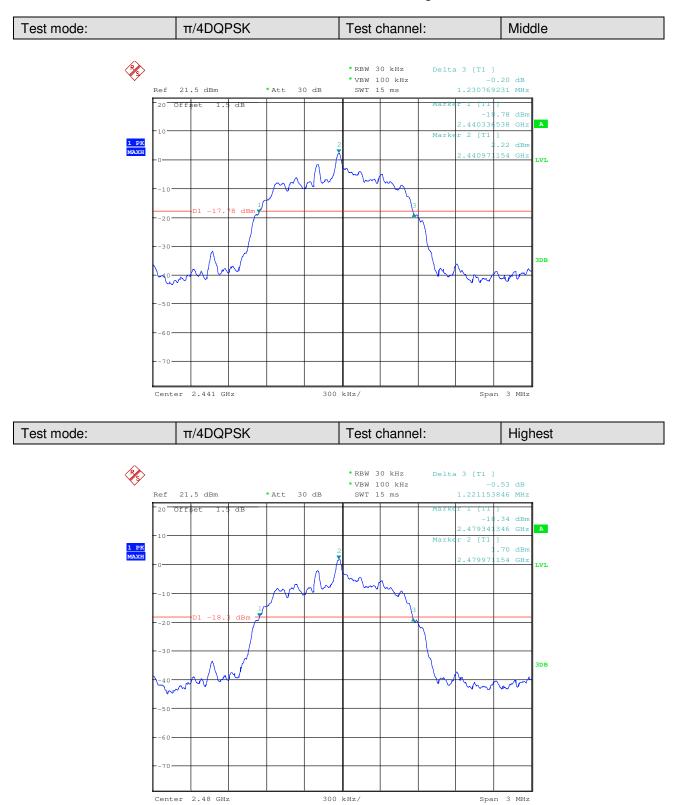


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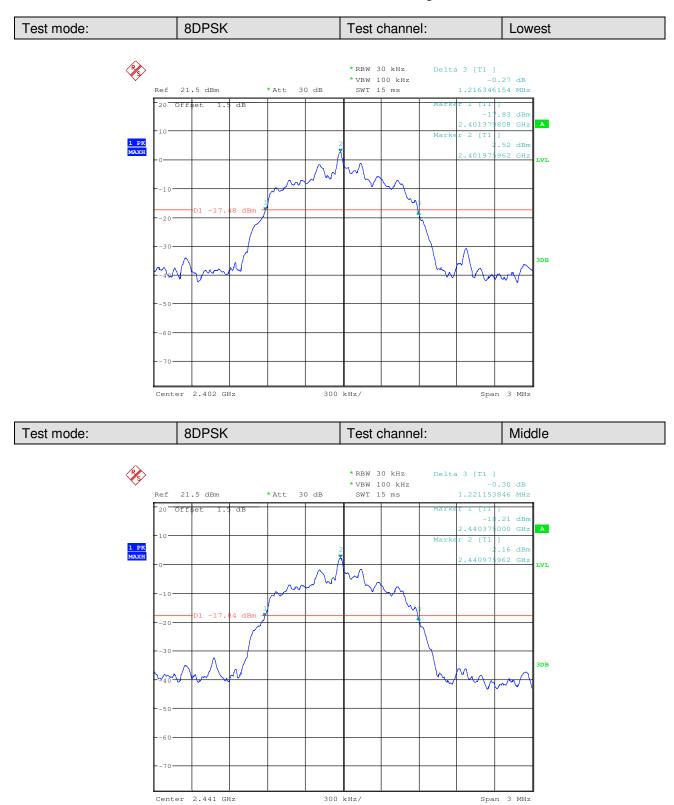


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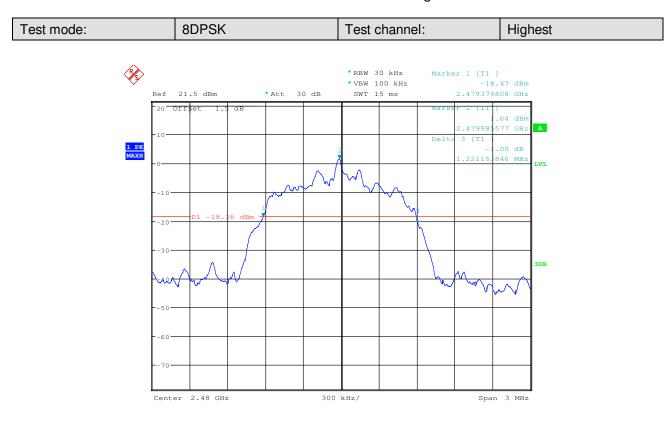


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### 5.5 Carrier Frequencies Separation

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)	
Test Method:	ANSI C63.10:2009	
Test Setup:	Spectrum Analyzer E.U.T Non-Conducted Table Ground Reference Plane	
Limit:	0.025MHz or 2/3 of the 20dB bandwidth (whichever is greater)	
Exploratory Test Mode:	Hopping transmitting with all kind of modulation and all kind of data type	
Final Test Mode:	Through Pre-scan, find the DH1 of data type is the worse case of GFSK modulation type, 2-DH1 of data type is worse case of $\pi$ /4DQPSK modulation type, 3-DH1 of data type is worse case of 8DPSK modulation type.	
Instruments Used:	Refer to section 4.10 for details	
Test Results:	Pass	



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### **Measurement Data**

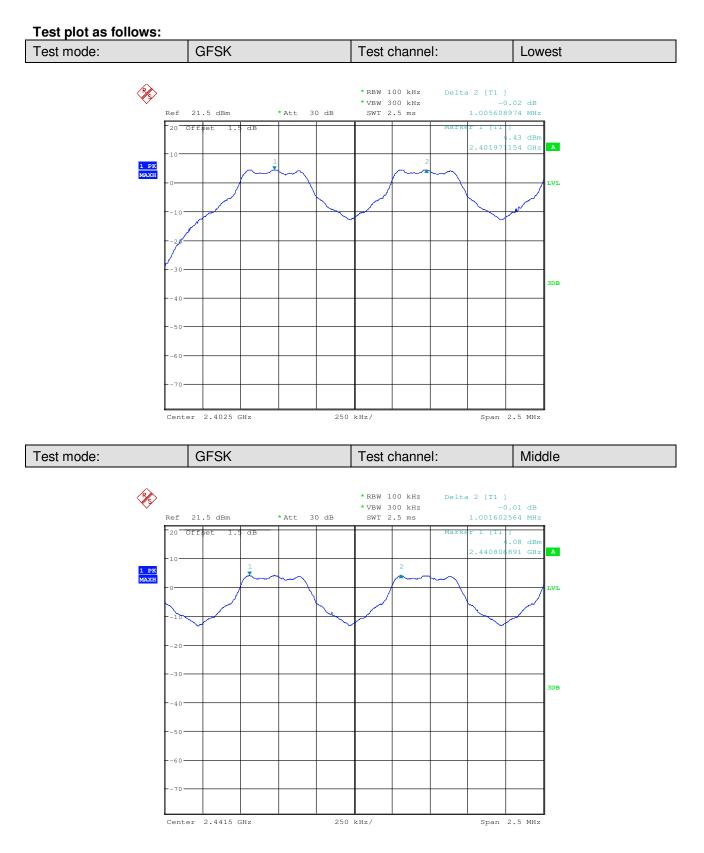
GFSK mode			
Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Lowest	1006	≥821	Pass
Middle	1002	≥821	Pass
Highest	1002	≥821	Pass
	π/4DQPSK m	ode	
Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Lowest	1002	≥821	Pass
Middle	1002	≥821	Pass
Highest	1002	≥821	Pass
	8DPSK mo	de	
Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Lowest	1002	≥821	Pass
Middle	1002	≥821	Pass
Highest	1006	≥821	Pass

Note: According to section 5.4,

Mode	20dB bandwidth (kHz) (worse case)	Limit (kHz) (Carrier Frequencies Separation)
GFSK	884.615384601	590
π/4DQPSK	1230.769231	821
8DPSK	1221.153846	814

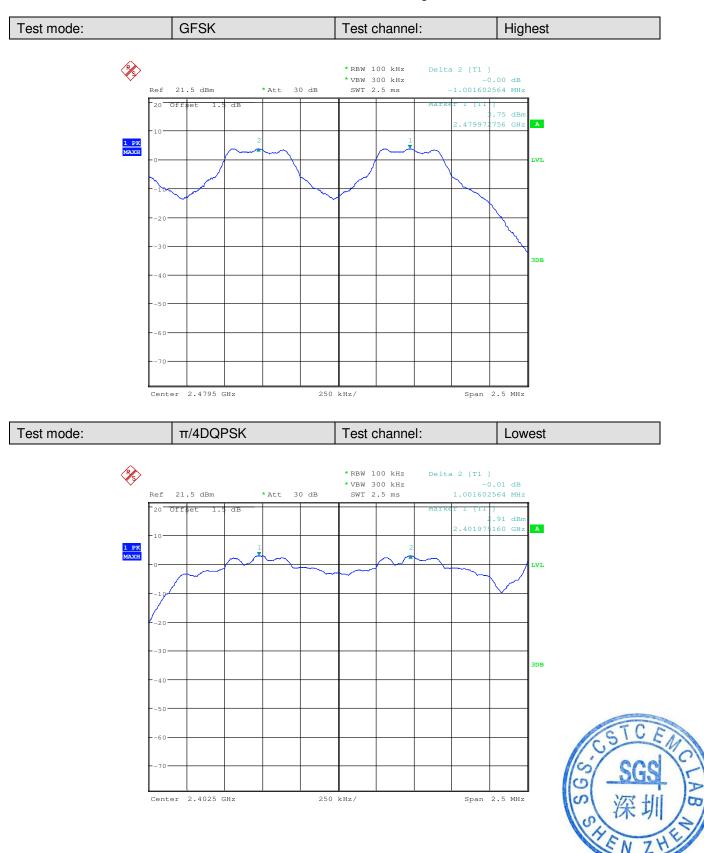


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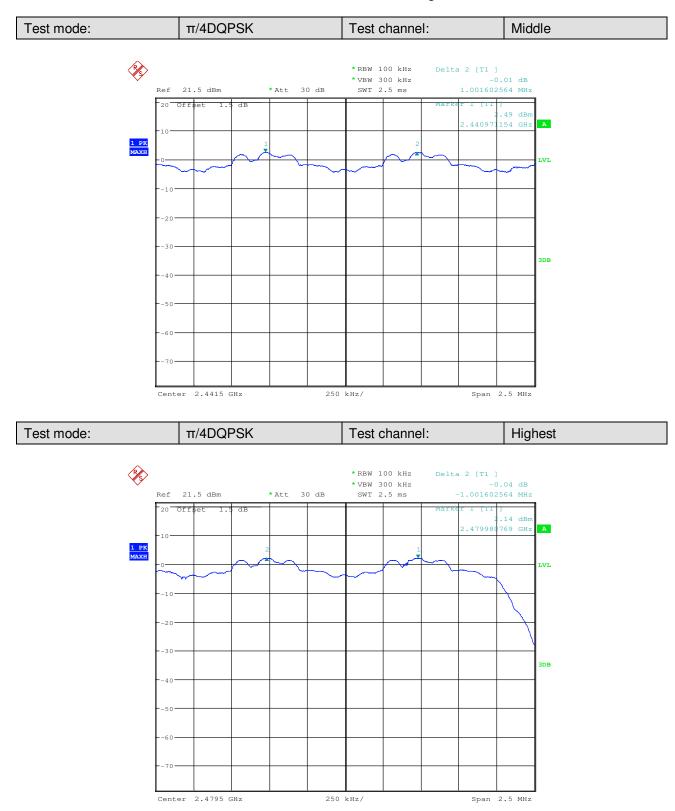


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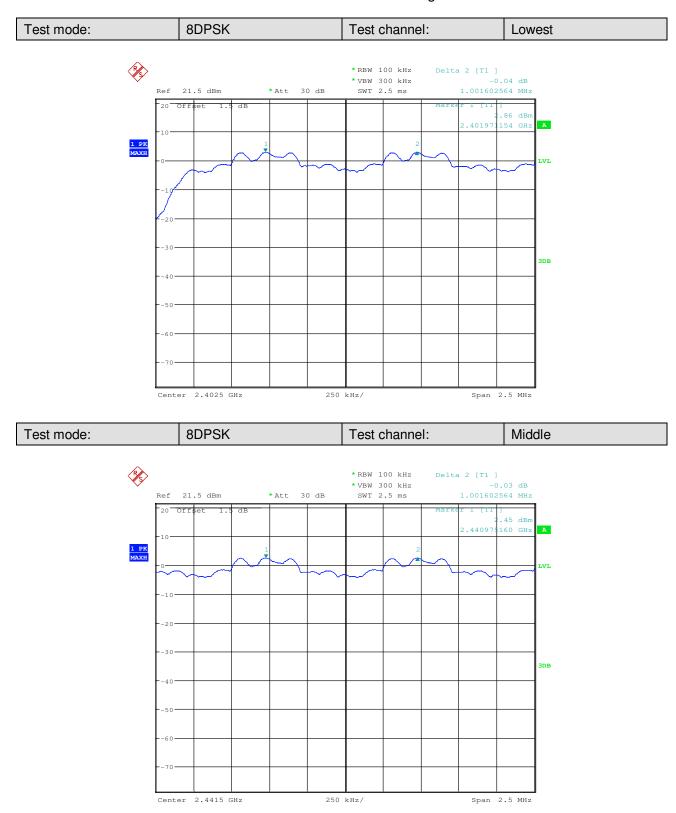


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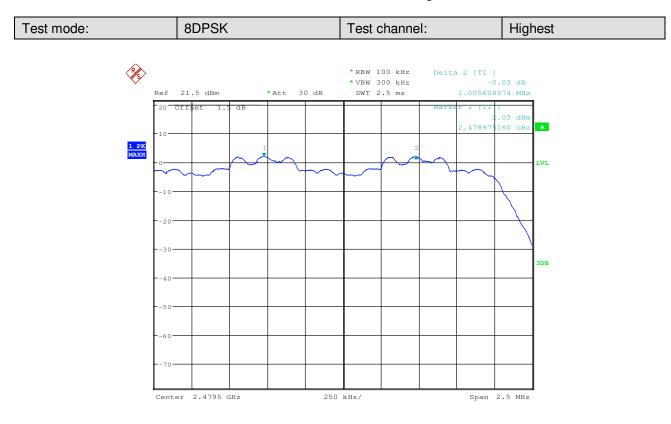


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### 5.6 Hopping Channel Number

Test Requirement:	47 CFR Part 15C Section 15.247 (b)	
Test Method:	ANSI C63.10:2009	
Test Setup:	Spectrum Analyzer E.U.T Non-Conducted Table Ground Reference Plane	
Limit:	At least 15 channels	
Test Mode:	Hopping transmitting with all kind of modulation	
Instruments Used:	Refer to section 4.10 for details	
Test Results:	Pass	

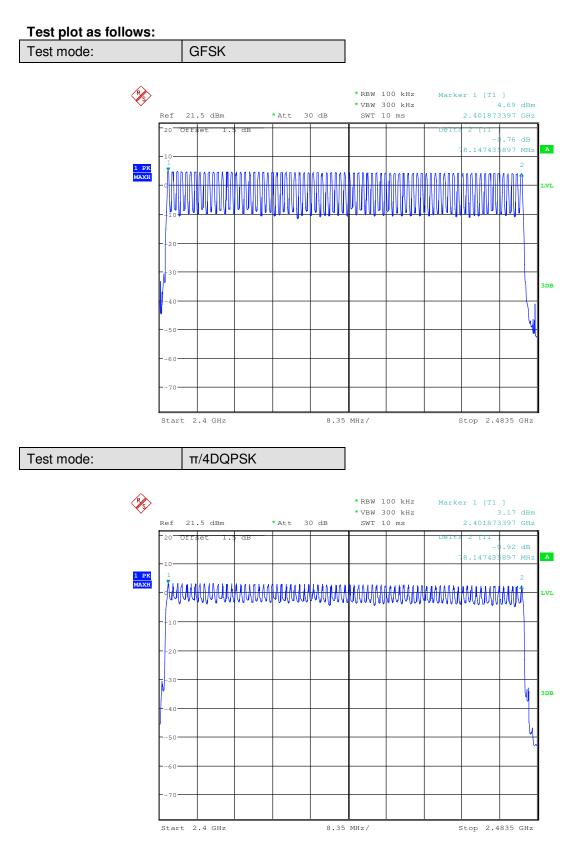
### **Measurement Data**

Mode	Hopping channel numbers	Limit
GFSK	79	≥15
π/4DQPSK	79	≥15
8DPSK	79	≥15

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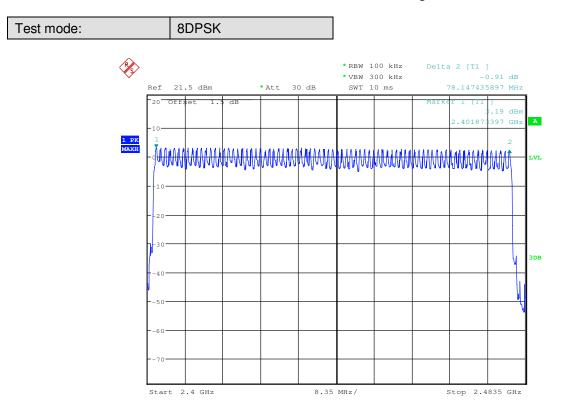


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#### 5.7 Dwell Time

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)				
Test Method:	ANSI C63.10:2009				
Test Setup:	Spectrum Analyzer E.U.T Non-Conducted Table				
	Ground Reference Plane				
Instruments Used:					
	Refer to section 4.10 for details				
Test Mode:	Hopping transmitting with all kind of modulation and all kind of data type.				
Limit:	0.4 Second				
Test Results:	Pass				

#### **Measurement Data**

Mode	Packet	Dwell time (second)	Limit (second)	
GFSK	DH1	0.1641	0.4	
	DH3	0.2846	0.4	
	DH5	0.3231	0.4	
π/4DQPSK	2-DH1	0.1667	0.4	
	2-DH3	0.2859	0.4	
	2-DH5	0.1949	0.4	
8DPSK	3-DH1	0.1679	0.4	
	3-DH3	0.2846	0.4	
	3-DH5	0.3231	0.4	

#### Test Result:

The test period: T= 0.4 Second/Channel x 79 Channel = 31.6 s

The lowest channel (2402MHz), middle channel (2441MHz), highest channel (2480MHz) as below

DH1 time slot=0.513(ms)\*(1600/ (2\*79))\*31.6=164.1 ms

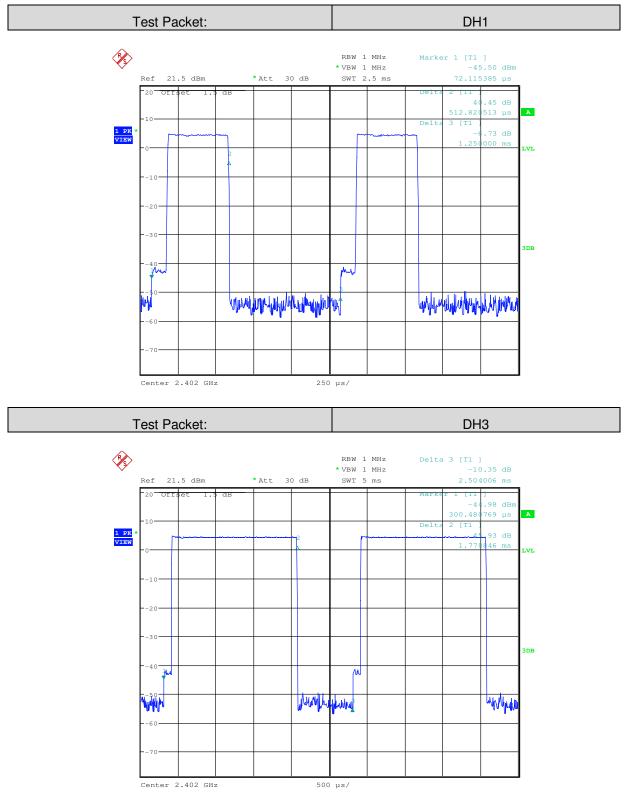
DH3 time slot=1.779(ms)\*(1600/ (4\*79))\*31.6=284.6 ms

DH5 time slot=3.029(ms)\*(1600/ (6\*79))\*31.6=323.1 ms



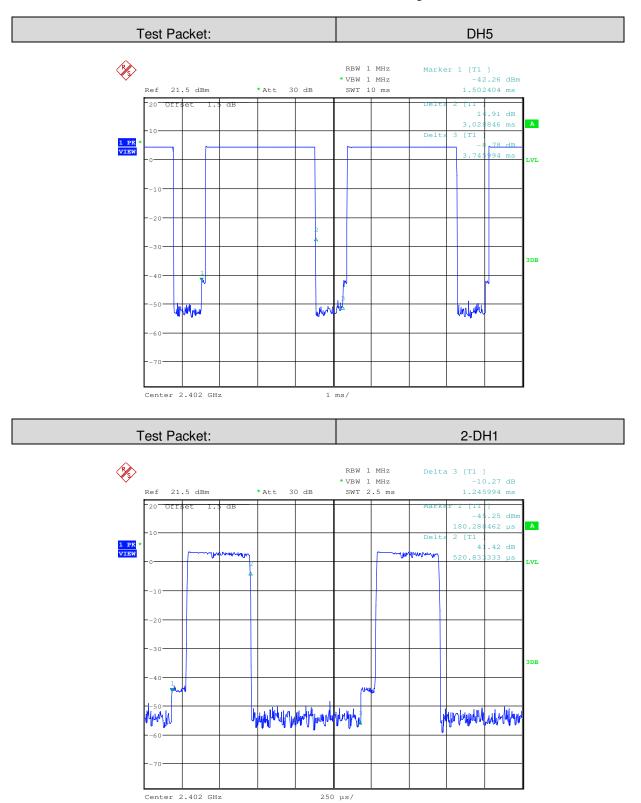
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#### Test plot as follows:



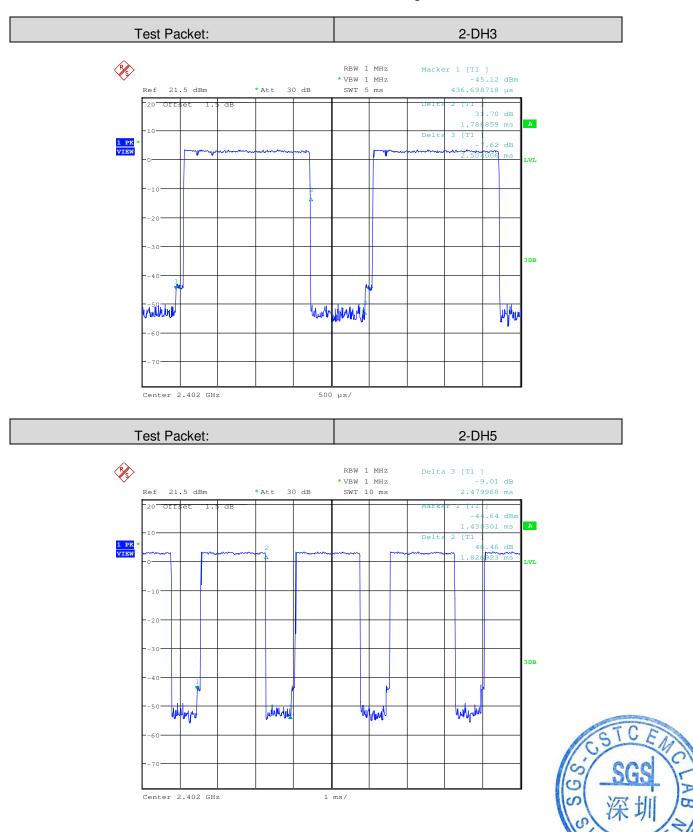


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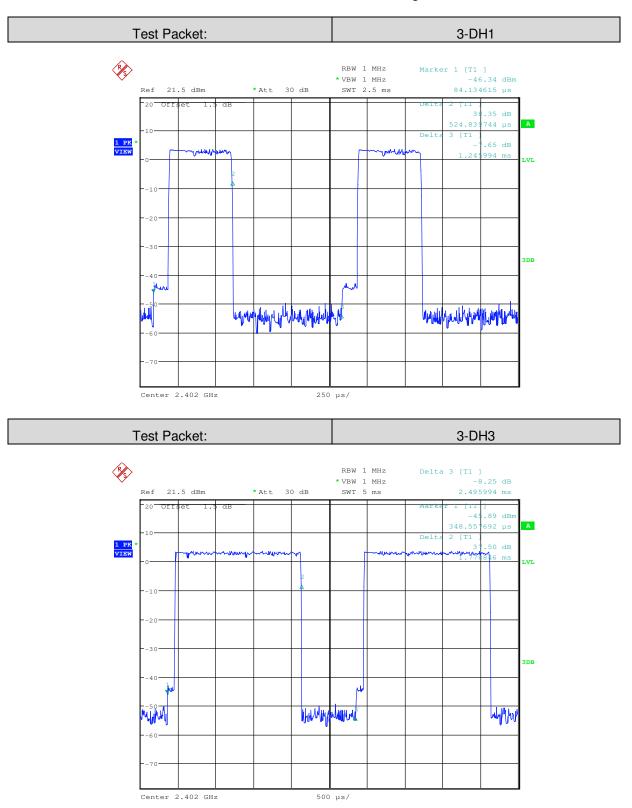


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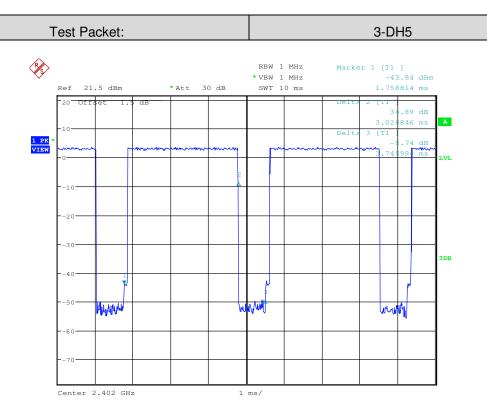


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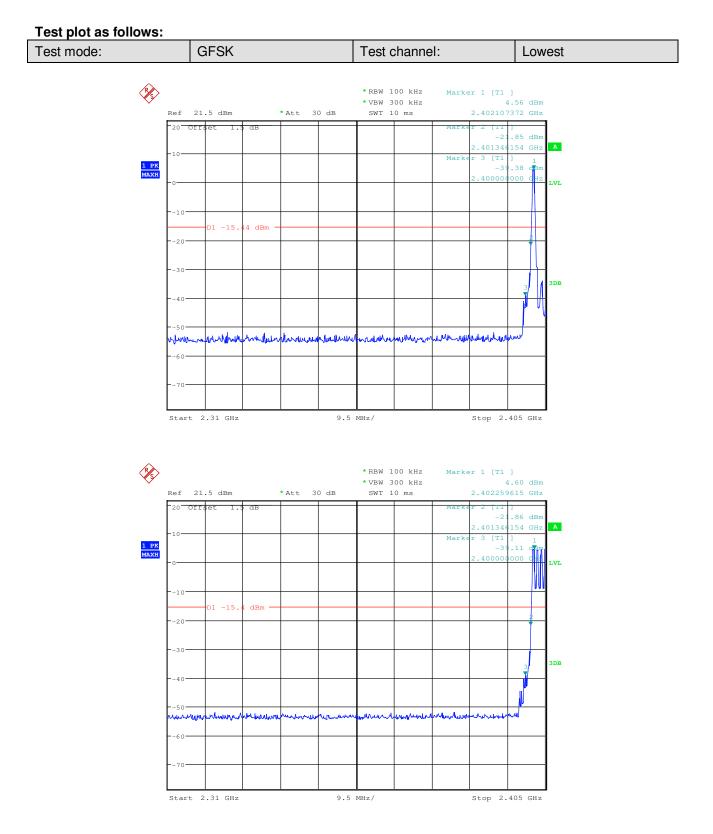
#### 5.8 Band-edge for RF Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)			
Test Method:	ANSI C63.10:2009			
Test Setup:	Spectrum Analyzer E.U.T Non-Conducted Table Ground Reference Plane			
	Remark: Offset the High-Frequency cable loss 1.5dB in the spectrum analyzer.			
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.			
Exploratory Test Mode:	Hopping transmitting with all kind of modulation and all kind of data type			
Final Test Mode:	Through Pre-scan, find the DH1 of data type is the worse case of GFSK modulation type, 2-DH1 of data type is worse case of $\pi$ /4DQPSK modulation type, 3-DH1 of data type is worse case of 8DPSK modulation type.			
Instruments Used:	Refer to section 4.10 for details			
Test Results:	Pass			

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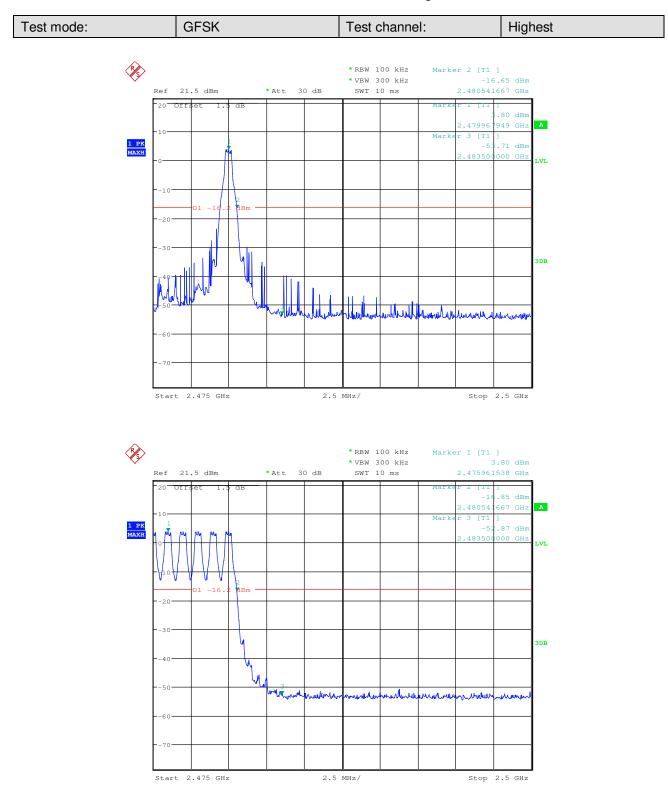


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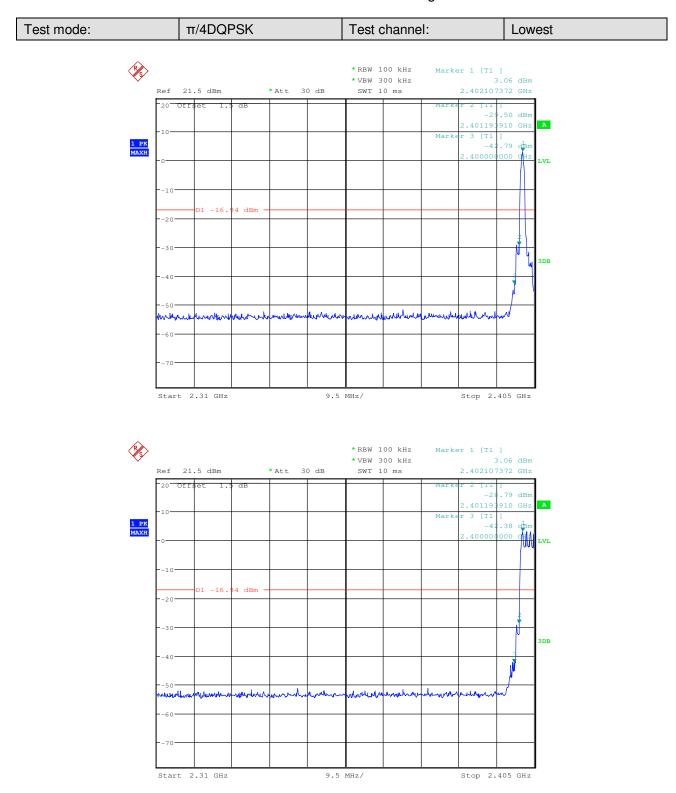


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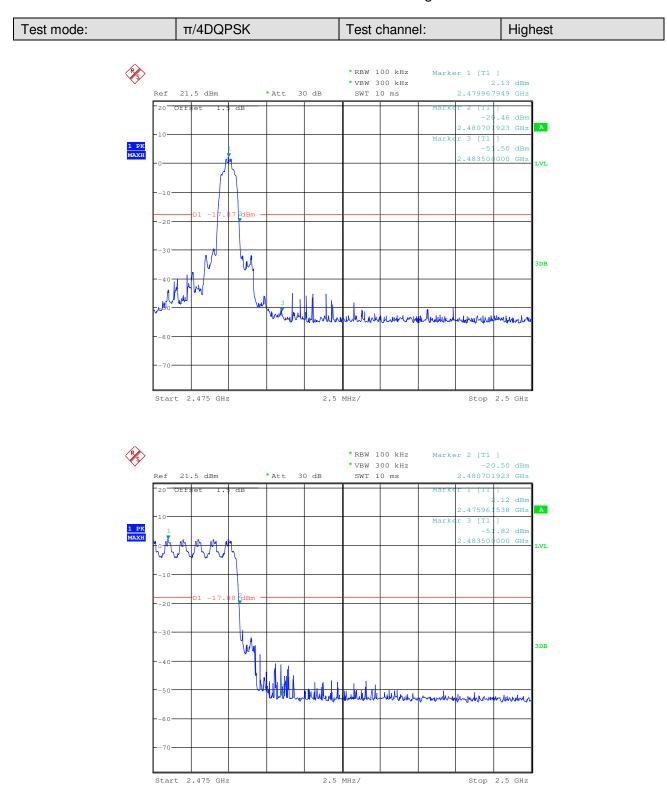


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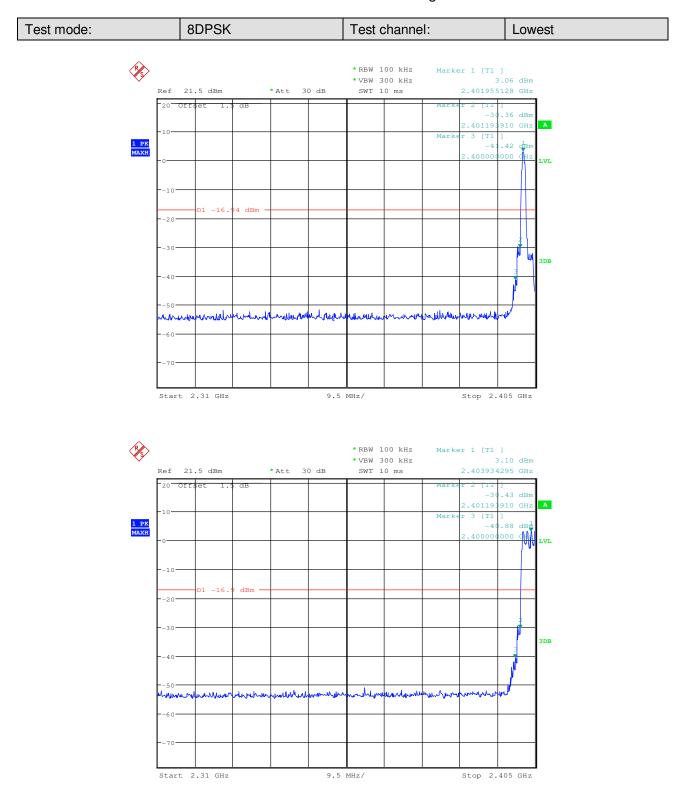


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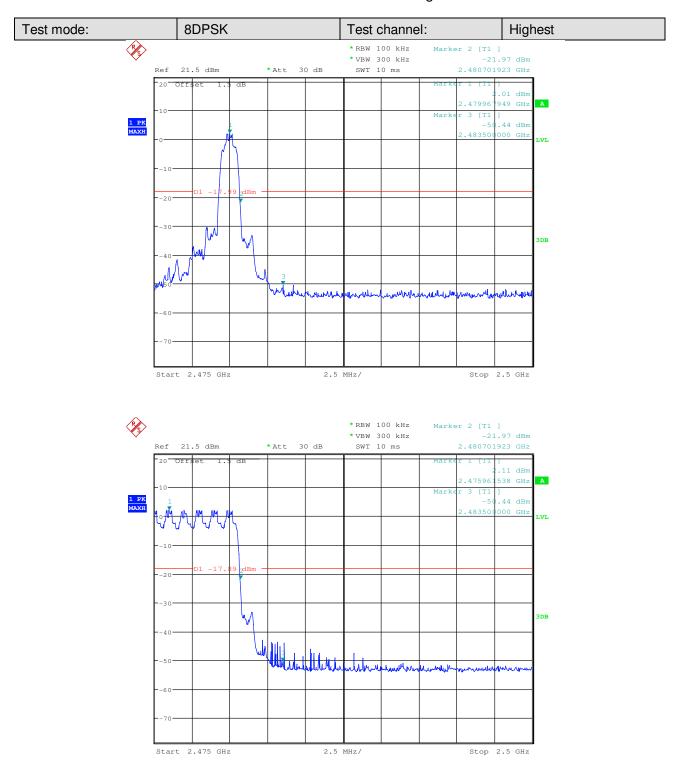


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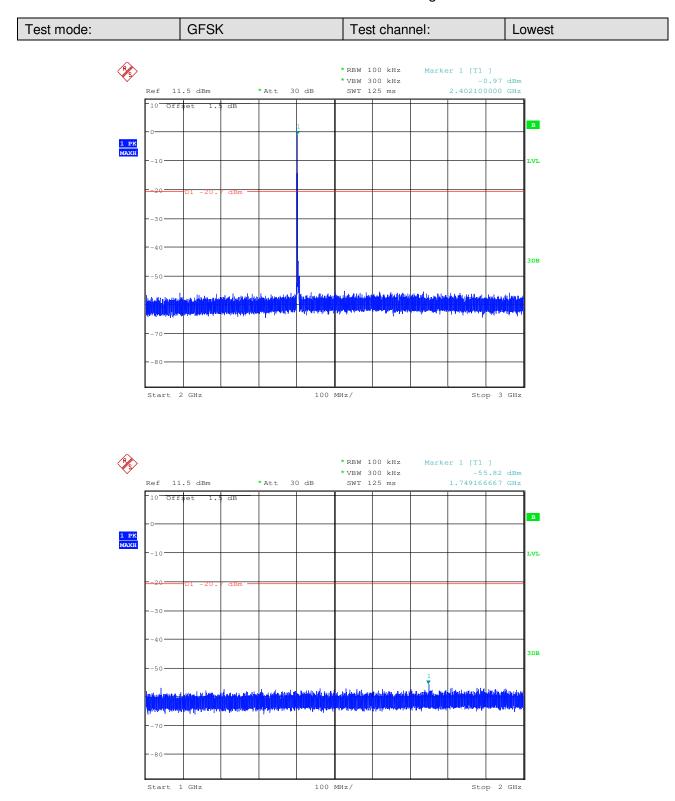
## 5.9 Spurious RF Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)					
Test Method:	ANSI C63.10:2009					
Test Setup:	Spectrum Analyzer E.U.T Non-Conducted Table Ground Reference Plane Remark:					
	Offset the High-Frequency cable loss 1.5dB in the spectrum analyzer.					
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.					
Exploratory Test Mode:	Non-hopping transmitting with all kind of modulation and all kind of data type					
Final Test Mode:	Through Pre-scan, find the DH1 of data type is the worse case of GFSK modulation type, 2-DH1 of data type is worse case of $\pi$ /4DQPSK modulation type, 3-DH1 of data type is worse case of 8DPSK modulation type.					
Instruments Used:	Refer to section 4.10 for details					
Test Results:	Pass					



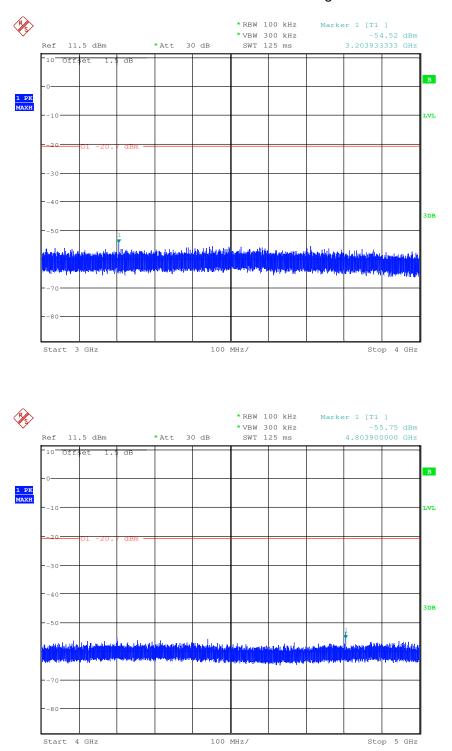


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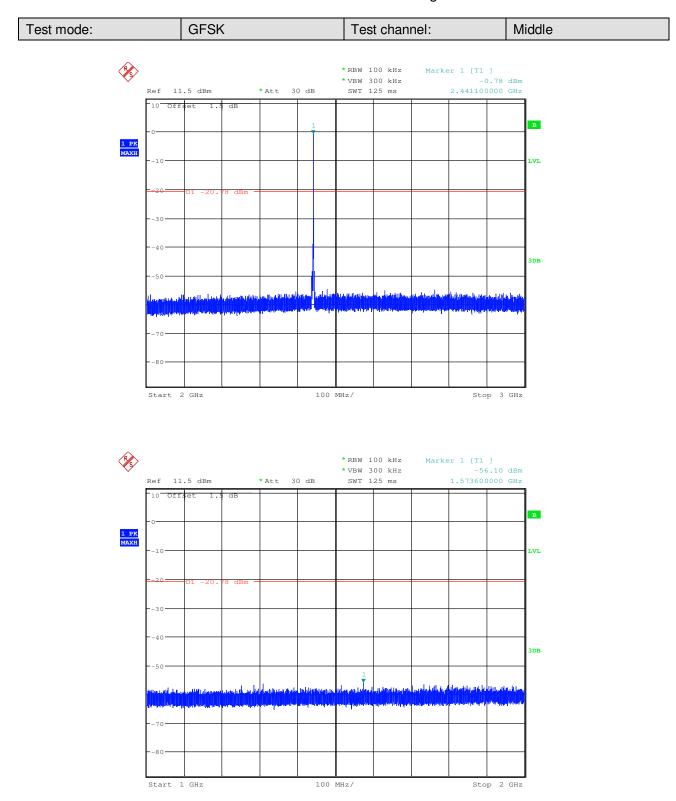


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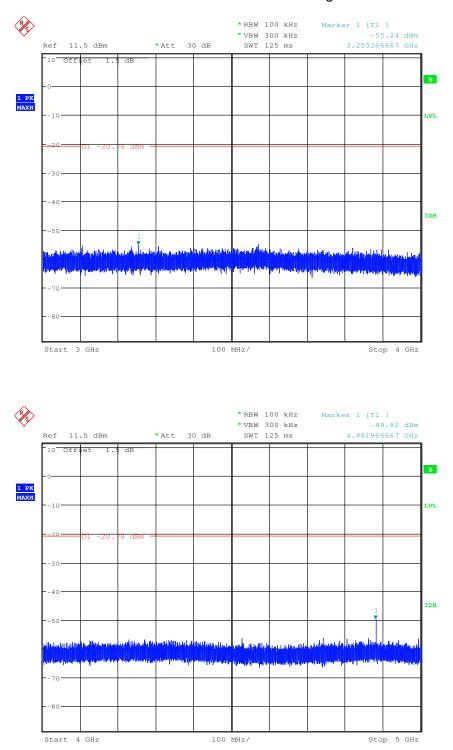


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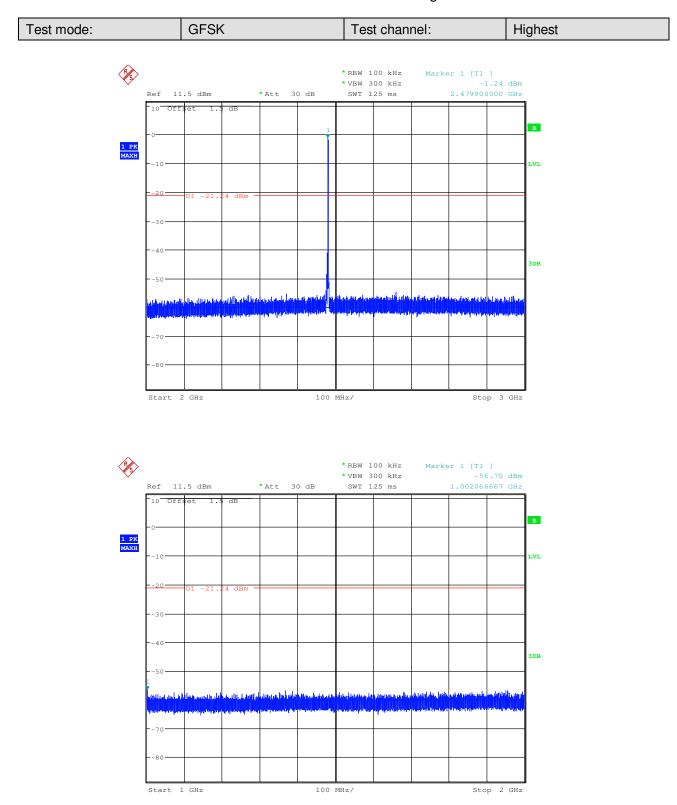


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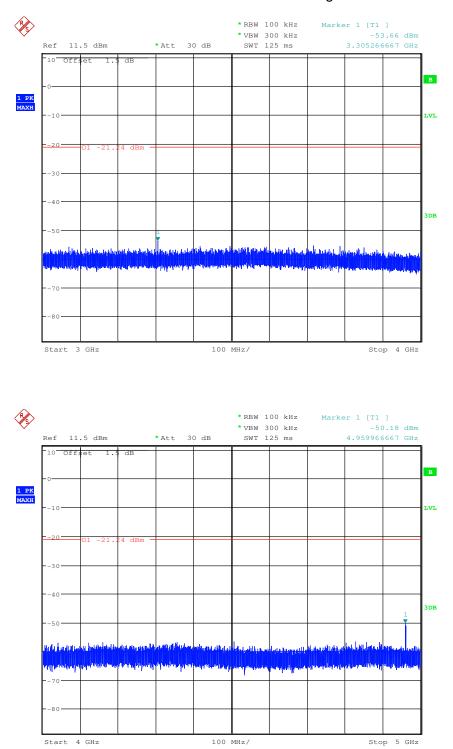


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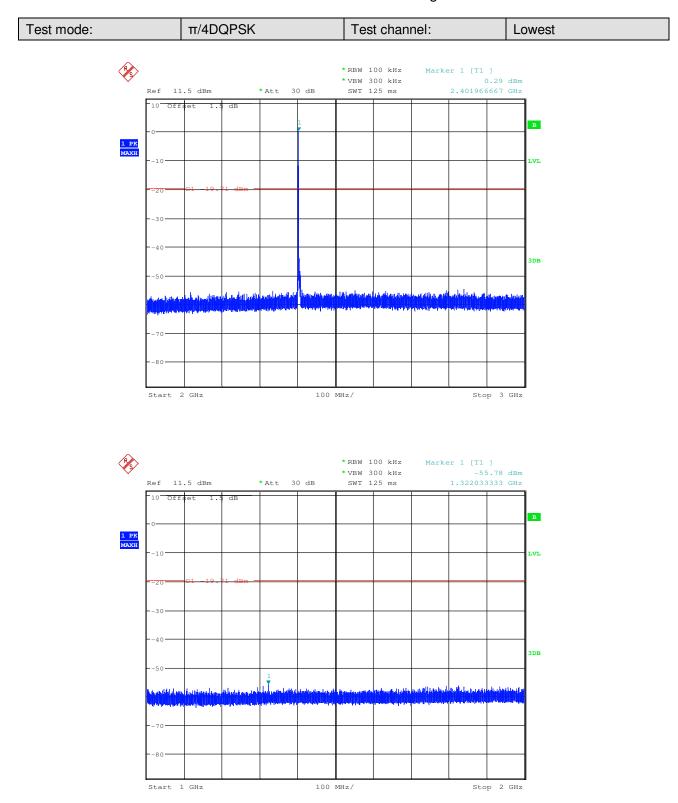


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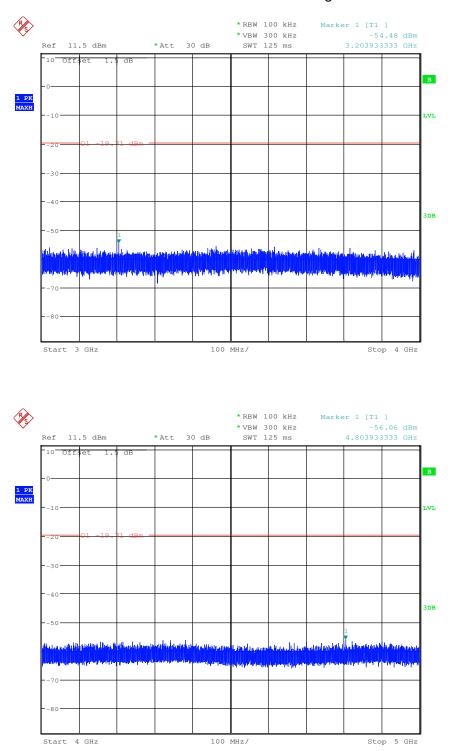


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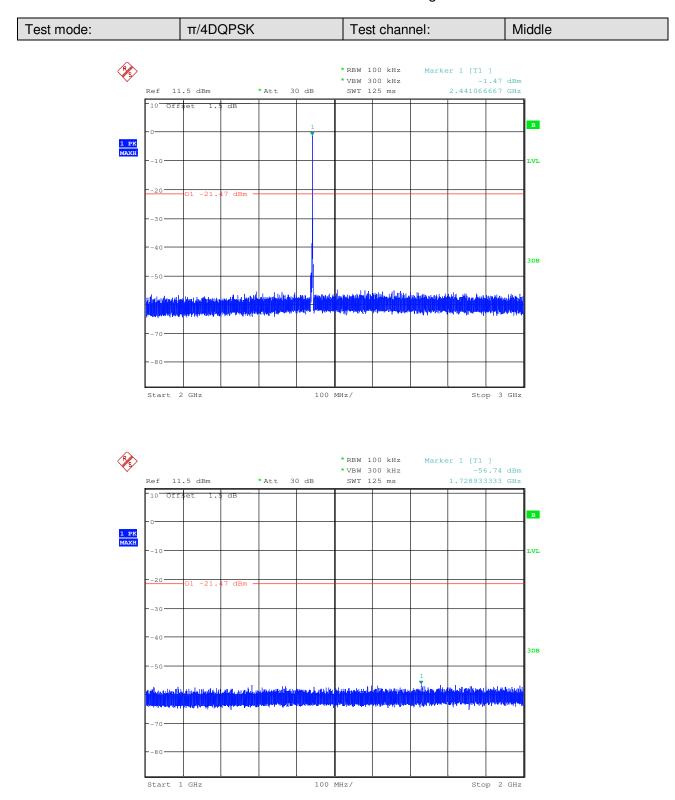


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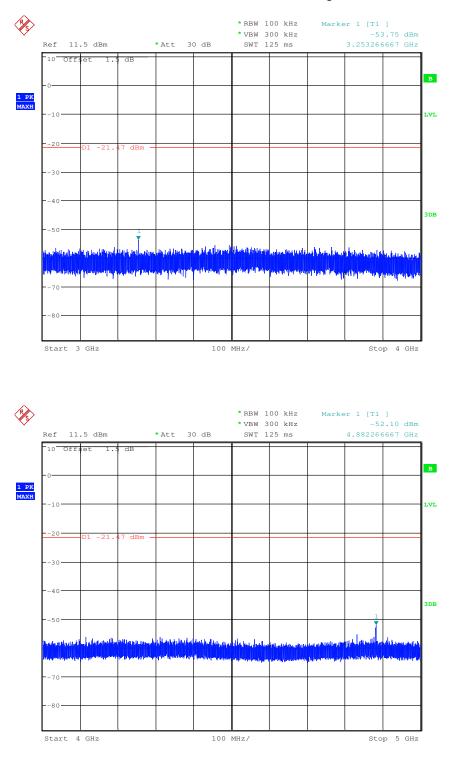


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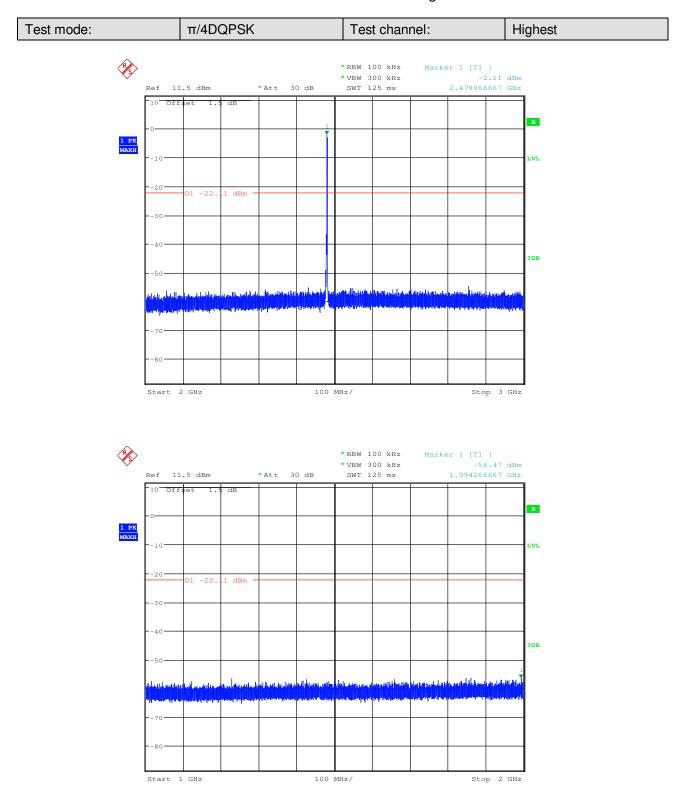
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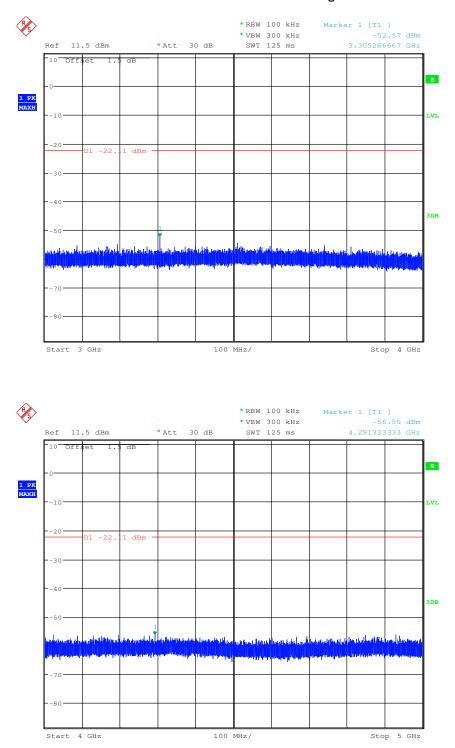


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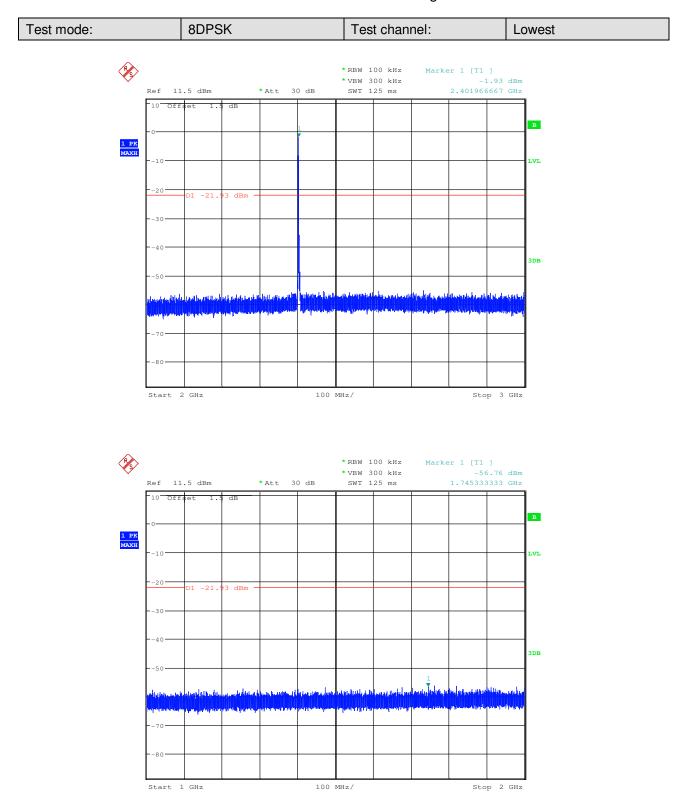


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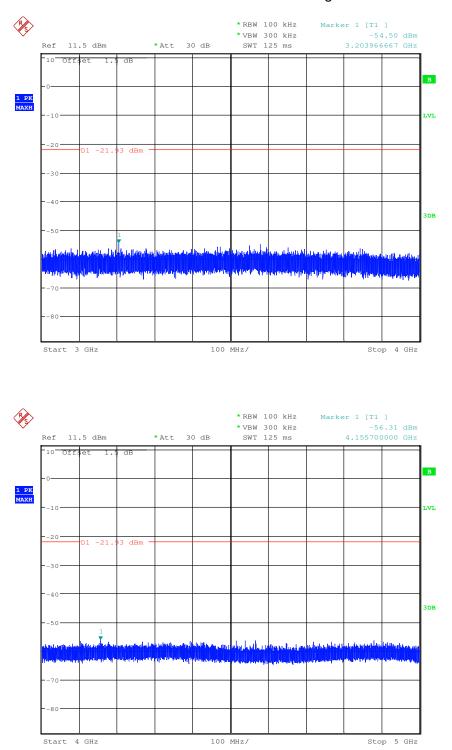


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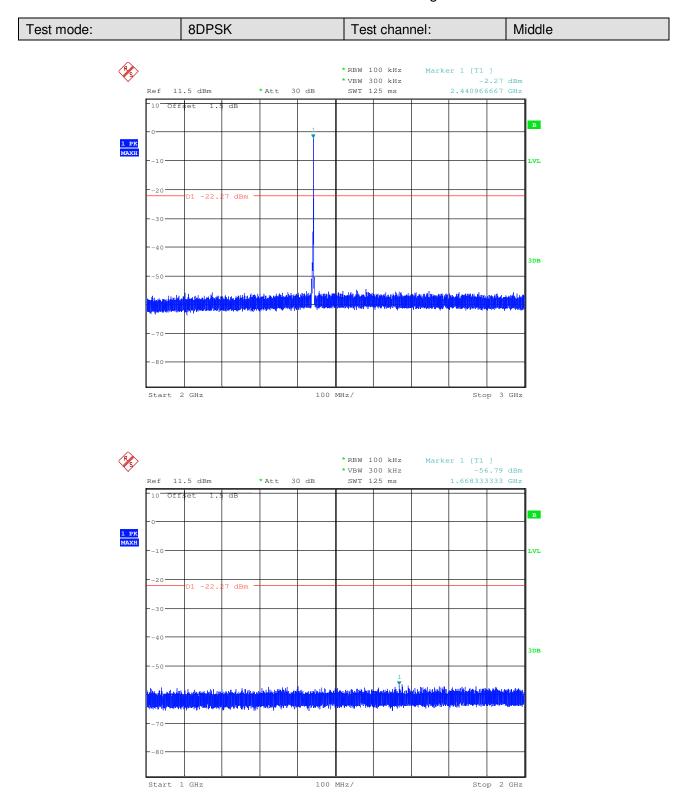


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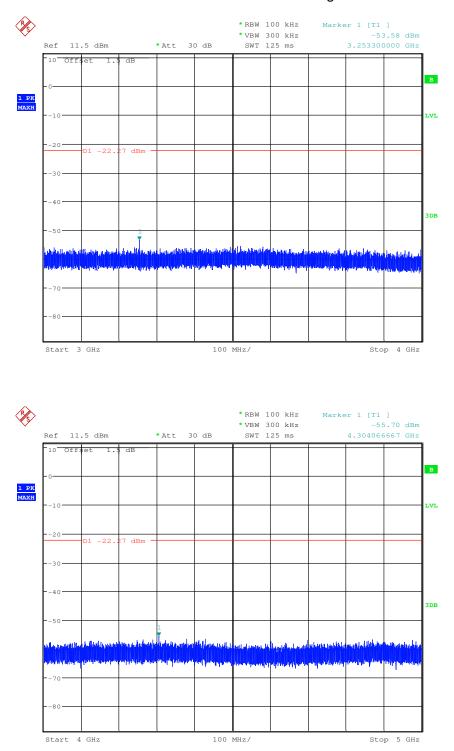


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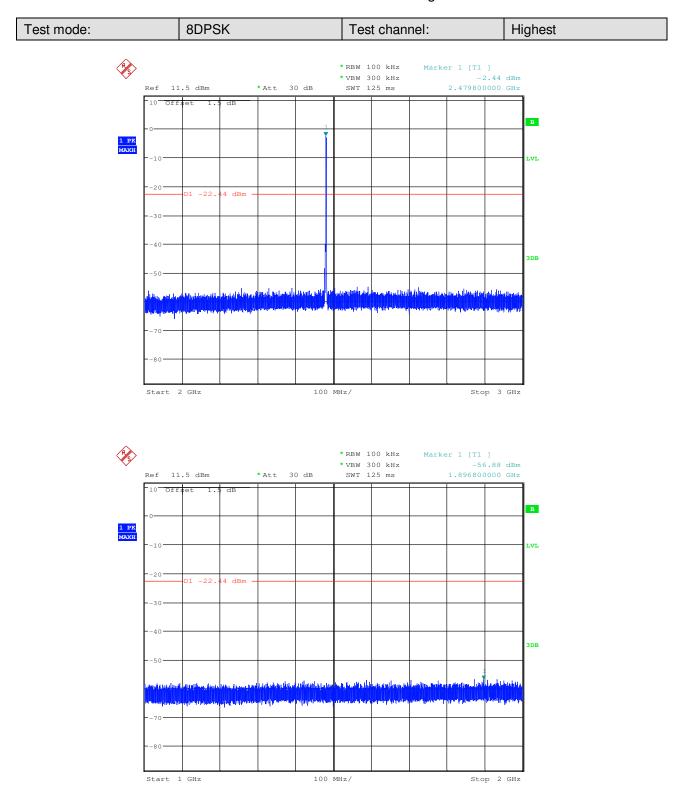


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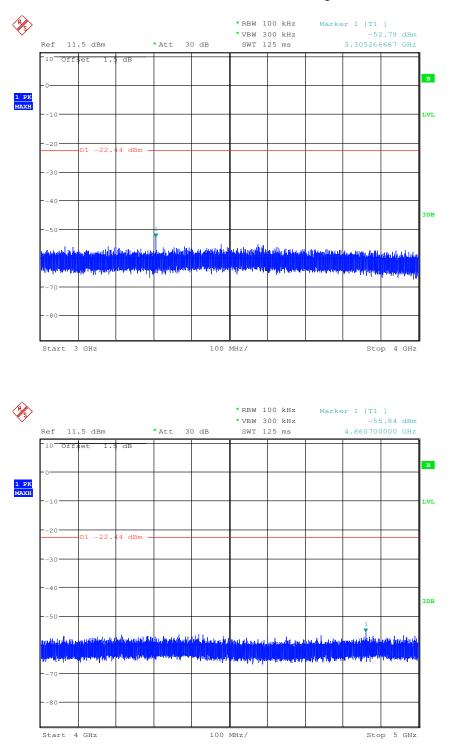


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#### Remark:

Pretest 9kHz to 25GHz, find the highest point when testing, so only the worst data were shown in the test report.



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# 5.10Pseudorandom Frequency Hopping Sequence

Test Requirement:				
-	47 CFR Part 15C 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 band	dwidth of the hopping channel, whichever is greater.			
Alternatively. Frequency ho	pping 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, whicheve	er 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			
	ordered list of hopping frequencies. Each frequency must be used equally			
	nsmitter. The system receivers shall have input bandwidths that match the			
hopping channel bandwidth	ns of their corresponding transmitters and shall shift frequencies in			
synchronization with the tra	ansmitted signals.			
EUT Pseudorandom Freq	uency Hopping Sequence			
The pseudorandom sequer	nce may be generated in a nine-stage shift register whose 5th and 9th stag			
outputs are added in a mod	dulo-two addition stage. And the result is fed back to the input of the first			
stage. The sequence begin	s with the first ONE of 9 consecutive ONEs; i.e. the shift register is initializ			
with nine ones.				
Number of shift register st	tages: 9			
<ul> <li>Length of pseudo-random</li> </ul>	i sequence: 29 -1 = 511 bits			
•	•			
• •	•			
<b>•</b> •	•			
Length of pseudo-random     Longest sequence of zero	•			
•	•			
Longest sequence of zero	os: 8 (non-inverted signal)			
Longest sequence of zero	•			
Longest sequence of zero	bs: 8 (non-inverted signal)			
Longest sequence of zero	Shift Register for Generation of the PRBS sequence			
Longest sequence of zero	bs: 8 (non-inverted signal)			
Longest sequence of zero	bs: 8 (non-inverted signal)			
Longest sequence of zero	bs: 8 (non-inverted signal)			
Longest sequence of zero	bs: 8 (non-inverted signal)			
Longest sequence of zero	bs: 8 (non-inverted signal)			



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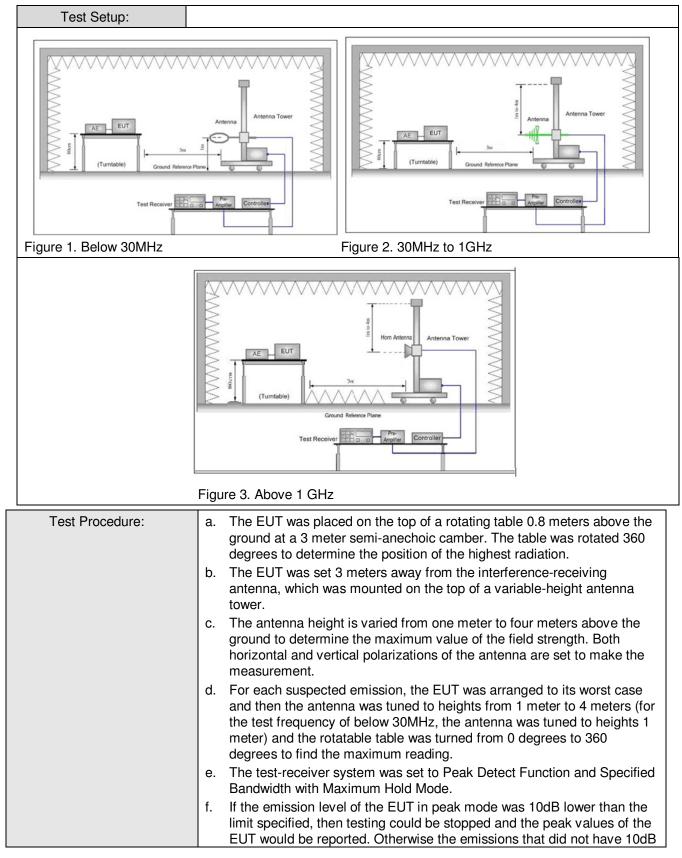
# 5.11 Radiated Spurious Emission

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205						
Test Method:	ANSI C63.10: 2009						
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)						
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark		
	0.009MHz-0.090MHz		Peak	10kHz	z 30kHz	Peak	
	0.009MHz-0.090MHz		Average	10kHz	z 30kHz	Average	
	0.090MHz-0.110MHz		Quasi-peak	10kHz	z 30kHz	Quasi-peak	
	0.110MHz-0.490MHz		Peak	10kHz	z 30kHz	Peak	
	0.110MHz-0.490MHz		Average	10kHz	z 30kHz	Average	
	0.490MHz -30MHz		Quasi-peak	10kHz	z 30kHz	Quasi-peak	
	30MHz-1GHz		Quasi-peak	100 kH	lz 300kHz	Quasi-peak	
	Above 1GHz		Peak	1MHz	z 3MHz	Peak	
			Peak	1MHz	z 10Hz	Average	
Limit:	Frequency		eld strength crovolt/meter)	Limit (dBuV/m)	Remark	Measureme distance (n	
	0.009MHz-0.490MHz	2	400/F(kHz)	-	-	300	
	0.490MHz-1.705MHz	24	1000/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 lim applicable to the equipment under test. This peak limit applies to the to peak emission level radiated by the device.					emission limit	





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	<ul> <li>margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</li> <li>g. Test the EUT in the lowest channel (2402MHz),the middle channel (2441MHz),the Highest channel (2480MHz)</li> <li>h. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.</li> <li>i. Repeat above procedures until all frequencies measured was complete.</li> </ul>
Exploratory Test Mode:	Non-hopping transmitting mode with all kind of modulation and all kind of data type
Final Test Mode:	Through Pre-scan, find the DH1 of data type is the worse case of GFSK modulation type
Instruments Used:	Refer to section 4.10 for details
Test Results:	Pass

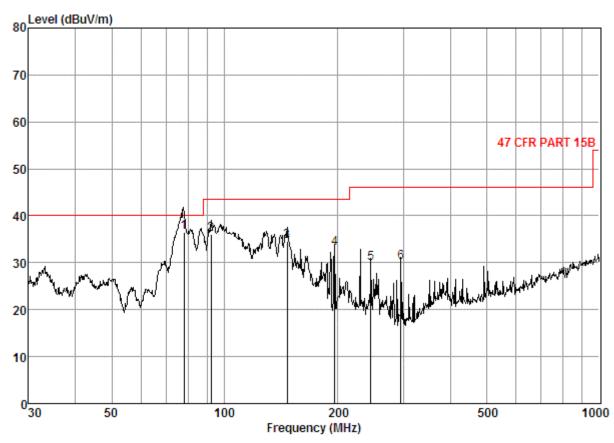
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#### 5.11.1 Radiated Emission below 1GHz

30MHz~1GHz (QP)		
Test mode:	AC Charge + TX mode	Vertical



Condition: 47 CFR PART 15 B 3m 3142C VERTICAL EUT : 6145AV

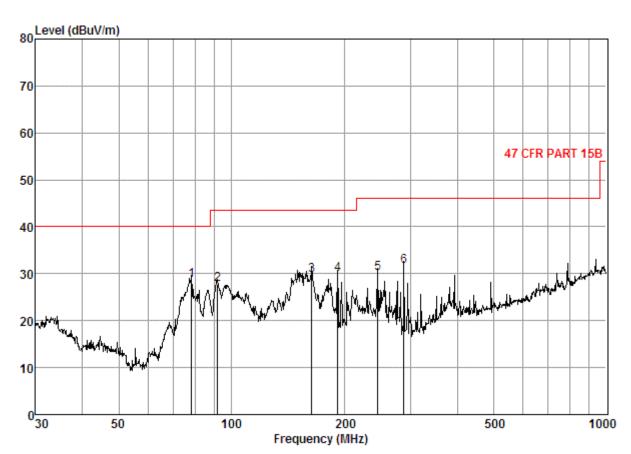
Mode : AC charge + TX mode

	Freq	CableAntenna Loss Factor						
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 2 3 4 5 6	77.85 92.14 146.89 196.51 245.95 295.15	1.38 1.79 2.14 2.44	16.37	25.52 24.94 25.26	48.53	34.46 33.02	43.50 43.50 43.50 46.00	-9.04 -10.48



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Condition: 47 CFR PART 15 B 3m 3142C HORIZONTAL

EUT : 6145AV

Mode	: AC c Freq	CableA	– TX mod intenna Factor	Read Level	Level	Limit Line	Over Limit	
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 2 3 4 5 6	78.14 91.82 163.76 191.75 245.95 287.99	1.26 1.38 1.94 2.10 2.44 2.68	7.66 11.62 15.80 11.94 12.66 12.75	25, 25 25, 52 25, 46 24, 96 25, 77 24, 45	44.96 40.31 37.30 40.72 40.80 40.70	28.63 27.79 29.58 29.80 30.13 31.68	43.50 43.50 43.50 46.00	-11.37 -15.71 -13.92 -13.70 -15.87 -14.32



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Worse case r	node:	GFSK(DH1)	Test	channel:	Lowest	Rema	ark:	Peak
Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2995.538	5.05	33.38	40.30	48.95	47.08	74	-26.92	Vertical
3834.506	6.23	33.61	40.91	47.25	46.18	74	-27.82	Vertical
4804.000	7.44	34.70	41.63	52.91	53.42	74	-20.58	Vertical
7206.000	8.72	35.88	39.87	47.41	52.14	74	-21.86	Vertical
9608.000	9.68	37.30	37.80	43.13	52.31	74	-21.69	Vertical
12178.980	11.36	39.09	38.35	39.91	52.01	74	-21.99	Vertical
2935.153	5.01	33.31	40.26	46.60	44.66	74	-29.34	Horizontal
3873.749	6.28	33.66	40.94	47.43	46.43	74	-27.57	Horizontal
4785.075	7.42	34.73	41.61	52.28	52.82	74	-21.18	Horizontal
7206.000	8.72	35.88	39.87	47.16	51.89	74	-22.11	Horizontal
9608.000	9.68	37.30	37.80	42.32	51.50	74	-22.50	Horizontal
12210.020	11.37	39.11	38.36	40.01	52.13	74	-21.87	Horizontal

#### 5.11.2 Transmitter Emission above 1GHz

Worse case	orse case mode:		) Tes	t channel:	Middle	Rem	nark:	Peak
Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2950.135	5.02	33.33	40.27	47.07	45.15	74	-28.85	Vertical
3883.622	6.31	33.68	40.95	47.94	46.98	74	-27.02	Vertical
4882.000	7.48	34.59	41.68	53.04	53.43	74	-20.57	Vertical
7323.000	8.87	35.93	39.77	47.53	52.56	74	-21.44	Vertical
9764.000	9.74	37.48	37.66	41.65	51.21	74	-22.79	Vertical
12334.980	11.42	39.24	38.42	39.10	51.34	74	-22.66	Vertical
3003.173	5.07	33.40	40.30	48.98	47.15	74	-26.85	Horizontal
3863.900	6.28	33.63	40.94	48.99	47.96	74	-26.04	Horizontal
4882.000	7.48	34.59	41.68	51.29	51.68	74	-22.32	Horizontal
7323.000	8.87	35.93	39.77	46.67	51.70	74	-22.30	Horizontal
9764.000	9.74	37.48	37.66	42.91	52.47	74	-21.53	Horizontal
12241.140	11.38	39.14	38.38	40.70	52.84	74	-21.16	Horizontal



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Worse case	mode:	GFSK(DH1	) Tes	t channel:	Highest	Rem	ark:	Peak
Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2957.654	5.02	33.33	40.27	47.37	45.45	74	-28.55	Vertical
3824.757	6.21	33.59	40.91	48.14	47.03	74	-26.97	Vertical
4960.000	7.53	34.46	41.74	48.78	49.03	74	-24.97	Vertical
7440.000	9.01	35.98	39.67	45.94	51.26	74	-22.74	Vertical
9920.000	9.81	37.63	37.53	42.27	52.18	74	-21.82	Vertical
12524.820	11.50	39.41	38.50	40.58	52.99	74	-21.01	Vertical
3072.770	5.17	33.37	40.35	47.44	45.63	74	-28.37	Horizontal
3963.520	6.41	33.76	41.01	47.83	46.99	74	-27.01	Horizontal
4960.000	7.53	34.46	41.74	49.55	49.80	74	-24.20	Horizontal
7440.000	9.01	35.98	39.67	46.06	51.38	74	-22.62	Horizontal
9920.000	9.81	37.63	37.53	41.15	51.06	74	-22.94	Horizontal
12086.330	11.32	38.99	38.31	40.95	52.95	74	-21.05	Horizontal

Remark:

1) 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 + Antenna Factor + Cable Factor – Preamplifier Factor

- 2) 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.
- 3) As shown in this section, for frequencies above 1GHz, 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 measurements were shown in the report.

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# 5.12Band edge (Radiated Emission)

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205							
Test Method:	ANSI C63.10: 2009	ANSI C63.10: 2009						
Test Site:	Measurement Distance: 3m	n (Semi-Anechoic Chambe	r)					
Limit:	Frequency	Limit (dBuV/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 Setup:								
Test Setup:								
Figure 1. 30MHz to 1GHz Figure 2. Above 1 GHz								



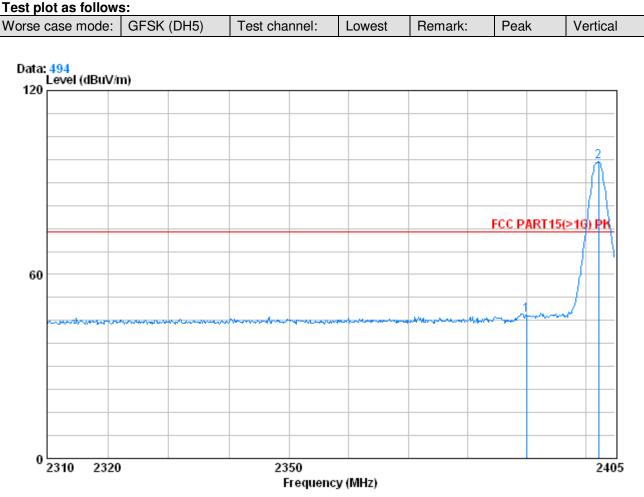
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Test Procedure:	<ul> <li>a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>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.</li> <li>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.</li> <li>e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>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</li> <li>g. Test the EUT in the lowest channel , the Highest channel</li> <li>h. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.</li> <li>i. Repeat above procedures until all frequencies measured was complete.</li> </ul>
Exploratory Test Mode:	Non-hopping transmitting mode with all kind of modulation and all kind of data type
Final Test Mode:	Through Pre-scan, find the DH5 of data type is the worse case of GFSK modulation type
Instruments Used:	Refer to section 4.10 for details
Test Results:	Pass

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Condition : FCC PART15(>1G) PK 3m VERTICAL

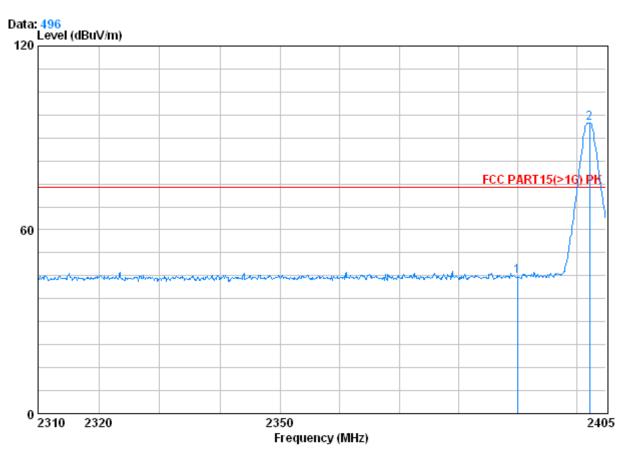
Job No. : 6145AV Mode : 2402 Bandedge

CableAntenna Preamp Read Limit Over Loss Factor Factor Level Level Limit Frea Line MHz dBuV dBuV/m dBuV/m dB dB/m dB dB 2.98 32.51 39.85 51.26 46.90 74.00 -27.10 2390.000 1 2 X 2402.245 2.98 32.51 39.86 101.08 96.71 74.00 22.71



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



Condition : FCC PART15(>1G) PK 3m HORIZONTAL Job No. : 6145AV

Mode	:2402 Bandedge
1010000	. AHOA DUIGOGEO

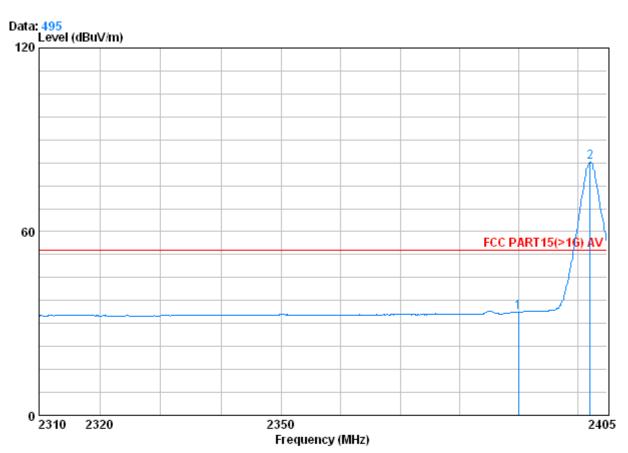
	Freq			Preamp Factor		Level		Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 2 X	2390.000 2402.245			39.85 39.86				





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



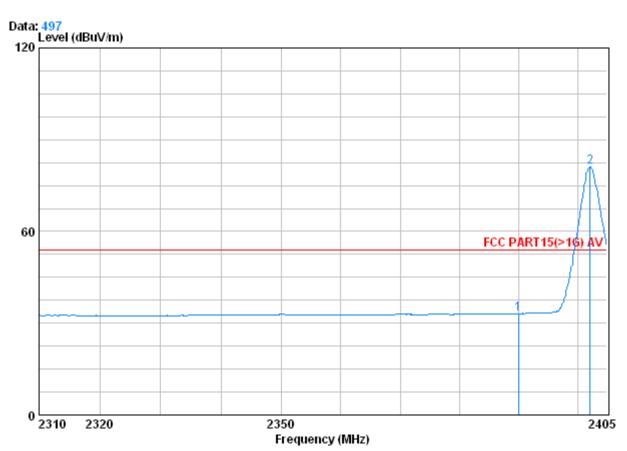
Condition : FCC PART15(>1G) AV 3m VERTICAL

Job No. : 6145AV

	Freq			Preamp Factor		Level		
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 2 0	2390.000 2402.150			39.85 39.86				



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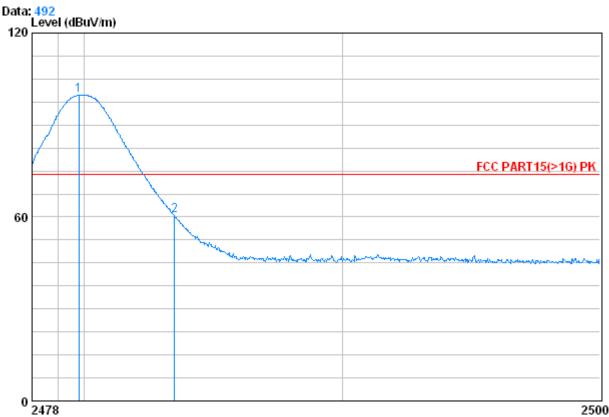
Condition : FCC PART15(>1G) AV 3m HORIZONTAL Job No. : 6145AV

	Freq			Preamp Factor		Level		
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 2 0	2390.000 2402.150			39.85 39.86				



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

: FCC PART15(>1G) PK 3m VERTICAL Condition

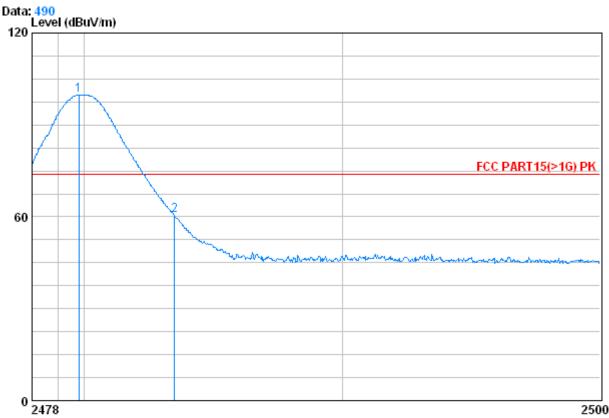
Job No. :6145AV M

Mode	:2480 Bandedge							
		Cablei	Antenna	Preamp	Read		Limit	Over
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 X	2479.804	3.03	32.67	39.92	103.88	99.66	74.00	25.66
2	2483.500	3.03	32.67	39.92	64.64	60.42	74.00	-13.58



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

```
Condition : FCC PART15(>1G) PK 3m HORIZONTAL
```

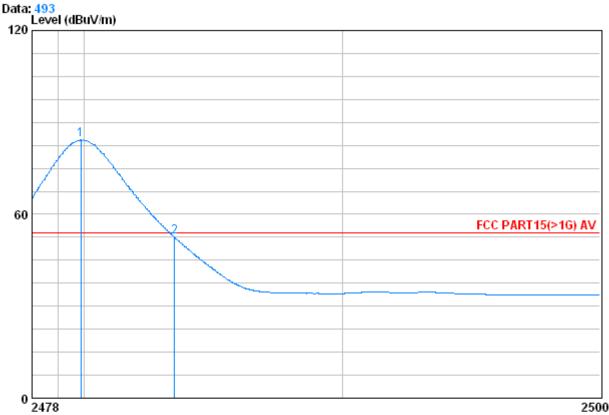
000110.	
Mode	:2480 Bandedge

	-	Freq			Preamp Factor	Read Level		Limit Line	Over Limit
		MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 2	X	2479.804 2483.500				103.92 64.62			



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

Condition : FCC PART15(>1G) AV 3m VERTICAL

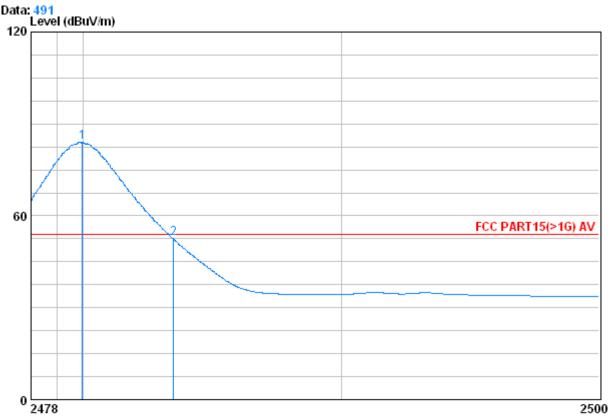
Job No. : 6145AV Mode : 2480 Bandedge

1040	Freq			Preamp Factor			Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
10 2	2479.892 2483.500			39.92 39.92				



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



Frequency (MHz)

: FCC PART15(>1G) AV 3m HORIZONTAL Condition Job No. :6145AV :2480 Bandedge Mode

	Freq			Preamp Factor				Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
10 2	2479.980 2483.500			39.92 39.92				30.08 -1.51

Note:

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 + Antenna Factor + Cable Factor – Preamplifier Factor