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

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FCC REPORT

Application No:	SZEM1509005957HR
Applicant:	SHENZHEN ZOWEE TECHNOLOGY CO., LTD
Manufacturer:	Medion AG
Factory:	Shenzhen Zowee Smart Manufacturing Co., Ltd
Product Name:	LIFETAB
Model No.(EUT):	PIC A0726.01
Add Model No.:	PIC A0726.xx (PIC A0726.xx where x can be number 0 to 9) except for PIC A0726.01
Trade Mark:	MEDION AG
FCC ID:	2AAP6A0726
Standards:	47 CFR Part 15, Subpart C (2014)
Date of Receipt:	2015-09-24
Date of Test:	2015-09-30 to 2015-10-22
Date of Issue:	2015-10-23
Test Result:	**PASS ***

* In the configuration tested, the EUT detailed in this report 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.

2 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2015-10-23		Original

Authorized for issue by:				
Tested By		(Eric Fu) /Project Engineer		2015-10-22 Date
Prepared By		(Hedy Wen) /Clerk		2015-10-23 Date
Checked By		(Jim Huang) /Reviewer		2015-10-23 Date

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 (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 (a)(1)	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
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 (2009)	PASS

Remark:

Model No.: PIC A0726.xx (PIC A0726.xx where x can be number 0 to 9)

Only the model PIC A0726.01 was tested, since the electrical circuit design, layout, components used and internal wiring were identical for all above models. Only the item number is different.

4 Contents

5 General Information

5.1 Client Information

Applicant:	SHENZHEN ZOWEE TECHNOLOGY CO., LTD
Address of Applicant:	Science & Technology Industrial Park of Privately Owned Enterprises, Pingshan, Xili, Nanshan District, Shenzhen, PR CHINA
Manufacturer:	Medion AG
Address of Manufacturer:	Am Zehnthof 77 D-45307 Essen.Germany
Factory:	Shenzhen Zowee Smart Manufacturing Co., Ltd
Address of Factory:	No. 149, Second Industrial Road, TangXiachong, SongGang, Baoan District, Shenzhen, Guangdong, China

5.2 General Description of EUT

Product Name:	LIFETAB
Model No.:	PIC A0726.01
Trade Mark:	MEDION AG
Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	BT 4.0 Dual mode
	This test report is for classic mode.
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, π/4DQPSK, 8DPSK
Number of Channel:	79
Hopping Channel Type:	Adaptive Frequency Hopping systems
Sample Type:	Portable production
Test Power Grade:	8 dBm
Antenna Type:	Integral
Antenna Gain:	1dBi
Battery:	Lithium-ion battery:3.7V 3400mAh(charge by USB)
EUT power supply or Adapter:	AC Adaptor Model: KSA29B0500200HU Input: AC100-240V 50/60Hz 0.5A Output: DC 5V 2.0A

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

5.3 Test Environment

Operating Environment:	
Temperature:	24.0 °C
Humidity:	52 % RH
Atmospheric Pressure:	1010mbar

5.4 Description of Support Units

The EUT has been tested independent unit.

5.5 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.

5.6 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.

• **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• **VCCI**

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, 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)**

The 3m Semi-anechoic chambers and the 10m Semi-anechoic chambers of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-2, 4620C-3.

5.7 Deviation from Standards

None.

5.8 Abnormalities from Standard Conditions

None.

5.9 Other Information Requested by the Customer

None.

5.10 Equipment List

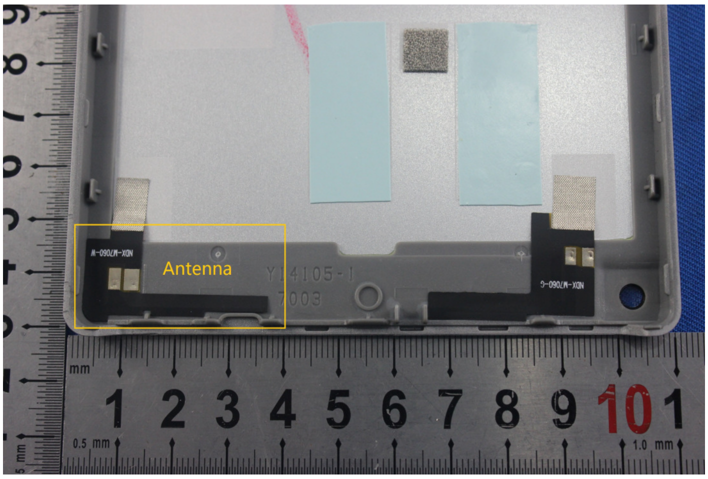
Conducted Emission						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. date (yyyy-mm-dd)**	**Cal.Due date (yyyy-mm-dd)**
1	Shielding Room	ZhongYu Electron	GB-88	SEL0042	2015-05-13	2016-05-13
2	LISN	Rohde & Schwarz	ENV216	SEL0152	2014-10-24	2015-10-24
3	LISN	ETS-LINDGREN	3816/2	SEL0021	2015-05-13	2016-05-13
4	8 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T8-02	SEL0162	2015-08-30	2016-08-30
5	4 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T4-02	SEL0163	2015-08-30	2016-08-30
6	2 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T2-02	SEL0164	2015-08-30	2016-08-30
7	EMI Test Receiver	Rohde & Schwarz	ESCI	SEL0022	2015-05-13	2016-05-13
8	Coaxial Cable	SGS	N/A	SEL0025	2015-05-13	2016-05-13
9	DC Power Supply	Zhao Xin	RXN-305D	SEL0117	2014-10-24	2015-10-24
10	Humidity/ Temperature Indicator	Shanhai Qixiang	ZJ1-2B	SEL0103	2014-10-24	2015-10-24
11	Barometer	Chang Chun	DYM3	SEL0088	2015-05-13	2016-05-13

RE in Chamber						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. date (yyyy-mm-dd)**	**Cal.Due date (yyyy-mm-dd)**
1	3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEL0017	2015-05-13	2016-05-13
2	EMI Test Receiver	Agilent Technologies	N9038A	SEL0312	2015-09-16	2016-09-16
3	EMI Test software	AUDIX	E3	SEL0050	N/A	N/A
4	BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEL0015	2014-10-24	2015-10-24
5	Double-ridged horn (1-18GHz)	ETS-LINDGREN	3117	SEL0006	2014-10-24	2015-10-24
6	Horn Antenna (18-26GHz)	ETS-LINDGREN	3160	SEL0076	2014-11-24	2015-11-24
7	Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEL0053	2015-05-13	2016-05-13
8	Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEL0168	2014-10-24	2015-10-24
9	Coaxial cable	SGS	N/A	SEL0027	2015-05-13	2016-05-13
10	Coaxial cable	SGS	N/A	SEL0189	2015-05-13	2016-05-13
11	Coaxial cable	SGS	N/A	SEL0121	2015-05-13	2016-05-13
12	Coaxial cable	SGS	N/A	SEL0178	2015-05-13	2016-05-13
13	Band filter	Amindeon	82346	SEL0094	2015-05-13	2016-05-13
14	Barometer	Chang Chun	DYM3	SEL0088	2015-05-13	2016-05-13
15	DC Power Supply	Zhao Xin	RXN-305D	SEL0117	2014-10-24	2015-10-24
16	Humidity/ Temperature Indicator	Shanhai Qixiang	ZJ1-2B	SEL0103	2014-10-24	2015-10-24
17	Signal Generator (10M-27GHz)	Rohde & Schwarz	SMR27	SEL0067	2015-05-13	2016-05-13
18	Signal Generator	Rohde & Schwarz	SMY01	SEL0155	2014-10-24	2015-10-24
19	Loop Antenna	Beijing Daze	ZN30401	SEL0203	2015-05-13	2016-05-13

RF connected test						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)
1	DC Power Supply	Zhao Xin	RXN-305D	SEL0117	2014-10-24	2015-10-24
2	Humidity/ Temperature Indicator	HYGRO	ZJ1-2B	SEL0033	2014-10-24	2015-10-24
3	Spectrum Analyzer	Rohde & Schwarz	FSP	SEL0154	2014-10-24	2015-10-24
4	Coaxial cable	SGS	N/A	SEL0178	2015-05-13	2016-05-13
5	Coaxial cable	SGS	N/A	SEL0179	2015-05-13	2016-05-13
6	Barometer	ChangChun	DYM3	SEL0088	2015-05-13	2016-05-13
7	Signal Generator	Rohde & Schwarz	SML03	SEL0068	2015-04-25	2016-04-25
8	Band filter	amideon	82346	SEL0094	2015-05-13	2016-05-13
9	POWER METER	R & S	NRVS	SEL0144	2014-10-24	2015-10-24
10	Attenuator	Beijin feihang taida	TST-2-6dB	SEL0205	2015-04-25	2016-04-25
11	Power Divider(splitter)	Agilent Technologies	11636B	SEL0130	2014-10-24	2015-10-24

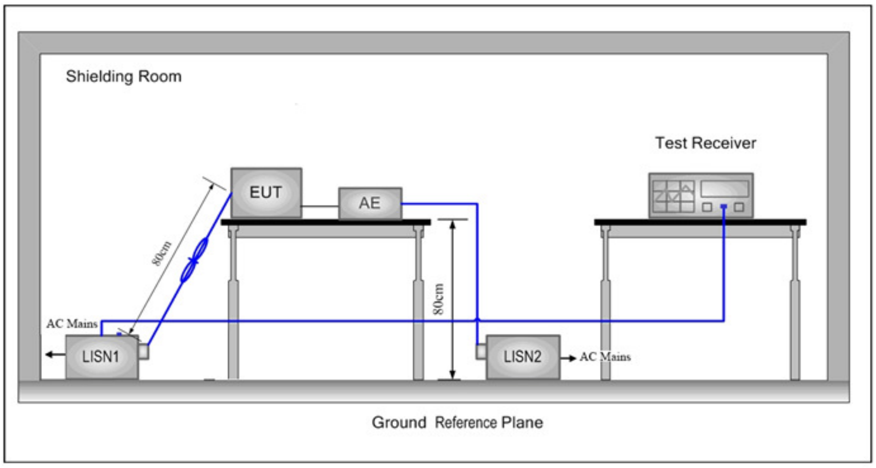
6 Test results and Measurement Data

6.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203 /247(c)
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 1dBi.	

6.2 Conducted Emissions

<table>
<tr><td>Test Requirement:</td><td>47 CFR Part 15C Section 15.207</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10: 2009</td></tr>
<tr><td>Test Frequency Range:</td><td>150kHz to 30MHz</td></tr>
<tr><td>Limit:</td><td><table><tr><td rowspan="2">Frequency range (MHz)</td><td colspan="2">Limit (dBuV)</td></tr><tr><td>Quasi-peak</td><td>Average</td></tr><tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr><tr><td>0.5-5</td><td>56</td><td>46</td></tr><tr><td>5-30</td><td>60</td><td>50</td></tr></table>* Decreases with the logarithm of the frequency.</td></tr>
<tr><td>Test Procedure:</td><td>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: 2009 on conducted measurement.</td></tr>
</table>

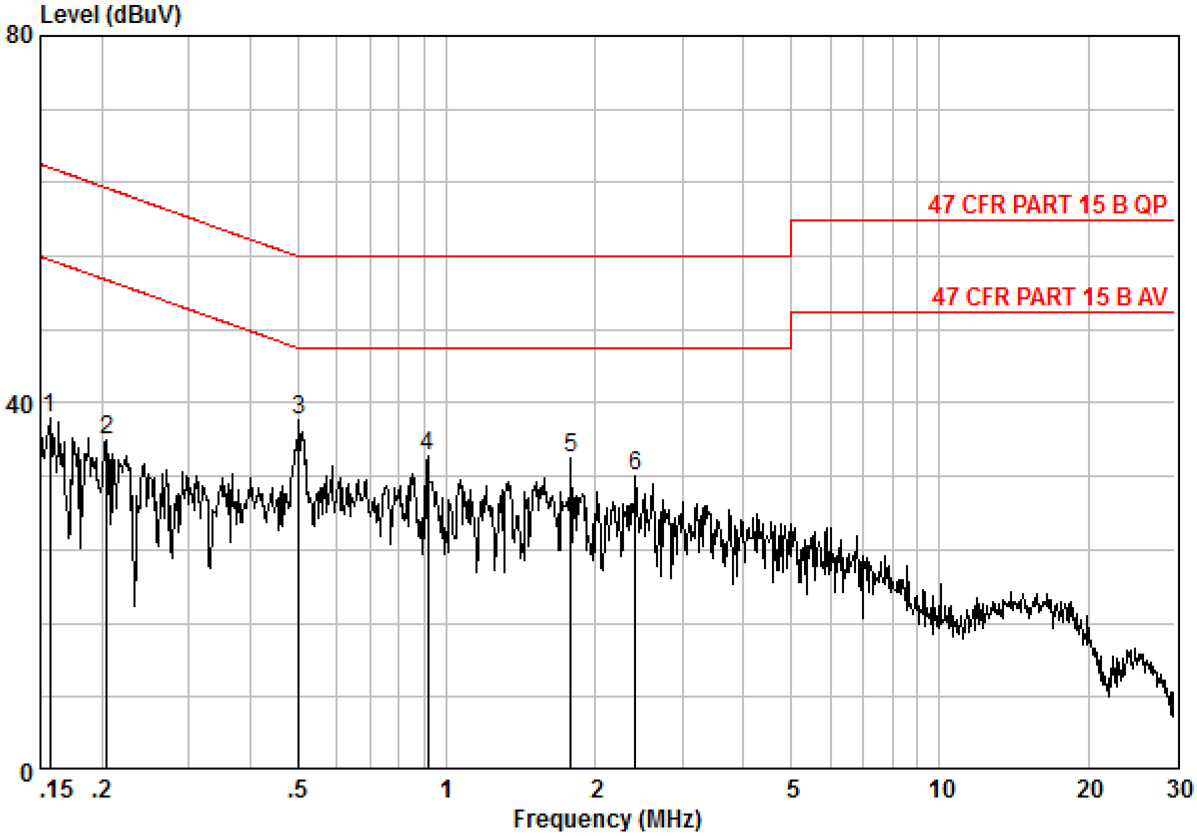
Test Setup:	
Exploratory Test Mode:	Non-hopping transmitting mode with all kind of modulation and all kind of data type at the lowest, middle, high channel. Transmitting mode.
Final Test Mode:	Through Pre-scan, find the DH1 of data type and GFSK modulation at the lowest channel is the worst case. Transmitting mode. Only the worst case is recorded in the report.
Instruments Used:	Refer to section 5.10 for details.
Test Results:	Pass

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.

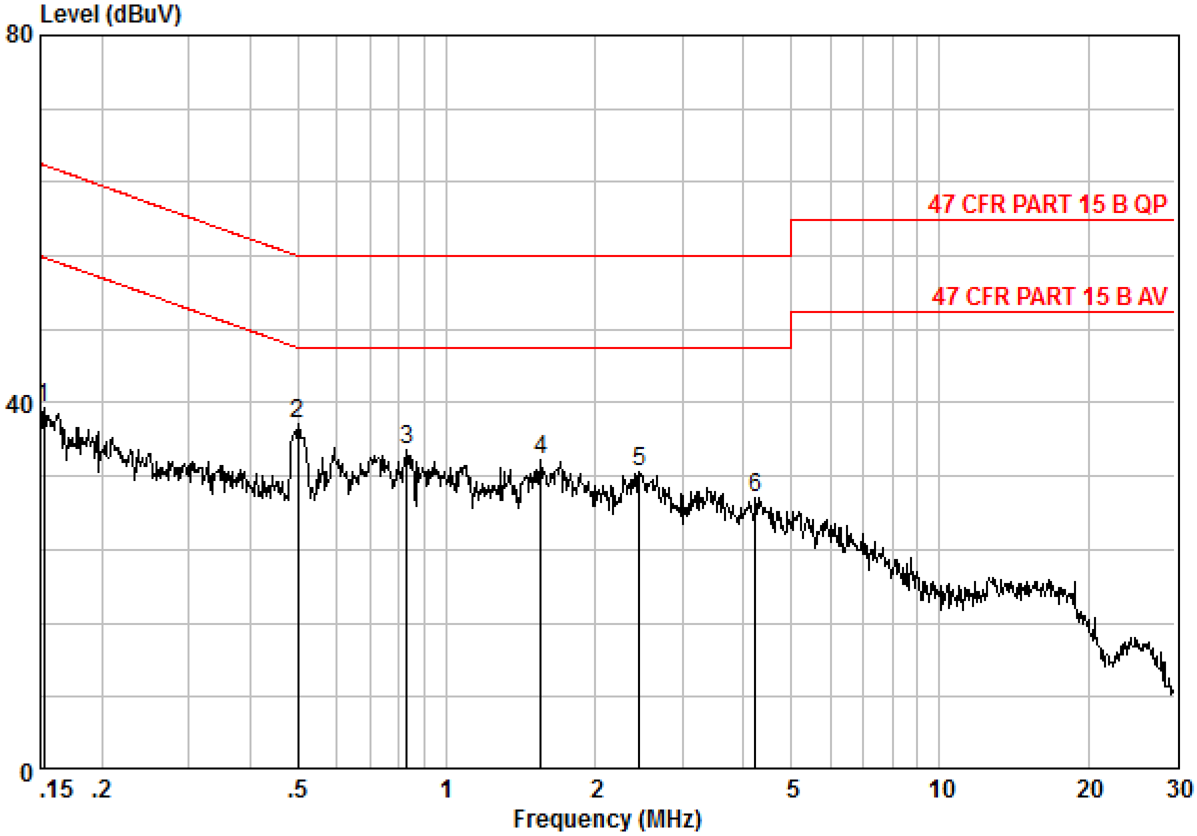
Live line:



Site : Shielding Room
Condition : 47 CFR PART 15 B AV CE LINE
Job No. : 5957HR
Test Mode : TX

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.15649	0.02	9.82	28.53	38.37	55.65	-17.28	Peak
2	0.20505	0.02	9.83	26.21	36.06	53.40	-17.34	Peak
3 @	0.50203	0.01	9.86	28.24	38.11	46.00	-7.89	Peak
4	0.91842	0.02	9.89	24.26	34.16	46.00	-11.84	Peak
5	1.790	0.02	9.94	24.08	34.04	46.00	-11.96	Peak
6	2.409	0.02	9.98	22.03	32.03	46.00	-13.97	Peak

Neutral line:



Site : Shielding Room
Condition : 47 CFR PART 15 B AV CE NEUTRAL
Job No. : 5957HR
Test Mode : TX

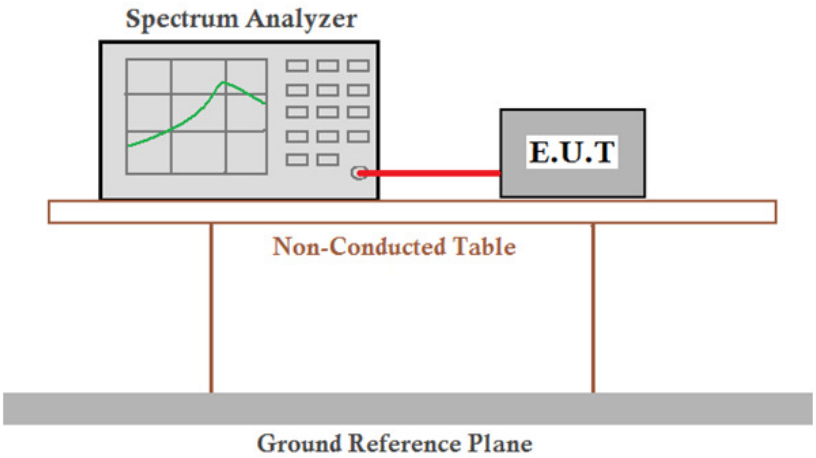
	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.15240	0.02	9.78	29.62	39.42	55.87	-16.45	Peak
2	0.49937	0.01	9.88	27.82	37.71	46.01	-8.30	Peak
3	0.83047	0.02	9.99	24.96	34.97	46.00	-11.03	Peak
4	1.552	0.02	10.08	23.77	33.88	46.00	-12.12	Peak
5	2.461	0.02	10.12	22.32	32.46	46.00	-13.54	Peak
6	4.224	0.01	10.13	19.56	29.70	46.00	-16.30	Peak

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:

2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.

6.3 Conducted Peak Output Power

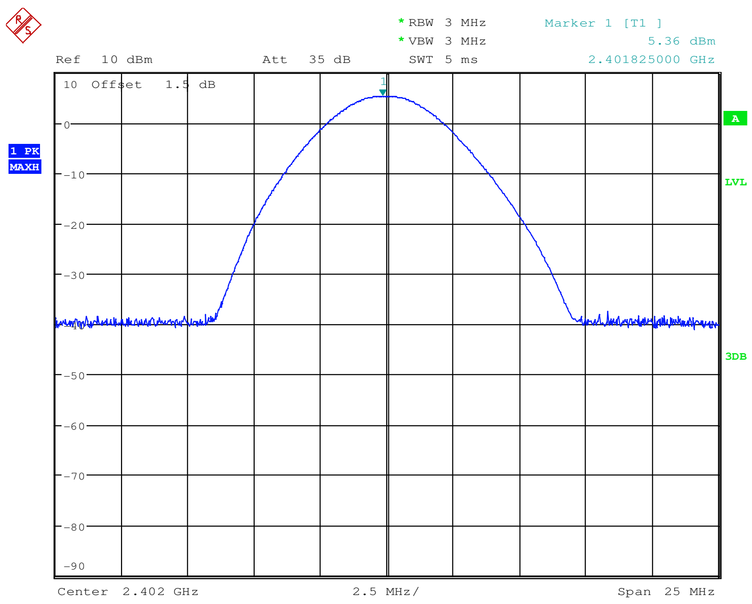
Test Requirement:	47 CFR Part 15C Section 15.247 (b)(1)
Test Method:	ANSI C63.10:2009
Test Setup:	 *Remark:* *Offset the High-Frequency cable loss 1.5dB in the spectrum analyzer.*
Limit:	30dBm
Exploratory Test Mode:	Non-hopping transmitting with all kind of modulation and all kind of data type.
Final Test Mode:	Through Pre-scan, find the DH1 of data type is the worst case of GFSK modulation type, 2-DH1 of data type is the worst case of π/4DQPSK modulation type, 3-DH1 of data type is the worst case of 8DPSK modulation type.
Instruments Used:	Refer to section 5.10 for details.
Test Results:	Pass

Measurement Data

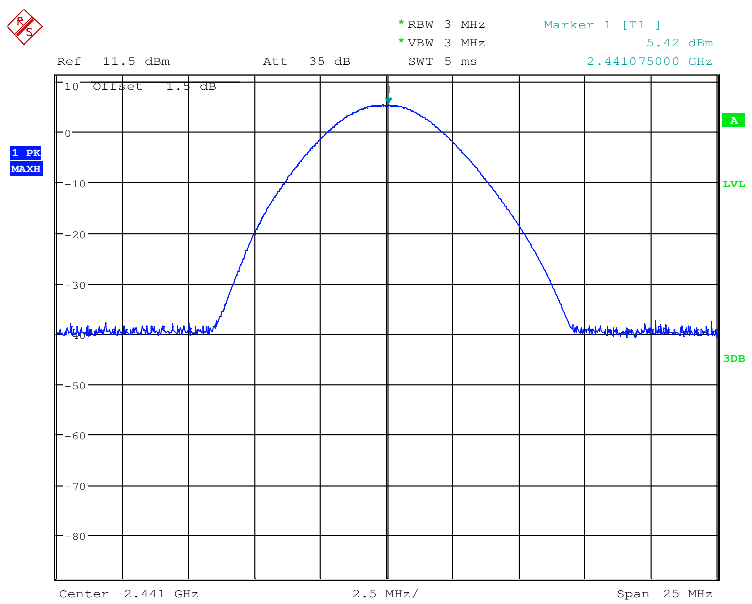
GFSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	5.36	30.00	Pass
Middle	5.42	30.00	Pass
Highest	5.33	30.00	Pass
π/4DQPSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	6.81	30.00	Pass
Middle	6.84	30.00	Pass
Highest	7.17	30.00	Pass
8DPSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	7.46	30.00	Pass
Middle	7.56	30.00	Pass
Highest	7.28	30.00	Pass

Test plot as follows:

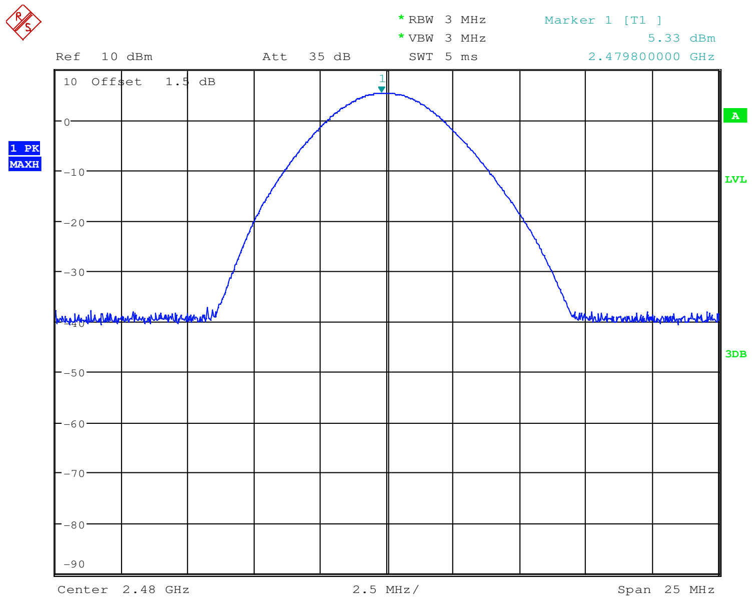
Test mode:	GFSK	Test channel:	Lowest



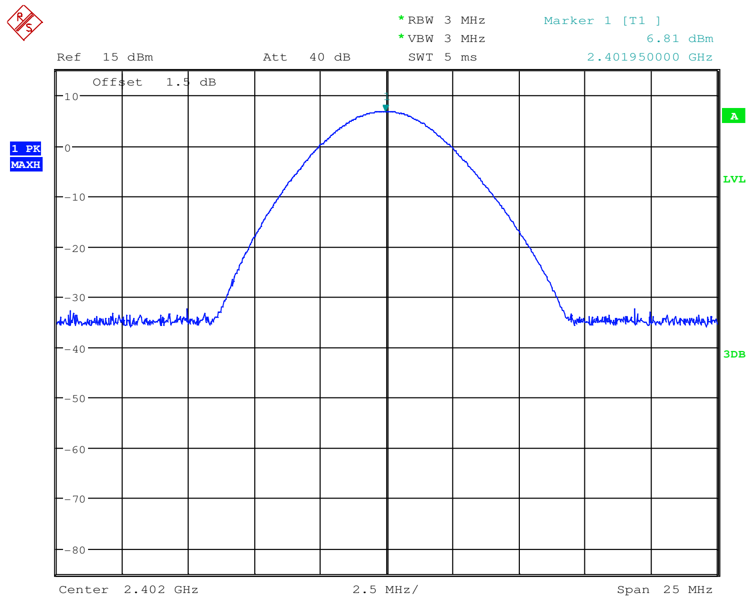
Test mode:	GFSK	Test channel:	Middle



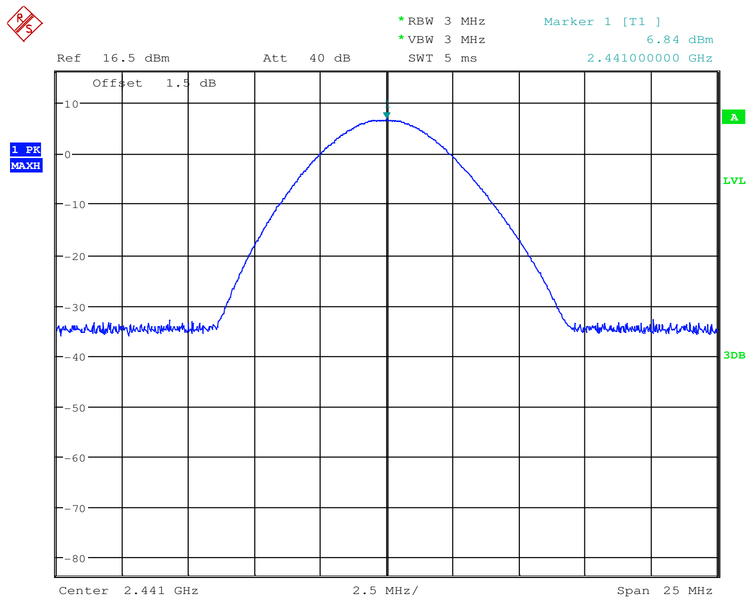
Test mode:	GFSK	Test channel:	Highest



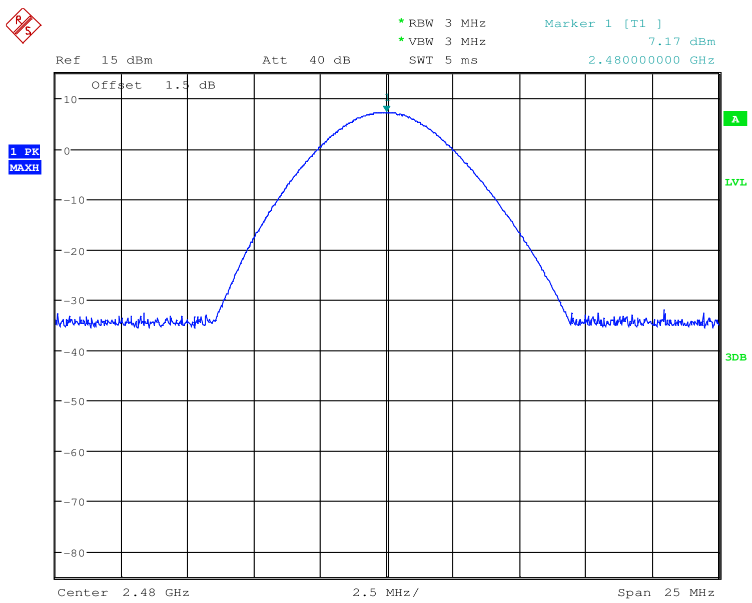
Test mode:	π/4DQPSK	Test channel:	Lowest



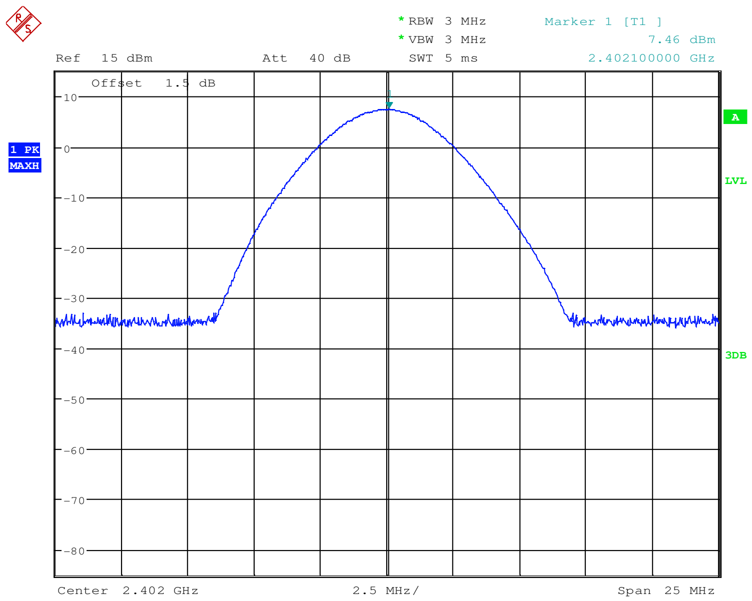
Test mode:	π/4DQPSK	Test channel:	Middle



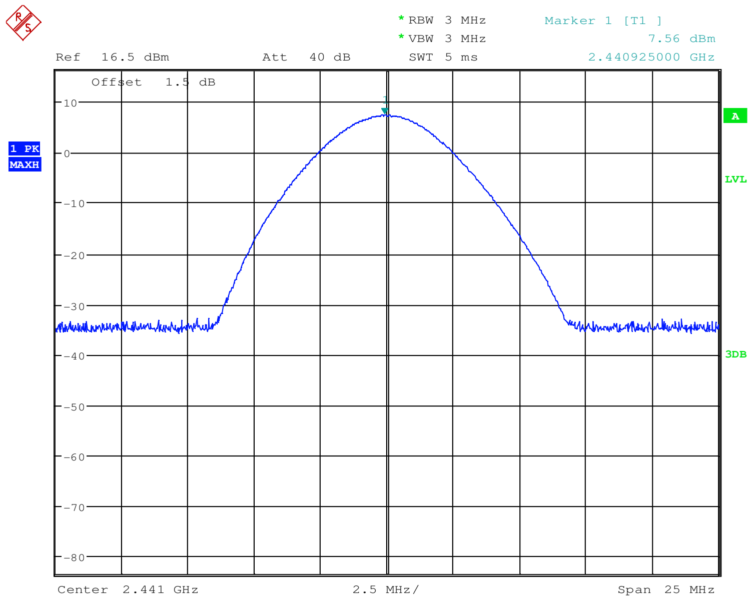
Test mode:	π/4DQPSK	Test channel:	Highest



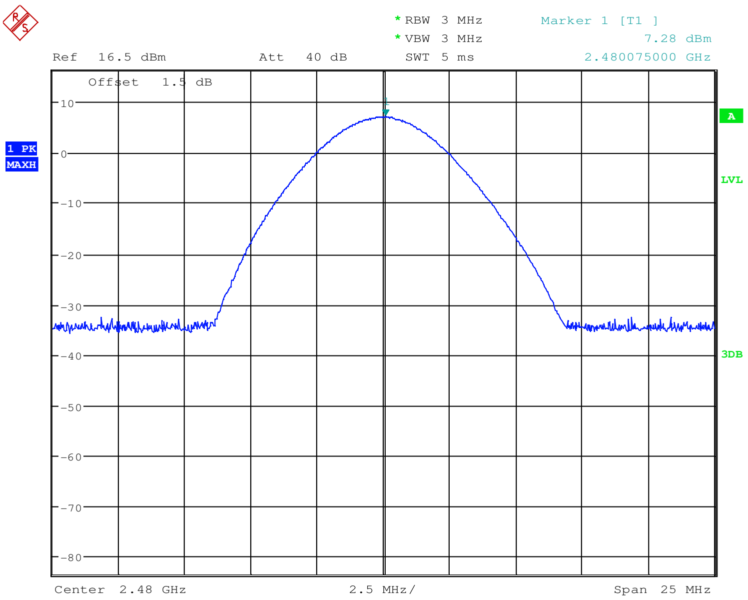
Test mode:	8DPSK	Test channel:	Lowest



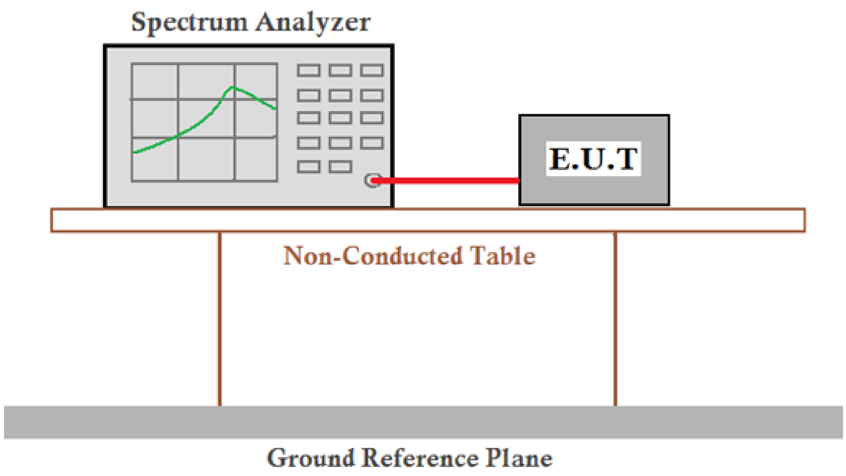
Test mode:	8DPSK	Test channel:	Middle



Test mode:	8DPSK	Test channel:	Highest



6.4 20dB Occupy Bandwidth

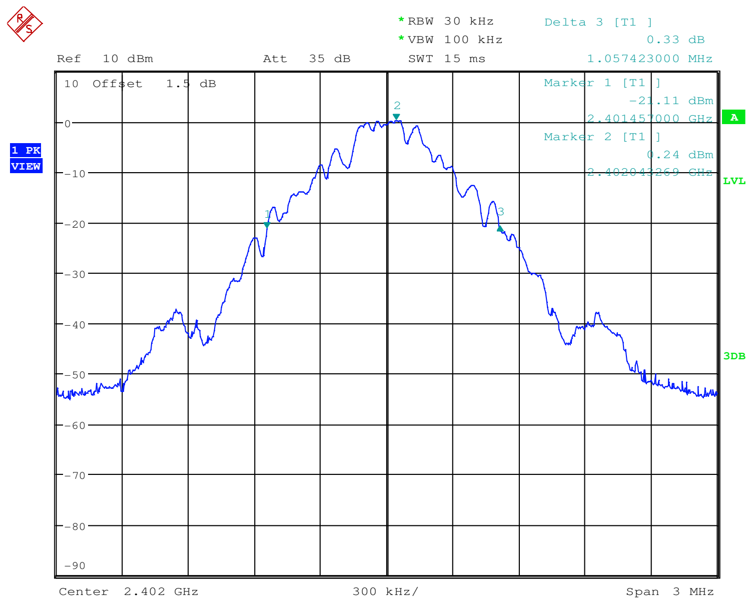
Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2009
Test Setup:	
Limit:	NA
Exploratory Test Mode:	Non-hopping transmitting with all kind of modulation and all kind of data type.
Final Test Mode:	Through Pre-scan, find the DH1 of data type is the worst case of GFSK modulation type, 2-DH1 of data type is the worst case of π/4DQPSK modulation type, 3-DH1 of data type is the worst case of 8DPSK modulation type.
Instruments Used:	Refer to section 5.10 for details.
Test Results:	Pass

Measurement Data

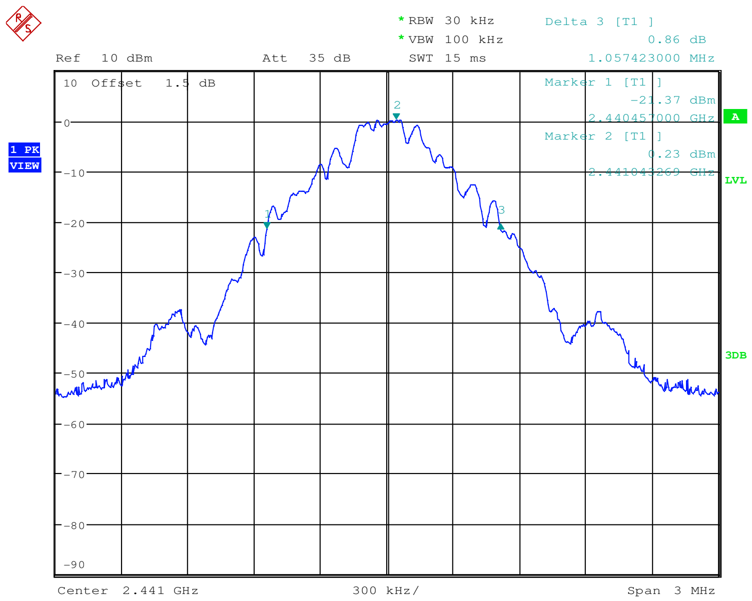
Test channel	20dB Occupy Bandwidth (kHz)		
	GFSK	π/4DQPSK	8DPSK
Lowest	1057.423	1360.577	1382.923
Middle	1057.423	1360.577	1379.808
Highest	1052.885	1364.269	1382.923

Test plot as follows:

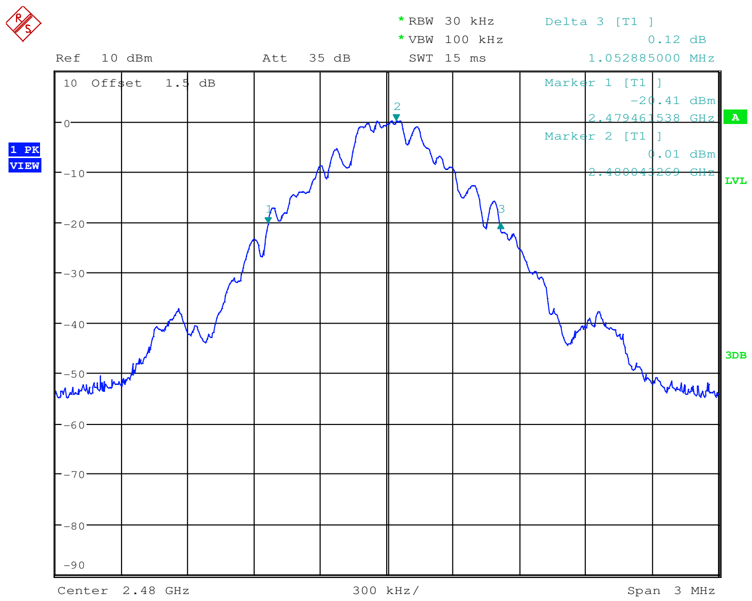
Test mode:	GFSK	Test channel:	Lowest



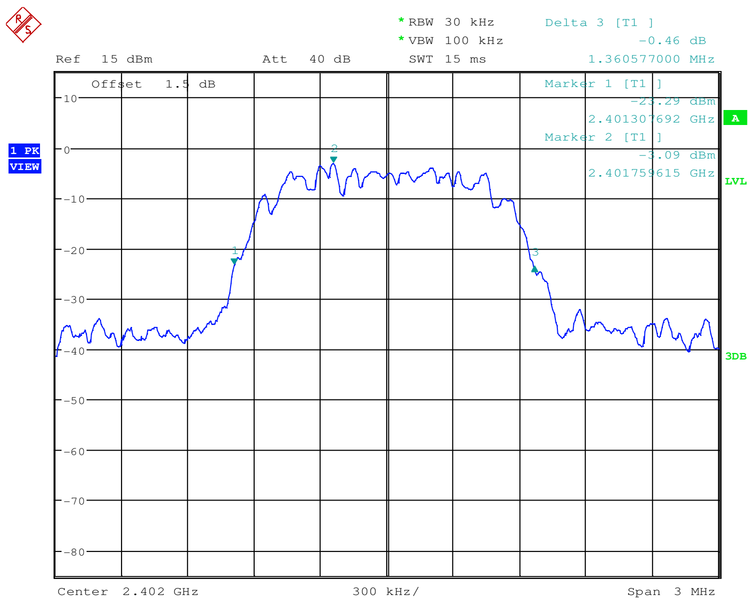
Test mode:	GFSK	Test channel:	Middle



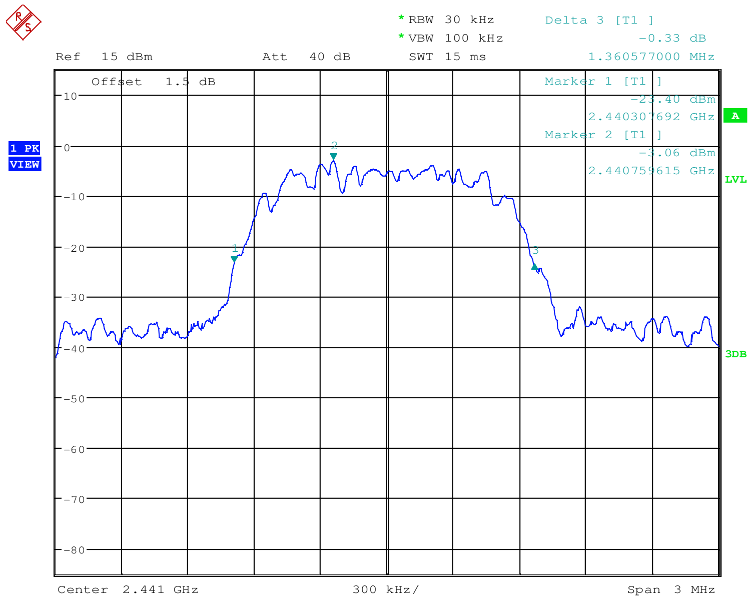
Test mode:	GFSK	Test channel:	Highest



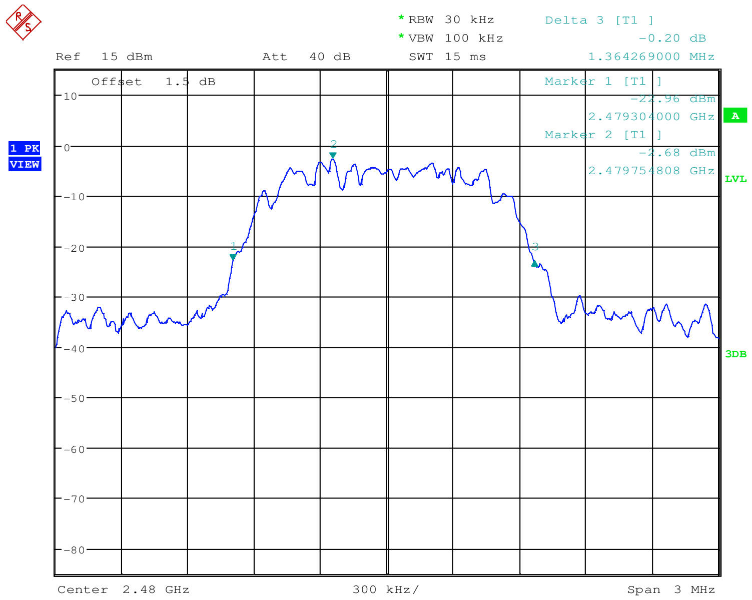
Test mode:	π/4DQPSK	Test channel:	Lowest



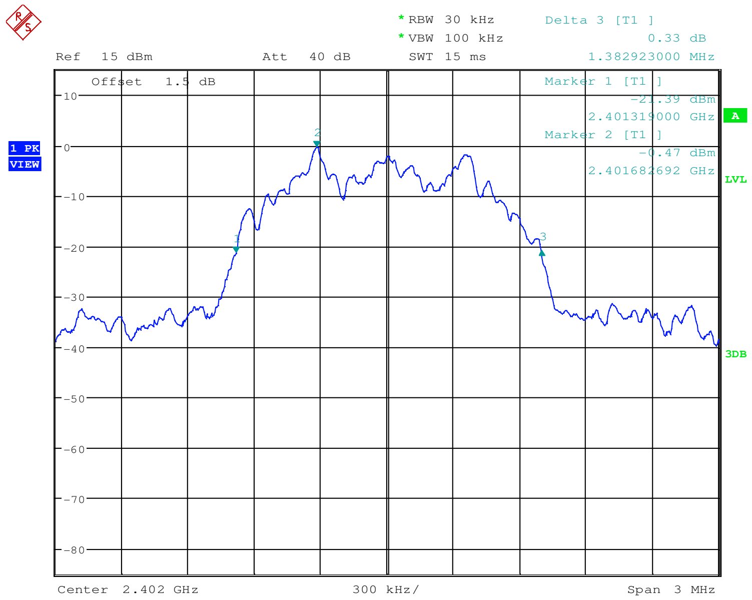
Test mode:	π/4DQPSK	Test channel:	Middle



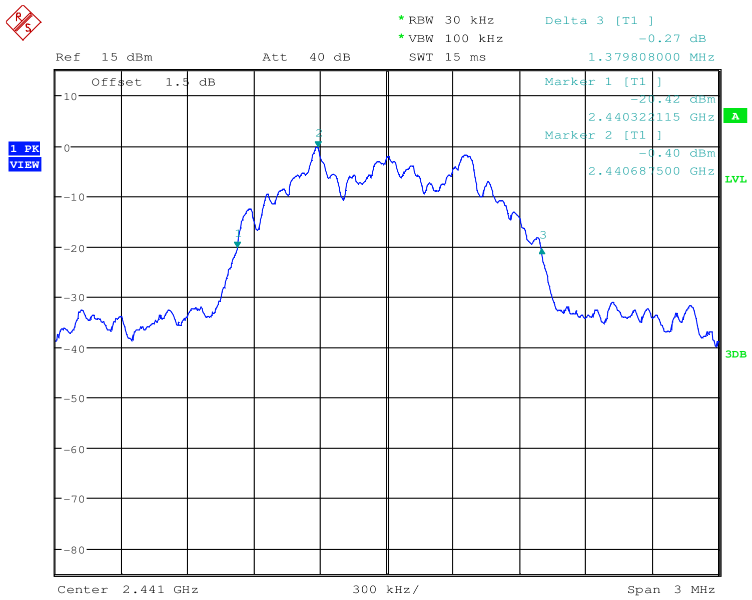
Test mode:	π/4DQPSK	Test channel:	Highest



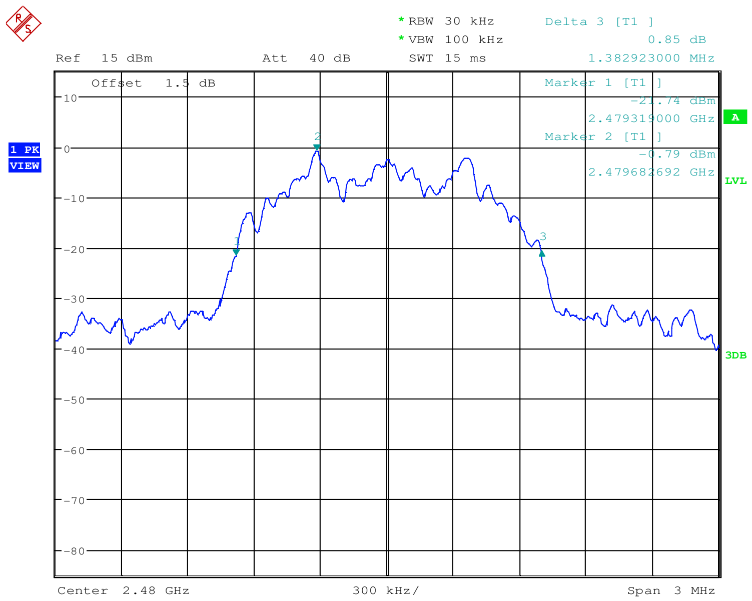
Test mode:	8DPSK	Test channel:	Lowest



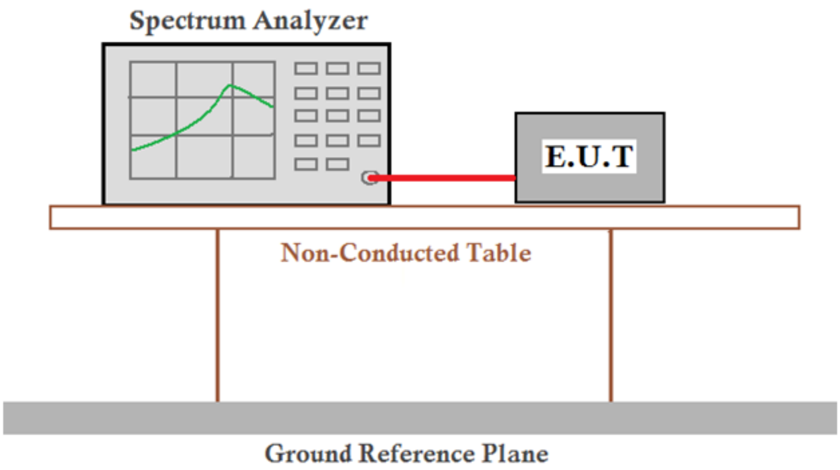
Test mode:	8DPSK	Test channel:	Middle



Test mode:	8DPSK	Test channel:	Highest



6.5 Carrier Frequencies Separation

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2009
Test Setup:	
Limit:	2/3 of the 20dB bandwidth
	Remark: the transmission power is less than 0.125W.
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 worst case of GFSK modulation type, 2-DH1 of data type is the worst case of π/4DQPSK modulation type, 3-DH1 of data type is the worst case of 8DPSK modulation type.
Instruments Used:	Refer to section 5.10 for details.
Test Results:	Pass

Measurement Data

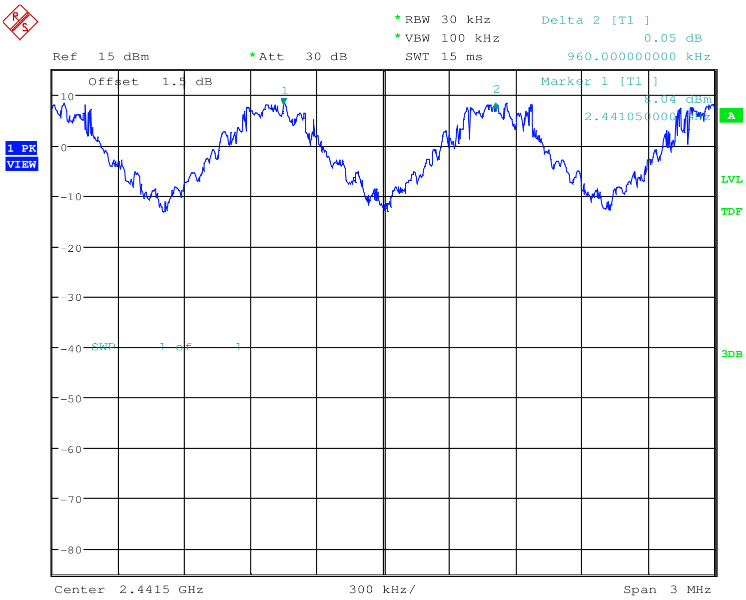
GFSK mode			
Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Middle	960.000	≥705	Pass
π/4DQPSK mode			
Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Middle	1014.000	≥910	Pass
8DPSK mode			
Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Middle	996.000	≥922	Pass

Note: According to section 6.4,

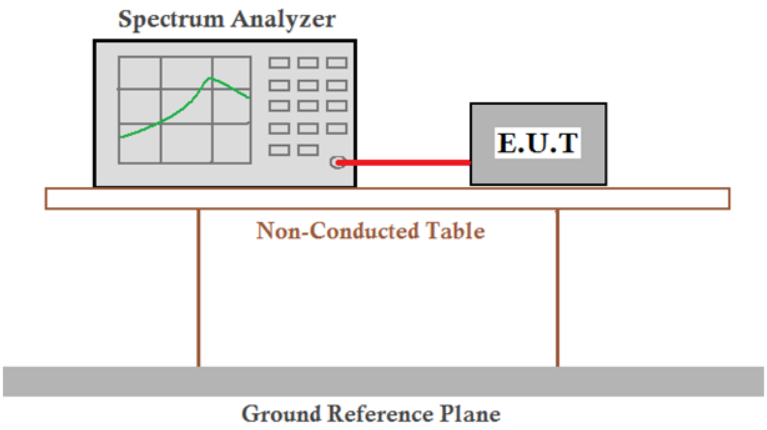
Mode	20dB bandwidth (kHz) (worse case)	Limit (kHz) (Carrier Frequencies Separation)
GFSK	1057.423	705
π/4DQPSK	1364.269	910
8DPSK	1382.923	922

Test plot as follows:

Test mode:	GFSK	Test channel:	Middle



6.6 Hopping Channel Number

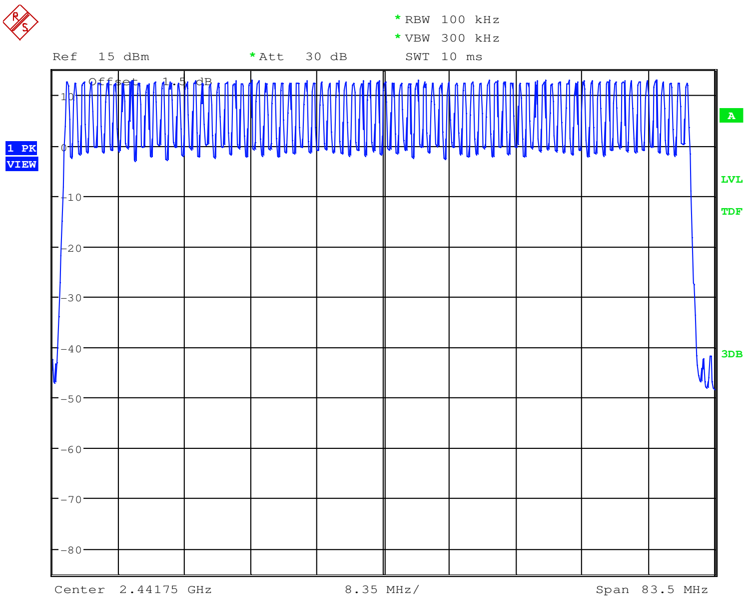
Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2009
Test Setup:	
Limit:	At least 15 channels.
Test Mode:	Hopping transmitting with all kind of modulation.
Instruments Used:	Refer to section 5.10 for details.
Test Results:	Pass

Measurement Data

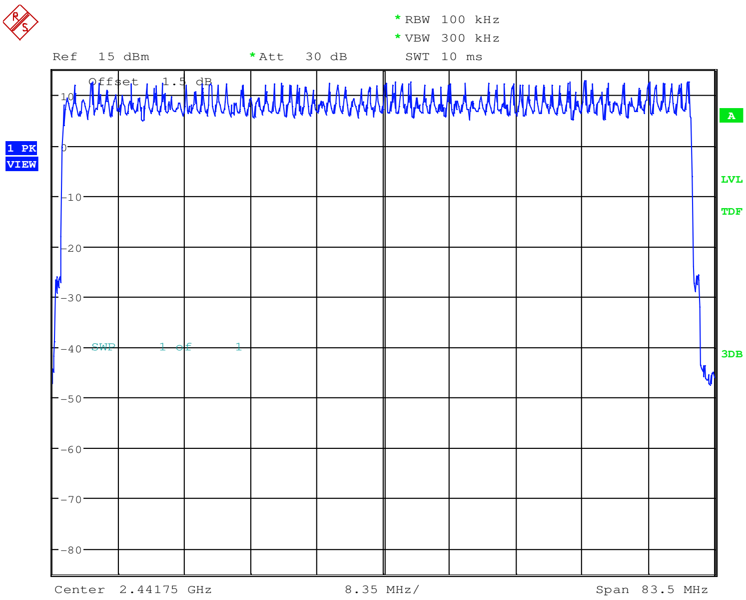
Mode	Hopping channel numbers	Limit
GFSK	79	≥15
π/4DQPSK	79	≥15
8DPSK	79	≥15

Test plot as follows:

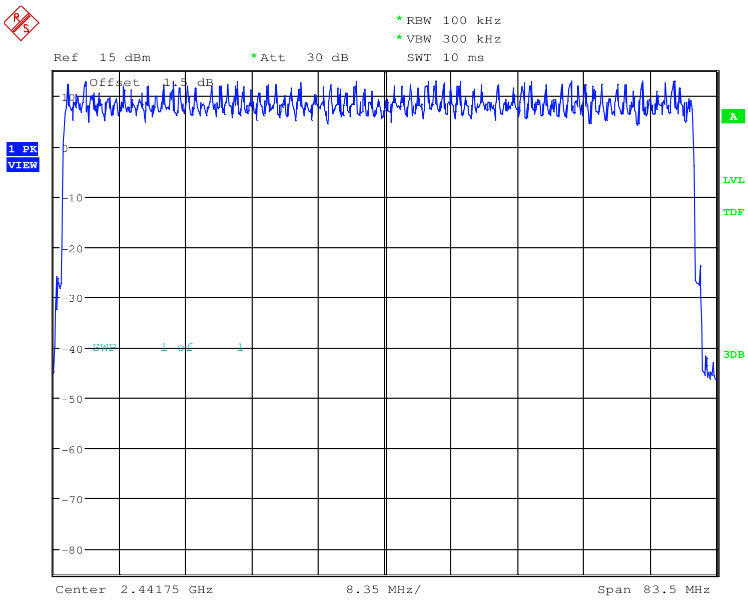
Test mode:	GFSK



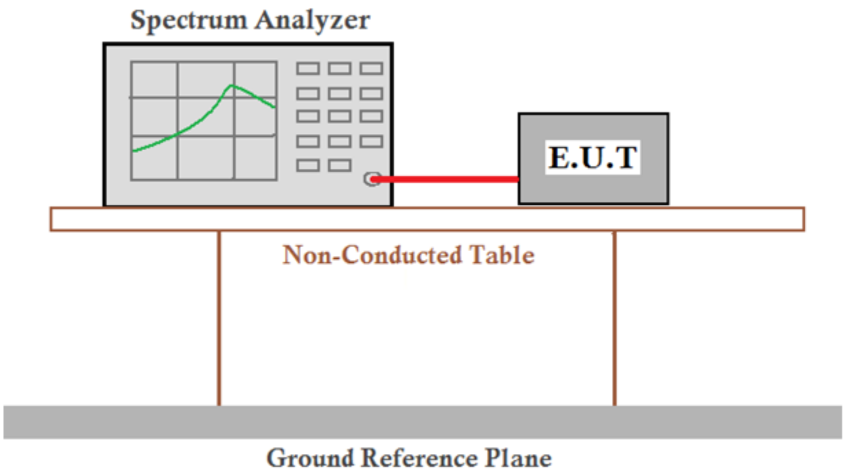
Test mode:	π/4DQPSK



Test mode:	8DPSK



6.7 Dwell Time

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2009
Test Setup:	
Instruments Used:	Refer to section 5.10 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	0.124	0.4
	DH3	0.264	0.4
	DH5	0.261	0.4
π/4DQPSK	2-DH1	0.123	0.4
	2-DH3	0.248	0.4
	2-DH5	0.262	0.4
8DPSK	3-DH1	0.123	0.4
	3-DH3	0.215	0.4
	3-DH5	0.320	0.4

Remark:

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

On (ms)*total number=dwell time (ms)

The middle channel (2441MHz), as below:

DH1 time slot=0.389 (ms)*total number=124.48 (ms)

DH3 time slot=1.649 (ms)* total number =263.84(ms)

DH5 time slot=2.905 (ms)* total number =261.45 (ms)

2-DH1 time slot=0.396 (ms)*total number=122.76 (ms)

2-DH3 time slot=1.655 (ms)* total number =248.25 (ms)

2-DH5 time slot=2.912 (ms)* total number = 262.08 (ms)

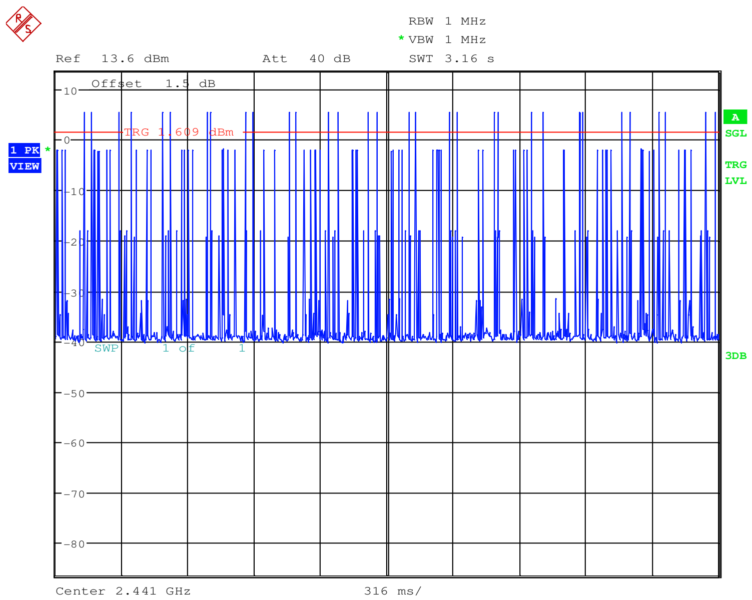
3-DH1 time slot=0.396 (ms)*total number=122.76 (ms)

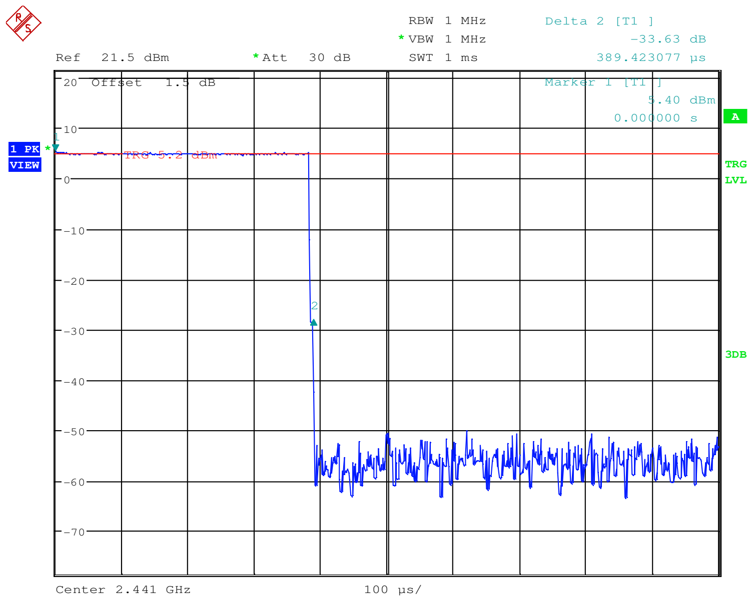
3-DH3 time slot=1.655 (ms)* total number =215.15 (ms)

3-DH5 time slot=2.911 (ms)* total number =320.21 (ms)

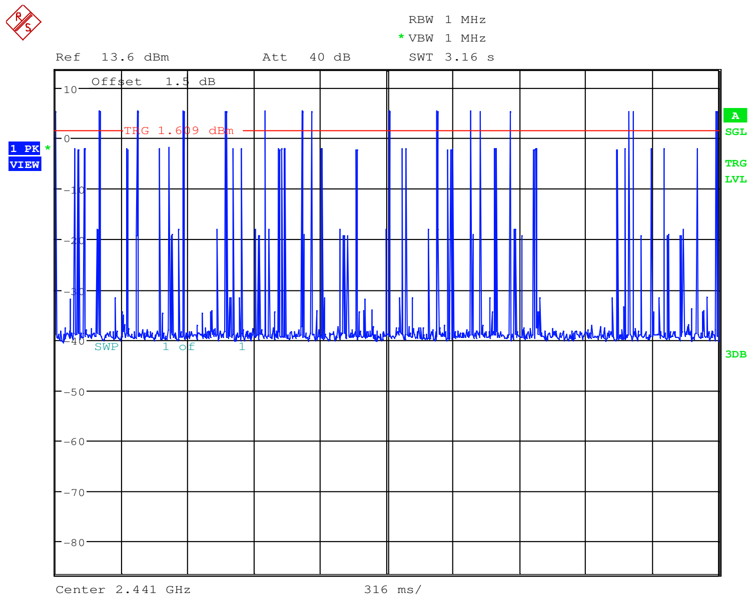
Test plot as follows:

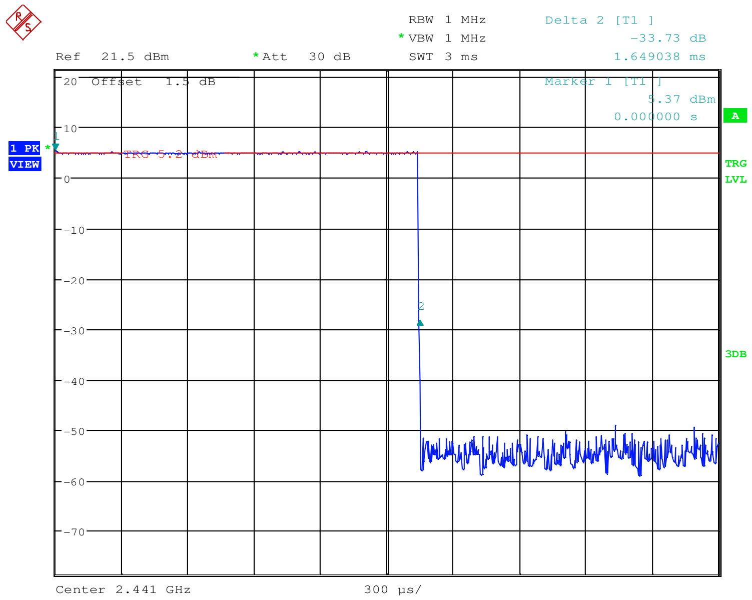
Test Packet:	DH1



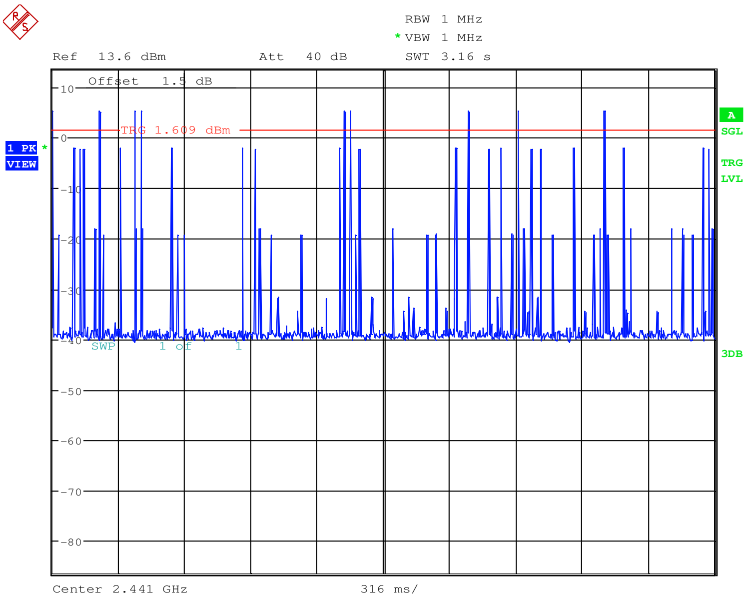


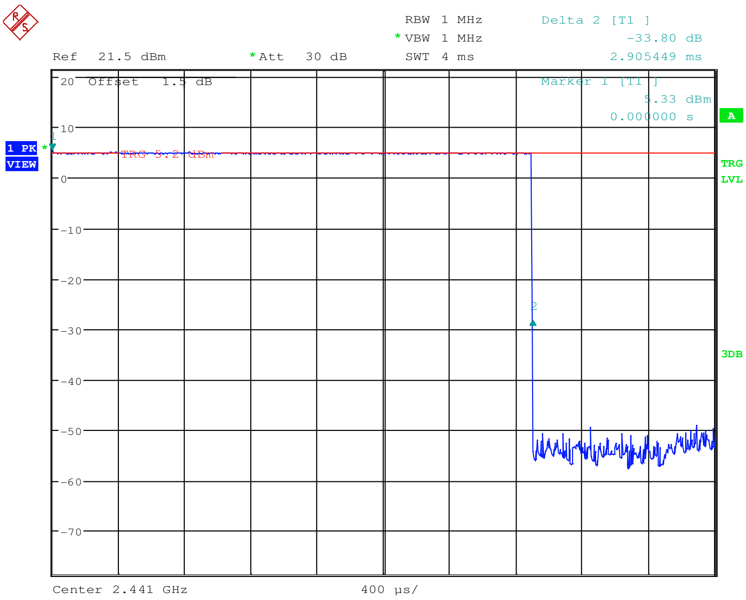
Test Packet:	DH3



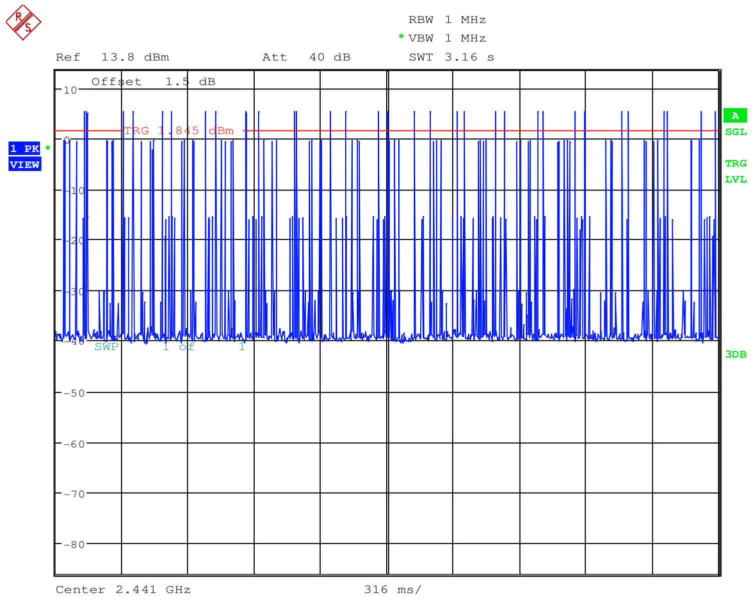


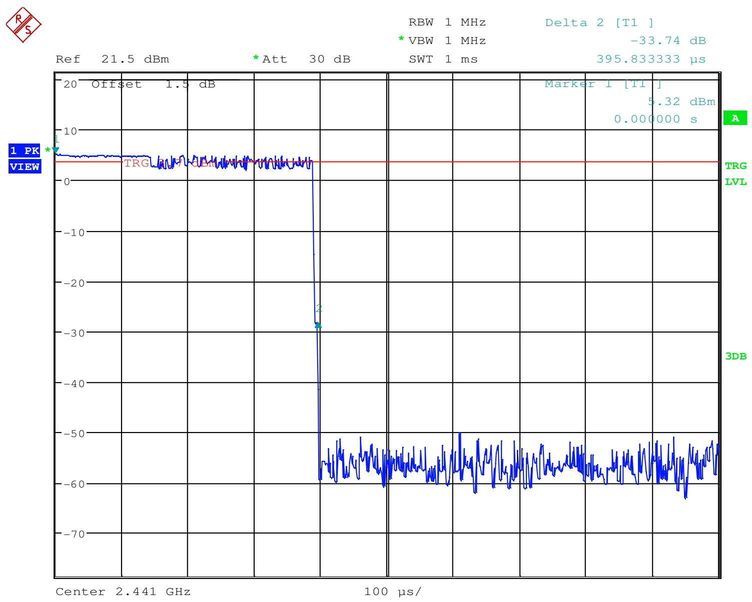
Test Packet:	DH5



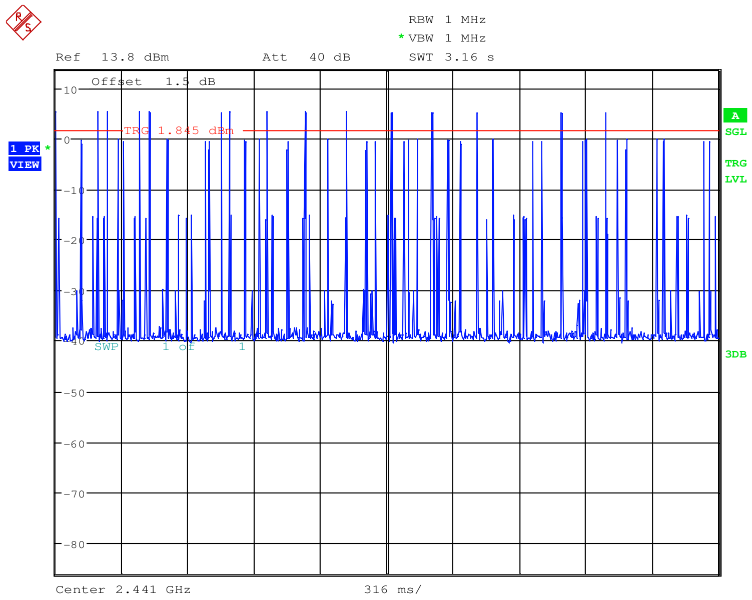


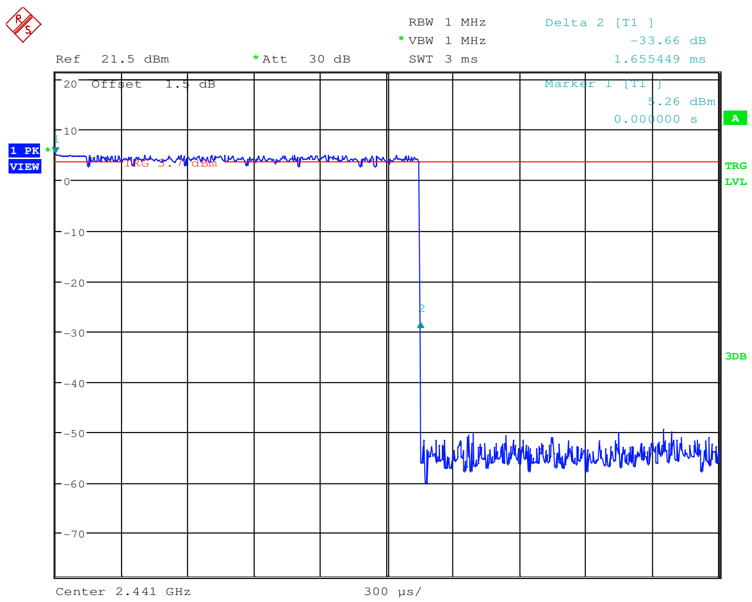
Test Packet:	2-DH1



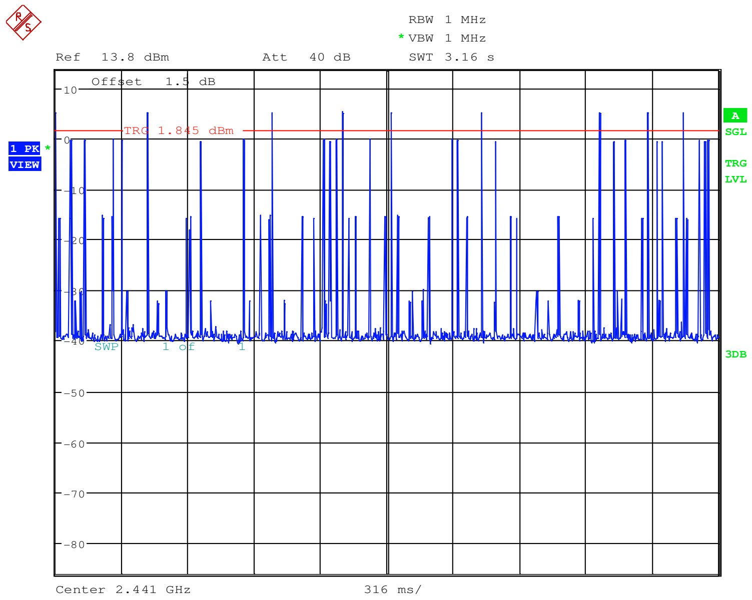


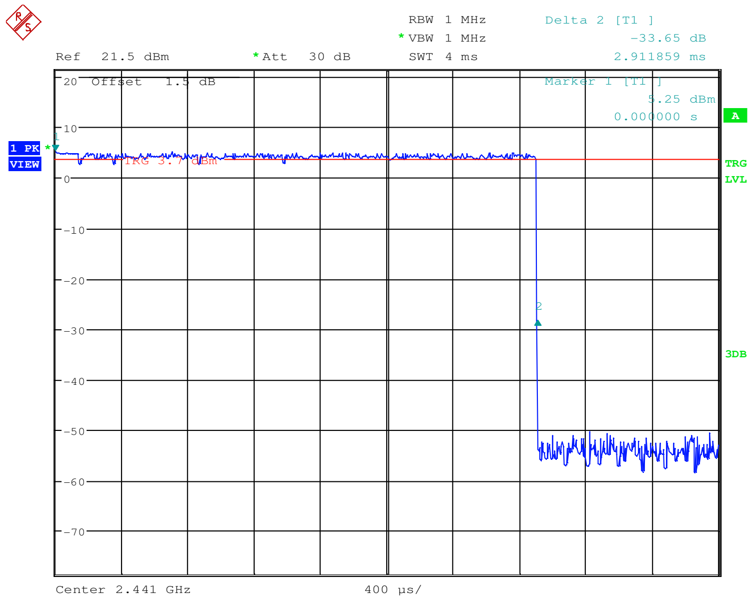
Test Packet:	2-DH3



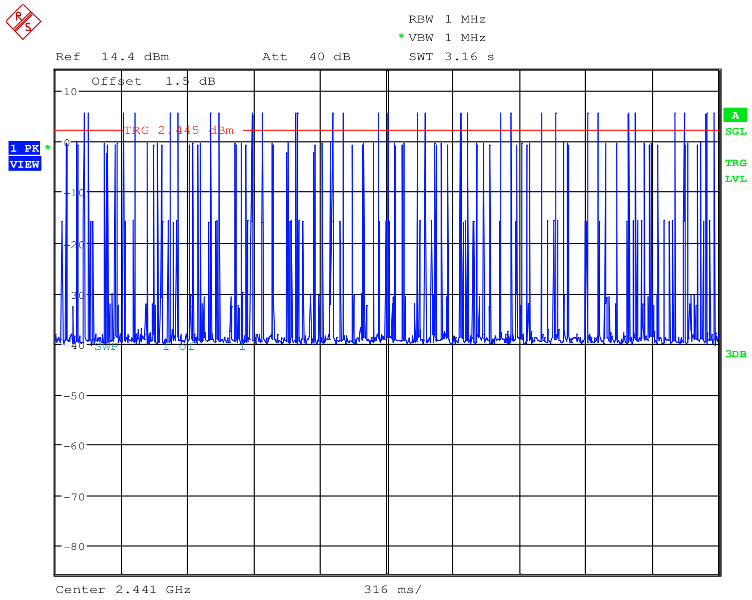


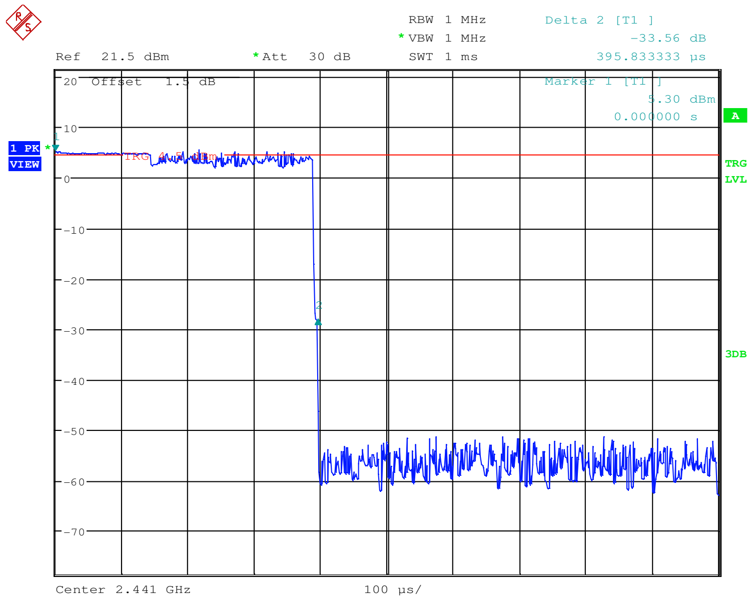
Test Packet:	2-DH5



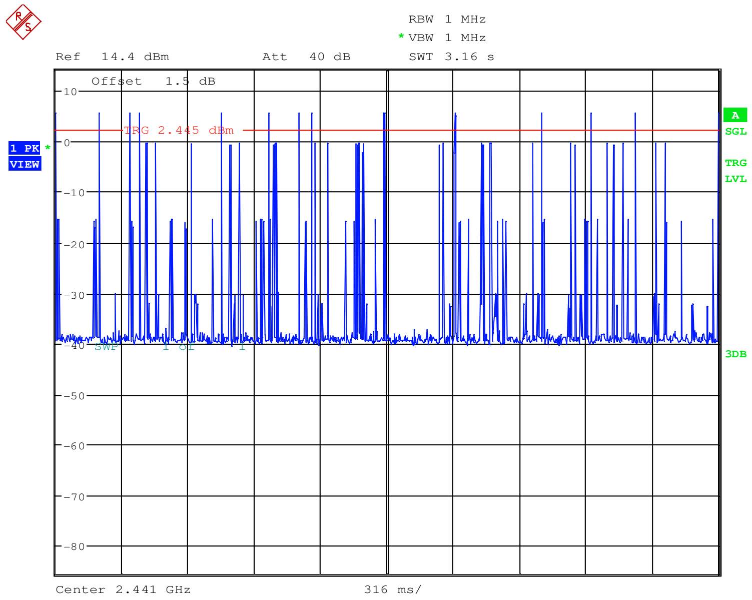


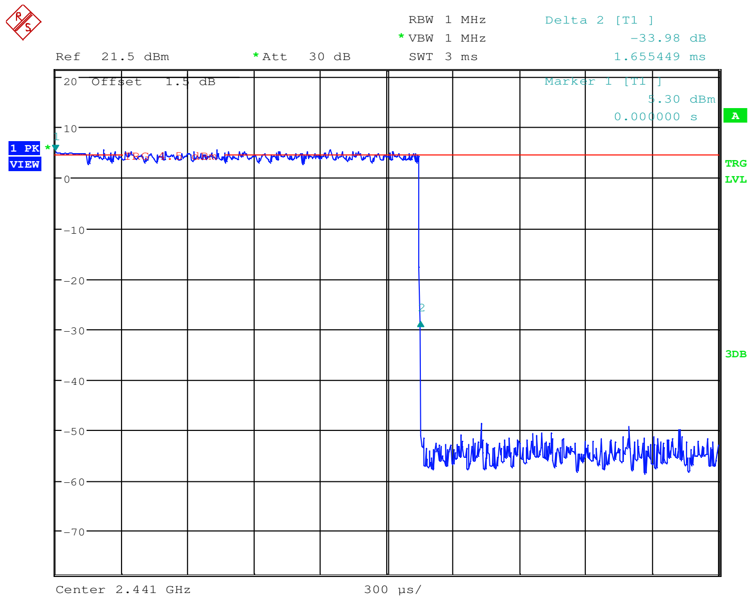
Test Packet:	3-DH1



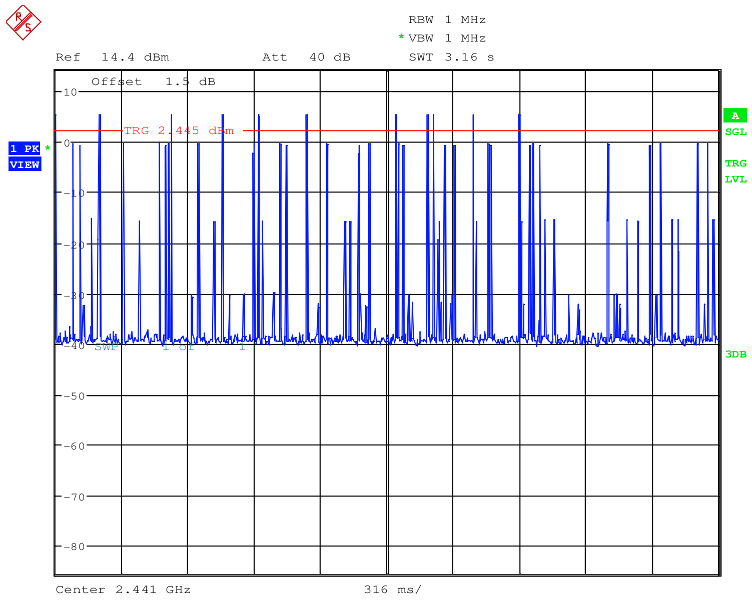


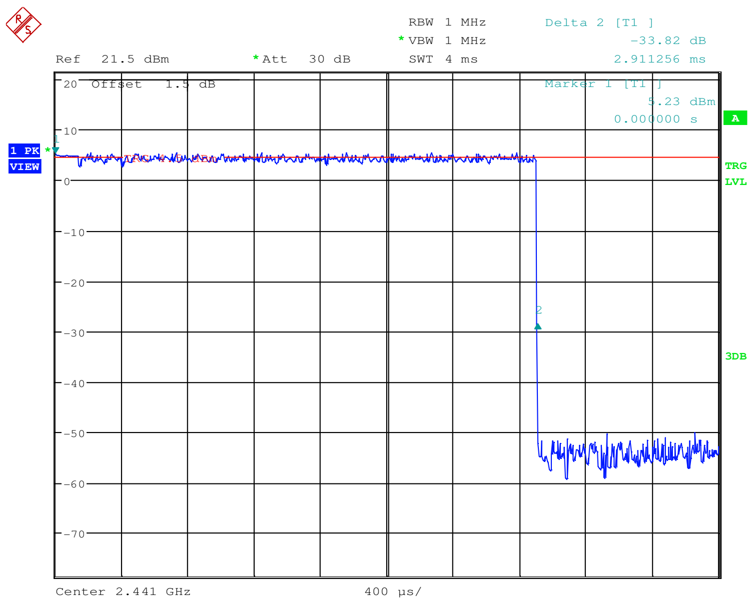
Test Packet:	3-DH3



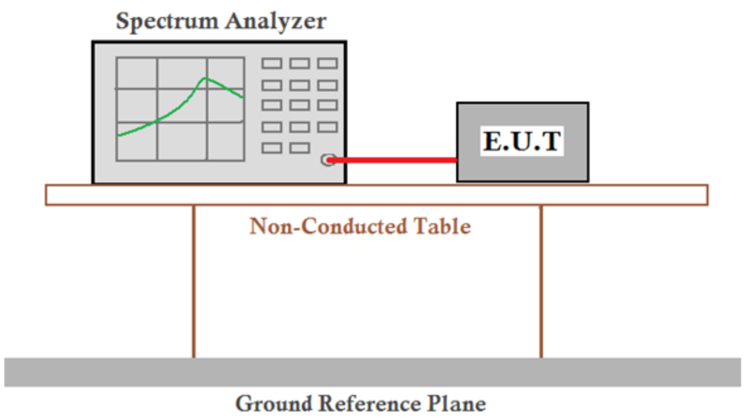


Test Packet:	3-DH5



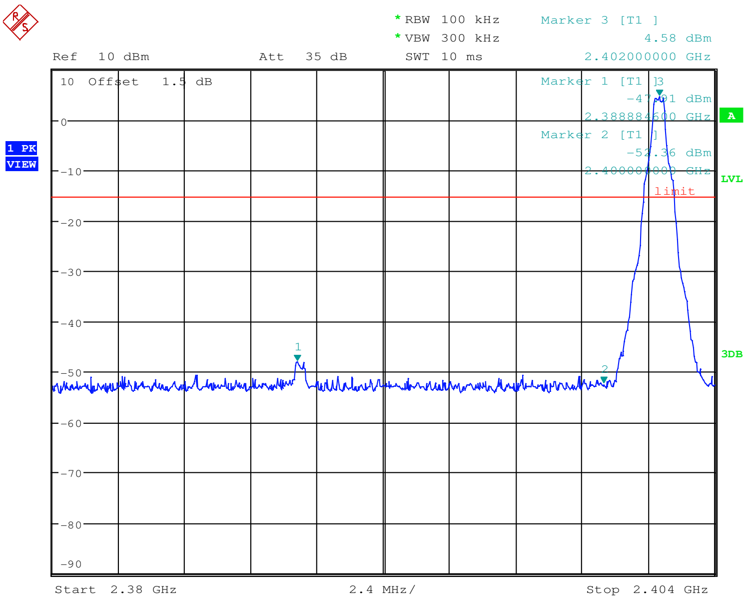


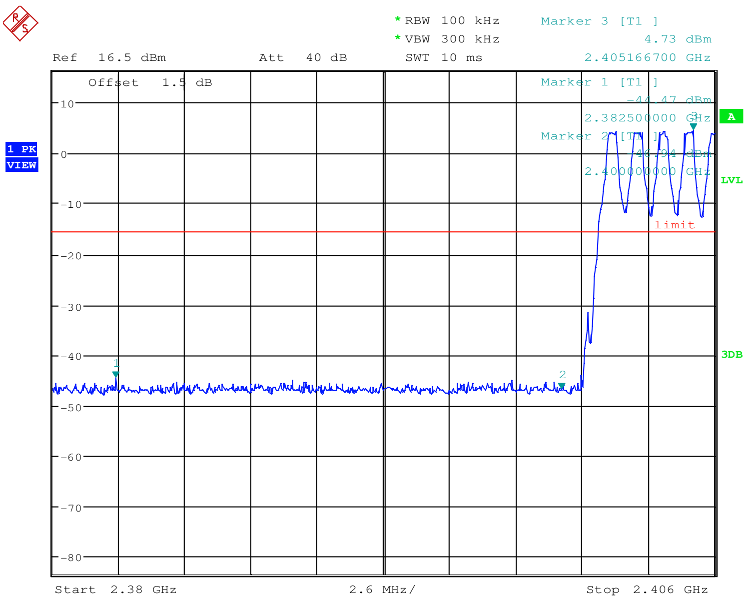
6.8 Band-edge for RF Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10:2009
Test Setup:	 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 and 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 worst case of GFSK modulation type, 2-DH1 of data type is the worst case of π/4DQPSK modulation type, 3-DH1 of data type is the worst case of 8DPSK modulation type.
Instruments Used:	Refer to section 5.10 for details.
Test Results:	Pass

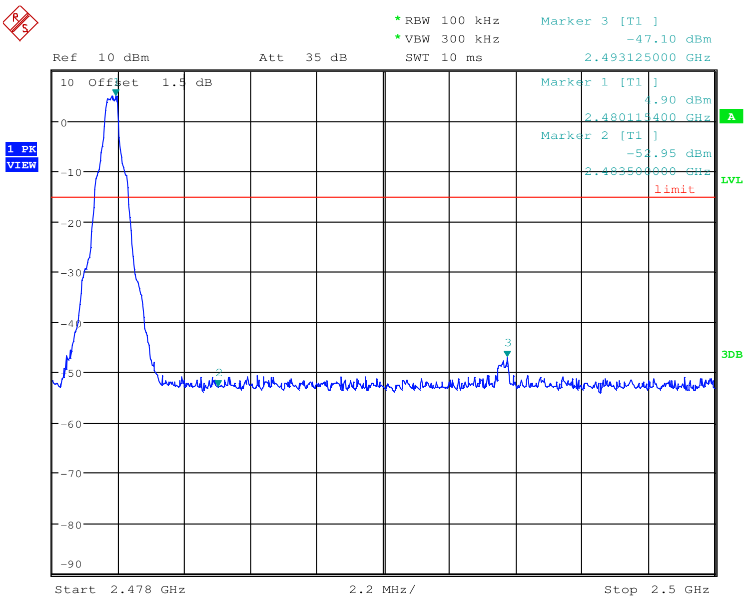
Test plot as follows:

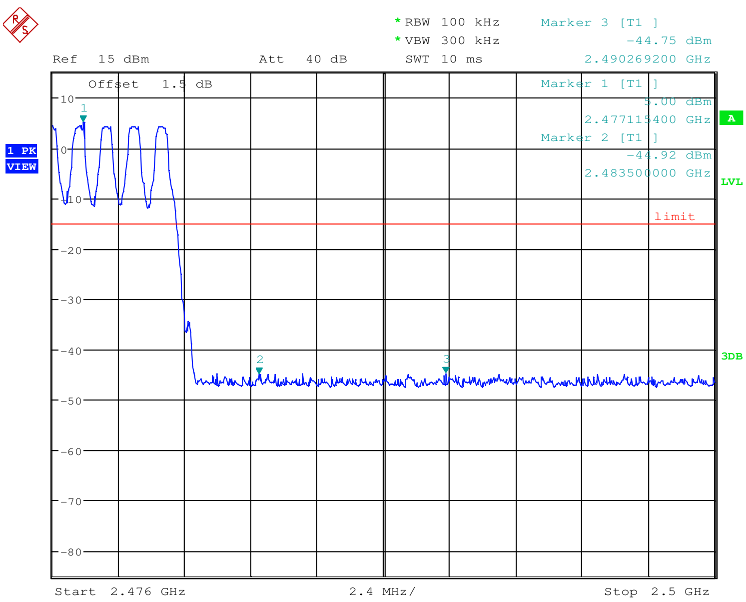
Test mode:	GFSK	Test channel:	Lowest



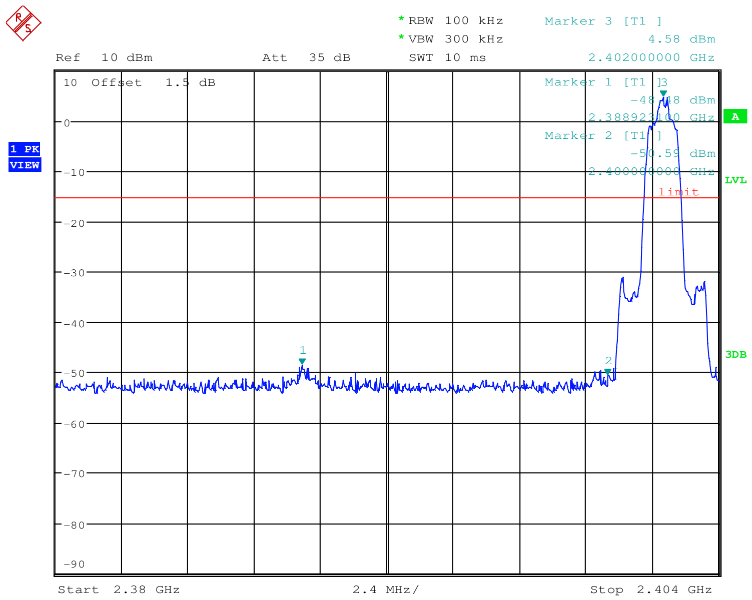


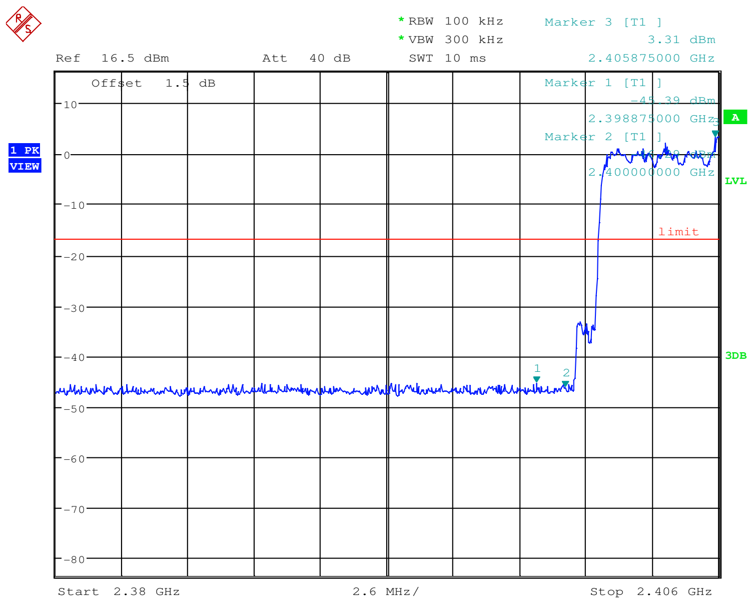
Test mode:	GFSK	Test channel:	Highest



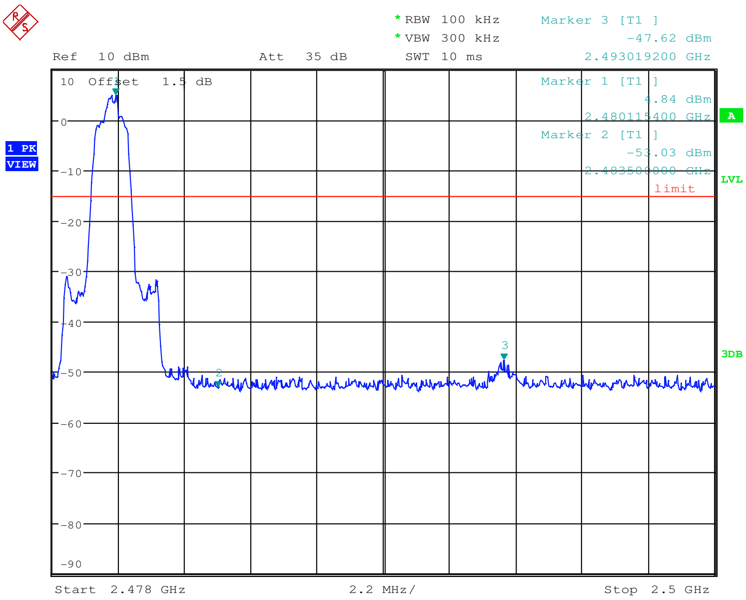


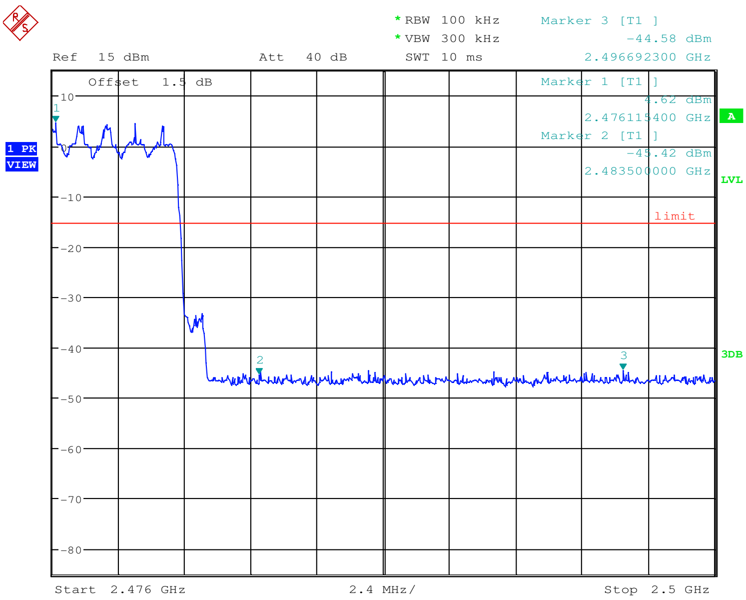
Test mode:	π/4DQPSK	Test channel:	Lowest



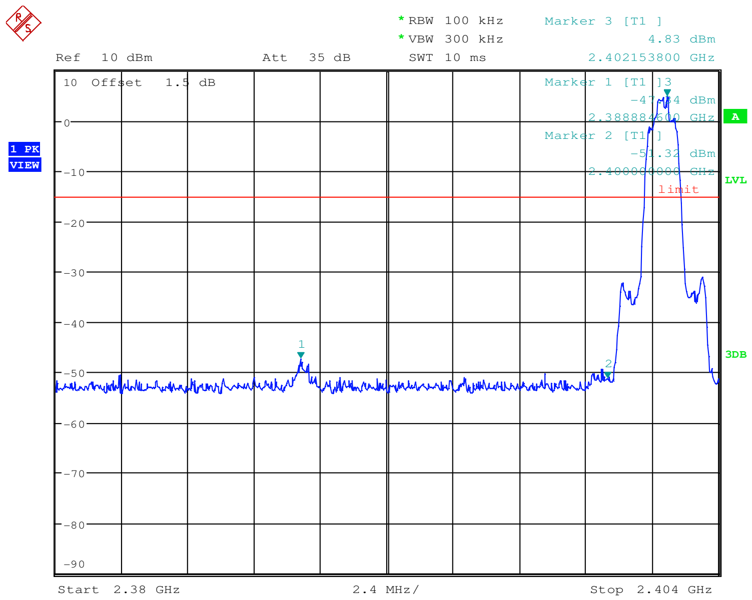


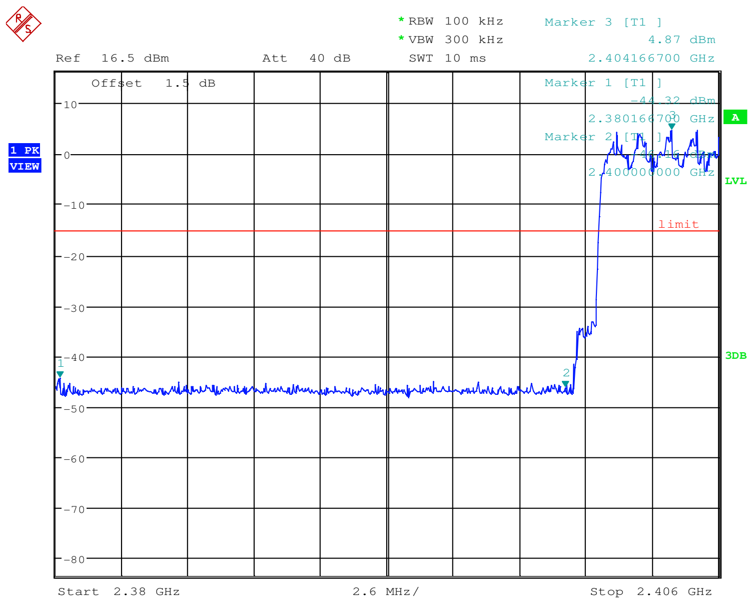
Test mode:	π/4DQPSK	Test channel:	Highest



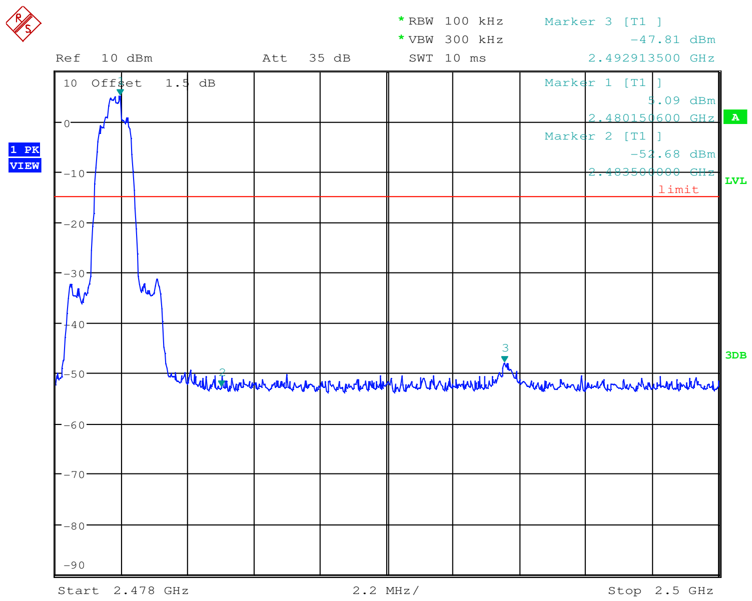


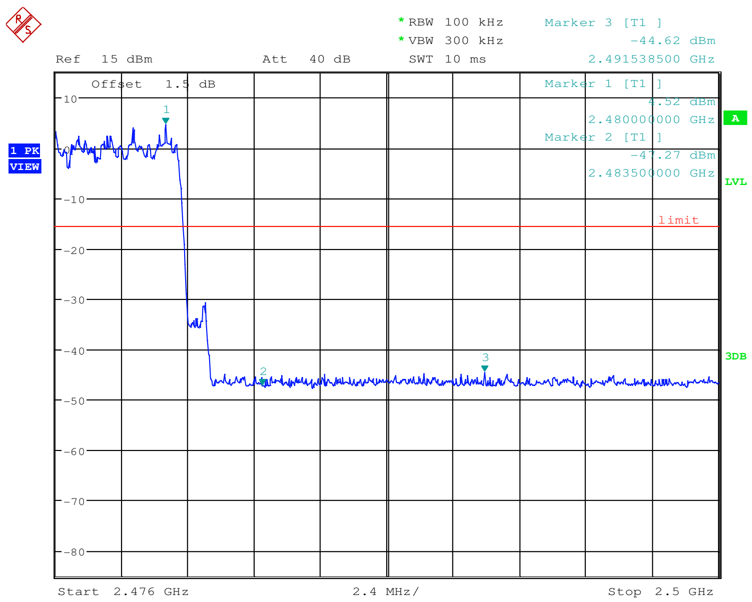
Test mode:	8DPSK	Test channel:	Lowest



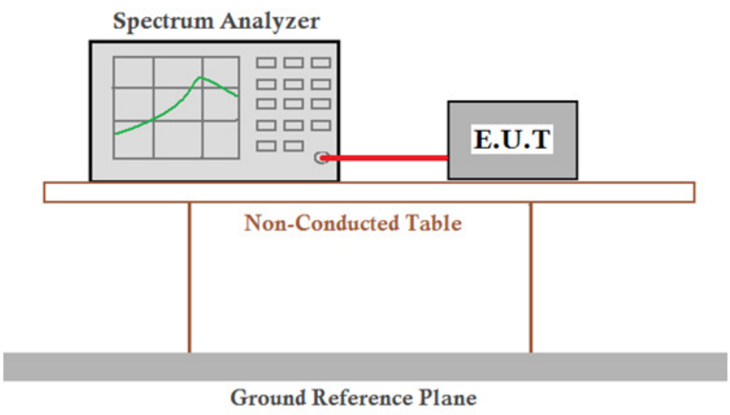


Test mode:	8DPSK	Test channel:	Highest



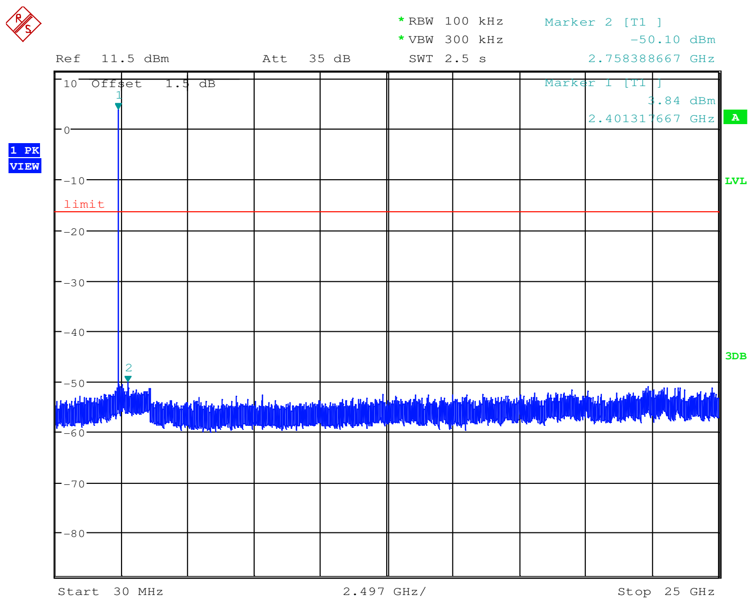


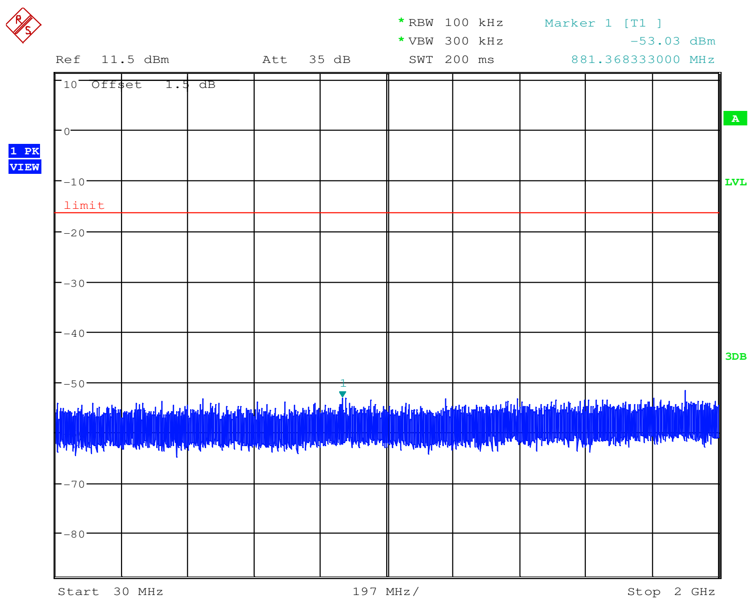
6.9 Spurious RF Conducted Emissions

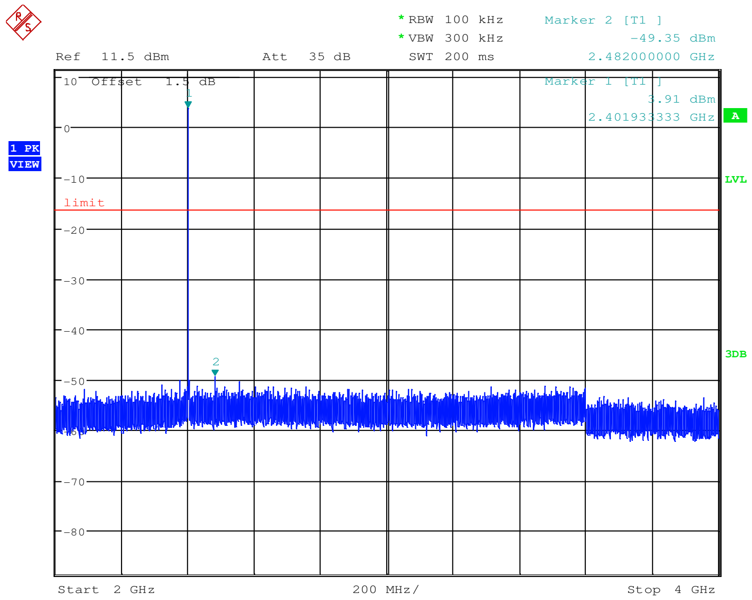
Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10:2009
Test Setup:	 Remark: Offset the High-Frequency cable loss 1.5dB in the spectrum analyzer.
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio 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 worst case of GFSK modulation type, 2-DH1 of data type is the worst case of π/4DQPSK modulation type, 3-DH1 of data type is the worst case of 8DPSK modulation type.
Instruments Used:	Refer to section 5.10 for details.
Test Results:	Pass

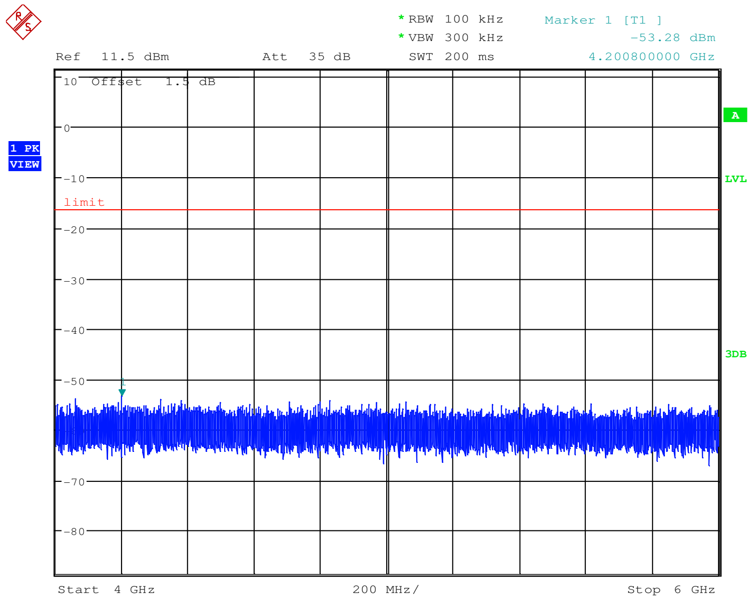
Test plot as follows:

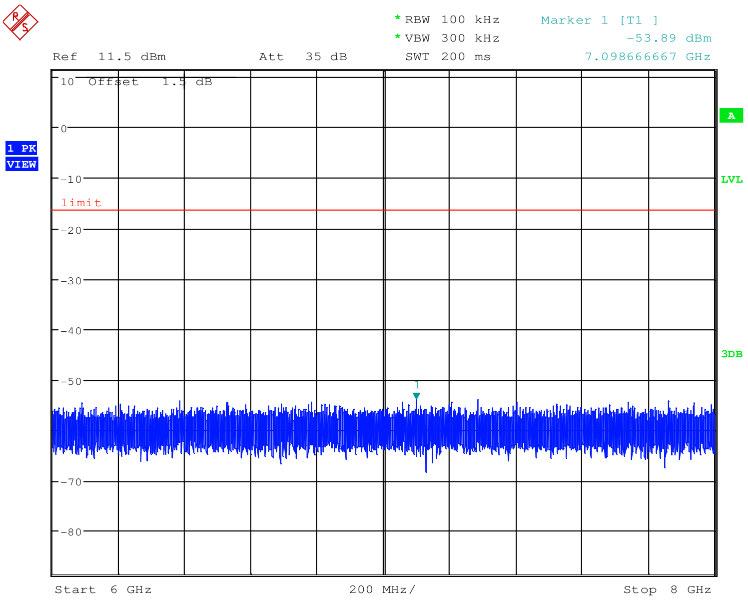
Test mode:	GFSK	Test channel:	Lowest

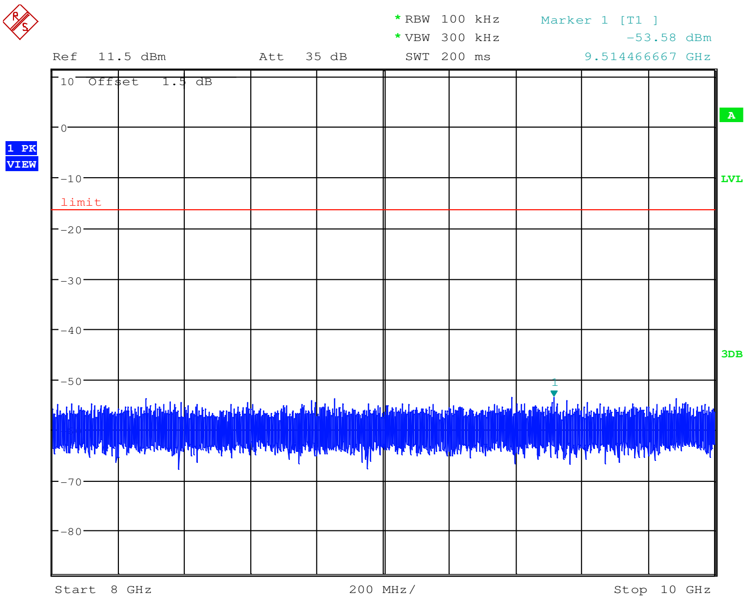




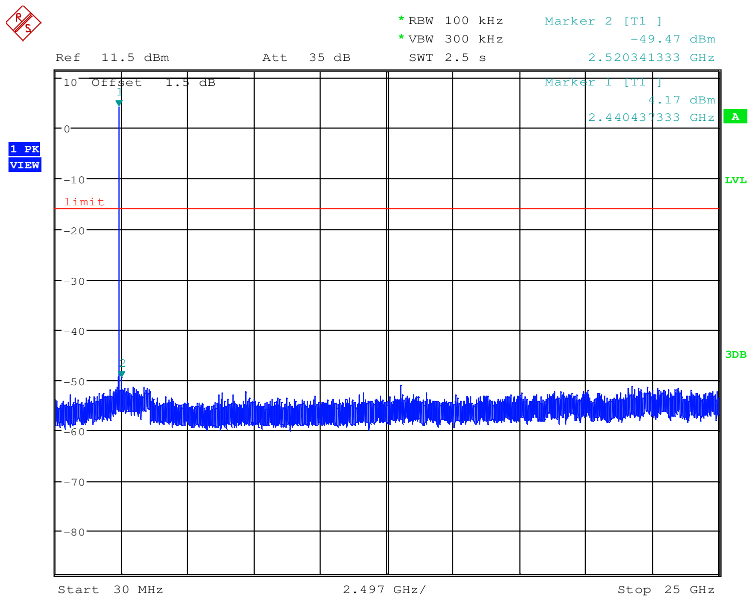

RBW 100 kHz
VBW 300 kHz
SWT 200 ms
Marker 2 [T1]
-49.35 dBm
2.482000000 GHz
Ref 11.5 dBm
Att 35 dB
Offset 1.5 dB
Marker 1 [T1]
3.91 dBm
2.401933333 GHz
1 PK
VIEW
limit
LVL
3DB
Start 2 GHz
200 MHz/
Stop 4 GHz

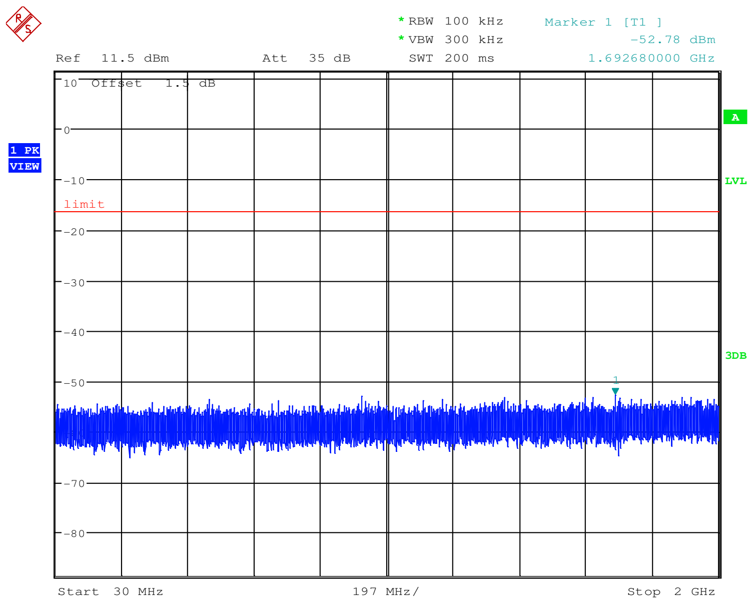

RBW 100 kHz
VBW 300 kHz
SWT 200 ms
Marker 1 [T1]
-53.28 dBm
4.200800000 GHz
Ref 11.5 dBm
Att 35 dB
Offset 1.5 dB
1 PK
VIEW
limit
LVL
3DB
Start 4 GHz
200 MHz/
Stop 6 GHz

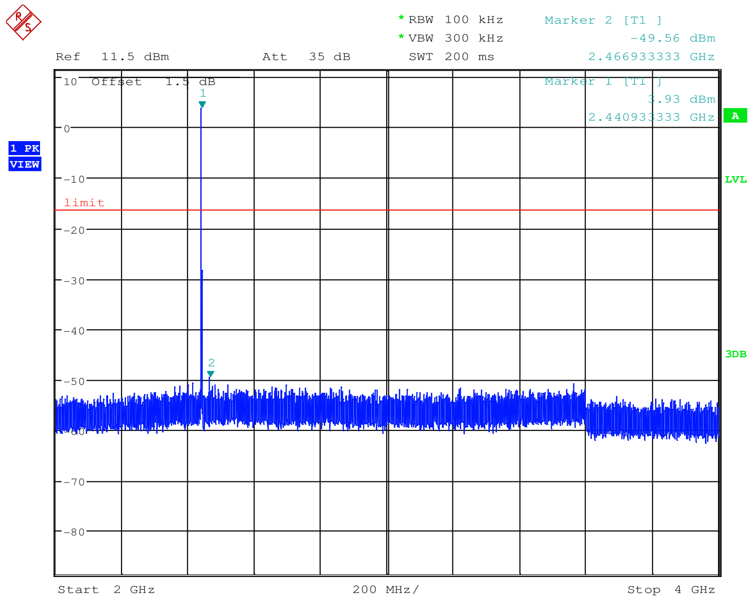

*RBW 100 kHz
*VBW 300 kHz
Marker 1 [T1]
-53.89 dBm
7.098666667 GHz
Ref 11.5 dBm
Att 35 dB
SWT 200 ms
Offset 1.5 dB
1 PK
VIEW
limit
A
LVL
3DB
Start 6 GHz
200 MHz/
Stop 8 GHz

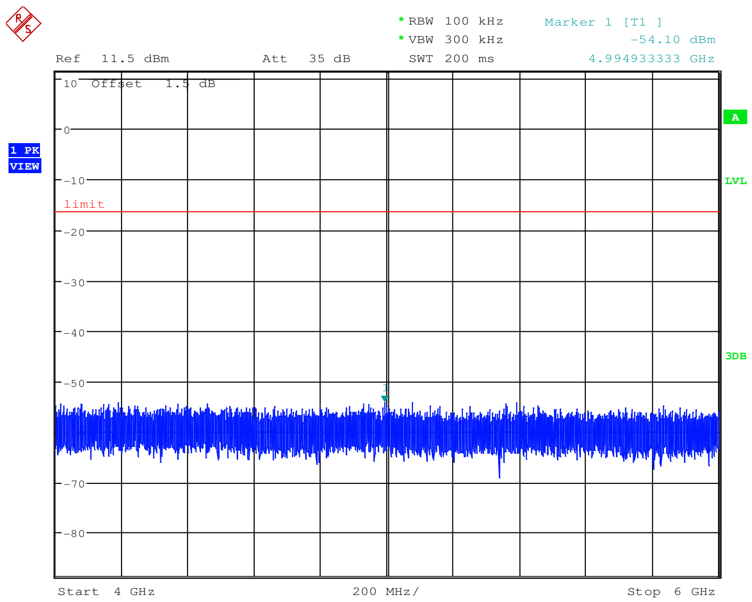

*RBW 100 kHz
*VBW 300 kHz
Marker 1 [T1]
-53.58 dBm
9.514466667 GHz
Ref 11.5 dBm
Att 35 dB
SWT 200 ms
Offset 1.5 dB
1 PK
VIEW
limit
A
LVL
3DB
Start 8 GHz
200 MHz/
Stop 10 GHz

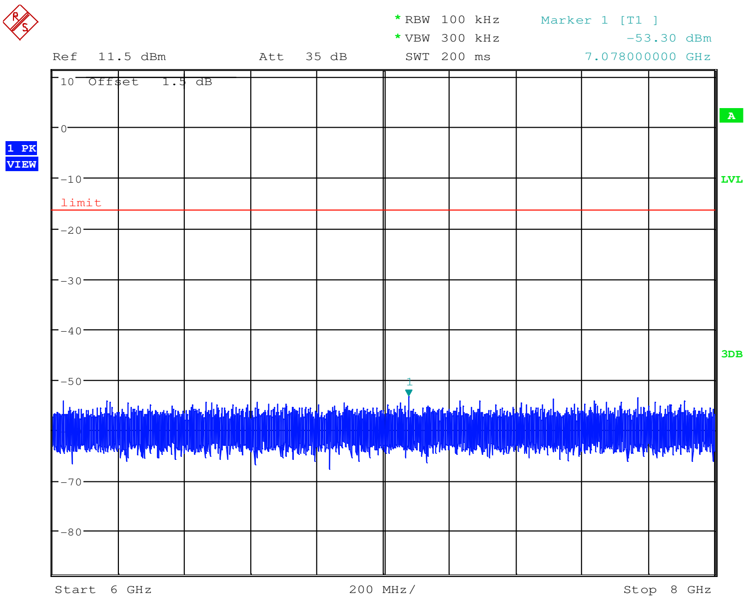
Test mode:	GFSK	Test channel:	Middle

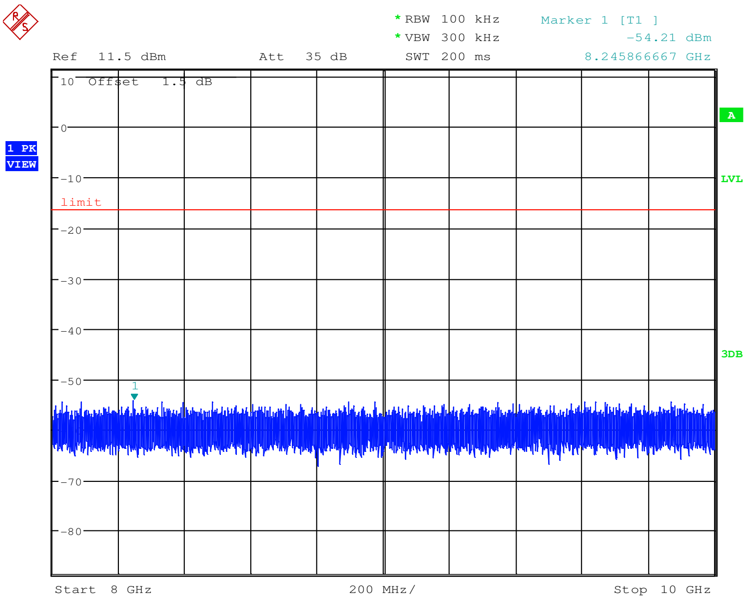




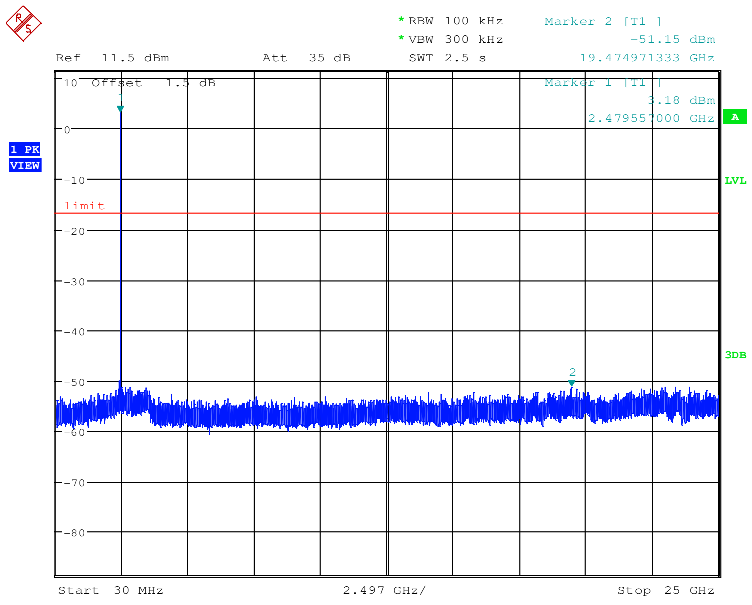

*RBW 100 kHz
*VBW 300 kHz
Marker 2 [T1]
-49.56 dBm
Ref 11.5 dBm
Att 35 dB
SWT 200 ms
2.466933333 GHz
Offset 1.5 dB
Marker 1 [T1]
3.93 dBm
2.440933333 GHz
1 PK
VIEW
limit
A
LVL
3DB
Start 2 GHz
200 MHz/
Stop 4 GHz

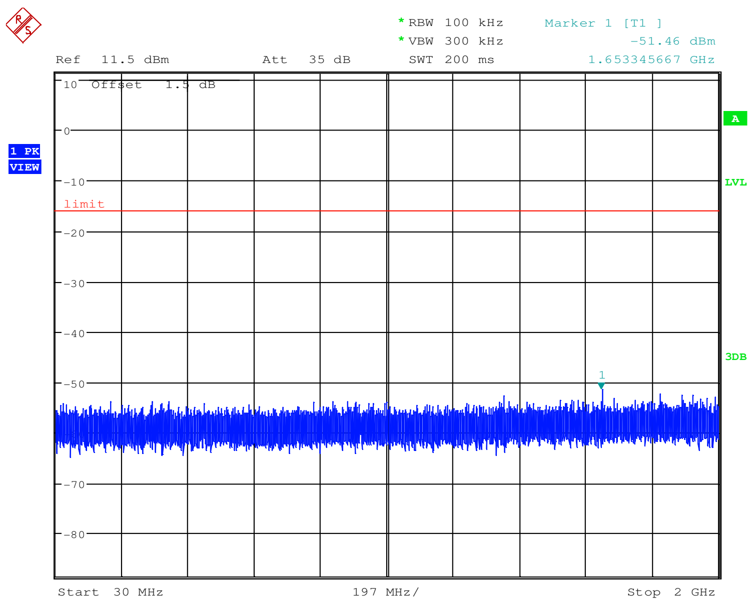

*RBW 100 kHz
*VBW 300 kHz
Marker 1 [T1]
-54.10 dBm
Ref 11.5 dBm
Att 35 dB
SWT 200 ms
4.994933333 GHz
Offset 1.5 dB
1 PK
VIEW
limit
A
LVL
3DB
Start 4 GHz
200 MHz/
Stop 6 GHz

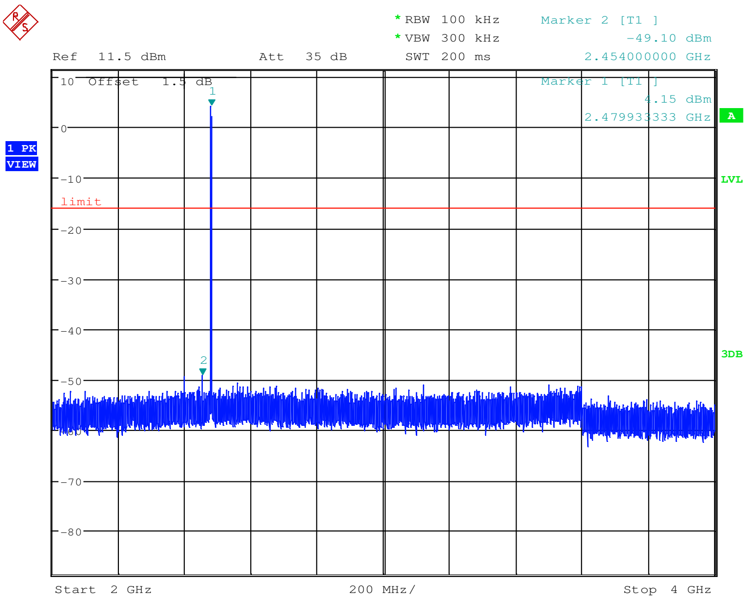

*RBW 100 kHz
*VBW 300 kHz
Marker 1 [T1]
-53.30 dBm
7.078000000 GHz
Ref 11.5 dBm
Att 35 dB
SWT 200 ms
Offset 1.5 dB
1 PK
VIEW
A
LVL
limit
3DB
Start 6 GHz
200 MHz/
Stop 8 GHz

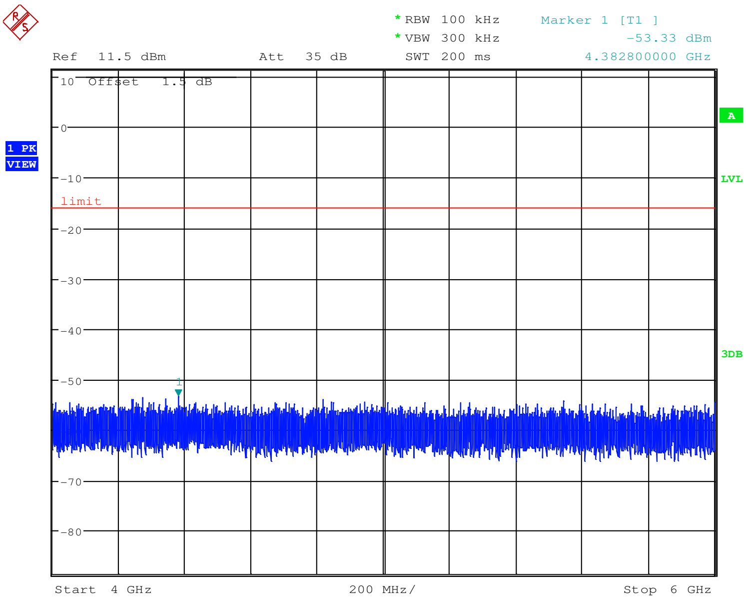

*RBW 100 kHz
*VBW 300 kHz
Marker 1 [T1]
-54.21 dBm
8.245866667 GHz
Ref 11.5 dBm
Att 35 dB
SWT 200 ms
Offset 1.5 dB
1 PK
VIEW
A
LVL
limit
3DB
Start 8 GHz
200 MHz/
Stop 10 GHz

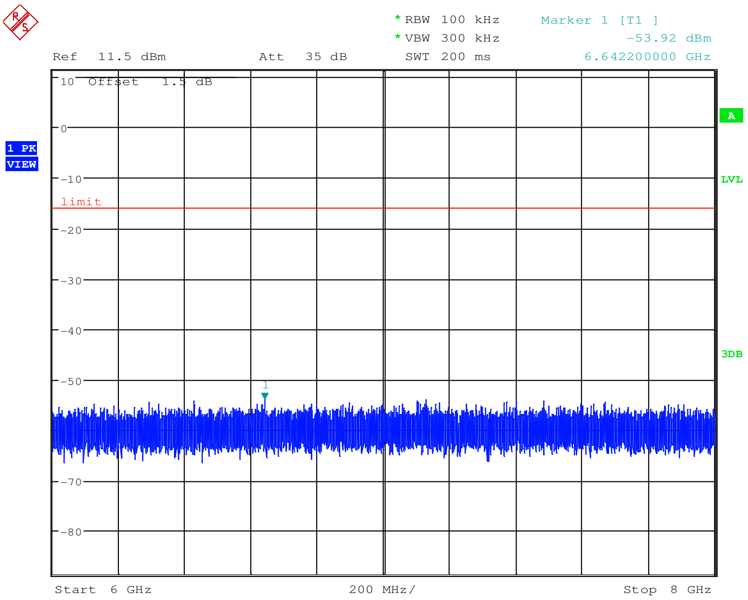
Test mode:	GFSK	Test channel:	Highest

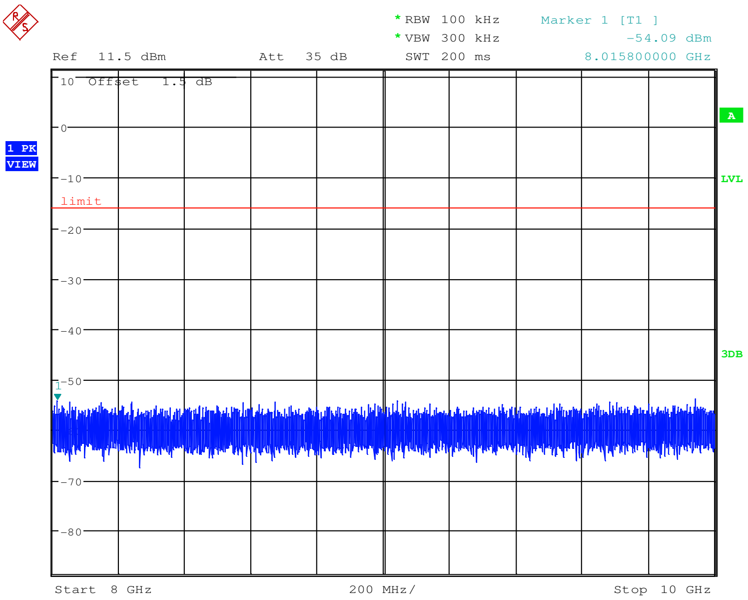




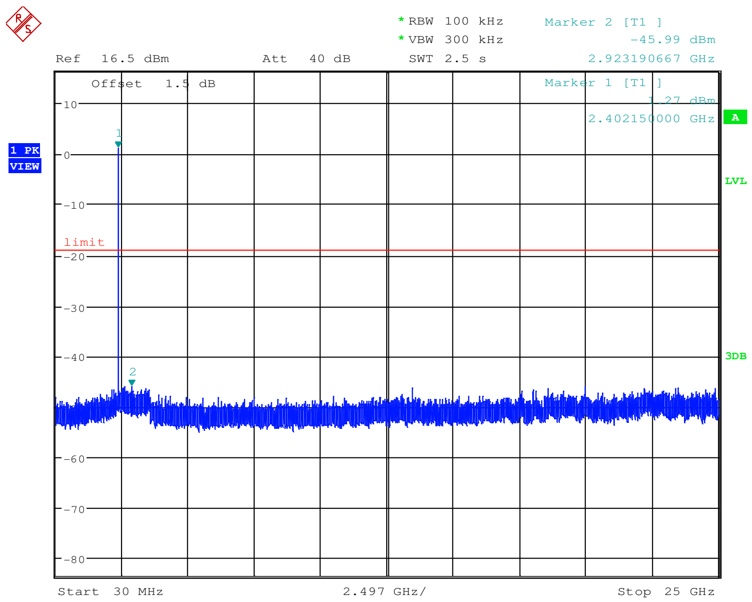

*RBW 100 kHz
*VBW 300 kHz
Marker 2 [T1]
-49.10 dBm
Ref 11.5 dBm
Att 35 dB
SWT 200 ms
2.454000000 GHz
Offset 1.5 dB
Marker 1 [T1]
4.15 dBm
2.479933333 GHz
1 PK
VIEW
limit
A
LVL
3DB
Start 2 GHz
200 MHz/
Stop 4 GHz

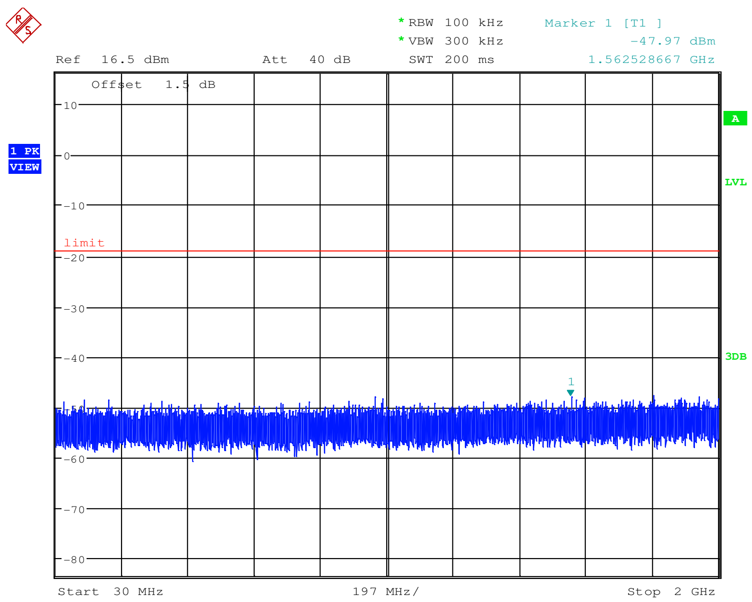

*RBW 100 kHz
*VBW 300 kHz
Marker 1 [T1]
-53.33 dBm
Ref 11.5 dBm
Att 35 dB
SWT 200 ms
4.382800000 GHz
Offset 1.5 dB
1 PK
VIEW
limit
A
LVL
3DB
Start 4 GHz
200 MHz/
Stop 6 GHz

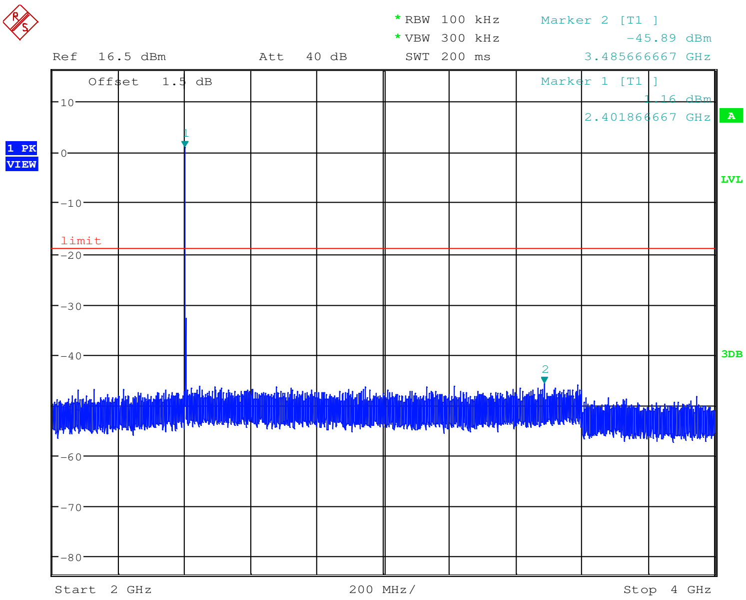

*RBW 100 kHz
Marker 1 [T1]
*VBW 300 kHz
-53.92 dBm
Ref 11.5 dBm
Att 35 dB
SWT 200 ms
6.642200000 GHz
Offset 1.5 dB
1 PK
VIEW
limit
A
LVL
3DB
Start 6 GHz
200 MHz/
Stop 8 GHz

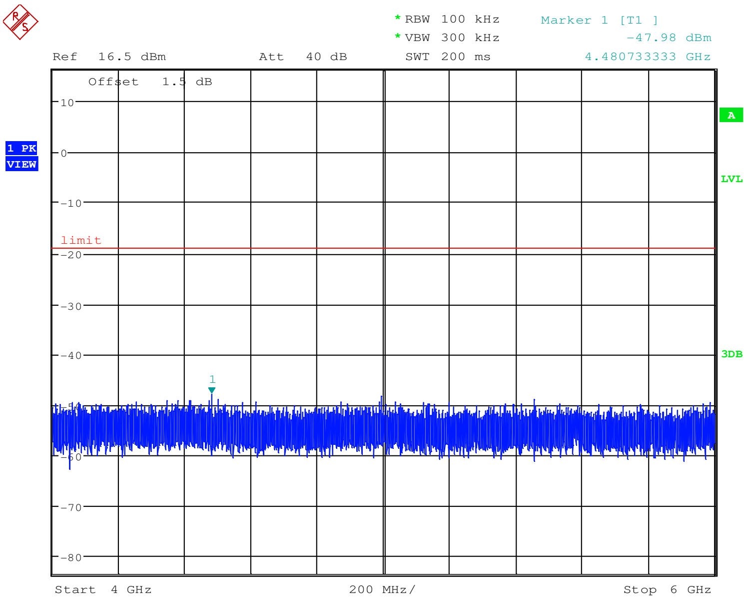

*RBW 100 kHz
Marker 1 [T1]
*VBW 300 kHz
-54.09 dBm
Ref 11.5 dBm
Att 35 dB
SWT 200 ms
8.015800000 GHz
Offset 1.5 dB
1 PK
VIEW
limit
A
LVL
3DB
Start 8 GHz
200 MHz/
Stop 10 GHz

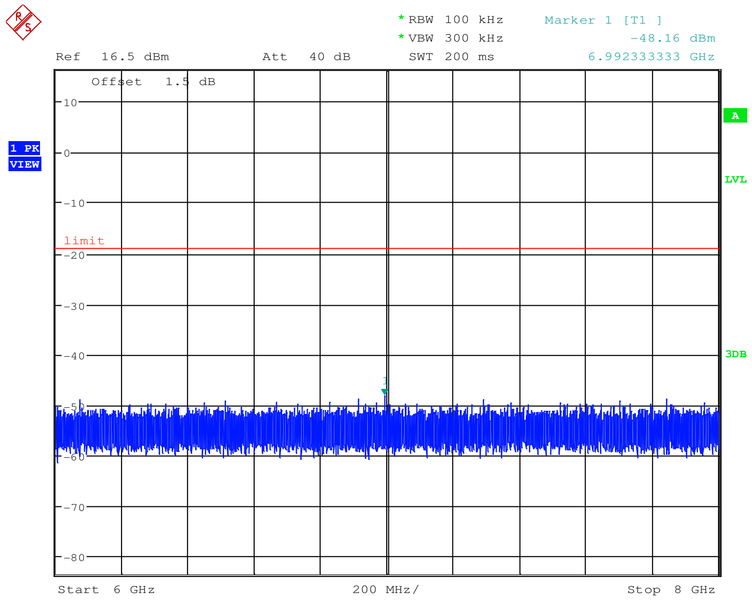
Test mode:	π/4DQPSK	Test channel:	Lowest

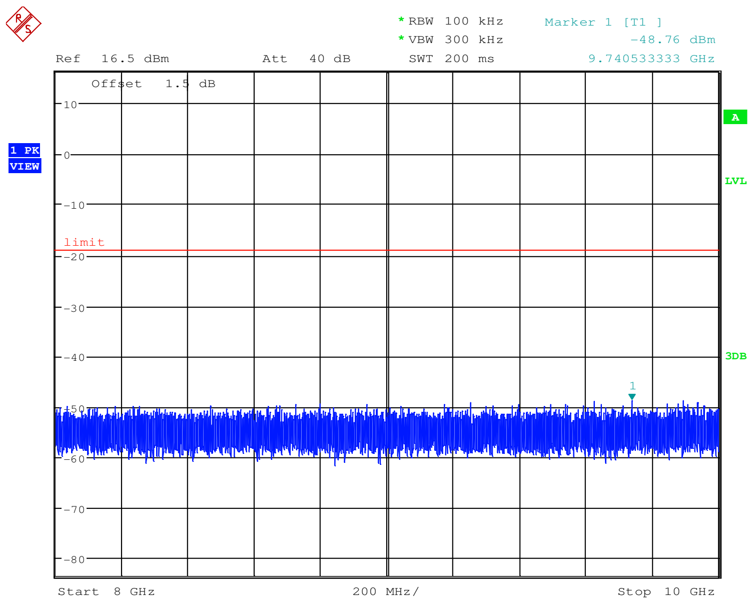




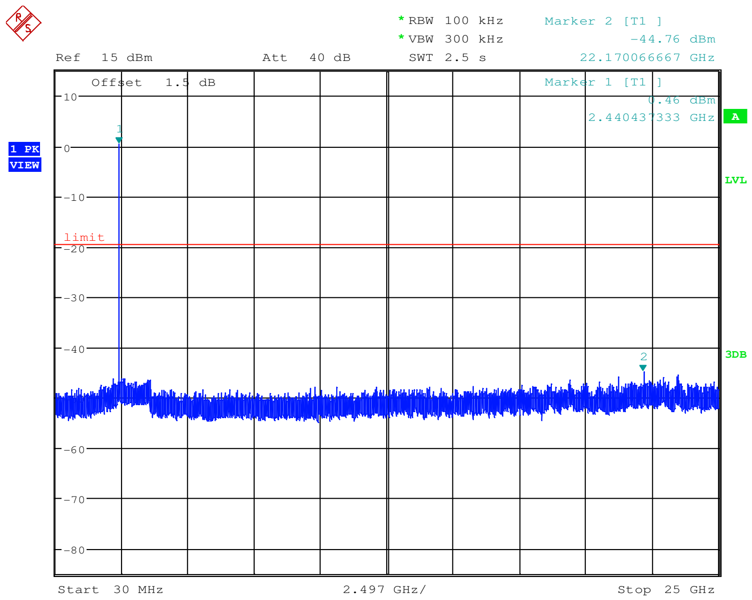

*RBW 100 kHz
*VBW 300 kHz
Marker 2 [T1]
-45.89 dBm
3.485666667 GHz
Ref 16.5 dBm
Att 40 dB
SWT 200 ms
Offset 1.5 dB
Marker 1 [T1]
1.16 dBm
2.401866667 GHz
1 PK
VIEW
A
LVL
3DB
limit
Start 2 GHz
200 MHz/
Stop 4 GHz

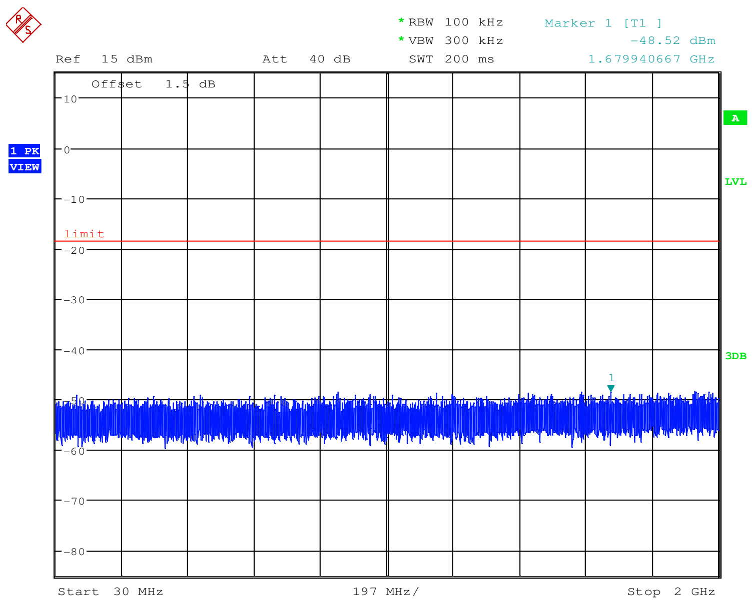

*RBW 100 kHz
*VBW 300 kHz
Marker 1 [T1]
-47.98 dBm
4.480733333 GHz
Ref 16.5 dBm
Att 40 dB
SWT 200 ms
Offset 1.5 dB
1 PK
VIEW
A
LVL
3DB
limit
Start 4 GHz
200 MHz/
Stop 6 GHz

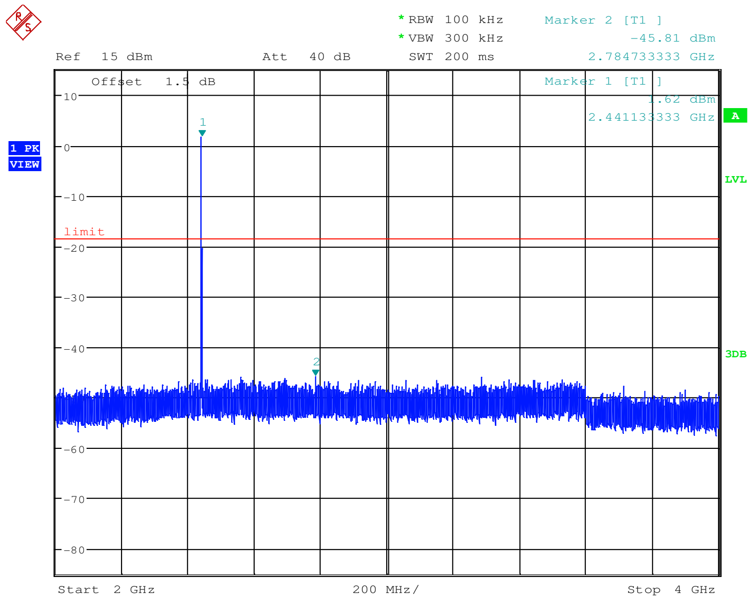

*RBW 100 kHz
*VBW 300 kHz
Marker 1 [T1]
-48.16 dBm
Ref 16.5 dBm
Att 40 dB
SWT 200 ms
6.992333333 GHz
Offset 1.5 dB
1 PK VIEW
A
LVL
3DB
limit
Start 6 GHz
200 MHz/
Stop 8 GHz

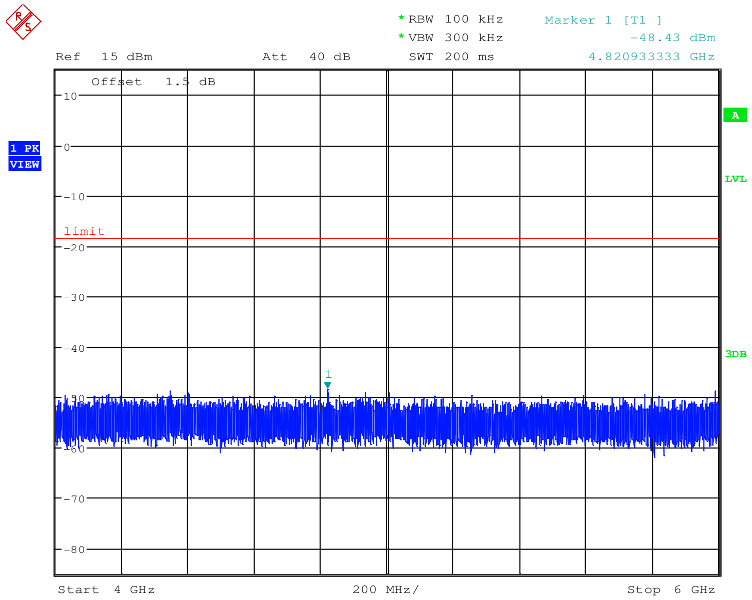

*RBW 100 kHz
*VBW 300 kHz
Marker 1 [T1]
-48.76 dBm
Ref 16.5 dBm
Att 40 dB
SWT 200 ms
9.740533333 GHz
Offset 1.5 dB
1 PK VIEW
A
LVL
3DB
limit
Start 8 GHz
200 MHz/
Stop 10 GHz

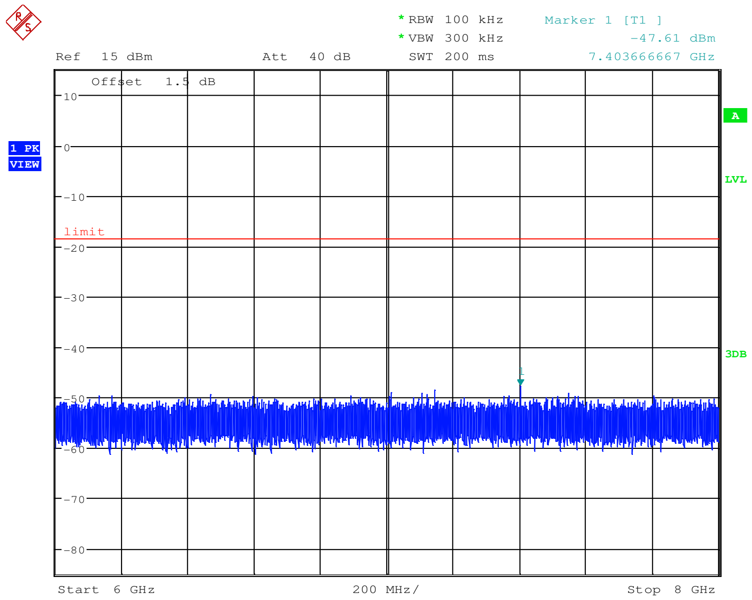
Test mode:	π/4DQPSK	Test channel:	Middle

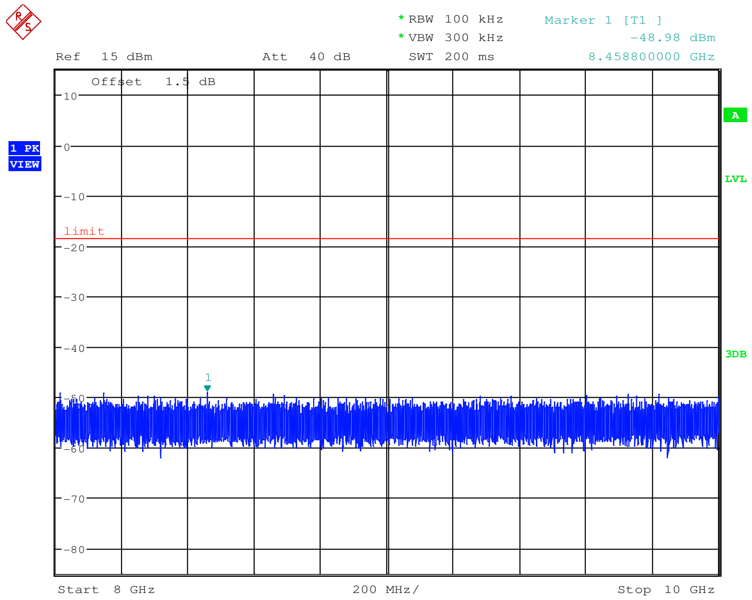




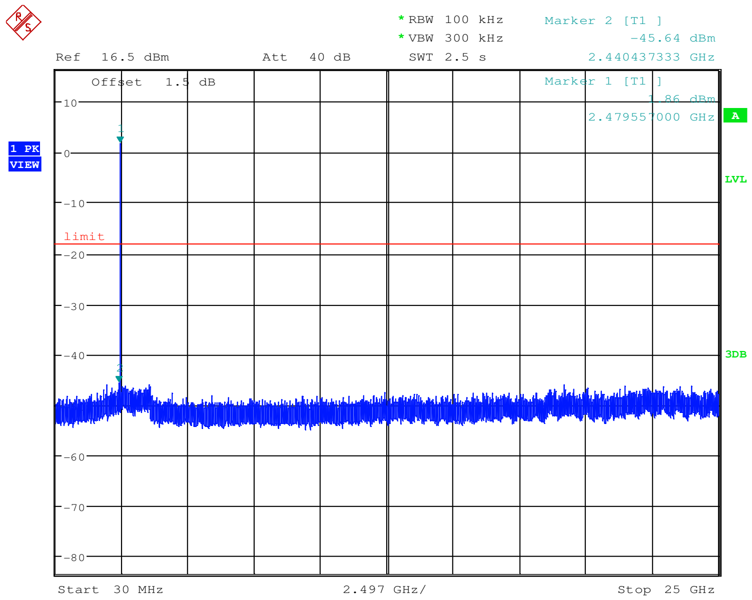

RBW 100 kHz
VBW 300 kHz
SWT 200 ms
Marker 2 [T1]
-45.81 dBm
2.784733333 GHz
Ref 15 dBm
Att 40 dB
Offset 1.5 dB
Marker 1 [T1]
2.441133333 GHz
1 PK
VIEW
limit
LVL
3DB
Start 2 GHz
200 MHz/
Stop 4 GHz

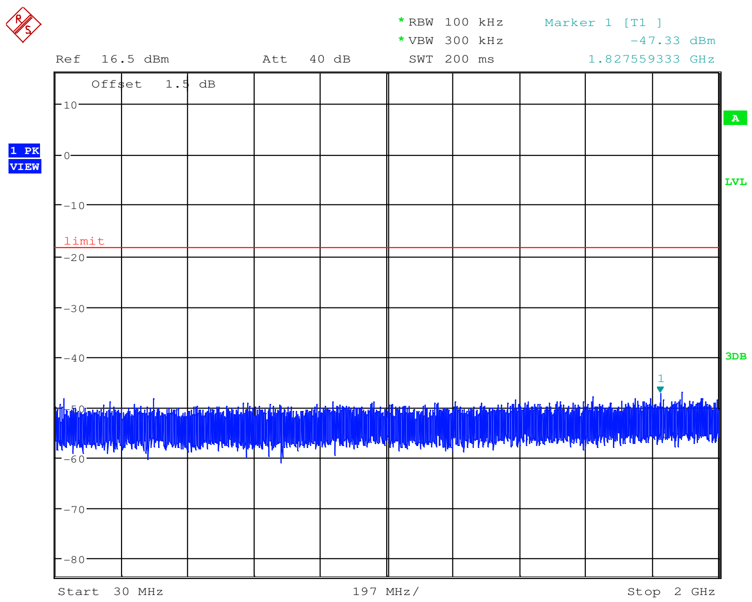

RBW 100 kHz
VBW 300 kHz
SWT 200 ms
Marker 1 [T1]
-48.43 dBm
4.820933333 GHz
Ref 15 dBm
Att 40 dB
Offset 1.5 dB
1 PK
VIEW
limit
LVL
3DB
Start 4 GHz
200 MHz/
Stop 6 GHz

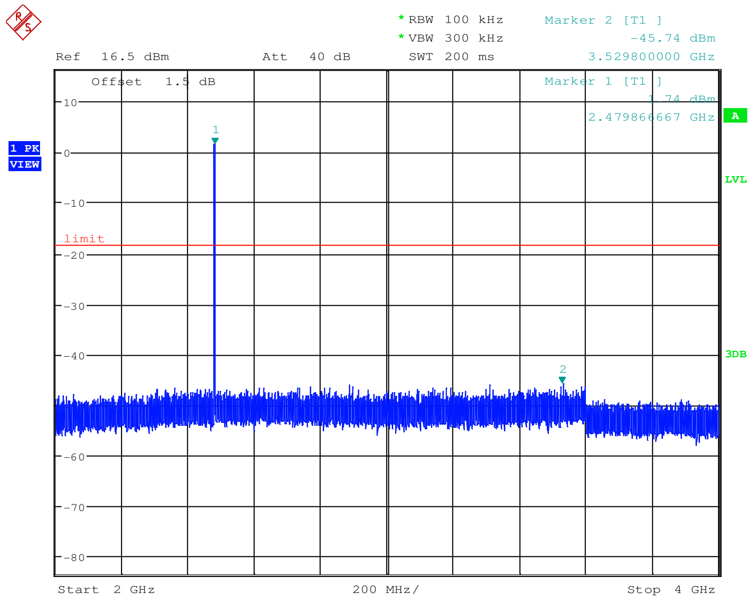

*RBW 100 kHz
*VBW 300 kHz
Marker 1 [T1]
-47.61 dBm
Ref 15 dBm
Att 40 dB
SWT 200 ms
7.403666667 GHz
Offset 1.5 dB
1 PK
VIEW
limit
A
LVL
3DB
Start 6 GHz
200 MHz/
Stop 8 GHz

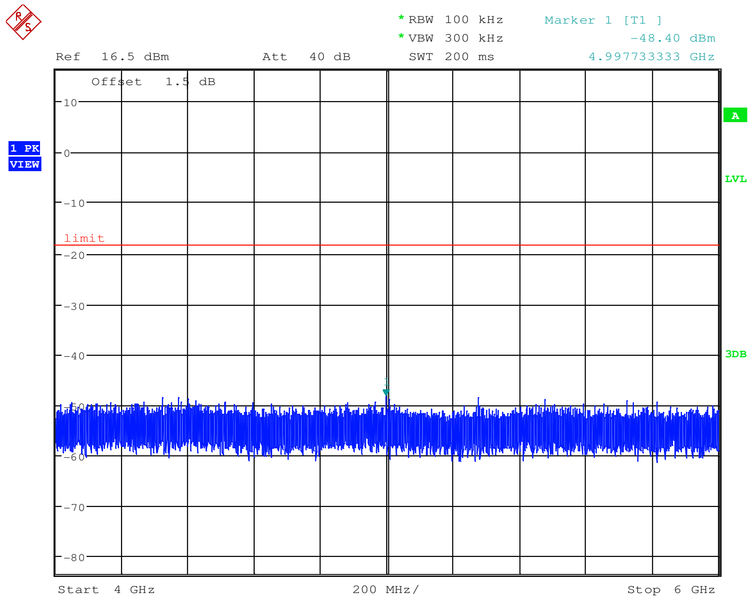

*RBW 100 kHz
*VBW 300 kHz
Marker 1 [T1]
-48.98 dBm
Ref 15 dBm
Att 40 dB
SWT 200 ms
8.458800000 GHz
Offset 1.5 dB
1 PK
VIEW
limit
A
LVL
3DB
Start 8 GHz
200 MHz/
Stop 10 GHz

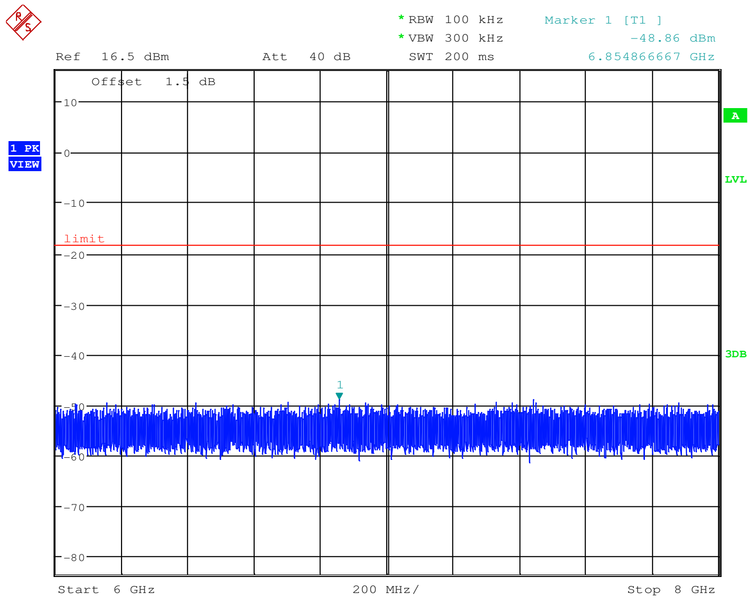
Test mode:	π/4DQPSK	Test channel:	Highest

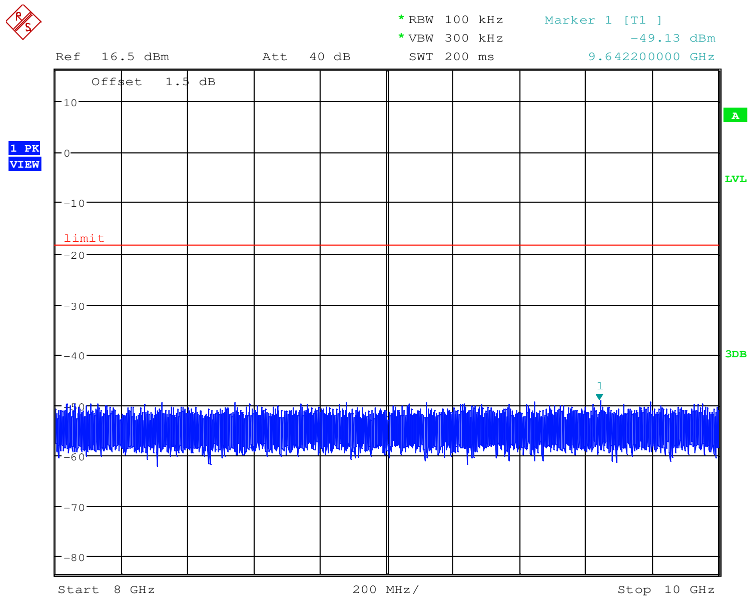




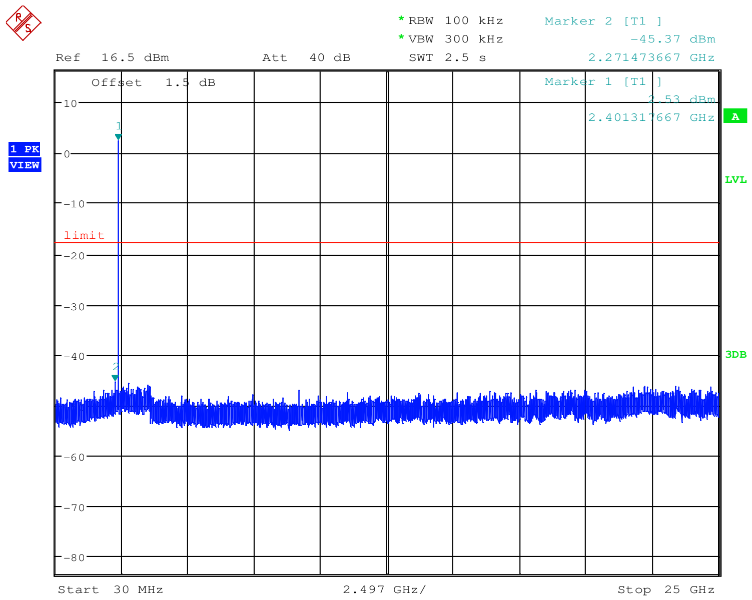

*RBW 100 kHz
*VBW 300 kHz
Marker 2 [T1]
-45.74 dBm
Ref 16.5 dBm
Att 40 dB
SWT 200 ms
3.529800000 GHz
Offset 1.5 dB
Marker 1 [T1]
2.479866667 GHz
1 PK
VIEW
limit
A
LVL
3DB
Start 2 GHz
200 MHz/
Stop 4 GHz

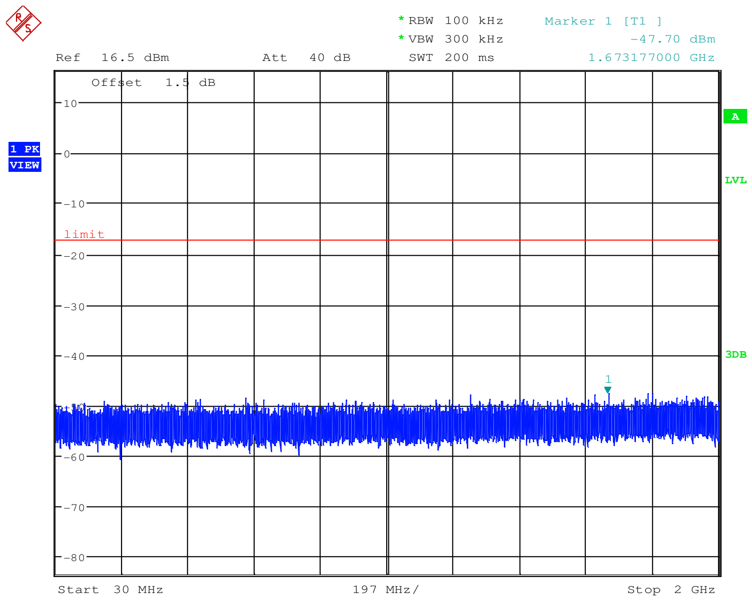

*RBW 100 kHz
*VBW 300 kHz
Marker 1 [T1]
-48.40 dBm
Ref 16.5 dBm
Att 40 dB
SWT 200 ms
4.997733333 GHz
Offset 1.5 dB
1 PK
VIEW
limit
A
LVL
3DB
Start 4 GHz
200 MHz/
Stop 6 GHz

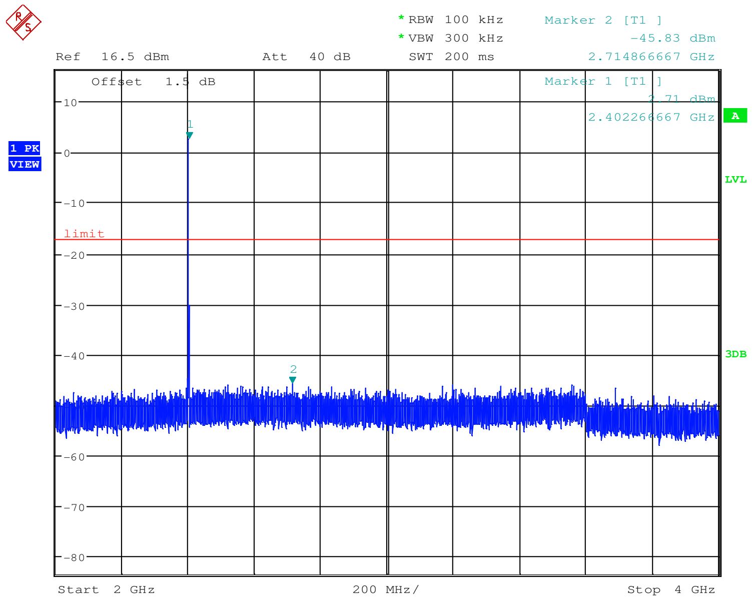

*RBW 100 kHz
Marker 1 [T1]
*VBW 300 kHz
-48.86 dBm
Ref 16.5 dBm
Att 40 dB
SWT 200 ms
6.854866667 GHz
Offset 1.5 dB
1 PK
VIEW
limit
A
LVL
3DB
Start 6 GHz
200 MHz/
Stop 8 GHz

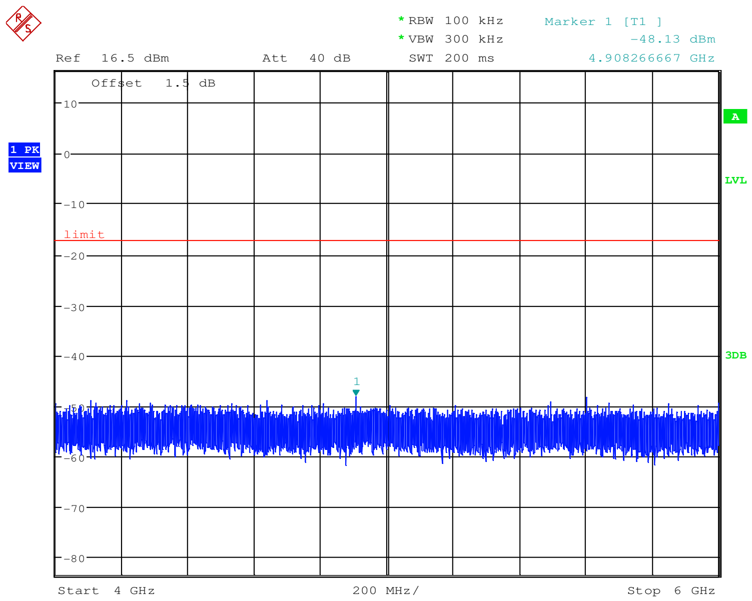

*RBW 100 kHz
Marker 1 [T1]
*VBW 300 kHz
-49.13 dBm
Ref 16.5 dBm
Att 40 dB
SWT 200 ms
9.642200000 GHz
Offset 1.5 dB
1 PK
VIEW
limit
A
LVL
3DB
Start 8 GHz
200 MHz/
Stop 10 GHz

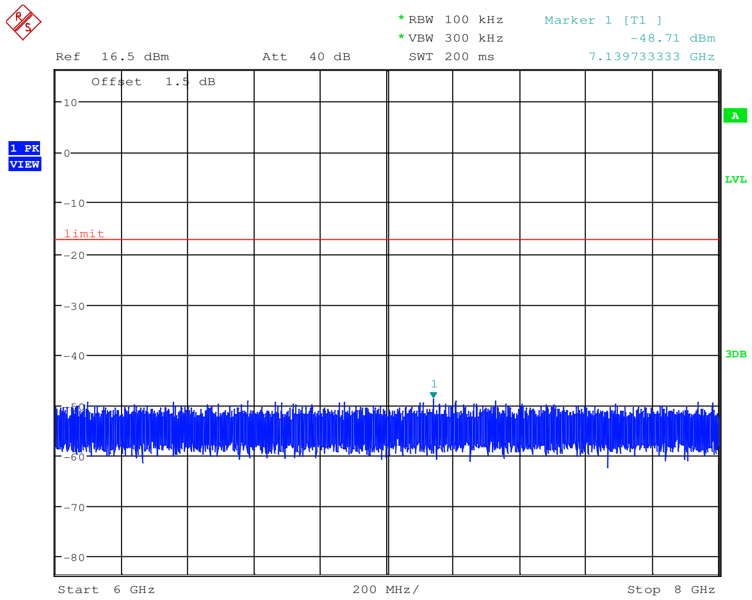
Test mode:	8DPSK	Test channel:	Lowest

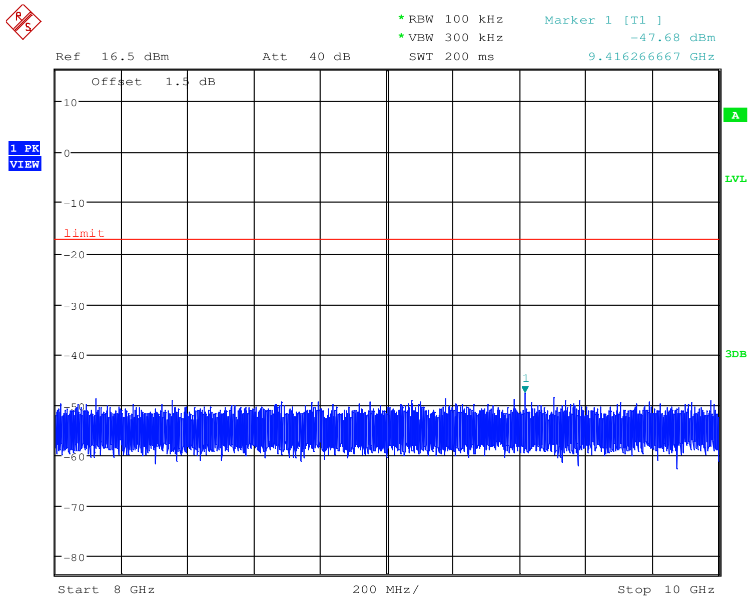




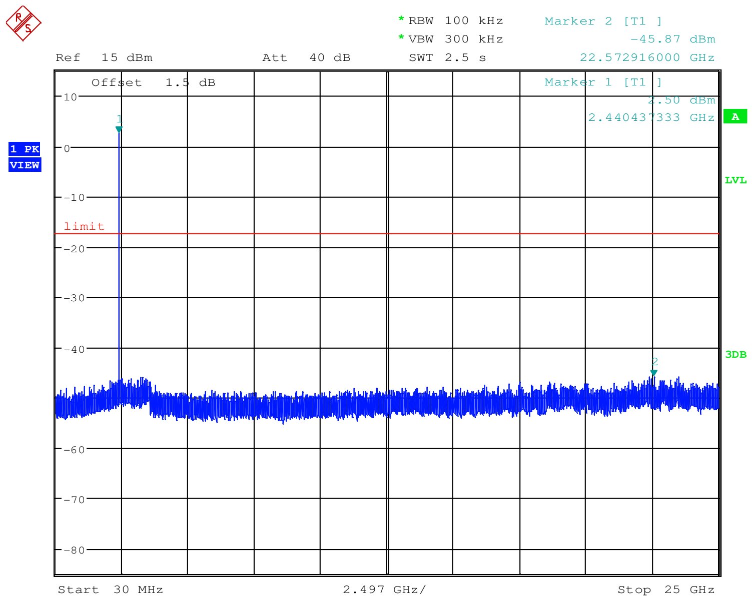

*RBW 100 kHz
*VBW 300 kHz
Marker 2 [T1]
-45.83 dBm
Ref 16.5 dBm
Att 40 dB
SWT 200 ms
2.714866667 GHz
Offset 1.5 dB
Marker 1 [T1]
2.71 dBm
2.402266667 GHz
1 PK VIEW
A
LVL
3DB
limit
Start 2 GHz
200 MHz/
Stop 4 GHz

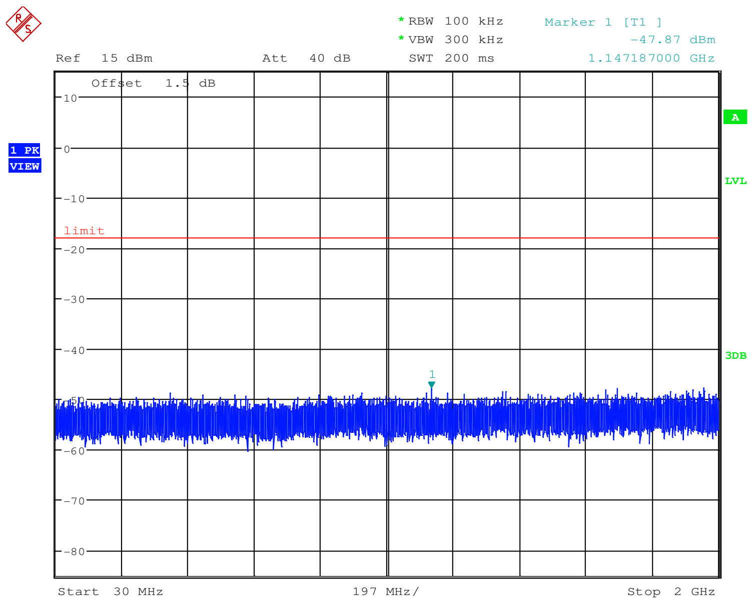

*RBW 100 kHz
*VBW 300 kHz
Marker 1 [T1]
-48.13 dBm
Ref 16.5 dBm
Att 40 dB
SWT 200 ms
4.908266667 GHz
Offset 1.5 dB
1 PK VIEW
A
LVL
3DB
limit
Start 4 GHz
200 MHz/
Stop 6 GHz

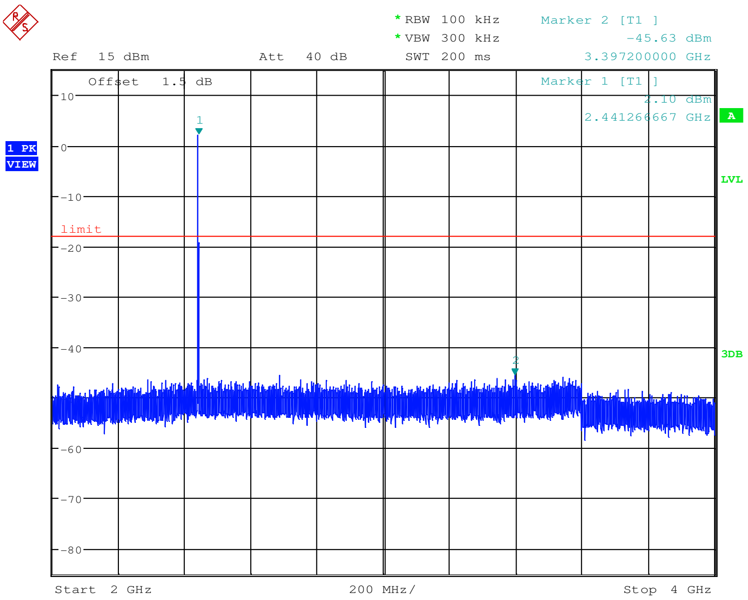

RBW 100 kHz
VBW 300 kHz
SWT 200 ms
Marker 1 [T1]
-48.71 dBm
7.139733333 GHz
Ref 16.5 dBm
Att 40 dB
Offset 1.5 dB
limit
1 PK VIEW
A
LVL
3DB
Start 6 GHz
200 MHz/
Stop 8 GHz

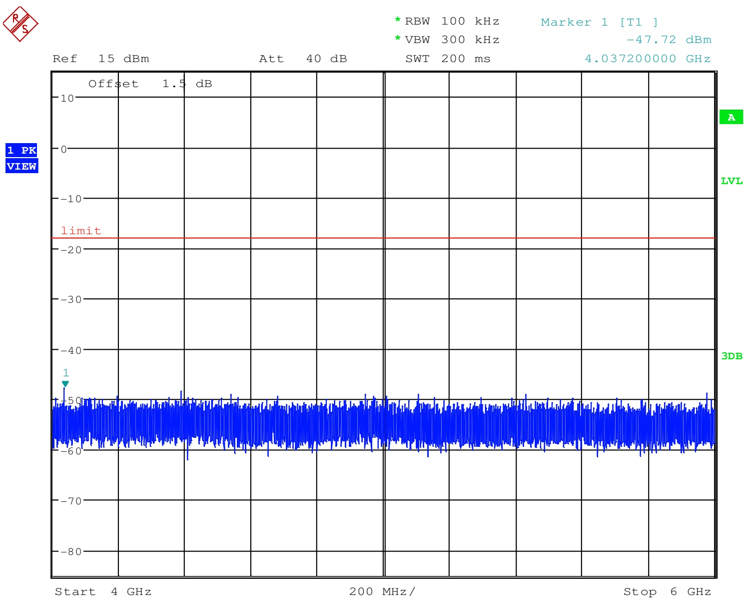

RBW 100 kHz
VBW 300 kHz
SWT 200 ms
Marker 1 [T1]
-47.68 dBm
9.416266667 GHz
Ref 16.5 dBm
Att 40 dB
Offset 1.5 dB
limit
1 PK VIEW
A
LVL
3DB
Start 8 GHz
200 MHz/
Stop 10 GHz

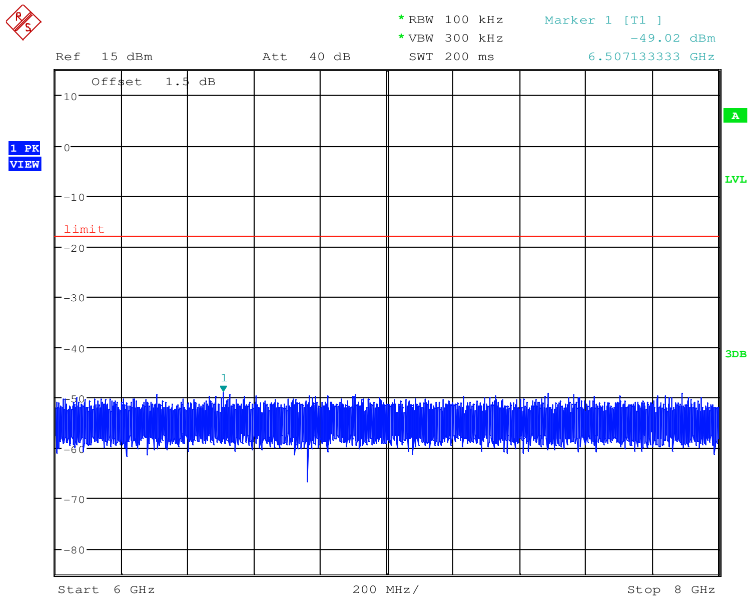
Test mode:	8DPSK	Test channel:	Middle



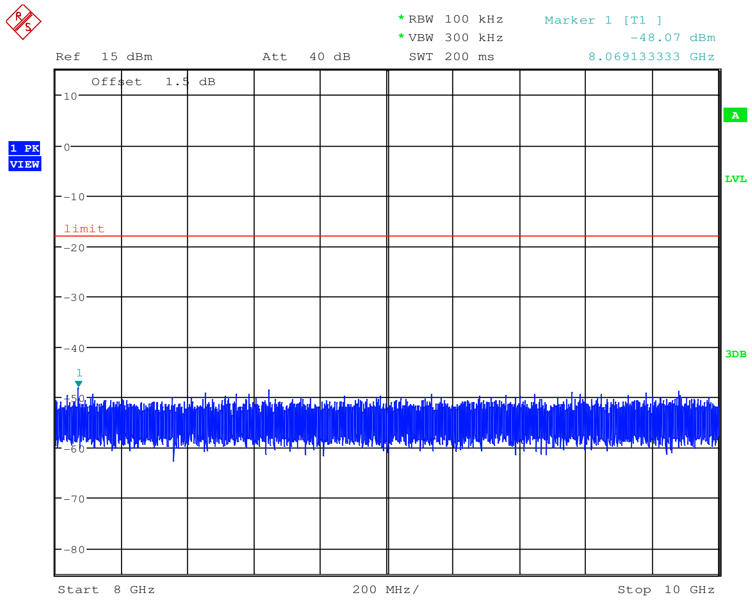



*RBW 100 kHz
*VBW 300 kHz
Marker 2 [T1]
-45.63 dBm
Ref 15 dBm
Att 40 dB
SWT 200 ms
3.397200000 GHz
Offset 1.5 dB
Marker 1 [T1]
2.10 dBm
2.441266667 GHz
1 PK
VIEW
A
LVL
3DB
limit
Start 2 GHz
200 MHz/
Stop 4 GHz


*RBW 100 kHz
*VBW 300 kHz
Marker 1 [T1]
-47.72 dBm
Ref 15 dBm
Att 40 dB
SWT 200 ms
4.037200000 GHz
Offset 1.5 dB
1 PK
VIEW
A
LVL
3DB
limit
Start 4 GHz
200 MHz/
Stop 6 GHz

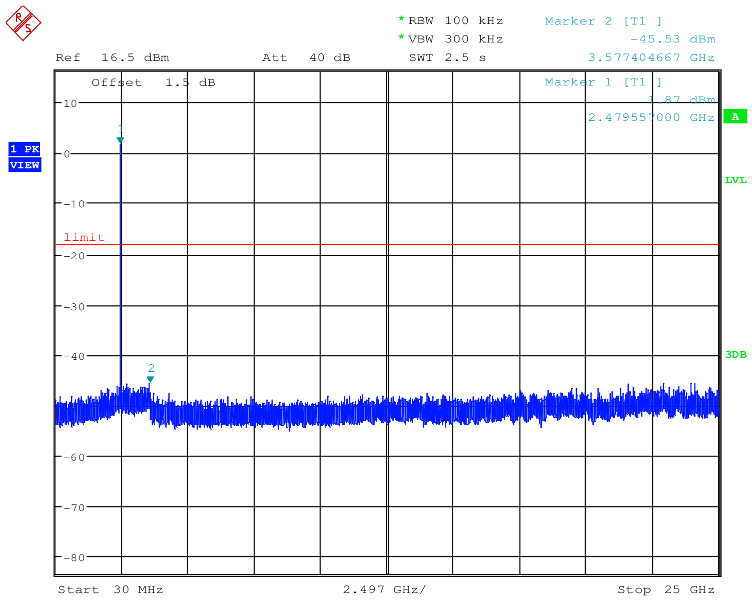


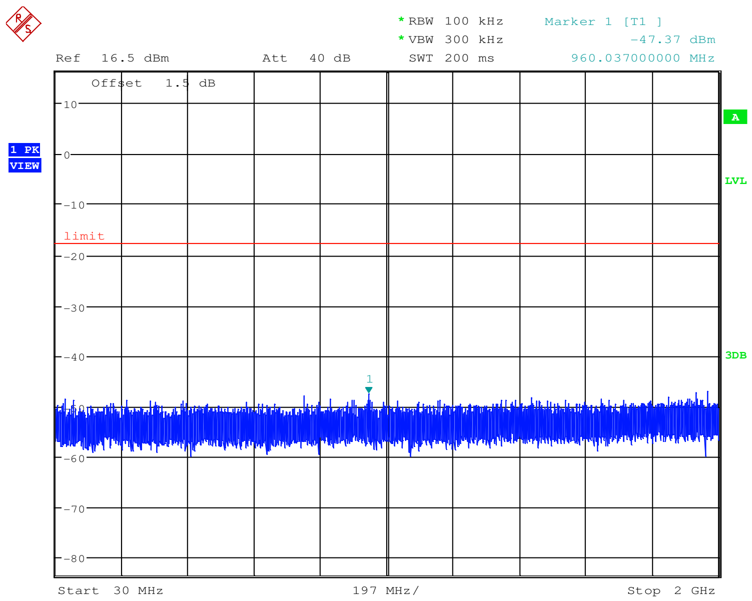
*RBW 100 kHz
*VBW 300 kHz
Marker 1 [T1]
-49.02 dBm
Ref 15 dBm
Att 40 dB
SWT 200 ms
6.507133333 GHz
Offset 1.5 dB
1 PK VIEW
A
LVL
3DB
limit
Start 6 GHz
200 MHz/
Stop 8 GHz

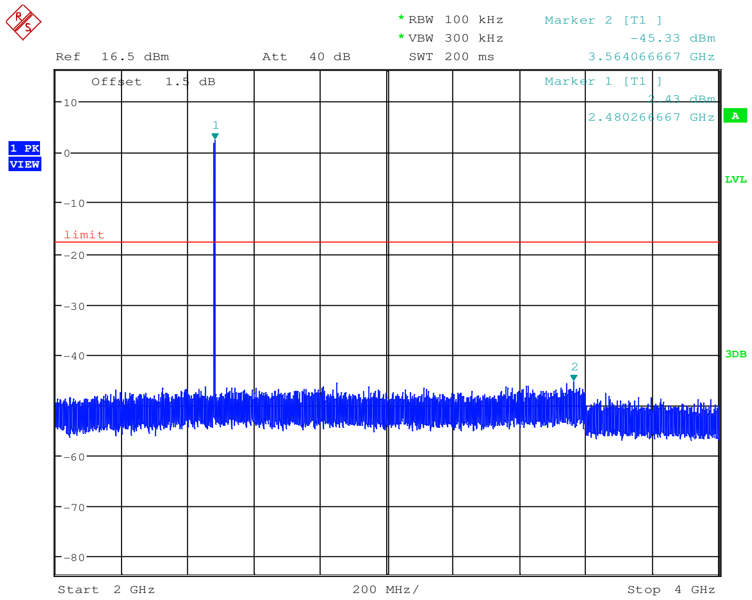


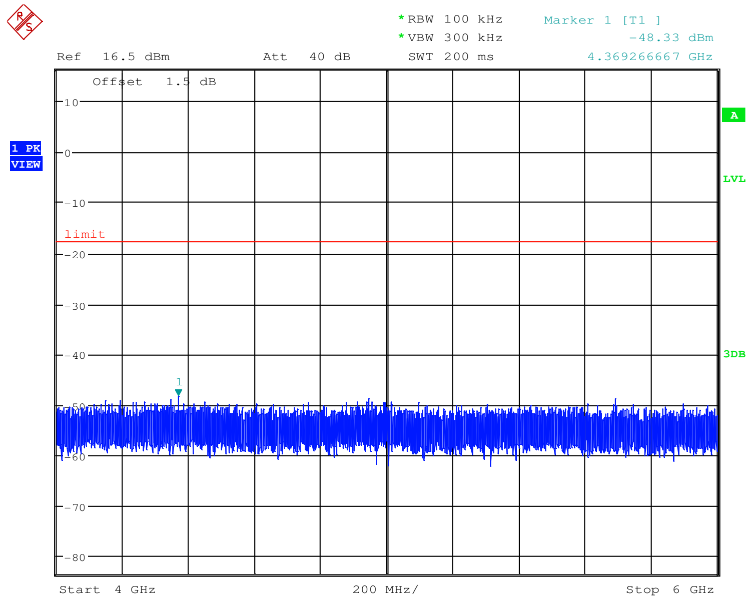
*RBW 100 kHz
*VBW 300 kHz
Marker 1 [T1]
-48.07 dBm
Ref 15 dBm
Att 40 dB
SWT 200 ms
8.069133333 GHz
Offset 1.5 dB
1 PK VIEW
A
LVL
3DB
limit
Start 8 GHz
200 MHz/
Stop 10 GHz

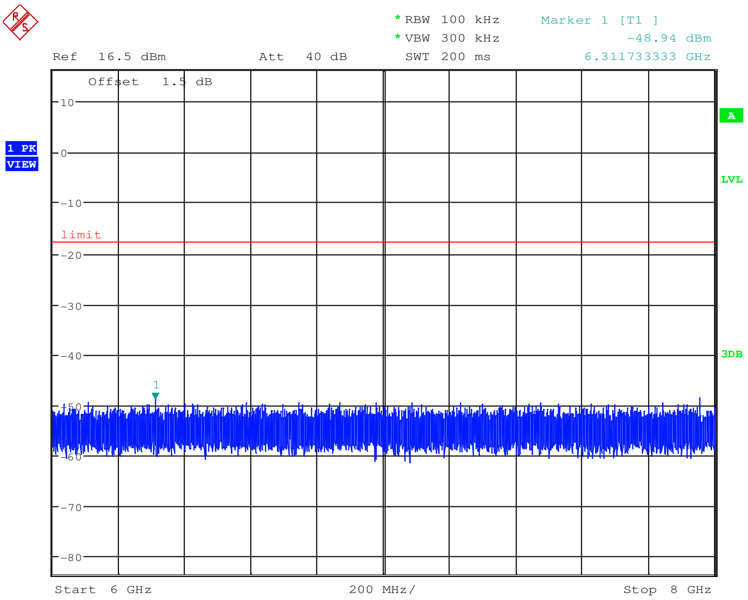
Test mode:	8DPSK	Test channel:	Highest

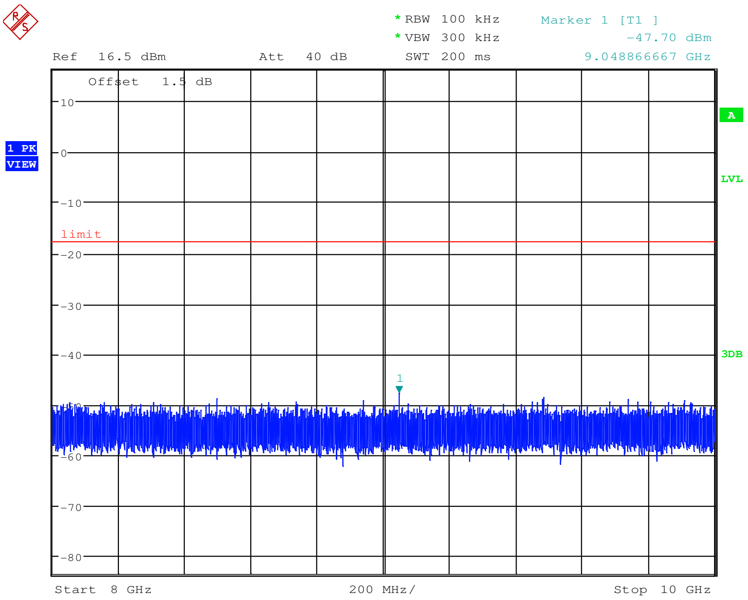





*RBW 100 kHz
*VBW 300 kHz
SWT 200 ms
Marker 2 [T1]
-45.33 dBm
3.564066667 GHz
Ref 16.5 dBm
Att 40 dB
Offset 1.5 dB
Marker 1 [T1]
2.43 dBm
2.480266667 GHz
1 PK VIEW
A
LVL
3DB
limit
10
0
-10
-20
-30
-40
-60
-70
-80
Start 2 GHz
200 MHz/
Stop 4 GHz


*RBW 100 kHz
*VBW 300 kHz
SWT 200 ms
Marker 1 [T1]
-48.33 dBm
4.369266667 GHz
Ref 16.5 dBm
Att 40 dB
Offset 1.5 dB
1 PK VIEW
A
LVL
3DB
limit
10
0
-10
-20
-30
-40
-70
-80
Start 4 GHz
200 MHz/
Stop 6 GHz





Remark:

Pretest 9kHz to 25GHz, find the highest point when testing, so only the worst data were shown in the test report. Per FCC Part 15.33 (a) and 15.31 (o) ,The amplitude of spurious emissions from intentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

6.10 Other requirements Frequency Hopping Spread Spectrum System

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

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.

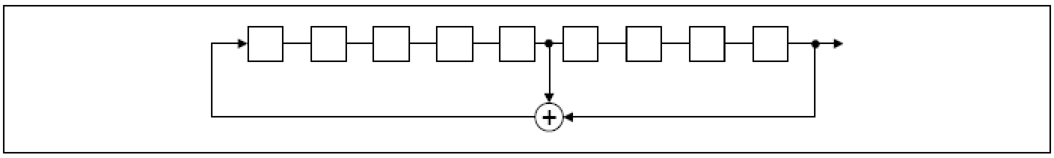
Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

Compliance for section 15.247(a)(1)

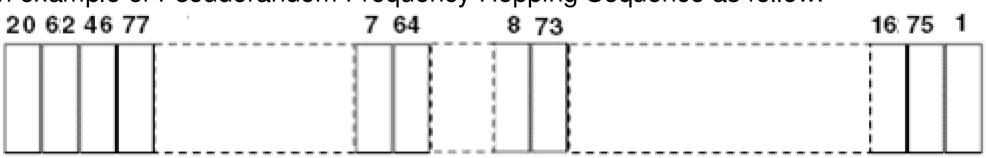
According to Bluetooth Core Specification, the pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive 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.

According to Bluetooth Core Specification, Bluetooth receivers are designed to have input and IF bandwidths that match the hopping channel bandwidths of any Bluetooth transmitters and shift frequencies in synchronization with the transmitted signals.

Compliance for section 15.247(g)
According to Bluetooth Core Specification, the Bluetooth system transmits the packet with the pseudorandom hopping frequency with a continuous data and the short burst transmission from the Bluetooth system is also transmitted under the frequency hopping system with the pseudorandom hopping frequency system.
Compliance for section 15.247(h)
According to Bluetooth Core specification, the Bluetooth system incorporates with an adaptive system to detect other user within the spectrum band so that it individually and independently to avoid hopping on the occupied channels. According to the Bluetooth Core specification, the Bluetooth system is designed not have the ability to coordinated with other FHSS System in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitter.

6.11 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	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	100 kHz	300kHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Limit:

Frequency	Field strength (microvolt/meter)	Limit (dBuV/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.

Test Setup:	

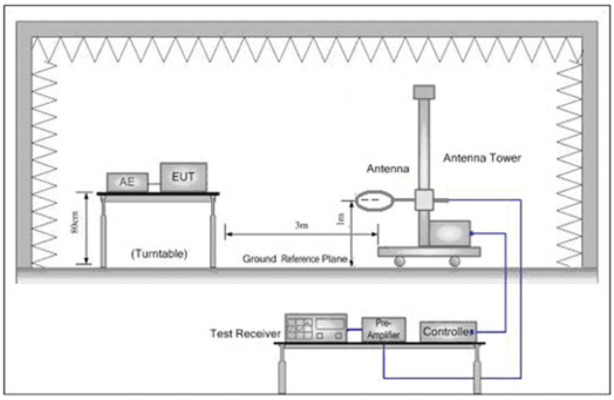


Figure 1. Below 30MHz

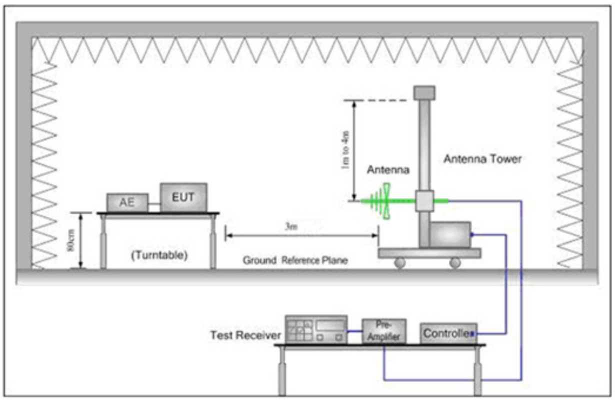


Figure 2. 30MHz to 1GHz

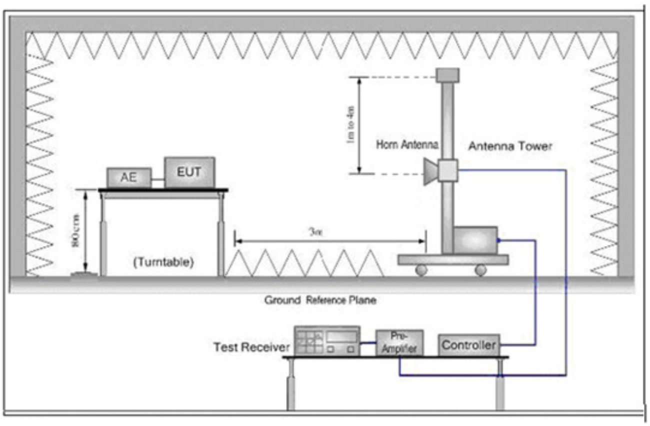


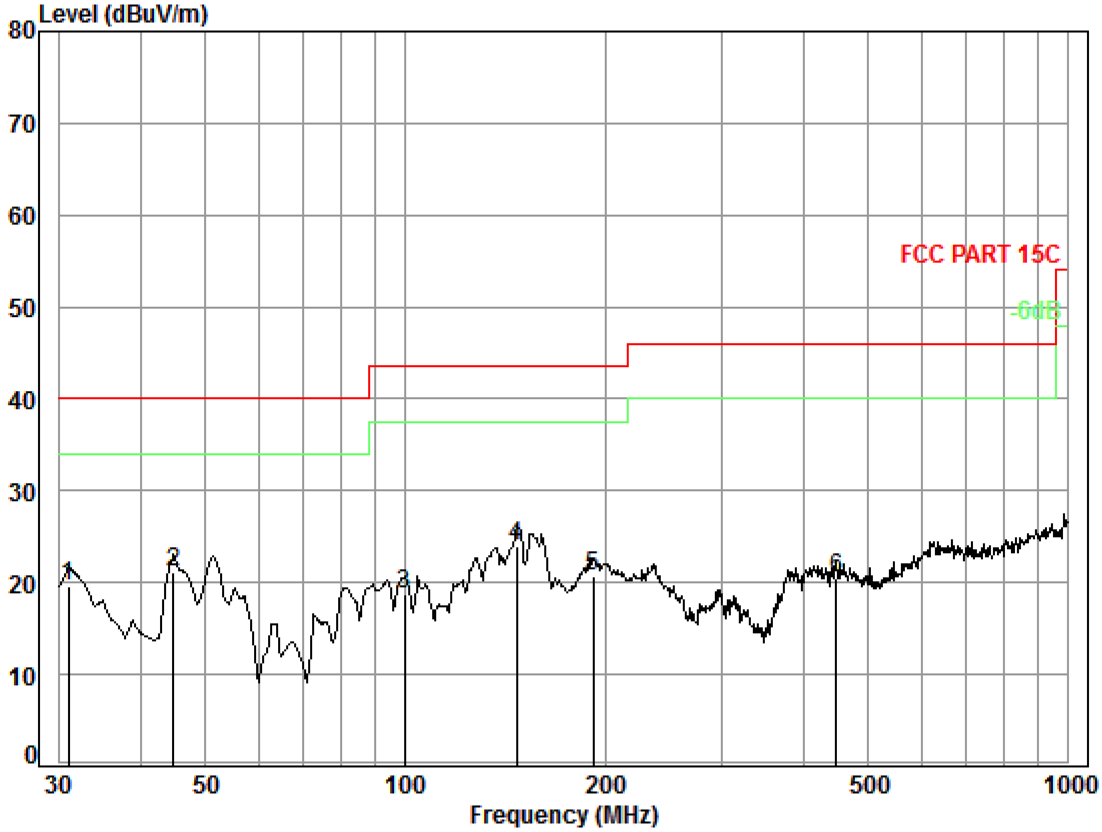
Figure 3. Above 1 GHz

Test Procedure:	
	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. g. Test the EUT in the lowest channel (2402MHz),the middle channel (2441MHz),the Highest channel (2480MHz) h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case. i. Repeat above procedures until all frequencies measured was complete.
Exploratory Test Mode:	Non-hopping transmitting mode with all kind of modulation and all kind of data type. Transmitting mode.
Final Test Mode:	Through Pre-scan, find the DH1 of data type and GFSK modulation is the worst case. Transmitting mode. For below 1GHz part, through pre-scan, the worst case is the lowest channel. Only the worst case is recorded in the report.
Instruments Used:	Refer to section 5.10 for details.
Test Results:	Pass

6.11.1 Radiated Emission below 1GHz

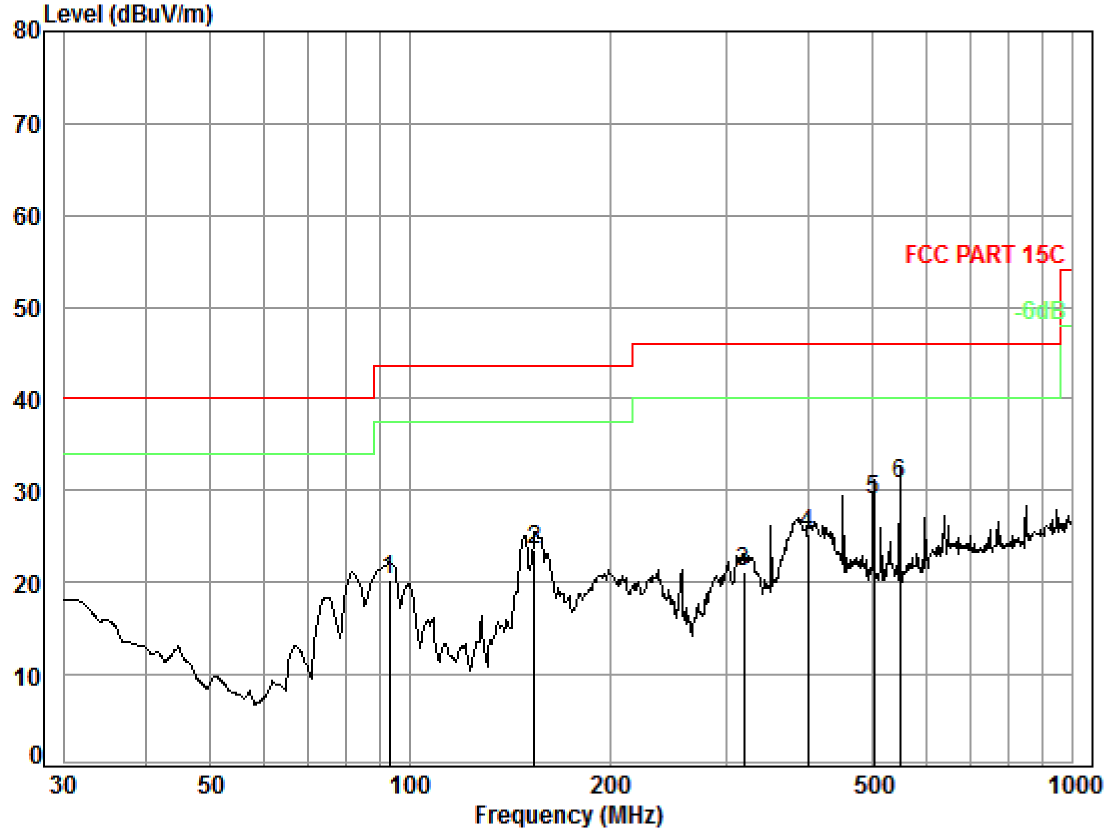
30MHz~1GHz (QP)		
Test mode:	Transmitting	Vertical



Condition: FCC PART 15C 3m 3142C Vertical
Job No. : 5957HR
Test mode: TX mode

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	30.96	0.60	18.16	27.35	28.30	19.71	40.00	-20.29
2	44.59	0.70	11.08	27.31	36.63	21.10	40.00	-18.90
3	99.88	1.20	9.10	27.20	35.54	18.64	43.50	-24.86
4	147.40	1.31	8.77	26.92	40.91	24.07	43.50	-19.43
5	191.75	1.39	10.12	26.73	35.87	20.65	43.50	-22.85
6	446.41	2.40	16.83	27.42	28.72	20.53	46.00	-25.47

Test mode:	Transmitting	Horizontal



Condition: FCC PART 15C 3m 3142C Horizontal
Job No. : 5957HR
Test mode: TX mode

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	93.11	1.13	8.82	27.21	37.60	20.34	43.50	-23.16
2	154.28	1.33	9.26	26.89	39.90	23.60	43.50	-19.90
3	318.82	1.96	14.58	26.54	31.16	21.16	46.00	-24.84
4	399.03	2.20	16.29	27.13	33.95	25.31	46.00	-20.69
5	501.18	2.60	17.83	27.69	36.33	29.07	46.00	-16.93
6	549.02	2.65	18.88	27.62	36.79	30.70	46.00	-15.30

6.11.2 Transmitter Emission above 1GHz

Worse case mode:	GFSK(DH1)	Test channel:	Lowest	Remark:	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
3870.000	-31.30	33.30	0.00	39.60	41.60	74.00	-32.40	Vertical
4804.000	-30.40	34.30	0.00	38.60	42.50	74.00	-31.50	Vertical
5910.000	-29.20	34.60	0.00	39.00	44.40	74.00	-29.60	Vertical
7206.000	-27.90	35.80	0.00	36.80	44.70	74.00	-29.30	Vertical
9608.000	-25.10	37.20	0.00	34.10	46.20	74.00	-27.80	Vertical
12120.000	-23.00	37.90	0.00	35.60	50.50	74.00	-23.50	Vertical
3915.000	-31.20	33.20	0.00	40.20	42.20	74.00	-31.80	Horizontal
4804.000	-30.40	34.30	0.00	39.30	43.20	74.00	-30.80	Horizontal
5940.000	-29.10	34.70	0.00	39.30	44.90	74.00	-29.10	Horizontal
7206.000	-27.90	35.80	0.00	37.00	44.90	74.00	-29.10	Horizontal
9608.000	-25.10	37.20	0.00	34.70	46.80	74.00	-27.20	Horizontal
12345.000	-22.70	37.90	0.00	33.60	48.80	74.00	-25.20	Horizontal

Worse case mode:	GFSK(DH1)	Test channel:	Middle	Remark:	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
3825.000	-31.20	33.20	0.00	39.70	41.70	74.00	-32.30	Vertical
4882.000	-30.40	34.60	0.00	39.40	43.60	74.00	-30.40	Vertical
5880.000	-29.30	34.50	0.00	39.30	44.50	74.00	-29.50	Vertical
7323.000	-27.90	35.70	0.00	37.10	44.90	74.00	-29.10	Vertical
9764.000	-24.90	37.30	0.00	34.60	47.00	74.00	-27.00	Vertical
12345.000	-22.70	37.90	0.00	34.20	49.40	74.00	-24.60	Vertical
3915.000	-31.20	33.20	0.00	39.00	41.00	74.00	-33.00	Horizontal
4882.000	-30.40	34.60	0.00	39.10	43.30	74.00	-30.70	Horizontal
6075.000	-29.10	35.00	0.00	39.00	44.90	74.00	-29.10	Horizontal
7323.000	-27.90	35.70	0.00	38.40	46.20	74.00	-27.80	Horizontal
9764.000	-24.90	37.30	0.00	34.50	46.90	74.00	-27.10	Horizontal
12645.000	-23.10	38.10	0.00	34.90	49.90	74.00	-24.10	Horizontal

Worse case mode:	GFSK(DH1)		Test channel:		Highest		Remark:	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
3840.000	-31.20	33.30	0.00	39.80	41.90	74.00	-32.10	Vertical
4960.000	-30.30	34.60	0.00	41.90	46.20	74.00	-27.80	Vertical
6015.000	-28.90	34.90	0.00	39.10	45.10	74.00	-28.90	Vertical
7440.000	-27.90	35.80	0.00	37.40	45.30	74.00	-28.70	Vertical
9920.000	-23.90	37.30	0.00	34.40	47.80	74.00	-26.20	Vertical
12630.000	-23.00	38.10	0.00	34.10	49.20	74.00	-24.80	Vertical
3990.000	-30.90	33.20	0.00	40.00	42.30	74.00	-31.70	Horizontal
4960.000	-30.30	34.60	0.00	40.80	45.10	74.00	-28.90	Horizontal
6210.000	-29.20	34.90	0.00	39.20	44.90	74.00	-29.10	Horizontal
7440.000	-27.90	35.80	0.00	37.40	45.30	74.00	-28.70	Horizontal
9920.000	-23.90	37.30	0.00	34.90	48.30	74.00	-25.70	Horizontal
12330.000	-22.60	37.90	0.00	34.30	49.60	74.00	-24.40	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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6.12 Restricted bands around fundamental frequency

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)
Limit:	(see table below)

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:

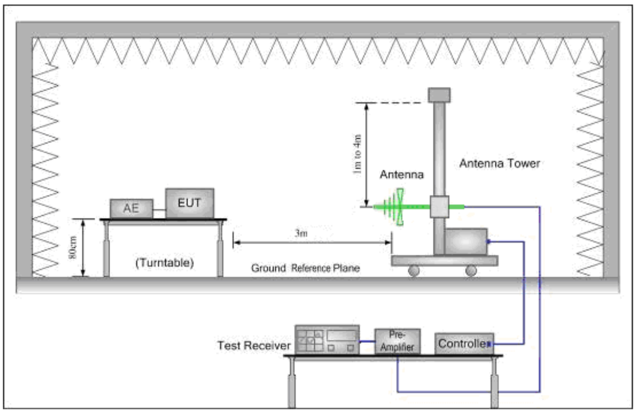


Figure 1. 30MHz to 1GHz

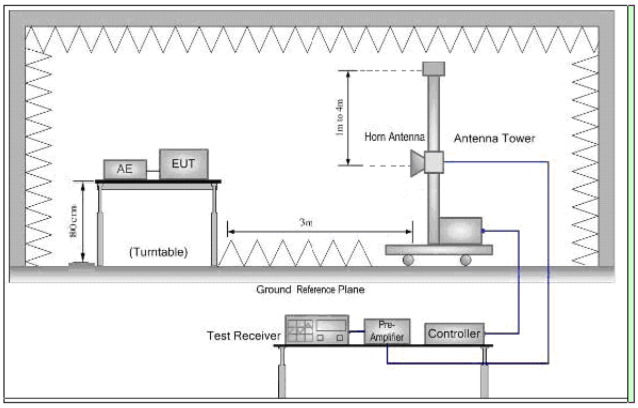
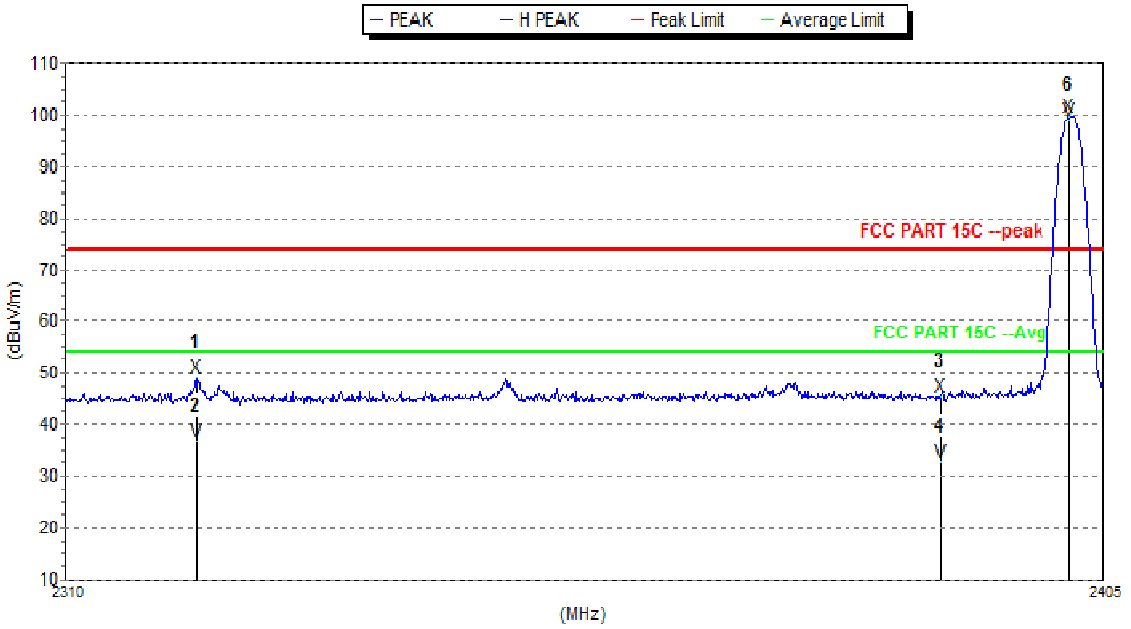


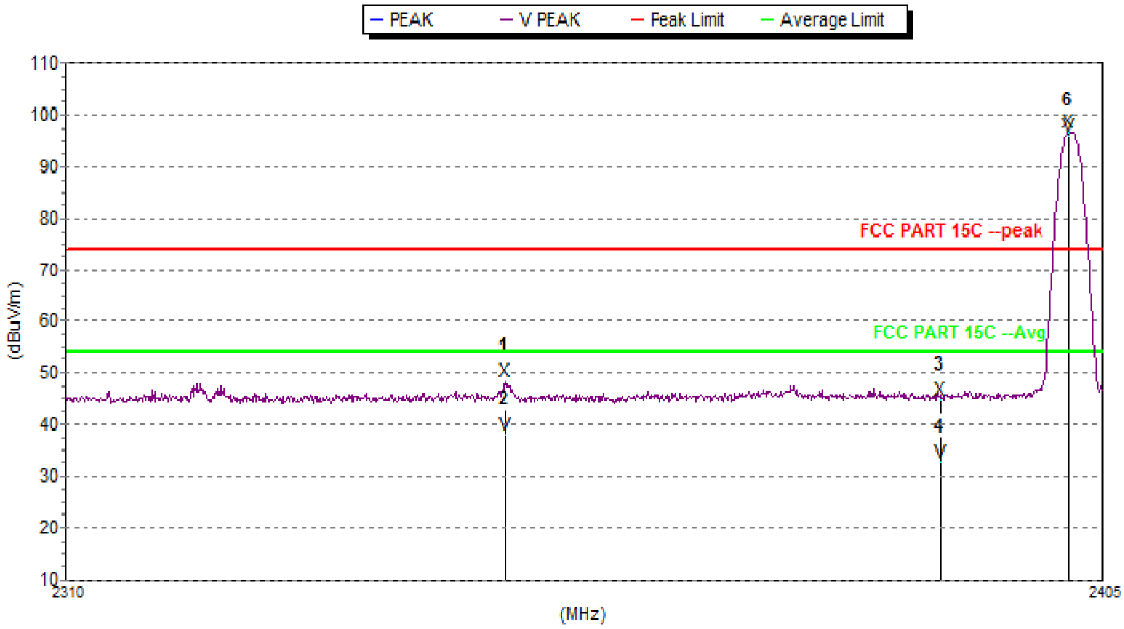
Figure 2. Above 1 GHz

Test Procedure:	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 g. Test the EUT in the lowest channel , the Highest channel h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case. i. Repeat above procedures until all frequencies measured was complete.
Exploratory Test Mode:	Non-hopping transmitting mode with all kind of modulation and all kind of data type Transmitting mode.
Final Test Mode:	Through Pre-scan, find the DH5 of data type and GFSK modulation is the worst case. Transmitting mode. Only the worst case is recorded in the report.
Instruments Used:	Refer to section 5.10 for details.
Test Results:	Pass

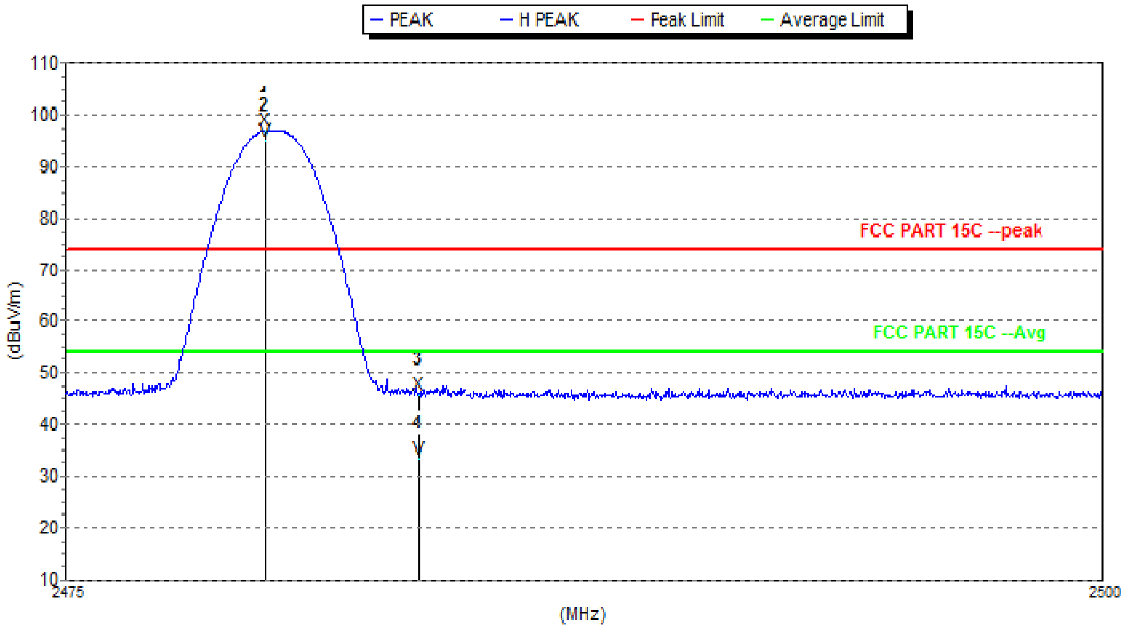
Test plot as follows:



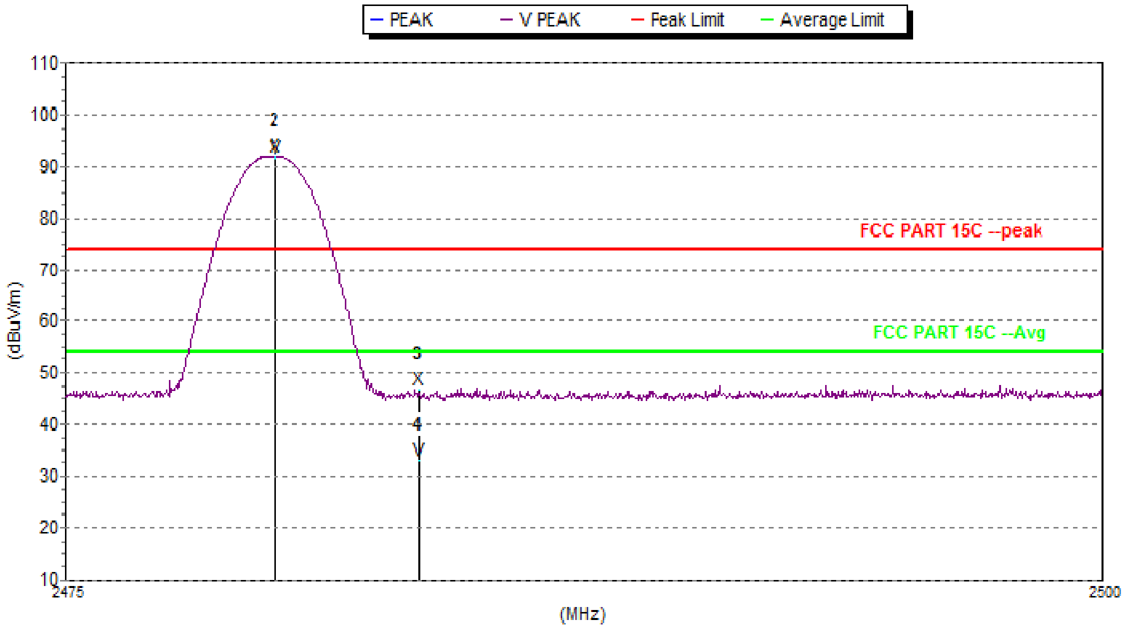
Mk.	Freq.(MHz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Ant.F.(dB/m)	Amp.G.(dB)	Cbl.L.(dB)	Pol.
Peak:								
1	2321.780	49.2	74.0	24.8	31.9	0.0	-19.1	H
2	2390	45.6	74.0	28.4	32.5	0.0	-19.3	H
3 F	2401.865	99.7	74.0	-25.7	32.6	0.0	-19.3	H
Avg								
1	2321.780	36.8	54.0	17.2	31.9	0.0	-19.1	H
2	2390	32.8	54.0	21.2	32.5	0.0	-19.3	H
3 F	2401.865	98.9	54.0	-44.9	32.6	0.0	-19.3	H



Mk.	Freq.(MHz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Ant.F.(dB/m)	Amp.G.(dB)	Cbl.L.(dB)	Pol.
Peak:								
1	2349.900	48.3	74.0	25.7	32.1	0.0	-19.2	V
2	2390	44.8	74.0	29.2	32.5	0.0	-19.3	V
3 F	2401.865	96.7	74.0	-22.7	32.6	0.0	-19.3	V
Avg								
1	2349.900	38.0	54.0	16.0	32.1	0.0	-19.2	V
2	2390	32.6	54.0	21.4	32.5	0.0	-19.3	V
3 F	2401.865	96.1	54.0	-42.1	32.6	0.0	-19.3	V



Mk.	Freq.(MHz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Ant.F.(dB/m)	Amp.G.(dB)	Cbl.L.(dB)	Pol.
Peak:								
1 F	2479.800	97.1	74.0	-23.1	32.5	0.0	-19.1	H
2	2483.5	45.9	74.0	28.1	32.5	0.0	-19.1	H
Avg								
1 F	2479.800	95.1	54.0	-41.1	32.5	0.0	-19.1	H
2	2483.5	33.5	54.0	20.5	32.5	0.0	-19.1	H



Mk.	Freq.(MHz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Ant.F.(dB/m)	Amp.G.(dB)	Cbl.L.(dB)	Pol.
Peak:								
1 F	2480.050	92.0	74.0	-18.0	32.5	0.0	-19.1	V
2	2483.5	46.7	74.0	27.3	32.5	0.0	-19.1	V
Avg								
1 F	2480.050	91.5	54.0	-37.5	32.5	0.0	-19.1	V
2	2483.5	33.2	54.0	20.8	32.5	0.0	-19.1	V

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