TESTING CERT #3478.01

TEST REPORT

EUT Description	**WiGig, WLAN and BT, 2x2 PCIe M.2 adapter card**
Brand Name	**Intel® Tri-Band Wireless-AC 18260**
Model Name	**18260NGW, 18260NGW LC**
Serial Number	**TA#: H77378-004 / H88544-002** **WF MAC: 34:13:E8:31:A7:36 / 34:13:E8:06:2F:58** **BT MAC: 34:13:E8:31:A7:3A / 34:13:E8:06:2F:5C** (see section 4)
FCC/IC ID	**FCC ID: PD918260NG** **IC ID: 1000M-18260NG**
Antenna type	**SkyCross WIMAX/WLAN Reference Antenna**
Hardware/Software Version	**HW config: 31.1** **Test SW: DRTU version 1.8.3-01557** **Op SW BT: 18.12**
Date of Sample Receipt	**2015-08-17**
Date of Test	**2015-08-24/2015-09-23**
Features	**WiGig + 802.11 a/b/g/n/ac Wireless LAN + BDR/EDR 2.1 + BLE 4.0** (see section 5)

Applicant	**Intel Mobile Communications**
Address	**100 Center Point Circle, Suite 200** **Columbia, South Carolina 29210** **USA**
Contact Person	**Steven Hackett**
Telephone/Fax/ Email	**steven.c.hackett@intel.com**

Reference Standards	**FCC CFR Title 47 Part 15C** **RSS-247 issue 1, RSS-Gen issue 4** (see section 1)

Test Report number	**15081803.TR03**
Revision Control	**Rev. 00**

The test results relate only to the samples tested.
The test report shall not be reproduced in full, without written approval of the laboratory.

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Table of Contents

1. Standards, reference documents and applicable test methods

1. FCC 47 CFR part 15 - Subpart C – §15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.
2. FCC 47 CFR part 15 - Subpart C – §15.209 Radiated emission limits; general requirements.
3. Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems - DA 00-705 Released March 30, 2000
4. RSS-247 Issue 1 - Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment.
5. RSS-Gen Issue 4 - General Requirements for Compliance of Radio Apparatus.
6. ANSI C63.10-2009 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

2. General conditions, competences and guarantees

- ✓ Intel Mobile Communications Wireless RF Lab (Intel WRF Lab) is a testing laboratory accredited by the American Association for Laboratory Accreditation (A2LA).
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- ✓ Intel WRF Lab has developed calibration and proficiency programs for its measurement equipment to ensure correlated and reliable results to its customers.
- ✓ This report is only referred to the item that has undergone the test.
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3. Environmental Conditions

- ✓ At the site where the measurements were performed the following limits were not exceeded during the tests:

Temperature	22ºC ± 2ºC
Humidity	52% ± 5%

4. Test samples

Sample	Control #	Description	Model	Serial #	Date of reception	Note
#01	15081801.S08	WiFi/BT High End Module	8260NGW	WF MAC: 34:13:E8:31:A7:36	2015-08-17	Used for conducted tests
	15081801.S03	Extender board	PCB00432	ASS0432-001, 4324612-097	2015-08-17	
	15051101.S17	Laptop	DELL E5440	7CSYN32	2015-05-20	
#02	15081801.S20	WiFi/BT High End Module	18260NGW	WF MAC 34:13:E8:06:2F:58	2015-08-26	Used for radiated tests
	15081801.S02	Extender board	PCB00432	ASS00432-001, 4322313-048	2015-08-17	
	15040201.S15	Laptop	Dell E5440	9R8YN32	2015-05-12	

NA: Not Applicable

5. EUT features

These are the detailed bands and modes supported by the Equipment Under Test:

WiGig	60GHz (57.24 – 63.72 GHz)
802.11b/g/n	2.4GHz (2400.0 – 2483.5 MHz)
802.11a/n/ac	5.3GHz (5250.0 – 5350.0 MHz) 5.6GHz (5470.0 – 5725.0 MHz) 5.8GHz (5725.0 – 5850.0 MHz)
BDR/EDR 2.1 BLE 4.0	2.4GHz (2400.0 – 2483.5 MHz)

6. Remarks and comments

N/A

7. Test Verdicts summary

7.1. BT Enhanced Data Rate

FCC part	RSS part	Test name	Verdict
15.247 (a) (1)	RSS-247 Clause 5.1 (1) and (2)	20dB Bandwidth and Carrier frequency separation	P
15.247 (a) (1) (iii)	RSS-247 Clause 5.1 (4)	Number of hopping channels	P
15.247 (a) (1) (iii)	RSS-247 Clause 5.1 (4)	Time of Occupancy (Dwell Time)	P
15.247 (b) (1)	RSS-247 Clause 5.4 (2)	Maximum Peak Output Power and antenna gain	P
15.247 (d)	RSS-247 Clause 5.5	Out-of-band Emissions (conducted)	P
15.247 (d) 15.209	RSS-247 Clause 5.5	Out-of-band Emissions (radiated)	P

P: Pass
F: Fail
NM: Not Measured
NA: Not Applicable

8. Document Revision History

Revision #	Date	Modified by	Details
Rev. 00	2015-10-09	O.Fargant	First Issue

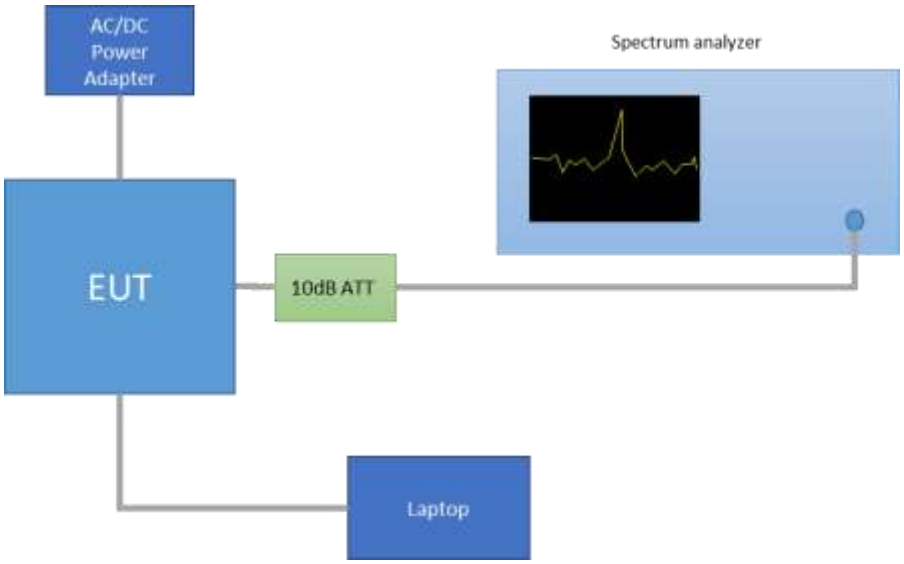
Annex A. Test & System Description

A.1 Measurement system

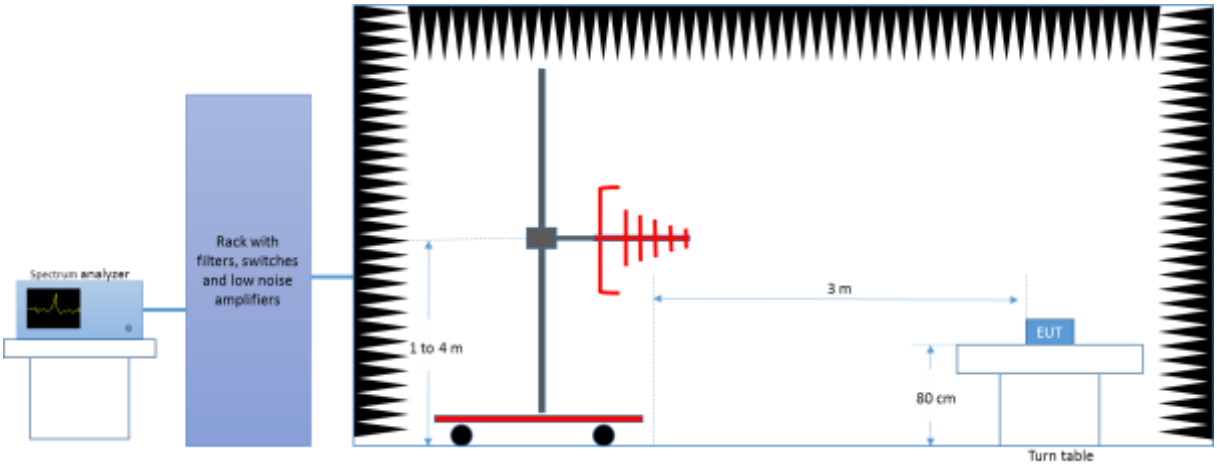
Measurements were performed using the following setups.

The DUT was installed in a test fixture and this test fixture is connected to a laptop computer and AC/DC power adapter. The laptop computer was used to configure the EUT to continuously transmit at a specified output power using all different modes and modulation schemes.

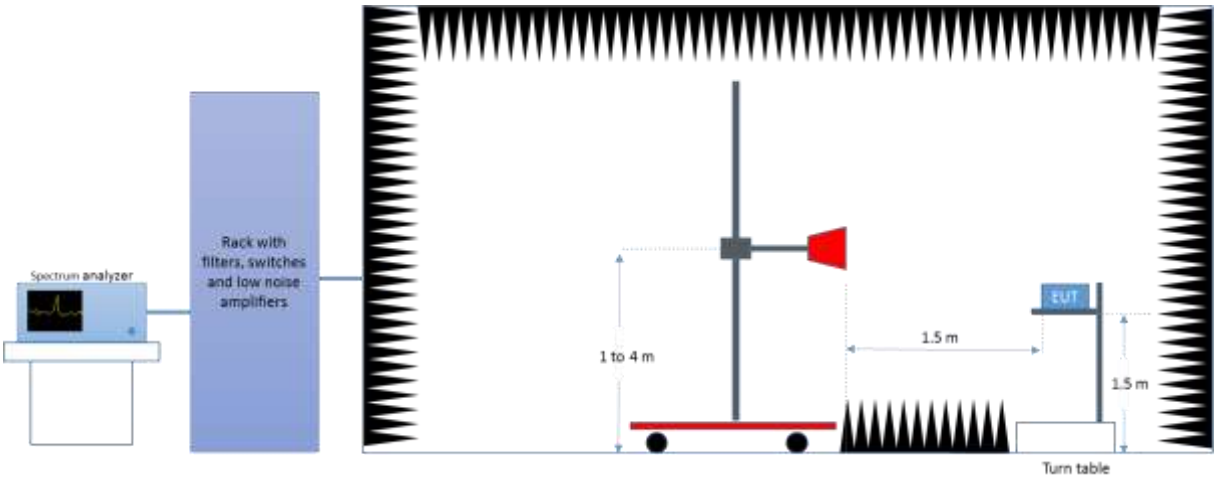
Conducted Setup



Radiated Setup < 1GHz



Radiated Setup > 1GHz



A.2 Test Equipment List

Conducted Setup

ID#	Device	Type/Model	Serial Number	Manufacturer	Cal. Date	Cal. Due Date
0033	Spectrum analyzer	FSV40	101072	Rohde & Schwarz	2014-01-30	2016-01-30

Radiated Setup

ID#	Device	Type/Model	Serial Number	Manufacturer	Cal. Date	Cal. Due Date
0133	Spectrum analyzer	FSV40	101358	Rohde & Schwarz	2014-05-09	2016-05-09
0137	Log antenna 30 MHz – 1 GHz	3142E	00156946	ETS Lindgren	2014-03-05	2016-03-05
0138	Hors antenna 1 GHz – 6.4 GHz	3117	00152266	ETS Lindgren	2014-03-04	2016-03-04
0141	Horn Antenna 6.4 GHz – 18 GHz	3117-PA	00157736	ETS Lindgren	2014-06-03	2016-06-03
0248	Horn Antenna 1 GHz – 18 GHz	3117-PA	00167062	ETS Lindgren	2014-08-13	2016-08-13
0139	Horn Antenna 18GHz – 26GHz	114514	00167100	ETS Lindgren	2014-04-25	2016-04-25
0140	Horn Antenna 26GHz – 40GHz	120722	00169638	ETS Lindgren	2014-08-14	2016-08-14
0135	Anechoic chamber	FACT 3	RFD_FA_100	ETS Lindgren	2014-05-06	2016-05-06
0329	Measurement Software	EMC32	1300.7027.00 (100401)	Rohde & Schwarz	N/A	N/A
0133	Spectrum analyzer	FSV40	101358	Rohde & Schwarz	2014-05-09	2016-05-09

A.3 Measurement Uncertainty Evaluation

The system uncertainty evaluation is shown in the below table:

Measurement type	Uncertainty [±dB]
Conducted Power (power meter)	± 1.0
Conducted spurious emission	± 2.9
Radiated test < 1GHz	± 3.8
Radiated test 1GHz -26 GHz	± 4.7

Annex B. Test Results

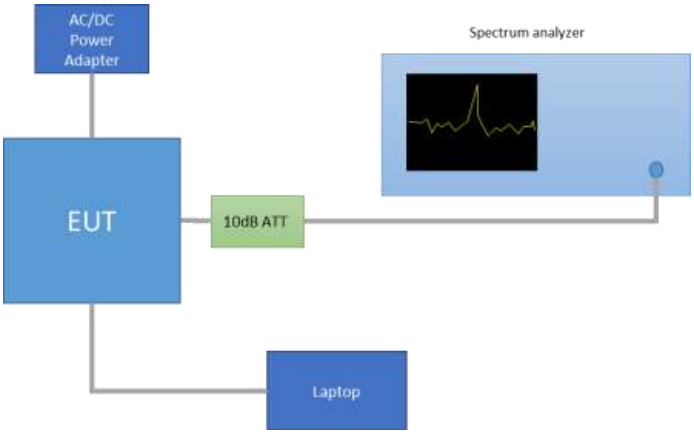
B.1 20dB Bandwidth and Carrier frequency separation

Test limits:

FCC part	RSS part	Limits
15.247 (a) (1)	RSS-247 Clause 5.1 (1) and (2)	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Test procedure:

The setup below was used to measure the 20dB Bandwidth and Carrier frequency separation. The antenna terminal of the EUT is connected to the spectrum through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.



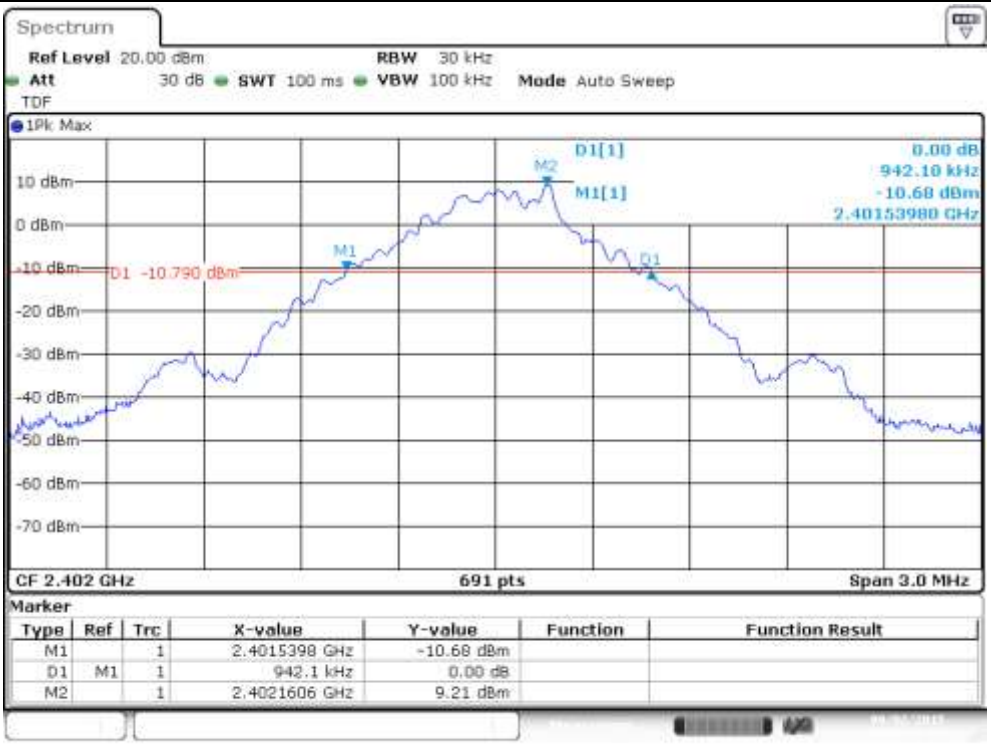
Results tables:

Mode	Channel Number	Frequency [MHz]	20dB BW [MHz]	Freq. Separation [kHz]
Basic Rate GFSK	0	2402	0.942	1005.00
	39	2441	0.942	
	78	2480	0.942	
EDR π/4-DQPSK	0	2402	1.424	991.70
	39	2441	1.459	
	78	2480	1.463	
EDR 8-DPSK	0	2402	1.437	1000.00
	39	2441	1.441	
	78	2480	1.441	

Results screenshot:

Basic Rate - GFSK

20dB BW - CH0



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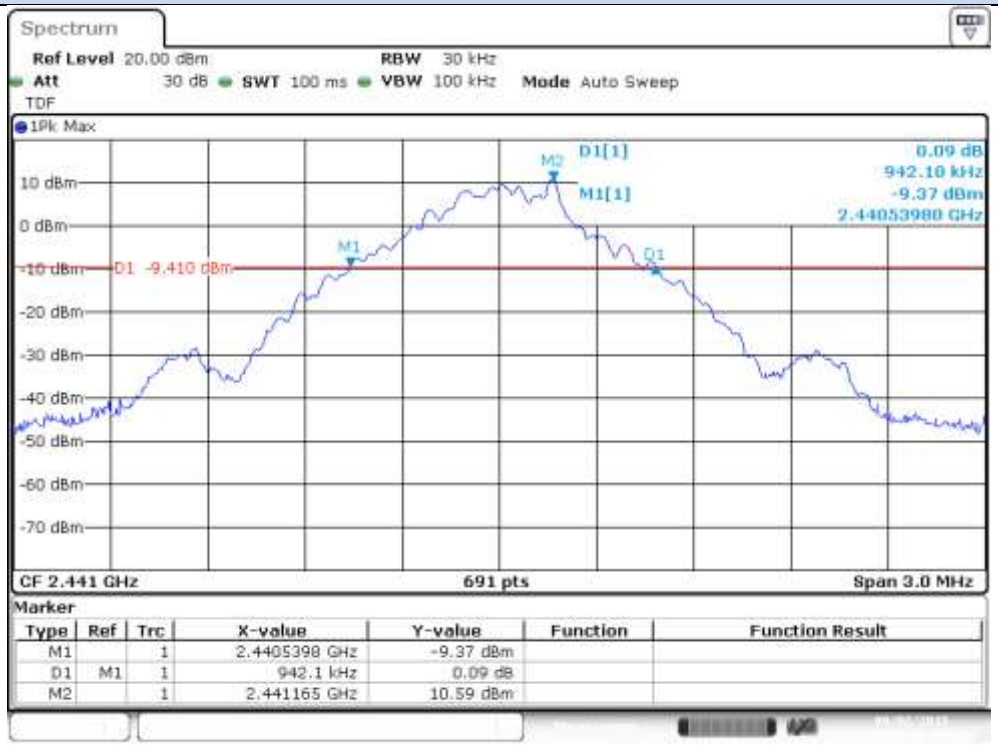
20dB BW - CH39



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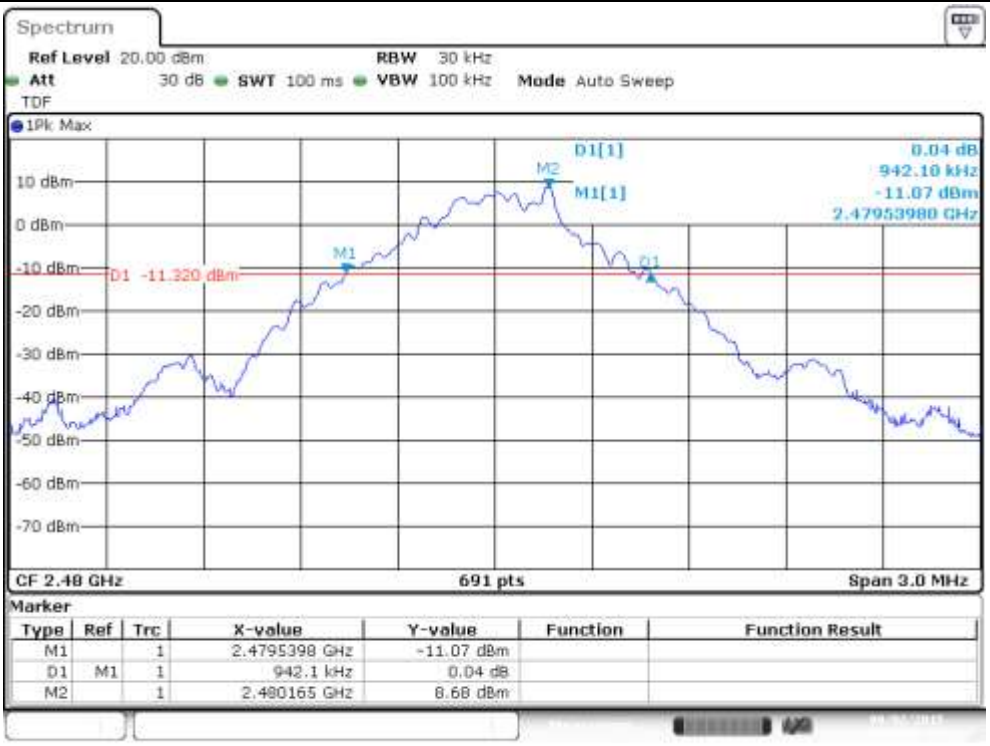
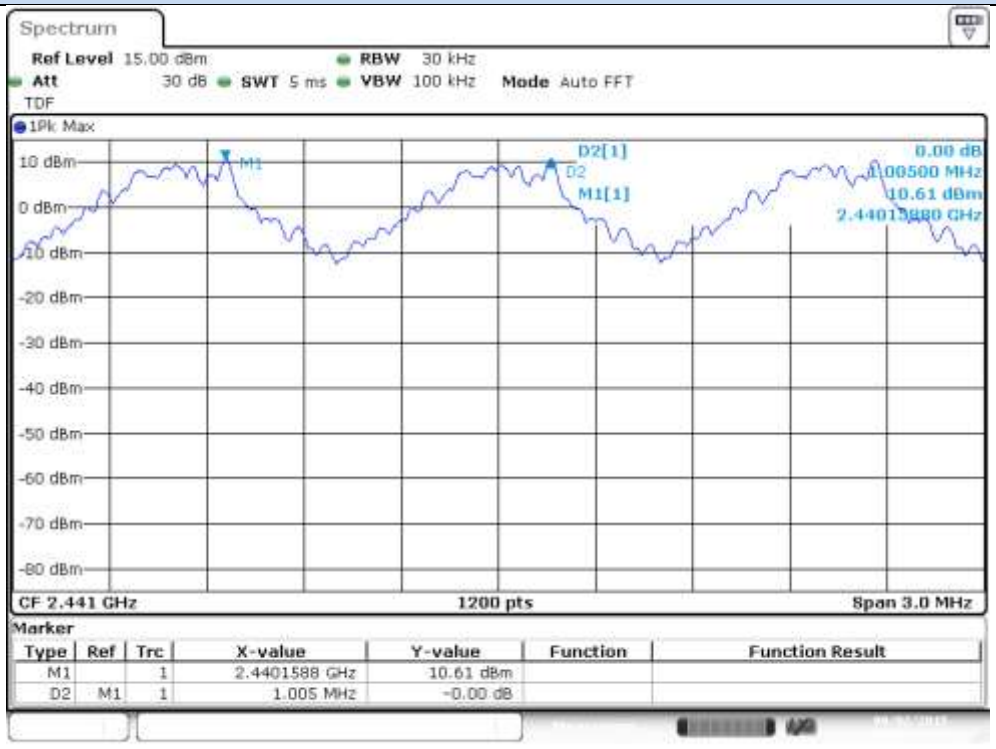
20dB BW - CH78



Date: 2.SEP.2015 11:04:05

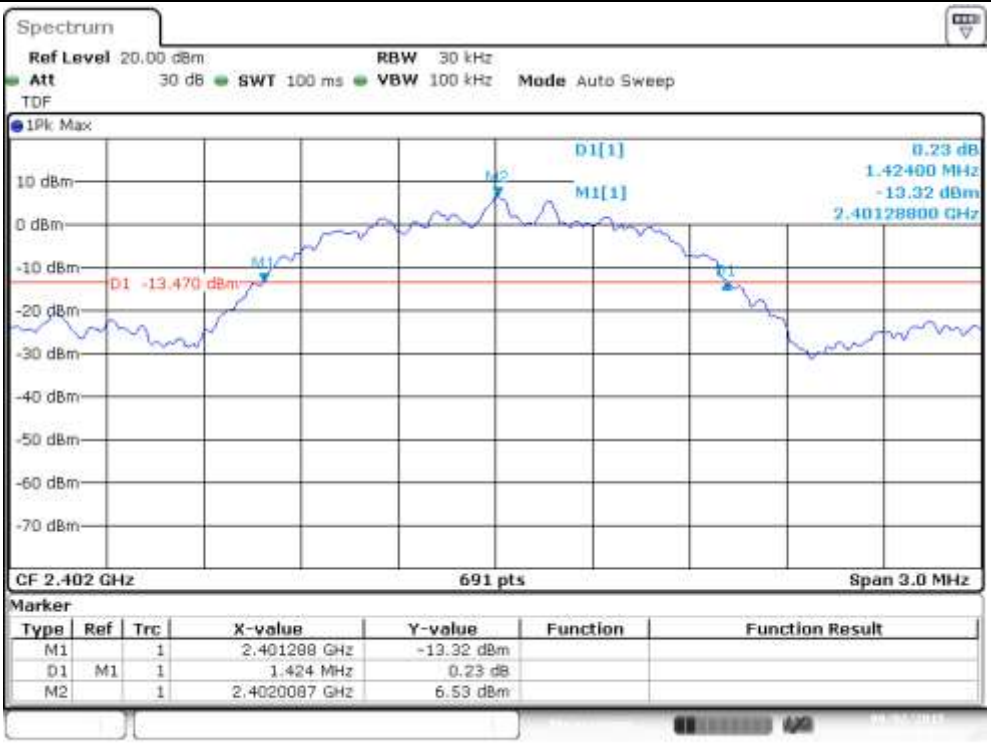
Freq. Separation



Date: 2.SEP.2015 10:32:56

EDR – π/4-DQPSK

20dB BW - CH0



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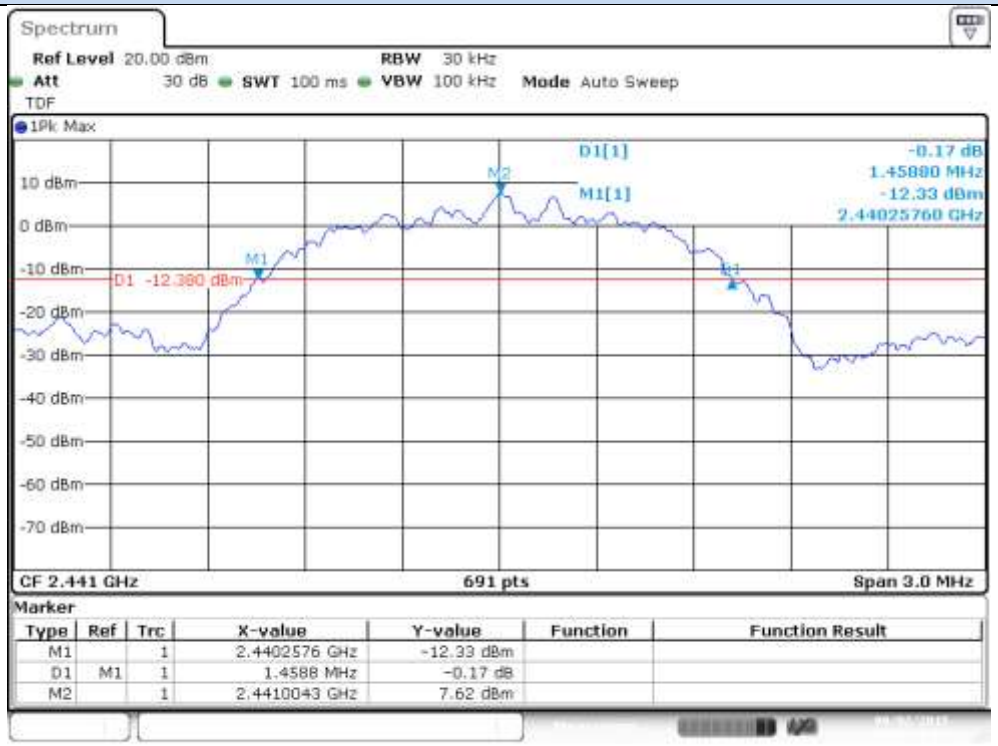
20dB BW - CH39

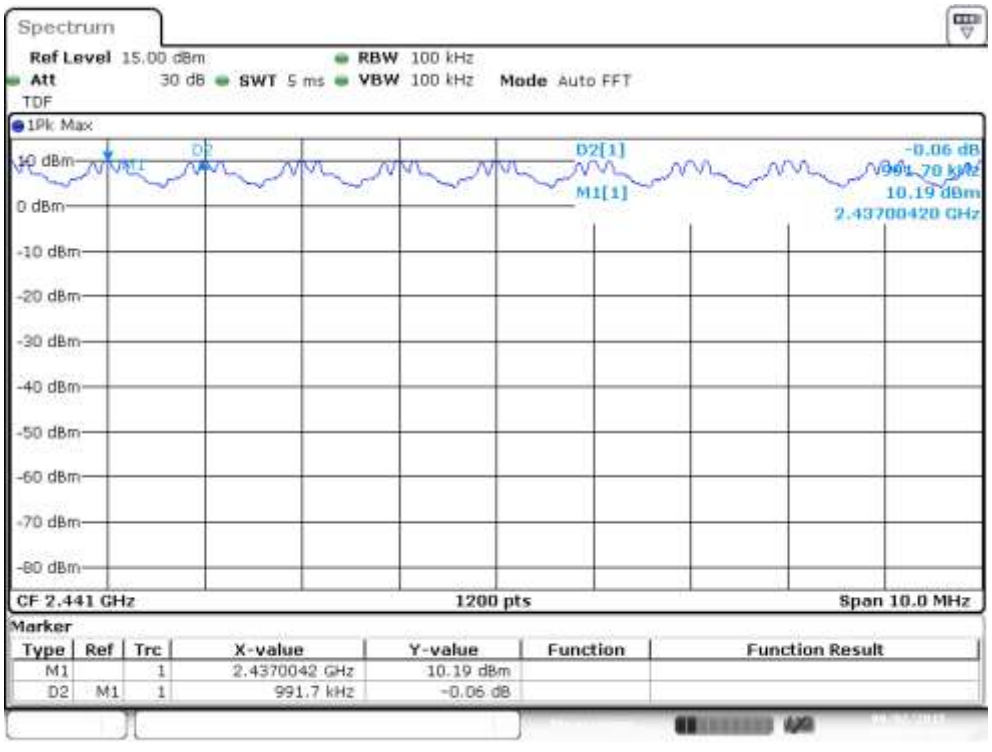


Date: 2.SEP.2015 11:39:11

20dB BW - CH78

Date: 2.SEP.2015 11:46:57

Freq. Separation



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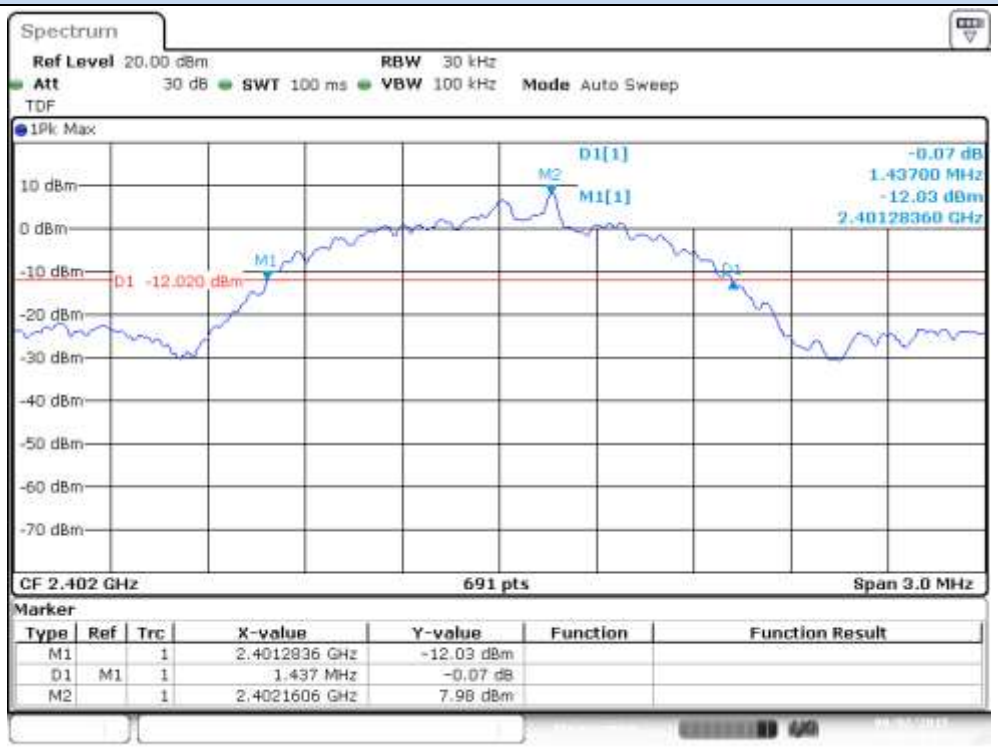
EDR – 8-DPSK

20dB BW - CH0



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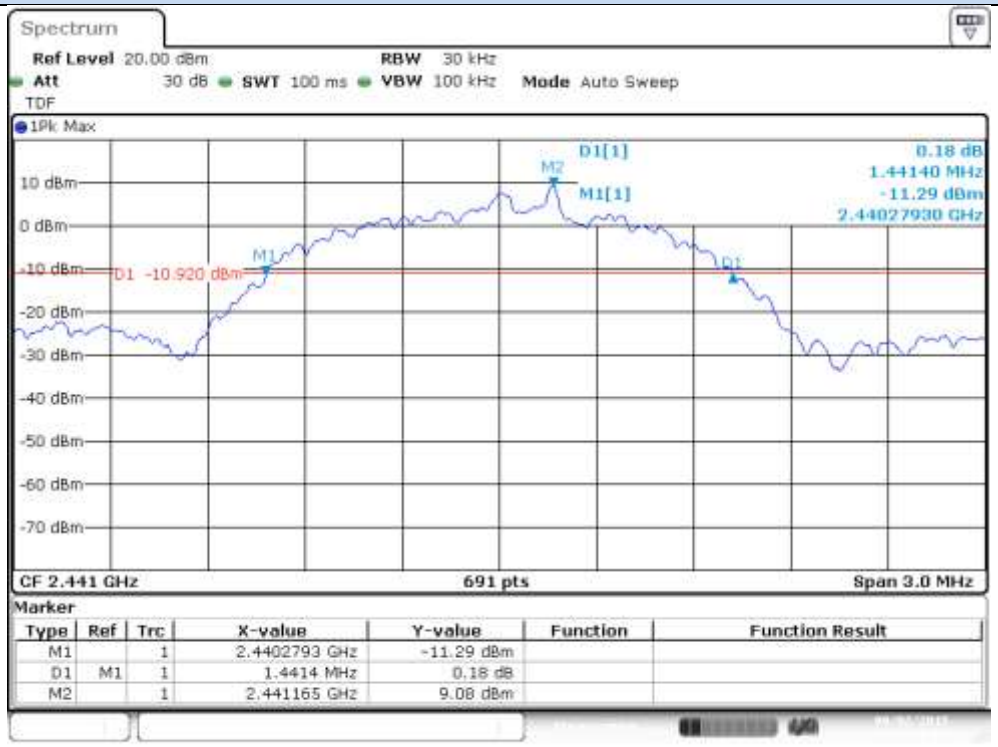
20dB BW - CH39



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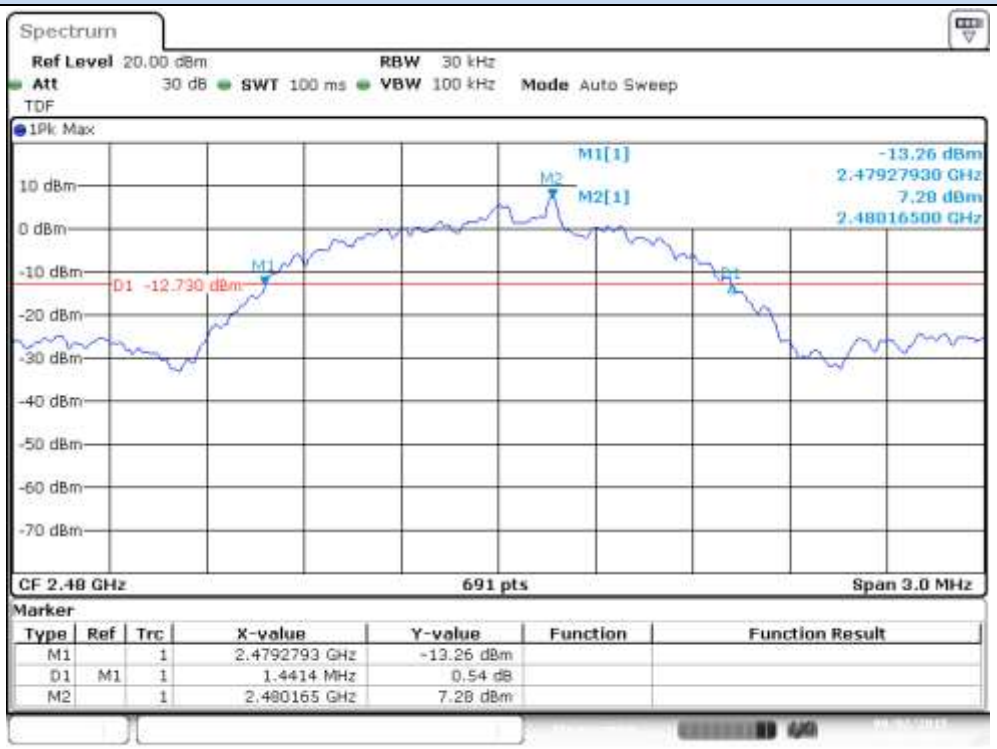
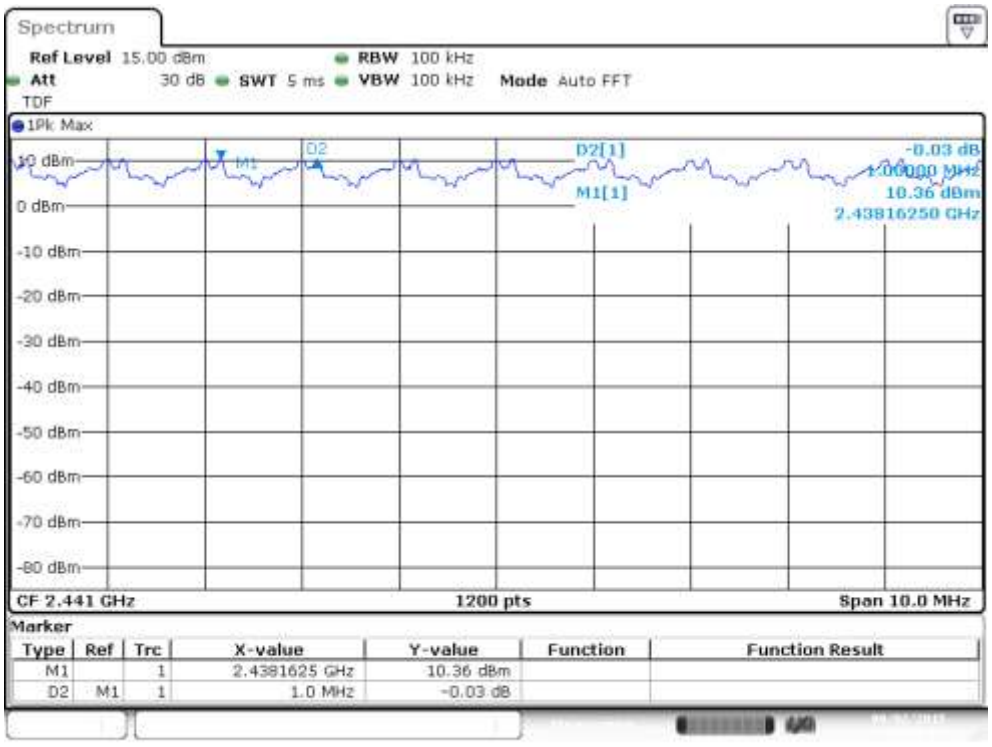
20dB BW - CH78



Date: 2.SEP.2015 12:19:16

Freq. Separation



Date: 2.SEP.2015 12:02:06

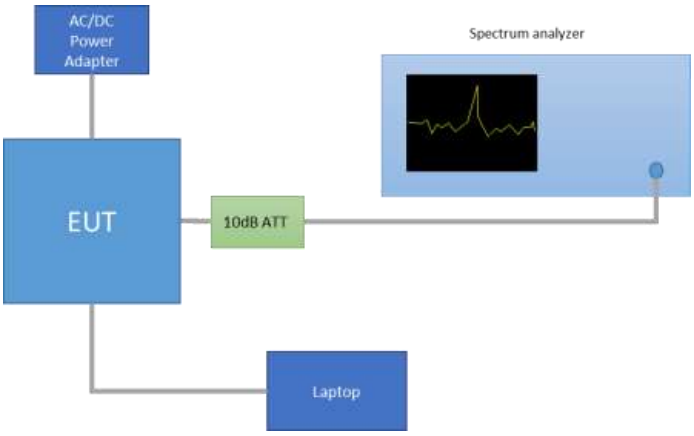
B.2 Number of hopping channels

Test limits:

FCC part	RSS part	Limits
15.247 (a) (1) (iii)	RSS-247 Clause 5.1 (4)	Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

Test procedure:

The setup below was used to measure the number of hopping channels. The antenna terminal of the EUT is connected to the spectrum through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.



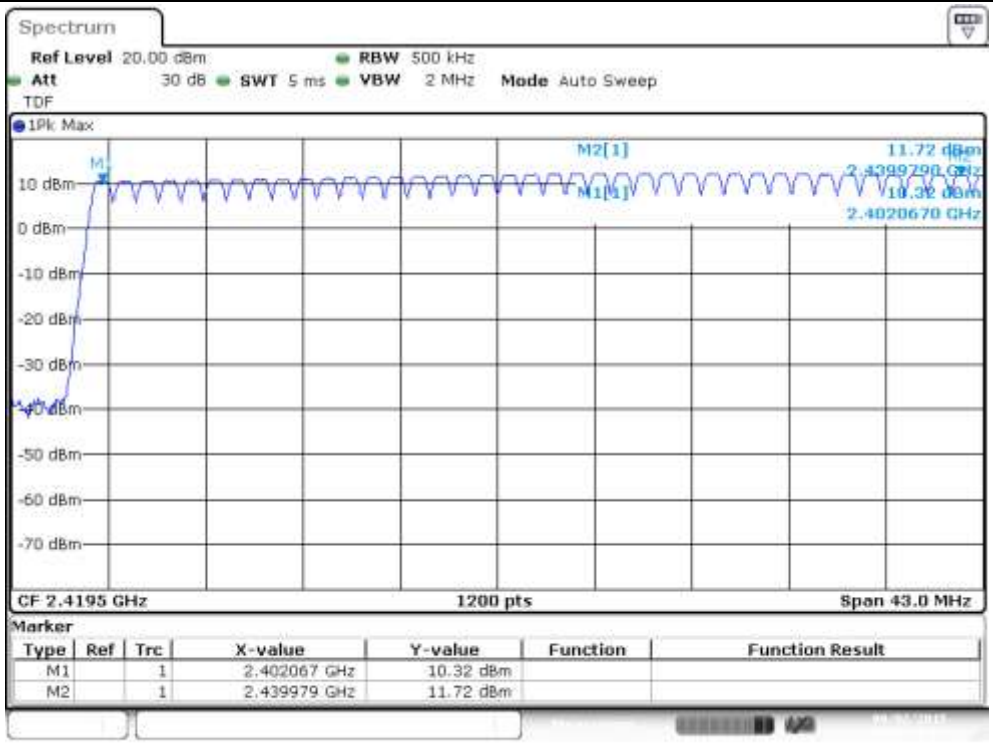
Results tables:

Mode	Number of hopping channels
Basic Rate GFSK	79
EDR π/4-DQPSK	79
EDR 8-DPSK	79

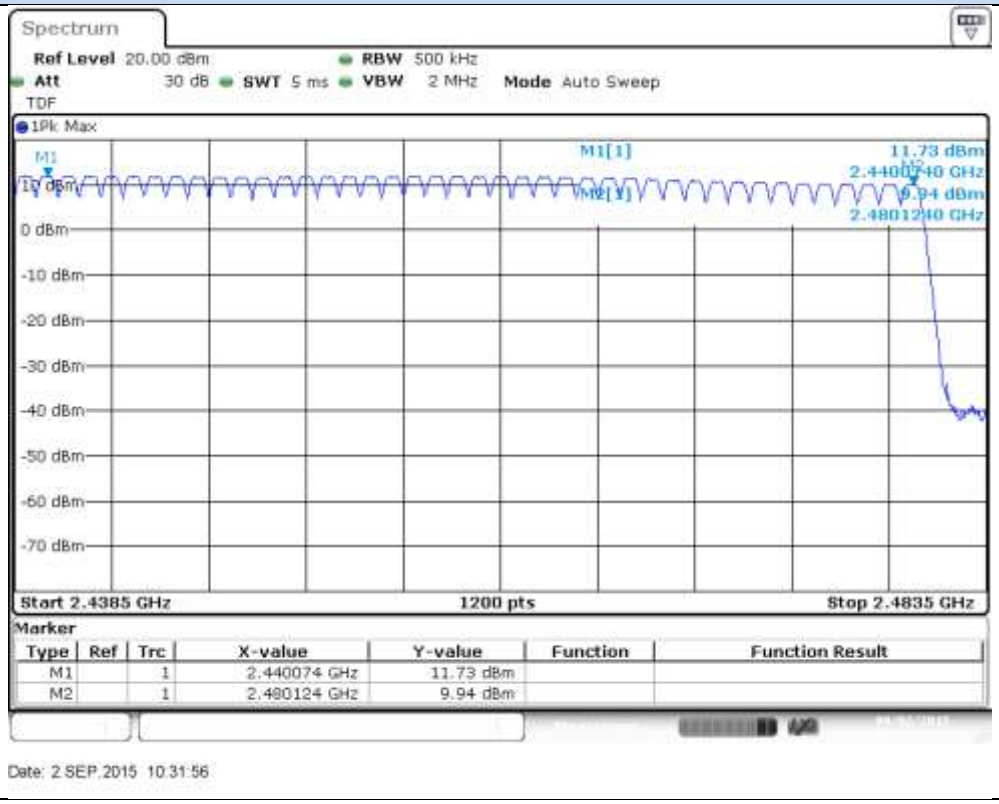
Results screenshot:

Number of hopping channels

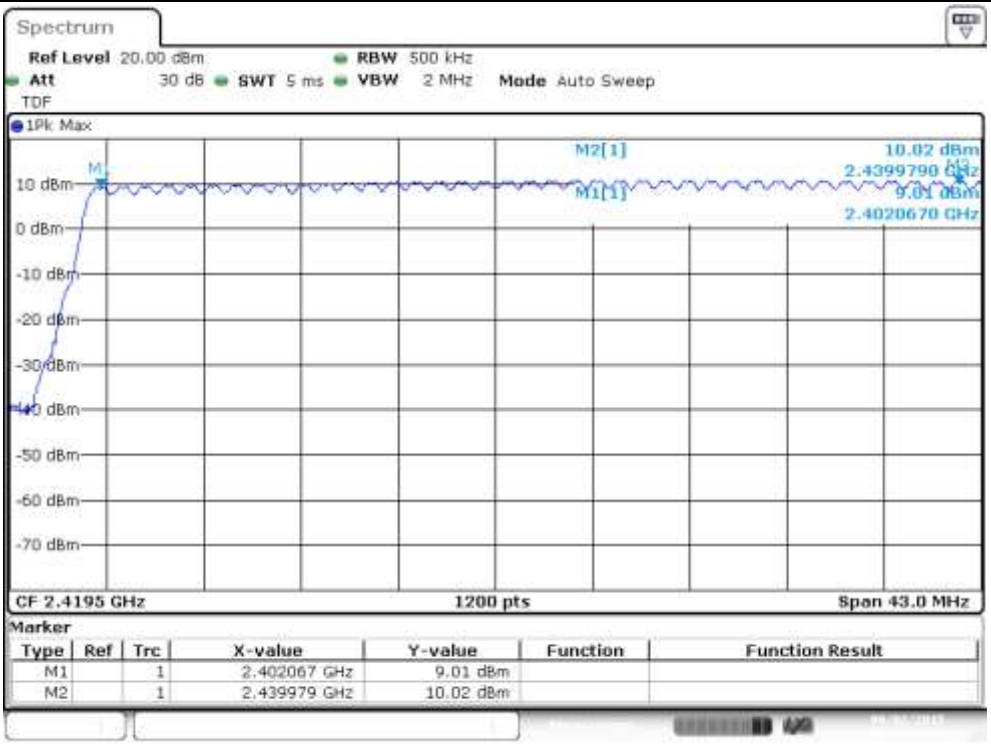
Basic Rate - GFSK



Basic Rate - GFSK



EDR – π/4-DQPSK



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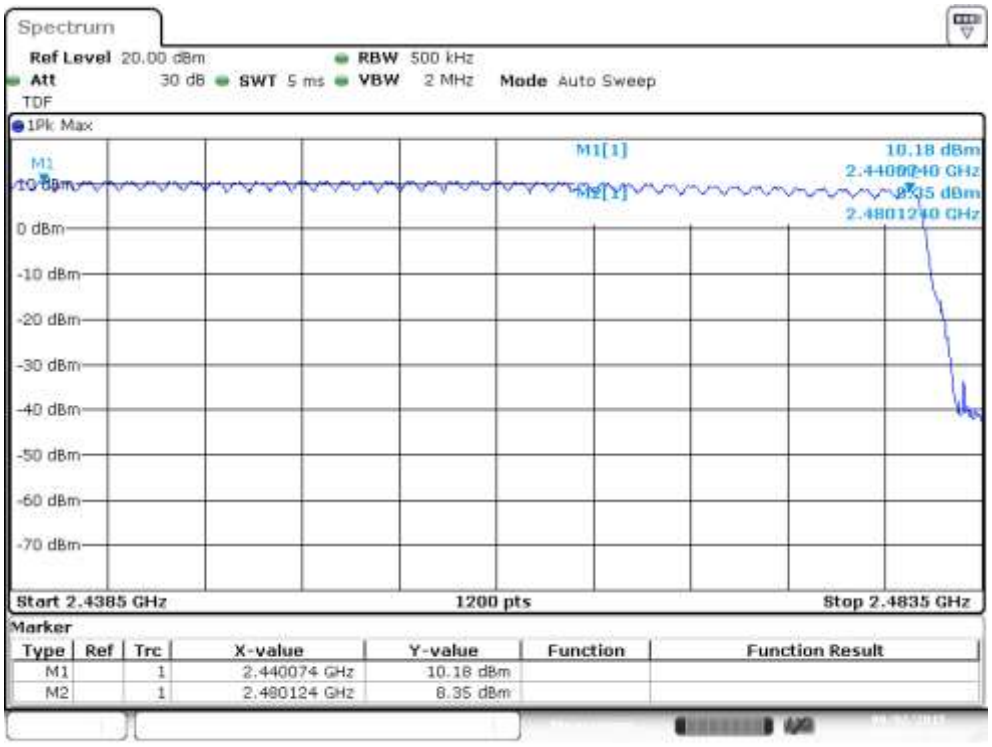
EDR – π/4-DQPSK



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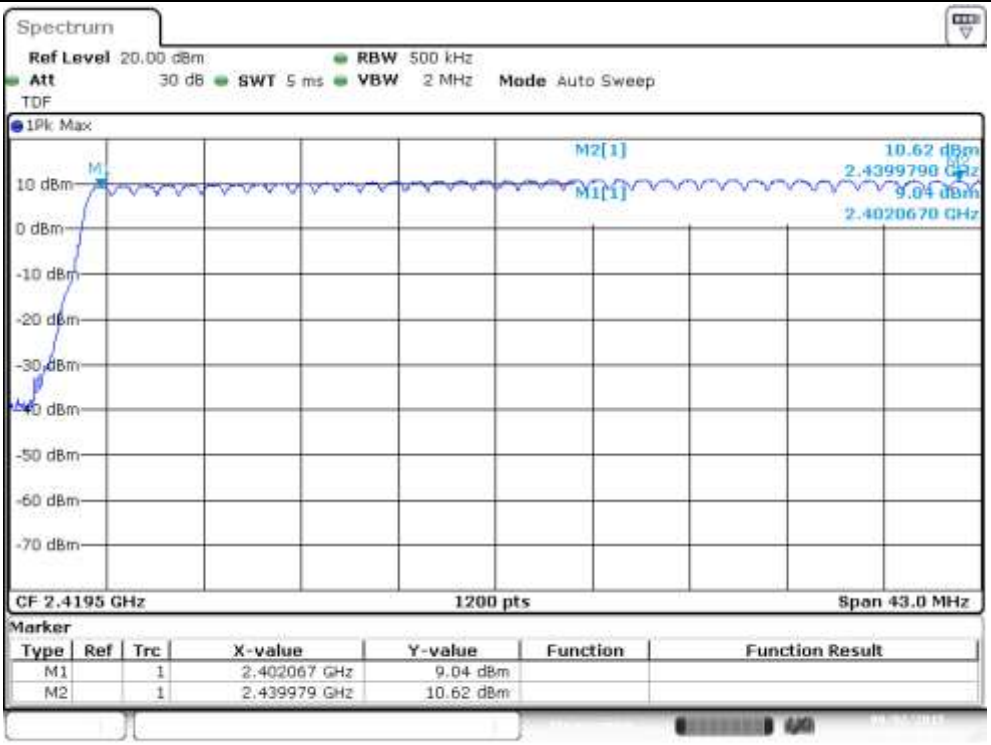
EDR – 8-DPSK



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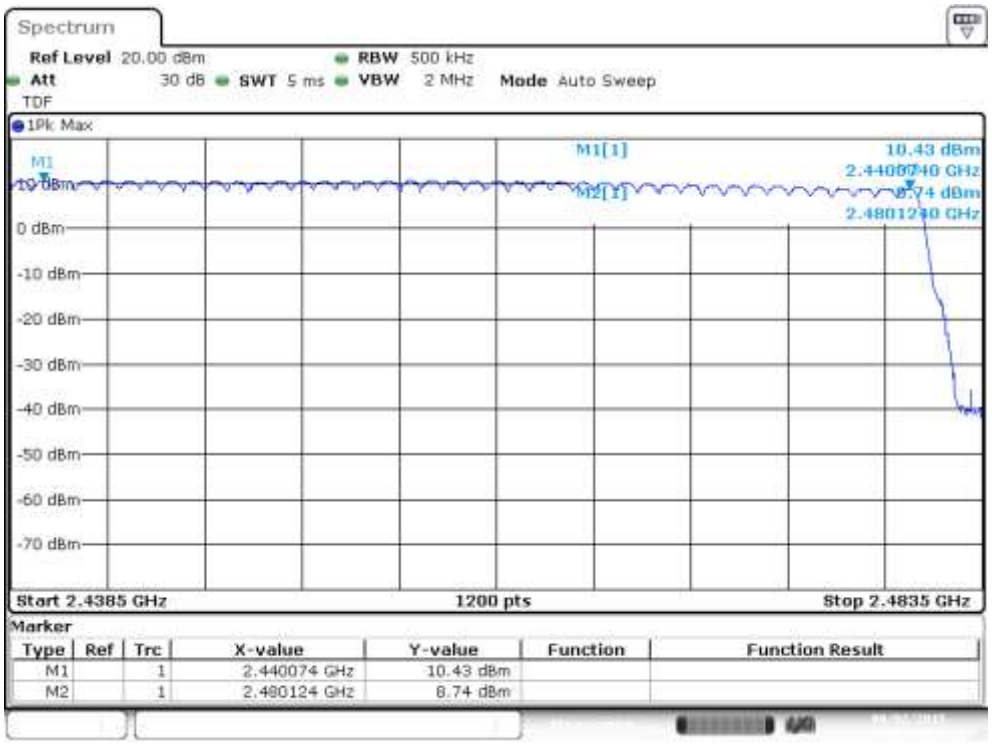
EDR – 8-DPSK



Date: 2.SEP.2015 12:03:34

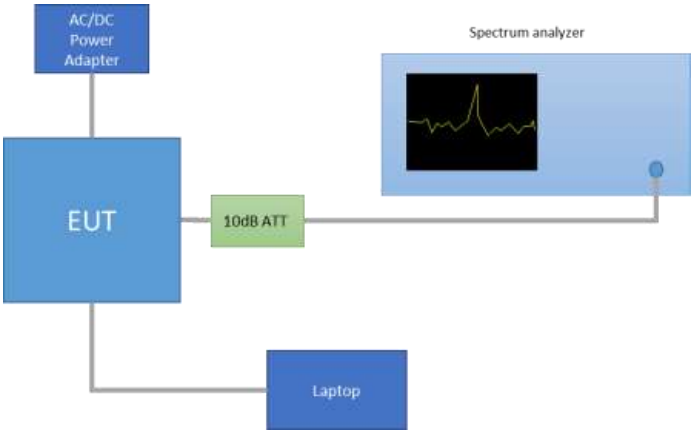
B.3 Time of Occupancy (Dwell Time)

Test limits:

FCC part	RSS part	Limits
15.247 (a) (1) (iii)	RSS-247 Clause 5.1 (4)	The average time of occupancy (Dwell Time) on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

Test procedure:

The setup below was used to measure the dwell time. The antenna terminal of the EUT is connected to the spectrum through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.



In the worst case, the system makes 1600 hops per second with 79 channels, providing a 1 timeslot length of 625µs.
A DH1 packet, with independence of the modulation, needs 1 time slot for transmitting and 1 time slot for receiving. Then, the system makes in the worst case 1600/2 = 800 hops per second with 79 channels. So each channel appears 800/79 = 10.13 times per second and, for a period of 0.4 x 79 = 31.6 seconds, each channel appears 10.13 x 31.6 = 320.11 times.

A DH3 packet, with independence of the modulation, needs 3 time slots for transmitting and 1 time slot for receiving. Then, the system makes in the worst case 1600/4 = 400 hops per second with 79 channels. So each channel appears 400/79 = 5.1 times per second and, for a period of 0.4 x 79 = 31.6 seconds, each channel appears 5.1 x 31.6 = 161.16 times.

A DH5 packet, with independence of the modulation, needs 5 time slots for transmitting and 1 time slot for receiving. Then, the system makes in the worst case 1600/6 = 266.67 hops per second with 79 channels. So each channel appears 166.67/79 = 3.37 times per second and, for a period of 0.4 x 79 = 31.6 seconds, each channel appears 3.37 x 31.6 = 106.49 times.

Thus, the total time of occupancy is obtained by multiplying the calculated maximum number of appearances per packet type and the measured Tx-time, as shown in the results screenshots.

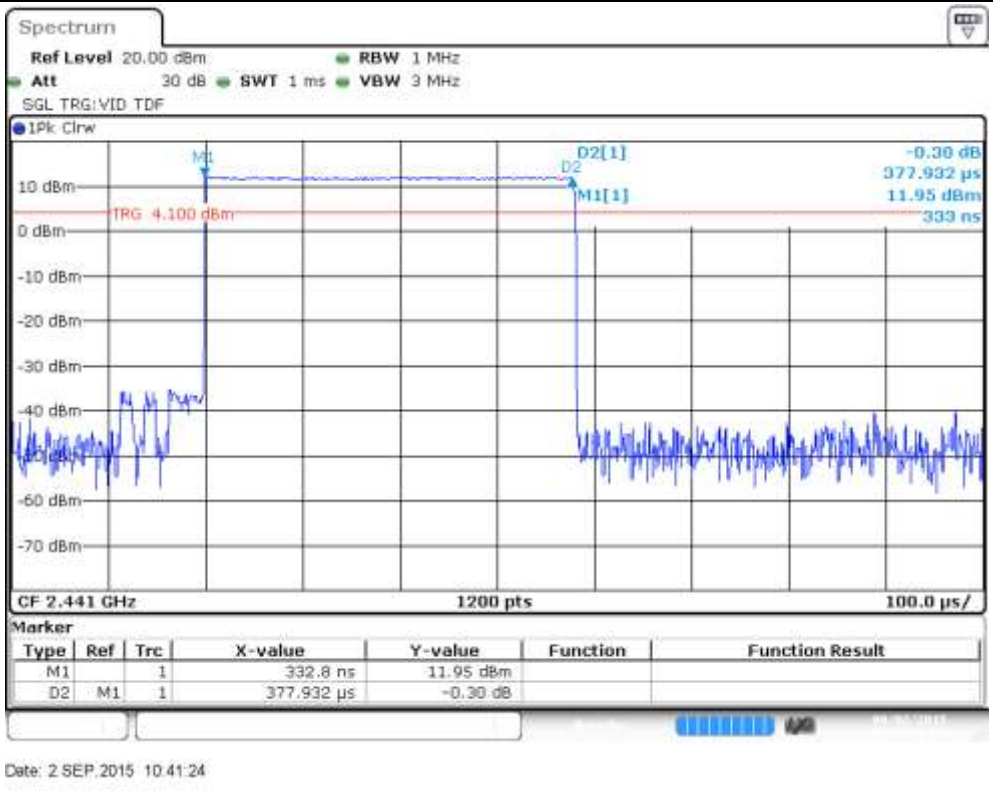
Results tables:

Mode	Packet Type	Times of appearance	Tx-time [ms]	Dwell Time [ms]
Basic Rate GFSK	DH1	320.11	0.378	121.00
	DH3	161.16	1.626	262.05
	DH5	106.49	2.881	306.80
EDR π/4-DQPSK	2-DH1	320.11	0.389	124.52
	2-DH3	161.16	1.635	263.50
	2-DH5	106.49	2.883	307.01
EDR 8-DPSK	3-DH1	320.11	0.388	124.20
	3-DH3	161.16	1.636	263.66
	3-DH5	106.49	2.885	307.22

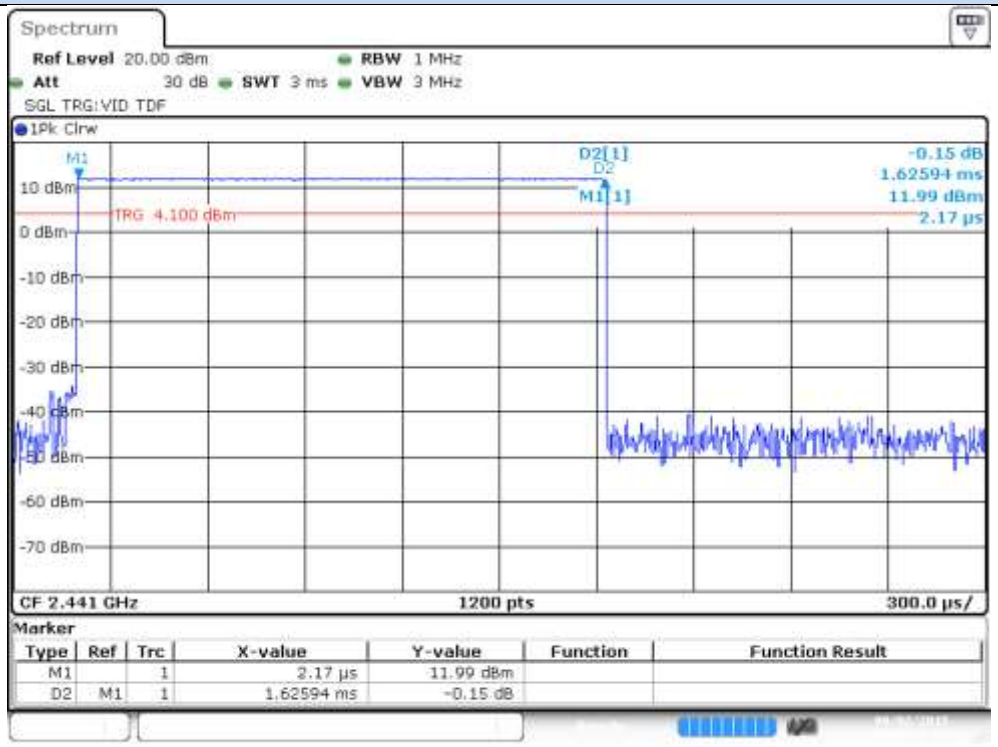
Results Screenshot:

BDR – GFSK

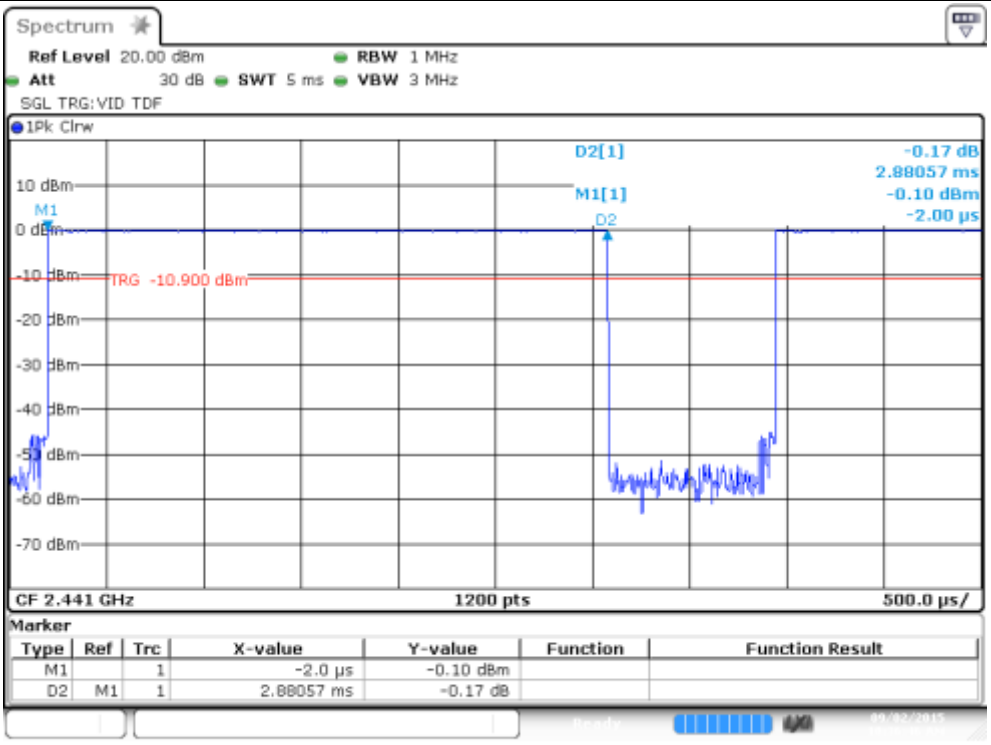
DH1 Tx-time



DH3 Tx-time

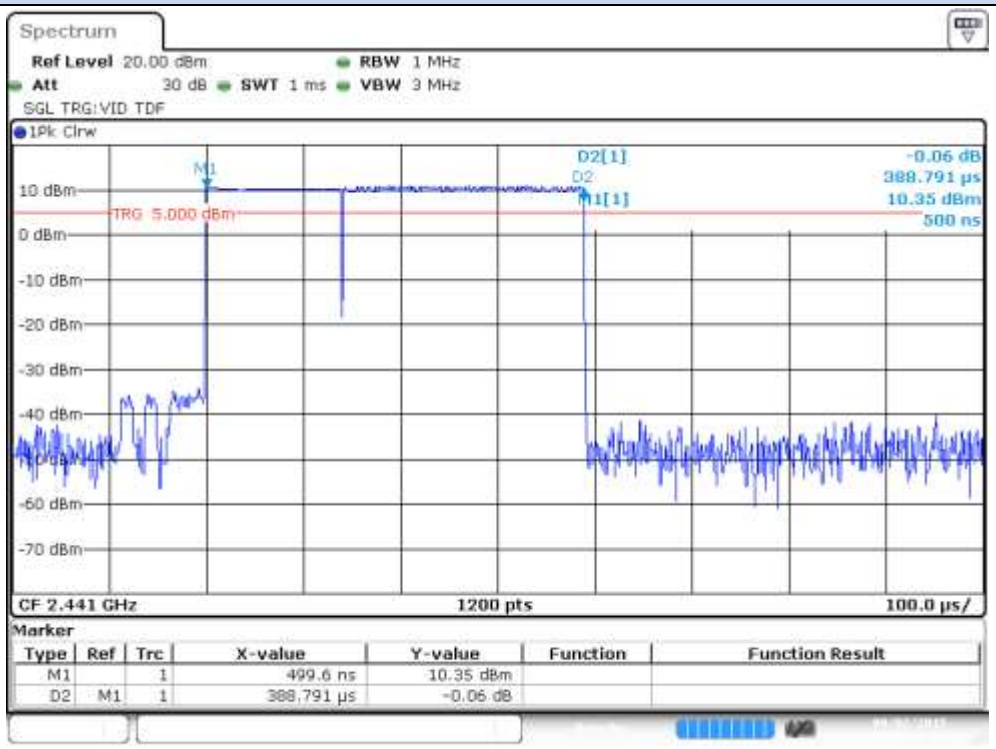


DH5 Tx-time



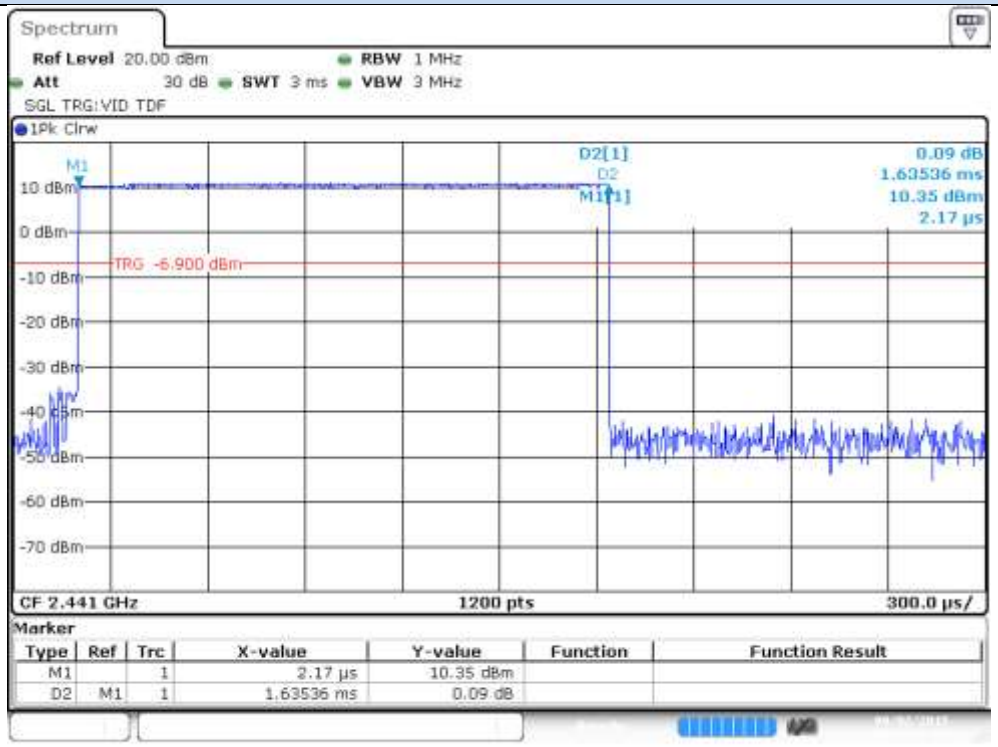
EDR – π/4-DQPSK

2-DH1 Tx-time



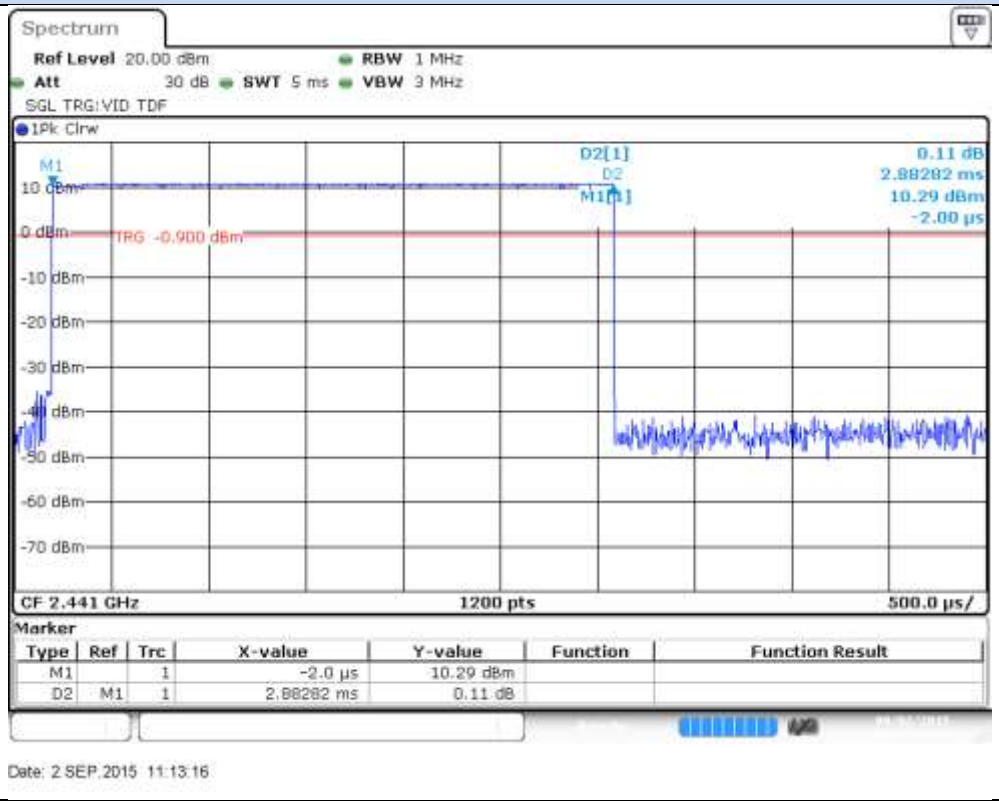
Date: 2.SEP.2015 11:09:39

2-DH3 Tx-time



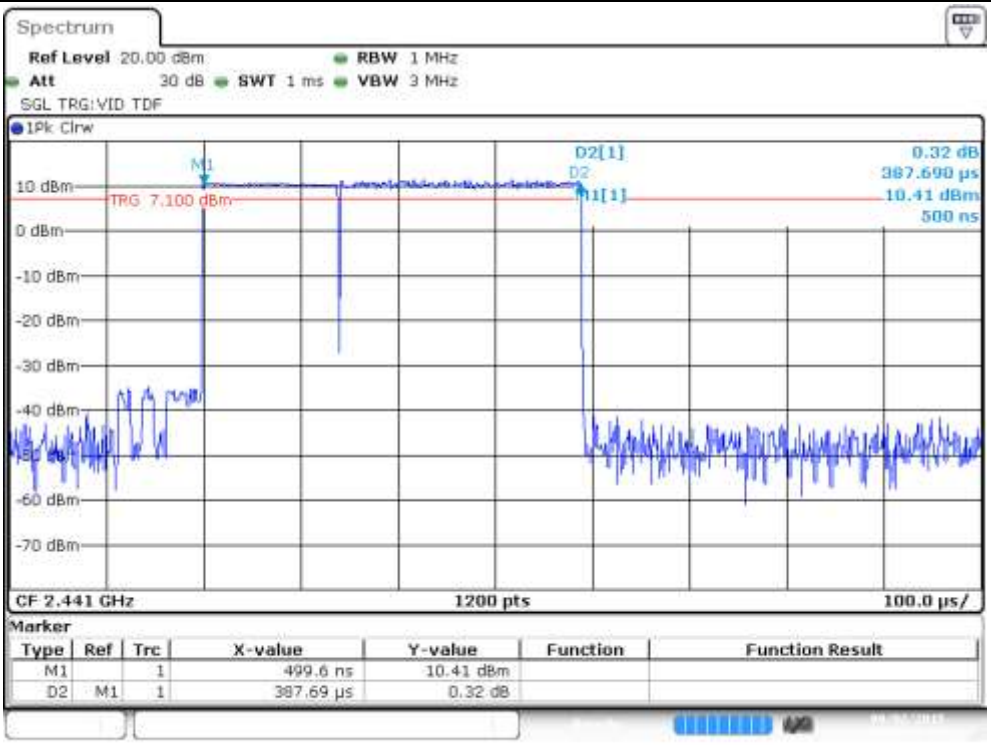
Date: 2.SEP.2015 11:11:34

2-DH5 Tx-time



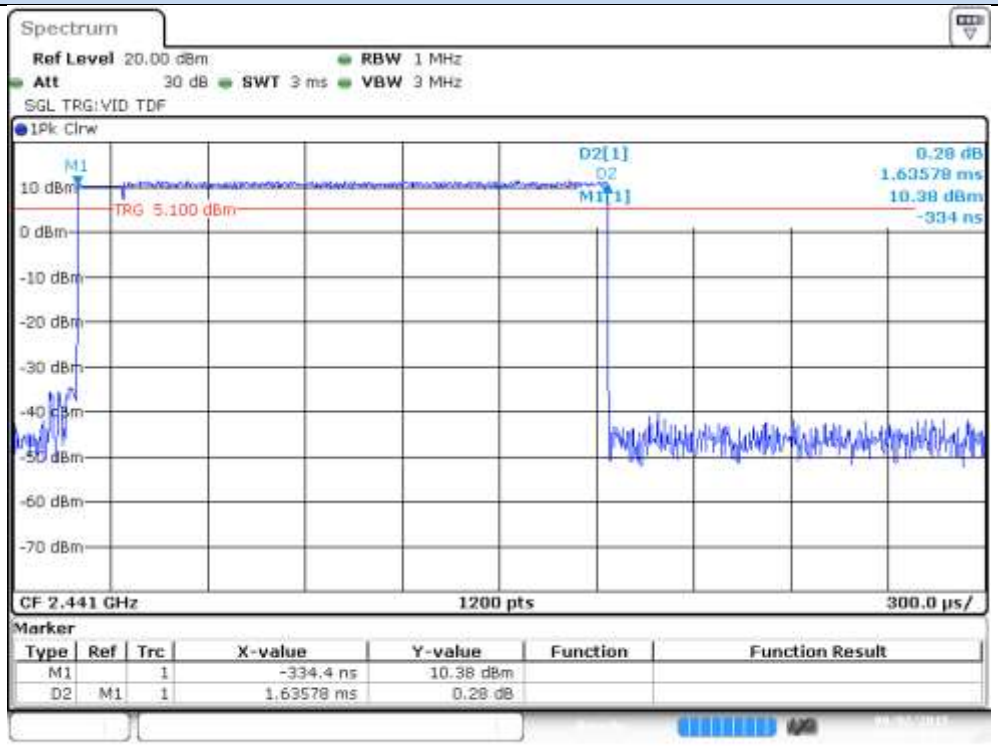
EDR – 8-DPSK

3-DH1 Tx-time



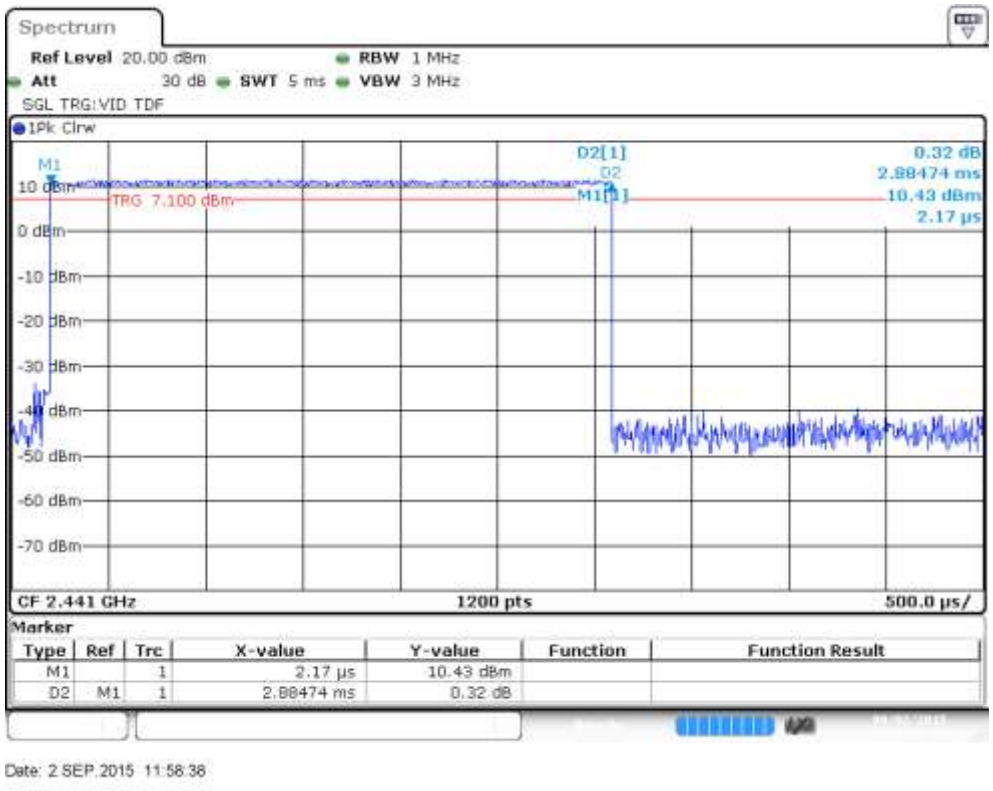
Date: 2.SEP.2015 11:56:18

3-DH3 Tx-time



Date: 2.SEP.2015 11:57:43

3-DH5 Tx-time



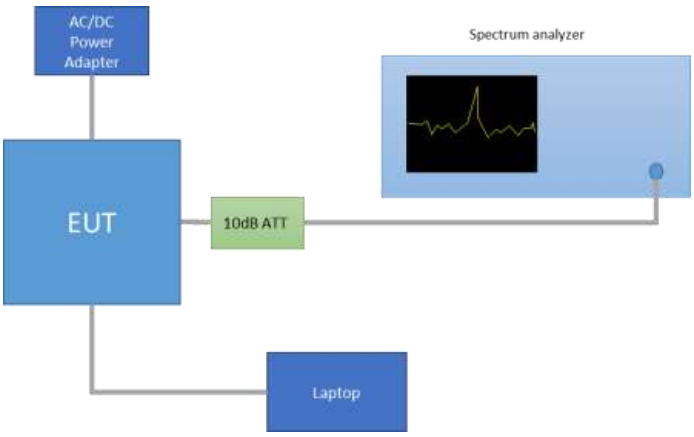
B.4 Maximum Peak Output Power and antenna gain

Test limits:

FCC part	RSS part	Limits
15.247 (b) (1)	RSS-247 Clause 5.4 (2)	(b) The maximum peak conducted output power of the intentional radiator shall not exceed the following: (1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. (…) (4) 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.

Test procedure:

The setup below was used to measure the maximum peak output power. The antenna terminal of the EUT is connected to the spectrum through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.



The declared maximum antenna gain is 3.24dBi.

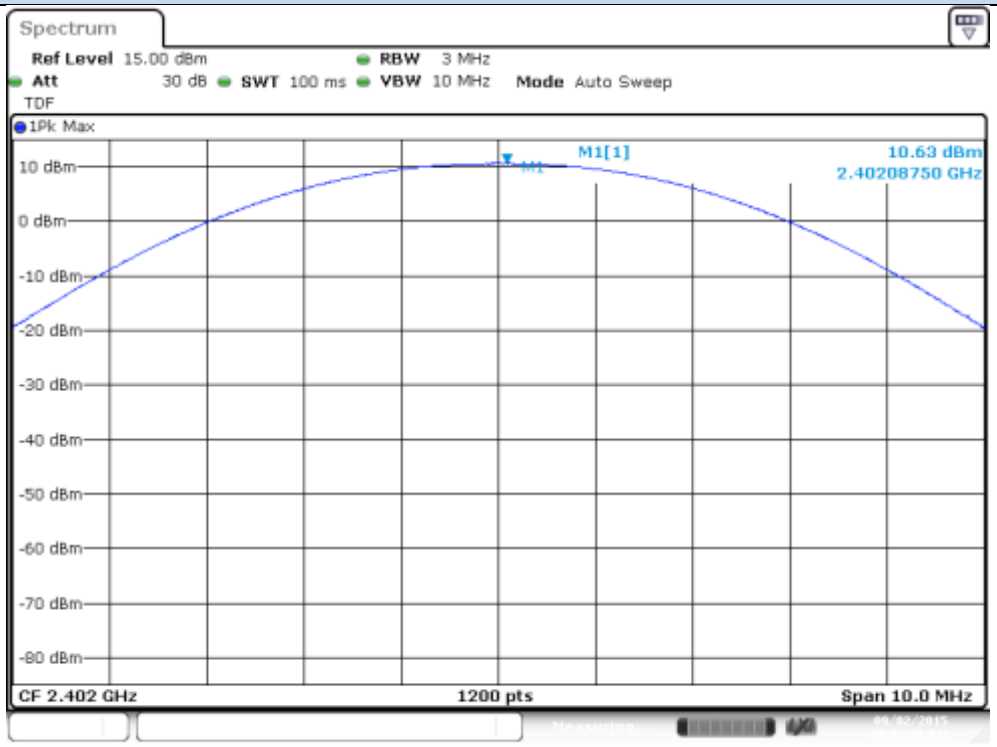
Results tables:

Mode	Channel Number	Frequency [MHz]	Peak Power [dBm]
Basic Rate GFSK	0	2402	10.63
	39	2441	12.47
	78	2480	10.13
EDR π/4-DQPSK	0	2402	10.32
	39	2441	12.13
	78	2480	9.93
EDR 8-DPSK	0	2402	10.52
	39	2441	12.19
	78	2480	9.99

Results Screenshot:

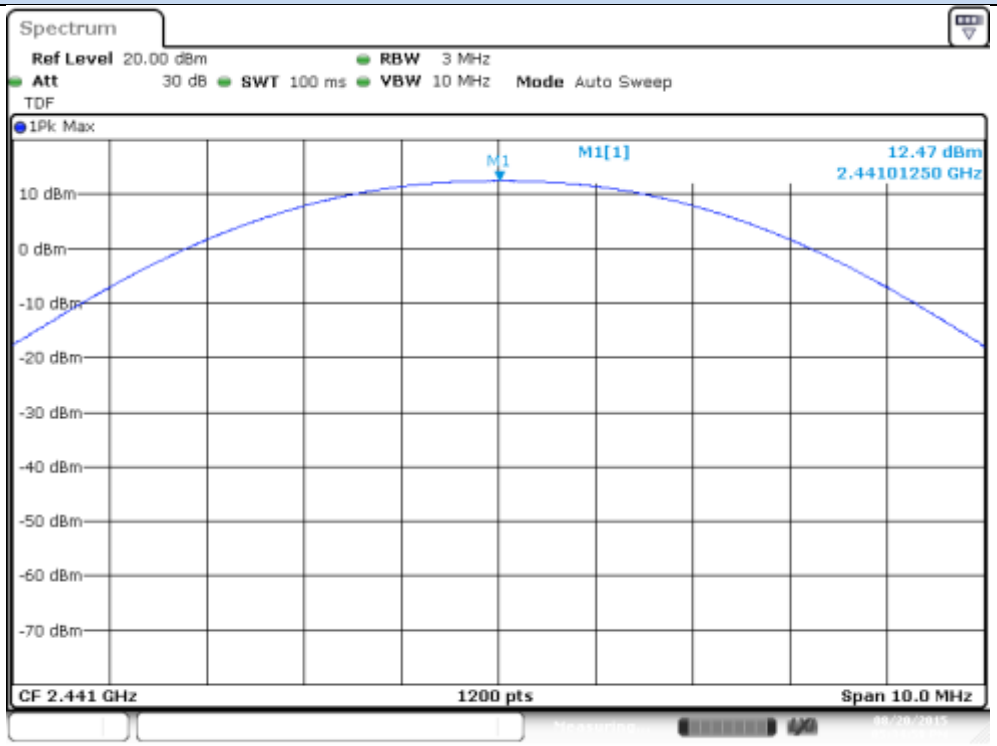
Basic Rate - GFSK

Peak Power - CH0



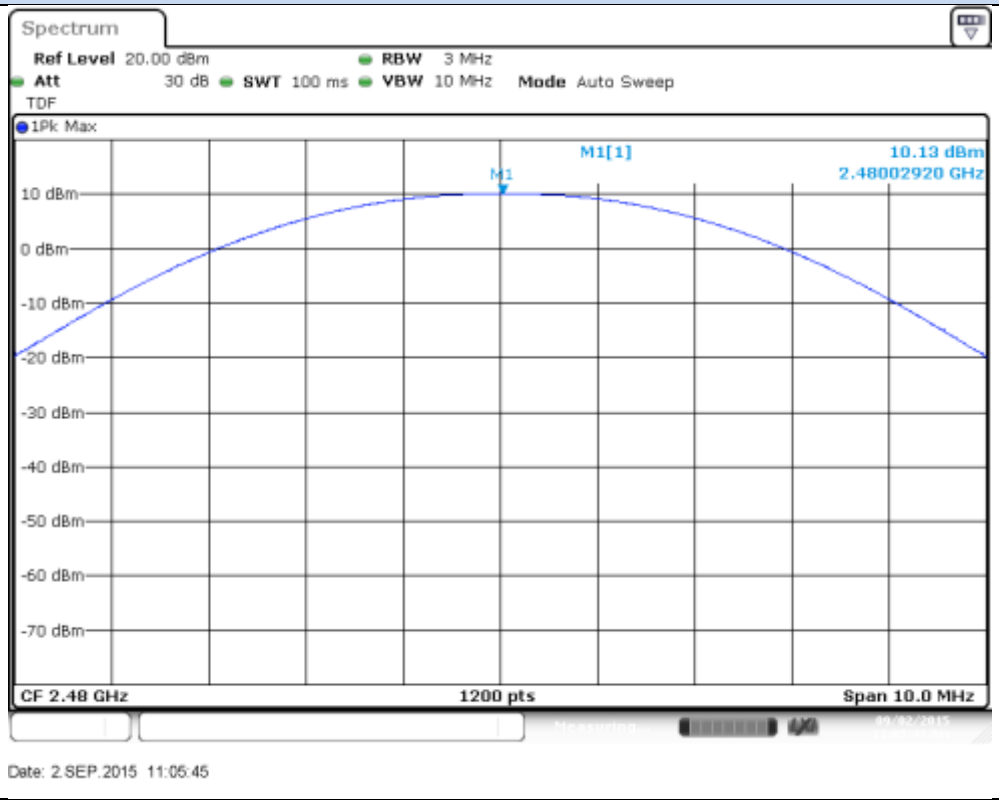
Date: 2.SEP.2015 10:11:41

Peak Power - CH39



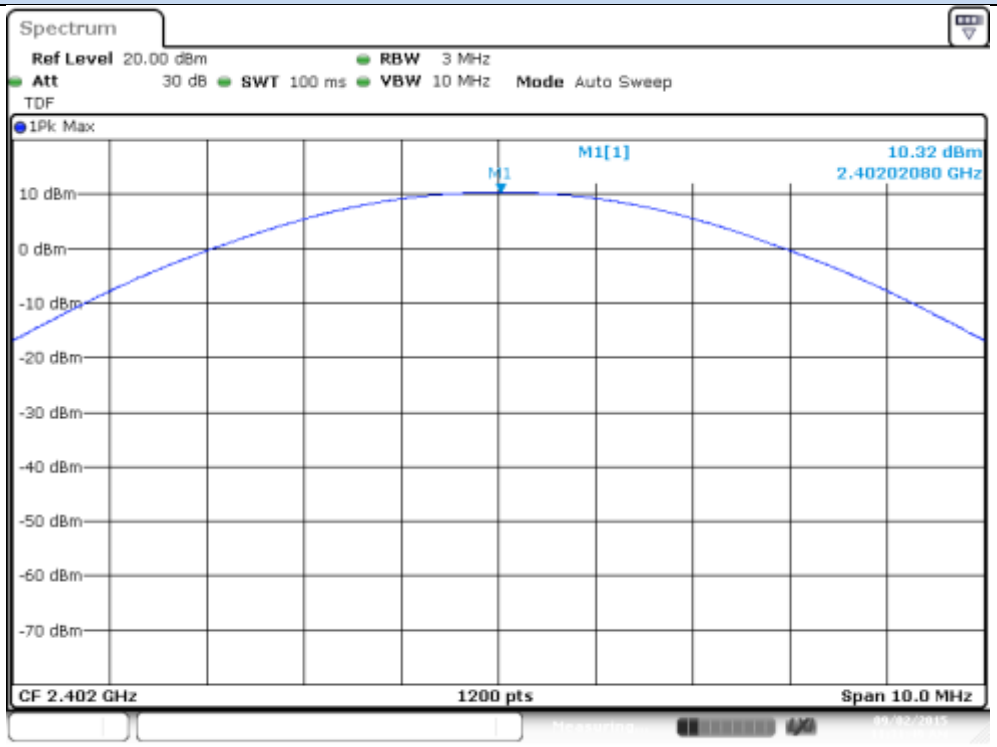
Date: 20.AUG.2015 17:34:58

Peak Power - CH78



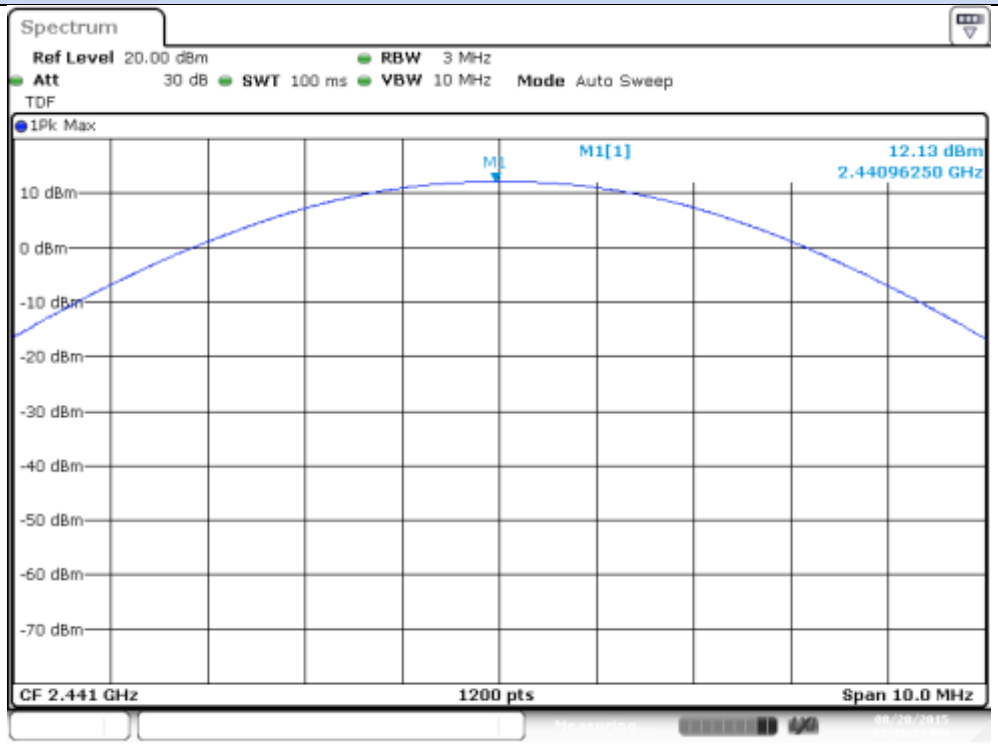
EDR – π/4-DQPSK

Peak Power - CH0



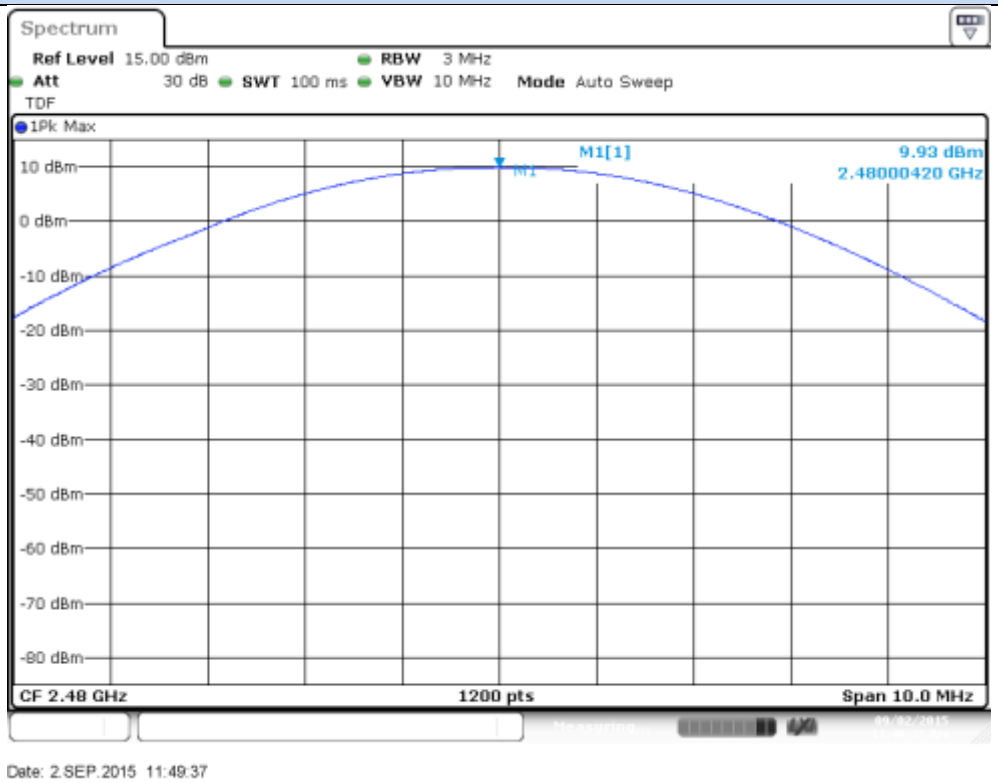
Date: 2.SEP.2015 11:31:49

Peak Power - CH39



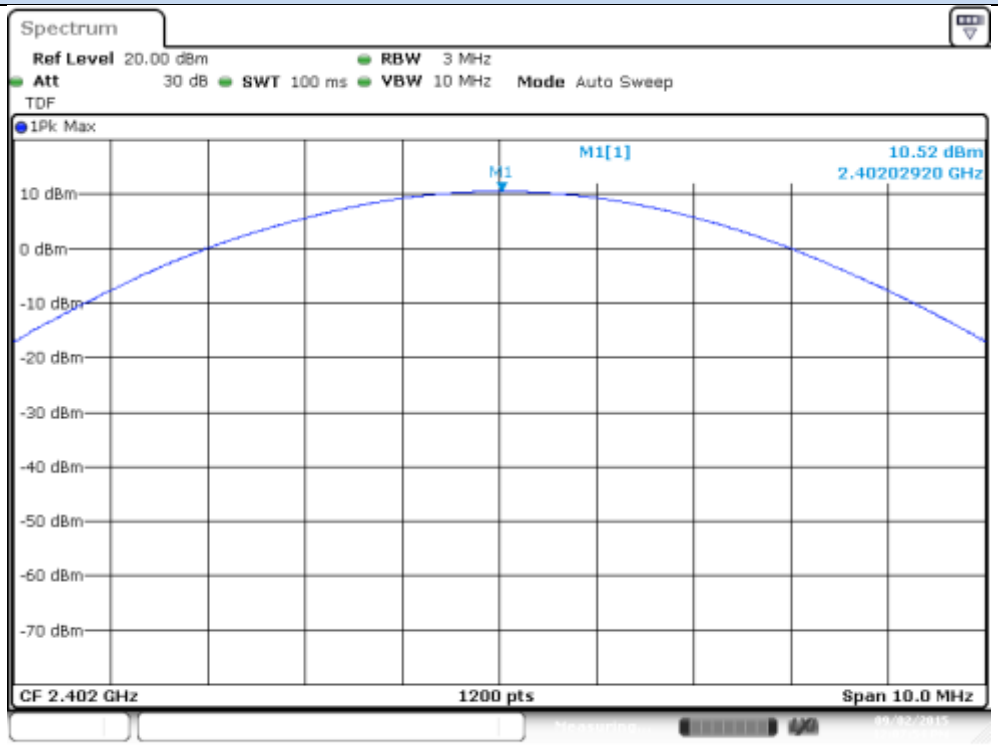
Date: 20.AUG.2015 17:35:54

Peak Power - CH78



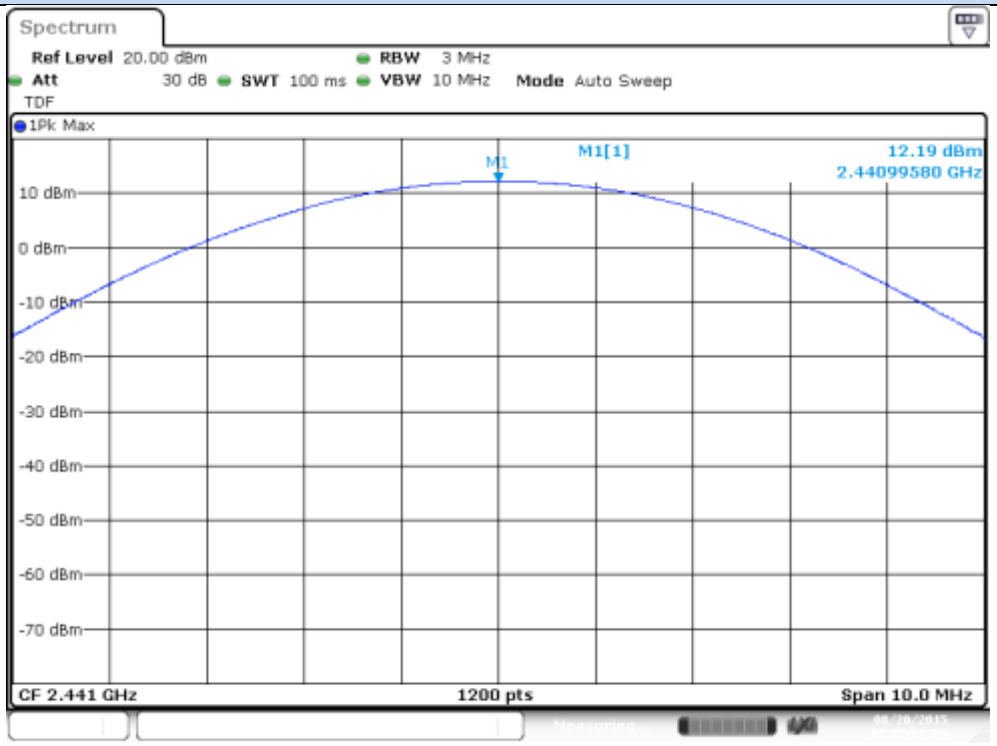
EDR – 8-DPSK

Peak Power - CH0



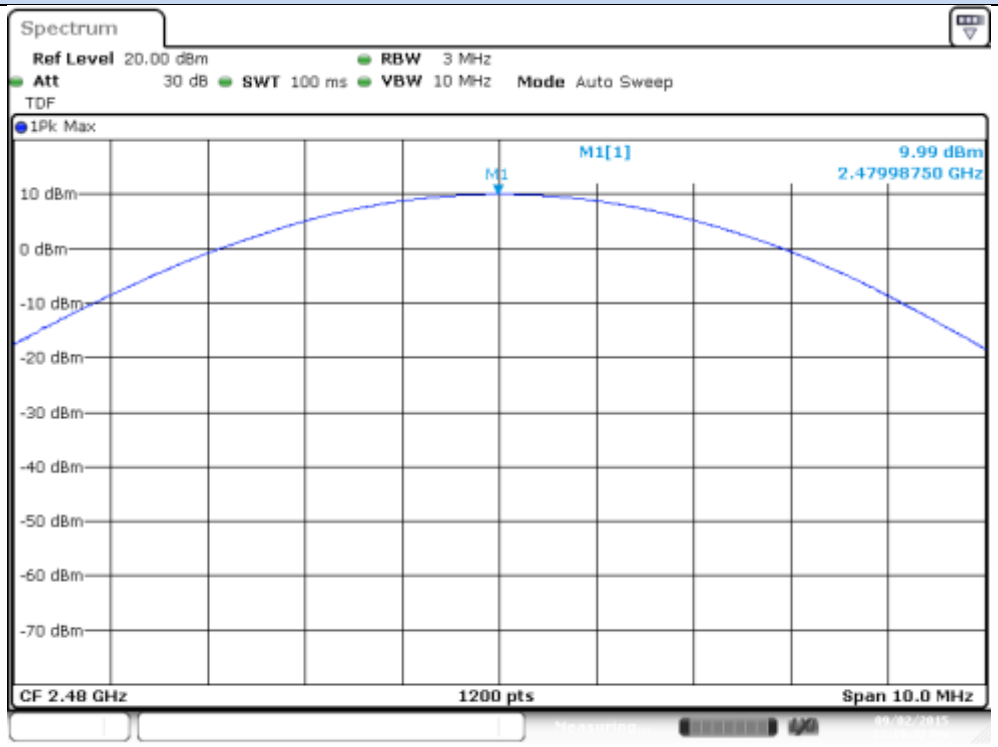
Date: 2.SEP.2015 12:07:54

Peak Power - CH39



Date: 20.AUG.2015 17:37:01

Peak Power - CH78



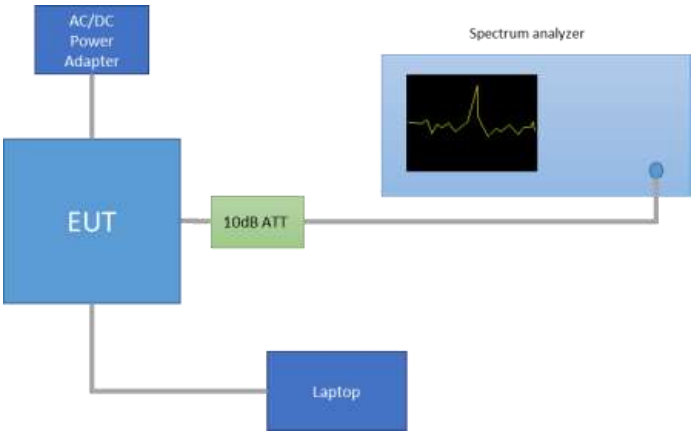
B.5 Out-of-band emissions (conducted)

Test limits:

FCC part	RSS part	Limits
15.247 (d)	RSS-247 Clause 5.5	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, provided the transmitter demonstrates compliance with the peak conducted power limits.

Test procedure:

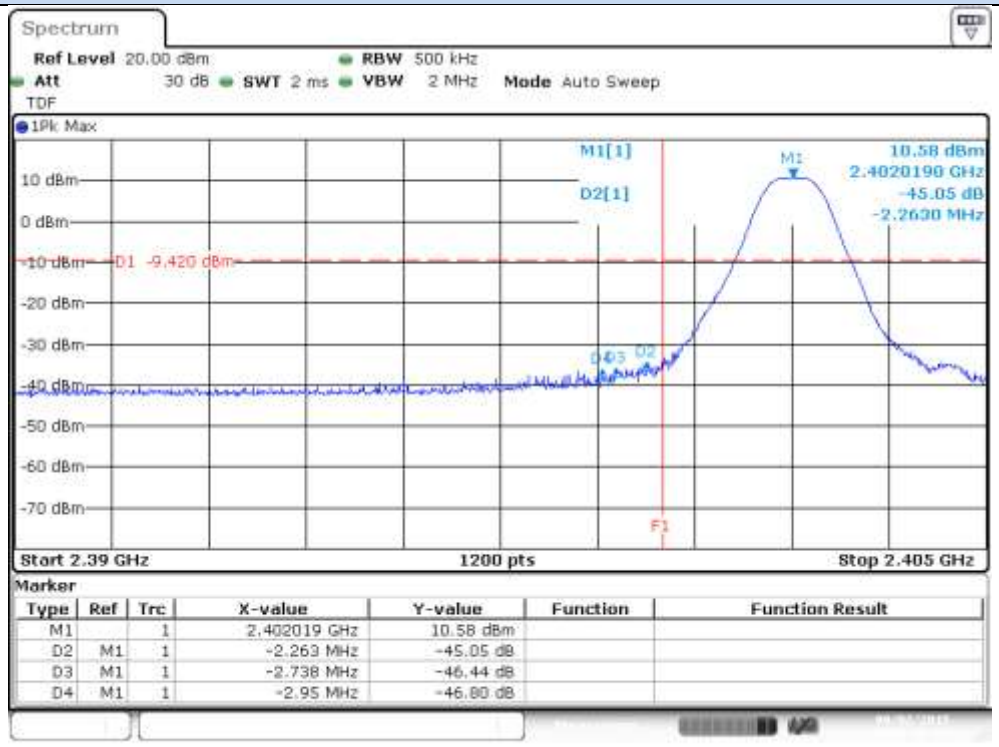
The setup below was used to measure the maximum peak output power. The antenna terminal of the EUT is connected to the spectrum through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.



Band Edge results Screenshot:

Basic Rate - GFSK

BE Low Freq Section - CH0

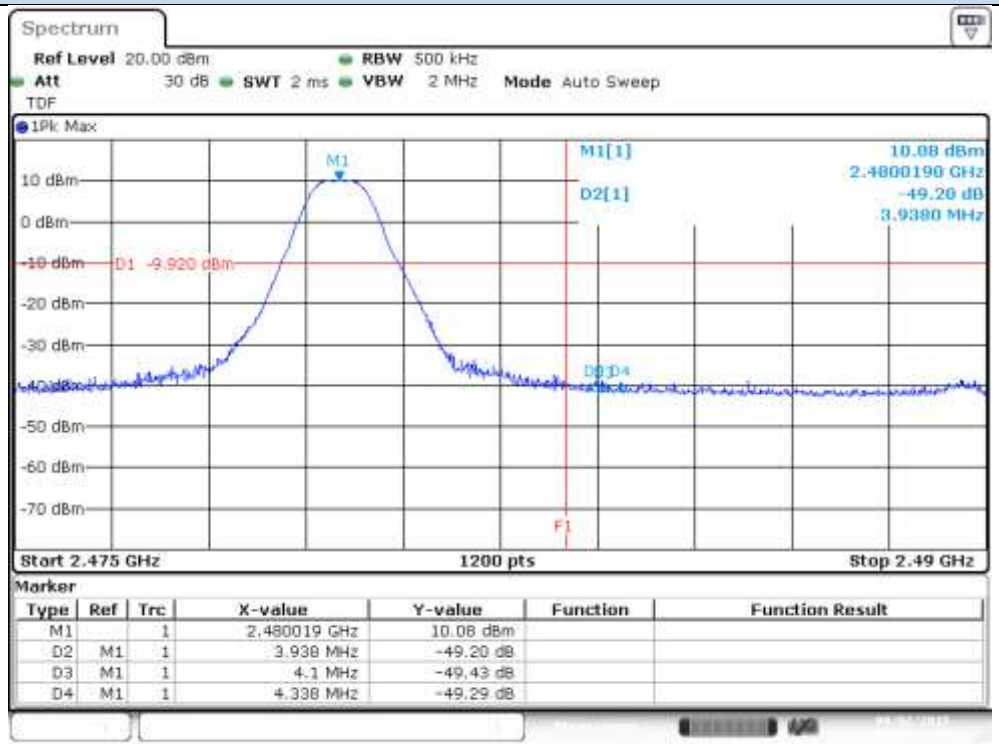


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.402019 GHz	10.58 dBm		
D2	M1	1	-2.263 MHz	-45.05 dB		
D3	M1	1	-2.738 MHz	-46.44 dB		
D4	M1	1	-2.95 MHz	-46.80 dB		

Date: 2.SEP.2015 10:14:48

BE High Freq Section - CH78

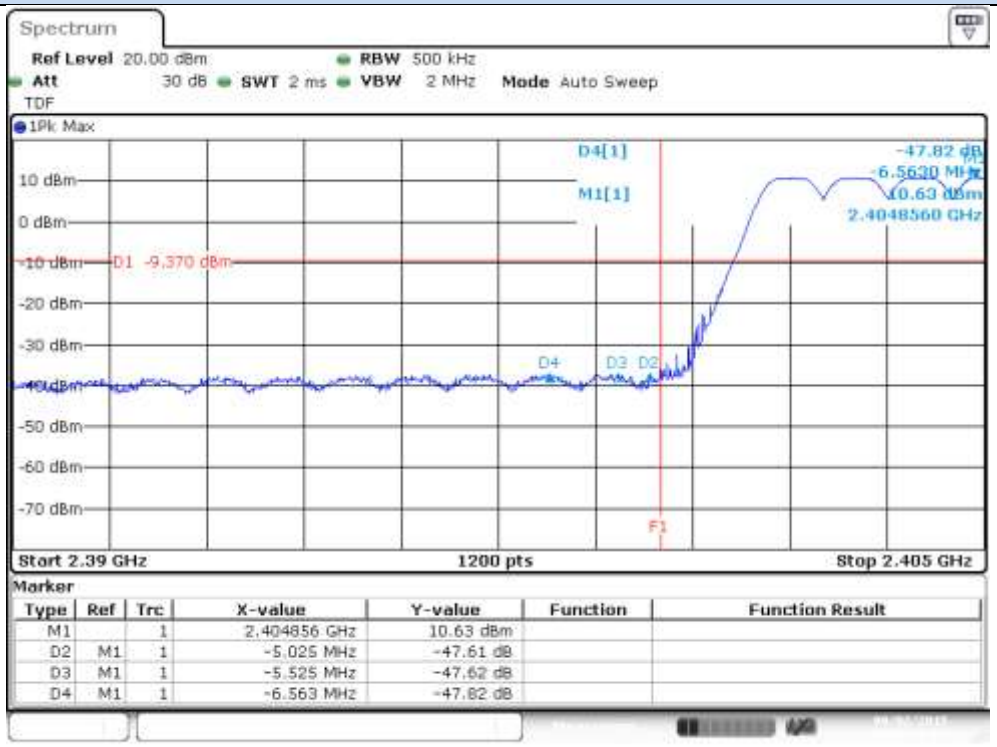


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.480019 GHz	10.08 dBm		
D2	M1	1	3.938 MHz	-49.20 dB		
D3	M1	1	4.1 MHz	-49.43 dB		
D4	M1	1	4.338 MHz	-49.29 dB		

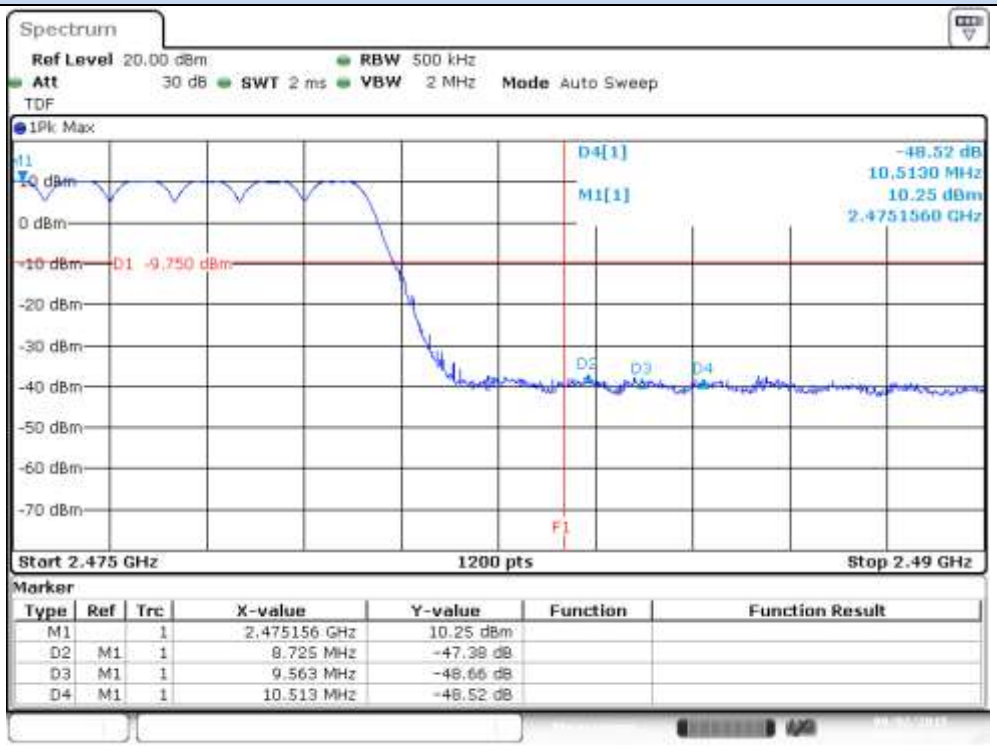
Date: 2.SEP.2015 11:01:25

BE Low Freq Section - Hopping



Date: 2 SEP.2015 10:28:12

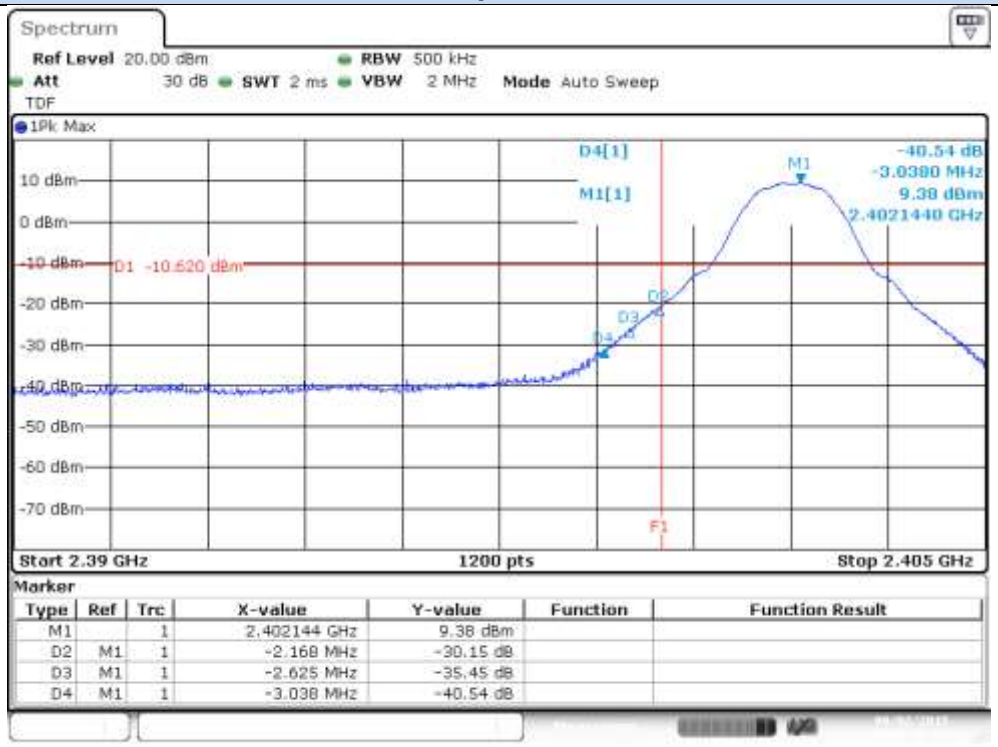
BE High Freq Section - Hopping



Date: 2 SEP.2015 10:30:15

EDR – π/4-DQPSK

BE Low Freq Section - CH0

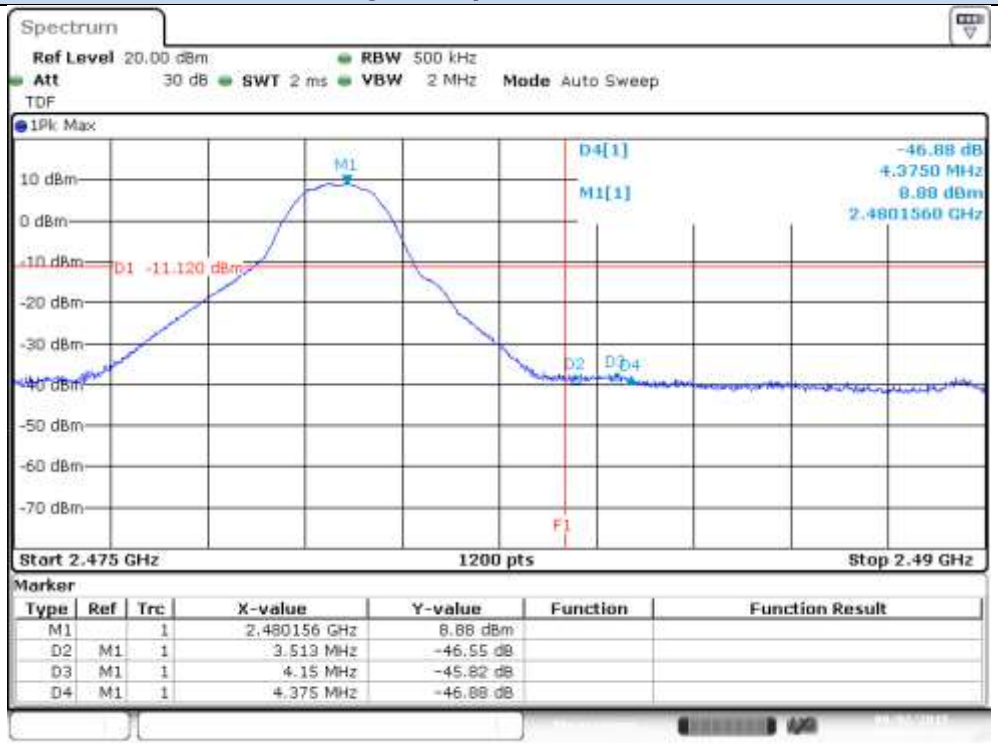


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.402144 GHz	9.38 dBm		
D2	M1	1	-2.168 MHz	-30.15 dB		
D3	M1	1	-2.625 MHz	-35.45 dB		
D4	M1	1	-3.038 MHz	-40.54 dB		

Date: 2.SEP.2015 11:28:41

BE High Freq Section - CH78

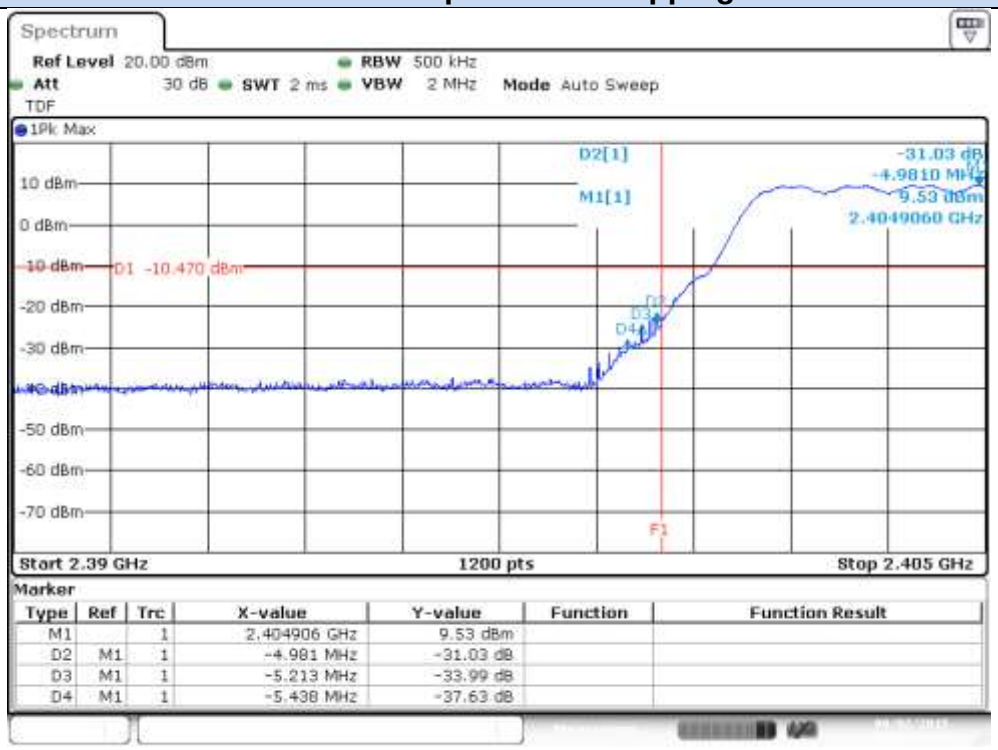


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.480156 GHz	8.88 dBm		
D2	M1	1	3.513 MHz	-46.55 dB		
D3	M1	1	4.15 MHz	-45.82 dB		
D4	M1	1	4.375 MHz	-46.88 dB		

Date: 2.SEP.2015 11:46:49

BE Low Freq Section - Hopping

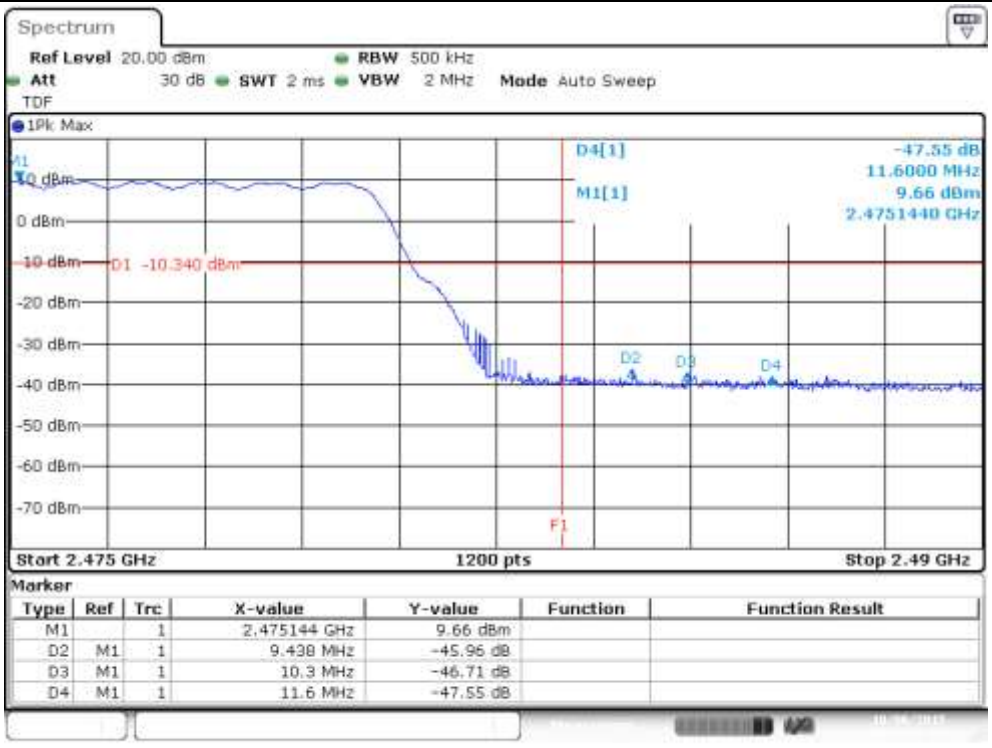


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.404906 GHz	9.53 dBm		
D2	M1	1	-4.981 MHz	-31.03 dB		
D3	M1	1	-5.213 MHz	-33.99 dB		
D4	M1	1	-5.438 MHz	-37.63 dB		

Date: 2.SEP.2015 11:14:56

BE High Freq Section - Hopping



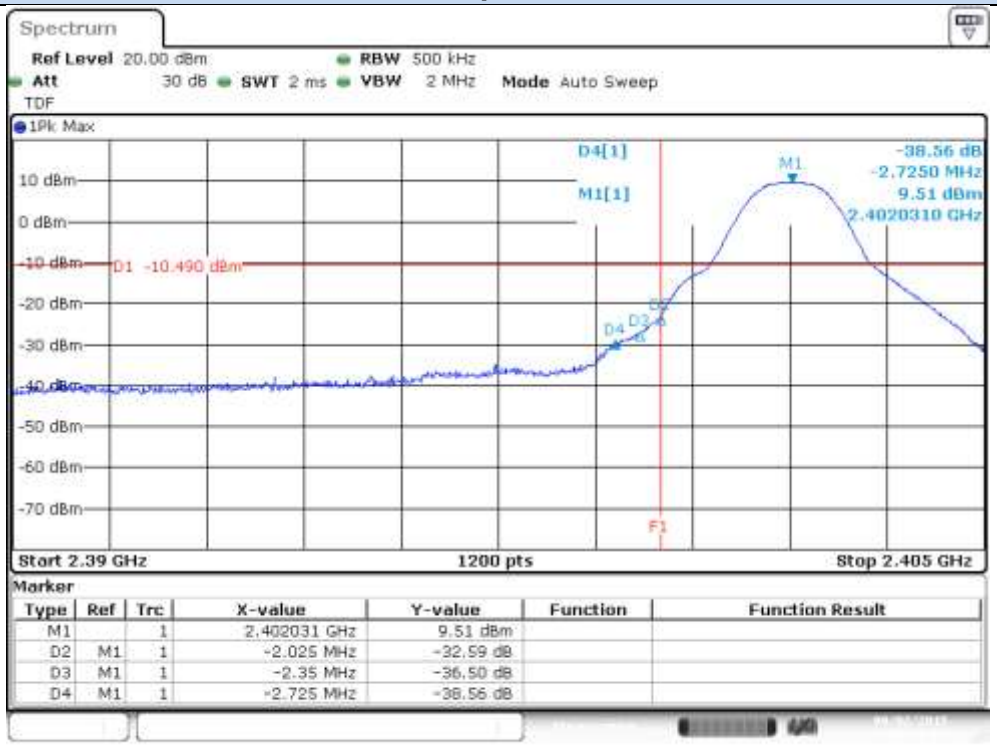
Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.475144 GHz	9.66 dBm		
D2	M1	1	9.438 MHz	-45.96 dB		
D3	M1	1	10.3 MHz	-46.71 dB		
D4	M1	1	11.6 MHz	-47.55 dB		

Date: 6.OCT.2015 11:23:38

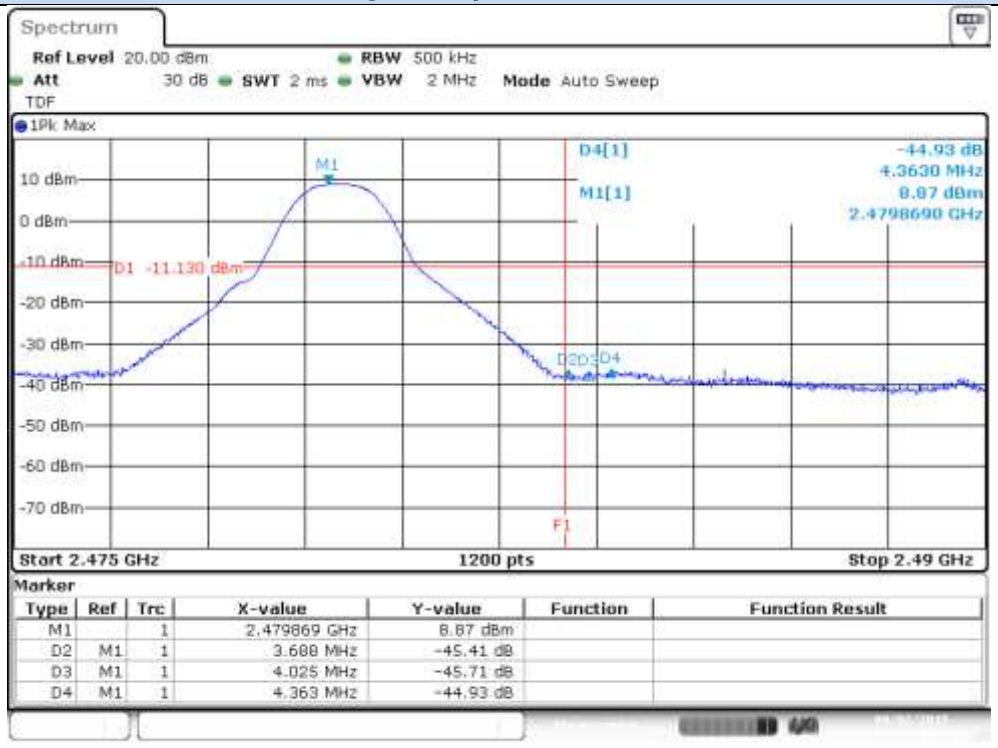
EDR – 8-DPSK

BE Low Freq Section - CH0



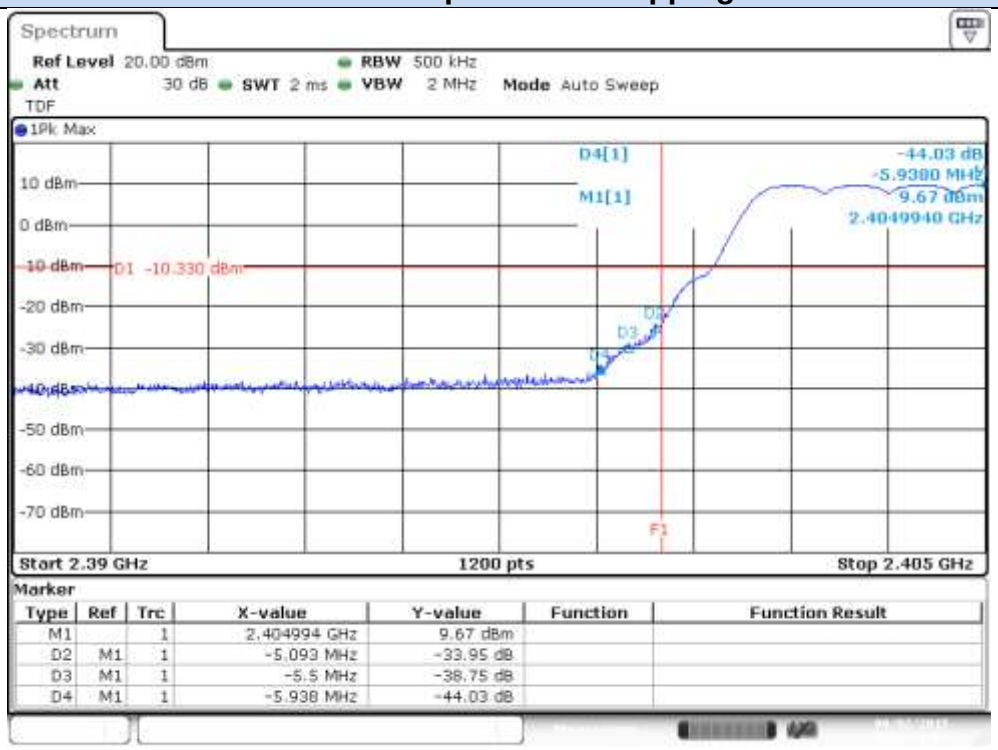
Date: 2.SEP.2015 12:05:01

BE High Freq Section - CH78



Date: 2.SEP.2015 12:17:24

BE Low Freq Section - Hopping

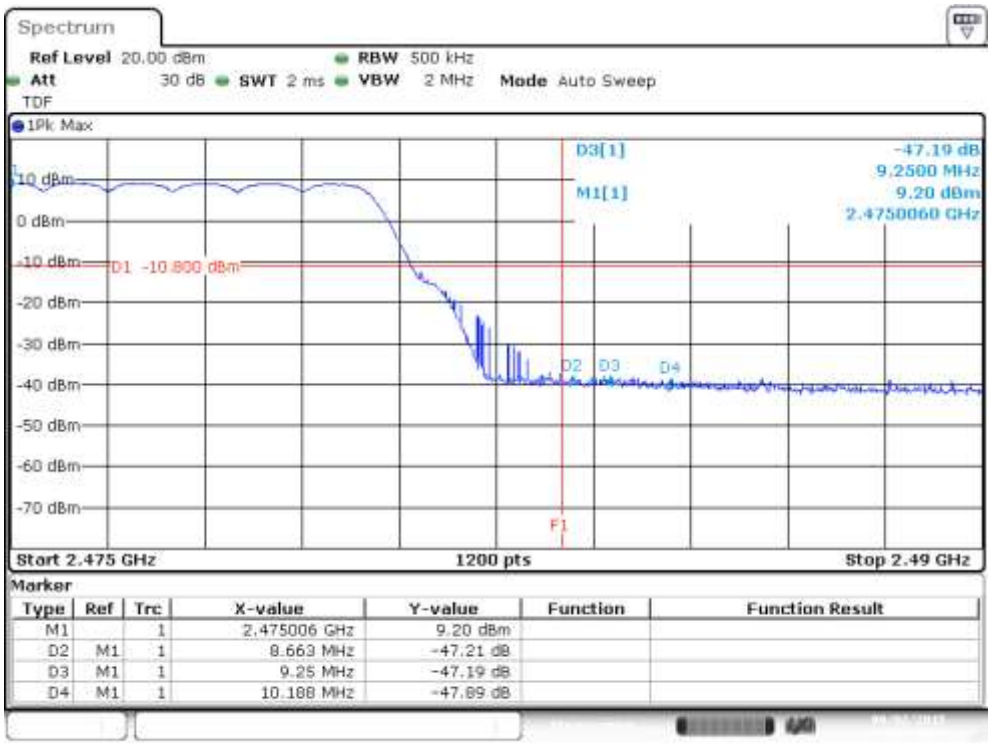


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.404994 GHz	9.67 dBm		
D2	M1	1	-5.093 MHz	-33.95 dB		
D3	M1	1	-5.5 MHz	-38.75 dB		
D4	M1	1	-5.938 MHz	-44.03 dB		

Date: 2.SEP.2015 11:59:42

BE High Freq Section - Hopping



Marker

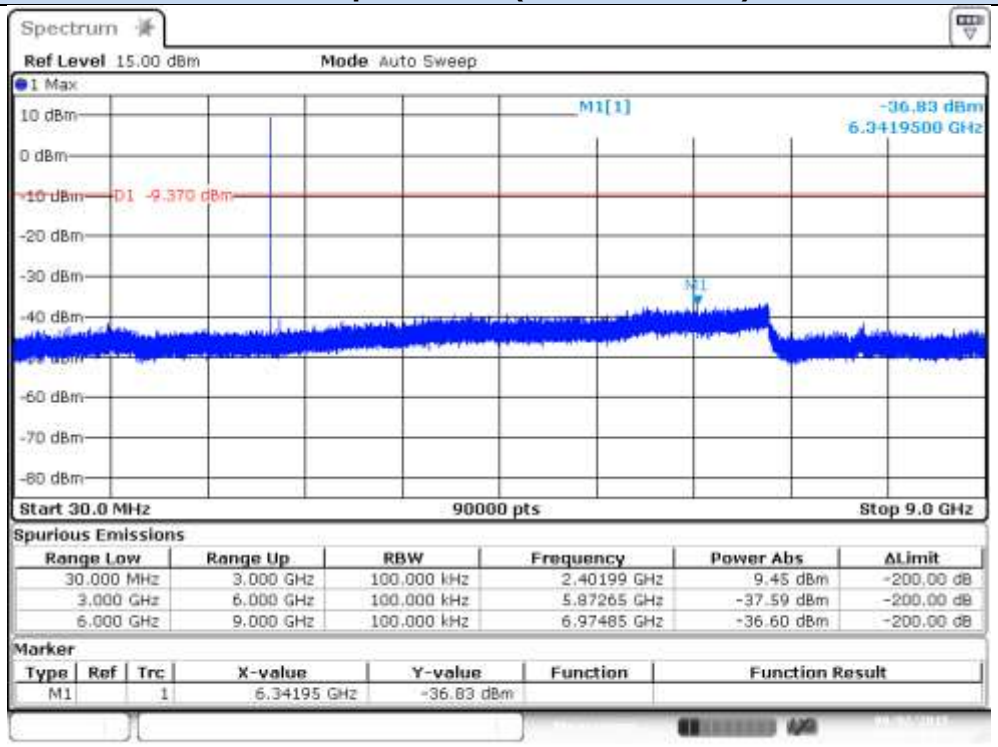
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.475006 GHz	9.20 dBm		
D2	M1	1	8.663 MHz	-47.21 dB		
D3	M1	1	9.25 MHz	-47.19 dB		
D4	M1	1	10.188 MHz	-47.89 dB		

Date: 2.SEP.2015 12:01:12

Conducted Spurious results Screenshot:

Basic Rate - GFSK

Cond Spur – CH0 (30MHz – 9GHz)



Spurious Emissions

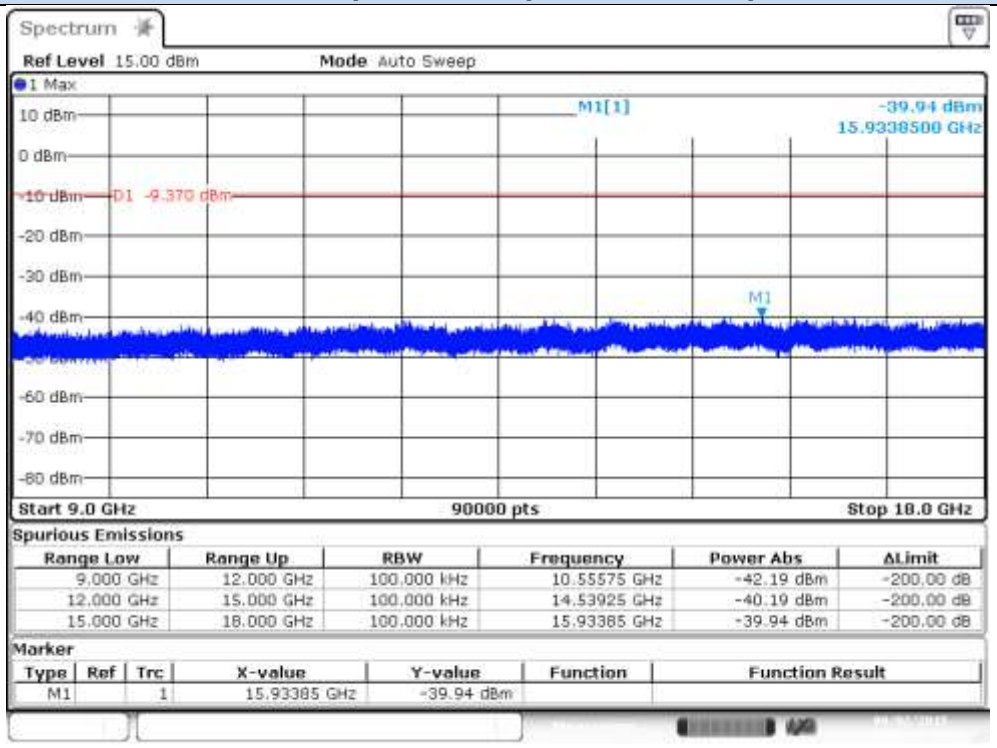
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	3.000 GHz	100.000 kHz	2.40199 GHz	9.45 dBm	-200.00 dB
3.000 GHz	6.000 GHz	100.000 kHz	5.87265 GHz	-37.59 dBm	-200.00 dB
6.000 GHz	9.000 GHz	100.000 kHz	6.97485 GHz	-36.60 dBm	-200.00 dB

Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	6.34195 GHz	-36.83 dBm		

Date: 2.SEP.2015 10:24:51

Cond Spur – CH0 (9GHz – 18GHz)



Spurious Emissions

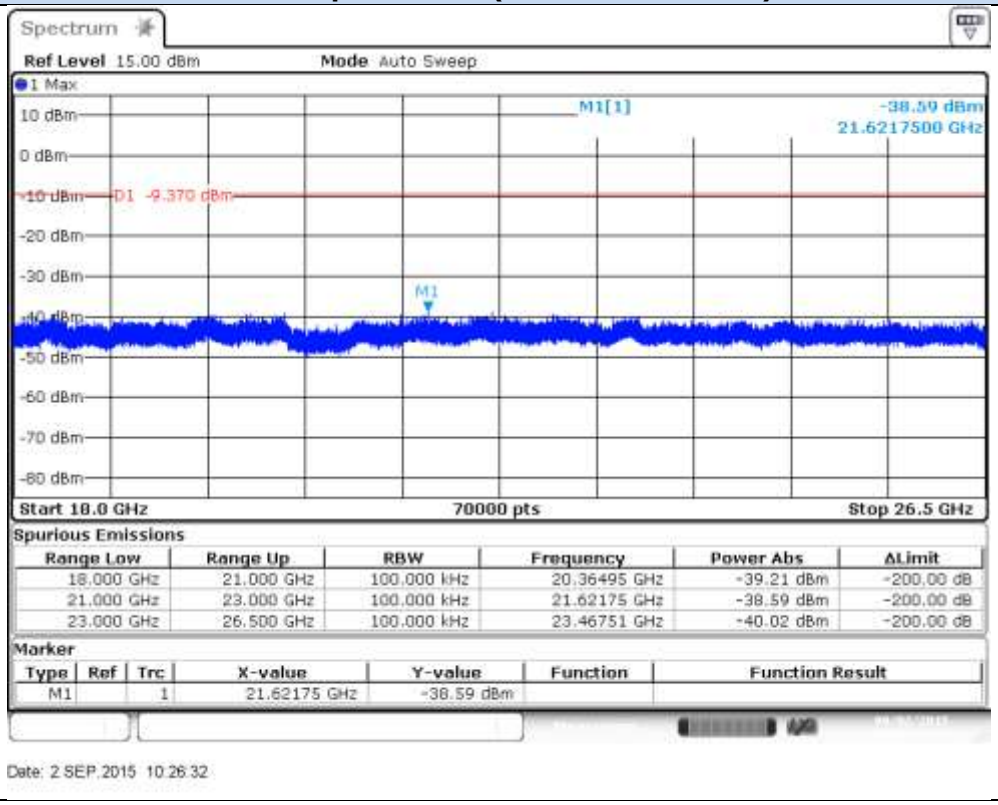
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
9.000 GHz	12.000 GHz	100.000 kHz	10.55575 GHz	-42.19 dBm	-200.00 dB
12.000 GHz	15.000 GHz	100.000 kHz	14.53925 GHz	-40.19 dBm	-200.00 dB
15.000 GHz	18.000 GHz	100.000 kHz	15.93385 GHz	-39.94 dBm	-200.00 dB

Marker

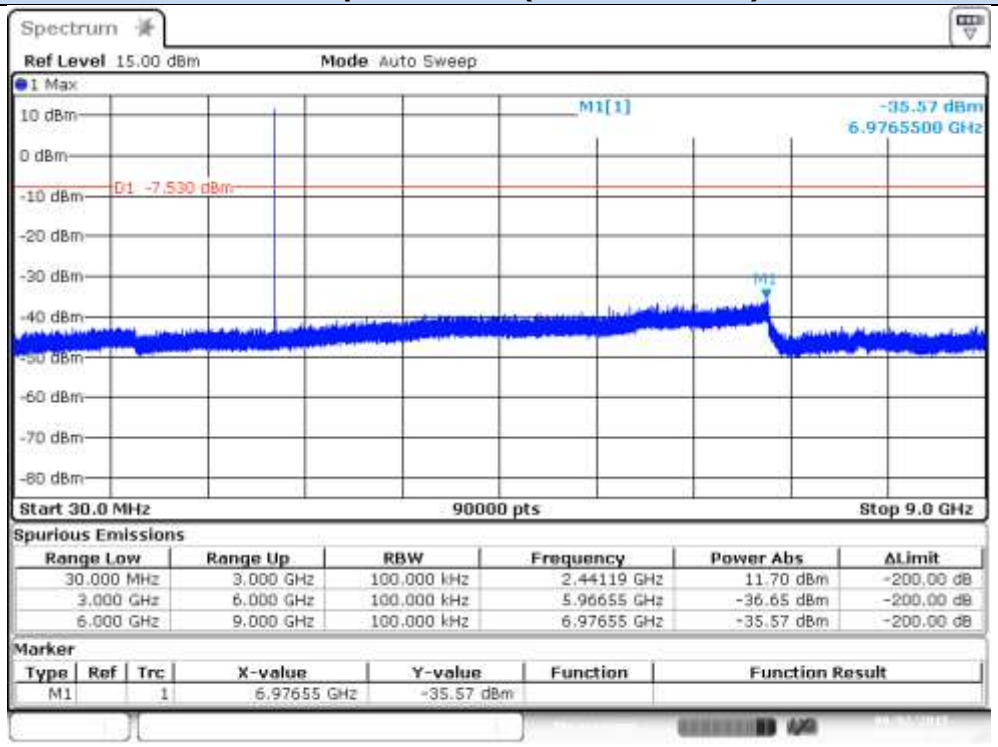
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	15.93385 GHz	-39.94 dBm		

Date: 2.SEP.2015 10:25:56

Cond Spur – CH0 (18GHz – 26.5GHz)



Cond Spur – CH39 (30MHz – 9GHz)



Spurious Emissions

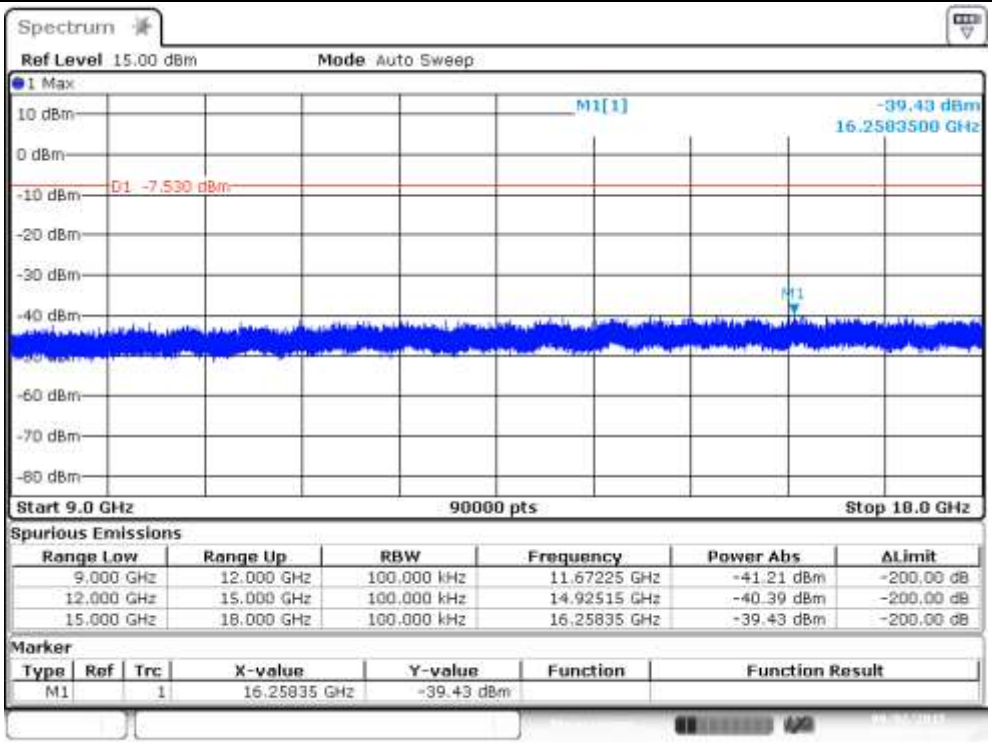
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	3.000 GHz	100.000 kHz	2.44119 GHz	11.70 dBm	-200.00 dB
3.000 GHz	6.000 GHz	100.000 kHz	5.96655 GHz	-36.65 dBm	-200.00 dB
6.000 GHz	9.000 GHz	100.000 kHz	6.97655 GHz	-35.57 dBm	-200.00 dB

Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	6.97655 GHz	-35.57 dBm		

Date: 2.SEP.2015 10:58:08

Cond Spur - CH39 (9GHz – 18GHz)



Spurious Emissions

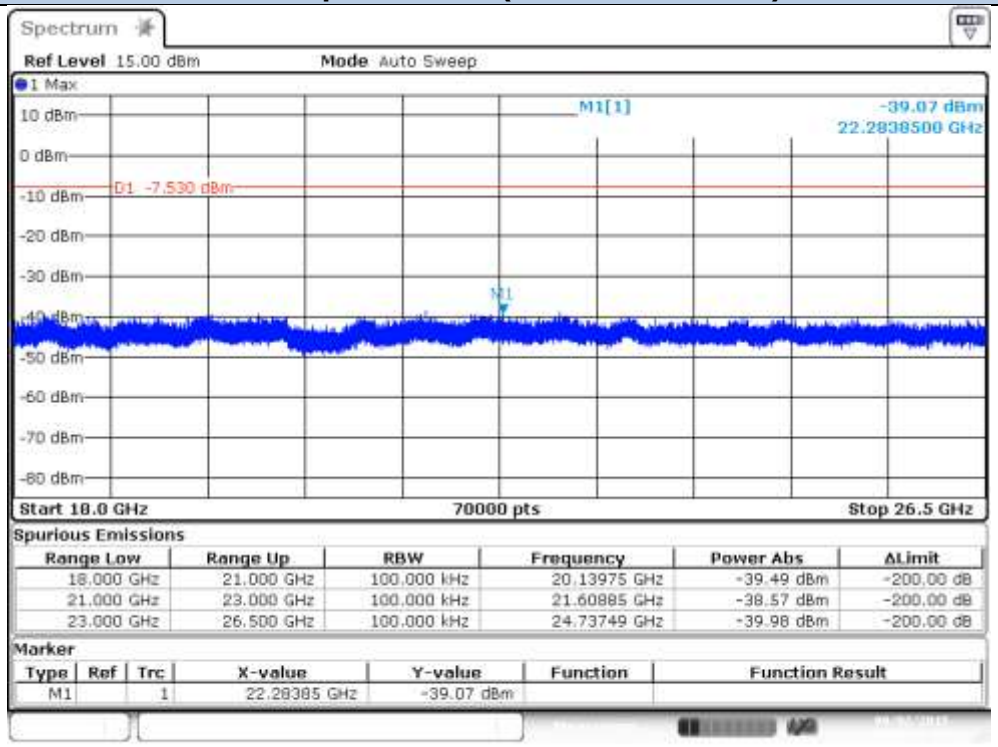
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
9.000 GHz	12.000 GHz	100.000 kHz	11.67225 GHz	-41.21 dBm	-200.00 dB
12.000 GHz	15.000 GHz	100.000 kHz	14.92515 GHz	-40.39 dBm	-200.00 dB
15.000 GHz	18.000 GHz	100.000 kHz	16.25835 GHz	-39.43 dBm	-200.00 dB

Marker

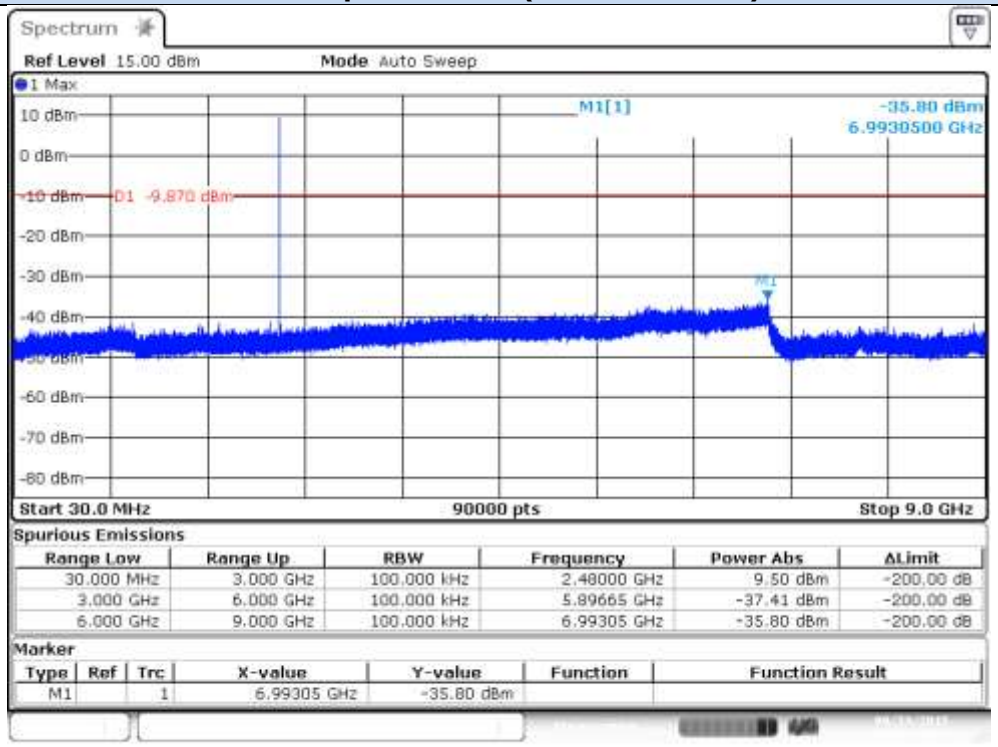
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	16.25835 GHz	-39.43 dBm		

Date: 2.SEP.2015 10:58:43

Cond Spur – CH39 (18GHz – 26.5GHz)



Cond Spur – CH78 (30MHz – 9GHz)



Spurious Emissions

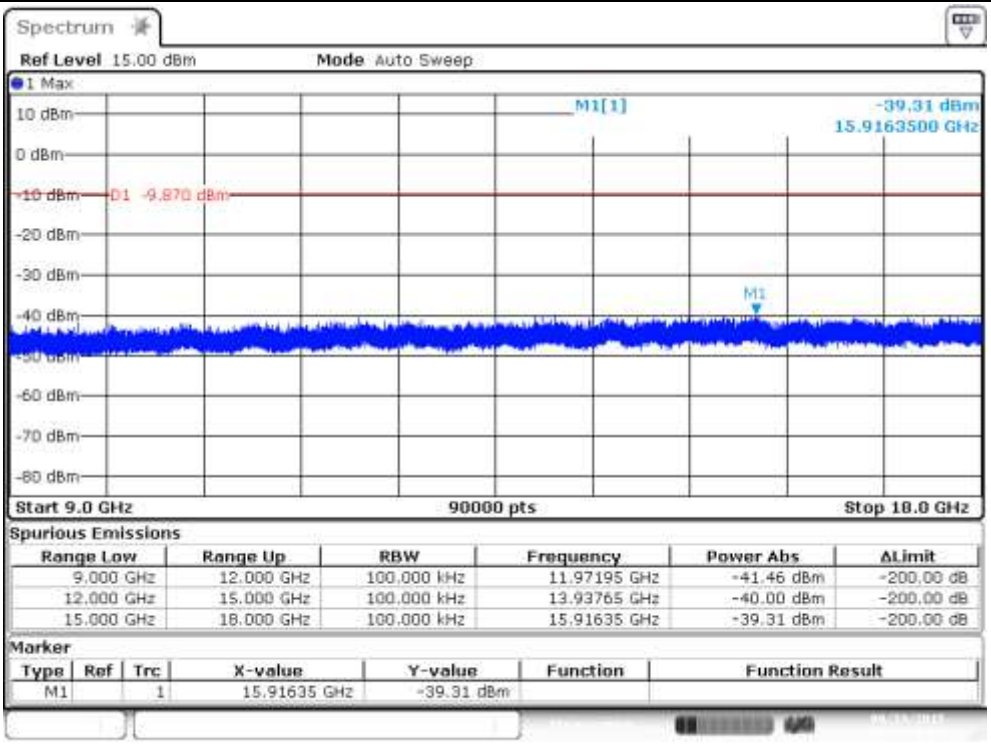
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	3.000 GHz	100.000 kHz	2.48000 GHz	9.50 dBm	-200.00 dB
3.000 GHz	6.000 GHz	100.000 kHz	5.89665 GHz	-37.41 dBm	-200.00 dB
6.000 GHz	9.000 GHz	100.000 kHz	6.99305 GHz	-35.80 dBm	-200.00 dB

Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	6.99305 GHz	-35.80 dBm		

Date: 23.SEP.2015 16:22:35

Cond Spur – CH78 (9GHz – 18GHz)



Spurious Emissions

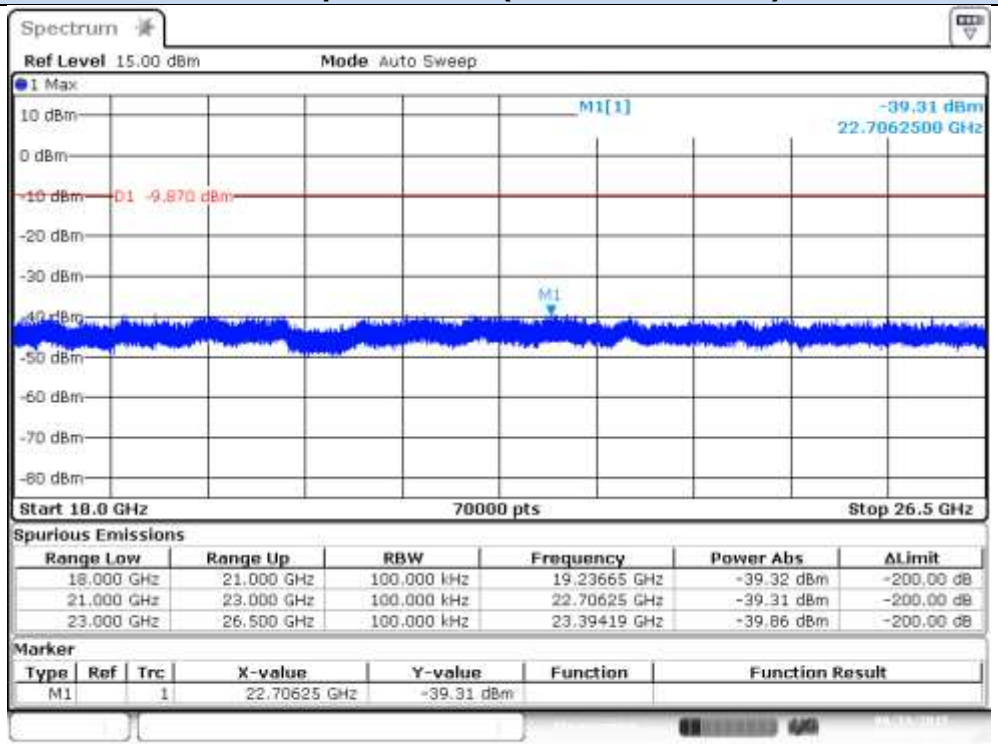
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
9.000 GHz	12.000 GHz	100.000 kHz	11.97195 GHz	-41.46 dBm	-200.00 dB
12.000 GHz	15.000 GHz	100.000 kHz	13.93765 GHz	-40.00 dBm	-200.00 dB
15.000 GHz	18.000 GHz	100.000 kHz	15.91635 GHz	-39.31 dBm	-200.00 dB

Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	15.91635 GHz	-39.31 dBm		

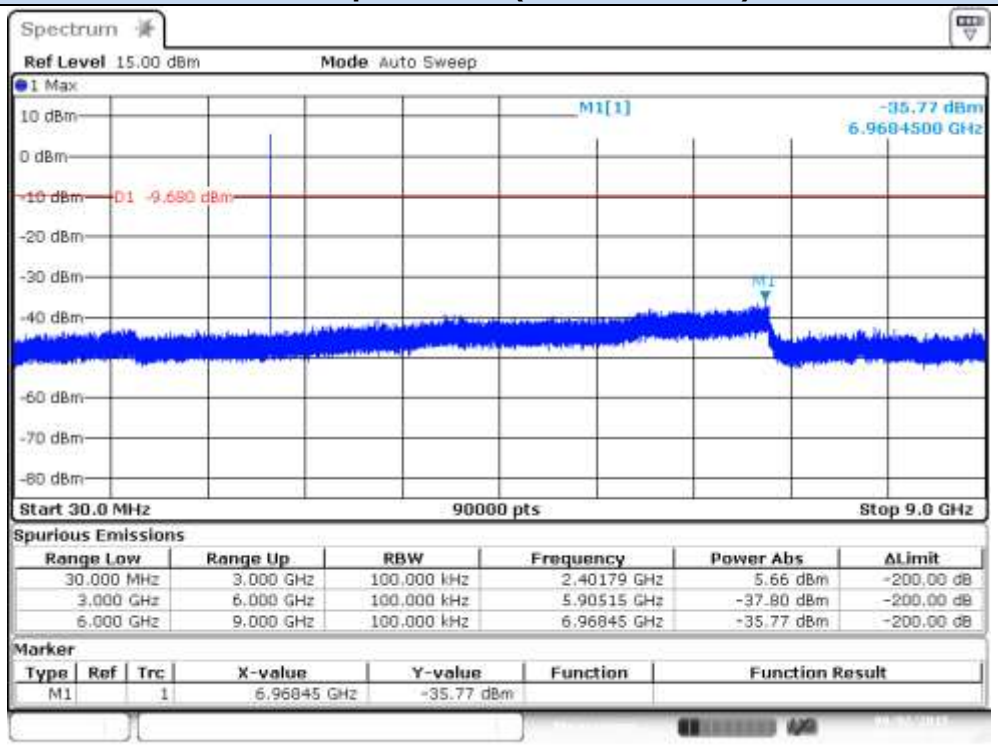
Date: 23.SEP.2015 16:24:38

Cond Spur – CH78 (18GHz – 26.5GHz)



EDR – π/4-DQPSK

Cond Spur – CH0 (30MHz – 9GHz)



Spurious Emissions

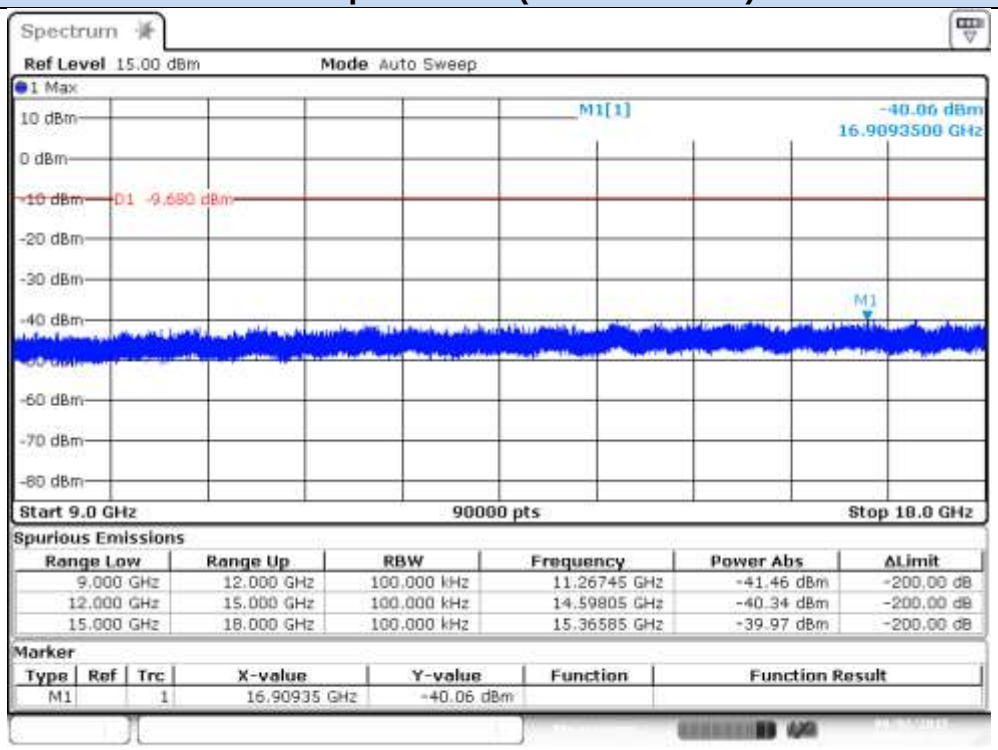
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	3.000 GHz	100.000 kHz	2.40179 GHz	5.66 dBm	-200.00 dB
3.000 GHz	6.000 GHz	100.000 kHz	5.90515 GHz	-37.80 dBm	-200.00 dB
6.000 GHz	9.000 GHz	100.000 kHz	6.96845 GHz	-35.77 dBm	-200.00 dB

Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	6.96845 GHz	-35.77 dBm		

Date: 2.SEP.2015 11:33:42

Cond Spur – CH0 (9GHz – 18GHz)



Spurious Emissions

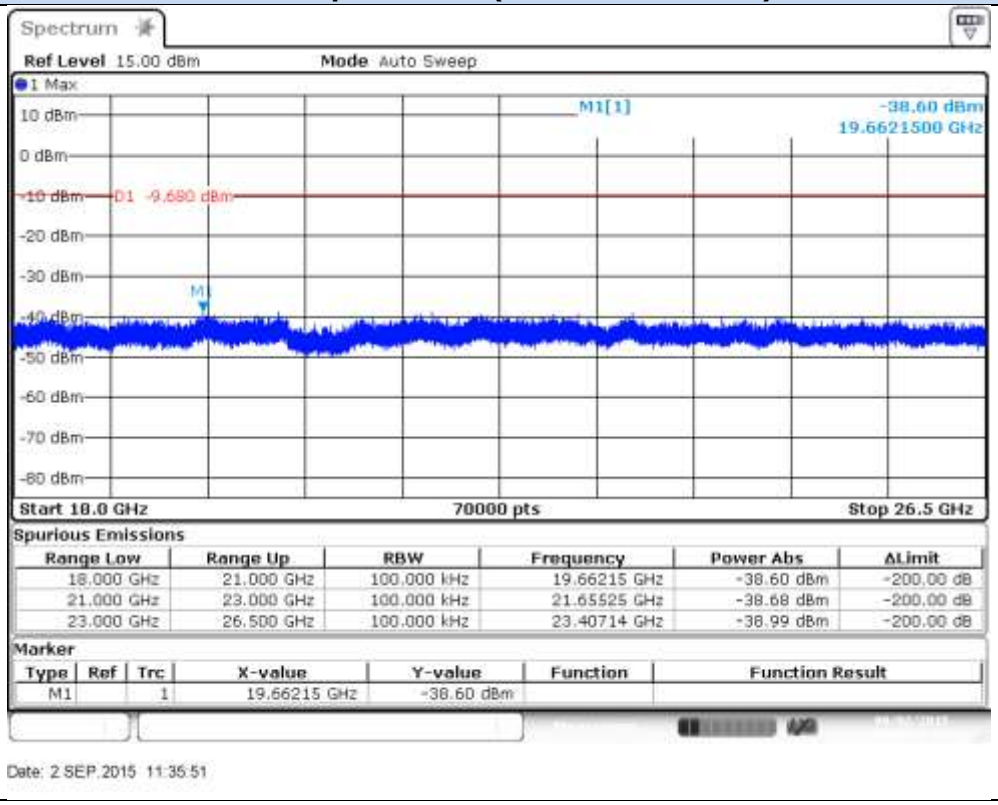
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
9.000 GHz	12.000 GHz	100.000 kHz	11.26745 GHz	-41.46 dBm	-200.00 dB
12.000 GHz	15.000 GHz	100.000 kHz	14.59805 GHz	-40.34 dBm	-200.00 dB
15.000 GHz	18.000 GHz	100.000 kHz	15.36585 GHz	-39.97 dBm	-200.00 dB

Marker

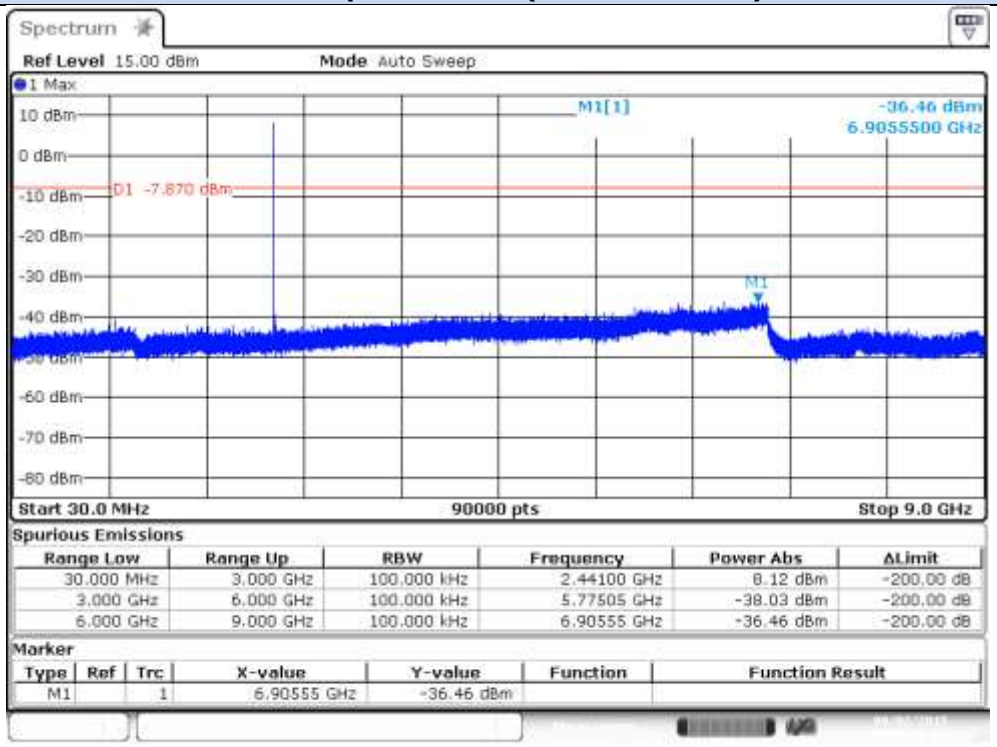
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	16.90935 GHz	-40.06 dBm		

Date: 2.SEP.2015 11:34:46

Cond Spur – CH0 (18GHz – 26.5GHz)



Cond Spur – CH39 (30MHz – 9GHz)



Spurious Emissions

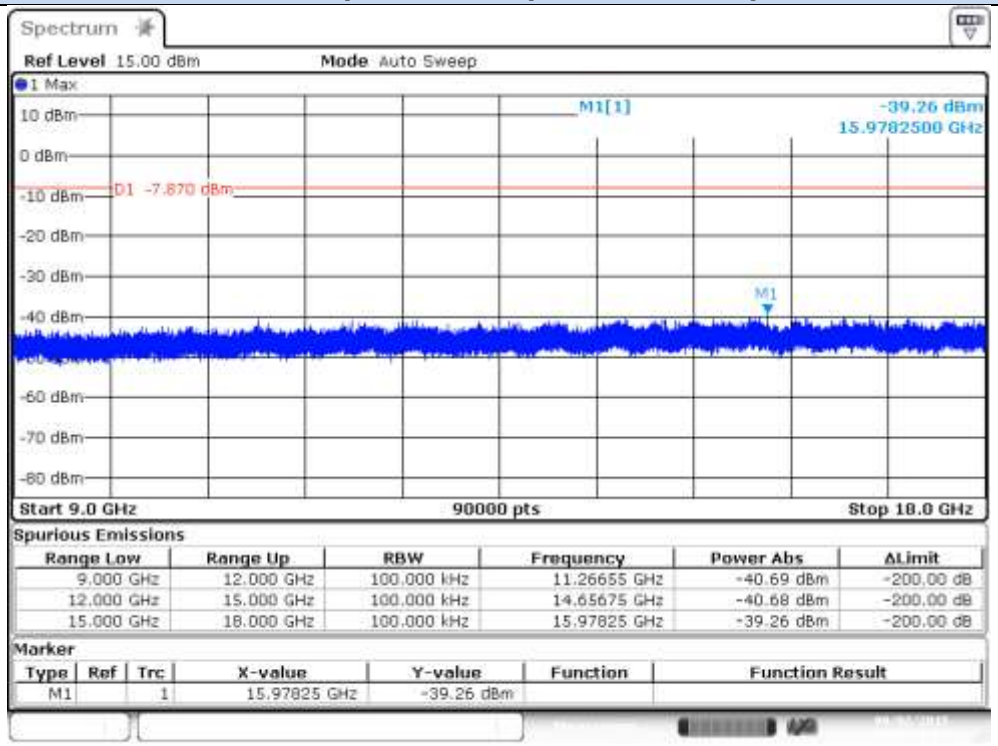
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	3.000 GHz	100.000 kHz	2.44100 GHz	8.12 dBm	-200.00 dB
3.000 GHz	6.000 GHz	100.000 kHz	5.77505 GHz	-38.03 dBm	-200.00 dB
6.000 GHz	9.000 GHz	100.000 kHz	6.90555 GHz	-36.46 dBm	-200.00 dB

Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	6.90555 GHz	-36.46 dBm		

Date: 2.SEP.2015 11:43:51

Cond Spur - CH39 (9GHz – 18GHz)



Spurious Emissions

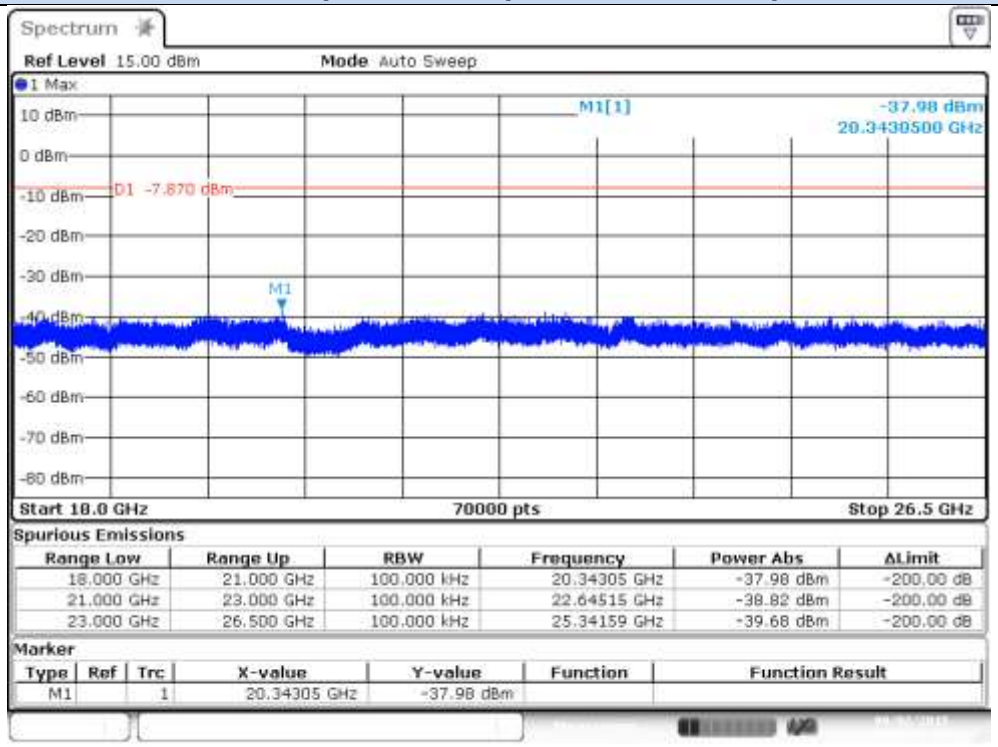
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
9.000 GHz	12.000 GHz	100.000 kHz	11.26655 GHz	-40.69 dBm	-200.00 dB
12.000 GHz	15.000 GHz	100.000 kHz	14.65675 GHz	-40.68 dBm	-200.00 dB
15.000 GHz	18.000 GHz	100.000 kHz	15.97825 GHz	-39.26 dBm	-200.00 dB

Marker

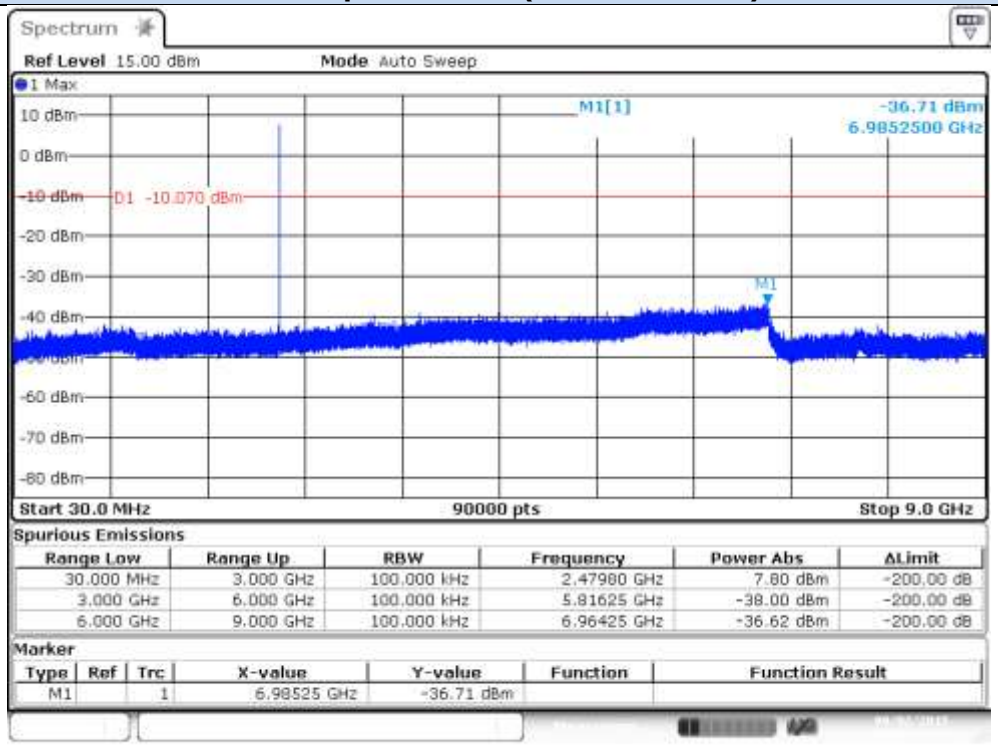
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	15.97825 GHz	-39.26 dBm		

Date: 2.SEP.2015 11:44:25

Cond Spur – CH39 (18GHz – 26.5GHz)

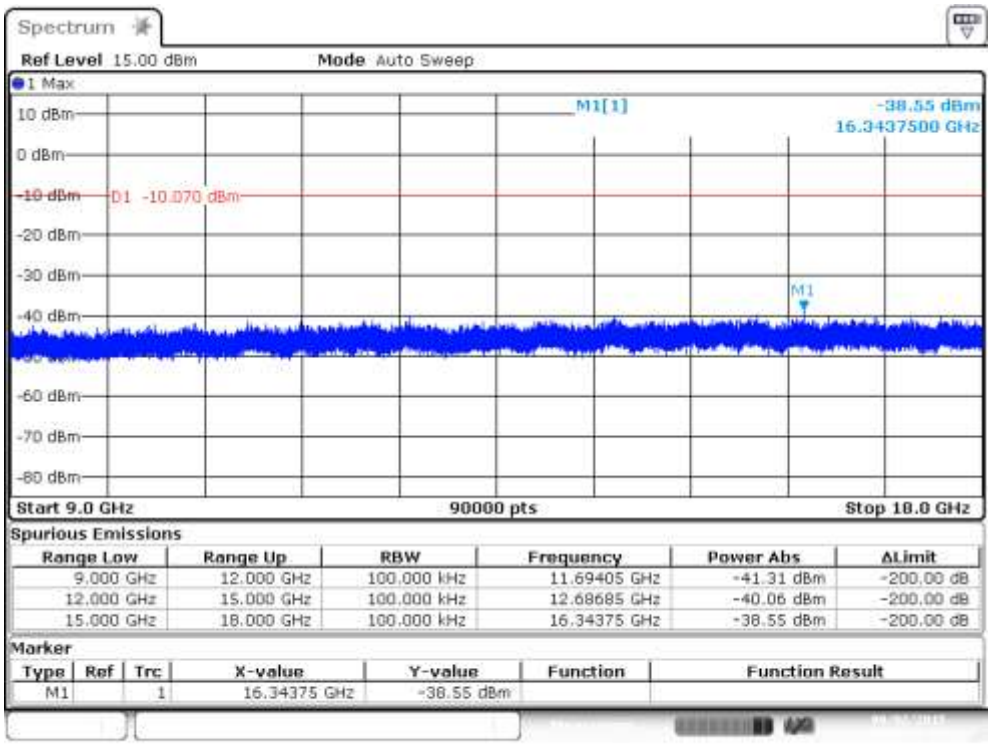


Cond Spur – CH78 (30MHz – 9GHz)



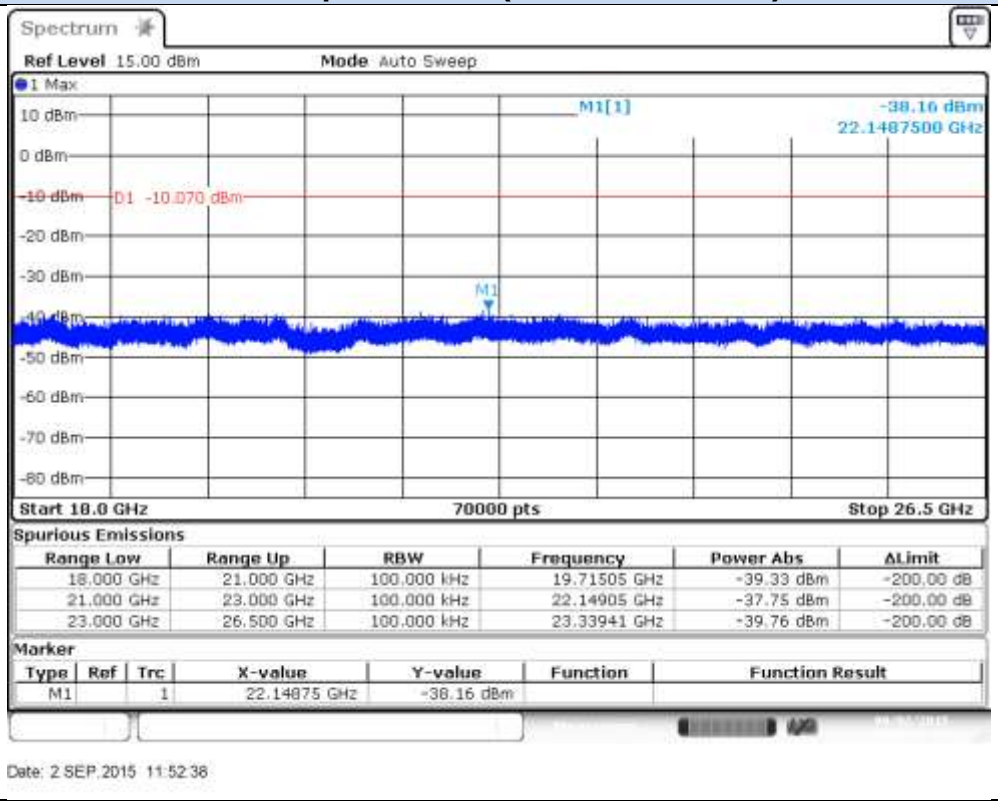
Date: 2.SEP.2015 11:50:42

Cond Spur – CH78 (9GHz – 18GHz)



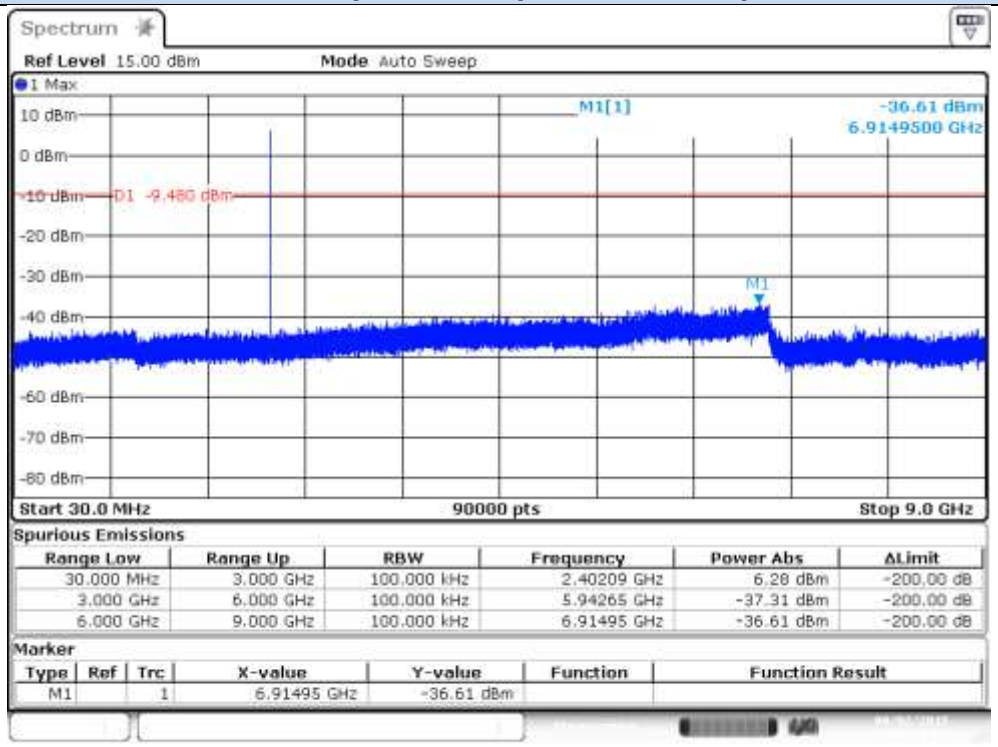
Date: 2.SEP.2015 11:51:47

Cond Spur – CH78 (18GHz – 26.5GHz)



EDR – 8-DPSK

Cond Spur – CH0 (30MHz – 9GHz)



Spurious Emissions

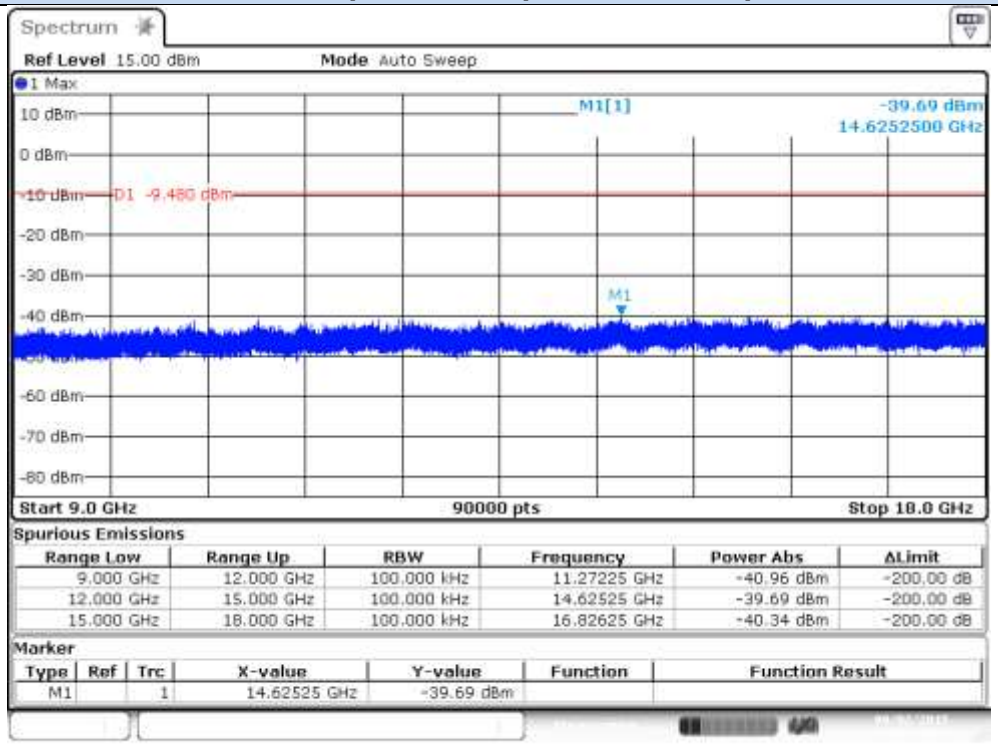
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	3.000 GHz	100.000 kHz	2.40209 GHz	6.28 dBm	-200.00 dB
3.000 GHz	6.000 GHz	100.000 kHz	5.94265 GHz	-37.31 dBm	-200.00 dB
6.000 GHz	9.000 GHz	100.000 kHz	6.91495 GHz	-36.61 dBm	-200.00 dB

Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	6.91495 GHz	-36.61 dBm		

Date: 2.SEP.2015 12:08:56

Cond Spur – CH0 (9GHz – 18GHz)



Spurious Emissions

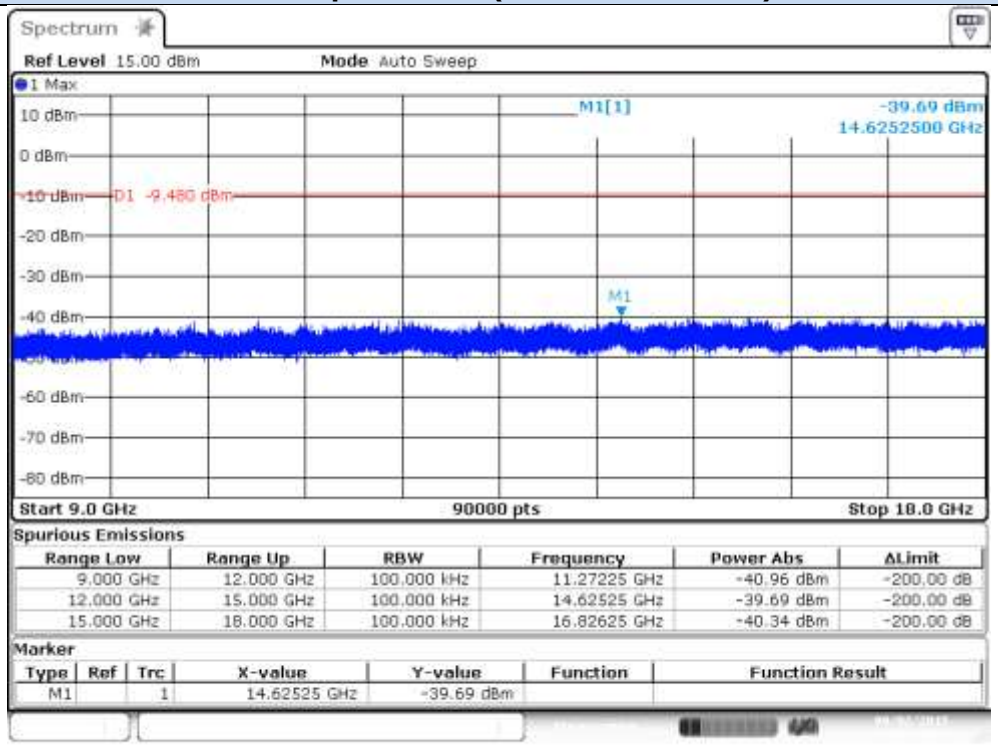
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
9.000 GHz	12.000 GHz	100.000 kHz	11.27225 GHz	-40.96 dBm	-200.00 dB
12.000 GHz	15.000 GHz	100.000 kHz	14.62525 GHz	-39.69 dBm	-200.00 dB
15.000 GHz	18.000 GHz	100.000 kHz	16.82625 GHz	-40.34 dBm	-200.00 dB

Marker

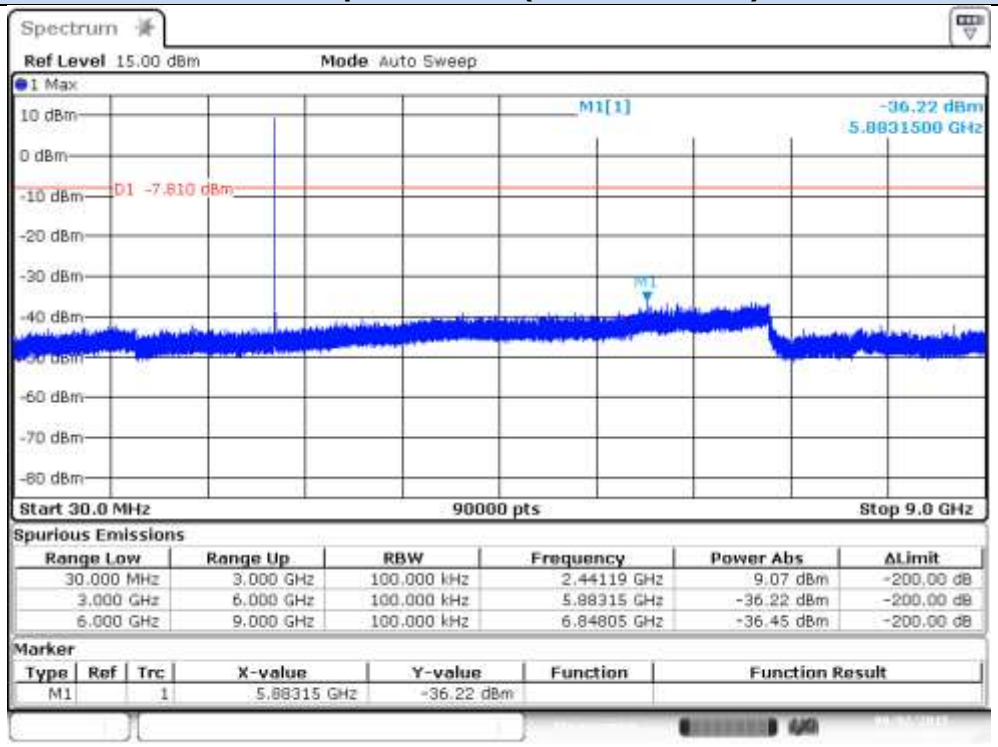
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	14.62525 GHz	-39.69 dBm		

Date: 2.SEP.2015 12:09:43

Cond Spur – CH0 (18GHz – 26.5GHz)



Cond Spur – CH39 (30MHz – 9GHz)



Spurious Emissions

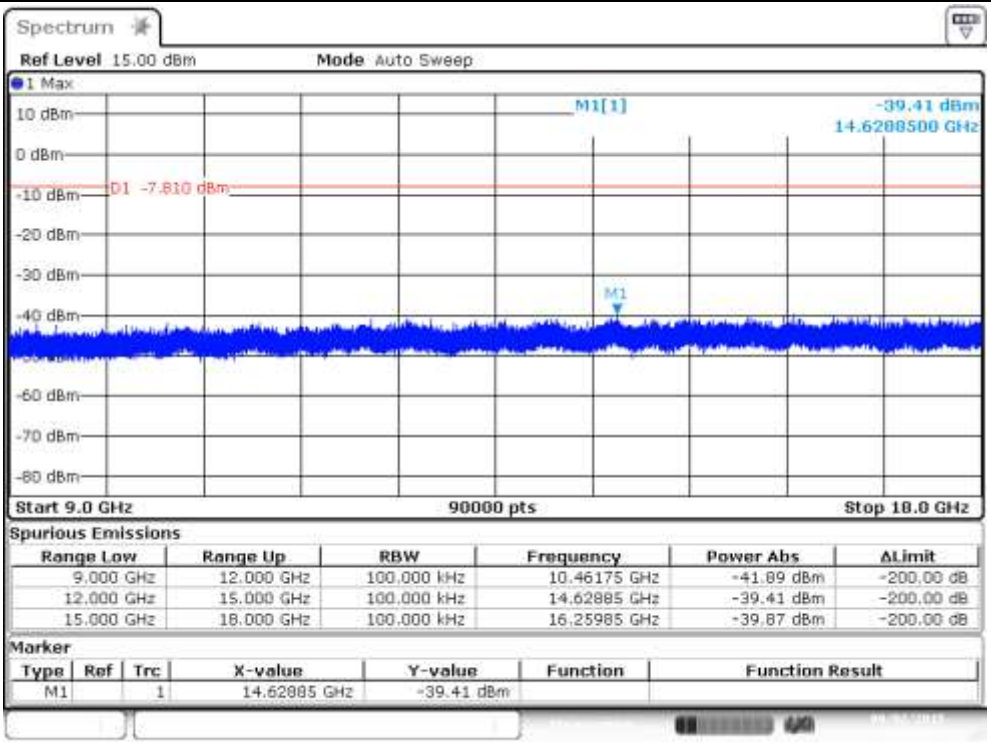
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	3.000 GHz	100.000 kHz	2.44119 GHz	9.07 dBm	-200.00 dB
3.000 GHz	6.000 GHz	100.000 kHz	5.88315 GHz	-36.22 dBm	-200.00 dB
6.000 GHz	9.000 GHz	100.000 kHz	6.84805 GHz	-36.45 dBm	-200.00 dB

Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.88315 GHz	-36.22 dBm		

Date: 2.SEP.2015 12:14:28

Cond Spur - CH39 (9GHz – 18GHz)



Spurious Emissions

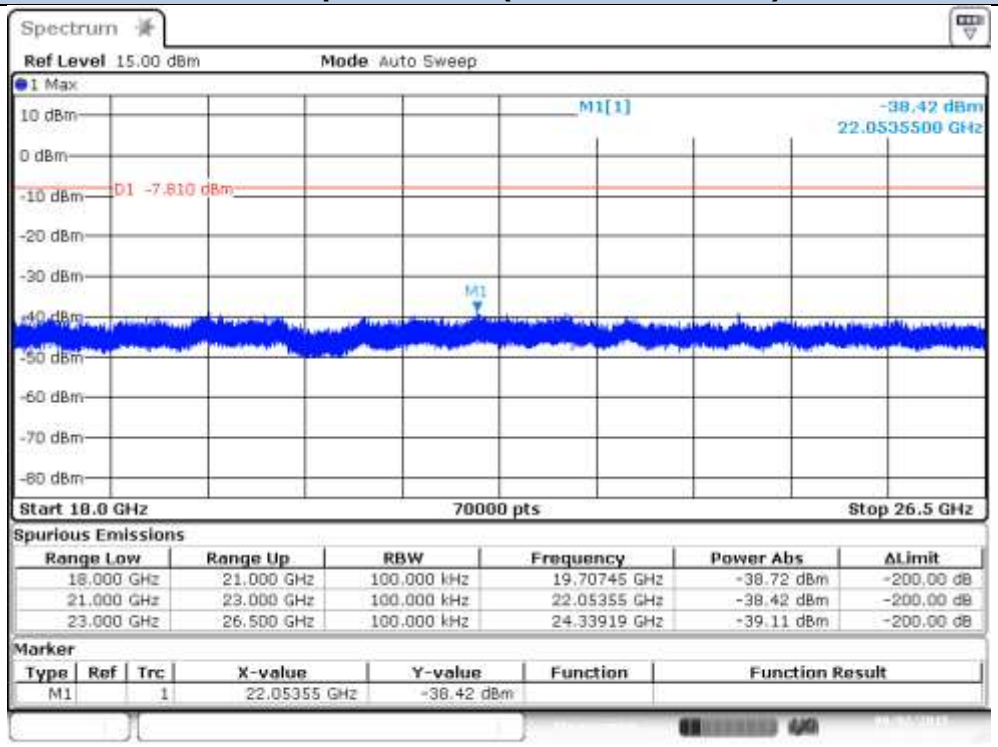
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
9.000 GHz	12.000 GHz	100.000 kHz	10.46175 GHz	-41.89 dBm	-200.00 dB
12.000 GHz	15.000 GHz	100.000 kHz	14.62885 GHz	-39.41 dBm	-200.00 dB
15.000 GHz	18.000 GHz	100.000 kHz	16.25985 GHz	-39.87 dBm	-200.00 dB

Marker

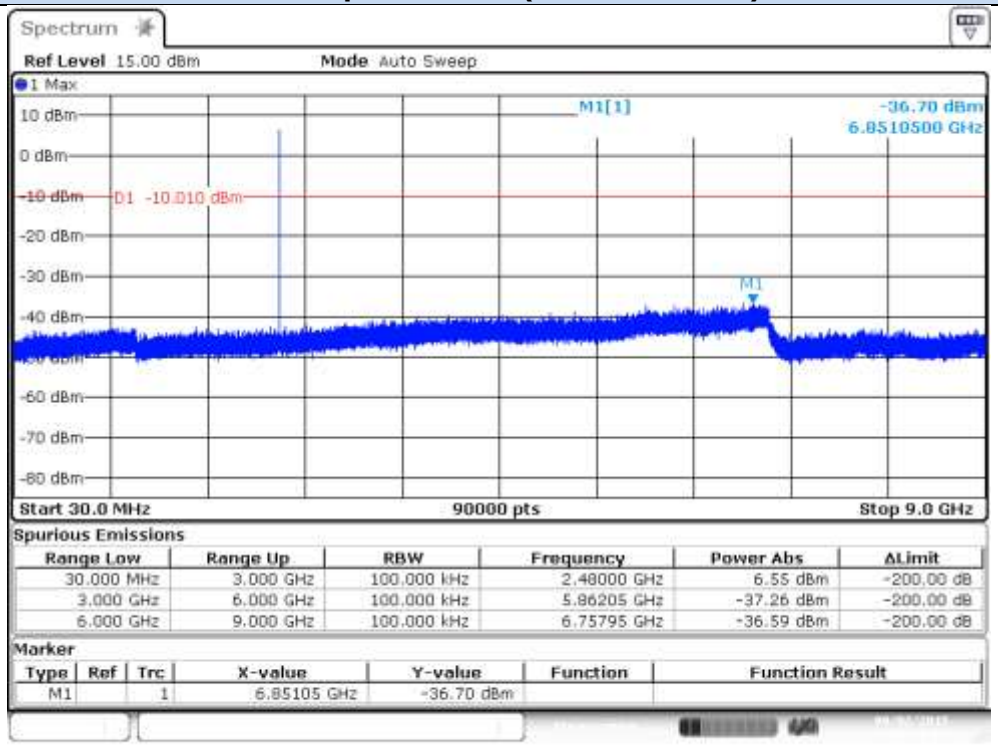
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	14.62885 GHz	-39.41 dBm		

Date: 2.SEP.2015 12:15:07

Cond Spur – CH39 (18GHz – 26.5GHz)

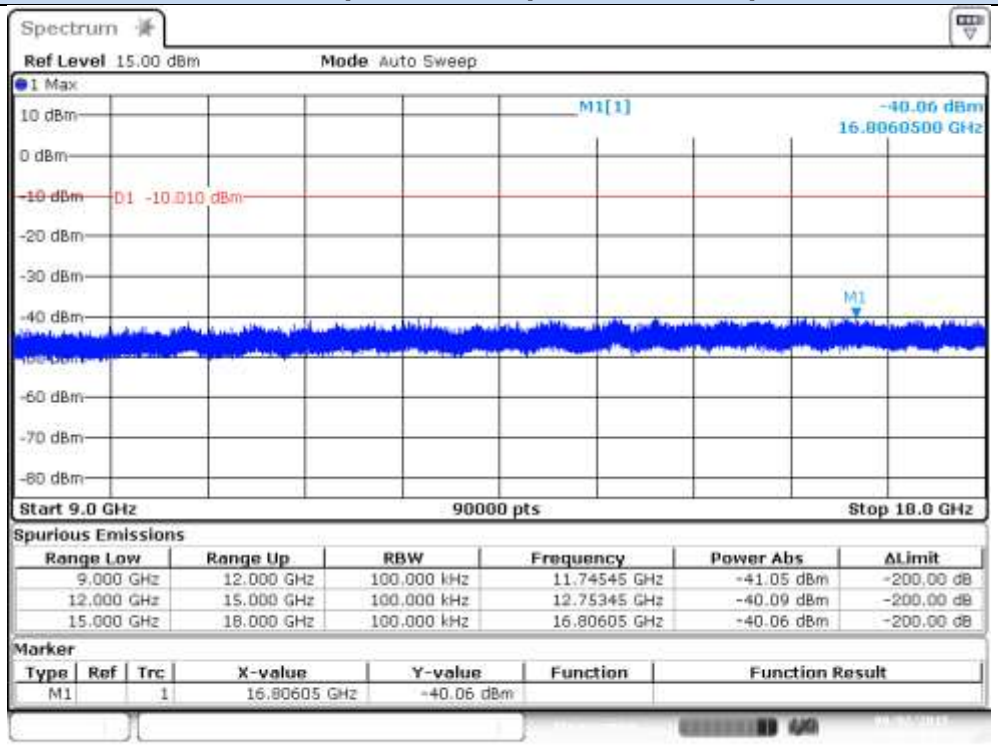


Cond Spur – CH78 (30MHz – 9GHz)



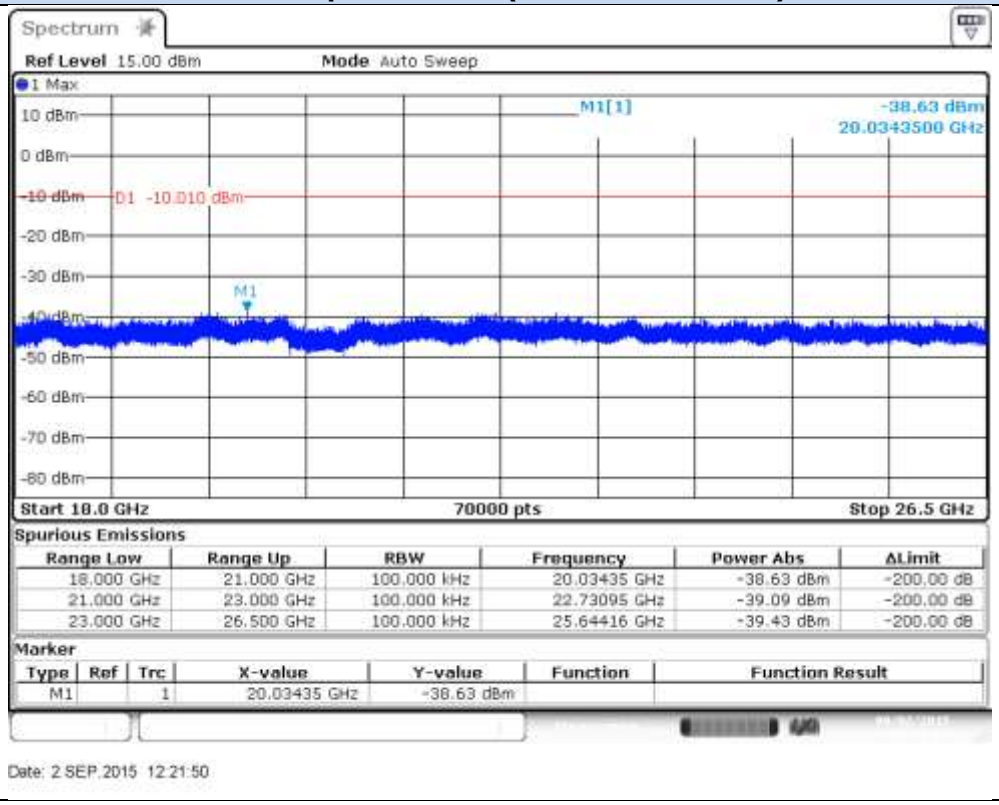
Date: 2.SEP.2015 12:20:31

Cond Spur – CH78 (9GHz – 18GHz)



Date: 2.SEP.2015 12:21:06

Cond Spur – CH78 (18GHz – 26.5GHz)



B.6 Radiated spurious emission

Standard references:

FCC part	RSS part	Limits
15.247 (d)	RSS-247 Clause 5.5	Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a):

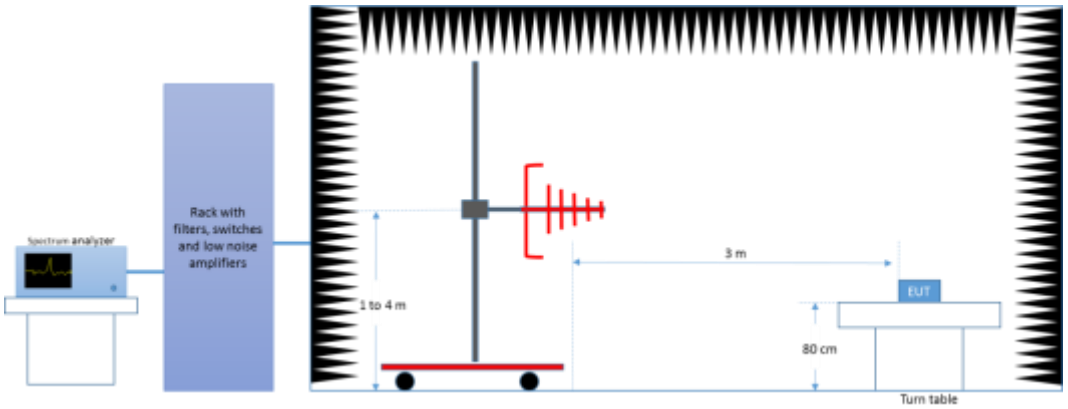
Freq Range (MHz)	Field Stregth (µV/m)	Field Stregth (dBµV/m)	Meas. Distance (m)
0.009-0.490	2400/f(kHz)	-	300
0.490-1.705	24000/f(kHz)	-	300
1.705-30.0	30	-	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
960-25000	500	54	3

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
For average radiated emission measurements above 1000 MHz, there is also a limit specified when measuring with peak detector function, corresponding to 20 dB above the indicated values in the table.

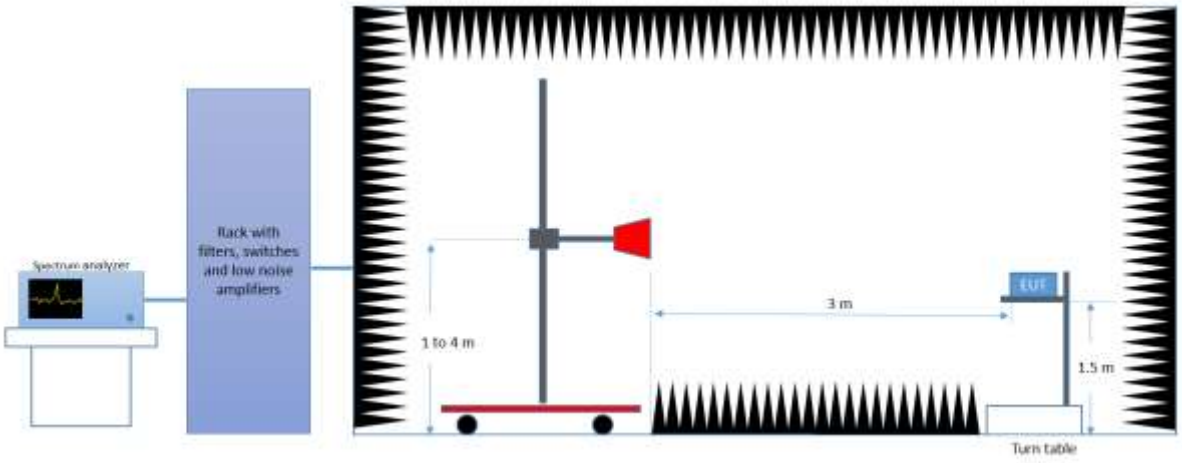
Test procedure:

The setups below were used to measure the radiated spurious emissions.
Depending of the frequency range and bands being tested, different antennas and filters were used.
The final measurement is done by varying the antenna height from 1 to 4 meters, the EUT azimuth over 360º and for both Vertical and Horizontal polarizations.
The radiated spurious emission was measured on the worst case configuration found.

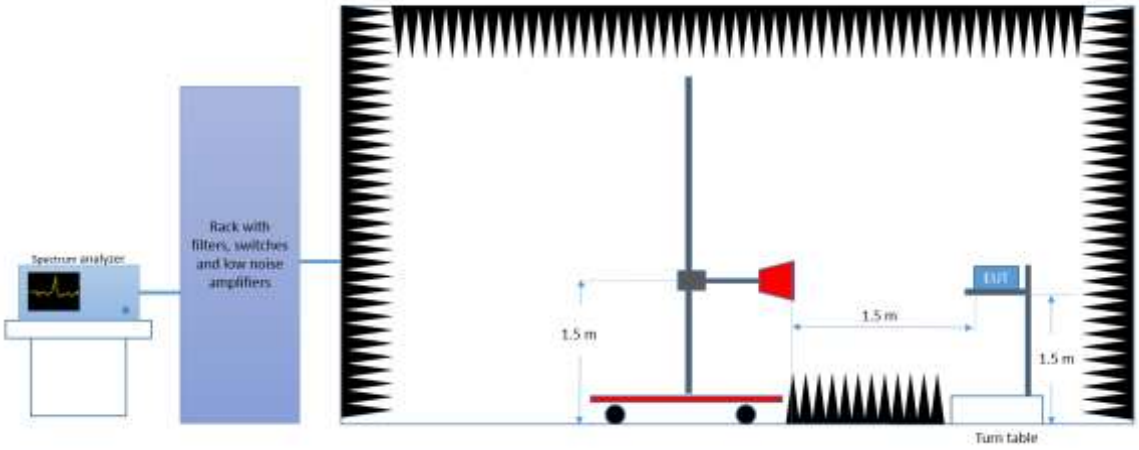
Radiated Setup < 1GHz



Radiated Setup > 1GHz



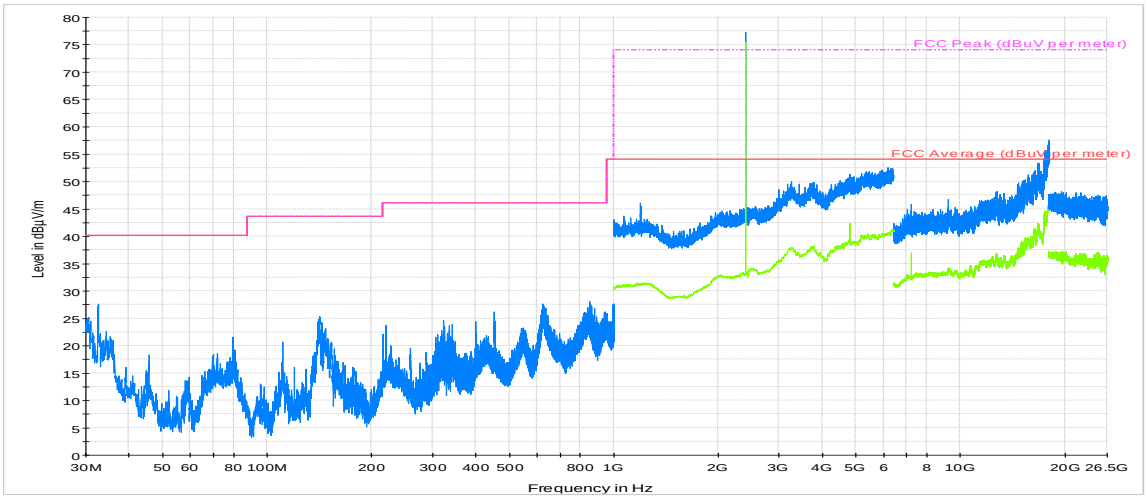
Radiated Setup > 18GHz



Test result:

BDR – GFSK

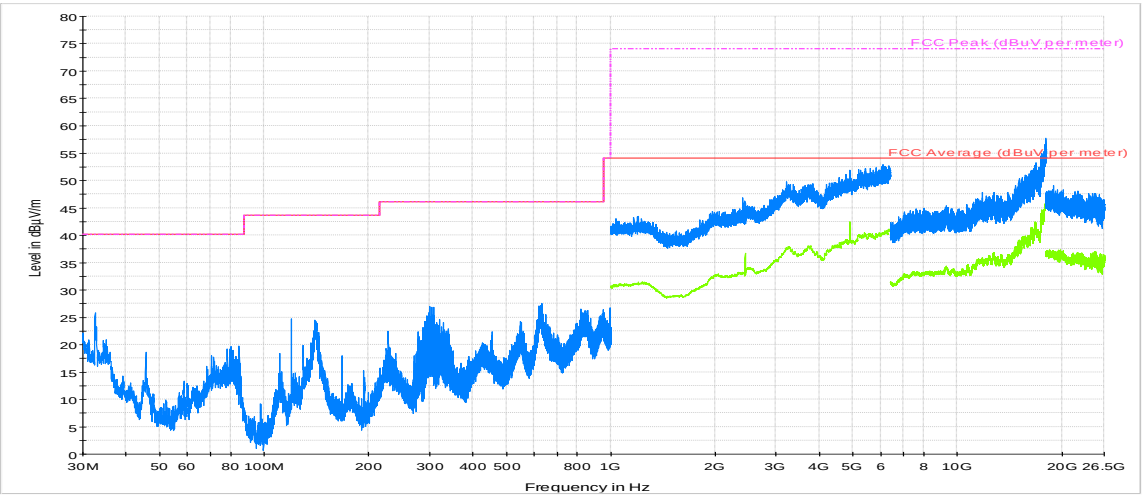
Radiated Spurious 30MHz – 26.5GHz – CH0



Peak measurements AVG measurements Limit FCC AVG Limit FCC Peak

Frequency	Max Peak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
32	28.1	---	40	**11.9**
4800	51.3	---	74	**22.7**
4800	---	46.3	54	**7.3**
18000	57.3	---	74	**16.7**
18000	---	45.4	54	**8.6**
18500	47.7	---	75	**26.3**
18500	---	36.4	54	**17.6**

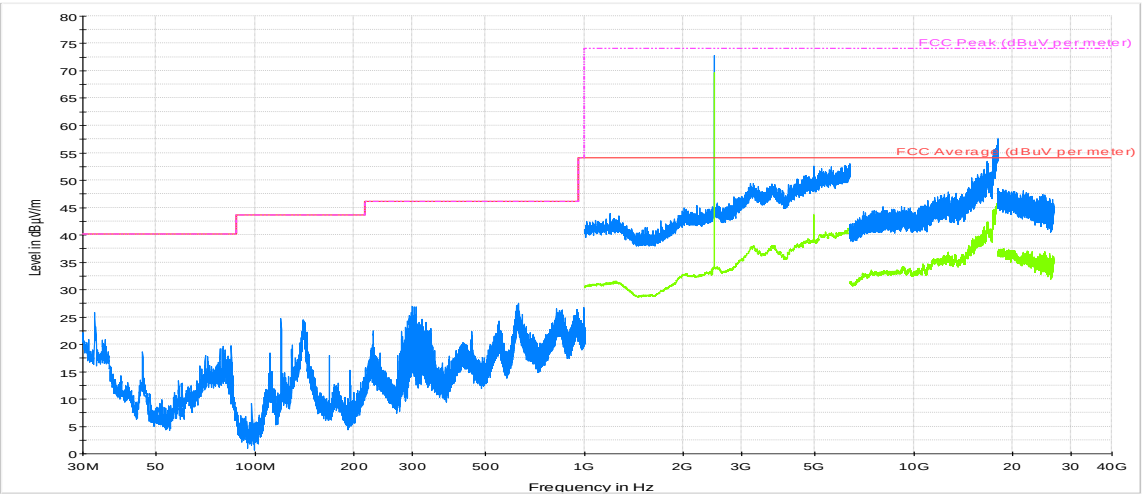
Radiated Spurious 30MHz – 26.5GHz – Ch39



Peak measurements AVG measurements Limit FCC AVG Limit FCC Peak

Frequency	Max Peak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
32	25.5	---	40	**12.5**
4882	52.2	---	74	**21.8**
4882	---	46.5	54	**7.5**
18000	57.3	---	74	**16.7**
18000	---	45.4	54	**8.6**
18500	47.7	---	75	**26.3**
18500	---	36.4	54	**17.6**

Radiated Spurious 30MHz – 26.5GHz – Ch78

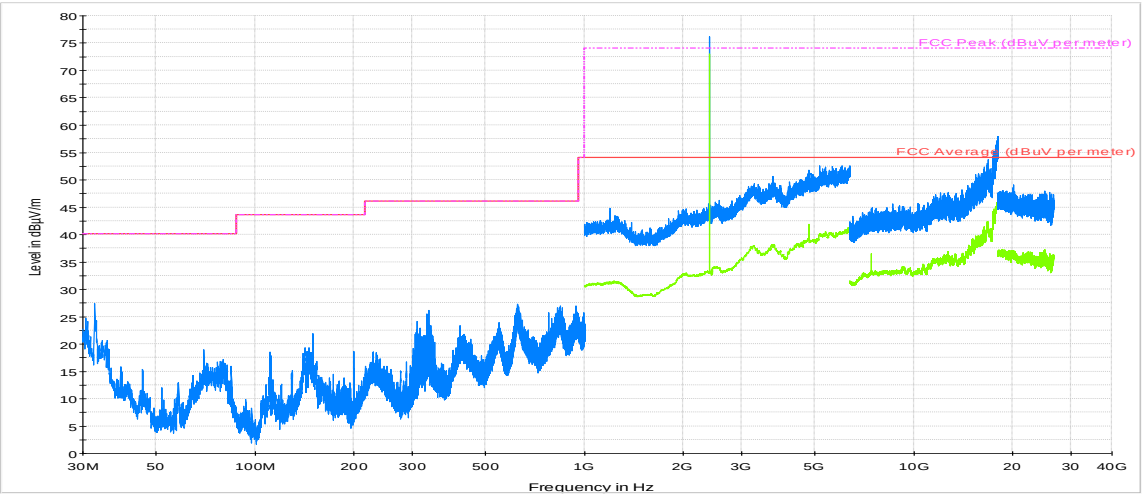


Peak measurements AVG measurements Limit FCC AVG Limit FCC Peak

Frequency	Max Peak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
32	27.9	---	40	**12.1**
4959	52.2	---	74	**21.8**
4959	---	48.3	54	**5.7**
18000	57.3	---	74	**16.7**
18000	---	45.4	54	**8.6**
18500	47.7	---	75	**26.3**
18500	---	36.4	54	**17.6**

EDR – π/4-DQPSK

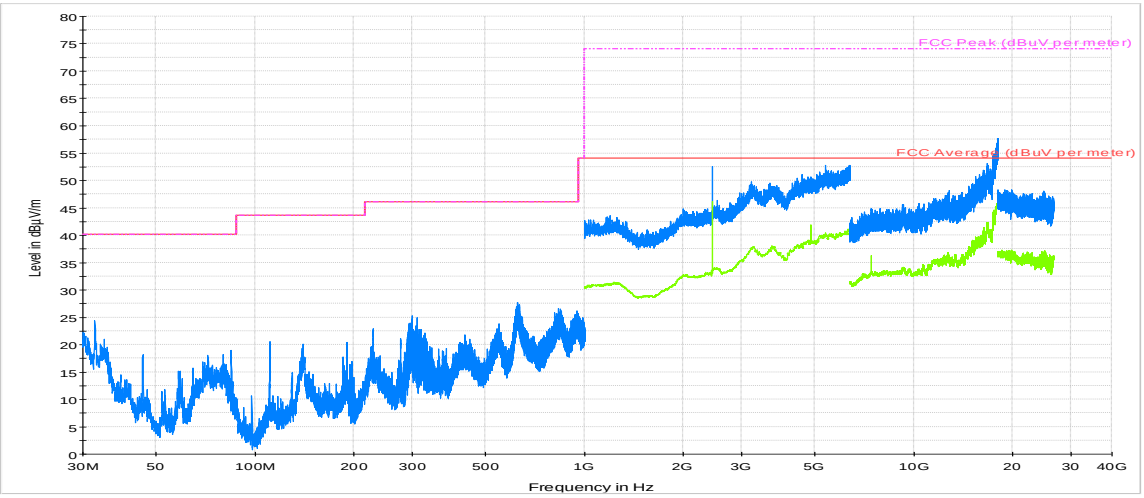
Radiated Spurious 30MHz – 26.5GHz – CH0



Peak measurements AVG measurements Limit FCC AVG Limit FCC Peak

Frequency	Max Peak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
32	27.5	---	40	**12.5**
4804	51.8	---	74	**22.2**
4804	---	44.3	54	**9.7**
18000	57.3	---	74	**16.7**
18000	---	45.4	54	**8.6**
18500	47.7	---	75	**26.3**
18500	---	36.4	54	**17.6**

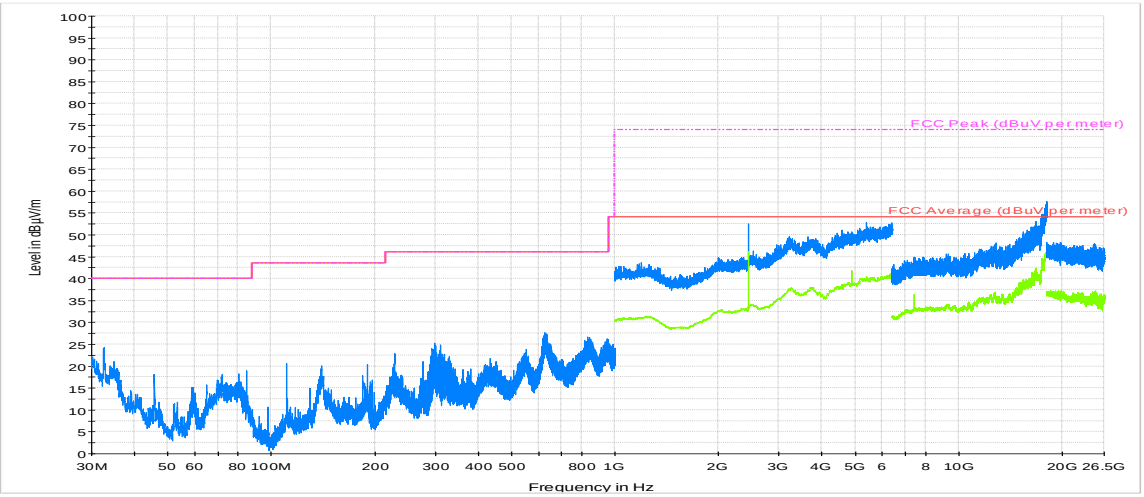
Radiated Spurious 30MHz – 26.5GHz – Ch39



Peak measurements AVG measurements Limit FCC AVG Limit FCC Peak

Frequency	Max Peak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
32	34.9	---	40	**5.1**
4881	53.1	---	74	**20.9**
4881	---	46.1	54	**7.9**
18000	57.3	---	74	**16.7**
18000	---	45.4	54	**8.6**
18500	47.7	---	75	**26.3**
18500	---	36.4	54	**17.6**

Radiated Spurious 30MHz – 26.5GHz – Ch78

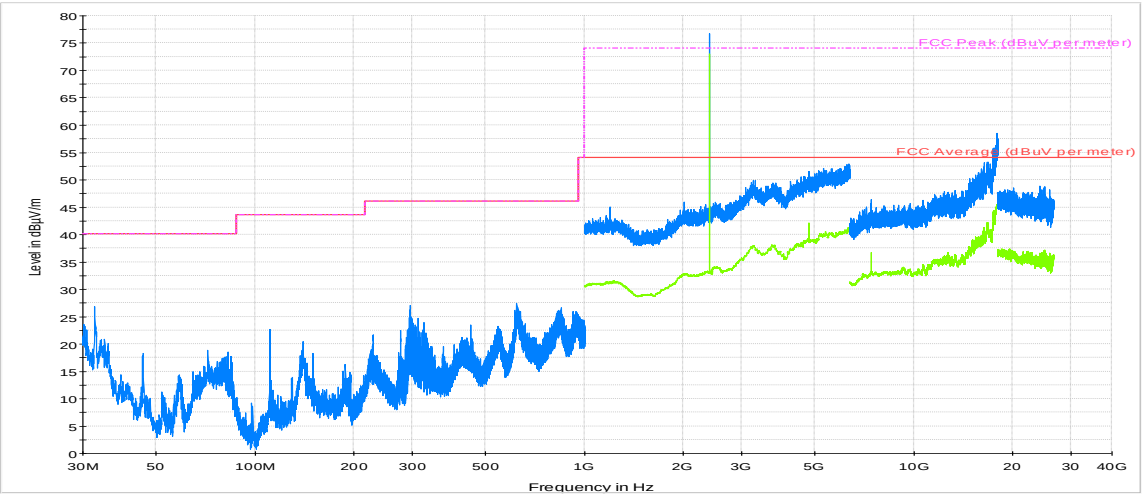


Peak measurements AVG measurements Limit FCC AVG Limit FCC Peak

Frequency	Max Peak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
452	29.9	---	46	**16.1**
4960	52.4	---	74	**21.6**
4960	---	45.5	54	**8.5**
18000	57.3	---	74	**16.7**
18000	---	45.4	54	**8.6**
18500	47.7	---	75	**26.3**
18500	---	36.4	54	**17.6**

EDR – 8-DPSK

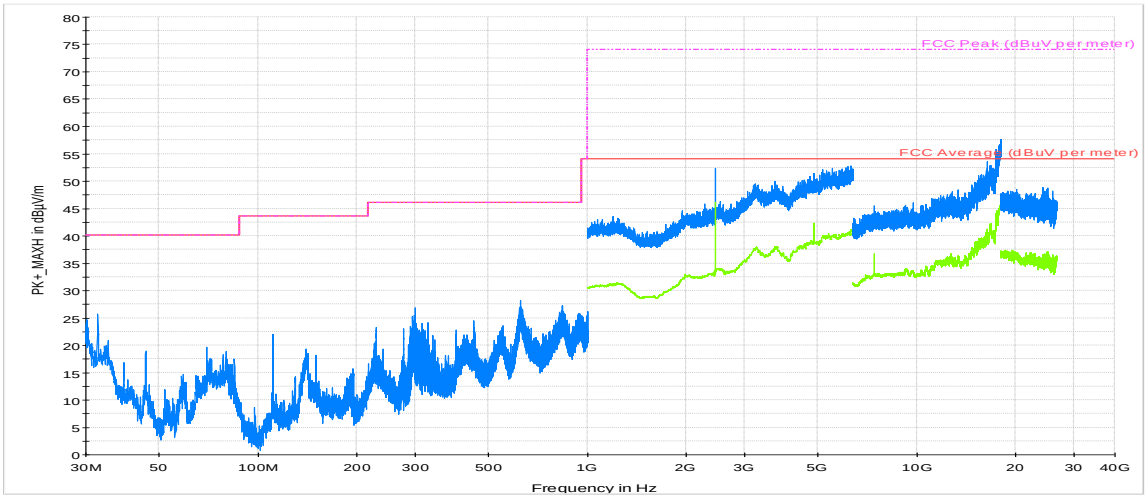
Radiated Spurious 30MHz – 26.5GHz – Ch0



Peak measurements AVG measurements Limit FCC AVG Limit FCC Peak

Frequency	Max Peak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
32	26.8	---	40	**13.2**
4803	51.3	---	74	**22.7**
4803	---	45.0	54	**9**
18000	57.3	---	74	**16.7**
18000	---	45.4	54	**8.6**
18500	47.7	---	75	**26.3**
18500	---	36.4	54	**17.6**

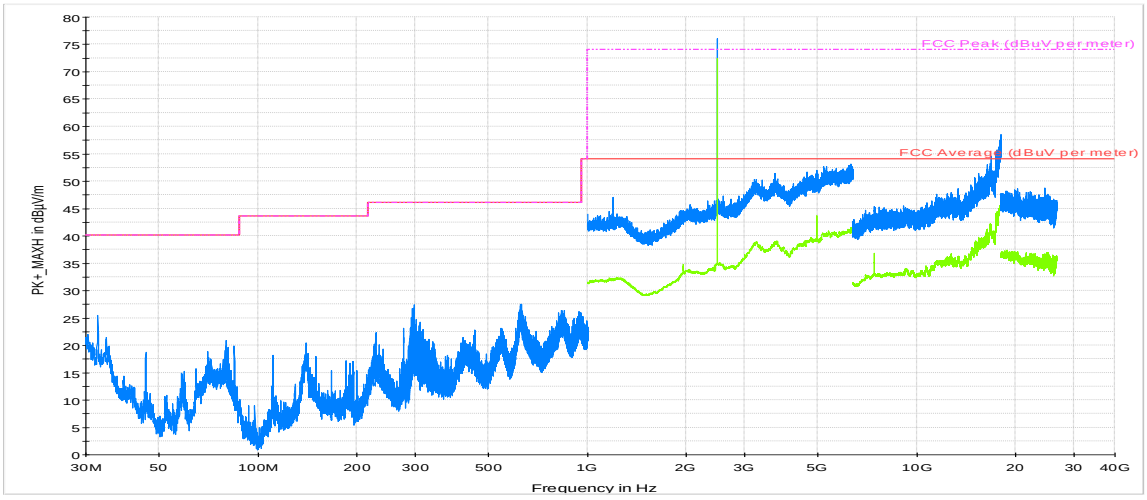
Radiated Spurious 30MHz – 26.5GHz – Ch39



Peak measurements AVG measurements Limit FCC AVG Limit FCC Peak

Frequency	Max Peak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
32	25.7	---	40	**14.3**
4881	52.4	---	74	**21.6**
4881	---	45.6	54	**8.4**
18000	57.3	---	74	**16.7**
18000	---	45.4	54	**8.6**
18500	47.7	---	75	**26.3**
18500	---	36.4	54	**17.6**

Radiated Spurious 30MHz – 26.5GHz – Ch78



Peak measurements AVG measurements Limit FCC AVG Limit FCC Peak

Frequency	Max Peak	RMS	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
297	27.4	---	46	**18.6**
4959	50.9	---	74	**23.1**
4959	---	47.6	54	**6.4**
18000	57.3	---	74	**16.7**
18000	---	45.4	54	**8.6**
18500	47.7	---	75	**26.3**
18500	---	36.4	54	**17.6**