N° 1-6736
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CERTIFICATE #3478.01

TEST REPORT

EUT Description	**WLAN and BT, 2x2 PCIe M.2 1216 adapter card**
Brand Name	**Intel® Wi-Fi 6 AX203**
Model Name	**AX203D2W**
FCC/IC ID	**FCCID: PD9AX203D2 / IC: 1000M-AX203D2**
Date of Test Start/End	**2020-10-24 / 2020-10-30**
Features	**802.11ax, Dual Band, 2x2 Wi-Fi 6 + Bluetooth® 5.1** (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 15 C** **RSS-247 issue 2, RSS-Gen issue 5 A1** (see section 1)

Test Report identification	**200928-02.TR05**
Revision Control	**Rev. 00** **This test report revision replaces any previous test report revision** (see section 8)

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Digitally signed by Khodor RIDA Date: 2021.01.19 18:12:51 +01'00'	Digitally signed by In Cheiel Date: 2021.01.19 18:14:31 +01'00'
Khodor RIDA (Test Engineer Lead)	Cheiel IN (Technical Manager)

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425 rue de Goa – Le Cargo B6 - 06600, Antibes, France
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Table of Contents

1. Standards, reference documents and applicable test methods

FCC	1. FCC Title 47 CFR part 15 - Subpart C – §15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz. 2019-10-01 Edition 2. FCC Title 47 CFR part 15 - Subpart C – §15.209 Radiated emission limits; general requirements. 2019-10-01 Edition 3. FCC OET KDB 558074 D01 v05r02 - Guidance for compliance measurements on digital transmission system, frequency hopping spread spectrum system, and hybrid system devices operating under section 15.247 of the FCC rules. 4. FCC OET KDB 662911 D01 v02r01 - Emissions Testing of Transmitters with Multiple Outputs in the Same Band. 5. ANSI C63.10-2013 - American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
ISED	1. RSS-247 Issue 2 - Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices. 2. RSS-Gen Issue 5 A1- General Requirements for Compliance of Radio Apparatus. 3. FCC OET KDB 558074 D01 v05r02 - Guidance for compliance measurements on digital transmission system, frequency hopping spread spectrum system, and hybrid system devices operating under section 15.247 of the FCC rules. 4. FCC OET KDB 662911 D01 v02r01 - Emissions Testing of Transmitters with Multiple Outputs in the Same Band. 5. ANSI C63.10-2013 - American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

2. General conditions, competences and guarantees

- ✓ Tests performed under FCC standards identified in section 1 are covered by A2LA accreditation.
- ✓ Tests performed under ISED standards identified in section 1 are covered by Cofrac accreditation.
- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is an ISO/IEC 17025:2017 laboratory accredited by the American Association for Laboratory Accreditation (A2LA) with the certificate number 3478.01.
- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is an Accredited Test Firm recognized by the FCC, with Designation Number FR0011.
- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is an ISO/IEC 17025:2017 testing laboratory accredited by the French Committee for Accreditation (Cofrac) with the certificate number 1-6736.
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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	23.0ºC ± 1.1ºC
Humidity	43.3% ±5.3%

4. Test samples

Sample	Control #	Description	Model	Serial #	Date of receipt	Note
#01	200928-01.S01	WiFi 6 Module	AX203NGW	WFM: FC448214839F	2020-10-02	RF Conducted
	170000-01.S02	Laptop	Latitude E5450	21HTPF2	2017-03-28	
	180717-03.S14	Extender	PCB00651_01	6510818-132	2018-08-21	
#02	200928-02.S01	WiFi 6 Module	AX203D2W	WFM:90CCDF735FC3	2020-10-22	Used for 30 MHz-1 GHz and 18 GHz-26 GHz Radiated Spurious Emissions tests
	170000-01.S01	Laptop	Latitude E5470	DBPLMC2	2017-03-28	
	200611-03.S26	Extender	ADEXELEC	-	2020-07-01	
	180000-01.S05	Socket	JfP Adapter M2	-	2017-08-09	
	200331-01.S04	Adaptor	HrP CRF M2	6960818-388	2020-04-30	
	200715-03.S06	Absorber	MCS absorber material	-	2020-07-23	
	200611-03.S11	Main Antenna	Skycross	-	2020-07-15	
	200611.03-S12	Aux Antenna	Skycross	-	2020-07-15	
#03	200928-02.S02	WiFi 6 Module	AX203D2W	WFM:90CCDF735F82	2020-10-22	Used for 1 GHz - 6.4 GHz RadiatedSpurious Emissions tests
	170000-01.S16	Laptop	Latitude E5470	C2HTPF2	2017-06-13	
	180000-01.S02	Socket	JfP Adapter M2	-	2017-08-09	
	180717-03.S13	Extender	HrP Extender db	6510818-131	2018-08-21	
	200611-03.S28	Main Antenna	Skycross	-	2020-07-01	
	200611-03.S29	Aux Antenna	Skycross	-	2020-07-01	
#4	200928-02.S02	WiFi 6 Module	AX203D2W	WFM:90CCDF735F82	2020-10-22	Used for 6.4 GHz - 18 GHz Radiated Spurious Emissions tests
	170801-01.S10	Laptop	Latitude E7470	7KNOXF2	2017-09-08	
	200102-01.S03	Extender	ADEXELEC	-	2020-01-02	
	180000-01.S02	Socket	JfP Adapter M2	-	2017-08-09	
	200928-02.S11	Adaptor	HrP M2 Adaptor JnP 1216	6961919-172	2020-10-27	
	200715-03.S06	Absorber	MCS absorber material	-	2020-07-23	
	200611-03.S28	Main Antenna	Skycross	-	2020-07-01	
	200611-03.S29	Aux Antenna	Skycross	-	2020-07-01	

5. EUT Features

The herein information is provided by the customer

<table>
<tr><td>Brand Name</td><td>Intel® Wi-Fi 6 AX203</td></tr>
<tr><td>Model Name</td><td>AX203D2W</td></tr>
<tr><td>Software Version</td><td>99.3500.51.0-01594</td></tr>
<tr><td>Driver Version</td><td>99.0.58.2</td></tr>
<tr><td>Prototype / Production</td><td>Production</td></tr>
<tr><td>Supported Radios</td><td>802.11b/g/n 2.4GHz (2400.0 – 2483.5 MHz)
802.11a/n/ac/ax 5.2GHz (5150.0 – 5350.0 MHz)
5.6GHz (5470.0 – 5725.0 MHz)
5.8GHz (5725.0 – 5825.0 MHz)
Bluetooth 5.2 2.4GHz (2400.0 – 2483.5 MHz)</td></tr>
<tr><td>Antenna Information</td><td>
<table>
<tr><th>Transmitter</th><th>Main (chain A)</th><th>Aux (chain B)</th></tr>
<tr><td>Manufacturer</td><td>SkyCross</td><td>Skycross</td></tr>
<tr><td>Antenna type</td><td>PIFA antenna</td><td>PIFA antenna</td></tr>
<tr><td>Part number</td><td>N/A</td><td>N/A</td></tr>
<tr><td>Declared antenna gain (dBi)</td><td>+3.24</td><td>+3.24</td></tr>
</table>
</td></tr>
<tr><td>Document</td><td>
<table>
<tr><th>Filename</th><th>Date of receipt</th></tr>
<tr><td>Intel_Ref_Antenna data_HMC-M2 Ant_Spec_Universe_SkyCross Antenna</td><td>2013-01-28</td></tr>
</table>
</td></tr>
</table>

6. Remarks and comments

1. No deviations were made from the test methods listed in section 1 of this report

7. Test Verdicts summary

The statement of conformity to applicable standards in the table below are based on the measured values, without taking into account the measurement uncertainties.

7.1. BT

FCC part	RSS part	Test name	Verdict
15.247 (a) (1)	RSS-247 Clause 5.1 (a) and (b)	20dB Bandwidth and Carrier frequency separation	P
15.247 (a) (1) (iii)	RSS-247 Clause 5.1 (d)	Number of hopping channels	P
15.247 (a) (1) (iii)	RSS-247 Clause 5.1 (d)	Time of Occupancy (Dwell Time)	P
15.247 (b) (1)	RSS-247 Clause 5.4 (b)	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 RSS-GEN A1 Clause 8.9	Out-of-band Emissions (radiated)	P

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

<if any remarks and comments related to the test case measurement>
1 & 3: See Section 6,

8. Document Revision History

Revision #	Modified by	Revision Details
Rev. 00	Z.OUACHICHA	First Issue

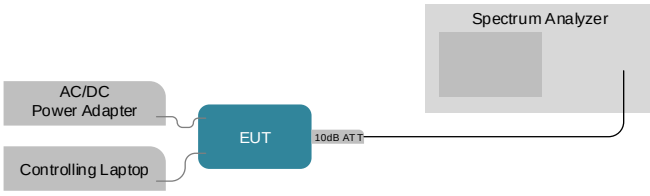
Annex A. Test & System Description

A.1 Measurement System

Measurements were performed using the following setups.

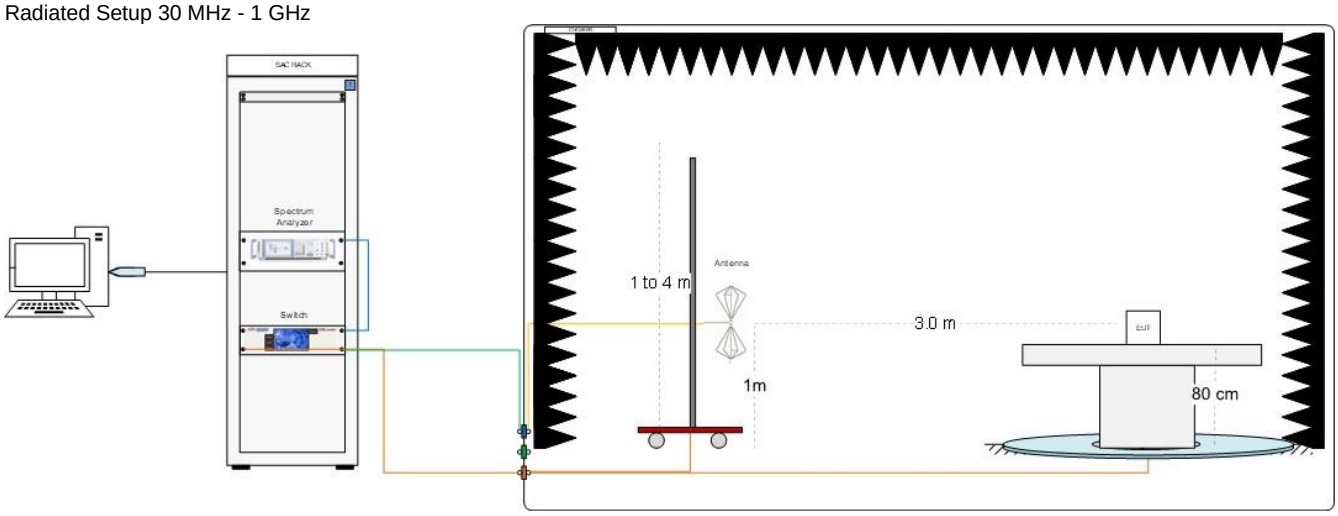
The DUT was installed in a test fixture and this test fixture is connected to a laptop computer and AC/DC power adapter. The laptop computer was used to configure the EUT to continuously transmit at a specified output power using all different modes and modulation schemes.

Conducted test setup

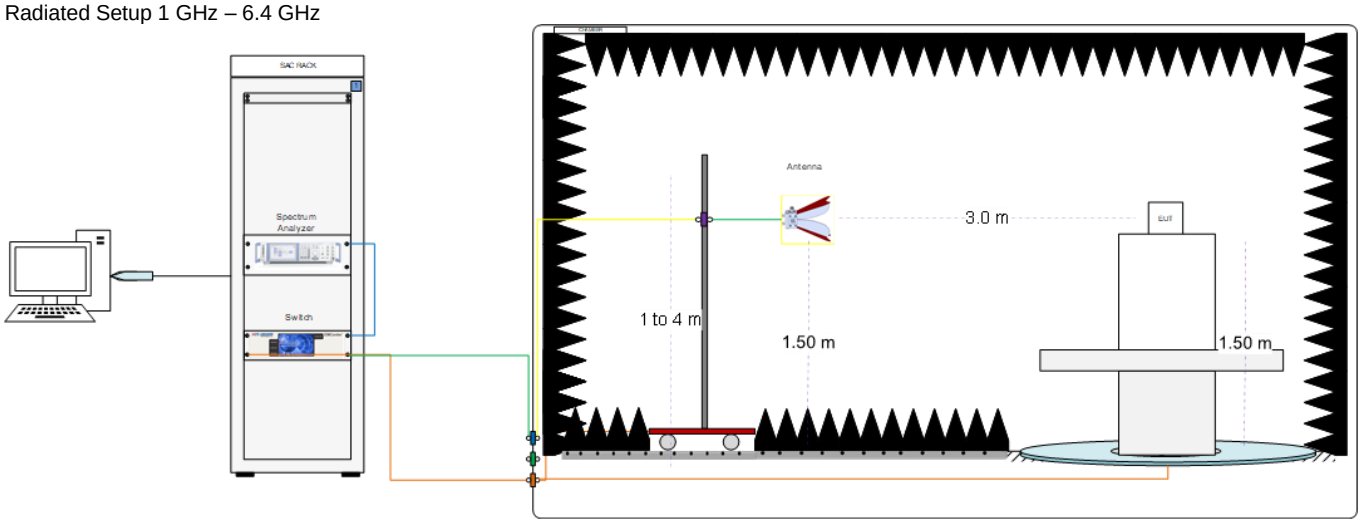


Radiated test setup

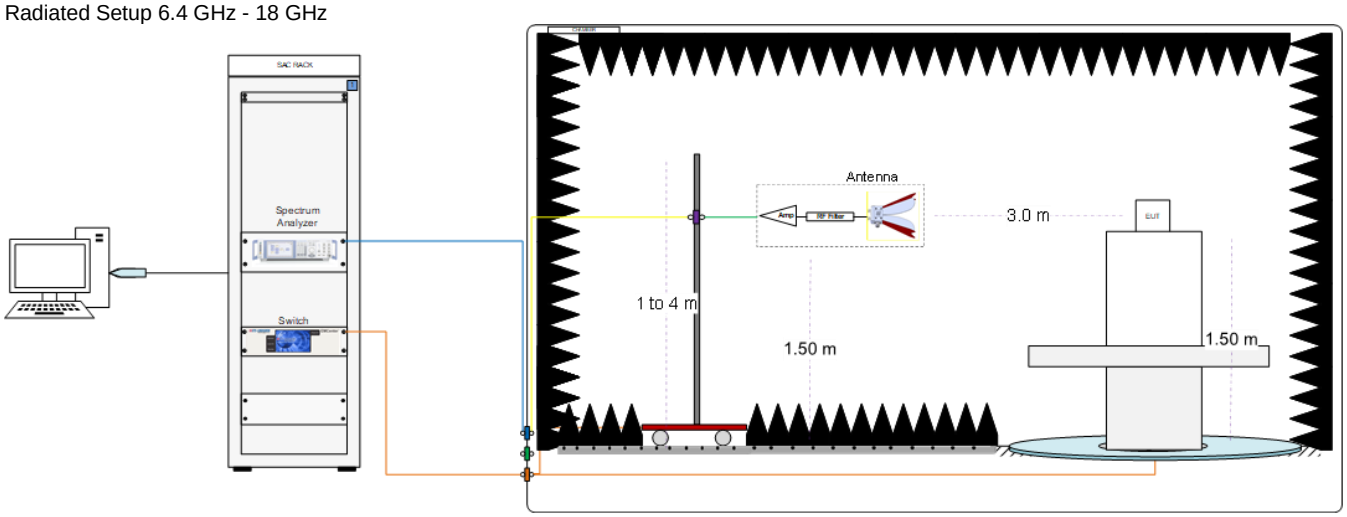
Radiated Setup 30 MHz - 1 GHz



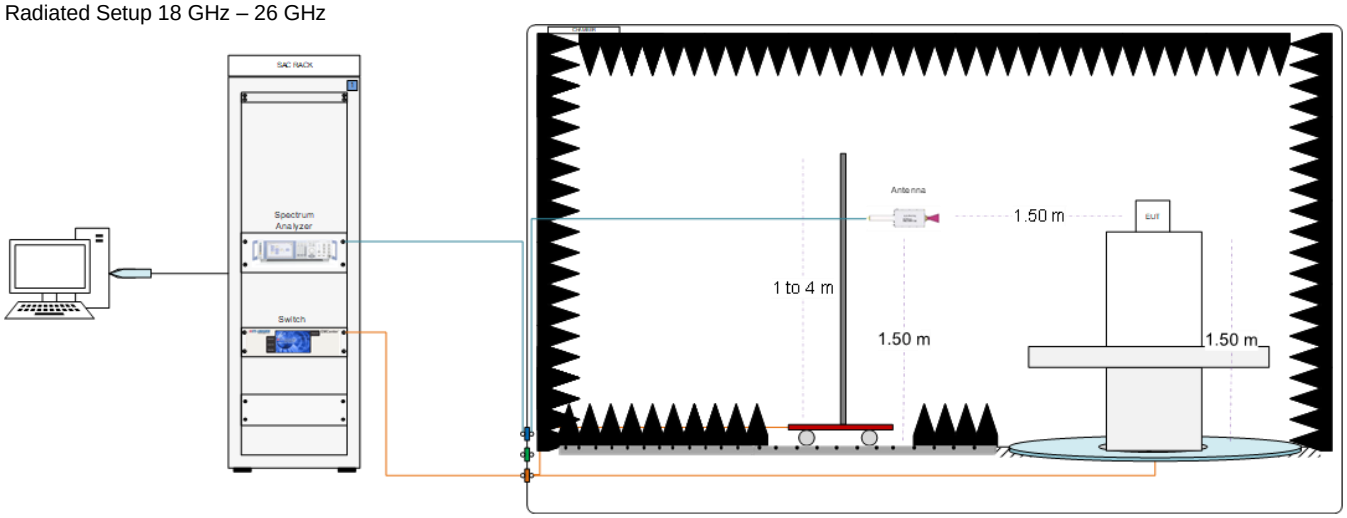
Radiated Setup 1 GHz – 6.4 GHz



Radiated Setup 6.4 GHz - 18 GHz



Radiated Setup 18 GHz – 26 GHz



Sample Calculation

The spurious received voltage V(dBuV) in the spectrum Analyzer is converted to Electric field strength using the transducer factor F corresponding to the Rx path Loss:

F (dB/m)= Rx Antenna Factor (dB/m) + Cable losses (dB) – Amplifiers Gain (dBi)
E (dBuV/m) = V(dBuV) + F (dB/m)

For field strength measurements made at other than the distance at which the applicable limit is specified, the field strength of the emission at the distance specified by the limit is deduced as follows:

$$E_{SpecLimit} = E_{Meas} + 20*\log(D_{Meas}/D_{SpecLimit})$$

where

$E_{SpecLimit}$ is the field strength of the emission at the distance specified by the limit, in dBµV/m
E_{Meas} is the field strength of the emission at the measurement distance, in dBµV/m
D_{Meas} is the measurement distance, in m
$D_{SpecLimit}$ is the distance specified by the limit, in m

A.2 Test Equipment List

Conducted setup

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
0316	Spectrum Analyzer	FSV30	103309	Rohde & Schwarz	2019-09-02	2021-09-02
0442	RF cable 50cm	Coax 2.92mm Male To 2.92mm Male	N/A	PASTERNACK	2020-08-26	2021-02-26
1044	10dB Attenuator + MH4	N/A	N/A	N/A	N/A	N/A
0583	Temp & Humidity Logger	RA12E-TH1-RAS	RA12-B9D6E	AVITECH	2019-09-06	2021-09-06
1002	Measurement SW v1.4.10.8	Octopi	N/A	Step AT	N/A	N/A

Radiated Setup #1

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
0135	Anechoic Chamber	FACT3	5720	ETS-Lindgren	2020-07-06	2022-01-07
0136	Turn Table	ETS	-	ETS-Lindgren	N/A	N/A
0147	Switch & Positioning systems	EMC Center	00159757	ETS-Lindgren	N/A	N/A
0530	Measurement SW	EMC32, v10.40.10	100623	Rohde & Schwarz	N/A	N/A
1033	Boresight antenna mast	BAM 4.0-P	P/278/2890.01	Maturo	N/A	N/A
0420	Spectrum Analyzer	FSV40	101556	Rohde & Schwarz	2020-05-25	2022-05-25
0993	Biconical antenna 30 MHz – 1 GHz	UBAA9115 + BBVU9135 + DGA9552N	0286 + CH 9044	Schwarzbeck	2019-11-22	2021-11-22
0325	Horn antenna 3117	3117	00157734	ETS-Lindgren	2019-08-12	2021-08-12
0141	Horn Antenna 3117 + Amplifier + HPF6.4	3117	00157736	ETS-Lindgren	2020-04-02	2022-04-02
0334	Double-Ridged Waveguide Horn with Pre-Amplifier 18 GHz to 40 GHz	3116C+PA	00169308bis + 00196308	ETS-Lindgren	2019-07-24	2021-07-24
0202	Cable 1m - 30MHz to 18 GHz	UFB311A-0-3360-50U300	MFR 64639223229-001	Micro-coax	2020-08-25	2021-02-25
0206	Cable 1.2m – 18 to 40 GHz	UFA147A-0-0480-200200	MFR 64639223720-003	Micro-coax	2020-08-25	2021-02-25
0263	Cable 1m - 1GHz to 18GHz	UFA147A	-	Utilflex	2020-08-25	2021-02-25
0369	Cable 2m - 26.5GHz to 40GHz	794-9191-2000A	E00327	Atem	2020-08-25	2021-02-25
0371	Cable 1m – 30 MHz - 18GHz	UFB311A-0-0590-50U50U	MFR 64639 223230-001	Micro-coax	2020-08-25	2021-02-25
0758	Cable 7.5m - 30MHz to 18GHz	0501051057000GX	18.23.181	Radiall	2020-08-25	2021-02-25
0809	Cable 7m - 18GHz to 40GHz	R286304009	-	Radiall	2020-08-25	2021-02-25
0859	Cable 2.5m - 30MHz to 18GHz	0500990992500KE	19.23.395	Radiall	2020-08-25	2021-02-25
0797	Temp & Humidity Logger	RA12E-TH1-RAS	RA12-D0EB1A	Avtech	2019-07-04	2021-07-04

N/A: Not Applicable

Radiated Setup #2

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
0337	Anechoic chamber	RFD-FA-100	5996	ETS Lindgren	2020-07-06	2022-07-06
0238	Switch & Positioner	EMCenter	00151232	ETS Lindgren	N/A	N/A
0382	Antenna Tower	2171B-3.0M	00150123	ETS Lindgren	N/A	N/A
0383	Turntable	-	-	ETS Lindgren	N/A	N/A
0329	Measurement SW	EMC32, v10.50.10	100401	Rohde & Schwarz	N/A	N/A
0133	Spectrum Analyzer	FSV40	101358	Rohde & Schwarz	2020-02-25	2022-02-25
0138	Double Ridge Horn (1- 18GHz)	3117	00152266	ETS Lindgren	2020-03-08	2022-03-08
0141	Horn Antenna 3117 + Amplifier + HPF6.4	3117	00157736	ETS-Lindgren	2020-04-02	2022-04-02
0334	Double Horn Ridged antenna	3116C-PA	00169308bis + 00196308	ETS-Lindgren	2019-07-24	2021-07-24
0871	RF Cable 1-18GHz, 1.5 m	0501050991200GX	19.21.710	Radiall	2020-08-20	2021-02-20
0860	RF Cable 1-18GHz, 1.2 m	2301761761200PJ	12.22.1104	Radiall	2020-08-20	2021-02-20
0275	RF Cable 1-18GHz - 6.5m	140-8500-11-51	001	Spectrum	2020-08-20	2021-02-20
0684	RF Cable 1GHz-18GHz 1.5m	-	-	Spirent	2020-08-20	2021-02-20
0679	RF Cable 18-40 GHz 6m	R286304009	1747364	Radiall	2020-08-20	2021-02-20
0028	RF Cable 1.2m 40MHz-40GHz	794-9191-1200A	DA585	Atem	2020-08-20	2021-02-20
0725	RF Cable 1-9.5GHz 1.2m	0500990991200KE	-	Radiall	2020-08-20	2021-02-20
0796	Temp & Humidity Logger	RA12E-TH1-RAS	RA12-D4F316	Avtech	2019-07-05	2021-07-05

N/A: Not Applicable

Shared Radiated Equipment

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
0616	Power Sensor	NRP-Z81	104385	Rohde & Schwarz	2020-04-08	2022-04-08
0617	Power Sensor	NRP-Z81	104386	Rohde & Schwarz	2020-04-08	2022-04-08
0618	Power Sensor	NRP-Z81	104382	Rohde & Schwarz	2020-04-08	2022-04-08

A.3 Measurement Uncertainty Evaluation

The system uncertainty evaluation is shown in the table below with a coverage factor of k = 2 to indicate a 95% level of confidence:

Measurement type	Uncertainty	Unit
Timing	±0.12	%
Power Spectral density	±1.47	dB
Occupied bandwidth	±2.07	%
Conducted Power	±1.03	dB
Conducted Spurious Emission <26.5 GHz	±2.90	dB
Radiated tests <1GHz	±5.26	dB
Radiated tests 1GHz – 26.5 GHz	±4.34	dB

Annex B. Test Results

The herein test results were performed by:

Test case measurement	Test Engineer
20dB Bandwidth and Carrier frequency separation	Z.Ouachicha
Number of hopping channels	Z.Ouachicha
Time of Occupancy (Dwell Time)	Z.Ouachicha
Maximum Peak Output Power and antenna gain	Z.Ouachicha
Out-of-band Emissions (conducted)	Z.Ouachicha
Out-of-band Emissions (radiated)	A.Lounes, N.Bui. N.Nachabe

B.1 20dB Bandwidth and carrier frequency separation

B.1.1 Test limits

FCC part	RSS part	Limits
15.247 (a) (1)	RSS-247 Clause 5.1 (a) and (b)	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.

B.1.2 Results tables

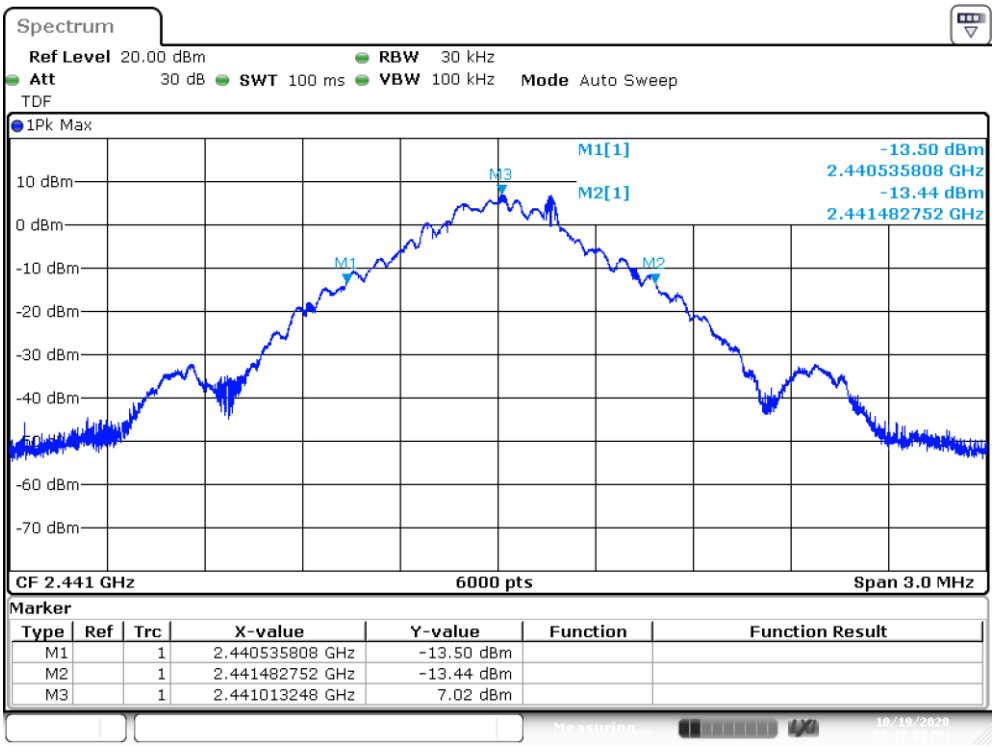
Mode	Packet Type	Channel Number	Frequency [MHz]	20dB BW [MHz]	Freq. Separation [kHz]
Basic Rate GFSK	DH5	0	2402	0.941	1000.0
		39	2441	**0.947**	
		78	2480	0.946	
EDR π/4-DQPSK	2DH5	0	2402	1.396	1000.0
		39	2441	1.397	
		78	2480	**1.405**	
EDR 8-DPSK	3DH5	0	2402	1.413	1002.5
		39	2441	**1.416**	
		78	2480	1.413	

Max Value

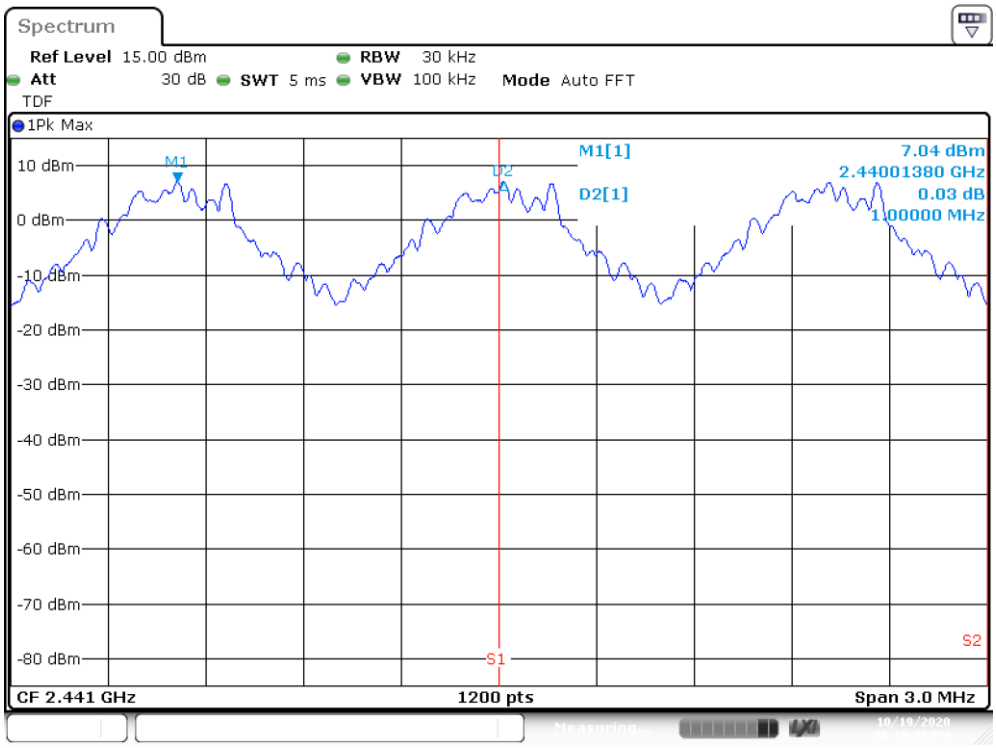
B.1.3 Results screenshot

Basic Rate - GFSK

20dB BW – CH39

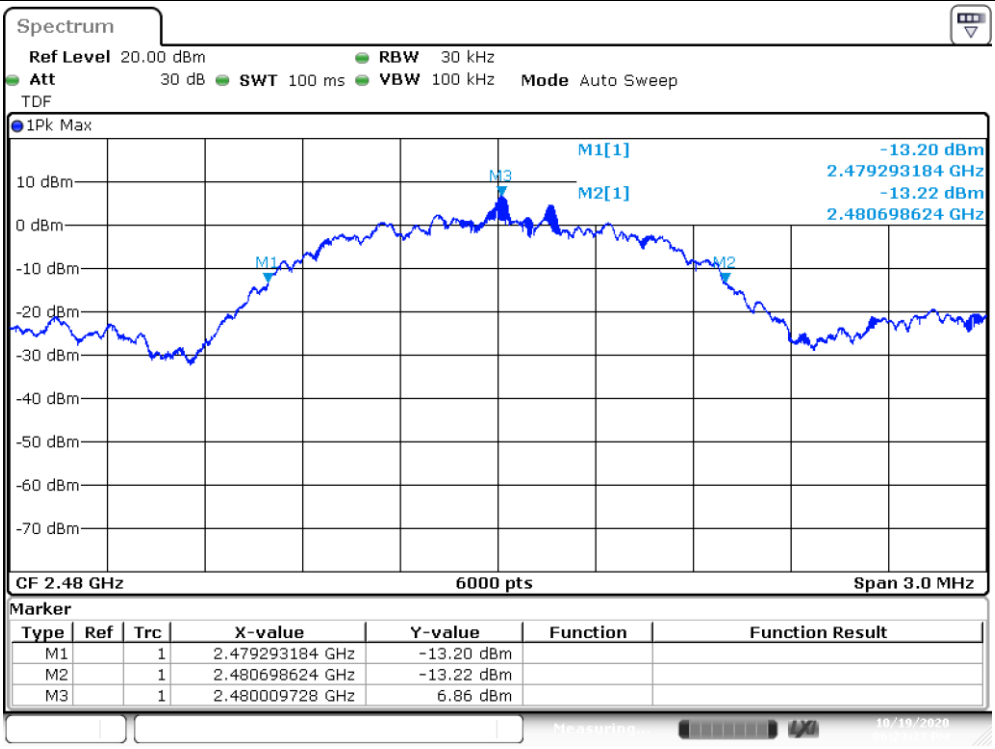


Freq. Separation

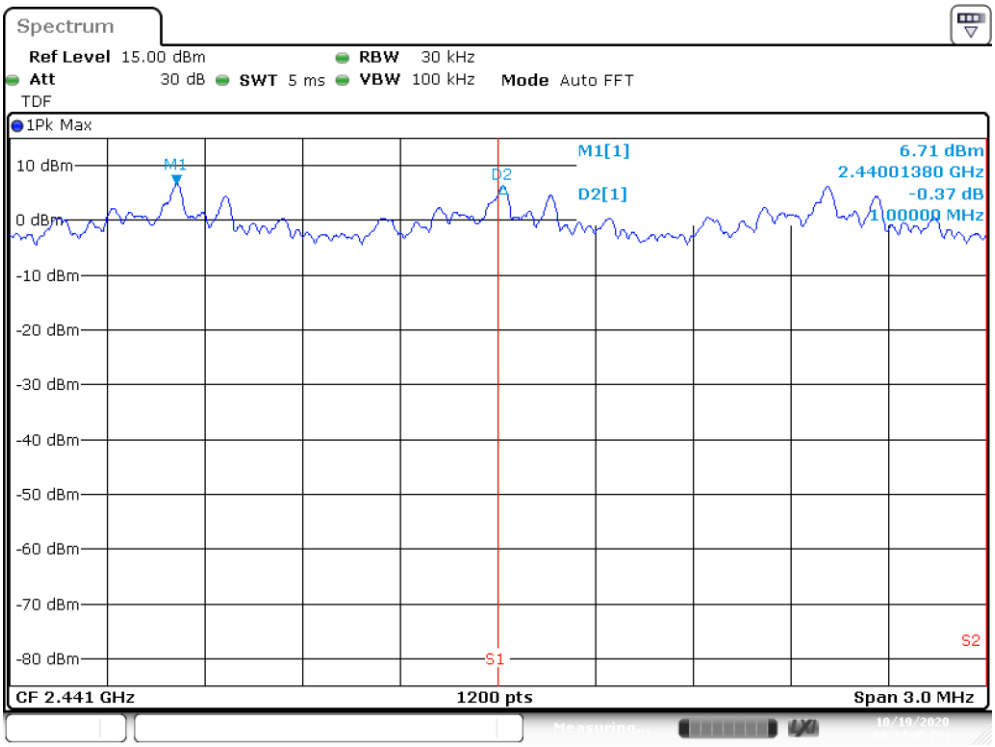


EDR – π/4-DQPSK

20dB BW – CH78

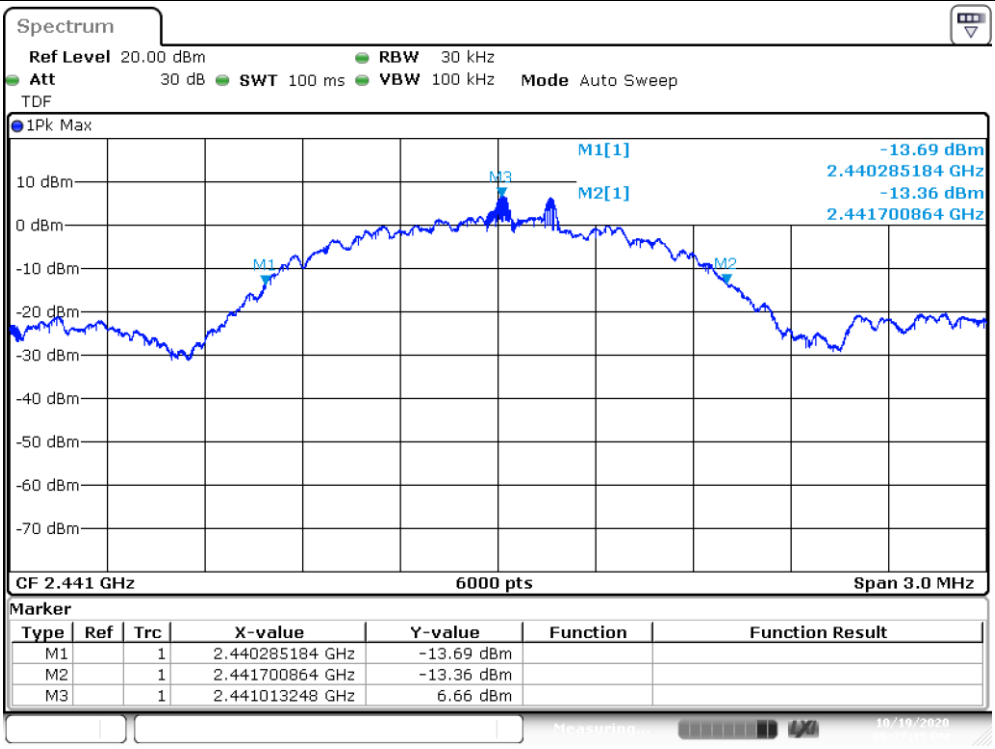


Freq. Separation

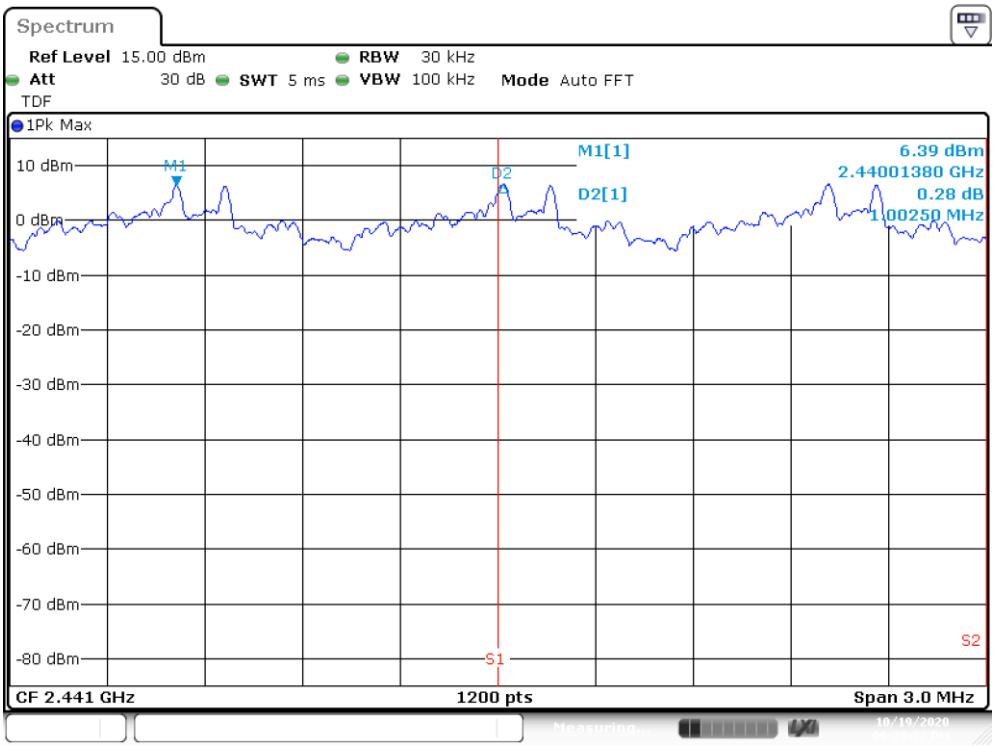


EDR – 8-DPSK

20dB BW – CH39



Freq. Separation



B.2 Number of hopping channels

B.2.1 Test limits

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

B.2.2 Test procedure

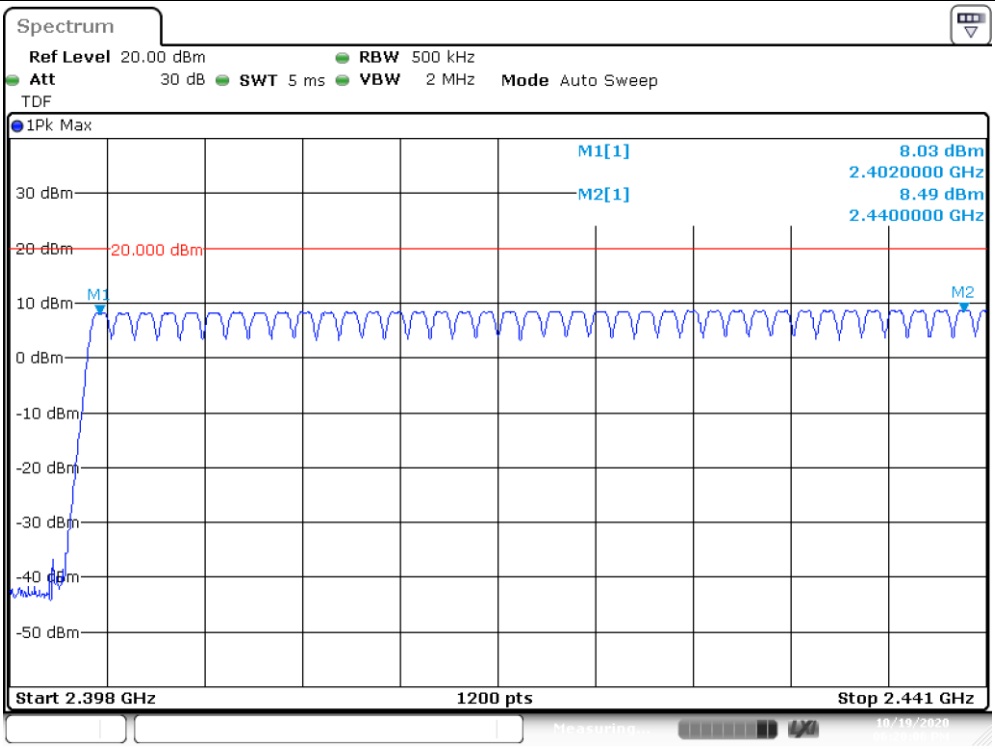
The conducted setup shown in section *Test & System Description* was used to measure the number of hopping channels. The antenna terminal of the EUT is connected to the spectrum through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.

B.2.3 Results tables

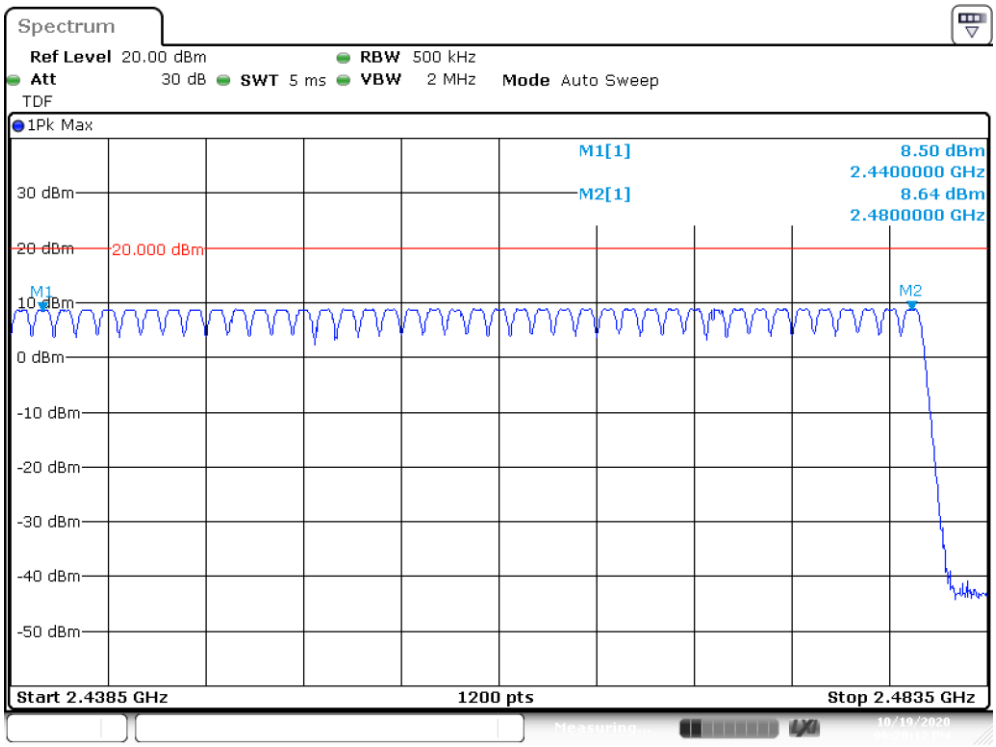
Mode	Packet Type	Number of hopping channels
Basic Rate GFSK	DH5	79
EDR π/4-DQPSK	2DH5	79
EDR 8-DPSK	3DH5	79

Number of hopping channels

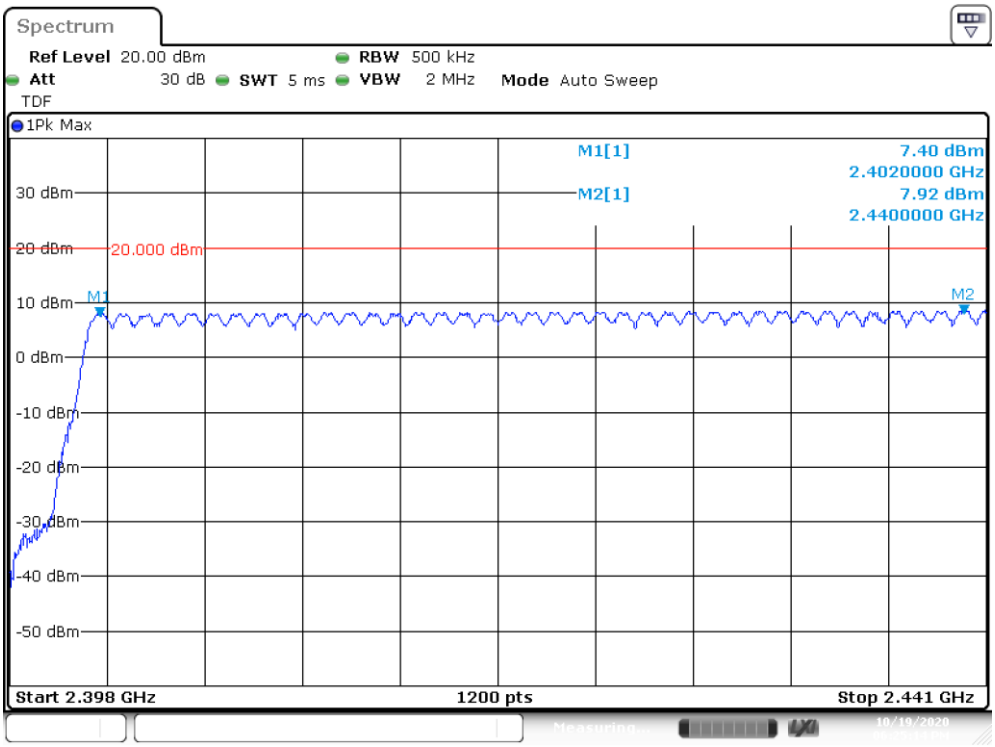
Basic Rate – GFSK



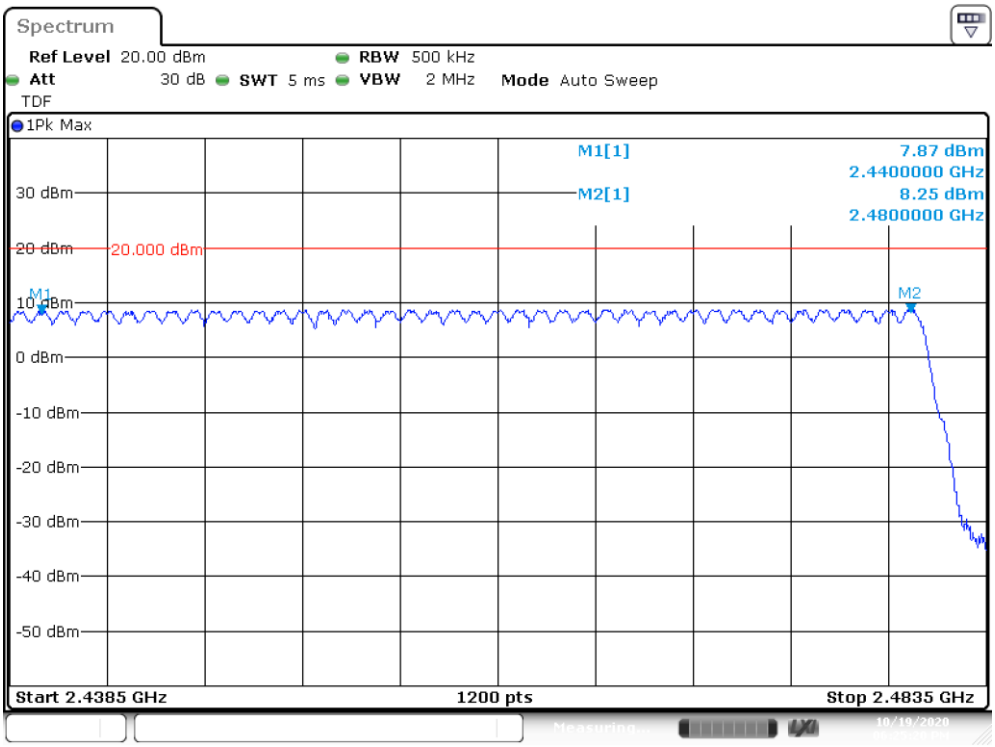
Basic Rate – GFSK



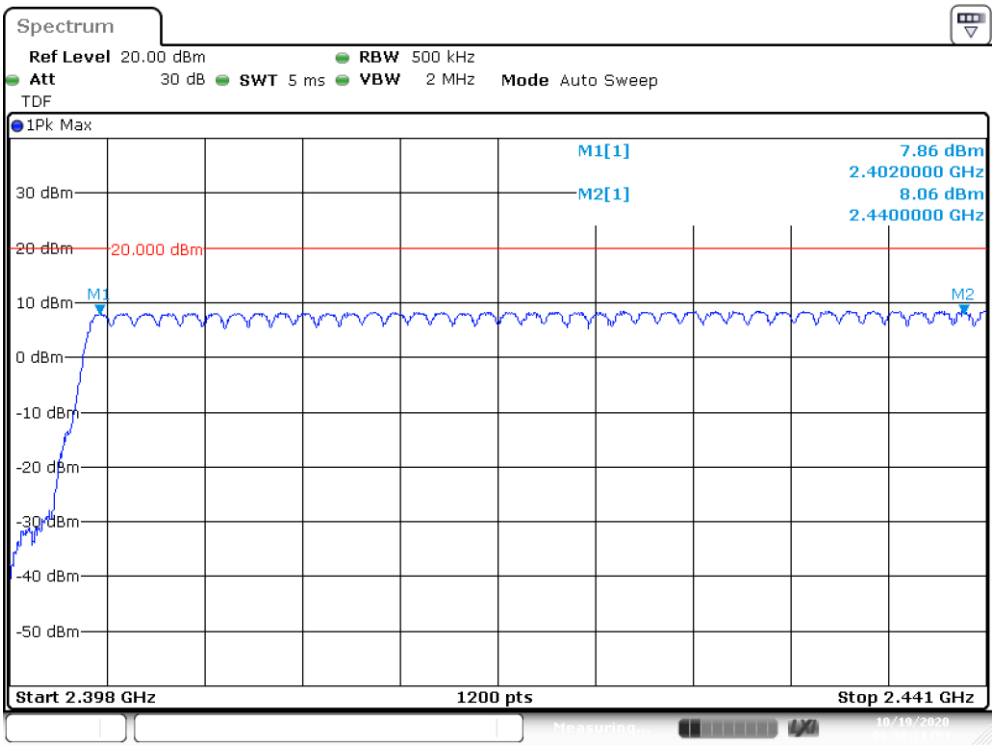
EDR – π/4-DPSK



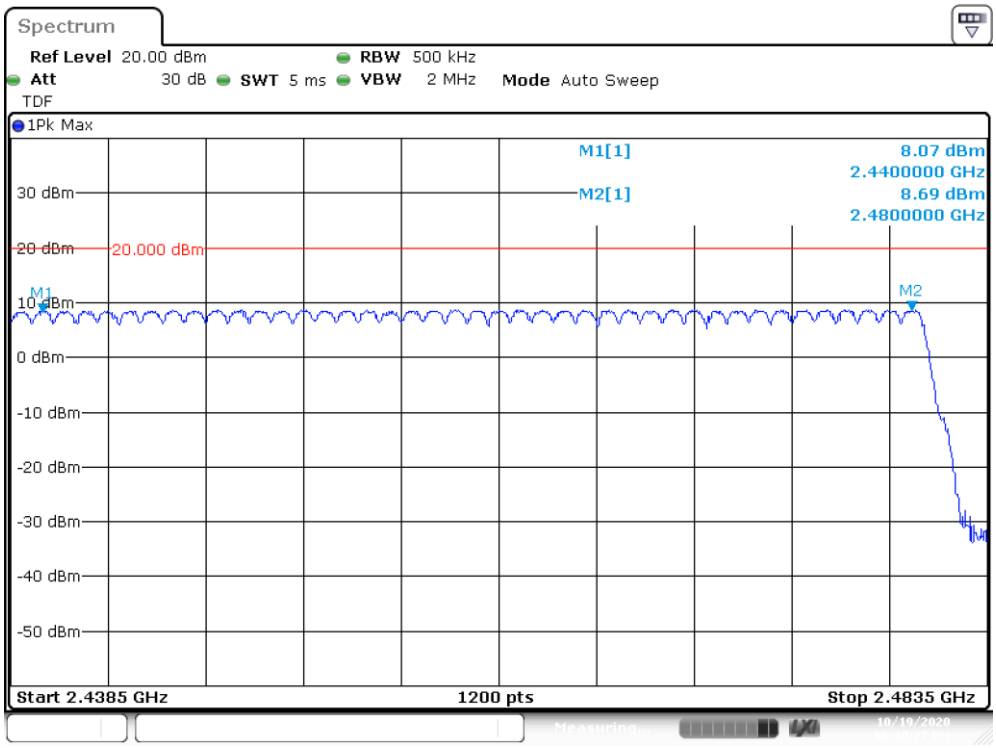
EDR – π/4-DPSK



EDR – 8-DPSK



EDR – 8-DPSK



B.3 Time of Occupancy (Dwell Time)

FCC part	RSS part	Limits
15.247 (a) (1) (iii)	RSS-247 Clause 5.1 (d)	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.

B.3.1 Test procedure

The conducted setup shown in section *Test & System Description* 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.

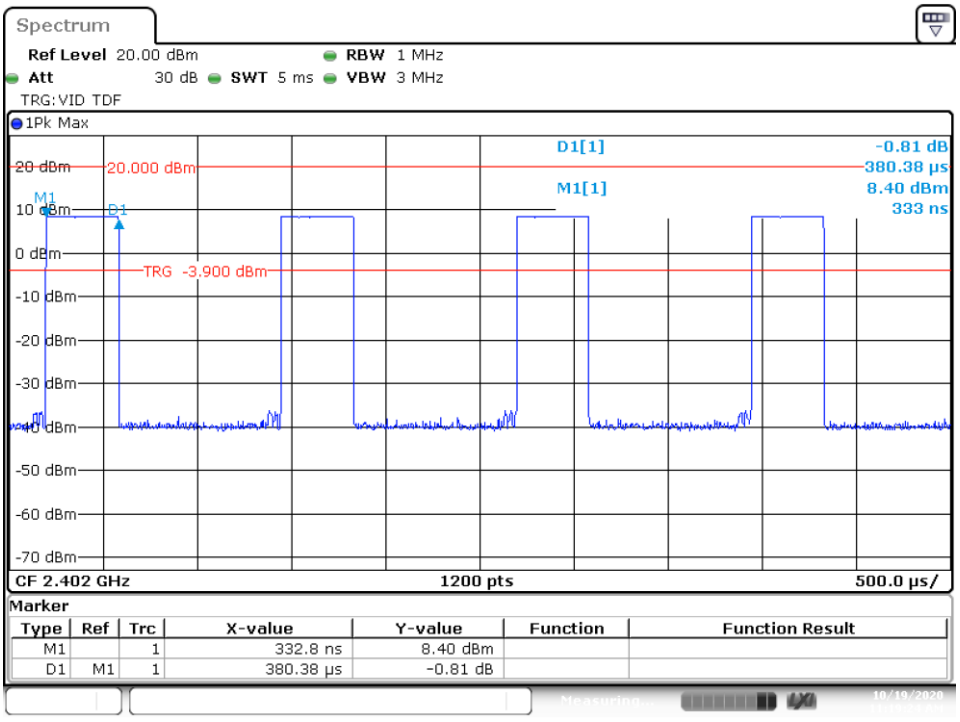
B.3.2 Results tables

Mode	Packet Type	Times of appearance	Tx-time [ms]	Dwell Time [ms]
Basic Rate GFSK	DH1	320.11	0.380	121.76
	DH3	161.16	1.635	263.48
	DH5	106.49	2.877	306.40
EDR π/4-DQPSK	2-DH1	320.11	0.384	122.81
	2-DH3	161.16	1.638	264.01
	2-DH5	106.49	2.888	307.50
EDR 8-DPSK	3-DH1	320.11	0.389	124.56
	3-DH3	161.16	1.634	263.34
	3-DH5	106.49	2.887	307.45

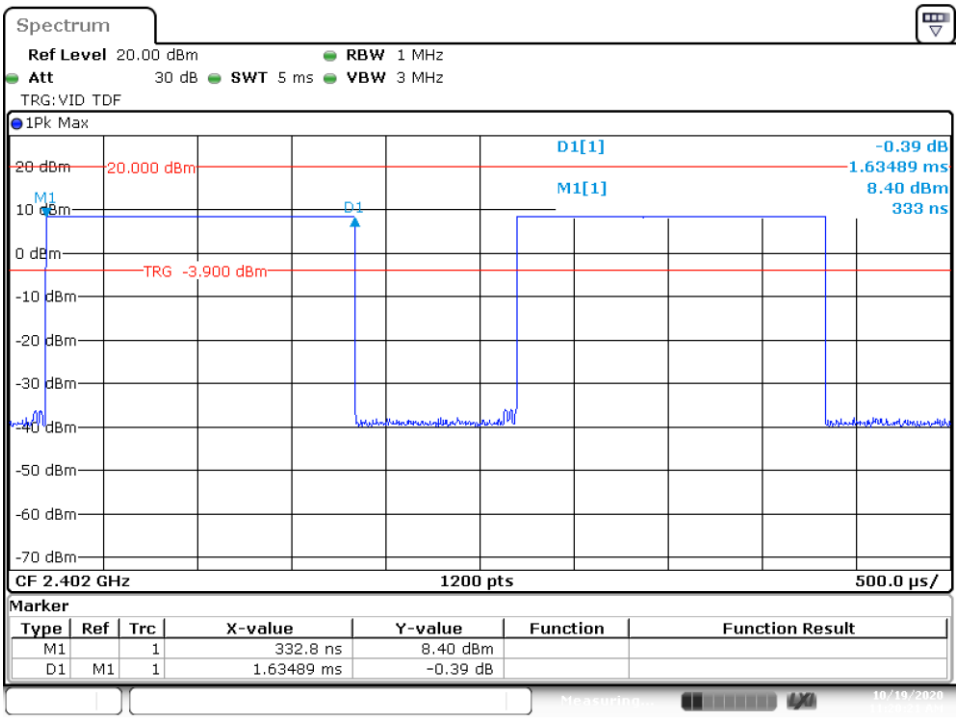
B.3.3 Results Screenshot

BDR – GFSK

DH1 Tx-Time

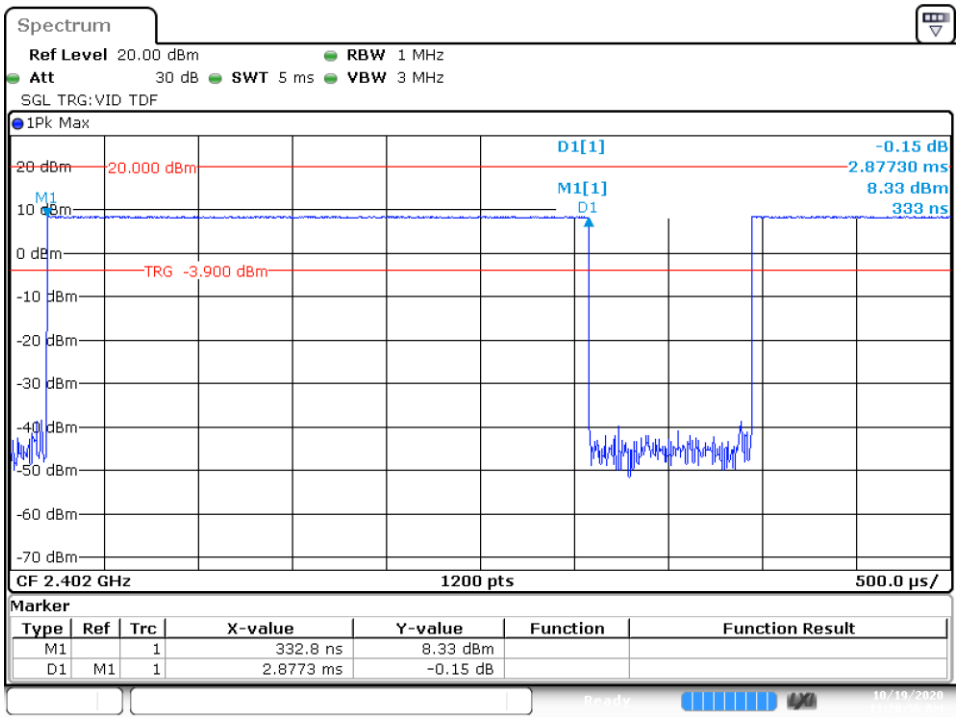


DH3 Tx-Time



Date: 19.OCT.2020 11:20:22

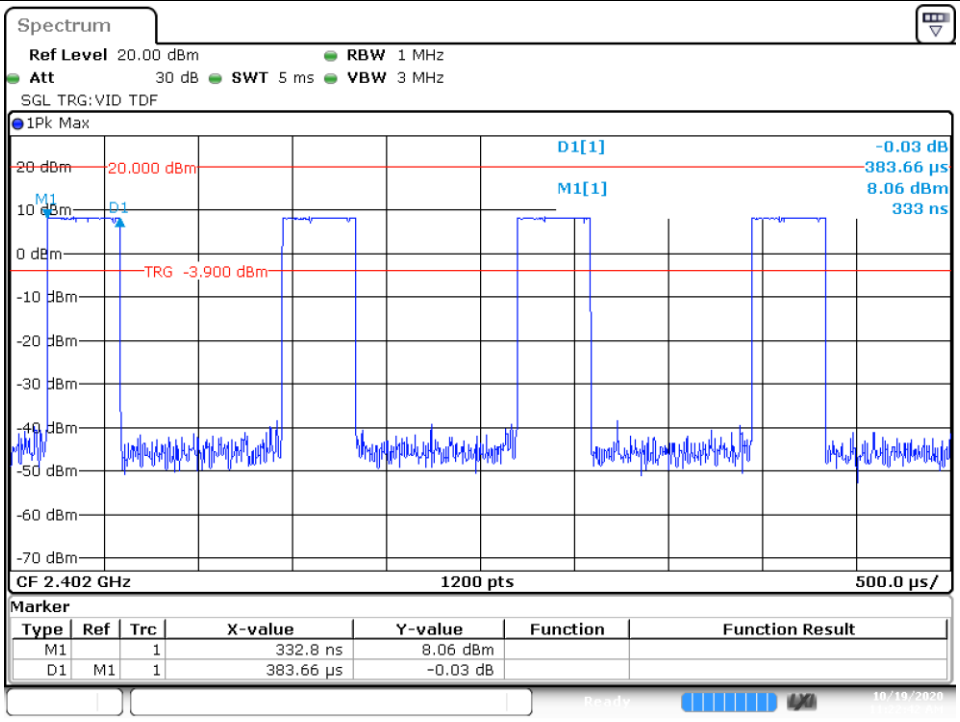
DH5 Tx-Time



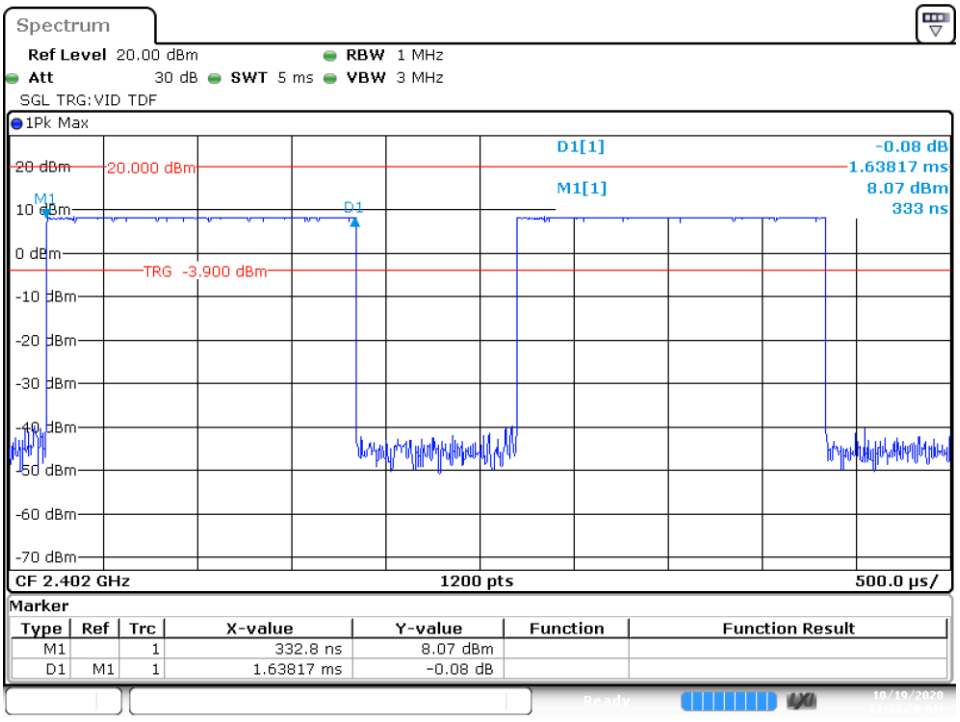
Date: 19.OCT.2020 11:20:57

EDR – π/4-DQPSK

2-DH1 Tx-Time

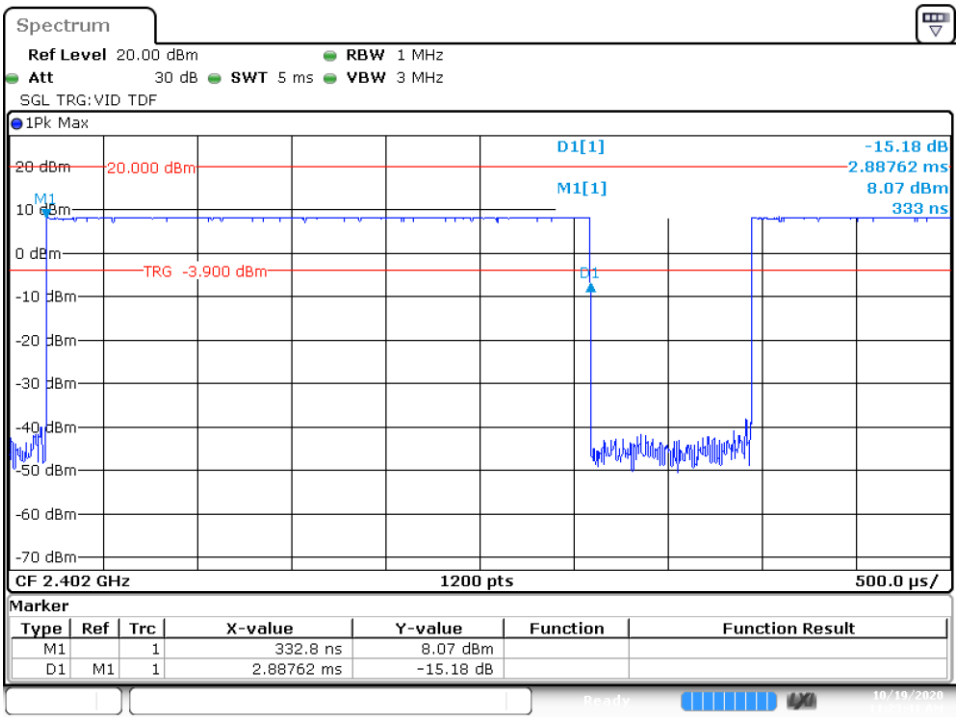


2-DH3 Tx-Time



Date: 19.OCT.2020 11:23:21

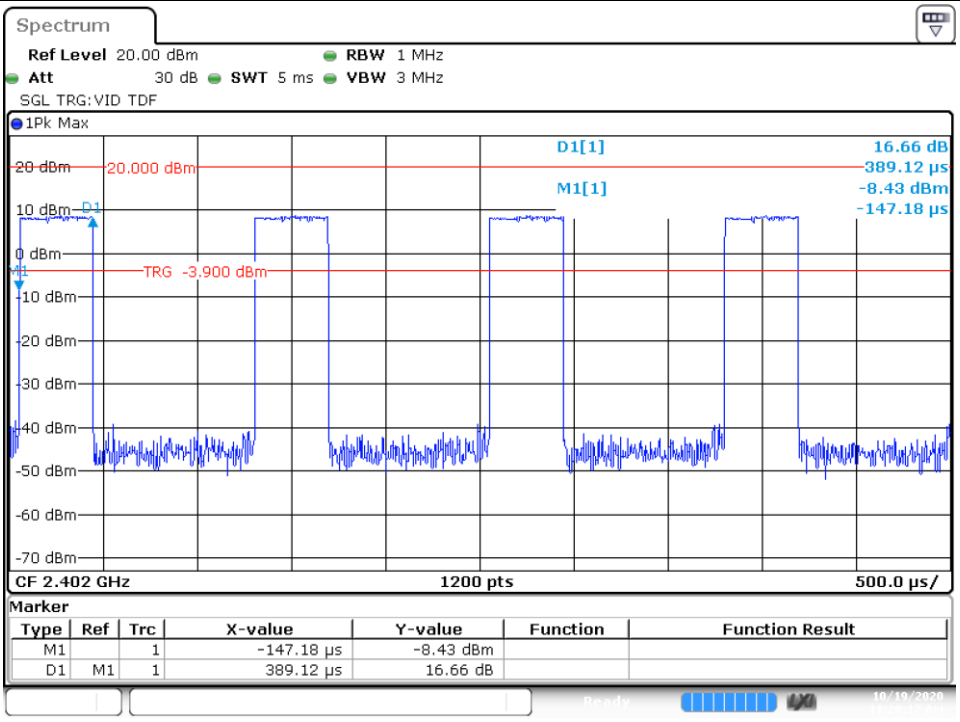
2-DH5 Tx-Time



Date: 19.OCT.2020 11:23:41

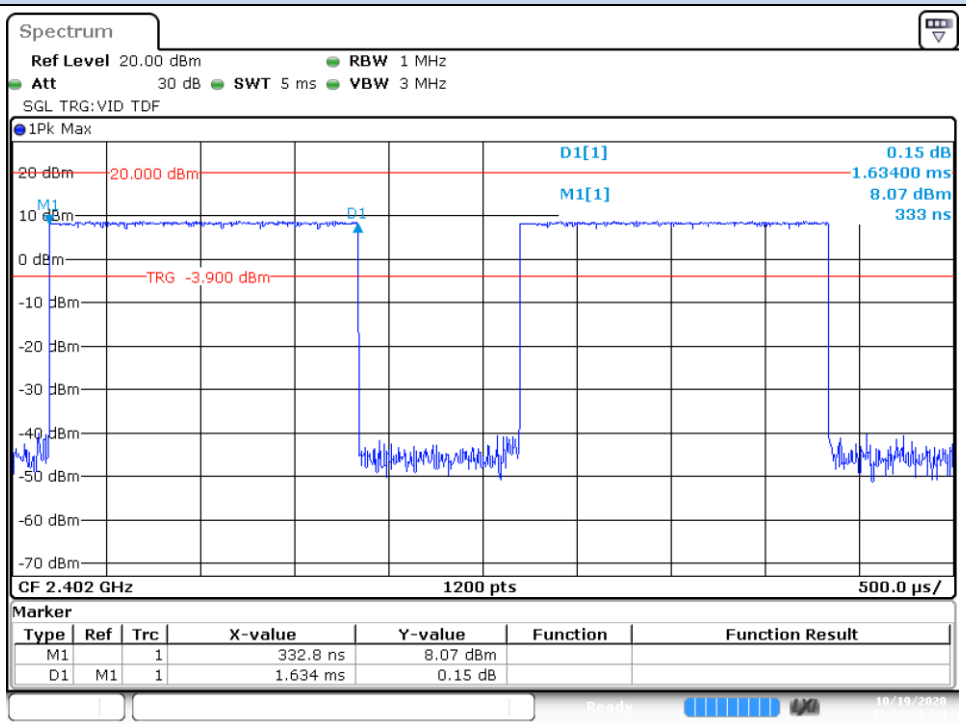
EDR – 8-DPSK

3-DH1 Tx-Time



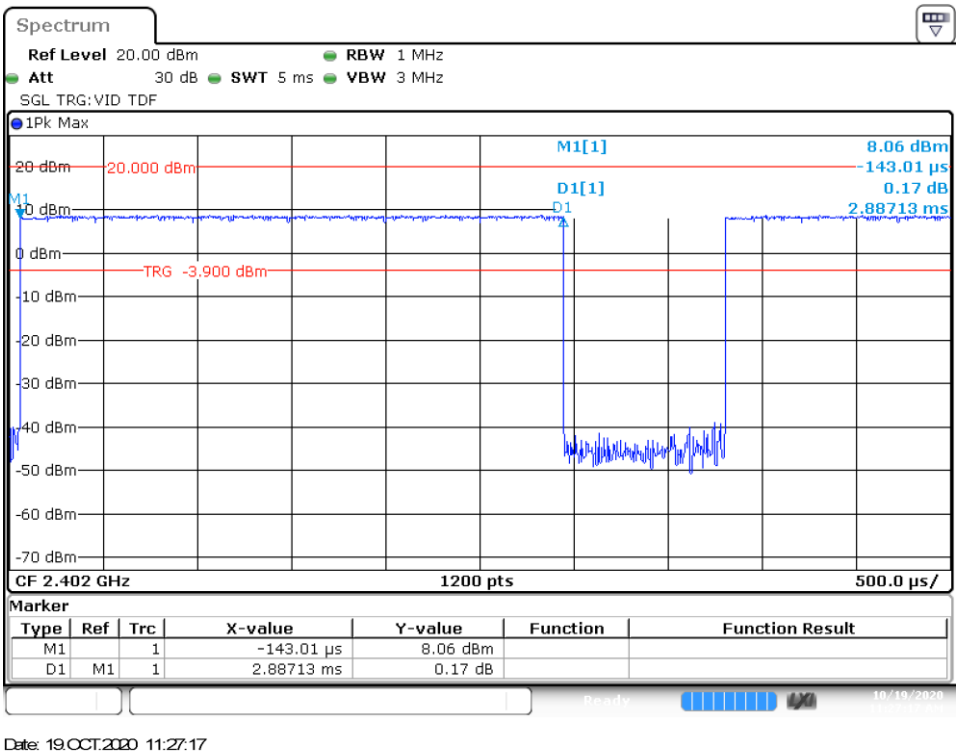
Date: 19.OCT.2020 11:28:18

3-DH3 Tx-Time



Date: 19.OCT.2020 11:26:44

3-DH5 Tx-Time



Date: 19.OCT.2020 11:27:17

B.4 Maximum Peak Output Power antenna gain

B.4.1 Test Limits

FCC part	RSS part	Limits
15.247 (b) (1)	RSS-247 Clause 5.4 (b)	(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.

B.4.2 Test procedure

The conducted setup shown in section *Test & System Description* 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.

B.4.3 Results tables

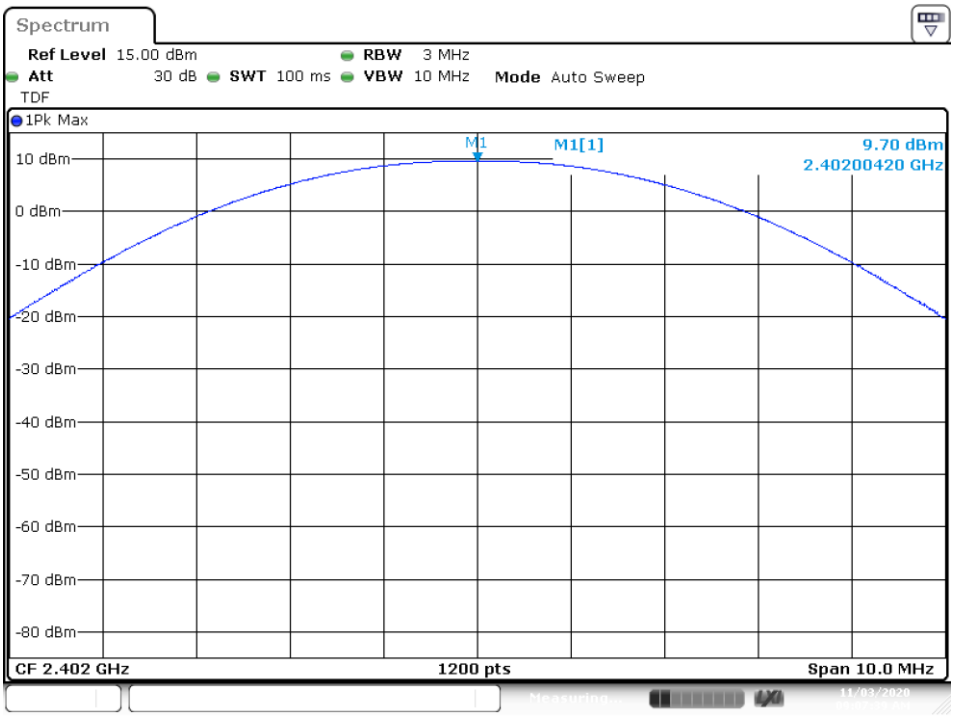
Mode	Packet Type	Channel Number	Frequency [MHz]	Peak Power [dBm]	Peak Power [mW]	Peak Power EIRP [dBm]	Peak Power EIRP [mW]
Basic Rate GFSK	DH5	0	2402	9.70	9.33	12.94	19.68
		39	2441	9.29	8.49	12.53	17.91
		78	2480	9.31	8.53	12.55	17.99
EDR π/4-DQPSK	2DH5	0	2402	10.08	10.19	13.32	21.48
		39	2441	9.63	9.18	12.87	19.36
		78	2480	9.65	9.23	12.89	19.45
EDR 8-DPSK	3DH5	0	2402	10.34	10.81	13.58	22.80
		39	2441	9.53	8.97	12.77	18.92
		78	2480	9.57	9.06	12.81	19.10

Max Value

B.4.4 Results Screenshot

Basic Rate - GFSK

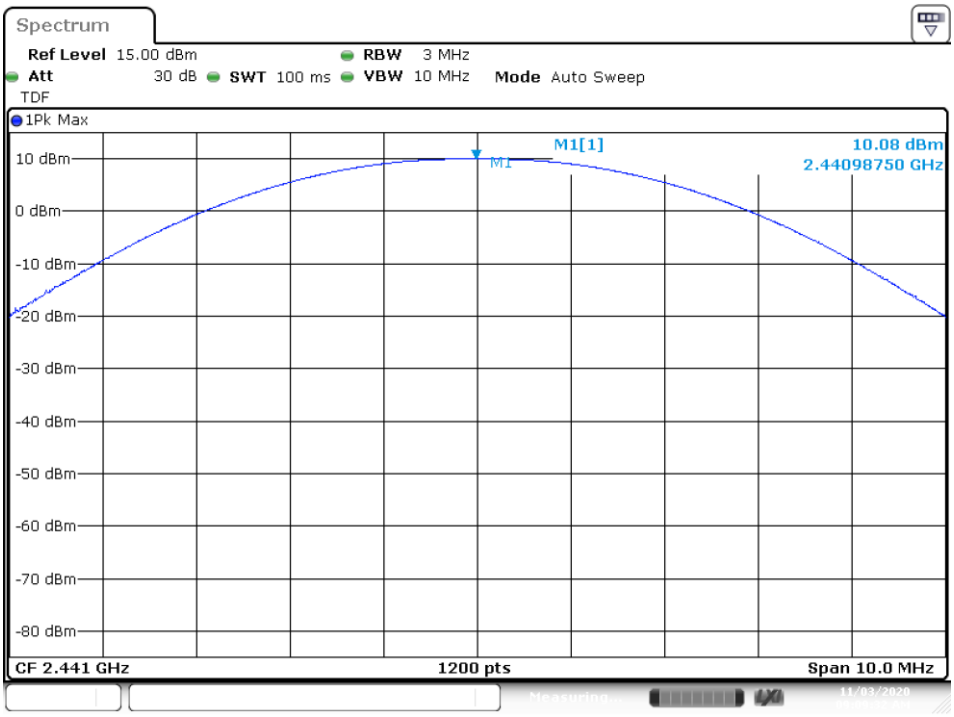
Peak Power – CH78



Date: 3.NOV.2020 09:07:39

EDR – π/4-DQPSK

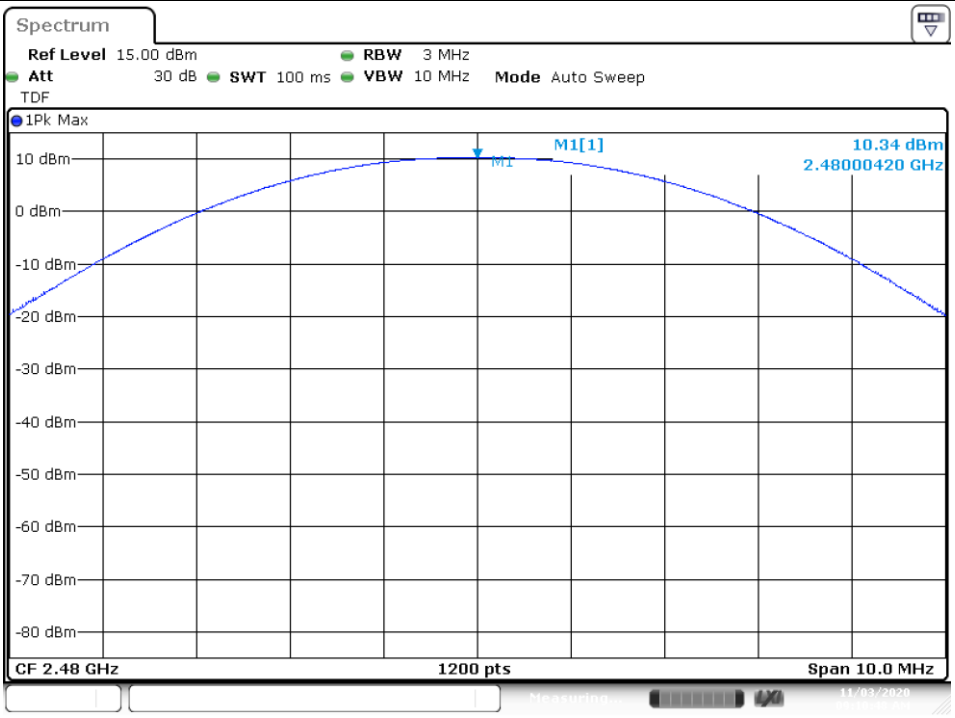
Peak Power – CH0



Date: 3.NOV.2020 09:09:32

EDR – 8-DPSK

Peak Power – CH0



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

B.5.1 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.

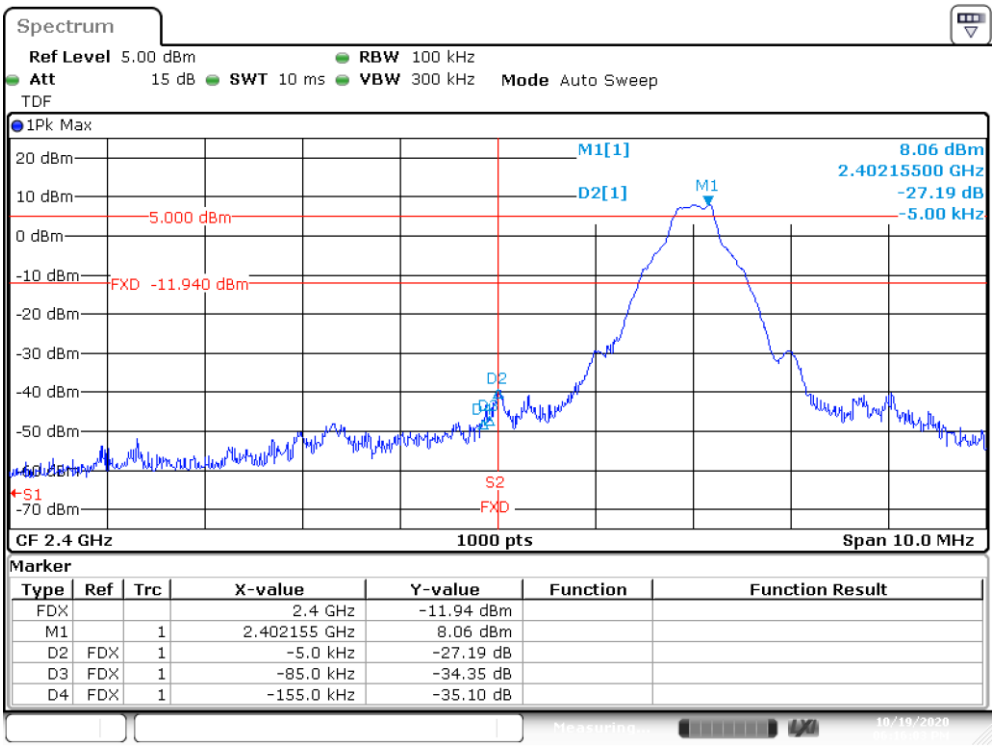
B.5.2 Test procedure

The conducted setup shown in section *Test & System Description* was used to measure the out-of-band emissions (conducted). 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.

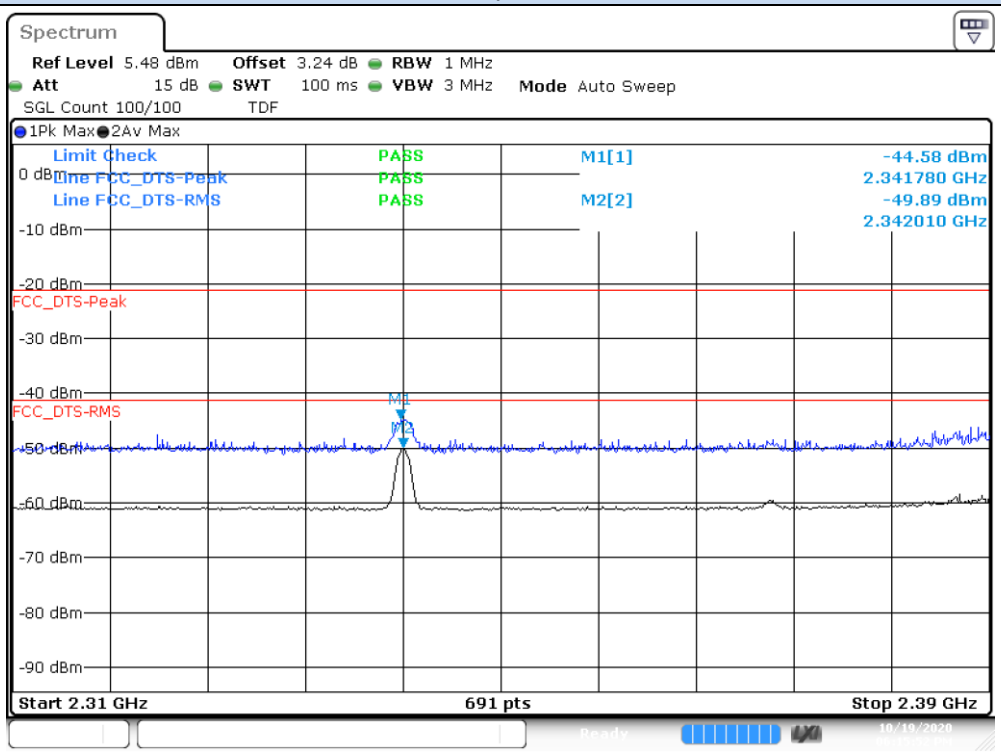
B.5.3 Test results

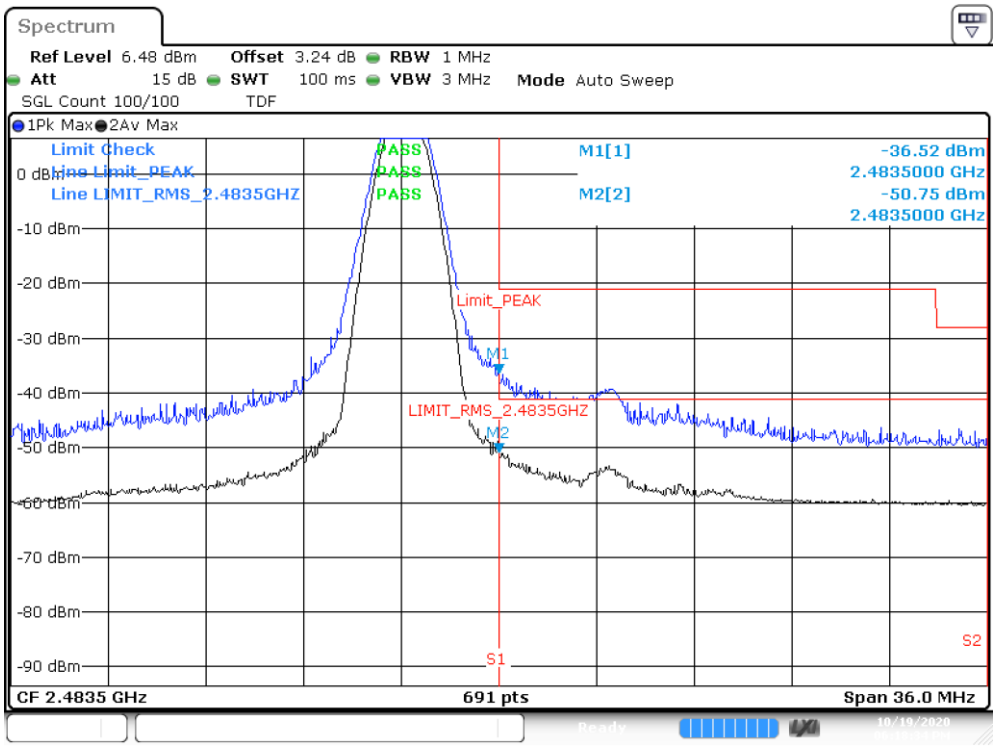
Basic Rate - GFSK

BE Low NR Freq Section – CH0

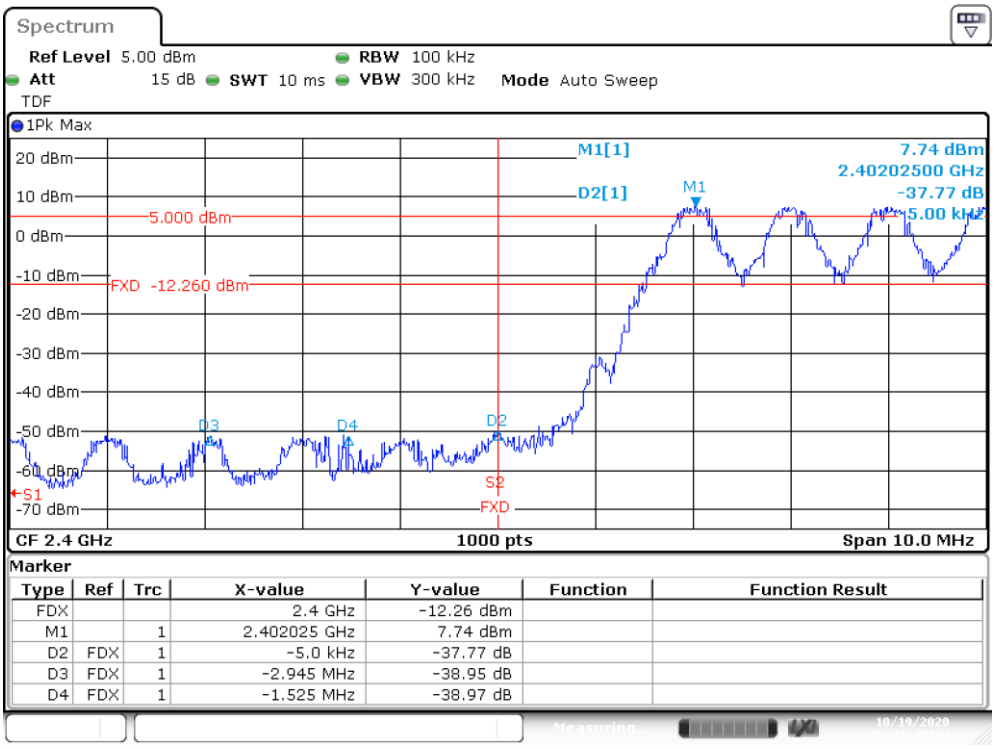


BE Low R Freq Section – CH0



BE High R Freq Section – CH78


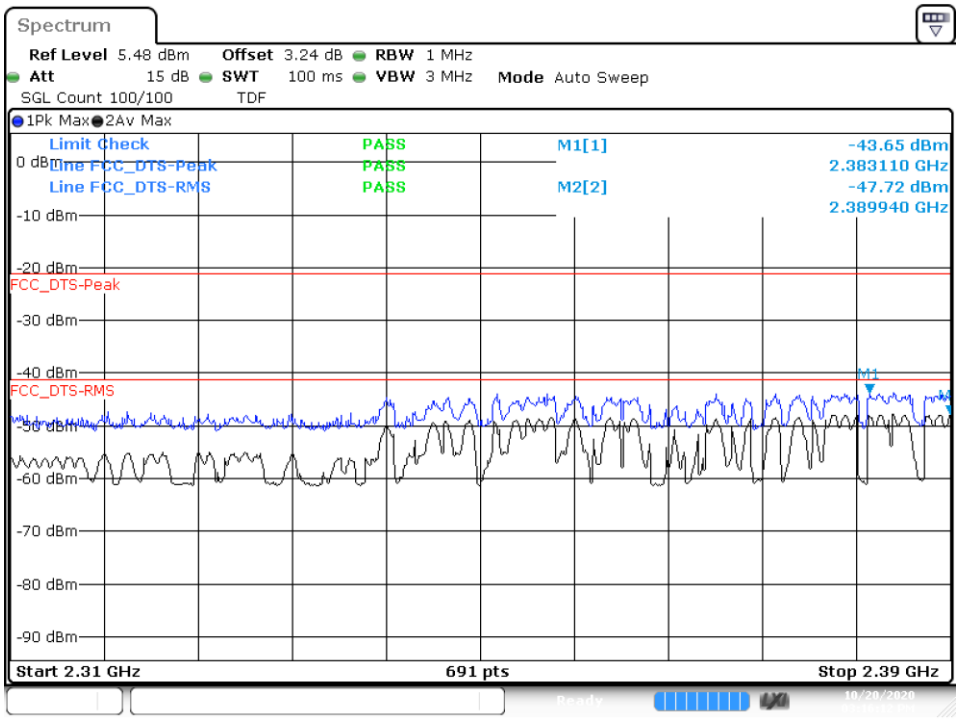
BE Low NR Freq Section – Hopping



Marker

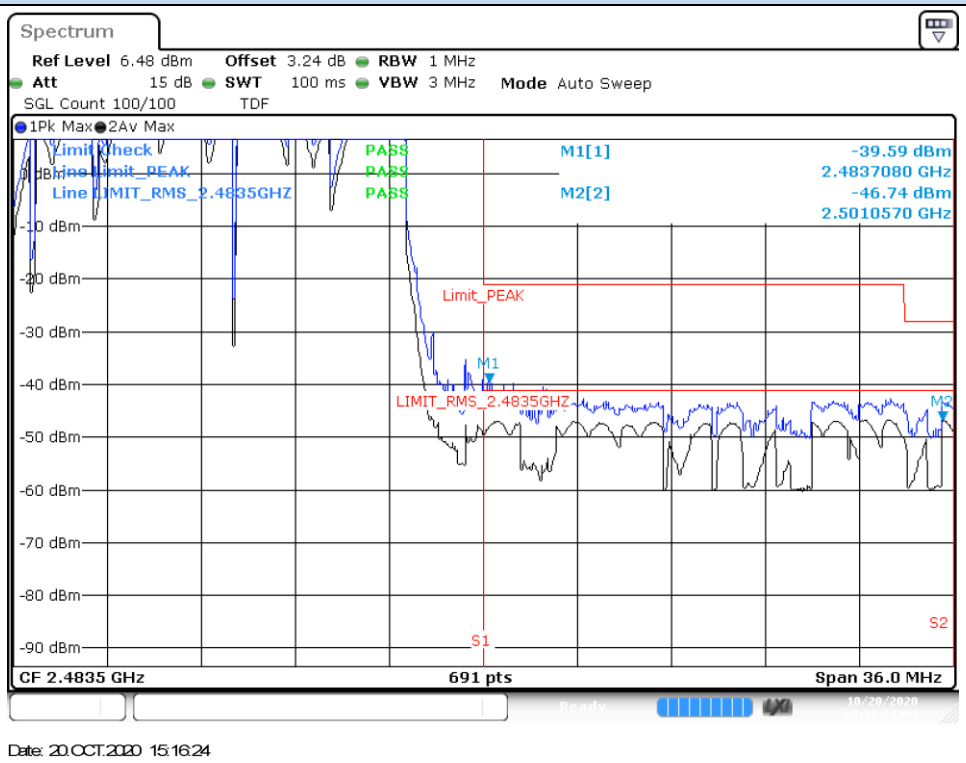
Type	Ref	Trc	X-value	Y-value	Function	Function Result
FDX			2.4 GHz	-12.26 dBm		
M1		1	2.402025 GHz	7.74 dBm		
D2	FDX	1	-5.0 kHz	-37.77 dB		
D3	FDX	1	-2.945 MHz	-38.95 dB		
D4	FDX	1	-1.525 MHz	-38.97 dB		

BE Low R Freq Section – Hopping



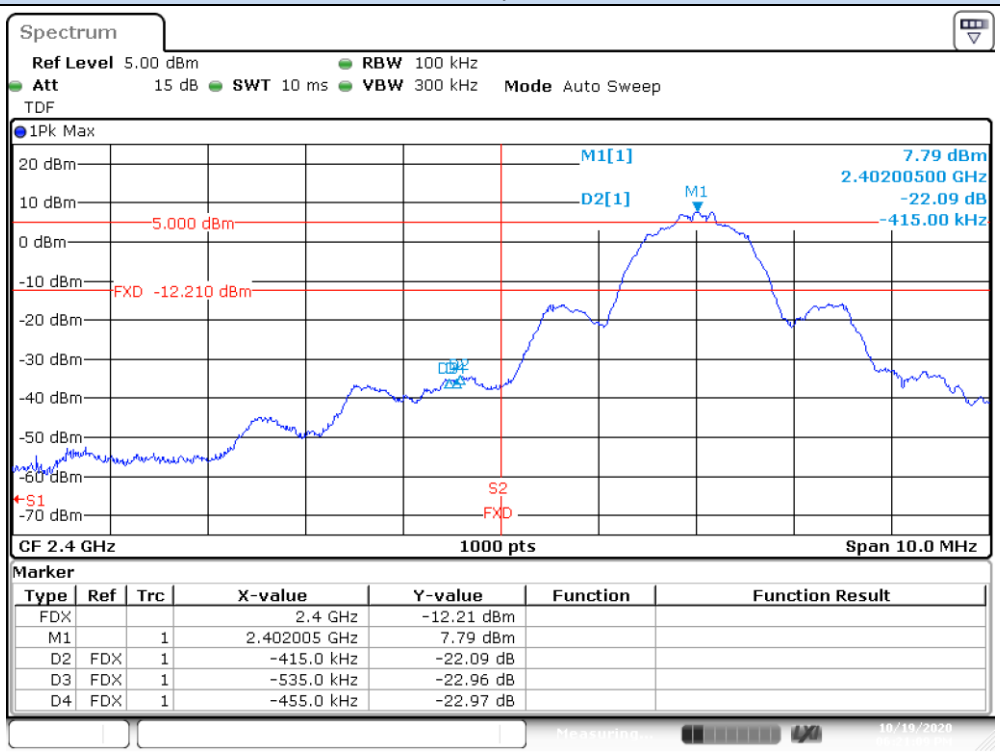
Date: 20.OCT.2020 15:16:13

BE High R Freq Section – Hopping

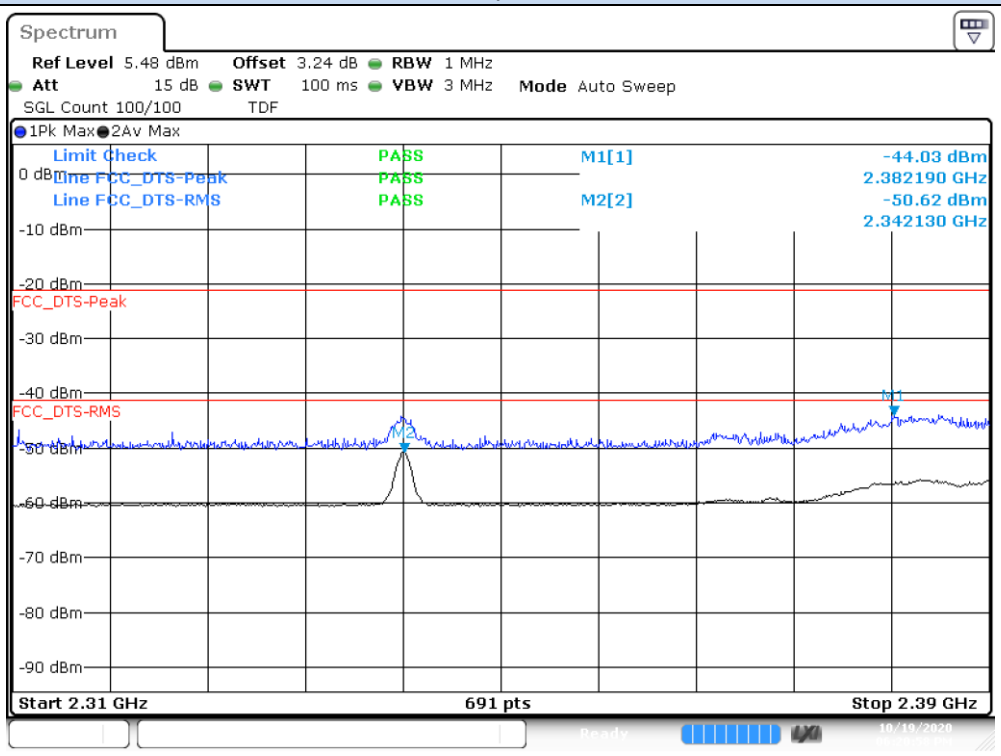


EDR – π/4-DQPSK

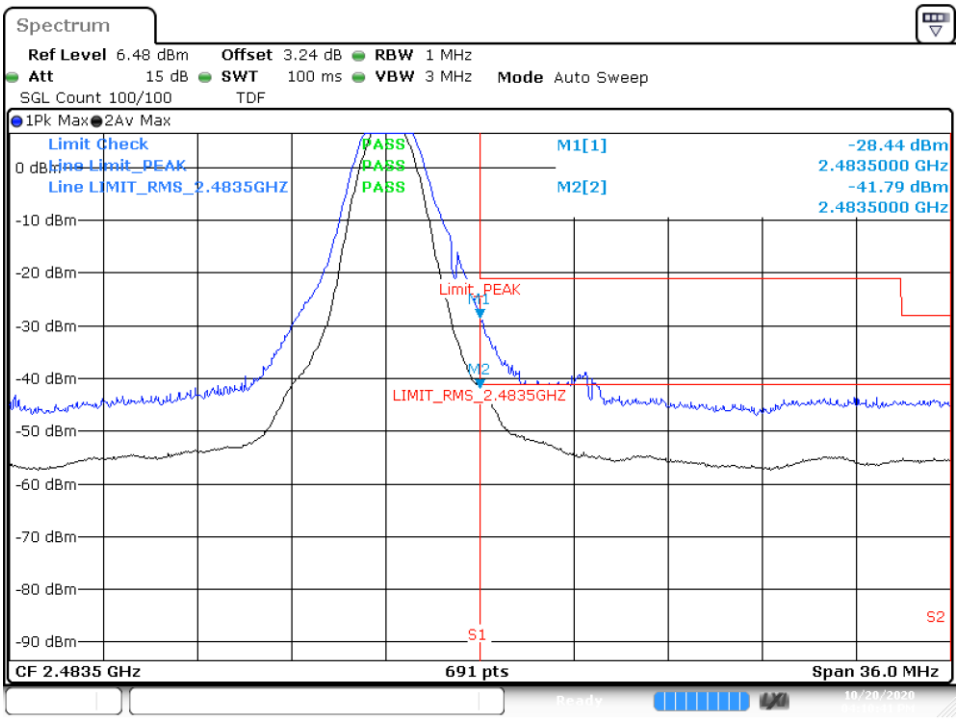
BE Low NR Freq Section – CH0



BE Low R Freq Section – CH0

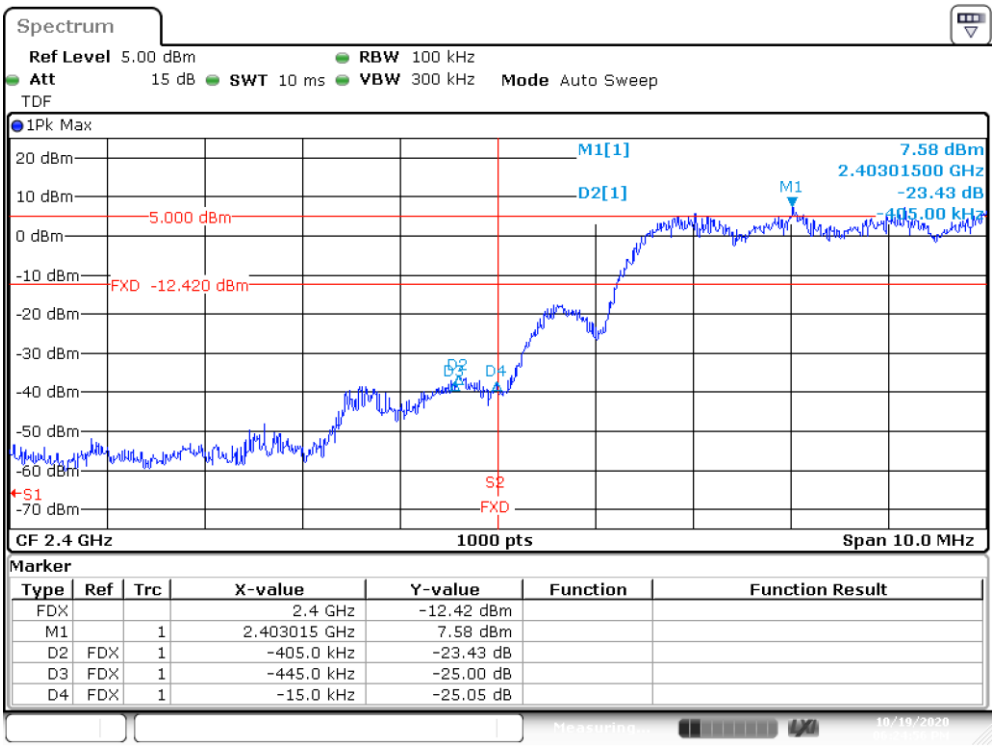


BE High R Freq Section – CH78

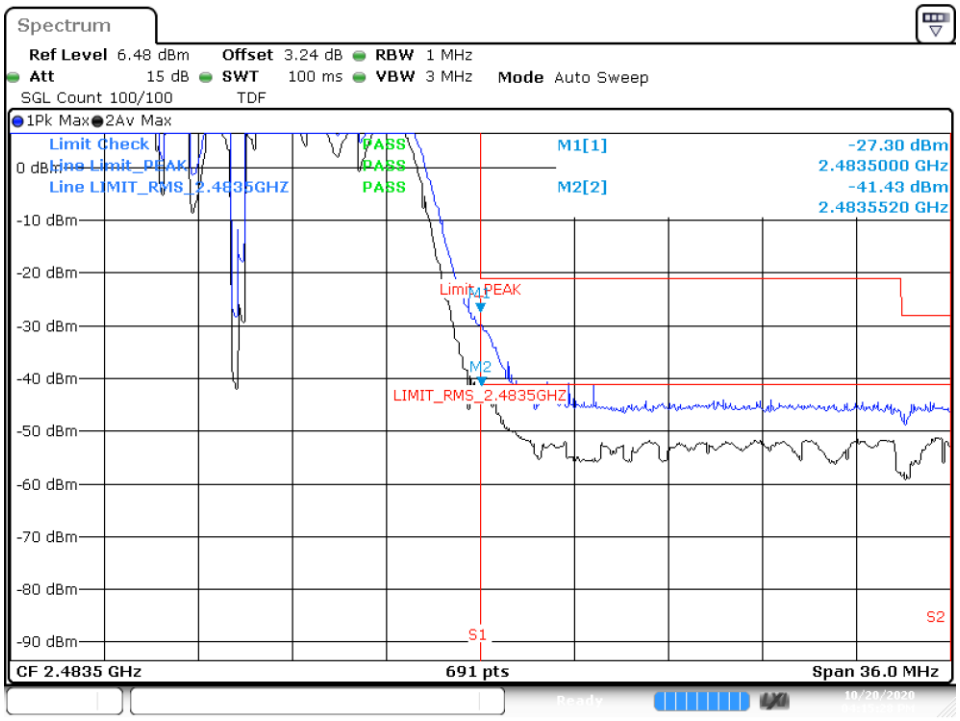


Date: 20.OCT.2020 16:10:42

BE Low NR Freq Section – Hopping

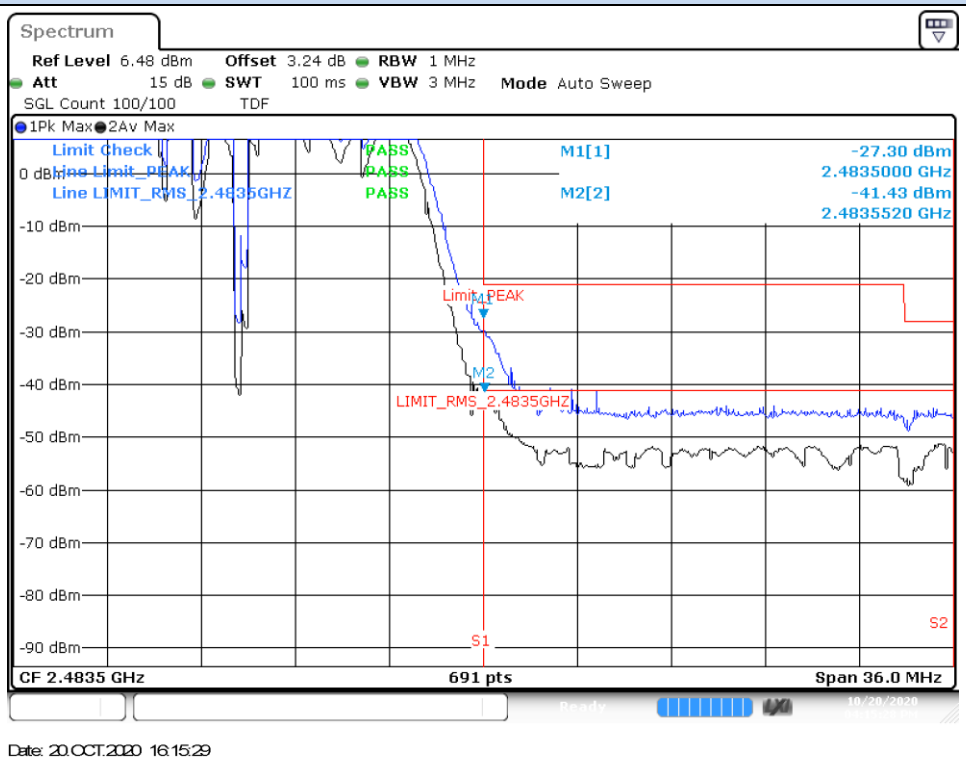


BE Low R Freq Section – Hopping



Date: 20.OCT.2020 16:15:29

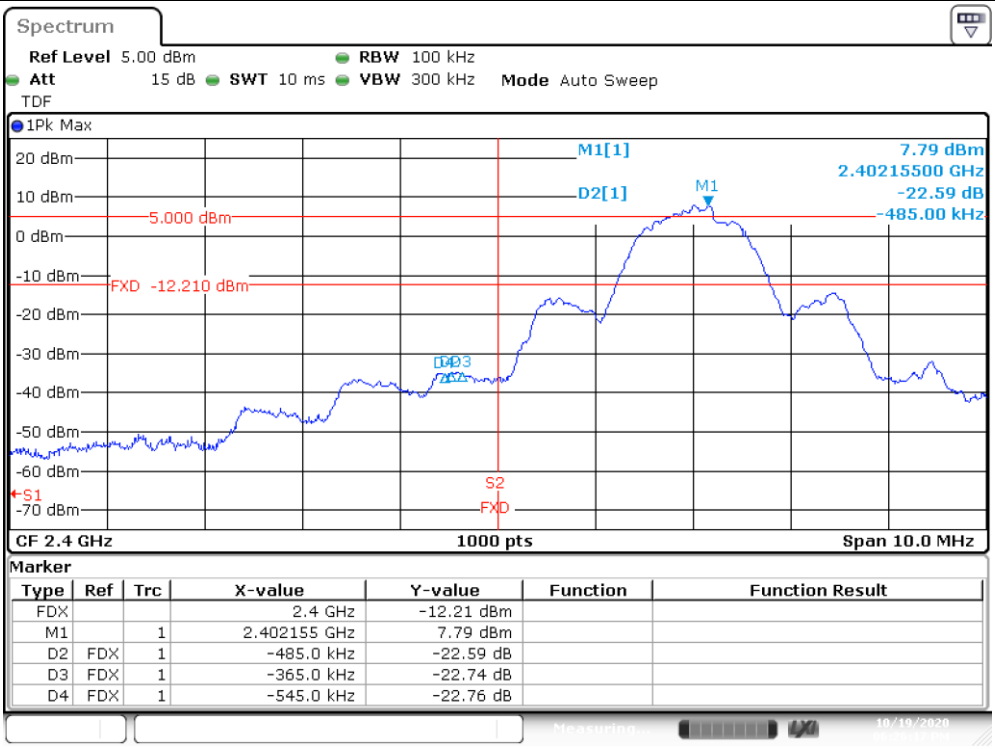
BE High R Freq Section – Hopping



Date: 20.OCT.2020 16:15:29

EDR – 8-DPSK

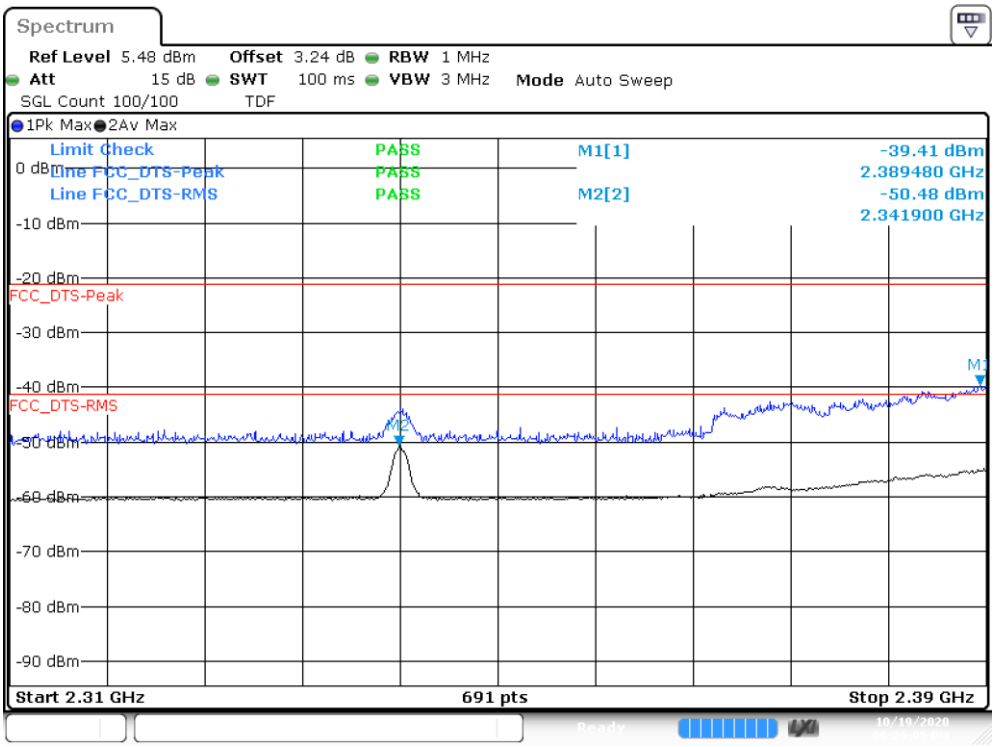
BE Low NR Freq Section – CH0



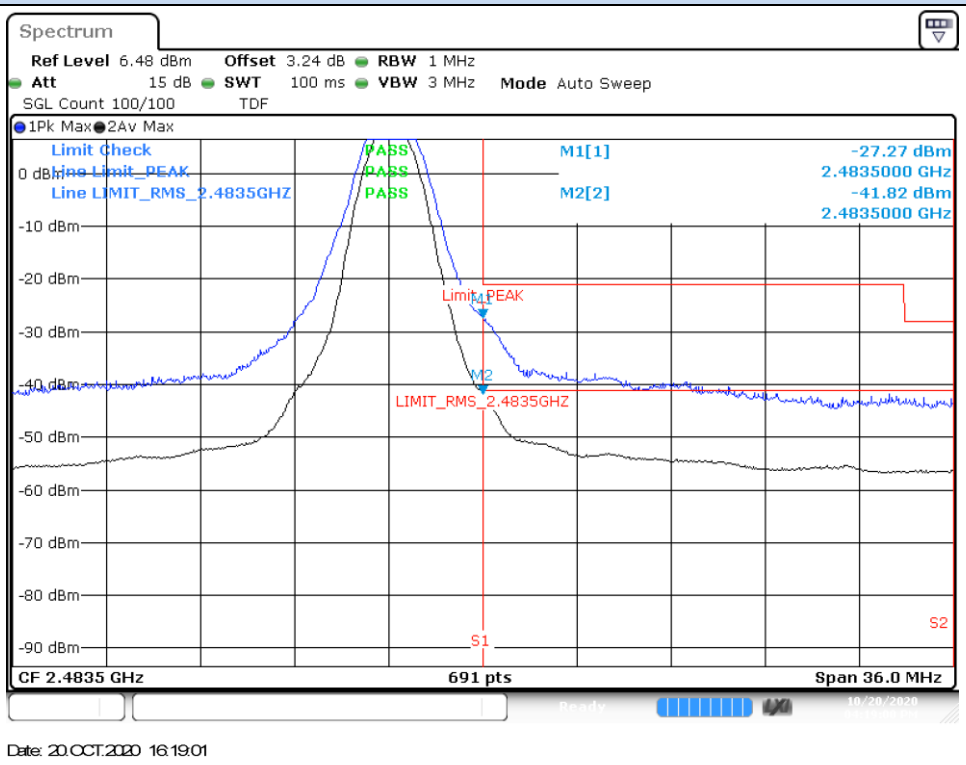
Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
FDX			2.4 GHz	-12.21 dBm		
M1		1	2.402155 GHz	7.79 dBm		
D2	FDX	1	-485.0 kHz	-22.59 dB		
D3	FDX	1	-365.0 kHz	-22.74 dB		
D4	FDX	1	-545.0 kHz	-22.76 dB		

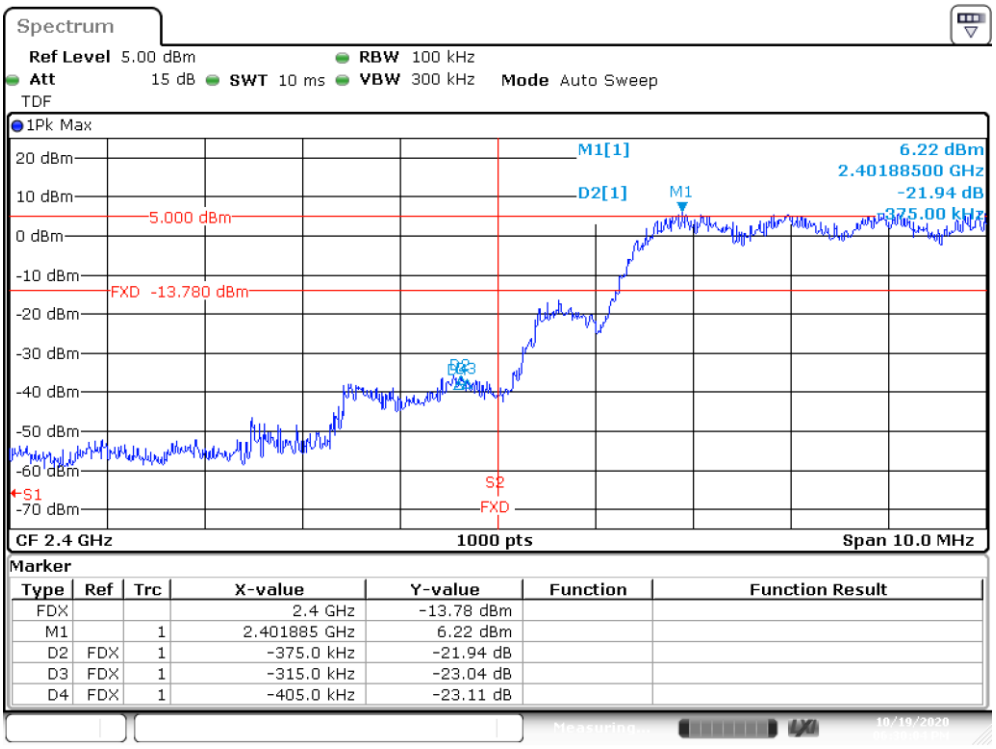
BE Low R Freq Section – CH0



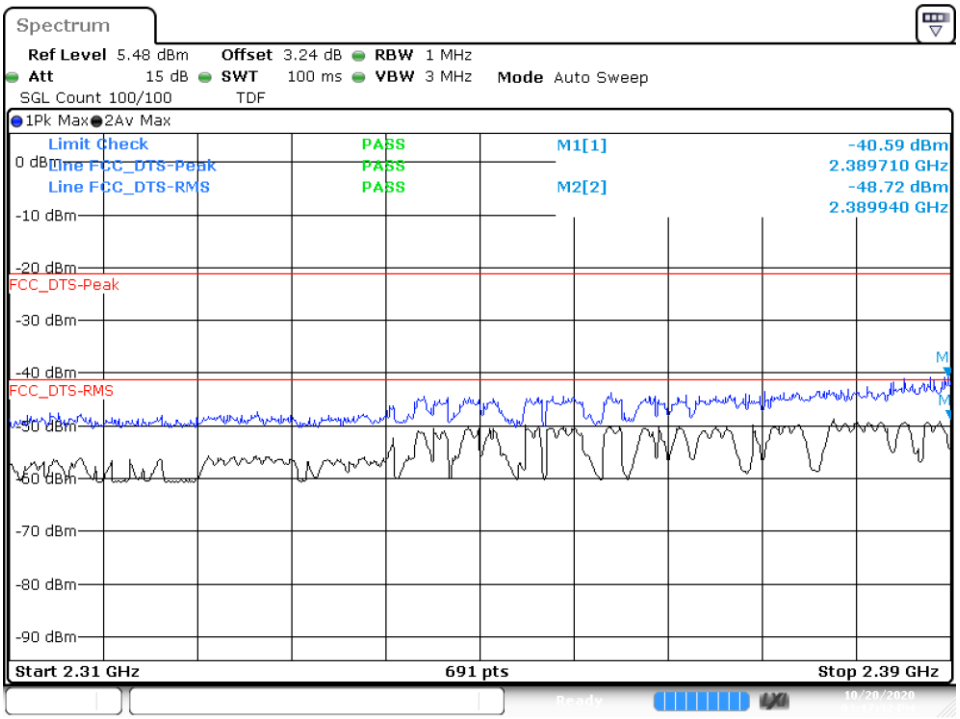
BE High R Freq Section – CH78



BE Low NR Freq Section – Hopping

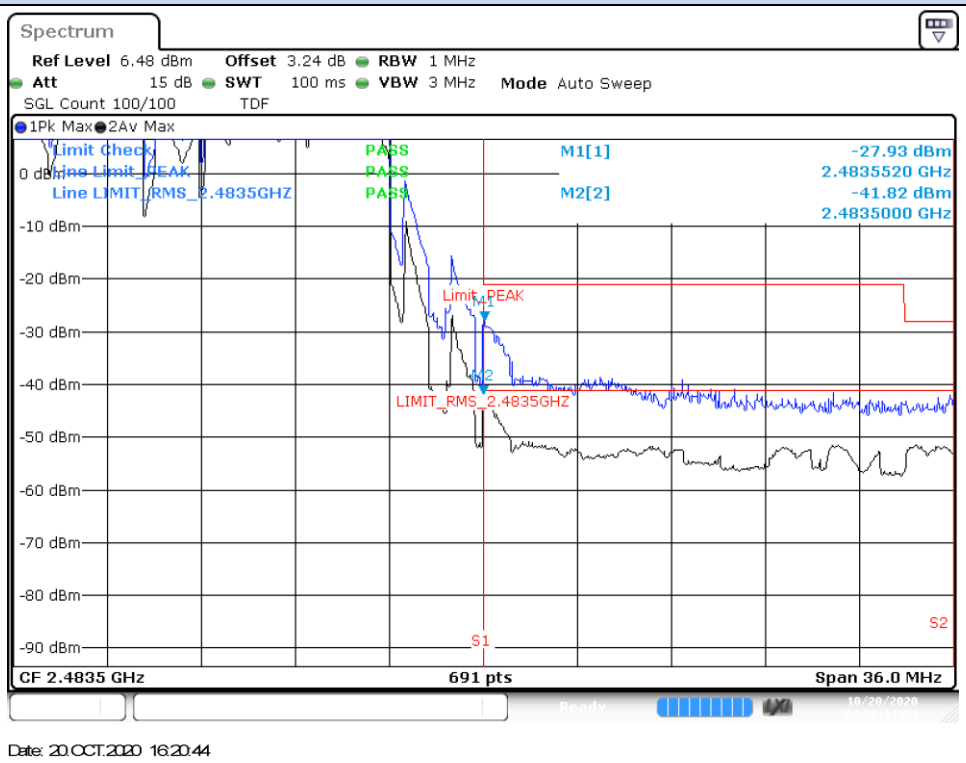


BE Low R Freq Section – Hopping



Date: 20.OCT.2020 15:17:33

BE High R Freq Section – Hopping



Date: 20.OCT.2020 16:20:44

B.6 Radiated spurious emission

B.6.1 Standards references

<table>
<tr><th>FCC part</th><th>RSS part</th><th>Limits</th></tr>
<tr><td>15.247 (d)
15.209 (a)</td><td>RSS-247
Clause 5.5

RSS GEN A1
Clause 8.9</td><td>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):
<table>
<tr><th>Freq Range (MHz)</th><th>Field Stregth (µV/m)</th><th>Field Stregth (dBµV/m)</th><th>Meas. Distance (m)</th></tr>
<tr><td>30-88</td><td>100</td><td>40</td><td>3</td></tr>
<tr><td>88-216</td><td>150</td><td>43.5</td><td>3</td></tr>
<tr><td>216-960</td><td>200</td><td>46</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>54</td><td>3</td></tr>
</table>
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.</td></tr>
</table>

B.6.2 Test procedure

The radiated setups shown in section *Test & System Description* 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 m to 4 m, the EUT azimuth over 360º and for both Vertical and Horizontal polarizations.
The radiated spurious emission was measured on the worst case configuration found.

B.6.3 Test Results

Radiated spurious - 30 MHz – 1 GHz

Radiated Spurious – All modes

Frequency	Quasi-Peak	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dB	---
74.9	36.8	40.0	3.2	V

Note 1: The spurious signals detected do not depend on either the operating channel or the modulation mode

1GHz – 26.5 GHz, BR – GFSK

Radiated Spurious – CH0 DH5

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3399.5	60.3	---	68.2	7.9	V
17820.5	---	40.0	54.0	14.0	H
17820.5	53.4	---	74.0	20.6	V
22000.0	47.6	---	68.2	20.6	H

Radiated Spurious – CH39 DH5

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3394.5	61.5	---	68.2	6.7	H
17815.0	53.3	---	74.0	20.7	V
17815.5	---	39.9	54.0	14.1	V
19529.0	47.0	---	74.0	27.0	V
19529.0	---	35.5	54.0	18.6	V
23993.0	---	36.4	54.0	17.6	V
23993.0	51.8	---	74.0	22.2	V

Radiated Spurious – CH78 DH5

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3391.5	62.0	---	68.2	**6.2**	H
17834.0	---	40.2	54.0	13.8	V
17834.0	53.5	---	74.0	20.5	H
22000.0	47.6	---	68.2	20.6	H

1 Ghz – 26.5 GHz, EDR – π/4-DQPSK

Radiated Spurious – CH0 2DH5

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3388.0	61.8	---	68.2	6.4	V
17913.5	---	40.0	54.0	14.0	V
17913.5	54.0	---	74.0	20.0	H
22000.0	47.4	---	68.2	20.8	V

Radiated Spurious – CH39 2DH5

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3392.5	61.4	---	68.2	6.8	V
17501.0	52.9	---	68.2	15.3	V
22000.0	47.1	---	68.2	21.1	V

Radiated Spurious – CH78 2DH5

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3399.5	62.1	---	68.2	**6.1**	H
17941.5	---	39.8	54.0	14.2	V
17941.5	53.4	---	74.0	20.6	V
22000.0	48.0	---	68.2	20.2	V

1 Ghz – 26.5 GHz, EDR – 8-DPSK

Radiated Spurious – CH0 3DH5

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3385.0	61.8	---	68.2	**6.4**	V
17831.5	53.7	---	74.0	20.3	V
17832.0	---	40.3	54.0	13.7	H
22000.0	48.3	---	68.2	19.9	H

Radiated Spurious – CH39 3DH5

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3395.0	61.0	---	68.2	7.2	H
17821.5	---	40.1	54.0	13.8	H
17821.5	54.3	---	74.0	19.7	V
22000.0	48.3	---	68.2	19.9	V

Radiated Spurious – CH78 3DH5

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
3389.5	61.8	---	68.2	6.4	H
17829.5	---	40.2	54.0	13.8	H
17829.5	53.4	---	74.0	20.6	H
22000.0	47.1	---	68.2	21.1	V