N° 1-6736
Scope available
on www.cofrac.fr

CERTIFICATE #3478.01

TEST REPORT

EUT Description	**WLAN and BT, 2x2 PCIe M.2 1216 adapter card**
Brand Name	**Intel®**
Model Name	**BE201D2WP**
FCC/IC ID	**PD2BE201D2P / 1000M-BE201D2P**
Date of Test Start/End	**2024-02-16 / 2024-06-17**
Features	**2x2 Wi-Fi - Bluetooth®** (see section 5)

Applicant	**Intel Corporation SAS**
Address	**425 Rue de Goa – Le Cargo B6 – 06600 Antibes, FRANCE**
Contact Person	**Benjamin Lavenant**
Telephone/Fax/ Email	**Benjamin.lavenant@intel.com**

Reference Standards	**FCC Title 47 CFR part 15 - Subpart C** **RSS-247 issue 3, RSS-Gen issue 5 A1** (see section1)

Test Report identification	**240521-02.TR14**
Revision Control	**Rev. 01** **This test report revision replaces any previous test report revision** (see section 8)

The test results relate only to the samples tested.
Reference to accreditation shall be used only by full reproduction of test report.

Issued by

Digitally signed by Requin
Date: 2024.07.26 10:33:46 +02'00'

Cedric REQUIN
(Test Engineer Lead)

Intel Corporation S.A.S – WRF Lab
425 rue de Goa – Le Cargo B6 - 06600, Antibes, France
Tel. +33493001400 / Fax +33493001401

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. 2023-10-01 Edition 2. FCC Title 47 CFR part 15 - Subpart C – §15.209 Radiated emission limits; general requirements. 2023-10-01 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 C63.10-2020 - American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
ISED	1. RSS-247 Issue 3 - 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 C63.10-2020 - 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.
- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is a Registered Test Site listed by ISED, with ISED #1000Y and CAB identifier FR0005.
- ✓ Intel WRF Lab only provides testing services and is committed to providing reliable, unbiased test results and interpretations.
- ✓ Intel WRF Lab is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.
- ✓ 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.
- ✓ This report does not imply an approval of the product by the Certification Bodies or competent Authorities.

3. Environmental Conditions

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

Temperature [ºC]	22.6 ºC ± 1.7 ºC
Humidity [%]	50.3% ± 4.6%

4. Test samples

Sample	Control #	Description	Model	Serial #	Date of receipt	Note
#01	240521-01.S07	WiFi 7 Module	BE201D2WP	F8FE5ECDC8EB	2024-06-05	Used for conducted tests
	200203-01.S10	Laptop	HP Oleander	000951007L	2023-04-24	
	241109-03.S70	Extender Board	CRF DB 2230 BNJ	2207308398	2024-06-05	
#02	240521-02.S05	Wifi 7 Module	BE201D2WP	F8FE5ECDC9B3	2024-05-22	Used for Radiated Spurious Emissions tests
	220225-03.S07	Microwave Absorber	Eccosorb BSR-1	-	2022-03-14	
	231109-03.S48	Adaptor	PCB00866-00_A	124627	2023-11-24	
	200611-03.S31	Extender	ADEXELEC	-	2020-08-19	
	200504-04.S07	Laptop	Latitude 5401	BVHLK13	2020-06-02	
	220117-04.S13	Antenna 2.4GHz	ANT24-P624-00	-	2022-02-09	
	240521-01.S12	Antenna 2.4GHz	ANT24-P624-00	-	2022-02-09	
	231120-05.S21	WiFi 7 Module	BE201D2WP	F8FE5CDCA49	2024-02-07	
	180001-01.S21	Socket	1216SD to M.2	-	2021-06-07	
#03	240521-02.S04	Wifi 7 Module	BE201D2WP	F8FE5ECDCA08	2024-05-22	Used for Radiated Spurious Emissions tests
	220225-03.S07	Microwave Absorber	Eccosorb BSR-1	-	2022-03-14	
	231109-03.S47	Adaptor	PCB00866-00_A	124727	2023-11-24	
	220915-09.S01	Extender	ADEXELEC	-	2022-04-06	
	200611-03.S30	Laptop	Latitude 5401	6DJLK13	2020-08-19	
	220117-04.S13	Antenna 2.4GHz	ANT24-P624-00	-	2022-02-09	
	240521-01.S12	Antenna 2.4GHz	ANT24-P624-00	-	2022-02-09	
	231120-05.S20	WiFi 7 Module	BE201D2WP	F8FE5CDCA49	2024-02-07	
	180001-01.S21	Socket	1216SD to M.2	-	2021-06-07	
#04	231120-05.S13	WiFi 7 Module	BE201D2WP	F8FE5ECDCA67	2024-02-06	Used for conducted tests
	200904-01.S10	Laptop	HP Opel	000075059C	2023-04-24	
	231109-03.S46	Extender Board	CRF DB 2230 BNJ	2202227961	2023-11-16	

5. EUT Features

The herein information is provided by the customer

Intel WRF Lab declines any responsibility for the accuracy of the stated customer provided information, especially if it has any impact on the correctness of test results presented in this report.

<table>
<tr><td>Brand Name</td><td>Intel®</td></tr>
<tr><td>Model Name</td><td>BE201D2WP</td></tr>
<tr><td>Software Version</td><td>DRTU.05726.99.0.86</td></tr>
<tr><td>Driver Version</td><td>99.0.86.3</td></tr>
<tr><td>Prototype / Production</td><td>Production</td></tr>
<tr><td>Supported Radios</td><td>802.11b/g/n/ax/be 2.4GHz
802.11a/n/ac/ax/be 5.2GHz
5.6GHz
5.8GHz
802.11ax/be 6GHz
Bluetooth 2.4GHz</td></tr>
<tr><td>Antenna Information</td><td>
<table>
<tr><th>Transmitter</th><th>Chain A (1)</th><th>Chain B (2)</th></tr>
<tr><td>Manufacturer</td><td>Intel</td><td>Intel</td></tr>
<tr><td>Antenna type</td><td>PIFA / Slot / Monopole</td><td>PIFA / Slot / Monopole</td></tr>
<tr><td>Part number</td><td>ANT24-P624-00 / ANT24-S624-00 / ANT24-M624-00</td><td>ANT24-P624-00 / ANT24-S624-00 / ANT24-M624-00</td></tr>
<tr><td>Max declared antenna gain (dBi) 2.4 GHz</td><td>+ 6.11</td><td>+6.11</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
2. Bluetooth tests have been performed on Chain A (1)
3. Conducted tests have been performed using the maximum antenna gain between the PIFA, Monopole and Slot antennas

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.

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	Pass
15.247 (a) (1) (iii)	RSS-247 Clause 5.1 (d)	Number of hopping channels	Pass
15.247 (a) (1) (iii)	RSS-247 Clause 5.1 (d)	Time of Occupancy (Dwell Time)	Pass
15.247 (b) (1)	RSS-247 Clause 5.4 (b)	Maximum Peak Output Power and antenna gain	Pass
15.247 (d)	RSS-247 Clause 5.5	Out-of-band Emissions (conducted)	Pass
15.247 (d) 15.209	RSS-247 Clause 5.5 RSS-GEN A1 Clause 8.9	Out-of-band Emissions (radiated)	Pass

8. Document Revision History

Revision #	Modified by	Revision Details
Rev. 00	T.MATHIEU R.SIMONINI	First Issue
Rev. 01	C. REQUIN	Uppon customer request: In section 5. antenna gain updated 6.11dBi instead of 6.00dBi.

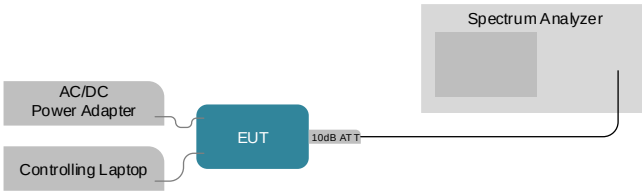
Annex A. Test & System Description

A.1 Measurement System

Measurements were performed using the following setups.

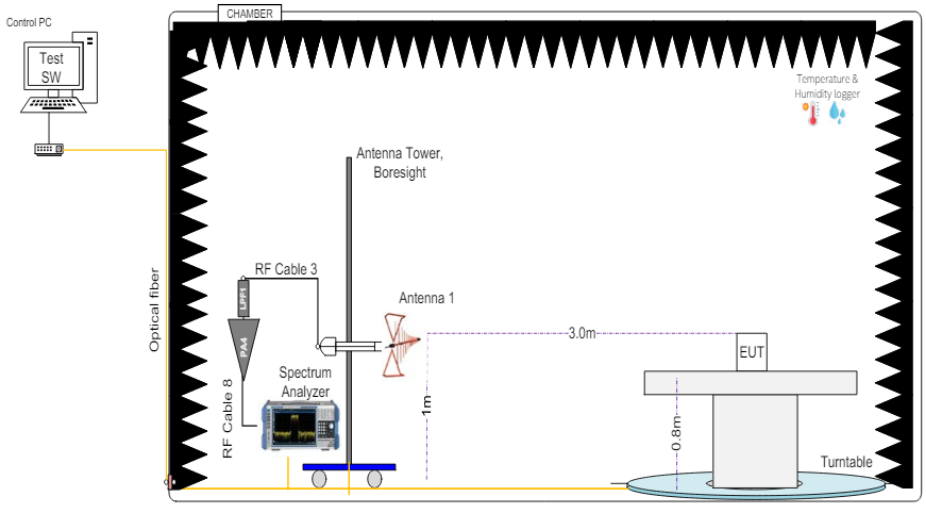
The DUT was installed in a test fixture and this test fixture is connected to a laptop computer and AC/DC power adapter. The laptop computer was used to configure the EUT to continuously transmit at a specified output power using all different modes and modulation schemes.

Conducted test setup

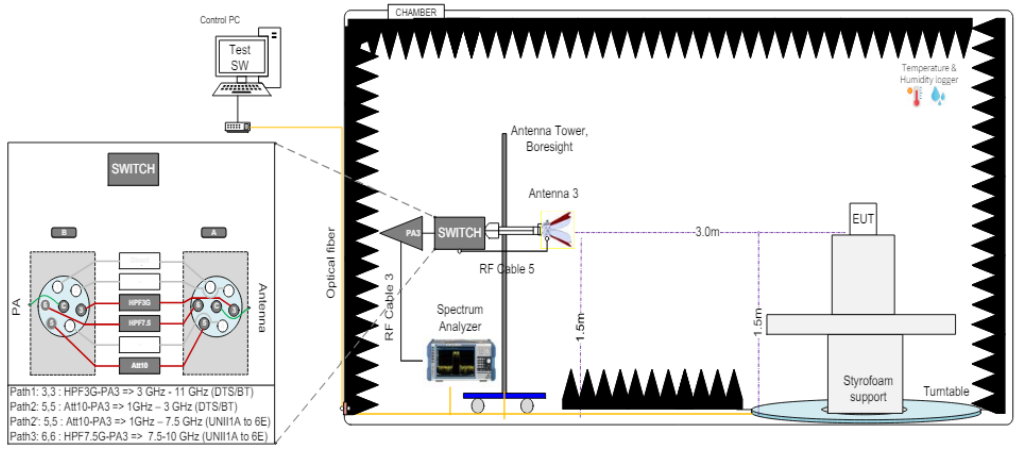


Radiated test setup

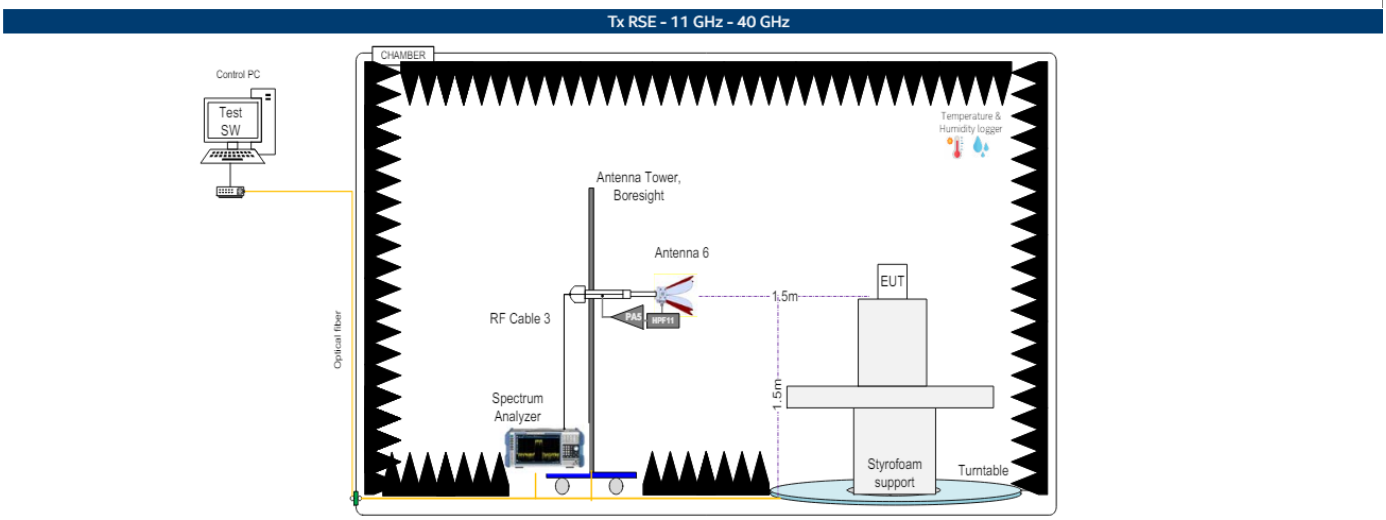
TX RSE - 30 MHz - 1 GHz



Tx RSE - 1 GHz - 11 GHz



Radiated test setup



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
273-000	Spectrum Analyzer	FSV30	103309	Rohde & Schwarz	2024-03-22	2026-03-22
019-000	RF cable 50cm	PE360-50CM	N/A	PASTERNACK	2024-02-21	2025-02-21
019-002	10dB Attenuator + MH4	PE7395-10	N/A	PASTERNACK	2024-02-21	2025-02-21
363-000	Temp & Humidity Logger	RA12E-TH1-RAS	RA12-D0EB1A	AVITECH	2023-09-28	2025-09-28
413-000	Measurement SW v1.5.4.2	Octopi	N/A	Step AT	N/A	N/A

Radiated Setup #1

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
006-000	Anechoic Chamber	FACT3	5720	ETS-Lindgren	2024-01-17	2026-01-17
006-008	Measurement SW, v11.30	EMC32	100623	Rohde & Schwarz	N/A	N/A
259-000	Temp & Humidity Logger	RA12E-TH-RAS	RA12-B9BD70	Avtech	2022-06-27	2024-06-27
006-001	Turn Table	ETS	-	ETS-Lindgren	N/A	N/A
006-011	Boresight antenna mast	BAM 4.0-P	P/278/2890.01	Maturo	N/A	N/A
057-000	Double Horn Ridged antenna	3117	167062	ETS-Lindgren	2022-07-08	2024-07-08
058-000	Double Horn Ridged antenna	3116C	157511	ETS-Lindgren	2022-10-21	2024-10-21
006-061	Bi-Log Periodic antenna	CBL6143A	61382	Teseq	2022-10-24	2024-10-24
147-000	Spectrum analyzer	FSW43	101847	Rohde & Schwarz	2022-11-30	2024-11-30
301-000	Amplifier 9kHz-1300MHz	8447F	3113A07440	HP	2024-03-19	2025-03-19
261-000	Amplifier 1GHz-18GHz	3117-PA	00157993	ETS-Lindgren	2024-03-14	2025-03-14
502-006	Amplifier 0.5GHz-40GHz	DEPA0540-43	2023A05	Diamond Engineering	2024-03-19	2025-03-19
009-007	RF Filter	ZHSS-k11G+	8493 1831830	Mini-Circuits	2024-03-19	2025-03-19
006-068	RF Switch	RC-2SP6T-40	02112090061	Micro-Circuits	2024-03-14	2025-03-14
006-066	Cable 7m – 25MHz to 40GHz	R286304174	20.46.370	Radiall	2024-03-14	2025-03-14
006-063	Cable 30cm – 1GHz to 40GHz	PE371-12	-	Pasternack	2024-03-14	2025-03-14
006-064	Cable 30cm – 1GHz to 40GHz	PE371-12	-	Pasternack	2024-03-14	2025-03-14
006-065	Cable 60cm – 25MHz to 1GHz	PE300-24	-	Pasternack	2024-03-12	2025-03-12

N/A: Not Applicable

Radiated Setup #2

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
007-000	Anechoic chamber	RFD-FA-100	5996	ETS Lindgren	2024-01-18	2026-01-18
127-000	Spectrum Analyzer	FSV40	101358	Rohde & Schwarz	2023-01-27	2025-01-27
007-007	Double Ridge Horn (1- 18GHz)	3117	00152266	ETS Lindgren	2024-03-26	2026-03-26
007-006	Switch & Positioner	EMCenter	00151232	ETS Lindgren	N/A	N/A
059-000	Double Ridge Horn (1- 18GHz)	3117	201542	ETS-Lindgren	2023-09-26	2025-09-26
264-000	Amplifier 1GHz-18GHz	3117-PA	00169546	ETS-Lindgren	2024-03-14	2025-03-14
007-011	RF Cable 1-18GHz - 6.5m	140-8500-11-51	001	Atem	2024-03-15	2025-03-15
007-005	Measurement SW, v11.20.00	EMC32	100401	Rohde & Schwarz	N/A	N/A
007-003	Antenna Tower	2171B-3.0M	00150123	ETS Lindgren	N/A	N/A
007-002	Turntable	-	-	ETS Lindgren	N/A	N/A
007-022	RF Cable 1-18GHz, 1.5m	0501050991200GX	19.23.493	Radiall	2024-03-12	2025-03-12
007-015	RF Cable 1GHz-18GHz 1.5m	-	-	Spirent	2024-03-12	2025-03-12
007-018	RF Cable 1-9.5GHz 1.2m	0500990991200KE	-	Radiall	2024-03-12	2025-03-12
007-020	RF Cable 1-18GHz, 1.2 m	2301761761200PJ	12.22.1104	Radiall	2024-03-15	2025-03-15
349-000	Temp & Humidity Logger	RA12E-TH1-RAS	RA12-D4F8C3	Avtech	2023-11-30	2025-11-30

N/A: Not Applicable

Shared Radiated Equipment

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
412-000	DRTU Power finder V2.1	-	-	Intel	NA	NA
139-000	Power Sensor	NRP-Z81	104383	Rohde & Schwarz	2023-04-21	2025-04-21
061-000	Power Sensor	NRP-Z81	104386	Rohde & Schwarz	2024-04-09	2026-04-09
140-000	Power Sensor	NRP-Z81	104382	Rohde & Schwarz	2024-04-04	2026-04-04

N/A: Not Applicable

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	±2.93	dB
Radiated tests <1GHz	±6.23	dB
Radiated tests 1GHz – 26.5 GHz	±6.10	dB

Annex B. Test Results

The herein test results were performed by:

Test case measurement	Test Personnel
20dB Bandwidth and Carrier frequency separation	T.MATHIEU
Number of hopping channels	T.MATHIEU
Time of Occupancy (Dwell Time)	T.MATHIEU
Maximum Peak Output Power and antenna gain	T.MATHIEU
Out-of-band Emissions (conducted)	T.MATHIEU
Spuirous Emissions (radiated)	K.KHATIB, R.SIMONINI

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

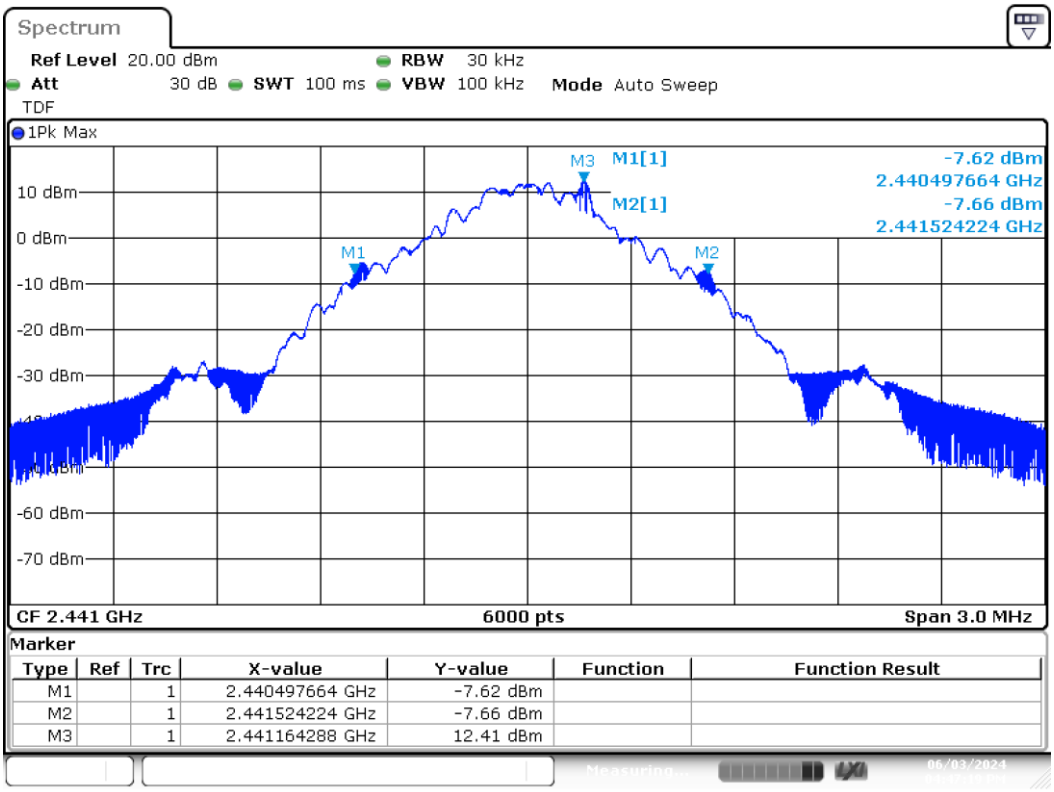
Mode	Packet Type	Channel Number	Frequency [MHz]	20dB BW [MHz]	Freq. Separation [kHz]
Basic Rate GFSK	DH5	0	2402	1.02	1000
		39	2441	1.03	
		78	2480	1.03	
EDR π/4-DQPSK	2DH5	0	2402	1.36	1005
		39	2441	1.36	
		78	2480	1.36	
EDR 8-DPSK	3DH5	0	2402	1.34	1000
		39	2441	1.34	
		78	2480	1.34	

Largest value per mode

B.1.3 Results screenshot

Basic Rate - GFSK

20dB BW – CH39



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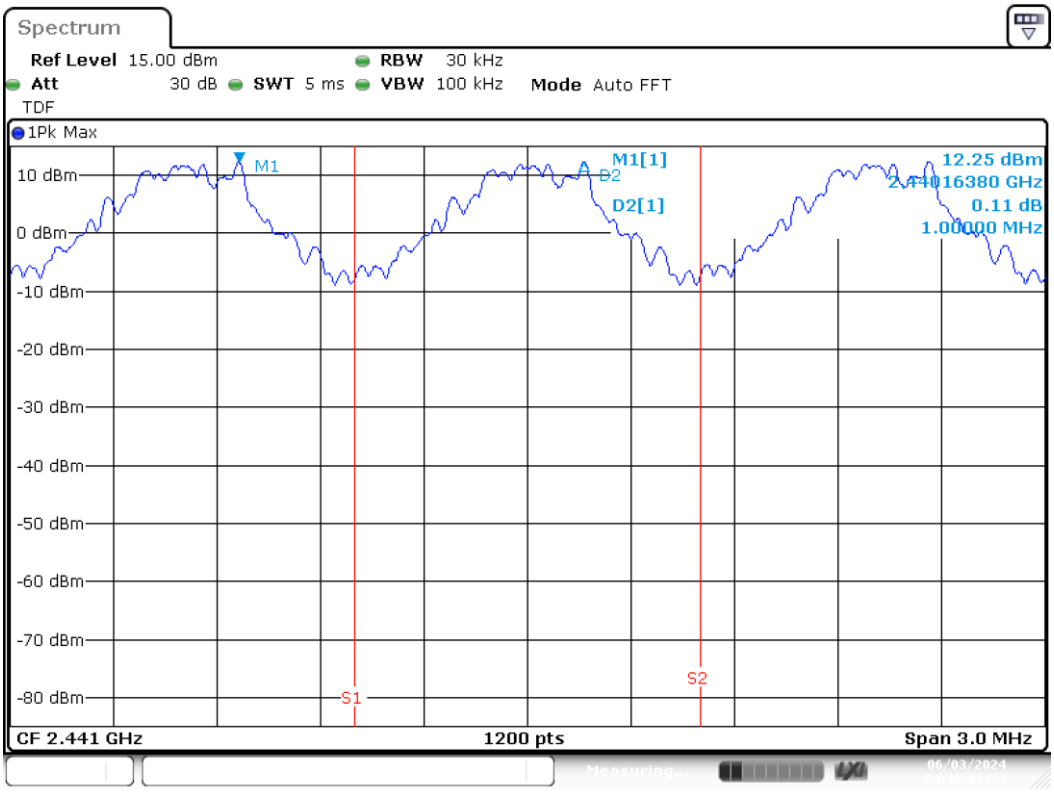
Freq. Separation



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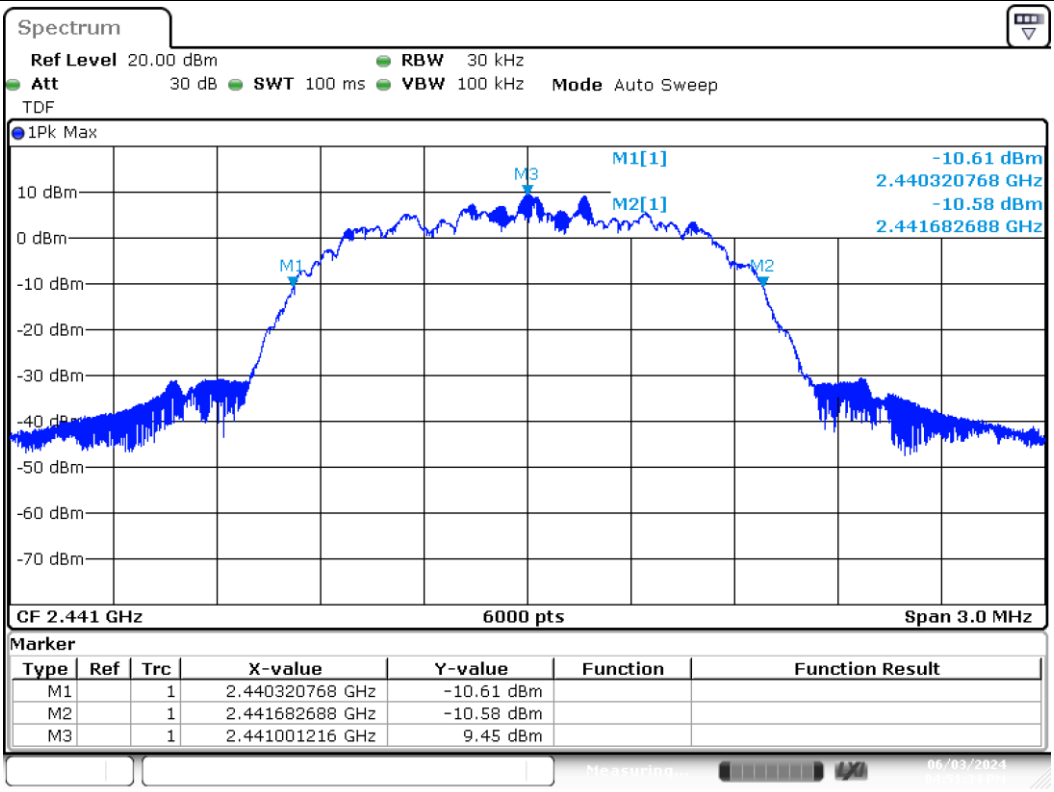
EDR – π/4-DQPSK

20dB BW – CH39



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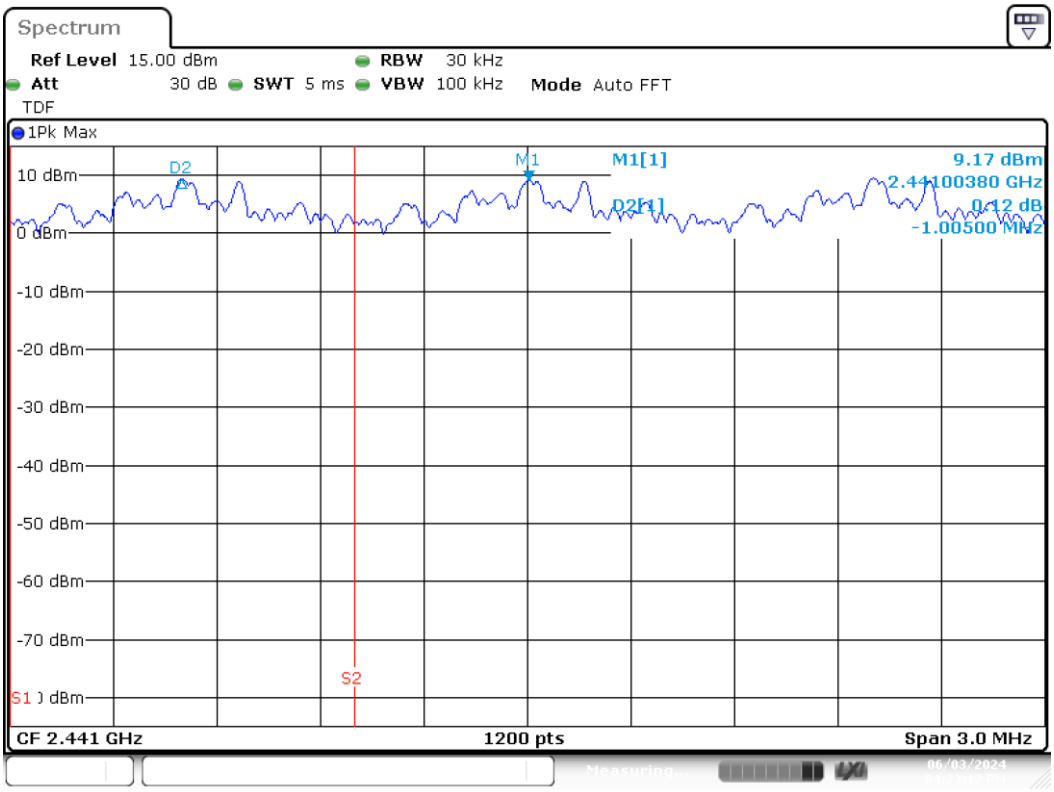

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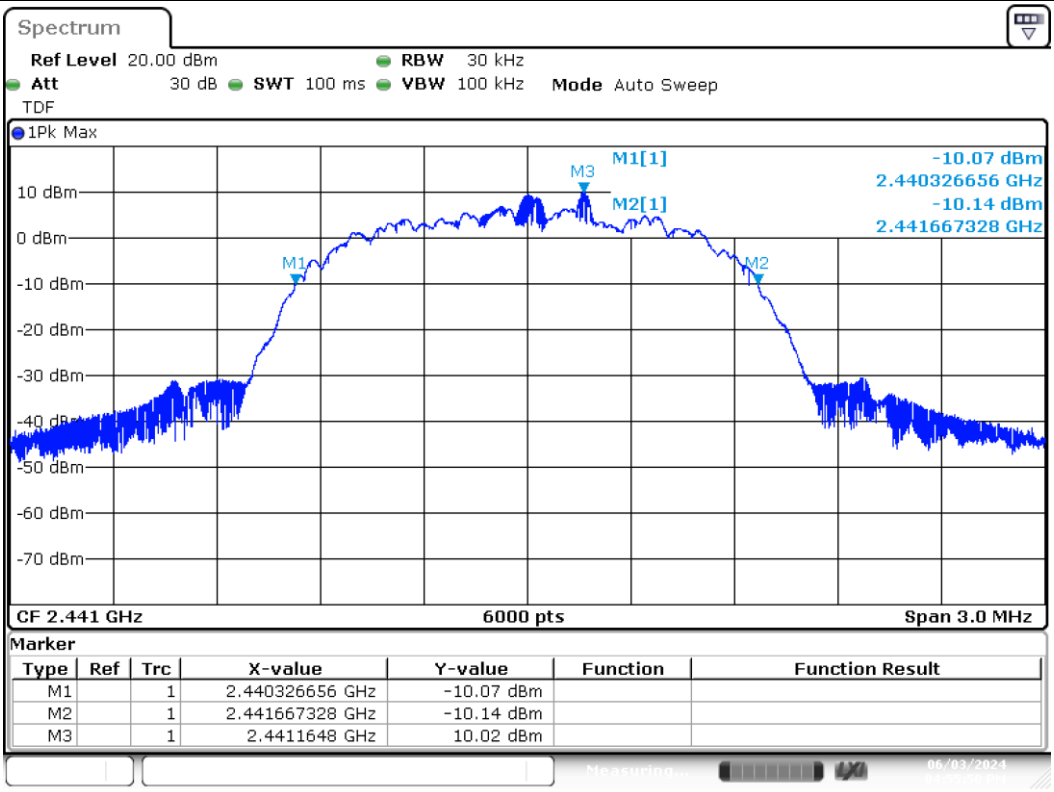
EDR – 8-DPSK

20dB BW – CH39



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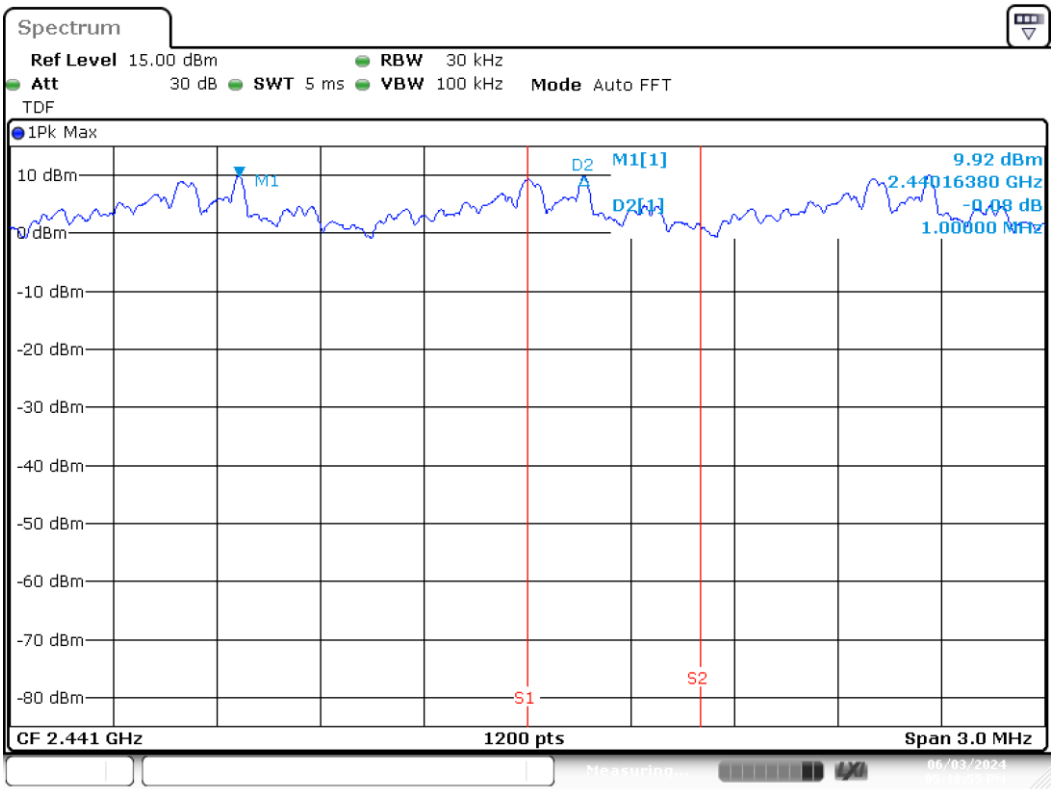
Freq. Separation



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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

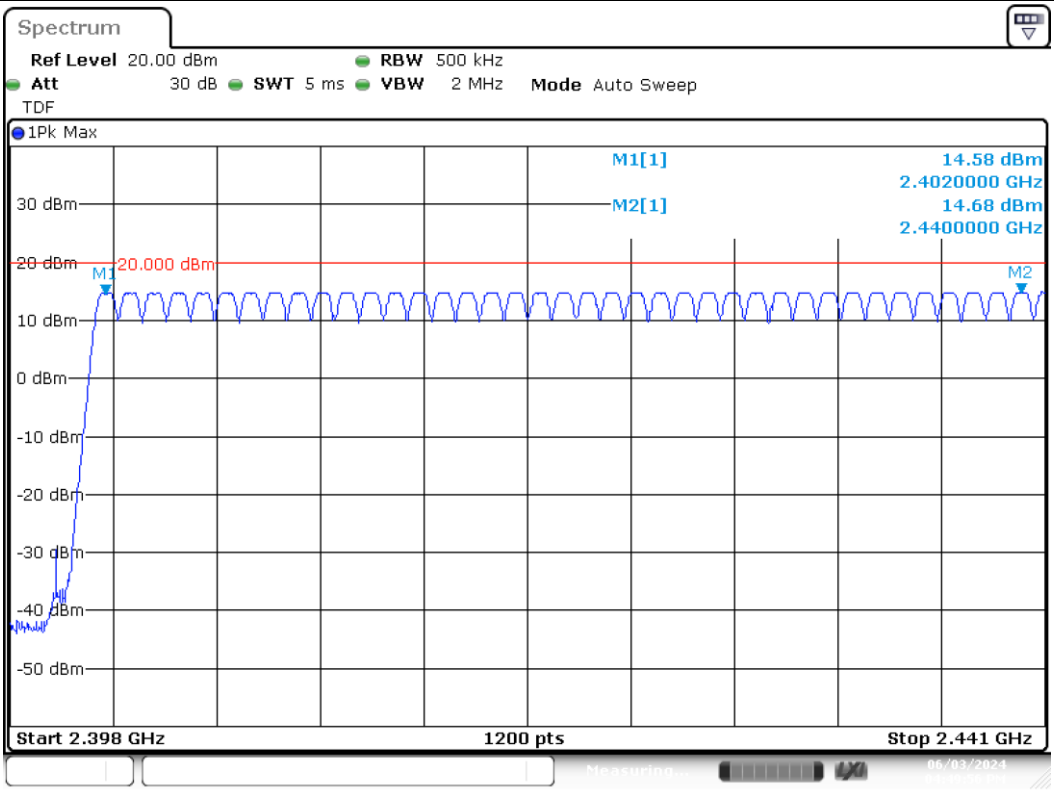
The conducted setup shown in section *Test & System Description* was used to measure the number of hopping channels. The antenna terminal of the EUT is connected to the spectrum through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.

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



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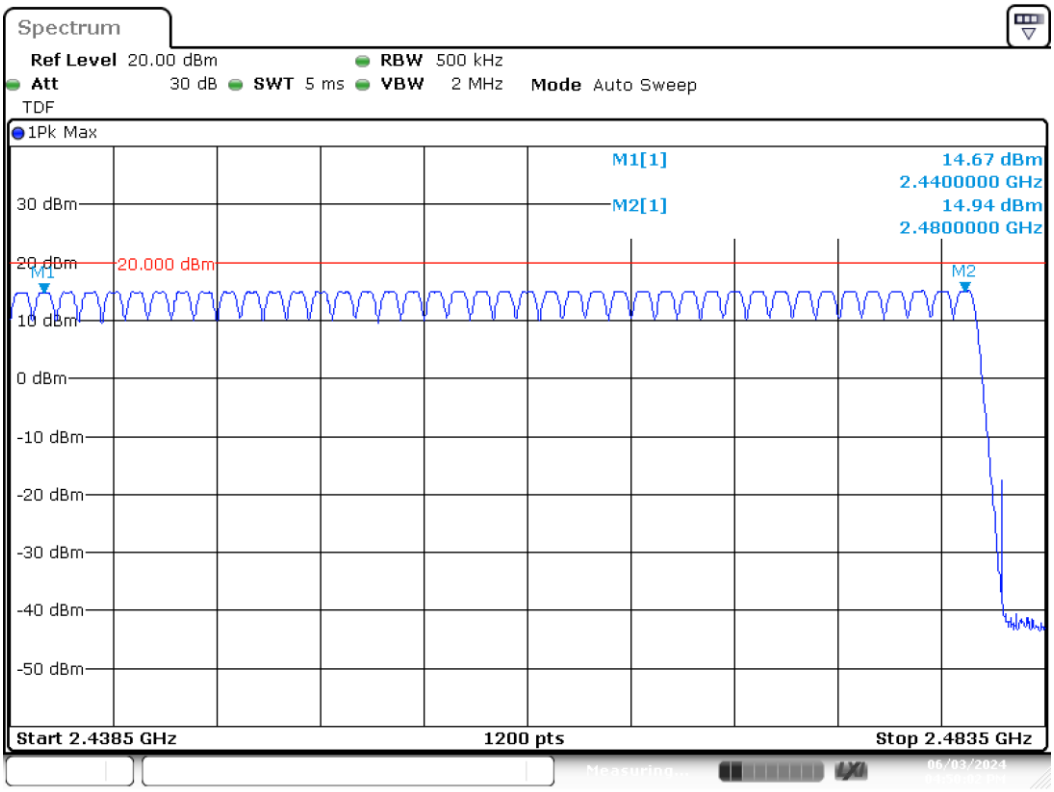

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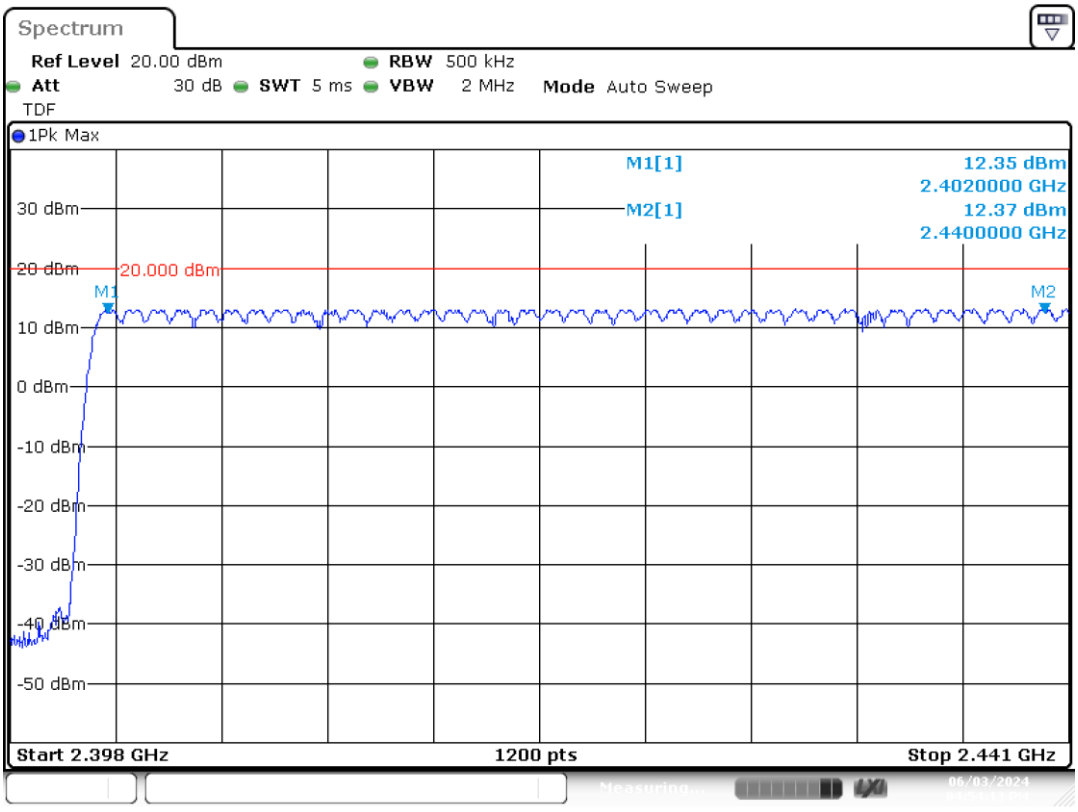
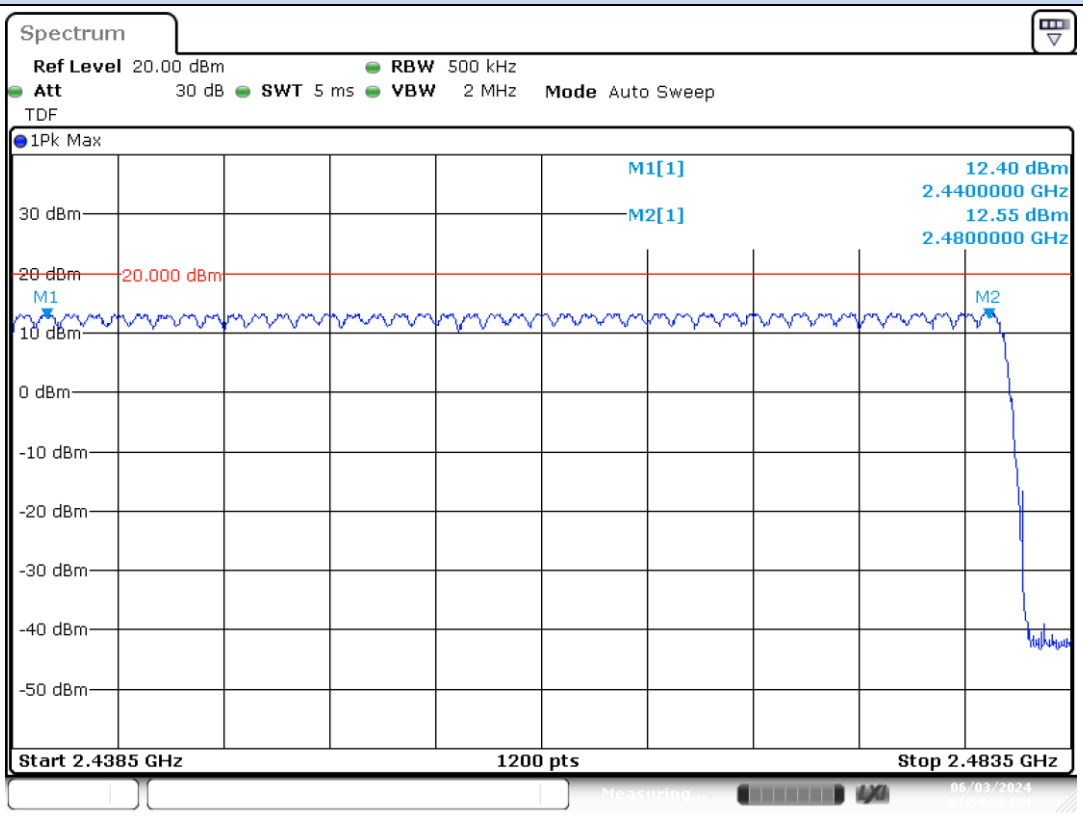
EDR – π/4-DPSK



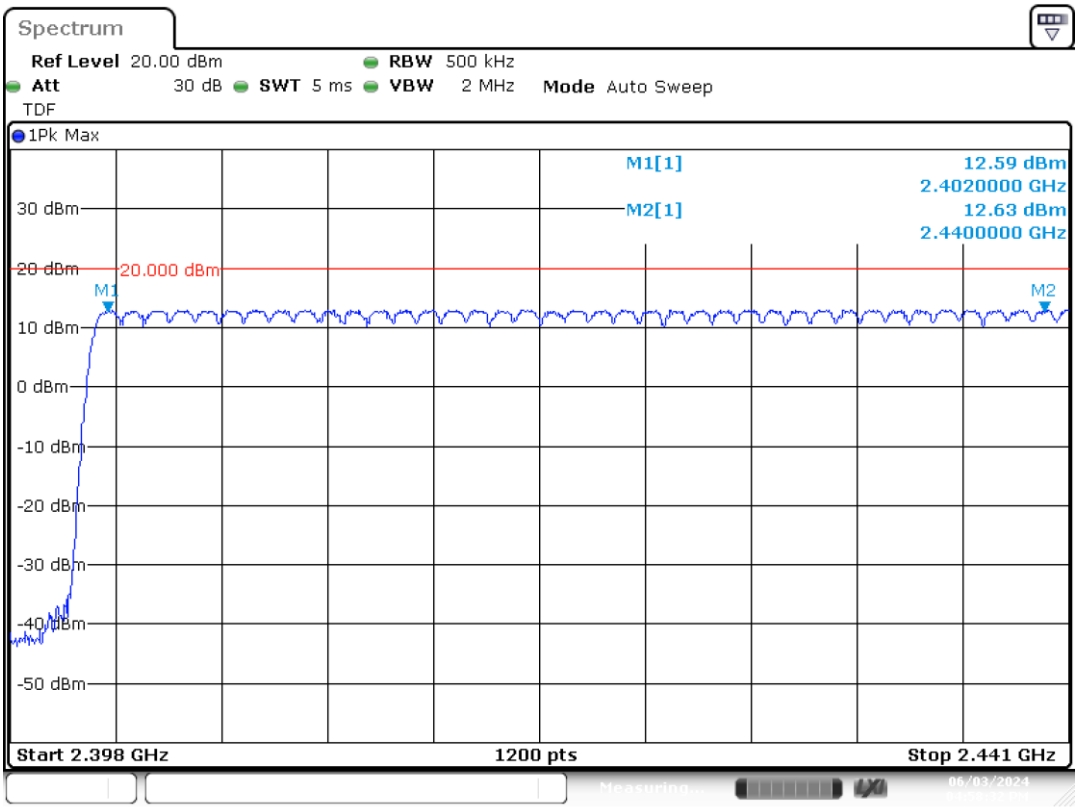
Date: 3.JUN.2024 16:54:14

EDR – π/4-DPSK



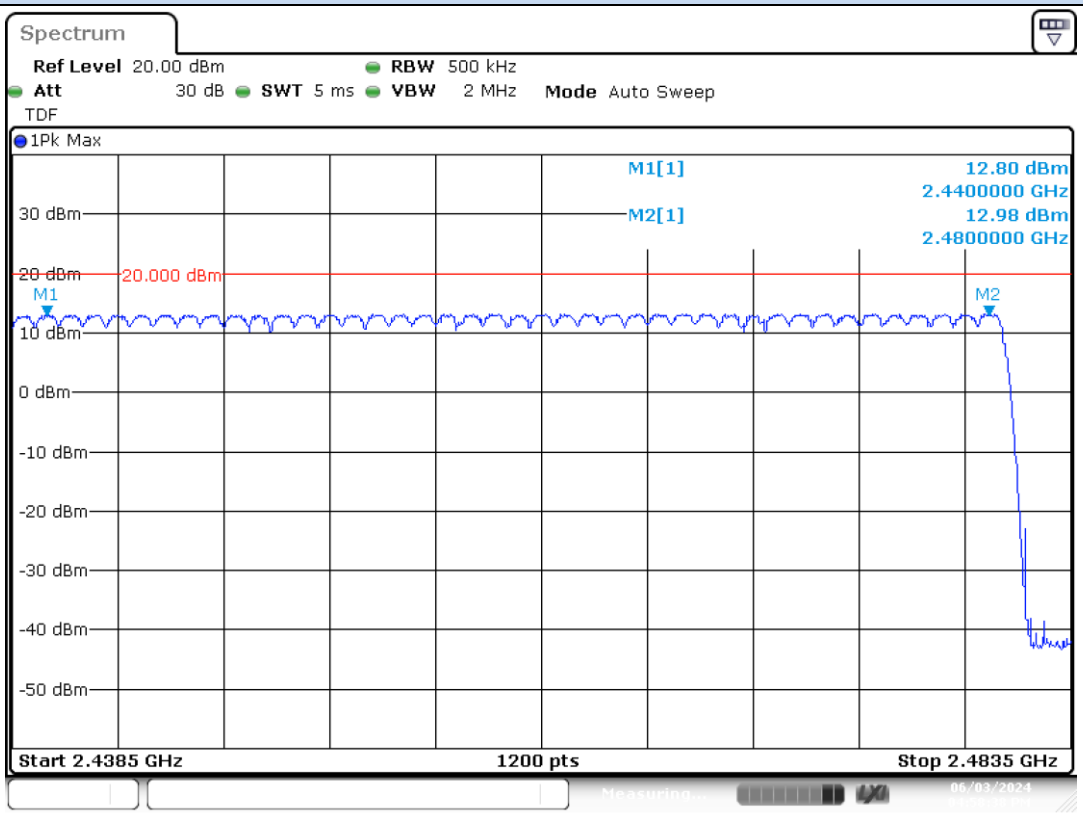
Date: 3.JUN.2024 16:54:20

EDR – 8-DPSK



Date: 3.JUN.2024 16:58:31

EDR – 8-DPSK



Date: 3.JUN.2024 16:58:38

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.

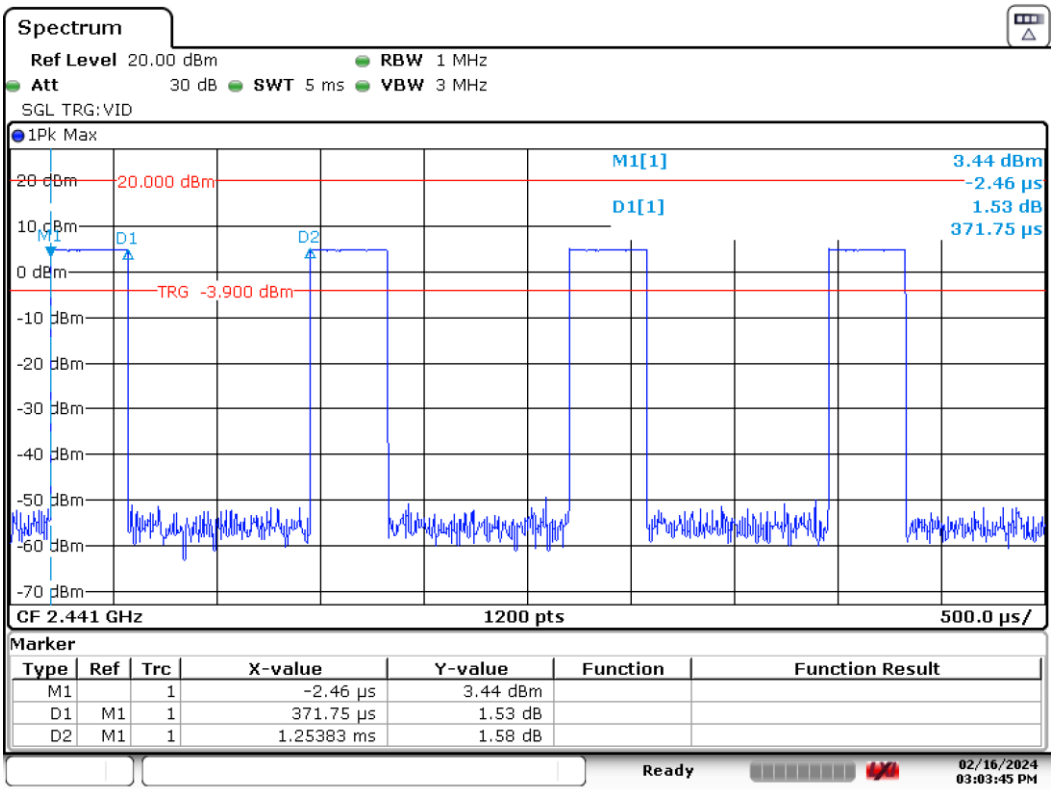
B.3.2 Results tables

Mode	Packet Type	Times of appearance	Tx-time [ms]	Dwell Time [ms]
Basic Rate GFSK	DH1	320.11	0.372	119.00
	DH3	161.16	1.626	261.98
	DH5	106.49	2.880	306.71
EDR π/4-DQPSK	2-DH1	320.11	0.380	121.67
	2-DH3	161.16	1.634	263.32
	2-DH5	106.49	2.880	306.71
EDR 8-DPSK	3-DH1	320.11	0.376	120.34
	3-DH3	161.16	1.630	262.65
	3-DH5	106.49	2.884	307.16

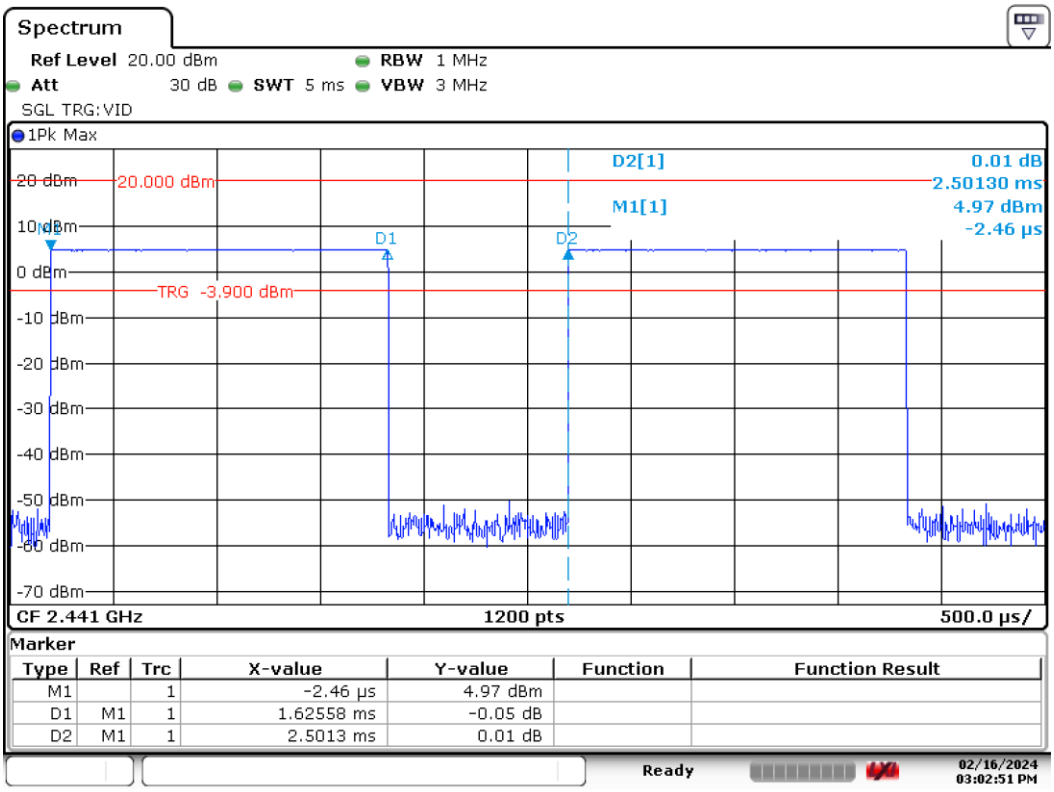
B.3.3 Results Screenshot

BDR – GFSK

DH1 Tx-Time

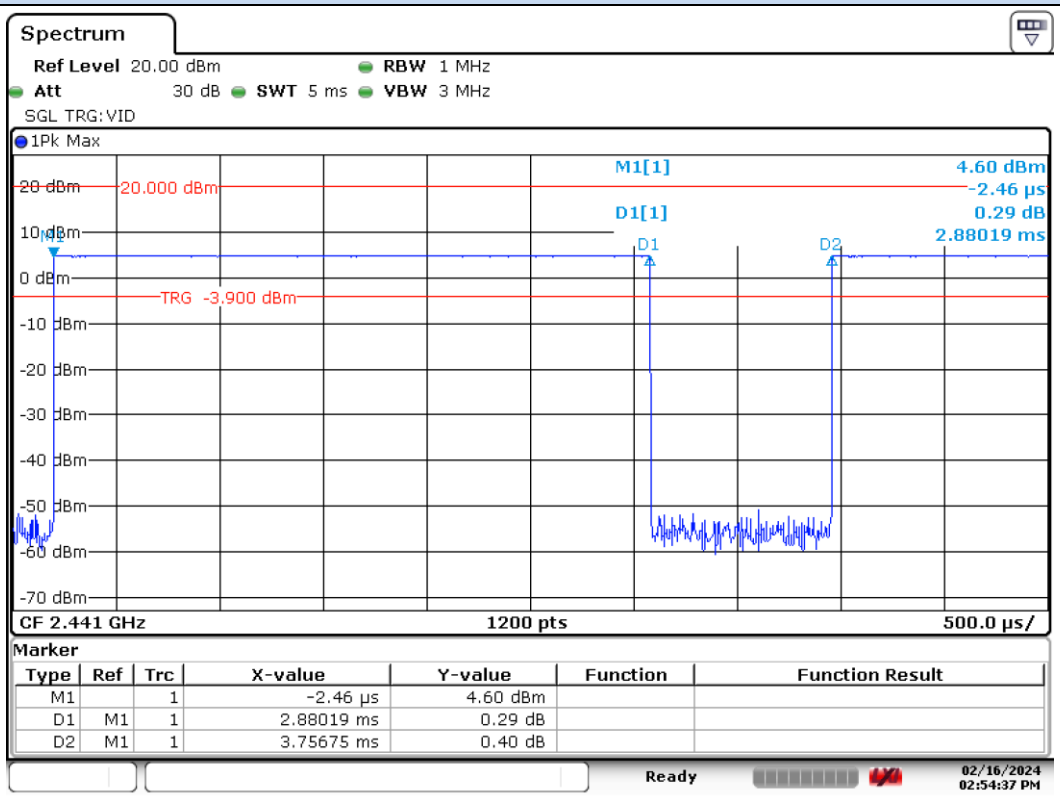


DH3 Tx-Time



Date: 16.FEB.2024 15:02:51

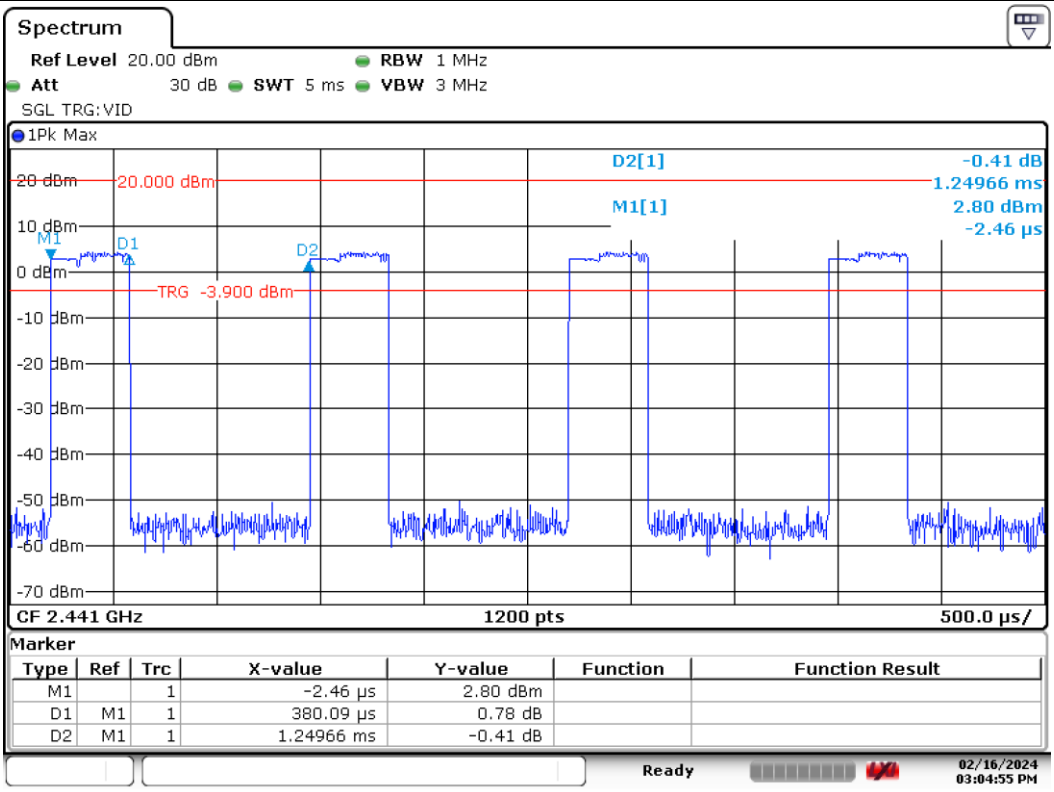
DH5 Tx-Time



Date: 16.FEB.2024 14:54:37

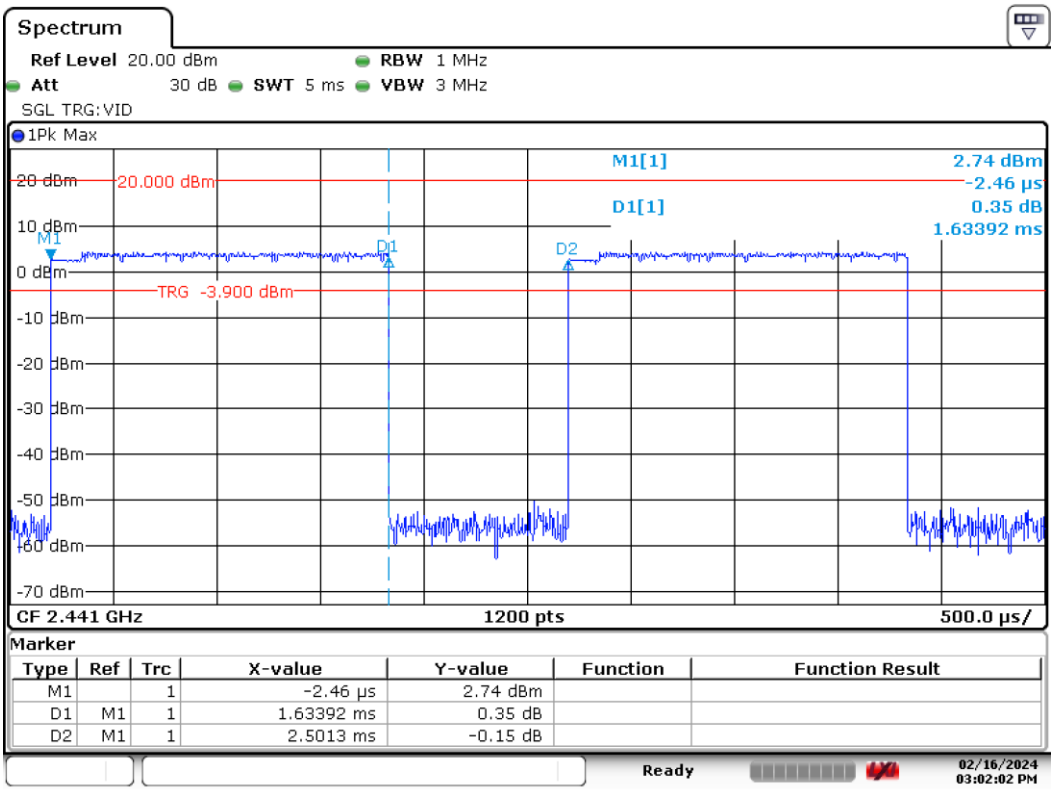
EDR – π/4-DQPSK

2-DH1 Tx-Time



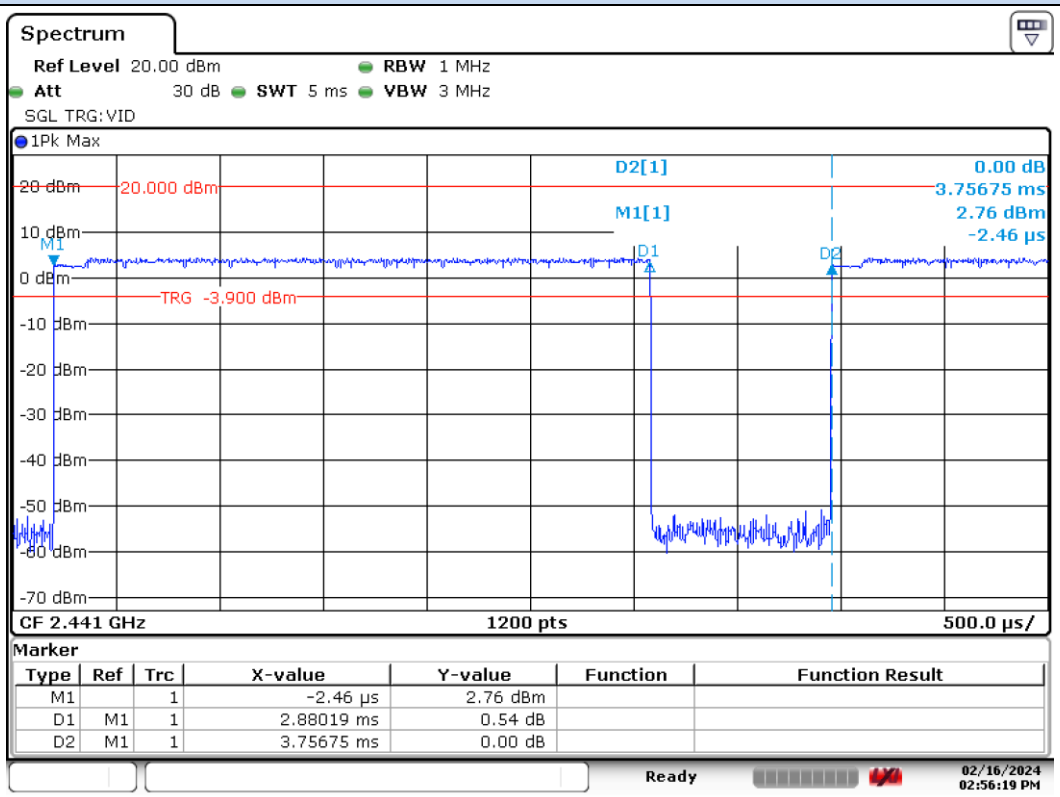
Date: 16.FEB.2024 15:04:55

2-DH3 Tx-Time



Date: 16.FEB.2024 15:02:02

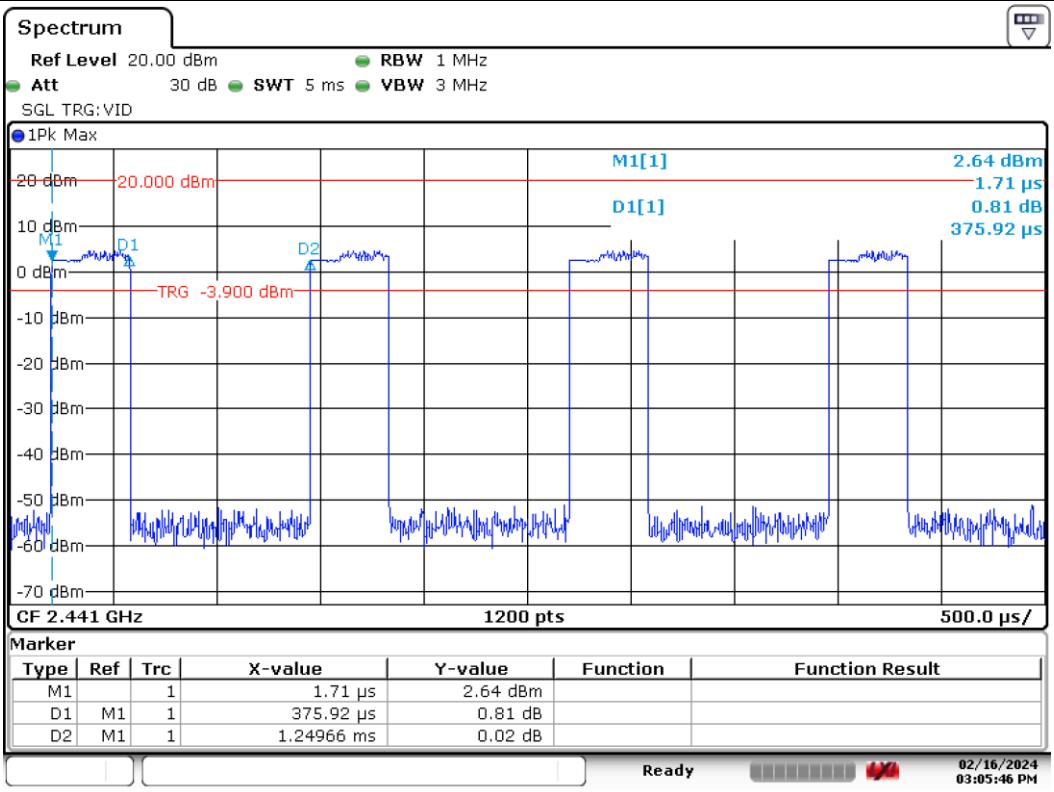
2-DH5 Tx-Time



Date: 16.FEB.2024 14:56:19

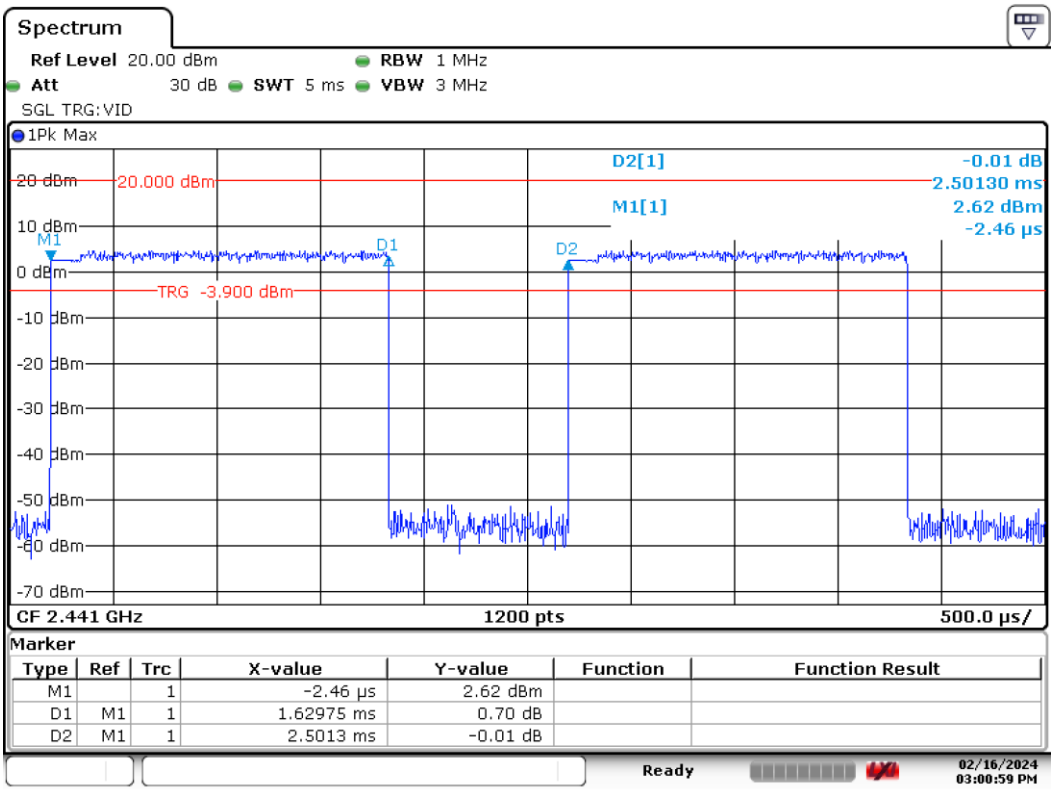
EDR – 8-DPSK

3-DH1 Tx-Time



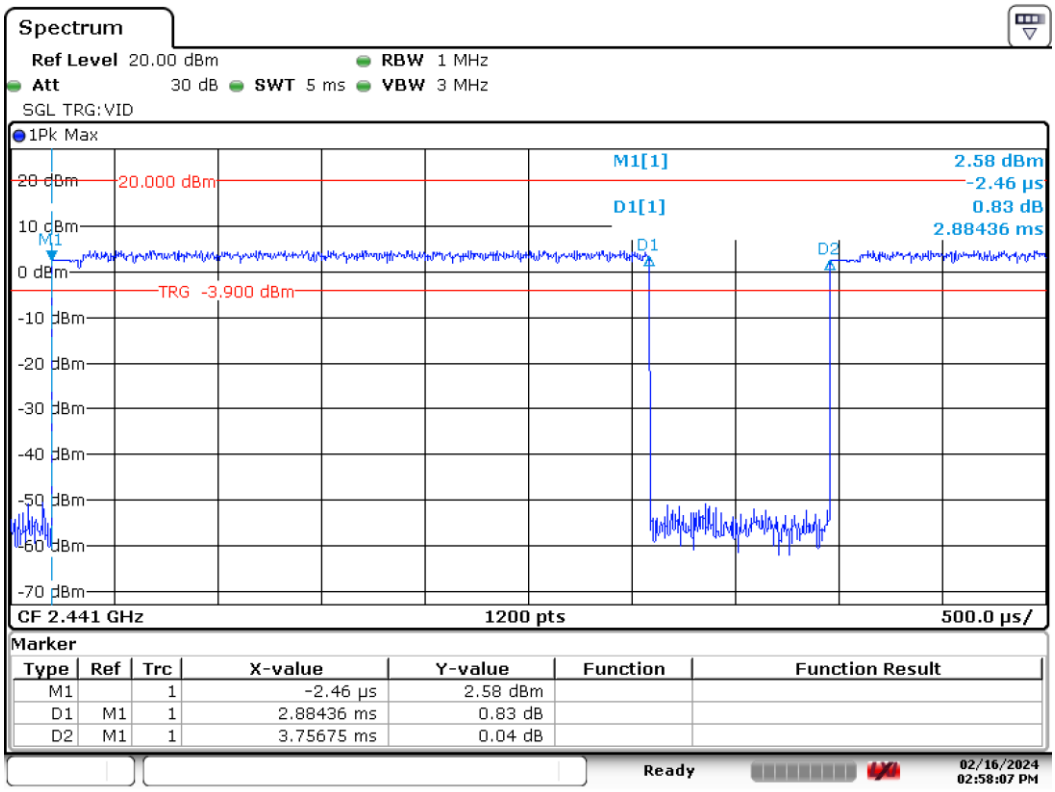
Date: 16.FEB.2024 15:05:47

3-DH3 Tx-Time



Date: 16.FEB.2024 15:00:59

3-DH5 Tx-Time



Date: 16.FEB.2024 14:58:07

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

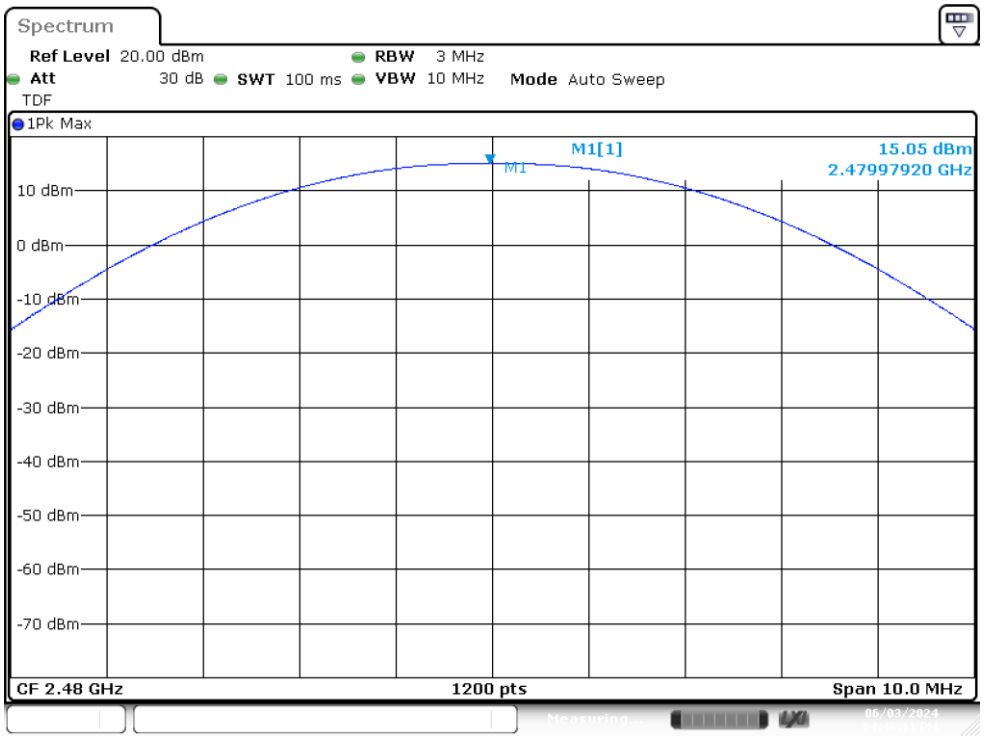
Mode	Packet Type	Channel Number	Frequency [MHz]	Peak Power [dBm]	Peak Power [mW]	Peak Power EIRP [dBm]	Peak Power EIRP [mW]
Basic Rate GFSK	DH5	0	2402	14.73	29.72	20.84	121.34
		39	2441	14.86	30.62	20.97	125.03
		78	2480	15.05	31.99	21.16	130.62
EDR π/4-DQPSK	2DH5	0	2402	14.47	27.99	20.58	114.29
		39	2441	14.58	28.71	20.69	117.22
		78	2480	14.76	29.92	20.87	122.18
EDR 8-DPSK	3DH5	0	2402	14.70	29.51	20.81	120.50
		39	2441	14.85	30.55	20.96	124.74
		78	2480	15.05	31.99	21.16	130.62

Highest/Lowest power per mode

B.4.4 Results Screenshot

Basic Rate - GFSK

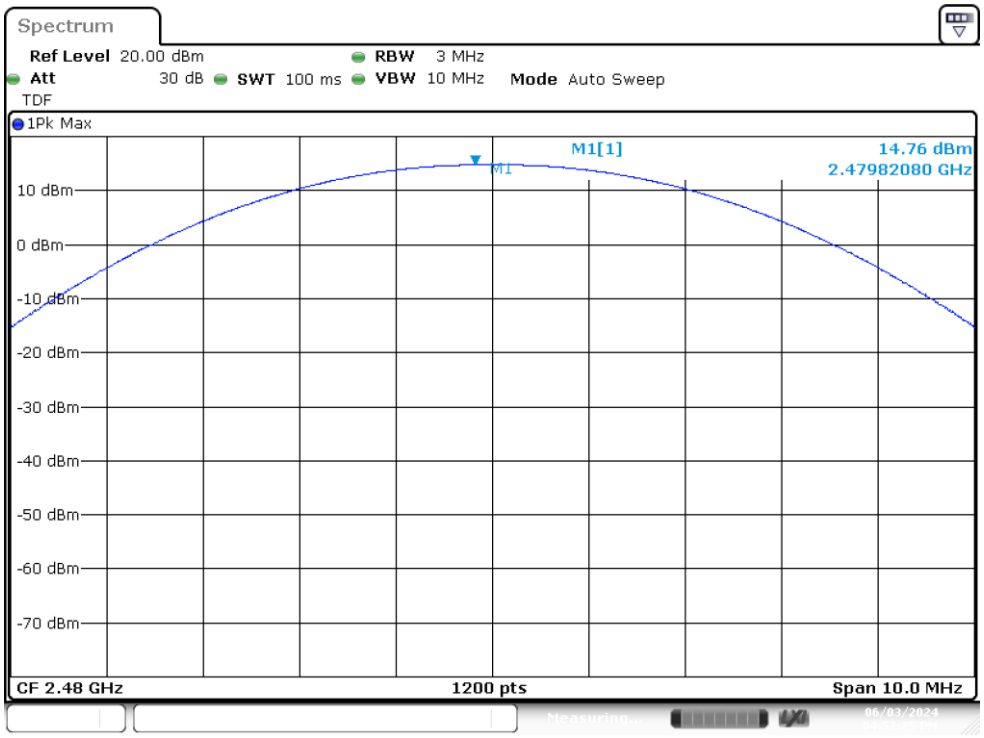
Peak Power – CH78



Date: 3.JUN.2024 16:48:11

EDR – π/4-DQPSK

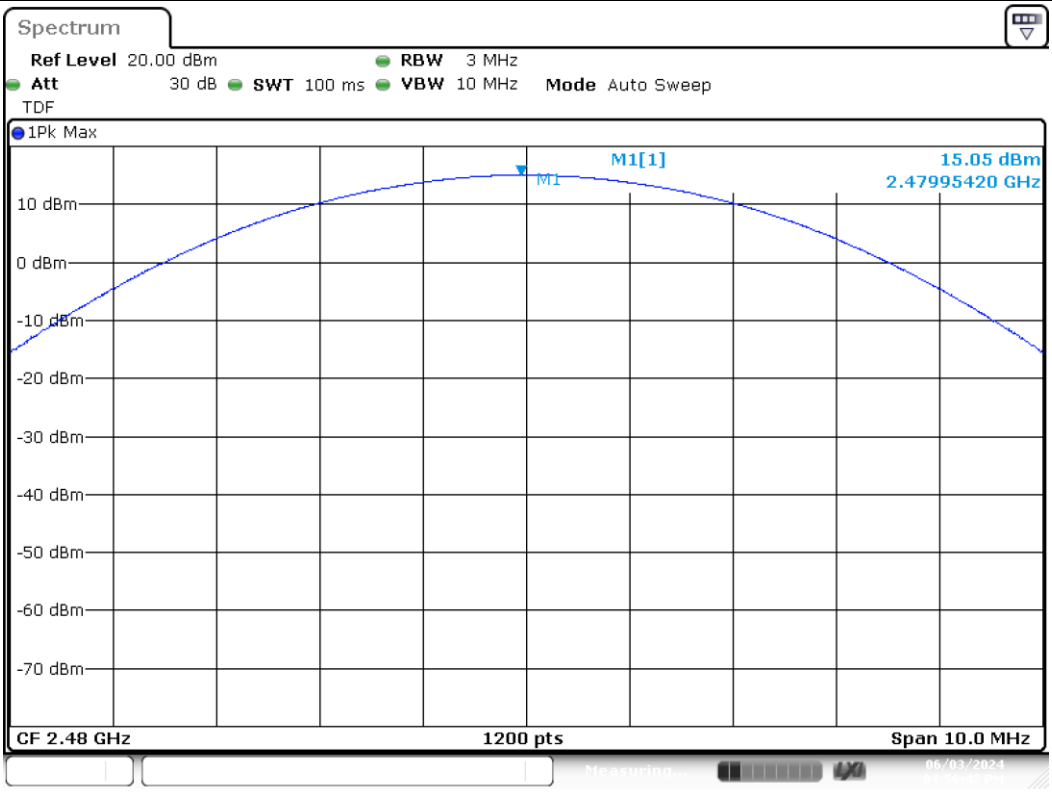
Peak Power – CH78



Date: 3.JUN.2024 16:52:26

EDR – 8-DPSK

Peak Power – CH78



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.

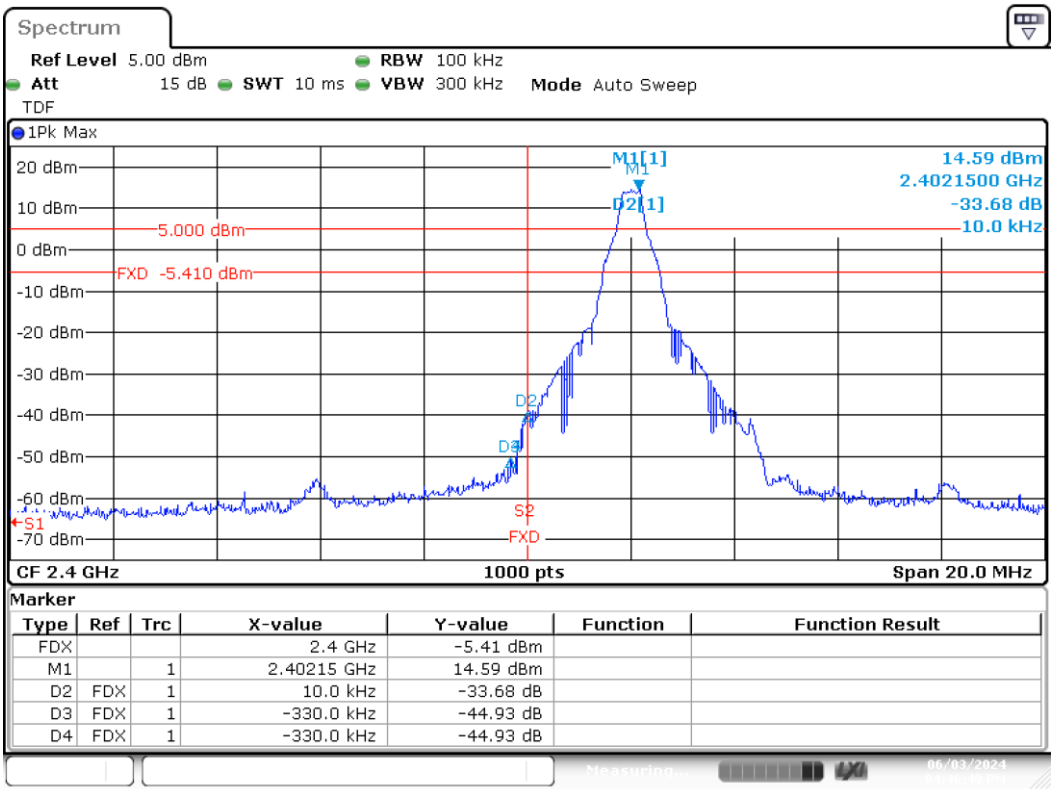
B.5.2 Test procedure

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

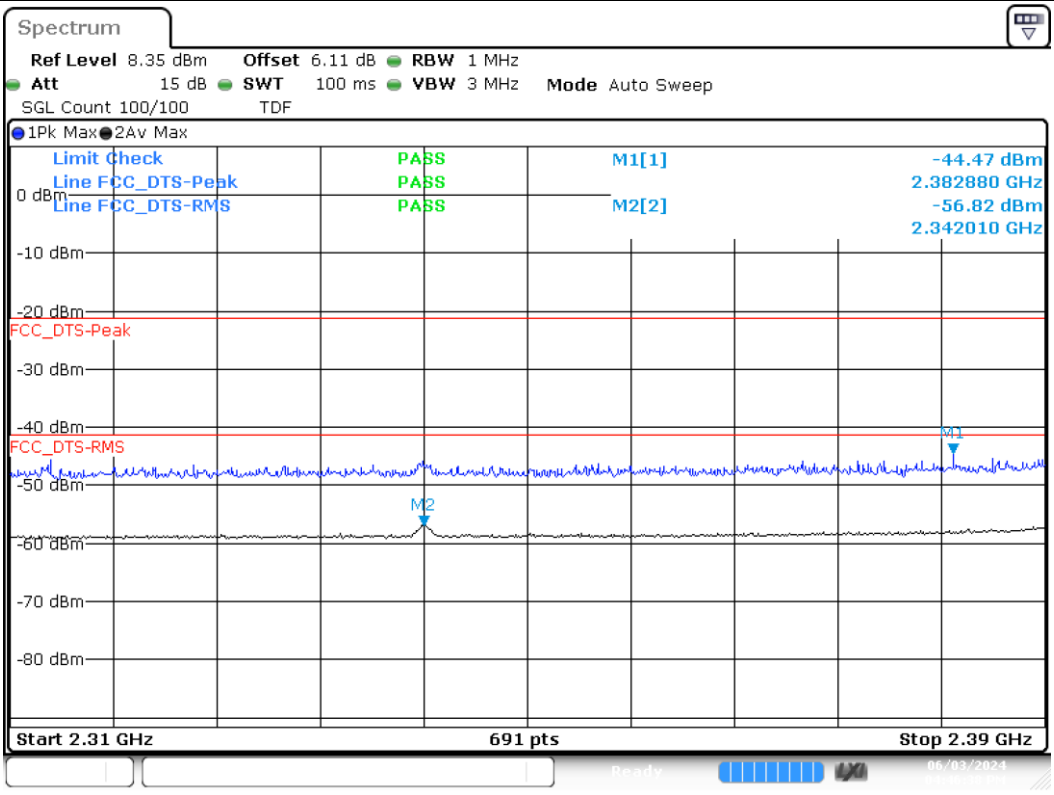
Basic Rate - GFSK

BE Low Freq Section – CH0



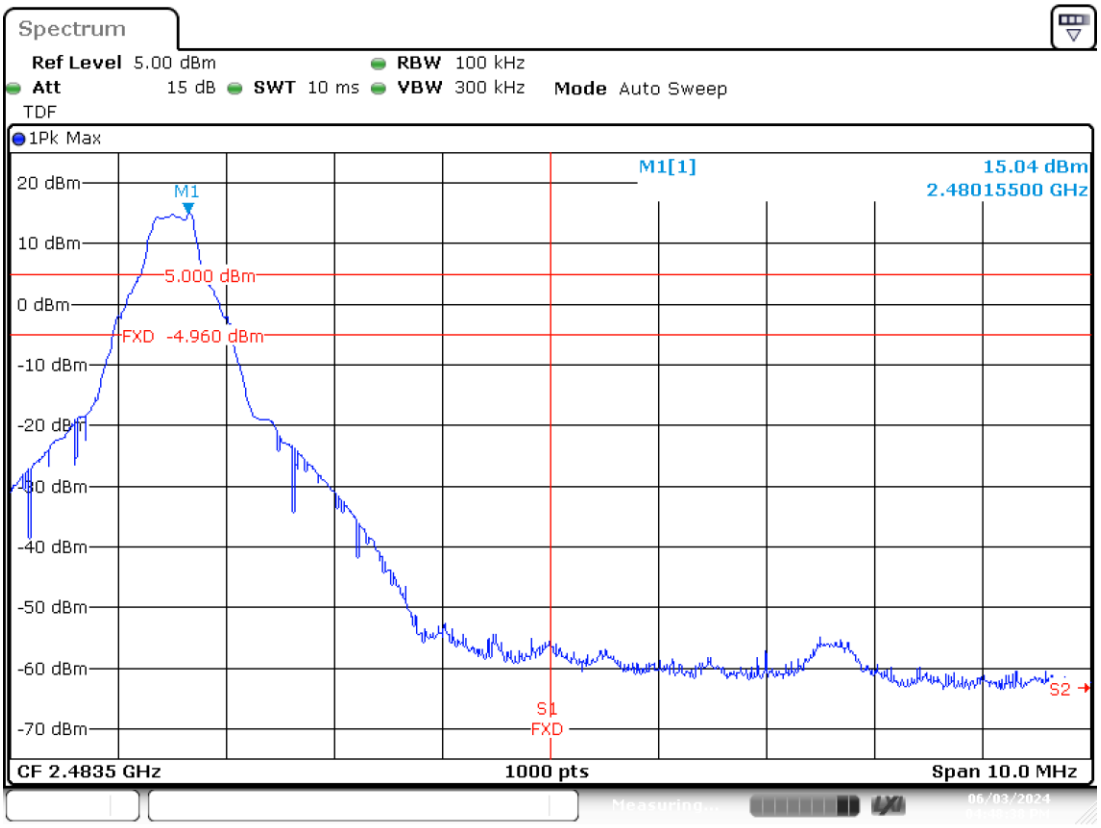
Date: 3.JUN.2024 16:46:49

BE Low Freq Section – CH0



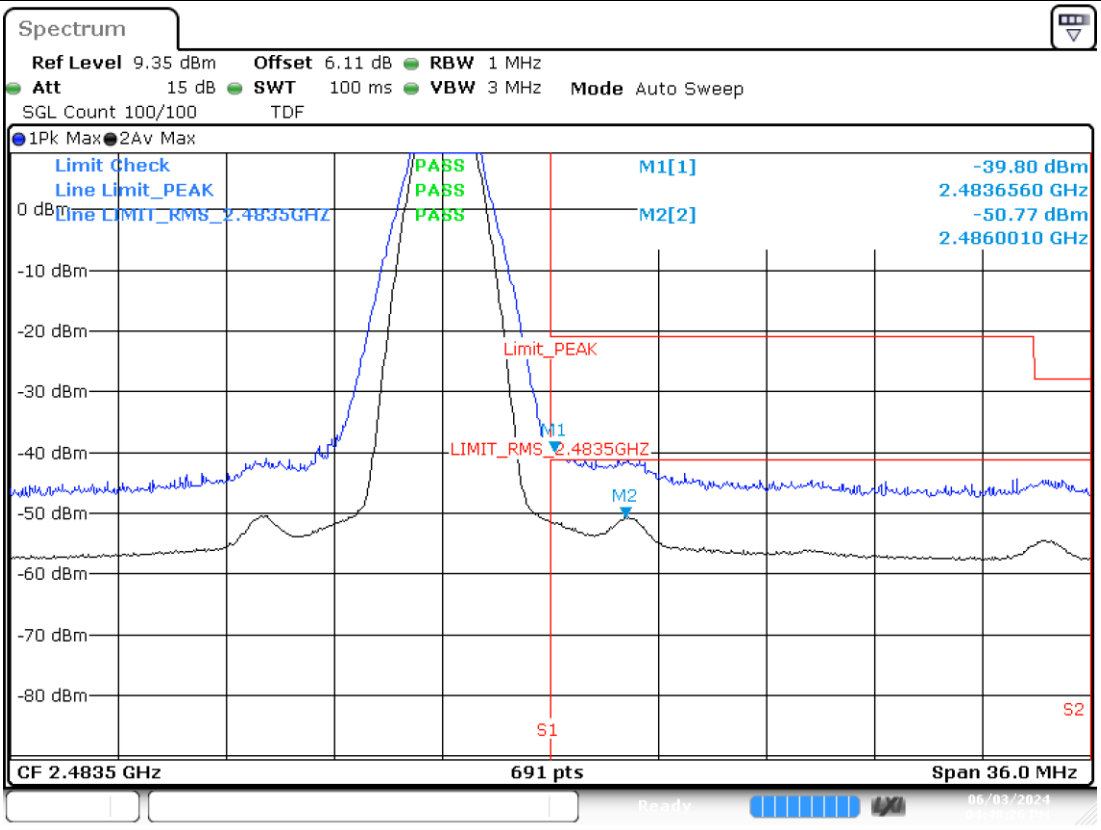
Date: 3.JUN.2024 16:46:38

BE High Freq Section – CH78



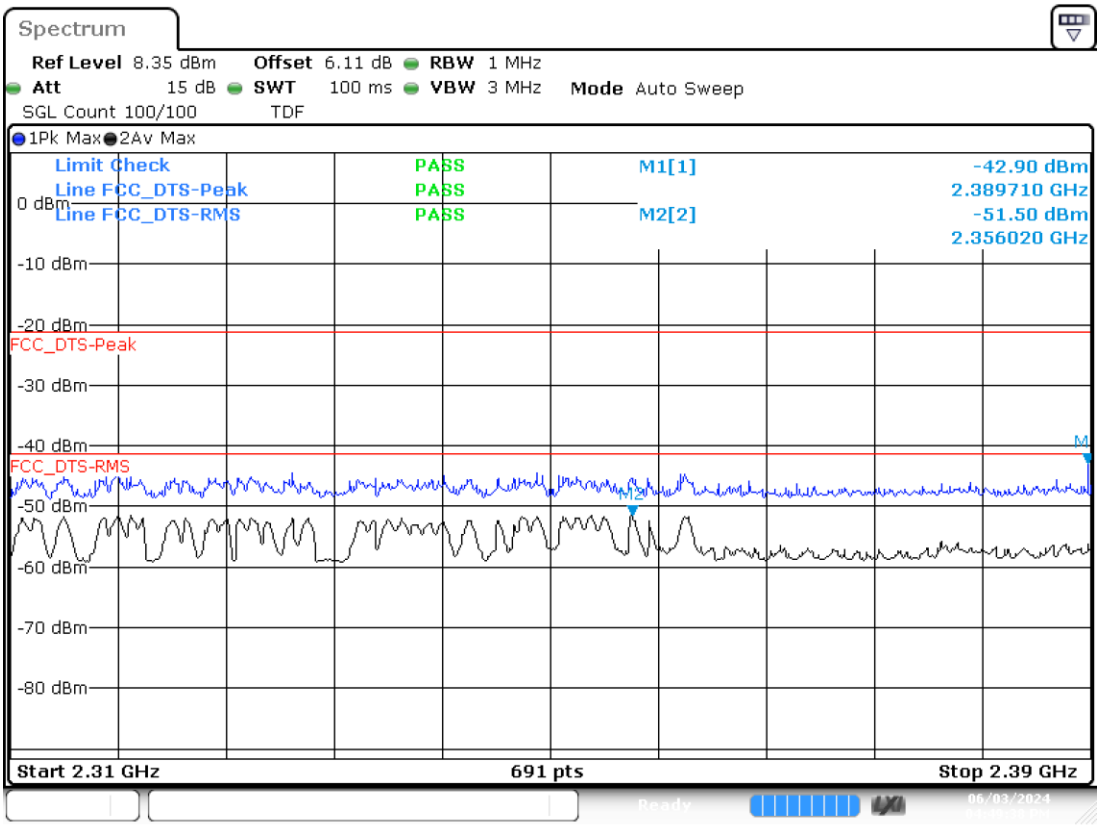
Date: 3.JUN.2024 16:48:38

BE High Freq Section – CH78



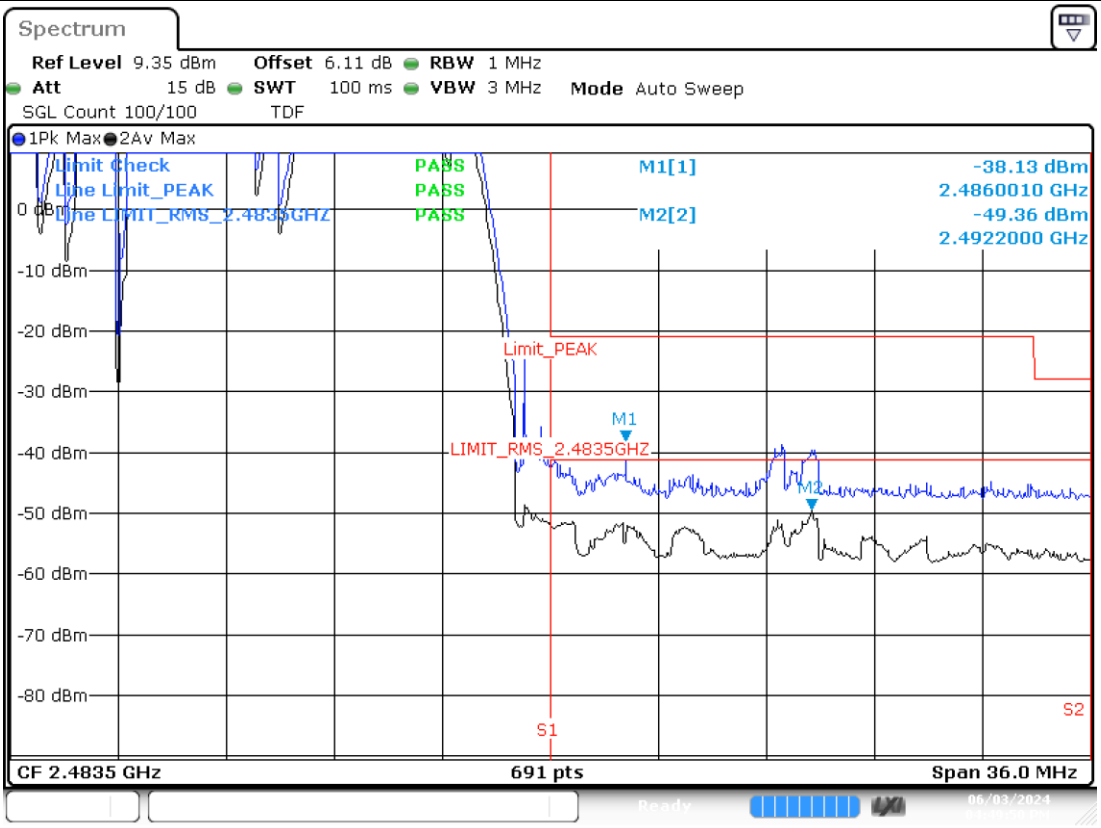
Date: 3.JUN.2024 16:48:27

BE Low Freq Section – Hopping



Date: 3.JUN.2024 16:49:38

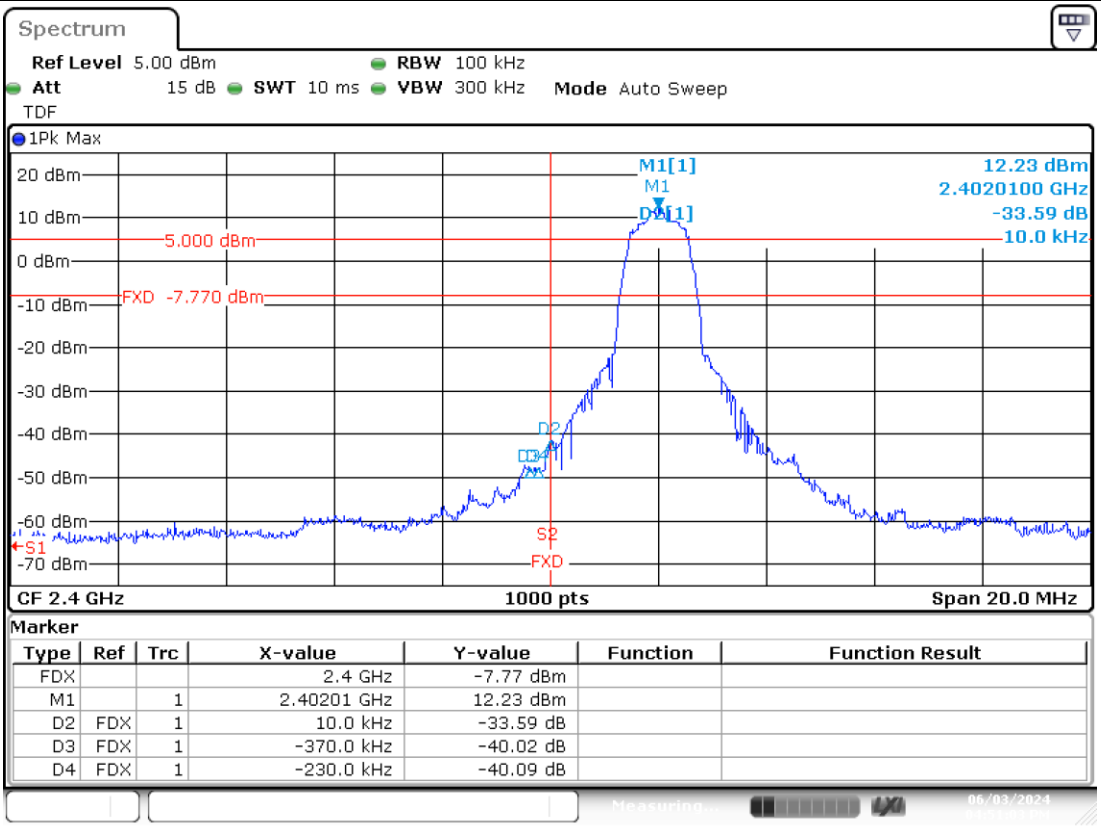
BE High Freq Section – Hopping



Date: 3.JUN.2024 16:49:50

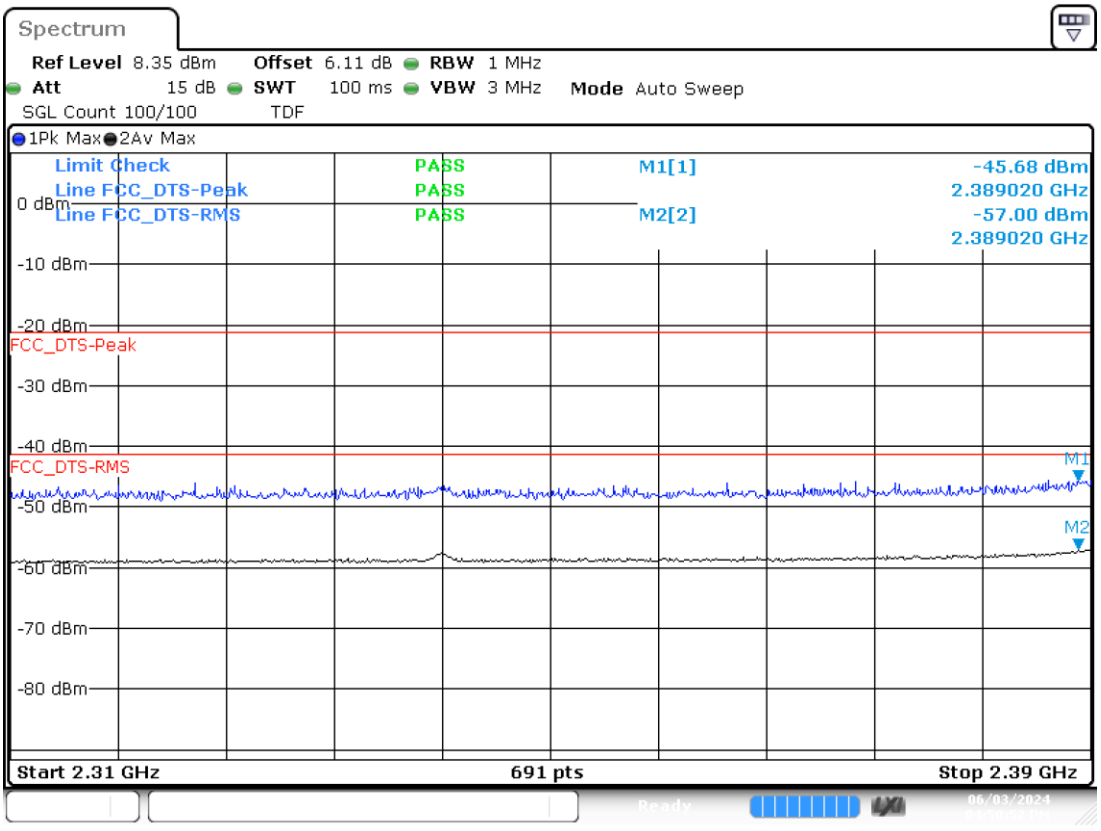
EDR – π/4-DQPSK

BE NR Low Freq Section – CH0



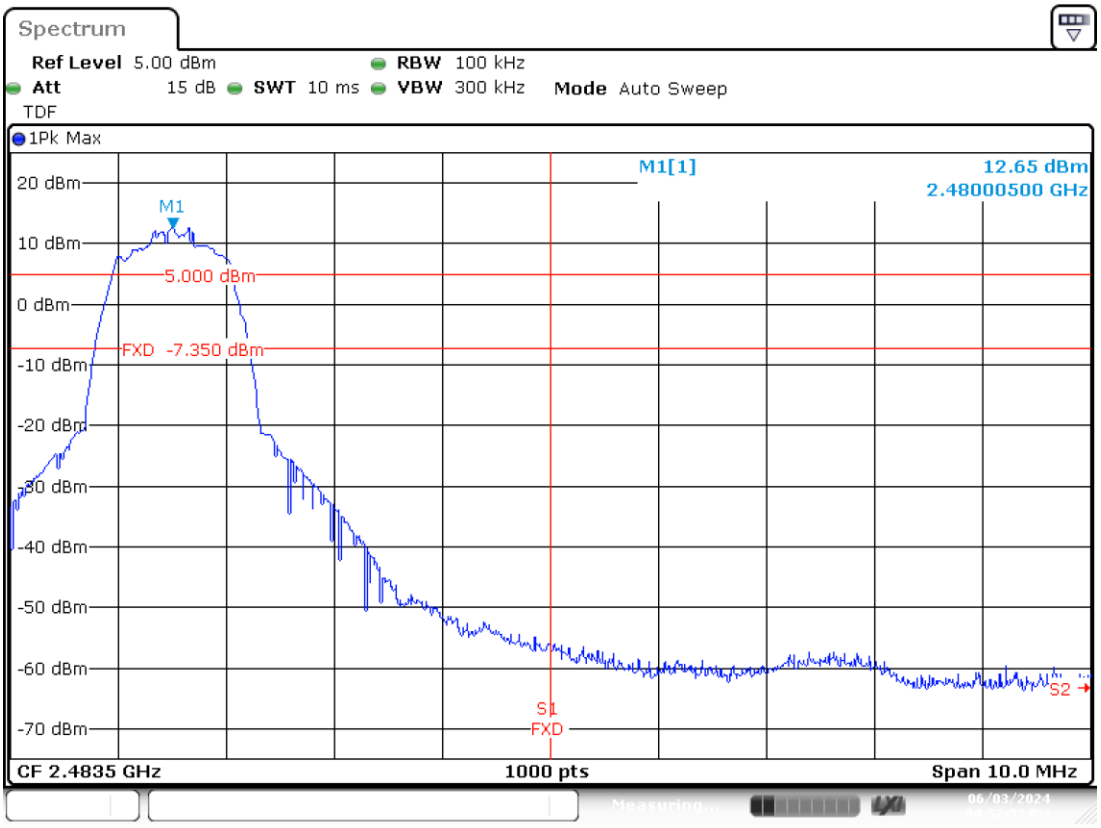
Date: 3.JUN.2024 16:51:04

BE R Low Freq Section – CH0



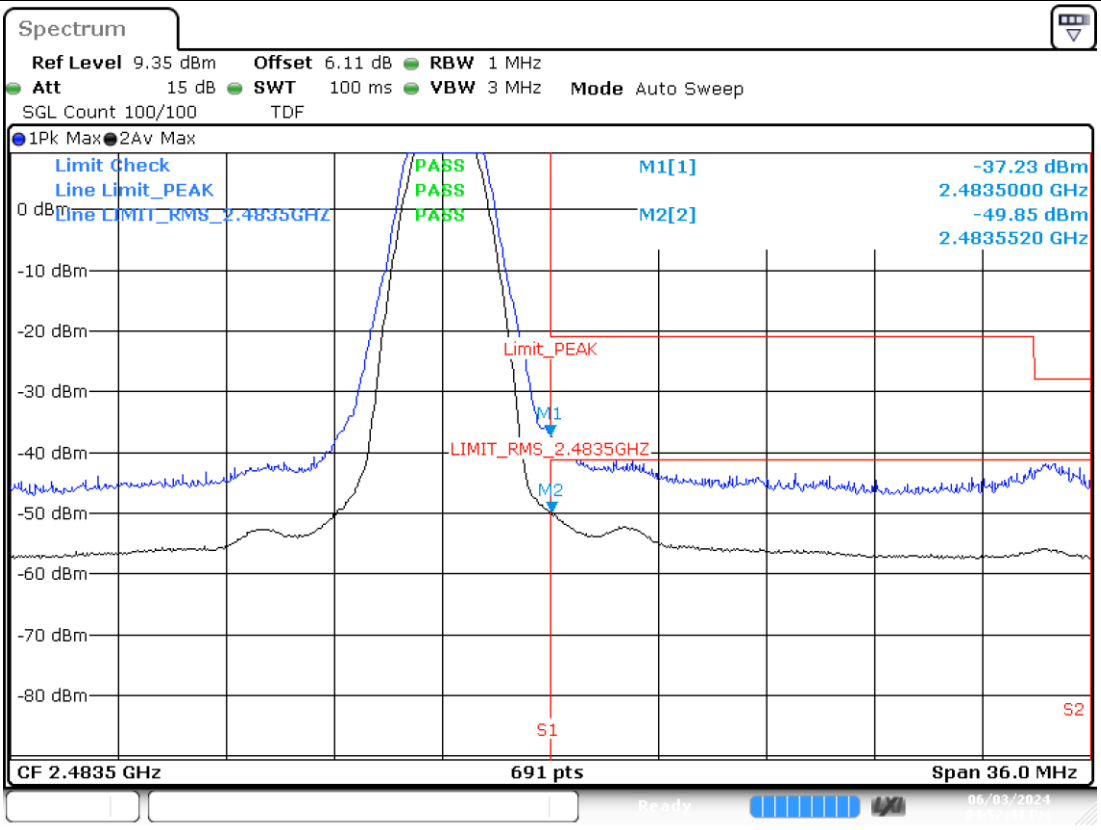
Date: 3.JUN.2024 16:50:52

BE NR High Freq Section – CH78



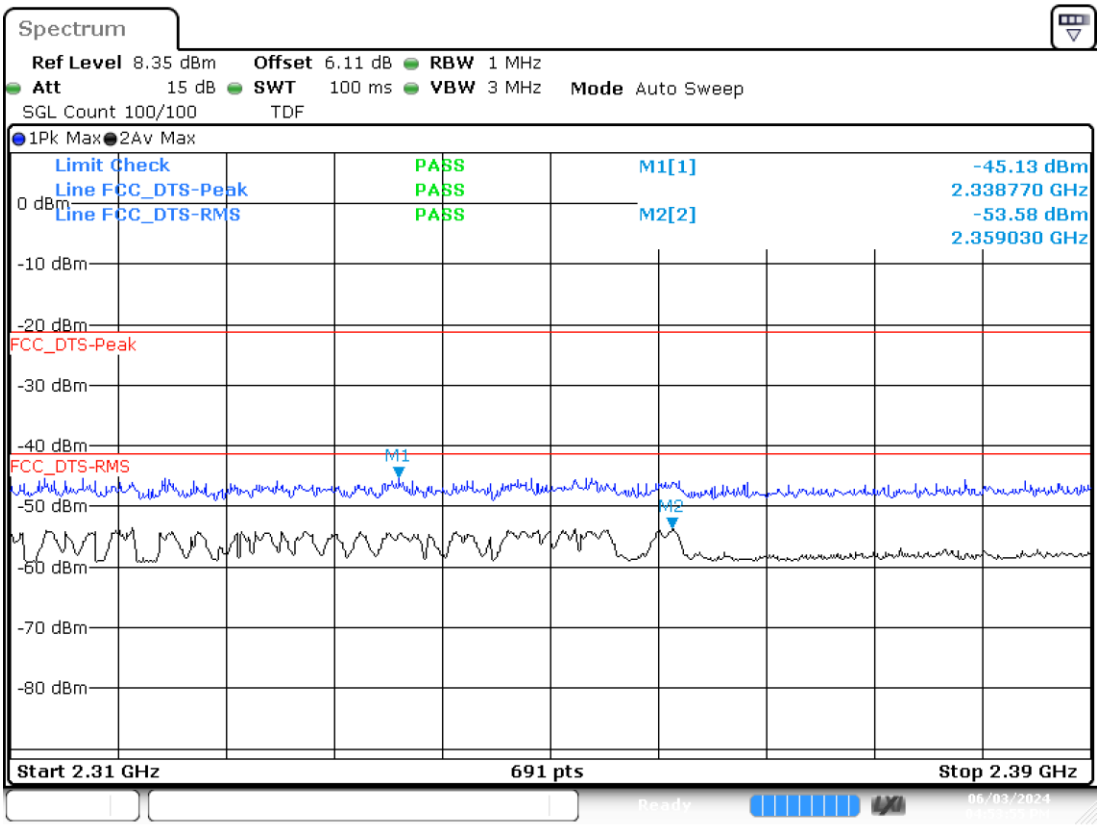
Date: 3.JUN.2024 16:52:52

BE R High Freq Section – CH78



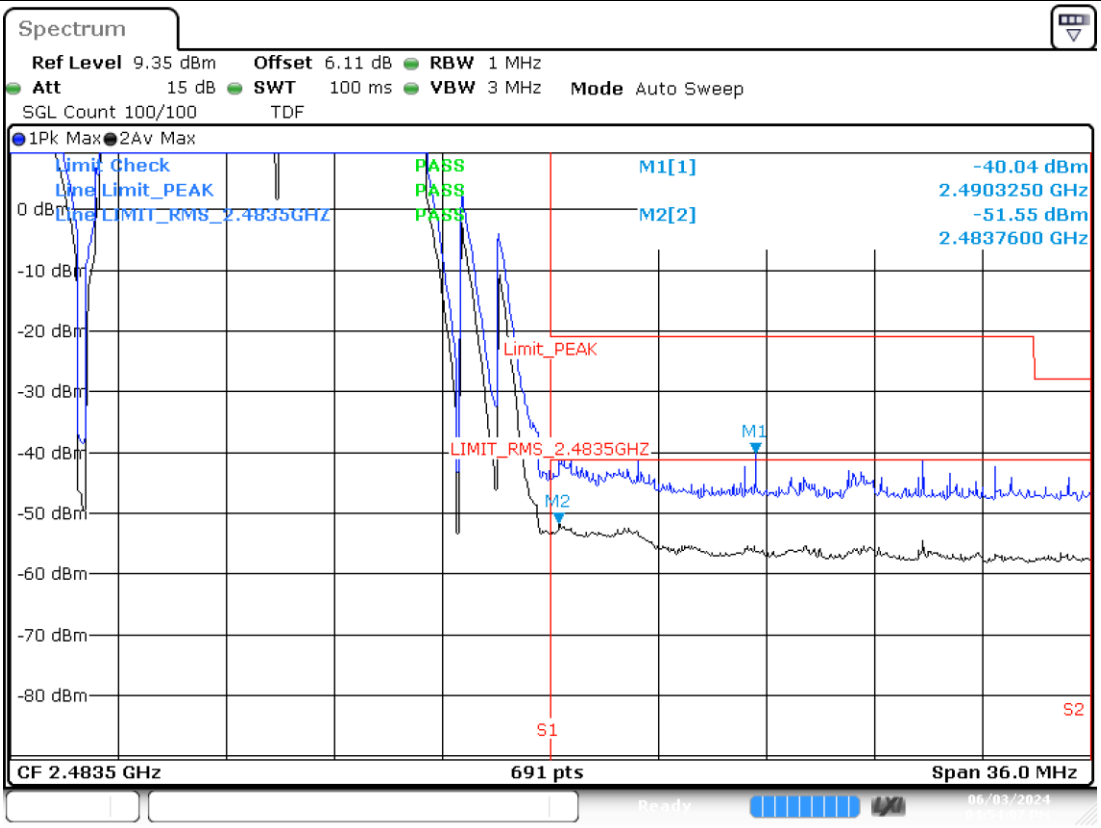
Date: 3.JUN.2024 16:52:41

BE Low Freq Section – Hopping



Date: 3.JUN.2024 16:53:56

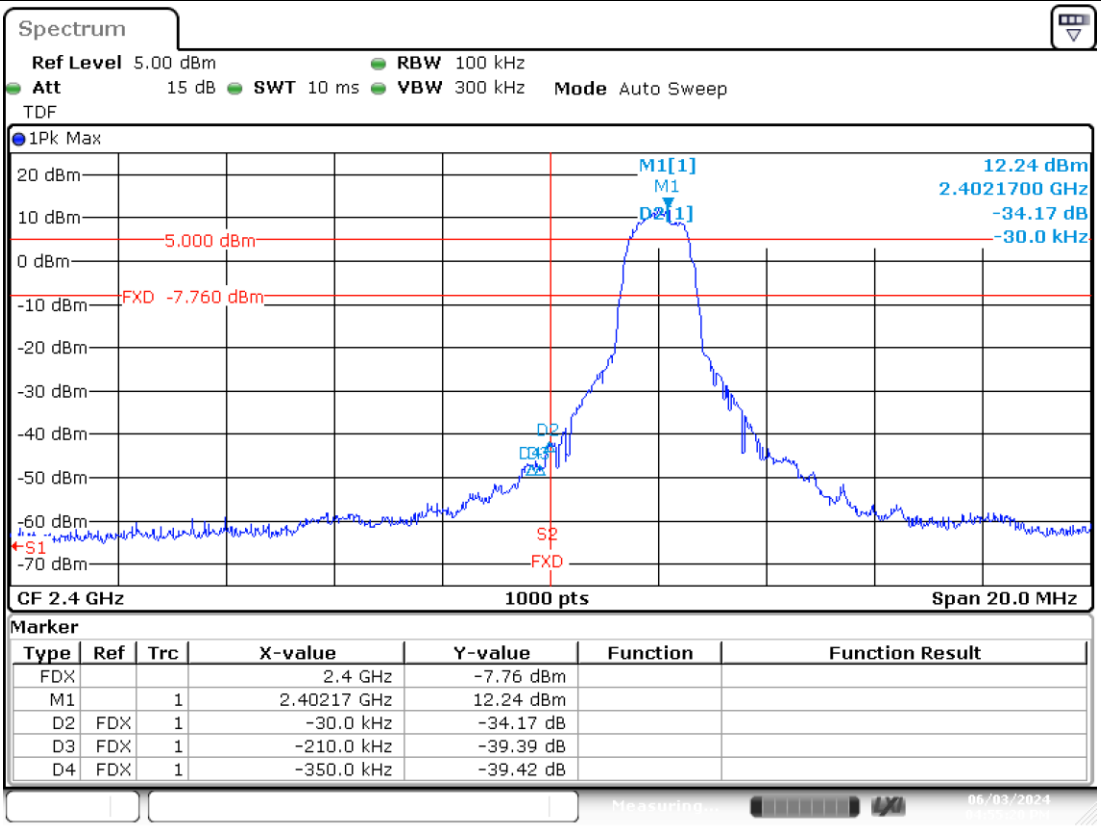
BE High Freq Section – Hopping



Date: 3.JUN.2024 16:54:07

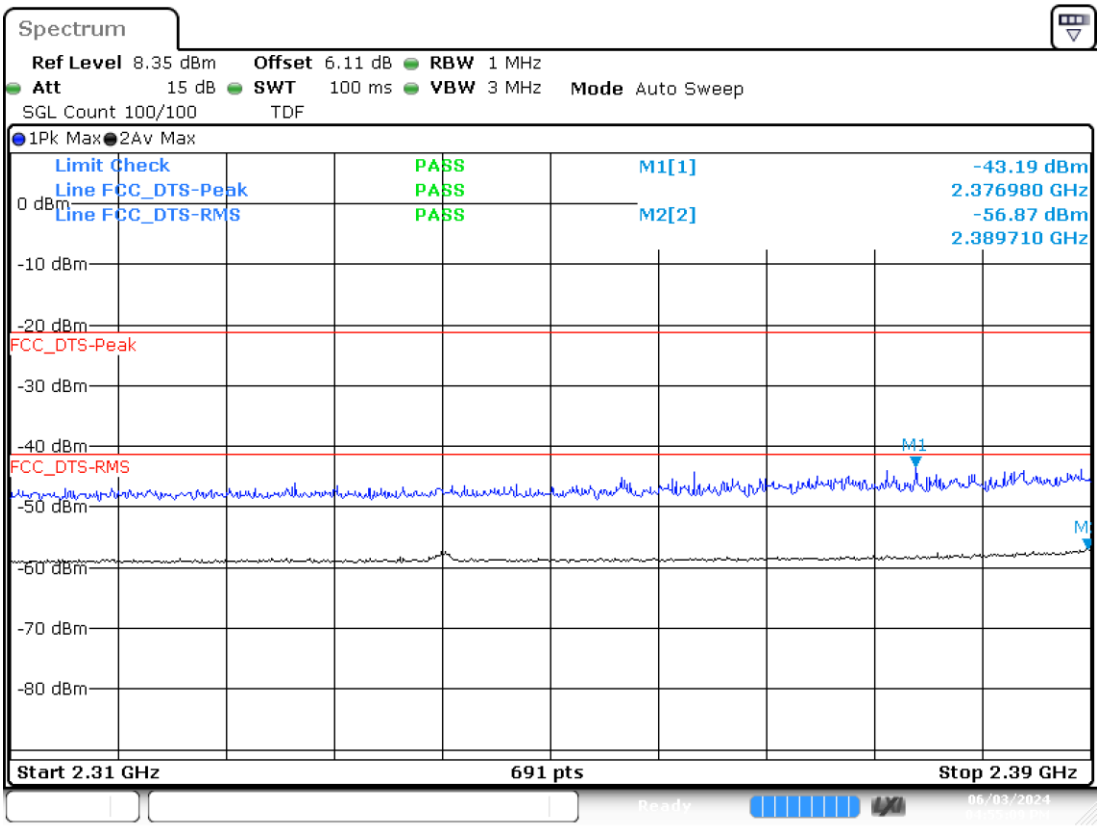
EDR – 8-DPSK

BE NR Low Freq Section – CH0



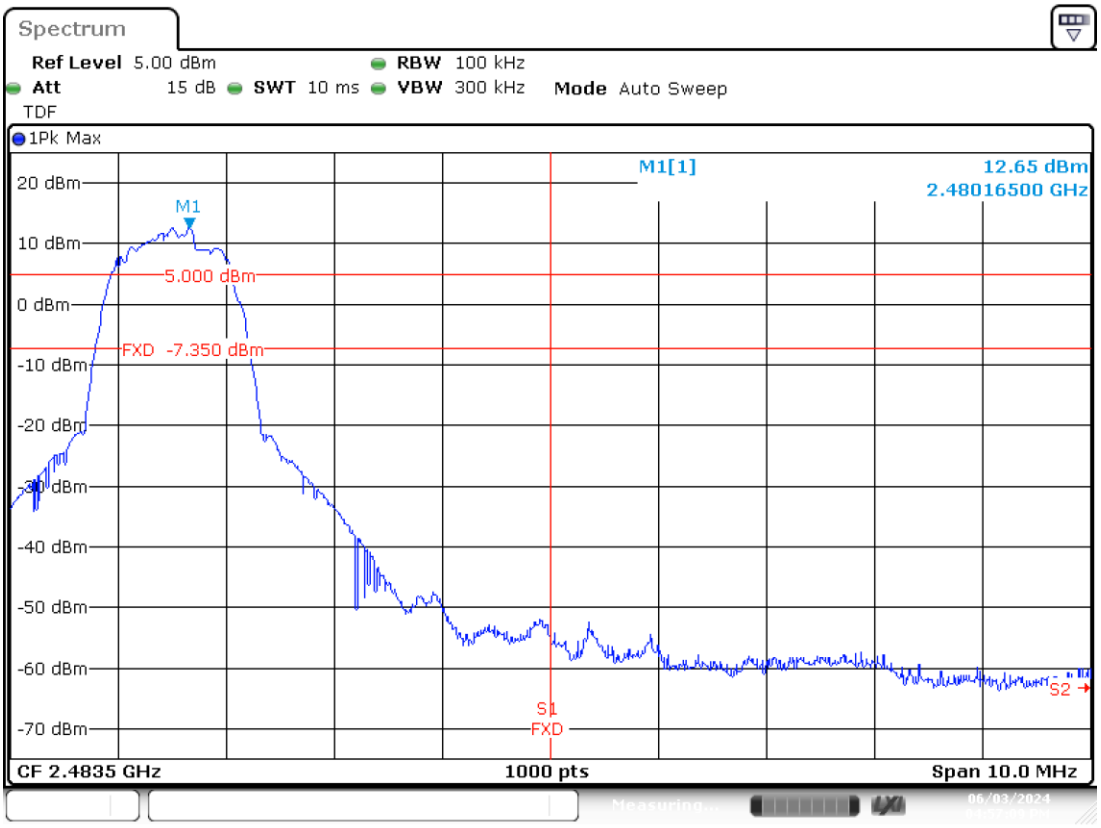
Date: 3.JUN.2024 16:55:21

BE R Low Freq Section – CH0

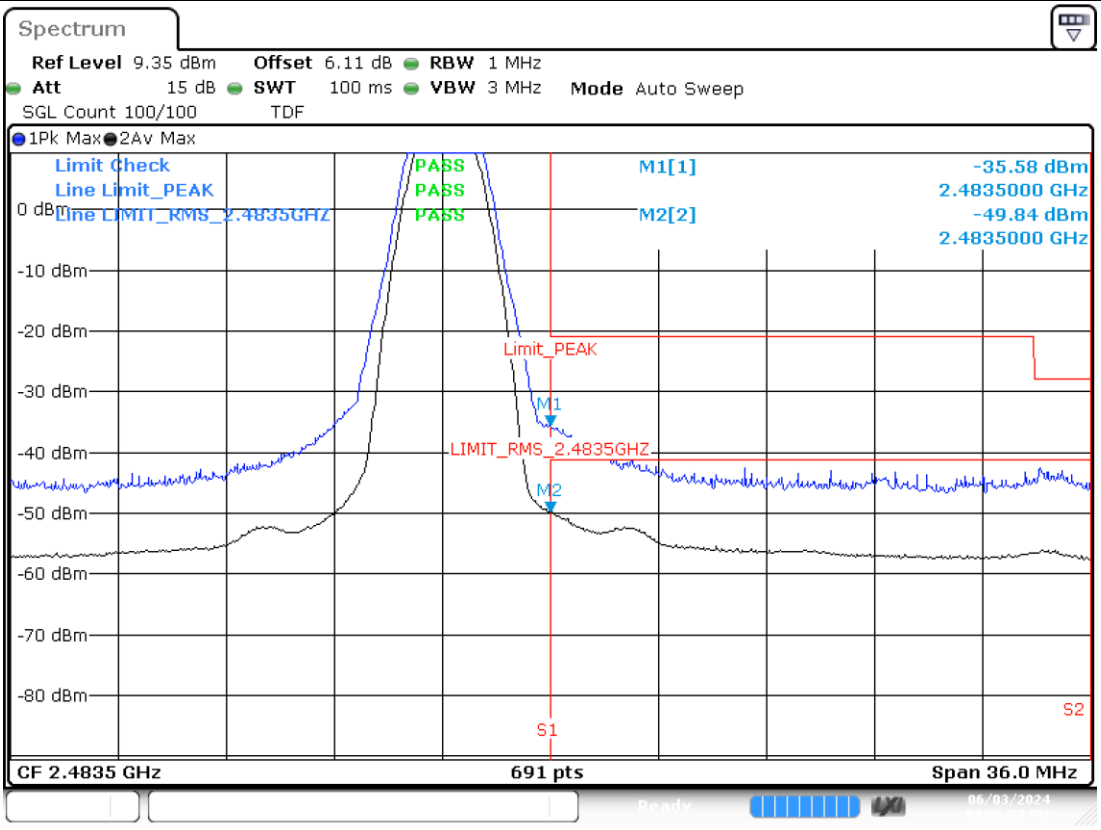


Date: 3.JUN.2024 16:55:09

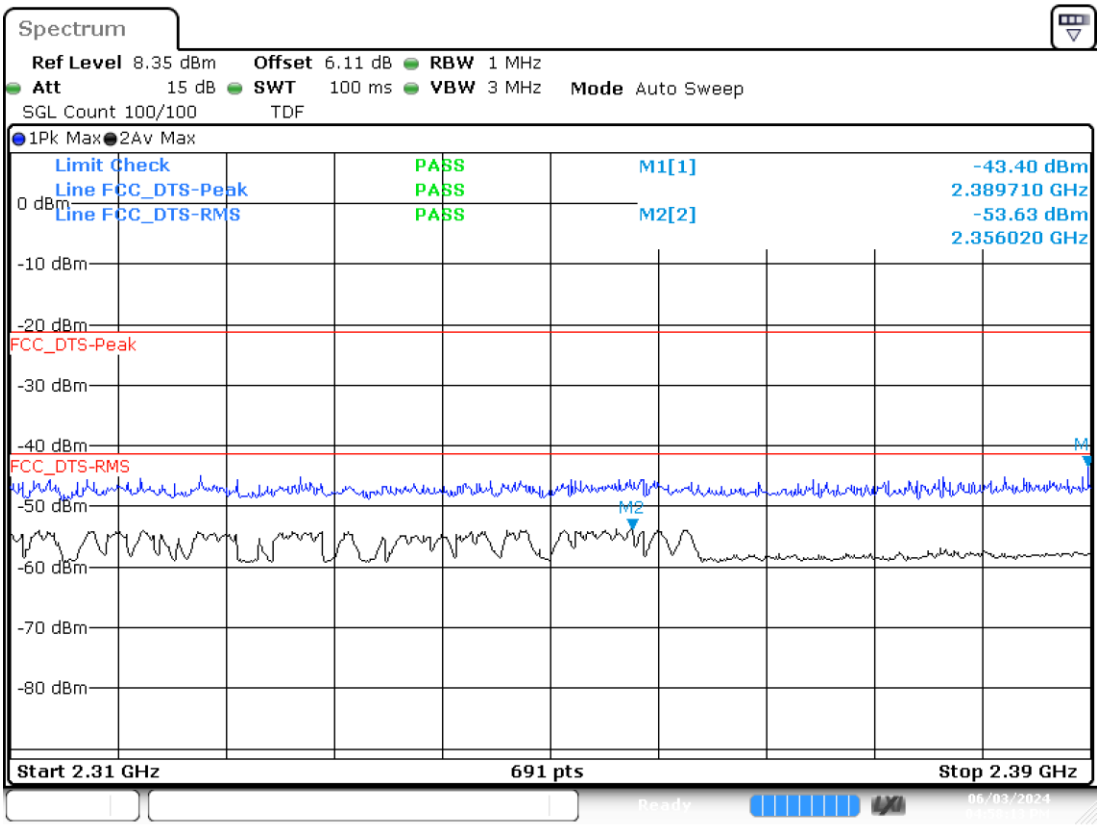
BE NR High Freq Section – CH78



BE R High Freq Section – CH78

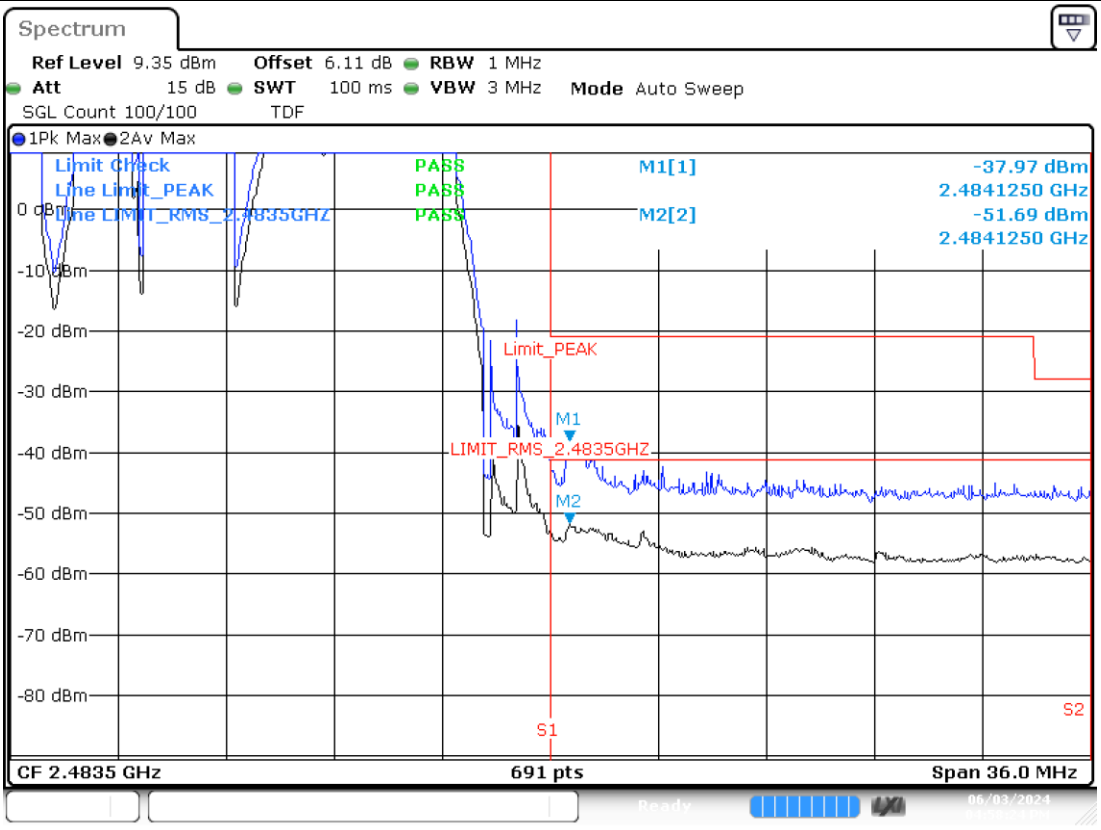


BE Low Freq Section – Hopping



Date: 3.JUN.2024 16:58:13

BE High Freq Section – Hopping



Date: 3.JUN.2024 16:58:25

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 to 1 GHz

Radiated Spurious – All modes

Frequency	Level	Detector	Limit	Margin	Polarization
MHz	dBµV/m	---	dBµV/m	dB	---
34.6	36.4	Quasi-Peak	40.0	3.6	V
45.8	35.6	Quasi-Peak	40.0	4.4	V
50.0	37.1	Quasi-Peak	40.0	2.9	V

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

1GHz – 26 GHz, BR – GFSK

Radiated Spurious – CH0 DH5

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBµV/m	---	dBµV/m	dB	---
10499.8	59.2	Peak	74.0	14.8	H
10499.8	47.9	Average	54.0	6.1	V
11961.1	49.9	Peak	74.0	24.1	V
11962.6	36.5	Average	54.0	17.5	V
25982.0	51.4	Peak	74.0	22.6	V
25982.0	40.1	Average	54.0	13.9	V

Radiated Spurious – CH39 DH5

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBµV/m	---	dBµV/m	dB	---
10500.7	59.9	Peak	74.0	14.1	H
10500.7	48.0	Average	54.0	**6.0**	V
11978.8	49.6	Peak	74.0	24.4	V
11978.8	36.5	Average	54.0	17.5	V
25996.5	51.9	Peak	74.0	22.1	H
25996.5	40.1	Average	54.0	13.9	V

Radiated Spurious – CH78 DH5

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBµV/m	---	dBµV/m	dB	---
10499.8	60.0	Peak	74.0	14.0	H
10499.8	48.0	Average	54.0	6.0	V
11966.8	36.1	Average	54.0	17.9	V
11966.8	49.9	Peak	74.0	24.1	V
25980.0	51.8	Peak	74.0	22.2	V
25980.0	40.0	Average	54.0	14.0	V

1 GHz – 26 GHz, EDR – π/4-DQPSK

Radiated Spurious – CH0 2DH5

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBµV/m	---	dBµV/m	dB	---
10499.8	60.3	Peak	74.0	13.7	H
10499.8	48.0	Average	54.0	6.0	V
11976.9	48.1	Peak	74.0	25.9	V
11977.6	36.8	Average	54.0	17.2	V
25994.0	51.0	Peak	74.0	23.0	V
25994.0	40.0	Average	54.0	14.0	V

Radiated Spurious – CH39 2DH5

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBµV/m	---	dBµV/m	dB	---
10499.8	60.4	Peak	74.0	13.6	V
10499.8	48.0	Average	54.0	**6.0**	V
11979.5	47.3	Peak	74.0	26.7	V
11979.5	36.9	Average	54.0	17.1	V
25996.5	52.3	Peak	74.0	21.7	H
25996.5	40.0	Average	54.0	14.0	V

Radiated Spurious – CH78 2DH5

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBµV/m	---	dBµV/m	dB	---
10499.8	60.0	Peak	74.0	14.0	H
10499.8	47.9	Average	54.0	6.1	H
11998.2	36.4	Average	54.0	17.6	V
11998.2	49.5	Peak	74.0	24.5	V
25993.5	51.5	Peak	74.0	22.5	H
25993.5	40.1	Average	54.0	13.9	V

1 GHz – 26 GHz, EDR – 8-DPSK

Radiated Spurious – CH0 3DH5

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBµV/m	---	dBµV/m	dB	---
10518.0	60.5	Peak	74.0	13.6	V
10518.9	47.9	Average	54.0	6.1	V
11983.2	47.4	Peak	74.0	26.6	V
11983.2	36.8	Average	54.0	17.2	V
25996.5	51.8	Peak	74.0	22.2	V
25996.5	40.0	Average	54.0	14.0	V

Radiated Spurious – CH39 3DH5

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBµV/m	---	dBµV/m	dB	---
10500.7	48.0	Average	54.0	**6.0**	V
10501.7	60.2	Peak	74.0	13.8	H
11993.8	47.4	Peak	74.0	26.6	V
11993.8	36.9	Average	54.0	17.1	V
25997.5	40.0	Average	54.0	14.0	V
25998.5	52.4	Peak	74.0	21.6	H

Radiated Spurious – CH78 3DH5

Frequency	Level	Detector	Limit	Margin	Polar
MHz	dBµV/m	---	dBµV/m	dB	---
10499.8	60.0	Peak	74.0	14.0	H
10499.8	47.9	Average	54.0	6.1	V
11993.8	46.9	Peak	74.0	27.1	V
11993.8	37.0	Average	54.0	17.0	V
25997.5	51.8	Peak	74.0	22.2	V
25997.5	40.0	Average	54.0	14.0	V