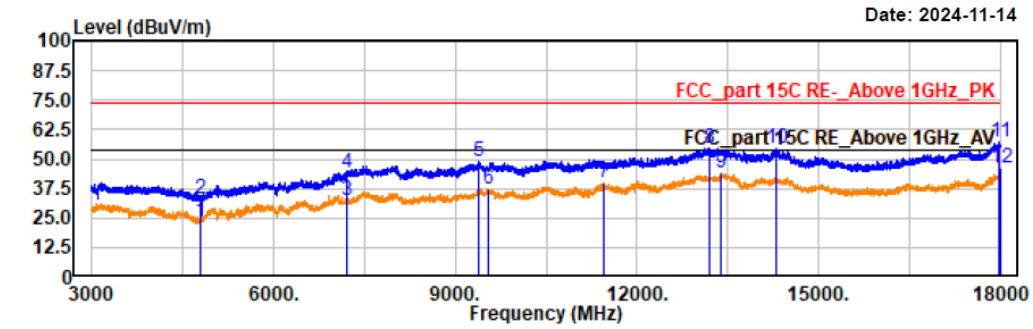
Project No.: 2407V34489E-RF
Test Mode: 3DH1-2402
EUT Model: BR2551E
Test distance: 1.8m

Temp/Humi/ATM: 23.6℃/53%/100.1kPa
Tested by: Wlif Wu
Power Source: AC120V/60Hz

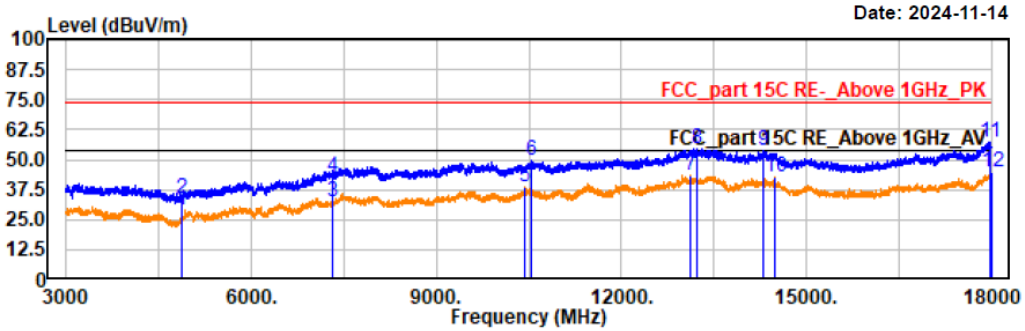


Trace: 1

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
4804.50	42.71	-19.55	23.16	54.00	30.84	vertical	Average
4804.50	46.58	-13.55	33.03	74.00	40.97	vertical	Peak
7206.00	44.22	-12.03	32.19	54.00	21.81	vertical	Average
7206.00	50.46	-6.03	44.43	74.00	29.57	vertical	Peak
9393.00	50.66	-2.01	48.65	74.00	25.35	vertical	Peak
9555.00	45.80	-8.33	37.47	54.00	16.53	vertical	Average
11464.50	46.42	-6.22	40.20	54.00	13.80	vertical	Average
13189.50	50.17	4.22	54.39	74.00	19.61	vertical	Peak
13380.00	45.96	-2.01	43.95	54.00	10.05	vertical	Average
14301.00	50.87	3.35	54.22	74.00	19.78	vertical	Peak
17988.00	50.38	6.93	57.31	74.00	16.69	vertical	Peak
17998.50	45.03	0.99	46.02	54.00	7.98	vertical	Average

Project No.: 2407V34489E-RF
Test Mode: 3DH1-2441
EUT Model: BR2551E
Test distance: 1.8m

Temp/Humi/ATM: 23.6℃/53%/100.1kPa
Tested by: Wlif Wu
Power Source: AC120V/60Hz

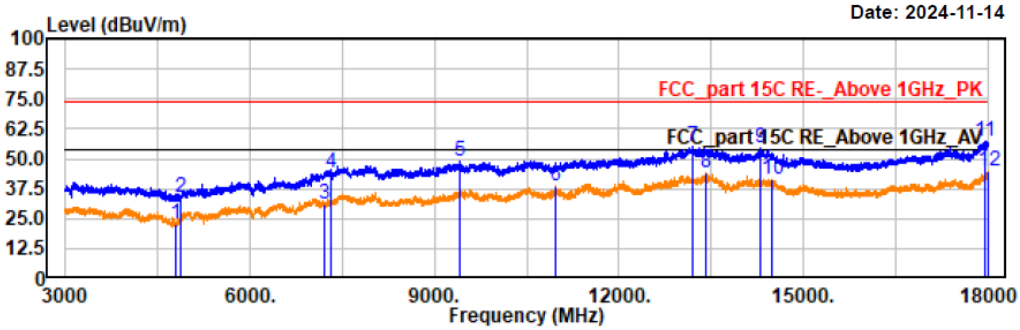


Trace: 1

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
4882.50	41.47	-12.49	28.98	54.00	25.02	Horizontal	Average
4882.50	46.53	-12.49	34.04	74.00	39.96	horizontal	Peak
7323.00	37.84	-5.62	32.22	54.00	21.78	Horizontal	Average
7323.00	48.47	-5.62	42.85	74.00	31.15	horizontal	Peak
10423.50	39.89	-1.37	38.52	54.00	15.48	Horizontal	Average
10543.50	50.87	-0.87	50.00	74.00	24.00	horizontal	Peak
13113.00	39.40	4.12	43.52	54.00	10.48	Horizontal	Average
13236.00	50.74	4.00	54.74	74.00	19.26	horizontal	Peak
14302.50	50.14	3.35	53.49	74.00	20.51	horizontal	Peak
14479.50	39.89	2.65	42.54	54.00	11.46	Horizontal	Average
17974.50	50.75	6.83	57.58	74.00	16.42	horizontal	Peak
17999.00	38.08	7.00	45.08	54.00	8.92	Horizontal	Average

Project No.: 2407V34489E-RF
Test Mode: 3DH1-2441
EUT Model: BR2551E
Test distance: 1.8m

Temp/Humi/ATM: 23.6℃/53%/100.1kPa
Tested by: Wlif Wu
Power Source: AC120V/60Hz

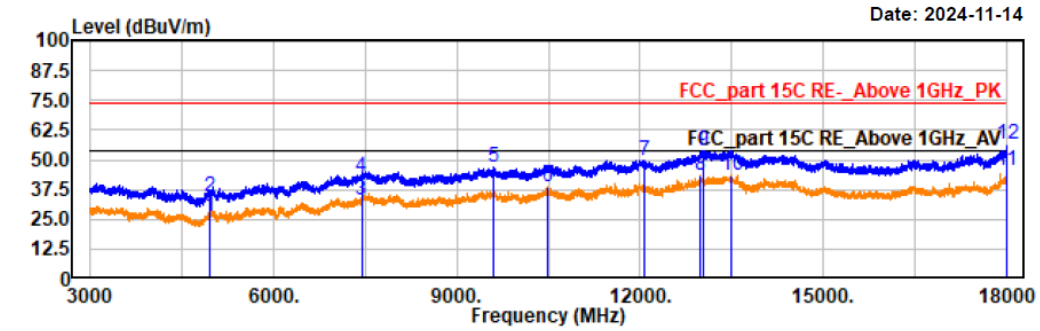


Trace: 1

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
4804.00	36.29	-13.55	22.74	54.00	31.26	Vertical	Average
4882.50	46.15	-12.49	33.66	74.00	40.34	Vertical	Peak
7206.00	37.19	-6.03	31.16	54.00	22.84	Vertical	Average
7323.00	49.48	-5.62	43.86	74.00	30.14	Vertical	Peak
9420.00	51.08	-2.20	48.88	74.00	25.12	Vertical	Peak
10981.50	40.03	-1.31	38.72	54.00	15.28	Vertical	Average
13191.00	50.76	4.22	54.98	74.00	19.02	Vertical	Peak
13414.50	39.79	4.09	43.88	54.00	10.12	Vertical	Average
14301.00	50.90	3.35	54.25	74.00	19.75	Vertical	Peak
14497.50	38.60	2.62	41.22	54.00	12.78	Vertical	Average
17938.50	50.89	6.60	57.49	74.00	16.51	Vertical	Peak
17998.50	37.90	6.99	44.89	54.00	9.11	Vertical	Average

Project No.: 2407V34489E-RF
Test Mode: 3DH1-2480
EUT Model: BR2551E
Test distance: 1.8m

Temp/Humi/ATM: 23.6℃/53%/100.1kPa
Tested by: Wlif Wu
Power Source: AC120V/60Hz

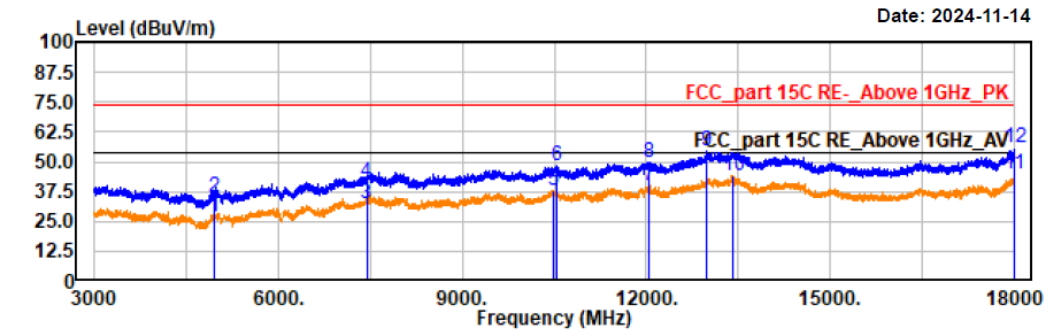


Trace: 1

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
4960.50	37.97	-11.64	26.33	54.00	27.67	Horizontal	Average
4960.50	43.77	-9.49	34.28	74.00	39.72	Horizontal	Peak
7440.00	37.66	-4.76	32.90	54.00	21.10	Horizontal	Average
7440.00	44.93	-2.07	42.86	74.00	31.14	Horizontal	Peak
9597.00	46.02	1.17	47.19	74.00	26.81	Horizontal	Peak
10497.00	39.29	-0.75	38.54	54.00	15.46	Horizontal	Average
12060.00	45.88	4.08	49.96	74.00	24.04	Horizontal	Peak
12976.50	38.79	4.45	43.24	54.00	10.76	Horizontal	Average
13026.00	45.55	8.30	53.85	74.00	20.15	Horizontal	Peak
13503.00	39.46	4.03	43.49	54.00	10.51	Horizontal	Average
17998.50	38.56	6.99	45.55	54.00	8.45	Horizontal	Average
17999.00	45.24	11.06	56.30	74.00	17.70	Horizontal	Peak

Project No.: 2407V34489E-RF
Test Mode: 3DH1-2480
EUT Model: BR2551E
Test distance: 1.8m

Temp/Humi/ATM: 23.6℃/53%/100.1kPa
Tested by: Wlif Wu
Power Source: AC120V/60Hz



Trace: 1

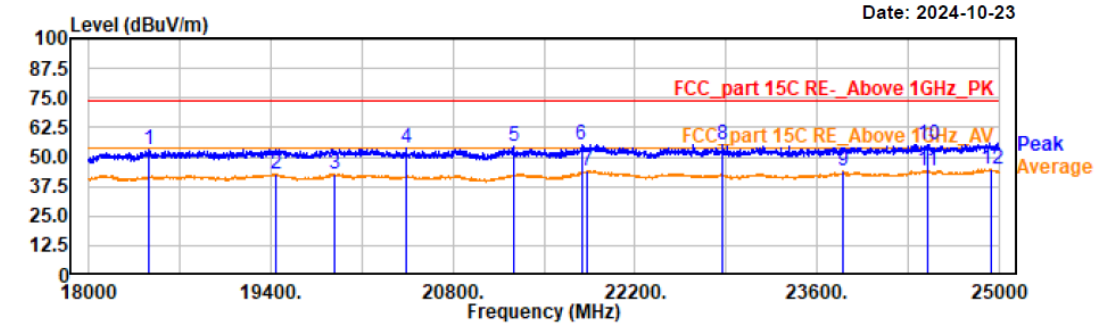
Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
4960.50	38.76	-11.64	27.12	54.00	26.88	vertical	Average
4960.50	44.46	-9.49	34.97	74.00	39.03	vertical	Peak
7440.00	37.26	-4.76	32.50	54.00	21.50	vertical	Average
7440.00	43.76	-2.07	41.69	74.00	32.31	vertical	Peak
10489.50	38.91	-0.82	38.09	54.00	15.91	vertical	Average
10545.00	46.06	2.07	48.13	74.00	25.87	vertical	Peak
12055.50	39.36	0.87	40.23	54.00	13.77	vertical	Average
12057.00	45.45	4.09	49.54	74.00	24.46	vertical	Peak
12984.00	46.04	8.30	54.34	74.00	19.66	vertical	Peak
13426.50	40.37	4.09	44.46	54.00	9.54	vertical	Average
17998.50	37.63	6.99	44.62	54.00	9.38	vertical	Average
17999.00	44.89	11.06	55.95	74.00	18.05	vertical	Peak

5) 18 GHz - 25 GHz（Worst case）

EUT operation mode: Transmitting in EDR low channel (π/4-DQPSK)

Project No.: 2407V34489E-RF
Test Mode:2DH1 2402MHz
EUT Model:BR2551E
Test distance: 1m

Temp/Humi/ATM: 23.5℃/54%/100.5kPa
Tested by:Wlif Wu
Power Source:AC 120V/60Hz

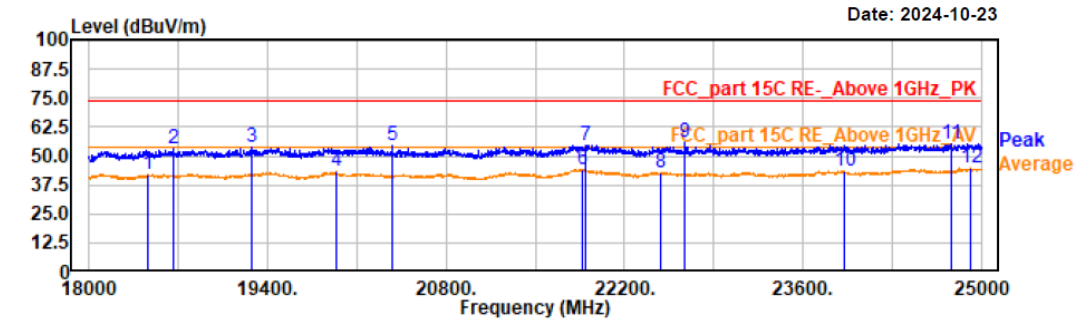


Trace: 1

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
18466.40	38.28	14.81	53.09	74.00	20.91	horizontal	Peak
19436.60	27.60	15.06	42.66	54.00	11.34	horizontal	Average
19889.80	27.60	15.10	42.70	54.00	11.30	horizontal	Average
20439.80	37.94	15.91	53.85	74.00	20.15	horizontal	Peak
21271.40	38.56	16.09	54.65	74.00	19.35	horizontal	Peak
21788.40	39.02	16.27	55.29	74.00	18.71	horizontal	Peak
21830.20	27.81	16.37	44.18	54.00	9.82	horizontal	Average
22868.60	38.52	16.66	55.18	74.00	18.82	horizontal	Peak
23799.20	26.14	17.80	43.94	54.00	10.06	horizontal	Average
24446.00	36.56	18.93	55.49	74.00	18.51	horizontal	Peak
24448.20	25.20	18.94	44.14	54.00	9.86	horizontal	Average
24941.00	25.83	18.85	44.68	54.00	9.32	horizontal	Average

Project No.: 2407V34489E-RF
Test Mode:2DH1 2402MHz
EUT Model:BR2551E
Test distance: 1m

Temp/Humi/ATM: 23.5℃/54%/100.5kPa
Tested by:Wlif Wu
Power Source:AC 120V/60Hz



Trace: 1

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
18462.00	27.27	14.81	42.08	54.00	11.92	vertical	Average
18660.00	37.90	14.88	52.78	74.00	21.22	vertical	Peak
19271.60	38.87	15.03	53.90	74.00	20.10	vertical	Peak
19936.00	28.02	15.11	43.13	54.00	10.87	vertical	Average
20376.00	38.73	15.78	54.51	74.00	19.49	vertical	Peak
21867.60	27.83	16.52	44.35	54.00	9.65	vertical	Average
21896.20	38.21	16.53	54.74	74.00	19.26	vertical	Peak
22488.00	26.29	16.66	42.95	54.00	11.05	vertical	Average
22677.20	39.36	16.68	56.04	74.00	17.96	vertical	Peak
23920.20	25.54	17.96	43.50	54.00	10.50	vertical	Average
24758.40	36.54	18.93	55.47	74.00	18.53	vertical	Peak
24919.00	25.91	18.87	44.78	54.00	9.22	vertical	Average

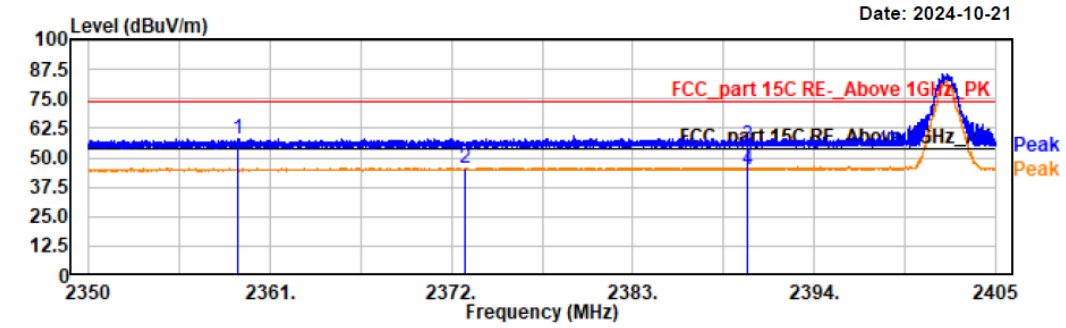
Restricted Bands Emissions:

Pre-Scan with GFSK, π/4-DQPSK, 8DPSK modes of operation in the X, Y and Z axes of orientation, the mode in Z-axis of orientation was recorded

Note:
Factor (dB/m) =Antenna Factor (dB/m) + Cable Loss (dB) - Amplifier Gain (dB)
Result (dBμV/m) = Reading (dBμV) + Factor (dB/m)
Margin (dB) = Limit (dBμV/m) –Result (dBμV/m)

Project No.: 2407V34489E-RF
Test Mode: 1DH1-2402
EUT Model: BR2551E
Test distance: 1.5m

Temp/Humi/ATM: 23.6℃/53%/100.1kPa
Tested by: Wlif Wu
Power Source: AC120V/60Hz

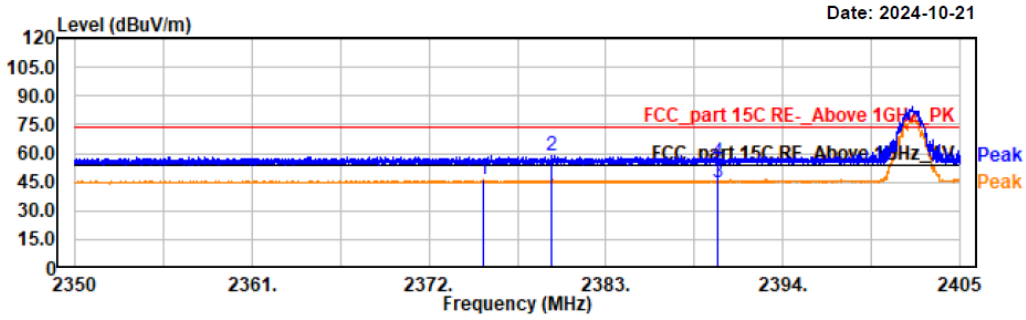


Trace: 1

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
2359.09	27.74	30.53	58.27	74.00	15.73	horizontal	Peak
2372.79	15.01	30.71	45.72	54.00	8.28	horizontal	Average
2390.00	24.46	30.93	55.39	74.00	18.61	horizontal	Peak
2390.00	14.21	30.93	45.14	54.00	8.86	horizontal	Average

Project No.: 2407V34489E-RF
Test Mode: 1DH1-2402
EUT Model: BR2551E
Test distance: 1.5m

Temp/Humi/ATM: 23.6℃/53%/100.1kPa
Tested by: Wlif Wu
Power Source: AC120V/60Hz

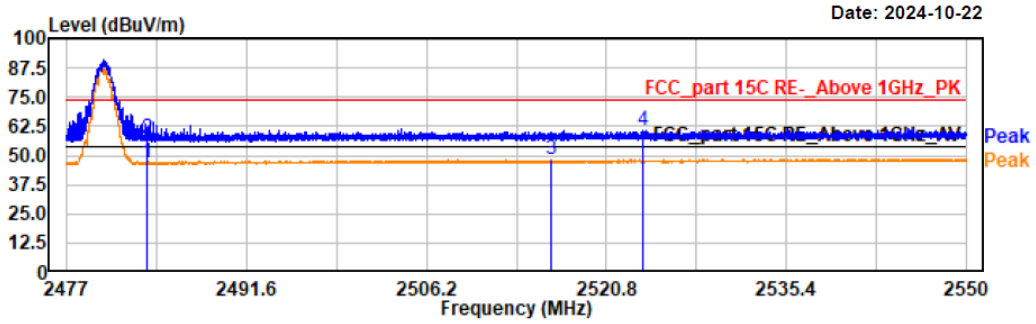


Trace: 1

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
2375.42	15.25	30.75	46.00	54.00	8.00	vertical	Average
2379.57	28.12	30.79	58.91	74.00	15.09	vertical	Peak
2390.00	14.17	30.93	45.10	54.00	8.90	vertical	Average
2390.00	24.93	30.93	55.86	74.00	18.14	vertical	Peak

Project No.: 2407V34489E-RF
Test Mode: 1DH1-2480
EUT Model: BR2551E
Test distance: 1.5m

Temp/Humi/ATM: 23.6℃/53%/100.1kPa
Tested by: Wlif Wu
Power Source: AC120V/60Hz

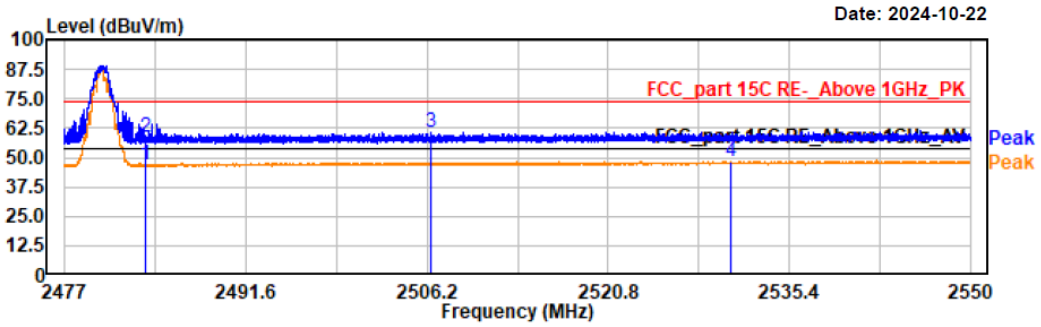


Trace: 1

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
2483.50	15.31	31.75	47.06	54.00	6.94	horizontal	Average
2483.50	25.38	31.75	57.13	74.00	16.87	horizontal	Peak
2516.37	15.77	32.30	48.07	54.00	5.93	horizontal	Average
2523.79	28.36	32.40	60.76	74.00	13.24	horizontal	Peak

Project No.: 2407V34489E-RF
Test Mode: 1DH1-2480
EUT Model: BR2551E
Test distance: 1.5m

Temp/Humi/ATM: 23.6℃/53%/100.1kPa
Tested by: Wlif Wu
Power Source: AC120V/60Hz

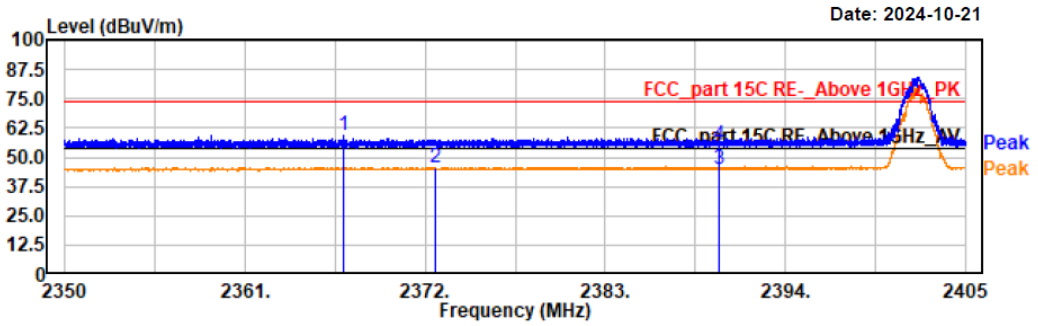


Trace: 1

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
2483.50	14.98	31.75	46.73	54.00	7.27	vertical	Average
2483.50	26.60	31.75	58.35	74.00	15.65	vertical	Peak
2506.55	28.68	32.15	60.83	74.00	13.17	vertical	Peak
2530.65	15.68	32.51	48.19	54.00	5.81	vertical	Average

Project No.: 2407V34489E-RF
Test Mode: 2DH1-2402
EUT Model: BR2551E
Test distance: 1.5m

Temp/Humi/ATM: 23.6℃/53%/100.1kPa
Tested by: Wlif Wu
Power Source: AC120V/60Hz

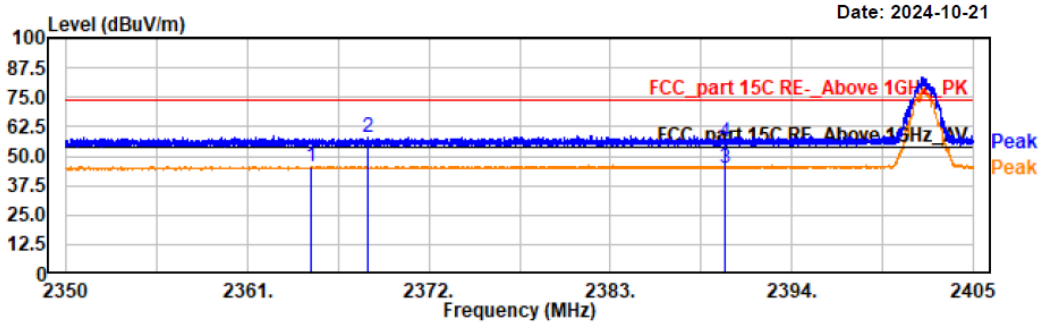


Trace: 1

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
2367.02	28.33	30.64	58.97	74.00	15.03	horizontal	Peak
2372.67	14.87	30.71	45.58	54.00	8.42	horizontal	Average
2390.00	14.04	30.93	44.97	54.00	9.03	horizontal	Average
2390.00	24.40	30.93	55.33	74.00	18.67	horizontal	Peak

Project No.: 2407V34489E-RF
Test Mode: 2DH1-2402
EUT Model: BR2551E
Test distance: 1.5m

Temp/Humi/ATM: 23.6℃/53%/100.1kPa
Tested by: Wlif Wu
Power Source: AC120V/60Hz

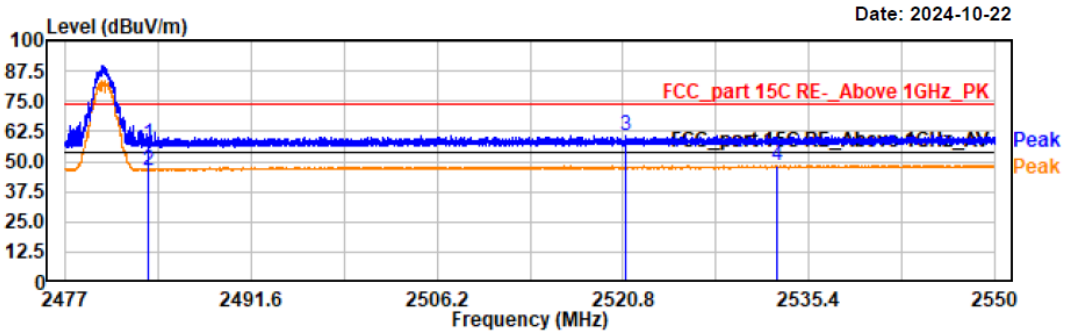


Trace: 1

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
2364.89	14.92	30.61	45.53	54.00	8.47	vertical	Average
2368.32	27.36	30.65	58.01	74.00	15.99	vertical	Peak
2390.00	14.06	30.93	44.99	54.00	9.01	vertical	Average
2390.00	24.61	30.93	55.54	74.00	18.46	vertical	Peak

Project No.: 2407V34489E-RF
Test Mode: 2DH1-2480
EUT Model: BR2551E
Test distance: 1.5m

Temp/Humi/ATM: 23.6℃/53%/100.1kPa
Tested by: Wlif Wu
Power Source: AC120V/60Hz

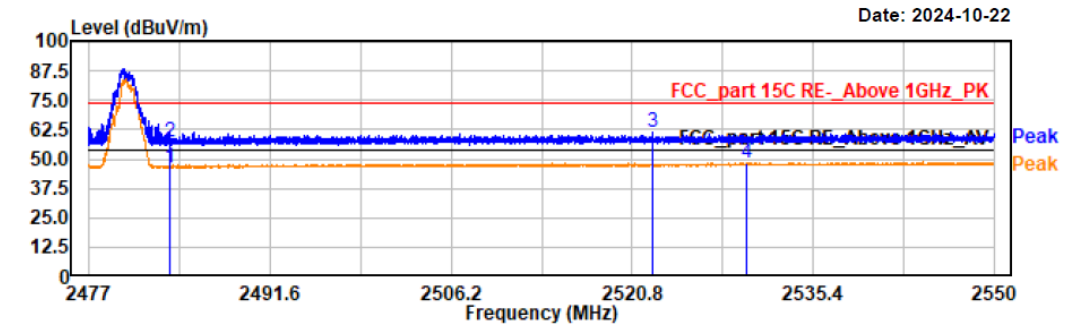


Trace: 1

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
2483.50	25.21	31.75	56.96	74.00	17.04	horizontal	Peak
2483.50	14.74	31.75	46.49	54.00	7.51	horizontal	Average
2521.06	28.39	32.36	60.75	74.00	13.25	horizontal	Peak
2532.96	15.85	32.54	48.39	54.00	5.61	horizontal	Average

Project No.: 2407V34489E-RF
Test Mode: 2DH1-2480
EUT Model: BR2551E
Test distance: 1.5m

Temp/Humi/ATM: 23.6℃/53%/100.1kPa
Tested by: Wlif Wu
Power Source: AC120V/60Hz

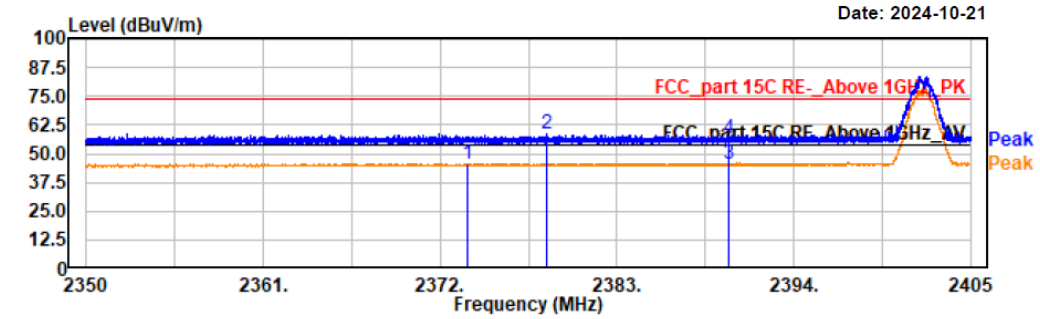


Trace: 1

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
2483.50	14.72	31.75	46.47	54.00	7.53	vertical	Average
2483.50	25.66	31.75	57.41	74.00	16.59	vertical	Peak
2522.47	28.81	32.38	61.19	74.00	12.81	vertical	Peak
2530.03	15.73	32.50	48.23	54.00	5.77	vertical	Average

Project No.: 2407V34489E-RF
Test Mode: 3DH1-2402
EUT Model: BR2551E
Test distance: 1.5m

Temp/Humi/ATM: 23.6℃/53%/100.1kPa
Tested by: Wlif Wu
Power Source: AC120V/60Hz

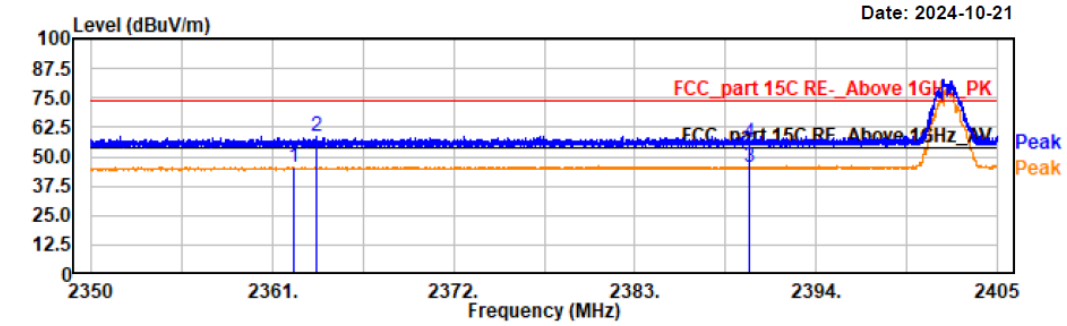


Trace: 1

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
2373.73	15.02	30.72	45.74	54.00	8.26	horizontal	Average
2378.65	27.77	30.78	58.55	74.00	15.45	horizontal	Peak
2390.00	14.35	30.93	45.28	54.00	8.72	horizontal	Average
2390.00	25.89	30.93	56.82	74.00	17.18	horizontal	Peak

Project No.: 2407V34489E-RF
Test Mode: 3DH1-2402
EUT Model: BR2551E
Test distance: 1.5m

Temp/Humi/ATM: 23.6℃/53%/100.1kPa
Tested by: Wlif Wu
Power Source: AC120V/60Hz

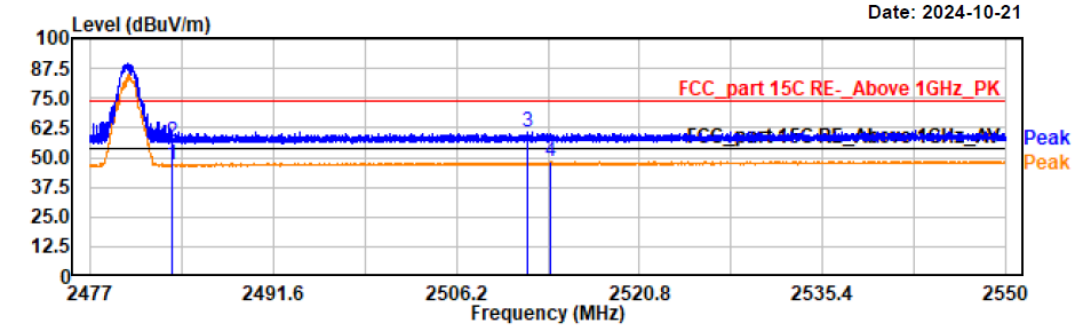


Trace: 1

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
2362.27	15.08	30.57	45.65	54.00	8.35	vertical	Average
2363.69	27.96	30.59	58.55	74.00	15.45	vertical	Peak
2390.00	14.35	30.93	45.28	54.00	8.72	vertical	Average
2390.00	24.64	30.93	55.57	74.00	18.43	vertical	Peak

Project No.: 2407V34489E-RF
Test Mode: 3DH1-2480
EUT Model: BR2551E
Test distance: 1.5m

Temp/Humi/ATM: 23.6℃/53%/100.1kPa
Tested by: Wlif Wu
Power Source: AC120V/60Hz

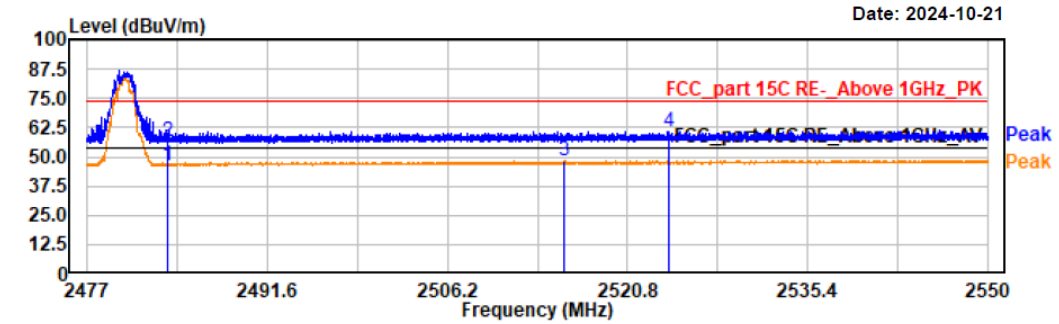


Trace: 1

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
2483.50	15.26	31.75	47.01	54.00	6.99	horizontal	Average
2483.50	24.48	31.75	56.23	74.00	17.77	horizontal	Peak
2511.82	28.29	32.24	60.53	74.00	13.47	horizontal	Peak
2513.70	15.74	32.26	48.00	54.00	6.00	horizontal	Average

Project No.: 2407V34489E-RF
Test Mode: 3DH1-2480
EUT Model: BR2551E
Test distance: 1.5m

Temp/Humi/ATM: 23.6℃/53%/100.1kPa
Tested by: Wlif Wu
Power Source: AC120V/60Hz



Trace: 1

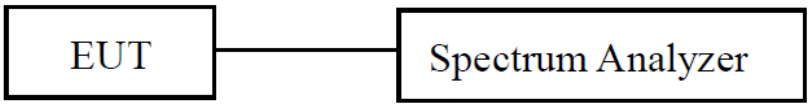
Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
2483.50	14.80	31.75	46.55	54.00	7.45	vertical	Average
2483.50	25.01	31.75	56.76	74.00	17.24	vertical	Peak
2515.72	15.98	32.29	48.27	54.00	5.73	vertical	Average
2524.09	28.40	32.41	60.81	74.00	13.19	vertical	Peak

FCC §15.247(a) (1)-CHANNEL SEPARATION TEST

Applicable Standard

Frequency hopping systems shall have hoping 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.

EUT Setup



Test Procedure

According to ANSI C63.10-2013 Section 7.8.2
The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:
a) Span: Wide enough to capture the peaks of two adjacent channels.
b) RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
c) Video (or average) bandwidth (VBW) ≥ RBW.
d) Sweep: Auto.
e) Detector function: Peak.
f) Trace: Max hold.
g) Allow the trace to stabilize.
Use the marker-delta function to determine the separation between the peaks of the adjacent channels.
Compliance of an EUT with the appropriate regulatory limit shall be determined. A plot of the data shall be included in the test report.

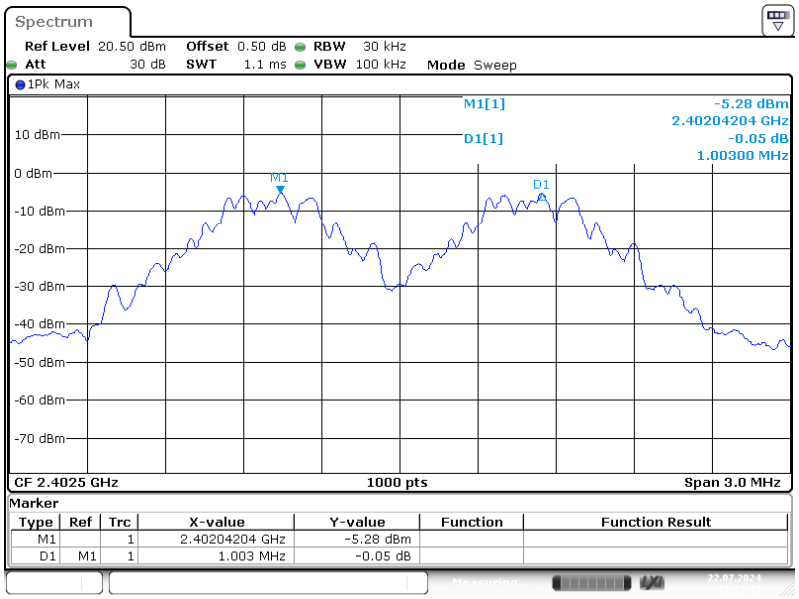
Test Data

Test Mode:	Transmitting	Test Engineer:	Ash Lin
Test Date:	2024-07-22	Environment:	Temp.: 23.6℃ Humi.: 64% Atm :100.3kPa

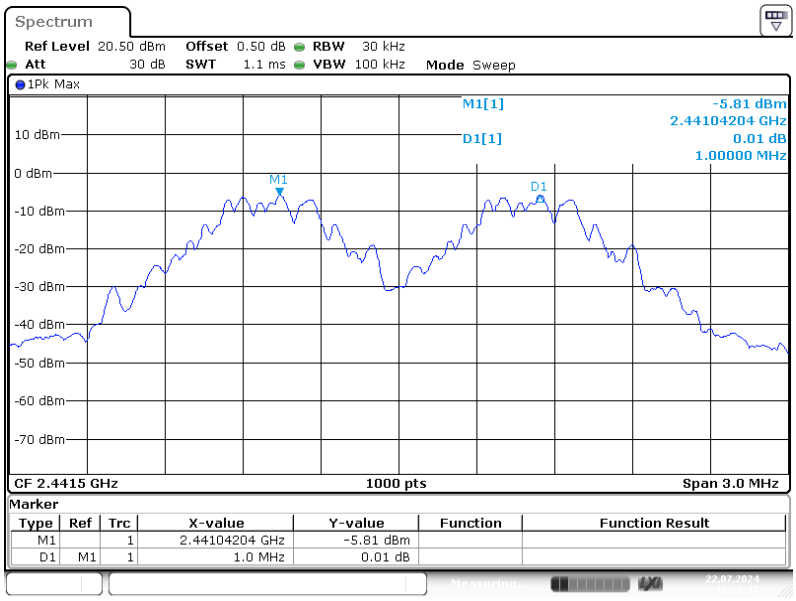
Mode	Channel	Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
BDR (GFSK)	Low	2402	1.003	0.593	Pass
	Middle	2441	1.000	0.593	Pass
	High	2480	1.000	0.595	Pass
EDR (π/4-DQPSK)	Low	2402	1.003	0.847	Pass
	Middle	2441	1.000	0.847	Pass
	High	2480	1.000	0.787	Pass
EDR (8DPSK)	Low	2402	1.003	0.771	Pass
	Middle	2441	1.003	0.769	Pass
	High	2480	1.000	0.769	Pass

Note: Limit = 20 dB bandwidth*2/3

BDR (GFSK): Low Channel



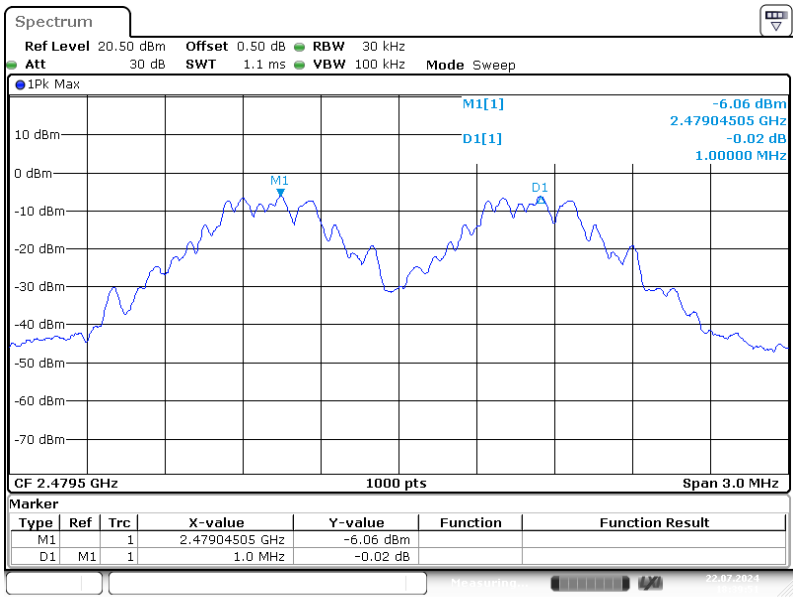
BDR (GFSK): Middle Channel



ProjectNo.:2407V34489E-RF Tester:Ash Lin

Date: 22.JUL.2024 18:38:47

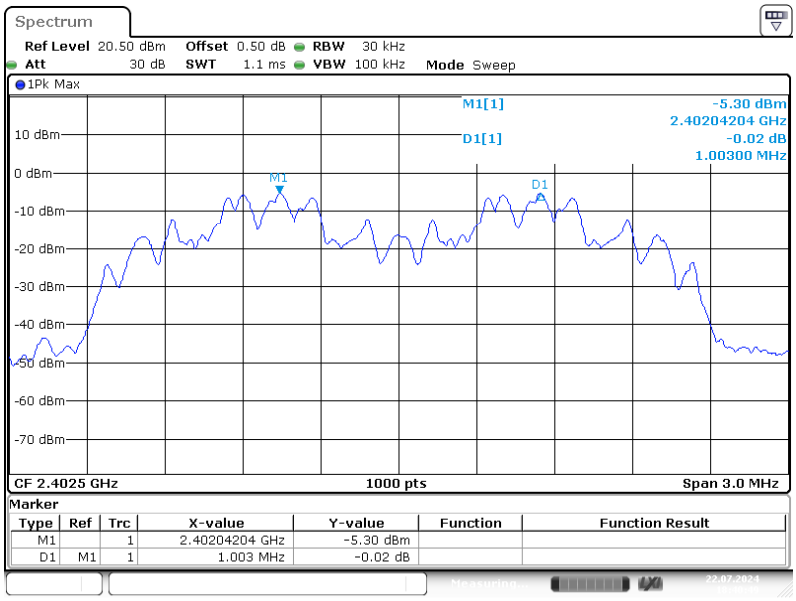
BDR (GFSK): High Channel



ProjectNo.:2407V34489E-RF Tester:Ash Lin

Date: 22.JUL.2024 18:39:51

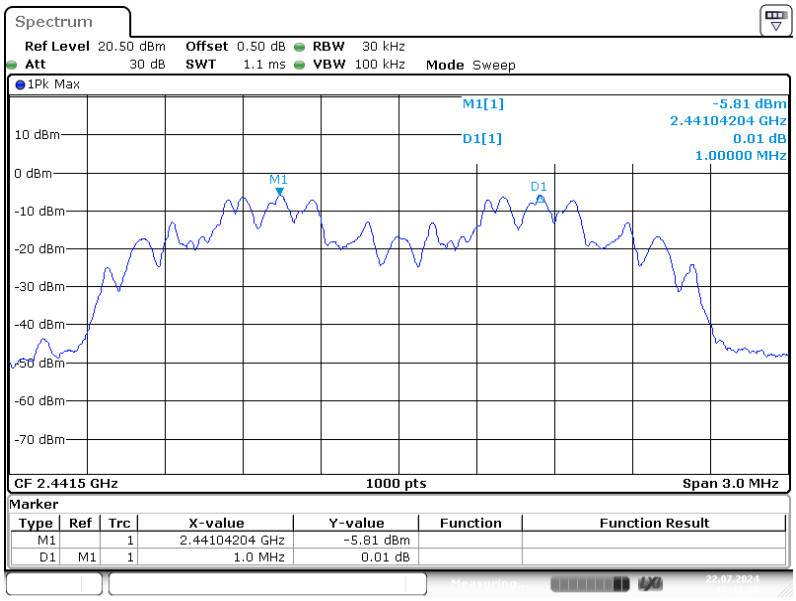
EDR (π/4-DQPSK): Low Channel



ProjectNo.:2407V34489E-RF Tester:Ash Lin

Date: 22.JUL.2024 18:40:48

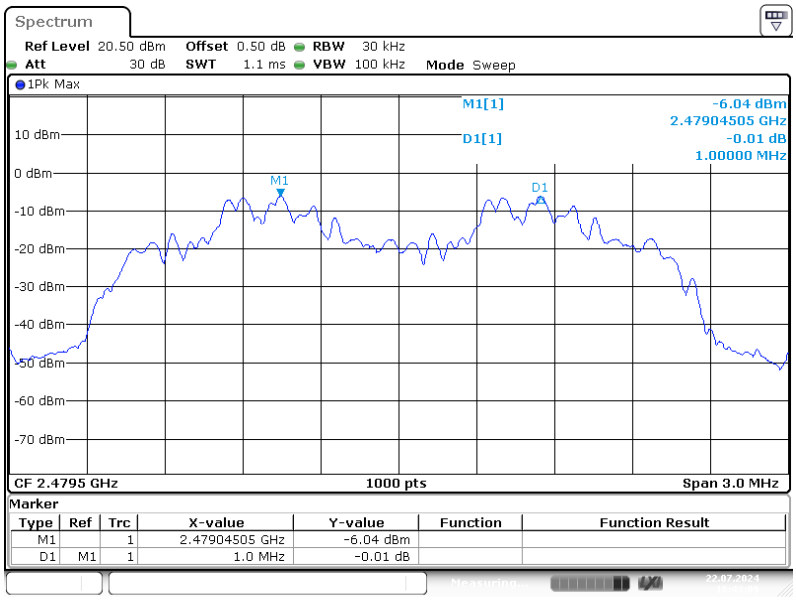
EDR (π/4-DQPSK): Middle Channel



ProjectNo.:2407V34489E-RF Tester:Ash Lin

Date: 22.JUL.2024 18:41:50

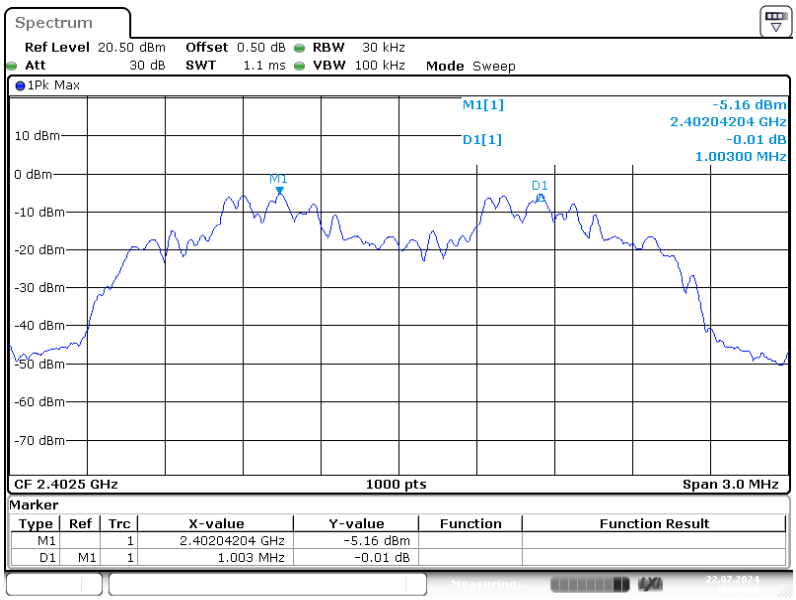
EDR (π/4-DQPSK): High Channel



ProjectNo.:2407V34489E-RF Tester:Ash Lin

Date: 22.JUL.2024 18:43:09

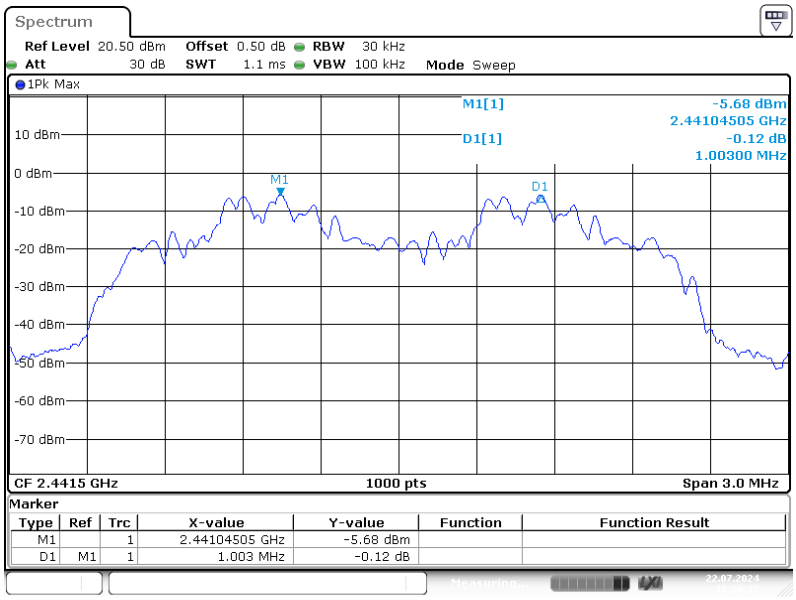
EDR (8DPSK): Low Channel



ProjectNo.:2407V34489E-RF Tester:Ash Lin

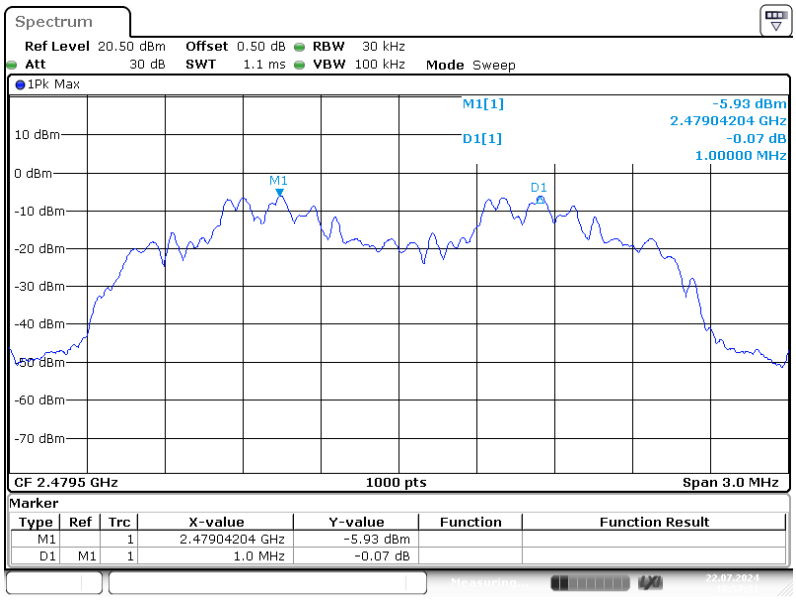
Date: 22.JUL.2024 18:54:59

EDR (8DPSK): Middle Channel



ProjectNo.:2407V34489E-RF Tester:Ash Lin
Date: 22.JUL.2024 18:56:37

EDR (8DPSK): High Channel



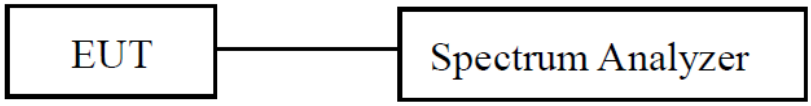
ProjectNo.:2407V34489E-RF Tester:Ash Lin
Date: 22.JUL.2024 18:57:31

FCC §15.247(a) (1) – 20 dB EMISSION BANDWIDTH

Applicable Standard

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.

EUT Setup



Test Procedure

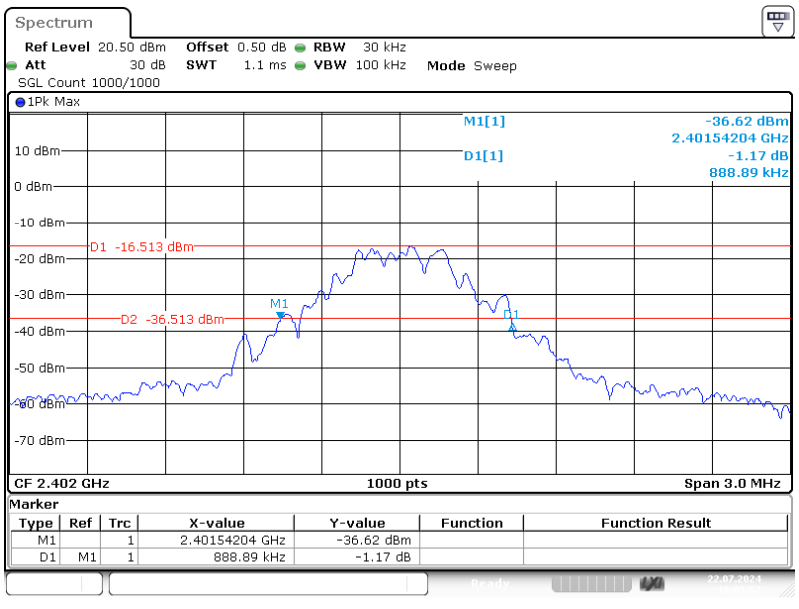
According to ANSI C63.10-2013 Section 6.9.2
a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.
b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement.
c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2
d) Steps a) through c) might require iteration to adjust within the specified tolerances.
e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target "−xx dB down" requirement; that is, if the requirement calls for measuring the −20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value.
f) Set detection mode to peak and trace mode to max hold.
g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
h) Determine the "−xx dB down amplitude" using [(reference value) − xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument.
i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j).

Test Data

Test Mode:	Transmitting	Test Engineer:	Ash Lin
Test Date:	2024-07-22	Environment:	Temp.: 23.6℃ Humi.: 64% Atm :100.3kPa

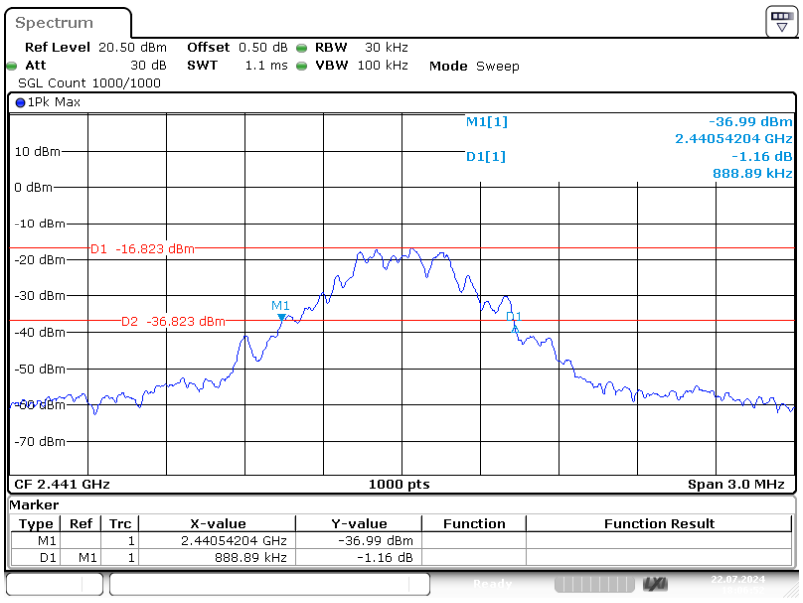
Mode	Channel	Frequency (MHz)	20 dB Emission Bandwidth (MHz)
BDR Mode (GFSK)	Low	2402	0.889
	Middle	2441	0.889
	High	2480	0.892
EDR (π/4-DQPSK)	Low	2402	1.27
	Middle	2441	1.27
	High	2480	1.18
EDR (8DPSK)	Low	2402	1.156
	Middle	2441	1.153
	High	2480	1.153

BDR(GFSK) : Low Channel



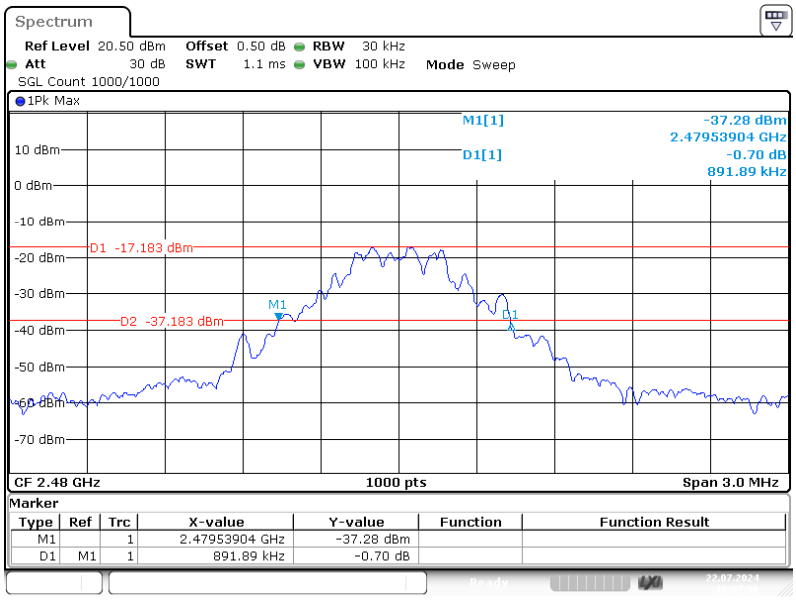
ProjectNo.:2407V34489E-RF Tester:Ash Lin
Date: 22.JUL.2024 18:05:57

BDR(GFSK) : Middle Channel



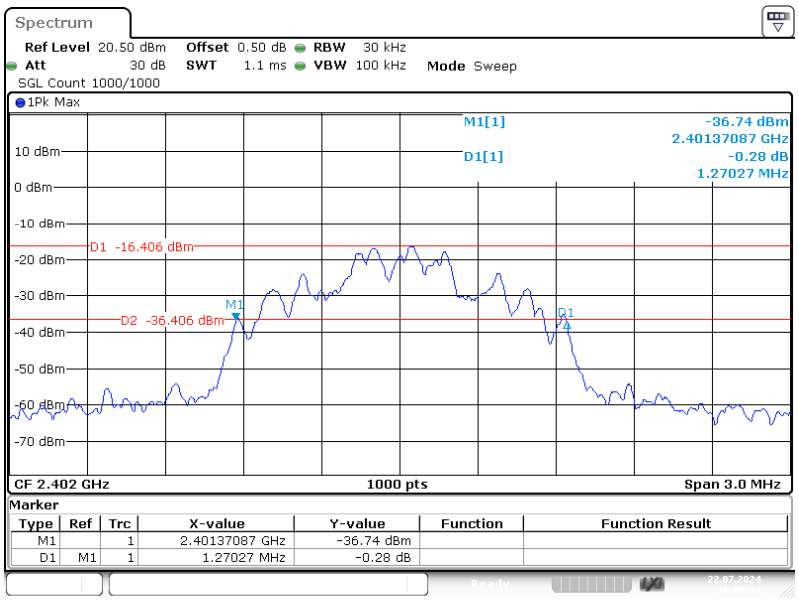
ProjectNo.:2407V34489E-RF Tester:Ash Lin
Date: 22.JUL.2024 18:06:52

BDR(GFSK) : High Channel



ProjectNo.:2407V34489E-RF Tester:Ash Lin
Date: 22.JUL.2024 18:07:57

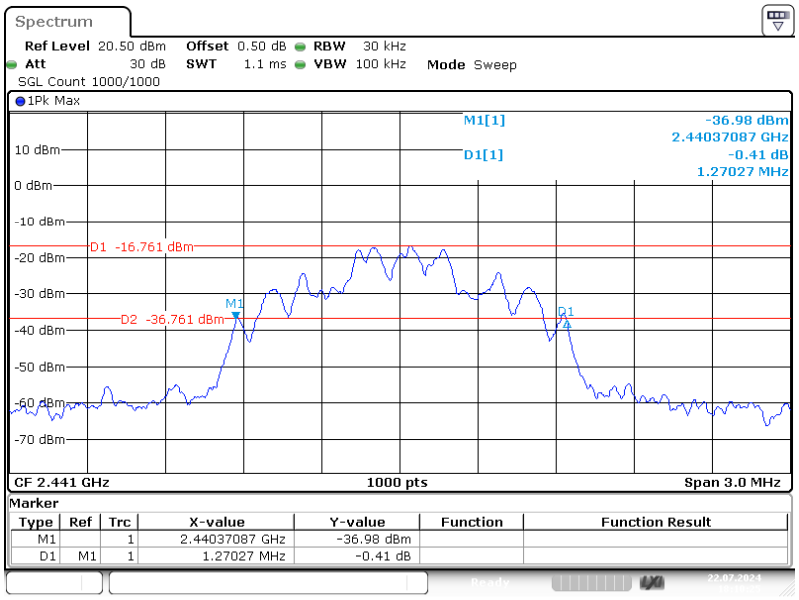
EDR (π/4-DQPSK): Low Channel



ProjectNo.:2407V34489E-RF Tester:Ash Lin

Date: 22.JUL.2024 18:09:35

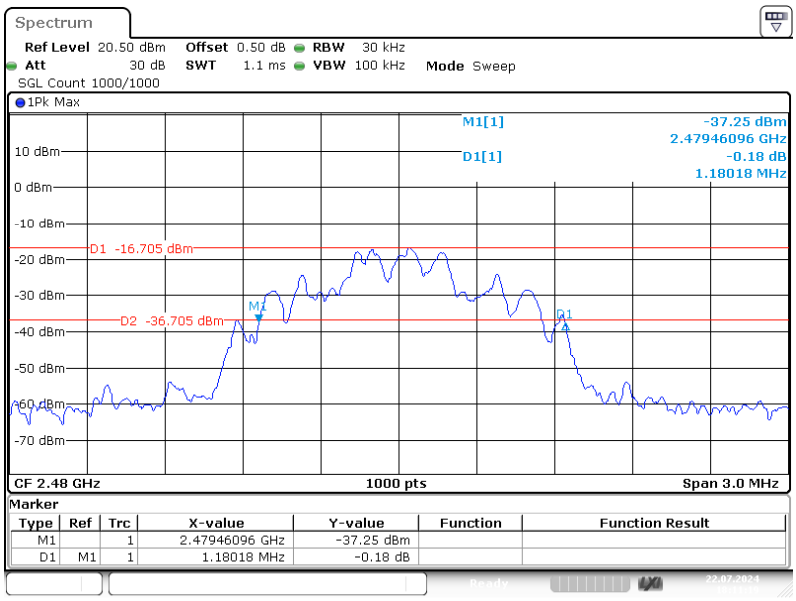
EDR(π/4-DQPSK): Middle Channel



ProjectNo.:2407V34489E-RF Tester:Ash Lin

Date: 22.JUL.2024 18:10:25

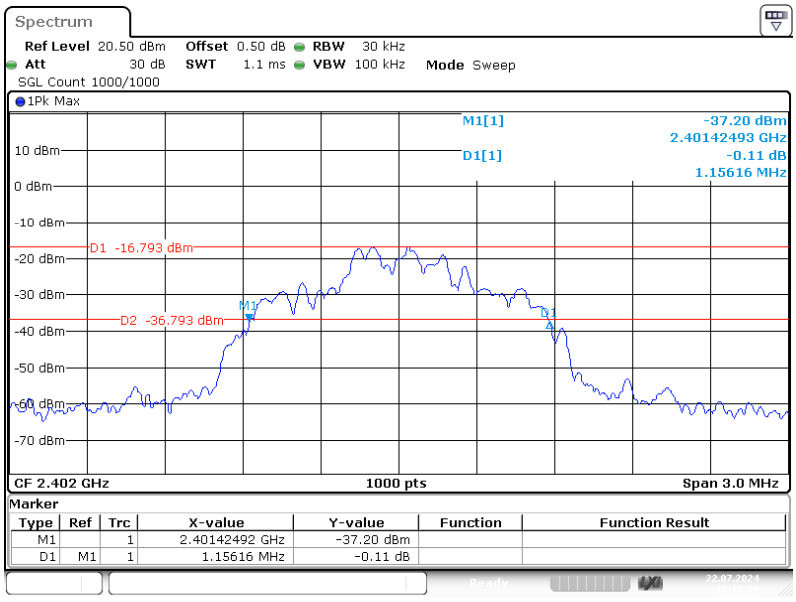
EDR (π/4-DQPSK): High Channel



ProjectNo.:2407V34489E-RF Tester:Ash Lin

Date: 22.JUL.2024 18:11:19

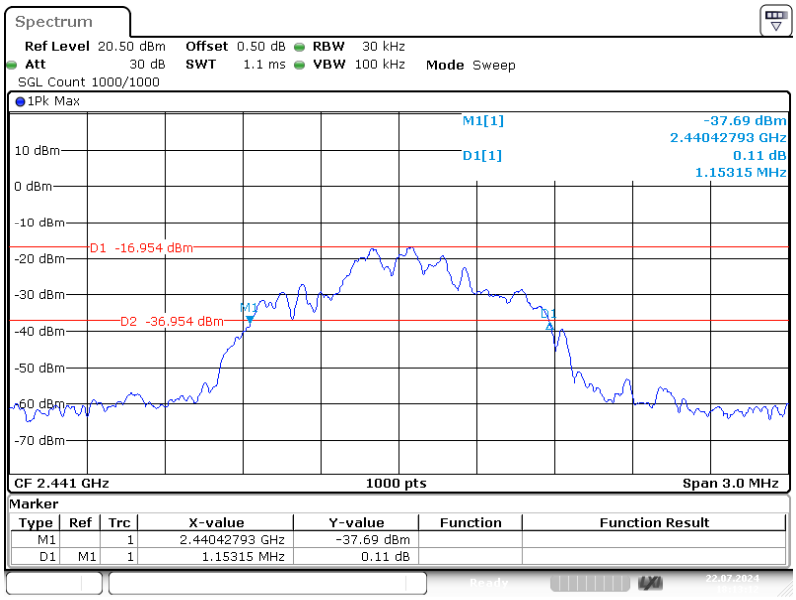
EDR (8DPSK): Low Channel



ProjectNo.:2407V34489E-RF Tester:Ash Lin

Date: 22.JUL.2024 18:12:19

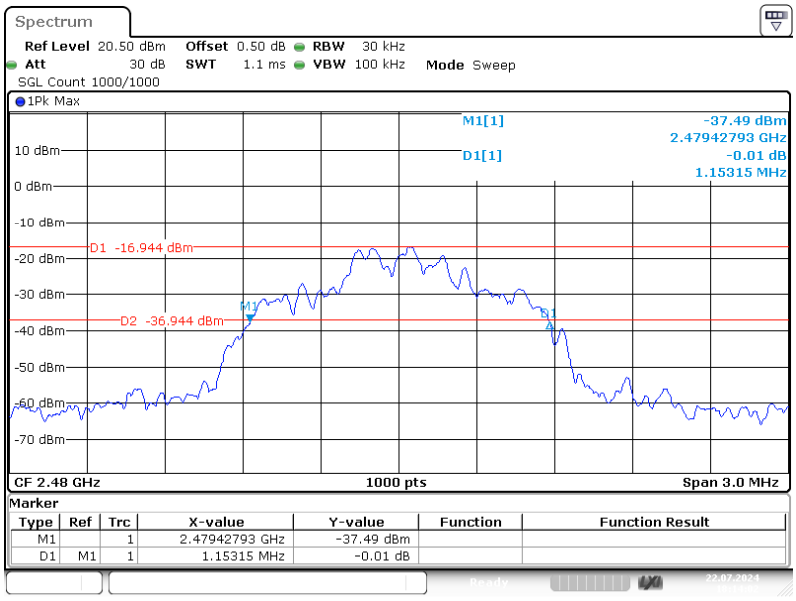
EDR (8DPSK): Middle Channel



ProjectNo.:2407V34489E-RF Tester:Ash Lin

Date: 22.JUL.2024 18:13:12

EDR (8DPSK): High Channel



ProjectNo.:2407V34489E-RF Tester:Ash Lin

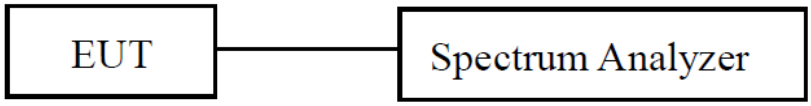
Date: 22.JUL.2024 18:14:02

FCC §15.247(a) (1) (iii)-QUANTITY OF HOPPING CHANNEL TEST

Applicable Standard

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy 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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

EUT Setup



Test Procedure

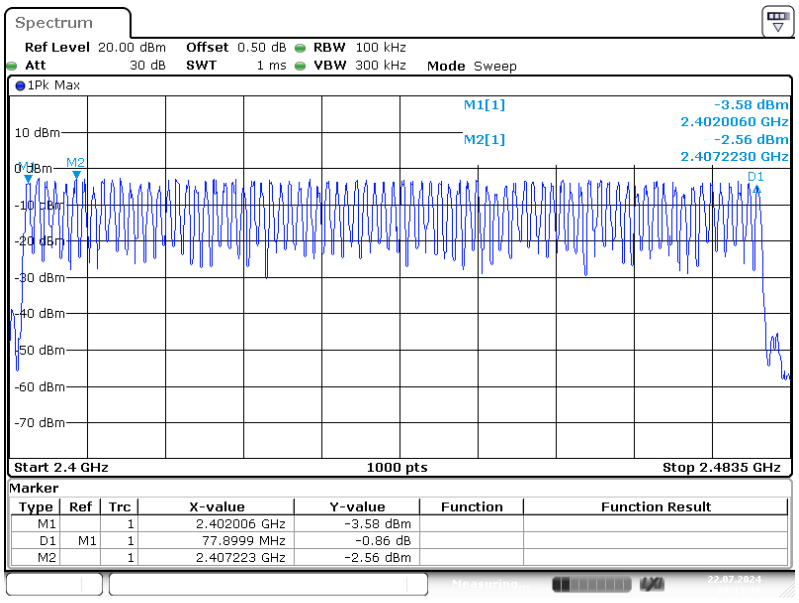
According to ANSI C63.10-2013 Section 7.8.3
The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:
a) Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
b) RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
c) VBW ⩾ RBW.
d) Sweep: Auto.
e) Detector function: Peak.
f) Trace: Max hold.
g) Allow the trace to stabilize
It might prove necessary to break the span up into subranges to show clearly all of the hopping frequencies. Compliance of an EUT with the appropriate regulatory limit shall be determined for the number of hopping channels. A plot of the data shall be included in the test report.

Test Data

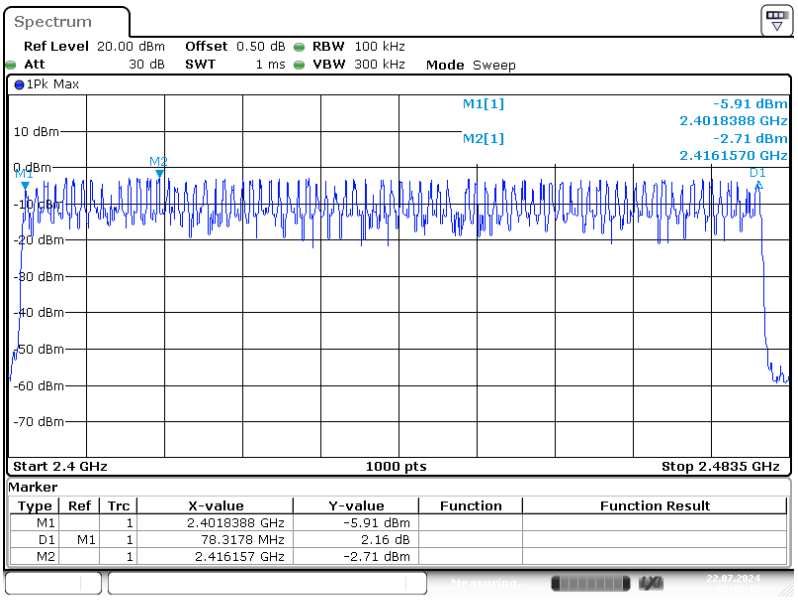
Test Mode:	Transmitting	Test Engineer:	Ash Lin
Test Date:	2024-07-22	Environment:	Temp.: 23.6℃ Humi.: 64% Atm :100.3kPa

Mode	Frequency Range (MHz)	Number of Hopping Channel (CH)	Limit (CH)
BDR (GFSK)	2400-2483.5	79	≥15
EDR (π/4-DQPSK)	2400-2483.5	79	≥15
EDR (8DPSK)	2400-2483.5	79	≥15

BDR (GFSK): Number of Hopping Channels



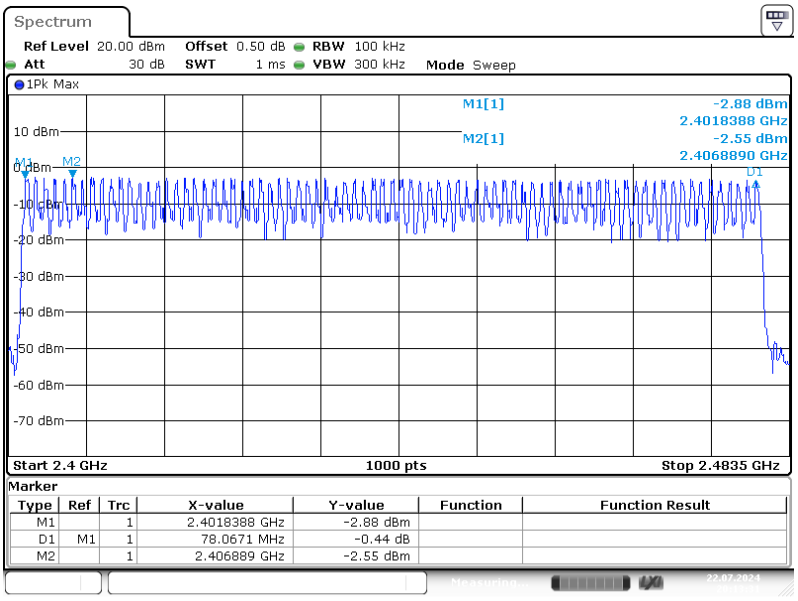
EDR (π/4-DQPSK): Number of Hopping Channels



ProjectNo.:2407V34489E-RF Tester:Ash Lin

Date: 22.JUL.2024 20:12:16

EDR (8DPSK): Number of Hopping Channels



ProjectNo.:2407V34489E-RF Tester:Ash Lin

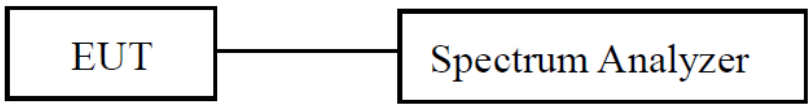
Date: 22.JUL.2024 20:13:30

FCC §15.247(a) (1) (iii) - TIME OF OCCUPANCY (DWELL TIME)

Applicable Standard

Frequency hopping systems in the 2400-2483.5 MHz shall use at least 15 channels. The average time of occupancy 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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

EUT Setup



Test Procedure

According to ANSI C63.10-2013 Section 7.8.4
The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:
a) Span: Zero span, centered on a hopping channel.
b) RBW shall be ⩽ channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel.
c) Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.
d) Detector function: Peak.
e) Trace: Max hold.
Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time.
Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. The sweep time shall be equal to, or less than, the period specified in the requirements. Determine the number of hops over the sweep time and calculate the total number of hops in the period specified in the requirements, using the following equation:
(Number of hops in the period specified in the requirements) = (number of hops on spectrum analyzer) × (period specified in the requirements / analyzer sweep time)
The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified in the requirements. If the number of hops in a specific time varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation.
The measured transmit time and time between hops shall be consistent with the values described in the operational description for the EUT.

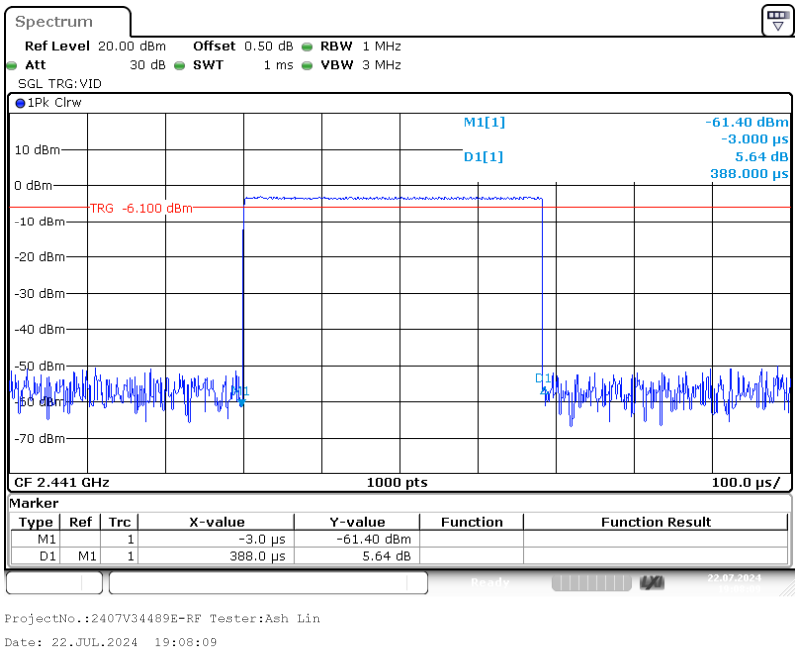
Test Data

Test Mode:	Transmitting	Test Engineer:	Ash Lin
Test Date:	2024-07-22	Environment:	Temp.: 23.6°C Humi.: 64% Atm :100.3kPa

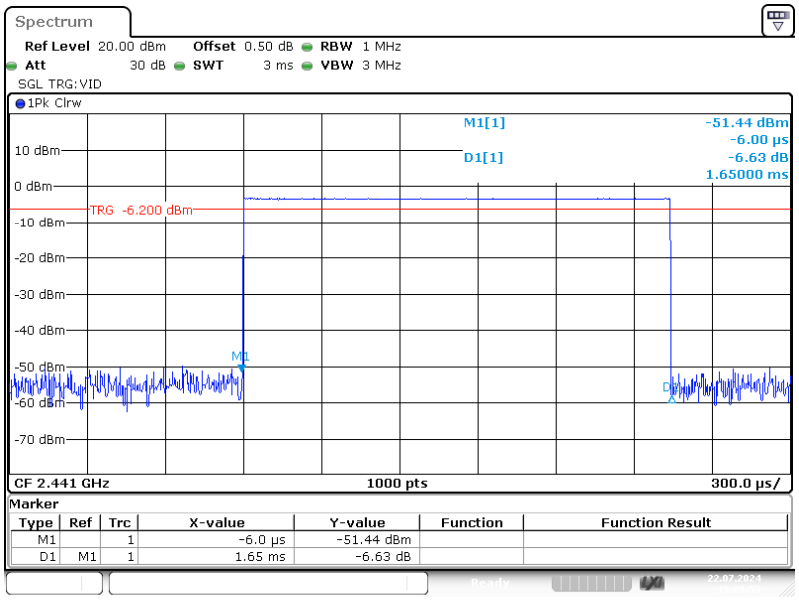
Test Modes	Packet Type	Test Frequency (MHz)	Pulse width (ms)	Dwell times (s)	Limit (s)
BDR Mode (GFSK)	DH1	2441	0.388	0.124	0.400
	DH3	2441	1.650	0.264	0.400
	DH5	2441	2.905	0.310	0.400
EDR Mode (π/4-DQPSK)	2DH1	2441	0.397	0.127	0.400
	2DH3	2441	1.656	0.265	0.400
	2DH5	2441	2.915	0.311	0.400
EDR Mode (8DPSK)	3DH1	2441	0.397	0.127	0.400
	3DH3	2441	1.656	0.265	0.400
	3DH5	2441	2.915	0.311	0.400

DH1/2DH1/3DH1:Dwell time=Pulse time (ms) × (1600/2/79) ×31.6 s
DH3/2DH3/3DH3:Dwell time=Pulse time (ms) × (1600/4/79) ×31.6 s
DH5/2DH5/3DH5:Dwell time=Pulse time (ms) × (1600/6/79) ×31.6 s

BDR (GFSK)_Hopping_DH1



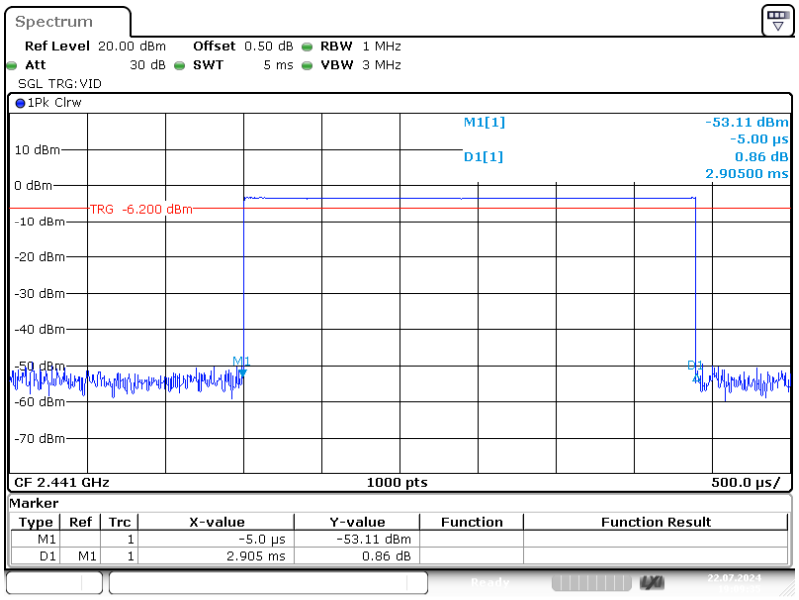
BDR (GFSK)_Hopping_DH3



ProjectNo.:2407V34489E-RF Tester:Ash Lin

Date: 22.JUL.2024 19:08:54

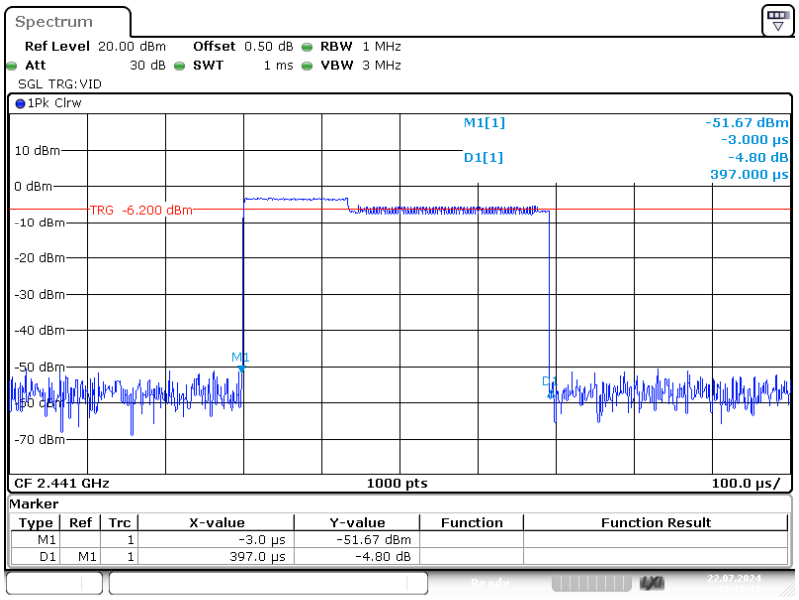
BDR (GFSK)_Hopping_DH5



ProjectNo.:2407V34489E-RF Tester:Ash Lin

Date: 22.JUL.2024 19:09:35

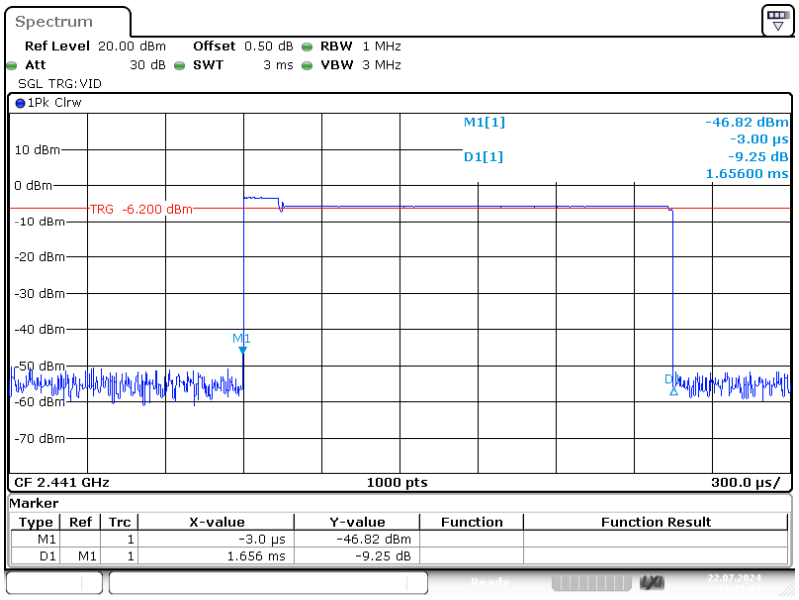
EDR (π/4-DQPSK)_Hopping_2DH1



ProjectNo.:2407V34489E-RF Tester:Ash Lin

Date: 22.JUL.2024 19:10:16

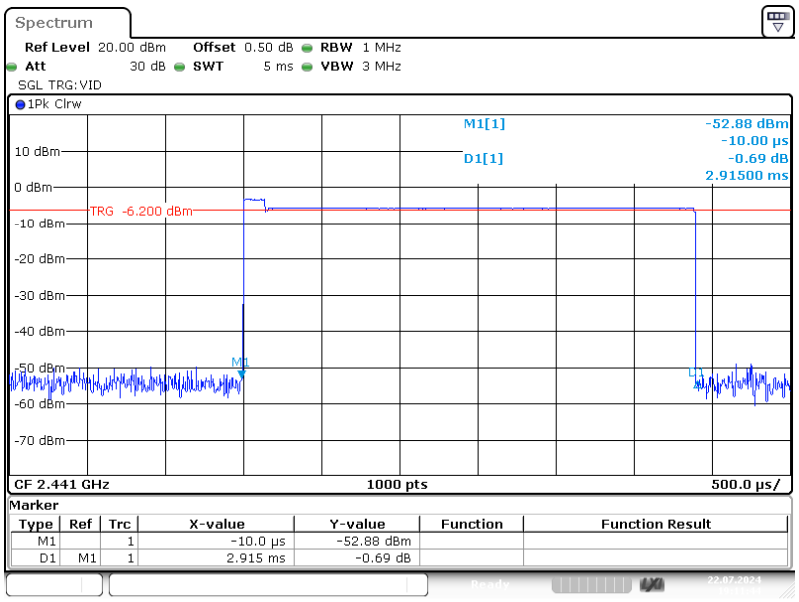
EDR (π/4-DQPSK)_Hopping_2DH3



ProjectNo.:2407V34489E-RF Tester:Ash Lin

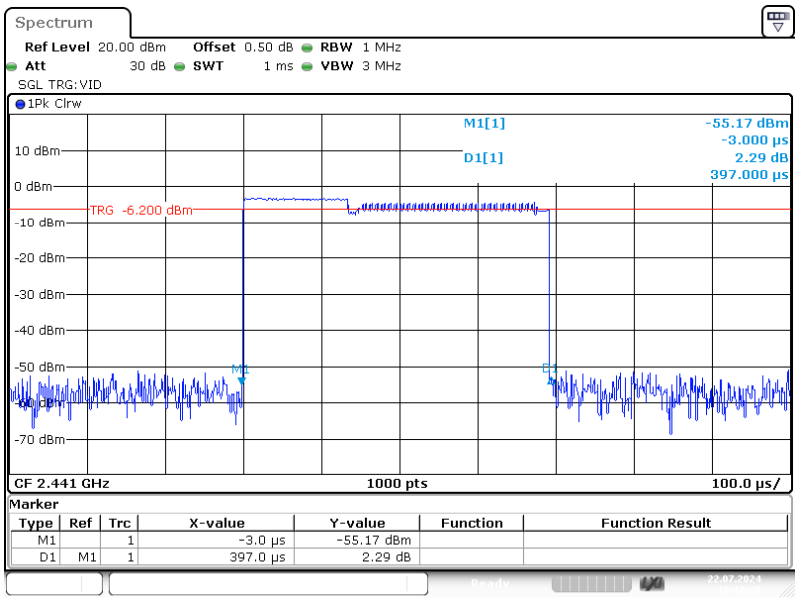
Date: 22.JUL.2024 19:17:07

EDR (π/4-DQPSK)_Hopping_2DH5



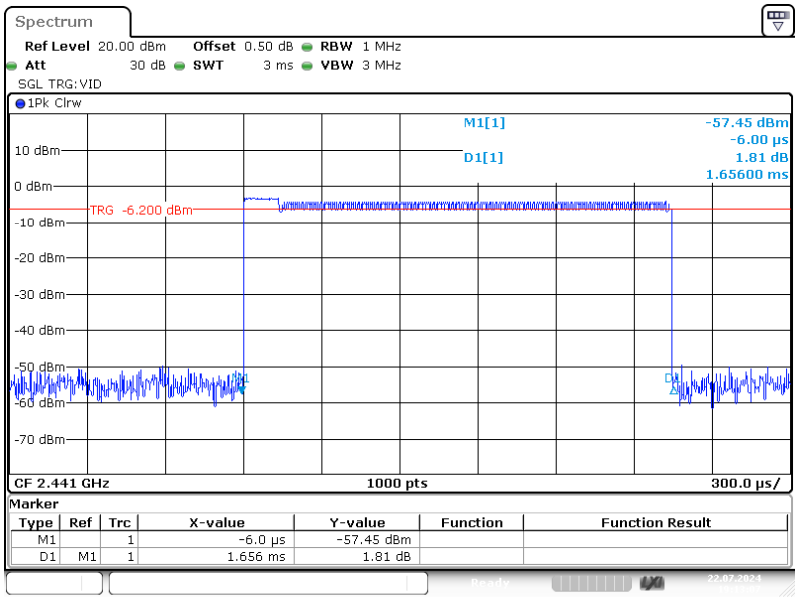
ProjectNo.:2407V34489E-RF Tester:Ash Lin
Date: 22.JUL.2024 19:11:43

EDR (8DPSK) _Hopping_3DH1



ProjectNo.:2407V34489E-RF Tester:Ash Lin
Date: 22.JUL.2024 19:12:27

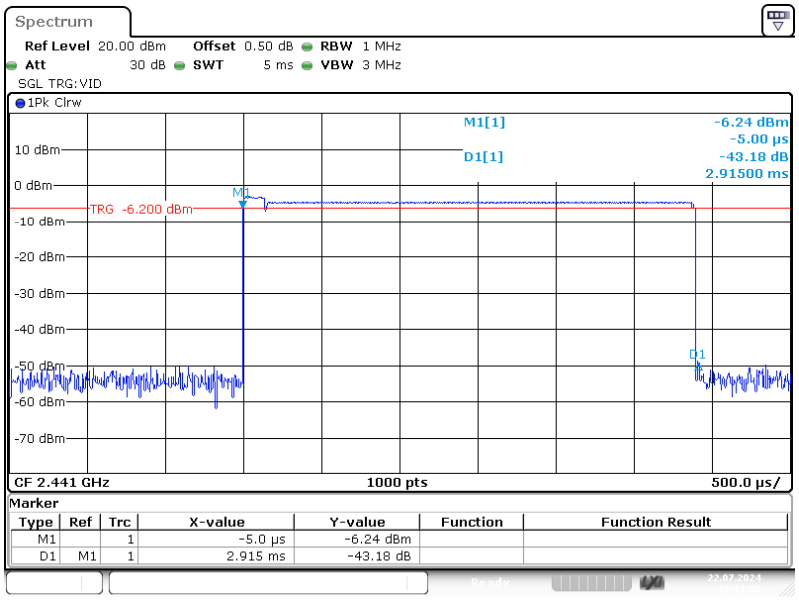
EDR (8DPSK) _Hopping_3DH3



ProjectNo.:2407V34489E-RF Tester:Ash Lin

Date: 22.JUL.2024 19:13:06

EDR (8DPSK) _Hopping_3DH5



ProjectNo.:2407V34489E-RF Tester:Ash Lin

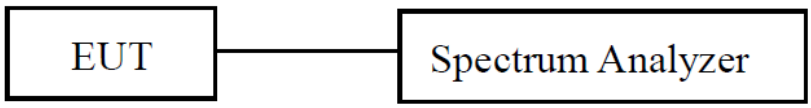
Date: 22.JUL.2024 19:13:49

FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT

Applicable Standard

According to §15.247(b) (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. And for all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

EUT Setup



Test Procedure

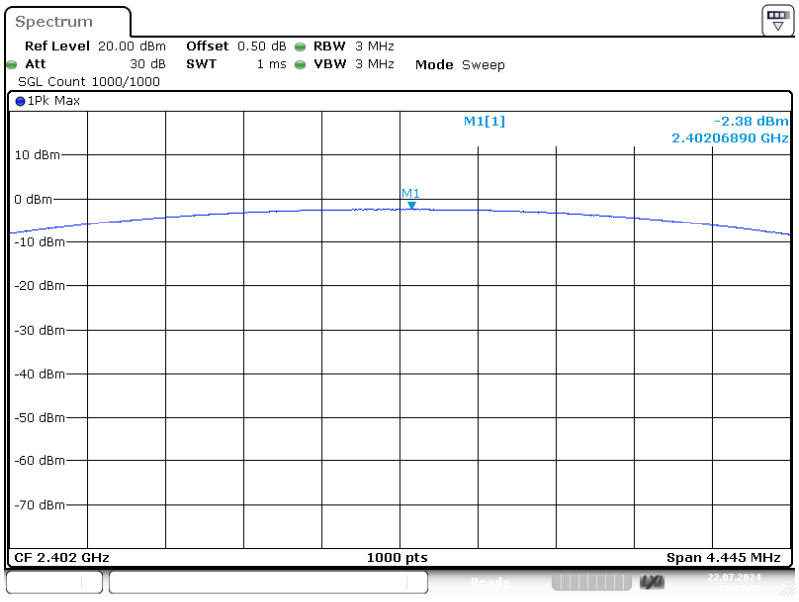
According to ANSI C63.10-2013 Section 7.8.5
This is an RF-conducted test to evaluate maximum peak output power. Use a direct connection between the antenna port of the unlicensed wireless device and the spectrum analyzer, through suitable attenuation, Offset the Insertion loss of the RF cable, DC Block/ Attenuator into the spectrum analyzer.
The hopping shall be disabled for this test:
a) Use the following spectrum analyzer settings:
1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
2) RBW > 20 dB bandwidth of the emission being measured.
3) VBW ⩾ RBW.
4) Sweep: Auto.
5) Detector function: Peak.
6) Trace: Max hold.
b) Allow trace to stabilize.
c) Use the marker-to-peak function to set the marker to the peak of the emission.
d) The indicated level is the peak output power, after any corrections for external attenuators and cables.
e) A plot of the test results and setup description shall be included in the test report.
NOTE—A peak responding power meter may be used, where the power meter and sensor system video bandwidth is greater than the occupied bandwidth of the unlicensed wireless device, rather than a spectrum analyzer.

Test Data

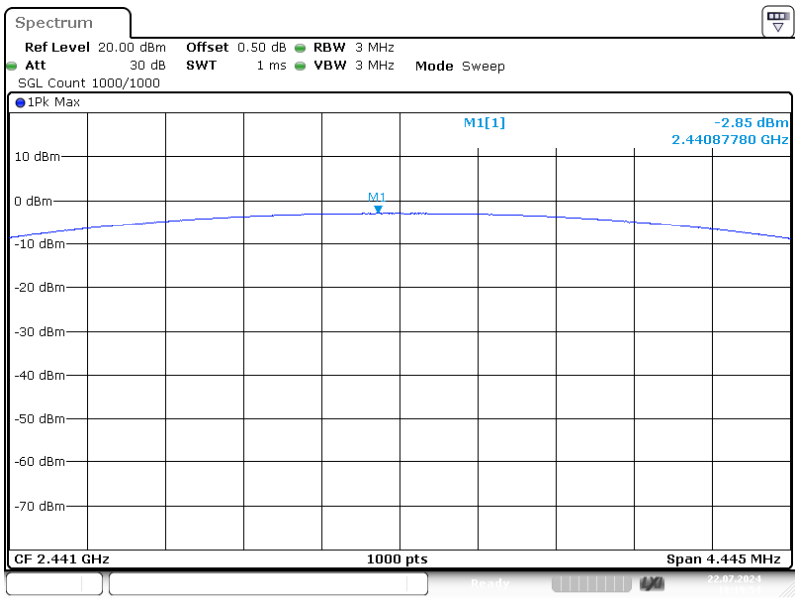
Test Mode:	Transmitting	Test Engineer:	Ash Lin
Test Date:	2024-07-22	Environment:	Temp.: 23.6℃ Humi.: 64% Atm :100.3kPa

Mode	Frequency (MHz)	Peak Conducted Output Power (dBm)	Limit (dBm)
BDR (GFSK)	2402	-2.38	21
	2441	-2.85	21
	2480	-3.08	21
EDR (π/4-DQPSK)	2402	-2.36	21
	2441	-2.84	21
	2480	-3.09	21
EDR (8DPSK)	2402	-2.36	21
	2441	-2.81	21
	2480	-3.07	21

BDR(GFSK): 2402MHz

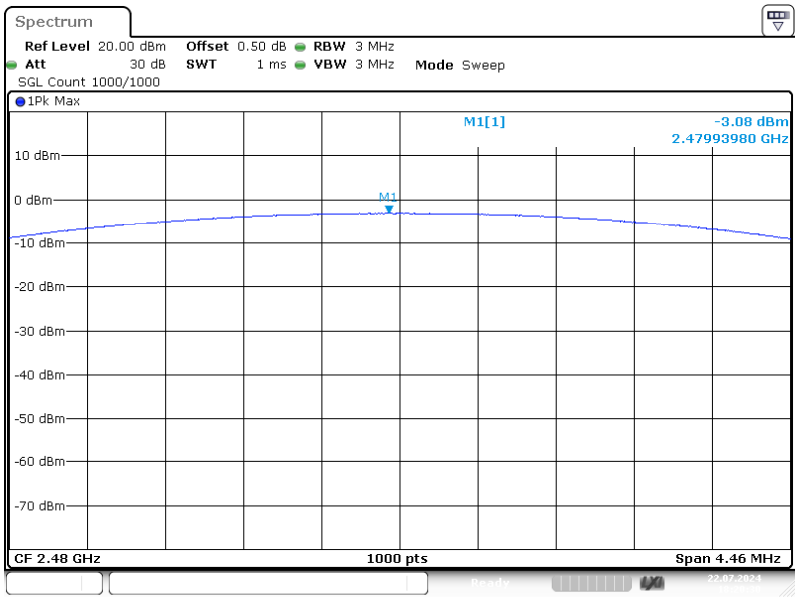


BDR(GFSK): 2441MHz



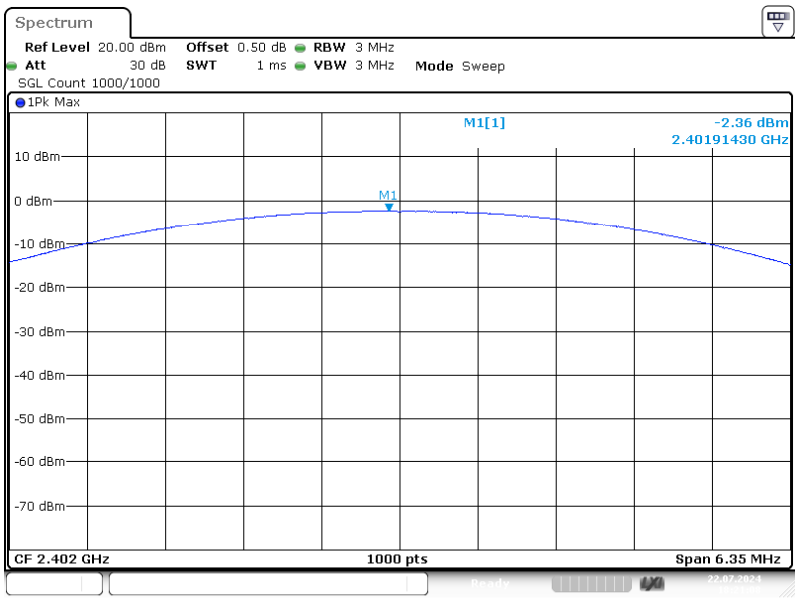
ProjectNo.:2407V34489E-RF Tester:Ash Lin
Date: 22.JUL.2024 18:19:55

BDR(GFSK): 2480MHz



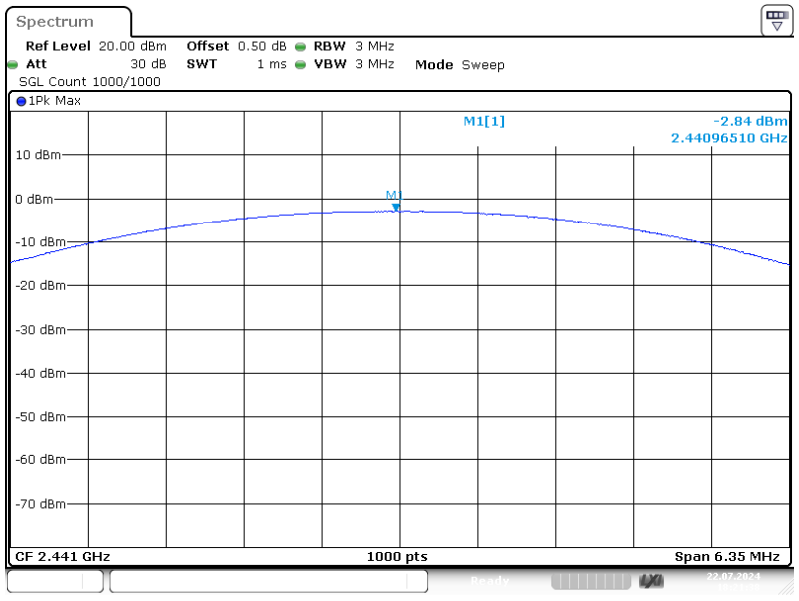
ProjectNo.:2407V34489E-RF Tester:Ash Lin
Date: 22.JUL.2024 18:20:30

EDR(π/4-DQPSK): 2402MHz



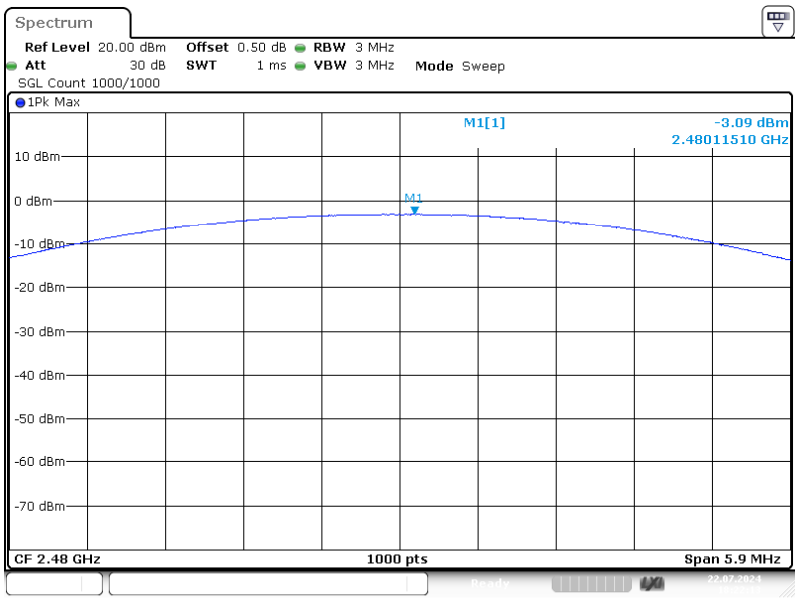
ProjectNo.:2407V34489E-RF Tester:Ash Lin
Date: 22.JUL.2024 18:21:08

EDR(π/4-DQPSK): 2441MHz



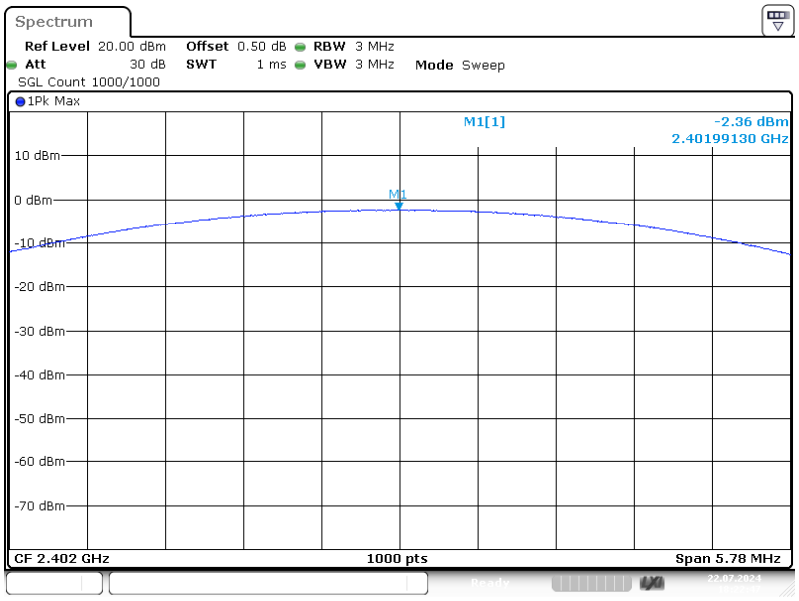
ProjectNo.:2407V34489E-RF Tester:Ash Lin
Date: 22.JUL.2024 18:21:38

EDR(π/4-DQPSK): 2480MHz



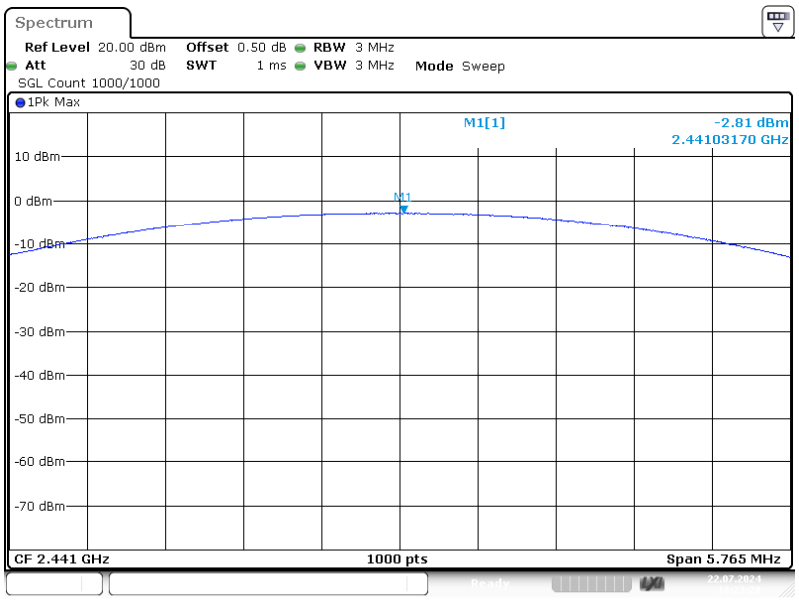
ProjectNo.:2407V34489E-RF Tester:Ash Lin
Date: 22.JUL.2024 18:22:13

EDR(8DPSK): 2402MHz



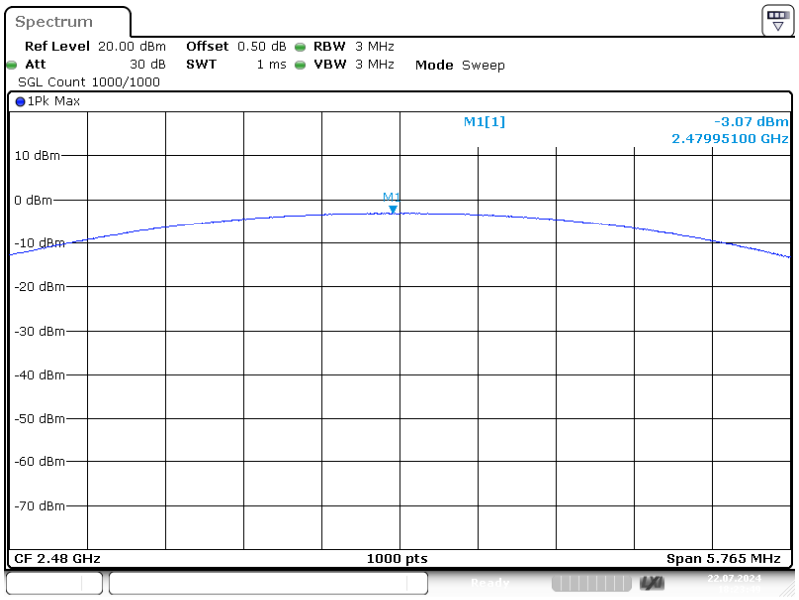
ProjectNo.:2407V34489E-RF Tester:Ash Lin
Date: 22.JUL.2024 18:22:47

EDR(8DPSK): 2441MHz



ProjectNo.:2407V34489E-RF Tester:Ash Lin
Date: 22.JUL.2024 18:23:20

EDR(8DPSK): 2480MHz



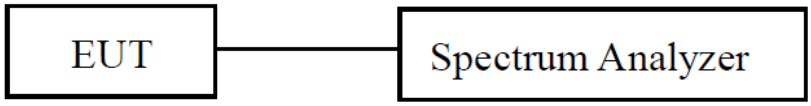
ProjectNo.:2407V34489E-RF Tester:Ash Lin
Date: 22.JUL.2024 18:23:48

FCC §15.247(d) - BAND EDGES TESTING

Applicable Standard

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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, 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) (see §15.205(c)).

EUT Setup



Test Procedure

According to ANSI C63.10-2013 Section 7.8.6
For band-edge measurements, use the band-edge procedure in 6.10. Band-edge measurements shall be tested both on single channels, and with the EUT hopping.
a) Set the center frequency and span to encompass frequency range to be measured.
b) Set the RBW = 100 kHz.
c) Set the VBW ≥ [3 × RBW].
d) Detector = peak.
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the peak marker function to determine the maximum amplitude level.
Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements. Report the three highest emissions relative to the limit.

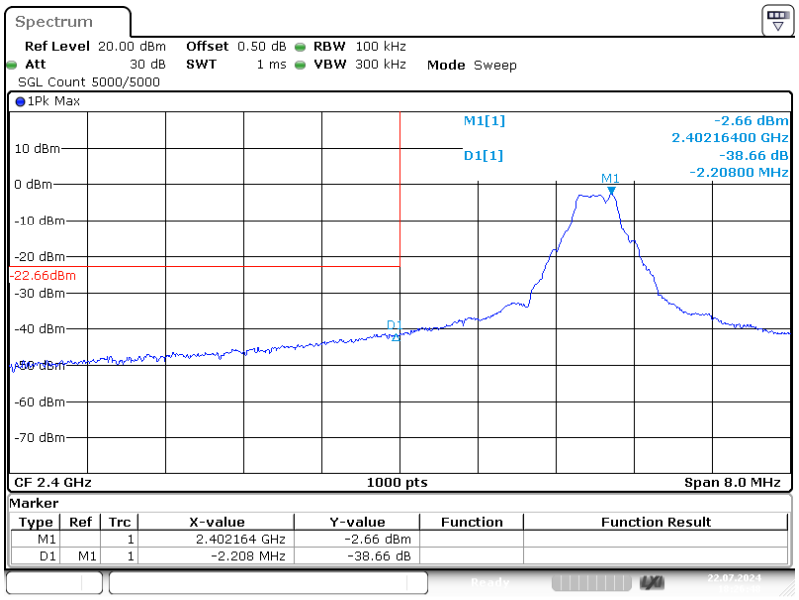
Test Data

Test Mode:	Transmitting	Test Engineer:	Ash Lin
Test Date:	2024-07-22	Environment:	Temp.: 23.6℃ Humi.: 64% Atm :100.3kPa

Please refer to the below plots:

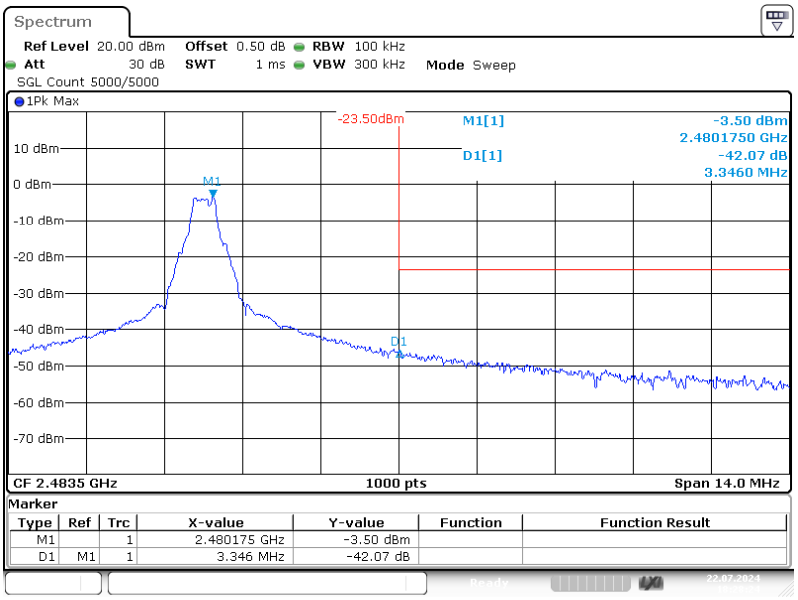
Band Edge

BDR (GFSK): Left Side



ProjectNo.:2407V34489E-RF Tester:Ash Lin
Date: 22.JUL.2024 18:26:47

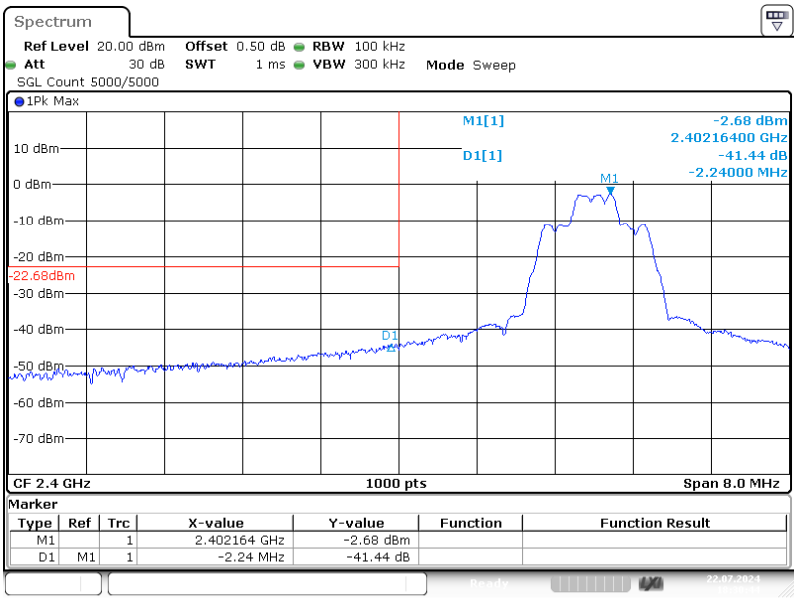
BDR (GFSK): Right Side



ProjectNo.:2407V34489E-RF Tester:Ash Lin

Date: 22.JUL.2024 18:28:23

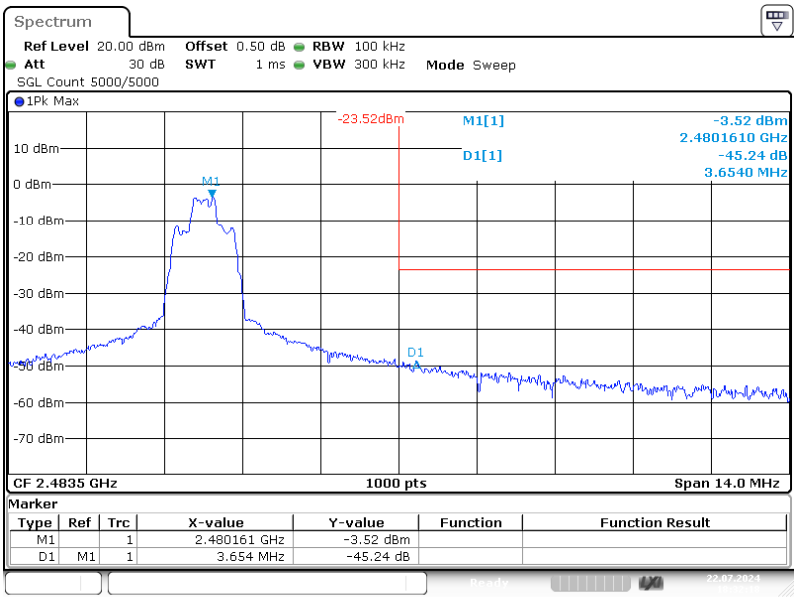
EDR (π /4-DQPSK_): Left Side



ProjectNo.:2407V34489E-RF Tester:Ash Lin

Date: 22.JUL.2024 18:30:44

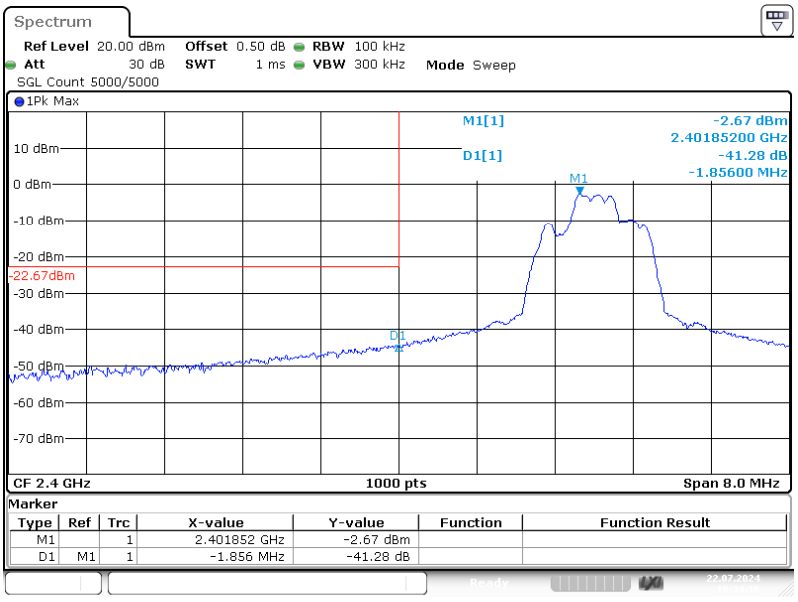
EDR (π/4-DQPSK): Right Side



ProjectNo.:2407V34489E-RF Tester:Ash Lin

Date: 22.JUL.2024 18:32:18

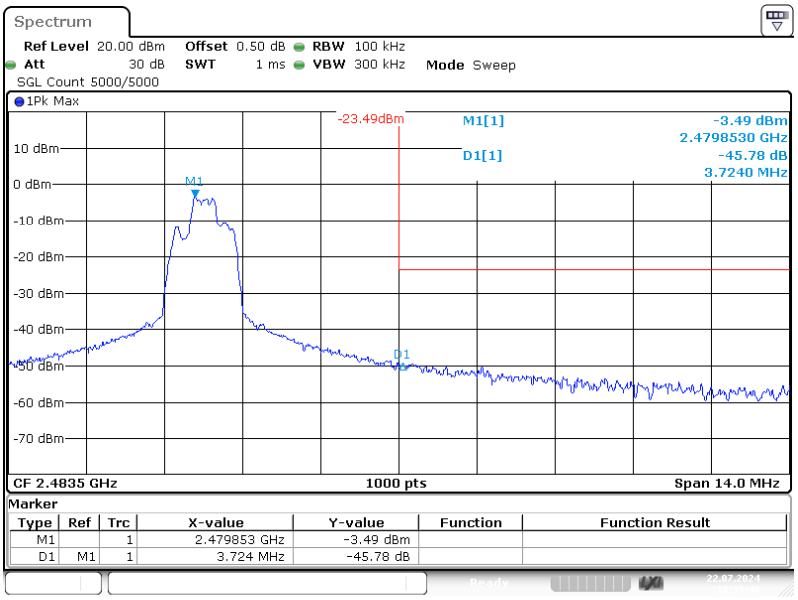
EDR (8DPSK): Left Side



ProjectNo.:2407V34489E-RF Tester:Ash Lin

Date: 22.JUL.2024 18:34:16

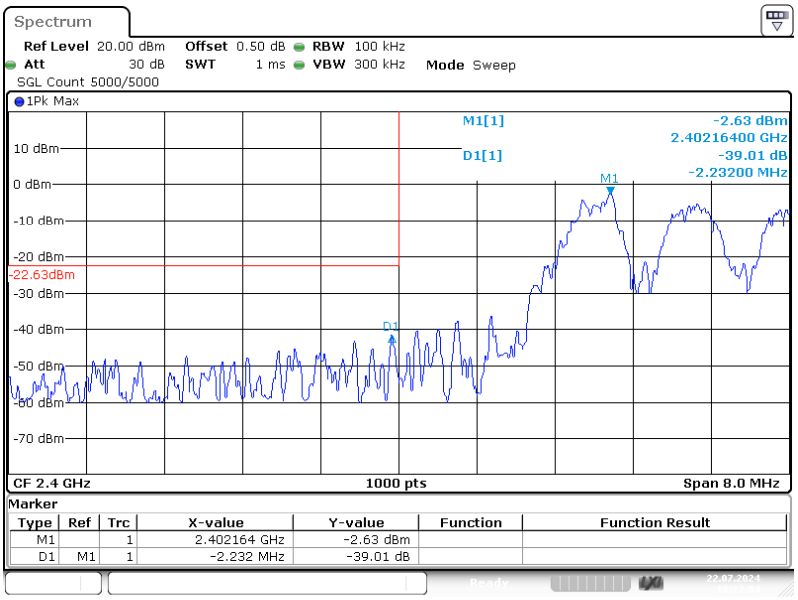
EDR (8DPSK): Right Side



ProjectNo.:2407V34489E-RF Tester:Ash Lin

Date: 22.JUL.2024 18:35:47

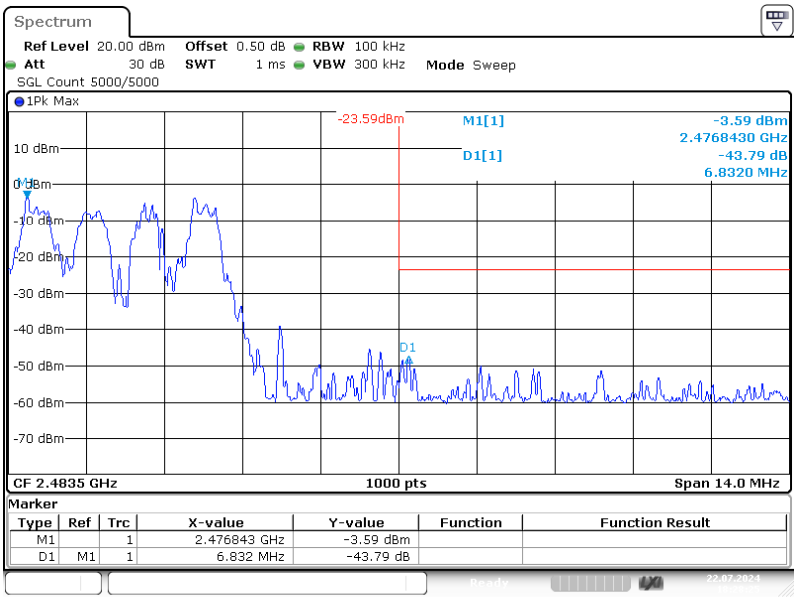
BDR (GFSK): Left Side - Hopping



ProjectNo.:2407V34489E-RF Tester:Ash Lin

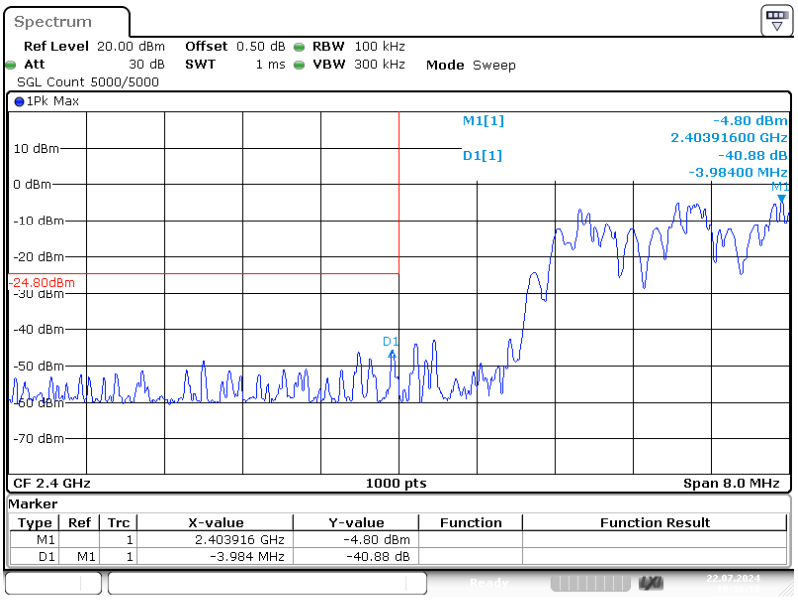
Date: 22.JUL.2024 18:27:03

BDR (GFSK): Right Side - Hopping



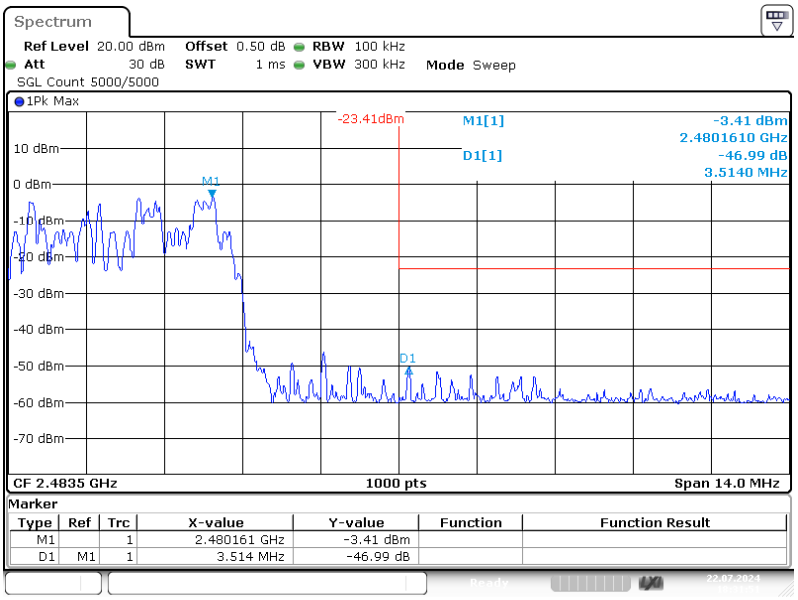
ProjectNo.:2407V34489E-RF Tester:Ash Lin
Date: 22.JUL.2024 18:28:24

EDR (π/4-DQPSK): Left Side - Hopping



ProjectNo.:2407V34489E-RF Tester:Ash Lin
Date: 22.JUL.2024 18:30:18

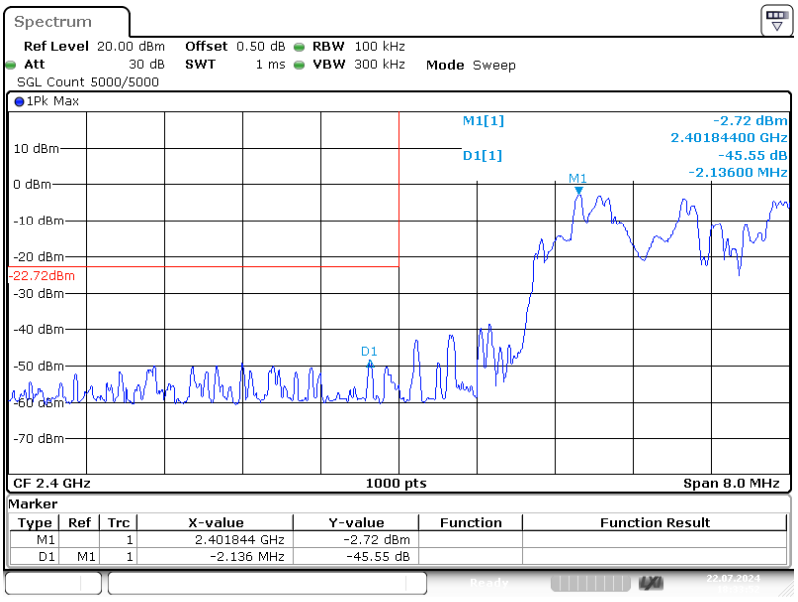
EDR (π/4-DQPSK): Right Side - Hopping



ProjectNo.:2407V34489E-RF Tester:Ash Lin

Date: 22.JUL.2024 18:31:51

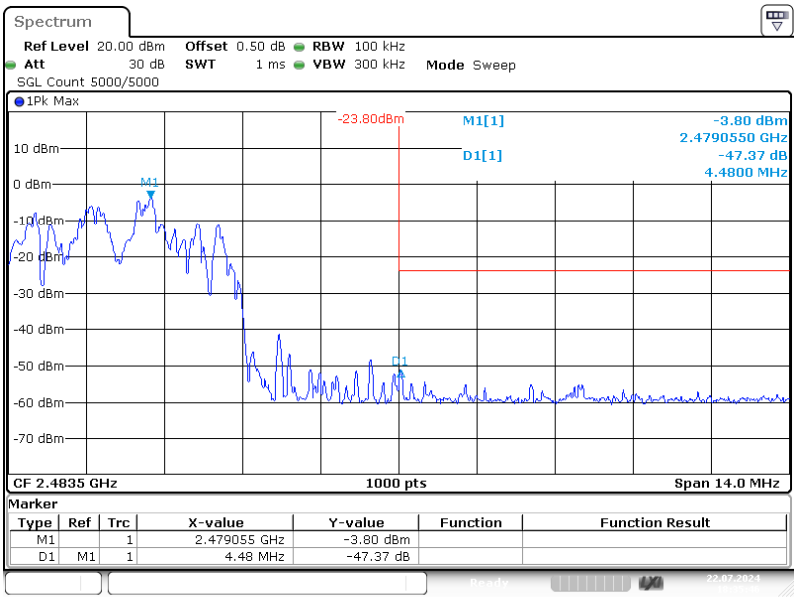
EDR (8DPSK): Left Side - Hopping



ProjectNo.:2407V34489E-RF Tester:Ash Lin

Date: 22.JUL.2024 18:33:52

EDR (8DPSK): Right Side - Hopping



ProjectNo.:2407V34489E-RF Tester:Ash Lin

Date: 22.JUL.2024 18:35:46

EUT PHOTOGRAPHS

Please refer to the attachment 2407V34489E-RF-EXP EUT EXTERNAL PHOTOGRAPHS and 2407V34489E-RF-INP EUT INTERNAL PHOTOGRAPHS.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment 2407V34489E-RF-TSP TEST SETUP PHOTOGRAPHS.

Declarations

1. Bay Area Compliance Laboratories Corp. (Xiamen) is not responsible for authenticity of any information provided by the applicant. Information from the applicant that may affect test results are marked with an asterisk "★".

2. Unless otherwise stated, the results shown in this test report refer only to the sample(s) tested.

3. Unless required by the rule provided by the applicant or product regulations, then decision rule in this report did not consider the uncertainty.

4. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor k=2 with the 95.45% confidence interval.

5. This report cannot be reproduced except in full, without prior written approval of Bay Area Compliance Laboratories Corp. (Xiamen).

6. This report is valid only with a valid digital signature. The digital signature may be available only under the adobe software above version 7.0.

******* END OF REPORT *******