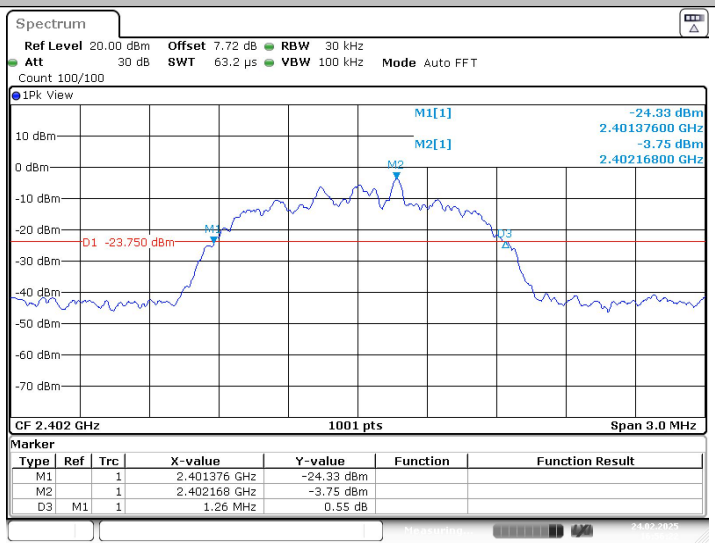
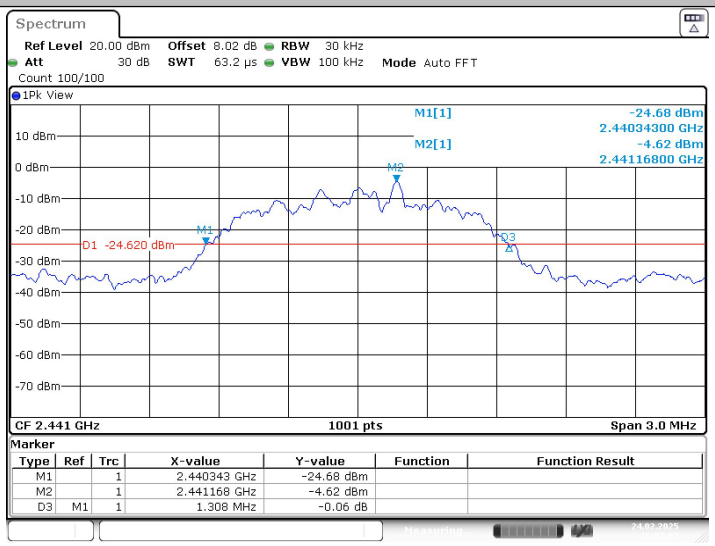
2DH5_Ant1_2402MHz



Date: 24.FEB.2025 16:56:23

2DH5_Ant1_2441MHz



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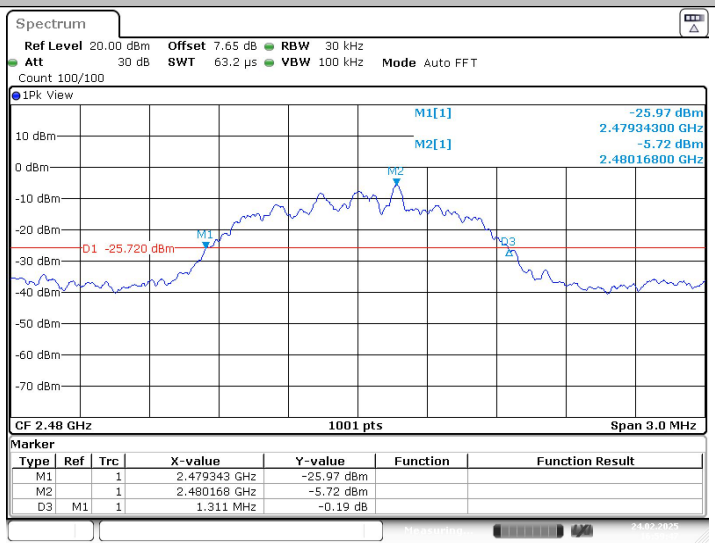
2DH5_Ant1_2480MHz



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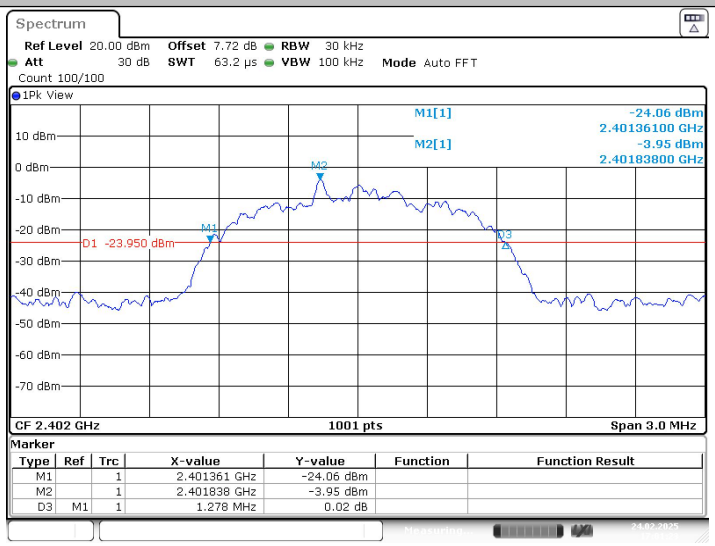
3DH5_Ant1_2402MHz



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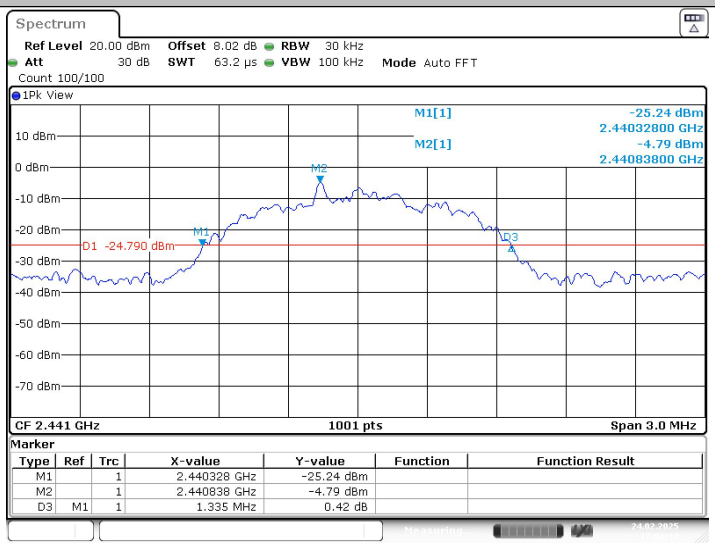
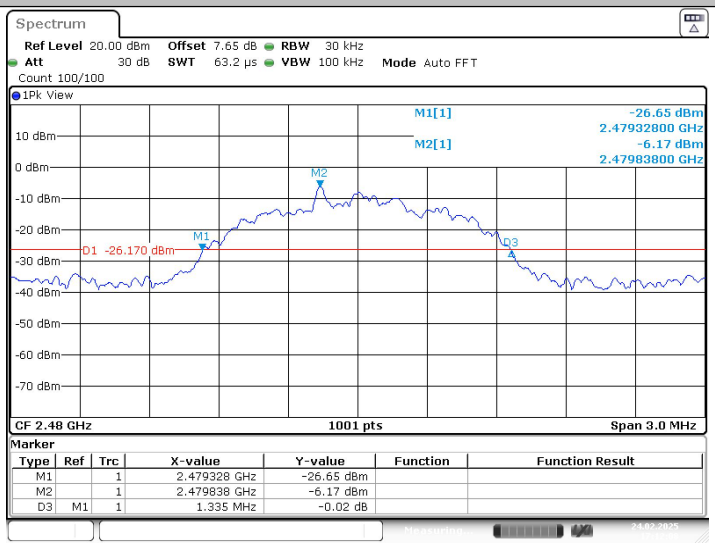
3DH5_Ant1_2441MHz



3DH5_Ant1_2480MHz



7.3. Output Power Measurement

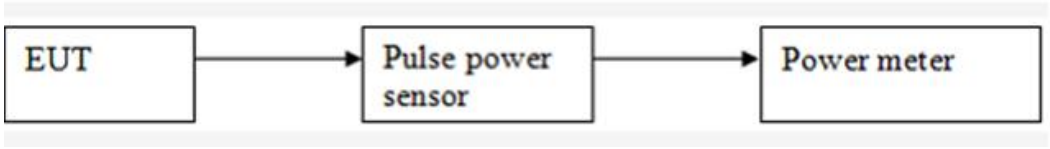
7.3.1. Test Limit

The maximum out power permissible output power is 1 Watt 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. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.And for antenna gain greater than 6dBi the limit shall reduce by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

7.3.2. Test Setting

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the power meter and enable the EUT transmit continuously.
2. Keep the EUT in transmitting at lowest, middle and highest channel individually. Record the max value.

7.3.3. Test Setup



7.3.4. Test Result

DH5

Test Channel	Fundamental Frequency (GHz)	Max Output Power(dBm)	Limit (dBm)	Peak/ Average	Pass/Fail
Lowest	2.402	-2.08	20.97	Peak	Pass
Middle	2.441	-2.92			Pass
Highest	2.480	-4.21			Pass

2DH5

Test Channel	Fundamental Frequency (GHz)	Max Output Power(dBm)	Limit (dBm)	Peak/ Average	Pass/Fail
Lowest	2.402	-0.83	20.97	Peak	Pass
Middle	2.441	-2.04			Pass
Highest	2.480	-3.13			Pass

3DH5

Test Channel	Fundamental Frequency (GHz)	Max Output Power(dBm)	Limit (dBm)	Peak/ Average	Pass/Fail
Lowest	2.402	-0.62	20.97	Peak	Pass
Middle	2.441	-1.96			Pass
Highest	2.480	-3.06			Pass

7.4. Carrier Frequency Separation Measurement

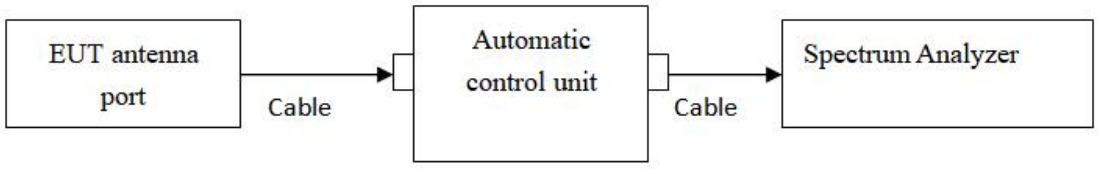
7.4.1. Test Limit

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.

7.4.2. Test Setting

1) Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2) Set center frequency of spectrum analyzer = middle of hopping channel.
3) Set the spectrum analyzer as RBW=100kHz, VBW=300kHz, Adjust Span to 2MHz, Sweep = auto
4) Use the marker-delta function to mark hopping channel carrier frequencies and record the channel separation.

7.4.3. Test Setup



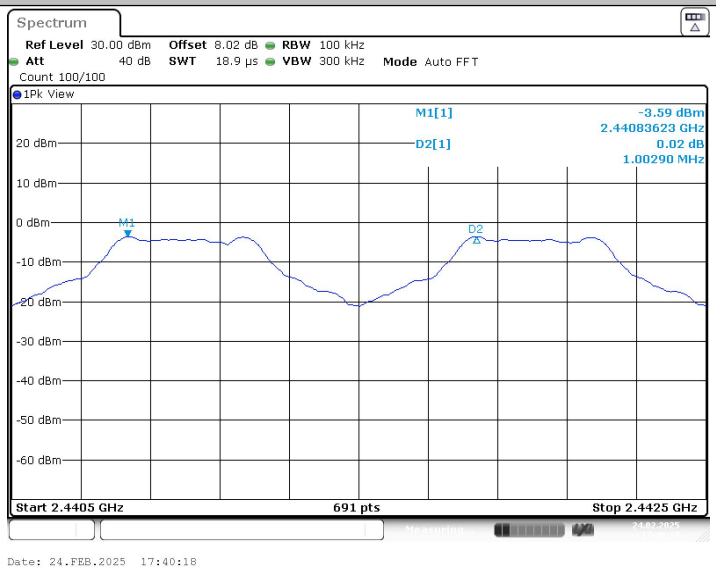
7.4.4. Test Result

Test Mode	Antenna	Freq[MHz]	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Hop	1.003	≥0.640	PASS
2DH5	Ant1	Hop	1.000	≥0.873	PASS
3DH5	Ant1	Hop	1.000	≥0.893	PASS

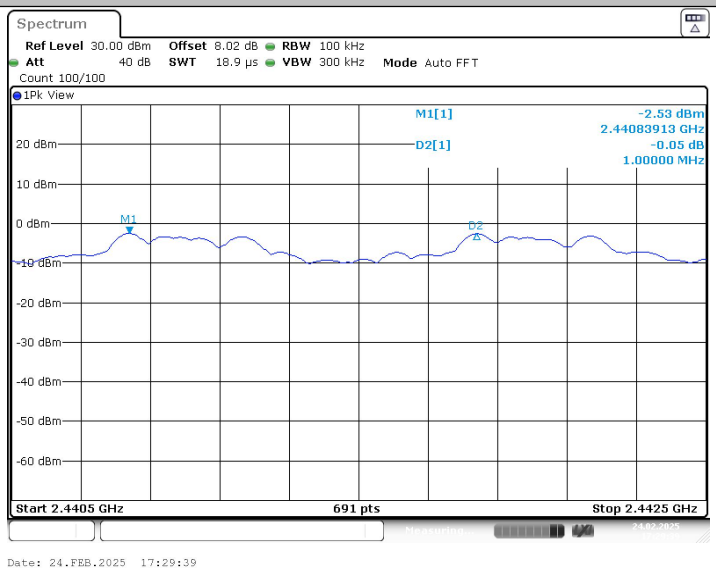
NOTE: Limit[MHz]= 20 dB Bandwidth [MHz]*2/3.

Test Graphs

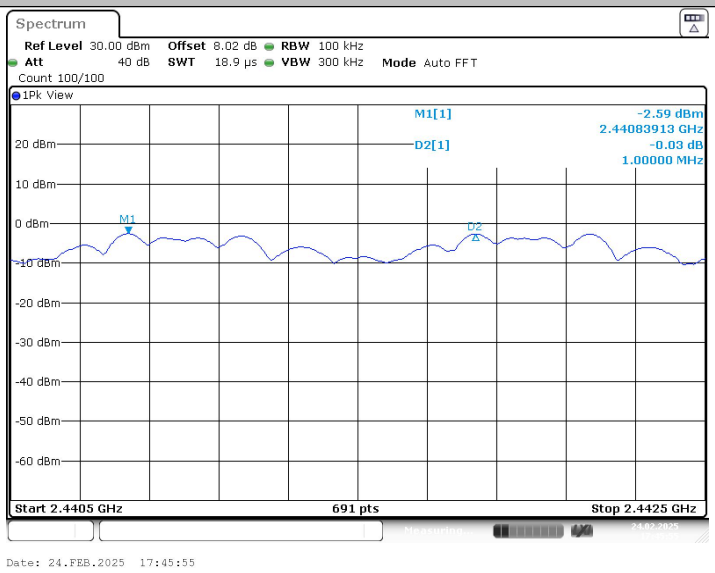
DH5_Ant1_Hop



2DH5_Ant1_Hop



3DH5_Ant1_Hop



7.5. Number of Hopping Channels Measurement

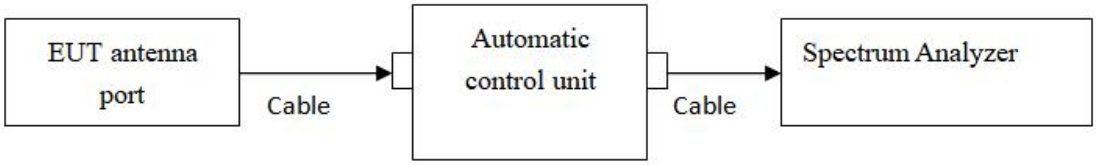
7.5.1. Test Limit

Regulation 15.247 (a) (1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

7.5.2. Test Settitng

1) Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2) Set the spectrum analyzer as RBW=100kHz, VBW=300kHz. Set the spectrum analyzer: start frequency = 2400MHz. stop frequency = 2483.5MHz. Submit the test result graph.

7.5.3. Test Setup

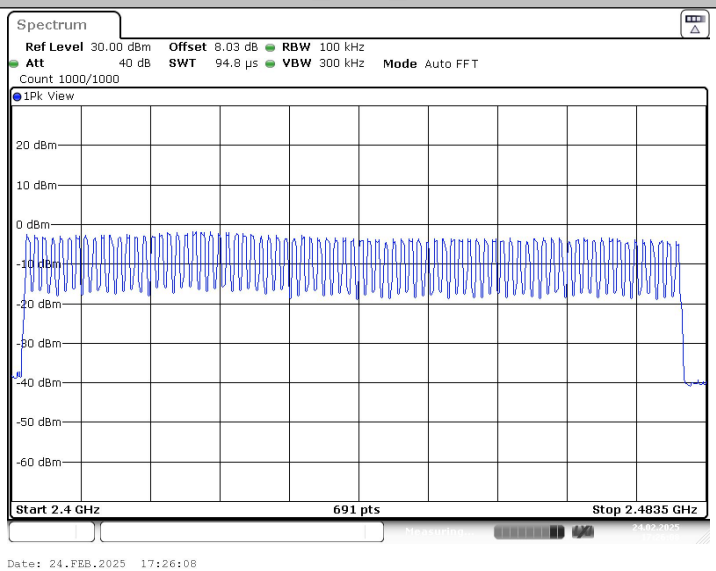


7.5.4. Test Result

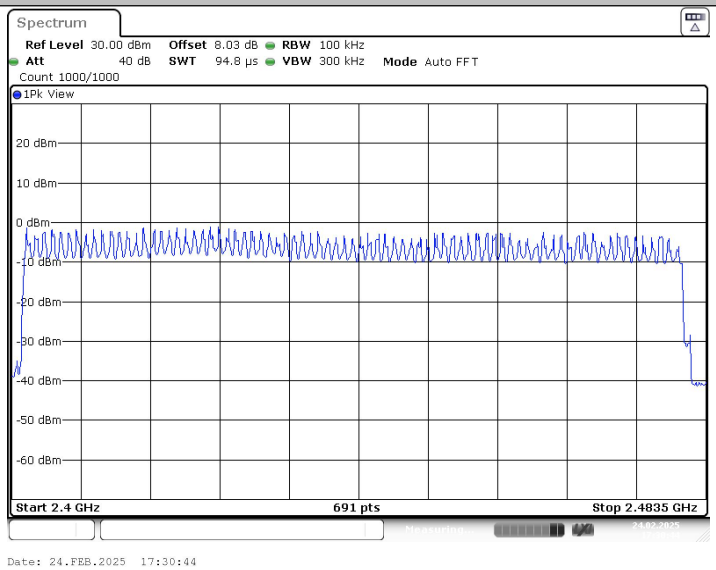
Test Mode	Antenna	Channel	Result[Num]	Limit[Num]	Verdict
DH5	Ant1	Hop	79	>=15	PASS
2DH5	Ant1	Hop	79	>=15	PASS
3DH5	Ant1	Hop	79	>=15	PASS

Test Graphs

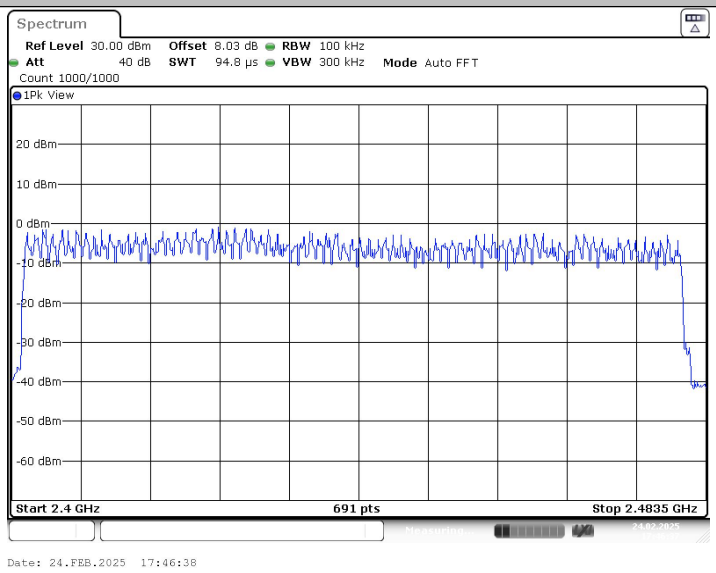
DH5_Ant1_Hop



2DH5_Ant1_Hop



3DH5_Ant1_Hop



7.6. Time of Occupancy Measurement

7.6.1. Test Limit

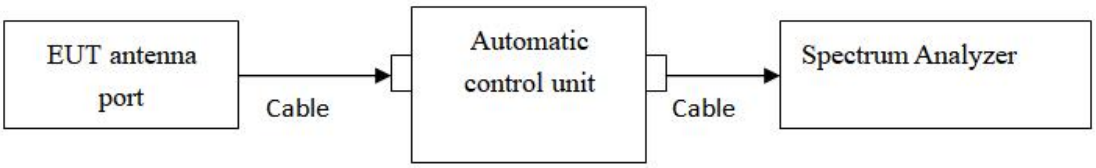
Regulation 15.247(a)(1)(iii) Frequency hopping systems in the 2400-2483.5MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

7.6.2. Test Setting

1) Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

1) Set spectrum analyzer span = 0. centered on a hopping channel;
2) Set RBW = 1MHz and VBW = 3MHz.Sweep = as necessary to capture the entire dwell time per hopping channel. Detector Function = Peak. Trace = Clear Write;
3) Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g.. data rate. modulation format. etc.). Repeat this test for each variation.
4) DH1 Packet permit maximum 1600 / 79 /2 = 10.12 hops per second in each channel (1 time slot TX, 1 time slot RX). So the dwell time is the time duration of the pulse times10.12 x 31.6 = 320 within 31.6 seconds
5) DH3 Packet permit maximum 1600 / 79 / 4= 5.06 hops per second in each channel (3 time slotsTX, 1 time slot RX). So the dwell time is the time duration of the pulse times5.06 x 31.6 = 160 within 31.6 seconds
6) DH5 Packet permit maximum 1600/ 79 / 6 = 3.37 hops per second in each channel (5 time slotsTX, 1 time slot RX). So the dwell time is the time duration of the pulse times 3.37 x 31.6 =106.6 within 31.6 seconds

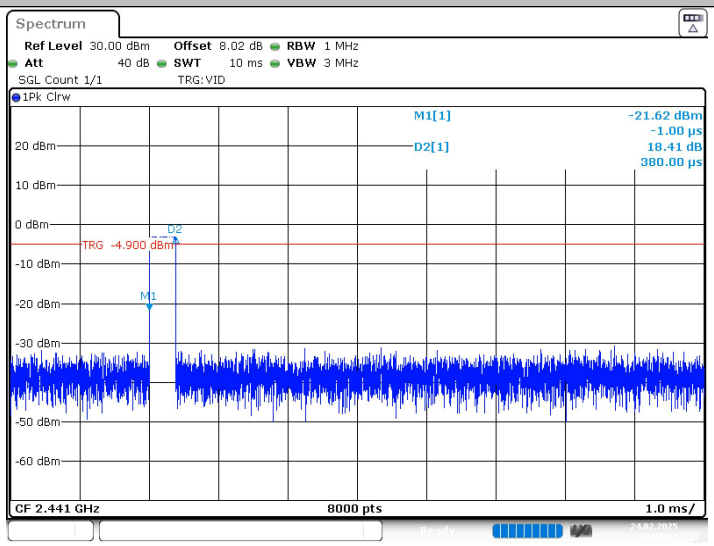
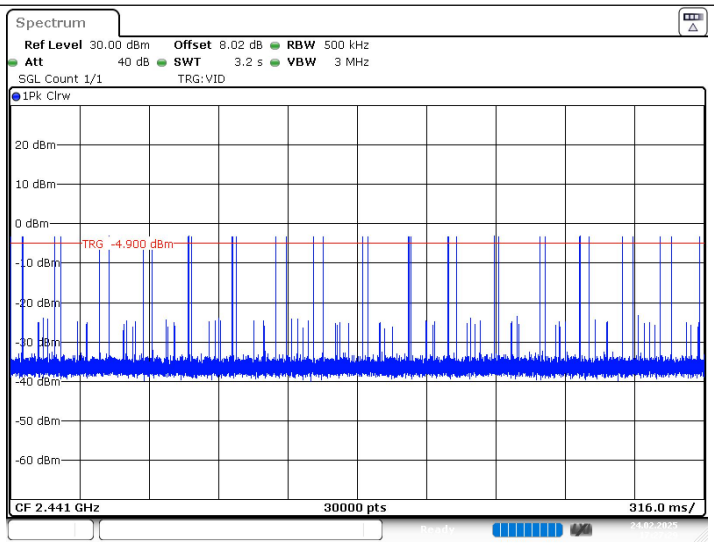
7.6.3. Test Setup

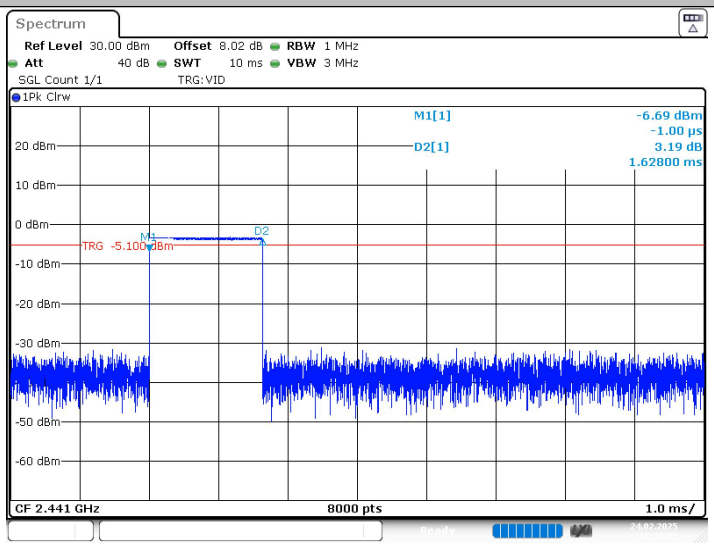
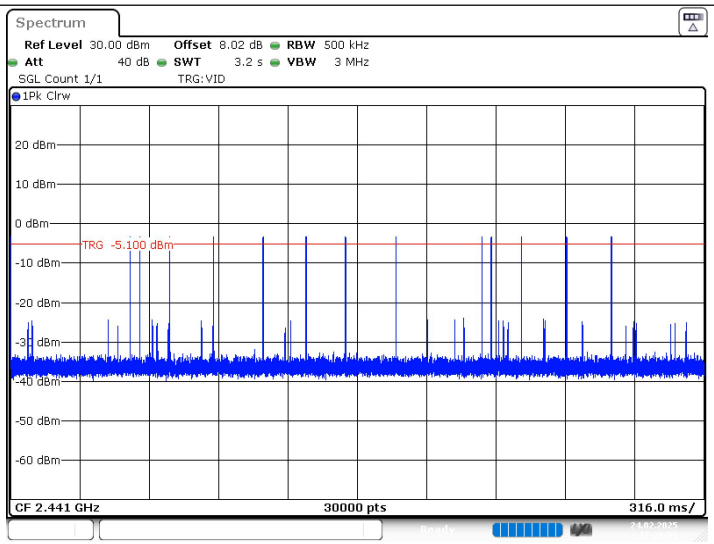


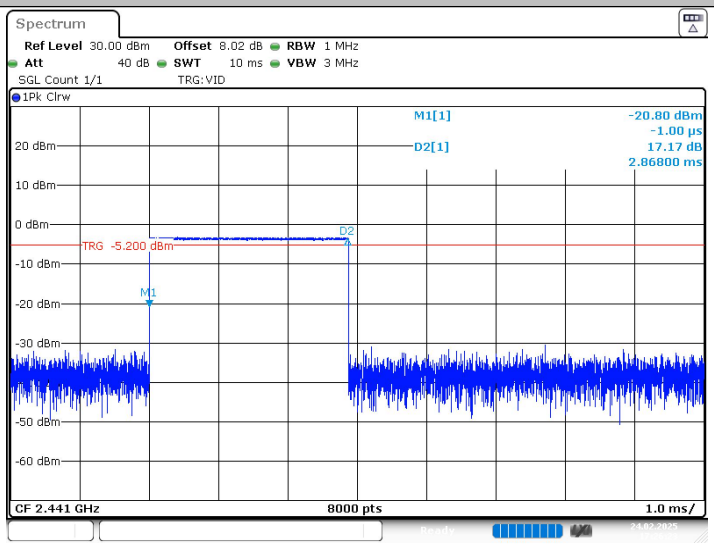
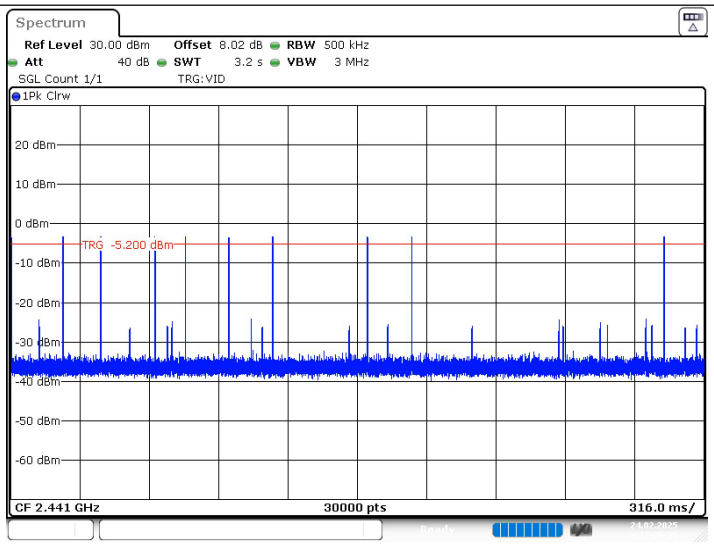
7.6.4. Test Result

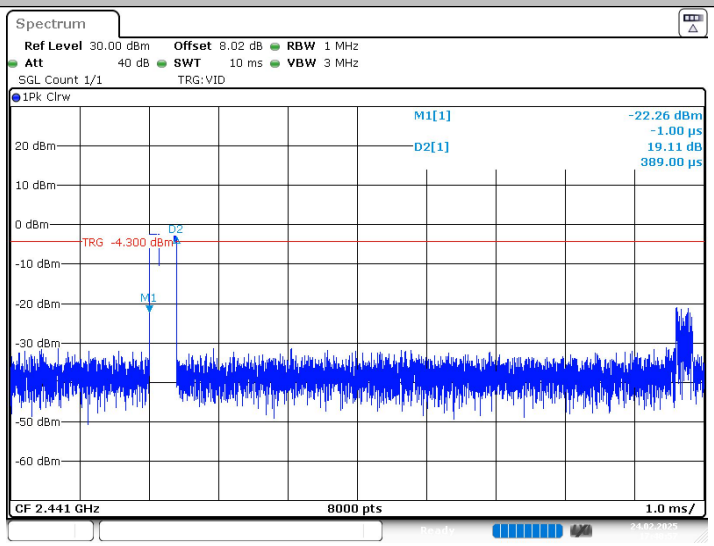
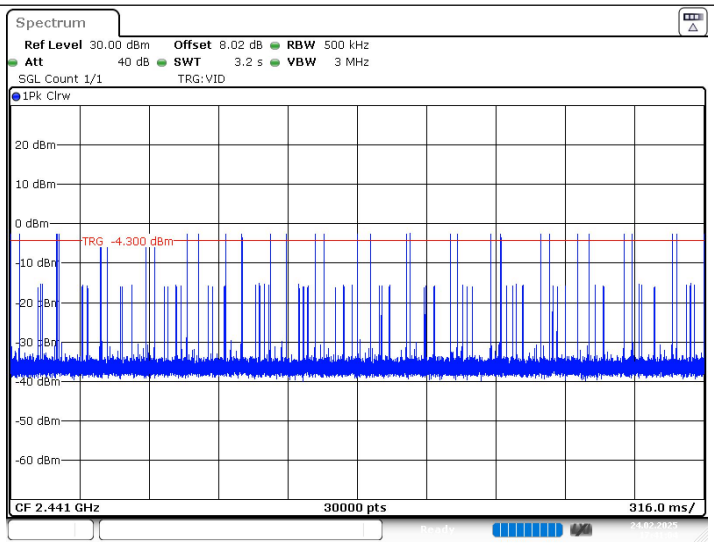
Test Mode	Antenna	Channel	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH1	Ant1	Hop	0.380	330	0.125	<=0.4	PASS
DH3	Ant1	Hop	1.628	140	0.228	<=0.4	PASS
DH5	Ant1	Hop	2.868	100	0.287	<=0.4	PASS
2DH1	Ant1	Hop	0.389	320	0.124	<=0.4	PASS
2DH3	Ant1	Hop	1.634	140	0.229	<=0.4	PASS
2DH5	Ant1	Hop	2.873	90	0.259	<=0.4	PASS
3DH1	Ant1	Hop	0.388	320	0.124	<=0.4	PASS
3DH3	Ant1	Hop	1.631	140	0.228	<=0.4	PASS
3DH5	Ant1	Hop	2.874	100	0.287	<=0.4	PASS

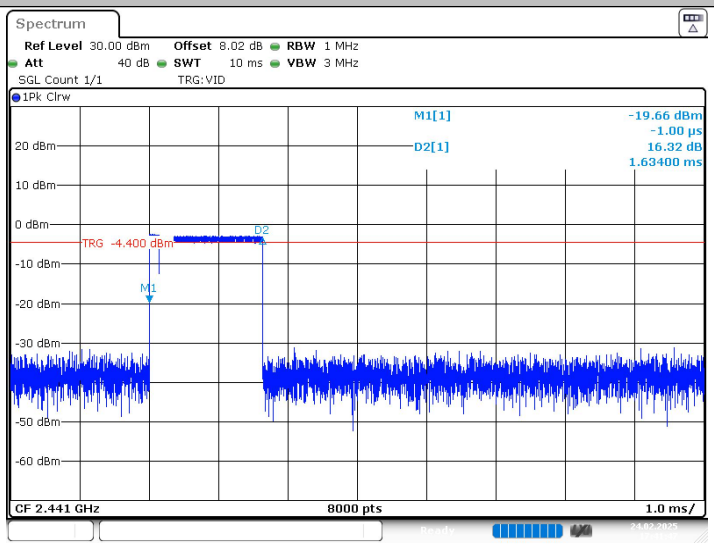
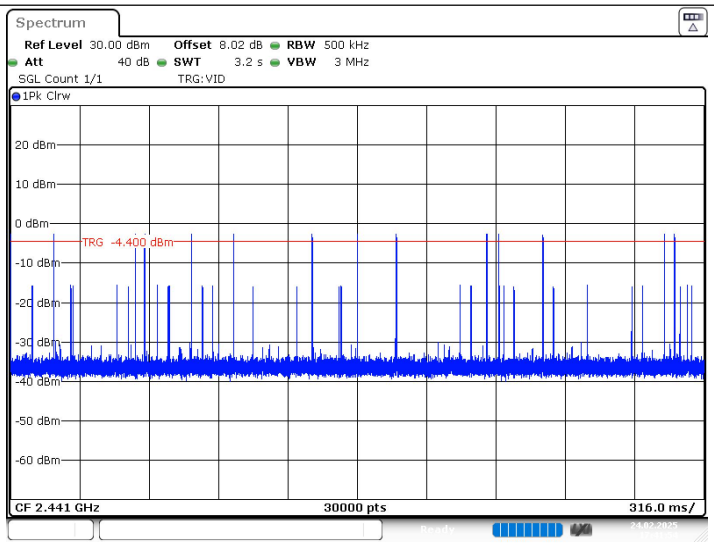
Test Graphs

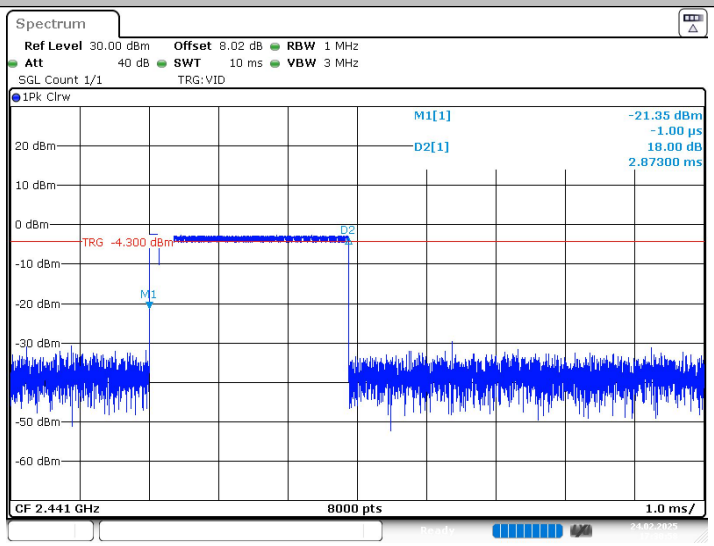
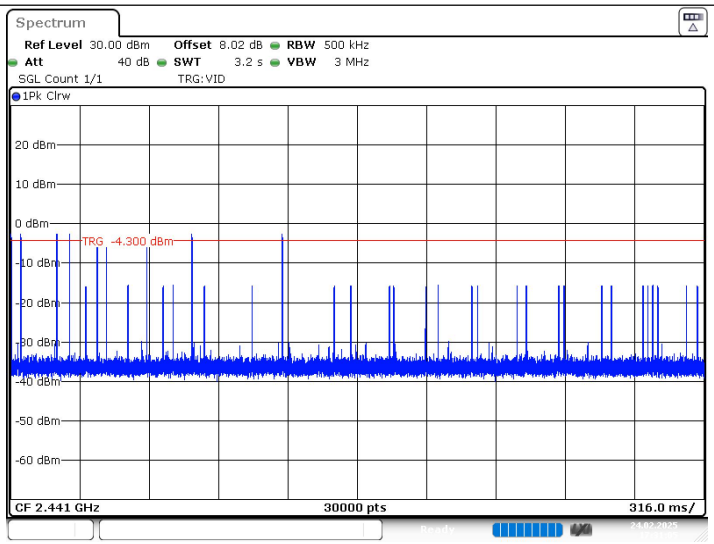
DH1_Ant1_Hop



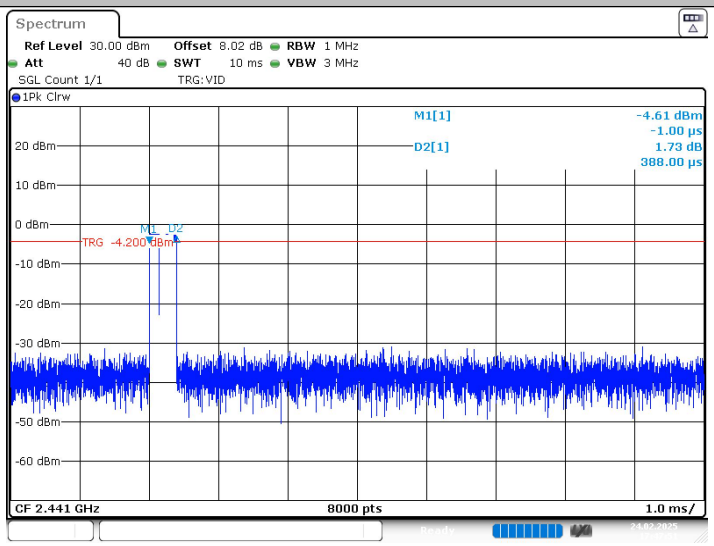
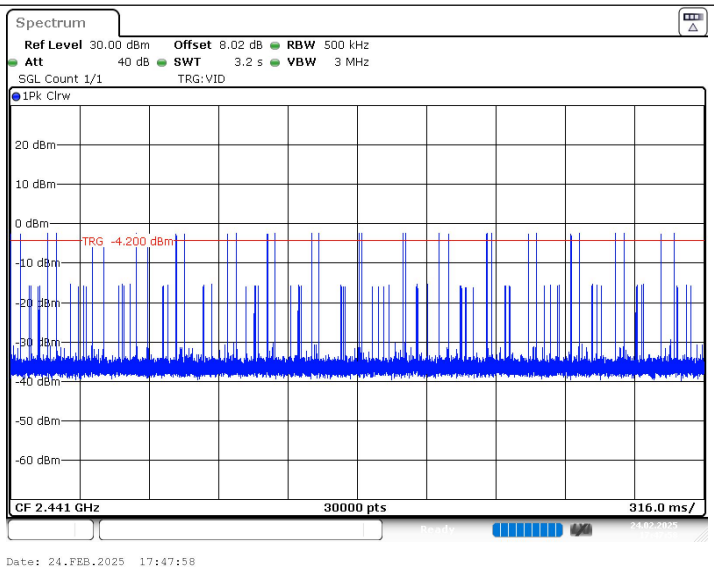
DH3_Ant1_Hop
 Spectrum Ref Level 30.00 dBm Offset 8.02 dB RBW 1 MHz Att 40 dB SWT 10 ms VBW 3 MHz SGL Count 1/1 TRG:VID 1Pk Clrw M1[1] -6.69 dBm -1.00 µs D2[1] 3.19 dB 1.62800 ms 20 dBm 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -50 dBm -60 dBm M1 D2 TRG -5.100 dBm CF 2.441 GHz 8000 pts 1.0 ms/ Date: 24.FEB.2025 17:28:03
 Spectrum Ref Level 30.00 dBm Offset 8.02 dB RBW 500 kHz Att 40 dB SWT 3.2 s VBW 3 MHz SGL Count 1/1 TRG:VID 1Pk Clrw 20 dBm 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm TRG -5.100 dBm CF 2.441 GHz 30000 pts 316.0 ms/ Date: 24.FEB.2025 17:28:10

DH5_Ant1_Hop
 Spectrum Ref Level 30.00 dBm Offset 8.02 dB RBW 1 MHz Att 40 dB SWT 10 ms VBW 3 MHz SGL Count 1/1 TRG:VID 1Pk Clrw M1[1] -20.80 dBm -1.00 µs D2[1] 17.17 dB 2.86800 ms 20 dBm 10 dBm 0 dBm TRG -5.200 dBm D2 -10 dBm M1 -20 dBm -30 dBm -50 dBm -60 dBm CF 2.441 GHz 8000 pts 1.0 ms/ Date: 24.FEB.2025 17:26:23
 Spectrum Ref Level 30.00 dBm Offset 8.02 dB RBW 500 kHz Att 40 dB SWT 3.2 s VBW 3 MHz SGL Count 1/1 TRG:VID 1Pk Clrw 20 dBm 10 dBm 0 dBm TRG -5.200 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm CF 2.441 GHz 30000 pts 316.0 ms/ Date: 24.FEB.2025 17:26:30

2DH1_Ant1_Hop



2DH3_Ant1_Hop



2DH5_Ant1_Hop



3DH1_Ant1_Hop



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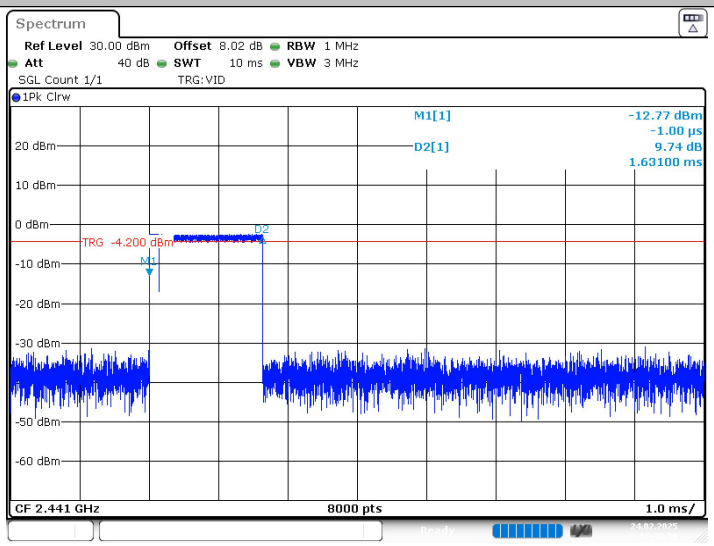
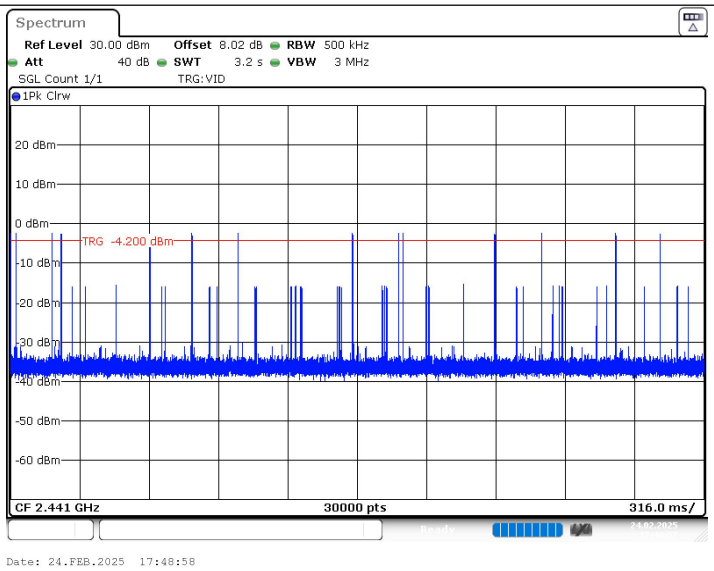
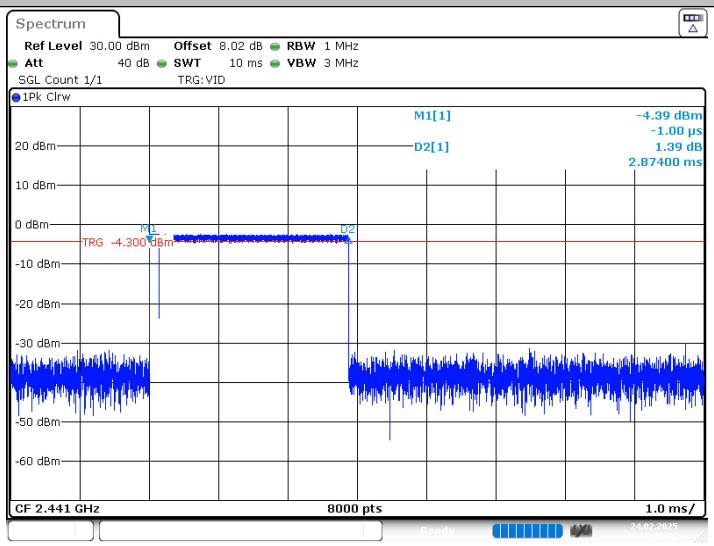
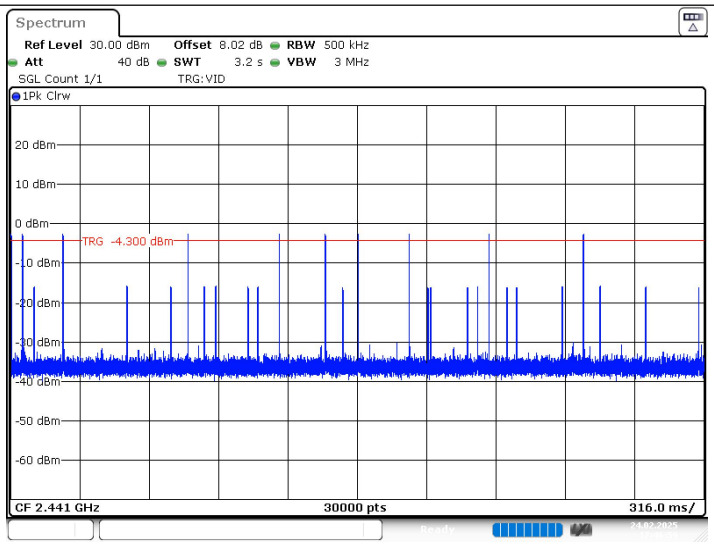



3DH5_Ant1_Hop



7.7. Band-edge Compliance & Conducted Spurious Emissions Measurement

7.7.1. Test Limit

In any 100kHz 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 20dB below that in the 100kHz 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 30dB instead of 20dB.

7.7.2. Test Setting

Test procedures follow KDB 558074 D01 DTS Measurement Guidance v05r02.

1) Remove the antenna from the EUT and then connect a low attenuation cable from the antenna port to the spectrum.
2) Set the spectrum analyzer: RBW =100kHz; VBW =300kHz, Frequency range = 30MHz to 26.5GHz; Sweep = auto; Detector Function = Peak. Trace = Max, hold.
3) Measure and record the results in the test report.
4) The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

7.7.3. Test Setup