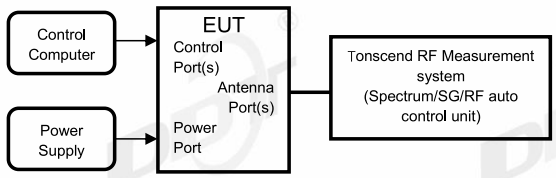
8. Dwell Time

8.1. Block diagram of test setup



8.2. Limits

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.

8.3. Test procedure

(1) The test according to ANSI C63.10-2013 clause 7.8.4.
(2) Connect EUT's antenna output to spectrum analyzer by RF cable, the path loss was compensated to the results.
(3) Set the EUT as maximum power setting and enable the EUT transmit continuously.
(4) Use the following spectrum analyzer settings for the maximum peak output power measurement:

RBW:	≤ channel spacing and where possible RBW should be set >>1 / T
VBW:	VBW ≥ RBW.
Span:	Zero span, centered on a hopping channel.
Detector Mode:	Peak
Sweep time:	Auto
Trace mode:	Clear Write.

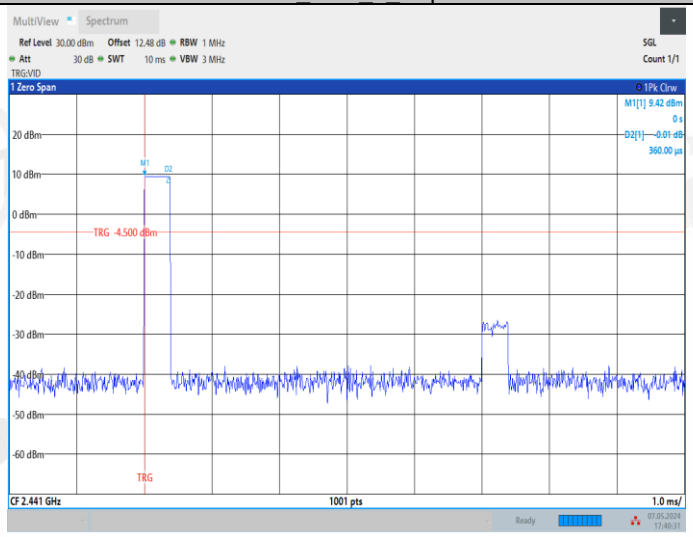
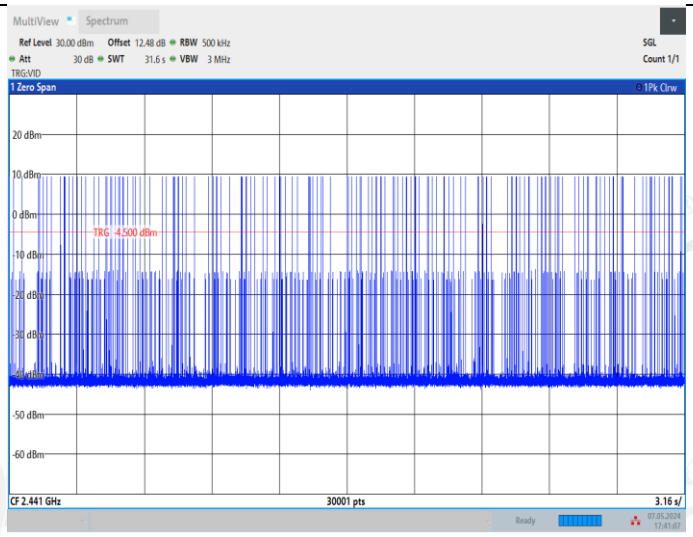
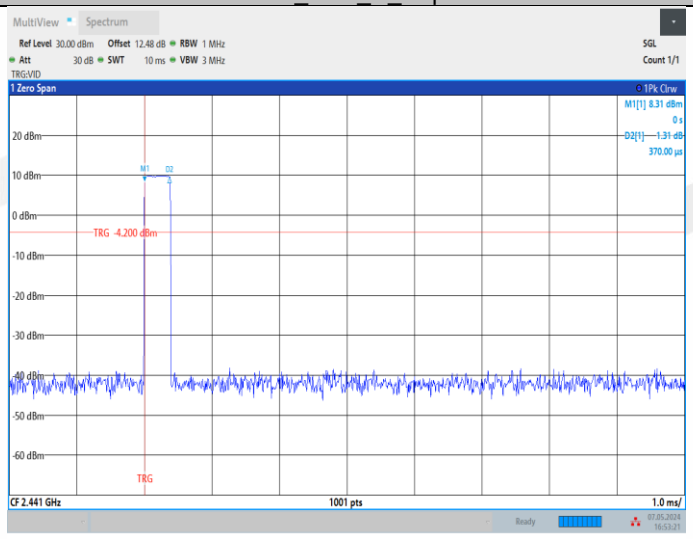
(5) The test period: T= 0.4 Second/Channel x 79 Channel = 31.6 s
(6) Measure the hopping number and on time of each pulse with spectrum analyzer in zero span set, and calculate dwell time with formula Dwell time = total hops *pulse's on time.
(7) Measure and record the results in the report.

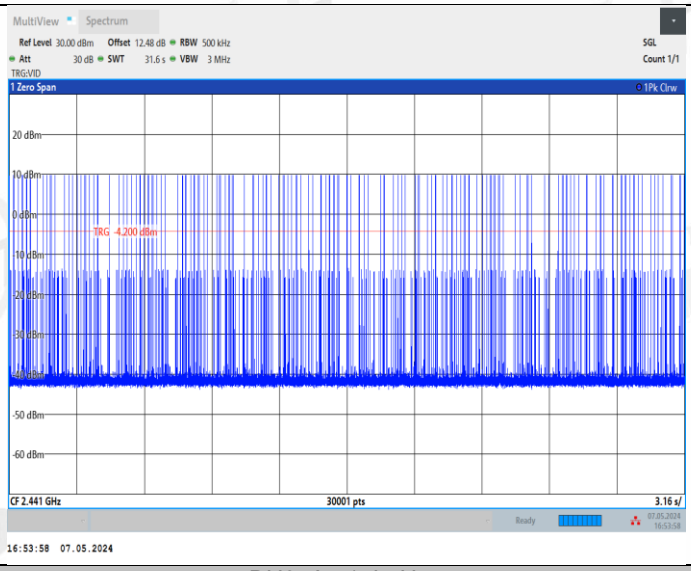
8.4. Test result

Test Engineer:	Haofeng	Test Site:	RF Measurement System 4#
Ambient Condition:	23.6℃,56.2%RH	Test Date:	2024.05.07
Test Power Supply:	Battery	Sample Number:	S24031401-001

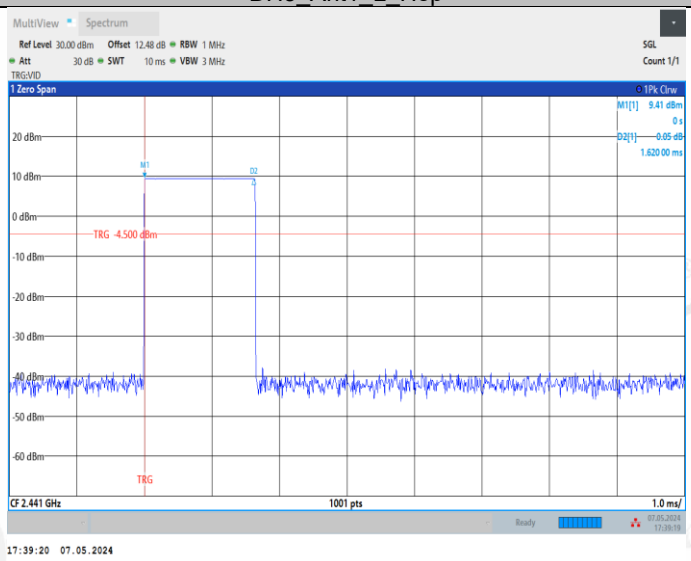
Test Mode	Antenna	Frequency [MHz]	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH1	Ant1_L	Hop	0.360	151	0.054	≤0.4	PASS
	Ant2_R	Hop	0.370	170	0.063	≤0.4	PASS
DH3	Ant1_L	Hop	1.620	101	0.164	≤0.4	PASS
	Ant2_R	Hop	1.620	111	0.18	≤0.4	PASS
DH5	Ant1_L	Hop	2.870	82	0.235	≤0.4	PASS
	Ant2_R	Hop	2.870	95	0.273	≤0.4	PASS
2DH1	Ant1_L	Hop	0.370	149	0.055	≤0.4	PASS
	Ant2_R	Hop	0.380	169	0.064	≤0.4	PASS
2DH3	Ant1_L	Hop	1.630	109	0.178	≤0.4	PASS
	Ant2_R	Hop	1.630	113	0.184	≤0.4	PASS
2DH5	Ant1_L	Hop	2.870	76	0.218	≤0.4	PASS
	Ant2_R	Hop	2.880	76	0.219	≤0.4	PASS
3DH1	Ant1_L	Hop	0.380	171	0.065	≤0.4	PASS
	Ant2_R	Hop	0.380	171	0.065	≤0.4	PASS
3DH3	Ant1_L	Hop	1.630	112	0.183	≤0.4	PASS
	Ant2_R	Hop	1.630	100	0.163	≤0.4	PASS
3DH5	Ant1_L	Hop	2.880	82	0.236	≤0.4	PASS
	Ant2_R	Hop	2.870	82	0.235	≤0.4	PASS

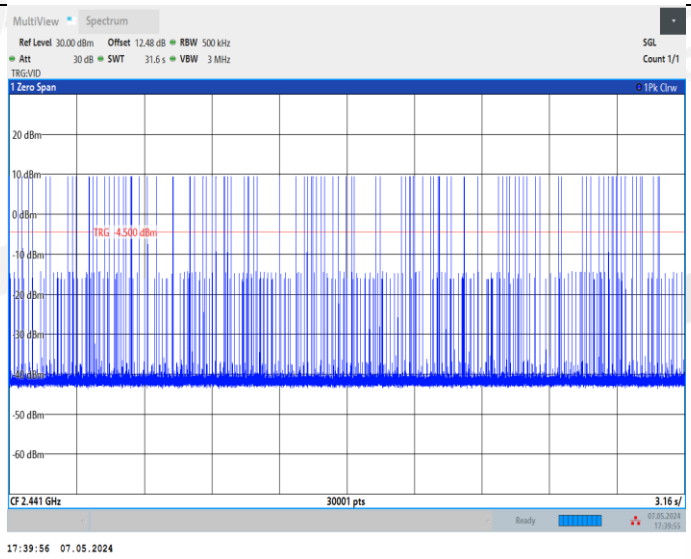
8.5. Test graphs

DH1_Ant1_L_Hop


DH1_Ant2_R_Hop


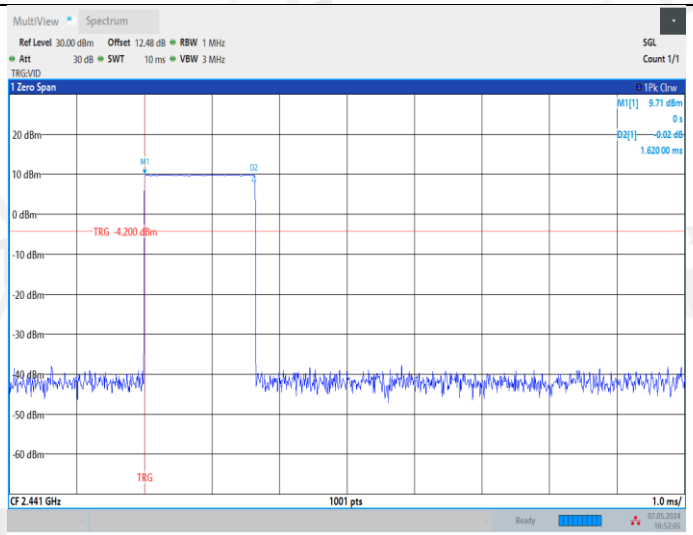


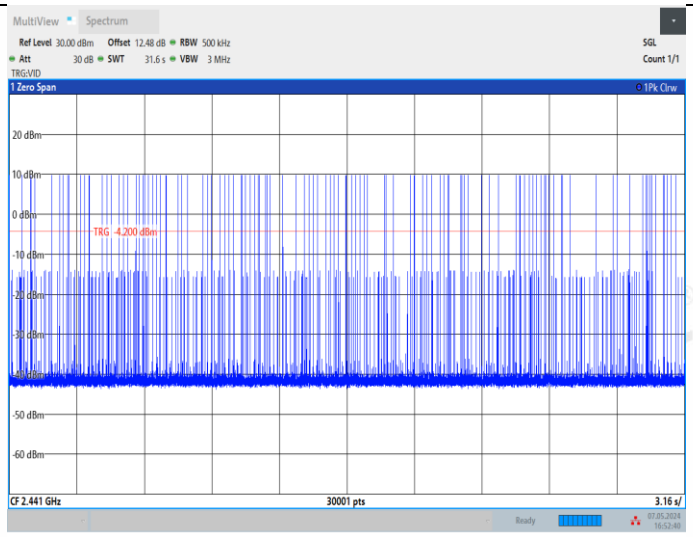
DH3_Ant1_L_Hop



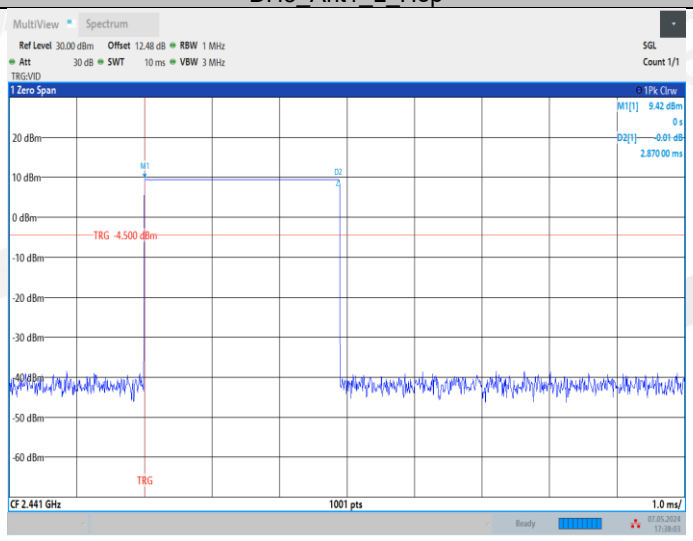


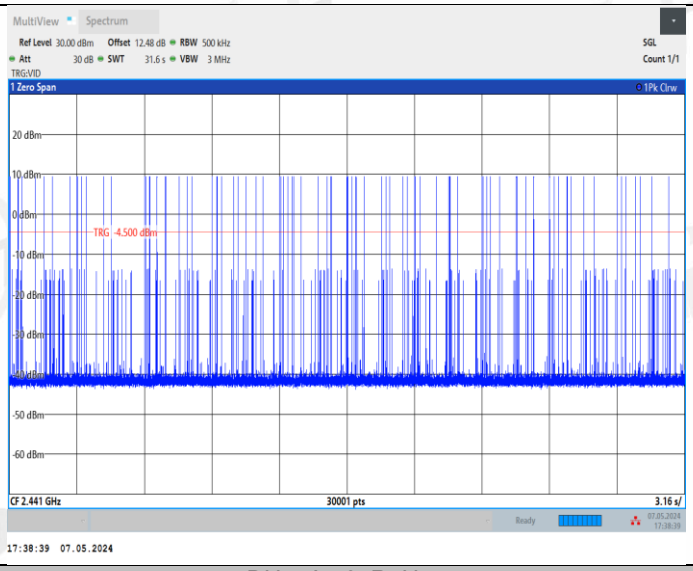
DH3_Ant2_R_Hop



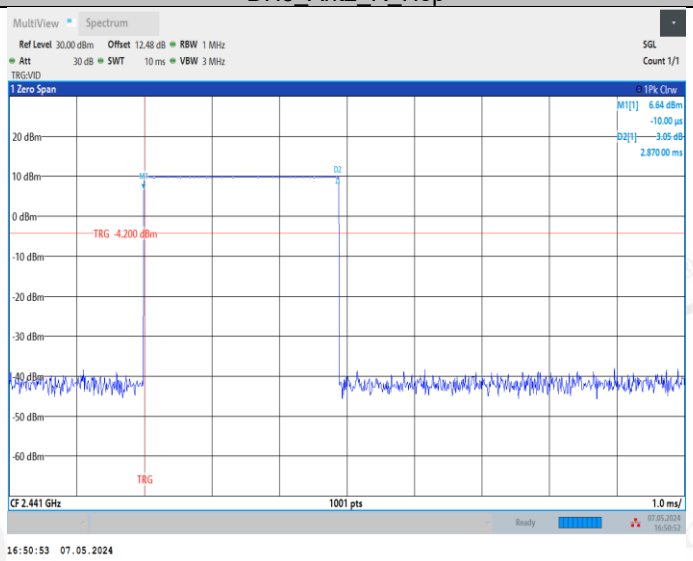


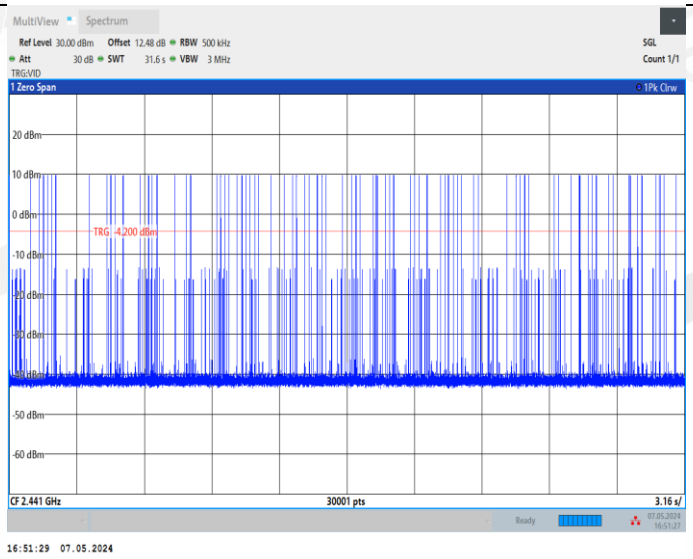
DH5_Ant1_L_Hop



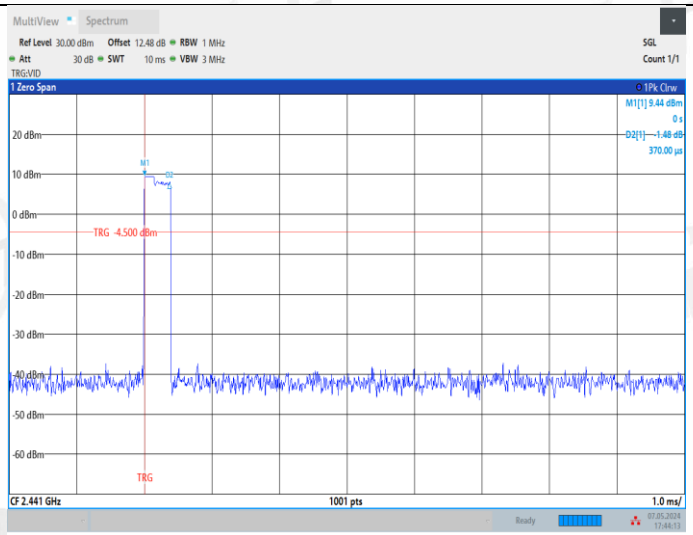


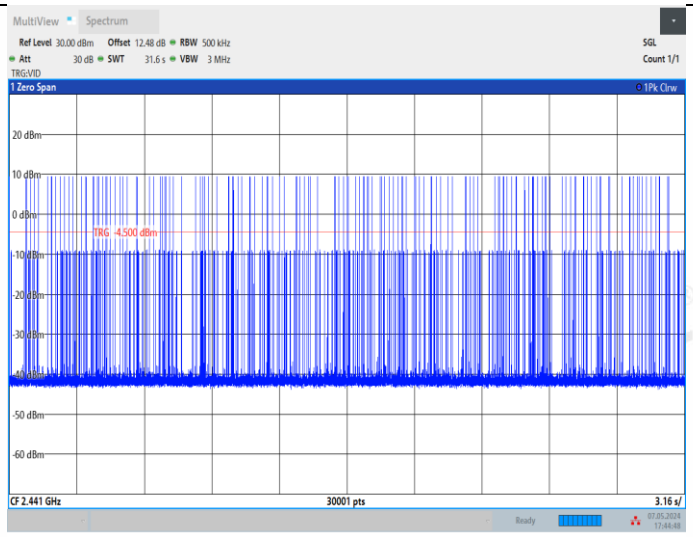
DH5_Ant2_R_Hop



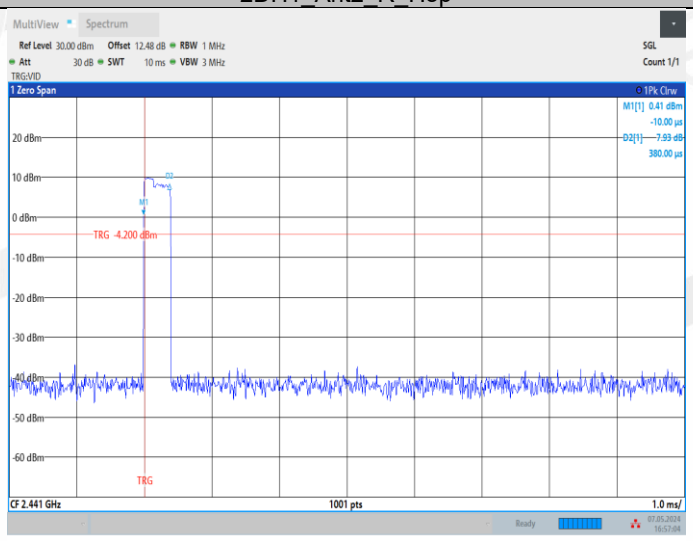


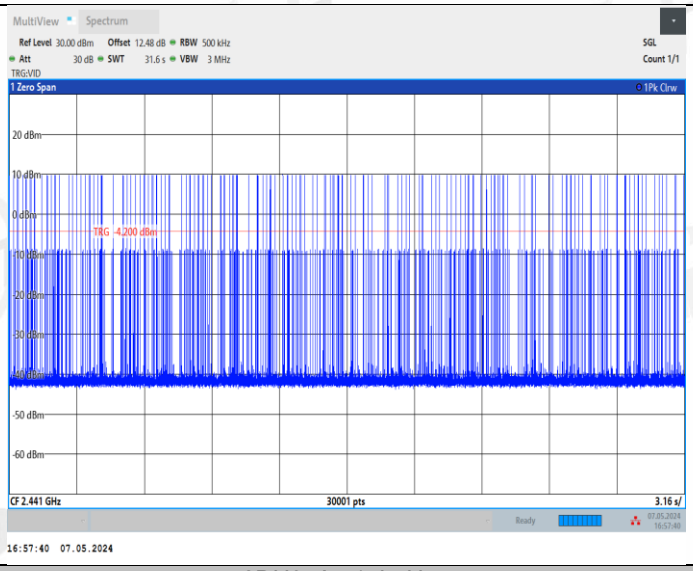
2DH1_Ant1_L_Hop



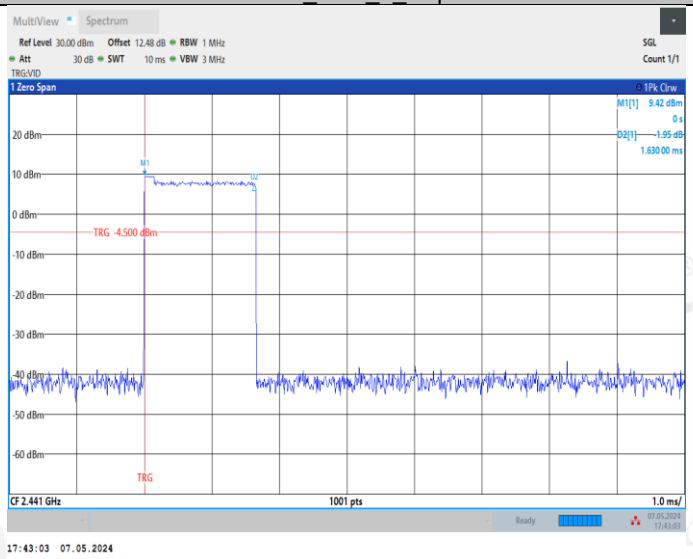


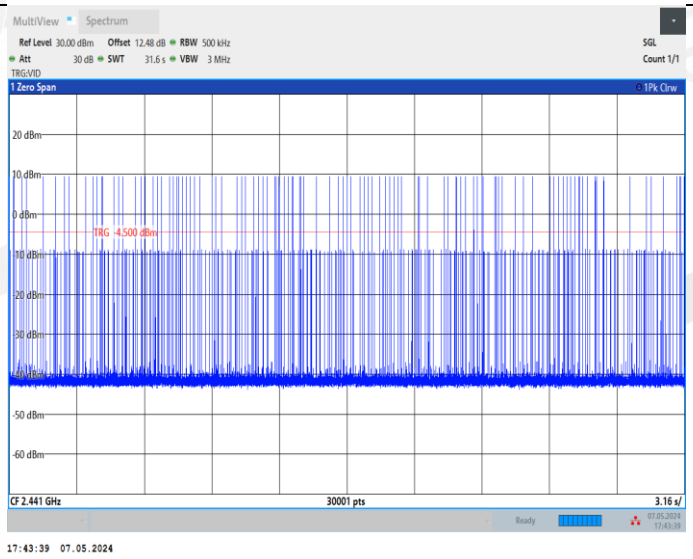
2DH1_Ant2_R_Hop



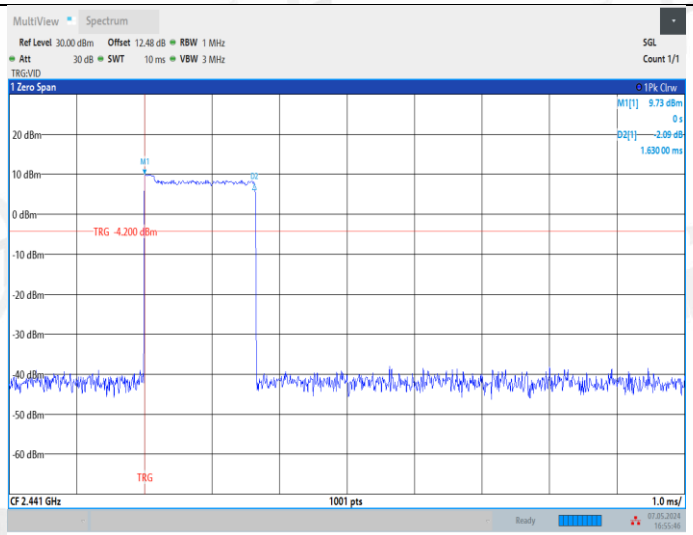


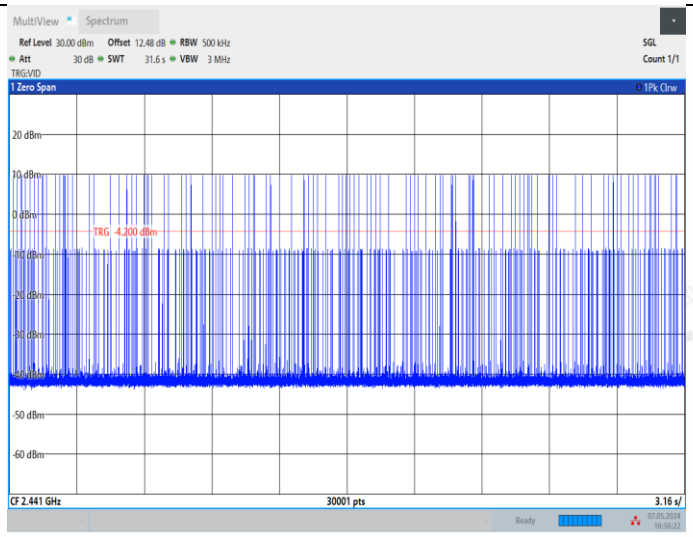
2DH3_Ant1_L_Hop



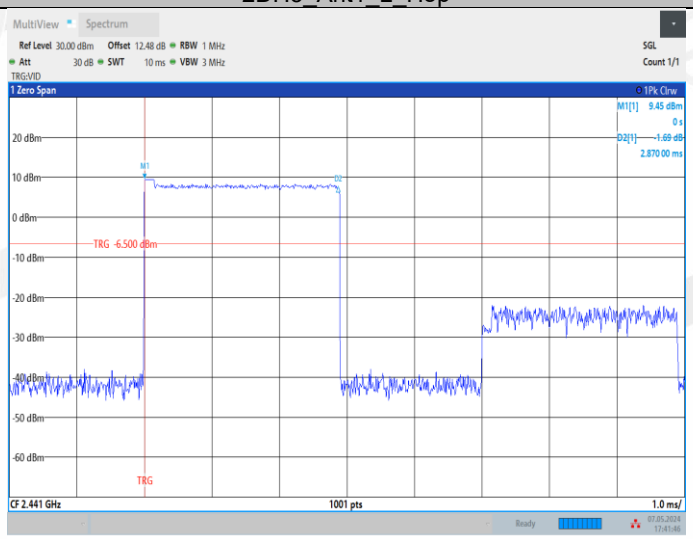


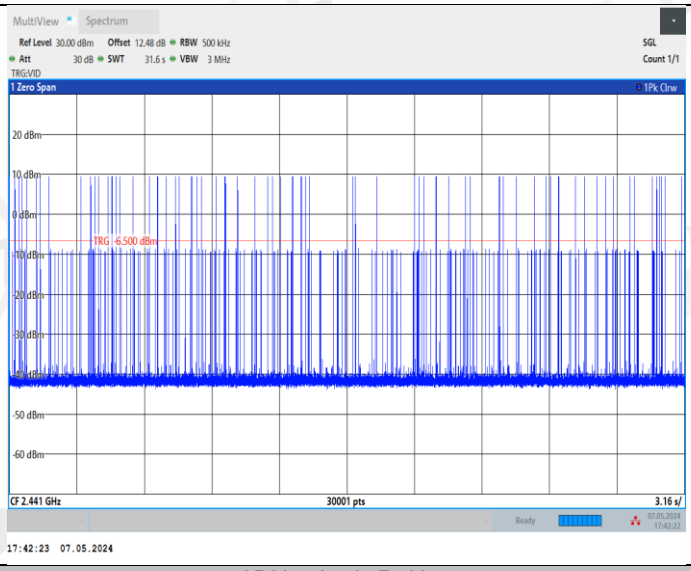
2DH3_Ant2_R_Hop



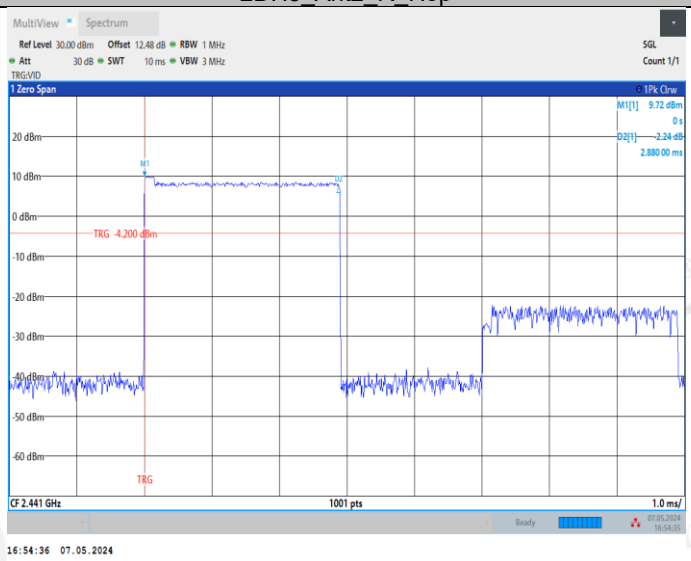


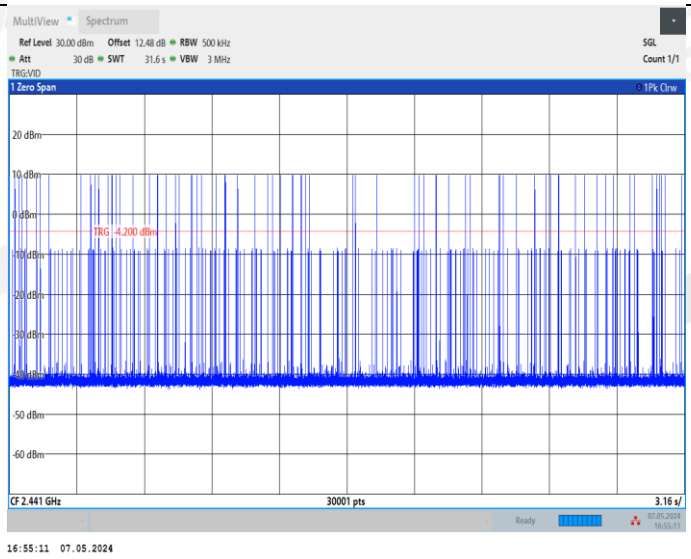
2DH5_Ant1_L_Hop



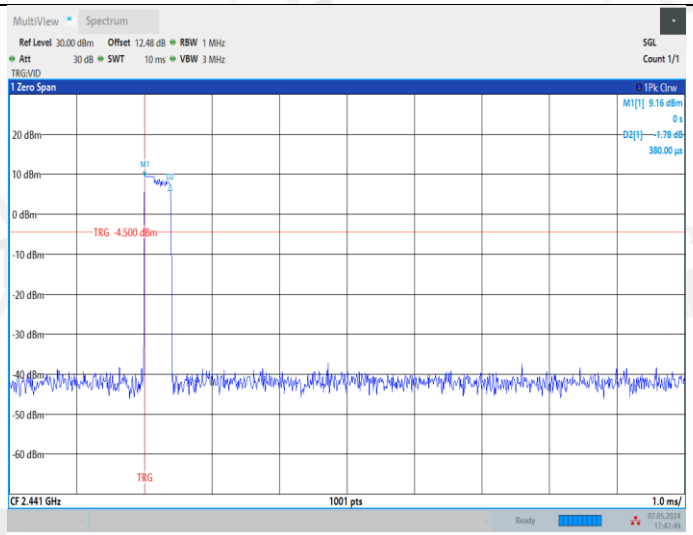


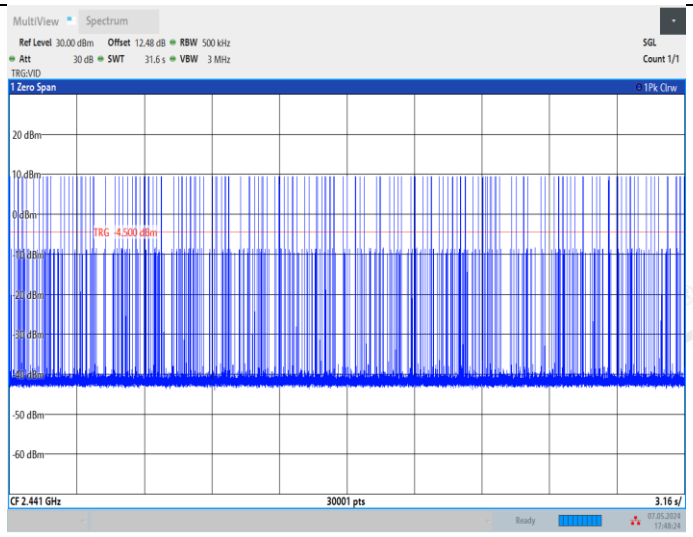
2DH5_Ant2_R_Hop



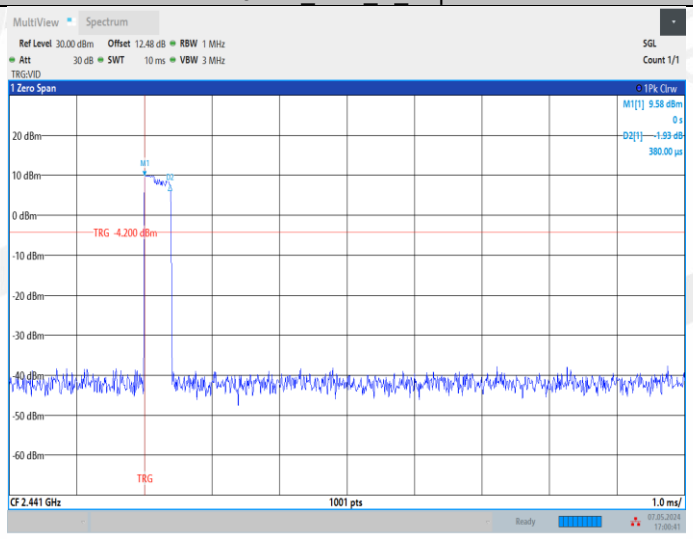


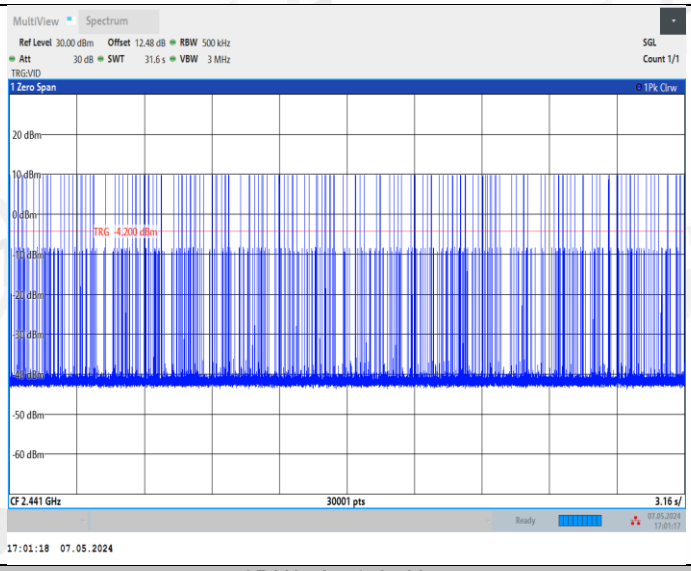
3DH1_Ant1_L_Hop



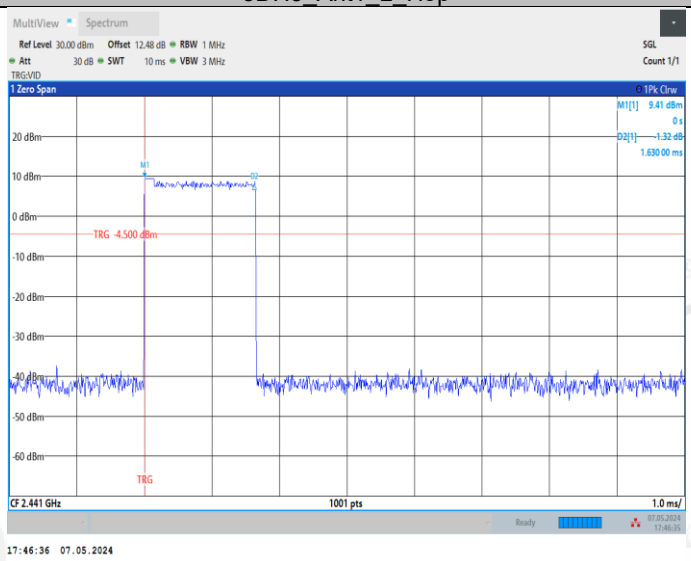


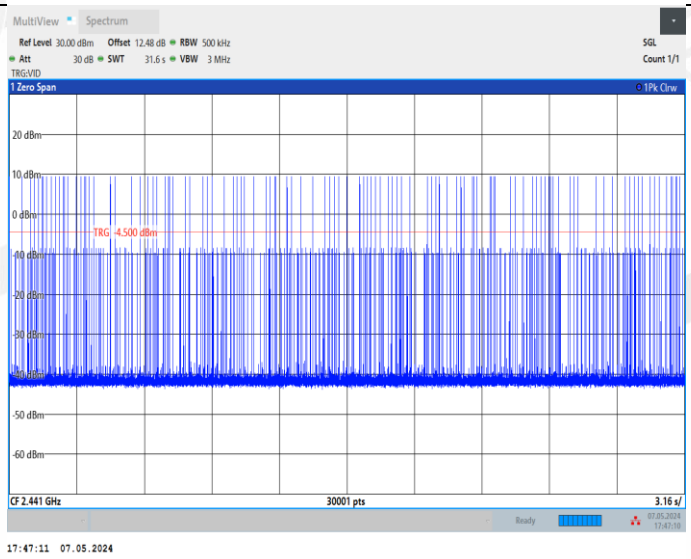
3DH1_Ant2_R_Hop



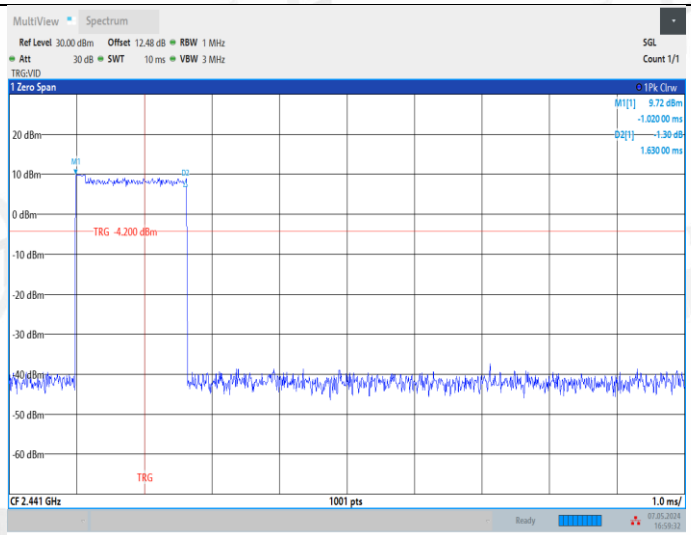


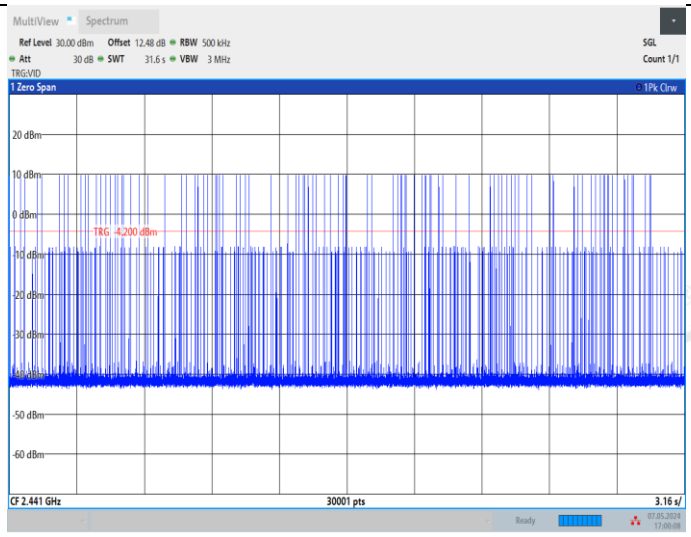
3DH3_Ant1_L_Hop



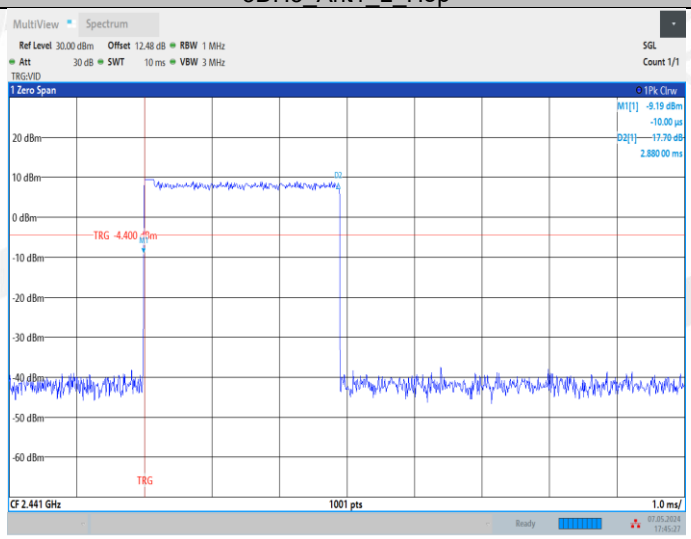


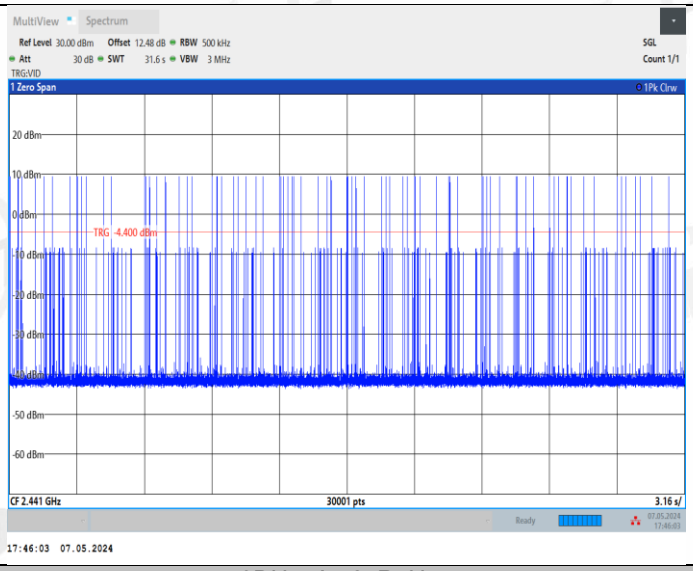
3DH3_Ant2_R_Hop



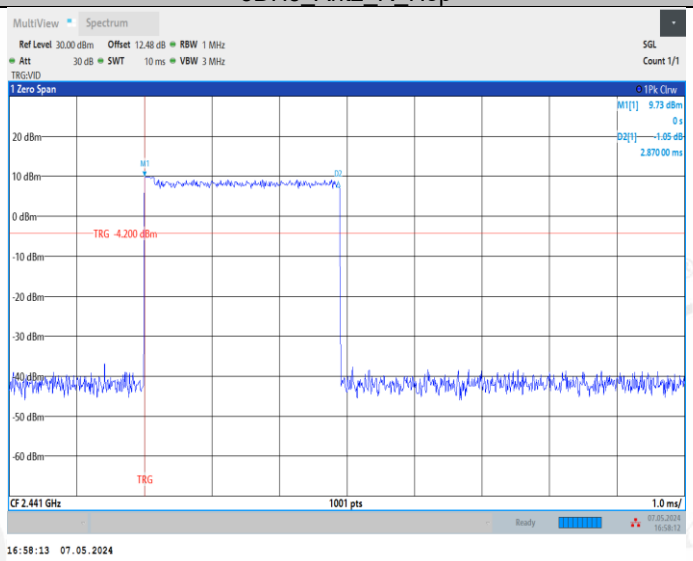


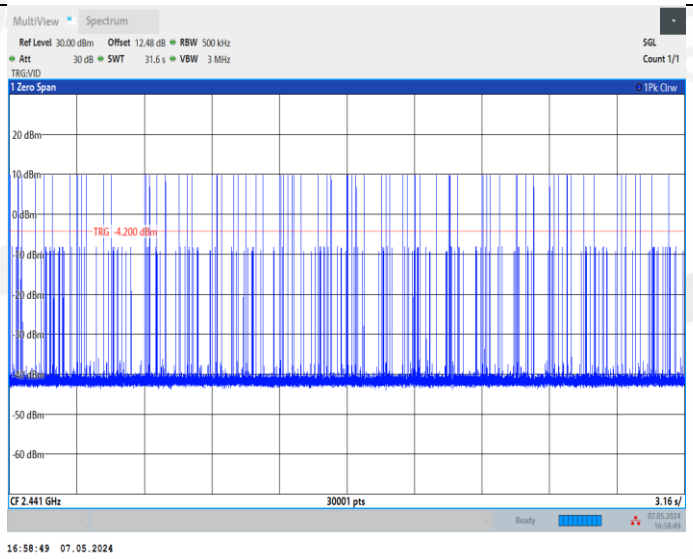
3DH5_Ant1_L_Hop





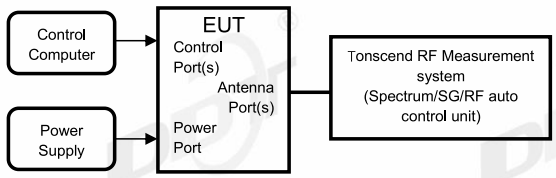
3DH5_Ant2_R_Hop





9. Number of Hopping Channel

9.1. Block diagram of test setup



9.2. Limits

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

9.3. Test procedure

(1) The test according to ANSI C63.10-2013 clause 7.8.3.
(2) Connect EUT's antenna output to spectrum analyzer by RF cable, the path loss was compensated to the results.
(3) Set the EUT as maximum power setting and enable the EUT transmit continuously.
(4) Use the following spectrum analyzer settings for the maximum peak output power measurement:

RBW:	RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
VBW:	VBW ≥ RBW.
Span:	The frequency band of operation
Detector Mode:	Peak
Sweep time:	Auto
Trace mode:	Max hold

(5) Measure the hopping number and record the results in the report.
(6) Measure and record the results in the report.

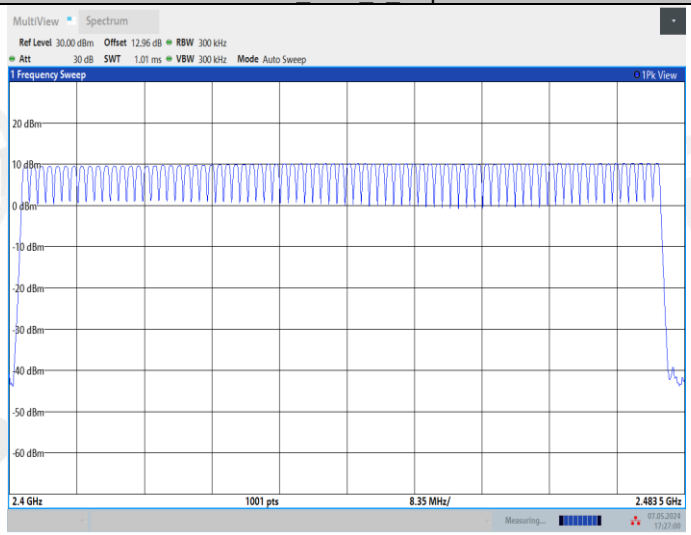
9.4. Test result

Test Engineer:	Haofeng	Test Site:	RF Measurement System 4#
Ambient Condition:	23.6℃,56.2%RH	Test Date:	2024.05.07
Test Power Supply:	Battery	Sample Number:	S24031401-001

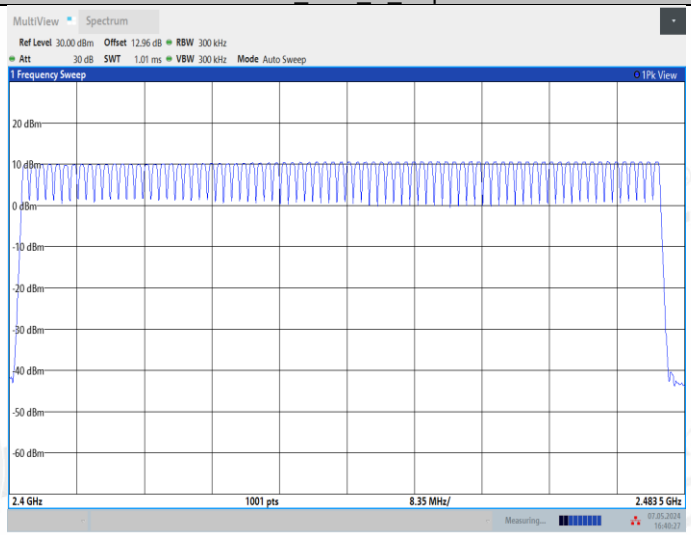
Test Mode	Antenna	Frequency [MHz]	Result [Num]	Limit [Num]	Verdict
DH5	Ant1_L	Hop	79	≥15	PASS
	Ant2_R	Hop	79	≥15	PASS
2DH5	Ant1_L	Hop	79	≥15	PASS
	Ant2_R	Hop	79	≥15	PASS
3DH5	Ant1_L	Hop	79	≥15	PASS
	Ant2_R	Hop	79	≥15	PASS

9.5. Test graphs

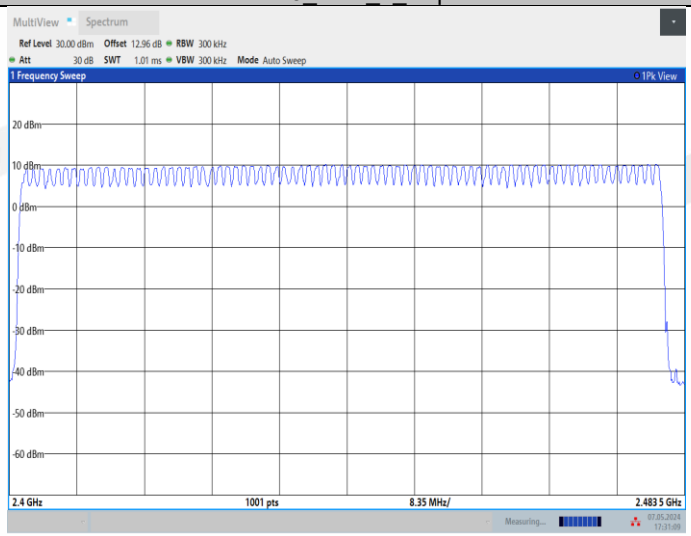
DH5_Ant1_L_Hop



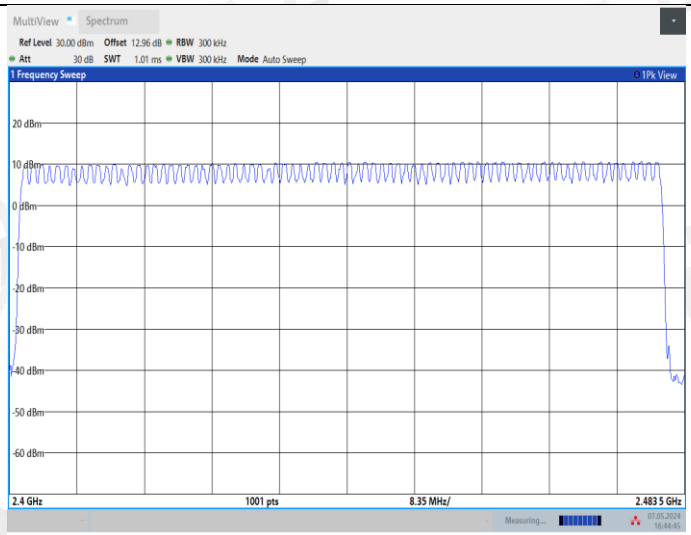
DH5_Ant2_R_Hop



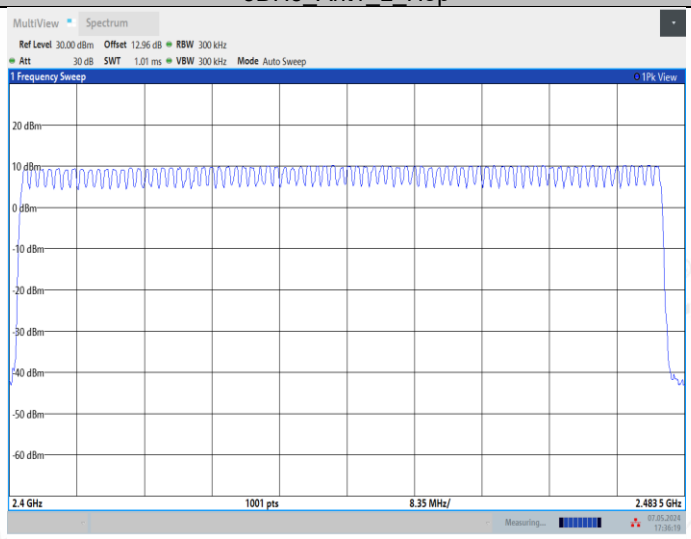
2DH5_Ant1_L_Hop



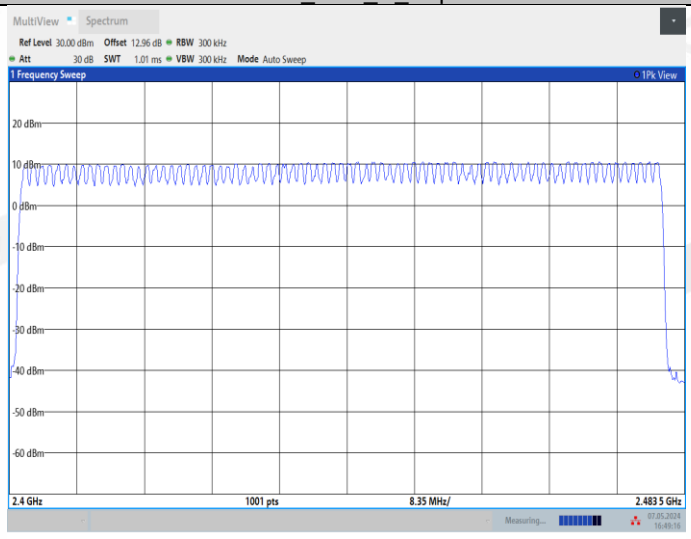
2DH5_Ant2_R_Hop



3DH5_Ant1_L_Hop

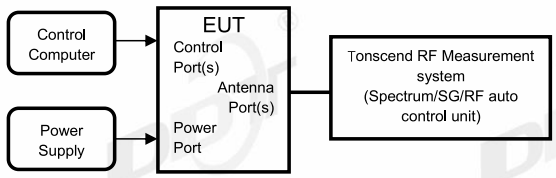


3DH5_Ant2_R_Hop



10. Band Edge Compliance (Conducted Method)

10.1. Block diagram of test setup



10.2. Limit

All restriction band should comply with 15.209, other emission should be at least 20dB below the fundamental.

10.3. Test procedure

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.
(2) Establish a reference level by using the following procedure:

RBW:	100 kHz
VBW:	300 kHz
Span	Encompass frequency range to be measured
Detector Mode:	Peak
Sweep time:	Auto
Trace mode	Max hold

(3) Allow the trace to stabilize, use the peak marker function to determine the maximum peak power level to establish the reference level.
(4) Then mark the maximum amplitude of all unwanted emissions outside of the authorized frequency band.

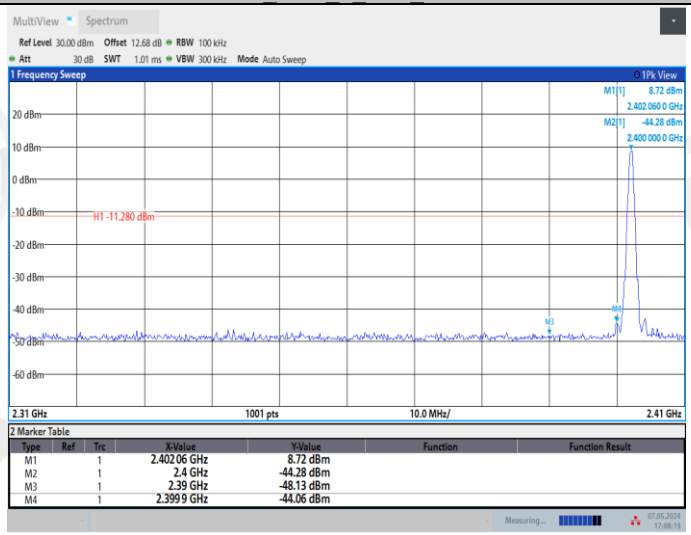
10.4. Test result

Test Engineer:	Haofeng	Test Site:	RF Measurement System 4#
Ambient Condition:	23.6℃,56.2%RH	Test Date:	2024.05.07
Test Power Supply:	Battery	Sample Number:	S24031401-001

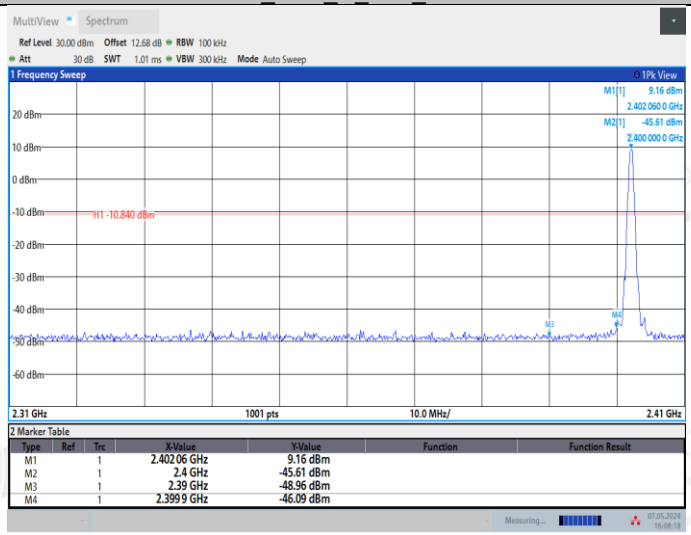
Mode	Freq. (MHz)	Verdict
GFSK	Hopping off 2402	Pass
	Hopping off 2480	Pass
	Hopping on	Pass
π/4-DQPSK	Hopping off 2402	Pass
	Hopping off 2480	Pass
	Hopping on	Pass
8DPSK	Hopping off 2402	Pass
	Hopping off 2480	Pass
	Hopping on	Pass

10.5. Test graphs

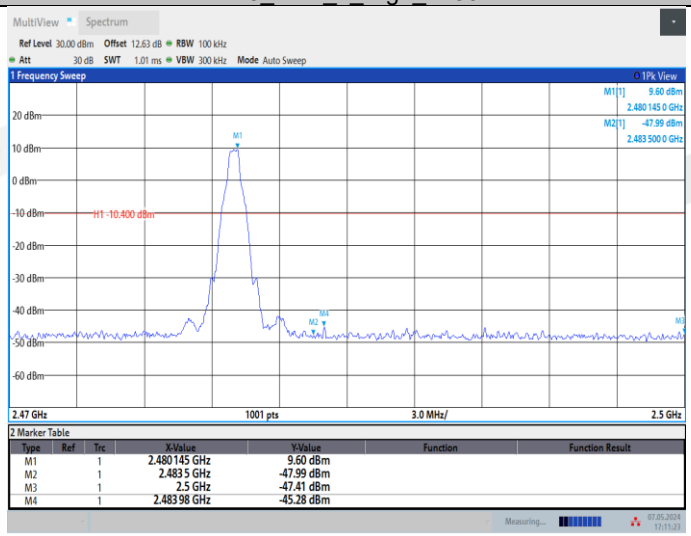
DH5_Ant1_L_Low_2402



DH5_Ant2_R_Low_2402



DH5_Ant1_L_High_2480



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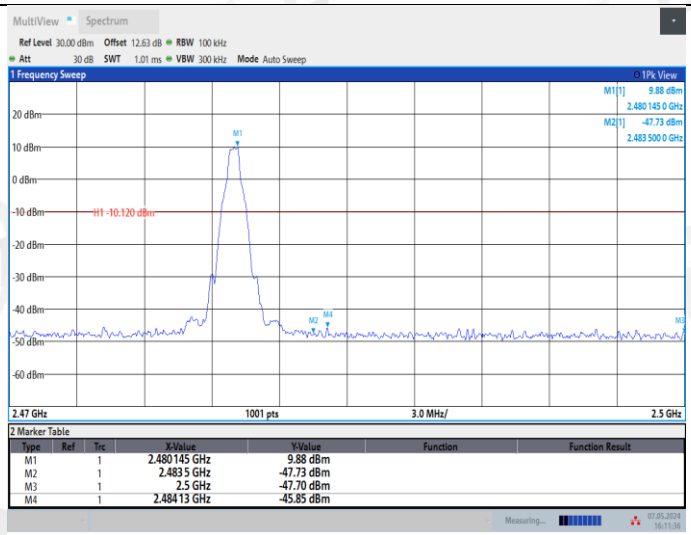

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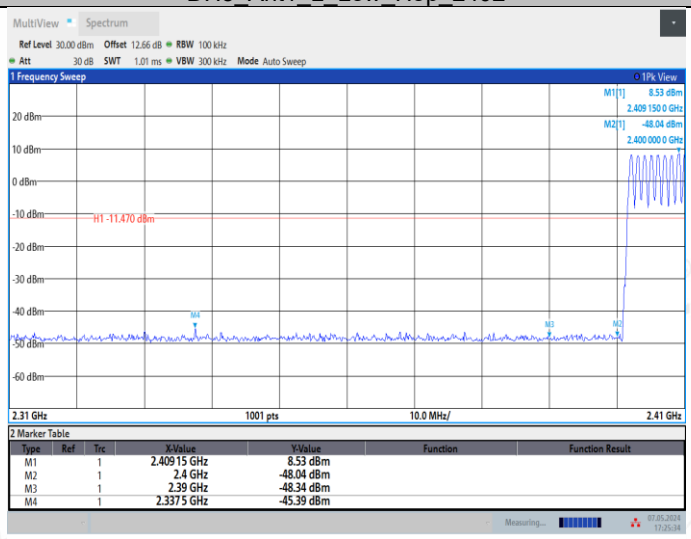

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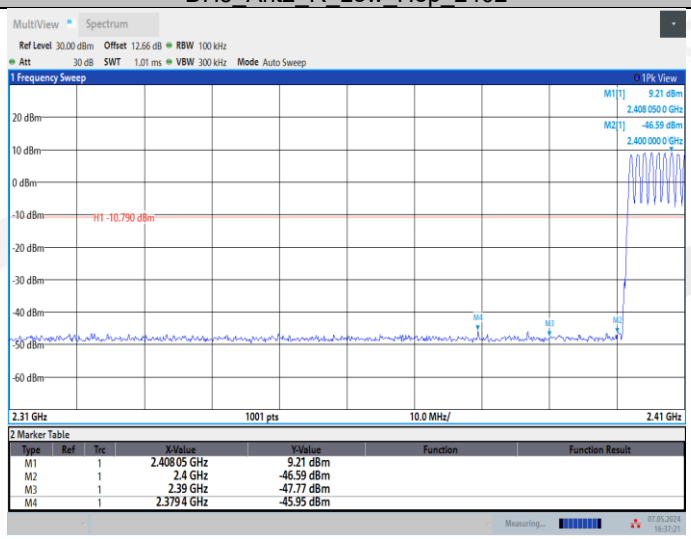

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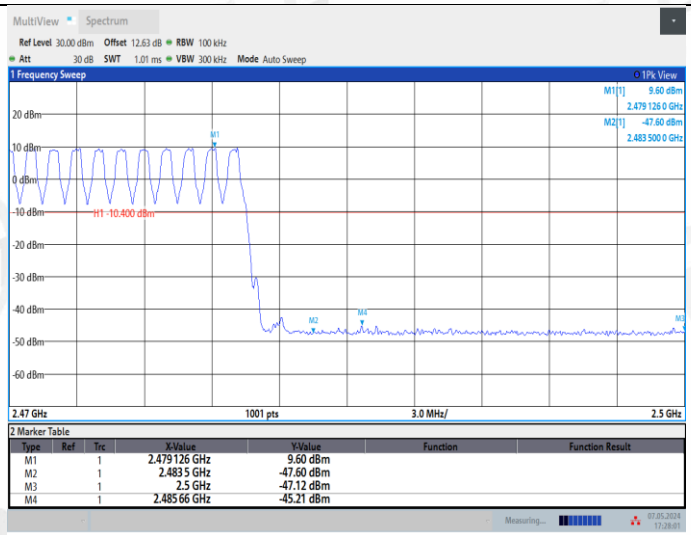

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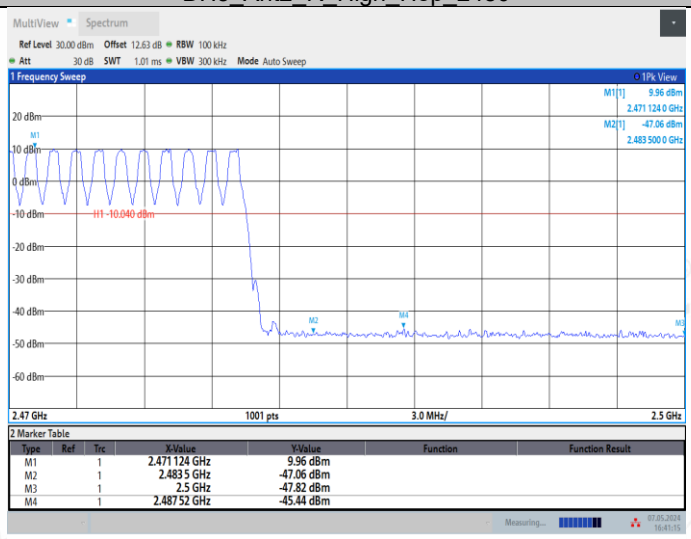

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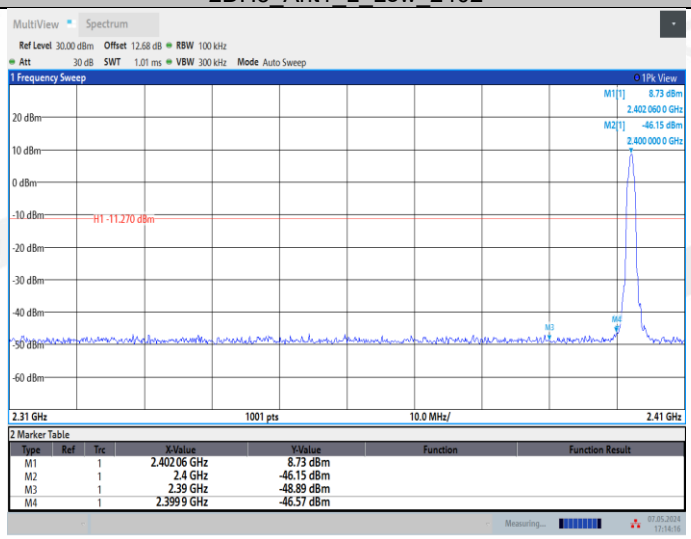

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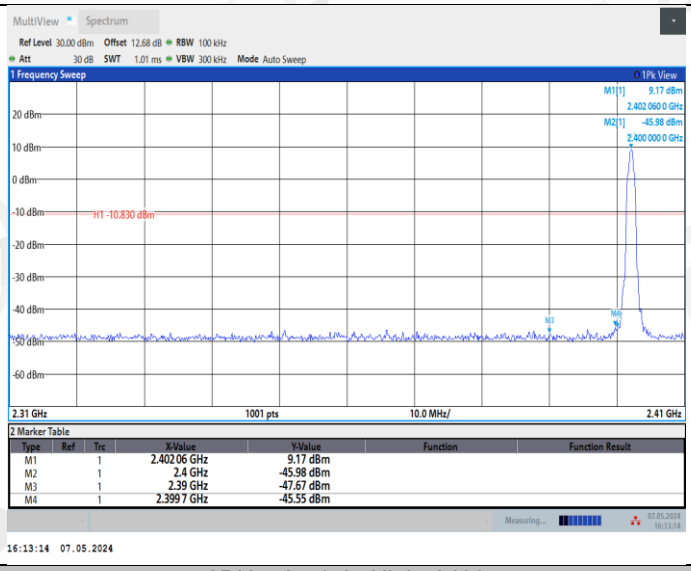

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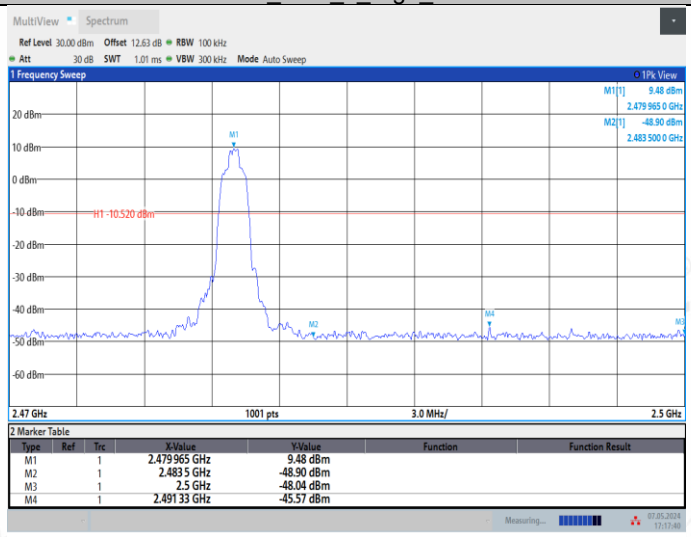

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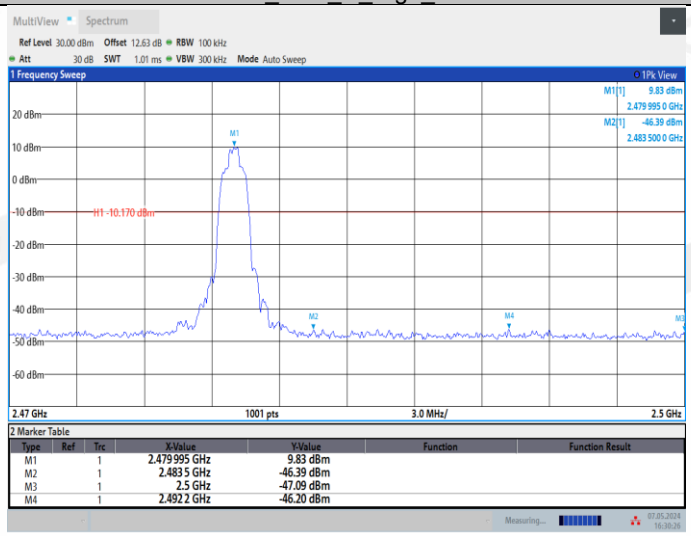

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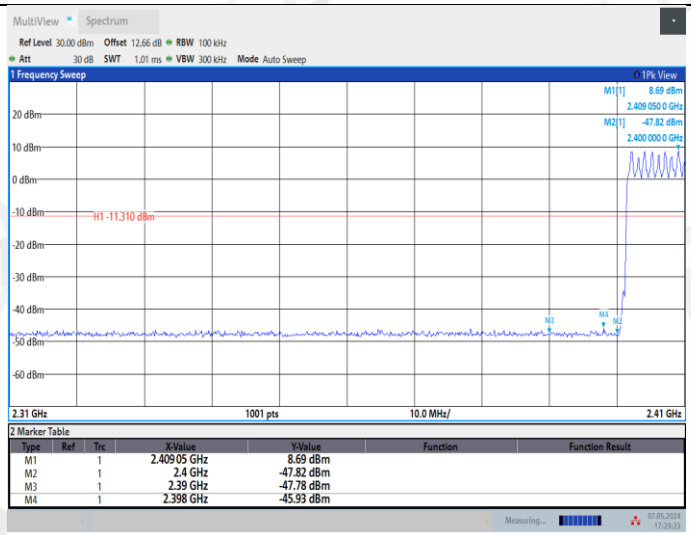

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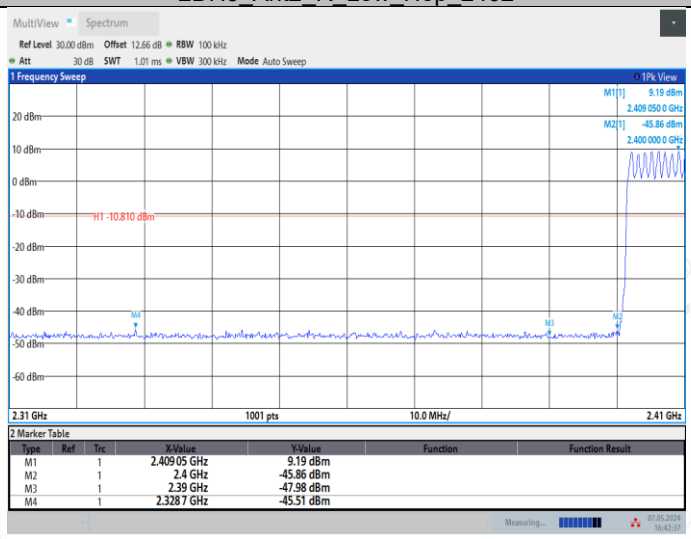

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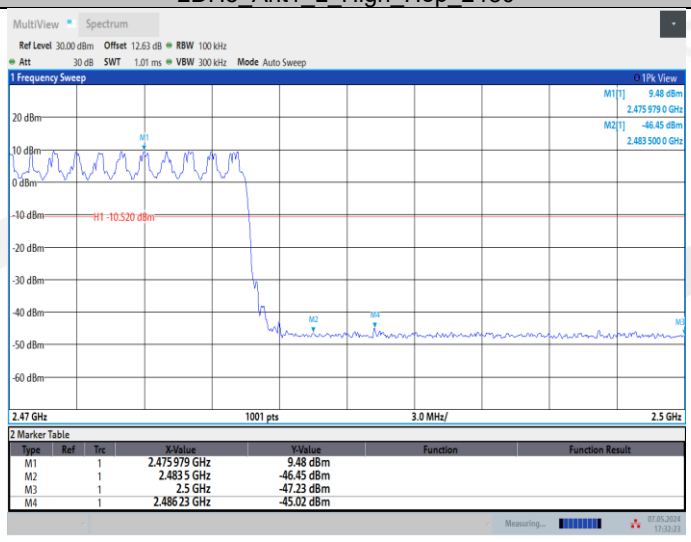

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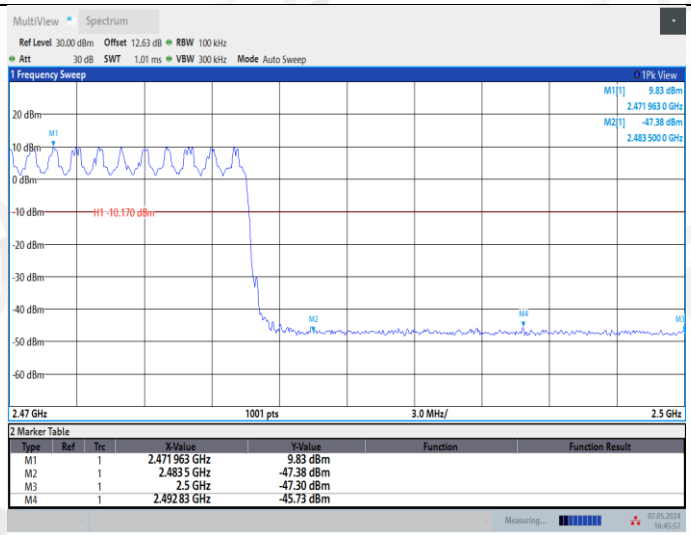

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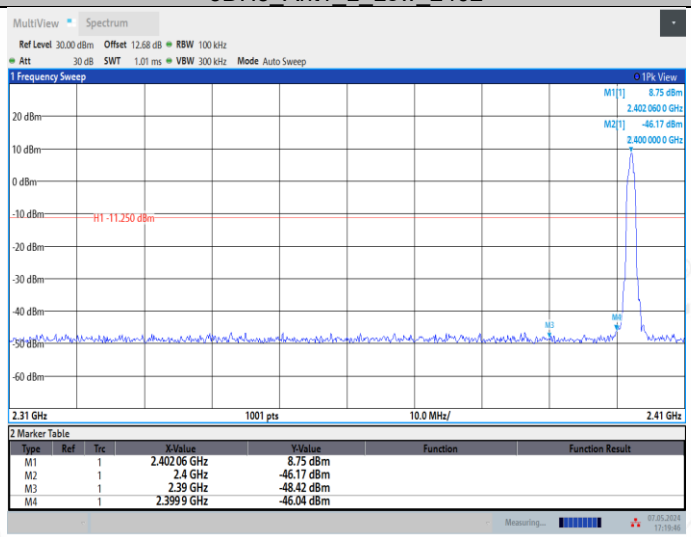

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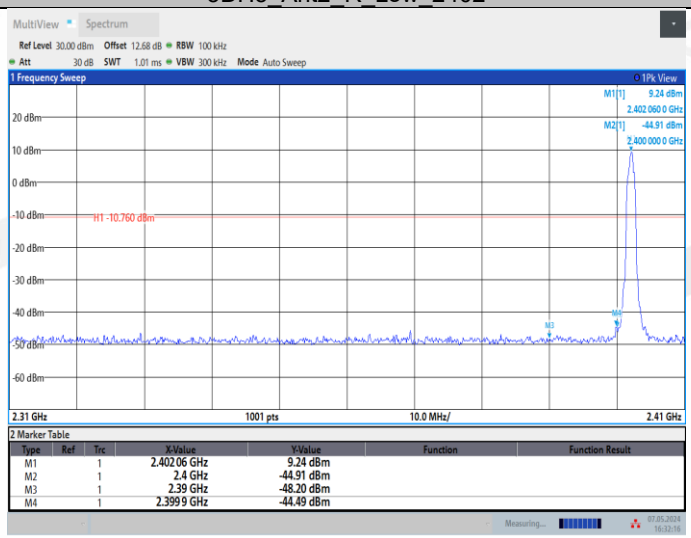

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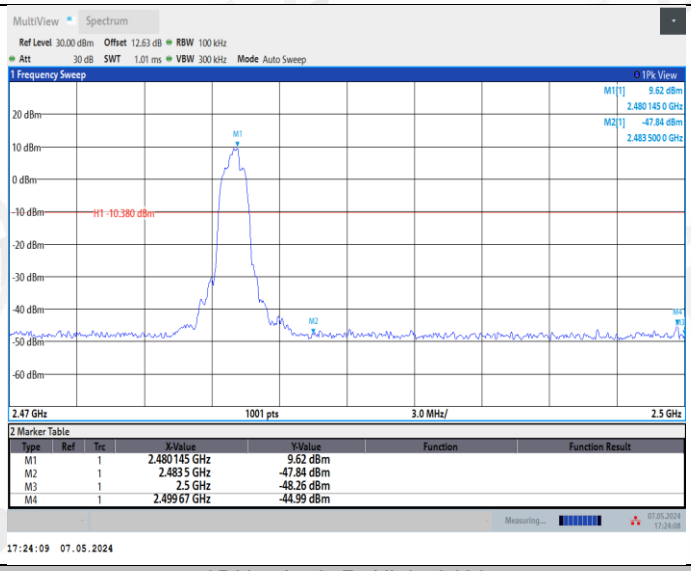

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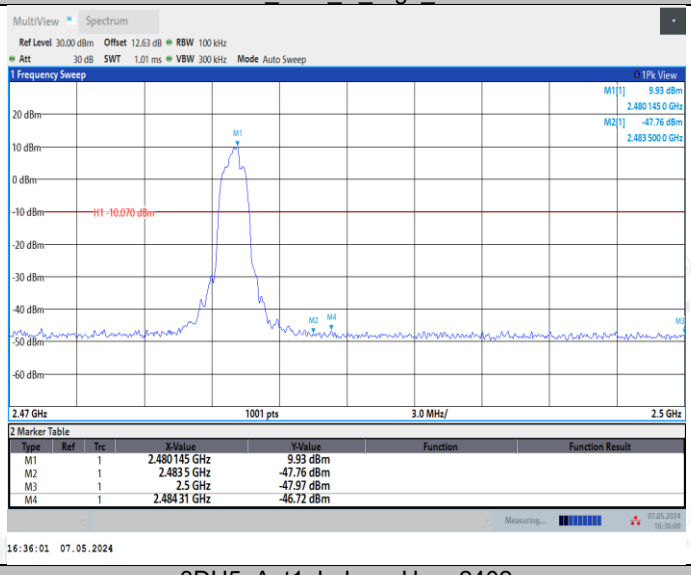

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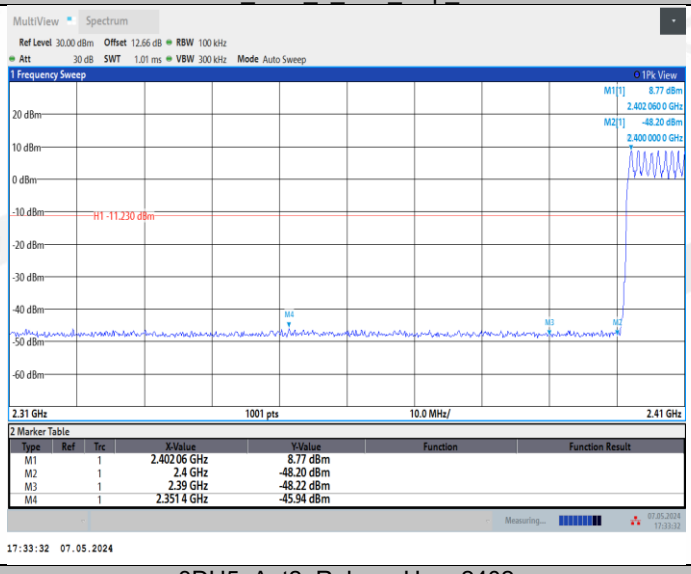

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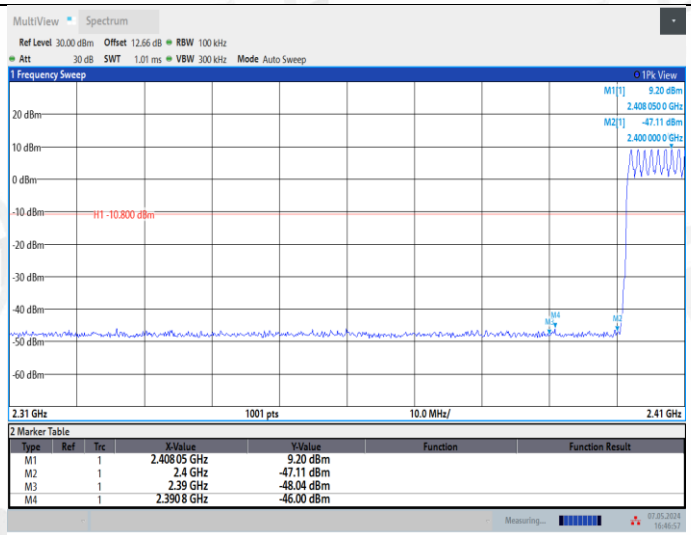

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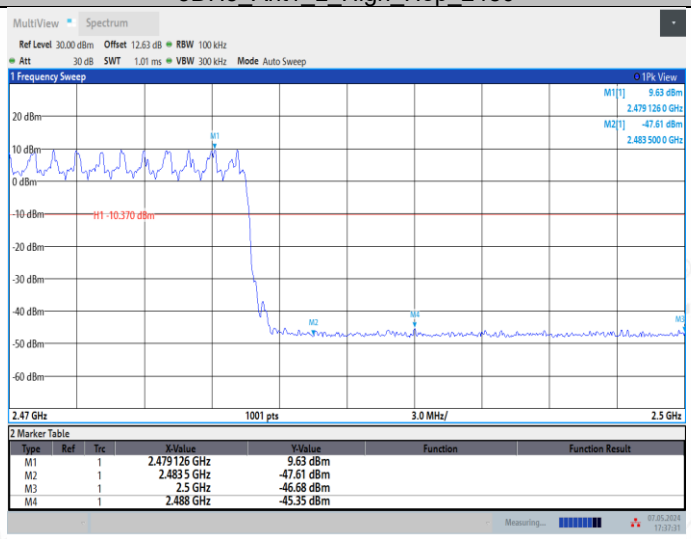

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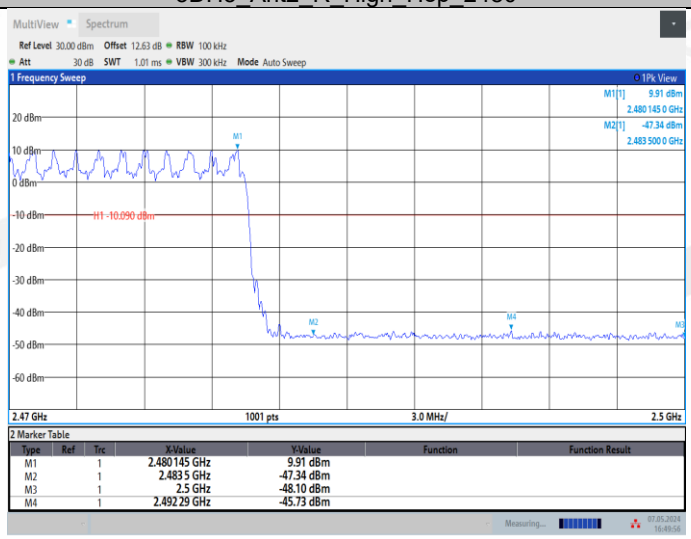
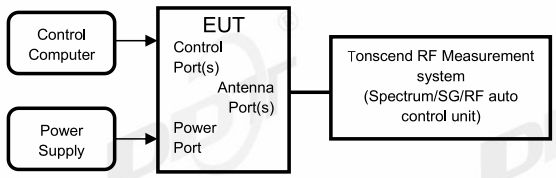


11. RF Conducted Spurious Emissions

11.1. Block diagram of test setup



11.2. Limits

In any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in 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.

11.3. Test procedure

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.
(2) Establish a reference level by using the following procedure:

Center frequency	Test frequency
RBW:	100 kHz
VBW:	300 kHz
Span	Wide enough to capture the peak level of the in-band emission
Detector Mode:	Peak
Sweep time:	Auto
Trace mode	Max hold

(3) Allow the trace to stabilize, use the peak marker function to determine the maximum peak power level to establish the reference level.
(4) Set the spectrum analyzer as follows:

RBW:	100 kHz
VBW:	300 kHz
Span	Encompass frequency range to be measured
Number of measurement points	≥Span/RBW
Detector Mode:	Peak
Sweep time:	Auto
Trace mode	Max hold

Allow the trace to stabilize, use the peak marker function to determine the maximum amplitude of all unwanted emissions outside of the authorized frequency band

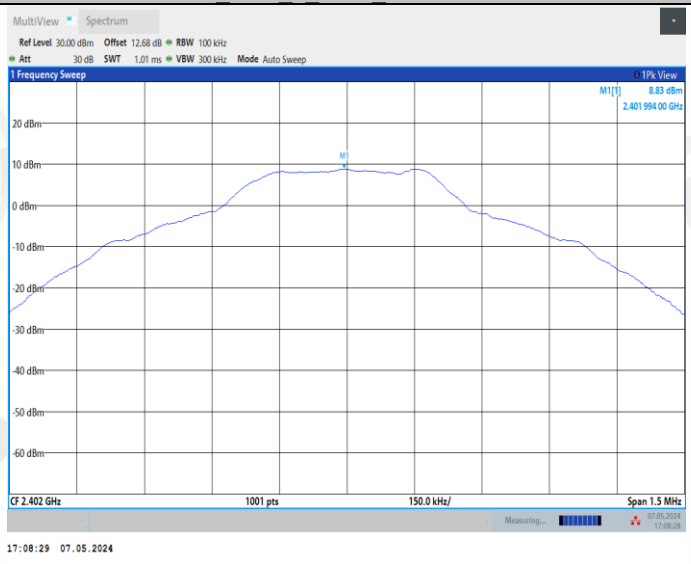
11.4. Test result

Test Engineer:	Haofeng	Test Site:	RF Measurement System 4#
Ambient Condition:	23.6℃,56.2%RH	Test Date:	2024.05.07
Test Power Supply:	Battery	Sample Number:	S24031401-001

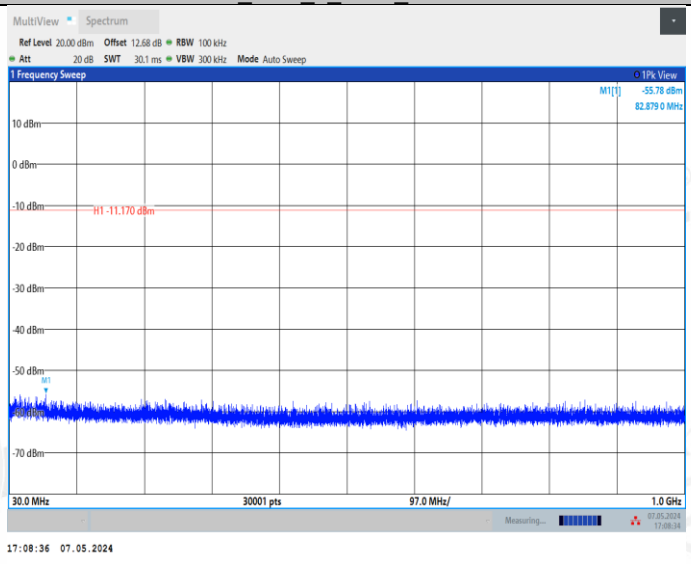
Mode	Freq. (MHz)	Verdict
GFSK	Hopping off 2402	Pass
	Hopping off 2441	Pass
	Hopping off 2480	Pass
π/4-DQPSK	Hopping off 2402	Pass
	Hopping off 2441	Pass
	Hopping off 2480	Pass
8DPSK	Hopping off 2402	Pass
	Hopping off 2441	Pass
	Hopping off 2480	Pass

11.5. Test graphs

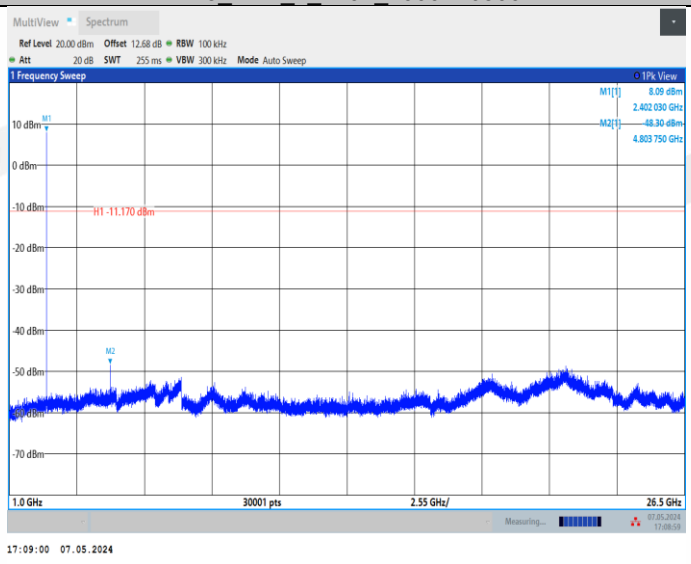
DH5_Ant1_L_2402_0~Reference



DH5_Ant1_L_2402_30~1000



DH5_Ant1_L_2402_1000~26500



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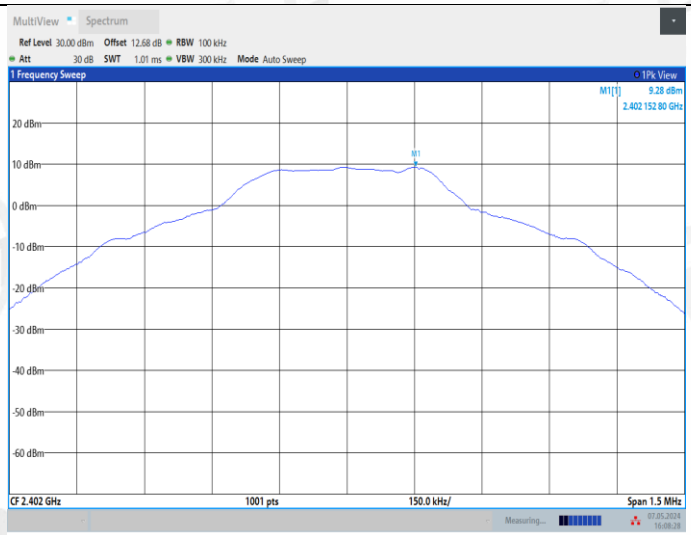

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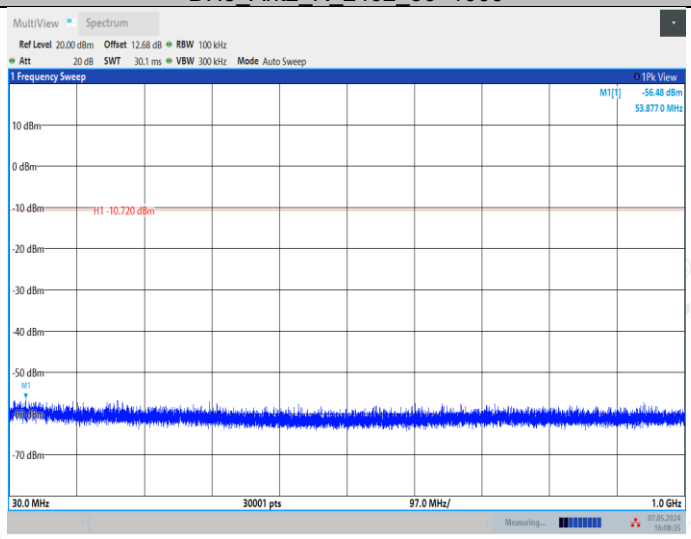

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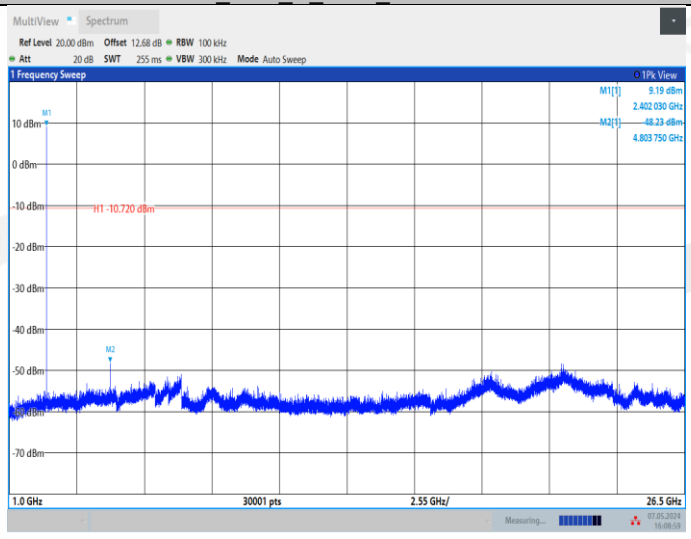

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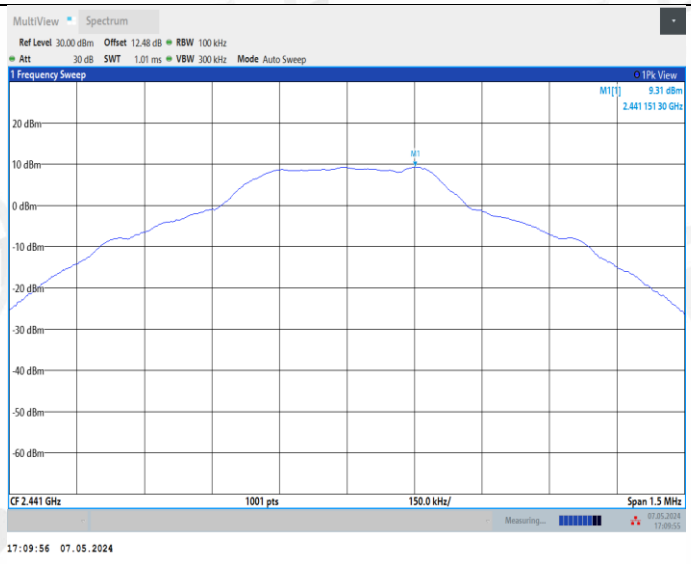

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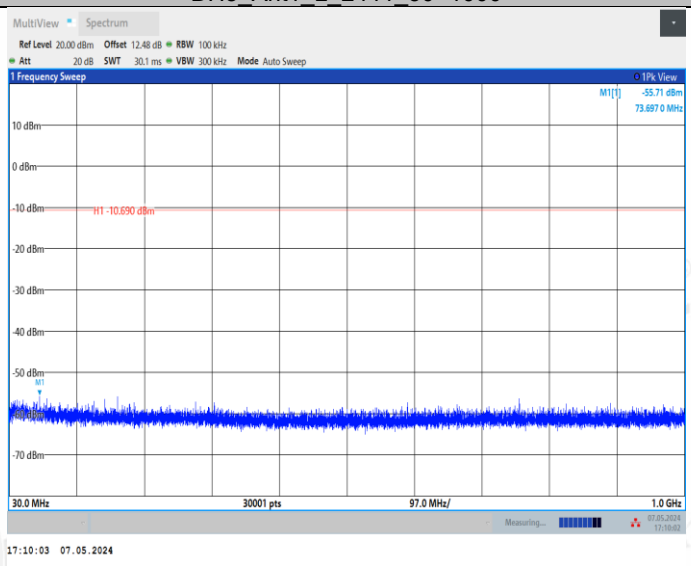

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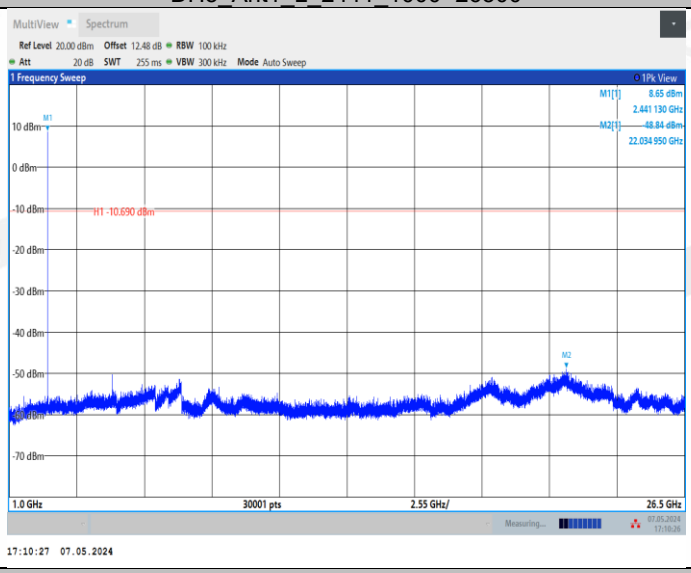

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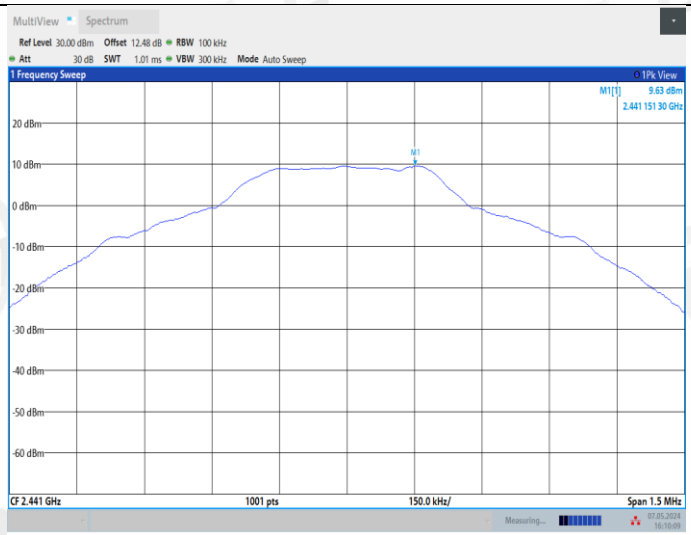

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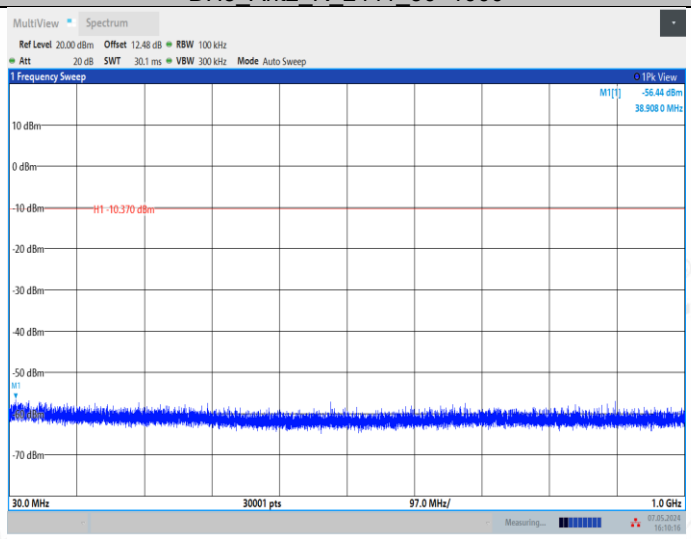
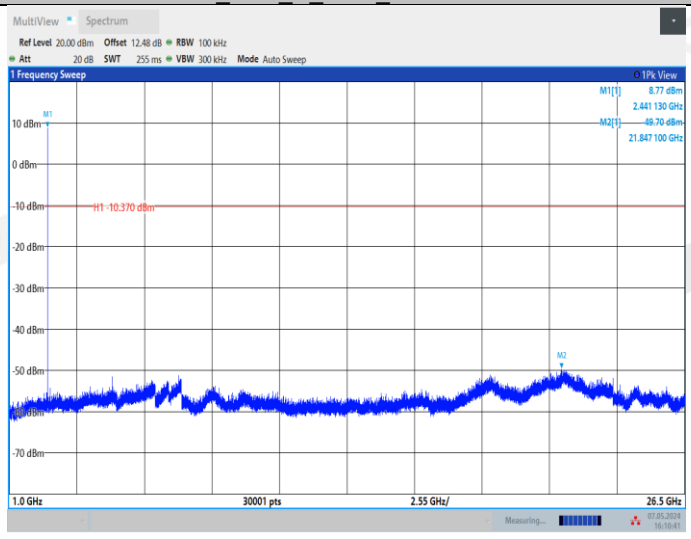


DH5_Ant2_R_2441_1000~26500



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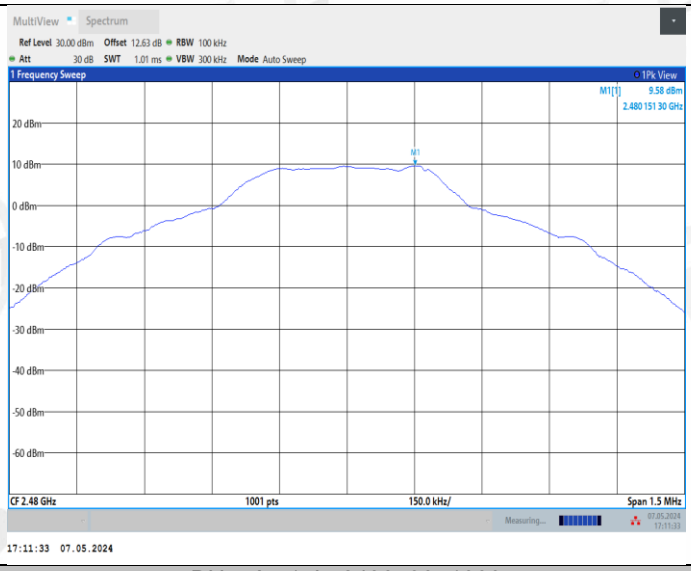

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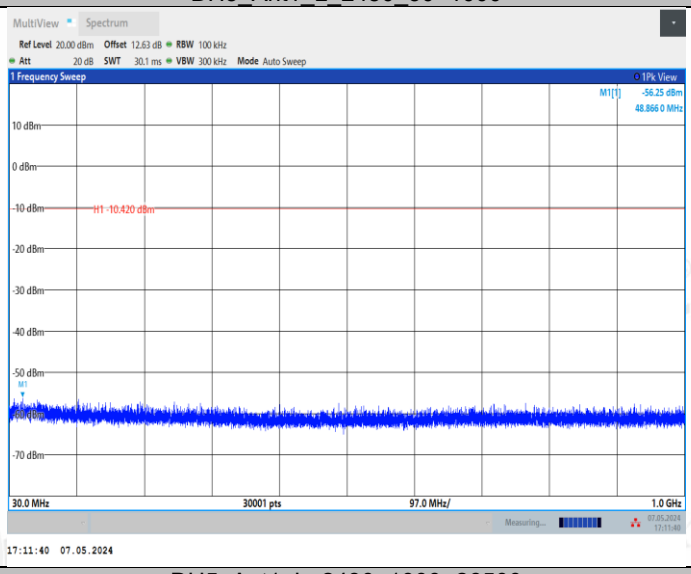

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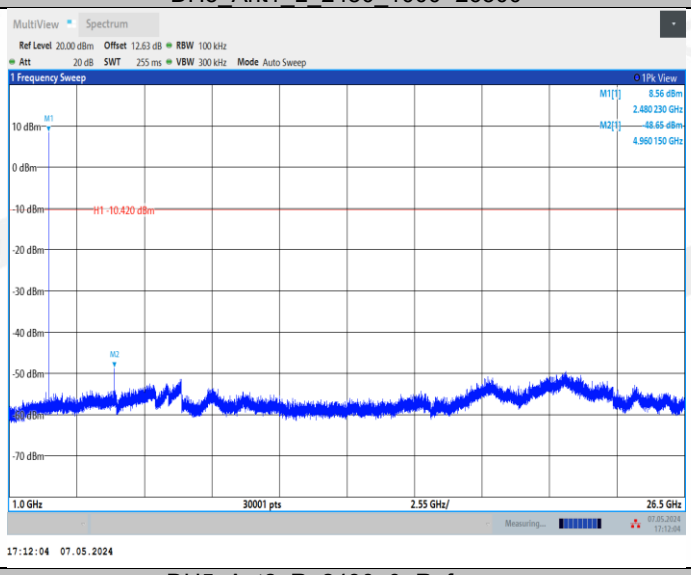

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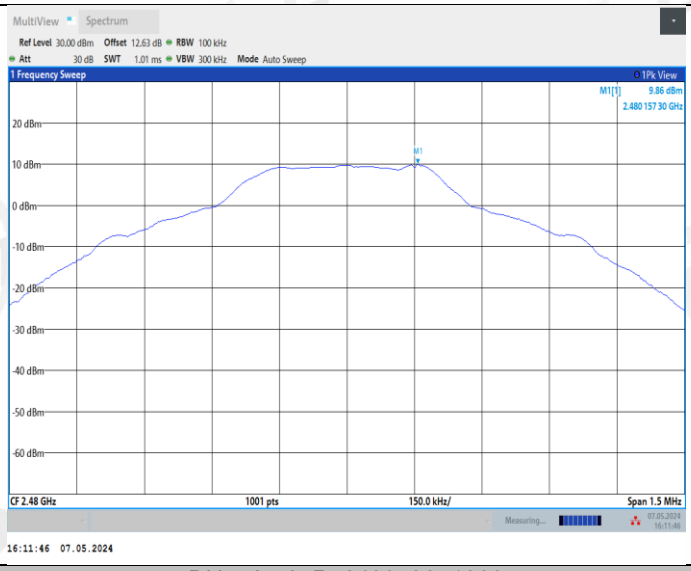

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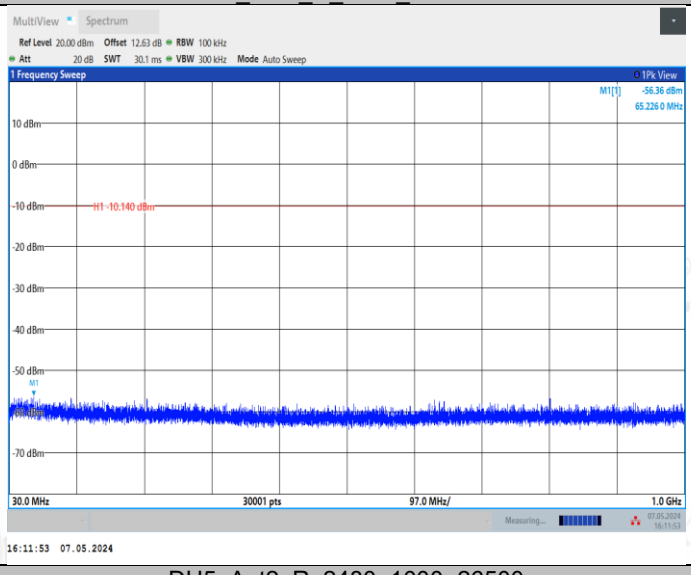

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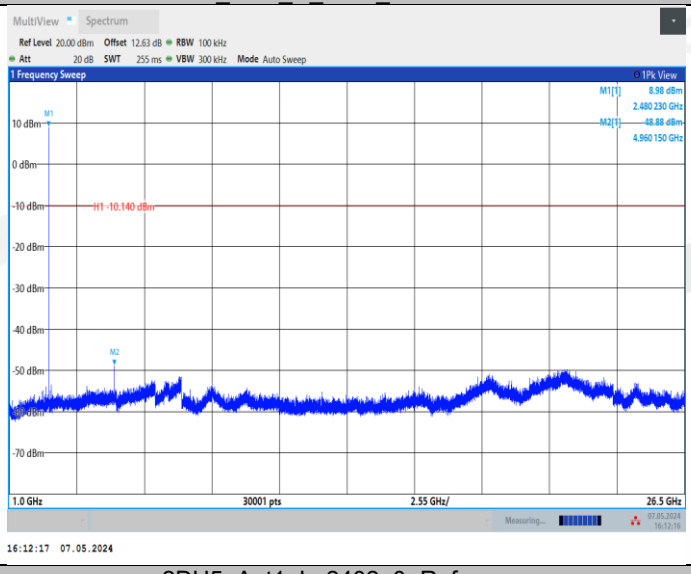

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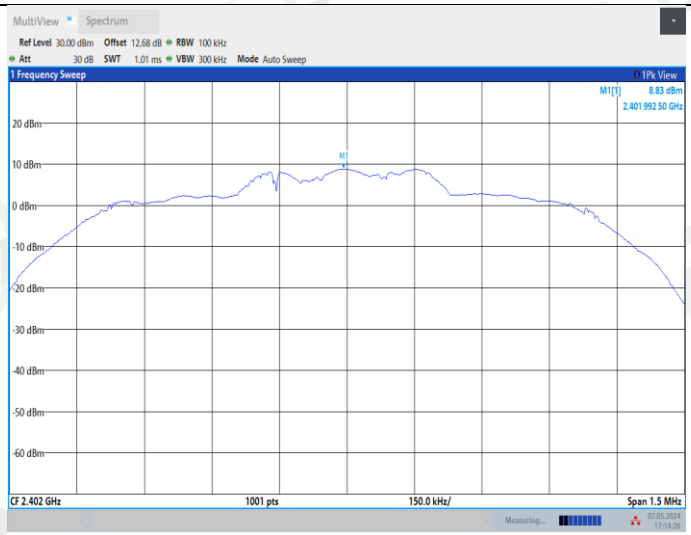

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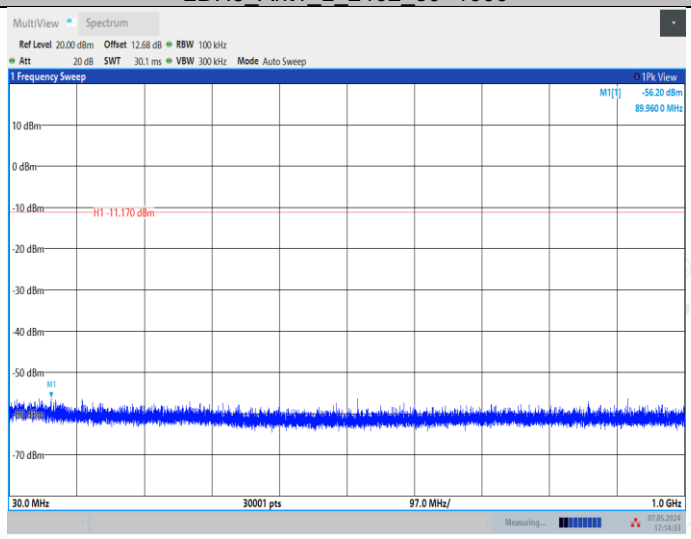

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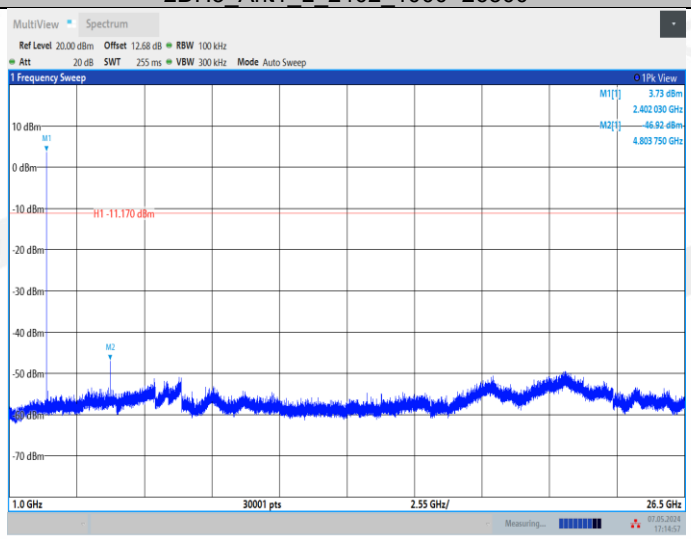

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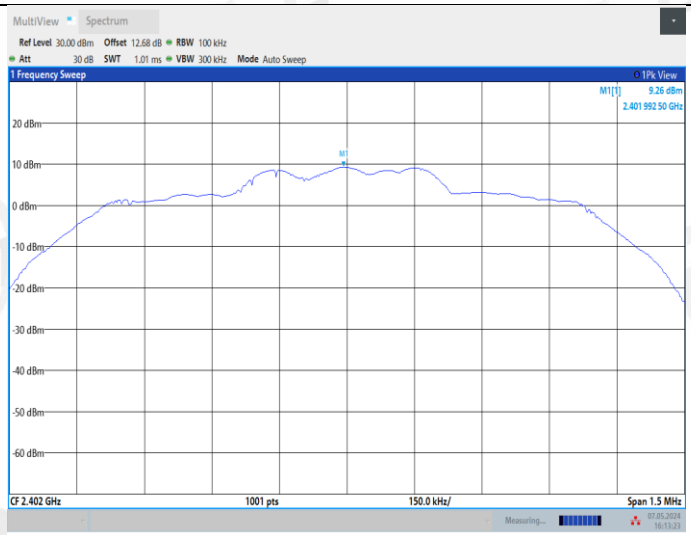

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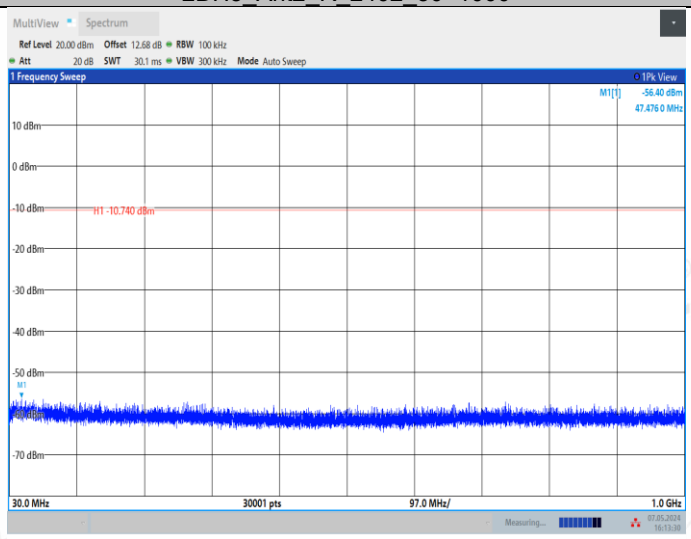

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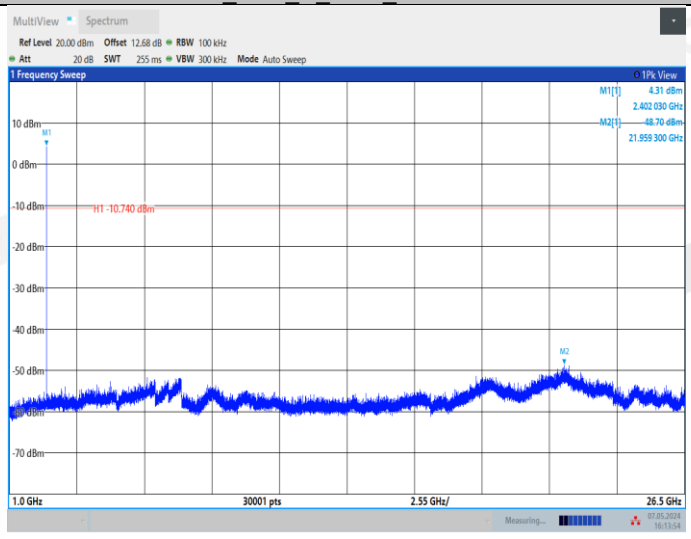

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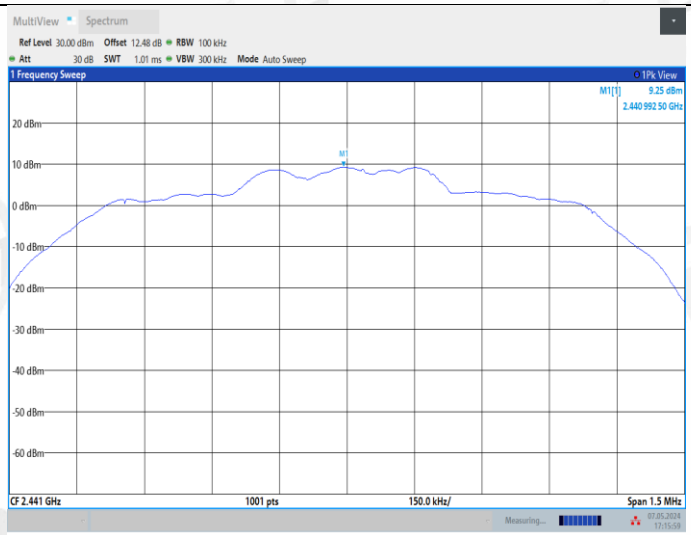

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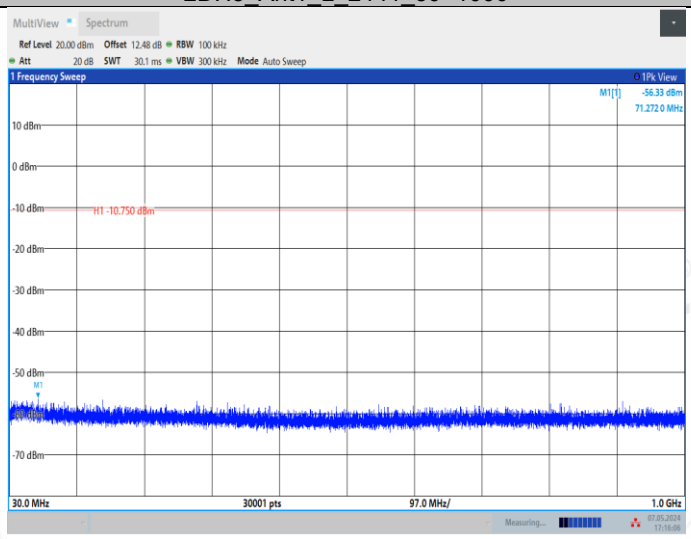

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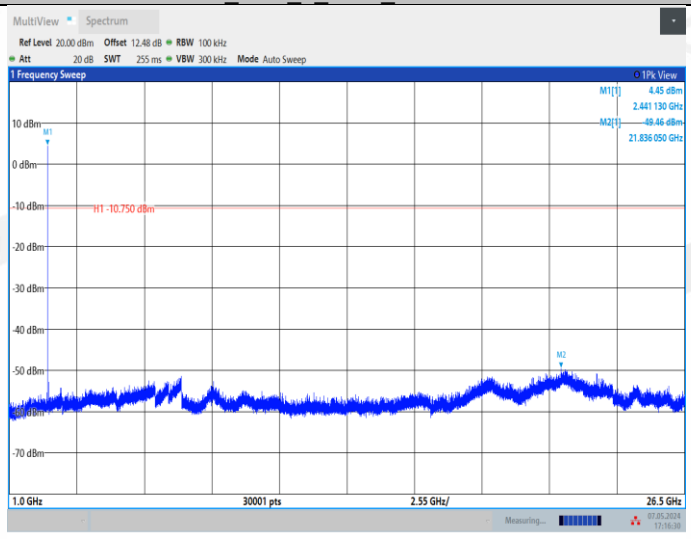

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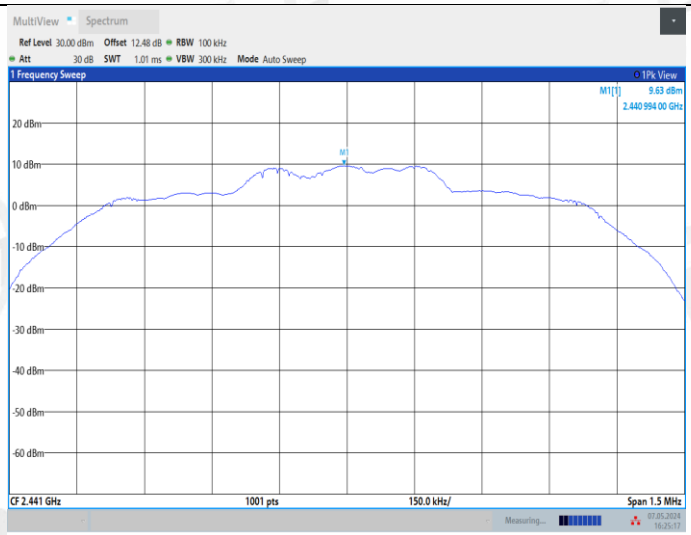

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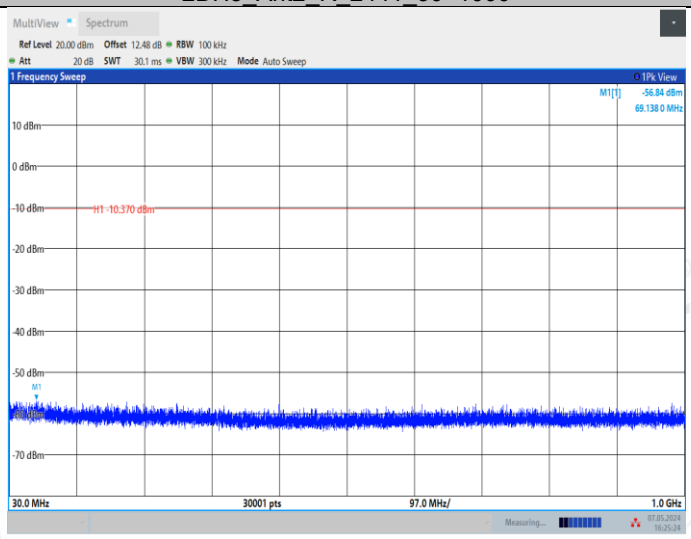

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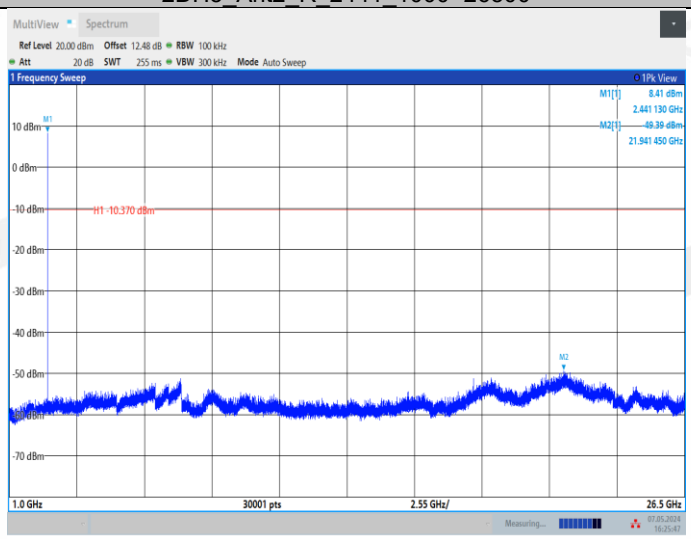

2DH5_Ant1_L_2480_0~Reference