CTC Laboratories, Inc.

Room 101 Building B, No. 7, Lanqing 1st Road, Luhu Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China

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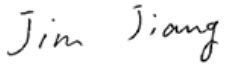
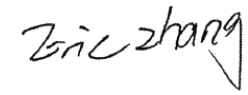
TEST REPORT

Report No. ·····:	**CTC2024205902**
FCC ID·····:	**2AQ5R-HM-5U**
Applicant·····:	**Shenzhen KTC Commercial Display Technology Co.,LTD.**
Address·····:	No.4023,Northern Wuhe Road,Bantian Street, Longgang District,Shenzhen City,Guangdong Province,P.R.
Manufacturer·····:	Shenzhen Bluesource Electronics Technology Co., Ltd
Address·····:	Building 5A1103, Huaqiang IdeaPark, Guangming District, Shenzhen, China
Product Name·····:	**Speakerphone**
Trade Mark·····:	/
Model/Type reference·····:	HM-5U
Listed Model(s) ·····:	/
Standard·····:	**FCC CFR Title 47 Part 15 Subpart C Section 15.247**
Date of receipt of test sample…:	Aug. 23, 2024
Date of testing……...:	Aug. 23, 2024 ~ Sept. 25, 2024
Date of issue……....:	Sept. 26, 2024
Result……:	**PASS**

Compiled by: (Printed name+signature)	Jim Jiang	
Supervised by: (Printed name+signature)	Eric Zhang	
Approved by: (Printed name+signature)	Totti Zhao	

Testing Laboratory Name……:	**CTC Laboratories, Inc.**
Address……:	Room 101 Building B, No. 7, Lanqing 1st Road, Luhu Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China

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1. TEST SUMMARY

1.1. Test Standards

The tests were performed according to following standards:

FCC Rules Part 15.247: Operation within the bands of 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz.
ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.

1.2. Report Version

Revised No.	Report No.	Date of issue	Description
01	CTC2024205902	Sept. 26, 2024	Original

1.3. Test Description

FCC Part 15 Subpart C (15.247)			
Test Item	**Standard Section**	**Result**	**Test Engineer**
	FCC		
Antenna Requirement	15.203	Pass	Jim Jiang
Conducted Emission	15.207	Pass	Jim Jiang
Restricted Bands	15.205	Pass	Jim Jiang
Hopping Channel Separation	15.247(a)(1)	Pass	Jim Jiang
Dwell Time	15.247(a)(iii)	Pass	Jim Jiang
Peak Output Power	15.247(b)(1)	Pass	Jim Jiang
Number of Hopping Frequency	15.247(a)(iii)	Pass	Jim Jiang
Conducted Band Edge and Spurious Emissions	15.247(d)	Pass	Jim Jiang
Radiated Band Edge and Spurious Emissions	15.205&15.209& 15.247(d)	Pass	Jim Jiang
Radiated Spurious Emission	15.247(d)&15.209	Pass	Jim Jiang
20dB Bandwidth	15.247(a)	Pass	Jim Jiang

Note: The measurement uncertainty is not included in the test result.

1.4. Test Facility

CTC Laboratories, Inc.

Add: Room 101 of Building B, Room 107, 108, 207, 208 of Building A, No. 7, Lanqing 1st Road, Luhu Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China

Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

A2LA-Lab Cert. No.: 4340.01

CTC Laboratories, Inc. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

Industry Canada (Registration No.: 9783A, CAB Identifier: CN0029)

CTC Laboratories, Inc. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 9783A on Jan, 2016.

FCC (Registration No.: 951311, Designation Number CN1208)

CTC Laboratories, Inc. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained inour files. Registration 951311, Aug 26, 2017.

1.5. Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01" Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the CTC Laboratories, Inc. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Below is the best measurement capability for CTC Laboratories, Inc.

Test Items	Measurement Uncertainty	Notes
RF output power	± 1.24 dB	(1)
Power Spectral Density	±1.88 dB	(1)
Duty Cycle	±0.566 dB	(1)
Tx-sequence	±0.566 dB	(1)
Tx-gap	±0.566 dB	(1)
Medium Utilization (MU) factor	±0.566 dB	(1)
Dwell time	±0.028%	(1)
Minimum Frequency Occupation	±0.028%	(1)
Hopping Sequence	±1.9%	(1)
Hopping Frequency Separation	±1.9%	(1)
Occupied Channel Bandwidth	±0.0196%	(1)
Transmitter unwanted emissions in the out-of-band domain	±1.328dB	(1)
Transmitter unwanted emissions in the spurious domain	30MHz~1GHz: ±0.746dB 1GHz~12.75GHz: ±1.328dB	(1)
Receiver spurious emissions	30MHz~1GHz: ±0.746dB 1GHz~12.75GHz: ±1.328dB	(1)

Note (1): This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

1.6. Environmental Conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	21°C ~ 27°C
Relative Humidity:	40% ~ 60%
Air Pressure:	101kPa

2. GENERAL INFORMATION

2.1. Client Information

Applicant:	Shenzhen KTC Commercial Display Technology Co.,LTD.
Address:	No.4023,Northern Wuhe Road,Bantian Street, Longgang District,Shenzhen City,Guangdong Province,P.R.
Manufacturer:	Shenzhen Bluesource Electronics Technology Co., Ltd
Address:	Building 5A1103, Huaqiang IdeaPark, Guangming District, Shenzhen, China

2.2. General Description of EUT

Product Name:	Speakerphone
Trade Mark:	/
Model/Type reference:	HM-5U
Listed Model(s):	/
Model Difference:	/
Power supply:	DC 15V 2.4A from adapter
Hardware version:	/
Software version:	/
Bluetooth 5.0/ BR/EDR	
Modulation:	GFSK, π/4-DQPSK
Operation frequency:	2402MHz~2480MHz
Channel number:	79
Channel separation:	1MHz
Antenna type:	PCB Antenna
Antenna gain:	1.72dBi

Note: The EUT contains two Bluetooth modules with the same PCB, layout and electrical circuit. This report only records the test data of one module.

2.3. Accessory Equipment Information

Equipment Information			
Name	Model	S/N	Manufacturer
Notebook	ThinkBook 14 G3 ACL	/	Lenovo
USB TO TTL	/	/	/
Adapter	FJ-SW248G1502400N	/	FUJIA
Cable Information			
Name	Shielded Type	Ferrite Core	Length
USB Cable	Unshielded	Without	100cm
Test Software Information			
Name	/	/	/
FCC assist	1.0.2.2	/	/

2.4. Operation State

Operation Frequency List: The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing. BT EDR, 79 channels are provided to the EUT. Channels 00/39/78 were selected for testing.

Operation Frequency List:

Channel	Frequency (MHz)
00	**2402**
01	2403
⋮	⋮
38	2440
39	**2441**
40	2442
⋮	⋮
77	2479
78	**2480**

Note: The display in grey were the channel selected for testing.

Test mode

For RF test items:
The engineering test program was provided and enabled to make EUT continuous transmit
For AC power line conducted emissions:
The EUT was set to connect with the Bluetooth instrument under large package sizes transmission.
For Radiated spurious emissions test item:
The engineering test program was provided and enabled to make EUT continuous transmit. The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

2.5. Measurement Instruments List

RF Test System - SRD					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated Until
1	Spectrum Analyzer	Keysight	N9020A	MY52091402	Aug. 21, 2025
2	USB Wideband Power Sensor	Keysight	U2021XA	MY55130004	Mar. 21 2025
3	USB Wideband Power Sensor	Keysight	U2021XA	MY55130006	Mar. 21 2025
4	Test Software	Tonscend	JS1120-3	V3.3.38	/

Radiated emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated Until
1	Trilog-Broadband Antenna	Schwarzbeck	VULB 9163	01026	Dec. 18, 2024
2	Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-647	Sep. 25, 2025
3	Test Receiver	Keysight	N9038A	MY56400071	Dec. 12, 2024
4	Broadband Amplifier	SCHWARZBECK	BBV9743B	259	Dec. 12, 2024
5	Mirowave Broadband Amplifier	SCHWARZBECK	BBV9718C	111	Dec. 12, 2024
6	3m chamber 3	YIHENG	EE106	/	Aug. 28, 2026
7	Test Software	FARA	EZ-EMC	FA-03A2	/

Conducted emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	LISN	R&S	ENV216	101112	Dec. 12, 2024
2	LISN	R&S	ENV216	101113	Dec. 12, 2024
3	EMI Test Receiver	R&S	ESCS30	100353	Dec. 12, 2024
4	ISN CAT6	Schwarzbeck	NTFM 8158	CAT6-8158-0046	Dec. 12, 2024
5	ISN CAT5	Schwarzbeck	NTFM 8158	CAT5-8158-0046	Dec. 12, 2024
6	Test Software	R&S	EMC32	6.10.10	/

Note: 1. The Cal. Interval was one year.

2. The cable loss has calculated in test result which connection between each test instruments.

3. TEST ITEM AND RESULTS

3.1. Conducted Emission

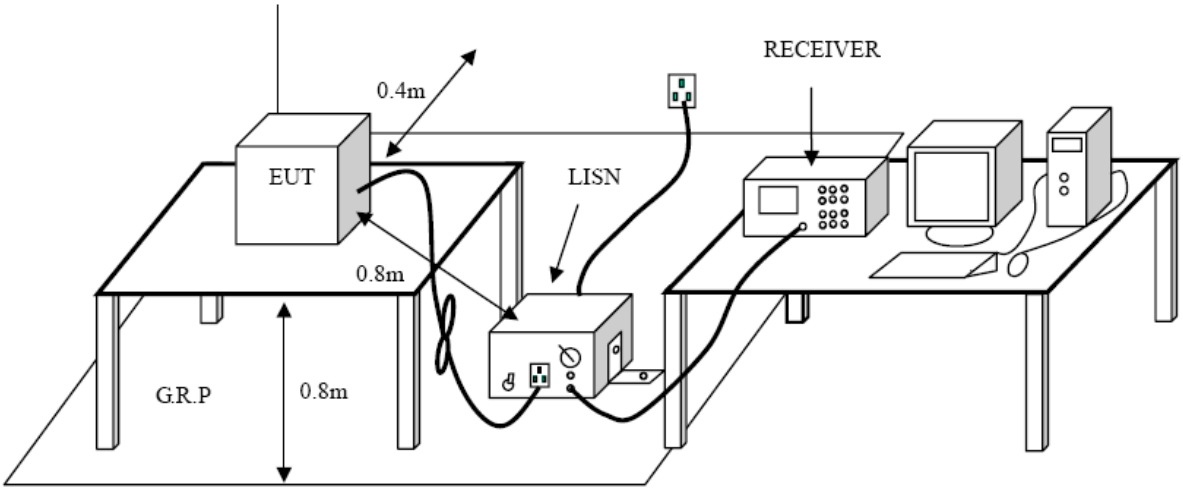
Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.207

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

Test Configuration



Test Procedure

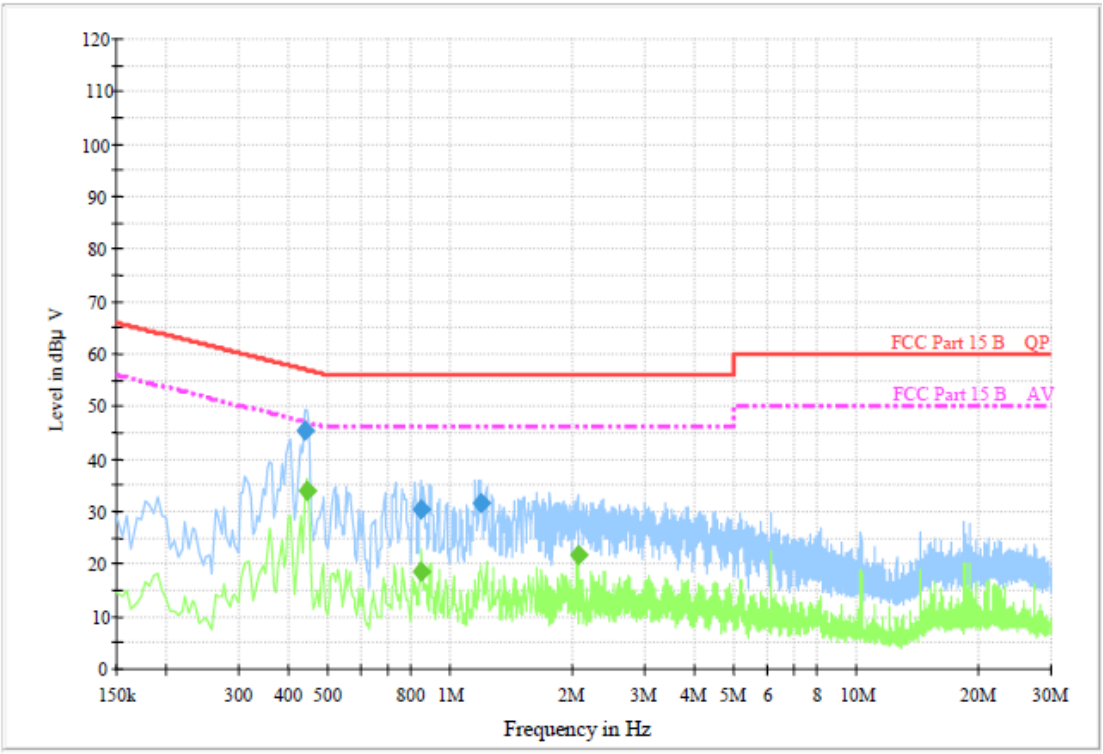
1. The EUT was setup according to ANSI C63.10:2013 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
4. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
5. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
6. Conducted Emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
7. During the above scans, the emissions were maximized by cable manipulation.

Test Mode

Please refer to the clause 2.4.

Test Results

Test Voltage:	AC 120V/60 Hz
Terminal:	Line



Final Measurement Detector 1

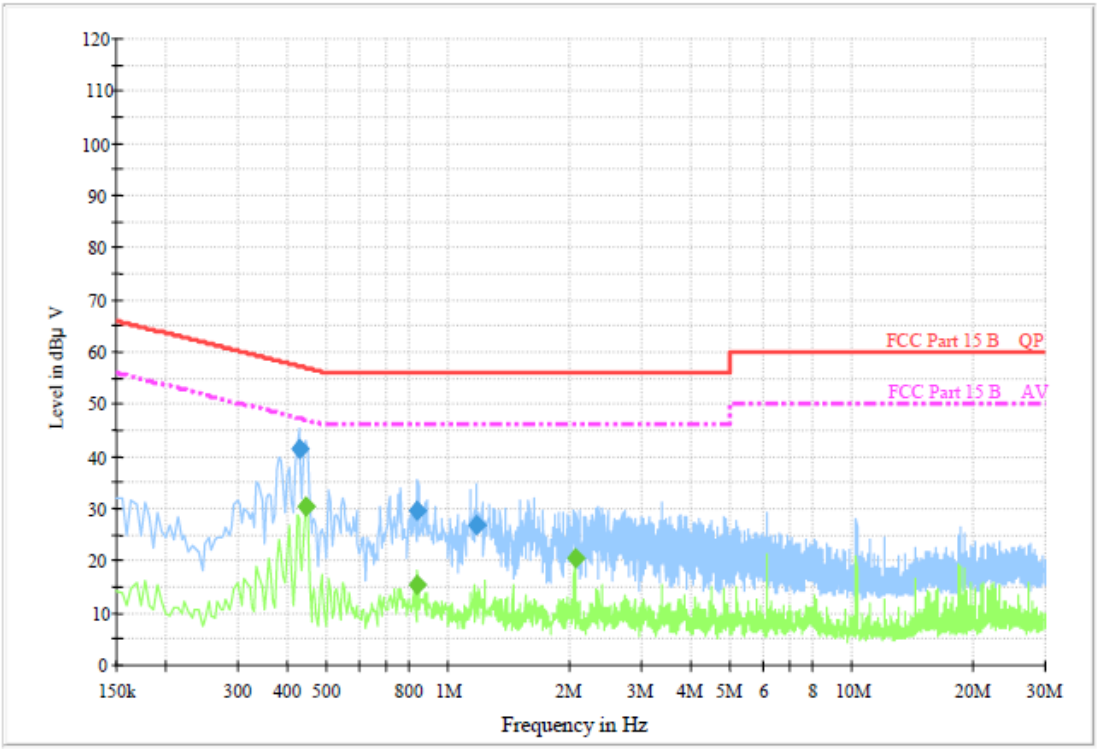
Frequency (MHz)	QuasiPeak (dBµ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)	Comment
0.438000	45.3	1000.00	9.000	On	L1	9.5	11.8	57.1	
0.843000	30.6	1000.00	9.000	On	L1	9.5	25.4	56.0	
1.185000	31.4	1000.00	9.000	On	L1	9.6	24.6	56.0	

Final Measurement Detector 2

Frequency (MHz)	Average (dBµ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)	Comment
0.442500	33.9	1000.00	9.000	On	L1	9.5	13.1	47.0	
0.847500	18.6	1000.00	9.000	On	L1	9.5	27.4	46.0	
2.049000	21.8	1000.00	9.000	On	L1	9.5	24.2	46.0	

Emission Level= Read Level+ Correct Factor

Test Voltage:	AC 120V/60 Hz
Terminal:	Neutral



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)	Comment
0.424500	41.5	1000.00	9.000	On	N	9.4	15.9	57.4	
0.838500	29.7	1000.00	9.000	On	N	9.4	26.3	56.0	
1.171500	26.8	1000.00	9.000	On	N	9.5	29.2	56.0	

Final Measurement Detector 2

Frequency (MHz)	Average (dBµ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)	Comment
0.442500	30.3	1000.00	9.000	On	N	9.4	16.7	47.0	
0.838500	15.5	1000.00	9.000	On	N	9.4	30.5	46.0	
2.049000	20.7	1000.00	9.000	On	N	9.4	25.3	46.0	

Emission Level= Read Level+ Correct Factor

3.2. Radiated Emission

Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.209

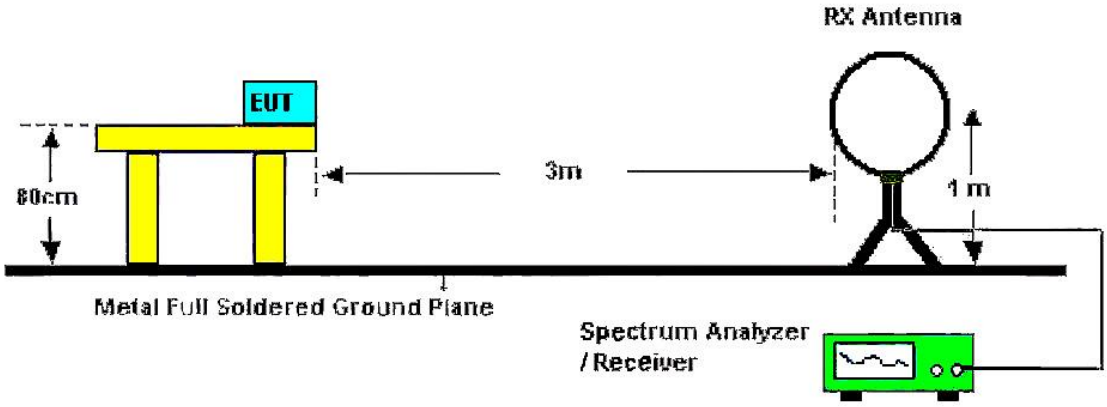
Frequency	Limit (dBuV/m @3m)	Value
30 MHz ~ 88 MHz	40.00	Quasi-peak
88 MHz ~ 216 MHz	43.50	Quasi-peak
216 MHz ~ 960 MHz	46.00	Quasi-peak
960 MHz ~ 1 GHz	54.00	Quasi-peak
Above 1 GHz	54.00	Average
	74.00	Peak

Note:

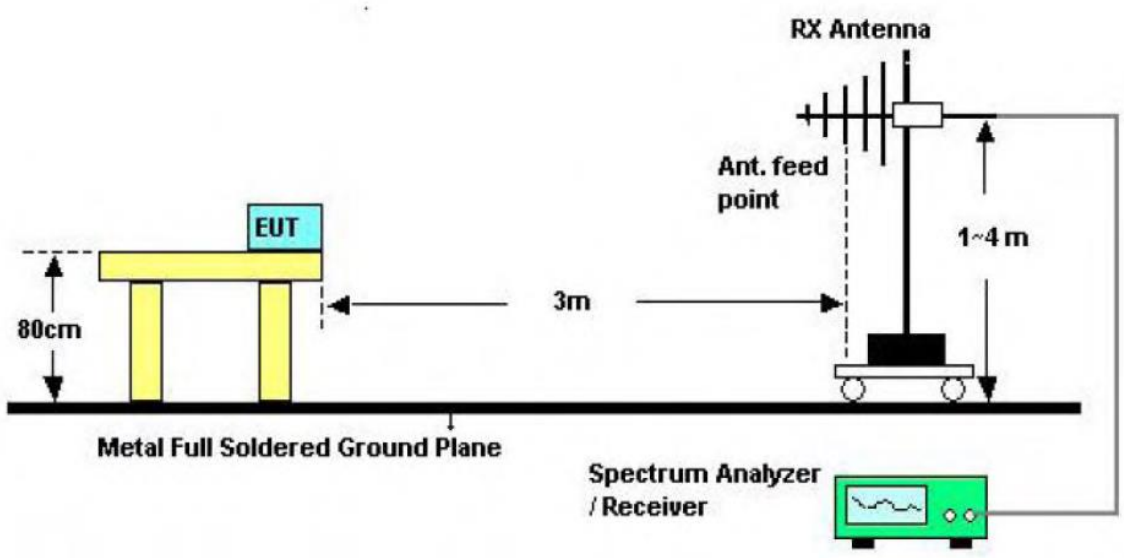
(1) The tighter limit applies at the band edges.

(2) Emission Level (dBuV/m)=20log Emission Level (uV/m).

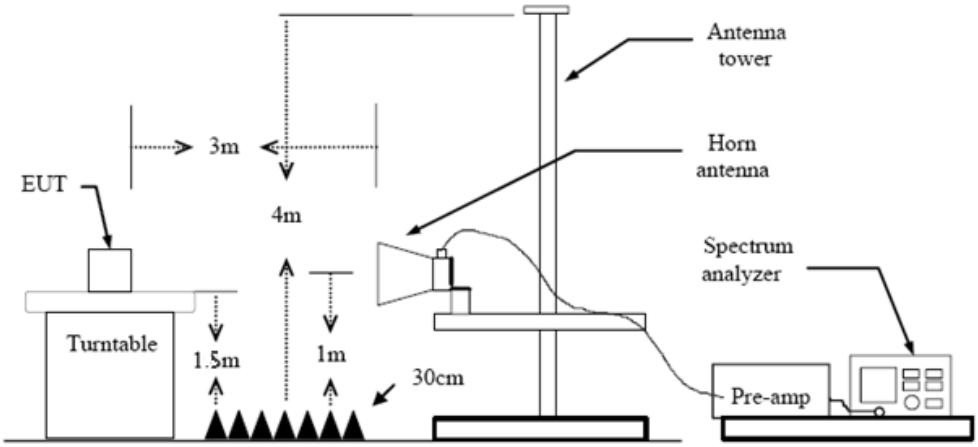
Test Configuration



Below 30MHz Test Setup



Below 1000MHz Test Setup



Above 1GHz Test Setup

Test Procedure

1. The EUT was setup and tested according to ANSI C63.10:2013
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings

(1) Span shall wide enough to fully capture the emission being measured;
(2) 9k – 150kHz:
RBW=300 Hz, VBW=1 kHz, Sweep=auto, Detector function=peak, Trace=max hold
(3) 0.15M – 30MHz:
RBW=10 kHz, VBW=30 kHz, Sweep=auto, Detector function=peak, Trace=max hold
(4) 30M - 1 GHz:
RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold
If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
(5) From 1 GHz to 10th harmonic:
RBW=1MHz, VBW=3MHz Peak detector for Peak value.
RBW=1MHz, VBW see note 1 with Peak Detector for Average Value.
Note 1: For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause 3.8 Duty Cycle.

Test Mode

Please refer to the clause 2.4.

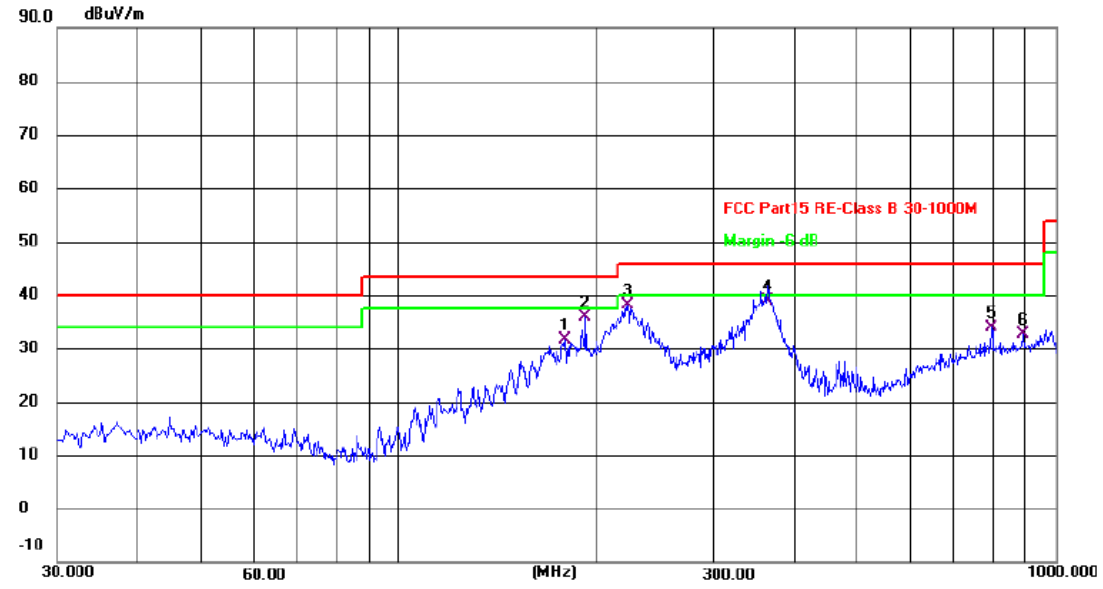
Test Result

9 KHz~30 MHz

From 9 KHz to 30 MHz: Conclusion: PASS
Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

30MHz-1GHz

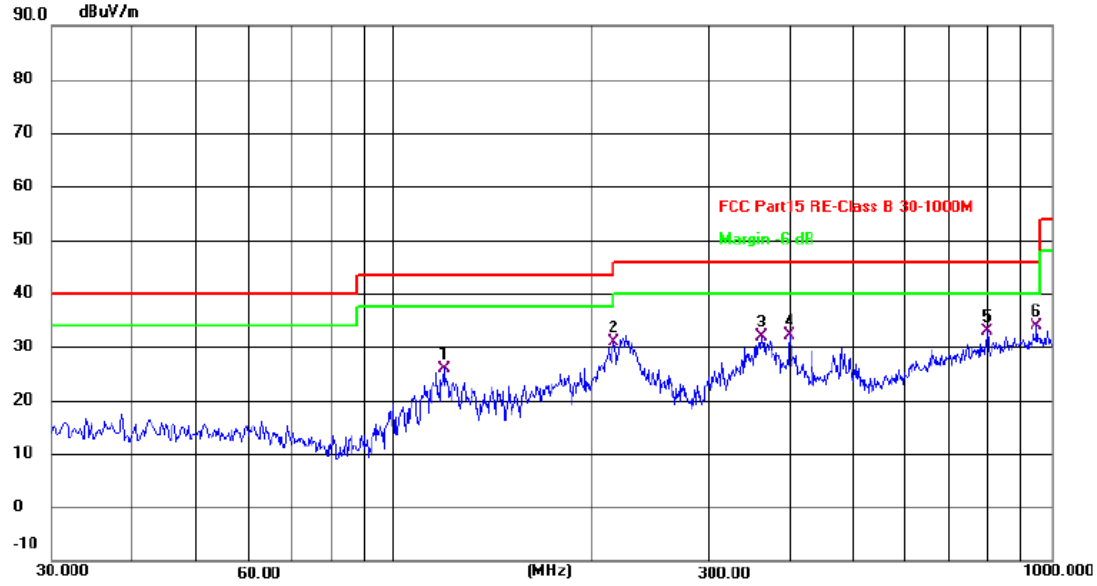
Ant. Pol.	Horizontal
Test Mode:	TX GFSK Mode 2402MHz
Remark:	Only worse case is reported



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	179.3800	49.18	-17.67	31.51	43.50	-11.99	QP
2	191.9900	54.73	-18.97	35.76	43.50	-7.74	QP
3	222.7066	56.64	-18.57	38.07	46.00	-7.93	QP
4 *	363.0333	52.86	-13.98	38.88	46.00	-7.12	QP
5	797.2700	37.72	-3.83	33.89	46.00	-12.11	QP
6	893.6233	35.50	-2.78	32.72	46.00	-13.28	QP

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX GFSK Mode 2402MHz
Remark:	Only worse case is reported



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	118.9166	44.05	-18.16	25.89	43.50	-17.61	QP
2	215.9166	49.58	-18.80	30.78	43.50	-12.72	QP
3	362.7100	45.91	-13.99	31.92	46.00	-14.08	QP
4	399.2466	45.07	-12.95	32.12	46.00	-13.88	QP
5	797.2700	36.59	-3.83	32.76	46.00	-13.24	QP
6 *	950.5300	35.57	-1.69	33.88	46.00	-12.12	QP

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

Above 1GHz

Ant. Pol.	Horizontal
Test Mode:	TX GFSK Mode 2402MHz (BT Module 1)
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4387.917	40.59	1.11	41.70	74.00	-32.30	peak
2	6416.750	38.76	7.11	45.87	74.00	-28.13	peak
3	8050.000	39.24	10.75	49.99	74.00	-24.01	peak
4	9957.417	39.17	13.13	52.30	74.00	-21.70	peak
5 *	11120.667	38.42	14.73	53.15	74.00	-20.85	peak
6	12444.500	37.32	15.62	52.94	74.00	-21.06	peak

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX GFSK Mode 2402MHz (BT Module 1)
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4293.917	40.81	0.91	41.72	74.00	-32.28	peak
2	6428.500	40.24	7.14	47.38	74.00	-26.62	peak
3	8136.167	39.79	10.52	50.31	74.00	-23.69	peak
4	9522.667	38.48	12.59	51.07	74.00	-22.93	peak
5 *	10815.167	38.49	14.47	52.96	74.00	-21.04	peak
6	12201.667	37.23	15.72	52.95	74.00	-21.05	peak

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

Ant. Pol.	Horizontal
Test Mode:	TX GFSK Mode 2441MHz (BT Module 1)
Remark:	No report for the emission which more than 20 dB below the pre-scribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	3968.833	41.55	0.42	41.97	74.00	-32.03	peak
2	6369.750	39.35	6.94	46.29	74.00	-27.71	peak
3	7388.083	39.35	10.09	49.44	74.00	-24.56	peak
4	8915.583	39.48	11.57	51.05	74.00	-22.95	peak
5	10396.083	38.96	13.88	52.84	74.00	-21.16	peak
6 *	12001.917	37.81	15.45	53.26	74.00	-20.74	peak

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX GFSK Mode 2441MHz (BT Module 1)
Remark:	No report for the emission which more than 20 dB below the pre-scribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	3953.167	41.40	0.36	41.76	74.00	-32.24	peak
2	5974.167	40.04	5.56	45.60	74.00	-28.40	peak
3	7932.500	40.04	10.71	50.75	74.00	-23.25	peak
4	9197.583	39.33	12.35	51.68	74.00	-22.32	peak
5	10760.333	38.10	14.37	52.47	74.00	-21.53	peak
6 *	11927.500	37.76	15.32	53.08	74.00	-20.92	peak

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

Ant. Pol.	Horizontal
Test Mode:	TX GFSK Mode 2480MHz (BT Module 1)
Remark:	No report for the emission which more than 20 dB below the pre-scribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	3949.250	41.00	0.34	41.34	74.00	-32.66	peak
2	7329.333	38.52	10.07	48.59	74.00	-25.41	peak
3	9319.000	38.68	12.47	51.15	74.00	-22.85	peak
4	10372.583	38.82	13.84	52.66	74.00	-21.34	peak
5	11375.250	37.92	14.84	52.76	74.00	-21.24	peak
6 *	12409.250	37.56	15.52	53.08	74.00	-20.92	peak

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX GFSK Mode 2480MHz (BT Module 1)
Remark:	No report for the emission which more than 20 dB below the pre-scribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4203.833	41.22	0.74	41.96	74.00	-32.04	peak
2	6424.583	39.66	7.13	46.79	74.00	-27.21	peak
3	7854.167	39.45	10.54	49.99	74.00	-24.01	peak
4	8939.083	39.51	11.61	51.12	74.00	-22.88	peak
5	10744.667	38.26	14.35	52.61	74.00	-21.39	peak
6 *	12021.500	37.46	15.48	52.94	74.00	-21.06	peak

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

Ant. Pol.	Horizontal
Test Mode:	TX π/4-DQPSK Mode 2402MHz (BT Module 1)
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	3933.583	42.59	0.28	42.87	74.00	-31.13	peak
2	7235.333	39.05	10.03	49.08	74.00	-24.92	peak
3	8328.083	40.04	10.48	50.52	74.00	-23.48	peak
4	9953.500	39.62	13.13	52.75	74.00	-21.25	peak
5	11011.000	38.36	14.68	53.04	74.00	-20.96	peak
6 *	12233.000	37.51	15.69	53.20	74.00	-20.80	peak

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX π/4-DQPSK Mode 2402MHz (BT Module 1)
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	3894.417	41.07	0.13	41.20	74.00	-32.80	peak
2	7086.500	39.11	9.40	48.51	74.00	-25.49	peak
3	8508.250	39.63	10.76	50.39	74.00	-23.61	peak
4	10020.083	38.83	13.22	52.05	74.00	-21.95	peak
5	10823.000	37.81	14.48	52.29	74.00	-21.71	peak
6 *	12088.083	37.70	15.57	53.27	74.00	-20.73	peak

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

Ant. Pol.	Horizontal
Test Mode:	TX π/4-DQPSK Mode 2441MHz (BT Module 1)
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4023.667	40.40	0.56	40.96	74.00	-33.04	peak
2	6083.833	40.11	5.91	46.02	74.00	-27.98	peak
3	7278.417	39.08	10.05	49.13	74.00	-24.87	peak
4	9648.000	38.74	12.68	51.42	74.00	-22.58	peak
5 *	11061.917	38.14	14.70	52.84	74.00	-21.16	peak
6	12417.083	37.25	15.55	52.80	74.00	-21.20	peak

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX π/4-DQPSK Mode 2441MHz (BT Module 1)
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4317.417	41.40	0.96	42.36	74.00	-31.64	peak
2	7278.417	39.44	10.05	49.49	74.00	-24.51	peak
3	8488.667	40.56	10.71	51.27	74.00	-22.73	peak
4	9969.167	38.56	13.14	51.70	74.00	-22.30	peak
5	10897.417	38.51	14.56	53.07	74.00	-20.93	peak
6 *	11896.167	37.96	15.26	53.22	74.00	-20.78	peak

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

Ant. Pol.	Horizontal
Test Mode:	TX π/4-DQPSK Mode 2480MHz (BT Module 1)
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4008.000	40.46	0.55	41.01	74.00	-32.99	peak
2	7192.250	39.03	9.98	49.01	74.00	-24.99	peak
3	8751.083	39.59	11.31	50.90	74.00	-23.10	peak
4	10415.667	38.72	13.90	52.62	74.00	-21.38	peak
5 *	11175.500	38.15	14.75	52.90	74.00	-21.10	peak
6	12287.833	37.28	15.62	52.90	74.00	-21.10	peak

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX π/4-DQPSK Mode 2480MHz (BT Module 1)
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	3906.167	41.94	0.17	42.11	74.00	-31.89	peak
2	6604.750	38.90	7.59	46.49	74.00	-27.51	peak
3	8363.333	39.86	10.50	50.36	74.00	-23.64	peak
4	9260.250	38.49	12.42	50.91	74.00	-23.09	peak
5 *	10396.083	39.65	13.88	53.53	74.00	-20.47	peak
6	12374.000	37.50	15.52	53.02	74.00	-20.98	peak

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

Ant. Pol.	Horizontal
Test Mode:	TX GFSK Mode 2402MHz (BT Module 2)
Remark:	No report for the emission which more than 20 dB below the pre-scribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1195.833	48.74	-7.73	41.01	74.00	-32.99	peak
2	4826.583	40.84	2.02	42.86	74.00	-31.14	peak
3	6867.167	38.88	8.25	47.13	74.00	-26.87	peak
4	9381.667	39.47	12.53	52.00	74.00	-22.00	peak
5	11011.000	38.36	14.68	53.04	74.00	-20.96	peak
6 *	12648.167	37.08	16.19	53.27	74.00	-20.73	peak

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX GFSK Mode 2402MHz (BT Module 2)
Remark:	No report for the emission which more than 20 dB below the pre-scribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1195.833	50.73	-7.73	43.00	74.00	-31.00	peak
2	5186.917	41.24	2.84	44.08	74.00	-29.92	peak
3	7536.917	38.95	10.08	49.03	74.00	-24.97	peak
4	9413.000	39.07	12.54	51.61	74.00	-22.39	peak
5	10823.000	38.11	14.48	52.59	74.00	-21.41	peak
6 *	12475.833	37.86	15.71	53.57	74.00	-20.43	peak

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

Ant. Pol.	Horizontal
Test Mode:	TX GFSK Mode 2441MHz (BT Module 2)
Remark:	No report for the emission which more than 20 dB below the pre-scribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1207.583	49.73	-7.69	42.04	74.00	-31.96	peak
2	5942.833	39.48	5.44	44.92	74.00	-29.08	peak
3	7799.333	39.17	10.42	49.59	74.00	-24.41	peak
4	9366.000	39.44	12.51	51.95	74.00	-22.05	peak
5	11061.917	38.14	14.70	52.84	74.00	-21.16	peak
6 *	12671.667	37.06	16.24	53.30	74.00	-20.70	peak

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX GFSK Mode 2441MHz (BT Module 2)
Remark:	No report for the emission which more than 20 dB below the pre-scribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1195.833	48.92	-7.73	41.19	74.00	-32.81	peak
2	3216.833	42.70	-1.94	40.76	74.00	-33.24	peak
3	6048.583	39.37	5.80	45.17	74.00	-28.83	peak
4	8645.333	40.48	11.11	51.59	74.00	-22.41	peak
5	10403.917	38.52	13.89	52.41	74.00	-21.59	peak
6 *	11896.167	37.96	15.26	53.22	74.00	-20.78	peak

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

Ant. Pol.	Horizontal
Test Mode:	TX GFSK Mode 2480MHz (BT Module 2)
Remark:	No report for the emission which more than 20 dB below the pre-scribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1199.750	51.04	-7.71	43.33	74.00	-30.67	peak
2	4008.000	39.96	0.55	40.51	74.00	-33.49	peak
3	5942.833	39.62	5.44	45.06	74.00	-28.94	peak
4	8406.417	40.08	10.55	50.63	74.00	-23.37	peak
5	10309.917	38.78	13.74	52.52	74.00	-21.48	peak
6 *	11880.500	38.09	15.23	53.32	74.00	-20.68	peak

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX GFSK Mode 2480MHz (BT Module 2)
Remark:	No report for the emission which more than 20 dB below the pre-scribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1195.833	52.88	-7.73	45.15	74.00	-28.85	peak
2	3929.667	41.26	0.26	41.52	74.00	-32.48	peak
3	6412.833	39.51	7.10	46.61	74.00	-27.39	peak
4	8363.333	40.16	10.50	50.66	74.00	-23.34	peak
5	10834.750	38.74	14.50	53.24	74.00	-20.76	peak
6 *	12444.500	37.87	15.62	53.49	74.00	-20.51	peak

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

Ant. Pol.	Horizontal
Test Mode:	TX π/4-DQPSK Mode 2402MHz (BT Module 2)
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	3216.833	42.90	-1.94	40.96	74.00	-33.04	peak
2	6134.750	39.66	6.06	45.72	74.00	-28.28	peak
3	8755.000	39.65	11.31	50.96	74.00	-23.04	peak
4	9937.833	38.78	13.11	51.89	74.00	-22.11	peak
5	11116.750	38.29	14.72	53.01	74.00	-20.99	peak
6 *	12354.417	38.05	15.54	53.59	74.00	-20.41	peak

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX π/4-DQPSK Mode 2402MHz (BT Module 2)
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1199.750	48.27	-7.71	40.56	74.00	-33.44	peak
2	4274.333	41.44	0.88	42.32	74.00	-31.68	peak
3	7137.417	38.20	9.68	47.88	74.00	-26.12	peak
4	8802.000	39.75	11.41	51.16	74.00	-22.84	peak
5	10176.750	38.65	13.54	52.19	74.00	-21.81	peak
6 *	12295.667	37.66	15.62	53.28	74.00	-20.72	peak

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

Ant. Pol.	Horizontal
Test Mode:	TX π/4-DQPSK Mode 2441MHz (BT Module 2)
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1199.750	49.27	-7.71	41.56	74.00	-32.44	peak
2	3921.833	41.99	0.24	42.23	74.00	-31.77	peak
3	6373.667	38.50	6.96	45.46	74.00	-28.54	peak
4	8308.500	39.65	10.45	50.10	74.00	-23.90	peak
5	10168.917	39.38	13.52	52.90	74.00	-21.10	peak
6 *	12319.167	37.99	15.59	53.58	74.00	-20.42	peak

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX π/4-DQPSK Mode 2441MHz (BT Module 2)
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1195.833	49.20	-7.73	41.47	74.00	-32.53	peak
2	4818.750	40.75	2.01	42.76	74.00	-31.24	peak
3	6330.583	40.01	6.79	46.80	74.00	-27.20	peak
4	8046.083	39.69	10.75	50.44	74.00	-23.56	peak
5	9945.667	39.35	13.11	52.46	74.00	-21.54	peak
6 *	12554.167	37.80	15.94	53.74	74.00	-20.26	peak

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

Ant. Pol.	Horizontal
Test Mode:	TX π/4-DQPSK Mode 2480MHz (BT Module 2)
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1497.417	52.43	-6.88	45.55	74.00	-28.45	peak
2	3937.500	41.27	0.30	41.57	74.00	-32.43	peak
3	6005.500	39.90	5.66	45.56	74.00	-28.44	peak
4	8324.167	40.82	10.46	51.28	74.00	-22.72	peak
5	10067.083	39.18	13.31	52.49	74.00	-21.51	peak
6 *	11841.333	38.37	15.16	53.53	74.00	-20.47	peak

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX π/4-DQPSK Mode 2480MHz (BT Module 2)
Remark:	No report for the emission which more than 20 dB below the prescribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1497.417	51.37	-6.88	44.49	74.00	-29.51	peak
2	4834.417	40.37	2.03	42.40	74.00	-31.60	peak
3	6424.583	39.28	7.13	46.41	74.00	-27.59	peak
4	8833.333	39.80	11.46	51.26	74.00	-22.74	peak
5	11199.000	38.25	14.76	53.01	74.00	-20.99	peak
6 *	12511.083	37.51	15.82	53.33	74.00	-20.67	peak

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

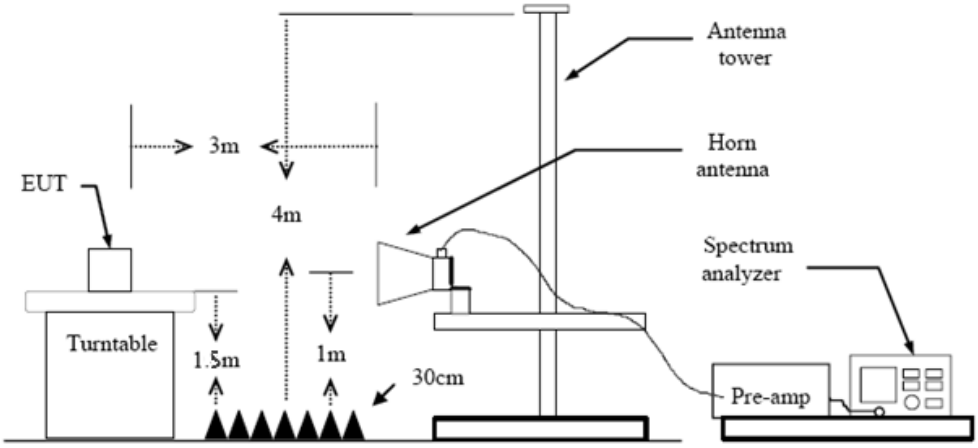
3.3. Band Edge Emissions (Radiated)

Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):

Restricted Frequency Band (MHz)	(dBuV/m)(at 3m)	
	Peak	Average
2310 ~ 2390	74	54
2483.5 ~ 2500	74	54

Test Configuration



Test Procedure

1. The EUT was setup and tested according to ANSI C63.10:2013 requirements.
2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.
5. The receiver set as follow:
   RBW=1MHz, VBW=3MHz Peak detector for Peak value.
   RBW=1MHz, VBW see note 1 with Peak Detector for Average Value.

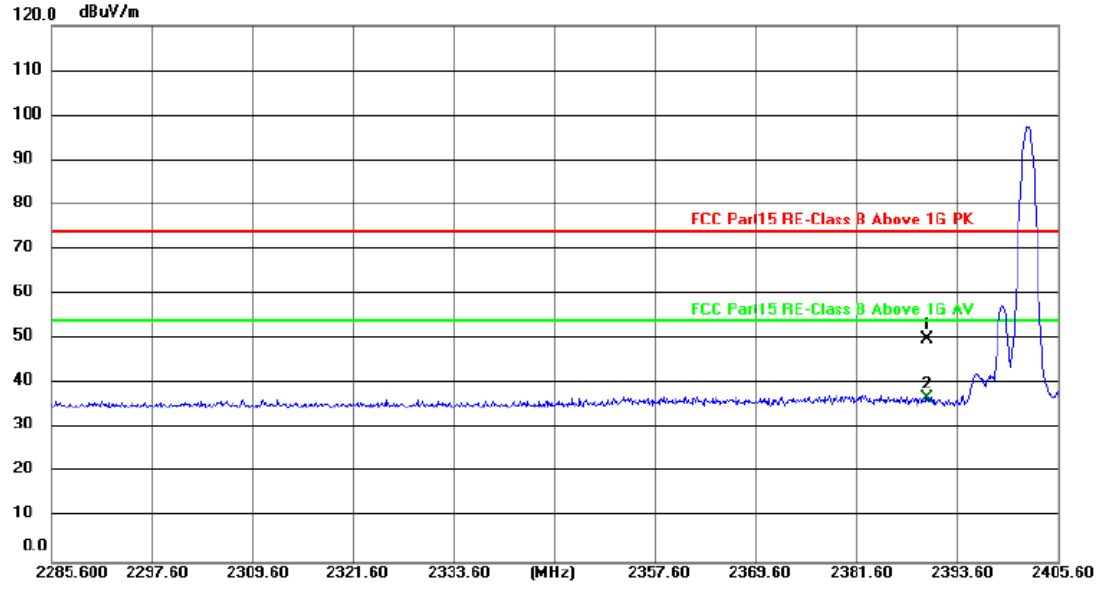
   Note 1: For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause 3.10 Duty Cycle.

Test Mode

Please refer to the clause 2.4.

Test Results

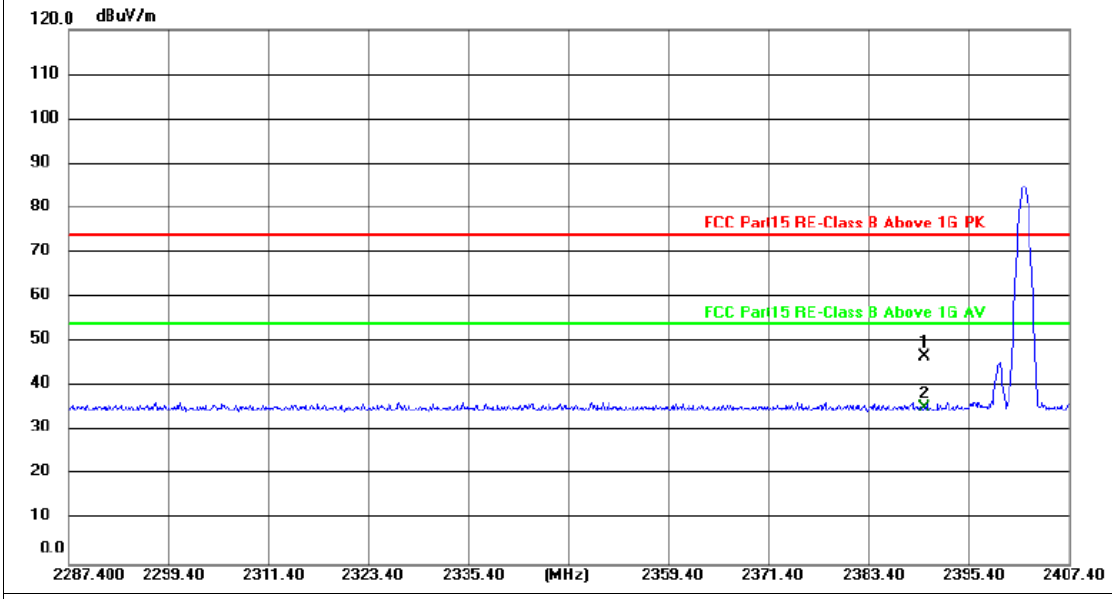
Ant. Pol.	Horizontal
Test Mode:	GFSK Mode 2402MHz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2390.000	18.78	31.31	50.09	74.00	-23.91	peak
2 *	2390.000	5.47	31.31	36.78	54.00	-17.22	AVG

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

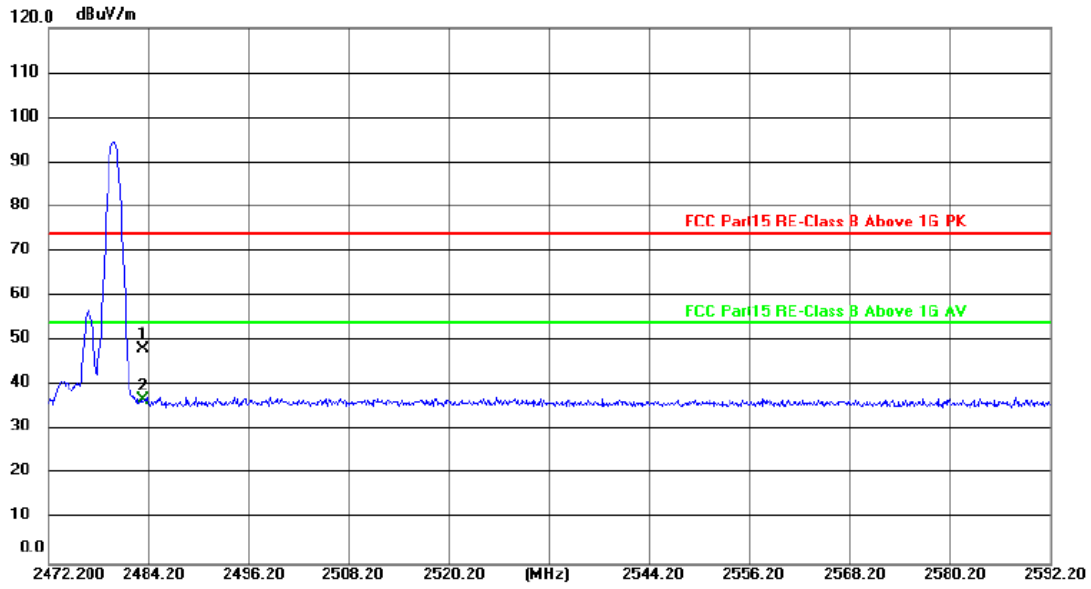
Ant. Pol.	Vertical
Test Mode:	GFSK Mode 2402MHz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2390.000	15.42	31.31	46.73	74.00	-27.27	peak
2 *	2390.000	3.80	31.31	35.11	54.00	-18.89	AVG

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

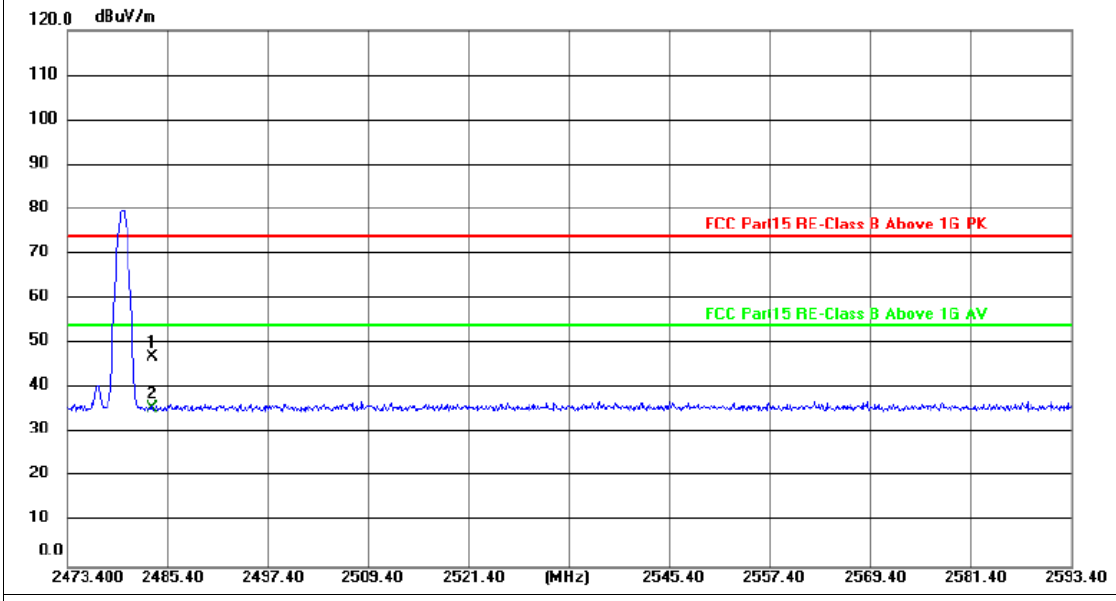
Ant. Pol.	Horizontal
Test Mode:	GFSK Mode 2480 MHz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2483.500	16.54	31.48	48.02	74.00	-25.98	peak
2 *	2483.500	5.16	31.48	36.64	54.00	-17.36	AVG

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

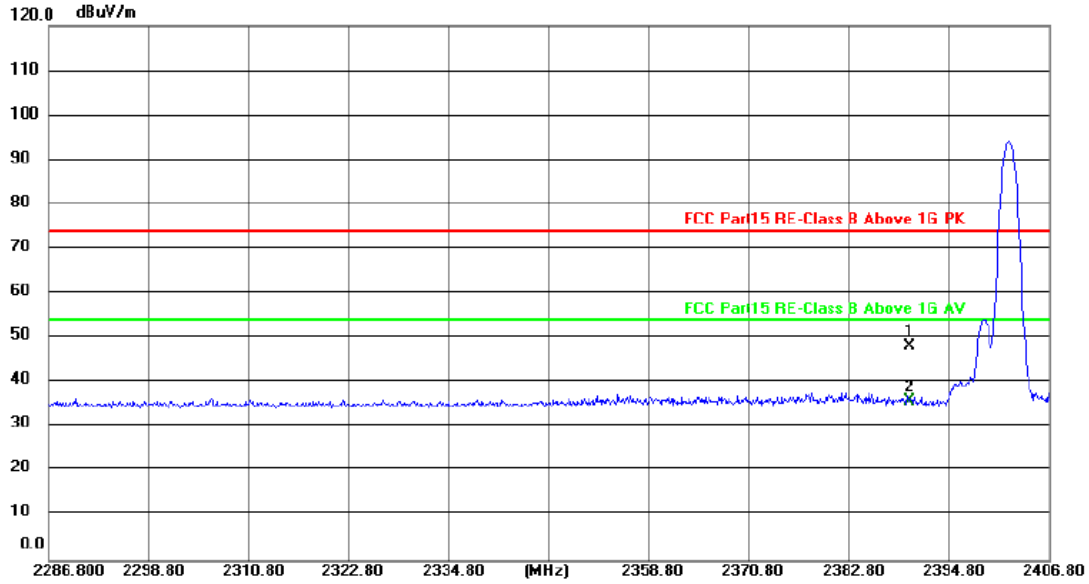
Ant. Pol.	Vertical
Test Mode:	GFSK Mode 2480 MHz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2483.500	15.50	31.48	46.98	74.00	-27.02	peak
2 *	2483.500	4.03	31.48	35.51	54.00	-18.49	AVG

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

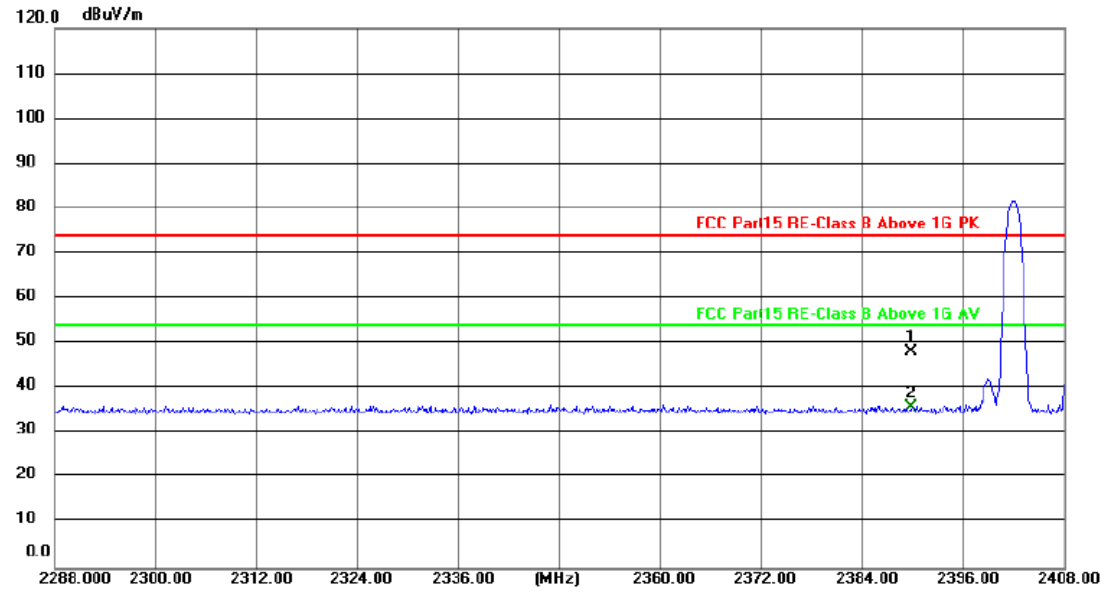
Ant. Pol.	Horizontal
Test Mode:	π/4-DQPSK Mode 2402MHz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2390.000	16.93	31.31	48.24	74.00	-25.76	peak
2 *	2390.000	4.54	31.31	35.85	54.00	-18.15	AVG

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

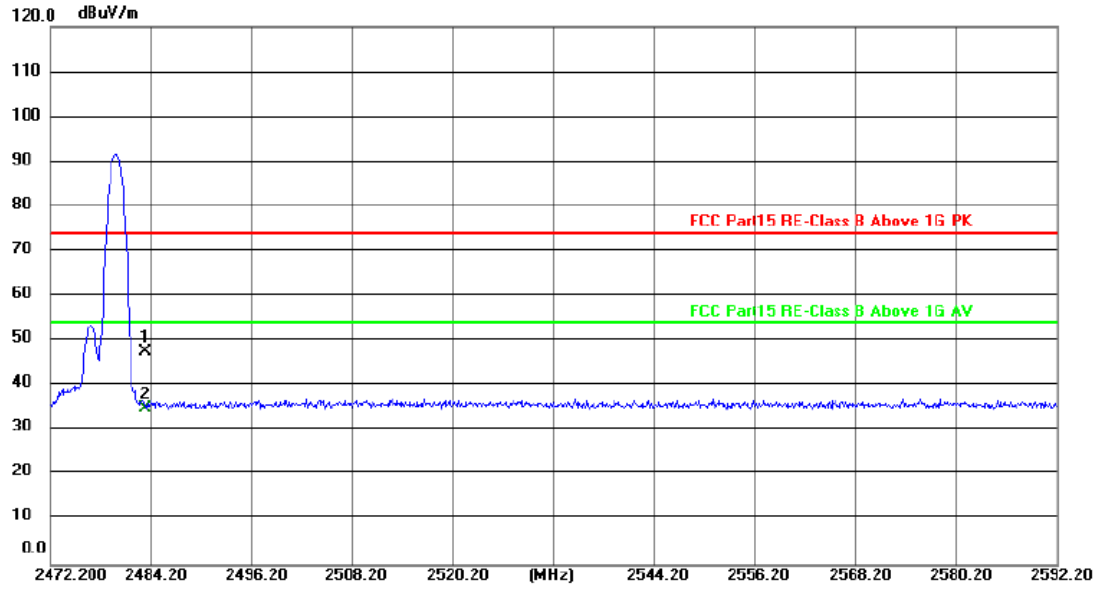
Ant. Pol.	Vertical
Test Mode:	π/4-DQPSK Mode 2402MHz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2390.000	16.85	31.31	48.16	74.00	-25.84	peak
2 *	2390.000	4.41	31.31	35.72	54.00	-18.28	AVG

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

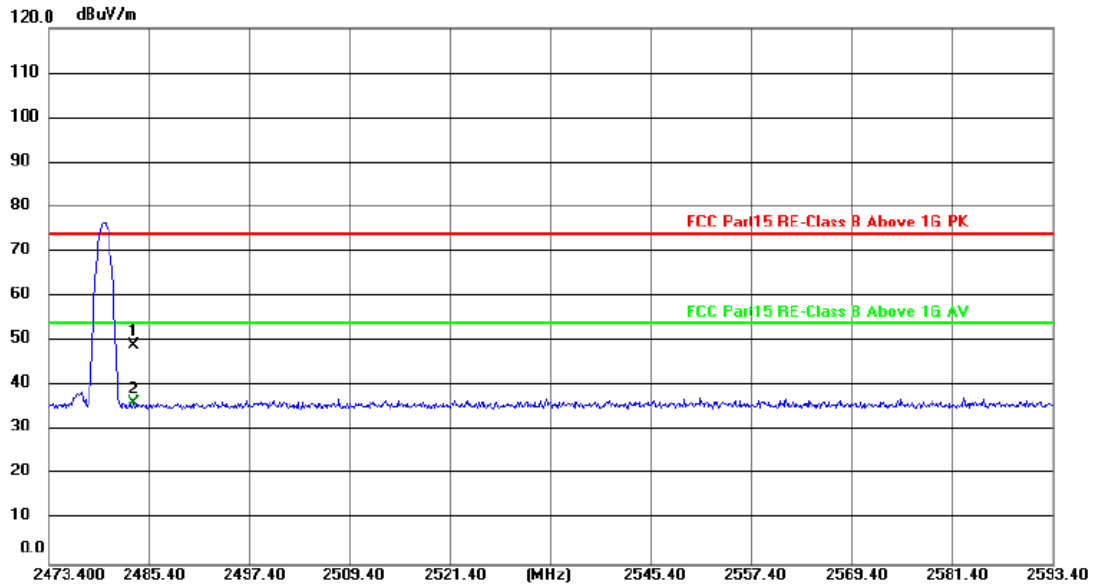
Ant. Pol.	Horizontal
Test Mode:	π/4-DQPSK Mode 2480MHz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2483.500	16.01	31.48	47.49	74.00	-26.51	peak
2 *	2483.500	3.61	31.48	35.09	54.00	-18.91	AVG

Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	π/4-DQPSK Mode 2480MHz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2483.500	17.58	31.48	49.06	74.00	-24.94	peak
2 *	2483.500	4.54	31.48	36.02	54.00	-17.98	AVG

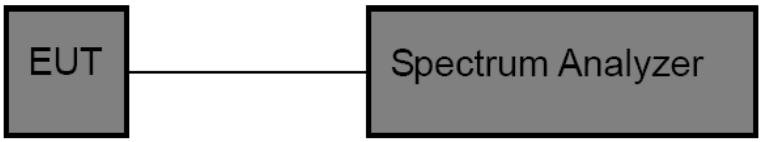
Remarks:
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2.Margin value = Level -Limit value

3.4. Band edge and Spurious Emissions (Conducted)

Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.

Test Configuration



Test Procedure

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
   RBW = 100 kHz, VBW ≥ RBW, scan up through 10th harmonic.
   Sweep = auto, Detector function = peak, Trace = max hold
4. Measure and record the results in the test report.

Test Mode

Please refer to the clause 2.4.

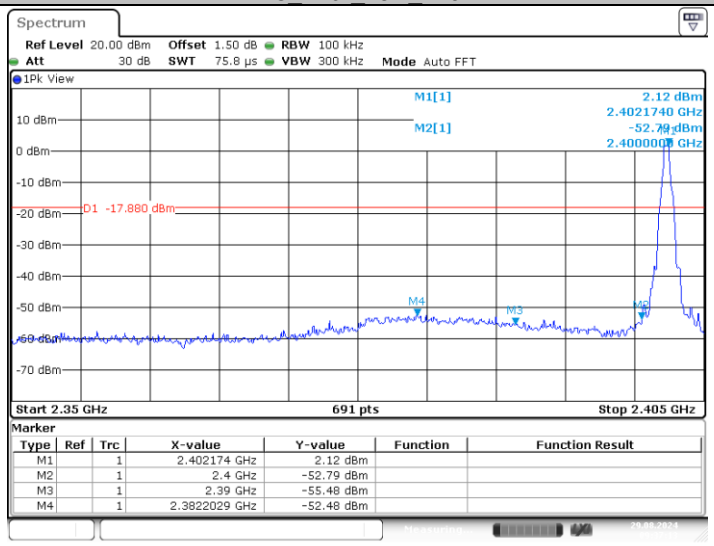
Test Results

(1) Band edge Conducted Test

Test Mode	Antenna	ChName	Freq(MHz)	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	2.12	-52.48	≤-17.88	PASS
		High	2480	3.26	-50.55	≤-16.74	PASS
		Low	Hop_2402	1.93	-52.67	≤-18.07	PASS
		High	Hop_2480	3.42	-50.65	≤-16.58	PASS
2DH5	Ant1	Low	2402	2.10	-51.90	≤-17.90	PASS
		High	2480	3.29	-50.21	≤-16.71	PASS
		Low	Hop_2402	-0.98	-51.87	≤-20.98	PASS
		High	Hop_2480	-0.43	-50.21	≤-20.43	PASS

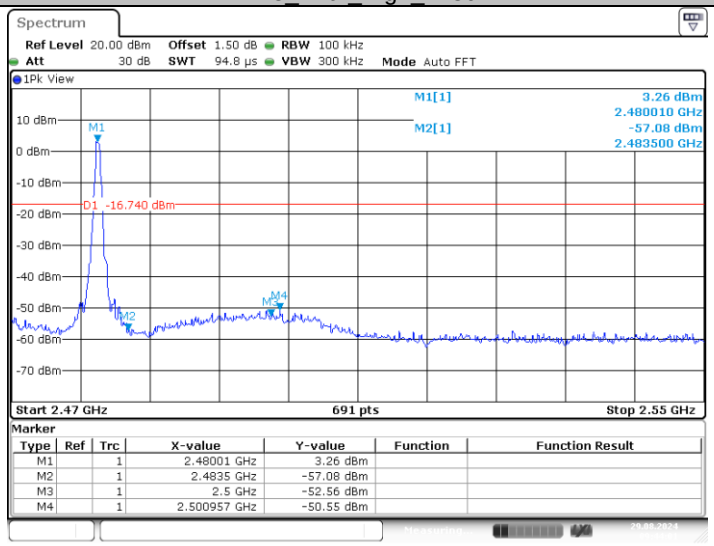
Test Graphs

DH5_Ant1_Low_2402



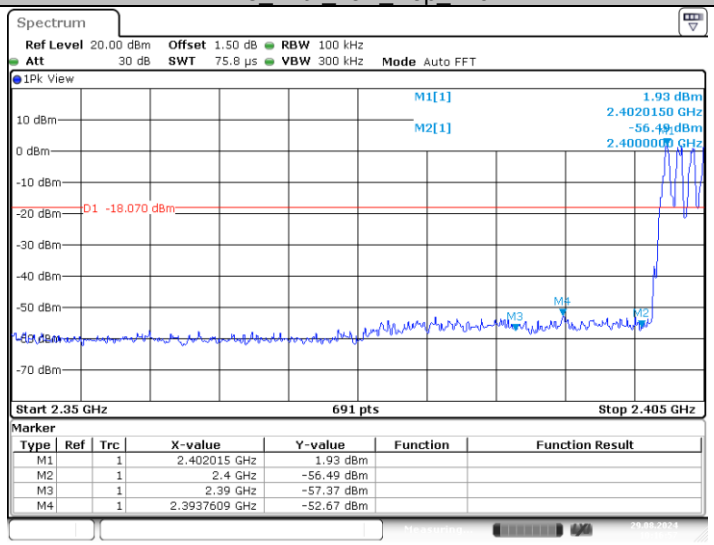
Date: 29.AUG.2024 09:37:13

DH5_Ant1_High_2480



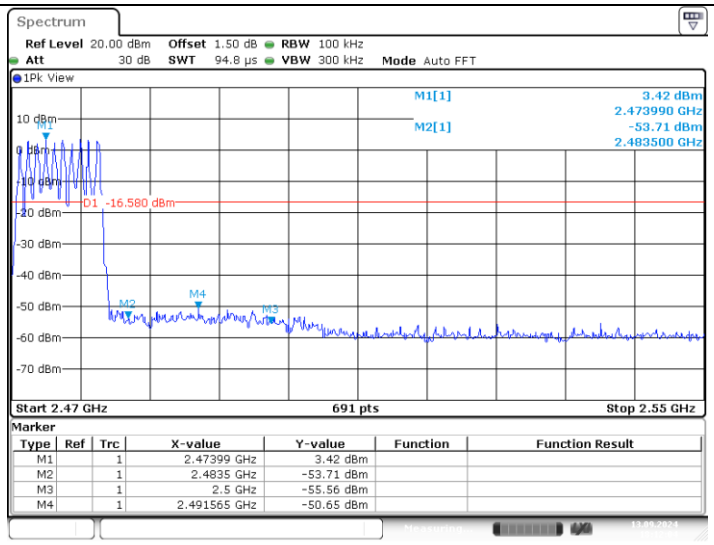
Date: 29.AUG.2024 09:44:01

DH5_Ant1_Low_Hop_2402

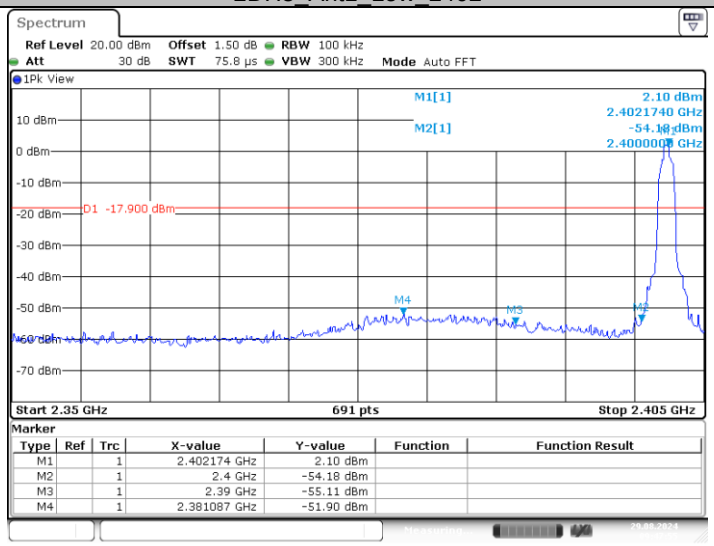


Date: 29.AUG.2024 10:16:57

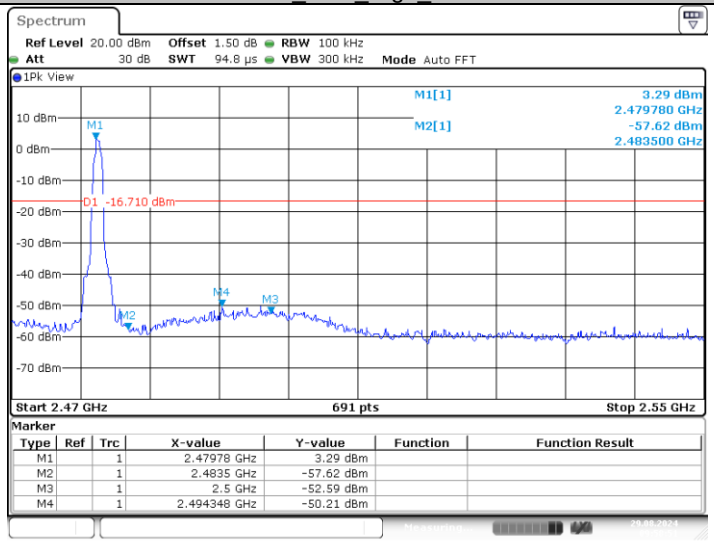
DH5_Ant1_High_Hop_2480



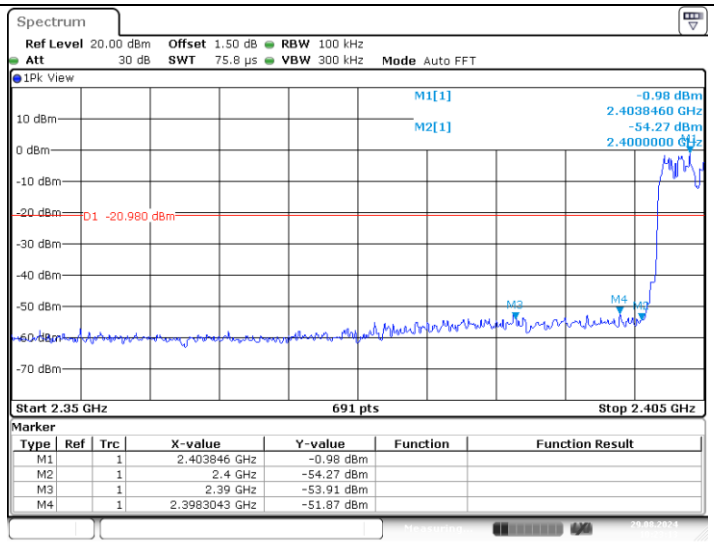
2DH5_Ant1_Low_2402



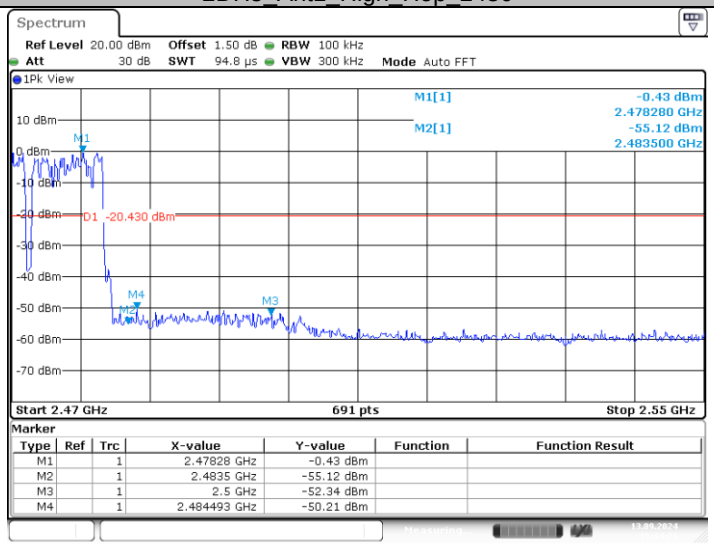
2DH5_Ant1_High_2480



2DH5_Ant1_Low_Hop_2402



2DH5_Ant1_High_Hop_2480

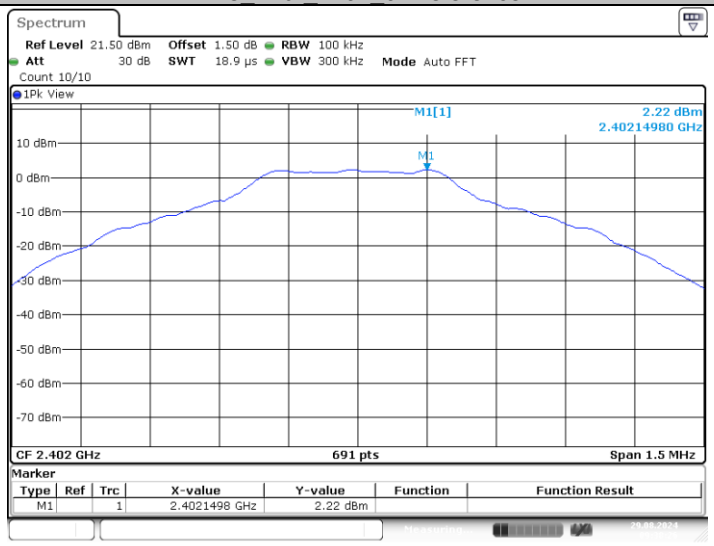


(2) Conducted Spurious Emissions Test

Test Mode	Antenna	Freq(MHz)	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	Reference	2.22	2.22	---	PASS
			30~1000	2.22	-58.53	≤-17.78	PASS
			1000~26500	2.22	-43.86	≤-17.78	PASS
		2441	Reference	2.90	2.90	---	PASS
			30~1000	2.90	-58.74	≤-17.10	PASS
			1000~26500	2.90	-44.68	≤-17.10	PASS
		2480	Reference	3.22	3.22	---	PASS
			30~1000	3.22	-58.73	≤-16.78	PASS
			1000~26500	3.22	-44.03	≤-16.78	PASS
2DH5	Ant1	2402	Reference	2.23	2.23	---	PASS
			30~1000	2.23	-57.88	≤-17.77	PASS
			1000~26500	2.23	-43.71	≤-17.77	PASS
		2441	Reference	2.94	2.94	---	PASS
			30~1000	2.94	-58.37	≤-17.06	PASS
			1000~26500	2.94	-45.23	≤-17.06	PASS
		2480	Reference	3.28	3.28	---	PASS
			30~1000	3.28	-58.78	≤-16.72	PASS
			1000~26500	3.28	-43.78	≤-16.72	PASS

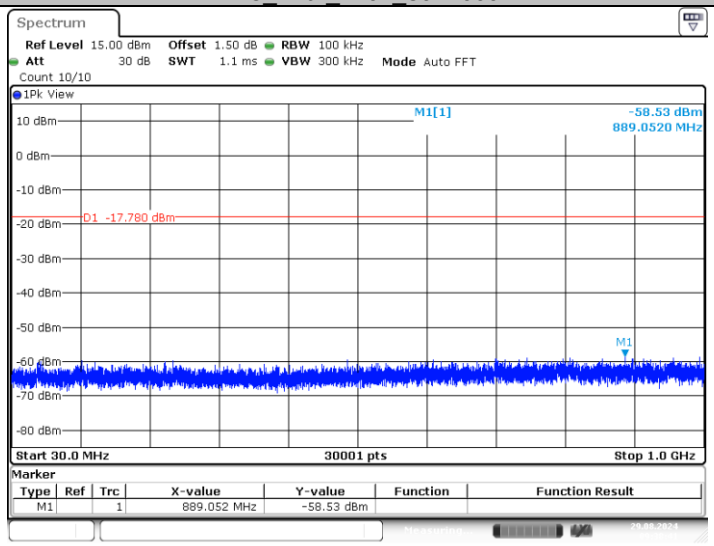
Test Graphs

DH5_Ant1_2402_0~Reference



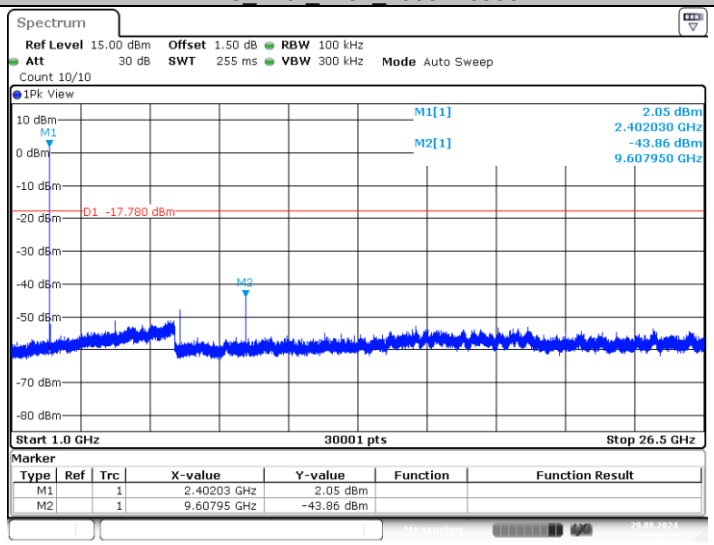
Date: 29.AUG.2024 09:38:26

DH5_Ant1_2402_30~1000



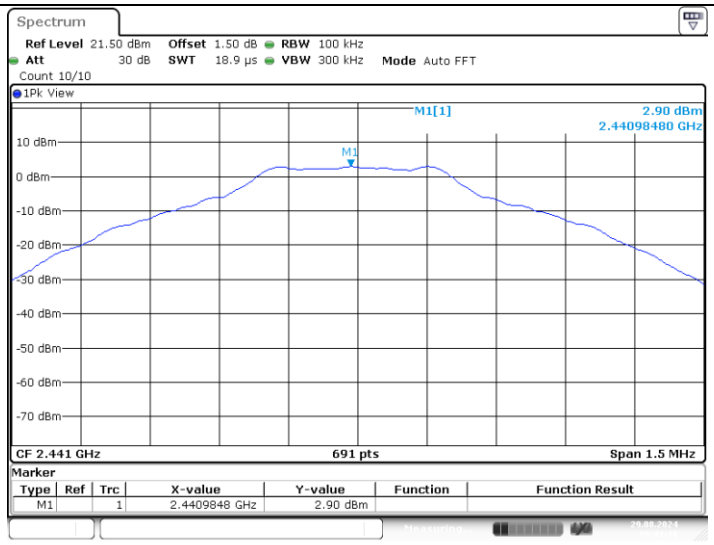
Date: 29.AUG.2024 09:38:41

DH5_Ant1_2402_1000~26500

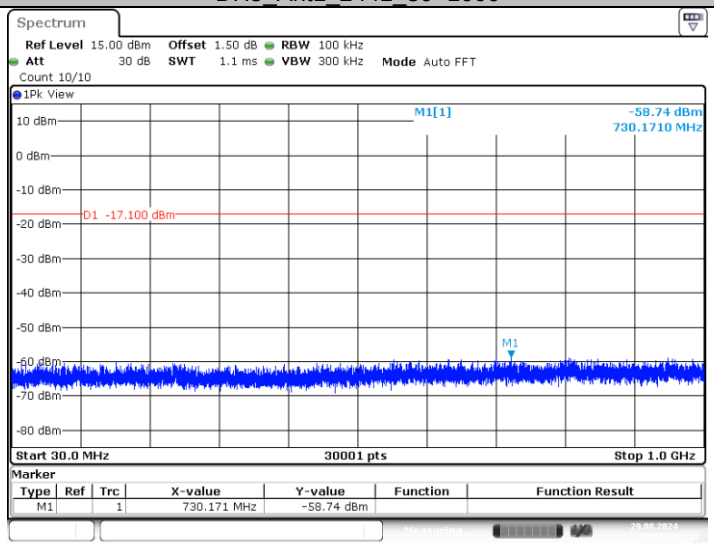


Date: 29.AUG.2024 09:39:21

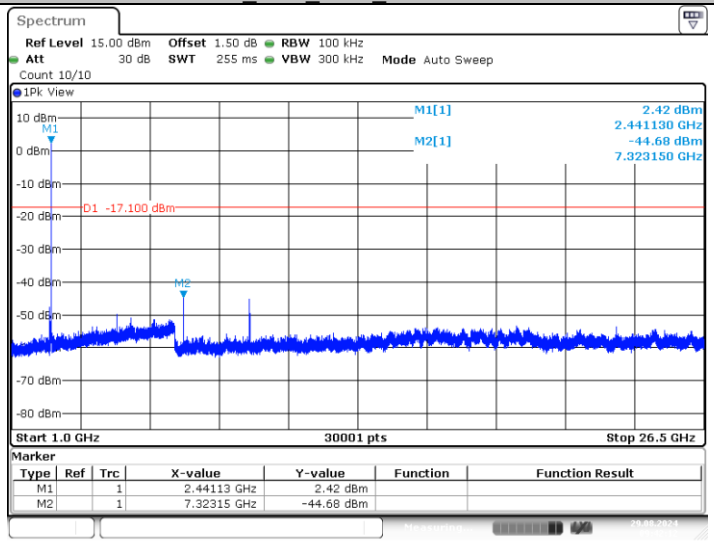
DH5_Ant1_2441_0~Reference



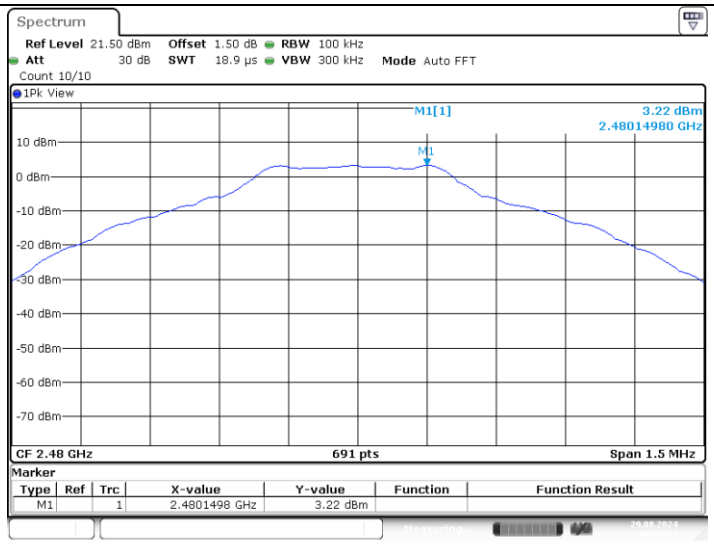
DH5_Ant1_2441_30~1000



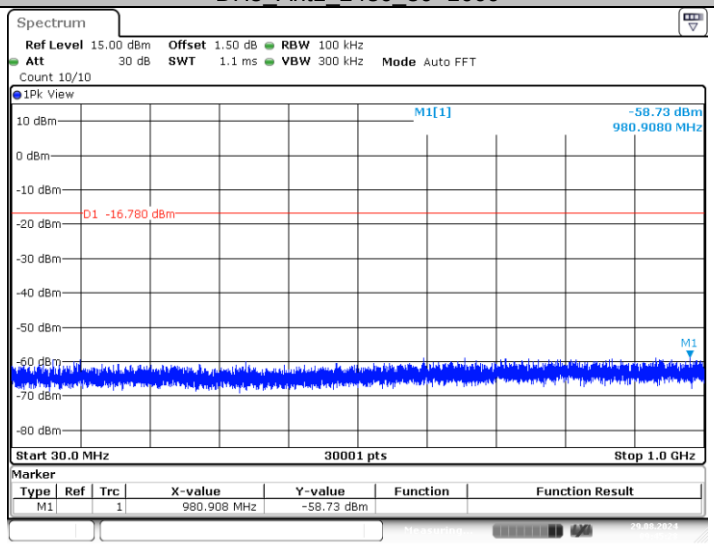
DH5_Ant1_2441_1000~26500



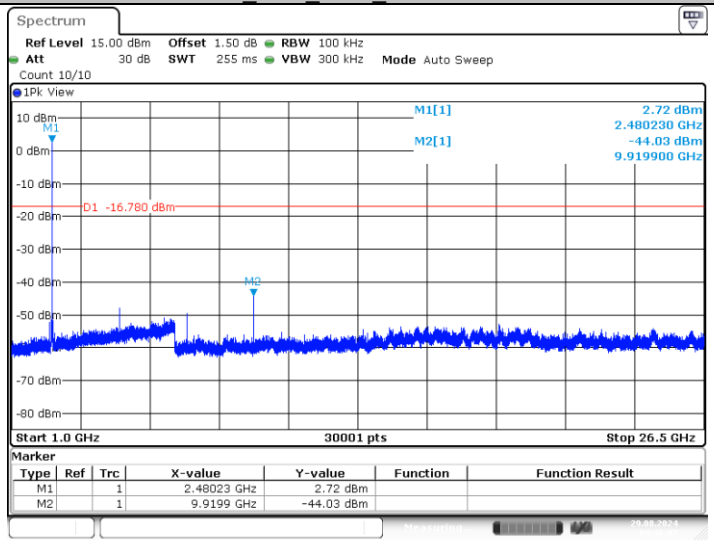
DH5_Ant1_2480_0~Reference



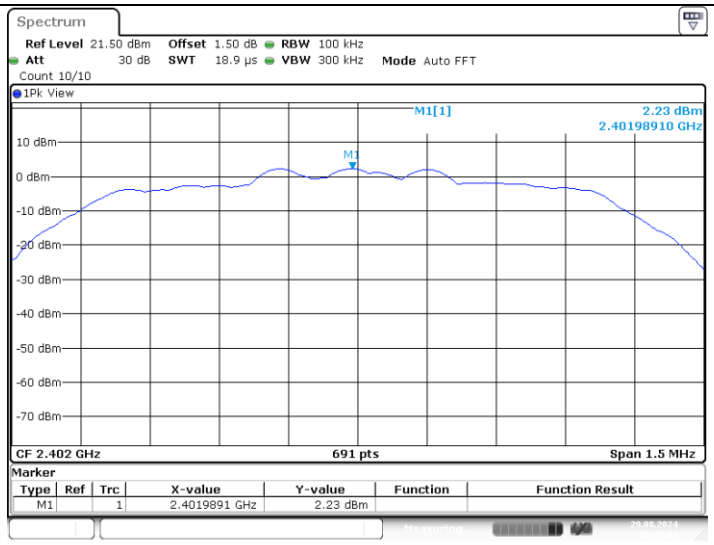
DH5_Ant1_2480_30~1000



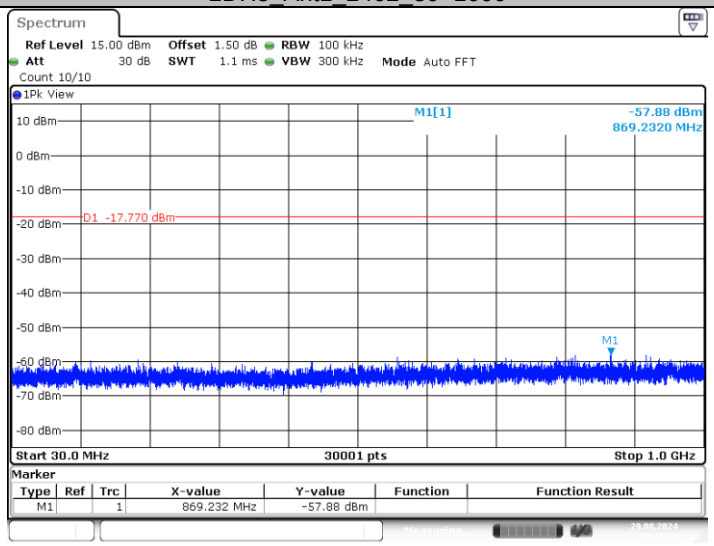
DH5_Ant1_2480_1000~26500



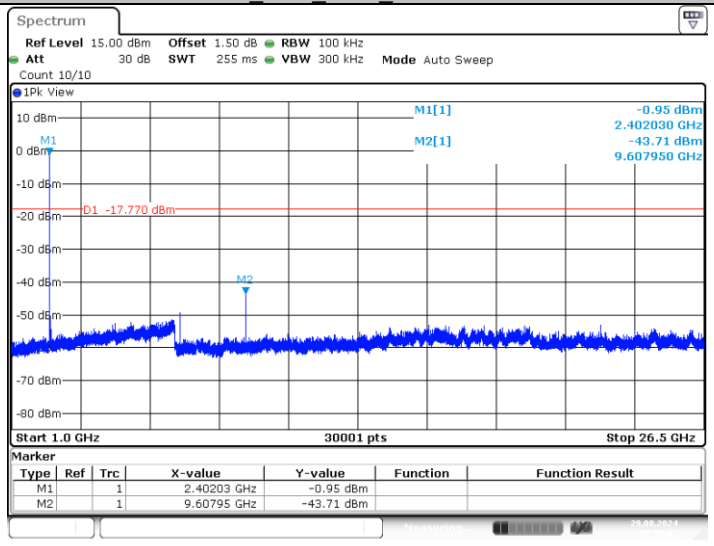
2DH5_Ant1_2402_0~Reference



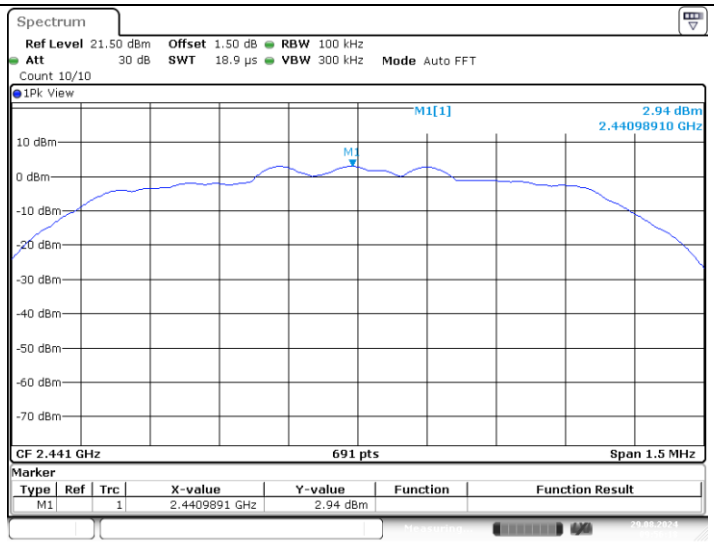
2DH5_Ant1_2402_30~1000



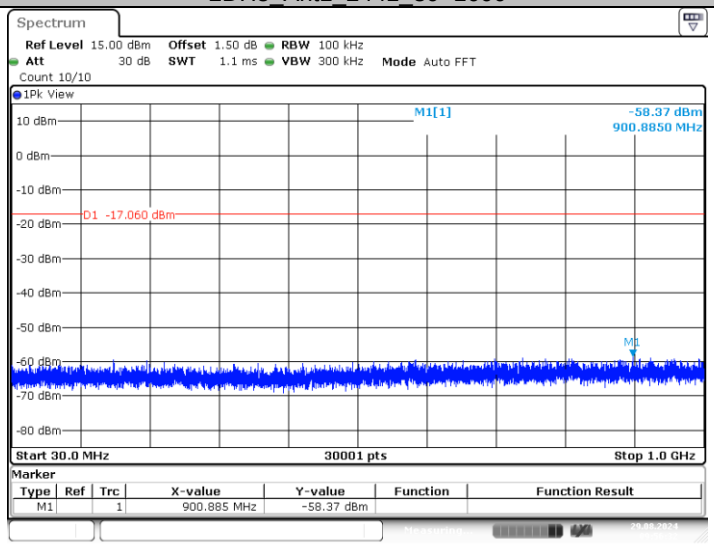
2DH5_Ant1_2402_1000~26500



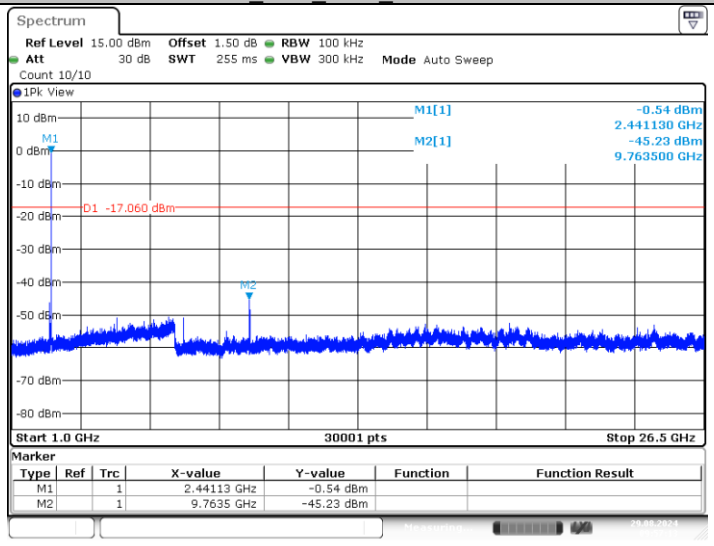
2DH5_Ant1_2441_0~Reference



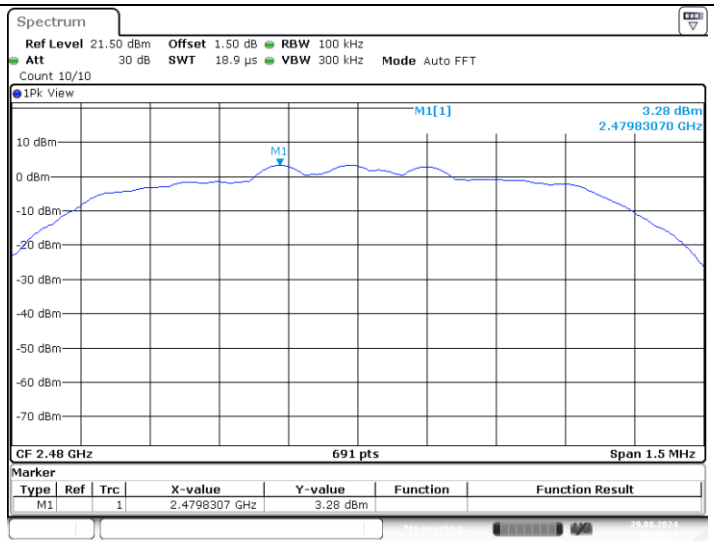
2DH5_Ant1_2441_30~1000



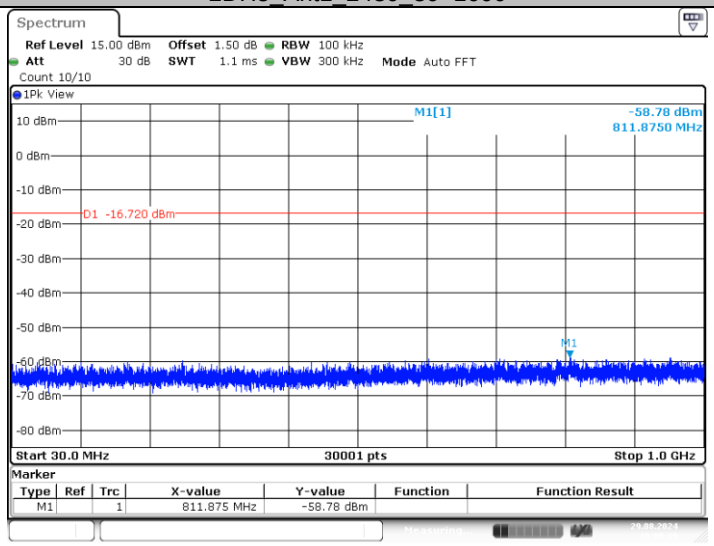
2DH5_Ant1_2441_1000~26500



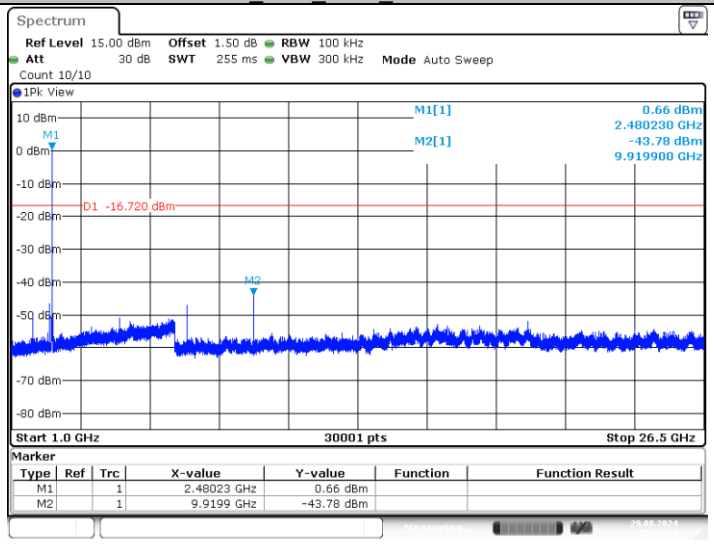
2DH5_Ant1_2480_0~Reference



2DH5_Ant1_2480_30~1000



2DH5_Ant1_2480_1000~26500

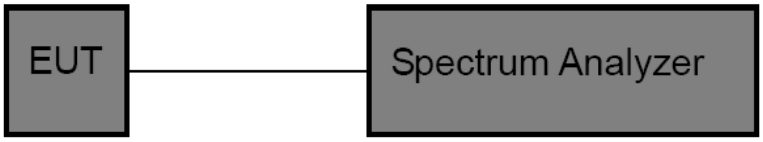


3.5. Bandwidth

Limit

N/A

Test Configuration



Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. OCB and 20dB Spectrum Setting:
   (1) Set RBW = 1% ~ 5% occupied bandwidth.
   (2) Set the video bandwidth (VBW) ≥ 3 RBW.
   (3) Detector = Peak.
   (4) Trace mode = Max hold.
   (5) Sweep = Auto couple.

Note: The EUT was set to continuously transmitting in each mode and low, Middle and high channel for the test.

Test Mode

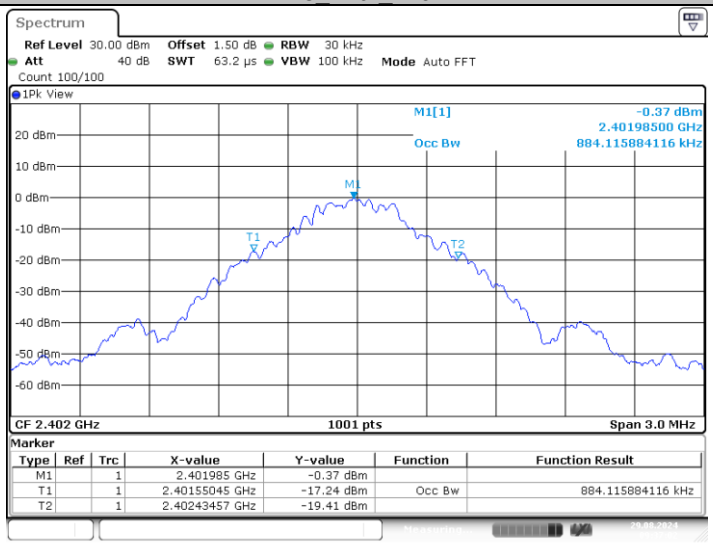
Please refer to the clause 2.4.

Test Results

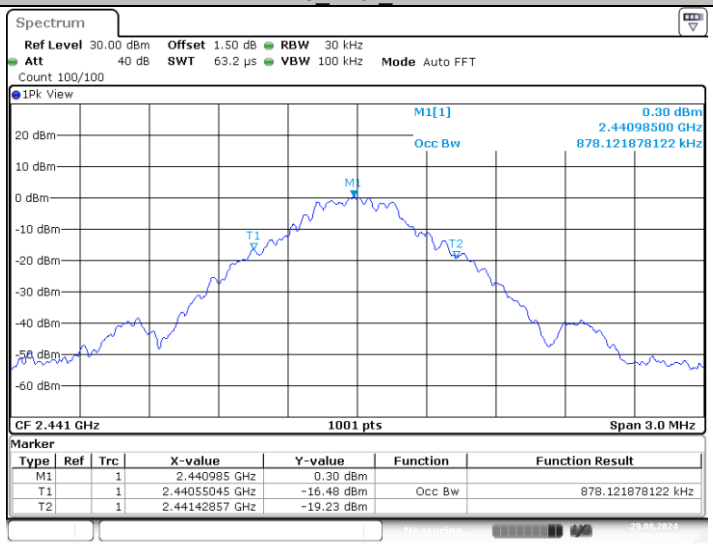
Modulation type	Channel	Occupied Bandwidth (MHz)	20dB Bandwidth (MHz)	20dB Bandwidth *2/3 (MHz)
GFSK	00	0.884	0.987	0.658
	39	0.878	0.996	0.664
	78	0.884	1.008	0.672
π/4-DQPSK	00	1.184	1.293	0.862
	39	1.181	1.293	0.862
	78	1.181	1.293	0.862

Occupied Bandwidth:

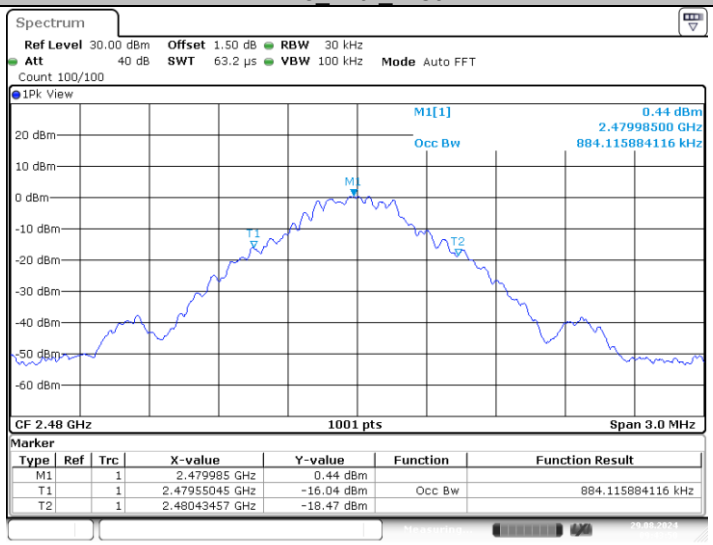
DH5_Ant1_2402



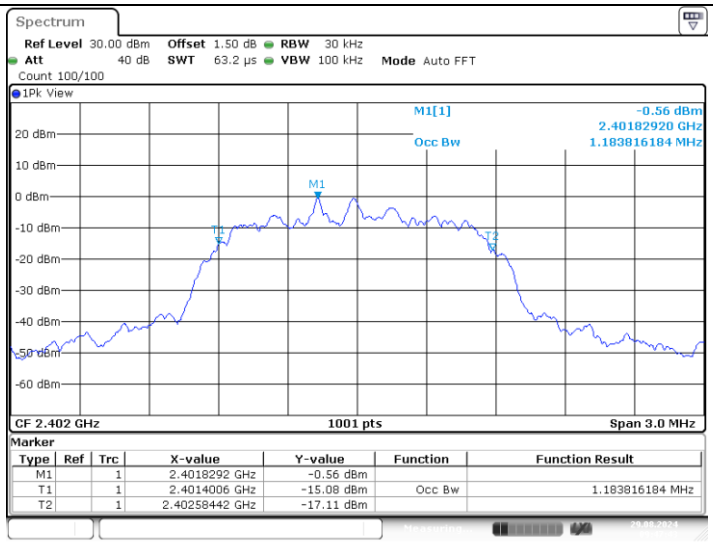
DH5_Ant1_2441



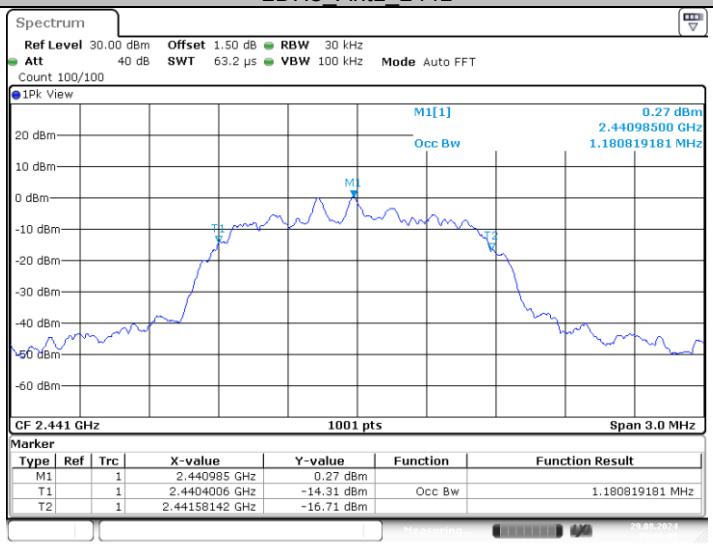
DH5_Ant1_2480



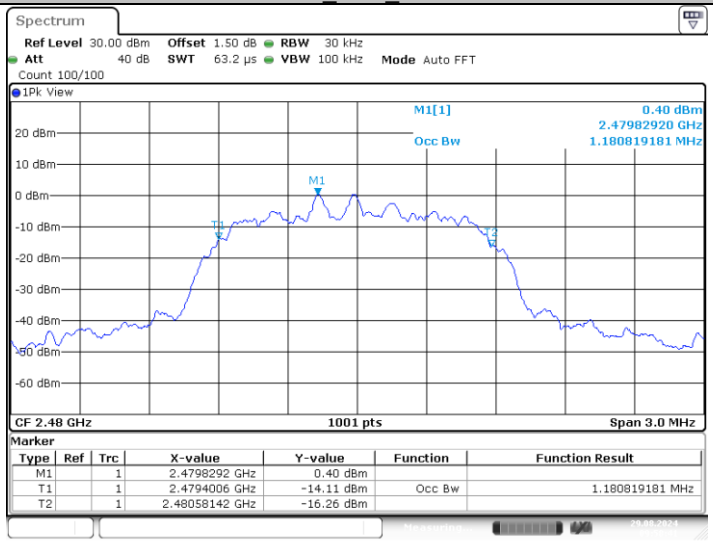
2DH5_Ant1_2402



2DH5_Ant1_2441

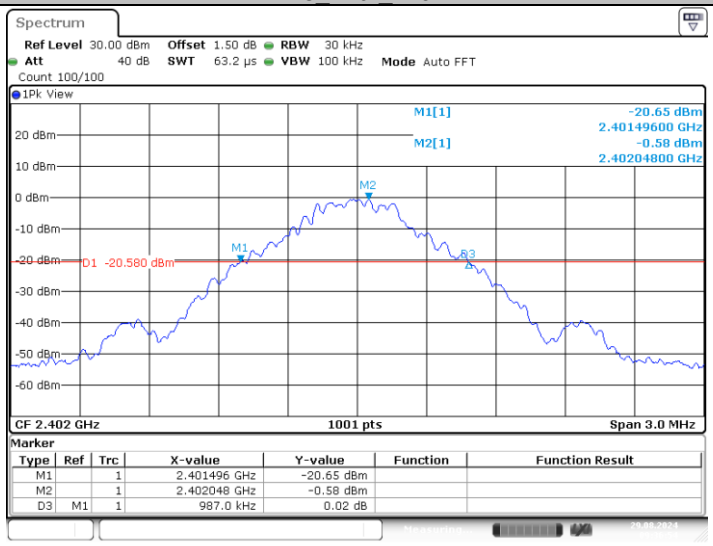


2DH5_Ant1_2480



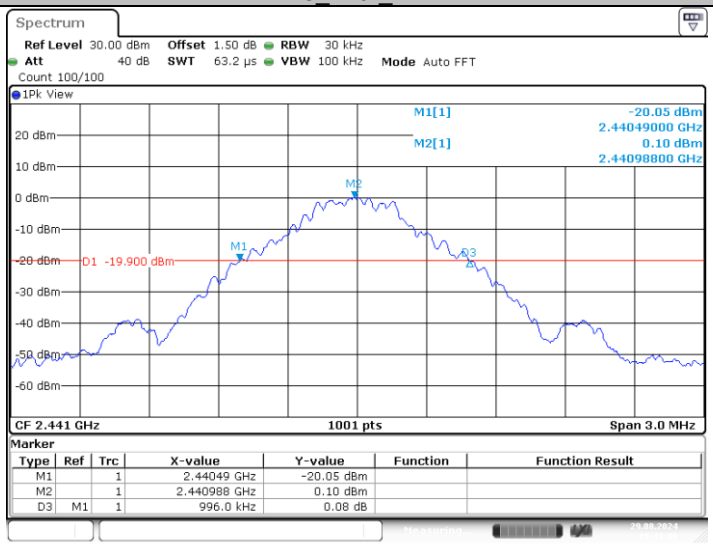
20dB Bandwidth:

DH5_Ant1_2402



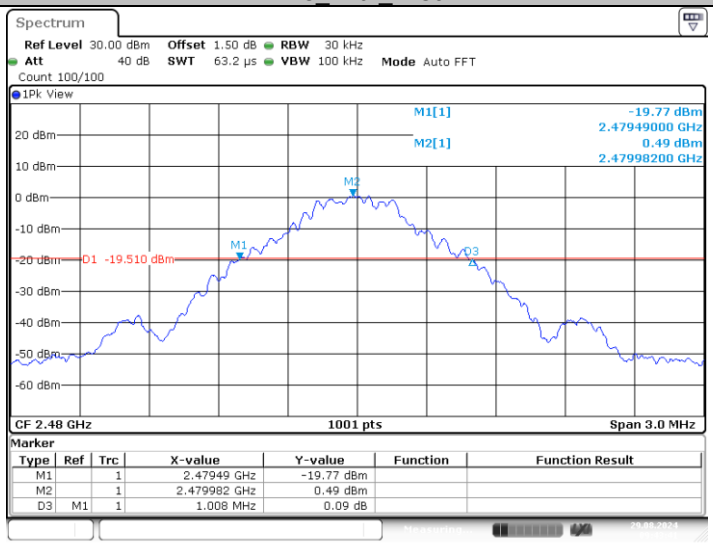
Date: 29.AUG.2024 09:36:54

DH5_Ant1_2441



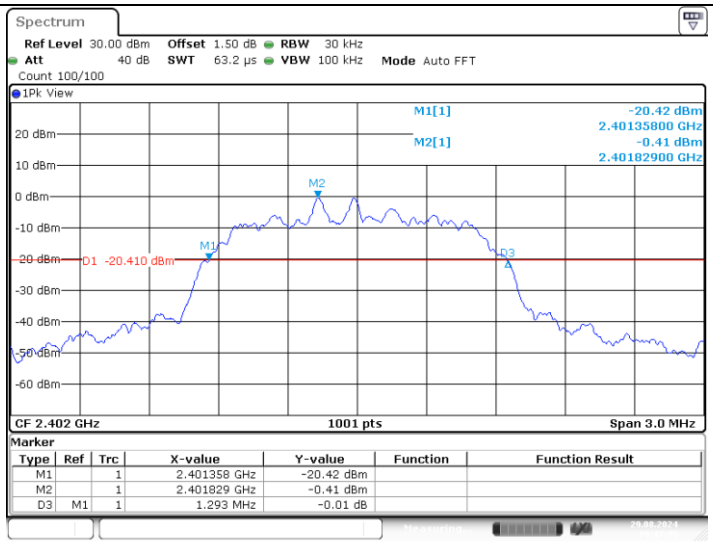
Date: 29.AUG.2024 09:41:00

DH5_Ant1_2480

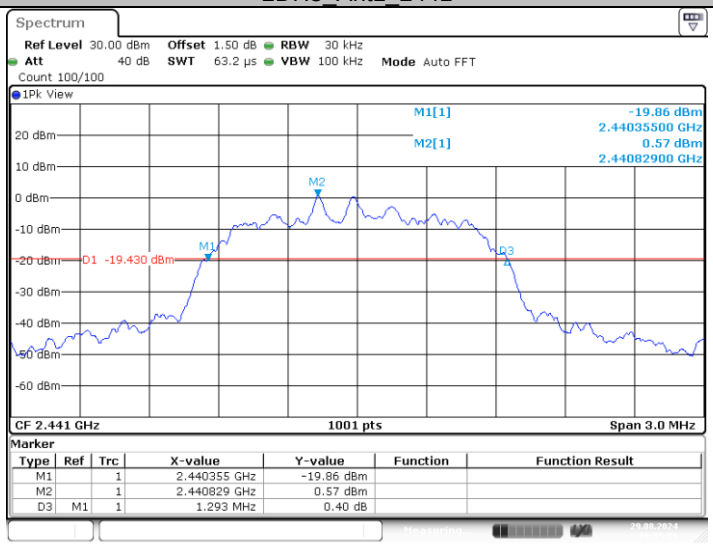


Date: 29.AUG.2024 09:43:41

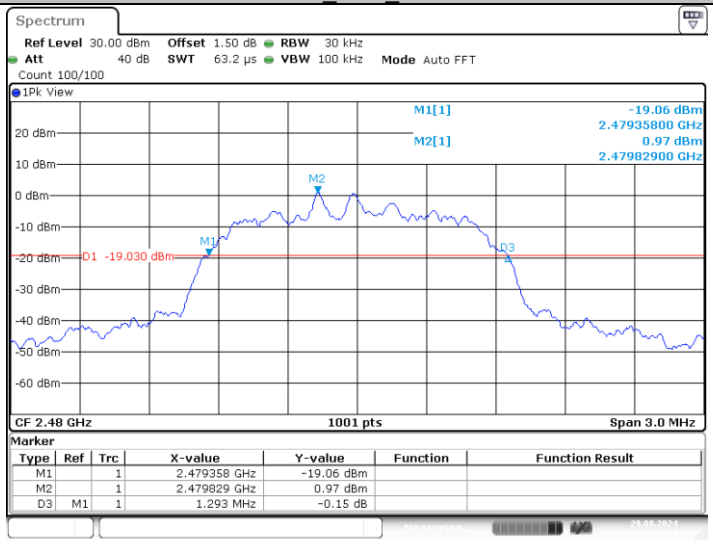
2DH5_Ant1_2402



2DH5_Ant1_2441



2DH5_Ant1_2480



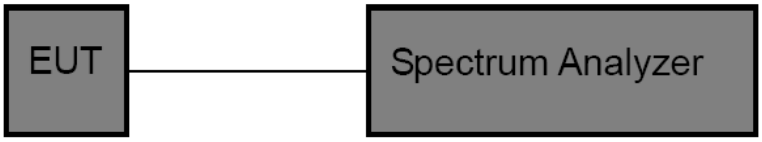
3.6. Channel Separation

Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):

Test Item	Limit	Frequency Range(MHz)
Channel Separation	>25KHz or >two-thirds of the 20 dB bandwidth Which is greater	2400~2483.5

Test Configuration



Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Spectrum Setting:
   (1) Set RBW = 100 kHz.
   (2) Set the video bandwidth (VBW) ≥ 3 RBW.
   (3) Detector = Peak.
   (4) Trace mode = Max hold.
   (5) Sweep = Auto couple.

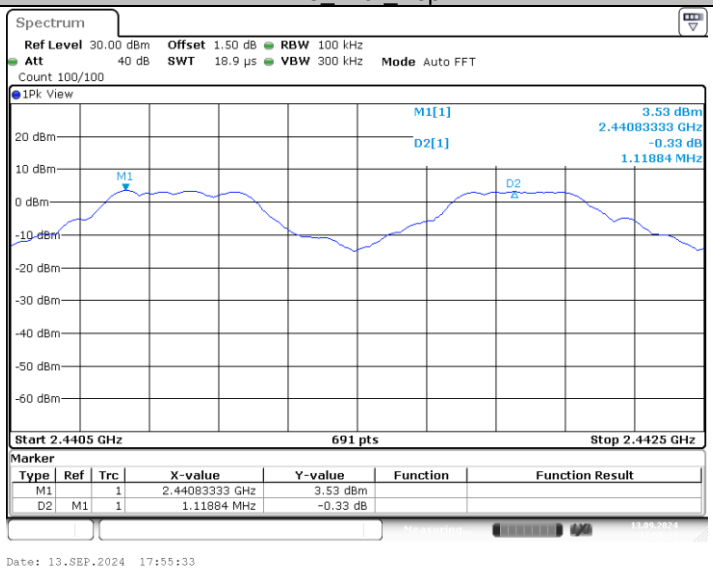
Test Mode

Please refer to the clause 2.4.

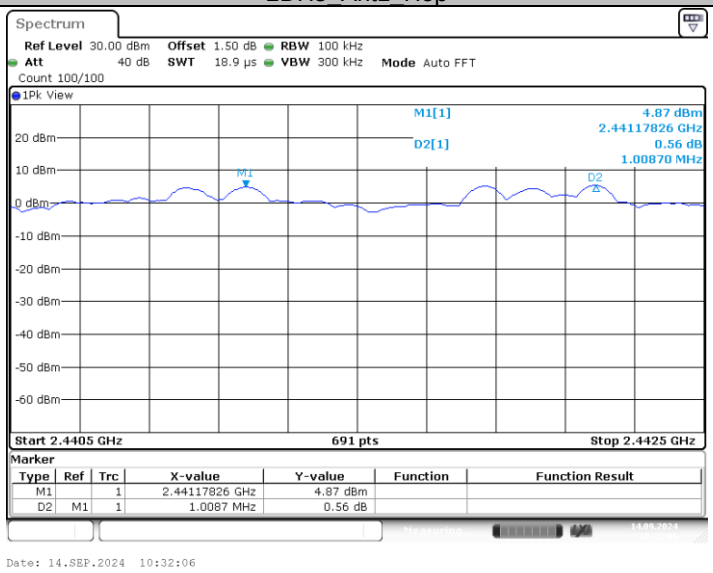
Test Results

Test Mode	Antenna	Channel	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Hop	1.119	≥0.664	PASS
2DH5	Ant1	Hop	1.009	≥0.862	PASS

DH5_Ant1_Hop



2DH5_Ant1_Hop



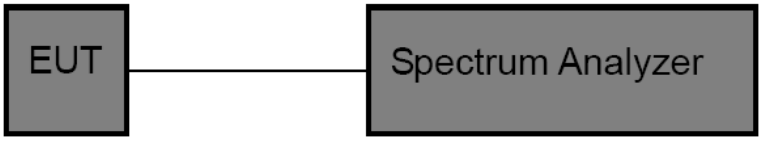
3.7. Number of Hopping Channel

Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(iii)

Section	Test Item	Limit
15.247 (a)(iii)	Number of Hopping Channel	⩾15

Test Configuration



Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Spectrum Setting:
   (1) Peak Detector: RBW=100 kHz, VBW≥RBW, Sweep time= Auto.

Test Mode

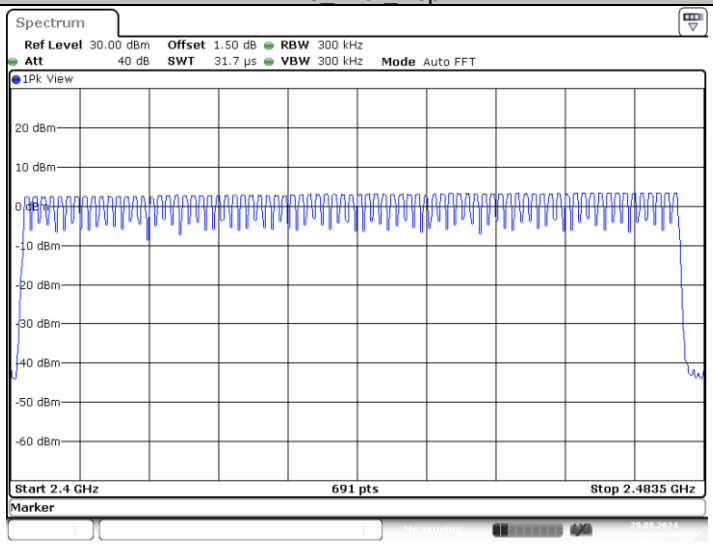
Please refer to the clause 2.4.

Test Result

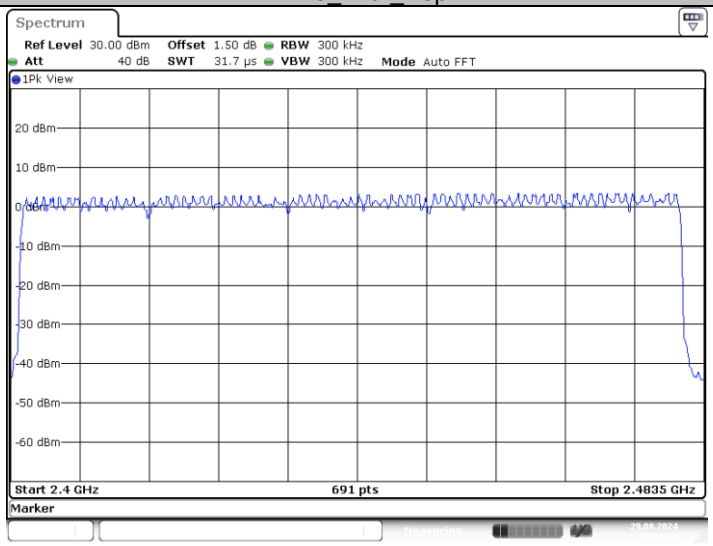
Modulation type	Channel number	Limit	Result
GFSK	79	≥15.00	Pass
π/4-DQPSK	79		

Test Graphs

DH5_Ant1_Hop



2DH5_Ant1_Hop



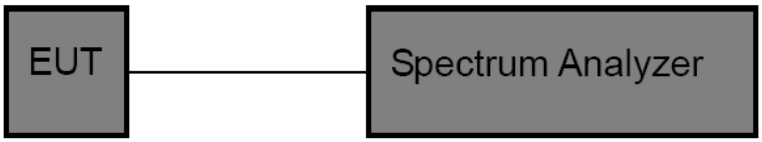
3.8. Dwell Time

Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(iii)

Section	Test Item	Limit
15.247 (a)(iii)	Average Time of Occupancy	0.4 sec

Test Configuration



Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Spectrum Setting:
   (1) Spectrum Setting: RBW=1MHz, VBW≥RBW.
   (2) Use video trigger with the trigger level set to enable triggering only on full pulses.
   (3) Sweep Time is more than once pulse time.
   (4) Set the center frequency on any frequency would be measure and set the frequency span to zero.
   (5) Measure the maximum time duration of one single pulse.
   (6) Set the EUT for packet transmitting.

Test Mode

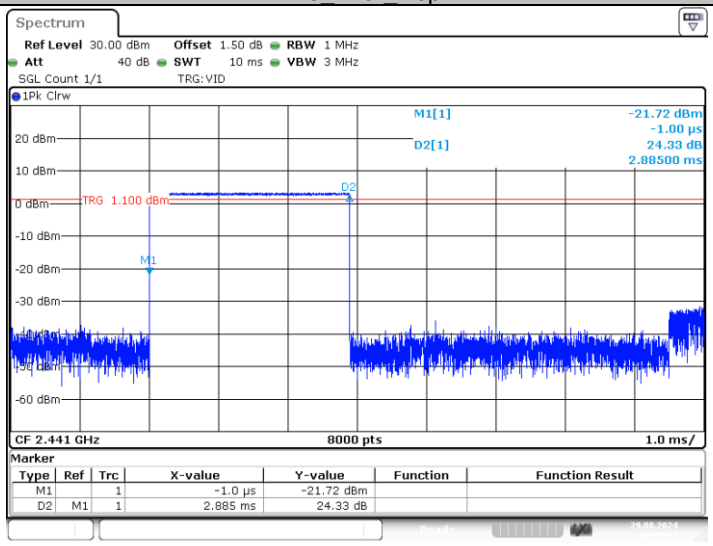
Please refer to the clause 2.4.

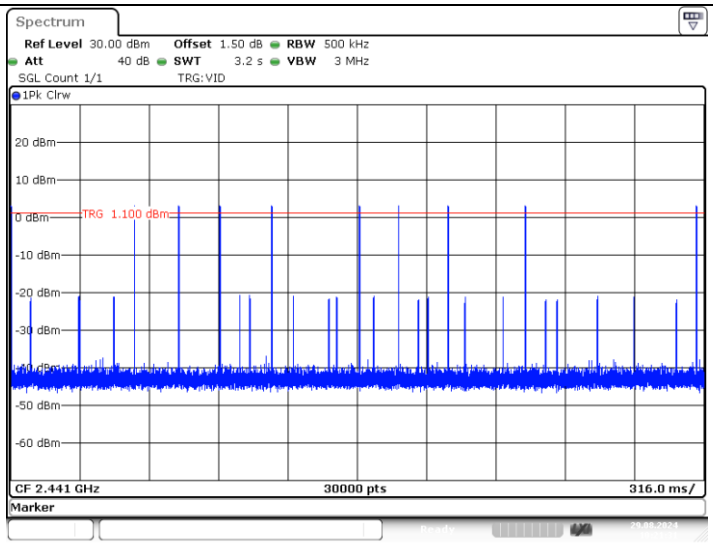
Test Result

Test Mode	Antenna	Freq(MHz)	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH5	Ant1	Hop	2.885	100	0.289	≤0.4	PASS
2DH5	Ant1	Hop	2.890	120	0.347	≤0.4	PASS

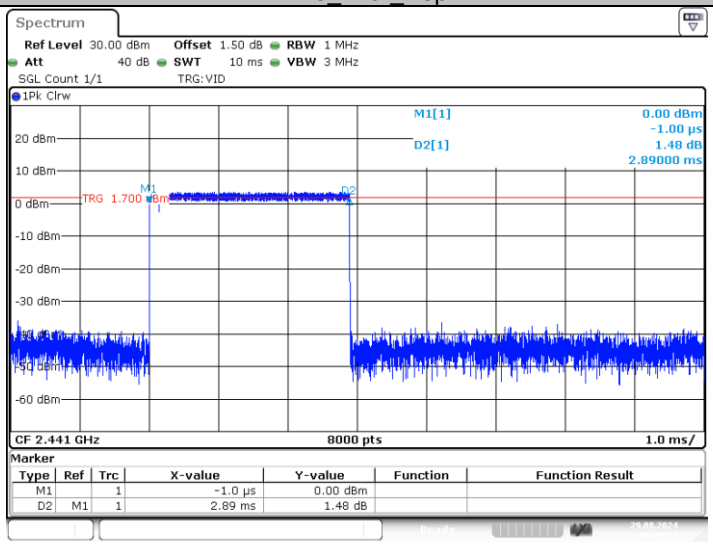
Test Graphs

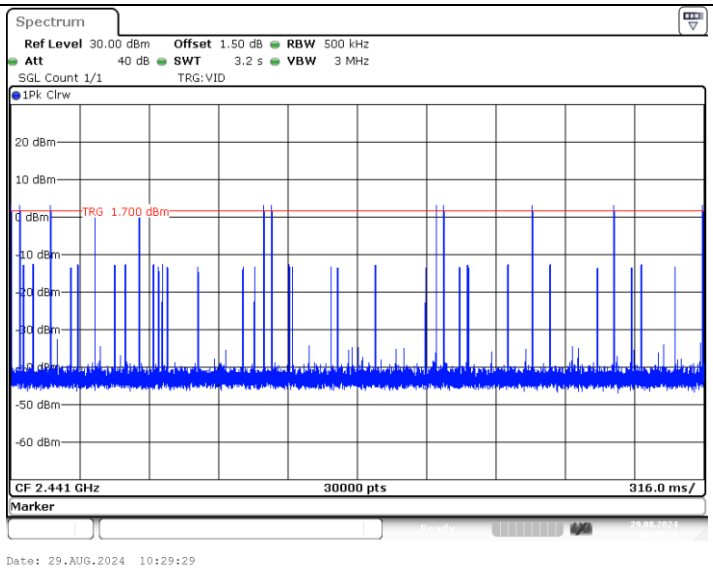
DH5_Ant1_Hop





2DH5_Ant1_Hop




Spectrum
Ref Level 30.00 dBm Offset 1.50 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 1.700 dBm
-10 dBm
-20 dBm
-30 dBm
-50 dBm
-60 dBm
CF 2.441 GHz
30000 pts
316.0 ms/
Marker
Date: 29.AUG.2024 10:29:29

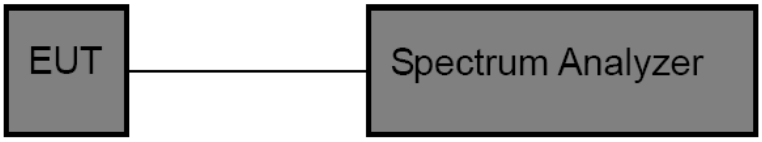
3.9. Peak Output Power

Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (b)(1):

Test Item	Limit	Frequency Range(MHz)
Maximum Conducted Peak Output Power	Hopping Channels>75 Power<1W(30dBm) Other <125mW(21dBm)	2400~2483.5

Test Configuration



Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Spectrum Setting:
   (1) Set RBW> 20DB Bandwidth.
   (2) Set the video bandwidth (VBW) ≥ RBW.
   (3) Detector = Peak.
   (4) Trace mode = Max hold.
   (5) Sweep = Auto couple.

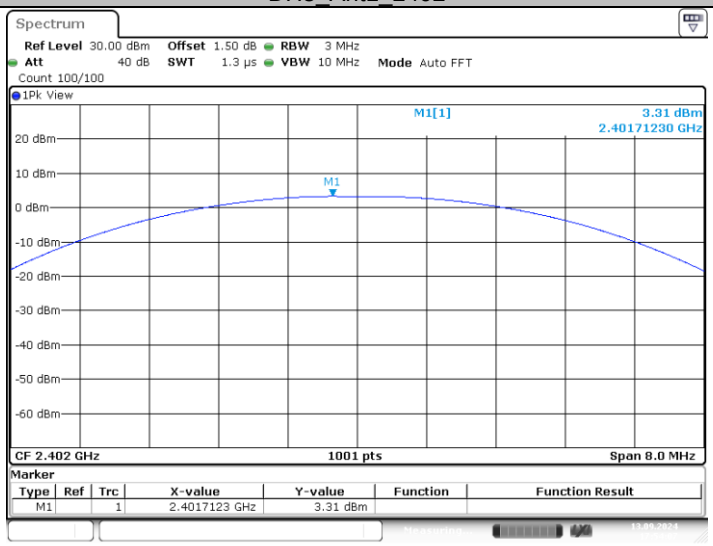
Test Mode

Please refer to the clause 2.4.

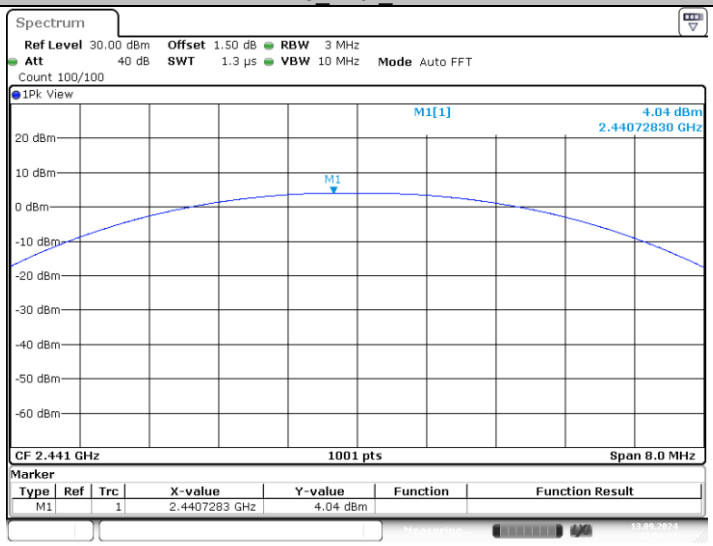
Test Result

Test Mode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
DH5	Ant1	2402	3.31	≤20.97	PASS
		2441	4.04	≤20.97	PASS
		2480	4.48	≤20.97	PASS
2DH5	Ant1	2402	3.79	≤20.97	PASS
		2441	4.63	≤20.97	PASS
		2480	4.98	≤20.97	PASS

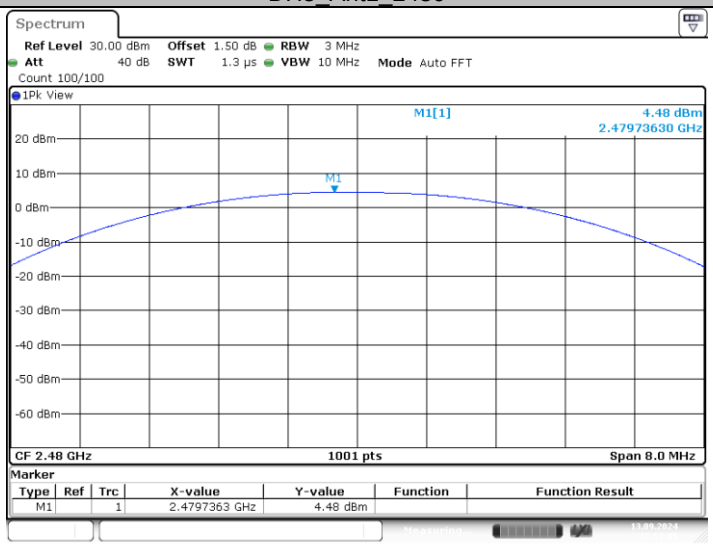
DH5_Ant1_2402



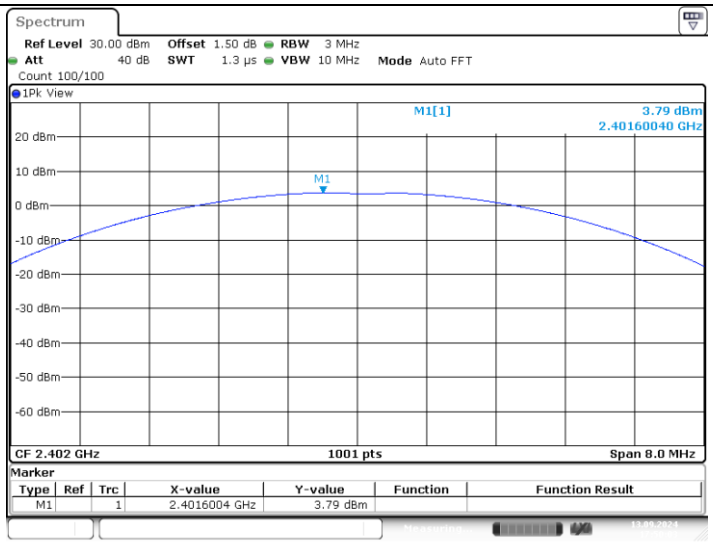
DH5_Ant1_2441



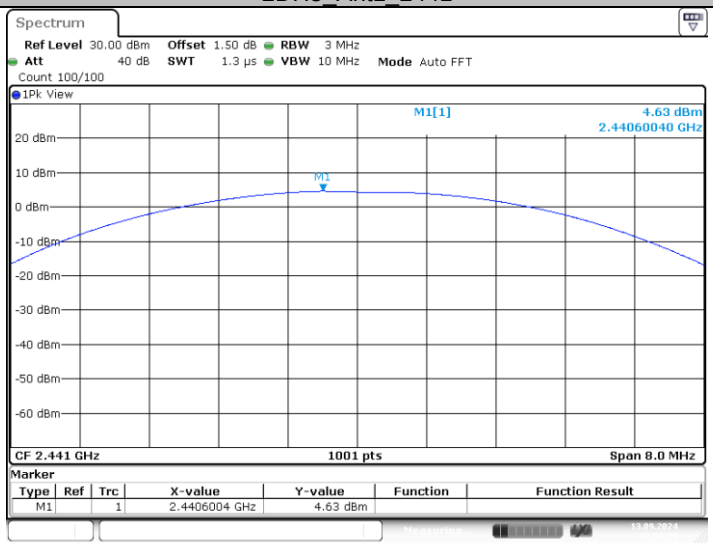
DH5_Ant1_2480



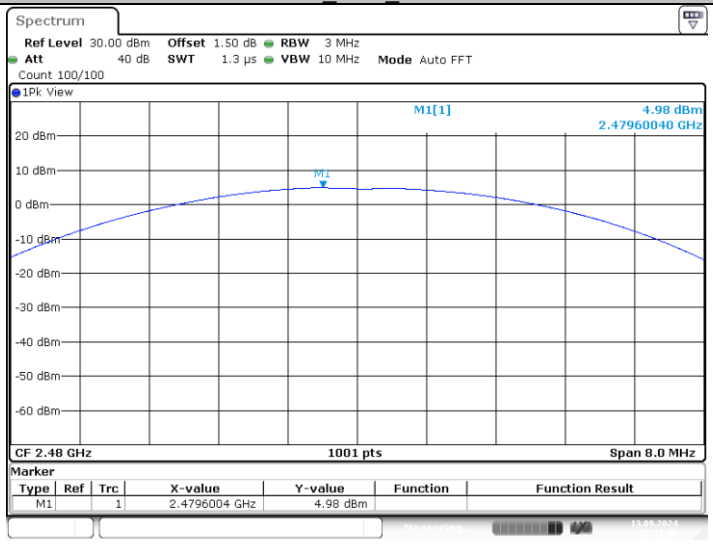
2DH5_Ant1_2402



2DH5_Ant1_2441



2DH5_Ant1_2480

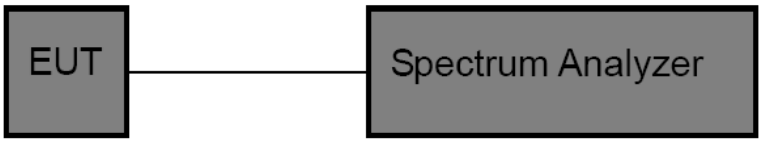


3.10. Duty Cycle

Limit

None, for report purposes only.

Test Configuration



Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement according to section 10.2 of KDB 558074 D01 DTS Meas Guidance v05r02.
3. Spectrum Setting:

Set analyzer center frequency to test channel center frequency.
Set the span to 0Hz
Set the RBW to 10MHz
Set the VBW to 10MHz
Detector: Peak
Sweep time: Auto

Allow trace to fully stabilize. Then use the peak marker function to determine the maximum amplitude level.

Test Mode

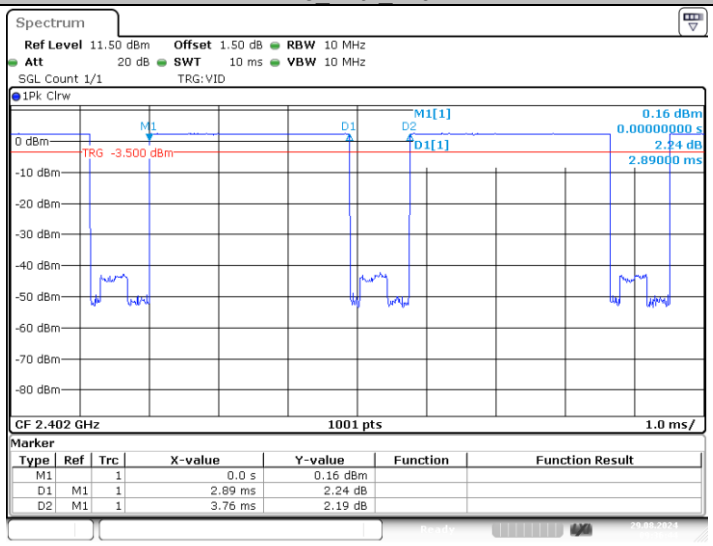
Please refer to the clause 2.4.

Test Result

Test Mode	Frequency [MHz]	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	1/T Minimum VBW (kHz)	Final setting For VBW (kHz)
GFSK	2402	2.89	3.76	76.86	0.35	1
	2441	2.89	3.76	76.86	0.35	1
	2480	2.89	3.76	76.86	0.35	1
π/4-DQPSK	2402	2.89	3.75	77.07	0.35	1
	2441	2.90	3.76	77.13	0.34	1
	2480	2.90	3.75	77.33	0.34	1

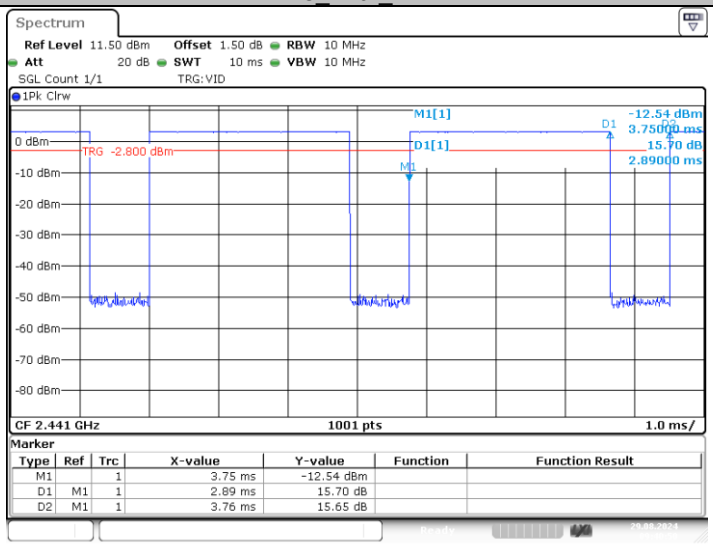
Test Graphs

DH5_Ant1_2402



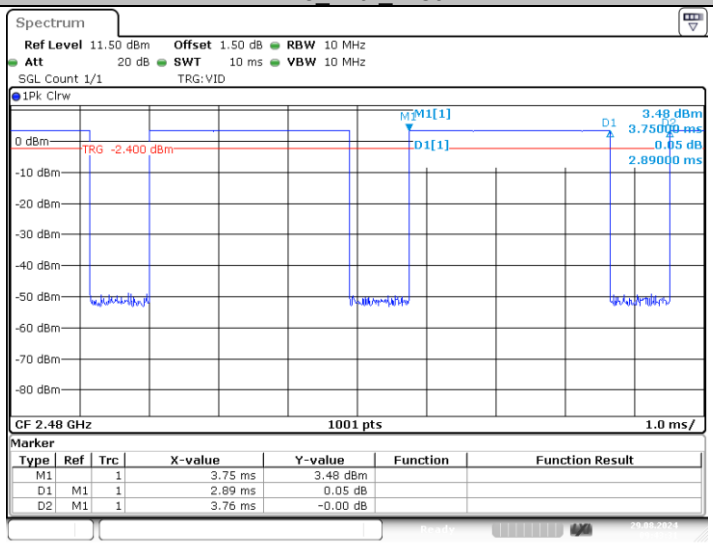
Date: 29.AUG.2024 09:36:44

DH5_Ant1_2441



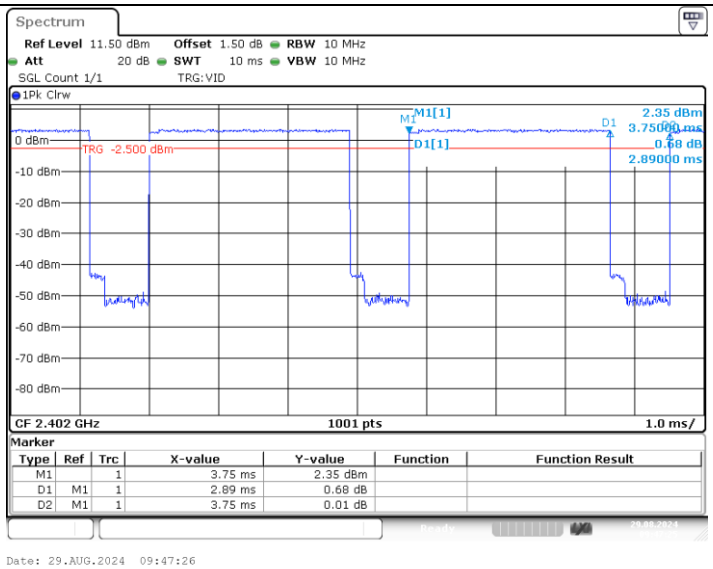
Date: 29.AUG.2024 09:40:50

DH5_Ant1_2480

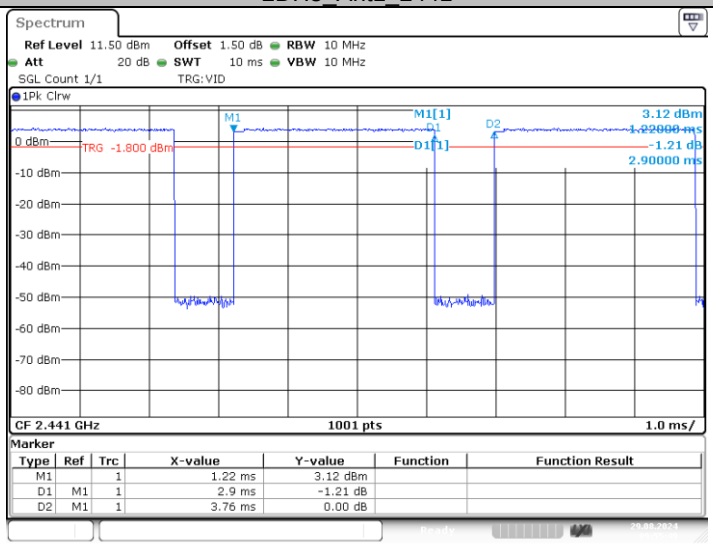


Date: 29.AUG.2024 09:43:31

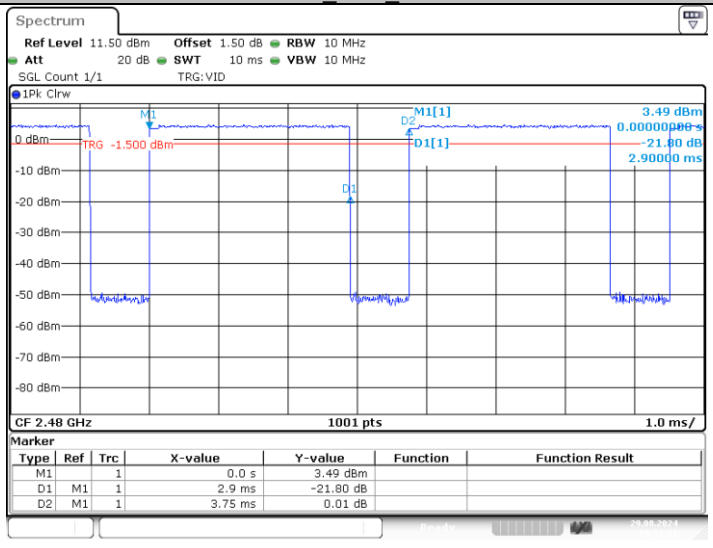
2DH5_Ant1_2402



2DH5_Ant1_2441



2DH5_Ant1_2480



3.11. Antenna Requirement

Requirement

FCC CFR Title 47 Part 15 Subpart C Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

(i) Systems operating in the 2400~2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

Test Result

The directional gain of the antenna less than 6dBi, please refer to the EUT internal photographs antenna photo.

**************************THE END**************************