

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 Dis- trict,Shenzhen City,Guangdong Province,P.R.			
Manufacturer:	Shenzhen Bluesource Electronics Tec	hnology Co., Ltd		
Address:	Building 5A1103, Huaqiang IdeaPark, zhen, China	Guangming District, Shen-		
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. 14, 2024			
Date of issue:	Sept. 14, 2024			
Result:	PASS			
Compiled by:		T: Jima		
(Printed name+signature)	Jim Jiang	Jim f		
Supervised by:		Jim Jiang Zonic zhang		
(Printed name+signature)	Eric Zhang	BACZA		
Approved by: (Printed name+signature)	Totti Zhao	Johnas		
		V		
Testing Laboratory Name:	CTC Laboratories, Inc.	1 at Dood Luby Community		
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. 14, 2024	Original

# **1.3. Test Description**

FCC Part 15 Subpart C (15.247)					
Test Item	Standard Section	Decult	Test Engineer		
lest item	FCC	Result			
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 Spu- rious 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.

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# 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 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**

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

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

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# 2. GENERAL INFORMATION

# **2.1. Client Information**

EN

Applicant:	Shenzhen KTC Commercial Display Technology Co.,LTD.
Address:	No.4023,Northern Wuhe Road,Bantian Street, Longgang Dis- trict,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.

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# 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	Name     Shielded Type     Ferrite Core     Length				
USB Cable	Unshielded	Without	100cm		
Test Software Information					
Name / / /					
FCC assist	1.0.2.2	/	/		

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# 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	tem Test Equipment Manufacturer Model No. Serial No. Calibrate					
1	1 Spectrum Analyzer Keysig		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	Item Test Equipment Manufacturer Model No. Serial No.					
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	/	

		Conc	ducted 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.

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

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# 3.1. Conducted Emission

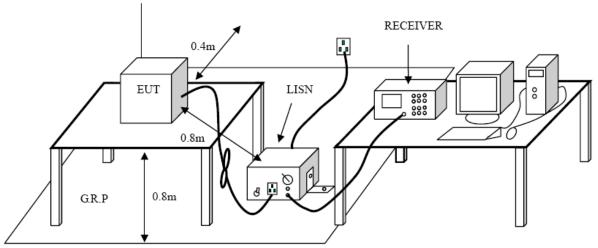
# Limit

# FCC CFR Title 47 Part 15 Subpart C Section 15.207

	Limit (d	BuV)
Frequency range (MHz)	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**



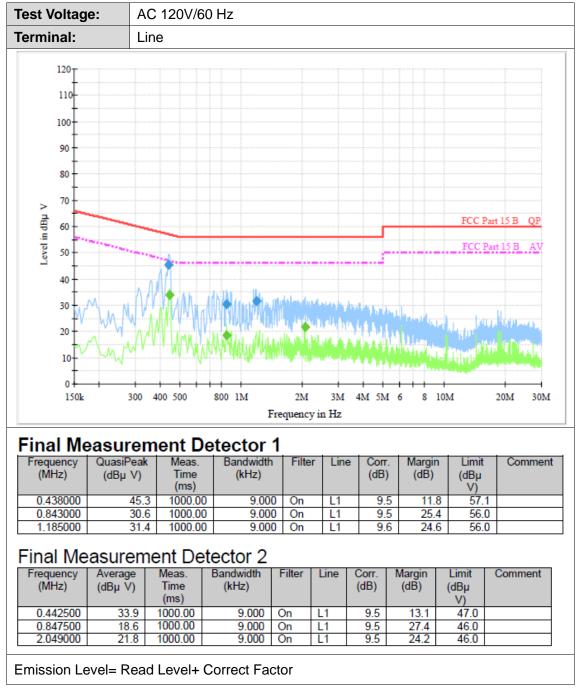
# **Test Procedure**

- 1. The EUT was setup according to ANSI C63.10:2013 requirements.
- The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting 2. 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.
- The EUT and simulators are connected to the main power through a line impedances stabilization 3. network (LISN). The LISN provides a 500hm /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)
- Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was 4. 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.



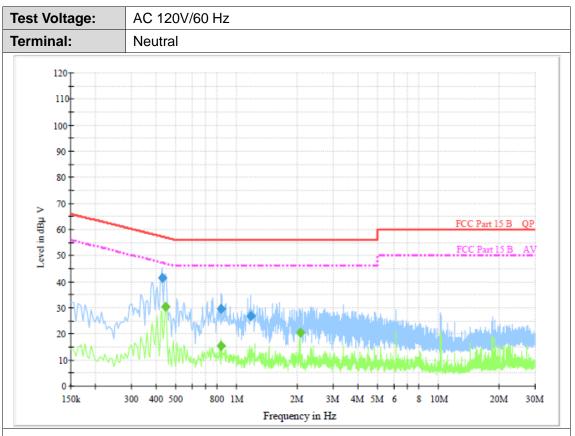


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# Final Measurement Detector 1

	Frequency (MHz)	QuasiPeak (dBµ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)	Comment
Γ	0.424500	41.5	1000.00	9.000	On	N	9.4	15.9	57.4	
Γ	0.838500	29.7	1000.00	9.000	On	N	9.4	26.3	56.0	
Γ	1.171500	26.8	1000.00	9.000	On	Ν	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
ľ	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	Ν	9.4	25.3	46.0	

Emission Level= Read Level+ Correct Factor

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# 3.2. Radiated Emission

<u>Limit</u>

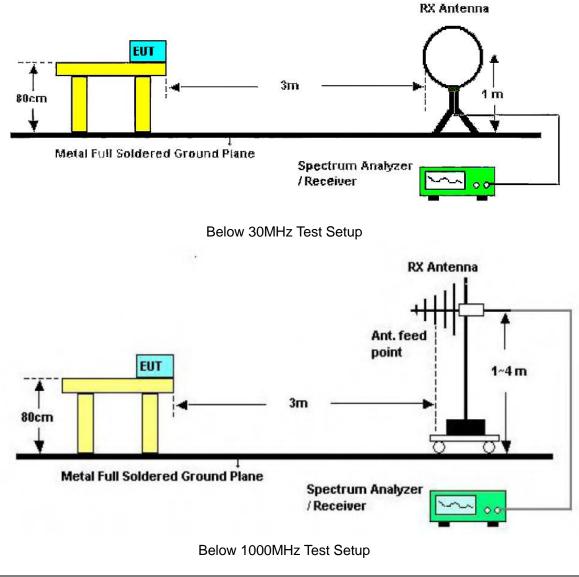
# FCC CFR Title 47 Part 15 Subpart C Section 15.209

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

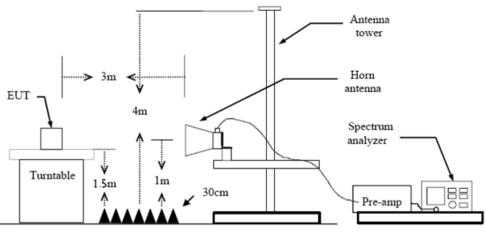
#### Note:

- (1) The tighter limit applies at the band edges.
- (2) Emission Level (dBuV/m)=20log Emission Level (uV/m).

# Test Configuration







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.



nt. Pol	•	Hori	zontal						
est Mo	de:	тх (	GFSK	Mode	2402MHz				
emark	:	Only	/ wors	e cas	e is reported	ł			
90.0 dBu	i¥/m								
BO									
70									
60							FCC Part 15 RE-Class	8 30-1000M	
50							Margin -6 dB		
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-10									
30.000		60.OD			(MHz)	300	).00		1000.00
No.	Freque (MHz		Rea (dB	ding uV)	Factor (dB/m)	Level (dBuV/m	Limit ) (dBuV/m)	Margin (dB)	Detecto
1	179.38	00	49.	.18	-17.67	31.51	43.50	-11.99	QP
2	191.99	00	54.	.73	-18.97	35.76	43.50	-7.74	QP
3	222.70		56.	.64	-18.57	38.07	46.00	-7.93	QP
4 *	363.03		52.		-13.98	38.88	46.00	-7.12	QP
5	797.27			.72	-3.83	33.89	46.00	-12.11	QP
6	893.62	33	35.	.50	-2.78	32.72	46.00	-13.28	QP

2.Margin value = Level -Limit value

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ſest	Mo	de:	ТΧ	GFSk	K Moo	e 2402MHz						
Rem	hark		Onl	y wor	se ca	se is reported	d					
90.0 dBuV/m												1
80												
70												
60												
50					++			Margin -6	ID RE-CIASS dB	8 30-1000M		
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-10 30	). <b>000</b>		60.00			(MHz)	3	00.00			100	0.000
N	0.	Freque (MHz			ading BuV)	Factor (dB/m)	Level (dBuV/m		imit uV/m)	Margin (dB)	Deteo	ctor
1		118.91	66	44	4.05	-18.16	25.89	43	3.50	-17.61	QF	Þ
2	2	215.91	66	49	9.58	-18.80	30.78	43	3.50	-12.72	QF	P
3		362.71			5.91	-13.99	31.92		6. <mark>00</mark>	-14.08	QF	
	-	399.24			5.07	-12.95	32.12		6. <b>00</b>	-13.88	QF	
4		797.27	00	36	6.59	-3.83	32.76	4	6.00	-13.24	QF	P
4	*	191.21										

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

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	-	-
Above	1GH	Z

A	nt. Po	Ι.	Hori	zontal					
T	est Mo	de:	тх (	GFSK Mode	2402MHz				
F	Remark			eport for the bed limit.	emission v	vhich more t	han 10 dB b	elow the	pre-
	No.	Frequer (MHz		Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
ľ	1	4387.9	17	40.59	1.11	41.70	74.00	-32.30	peak
	2	6416.7	50	38.76	7.11	45.87	74.00	-28.13	peak
	3	8050.0	00	39.24	10.75	49.99	74.00	-24.01	peak
	4	9957.4	17	39.17	13.13	52.30	74.00	-21.70	peak
	5 *	11120.6	67	38.42	14.73	53.15	74.00	-20.85	peak
	6	12444.5	500	37.32	15.62	52.94	74.00	-21.06	peak

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

Ant. Po	I.	Vert	ical					
Test Mc	ode:	ТХ	GFSK Mode	2402MHz				
Remark	<b>(:</b>		report for the bed limit.	emission v	vhich more t	han 10 dB b	elow the	pre-
No.	Frequer (MHz		Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4293.9	17	40.81	0.91	41.72	74.00	-32.28	peak
2	6428.5	00	40.24	7.14	47.38	74.00	-26.62	peak
3	8136.1	67	39.79	10.52	50.31	74.00	-23.69	peak
4	9522.6	67	38.48	12.59	51.07	74.00	-22.93	peak
5 *	10815.1	167	38.49	14.47	52.96	74.00	-21.04	peak
6	12201.6	667	37.23	15.72	52.95	74.00	-21.05	peak

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1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value



	nt. Pol	l.	Hori	zontal					
Те	est Mo	de:							
Re	emark	:		eport for the bed limit.	emission v	vhich more t	han 10 dB b	elow the	pre-
	No.	Frequer (MHz	-	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
	1	3968.8	33	41.55	0.42	41.97	74.00	-32.03	peak
	2	6369.7	50	39.35	6.94	46.29	74.00	-27.71	peak
	3	7388.0	83	39.35	10.09	49.44	74.00	-24.56	peak
	4	8915.5	83	39.48	11.57	51.05	74.00	-22.95	peak
	5	10396.0	)83	38.96	13.88	52.84	74.00	-21.16	peak
	6 *	12001.9	917	37.81	15.45	53.26	74.00	-20.74	peak

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

Ant. Po	I.	Vert	ical					
Test Mo	ode:	ТХ	GFSK Mode	2441MHz				
Remark	<b>(:</b>		report for the bed limit.	emission v	which more t	han 10 dB b	elow the	pre-
No.	Freque (MHz	-	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	3953.1	67	41.40	0.36	41.76	74.00	-32.24	peak
2	5974.1	67	40.04	5.56	45.60	74.00	-28.40	peak
3	7932.5	00	40.04	10.71	50.75	74.00	-23.25	peak
4	9197.5	83	39.33	12.35	51.68	74.00	-22.32	peak
5	10760.3	333	38.10	14.37	52.47	74.00	-21.53	peak
6 *	11927.5	500	37.76	15.32	53.08	74.00	-20.92	peak

Remarks:

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

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	Ant. Po	I.	Hori	Horizontal										
-	Test Mo	ode:	TX	GFSK Mode	2480MHz									
	Remark	K:		report for the bed limit.	emission v	which more t	han 10 dB t	elow the	pre-					
	No.	Frequer (MHz		Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector					
	1	3949.2	50	41.00	0.34	41.34	74.00	-32.66	peak					
	2	7329.3	33 38.52		10.07 12.47	48.59 51.15	74.00 74.00	-25.41 -22.85	peak					
	3	9319.000		38.68					peak					
	4 1037		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					

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

Ant. Po	I.	Vert	ical					
Test Mo	ode:	ТΧ	GFSK Mode	2480MHz				
Remark	<b>K:</b>		report for the bed limit.	e emission v	which more t	han 10 dB t	elow the	pre-
No.	(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	6424.5	83	39.66	7.13	46.79	74.00	-27.21	peak
3	7854.1	67	39.45	10.54	49.99	74.00	-24.01	peak
4	8939.0	83	39.51	11.61	51.12	74.00	-22.88	peak
5	10744.6	67	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

EN

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



ŀ	Ant. Pol	I.	Hori	Horizontal									
٦	lest Mo	de:	ТΧ	π/4-DQPSK	Mode 2402	2MHz							
F	Remark	:		eport for the bed limit.	emission v	vhich more t	han 10 dB b	elow the	pre-				
	No.	lo. Freque (MHz		Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector				
ľ	1	3933.5	83	42.59	0.28	42.87	74.00	-31.13	peak				
ľ	2	7235.3	33 39.05		10.03	49.08	74.00	-24.92	peak				
ľ	3	8328.0	83	40.04	10.48	50.52	74.00	-23.48	peak				
ľ	4	9953.5	00	39.62	13.13	52.75	74.00	-21.25	peak				
Ī	5 11011.		000	38.36	14.68	53.04	74.00	-20.96	peak				
ľ	6 *	12233.000		37.51	15.69	53.20	74.00	-20.80	peak				

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

Ant. Po	I.	Vert	Vertical									
Test Mo	ode:	ΤХ	π/4-DQPSK	Mode 2402	2MHz							
Remark	(:		eport for the bed limit.	emission v	vhich more t	han 10 dB b	elow the	e pre-				
No.	(MH2		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	7086.5	00	39.11	9.40	48.51	74.00	-25.49	peak				
3	8508.2	50	39.63	10.76	50.39	74.00	-23.61	peak				
4	10020.0	)83	38.83	13.22	52.05	74.00	-21.95	peak				
5	10823.0	000	37.81	14.48	52.29	74.00	-21.71	peak				
6 *	12088.0	083	37.70	15.57	53.27	74.00	-20.73	peak				

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1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value



ŀ	Ant. Po	l.	Hori	Horizontal									
٦	lest Mo	de:	ТΧ	π/4-DQPSK	Mode 2441	MHz							
F	Remark	:		eport for the bed limit.	emission v	vhich more t	han 10 dB b	elow the	pre-				
	No.	Frequer (MHz	-	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector				
ľ	1	4023.6	67	40.40	0.56	40.96	74.00	-33.04	peak				
ľ	2	6083.8	.833 40.11		5.91	46.02	74.00	-27.98	peak				
ľ	3	7278.4	17	39.08	10.05	49.13	74.00	-24.87	peak				
	4	9648.0	00	38.74	12.68	51.42	74.00	-22.58	peak				
Ī	5 * 11061.		917	38.14	14.70	52.84	74.00	-21.16	peak				
ľ	6	12417.0	)83	37.25	15.55	52.80	74.00	-21.20	peak				

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

Ant. Po	I.	Vert	ical					
Fest Mo	ode:	ΤХ	π/4-DQPSK	Mode 244	1MHz			
Remark	<b>c</b> :		report for the bed limit.	emission v	which more t	han 10 dB b	elow the	pre-
No.	No. Frequency (MHz) 1 4317.417		Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1			41.40	0.96	42.36	74.00	-31.64	peak
2	7278.4	17	39.44	10.05	49.49	74.00	-24.51	peak
3	8488.6	67	40.56	10.71	51.27	74.00	-22.73	peak
4 9969.1		67	38.56	13.14	51.70	74.00	-22.30	peak
5	10897.4	117	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:

EN

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value



A	nt. Pol	-	Horizontal									
Т	est Mo	de:	TX 1	π/4-DQPSK	Mode 2480	MHz						
R	emark	:		eport for the bed limit.	emission w	hich more t	han 10 dB b	elow the	pre-			
	No.	Freque (MHz		Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector			
ľ	1	4008.0	00	40.46	0.55	41.01	74.00	-32.99	peak			
	2	7192.2	50	39.03	9.98	49.01	74.00	-24.99	peak			
	3	8751.0	83	39.59	11.31	50.90	74.00	-23.10	peak			
	4	10415.6	667	38.72	13.90	52.62	74.00	-21.38	peak			
	5 *	11175.5	5.500 38.15		14.75	52.90	74.00	-21.10	peak			
	6	12287.8	333	37.28	15.62	52.90	74.00	-21.10	peak			

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Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

Ant. Po	I.	Vert	Vertical									
Test Mc	ode:	ΤХ	π/4-DQPSK	Mode 2480	OMHz							
Remark	κ:		report for the bed limit.	e emission v	vhich more t	han 10 dB b	elow the	pre-				
No.	(MHZ)		Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector				
1			41.94	0.17	42.11	74.00	-31.89	peak				
2	6604.7	50	38.90	7.59	46.49	74.00	-27.51	peak				
3	8363.3	33	39.86	10.50	50.36	74.00	-23.64	peak				
4	9260.2	50	38.49	12.42	50.91	74.00	-23.09	peak				
5 *	10396.0	)83	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				

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

EN



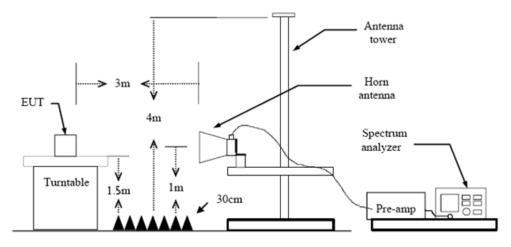
# 3.3. Band Edge Emissions (Radiated)

<u>Limit</u>

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

Restricted Frequency Band	(dBuV/m)(at 3m)						
(MHz)	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

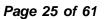
nt. Po			zontal					
est Mo	ode:	GFS	SK Mode 24	02MHz				
120.0 dB	uV/m							
10		_						
00								
io		_						
:0						ar(15 RE-Class & A	L 10 DK	
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50							h	
io 📃		_				ar 15 RE-Class B A	X	
10 <u> </u>		_					2	
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0.0 2285.60	0 2297.60	2309.60	2321.60 23	33.60 (MHz)	2357.60 2	369.60 2381.6	0 2393.60	) 2405.61
No.	Freque (MHz		Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detecto
4			· · ·					maalu
1	2390.0		18.78	31.31	50.09	74.00	-23.91	peak
2 *	2390.0	00	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

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Ant. Po	I.	Vert	ical					
Test Mo	ode:	GFS	SK Mode 240	02MHz				
120.0 dB	uV∕m							
110								
100		_						
90								
80					FCC P	art15 RE-Class B A	have 16 PK	$\mathbf{A}$
70								
60		_			FCC P	ar(15 RE-Class B A	bove 1G AV	
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10 0.0		-						
2287.40	0 2299.40	2311.40	2323.40 23	35.40 (MHz)	2359.40 2	371.40 2383.4	0 2395.40	2407.40
No.	Freque (MHz	-	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detecto
1	2390.0	00	15.42	31.31	46.73	74.00	-27.27	peak
2 *	2390.0	00	3.80	31.31	35.11	54.00	-18.89	AVG

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-																
Ant.	Pol.				zonta											
Test	Mod	de:		GFS	SK M	ode 24	80 M	Hz								
120.0	) dBu'	V/m														
110																
100																
90		٨														
80     Image: Constraint of the second seco																
60	- 6										FCC F	ar 15 RE	-Class B a	Above 1G	۸V	
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20							_								-	
10																
0.0 24	72.200	248	4.20 2	496.20	250	8.20 2	520.20	(MHz	zì	254	4.20 2	556.20	2568.	20 25	80.20	2592.20
N	0.		equer (MHz	-		ading BuV)	1	actor B/m)			vel V/m)		mit ıV/m)	Marg (dB		Detector
1		24	483.5	00	- 16	6.54	3	1.48		48	.02	74	.00	-25.9	98	peak
2	*	24	483.5	00	5	.16	3	1.48		36	.64	54	.00	-17.3	36	AVG
	narks						ID /							<i>с</i> . –		
		•				actor (		)+Cal	DIE	e Fact	or (dB	)-Pre	-ampli	tier Fa	acto	or

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2.Margin value = Level -Limit value

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Ant. Po	ol.	Vert	ical						
Fest Mo	ode:	GFS	SK Mode 24	80 MHz					
120.0 dB	uV/m								
110									
100									
90									
80	n.								
70					FLL P	arl15 RE-Class B /	ADOVE IS PK		
60	Α —								
50	1 X					ar(15 RE-Class B /	ADOVE IS AV		
40	2								
30	- Sentenen	week the second s	mandak watan madad	way way the second s	Menhangsahatang hashatan maslaga	mentersation with a main official of	an a	and the sector of the sector o	
20									
10									
0.0 2473.40	0 2485.40	2497.40	2509.40 25	j21.40 (MHz)	2545.40 2	557.40 2569.4	40 2581.40	) 2593.40	
No.	Frequ	-	Reading	Factor		Limit	Margin	Detector	
	(MF		(dBuV)	(dB/m)	(dBuV/m)				
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	
	r (dB/m) :		na Factor ( Limit value	dB/m)+Cab	le Factor (dB	8)-Pre-ampli	ifier Facto	or	



Ant. Po	ol.	Hor	izont	al							
est M	ode:	π/4-	DQF	PSK Mo	de 2402	ИH	Z				
120.0 d	BuV/m										
110											
100											
90											A
80									ar(15 RE-Class B #	baus 16 PK	
70								FLU F			
60								ECC P	ar(15 RE-Class B A	boye 15 eV	
50											
40							and you also the same	Variation and the state	بليد المحديد الاردوسيان بسياد بالمرار	z h	
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20											
10											
0.0 2286.8	00 2298.80	2310.80	232	2.80 23	34.80 (MI	1z)	235	8.80 2	370.80 2382.8	30 2394.80	2406.80
No.	Freque (MH	-	1	ading BuV)	Facto (dB/m			evel JV/m)	Limit (dBuV/m)	Margin (dB)	Detecto
1	2390.	000	10	6.93	31.31		48	.24	74.00	-25.76	peak
2 *	2390.	000	4	.54	31.31		35	.85	54.00	-18.15	AVG
Remar 1.Facto	-	- Anter	nna F	actor (	dB/m)+C;	abl	e Fac	tor (dE	3)-Pre-ampli	ifier Facto	or

2.Margin value = Level -Limit value

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Ant. Po	Ι.	Vert	ical					
est Mo	de:	π/4-	DQPSK Mo	de 2402MH	z			
120.0 dB	uV∕m							
110								
100								
90								
BO								
70					FLL I	Part15 RE-Class 8 /	Above 15 PK	
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50						Par(15 RE-Class B /	1 X	
40							ž –	
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20								
10								
0.0 2288.00	0 2300.00	2312.00	2324.00 23	36.00 (MHz)	2360.00	2372.00 2384.0	00 2396.0	0 2408.00
No.	Freque (MH	-	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
	s:							-



nt. Po			zontal					
est Mo		π/4-	DQPSK MC	de 2480MH	IZ			
20.0 dB	uV/m							
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	$\square$							
70 <b>—</b>					FCC	Parl15 RE-Class B A	ubove 1G PK	
50								
50 A	1				FCC	Part15 RE-Class B A	bove 1G AV	
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80	22 months	anan an	-hatter and a state and a state of the state	upper and the second	where it are not an in the section of the	or when we want the second	materia	and the second states of the
20								
0.0								
2472.20	0 2484.20	2496.20	2508.20 2	520.20 (MHz)	2544.20	2556.20 2568.2	20 2580.2	0 2592.2
No.	Frequ (Mł	-	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detecto
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

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

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Ant. Po											
Test M	ode:	π/4-	DQPSK Mo	de 2480MH	z						
120.0 d	Bu¥/m										
110											
100											
90											
80	^				FCC F	art15 RE-Class B A	bove 1G PK				
70	$\mathbb{N}$										
60					FCC F	ar(15 RE-Class & A	bove 1G AV				
50	X										
40	- z		a the second of the second second		un munt mundate an	Alm Are other at an an	and the second second	and an address of a			
30											
20											
10											
0.0	00 2485.40	2497.40	2509.40 25	j21.40 (MHz)	2545.40 2	557.40 2569.4	0 2581.40	) 2593.40			
No.	Frequ (MF		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			
Remar	-	A	ла Ганат (r		а Паріан / -ID		Car Facto				
			nna Factor (o -Limit value	ы/m)+Cabl	e Factor (dB	)-Pre-ampli	ner Facto	Dr			

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2.Margin value = Level -Limit value

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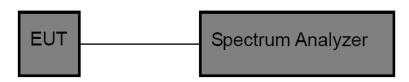


# 3.4. Band edge and Spurious Emissions (Conducted)

# 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**

- The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss 1. 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  $\geq$  RBW, scan up through 10<sup>th</sup> 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.

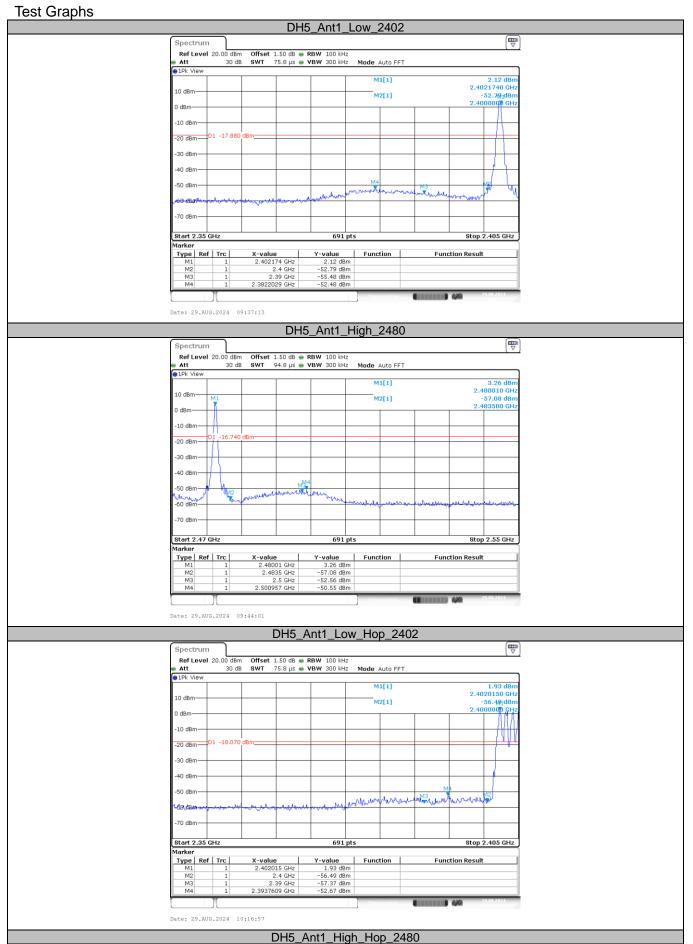
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#### **Test Results**

#### (1) Band edge Conducted Test

Toot Mode	Antonno	ChName		RefLevel	Result	Limit	Verdict	
Test Mode	Antenna	Chivame	Freq(MHz)	[dBm]	[dBm]	[dBm]		
		Low	2402	2.12	-52.48	≤-17.88	PASS	
DH5	Ant1	High	2480	3.26	-50.55	≤-16.74	PASS	
DHD		Low	Hop_2402	1.93	-52.67	≤-18.07	PASS	
		High	Hop_2480	3.42	-50.65	≤-16.58	PASS	
	A	Low	2402	2.10	-51.90	≤-17.90	PASS	
2DH5		High	2480	3.29	-50.21	≤-16.71	PASS	
2005	Ant1	Low	Hop_2402	-0.98	-51.87	≤-20.98	PASS	
		High	Hop_2480	-0.43	-50.21	≤-20.43	PASS	





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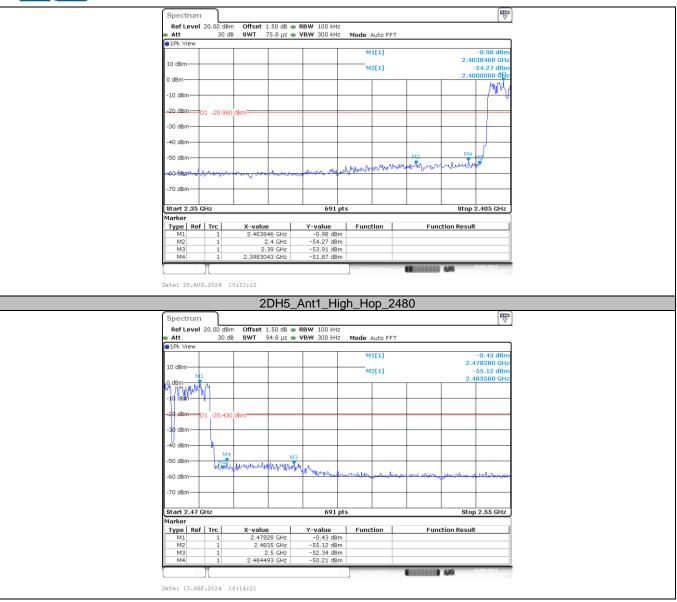


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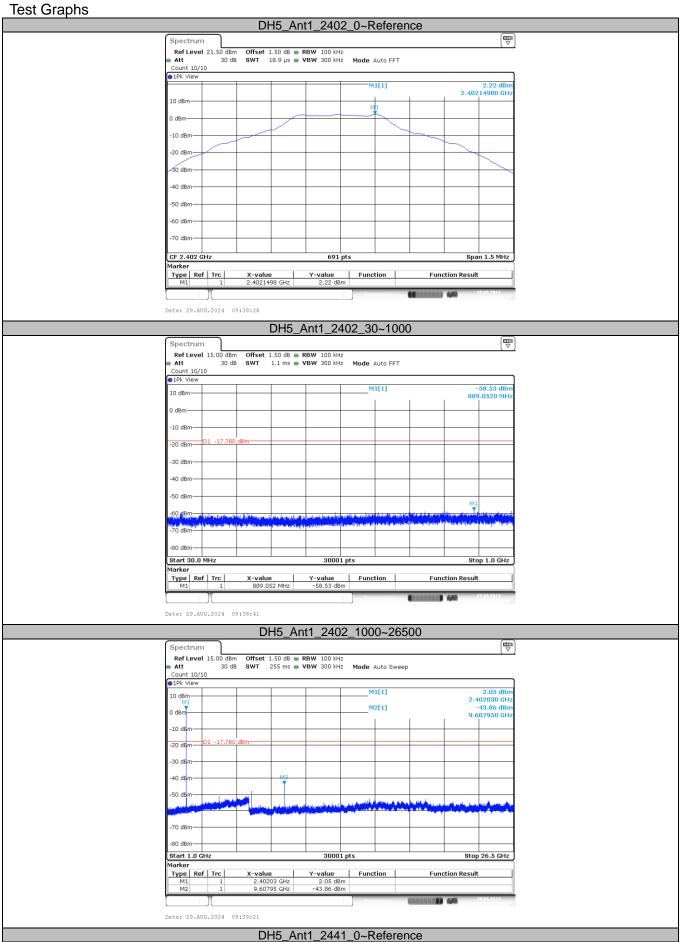


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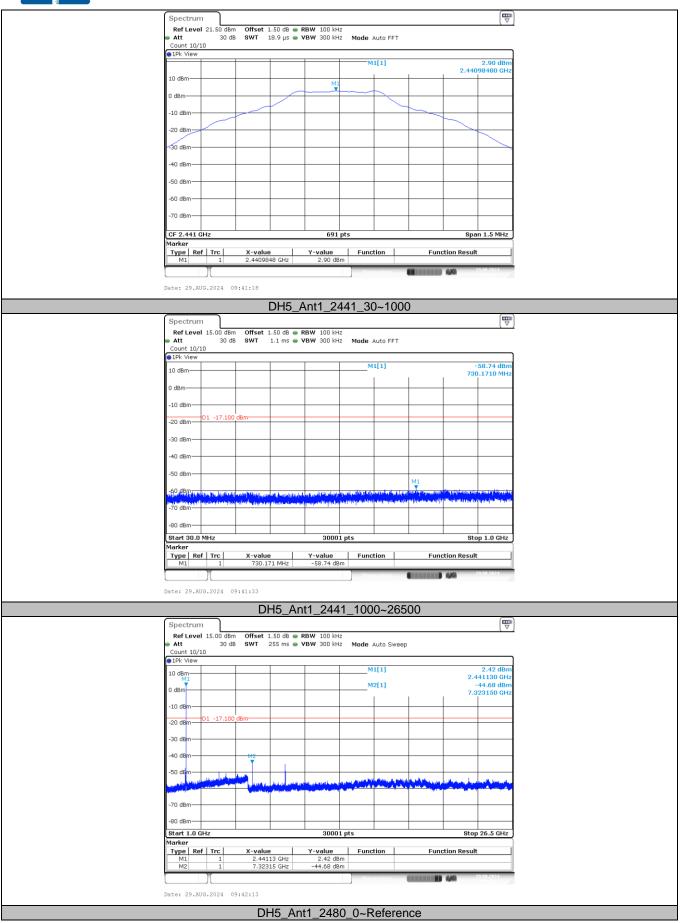
#### (2) Conducted Spurious Emissions Test

Test Mode	Antenna	Freq(MHz)	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
			Reference	2.22	2.22		PASS
		2402	30~1000	2.22	-58.53	≤-17.78	PASS
			1000~26500	2.22	-43.86	≤-17.78	PASS
			Reference	2.90	2.90		PASS
DH5	Ant1	2441	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
		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
			Reference	2.94	2.94		PASS
2DH5	Ant1	2441	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



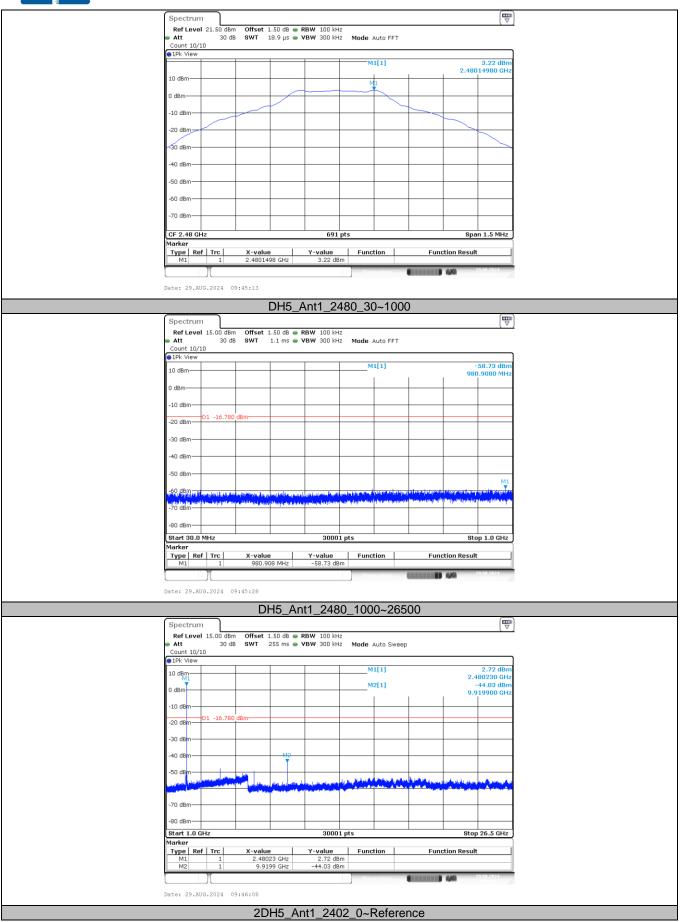
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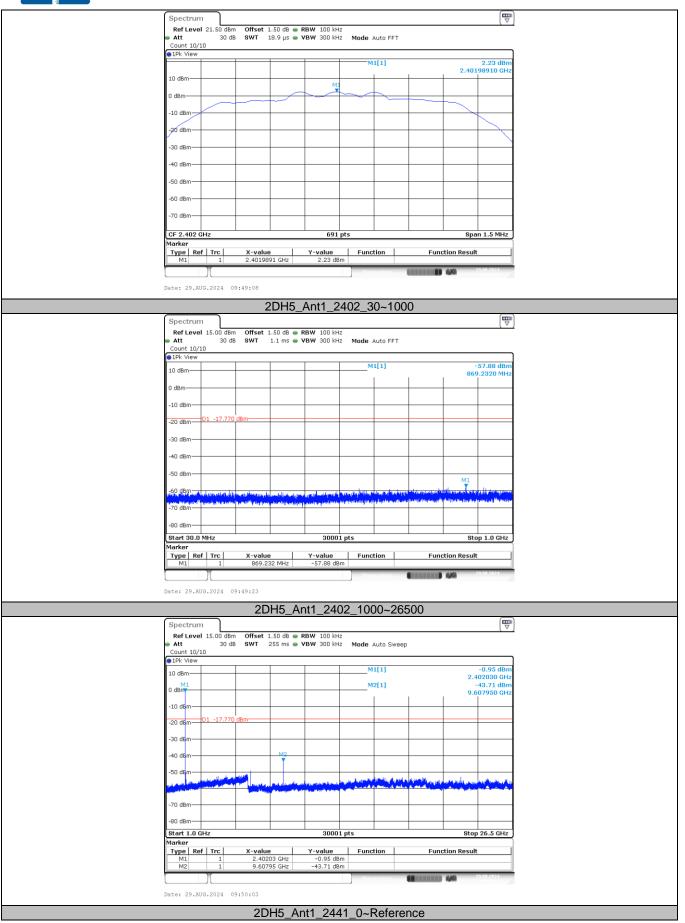






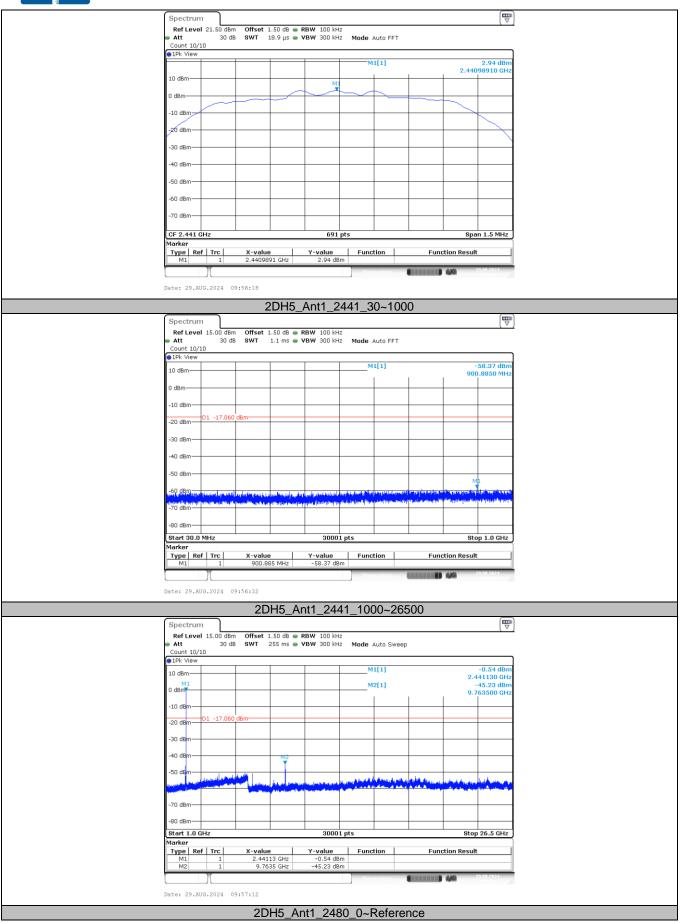






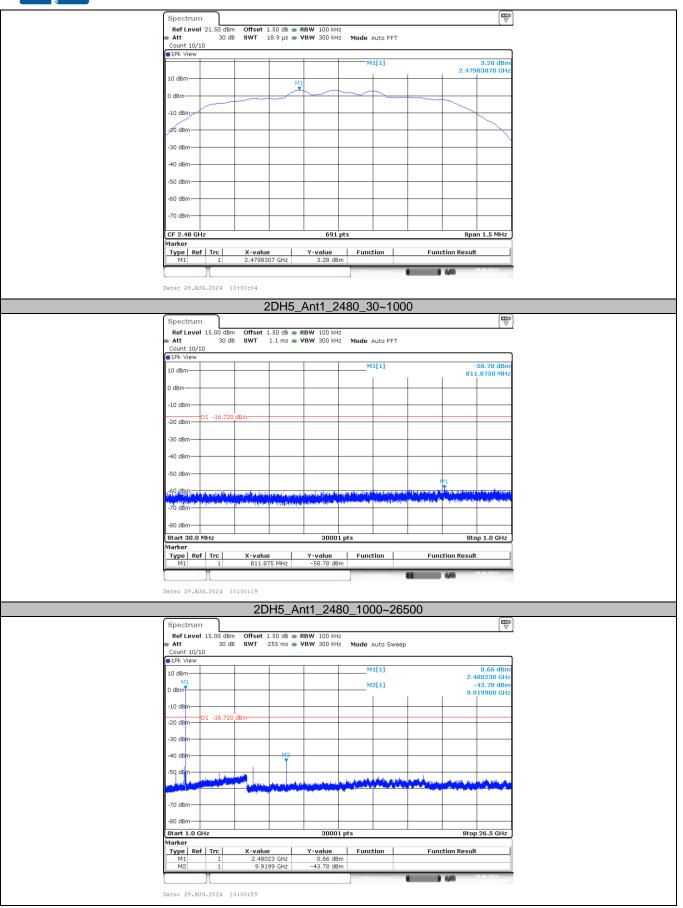












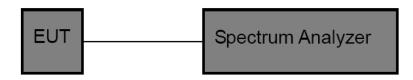


# 3.5. Bandwidth

### 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 =  $1\% \sim 5\%$  occupied bandwidth.
  - (2) Set the video bandwidth (VBW)  $\geq$  3 RBW.
  - (3) Detector = Peak.

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- (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

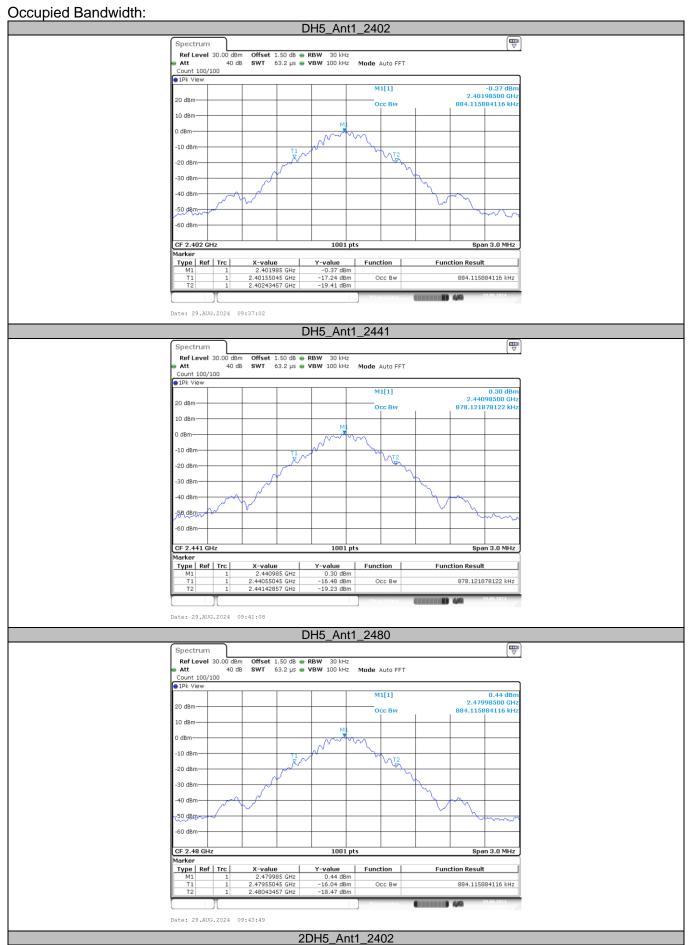
Please refer to the clause 2.4.

#### **Test Results**

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

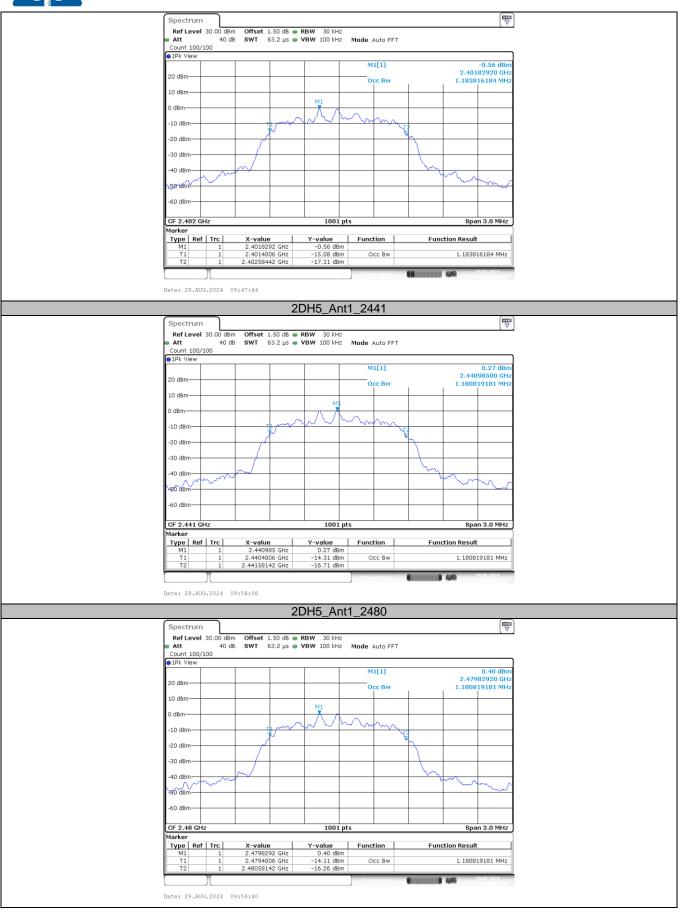
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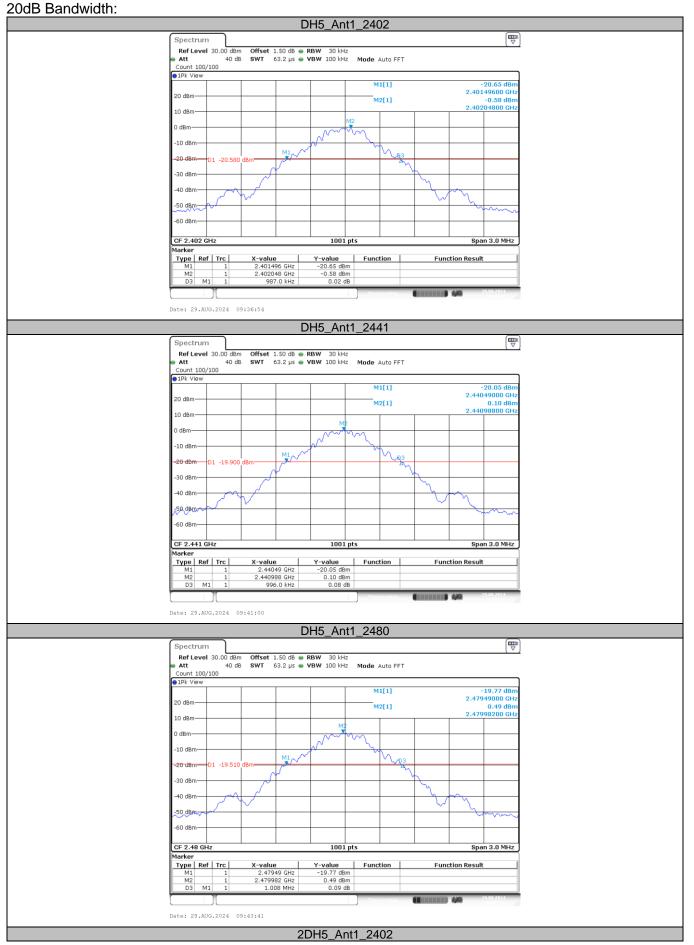


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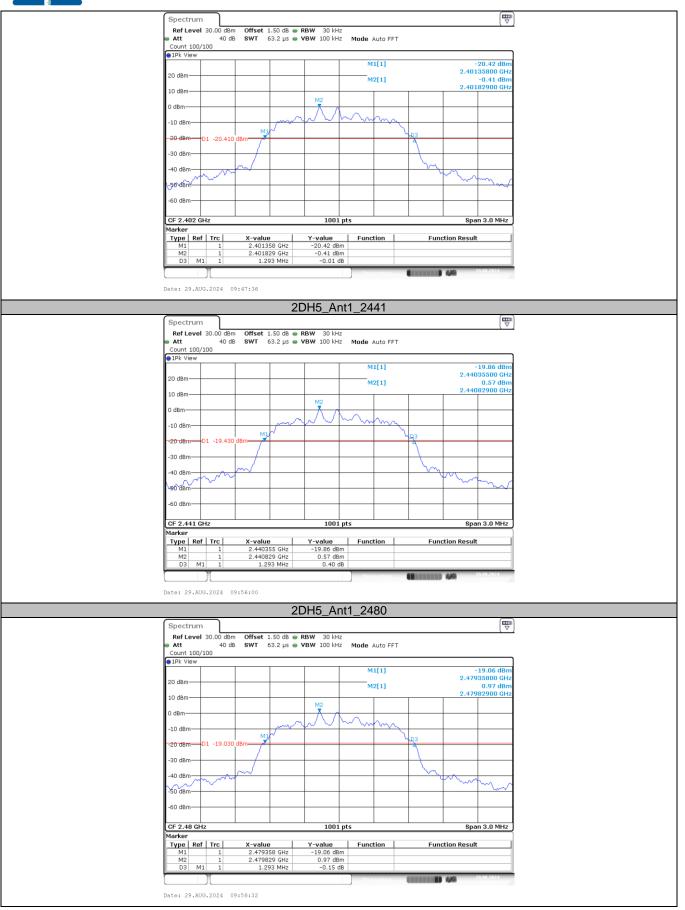






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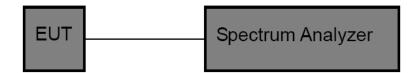
# 3.6. Channel Separation

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)  $\ge$  3 RBW.
- (3) Detector = Peak.
- (4) Trace mode = Max hold.
- (5) Sweep = Auto couple.

#### **Test Mode**

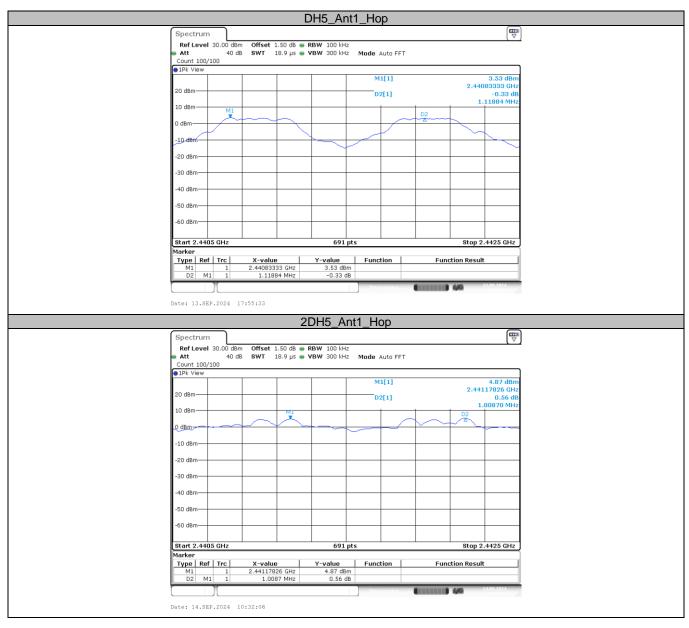
ΕN

Please refer to the clause 2.4.



**Test Results** 

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



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# 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**

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



DH5_Ant1_Hop
Ref Level     30.0 dBm     Offset     1.50 dB     RBW     300 kHz     Mode     Auto     FFT       Att     40 dB     SWT     31.7 µs     VBW     300 kHz     Mode     Auto     FFT       PLF View     20 dBm     20 dBm
PPk View 20 dBm 20 dBm 10 dBm 0 (98,7,0,7,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
ol <mark>derAulueuuuuuuuuuuuuuuuuuuuuuuuuuuuuuuuuu</mark>
ol <mark>derAulueuuuuuuuuuuuuuuuuuuuuuuuuuuuuuuuuu</mark>
ole <mark>red had waaroor had haal had had had had had had had had had had</mark>
-20 dBm
-30 dBm
140 dBm
-50 dBm
-60 dBm
Start 2.4 GHz 691 pts Stop 2.4835 GHz Marker
Measuring
Date: 29.AUG.2024 10:21:05
2DH5_Ant1_Hop
Spectrum 🕎
Ref Level     30.00 dBm     Offset     1.50 dB     RBW     300 kHz       ● Att     40 dB     SWT     31.7 μs     • VBW     300 kHz     Mode     Auto FFT
●1Pk View
20 dBm
10 dBm
10 dBm-
10 dBm
10 dBm-
10 dBm
10 dBm 0/d6/h10/20010000000000000000000000000000000
10 dBm
10 dBm 0/d6/h10/20010000000000000000000000000000000
10 dBm 0 dBm 0 dBm 0 dBm   -10 dBm -10 dBm 0 dBm 0 dBm   -20 dBm -10 dBm 0 dBm   -30 dBm -10 dBm 0 dBm   -50 dBm -10 dBm 0 dBm   -50 dBm -10 dBm 0 dBm   -50 dBm -10 dBm 0 dBm   -60 dBm <
10 dBm 0 dbm



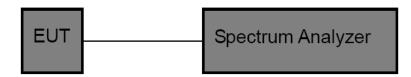
# 3.8. Dwell Time

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**

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the 1. block diagram above.
- Spectrum Setting: 2.
  - (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**

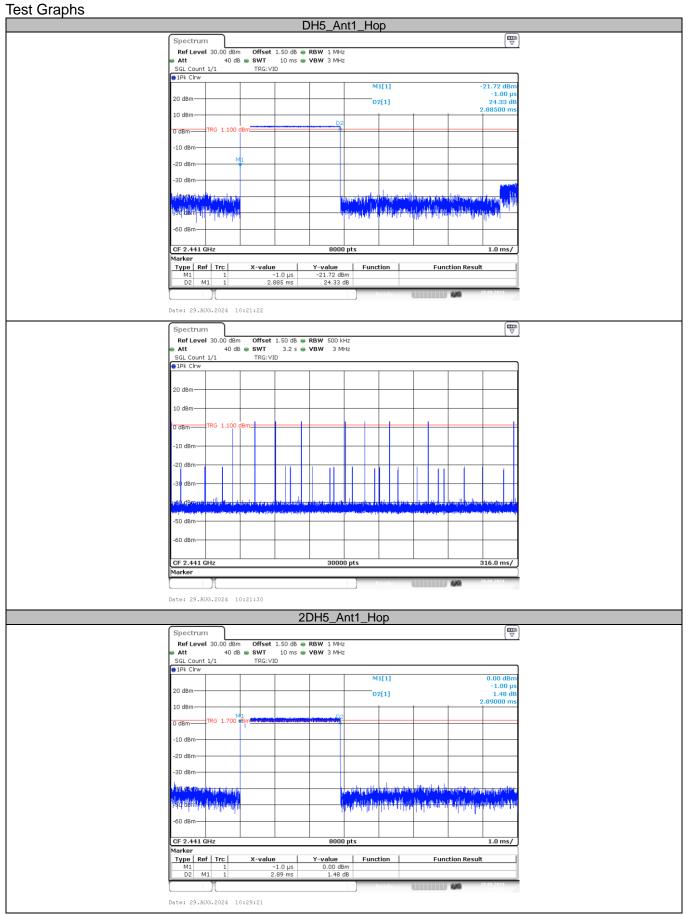
Please refer to the clause 2.4.

#### **Test Result**

ΞN

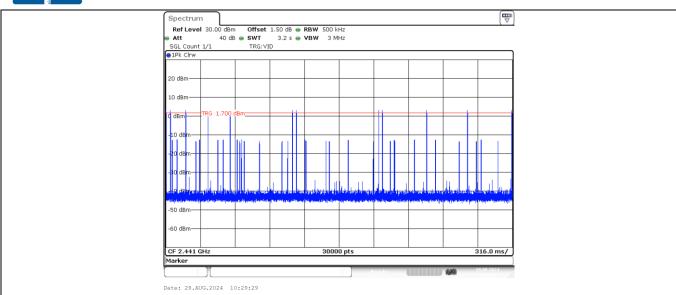
Test Mode	Antenna	Freq(MHz)	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH5	Ant1	Нор	2.885	100	0.289	≤0.4	PASS
2DH5	Ant1	Нор	2.890	120	0.347	≤0.4	PASS













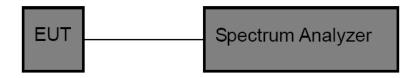
# 3.9. Peak Output Power

## 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 Pow- er<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)  $\geq$  RBW.
  - (3) Detector = Peak.

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- (4) Trace mode = Max hold.
- (5) Sweep = Auto couple.

#### **Test Mode**

Please refer to the clause 2.4.

#### **Test Result**

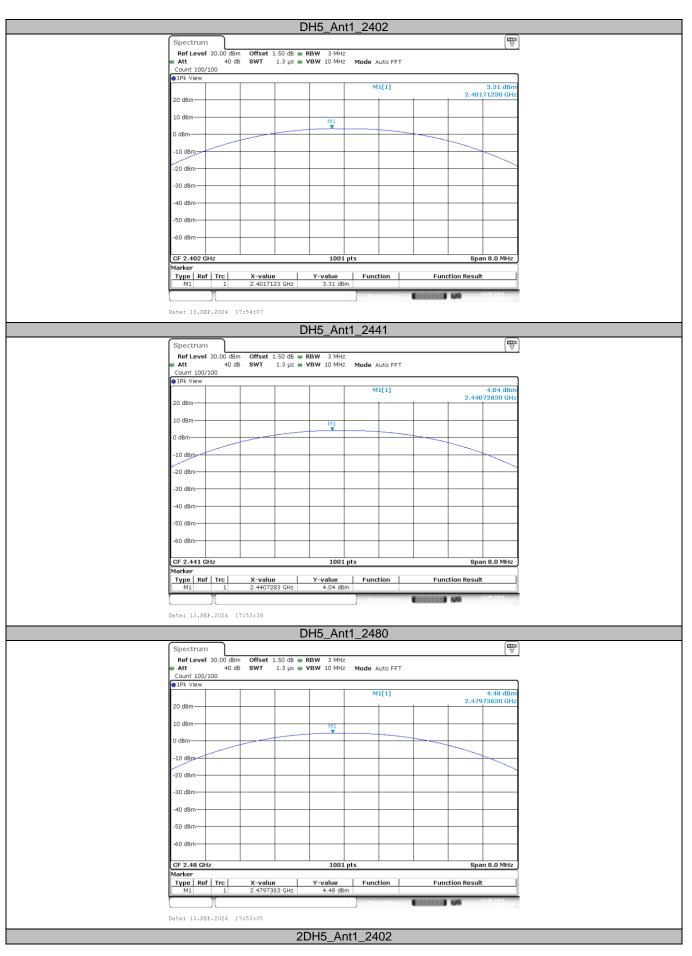
Test Mode	Antenna	Channel Result[dBm]		Limit[dBm]	Verdict
		2402	3.31	≤20.97	PASS
DH5	Ant1	2441	4.04	≤20.97	PASS
		2480	4.48	≤20.97	PASS
		2402	3.79	≤20.97	PASS
2DH5	Ant1 244	2441	4.63	≤20.97	PASS
		2480	4.98	≤20.97	PASS

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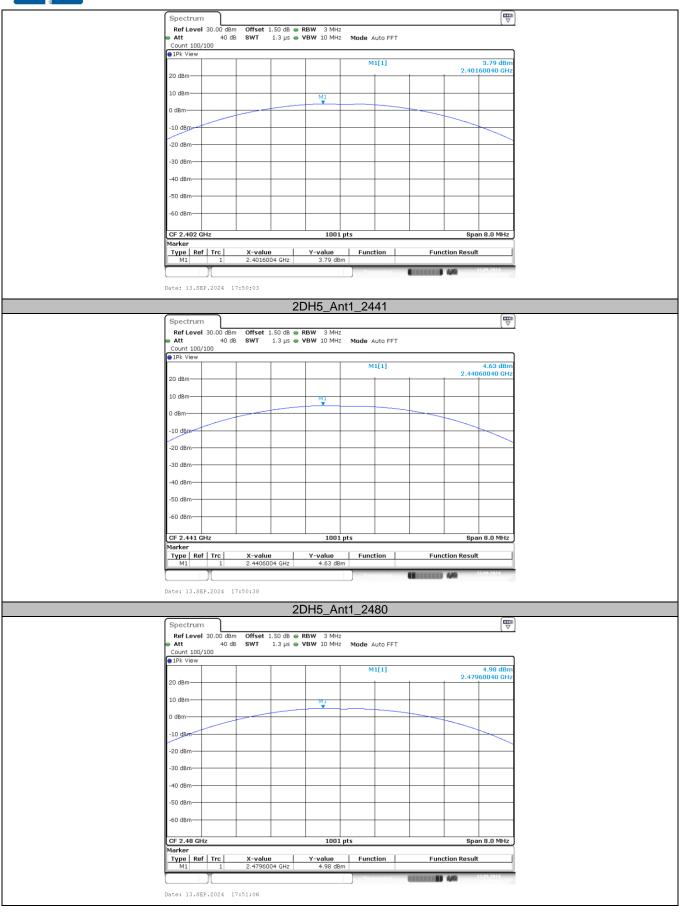
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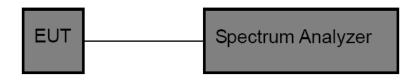


# 3.10. Duty Cycle

## 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**

ΞN

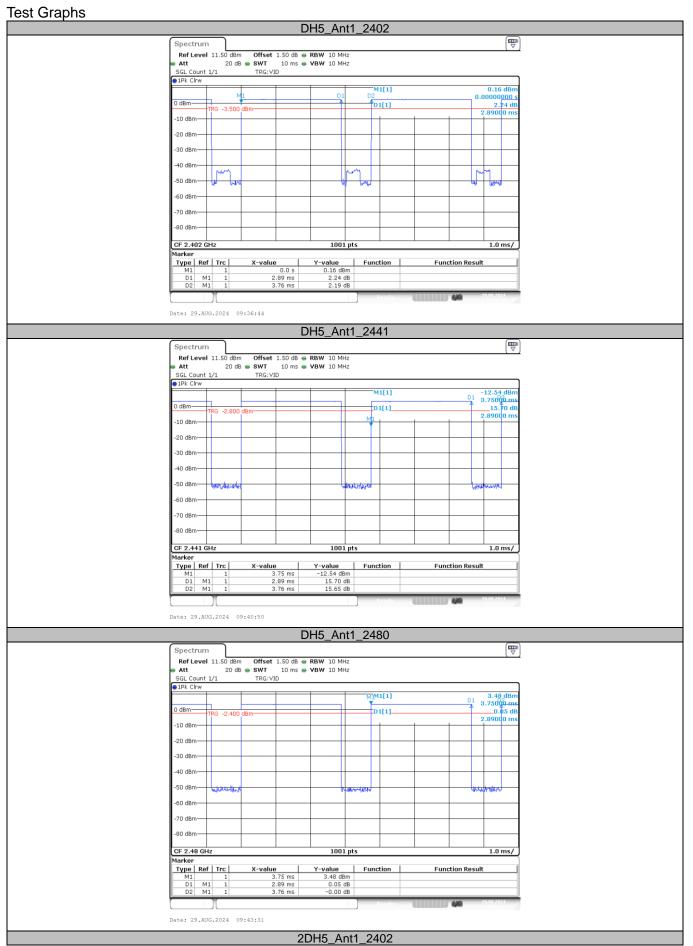
Test Mode	Frequency [MHz]	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	1/T Minimum VBW (kHz)	Final setting For VBW (kHz)
	2402	2.89	3.76	76.86	0.35	1
GFSK	2441	2.89	3.76	76.86	0.35	1
	2480	2.89	3.76	76.86	0.35	1
	2402	2.89	3.75	77.07	0.35	1
π/4-DQPSK	2441	2.90	3.76	77.13	0.34	1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

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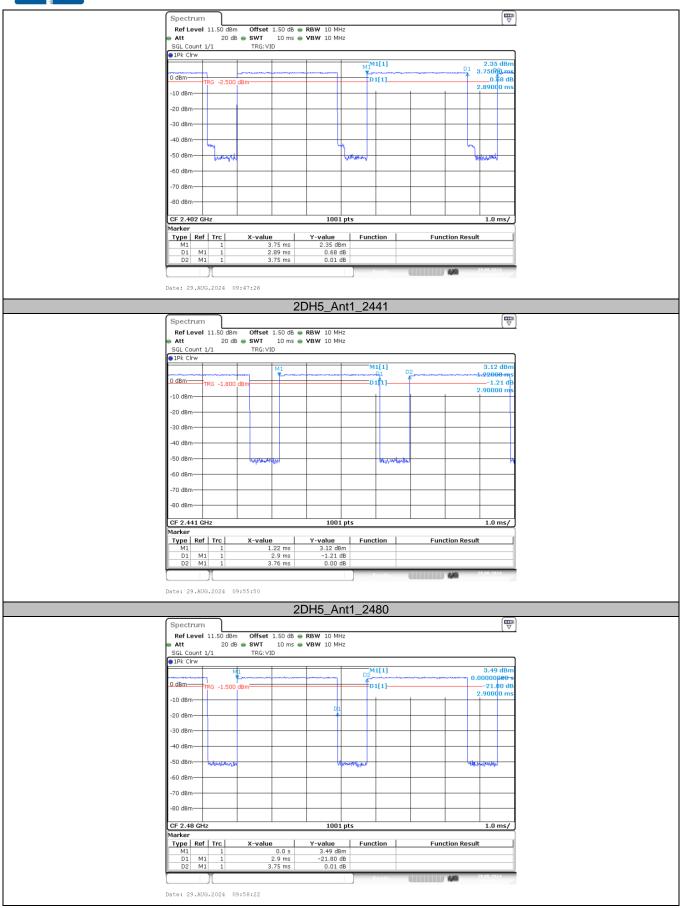
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# 3.11. Antenna Requirement

## **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.