

TEST REPORT								
FCC ID::	2AQRM-A1							
Test Report No::	TCT241128E021							
Date of issue::	Dec. 25, 2024							
Testing laboratory::	SHENZHEN TONGCE TESTING LAB							
Testing location/ address:	2101 & 2201, Zhenchang Factory, Renshan Industrial Zone, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, 518103, People's Republic of China							
Applicant's name:	FOXX Development Inc.							
Address::	3480 Preston Ridge Road, Suite500, Alpharetta, GA 30005, USA							
Manufacturer's name:	FOXX Development Inc.							
Address::	3480 Preston Ridge Road, Suite500, Alpharetta, GA 30005, USA							
Standard(s):	FCC CFR Title 47 Part 15 Subpart C Section 15.247 FCC KDB 558074 D01 15.247 Meas Guidance v05r02 ANSI C63.10:2020							
Product Name::	Smart Phone							
Trade Mark:	MIRO, FOXXD, FOXX							
Model/Type reference:	A1 (C)							
Rating(s):	Power supply: DC 5V from adaptor or DC 3.8V from battery Power Adapter: Model: 495 Input: 100-240V~50/60Hz, 200mA Output: 5.0V===1.0A							
Date of receipt of test item:	Nov. 28, 2024							
Date (s) of performance of test:	Nov. 29, 2024 ~ Dec. 24, 2024							
Tested by (+signature):	Rleo LIU Rlo Un JONGCE TE							
Check by (+signature):	Beryl ZHAO Boyl 26 (TCT)							
Approved by (+signature):	Tomsin Jows in 135 34							

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1. General Product Information

1.1. EUT description

Product Name:	Smart Phone	(3)	
Model/Type reference:	A1		
Sample Number:	TCT241128E021-0101		
Bluetooth Version:	V5.0 (This report is for BDR+EDR		
Operation Frequency:	2402MHz~2480MHz		
Transfer Rate:	1/2/3 Mbits/s	(C)	(C)
Number of Channel:	79		
Modulation Type:	GFSK, π/4-DQPSK, 8DPSK		
Modulation Technology:	FHSS		
Antenna Type:	Internal Antenna		
Antenna Gain:	1.50dBi		(0)
	Power supply: DC 5V from adaptor Power Adapter: Model: 495 Input: 100-240V~50/60Hz, 200mA Output: 5.0V==1.0A		attery

Note: The antenna gain listed in this report is provided by applicant, and the test laboratory is not responsible for this parameter.

1.2. Model(s) list

None.

1.3. Operation Frequency

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402MHz	20	2422MHz	40	2442MHz	- 60	2462MHz
(G))1	2403MHz	21	2423MHz	41	2443MHz	61	2463MHz
				·			
10	2412MHz	30	2432MHz	50	2452MHz	70	2472MHz
11	2413MHz	31	2433MHz	51	2453MHz	71	2473MHz
							·
18	2420MHz	38	2440MHz	58	2460MHz	78	2480MHz
19	2421MHz	39	2441MHz	- 59	2461MHz		-
6.7	0 10 0	00 0 70 1	/		EOK // 5	ODOK O	DDOK

Remark: Channel 0, 39 & 78 have been tested for GFSK, $\pi/4$ -DQPSK, 8DPSK modulation mode.



2. Test Result Summary

Requirement	CFR 47 Section	Result
Antenna Requirement	§15.203/§15.247 (c)	PASS
AC Power Line Conducted Emission	§15.207	PASS
Conducted Peak Output Power	§15.247 (b)(1)	PASS
20dB Occupied Bandwidth	§15.247 (a)(1)	PASS
Carrier Frequencies Separation	§15.247 (a)(1)	PASS
Hopping Channel Number	§15.247 (a)(1)	PASS
Dwell Time	§15.247 (a)(1)	PASS
Radiated Emission	§15.205/§15.209	PASS
Band Edge	§15.247(d)	PASS

Note:

- 1. PASS: Test item meets the requirement.
- 2. Fail: Test item does not meet the requirement.
- 3. N/A: Test case does not apply to the test object.
- 4. The test result judgment is decided by the limit of test standard.





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3. General Information

3.1. Test environment and mode

Operating Environment:						
Condition	Conducted Emission	Radiated Emission				
Temperature:	24.8 °C	25.0 °C				
Humidity:	52 % RH	49 % RH				
Atmospheric Pressure:	1010 mbar	1010 mbar				
Test Software:						
Software Information:	Engineering mode					
Power Level:	4					
Test Mode:						
Engineering mode: Keep the EUT in continuous transmitting by select channel and modulations with Fully-charged battery.						

The sample was placed 0.8m & 1.5m for the measurement below & above 1GHz above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case (Z axis) are shown in Test Results of the following pages.

DH1 DH3 DH5 all have been tested, only worse case DH1 is reported.

3.2. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Equipment	Model No.	Serial No.	FCC ID	Trade Name	
1	1	1	/	1	

Note:

- 1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.
- 3. For conducted measurements (Output Power, 20dB Occupied Bandwidth, Carrier Frequencies Separation, Hopping Channel Number, Dwell Time, Spurious Emissions), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is listed in the Test Instruments.

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4. Facilities and Accreditations

4.1. Facilities

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

• FCC - Registration No.: 645098

SHENZHEN TONGCE TESTING LAB

Designation Number: CN1205

The testing lab has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

IC - Registration No.: 10668A

SHENZHEN TONGCE TESTING LAB

CAB identifier: CN0031

The testing lab has been registered by Innovation, Science and Economic Development Canada for radio equipment testing.

4.2. Location

SHENZHEN TONGCE TESTING LAB

Address: 2101 & 2201, Zhenchang Factory, Renshan Industrial Zone, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, 518103, People's Republic of China

TEL: +86-755-27673339

4.3. Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	MU
1	Conducted Emission	± 3.10 dB
2	RF power, conducted	± 0.12 dB
3	Spurious emissions, conducted	± 0.11 dB
4	All emissions, radiated(<1 GHz)	± 4.56 dB
5	All emissions, radiated(1 GHz - 18 GHz)	± 4.22 dB
6	All emissions, radiated(18 GHz- 40 GHz)	± 4.36 dB

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5. Test Results and Measurement Data

5.1. Antenna requirement

Standard requirement: FCC Part15 C Section 15.203 /247(c)

15.203 requirement:

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 an 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.

15.247(c) (1)(i) requirement:

(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.

E.U.T Antenna:

The Bluetooth antenna is internal antenna which permanently attached, and the best case gain of the antenna is 1.50dBi.



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5.2. Conducted Emission

5.2.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.207							
Test Method:	ANSI C63.10:2020							
Frequency Range:	150 kHz to 30 MHz	(C)	(C ¹)					
Receiver setup:	RBW=9 kHz, VBW=30	kHz, Sweep time	e=auto					
	Frequency range	Limit (
Limits:	(MHz) 0.15-0.5	Quasi-peak 66 to 56*	Average 56 to 46*					
Lillius.	0.15-0.5	56	46					
	5-30	60	50					
	Reference	e Plane	(0)					
Test Setup: Ac power 80cm LISN								
Test Mode:	Charging + Transmitting	ng Mode						
Test Procedure:	 The E.U.T is connected to an adapter through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to 							
Test Result:	ANSI C63.10:2020 on conducted measurement. PASS							



5.2.2. Test Instruments

Cond	Conducted Emission Shielding Room Test Site (843)										
Equipment	Manufacturer	Model	Serial Number	Calibration Due							
EMI Test Receiver	R&S	ESCI3	100898	Jun. 26, 2025							
LISN	Schwarzbeck	NSLK 8126	8126453	Jan. 31, 2025							
Attenuator	N/A	10dB	164080	Jun. 26, 2025							
Line-5	TCT	CE-05	/	Jun. 26, 2025							
EMI Test Software	EZ_EMC	EMEC-3A1	1.1.4.2	1 (6							

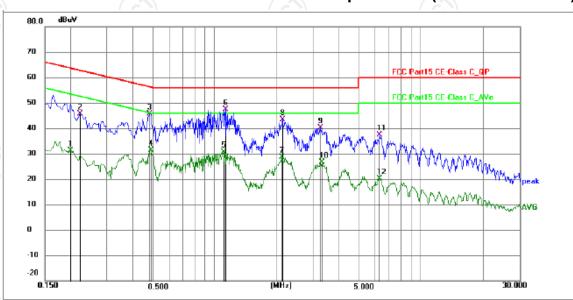




5.2.3. Test data

Please refer to following diagram for individual

Conducted Emission on Line Terminal of the power line (150 kHz to 30MHz)



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark	
1	0.1995	20.53	10.56	31.09	53.63	-22.54	AVG	Р		
2	0.2220	35.02	10.56	45.58	62.74	-17.16	QP	Р		
3	0.4830	35.18	10.57	45.75	56.29	-10.54	QP	Р		
4	0.4874	20.74	10.57	31.31	46.21	-14.90	AVG	Р		
5	1.1040	19.99	10.66	30.65	46.00	-15.35	AVG	Р		
6 *	1.1265	36.61	10.66	47.27	56.00	-8.73	QP	Р		
7	2.1164	18.02	10.68	28.70	46.00	-17.30	AVG	Р		
8	2.1300	32.78	10.68	43.46	56.00	-12.54	QP	Р		
9	3.2640	29.60	10.65	40.25	56.00	-15.75	QP	Р		
10	3.3090	15.87	10.65	26.52	46.00	-19.48	AVG	Р		
11	6.3150	26.48	10.78	37.26	60.00	-22.74	QP	Р		
12	6.3150	9.38	10.78	20.16	50.00	-29.84	AVG	Р		

Note:

Freq. = Emission frequency in MHz

Reading level $(dB\mu V)$ = Receiver reading

Corr. Factor (dB) = LISN factor + Cable loss

Measurement $(dB\mu V)$ = Reading level $(dB\mu V)$ + Corr. Factor (dB)

 $Limit (dB\mu V) = Limit stated in standard$

 $Margin (dB) = Measurement (dB\mu V) - Limits (dB\mu V)$

Q.P. =Quasi-Peak

AVG =average

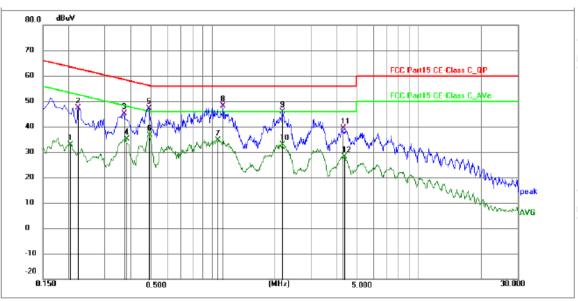
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^{*} is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz.



Conducted Emission on Neutral Terminal of the power line (150 kHz to 30MHz)



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.2040	22.23	10.56	32.79	53.45	-20.66	AVG	Р	
2	0.2220	36.77	10.56	47.33	62.74	-15.41	QP	Р	
3	0.3704	34.46	10.57	45.03	58.49	-13.46	QP	Р	
4	0.3795	24.50	10.57	35.07	48.29	-13.22	AVG	Р	
5	0.4875	36.60	10.57	47.17	56.21	-9.04	QP	Р	
6	0.4920	25.99	10.57	36.56	46.13	-9.57	AVG	Р	
7	1.0590	24.06	10.66	34.72	46.00	-11.28	AVG	Р	
8 *	1.1220	37.53	10.66	48.19	56.00	-7.81	QP	Р	
9	2.1705	35.32	10.68	46.00	56.00	-10.00	QP	Р	
10	2.1705	22.24	10.68	32.92	46.00	-13.08	AVG	Р	
11	4.2720	28.59	10.69	39.28	56.00	-16.72	QP	Р	
12	4.3395	17.47	10.69	28.16	46.00	-17.84	AVG	Р	

Note1:

Freq. = Emission frequency in MHz

Reading level $(dB\mu V)$ = Receiver reading

Corr. Factor (dB) = LISN factor + Cable loss

Measurement $(dB\mu V)$ = Reading level $(dB\mu V)$ + Corr. Factor (dB)

 $Limit (dB\mu V) = Limit stated in standard$

 $Margin (dB) = Measurement (dB\mu V) - Limits (dB\mu V)$

Q.P. =Quasi-Peak AVG =average

* is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz.

Note2:

Measurements were conducted in all three channels (high, middle, low) and three modulation (GFSK, Pi/4 DQPSK, 8DPSK), and the worst case Mode (Highest channel and 8DPSK) was submitted only.

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5.3. Conducted Output Power

5.3.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (b)(1)			
Test Method:	KDB 558074 D01 v05r02			
Limit:	Section 15.247 (b) The maximum peak conducted output power of the intentional radiator shall not exceed the following: (1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band 0.125 watts.			
Test Setup:	Spectrum Analyzer EUT			
Test Mode:	Transmitting mode with modulation			
Test Procedure:	Use the following spectrum analyzer settings: Span = approximately 5 times the 20 dB bandwid centered on a hopping channel RBW > the 20 dB bandwidth of the emission being measured VBW ≥ RBW Sweep = auto Detector function = peak Trace = max hold Allow the trace to stabilize. Use the marker-to-peak function to set the marker to to peak of the emission.			
Test Result:	PASS			

5.3.2. Test Instruments

Name	Manufacturer	Model No.	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY50101018	Jun. 26, 2025
Test Software	TST Pass	/	9 /	1

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5.4. 20dB Occupy Bandwidth

5.4.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)			
Test Method:	KDB 558074 D01 v05r02			
Limit:	N/A			(.c ⁽¹⁾)
Test Setup:	Spectrum Analyze	er	EUT	
Test Mode:	Transmitting m	node with modu	lation	
Test Procedure:	 Transmitting mode with modulation The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement. Set to the maximum power setting and enable the EUT transmit continuously. Use the following spectrum analyzer settings for 20dB Bandwidth measurement. Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hopping channel; 1%≤RBW≤5% of the 20 dB bandwidth; VBW≥3RBW; Sweep = auto; Detector function = peak; Trace = max hold. Measure and record the results in the test report. 			
Test Result:	PASS		(0)	

5.4.2. Test Instruments

Name	Manufacturer	Model No.	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY50101018	Jun. 26, 2025
Test Software	TST Pass	T	1	1

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5.5. Carrier Frequencies Separation

5.5.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)				
Test Method:	KDB 558074 D01 v05r02				
Limit:	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz of the 20 dB bandwidth of the hopping channel, whicheve is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.				
Test Setup:	Spectrum Analyzer EUT				
Test Mode:	Hopping mode				
Test Procedure:	 The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement. Set to the maximum power setting and enable the EUT transmit continuously. Enable the EUT hopping function. Use the following spectrum analyzer settings: Span = wide enough to capture the peaks of two adjacent channels; RBW is set to approximately 30% of the channel spacing, adjust as necessary to best identify the center of each individual channel; VBW≥RBW; Sweep = auto; Detector function = peak; Trace = max hold. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. Record the value in report. 				
Test Result:	PASS				

5.5.2. Test Instruments

Name	Manufacturer	Model No.	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY50101018	Jun. 26, 2025
Test Software	TST Pass	/	/	/



5.6. Hopping Channel Number

5.6.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)		
Test Method:	KDB 558074 D01 v05r02		
Limit:	Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.		
Test Setup:	Spectrum Analyzer EUT		
Test Mode:	Hopping mode		
Test Procedure:	 The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement. Set to the maximum power setting and enable the EUT transmit continuously. Enable the EUT hopping function. Use the following spectrum analyzer settings: Span = the frequency band of operation; set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller; VBW≥RBW; Sweep = auto; Detector function = peak; Trace = max hold. The number of hopping frequency used is defined as the number of total channel. Record the measurement data in report. 		
Test Result:	PASS		

5.6.2. Test Instruments

Name	Manufacturer	Model No.	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY50101018	Jun. 26, 2025
Test Software	TST Pass	/	/	/

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5.7. Dwell Time

5.7.1. Test Specification

FCC Part15 C Section 15.247 (a)(1)				
KDB 558074 D01 v05r02				
The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.				
Spectrum Analyzer EUT				
Hopping mode				
 The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement. Set to the maximum power setting and enable the EUT transmit continuously. Enable the EUT hopping function. Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel; RBW shall be ≤ channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel; VBW≥RBW; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold. Measure and record the results in the test report. 				
PASS				

5.7.2. Test Instruments

Name	Manufacturer	Model No.	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY50101018	Jun. 26, 2025
Test Software	TST Pass	/)	(6)



5.8. Pseudorandom Frequency Hopping Sequence

Test Requirement: FCC Part15 C Section 15.247 (a)(1) requirement:

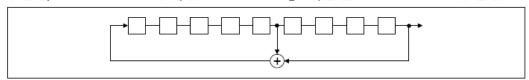
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Alternatively. Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

EUT Pseudorandom Frequency Hopping Sequence

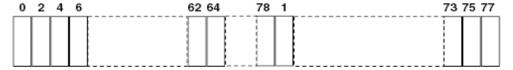
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first one of 9 consecutive ones; i.e. the shift register is initialized with nine ones.

- Number of shift register stages: 9
- Length of pseudo-random sequence: 29-1 = 511 bits
- Longest sequence of zeros: 8 (non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:



Each frequency used equally on the average by each transmitter. The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

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5.9. Conducted Band Edge Measurement

5.9.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (d)				
Test Method:	KDB 558074 D01 v05r02				
Limit:	In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fain the restricted bands must also comply with the radiated emission limits.				
Test Setup:	Spectrum Analyzer EUT				
Test Mode:	Transmitting mode with modulation				
Test Procedure:	 Set to the maximum power setting and enable the EUT transmit continuously. Set RBW = 100 kHz (≥1% span=10MHz), VBW = 300 kHz (≥RBW). Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100kHz RBW. The attenuation shall be 30 dB instead of 20 dB when RMS conducted output power procedure is used. Enable hopping function of the EUT and then repeat step 2 and 3. Measure and record the results in the test report. 				
Test Result:	PASS				

5.9.2. Test Instruments

Name	Manufacturer	Model No.	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY50101018	Jun. 26, 2025
Test Software	TST Pass	1	3 /	

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5.10. Conducted Spurious Emission Measurement

5.10.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	KDB 558074 D01 v05r02
Limit:	In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.
Test Setup:	Spectrum Analyzer EUT
Test Mode:	Transmitting mode with modulation
Test Procedure:	 The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement. Set to the maximum power setting and enable the EUT transmit continuously. Set RBW = 100 kHz, VBW = 300kHz, scan up through 10th harmonic. All harmonics / spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW. Measure and record the results in the test report. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
Test Result:	PASS

5.10.2. Test Instruments

Name	Manufacturer	Model No.	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY50101018	Jun. 26, 2025
Test Software	TST Pass	/	9 /	(6)

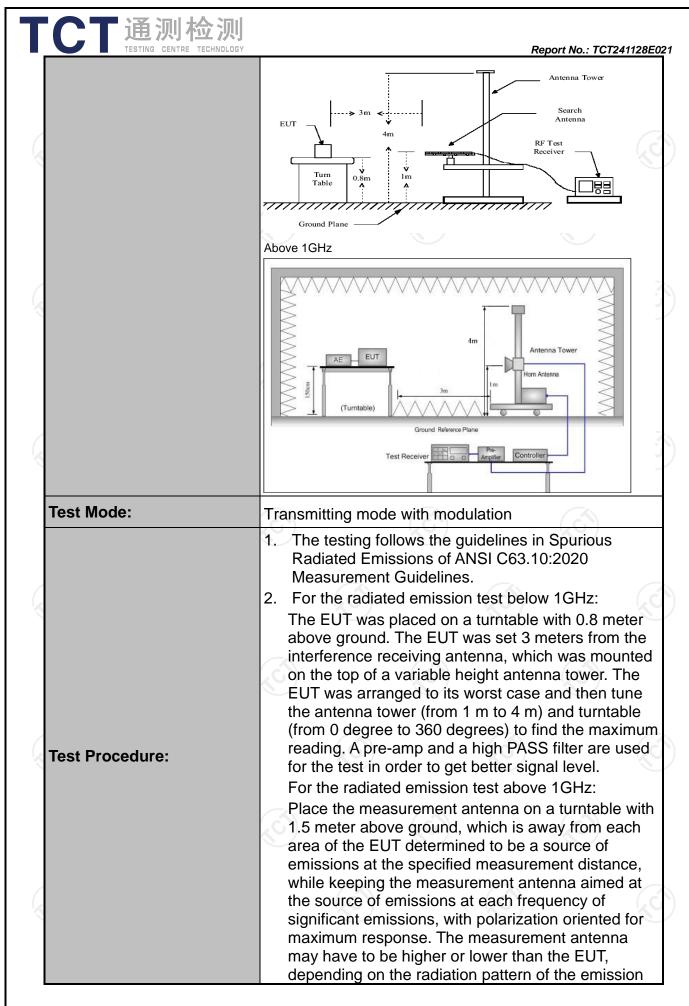
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5.11. Radiated Spurious Emission Measurement

5.11.1. Test Specification

Total Dominomonts	500 Day 45	20-41-	41	F 000			(,0
Test Requirement:	FCC Part15 (n 1:	5.209			
Test Method:	ANSI C63.10	:2020					
Frequency Range:	9 kHz to 25 C	SHz				Ĉ	
Measurement Distance:	3 m					100	
Antenna Polarization:	Horizontal &	Vertical					
	Frequency	Detector		RBW	VBW		Remark
	9kHz- 150kHz	Quasi-p	eak	200Hz	1kHz	(Quasi-peak Value
Receiver Setup:	150kHz- 30MHz	Quasi-p	eak	9kHz	30kHz	(Quasi-peak Value
·	30MHz-1GHz	Quasi-p	eak	120KHz	300KHz		Quasi-peak Value
	Above 1GHz	Peak	(1MHz	3MHz	F	Peak Value
	Above 1GHZ	Peak	(1MHz	10Hz	A۱	erage Value
	Frequenc	(Field Strer		Measurement Distance (meters)		
	0.009-0.4	90	2400/F(KHz)			300	
	0.490-1.7		24000/F(K			30	
	1.705-3		30	,		30	
	30-88	6	100		I/C	3	
	88-216	150				3	
Limit:	216-960		200				3
	Above 96	80	500			3	
	Frequency		Field Strength (microvolts/meter) Measu Dista			се	Detector
			500		(meters	s)	Average
	Above 1GHz		50		3	(,0	Peak
	For radiated emis	sions belo	w 30	MHz			
	Dis	tance = 3m				Compu	tor
	-					Compa	
			() _	Pre -A	mplifier	レート
Test setup:	0.8m	Turn table		1m		ceiver	
		Gro	und Plan	ne	<u> </u>		_
	30MHz to 1GHz						



「 一 工 通 测 检 测	
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	and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
	3. Set to the maximum power setting and enable the EUT transmit continuously.
	4. Use the following spectrum analyzer settings:(1) Span shall wide enough to fully capture the emission being measured;
4	(2) Set RBW=120 kHz for f < 1 GHz, RBW=1MHz for f>1GHz; VBW≥RBW;
	Sweep = auto; Detector function = peak; Trace = max hold for peak
	(3) For average measurement: use duty cycle correction factor method per
	15.35(c). Duty cycle = On time/100 milliseconds On time =N1*L1+N2*L2++Nn-1*LNn-1+Nn*Ln Where N1 is number of type 1 pulses, L1 is
	length of type 1 pulses, etc.
	Average Emission Level = Peak Emission Level + 20*log(Duty cycle)
	Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
Test results:	PASS





5.11.2. Test Instruments

	Radiated Em	nission Test Site	e (966)	
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESCI7	100529	Jan. 31, 2025
Spectrum Analyzer	R&S	FSQ40	200061	Jun. 26, 2025
Pre-amplifier	SKET	LNPA_0118G- 45	SK2021012 102	Jan. 31, 2025
Pre-amplifier	SKET	LNPA_1840G- 50	SK2021092 03500	Jan. 31, 2025
Pre-amplifier	HP	8447D	2727A05017	Jun. 26, 2025
Loop antenna	Schwarzbeck	FMZB1519B	00191	Jun. 26, 2025
Broadband Antenna	Schwarzbeck	VULB9163	340	Jun. 28, 2025
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Jun. 28, 2025
Horn Antenna	Schwarzbeck	BBHA 9170	00956	Feb. 02, 2025
Coaxial cable	SKET	RE-03-D	1	Jun. 26, 2025
Coaxial cable	SKET	RE-03-M) /	Jun. 26, 2025
Coaxial cable	SKET	RE-03-L	/	Jun. 26, 2025
Coaxial cable	SKET	RE-04-D		Jun. 26, 2025
Coaxial cable	SKET	RE-04-M		Jun. 26, 2025
Coaxial cable	SKET	RE-04-L	/	Jun. 26, 2025
Antenna Mast	Keleto	RE-AM	1	(3)
EMI Test Software	EZ_EMC	FA-03A2 RE+	1.1.4.2	

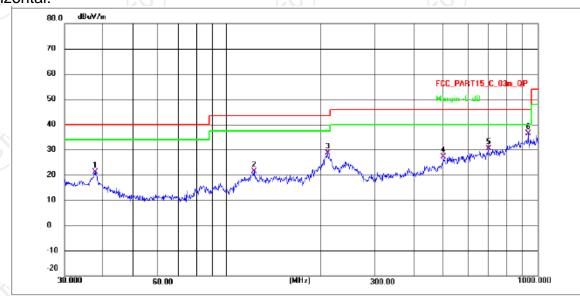


5.11.3. Test Data

Please refer to following diagram for individual

Below 1GHz



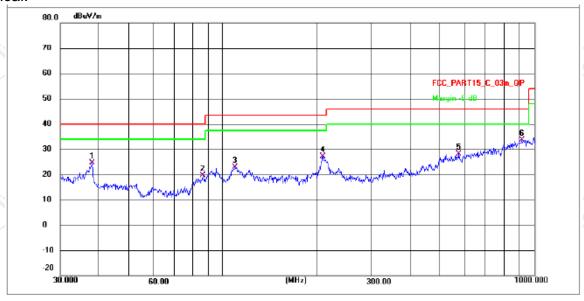


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	37.6797	30.73	-9.65	21.08	40.00	-18.92	QP	Р
2	122.6188	43.56	-22.25	21.31	43.50	-22.19	QP	Р
3	211.1560	50.09	-21.42	28.67	43.50	-14.83	QP	Р
4	497.6764	46.19	-19.01	27.18	46.00	-18.82	QP	Р
5	695.6360	47.95	-17.64	30.31	46.00	-15.69	QP	Р
6 *	933.9075	52.41	-16.00	36.41	46.00	-9.59	QP	Р





Vertical:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	37.9450	34.39	-9.65	24.74	40.00	-15.26	QP	P
2	86.0490	42.35	-22.68	19.67	40.00	-20.33	QP	Р
3	109.4116	45.27	-22.38	22.89	43.50	-20.61	QP	Р
4	210.0481	48.45	-21.44	27.01	43.50	-16.49	QP	P
5	573.6191	46.56	-18.51	28.05	46.00	-17.95	QP	Р
6 *	914.4640	49.80	-16.13	33.67	46.00	-12.33	QP	Р

Note: 1. The low frequency, which started from 9KHz~30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

- 2. Measurements were conducted in all three channels (high, middle, low) and three modulation (GFSK, Pi/4 DQPSK, 8DPSK) and the worst case Mode (Highest channel and 8DPSK) was submitted only.
- 3. Freq. = Emission frequency in MHz

Measurement $(dB\mu V/m) = Reading level (dB\mu V) + Corr. Factor (dB)$

Correction Factor= Antenna Factor + Cable loss - Pre-amplifier

Limit $(dB\mu V/m) = Limit$ stated in standard

Over (dB) = Measurement $(dB\mu V/m)$ – Limits $(dB\mu V/m)$

* is meaning the worst frequency has been tested in the test frequency range.



Test Result of Radiated Spurious at Band edges

	Test Cha	nnel: Lov	Test Mode west channe		ization: Ve	rtical	
Frequency	Reading	Factor	Level	Limit	Marging	Detector	Result
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)		
2310	59.90	-16.45	43.45	74	-30.55	Peak	Pass
2390	58.78	-15.86	42.92	74	-31.08	Peak	Pass
2400	59.91	-15.82	44.09	74	-29.91	Peak	Pass
	Test Chan	nel: Low	est channel,	Test Polariz	ation: Hori	izontal	
Frequency	Reading	Factor	Level	Limit	Marging	Detector	Result
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)		
2310	60.22	-16.45	43.77	74	-30.23	Peak	Pass
2390	59.10	-15.86	43.24	74	-30.76	Peak	Pass
2400	60.23	-15.82	44.41	74	-29.59	Peak	Pass
((0,))	Test Char	nnel: Hig	hest channe	l, Test Polar	ization: Ve	ertical	(C)
Frequency	Reading	Factor	Level	Limit	Marging	Detector	Result
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)		
2483.5	61.28	-16.60	44.68	74	-29.32	Peak	Pass
2500	59.56	-16.45	43.11	74	-30.89	Peak	Pass
	Test Chani	nel: High	est channel,	Test Polariz	ation: Hor	izontal	
Frequency	Reading	Factor	Level	Limit	Marging	Detector	Result
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)		
2483.5	61.10	-16.60	44.50	74	-29.50	Peak	Pass
2500	59.17	-16.45	42.72	74	-31.28	Peak	Pass

Note: Measurements were conducted in all three modulation (GFSK, Pi/4 DQPSK, 8DPSK), and the worst case Mode (8DPSK) was submitted only.





Above 1GHz

Modulation	Type: 8D	PSK										
Low chann	Low channel: 2402 MHz											
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBuV)	Correction Factor (dB/m)	Emissic Peak (dBµV/m)	l AV	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)			
4806	Н	56.94	-	-9.51	47.43		74	54	-6.57			
7209	Н	46.27	ŀ	-1.41	44.86		74	54	-9.14			
	H					Z						
	, G')		(, C	*)		·C')		(, 6,)				
4806	V	56.73		-9.51	47.22	<u></u>	74	54	-6.78			
7209	V	47.37	-	-1.41	45.96		74	54	-8.04			
	V											

Middle cha	nnel: 2441	MHz		XC)		70)		ZC.
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)	Emissic Peak (dBµV/m)	AV	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4884	H	55.53	-	-9.36	46.17		74	54	-7.83
7326	H	46.24		-1.14	45.10	<u>0</u>	74	54	-8.90
	H					<u></u>			
4884	V	55.98		-9.36	46.62		74	54	-7.38
7326	V	46.85		-1.14	45.71		74	54	-8.29
)	V	(A-2)		')		(S-2-)		

High chann	el: 2480 N	ЛHz							
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)	Peak	A \ /	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4960	Н	57.60)	-9.20	48.40	1	74	54	-5.60
7440	Η	47.18		-0.96	46.22		74	54	-7.78
	Η				Z		-		
		(.c)		(, 0			(.c)		(.C)
4960	V	56.55		-9.20	47.35	-	74	54	-6.65
7440	V	45.97		-0.96	45.01		74	54	-8.99
	V								

Note:

- 1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss Pre-amplifier
- 2. Margin (dB) = Emission Level (Peak) (dB μ V/m)-Average limit (dB μ V/m)
- 3. The emission levels of other frequencies are very lower than the limit and not show in test report.
- 4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.
- 5. Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.
- 6. Measurements were conducted in all three modulation (GFSK, Pi/4 DQPSK, 8DPSK), and the worst case Mode (8DPSK) was submitted only.
- 7. All the restriction bands are compliance with the limit of 15.209.





Appendix A: Test Result of Conducted Test

1. Bandwidth

1.1 Test Result

1.1.1 OBW

Mode	TX	Frequency	Packet Type	ANT	99% Occupie (MI		Verdict
	Type	(MHz)	турс		Result	Limit	
		2402	DH5	_1	0.848	/	Pass
GFSK	SISO	2441	DH5	(C1)	0.847	5) /	Pass
		2480	DH5	1	0.848	1	Pass
		2402	2DH5	1	1.184	/	Pass
Pi/4DQPSK	SISO	2441	2DH5	1	1.184	1	Pass
(2		2480	2DH5	1	1.181	1(0)	Pass
		2402	3DH5	1	1.185	1	Pass
8DPSK	SISO	2441	3DH5	1	1.186	/	Pass
		2480	3DH5	1	1.188	Z /	Pass
(YQ.)		(20)		(C_{i})	\(\lambda\)	(3)	KO.

1.1.2 20dB BW

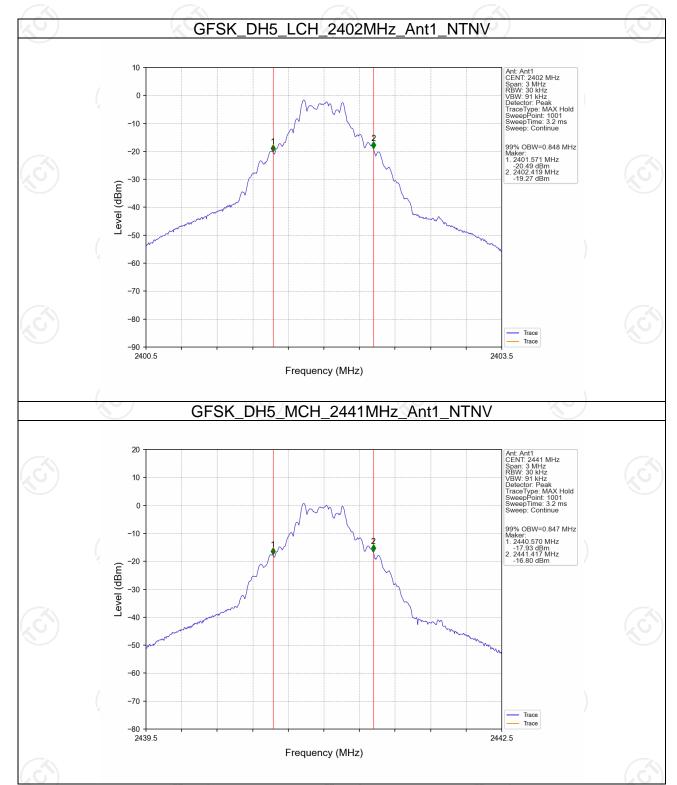
Mode	TX	Frequency	Packet	ANT	20dB Bandwidth (MHz)		Verdict
	Type	(MHz)	Type	AINI	Result	Limit	verdict
GFSK	SISO	2402	DH5	1	0.947	1	Pass
		2441	DH5	1	0.947	/	Pass
		2480	DH5	1	0.947	/	Pass
Pi/4DQPSK	SISO	2402	2DH5	ひ`) 1	1.294	/	Pass
		2441	2DH5	1	1.294	1	Pass
		2480	2DH5	1	1.295	/	Pass
8DPSK	SISO	2402	3DH5	1	1.308	1	Pass
		2441	3DH5	1	1.309	1(0)	Pass
		2480	3DH5	1	1.309	1	Pass





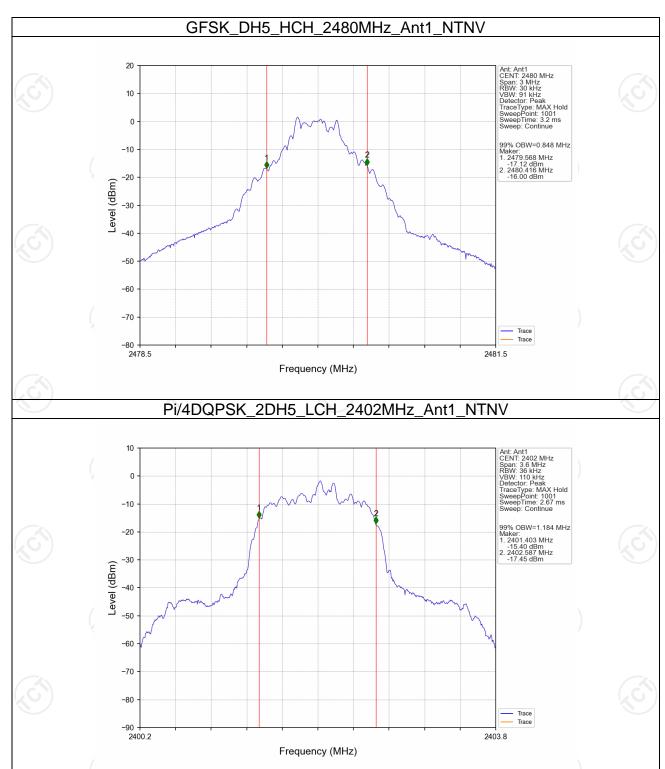
1.2 Test Graph

1.2.1 OBW



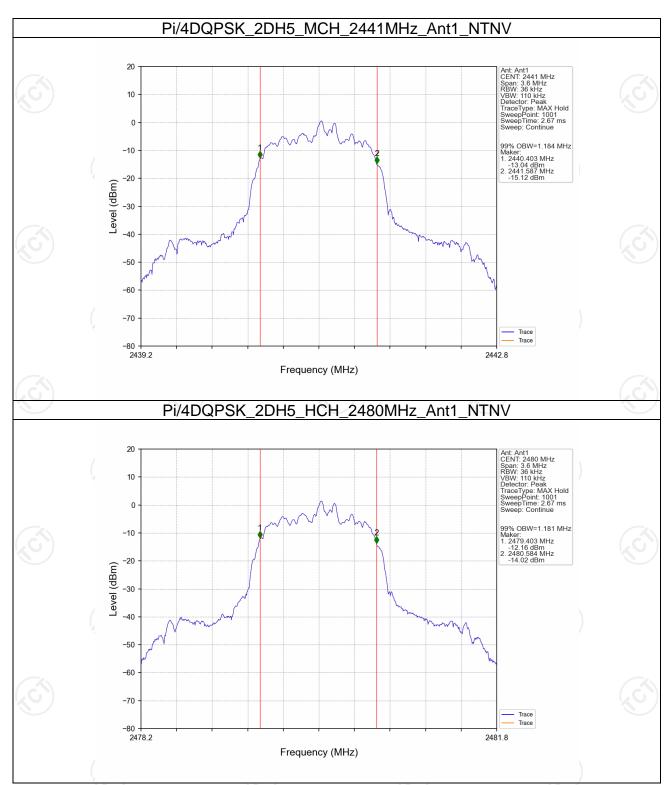






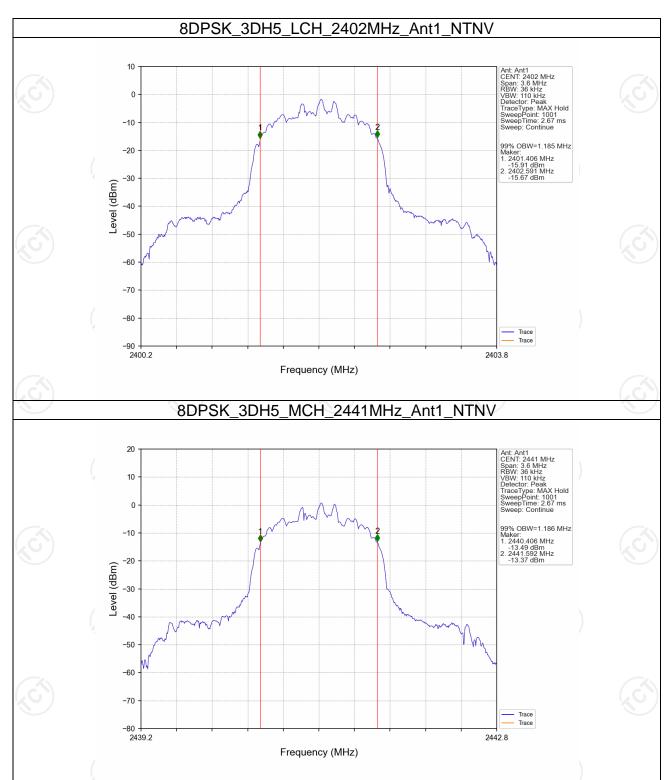




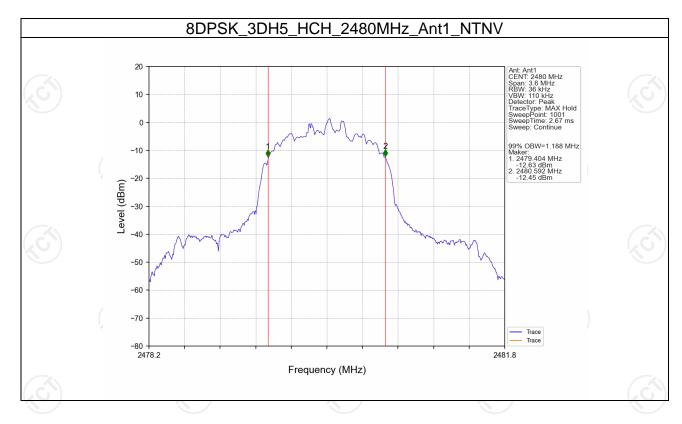










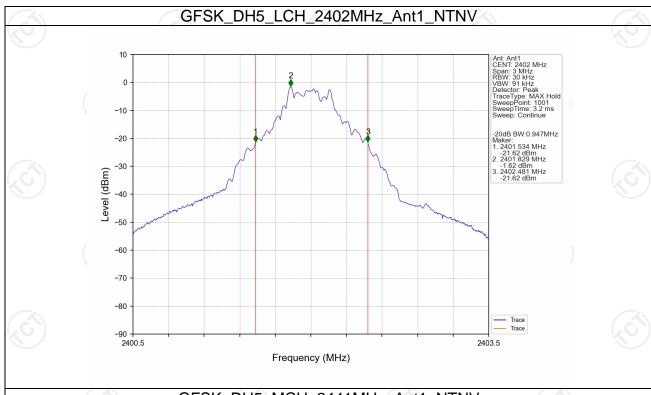




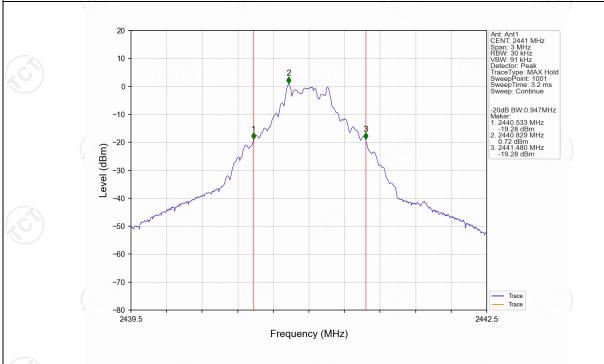




1.2.2 20dB BW

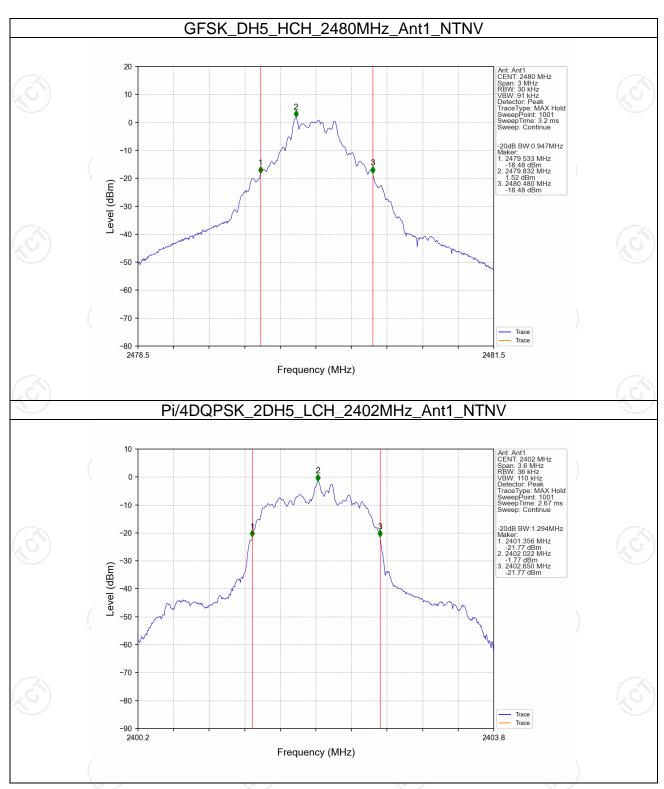


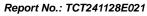
GFSK_DH5_MCH_2441MHz_Ant1_NTNV



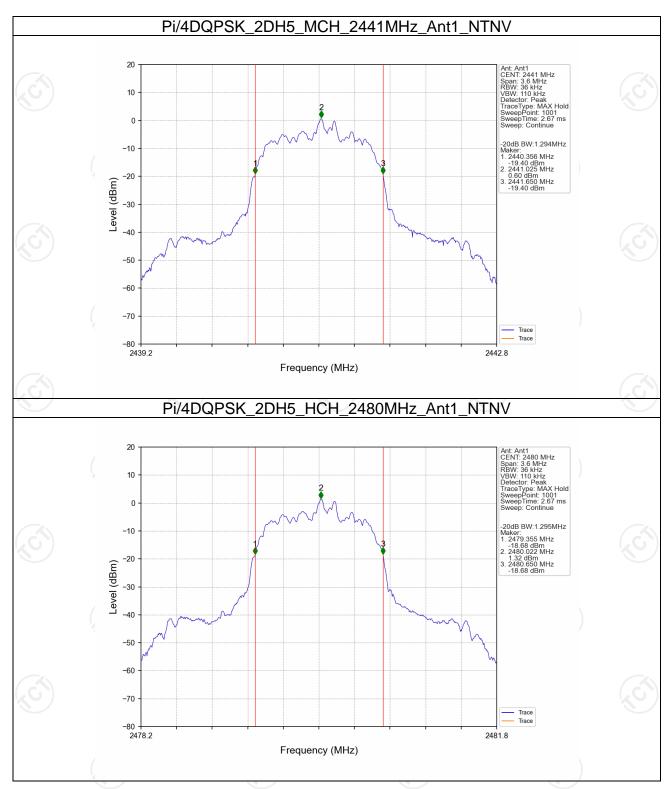






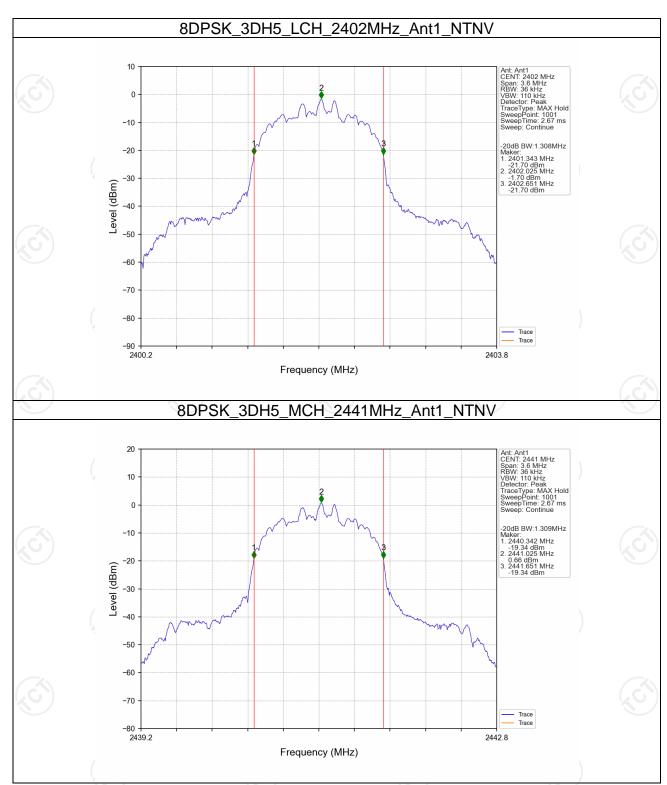


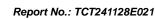




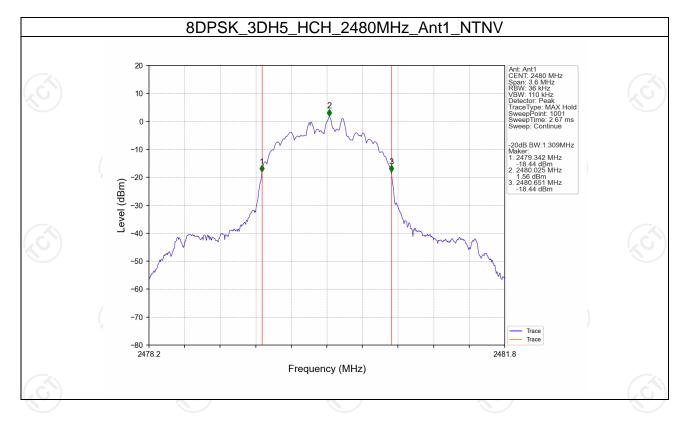


















2. Maximum Conducted Output Power

2.1 Test Result

2.1.1 Power

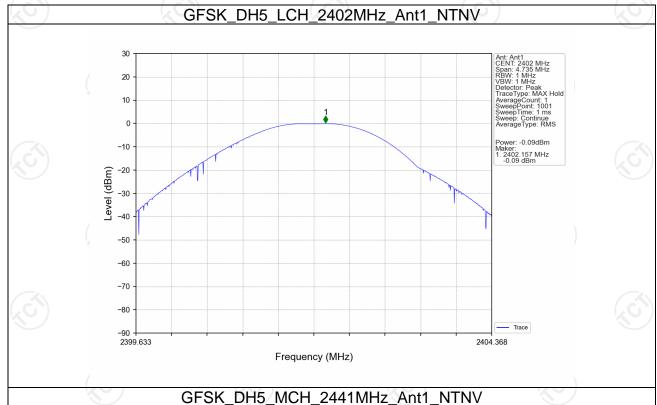
Mode	TX	Frequency	Packet Type	Maximum Peak Powe	Verdict	
	Туре	(MHz)		ANT1	Limit	
		2402	DH5	-0.09	<=30	Pass
GFSK	SISO	2441	DH5	2.26	<=30	Pass
(40.)		2480	DH5	3.04	<=30	Pass
	SISO	2402	2DH5	1.78	<=20.97	Pass
Pi/4DQPSK		2441	2DH5	4.14	<=20.97	Pass
		2480	2DH5	4.91	<=20.97	Pass
Υ.		2402	3DH5	2.11	<=20.97	Pass
8DPSK	SISO	2441	3DH5	4.47	<=20.97	Pass
		2480	3DH5	5.31	<=20.97	Pass
Note1: Ante	nna Gair	n: Ant1: 1.50d	Bi;			

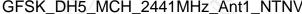


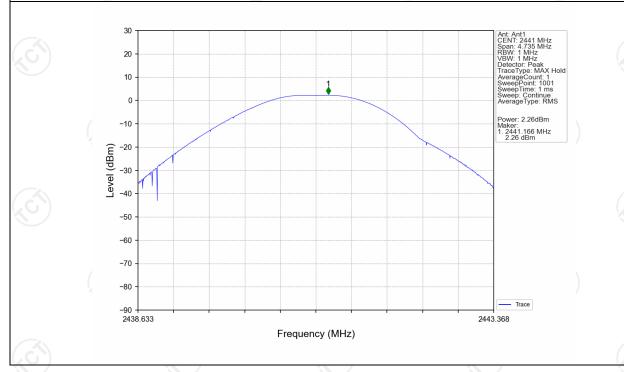


2.2 Test Graph

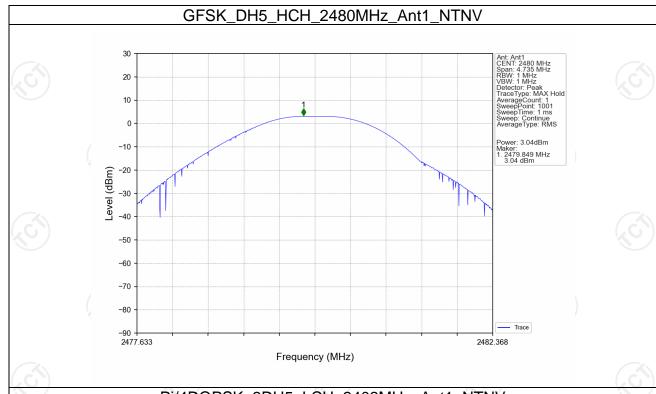
2.2.1 Power



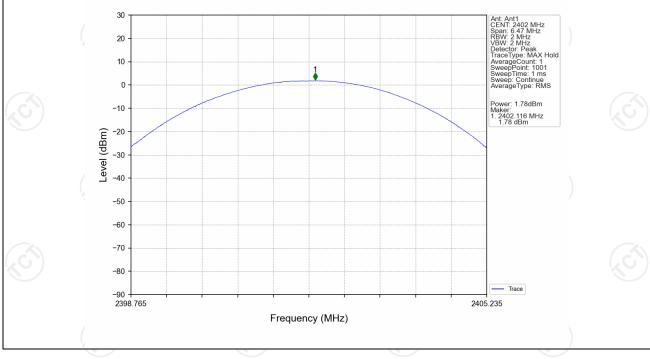




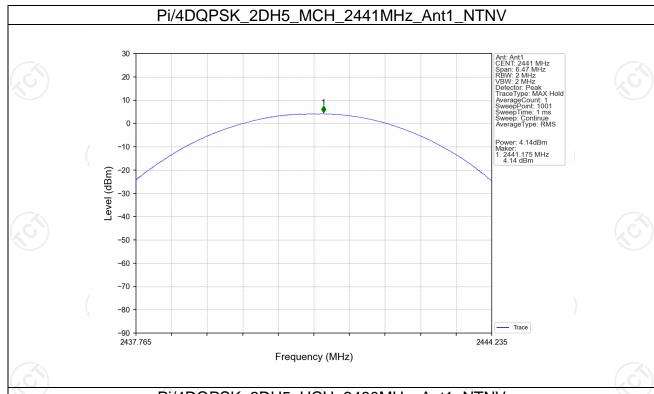


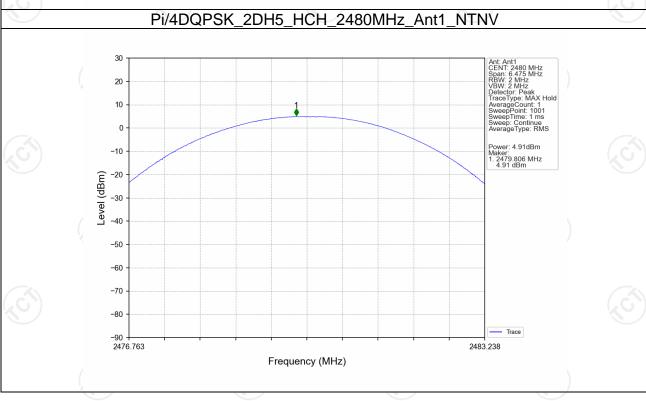


Pi/4DQPSK_2DH5_LCH_2402MHz_Ant1_NTNV

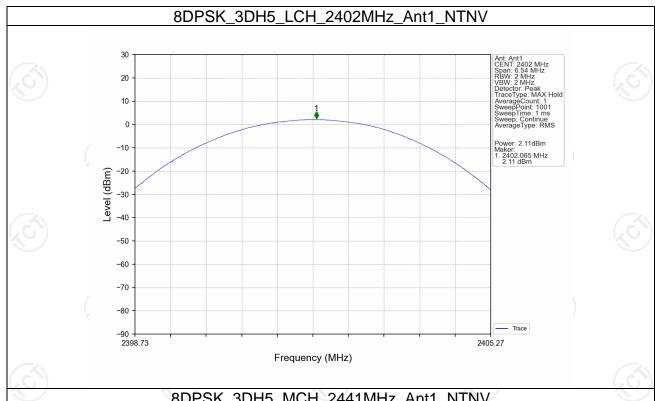


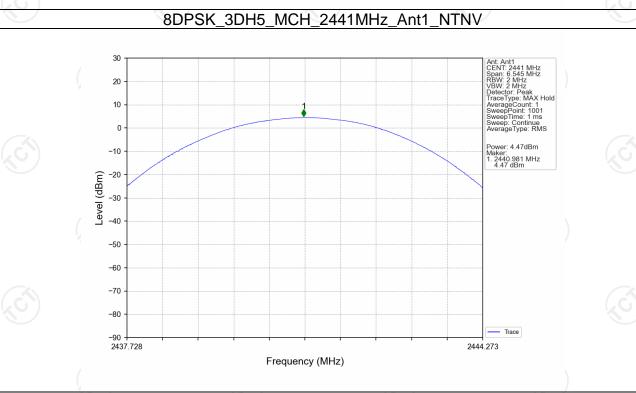




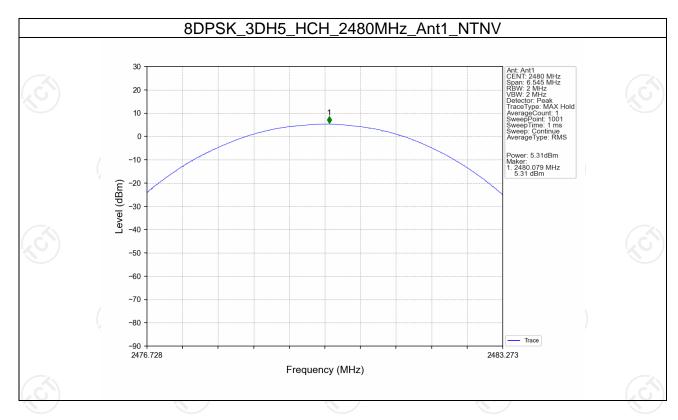
















3. Carrier Frequency Separation

3.1 Test Result

3.1.1 Ant1

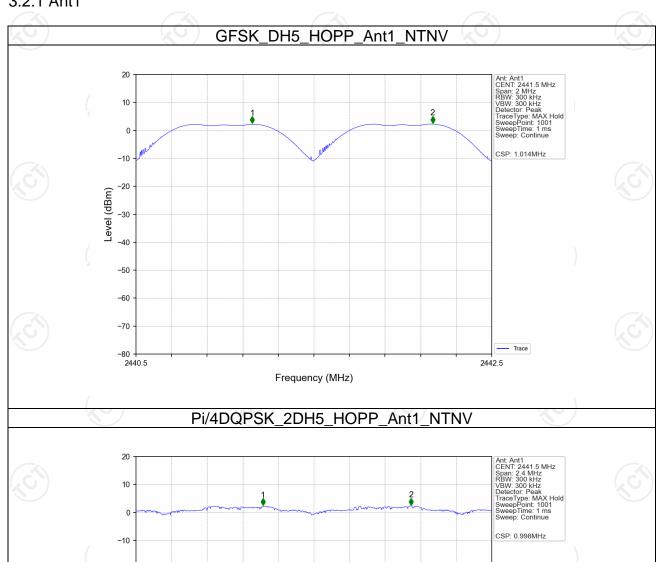
				Ant1			
Mode	TX Type	Frequency (MHz)	Packet Type	Channel Separation (MHz)	20dB Bandwidth (MHz)	Limit (MHz)	Verdict
GFSK	SISO	HOPP	DH5	1.014	0.947	>=0.947	Pass
Pi/4DQPSK	SISO	HOPP	2DH5	0.998	1.295	>=0.863	Pass
8DPSK	SISO	HOPP	3DH5	1.001	1.309	>=0.873	Pass

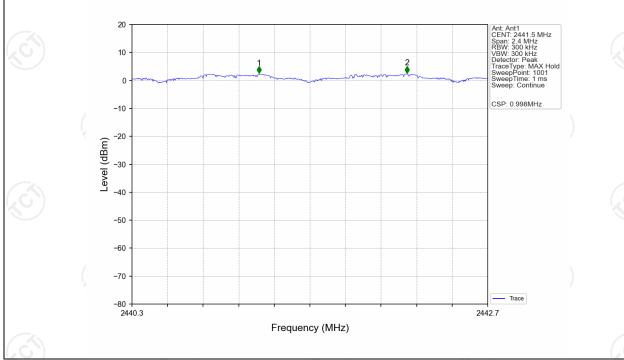




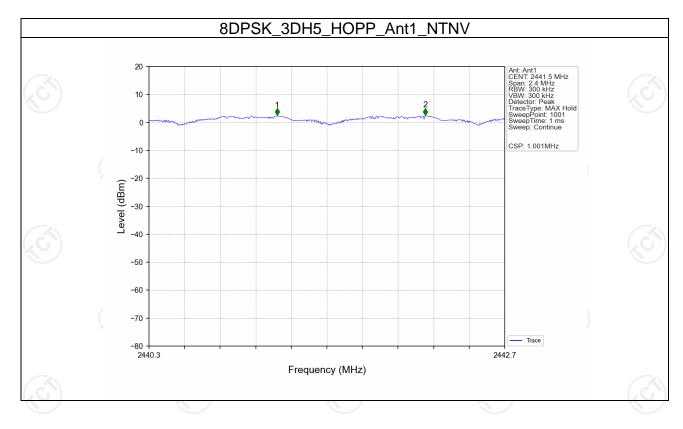
3.2 Test Graph

3.2.1 Ant1











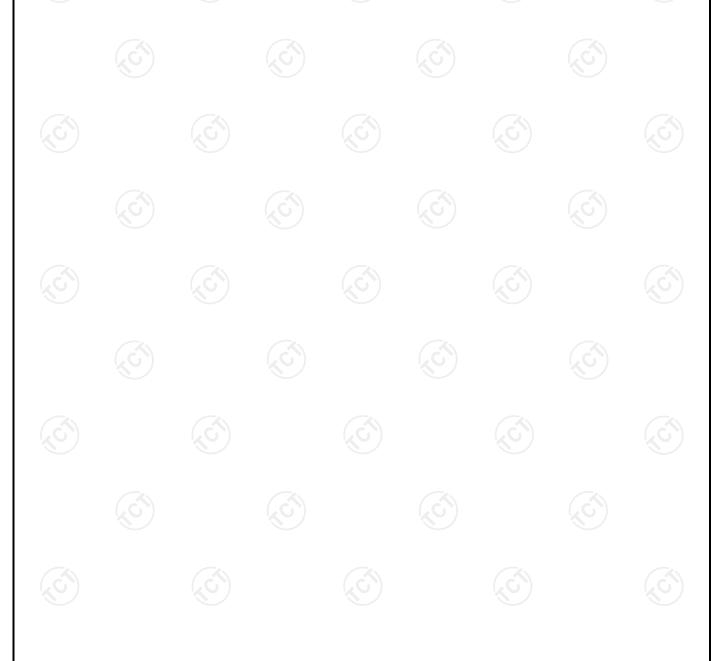


4. Number of Hopping Frequencies

4.1 Test Result

4.1.1 HoppNum

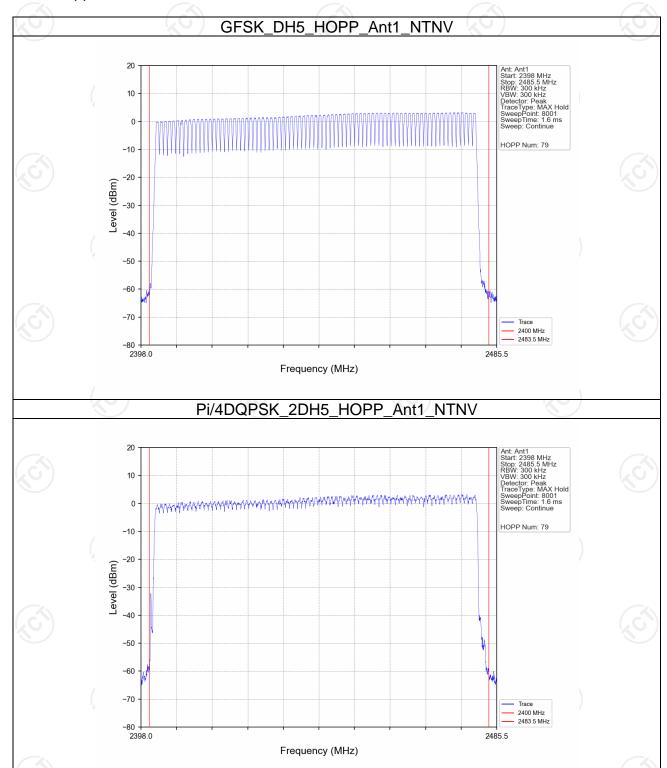
Mode	TX Type	Frequency (MHz)	Packet Type	Num of Hoppir ANT1	ng Frequencies Limit	Verdict
GFSK	SISO	HOPP	DH5	79	>=15	Pass
Pi/4DQPSK	SISO	HOPP	2DH5	79	>=15	Pass
8DPSK	SISO	HOPP	3DH5	79	>=15	Pass



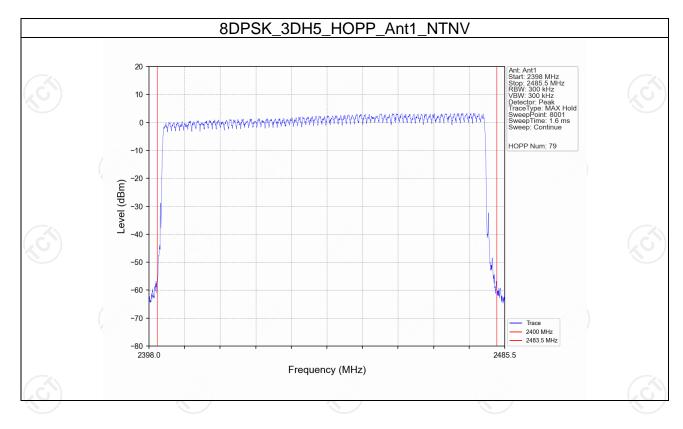


4.2 Test Graph

4.2.1 HoppNum









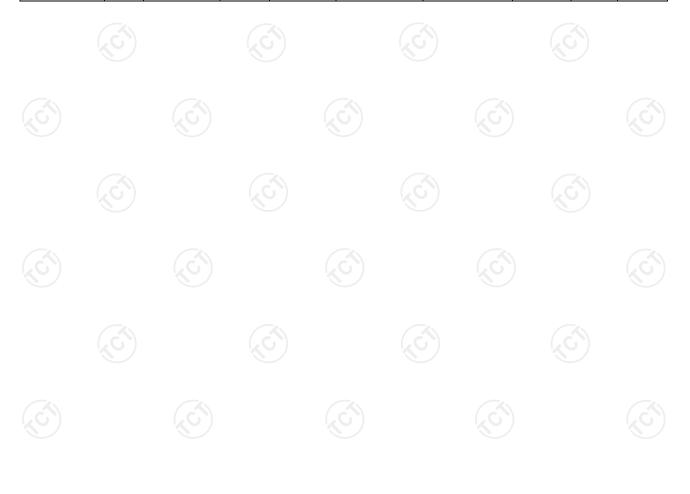


5. Time of Occupancy (Dwell Time)

5.1 Test Result

5.1.1 Ant1

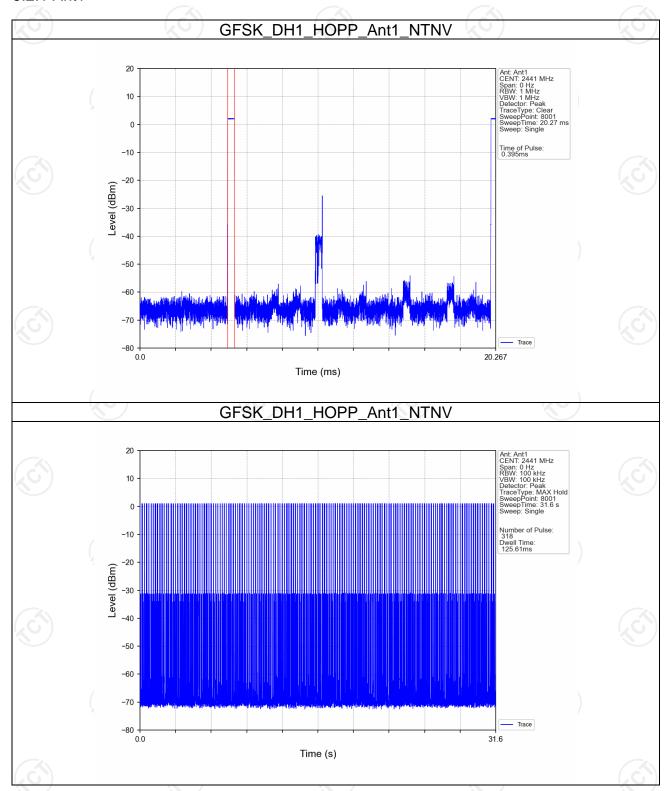
			Ant1						
Mode	TX Type	Frequency (MHz)	Packet Type	Duration of Single Pulse (ms)	Observation Period (s)	Num of Pulse in Observation Period	Dwell Time (ms)	Limit (ms)	Verdict
			DH1	0.395	31.600	318	125.610	<=400	Pass
GFSK	SISO	HOPP	DH3	1.664	31.600	150	249.600	<=400	Pass
			DH5	2.913	31.600	104	302.952	<=400	Pass
			2DH1	0.388	31.600	320	124.160	<=400	Pass
Pi/4DQPSK	SISO	HOPP	2DH3	1.641	31.600	162	265.842	<=400	Pass
			2DH5	2.900	31.600	106	307.400	<=400	Pass
			3DH1	0.388	31.600	319	123.772	<=400	Pass
8DPSK	SISO	HOPP	3DH3	1.636	31.600	160	261.760	<=400	Pass
			3DH5	2.900	31.600	103	298.700	<=400	Pass

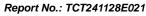




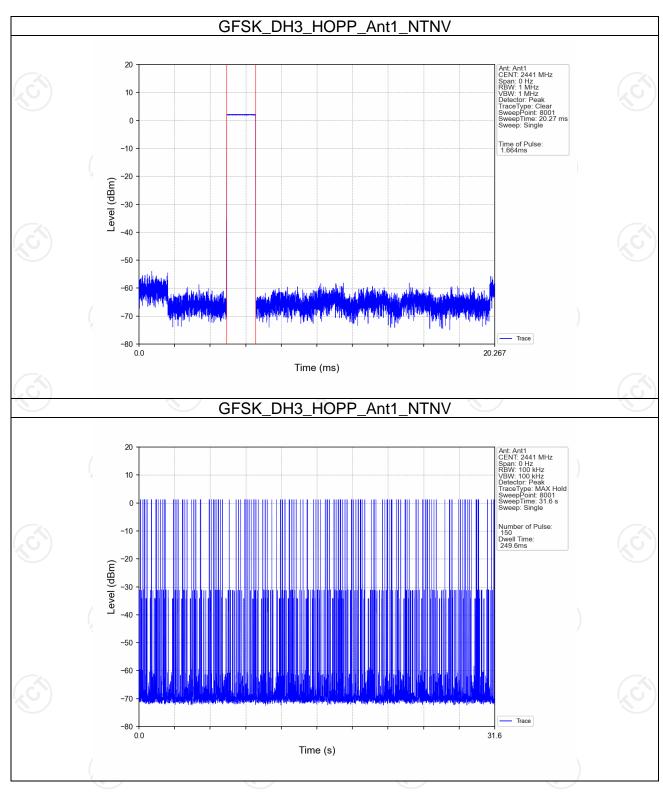
5.2 Test Graph

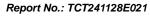
5.2.1 Ant1



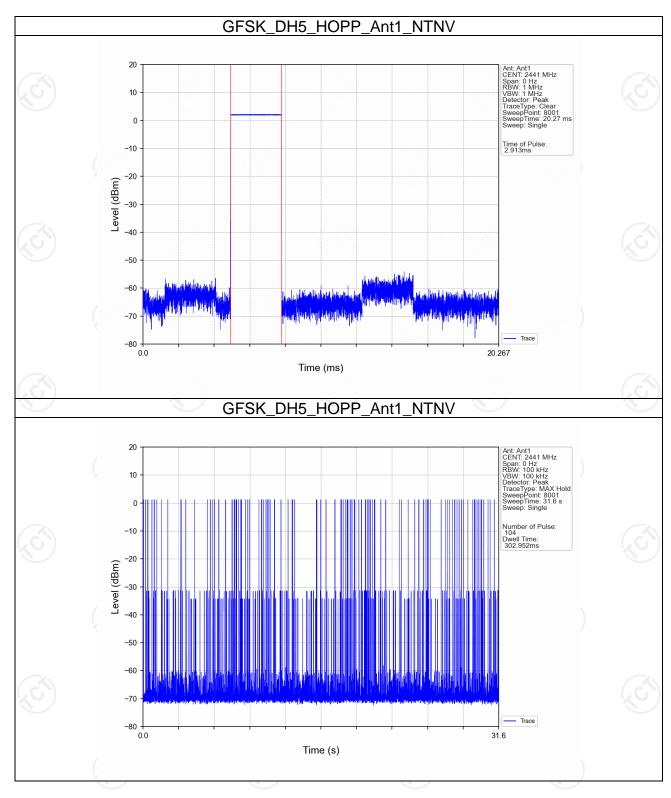


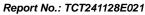




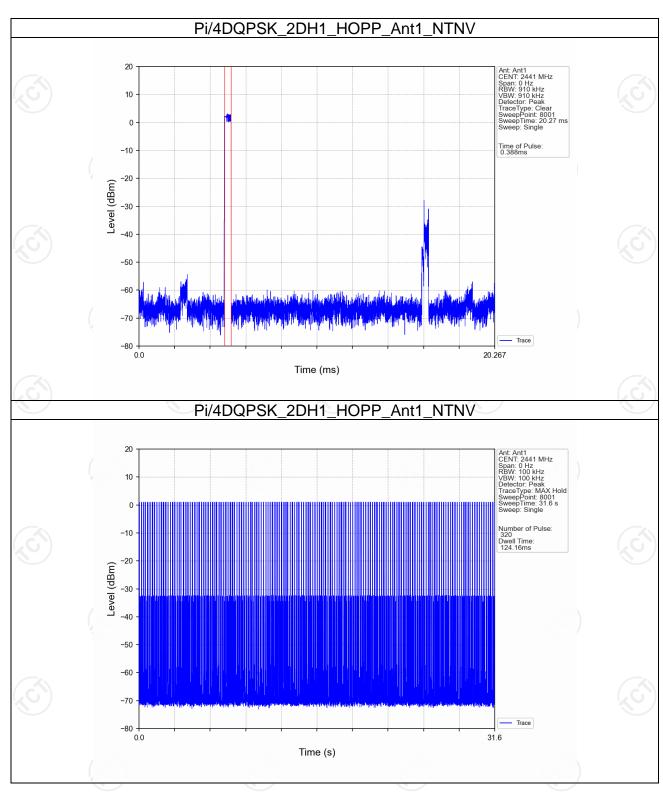


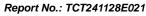




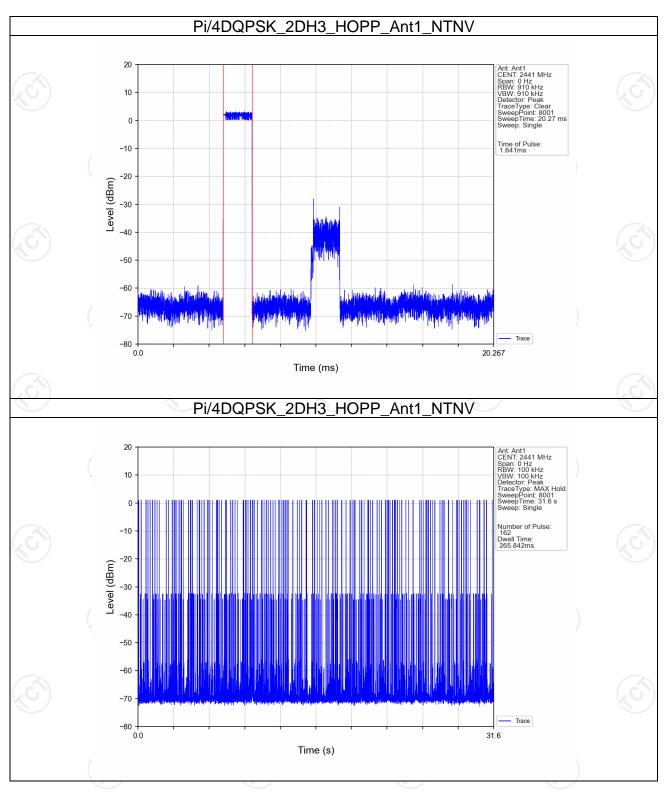


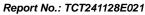




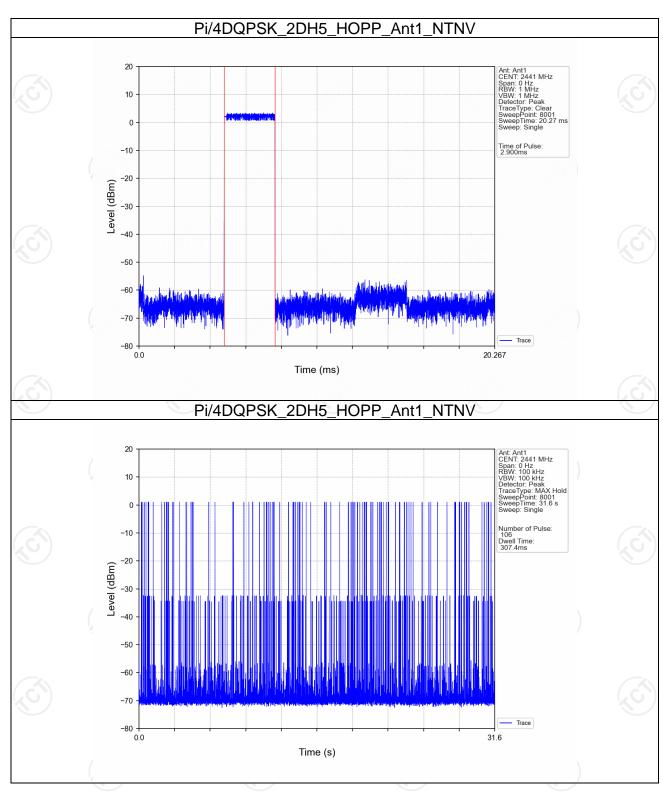


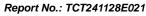




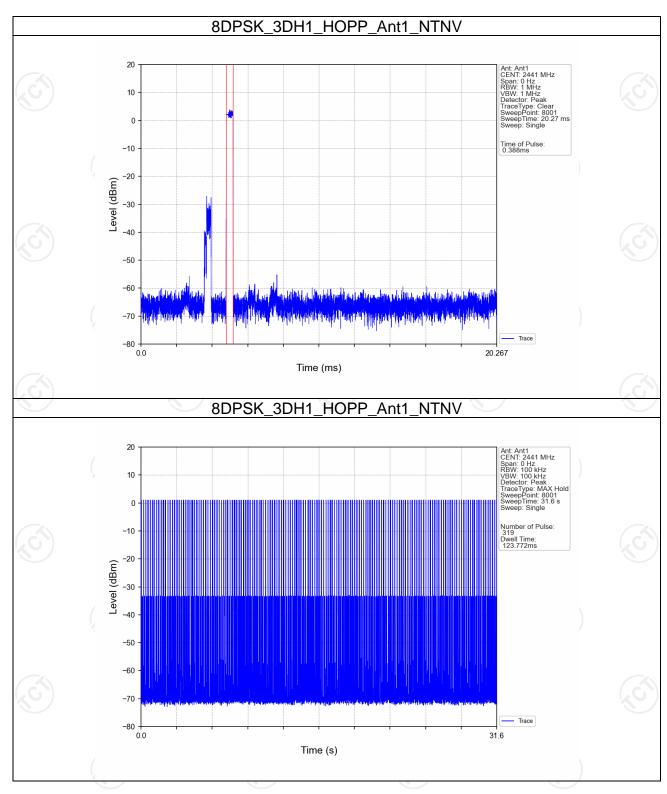


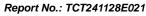




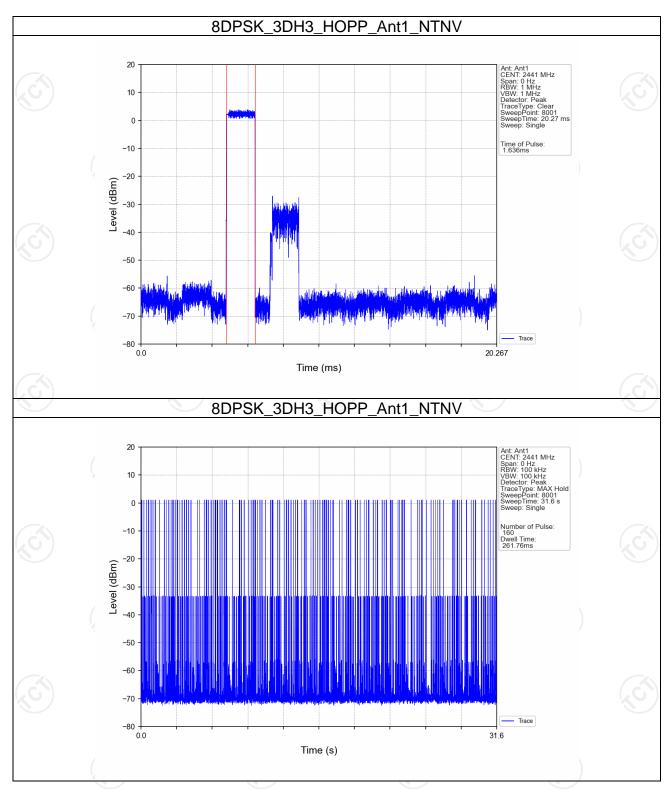


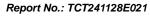




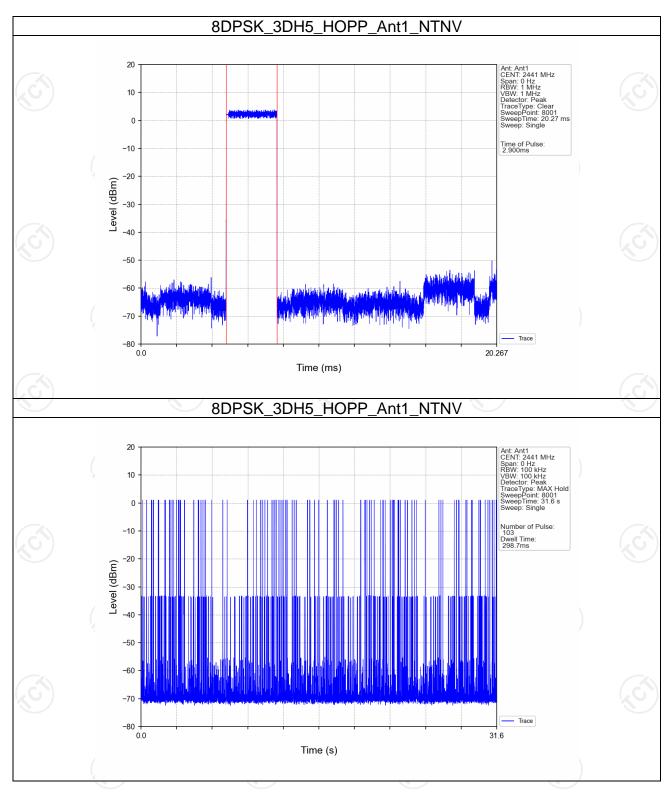














6. Unwanted Emissions In Non-restricted Frequency Bands

6.1 Test Result

6.1.1 Ref

Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Level of Reference (dBm)
		2402	DH5	1	-0.32
GFSK	SISO	2441	DH5	1	2.02
GISK		2480	DH5	1	2.82
	SISO	2402	2DH5	1	-0.44
Pi/4DQPSK		2441	2DH5	1	1.81
FI/4DQF3K		2480	2DH5	1	2.65
		2402	3DH5	/ 1	-0.32
8DPSK	SISO	2441	3DH5	1	2.07
ODI OK		2480	3DH5	1	2.90

Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2020, the channel contains the maximum PSD level was used to establish the reference level.

6.1.2 CSE

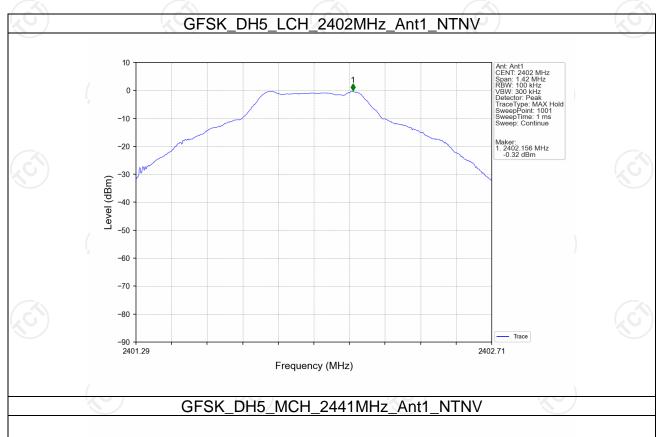
Mode	TX Type	Frequency (MHz)	Packet Type	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict	
	7,	2402	DH5	(1)	2.82	-17.18	Pass	
		2441	DH5	1	2.82	-17.18	Pass	
GFSK	SISO	2480	DH5	1	2.82	-17.18	Pass	
		HOPP	DH5	4	2.82	-17.18	Pass	
		порр		1	2.82	-17.18	Pass	
,		2402	2DH5	1	2.65	-17.35	Pass	
	SISO	2441	2DH5	1	2.65	-17.35	Pass	
Pi/4DQPSK		2480	2DH5	_1	2.65	-17.35	Pass	
		HODD	2DH5	(01)	2.65	-17.35	Pass	
		HOPP			2.65	-17.35	Pass	
	SISO		2402	3DH5	1	2.90	-17.10	Pass
8DPSK		2441	3DH5	1	2.90	-17.10	Pass	
		2480	3DH5	1	2.90	-17.10	Pass	
		HOPP 3DH5	3DUE	4	2.90	-17.10	Pass	
			I	2.90	-17.10	Pass		

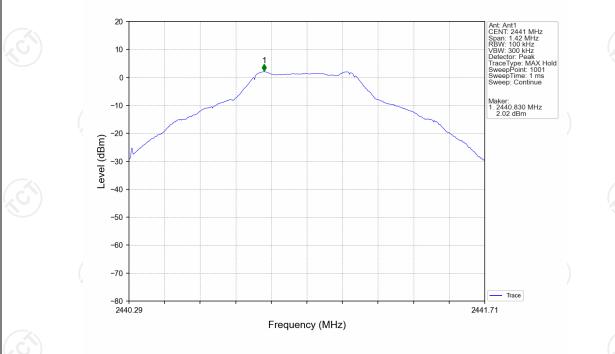
Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2020, the channel contains the maximum PSD level was used to establish the reference level.



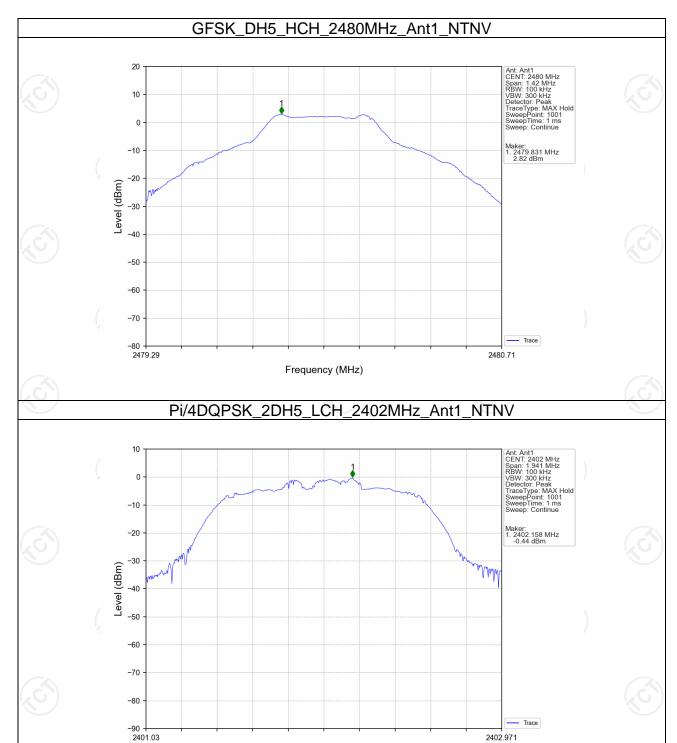
6.2 Test Graph

6.2.1 Ref





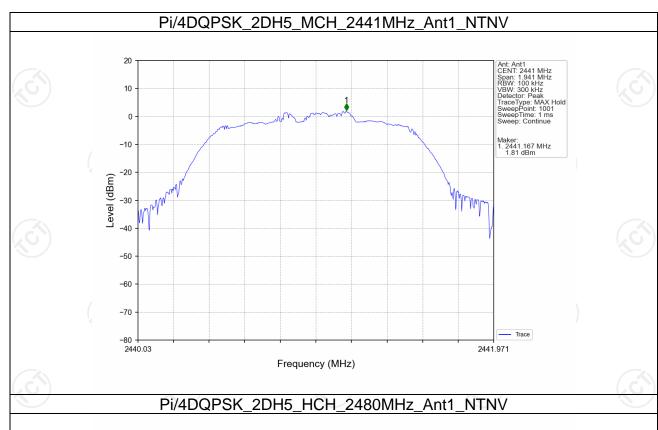


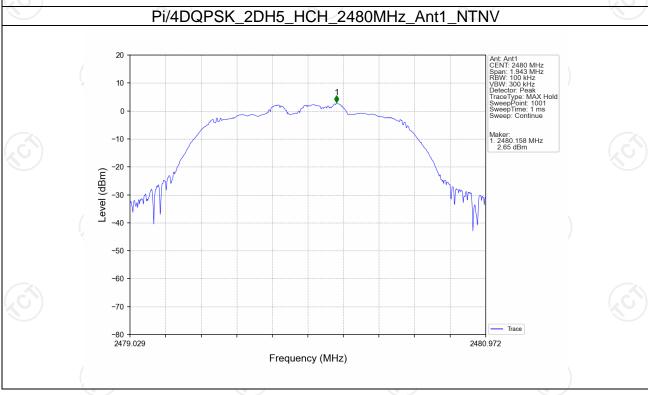


Frequency (MHz)

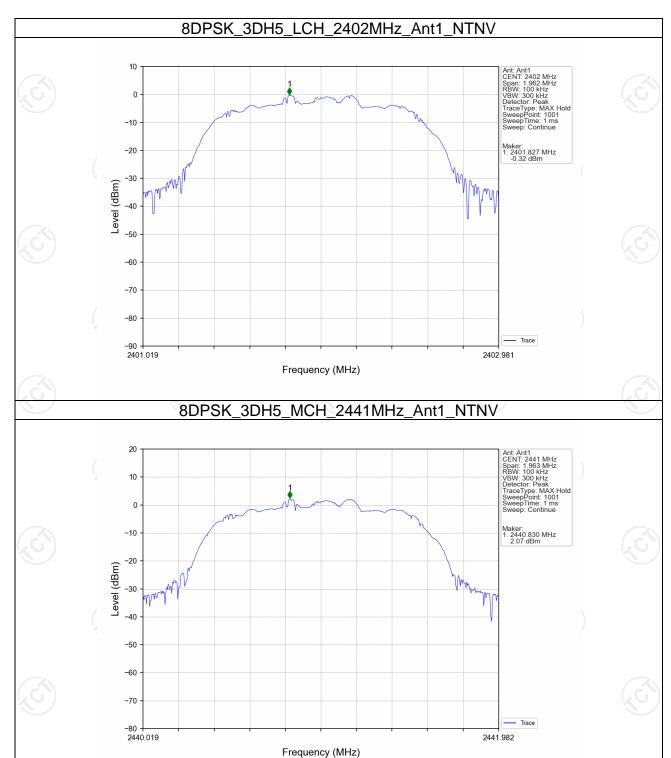




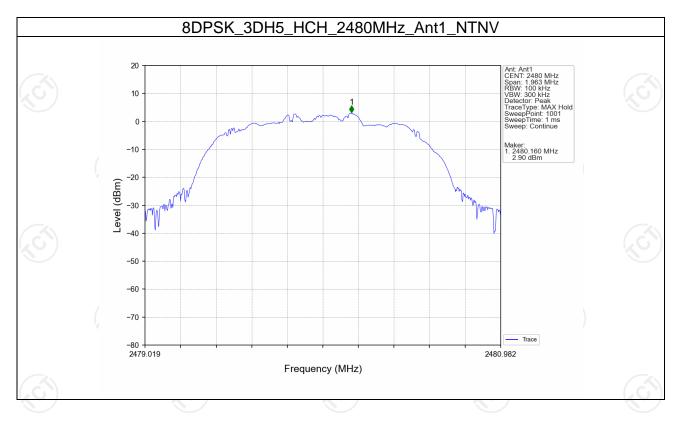




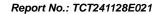








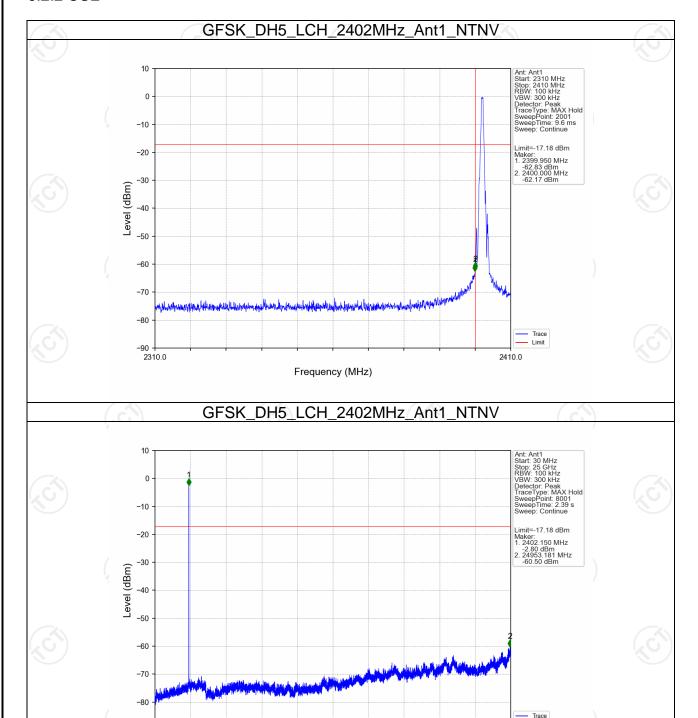






-90 ↓ 30.0

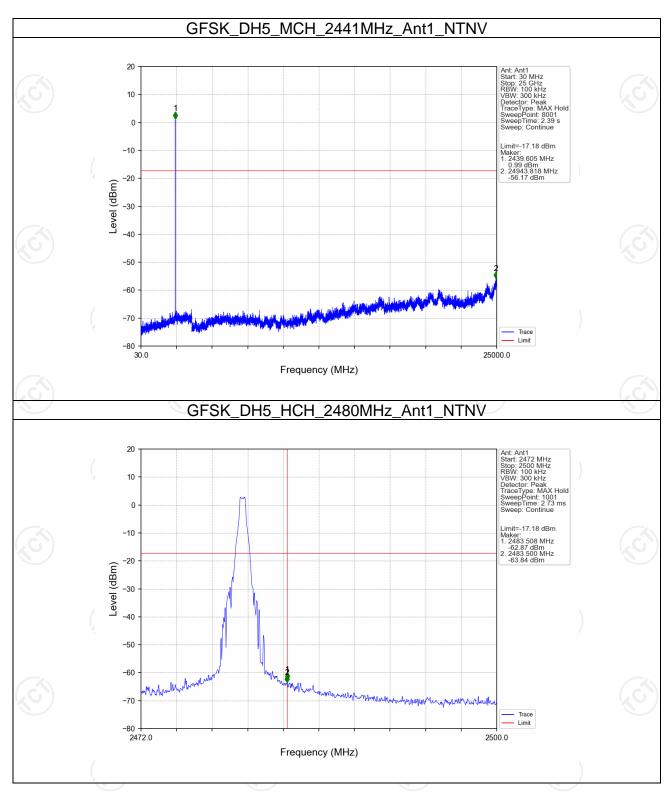
6.2.2 CSE



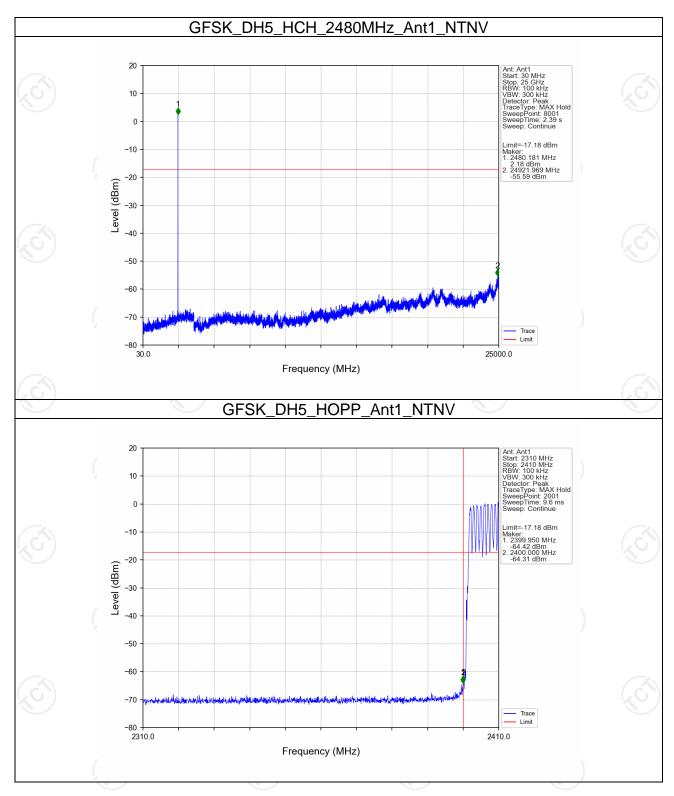
25000.0

Frequency (MHz)



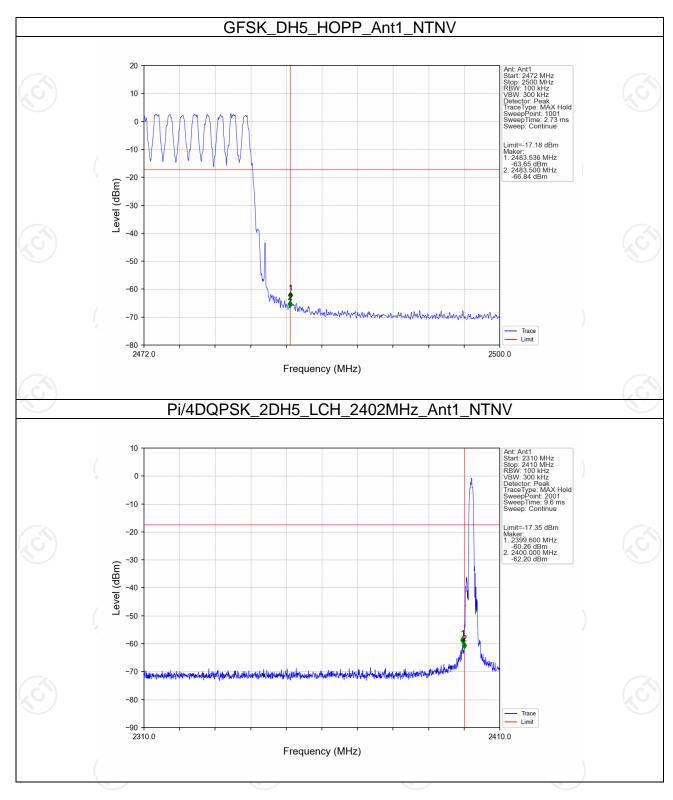




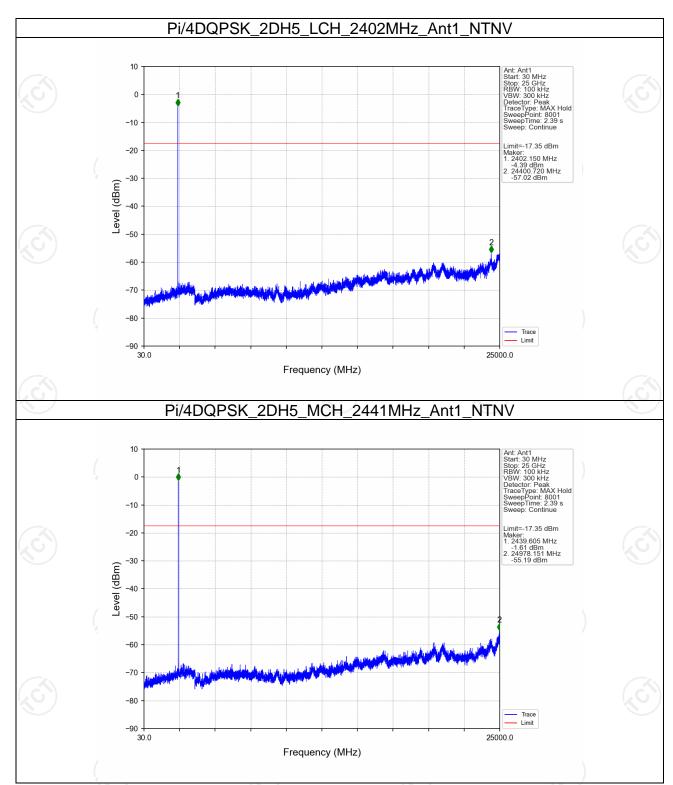




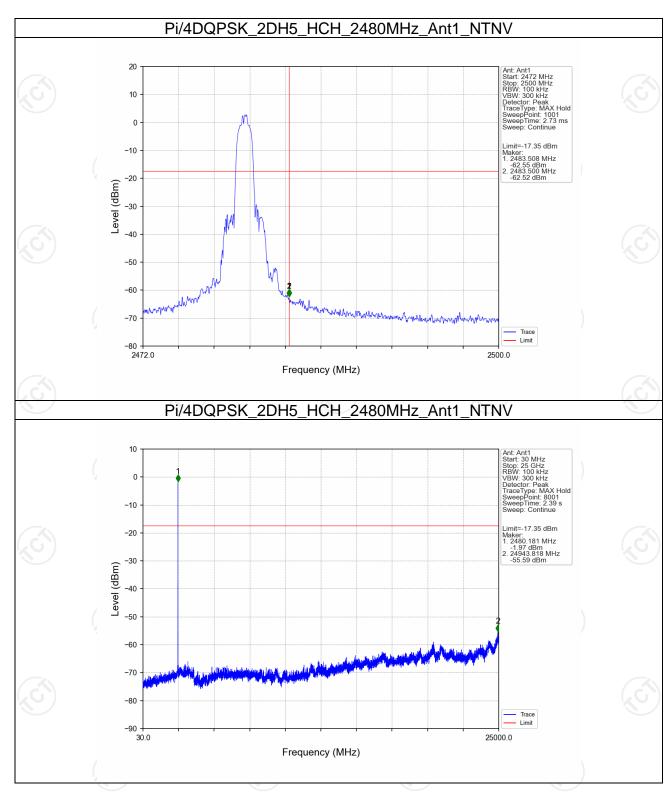






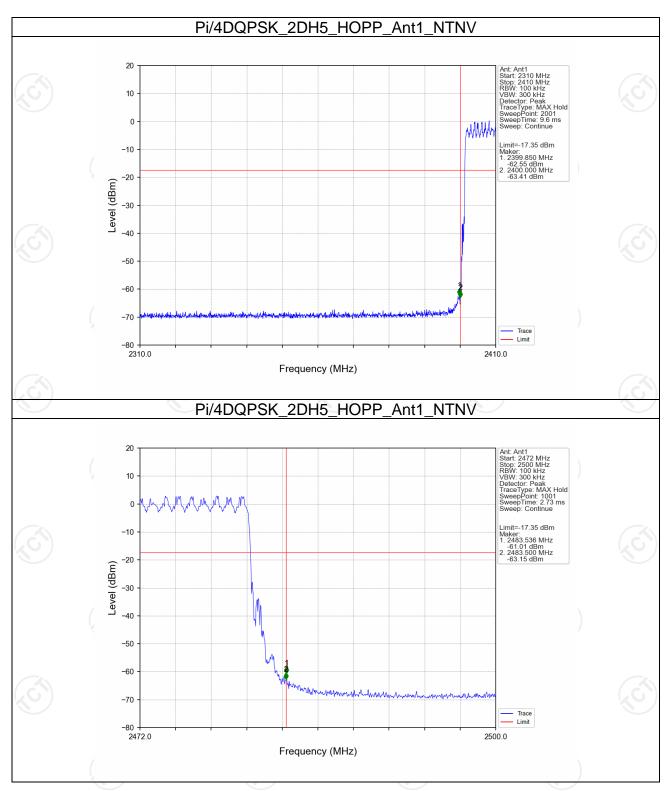




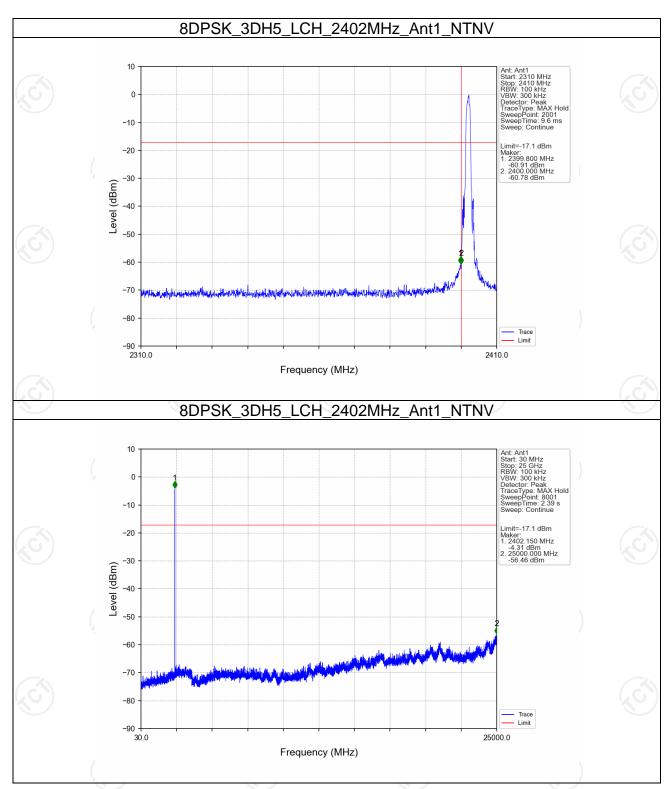




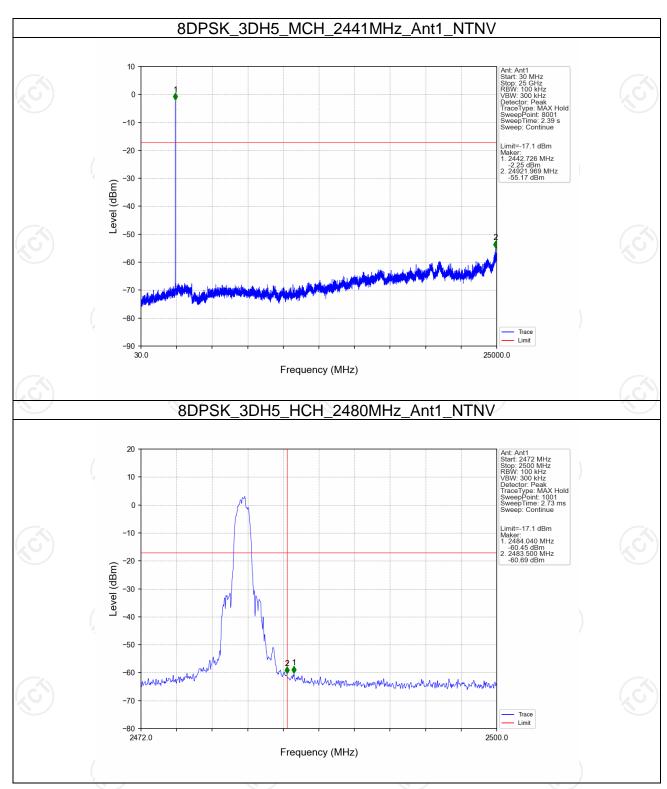




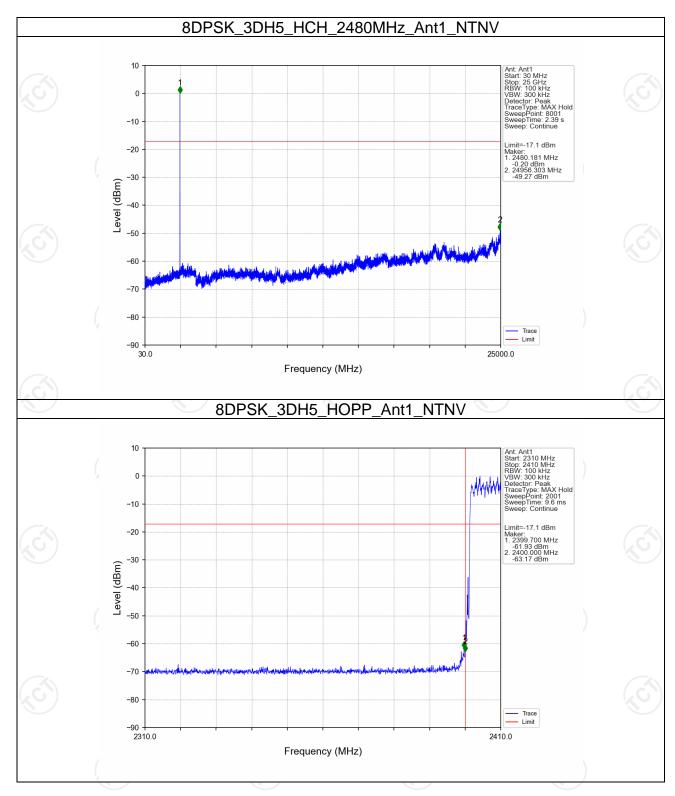




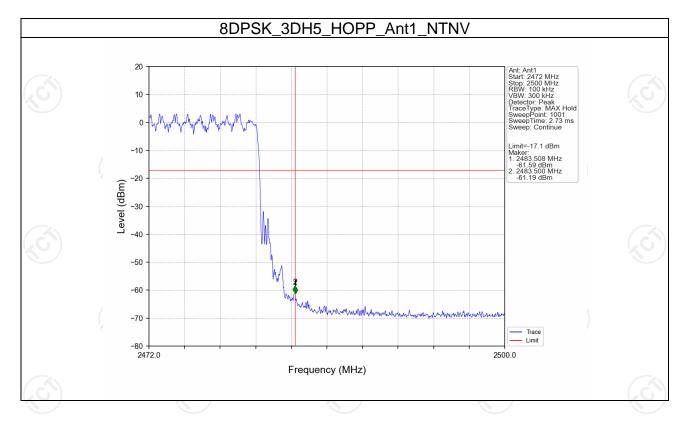
















Appendix B: Photographs of Test Setup

Please refer to document Appendix No.: TCT241128E021-A



Appendix C: Photographs of EUT

Please refer to document Appendix No.: TCT241128E021-B & TCT241128E021-C

