

	TEST REPOR	RT				
FCC ID:	2AQRM2022001					
Test Report No::	TCT220118E015					
Date of issue::	Feb. 16, 2022					
Testing laboratory:	SHENZHEN TONGCE TESTIN	G LAB				
Testing location/ address:	TCT Testing Industrial Park Fuqiao 5th Industrial Zone, Fuhai Street, Bao'an District Shenzhen, Guangdong, 518103, People's Republic of China					
Applicant's name::	FOXX Development Inc.		(0)			
Address::	101 E. Park Blvd., Plano, TX 75	5074, United States				
Manufacturer's name:	SHENZHEN JREN TECHNOLO	OGY CO., LTD				
Address::	B Area, 9/F, A4 Building, Tianru 1st Road, Zhancheng, Fuhai, B					
Standard(s):	FCC CFR Title 47 Part 15 Subp FCC KDB 558074 D01 15.247 ANSI C63.10:2013					
Test item description:	Tablet PC					
Trade Mark:	N/A					
Model/Type reference:	T8 PLUS, T8M, T8S					
Rating(s)::	Rechargeable Li-ion Battery DC	C 3.8V				
Date of receipt of test item:	Jan. 18, 2022					
Date (s) of performance of test:	Jan. 18, 2022 - Feb. 16, 2022					
Tested by (+signature):	: Rieo LIU Rieo (h. Longos 700)					
Check by (+signature):	Beryl ZHAO Roy(10 TET TOT)					
Approved by (+signature):	: Tomsin					

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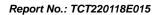




Table of Contents

1.		
	1.1. EUT description	
	1.2. Model(s) list	
	1.3. Operation Frequency	
2.	Test Result Summary	5
3.	General Information	
	3.1. Test environment and mode	
	3.2. Description of Support Units	6
4.	Facilities and Accreditations	7
	4.1. Facilities	<u>(,C)</u>
	4.2. Location	
	4.3. Measurement Uncertainty	
5.	Test Results and Measurement Data	
	5.1. Antenna requirement	
	5.2. Conducted Emission	9
	5.3. Conducted Output Power	13
	5.4. 20dB Occupy Bandwidth	
	5.5. Carrier Frequencies Separation	15
	5.6. Hopping Channel Number	16
	5.7. Dwell Time	
	5.8. Pseudorandom Frequency Hopping Sequence	18
	5.9. Conducted Band Edge Measurement	19
	5.10.Conducted Spurious Emission Measurement	20
	5.11.Radiated Spurious Emission Measurement	21
Α	ppendix A: Test Result of Conducted Test	
Α	ppendix B: Photographs of Test Setup	
	ppendix C: Photographs of EUT	



1. General Product Information

1.1. EUT description

Test item description:	Tablet PC	(0)
Model/Type reference:	T8 PLUS	
Sample Number:	TCT220118E015-0101	
Bluetooth Version:	V4.2 (This report is for BDR+EDR)	
Operation Frequency:	2402MHz~2480MHz	
Transfer Rate:	1/2/3 Mbits/s	
Number of Channel:	79	
Modulation Type:	GFSK, π/4-DQPSK, 8DPSK	
Modulation Technology:	FHSS	
Antenna Type:	Internal Antenna	
Antenna Gain:	1.5dBi	
Rating(s):	Rechargeable Li-ion Battery DC 3.8V	
Maria Thanas Cara Alba Para dia dia an	enartia provided by applicant and the test leberator	 1. 1

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

No.	Model No.	Tested with
1	T8 PLUS	
Other models	T8M, T8S	

Note: T8 PLUS is tested model, other models are derivative models. The models are identical in circuit and PCB layout, only different on the model names. So the test data of T8 PLUS can represent the remaining models.



Page 3 of 92

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1.3. Operation Frequency

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402MHz	_ 20	2422MHz	40	2442MHz	60	2462MHz
(6)1	2403MHz	21	2423MHz	41	2443MHz	61	2463MHz
		/		/		·	
10	2412MHz	30	2432MHz	50	2452MHz	70	2472MHz
11	2413MHz	31	2433MHz	51	2453MHz	71	2473MHz
	O						
18	2420MHz	38	2440MHz	58	2460MHz	78	2480MHz
19	2421MHz	39	2441MHz	- 59	2461MHz		- 0

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	' \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		
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.





3. General Information

3.1. Test environment and mode

Operating Environment:						
Condition	Conducted Emission	Radiated Emission				
Temperature:	25.0 °C	24.2 °C				
Humidity:	55 % RH	53 % RH				
Atmospheric Pressure:	1010 mbar	1010 mbar				
Test Software:						
Software Information:	Engineering mode					
Power Level:	Power Level: Default					
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
Adapter	JD-050200	2012010907576735	/	JD

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.



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-1

SHENZHEN TONGCE TESTING LAB

CAB identifier: CN0031

The testing lab has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing.

4.2. Location

SHENZHEN TONGCE TESTING LAB

Address: TCT Testing Industrial Park Fugiao 5th Industrial Zone, Fuhai Street, 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



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.

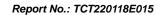
E.U.T Antenna:

The Bluetooth antenna is internal antenna which permanently attached, and the best case gain of the antenna is 1.5dBi.



Antenna

Page 8 of 92





5.2. Conducted Emission

5.2.1. Test Specification

74.						
Test Requirement:	FCC Part15 C Section 15.207					
Test Method:	ANSI C63.10:2013					
Frequency Range:	150 kHz to 30 MHz					
Receiver setup:	RBW=9 kHz, VBW=30	RBW=9 kHz, VBW=30 kHz, Sweep time=auto				
Limits:	Frequency range (MHz) 0.15-0.5 0.5-5 5-30	Limit (Quasi-peak 66 to 56* 56 60	dBuV) Average 56 to 46* 46 50			
	Reference Plane					
Test Setup:	AC power E.U.T					
Test Mode:	Charging + Transmittin	g 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 ANSI C63.10:2013 on conducted measurement. 					
Test Result:	PASS					



5.2.2. Test Instruments

Conducted Emission Shielding Room Test Site (843)									
Equipment	Manufacturer	Model	Serial Number	Calibration Due					
EMI Test Receiver	R&S	ESCI3	100898	Jul. 07, 2022					
Line Impedance Stabilisation Newtork(LISN)	Schwarzbeck	Schwarzbeck NSLK 8126		Mar. 11, 2022					
Line-5	TCT	CE-05	N/A	Jul. 07, 2022					
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A					

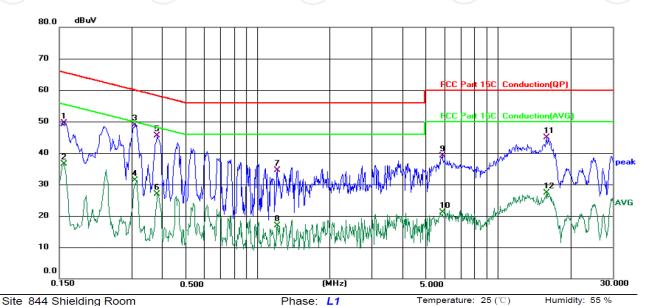




5.2.3. Test data

Please refer to following diagram for individual

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



Limit: FCC Part 15C Conduction(QP)

Power: DC 5V(Adapter Input AC 120V/60Hz)

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBu∨	dB	dBu∨	dBu∨	dB	Detector	Comment
1		0.1564	39.86	9.60	49.46	65.65	-16.19	QP	
2		0.1564	26.92	9.60	36.52	55.65	-19.13	AVG	
3	*	0.3100	39.56	9.31	48.87	59.97	-11.10	QP	
4		0.3100	21.92	9.31	31.23	49.97	-18.74	AVG	
5		0.3820	36.32	9.25	45.57	58.24	-12.67	QP	
6		0.3820	17.75	9.25	27.00	48.24	-21.24	AVG	
7		1.2100	25.09	9.35	34.44	56.00	-21.56	QP	
8		1.2100	7.53	9.35	16.88	46.00	-29.12	AVG	
9		5.8940	29.46	9.56	39.02	60.00	-20.98	QP	
10		5.8940	11.50	9.56	21.06	50.00	-28.94	AVG	
11		15.8900	35.16	9.67	44.83	60.00	-15.17	QP	
12		15.8900	17.61	9.67	27.28	50.00	-22.72	AVG	

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

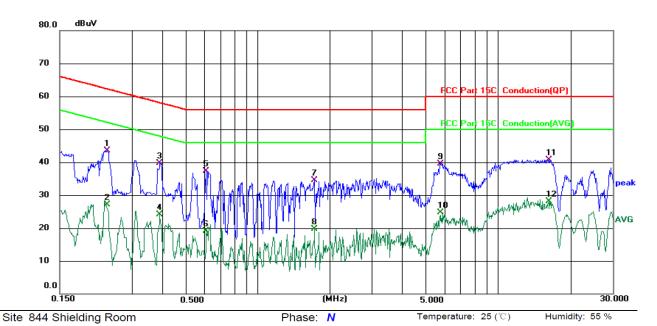
AVG =average

^{*} 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)



Limit: FCC Part 15C Conduction(QP)

Power: DC 5V(Adapter Input AC 120V/60Hz)

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBu∨	dB	dBu∨	dBu∀	dB	Detector	Comment
1		0.2363	34.27	9.32	43.59	62.23	-18.64	QP	
2		0.2363	17.86	9.32	27.18	52.23	-25.05	AVG	
3	*	0.3899	30.45	9.26	39.71	58.07	-18.36	QP	
4		0.3899	14.79	9.26	24.05	48.07	-24.02	AVG	
5		0.6100	28.16	9.21	37.37	56.00	-18.63	QP	
6		0.6100	9.87	9.21	19.08	46.00	-26.92	AVG	
7		1.7217	25.07	9.36	34.43	56.00	-21.57	QP	
8		1.7217	10.25	9.36	19.61	46.00	-26.39	AVG	
9		5.7460	30.02	9.50	39.52	60.00	-20.48	QP	
10		5.7460	15.29	9.50	24.79	50.00	-25.21	AVG	
11		16.2620	31.00	9.69	40.69	60.00	-19.31	QP	
12		16.2620	18.49	9.69	28.18	50.00	-21.82	AVG	

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 (dBµV) = Limit stated in standard

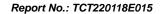
 $Margin (dB) = Measurement (dB\mu V) - Limits (dB\mu V)$

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 GFSK) was submitted only.





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 bandwidth, 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 the peak of the emission.		
Test Result:	PASS		

5.3.2. Test Instruments

5.3.2. Test Instru	ments			
Name	Manufacturer	Model No.	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100619	Jul. 18, 2022
Combiner Box	Ascentest	AT890-RFB	S N/A	Jul. 07, 2022





5.4. 20dB Occupy Bandwidth

5.4.1. Test Specification

Test Requirement:	FCC Part15 C Section	FCC Part15 C Section 15.247 (a)(1)				
Test Method:	KDB 558074 D01 v05rd	KDB 558074 D01 v05r02				
Limit:	N/A					
Test Setup:	Spectrum Analyzer	EUT	(c			
Test Mode:	Transmitting mode with	n modulation				
Test Procedure:	 The RF output of EUT was connected to the spectron analyzer by RF cable and attenuator. The path lost 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 20 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≥3RE Sweep = auto; Detector function = peak; Trace = r hold. Measure and record the results in the test report. 					
Test Result:	PASS					

5.4.2. Test Instruments

Name	Manufacturer	Model No.	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100619	Jul. 18, 2022
Combiner Box	Ascentest	AT890-RFB	N/A	Jul. 07, 2022



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 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.			
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 and attenuator. 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	MY49100619	Jul. 18, 2022
Combiner Box	Ascentest	AT890-RFB	N/A	Jul. 07, 2022





5.6. Hopping Channel Number

5.6.1. Test Specification

path loss was compensated to the results for each measurement. 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Enable the EUT hopping function. 4. Use the following spectrum analyzer settings: Sparthe frequency band of operation; set the RBW to let than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller; VBW≥RBW; Swe = auto; Detector function = peak; Trace = max holds. 5. The number of hopping frequency used is defined the number of total channel.		
Test Setup: Spectrum Analyzer EUT	Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Setup: Spectrum Analyzer EUT	Test Method:	KDB 558074 D01 v05r02
Test Mode: Hopping mode 1. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Enable the EUT hopping function. 4. Use the following spectrum analyzer settings: Spand the frequency band of operation; set the RBW to let than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller; VBW≥RBW; Swere auto; Detector function = peak; Trace = max holds. The number of hopping frequency used is defined the number of total channel.	Limit:	
Test Mode: 1. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Enable the EUT hopping function. 4. Use the following spectrum analyzer settings: Spart the frequency band of operation; set the RBW to let than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller; VBW≥RBW; Swe = auto; Detector function = peak; Trace = max hold 5. The number of hopping frequency used is defined the number of total channel.	Test Setup:	
spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Enable the EUT hopping function. 4. Use the following spectrum analyzer settings: Spanthe frequency band of operation; set the RBW to let than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller; VBW≥RBW; Swe = auto; Detector function = peak; Trace = max holds. 5. The number of hopping frequency used is defined the number of total channel.	Test Mode:	
6. Record the measurement data in report.	Test Procedure:	 spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Enable the EUT hopping function. 4. 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. 5. The number of hopping frequency used is defined as
Test Result: PASS	Test Result:	PASS

5.6.2. Test Instruments

Name	Manufacturer	Model No.	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100619	Jul. 18, 2022
Combiner Box	Ascentest	AT890-RFB	N/A	Jul. 07, 2022



5.7. Dwell Time

5.7.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	KDB 558074 D01 v05r02
Limit:	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.
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 and attenuator. 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.
Test Result:	PASS

5.7.2. Test Instruments

Name	Manufacturer	Model No.	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100619	Jul. 18, 2022
Combiner Box	Ascentest	AT890-RFB	N/A	Jul. 07, 2022



5.8. Pseudorandom Frequency Hopping Sequence

Test Requirement:

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

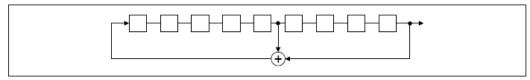
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

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

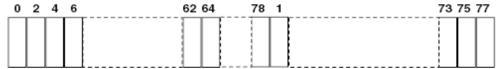
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first one of 9 consecutive ones; i.e. the shift register is initialized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

Page 18 of 92

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com





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 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:	 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 Manufactu		Model No.	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100619	Jul. 18, 2022
Combiner Box	Ascentest	AT890-RFB	N/A	Jul. 07, 2022





5.10. Conducted Spurious Emission Measurement

5.10.1. Test Specification

FCC Part15 C Section 15.247 (d)
KDB 558074 D01 v05r02
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.
Spectrum Analyzer EUT
Transmitting mode with modulation
 The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. 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.
PASS

5.10.2. Test Instruments

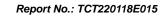
Name	Manufacturer	Model No.	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100619	Jul. 18, 2022
Combiner Box	Ascentest	AT890-RFB	N/A	Jul. 07, 2022



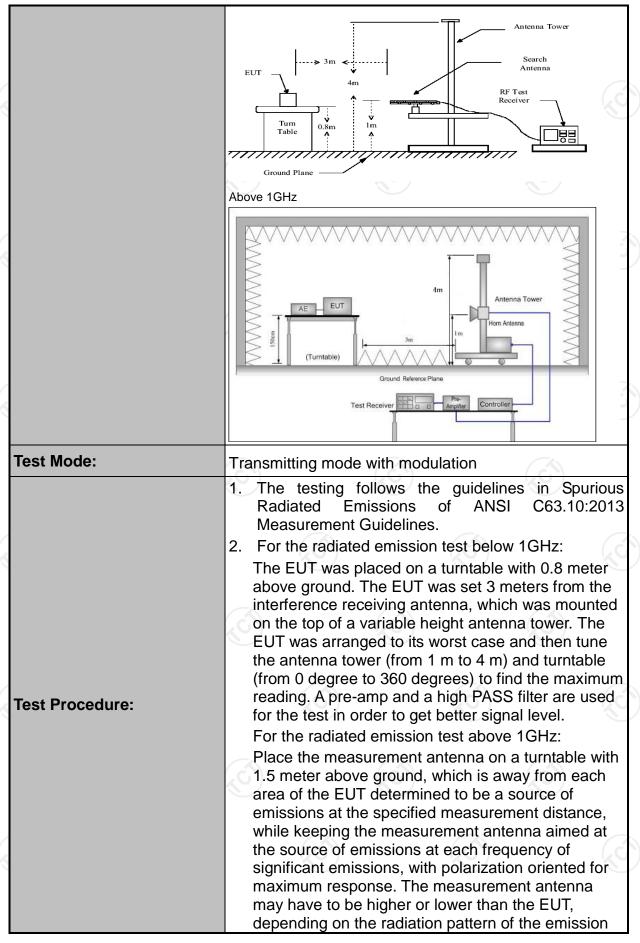
5.11. Radiated Spurious Emission Measurement

5.11.1. Test Specification

		Z\					
Test Requirement:	FCC Part15	C Sectio	n 15.209	(0,)		0	
Test Method:	ANSI C63.10	0:2013					
Frequency Range:	9 kHz to 25 (GHz					
Measurement Distance:	3 m		(b)		160)	
Antenna Polarization:	Horizontal &	Vertical					
	Frequency	Detector	RBW	VBW		Remark	
	9kHz- 150kHz	Quasi-pea	ak 200Hz	1kHz	Quas	si-peak Value	
Receiver Setup:	150kHz- 30MHz	Quasi-pea		30kHz		si-peak Value	
·	30MHz-1GHz	Quasi-pea	ak 120KHz	300KHz	Quas	si-peak Value	
	.G`)	Peak	1MHz	3MHz	/ _	eak Value	
	Above 1GHz	Peak	1MHz	10Hz		erage Value	
		1 oak	1171112	10112		rage value	
			Field Stre	ength	Me	asurement	
	Frequen	icy	(microvolts	/meter)	Dista	nce (meters)	
	0.009-0.4	190	2400/F(H			300	
	0.490-1.7		24000/F(30		
	1.705-3		30	11112)	30		
		30-88		100		3	
			/ X			7	
1 ::	88-216		150		-(-C	3	
Limit:	216-96		200		3		
	Above 9	60	500			3	
	Frequency		eld Strength rovolts/meter)	Measure Distan (mete	ice	Detector	
			500	3		Average	
	Above 1GH	Z	5000	3		Peak	
	For radiated emis	ssions belov	w 30MHz		(c)		
	Di	stance = 3m			Compu	ter 🗖	
	+					- _	
		1/		Pre -	Amplifier	1 <i>(2</i>	
		. (. / г	——	, and		
Test setup:	EUT	Turn table	1 _m	_			
	0.8m			_ L	Receiver	\Box	
	30MHz to 1GHz	Grou	nd Plane				
		X \					









TESTING CENTRE TECHNOLOGY	Report No.: 1C1220118E01
	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; (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
X - 1	70



5.11.2. Test Instruments

	Radiated En	nission Test Site	e (966)	
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESIB7	100197	Jul. 07, 2022
Spectrum Analyzer	R&S	FSQ40	200061	Jul. 07, 2022
Pre-amplifier	SKET	LNPA_0118G- 45	SK2021012 102	Mar. 11, 2022
Pre-amplifier	SKET	LNPA_1840G- 50	SK2021092 03500	Apr. 08, 2022
Pre-amplifier	HP	8447D	2727A05017	Jul. 07, 2022
Loop antenna	ZHINAN	ZN30900A	12024	Sep. 05, 2022
Broadband Antenna	Schwarzbeck	VULB9163	340	Sep. 04, 2022
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Sep. 04, 2022
Horn Antenna	Schwarzbeck	BBHA 9170	00956	Apr. 10, 2023
Antenna Mast	Keleto	RE-AM	N/A	N/A
Coaxial cable	SKET	RC_DC18G-N	N/A	Apr. 08, 2022
Coaxial cable	SKET	RC-DC18G-N	N/A	Apr. 08, 2022
Coaxial cable	SKET	RC-DC40G-N	N/A	Jul. 07, 2022
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

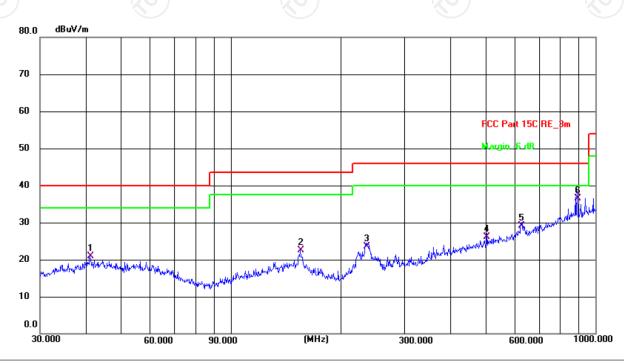


5.11.3. Test Data

Please refer to following diagram for individual

Horizontal:

Below 1GHz



Site #2 3m Anechoic Chamber Polarization: *Horizontal* Temperature: 24.2(C) Humidity: 53 %

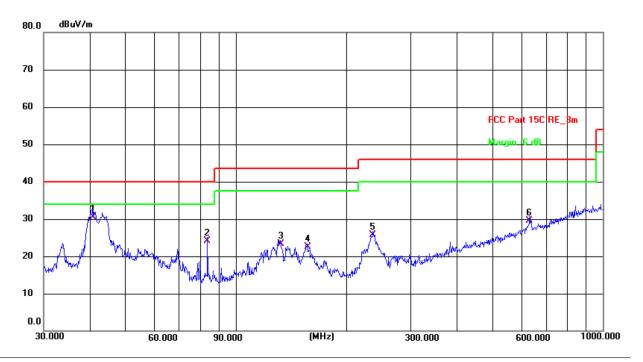
Limit: FCC Part 15C RE_3m Power: DC 3.8 V

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	41.1320	6.96	13.99	20.95	40.00	-19.05	QP	Р	
2	155.3644	9.21	13.38	22.59	43.50	-20.91	QP	Р	
3	236.6447	10.94	12.56	23.50	46.00	-22.50	QP	Р	
4	504.7062	6.62	19.48	26.10	46.00	-19.90	QP	Р	
5	625.0780	7.54	21.66	29.20	46.00	-16.80	QP	Р	
6 *	890.7278	10.24	26.36	36.60	46.00	-9.40	QP	Р	





Vertical:



Site #2 3m Anechoic Chamber Polarization: Vertical Temperature: 24.2(C) Humidity: 53 %

Power: DC 3.8 V

Limit: FCC Part 15C RE 3m

		_							
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 *	40.7016	16.61	13.99	30.60	40.00	-9.40	QP	Р	
2	83.8155	14.91	9.29	24.20	40.00	-15.80	QP	Р	
3	132.2205	10.66	12.74	23.40	43.50	-20.10	QP	Р	
4	156.4577	9.11	13.39	22.50	43.50	-21.00	QP	Р	
5	236.6447	13.24	12.56	25.80	46.00	-20.20	QP	Р	
6	631.6883	7.84	21.76	29.60	46.00	-16.40	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 GFSK) 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 $(dB) = Measurement (dB\mu V/m) - Limits (dB\mu V/m)$

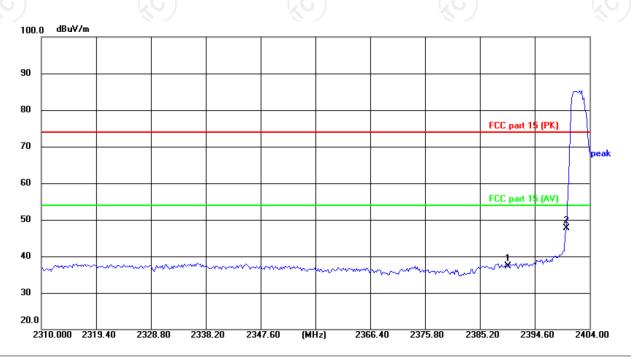
* is meaning the worst frequency has been tested in the test frequency range.



Test Result of Radiated Spurious at Band edges

Lowest channel 2402:

Horizontal:



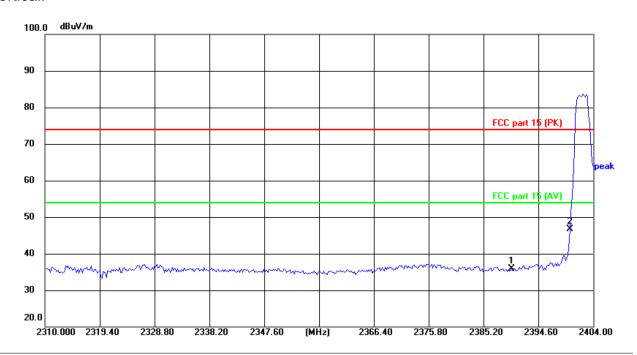
Site Polarization: Horizontal Temperature: $25(^{\circ}\text{C})$ Limit: FCC part 15 (PK) Power: DC 3.8V Humidity: 55%

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	2390.000	50.42	-13.15	37.27	74.00	-36.73	peak
2 *	2400.000	60.92	-13.12	47.80	74.00	-26.20	peak





Vertical:



Site Polarization: Vertical Temperature: $25(^{\circ}\text{C})$ Limit: FCC part 15 (PK) Power: DC 3.8V Humidity: 55%

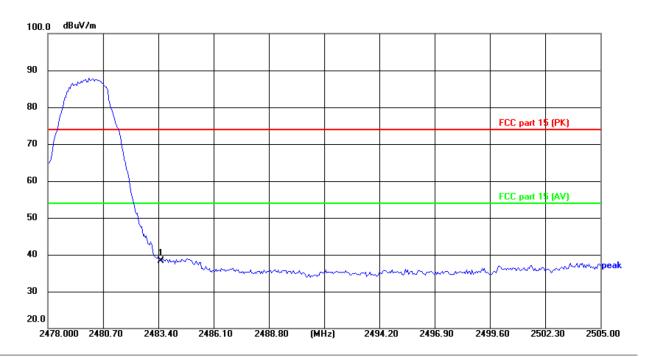
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector
1	2390.000	49.04	-13.15	35.89	74.00	-38.11	peak
2 *	2400.000	59.81	-13.12	46.69	74.00	-27.31	peak





Highest channel 2480:

Horizontal:



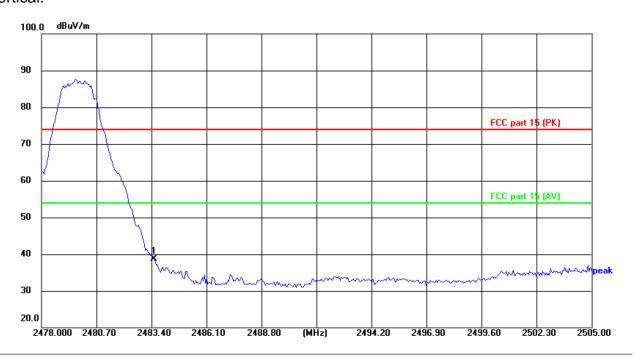
Site Polarization: *Horizontal* Temperature: $25(^{\circ}C)$ Limit: FCC part 15 (PK) Power: DC 3.8V Humidity: 55%

No.	Frequency (MHz)			Level (dBuV/m)		Margin (dB)	Detector	
1 *	2483.500	51.19	-12.84	38.35	74.00	-35.65	peak	





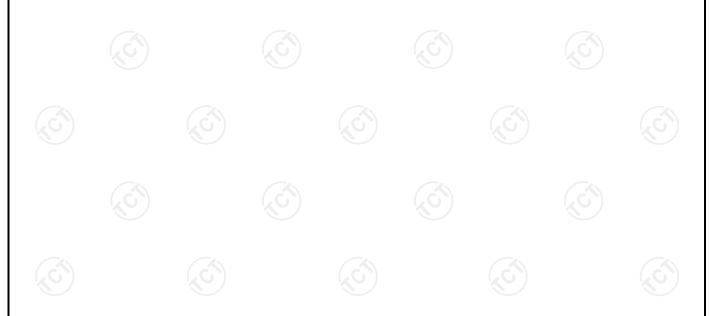
Vertical:



Site Polarization: Vertical Temperature: $25(^{\circ}\text{C})$ Limit: FCC part 15 (PK) Power: DC 3.8V Humidity: 55%

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	2483.500	51.53	-12.84	38.69	74.00	-35.31	peak

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





Above 1GHz

Modulation Type: GFSK									
Low channel: 2402 MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBuV)	Correction Factor (dB/m)	Emissic Peak (dBµV/m)	AV	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4804	Н	45.14		0.66	45.80		74	54	-8.20
7206	Η	35.72		9.5	45.22		74	54	-8.78
	H								
	(G') (G') (G')								
4804	V	44.68		0.66	45.34		74	54	-8.66
7206	V	36.33		9.5	45.83		74	54	-8.17
	V								

Middle channel: 2441 MHz			(20)			((0))			1 _K G
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)	Emission Peak (dBµV/m)	AV	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4882	H	45.21		0.99	46.20		74	54	-7.80
7323	(CH)	36.57	4	9.87	46.44	(C) 1/2	74	54	-7.56
	H				`				
			1						
4882	V	44.36		0.99	45.35		74	54	-8.65
7323	V	35.54		9.87	45.41		74	54	-8.59
()	V	(<u></u>)		(9 /		(22)		

High channel: 2480 MHz									
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)
4960	Н	46.28		1.33	47.61		74	54	-6.39
7440	Н	36.87		10.22	47.09		74	54	-6.91
	Н	 /.							
4960	V	46.05		1.33	47.38		74	54	-6.62
7440	V	36.46		10.22	46.68		74	54	-7.32
	V								

Note:

- 1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss Pre-amplifier
- 2. $Margin (dB) = Emission Level (Peak) (dB\mu V/m)-Average limit (dB\mu V/m)$
- 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 (GFSK) was submitted only.
- 7. All the restriction bands are compliance with the limit of 15.209.

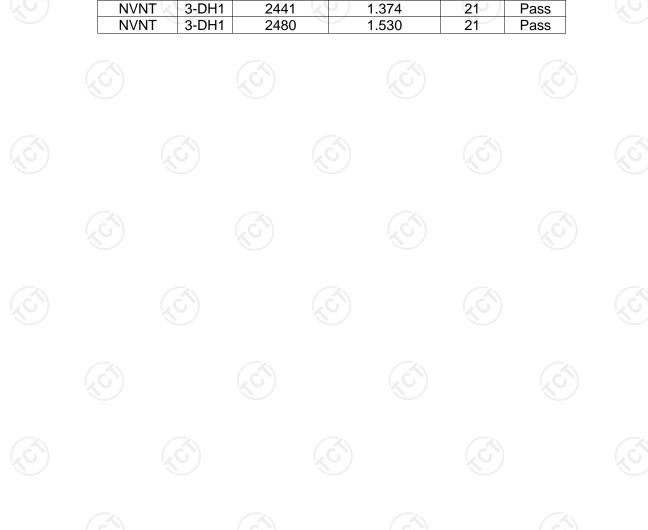




Appendix A: Test Result of Conducted Test

Maximum Conducted Output Power

Condition	Mode	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	1-DH1	2402	-1.252	30	Pass
NVNT	1-DH1	2441	1.866	30	Pass
NVNT	1-DH1	2480	2.219	30	Pass
NVNT	2-DH1	2402	-1.991	21	Pass
NVNT	2-DH1	2441	1.211	21	Pass
NVNT	2-DH1	2480	1.433	21	Pass
NVNT	3-DH1	2402	-1.875	21	Pass
NVNT	3-DH1	2441	1.374	21	Pass
NVNT	3-DH1	2480	1.530	21	Pass







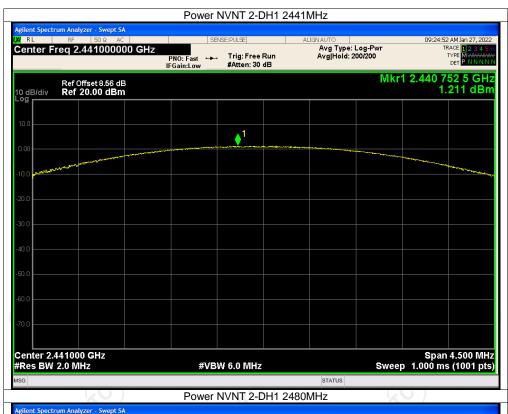


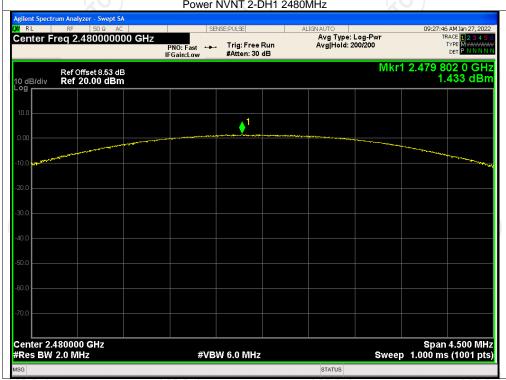




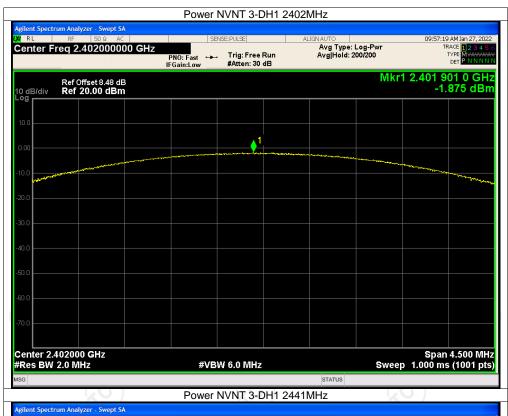




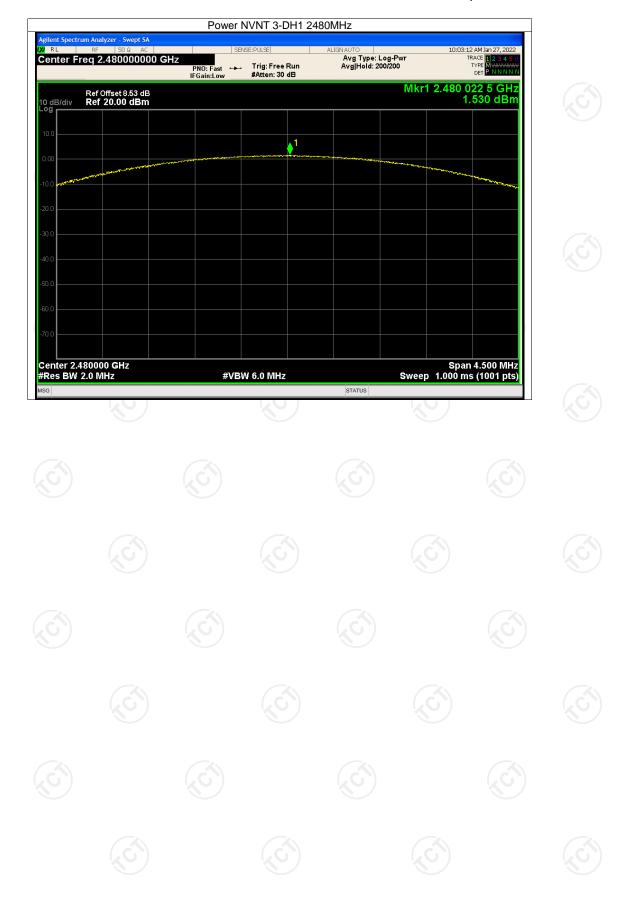








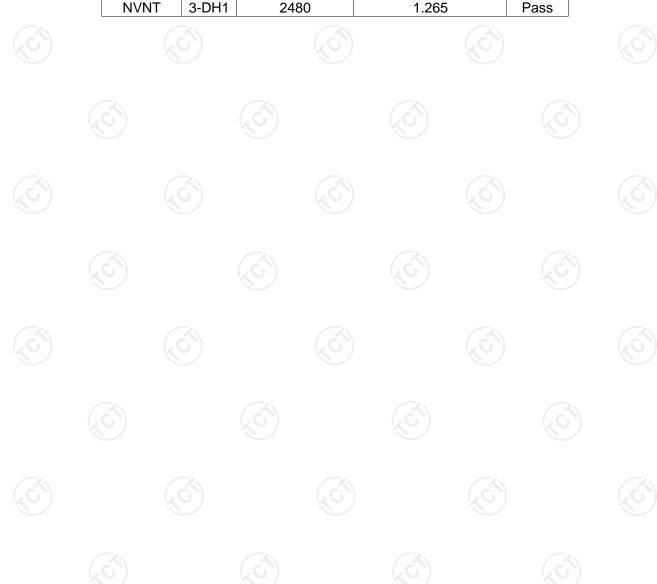






-20dB Bandwidth

Condit	ion	Mode	Frequency (MHz)	-20 dB Bandwidth (MHz)	Verdict
NVN ⁻	Τ /	1-DH1	2402	0.901	Pass
NVN ⁻	T ((1-DH1	2441	0.900	Pass
NVN ⁻	T	1-DH1	2480	0.900	Pass
NVN ⁻	Τ	2-DH1	2402	1.254	Pass
NVN ⁻	Τ	2-DH1	2441	1.258	Pass
NVN ⁻	Τ	2-DH1	2480	1.260	Pass
NVN ⁻	Τ	3-DH1	2402	1.263	Pass
NVN ⁻	Τ	3-DH1	2441	1.265	Pass
NVN ⁻	Τ	3-DH1	2480	1.265	Pass

















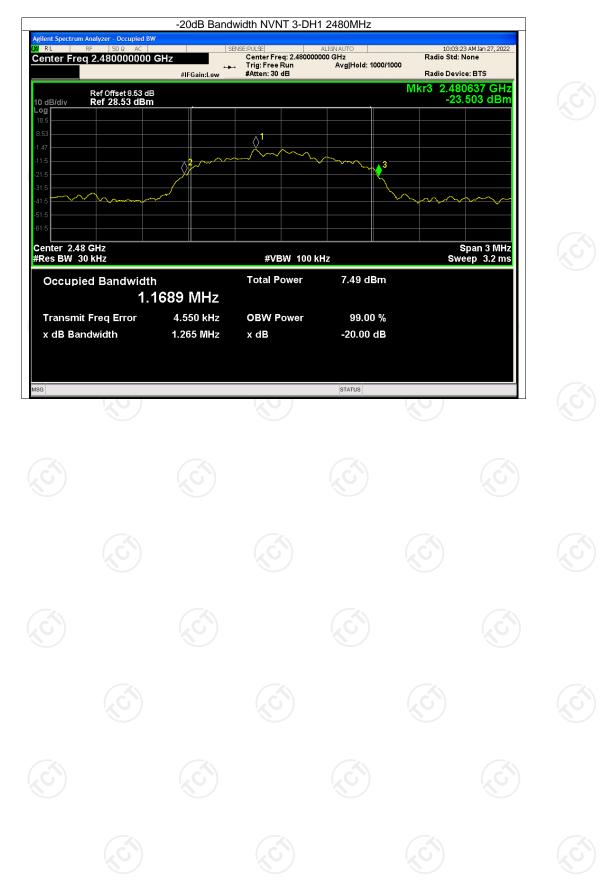








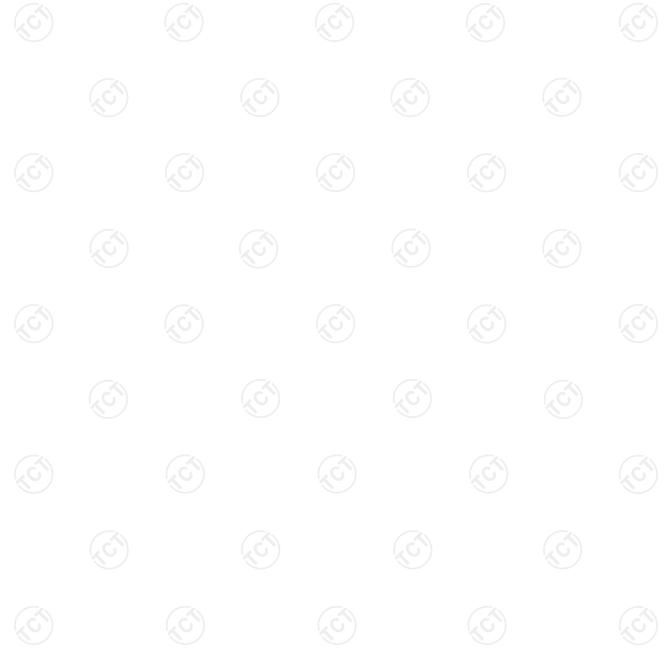




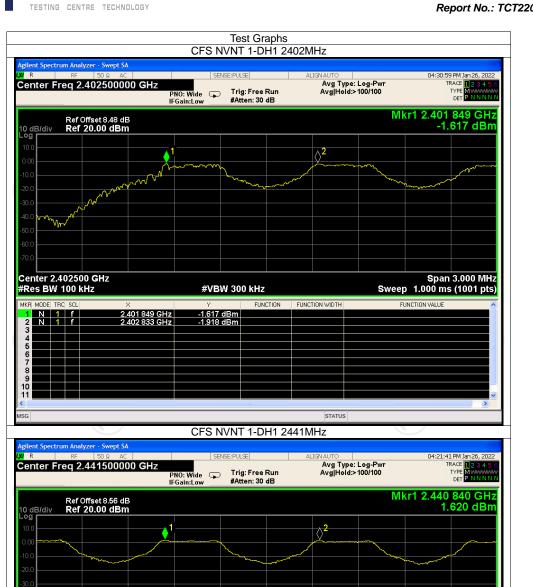


Carrier Frequencies Separation

Condition	Mode	Hopping Freq1 (MHz)	Hopping Freq2 (MHz)	HFS (MHz)	Limit (MHz)	Verdict
NVNT	1-DH1	2401.849	2402.833	0.984	0.901	Pass
NVNT	1-DH1	2440.840	2441.845	1.005	0.901	Pass
NVNT	1-DH1	2478.846	2479.839	0.993	0.901	Pass
NVNT	2-DH1	2401.858	2402.833	0.975	0.840	Pass
NVNT	2-DH1	2440.831	2442.004	1.173	0.840	Pass
NVNT	2-DH1	2478.849	2479.815	0.966	0.840	Pass
NVNT	3-DH1	2401.834	2402.836	1.002	0.843	Pass
NVNT	3-DH1	2440.846	2441.845	0.999	0.843	Pass
NVNT	3-DH1	2478.852	2479.977	1.125	0.843	Pass

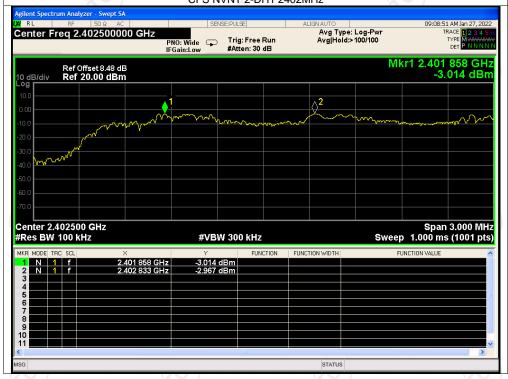


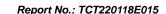




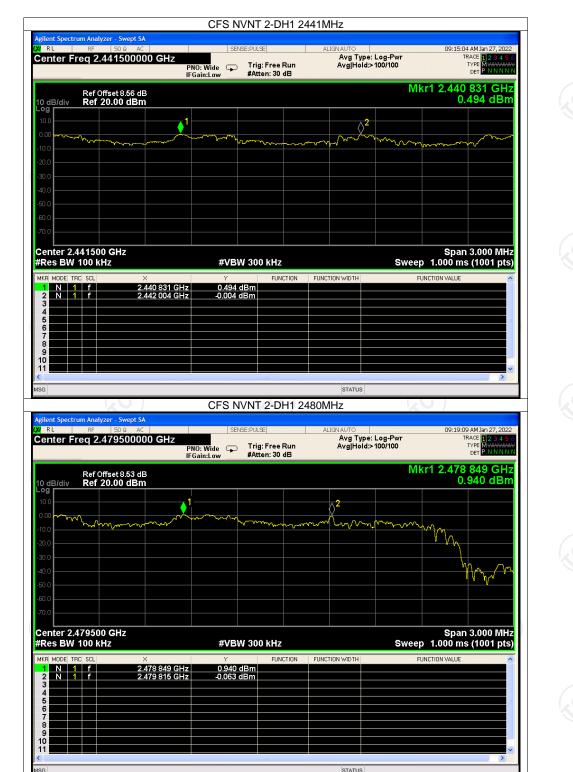








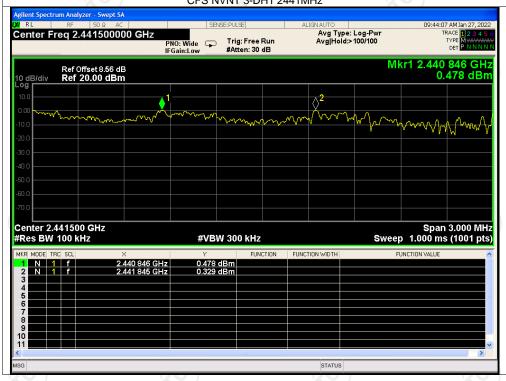




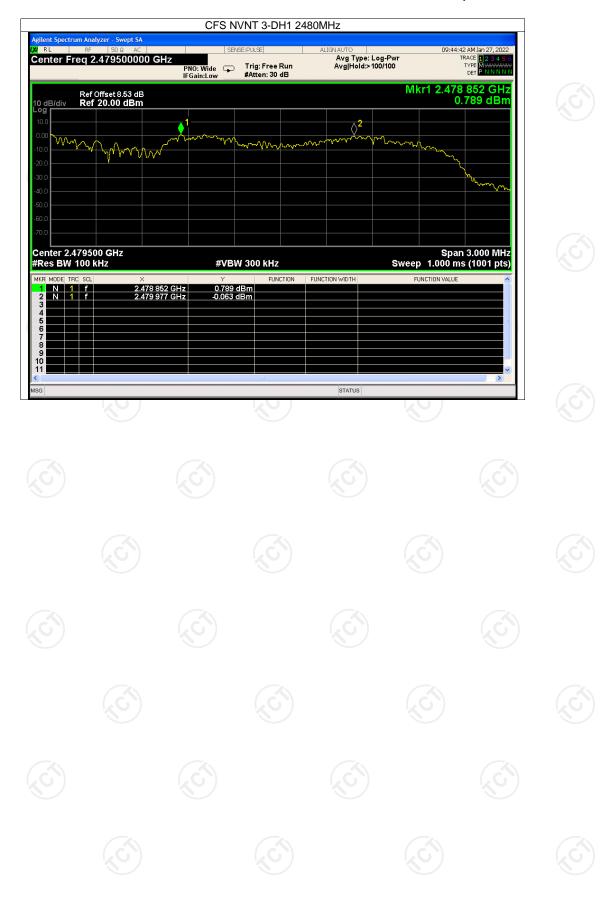








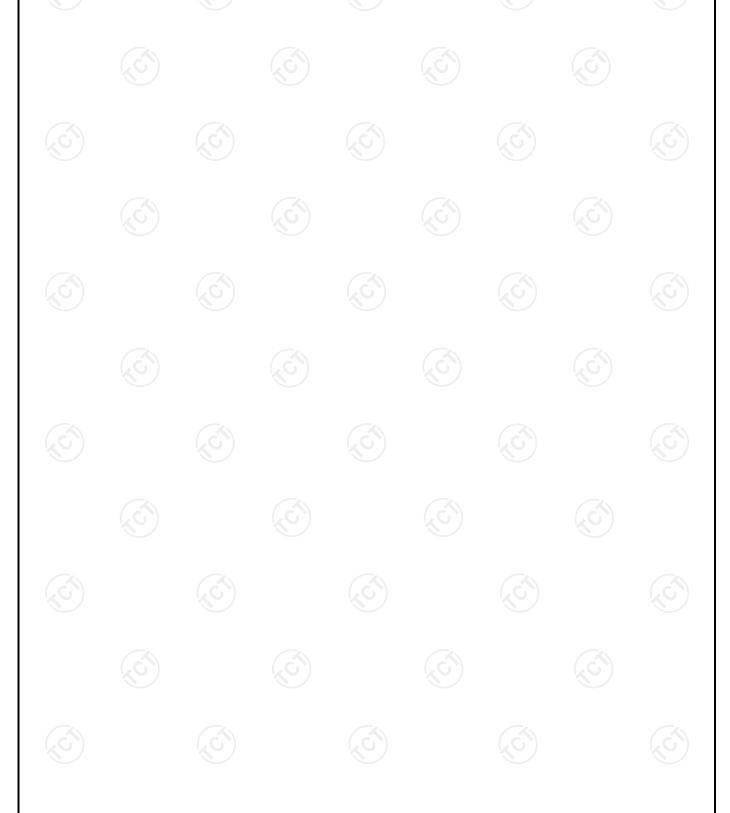




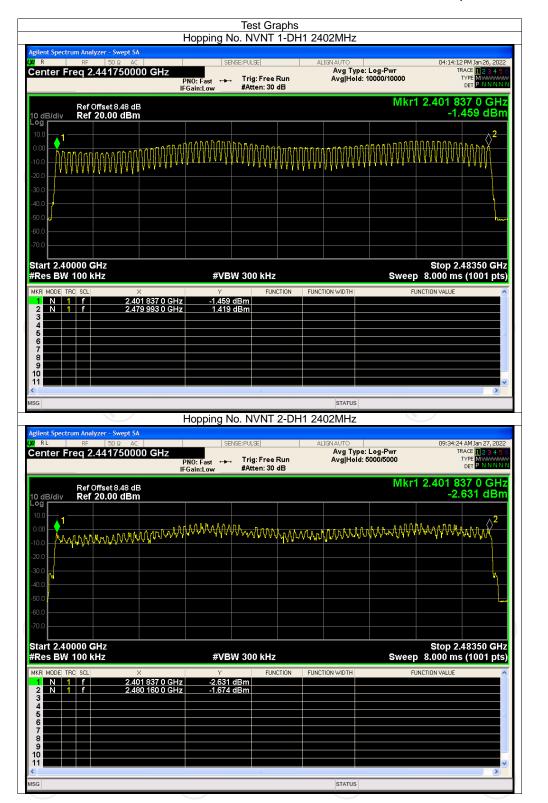


Number of Hopping Channel

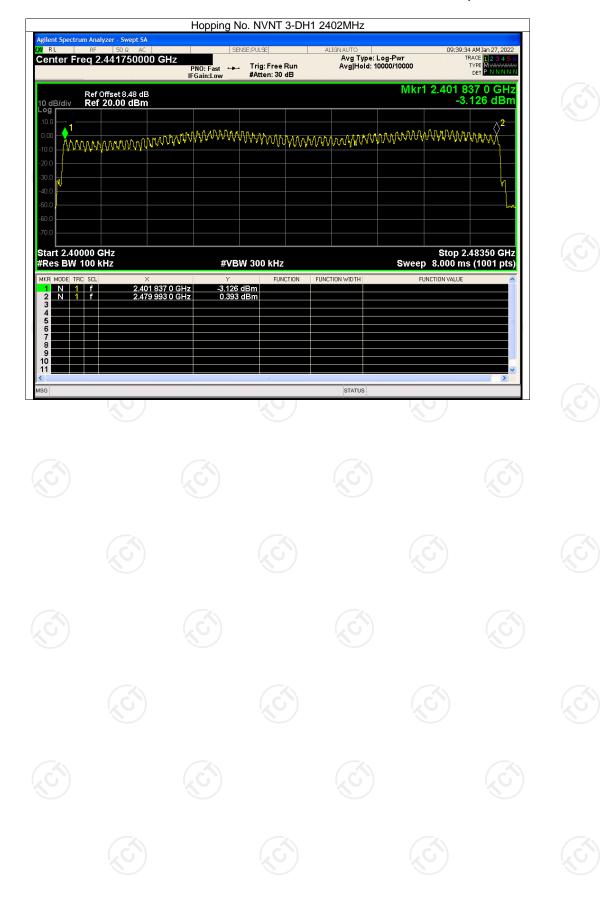
		11 5		
Condition	Mode	Hopping Number	Limit	Verdict
NVNT	1-DH1	79	15	Pass
NVNT	2-DH1	79	15	Pass
NVNT	3-DH1	79	15	Pass











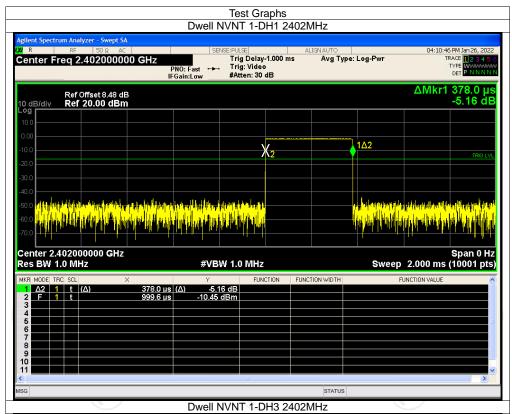


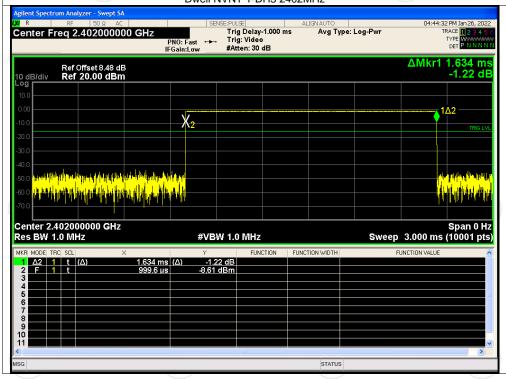
Dwell Time

Condition	Mode	Frequency (MHz)	Pulse Time (ms)	Total Dwell Time (ms)	Period Time (ms)	Limit (ms)	Verdict
NVNT	1-DH1	2402	0.378	120.960	31600	400	Pass
NVNT	1-DH3	2402	1.634	261.440	31600	400	Pass
NVNT	1-DH5	2402	2.882	307.413	31600	400	Pass
NVNT	2-DH1	2402	0.380	121.600	31600	400	Pass
NVNT	2-DH3	2402	1.637	261.920	31600	400	Pass
NVNT	2-DH5	2402	2.881	307.307	31600	400	Pass
NVNT	3-DH1	2402	0.385	123.200	31600	400	Pass
NVNT	3-DH3	2402	1.636	261.760	31600	400	Pass
NVNT	3-DH5	2402	2.886	307.840	31600	400	Pass



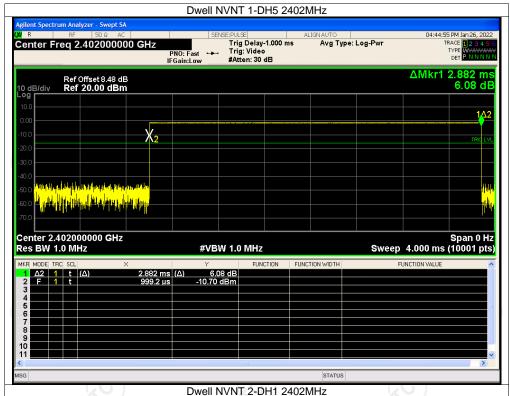


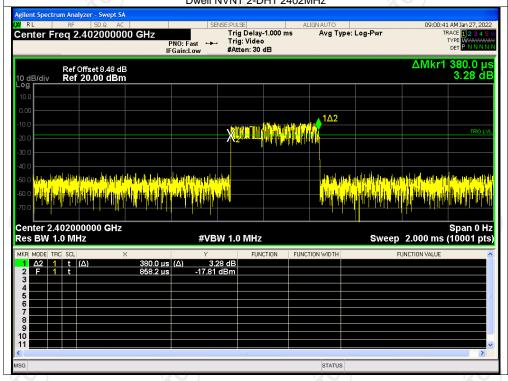




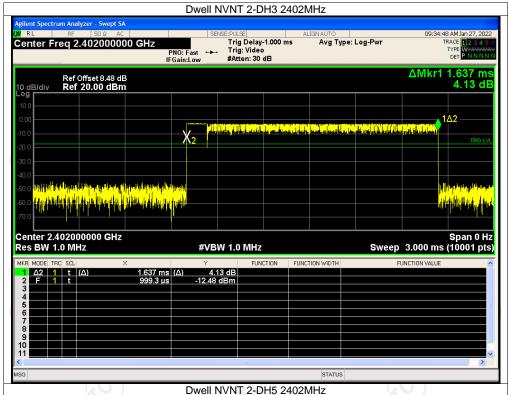


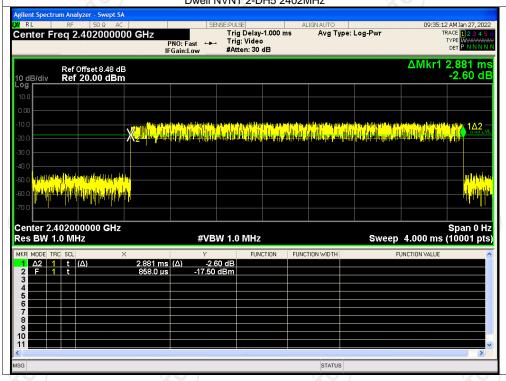




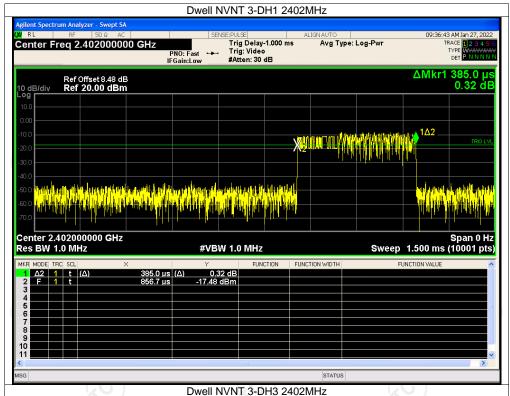


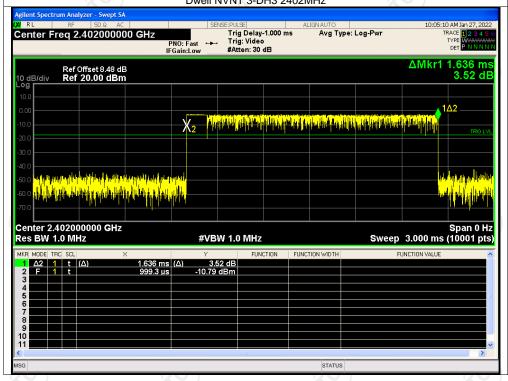




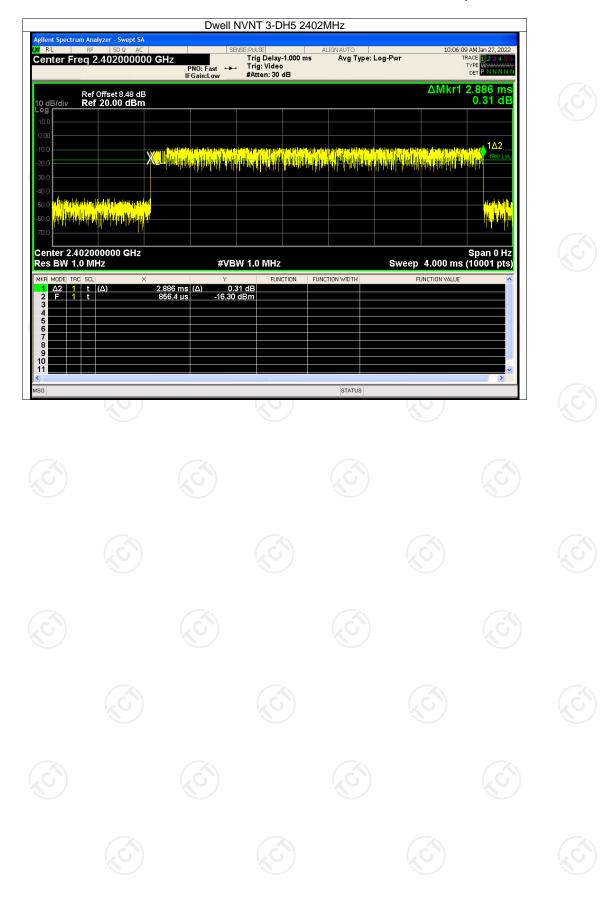








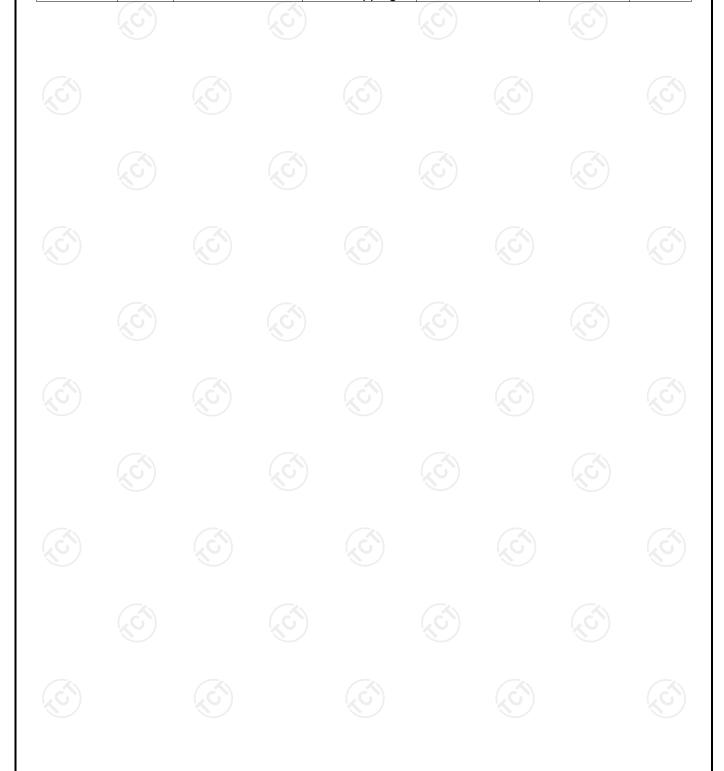


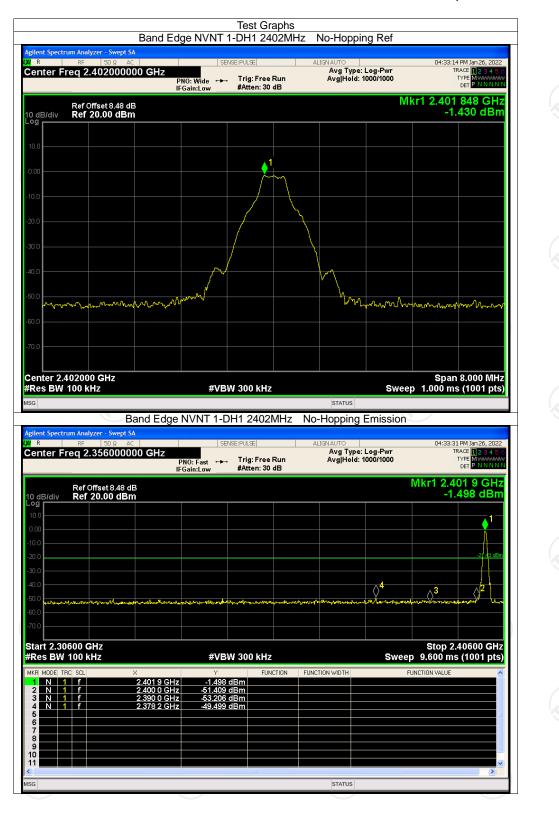




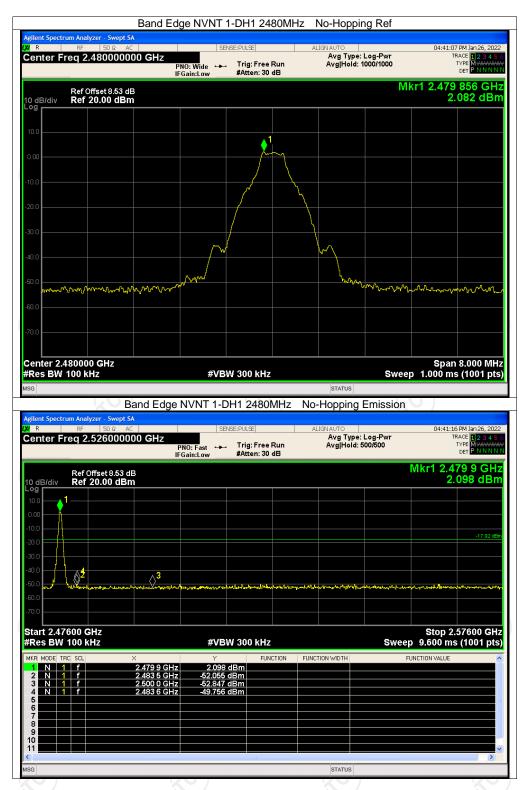
Band Edge

Condition	Mode	Frequency (MHz)	Hopping Mode	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	1-DH1	2402	No-Hopping	-48.06	-20	Pass
NVNT	1-DH1	2480	No-Hopping	-51.83	-20	Pass
NVNT	2-DH1	2402	No-Hopping	-48.26	-20	Pass
NVNT	2-DH1	2480	No-Hopping	-51.33	-20	Pass
NVNT	3-DH1	2402	No-Hopping	-47.51	-20	Pass
NVNT	3-DH1	2480	No-Hopping	-52.55	-20	Pass

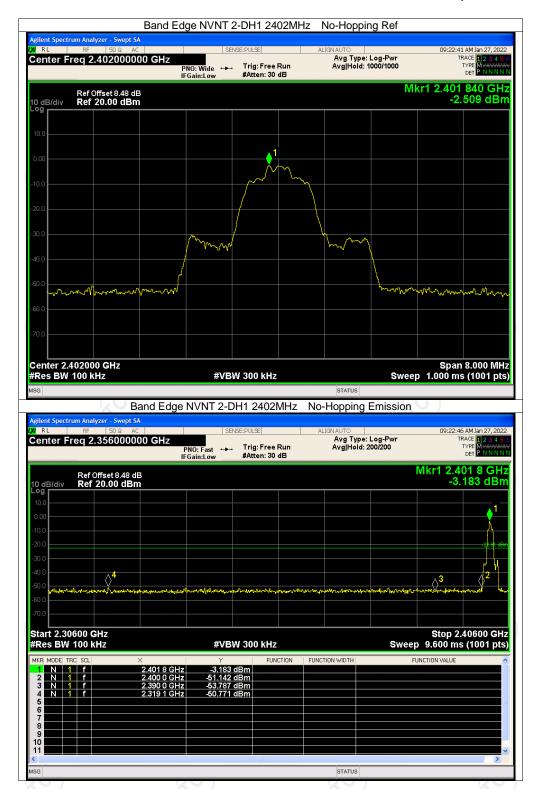




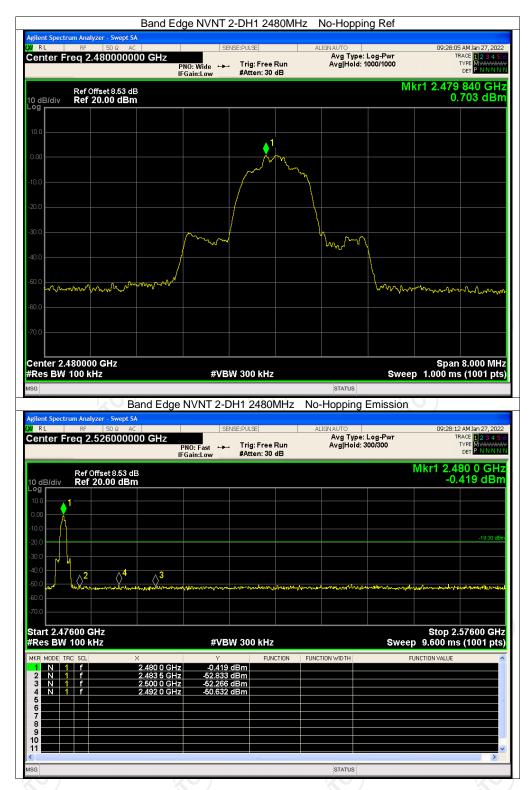




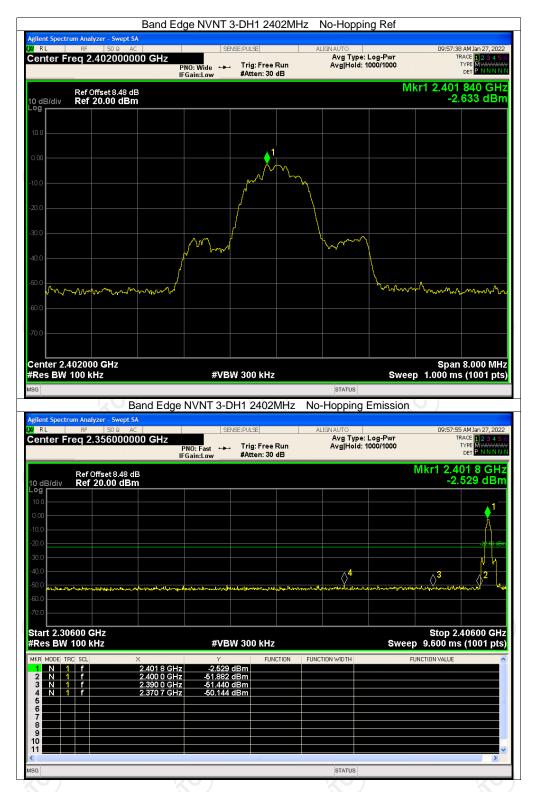




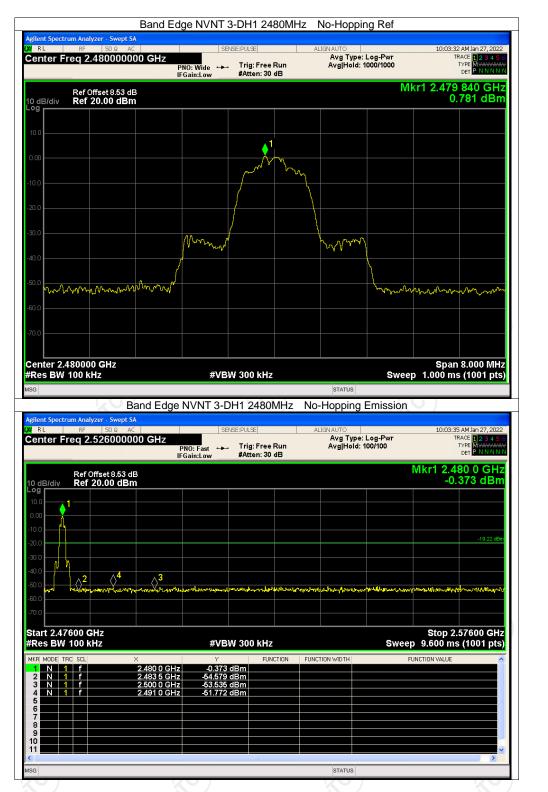








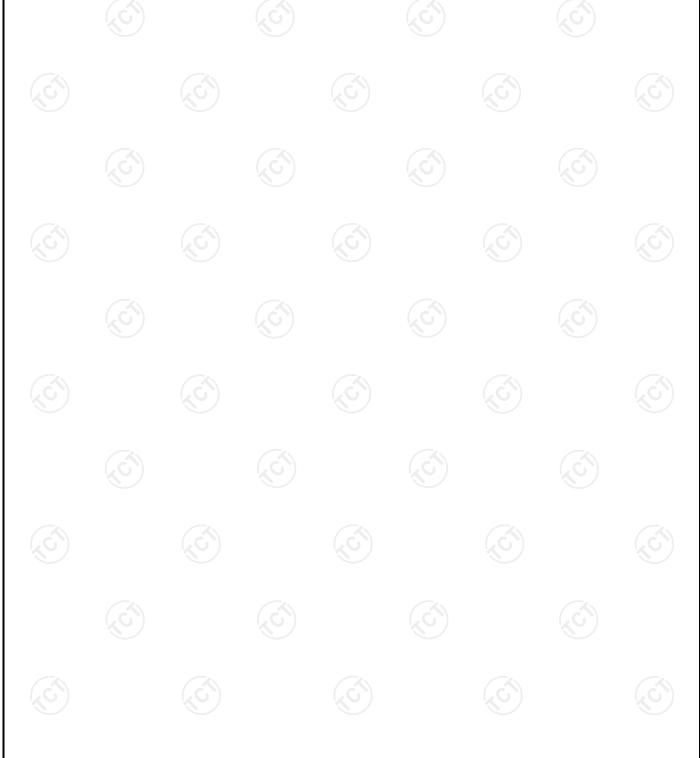


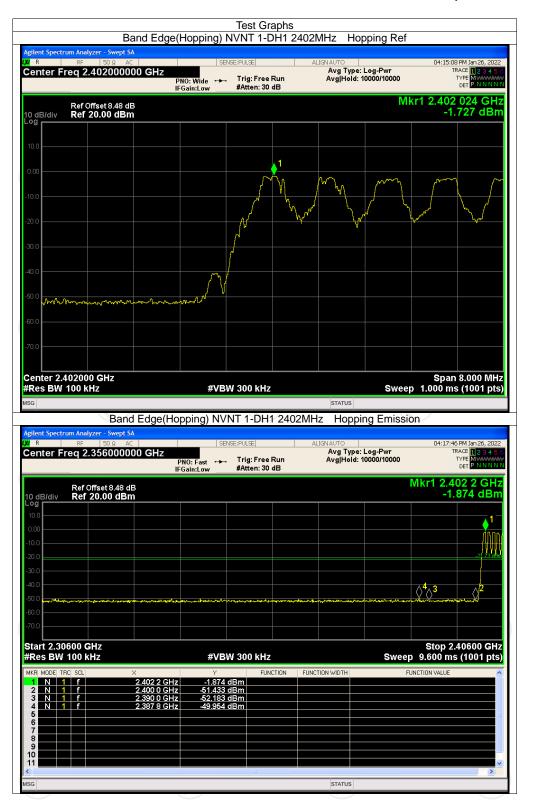




Band Edge(Hopping)

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Condition	Mode	Frequency (MHz)	Hopping Mode	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	1-DH1	2402	Hopping	-48.22	-20	Pass
NVNT	1-DH1	2480	Hopping	-52.68	-20	Pass
NVNT	2-DH1	2402	Hopping	-47.05	-20	Pass
NVNT	2-DH1	2480	Hopping	-47.03	-20	Pass
NVNT	3-DH1	2402	Hopping	-46.78	-20	Pass
NVNT	3-DH1	2480	Hopping	-51.92	-20	Pass



























Conducted RF Spurious Emission

Condition	Mode	Frequency (MHz)	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	1-DH1	2402	-37.77	-20	Pass
NVNT	1-DH1	2441	-40.75	-20	Pass
NVNT	1-DH1	2480	-39.80	-20	Pass
NVNT	2-DH1	2402	-35.64	-20	Pass
NVNT	2-DH1	2441	-37.27	-20	Pass
NVNT	2-DH1	2480	-38.54	-20	Pass
NVNT	3-DH1	2402	-35.53	-20	Pass
NVNT	3-DH1	2441	-39.59	-20	Pass
NVNT	3-DH1	2480	-38.12	-20	Pass

