	<b>TEST REPO</b>	RT			
FCC ID	2ALNA-BTH12				
Test Report No:	TCT220415E025				
Date of issue	May 10, 2022				
	SHENZHEN TONGCE TES				
Testing laboratory : Testing location/ address:	TCT Testing Industrial Park Street, Bao'an District Shenz Republic of China	Fuqiao 5th Indust			
Applicant's name:	Shenzhen Thousandshores	Technology Co.,	Ltd.		
Address:	Room 1101, Building B, Lotu Majialong Community, Nanto Shenzhen, China				
Manufacturer's name :	Shenzhen Thousandshores	Technology Co.,	Ltd.		
Address:	Room 1101, Building B, Lotus Plaza, No. 3186, Nanshan Avenue Majialong Community, Nantou Street, Nanshan District, Shenzhen, China				
Standard(s):	FCC CFR Title 47 Part 15 Subpart C Section 15.247 FCC KDB 558074 D01 15.247 Meas Guidance v05r02 ANSI C63.10:2013				
Product Name:	Wireless Headphones				
Trade Mark:	Tribit	9			
Model/Type reference:	TR-KH02				
Rating(s):	Rechargeable Li-ion Battery	DC 3.7V			
Date of receipt of test item	Apr. 15, 2022	~.			
Date (s) of performance of test:	Apr. 15, 2022 ~ May 10, 202	22			
Tested by (+signature) :	Aaron MO	Aaron 1	TONGCE		
Check by (+signature) :	Beryl ZHAO	Barge the			
Approved by (+signature):	Tomsin	Tomsm	to gi		
Remark:	This test report was based on TCT211229E004; Change applicant and manufacturer address, product model No. and add lamp belt inside ear case.				

TONGCE TESTING LAB. This document may be altered or revised by SHENZHEN TONGCE TESTING LAB personnel only, and shall be noted in the revision section of the document. The test results in the report only apply to the tested sample.

# **Table of Contents**

TCT 通测检测 TESTING CENTRE TECHNOLOGY

1. General Product Information	3
1.1. EUT description	.3
1.2. Model(s) list	
1.3. Operation Frequency	.3
2. Test Result Summary	4
3. General Information.	
3.1. Test environment and mode	.5
3.2. Description of Support Units	.5
4. Facilities and Accreditations	
4.1. Facilities	
4.2. Location	
4.3. Measurement Uncertainty	. 6
5. Test Results and Measurement Data	7
5.1. Antenna requirement	
5.2. Conducted Emission	. 8
5.3. Conducted Output Power	12
5.4. 20dB Occupy Bandwidth	13
5.5. Carrier Frequencies Separation	14
5.6. Hopping Channel Number	15
5.7. Dwell Time	
5.8. Pseudorandom Frequency Hopping Sequence	17
5.9. Conducted Band Edge Measurement	18
5.10.Conducted Spurious Emission Measurement	
5.11.Radiated Spurious Emission Measurement	20
Appendix A: Test Result of Conducted Test	
Appendix B: Photographs of Test Setup	
Appendix C: Photographs of EUT	



## **1. General Product Information**

## 1.1. EUT description

Product Name:	Wireless Headphones		$(\mathbf{c}^{*})$
Model/Type reference:	TR-KH02		
Sample Number	TCT211229E004-0101		
Bluetooth Version:	V5.2	No.	
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:	PCB Antenna		
Antenna Gain:	0dBi		KC)
Rating(s):	Rechargeable Li-ion Battery DC 3.7V		

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



## 1.3. Operation Frequency

Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
2402MHz	20	2422MHz	40	2442MHz	60	2462MHz
2403MHz	21	2423MHz	41	2443MHz	61	2463MHz
2412MHz	30	2432MHz	50	2452MHz	70	2472MHz
2413MHz	31	2433MHz	51	2453MHz	71	2473MHz
2420MHz	38	2440MHz	58	2460MHz	78	2480MHz
2421MHz	39	2441MHz	59	2461MHz		(c)
	2402MHz 2403MHz 2412MHz 2413MHz 2413MHz 2420MHz 2420MHz	2402MHz       20         2403MHz       21             2412MHz       30         2413MHz       31             2420MHz       38         2421MHz       39	2402MHz       20       2422MHz         2403MHz       21       2423MHz         2412MHz       30       2432MHz         2413MHz       31       2433MHz         2420MHz       38       2440MHz         2421MHz       39       2441MHz	2402MHz       20       2422MHz       40         2403MHz       21       2423MHz       41               2412MHz       30       2432MHz       50         2413MHz       31       2433MHz       51               2420MHz       38       2440MHz       58         2421MHz       39       2441MHz       59	2402MHz       20       2422MHz       40       2442MHz         2403MHz       21       2423MHz       41       2443MHz                2412MHz       30       2432MHz       50       2452MHz         2413MHz       31       2433MHz       51       2453MHz                2413MHz       31       2433MHz       51       2453MHz                2420MHz       38       2440MHz       58       2460MHz         2421MHz       39       2441MHz       59       2461MHz	2403MHz       21       2423MHz       41       2443MHz       61                 2412MHz       30       2432MHz       50       2452MHz       70         2413MHz       31       2433MHz       51       2453MHz       71                 2412MHz       31       2433MHz       51       2453MHz       71                 2413MHz       38       2440MHz       58       2460MHz       78

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

Report No.: TCT220415E025



# 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.
- 5. Conducted Peak Output Power, 20dB Occupied Bandwidth, Carrier Frequencies Separation, Hopping Channel Number and Dwell Time data reference report No.TCT211229E004.

# 3. General Information

## 3.1. Test environment and mode

Operating Environment:						
Condition	Conducted Emission	Radiated Emission				
Temperature:	25.2 °C	24.9 °C				
Humidity:	50 % RH	47 % RH				
Atmospheric Pressure:	1010 mbar	1010 mbar				
Test Software:						
Software Information:	BK32xx RF Test_V1.8.2					
Power Level:	3					
Test Mode:						
Engineering mode:	Keep the EUT in continuous channel and modulations with					
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	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.

# 

# 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 Fuqiao 5th Industrial Zone, Fuhai Street, Bao'an District Shenzhen, Guangdong, 518103, People's Republic of China TEL: +86-755-27673339

## 4.3. Measurement Uncertainty

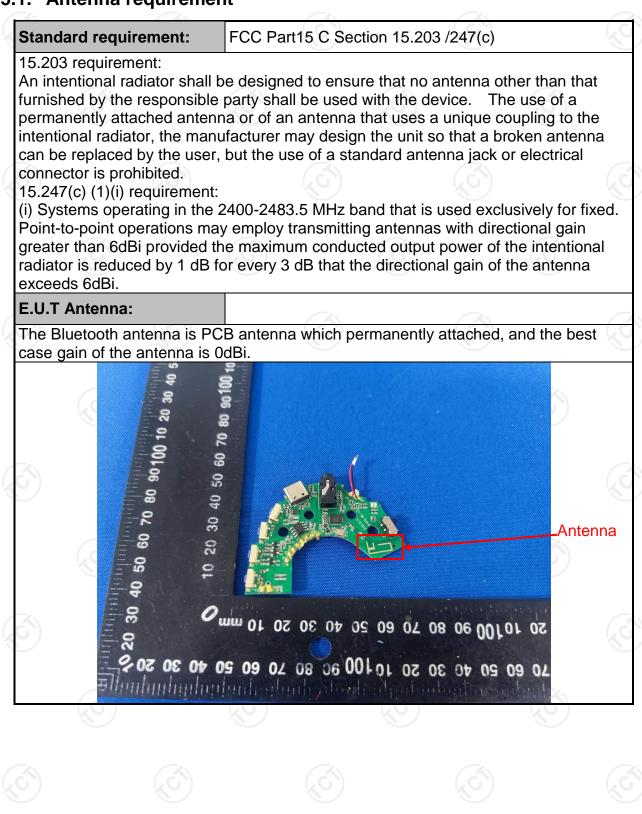
The reported uncertainty of measurement  $y \pm U$ , where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

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





## 5.2. Conducted Emission

## 5.2.1. Test Specification

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 kHz, Sweep time=auto				
	Frequency range	Limit (	dBuV)		
	(MHz)	Quasi-peak	Average		
Limits:	0.15-0.5	66 to 56*	56 to 46*		
	0.5-5	56	46		
	5-30	60	50		
	Referenc	e Plane	1201		
Test Setup:	E.U.T       AC powe         Test table/Insulation plane         Remarkc         E.U.T: Equipment Under Test         LISN: Line Impedence Stabilization Na         Test table height=0.8m	EMI Receiver	— AC power		
Test Mode:	Charging + Transmittir	ng Mode			
	1. The E.U.T is conne impedance stabiliz				
Test Procedure:	<ul> <li>provides a 50ohm/s measuring equipme</li> <li>2. The peripheral device power through a Lic coupling impedance refer to the block photographs).</li> <li>3. Both sides of A.C. conducted interferent emission, the relative the interface cables ANSI C63 10:2013 (</li> </ul>	nt. ces are also conne ISN that provides with 50ohm tern diagram of the line are checke nce. In order to fin re positions of equ must be changed	ected to the main a 500hm/50uh nination. (Please test setup and ed for maximun nd the maximun ipment and all o according to		
Test Procedure:	<ul> <li>measuring equipme</li> <li>2. The peripheral device power through a Licoupling impedance refer to the block photographs).</li> <li>3. Both sides of A.C. conducted interference mission, the relative</li> </ul>	nt. ces are also conne ISN that provides with 50ohm tern diagram of the line are checke nce. In order to fin re positions of equ must be changed	pedance for the ected to the main a 50ohm/50ul- nination. (Please test setup and ed for maximum nd the maximum ipment and all o according to		

Page 8 of 93



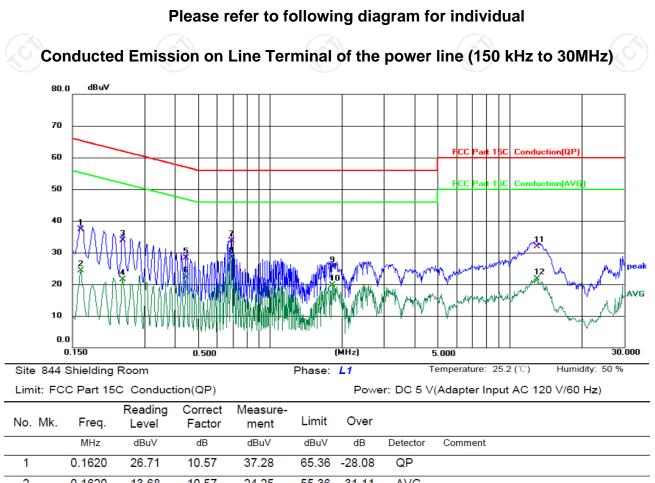
#### 5.2.2. Test Instruments

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)		NSLK 8126	8126453	Feb. 24, 2023		
	Line-5	e-5 TCT		N/A	Jul. 07, 2022		
~	EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A		



Page 9 of 93

#### 5.2.3. Test data

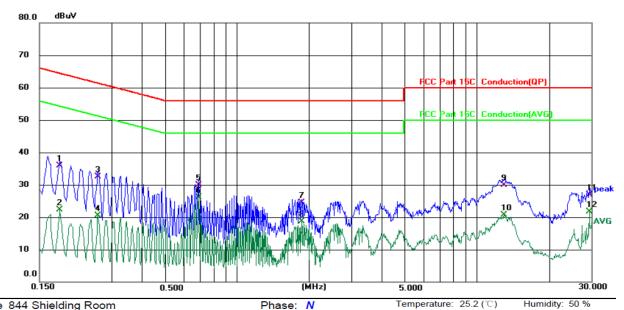


	1	0.1620	26.71	10.57	37.28	65.36 -28.08	QP
_	2	0.1620	13.68	10.57	24.25	55.36 -31.11	AVG
	3	0.2419	23.62	10.32	33.94	62.03 -28.09	QP
	4	0.2419	11.18	10.32	21.50	52.03 -30.53	AVG
	5	0.4460	18.14	10.22	28.36	56.95 -28.59	QP
	6	0.4460	12.10	10.22	22.32	46.95 -24.63	AVG
	7	0.6900	23.61	10.14	33.75	56.00 -22.25	QP
	8 *	0.6900	18.43	10.14	28.57	46.00 -17.43	AVG
	9	1.8260	15.40	10.08	25.48	56.00 -30.52	QP
_	10	1.8260	9.55	10.08	19.63	46.00 -26.37	AVG
_	11	13.0100	21.55	10.31	31.86	60.00 -28.14	QP
	12	13.0100	11.37	10.31	21.68	50.00 -28.32	AVG

#### Note:

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 30Ml	Hz.
	Page 10 of 93

Report No.: TCT220415E025



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

 Site 844 Shielding Room
 Phase: N
 Temperature: 25.2 (°C)
 Humidity: 4

 Limit: FCC Part 15C Conduction(QP)
 Power: DC 5 V(Adapter Input AC 120 V/60 Hz)

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1819	25.30	10.52	35.82	64.40	-28.58	QP	
2		0.1819	11.77	10.52	22.29	54.40	-32.11	AVG	
3		0.2620	22.15	10.31	32.46	61.37	-28.91	QP	
4		0.2620	10.24	10.31	20.55	51.37	-30.82	AVG	
5		0.6900	19.69	10.14	29.83	56.00	-26.17	QP	
6	*	0.6900	16.04	10.14	26.18	46.00	-19.82	AVG	
7		1.8660	14.34	10.17	24.51	56.00	-31.49	QP	
8		1.8660	8.60	10.17	18.77	46.00	-27.23	AVG	
9		13.0340	19.57	10.41	29.98	60.00	-30.02	QP	
10		13.0340	10.27	10.41	20.68	50.00	-29.32	AVG	
11		29.4060	16.46	10.53	26.99	60.00	-33.01	QP	
12		29.4060	11.13	10.53	21.66	50.00	-28.34	AVG	

#### Note1:

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> 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 Pi/4 DQPSK) was submitted only.

Page 11 of 93



## 5.3. Conducted Output Power

## 5.3.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.2	247 (b)(1)	
Test Method:	KDB 558074 D01 v05r02		
Limit:	power of the intentional rad	hopping systems operating nd employing at least 75 nannels, and all frequency 25-5850 MHz band: 1 watt. ping systems in the	
Test Setup:	Spectrum Analyzer	EUT	
Test Mode:	Transmitting mode with mo	dulation	
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

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





## 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			
Test Setup:	Spectrum Analyzer EUT			
Test Mode:	Transmitting mode with modulation			
Test Procedure:	<ol> <li>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.</li> <li>Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>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.</li> <li>Measure and record the results in the test report.</li> </ol>			
Test Result:	PASS			

#### 5.4.2. Test Instruments

Name	Manufacturer	Model No.	Serial Number	<b>Calibration Due</b>
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:	<ol> <li>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.</li> <li>Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>Enable the EUT hopping function.</li> <li>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.</li> <li>Use the marker-delta function to determine the separation between the peaks of the adjacent channels. Record the value in report.</li> </ol>
Test Result:	PASS

### 5.5.2. Test Instruments

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

Page 14 of 93



## 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:	<ol> <li>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.</li> <li>Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>Enable the EUT hopping function.</li> <li>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.</li> <li>The number of hopping frequency used is defined as the number of total channel.</li> <li>Record the measurement data in report.</li> </ol>
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

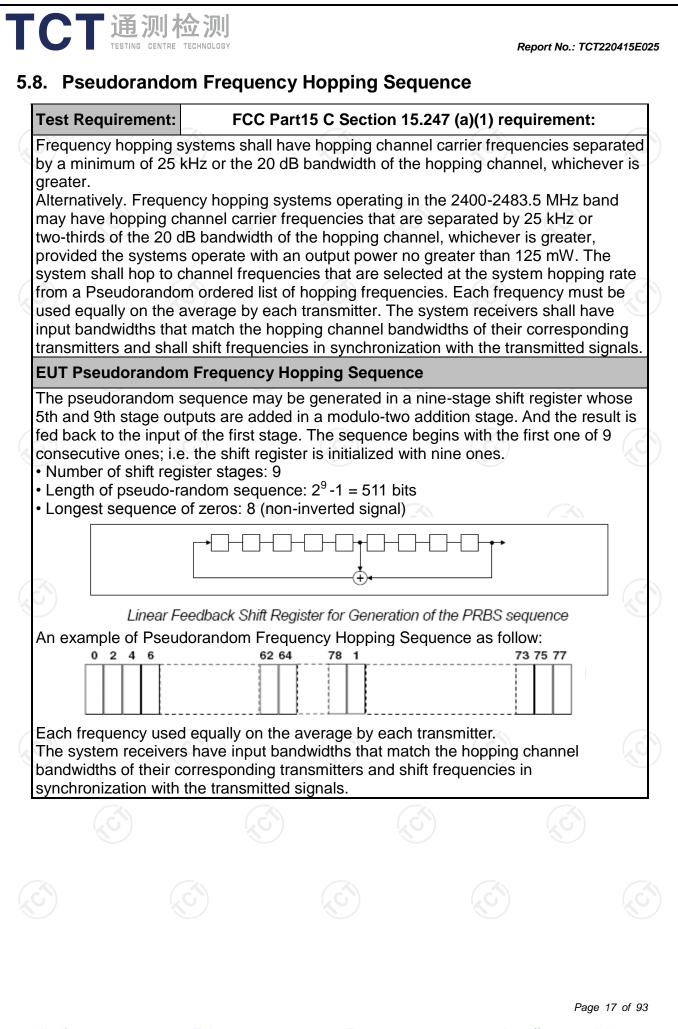
## 5.7. Dwell Time

#### 5.7.1. Test Specification

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
<ol> <li>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.</li> <li>Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>Enable the EUT hopping function.</li> <li>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 &gt;&gt; 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.</li> <li>Measure and record the results in the test report.</li> </ol>
PASS

#### 5.7.2. Test Instruments

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





## 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:	<ol> <li>Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>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.</li> <li>Enable hopping function of the EUT and then repeat step 2 and 3.</li> <li>Measure and record the results in the test report.</li> </ol>
Test Result:	PASS

#### 5.9.2. Test Instruments

Name	Manufacturer	Model No.	Serial Number	<b>Calibration Due</b>
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

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:	<ol> <li>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.</li> <li>Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>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.</li> <li>Measure and record the results in the test report.</li> <li>The RF fundamental frequency should be excluded against the limit line in the operating frequency band.</li> </ol>
Test Result:	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	

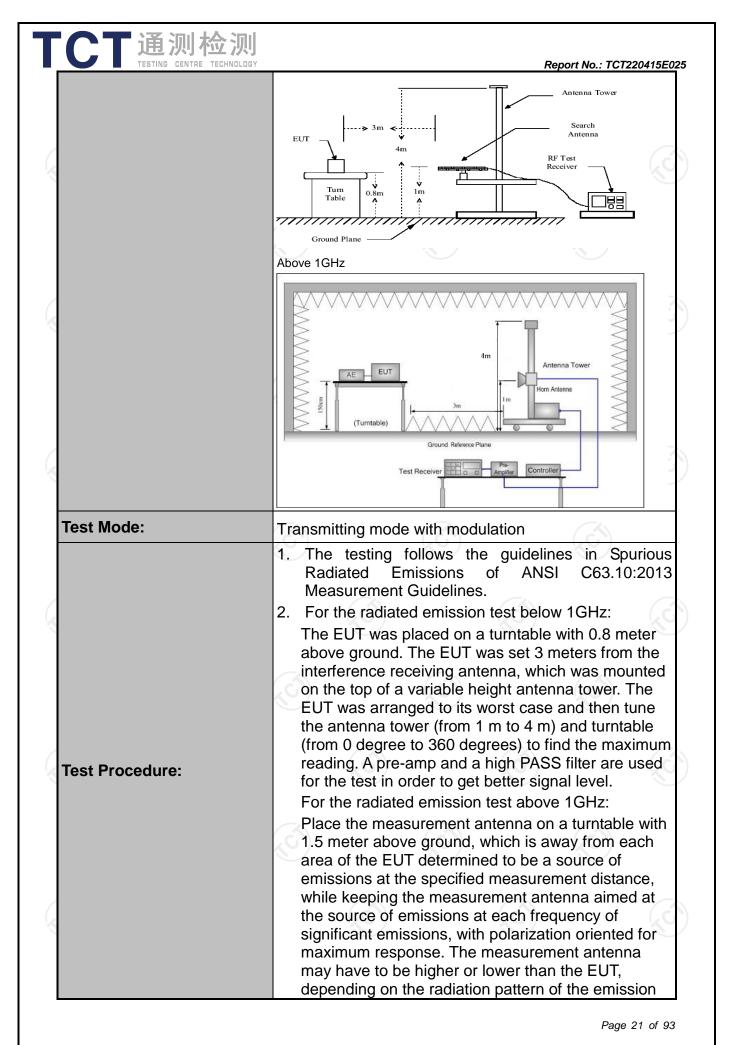


## 5.11. Radiated Spurious Emission Measurement

#### 5.11.1. Test Specification

TCT 通测检测 TESTING CENTRE TECHNOLOGY

Test Requirement:	FCC Part15	C Section	15.209	9		N.
Test Method:	ANSI C63.10	):2013				
Frequency Range:	9 kHz to 25 (	GHz				í.
Measurement Distance:	3 m	X	9		R	)
Antenna Polarization:	Horizontal &	Vertical				
	Frequency	Detector	RBW	VBW		Remark
	9kHz- 150kHz	Quasi-peak		1kHz		i-peak Value
Receiver Setup:	150kHz- 30MHz	Quasi-peal	k 9kHz	30kHz	Quas	i-peak Value
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quas	i-peak Value
	Above 1GHz	Peak	1MHz	3MHz		eak Value
		Peak	1MHz	10Hz	Ave	rage Value
			Field Str	ength	Me	asurement
	Frequen		(microvolts	/meter)	Dista	nce (meters)
	0.009-0.4		2400/F(			300
	0.490-1.7	24000/F	(KHz)		30	
	1.705-3	30	1	30		
	88-216	<u> </u>		3		
_imit:	216-96	200		3		
	Above 960		500		3	
	Frequency Above 1GH:	(micro	500 5000	Distan (meter 3 3		Detector Average Peak
Test setup:	For radiated emis	ssions below stance = 3m Turn table Ground			Compu	



	receiving measure maximanten restrict above 3. Set to EUT to 4. Use th (1) S en (2) S for (3) F	taying aimed at t ing the maximum urement antenna- nizes the emission a elevation for re- ted to a range of the ground or re- to the maximum transmit continue he following spe pan shall wide e mission being m fet RBW=120 kH or f>1GHz ; VBW Sweep = auto; D = max hold for p For average mea correction factor 5.35(c). Duty cyc on time =N1*L1+	he emission s n signal. The n elevation sha ons. The meas maximum emi f heights of fro eference grou power setting ously. ctrum analyze nough to fully easured; z for f < 1 GH /≥RBW; retector function eak asurement: us method per cle = On time/ N2*L2++Nn	final all be that v surement issions sha om 1 m to 4 nd plane. g and enat er settings: capture the lz, RBW=1 on = peak; e duty cycl 100 millise p-1*LNn-1+	which all be 4 m ole the ne MHz Trace le conds Nn*Lr
		Where N1 is nur length of type 1   Average Emissic Level + 20*log(D corrected Readin oss + Read Leve	oulses, etc. on Level = Pea uty cycle) g: Antenna Fa	ak Emissio actor + Cal	on ole
Test results:		length of type 1 p Average Emissic Level + 20*log(D corrected Readin	oulses, etc. on Level = Pea uty cycle) g: Antenna Fa	ak Emissio actor + Cal	on ole
Test results:		length of type 1 p Average Emissic Level + 20*log(D corrected Readin	oulses, etc. on Level = Pea uty cycle) g: Antenna Fa	ak Emissio actor + Cal	on ole
Test results:		length of type 1 p Average Emissic Level + 20*log(D corrected Readin	oulses, etc. on Level = Pea uty cycle) g: Antenna Fa	ak Emissio actor + Cal	on ole
Test results:		length of type 1 p Average Emissic Level + 20*log(D corrected Readin	oulses, etc. on Level = Pea uty cycle) g: Antenna Fa	ak Emissio actor + Cal	on ole



## 5.11.2. Test Instruments

Radiated Emission Test Site (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	Feb. 24, 2023						
Pre-amplifier	SKET	LNPA_1840G- 50	SK2021092 03500	Feb. 24, 2023						
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	Feb. 24, 2023						
Coaxial cable	SKET	RC-DC18G-N	N/A	Feb. 24, 2023						
Coaxial cable	SKET	RC-DC40G-N	N/A	Jul. 07, 2022						
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A						

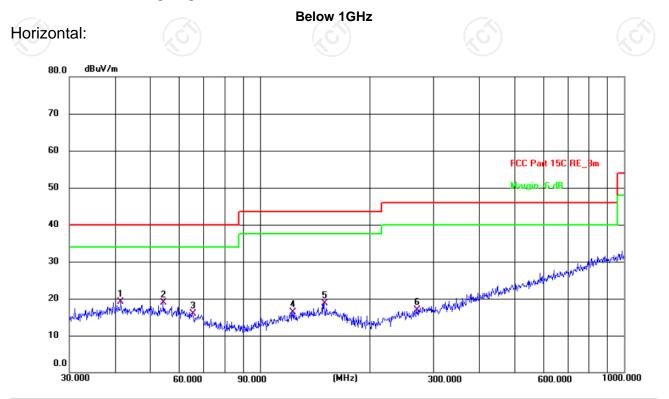


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#### 5.11.3. Test Data

TCT 通测检测 TESTING CENTRE TECHNOLOGY

#### Please refer to following diagram for individual

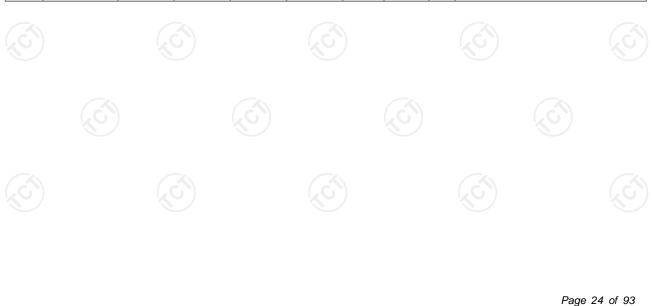


Site #2 3m Anechoic Chamber Limit: FCC Part 15C RE\_3m

Polarization: Horizontal Power: DC 3.7 V

Temperature: 24.9(C) Humidity: 47 %

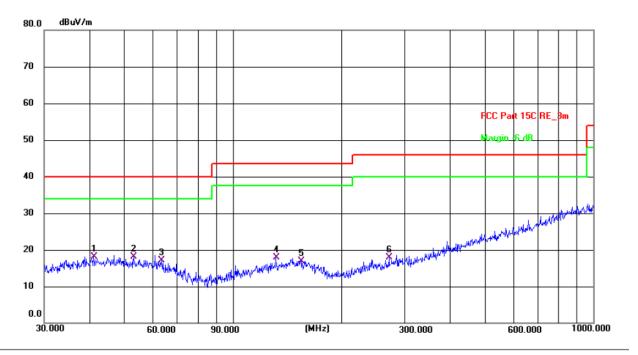
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 *	41.5670	5.10	13.98	19.08	40.00	-20.92	QP	Ρ	
2	54.2610	5.31	13.50	18.81	40.00	-21.19	QP	Р	
3	65.3432	3.87	12.03	15.90	40.00	-24.10	QP	Р	
4	122.8340	4.21	12.16	16.37	43.50	-27.13	QP	Р	
5	150.0108	5.47	13.33	18.80	43.50	-24.70	QP	Р	
6	269.4284	3.62	13.27	16.89	46.00	-29.11	QP	Ρ	



Report No.: TCT220415E025

#### Vertical:

TCT通测检测 TESTING CENTRE TECHNOLOGY



Site #	Site #2 3m Anechoic Chamber			Polarization: Vertical				-	Temperature: 24.9(C)	Humidity: 47 %	
Limit:	Limit: FCC Part 15C RE_3m Power: DC 3						3.7 V	3.7 ∨			
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark		
1	41.1320	4.04	14.00	18.04	40.00	-21.96	QP	Ρ			
2 *	53.1313	4.58	13.57	18.15	40.00	-21.85	QP	Ρ			
3	63.5356	4.66	12.40	17.06	40.00	-22.94	QP	Ρ			
4	131.7577	5.17	12.73	17.90	43.50	-25.60	QP	Ρ			
5	154.2786	3.64	13.36	17.00	43.50	-26.50	QP	Ρ			
6	271.3246	4.37	13.44	17.81	46.00	-28.19	QP	Ρ			

**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 Pi/4 DQPSK) 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

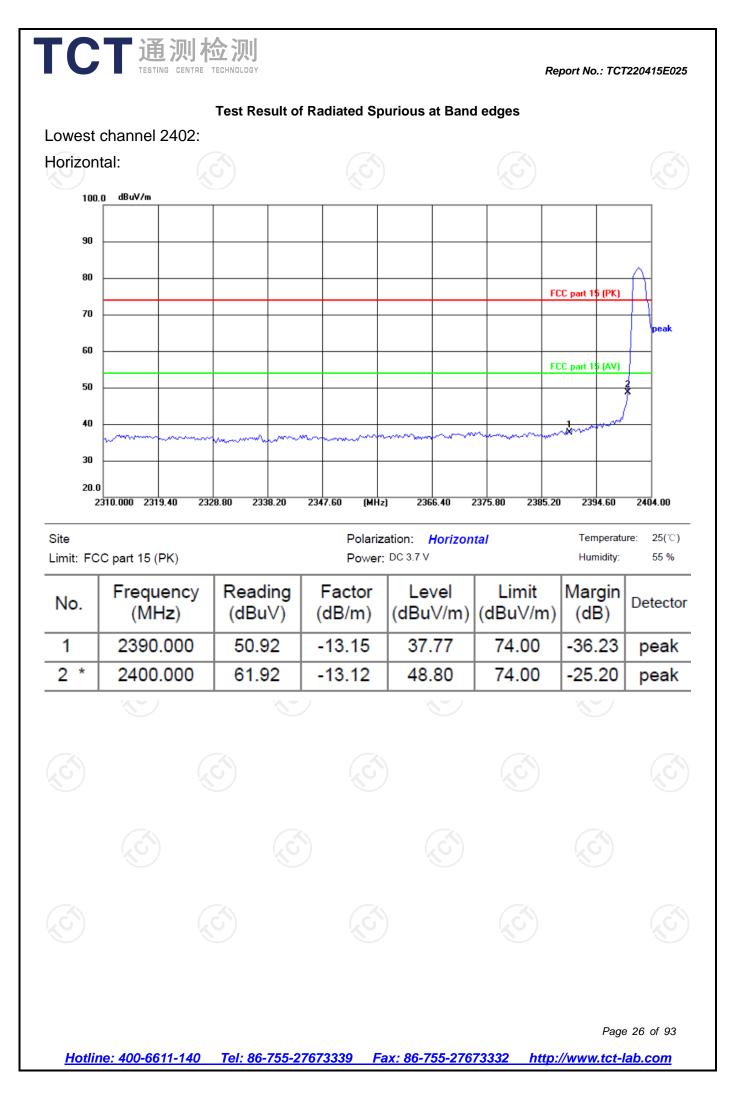
Limit  $(dB\mu V/m) = Limit$  stated in standard

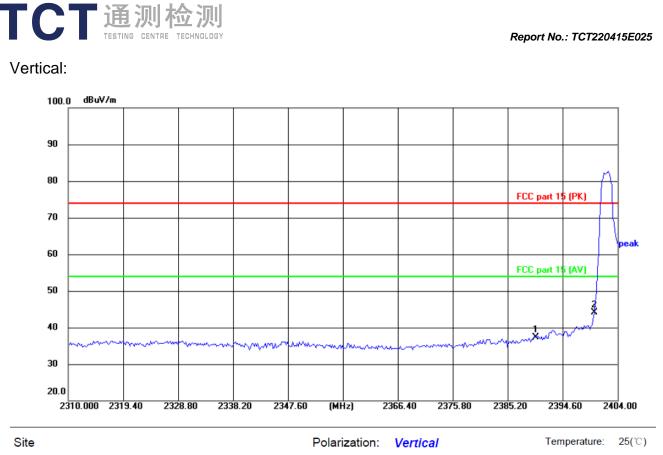
Over (dB) = Measurement (dB $\mu$ V/m) – Limits (dB $\mu$ V/m)

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

Page 25 of 93

Report No.: TCT220415E025





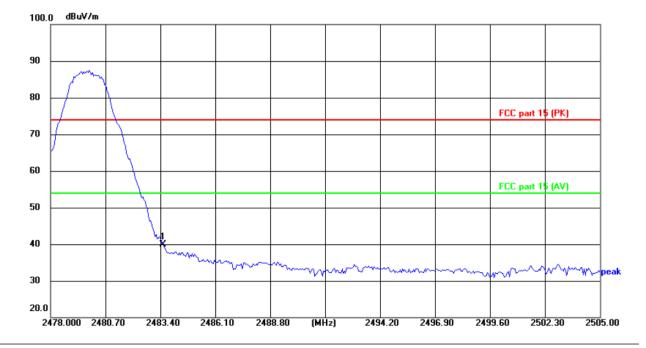
Limit: FC	mit: FCC part 15 (PK) Power: DC 3.7 V						55 %
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2390.000	50.54	-13.15	37.39	74.00	-36.61	peak
2 *	2400.000	57.31	-13.12	44.19	74.00	-29.81	peak

Page 27 of 93

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Highest channel 2480:

Horizontal:

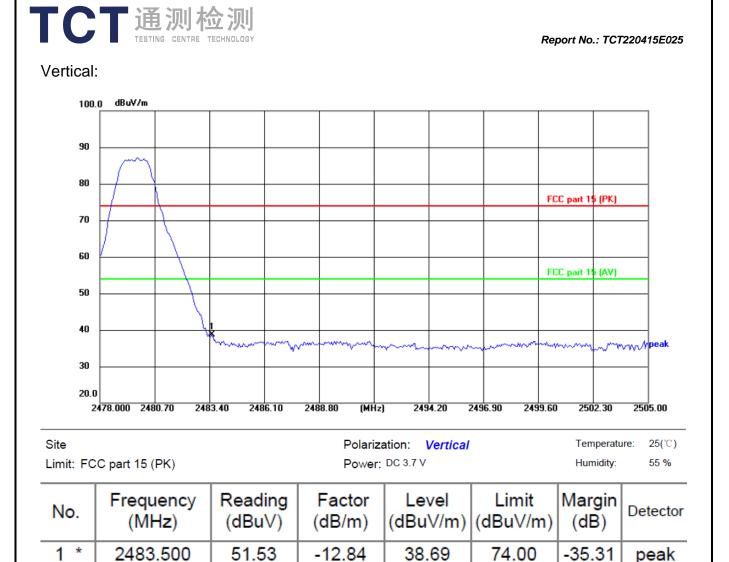


Site Limit: FC	Site     Polarization:     Horizontal       Limit:     FCC part 15 (PK)     Power:     DC 3.7 V					Temperatu Humidity:	ıre: 25(℃) 55 %
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Margin (dB)	Detector	
1 *	2483.500	52.69	-12.84	39.85	74.00	-34.15	peak
A - /		- /	· · · · ·				A - /

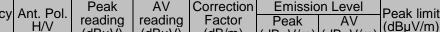
Page 28 of 93

Report No.: TCT220415E025

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



Correction

Factor

(dB/m)

0.99

9.87

---

0.99

9.87

---

			_						
	V								
7440	V	34.09		10.22	44.31		74	54	-9.69
4960	V	45.33		1.33 🔪	46.66		74	54	-7.34
GN)		(.c.)					(.c.)		
	Н								
7440	Н	35.41		10.22	45.63		74	54	-8.37
4960	Н	44.76		1.33	46.09	:	74	54	-7.91
(MHz)	H/V	reading (dBµV)	reading (dBµV)	Factor (dB/m)	Peak (dBµV/m)	AV		(dBµV/m)	(dB)
Frequency	Ant Pol	Реак	AV	Correction		n Level	Peak limit	AV limit	Margin

#### Note:

Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss - Pre-amplifier 1.

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 (Pi/4 DQPSK) was submitted only.

7. All the restriction bands are compliance with the limit of 15.209.

Middle channel: 2441 MHz

H/V

н

H

Ĥ

V

V

V

High channel: 2480 MHz

Frequency Ant. Pol.

(MHz)

4882

7323

---

4882

7323

----

Peak

reading

(dBµV)

46.96

35.25

---

46.06

36.82

\_\_\_\_

AV

reading

(dBµV)

----#

-44

---

---

---

---

Above 1GHz

Modulation	Type: Pi/4	4 DQPSK										
Low channe	Low channel: 2402 MHz											
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBuV)	Correction Factor (dB/m)	Peak	n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)			
4804	Н	45.05		0.66	45.71		74	54	-8.29			
7206	Н	34.79		9.50	44.29		74	54	-9.71			
	H					~~-						
(	<b>C</b> )		U)			·C`)		$(\mathbf{O})$				
4804	V	47.69		0.66	48.35		74	54	-5.65			
7206	V	38.14		9.50	47.64		74	54	-6.36			
	V											

**Emission Level** 

AV

(dBuV/m

**.**....

\_\_\_\_

----

---

---

\_\_\_\_

Peak

dBµV/m)

47.95

45.12

---

47.05

46.69

---

Peak limit

(dBµV/m)

74

74

---

74

74

\_\_\_\_

AV limit

(dBµV/m)

54

54

\_\_\_\_

54

54

---

Margin

(dB)

-6.05

-8.88

---

-6.95

-7.31

----

#### Report No.: TCT220415E025



# **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	-1.52	30	Pass				
NVNT	1-DH1	2441	-1.83	30	Pass				
NVNT	1-DH1	2480	-1.20	30	Pass				
NVNT	2-DH1	2402	-1.23	21	Pass				
NVNT	2-DH1	2441	-1.63	21	Pass				
NVNT	2-DH1	2480	-1.11	21	Pass				
NVNT	3-DH1	2402	-1.26	21	Pass				
NVNT	3-DH1	2441	-1.70	21	Pass				
<b>NVNT</b>	3-DH1	2480	-1.26	21	Pass				



















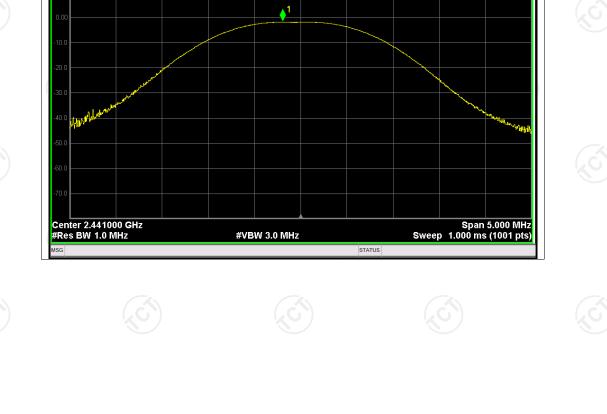


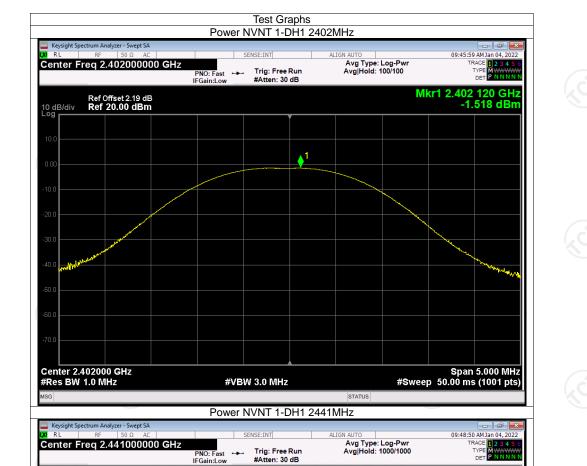




Page 31 of 93

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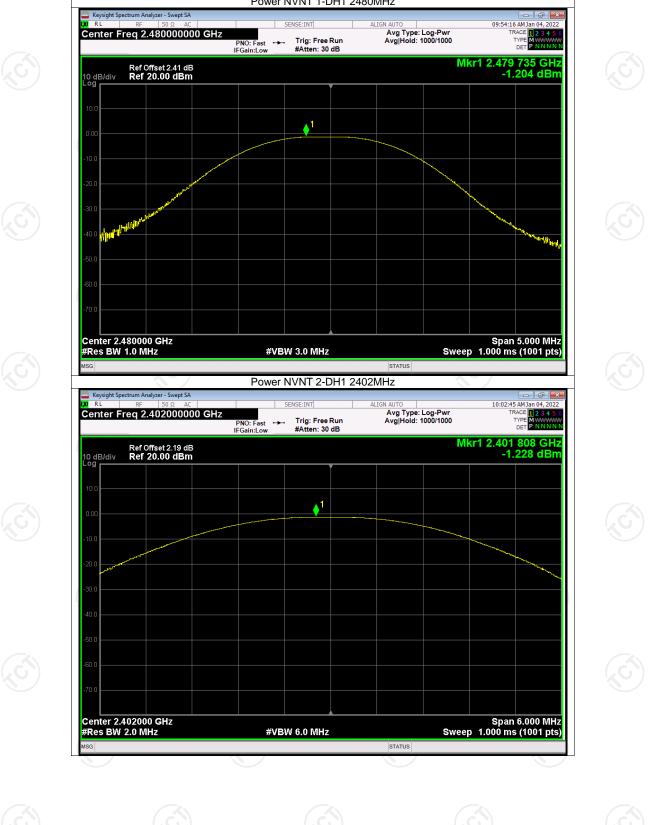
TCT 通测检测 TESTING CENTRE TECHNOLOGY

Ref Offset 2.32 dB Ref 20.00 dBm

10 dB/div

Report No.: TCT220415E025

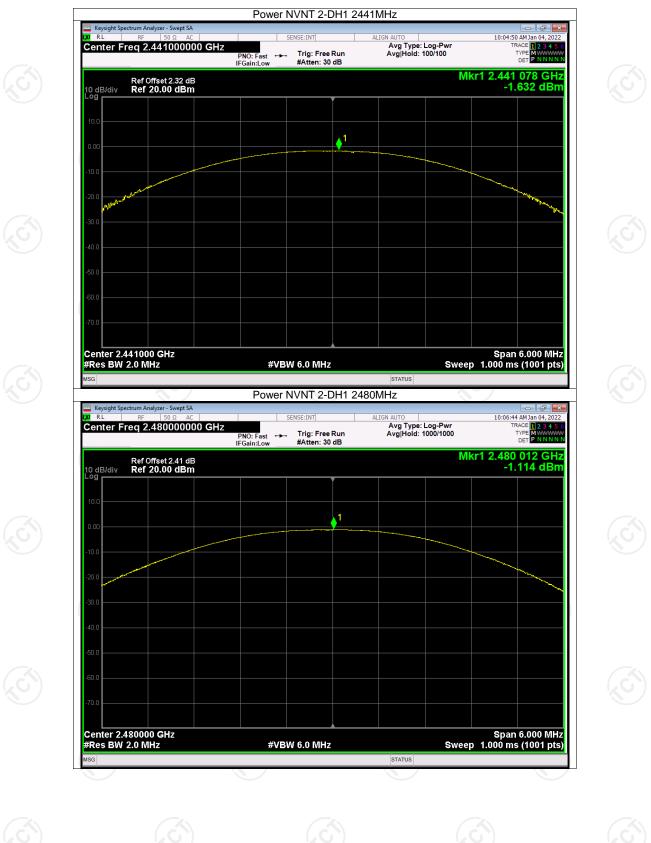
Mkr1 2.440 805 GHz -1.827 dBm



Power NVNT 1-DH1 2480MHz

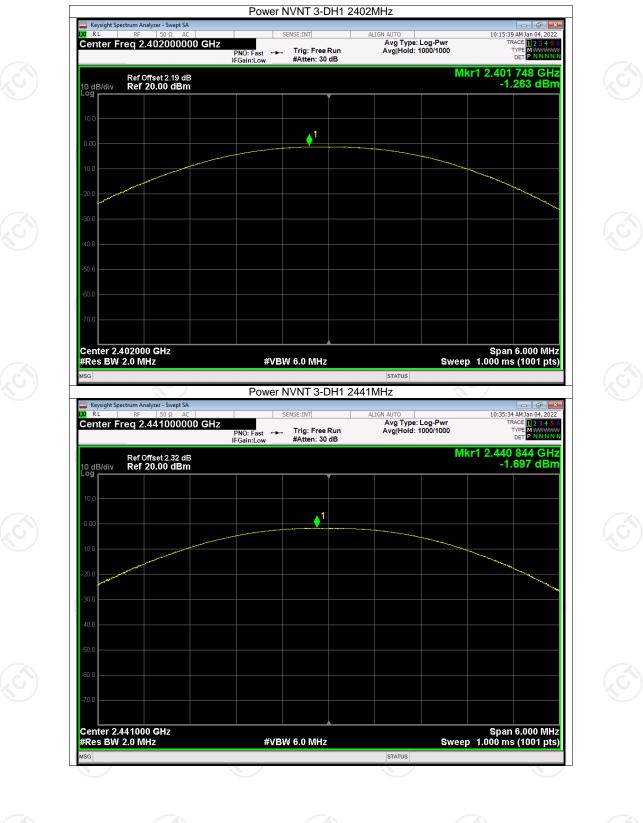
Report No.: TCT220415E025

Page 33 of 93



Report No.: TCT220415E025

Page 34 of 93



Page 35 of 93

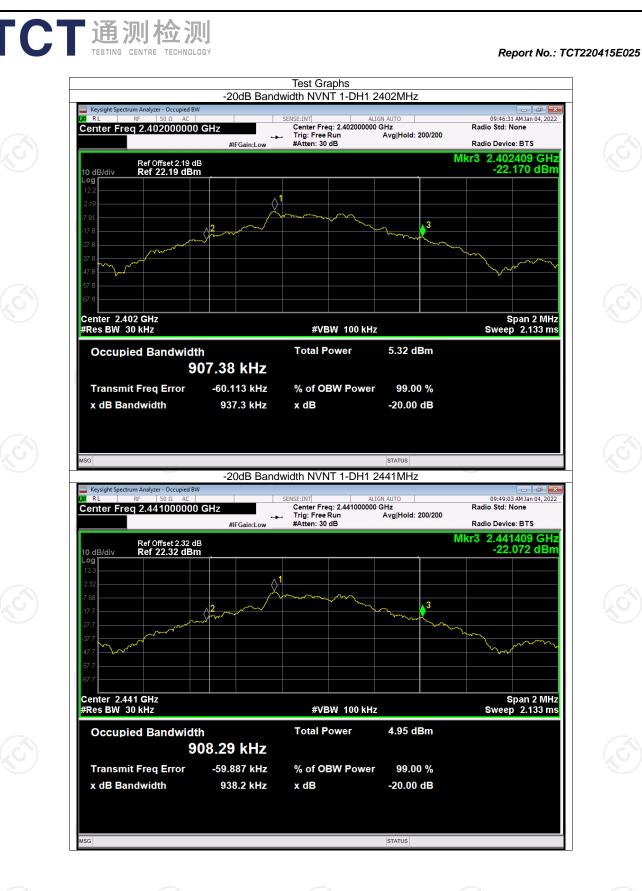
ΓC			2490144	Report No.: TCT	<sup></sup>		
	Keysight Spectrum Analyzer - Swept SA	XX RL RE 50.9 AC SENSE:INT ALIGN AUTO 10:37:17 AM Jan 04, 2022					
	Center Freq 2.480000000 G	HZ PNO: Fast +++ Trig: Free Run IFGain:Low #Atten: 30 dB	Avg Type: Log-Pwr Avg Hold: 1000/1000	TRACE 1 2 3 4 5 6 TYPE MWWWW DET P N N N N N			
	Ref Offset 2.41 dB 10 dB/div Ref 20.00 dBm		Mkr	1 2.479 790 GHz -1.256 dBm			
	Log						
	10.0	1					
	0.00						
	-10.0						
	-20.0						
	-30.0						
	-40.0						
	-50.0						
	-60.0						
	-70.0						
	Center 2.480000 GHz #Res BW 2.0 MHz	#VBW 6.0 MHz	Sweep	Span 6.000 MHz 1.000 ms (1001 pts)			
	MSG	~~~~	STATUS	/			
				Page	e 36 of 93		
	ne: 400-6611-140 Tel: 8	6-755-27673339 Fax	(: 86-755-27673332	http://www.tct-l			



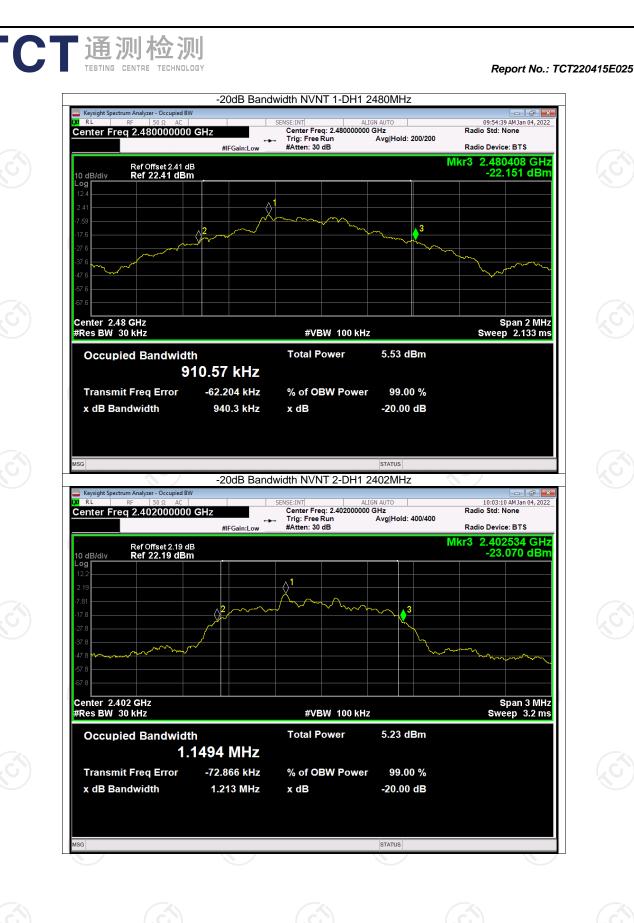
Condition	Mode	Frequency (MHz)	-20 dB Bandwidth (MHz)	Verdict
NVNT	1-DH1	2402	0.937	Pass
NVNT	1-DH1	2441	0.938	Pass
NVNT	1-DH1	2480	0.940	Pass
NVNT	2-DH1	2402	1.213	Pass
NVNT	2-DH1	2441	1.199	Pass
NVNT	2-DH1	2480	1.199	Pass
NVNT	3-DH1	2402	1.201	Pass
NVNT	3-DH1	2441	1.197	Pass
NVNT	3-DH1	2480	1.202	Pass



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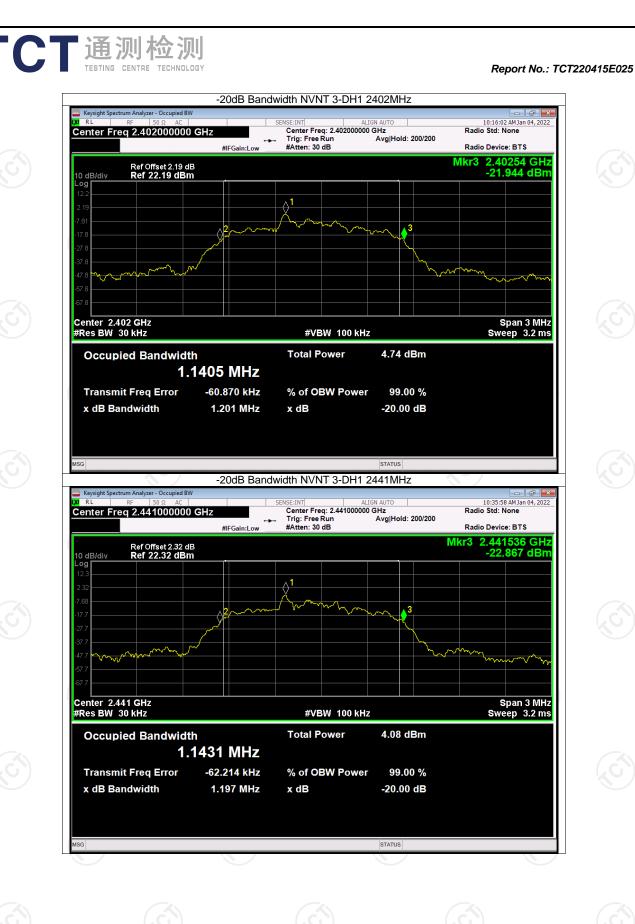
Page 38 of 93

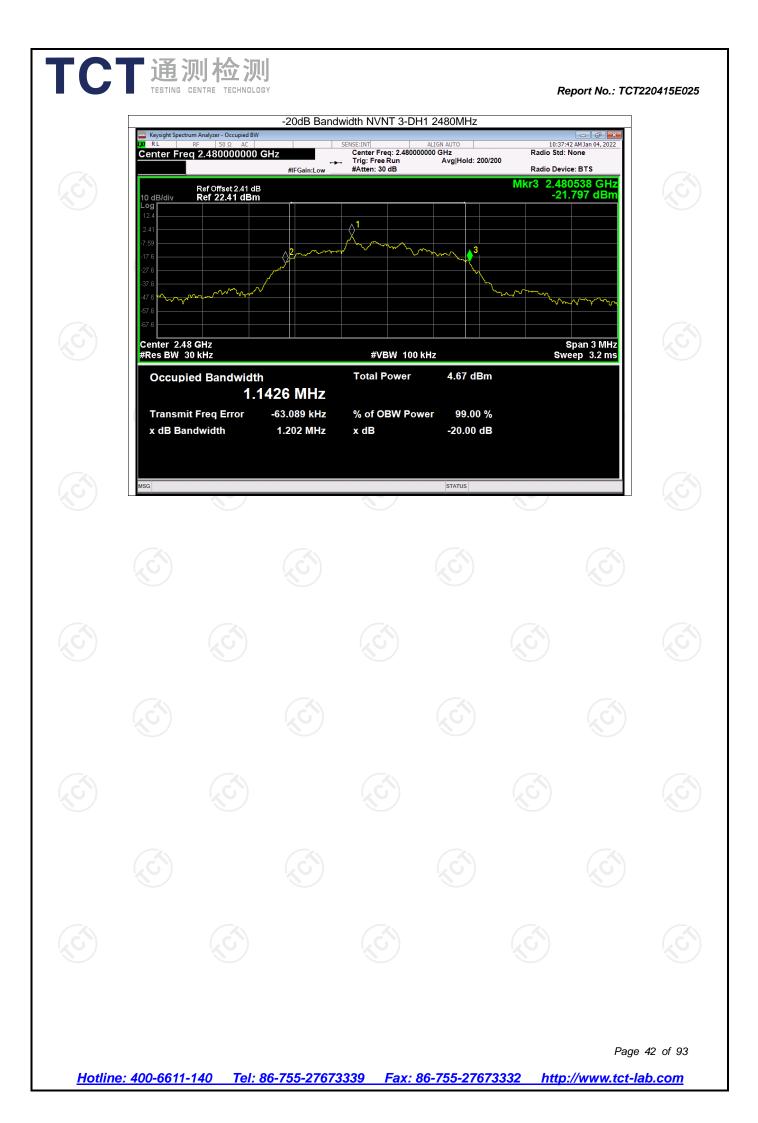




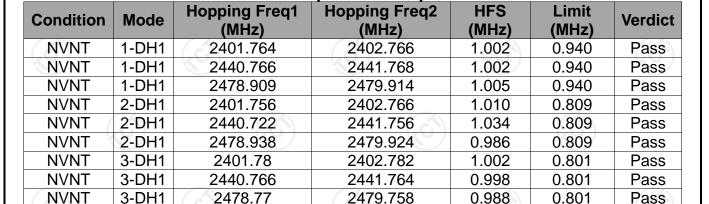
Page 40 of 93

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## **Carrier Frequencies Separation**

Report No.: TCT220415E025

Page 43 of 93

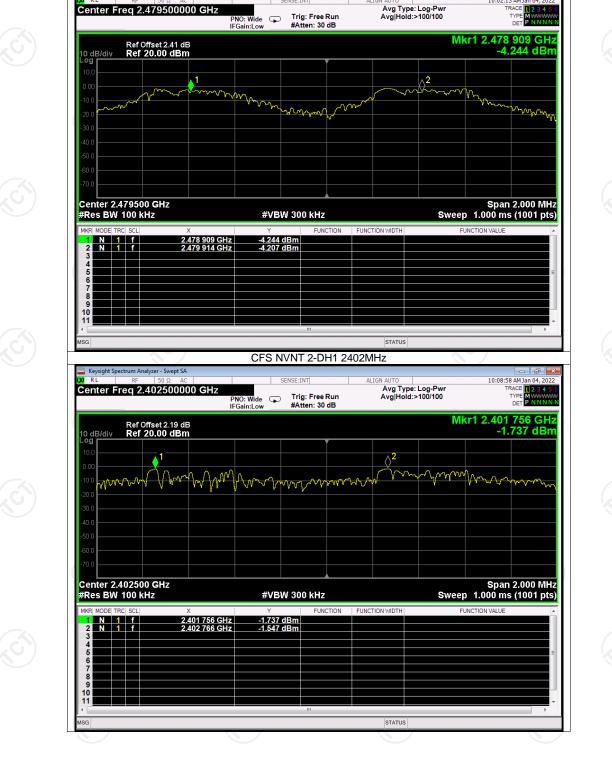




Test Graphs CFS NVNT 1-DH1 2402MHz

Report No.: TCT220415E025

Page 44 of 93



CFS NVNT 1-DH1 2480MHz

**FCT**通测检测 TESTING CENTRE TECHNOLOGY

Keysight Spectrum Analyzer - Swept SA

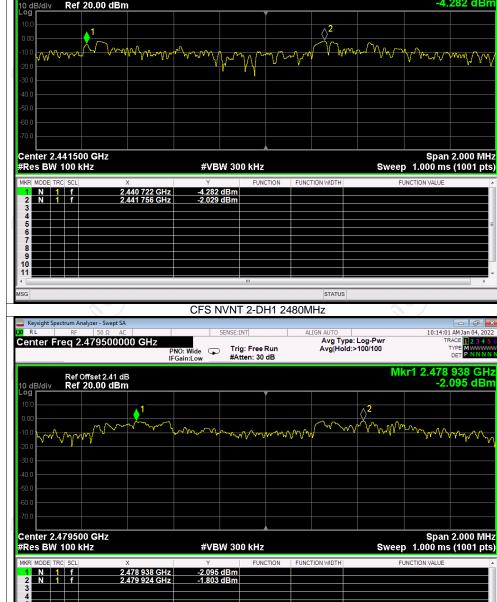
Center Freq 2.479500000 GHz

Report No.: TCT220415E025

Page 45 of 93

10:02:13 AM Jan 04, 2022

#### CFS NVNT 2-DH1 2441MHz SENSE:INT ALIGN AUTO 10:11:52 AMJan 04, 2022 PNO: Wide Trig: Free Run #Atten: 30 dB Avg Type: Log-Pwr Trift Trift Mikr1 2.440 722 GHz -4,282 dBm CH CH



Report No.: TCT220415E025

Page 46 of 93



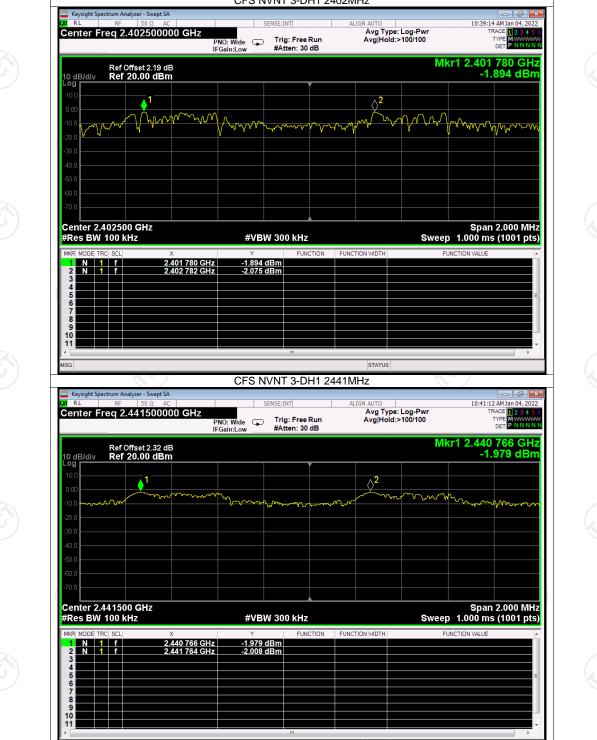


**FCT**通测检测 TESTING CENTRE TECHNOLOGY

Keysight Spectrum Analyzer - Swept SA

Center Freq 2.441500000 GHz

Ref Offset 2.32 dB Ref 20.00 dBm



CFS NVNT 3-DH1 2402MHz

SG

Report No.: TCT220415E025

Page 47 of 93

LXI RL	rum Analyzer - Swept SA RF 50 Ω AC eq <b>2.479500000 C</b>	GHZ PNO: Wide IFGain:Low	SENSE:INT Trig: Free Run #Atten: 30 dB	ALIGN AUTO Avg Type: Log Avg Hold:>100	-Pwr /100	:53 AM Jan 04, 2022 TRACE 1 2 3 4 5 6 TYPE M WWWW DET P NNNN	
10 dB/div Log 10 0 -10 0 -20 0 -30 0 -40 0	Ref Offset 2.41 dB Ref 20.00 dBm	www.www.	Munt	m 2 m	Mkr1 2.47	8 770 GHz I.518 dBm	
-50 0 -60 0 -70 0 Center 2.47 #Res BW 1 MKR MODE TRC 1 N 1 2 N 1 3 4	00 kHz SCL X f 2.478	770 GHz -1.518	BW 300 kHz B dBm dBm	FUNCTION WIDTH	Spa Sweep 1.000 m FUNCTION VALUE		
5 7 8 9 10 11 				STATUS		· · ·	

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Condition	Mode	Frequency (MHz)	Hopping Mode	Max Value (dBc)	Limit (dBc)	Verdict	
NVNT	1-DH1	2402	No-Hopping	-56.04	-20	Pass	
	1-DH1	2480	No-Hopping	-55.08	-20	Pass	
NVNT	2-DH1	2402	No-Hopping	-55.26	-20	Pass	
NVNT	2-DH1	2480	No-Hopping	-55.81	-20	Pass	
NVNT	3-DH1	2402	No-Hopping	-56.29	-20	Pass	
NVNT	3-DH1	2480	No-Hopping	-56.68	-20	Pass	

#### **Band Edge** Hopping Frequency

Max Value

#### Report No.: TCT220415E025

Page 49 of 93

Limit



## Center Freq 2.402000000 GHz Avg Type: Log-Pwr Avg|Hold: 1000/1000 2345 PNO: Wide ---- Trig: Free Run IFGain:Low #Atten: 30 dB Mkr1 2.401 776 GHz -1.691 dBm Ref Offset 2.19 dB Ref 20.00 dBm ▲1 mm. M W Center 2.402000 GHz #Res BW 100 kHz Span 8.000 MHz Sweep 1.000 ms (1001 pts) #VBW 300 kHz STATUS Band Edge NVNT 1-DH1 2402MHz No-Hopping Emission Keysight Spectrum Analyzer - Swept SA × 09:46:45 AM Jan 04, 202 ALIGN AUTO SENSE:INT

Test Graphs Band Edge NVNT 1-DH1 2402MHz No-Hopping Ref

enter F	req 2.	35600000	00 GHz	NO: Fast ↔→→ Gain:Low		Free Fen: 30				pe: Log-Pwr Id: 200/200		TI	TYPE MY DET P	2 3 4 1 www.
0 dB/div		offset 2.19 dE 20.00 dBm									Mk	r1 2.4 -1.	02 1 662 (	
10.0														▲1
.00 <b></b>														<u>Í</u>
).0 ).0													-2	
).0 ).0				۰ <b>4</b>										/ ካ 2 ካ
).0 <b>5.0 10</b>	ورجي تدارير الماريد	www.	hanger an all hansa	rad floor man out	vrtavUnter	-1, <sup>1</sup> 1,18,142,18	the and the	uhang kang biga	publishermate	andro Maharan	and and provide a state of the	3 Volumenter	man	
).0														
art 2.30 Res BW				#VB	W 300	kHz				Sw	eep 9.	Stop 2. 600 ms		
IR     MODE     TF       1     N     1       2     N     1       3     N     1		)	2.402 1 GHz 2.400 0 GHz 2.390 0 GHz	Y -1.662 -54.255 -60.978	dBm dBm	FUNC	TION	FUNC	FION WIDTH		FUNCTIO	ON VALUE		
4 N 1 5 6 7 8			2.338 8 GHz	-57.738	авт									
3									STATUS	;				F

Report No.: TCT220415E025

09:46:40 AM Jan 04, 20

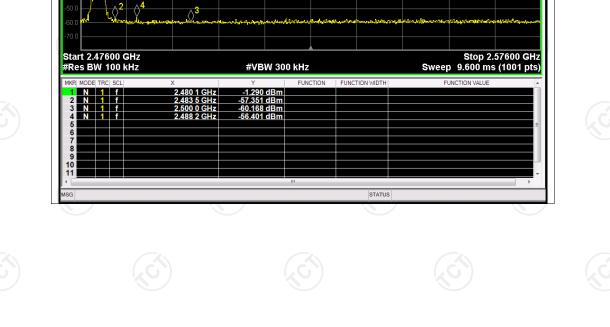


10 dB/div Loa

Keysight Spectrum Analyzer - Swept SA RL RF 50 Ω AG







## Mkr1 2.479 768 GHz -1.322 dBm 10 dB/div Log <u>1</u> 1~~ mmm 1 Arm man hannon mm Amana Center 2.480000 GHz #Res BW 100 kHz Span 8.000 MHz Sweep 1.000 ms (1001 pts) #VBW 300 kHz

Band Edge NVNT 1-DH1 2480MHz No-Hopping Ref

PNO: Wide ↔ Trig: Free Run IFGain:Low #Atten: 30 dB

Avg Type: Log-Pwr Avg|Hold: 1000/1000

Band Edge NVNT 1-DH1 2480MHz No-Hopping Emission 09:54:53 AM Jan 04, 2022 TRACE 1 2 3 4 5 6 TYPE MWWWW DET PNNNN Keysight Spectrum Analyzer - Swept SA Avg Type: Log-Pwr Avg|Hold: 200/200 Center Freq 2.526000000 GHz PNO: Fast +++ Trig: Free Run IFGain:Low #Atten: 30 dB Mkr1 2.480 1 GHz -1.290 dBm Ref Offset 2.41 dB Ref 20.00 dBm 10 dB/div Log

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### Report No.: TCT220415E025

09:54:48 AM Jan 04, 2022

TYPE MIANANA

-21.32 d

Page 51 of 93

Keysight Spectrum Analyzer - Swept SA

Center Freq 2.480000000 GHz

Ref Offset 2.41 dB Ref 20.00 dBm









1.00 www www myn wh  $\mathcal{M}_{\mathcal{N}}$ Center 2.402000 GHz #Res BW 100 kHz Span 8.000 MHz Sweep 1.000 ms (1001 pts) #VBW 300 kHz Band Edge NVNT 2-DH1 2402MHz No-Hopping Emission 10:03:25 AM Jan 04, 2022 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P.NNNN Keysight Spectrum Analyzer - Swept SA Avg Type: Log-Pwr Avg|Hold: 200/200 Center Freq 2.356000000 GHz PNO: Fast +++ Trig: Free Run IFGain:Low #Atten: 30 dB Mkr1 2.401 8 GHz -1.472 dBm Ref Offset 2.19 dB Ref 20.00 dBm 10 dB/div Log Start 2.30600 GHz #Res BW 100 kHz Stop 2.40600 GHz Sweep 9.600 ms (1001 pts) #VBW 300 kHz FUNCTION WIDTH 2.400 0 GHz 2.390 0 GHz 2.388 7 GHz -53.393 dBm -60.896 dBm -56.716 dBm 
 N
 1
 f

 N
 1
 f

 N
 1
 f



## 

Ref Offset 2.19 dB Ref 20.00 dBm

Keysight Spectrum Analyzer - Swept SA

10 dB/div Log

Report No.: TCT220415E025







SG





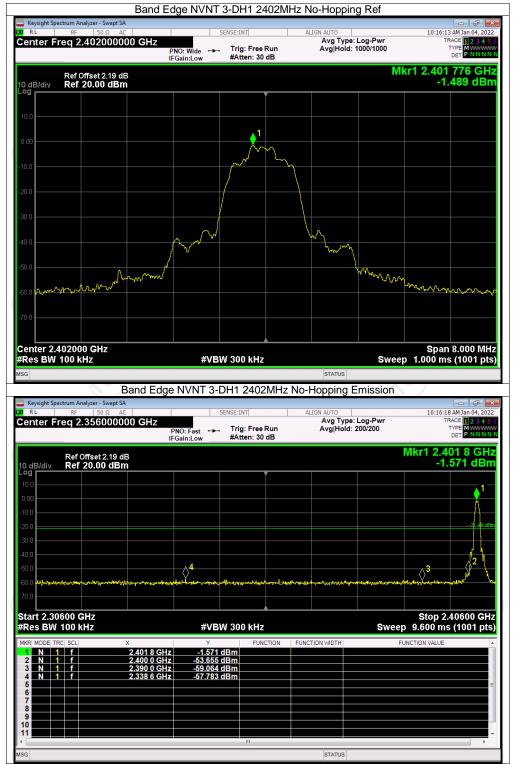




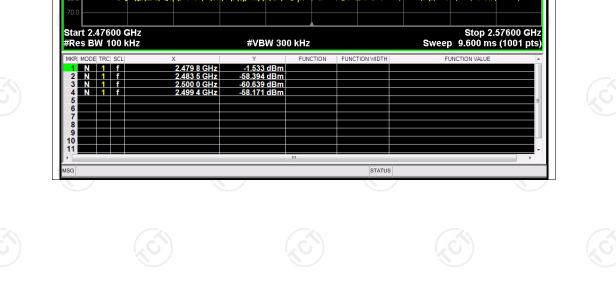
Band Edge NVNT 2-DH1 2480MHz No-Hopping Ref

### Report No.: TCT220415E025

# Report No.: TCT220415E025







4/ man man MMM Span 8.000 MHz Sweep 1.000 ms (1001 pts) #VBW 300 kHz

Band Edge NVNT 3-DH1 2480MHz No-Hopping Ref

1

PNO: Wide ↔ Trig: Free Run IFGain:Low #Atten: 30 dB

Avg Type: Log-Pwr Avg|Hold: 1000/1000

#### Band Edge NVNT 3-DH1 2480MHz No-Hopping Emission

10:37:58 AM Jan 04, 2022 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P.NNNN Keysight Spectrum Analyzer - Swept SA
 RL
 RF
 S0 Ω AC Center Freq 2.526000000 GHz Avg Type: Log-Pwr Avg|Hold: 100/100 PNO: Fast +++ Trig: Free Run IFGain:Low #Atten: 30 dB Mkr1 2.479 8 GHz -1.533 dBm Ref Offset 2.41 dB Ref 20.00 dBm 10 dB/div Log -21 49 df <mark>رک</mark> \_{∕<mark>4</mark>3



10 dB/div Log

Keysight Spectrum Analyzer - Swept SA

Center Freq 2.480000000 GHz

Ref Offset 2.41 dB Ref 20.00 dBm

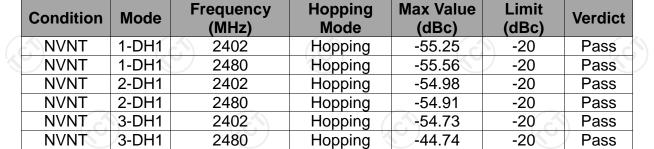
#### Report No.: TCT220415E025

10:37:53 AM Jan 04, 2022 TRACE

TYPE 

Mkr1 2.479 776 GHz -1.488 dBm

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## **Band Edge(Hopping)**



Report No.: TCT220415E025

Page 56 of 93









Page 58 of 93

## ▲1 Montherand Nm My M www Ann Center 2.402000 GHz #Res BW 100 kHz Span 8.000 MHz Sweep 1.000 ms (1001 pts) #VBW 300 kHz Band Edge(Hopping) NVNT 2-DH1 2402MHz Hopping Emission Keysight Spectrum Analyzer - Swept SA 10:09:49 AM Jan 04, 2022 TRACE 1 2 3 4 5 0 TYPE MWWWWW DET P N N N N ALIGN Avg Type: Log-Pwr Avg|Hold: 2000/2000 Center Freq 2.356000000 GHz PNO: Fast +++ Trig: Free Run IFGain:Low #Atten: 30 dB Mkr1 2.403 8 GHz -1.575 dBm Ref Offset 2.19 dB Ref 20.00 dBm 10 dB/div Log NN 55 dE $\langle \rangle^3$ 2 Ô Start 2.30600 GHz #Res BW 100 kHz Stop 2.40600 GHz Sweep 9.600 ms (1001 pts) #VBW 300 kHz FUNCTION WIDTH 2.400 0 GHz 2.390 0 GHz 2.314 8 GHz -57.393 dBm -58.263 dBm -56.537 dBm N 1 f N 1 f N 1 f

Band Edge(Hopping) NVNT 2-DH1 2402MHz Hopping Ref

Trig: Free Run #Atten: 30 dB

PNO: Wide ↔→ IFGain:Low Avg Type: Log-Pwr Avg|Hold: 2000/2000

10 dB/div Log

SG

Keysight Spectrum Analyzer - Swept SA

Center Freq 2.402000000 GHz

Ref Offset 2.19 dB Ref 20.00 dBm Report No.: TCT220415E025

Page 59 of 93

10:09:16 AM Jan 04, 2022

TYPE DET

Mkr1 2.401 776 GHz -1.547 dBm





## 1 V WYV ΥW M $\sqrt{M}$ wind Center 2.402000 GHz #Res BW 100 kHz Span 8.000 MHz Sweep 1.000 ms (1001 pts) #VBW 300 kHz Band Edge(Hopping) NVNT 3-DH1 2402MHz Hopping Emission Keysight Spectrum Analyzer - Swept SA 10:40:07 AM Jan 04, 2022 TRACE 1 2 3 4 5 0 TYPE MWWWWW DET P N N N N ALIGN Avg Type: Log-Pwr Avg|Hold: 2000/2000 Center Freq 2.356000000 GHz PNO: Fast +++ Trig: Free Run IFGain:Low #Atten: 30 dB Mkr1 2.403 8 GHz -1.604 dBm Ref Offset 2.19 dB Ref 20.00 dBm 10 dB/div Log 72 d **∲**<sup>4</sup> $\langle \rangle^3$ Start 2.30600 GHz #Res BW 100 <u>kHz</u> Stop 2.40600 GHz Sweep 9.600 ms (1001 pts) #VBW 300 kHz FUNCTION WIDTH 2.400 0 GHz 2.390 0 GHz 2.320 9 GHz -52.582 dBm -59.484 dBm -56.460 dBm N 1 f N 1 f N 1 f SG

Band Edge(Hopping) NVNT 3-DH1 2402MHz Hopping Ref

Trig: Free Run #Atten: 30 dB

PNO: Wide ↔→ IFGain:Low

Avg Type: Log-Pwr Avg|Hold: 2000/2000

Keysight Spectrum Analyzer - Swept SA Center Freq 2.402000000 GHz

10 dB/div Log

Ref Offset 2.19 dB Ref 20.00 dBm

#### Report No.: TCT220415E025

- F X 10:39:35 AM Jan 04, 2022 TRACE 12 3 4 5

1234

TYPE

Mkr1 2.401 776 GHz -1.720 dBm

Page 61 of 93

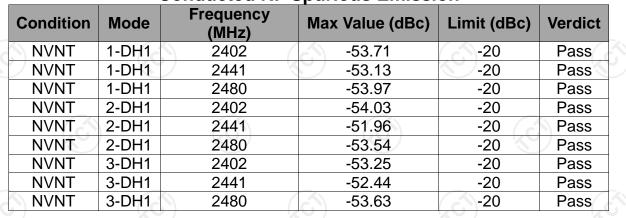






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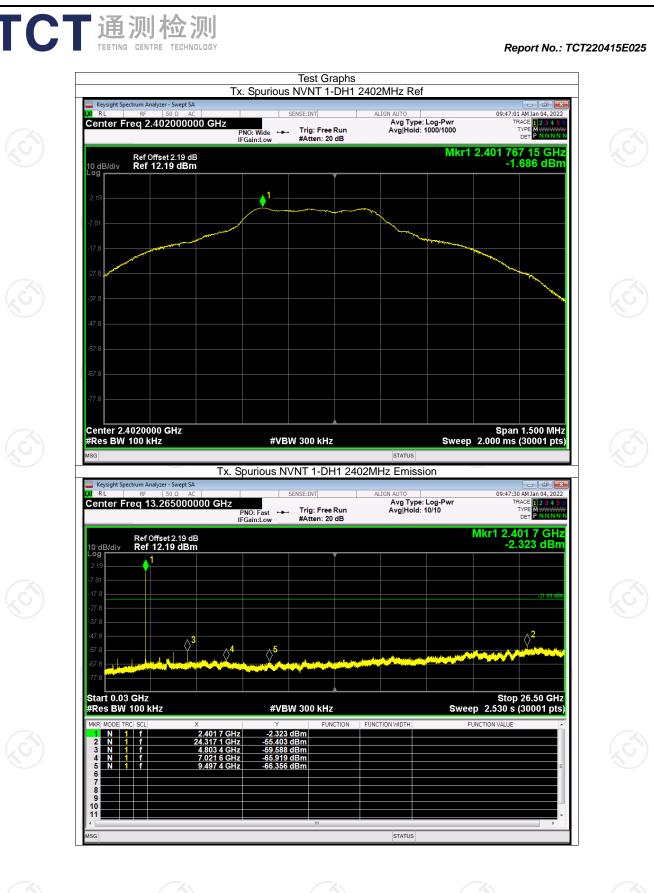
Report No.: TCT220415E025

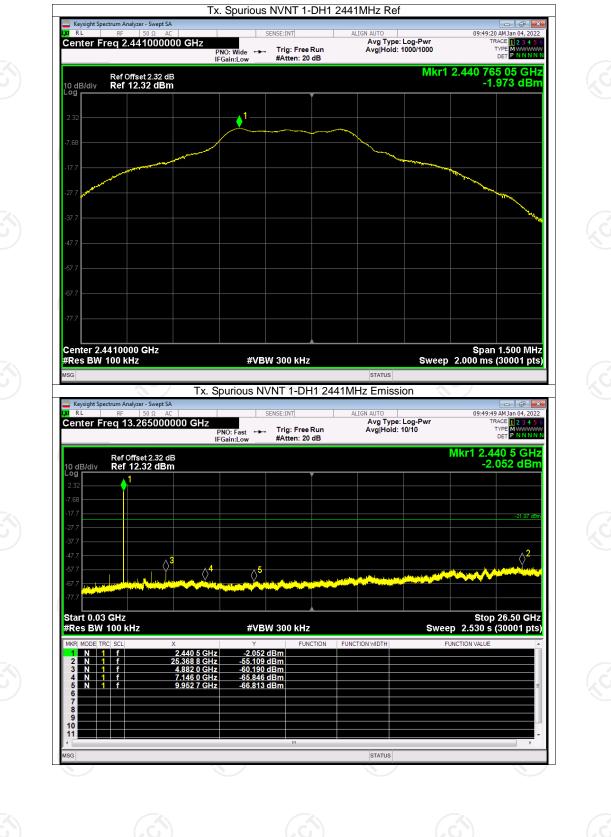


## **Conducted RF Spurious Emission**

Page 63 of 93

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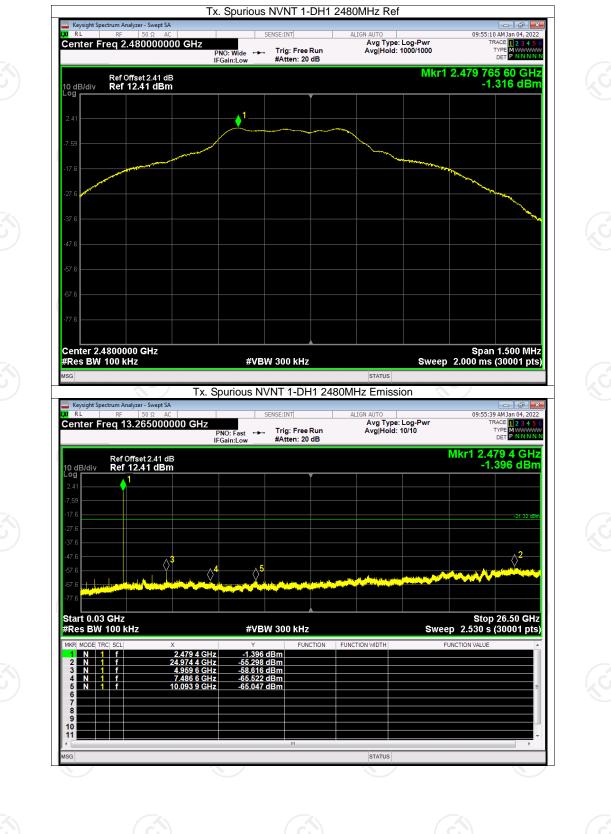




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Report No.: TCT220415E025

Page 65 of 93



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Report No.: TCT220415E025

Page 66 of 93

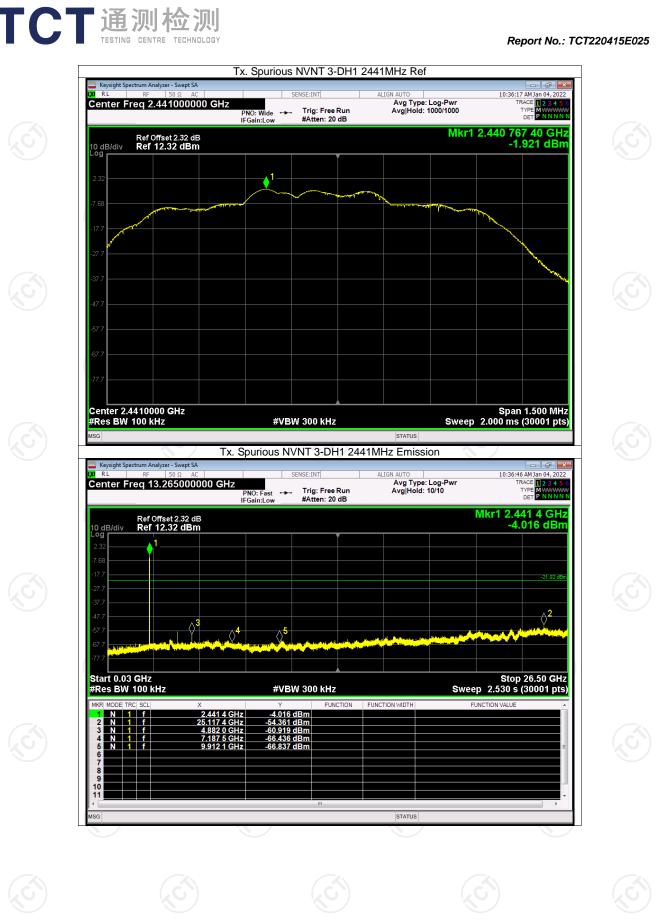


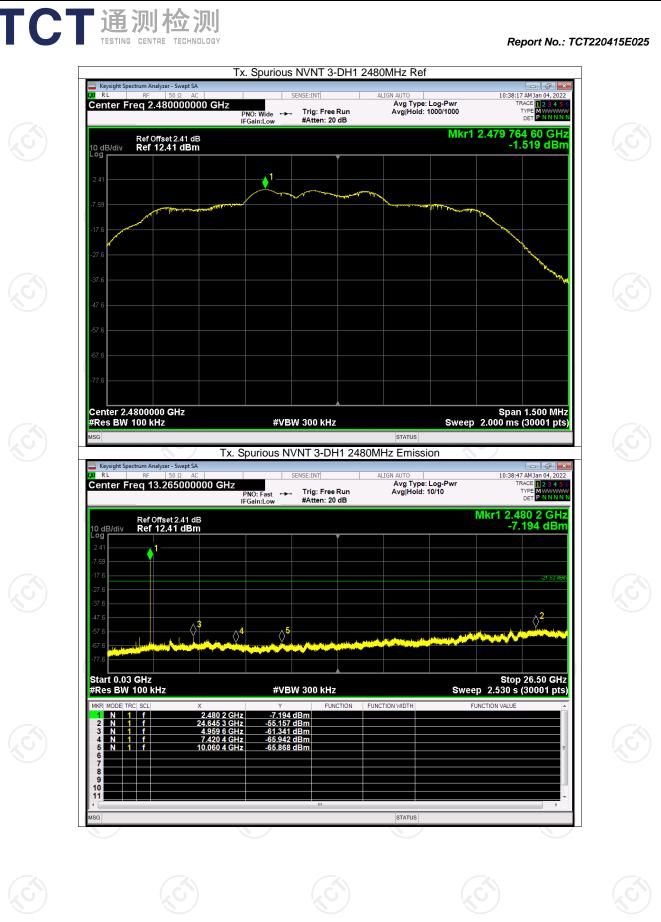


Page 68 of 93









I C	ТЭТ			f Honnin	g Chann		eport No.: TCT2	20415E025
	Condition NVNT NVNT NVNT	Mode 1-DH1 2-DH1 3-DH1	Ho	79 79 79 79 79	nber	Limit 15 15 15	Verdict Pass Pass Pass	Ì
<u>Hotli</u>	ine: 400-6611	<u>-140 Tel: 8</u>	<u>86-755-2767:</u>	<u>3339 Fax:</u>	<u>86-755-2767</u>	<u>'3332 http</u>	Page : ://www.tct-la	73 of 93 <u>b.com</u>

	Test Graphs Hopping No. NVNT 1-DH	1 2441MHz	
04 RL RF 50 Ω AC Center Freq 2.441750000 GHz	PNO: Fast Trig: Free Run IFGain:Low #Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	09:59:51 AM Jan 04, 2022 TRACE <b>1 2 3 4 5 6</b> TYPE MWWWWW DET <b>P N N N N</b>
Ref Offset 2.32 dB 10 dB/div Ref 20.00 dBm		Mkr1 2	.401 753 5 GHz -1.388 dBm
	እለስለከለበለበ በዚህ የሚያስ የሆኑ የ	እስለለበሰብ በለበለስ ለስለስ እስ በእስ እስ በ	
-10.0 -20.0 -30.0	ANAMAMAMAMAMAMAMAMAMAMAMAMAMAMAMAMAMAMA	<u>AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA</u>	844844844844
-40.0			
-60.0 -70.0 Start 2.40000 GHz			Stop 2.48350 GHz
#Res BW 100 kHz	#VBW 300 kHz	-	.000 ms (1001 pts)
1         N         1         f         2.401 753 5         2           2         N         1         f         2.479 826 0         3           3	GHz -1.388 dBm		
4 5 6 7 7			E
8 9 10 11			
MSG		STATUS	4
Keysight Spectrum Analyzer - Swept SA           K         RF         50 Ω         AC	Hopping No. NVNT 2-DH	ALIGN AUTO	10:12:45 AM Jan 04, 2022
Center Freq 2.441750000 GHz	PNO: Fast 🖵 Trig: Free Run IFGain:Low #Atten: 30 dB	Avg Type: Log-Pwr Avg Hold:>100/100	TRACE 123456 TYPE MWWWWW DET PNNNNN
Ref Offset 2.32 dB 10 dB/div Ref 20.00 dBm	The second se	Mkr1 2	.401 753 5 GHz -6.860 dBm
10.0 0.00 1 10.00 1 10.00 10.0	ኒ አቢ ብ ዛ ዛ የ እ ስ የ በ አብ ዓ በ እ እ ት ት ግ ለ ላ ኩ	<u>ስስ ልለክብ - ስ የ - ሌላክሲի « « • ሌ. ሲ. ስ ዛ</u>	1111111 A A H 1 2
-20.0	hadennegaterstation	CHE TRUTH ALA AJ HE EN MA ALA P	
-30.0			
-60.0			h.
		Sween_S	Stop 2.48350 GHz .000 ms (1001 pts)
Start 2.40000 GHz #Res BW 100 kHz	#VBW 300 kHz		
#Res BW 100 kHz	Y FUNCTION		ION VALUE
#Res BW 100 kHz	Y FUNCTION		ION VALUE

Center Fre	um Analyzer - Swept SA RF 50 Ω AC q 2.441750000 ( Ref Offset 2.32 dB Ref 20.00 dBm		NO. NVNT 3-DH1 SENSE:INT 7 Trig: Free Run #Atten: 30 dB	ALIGN AUTO Avg Type: Log Avg Hold:>100/	Pwr 100 Mkr1 2.401	39 AMJan 04, 2022 TRACE 12 3 4 5 6 TYPE MWWWW DET PNNNNN 670 0 GHz 6.455 dBm	
. 1	LANNY YNN Y	ANWAMANAAA	LANIALA LUARA	<u>~}//I.Ano.u/II/I</u> 4.	MARY ALAL		
-60.0 -70.0 #Res BW 1 MKR MODE TRC 1 N 1 2 N 1	00 kHz SCL X f 2.401 6	Y 70 0 GHz -6.45	W 300 kHz FUNCTION 3 dBm	FUNCTION WIDTH	Stop Sweep 8.000 m		
3 6 7 8 9 10 11 ×				STATUS	~~/		

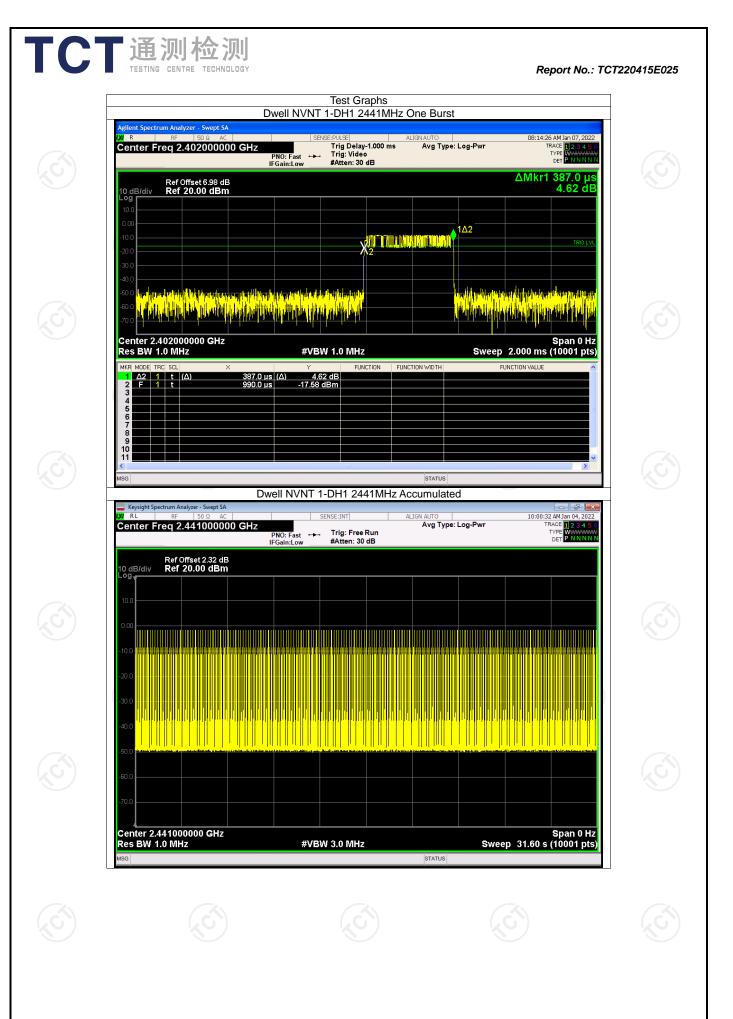
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	Dwell Time										
Condition	Mode	Frequency (MHz)	Pulse Time (ms)	Total Dwell Time (ms)	Burst Count	Period Time (ms)	Limit (ms)	Verdict			
NVNT	1-DH1	2441	0.387	123.84	182	31600	400	Pass			
NVNT	1-DH3	2441	1.64	177.12	108	31600	400	Pass			
NVNT	1-DH5	2441	2.89	216.75	75	31600	400	Pass			
NVNT	2-DH1	2441	0.383	122.56	190	31600	400	Pass			
NVNT	2-DH3	2441	1.63	278.73	171	31600	400	Pass			
NVNT	2-DH5	2441	2.89	216.75	75	31600	400	Pass			
NVNT	3-DH1	2441	0.384	122.88	182	31600	400	Pass			
NVNT	3-DH3	2441	1.64	178.76	109	31600	400	Pass			
NVNT	3-DH5	2441	2.89	219.64	76	31600	400	Pass			

Page 76 of 93

Report No.: TCT220415E025

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Page 77 of 93

		T 1-DH3 2441MHz		
RL         RF         50 Ω         AC           Center Freq 2.44100000         Center Freq 2.441000000         Center Freq 2.4410000000         Center F		Trig Delay-500.0 µs	ALIGN AUTO Avg Type: Log-Pwr	10:44:03 AM Jan 04, 2022 TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P N N N N N
Ref Offset 2.32 dE	3		Ĺ	Mkr1 1.640 ms 6.08 dB
10 dB/div Ref 20.00 dBm				
0.00	1∆2			
-10.0 <b>X</b> 2				TRIG LVL
-30.0				
-40.0				
-60.0 <mark>p[p<sup>4</sup>] http</mark>		and a subset of the state of th	an na dia tanàna mandritra mandritra amin'ny fanisa Ny INSEE dia mampina mandritra mandritra dia mandritra dia mandritra dia mandritra dia mandritra dia mandritra d	n an
-70.0				
Center 2.441000000 GHz Res BW 1.0 MHz	#V	BW 3.0 MHz	Sweep 10	Span 0 Hz .00 ms (10001 pts)
<b>1</b> Δ2 <b>1 t</b> (Δ)	× Υ 1.640 ms (Δ)	6.08 dB	CTION WIDTH FUNCT	ION VALUE
2 F 1 t 3 4	498.0 µs -8.0	64 dBm		
5				E
7 8 9				
MSG			STATUS	
Keysight Spectrum Analyzer - Swept SA		1-DH3 2441MHz A	ccumulated	
RL         RF         50 Ω         AC           Center Freq 2.44100000	00 GHz		ALIGN AUTO Avg Type: Log-Pwr	10:44:37 AM Jan 04, 2022 TRACE 1 2 3 4 5 6
	PNO: Fast ← IFGain:Low	<ul> <li>Trig: Free Run #Atten: 30 dB</li> </ul>		TYPE WWWWWWW DET PNNNNN
Ref Offset 2.32 dE 10 dB/div Ref 20.00 dBm Log	3			
10.0				
-10.0			****	
-20.0				
-30.0				
-40.0				
-60.0				
-70.0				
Center 2.441000000 GHz				Span 0 Hz
Res BW 1.0 MHz	#V	BW 3.0 MHz	Sweep	31.60 s (10001 pts)
mod				

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Page 78 of 93

[		Dwell NVNT 1-DH5 2441MHz	One Burst	
	Keysight Spectrum Analyzer - Swept SA R L RF 50 Ω AC Center Freq 2.441000000 GH:	Z SENSE:INT Trig Delay-500.0 µs PNO: Fast →→ Trig: Video IFGain:Low #Atten: 30 dB	Avg Type: Log-Pwr	0;47:57 AM Jan 04, 2022 TRACE 12 3 4 5 6 TYPE WWWWWWW DET PINNIN
	Ref Offset 2.32 dB 10 dB/div Ref 20.00 dBm	1Δ2	ΔMI	xr1 2.890 ms 5.18 dB
	-10.0 <b>2</b> -20.0 <b>2</b> -20			TRIG LVL
	-30.0 -40.0 -50.0 רוקא (גער) אין	(n, Mitter 1) (n' d th ) it car on the cash with th ) it car is a	1984,012 Anti Palifati, Sari Jali 2004 100 44,44 anti anti anti anti anti anti	anya i Kajan wanye ya nga jenga
$\mathbf{C}$	-60.0	and the second	ndyrniain flach a flyrifled yn a han anwlf a padyr a ganaraed	Span 0 Hz
	Res BW 1.0 MHz           MKR MODE TRC SCL         X           1         Δ2         1         t         (Δ)         2.89	#VBW 3.0 MHz Y FUNCTION FUN 0 ms (Δ) 5.18 dB .0 μs -8.03 dBm	Sweep 10.00	ms (10001 pts)
				=
	8 9 10 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
	MSG	Dwell NVNT 1-DH5 2441MHz A	status ccumulated	
	KL RF 50 Ω AC     Center Freq 2.441000000 GH:	Z PNO: Fast IFGain:Low <b>#Atten: 30 dB</b>	ALIGN AUTO 1 Avg Type: Log-Pwr	0:48:30 AMJan 04, 2022 TRACE 1 2 3 4 5 6 TYPE WWWWWWW DET P NNNNN
	Ref Offset 2.32 dB 10 dB/div Ref 20.00 dBm			
3				
	-10.0			
	-30.0			
	-50.0			
(C)	-70.0			
	Center 2.441000000 GHz Res BW 1.0 MHz	#VBW 3.0 MHz		Span 0 Hz 60 s (10001 pts)
	MSG		STATUS	

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#### Report No.: TCT220415E025

## ΔMkr1 383.0 μs 3.58 dB Ref Offset 6.98 dB Ref 20.00 dBm 10 dB/div Log **r** 1Δ2 TRIG LV it with a first in the party of a constraint of a structure of the party during the definition of the structure of the struc Many month lite hear a shak it f Center 2.402000000 GHz Res BW 1.0 MHz Span 0 Hz Sweep 2.000 ms (10001 pts) #VBW 1.0 MHz FUNCTION WIDTH FUNCTION FUNCTION VA MKR I Δ2 1 t (Δ) F 1 t 383.0 μs (Δ) 990.2 μs 3.58 dB -17.11 dBm 67 8 9 10 11 Dwell NVNT 2-DH1 2441MHz Accumulated Keysight Spectrum Analyzer - Swept SA X RL RF 50 Ω AC 10:13:27 AM Jan 04, 2022 TRACE 1 2 3 4 5 TYPE WWWW DET PNNNN ALIGN Center Freq 2.441000000 GHz Avg Type: Log-Pwr PNO: Fast ++++ Trig: Free Run IFGain:Low #Atten: 30 dB Ref Offset 2.32 dB Ref 20.00 dBm 10 dB/div Center 2.441000000 GHz Res BW 1.0 MHz Span 0 Hz Sweep 31.60 s (10001 pts) #VBW 3.0 MHz STATUS

Dwell NVNT 2-DH1 2441MHz One Burst

EPOLSE Trig Delay-1.000 ms Trig: Video #Atten: 30 dB

PNO: Fast ↔→ IFGain:Low ALIG

Avg Type: Log-Pwr

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ent Spectrum Analyzer - Swept SA

Center Freq 2.402000000 GHz

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Report No.: TCT220415E025

Page 80 of 93

56 AM Jan 07, 202 TRACE

RACE TYPE DET

		II NVNT 2-DH3 2441MHz One	e Burst	
LXI RL	er Freq 2.441000000 GHz	Trig Delay-500.0 μs : Fast ↔ Trig: Video	AUTO 1 Avg Type: Log-Pwr	C:50:04 AM Jan 04, 2022 TRACE 123456 TYPE WWWWWWW DET PINNNNN
	IFGa Ref Offset 2.32 dB	in:Low #Atten: 30 dB	ΔΜ	kr1 1.630 ms 6.37 dB
10 dE Log 1 10.0				
0.00 -10.0				TRIG LVL
-20.0 -30.0 -40.0				
-50.0 -60.0	enerality per sufference energy and the suff	r i gjangan yn syn yw saw y syn a gwlana yn yw a gwlana yn yw a gwlana yn yw yw a gwlana yn a gwlana yn a gwlan Ar f ffarau yw a gwlana yw	r ne mole pogen fel de la presenta de la competencia. La competencia de la	najin eranda wa wenye na iyon nya hay na Ta Jan Ba man a tanàna ana ana ana an
-70.0	er 2.441000000 GHz		a porta di plan da primi di primi di plan di parti di par La porta di plan	
Res	BW 1.0 MHz           ODE TRC SCL         X	#VBW 3.0 MHz	-	Span 0 Hz ms (10001 pts)
1 2 3	Δ2 1 t (Δ) 1.630 ms (Δ F 1 t 488.0 μs			
4 5 6 7				=
8 9 10				
MSG		m	STATUS	
	ight Spectrum Analyzer - Swept SA	NVNT 2-DH3 2441MHz Accu		
Cent	er Freq 2.441000000 GHz		AUTO 1 Avg Type: Log-Pwr	0:50:37 AM Jan 04, 2022 TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P N N N N N
10 dE	Ref Offset 2.32 dB			
Log ,				
0.00				
-10.0				
-20.0 -				
-30.0				
-40.0				
-50.0 -				
-70.0				
Cent	er 2.441000000 GHz			Span 0 Hz
	BW 1.0 MHz	#VBW 3.0 MHz	Sweep 31.	60 s (10001 pts)
	0			

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