	TEST REP	ORT			
FCC ID :	2AO9PTWS500SPK				
Test Report No:	TCT220407E039				
Date of issue:	Apr. 15, 2022				
Testing laboratory: :	SHENZHEN TONGCE TE	STING 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: :	Elita International Limited	$\left( \mathcal{C}^{\prime}\right)$			
Address:	29F 2, Building 2, China Phoenix Building, No.2008 Shennan Avenue, Futian District, Shenzhen, Guangdong, China				
Manufacturer's name :	Dongguan Suoteng Technology Co., Ltd				
Address:	6th Floor, Building A, Huiheng Industrial Zone, Shajiao Community, Humen Town, Dongguan, Guangdong, 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::	TRUE WIRELESS BLUETOOTH SPEAKERS				
Trade Mark:	VIVITAR		S)		
Model/Type reference :	TWS500SPK				
Rating(s):	Rechargeable Li-ion Batte	ry DC 3.7V			
Date of receipt of test item	Apr. 07, 2022				
Date (s) of performance of test:	Apr. 07, 2022 - Apr. 15, 2022				
Tested by (+signature) :	Brews XU	forens the	NGCET		
Check by (+signature) :	Beryl ZHAO	Bart 26	CT		
Approved by (+signature):	Tomsin Tomsin 3				

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## **1. General Product Information**

## 1.1. EUT description

Product Name:	TRUE WIRELESS BLUETOOTH SPEAKERS
Model/Type reference:	TWS500SPK
Sample Number:	TCT220407E039-0101
Bluetooth Version:	V5.3 (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:	PCB Antenna
Antenna Gain:	0.68dBi
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

None.

## 1.3. Operation Frequency

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402MHz	20	2422MHz	40	2442MHz	60	2462MHz
1	2403MHz	21	2423MHz	41	2443MHz	61	2463MHz
10	2412MHz	30	2432MHz	50	2452MHz	70	2472MHz
11	2413MHz	31	2433MHz	51	2453MHz	71	2473MHz
·							
18	2420MHz	38	2440MHz	58	2460MHz	78	2480MHz
19	2421MHz	39	2441MHz	59	2461MHz		$\left( c \right)$
Remark:	Channel 0, 3	89 & 78 ha	ave been tes	sted for G	GFSK, π/4-D	QPSK, 8I	DPSK

modulation mode.

Report No.: TCT220407E039



## 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.

## 3. General Information

## 3.1. Test environment and mode

Operating Environment:				
Condition	Conducted Emission	Radiated Emission		
Temperature:	25.0 °C	23.9 °C		
Humidity:	55 % RH	48 % RH		
Atmospheric Pressure:	1010 mbar	1010 mbar		
Test Software:				
Software Information:	FCC_assist_1.0.2.2			
Power Level:	10			
Test Mode:				
Engineering mode: Keep the EUT in continuous transmitting by select channel and modulations with Fully-charged battery				
above the ground plane of 3 polarities were performed. I	8m & 1.5m for the measure 8m chamber. Measurements in During the test, each emission	n both horizontal and vertica n 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 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

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

#### 15.203 requirement:

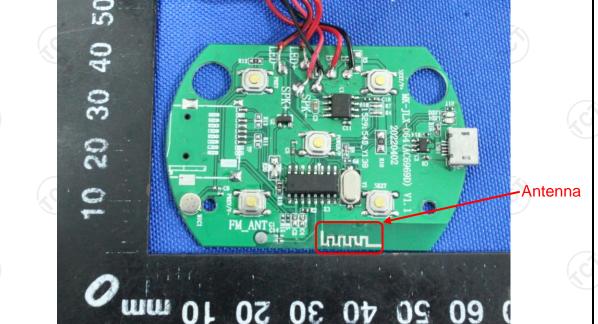
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit 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 PCB antenna which permanently attached, and the best case gain of the antenna is 0.68dBi.



## 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)			
Limits:	(MHz)	Quasi-peak	Average			
	0.15-0.5	66 to 56*	56 to 46*			
	0.5-5	56	46			
	5-30	60	50			
	Reference	e Plane				
Test Setup:	E.U.T AC powe	EMI Receiver	j── AC power			
	LISN: Line Impedence Stabilization N Test table height=0.8m	letwork				
Test Mode:	LISN: Line Impedence Stabilization N					
Test Mode: Test Procedure:	<ul> <li>LISN Line Impedence Stabilization National Test table height=0.8m</li> <li>Charging + Transmittin</li> <li>The E.U.T is connecting impedance stabilized provides a 500hm/s measuring equipme</li> <li>The peripheral device power through a L coupling impedance refer to the block photographs).</li> <li>Both sides of A.C conducted interfere emission, the relative the interface cables</li> </ul>	ng Mode ected to an adapte zation network 50uH coupling im 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 equi must be changed	(L.I.S.N.). Thi ppedance for th ected to the mai s a 500hm/50ul nination. (Pleas test setup an ed for maximur nd the maximur ipment and all c l according to			
	<ul> <li>LISN Line Impedence Stabilization National Test table height=0.8m</li> <li>Charging + Transmittin</li> <li>1. The E.U.T is connect impedance stabilized provides a 500hm/st measuring equipme</li> <li>2. The peripheral device power through a L coupling impedance refer to the block photographs).</li> <li>Both sides of A.C conducted interfere emission, the relative</li> </ul>	ng Mode ected to an adapte zation network 50uH coupling im 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 equi must be changed	(L.I.S.N.). This pedance for the ected to the main s a 50ohm/50uh nination. (Please test setup and ed for maximum nd the maximum ipment and all c l according to			

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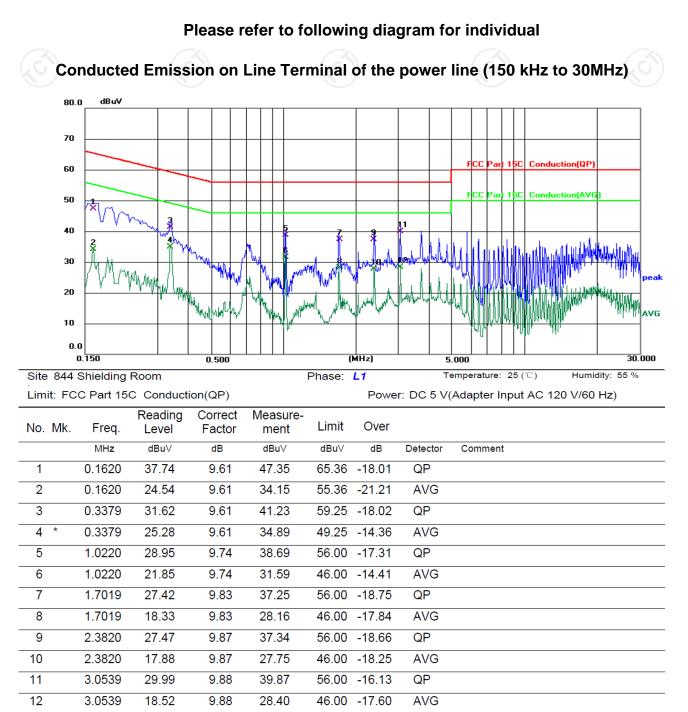


#### 5.2.2. Test Instruments

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	NSLK 8126	8126453	Feb. 24, 2023			
Line-5	ТСТ	CE-05	N/A	Jul. 07, 2022			
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A			



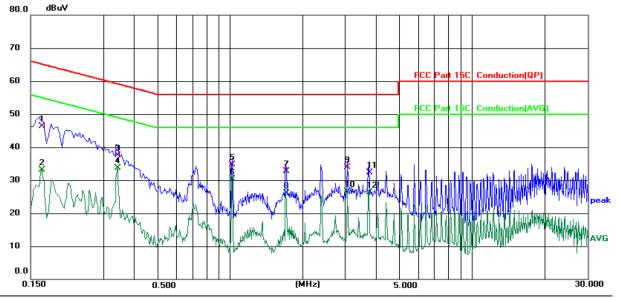
#### 5.2.3. Test data



#### 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.

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

Site 844 Shielding RoomPhase:NTemperature:25 (°C)Humidity:55 %Limit:FCC Part 15C Conduction(QP)Power:DC 5 V(Adapter Input AC 120 V/60 Hz)

	Die eindlich ein						
Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
MHz	dBuV	dB	dBuV	dBu∨	dB	Detector	Comment
0.1660	36.68	9.70	46.38	65.16	-18.78	QP	
0.1660	23.49	9.70	33.19	55.16	-21.97	AVG	
0.3420	27.90	9.61	37.51	59.15	-21.64	QP	
0.3420	24.15	9.61	33.76	49.15	-15.39	AVG	
1.0220	24.95	9.74	34.69	56.00	-21.31	QP	
1.0220	20.64	9.74	30.38	46.00	-15.62	AVG	
1.7019	22.97	9.76	32.73	56.00	-23.27	QP	
1.7019	16.26	9.76	26.02	46.00	-19.98	AVG	
3.0539	24.08	9.78	33.86	56.00	-22.14	QP	
3.0539	16.80	9.78	26.58	46.00	-19.42	AVG	
3.7419	22.48	9.79	32.27	56.00	-23.73	QP	
3.7419	16.43	9.79	26.22	46.00	-19.78	AVG	
	MHz 0.1660 0.3420 0.3420 1.0220 1.0220 1.7019 1.7019 3.0539 3.0539 3.7419	MHz         dBu∨           0.1660         36.68           0.1660         23.49           0.3420         27.90           0.3420         24.15           1.0220         24.95           1.0220         20.64           1.7019         22.97           1.7019         16.26           3.0539         24.08           3.0539         16.80           3.7419         22.48	MHz         dBu∨         dB           0.1660         36.68         9.70           0.1660         23.49         9.70           0.3420         27.90         9.61           0.3420         24.15         9.61           1.0220         24.95         9.74           1.0220         20.64         9.74           1.7019         22.97         9.76           1.7019         16.26         9.76           3.0539         24.08         9.78           3.0539         16.80         9.78           3.7419         22.48         9.79	MHz         dBu∨         dB         dBu∨           0.1660         36.68         9.70         46.38           0.1660         23.49         9.70         33.19           0.3420         27.90         9.61         37.51           0.3420         24.15         9.61         33.76           1.0220         24.95         9.74         34.69           1.0220         20.64         9.74         30.38           1.7019         22.97         9.76         32.73           1.7019         16.26         9.76         26.02           3.0539         24.08         9.78         33.86           3.0539         16.80         9.78         26.58           3.7419         22.48         9.79         32.27	MHz         dBuV         dB         dBuV         dBuV           0.1660         36.68         9.70         46.38         65.16           0.1660         23.49         9.70         33.19         55.16           0.3420         27.90         9.61         37.51         59.15           0.3420         24.15         9.61         33.76         49.15           1.0220         24.95         9.74         34.69         56.00           1.0220         20.64         9.74         30.38         46.00           1.7019         22.97         9.76         32.73         56.00           1.7019         16.26         9.76         26.02         46.00           3.0539         24.08         9.78         33.86         56.00           3.0539         16.80         9.78         26.58         46.00           3.7419         22.48         9.79         32.27         56.00	MHz         dBuV         dB         dBuV         dBuV         dB           0.1660         36.68         9.70         46.38         65.16         -18.78           0.1660         23.49         9.70         33.19         55.16         -21.97           0.3420         27.90         9.61         37.51         59.15         -21.64           0.3420         24.15         9.61         33.76         49.15         -15.39           1.0220         24.95         9.74         34.69         56.00         -21.31           1.0220         20.64         9.74         30.38         46.00         -15.62           1.7019         22.97         9.76         32.73         56.00         -23.27           1.7019         16.26         9.76         26.02         46.00         -19.98           3.0539         24.08         9.78         33.86         56.00         -22.14           3.0539         16.80         9.78         26.58         46.00         -19.42           3.7419         22.48         9.79         32.27         56.00         -23.73	MHzdBuVdBdBuVdBdBuVdBDetector0.166036.689.7046.3865.16-18.78QP0.166023.499.7033.1955.16-21.97AVG0.342027.909.6137.5159.15-21.64QP0.342024.159.6133.7649.15-15.39AVG1.022024.959.7434.6956.00-21.31QP1.022020.649.7430.3846.00-15.62AVG1.701922.979.7632.7356.00-23.27QP1.701916.269.7826.5846.00-19.98AVG3.053916.809.7826.5846.00-19.42AVG3.741922.489.7932.2756.00-23.73QP

Note1:

Freq. = Emission frequency in MHz

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

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

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

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

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

Q.P. =Quasi-Peak AVG =average

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

#### Note2:

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



## 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 bandwi 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 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

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## 5.6. Hopping Channel Number

## 5.6.1. Test Specification

C Part15 C Section 15.247 (a)(1) B 558074 D01 v05r02 equency hopping systems in the 2400-2483.5 MHz and shall use at least 15 channels. etrum Analyzer pping mode The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The
equency hopping systems in the 2400-2483.5 MHz nd shall use at least 15 channels.
ectrum Analyzer EUT pping mode The RF output of EUT was connected to the
ectrum Analyzer EUT pping mode The RF output of EUT was connected to the
pping mode The RF output of EUT was connected to the
The RF output of EUT was connected to the
path loss was compensated to the results for each measurement. Set to the maximum power setting and enable the EUT transmit continuously. Enable the EUT hopping function. Use the following spectrum analyzer settings: Span = the frequency band of operation; set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller; VBW≥RBW; Sweep = auto; Detector function = peak; Trace = max hold. The number of hopping frequency used is defined as the number of total channel. Record the measurement data in report.
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#### 5.6.2. 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
	()			

## 5.7. Dwell Time

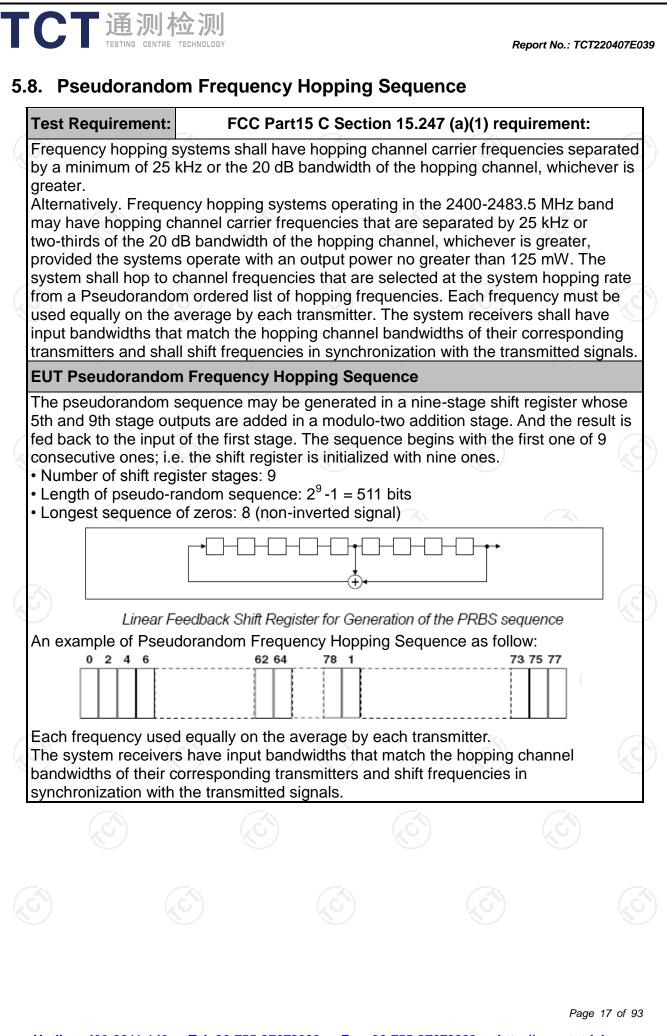
### 5.7.1. Test Specification

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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:	<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>
Test Result:	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

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
Transmitting mode with modulation
<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>
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
(G)	667	) (	(G)	(G)



## 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	<b>Calibration Due</b>
Spectrum Analyzer	Agilent	N9020A	MY49100619	Jul. 18, 2022
Combiner Box	Ascentest	AT890-RFB	N/A	Jul. 07, 2022

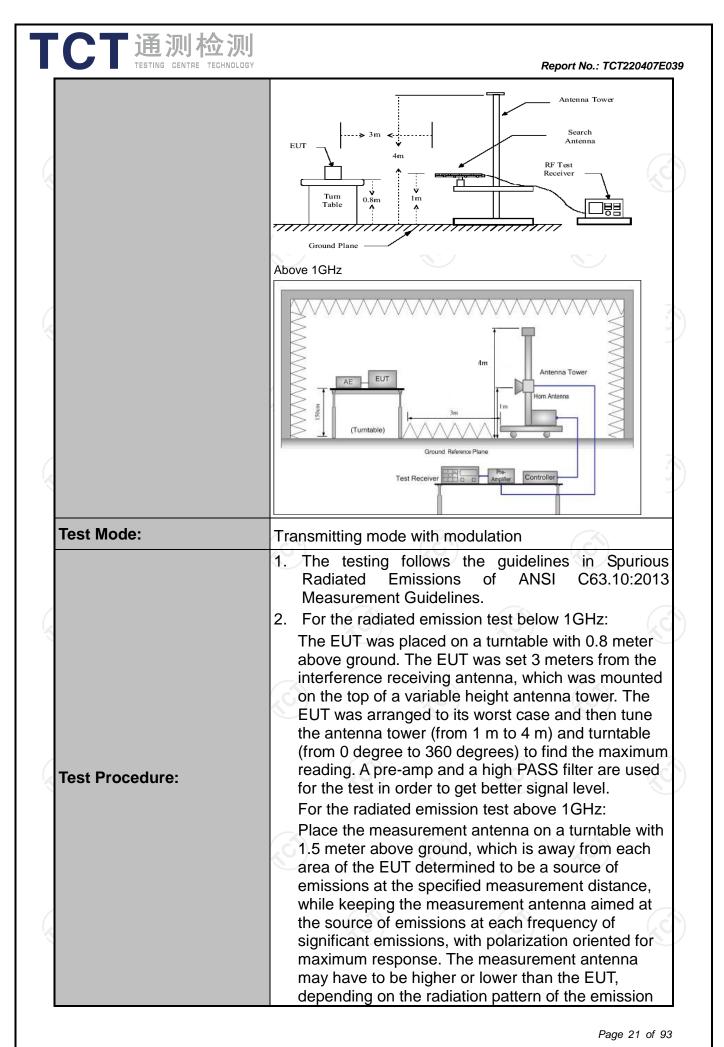
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#### 5.11.1. Test Specification

TCT通测检测 TESTING CENTRE TECHNOLOGY

Test Requirement:	FCC Part15	C Section	15.209			K
Test Method:	ANSI C63.10	0:2013				
Frequency Range:	9 kHz to 25 (	GHz				6
Measurement Distance:	3 m		9		K.	9
Antenna Polarization:	Horizontal &	Vertical				
	Frequency	Detector	RBW	VBW		Remark
	9kHz- 150kHz	Quasi-peak	200Hz	1kHz	Quas	si-peak Value
Receiver Setup:	150kHz- 30MHz	Quasi-peak	k 9kHz	30kHz	Quas	si-peak Value
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quas	si-peak Value
	Above 1GHz	Peak	1MHz	3MHz		eak Value
	Above Tonz	Peak	1MHz	10Hz	Ave	erage Value
			Field Str	ength	Me	asurement
	Frequen	ю	(microvolts	-	Dista	nce (meters)
	0.009-0.4		2400/F(		ļ	300
	0.490-1.7		24000/F	· · · ·		30
	1.705-3		30			30
	30-88		100			3
Limit:	88-216		150		3	
Emilit.	216-96 Above 9	<u>200</u> 500			3	
	Frequency Above 1GH:	(micro	d Strength ovolts/meter) 500 5000	Distan (mete 3 3		Detector Average Peak
Test setup:	For radiated emis	ssions below istance = 3m Turn table			Compu	
5			(			
						Page 20 of s



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	receiving the maxim measurement anter maximizes the emis antenna elevation for restricted to a range above the ground o 3. Set to the maximu EUT transmit contin 4. Use the following s (1) Span shall wide emission being (2) Set RBW=120 for f>1GHz ; VE Sweep = auto = max hold for (3) For average m	pectrum analyzer settings: e enough to fully capture the g measured; kHz for f < 1 GHz, RBW=1Mł BW≥RBW; o; Detector function = peak; Tr	hich be m the Hz race
	15.35(c). Duty of On time =N1*L Where N1 is n length of type Average Emis Level + 20*log Corrected Read	ssion Level = Peak Emission g(Duty cycle) ding: Antenna Factor + Cable	n*Lr s
Test results:	15.35(c). Duty of On time =N1*L Where N1 is n length of type Average Emis Level + 20*log Corrected Read	1+N2*L2++Nn-1*LNn-1+Nr number of type 1 pulses, L1 is 1 pulses, etc. ssion Level = Peak Emission g(Duty cycle)	n*Lr s
Test results:	15.35(c). Duty of On time =N1*L Where N1 is n length of type Average Emis Level + 20*log Corrected Read Loss + Read Le	1+N2*L2++Nn-1*LNn-1+Nr number of type 1 pulses, L1 is 1 pulses, etc. ssion Level = Peak Emission g(Duty cycle) ding: Antenna Factor + Cable	n*Lı s
Test results:	15.35(c). Duty of On time =N1*L Where N1 is n length of type Average Emis Level + 20*log Corrected Read Loss + Read Le	1+N2*L2++Nn-1*LNn-1+Nr number of type 1 pulses, L1 is 1 pulses, etc. ssion Level = Peak Emission g(Duty cycle) ding: Antenna Factor + Cable	n*Li s
Test results:	15.35(c). Duty of On time =N1*L Where N1 is n length of type Average Emis Level + 20*log Corrected Read Loss + Read Le	1+N2*L2++Nn-1*LNn-1+Nr number of type 1 pulses, L1 is 1 pulses, etc. ssion Level = Peak Emission g(Duty cycle) ding: Antenna Factor + Cable	n*Li s



TCT通测检测 TESTING CENTRE TECHNOLOGY

	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	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
EMI Test Software	•	EZ-EMC	N/A	N/A

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#### Please refer to following diagram for individual

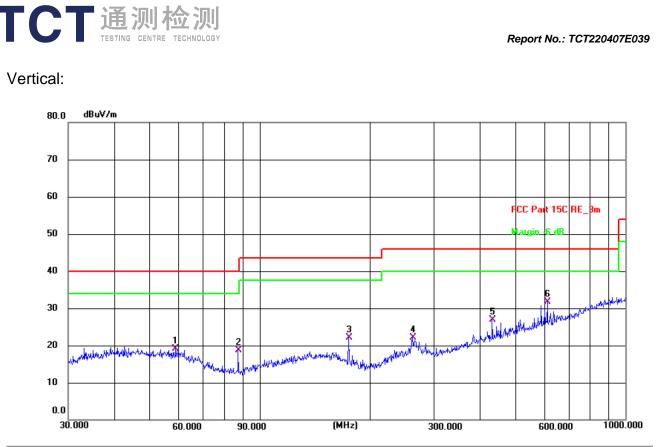


Site #2 3m Anechoic Chamber Limit: FCC Part 15C RE 3m Polarization: *Horizontal* Power: DC 3.7 V Temperature: 23.9(C) Humidity: 48 %

Report No.: TCT220407E039

Ennit.	10010110								
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	42.1542	5.44	13.98	19.42	40.00	-20.58	QP	Р	
2	53.6932	6.00	13.54	19.54	40.00	-20.46	QP	Р	
3	130.8369	4.86	12.66	17.52	43.50	-25.98	QP	Р	
4	158.6677	5.91	13.40	19.31	43.50	-24.19	QP	Р	
5	256.5211	7.55	12.54	20.09	46.00	-25.91	QP	Ρ	
6 *	432.5457	11.88	17.94	29.82	46.00	-16.18	QP	Ρ	





Site 7	#2 3m Anecho	oic Chambe	er	Polarization: Vertical					Temperature: 23	8.9(C)	Humidity: 48 %
Limit:	FCC Part 15	C RE_3m			Po	wer: DC	3.7 V				
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark		
1	59.0251	5.86	13.19	19.05	40.00	-20.95	QP	Р			
2	87.4177	9.39	9.28	18.67	40.00	-21.33	QP	Р			
3	175.0368	10.23	11.82	22.05	43.50	-21.45	QP	Р			
4	261.9753	9.35	12.66	22.01	46.00	-23.99	QP	Р			
5	432.5457	8.91	17.94	26.85	46.00	-19.15	QP	Р			
6 *	612.0642	10.14	21.48	31.62	46.00	-14.38	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.

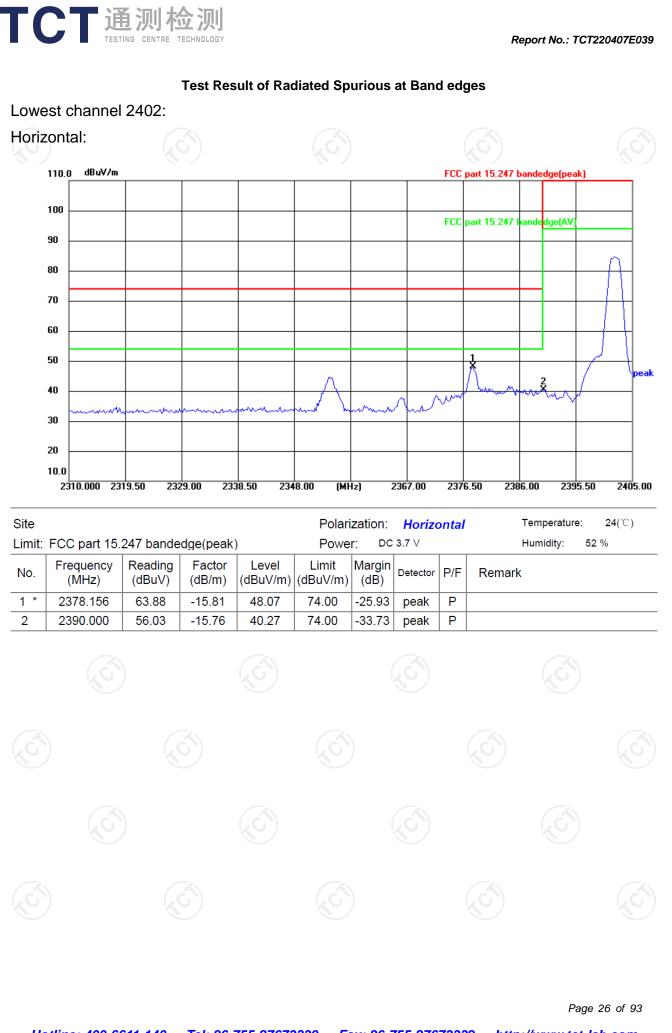
 Measurements were conducted in all three channels (high, middle, low) and three modulation (GFSK, Pi/4 DQPSK, 8DPSK) and the worst case Mode (Highest channel and 8DPSK) was submitted only.
 Freq. = Emission frequency in MHz

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

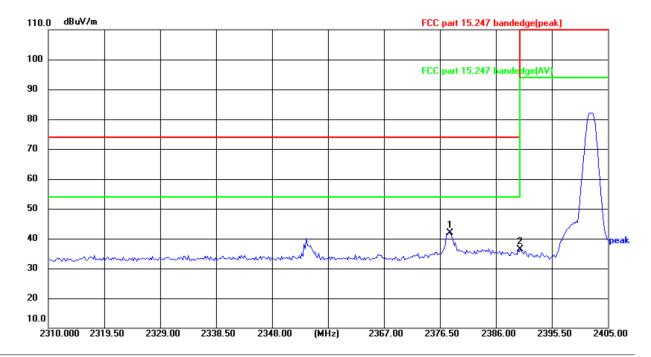
\* is meaning the worst frequency has been tested in the test frequency range.

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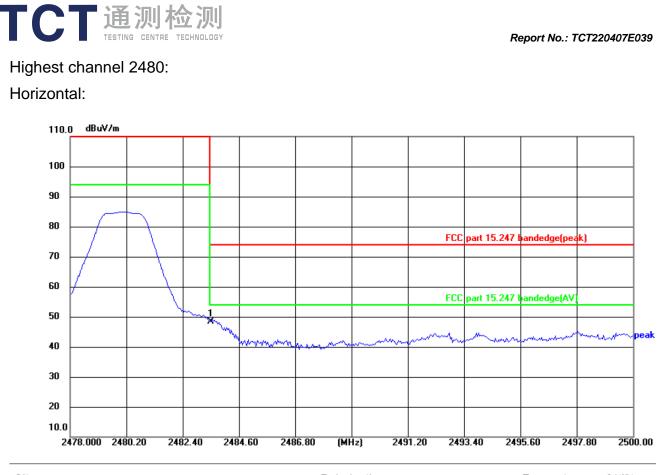
#### Vertical:



Site					Polar	ization:	Vertic	al	Temperature: 24(℃)
Limit:	FCC part 15	247 bande	edge(peak	)	r: DC	3.7 ∨		Humidity: 52 %	
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 *	2377.966	57.80	-15.81	41.99	74.00	-32.01	peak	Ρ	
2	2390.000	52.05	-15.76	36.29	74.00	-37.71	peak	Ρ	



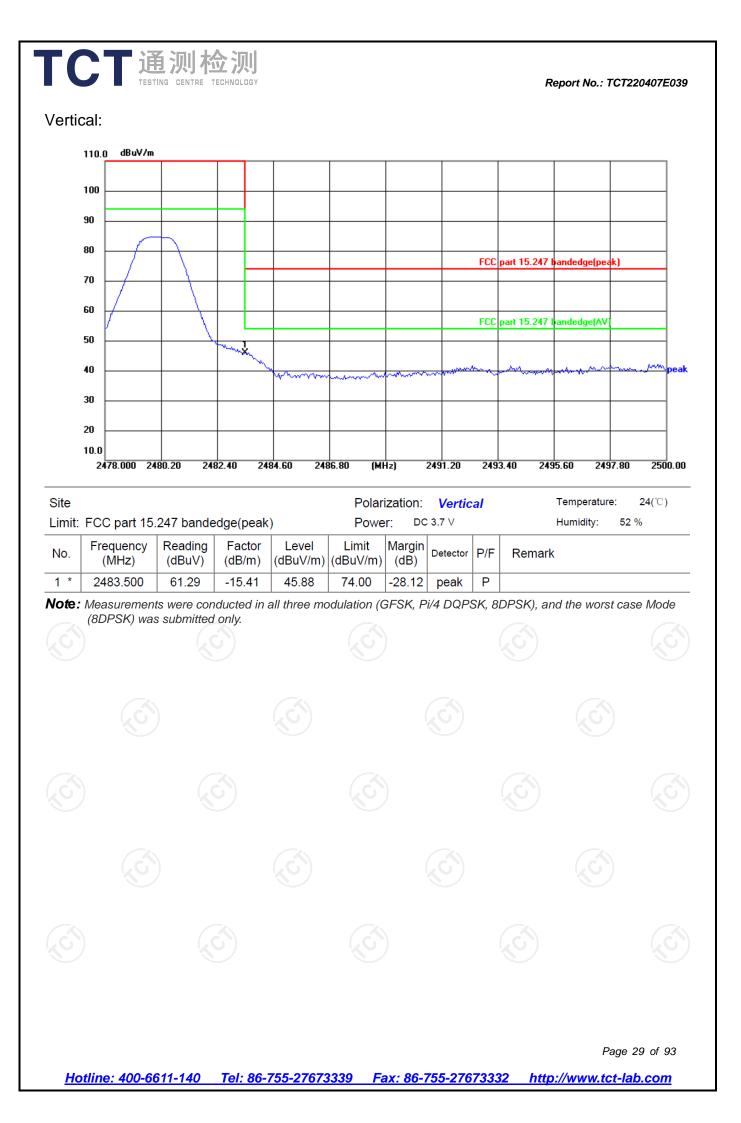
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Site					Polar	ization:	Horiz	ontal	Temperature: 24(℃)
Limit: FCC part 15.247 bandedge(peak) Power: DC 3.7 V Humidity: 52 %									Humidity: 52 %
No.	Frequency (MHz)	Reading (dBuV)		Level (dBuV/m)		Margin (dB)	Detector	P/F	Remark
1 *	2483.500	63.89	-15.41	48.48	74.00	-25.52	peak	Ρ	

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#### Above 1GHz

Modulation	Type: 8D	PSK							
Low chann	el: 2402 N	1Hz							
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBuV)	Correction Factor (dB/m)	Peak	on Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4804	Н	45.94		0.66	46.60		74	54	-7.40
7206	Н	35.86		9.50	45.36		74	54	-8.64
	Н								
	.G`)		(.C)		(	.G`)		(.G.)	
4804	V	44.47		0.66	45.13	<u> </u>	74	54	-8.87
7206	V	35.95		9.50	45.45		74	54	-8.55
	V								

Middle cha	nnel: 2441	MHz			( כ				Х С
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)
4882	Н	45.03		0.99	46.02		74	54	-7.98
7323	κCĤ)	36.84	-40	9.87	46.71	<u>0</u> -)-	74	54	-7.29
	Ĥ					$\sim$			
4882	V	44.25		0.99	45.24		74	54	-8.76
7323	V	35.47		9.87	45.34		74	54	-8.66
<u> </u>	V				/				

High chann	nel: 2480 N	ЛНz							
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)		on Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4960	H	46.14		1.33	47.47		74	54	-6.53
7440	Н	36.77		10.22	46.99		74	54	-7.01
	Н	<b>77</b> 1.							
G)				(.0			$(\mathbf{G})$		(.c
4960	V	45.98		1.33 🔪	47.31		74	54	-6.69
7440	V	36.09		10.22	46.31		74	54	-7.69
	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.

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

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



## **Appendix A: Test Result of Conducted Test**

Maximum Conducted Output Power					
Condition	Mode	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	1-DH1	2402	-2.40	30	Pass
NVNT	1-DH1	2441	-2.12	30	Pass
NVNT	1-DH1	2480	-1.76	30	Pass
NVNT	2-DH1	2402	-1.52	21	Pass
NVNT	2-DH1	2441	-1.26	21	Pass
NVNT	2-DH1	2480	-0.89	21	Pass
NVNT	3-DH1	2402	-0.95	21	Pass
NVNT	3-DH1	2441	-0.81	21	Pass
NVNT	3-DH1	2480	-0.43	21	Pass













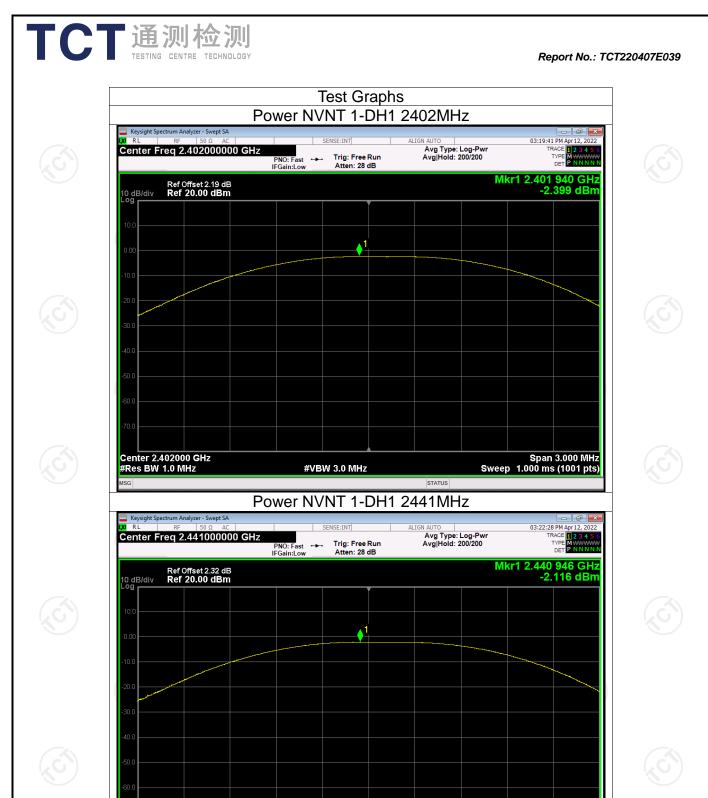












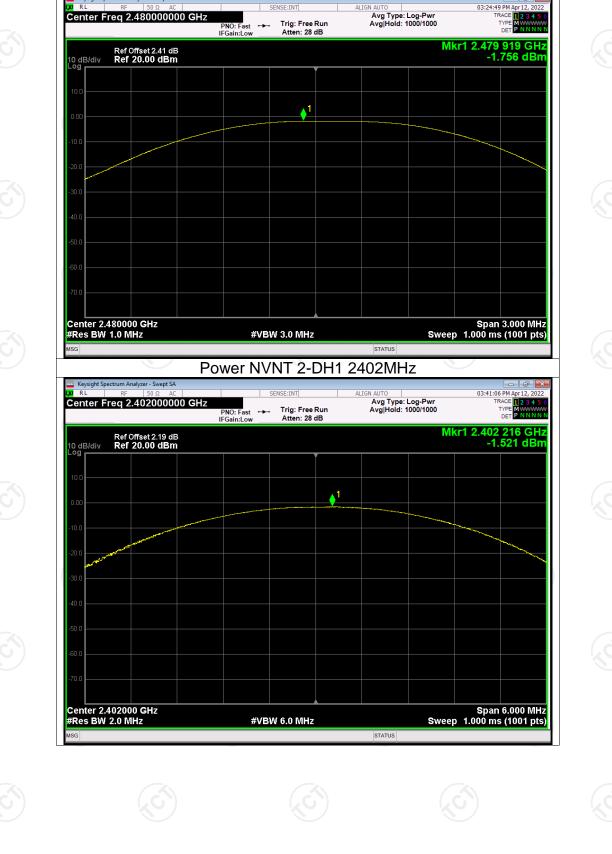
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Span 3.000 MHz Sweep 1.000 ms (1001 pts)

#VBW 3.0 MHz

STATUS

Center 2.441000 GHz #Res BW 1.0 MHz



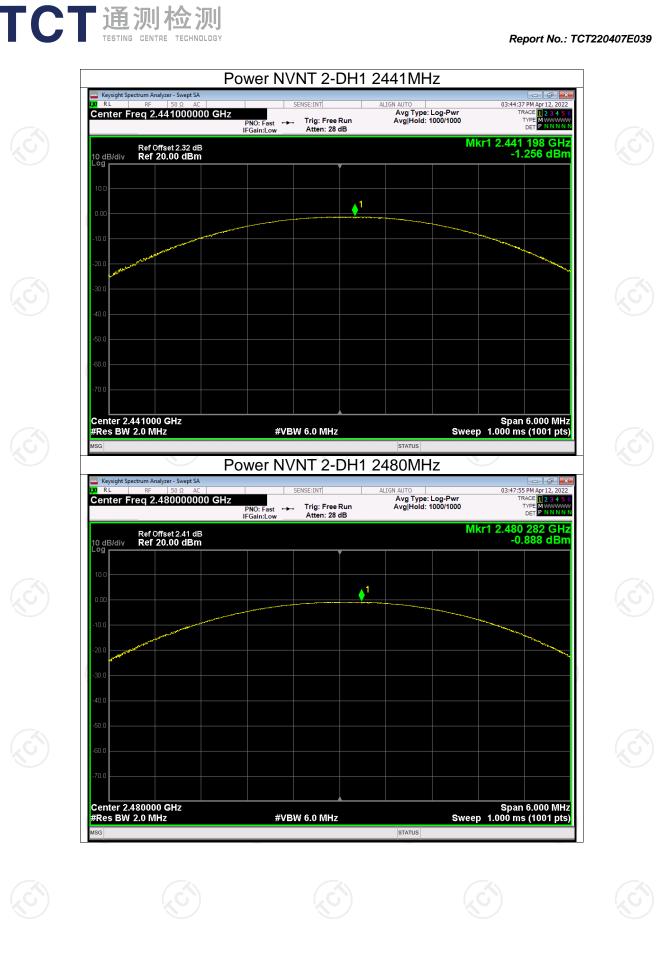
Power NVNT 1-DH1 2480MHz

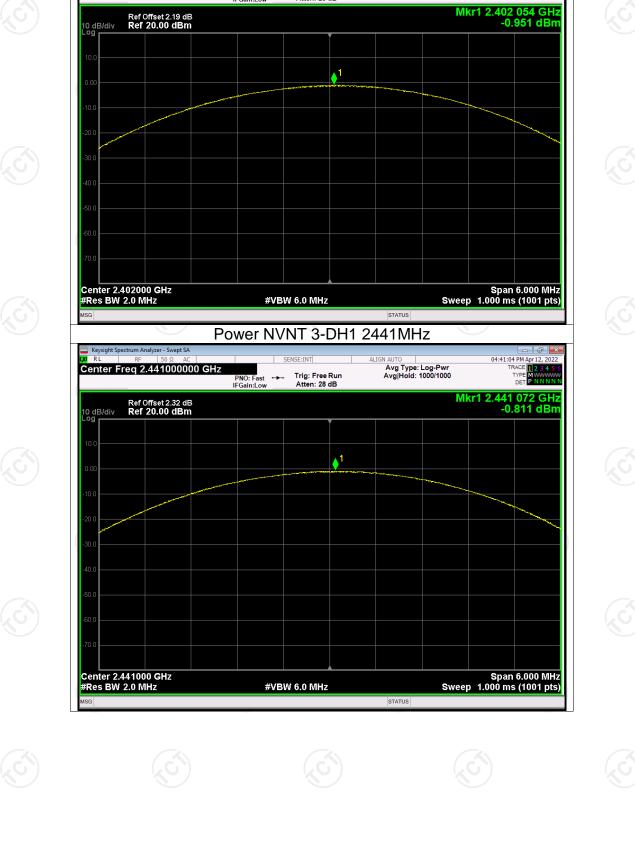
KI RL

Keysight Spectrum Analyzer - Swept SA

Report No.: TCT220407E039

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Power NVNT 3-DH1 2402MHz

PNO: Fast ---- Trig: Free Run IFGain:Low Atten: 28 dB

KI RL

Keysight Spectrum Analyzer - Swept SA

Center Freq 2.402000000 GHz

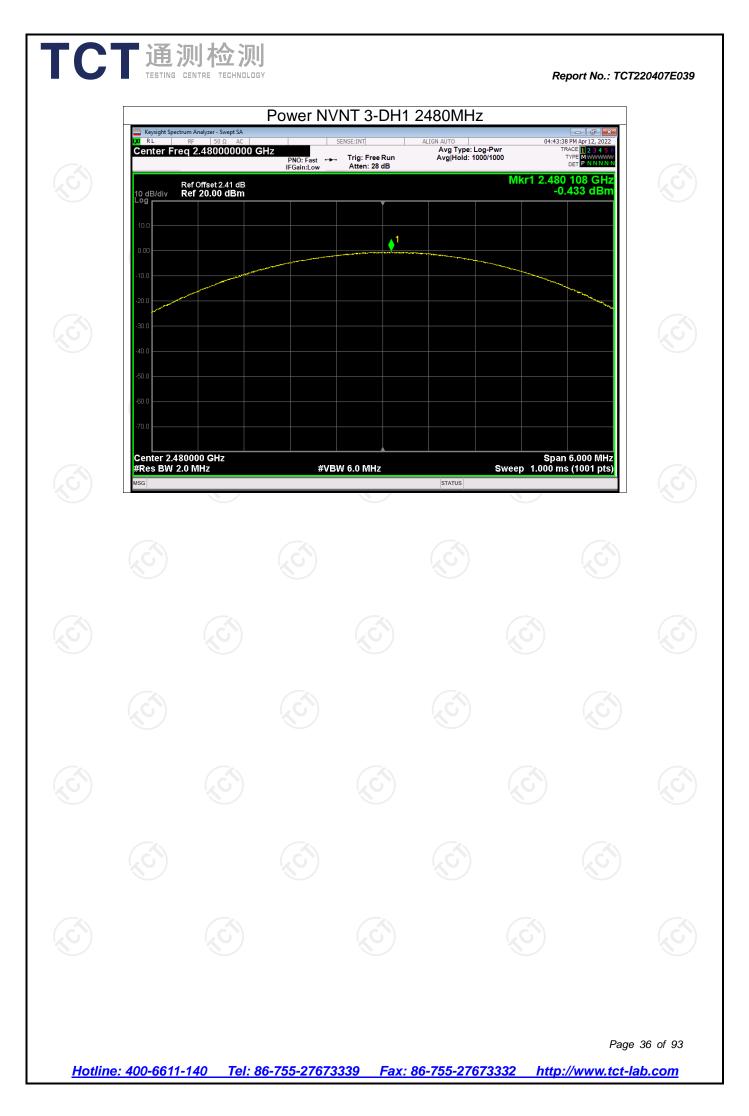
Report No.: TCT220407E039

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04:35:34 PM Apr 12, 2022 TRACE 1 2 3 4 5 TYPE MWWWW DET P N N N N

TYPE

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





-20dB Bandwidth						
Condition Mode		Frequency (MHz)	-20 dB Bandwidth (MHz)	Verdict		
NVNT	1-DH1	2402	0.881	Pass		
NVNT 🚫	1-DH1	2441	0.872	Pass		
NVNT	1-DH1	2480	0.871	Pass		
NVNT	2-DH1	2402	1.256	Pass		
NVNT	2-DH1	2441	1.256	Pass		
NVNT	2-DH1	2480	1.257	Pass		
NVNT	3-DH1	2402	1.221	Pass		
NVNT	3-DH1	2441	1.222	Pass		
NVNT	3-DH1	2480	1.218	Pass		
N.	5)	KO)	KO)			

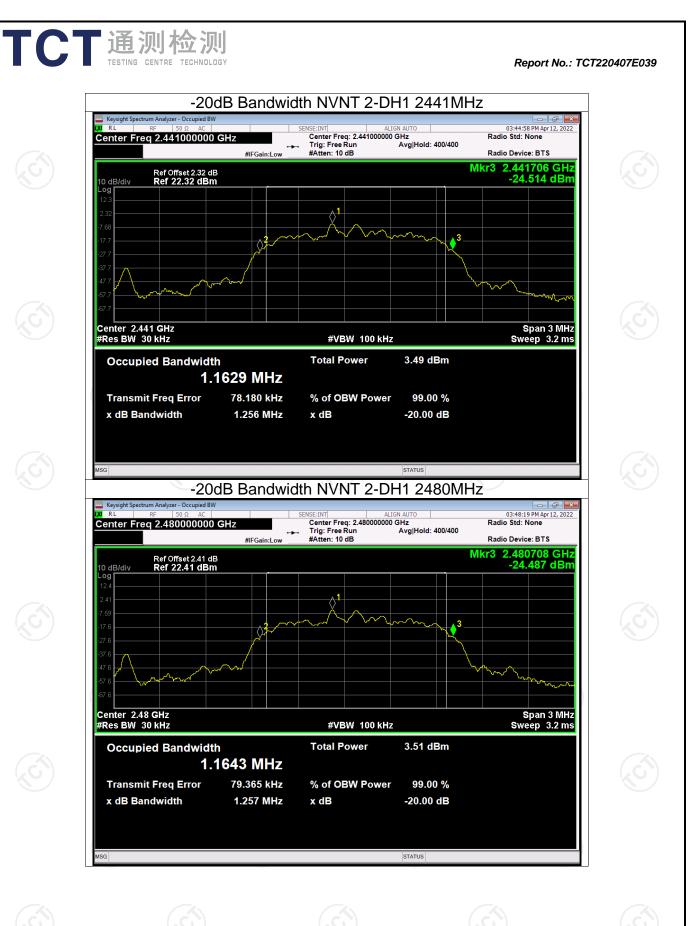
Page	.37	of	93
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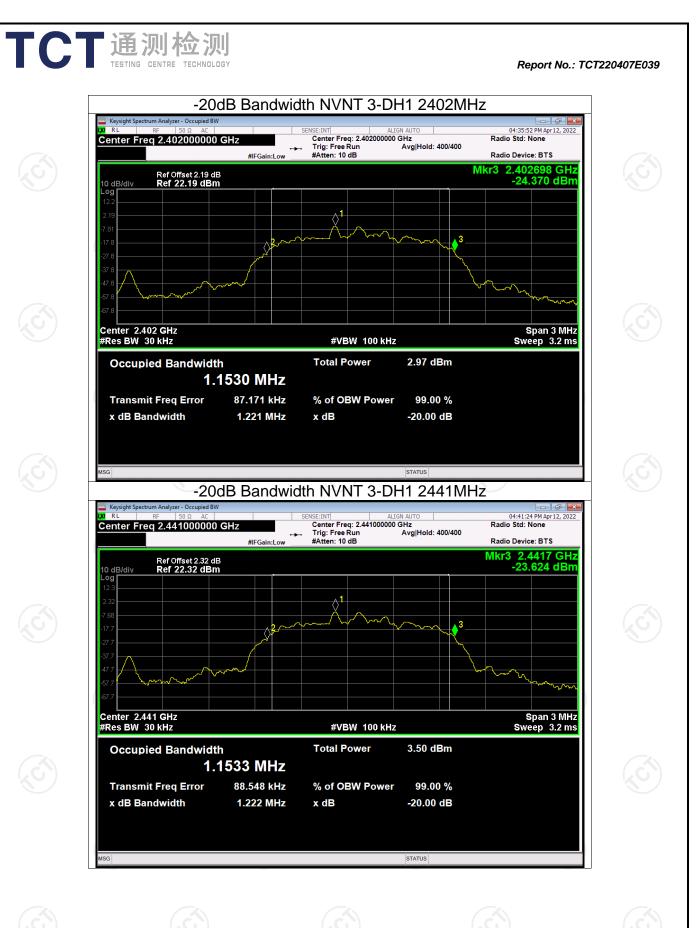
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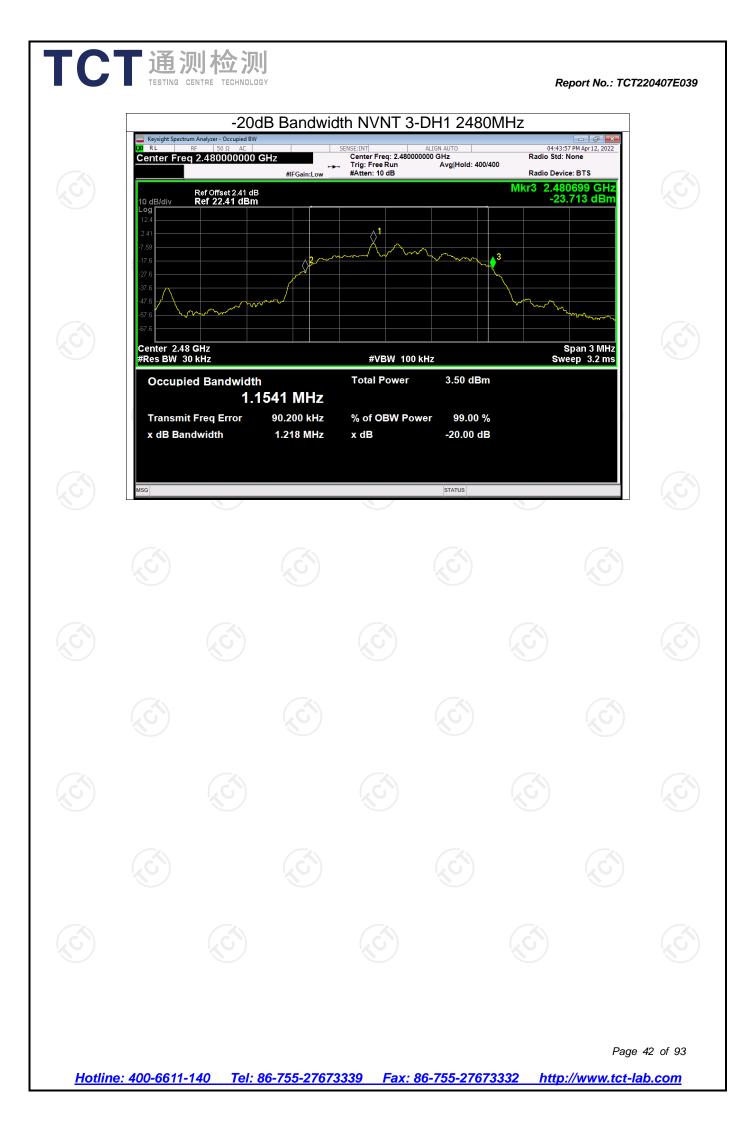


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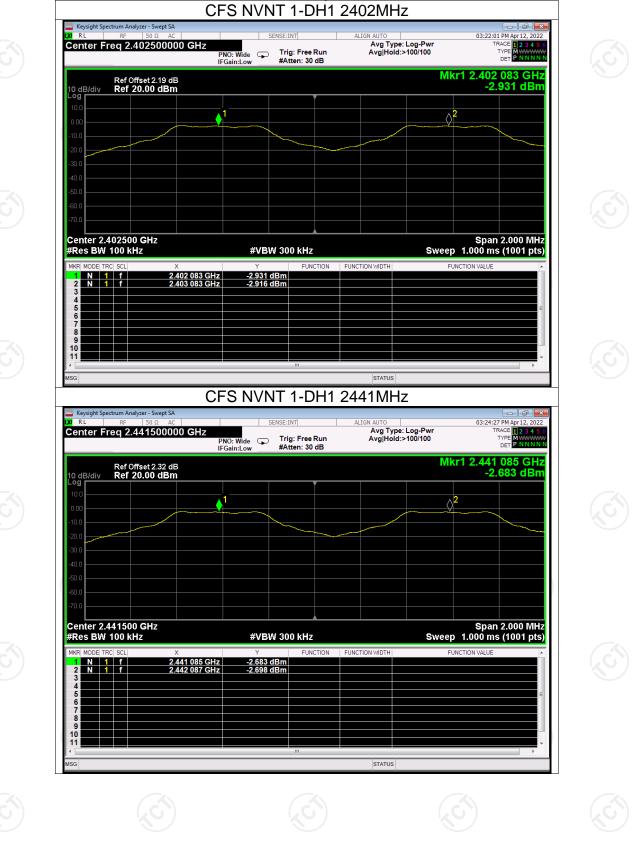


Report No.: TCT2204
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Carrier requencies deparation						
Condition	Mode	Hopping Freq1 (MHz)	Hopping Freq2 (MHz)	HFS (MHz)	Limit (MHz)	Verdict
NVNT	1-DH1	2402.083	2403.083	1	0.881	Pass
NVNT	1-DH1	2441.085	2442.087	1.002	0.881	Pass
NVNT	1-DH1	2479.086	2480.086	1	0.881	Pass
NVNT	2-DH1	2401.922	2402.926	1.004	0.838	Pass
NVNT	2-DH1	2440.922	2441.922	1	0.838	Pass
NVNT	2-DH1	2478.928	2479.926	0.998	0.838	Pass
NVNT	3-DH1	2401.922	2402.924	1.002	0.815	Pass
NVNT	3-DH1	2440.924	2441.924	1	0.815	Pass
NVNT	3-DH1	2478.926	2479.926	1	0.815	Pass
KO)				KO)		KO )

#### **Carrier Frequencies Separation**





**Test Graphs** 

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## Center 2.479500 GHz #Res BW 100 kHz Span 2.000 MHz Sweep 1.000 ms (1001 pts) #VBW 300 kHz N 1 f N 1 f 2.479 086 GHz 2.480 086 GHz -2.358 dBm -2.365 dBm 234 10 11 CFS NVNT 2-DH1 2402MHz Keysight Spectrum Analyzer - Swept SA 03:44:09 PM Apr 12 Avg Type: Log-Pw Avg|Hold:>100/100 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P NNNN Center Freg 2.402500000 GHz Trig: Free Run #Atten: 30 dB PNO: Wide IFGain:Low Mkr1 2.401 922 GHz -2.440 dBm Ref Offset 2.19 dB Ref 20.00 dBm 10 dB/div Log **r** $\Diamond^2$ 1 Center 2.402500 GHz #Res BW 100 kHz Span 2.000 MHz Sweep 1.000 ms (1001 pts) #VBW 300 kHz FUNCTION WIDTH TION N 1 f N 1 f 2.401 922 GHz 2.402 926 GHz -2.440 dBm -2.427 dBm 10 11 STATUS

CFS NVNT 1-DH1 2480MHz

Trig: Free Run #Atten: 30 dB

PNO: Wide IFGain:Low

ALTGN A

Avg Type: Log-Pwr Avg|Hold:>100/100

🔤 Keysight Spectrum Analyzer - Swept S KI RL Center Freg 2.479500000 GHz Ref Offset 2.41 dB Ref 20.00 dBm 10 d Log

Report No.: TCT220407E039

03:27:17 PM Apr 12, 20 TRACE 1 2 3 4 TYPE MWWW DET P N N N

TYPE DET

Mkr1 2.479 086 GHz -2.358 dBm

 $\Delta^2$ 

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# 03:47:25 PM Apr 12, 20 TRACE 1 2 3 4 TYPE MWWW DET P N N N Avg Type: Log-Pwr Avg|Hold:>100/100 Trig: Free Run #Atten: 30 dB PNO: Wide 🖵 IFGain:Low Mkr1 2.440 922 GHz -2.174 dBm Ref Offset 2.32 dB Ref 20.00 dBm 10 d Log **⊘**<sup>2</sup> **∲** Center 2.441500 GHz #Res BW 100 kHz Span 2.000 MHz Sweep 1.000 ms (1001 pts) #VBW 300 kHz N 1 f N 1 f 2.440 922 GHz 2.441 922 GHz -2.174 dBm -2.188 dBm 234 10 11 CFS NVNT 2-DH1 2480MHz Keysight Spectrum Analyzer - Swept SA 03:54:38 PM Apr 12, 2022 TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P N N N N Avg Type: Log-Pw Avg|Hold:>100/100 Center Freg 2.479500000 GHz Trig: Free Run #Atten: 30 dB PNO: Wide IFGain:Low Mkr1 2.478 928 GHz -1.729 dBm Ref Offset 2.41 dB Ref 20.00 dBm 10 dB/div Log **r ⊘**<sup>2</sup> ▲1

CFS NVNT 2-DH1 2441MHz

ALTGN AL

Center 2.479500 GHz #Res BW 100 kHz Span 2.000 MHz Sweep 1.000 ms (1001 pts) #VBW 300 kHz FUNCTION WIDTH TION N 1 f N 1 f 2.478 928 GHz 2.479 926 GHz -1.729 dBm -1.743 dBm 10 11 STATUS





KI RL

🔤 Keysight Spectrum Analyzer - Swept S

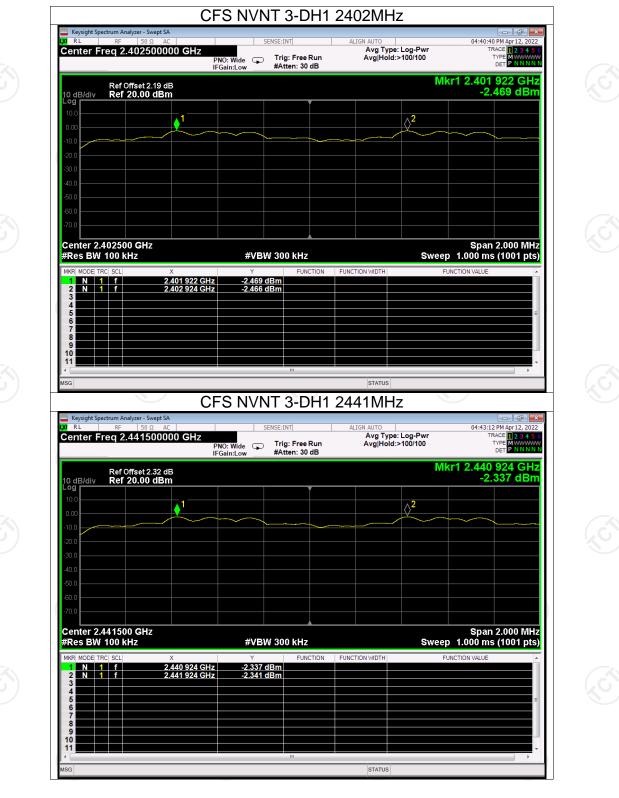
Center Freg 2.441500000 GHz











		S NVNT 3-DI	H1 2480MHz		
	50 Ω AC 79500000 GHz	SENSE:INT NO: Wide Trig: Free R Gain:Low #Atten: 30 d	ALIGN AUTO Avg Type: Log-F un Avg Hold:>100/1 B	04:47:25 PM Apr Wr TRACE 00 TYPE M DET P	2 3 4 5 6 WWWWW N N N N N
Ref Offs 10 dB/div Ref 20, Log	et 2.41 dB .00 dBm			Mkr1 2.478 926 -1.968	GHz dBm
0.00 -10.0 -20.0					~~~~
-30.0 -40.0 -50.0					
-60.0 -70.0 Center 2.479500 C				Span 2.00	0 MHz
#Res BW 100 kHz           MKR MODE TRC SCL           1         N           2         N           3	× 2.478 926 GHz 2.479 926 GHz	#VBW 300 kHz Y FUNCT -1.968 dBm -1.978 dBm	ION FUNCTION WIDTH	Sweep 1.000 ms (100 FUNCTION VALUE	1 pts)
4 5 6 7 8					
9 10 11 • MSG			STATUS		

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

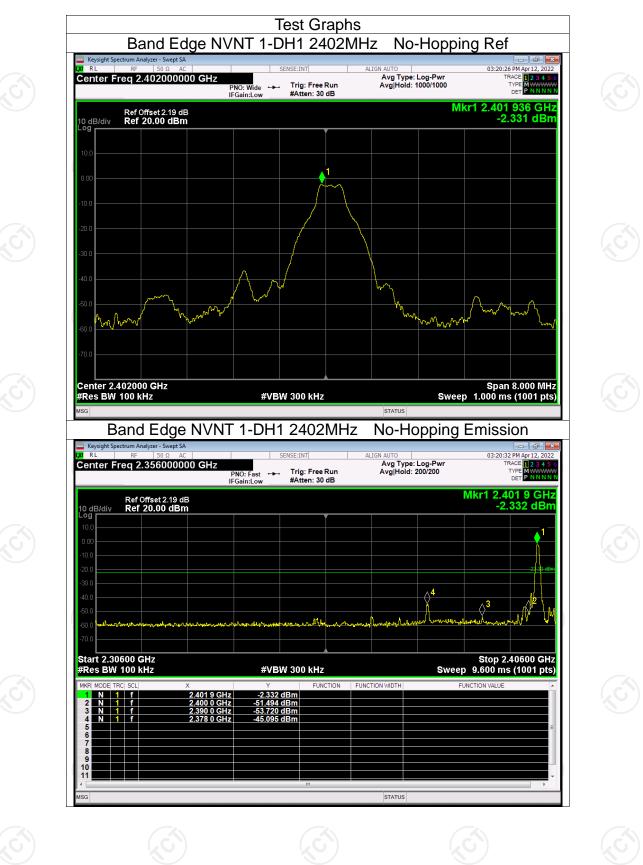
Dallu Luge						
Condition	Mode	Frequency (MHz)	Hopping Mode	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	1-DH1	2402	No-Hopping	-42.76	-20	Pass
NVNT	1-DH1	2480	No-Hopping	-43.38	-20	Pass
NVNT	2-DH1	2402	No-Hopping	-43.21	-20	Pass
NVNT	2-DH1	2480	No-Hopping	-42.87	-20	Pass
NVNT	3-DH1	2402	No-Hopping	-48.78	-20	Pass
NVNT	3-DH1	2480	No-Hopping	-42.12	-20	Pass

			Band Edge			
Condition	Mode	Frequency (MHz)	Hopping Mode	Max Value (dBc)	Limit (dBc)	Verdi
NVNT	1-DH1	2402	No-Hopping	-42.76	-20	Pas
NVNT	1-DH1	2480	No-Hopping	-43.38	-20	Pas
NVNT	2-DH1	2402	No-Hopping	-43.21	-20	Pas
NVNT	2-DH1	2480	No-Hopping	-42.87	-20	Pas



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Report No.: TCT220407E039



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Band Edge NVNT 2-DH1 2402MHz

**н**н

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

10 dB/div Loa

 Keysight Spectrum Analyzer - Swept SA

 RL
 RF
 50 Ω
 AC

 Center Freq 2.402000000 GHz

Ref Offset 2.19 dB Ref 20.00 dBm

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Report No.: TCT220407E039

03:41:37 PM Apr 12, 20 TRACE 1 2 3 4 TYPE MWWW DET P N N N

Mkr1 2.401 936 GHz -2.424 dBm

No-Hopping Ref

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



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Band Edge NVNT 3-DH1 2402MHz

Report No.: TCT220407E039

No-Hopping Ref

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Band Edge(Hopping)						
Condition	Mode	Frequency (MHz)	Hopping Mode	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	1-DH1	2402	Hopping	-41.92	-20	Pass
NVNT	1-DH1	2480	Hopping	-42.27	-20	Pass
NVNT	2-DH1	2402	Hopping	-43.56	-20	Pass
NVNT	2-DH1	2480	Hopping	-43.00	-20	Pass
NVNT	3-DH1	2402	Hopping	-45.58	-20	Pass
NVNT 🐇	3-DH1	2480	Hopping	-42.90	-20	Pass

### Band Edge(Hopping)



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Mkr1 2.401 936 GHz -2.395 dBm Ref Offset 2.19 dB Ref 20.00 dBm 10 dB/div Log n, Center 2.402000 GHz #Res BW 100 kHz Span 8.000 MHz Sweep 1.000 ms (1001 pts) #VBW 300 kHz STATUS Band Edge(Hopping) NVNT 1-DH1 2402MHz Hopping Emission Keysight Spect K RI Avg Type: Log-Pwr Avg|Hold: 5000/5000 Center Freq 2.356000000 GHz PNO: Fast ---- Trig: Free Run IFGain:Low #Atten: 30 dB TYP Mkr1 2.404 9 GHz -2.476 dBm Ref Offset 2.19 dB Ref 20.00 dBm 10 dB/di Log ĮŲ A 3 (Start 2.30600 GHz #Res BW 100 kHz Stop 2.40600 GHz Sweep 9.600 ms (1001 pts) #VBW 300 kHz FUNCTION WIDTH -2.476 dBm -46.840 dBm -46.411 dBm -44.319 dBm 2.400 0 GHz 2.390 0 GHz 2.387 0 GHz N N STATUS

Test Graphs

Band Edge(Hopping) NVNT 1-DH1 2402MHz

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

TCT通测检测 TESTING CENTRE TECHNOLOGY

Keysight Sp LXI R L

Center Freq 2.402000000 GHz

Report No.: TCT220407E039

NNNN

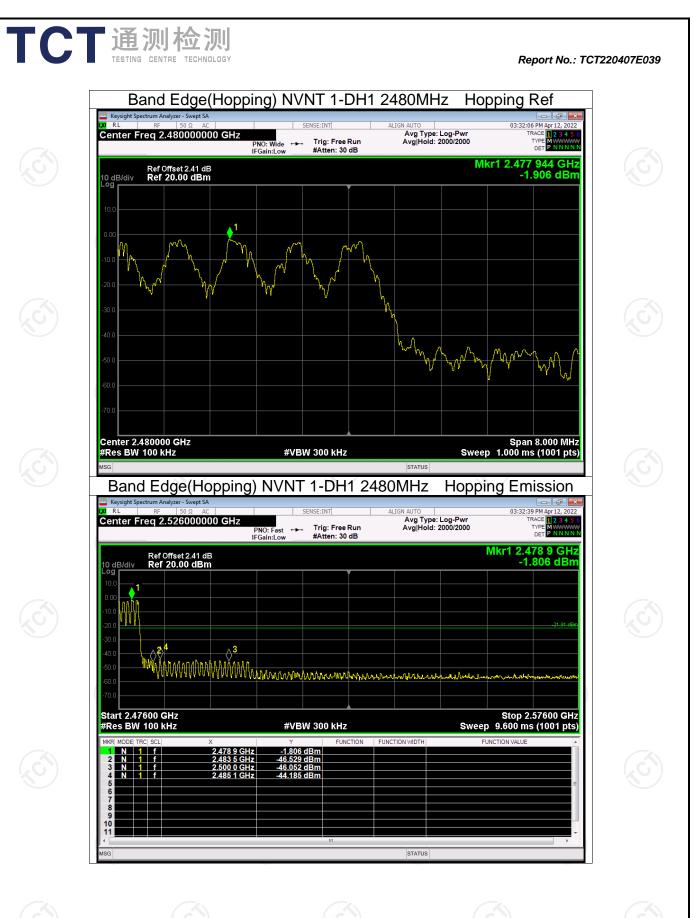
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03:39:10 PM Apr 12, 2022

TYP DE 1 2 3 4 5 Miananana

Hopping Ref

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



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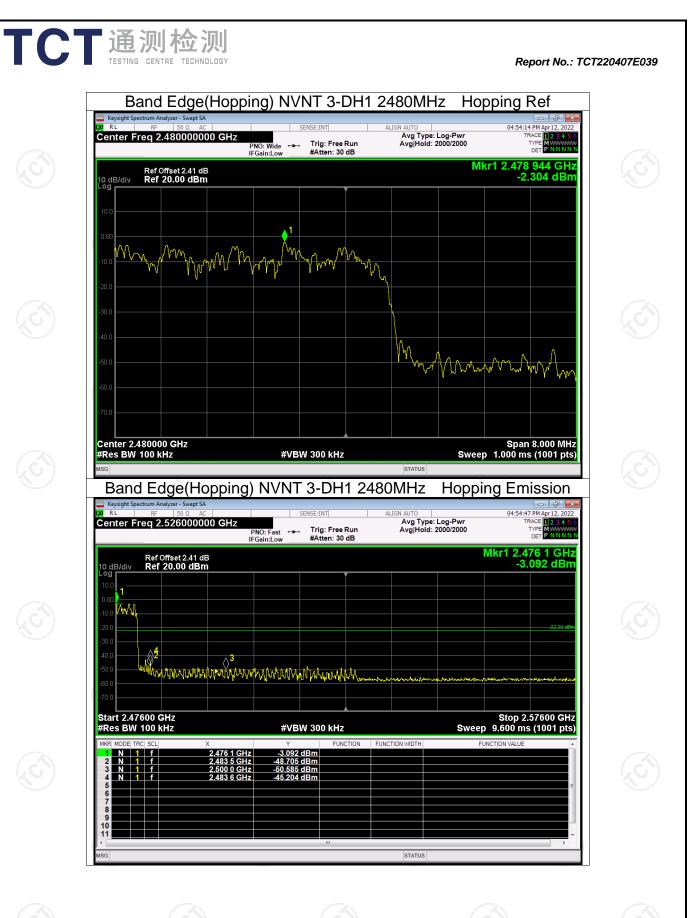


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### **Conducted RF Spurious Emission**

Condition	Mode	Frequency (MHz)	Max Value (dBc)	Limit (dBc)	Verdict	
NVNT	1-DH1	2402	-42.43	-20	Pass	
NVNT	1-DH1	2441	-43.13	-20	Pass	
NVNT	1-DH1	2480	-43.63	-20	Pass	
NVNT	2-DH1	2402	-42.86	-20	Pass	
NVNT	2-DH1	2441	-43.21	-20	Pass	
NVNT	2-DH1	2480	-44.22	-20	Pass	
NVNT 🚫	3-DH1	2402	-43.01	-20	Pass	
NVNT	3-DH1	2441	-43.40	-20	Pass	
NVNT	3-DH1	2480	-43.33	-20	Pass	

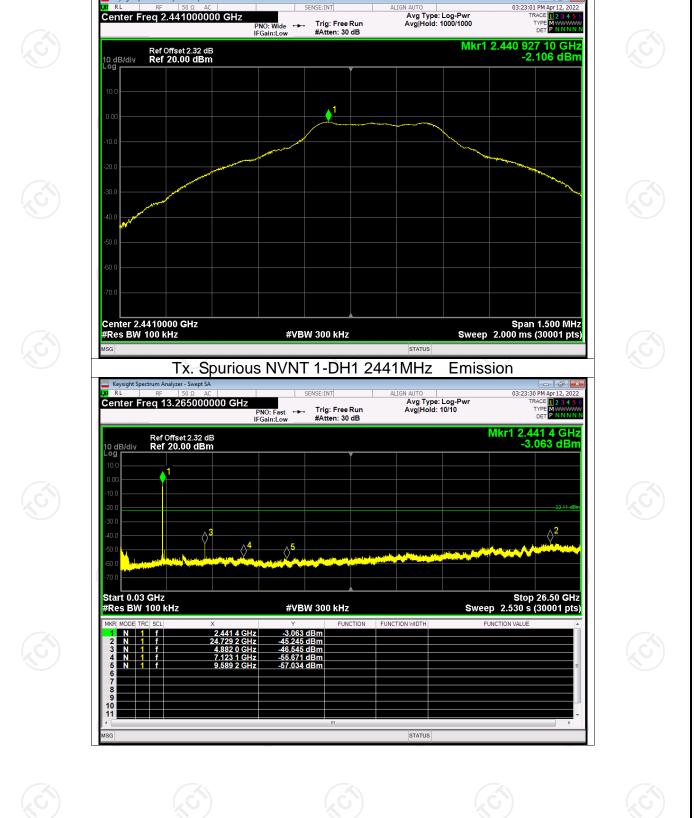
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Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com



Report No.: TCT220407E039



Tx. Spurious NVNT 1-DH1 2441MHz

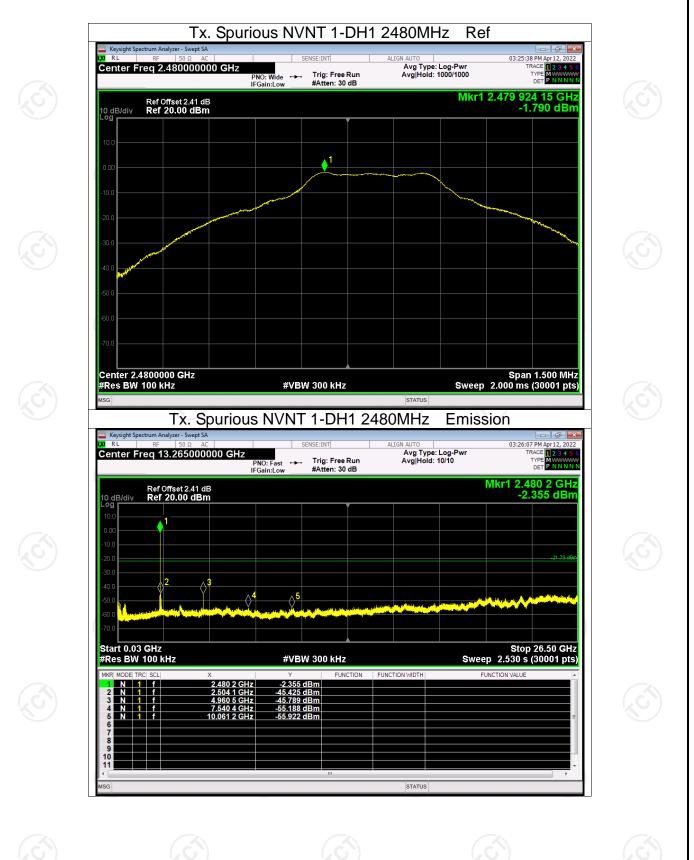
🔤 Keysight S

KI RL

Report No.: TCT220407E039

Ref

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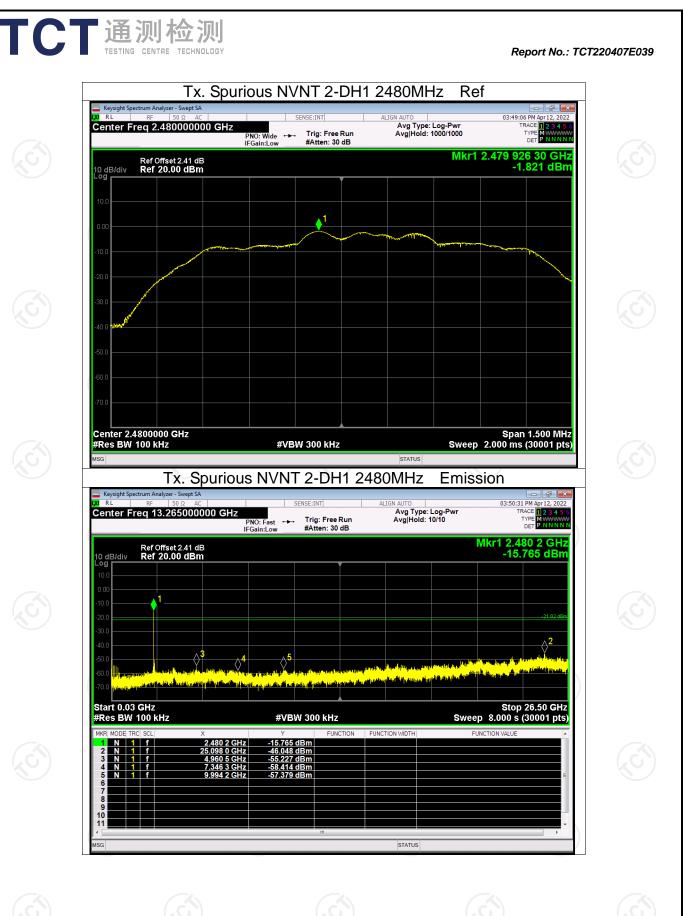
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Report No.: TCT220407E039

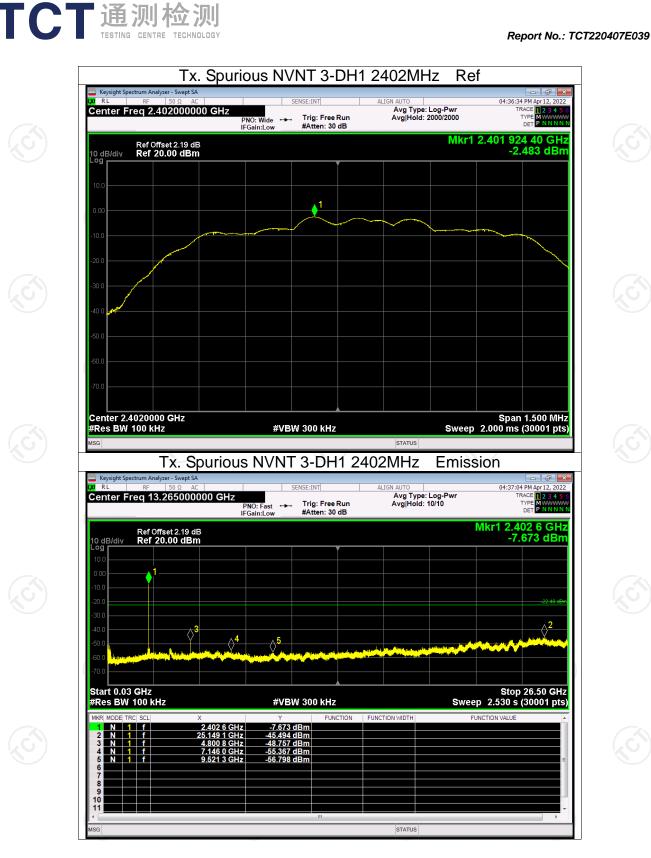




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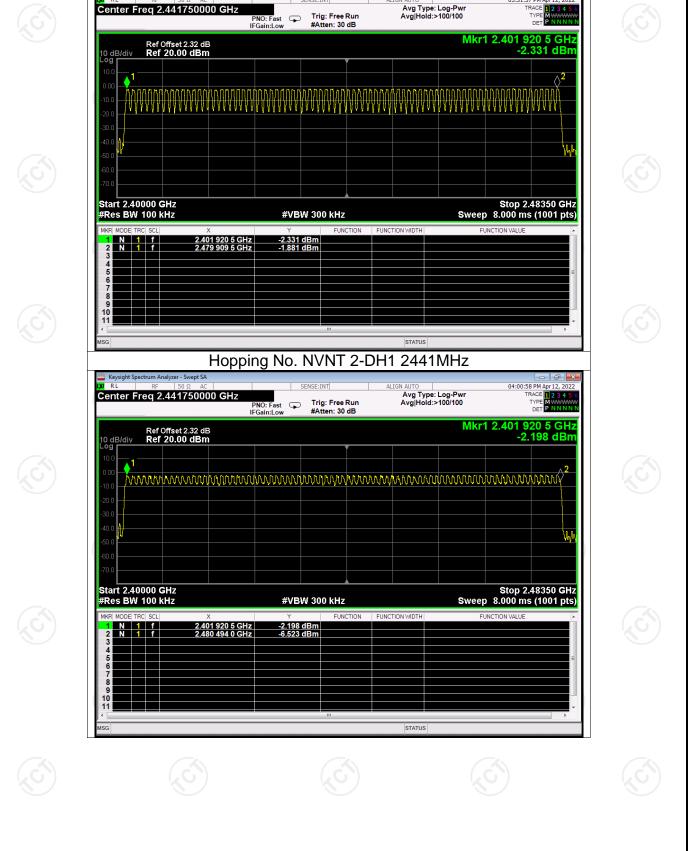


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	Verd Pas	Limit 15	Channel umber	lopping N 79	e   F	Mode 1-DH	Condition NVNT	(
S	Pas	15		79		2-DH	NVNT	
S	Pas	15		79		3-DH <sup>2</sup>	NVNT	



Test Graphs Hopping No. NVNT 1-DH1 2441MHz

Keysight Spectrum Analyzer - Swept S/

Center Freq 2.441750000 GHz

Report No.: TCT220407E039

03:31:37 PM Apr 12, 2022

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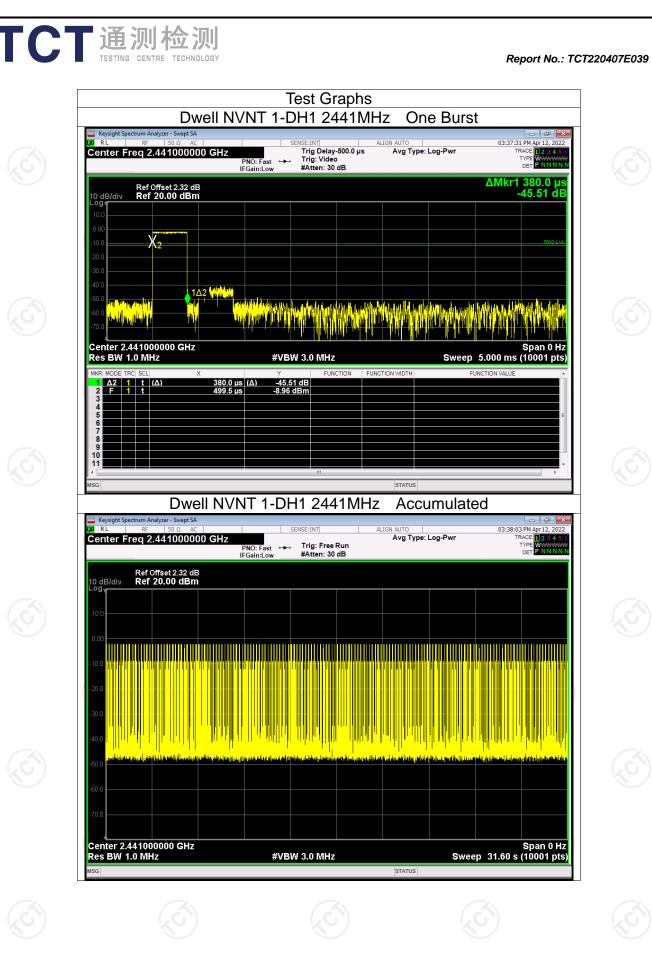
TC		检测 TECHNOLOGY				Report No	D.: TCT220407E039
	Keysight Spectrum Analyz	ter - Swept SA 50 Ω AC	ing No. NV		IN AUTO	04:53:08 PM Apr12, 2	022
		set 2.32 dB 9.00 dBm	IFGain:Low #At	i: Free Run ten: 30 dB	Avg Type: Log-Pwr Avg Hold:>100/100	1 2.401 920 5 G -3.317 dE	
	-50 0 -60 0 -70 0 Start 2,40000 GH #Res BW 100 kH: MKR MODE TRC SCL 1 N 1 f 2 N 1 f 3 4 5 6 6 7		#VBW 300 z -3.317 dBm z -3.834 dBm			Stop 2.48350 G p 8.000 ms (1001 p UNCTION VALUE	Hz ts)
	8 9 10 11 4 MSG			"	STATUS		
							Page 75 of 93

ТСТ	通测检测
	TESTING CENTRE TECHNOLOGY

Report No.: TCT220407E039

			Dwe	II Time				
Condition	Mode	Frequency (MHz)	Pulse Time (ms)	Total Dwell Time (ms)	Burst Count	Period Time (ms)	Limit (ms)	Verdict
NVNT	1-DH1	2441	0.38	120.46	317	31600	400	Pass
NVNT	1-DH3	2441	1.63	249.39	153	31600	400	Pass
NVNT	1-DH5	2441	2.88	334.08	116	31600	400	Pass
NVNT 😓	2-DH1	2441	0.39	124.41	319	31600	400	Pass
NVNT	2-DH3	2441	1.64	277.16	169	31600	400	Pass
NVNT	2-DH5	2441	2.89	329.46	114	31600	400	Pass
NVNT	3-DH1	2441	0.39	122.85	315	31600	400	Pass
NVNT	3-DH3	2441	1.64	247.64	151	31600	400	Pass
NVNT	3-DH5	2441	2.89	283.22	98	31600	400	Pass

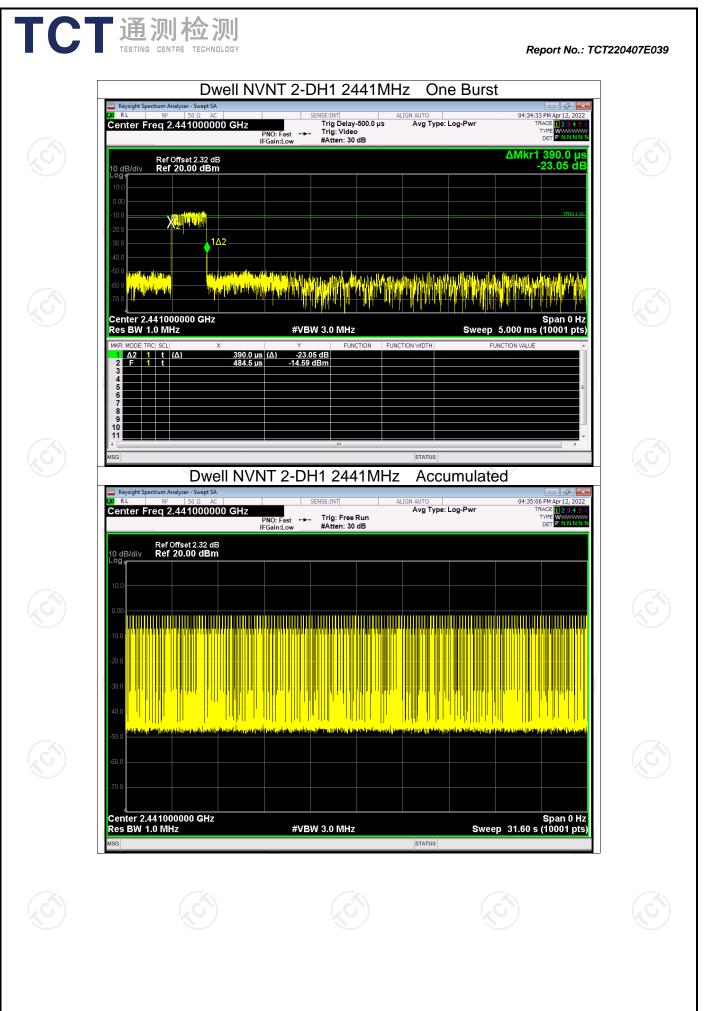




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TC	通测检测 TESTING CENTRE TECHNOLOGY Report No.: TCT	T220407E039
	Dwell NVNT 1-DH3 2441MHz       One Burst         Keysight Spectrum Analyzer - Swept SA       SENSE:INT       ALIGN AUTO       05:02:26 PM Apr 12, 2022         Center Freq 2.4410000000 GHz       Trig Delay-500.0 µs       Avg Type: Log-Pwr       TRACE       Trig: Video         PNO: Fast       Frig: Video       Trig: Video       Trig: Video       Trig: Video       Trig: Video	
	Ref Offset 2.32 dB         ΔMkr1 1.630 ms           10 dB/div         Ref 20.00 dBm           10 0         0.99 dB           10 0         0.00	
	Center 2.44 1000000 GHz         Span 0 Hz           Res BW 1.0 MHz         #VBW 3.0 MHz         Sweep 10.00 ms (10001 pts)           MKR MODE TRC SCL         X         Y         FUNCTION         FUNCTION WIDTH         FUNCTION VALUE           1         Δ2         1         t         (Δ)         0.99 dB         Image: Content of the second	
	2 F 1 t 489.0 µs -17.70 dBm	
	11         status           Msg         status           Dwell NVNT 1-DH3 2441MHz         Accumulated           Keysight Spectrum Analyzer - Swept SA         COM April 2, 2022           MRL         RF         S0 Ω         AC	
	Center Freq 2.441000000 GHz     Avg Type: Log-Pwr     TRACE 123450       PN0: Fast     Free Run     Trig: Free Run       IFGain:Low     #Atten: 30 dB     Der P KIN N N       Ref Offset 2.32 dB     10 dB/div     Ref 20.00 dBm	
	-200	
	-50 0 -60 0 -70 0 -70 0 -70 0	
	Center 2.441000000 GHz         Span 0 Hz           Res BW 1.0 MHz         #VBW 3.0 MHz         Sweep 31.60 s (10001 pts)	

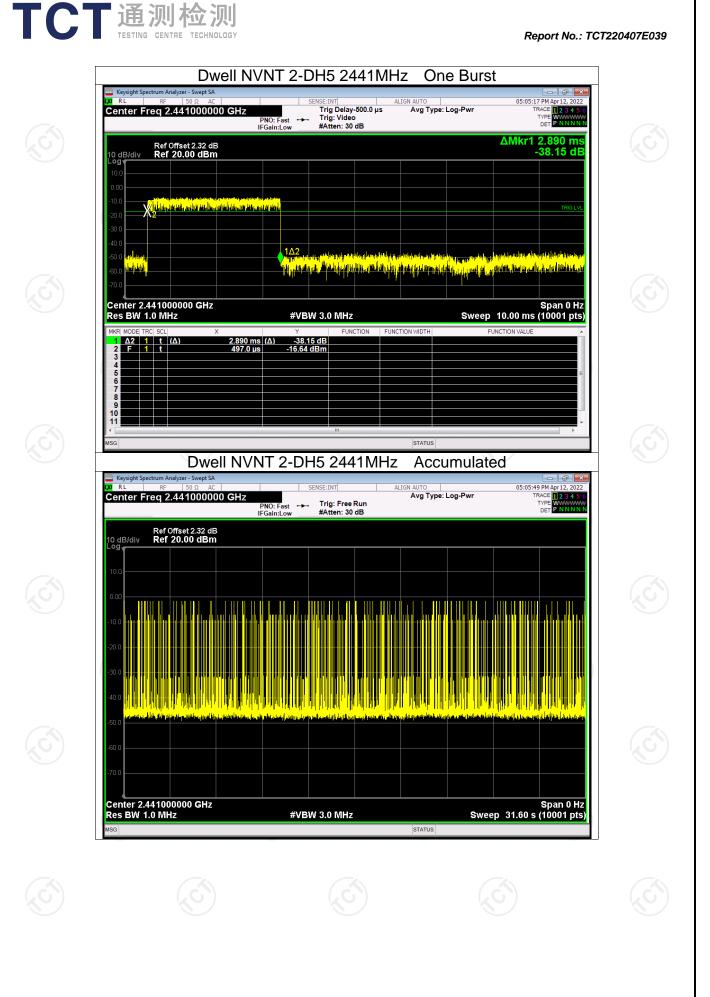
Keysight Spectrum Analyzer - Swe           K         RF         50 Ω           Center Freq 2.44100	AC SENSE:INT ALI 0000 GHz Trig Delay-500.0 µs PNO: East Trig: Video	Z One Burst	
Ref Offset 2.3 10 dB/div Ref 20.00 c	IFGain:Low #Atten: 30 dB	ΔMkr1 2.880 ms -9.52 dB	
10.0 0.00 -10.0		TRICLY	
-20.0			
-50.0 มูมุ <u>พพ</u> พ -60.0 <mark>ผู้ผู้หม่มู่</mark> -70.0	na solandi kana kana kana kana kana kana kana kan	n na na sana na sana na sana na	
Center 2.441000000 G Res BW 1.0 MHz	#VBW 3.0 MHz	Span 0 Hz Sweep 10.00 ms (10001 pts)	
MKR MODE TRC SCL $\begin{array}{c ccccccccccccccccccccccccccccccccccc$	χ         γ         FUNCTION         FUNCTION           2.880 ms         (Δ)         -9.52 dB         484.0 μs         -12.59 dBm	ON WIDTH FUNCTION VALUE	
5 6 7 8 9		E	
10 11 · · · · · · · · · · · · · · · · · ·		STATUS	
Keysight Spectrum Analyzer - Swe	AC SENSE:INT ALI	Accumulated	-
Center Freq 2.44100 Ref Offset 2.3	PNO: Fast ++- Trig: Free Run IFGain:Low #Atten: 30 dB	Avg Type: Log-Pwr TRACE D2845 6 TYPE WWWWW DET PNNNNN DET PNNNNN	
10 dB/div Ref 20.00 d			
-10.0 <b>112 11 112 11 11 11 11 11 11 11 11 11 11</b>			
-30.0		na a caratina canan na ara	
-40.0	i (1997) - Andre Stander, and an	n an	
-60.0			
Center 2.441000000 G	Hz #/CW/00004	Span 0 Hz	
Res BW 1.0 MHz	#VBW 3.0 MHz	Sweep 31.60 s (10001 pts) status	

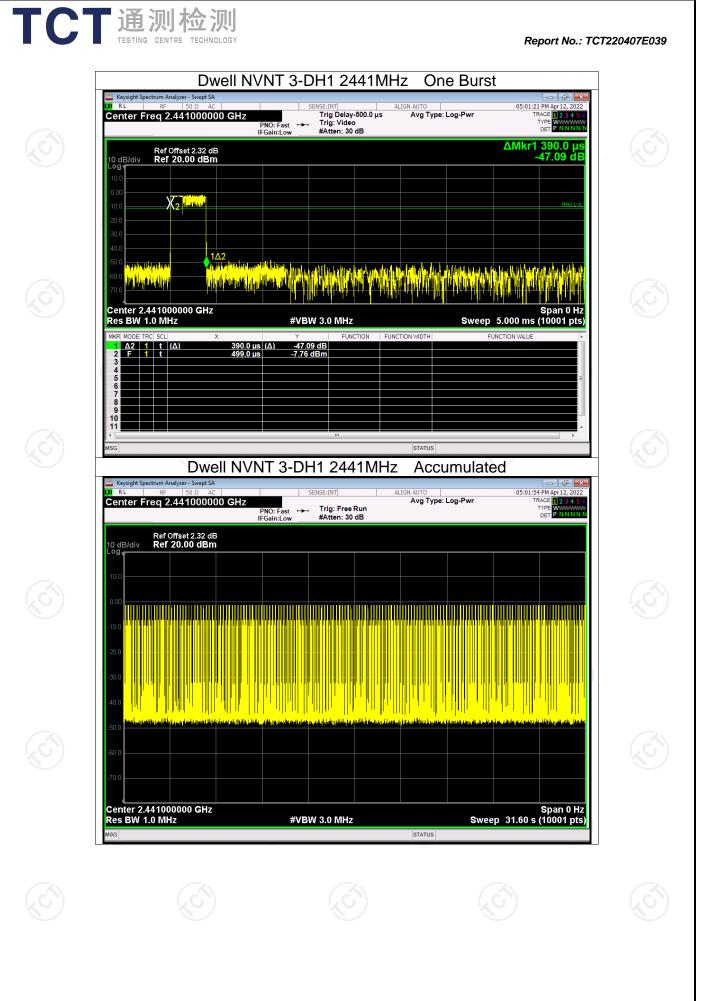


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TC	通测检测 TESTING CENTRE TECHNOLOGY Report No.: TC	T220407E039
	Dwell NVNT 2-DH3 2441MHz         One Burst           Keysight Spectrum Analyzer - Swept SA         C           RL         RF         50 Ω         AC	
	Center Freq 2.441000000 GHz Trig Delay-500.0 µs Avg Type: Log-Pwr TRACE 12:345 G PNO: Fast Trig: Video Trip: Video UPF NNNNNN IFGain:Low #Atten: 30 dB	
	10 dB/div Ref 20.00 dBm -48.46 dB	
	-70 0         -70 0 <th< td=""><td></td></th<>	
	MKR         MODE         TRC SCL         X         Y         FUNCTION         FUNCTION WIDTH         FUNCTION VALUE           1         Δ2         1         t         (Δ)         1.540 ms         (Δ)         -48.46 dB         -48.46 dB           2         F         1         t         484.0 μs         -12.44 dBm         -48.46 dB         -48.46 dB	
	4	
	10	
	Sense: Int         Align Auto         OS:04:39 PM Apr12, 2022           Center Fred 2.441000000 GHz         Align Auto         05:04:39 PM Apr12, 2022	
	PNO: Fast  PNO: Fast  Free Run  TYPE WWWWWWW IFGain:Low #Atten: 30 dB  DET PNNNN Ref Offset 2.32 dB	
	10 dB/div Ref 20.00 dBm	
	-20.0	
	Center 2.441000000 GHz         Span 0 Hz           Res BW 1.0 MHz         #VBW 3.0 MHz         Sweep         31.60 s (10001 pts)           Msg         status         status         status	

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	Dwell NVNT 3-DH3 2441MHz One Burst Keysight Spectrum Analyzer - Swept SA RL RF 50 Ω AC SENSE:INT ALIGN AUTO 05:06:20 PM Apr12, 2022 Center Freq 2.441000000 GHz Trig: Delay-500.0 µs Avg Type: Log-Pwr TRACE D 3:4 5:07 PNO: Fast → Trig: Video PG6/aint ow Patter: 28 dB DEF	
5)	IFGain:Low     #Atten: 28 dB       Ref Offset 2.32 dB     AMkr1 1.640 ms       10 dB/div     Ref 20.00 dBm	
	-30.0 -40.0 -50.0 -50.0 -50.0	
3	-50.0 -60.0 -70.0 Center 2.441000000 GHz	
	Res BW 1.0 MHz         #VBW 3.0 MHz         Sweep 10.00 ms (10001 pts)           MKR MODE TRC SCL         X         Y         FUNCTION         FUNCTION VALUE         •           1 Δ2 1         t         (Δ)         1.640 ms (Δ)         -48.27 dB         •         •           2 F         1         t         498.0 us         -3.29 dBm         •         •	
	3 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	
	8 9 9 10 10 10 10 10 10 10 10 10 10 10 10 10	6
	ASG STATUS Dwell NVNT 3-DH3 2441MHz Accumulated	
	Keysight Spectrum Analyzer - Swept SA     □     <	
	Ref Offset 2.32 dB 10 dB/div Ref 20.00 dBm	
3		(
(		
5)	-60.0	N.
	Center 2.441000000 GHz Span 0 Hz	
	Res BW 1.0 MHz         #VBW 3.0 MHz         Sweep 31.60 s (10001 pts)           MSG         STATUS	

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