

	TEST REPOR	T		
FCC ID:	2BFEP-DBM30			
Test Report No::	TCT240321E039			
Date of issue::	Apr. 23, 2024			
Testing laboratory:	SHENZHEN TONGCE TESTING	G LAB		
Testing location/ address:	2101 & 2201, Zhenchang Facto Fuhai Subdistrict, Bao'an Distric 518103, People's Republic of C	et, Shenzhen, Guangdong,		
Applicant's name::	CONVERGE BEAUTY LIMITED			
Address::	FLAT/RM C 22/F FORD GLOR' STREET LAI CHI KOK KOWLO			
Manufacturer's name:	Shenzhen Puge Electronics Co.	., Ltd.		
Address::	Building E, Urban Construction Industrial Zone, No. 1 Fenghuang Lingxia Road, Fuyong Street, Baoan 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::	Smart Wi-Fi Doorbell Camera			
Trade Mark:	N/A	(6)		
Model/Type reference:	M20, M10, M30, M60, T30, T20 N10, P30, P20, P10, Q30, Q20,	, T10, U30, U20, U10, N30, N20, Q10, V30, V20, V10		
Rating(s)::	Rechargeable Li-ion Battery DC	3.7V		
Date of receipt of test item	Mar. 21, 2024			
Date (s) of performance of test:	Mar. 21, 2024 ~ Apr. 23, 2024			
Tested by (+signature):	Onnado YE	Onnado Janger		
Check by (+signature):	Beryl ZHAO	BoyC TOT		
Approved by (+signature):	Tomsin	Tomsies &		

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# 1. General Product Information

# 1.1. EUT description

Product Name:	Smart Wi-Fi Doorbell Camera
Model/Type reference:	M20
Sample Number:	TCT240321E038-0101
Operation Frequency:	2412MHz~2462MHz (802.11b/802.11g/802.11n(HT20)
Channel Separation:	5MHz
Number of Channel:	11 for 802.11b/802.11g/802.11n(HT20)
Modulation Technology:	802.11b: Direct Sequence Spread Spectrum (DSSS) 802.11g/802.11n: Orthogonal Frequency Division Multiplexing(OFDM)
Data speed:	802.11b: 1Mbps, 2Mbps, 5.5Mbps, 11Mbps 802.11g: 6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps, 54Mbps 802.11n: Up to 150Mbps
Antenna Type:	Internal Antenna
Antenna Gain:	1.65dBi
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

No.	Model No.	Tested with
1	M20	
Other models	M10, M30, T30, M60, T20, T10, U30, U20, U10, N30, N20, N10, P30, P20, P10, Q30, Q20, Q10, V30, V20, V10	

Note: M20 is tested model, other models are derivative models. The models are identical in circuit and PCB layout, only different on the model names, colors and appearance. So the test data of M20 can represent the remaining models.

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# 1.3. Operation Frequency

# For 802.11b/g/n(HT20)

	<u> </u>	<u> </u>					
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412MHz	4	2427MHz	7	2442MHz	10	2457MHz
2	2417MHz	5	2432MHz	8	2447MHz	11	2462MHz
3	2422MHz	6	2437MHz	9	2452MHz		

#### Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

# 802.11b/802.11g/802.11n (HT20)

Channel	Frequency
The lowest channel	2412MHz
The middle channel	2437MHz
The Highest channel	2462MHz





# 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 Output Power	§15.247 (b)(3)	PASS
6dB Emission Bandwidth	§15.247 (a)(2)	PASS
Power Spectral Density	§15.247 (e)	PASS
Band Edge	§15.247(d)	PASS
Spurious Emission	§15.205/§15.209	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:	20.3 °C	24.3 °C			
Humidity:	44 % RH	50 % RH			
Atmospheric Pressure:	1010 mbar	1010 mbar			
Test Software:					
Software Information:	ETF GUI Tool				
Power Level:	Default				
Test Mode:					
Engineer mode:  Keep the EUT in continuous transmitting by select channel and modulations with max duty cycle					

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.

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

Per-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.

(°)	Mode	Data rate		
	802.11b	1Mbps		
802.11g		6Mbps		
802.11n(H20)		6.5Mbps		



# 3.2. Description of Support Units

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

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

#### 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, 6dB Emission Bandwidth, Power Spectral Density, 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: 2101 & 2201, Zhenchang Factory Renshan Industrial Zone, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, 518103, People's Republic of China

TEL: +86-755-27673339

# 4.3. Measurement Uncertainty

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

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



# 5. Test Results and Measurement Data

# 5.1. Antenna requirement

# Standard requirement: FCC Part15 C

FCC Part15 C Section 15.203 /247(c)

15.203 requirement:

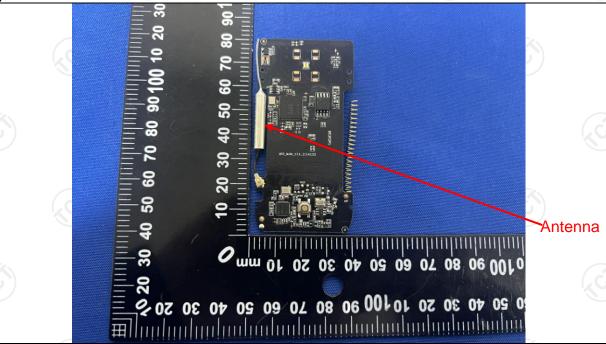
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit 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 WIFI antenna is internal antenna which permanently attached, and the best case gain of the antenna is 1.65dBi.







# 5.2. Conducted Emission

# 5.2.1. Test Specification

Test Requirement:	FCC Part15 C Section	15 207	(.c.
•			
Test Method:	ANSI C63.10:2013		
Frequency Range:	150 kHz to 30 MHz		
Receiver setup:	RBW=9 kHz, VBW=30	kHz, Sweep time	=auto
Limits:	Frequency range (MHz) 0.15-0.5 0.5-5	Limit ( Quasi-peak 66 to 56* 56	dBuV) Average 56 to 46* 46
	5-30	- 60	50
Test Setup:	Reference Plane  40cm  80cm LISN  Filter AC power  Test table/Insulation plane  Remark  E.U.T. Equipment Under Test LISN: Line Impedence Stabilization Network Test table height=0.8m		
Test Mode: Test Procedure:	<ol> <li>Charging + Transmitting Mode</li> <li>The E.U.T is connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.</li> <li>The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</li> <li>Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.</li> </ol>		
	PASS	<del>(201)</del>	——————————————————————————————————————



# 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	Jun. 29, 2024				
Line Impedance Stabilisation Newtork(LISN)	Schwarzbeck	NSLK 8126	8126453	Jan. 31, 2025				
Line-5	TCT	CE-05	/	Jul. 03, 2024				
EMI Test Software	Shurple Technology	EZ-EMC	1 (3)	1 6				

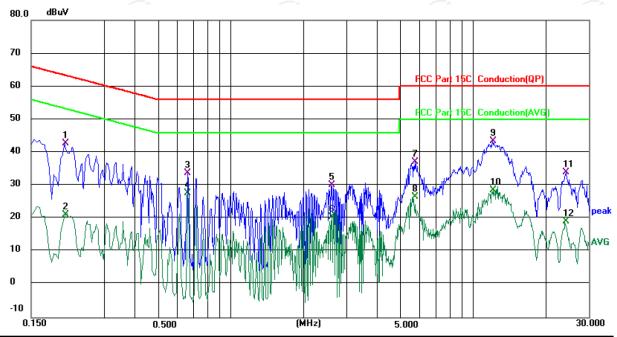




#### 5.2.3. Test data

# Please refer to following diagram for individual

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



Site 844 Shielding Room

Phase: L1

Temperature: 20.3 (℃)

Humidity: 44 %

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	dBu∀	dB	dBu∀	dBu∀	dB	Detector	Comment
1		0.2083	32.65	10.05	42.70	63.27	-20.57	QP	
2		0.2083	11.17	10.05	21.22	53.27	-32.05	AVG	
3		0.6660	24.59	9.19	33.78	56.00	-22.22	QP	
4		0.6660	18.43	9.19	27.62	46.00	-18.38	AVG	
5		2.6139	20.11	10.12	30.23	56.00	-25.77	QP	
6		2.6139	10.37	10.12	20.49	46.00	-25.51	AVG	
7		5.7538	26.77	10.44	37.21	60.00	-22.79	QP	
8		5.7538	16.22	10.44	26.66	50.00	-23.34	AVG	
9	*	12.1500	32.76	10.64	43.40	60.00	-16.60	QP	
10		12.1500	18.01	10.64	28.65	50.00	-21.35	AVG	
11		24.1980	23.18	10.76	33.94	60.00	-26.06	QP	
12		24.1980	8.34	10.76	19.10	50.00	-30.90	AVG	

#### Note:

Freq. = Emission frequency in MHz

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

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

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

Limit (dBµV) = Limit stated in standard

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

Q.P. =Quasi-Peak

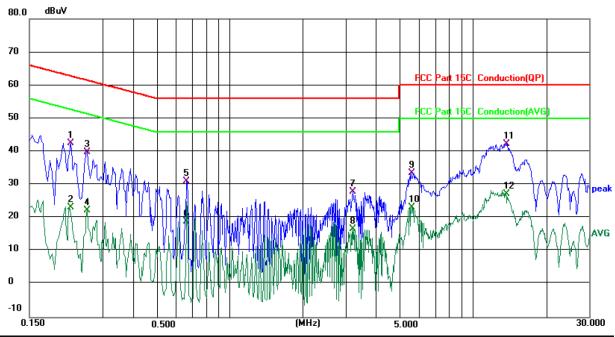
AVG =average

 $<sup>^{\</sup>star}$  is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz.





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



Site 844 Shielding Room

Phase: N

Temperature: 20.3 (°C)

Humidity: 44 %

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	dBu∀	dB	dBu∀	dBu∀	dB	Detector	Comment
1		0.2220	32.68	9.82	42.50	62.74	-20.24	QP	
2		0.2220	13.48	9.82	23.30	52.74	-29.44	AVG	
3		0.2580	30.00	9.83	39.83	61.50	-21.67	QP	
4		0.2580	12.49	9.83	22.32	51.50	-29.18	AVG	
5		0.6660	22.00	9.16	31.16	56.00	-24.84	QP	
6		0.6660	9.70	9.16	18.86	46.00	-27.14	AVG	
7		3.2219	17.68	10.13	27.81	56.00	-28.19	QP	
8		3.2219	6.55	10.13	16.68	46.00	-29.32	AVG	
9		5.5979	23.14	10.36	33.50	60.00	-26.50	QP	
10		5.5979	12.75	10.36	23.11	50.00	-26.89	AVG	
11	*	13.7179	31.64	10.61	42.25	60.00	-17.75	QP	
12		13.7179	16.53	10.61	27.14	50.00	-22.86	AVG	

#### Note:

Freq. = Emission frequency in MHz

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

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

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

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

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

Q.P. =Quasi-Peak

AVG =average

 $<sup>^{\</sup>star}$  is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz.



# 5.3. Maximum Conducted (Average) Output Power

# 5.3.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	KDB 558074 D01 v05r02
Limit:	30dBm
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>Measure the conducted output power and record the results in the test report.</li> </ol>
Test Result:	PASS

# 5.3.2. Test Instruments

Equipment	Manufacturer Model S		Serial Number	<b>Calibration Due</b>	
Spectrum Analyzer	Agilent	N9020A	MY49100619	Jun. 28, 2024	
Combiner Box	Ascentest	AT890-RFB			

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# 5.4. Emission Bandwidth

# 5.4.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (a)(2)
Test Method:	KDB 558074 D01 v05r02
Limit:	>500kHz
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>Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6dB bandwidth must be greater than 500 kHz.</li> <li>Measure and record the results in the test report.</li> </ol>
Test Result:	PASS

# 5.4.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100619	Jun. 28, 2024
Combiner Box	Ascentest	AT890-RFB		(3)







# 5.5. Power Spectral Density

# 5.5.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (e)					
Test Method:	KDB 558074					
Limit:	The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.					
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>Make the measurement with the spectrum analyzer's resolution bandwidth (RBW): 3 kHz ≤ RBW ≤ 100 kHz. Video bandwidth VBW ≥ 3 x RBW. Set the span to at least 1.5 times the OBW.</li> <li>Detector = RMS, Sweep time = auto couple.</li> <li>Employ trace averaging (RMS) mode over a minimum of 100 traces. Use the peak marker function to determine the maximum power level.</li> <li>Measure and record the results in the test report.</li> </ol>					
Test Result:	PASS					

# 5.5.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100619	Jun. 28, 2024
Combiner Box	Ascentest	AT890-RFB	1	1





# 5.6. Conducted Band Edge and Spurious Emission Measurement

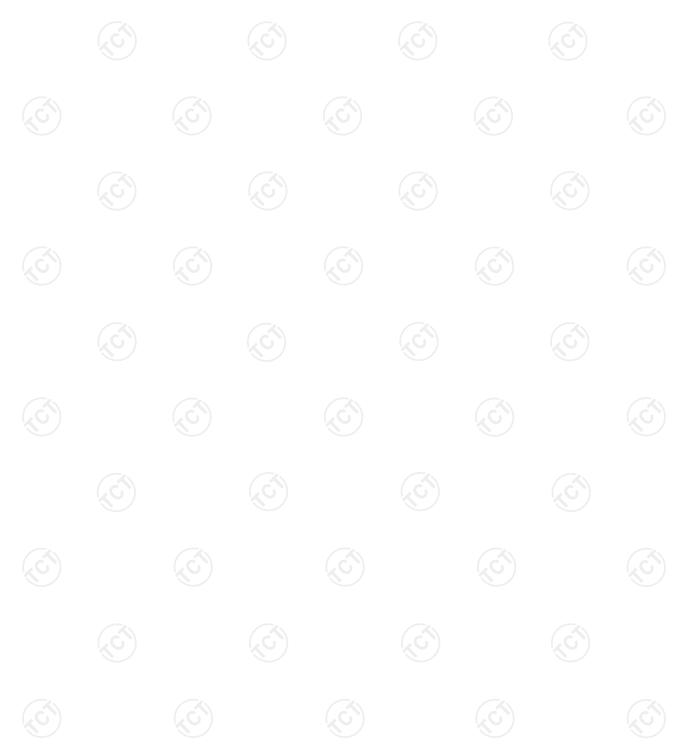
# 5.6.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	KDB558074
Limit:	In any 100 kHz bandwidth outside of the authorized frequency band, the emissions which fall in the non-restricted bands shall be attenuated at least 20 dB / 30dB relative to the maximum PSD level in 100 kHz by RF conducted measurement and radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(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>Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).</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



# 5.6.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100619	Jun. 28, 2024
Combiner Box	Ascentest	AT890-RFB	1	1



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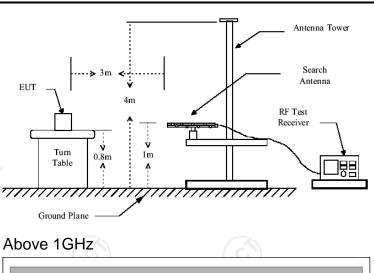
TESTING CENTRE TECHNOLOGY Report No.: TCT240321E039

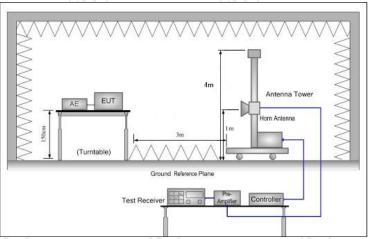
# 5.7. Radiated Spurious Emission Measurement

# 5.7.1. Test Specification

Test Requirement:	FCC Part15	FCC Part15 C Section 15.209							
Test Method:	ANSI C63.10	0:2013							
Frequency Range:	9 kHz to 25 (	GHz							
Measurement Distance:	3 m		(0)		KC				
Antenna Polarization:	Horizontal &	Vertical							
Operation mode:	Transmitting	mode wit	h modulat	ion		C.			
Receiver Setup:	Frequency 9kHz- 150kHz 150kHz- 30MHz 30MHz Above 1GHz	Detector Quasi-peak Quasi-peak Peak	9kHz	VBW 1kHz 30kHz 300KHz 3MHz 10Hz	Remark Quasi-peak Value Quasi-peak Value Quasi-peak Value Peak Value				
Limit:	II Freduency I		Field Strength (microvolts/meter) 2400/F(KHz) 24000/F(KHz) 30 100 150 200 500  eld Strength rovolts/meter)  Measure Distair (mete 500 3 5000 3		nce Detector				
Test setup:	For radiated emissions below 30MHz  Distance = 3m  Computer  Pre - Amplifier  Receiver  30MHz to 1GHz								







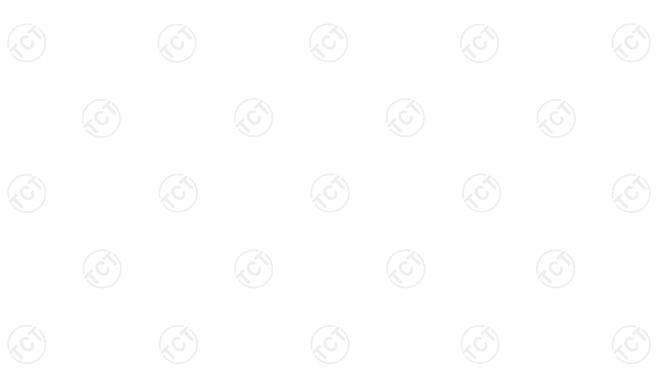
1. For the radiated emission test below 1GHz:

#### **Test Procedure:**

The EUT was placed on a turntable with 0.8 meter above ground. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high PASS filter are used for the test in order to get better signal level. For the radiated emission test above 1GHz: Place the measurement antenna on a turntable with 1.5 meter above ground, which is away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which



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	maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.  3. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level  4. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission
	<ul> <li>level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.</li> <li>5. Use the following spectrum analyzer settings: <ul> <li>(1) Span shall wide enough to fully capture the emission being measured;</li> <li>(2) Set RBW=120 kHz for f &lt; 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;</li> <li>(3) Set RBW = 1 MHz, VBW= 3MHz for f &gt;1 GHz for</li> </ul> </li> </ul>
	peak measurement.  For average measurement: VBW = 10 Hz, when duty cycle is no less than 98 percent. VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
Test results:	PASS





# 5.7.2. Test Instruments

	Radiated En	nission Test Site	e (966)	
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESIB7	100197	Jun. 29, 2024
Spectrum Analyzer	R&S	FSQ40	200061	Jun. 29, 2024
Pre-amplifier	SKET	LNPA_0118G- 45	SK2021012 102	Jan. 31, 2025
Pre-amplifier	SKET	LNPA_1840G- 50	SK2021092 03500	Jan. 31, 2025
Pre-amplifier	HP	8447D	2727A05017	Jun. 27, 2024
Loop antenna	Schwarzbeck	FMZB1519B	00191	Jul. 02, 2024
Broadband Antenna	Schwarzbeck	VULB9163	340	Jul. 01, 2024
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Jul. 01, 2024
Horn Antenna	Schwarzbeck	BBHA 9170	00956	Feb. 02, 2025
Antenna Mast	Keleto	RE-AM	/	/
Coaxial cable	SKET	RC-18G-N-M	1	Jan. 31, 2025
Coaxial cable	SKET	RC_40G-K-M	/	Jan. 31, 2025
EMI Test Software	Shurple Technology	EZ-EMC		1 6

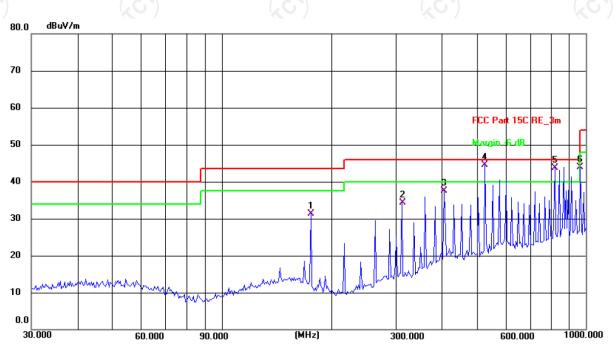




# 5.7.3. Test Data

# Please refer to following diagram for individual Below 1GHz

Horizontal:



Site: 3m Anechoic Chamber Polarization: Horizontal Temperature: 24.3(C) Humidity: 50 %

Power: DC 3.7 V

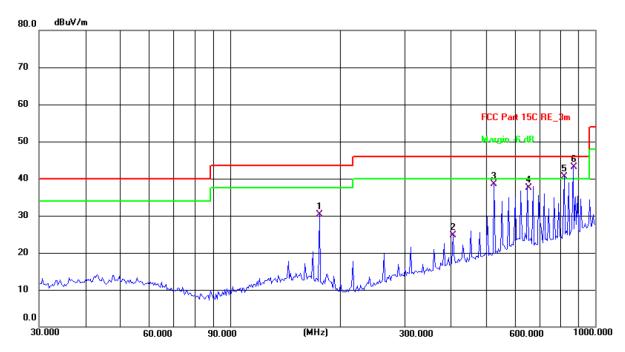
Limit: FCC Part 15C RE\_3m

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	175.6516	43.40	-12.16	31.24	43.50	-12.26	QP	Р	
2	312.1794	44.27	-9.90	34.37	46.00	-11.63	QP	Р	
3	407.5144	45.69	-8.21	37.48	46.00	-8.52	QP	Р	
4 *	528.2458	50.77	-6.25	44.52	46.00	-1.48	QP	Р	
5!	821.7103	44.82	-1.15	43.67	46.00	-2.33	QP	Р	
6	965.5420	42.42	1.39	43.81	54.00	-10.19	QP	Р	





#### Vertical:



Site: 3m Anechoic Chamber Polarization: Vertical Temperature: 24.3(C) Humidity: 50 %

Limit: FCC Part 15C RE 3m

Limit: 1	-CC Part 15C F				Power:	DC 3.7 V	<b>V</b>		
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	175.6516	42.47	-12.16	30.31	43.50	-13.19	QP	Р	
2	407.5144	32.92	-8.21	24.71	46.00	-21.29	QP	Р	
3	528.2458	44.77	-6.25	38.52	46.00	-7.48	QP	Р	
4	651.9417	40.86	-3.26	37.60	46.00	-8.40	QP	Р	
5 !	821.7103	41.72	-1.15	40.57	46.00	-5.43	QP	Р	
6 *	869 1302	43.72	-0.70	43.02	46.00	-2 98	OP	Р	

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

- 2. Measurements were conducted in all three channels (high, middle, low) and all modulation(802.11b, 802.11g, 802.11n(HT20)), and the worst case Mode (Highest channel and 802.11b) 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

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

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

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

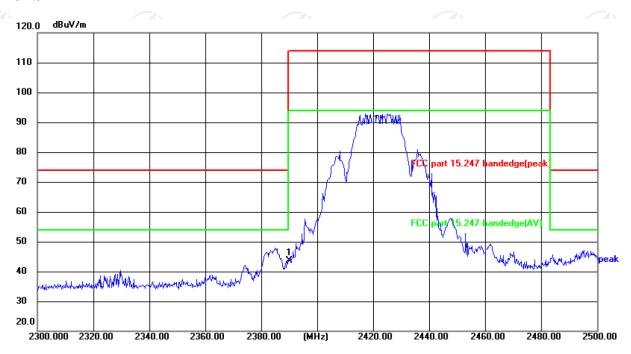
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# Test Result of Radiated Spurious at Band edges

#### Lowest channel 2412:

#### Horizontal:



Site: 3m Anechoic Chamber Polarization: Horizontal Temperature: 24.1(°C) Humidity: 43 %

Limit: FCC part 15.247 bandedge(peak)

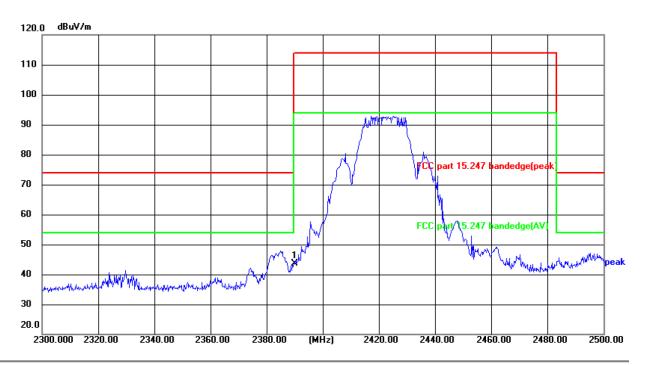
Power:DC 3.7 V

No.	Frequency (MHz)	Reading (dBuV)	l	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark	
1 *	2390.000	59.43	-15.86	43.57	74.00	-30.43	peak	Р		
(C)		(	5)		(,0)				(C)	(0)





#### Vertical:



Site: 3m Anechoic Chamber Polarization: Vertical Temperature: 24.1(°C) Humidity: 43 %

Limit: FCC part 15.247 bandedge(peak)

Power:DC 3.7 V

No.	Frequency (MHz)	Reading (dBuV)		Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 *	2390.000	59.43	-15.86	43.57	74.00	-30.43	peak	Р	

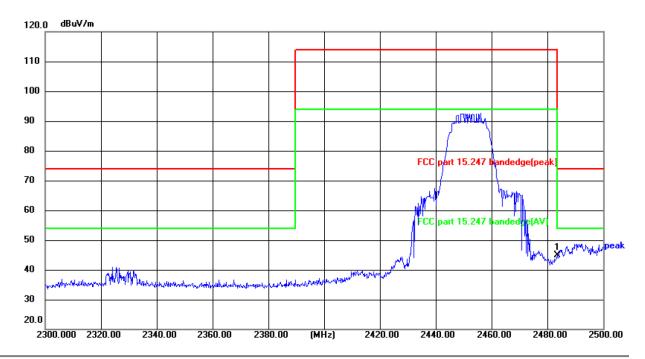
**Note:** Measurements were conducted in all two channels (high, low) and all modulation (802.11b, 802.11g, 802.11n(HT20)), and the worst case Mode 802.11b was submitted only.





# Highest channel 2462:

## Horizontal:



Site: 3m Anechoic Chamber Polarization: Horizontal Temperature: 24.1(°C) Humidity: 43 %

Limit: FCC part 15.247 bandedge(peak)

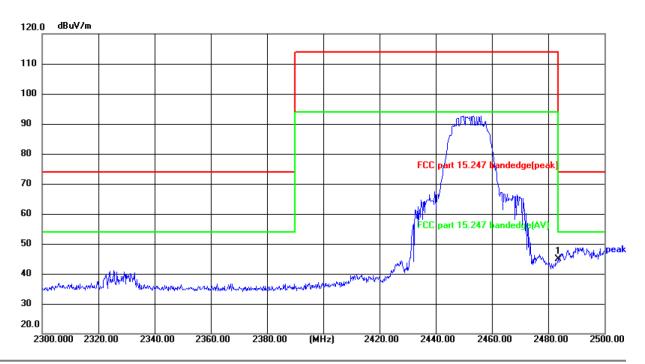
Power:DC 3.7 V

No.	Frequency (MHz)	Reading (dBuV)		Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 *	2483.500	60.85	-15.87	44.98	74.00	-29.02	peak	Р	





#### Vertical:



Site: 3m Anechoic Chamber Polarization: Vertical Temperature: 24.1(°C) Humidity: 43 %

Limit: FCC part 15.247 bandedge(peak)

Power:DC 3.7 V

No.	Frequency (MHz)	Reading (dBuV)		Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 *	2483.500	60.85	-15.87	44.98	74.00	-29.02	peak	Р	

#### Note:

- 1. Peak Final Emission Level=Peak Reading + Correction Factor;
- 2. Correction Factor= Antenna Factor + Cable loss Pre-amplifier
- 3. Measurements were conducted in all two channels (high, low) and all modulation (802.11b, 802.11g, 802.11n(HT20)), and the worst case Mode 802.11b was submitted only.





## Above 1GHz Modulation Type: 802.11b

			L	ow channe	l: 2412 MH:	Z			
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBuV)	Correction Factor (dB/m)	Emission Peak (dBµV/m)	AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4824	Н	45.52		0.75	46.27		74	54	-7.73
7236	Η	33.67		9.87	43.54		74	54	-10.46
	Н								
4824	V	44.24		0.75	44.99		74	54	-9.01
7236	V	33.11	{_C	9.87	42.98	O`)	74	54	-11.02
	V				~	)			

			Mi	ddle chann	el: 2437 MI	Ηz			
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)	Emission Peak (dBµV/m)	n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4874	Н	44.39		0.97	45.36		74	54	-8.64
7311	Н	31.61		9.83	41.44		74	54	-12.56
	H				(			-4-	
	KO)		Ι <u>΄</u>		K	0)		(VO)	
4874	V	42.51		0.97	43.48		74	54	-10.52
7311	V	31.32		9.83	41.15		74	54	-12.85
	V								

					4 1				
			/ н	ligh channe	l: 2462 MH	Z			
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)	Emission Peak (dBµV/m)	n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4924	H	43.07	( c)	1.18	44.25		74	54	-9.75
7386	Ŧ	34.15		10.07	44.22	)	74	54	-9.78
	H								
4924	V	43.58		1.18	44.76		74	54	-9.24
7386	V	33.92		10.07	43.99		74	54	-10.01
	V	-12			<i></i>				7

## 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. The highest test frequency is 25GHz.
- 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. All the restriction bands are compliance with the limit of 15.209.



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Modulation Type: 802.11g

	Low channel: 2412 MHz												
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBuV)	Correction Factor (dB/m)	Emission Peak (dBµV/m)	n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)				
4824	Τ	44.22		0.75	44.97		74	54	-9.03				
7236	Н	34.16		9.87	44.03		74	54	-9.97				
\/	Н				<b>/</b>		<u></u>		\\\\\				
4824	V	43.66		0.75	44.41		74	54	-9.59				
7236	V	33.58		9.87	43.45	~~	74	54	-10.55				
	V		<del>(</del>			O`)		(, G-1)					

	Middle channel: 2437 MHz								
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)	Emission Peak (dBµV/m)	n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4874	Н	43.67		0.97	44.64	-	74	54	-9.36
7311	Н	32.01		9.83	41.84		74	54	-12.16
	Н								
4874	V	42.45	//-0	0.97	43.42	<u> </u>	74	54	-10.58
7311	V	31.90		9.83	41.73		74	54	-12.27
	V								

					7.				
	High channel: 2462 MHz								(.c.)
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)	Emission Peak (dBµV/m)	n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4924	H	43.14		1.18	44.32		74	54	-9.68
7386	H	33.29	<del>/</del> c)	10.07	43.36	<u> </u>	74	54	-10.64
	H			/				/	
4924	V	44.72		1.18	45.90		74	54	-8.10
7386	V	34.31		10.07	44.38		74	54	-9.62
$(\cdot \in \cdot)$	V	<del>(-</del> C)		(, (	·		\C\ <del>2\</del>		(, <del>-</del> )

#### 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. The highest test frequency is 25GHz.
- 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. All the restriction bands are compliance with the limit of 15.209.





Modulation	Type: 802.11n	(HT20)
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Low channel: 2412 MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBuV)	Correction Factor (dB/m)	Emission Peak (dBµV/m)	n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4824	Н	42.33		0.75	43.08		74	54	-10.92
7236	Н	30.14		9.87	40.01		74	54	-13.99
	Н				<b>)</b>		<u></u>		
4824	V	43.08		0.75	43.83		74	54	-10.17
7236	V	32.15		9.87	42.02	~	74	54	-11.98
	V		{_C	*)		O ')		(, G)	

	Middle channel: 2437 MHz								
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)	Emission Peak (dBµV/m)	n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4874	Н	42.68		0.97	43.65	-	74	54	-10.35
7311	Н	32.14		9.83	41.97		74	54	-12.03
	Н								
4874	V	44.87	//-0	0.97	45.84	<u> </u>	74	54	-8.16
7311	V	33.06		9.83	42.89		74	54	-11.11
	V								

					7/.				
(.c)	High channel: 2462 MHz						(.c.)		(.c.)
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)	Emission Peak (dBµV/m)	n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4924	Н	41.33		1.18	42.51		74	54	-11.49
7386	H	32.01	<del>/</del> c)	10.07	42.08	<u> </u>	74	54	-11.92
	H			/		)		\(\frac{1}{2}\)	
4924	V	43.61		1.18	44.79		74	54	-9.21
7386	V	33.24		10.07	43.31		74	54	-10.69
(, <del>C-</del> , )	V	<del>(-,</del> C)		(, (	( )		\C <del>\ \</del>		(. <del></del> )

#### 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. The highest test frequency is 25GHz.
- 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. All the restriction bands are compliance with the limit of 15.209.

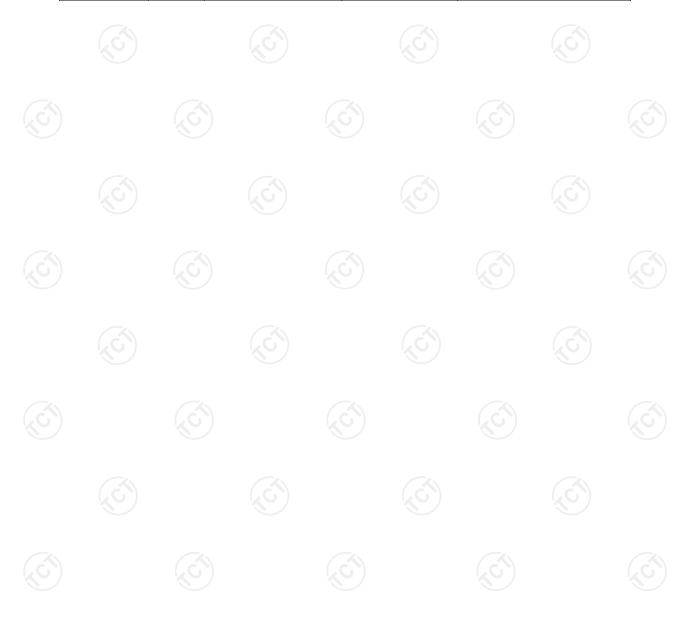




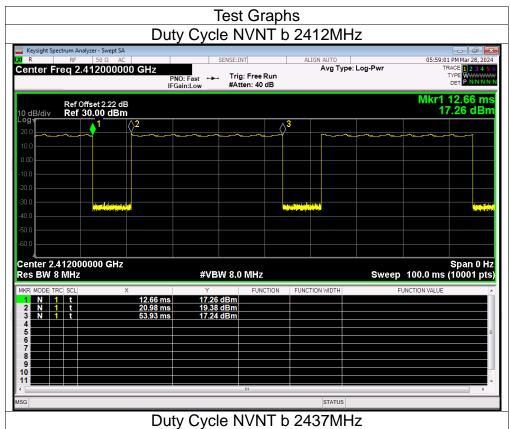
# **Appendix A: Test Result of Conducted Test**

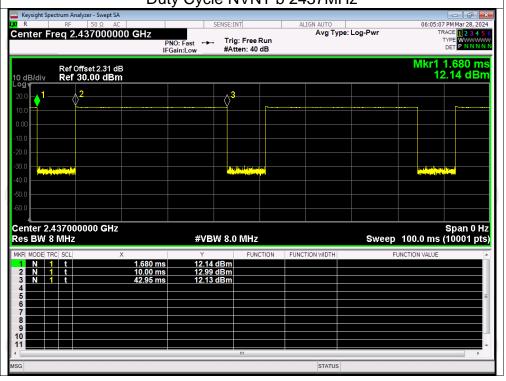
**Duty Cycle** 

Condition Mode		Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)						
NVNT	b	2412	78.58	1.05						
NVNT	b	2437	75.07	1.25						
NVNT	b	2462	75.07	1.25						
NVNT	g	2412	73.88	1.31						
NVNT	g	2437	71.04	1.48						
NVNT	g	2462	71.64	1.45						
NVNT	n20	2412	47.82	3.20						
NVNT	n20	2437	47.69	3.22						
NVNT	n20	2462	47.81	3.21						

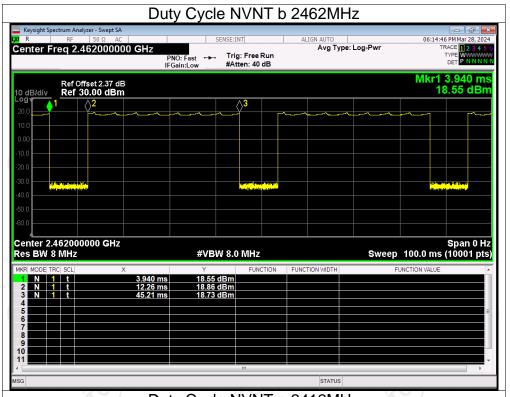


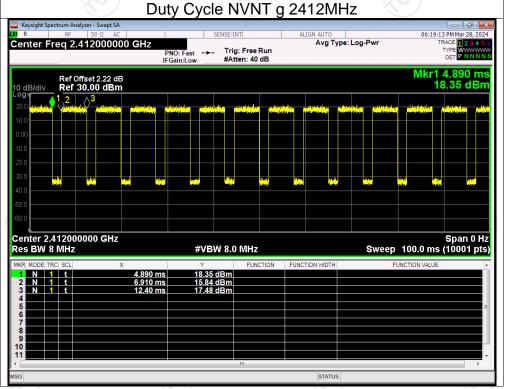




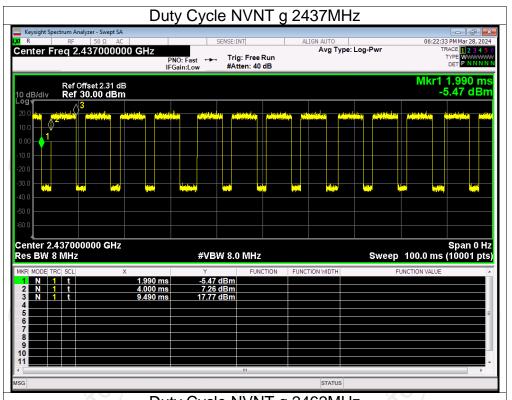


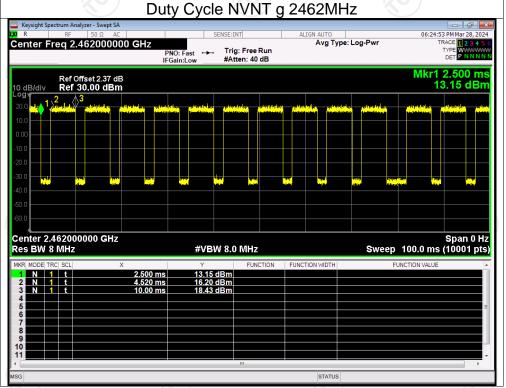




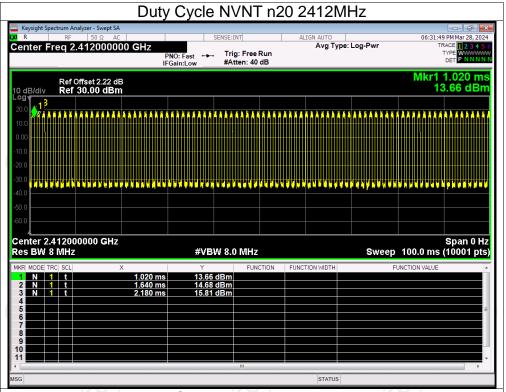


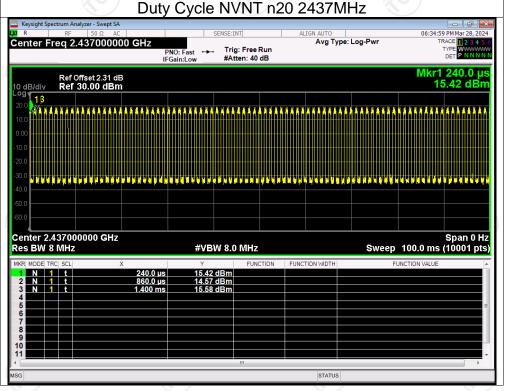




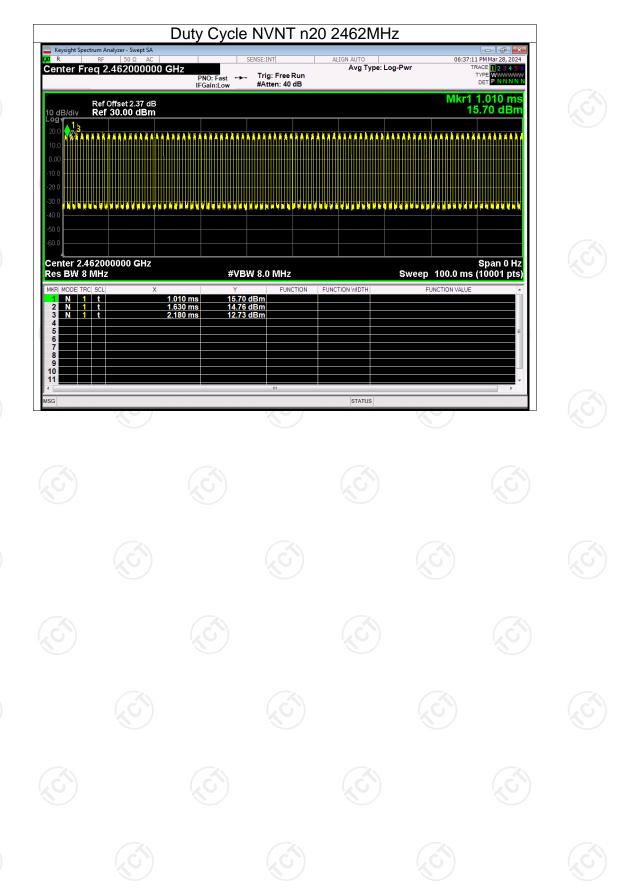












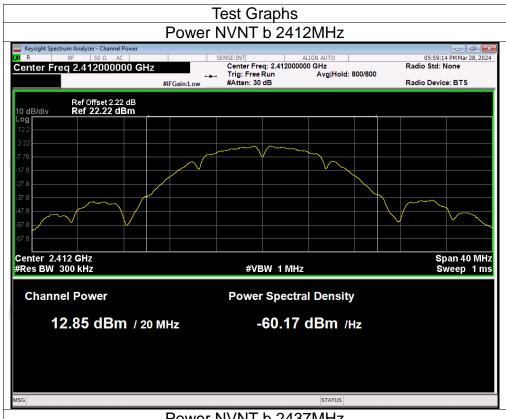


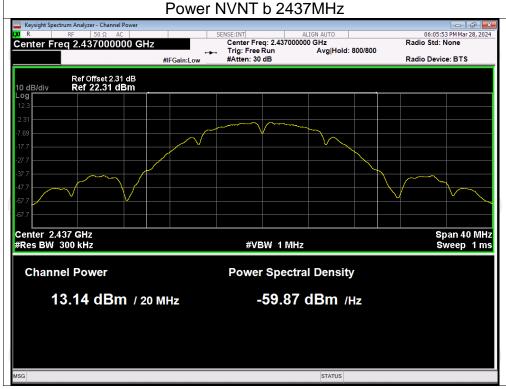
**Maximum Conducted Output Power** 

Condition	Mode	Frequency (MHz)	Conducted Power (dBm)	Duty Factor (dB)	Total Power (dBm)	Limit (dBm)	Verdict
NVNT	b	2412	12.85	1.05	13.90	30	Pass
NVNT	b	2437	13.14	1.25	14.39	30	Pass
NVNT	b	2462	13.31	1.25	14.56	30	Pass
NVNT	g	2412	12.82	1.31	14.13	30	Pass
NVNT	g	2437	12.89	1.48	14.37	30	Pass
NVNT	g	2462	13.05	1.45	14.50	30	Pass
NVNT	n20	2412	9.39	3.20	12.59	30	Pass
NVNT	n20	2437	9.61	3.22	12.83	30	Pass
NVNT	n20	2462	9.93	3.21	13.14	30	Pass

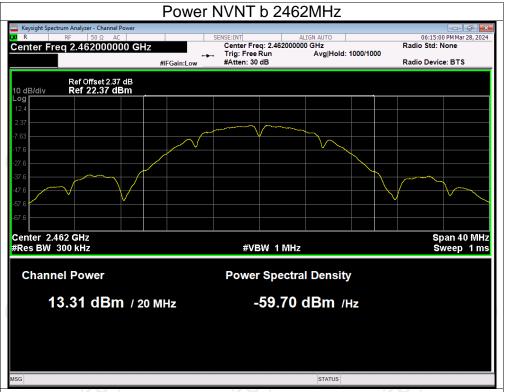


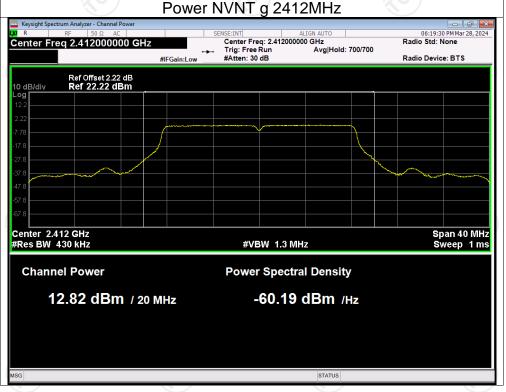




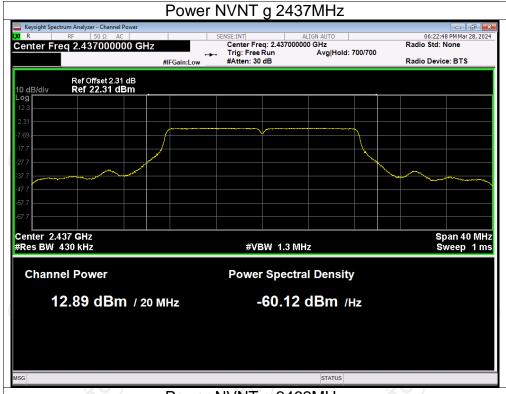


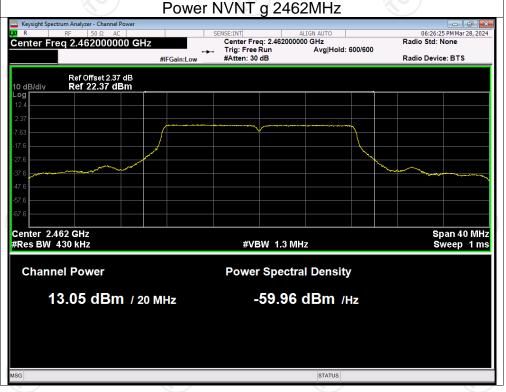




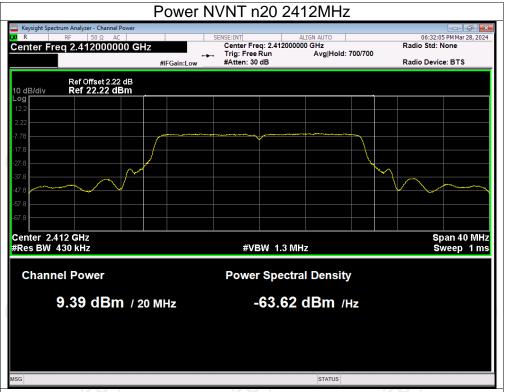


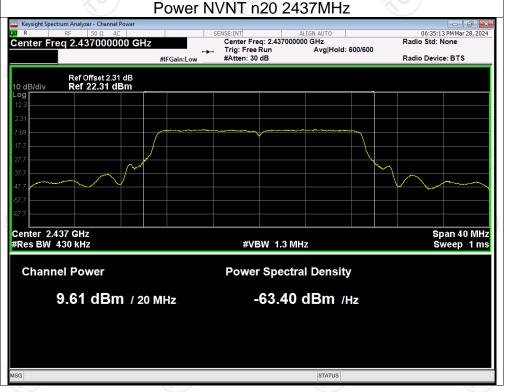




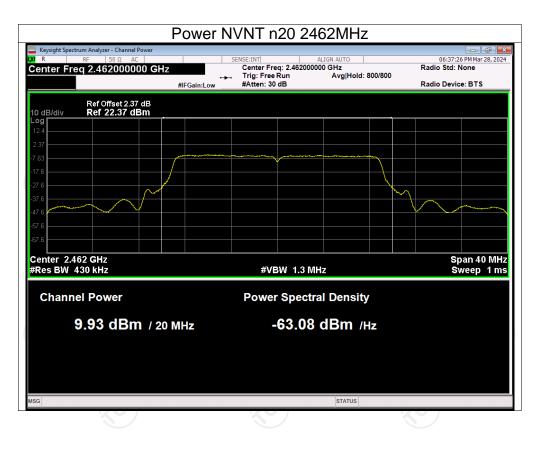
















## -6dB Bandwidth

Condition	Mode	Frequency (MHz)	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	b	2412	9.056	0.5	Pass
NVNT	b	2437	9.063	0.5	Pass
NVNT	b	2462	9.569	0.5	Pass
NVNT	g	2412	16.354	0.5	Pass
NVNT	g	2437	16.358	0.5	Pass
NVNT	g	2462	16.338	0.5	Pass
NVNT	n20	2412	17.710	0.5	Pass
NVNT	n20	2437	17.712	0.5	Pass
NVNT	n20	2462	17.714	0.5	Pass



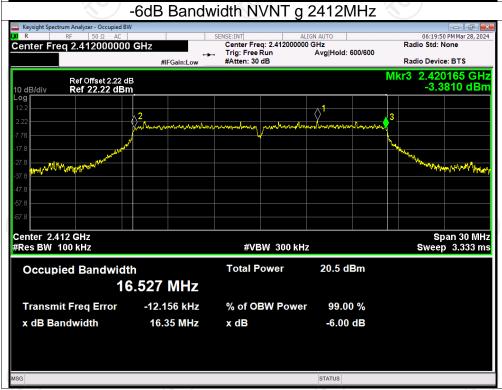




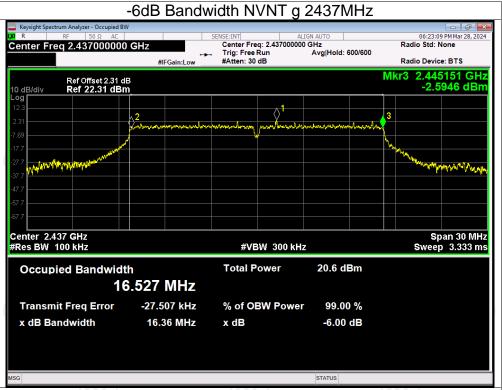






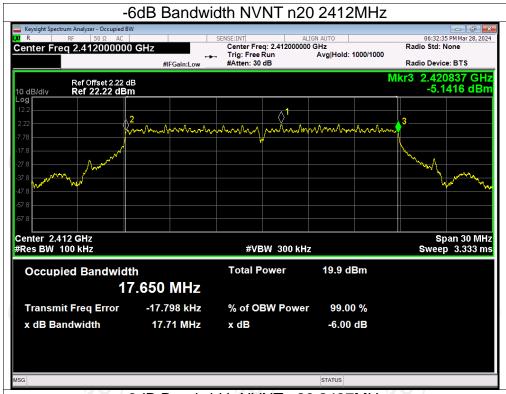


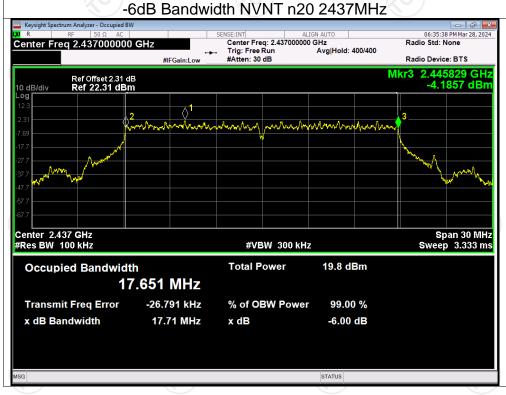




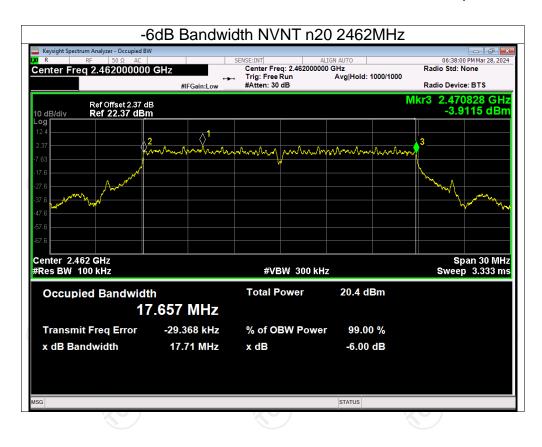
















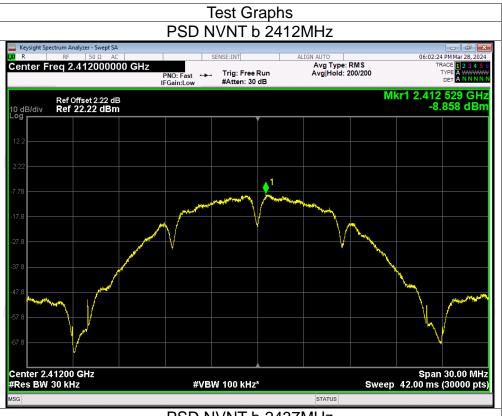
**Maximum Power Spectral Density Level** 

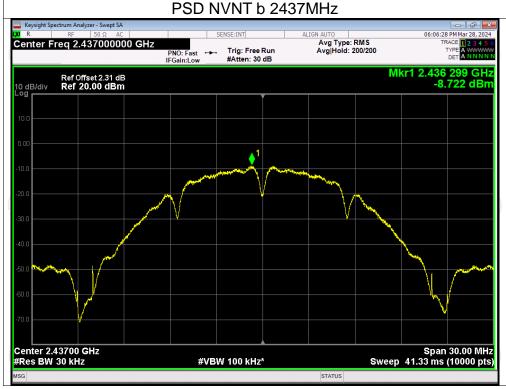
Condition	Mode	Frequency (MHz)	Conducted PSD (dBm/ 30kHz)	Duty Factor (dB)	Total PSD (dBm/ 30kHz)	Total PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Verdict
NVNT	b	2412	-8.86	1.05	-7.81	-17.81	8	Pass
NVNT	b	2437	-8.72	1.25	-7.47	-17.47	8	Pass
NVNT	b	2462	-8.35	1.25	-7.10	-17.10	8	Pass
NVNT	g	2412	-11.79	1.31	-10.48	-20.48	8	Pass
NVNT	g	2437	-11.62	1.48	-10.14	-20.14	8	Pass
NVNT	g	2462	-11.05	1.45	-9.60	-19.60	8	Pass
NVNT	n20	2412	-14.45	3.20	-11.25	-21.25	8	Pass
NVNT	n20	2437	-14.00	3.22	-10.78	-20.78	8	Pass
NVNT	n20	2462	-13.64	3.21	-10.43	-20.43	8	Pass

Note: Total PSD (dBm/3kHz) = Total PSD (dBm/30kHz) +10log(3kHz/30kHz)

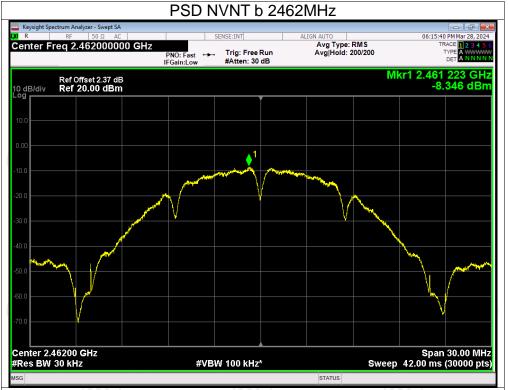


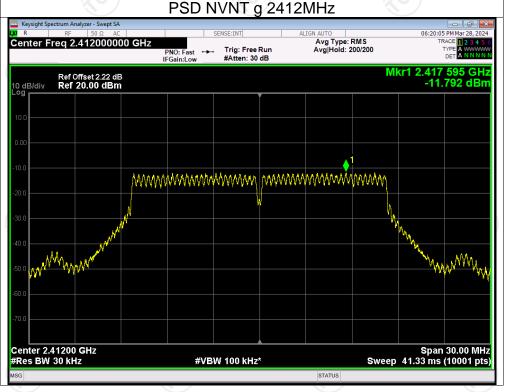




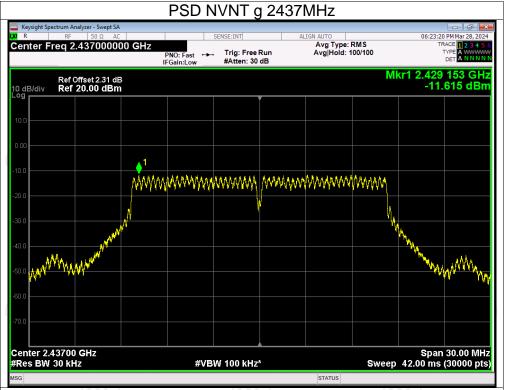


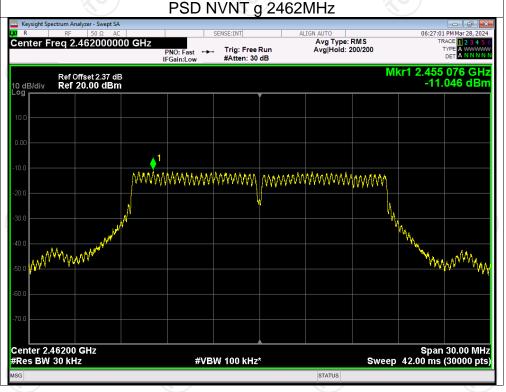




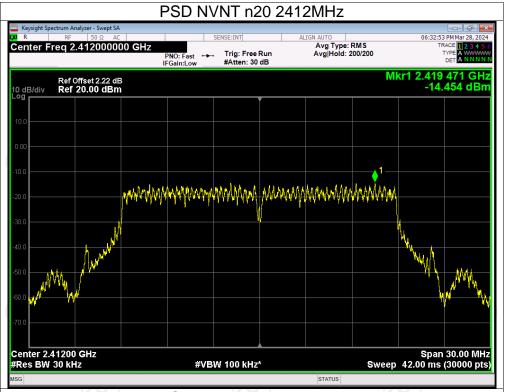


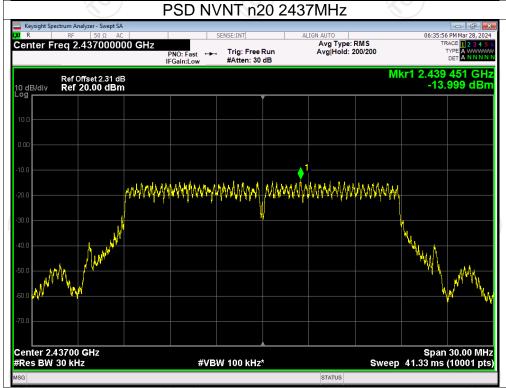




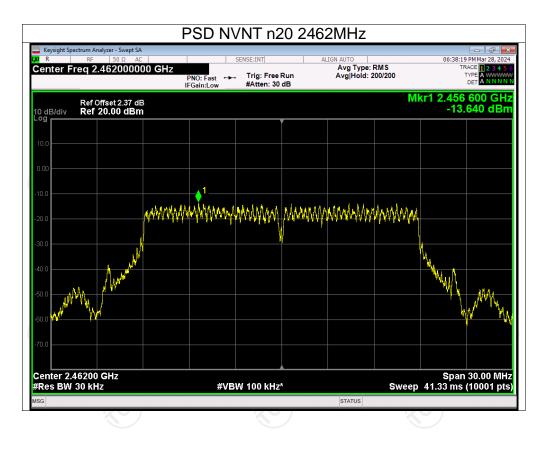










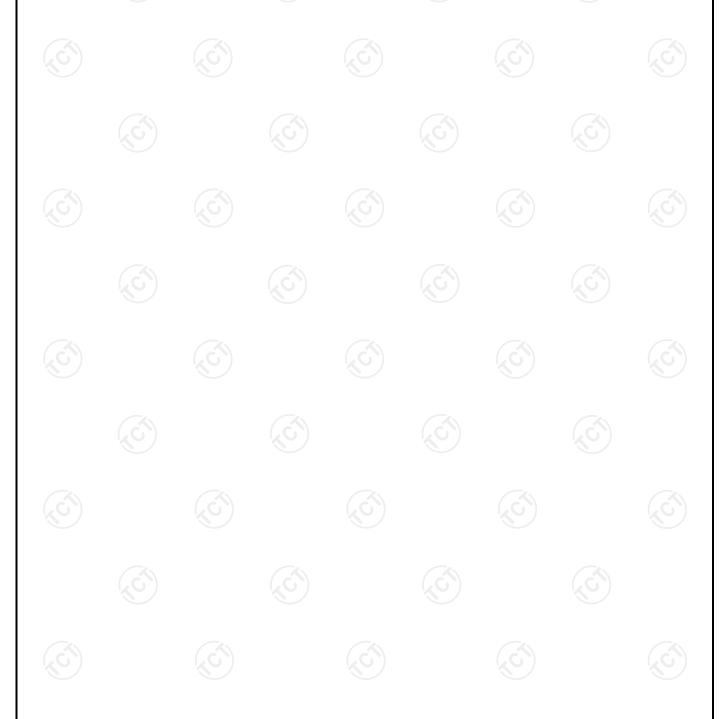




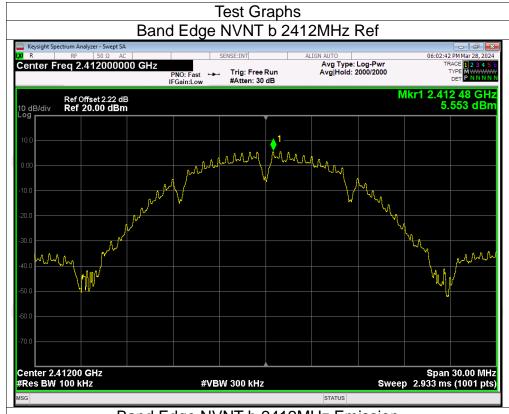


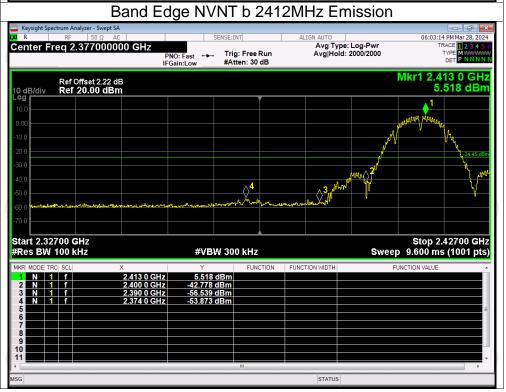
**Band Edge** 

Condition	Mode	Frequency (MHz)	Max Value (dBc)	Limit (dBc)	Verdict	
NVNT	b	2412	-59.42	-30	Pass	
NVNT	b	2462	-59.62	-30	Pass	
NVNT	g	2412	-48.93	-30	Pass	
NVNT	g	2462	-41.60	-30	Pass	
NVNT	n20	2412	-47.34	-30	Pass	
NVNT	n20	2462	-47.75	-30	Pass	



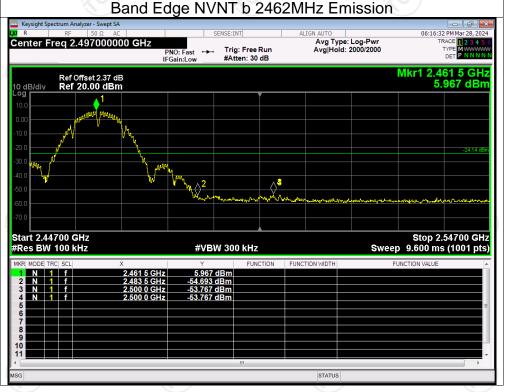




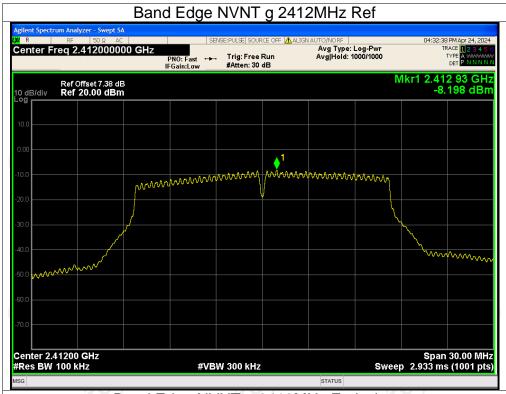


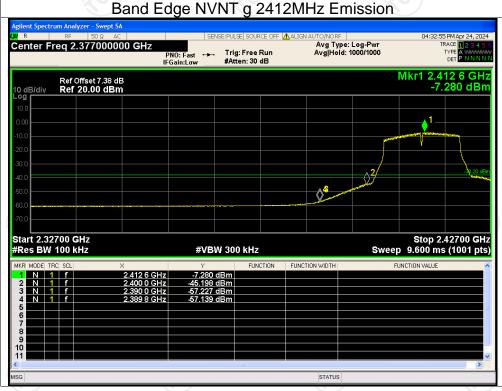




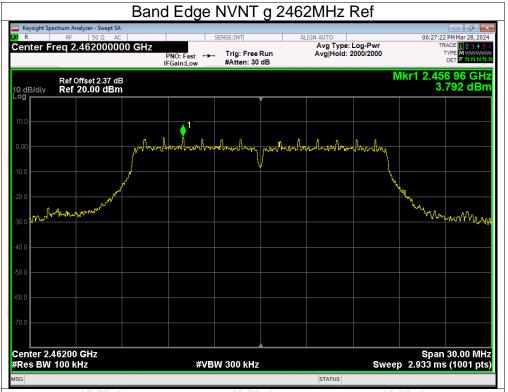


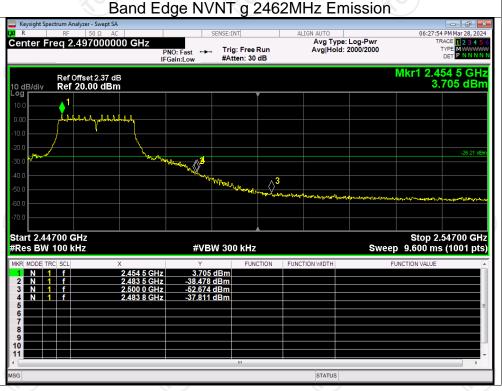






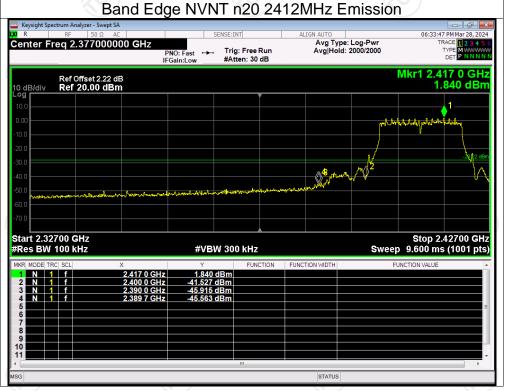






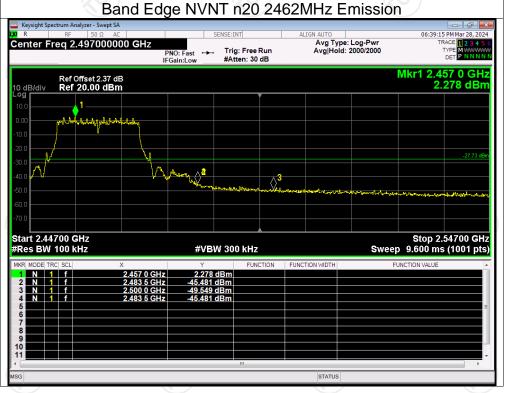












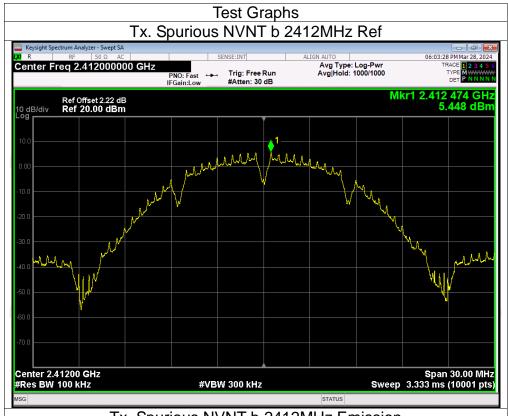


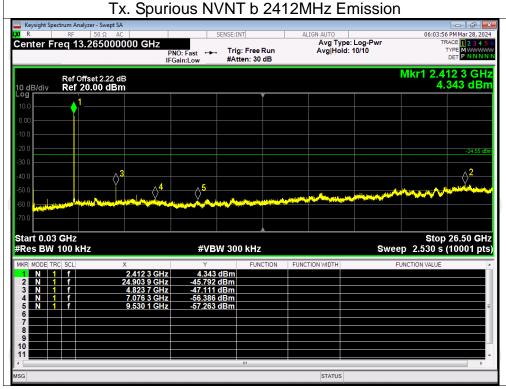
**Conducted RF Spurious Emission** 

Condition	Mode	Frequency (MHz)	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	b	2412	-51.24	-30	Pass
NVNT	b	2437	-51.55	-30	Pass
NVNT	b	2462	-51.22	-30	Pass
NVNT	g	2412	-49.60	-30	Pass
NVNT	g	2437	-49.84	-30	Pass
NVNT	g	2462	-50.06	-30	Pass
NVNT	n20	2412	-47.46	-30	Pass
NVNT	n20	2437	-47.12	-30	Pass
NVNT	n20	2462	-47.79	-30	Pass

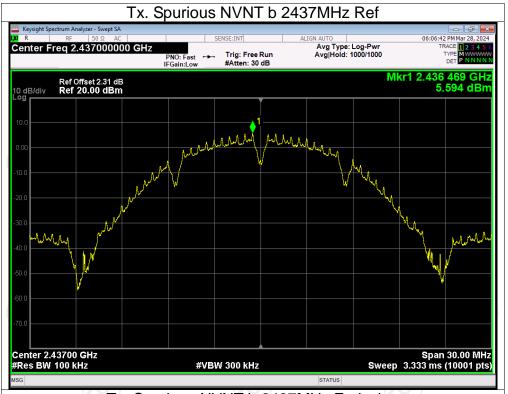


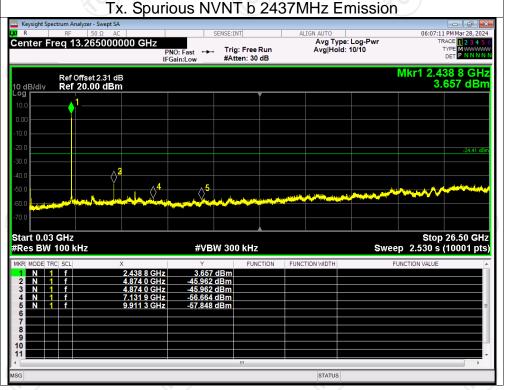




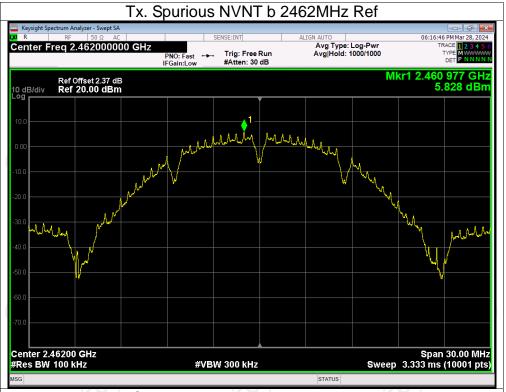


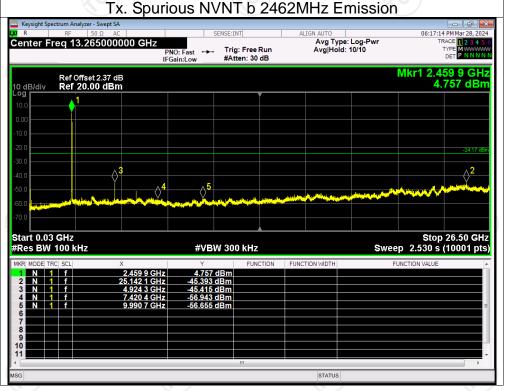




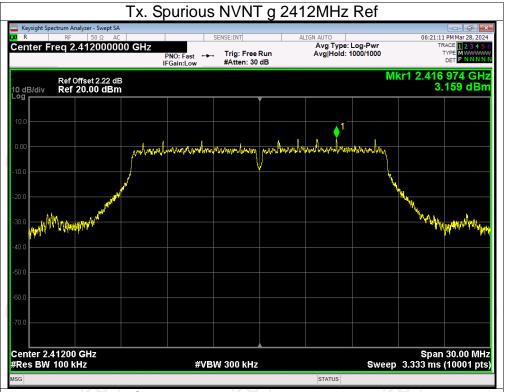


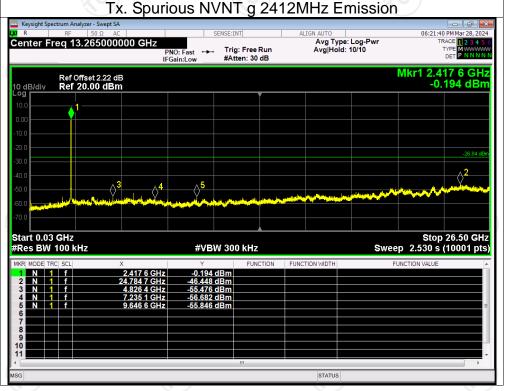




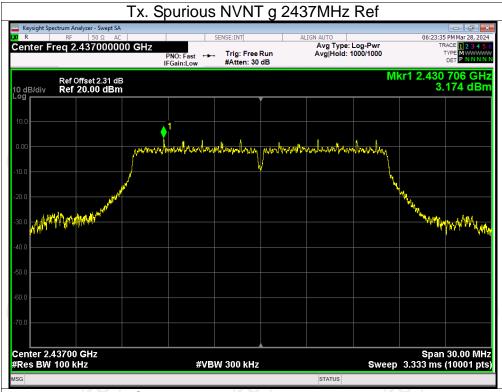


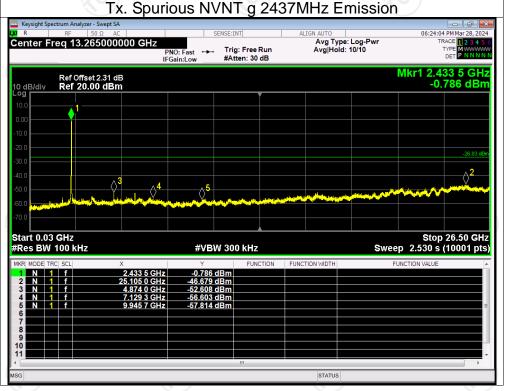




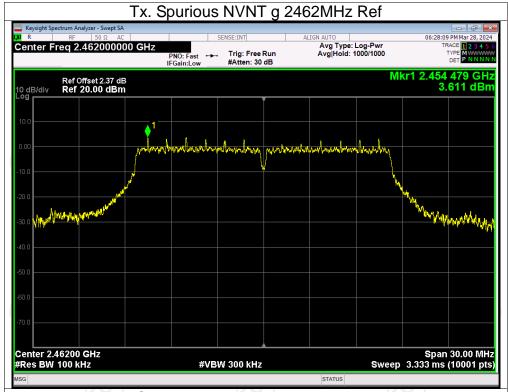


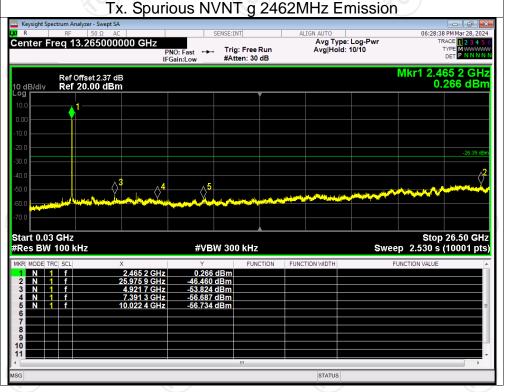




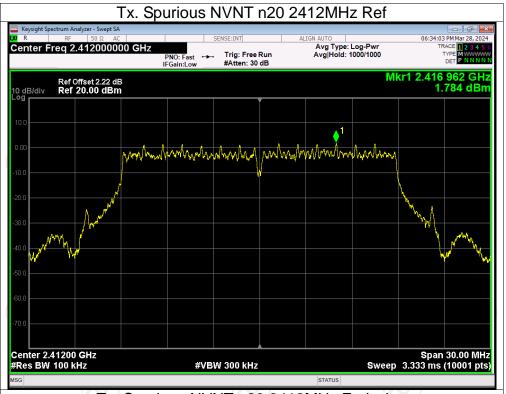


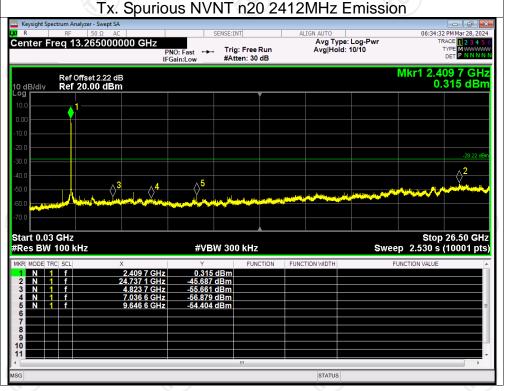




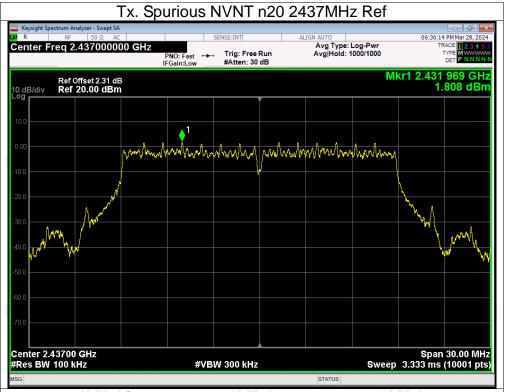


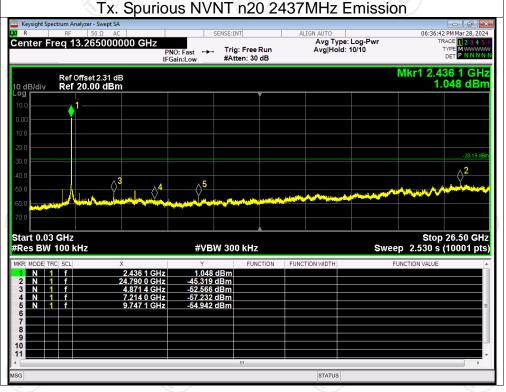




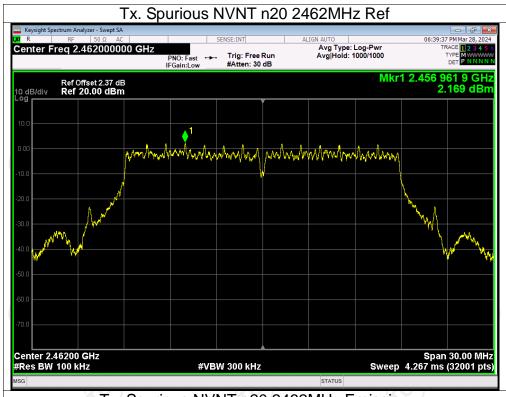


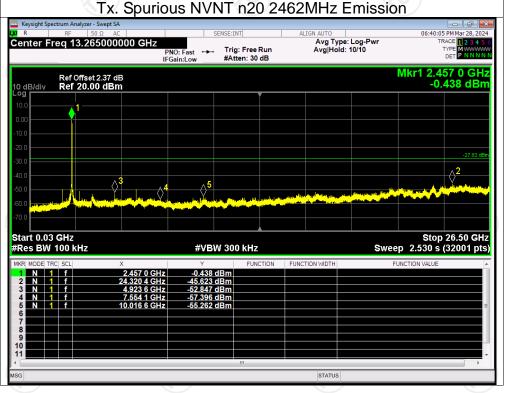














## **Appendix B: Photographs of Test Setup**

Refer to the test report No. TCT240321E038

## **Appendix C: Photographs of EUT**

Refer to the test report No. TCT240321E038

