

TEST REPORT					
FCC ID:	2AUARTK689BT				
Test Report No::	TCT240712E061				
Date of issue::	Jul. 29, 2024				
Testing laboratory:	SHENZHEN TONGCE TESTIN	G LAB			
Testing location/ address:	2101 & 2201, Zhenchang Factor Fuhai Subdistrict, Bao'an District 518103, People's Republic of C	ct, Shenzhen, Guangdong,			
Applicant's name::	THINKCAR TECH CO., LTD.				
Address::	2606, building 4, phase II, Tiana Bantian, Longgang District, She				
Manufacturer's name:	THINKCAR TECH CO., LTD.				
Address::	2606, building 4, phase II, TiananYungu, Gangtou community, Bantian, Longgang 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::	Automotive Diagnostic Tool				
Trade Mark:	THINKCAR, XHINKCAR, MUCA	AR G			
Model/Type reference:	TK689BT				
Rating(s)::	Rechargeable Li-ion Battery DC	3.8V			
Date of receipt of test item:	Jul. 12, 2024				
Date (s) of performance of test:	Jul. 12, 2024 ~ Jul. 29, 2024				
Tested by (+signature) :	Yannie ZHONG				
Check by (+signature):	Beryl ZHAO  Boy( TCT)				
Approved by (+signature):	Tomsin	Tomsies 3			

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# **Table of Contents**

1.	General Product Information	3
	1.1. EUT description	3
	1.2. Model(s) list	3
	1.3. Operation Frequency	4
2.	Test Result Summary	5
3.	General Information	6
	3.1. Test environment and mode	
	3.2. Description of Support Units	7
4.	Facilities and Accreditations	
	4.1. Facilities	8
	4.2. Location	8
	4.3. Measurement Uncertainty	
<b>5.</b>	Test Results and Measurement Data	9
	5.1. Antenna requirement	9
	5.2. Conducted Emission	
	5.3. Maximum Conducted (Average) Output Power	14
	5.4. Emission Bandwidth	
	5.5. Power Spectral Density	16
	5.6. Conducted Band Edge and Spurious Emission Measurement	17
	5.7. Radiated Spurious Emission Measurement	19
A	ppendix A: Test Result of Conducted Test	
A	ppendix B: Photographs of Test Setup	
A	ppendix C: Photographs of EUT	



# 1. General Product Information

# 1.1. EUT description

Product Name:	Automotive Diagnostic Tool
Model/Type reference:	TK689BT
Sample Number:	TCT240712E035-0101
Operation Frequency:	2412MHz~2462MHz (802.11b/802.11g/802.11n(HT20)) 2422MHz~2452MHz (802.11n(HT40))
Channel Separation:	5MHz
Number of Channel:	11 for 802.11b/802.11g/802.11n(HT20) 7 for 802.11n(HT40)
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:	FPC Antenna
Antenna Gain:	5dBi
Rating(s):	Rechargeable Li-ion Battery DC 3.8V

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.



Page 3 of 75



# 1.3. Operation Frequency

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

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		

## For 802.11n (HT40)

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
		4	2427MHz	7	2442MHz		
(0)	(	5	2432MHz	8	2447MHz	G')	اران
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

#### 802.11n (HT40)

( - /	
Channel	Frequency
The lowest channel	2422MHz
The middle channel	2437MHz
The Highest channel	2452MHz



# 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

- 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:	22.7 °C	22.8 °C		
Humidity:	52 % RH	51 % RH		
Atmospheric Pressure:	1010 mbar	1010 mbar		
Test Software:				
Software Information:	Engineering mode			
Power Level:	5			
Test Mode:				
Engineering mode: Keep the EUT in continuous transmitting by select channel and modulations with Fully-charged battery				

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

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	
802.11n(H40)	13.5Mbps	



## 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
Adapter	EP-TA200	R37R55T6KL2SE3	/	SAMSUNG

#### 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.



Page 7 of 75



## 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 Section 15.203 /247(c)

15.203 requirement:

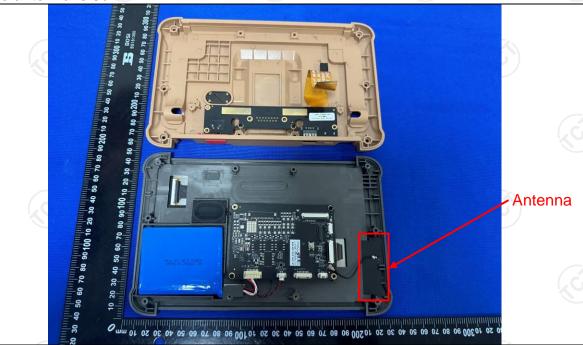
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit 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 FPC antenna which permanently attached, and the best case gain of the antenna is 5dBi.



Page 9 of 75



TESTING CENTRE TECHNOLOGY Report No.: TCT240712E061

## 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					
Limits:	Frequency range (MHz)         Limit (dBuV) Quasi-peak         Average           0.15-0.5         66 to 56*         56 to 46*           0.5-5         56         46           5-30         60         50					
	Reference Plane					
Test Setup:	AC power  Test table/Insulation plane  Remarkc E.U.T. Equipment Under Test LISN: Line Impedence Stabilization Network Test table height=0.8m					
Test Mode:	Charging + Transmitting Mode					
Test Procedure:	<ol> <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>					
Test Result:	PASS	(6)	180			



### 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. 26, 2025			
LISN	Schwarzbeck	NSLK 8126	8126453	Jan. 31, 2025			
Attenuator	N/A	10dB	164080	Jun. 26, 2025			
Line-5	TCT	CE-05	/	Jun. 26, 2025			
EMI Test Software	EZ_EMC	EMEC-3A1	1.1.4.2	1 6			

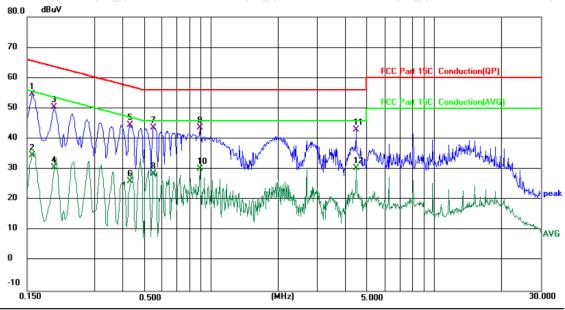




#### 5.2.3. Test data

### Please refer to following diagram for individual

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



Site 844 Shielding Room

Phase: L1

Temperature: 22.7 (℃)

Humidity: 52 %

Limit: FCC Part 15C Conduction(QP)

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

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1580	45.00	9.67	54.67	65.57	-10.90	QP	
2		0.1580	25.02	9.67	34.69	55.57	-20.88	AVG	
3		0.1980	40.82	9.65	50.47	63.69	-13.22	QP	
4		0.1980	20.97	9.65	30.62	53.69	-23.07	AVG	
5		0.4339	34.57	10.09	44.66	57.18	-12.52	QP	
6		0.4339	15.99	10.09	26.08	47.18	-21.10	AVG	
7		0.5540	33.39	10.23	43.62	56.00	-12.38	QP	
8		0.5540	18.45	10.23	28.68	46.00	-17.32	AVG	
9		0.8940	32.97	10.62	43.59	56.00	-12.41	QP	
10		0.8940	19.63	10.62	30.25	46.00	-15.75	AVG	
11		4.4740	32.80	10.13	42.93	56.00	-13.07	QP	
12		4.4740	20.36	10.13	30.49	46.00	-15.51	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)

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

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

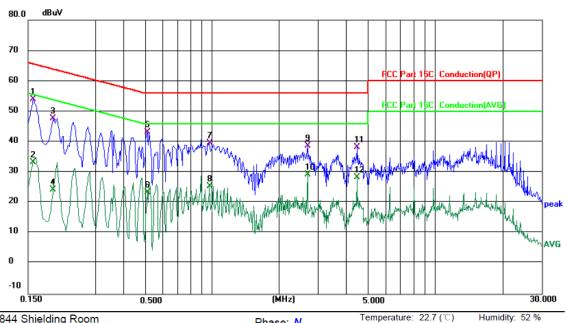
Q.P. =Quasi-Peak

AVG =average

<sup>\*</sup> 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)



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

Temperature: 22.7 (°C) Site 844 Shielding Room Phase: N

No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1 *	0.1580	44.47	9.65	54.12	65.57	-11.45	QP	
2	0.1580	23.75	9.65	33.40	55.57	-22.17	AVG	
3	0.1940	38.06	9.63	47.69	63.86	-16.17	QP	
4	0.1940	14.67	9.63	24.30	53.86	-29.56	AVG	
5	0.5140	33.13	10.16	43.29	56.00	-12.71	QP	
6	0.5140	13.15	10.16	23.31	46.00	-22.69	AVG	
7	0.9779	28.91	10.68	39.59	56.00	-16.41	QP	
8	0.9779	14.81	10.68	25.49	46.00	-20.51	AVG	
9	2.6819	28.82	9.86	38.68	56.00	-17.32	QP	
10	2.6819	19.36	9.86	29.22	46.00	-16.78	AVG	
11	4.4699	28.24	10.04	38.28	56.00	-17.72	QP	
12	4.4699	18.39	10.04	28.43	46.00	-17.57	AVG	

#### Note:

Freq. = Emission frequency in MHz

Limit: FCC Part 15C Conduction(QP)

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



# 5.3. Maximum Conducted (Average) Output Power

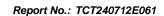
# 5.3.1. Test Specification

<b>-</b> (B)	500 D (45 0 0 ) ( 45 0 47 ( ) \
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

RF Test Room						
Equipment Manufacturer Model Serial Number Calibration Du						
Spectrum Analyzer	Agilent	N9020A	MY49100619	Jun. 26, 2025		
Combiner Box	Ascentest	AT890-RFB		(0)		

Page 14 of 75





## 5.4. Emission Bandwidth

# 5.4.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.24	7 (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

RF Test Room						
Equipment Manufacturer Model Serial Number Calibration Due						
Spectrum Analyzer	Agilent	N9020A	MY49100619	Jun. 26, 2025		
Combiner Box	Ascentest	AT890-RFB	1			

Page 15 of 75





# 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

RF Test Room							
Equipment Manufacturer Model Serial Number Calibration Due							
Spectrum Analyzer	Agilent	N9020A	MY49100619	Jun. 26, 2025			
Combiner Box	Ascentest	AT890-RFB					





# 5.6. Conducted Band Edge and Spurious Emission Measurement

# 5.6.1. Test Specification

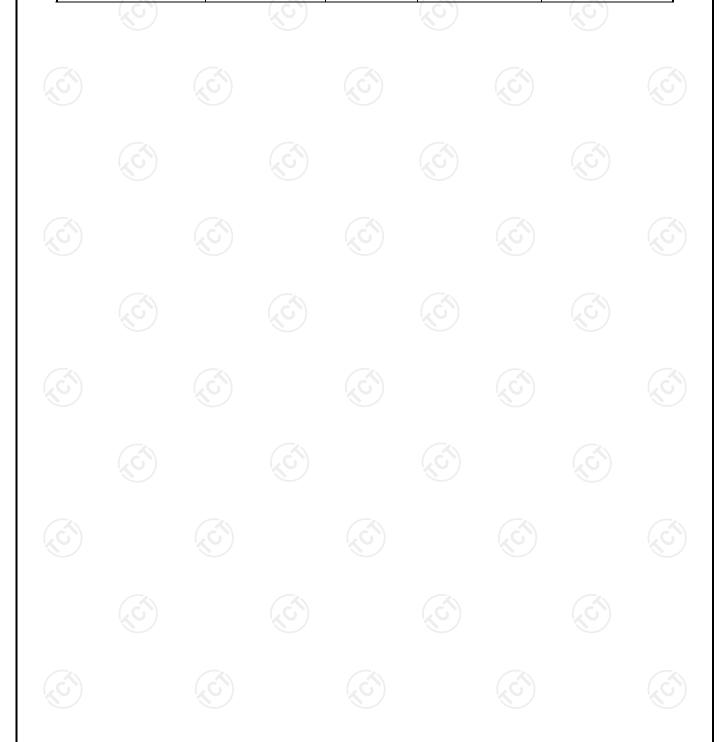
Test Requirement:	FCC Part15 C Section 15.247 (d)					
Test Method:	KDB558074					
Limit:	In any 100 kHz bandwidth outside of the authorize frequency band, the emissions which fall in the non-restricted bands shall be attenuated at least 20 d 30dB relative to the maximum PSD level in 100 kHz RF conducted measurement and radiated emission 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					

Page 17 of 75



### 5.6.2. Test Instruments

RF Test Room							
Equipment Manufacturer Model Serial Number Calibration Due							
Spectrum Analyzer	Agilent	N9020A	MY49100619	Jun. 26, 2025			
Combiner Box	Ascentest	AT890-RFB					



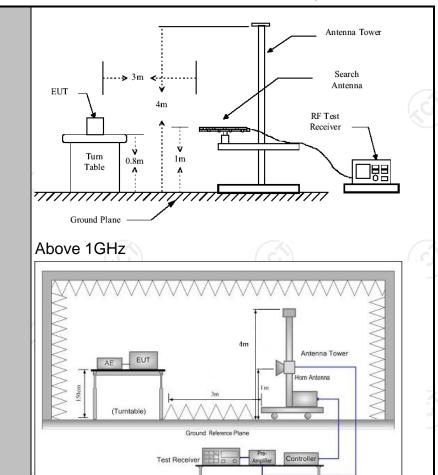


# **5.7. Radiated Spurious Emission Measurement**

## 5.7.1. Test Specification

Test Requirement:	FCC Part15	C Section	15.209	$(C^{\prime\prime})$		(¿Ć			
Test Method:	ANSI C63.10	0:2013							
Frequency Range:	9 kHz to 25 (	GHz				<i>(</i> -			
Measurement Distance:	9 kHz to 25 GHz  3 m  Horizontal & Vertical  Transmitting mode with modulation    Frequency   Detector   RBW   VBW   Remark								
Antenna Polarization:	Horizontal &	Vertical							
Operation mode:	Transmitting	mode wit	h modulat	ion					
Receiver Setup:	9kHz- 150kHz 150kHz- 30MHz	Quasi-peak Quasi-peak Quasi-peak	200Hz 9kHz 120KHz	1kHz 30kHz 300KHz	Hz Quasi-peak \ CHz Quasi-peak \				
	Above 1GHz								
Limit:	0.009-0.4 0.490-1.7 1.705-3 30-88 88-216 216-96 Above 9	490 705 30 60 Field (micro	(microvolts 2400/F(k 24000/F( 30 100 150 200 500 d Strength volts/meter)	/meter) KHz) KHz)  Measure Distan (mete)	Dista	300 30 30 30 30 3 3 3 3 3 Detector Average			
Test setup:		Turn table	lm	Pre -	Compu	lter C			



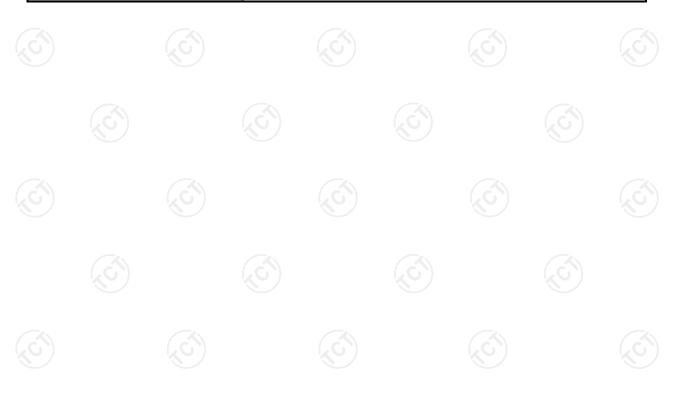


**Test Procedure:** 

1. For the radiated emission test below 1GHz: 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



TESTING CENTRE TECHNOLOGY	Report No.: 1C124U/12EU
	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 peak measurement</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 Er	mission Test Sit	e (966)	
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESCI7	100529	Jan. 31, 2025
Spectrum Analyzer	R&S	FSQ40	200061	Jun. 26, 2025
Pre-amplifier	HP	8447D	2727A05017	Jun. 26, 2025
Pre-amplifier	SKET	LNPA_0118G- 45	SK202101210 2	Jan. 31, 2025
Pre-amplifier	SKET	LNPA_1840G- 50	SK202109203 500	Jan. 31, 2025
Loop antenna	Schwarzbeck	FMZB1519B	00191	Jun. 26, 2025
Broadband Antenna	Schwarzbeck	VULB9163	340	Jun. 28, 2025
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Jun. 28, 2025
Horn Antenna	Schwarzbeck	BBHA 9170	00956	Feb. 02, 2025
Coaxial cable	SKET	RE-03-D	/	Jun. 26, 2025
Coaxial cable	SKET	RE-03-M	) 1	Jun. 26, 2025
Coaxial cable	SKET	RE-03-L	/	Jun. 26, 2025
Coaxial cable	SKET	RE-04-D	(3)	Jun. 26, 2025
Coaxial cable	SKET	RE-04-M		Jun. 26, 2025
Coaxial cable	SKET	RE-04-L	/	Jun. 26, 2025
Antenna Mast	Keleto	RE-AM	) /	(6)
EMI Test Software	EZ_EMC	FA-03A2 RE+	1.1.4.2	/

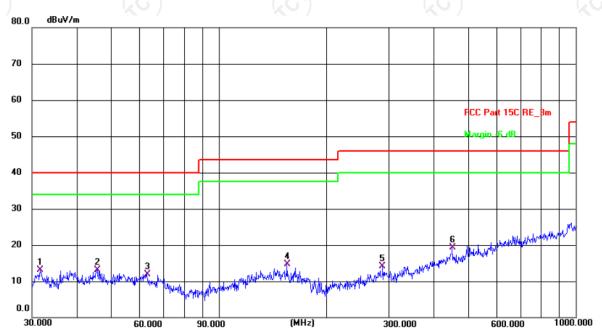


### 5.7.3. Test Data

# Please refer to following diagram for individual

**Below 1GHz** 





Site 3m Anechoic Chamber2 Polarization: Horizontal Temperature: 22.8(C) Humidity: 51 %

Limit: FCC Part 15C RE\_3m

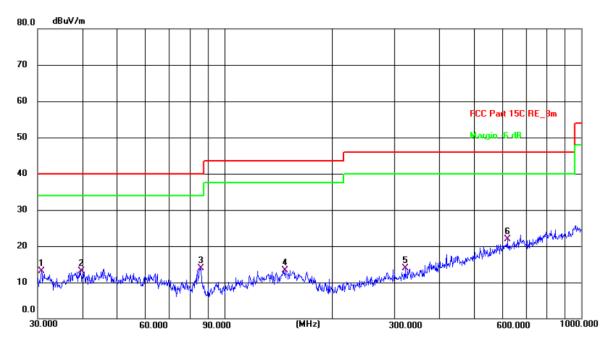
Power: DC 3.8 V

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	31.6201	32.55	-19.43	13.12	40.00	-26.88	QP	Р	
2	45.5348	31.82	-18.62	13.20	40.00	-26.80	QP	Р	
3	62.8707	31.06	-19.10	11.96	40.00	-28.04	QP	Р	
4	155.3643	31.74	-16.94	14.80	43.50	-28.70	QP	Р	
5	287.9904	31.55	-17.54	14.01	46.00	-31.99	QP	Р	
6 *	451.1350	32.71	-13.50	19.21	46.00	-26.79	QP	Р	





#### Vertical:



Site 3m Anechoic Chamber2 Polarization: Vertical Temperature: 22.8(C) Humidity: 51 %

Limit: FCC Part 15C RE 3m

Power: DC 3.8 V

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	30.7454	32.62	-19.54	13.08	40.00	-26.92	QP	Р	
2	39.5757	31.51	-18.40	13.11	40.00	-26.89	QP	Р	
3	85.5976	36.52	-22.56	13.96	40.00	-26.04	QP	Р	
4	147.9214	30.80	-17.51	13.29	43.50	-30.21	QP	Р	
5	321.0608	31.50	-17.57	13.93	46.00	-32.07	QP	Р	
6 *	620.7096	31.17	-9.31	21.86	46.00	-24.14	QP	Р	

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

- 2. Measurements were conducted in all three channels (high, middle, low) and all modulation(802.11b, 802.11g, 802.11n(HT20), 802.11n(HT40)), and the worst case Mode (Middle 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

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

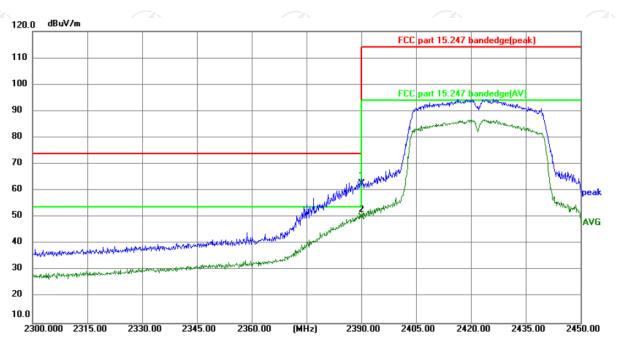
 $^{st}$  is meaning the worst frequency has been tested in the test frequency range.



### Test Result of Radiated Spurious at Band edges

### Lowest channel 2422:

### Horizontal:

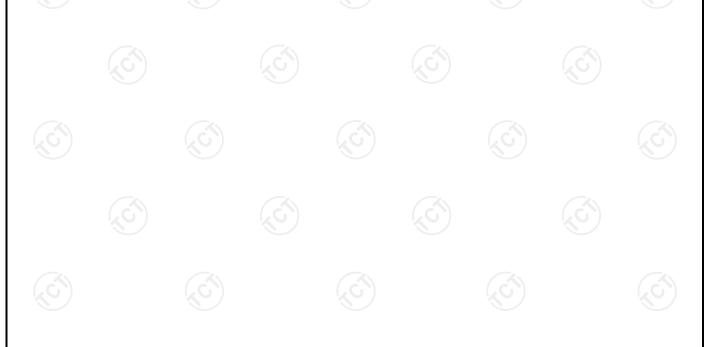


Site: 3m Anechoic Chamber Polarization: Horizontal Temperature: 24.8(°C) Humidity: 51 %

Limit: FCC part 15.247 bandedge(peak)

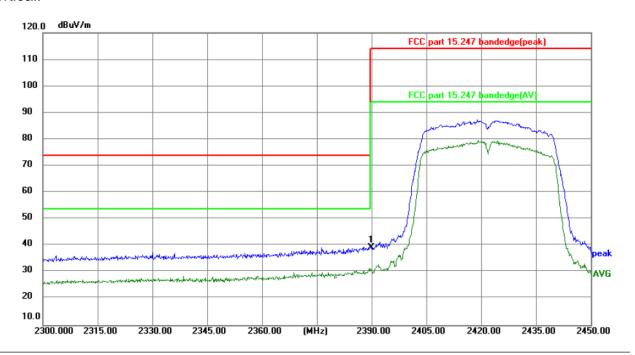
Power: DC 3.8 V

No.	Frequency (MHz)	Reading (dBuV)		Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 *	2390.000	79.29	-16.70	62.59	74.00	-11.41	peak	Р	
2	2390.230	66.82	-16.70	50.12	94.00	-43.88	AVG	Р	





#### Vertical:



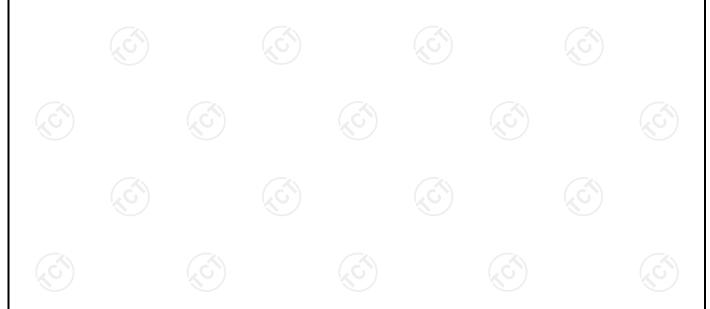
Site: 3m Anechoic Chamber Polarization: Vertical Temperature: 24.8(°C) Humidity: 51 %

Limit: FCC part 15.247 bandedge(peak)

Power: DC 3.8 V

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 *	2390.000	56.04	-16.70	39.34	74.00	-34.66	peak	Р	

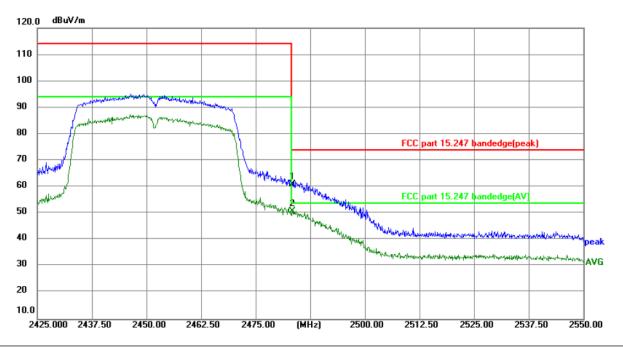
**Note:** Measurements were conducted in all two channels (high, low) and all modulation (802.11b, 802.11g, 802.11n(HT20), 802.11n(HT40)), and the worst case Mode 802.11n(HT40) was submitted only.





## Highest channel 2452:

### Horizontal:



Site: 3m Anechoic Chamber Polarization: Horizontal Temperature: 24.8(°C) Humidity: 51 %

Limit: FCC part 15.247 bandedge(peak)

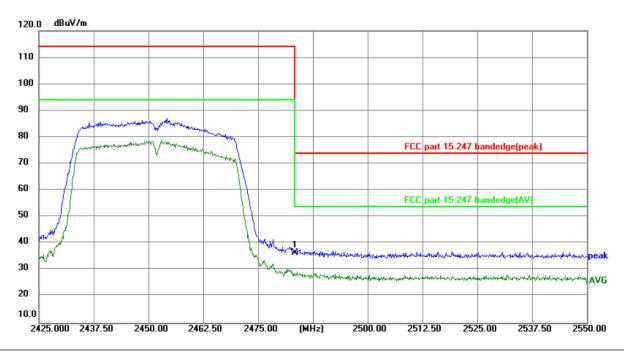
Power: DC 3.8 V

	No.	Frequency (MHz)	Reading (dBuV)		Level (dBuV/m)		Margin (dB)	Detector	P/F	Remark
	1	2483.500	77.58	-16.65	60.93	74.00	-13.07	peak	Р	
Г	2 *	2483.500	67.41	-16.65	50.76	54.00	-3.24	AVG	Р	





#### Vertical:



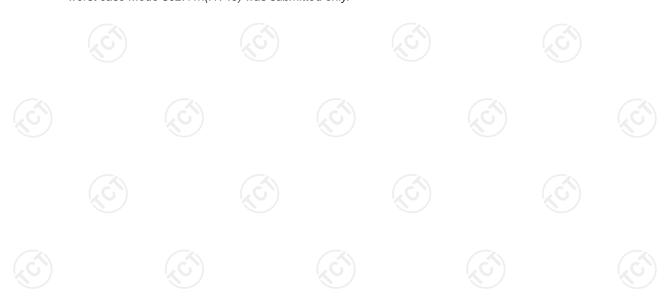
Site: 3m Anechoic Chamber Polarization: Vertical Temperature: 24.8(°C) Humidity: 51 %

Limit: FCC part 15.247 bandedge(peak)

Power: DC 3.8 V

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 *	2483.500	53.27	-16.65	36.62	74.00	-37.38	peak	Р	

- 1. Peak Final Emission Level=Peak Reading + Correction Factor;
- 2. Correction Factor= Antenna Factor + Cable loss Pre-amplifier
- 3. Measurements were conducted in all modulation(802.11b, 802.11g, 802.11n(HT20), 802.11n(HT40)), and the worst case Mode 802.11n(HT40) 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)	tor Peak		Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4824	Н	45.01		0.75	45.76		74	54	-8.24
7236	Н	33.25		9.87	43.12		74	54	-10.88
	Н								
4824	V	44.56		0.75	45.31		74	54	-8.69
7236	V	33.14	{,.	9.87	43.01	O`)	74	54	-10.99
	V				~	<del>-</del>			

			Mi	ddle chann	el: 2437 MH	Ηz			
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)	Daal. AV		Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4874	Н	44.39		0.97	45.36		74	54	-8.64
7311	Н	31.67		9.83	41.50		74	54	-12.50
	H				(			-4-	
	KO)		ĬζŪ		K			(V)	
4874	V	42.43		0.97	43.40		74	54	-10.60
7311	V	31.76		9.83	41.59		74	54	-12.41
	V								

			/ 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)	AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)	
4924	H	43.78		1.18	44.96		74	54	-9.04	
7386	Ŧ	34.32		10.07	44.39	)	74	54	-9.61	
	Н					-				
4924	V	43.24		1.18	44.42		74	54	-9.58	
7386	V	33.20		10.07	43.27		74	54	-10.73	
\/	V				<i>/</i>					

### 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.



Page 29 of 75



Modulation Type: 802.11g

					l: 2412 MH:	<u> </u>			
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBuV)	Correction Factor (dB/m)	Dools AV		Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4824	Н	44.43		0.75	45.18		74	54	-8.82
7236	Н	34.04		9.87	43.91		74	54	-10.09
\(\frac{1}{2}\)	Н				<i></i>				
4824	V	43.65		0.75	44.40		74	54	-9.60
7236	V	33.59		9.87	43.46	~~~	74	54	-10.54
	V		{_C		(	3		(, C)	

	Middle channel: 2437 MHz										
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)			Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)		
4874	Н	43.02		0.97	43.99	-	74	54	-10.01		
7311	Н	32.88		9.83	42.71		74	54	-11.29		
	Н										
4874	V	42.27	1/0	0.97	43.24	0 )	74	54	-10.76		
7311	٧	31.60		9.83	41.43		74	54	-12.57		
	V										

					2.				
			) H	ligh channe	gh 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	43.36		1.18	44.54		74	54	-9.46
7386	H	33.23	(	10.07	43.30		74	54	-10.70
	H			/	(	)		/	
4924	V	44.74		1.18	45.92		74	54	-8.08
7386	V	34.39		10.07	44.46		74	54	-9.54
(, <del>C-</del> , )	V	<del>(-</del> 6)		(, 0	<u> </u>		(C)-}		(. <del>-(.)</del>

- 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)			Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)			
4824	Н	42.25		0.75	43.00		74	54	-11.00			
7236	Н	30.41		9.87	40.28		74	54	-13.72			
	Η					-						
4824	V	43.02		0.75	43.77		74	54	-10.23			
7236	V	32.88		9.87	42.75		74	54	-11.25			
	V		4 <sub>×</sub> C			O )		(, G)				

	Middle channel: 2437 MHz											
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)			Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)			
4874	Н	42.46		0.97	43.43	-	74	54	-10.57			
7311	Н	32.84		9.83	42.67		74	54	-11.33			
	Н											
4874	V	44.73	1/0	0.97	45.70	0 )	74	54	-8.30			
7311	٧	33.59		9.83	43.42	]	74	54	-10.58			
	V											

					2				
			) H	ligh channe	el: 2462 MH	Z			(.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	41.57		1.18	42.75		74	54	-11.25
7386	H	32.01	( 6)	10.07	42.08		74	54	-11.92
	H			/		)		/	
4924	V	43.42		1.18	44.60		74	54	-9.40
7386	V	33.49		10.07	43.56		74	54	-10.44
$(-\epsilon)$	V	<del>(-</del> 6)		(, 0	<u> </u>		(C)=}		(, <del>-C</del> , )

- 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	(HT40)
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	Low channel: 2422 MHz											
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBuV)	reading Correction Emission Level Factor (dB/m) (dBµV/m) (dBµV/m) Peak Iim (dBµV/m)		Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)				
4844	Н	41.16		0.75	41.91		74	54	-12.09			
7266	Η	31.62		9.87	41.49		74	54	-12.51			
·/	Н				J		<u></u>					
4824	V	43.23		0.75	43.98		74	54	-10.02			
7236	V	33.77		9.87	43.64		74	54	-10.36			
	V		{ <sub>Z</sub> C		(	3		(, C-1)				

	Middle channel: 2437 MHz										
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)	Daal. AV		Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)		
4874	Н	44.81		0.97	45.78	-	74	54	-8.22		
7311	Н	33.49		9.83	43.32		74	54	-10.68		
	Н										
4874	V	45.88	1/0	0.97	46.85	0 )	74	54	-7.15		
7311	٧	36.35		9.83	46.18		74	54	-7.82		
	V										

					2.				
			\ Н	ligh channe	l: 2452 MH	Z			(.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)
4904	H	42.14		1.18	43.32		74	54	-10.68
7356	H	31.22	( 6)	10.07	41.29		74	54	-12.71
	H			/		)		/	
4904	V	44.40		1.18	45.58		74	54	-8.42
7356	V	32.16		10.07	42.23		74	54	-11.77
(, <del>C-</del> , )	V	<del>(-</del> 6)		(.0	· · · · ·		(C) <del>2)</del>		(. <del></del> )

- 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.
- 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**

Appendix A: DTS Bandwidth

Test Result

TestMode	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
	2412	8.040	2407.880	2415.920	0.5	PASS
11B	2437	8.280	2433.160	2441.440	0.5	PASS
	2462	7.640	2458.280	2465.920	0.5	PASS
	2412	16.400	2403.840	2420.240	0.5	PASS
11G	2437	16.480	2428.760	2445.240	0.5	PASS
	2462	16.480	2453.760	2470.240	0.5	PASS
	2412	17.600	2403.240	2420.840	0.5	PASS
11N20SISO	2437	17.720	2428.160	2445.880	0.5	PASS
	2462	17.720	2453.160	2470.880	0.5	PASS
	2422	36.480	2403.760	2440.240	0.5	PASS
11N40SISO	2437	35.200	2419.720	2454.920	0.5	PASS
	2452	36.160	2434.080	2470.240	0.5	PASS





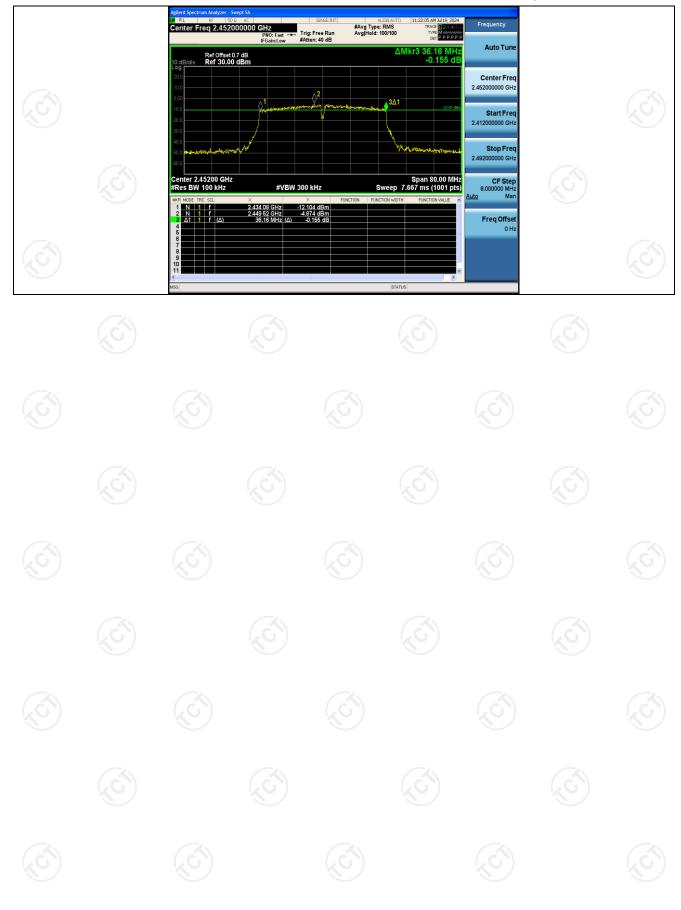


## **Test Graphs**



11N20SISO\_ 2462







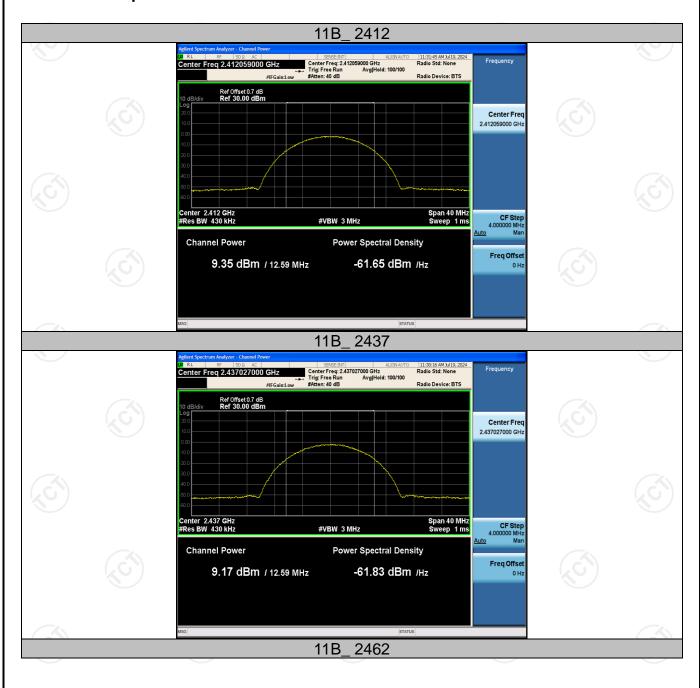
# Appendix C: Maximum conducted output power Test Result

	<u> </u>	12 9 1		
TestMode	Channel	Result[dBm]	Limit[dBm]	Verdict
11B	2412	9.35	<=30	PASS
	2437	9.17	<=30	PASS
	2462	9.61	<=30	PASS
11G	2412	9.27	<=30	PASS
	2437	9.43	<=30	PASS
	2462	9.47	<=30	PASS
11N20SISO	2412	9.14	<=30	PASS
	2437	9.29	<=30	PASS
	2462	9.33	<=30	PASS
11N40SISO	2422	9.58	<=30	PASS
	2437	9.70	<=30	PASS
	2452	9.57	<=30	PASS





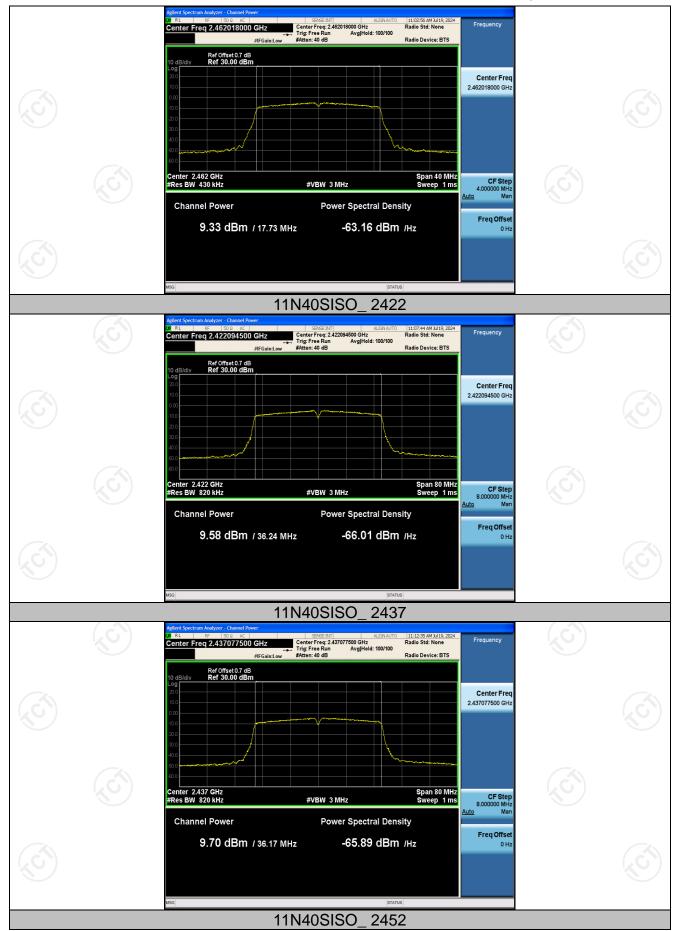
#### **Test Graphs**



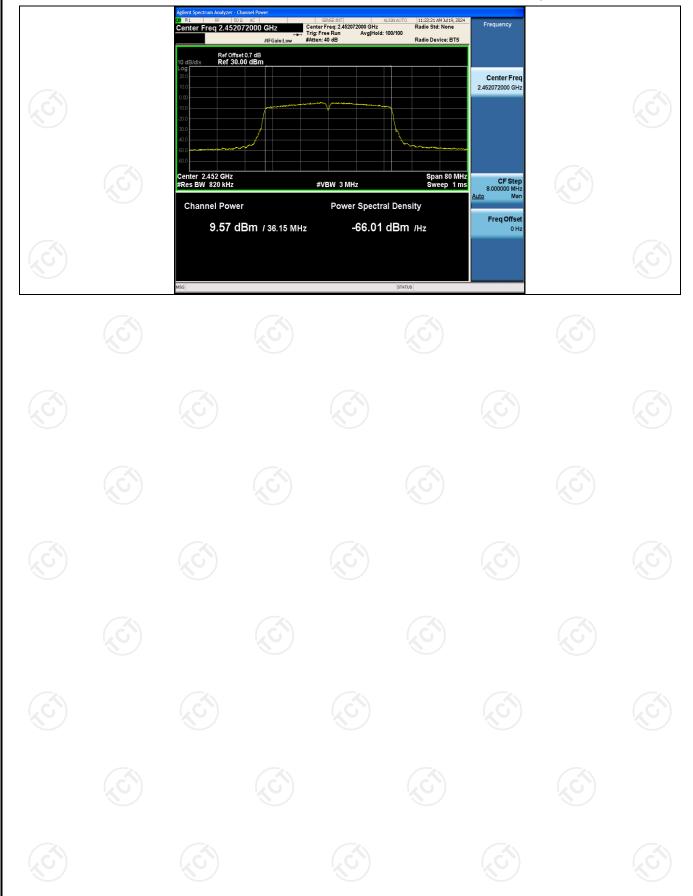














### Appendix D: Maximum power spectral density Test Result

TestMode	Channel	Result[dBm/3-100kHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
11B	2412	-17.20	-22.43	<=8	PASS
	2437	-16.18	-21.41	<=8	PASS
	2462	-16.77	-22.00	<=8	PASS
11G	2412	-18.71	-23.94	<=8	PASS
	2437	-18.15	-23.38	<=8	PASS
	2462	-18.69	-23.92	<=8	PASS
11N20SISO	2412	-19.21	-24.44	<=8	PASS
	2437	-18.99	-24.22	<b>8=&gt;</b>	PASS
	2462	-18.85	-24.08	<=8	PASS
11N40SISO	2422	-21.33	-26.56	<=8	PASS
	2437	-21.37	-26.60	<=8	PASS
	2452	-21.44	-26.67	<=8	PASS

Note: Result[dBm/3kHz] = Result[dBm/3-100kHz] +10log(3kHz/10kHz)



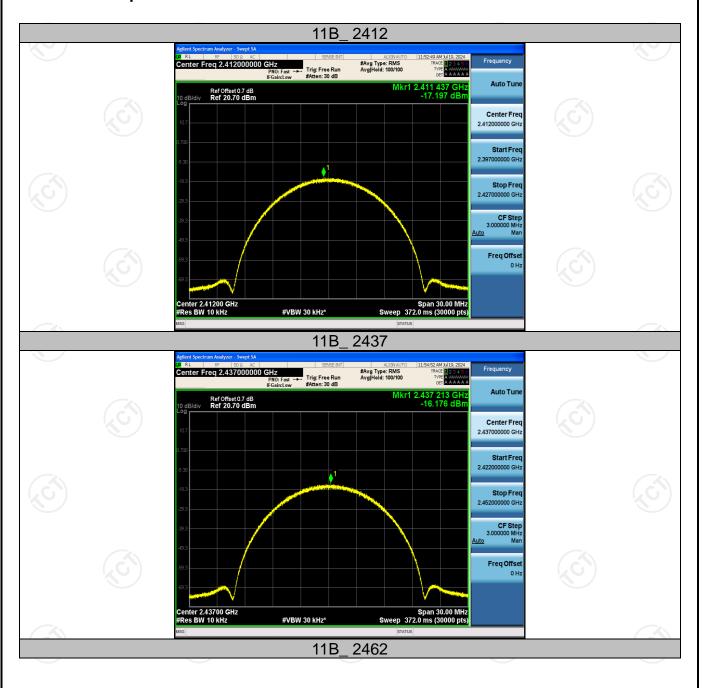
Page 45 of 75

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

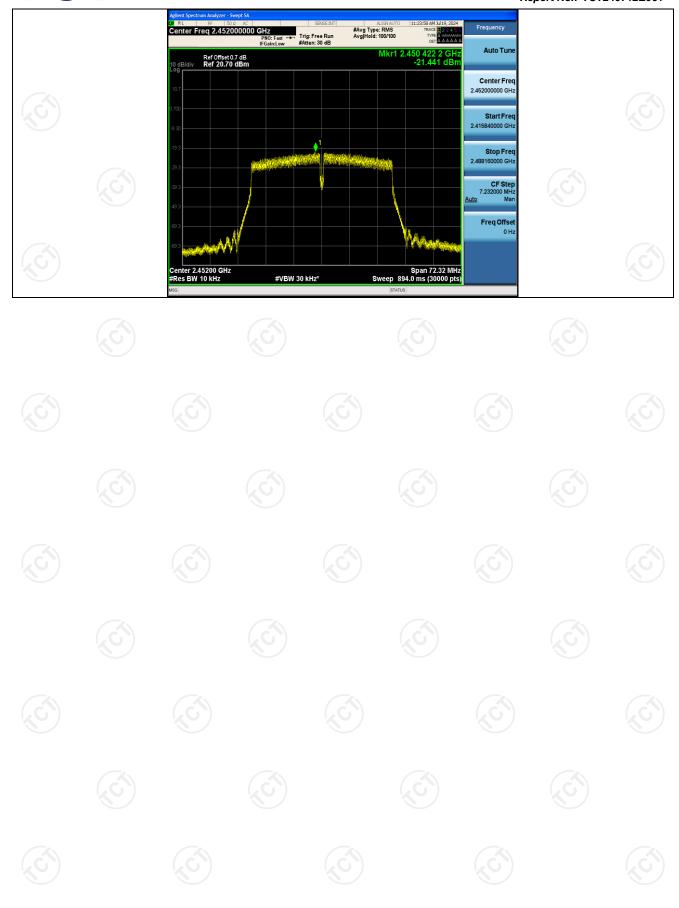




#### **Test Graphs**









# Appendix E: Band edge measurements Test Result

	1,20,		2 9 /			<u> </u>	
TestMode	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict	
11B	Low	2412	4.05	-48.17	<=-25.95	PASS	
	High	2462	9.64	-51.93	<=-20.36	PASS	
11G	Low	2412	-2.11	-45.49	<=-32.11	PASS	
	High	2462	-2.09	-53.97	<=-32.09	PASS	
11N20SISO	Low	2412	-2.49	-45.42	<=-32.49	PASS	
	High	2462	-1.98	-52.65	<=-31.98	PASS	
11N40SISO	Low	2422	-4.69	-44.89	<=-34.69	PASS	
	High	2452	-4.76	-47.70	<=-34.76	PASS	
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### **Test Graphs**

