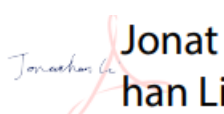



<b>Prüfbericht-Nr.:</b> <i>Test report no.:</i>	<b>CN23IYRN 002</b>	<b>Auftrags-Nr.:</b> <i>Order no.:</i>	<b>168414793</b>	<b>Seite 1 von 20</b> <i>Page 1 of 20</i>
<b>Kunden-Referenz-Nr.:</b> <i>Client reference no.:</i>	<b>N/A</b>	<b>Auftragsdatum:</b> <i>Order date:</i>	<b>2022-09-23</b>	
<b>Auftraggeber:</b> <i>Client:</i>	<b>IRay Technology Co., Ltd.</b> 11 GUIYANG STREET, YANTAI ECONOMY AND TECHNOLOGY DEVELOPMENT DISTRICT, YANTAI Shandong, P.R. CHINA			
<b>Prüfgegenstand:</b> <i>Test item:</i>	Portable Thermal Camera			
<b>Bezeichnung / Typ-Nr.:</b> <i>Identification / Type no.:</i>	S1280, SabcdXXX (a,b,c,d=0~9,X=null or A~Z for marketing purpose) (Trademark: InfiRay)			
<b>Auftrags-Inhalt:</b> <i>Order content:</i>	Test Report			
<b>Prüfgrundlage:</b> <i>Test specification:</i>	CFR47 FCC Part 15: Subpart C Section 15.247			
<b>Wareneingangsdatum:</b> <i>Date of sample receipt:</i>	2022-10-13	Please refer to Photo Document		
<b>Prüfmuster-Nr.:</b> <i>Test sample no.:</i>	A003352666-001 A003363248-001~007			
<b>Prüfzeitraum:</b> <i>Testing period:</i>	2022-11-15 - 2022-11-25			
<b>Ort der Prüfung:</b> <i>Place of testing:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
<b>Prüflaboratorium:</b> <i>Testing laboratory:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
<b>Prüfergebnis*:</b> <i>Test result*:</i>	Pass			
<b>geprüft von:</b> <i>tested by:</i>	 <b>Jonathan Li</b>		<b>genehmigt von:</b> <i>authorized by:</i>	 <b>Lin Lin</b>
<b>Datum:</b> <i>Date:</i>	2023-02-24		<b>Ausstellungsdatum:</b> <i>Issue date:</i>	2023-02-24
<b>Stellung / Position:</b>	Sachverständige(r) / Expert		<b>Stellung / Position:</b>	Sachverständige(r) / Expert
<b>Sonstiges / Other:</b>	FCC ID: 2AYGT-S1280			
<b>Zustand des Prüfgegenstandes bei Anlieferung:</b> <i>Condition of the test item at delivery:</i>	Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>			
<b>* Legende:</b>	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend N/A = nicht anwendbar	4 = ausreichend N/T = nicht getestet
<b>* Legend:</b>	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory N/A = not applicable	4 = sufficient N/T = not tested
<b>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</b> <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

v05

## ***Test Summary***

**5.1.1 ANTENNA REQUIREMENT**

*RESULT: Pass*

**5.1.2 MAXIMUM PEAK CONDUCTED OUTPUT POWER**

*RESULT: Pass*

**5.1.3 CONDUCTED POWER SPECTRAL DENSITY**

*RESULT: Pass*

**5.1.4 6DB BANDWIDTH**

*RESULT: Pass*

**5.1.5 99% BANDWIDTH**

*RESULT: Pass*

**5.1.6 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 KHZ BANDWIDTH**

*RESULT: Pass*

**5.1.7 RADIATED SPURIOUS EMISSION**

*RESULT: Pass*

## Contents

<b>1</b>	<b>GENERAL REMARKS .....</b>	<b>4</b>
<b>1.1</b>	<b>COMPLEMENTARY MATERIALS .....</b>	<b>4</b>
<b>2</b>	<b>TEST SITES .....</b>	<b>5</b>
<b>2.1</b>	<b>TEST FACILITIES .....</b>	<b>5</b>
<b>2.2</b>	<b>LIST OF TEST AND MEASUREMENT INSTRUMENTS.....</b>	<b>5</b>
<b>2.3</b>	<b>TRACEABILITY .....</b>	<b>6</b>
<b>2.4</b>	<b>CALIBRATION .....</b>	<b>6</b>
<b>2.5</b>	<b>MEASUREMENT UNCERTAINTY.....</b>	<b>6</b>
<b>2.6</b>	<b>LOCATION OF ORIGINAL DATA.....</b>	<b>6</b>
<b>2.7</b>	<b>STATUS OF FACILITY USED FOR TESTING.....</b>	<b>6</b>
<b>3</b>	<b>GENERAL PRODUCT INFORMATION .....</b>	<b>7</b>
<b>3.1</b>	<b>PRODUCT FUNCTION AND INTENDED USE.....</b>	<b>7</b>
<b>3.2</b>	<b>RATINGS AND SYSTEM DETAILS .....</b>	<b>7</b>
<b>3.3</b>	<b>INDEPENDENT OPERATION MODES .....</b>	<b>9</b>
<b>3.4</b>	<b>NOISE GENERATING AND NOISE SUPPRESSING PARTS.....</b>	<b>9</b>
<b>3.5</b>	<b>SUBMITTED DOCUMENTS.....</b>	<b>9</b>
<b>4</b>	<b>TEST SET-UP AND OPERATION MODES .....</b>	<b>10</b>
<b>4.1</b>	<b>PRINCIPLE OF CONFIGURATION SELECTION .....</b>	<b>10</b>
<b>4.2</b>	<b>TEST OPERATION AND TEST SOFTWARE.....</b>	<b>10</b>
<b>4.3</b>	<b>SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT.....</b>	<b>10</b>
<b>4.4</b>	<b>COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE.....</b>	<b>10</b>
<b>4.5</b>	<b>TEST SETUP DIAGRAM.....</b>	<b>11</b>
<b>5</b>	<b>TEST RESULTS .....</b>	<b>12</b>
<b>5.1</b>	<b>TRANSMITTER REQUIREMENT &amp; TEST SUITES .....</b>	<b>12</b>
<b>5.1.1</b>	<i>Antenna Requirement .....</i>	<i>12</i>
<b>5.1.2</b>	<i>Maximum Peak Conducted Output Power.....</i>	<i>13</i>
<b>5.1.3</b>	<i>Conducted Power Spectral Density .....</i>	<i>15</i>
<b>5.1.4</b>	<i>6dB Bandwidth .....</i>	<i>16</i>
<b>5.1.5</b>	<i>99% Bandwidth .....</i>	<i>17</i>
<b>5.1.6</b>	<i>Conducted Spurious Emissions Measured in 100 kHz Bandwidth .....</i>	<i>18</i>
<b>5.1.7</b>	<i>Radiated Spurious Emission .....</i>	<i>19</i>
<b>6</b>	<b>PHOTOGRAPHS OF THE TEST SET-UP.....</b>	<b>20</b>
<b>7</b>	<b>LIST OF TABLES.....</b>	<b>20</b>

# 1 General Remarks

## 1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A: Photographs of the Test Set-up

Appendix B: Test Results of Wi-Fi 802.11 b/g/n

## 2 Test Sites

### 2.1 Test Facilities

**TÜV Rheinland (Shenzhen) Co., Ltd.**

No. 362 Huanguan Road Middle, Longhua District, 518110, Shenzhen, P. R. China.

FCC Accreditation Designation No.: CN1260

### 2.2 List of Test and Measurement Instruments

**Table 1: List of Test and Measurement Equipment**

<b>Radio Spectrum Testing (SRD-Tonscend)</b>				
<b>Equipment</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial No.</b>	<b>Cal. until</b>
EXA Signal Analyzer, Multi-touch	Keysight	N9010B	MY60241175	2023-10-10
MXG X-Series RF Vector Signal Generator	Keysight	N5182B	MY61250137	2023-10-10
EXG X-Series Microwave Analog Signal Generator	Keysight	N5173B	MY61250141	2023-10-10
DC power supply	Keysight	E3642A	MY61276100	2023-10-10
Wireless Connectivity Tester	R&S	CMW270	102505	2023-10-10
Power Control Unit	Tonscend	JS0806-4ADC	N/A	2023-10-10
Automation Control Unit	Tonscend	JS0806-2	21C8060396	2023-10-10
Test Software	Tonscend	JS1120-3	N/A	N/A
Control PC	Lenovo	TianYi510S-071MB	YLX23JMF	N/A
OSP	R&S	OSP 150	101017	2023-11-21
Shielding Room 8#	Albatross	SR8	APC17151-SR8	2024-06-22
<b>Unwanted Emission Testing (TS9975)</b>				
<b>Equipment</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial No.</b>	<b>Cal. until</b>
EMI Test Receiver	R&S	ESR 7	102021	2023-08-02
Signal Analyzer	R&S	FSV 40	101439	2023-08-01
System Controller Interface	R&S	SCI-100	S10010038	N/A
Filterbank	R&S	Wlan	100759	2023-08-01
OSP	R&S	OSP 120	102040	N/A
Pre-amplifier	R&S	SCU08F1	08320031	2023-08-02
Amplifier	R&S	SCU-18F	180070	2023-08-02
Amplifier	R&S	SCU40A	100475	2023-08-02
Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	193	2024-08-06
Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218717	2024-08-06
Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19067	2024-08-27
Active Loop Antenna	Schwarzbeck	FMZB 1513	302	2023-08-06
Test software	R&S	EMC32 (V10.60.10)	N/A	N/A

Control PC	Dell	OptiPlex 7050	36NV9P2	N/A
3m Semi-Anechoic Chamber	Albatross	SAC-3m	APC17151-SAC	2024-06-22

## 2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

## 2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

## 2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table.

Parameter	Uncertainty (k=2)
RF output power, conducted	± 0.99 dB
Occupied Channel Bandwidth	± 2.08 %
RF power density, conducted	± 0.99 dB
Unwanted Emissions, conducted	± 0.89 dB
Radiated Emission of Transmitter, valid up to 26.5 GHz	±4.17 dB
Radiated Emission of Receiver, valid up to 26.5 GHz	±4.17 dB

## 2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A & B of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) Co., Ltd. file for certification follow-up purposes.

## 2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at No. 362 Huanguan Road Middle, Longhua District, 518110, Shenzhen, P. R. China. is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

### 3 General Product Information

#### 3.1 Product Function and Intended Use

The EUT is a Portable Thermal Camera, which supports Bluetooth (dual mode), 2.4GHz Wi-Fi 802.11 b/g/n and 5GHz Wi-Fi 802.11 a/n/ac wireless technologies.

The EUT can't work when it is charging.

All the models are identical for the marketing purpose.

For details, refer to the User Manual, Technical Description and Circuit Diagram.

#### 3.2 Ratings and System Details

**Table 2: Technical Specification of EUT**

General Information of EUT	Value
Product Name:	Portable Thermal Camera
Model No.:	S1280, SabcdXXX (a,b,c,d=0~9,X=null or A~Z for marketing purpose)
Trademark:	InfiRay
FCC ID:	2AYGT-S1280
Operating Voltage:	DC 5V, 2.0A (Charged by USB port) DC 3.8V, 9000mAh (supplied by lithium-ion rechargeable battery)
Testing Voltage:	Fully charged battery
Operating Temperature Range:	-15 °C ~ 50 °C
<b>Technical Specification of Wi-Fi 802.11 b/g/n</b>	
Operating Frequency:	2412 - 2462 MHz for 802.11b/g/n(HT20) 2422 - 2452 MHz for 802.11n(HT40)
Type of Modulation:	DSSS(DBPSK/DQPSK/CCK) OFDM(BPSK/QPSK/16QAM/64QAM)
Data Rate:	1/2/5.5/11 Mbps for 802.11b 6/9/12/18/24/36/48/54 Mbps for 802.11g MCS0 ~ MCS7 for 802.11n
Channel Number:	11 channels for 802.11b/g/n(HT20) 7 channels for 802.11n(HT40)
Channel Separation:	5 MHz
Antenna Type:	Two Integral Antennas
Antenna Number:	1Tx1Rx for SISO mode (ANT0 or ANT1), 2Tx2Rx for MIMO mode
Antenna Gain of 2.4GHz Wi-Fi:	3.35 dBi for ANT0 3.35 dBi for ANT1
Antenna Number:	1Tx1Rx for SISO mode (ANT0 or ANT1), 2Tx2Rx for MIMO mode

**Table 3: RF Channel and Frequency of Wi-Fi 802.11 b/g/n**

RF Channel	802.11 b/g/n(HT20)	802.11 n(HT40)
	Frequency (MHz)	Frequency (MHz)
<b>01</b>	<b>2412</b>	/
02	2417	/
<b>03</b>	<b>2422</b>	<b>2422</b>
04	2427	2427
05	2432	2432
<b>06</b>	<b>2437</b>	<b>2437</b>
07	2442	2442
08	2447	2447
<b>09</b>	<b>2452</b>	<b>2452</b>
10	2457	/
<b>11</b>	<b>2462</b>	/

Test frequencies are lowest channel: 2412 MHz, middle channel: 2437 MHz and highest channel: 2462 MHz for 802.11b/g/n(HT20)

Test frequencies are lowest channel: 2422 MHz, middle channel: 2437 MHz and highest channel: 2452 MHz for 802.11n(HT40)



### 3.3 Independent Operation Modes

The basic operation modes are:

- A. On, Wi-Fi 802.11 b/g/n wireless transmitting mode
  - 1) Low Channel
  - 2) Middle Channel
  - 3) High Channel
- B. Off

### 3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

### 3.5 Submitted Documents

- Application Form
- User Manual
- ID Label and Location Info

## 4 Test Set-up and Operation Modes

### 4.1 Principle of Configuration Selection

**Radio Spectrum:** The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

**Emission:** The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

### 4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All tests were performed according to the procedures in ANSI C63.10: 2013.

According to clause 3.1, all tests were performed on model S1280 in this report.

### 4.3 Special Accessories and Auxiliary Equipment

Table 4: Auxiliary Equipment Used during Test

Description	Manufacturer	Model	S/N
Laptop	Lenovo	T480	PF-16A6N8

### 4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

## 4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

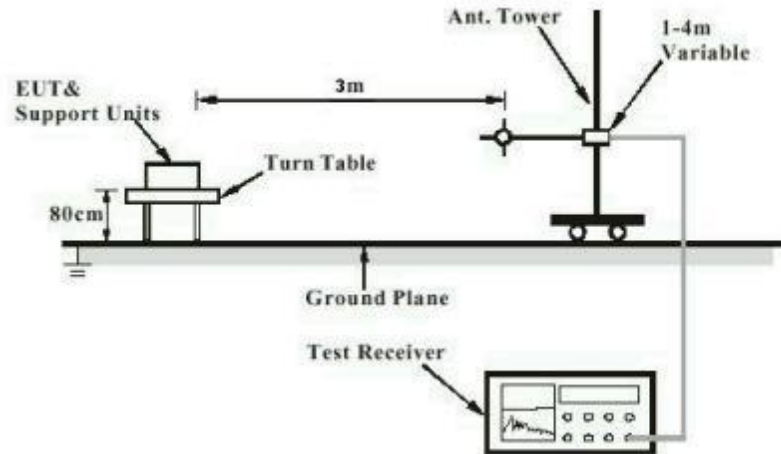


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

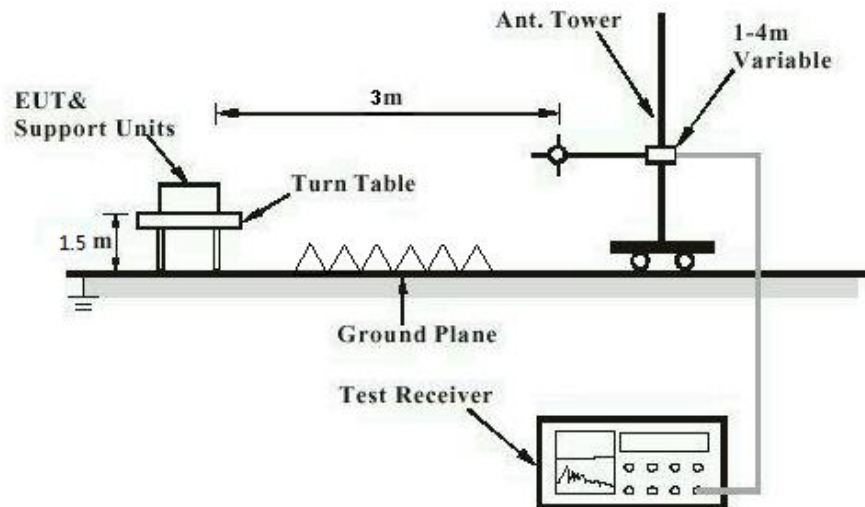
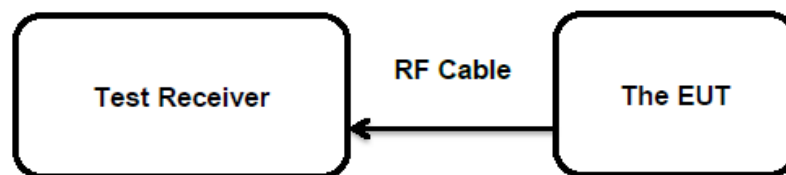


Diagram of Measurement Configuration for Conducted Transmitter Measurement



## 5 Test Results

### 5.1 Transmitter Requirement & Test Suites

#### 5.1.1 Antenna Requirement

RESULT:

**Pass**

**Test Specification**

Test standard : FCC Part 15.247(b)(4) and Part 15.203

According to the manufacturer declared, the EUT have an integral antennas, the directional gain of antenna is 3.35 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement.

Therefore the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

## 5.1.2 Maximum Peak Conducted Output Power

**RESULT:****Pass****Test Specification**

Test standard	:	FCC Part 15.247(b)(3)
Basic standard	:	ANSI C63.10: 2013
Limits	:	1.0 Watts
Kind of test site	:	Shielded Room

**Test Setup**

Date of testing	:	2022-11-15 to 2022-11-16
Input voltage	:	Fully charged battery
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	23.5 °C
Relative humidity	:	64 %
Atmospheric pressure	:	101 kPa

For details refer to following test result.

**Table 5: Test Result of Maximum Peak Conducted Output Power**

SISO mode

Test Mode	Data Rate	Test Channel (MHz)	Measured Peak Power (SISO Ant0)		Measured Peak Power (SISO Ant1)		Limit (W)
			(dBm)	(W)	(dBm)	(W)	
802.11b	1 Mbps	2412	17.03	0.0505	17.11	0.0514	< 1.0
		2437	15.94	0.0393	16.96	0.0497	
		2462	16.98	0.0499	17.33	0.0541	
802.11g	6 Mbps	2412	16.67	0.0465	16.47	0.0444	
		2437	15.22	0.0333	16.66	0.0463	
		2462	15.58	0.0361	15.82	0.0382	
802.11n (HT20)	MCS0	2412	15.54	0.0358	16.34	0.0431	
		2437	15.18	0.0330	16.47	0.0444	
		2462	16.04	0.0402	16.50	0.0447	
802.11n (HT40)	MCS0	2422	16.35	0.0432	16.09	0.0406	
		2437	16.18	0.0415	17.41	0.0551	
		2452	15.13	0.0326	15.87	0.0386	
<b>Maximum Measured Value</b>			<b>17.03</b>	<b>0.0505</b>	<b>17.41</b>	<b>0.0551</b>	

MIMO mode:

Test Mode	Data Rate	Test Channel (MHz)	Measured Peak Power		Limit (W)
			(dBm)	(W)	
802.11n (HT20)	MCS0	2412	18.97	0.0789	< 1.0
		2437	18.88	0.0773	
		2462	19.29	0.0849	
802.11n (HT40)	MCS0	2422	19.23	0.0838	
		2437	19.85	0.0966	
		2452	18.53	0.0713	
<b>Maximum Measured Value</b>			<b>19.85</b>	<b>0.0966</b>	

Note:

- 1) The cable loss is taken into account in results.
- 2) Antenna gain(G): 3.35 dBi for ANT0, 3.35 dBi for ANT1

### 5.1.3 Conducted Power Spectral Density

**RESULT:****Pass****Test Specification**

Test standard	: FCC Part 15.247(e)
Basic standard	: ANSI C63.10: 2013
Limits	: < 8 dBm / 3kHz
Kind of test site	: Shielded Room

**Test Setup**

Date of testing	: 2022-11-15 to 2022-11-16
Input voltage	: Fully charged battery
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: 23.5 °C
Relative humidity	: 64 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix B.

### 5.1.4 6dB Bandwidth

**RESULT:****Pass****Test Specification**

Test standard	:	FCC Part 15.247(a)(2)
Basic standard	:	ANSI C63.10: 2013
Limits	:	> 500 KHz
Kind of test site	:	Shielded Room

**Test Setup**

Date of testing	:	2022-11-15 to 2022-11-16
Input voltage	:	Fully charged battery
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	23.5 °C
Relative humidity	:	64 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix B.



**Prüfbericht - Nr.:** CN23IYRN 002  
Test Report No.:Seite 17 von 20  
Page 17 of 20

### 5.1.5 99% Bandwidth

**RESULT:****Pass****Test Specification**

Test standard : FCC Part 15.247(a)  
Basic standard : ANSI C63.10: 2013  
Kind of test site : Shielded Room

**Test Setup**

Date of testing : 2022-11-15 to 2022-11-16  
Input voltage : Fully charged battery  
Operation mode : A  
Test channel : Low / Middle / High  
Ambient temperature : 23.5 °C  
Relative humidity : 64 %  
Atmospheric pressure : 101 kPa

For the measurement records, refer to the appendix B.

### 5.1.6 Conducted Spurious Emissions Measured in 100 kHz Bandwidth

**RESULT:****Pass****Test Specification**

Test standard	: FCC Part 15.247(d)
Basic standard	: ANSI C63.10: 2013
Limits	: 20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power); In addition, radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified in 15.209(a)
Kind of test site	: Shielded Room

**Test Setup**

Date of testing	: 2022-11-15 to 2022-11-16
Input voltage	: Fully charged battery
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: 23.5 °C
Relative humidity	: 64 %
Atmospheric pressure	: 101 kPa

Test results of 100kHz Bandwidth of Frequency Band Edge by Conducted method refer to test plots, and compliance is achieved as well.

For the measurement records, refer to the appendix B.

### 5.1.7 Radiated Spurious Emission

**RESULT:****Pass****Test Specification**

Test standard	:	FCC Part 15.247(d) & FCC Part 15.205
Basic standard	:	ANSI C63.10: 2013
Limits	:	Refer to 15.209(a) of FCC part 15.247(d)
Kind of test site	:	3m Semi-anechoic Chamber

**Test Setup**

Date of testing	:	2022-11-22 to 2022-11-25
Input voltage	:	Fully charged battery
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	Refer to test result
Relative humidity	:	Refer to test result
Atmospheric pressure	:	101 kPa

**Remark:**

Testing was carried out within frequency range 9kHz to the tenth harmonics. All configurations tested for both MIMO and SISO, only worst-case mode data reported.

For the measurement records, refer to the appendix B.

## 6 Photographs of the Test Set-Up

For photographs of the test set-up, refer to the appendix A.

## 7 List of Tables

Table 1: List of Test and Measurement Equipment.....	5
Table 2: Technical Specification of EUT .....	7
Table 3: RF Channel and Frequency of Wi-Fi 802.11 b/g/n .....	8
Table 4: Auxiliary Equipment Used during Test .....	10
Table 5: Test Result of Maximum Peak Conducted Output Power.....	14