Prüfbericht-Nr.: *Test report no.:*	**CN22M62P 002**	**Auftrags-Nr.:** *Order no.*:	**168381079**	**Seite 1 von 22** *Page 1 of 22*
Kunden-Referenz-Nr.: *Client reference no.:*	**N/A**	**Auftragsdatum:** *Order date:*	2022-05-15	
Auftraggeber: *Client:*	ZTE Corporation ZTE Plaza, Hi-Tech Park, Nanshan District, Shenzhen, Guangdong, P.R.China			
Prüfgegenstand: *Test item:*	Home Gateway			
Bezeichnung / Typ-Nr.: *Identification / Type no.:*	E1320 (Trademark: ZTE)			
Auftrags-Inhalt: *Order content*:	Test Report			
Prüfgrundlage: *Test specification:*	CFR47 FCC Part15: Subpart E Section 15.407 FCC KDB 662911 D01 Multiple Transmitter Output v02r01 FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01 ANSI C63.10:2013			

Wareneingangsdatum: *Date of sample receipt:*	2022-07-16	Please refer to Photo Document
Prüfmuster-Nr.: *Test sample no:*	A003294694-001~002	
Prüfzeitraum: *Testing period:*	2022-07-16 - 2022-08-09	
Ort der Prüfung: *Place of testing:*	TÜV Rheinland (Shenzhen) Co., Ltd.	
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland (Shenzhen) Co., Ltd.	
Prüfergebnis*: *Test result*:*	Pass	

geprüft von: *tested by:*	Bell Hu Signed by: Bell Hu	**genehmigt von:** *authorized by:*	Lin Lin Signed by: Lin Lin
Datum: *Date:* 2022-08-30		**Ausstellungsdatum:** *Issue date:* 2022-08-30	
Stellung / *Position:*	Project Manager	**Stellung** / *Position:*	Reviewer
Sonstiges / *Other:*	FCC ID: Q78-E1320		

Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery:*	Prüfmuster vollständig und unbeschädigt *Test item complete and undamaged*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
** Legend:*	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specification(s)		*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

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 FREQUENCY STABILITY
RESULT: Pass

5.1.5 26DB BANDWIDTH AND 99% BANDWIDTH
RESULT: Pass

5.1.6 6DB BANDWIDTH
RESULT: Pass

5.1.7 RADIATED SPURIOUS EMISSION
RESULT: Pass

5.1.8 DYNAMIC FREQUENCY SELECTION (DFS)
RESULT: Pass

5.1.9 CONDUCTED EMISSION ON AC MAINS
RESULT: Pass

Contents

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 5GHz Wi-Fi
Appendix C: Test Results DFS

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.: 694916

ISED wireless device testing laboratory: 25069

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Radio Spectrum Testing (SRD-Tonscend)				
Equipment	**Manufacturer**	**Model**	**Serial No.**	**Cal. until**
EXA Signal Analyzer, Multi-touch	Keysight	N9010B	MY60241175	2022-09-28
MXG X-Series RF Vector Signal Generator	Keysight	N5182B	MY61250137	2022-09-28
EXG X-Series Microwave Analog Signal Generator	Keysight	N5173B	MY61250141	2022-09-28
DC power supply	Keysight	E3642A	MY61276100	2022-09-28
Power Control Unit	Tonscend	JS0806-4ADC	N/A	2022-09-28
Automation Control Unit	Tonscend	JS0806-2	21C8060396	2022-09-28
Test Software	Tonscend	JS1120-3	N/A	N/A
Control PC	Lenovo	TianYi510S-071MB	YLX23JMF	N/A
Shielding Room 8#	Albatross	SR8	APC17151-SR8	2024-06-22
Unwanted Emission Testing (TS9975)				
Equipment	**Manufacturer**	**Model**	**Serial No.**	**Cal. until**
EMI Test Receiver	R&S	ESR 7	102021	2022-08-10
Signal Analyzer	R&S	FSV 40	101439	2022-08-09
System Controller Interface	R&S	SCI-100	S10010038	N/A
Filterbank	R&S	Wlan	100759	2022-08-09
OSP	R&S	OSP 120	102040	N/A
Pre-amplifier	R&S	SCU08F1	08320031	2022-08-09
Amplifier	R&S	SCU-18F	180070	2022-08-09
Amplifier	R&S	SCU40A	100475	2022-08-09
Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	193	2022-08-08
Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218717	2022-08-08
Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19067	2022-08-08
Active Loop Antenna	Schwarzbeck	FMZB 1513	302	2022-09-13
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

Conducted Emission				
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Until**
EMI Test Receiver	R&S	ESR3	102428	2022-08-10
Artificial Mains Network	R&S	ENV216	102333	2022-08-10
Artificial Mains Network	R&S	ENV432	101411	2022-08-10
EMC32 test software	R&S	EMC32(Ver.10.50.00)	N/A	N/A

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 basics 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
Radio Frequency	±1 x 10-7
RF Power (conducted)	±2.5 dB
Radiated Emission of Transmitter, valid up to 26.5 GHz	±6 dB
Radiated Emission of Receiver, valid up to 26.5 GHz	±6 dB
Conducted Emission, (9kHz to 150kHz)/(150kHz to 30MHz)	± 3.70 dB / ± 3.30 dB
Temperature	±1 °C
Humidity	±5 %
Voltage (DC)	±1 %
Voltage (AC, <10kHz)	±2 %

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 Home Gateway which supports 2.4GHz Wi-Fi 802.11 b/g/n/ax and 5GHz Wi-Fi 802.11a/n/ac/ax wireless technology.

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
Kind of Equipment:	Home Gateway
Type Designation:	E1320
Trademark:	ZTE
FCC ID:	Q78-E1320
Operating Voltage:	DC 12.0V/1.0A via adapter
Testing Voltage:	AC 120V, 60Hz
Technical Specification of Wi-Fi 802.11 b/g/n/ax	
Operating Frequency:	2412 - 2462 MHz for 802.11b/g/n(HT20)/ax(HE20) 2422 - 2452 MHz for 802.11n(HT40)/ax(HE40)
Type of Modulation:	802.11b: CCK, DQPSK, DBPSK 802.11g/n : BPSK, QPSK, 16QAM, 64QAM 802.11ax: BPSK, QPSK, 16QAM, 6 4QAM, 256QAM, 1024QAM
Data Rate:	1/2/5.5/11 Mbps for 802.11b 6/9/12/18/24/36/48/54 Mbps for 802.11g MCS0-MCS15 for 802.11n(HT20/40) MCS0-MCS11 for 802.11ax(HE20/40) (All data rates considered, only the Worst-cases reported)
Channel Number:	11 channels for 802.11b/g/n(HT20)/ax(HE20 7 channels for 802.11n(HT40)/ax(HE40
Channel Separation:	5 MHz
Antenna Type:	Integral Antenna
Number of Antenna:	2
Antenna Gain:	5.0 dBi Max
Note: WLAN 2.4GHz 802.11n and 802.11ax support beamforming Function. For directional gain: Array Gain = 10 log(N_{ANT}/N_{SS}) dB. So the Directional gain =G_{ANT} + 10 log(N_{ANT}) dBi (The worst case directional gain will occur when NSS = 1).	
Technical Specification of Wi-Fi 802.11 a/n/ac/ax	
Operating Frequency:	5180-5320MHz, 5500-5720MHz, 5745-5825MHz
Type of Modulation:	802.11n/a: BPSK, QPSK, 16QAM, 64QAM 802.11ac: BPSK, QPSK, 16QAM, 64QAM, 256QAM 802.11ax: BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM
Operating Frequency / Protocol:	5180-5320MHz: 802.11 a/n20/n40/ac20/ac40/ac80/ac160/ ax20/ax40/ax80/ax160

	5500-5720MHz: 802.11 a/n20/n40/ac20/ac40/ac80/ac160/ ax20/ax40/ax80/ax160 5745-5825MHz: 802.11 a/n20/n40/ac20/ac40/ac80/ax20/ax40/ax80
Data Rate:	1/2/5.5/11 Mbps for 802.11b 6/9/12/18/24/36/48/54 Mbps for 802.11g MCS0 ~ MCS23 for 802.11n MCS0-MCS9 for 802.11ac MCS0-MCS11 for 802.11ax (All data rates considered, only the Worst-cases reported)
Channel Separation	5 MHz
Antenna Type:	Integral Antenna
Number of Antenna:	3
Antenna Gain:	5.7dBi peak gain@5.18GHz, 5.2dBi peak gain@5.32GHz 5.0dBi peak gain@5.5GHz, 4.9dBi peak gain@5.6GHz 5.1dBi peak gain@5.7GHz,4.8dBi peak gain@5.785GHz
TPC function:	Supported
Type of Device	Master Device with Radar Detection
Note: WLAN 5GHz 802.11n/802.11ac/802.11ax support beamforming Function. For directional gain: Array Gain = 10 log(N_{ANT}/N_{SS}) dB. So the Directional gain =G_{ANT} + 10 log(N_{ANT}) dBi (The worst case directional gain will occur when NSS = 1).	

3.3 Independent Operation Modes

The basic operation modes are:

A. On, Wi-Fi 802.11 a/n/ac/ax wireless transmitting mode
   1. Low channel
   2. Middle channel
   3. High channel

B. On, Normal Operation (Wi-Fi Link)

C. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- Application Form
- Operation Description
- Schematics
- PCB Layout
- User Manual
- Block Diagram
- Rating Label
- Parts List

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 E1320 in this report.

Table 3: Test channel and frequency

Mode	Test Channels
802.11 a/n20/ac20/ax20	L: 5180MHz; 5260MHz; 5500MHz; 5745MHz M: MHz; 5200MHz;5280MHz; 5580MHz; 5785MHz H: 5240MHz;5320MHz; 5700MHz; 5825MHz
802.11 n40/ac40/ax40	L/M: 5190MHz; 5270MHz; 5510MHz; 5510MHz; 5755MHz H: 5230MHz; 5310MHz; 5670MHz; 5795MHz
802.11 ac80/ax80	L/M/H: 5210MHz; 5290MHz; 5530MHz; 5610MHz; 5775MHz

Straddle channel:

Mode	Test Channels	
802.11 a/n20/ac20/ax20	5720MHz	5470MHz -5725MHz, Straddle Channel
802.11 n40/ac40/ax40	5710MHz	
802.11 ac80/ax80	5690MHz	
802.11 ac160/ax160	5570MHz	
802.11 ac160/ax160	5250MHz	5150MHz 5350MHz, Straddle Channel

4.3 Special Accessories and Auxiliary Equipment

Table 4: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	S/N
Laptop	Lenovo	T14	N/A
AC/DC adapter	Xiamen Castec	MN0112K-L120100	Input 100-240V AC, 50/60Hz 0.3A Max; Output 12V/1.0A 12W

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)

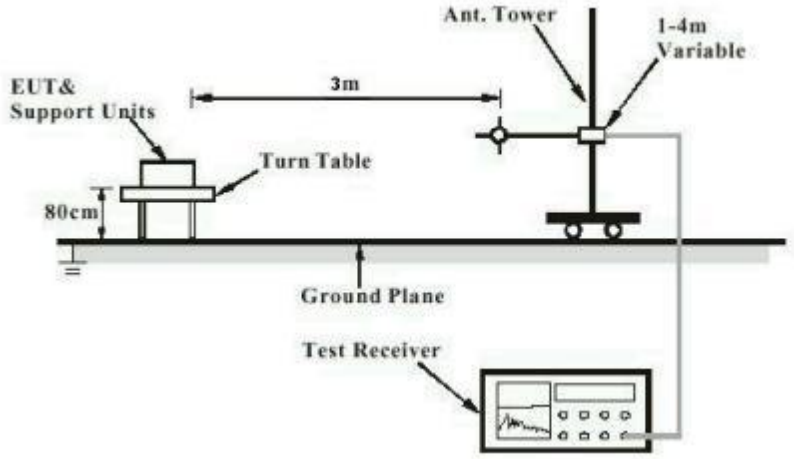


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

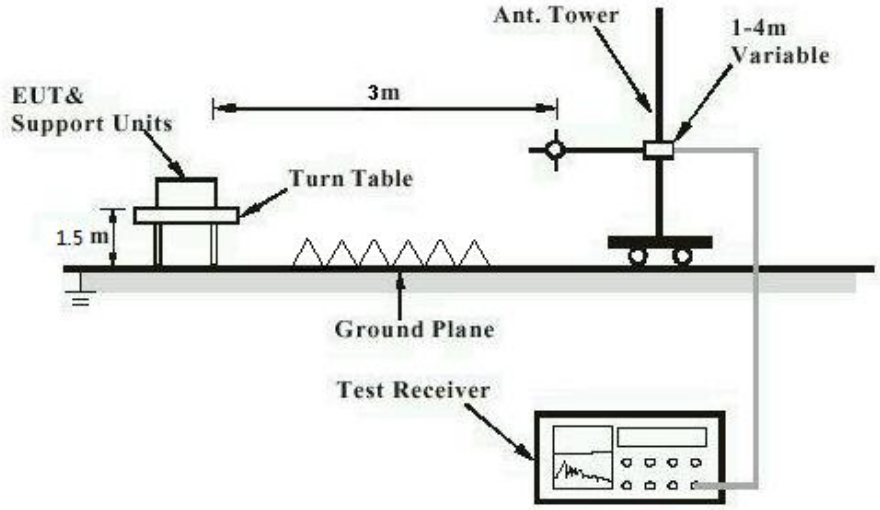


Diagram of Measurement Configuration for Mains Conduction Measurement

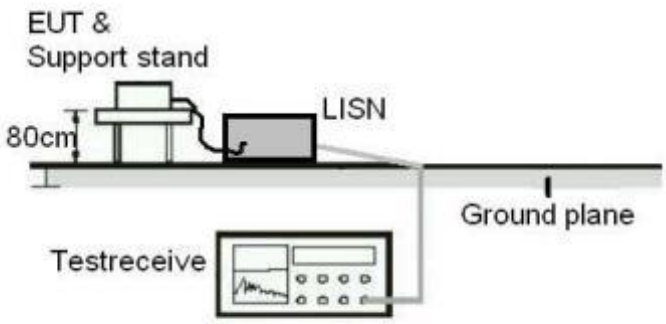


Diagram of Measurement Configuration for Conducted Transmitter Measurement

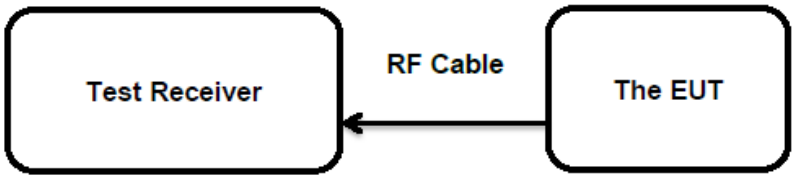
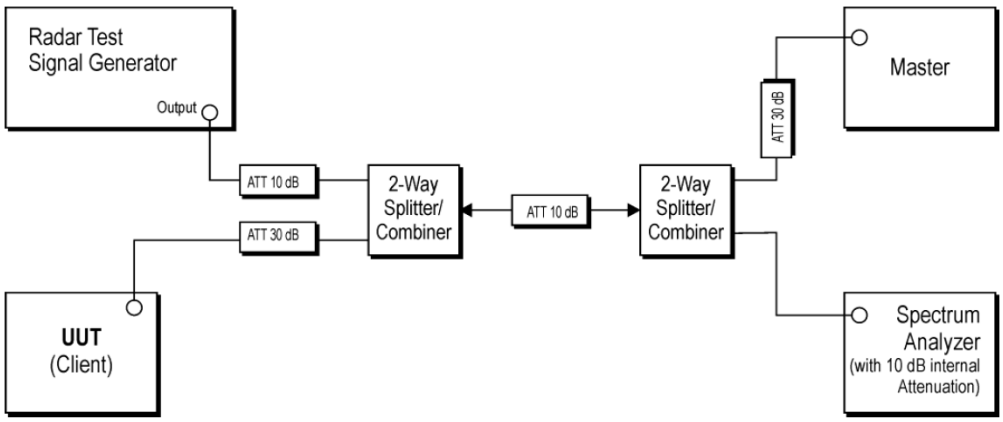


Diagram of Measurement Configuration for Dynamic Frequency Selection (DFS)



5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT: **Pass**

Test Specification
Test standard : Part 15.203

According to the manufacturer declared, the EUT have Integral antennas, and the antenna connector is designed with permanent attachment and no consideration of replacement. Antenna gain as listed in section 3.2 table 2.

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

Refer to EUT Photo for further details.

5.1.2 Maximum Conducted Output Power

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.407(a)(1)(ii)&(2)&(4)
Basic standard	:	ANSI C63.10: 2013
Limits	:	1000mW (30dBm) (5150-5250MHz) *250 mW (24dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz, where is lesser.(5250-5350MHz, 5470-5725MHz) <1W (30dBm) (5725-5850MHz)
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2022-07-21 to 2022-07-30
Input voltage	:	AC 120V, 60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	24.8 ℃
Relative humidity	:	55 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix B.

This device is an indoor access point.

5.1.3 Conducted Power Spectral Density

RESULT: **Pass**

Test Specification

Test standard	:	FCC part 15.407(a)
Basic standard	:	ANSI C63.10: 2013 KDB 789033 D02 v01r03
Limits	:	<11dBm/MHz (5150-5250MHz 5250-5350MHz, 5470-5725MHz) <30dBm/500kHz (5725-5850MHz)
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2022-07-21 to 2022-07-30
Input voltage	:	AC 120V, 60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	24.8 ℃
Relative humidity	:	55 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix B.

5.1.4 Frequency Stability

RESULT: **N/A**

Test Specification

Test standard	:	FCC Part 15.407(g)
Basic standard	:	ANSI C63.10: 2013
Limits	:	Within assigned bands
Kind of test site	:	Shielded Room

As declared, the device will be maintained within assigned bands under all conditions of normal operation as Specified.

5.1.5 26dB Bandwidth and 99% Bandwidth

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.407(e)
Basic standard	:	ANSI C63.10: 2013
Limits	:	N/A
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2022-07-21 to 2022-07-30
Input voltage	:	AC 120V, 60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	24.8 ℃
Relative humidity	:	55 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix B.

5.1.6 6dB Bandwidth

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.407(e)
Basic standard	:	ANSI C63.10: 2013
Limits	:	At least 500KHz (5725-5850MHz)
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2022-07-21 to 2022-07-30
Input voltage	:	AC 120V, 60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	24.8 ℃
Relative humidity	:	55 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix B.

5.1.7 Radiated Spurious Emission

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.407(b) & FCC Part 15.205 & FCC Part 15.209
Basic standard	:	ANSI C63.10: 2013 KDB 789033 D02 v01r03
Limits	:	• For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz. • For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz. • For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz. Emissions outside the band 5470-5600 MHz and 5650-5725 MHz shall not exceed -27 dBm/MHz e.i.r.p. • For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge. Restricted Bands meet the requirement of 15.209 limit
Kind of test site	:	3m Semi-anechoic Chamber

Test Setup

Date of testing	:	2022-07-27 to 2022-08-06
Input voltage	:	AC 120V, 60Hz
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. Only the worst case spurious emissions configuration of the each mode were reported.

For the measurement records, refer to the appendix B.

5.1.8 Dynamic Frequency Selection (DFS)

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.407(h)
Basic standard	:	ANSI C63.10: 2013
Limits	:	5250-5350MHz, 5470-5725MHz FCC Part 15.407(h)(2)
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2022-07-25~2022-08-08
Input voltage	:	AC 120V, 60Hz
Operation mode	:	B
Test channel	:	CH 58, CH 106
Ambient temperature	:	24.8 ℃
Relative humidity	:	55 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix C.

5.1.9 Conducted Emission on AC Mains

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.207(a)
Basic standard	:	ANSI C63.10: 2013
Frequency range	:	0.15 – 30MHz
Limits	:	FCC Part 15.207(a)
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2022-07-25
Input voltage	:	AC 120V, 60Hz
Operation mode	:	B
Earthing	:	Not connected
Ambient temperature	:	23.1 ℃
Relative humidity	:	52 %
Atmospheric pressure	:	101 kPa

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