

Test report No: 4909379.60

FCC TEST REPORT

Product Name	Miko Mini Robot
Model and /or type reference	
Trademark	EMK401
FCC ID	2AS3S-EMK401
Applicant's name / address	RN Chidakashi Technologies Private Limited Flat No - 4, StambhTirth Building, Plot No 82, R.A. Kidwai Road Wadala, Mumbai, 400031, India
Test method requested, standard	FCC CFR Title 47 Part 15 Subpart E Section 15.407 ANSI C63.10: 2013
Verdict Summary	IN COMPLIANCE
Tested by (name & signature)	Jazz Liang 
Approved by (name & signature)	Tim Yan 
Date of issue	2023-11-13
Report template No	Template_FCC-RF-V1.0

INDEX

	page
General conditions	5
Environmental conditions	5
Possible test case verdicts	6
Abbreviations	6
Document History	7
Remarks and Comments	7
Used Equipment	8
Uncertainty	10
1 General Information	11
1.1 General Description of the Item(s)	11
1.2 802.11ax RU configurations:	16
1.3 Test Data Rate	17
2 Description of Test Setup	19
2.1 Operating mode(s) used for tests	19
2.2 Auxiliary equipment / Test software for the EUT	20
2.3 Test Configuration / Block diagram used for tests	21
2.4 Testing process	23
3 Verdict summary section	24
3.1 Standards	24
3.2 Deviation(s) from the Standard(s) / Test Specification(s)	24
3.3 Overview of results	25
3.4 Power setting in test	26
4 Test Results	28
4.1 AC Power Line Conducted Emission	28
4.1.1 Limit 28	
4.1.2 Test Setup	28
4.1.3 Test Procedure	28
4.2 Radiated Emissions	29
4.2.1 Limit 29	
4.2.2 Test Setup	31
4.2.3 Test Procedure	32
4.3 Emission bandwidth	33
4.3.1 Limit 33	
4.3.2 Test Setup	33

4.3.3	Test Procedure	33
	Test Method	33
4.4	6dB bandwidth	34
4.4.1	Limit 34	
4.4.2	Test Setup	34
4.4.3	Test Procedure	34
4.5	Duty cycle	35
4.5.1	Limit 35	
4.5.2	Test Setup	35
4.5.3	Test Procedure	35
4.6	Power Output.....	36
4.6.1	Limit 36	
4.6.2	Test Setup	37
4.6.3	Test Procedure	37
4.7	Maximum Power Spectral Density.....	39
4.7.1	Limit 39	
4.7.2	Test Setup	41
4.7.3	Test Procedure	41
4.8	Radiated Emission Band Edge.....	42
4.8.1	Limit 42	
4.8.2	Test Setup	44
4.8.3	Test Procedure	44
4.9	Frequency Stability	46
4.9.1	Limit: 46	
4.9.2	Test Setup	46
4.9.3	Test Procedure	46
4.10	Antenna Requirement.....	47
4.10.1	Limit: 47	
4.10.2	Antenna Connector Construction:	47
5	Test setup photo and EUT Photo.....	48
6	Test Result	49
	Appendix A: Conducted Emission	49
	Appendix B: Radiated Emission	51
	Appendix C: Emission bandwidth and occupied bandwidth	165
	Appendix D: 6dB Emission Bandwidth	167
	Appendix E: Duty cycle	168
	Appendix F: Power Output.....	170
	Appendix G: Maximum Power Spectral Density	172

Appendix H: Radiated Emission Band Edge	184
Appendix I: Frequency Stability	254

GENERAL CONDITIONS

Test Location	DEKRA Testing and Certification (Shanghai) Ltd. Guangzhou Branch Block 5, No.3, Qiyun Road, Huangpu District, Guangzhou, Guangdong, China FCC Designation Number: CN1324;
Date of receipt of test item	2023-09-12
Date (s) of performance of tests	2023-09-12 to 2023-11-13
Test sample	Normal sample: EMK401 (lab no.4909379-1) RF conducted sample: EMK401 (lab no.4909379-1) RF radiated sample: EMK401 (lab no.4909379-1)

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or Competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA.

ENVIRONMENTAL CONDITIONS

The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. The climatic conditions during the tests were within the following limits:

Ambient temperature	15 °C – 35 °C
Relative Humidity air	30% - 60%

If explicitly required in the basic standard or applied product / product family standard the climatic values are recorded and documented separately in this test report.

POSSIBLE TEST CASE VERDICTS

Test case does not apply to test object	N/A
Test object does meet requirement	P (Pass) / PASS
Test object does not meet requirement	F (Fail) / FAIL
Not measured	N/M

ABBREVIATIONS

For the purposes of the present document, the following abbreviations apply:

EUT	: Equipment Under Test
QP	: Quasi-Peak
CAV	: CISPR Average
AV	: Average
CDN	: Coupling Decoupling Network
SAC	: Semi-Anechoic Chamber
OATS	: Open Area Test Site
BW	: Bandwidth
AM	: Amplitude Modulation
PM	: Pulse Modulation
HCP	: Horizontal Coupling Plane
VCP	: Vertical Coupling Plane
U_N	: Nominal voltage
Tx	: Transmitter
Rx	: Receiver
N/A	: Not Applicable
N/M	: Not Measured

DOCUMENT HISTORY

Report nr.	Date	Description
4909379.60	2023-11-13	First release.

REMARKS AND COMMENTS

1. The equipment under test (EUT) does meet the essential requirements of the stated standard(s)/test(s).
2. The measurement result is considered in conformance with the requirement if it is within the prescribed limit, It is not necessary to account the uncertainty associated with the measurement result.
3. The test results presented in this report relate only to the object tested.
4. This report will not be used for social proof function in China market.
5. DEKRA declines any responsibility with the following test data provided by customer that may affect the validity of result:
 - Chapter 1.1 General Description of the Item(s);
 - Chapter 1.2 Antenna Informaion;
 - Chapter 1.3 Test Data Rate;

USED EQUIPMENT

For Continuous disturbances conducted (150 kHz to 30 MHz)

Instrumentation	Manufacturer	Model No.	Serial No.	DEKRA No.	Cal. Due date
Shielding Room	Changzhou Feite	/	/	G/L861	2024/05/31
EMI Receiver	R&S	ESCI	101206	G/L857	2024/07/02
LISN	R&S	ENV216	101337	G/L859	2024/07/02

For Radiated Emission (30MHz-1000MHz)

Instrumentation	Manufacturer	Model No.	Serial No.	DEKRA No.	Cal. Due date
3m Chamber	ETS	FACT3-2.0	CT000344-1100	G/L856	2024/06/04
EMI receiver	R&S	ESCI	101205	G/L858	2024/07/02
Antenna (30MHz-3GHz)	SCHWARZBECK	VULB9163	506	G/L864	2023/12/05
Antenna (30MHz-2GHz)	SCHWARZBECK	VULB9168	01229	GZ2018	2024/03/12
CMAD	TESEQ	CMAD 20B	49023	GZ1756	2024/09/08
CMAD	TESEQ	CMAD 20B	49024	GZ1757	2024/09/08
CMAD	TESEQ	CMAD 20B	49026	GZ1758	2024/09/08
CDNE	TESEQ	M310	48706	GZ1759	2024/09/07
CDNE	TESEQ	M210	540133	GZ1906	2024/05/07
Test software	AUDIX	e3	Version 6.130520	---	---

For Radiated Emission (1GHz-18GHz)

Instrumentation	Manufacturer	Model No.	Serial No.	DEKRA No.	Cal. Due date
3m Chamber	ETS	FACT3-2.0	CT000344-1100	G/L856	2024/06/04
Antenna (1GHz-18GHz)	R&S	HF907	102306	G/L1236	2024/04/10
Horn antenna preamplifier	Schwarzbeek	SCU-18	102234	G/L1236-1	2024/02/21
Antenna (1GHz-18GHz)	SCHWARZBECK	BBHA 9120D	02408	GZ2019	2024/01/16
Horn antenna preamplifier	EMC Instruments corporation	EMC051845 SE	980778	GZ2009	2023/12/04
Spectrum analyzer	R&S	FSV	SN101012	G/L1235	2024/01/09

FOR RF

Instrumentation	Manufacturer	Model	Serial no.	DEKRA No.	Cal Due date
Spectrum analyzer	R&S	FSV	SN101012	G/L1235	2024/01/09
Chamber	ETS	/	/	G/L856	2024/06/04
Horn antenna (1GHz-18GHz)	R&S	HF907	102306	G/L1236	2024/04/10
Horn antenna preamplifier	Schwarzbeek	SCU-18	102234	G/L1236-1	2024/02/21
Horn antenna (18GHz-26.5GHz)	ETS	3160-09	00164643	G/L1237	2024/01/09
Horn antenna preamplifier	/	SCU-26D	1879064	G/L1237-1	2024/01/08
EMI receiver	R&S	ESCI	101205	G/L857	2024/07/02
Antenna (30MHz-2GHz)	SCHWARZBECK	VULB9168	01229	GZ2018	2024/03/12
Antenna (30MHz-3GHz)	SCHWARZBECK	VULB9163	506	G/L864	2023/12/05
OSP	R&S	OSP 150	101907	GZ1894	2024/02/23
Signal generator	R&S	SMB 100A	181317	GZ1895	2024/02/23
Vector signal generator	R&S	SMBV100A	263671	GZ1896	2024/02/23
Wireless connectivity tester	R&S	CMW 270	100990	GZ1893	2024/02/23
Manual step attenuator (11dB)	Keysight	8494B	TH60074118	GZ2086	2024/07/07
Manual step attenuator (70dB)	Keysight	8495D	TH60074471	GZ2087	2024/07/07
Programmable Temperature & Humidity Chamber	ASTUOD	TT-5166	52689	GZ2209	2024/05/08
Test software	R&S	EMC32	---	---	Version 11.30.00

UNCERTAINTY

Test Item	Uncertainty
Occupied Channel Bandwidth	$\pm 0,7\%$
RF Output power, conducted	$\pm 0,6\text{dB}$
Power Spectral Density, Conducted	$\pm 0,6\text{dB}$
Unwanted Emissions, Conducted	$\pm 0.7\text{dB}$
Spurious (30-1000MHz)	$\pm 4,4\text{dB}$
Spurious (1-12,75GHz)	$\pm 4,4\text{dB}$

1 GENERAL INFORMATION

1.1 General Description of the Item(s)

Description of the item.....:	Miko Mini Robot
Trademark	MIKO
Model / Type number	EMK401
FCC ID.....:	2AS3S-EMK401
Hardware	N/A
Software	N/A
Firmware.....:	N/A
Ratings	Input rating: 5,0 V _~ ; 3,0 A or 9,0 V _~ ; 2,0 A or 12,0 V _~ ; 1,5 A. Internal Li-ion battery (18650): 2400 mAh; 3,7 V _~ ; 8,88 Wh.
Manufacturer	Same as applicant
Factory 1.....:	Pacific Industries Zhongshan Limited Xincun Factory Area, Baishawan Industrial Park, Eastern District, 528400, Zhongshan, Guangdong, China.
Factory 2.....:	Kaynes Electronics Manufacturing Private Limited 26-27. Bandanguppe-kellamballi Industrial Area, State Code: 29 ,571313,Chamarajanagara,India

Rated power supply.....:	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
<input checked="" type="checkbox"/>	AC: 100-240 V, 50/60 Hz	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	AC:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	DC: 5 V						
<input type="checkbox"/>	Battery:						
Mounting position	<input checked="" type="checkbox"/>	Table top equipment					
	<input type="checkbox"/>	Wall/Ceiling mounted equipment					
	<input type="checkbox"/>	Floor standing equipment					
	<input checked="" type="checkbox"/>	Hand-held equipment					
	<input type="checkbox"/>	Other:					

Wireless module Characteristic

Wireless module No.	SKI.WB800DS2.1_800M
Operating frequency range(s) – Tx :	2412 – 2462 MHz for 2.4G WIFI WLAN 5GHz Band: 5180 MHz ~ 5320 MHz, 5500 MHz ~ 5700 MHz, 5745 MHz ~ 5825 MHz; 2402 – 2480 MHz for Bluetooth
Operating frequency range(s) – Rx :	2412 – 2462 MHz for 2.4G WIFI WLAN 5GHz Band: 5180 MHz ~ 5320 MHz, 5500 MHz ~ 5700 MHz, 5745 MHz ~ 5825 MHz; 2402 – 2480 MHz for Bluetooth
Type of Modulation	WLAN 2.4GHz : IEEE 802.11b: DSSS (CCK, QPSK, BPSK); IEEE 802.11g: OFDM (BPSK, QPSK, 16QAM, 64QAM); IEEE 802.11n HT20/40: OFDM (BPSK, QPSK, 16QAM, 64QAM) IEEE 802.11ax (HE20/40): OFDMA (1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK) WLAN 5GHz : IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20, HT40: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ac (VHT20/40): OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ax (HE20/40): OFDMA (256QAM, 64QAM, 16QAM, QPSK, BPSK); Bluetooth LE:GFSK
Antenna type	FPC antenna
Antenna gain	2,3 dBi for 2.4GHz 2,48 dBi for 5GHz
Operation temperature range	-20 – 70 °C

Antenna List

Antenna Model No.	LJF02-23062508-R0A		
Antenna Manufacturer	Shenzhen Lejin radio frequency technology Co., LTD		
Antenna Delivery	<input checked="" type="checkbox"/> 1*TX+1*RX	<input type="checkbox"/> 2*TX+2*RX	<input type="checkbox"/> 3*TX+3*RX
Antenna Technology	<input checked="" type="checkbox"/> SISO		
	<input type="checkbox"/> MIMO	<input type="checkbox"/> Basic methodology	
		<input type="checkbox"/> Sectorized antenna systems	
		<input type="checkbox"/> Cross-polarized antennas	
		<input type="checkbox"/> Unequal antenna gains, with equal transmit powers	
		<input type="checkbox"/> Spatial Multiplexing	
	<input type="checkbox"/> Cyclic Delay Diversity (CDD)		
Antenna Type	FPC antenna		
Antenna Gain			
Antenna Technology	Ant Gain(eth1) (dBi)		
<input checked="" type="checkbox"/> SISO	<input checked="" type="checkbox"/> Ant1	2,3 dBi for 2.4GHz 2,48 dBi for 5GHz	
	<input type="checkbox"/> Ant2	-	

The WIFI mode operating channels are:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2412	7	2447
1	2417	8	2452
2	2422	9	2457
3	2427	10	2462
4	2432	-	-
5	2437	-	-
6	2442	-	-

802.11a/n/ac/ax(20MHz) Working Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
36	5180 MHz	40	5200 MHz	44	5220 MHz	48	5240 MHz
52	5260 MHz	56	5280 MHz	60	5300 MHz	64	5320 MHz
100	5500 MHz	104	5520 MHz	108	5540 MHz	112	5560 MHz
116	5580 MHz	120	5600 MHz	124	5620 MHz	128	5640 MHz
132	5660 MHz	136	5680 MHz	140	5700 MHz	149	5745 MHz
153	5765 MHz	157	5785 MHz	161	5805 MHz	165	5825 MHz

802.11n/ac/ax(40MHz) Working Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz	54	5270 MHz	62	5310 MHz
102	5510 MHz	110	5550 MHz	118	5590 MHz	126	5630 MHz
134	5670 MHz	151	5755 MHz	159	5795 MHz	N/A	N/A

The radio module (Bluetooth) operating channels are:

BLE:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	14	2430	28	2458
1	2404	15	2432	29	2460
2	2406	16	2434	30	2462
3	2408	17	2436	31	2464
4	2410	18	2438	32	2466
5	2412	19	2440	33	2468
6	2414	20	2442	34	2470
7	2416	21	2444	35	2472
8	2418	22	2446	36	2474
9	2420	23	2448	37	2476
10	2422	24	2450	38	2478
11	2424	25	2452	39	2480

12	2426	26	2454	-	-
13	2428	27	2456	-	-

Intended use of the Equipment Under Test (EUT)

The apparatus as supplied for the test is Miko Mini Robot which intended for residential use, the product contains electronic circuitry and with earth connection. It contains a Wireless module, so it would be controlled by other Wi-Fi devices through APPs.

Hence, model EMK401 which contains this certified module SKI.WB800DS2.1_800M was chosen for full test.

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

Designed By

MIKO

Input Rating: 5.0V \Rightarrow 3.0A / 9.0V \Rightarrow 2.0A / 12.0V \Rightarrow 1.5A

Model : EMK401

S/N :

P/N :

FCC ID: 2AS3S-EMK401

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions :

- (1) this device may not cause harmful interference, &
- (2) this device must accept any interference received, including interference that may cause undesired operation.

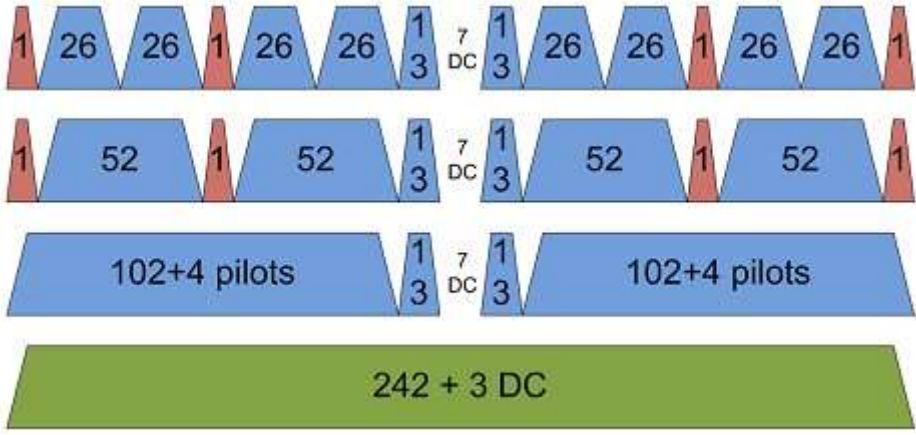
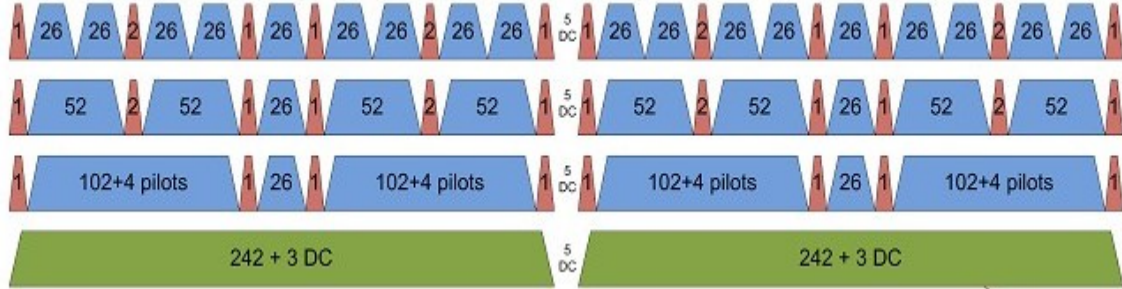


Designed in India. Made in China.

Remark:

- 1.The CE marking must have substantially the same vertical dimension, which shall not be less than 5 mm.
- 2.The symbol combination of WEEE logo shall have a minimum height of 7 mm.
- 3.The EU/EFTA importer (and manufacture, if it is different)'s ①company name, ②registered trade name or registered trademark and③the postal address will be marked on the products before being place on the market. The contact details shall be in a language easily understood by end-users and market surveillance authorities.

1.2 802.11ax RU configurations:

Bandwidth	RU all configurations
20MHz	 <p>The diagram for 20MHz shows four levels of RU configurations. The top level consists of 10 individual RUs, each 26 MHz wide, with a 1 MHz guard band at each end and a 3 MHz DC gap between the 5th and 6th RUs. The second level shows two 52 MHz RUs with a 3 MHz DC gap between them. The third level shows two 102+4 pilots RUs with a 3 MHz DC gap between them. The bottom level is a single green bar representing 242 + 3 DC.</p>
40MHz	 <p>The diagram for 40MHz shows four levels of RU configurations. The top level consists of 20 individual RUs, each 26 MHz wide, with 1 MHz guard bands at the ends and between RUs, and a 3 MHz DC gap between the 10th and 11th RUs. The second level shows four 52 MHz RUs with 1 MHz guard bands and a 3 MHz DC gap between the 2nd and 3rd RUs. The third level shows four 102+4 pilots RUs with 1 MHz guard bands and a 3 MHz DC gap between the 2nd and 3rd RUs. The bottom level consists of two green bars, each representing 242 + 3 DC, with a 3 MHz DC gap between them.</p>

Note: The PSD of partial RU is lower than that of full RU, so we did not evaluate the test for partial RU.

1.3 Test Data Rate

IEEE 802.11a

Modulation	R	Data Rate(Mb/s)
BPSK	1/2	6
BPSK	3/4	9
QPSK	1/2	12
QPSK	3/4	18
16-QAM	1/2	24
16-QAM	3/4	36
64-QAM	2/3	48
64-QAM	3/4	54

IEEE 802.11n/ac

Spatial streames	MCS Index	Modulation	R	Data Rate(Mb/s)					
				400ns GI			800ns GI		
				20MHz	40MHz	80MHz	20MHz	40MHz	80MHz
1	0	BPSK	1/2	7.2	15	32.5	6.5	13.5	29.3
1	1	QPSK	1/2	14.4	30	65	13	27	58.5
1	2	QPSK	3/4	21.7	45	97.5	19.5	40.5	87.8
1	3	16-QAM	1/2	28.9	60	130	26	54	117
1	4	16-QAM	3/4	43.3	90	195	39	81	175.5
1	5	64-QAM	2/3	57.8	120	260	52	108	234
1	6	64-QAM	3/4	65	135	292.5	58.5	121.5	263.3
1	7	64-QAM	5/6	72.2	150	325	65	135	292.5
1	8	256QAM	3/4	86.7	180	390	78	162	351
1	9	256QAM	5/6	N/A	200	433.3	N/A	180	390

IEEE 802.11ax

Spatial streames	MCS Index	Modulation	R	Data Rate(Mb/s)								
				800ns GI			1600ns GI			3200ns GI		
				20MHz	40MHz	80MHz	20MHz	40MHz	80MHz	20MHz	40MHz	80MHz
1	0	BPSK	1/2	8.6	17.2	36	8.1	16.3	34	7.3	14.6	30.6
1	1	QPSK	1/2	17.2	34.4	72.1	16.3	32.5	68.1	14.6	29.3	61.3
1	2	QPSK	3/4	25.8	51.6	108.1	24.4	48.8	102.1	21.9	43.9	91.9
1	3	16-QAM	1/2	34.4	68.8	144.1	32.5	65	136.1	29.3	58.5	122.5
1	4	16-QAM	3/4	51.6	103.2	216.2	48.8	97.5	204.2	43.9	87.8	183.8
1	5	64-QAM	2/3	68.8	137.6	288.2	65	130	272.2	58.5	117	245
1	6	64-QAM	3/4	77.4	154.9	324.3	73.1	146.3	306.3	65.8	131.6	275.6
1	7	64-QAM	5/6	86	172.1	360.3	81.3	162.5	340.3	73.1	146.3	306.3
1	8	256QAM	3/4	103.2	206.5	432.4	97.5	195	408.3	87.8	175.5	367.5
1	9	256QAM	5/6	114.7	229.4	480.4	108.3	216.7	453.7	97.5	195	408.3
1	10	1024QAM	3/4	129	258.1	540.4	121.9	243.8	510.4	109.7	219.4	459.4
1	11	1024QAM	5/6	143.4	286.8	600.5	135.4	270.8	567.1	121.9	243.8	510.4

Note 1: We have evaluated low/mid/high data rate, the blue font is the highest power data rate.

Note 2: The General Description of the Item, antenna information, 802.11ax RU configurations , Data Rate and Channel List in clause 1 are provided and confirmed by the client.

2 DESCRIPTION OF TEST SETUP

2.1 Operating mode(s) used for tests

During the tests the following operating mode(s) has(have) been used.

Test Mode	Mode 1: Transmit by 802.11a
	Mode 2: Transmit by 802.11n (20MHz)
	Mode 3: Transmit by 802.11n (40MHz)
	Mode 4: Transmit by 802.11ac (20MHz)
	Mode 5: Transmit by 802.11ac (40MHz)
	Mode 6: Transmit by 802.11ax (20MHz)
	Mode 7: Transmit by 802.11ax (40MHz)

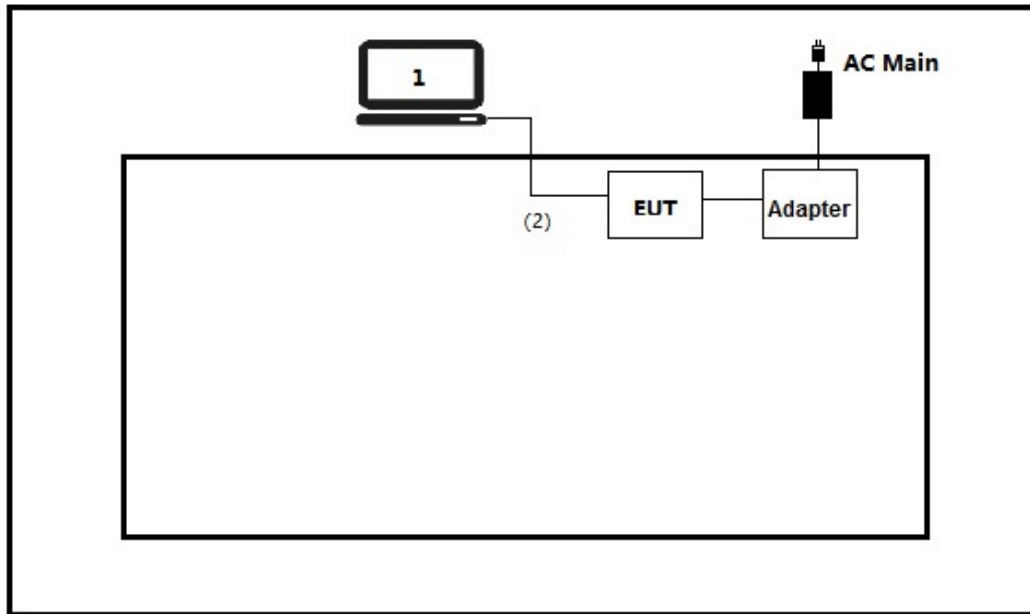
2.2 Auxiliary equipment / Test software for the EUT

The EUT has been tested with the following auxiliary equipment / unit / software:

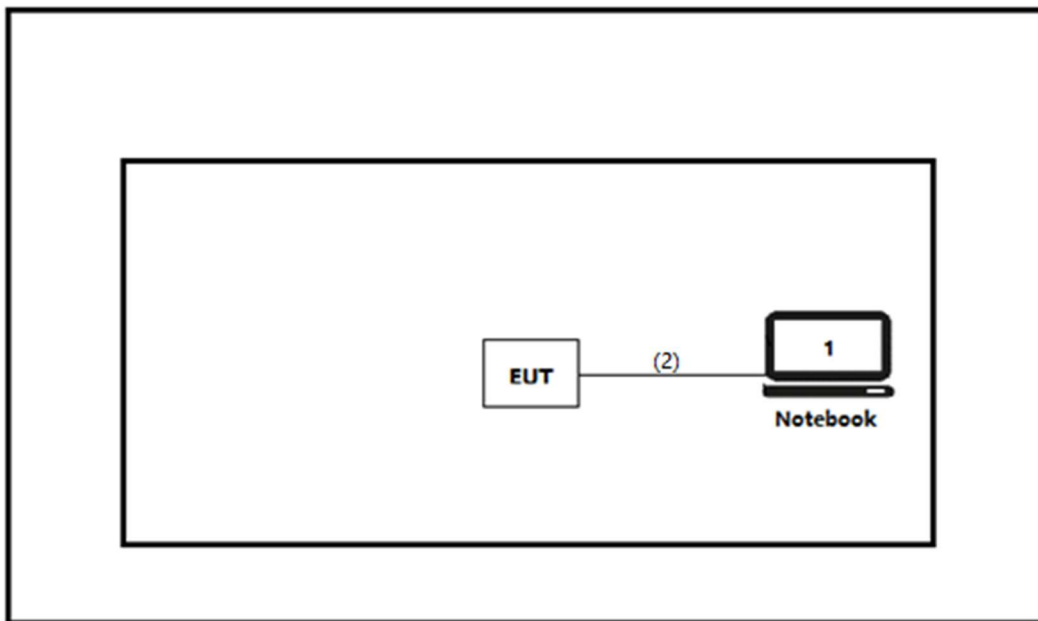
Auxiliary equipment / unit / software	Type / Version	Manufacturer	Supplied by
Laptop	Latitude 5488	DELL	DEKRA
SecureCRT (soft ware)	-	-	Client
Adaptor	-	HUAWEI	DEKRA
Supplemental information: ---			

2.3 Test Configuration / Block diagram used for tests

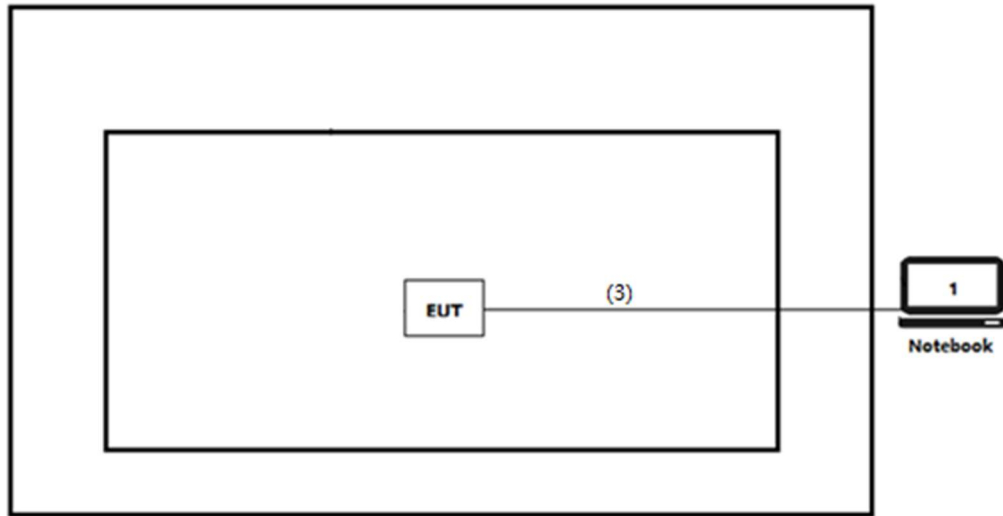
Test setup Diagram- AC Line Conducted Emission Test



Test setup Diagram- Conducted test



Test setup Diagram- Radiated Emission



2.4 Testing process

1	Setup the EUT as shown in Section 2.3.
2	Execute the software "SecureCRT" on the notebook.
3	Configure the test mode, the test channel, and the data rate.
4	Verify that the EUT works properly.

3 VERDICT SUMMARY SECTION

This chapter presents an overview of standards and results. Refer to the next chapters for details of measured test results and applied test levels.

3.1 Standards

Standard	Year	Description
FCC CFR Title 47 Part 15 Subpart E Section 15.407	2023	FCC CFR Title 47 Part 15 Subpart E
KDB 789033 D02 General UNII Test Procedures New Rules v02r01	2017	This document provides guidance for determining emissions compliance of U-NII devices under Part 15, Subpart E of the FCC rules.
KDB 662911 D01 v02r01	2020	Provision to Allow Measurement of Directional Gain of Multi-Antenna Systems for Compliance Verification
ANSI C63.10	2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

3.2 Deviation(s) from the Standard(s) / Test Specification(s)

The following deviation(s) was / were made from the published requirements of the listed standards: N/A.

(Please define the deviations from the standard(s) if applicable)

3.3 Overview of results

Requirement – Test case	Basic standard(s)	Verdict	Remark
Conducted Emission	FCC CFR Title 47 Part 15 Subpart E: Section 15.207	PASS	Test data please refer to Appendix A
Radiated Emission	FCC CFR Title 47 Part 15 Subpart E: Section 15.209	PASS	Test data please refer to Appendix B
Emission bandwidth and occupied bandwidth	FCC CFR Title 47 Part 15 Subpart E: Section 15.407(a)	PASS	Test data please refer to Appendix C
6dB Emission Bandwidth	FCC CFR Title 47 Part 15 Subpart E: Section 15.407(e)	PASS	Test data please refer to Appendix D
Duty cycle	ANSI C63.10:2013	PASS	Test data please refer to Appendix E
Power Output	FCC CFR Title 47 Part 15 Subpart E: Section 15.407(a)	PASS	Test data please refer to Appendix F
Peak Power Spectral Density	FCC CFR Title 47 Part 15 Subpart E: Section 15.407(a)	PASS	Test data please refer to Appendix G
Radiated Emission Band Edge	FCC CFR Title 47 Part 15 Subpart E: Section 15.205, 15.407(b)	PASS	Test data please refer to Appendix H
Frequency Stability	FCC CFR Title 47 Part 15 Subpart E: Section 15.407(g)	PASS	Test data please refer to Appendix I
Antenna Requirement	FCC 15.203	PASS	---

3.4 Power setting in test

Mode	Channel	Frequency (MHz)	Power setting		
			SISO:ANT1	-	-
802.11a	36	5180	11	-	-
	44	5220	11	-	-
	48	5240	11	-	-
	52	5260	11	-	-
	60	5300	11	-	-
	64	5320	11	-	-
	100	5500	11	-	-
	116	5580	11	-	-
	140	5700	11	-	-
	149	5745	11	-	-
	157	5785	11	-	-
	165	5825	11	-	-
802.11n(20MHz)	36	5180	11	-	-
	44	5220	11	-	-
	48	5240	11	-	-
	52	5260	11	-	-
	60	5300	11	-	-
	64	5320	11	-	-
	100	5500	11	-	-
	116	5580	11	-	-
	140	5700	11	-	-
	149	5745	11	-	-
	157	5785	11	-	-
	165	5825	11	-	-
802.11n(40MHz)	38	5190	11	-	-
	46	5230	11	-	-
	54	5270	11	-	-
	62	5310	11	-	-
	102	5510	11	-	-
	118	5590	11	-	-
	134	5670	11	-	-
	151	5755	11	-	-
159	5795	11	-	-	

802.11ac(20MHz)	36	5180	11	-	-
	44	5220	11	-	-
	48	5240	11	-	-
	52	5260	11	-	-
	60	5300	11	-	-
	64	5320	11	-	-
	100	5500	11	-	-
	116	5580	11	-	-
	140	5700	11	-	-
	149	5745	11	-	-
	157	5785	11	-	-
	165	5825	11	-	-
802.11ac(40MHz)	38	5190	11	-	-
	46	5230	11	-	-
	54	5270	11	-	-
	62	5310	11	-	-
	102	5510	11	-	-
	118	5590	11	-	-
	134	5670	11	-	-
	151	5755	11	-	-
159	5795	11	-	-	
802.11ax(20MHz)	36	5180	11	-	-
	44	5220	11	-	-
	48	5240	11	-	-
	52	5260	11	-	-
	60	5300	11	-	-
	64	5320	11	-	-
	100	5500	11	-	-
	116	5580	11	-	-
	140	5700	11	-	-
	149	5745	11	-	-
	157	5785	11	-	-
	165	5825	11	-	-
802.11ax(40MHz)	38	5190	19	-	-
	46	5230	19	-	-
	54	5270	15	-	-
	62	5310	15	-	-
	102	5510	15	-	-
	118	5590	15	-	-
	134	5670	15	-	-
	151	5755	16	-	-
	159	5795	16	-	-

4 TEST RESULTS

4.1 AC Power Line Conducted Emission	VERDICT: PASS
---	----------------------

4.1.1 Limit

Standard	FCC Part 15 Subpart C Paragraph 15.207;	
Frequency range [MHz]	Limit: QP [dB(μV) ¹⁾	Limit: AV [dB(μV) ¹⁾
0,15 - 0,50	66 - 56 ²⁾	56 - 46 ²⁾
0,50 - 5,0	56	46
5,0 - 30	60	50

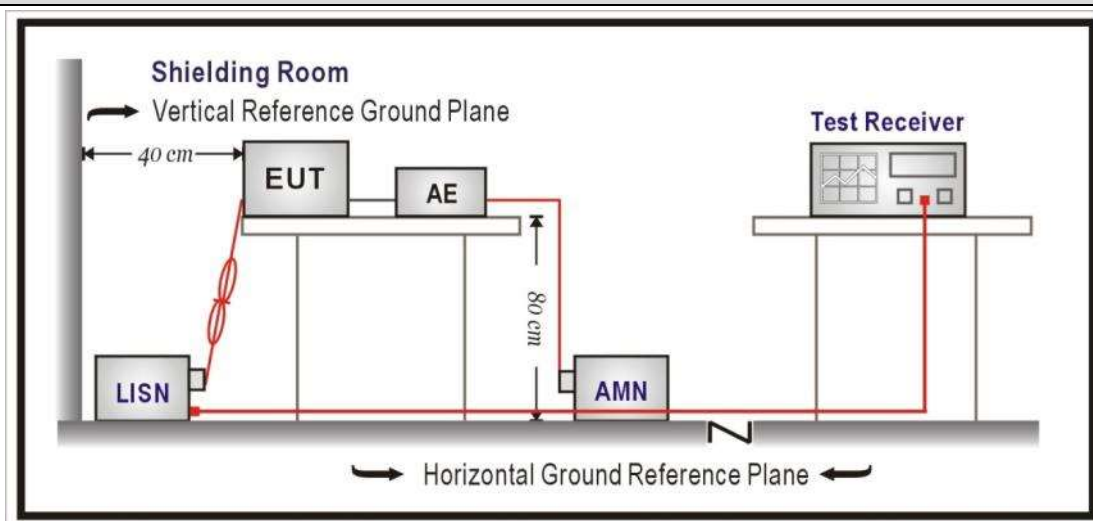
¹⁾ At the transition frequency, the lower limit applies.

²⁾ The limit decreases linearly with the logarithm of the frequency.

NOTE 1: The exclusion band for transmitters shall be considered for transmitters operating at frequencies below 30 MHz.

NOTE 2: Where the AC output port is directly connected (or via a circuit breaker) to the AC power input port of the EUT the AC power output port need not to be tested.

4.1.2 Test Setup



4.1.3 Test Procedure

	References Rule	Chapter	Item
<input checked="" type="checkbox"/>	ANSI C63.10-2013	6.2	Standard test method for ac power-line conducted emissions from unlicensed wireless devices

4.2 Radiated Emissions	VERDICT: PASS
-------------------------------	----------------------

4.2.1 Limit

Standard	FCC Part 15 Subpart C Paragraph 15.205
-----------------	--

Restricted Bands of operation

MHz	MHz	MHz	GHz
0. 090-0. 110	16. 42-16. 423	399. 9-410	4. 5-5. 15
¹ 0. 495-0. 505	16. 69475-16. 69525	608-614	5. 35-5. 46
2. 1735-2. 1905	16. 80425-16. 80475	960-1240	7. 25-7. 75
4. 125-4. 128	25. 5-25. 67	1300-1427	8. 025-8. 5
4. 17725-4. 17775	37. 5-38. 25	1435-1626. 5	9. 0-9. 2
4. 20725-4. 20775	73-74. 6	1645. 5-1646. 5	9. 3-9. 5
6. 215-6. 218	74. 8-75. 2	1660-1710	10. 6-12. 7
6. 26775-6. 26825	108-121. 94	1718. 8-1722. 2	13. 25-13. 4
6. 31175-6. 31225	123-138	2200-2300	14. 47-14. 5
8. 291-8. 294	149. 9-150. 05	2310-2390	15. 35-16. 2
8. 362-8. 366	156. 52475-156. 52525	2483. 5-2500	17. 7-21. 4
8. 37625-8. 38675	156. 7-156. 9	2690-2900	22. 01-23. 12
8. 41425-8. 41475	162. 0125-167. 17	3260-3267	23. 6-24. 0
12. 29-12. 293	167. 72-173. 2	3332-3339	31. 2-31. 8
12. 51975-12. 52025	240-285	3345. 8-3358	36. 43-36. 5
12. 57675-12. 57725	322-335. 4	3600-4400	(²)
13. 36-13. 41			

¹Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

²Above 38.6

FCC Part 15 Subpart C Paragraph 15.209 (Restricted Band Emissions Limit)

Frequency (MHz)	Field strength (μ V/m)	Field strength (dB μ V/m)	Measurement distance (m)
0.009 - 0.49	2400/F(kHz)	48.5 – 13.8	300 _(Note 1)
0.49 - 1.705	24000/F(kHz)	33.8 - 23	30 _(Note 1)
1.705 - 30	30	29.5	30 _(Note 1)
30 - 88	100	40	3 _(Note 2)
88 - 216	150	43.5	3 _(Note 2)
216 - 960	200	46	3 _(Note 2)
Above 960	500	54	3 _(Note 2)

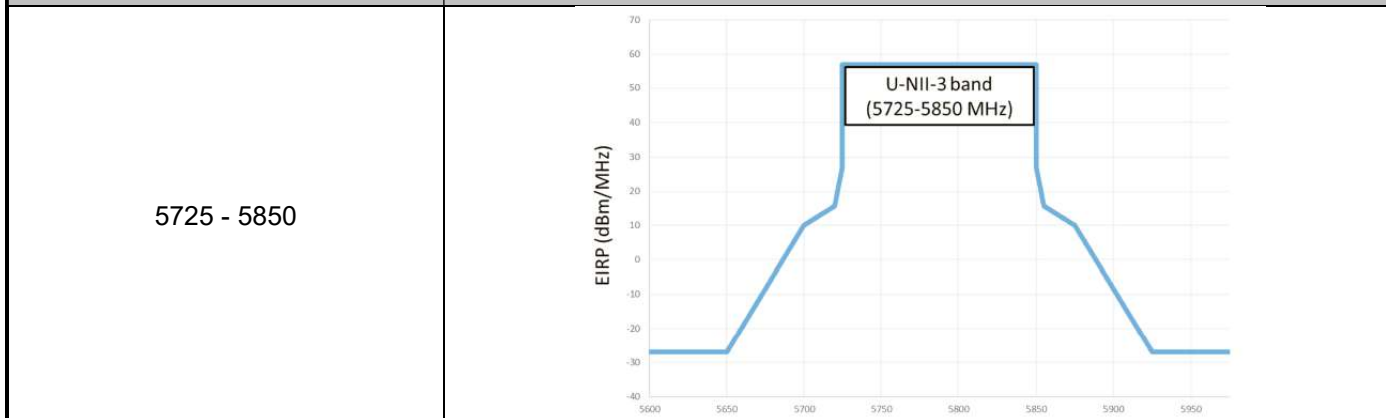
Note 1: At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

Note 2: At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

FCC Part 15 Subpart C Paragraph 15.407(5)(b) (Unrestricted Band Emissions Limit)

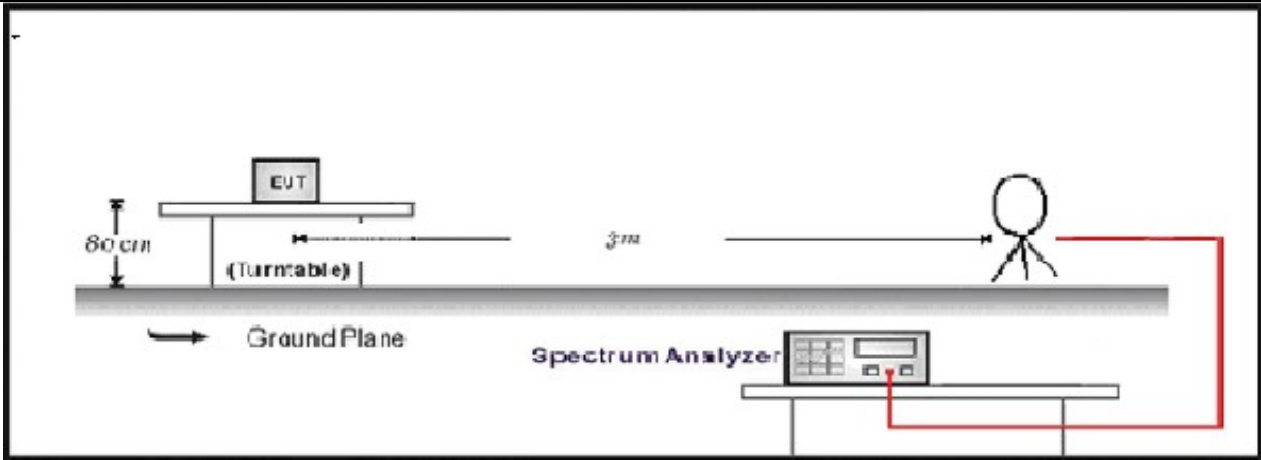
Operating Frequency Band (MHz)	EIRP Limit (dBm/MHz)	Equivalent Field Strength at 3m (dB μ V/m)
5150 - 5250	-27	68.3
5250 - 5350	-27	68.3
5470 - 5725	-27	68.3

Operating Frequency Band (MHz)	EIRP Limit (dBm/MHz)
--------------------------------	----------------------

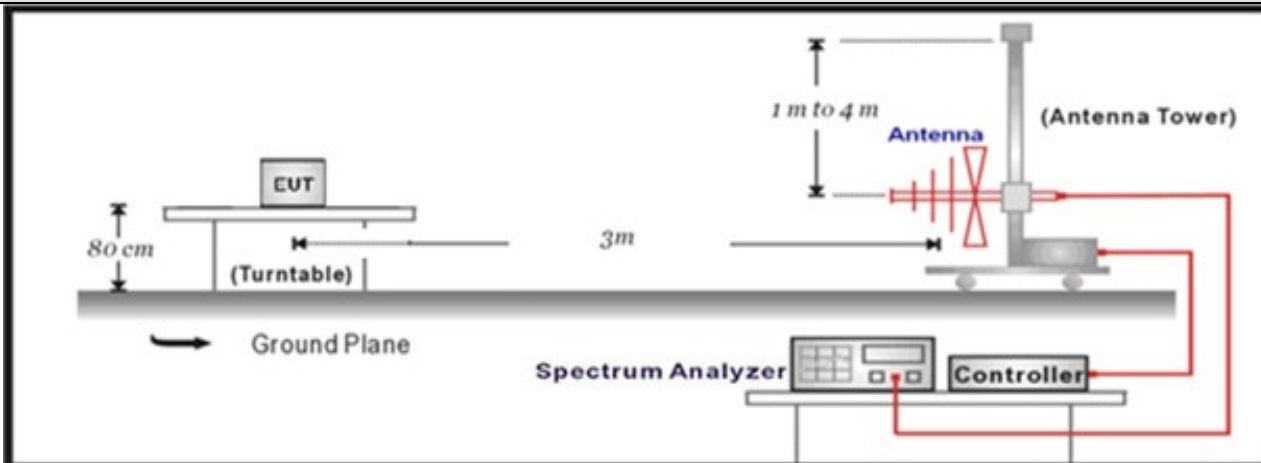


4.2.2 Test Setup

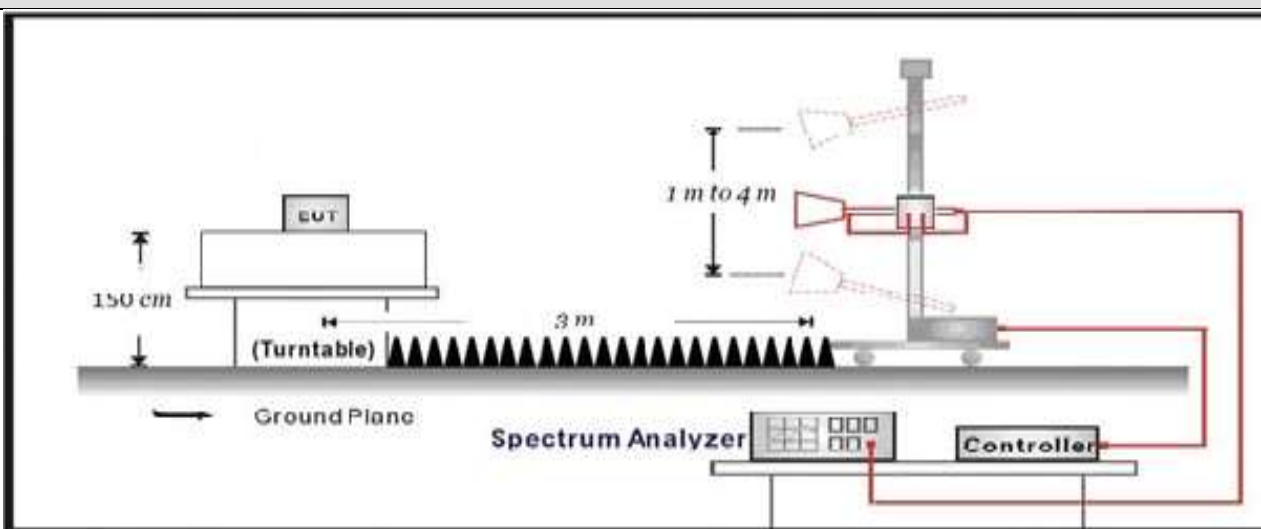
Below 30MHz Test Setup:



30MHz-1GHz Test Setup:



Above 1GHz Test Setup:



4.2.3 Test Procedure

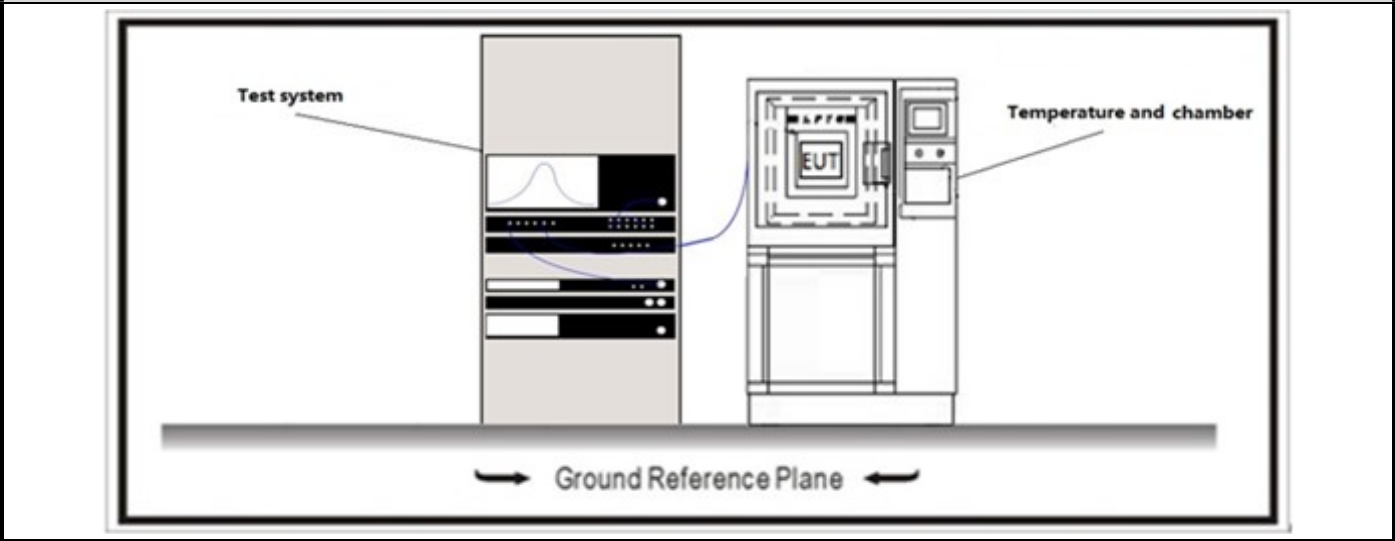
Test Method			
	References Rule	Chapter	Description
<input type="checkbox"/>	ANSI C63.10	12.7.3	Emissions in non-restricted frequency bands
<input checked="" type="checkbox"/>	ANSI C63.10	12.7.2	Emissions in restricted frequency bands
<input checked="" type="checkbox"/>	ANSI C63.10	12.7.5	Radiated emission measurements
<input checked="" type="checkbox"/>	ANSI C63.10	12.7.6	Procedure for peak unwanted emissions measurements above 1000 MHz
<input checked="" type="checkbox"/>	ANSI C63.10	12.7.7	Procedures for average unwanted emissions measurements above 1000 MHz
<input checked="" type="checkbox"/>	ANSI C63.10	12.7.7.2	Method AD (average detection)—primary method
<input type="checkbox"/>	ANSI C63.10	12.7.7.3	Method VB-A (Alternative)
<input checked="" type="checkbox"/>	ANSI C63.10	6.4	Radiated emissions from unlicensed wireless devices below 30 MHz
<input checked="" type="checkbox"/>	ANSI C63.10	6.5	Radiated emissions from unlicensed wireless devices in the frequency range of 30 MHz to 1000 MHz
<input checked="" type="checkbox"/>	ANSI C63.10	6.6	Radiated emissions from unlicensed wireless devices above 1 GHz

4.3 Emission bandwidth	VERDICT: PASS
-------------------------------	----------------------

4.3.1 Limit

Standard	FCC CFR Title 47 Part 15 Subpart E: Section 15.407
Whin the Frequncy band.	

4.3.2 Test Setup

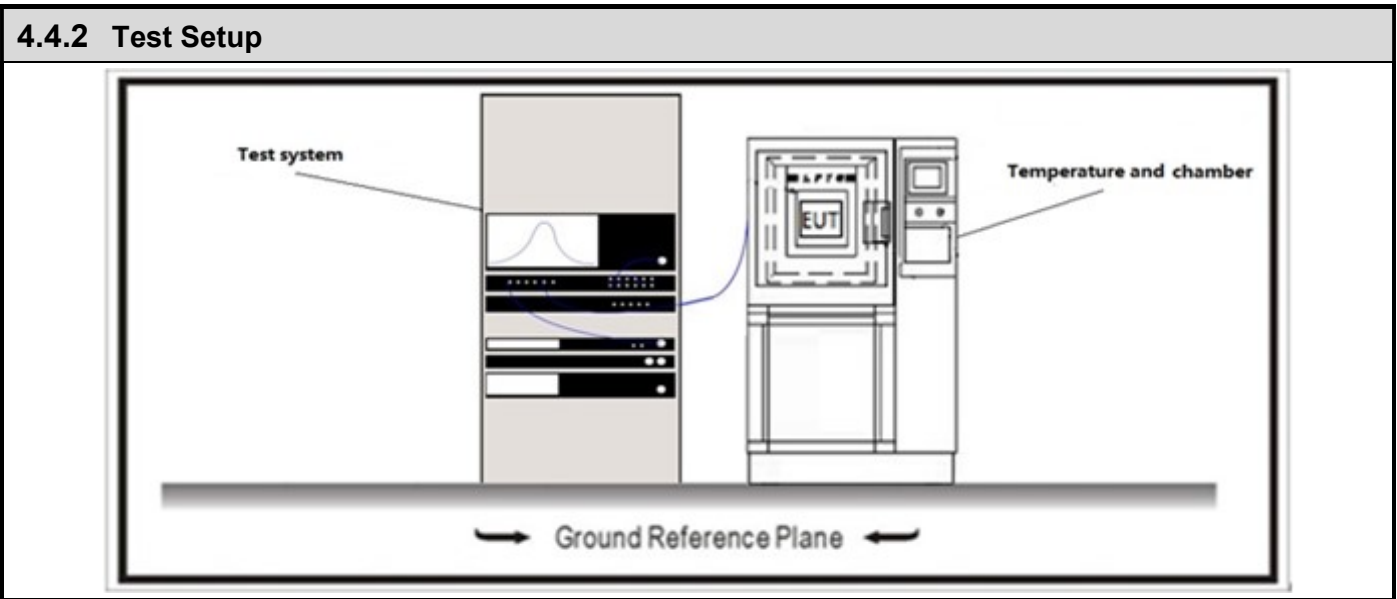


4.3.3 Test Procedure

Test Method			
	References Rule	Chapter	Description
<input type="checkbox"/>	ANSI C63.10	12.4	Emission bandwidth and occupied bandwidth
<input type="checkbox"/>	ANSI C63.10	12.4.1	Emission bandwidth (26dB)
<input type="checkbox"/>	ANSI C63.10	12.4.2	Occupied bandwidth (99%)
<input checked="" type="checkbox"/>	FCC KDB 789033 D02v02r01	C	Bandwidth Measurement
<input checked="" type="checkbox"/>	FCC KDB 789033 D02v02r01	C.1	Emission Bandwidth (26dB)
<input type="checkbox"/>	FCC KDB 789033 D02v02r01	C.2	Minimum Emission Bandwidth for the band 5.725-5.85 GHz (6dB)
<input checked="" type="checkbox"/>	FCC KDB 789033 D02v02r01	D	99 Percent Occupied Bandwidth

4.4 6dB bandwidth	VERDICT: PASS
--------------------------	----------------------

4.4.1 Limit	
Standard	FCC CFR Title 47 Part 15 Subpart E: Section 15.407(e)
6dB Bandwith \geq 500KHz	



4.4.3 Test Procedure

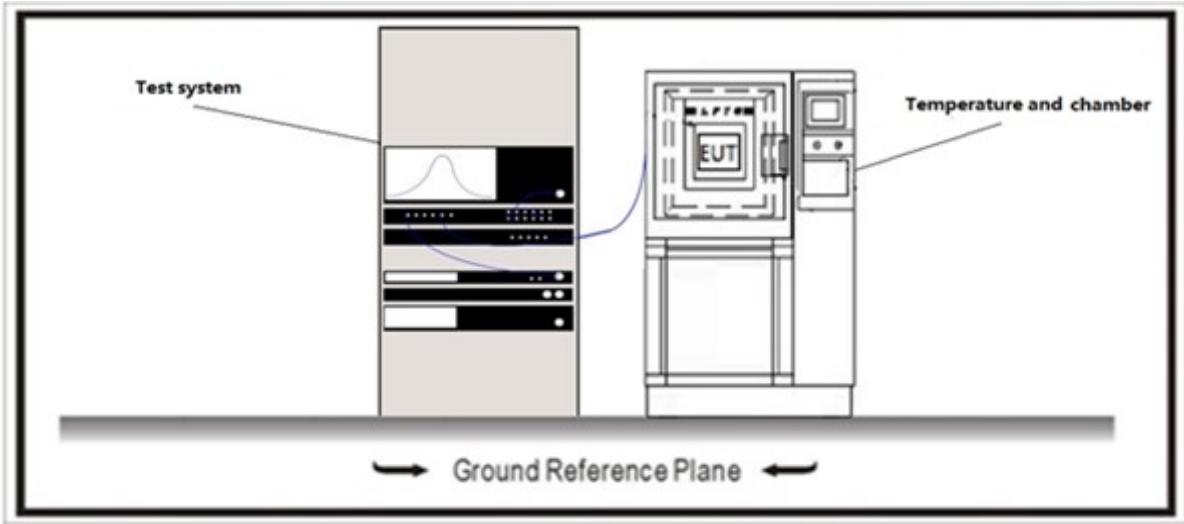
Test Method			
	References Rule	Chapter	Description
<input type="checkbox"/>	ANSI C63.10	12.4	Emission bandwidth and occupied bandwidth
<input type="checkbox"/>	ANSI C63.10	12.4.1	Emission bandwidth (26dB)
<input type="checkbox"/>	ANSI C63.10	12.4.2	Occupied bandwidth (99%)
<input checked="" type="checkbox"/>	FCC KDB 789033 D02v02r01	C	Bandwidth Measurement
<input type="checkbox"/>	FCC KDB 789033 D02v02r01	C.1	Emission Bandwidth (26dB)
<input checked="" type="checkbox"/>	FCC KDB 789033 D02v02r01	C.2	Minimum Emission Bandwidth for the band 5.725-5.85 GHz (6dB)
<input type="checkbox"/>	FCC KDB 789033 D02v02r01	D	99 Percent Occupied Bandwidth

4.5 Duty cycle	VERDICT: PASS
-----------------------	----------------------

4.5.1 Limit

N/A

4.5.2 Test Setup



4.5.3 Test Procedure

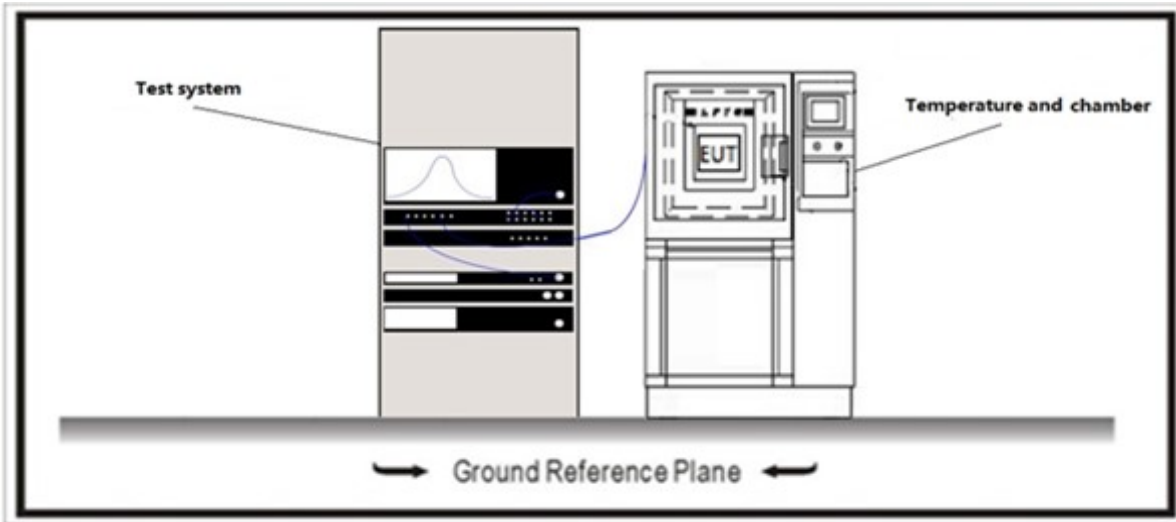
	References Rule	Chapter	Description
<input checked="" type="checkbox"/>	ANSI C63.10	11.6	Duty cycle (D), transmission duration (T), and maximum power control level

4.6 Power Output	VERDICT: PASS
-------------------------	----------------------

4.6.1 Limit

Standard	FCC Part 15 Subpart E Paragraph 15.407 (a)
<input checked="" type="checkbox"/>	For the band 5.15-5.25 GHz
<input type="checkbox"/>	Outdoor access point: the maximum conducted output power shall not exceed 1 W. If $G_{TX} > 6\text{dBi}$, then $P_{out} \leq 30 - (G_{TX} - 6)$ and $\leq 125\text{mW}$ at any angle above 30 degrees
<input type="checkbox"/>	Indoor access point: the maximum conducted output power shall not exceed 1 W. If $G_{TX} > 6\text{dBi}$, then $P_{out} \leq 30 - (G_{TX} - 6)$
<input type="checkbox"/>	Fixed point-to-point access points: the maximum conducted output power shall not exceed 1 W. If $G_{TX} > 23\text{dBi}$, then $P_{out} \leq 30 - (G_{TX} - 23)$
<input checked="" type="checkbox"/>	Mobile and portable client devices: the maximum conducted output power shall not exceed 250mW. If $G_{TX} > 6\text{dBi}$, then $P_{out} \leq 24 - (G_{TX} - 6)$
<input checked="" type="checkbox"/>	For the band 5.25-5.35 GHz:
<input checked="" type="checkbox"/>	The maximum conducted output power shall not exceed 250mW or $11\text{dBm} + 10 \text{Log B}$, where B is the 26dB emission bandwidth in MHz. If $G_{TX} > 6\text{dBi}$, then $P_{out} \leq (\text{The lesser of } 24 \text{ or } 11\text{dBm} + 10 \text{Log B}) - (G_{TX} - 6)$
<input checked="" type="checkbox"/>	For the 5.47-5.725 GHz:
<input checked="" type="checkbox"/>	The maximum conducted output power shall not exceed 250mW or $11\text{dBm} + 10 \text{Log B}$, where B is the 26dB emission bandwidth in MHz. If $G_{TX} > 6\text{dBi}$, then $P_{out} \leq (\text{The lesser of } 24 \text{ or } 11\text{dBm} + 10 \text{Log B}) - (G_{TX} - 6)$
<input checked="" type="checkbox"/>	For the band 5.725-5.85 GHz:
<input type="checkbox"/>	Point-to-multipoint systems (P2M): the maximum conducted output power (P_{Out}) shall not exceed the lesser of 1 W. If $G_{TX} > 6 \text{ dBi}$, then $P_{Out} = 30 - (G_{TX} - 6)$
<input checked="" type="checkbox"/>	Point-to-point systems (P2P): the maximum conducted output power (P_{Out}) shall not exceed the lesser of 1 W
Note 1 : GTX directional gain of transmitting antennas.	
Note 2 : Pout is maximum conducted output power .	

4.6.2 Test Setup



4.6.3 Test Procedure

References Rule		Chapter	Description
<input checked="" type="checkbox"/>	ANSI C63.10	12.3	Maximum conducted output power
<input checked="" type="checkbox"/>	ANSI C63.10	12.3.2	Maximum conducted output power measurement using a spectrum analyzer (SA) or EMI receiver
	<input type="checkbox"/> ANSI C63.10	12.3.2.2	Method SA-1
	<input type="checkbox"/> ANSI C63.10	12.3.2.3	Method SA-1A (alternative)
	<input checked="" type="checkbox"/> ANSI C63.10	12.3.2.4	Method SA-2
	<input type="checkbox"/> ANSI C63.10	12.3.2.5	Method SA-2A (alternative)
	<input type="checkbox"/> ANSI C63.10	12.3.2.6	Method SA-3
	<input type="checkbox"/> ANSI C63.10	12.3.2.7	Method SA-3A (alternative)
<input type="checkbox"/>	ANSI C63.10	12.3.3	Maximum conducted output power using a power meter
	<input type="checkbox"/> ANSI C63.10	12.3.3.1	Method PM
	<input type="checkbox"/> ANSI C63.10	12.3.3.2	Method PM-G

Directional Gain Calculations for In-Band test method				
	References Rule		Chapter	Description
<input checked="" type="checkbox"/>	KDB 662911		F2)a)	Basic methodology
	<input checked="" type="checkbox"/>	KDB 662911	F2)a) (i)	transmit signals are correlated
	<input type="checkbox"/>	KDB 662911	F2)a) (ii)	transmit signals are uncorrelated
<input type="checkbox"/>	KDB 662911		F2)b)	Sectorized antenna systems.
<input type="checkbox"/>	KDB 662911		F2)c)	Cross-polarized antennas
	<input type="checkbox"/>	ANSI C63.10	F2)c) (i)	Cross-polarized antennas
	<input type="checkbox"/>	ANSI C63.10	F2)c) (ii)	Multiple antennas
<input type="checkbox"/>	KDB 662911		F2)e)	Spatial stream
	<input type="checkbox"/>	KDB 662911	F2)e) (i)	Antennas have the same gain
	<input type="checkbox"/>	KDB 662911	F2)e) (ii)	Antenna have the different gain with one spatial stream
	<input type="checkbox"/>	KDB 662911	F2)e) (iii)	Antenna have the different gain with more than one spatial stream
<input type="checkbox"/>	KDB 662911		F2)f)	Cyclic Delay Diversity (CDD)
	<input type="checkbox"/>	KDB 662911	F2)f) (i)	Antennas have the same gain
	<input type="checkbox"/>	KDB 662911	F2)f) (ii)	Antenna have the different gain with one spatial stream
	<input type="checkbox"/>	KDB 662911	F2)f) (iii)	Antenna have the different gain with more than one spatial stream

4.7 Maximum Power Spectral Density	VERDICT: PASS
---	----------------------

4.7.1 Limit

Standard	FCC Part 15 Subpart E Paragraph 15.407 (a)
-----------------	--

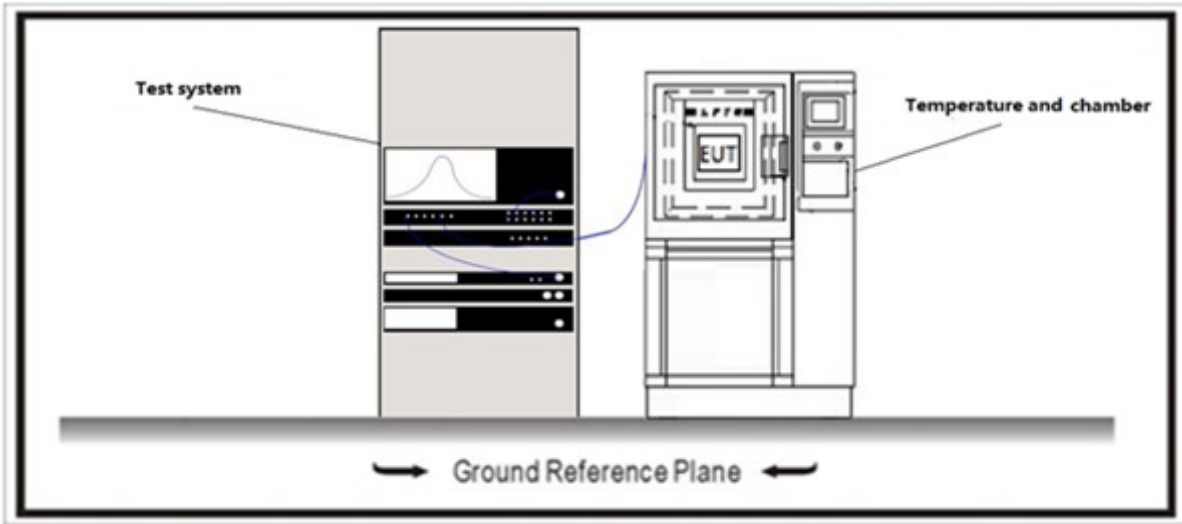
<input checked="" type="checkbox"/>	For the band 5.15-5.25 GHz
<input type="checkbox"/>	Outdoor access point: the maximum power spectral density shall not exceed 17 dBm/MHz. If $G_{TX} > 6\text{dBi}$, then $P_{out} \leq 17 - (G_{TX} - 6)$
<input type="checkbox"/>	Indoor access point: the maximum power spectral density shall not exceed 17 dBm/MHz. If $G_{TX} > 6\text{dBi}$, then $P_{out} \leq 17 - (G_{TX} - 6)$
<input type="checkbox"/>	Fixed point-to-point access points: the maximum power spectral density shall not exceed 17 dBm/MHz. If $G_{TX} > 23\text{dBi}$, then $P_{out} \leq 17 - (G_{TX} - 23)$
<input checked="" type="checkbox"/>	Mobile and portable client devices: the maximum power spectral density shall not exceed 11 dBm/MHz. If $G_{TX} > 6\text{dBi}$, then $P_{out} \leq 11 - (G_{TX} - 6)$
<input checked="" type="checkbox"/>	For the 5.25-5.35 GHz:
<input checked="" type="checkbox"/>	The maximum power spectral density shall not exceed 11 dBm/MHz. If $G_{TX} > 6\text{dBi}$, then $P_{out} \leq 11 - (G_{TX} - 6)$
<input checked="" type="checkbox"/>	For the 5.47-5.725 GHz:
<input checked="" type="checkbox"/>	The maximum power spectral density shall not exceed 11 dBm/MHz. If $G_{TX} > 6\text{dBi}$, then $P_{out} \leq 11 - (G_{TX} - 6)$
<input checked="" type="checkbox"/>	For the band 5.725-5.85 GHz:
<input checked="" type="checkbox"/>	The maximum power spectral density shall not exceed 30 dBm/500KHz. If $G_{TX} > 6\text{dBi}$, then $P_{out} \leq 30 - (G_{TX} - 6)$

Note 1: G_{TX} directional gain of transmitting antennas.

Note 2: P_{out} is maximum power spectral density.

Directional Gain Calculations for In-Band test method				
	References Rule		Chapter	Description
<input checked="" type="checkbox"/>	KDB 662911		F2)a)	Basic methodology
	<input checked="" type="checkbox"/>	KDB 662911	F2)a) (i)	transmit signals are correlated
	<input type="checkbox"/>	KDB 662911	F2)a) (ii)	transmit signals are uncorrelated
<input type="checkbox"/>	KDB 662911		F2)b)	Sectorized antenna systems.
<input type="checkbox"/>	KDB 662911		F2)c)	Cross-polarized antennas
	<input type="checkbox"/>	ANSI C63.10	F2)c) (i)	Cross-polarized antennas
	<input type="checkbox"/>	ANSI C63.10	F2)c) (ii)	Multiple antennas
<input type="checkbox"/>	KDB 662911		F2)e)	Spatial stream
	<input type="checkbox"/>	KDB 662911	F2)e) (i)	Antennas have the same gain
	<input checked="" type="checkbox"/>	KDB 662911	F2)e) (ii)	Antenna have the different gain with one spatial stream
	<input type="checkbox"/>	KDB 662911	F2)e) (iii)	Antenna have the different gain with more than one spatial stream
<input type="checkbox"/>	KDB 662911		F2)f)	Cyclic Delay Diversity (CDD)
	<input type="checkbox"/>	KDB 662911	F2)f) (i)	Antennas have the same gain
	<input type="checkbox"/>	KDB 662911	F2)f) (ii)	Antenna have the different gain with one spatial stream
	<input type="checkbox"/>	KDB 662911	F2)f) (iii)	Antenna have the different gain with more than one spatial stream

4.7.2 Test Setup



4.7.3 Test Procedure

	References Rule	Chapter	Description
<input checked="" type="checkbox"/>	ANSI C63.10	12.5	Peak power spectral density
<input checked="" type="checkbox"/>	FCC KDB 789033 D02v02r01	F	Maximum Power Spectral Density (PSD)

4.8 Radiated Emission Band Edge	VERDICT: PASS
--	----------------------

4.8.1 Limit

Standard	FCC Part 15 Subpart C Paragraph 15.205
-----------------	--

Restricted Bands of operation

MHz	MHz	MHz	GHz
0. 090-0. 110	16. 42-16. 423	399. 9-410	4. 5-5. 15
¹ 0. 495-0. 505	16. 69475-16. 69525	608-614	5. 35-5. 46
2. 1735-2. 1905	16. 80425-16. 80475	960-1240	7. 25-7. 75
4. 125-4. 128	25. 5-25. 67	1300-1427	8. 025-8. 5
4. 17725-4. 17775	37. 5-38. 25	1435-1626. 5	9. 0-9. 2
4. 20725-4. 20775	73-74. 6	1645. 5-1646. 5	9. 3-9. 5
6. 215-6. 218	74. 8-75. 2	1660-1710	10. 6-12. 7
6. 26775-6. 26825	108-121. 94	1718. 8-1722. 2	13. 25-13. 4
6. 31175-6. 31225	123-138	2200-2300	14. 47-14. 5
8. 291-8. 294	149. 9-150. 05	2310-2390	15. 35-16. 2
8. 362-8. 366	156. 52475-156. 52525	2483. 5-2500	17. 7-21. 4
8. 37625-8. 38675	156. 7-156. 9	2690-2900	22. 01-23. 12
8. 41425-8. 41475	162. 0125-167. 17	3260-3267	23. 6-24. 0
12. 29-12. 293	167. 72-173. 2	3332-3339	31. 2-31. 8
12. 51975-12. 52025	240-285	3345. 8-3358	36. 43-36. 5
12. 57675-12. 57725	322-335. 4	3600-4400	(²)
13. 36-13. 41			

¹Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

²Above 38.6

FCC Part 15 Subpart C Paragraph 15.209 (Restricted Band Emissions Limit)

Frequency (MHz)	Field strength (μ V/m)	Field strength (dB μ V/m)	Measurement distance (m)
0.009 - 0.49	2400/F(kHz)	48.5 – 13.8	300 _(Note 1)
0.49 - 1.705	24000/F(kHz)	33.8 - 23	30 _(Note 1)
1.705 - 30	30	29.5	30 _(Note 1)
30 - 88	100	40	3 _(Note 2)
88 - 216	150	43.5	3 _(Note 2)
216 - 960	200	46	3 _(Note 2)
Above 960	500	54	3 _(Note 2)

Note 1: At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

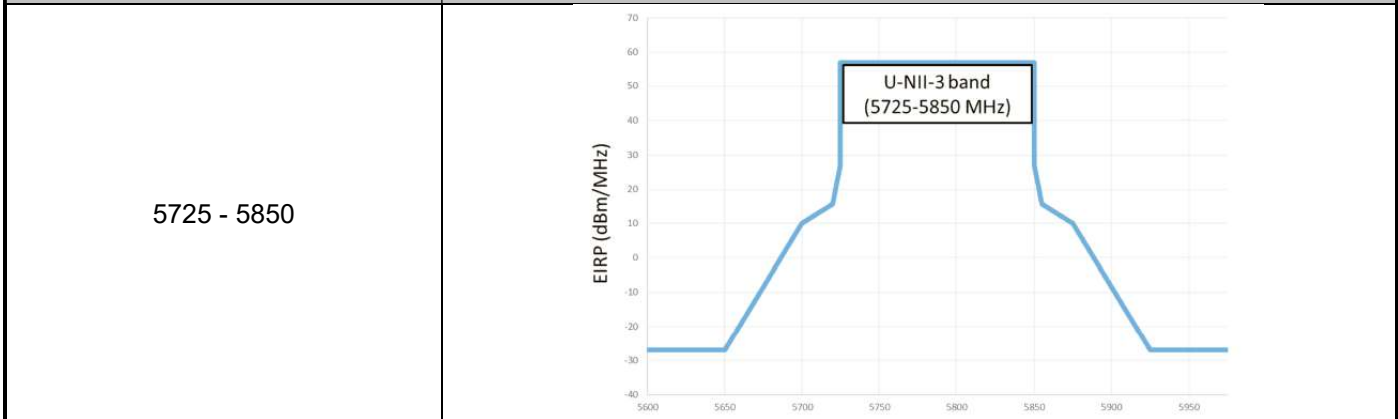
Note 2: At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment.

Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

FCC Part 15 Subpart C Paragraph 15.407(5)(b) (Unrestricted Band Emissions Limit)

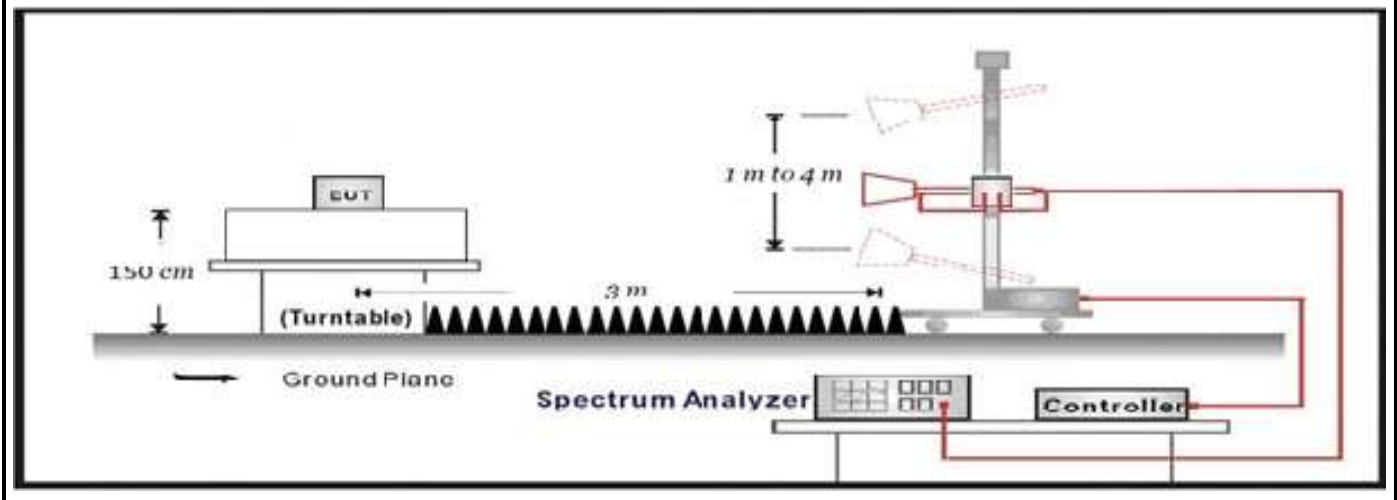
Operating Frequency Band (MHz)	EIRP Limit (dBm/MHz)	Equivalent Field Strength at 3m (dB μ V/m)
5150 - 5250	-27	68.3
5250 - 5350	-27	68.3
5470 - 5725	-27	68.3

Operating Frequency Band (MHz)	EIRP Limit (dBm/MHz)
--------------------------------	----------------------



4.8.2 Test Setup

Above 1GHz Test Setup:



4.8.3 Test Procedure

	References Rule	Chapter	Description
<input type="checkbox"/>	ANSI C63.10	12.7.3	Emissions in non-restricted frequency bands
<input checked="" type="checkbox"/>	ANSI C63.10	12.7.2	Emissions in restricted frequency bands
<input type="checkbox"/>	ANSI C63.10	12.7.5	Radiated emission measurements
<input checked="" type="checkbox"/>	ANSI C63.10	12.7.6	Procedure for peak unwanted emissions measurements above 1000 MHz
<input checked="" type="checkbox"/>	ANSI C63.10	12.7.7	Procedures for average unwanted emissions measurements above 1000 MHz
<input checked="" type="checkbox"/>	ANSI C63.10	12.7.7.2	Method AD (average detection)—primary method
<input type="checkbox"/>	ANSI C63.10	12.7.7.3	Method VB-A (Alternative)
<input type="checkbox"/>	ANSI C63.10	6.4	Radiated emissions from unlicensed wireless devices below 30 MHz
<input type="checkbox"/>	ANSI C63.10	6.5	Radiated emissions from unlicensed wireless devices in the frequency range of 30 MHz to 1000 MHz
<input type="checkbox"/>	ANSI C63.10	6.6	Radiated emissions from unlicensed wireless devices above 1 GHz
<input type="checkbox"/>	FCC KDB 789033 D02v02r01	G.2	Unwanted Emissions that fall Outside of the Restricted Bands
<input type="checkbox"/>	FCC KDB 789033 D02v02r01	G.1	Unwanted Emissions in the Restricted Bands
<input type="checkbox"/>	FCC KDB 789033 D02v02r01	G.4	Procedure for Unwanted Emissions Measurements below 1000 MHz
<input type="checkbox"/>	FCC KDB 789033 D02v02r01	G.5	Procedure for Unwanted Maximum Emissions Measurements above 1000 MHz
<input type="checkbox"/>	FCC KDB 789033 D02v02r01	G.6	Procedures for Average Unwanted Emissions Measurements above 1000 MHz

	<input type="checkbox"/>	FCC KDB 789033 D02v02r01	G.6.c	Method AD (Average detection)—primary method
	<input type="checkbox"/>	FCC KDB 789033 D02v02r01	G.6.d	Method VB (Averaging using reduced video bandwidth): Alternative method.

4.9 Frequency Stability

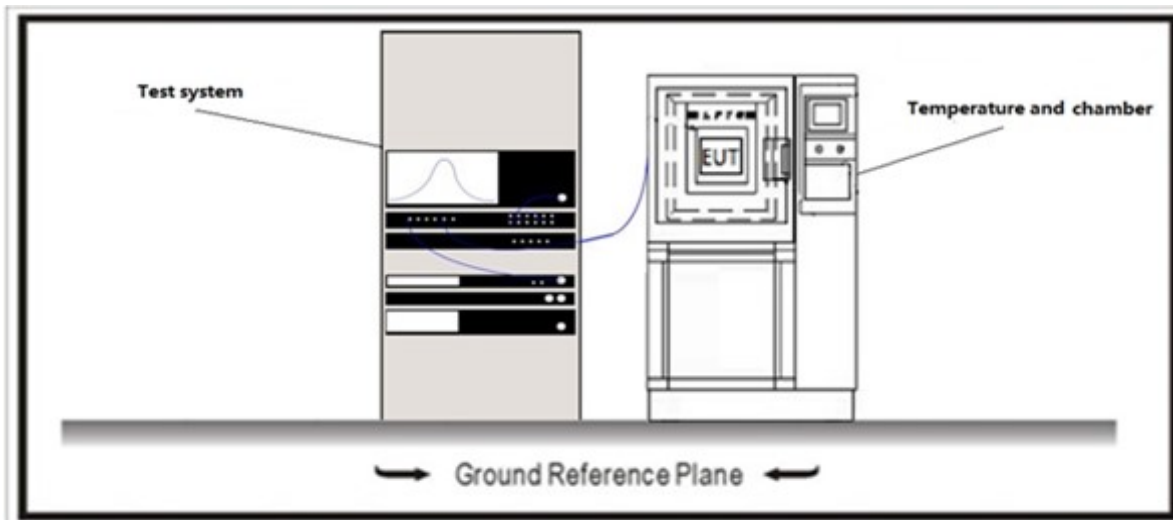
VERDICT: PASS

4.9.1 Limit:

In-band emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

The transmitter center frequency tolerance shall be ± 20 ppm maximum for the 5 GHz band and ± 25 ppm maximum for the 2.4 GHz band.

4.9.2 Test Setup



4.9.3 Test Procedure

	References Rule	Chapter	Description
<input checked="" type="checkbox"/>	ANSI C63.10	6.8	Frequency stability tests
<input checked="" type="checkbox"/>	ANSI C63.10	6.8.1	Frequency stability with respect to ambient temperature
<input checked="" type="checkbox"/>	ANSI C63.10	6.8.2	Frequency stability when varying supply voltage

4.10 Antenna Requirement

VERDICT: PASS

4.10.1 Limit:

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 shall be considered sufficient to comply with the provisions of this section. 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

4.10.2 Antenna Connector Construction:

<input checked="" type="checkbox"/>	The use of a permanently attached antenna
<input type="checkbox"/>	The antenna use of a unique coupling to the intentional radiator
<input type="checkbox"/>	The use of a nonstandard antenna jack or electrical connector

Please refer to the attached document "Internal Photograph" to show the antenna connector.

5 TEST SETUP PHOTO AND EUT PHOTO

Remark: The test setup photo and EUT Photo please see appendix.