



FCC Part 15E Test Report

FCC ID: 2BLUW-RM21

Applicant: FJ Dynamics Technology (Fujian) Co., Ltd.

Address: Floor 23A, Unit 2, Huajian Building, No.12, 16, and 18 East Keji Road, Shangjie Town, Minhou County, Fuzhou City, Fujian Province, China

Manufacturer: FJ Dynamics Technology (Fujian) Co., Ltd.

Address: Floor 23A, Unit 2, Huajian Building, No.12, 16, and 18 East Keji Road, Shangjie Town, Minhou County, Fuzhou City, Fujian Province, China

EUT: FJD Autonomous Mower

Trade Mark: N/A

Model Number: RM21, RM25, Z01

Date of Receipt: Jun. 06, 2024

Test Date: Jun. 16, 2024 - Jul. 25, 2024

Date of Report: Jul. 25, 2024

Prepared By: Shenzhen DL Testing Technology Co., Ltd.

Address: 101-201, Building C, Shuanghuan, No.8, Baoqing Road, Baolong Industrial Zone, Baolong Street, Longgang District, Shenzhen, Guangdong, China

Applicable Standards: FCC PART 15 E 15.407
ANSI C63.10:2013

Test Result: Pass

Report Number: DL-240606029ER

Prepared (Test Engineer): Pxing Huang

Reviewer (Supervisor): Jack Bu

Approved (Manager): Jade Yang



This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Shenzhen DL Testing Technology Co., Ltd.



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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.407) , Subpart E			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.407(b), 15.209	Radiated Spurious Emission	PASS	
15.407 (b)	Band Edge Emission	PASS	
15.407 (a)	Peak Output Power	PASS	
15.407 (a)	Power Spectral Density	PASS	
15.407(e)	6dB bandwidth and 99%dB Bandwidth	PASS	
15.407(g)	Frequency Stability	PASS	
15.407(c)	Transmission in case of Absence of Information	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

Test lab: Shenzhen DL Testing Technology Co., Ltd.

Address: 101-201, Building C, Shuanghuan, No.8, Baoqing Road, Baolong Industrial Zone, Baolong Street, Longgang District, Shenzhen, Guangdong, China

FCC Test Firm Registration Number: 854456

Designation Number: CN1307

IC Registered No.: 27485

CAB ID.: CN0118

1.1 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded 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	Uncertainty
1	Conducted Emission Test	$\pm 2.56\text{dB}$
2	RF power,conducted	$\pm 0.42\text{dB}$
3	Spurious emissions,conducted	$\pm 2.76\text{dB}$
4	All emissions,radiated(9kHz-1GHz)	$\pm 3.65\text{dB}$
5	All emissions,radiated(1GHz-40GHz)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^{\circ}\text{C}$
7	Humidity	$\pm 2\%$
8	Bandwidth	$\pm 0.2\text{MHz}$
9	Power Spectral Density	$\pm 0.42\text{dB}$



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product Name:	FJD Autonomous Mower
Trademark	N/A
Model No.:	RM21, RM25, Z01
Model Difference	N/A
Operation Frequency:	5745-5825MHz(802.11a/n/ac(HT20)) 5755-5795MHz(802.11n/ac(HT40))
Channel numbers:	See channel list
Channel separation:	20MHz/40MHz
Modulation technology:	64QAM, 16QAM, QPSK, BPSK for OFDM
Rate of Transmitter	802.11a: 6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps, 54Mbps 802.11n: Up to 300Mbps 802.11ac: up to 867Mbps
Antenna Type:	Internal Antenna
Antenna gain:	3.95dBi
Power supply:	DC 48V from battery DC 58.8V from charger
Charger:	Model: CS1500 Input: AC 100-245V 8A 50/60Hz Output: DC 58.8V 20A

Note:

- 1.For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- 2.The EUT's all information provided by client.



2. Channel List

Channel List for 802.11a/n(HT20)/ac(HT20)			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	161	5805
153	5765	165	5825
157	5785		

Channel List for 802.11n(HT40)/ac(HT40)			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
151	5755	159	5795



2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Description		
Pretest Mode	Channel	Band 4
Mode 1	802.11a/n/acHT20	CH149, CH157, CH165
Mode 2	802.11n/acHT40	CH151, CH159
Mode 3	Link Mode	

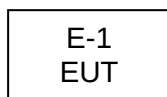
For Radiated Emission		
Pretest Mode	Channel	Band 4
Mode 1	802.11a/n/acHT20	CH149, CH157, CH165
Mode 2	802.11n/acHT40	CH151, CH159
Mode 3	Link Mode	

Note: 1. The measurements are performed at the highest, middle, lowest available channels.
2. During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.

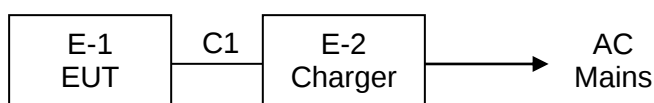


2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious Emission Test



Conducted Spurious Emission Test



2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

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.

Item	Equipment	Model/Type No.	Series No.	Note
E-1	FJD Autonomous Mower	RM21, RM25, Z01	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note

Note:

- (1) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

2.5 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING

During testing, channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the end product.

Max output power Setting				
Test software Version	Test program: MTK			
Mode	802.11a	802.11n HT20	802.11n HT40	802.11ac HT20/HT40
Data Rate	6Mbps	MSC0	MSC0	MSC0
Power Setting of Softwave	60	60	66	66



2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation test, Band-edge test and 6db bandwidth test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	Agilent	E4408B	MY50140780	Nov. 05, 2022	Nov. 04, 2023
2	Test Receiver (9kHz-7GHz)	R&S	ESRP7	101393	Nov. 05, 2022	Nov. 04, 2023
3	Bilog Antenna (30MHz-1GHz)	R&S	VULB9162	00306	Nov. 05, 2022	Nov. 04, 2023
4	Horn Antenna (1GHz-18GHz)	Schwarzbeck	BBHA9120D	02139	Nov. 05, 2022	Nov. 04, 2023
5	Horn Antenna (18GHz-40GHz)	A.H. Systems	SAS-574	588	Nov. 05, 2022	Nov. 04, 2023
6	Amplifier (9KHz-6GHz)	Schwarzbeck	BBV9743B	00153	Nov. 05, 2022	Nov. 04, 2023
7	Amplifier (1GHz-18GHz)	EMEC	EM01G8GA	00270	Nov. 05, 2022	Nov. 04, 2023
8	Amplifier (18GHz-40GHz)	Quanjuda	DLE-161	97	Nov. 05, 2022	Nov. 04, 2023
9	Loop Antenna (9KHz-30MHz)	Schwarzbeck	FMZB1519B	00014	Nov. 05, 2022	Nov. 04, 2023
10	RF cables1 (9kHz-1GHz)	ChengYu	966	004	Nov. 05, 2022	Nov. 04, 2023
11	RF cables2 (1GHz-40GHz)	ChengYu	966	003	Nov. 05, 2022	Nov. 04, 2023
12	Antenna connector	Florida RF Labs	N/A	RF 01#	Nov. 05, 2022	Nov. 04, 2023
13	Power probe	KEYSIGHT	U2021XA	MY55210018	Nov. 05, 2022	Nov. 04, 2023
14	Signal Analyzer 9kHz-26.5GHz	Agilent	N9020A	MY55370280	Nov. 05, 2022	Nov. 04, 2023
15	Test Receiver 20kHz-40GHz	R&S	ESU 40	100376	Nov. 05, 2022	Nov. 04, 2023
16	D.C. Power Supply	LongWei	PS-305D	010964729	Nov. 05, 2022	Nov. 04, 2023

Conduction Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	843 Shielded Room	ChengYu	843 Room	843	Sep. 20, 2022	Sep. 19, 2025
2	EMI Receiver	R&S	ESR	101421	Nov. 05, 2022	Nov. 04, 2023
3	LISN	R&S	ENV216	102417	Nov. 05, 2022	Nov. 04, 2023
4	843 Cable 1#	ChengYu	CE Cable	001	Nov. 05, 2022	Nov. 04, 2023

Other

Item	Name	Manufacturer	Model	Software version
1	EMC Conduction Test System	FALA	EZ_EMCC	EMC-CON 3A1.1
2	EMC radiation test system	FALA	EZ_EMCC	FA-03A2
3	RF test system	MAIWEI	MTS8310	2.0.0.0
4	RF communication test system	MAIWEI	MTS8200	2.0.0.0



3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Limit (dBuV)		Standard
	Quasi-peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.5 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

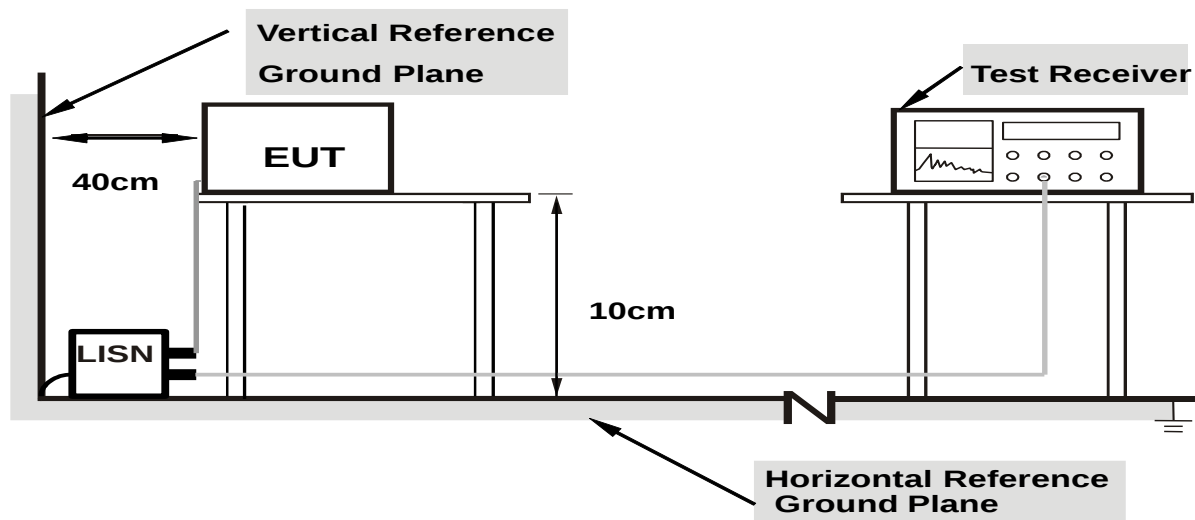
3.1.2 TEST PROCEDURE

- a. The EUT was placed 0.1 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 TEST SETUP



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.1.5 EUT OPERATING CONDITIONS

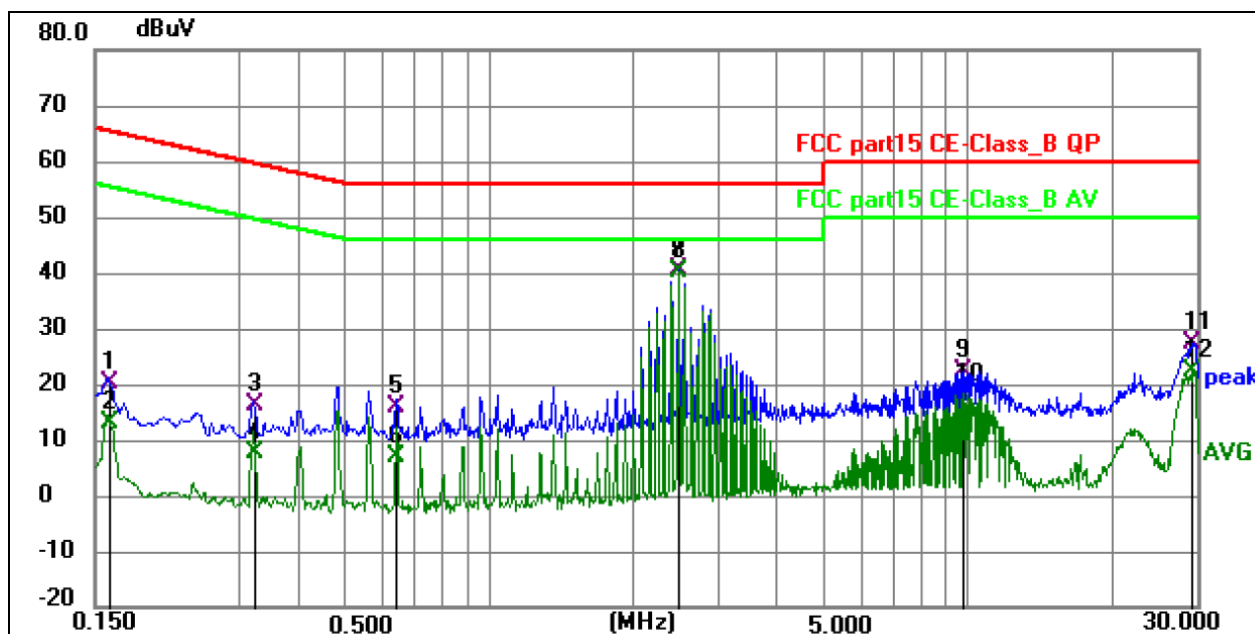
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

We pretest AC 120V and AC 230V, the worst voltage was AC 120V and the data recording in the report.

3.1.6 TEST RESULTS



Temperature:	25 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	L
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode 3



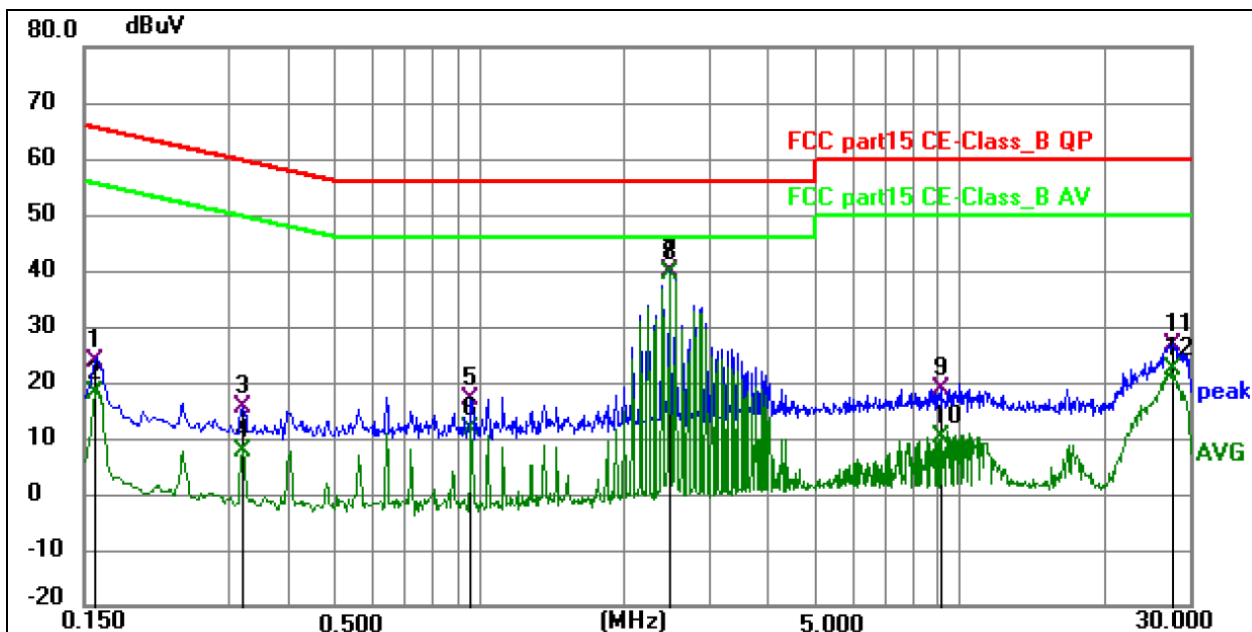
Remark:

Margin = Limit – Level, Correct Factor = Cable lose + LISN insertion loss, Level= Reading + Correct factor

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1615	10.27	10.05	20.32	65.39	-45.07	QP	P	
2	0.1615	2.98	10.05	13.03	55.39	-42.36	AVG	P	
3	0.3251	7.19	9.13	16.32	59.58	-43.26	QP	P	
4	0.3251	-1.46	9.13	7.67	49.58	-41.91	AVG	P	
5	0.6403	6.66	9.29	15.95	56.00	-40.05	QP	P	
6	0.6403	-2.48	9.29	6.81	46.00	-39.19	AVG	P	
7	2.4855	30.53	9.96	40.49	56.00	-15.51	QP	P	
8 *	2.4855	30.10	9.96	40.06	46.00	-5.94	AVG	P	
9	9.7752	12.15	10.28	22.43	60.00	-37.57	QP	P	
10	9.7752	7.88	10.28	18.16	50.00	-31.84	AVG	P	
11	29.3233	16.14	11.03	27.17	60.00	-32.83	QP	P	
12	29.3233	11.16	11.03	22.19	50.00	-27.81	AVG	P	



Temperature:	25 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	N
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode 3



Remark:

Margin = Limit – Level, Correct Factor = Cable lose + LISN insertion loss, Level= Reading + Correct factor

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1590	13.25	10.36	23.61	65.52	-41.91	QP	P	
2	0.1590	7.67	10.36	18.03	55.52	-37.49	AVG	P	
3	0.3209	6.33	9.07	15.40	59.68	-44.28	QP	P	
4	0.3209	-1.43	9.07	7.64	49.68	-42.04	AVG	P	
5	0.9600	7.71	9.34	17.05	56.00	-38.95	QP	P	
6	0.9600	2.30	9.34	11.64	46.00	-34.36	AVG	P	
7	2.4810	29.97	9.85	39.82	56.00	-16.18	QP	P	
8 *	2.4810	29.45	9.85	39.30	46.00	-6.70	AVG	P	
9	9.1320	8.55	10.08	18.63	60.00	-41.37	QP	P	
10	9.1320	-0.01	10.08	10.07	50.00	-39.93	AVG	P	
11	27.6314	15.49	11.12	26.61	60.00	-33.39	QP	P	
12	27.6314	11.08	11.12	22.20	50.00	-27.80	AVG	P	



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Limit (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	40GHz
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.2.2 TEST PROCEDURE

Below 1GHz test procedure as below:

- a. The EUT was placed on the top of a rotating table 0.1 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.



- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

- g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.1 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel

Note:

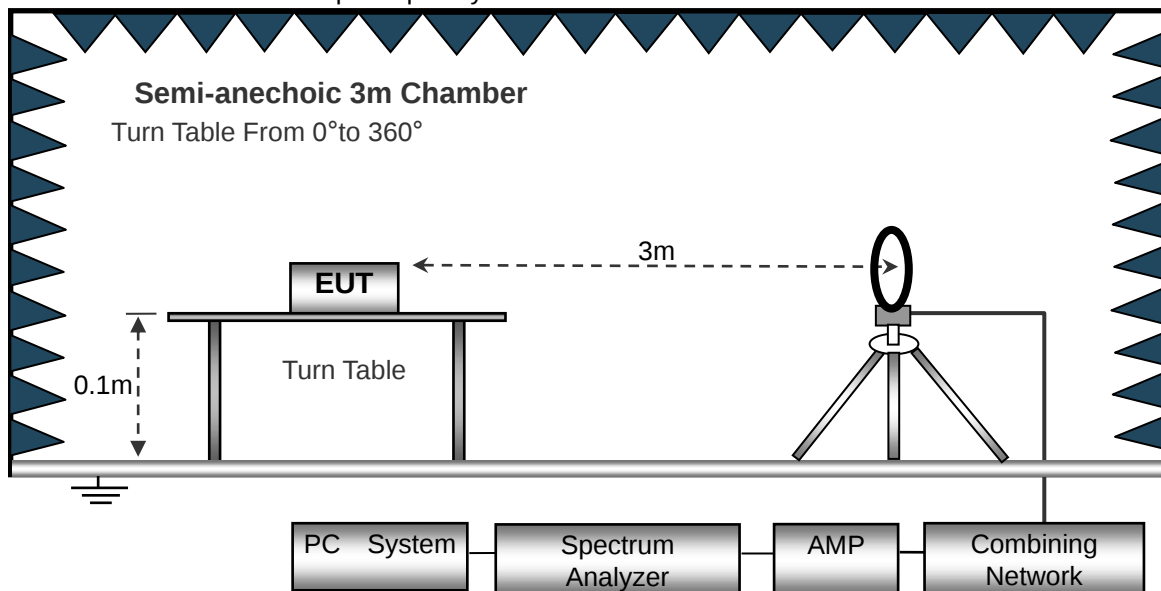
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

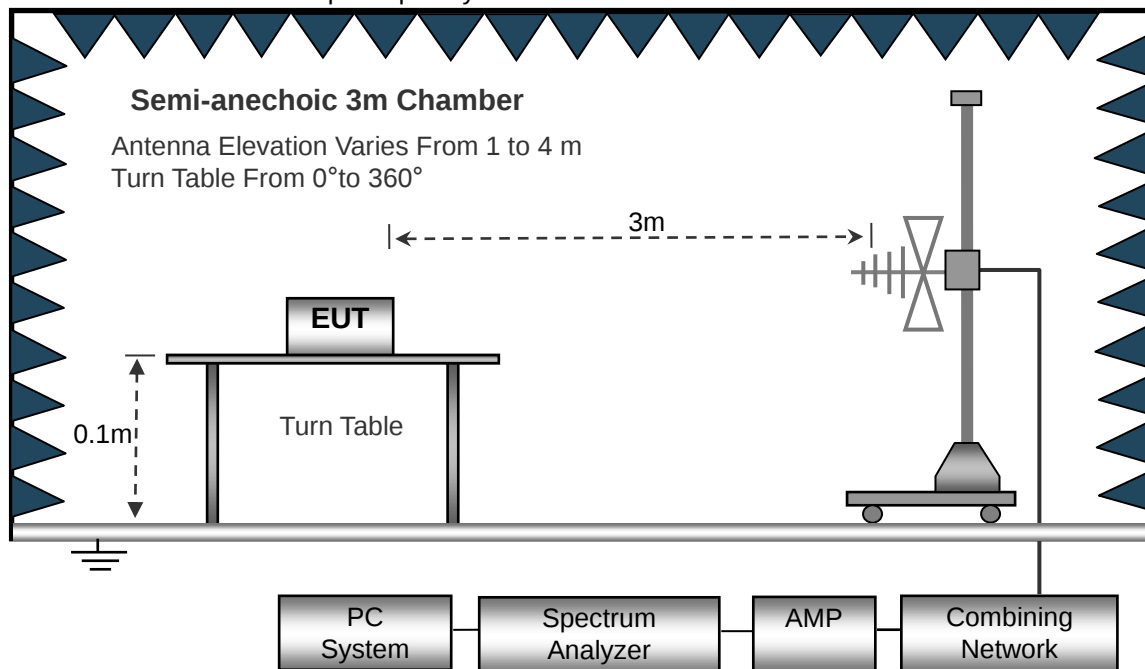
No deviation

3.2.4 TEST SETUP

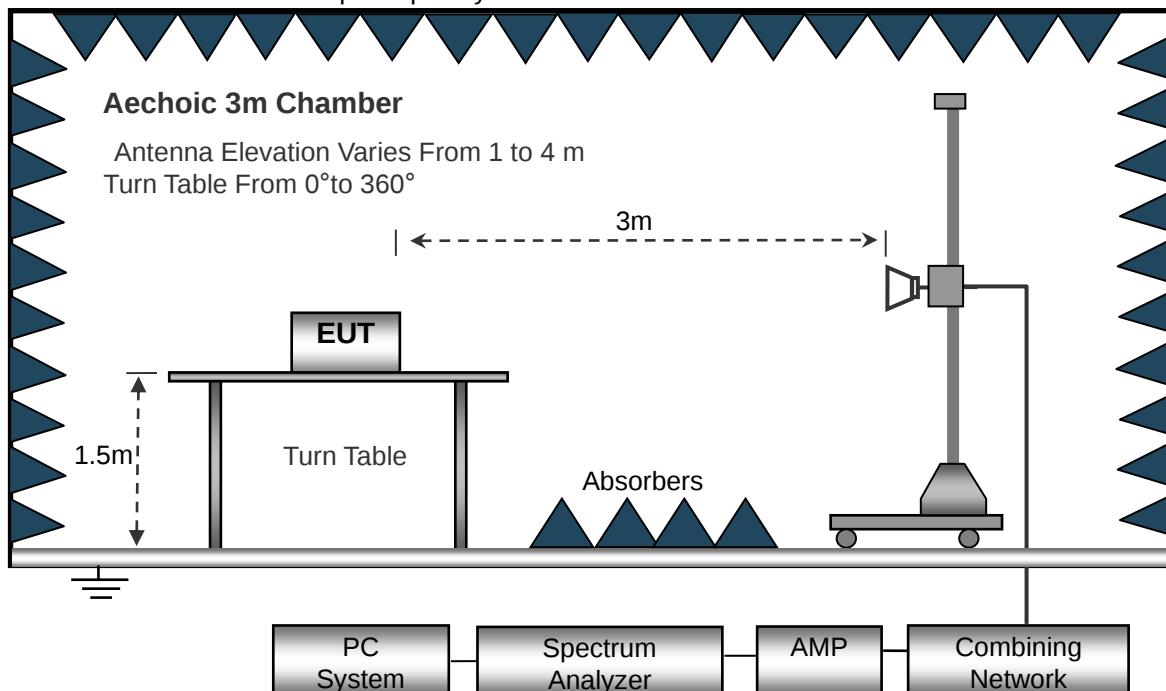
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



3.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

**3.2.6 TEST RESULTS (Between 9KHz – 30 MHz)**

Temperature:	20°C	Relative Humidity:	48%
Pressure:	1010 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	Mode 3	Polarization :	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

NOTE:

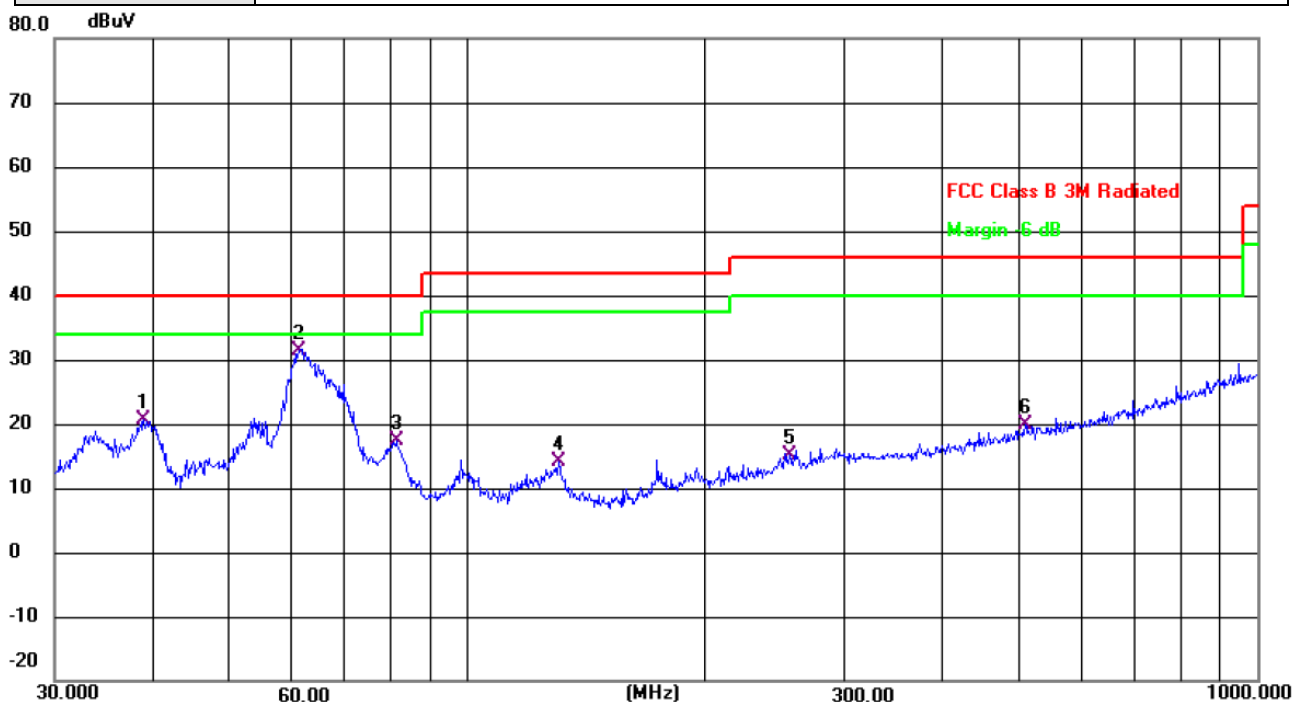
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance}/\text{test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.

**3.2.7 TEST RESULTS (Between 30MHz – 1GHz)**

Temperature:	26℃	Relative Humidity:	54%
Pressure:	1010 hPa	Polarization :	Horizontal
Test Voltage :	AC 120V/60Hz		
Test Mode :	Mode 3		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	
		MHz	dBuV	dB	dBuV	dB	dB	Detector
1		38.8878	34.83	-14.08	20.75	40.00	-19.25	QP
2	*	61.1315	44.30	-13.00	31.30	40.00	-8.70	QP
3		81.2117	34.76	-17.48	17.28	40.00	-22.72	QP
4		130.3789	31.08	-16.96	14.12	43.50	-29.38	QP
5		255.6231	27.69	-12.58	15.11	46.00	-30.89	QP
6		508.2582	27.28	-7.42	19.86	46.00	-26.14	QP

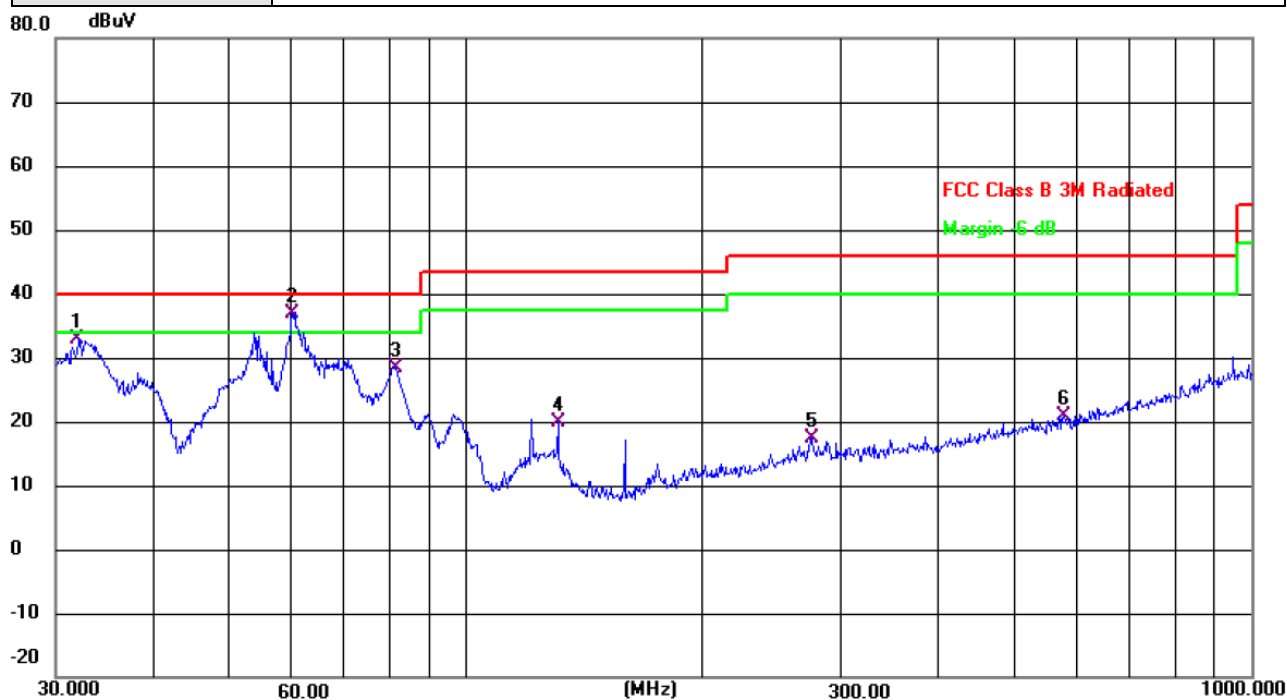
Remark:

Correct Factor = Cable loss + Antenna factor – Preamplifier;

Level = Reading Level + Correct Factor; Margin = Level - Limit;



Temperature:	26℃	Relative Humidity:	54%
Pressure:	1010 hPa	Polarization :	Vertical
test voltage :	AC 120V/60Hz		
Test Mode :	Mode 3		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Detector
		MHz	dBuV	dB	dBuV	dB	dB	
1		32.0667	48.58	-15.59	32.99	40.00	-7.01	QP
2	*	60.0691	49.56	-12.72	36.84	40.00	-3.16	QP
3		81.4970	45.86	-17.47	28.39	40.00	-11.61	QP
4		130.8369	36.98	-16.99	19.99	43.50	-23.51	QP
5		275.1570	29.54	-12.07	17.47	46.00	-28.53	QP
6		576.6443	27.40	-6.44	20.96	46.00	-25.04	QP

Remark:

Correct Factor = Cable loss + Antenna factor – Preamplifier;

Level = Reading Level + Correct Factor; Margin = Level - Limit;

**3.2.8 TEST RESULTS (1ghz~40ghZ)**

802.11a band 4

Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:5745									
V	11490	55.04	49.05	15.3	37.39	58.68	74	-15.32	PK
V	11490	41.70	49.05	15.3	37.39	45.34	54	-8.66	AV
V	17235	56.22	49.16	15.27	40.45	62.78	68.2	-5.42	PK
V	17235	41.55	49.16	15.27	40.45	48.11	54	-5.89	AV
H	11490	53.17	49.05	15.3	37.39	56.81	74	-17.19	PK
H	11490	42.76	49.05	15.3	37.39	46.40	54	-7.60	AV
H	17235	52.11	49.16	15.27	40.45	58.67	68.2	-9.53	PK
H	17235	40.88	49.16	15.27	40.45	47.44	54	-6.56	AV
operation frequency:5785									
V	11570	52.43	49.09	15.34	37.42	56.10	74	-17.90	PK
V	11570	41.80	49.09	15.34	37.42	45.47	54	-8.53	AV
V	17355	51.10	49.18	15.29	40.47	57.68	68.2	-10.52	PK
V	17355	40.86	49.18	15.29	40.47	47.44	54	-6.56	AV
H	11570	51.44	49.09	15.34	37.42	55.11	74	-18.89	PK
H	11570	42.65	49.09	15.34	37.42	46.32	54	-7.68	AV
H	17355	49.50	49.18	15.29	40.47	56.08	68.2	-12.12	PK
H	17355	40.75	49.18	15.29	40.47	47.33	54	-6.67	AV
operation frequency:5825									
V	11650	52.84	49.11	15.37	37.46	56.56	74	-17.44	PK
V	11650	42.00	49.11	15.37	37.46	45.72	54	-8.28	AV
V	17475	49.98	49.21	15.34	40.51	56.62	68.2	-11.58	PK
V	17475	41.04	49.21	15.34	40.51	47.68	54	-6.32	AV
H	11650	58.34	49.11	15.37	31.31	55.91	74	-18.09	PK
H	11650	48.73	49.11	15.37	31.31	46.30	54	-7.70	AV
H	17475	50.12	49.21	15.34	40.51	56.76	68.2	-11.44	PK
H	17475	40.76	49.21	15.34	40.51	47.40	54	-6.60	AV

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.



802.11n HT20

Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:5745									
V	11490	50.02	49.05	15.3	37.39	53.66	74	-20.34	PK
V	11490	42.74	49.05	15.3	37.39	46.38	54	-7.62	AV
V	17235	49.29	49.16	15.27	40.45	55.85	68.2	-12.35	PK
V	17235	40.87	49.16	15.27	40.45	47.43	54	-6.57	AV
H	11490	50.09	49.05	15.3	37.39	53.73	74	-20.27	PK
H	11490	41.75	49.05	15.3	37.39	45.39	54	-8.61	AV
H	17235	49.00	49.16	15.27	40.45	55.56	68.2	-12.64	PK
H	17235	41.02	49.16	15.27	40.45	47.58	54	-6.42	AV
operation frequency:5785									
V	11570	53.17	49.09	15.34	37.42	56.84	74	-17.16	PK
V	11570	42.86	49.09	15.34	37.42	46.53	54	-7.47	AV
V	17355	49.88	49.18	15.29	40.47	56.46	68.2	-11.74	PK
V	17355	41.14	49.18	15.29	40.47	47.72	54	-6.28	AV
H	11570	50.12	49.09	15.34	37.42	53.79	74	-20.21	PK
H	11570	44.28	49.09	15.34	37.42	47.95	54	-6.05	AV
H	17355	50.08	49.18	15.29	40.47	56.66	68.2	-11.54	PK
H	17355	41.33	49.18	15.29	40.47	47.91	54	-6.09	AV
operation frequency:5825									
V	11650	52.05	49.11	15.37	37.46	55.77	74	-18.23	PK
V	11650	42.05	49.11	15.37	37.46	45.77	54	-8.23	AV
V	17475	48.97	49.21	15.34	40.51	55.61	68.2	-12.59	PK
V	17475	41.25	49.21	15.34	40.51	47.89	54	-6.11	AV
H	11650	58.09	49.11	15.37	31.31	55.66	74	-18.34	PK
H	11650	45.04	49.11	15.37	31.31	42.61	54	-11.39	AV
H	17475	50.00	49.21	15.34	40.51	56.64	68.2	-11.56	PK
H	17475	41.25	49.21	15.34	40.51	47.89	54	-6.11	AV

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.



802.11n HT40

Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:5755									
V	11510	49.87	49.07	15.33	37.41	53.54	74	-20.46	PK
V	11510	42.20	49.07	15.33	37.41	45.87	54	-8.13	AV
V	17265	50.39	49.17	15.28	40.46	56.96	68.2	-11.24	PK
V	17265	40.83	49.17	15.28	40.46	47.40	54	-6.60	AV
H	11510	49.10	49.07	15.33	37.41	52.77	74	-21.23	PK
H	11510	41.77	49.07	15.33	37.41	45.44	54	-8.56	AV
H	17265	50.68	49.17	15.28	40.46	57.25	68.2	-10.95	PK
H	17265	40.84	49.17	15.28	40.46	47.41	54	-6.59	AV
operation frequency:5795									
V	11590	49.86	49.11	15.37	37.46	53.58	74	-20.42	PK
V	11590	41.90	49.11	15.37	37.46	45.62	54	-8.38	AV
V	17385	49.16	49.21	15.34	40.51	55.80	68.2	-12.40	PK
V	17385	40.96	49.21	15.34	40.51	47.60	54	-6.40	AV
H	11590	58.40	49.11	15.37	31.31	55.97	74	-18.03	PK
H	11590	45.46	49.11	15.37	31.31	43.03	54	-10.97	AV
H	17385	48.86	49.21	15.34	40.51	55.50	68.2	-12.70	PK
H	17385	40.83	49.21	15.34	40.51	47.47	54	-6.53	AV

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.



802.11ac HT20

Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:5745									
V	11490	50.12	49.05	15.3	37.39	53.02	74	-20.98	PK
V	11490	43.08	49.05	15.3	37.39	46.08	54	-7.92	AV
V	17235	49.35	49.16	15.27	40.45	55.18	68.2	-13.02	PK
V	17235	40.88	49.16	15.27	40.45	46.84	54	-7.16	AV
H	11490	49.19	49.05	15.3	37.39	52.1	74	-21.90	PK
H	11490	41.99	49.05	15.3	37.39	45.01	54	-8.99	AV
H	17235	48.96	49.16	15.27	40.45	54.8	68.2	-13.40	PK
H	17235	41.04	49.16	15.27	40.45	46.99	54	-7.01	AV
operation frequency:5785									
V	11570	49.14	49.09	15.34	37.42	52.08	74	-21.92	PK
V	11570	42.51	49.09	15.34	37.42	45.55	54	-8.45	AV
V	17355	49.90	49.18	15.29	40.47	55.74	68.2	-12.46	PK
V	17355	41.03	49.18	15.29	40.47	47	54	-7.00	AV
H	11570	50.43	49.09	15.34	37.42	53.35	74	-20.65	PK
H	11570	43.79	49.09	15.34	37.42	46.81	54	-7.19	AV
H	17355	50.07	49.18	15.29	40.47	55.91	68.2	-12.29	PK
H	17355	41.42	49.18	15.29	40.47	47.39	54	-6.61	AV
operation frequency:5825									
V	11650	49.92	49.11	15.37	37.46	52.9	74	-21.10	PK
V	11650	41.98	49.11	15.37	37.46	45.08	54	-8.92	AV
V	17475	48.87	49.21	15.34	40.51	54.79	68.2	-13.41	PK
V	17475	41.24	49.21	15.34	40.51	47.27	54	-6.73	AV
H	11650	58.61	49.11	15.37	31.31	55.31	74	-18.69	PK
H	11650	44.93	49.11	15.37	31.31	41.84	54	-12.16	AV
H	17475	49.09	49.21	15.34	40.51	55	68.2	-13.20	PK
H	17475	41.18	49.21	15.34	40.51	47.21	54	-6.79	AV

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.



802.11ac HT40

Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:5755									
V	11510	49.96	49.07	15.33	37.41	52.89	74	-21.11	PK
V	11510	43.48	49.07	15.33	37.41	46.51	54	-7.49	AV
V	17265	49.36	49.17	15.28	40.46	55.2	68.2	-13.00	PK
V	17265	41.79	49.17	15.28	40.46	47.74	54	-6.26	AV
H	11510	49.07	49.07	15.33	37.41	52.01	74	-21.99	PK
H	11510	43.10	49.07	15.33	37.41	46.13	54	-7.87	AV
H	17265	49.58	49.17	15.28	40.46	55.42	68.2	-12.78	PK
H	17265	40.83	49.17	15.28	40.46	46.8	54	-7.20	AV
operation frequency:5795									
V	11590	50.18	49.11	15.37	37.46	53.16	74	-20.84	PK
V	11590	41.98	49.11	15.37	37.46	45.08	54	-8.92	AV
V	17385	48.90	49.21	15.34	40.51	54.82	68.2	-13.38	PK
V	17385	41.23	49.21	15.34	40.51	47.26	54	-6.74	AV
H	11590	58.10	49.11	15.37	31.31	54.81	74	-19.19	PK
H	11590	45.43	49.11	15.37	31.31	42.33	54	-11.67	AV
H	17385	49.00	49.21	15.34	40.51	54.92	68.2	-13.28	PK
H	17385	40.74	49.21	15.34	40.51	46.78	54	-7.22	AV

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.



3.3 CONDUCTED BAND EMISSION MEASUREMENT

3.3.1 TEST REQUIREMENT:

FCC Part15 C Section 15.209 and 15.407

(1) 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.

(4) 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 10dBm/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.

Spectrum Parameter	Setting	
Attenuation	Auto	
Start Frequency	5725MHz	
Stop Frequency	5850MHz	
RB / VB (emission in restricted band)	1 MHz / 3 MHz for Peak, 1 MHz / 10Hz for Average	

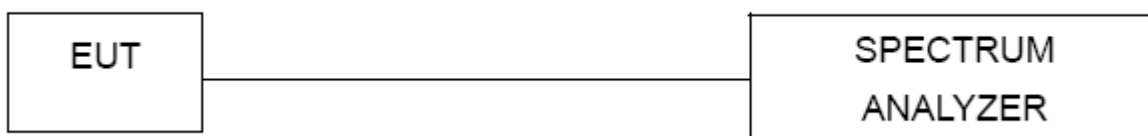
3.3.2 TEST PROCEDURE

Test method: FCC KDB 789033 G)& Parts 15.407(b)(4) & 15.209(a)

3.3.3 DEVIATION FROM TEST STANDARD

No deviation

3.3.4 TEST SETUP



3.3.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

3.3.6 TEST RESULT

Note: Ref offset= antenna +cable loss

Please see annex 2



4. AVERAGING OUTPUT POWER

4.1 APPLIED PROCEDURES / LIMIT

For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

4.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the power meter and antenna output port as show in the block diagram below,
- b. (i) Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.
(ii) Set RBW = 1 MHz.
(iii) Set VBW $\geq$ 3 MHz.
(iv) Number of points in sweep $\geq 2 \times \text{span} / \text{RBW}$. (This ensures that bin-to-bin spacing is $\leq \text{RBW}/2$, so that narrowband signals are not lost between frequency bins.)
(v) Sweep time = auto.
(vi) Detector = power averaging (rms), if available. Otherwise, use sample detector mode.
(vii) If transmit duty cycle < 98%, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle $\geq$ 98%, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run."
(viii) Trace average at least 100 traces in power averaging (rms) mode.
(ix) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the spectrum.

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



4.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.



4.1.5 TEST RESULTS

Band	Mode	Test Channel	Average Output Power (dBm)	Duty factor (dB)	Total Output Power(dB)	LIMIT (dBm)
Band 4	802.11a	Low	9.914	0.87	10.784	30
		Middle	9.255	1.06	10.315	30
		High	9.817	0.87	10.687	30
	802.11n HT20	Low	9.991	0.13	10.121	30
		Middle	9.499	0.13	9.629	30
		High	10.039	0.16	10.199	30
	802.11n HT40	Low	9.557	0.32	9.877	30
		High	9.585	0.32	9.905	30
	802.11ac HT20	Low	10.643	0.13	10.773	30
		Middle	10.2	0.13	10.33	30
		High	10.698	0.13	10.828	30
	802.11ac HT40	Low	9.588	0.26	9.848	30
		High	9.553	0.32	9.873	30

The plot please see annex 2.



5. POWER SPECTRAL DENSITY TEST

5.1 APPLIED PROCEDURES / LIMIT

In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.
In addition, the maximum power spectral density shall not exceed 30 dBm in any 500 kHz band.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	= the frequency band of operation
RB	$RBW \geq 1\text{MHz}$ for band 1 $RBW \geq 510\text{KHz}$ for band 4
VB	$VBW \geq 3RBW$
Detector	RMS (i.e., power averaging).
Trace	Max Hold
Sweep Time	Auto

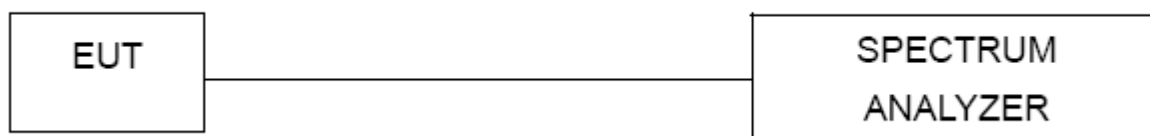
5.1.1 TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.
4. For U-NII1, U-NII-2A, U-NII-2C Band:
Set $RBW=1\text{MHz}$, $VBW=3\text{MHz}$, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)
For U-NII-3 Band:
Set $RBW=510\text{ kHz}$, $VBW=3*RBW$, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)
5. Use the cursor on spectrum to peak search the highest level of trace
6. Record the max. reading and add $10 \log(1/\text{duty cycle})$.
we test all antennas, the antenna 1 was worst mode and the data recording in the report.
7. Duty factor Reference is made to the test results in Section 7.1.5.

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



5.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.1.5 TEST RESULTS

Please see annex 2.



6. 6DB&26DB&99% BANDWIDTH TEST

6.1 APPLIED PROCEDURES / LIMIT

The 26 dB bandwidth is used to determine the conducted power limits.

There is no limit bandwidth for U-NII-1, U-NII-2-A and U-NII-2-C.

The minimum of 6dB Bandwidth measurement is 0.5 MHz for U-NII-3

6.1.1 TEST PROCEDURE

6dB Bandwidth	
Spectrum Parameters	Setting
RBW	100KHz
VBW	300KHz
Span	30MHz(20MHz Bandwidth mode) 60MHz(40MHz Bandwidth mode) 120MHz(80MHz Bandwidth mode)
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

26dB Bandwidth	
Spectrum Parameters	Setting
RBW	approximately 1% of the emission bandwidth
VBW	>RBW
Span	30MHz(20MHz Bandwidth mode) 60MHz(40MHz Bandwidth mode) 120MHz(80MHz Bandwidth mode)
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

99% Occupied Bandwidth	
Spectrum Parameters	Setting
RBW	1% to 5% of the OBW
VBW	Approximately three times the RBW
Span	between 1.5 times and 5.0 times the OBW
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP





6.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

6.1.5 TEST RESULTS

Please see annex 2.



7. DUTY CYCLE TEST SIGNAL

7.1 APPLIED PROCEDURES / LIMIT

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle. All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

7.1.1 TEST PROCEDURE

1. Set RBW = 1 MHz.
2. Set the video bandwidth (VBW) $\geq$ RBW.
3. Detector = Peak.
4. Sweep = auto couple.
5. Allow the trace to stabilize.
6. Span=0

7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP



7.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

7.1.5 TEST RESULTS

Please see annex 2.



8. FREQUENCY STABILITY

8.1 APPLIED PROCEDURES / LIMIT

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

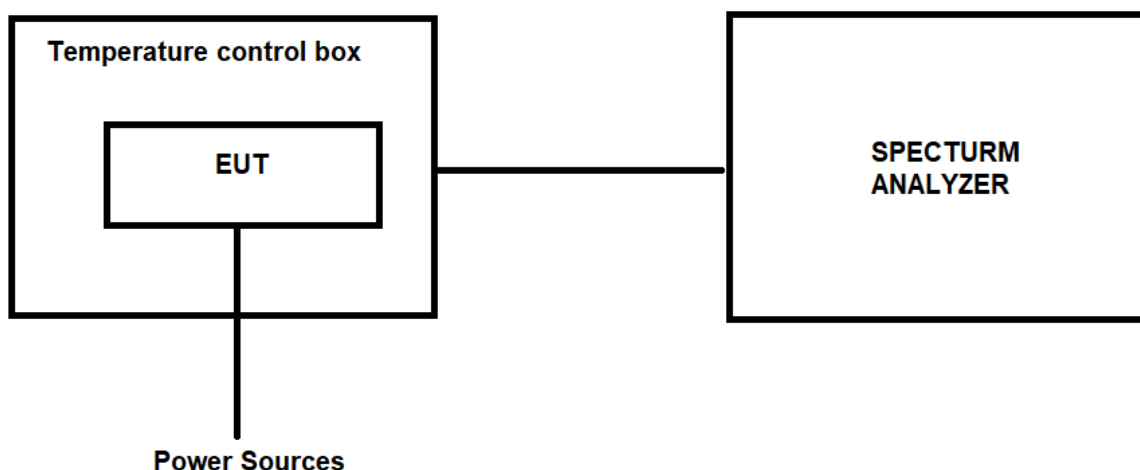
8.1.1 TEST PROCEDURE

1. The EUT was placed inside temperature chamber and powered and powered by nominal DC voltage.
2. Set EUT as normal operation.
3. Turn the EUT on and couple its output to spectrum.
4. Turn the EUT off and set the chamber to the highest temperature specified.
5. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT and measure the operating frequency.
6. Repeat step with the temperature chamber set to the lowest temperature.

8.1.2 DEVIATION FROM STANDARD

No deviation.

8.1.3 TEST SETUP



8.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

**8.1.5 TEST RESULTS**

Test Voltage	Test Temp.	Measured Frequency	Spectrum Frequency (MHz)			Δ Frequency (MHz)		
		(MHz)	802.11a	802.11n HT20	802.11ac HT20	802.11a	802.11n HT20	802.11ac HT20
4.18V	-20℃	5745	5745.0327	5745.0308	5745.0276	0.0327	0.0308	0.0276
		5785	5785.0345	5785.0295	5785.0284	0.0345	0.0295	0.0284
		5825	5825.0324	5825.0322	5825.0300	0.0324	0.0322	0.0300
3.42V		5745	5745.0224	5745.0184	5745.0258	0.0224	0.0184	0.0258
		5785	5785.0287	5785.0346	5785.0284	0.0287	0.0346	0.0284
		5825	5825.0373	5825.0384	5825.0372	0.0373	0.0384	0.0372
3.8V	25℃	5745	5745.0296	5745.0289	5745.0304	0.0296	0.0289	0.0304
		5785	5785.0447	5785.0375	5785.0424	0.0447	0.0375	0.0424
		5825	5825.0203	5825.0235	5825.0187	0.0203	0.0235	0.0187
4.18V	50℃	5745	5745.0638	5745.0591	5745.0635	0.0638	0.0591	0.0635
		5785	5785.0424	5785.0382	5785.0426	0.0424	0.0382	0.0426
		5825	5825.0615	5825.0586	5825.0624	0.0615	0.0586	0.0624
3.42V	50℃	5745	5745.0427	5745.0393	5745.0418	0.0427	0.0393	0.0418
		5785	5785.0214	5785.0214	5785.0224	0.0214	0.0214	0.0224
		5825	5825.0680	5825.0698	5825.0701	0.0680	0.0698	0.0701

Test Voltage	Test Temp.	Measured Frequency (MHz)	Spectrum Frequency (MHz)		Δ Frequency (MHz)	
			802.11n HT40	802.11ac HT40	802.11n HT40	802.11ac HT40
4.18V	-20℃	5755	5755.0505	5755.0513	0.0505	0.0513
		5795	5795.0605	5795.0574	0.0605	0.0574
3.42V		5755	5755.0204	5755.0626	0.0204	0.0626
		5795	5795.0404	5795.0444	0.0404	0.0444
3.8V	25℃	5755	5755.0214	5755.0194	0.0214	0.0194
		5795	5795.0523	5795.0497	0.0523	0.0497
4.18V	50℃	5755	5755.0425	5755.0395	0.0425	0.0395
		5795	5795.0293	5795.0285	0.0293	0.0285
3.42V	50℃	5755	5755.0284	5755.0294	0.0284	0.0294
		5795	5795.0423	5795.0405	0.0423	0.0405



9. TRANSMISSION IN THE ABSENCE OF DATA

9.1 STANDARD REQUIREMENT

According to §15.407(c)

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

9.2 TEST RESULT

No non-compliance noted:
Refer to the theory of operation.

10. ANTENNA REQUIREMENT

10.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: 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.

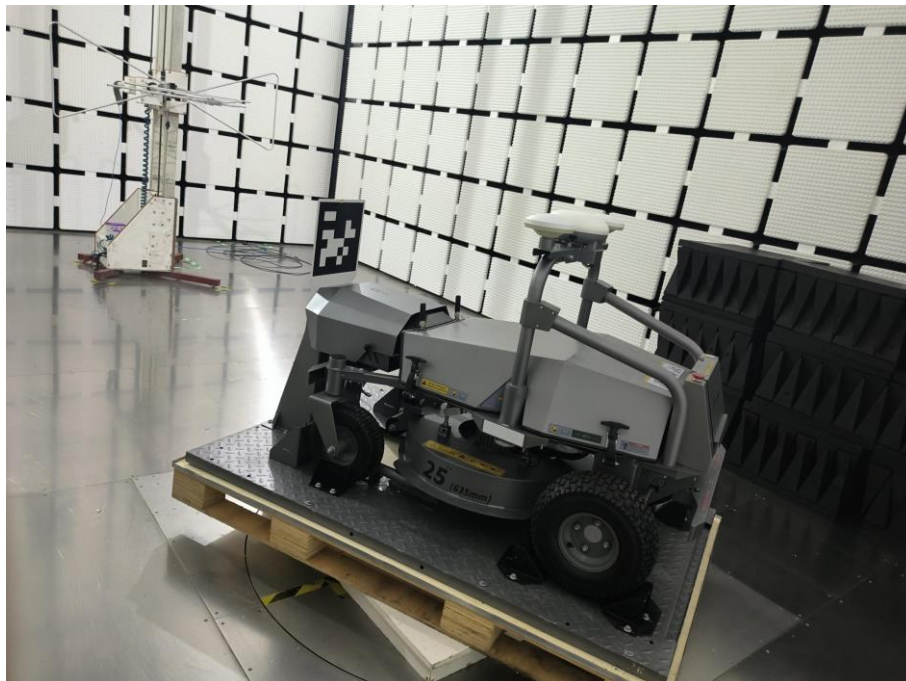
10.2 EUT ANTENNA

The EUT antenna is Internal Antenna, It comply with the standard requirement.



11. TEST SEUUP PHOTO

Radiated Measurement Photos





Conducted Measurement Photos





12. EUT PHOTO



***** END OF REPORT *****