

TEST REPORT

Product Name : Barcode scanner
Brand Name : N/A
Model : MJ-1203
Series Model : MJ-1202, MJ-1204, MJ-1205, MJ-1206, MJ-2020, MJ-2023, MJ-2024, MJ-2025, MJ-2026
FCC ID : 2A4TH-MJ-1203
Applicant : **ShenZhen Alacrity Barcode Technology Co.,Ltd**
Address : 5F, Building B, Southern Pearl Technology Park, No.83, Yingtai Road, Dalang, Longhua, Shenzhen
Manufacturer : **ShenZhen Alacrity Barcode Technology Co.,Ltd**
Address : 5F, Building B, Southern Pearl Technology Park, No.83, Yingtai Road, Dalang, Longhua, Shenzhen
Standard(s) : FCC CFR Title 47 Part 15 Subpart C Section 15.247
Date of Receipt : Jul. 28, 2025
Date of Test : Jul. 28, 2025~ Aug. 06, 2025
Issued Date : Aug. 06, 2025

Issued By: **Guangdong Asia Hongke Test Technology Limited**
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Note: This device has been tested and found to comply with the standard(s) listed, this test report merely corresponds to the test sample. It is not permitted to copy extracts of these test result without the written permission of the test laboratory. This report shall not be reproduced except in full, without the written approval of Guangdong Asia Hongke Test Technology Limited. If there is a need to alter or revise this document, the right belongs to Guangdong Asia Hongke Test Technology Limited, and it should give a prior written notice of the revision document. This test report must not be used by the client to claim product endorsement.

Guangdong Asia Hongke Test Technology Limited

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Report Revise Record

Report Version	Issued Date	Notes
M1	Aug. 06, 2025	Initial Release

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1 TEST SUMMARY

1.1 Test Standards

The tests were performed according to following standards:

[FCC Rules Part 15.247](#): Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

[ANSI C63.10: 2013](#): American National Standard for Testing Unlicensed Wireless Devices

[KDB558074 D01 15.247 Meas Guidance v05r02](#): Guidance for Compliance Measurements on Digital Transmission System, Frequency Hopping Spreda Spectrum System, and Hybrid System Devices Operating Under Section 15.247 of the FCC Rules

1.2 Test Summary

Test Item	Section in 47 CFR	Result
Maximum Conducted Output Power	§15.247(b)	Pass
Power Spectral Density	§15.247(b)	Pass
20dB Bandwidth	§15.247(a)	Pass
Frequency Separation	§15.247(a)	Pass
Number Of Hopping Frequency	§15.247(a)	Pass
Time Of Occupancy (Dwell Time)	§15.247(a)	Pass
Conducted Spurious Emissions and Band Edges Emissions	§15.205, §15.247(d)	Pass
Radiated Spurious Emissions	§15.209, §15.247(d)	Pass
Emissions at Restricted Band	§15.205	Pass
AC Mains Conducted Emissions	§15.207(a)	Pass
Antenna Requirements	§15.203	Pass

1.3 Test Facility

Test Laboratory:

Guangdong Asia Hongke Test Technology Limited

B1/F, Building 11, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

The test facility is recognized, certified or accredited by the following organizations:

FCC-Registration No.: 251906 Designation Number: CN1376

Guangdong Asia Hongke Test Technology Limited has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

IC —Registration No.: 31737 CAB identifier: CN0165

The 3m Semi-anechoic chamber of Guangdong Asia Hongke Test Technology Limited has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 31737

A2LA-Lab Cert. No.: 7133.01

Guangdong Asia Hongke Test Technology Limited has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

1.4 Measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report according to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the Guangdong Asia Hongke Test Technology Limited's quality system according to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Asia Hongke laboratory is reported:

Test	Measurement Uncertainty	Notes
Power Line Conducted Emission	9KHz~30MHz ± 1.20 dB	(1)
Radiated Emission	9KHz~30MHz ± 3.10 dB	(1)
Radiated Emission	30MHz~1GHz ± 3.75 dB	(1)
Radiated Emission	1GHz~18GHz ± 3.88 dB	(1)
Radiated Emission	18GHz-40GHz ± 3.88 dB	(1)
RF power, conducted	30MHz~6GHz ± 0.16 dB	(1)
RF power density, conducted	± 0.24 dB	(1)
Spurious emissions, conducted	± 0.21 dB	(1)
Temperature	± 1 °C	(1)
Humidity	± 3 %	(1)
DC and low frequency voltages	± 1.5 %	(1)
Time	± 2 %	(1)
Duty cycle	± 2 %	(1)
Bandwidth	$\pm 1.5 \times 10^{-6}$	(1)

The report uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty Multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

2 GENERAL INFORMATION

2.1 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

2.2 General Description of EUT

Product Name:	Barcode scanner
Model/Type reference:	MJ-1203
Serial Model:	MJ-1202, MJ-1204, MJ-1205, MJ-1206, MJ-2020, MJ-2023, MJ-2024, MJ-2025, MJ-2026
Model Different:	All models are the same, only differing in color and model name.
Power Supply:	Input:DC5V 0.78mA DC 3.7V from battery 1800mAh
Hardware Version:	N/A
Software Version:	N/A
Sample(s) Status:	AiTSZ-250728012-1(Normal sample) AiTSZ-250728012-2(Engineer sample)

SRD:

Supported type:	Wireless 2.4G
Modulation:	GFSK
Operation frequency:	2410MHz~2470MHz
Channel number:	61
Antenna type:	Spring antenna
Antenna gain:	0.54dBi

Remark:

The above DUT's information was declared by manufacturer. For more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.3 Description of Test Modes and Test Frequency

The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing.

Operation Frequency List:

Channel	Frequency (MHz)
01	2410
02	2411
:	:
30	2438
31	2440
32	2442
:	:
60	2469
61	2470

Note: Test performed at the lowest/middle/highest frequencies selected in the list above for EUT supported while working on specified mode.

Power setting during the test:

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 firmware of the final end product.

Power Parameters:

Test Software Version	CMD command		
Channel	Low	Middle	High
Power setting	default	default	default

2.4 Special Accessories

Follow auxiliary equipment(s) test with EUT that provided by the manufacturer or laboratory is listed as follow:

Description	Manufacturer	Model	Serial No.	Provided by	Other
Adapter	HNT	HNT-QC530	/	Test lab	/
/	/	/	/	/	/

2.5 Equipment List for the Test

No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	EMI Measuring Receiver	R&S	ESR	101160	2024.09.25	2025.09.24
2	Spectrum Analyzer	R&S	FSV40	101470	2024.09.23	2025.09.22
3	Low Noise Pre Amplifier	SCHWARZBECK	BBV 9745	00282	2024.09.25	2025.09.24
4	Low Noise Pre Amplifier	CESHENG	CSKJLNA23101 6A	CSKJLNA231016 A	2024.09.25	2025.09.24
5	Passive Loop	ETS	6512	00165355	2024.08.29	2027.08.28
6	TRILOG Super Broadband test Antenna	SCHWARZBECK	VULB9168	01434	2024.08.29	2027.08.28
7	Broadband Horn Antenna	Schwarzbeck	BBHA 9120D	452	2024.08.29	2027.08.28
8	Horn Antenna 15-40GHz	SCHWARZBECK	BBHA9170	BBHA9170367	2024.08.28	2027.08.27
9	6dB Attenuator	JFW	50FPE-006	4360846-949-1	2024.09.24	2025.09.23
10	EMI Test Receiver	R&S	ESPI	100771	2024.09.25	2025.09.24
11	LISN	R&S	NNLK 8129	8130179	2024.09.24	2025.09.23
12	LISN	R&S	ESH3-Z5	892785/016	2024.09.23	2025.09.22
13	Pulse Limiter	R&S	ESH3-Z2	102789	2024.09.24	2025.09.23
14	RF Automatic Test system	TST	TSTPASS	21033016	2024.09.25	2025.09.24
15	Vector Signal Generator	Agilent	N5182A	MY50143009	2024.09.25	2025.09.24
16	Analog signal generator	Agilent	E8257	MY51554256	2024.09.25	2025.09.24
17	Spectrum Analyzer	Agilent	N9020A	MY51289843	2024.09.25	2025.09.24
18	Spectrum Analyzer	Agilent	N9020A	MY53421570	2024.09.25	2025.09.24
19	Power Sensor	Agilent	8481A	MY41097697	2024.09.25	2025.09.24
20	Wideband Radio communication tester	R&S	CMW500	1201.0002K50	2024.09.24	2025.09.23
21	DC power supply	ZHAOXIN	RXN-305D-2	28070002559	2024.09.24	2025.09.23
22	RE Software	EZ	EZ-EMC_RE	Ver.AIT-03A	N/A	N/A
23	CE Software	EZ	EZ-EMC_CE	Ver.AIT-03A	N/A	N/A
24	RF Software	TST	TSTPASS	Version 2.0	N/A	N/A
25	RF Software	cesheng	WCS-WCN	Version 2024.6.20	N/A	N/A
26	temporary antenna connector(Note)	NTS	R001	N/A	N/A	N/A

Note: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

3 TEST CONDITIONS AND RESULTS

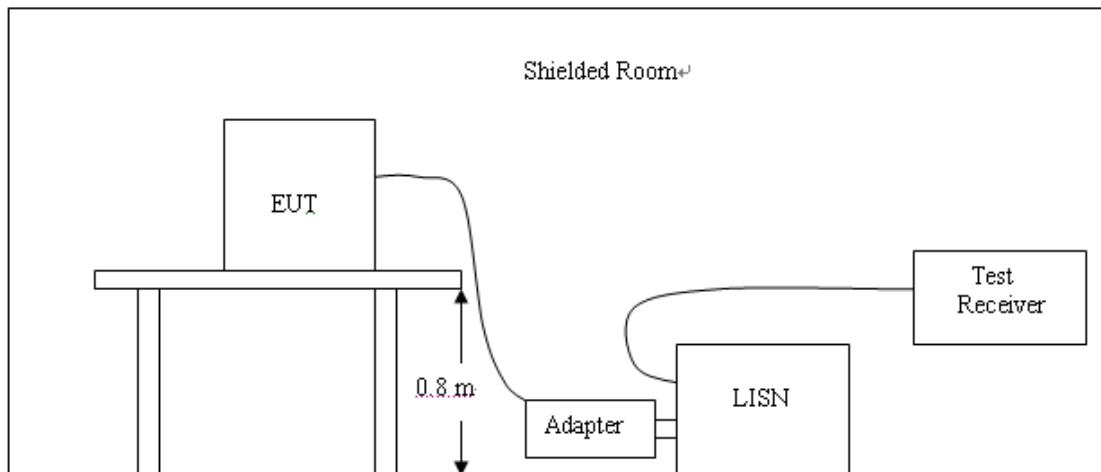
3.1 Conducted Emissions Test

LIMIT

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION

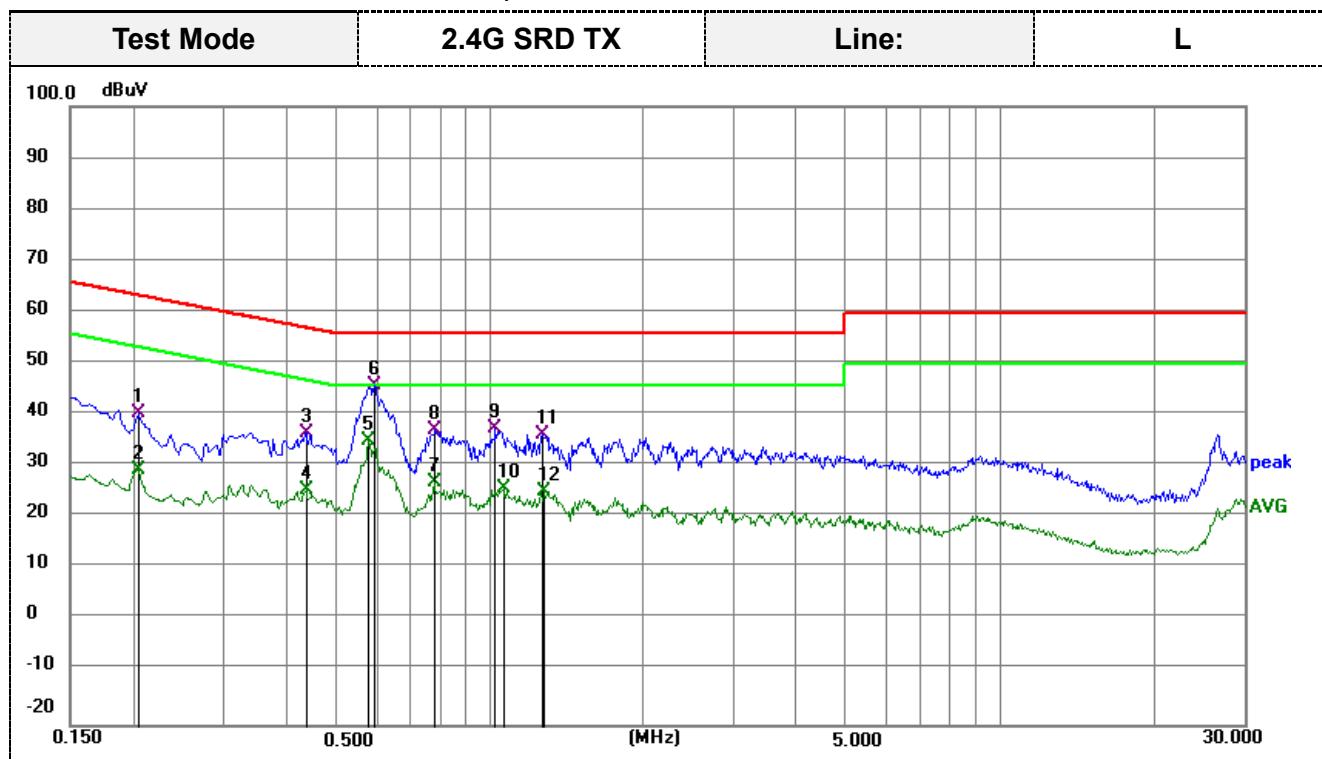


TEST PROCEDURE

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10:2013.
2. Support equipment, if needed, was placed as per ANSI C63.10:2013.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10:2013.
4. The adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.

TEST RESULTS

Remark: Both 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz power supply have been tested, only the worst result of 120 VAC, 60 Hz was reported as below:

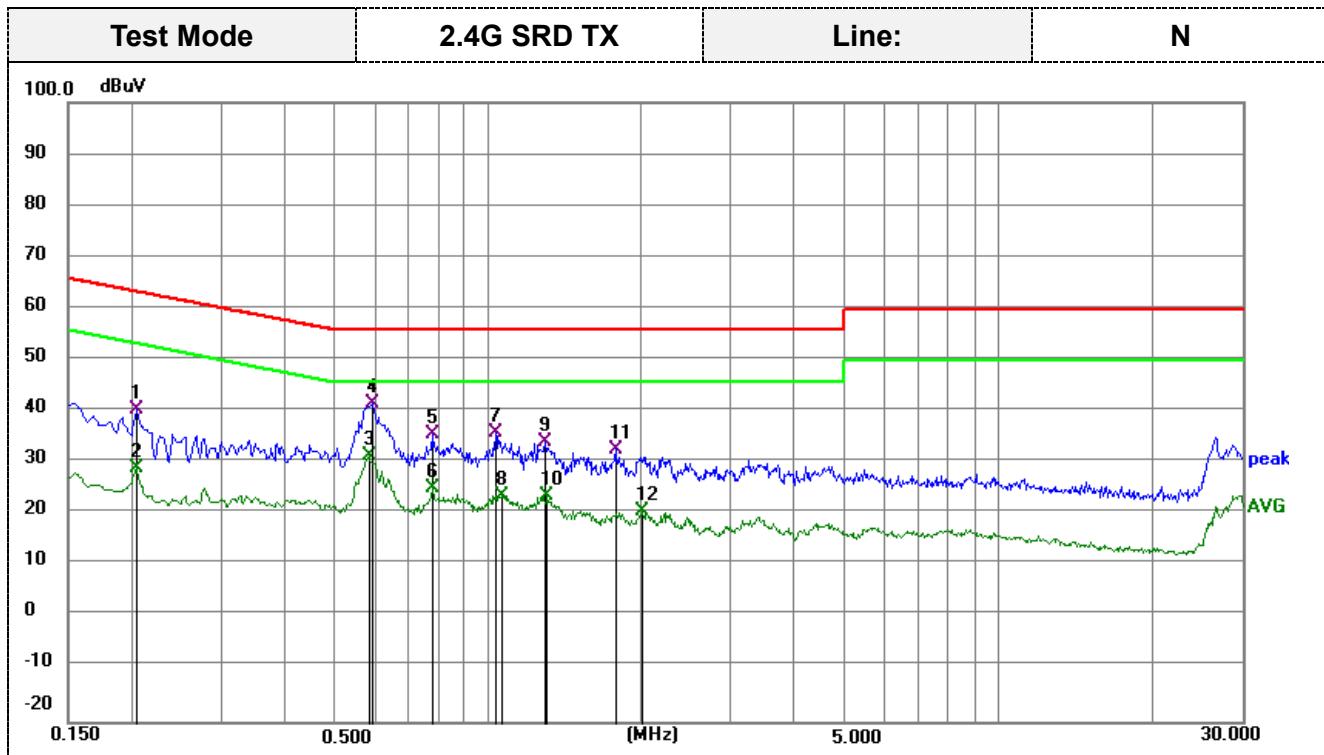


Remark: Correct Factor = Insertion loss of LISN + Cable loss + Insertion loss of Pulse Limiter;

Measurement Result = Reading Level +Correct Factor;

Margin = Measurement Result- Limit

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
							QP
1	0.2040	29.86	10.70	40.56	63.45	-22.89	QP
2	0.2040	19.01	10.70	29.71	53.45	-23.74	AVG
3	0.4335	26.18	10.69	36.87	57.19	-20.32	QP
4	0.4335	15.00	10.69	25.69	47.19	-21.50	AVG
5	0.5775	24.53	10.69	35.22	46.00	-10.78	AVG
6	0.5910	35.19	10.69	45.88	56.00	-10.12	QP
7	0.7755	16.67	10.67	27.34	46.00	-18.66	AVG
8	0.7799	26.55	10.67	37.22	56.00	-18.78	QP
9	1.0230	26.86	10.64	37.50	56.00	-18.50	QP
10	1.0635	15.34	10.66	26.00	46.00	-20.00	AVG
11	1.2660	25.64	10.68	36.32	56.00	-19.68	QP
12	1.2795	14.85	10.68	25.53	46.00	-20.47	AVG



Remark: Correct Factor = Insertion loss of LISN + Cable loss + Insertion loss of Pulse Limiter;

Measurement Result = Reading Level +Correct Factor;

Margin = Measurement Result- Limit

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
							QP AVG
1	0.2040	29.81	10.69	40.50	63.45	-22.95	QP
2	0.2040	18.70	10.69	29.39	53.45	-24.06	AVG
3	0.5820	21.11	10.68	31.79	46.00	-14.21	AVG
4	0.5910	31.25	10.68	41.93	56.00	-14.07	QP
5	0.7755	25.22	10.66	35.88	56.00	-20.12	QP
6	0.7799	14.75	10.66	25.41	46.00	-20.59	AVG
7	1.0365	25.54	10.64	36.18	56.00	-19.82	QP
8	1.0680	13.40	10.65	24.05	46.00	-21.95	AVG
9	1.2930	23.69	10.68	34.37	56.00	-21.63	QP
10	1.3065	13.10	10.68	23.78	46.00	-22.22	AVG
11	1.7790	22.26	10.74	33.00	56.00	-23.00	QP
12	2.0085	10.05	10.77	20.82	46.00	-25.18	AVG

3.2 Radiated Emissions and Band Edge

Limit

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission out of authorized band shall not exceed the following table at a 3 meters measurement distance.

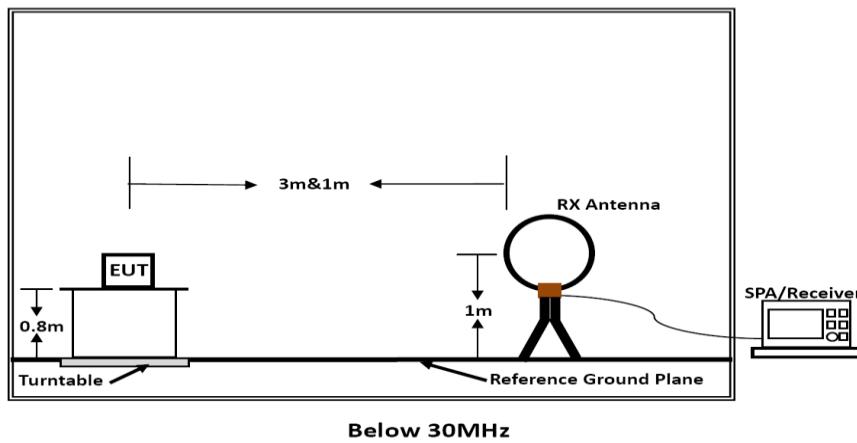
In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a)

Radiated emission limits

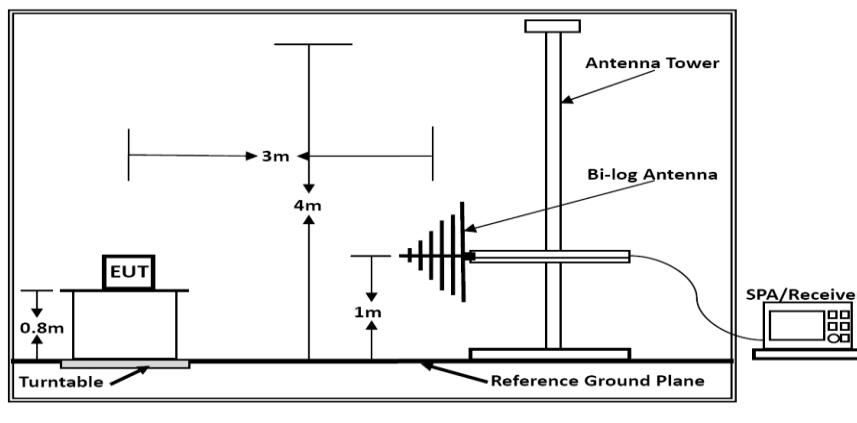
Frequency (MHz)	Distance (Meters)	Radiated (dB μ V/m)	Radiated (μ V/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(30/3)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST CONFIGURATION

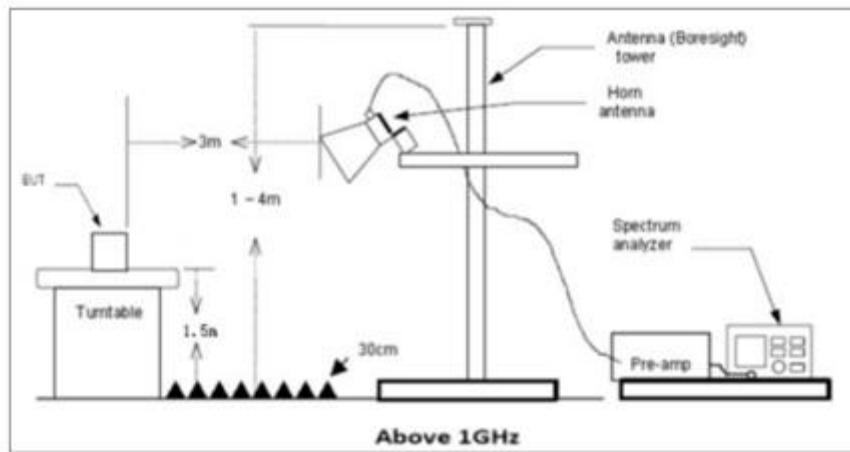
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



Test Procedure

1. Below 1GHz measurement the EUT is placed on a turntable which is 0.8m above ground plane, and above 1GHz measurement EUT was placed on a low permittivity and low loss tangent turn table which is 1.5m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0°C to 360°C to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. Radiated emission test frequency band from 9KHz to 25GHz.
6. The distance between test antenna and EUT as following table states:

Test Frequency range	Test Antenna Type	Test Distance
9KHz-30MHz	Active Loop Antenna	3
30MHz-1GHz	Bilog Antenna	3
1GHz-18GHz	Horn Antenna	3
18GHz-25GHz	Horn Antenna	1

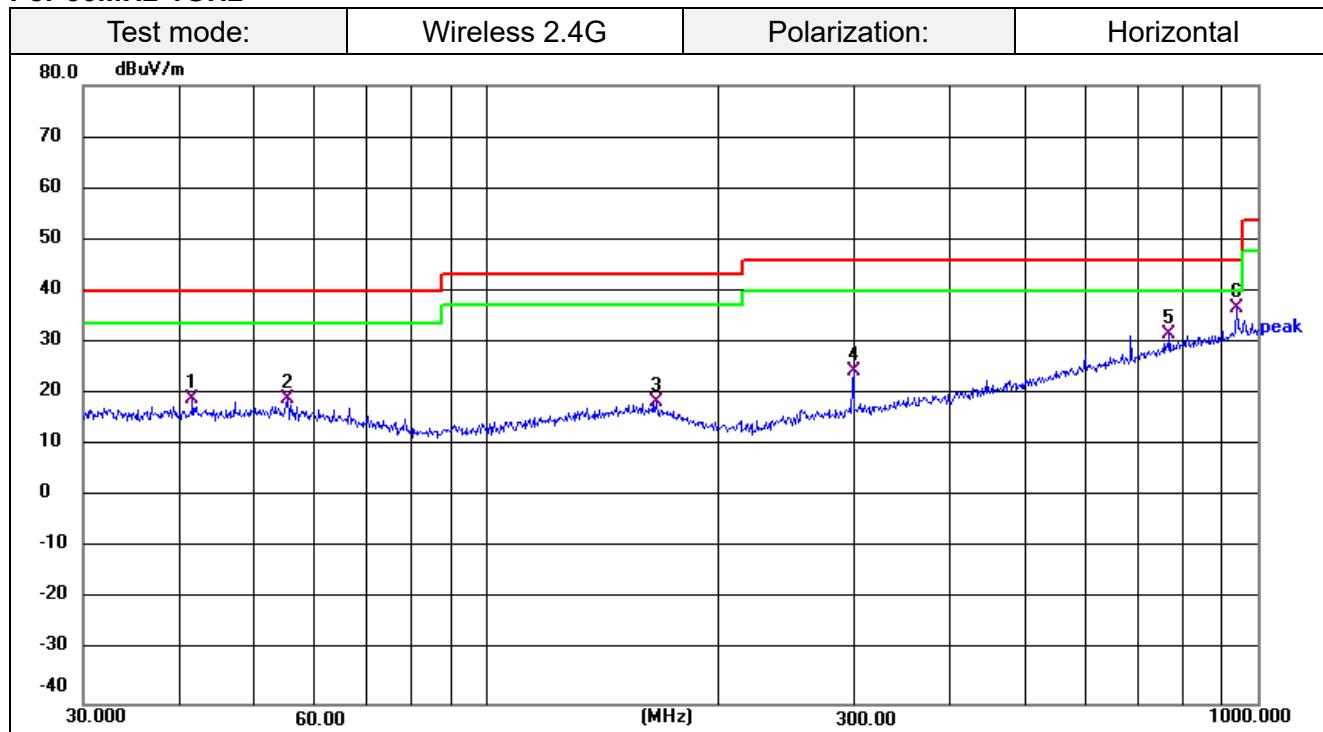
7. Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
9KHz-150KHz	RBW=200Hz/VBW=3KHz,Sweep time=Auto	QP
150KHz-30MHz	RBW=9KHz/VBW=100KHz,Sweep time=Auto	QP
30MHz-1GHz	RBW=120KHz/VBW=1000KHz,Sweep time=Auto	QP
1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto	Peak

TEST RESULTS

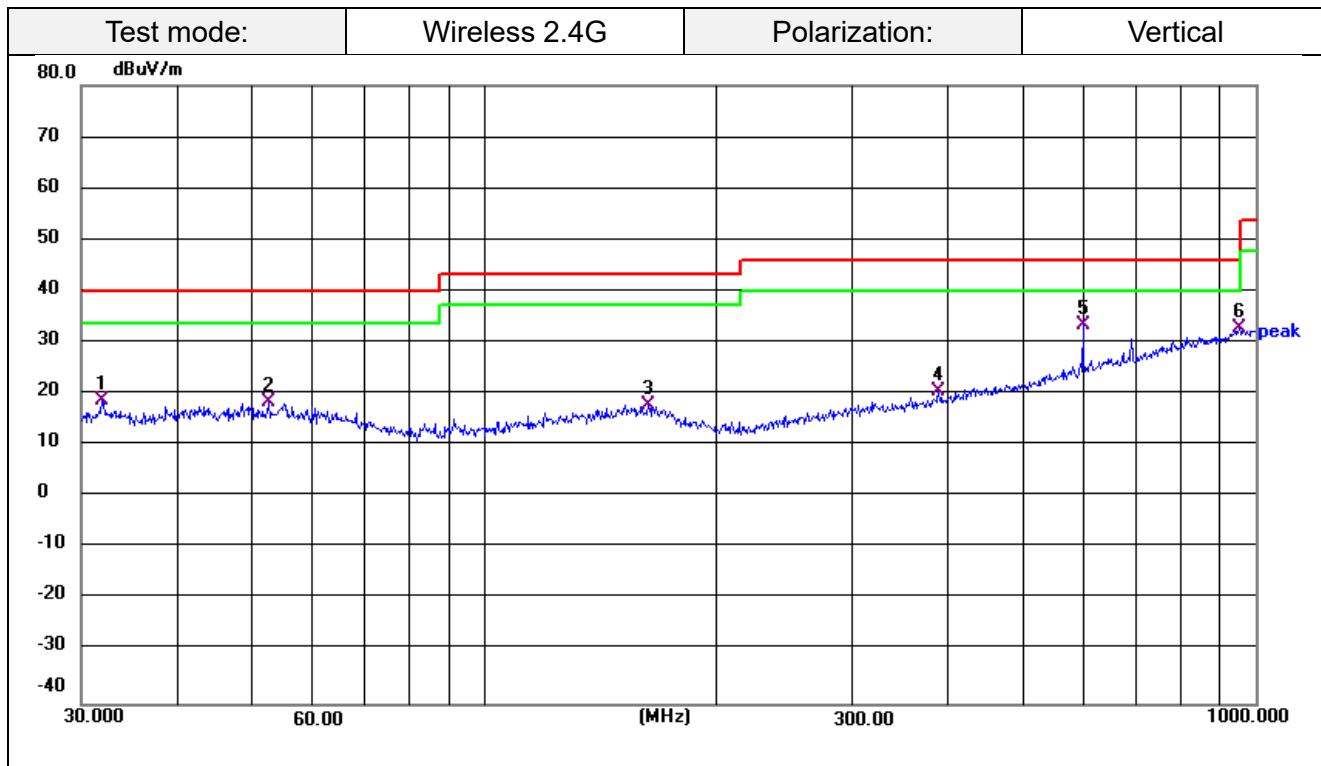
Remark:

1. For below 1GHz testing recorded worst at highest channel.
2. Radiated emission test from 9 KHz to 10th harmonic of fundamental was verified, and the emission levels from 9kHz to 30MHz are attenuated 20dB below the limit and not recorded in report.

For 30MHz-1GHz

Remark:

Emission Level = Reading + Factor;
Factor = Antenna Factor + Cable Loss – Pre-amplifier;
Margin= Emission Level - Limit.

No.	Frequency (MHz)	Reading (dB _u V)	Factor (dB/m)	Level (dB _u V/m)	Limit (dB _u V/m)	Margin (dB)	Det.
1	41.5670	35.66	-16.52	19.14	40.00	-20.86	QP
2	55.2207	36.29	-17.06	19.23	40.00	-20.77	QP
3	166.0680	35.51	-16.72	18.79	43.50	-24.71	QP
4	299.3158	41.74	-16.97	24.77	46.00	-21.23	QP
5	768.7481	38.41	-6.54	31.87	46.00	-14.13	QP
6	938.8326	40.75	-3.80	36.95	46.00	-9.05	QP


Remark:

Emission Level = Reading + Factor;

Factor = Antenna Factor + Cable Loss – Pre-amplifier;

Margin= Emission Level - Limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	31.9546	36.27	-17.43	18.84	40.00	-21.16	QP
2	52.5753	35.34	-16.83	18.51	40.00	-21.49	QP
3	163.1818	34.79	-16.63	18.16	43.50	-25.34	QP
4	387.9920	35.62	-14.83	20.79	46.00	-25.21	QP
5	597.2234	43.34	-9.80	33.54	46.00	-12.46	QP
6	952.0937	36.40	-3.51	32.89	46.00	-13.11	QP

Above 1GHz:

Frequency(MHz):		2410		Polarity:	Horizontal	
Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB/m)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
4820.00	62.00	-7.38	54.62	74	-19.38	PEAK
4820.00	54.40	-7.38	47.02	54	-6.98	AVG
7229.85	49.37	-1.4	47.97	74	-26.03	PEAK
--	--	--	--	--	--	AVG

Frequency(MHz):		2410		Polarity:	VERTICAL	
Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB/m)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
4820.00	62.37	-7.38	54.99	74	-19.01	PEAK
4820.00	56.23	-7.38	48.85	54	-5.15	AVG
7229.85	50.31	-1.4	48.91	74	-25.09	PEAK
--	--	--	--	--	--	AVG

Frequency(MHz):		2440		Polarity:	Horizontal	
Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB/m)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
4880.20	62.19	-6.75	55.44	74	-18.56	PEAK
4880.20	55.42	-6.75	48.67	54	-5.33	AVG
7319.25	48.19	-0.54	47.65	74	-26.35	PEAK
--	--	--	--	--	--	AVG

Frequency(MHz):		2440		Polarity:	VERTICAL	
Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB/m)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
4880.20	62.94	-6.75	56.19	74	-17.81	PEAK
4880.20	53.98	-6.75	47.23	54	-6.77	AVG
7319.25	48.30	-0.54	47.76	74	-26.24	PEAK
--	--	--	--	--	--	AVG

Frequency(MHz):		2470		Polarity:	Horizontal	
Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB/m)	Emission Level (dB μ V/m)	Limits	Margin (dB)	Detector Type
4940.00	47.02	-6.03	55.29	74	-18.71	PEAK
4940.00	52.64	-6.03	46.61	54	-7.39	AVG
7409.35	46.47	0.02	47.90	74	-26.10	PEAK
--	--	--	--	--	--	AVG

Frequency(MHz):		2470		Polarity:	VERTICAL	
Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB/m)	Emission Level (dB μ V/m)	Limits	Margin (dB)	Detector Type
4940.00	45.63	-6.03	55.85	74	-18.15	PEAK
4940.00	54.06	-6.03	48.03	54	-5.97	AVG
7409.35	45.02	0.02	48.91	74	-25.09	PEAK
--	--	--	--	--	--	AVG

REMARKS:

1. Emission level (dB μ V/m) = Reading (dB μ V)+ Factor (dB/m)
2. Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Emission level- Limit value.
4. -- Mean the PK detector measured value is below average limit.
5. Other emission levels are attenuated 20dB below the limit and not recorded in report.
6. RBW1MHz VBW3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.

Radiation Restricted band

Frequency(MHz):		2410		Polarity:	Horizontal	
Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB/m)	Emission Level (dB μ V/m)	Limits	Margin	Detector Type
2388.05	58.55	-4.07	54.48	74	-19.52	PEAK
2388.05	53.82	-4.07	49.75	54	-4.25	AVG
2390.00	40.62	-4.10	57.28	74	-16.72	PEAK
2390.00	51.66	-4.10	47.56	54	-6.44	AVG

Frequency(MHz):		2410		Polarity:	Vertical	
Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB/m)	Emission Level (dB μ V/m)	Limits	Margin	Detector Type
2389.20	58.99	-4.09	54.90	74	-19.10	PEAK
2389.20	50.98	-4.09	46.89	54	-7.11	AVG
2390.00	62.44	-4.10	58.34	74	-15.66	PEAK
2390.00	54.55	-4.10	50.45	54	-3.55	AVG

Frequency(MHz):		2470		Polarity:	Horizontal	
Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB/m)	Emission Level (dB μ V/m)	Limits	Margin	Detector Type
2483.50	53.15	-3.09	50.06	74	-23.94	PEAK
--	--	--	--	--	--	AVG
2485.37	50.21	-3.07	47.14	74	-26.86	PEAK
--	--	--	--	--	--	AVG

Frequency(MHz):		2470		Polarity:	Vertical	
Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB/m)	Emission Level (dB μ V/m)	Limits	Margin	Detector Type
2483.50	57.85	-3.09	54.76	74	-19.24	PEAK
2483.50	50.78	-3.09	47.69	54	-6.31	AVG
2487.20	52.49	-3.04	49.45	74	-24.55	PEAK
--	--	--	--	--	--	AVG

REMARKS:

1. Emission level (dB μ V/m) = Reading (dB μ V) + Factor (dB/m)
2. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor
3. Margin value = Emission level - Limit value.
4. -- Mean the PK detector measured value is below average limit.
5. Other emission levels are attenuated 20dB below the limit and not recorded in report.
6. RBW1MHz VBW3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.

3.3 Maximum Peak Conducted Output Power

Limit

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels: 1 watt.

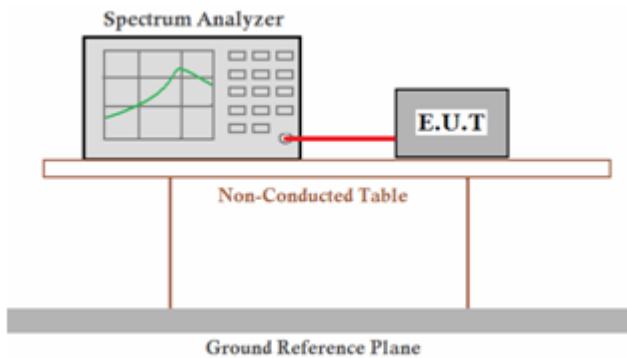
For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

Test Procedure

The transmitter output (antenna port) was connected to the spectrum analyzer. According to ANSI C63.10:2013 Output power test procedure for frequency-hopping spread-spectrum (FHSS) devices; this is an RF-conducted test to evaluate maximum peak output power. Use a direct connection between the antenna port of the unlicensed wireless device and the spectrum analyzer, through suitable attenuation. The hopping shall be disabled for this test:

- a) Use the following spectrum analyzer settings:
 - 1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
 - 2) RBW > 20 dB bandwidth of the emission being measured.
 - 3) VBW \geq RBW.
 - 4) Sweep: Auto.
 - 5) Detector function: Peak.
 - 6) Trace: Max hold.
- b) Allow trace to stabilize.
- c) Use the marker-to-peak function to set the marker to the peak of the emission.
- d) The indicated level is the peak output power, after any corrections for external attenuators and cables.

Test Configuration



Test Results

Pass Not Applicable

Note:

For test data, please refer to Appendix RF test data for 2_4G_Proprietary.

3.4 20dB Bandwidth

Limit

For frequency hopping systems operating in the 2400MHz-2483.5MHz no limit for 20dB bandwidth.

Test Procedure

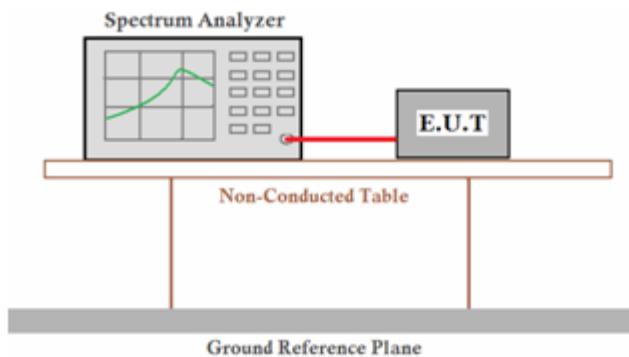
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Spectrum Analyzer. Place the EUT on the table and set it in transmitting mode.

Use the following spectrum analyzer settings:

- 1) Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel.
- 2) RBW \geq 1% of the 20 dB bandwidth, VBW \geq RBW.
- 3) Detector function = peak.
- 4) Trace = max hold.

The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

Test Configuration



Test Results

Pass **Not Applicable**

Note:

For test data, please refer to Appendix RF test data for 2_4G_Proprietary.

3.5 Frequency Separation

LIMIT

According to 15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25KHz or the $2/3*20$ dB bandwidth of the hopping channel, whichever is greater.

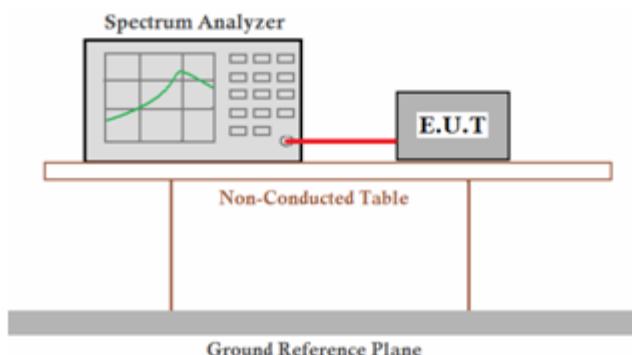
Test Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Spectrum Analyzer. Place the EUT on the table and set it in transmitting mode.

Use the following spectrum analyzer settings:

- 1) Set center frequency of Spectrum Analyzer = middle of hopping channel.
- 2) Set the Spectrum Analyzer as RBW = 100 kHz, VBW =300 kHz, Span = wide enough to capture the peaks of two adjacent channels, Sweep = auto.
- 3) Max hold, mark 2 peaks of hopping channel and record the 2 peaks frequency.

TEST CONFIGURATION



TEST RESULTS

Pass **Not Applicable**

Note:

For test data, please refer to Appendix RF test data for 2_4G_Proprietary.

3.6 Number of hopping frequency

Limit

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels.

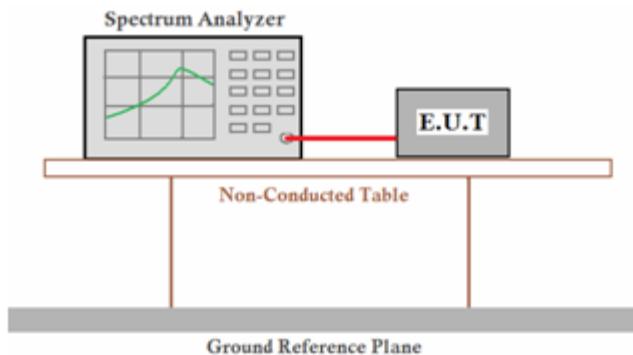
Test Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Spectrum Analyzer. Place the EUT on the table and set it in transmitting mode.

Use the following spectrum analyzer settings:

- 1) Set Spectrum Analyzer Start=2400MHz, Stop = 2483.5MHz, Sweep = auto.
- 2) Set the Spectrum Analyzer as RBW/VBW=100KHz/300KHz.
- 3) Max hold, view and count how many channel in the band.

Test Configuration



Test Results

Pass Not Applicable

Note:

For test data, please refer to Appendix RF test data for 2_4G_Proprietary.

3.7 Time of Occupancy (Dwell Time)

Limit

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

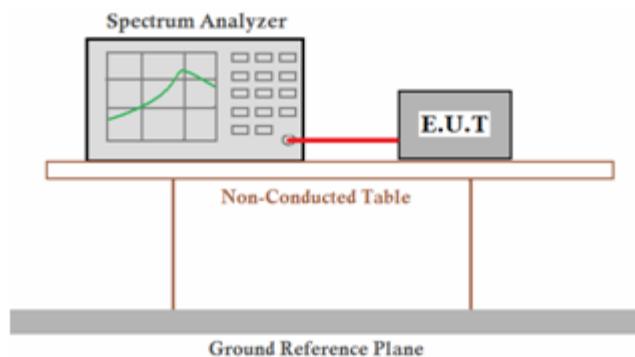
Test Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Spectrum Analyzer. Place the EUT on the table and set it in transmitting mode.

Use the following spectrum analyzer settings:

- 1) Set center frequency of Spectrum Analyzer = operating frequency.
- 2) Set the Spectrum Analyzer as RBW=1MHz, VBW=3MHz, Span = 0Hz, Sweep = auto.
- 3) Repeat above procedures until all frequency measured was complete.

Test Configuration



Test Results

Pass Not Applicable

Note:

For test data, please refer to Appendix RF test data for 2_4G_Proprietary.

3.8 Out-of-band Emissions

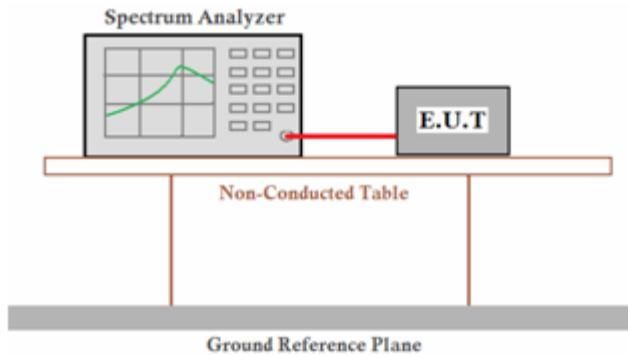
Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

Test Procedure

Connect the transmitter output to spectrum analyzer using a low loss RF cable, and set the spectrum analyzer to RBW=100 kHz, VBW= 300 kHz, peak detector, and max hold. Measurements utilizing these setting are made of the in-band reference level, bandedge and out-of-band emissions.

Test Configuration



Test Results

Pass Not Applicable

Note:

For test data, please refer to Appendix RF test data for 2_4G_Proprietary.

3.9 Pseudorandom Frequency Hopping Sequence

TEST APPLICABLE

For 47 CFR Part 15C section 15.247 (a) (1) & RSS 247 requirement:

The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Test result

The device hops on 61 channel frequencies that are selected in a pseudo random order.

An example of the order is:

{1. 2. 3. 4.....58. 59. 60. 61}

The dwell time of each hopping channel is 153ms. Each channel is used equally on average.

3.10 Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR Section 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited

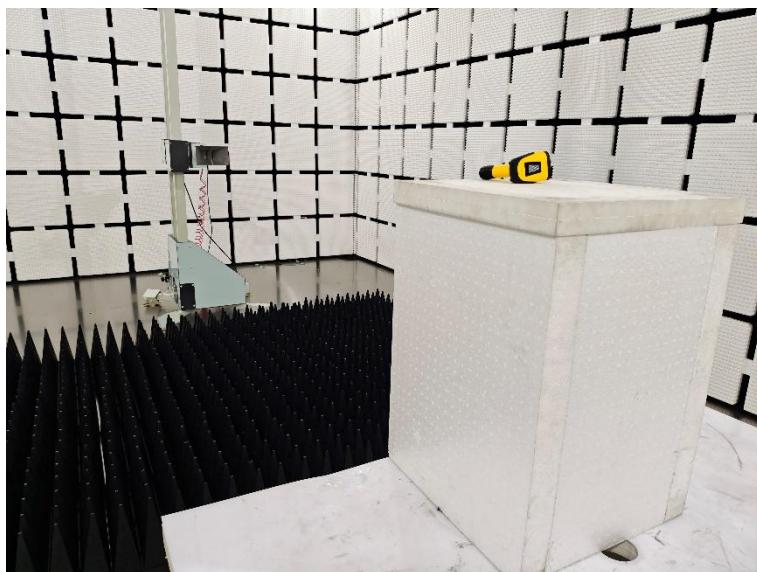
FCC CFR Title 47 Part 15 Subpart C Section 15.247(b) (4):

(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Result

The maximum gain of antenna was 0.54 dBi with impedance 50Ω .

4 Test Setup Photographs of EUT



5 Photos of EUT

Please refer to test Report No.:AiTSZ-250728012FW1.

***** **End of Report** *****