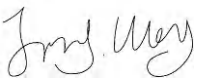
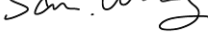
Shenzhen GUOREN Certification Technology Service Co., Ltd.

101#, Building K & Building T, The Second Industrial Zone, Jiazitang Community, Fenghuang Street, Guangming District, Shenzhen, China

FCC PART 15 SUBPART C TEST REPORT

FCC PART 15 SUBPART E 15.407

Report Reference No..... :	**GRCTR240102003-01**	
FCC ID..... :	**AZP-FMR-05VTX**	
Compiled by (position+printed name+signature).. :	Testing Engineer Jimmy Wang	
Supervised by (position+printed name+signature).. :	Project Engineer Kelley Zhang	
Approved by (position+printed name+signature).. :	Manager Sam Wang	
Date of issue.....:	Apr. 19, 2024	
Testing Laboratory Name.....:	**Shenzhen GUOREN Certification Technology Service Co., Ltd.**	
Address..... :	101#, Building K & Building T, The Second Industrial Zone, Jiazitang Community, Fenghuang Street, Guangming District, Shenzhen, China	
Applicant's name.....:	**Futaba Corporation**	
Address..... :	1080 Yabutsuka, Chosei-mura, Chosei-gun, Chiba-ken, 299-4395, Japan	
Test specification..... **:**		
Standard.....:	**FCC Part 15 Subpart E 15.407**	

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Test item description.....:	**Wireless video transceiver**
Trade Mark.....:	Futaba
Manufacturer.....:	Divimath, Inc.
Model/Type reference..... :	FMR-05 VIDEO TX MODULE US
Listed Models ..... :	/
Firmware Version.....:	07.046.035
Hardware Version..... :	V2.3
Modulation ..... :	OFDM
Frequency.....	5740MHz-5830MHz
Ratings.....:	12.0V⎓2.0A(Powered by Adapter)
Result.....:	**PASS**

T E S T R E P O R T

Equipment under Test	:	Wireless video transceiver
Model /Type	:	FMR-05 VIDEO TX MODULE US
Listed Models	:	/
Applicant	:	**Futaba Corporation**
Address	:	1080 Yabutsuka, Chosei-mura, Chosei-gun, Chiba-ken, 299-4395, Japan
Manufacturer	:	**Divimath, Inc.**
Address	:	1879 Lundy Ave, #286, San Jose, CA95131,USA

Test Result:	**PASS**

The 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.

Contents

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15.407: UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE DEVICES.
ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices
KDB 789033 D02: GUIDELINES FOR COMPLIANCE TESTING OF UNLICENSED NATIONAL INFORAMTION INFRASTRUCTURE (U-NII) DEVICES PART 15, SUBPART E

2 SUMMARY

2.1 General Remarks

Date of receipt of test sample	:	Jan. 08, 2024
Testing commenced on	:	Jan. 08, 2024
Testing concluded on	:	Apr. 19, 2024

2.2 Product Description

Product Name:	Wireless video transceiver
Model/Type reference:	FMR-05 VIDEO TX MODULE US
Listed Models:	/
Power supply:	12.0V⎓2.0A(Powered by Adapter)
Adapter information (Auxiliary test supplied by test Lab):	Model:CD139 Input:AC100-240V 50/60Hz, 0.6A Output:DC 12V,2A
Sample ID:	GRCTR240102003-1# (Engineer sample), GRCTR240102003-2# (Normal sample)
5G	
Operation frequency:	5740MHz-5830MHz
Modulation:	OFDM
Antenna type:	Internal antenna
Antenna gain:	5.90 dBi
Remark:*When the information provided by the customer was used to calculate test results, if the information provided by the customer is not accurate, shenzhen GUOREN Certification Technology Service Co., Ltd. does not assume any responsibility.	

2.3 Equipment Under Test

Power supply system utilised

Power supply voltage	:	○	230V / 50 Hz	○	120V / 60Hz
		○	12 V DC	○	24 V DC
		●	Other (specified in blank below)		

DC 12V From external circuit

2.4 Short description of the Equipment under Test (EUT)

This is a Wireless video transceiver.

For more details, refer to the user's manual of the EUT.

2.5 EUT operation mode

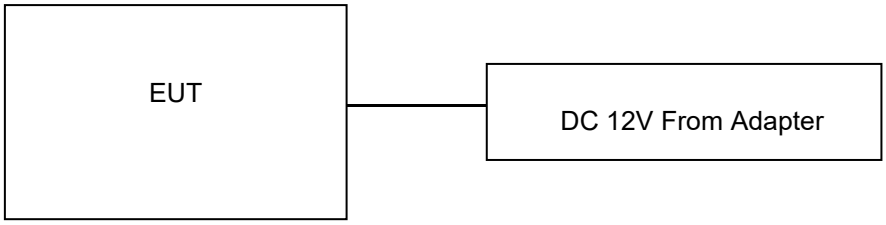
The Applicant provides communication tools software(SecureCRT) to control the EUT for staying in continuous transmitting (Duty Cycle more than 98%) for testing meet KDB558074 test requirement.

Operation Frequency Band:

10MHz	20MHz
Frequency (MHz)	Frequency (MHz)
5740	5750
5750	5770
5760	5790
5770	5810
5780	5830
5790	
5800	
5810	
5820	
5830	

Note: The line display in gray is those Channels/Frequencies select to test in this report for each operation mode.

2.6 Block Diagram of Test Setup



2.7 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended to comply with Section 15.407 of the FCC Part 15, Subpart E Rules.

2.8 Modifications

No modifications were implemented to meet testing criteria.

3 TEST ENVIRONMENT

3.1 Address of the test laboratory

Shenzhen GUOREN Certification Technology Service Co., Ltd.
101#, Building K & Building T, The Second Industrial Zone, Jiazitang Community, Fenghuang Street, Guangming District, Shenzhen, China

3.2 Test Facility

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

FCC-Registration No.: 920798 Designation Number: CN1304

Shenzhen GUOREN Certification Technology Service Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

A2LA-Lab Cert. No.: 6202.01

Shenzhen GUOREN Certification Technology Service Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

ISED#: 27264 CAB identifier: CN0115
Shenzhen GUOREN Certification Technology Service Co., Ltd. has been listed by Innovation, Science and Economic Development Canada to perform electromagnetic emission measurement.

CNAS-Lab Code: L15631
Shenzhen GUOREN Certification Technology Service Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories for the Competence of Testing and Calibration Laboratories.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2010.

3.3 Environmental conditions

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

Normal Temperature	15-35 ℃
Relative Humidity	30-60 %
Air Pressure	950-1050mbar

3.4 Test Description

FCC Requirement		
FCC Part 15.207	AC Power Conducted Emission	PASS
FCC Part 15.407(a)	Emission Bandwidth(26dBm Bandwidth)	N/A_{Note1}
FCC Part 15.407(e)	Minimum Emission Bandwidth(6dBm Bandwidth)	$PASS_{Note2}$
FCC Part 15.407(a)	Maximum Conducted Output Power	PASS
FCC Part 15.407(a)	Peak Power Spectral Density	PASS
FCC Part 15.407(g)	Frequency Stability	PASS

FCC Part 15.407(b)	Undesirable emission	PASS
FCC Part 15.407(b)/15.205/15.209	Radiated Emissions	PASS
FCC Part 15.407(h)	Dynamic Frequency Selection	N/A Note 3
FCC Part 15.203/15.247(b)	Antenna Requirement	PASS

Note 1: Apply to U-NII 1, U-NII 2A, and U-NII 2C band.
Note 2: Apply to U-NII 3 band only.
Note 3: This device not work in DFS band.
Note 4: N/A means “not applicable”.

3.5 Statement of the 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 acc. to TR-100028-01” Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1” and TR-100028-02 “Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 “ and is documented in the Shenzhen GUOREN Certification Technology Service Co., Ltd.quality system acc. 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 Shenzhen GUOREN Certification Technology Service Co., Ltd.:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.06 dB	(1)
Radiated Emission	1~18GHz	5.14 dB	(1)
Radiated Emission	18-40GHz	5.38 dB	(1)
Conducted Disturbance	0.15~30MHz	2.14 dB	(1)
Max output power	30MHz~18GHz	0.54 dB	(1)
Power spectral density	/	0.56 dB	(1)
Spectrum bandwidth	/	1.2%	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

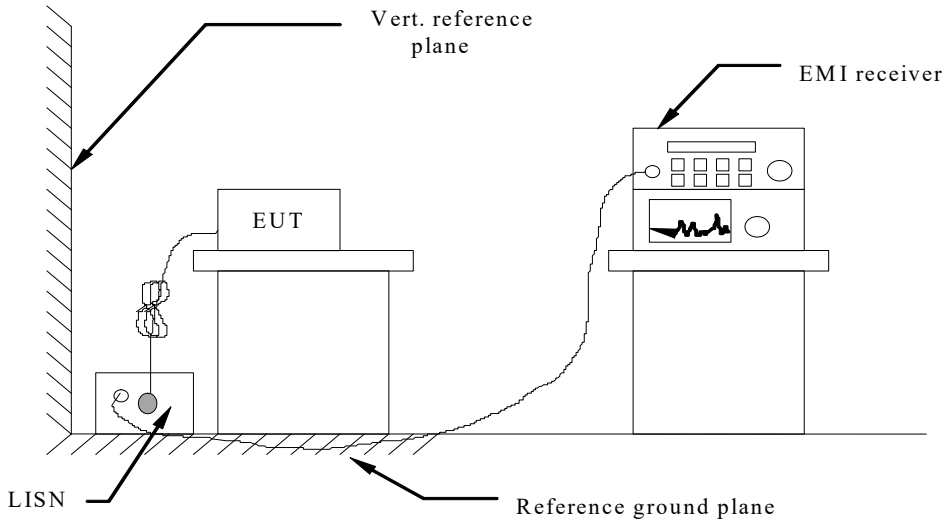
3.6 Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Equipment No.	Calibration Date	Calibration Due Date
LISN	R&S	ENV216	GRCTEE009	2023/09/27	2024/09/26
LISN	R&S	ENV216	GRCTEE010	2023/09/27	2024/09/26
EMI Test Receiver	R&S	ESPI	GRCTEE017	2023/09/28	2024/09/27
EMI Test Receiver	R&S	ESCI	GRCTEE008	2023/09/27	2024/09/26
Spectrum Analyzer	Agilent	N9020A	GRCTEE002	2023/09/27	2024/09/26
Spectrum Analyzer	R&S	FSP	GRCTEE003	2023/09/28	2024/09/27
Antenna tower/turntable controller	Top Precision Technology	TP-C2	GRCTEE023	N/A	N/A
Vector Signal generator	Agilent	N5181A	GRCTEE007	2023/09/27	2024/09/26
Analog Signal Generator	R&S	SML03	GRCTEE006	2023/09/27	2024/09/26
Climate Chamber	QIYA	LCD-9530	GRCTES016	2023/09/27	2024/09/26
Ultra-Broadband Antenna	Schwarzbeck	VULB9163	GRCTEE018	2023/09/28	2026/09/27
Horn Antenna	Schwarzbeck	BBHA 9120D	GRCTEE019	2023/09/28	2026/09/27
Loop Antenna	Zhinan	ZN30900C	GRCTEE020	2023/10/15	2026/10/14
Horn Antenna	Beijing Hangwei Dayang	OBH100400	GRCTEE049	2023/09/28	2026/09/27
Amplifier	Schwarzbeck	BBV 9745	GRCTEE021	2023/09/27	2024/09/26
Amplifier	Taiwan chengyi	EMC051845B	GRCTEE022	2023/09/28	2024/09/27
Temperature/Humidity Meter	Huaguan	HG-308	GRCTES037	2023/09/27	2024/09/26
Directional coupler	NARDA	4226-10	GRCTEE004	2023/09/27	2024/09/26
High-Pass Filter	XingBo	XBLBQ-GTA18	GRCTEE053	2023/09/27	2024/09/26
High-Pass Filter	XingBo	XBLBQ-GTA27	GRCTEE054	2023/09/27	2024/09/26
Automated filter bank	Tonscend	JS0806-F	GRCTEE055	2023/09/27	2024/09/26
Power Sensor	Agilent	U2021XA	GRCTEE070	2023/09/27	2024/09/26
EMI Test Software	ROHDE & SCHWARZ	ESK1-V1.71	GRCTEE060	N/A	N/A
EMI Test Software	Fera	EZ-EMC	GRCTEE061	N/A	N/A

4 TEST CONDITIONS AND RESULTS

4.1 AC Power Conducted Emission

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 EUT received power from adapter, the adapter received AC120V/60Hz and AC 240V/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.

AC Power Conducted Emission Limit

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following：

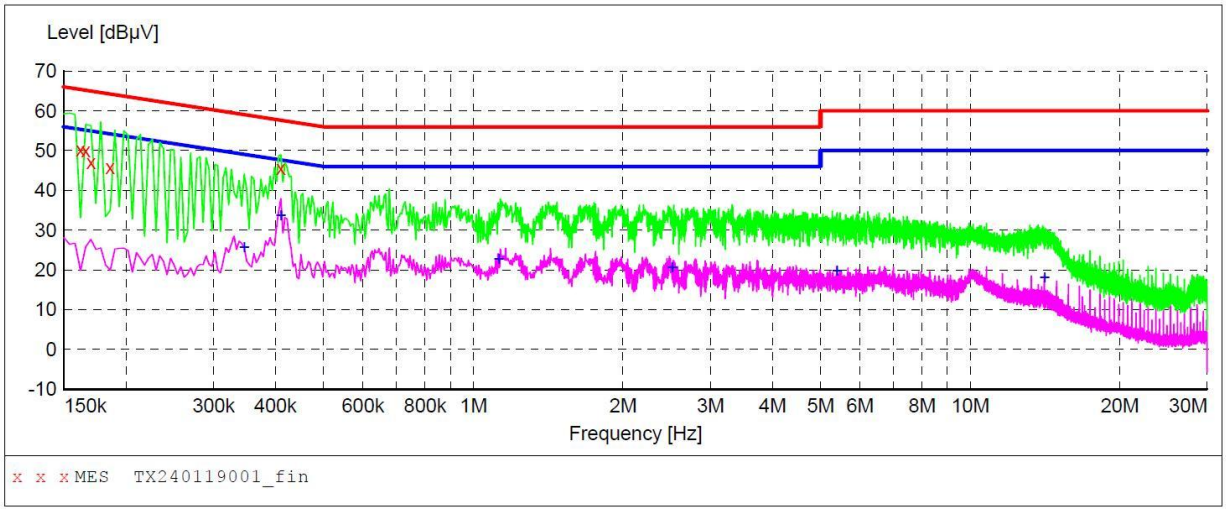
Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

TEST RESULTS

Remark:
1. 10MHz and 20MHz were tested at Low, Middle, and High channel, only the worst result of 10MHz 5780MHz was reported as below:

2. 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:

Power supply:	DC 12V from Adapter AC 120V/60Hz	Polarization	L



MEASUREMENT RESULT: "TX240119001_fin"

1/19/2024 4:04PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.162000	50.30	9.5	65	15.1	QP	L1	GND
0.166000	50.00	9.5	65	15.2	QP	L1	GND
0.170000	47.00	9.5	65	18.0	QP	L1	GND
0.186000	45.70	9.5	64	18.5	QP	L1	GND
0.410000	45.60	9.8	58	12.0	QP	L1	GND

MEASUREMENT RESULT: "TX240119001_fin2"

1/19/2024 4:04PM

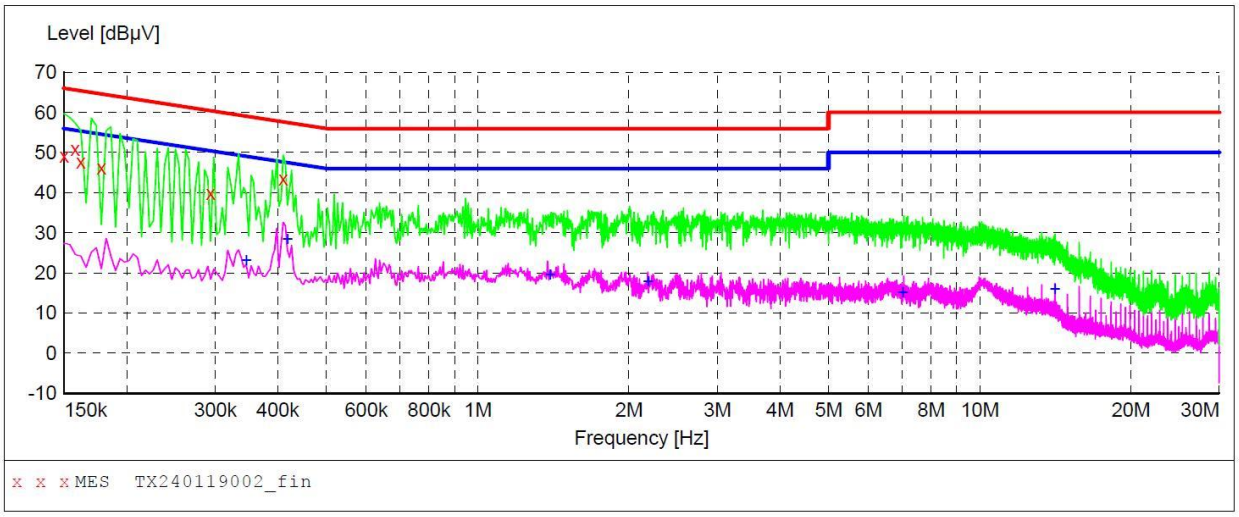
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.346000	25.80	9.5	49	23.3	AV	L1	GND
0.410000	33.80	9.8	48	13.8	AV	L1	GND
1.126000	22.80	10.0	46	23.2	AV	L1	GND
2.514000	20.60	10.0	46	25.4	AV	L1	GND
5.398000	19.90	10.0	50	30.1	AV	L1	GND
14.118000	18.20	10.0	50	31.8	AV	L1	GND

Note:1).Level (dBµV)= Reading (dBµV)+ Transducer (dB)

2). Transducer (dB)=insertion loss of LISN (dB) + Cable loss (dB)

3). Margin(dB) = Limit (dBµV) - Level (dBµV)

Power supply:	DC 12V from Adapter AC 120V/60Hz	Polarization	N



MEASUREMENT RESULT: "TX240119002_fin"

1/19/2024 4:09PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	49.10	9.6	66	16.9	QP	N	GND
0.158000	50.80	9.5	66	14.8	QP	N	GND
0.162000	47.70	9.5	65	17.7	QP	N	GND
0.178000	46.20	9.5	65	18.4	QP	N	GND
0.294000	39.90	9.5	60	20.5	QP	N	GND
0.410000	43.40	9.8	58	14.2	QP	N	GND

MEASUREMENT RESULT: "TX240119002_fin2"

1/19/2024 4:09PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.346000	23.20	9.5	49	25.9	AV	N	GND
0.418000	28.50	9.8	48	19.0	AV	N	GND
1.394000	19.60	10.0	46	26.4	AV	N	GND
2.186000	18.00	10.0	46	28.0	AV	N	GND
7.026000	15.20	10.0	50	34.8	AV	N	GND
14.126000	16.00	10.0	50	34.0	AV	N	GND

Note:1).Level (dBµV)= Reading (dBµV)+ Transducer (dB)

2). Transducer (dB)=insertion loss of LISN (dB) + Cable loss (dB)

3). Margin(dB) = Limit (dBµV) - Level (dBµV)

4.2 Radiated Emissions

Limit

The maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(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.
(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
(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 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Undesirable emission limits

Requirement	Limit(EIRP)	Limit (Field strength at 3m) Note1
15.407(b)(1)	PK:-27(dBm/MHz)	PK:68.2(dBμV/m)
15.407(b)(2)		
15.407(b)(3)		
15.407(b)(4)		

Note1: The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3}$$ μV/m, where P is the eirp (Watts)

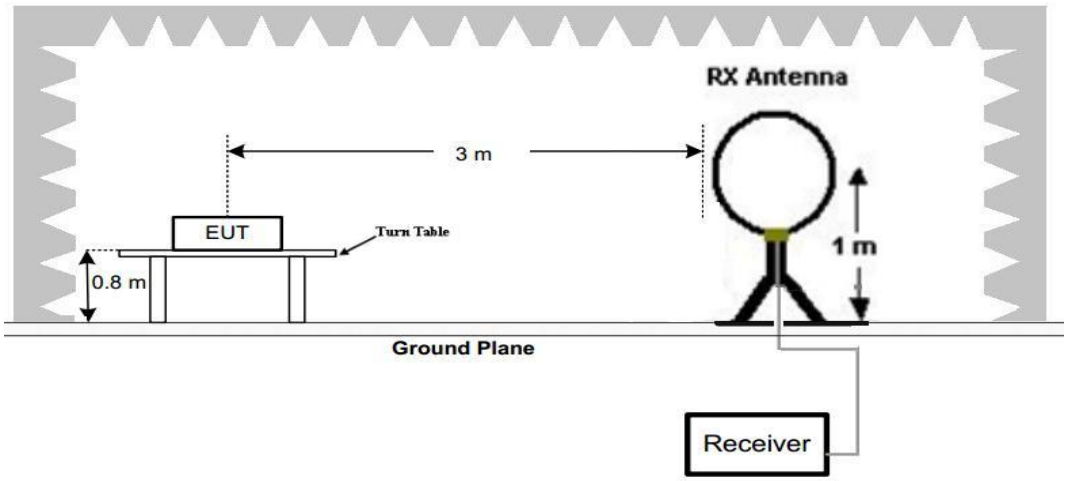
(5) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209
(6)In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a)

Radiated emission limits

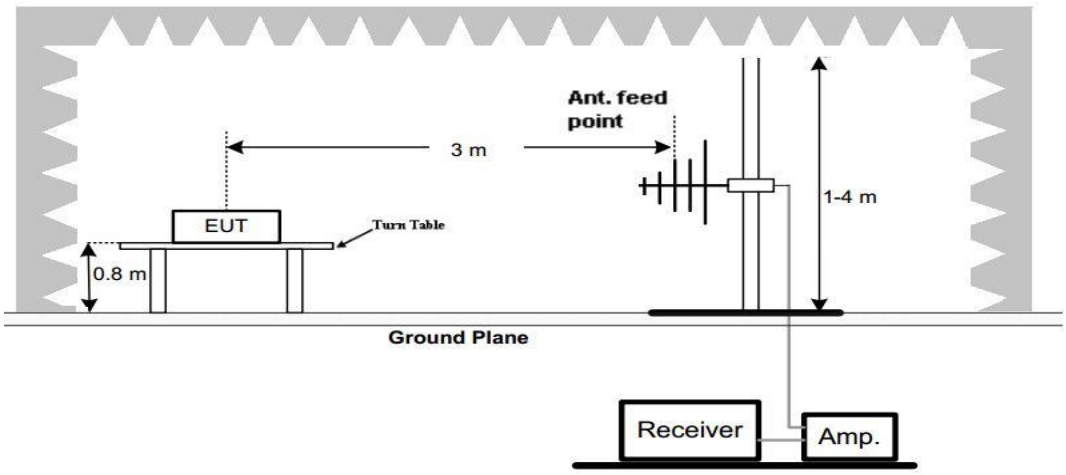
Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(30/3)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST CONFIGURATION

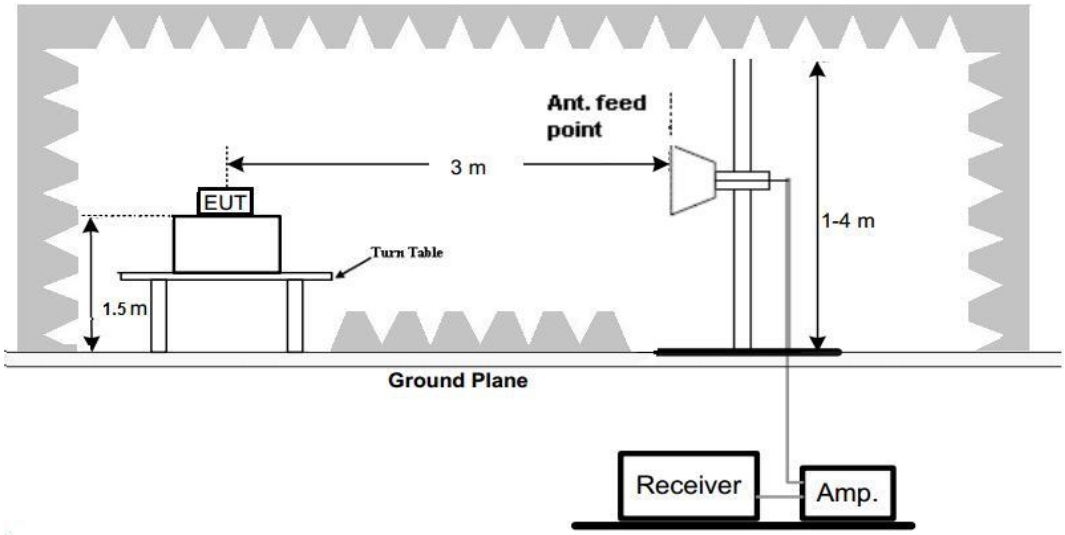
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(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° to 360° 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 40GHz.
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 Anternna	1

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

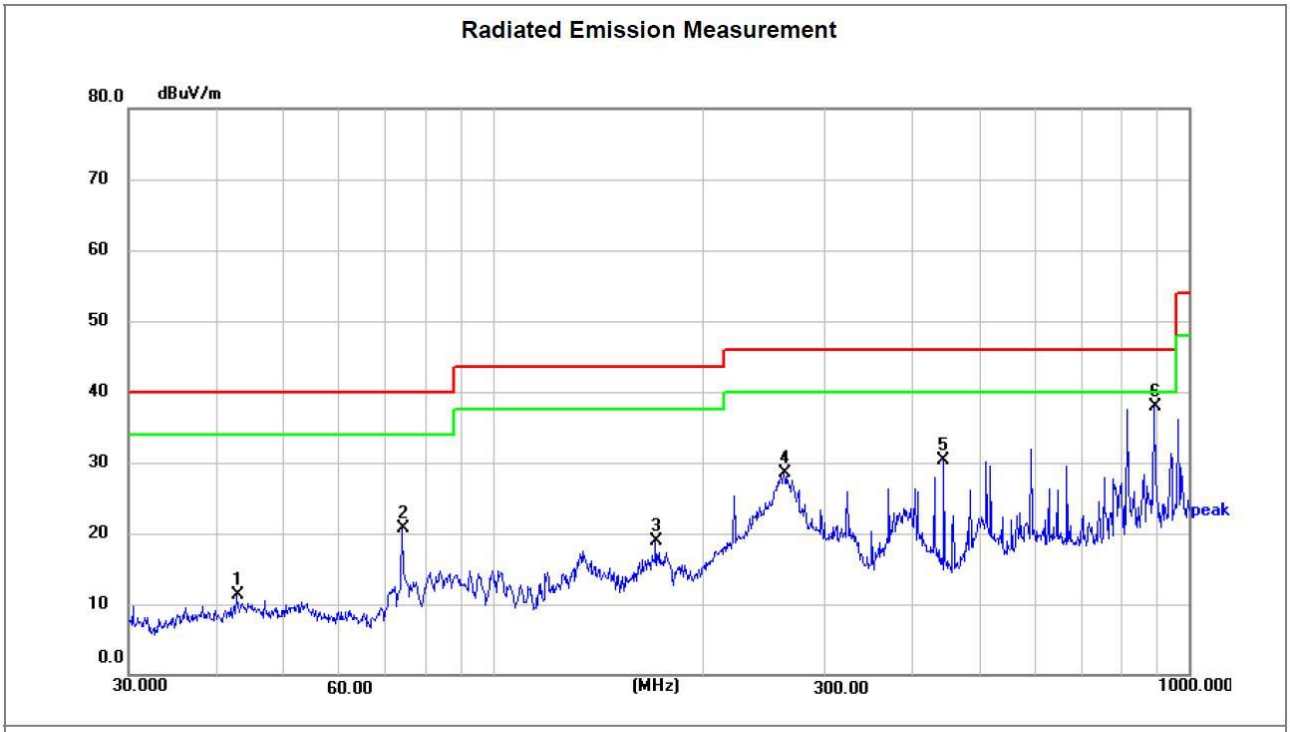
Test Frequency range	Test Receiver/Spectrum Setting	Detector
9KHz-150KHz	RBW=200Hz/VBW=3KHz,Sweep time=Auto	QP
150KHz-30MHz	RBW=9KHz/VBW=100KHz,Sweep time=Auto	QP
30MHz-1GHz	RBW=120KHz/VBW=1000KHz,Sweep time=Auto	QP
1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz,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

TEST RESULTS

Remark:
1. This test was performed with EUT in X, Y, Z position and the worse case was found when EUT in X position.
2. 10MHz and 20MHz were tested at Low, Middle, and High channel for below 1GHz test, only the worst result of 10MHz 5780MHz was recorded.
3. 10MHz and 20MHz were tested at Low, Middle, and High channel for above 1GHz test, only the worst case 10MHz was recorded.
4. Radiated emission test from 9 KHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9 KHz to 30MHz and not recorded in this report.

For 30MHz-1GHz

Horizontal



Site LAB
İmit: FCC Part15 RE-Class B_30-1000MHz
EUT:
M/N:
Mode:
Note:

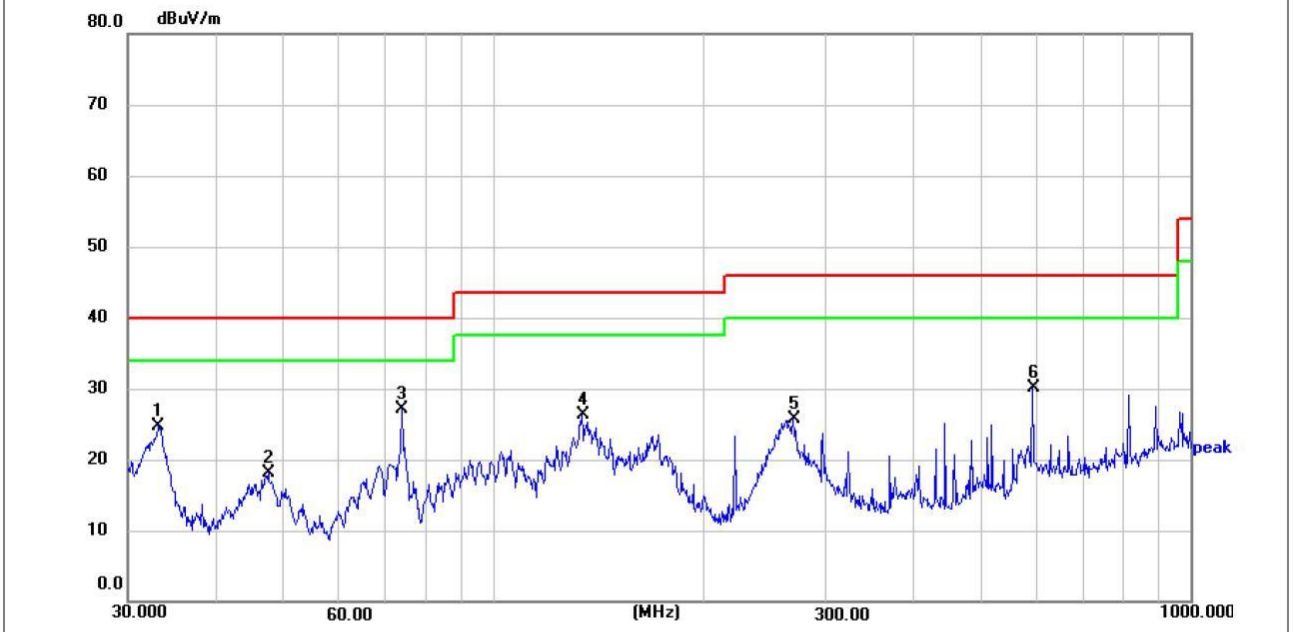
Polarization: ***Horizontal***
Power: AC120V/60Hz
Distance: 3m

Temperature: 24.5(C)
Humidity: 52 %

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	42.8998	28.92	-17.70	11.22	40.00	-28.78	peak	199	351	P	
2	74.1351	42.27	-21.66	20.61	40.00	-19.39	peak	199	200	P	
3	171.3926	39.99	-21.16	18.83	43.50	-24.67	peak	199	307	P	
4	261.9753	46.57	-17.98	28.59	46.00	-17.41	peak	199	200	P	
5	444.8514	45.53	-15.22	30.31	46.00	-15.69	peak	100	45	P	
6 *	890.7278	45.48	-7.67	37.81	46.00	-8.19	peak	100	324	P	

Note:1).Level (dBμV/m)= Reading (dBμV)+ Factor (dB/m)
2). Factor(dB/m)=Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB)
3). Margin(dB) = Level (dBμV/m) - Limit (dBμV/m)

Vertical



Site LAB
Limit: FCC Part15 RE-Class B_30-1000MHz
EUT:
M/N:
Mode:
Note:

Polarization: *Vertical*
Power: AC120V/60Hz
Distance: 3m

Temperature: 24.5(C)
Humidity: 52 %

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	33.0950	44.37	-19.70	24.67	40.00	-15.33	peak	100	36	P	
2	47.6586	35.57	-17.50	18.07	40.00	-21.93	peak	100	8	P	
3 *	74.1351	48.71	-21.66	27.05	40.00	-12.95	peak	100	313	P	
4	134.0882	48.65	-22.39	26.26	43.50	-17.24	peak	100	204	P	
5	269.4284	43.58	-17.78	25.80	46.00	-20.20	peak	100	134	P	
6	593.0497	41.52	-11.51	30.01	46.00	-15.99	peak	199	351	P	

Note:1).Level (dBμV/m)= Reading (dBμV)+ Factor (dB/m)
2). Factor(dB/m)=Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB)
3). Margin(dB) = Level (dBμV/m) - Limit (dBμV/m)

For 1GHz to 40GHz

Note: 10MHz and 20MHz modes have been tested for above 1GHz test, only the worst case 10MHz was recorded.

Note: 10MHz and 20MHz modes have been tested for above 1GHz test, only the worst case 10MHz was recorded.

10MHz (above 1GHz)

Tested	Frequency	Emission	Detector	ANT	Limit	Margin	Raw	Antenna	Cable	Pre	Correction
Channel	(MHz)	Level	Mode	Pol	(dBuV/m)	(dB)	Value	Factor	Factor	amplifier	Factor
		(dBuV/m)					(dBuV)	(dB/m)	(dB)	(dB)	(dB/m)
	5725.00	51.72	PK	H	68.20	16.48	69.58	30.81	6.01	54.68	-17.86
	5725.00	44.38	AV	H	54.00	9.62	62.24	30.81	6.01	54.68	-17.86
(5740MHz)	11480.00	51.05	PK	H	68.20	17.15	55.78	39.05	10.78	54.56	-4.73
	--	--	--	--	--	--		--	--	--	--
(5780MHz)	11560.00	52.47	PK	H	68.20	15.73	57.06	39.28	10.91	54.78	-4.59
	--	--	--	--	--	--	--	--	--	--	--
	5850.00	50.36	PK	H	68.20	17.84	67.94	30.93	6.14	54.65	-17.58
(5830MHz)	11660.00	51.82	PK	H	68.20	16.38	55.49	39.47	11.21	54.35	-3.67
	--	--	--	--	--	--	--	--	--	--	--

Tested	Frequency	Emission	Detector	ANT	Limit	Margin	Raw	Antenna	Cable	Pre	Correction
Channel	(MHz)	Level	Mode	Pol	(dBuV/m)	(dB)	Value	Factor	Factor	amplifier	Factor
		(dBuV/m)					(dBuV)	(dB/m)	(dB)	(dB)	(dB/m)
	5725.00	52.48	PK	V	68.20	15.72	70.34	30.81	6.01	54.68	-17.86
	5725.00	44.82	AV	V	54.00	9.18	62.68	30.81	6.01	54.68	-17.86
(5740MHz)	11480.00	52.64	PK	V	68.20	15.56	57.37	39.05	10.78	54.56	-4.73
	--	--	--	--	--	--	--	--	--	--	--
(5780MHz)	11560.00	51.77	PK	V	68.20	16.43	56.36	39.28	10.91	54.78	-4.59
	--	--	--	--	--	--	--	--	--	--	--
	5850.00	52.35	PK	V	68.20	15.85	69.93	30.93	6.14	54.65	-17.58
(5830MHz)	11660.00	51.93	PK	V	68.20	16.27	55.60	39.47	11.21	54.35	-3.67
	--	--	--	--	--	--	--	--	--	--	--

REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. -- Mean the other emission levels were very low against the limit.
5. RBW1MHz VBW3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.

4.3 Maximum Conducted Average Output Power

Limit

For the band 5.15-5.25 GHz.
(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi.

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

(iv) For 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.

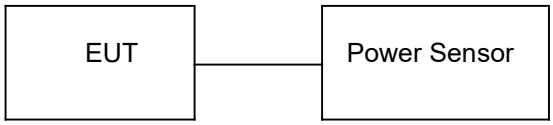
For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz.

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

Test Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power sensor.

Test Configuration



Test Results

Type	Channel	Output power (dBm)	Limit (dBm)	Result
10MHz	Low	10.75	29.42	Pass
	Mid	10.62		
	High	10.38		
20MHz	Low	10.92	29.42	Pass
	Mid	10.47		
	High	10.63		

4.4 Power Spectral Density

Limit

(1) For the band 5.15 - 5.25 GHz.

(i) For an outdoor access point operating in the band 5.15 - 5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 MHz band.[note1]

(ii) For an indoor access point operating in the band 5.15 - 5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 MHz band.[note1]

(iii) For fixed point-to-point access points operating in the band 5.15 - 5.25 GHz, transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi.

(iv) For mobile and portable client devices in the 5.15 - 5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 MHz band. [note1]

(2) For the 5.25 - 5.35 GHz and 5.47 - 5.725 GHz bands, the peak power spectral density shall not exceed 11 dBm in any 1 MHz band. [note1]

(3) For the band 5.725 - 5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500 kHz band. [note1, note2]

Note1: If transmitting antennas of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note2: Fixed point - to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information.

Test Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW = 1MHz for U-NII 1, U-NII 2A, U-NII C band and 300KHz for U-NII 3 band.
3. Set the VBW ≥ 3× RBW.
4. Set the span to encompass the entire EBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum power level.

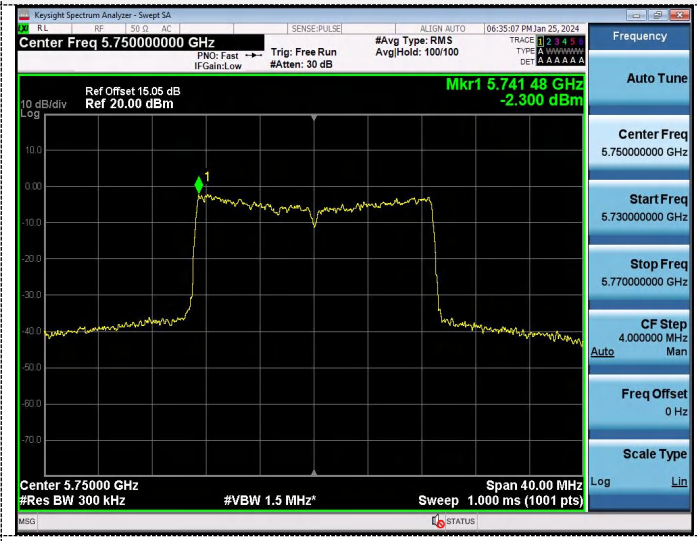
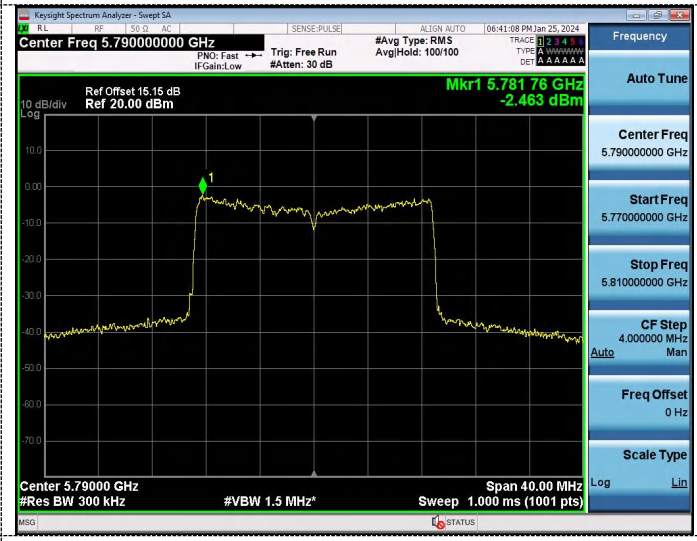
Test Configuration

Test Results

Type	Channel	Power Spectral Density (dBm/300KHz)	Power Spectral Density (dBm/500KHz)	Limit (dBm/500KHz)	Result
10MHz	Low	1.13	3.348	29.42	Pass
	Mid	0.46	2.678		
	High	0.55	2.768		
20MHz	Low	-2.30	-0.082	29.42	Pass
	Mid	-2.46	-0.242		
	High	-2.39	-0.172		

Remark: P.S.D(dBm/500KHz)= P.S.D(dBm/300KHz)+10 log (500 kHz/300KHz).

Test plot as follows

10MHz	*20MHz*
	
Low	Low
	
Mid	Mid
	
High	High

4.5 Emission Bandwidth (26dB Bandwidth)

Limit

N/A

Test Procedure

1. Set resolution bandwidth (RBW) = approximately 1 % of the EBW.
2. Set the video bandwidth (VBW) > RBW.
3. Detector = Peak.
4. Trace mode = Max hold.
5. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW / EBW ratio is approximately 1 %.

Test Configuration

Test Results

Not applicable.

4.6 Minimum Emission Bandwidth (6dB Bandwidth)

Limit

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

Test Procedure

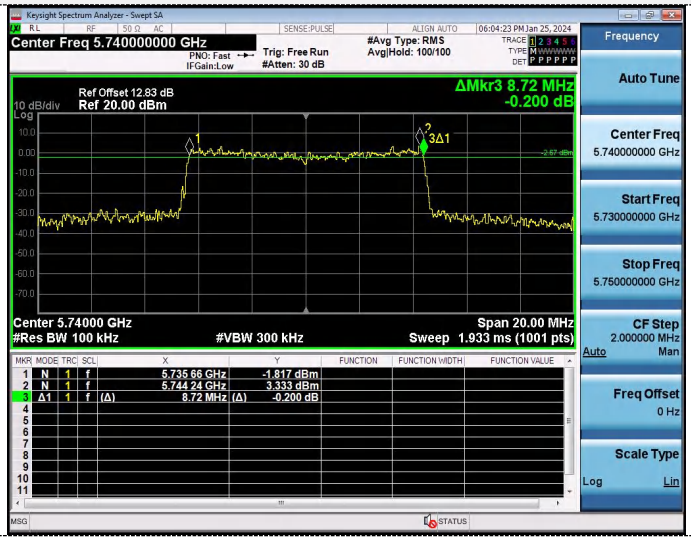
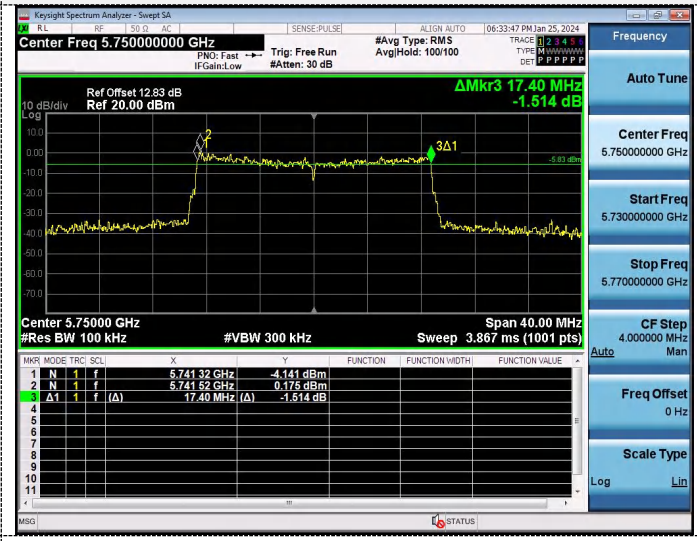
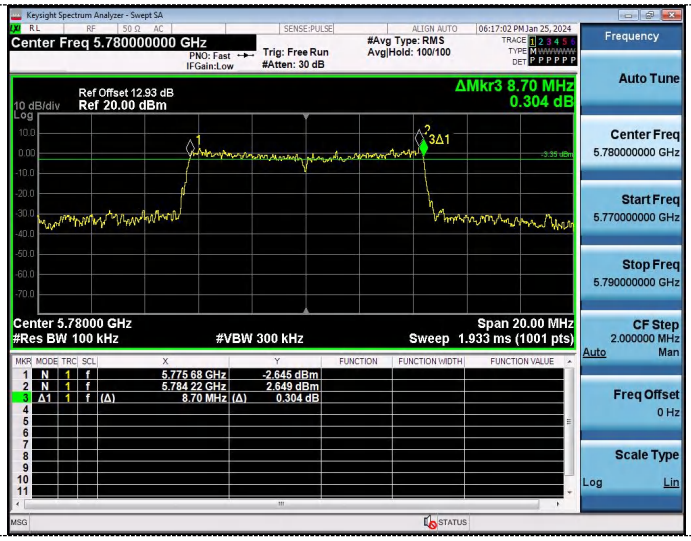
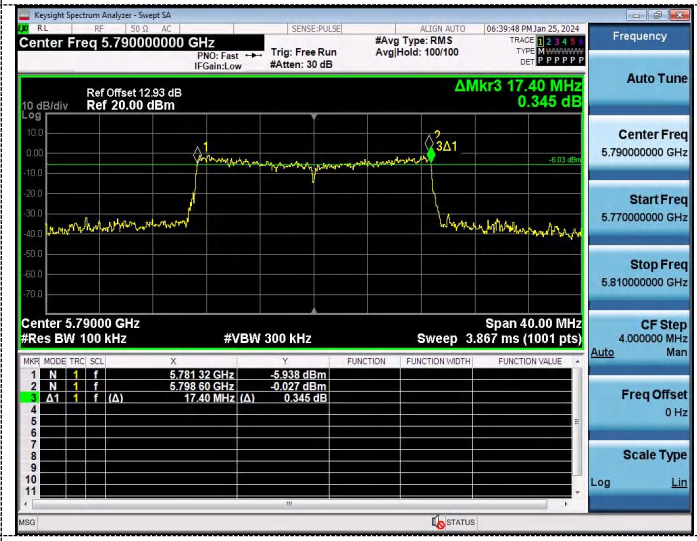
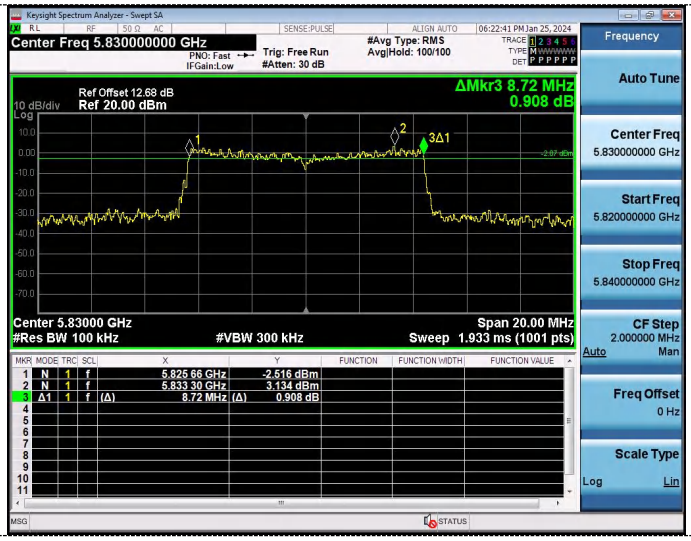
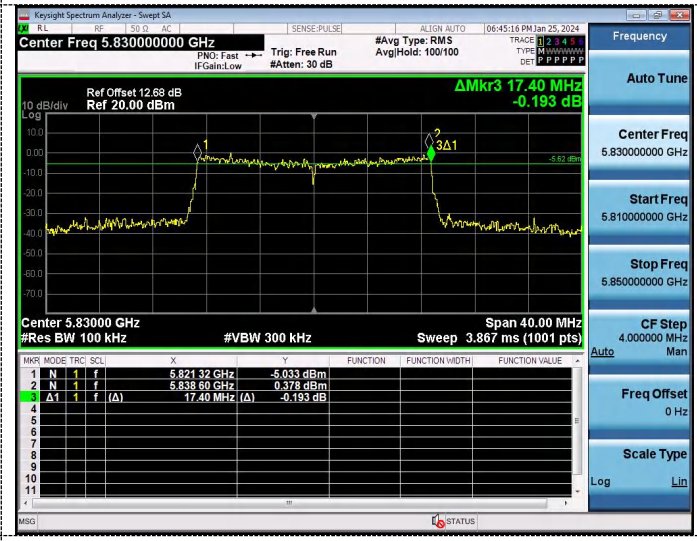
1. Set resolution bandwidth (RBW) = 100 kHz
2. Set the video bandwidth 3 x RBW.
3. Detector = Peak.
4. Trace mode = Max hold.
5. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Test Configuration

Test Results

Type	Channel	6dB Bandwidth (MHz)	Limit (KHz)	Result
10MHz	Low	8.720	≥500KHz	Pass
	Mid	8.700		
	High	8.720		
20MHz	Low	17.400		
	Mid	17.400		
	High	17.400		

Test plot as follows:

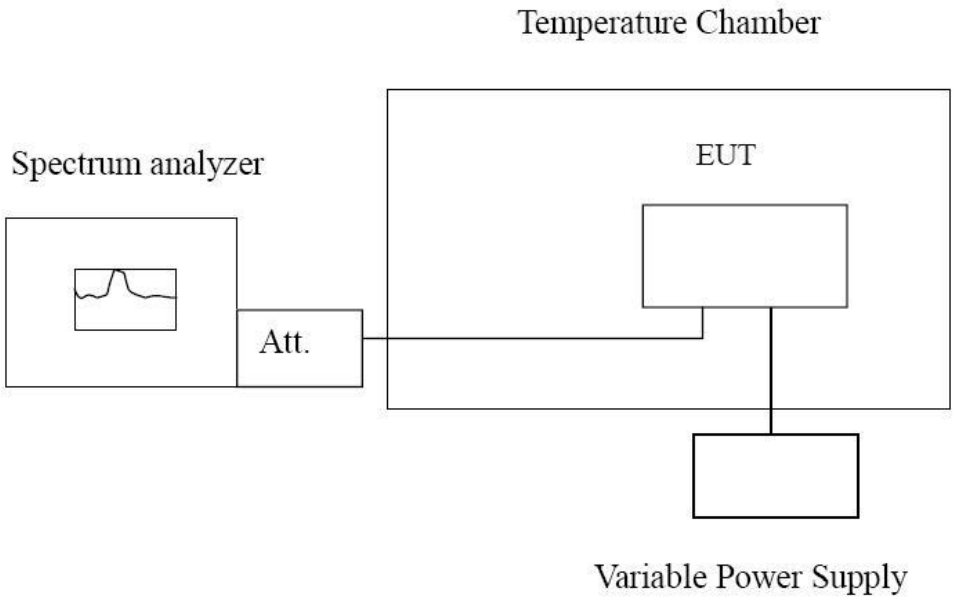
10MHz	*20MHz*
	
Low	Low
	
Mid	Mid
	
High	High

4.7 Frequency Stability

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 users manual.

TEST CONFIGURATION



TEST PROCEDURE

Frequency Stability under Temperature Variations:
The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20℃ operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30℃. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached.

Frequency Stability under Voltage Variations:
Set chamber temperature to 20℃. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.
Reduce the input voltage to specify extreme voltage variation (±15%) and endpoint, record the maximum frequency change.

TEST RESULTS

Record worst case as below:

Reference Frequency: 5740MHz					
Voltage (V)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
12.0	-30	146.82	0.02558	Within the band of operation	Pass
	-20	144.73	0.02521		
	-10	129.54	0.02257		
	0	137.78	0.02400		
	10	124.56	0.02170		
	20	133.82	0.02331		
	30	137.51	0.02396		
	40	134.97	0.02351		
	50	128.67	0.02242		
13.2	20	132.41	0.02307		
10.8	20	137.84	0.02401		

4.8 Band edge for RF Conducted Emissions

Limit

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.

2) For transmitters operating solely in the 5.725 – 5.850 GHz band.

All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

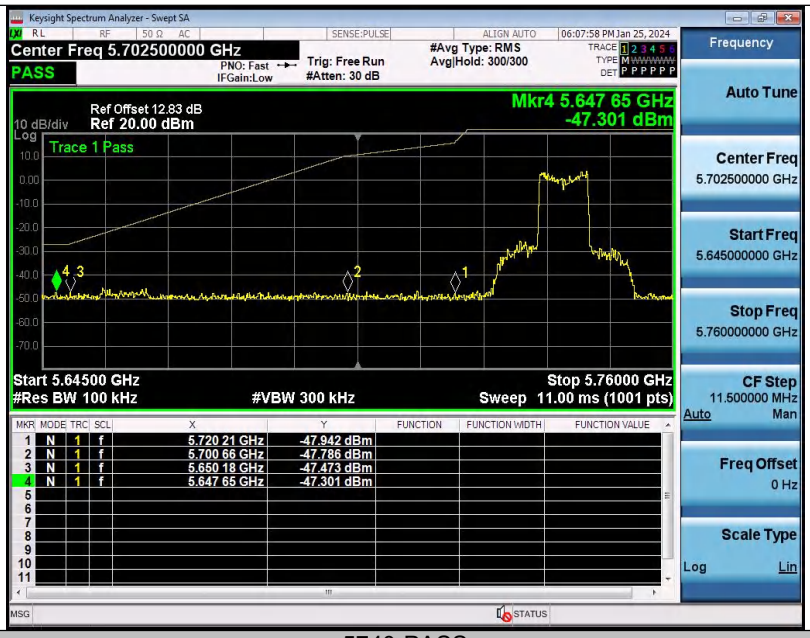
Test Procedure

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.

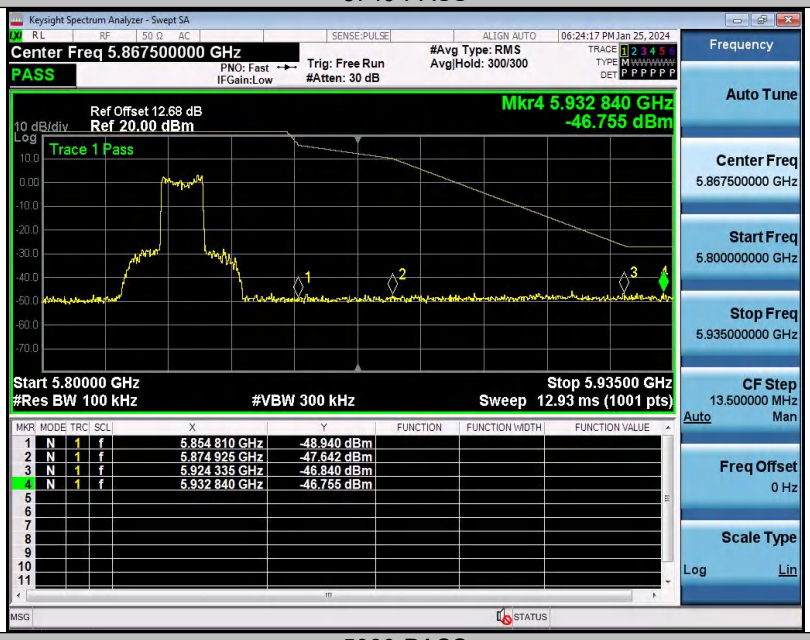
Test Configuration

Test Results

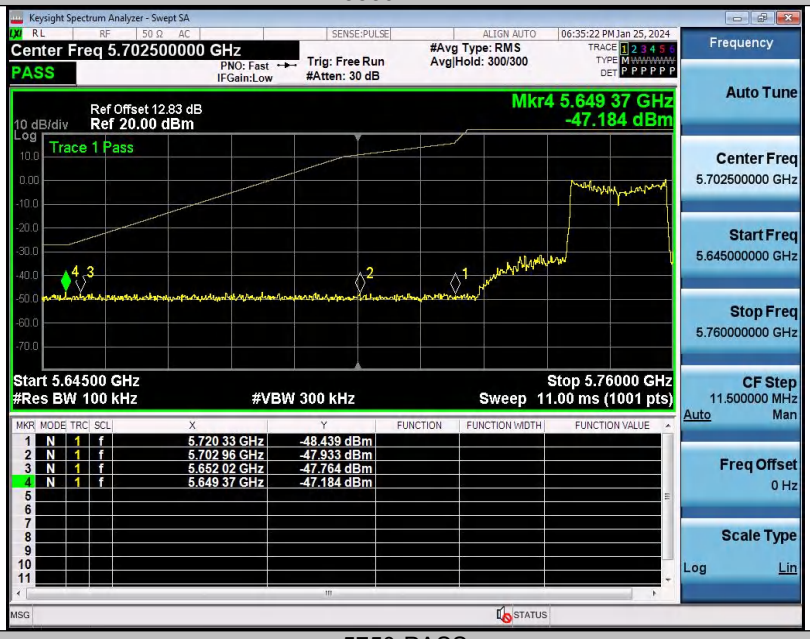
Test plot as follows:



5740-PASS



5830-PASS

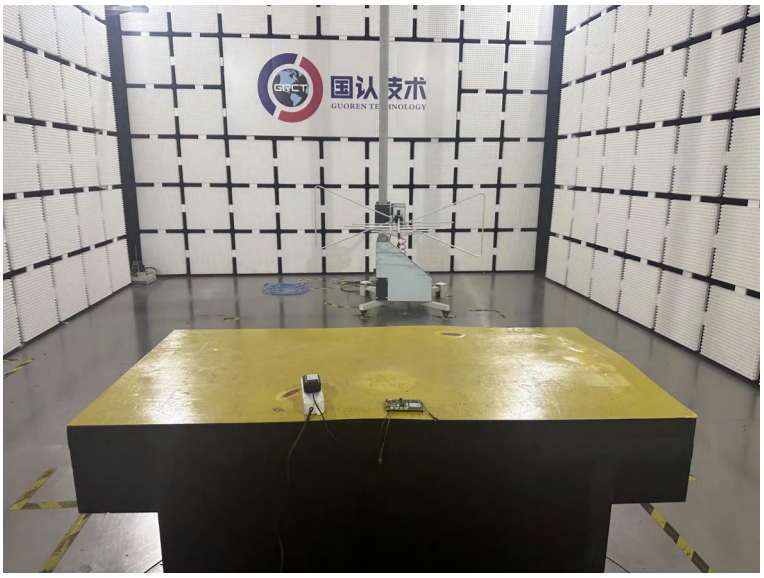


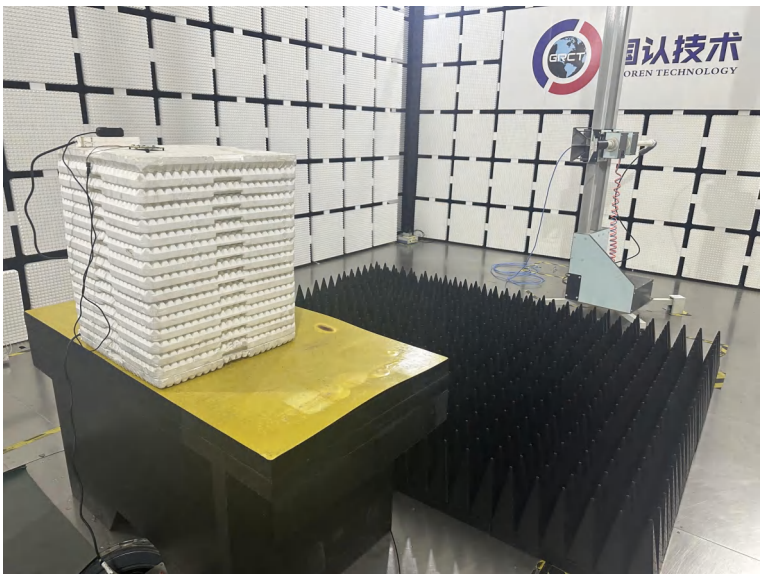
5750-PASS


Keysight Spectrum Analyzer - Swept SA
Center Freq 5.867500000 GHz
PASS
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 300/300
06:46:54 PM Jan 25, 2024
Ref Offset 12.68 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr4 5.932 165 GHz
-47.109 dBm
Trace 1 Pass
Start 5.80000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 5.93500 GHz
Sweep 12.93 ms (1001 pts)
1 N 1 f 5.853 325 GHz -37.142 dBm
2 N 1 f 5.873 170 GHz -48.069 dBm
3 N 1 f 5.924 875 GHz -47.440 dBm
4 N 1 f 5.932 165 GHz -47.109 dBm
Frequency
Auto Tune
Center Freq
5.867500000 GHz
Start Freq
5.800000000 GHz
Stop Freq
5.935000000 GHz
CF Step
13.500000 MHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin
MSG
STATUS

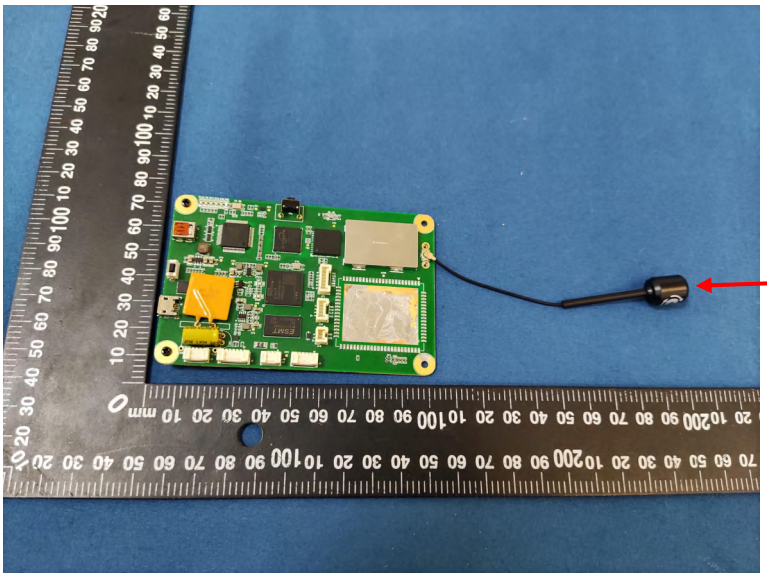
5830-PASS

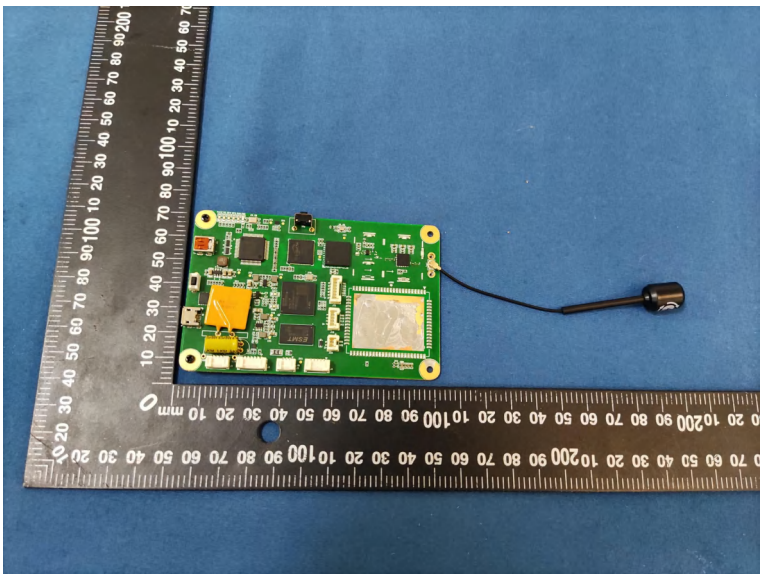
5 Test Setup Photos of the EUT

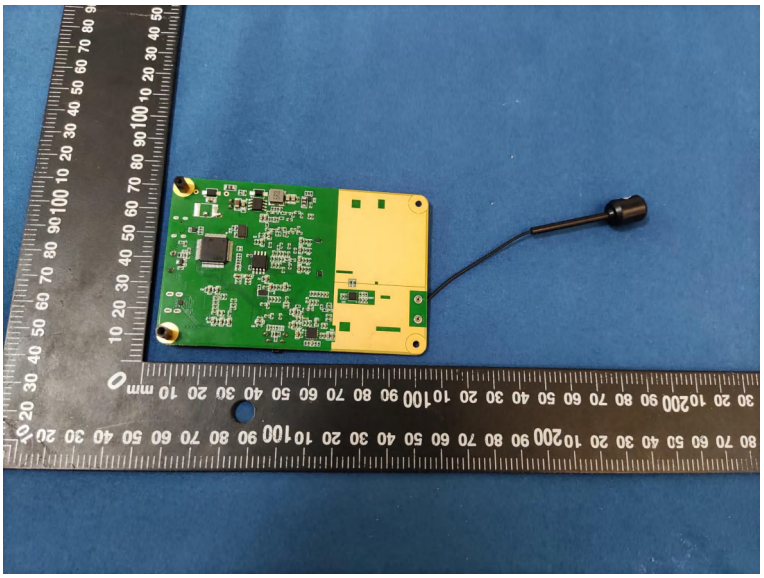




6 Photos of the EUT







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