Test Report

Product name ..... :	INTOUCH550A
Trademark ..... :	INSTORE SCREEN
Model no. ..... :	INTOUCH550A
Series Model(s). ..... :	INTOUCH55***, (* can be A-Z, a-z, 0-9, or blank for marketing purpose only)
FCC ID ..... :	2AI56-INTOUCH550A
Report No ..... :	T220525032-RF01
Test Standards ..... :	FCC Part15, Subpart C(15.247) ANSI C63.10-2013 FCC KDB 558074 D01 15.247 Meas Guidance v05r02
Applicant ..... :	HKC Corporation Limited
Address of applicant ..... :	Building 1,2,3,Huike Industrial Park, Minying Industrial Zone, ShuiTian, ShiYan, Baoan, Shenzhen, China
Manufacturer ..... :	Instorescreen LLC
Manufacturer Address ..... :	2338 Immokalee Rd, Unit 220 Naples, FL 34110
Date of Test Date ..... :	May.25,2022 to Jul.25,2022
Date of issue. ..... :	Nov.14,2022
Test result ..... :	Compliance

Testing Engineer : Will . Wu

Reviewed By : Sabil - Yang

Approved Signatory : Tom . Gao

The test results in the report only apply to the tested sample. The test report shall be invalid without all the signatures of testing engineers, reviewer and approver. Any objections must be raised to CSIC within 15 days since the date when the report is received. It will not be taken into consideration beyond this limit.

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	Nov.14,2022	Initial Issue	ALL	Adil Yang

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1. TEST SUMMARY

1.1. TEST DESCRIPTION

Test procedures according to the technical standards:

FCC Part 15, Subpart C(15.247)			
Item	Clause	Result	Remark
Conducted Emission	15.207	PASS	
Output Power	15.247(b)(3)	PASS	
Radiated Spurious Emission	15.247(c)	PASS	
Conducted Spurious & Band Edge Emission	15.247(d)	PASS	
Power Spectral Density	15.247(e)	PASS	
6dB Bandwidth	15.247(a)(2)	PASS	
Restricted bands of operation	15.205	PASS	
Band Edge Emission	15.247(d)/15.209(a)	PASS	
Antenna Requirement	15.203	PASS	

Note:
1) “N/A” denotes test is not applicable in this Test Report.
2) All tests are according to ANSI C63.10-2013.
3) The statements of test result on the above are decided by the request of test standard only; the measurement uncertainties are not factored into this compliance determination.
4) The information of measurement uncertainty is available upon the customer’s request.

1.2. TEST FACILITY

Shenzhen Central Standard International Center Co., Ltd.
Room 201, Building 1, Mogen Fashion Industrial Park, No. 10, Shilongzai Road, Xinshi Community, Dalang Street, Longhua District, Shenzhen

The test facility is recognized, certified or accredited by the following organizatios:
CNAS – Registration NO.: L11671
FCC - Registration NO.: 0031378433 Designation Number: CN1317
IC – CAB identifier: CN0051
A2LA – Lab Cert. No.: 6426.01

1.3. 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 Central Standard International Center 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.

Below is the best measurement capability for Shenzhen Central Standard International Center Co., Ltd.

Test Items	Measurement Uncertainty	Notes
RF output power, conducted	±0.59dB	(1)
Unwanted Emissions, conducted	±2.20dB	(1)
All emissions, radiated 9KHz-30MHz	±4.44dB	(1)
All emissions, radiated 30-1GHz	±4.48dB	(1)
All emissions, radiated 1G-6GHz	±5.08dB	(1)
All emissions, radiated>6G	±5.08dB	(1)
Conducted Emission (9KHz-150KHz)	±1.60dB	(1)
Conducted Emission (150KHz-30MHz)	±3.68dB	(1)

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

2. GENERAL INFORMATION

2.1. GENERAL DESCRIPTION OF EUT

EUT(Product Specifications)	
Product Name:	INTOUCH550A
Model:	INTOUCH550A
Series Model(s):	INTOUCH55***, (* can be A-Z, a-z, 0-9, or blank for marketing purpose only)
Power supply:	100-240V~ 50/60Hz 1.5A
Hardware version:	T30G
Software version:	20220526
WIFI-2.4G (RF Specifications)	
Supported type:	802.11b, 802.11g, 802.11n(HT20)
Modulation:	DSSS for 802.11b OFDM for 802.11g/802.11n(HT20)
Operation frequency:	802.11b/802.11g/802.11n(HT20): 2412MHz~2462MHz
Operation bandwidth:	20MHz
Channel number:	11
Channel separation:	5MHz
Antenna type:	Dipole antenna
Antenna gain:	3.99dBi

Note1: For a more detailed features description, please refer to the manufacture's specifications or the user's manual.
Note2: Full tests were applied to model T220525032-Y01/01 only in this document.

2.2. 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 mode for testing.

Operation Frequency List WIFI：

Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	**2412**	08	2447
02	2417	09	2452
03	2422	10	2457
04	2427	**11**	**2462**
05	2432		
06	**2437**		
07	2442		

Note: Bold font is the channel selected for testing

For 802.11b/g/n(20MHz)		
Test Channel	EUT Channel	Test Frequency (MHz)
lowest	CH01	2412
middle	CH06	2437
highest	CH11	2462

2.3. MEASUREMENT INSTRUMENTS LIST

RF Connected Test							
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Previously calibration data	Latest calibration data	Calibrated until
1	Spectrum Analyzer	Agilent	N9020A	MY50200391	Jun. 15, 2021	Jun. 14, 2022	Jun. 13, 2023
2	Power sensor	KEYSIGHT	U2021XA	MY55080015	Jun. 15, 2021	Jun. 14, 2022	Jun. 13, 2023
3	Power sensor	KEYSIGHT	U2021XA	MY54250016	Jun. 15, 2021	Jun. 14, 2022	Jun. 13, 2023
4	Power sensor	KEYSIGHT	U2021XA	MY54250020	Jun. 15, 2021	Jun. 14, 2022	Jun. 13, 2023
5	Power sensor	KEYSIGHT	U2021XA	MY54210030	Jun. 15, 2021	Jun. 14, 2022	Jun. 13, 2023
6	Vector Signal Generator	Agilent	N5182A	MY50140130	Jun. 15, 2021	Jun. 14, 2022	Jun. 13, 2023
7	Signal generator	Agilent	SML03	100925	Jun. 15, 2021	Jun. 14, 2022	Jun. 13, 2023
8	Power sensor Box	MWRFtest	N/A	N/A	N/A	N/A	N/A
9	RF Switch Box	MWRFtest	MW100-RFCB	N/A	N/A	N/A	N/A
10	MTS 8310	MWRFtest	V：2.0.0.0				

Radiation Test equipment							
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Previously calibration data	Latest calibration data	Calibrated until
1	EMI TEST RECEIVER	R&S	ESIB26	100342	Jun. 15, 2021	Jun. 14, 2022	Jun. 13, 2023
2	Amplifier	HP	8447F	2634A02050	Jun. 15, 2021	Jun. 14, 2022	Jun. 13, 2023
3	Amplifier	Agilent	8449B	4035A00116	Jun. 15, 2021	Jun. 14, 2022	Jun. 13, 2023
4	Loop Antenna	SCHNARZBECK	FMZB1519B	00023	/	Nov. 17, 2021	Nov. 16, 2022
5	Bilog Antenna	Schwarzbeck	VULB-9168	VULB9168-250	Jul. 28, 2021	Jul. 26, 2022	Jul. 25, 2025
6	Horn Antenna	AARONIAAG	Powerlog 70180	3980	Jul. 28, 2021	Jul. 05, 2022	Jul. 04, 2025
7	Horn Antenna	A-INFOMW	LB-180400-KF	J211020657	/	Sep. 28, 2021	Sep. 27, 2022
8	3M Chamber	Maor	9*6*6	--	/	May. 04, 2020	May. 03, 2023
10	EZ-EMC	Farad	V3.1				

Mains Terminal Disturbance Voltage Test equipment							
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Previously calibration data	Latest calibration data	Calibrated until
1	EMI Test Receiver	R&S	ESRP3	101936	Jun. 15, 2021	Jun. 14, 2022	Jun. 13, 2023
2	LISN	R&S	ENV216	100002	Jun. 15, 2021	Jun. 14, 2022	Jun. 13, 2023
3	LISN	MEB	NNB 42	--	Jun. 15, 2021	Jun. 14, 2022	Jun. 13, 2023
4	Shelding Room	Maor	8*4*3	--	/	May. 04, 2020	May. 03, 2023
5	EZ-EMC	Fara	V3.1				

Note:
1) The cable loss has calculated in test result which connection between each test instruments.

2.4. DESCRIPTION OF THE 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.

Worst Mode	Description	Data Rate
Mode 1	TX IEEE 802.11b CH1	1 Mbps
Mode 2	TX IEEE 802.11b CH6	1 Mbps
Mode 3	TX IEEE 802.11 b CH11	1 Mbps
Mode 4	TX IEEE 802.11g CH1	6 Mbps
Mode 5	TX IEEE 802.11g CH6	6 Mbps
Mode 6	TX IEEE 802.11g CH11	6 Mbps
Mode 7	TX IEEE 802.11n 20 CH1	6.5 Mbps
Mode 8	TX IEEE 802.11n 20 CH6	6.5 Mbps
Mode 9	TX IEEE 802.11n 20 CH11	6.5 Mbps

Note:

1) The measurements are performed at the high, middle, low available channels.
2) All the bit rate of transmitter have been tested and found the lowest rate is found to be the worst case and recorded.
3) For radiated emission 9kHz-1 GHz test, the IEEE 802.11n20 Channel 06 is found to be the worst case and recorded.
4) This test was performed with EUT in X, Y, Z position and worst case was found when EUT in X position.
5) For radiated emission above 1 GHz test, 1GHz-25GHz have been pre-tested and in this report only recorded the worst case. The remaining spurious points are all below the limit value of 20dB.

For AC Conducted Emission

Test Case	
AC Conducted Emission	Mode10: Working

2.5. TEST SOFTWARE AND POWER LEVEL

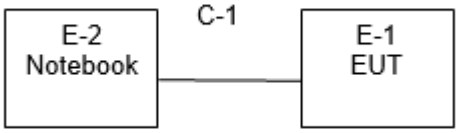
During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level.

RF Function	Type	Mode Or Modulation type	Ant Gain(dBi)	Power Class	Software For Testing
WIFI(2.4G)	2.4G WIFI	802.11b	Ant：3.99	22	EspRFTestTool _v2.8_Manual
		802.11g		22	
		802.11n(HT20)		22	

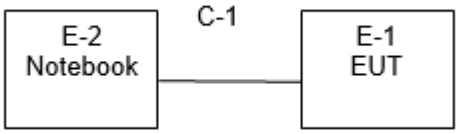
Note: The power class cannot be manually adjusted in the software.

2.6. BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

a. Radiated Spurious Emission Test



b. Conducted Emission Test



2.7. DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

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.

Necessary accessories					
Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
N/A	N/A	N/A	N/A	N/A	N/A

Support units					
Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
E-2	Notebook	Lenovo	ThinkPad E575	N/A	N/A
C-1	USB Cable	N/A	100cm	N/A	N/A

Note:
1) The support equipment was authorized by Declaration of Confirmation.
2) For detachable type I/O cable should be specified the length in cm in『Length』column.

2.8. ENVIRONMENTAL CONDITIONS FOR TESTING

Test Item	Temperature (°C)	Relative Humidity (%)	Test Voltage	Tested by
Conducted Emission	27.1	58.0	AC 120V/60Hz	Will.Wu
Output Power	26.0	64.0	AC 120V/60Hz	Adil.yang
Radiated Spurious Emission	27.1	65.0	AC 120V/60Hz	Adil.yang
Conducted Spurious & Band Edge Emission	26.0	64.0	AC 120V/60Hz	Adil.yang
Power Spectral Density	26.0	64.0	AC 120V/60Hz	Adil.yang
6dB Bandwidth	26.0	64.0	AC 120V/60Hz	Adil.yang
Restricted bands of operation	26.0	64.0	AC 120V/60Hz	Adil.yang
Band Edge Emission	27.1	65.0	AC 120V/60Hz	Adil.yang

3. EMC TEST

3.1. CONDUCTED EMISSION MEASUREMENT

Limit

Operating frequency band. In case the emission fall within the restricted band specified on Part 207(a) limit in the table below has to be followed.

FREQUENCY (MHz)	Conducted Emission limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56 *	56 - 46 *
0.5 - 5	56	46
5 - 30	60	50

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.

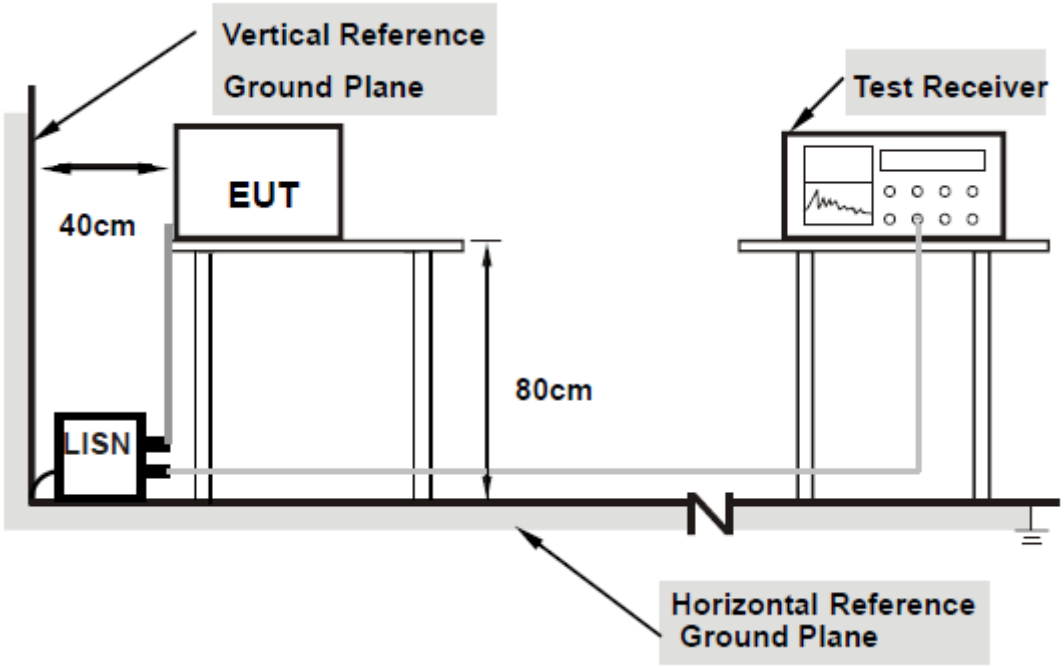
The following table is the setting of the receiver

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

Test Procedure

a) The EUT was 0.8 meters from the horizontal ground plane and 0.4 meters from the vertical 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.

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

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.

Data Sample

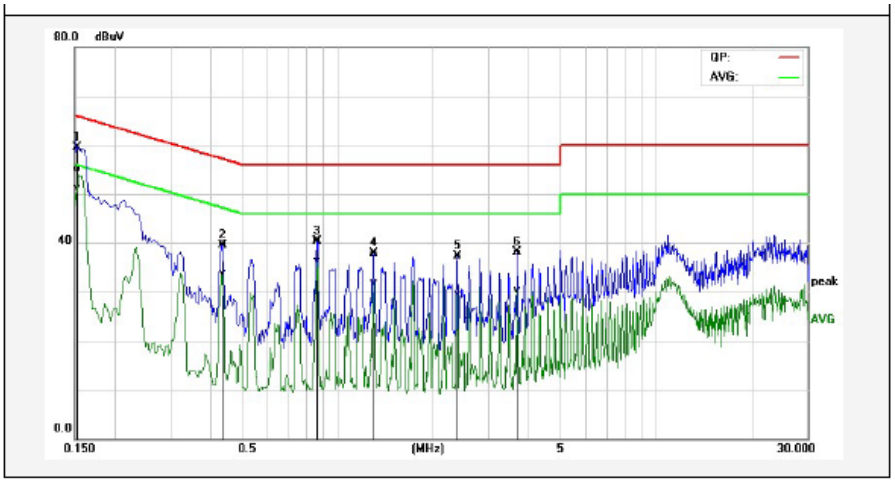
No.	Frequency	Reading (dBuV)		Correct	Result (dBuV/m)		Limit (dBuV/m)		Margin (dB)		Remark
	(MHz)	QP	AVG	Factor (dB/m)	QP	AVG	QP	AVG	QP	AVG	
x	xx.xxxx	39.01	34.65	9.78	48.79	44.43	60	50	-11.21	-5.57	Pass/fail

Frequency (MHz), emission frequency in MHz;
QP/AVG Reading (dBuV), uncorrected analyzer / receiver reading;
Correct Factor(dB), insertion loss of LISN + cable loss;
Result (dBuV), QP/AVG Reading in dBuV + Correct factor in dB
Limit (dBuV/m), limit stated in standard;
Margin (dB), result in dBuV – limit in dBuV.

Test Results

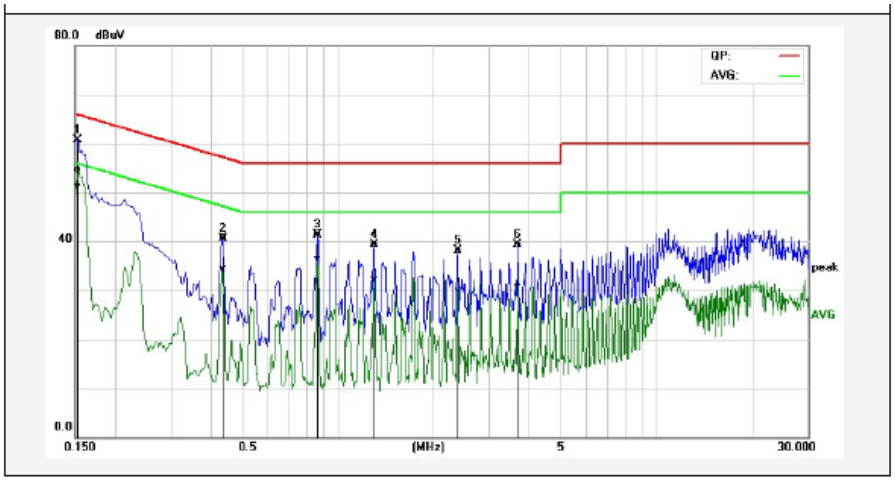
Test Mode:	Mode10

L



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1*	0.1539	45.24	41.50	9.88	55.12	51.38	65.78	55.79	-10.66	-4.41	Pass
2P	0.4340	30.33	24.45	9.53	39.86	33.98	57.18	47.18	-17.32	-13.20	Pass
3P	0.8700	31.12	26.69	9.63	40.75	36.32	56.00	46.00	-15.25	-9.68	Pass
4P	1.3027	28.30	22.27	9.66	37.96	31.93	56.00	46.00	-18.04	-14.07	Pass
5P	2.3961	27.76	19.97	9.57	37.33	29.54	56.00	46.00	-18.67	-16.46	Pass
6P	3.7000	28.34	20.56	9.72	38.06	30.28	56.00	46.00	-17.94	-15.72	Pass

N



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1*	0.1539	44.75	41.44	9.88	54.63	51.32	65.78	55.79	-11.15	-4.47	Pass
2P	0.4340	31.28	24.97	9.53	40.81	34.50	57.18	47.18	-16.37	-12.68	Pass
3P	0.8700	31.98	26.63	9.63	41.61	36.26	56.00	46.00	-14.39	-9.74	Pass
4P	1.3027	29.72	22.56	9.66	39.38	32.22	56.00	46.00	-16.62	-13.78	Pass
5P	2.3961	28.50	20.36	9.57	38.07	29.93	56.00	46.00	-17.93	-16.07	Pass
6P	3.7000	29.67	20.96	9.72	39.39	30.68	56.00	46.00	-16.61	-15.32	Pass

3.2. RADIATED EMISSION MEASUREMENT

Limit

In any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the Restricted band specified on Part15.205 (a)&209(a) limit in the table and according to ANSI C63.10-2013 below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (0.009MHz - 1000MHz)

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 (1GHz-25 GHz)

FREQUENCY (MHz)	(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).

LIMITS OF RESTRICTED FREQUENCY BANDS

FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (GHz)
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

For Radiated Emission	
Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/QP/AVG
Start Frequency	9 KHz/150KHz(Peak/QP/AVG)
Stop Frequency	150KHz/30MHz(Peak/QP/AVG)
RB / VB (emission in restricted band)	200Hz (From 9kHz to 0.15MHz)/
	9KHz (From 0.15MHz to 30MHz);
	200Hz (From 9kHz to 0.15MHz)/
	9KHz (From 0.15MHz to 30MHz)
Attenuation	Auto
Detector	Peak/QP
Start Frequency	30 MHz(Peak/QP)
Stop Frequency	1000 MHz (Peak/QP)
RB / VB (emission in restricted band)	120 KHz / 300 KHz
Attenuation	Auto
Detector	Peak/AVG
Start Frequency	1000 MHz(Peak/AVG)
Stop Frequency	10th carrier hamonic(Peak/AVG)
RB / VB (emission in restricted band)	1 MHz / 3 MHz(Peak)
	1 MHz/1/T MHz(AVG)
For Restricted band	
Spectrum Parameter	Setting
Detector	Peak/AVG
Start/Stop Frequency	Lower Band Edge: 2310 to 2410 MHz
	Upper Band Edge: 2476 to 2500 MHz
RB / VB	1 MHz / 3 MHz(Peak)
	1 MHz/1/T MHz(AVG)
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~90kHz / RB 200Hz for Peak & AVG
Start ~ Stop Frequency	90kHz~110kHz / RB 200Hz for QP
Start ~ Stop Frequency	110kHz~490kHz / RB 200Hz for Peak & AVG
Start ~ Stop Frequency	490kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

Test Procedure

a) The measuring distance of at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz,and above 1GHz.
b) The EUT was placed on the top of a rotating table 0.8 meters (above 1GHz is 1.5 m) above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
c) The height of the equipment shall be 0.8 m(above 1GHz is 1.5 m); the height of the test antenna shall vary between 1 m to 4 m. horizontal and vertical polarizations of the antenna are set to make the measurement.
d) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then QuasiPeak detector mode re-measured.
e) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f) For the actual test configuration, please refer to the related Item –EUT Test Photos.

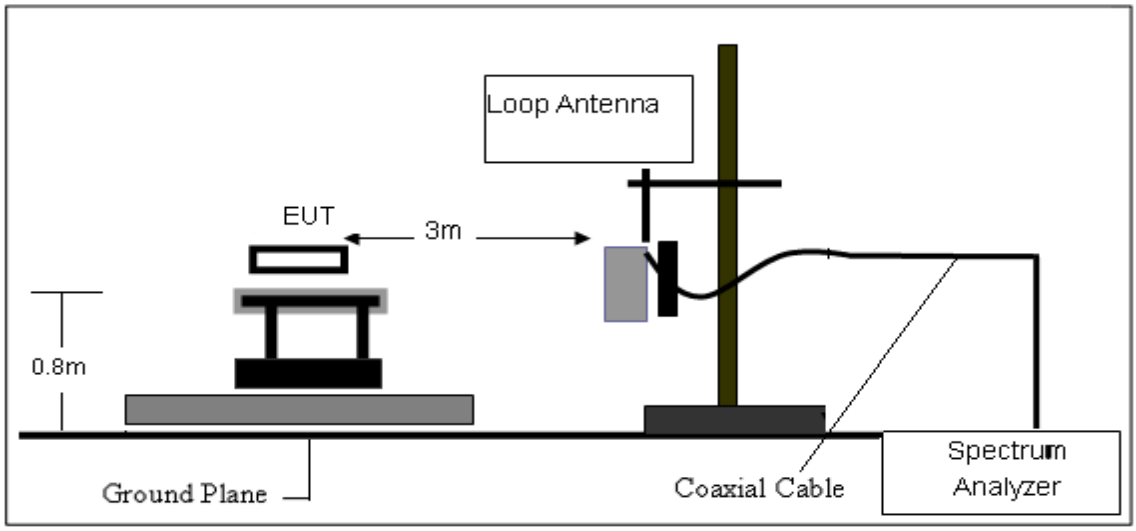
Note:
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

DEVIATION FROM TEST STANDARD

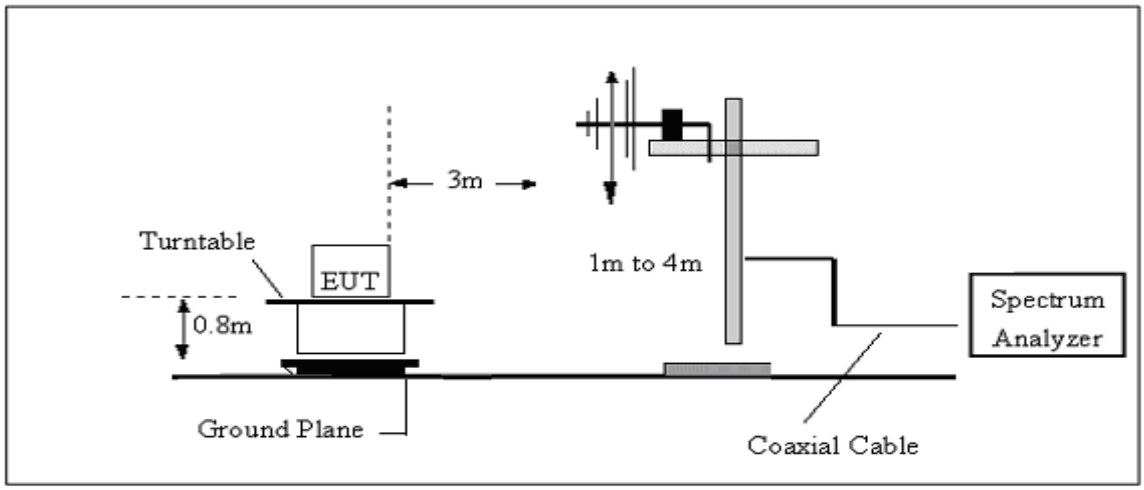
No deviation.

Test Setup

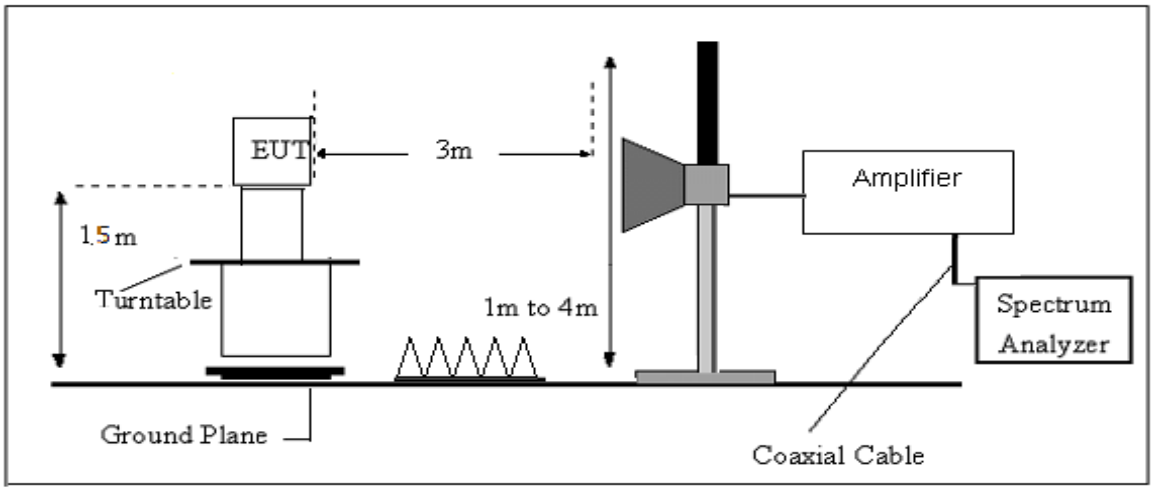
1. Radiated Emission Test-Up Frequency Below 30MHz



2. Radiated Emission Test-Up Frequency 30MHz~1GHz



3. Radiated Emission Test-Up Frequency Above 1GHz



EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.5 Unless otherwise a special operating condition is specified in the follows during the testing.

Data Sample

Below 1GHz:

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
x	xxx.xxxx	42.72	2.48	45.20	74.00	-28.80	QP

Frequency (MHz), emission frequency in MHz;
Reading (dBuV), uncorrected analyzer / receiver reading;
Correct Factor(dB/m), antenna factor +cable loss – amplifier gain
Result (dBuV/m), reading in dBuV +Correct factor in dB/m
Limit (dBuV/m), limit stated in standard;
Margin (dB), result in dBuV/m – limit in dBuV/m
QP, quasi-peak reading.

Above 1GHz:

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	xxxx.xxx	42.72	2.48	45.20	74.00	-28.80	peak
2	xxxx.xxx	32.75	2.48	35.23	54.00	-18.77	AVG

Frequency (MHz), emission frequency in MHz;
Reading (dBuV), uncorrected analyzer / receiver reading;
Correct Factor(dB/m), antenna factor +cable loss – amplifier gain
Result (dBuV/m), reading in dBuV +Correct factor in dB/m
Limit (dBuV/m), limit stated in standard;
Margin (dB), result in dBuV/m – limit in dBuV/m
peak, peak reading;
AVG, average reading.

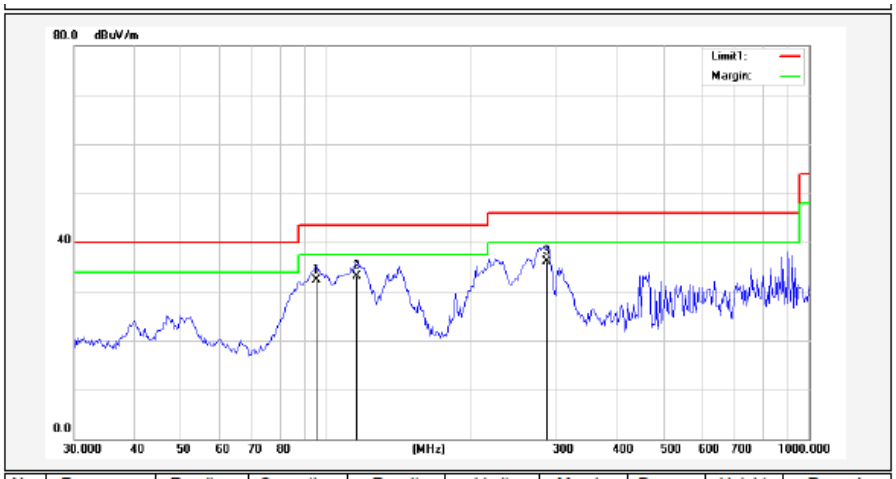
Test Result

9KHz-30MHz						
Temperature:	27.1℃		Relative Humidity:	65.0%		
Test Voltage:	AC 120V/60Hz		Polarization:	/		
Test Mode:	TX Mode					
Freq.	Reading	Factor	Result	Limit	Margin	Test Result
(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
--	--	--	--	--	--	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 (specific distance/test distance)(dB);
Limit line = specific limits (dBuv) + distance extrapolation factor.

Below 1GHz:	
Test Mode:	Mode 5(worst mode)

Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	95.6483	47.13	-14.84	32.29	43.50	-11.21			QP
2	115.6320	46.82	-13.79	33.03	43.50	-10.47			QP
3*	286.2653	47.44	-11.43	36.01	46.00	-9.99			QP

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1!	40.0172	46.43	-10.90	35.53	40.00	-4.47			QP
2*	108.5455	54.31	-14.18	40.13	43.50	-3.37			QP
3!	143.7760	50.99	-12.07	38.92	43.50	-4.58			QP

Above 1GHz：

802.11 b-Low (worst mode) Horizontal

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	3216.1651	44.11	5.05	49.16	74.00	-24.84	peak
2	3216.1651	36.20	5.05	41.25	54.00	-12.75	AVG
3	4812.3698	40.38	10.44	50.82	74.00	-23.18	peak
4	4812.3698	26.15	10.44	36.59	54.00	-17.41	AVG
5	7237.6085	36.46	16.88	53.34	74.00	-20.66	peak
6	7237.6085	21.36	16.88	38.24	54.00	-15.76	AVG

802.11 b-Low (worst mode) Vertical

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4987.3190	39.89	10.78	50.67	74.00	-23.33	peak
2	4987.3190	24.70	10.78	35.48	54.00	-18.52	AVG
3	6242.3341	37.67	15.07	52.74	74.00	-21.26	peak
4	6242.3341	23.40	15.07	38.47	54.00	-15.53	AVG
5	6983.7218	37.04	16.48	53.52	74.00	-20.48	peak
6	6983.7218	21.01	16.48	37.49	54.00	-16.51	AVG

802.11 b-High (worst mode) Horizontal

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	3282.4652	44.70	5.25	49.95	74.00	-24.05	peak
2	3282.4652	36.93	5.25	42.18	54.00	-11.82	AVG
3	4911.5752	45.14	10.67	55.81	74.00	-18.19	peak
4	4911.5752	26.81	10.67	37.48	54.00	-16.52	AVG
5	6983.7218	37.25	16.48	53.73	74.00	-20.27	peak
6	6983.7218	22.72	16.48	39.20	54.00	-14.80	AVG

802.11 b-High (worst mode) Vertical

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	3282.4652	39.26	5.25	44.51	74.00	-29.49	peak
2	3282.4652	30.24	5.25	35.49	54.00	-18.51	AVG
3	4911.5752	41.42	10.67	52.09	74.00	-21.91	peak
4	4911.5752	26.91	10.67	37.58	54.00	-16.42	AVG
5	6983.7218	36.85	16.48	53.33	74.00	-20.67	peak
6	6983.7218	20.93	16.48	37.41	54.00	-16.59	AVG

Node:

1、Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.

2、Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.

3、Average test would be performed if the peak result were greater than the average limit or as required by the applicant.

4、Margin (dB), result in dBuV/m – limit in dBuV/m.

Restricted band Requirements
802.11 n(HT20)-Low (worst mode)

Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2352.645	51.25	2.56	53.81	74.00	-20.19	peak
2	2352.645	31.33	2.56	33.89	54.00	-20.11	AVG
3	2390.000	57.96	2.71	60.67	74.00	-13.33	peak
4	2390.000	42.14	2.71	44.85	54.00	-9.15	AVG

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2324.870	41.80	2.46	44.26	74.00	-29.74	peak
2	2324.870	21.43	2.46	23.89	54.00	-30.11	AVG
3	2390.000	41.80	2.71	44.51	74.00	-29.49	peak
4	2390.000	28.76	2.71	31.47	54.00	-22.53	AVG

802.11 n(HT20)-High (worst mode)

Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	54.48	3.04	57.52	74.00	-16.48	peak
2	2483.500	41.48	3.04	44.52	54.00	-9.48	AVG
3	2484.369	54.15	3.04	57.19	74.00	-16.81	peak
4	2484.369	35.20	3.04	38.24	54.00	-15.76	AVG

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	39.13	3.04	42.17	74.00	-31.83	peak
2	2483.500	29.11	3.04	32.15	54.00	-21.85	AVG
3	2494.088	41.48	3.07	44.55	74.00	-29.45	peak
4	2494.088	21.78	3.07	24.85	54.00	-29.15	AVG

3.3. CONDUCTED SPURIOUS & BAND EDGE EMISSION

Limit

According to FCC section 15.247(d), in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

Test Procedure

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	30 MHz to 10th carrier harmonic
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold
For Band edge	
Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	Lower Band Edge: 2327 – 2427 MHz
	Upper Band Edge: 2447 – 2547 MHz
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

Test Configuration

The EUT is connected to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

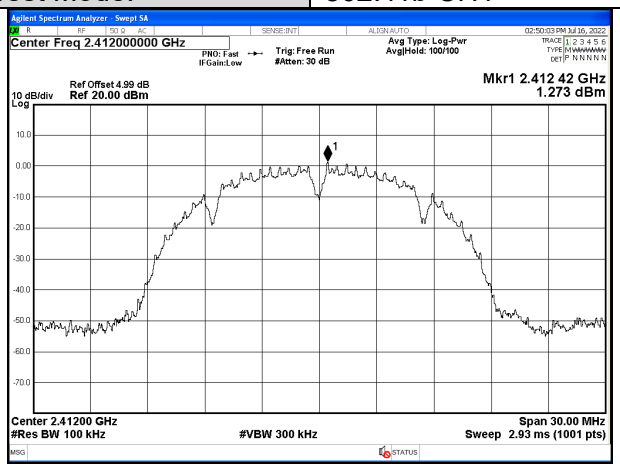
EUT OPERATION CONDITIONS

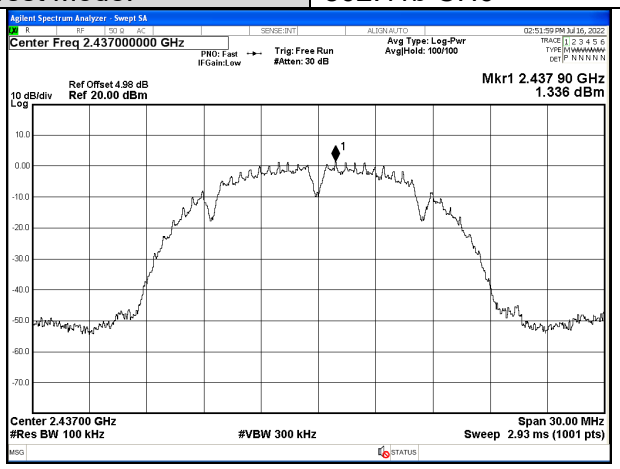
The EUT tested system was configured as the statements of 2.5 Unless otherwise a special operating condition is specified in the follows during the testing.

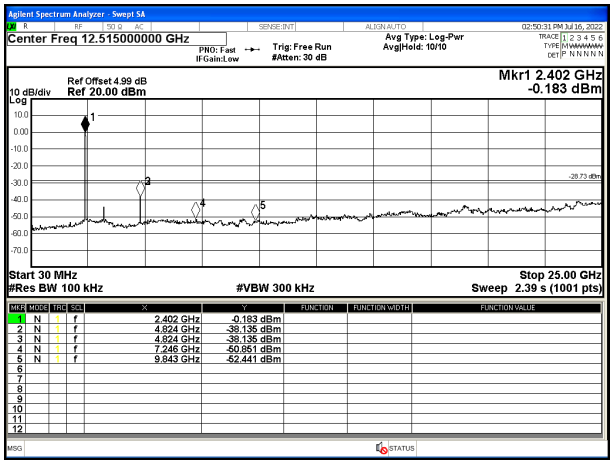
Test Results

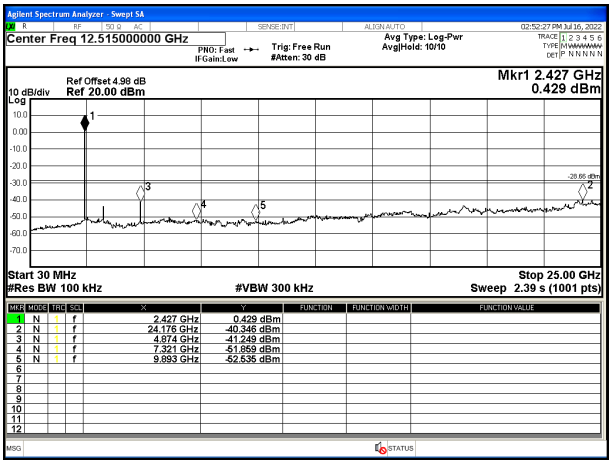
Conducted spurious emission

Test Mode:	802.11b CH1	Test Mode:	802.11b CH6

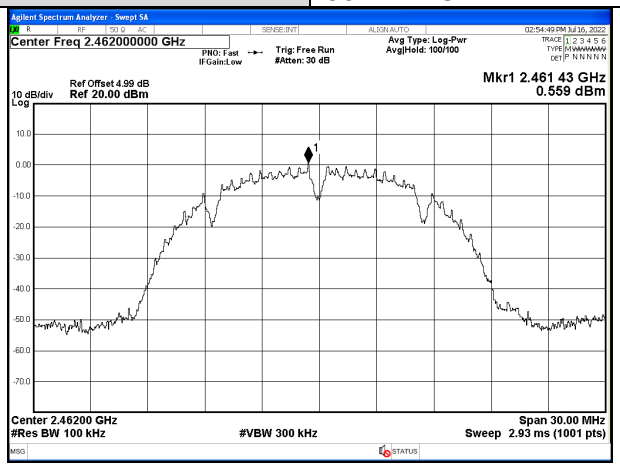


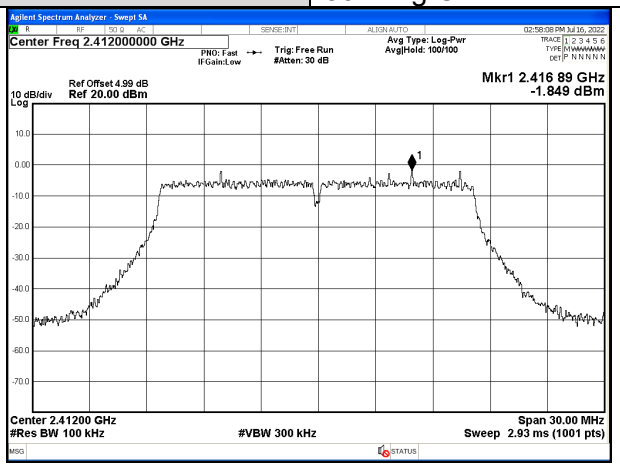


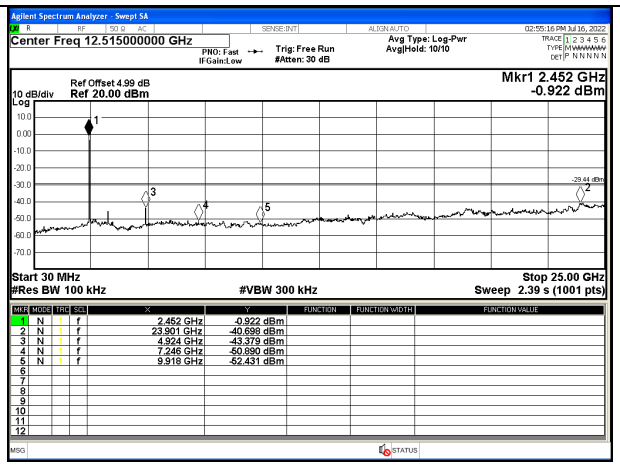


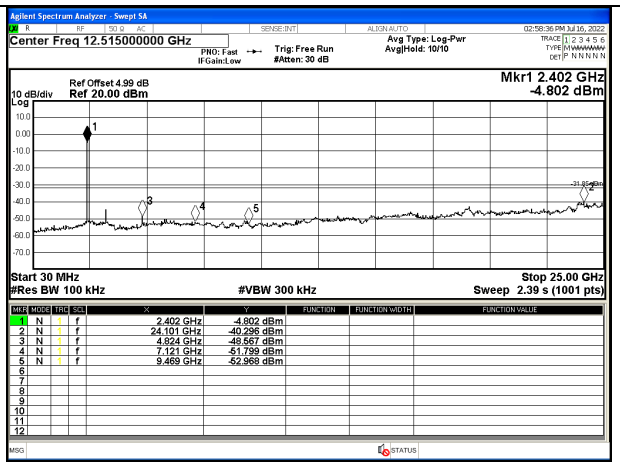


Test Mode:	802.11b CH11	Test Mode:	802.11g CH1

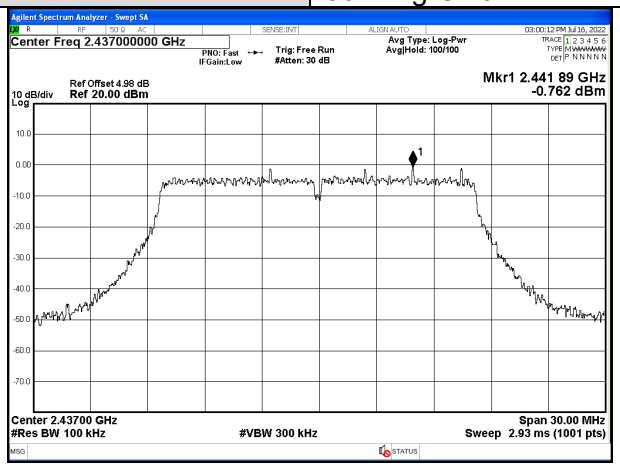


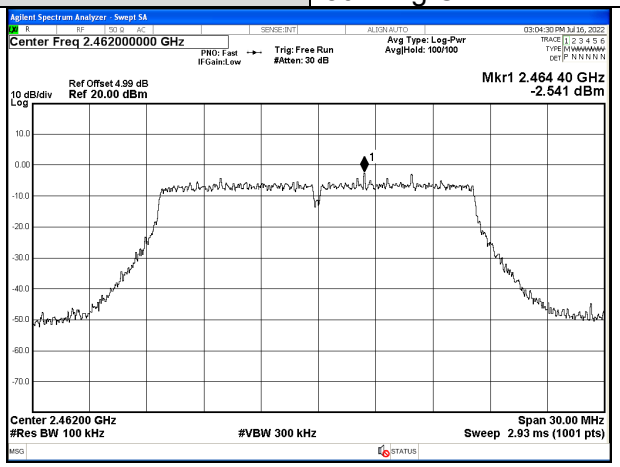


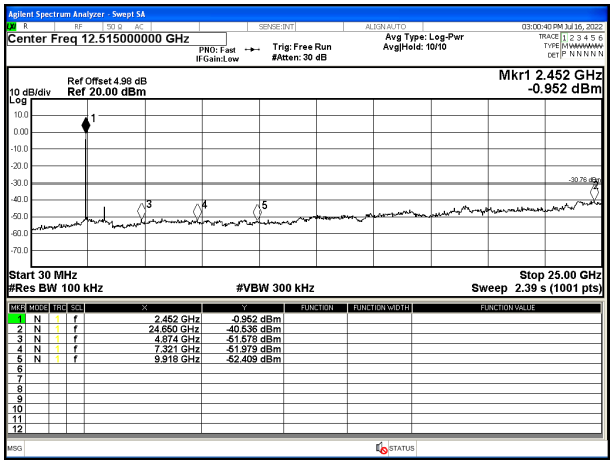


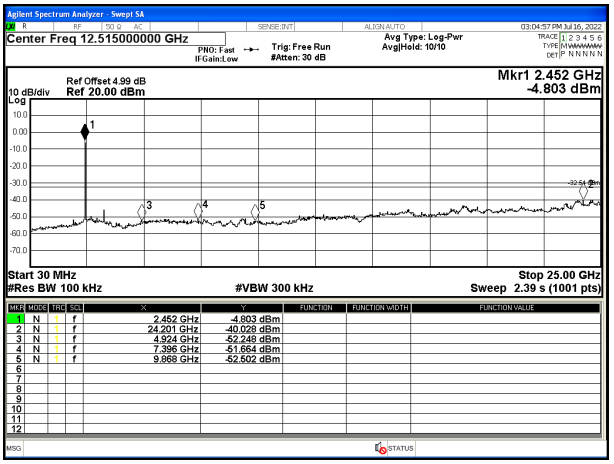


Test Mode:	802.11g CH6	Test Mode:	802.11g CH11

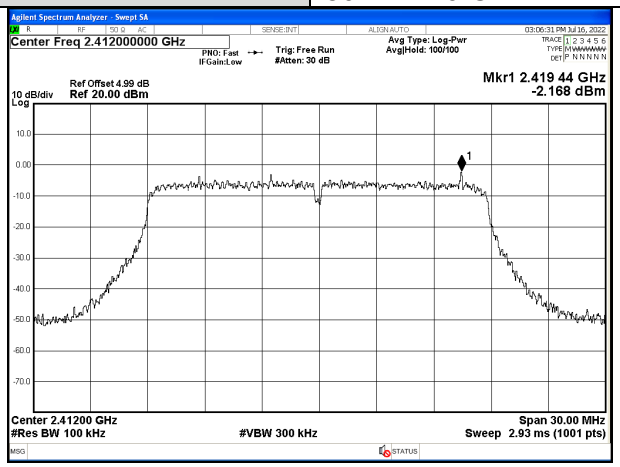


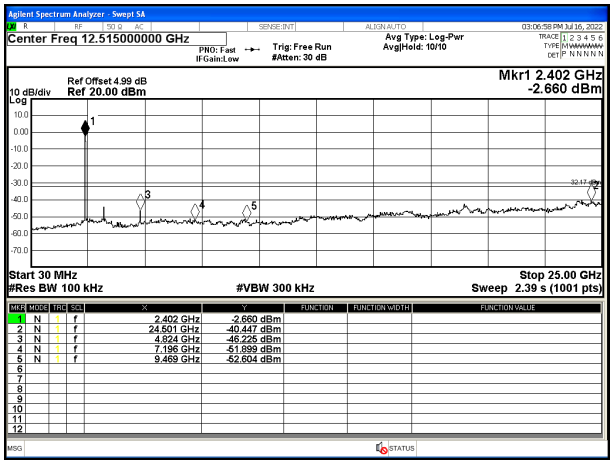




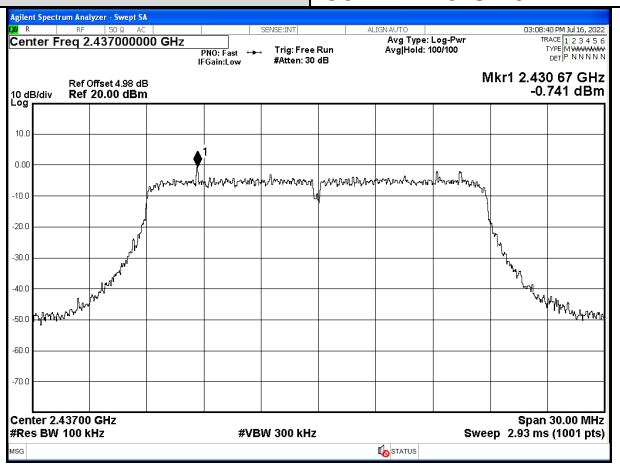


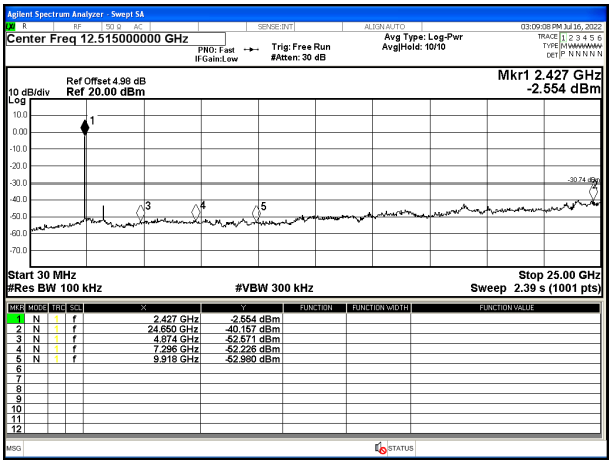
Test Mode:	802.11n20 CH1



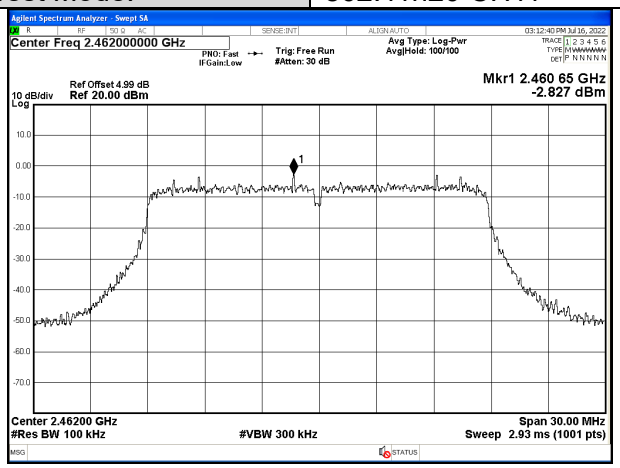


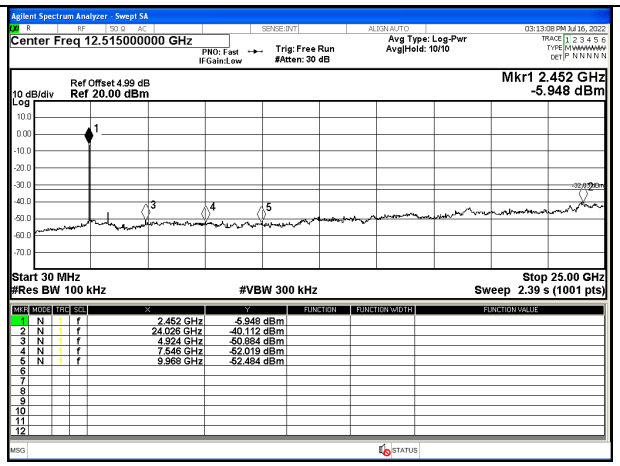
Test Mode:	802.11n20 CH6





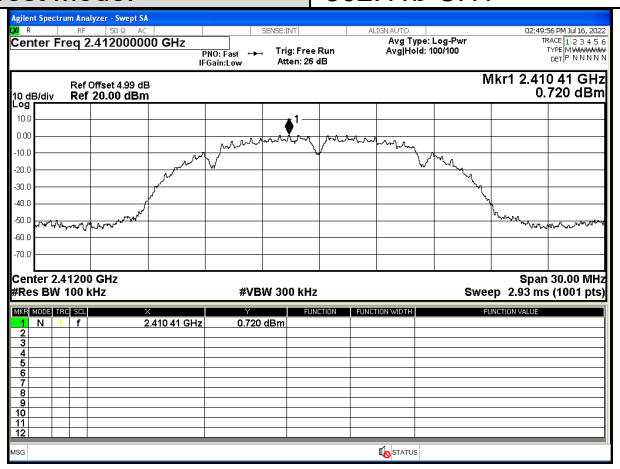
Test Mode:	802.11n20 CH11

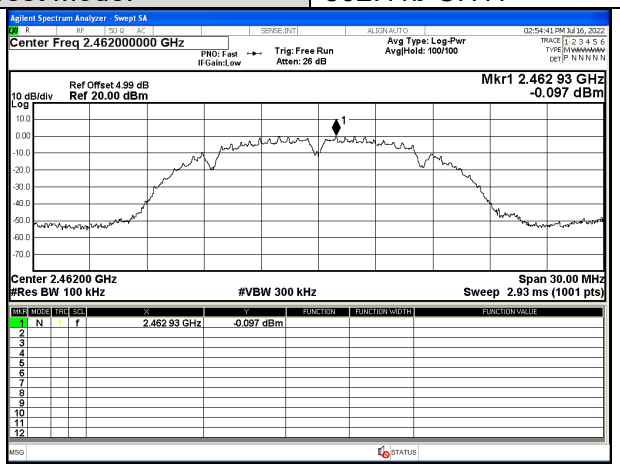


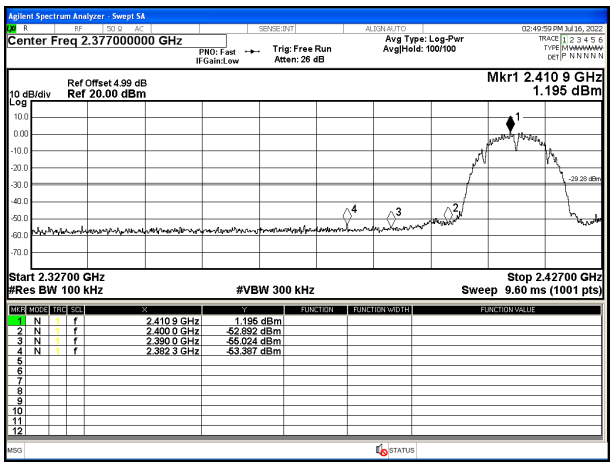

Agilent Spectrum Analyzer - Swept SA
Center Freq 12.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 10/10
03:13:08 PM Jul 16, 2022
Ref Offset 4.99 dB
10 dB/div Ref 20.00 dBm
Log
Mkr1 2.452 GHz
-5.948 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.39 s (1001 pts)
1 N 1 f 2.452 GHz -5.948 dBm
2 N 1 f 24.026 GHz -40.112 dBm
3 N 1 f 4.924 GHz -50.884 dBm
4 N 1 f 7.546 GHz -52.019 dBm
5 N 1 f 9.968 GHz -52.484 dBm

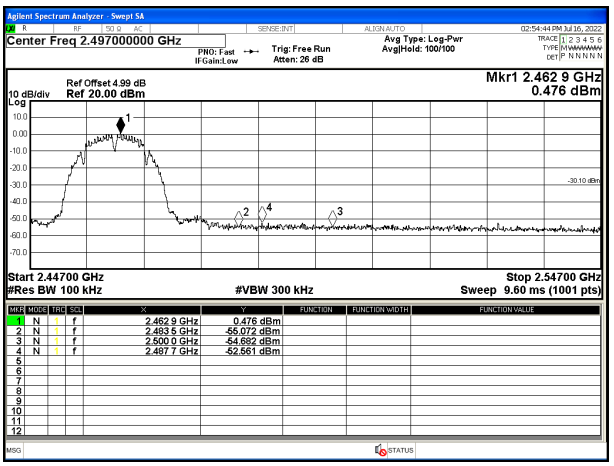
For Band edge(it's also the reference level for conducted spurious emission)

Test Mode:	802.11b CH1	Test Mode:	802.11b CH11

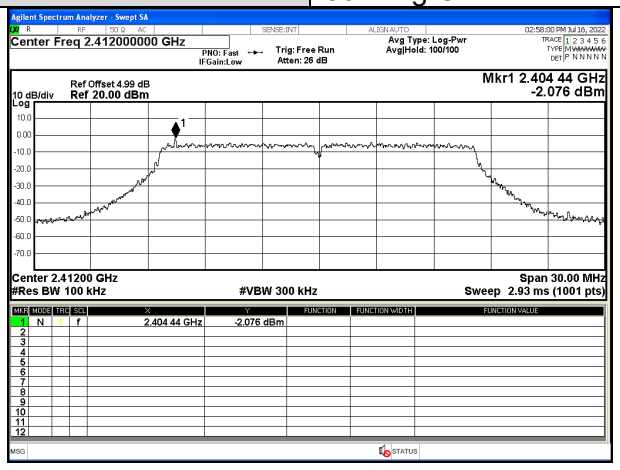


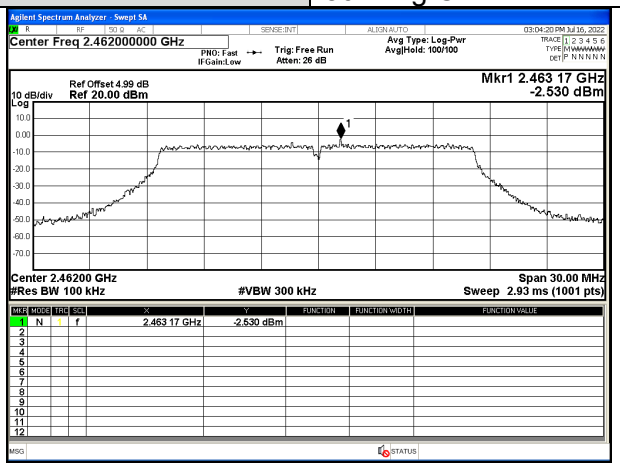


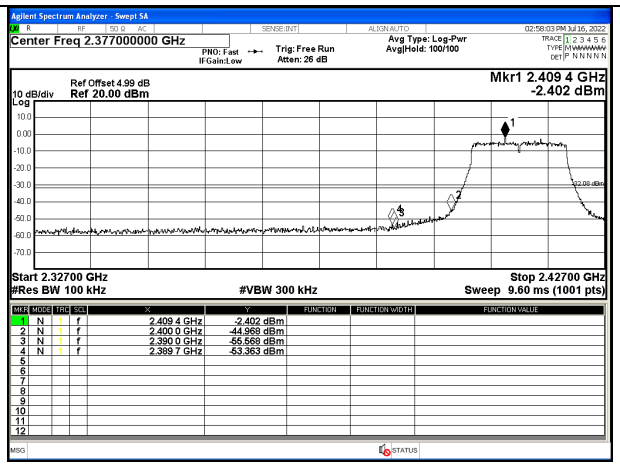


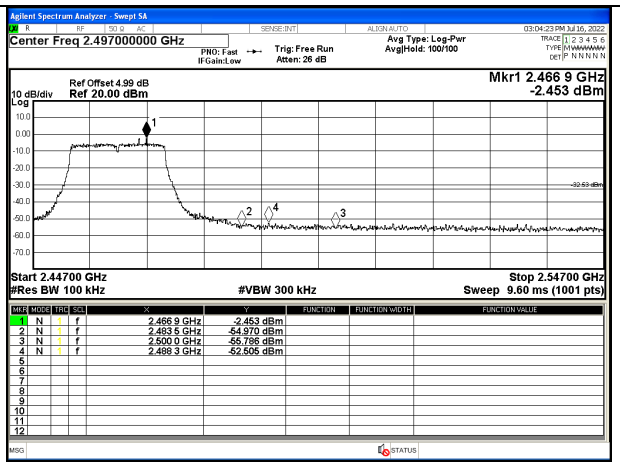


Test Mode:	802.11g CH1	Test Mode:	802.11g CH11

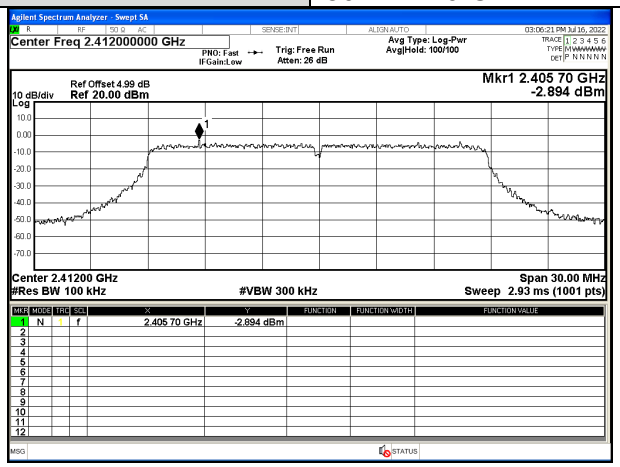


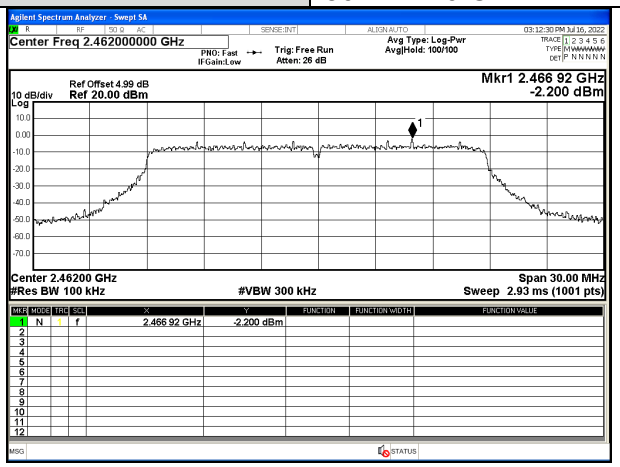


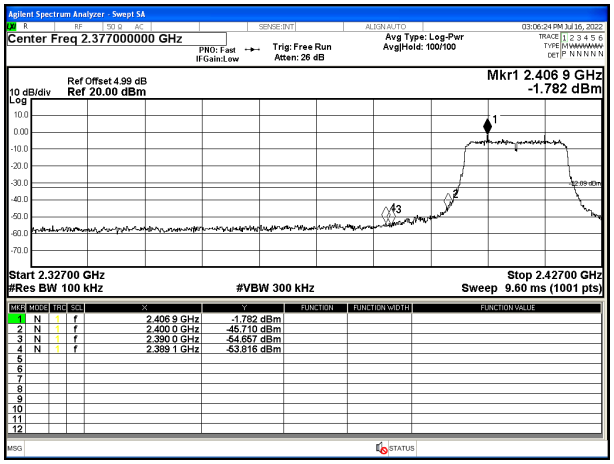


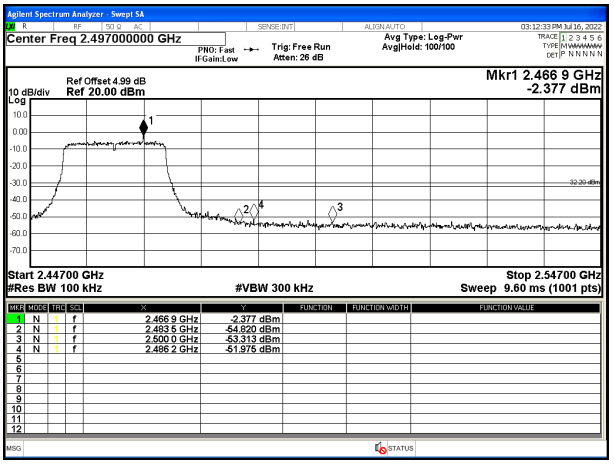


Test Mode:	802.11n20 CH1	Test Mode:	802.11n20 CH11









3.4. POWER SPECTRAL DENSITY TEST

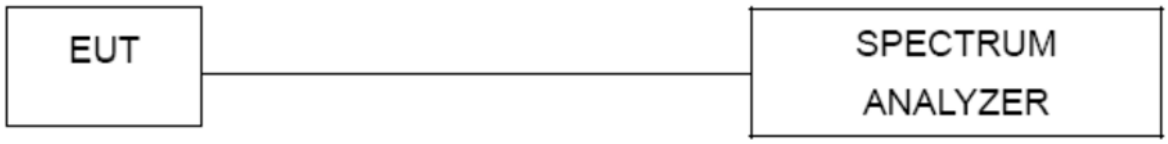
Limits

FCC Part 15.247,Subpart C				
Section	Test Item	Limit	FrequencyRange (MHz)	Result
15.247(e)	Power Spectral Density	≤8 dBm (RBW≥3KHz)	2400-2483.5	PASS

Test Procedure

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW to: 100 kHz ⩾ RBW ⩾ 3 kHz.
4. Set the VBW ⩾ 3 x RBW.
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 amplitude level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

TEST SETUP



EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.5 Unless otherwise a special operating condition is specified in the follows during the testing.

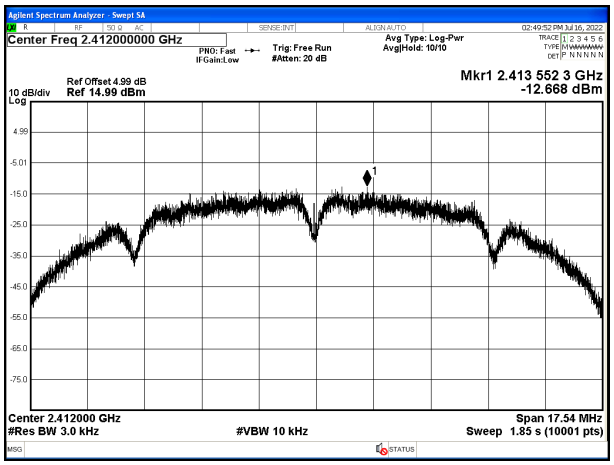
Test Results

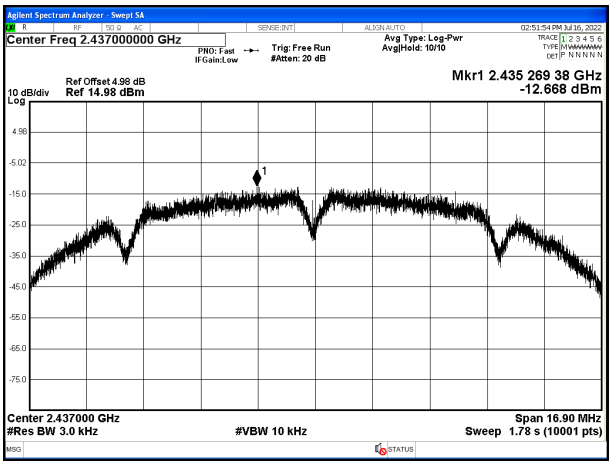
802.11b			
Frequency	Power Density (dBm/3kHz) (dBm)	Limit (dBm/3KHz)	Result
CH1(2412MHz)	-12.668	8	Pass
CH6(2437MHz)	-12.668	8	Pass
CH11(2462MHz)	-11.802	8	Pass

802.11g			
Frequency	Power Density (dBm/3kHz) (dBm)	Limit (dBm/3KHz)	Result
CH1(2412MHz)	-14.923	8	Pass
CH6(2437MHz)	-14.451	8	Pass
CH11(2462MHz)	-15.728	8	Pass

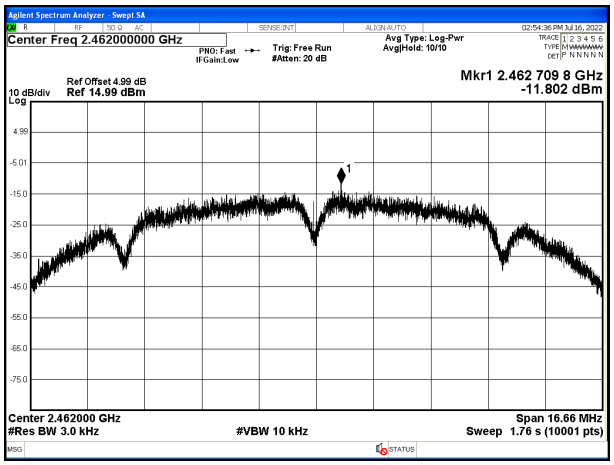
802.11n20			
Frequency	Power Density (dBm/3kHz) (dBm)	Limit (dBm/3KHz)	Result
CH1(2412MHz)	-14.252	8	Pass
CH6(2437MHz)	-13.462	8	Pass
CH11(2462MHz)	-14.686	8	Pass

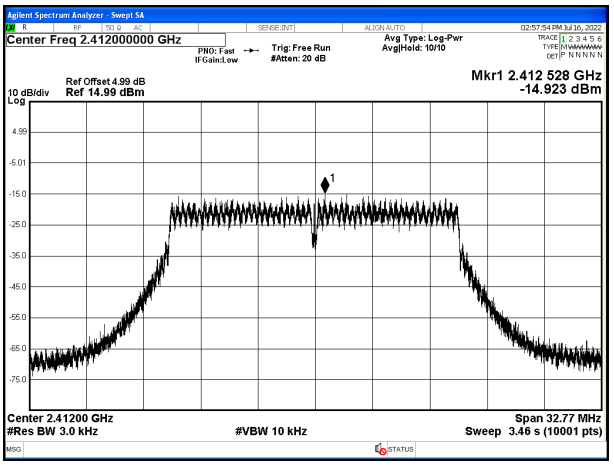
Test Mode:	802.11b CH1	Test Mode:	802.11b CH6



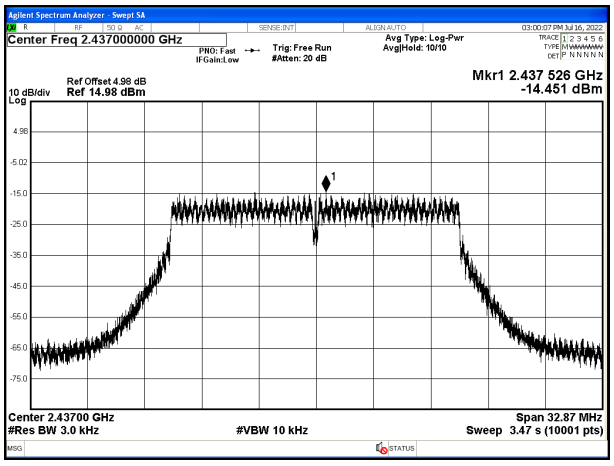


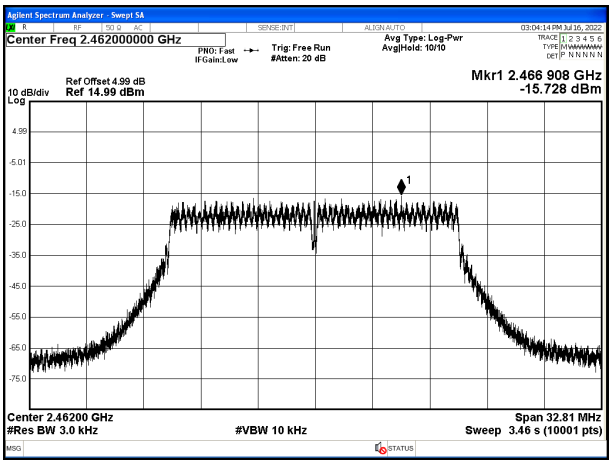
Test Mode:	802.11b CH11	Test Mode:	802.11g CH1



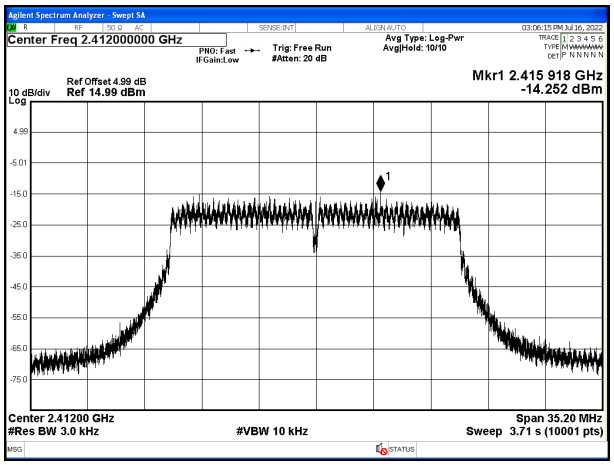


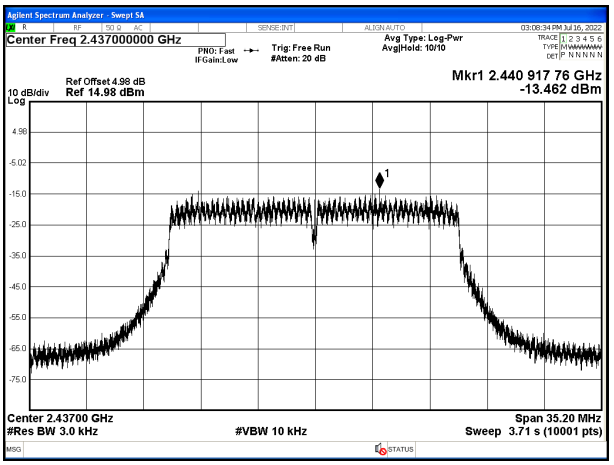
Test Mode:	802.11g CH6	Test Mode:	802.11g CH11



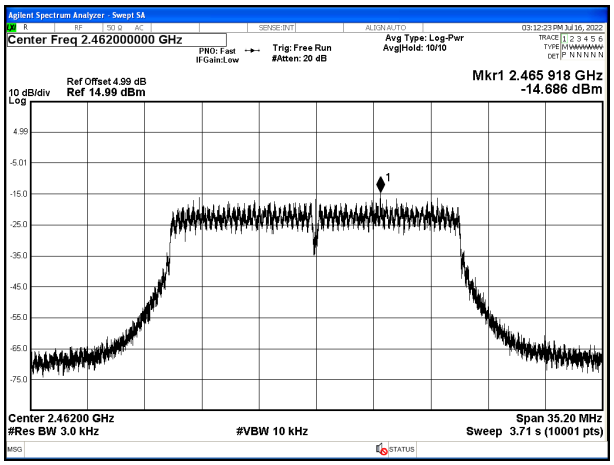


Test Mode:	802.11n20 CH1	Test Mode:	802.11n20 CH6





Test Mode:	802.11n20 CH11



3.5. 6dB BANDWIDTH TEST

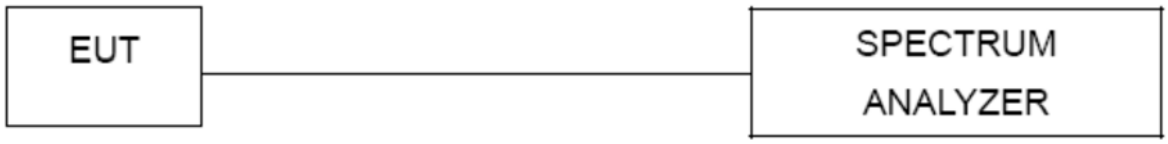
Limits

FCC Part 15.247,Subpart C				
Section	Test Item	Limit	FrequencyRange (MHz)	Result
15.247 (a)(2)	Bandwidth	≥500KHz 6dB bandwidth	2400-2483.5	PASS

Test Procedure

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW- 3RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be- 6 dB.

TEST SETUP



EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.5 Unless otherwise a special operating condition is specified in the follows during the testing.

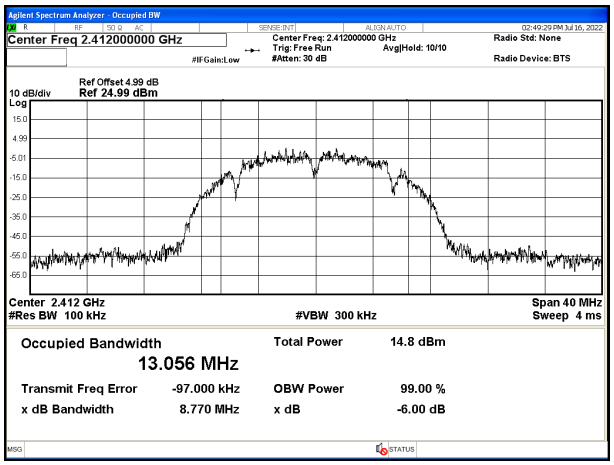
Test Results

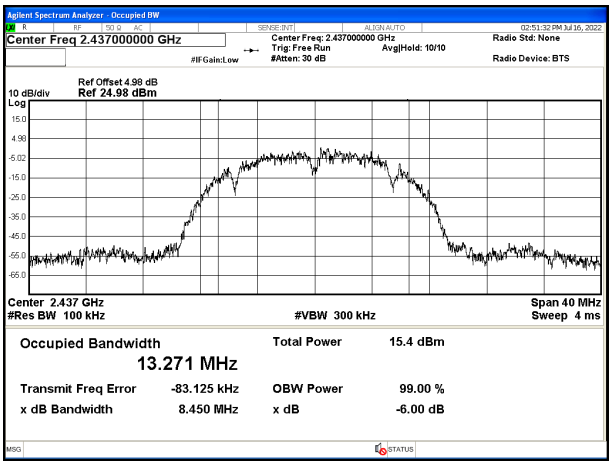
802.11b			
Frequency	6dB Bandwidth (MHz)	Channel Separation (KHz)	Result
CH1(2412MHz)	8.7701	0.5	Pass
CH6(2437MHz)	8.4503	0.5	Pass
CH11(2462MHz)	8.3309	0.5	Pass

802.11g			
Frequency	6dB Bandwidth (MHz)	Channel Separation (KHz)	Result
CH1(2412MHz)	16.3868	0.5	Pass
CH6(2437MHz)	16.4344	0.5	Pass
CH11(2462MHz)	16.4035	0.5	Pass

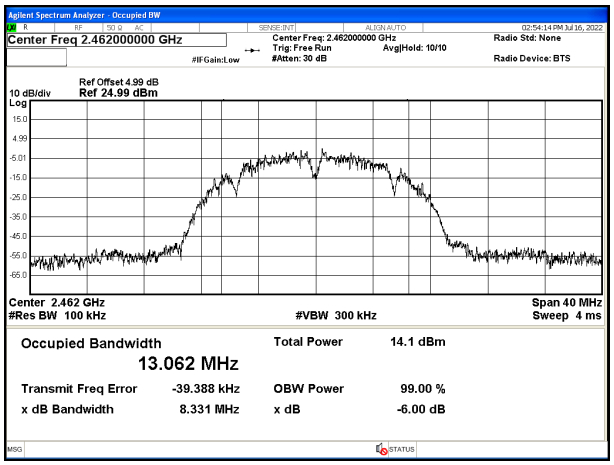
802.11n20			
Frequency	6dB Bandwidth (MHz)	Channel Separation (KHz)	Result
CH1(2412MHz)	17.6022	0.5	Pass
CH6(2437MHz)	17.6000	0.5	Pass
CH11(2462MHz)	17.5990	0.5	Pass

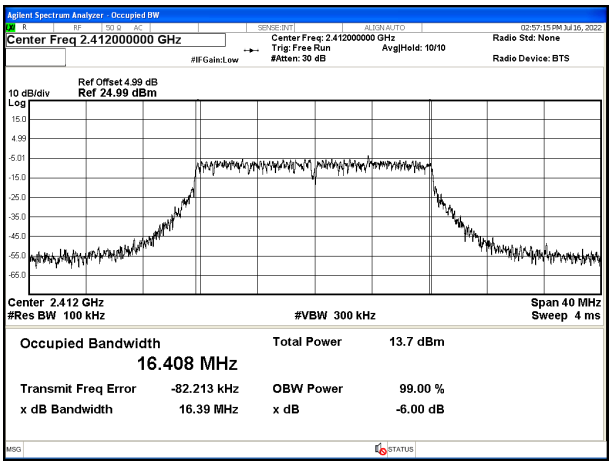
Test Mode:	802.11b CH1	Test Mode:	802.11b CH6



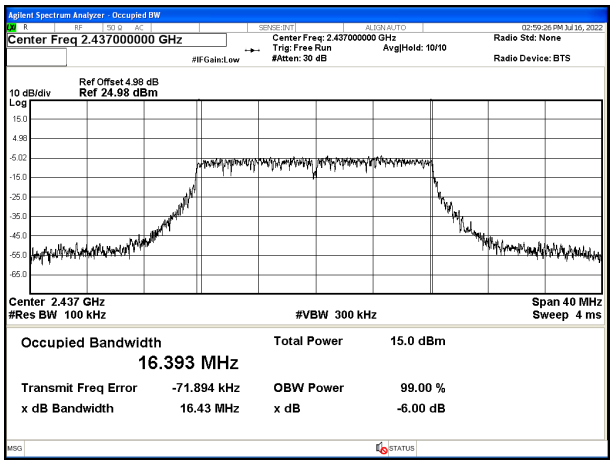


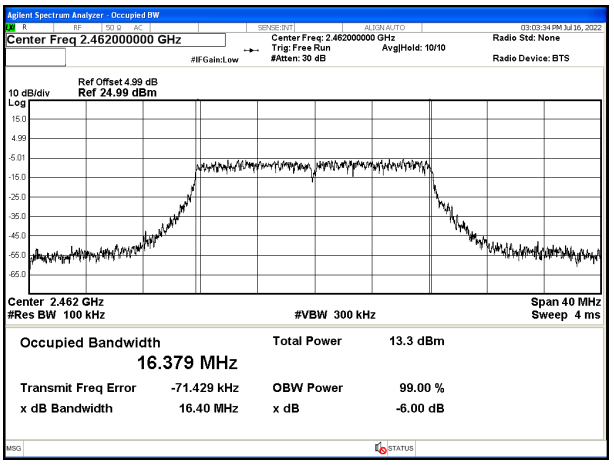
Test Mode:	802.11b CH11	Test Mode:	802.11g CH1



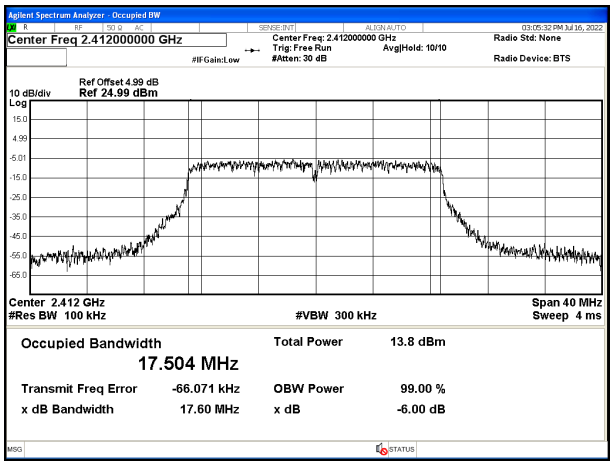


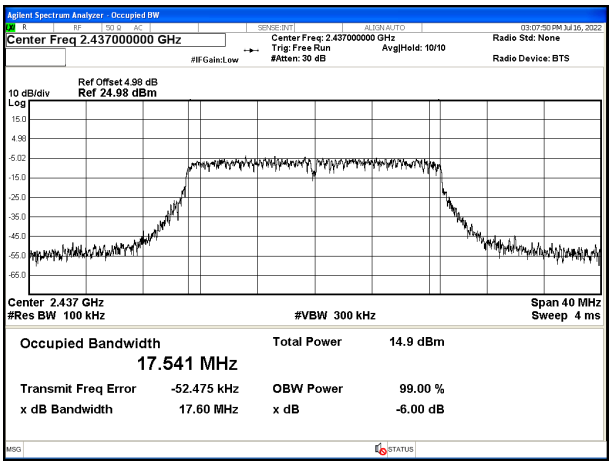
Test Mode:	802.11g CH6	Test Mode:	802.11g CH11



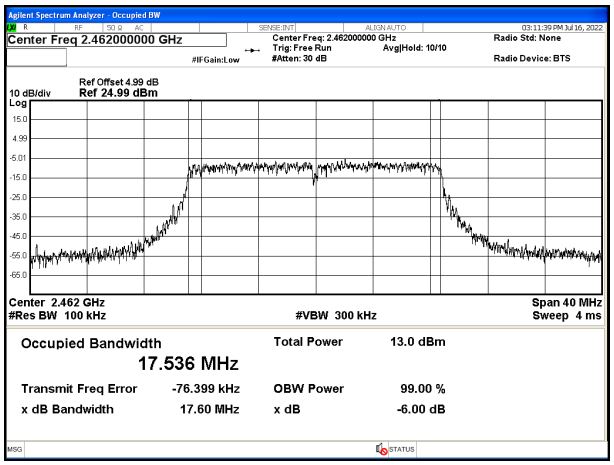


Test Mode:	802.11n20 CH1	Test Mode:	802.11n20 CH6





Test Mode:	802.11n20 CH11



3.6. MAXIMUM CONDUCTED(AVGRAGE) OUTPUT POWER TEST

Limits

FCC Part 15.247,Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (b)(3)	Output Power	1 watt or 30dBm	2400-2483.5	PASS

Test Procedure

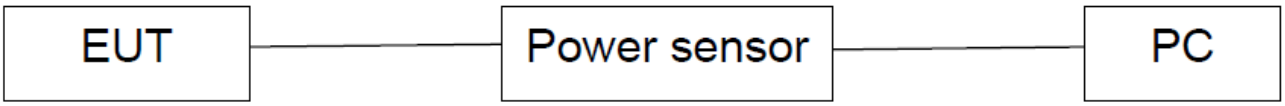
Some regulatory agencies permit the maximum conducted (average) output power to be measured as an alternative to the maximum peak conducted output power for determining compliance to the limit. When this option is exercised, the measured power is to be referenced to the OBW rather than to the DTS bandwidth (see 11.2 for definitions and 6.9.2 for measurement guidance).
When using a spectrum analyzer or EMI receiver to perform these measurements, it shall be capable of utilizing a number of measurement points in each sweep that is greater than or equal to twice the span / RBW, to set a bin-to-bin spacing of ≤ RBW / 2 so that narrowband signals are not lost between frequency bins. If possible, configure or modify the operation of the EUT so that it transmits continuously at its maximum power control level (see 11.6).
The intent is to test at 100% duty cycle; however, a small reduction in duty cycle (to no lower than 98%) is permitted, if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test laboratory to permit such continuous operation.
If continuous transmission (or at least 98% duty cycle) cannot be achieved because of hardware limitations (e.g., overheating), the EUT shall be operated at its maximum power control level, with the transmit duration as long as possible, and the duty cycle as high as possible during which sweep triggering/signal gating techniques may be used to perform the measurement over the transmission duration.

Measurement using a power meter (PM):
1. Method AVGPM:
Method AVGPM is a measurement using an RF average power meter, as follows:
a) As an alternative to spectrum analyzer or EMI receiver measurements, measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied:
1) The EUT is configured to transmit continuously, or to transmit with a constant duty cycle.
2) At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
3) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
b) If the transmitter does not transmit continuously, measure the duty cycle, D, of the transmitter output signal as described in 11.6.
c) Measure the average power of the transmitter. This measurement is an average over both the ON and OFF periods of the transmitter.
d) Adjust the measurement in dBm by adding [10 log (1 / D)], where D is the duty cycle.

2. Method AVGPM-G:
Method AVGPM-G is a measurement using a gated RF average power meter.

Alternatively, measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Because the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

TEST SETUP



EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.5 Unless otherwise a special operating condition is specified in the follows during the testing.

Test Results

802.11b				
Test Channel	Frequency (MHz)	AVG Power (dBm)	LIMIT dBm	Result
CH1	2412	8.68	30	Pass
CH6	2437	8.70	30	Pass
CH11	2462	7.90	30	Pass

802.11g				
Test Channel	Frequency (MHz)	AVG Power (dBm)	LIMIT dBm	Result
CH1	2412	8.50	30	Pass
CH6	2437	8.60	30	Pass
CH11	2462	7.60	30	Pass

802.11n20				
Test Channel	Frequency (MHz)	AVG Power (dBm)	LIMIT dBm	Result
CH1	2412	8.40	30	Pass
CH6	2437	9.93	30	Pass
CH11	2462	7.50	30	Pass

3.7. ANTENNA REQUIREMENT

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.

EUT ANTENNA

The EUT antenna is Dipole antenna. It comply with the standard requirement.

4. TEST PHOTOS

Please refer of Test Setup Photos_T220525032.

5. EUT PHOTOS

Please refer of External Photos_T220525032 and Internal Photos_T220525032.

**************************THE END**************************