



FCC TEST REPORT

FCC ID: 2AYE8MIFIDATA

Product Name	:	4G ROUTER
Model Name	:	LC111, LC112,LC113,LC115,LC116,LC117,LC118,GC111,GC112,GC113,G C115,B315,B525,E5573,E3372
Brand Name	:	N/A
Report No.	:	PTC20091603002E-FC01
Prepared for		
ShenZhen MifiData technology Co.,Ltd.		
4/F building F, Station Industrial Park ,TianBao road,ShiYan Town ,BaoAn District ,Shenzhen Guangdong, China		
Prepared by		
Precise Testing & Certification Corp., Ltd.		
Building 1, No.6 Tongxin Road, Dongcheng Street, Dongguan,China		



1TEST RESULT CERTIFICATION

Applicant's name : ShenZhen MifiData technology Co.,Ltd.
Address : 4/F building F, Station Industrial Park ,TianBao road,ShiYan
Town ,BaoAn District ,Shenzhen Guangdong, China

Manufacture's name : ShenZhen MifiData technology Co.,Ltd.
Address : 4/F building F, Station Industrial Park ,TianBao road,ShiYan
Town ,BaoAn District ,Shenzhen Guangdong, China

Product name : 4G ROUTER
Model name : LC111,
LC112,LC113,LC115,LC116,LC117,LC118,GC111,GC112,GC113,GC
115,B315,B525,E5573,E3372

Standards : FCC CFR47 Part 15 Section 15.247

Test procedure : ANSI C63.10:2013

Test Date : Dec 01, 2020 to Dec. 10, 2020

Date of Issue : Dec. 11, 2020

Test Result : Pass

This device described above has been tested by PTC, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Test Engineer:

Leo Yang / Engineer

Technical Manager:

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1. Summary of test results

The EUT have been tested according to the applicable standards as referenced below.

Description of Test Item	Standard	Results
6dB Bandwidth Bandwidth	FCC 15.247 (a) (2)	PASS
Conducted Output Power	FCC 15.247 (b) (3)	PASS
Power Spectral Density	FCC 15.247 (e)	PASS
Band-edge and Spurious Emissions (Conducted)	FCC 15.247 (d)	PASS
Radiated Spurious Emissions	FCC 15.247 (d) FCC 15.209 FCC 15.205	PASS
Radiated Band Edge Compliance	FCC 15.247 (d) FCC 15.209 FCC 15.205	PASS
Power Line Conducted Emission	FCC 15.207	PASS
Antenna requirement	FCC 15.203	PASS

Notes:

- The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
- All modes of operation and data rates were investigated. For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst case emissions.



11 TEST FACILITY

Dongguan Precise Testing & Certification Corp., Ltd.

Address: Building 1, No.6 Tongxin Road, Dongcheng Street, Dongguan, China

FCC Registration Number: 790290

A2LA Certificate No.: 4408.01

IC Registration Number: 12191A

2. General test information

2.1 Description of EUT

EUT* Name	: 4G ROUTER
Model Number	: LC111, LC112,LC113,LC115,LC116,LC117,LC118,GC111,GC112,GC113,GC115,B315,B525,E5573,E3372
EUT function description	: Please reference user manual of this device
Power supply	: DC 12V from external AC Adapter (Model : RA042-1201000US)
Radio Technology	: IEEE 802.11b/g/n
Operation frequency	: IEEE 802.11b: 2412MHz—2462MHz IEEE 802.11g: 2412MHz—2462MHz IEEE 802.11n HT20: 2412MHz—2462MHz
Modulation	: IEEE 802.11b: DSSS(CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Transmitter rate	: IEEE 802.11b: 1, 2, 5.5, 11 Mbps IEEE 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps IEEE 802.11n HT20: up to 150 Mbps
Antenna Type	: Integrated metal antenna 0: 2.4G band maximum PK gain 4.97dBi Integrated metal antenna 1: 2.4G band maximum PK gain 4.97dBi
Sample Type	: Family production

Note1: EUT is the ab. of equipment under test.

Notes: 201 is the last of equipment under test.

Antenna information							
		Ant0 gain		Ant1 gain		MIMO	
IEEE 802.11b		4.97		4.97		/	
IEEE 802.11g		4.97		4.97		/	
IEEE 802.11n HT20		4.97		4.97		7.98	
Channel information							
CH	Frequency	CH	Frequency	CH	Frequency	CH	Frequency
1	2412	5	2432	9	2452	/	/
2	2417	6	2437	10	2457	/	/
3	2422	7	2442	11	2462	/	/
4	2427	8	2447	/	/	/	/



22 Accessories of EUT

Description of Accessories	Manufacturer	Model number	Serial No.	Other
AC Adapter	N/A	RA042-1201000US	N/A	Input: AC 100-240V -50/60Hz, 0.35A Max: Output: DC 12V, 1A; Length: 0.8m

**23 Assistant equipment used for test**

Assistant equipment	Manufacturer	Model number	EMC Compliance	SN
Notebook	DELL	Latitude D610	FCC DOC	00045-534-136-300
Network Cable	N/A	N/A	N/A	Length: 1.5m

24 Block diagram of EUT configuration for test



EUT was connected to control to provided by manufacturer which has a standard LAN PORT connector to connect to Notebook, and the Notebook will run “CMD telnet” to control EUT work in Continuous Tx mode(100% duty cycle), and select test channel, wireless mode and data rate.

Tested mode, channel, and data rate information				
Mode	Setting Tx Power	data rate (Mbps) (see Note)	Channel	Frequency (MHz)
IEEE 802.11b	/	1	LCH :CH1	2412
	/	1	MCH: CH6	2437
	/	1	HCH: CH11	2462
IEEE 802.11g	/	6	LCH :CH1	2412
	/	6	MCH: CH6	2437
	/	6	HCH: CH11	2462
IEEE 802.11n HT20	/	MCS 0	LCH :CH1	2412
	/	MCS 0	MCH: CH6	2437
	/	MCS 0	HCH: CH11	2462
Note: According exploratory test, EUT will have maximum output power in those data rate, so those data rate were used for all test.				

25 Deviations of test standard

No Deviation

26 Test environment conditions

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

Temperature range:	21-25°C
Humidity range:	40-75%
Pressure range:	86-106kPa

27. Measurement uncertainty

Parameter	Uncertainty
RF output power, conducted	±1.0dB
Power Spectral Density, conducted	±2.2dB
Radio Frequency	± 1 x 10 ⁻⁶
Bandwidth	± 1.5 x 10 ⁻⁶
Time	±2%
Duty Cycle	±2%
Temperature	±1°C
Humidity	±5%
DC and low frequency voltages	±3%
Conducted Emissions (150kHz~30MHz)	±3.64dB
Radiated Emission(30MHz~1GHz)	±5.03dB
Radiated Emission(1GHz~25GHz)	±4.74dB
Remark: The coverage Factor (k=2), and measurement Uncertainty for a level of Confidence of 95%	

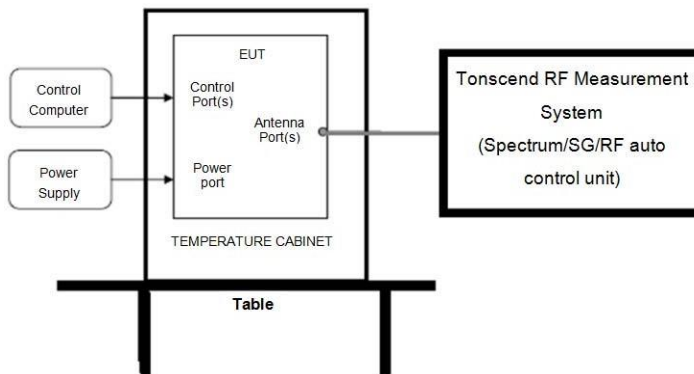


3. Equipment used during test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
RF Connected Test (Tonscend RF Measurement System)					
Spectrum analyzer	R&S	FSU26	200071	Sep. 18, 2020	1 Year
Wideband Radio Communication tester	R&S	CMW500	117491	Sep. 18, 2020	1 Year
Vector Signal Generator	Agilent	E8267D	US49060192	Sep. 18, 2020	1 Year
Vector Signal Generator	Agilent	N5182A	MY48180737	Sep. 18, 2020	1 Year
Power Sensor	Agilent	U2021XA	MY55150010	Sep. 18, 2020	1 Year
Power Sensor	Agilent	U2021XA	MY55150011	Sep. 18, 2020	1 Year
DC Power Source	MATRIS	MPS-3005L-3	D813058W	Sep. 18, 2020	1 Year
Attenuator	Mini-Circuits	BW-S10W2	101109	Sep. 18, 2020	1 Year
RF Cable	Micable	C10-01-01-1	100309	Sep. 18, 2020	1 Year
Temp&Humi Programmable	ZHIXIANG	ZXGDJS-150 L	ZX170110-A	Sep. 18, 2020	1 Year
Test Software	JS Tonscend	JS1120-3	Ver.2.7	N/A	N/A
Radiated Emission Test Chamber 1#					
EMI Test Receiver	R&S	ESU8	100316	Sep. 18, 2020	1 Year
Spectrum analyzer	Agilent	E4447A	MY50180031	Sep. 18, 2020	1 Year
Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	Sep. 18, 2020	1 Year
Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	Sep. 18, 2020	1 Year
Double Ridged Horn Antenna	R&S	HF907	100276	Sep. 18, 2020	1 Year
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	790	Sep. 18, 2020	1 Year
Pre-amplifier	A.H.	PAM-0118	360	Sep. 18, 2020	1 Year
Pre-amplifier	TERA-MW	TRLA-0040G 35	101303	Sep. 18, 2020	1 Year
RF Cable	HUBSER	CP-X2+ CP-X1	W11.03+ W12.02	Sep. 18, 2020	1 Year
RF Cable	N/A	SMAJ-SMAJ-1M+ 11M	17070133 +17 070131	Sep. 18, 2020	1 Year
MI Cable	HUBSER	C10-01-01-1 M	1091629	Sep. 18, 2020	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A
Power Line Conducted Emissions Test					
Test Receiver	R&S	ESU8	100316	Sep. 18, 2020	1 Year
LISN 1	R&S	ENV216	101109	Sep. 18, 2020	1 Year
LISN 2	R&S	ESH2-Z5	100309	Sep. 18, 2020	1 Year
Pulse Limiter	R&S	ESH3-Z2	101242	Sep. 18, 2020	1 Year
CE Cable 1	HUBSER	N/A	W10.01	Sep. 18, 2020	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A

4. 6dB Bandwidth

4.1 Block diagram of test setup



4.2 Limits

For direct sequence systems, the minimum 6dB bandwidth shall be at least 500 kHz

4.3 Test Procedure

- (1) Connect EUT's antenna output to spectrum analyzer by RF cable.
- (2) Set the spectrum analyzer as follows:

RBW:	100kHz
VBW:	300kHz
Detector Mode:	Peak
Sweep time:	auto
Trace mode	Max hold

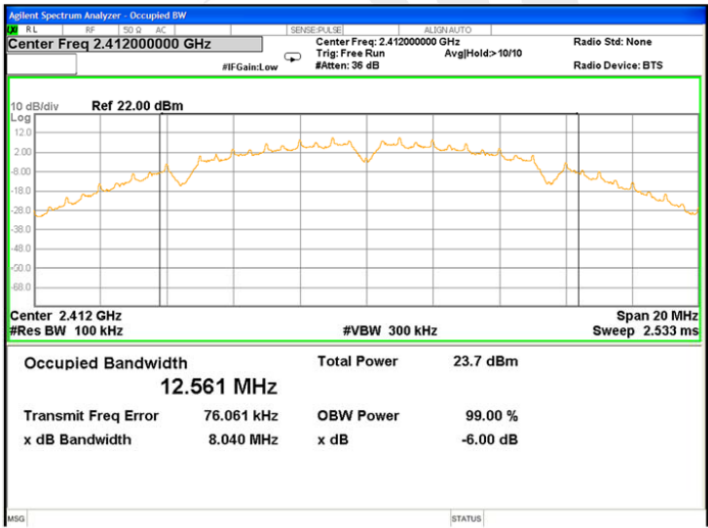
- (3) Allow the trace to stabilize, measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



44 Test Result

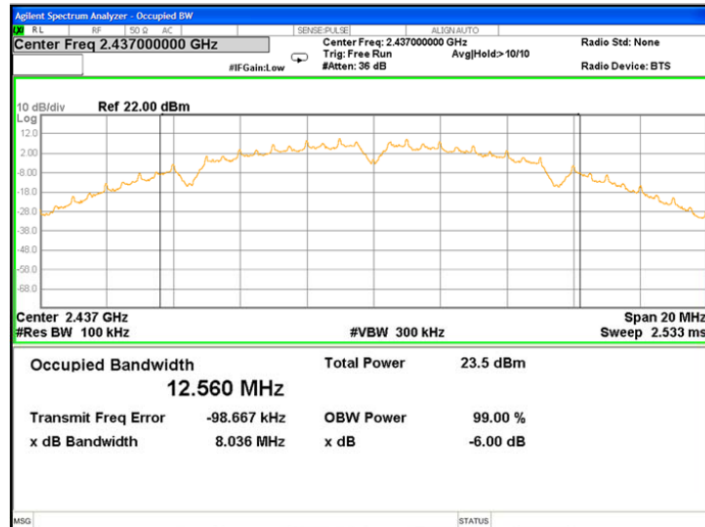
Test Mode	Frequency (MHz)	Measurement (kHz)		Limit (kHz)
		ANT-0	ANT-1	
IEEE 802.11b	2412	8.040	9.554	> 500
	2437	8.036	9.065	> 500
	2462	7.076	9.559	> 500
IEEE 802.11g	2412	15.430	15.110	> 500
	2437	15.460	15.090	> 500
	2462	15.310	15.090	> 500
IEEE 802.11n HT20	2412	16.020	15.100	> 500
	2437	15.970	15.090	> 500
	2462	15.920	15.090	> 500

45 original test plots

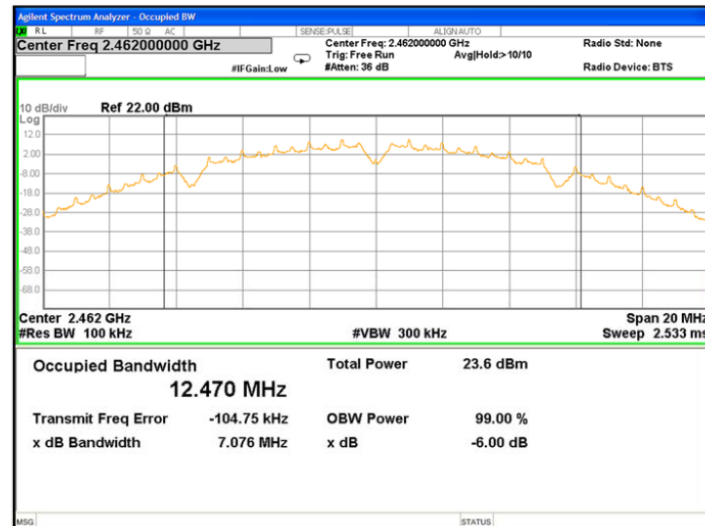
Test Mode:	IEEE 802.11b TX mode
Antenna:	ANT-0
2412 MHz	 Agilent Spectrum Analyzer - Occupied BW Center Freq 2.412000000 GHz Ref 22.00 dBm 10 dB/div Log Center Freq 2.412 GHz #Res BW 100 kHz #VBW 300 kHz Span 20 MHz Sweep 2.533 ms Occupied Bandwidth 12.561 MHz Total Power 23.7 dBm Transmit Freq Error 76.061 kHz OBW Power 99.00 % x dB Bandwidth 8.040 MHz x dB -6.00 dB



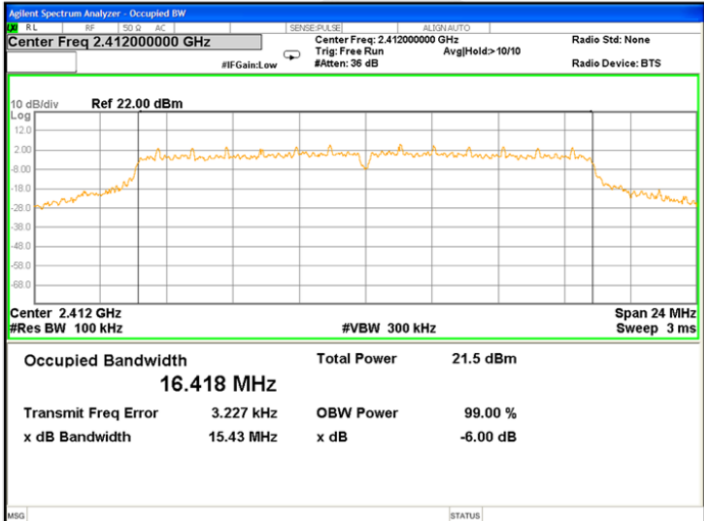
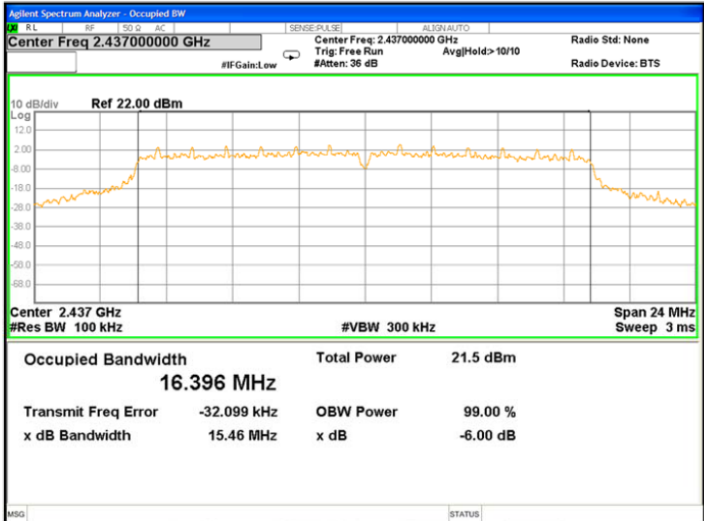
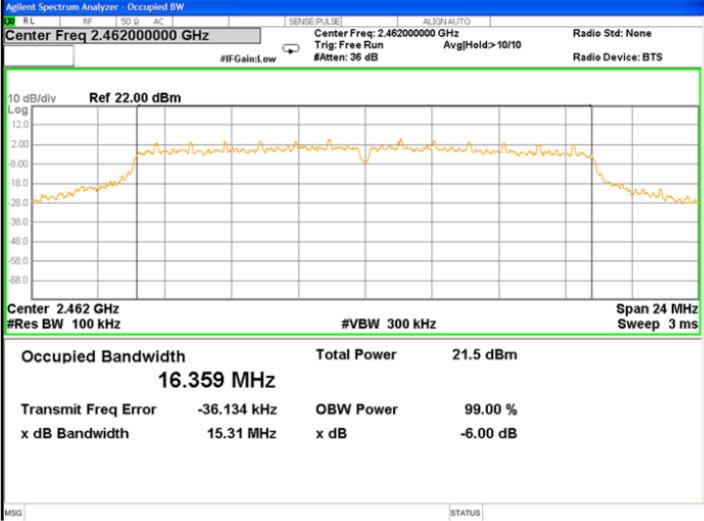
2437 MHz



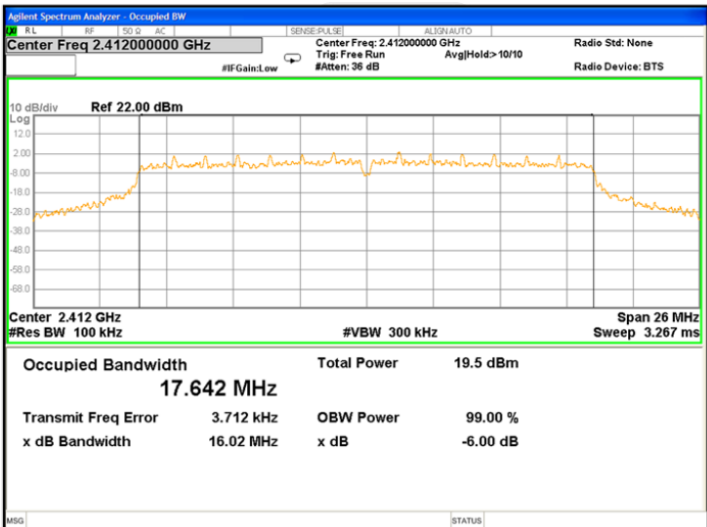
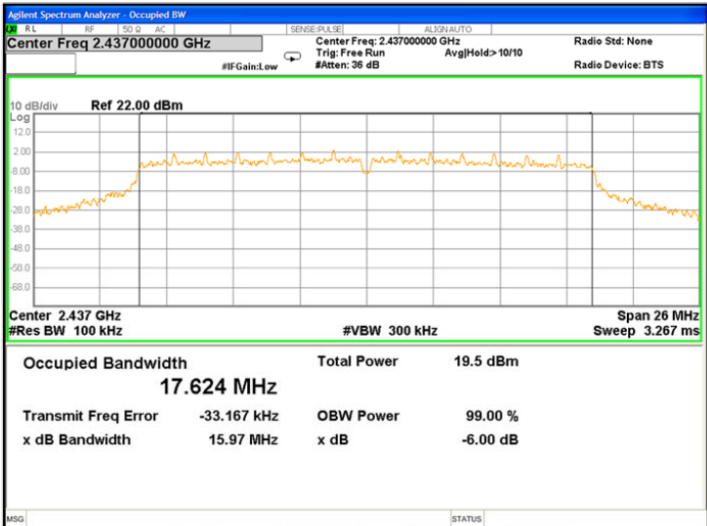
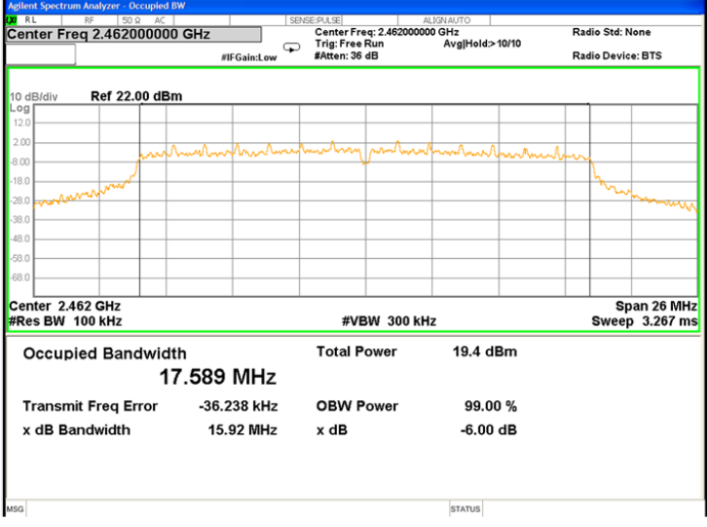
2462 MHz



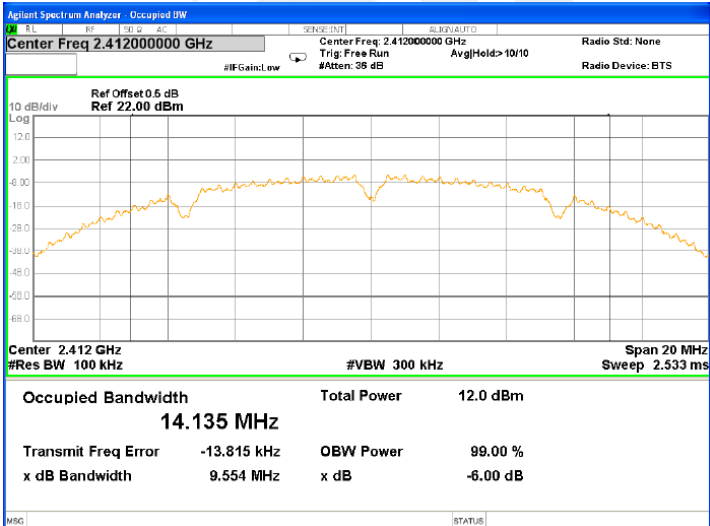
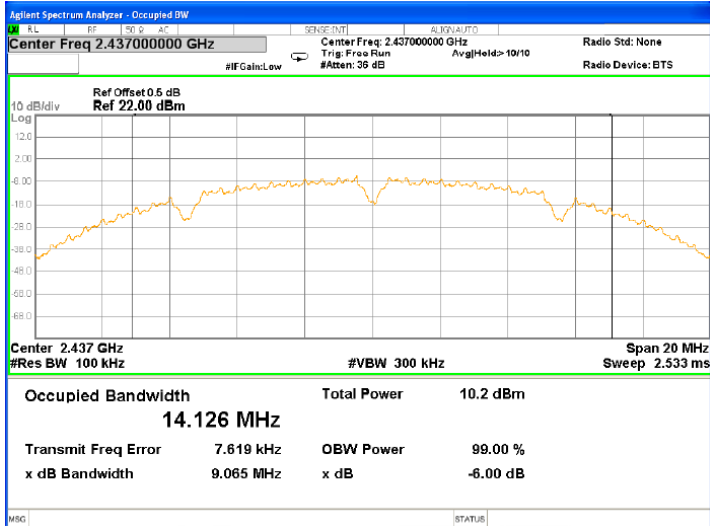
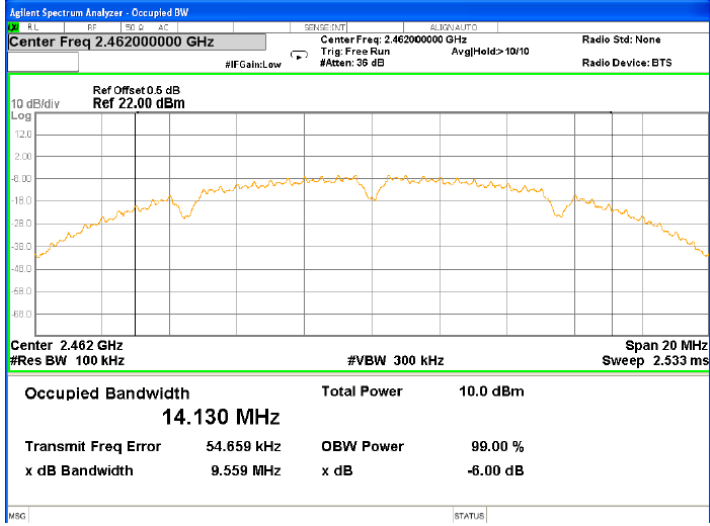


Test Mode:	IEEE 802.11g TX mode
Antenna:	ANT-0
2412 MHz	 Agilent Spectrum Analyzer - Occupied BW Center Freq 2.412000000 GHz Center Freq: 2.412000000 GHz Trig: Free Run #Attenu: 36 dB Avg/Hold: >10/10 Radio Std: None Radio Device: BTS 10 dB/div Ref 22.00 dBm Center 2.412 GHz #Res BW 100 kHz #VBW 300 kHz Span 24 MHz Sweep 3 ms Occupied Bandwidth 16.418 MHz Total Power 21.5 dBm Transmit Freq Error 3.227 kHz OBW Power 99.00 % x dB Bandwidth 15.43 MHz x dB -6.00 dB
2437 MHz	 Agilent Spectrum Analyzer - Occupied BW Center Freq 2.437000000 GHz Center Freq: 2.437000000 GHz Trig: Free Run #Attenu: 36 dB Avg/Hold: >10/10 Radio Std: None Radio Device: BTS 10 dB/div Ref 22.00 dBm Center 2.437 GHz #Res BW 100 kHz #VBW 300 kHz Span 24 MHz Sweep 3 ms Occupied Bandwidth 16.396 MHz Total Power 21.5 dBm Transmit Freq Error -32.099 kHz OBW Power 99.00 % x dB Bandwidth 15.46 MHz x dB -6.00 dB
2462 MHz	 Agilent Spectrum Analyzer - Occupied BW Center Freq 2.462000000 GHz Center Freq: 2.462000000 GHz Trig: Free Run #Attenu: 36 dB Avg/Hold: >10/10 Radio Std: None Radio Device: BTS 10 dB/div Ref 22.00 dBm Center 2.462 GHz #Res BW 100 kHz #VBW 300 kHz Span 24 MHz Sweep 3 ms Occupied Bandwidth 16.359 MHz Total Power 21.5 dBm Transmit Freq Error -36.134 kHz OBW Power 99.00 % x dB Bandwidth 15.31 MHz x dB -6.00 dB

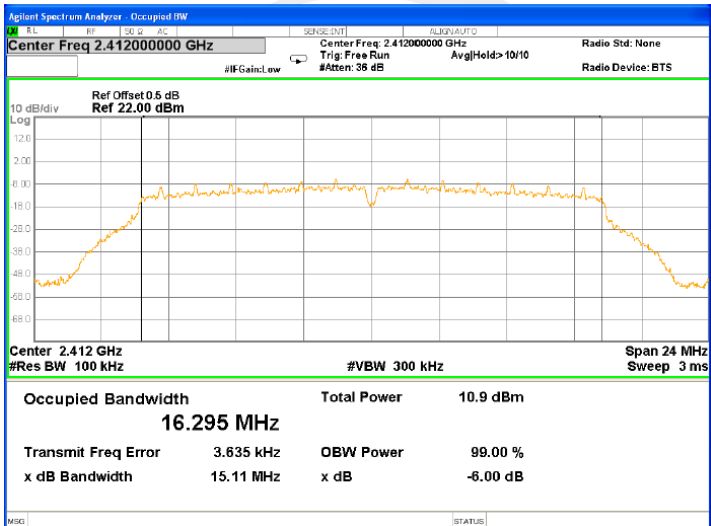
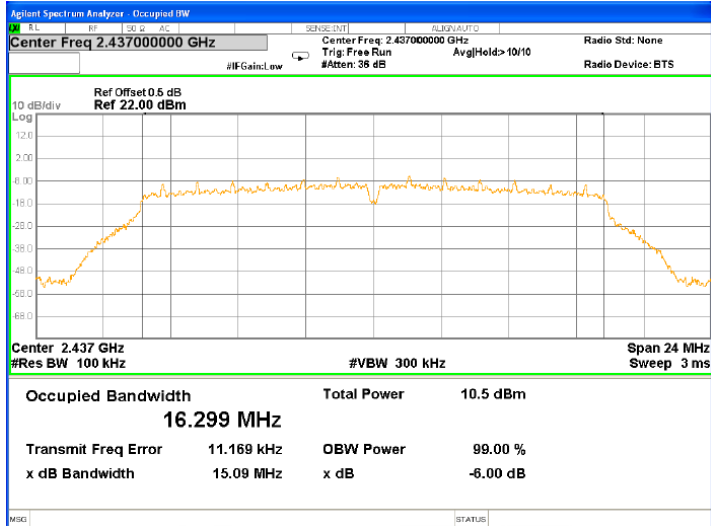
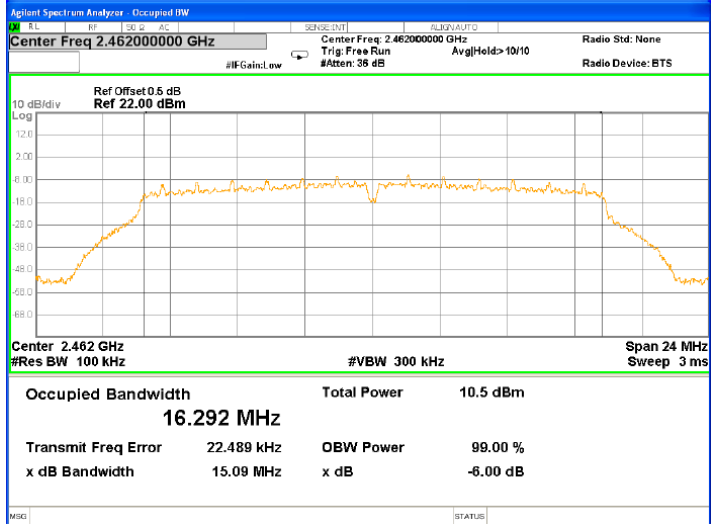


Test Mode:	IEEE 802.11n 2.4GHz 20MHz TX mode
Antenna:	ANT-0
2412 MHz	 Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.412000000 GHz Center Freq: 2.412000000 GHz Trig: Free Run Avg: Hold > 10/10 Radio Std: None Radio Device: BTS Ref 22.00 dBm 10 dB/div Log Center 2.412 GHz #Res BW 100 kHz #VBW 300 kHz Span 26 MHz Sweep 3.267 ms Occupied Bandwidth 17.642 MHz Total Power 19.5 dBm Transmit Freq Error 3.712 kHz OBW Power 99.00 % x dB Bandwidth 16.02 MHz x dB -6.00 dB
2437 MHz	 Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.437000000 GHz Center Freq: 2.437000000 GHz Trig: Free Run Avg: Hold > 10/10 Radio Std: None Radio Device: BTS Ref 22.00 dBm 10 dB/div Log Center 2.437 GHz #Res BW 100 kHz #VBW 300 kHz Span 26 MHz Sweep 3.267 ms Occupied Bandwidth 17.624 MHz Total Power 19.5 dBm Transmit Freq Error -33.167 kHz OBW Power 99.00 % x dB Bandwidth 15.97 MHz x dB -6.00 dB
2462 MHz	 Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.462000000 GHz Center Freq: 2.462000000 GHz Trig: Free Run Avg: Hold > 10/10 Radio Std: None Radio Device: BTS Ref 22.00 dBm 10 dB/div Log Center 2.462 GHz #Res BW 100 kHz #VBW 300 kHz Span 26 MHz Sweep 3.267 ms Occupied Bandwidth 17.589 MHz Total Power 19.4 dBm Transmit Freq Error -36.238 kHz OBW Power 99.00 % x dB Bandwidth 15.92 MHz x dB -6.00 dB

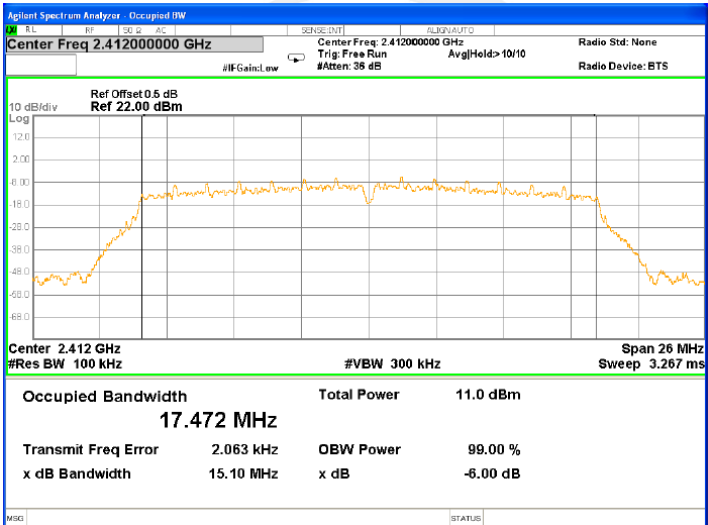
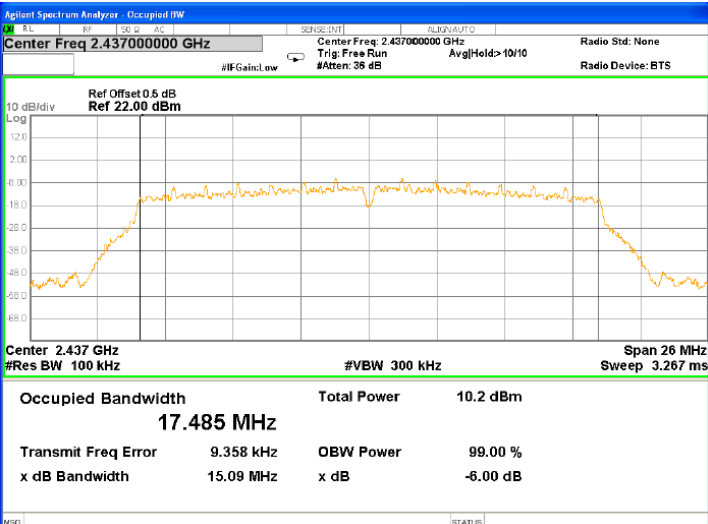
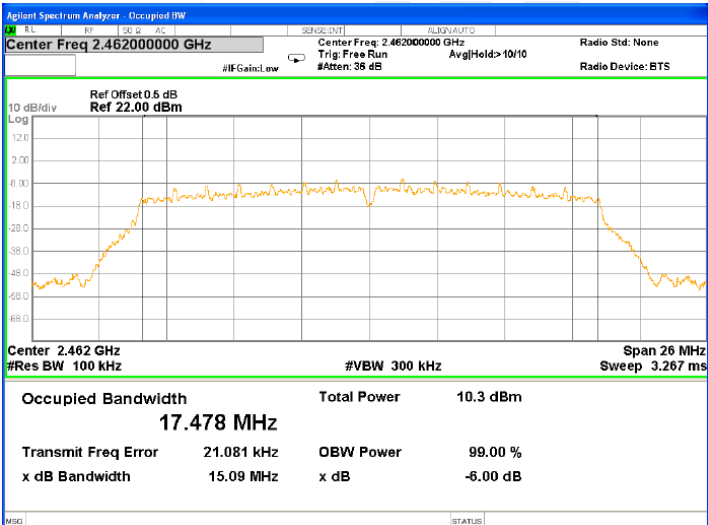


Test Mode:	IEEE 802.11b TX mode
Antenna:	ANT-1
2412 MHz	 Agilent Spectrum Analyzer - Occupied BW Center Freq 2.412000000 GHz Ref Offset 0.5 dB Ref 22.00 dBm 10 dB/div Center 2.412 GHz #Res BW 100 kHz #VBW 300 kHz Span 20 MHz Sweep 2.533 ms Occupied Bandwidth 14.135 MHz Total Power 12.0 dBm Transmit Freq Error -13.815 kHz OBW Power 99.00 % x dB Bandwidth 9.554 MHz x dB -6.00 dB
2437 MHz	 Agilent Spectrum Analyzer - Occupied BW Center Freq 2.437000000 GHz Ref Offset 0.5 dB Ref 22.00 dBm 10 dB/div Center 2.437 GHz #Res BW 100 kHz #VBW 300 kHz Span 20 MHz Sweep 2.533 ms Occupied Bandwidth 14.126 MHz Total Power 10.2 dBm Transmit Freq Error 7.619 kHz OBW Power 99.00 % x dB Bandwidth 9.065 MHz x dB -6.00 dB
2462 MHz	 Agilent Spectrum Analyzer - Occupied BW Center Freq 2.462000000 GHz Ref Offset 0.5 dB Ref 22.00 dBm 10 dB/div Center 2.462 GHz #Res BW 100 kHz #VBW 300 kHz Span 20 MHz Sweep 2.533 ms Occupied Bandwidth 14.130 MHz Total Power 10.0 dBm Transmit Freq Error 54.659 kHz OBW Power 99.00 % x dB Bandwidth 9.559 MHz x dB -6.00 dB



Test Mode:	IEEE 802.11g TX mode
Antenna:	ANT-1
2412 MHz	 Agilent Spectrum Analyzer - Occupied BW Center Freq 2.412000000 GHz Ref Offset 0.5 dB Ref 22.00 dBm 10 dB/div Log Center 2.412 GHz #Res BW 100 kHz #VBW 300 kHz Span 24 MHz Sweep 3 ms Occupied Bandwidth 16.295 MHz Total Power 10.9 dBm Transmit Freq Error 3.635 kHz OBW Power 99.00 % x dB Bandwidth 15.11 MHz x dB -6.00 dB
2437 MHz	 Agilent Spectrum Analyzer - Occupied BW Center Freq 2.437000000 GHz Ref Offset 0.5 dB Ref 22.00 dBm 10 dB/div Log Center 2.437 GHz #Res BW 100 kHz #VBW 300 kHz Span 24 MHz Sweep 3 ms Occupied Bandwidth 16.299 MHz Total Power 10.5 dBm Transmit Freq Error 11.169 kHz OBW Power 99.00 % x dB Bandwidth 15.09 MHz x dB -6.00 dB
2462 MHz	 Agilent Spectrum Analyzer - Occupied BW Center Freq 2.462000000 GHz Ref Offset 0.5 dB Ref 22.00 dBm 10 dB/div Log Center 2.462 GHz #Res BW 100 kHz #VBW 300 kHz Span 24 MHz Sweep 3 ms Occupied Bandwidth 16.292 MHz Total Power 10.5 dBm Transmit Freq Error 22.489 kHz OBW Power 99.00 % x dB Bandwidth 15.09 MHz x dB -6.00 dB



Test Mode:	IEEE 802.11n 2.4GHz 20MHz TX mode
Antenna:	ANT-1
2412 MHz	 Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.412000000 GHz Ref Offset: 0.5 dB Ref: 22.00 dBm Center: 2.412 GHz #Res BW: 100 kHz #VBW: 300 kHz Span: 26 MHz Sweep: 3.267 ms Occupied Bandwidth: 17.472 MHz Total Power: 11.0 dBm Transmit Freq Error: 2.063 kHz OBW Power: 99.00 % x dB Bandwidth: 15.10 MHz x dB: -6.00 dB
2437 MHz	 Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.437000000 GHz Ref Offset: 0.5 dB Ref: 22.00 dBm Center: 2.437 GHz #Res BW: 100 kHz #VBW: 300 kHz Span: 26 MHz Sweep: 3.267 ms Occupied Bandwidth: 17.485 MHz Total Power: 10.2 dBm Transmit Freq Error: 9.358 kHz OBW Power: 99.00 % x dB Bandwidth: 15.09 MHz x dB: -6.00 dB
2462 MHz	 Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.462000000 GHz Ref Offset: 0.5 dB Ref: 22.00 dBm Center: 2.462 GHz #Res BW: 100 kHz #VBW: 300 kHz Span: 26 MHz Sweep: 3.267 ms Occupied Bandwidth: 17.478 MHz Total Power: 10.3 dBm Transmit Freq Error: 21.081 kHz OBW Power: 99.00 % x dB Bandwidth: 15.09 MHz x dB: -6.00 dB



5. Conducted Output Power

51 Block diagram of test setup

Same as section 4.1

52 Limits

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. 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 as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

53 Test Procedure

Method Peak (Measurement using a gated RF Peak -reading power meter). Connect each EUT's antenna output to power sensor by RF cable and attenuator Measure the PK output power of each antenna port by power meter.



54 Test Result

Power output test was verified over all data rates of each mode shown as below, and then choose the maximum power output (gray marker) for final test of each channel.

SISO Mode Mode Test Result of Peak Output Power - ANT 0

Test Mode	Data Rate / MCS	Channel No.	Freq. (MHz)	Peak Power (dBm)	Limit (dBm)	Result
11b	1Mbps	01	2412	18.23	≤ 30.00	Pass
11b	1Mbps	06	2437	18.36	≤ 30.00	Pass
11b	1Mbps	11	2462	18.11	≤ 30.00	Pass
11g	6Mbps	01	2412	15.32	≤ 30.00	Pass
11g	6Mbps	06	2437	15.58	≤ 30.00	Pass
11g	6Mbps	11	2462	15.27	≤ 30.00	Pass

SISO Mode Mode Test Result of Peak Output Power - ANT 1

Test Mode	Data Rate / MCS	Channel No.	Freq. (MHz)	Peak Power (dBm)	Limit (dBm)	Result
11b	1Mbps	01	2412	18.21	≤ 30.00	Pass
11b	1Mbps	06	2437	18.32	≤ 30.00	Pass
11b	1Mbps	11	2462	18.09	≤ 30.00	Pass
11g	6Mbps	01	2412	15.29	≤ 30.00	Pass
11g	6Mbps	06	2437	15.50	≤ 30.00	Pass
11g	6Mbps	11	2462	15.19	≤ 30.00	Pass

MIMO Mode Test Result of Peak Output Power

Test Mode	Data Rate / MCS	Channel No.	Freq. (MHz)	ANT 0 Peak Power (dBm)	ANT 1 Peak Power (dBm)	Total Peak Power (dBm)	Limit (dBm)	Result
11n-HT20	MCS 0	01	2412	14.38	14.17	17.29	≤ 30.00	Pass
11n-HT20	MCS 0	06	2437	14.51	14.57	17.55	≤ 30.00	Pass
11n-HT20	MCS 0	11	2462	14.40	14.31	17.37	≤ 30.00	Pass

Note: Total Peak Power (dBm) = $10 \cdot \log\{10(\text{ANT 0 Average Power} / 10) + 10(\text{ANT 1 Average Power} / 10)\}$ (dBm).

6. Power Spectral Density

6.1 Block diagram of test setup

Same as section 4.1

6.2 Limits

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

6.3 Test Procedure

- (1) Connect EUT's antenna output to spectrum analyzer by RF cable.
- (2) Set the spectrum analyzer as follows:

Center frequency	DTS Channel center frequency
RBW:	$3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$
VBW:	$\geq 3\text{RBW}$
Span	1.5times the DTS bandwidth
Detector Mode:	RMS
Sweep time:	auto
Trace mode	Max hold
- (3) Allow the trace to stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
- (4) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.



64 Test Result

Test Mode	Frequency (MHz)	Measurement (dBm/3KHz)			Limit (dBm/3KHz)
		ANT-0	ANT-1	ANT-0+1	
IEEE 802.11b	2412	-20.470	-20.140	/	< 6.02
	2437	-20.698	-22.930	/	< 6.02
	2462	-21.580	-23.046	/	< 6.02
IEEE 802.11g	2412	-22.756	-22.000	/	< 6.02
	2437	-24.277	-22.128	/	< 6.02
	2462	-23.643	-21.834	/	< 6.02
IEEE 802.11n HT20	2412	-20.784	-21.693	-18.204	< 6.02
	2437	-22.168	-23.713	-19.862	< 6.02
	2462	-20.526	-23.285	-18.501	< 6.02

Note: Directional gain = $4.97\text{dBi} + 10\log(2) = 7.98\text{dBi} > 6\text{dBi}$, so the limit reduced to $8 - (7.98 - 6) = 6.02\text{dBm}$.

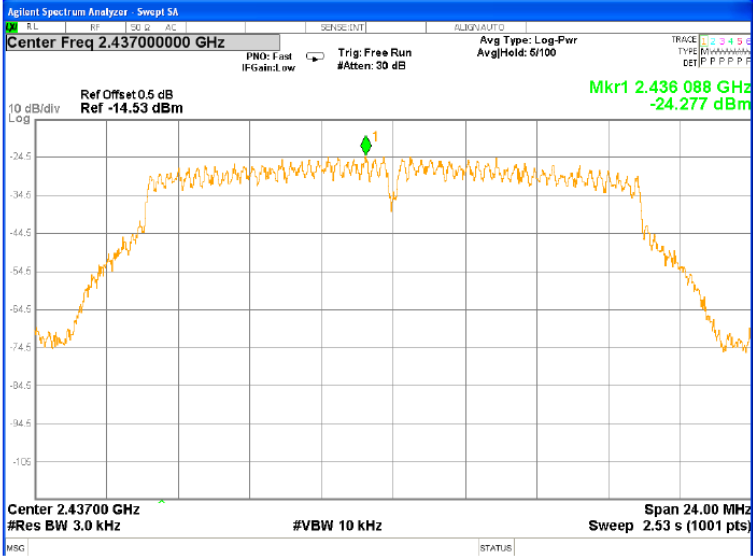
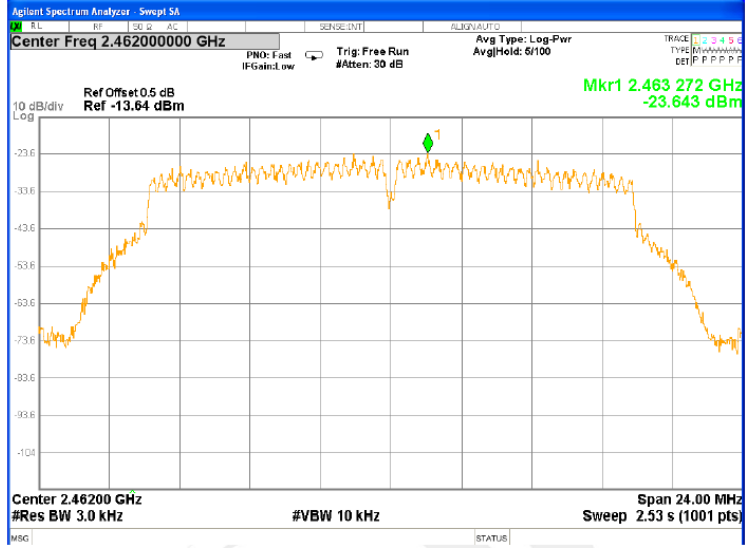
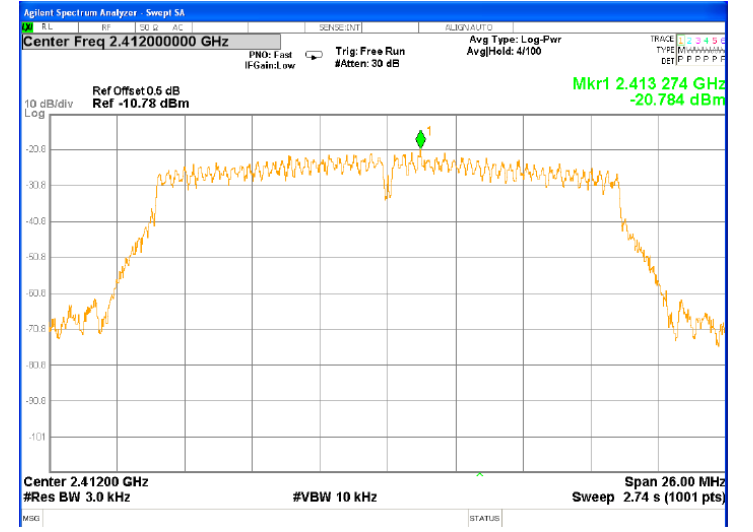
65 original test data

Test Mode:	IEEE 802.11b TX mode
Antenna:	ANT-0
2412 MHz	Agilent Spectrum Analyzer - Swept SA Marker 1 2.413024000000 GHz Ref Offset 0.5 dB Ref 2.66 dBm Mkr1 2.413 024 GHz -20.470 dBm Center 2.412000 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 16.00 MHz Sweep 1.69 s (1001 pts)

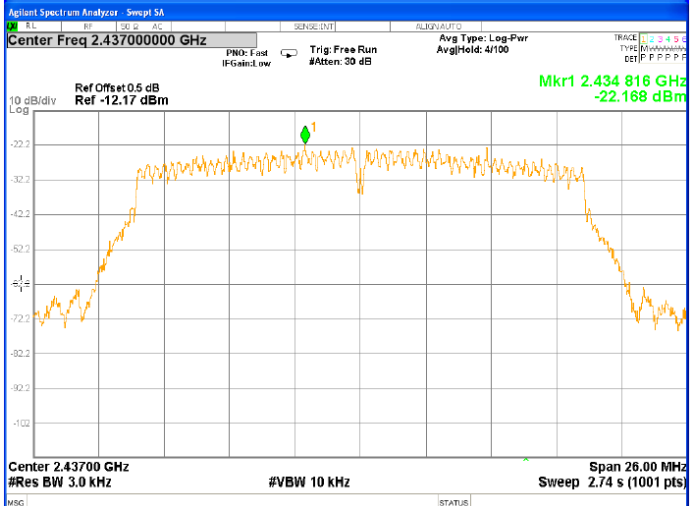
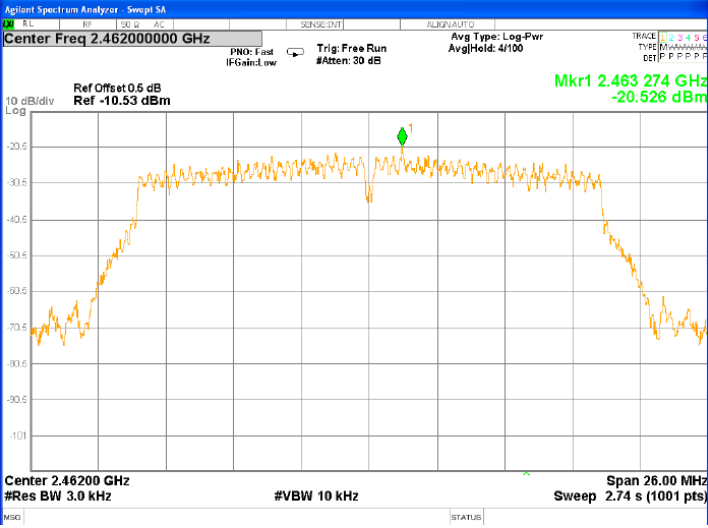
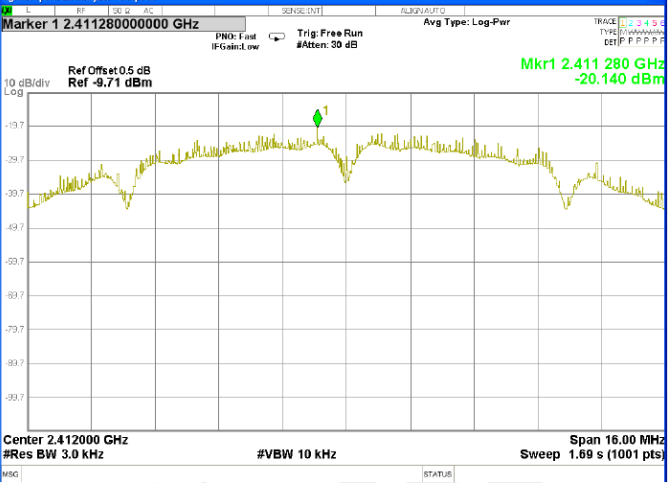


2437 MHz	
2462 MHz	
Test Mode:	IEEE 802.11g TX mode
Antenna:	ANT-0
2412 MHz	



2437 MHz	
2462 MHz	
Test Mode:	IEEE 802.11n 2.4GHz 20MHz TX mode
Antenna:	ANT-0
2412 MHz	



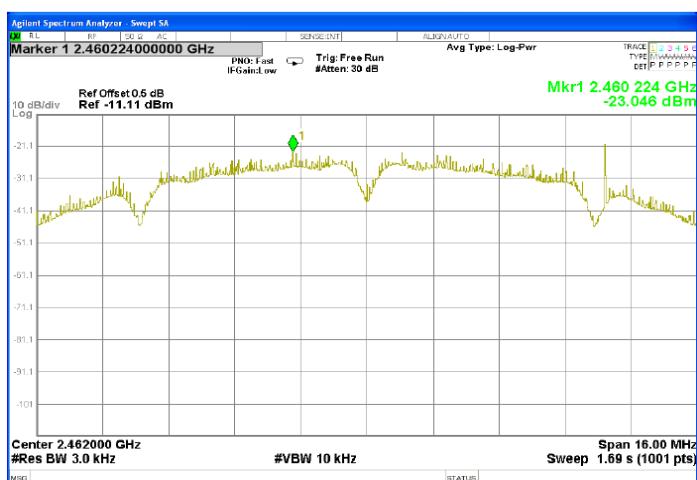
2437 MHz	
2462 MHz	
Test Mode:	IEEE 802.11b TX mode
Antenna:	ANT-1
2412 MHz	



2437 MHz



2462 MHz



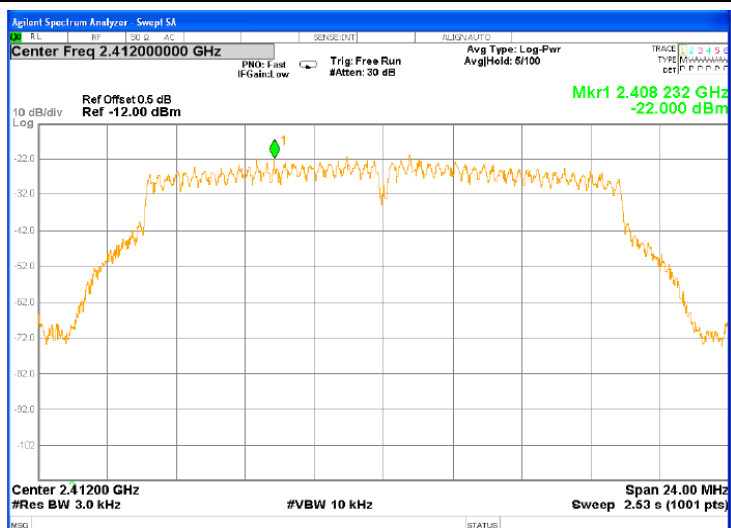
Test Mode:

IEEE 802.11g TX mode

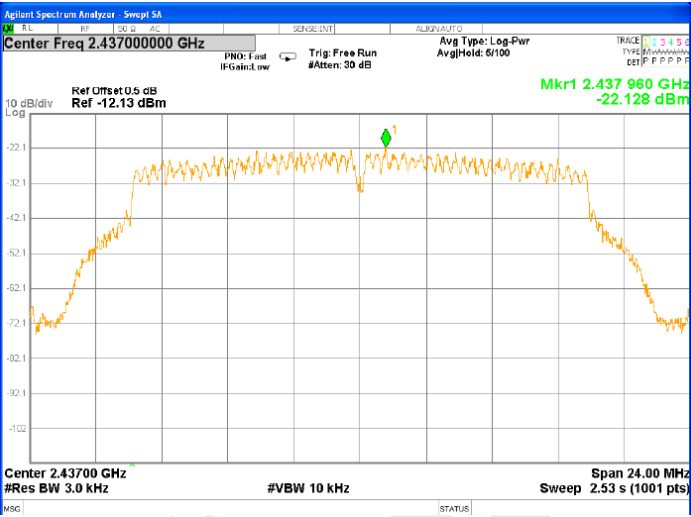
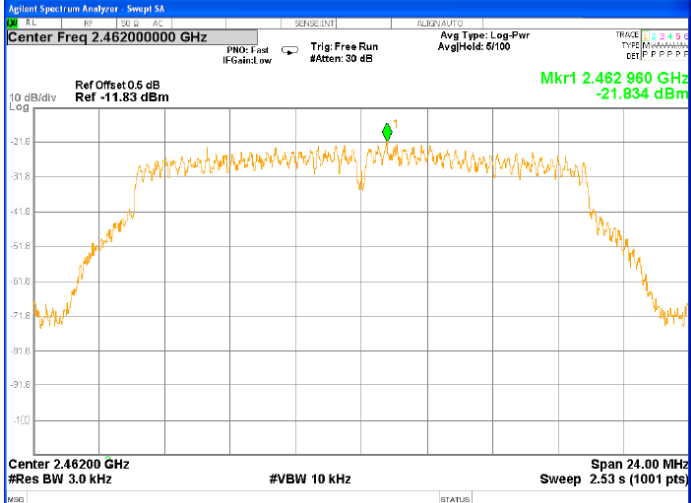
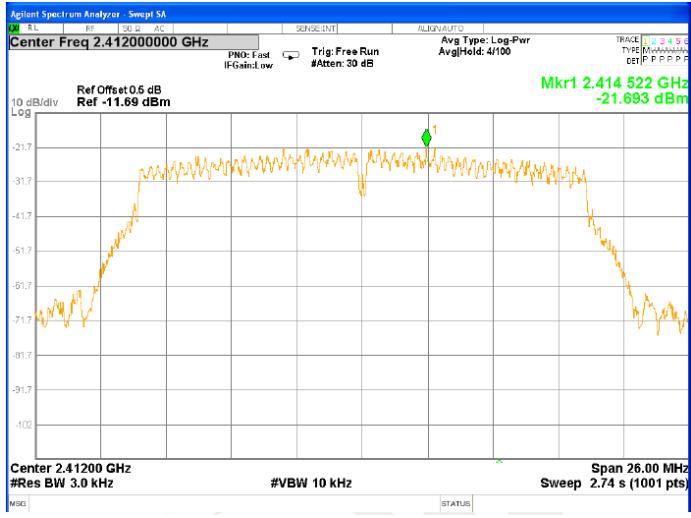
Antenna:

ANT-1

2412 MHz

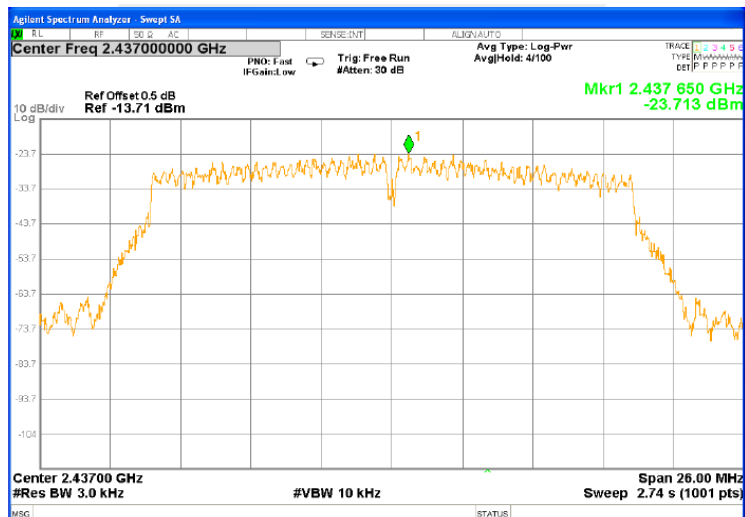




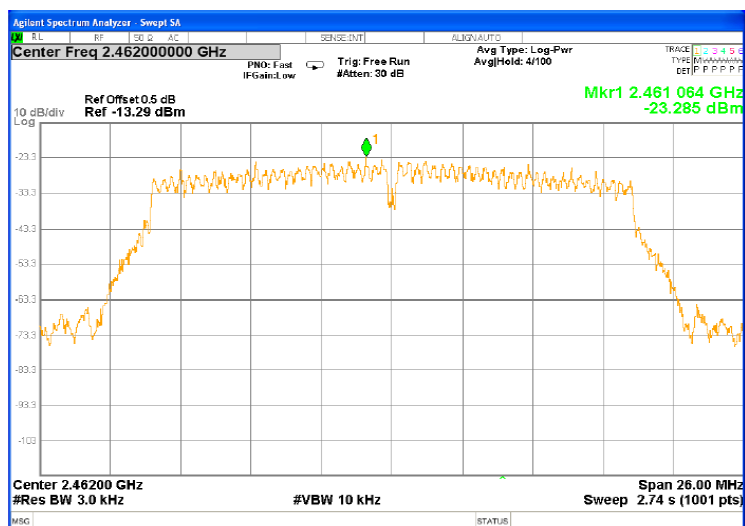
2437 MHz	
2462 MHz	
Test Mode:	IEEE 802.11n 2.4GHz 20MHz TX mode
Antenna:	ANT-1
2412 MHz	



2437 MHz



2462 MHz





7. Band Edge and Spurious Emissions (Conducted)

7.1 Block diagram of test setup

Same as section 4.1

7.2 Limits

In any 100kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

7.3 Test Procedure

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

(2) Establish a reference level by
using the following procedure: Center frequency DTS
Channel center frequency

RBW:	100kHz
VBW:	300kHz
Span	1.5times the DTS bandwidth
Detector Mode:	Peak
Sweep time:	auto
Trace mode	Max hold

(3) Allow the trace to stabilize, use the peak marker function to determine the maximum peak power level to establish the reference level.

(4) Set the
spectrum analyzer as follows: RBW:

	100kHz
VBW:	300kHz
Span	Encompass frequency range to be measured
Number of measurement points	$\geq \text{span/RBW}$
Detector Mode:	Peak
Sweep time:	auto
Trace mode	Max hold

(5) Allow the trace to stabilize, use the peak marker function to determine the maximum amplitude of all unwanted emissions outside of the authorized frequency band



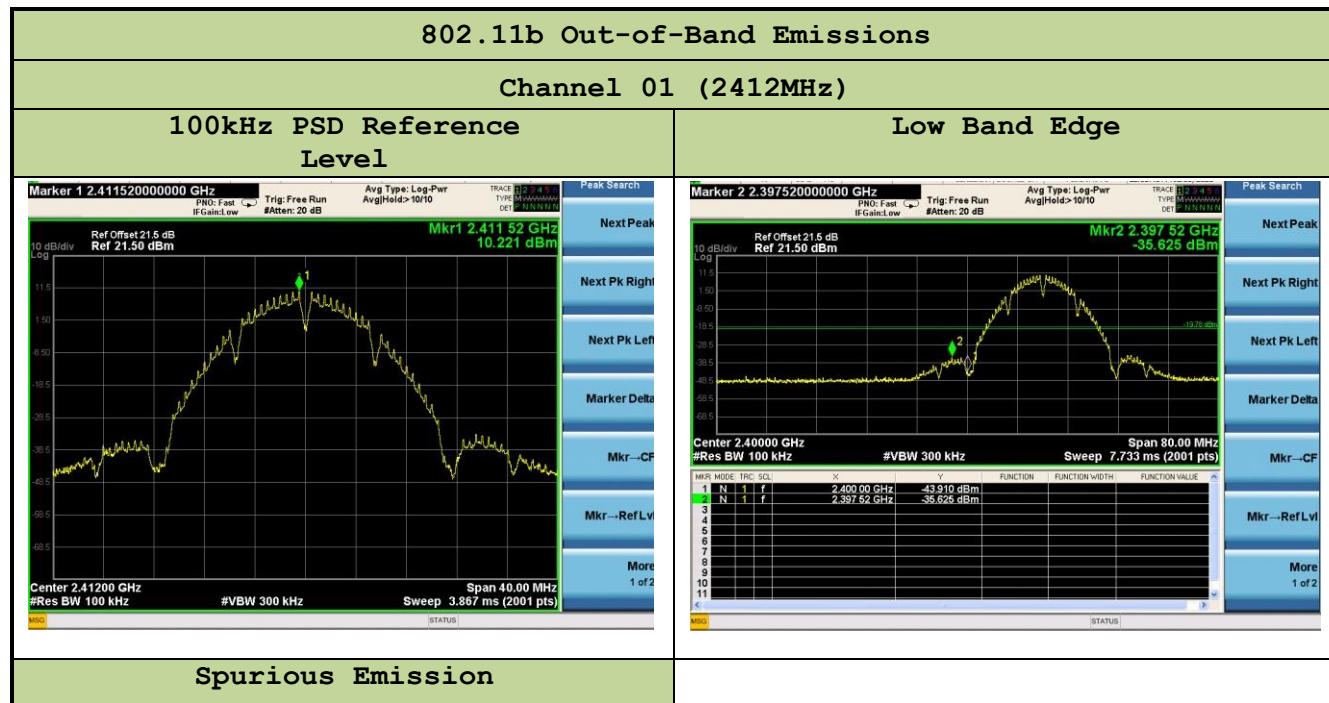
74 Test Result

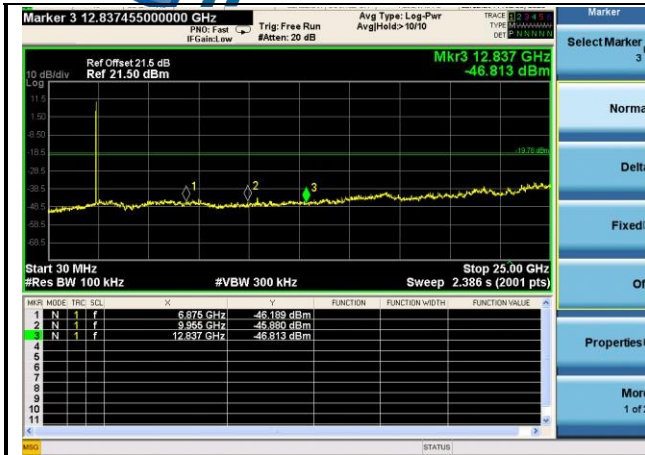
Report No.: PTC20091603002E-FC01

Test Mode	Data Rate / MCS	Channel No.	Frequency (MHz)	Limit	Result
802.11b	1Mbps	01	2412	30dBc	Pass
802.11b	1Mbps	06	2437	30dBc	Pass
802.11b	1Mbps	11	2462	30dBc	Pass
802.11g	6Mbps	01	2412	30dBc	Pass
802.11g	6Mbps	06	2437	30dBc	Pass
802.11g	6Mbps	11	2462	30dBc	Pass
802.11n- HT20	MCS0	01	2412	30dBc	Pass
802.11n- HT20	MCS0	06	2437	30dBc	Pass
802.11n- HT20	MCS0	11	2462	30dBc	Pass

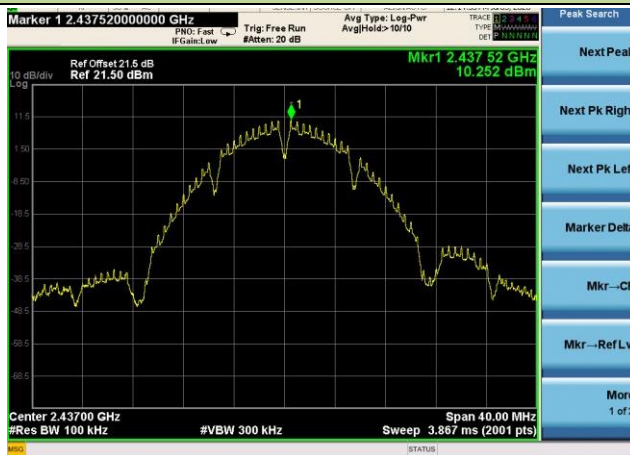
Note: For 11B and 11G, both two antennas have been tested. Only Worst Case test data is provided as follows.

75 original test plots

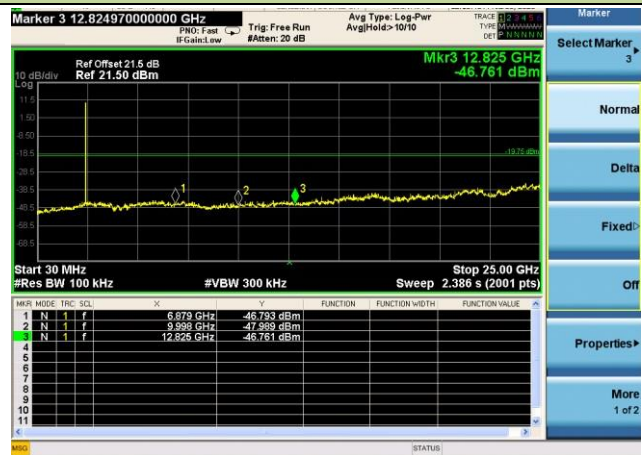




Channel 06 (2437MHz)

100kHz PSD Reference
Level

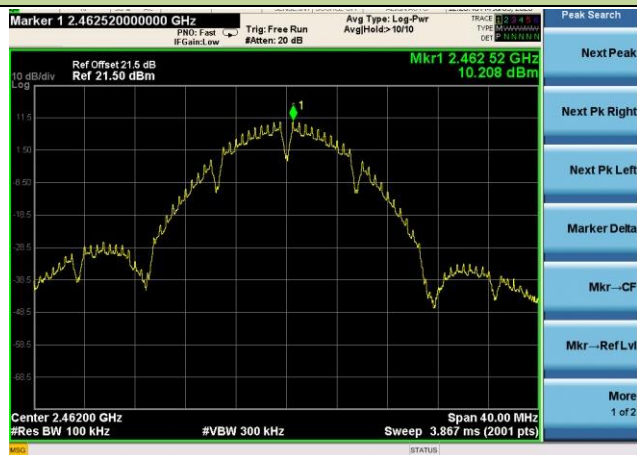
Spurious Emission



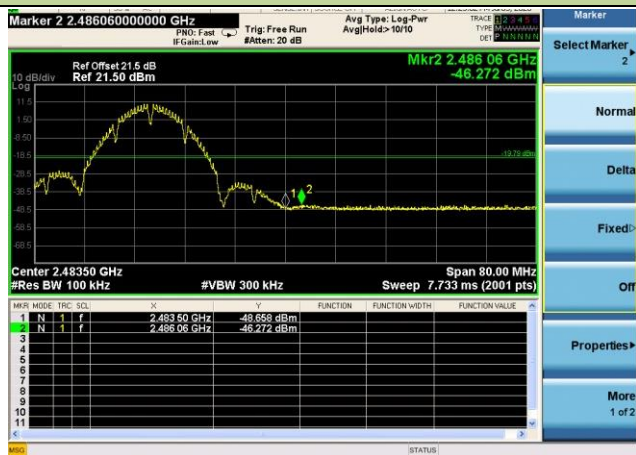


802.11b Out-of-Band Emissions

Channel 11 (2462MHz)

100kHz PSD Reference
Level

High Band Edge



Spurious Emission





802.11g Out-of-Band Emissions

Channel 11 (2462MHz)

100kHz PSD Reference
Level

High Band Edge



Spurious Emission



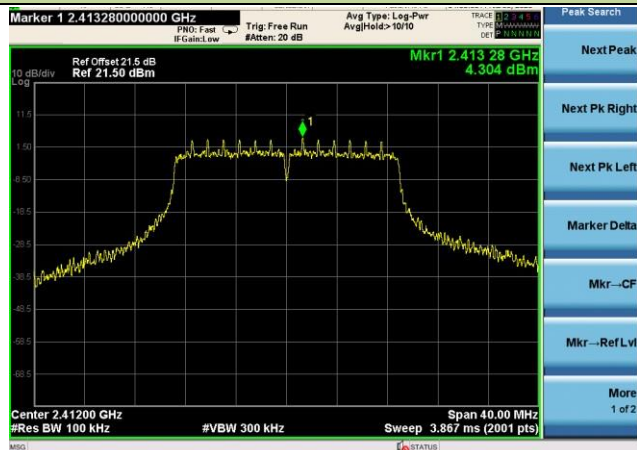


Ant 0-802.11n-HT20 Out-of-Band Emissions

Channel 01 (2412MHz)

100kHz PSD Reference
Level

Low Band Edge



Spurious Emission



Channel 06 (2437MHz)

100kHz PSD Reference
Level

Spurious Emission





Ant 0-802.11n-HT20 Out-of-Band Emissions

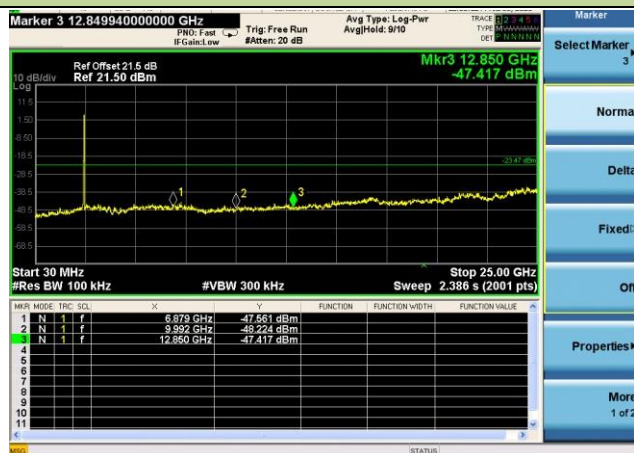
Channel 11 (2462MHz)

100kHz PSD Reference
Level

High Band Edge



Spurious Emission

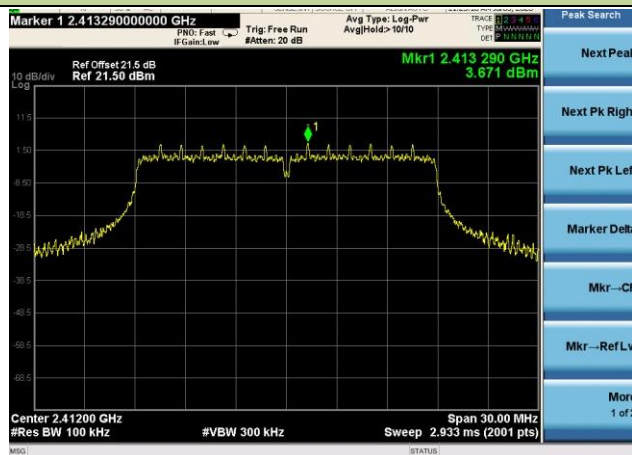




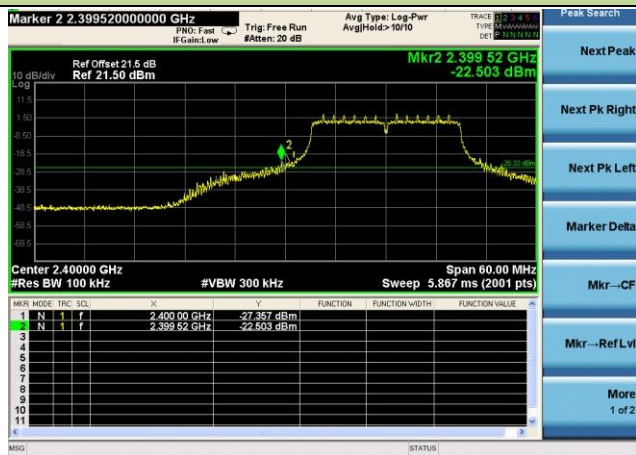
Ant 1-802.11n-HT20 Out-of-Band Emissions

Channel 01 (2412MHz)

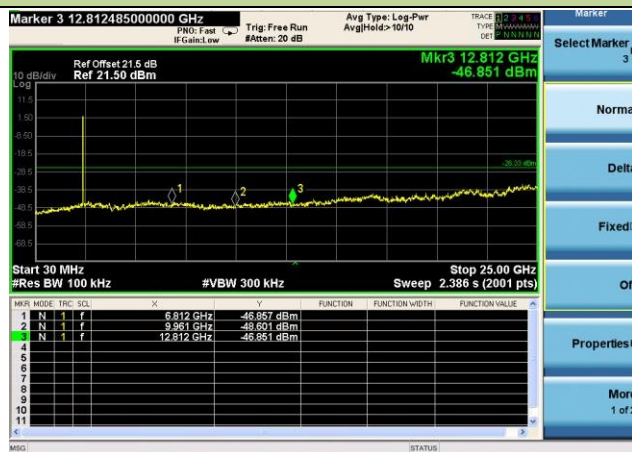
100kHz PSD Reference Level



Low Band Edge

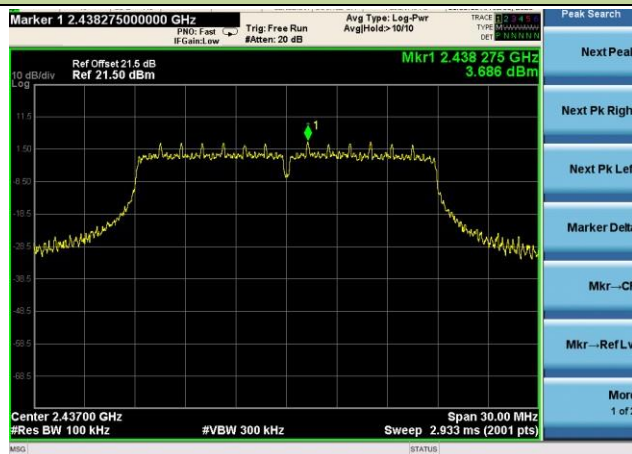


Spurious Emission



Channel 06 (2437MHz)

100kHz PSD Reference Level



Spurious Emission



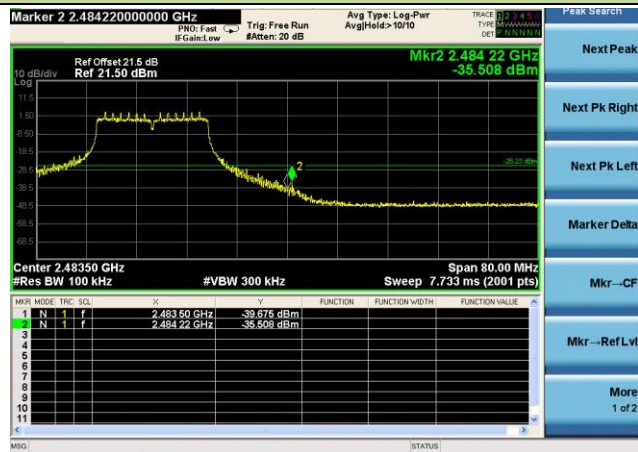


Ant 1 - 802.11n-HT20 Out-of-Band Emissions

Channel 11 (2462MHz)

100kHz PSD Reference Level

High Band Edge



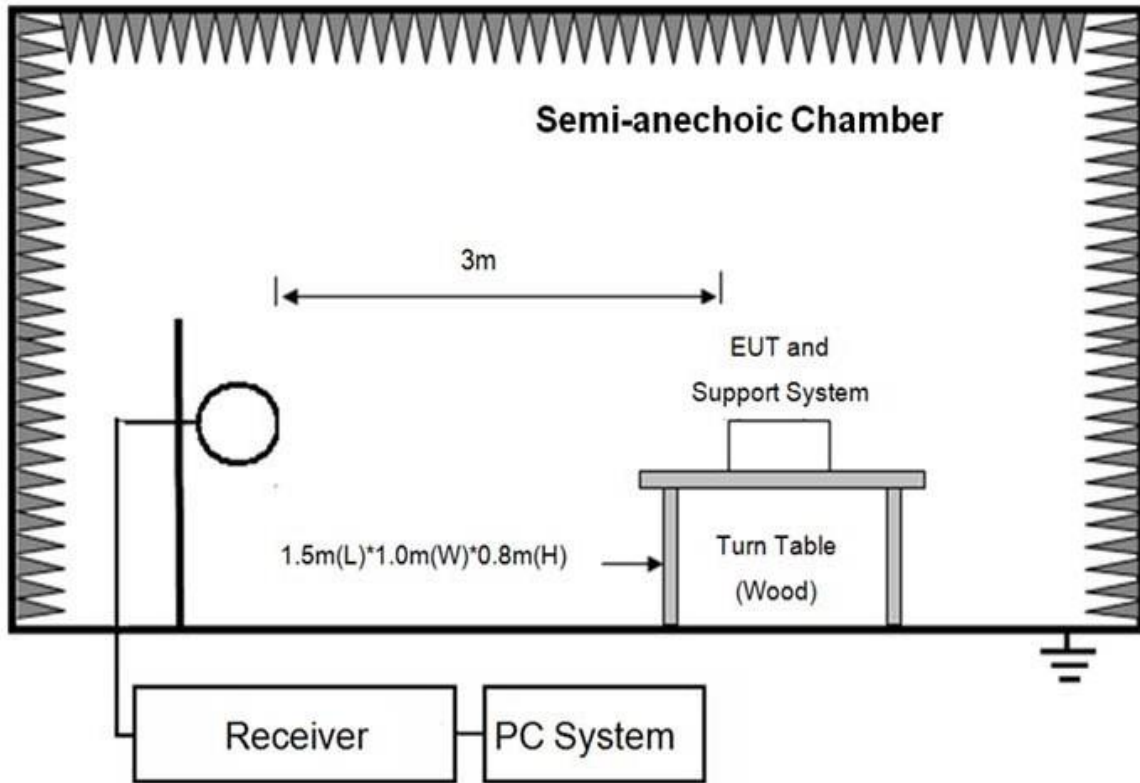
Spurious Emission



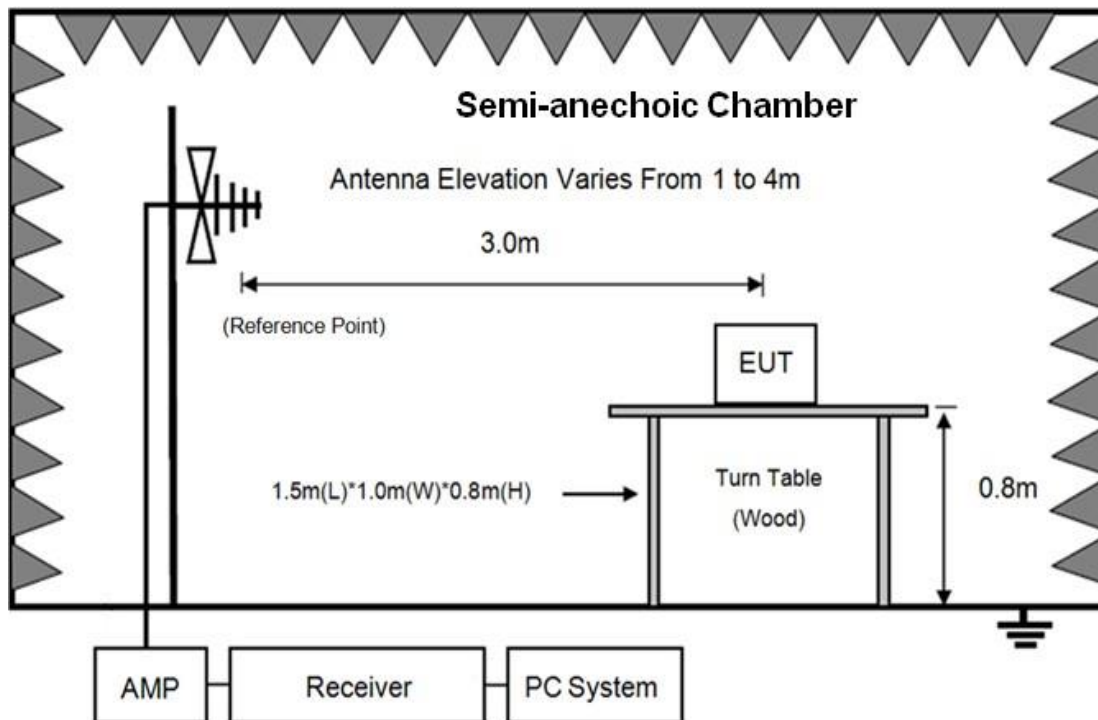
8. Radiated Spurious Emissions

8.1 Block diagram of test setup

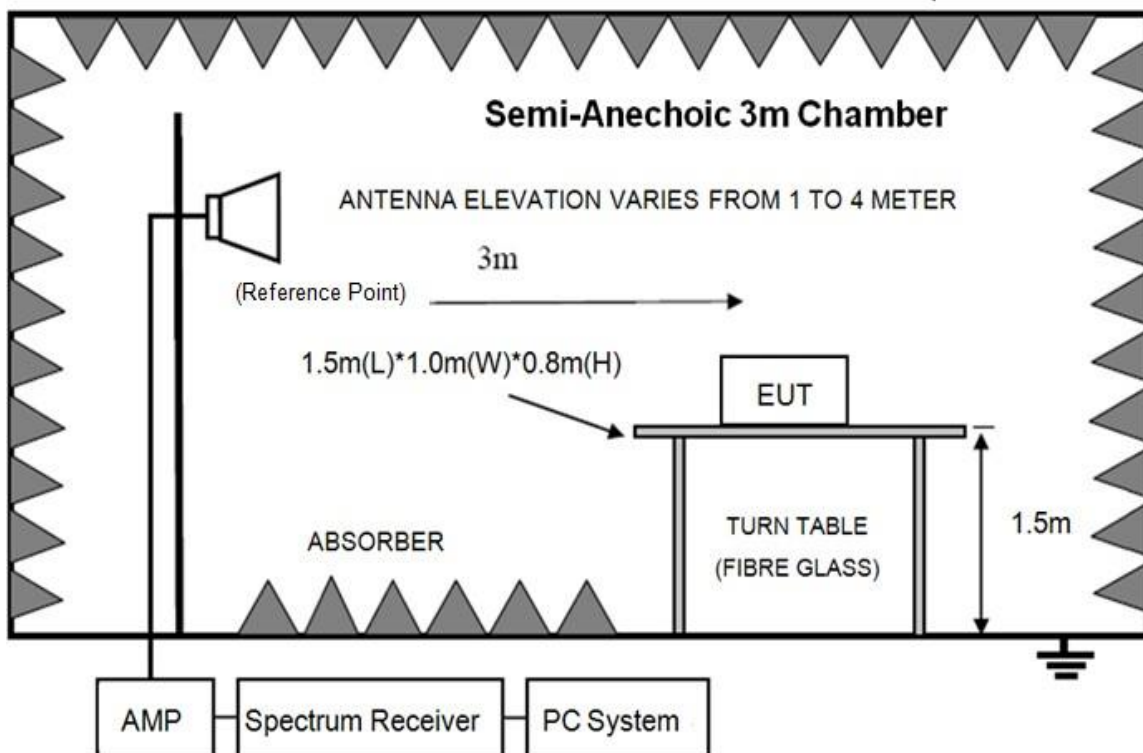
In 3m Anechoic Chamber Test Setup Diagram for 9kHz-30MHz



In 3m Anechoic Chamber Test Setup Diagram for 30MHz-1GHz



In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz



Note: For harmonic emissions test a appropriate high pass filter was inserted in the input port of AMP.

82 Limit

8.2.1 FCC 15.205 Restricted frequency band

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	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
4.1772&4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.2072&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.G
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			

8.2.2 FCC 15.209 Limit.

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V/m}$	$\text{dB}(\mu\text{V})/\text{m}$
0.009 ~ 0.490	300	2400/F(kHz)	67.6-20log(F)
0.490 ~ 1.705	30	24000/F(kHz)	87.6-20log(F)
1.705 ~ 30.0	30	30	29.54
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

Note: (1) The emission limits shown in the above table are based on measurements employing a CISPR QP detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

(2) At frequencies below 30MHz, measurement may be performed at a distance closer than that specified, and the limit at closer measurement distance can be extrapolated by below formula:

$$\text{Limit}_{3\text{m}}(\text{dB}\mu\text{V}/\text{m}) = \text{Limit}_{30\text{m}}(\text{dB}\mu\text{V}/\text{m}) + 40\text{Log}(30\text{m}/3\text{m})$$

8.2.3 Limit for this EUT

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

8.3 Test Procedure

(1) EUT height should be 0.8m for below 1GHz at a semi - anechoic chamber while EUT height should be 1.5m for above 1GHz at full chamber or semi - anechoic chamber ground with absorbers.

(2) The antenna used as below table.

Test frequency range	Test antenna used	Measuring distance
9kHz-30MHz	Active Loop antenna	3 m
30MHz-1GHz	Trilog Broadband Antenna	3 m
1GHz-18GHz	Double Ridged Horn Antenna(1GHz-18GHz)	3 m
18GHz-40GHz	Horn Antenna(18GHz-40GHz)	1 m

According ANSI C63.10:2013 clause 6.4.4.2 and 6.5.3, for measurements below 30 MHz, the loop antenna was positioned with its plane vertical from the EUT and rotated about its vertical axis for maximum response at each azimuth position around the EUT. And the loop antenna also be positioned with its plane horizontal at the specified distance from the EUT. The center of the loop is 1 m above the ground. for measurement above 30MHz, the Trilog



Broadband Antenna or Horn Antenna was located 3m from EUT, Measurements were made with the antenna positioned in both the horizontal and vertical planes of Polarization, and the measurement antenna was varied from 1 m to 4 m. in height above the reference ground plane to obtain the maximum signal strength.

(3) Below pre-scan procedure was first performed in order to find prominent frequency spectrum radiated emissions from 9kHz to 25GHz:

(a) Scanning the peak frequency spectrum with the antenna specified in step (3), and the EUT was rotated 360 degree, the antenna height was varied from 1m to 4m(Except loop antenna, it's fixed 1m above ground.)

(b) Change work frequency or channel of device if practicable.

(c) Change modulation type of device if practicable.

(d) Change power supply range from 85% to 115% of the rated supply voltage

(e) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions.

Spectrum frequency from 9kHz to 25GHz (tenth harmonic of fundamental frequency) was investigated, and no any obvious emission were detected from 18GHz to 25GHz, so below final test was performed with frequency range from 9kHz to 18GHz.

(4) For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10 2013 on Radiated Emission test.

(5) The emissions from 9kHz to 1GHz were measured based on CISPR QP detector except for the frequency bands 9-90kHz, 110-490kHz, for emissions from 9kHz-90kHz,110kHz-490kHz and above 1GHz were measured based on average detector, for emissions above 1GHz, peak emissions also be measured and need comply with Peak limit.

(6) The emissions from 9kHz to 1GHz, QP or average values were measured with EMI receiver with below RBW

Frequency band	RBW
9kHz-150kHz	200Hz
150kHz-30MHz	9kHz
30MHz-1GHz	120kHz

(7) For emissions above 1GHz, both Peak and Average level were measured with Spectrum

Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure; RMS detector RBW 1MHz VBW 3MHz for Average measure(according ANSI C63.10:2013 clause 4.2.3.2.3 procedure for average measure).



84 Test result

PASS. (See below detailed test result)

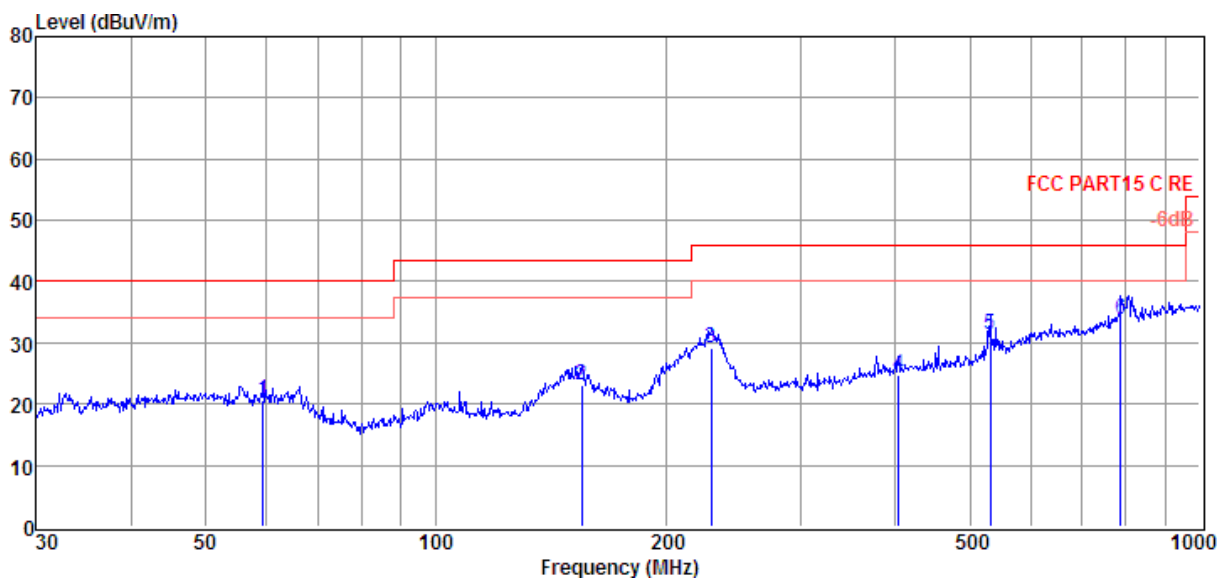
All the emissions except fundamental emission from 9kHz to 25GHz were comply with 15.209 limit.

Note1: According exploratory test no any obvious emission were detected from 9kHz to 30MHz and 18GHz to 25GHz, so the final test was performed with frequency range from 30MHz to 18GHz and recorded in below.

Note2: For emissions below 1GHz, according exploratory explorer test, when change Tx mode and channel, have no distinct influence on emissions level, so for emissions below 1GHz, the final test was only performed with EUT working in Ant0, 11b, Tx CH6 mode.

Note3: For emissions above 1GHz, Scan with 11b mode ANT 1, 11g mode ANT 1 and ANT 0, 11n HT20 mode ANT 1 and ANT0, the worst case is 11b ANT 1 mode

Radiated Emission test (below 1GHz)



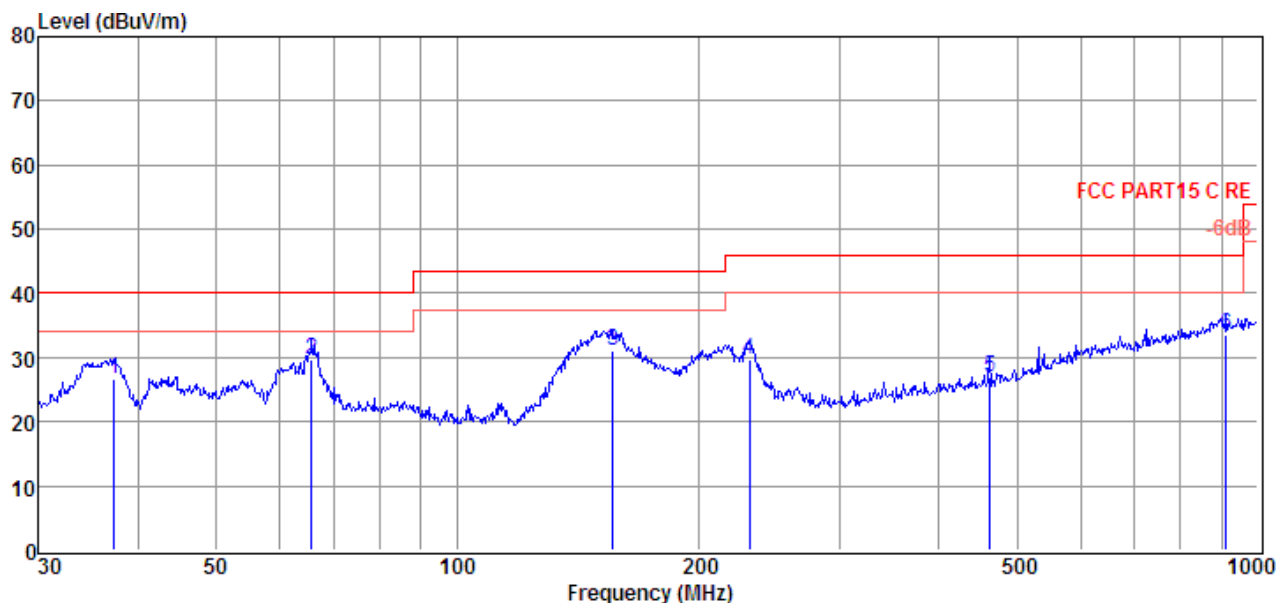
HORIZONTAL

Item(Mark)	Freq.(MHz)	Read Level(dB μ V)	Antenna Factor(dB/m)	Cable Loss dB	Result Level(dB μ V/m)	Limit Line (dB μ V/m)	Over Limit(dB)	Detector	Polarization
1	59.44	4.94	11.52	4.09	20.55	40.00	-19.45	QP	HORIZONTAL
2	155.36	9.94	8.34	4.80	23.08	43.50	-20.42	QP	HORIZONTAL
3	229.29	11.84	12.11	5.19	29.14	46.00	-16.86	QP	HORIZONTAL
4	403.25	3.59	15.28	5.93	24.80	46.00	-21.20	QP	HORIZONTAL
5	531.96	7.52	18.15	5.78	31.45	46.00	-14.55	QP	HORIZONTAL
6	787.85	5.32	21.12	7.28	33.72	46.00	-12.28	QP	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.

2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.



VERTICAL

Item (Mark)	Freq (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	37.29	10.76	12.06	3.85	26.67	40.00	-13.33	QP	VERTICAL
2	65.80	15.39	10.08	4.14	29.61	40.00	-10.39	QP	VERTICAL
3	156.46	18.00	8.40	4.80	31.20	43.50	-12.30	QP	VERTICAL
4	231.72	12.33	12.15	5.20	29.68	46.00	-16.32	QP	VERTICAL
5	462.35	4.65	16.69	5.54	26.88	46.00	-19.12	QP	VERTICAL
6	912.86	3.46	22.57	7.64	33.67	46.00	-12.33	QP	VERTICAL

- Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
 2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
 3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.



Radiated Emission test (above 1GHz)

Freq (MHz)	Read level (dBμV)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector type	Polarization
11b CH1									
4825.00	43.03	34.72	43.91	7.40	41.24	74.00	-32.76	Peak	HORIZONTAL
6525.00	41.00	35.76	43.36	8.27	41.67	74.00	-32.33	Peak	HORIZONTAL
8939.00	40.83	37.48	44.08	10.30	44.53	74.00	-29.47	Peak	HORIZONTAL
11506.00	39.09	38.60	44.17	11.01	44.53	74.00	-29.47	Peak	HORIZONTAL
13121.00	41.03	39.42	44.38	11.47	47.54	74.00	-26.46	Peak	HORIZONTAL
14889.00	40.06	41.58	44.29	12.81	50.16	74.00	-23.84	Peak	HORIZONTAL
4774.00	41.82	34.64	43.94	7.35	39.87	74.00	-34.13	Peak	VERTICAL
6389.00	40.04	35.70	43.32	8.26	40.68	74.00	-33.32	Peak	VERTICAL
8599.00	39.14	37.34	43.98	9.91	42.41	74.00	-31.59	Peak	VERTICAL
10095.00	40.88	38.26	44.39	10.91	45.66	74.00	-28.34	Peak	VERTICAL
12050.00	39.57	38.89	44.11	10.99	45.34	74.00	-28.66	Peak	VERTICAL
14821.00	39.85	41.56	44.31	12.78	49.88	74.00	-24.12	Peak	VERTICAL
11b CH6									
4774.00	41.29	34.64	43.94	7.35	39.34	74.00	-34.66	Peak	HORIZONTAL
6525.00	40.20	35.76	43.36	8.27	40.87	74.00	-33.13	Peak	HORIZONTAL
9024.00	39.70	37.51	44.11	10.38	43.48	74.00	-30.52	Peak	HORIZONTAL
10979.00	40.37	38.79	44.25	11.06	45.97	74.00	-28.03	Peak	HORIZONTAL
13121.00	38.49	39.42	44.38	11.47	45.00	74.00	-29.00	Peak	HORIZONTAL
13954.00	39.77	39.98	44.59	12.31	47.47	74.00	-26.53	Peak	HORIZONTAL
4825.00	43.92	34.72	43.91	7.40	42.13	74.00	-31.87	Peak	VERTICAL
5981.00	39.68	35.69	43.21	8.20	40.36	74.00	-33.64	Peak	VERTICAL
8956.00	39.61	37.48	44.09	10.32	43.32	74.00	-30.68	Peak	VERTICAL
10894.00	40.59	38.74	44.27	11.04	46.10	74.00	-27.90	Peak	VERTICAL
14141.00	39.96	40.42	44.55	12.43	48.26	74.00	-25.74	Peak	VERTICAL
15569.00	39.67	42.63	44.05	13.23	51.48	74.00	-22.52	Peak	VERTICAL
11b CH11									
4740.00	41.99	34.58	43.96	7.32	39.93	74.00	-34.07	Peak	HORIZONTAL
5760.00	40.81	35.60	43.34	8.06	41.13	74.00	-32.87	Peak	HORIZONTAL
7630.00	39.79	37.05	43.69	8.90	42.05	74.00	-31.95	Peak	HORIZONTAL
9194.00	40.43	37.58	44.16	10.47	44.32	74.00	-29.68	Peak	HORIZONTAL
10945.00	39.21	38.77	44.26	11.05	44.77	74.00	-29.23	Peak	HORIZONTAL
13410.00	39.04	39.71	44.45	11.76	46.06	74.00	-27.94	Peak	HORIZONTAL
4825.00	43.81	34.72	43.91	7.40	42.02	74.00	-31.98	Peak	VERTICAL
6440.00	40.57	35.70	43.33	8.26	41.20	74.00	-32.80	Peak	VERTICAL
7936.00	40.24	37.17	43.78	9.17	42.80	74.00	-31.20	Peak	VERTICAL
9959.00	40.77	38.16	44.39	10.87	45.41	74.00	-28.59	Peak	VERTICAL
12050.00	39.69	38.89	44.11	10.99	45.46	74.00	-28.54	Peak	VERTICAL
15552.00	39.34	42.62	44.06	13.22	51.12	74.00	-22.88	Peak	VERTICAL

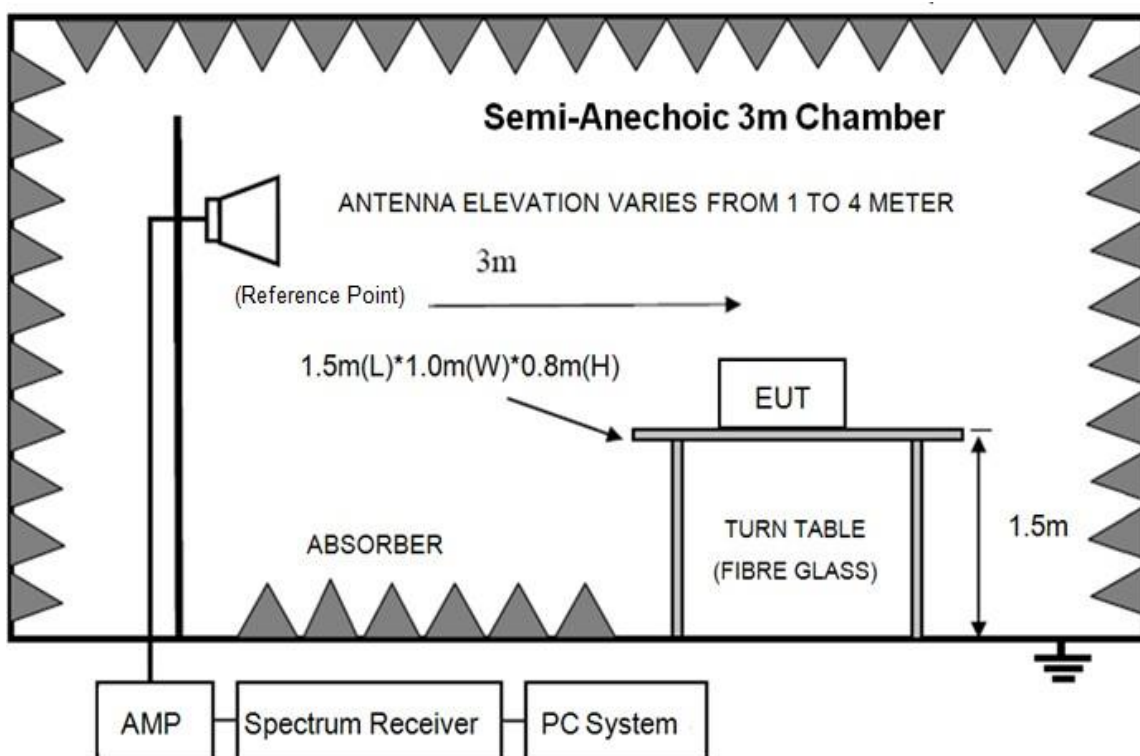
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.

2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

3: For emissions above 1GHz. If peak results comply with AV limit, AV Result is deemed to comply with AV limit.

9. Radiated Band Edge Compliance

91 Block diagram of test setup



92 Limit

All restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz shall be at least 20dB below the fundamental emissions, or comply with RSS-Gen Issue 3 clause 7.2.5 (Same as FCC 15.209) limits.

93 Test Procedure

Same with clause 8.3 except change investigated frequency range from 2310MHz to 2422MHz and 2450MHz to 2500MHz.

Remark: All restriction band have been tested, and only the worse case is shown in report.

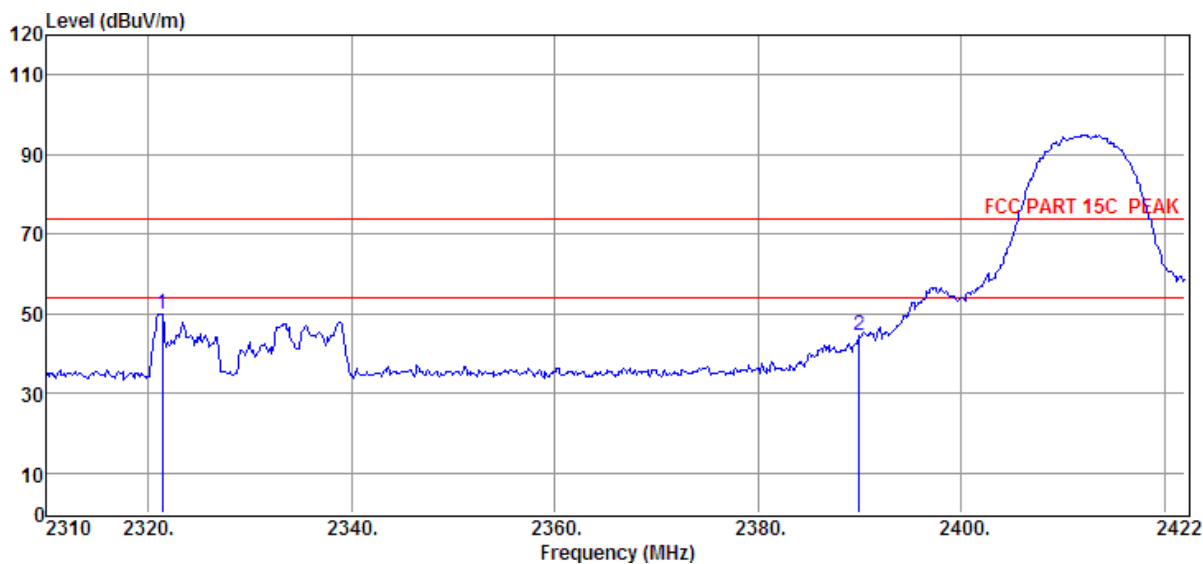
94 Test result

PASS. (See below detailed test result)

Note: 11b Ant0, 11g ANT 0/1, n20 ANT 0/1 mode all have been tested, only ANT 1 mode is worse case and reported.



11B 2412MHz HORIZONTAL

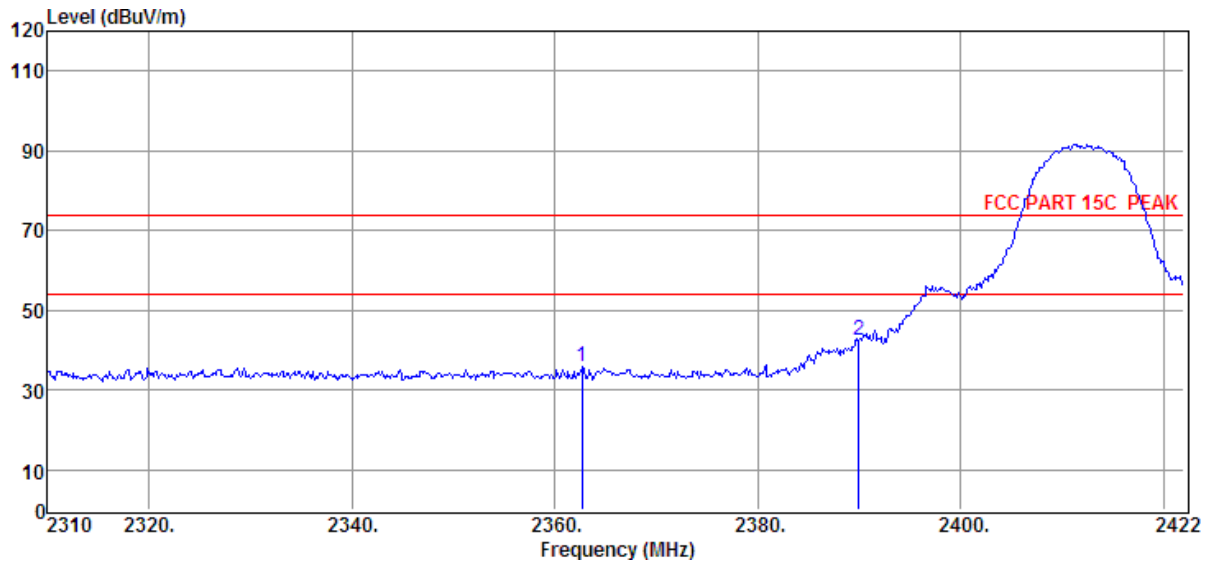


Item rk)	Fre q. z) (MH	R ead Level (dB μV)	Ante nna Factor (dB/m)	P RM Fa ctor dB	Ca ble Loss dB	Re sult Level (dBμV/m)	L imit Line (dBμV/ m)	O ver Limit (d B)	Detector	Polarization
1	2321.42	62.37	26.76	44.32	5.03	49.84	74.00	-24.16	Peak	HORIZONTAL
2	2389.97	56.63	27.00	44.32	5.11	44.42	74.00	-29.58	Peak	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.



11B 2412MHz VERTICAL

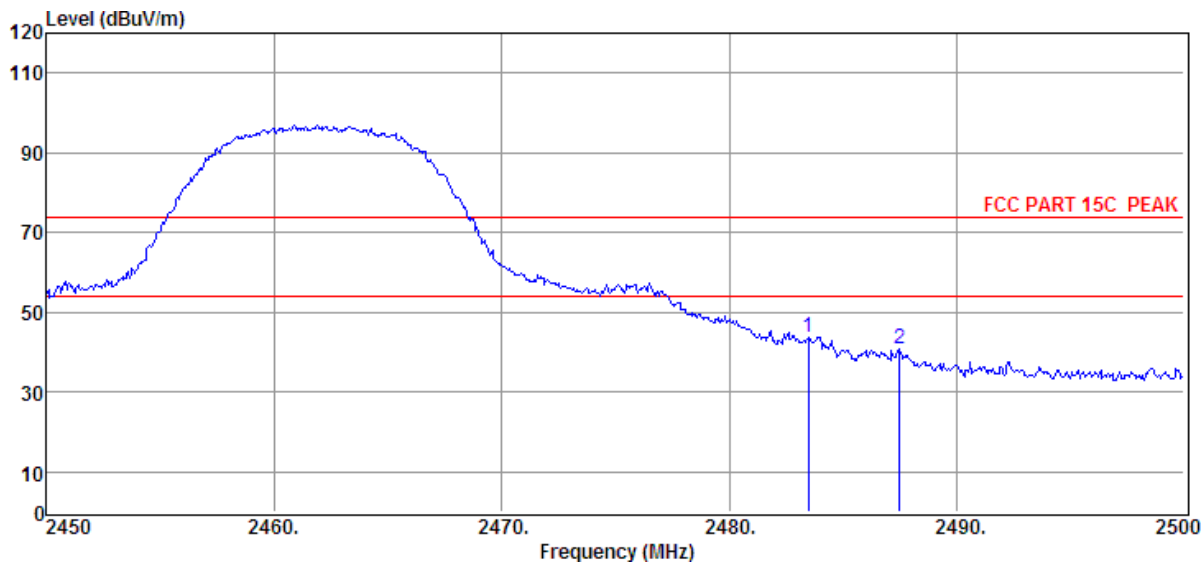


Item (Mark)	Frequency (MHz)	Read Level (dB μ V)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dB μ V/m)	Limit Line (dB μ V/m)	Over Limit (dB)	Detector	Polarization
1	2362.64	48.04	26.91	44.32	5.08	35.71	74.00	-38.29	Peak	VERTICAL
2	2389.97	54.71	27.00	44.32	5.11	42.50	74.00	-31.50	Peak	VERTICAL

- Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.



11B 2462MHz HORIZONTAL

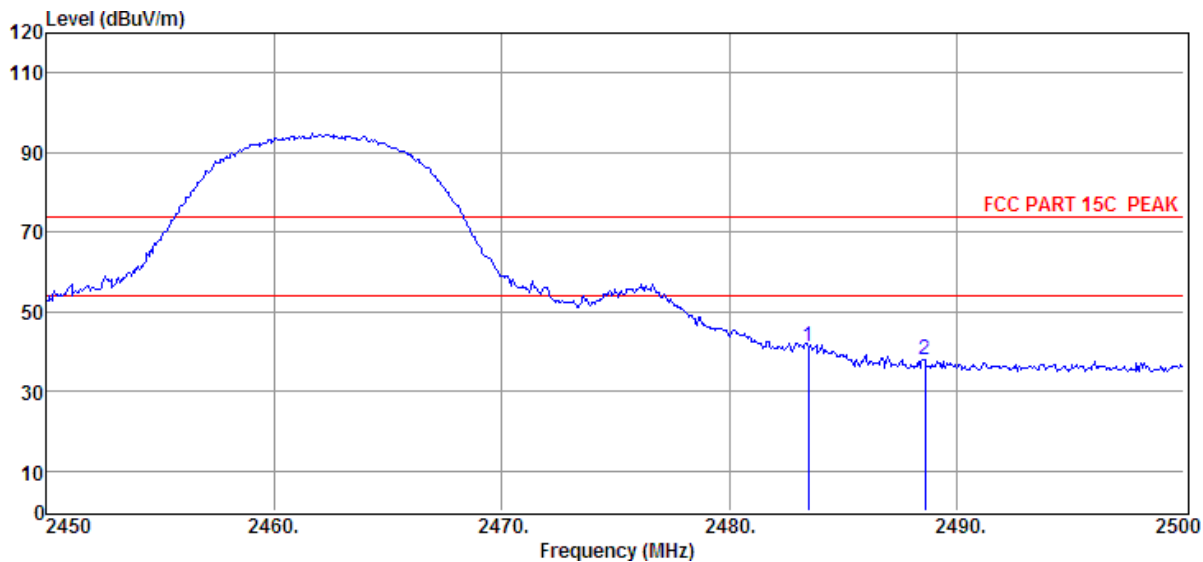


Item (Mark)	Frequency (MHz)	Read Level (dB μ V)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dB μ V/m)	Limit Line (dB μ V/m)	Over Limit (dB)	Detector	Polarization
1	2483.50	55.29	27.34	44.32	5.21	43.52	74.00	-30.48	Peak	HORIZONTAL
2	2487.50	52.50	27.35	44.32	5.22	40.75	74.00	-33.25	Peak	HORIZONTAL

- Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.



11B 2462MHz VERTICAL

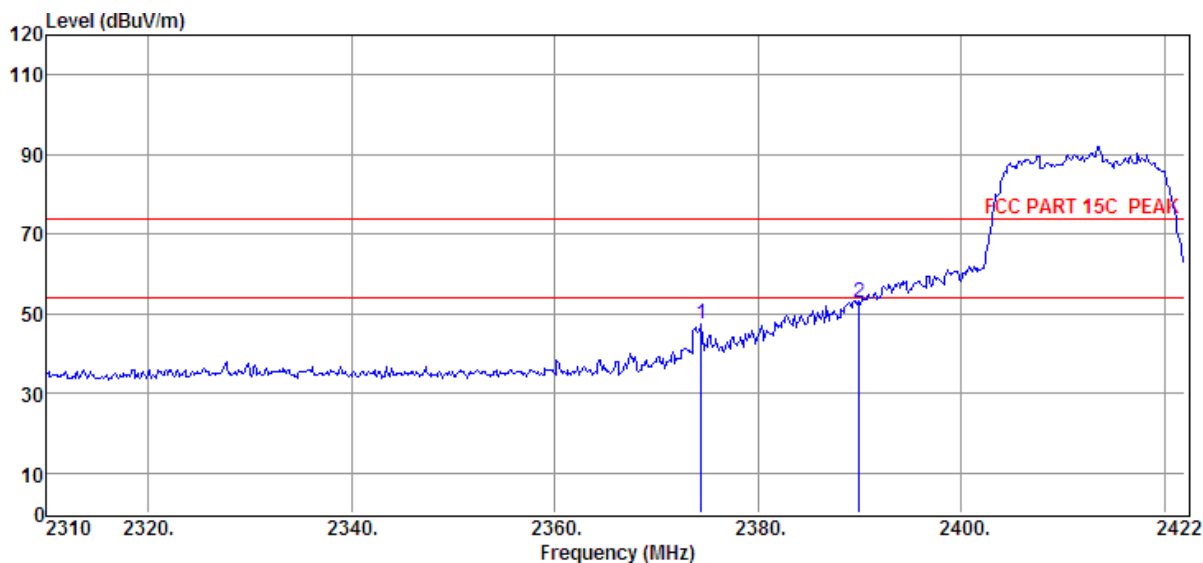


Item (Mark)	Frequency (MHz)	Read Level (dB μ V)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dB μ V/m)	Limit Line (dB μ V/m)	Over Limit (dB)	Detector	Polarization
1	2483.50	52.99	27.34	44.32	5.21	41.22	74.00	-32.78	Peak	VERTICAL
2	2488.60	49.82	27.36	44.32	5.22	38.08	74.00	-35.92	Peak	VERTICAL

- Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.



11G 2412MHz HORIZONTAL

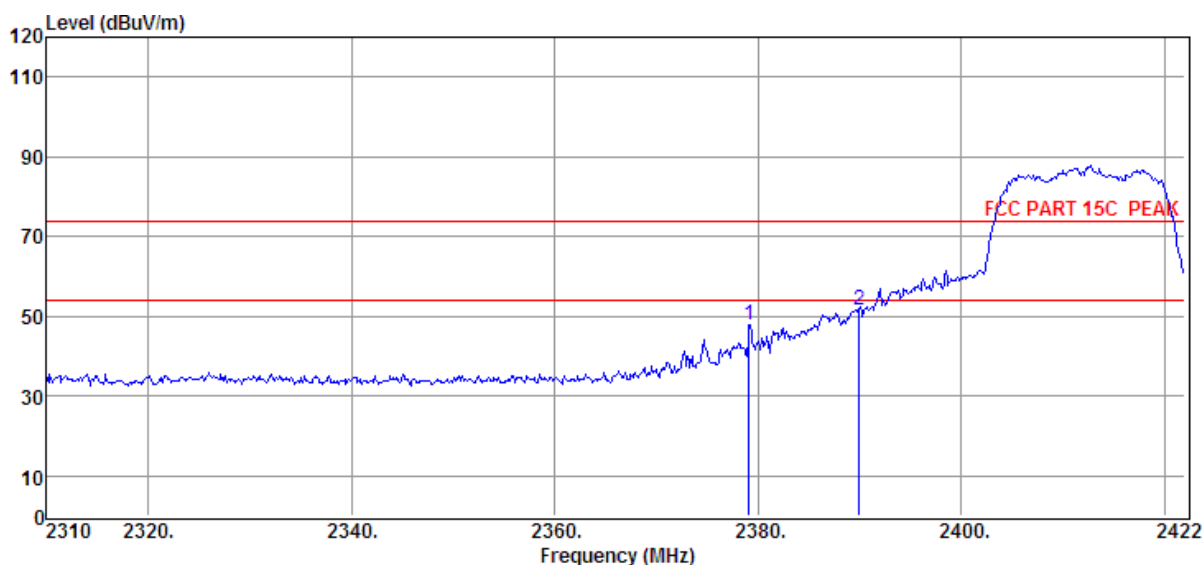


Item (Mark)	Frequency (MHz)	Read Level (dB μV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2374.40	59.86	26.95	44.32	5.09	47.58	74.00	-26.42	Peak	HORIZONTAL
2	2389.97	64.97	27.00	44.32	5.11	52.76	74.00	-21.24	Peak	HORIZONTAL

- Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.



11G 2412MHz VERTICAL

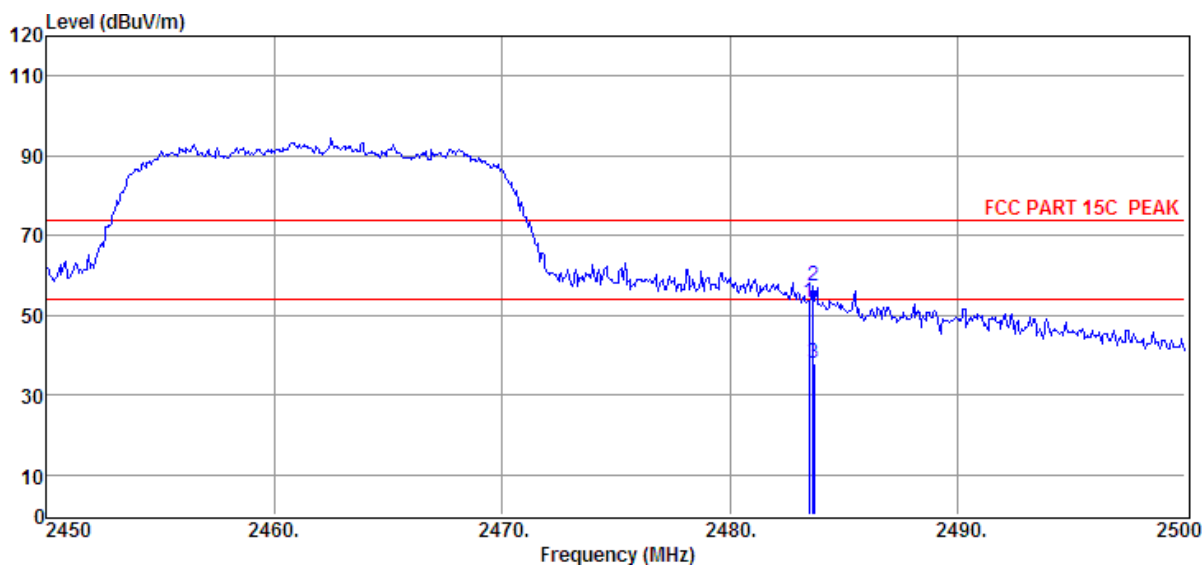


Item (Mark)	Frequency (MHz)	Read Level (dB μV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2379.10	59.96	26.96	44.32	5.10	47.70	74.00	-26.30	Peak	VERTICAL
2	2389.97	63.55	27.00	44.32	5.11	51.34	74.00	-22.66	Peak	VERTICAL

- Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.



11G 2462MHz HORIZONTAL

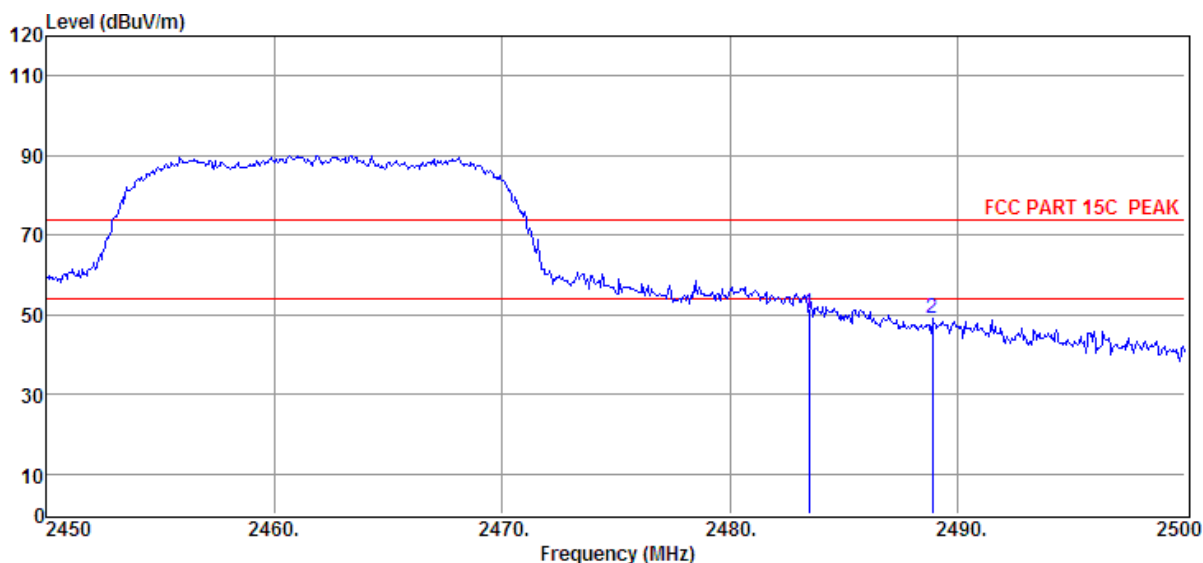


Item (Mark)	Frequency (MHz)	Read Level (dB μV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2483.50	65.03	27.34	44.32	5.21	53.26	74.00	-20.74	Peak	HORIZONTAL
2	2483.65	69.08	27.34	44.32	5.21	57.31	74.00	-16.69	Peak	HORIZONTAL
3	2483.71	49.55	27.34	44.32	5.21	37.78	54.00	-16.22	Average	HORIZONTAL

- Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
 4. Test setup: RBW: 1 MHz, VBW: 10 Hz, Sweep time: auto for average measure.



11G 2462MHz VERTICAL

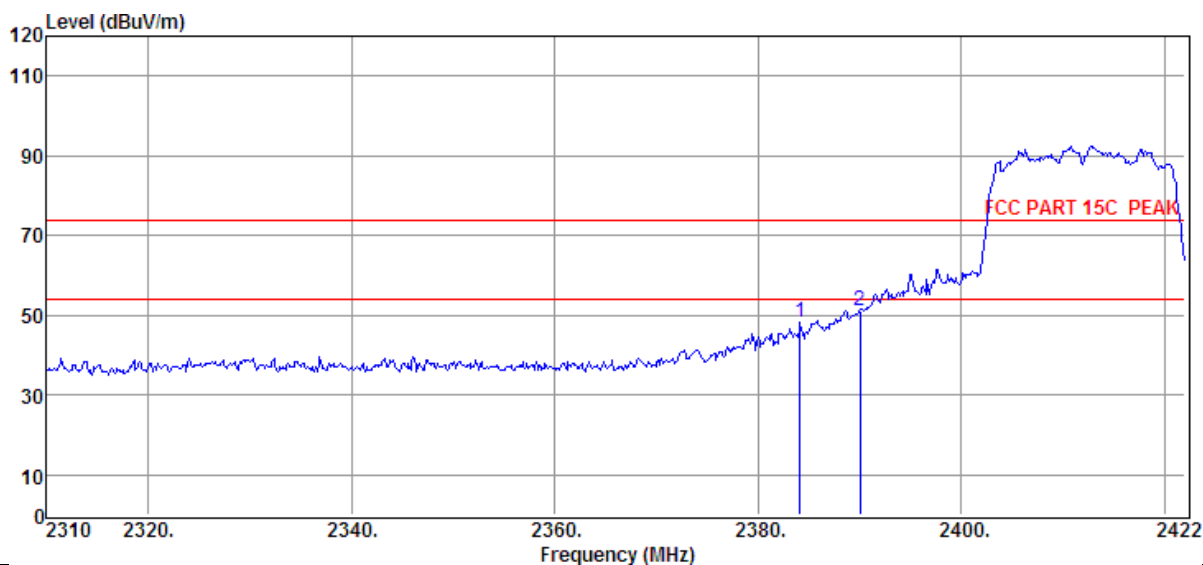


Item (Mark)	Frequency (MHz)	Read Level (dB μ V)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dB μ V/m)	Limit Line (dB μ V/m)	Over Limit (dB)	Detector	Polarization
1	2483.50	62.17	27.34	44.32	5.21	50.40	74.00	-23.60	Peak	VERTICAL
2	2488.90	60.61	27.36	44.32	5.22	48.87	74.00	-25.13	Peak	VERTICAL

- Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.



11N20 2412MHz HORIZONTAL

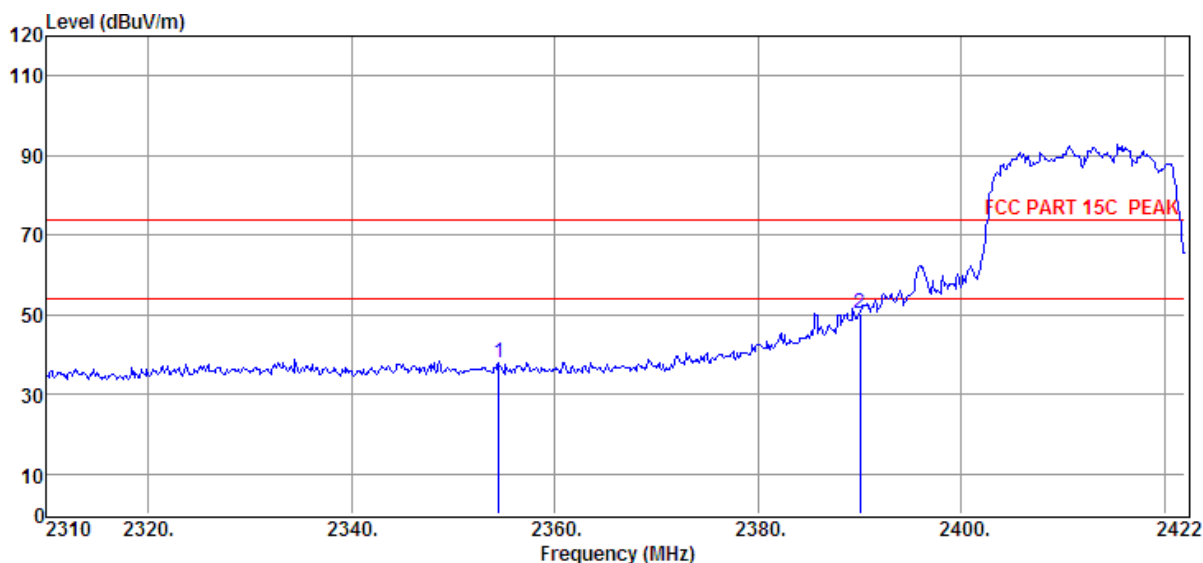


Item (Mark)	Frequency (MHz)	Read Level (dB μ V)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dB μ V/m)	Limit Line (dB μ V/m)	Over Limit (dB)	Detector	Polarization
1	2384.14	60.54	26.98	44.32	5.10	48.30	74.00	-25.70	Peak	HORIZONTAL
2	2390.00	63.46	27.00	44.32	5.11	51.25	74.00	-22.75	Peak	HORIZONTAL

- Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.



11N20 2412MHz VERTICAL

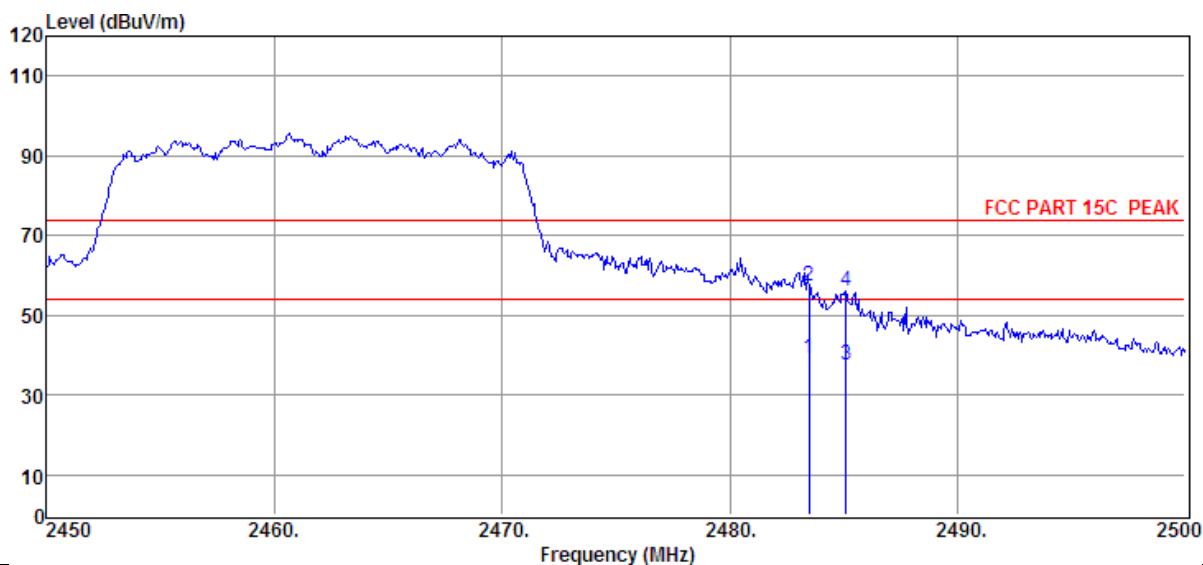


Item (Mark)	Frequency (MHz)	Read Level (dB μV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2354.46	50.15	26.88	44.32	5.07	37.78	74.00	-36.22	Peak	VERTICAL
2	2390.00	62.57	27.00	44.32	5.11	50.36	74.00	-23.64	Peak	VERTICAL

- Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.



11N20 2462MHz HORIZONTAL

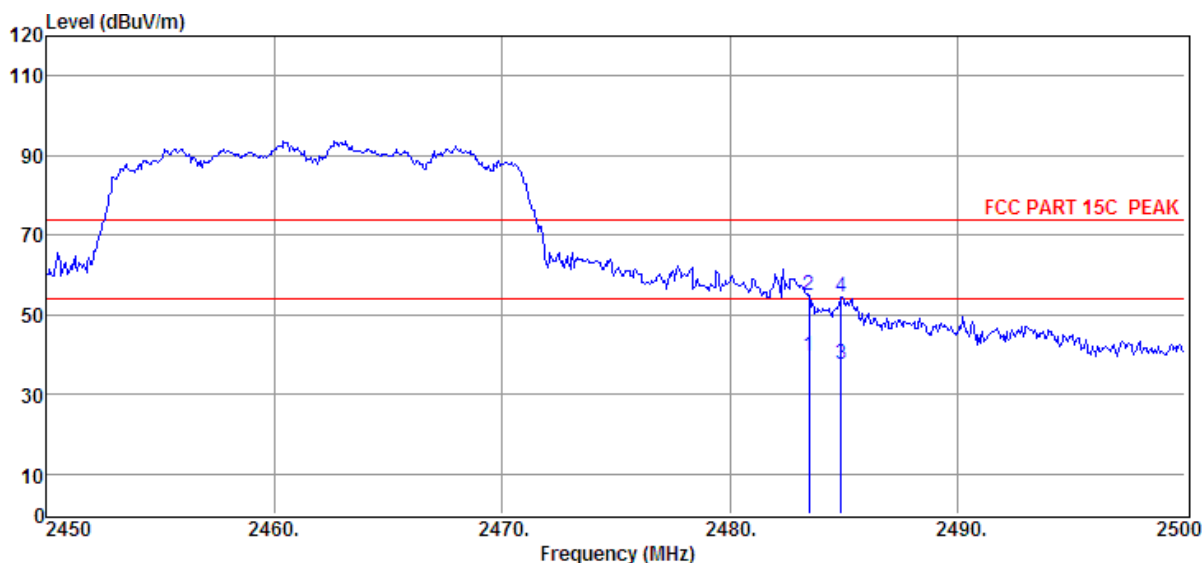


Item (Mark)	Frequency (MHz)	Read Level (dB μV)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2483.50	51.14	27.34	44.32	5.21	39.37	54.00	-14.63	Average	HORIZONTAL
2	2483.50	68.99	27.34	44.32	5.21	57.22	74.00	-16.78	Peak	HORIZONTAL
3	2485.10	49.32	27.35	44.32	5.21	37.56	54.00	-16.44	Average	HORIZONTAL
4	2485.10	67.67	27.35	44.32	5.21	55.91	74.00	-18.09	Peak	HORIZONTAL

- Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
 4. Test setup: RBW: 1 MHz, VBW: 10 Hz, Sweep time: auto for average measure.



11N20 2462MHz VERTICAL

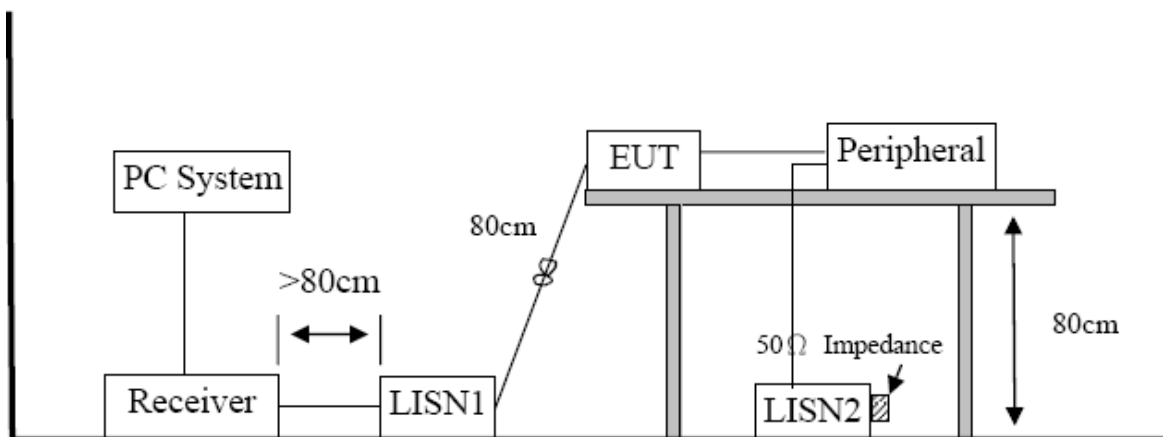


Item (Mark)	Frequency (MHz)	Read Level (dB μV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2483.50	51.36	27.34	44.32	5.21	39.59	54.00	-14.41	Average	VERTICAL
2	2483.50	66.43	27.34	44.32	5.21	54.66	74.00	-19.34	Peak	VERTICAL
3	2484.90	49.14	27.35	44.32	5.21	37.38	54.00	-16.62	Average	VERTICAL
4	2484.90	66.32	27.35	44.32	5.21	54.56	74.00	-19.44	Peak	VERTICAL

- Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.
 4. Test setup: RBW: 1 MHz, VBW: 10 Hz, Sweep time: auto for average measure.

10. Power Line Conducted Emission

101. Block diagram of test setup



102. Power Line Conducted Emission Limits(Class B)

Frequency	Quasi-Peak Level dB(μ V)	Average Level dB(μ V)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Note 1: * Decreasing linearly with logarithm of frequency.

Note 2: The lower limit shall apply at the transition frequencies.

103. Test Procedure

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80cm above the ground plane.

All I/O cables were positioned to simulate typical actual usage as per ANSI

C63.4. All support equipment power received from a second LISN.

Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.

The Receiver scanned from 150 kHz to 30MHz for emissions in each of the test

modes. During the above scans, the emissions were maximized by cable manipulation.

After the preliminary scan, we found the test mode producing the highest emission level.

The EUT configuration and worse cable configuration of the above highest emission levels were recorded for reference of the final test.

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.



A scan was taken on both power lines, Neutral and Line, recording at least the six highest emissions.

Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.

The test data of the worst-case condition(s) was

recorded. The bandwidth of test receiver is set at 9 kHz.

104 Test Result

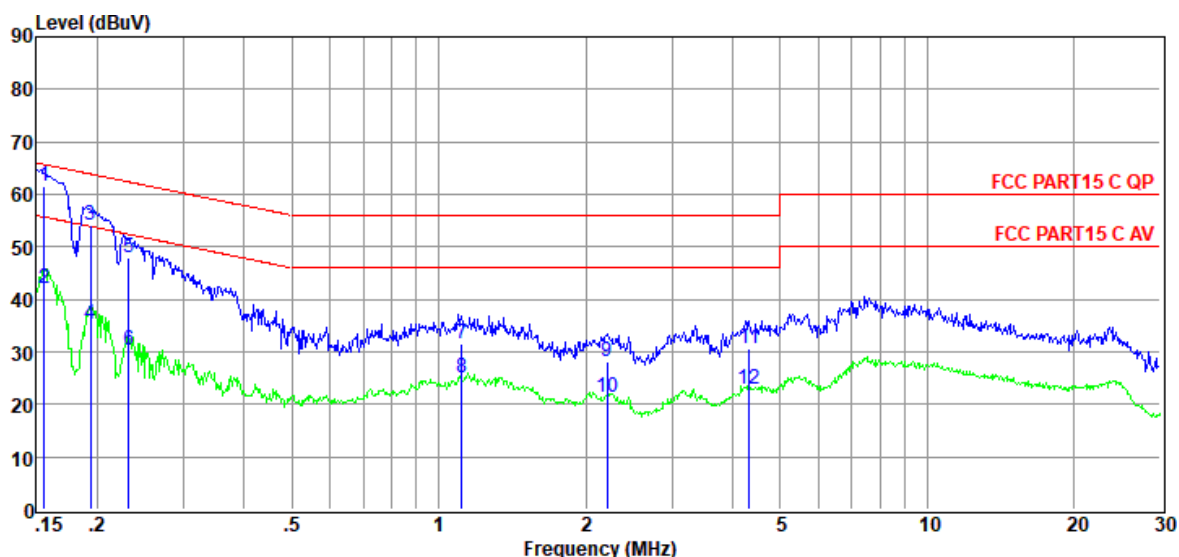
PASS. (See below detailed test result)

Note1: All emissions not reported below are too low against the prescribed limits. Note2: “----” means peak detection; “ ” means average detection

Note3: Pre-test AC conducted emission at both voltage AC 120V/60Hz and AC 240V/50Hz, recorded worst case (AC 120V/60Hz).

Memo : AC 120V/60Hz LINE

Data: 2



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	LI SN Fac tor (dB)	Cable Loss (dB)	Pulse Limiter Factor (dB)	Result Level (dBμV)	Limit Line (dBμV)	Over Limit (dB)	Detector	Phase
1	0.16	42.05	9.52	0.04	9.86	61.47	65.69	-4.22	QP	LINE
2	0.16	22.58	9.52	0.04	9.86	42.00	55.69	-13.69	Average	LINE
3	0.19	34.68	9.51	0.04	9.86	54.09	63.89	-9.80	QP	LINE
4	0.19	15.76	9.51	0.04	9.86	35.17	53.89	-18.72	Average	LINE
5	0.23	28.43	9.52	0.04	9.86	47.85	62.39	-14.54	QP	LINE
6	0.23	10.81	9.52	0.04	9.86	30.23	52.39	-22.16	Average	LINE
7	1.12	12.13	9.57	0.14	9.86	31.70	56.00	-24.30	QP	LINE
8	1.12	5.46	9.57	0.14	9.86	25.03	46.00	-20.97	Average	LINE
9	2.21	8.45	9.60	0.12	9.87	28.04	56.00	-27.96	QP	LINE
10	2.21	1.68	9.60	0.12	9.87	21.27	46.00	-24.73	Average	LINE
11	4.32	11.15	9.64	0.10	9.87	30.76	56.00	-25.24	QP	LINE
12	4.32	3.20	9.64	0.10	9.87	22.81	46.00	-23.19	Average	LINE

Note: 1. Result Level = Read Level + LISN Factor + Pulse Limiter Factor + Cable loss.

2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).

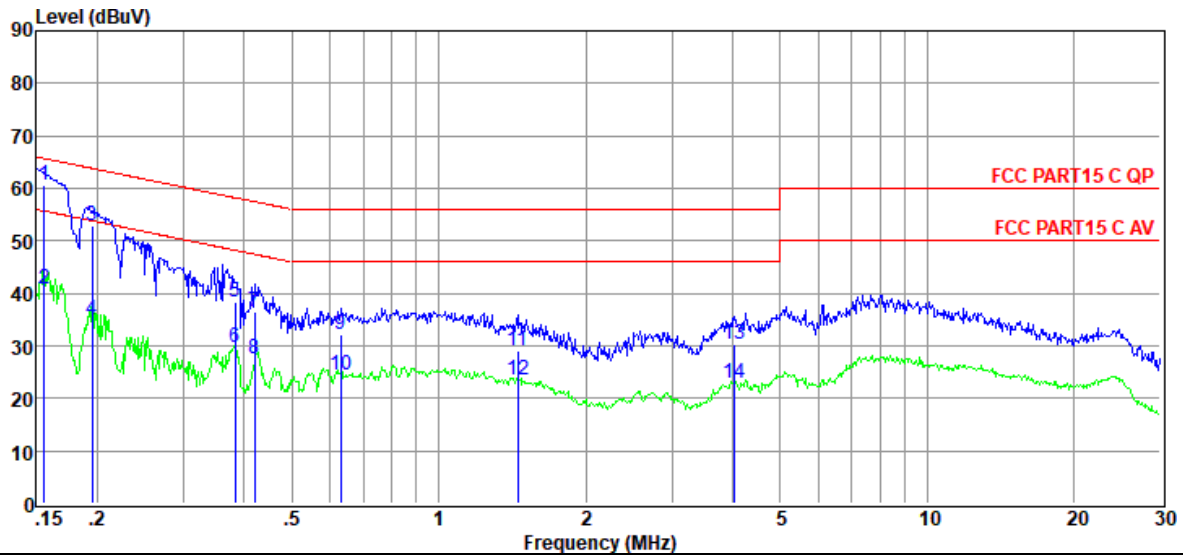


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4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

Memo : AC 120V/60Hz NEUTRAL

Data: 4



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	LI SN Fac tor (dB)	Cable Loss (dB)	Pulse Limiter Factor (dB)	Result Level (dBμV)	Limit Line (dBμV)	Over Limit (dB)	Detector	Phase
1	0.16	41.34	9.48	0.04	9.86	60.72	65.69	-4.97	QP	NEUTRAL
2	0.16	21.33	9.48	0.04	9.86	40.71	55.69	-14.98	Average	NEUTRAL
3	0.20	33.60	9.45	0.04	9.86	52.95	63.80	-10.85	QP	NEUTRAL
4	0.20	15.69	9.45	0.04	9.86	35.04	53.80	-18.76	Average	NEUTRAL
5	0.38	19.00	9.37	0.04	9.83	38.24	58.21	-19.97	QP	NEUTRAL
6	0.38	10.50	9.37	0.04	9.83	29.74	48.21	-18.47	Average	NEUTRAL
7	0.42	17.19	9.37	0.04	9.82	36.42	57.44	-21.02	QP	NEUTRAL
8	0.42	8.21	9.37	0.04	9.82	27.44	47.44	-20.00	Average	NEUTRAL
9	0.63	12.80	9.33	0.07	9.84	32.04	56.00	-23.96	QP	NEUTRAL
10	0.63	5.34	9.33	0.07	9.84	24.58	46.00	-21.42	Average	NEUTRAL
11	1.45	9.90	9.28	0.13	9.86	29.17	56.00	-26.83	QP	NEUTRAL
12	1.45	4.30	9.28	0.13	9.86	23.57	46.00	-22.43	Average	NEUTRAL

Note: 1. Result Level = Read Level + LISN Factor + Pulse Limiter Factor + Cable loss.

2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).

4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.



11. Antenna Requirements

111 Limit

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. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

112 Result

The antennas used for this product are integrated antenna and other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is 4.97dBi.

END OF REPORT