China

FCC/IC- TEST REPORT

Report Number	:	**708881780402-00**	Date of Issue:	November 16, 2017

Model	:	W-WRN-000
Product Type	:	Wireless Repeater Node
FCC ID	:	N73-WRN
IC	:	7449B-WRN
Applicant	:	Mine Site Technologies Pty Limited.
Address	:	Level 5, 113 Wicks Road, North Ryde. 2113 NSW, Australia
Production Facility	:	MINE SITE TECHNOLOGIES CHINA CO.,LTD
Address	:	4F, Building 1, No.1413, Moganshan Road, Hangzhou, China, 310015

Test Result	:	■ **Positive**	☐ **Negative**
Total pages including Appendices	:	85	

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3-13, No.151, Heng Tong Road, Shanghai, 200070, P.R. China
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2 Details about the Test Laboratory

Details about the Test Laboratory
Test Site 1

Company name:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch No.16 Lane, 1951 Du Hui Road, Shanghai 201108, P.R. China
FCC Registration No.:	820234
Telephone:	+86 21 6141 0123
Fax:	+86 21 6140 8600

Test Site 2

Company name:	MRT Technology (Suzhou) Co., Ltd. D8 Building, Youxin Industrial Park, No. 2 Tina'ed Wuzhong Economic Development Zone, Suzhou, China
FCC Registration No.:	893164
IC Registration No.:	11384A-1
Telephone:	+86-512-66308358
Fax:	+86-512-66308368

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3 Description of the Equipment under Test

Description of the Equipment Under Test

Product:	Wireless Repeater Node
Model no.:	W-WRN-000
FCC ID:	N73-WRN
IC:	7449B-WRN
Options and accessories:	NA
Input Rated Voltage Extreme Voltage	DC 7.4V DC 5.4V-8.4V
RF Transmission Frequency:	802.11b/g/n-HT20: 2412 ~ 2462 MHz 802.11n-HT40: 2422 ~ 2452 MHz
No. of Operated Channel:	11 for 802.11b/802.11g/802.11(H20) 7 for 802.11n(H40)
Channel Space:	5MHz

Channel list:

Operation Frequency each of channel For 802.11b/g/n(H20)

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412MHz	4	2427MHz	7	2442MHz	10	2457MHz
2	2417MHz	5	2432MHz	8	2447MHz	11	2462MHz
3	2422MHz	6	2437MHz	9	2452MHz		

Operation Frequency each of channel For 802.11n(H40)

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
		4	2427MHz	7	2442MHz		
		5	2432MHz	8	2447MHz		
3	2422MHz	6	2437MHz	9	2452MHz		

Radio technology:	IEEE 802.11b/802.11g/802.11(H20)/802.11n(H40)
Modulation:	Direct Sequence Spread Spectrum (DSSS) for 802.11b Orthogonal Frequency Division Multiplexing(OFDM) for 802.11g/n
Data speed (IEEE 802.11b):	1Mbps, 2Mbps, 5.5Mbps, 11Mbps
Data speed (IEEE 802.11g):	6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps,54Mbps
Data speed (IEEE 802.11n):	Up to 150Mbps
Hardware version:	HR-A
Software version:	3.2.1
Antenna Type:	External
Antenna Gain:	2.0dBi
Description of the EUT:	The Equipment Under Test (EUT) is Wireless Repeater Node operated at 2.4GHz.

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4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators
RSS-247 Issue 2	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

All the test methods were according to KDB558074 D01 DTS Measurement Guidance v04 and ANSI C63.10 (2013).

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5 Summary of Test Results

Technical Requirements						
FCC Part 15 Subpart C & RSS-210 Issue 2						
Test Condition		Pages	Test Site	Test Result		
				Pass	Fail	N/A
§15.207 RSS-Gen [8.8]	Conducted emission AC power port	---	---	☐	☐	☒
§15.247 (b) (1) RSS-247 [5.4(4)]	Conducted peak output power	12	Site 2	☒	☐	☐
§15.247(a)(1)	20dB bandwidth	---	---	☐	☐	☒
§15.247(a)(1)	Carrier frequency separation	---	---	☐	☐	☒
§15.247(a)(1)(iii)	Number of hopping frequencies	---	---	☐	☐	☒
§15.247(a)(1)(iii)	Dwell Time	---	---	☐	☐	☒
§15.247(e) RSS-247 [5.2]	Power spectral density	18	Site 2	☒	☐	☐
§15.247(a)(2) RSS-247 [5.2]	6dB bandwidth and 99% Occupied Bandwidth	13	Site 2	☒	☐	☐
§15.247(d) RSS-247 [5.5]	Spurious RF conducted emissions	23	Site 2	☒	☐	☐
§15.247(d) & §15.209 RSS-247 [5.5]	Spurious radiated emissions and Band edge for transmitter	22	Site 2	☒	☐	☐
§15.203	Antenna requirement	See note 1		☒	☐	☐

Remark 1: N/A – Not Applicable.
Note 1: 15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. 15.247(c) (1)(i) requirement: (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.
E.U.T Antenna: The WiFi antenna is an external antenna which fixed and user by professional, the best-case gain of the antenna is 2 dBi.

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6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: N73-WRN, IC: 7449B-WRN complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C Rules and RSS-247 Issue 2.

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SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

☐ - **Not** Performed

The Equipment under Test

■ - **Fulfills** the general approval requirements.

☐ - **Does not** fulfill the general approval requirements.

Sample Received Date:	August 23, 2017
Testing Start Date:	August 24, 2017
Testing End Date:	August 30, 2017

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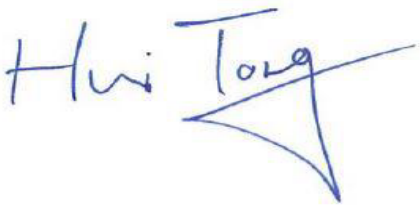
Reviewed by:	Prepared by:
	
Hui TONG	Jiaxi XU
Review Engineer	Project Engineer

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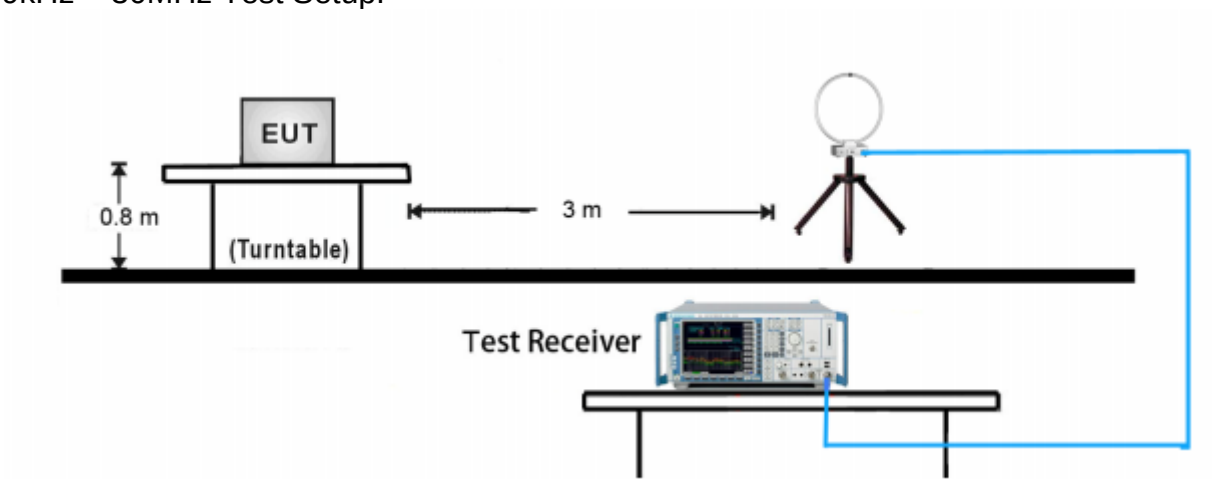
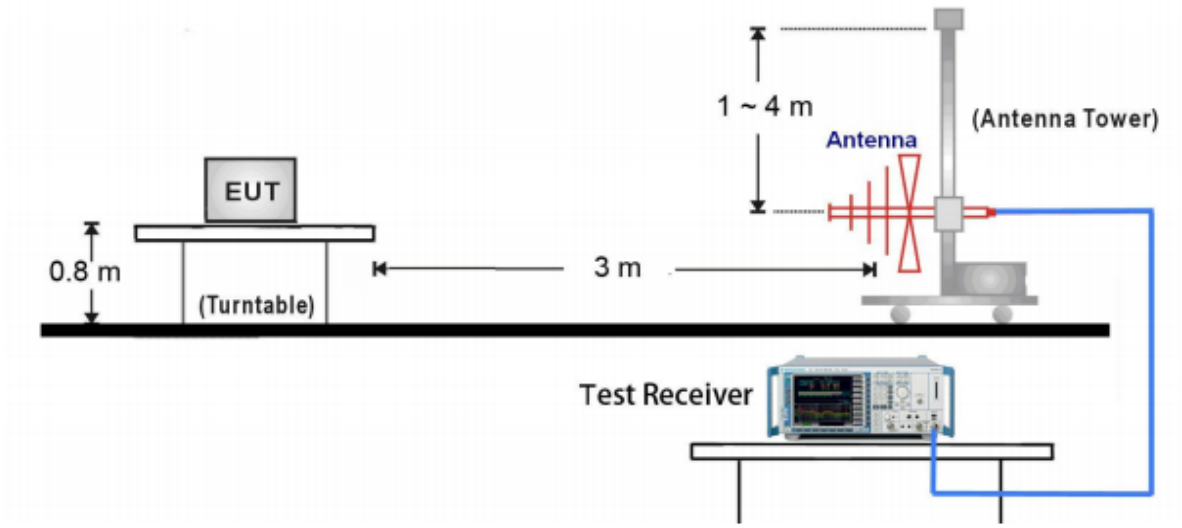
7 Test Setups

7.1 Radiated test setups

9kHz ~ 30MHz Test Setup:



30MHz ~ 1GHz Test Setup:



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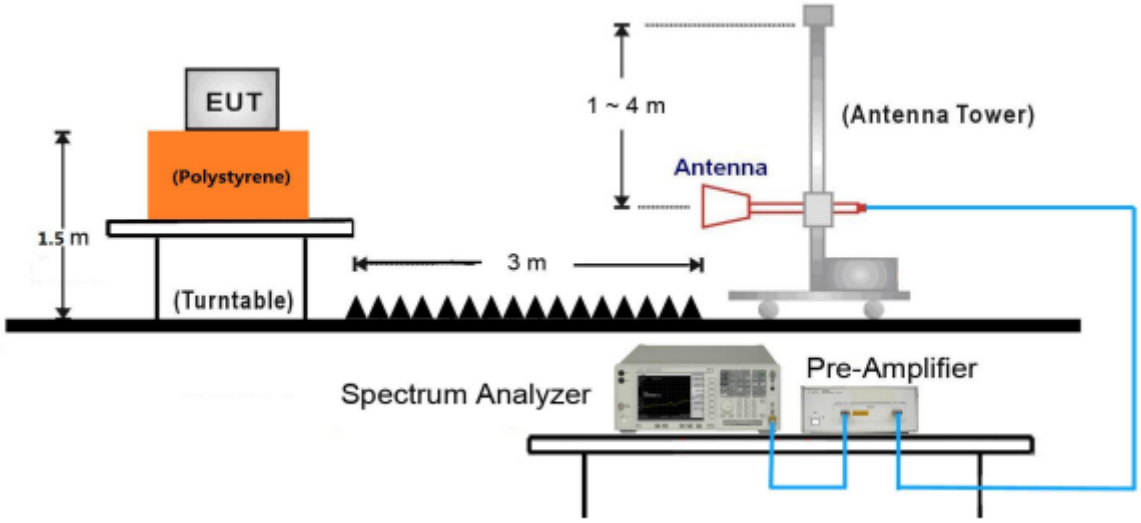
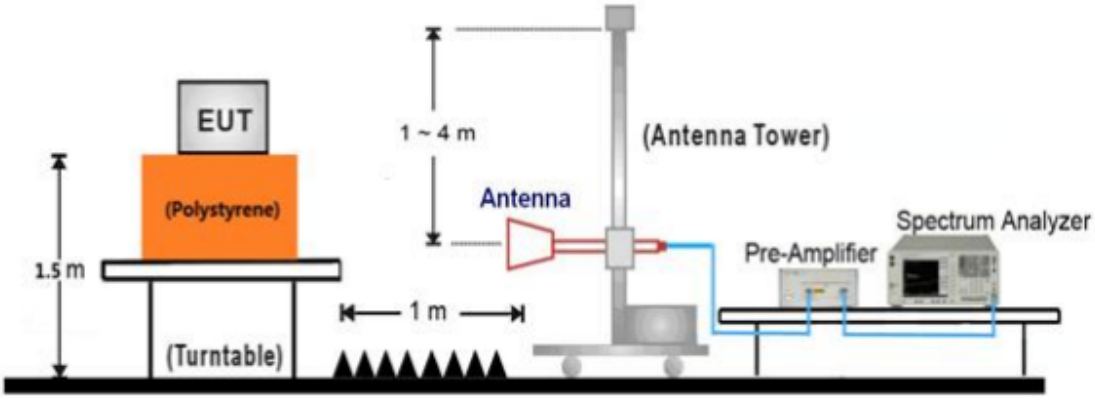
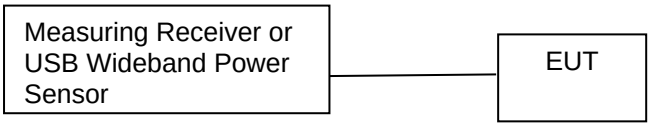
1GHz ~ 18GHz Test Setup:



18GHz ~ 25GHz Test Setup:



7.2 Conducted RF test setups



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8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)
Notebook	Lenove	X240

Test channel & mode:
The Wireless Repeater Node was configured using a proprietary communication interface procided by the client. The interface allows power level and channel control required to support the evaluation. The power level settings in the table below were used for the evaluation.

Test software	putty.exe, artgui.exe

802.11b/802.11g/802.11n-HT20

Test mode	Channel	Frequency (MHz)
Tx	1	2412
Tx	6	2437
Tx	11	2462

802.11n-HT40

Test mode	Channel	Frequency (MHz)
Tx	3	2422
Tx	6	2437
Tx	9	2452

Device Capabilities
This device contains the following capabilities:
802.11b/g/n-HT20/n-HT40 Wi-Fi Device.
Note: 2.4GHz WLAN (DTS) operation is possible in 20MHz, and 40MHz channel bandwidths. The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = peak per the guidance of Section 6.0 b) of KDB 558074 D01v04. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

Test Mode	Duty Cycle
802.11b	99.02
802.11g	97.07
802.11n-HT20	97.27
802.11n-HT40	95.80

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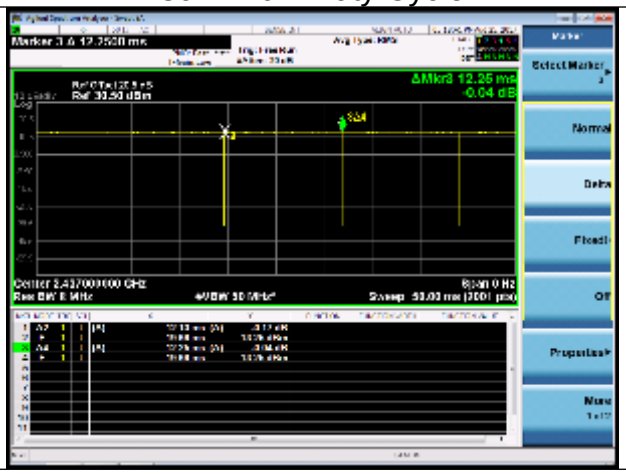
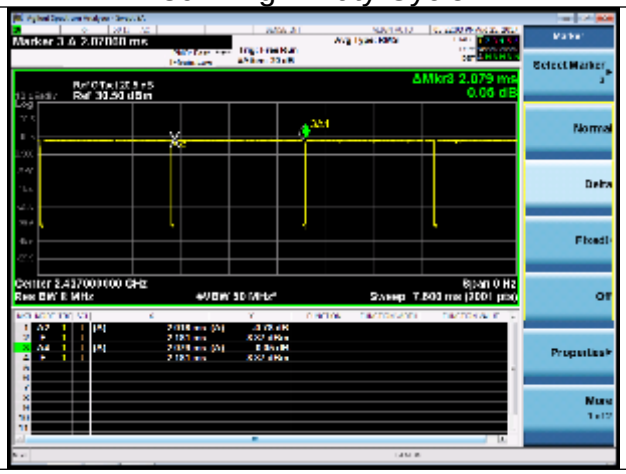
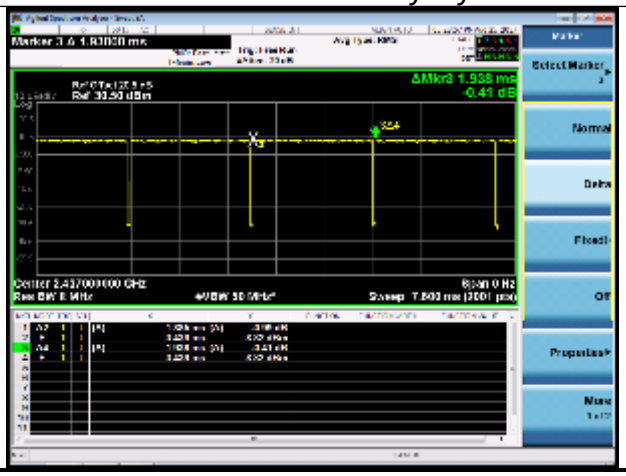
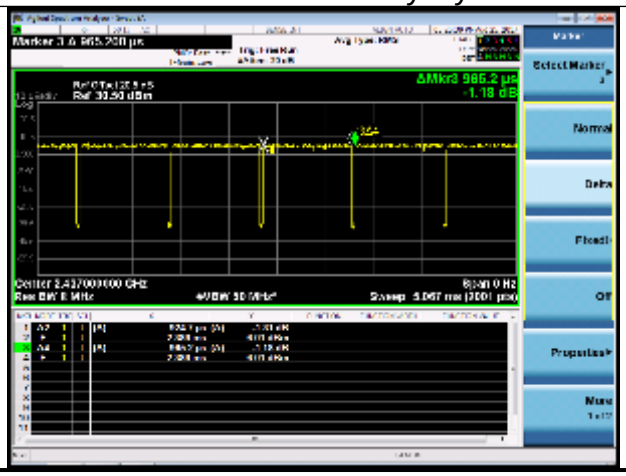
802.11b – Duty Cycle	802.11g – Duty Cycle
	
802.11n–HT20 – Duty Cycle	**802.11n-HT40 – Duty Cycle**
	

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9 Technical Requirement

9.1 Conducted peak output power

Test Method

KDB 558074 D01 v04 – Section 9.1.3 PKPM1 – Peak Power Method

9.1.3 PKPM1 Peak-reading power meter method:
The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

Limits

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤1	≤30

Test result as below table

FCC Part 15.247							
Mode	Antenna Gain (dBi)	Channel	Frequency (MHz)	Final Power Setting Value	Peak Power (dBm)	Average Power (dBm)	Limit (dBm)
b	2	CH01	2412	68	17.42	14.84	30.00
	2	CH06	2437	68	17.31	14.43	30.00
	2	CH11	2462	68	17.13	13.95	30.00
g	2	CH01	2412	62	17.82	12.66	30.00
	2	CH06	2437	66	17.12	11.04	30.00
	2	CH11	2462	66	17.08	10.75	30.00
n-HT20	2	CH01	2412	61	16.66	9.73	30.00
	2	CH06	2437	66	17.12	11.21	30.00
	2	CH11	2462	66	17.04	10.79	30.00
n-HT40	2	CH03	2422	58	15.87	8.00	30.00
	2	CH06	2437	63	16.50	9.51	30.00
	2	CH09	2452	63	16.32	9.13	30.00

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9.2 6dB bandwidth and 99% Occupied Bandwidth

Test Method

1. Use the following spectrum analyzer settings:
   RBW=100K, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Use the automatic bandwidth measurement capability of an instrument, may be employed using the X dB bandwidth mode with X set to 6 dB, 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.
3. Allow the trace to stabilize, record the 6 dB Bandwidth value.

Limit

Limit [kHz]
≥500

Test result

Test Mode	Data Rate / MCS	Channel No.	Freq. (MHz)	6db Bandwidth (MHz)	Limit (MHz)	Result
802.11b	1Mbps	01	2412	8.01	≥ 0.5	Pass
802.11b	1Mbps	06	2437	7.12	≥ 0.5	Pass
802.11b	1Mbps	11	2462	7.58	≥ 0.5	Pass
802.11g	6Mbps	01	2412	16.35	≥ 0.5	Pass
802.11g	6Mbps	06	2437	16.35	≥ 0.5	Pass
802.11g	6Mbps	11	2462	16.35	≥ 0.5	Pass
802.11n-HT20	6.5Mbps	01	2412	17.54	≥ 0.5	Pass
802.11n-HT20	6.5Mbps	06	2437	17.32	≥ 0.5	Pass
802.11n-HT20	6.5Mbps	11	2462	17.58	≥ 0.5	Pass
802.11n-HT40	13.5Mbps	03	2422	35.18	≥ 0.5	Pass
802.11n-HT40	13.5Mbps	06	2437	35.18	≥ 0.5	Pass
802.11n-HT40	13.5Mbps	09	2452	35.17	≥ 0.5	Pass

Test Mode	Data Rate / MCS	Channel No.	Freq. (MHz)	99% Bandwidth (MHz)	Limit	Result
802.11b	1Mbps	01	2412	13.82	NA	NA
802.11b	1Mbps	06	2437	13.34		
802.11b	1Mbps	11	2462	13.05		
802.11g	6Mbps	01	2412	16.53		
802.11g	6Mbps	06	2437	16.69		
802.11g	6Mbps	11	2462	16.55		
802.11n-HT20	6.5Mbps	01	2412	17.69		
802.11n-HT20	6.5Mbps	06	2437	17.79		
802.11n-HT20	6.5Mbps	11	2462	17.72		
802.11n-HT40	13.5Mbps	03	2422	35.89		
802.11n-HT40	13.5Mbps	06	2437	35.97		
802.11n-HT40	13.5Mbps	09	2452	35.93		

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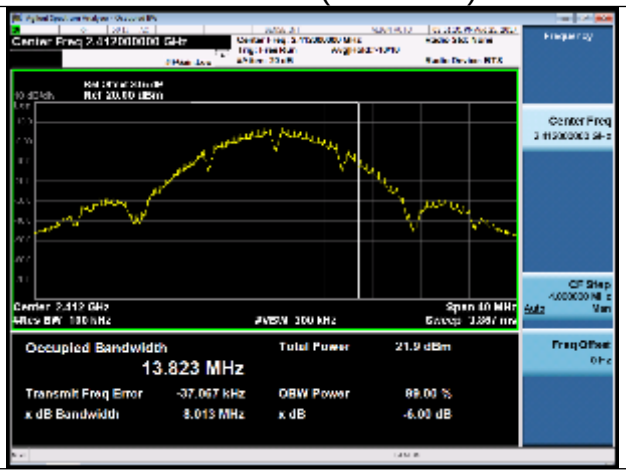
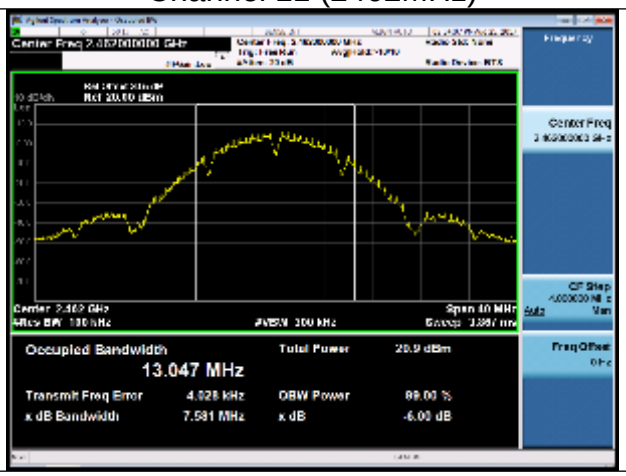
802.11b 6dB Bandwidth	
Channel 01 (2412MHz)	Channel 06 (2437MHz)
	
Channel 11 (2462MHz)	
	

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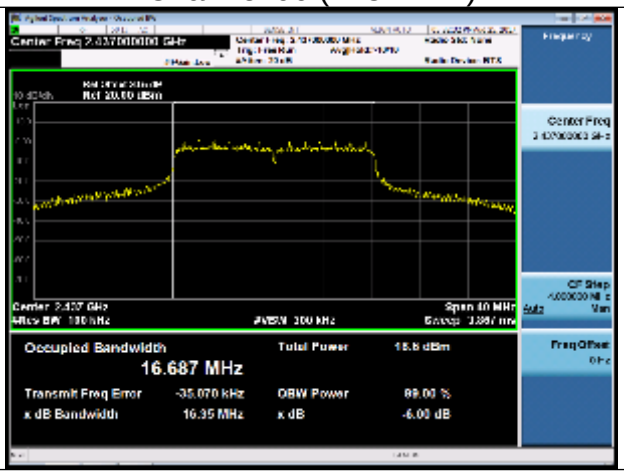
802.11g 6dB Bandwidth	
Channel 01 (2412MHz)	Channel 06 (2437MHz)
	
Channel 11 (2462MHz)	
	

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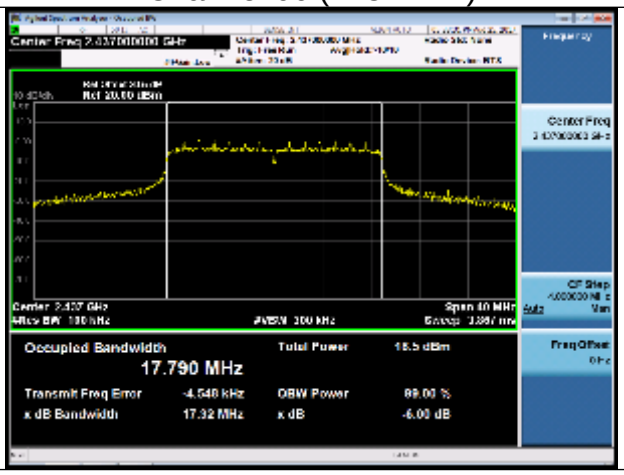
802.11n HT20 6dB Bandwidth	
Channel 01 (2412MHz)	Channel 06 (2437MHz)
	
Channel 11 (2462MHz)	
	

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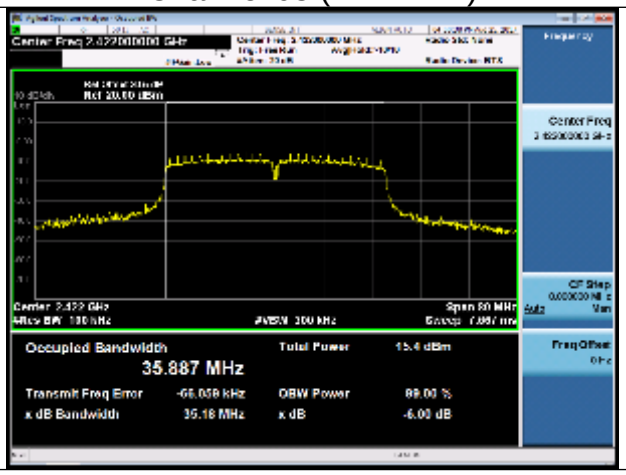
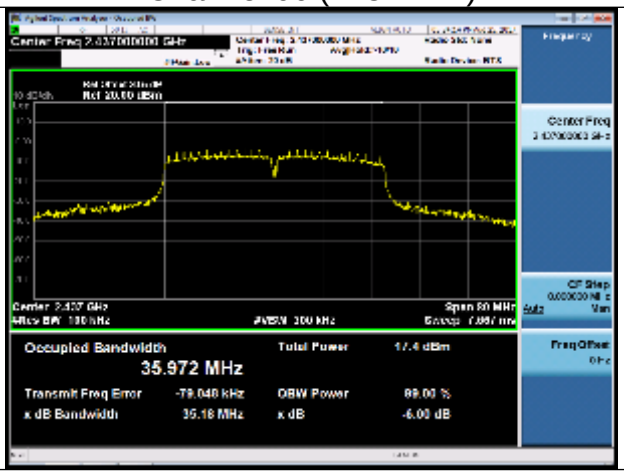
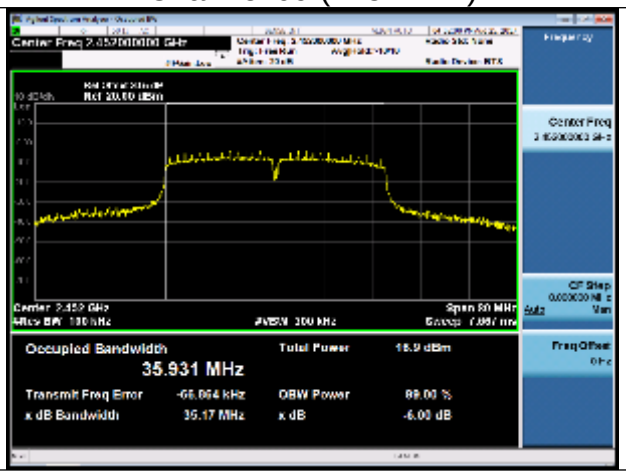
802.11n HT40 6dB Bandwidth	
Channel 03 (2422MHz)	Channel 06 (2437MHz)
	
Channel 09 (2452MHz)	
	

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9.3 Power spectral density

Test Method

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance:

1. Set analyzer center frequency to DTS channel center frequency. RBW=3kHz, VBW≥3RBW, Span=1.5 times DTS bandwidth, Detector=Peak, Sweep=auto, Trace= max hold.
2. Allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
3. Repeat above procedures until other frequencies measured were completed.

Limit

Limit [dBm]
≤8

Test result

Test Mode	Data Rate / MCS	Channel No.	Freq. (MHz)	PKPSD (dBm / 10kHz)	Limit (dBm/3kHz)	Result
802.11b	1Mbps	01	2412	-7.21	≤8	Pass
802.11b	1Mbps	06	2437	-7.49	≤8	Pass
802.11b	1Mbps	11	2462	-7.79	≤8	Pass
802.11g	6Mbps	01	2412	-12.46	≤8	Pass
802.11g	6Mbps	06	2437	-12.79	≤8	Pass
802.11g	6Mbps	11	2462	-13.31	≤8	Pass
802.11n-HT20	6.5Mbps	01	2412	-12.97	≤8	Pass
802.11n-HT20	6.5Mbps	06	2437	-13.78	≤8	Pass
802.11n-HT20	6.5Mbps	11	2462	-14.36	≤8	Pass
802.11n-HT40	13.5Mbps	03	2422	-14.74	≤8	Pass
802.11n-HT40	13.5Mbps	06	2437	-15.44	≤8	Pass
802.11n-HT40	13.5Mbps	09	2452	-15.28	≤8	Pass

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802.11b PKPSD	
Channel 01 (2412MHz)	Channel 06 (2437MHz)
	
Channel 11 (2462MHz)	
	

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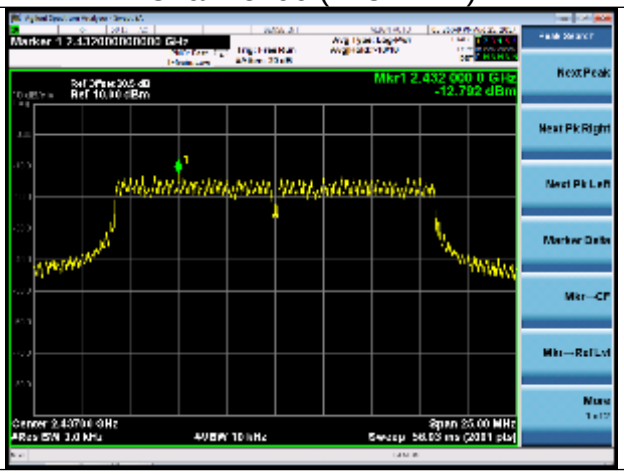
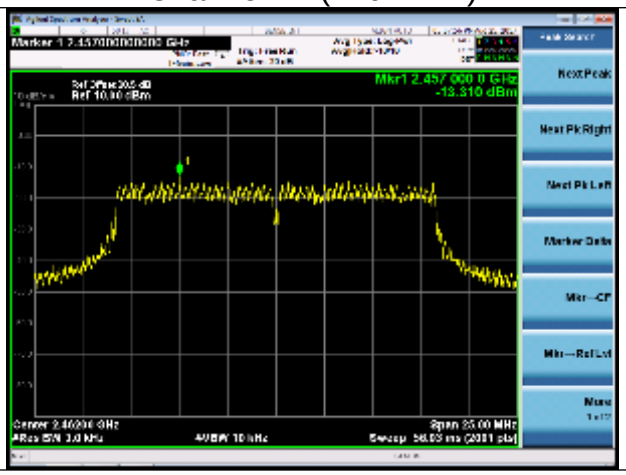
802.11g PKPSD	
Channel 01 (2412MHz)	Channel 06 (2437MHz)
	
Channel 11 (2462MHz)	
	

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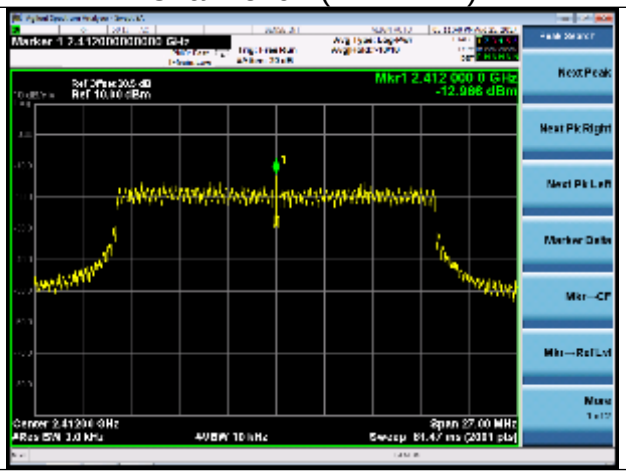
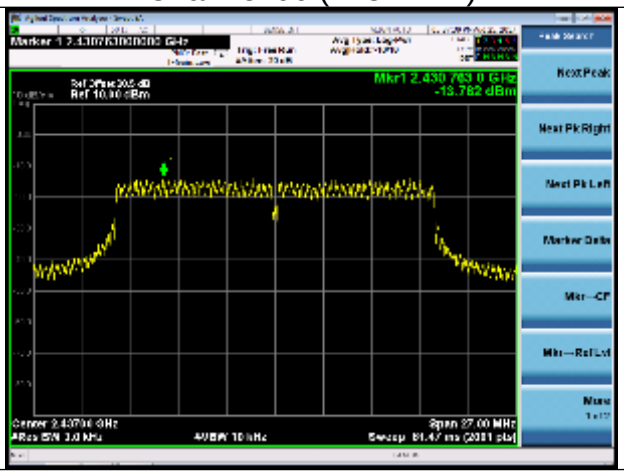
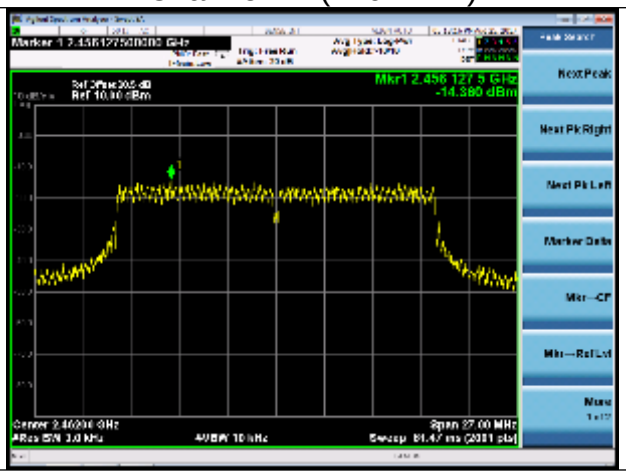
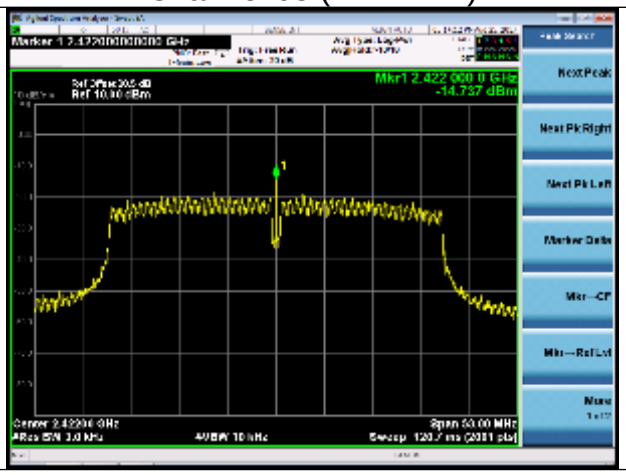
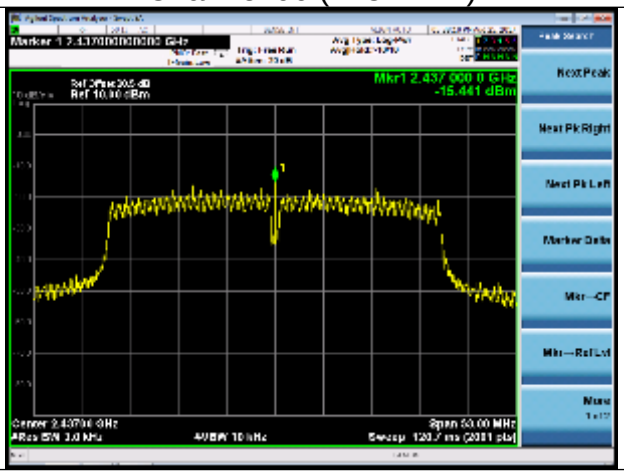
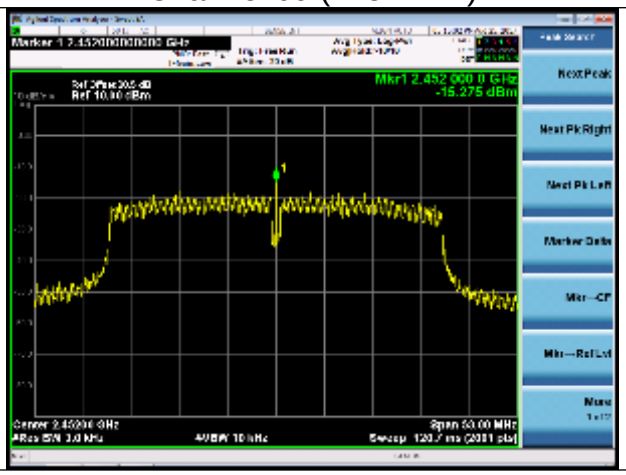
802.11n HT20 PKPSD	
Channel 01 (2412MHz)	Channel 06 (2437MHz)
	
Channel 11 (2462MHz)	
	

China

802.11n HT40 PKPSD	
Channel 03 (2422MHz)	Channel 06 (2437MHz)
	
Channel 09 (2452MHz)	
	

9.4 Conducted Band Edge and Out-of-Band Emissions

Test Method

1. Establish a reference level by using the following procedure:
   a. Set RBW=100 kHz. VBW≥3RBW. Detector =peak, Sweep time = auto couple, Trace mode = max hold.
   b. Allow trace to fully stabilize, use the peak marker function to determine the maximum PSD level.
2. Use the maximum PSD level to establish the reference level.
   a. Set the center frequency and span to encompass frequency range to be measured.
   b. Use the peak marker function to determine the maximum amplitude level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements, report the three highest emissions relative to the limit.
3. Repeat above procedures until other frequencies measured were completed.

Limit

Frequency Range MHz	Limit (dBc)
30-25000	-20

Test result

Test Mode	Data Rate / MCS	Channel No.	Freq. (MHz)	Limit	Result
802.11b	1Mbps	01	2412	20dBc	Pass
802.11b	1Mbps	06	2437	20dBc	Pass
802.11b	1Mbps	11	2462	20dBc	Pass
802.11g	6Mbps	01	2412	20dBc	Pass
802.11g	6Mbps	06	2437	20dBc	Pass
802.11g	6Mbps	11	2462	20dBc	Pass
802.11n-HT20	6.5Mbps	01	2412	20dBc	Pass
802.11n-HT20	6.5Mbps	06	2437	20dBc	Pass
802.11n-HT20	6.5Mbps	11	2462	20dBc	Pass
802.11n-HT40	13.5Mbps	03	2422	20dBc	Pass
802.11n-HT40	13.5Mbps	06	2437	20dBc	Pass
802.11n-HT40	13.5Mbps	09	2452	20dBc	Pass

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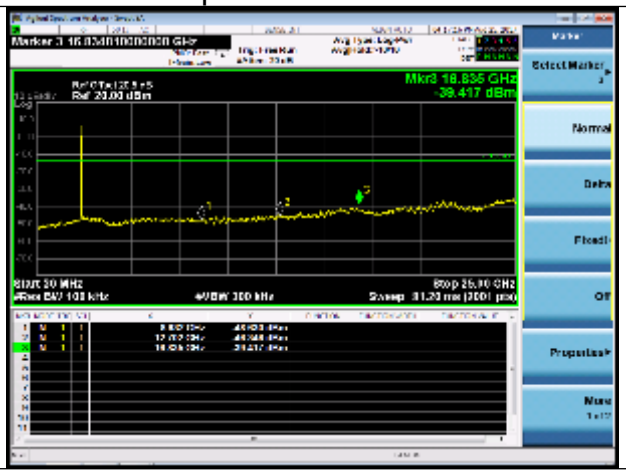
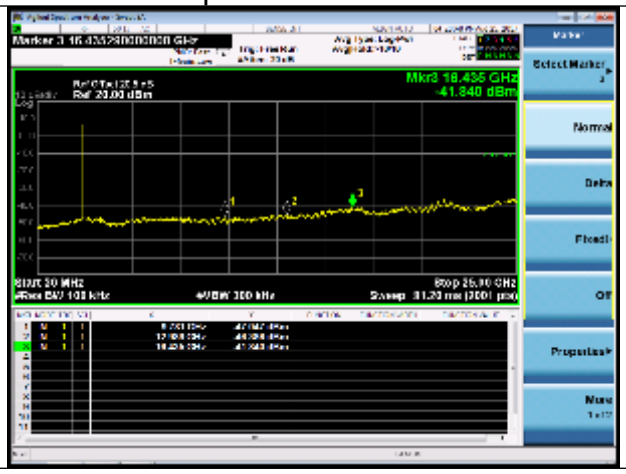
Spurious RF conducted emissions

802.11b 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
	

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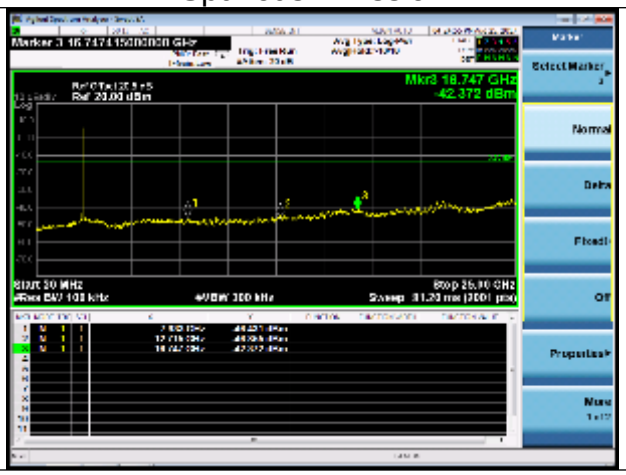
Channel 11 (2462MHz)	
100kHz PSD reference Level	High Band Edge
	
Spurious Emission	
	

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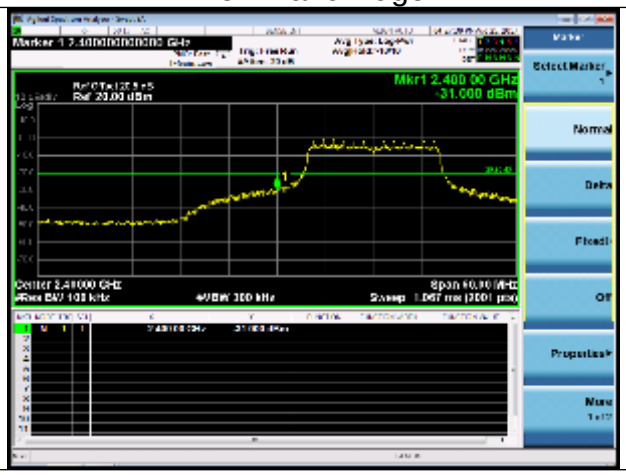
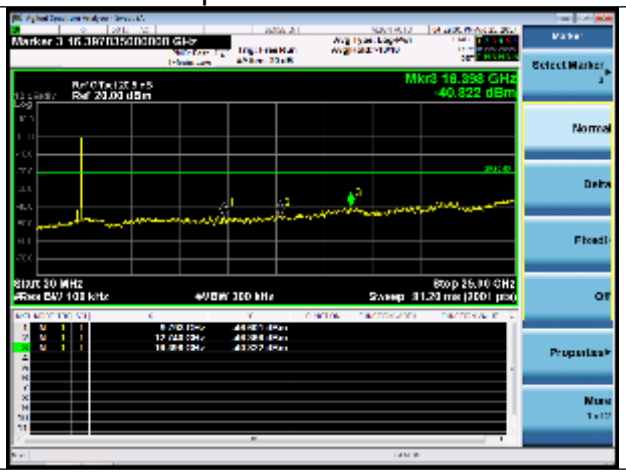
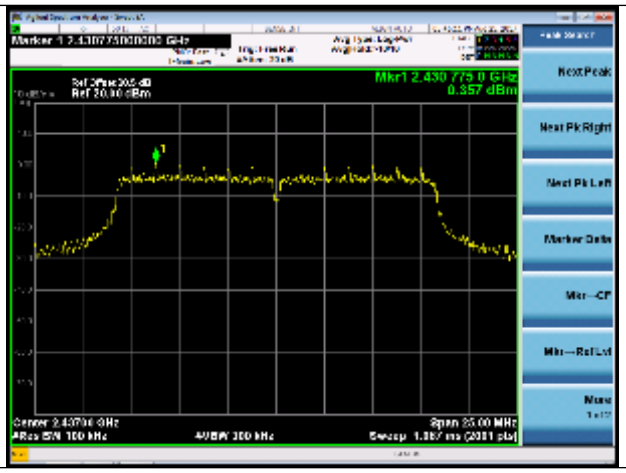
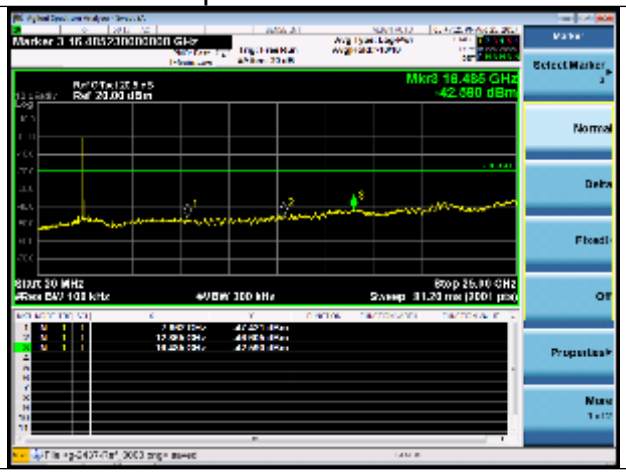
802.11g Out-of-Band Emissions	
Channel 01 (2412MHz)	
100kHz PSD reference Level	Low Band Edge
	
Spurious Emission	
	
Channel 06 (2437MHz)	
100kHz PSD reference Level	Spurious Emission
	

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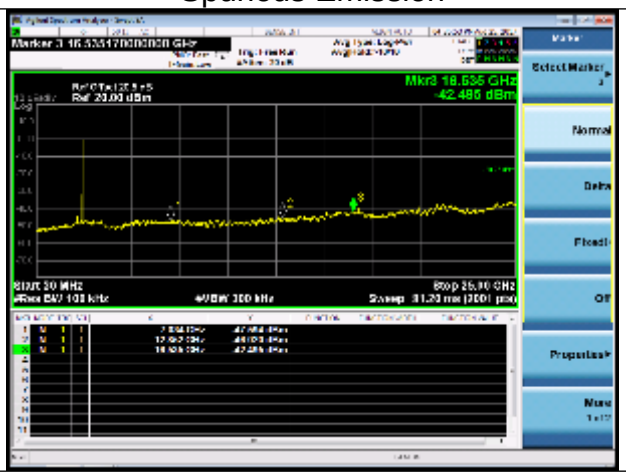
Channel 11 (2462MHz)	
100kHz PSD reference Level	High Band Edge
	
Spurious Emission	
	

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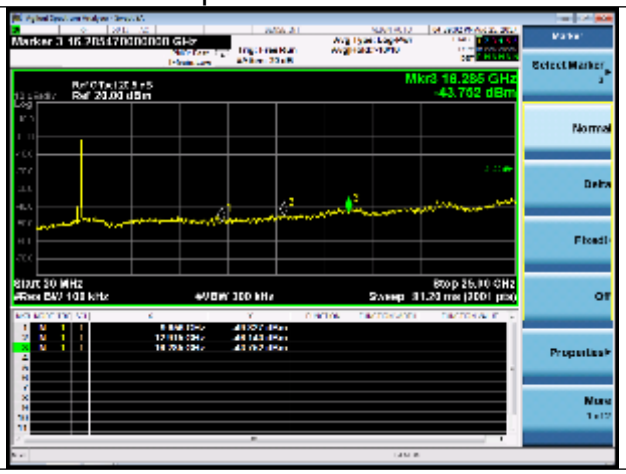
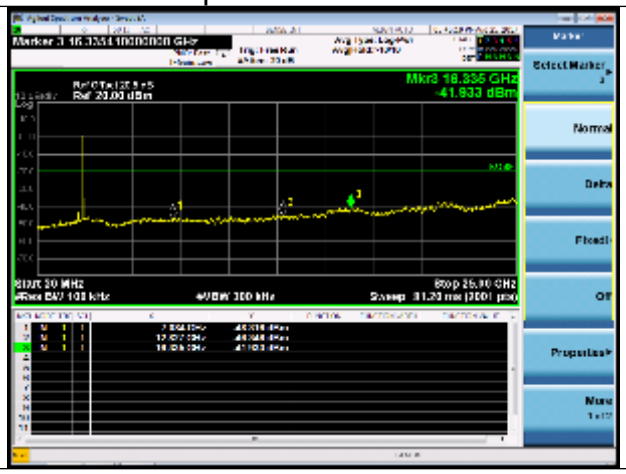
802.11n-HT20 Out-of-Band Emissions	
Channel 01 (2412MHz)	
100kHz PSD reference Level	Low Band Edge
	
Spurious Emission	
	
Channel 06 (2437MHz)	
100kHz PSD reference Level	Spurious Emission
	

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Channel 11 (2462MHz)	
100kHz PSD reference Level	High Band Edge
	
Spurious Emission	
	

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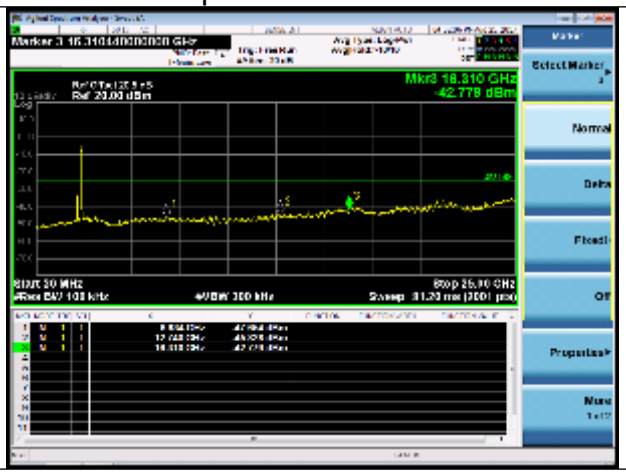
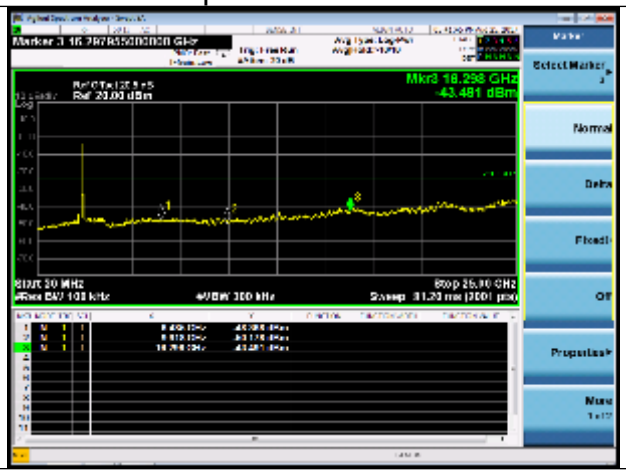
802.11n-HT40 Out-of-Band Emissions	
Channel 03 (2422MHz)	
100kHz PSD reference Level	Low Band Edge
	
Spurious Emission	
	
Channel 06 (2437MHz)	
100kHz PSD reference Level	Spurious Emission
	

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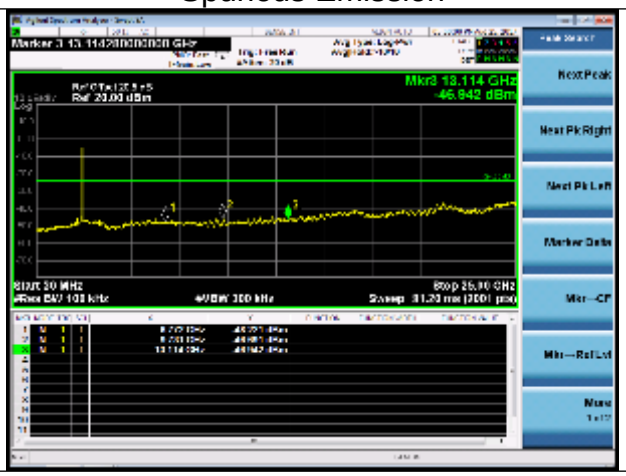
Channel 09 (2452MHz)	
100kHz PSD reference Level	High Band Edge
	
Spurious Emission	
	

9.5 Spurious radiated emissions for transmitter

Test Method

1: The EUT was place on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3-meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

2: The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.

3: The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

4: For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

5: Use the following spectrum analyzer settings According to C63.10:

For Above 1GHz

Span = wide enough to capture the peak level of the in-band emission and all spurious

RBW = 1MHz, VBW≥RBW for peak measurement and VBW = 10Hz for average measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For Below 1GHz

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious

RBW = 100 KHz, VBW≥RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

Note:

1: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Quasi-peak detection (QP) at frequency below 1GHz.

2: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for peak detection (PK) at frequency above 1GHz.

3: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average ((duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor (20log(1/duty cycle)).

4: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.

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Limit

The radio emission outside the operating frequency band shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Radiated emissions which fall in the restricted bands, as defined in section15.205, must comply with the radiated emission limits specified in section 15.209.

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

Frequency MHz	Field Strength uV/m	Measured Distance Meters
0.009~0.490	2400/F (kHz)	300
0.490~1.705	24000/F (kHz)	30
1.705~30	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

Frequency MHz	Field Strength (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)=20logEmission level (uV/m).

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Spurious radiated emissions for transmitter

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Transmitting spurious emission test result as below:
Remark 1: There are the ambient noise within frequency range 9kHz ~ 30MHz and 18GHz ~ 25GHz, the permissible value is not show in the report.
Remark 2: Average measurement was not performed if peak level lower than average limit.
Remark 3: Other frequency was 20dB below limit line with 1-18GHz, there is not show in the report.

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Test Result

Test mode: 802.11b							
Channel 01 (2412MHz)							
Frequency (MHz)	**Reading Level (dBuV)**	**Factor (dB)**	**Measure Level (dBuV/m)**	**Limit (dBuV/M)**	**Margin (dB)**	**Detector**	**Polarization**
4825.0	48.0	2.7	50.6	74.0	-23.4	Peak	Horizontal
5417.0	33.6	3.3	36.9	74.0	-37.1	Peak	Horizontal
6635.0	32.0	7.6	39.7	74.0	-34.3	Peak	Horizontal
7835.0	32.2	10.3	42.5	74.0	-31.5	Peak	Horizontal
4825.0	49.1	2.7	51.8	74.0	-22.2	Peak	Vertical
5432.0	34.4	3.3	37.7	74.0	-36.3	Peak	Vertical
6634.0	33.3	7.6	40.9	74.0	-33.1	Peak	Vertical
7926.0	31.6	10.6	42.3	74.0	-31.7	Peak	Vertical

Test mode: 802.11b							
Channel 06 (2437MHz)							
Frequency (MHz)	**Reading Level (dBuV)**	**Factor (dB)**	**Measure Level (dBuV/m)**	**Limit (dBuV/M)**	**Margin (dB)**	**Detector**	**Polarization**
4876.0	49.3	2.6	51.9	74.0	-22.1	Peak	Horizontal
5403.0	34.0	3.0	37.0	74.0	-37.0	Peak	Horizontal
6633.0	32.4	7.6	40.1	74.0	-33.9	Peak	Horizontal
7924.0	31.5	10.6	42.1	74.0	-31.9	Peak	Horizontal
4876.0	50.9	2.6	53.5	74.0	-20.5	Peak	Vertical
5407.0	34.1	3.1	37.2	74.0	-36.8	Peak	Vertical
6657.0	32.7	7.6	40.3	74.0	-33.8	Peak	Vertical
7925.0	31.3	10.6	42.0	74.0	-32.0	Peak	Vertical

Test mode: 802.11b							
Channel 11 (2462MHz)							
Frequency (MHz)	**Reading Level (dBuV)**	**Factor (dB)**	**Measure Level (dBuV/m)**	**Limit (dBuV/M)**	**Margin (dB)**	**Detector**	**Polarization**
4927.0	50.2	2.6	52.9	74.0	-21.1	Peak	Horizontal
5394.0	33.8	3.0	36.9	74.0	-37.1	Peak	Horizontal
6678.0	33.4	7.7	41.1	74.0	-32.9	Peak	Horizontal
7928.0	31.4	10.7	42.0	74.0	-32.0	Peak	Horizontal
4927.0	49.1	2.6	51.7	74.0	-22.3	Peak	Vertical
5407.0	33.6	3.1	36.6	74.0	-37.4	Peak	Vertical
6687.0	32.3	7.6	39.9	74.0	-34.1	Peak	Vertical
7926.0	31.5	10.6	42.1	74.0	-31.9	Peak	Vertical

Remark:

(1) Emission level= Original Receiver Reading + Correct Factor
(2) Correct Factor = Antenna Factor + Cable Loss -Amplifier gain
(3) Margin = limit – Corrected Reading

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Test mode: 802.11g							
Channel 01 (2412MHz)							
Frequency (MHz)	**Reading Level (dBuV)**	**Factor (dB)**	**Measure Level (dBuV/m)**	**Limit (dBuV/M)**	**Margin (dB)**	**Detector**	**Polarization**
4816.5	44.8	2.6	47.4	74.0	-26.6	Peak	Horizontal
5399.0	33.1	3.0	36.1	74.0	-37.9	Peak	Horizontal
6627.0	31.7	7.6	39.3	74.0	-34.7	Peak	Horizontal
7825.0	31.3	10.4	41.7	74.0	-32.3	Peak	Horizontal
4833.5	49.1	2.8	51.9	74.0	-22.1	Peak	Vertical
5417.0	33.3	3.3	36.6	74.0	-37.4	Peak	Vertical
6678.0	31.6	7.7	39.3	74.0	-34.7	Peak	Vertical
7922.0	31.5	10.6	42.1	74.0	-31.9	Peak	Vertical

Test mode: 802.11g							
Channel 06 (2437 MHz)							
Frequency (MHz)	**Reading Level (dBuV)**	**Factor (dB)**	**Measure Level (dBuV/m)**	**Limit (dBuV/M)**	**Margin (dB)**	**Detector**	**Polarization**
4874.3	45.7	2.6	48.3	54.0	-5.7	Average	Horizontal
4876.0	58.8	2.6	61.4	74.0	-12.6	Peak	Horizontal
5417.0	33.9	3.3	37.1	74.0	-36.9	Peak	Horizontal
6516.0	33.3	7.4	40.6	74.0	-33.4	Peak	Horizontal
8001.0	30.9	10.8	41.8	74.0	-32.3	Peak	Horizontal
4874.1	45.3	2.6	47.9	54.0	-6.1	Average	Vertical
4876.0	59.6	2.6	62.3	74.0	-11.7	Peak	Vertical
5389.0	33.4	3.1	36.5	74.0	-37.5	Peak	Vertical
6627.0	32.6	7.6	40.1	74.0	-33.9	Peak	Vertical
7923.0	31.6	10.6	42.2	74.0	-31.8	Peak	Vertical

Test mode: 802.11g							
Channel 11 (2462MHz)							
Frequency (MHz)	**Reading Level (dBuV)**	**Factor (dB)**	**Measure Level (dBuV/m)**	**Limit (dBuV/M)**	**Margin (dB)**	**Detector**	**Polarization**
4910.0	49.3	2.5	51.8	74.0	-22.2	Peak	Horizontal
5422.0	33.2	3.3	36.5	74.0	-37.5	Peak	Horizontal
6678.0	32.3	7.7	40.0	74.0	-34.0	Peak	Horizontal
8000.0	31.3	10.8	42.2	74.0	-31.8	Peak	Horizontal
4918.5	50.5	2.6	53.0	74.0	-21.0	Peak	Vertical
5389.0	33.6	3.1	36.7	74.0	-37.3	Peak	Vertical
6656.0	33.4	7.6	40.9	74.0	-33.1	Peak	Vertical
7923.0	30.9	10.6	41.5	74.0	-32.5	Peak	Vertical

Remark:

(1) Emission level= Original Receiver Reading + Correct Factor
(2) Correct Factor = Antenna Factor + Cable Loss -Amplifier gain
(3) Margin = limit – Corrected Reading

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Test mode: 802.11n-HT20							
Channel 01 (2412MHz)							
Frequency (MHz)	**Reading Level (dBuV)**	**Factor (dB)**	**Measure Level (dBuV/m)**	**Limit (dBuV/M)**	**Margin (dB)**	**Detector**	**Polarization**
4825.0	45.9	2.7	48.6	74.0	-25.4	Peak	Horizontal
5427.0	34.4	3.3	37.7	74.0	-36.3	Peak	Horizontal
6627.0	32.8	7.6	40.4	74.0	-33.6	Peak	Horizontal
8909.0	29.8	11.9	41.7	74.0	-32.3	Peak	Horizontal
4825.0	44.7	2.7	47.4	74.0	-26.6	Peak	Vertical
5411.0	32.8	3.1	36.0	74.0	-38.0	Peak	Vertical
6565.0	32.1	7.5	39.6	74.0	-34.4	Peak	Vertical
8867.0	30.7	11.6	42.2	74.0	-31.8	Peak	Vertical

Test mode: 802.11n-HT20							
Channel 06 (2437 MHz)							
Frequency (MHz)	**Reading Level (dBuV)**	**Factor (dB)**	**Measure Level (dBuV/m)**	**Limit (dBuV/M)**	**Margin (dB)**	**Detector**	**Polarization**
4874.7	44.9	2.6	47.5	54.0	-6.5	Average	Horizontal
4876.0	56.6	2.6	59.2	74.0	-14.8	Peak	Horizontal
5422.0	33.8	3.3	37.1	74.0	-36.9	Peak	Horizontal
7937.0	30.9	10.7	41.6	74.0	-32.4	Peak	Horizontal
8773.0	30.5	11.8	42.3	74.0	-31.7	Peak	Horizontal
4873.3	44.9	2.6	47.5	54.0	-6.5	Average	Vertical
4876.0	60.8	2.6	63.4	74.0	-10.6	Peak	Vertical
5404.0	33.3	3.0	36.3	74.0	-37.7	Peak	Vertical
6676.0	32.4	7.7	40.1	74.0	-33.9	Peak	Vertical
7967.0	31.5	10.8	42.3	74.0	-31.7	Peak	Vertical

Test mode: 802.11n-HT20							
Channel 11 (2462MHz)							
Frequency (MHz)	**Reading Level (dBuV)**	**Factor (dB)**	**Measure Level (dBuV/m)**	**Limit (dBuV/M)**	**Margin (dB)**	**Detector**	**Polarization**
4918.5	50.7	2.6	53.2	74.0	-20.8	Peak	Horizontal
5417.0	33.5	3.3	36.7	74.0	-37.3	Peak	Horizontal
7926.0	31.5	10.6	42.1	74.0	-31.9	Peak	Horizontal
8637.0	31.8	11.2	43.0	74.0	-31.0	Peak	Horizontal
4918.5	50.8	2.6	53.4	74.0	-20.6	Peak	Vertical
5387.0	33.5	3.1	36.7	74.0	-37.3	Peak	Vertical
7932.0	31.8	10.7	42.5	74.0	-31.5	Peak	Vertical
8637.0	31.3	11.2	42.4	74.0	-31.6	Peak	Vertical

Remark:

(1) Emission level= Original Receiver Reading + Correct Factor
(2) Correct Factor = Antenna Factor + Cable Loss -Amplifier gain
(3) Margin = limit – Corrected Reading

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Test mode: 802.11n-HT40							
Channel 03 (2422MHz)							
Frequency (MHz)	**Reading Level (dBuV)**	**Factor (dB)**	**Measure Level (dBuV/m)**	**Limit (dBuV/M)**	**Margin (dB)**	**Detector**	**Polarization**
5403.0	33.5	3.0	36.5	74.0	-37.5	Peak	Horizontal
6617.0	32.7	7.6	40.2	74.0	-33.8	Peak	Horizontal
7521.0	31.3	10.9	42.2	74.0	-31.8	Peak	Horizontal
8835.0	30.7	11.6	42.4	74.0	-31.6	Peak	Horizontal
5402.0	33.7	3.0	36.7	74.0	-37.3	Peak	Vertical
7341.0	31.6	10.7	42.3	74.0	-31.7	Peak	Vertical
7924.0	31.0	10.6	41.7	74.0	-32.3	Peak	Vertical
8411.0	32.5	10.1	42.6	74.0	-31.4	Peak	Vertical

Test mode: 802.11n-HT40							
Channel 06 (2437 MHz)							
Frequency (MHz)	**Reading Level (dBuV)**	**Factor (dB)**	**Measure Level (dBuV/m)**	**Limit (dBuV/M)**	**Margin (dB)**	**Detector**	**Polarization**
4873.0	41.9	2.6	44.5	54.0	-9.5	Average	Horizontal
4876.0	53.9	2.6	56.5	74.0	-17.5	Peak	Horizontal
7345.0	31.5	10.7	42.2	74.0	-31.8	Peak	Horizontal
8637.0	31.4	11.2	42.5	74.0	-31.5	Peak	Horizontal
8864.0	30.4	11.6	42.0	74.0	-32.0	Peak	Horizontal
4874.6	41.6	2.6	44.2	54.0	-9.8	Average	Vertical
4876.0	55.6	2.6	58.2	74.0	-15.8	Peak	Vertical
7341.0	32.0	10.7	42.7	74.0	-31.3	Peak	Vertical
8637.0	31.8	11.2	42.9	74.0	-31.1	Peak	Vertical
8864.0	30.4	11.6	42.0	74.0	-32.0	Peak	Vertical

Test mode: 802.11n-HT40							
Channel 09 (2452MHz)							
Frequency (MHz)	**Reading Level (dBuV)**	**Factor (dB)**	**Measure Level (dBuV/m)**	**Limit (dBuV/M)**	**Margin (dB)**	**Detector**	**Polarization**
4893.0	44.2	2.7	46.9	74.0	-27.1	Peak	Horizontal
4898.1	31.9	2.7	34.5	54.0	-19.5	Average	Horizontal
7440.0	31.6	10.7	42.3	74.0	-31.7	Peak	Horizontal
7835.0	31.6	10.3	41.9	74.0	-32.1	Peak	Horizontal
8773.0	30.9	11.8	42.7	74.0	-31.3	Peak	Horizontal
4893.0	44.8	2.7	47.5	74.0	-26.5	Peak	Vertical
7721.0	32.1	10.3	42.4	74.0	-31.6	Peak	Vertical
7923.0	31.5	10.6	42.1	74.0	-31.9	Peak	Vertical
8835.0	30.1	11.6	41.8	74.0	-32.2	Peak	Vertical

Remark:

(1) Emission level= Original Receiver Reading + Correct Factor
(2) Correct Factor = Antenna Factor + Cable Loss -Amplifier gain
(3) Margin = limit – Corrected Reading

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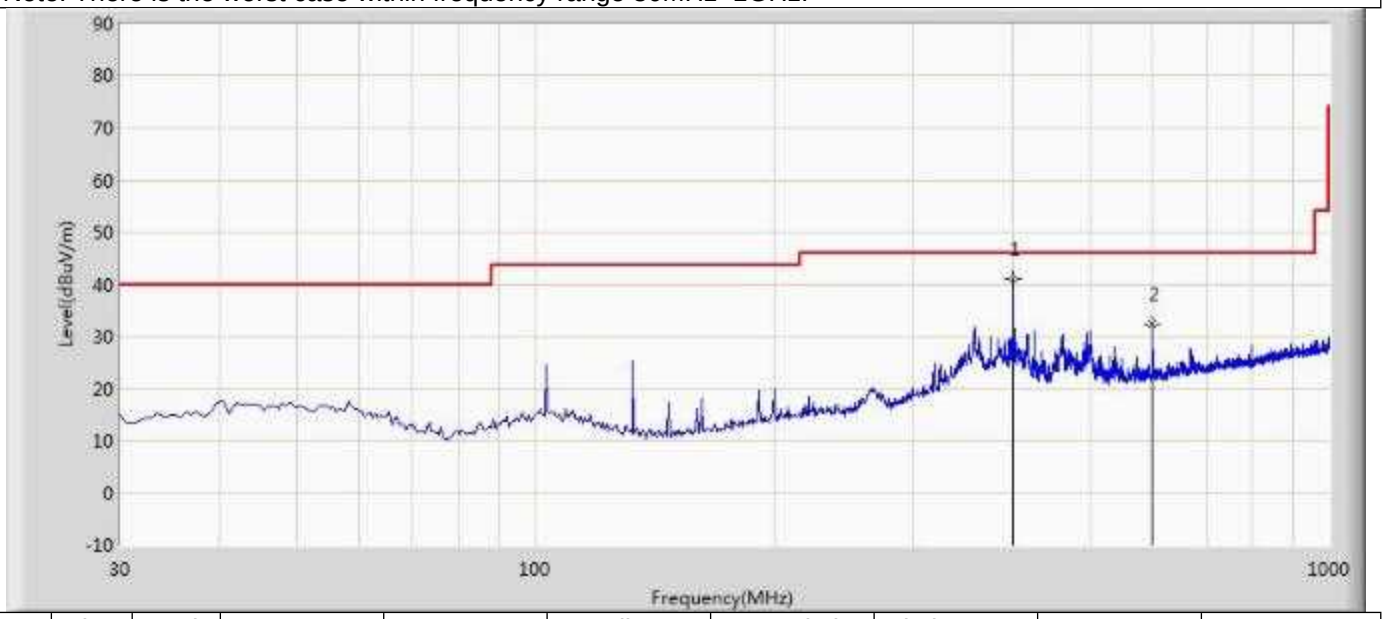
The worst case of Radiated Emission below 1GHz:

Site: AC2	Time: 2017/08/25 - 17:01
Limit: FCC_Part15.109_RE(3m)_ClassB	Engineer: Dandy Li
Probe: VULB9162_0.03-8GHz	Polarity: Horizontal
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11b at channel 2437MHz. Note: There is the worst case within frequency range 30MHz~1GHz.	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	400.055	40.987	24.232	-5.013	46.000	16.755	PK
2			599.875	32.206	12.112	-13.794	46.000	20.094	PK

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)
Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

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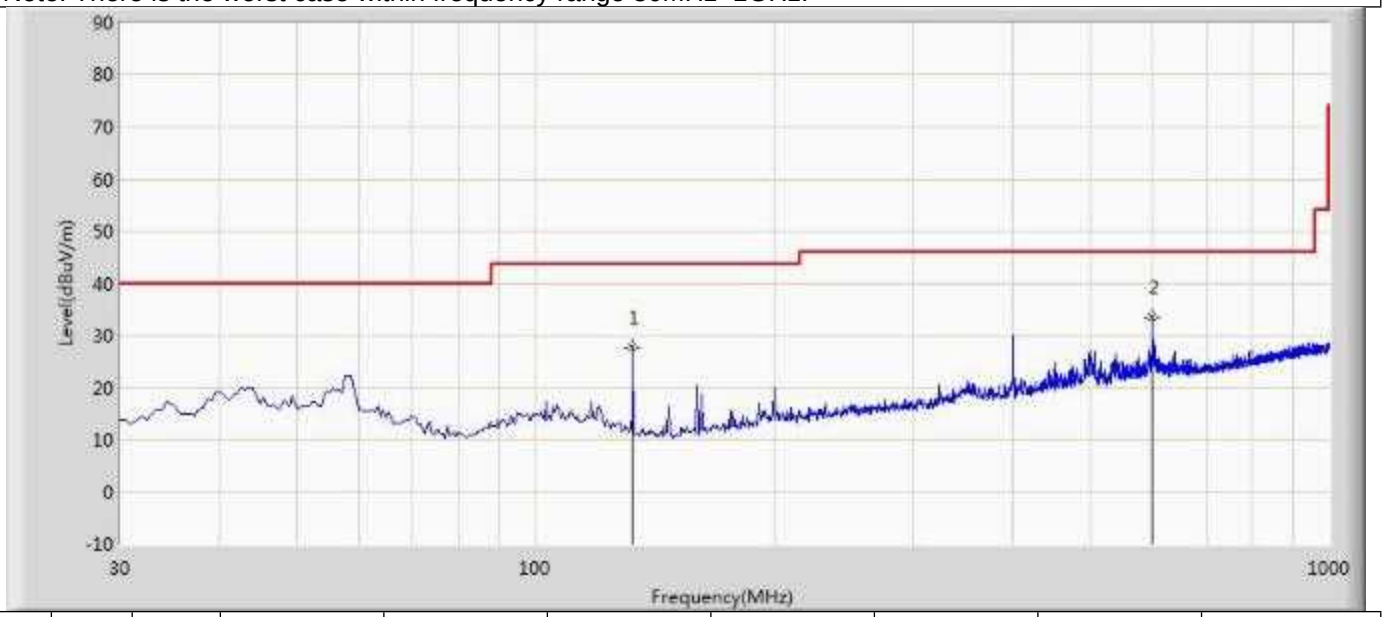
Site: AC2	Time: 2017/08/25 - 17:04
Limit: FCC_Part15.109_RE(3m)_ClassB	Engineer: Dandy Li
Probe: VULB9162_0.03-8GHz	Polarity: Vertical
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11b at channel 2437MHz. Note: There is the worst case within frequency range 30MHz~1GHz.	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			132.820	27.787	17.935	-15.713	43.500	9.852	PK
2		*	599.875	33.404	13.310	-12.596	46.000	20.094	PK

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)
Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

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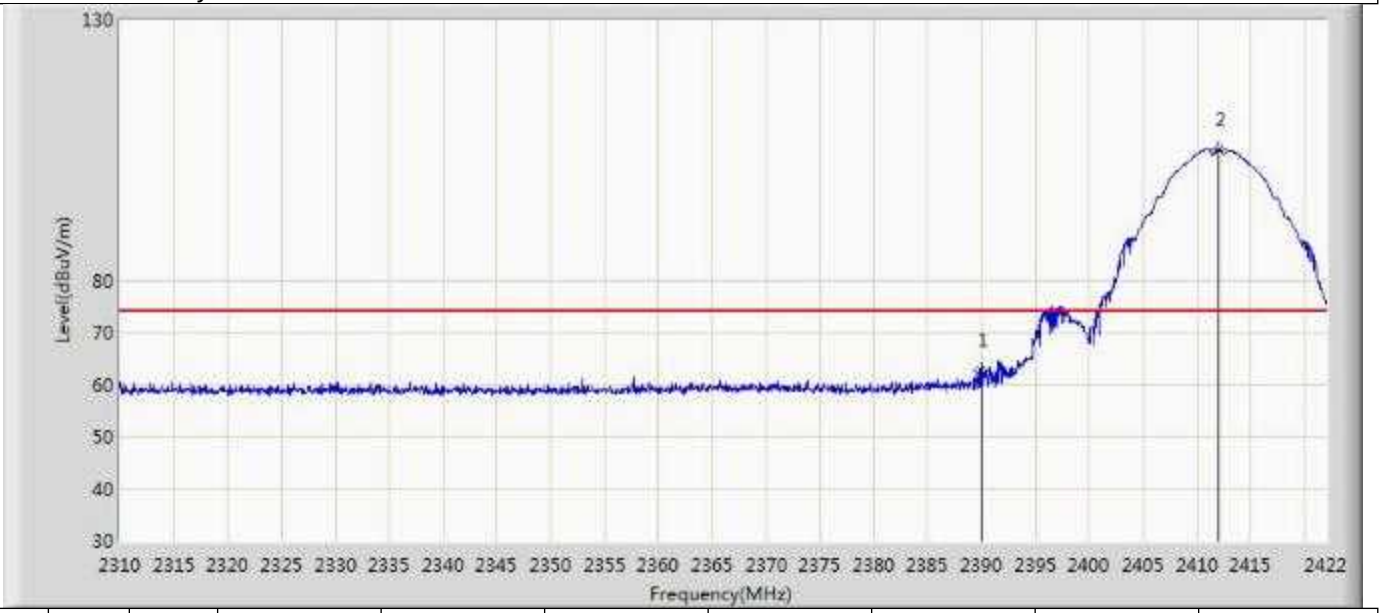
Radiated Restricted Band Edge Measurement
Test Result:

Site: AC2	Time: 2017/08/24 - 20:28
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11b at channel 2412MHz Power=68	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2390.000	62.895	30.617	-11.105	74.000	32.278	PK
2		*	2412.032	105.187	72.947	N/A	N/A	32.240	PK

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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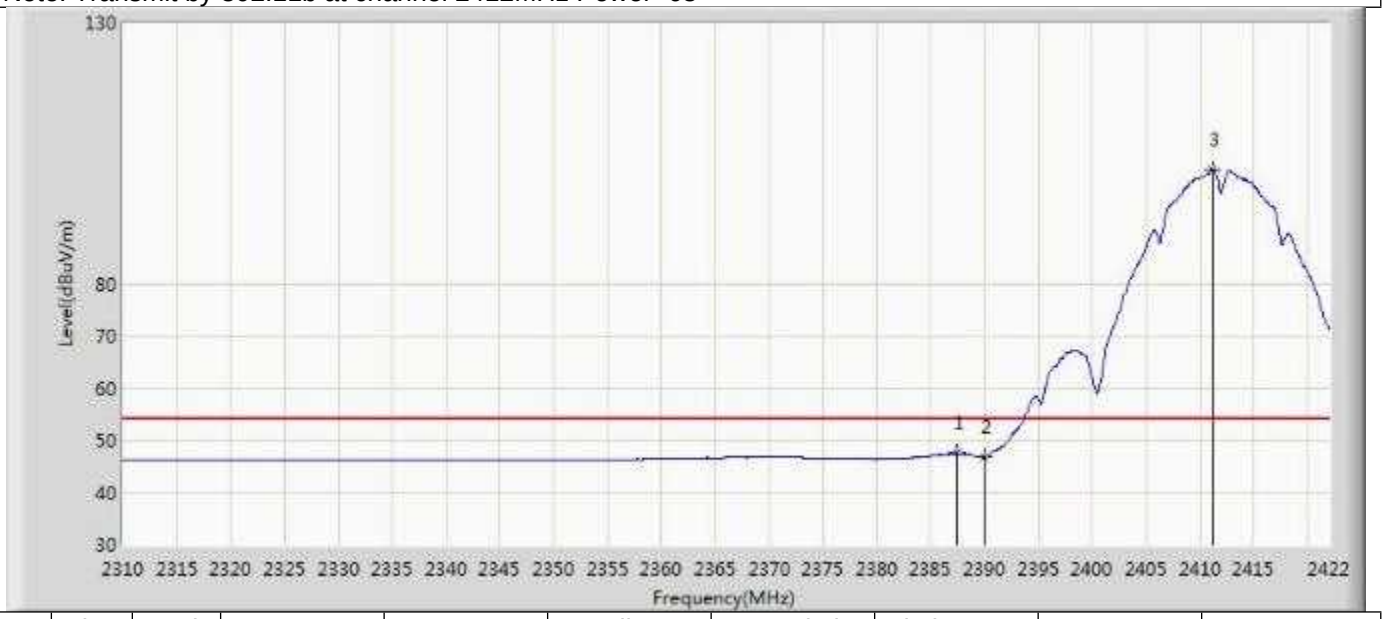
Site: AC2	Time: 2017/08/24 - 20:29
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11b at channel 2412MHz Power=68	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2387.448	47.718	15.454	-6.282	54.000	32.263	AV
2			2390.000	46.919	14.641	-7.081	54.000	32.278	AV
3		*	2411.248	101.918	69.675	N/A	N/A	32.243	AV

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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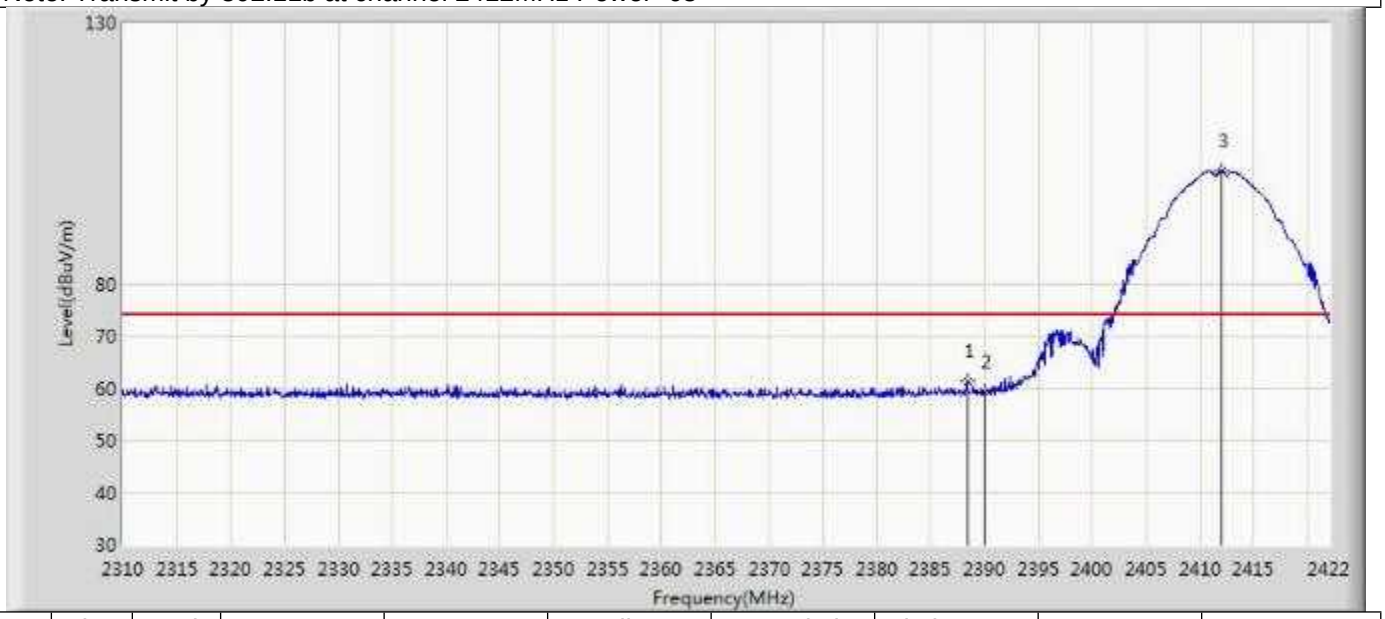
Site: AC2	Time: 2017/08/24 - 20:30
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11b at channel 2412MHz Power=68	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2388.400	61.409	29.140	-12.591	74.000	32.269	PK
2			2390.000	59.303	27.025	-14.697	74.000	32.278	PK
3		*	2412.032	101.699	69.459	N/A	N/A	32.240	PK

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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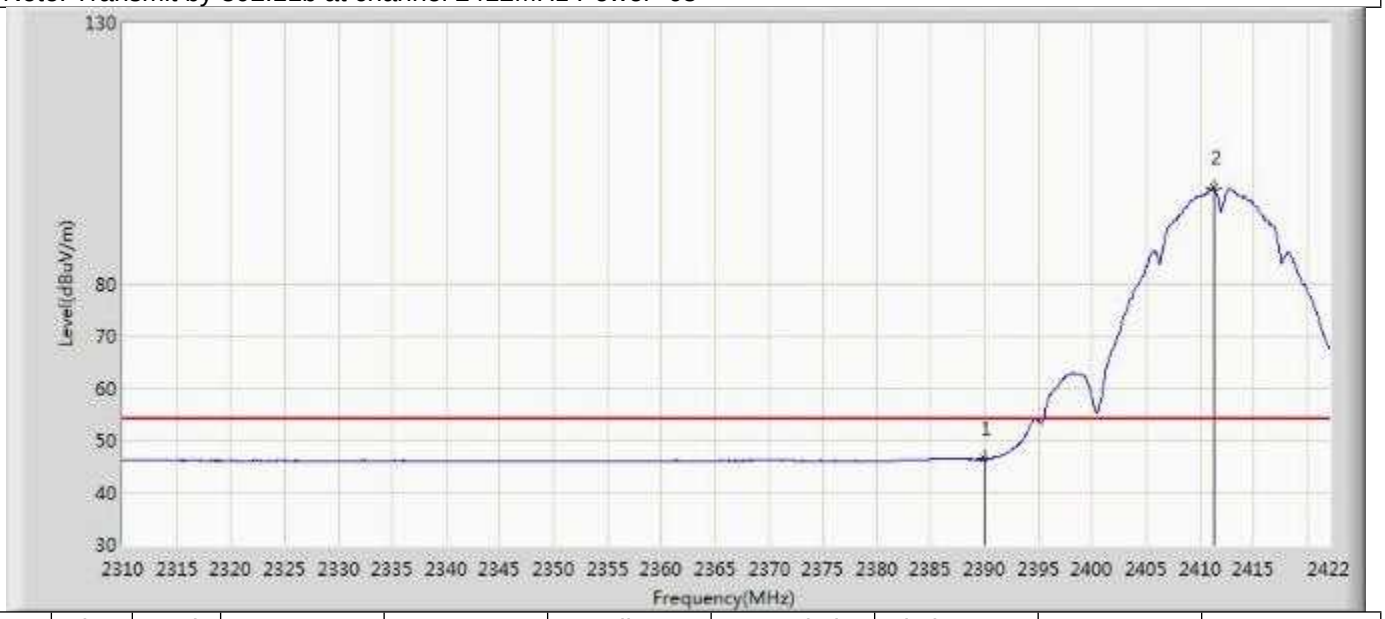
Site: AC2	Time: 2017/08/24 - 20:31
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11b at channel 2412MHz Power=68	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2390.000	46.385	14.107	-7.615	54.000	32.278	AV
2		*	2411.304	98.356	66.113	N/A	N/A	32.243	AV

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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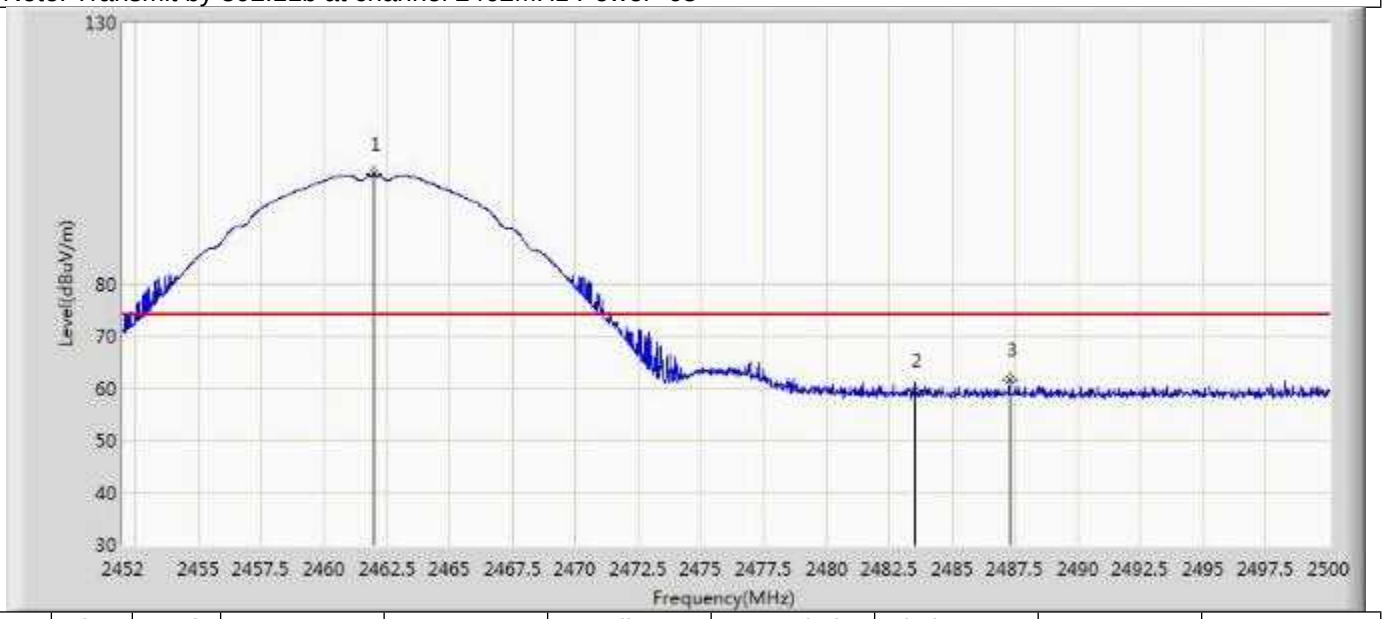
Site: AC2	Time: 2017/08/25 - 20:37
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11b at channel 2462MHz Power=68	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2461.984	100.926	68.688	N/A	N/A	32.238	PK
2			2483.500	59.627	27.346	-14.373	74.000	32.282	PK
3			2487.280	61.562	29.268	-12.438	74.000	32.294	PK

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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Site: AC2	Time: 2017/08/25 - 20:42
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11b at channel 2462MHz Power=68	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2461.384	97.242	65.006	N/A	N/A	32.236	AV
2			2483.500	46.409	14.128	-7.591	54.000	32.282	AV

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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Site: AC2	Time: 2017/08/25 - 20:43
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11b at channel 2462MHz Power=68	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2460.856	104.197	71.964	N/A	N/A	32.233	PK
2			2483.500	58.950	26.669	-15.050	74.000	32.282	PK
3			2484.880	60.963	28.677	-13.037	74.000	32.286	PK

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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Site: AC2	Time: 2017/08/25 - 20:44
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11b at channel 2462MHz Power=68	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2461.384	100.688	68.452	N/A	N/A	32.236	AV
2			2483.500	46.625	14.344	-7.375	54.000	32.282	AV

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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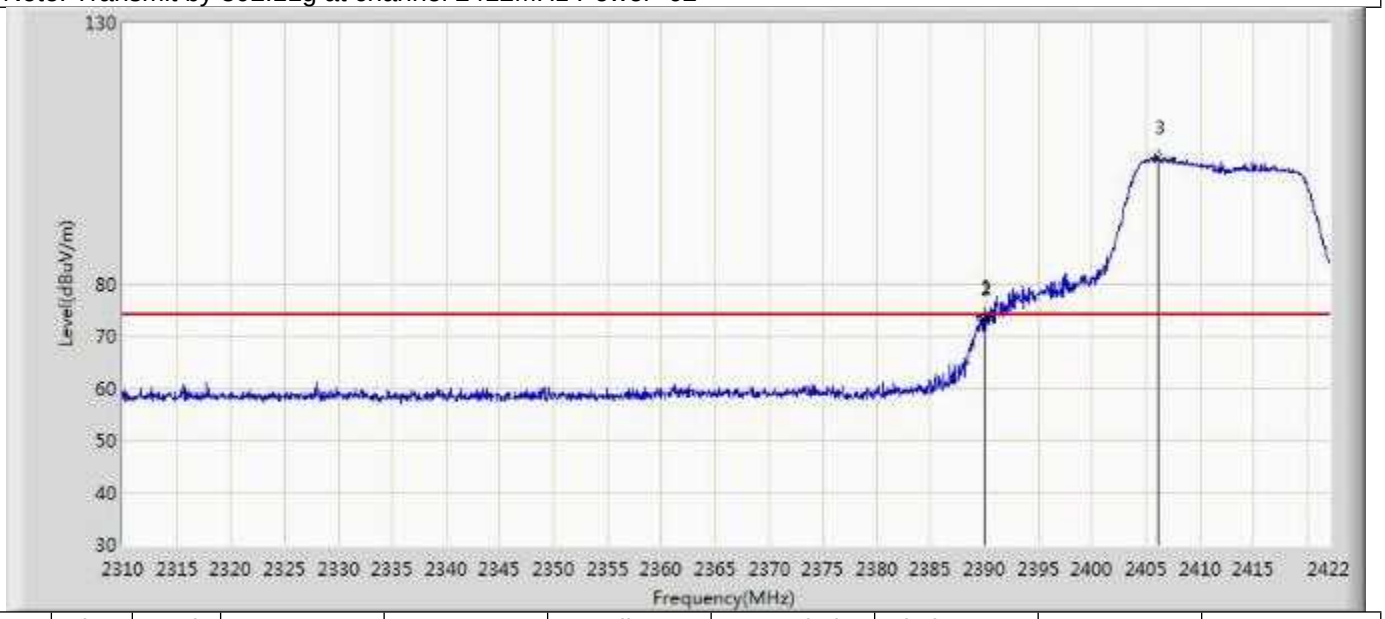
Site: AC2	Time: 2017/08/24 - 21:12
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11g at channel 2412MHz Power=62	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2389.968	73.850	41.572	-0.150	74.000	32.278	PK
2			2390.000	73.265	40.987	-0.735	74.000	32.278	PK
3		*	2406.152	104.089	71.829	N/A	N/A	32.260	PK

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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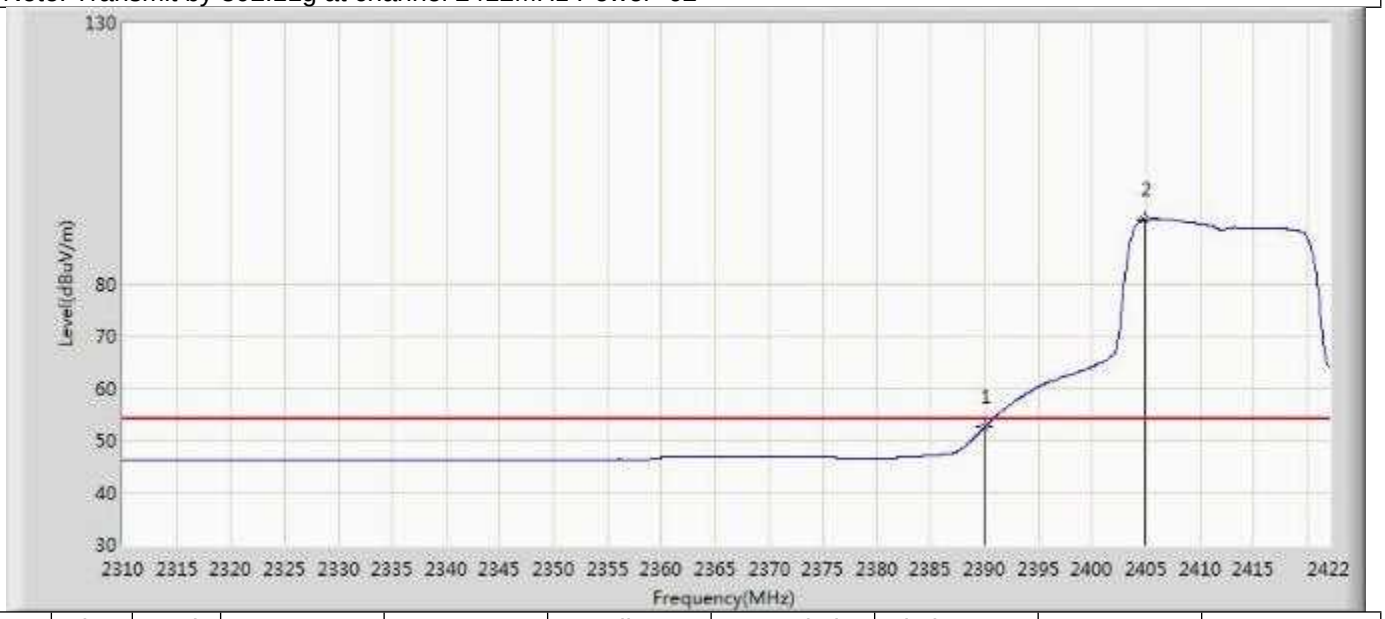
Site: AC2	Time: 2017/08/24 - 21:14
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11g at channel 2412MHz Power=62	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2390.000	52.500	20.222	-1.500	54.000	32.278	AV
2		*	2404.864	92.357	60.093	N/A	N/A	32.265	AV

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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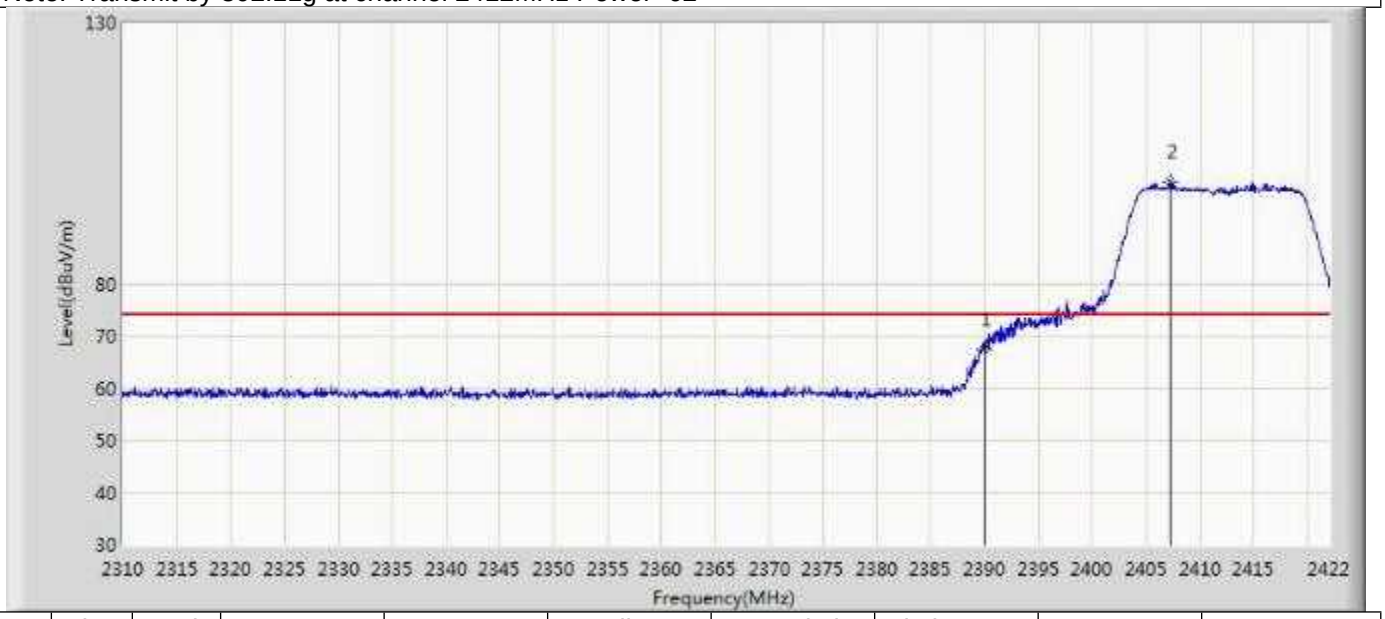
Site: AC2	Time: 2017/08/24 - 21:15
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11g at channel 2412MHz Power=62	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2390.000	67.373	35.095	-6.627	74.000	32.278	PK
2		*	2407.328	99.555	67.299	N/A	N/A	32.256	PK

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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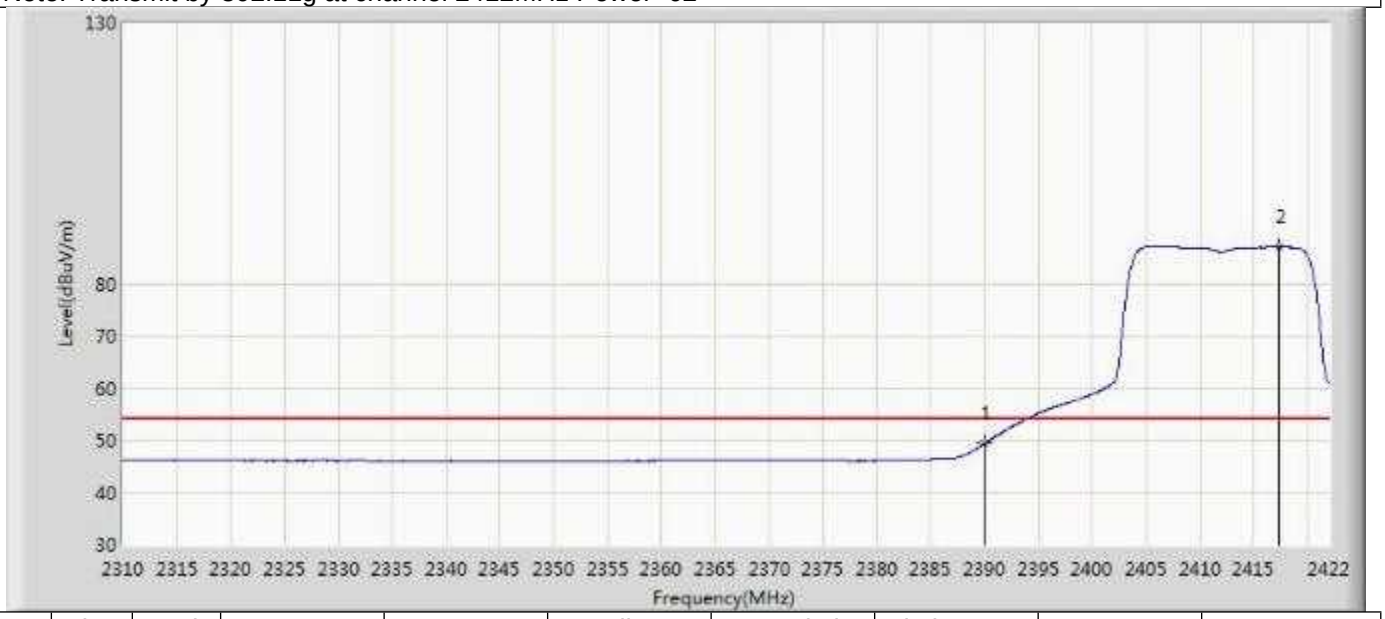
Site: AC2	Time: 2017/08/24 - 21:16
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11g at channel 2412MHz Power=62	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2390.000	49.326	17.048	-4.674	54.000	32.278	AV
2		*	2417.408	87.101	54.884	N/A	N/A	32.217	AV

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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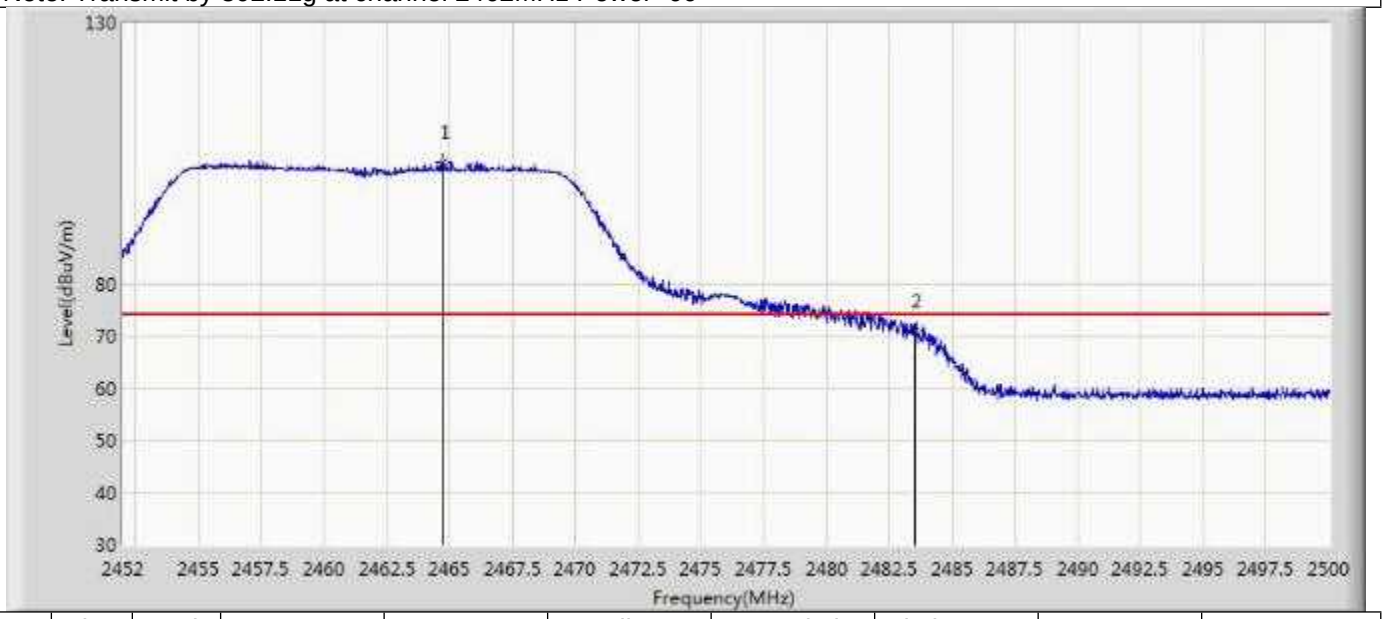
Site: AC2	Time: 2017/08/24 - 21:27
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11g at channel 2462MHz Power=66	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2464.744	103.427	71.186	N/A	N/A	32.242	PK
2			2483.500	70.885	38.604	-3.115	74.000	32.282	PK

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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Phone: +86 21 61410123, Fax:+86 21 61408600

Site: AC2	Time: 2017/08/24 - 21:30
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11g at channel 2462MHz Power=66	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2455.912	91.346	59.134	N/A	N/A	32.212	AV
2			2483.500	50.995	18.714	-3.005	54.000	32.282	AV

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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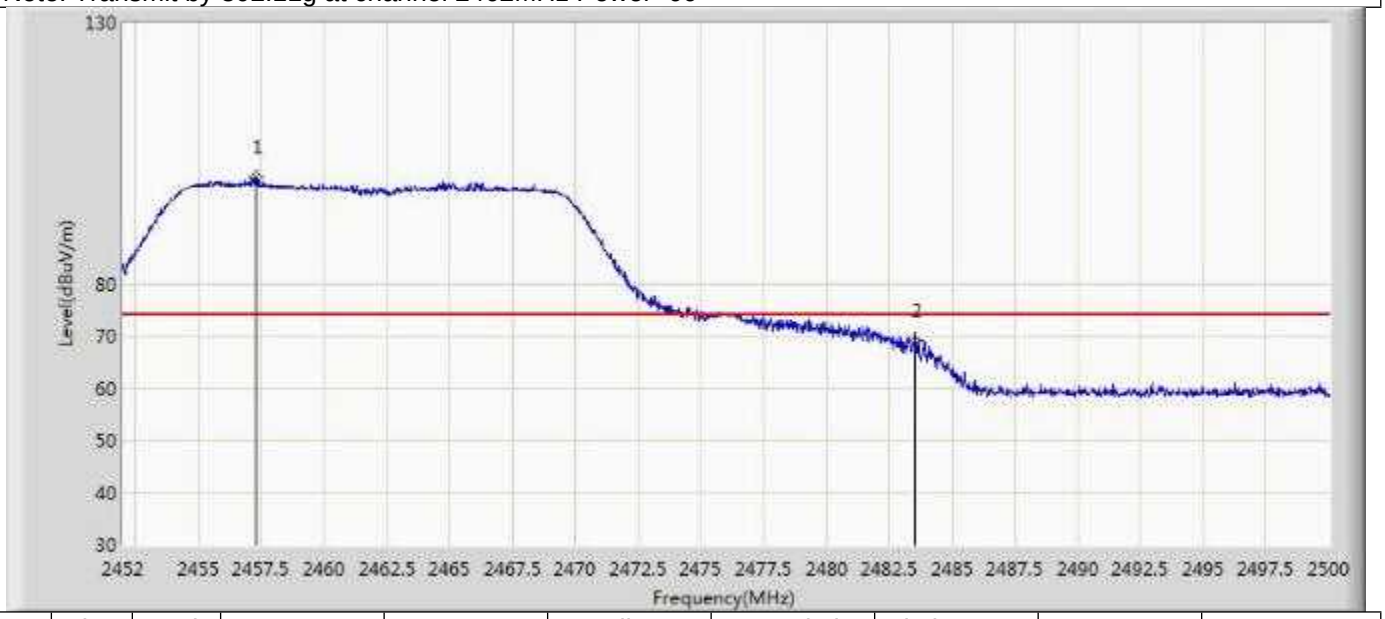
Site: AC2	Time: 2017/08/24 - 21:31
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11g at channel 2462MHz Power=66	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2457.280	100.319	68.101	N/A	N/A	32.218	PK
2			2483.500	69.065	36.784	-4.935	74.000	32.282	PK

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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Site: AC2	Time: 2017/08/24 - 21:32
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11g at channel 2462MHz Power=66	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2456.032	87.922	55.709	N/A	N/A	32.213	AV
2			2483.500	49.180	16.899	-4.820	54.000	32.282	AV

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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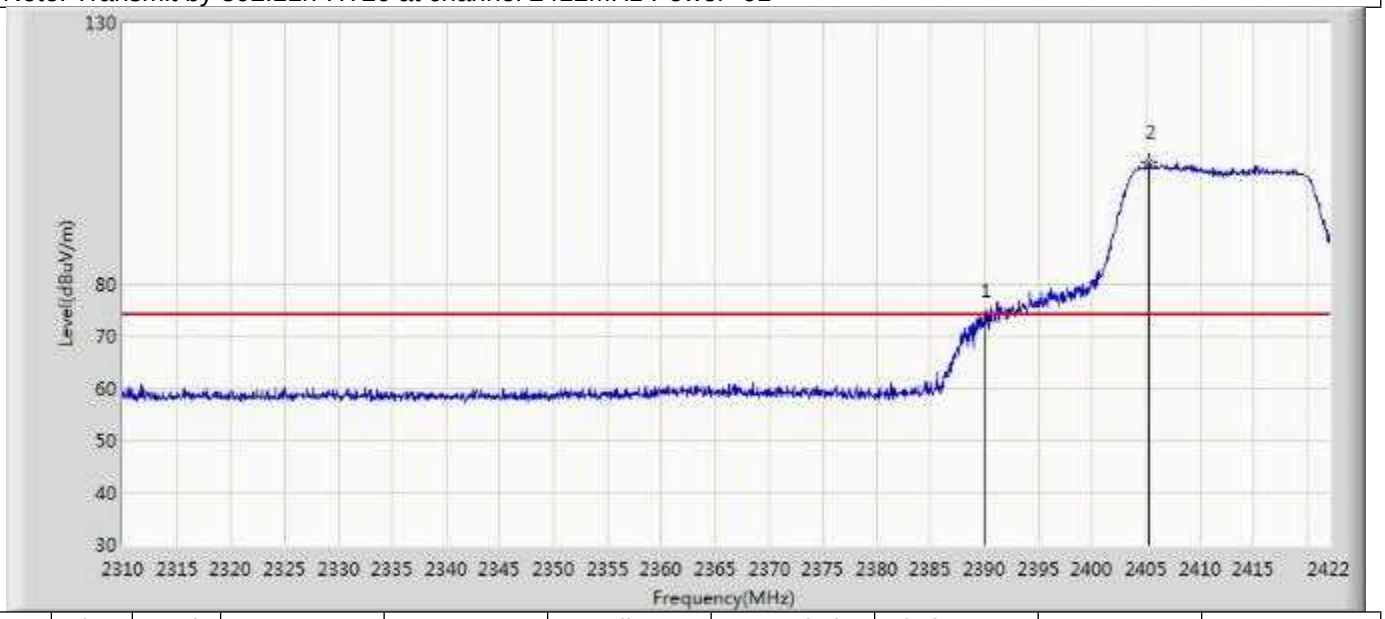
Site: AC2	Time: 2017/08/24 - 21:42
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11n-HT20 at channel 2412MHz Power=61	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2390.000	72.948	40.670	-1.052	74.000	32.278	PK
2		*	2405.312	103.381	71.118	N/A	N/A	32.262	PK

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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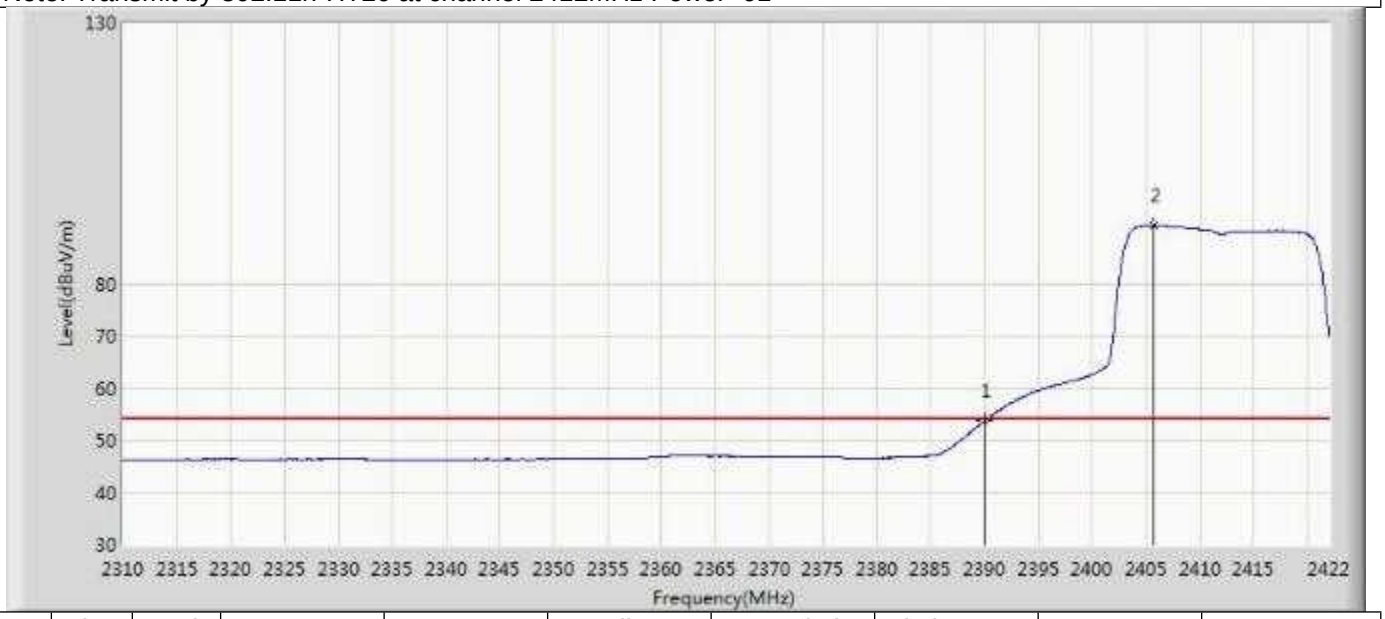
Site: AC2	Time: 2017/08/24 - 21:45
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11n-HT20 at channel 2412MHz Power=61	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2390.000	53.727	21.449	-0.273	54.000	32.278	AV
2		*	2405.760	91.149	58.888	N/A	N/A	32.261	AV

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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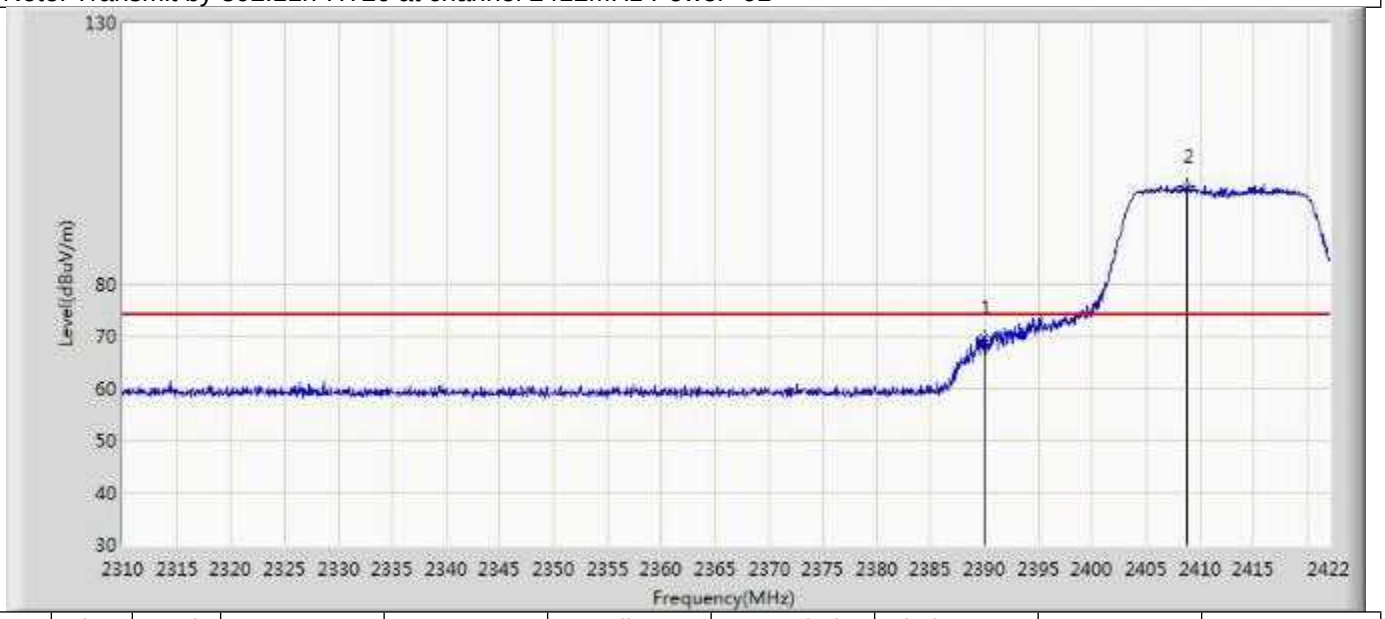
Site: AC2	Time: 2017/08/24 - 21:45
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11n-HT20 at channel 2412MHz Power=61	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2390.000	69.717	37.439	-4.283	74.000	32.278	PK
2		*	2408.784	98.820	66.569	N/A	N/A	32.251	PK

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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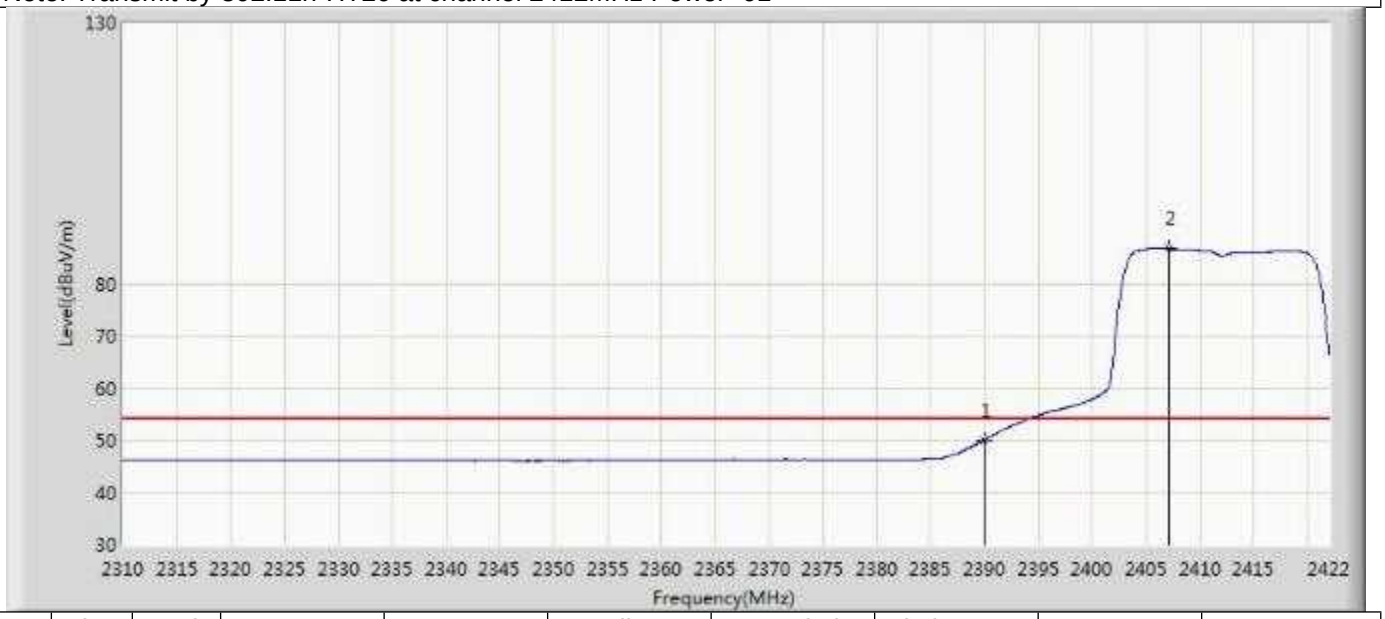
Site: AC2	Time: 2017/08/24 - 21:48
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11n-HT20 at channel 2412MHz Power=61	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2390.000	50.042	17.764	-3.958	54.000	32.278	AV
2		*	2407.160	86.763	54.506	N/A	N/A	32.257	AV

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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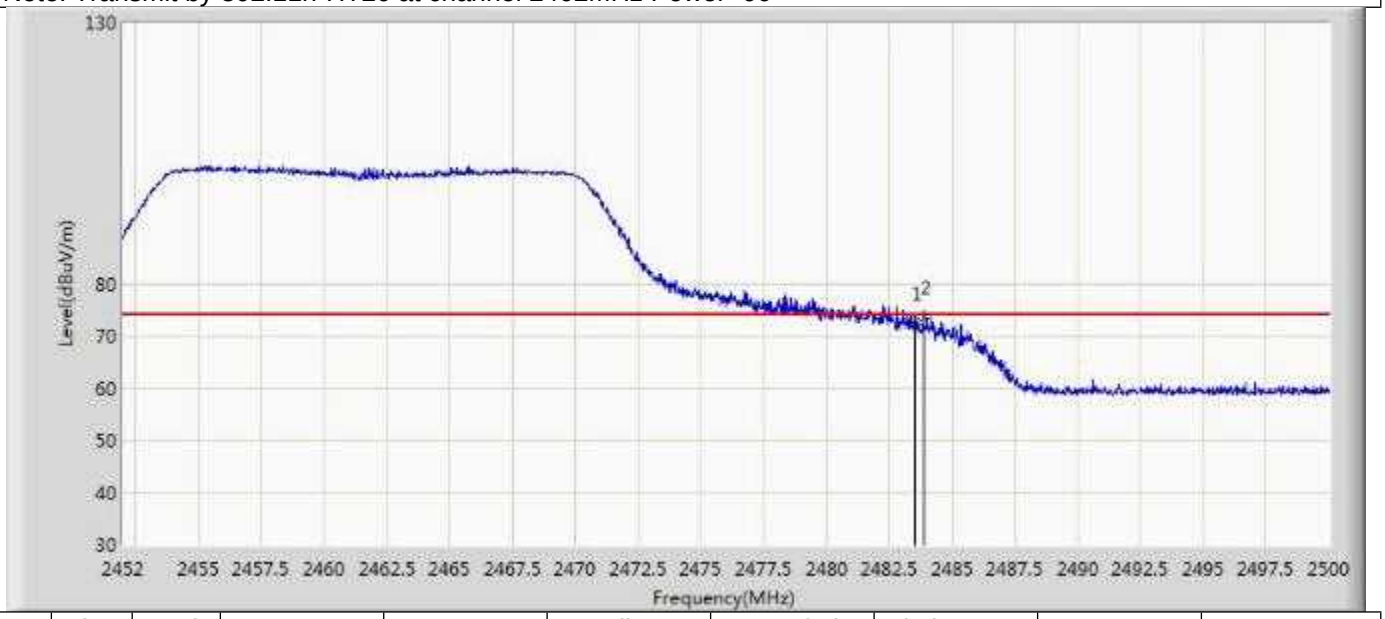
Site: AC2	Time: 2017/08/24 - 21:49
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11n-HT20 at channel 2462MHz Power=66	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2483.500	72.192	39.911	-1.808	74.000	32.282	PK
2		*	2483.872	73.578	41.295	-0.422	74.000	32.282	PK

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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China

Site: AC2	Time: 2017/08/24 - 21:53
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11n-HT20 at channel 2462MHz Power=66	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2455.696	90.252	58.041	N/A	N/A	32.211	AV
2			2483.500	52.415	20.134	-1.585	54.000	32.282	AV

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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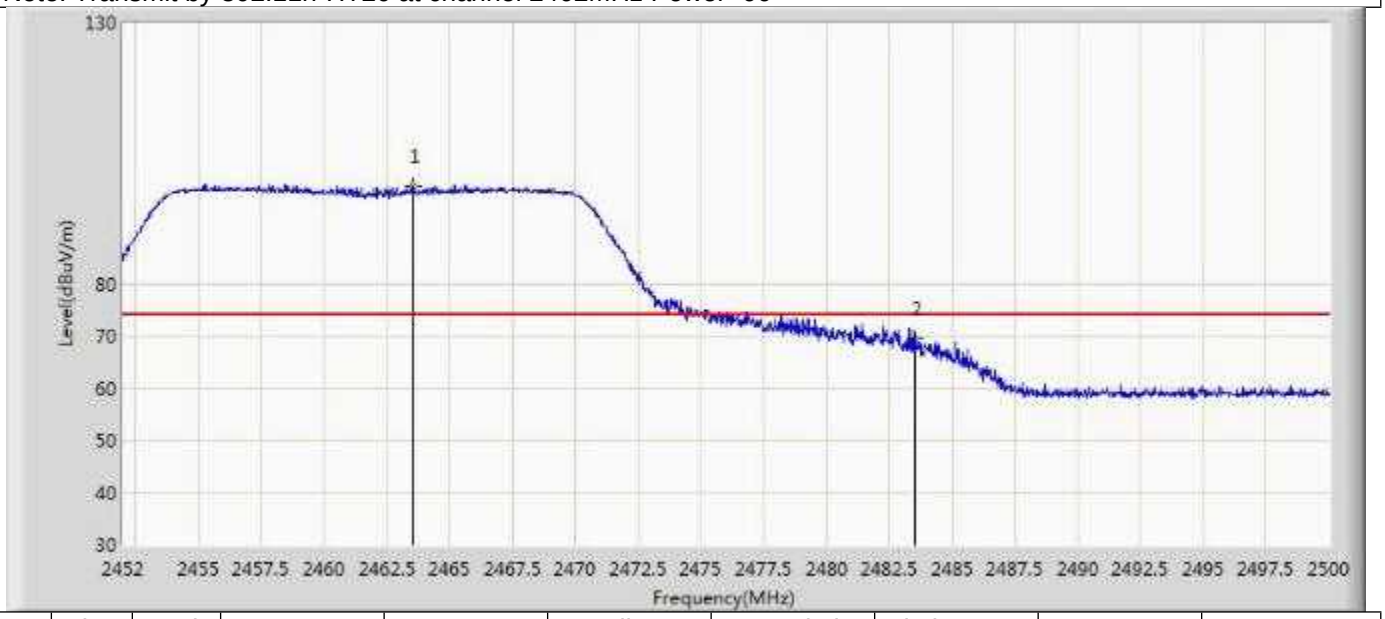
Site: AC2	Time: 2017/08/24 - 21:53
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11n-HT20 at channel 2462MHz Power=66	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2463.568	98.667	66.428	N/A	N/A	32.240	PK
2			2483.500	69.382	37.101	-4.618	74.000	32.282	PK

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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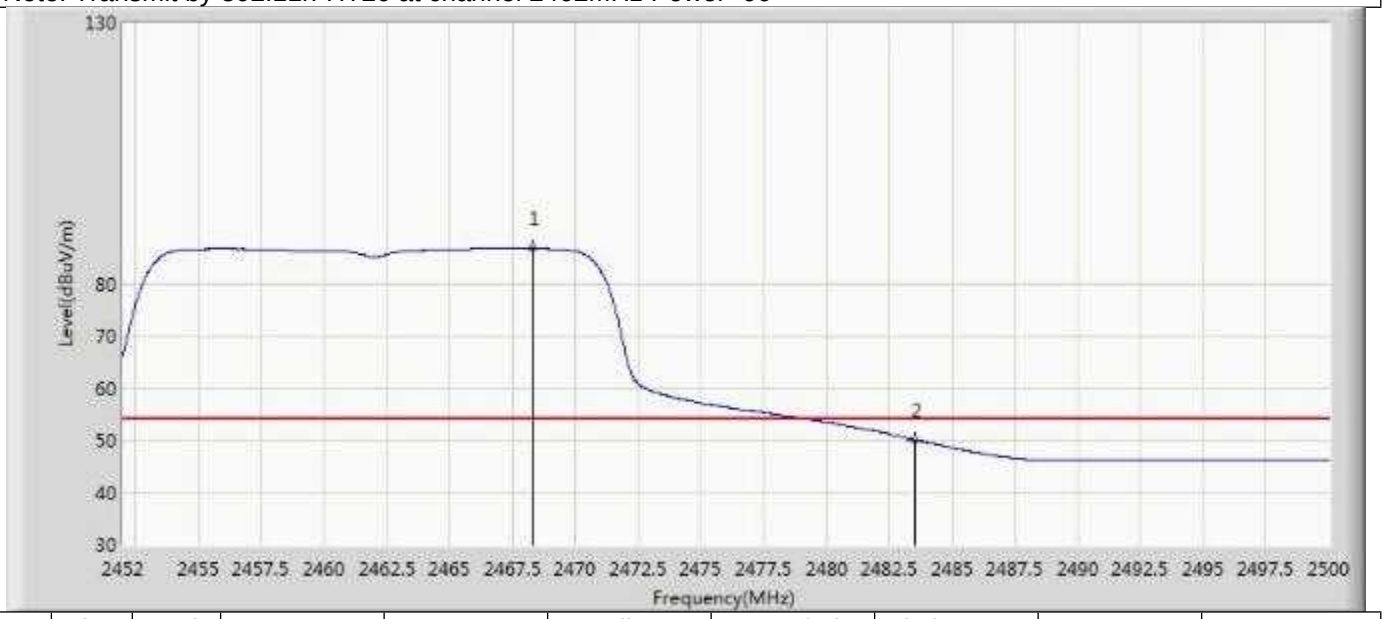
China

Site: AC2	Time: 2017/08/24 - 21:55
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11n-HT20 at channel 2462MHz Power=66	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2468.320	86.755	54.508	N/A	N/A	32.247	AV
2			2483.500	50.077	17.796	-3.923	54.000	32.282	AV

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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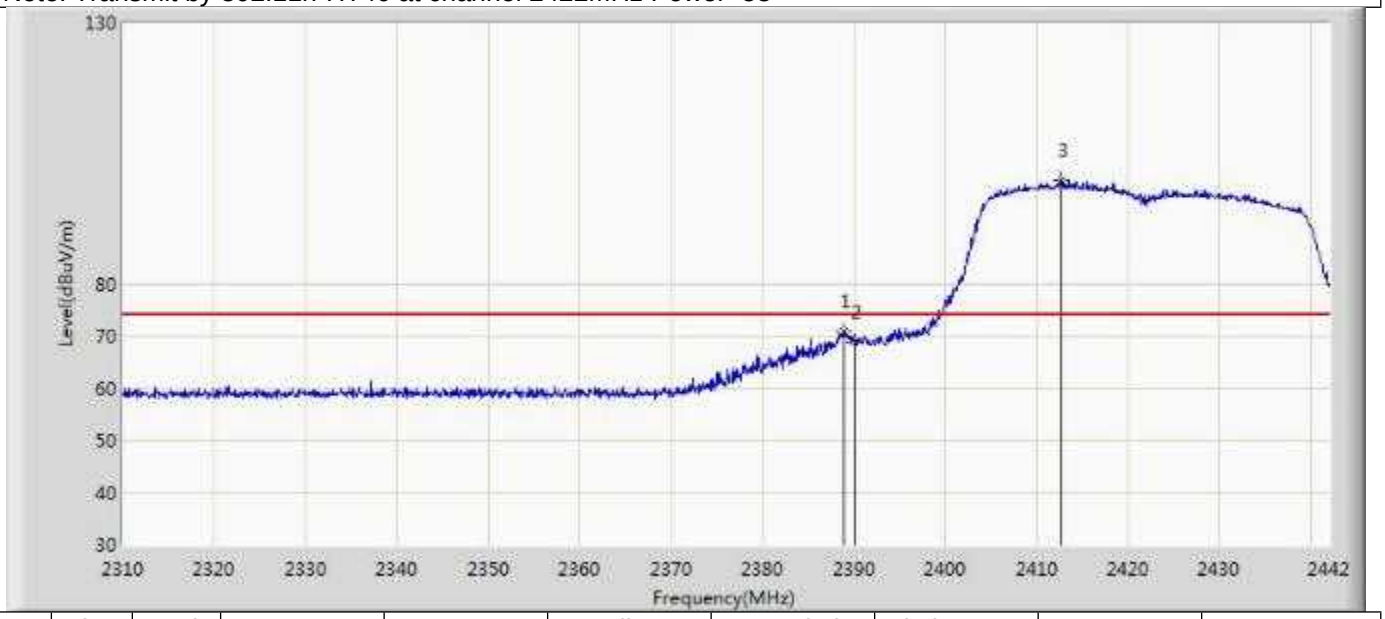
Site: AC2	Time: 2017/08/24 - 22:15
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11n-HT40 at channel 2422MHz Power=58	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2388.936	70.866	38.594	-3.134	74.000	32.273	PK
2			2390.000	68.888	36.610	-5.112	74.000	32.278	PK
3		*	2412.762	99.891	67.654	N/A	N/A	32.236	PK

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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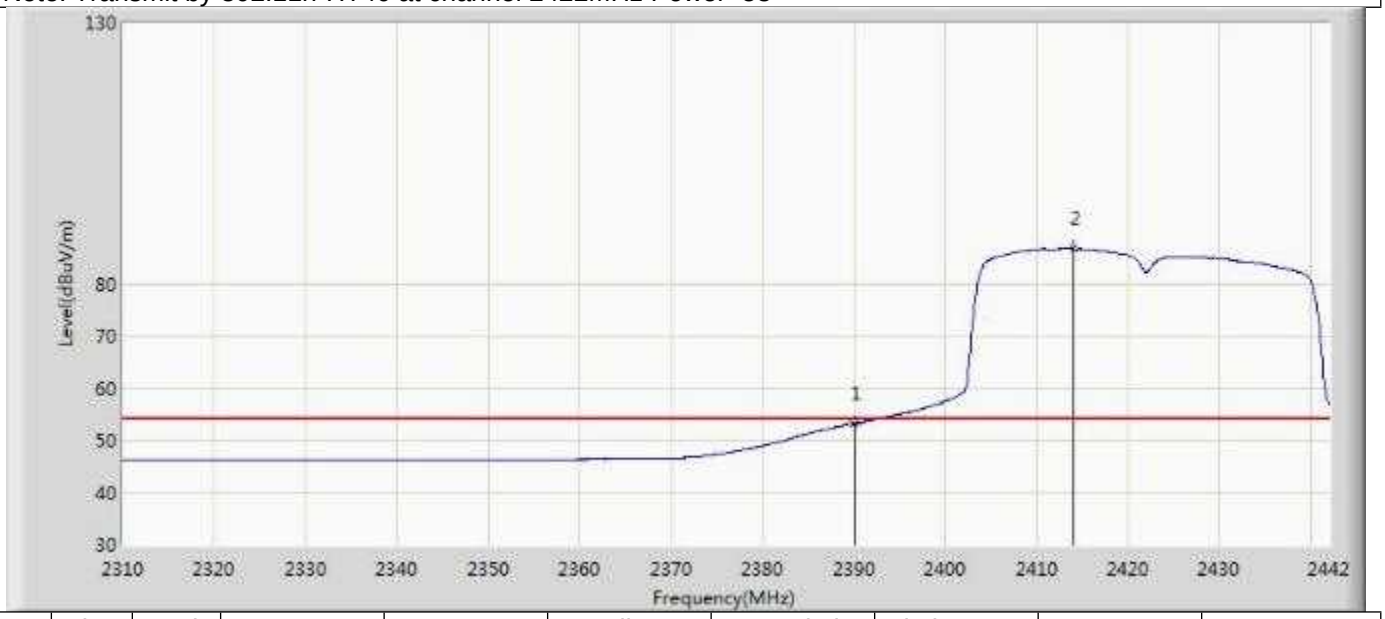
Site: AC2	Time: 2017/08/24 - 22:12
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11n-HT40 at channel 2422MHz Power=58	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2390.000	53.241	20.963	-0.759	54.000	32.278	AV
2		*	2414.016	86.687	54.456	N/A	N/A	32.231	AV

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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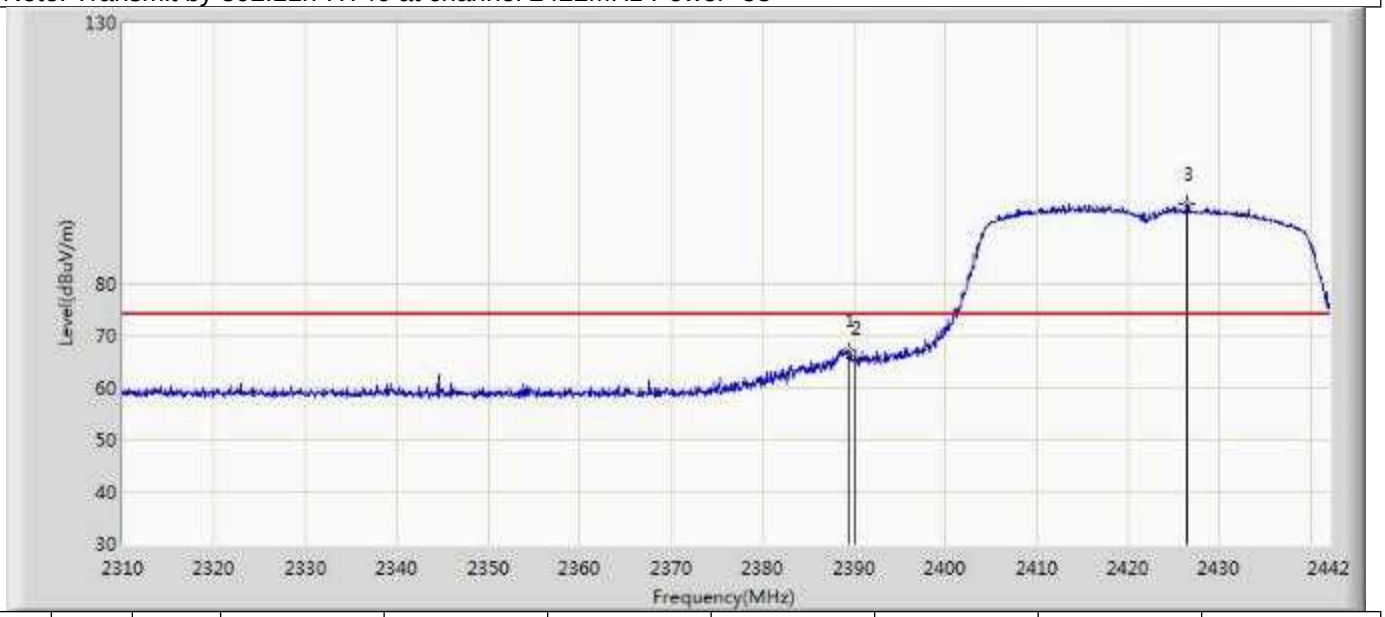
Site: AC2	Time: 2017/08/24 - 22:16
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11n-HT40 at channel 2422MHz Power=58	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2389.332	67.067	34.793	-6.933	74.000	32.275	PK
2			2390.000	65.774	33.496	-8.226	74.000	32.278	PK
3		*	2426.490	95.118	62.939	N/A	N/A	32.180	PK

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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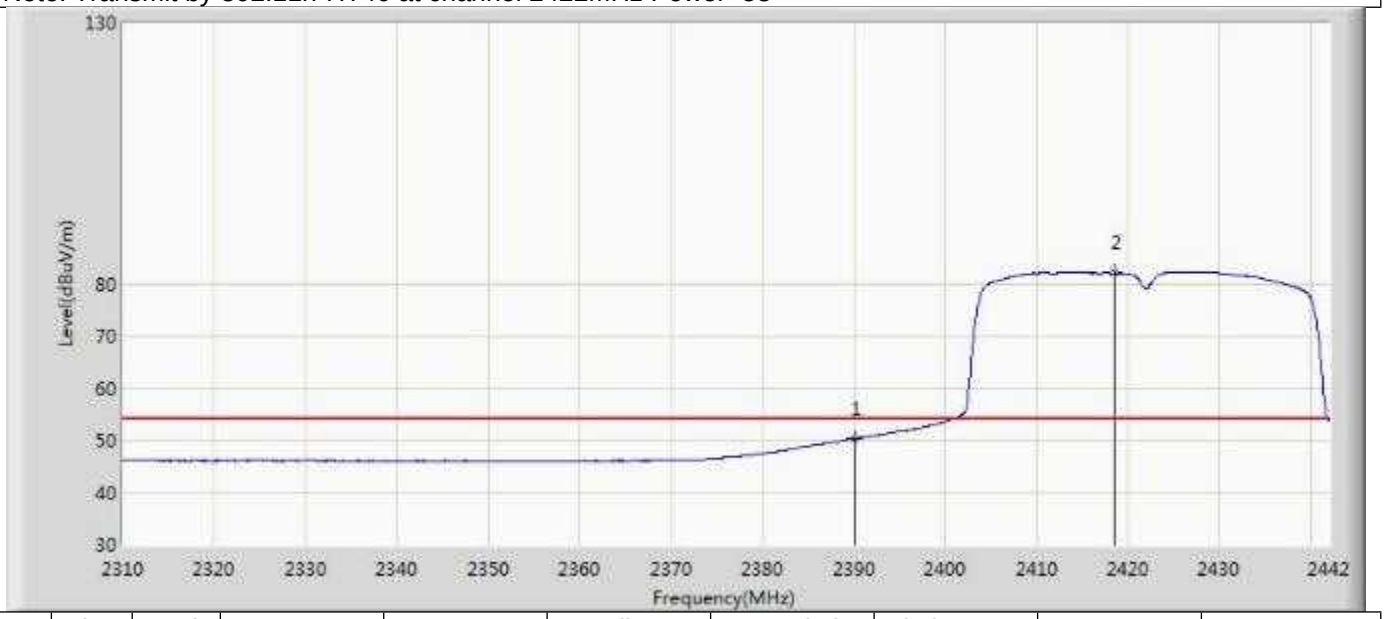
Site: AC2	Time: 2017/08/24 - 22:18
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11n-HT40 at channel 2422MHz Power=58	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2390.000	50.317	18.039	-3.683	54.000	32.278	AV
2		*	2418.438	82.040	49.827	28.040	54.000	32.213	AV

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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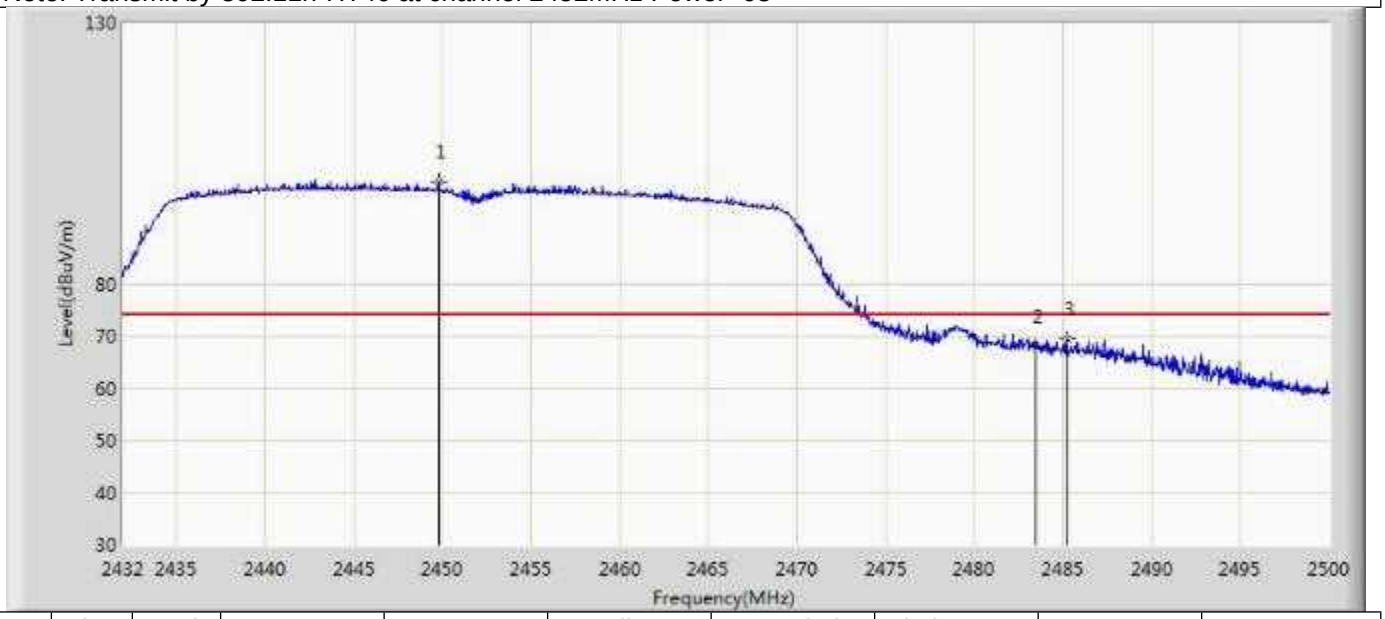
China

Site: AC2	Time: 2017/08/24 - 22:27
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11n-HT40 at channel 2452MHz Power=63	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2449.782	99.574	67.388	N/A	N/A	32.185	PK
2			2483.500	68.024	35.743	-5.976	74.000	32.282	PK
3			2485.244	69.436	37.149	-4.564	74.000	32.287	PK

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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China

Site: AC2	Time: 2017/08/24 - 22:25
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11n-HT40 at channel 2452MHz Power=63	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2445.498	86.551	54.382	N/A	N/A	32.169	AV
2			2483.500	53.071	20.790	-0.929	54.000	32.282	AV

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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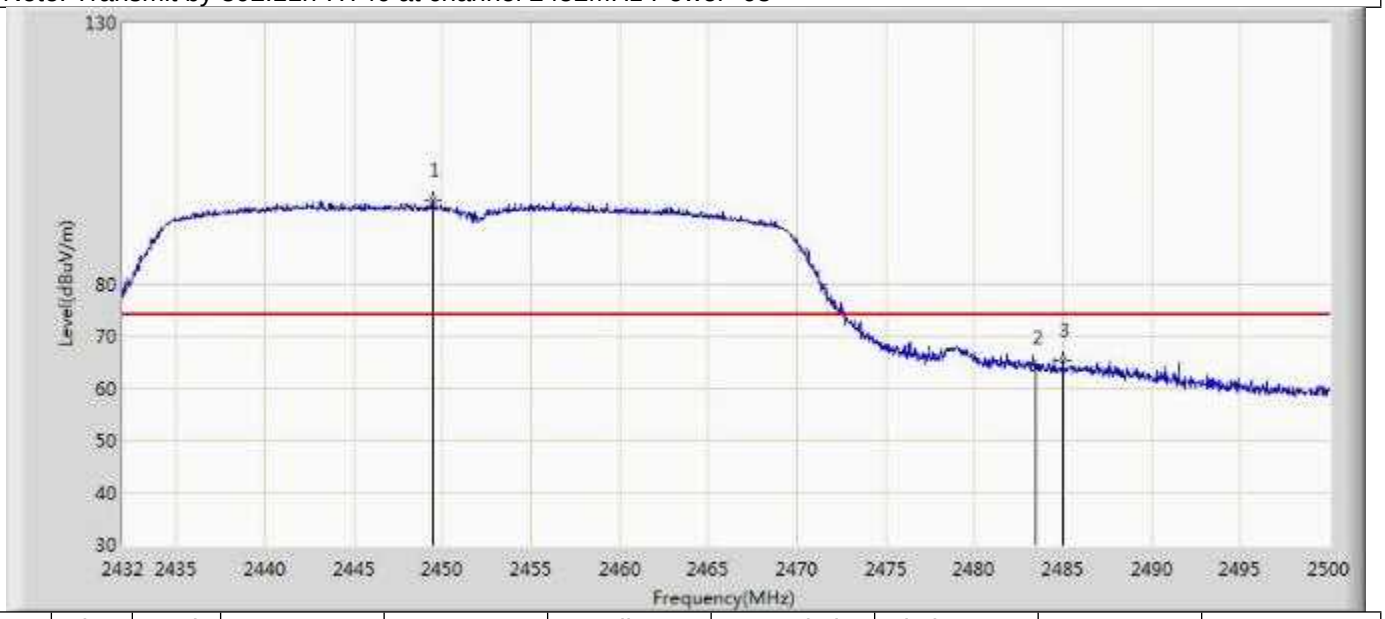
China

Site: AC2	Time: 2017/08/24 - 22:28
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11n-HT40 at channel 2452MHz Power=63	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2449.442	96.140	63.956	N/A	N/A	32.184	PK
2			2483.500	64.009	31.728	-9.991	74.000	32.282	PK
3			2485.006	65.398	33.112	-8.602	74.000	32.286	PK

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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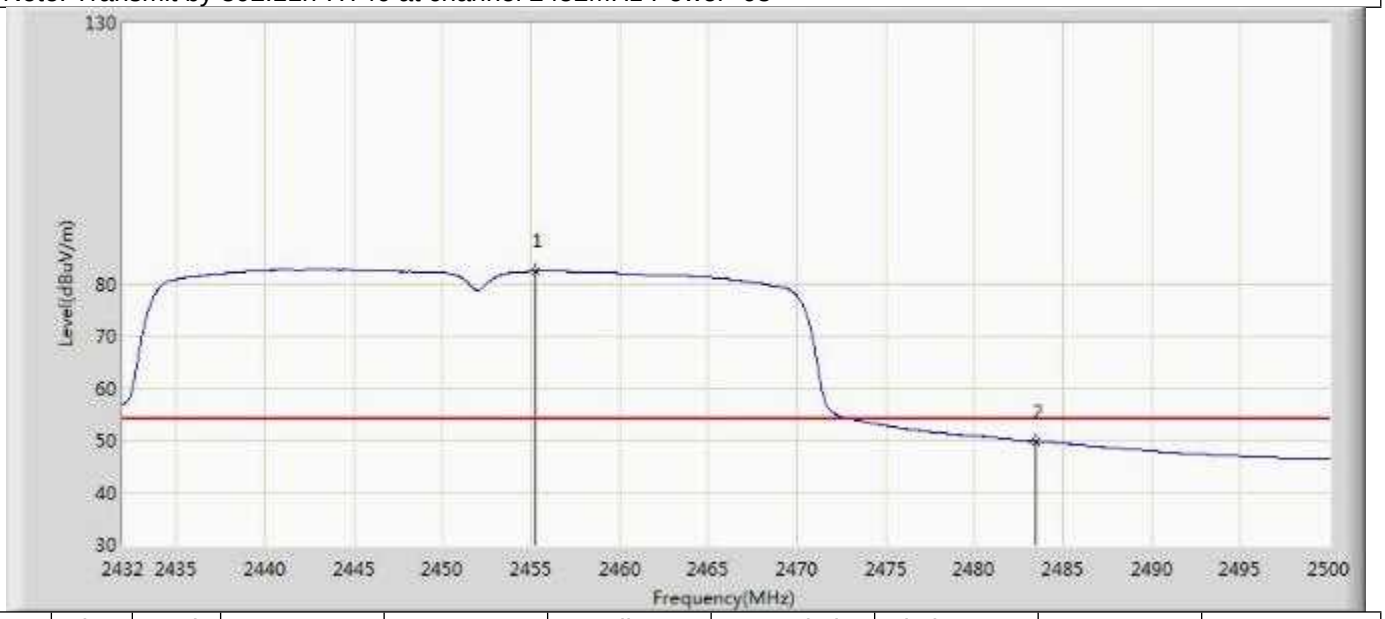
Site: AC2	Time: 2017/08/24 - 22:30
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIRELESS REPEATER NODE	Power: By Battery
Note: Transmit by 802.11n-HT40 at channel 2452MHz Power=63	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2455.222	82.365	50.156	N/A	N/A	32.209	AV
2			2483.500	49.850	17.569	-4.150	54.000	32.282	AV

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

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10 Test Equipment List

List of Test Instruments

Test Site1

	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
C	Signal Analyzer	Rohde & Schwarz	FSV40	101091	2018-8-7
RE	EMI Test Receiver	Rohde & Schwarz	ESR3	101906	2018-8-7
	Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	848	2018-9-17
	Horn Antenna	Rohde & Schwarz	HF907	102393	2018-9-17
	Pre-amplifier	Rohde & Schwarz	SCU-18D	19006451	2018-8-7
	3m Semi-anechoic chamber	TDK	9X6X6	----	2018-5-20
CE	EMI Test Receiver	Rohde & Schwarz	ESR 3	101907	2018-8-7
	LISN	Rohde & Schwarz	ENV4200	100224	2018-8-7
	LISN	Rohde & Schwarz	ENV216	101924	2018-8-7

Test Site2

Radiated Disturbance – AC2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cal. Due Date
MXE EMI Receiver	Agilent	N9038A	MRTSUE06125	1 year	2018/08/03
Loop Antenna	Schwarzbeck	FMZB1519	MRTSUE06025	1 year	2017/12/21
Bilog Period Antenna	Schwarzbeck	VULB9162	MRTSUE06022	1 year	2017/10/22
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06171	1 year	2017/11/19
Broadband Coaxial Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06106	1 year	2017/12/10
Broadband Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06024	1 year	2018/04/25
Digitial Thermometer & Hygrometer	Minggao	ETH529	MRTSUE06170	1 year	2017/11/30
Anechoic Chamber	RIKEN	Chamber-AC2	MRTSUE06213	1 year	2018/05/10

Conducted Test Equipment - TR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2018/04/25
USB Wideband Power Sensor	Booton	55006	MRTSUE06109	1 year	2018/04/25
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06184	1 year	2017/12/22

C - Conducted RF tests

- Conducted peak output power
- 6dB bandwidth and 99% Occupied Bandwidth
- Power spectral density*
- Spurious RF conducted emissions
- Conducted Band edge

China

11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

Test Site1

Items	Extended Uncertainty
Conducted Disturbance at Mains Terminals	150kHz to 30MHz, LISN, ±2.73dB
Radiated Disturbance	30MHz to 1GHz, ±5.03dB (Horizontal) ±5.11dB (Vertical) 1GHz to 18GHz, ±5.15dB (Horizontal) ±5.12dB (Vertical) 18GHz to 25GHz, ±4.76dB

Test Site2

AC Conducted Emission Measurement - SR2

Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):

150kHz~30MHz: 3.46dB

Radiated Emission Measurement – AC1

Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):

9kHz ~ 1GHz: 4.18dB

1GHz ~ 25GHz: 4.76dB

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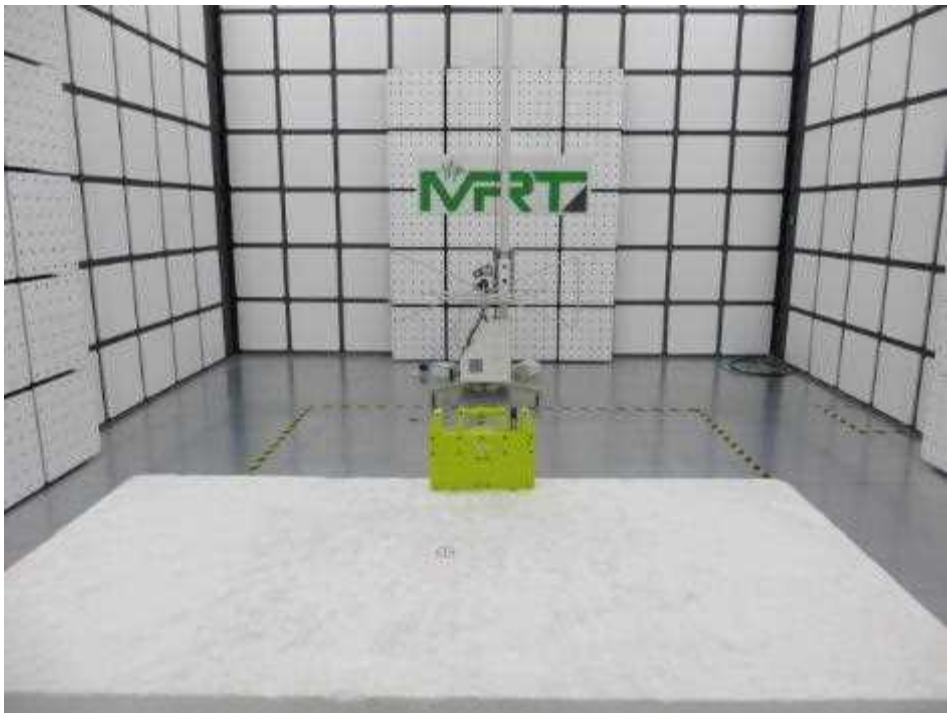
12 Photographs of Test Set-ups

9kHz ~ 30MHz

30MHz ~ 1GHz



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1GHz ~ 18GHz

18GHz ~ 25GHz

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13 Photographs of EUT

Wireless Repeater Node (Model: W-WRN-000)

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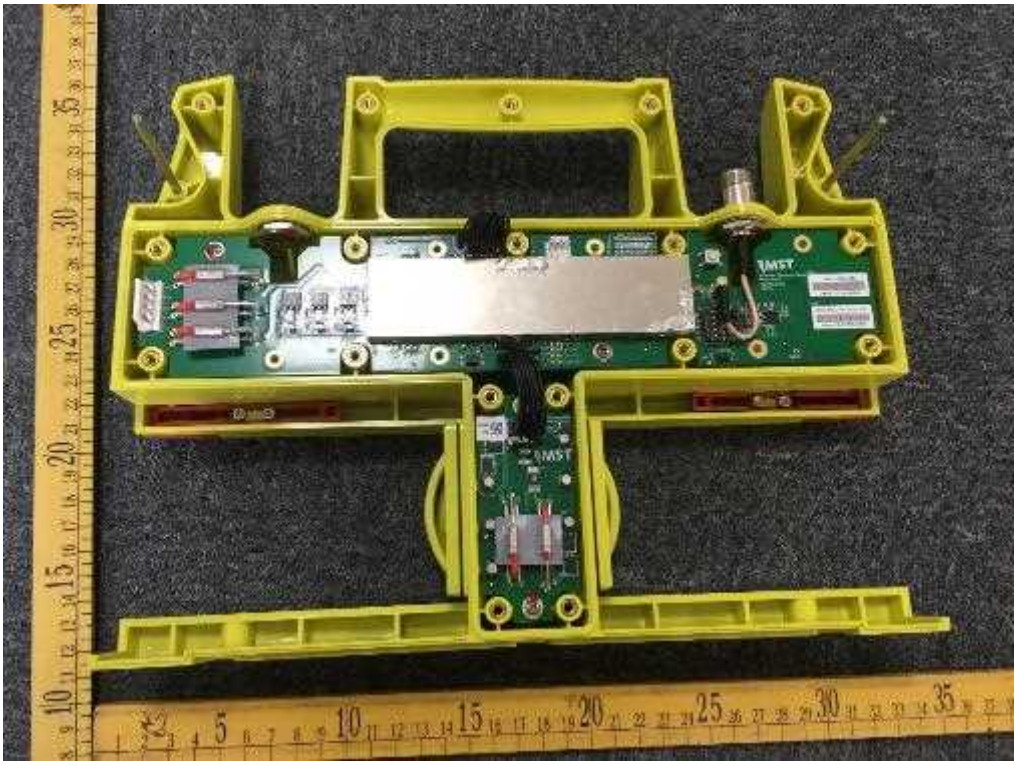

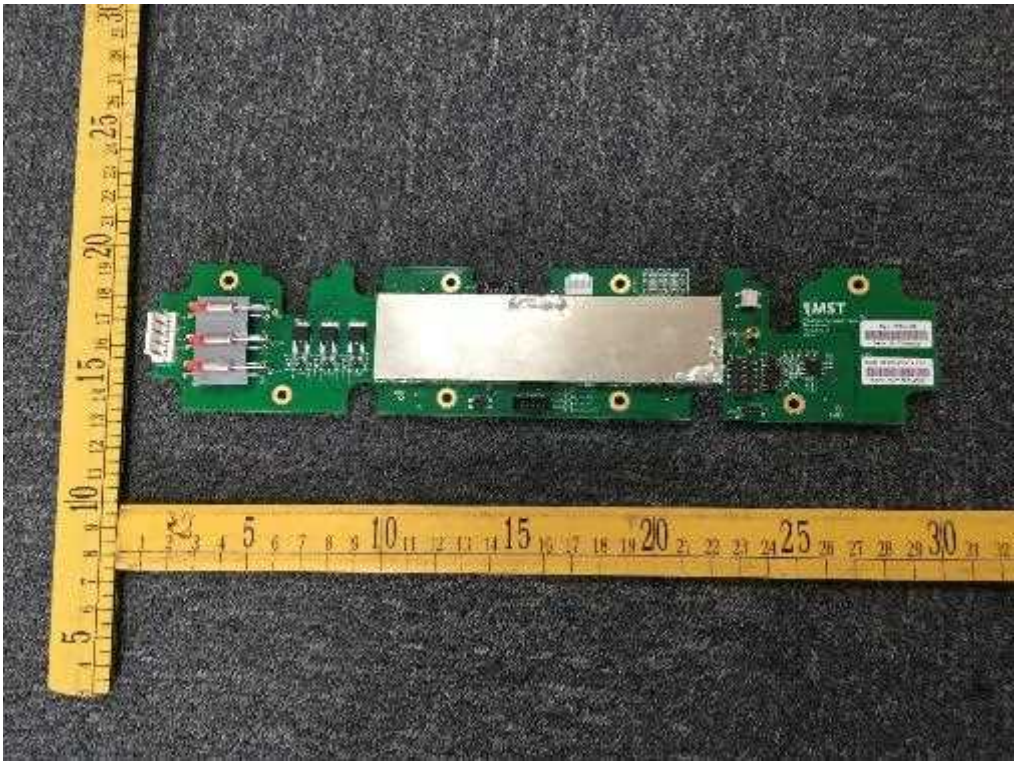

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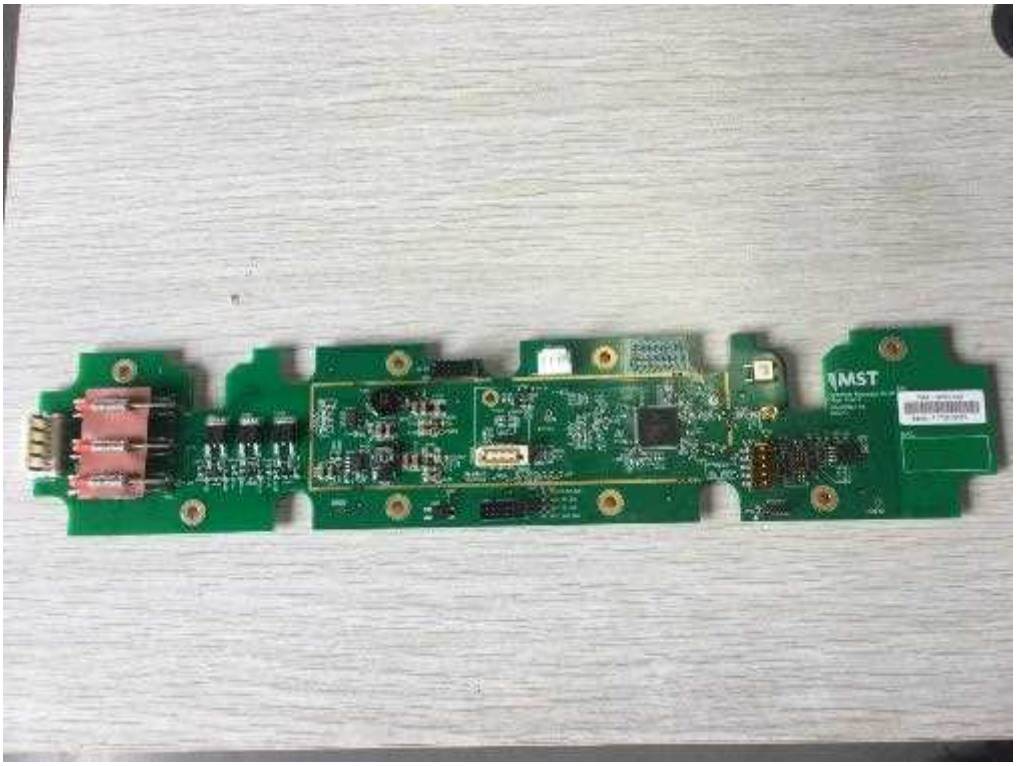

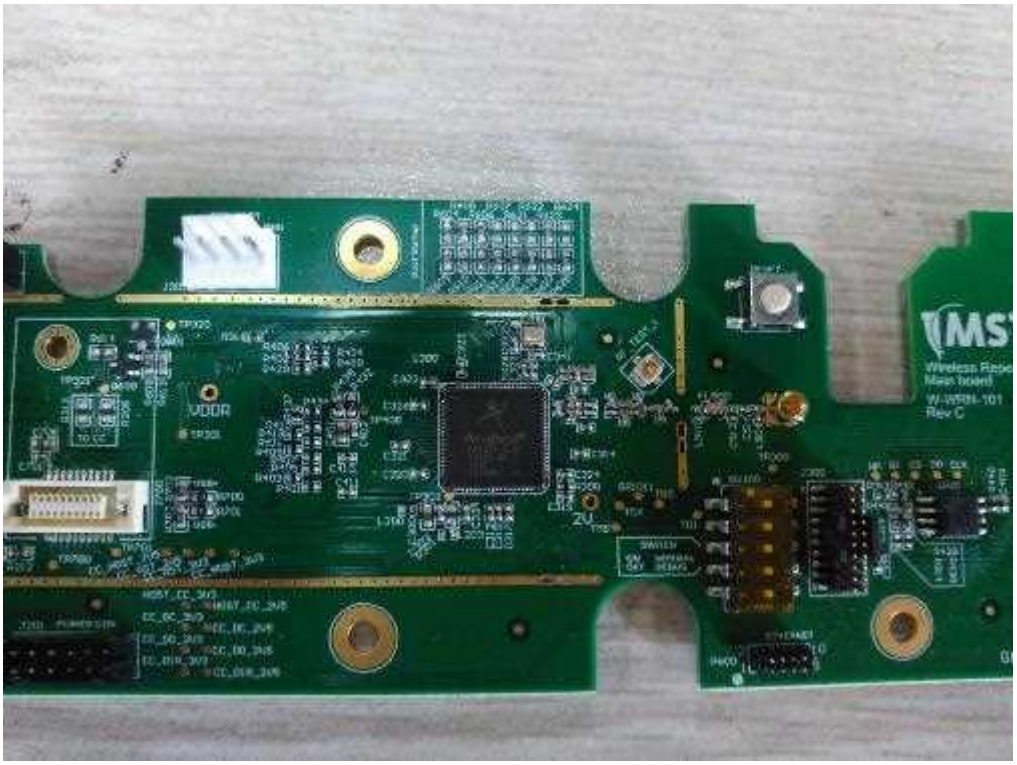

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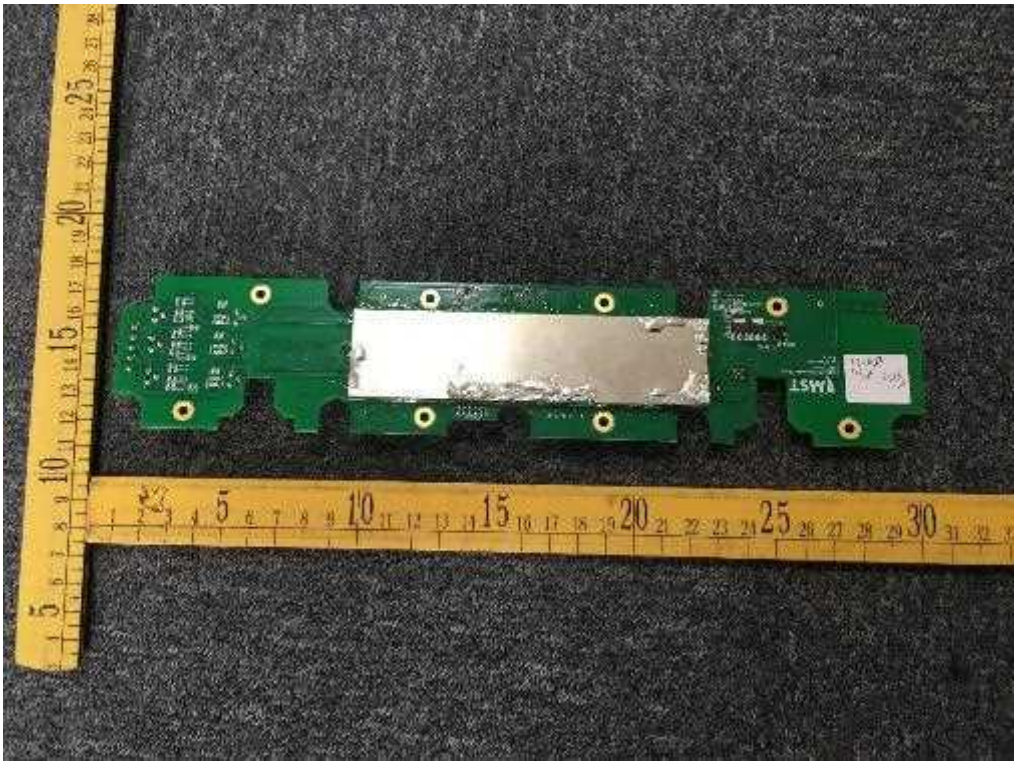

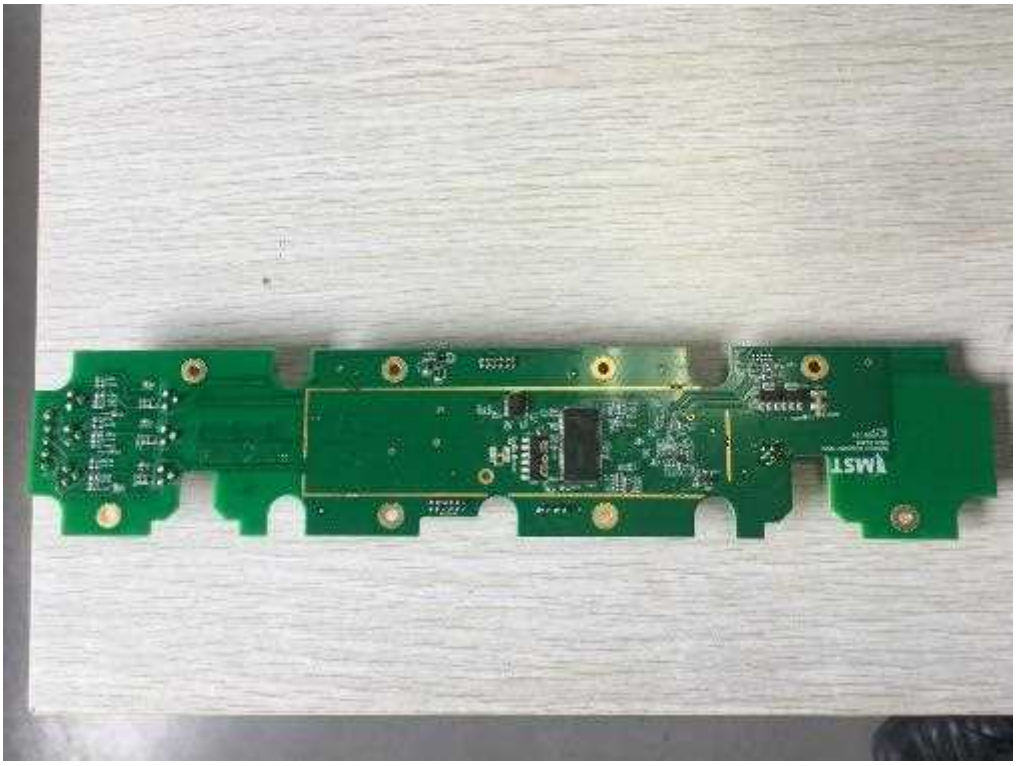

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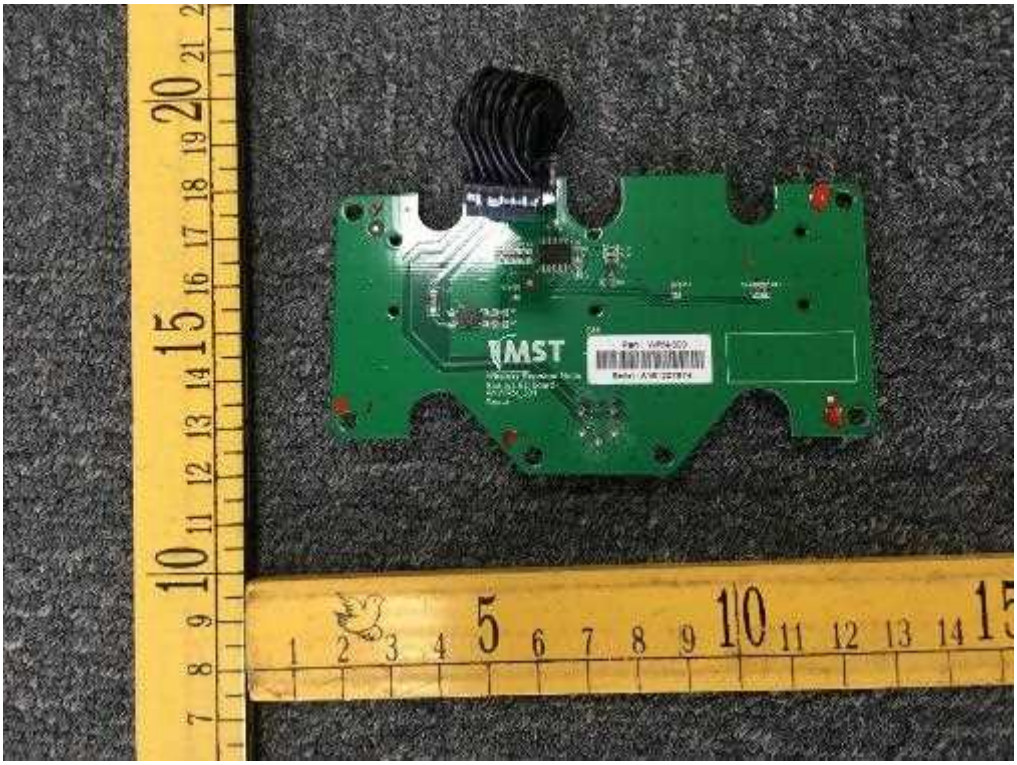

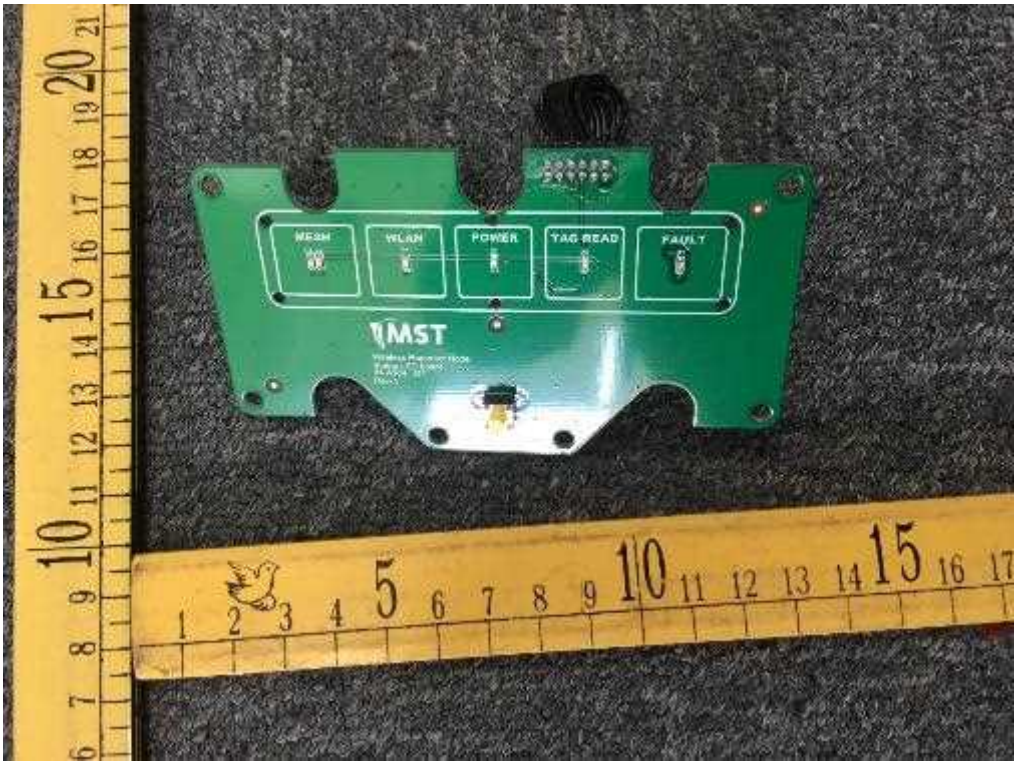

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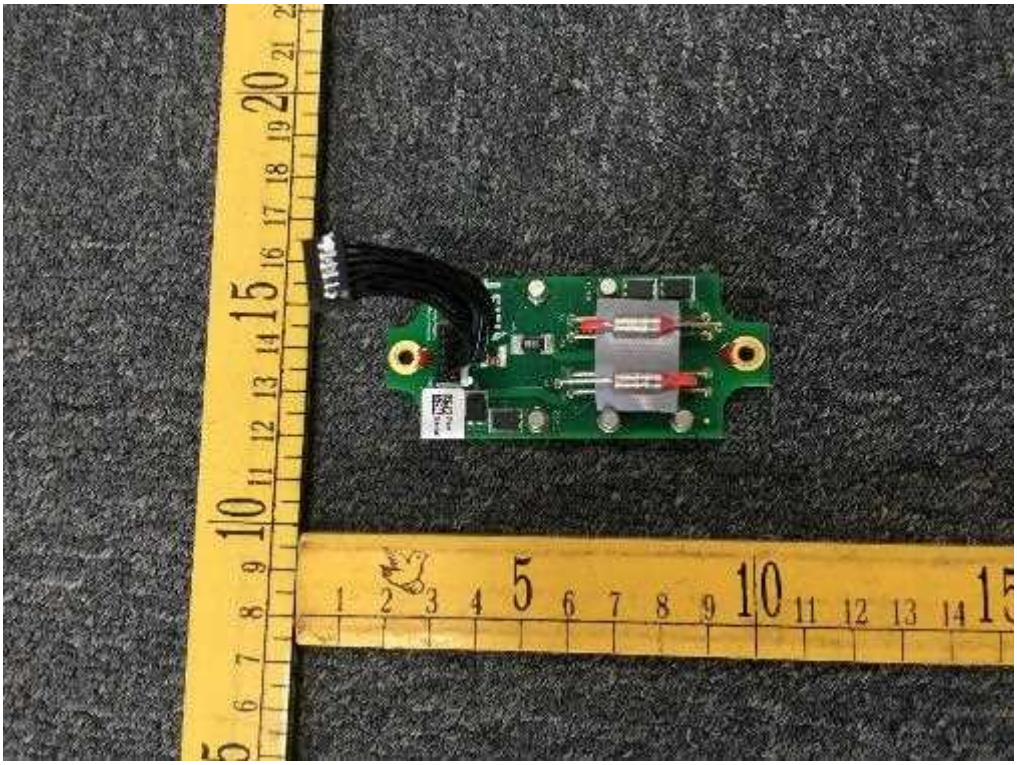

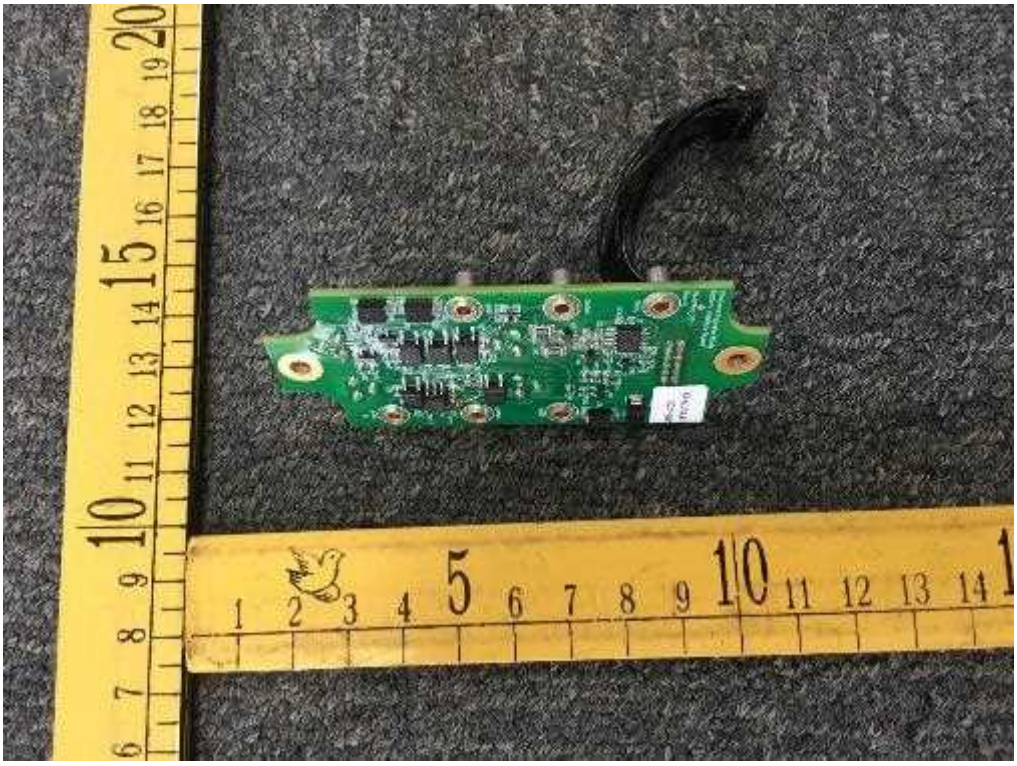

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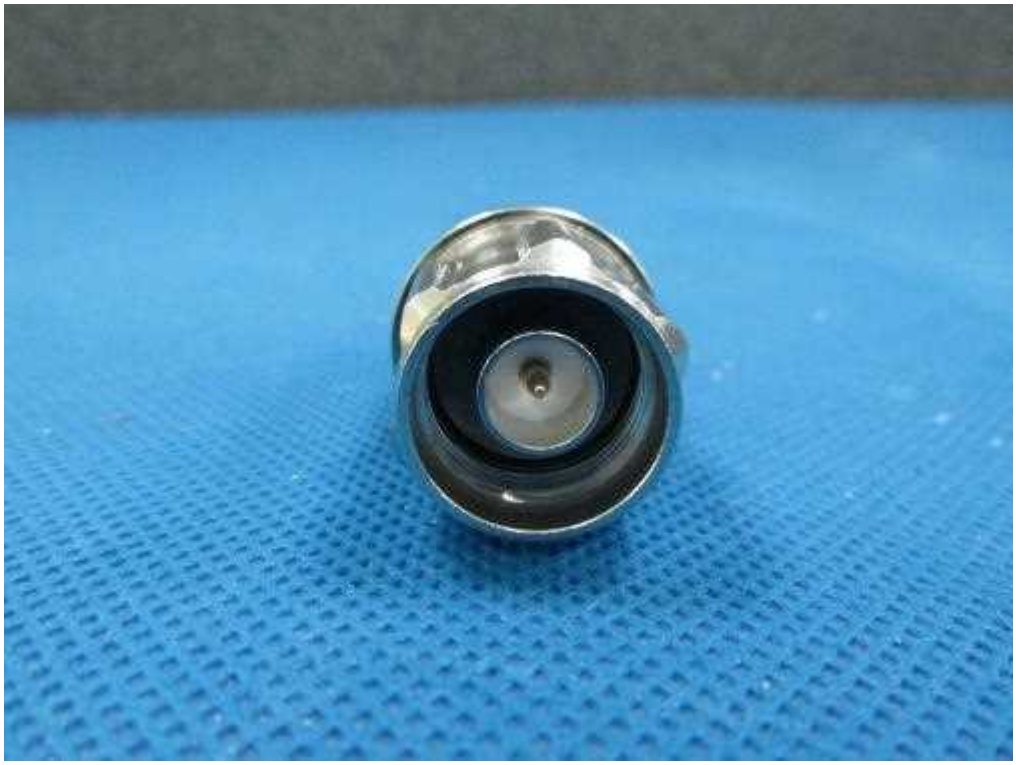

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