RADIO TEST REPORT

FCC 47 CFR PART 15 SUBPART C

Test Standard	**FCC Part 15.247**
Product name	**NearSky 360**
Brand name	**CIMCON**
Model No.	**NS360V2**
Test Result	**Pass**

The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report.

The test Report of full or partial shall not copy. Without written approval of Compliance Certification Services Inc. (Wugu Laboratory).

Approved by: *Reviewed by:*

Kevin Tsai
Deputy Manager

Dally Hong
Engineer

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.
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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	April 9, 2019	Initial Issue	ALL	Becca Chen
01	April 23, 2019	Remove the chain 0 description.	P18, P19-24, P29-31, P33-41	Becca Chen

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1. GENERAL INFORMATION

1.1 EUT INFORMATION

Applicant	**CIMCON Lighting, Inc.** 35 Crosby Drive, Bedford, MA 01730, USA
Manufacturer	**CIMCON Lighting, Inc.** 35 Crosby Drive, Bedford, MA 01730, USA
Equipment	NearSky 360
Model Name	NS360V2
Model Discrepancy	N/A
Trade Name	CIMCON
Received Date	October 16, 2018
Date of Test	November 22 ~ 23, 2018
Output Power(W)	**Mode** / **Output Power (W)** IEEE 802.11b Mode / 0.1114 IEEE 802.11g Mode / 0.1866 IEEE 802.11n HT 20 Mode / 0.1884
Power Supply	AC 120V

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1.2 EUT CHANNEL INFORMATION

Frequency Range	802.11b/g/n HT 20 Mode: 2412MHz ~ 2462MHz
Modulation Type	1. IEEE 802.11b Mode: DSSS(DBPSK/DQPSK/CCK) 2. IEEE 802.11g Mode: OFDM (BPSK/QPSK/16QAM/64QAM) 3. IEEE 802.11n HT 20 Mode : OFDM (BPSK/QPSK/16QAM/64QAM)
Number of channels	1. IEEE 802.11b Mode: 11 Channels 2. IEEE 802.11g Mode: 11 Channels 3. IEEE 802.11n HT 20 Mode : 11 Channels

Remark: Refer as ANSI 63.10:2013 clause 5.6.1 Table 4 for test channels

Number of frequencies to be tested		
Frequency range in which device operates	**Number of frequencies**	**Location in frequency range of operation**
☐ 1 MHz or less	1	Middle
☐ 1 MHz to 10 MHz	2	1 near top and 1 near bottom
☒ More than 10 MHz	3	1 near top, 1 near middle, and 1 near bottom

1.3 ANTENNA INFORMATION

Antenna Type	☐ PIFA ☐ PCB ☒ Dipole ☐ Coils
Antenna Gain	3.32 dBi
Antenna Connector	Ipex MHF

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1.4 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	+/- 1.2575
Emission bandwidth, 20dB bandwidth	+/- 0.0014
RF output power, conducted	+/- 1.14
Power density, conducted	+/- 1.40
3M Semi Anechoic Chamber / 30M~200M	+/- 4.12
3M Semi Anechoic Chamber / 200M~1000M	+/- 4.68
3M Semi Anechoic Chamber / 1G~8G	+/- 5.18
3M Semi Anechoic Chamber / 8G~18G	+/- 5.47
3M Semi Anechoic Chamber / 18G~26G	+/- 3.81
3M Semi Anechoic Chamber / 26G~40G	+/- 3.87

Remark:

1. *This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.*
2. *ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report.*

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1.5 FACILITIES AND TEST LOCATION

All measurement facilities used to collect the measurement data are located at *No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.)*

Test site	Test Engineer	Remark
AC Conduction Room	Dally Hong	-
Radiation	Jerry Chuang	-
RF Conducted	Dally Hong	-

Remark: *The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.*

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1.6 INSTRUMENT CALIBRATION

RF Conducted Test Site					
Equipment	**Manufacturer**	**Model**	**S/N**	**Cal Date**	**Cal Due**
Power Meter	Anritsu	ML2495A	1149001	02/06/2018	02/05/2019
Power Seneor	Anritsu	MA2491A	030982	02/07/2018	02/06/2019
Signal Analyzer	R&S	FSV 40	101073	09/27/2018	09/26/2019

3M 966 Chamber Test Site					
Equipment	**Manufacturer**	**Model**	**S/N**	**Cal Date**	**Cal Due**
Band Reject Filters	MICRO TRONICS	BRM 50702	120	05/14/2018	05/13/2019
Bilog Antenna	Sunol Sciences	JB3	A030105	07/13/2018	07/12/2019
Cable	HUBER SUHNER	SUCOFLEX 104PEA	25157	06/29/2018	06/28/2019
Cable	HUBER SUHNER	SUCOFLEX 104PEA	20995	06/29/2018	06/28/2019
Digital Thermo-Hygro Meter	WISEWIND	1206	D07	02/08/2018	02/07/2019
Horn Antenna	SCHWARZBECK	BBHA 9120D	779	03/14/2018	03/13/2019
Loop Ant	COM-POWER	AL-130	121051	03/21/2018	03/20/2019
Pre-Amplifier	EMEC	EM330	060609	06/29/2018	06/28/2019
Pre-Amplifier	HP	8449B	3008A00965	06/29/2018	06/28/2019
PSA Series Spectrum Analyzer	Agilent	E4446A	MY46180323	05/31/2018	05/30/2019
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R

AC Conducted Emissions Test Site					
Equipment	**Manufacturer**	**Model**	**S/N**	**Cal Date**	**Cal Due**
EMI Test Receiver	R&S	ESCI	100064	07/24/2018	07/23/2019
LISN	SCHWARZBECK	NSLK 8127	8127-541	02/09/2018	02/08/2019
LISN	SCHAFFNER	NNB41	03/10013	02/06/2018	02/05/2019

Remark: *Each piece of equipment is scheduled for calibration once a year.*

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1.7 SUPPORT AND EUT ACCESSORIES EQUIPMENT

EUT Accessories Equipment					
No.	**Equipment**	**Brand**	**Model**	**Series No.**	**FCC ID**
	N/A				

Support Equipment					
No.	**Equipment**	**Brand**	**Model**	**Series No.**	**FCC ID**
1	NB(B)	Toshiba	PORTEGE R30-A	N/A	PD97260H

1.8 TEST METHODOLOGY AND APPLIED STANDARDS

The test methodology, setups and results comply with all requirements in accordance with ANSI C63.10:2013, FCC Part 2, FCC Part 15.247, KDB 558074 D01.

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2. TEST SUMMERY

FCC Standard Section	Report Section	Test Item	Result
15.203	1.3	Antenna Requirement	Pass
15.207(a)	5.1	AC Conducted Emission	Pass
15.247(a)(2)	5.2	6 dB Bandwidth	Pass
2.1049	5.2	Occupied Bandwidth (99%)	Pass
15.247(b)(3)	5.3	Output Power Measurement	Pass
15.247(e)	5.4	Power Spectral Density	Pass
15.247(d)	5.5	Conducted Band Edge	Pass
15.247(d)	5.5	Conducted Spurious Emission	Pass
15.247(d)	5.6	Radiation Band Edge	Pass
15.247(d)	5.6	Radiation Spurious Emission	Pass

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3. DESCRIPTION OF TEST MODES

3.1 THE WORST MODE OF OPERATING CONDITION

Operation mode	IEEE 802.11b Mode : 1Mbps IEEE 802.11g Mode : 6Mbps IEEE 802.11n HT 20 Mode : MCS0
Test Channel Frequencies	**IEEE 802.11b Mode :** 1. Lowest Channel : 2412MHz 2. Middle Channel : 2437MHz 3. Highest Channel : 2462MHz **IEEE 802.11g Mode :** 1. Lowest Channel : 2412MHz 2. Middle Channel : 2437MHz 3. Highest Channel : 2462MHz **IEEE 802.11n HT 20 Mode :** 1. Lowest Channel : 2412MHz 2. Middle Channel : 2437MHz 3. Highest Channel : 2462MHz
Operation Transmitter	IEEE 802.11b Mode :1T1R IEEE 802.11g Mode : 1T1R IEEE 802.11n HT 20 Mode : 1T1R

Remark: *EUT pre-scanned data rate of output power for each mode, the worst data rate was recorded in this report.*

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3.2 THE WORST MODE OF MEASUREMENT

AC Power Line Conducted Emission	
Test Condition	AC Power line conducted emission for line and neutral
Power supply Mode	Mode 1: AC 120V.
Worst Mode	☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4

Radiated Emission Measurement Above 1G	
Test Condition	Band edge, Emission for Unwanted and Fundamental
Power supply Mode	Mode 1: AC 120V.
Worst Mode	☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4
Worst Position	☐ Placed in fixed position. ☒ Placed in fixed position at X-Plane (E2-Plane) ☐ Placed in fixed position at Y-Plane (E1-Plane) ☐ Placed in fixed position at Z-Plane (H-Plane)
Worst Polarity	☒ Horizontal ☐ Vertical

Radiated Emission Measurement Below 1G	
Test Condition	Radiated Emission Below 1G
Power supply Mode	Mode 1: AC 120V.
Worst Mode	☒ Mode 1 ☐ Mode 2 ☐ Mode 3 ☐ Mode 4

Remark:

1. The worst mode was record in this test report.
2. EUT pre-scanned in three axis, X, Y, Z and two polarity, Horizontal and Vertical for radiated measurement. The worst case (X-Plane and Horizontal) were recorded in this report
3. AC power line conducted emission and for below 1G radiation emission were performed the EUT transmit at the highest output power channel as worse case.

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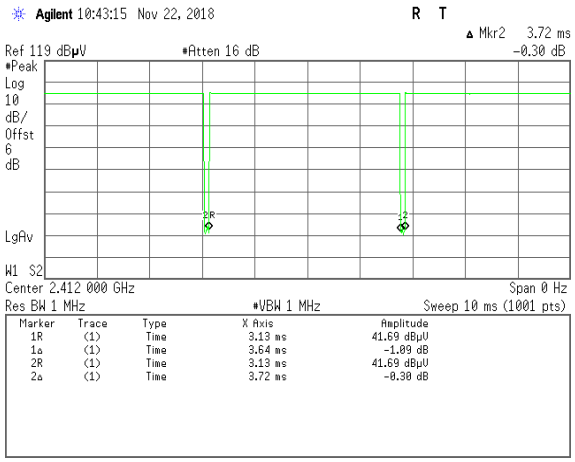
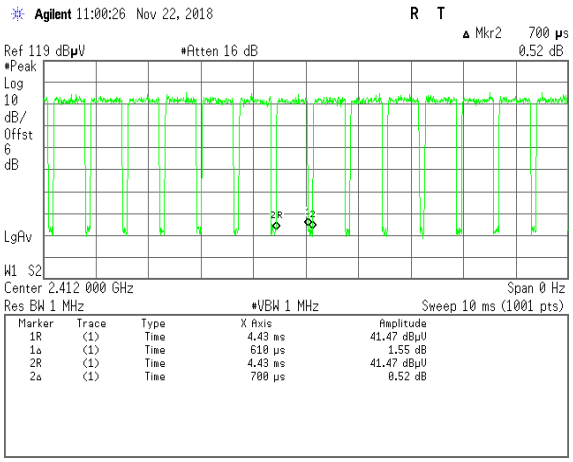
4. EUT DUTY CYCLE

Duty Cycle			
Configuration	TX ON (ms)	TX ALL (ms)	Duty Cycle (%)
802.11b	3.6400	3.7200	97.85%
802.11g	0.6100	0.7000	87.14%
802.11n HT 20	0.1600	0.2400	66.67%

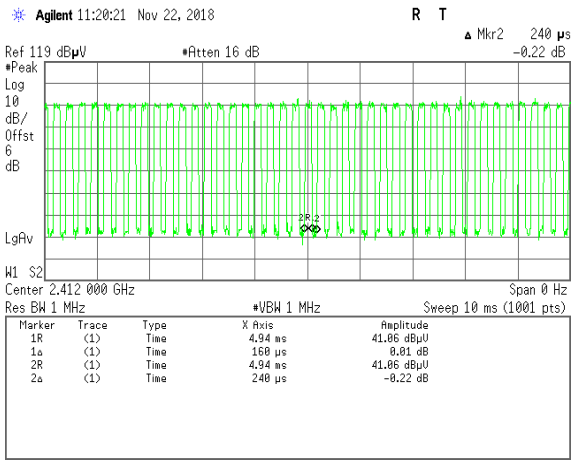
802.11b



802.11g



802.11n HT 20



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5. TEST RESULT

5.1 AC POWER LINE CONDUCTED EMISSION

5.1.1 Test Limit

According to §15.207(a),

Frequency Range (MHz)	Limits(dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

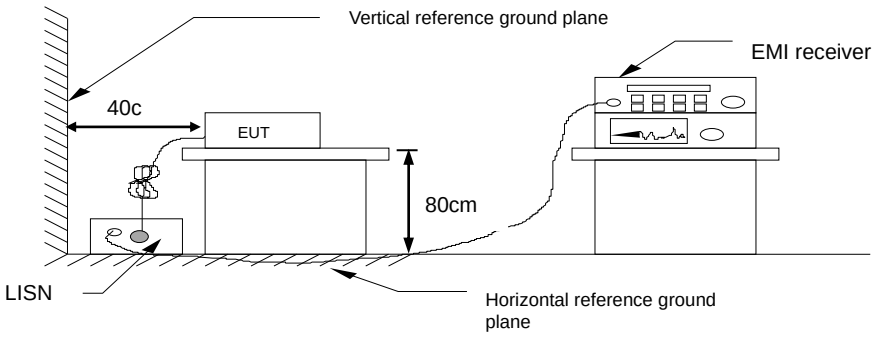
* Decreases with the logarithm of the frequency.

5.1.2 Test Procedure

Test method Refer as ANSI 63.10:2013 clause 6.2,

1. The EUT was placed on a non-conducted table, which is 0.8m above horizontal ground plane and 0.4m above vertical ground plane.
2. EUT connected to the line impedance stabilization network (LISN)
3. Receiver set RBW of 9kHz and Detector Peak and note as quasi-peak and average.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. Recorded Line for Neutral and Line.

5.1.3 Test Setup



5.1.4 Test Result

Pass.

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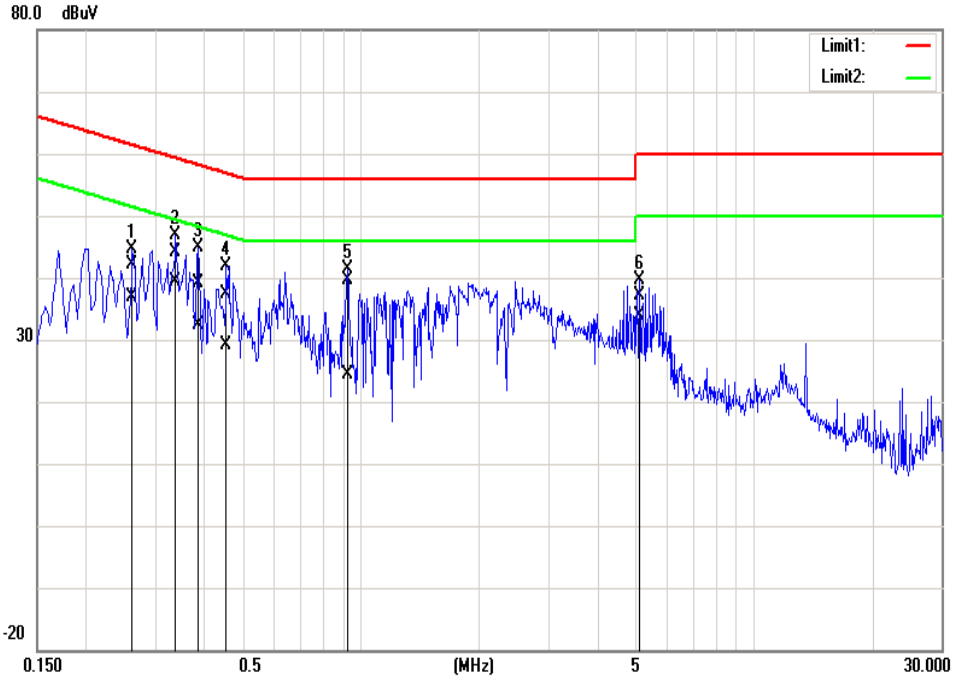
Test Data

Test Mode:	Mode 1	Temp/Hum	24(℃) / 50%RH
Phase:	Line	Test Date	November 23, 2018
		Test Engineer	Dally Hong



No.	Frequency	Quasi Peak reading	Average reading	Correction factor	Quasi Peak result	Average result	Quasi Peak limit	Average limit	Quasi Peak margin	Average margin
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)
1	0.2620	41.86	36.72	0.16	42.02	36.88	61.37	51.37	-19.35	-14.49
2*	0.3380	43.93	39.17	0.18	44.11	39.35	59.25	49.25	-15.14	-9.90
3	0.3860	39.05	32.16	0.18	39.23	32.34	58.15	48.15	-18.92	-15.81
4	0.4540	37.21	29.05	0.18	37.39	29.23	56.80	46.80	-19.41	-17.57
5	0.9260	39.52	24.24	0.20	39.72	24.44	56.00	46.00	-16.28	-21.56
6	5.1340	36.88	33.55	0.32	37.20	33.87	60.00	50.00	-22.80	-16.13

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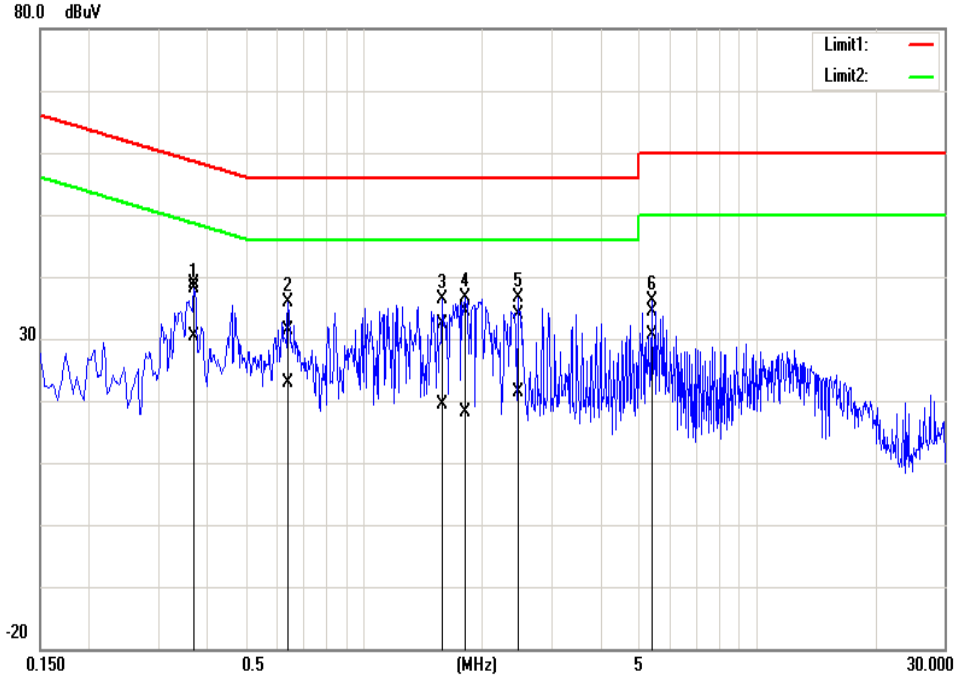
Test Mode:	Mode 1	Temp/Hum	24(℃) / 50%RH
Phase:	Neutral	Test Date	November 23, 2018
		Test Engineer	Dally Hong



No.	Frequency	Quasi Peak reading	Average reading	Correction factor	Quasi Peak result	Average result	Quasi Peak limit	Average limit	Quasi Peak margin	Average margin
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)
1*	0.3700	38.70	30.14	0.19	38.89	30.33	58.50	48.50	-19.61	-18.17
2	0.6420	31.22	22.79	0.19	31.41	22.98	56.00	46.00	-24.59	-23.02
3	1.5820	32.07	19.20	0.23	32.30	19.43	56.00	46.00	-23.70	-26.57
4	1.8100	34.12	17.88	0.24	34.36	18.12	56.00	46.00	-21.64	-27.88
5	2.4660	33.58	21.02	0.25	33.83	21.27	56.00	46.00	-22.17	-24.73
6	5.4180	34.10	30.33	0.33	34.43	30.66	60.00	50.00	-25.57	-19.34

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5.2 6DB BANDWIDTH AND OCCUPIED BANDWIDTH (99%)

5.2.1 Test Limit

According to §15.247(a)(2),

6 dB Bandwidth ：

Limit	Shall be at least 500kHz

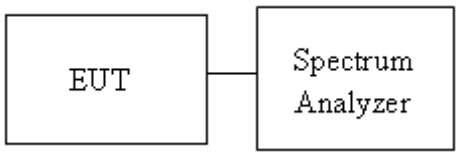
Occupied Bandwidth(99%) ： For reporting purposes only.

5.2.2 Test Procedure

Test method Refer as KDB 558074 D01 and ANSI 63.10:2013 clause 6.9.2,

1. The EUT RF output connected to the spectrum analyzer by RF cable.
2. Setting maximum power transmit of EUT
3. SA set RBW =100KHz, VBW = 300KHz and Detector = Peak, to measurement 6dB Bandwidth
4. SA set RBW = 1% ~ 5% OBW, VBW = three times the RBW and Detector = Peak, to measurement 99% Bandwidth
5. Measure and record the result of 6 dB Bandwidth and 99% Bandwidth. in the test report.

5.2.3 Test Setup



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5.2.4 Test Result

Test mode: IEEE 802.11b Mode / 2412-2462 MHz				
Channel	**Frequency (MHz)**	**OBW (99%) (MHz)**	**6dB BW (MHz)**	**6dB limit (kHz)**
Low	2412	14.1534	9.5217	≥500
Mid	2437	14.1099	9.5217	
High	2462	14.0231	9.0435	

Test mode: IEEE 802.11g Mode / 2412-2462 MHz				
Channel	**Frequency (MHz)**	**OBW (99%) (MHz)**	**6dB BW (MHz)**	**6dB limit (kHz)**
Low	2412	16.7149	15.4348	≥500
Mid	2437	18.1476	15.3478	
High	2462	17.1924	15.3478	

Test mode: IEEE 802.11n HT 20 Mode / 2412-2462 MHz				
Channel	**Frequency (MHz)**	**OBW (99%) (MHz)**	**6dB BW (MHz)**	**6dB limit (kHz)**
Low	2412	17.7134	16.6522	≥500
Mid	2437	17.6266	16.9565	
High	2462	17.6266	17.5217	

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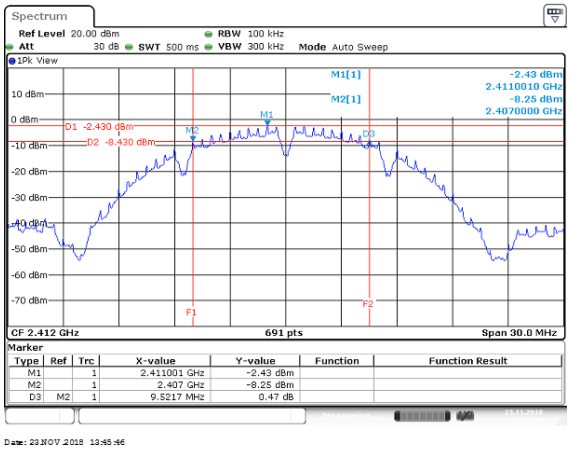
Test Data

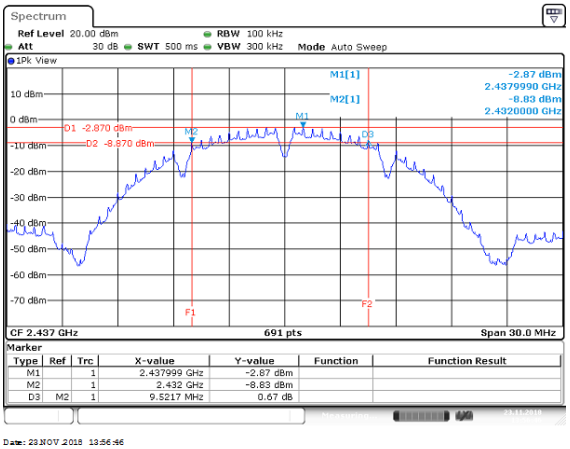
6dB BANDWIDTH

IEEE 802.11b Mode

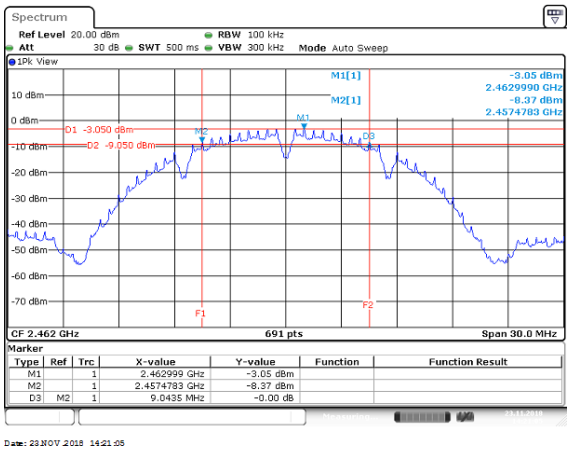
Low CH



Mid CH



High CH



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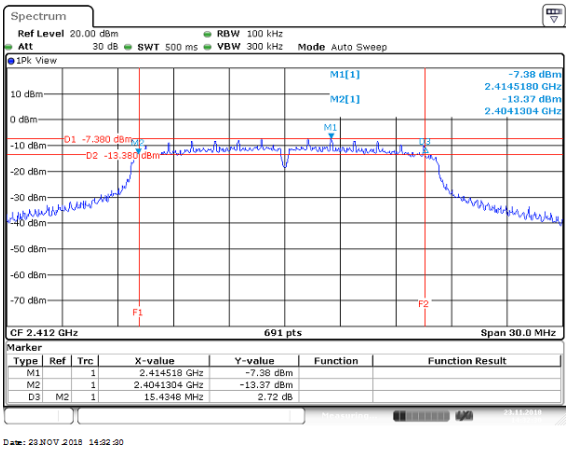
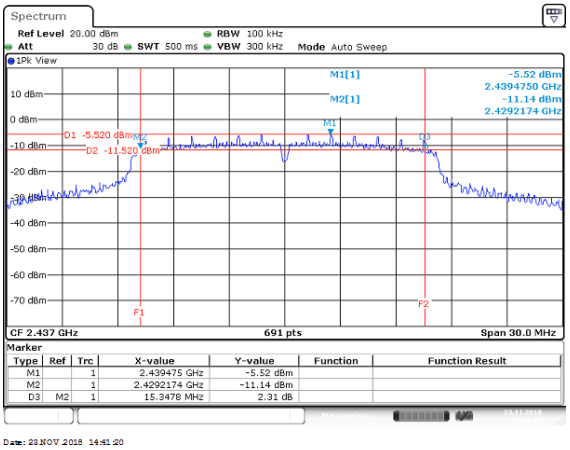
IEEE 802.11g Mode

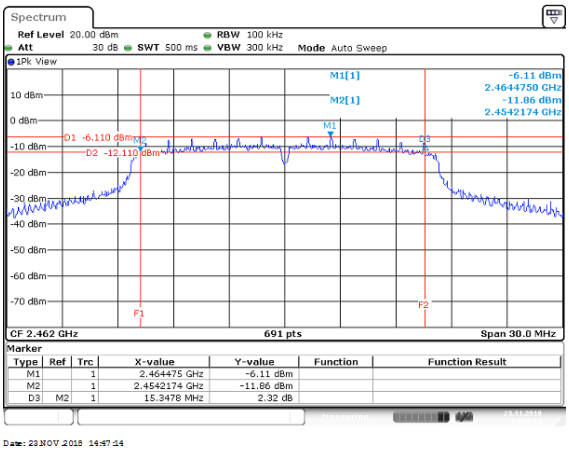
Low CH



Mid CH



High CH



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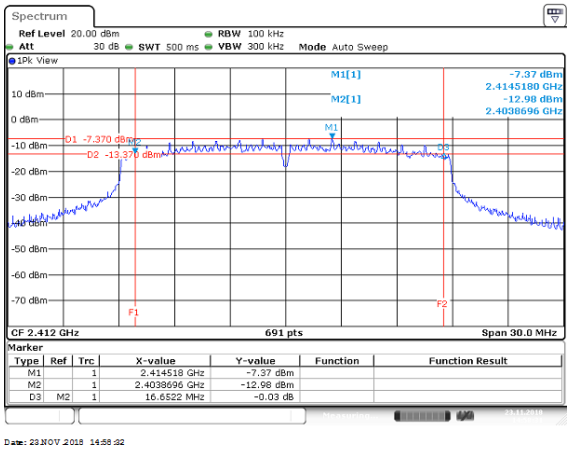
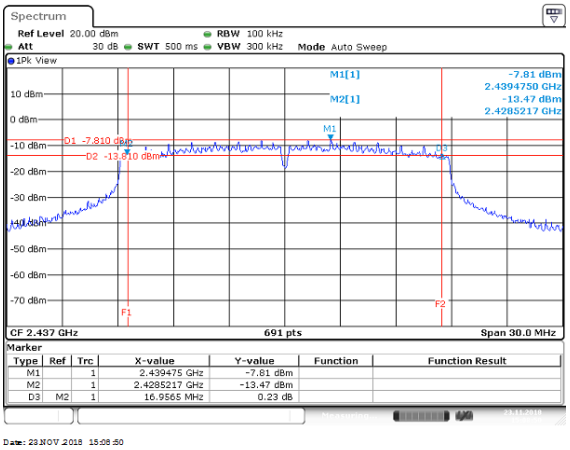
IEEE 802.11n HT 20 Mode

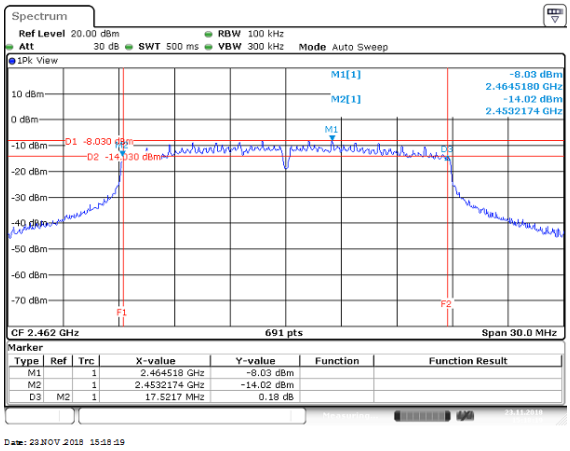
Low CH



Mid CH



High CH



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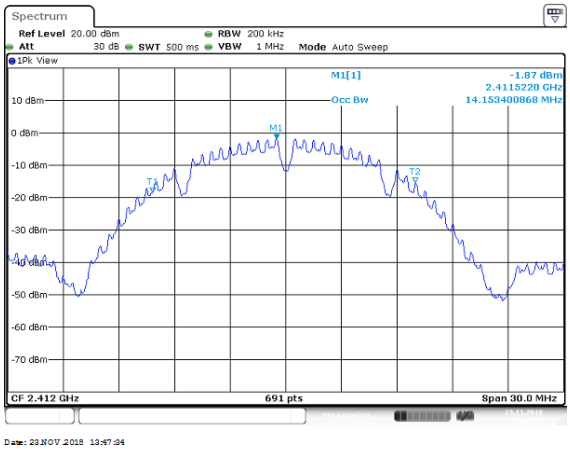
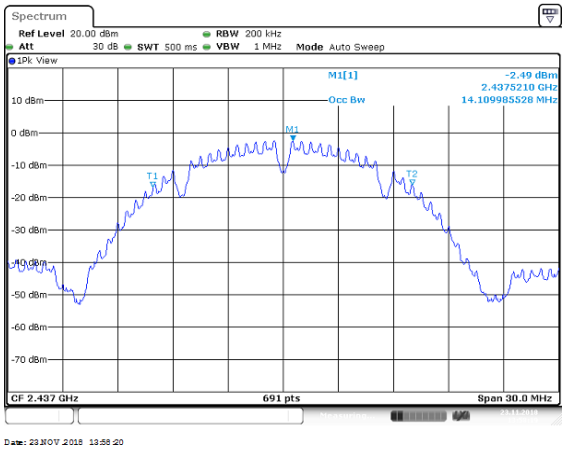
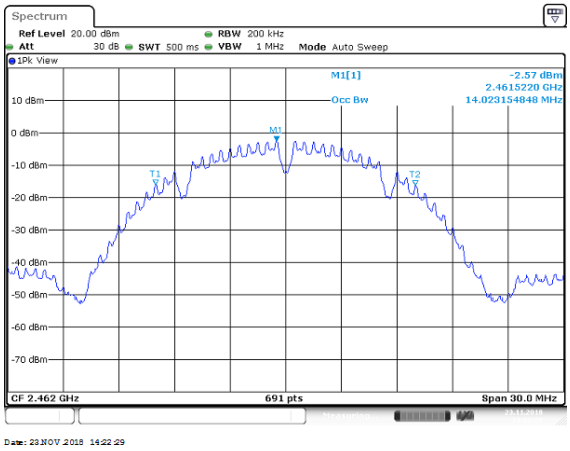
Test Data

BANDWIDTH (99%)

IEEE 802.11b Mode	
Low CH	**Mid CH**
	
High CH	
	

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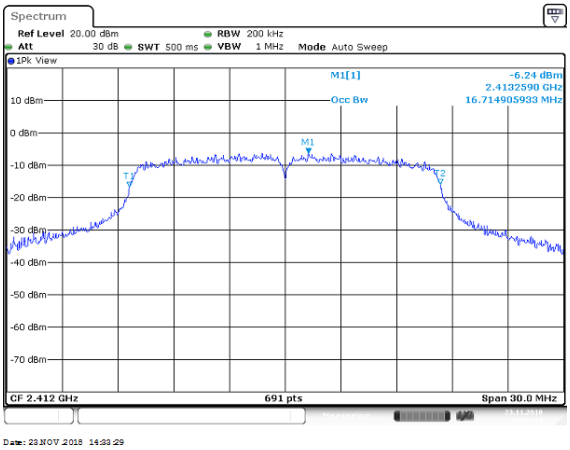
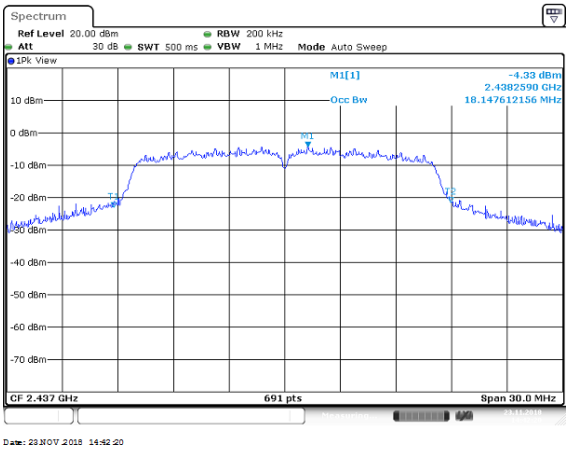
IEEE 802.11g Mode

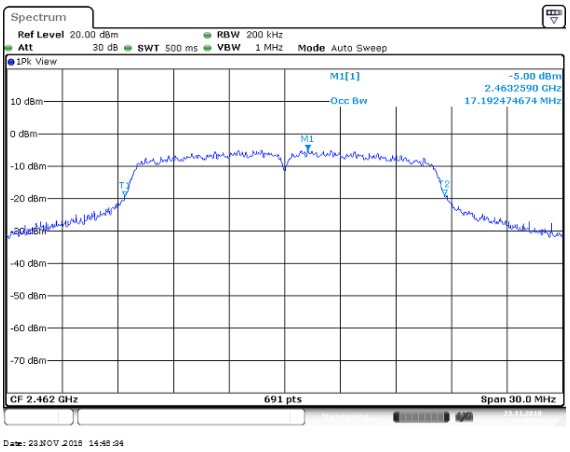
Low CH



Mid CH



High CH



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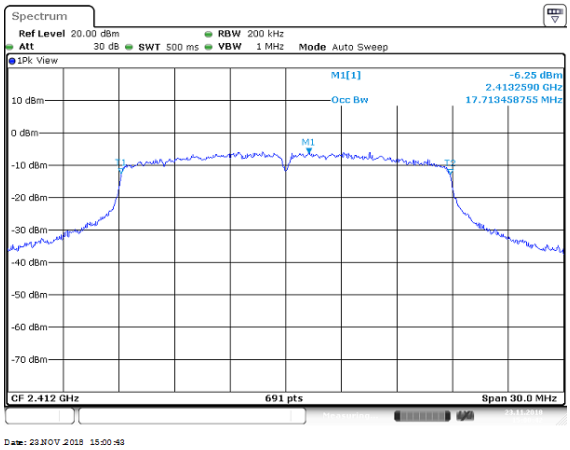
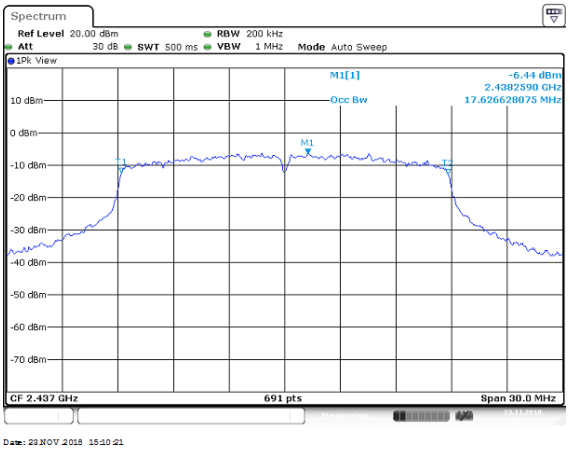
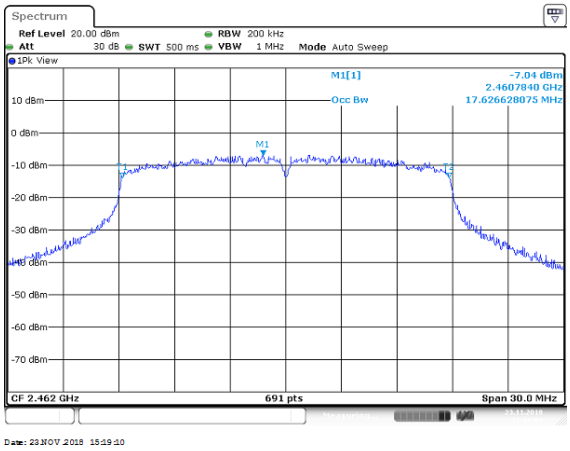
IEEE 802.11n HT 20 Mode	
Low CH	**Mid CH**
	
High CH	
	

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5.3 OUTPUT POWER MEASUREMENT

5.3.1 Test Limit

According to §15.247(b)(3),

Peak output power：

For systems using digital modulation in the 2400-2483.5 MHz: 1 Watt(30 dBm), base on the use of antennas with directional gain not exceed 6 dBi. If transmitting antennas of directional gain greater than 6dBi are used the peak output power the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

Limit	☒ Antenna not exceed 6 dBi：30dBm ☐ Antenna with DG greater than 6 dBi： [Limit = 30 – (DG – 6)] ☐ Point-to-point operation：

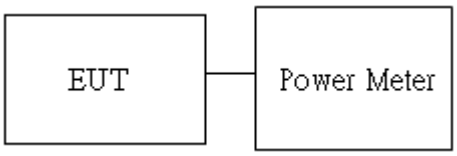
Average output power：For reporting purposes only.

5.3.2 Test Procedure

Test method Refer as KDB 558074 D01.

1. The EUT RF output connected to the power meter by RF cable.
2. Setting maximum power transmit of EUT.
3. The path loss was compensated to the results for each measurement.
4. Measure and record the result of Peak output power and Average output power. in the test report.

5.3.3 Test Setup



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5.3.4 Test Result

Peak output power：

Wifi 2.4G						
Config	**CH**	**Freq. (MHz)**	**power set**	**PK Power (dBm)**	**PK Power (W)**	**Limit (dBm)**
IEEE 802.11b mode Data rate: 1Mbps	Low	2412	20	20.47	0.1114	30
	Mid	2437	20	20.30	0.1072	
	High	2462	20	20.16	0.1038	
IEEE 802.11g mode Data rate: 6Mbps	Low	2412	17	22.07	0.1611	
	Mid	2437	20	22.32	0.1706	
	High	2462	19	22.71	0.1866	
IEEE 802.11n HT 20 mode Data rate: MCS0	Low	2412	16	22.66	0.1845	
	Mid	2437	20	22.70	0.1862	
	High	2462	20	22.75	0.1884	

Average output power：

Wifi 2.4G			
Config	**CH**	**Freq. (MHz)**	**AV Power (dBm)**
IEEE 802.11b mode Data rate: 1Mbps	Low	2412	18.13
	Mid	2437	17.94
	High	2462	17.79
IEEE 802.11g mode Data rate: 6Mbps	Low	2412	14.55
	Mid	2437	16.37
	High	2462	15.92
IEEE 802.11n HT 20 mode Data rate: MCS0	Low	2412	11.50
	Mid	2437	12.20
	High	2462	12.05

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5.4 POWER SPECTRAL DENSITY

5.4.1 Test Limit

According to §15.247(e),

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

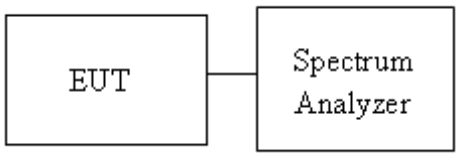
Limit	☒ Antenna not exceed 6 dBi：8dBm ☐ Antenna with DG greater than 6 dBi： [Limit = 8 – (DG – 6)] ☐ Point-to-point operation：

5.4.2 Test Procedure

Test method Refer as KDB 558074 D01.

1. The EUT RF output connected to the spectrum analyzer by RF cable.
2. Setting maximum power transmit of EUT
3. SA set RBW = 3kHz, VBW = 30kHz, Span = 1.5 times DTS Bandwidth (6 dB BW), Detector = Peak, Sweep Time = Auto and Trace = Max hold.
4. The path loss and Duty Factor were compensated to the results for each measurement by SA.
5. Mark the maximum level.
6. Measure and record the result of power spectral density. in the test report.

5.4.3 Test Setup



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5.4.4 Test Result

Test mode: IEEE 802.11b Mode / 2412-2462 MHz			
Channel	**Frequency (MHz)**	**PPSD (dBm)**	**Limit (dBm)**
Low	2412	-5.02	8
Mid	2437	-5.60	
High	2462	-5.52	

Test mode: IEEE 802.11g Mode / 2412-2462 MHz			
Channel	**Frequency (MHz)**	**PPSD (dBm)**	**Limit (dBm)**
Low	2412	-10.07	8
Mid	2437	-7.99	
High	2462	-8.69	

Test mode: IEEE 802.11n HT 20 Mode / 2412-2462 MHz			
Channel	**Frequency (MHz)**	**PPSD (dBm)**	**Limit (dBm)**
Low	2412	-12.80	8
Mid	2437	-11.52	
High	2462	-11.17	

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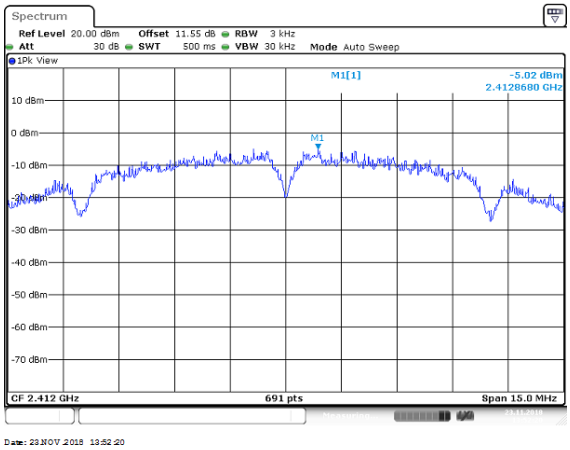
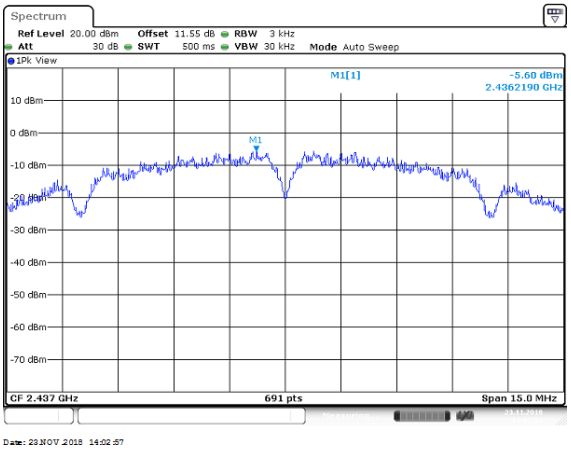
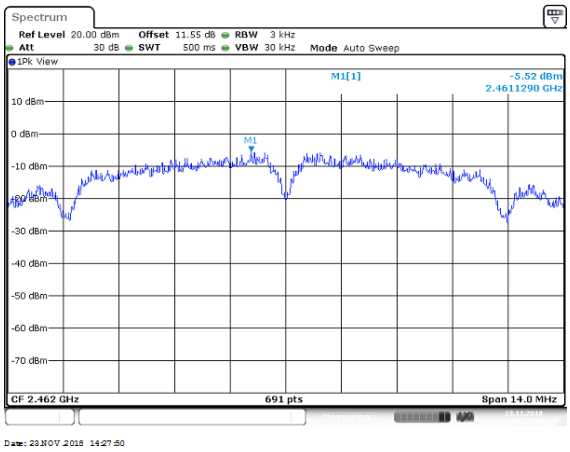
Test Data

IEEE 802.11b Mode	
Low CH	**Mid CH**
	
High CH	
	

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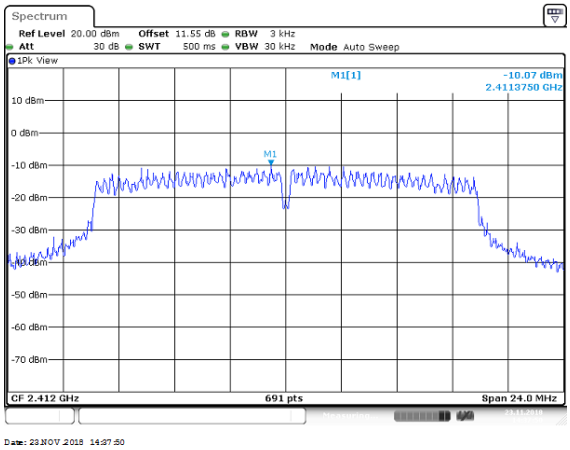
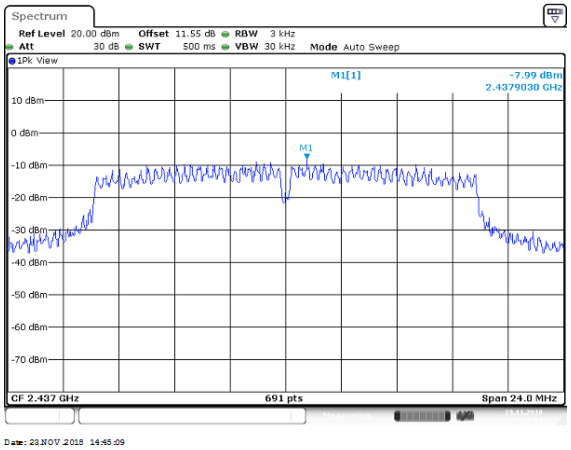
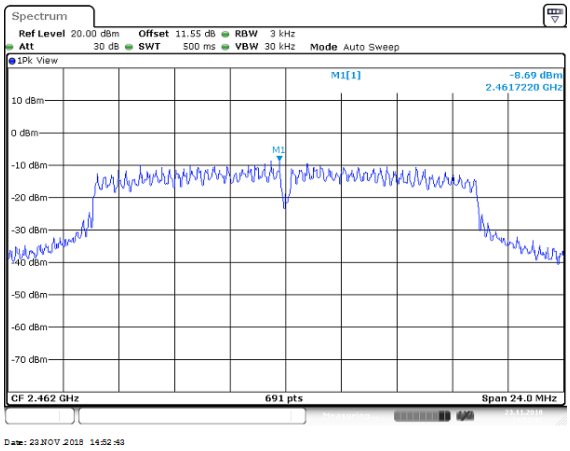
IEEE 802.11g Mode	
Low CH	**Mid CH**
	
High CH	
	

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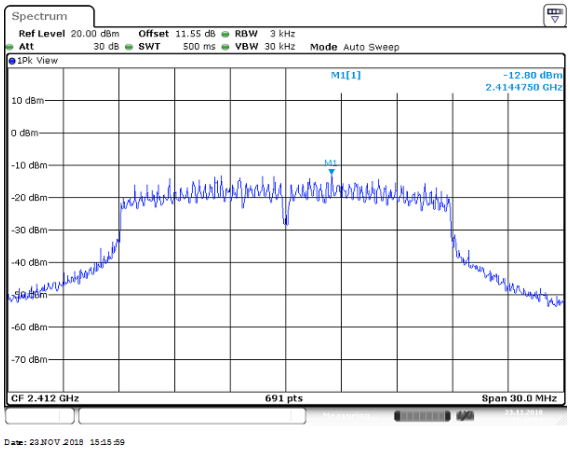
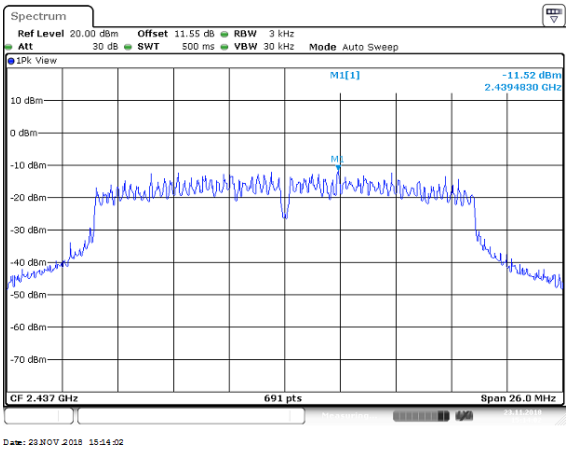
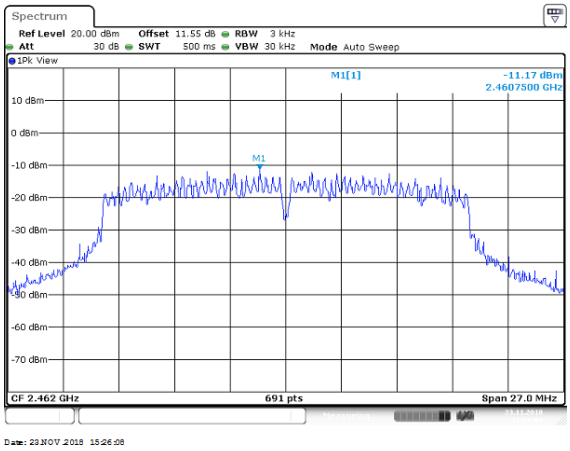
IEEE 802.11n HT 20 Mode	
Low CH	**Mid CH**
	
High CH	
	

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5.5 CONDUCTED BANDEDGE AND SPURIOUS EMISSION

5.5.1 Test Limit

According to §15.247(d),

In any 100 kHz bandwidth outside the authorized frequency band,

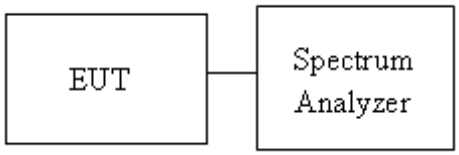
Non-restricted bands shall be attenuated at least 20 dB/30 dB relative to the maximum PSD level in 100 kHz by RF conducted or a radiated measurement which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

5.5.2 Test Procedure

Test method Refer as KDB 558074 D01.

1. EUT RF output port connected to the SA by RF cable, and the path loss was compensated to result.
2. SA setting, RBW=100kHz, VBW=300kHz, Detector=Peak, Trace mode = max hold, SWT = Auto.
3. In any 100 kHz bandwidth outside the authorized frequency band, shall be attenuated at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when conducted power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

5.5.3 Test Setup



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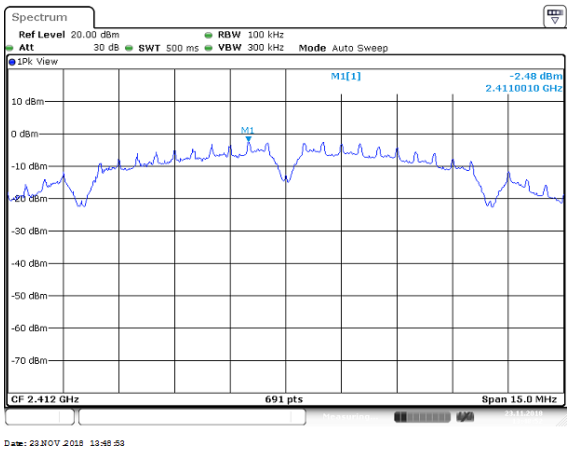
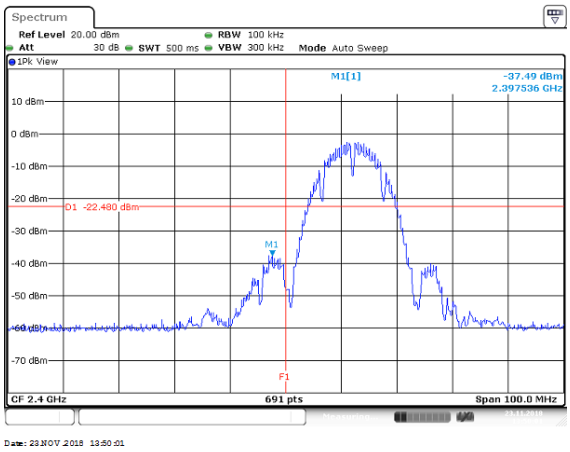
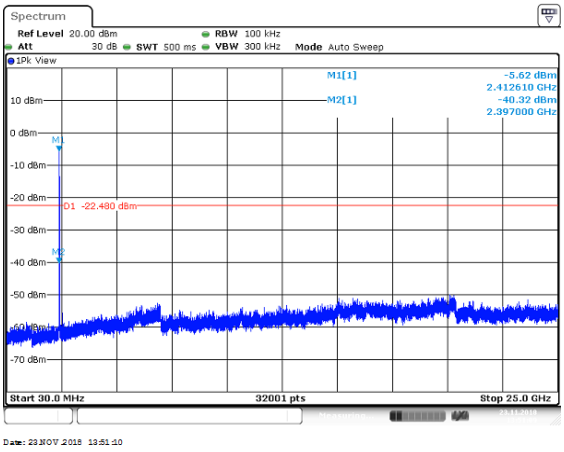
5.5.4 Test Result

Test Data

IEEE 802.11b Mode Low CH	
Reference Level of PSD in 100kHz	**Band Edge**
	
Spurious Emission 30MHz-25GHz	
	

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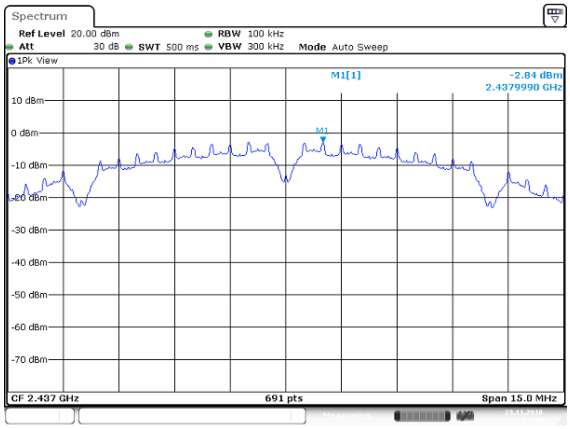
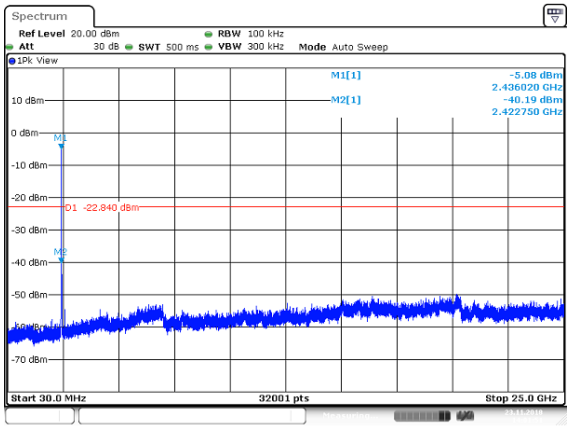
IEEE 802.11b Mode Mid CH	
Reference Level of PSD in 100kHz	**Spurious Emission 30MHz-25GHz**
	

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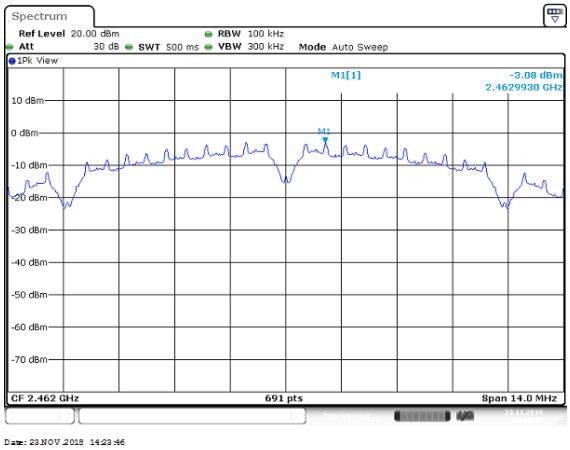
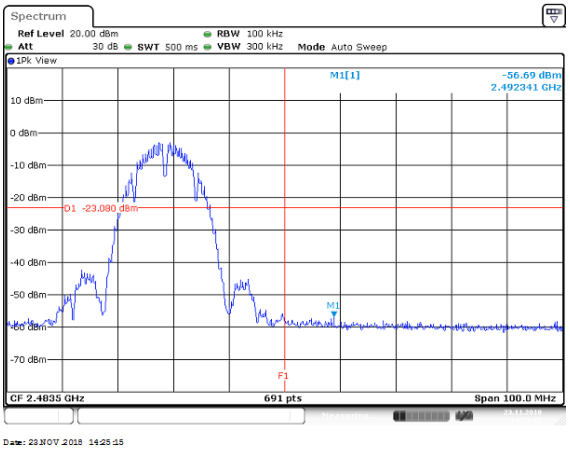
IEEE 802.11b Mode High CH

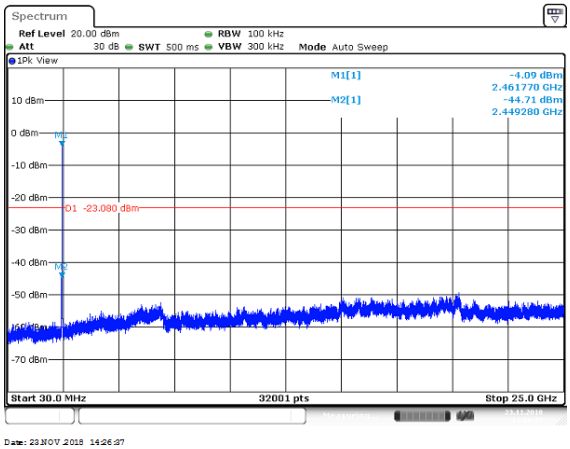
Reference Level of PSD in 100kHz



Band Edge



Spurious Emission 30MHz-25GHz



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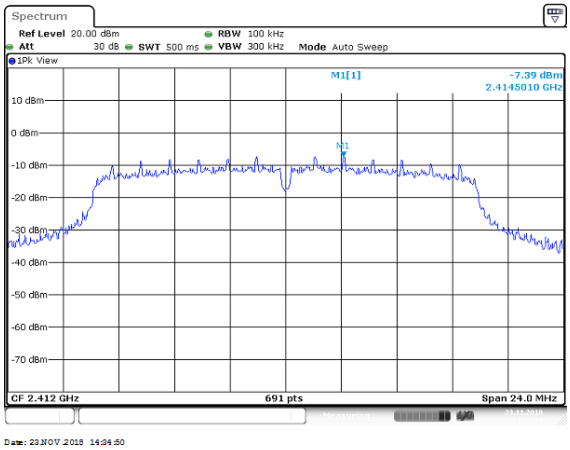
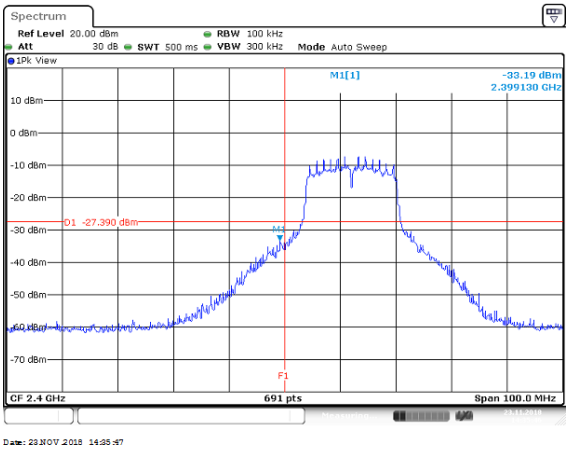
IEEE 802.11g Mode Low CH

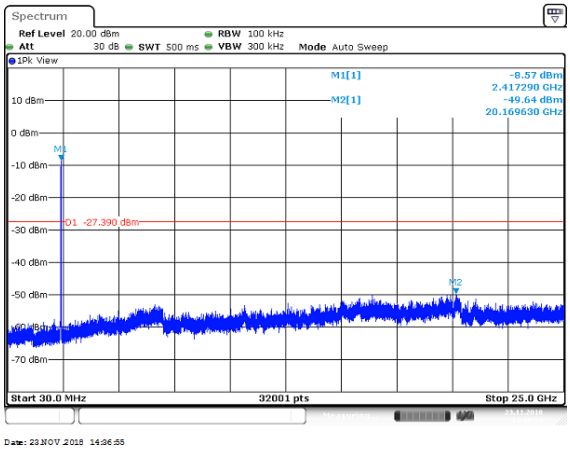
Reference Level of PSD in 100kHz



Band Edge



Spurious Emission 30MHz-25GHz



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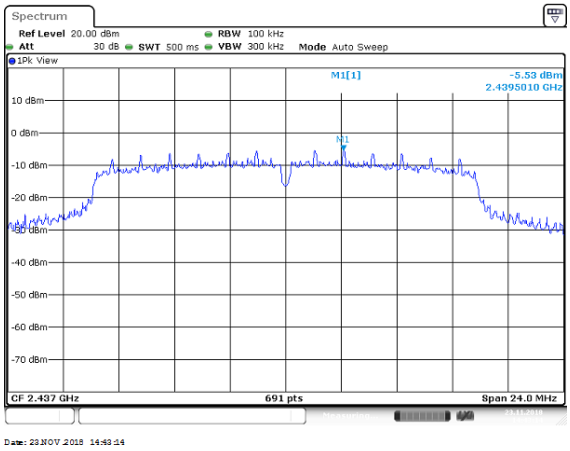
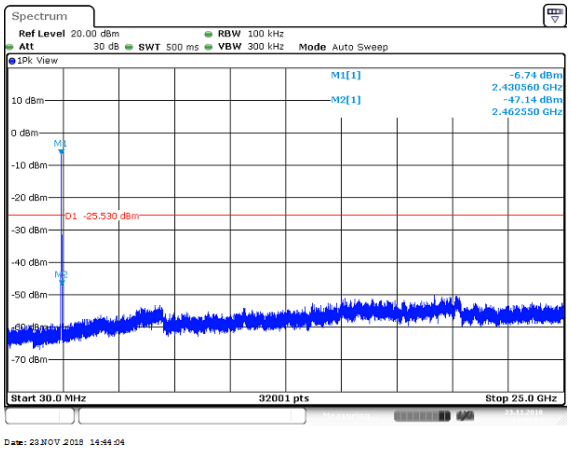
IEEE 802.11g Mode Mid CH	
Reference Level of PSD in 100kHz	**Spurious Emission 30MHz-25GHz**
	

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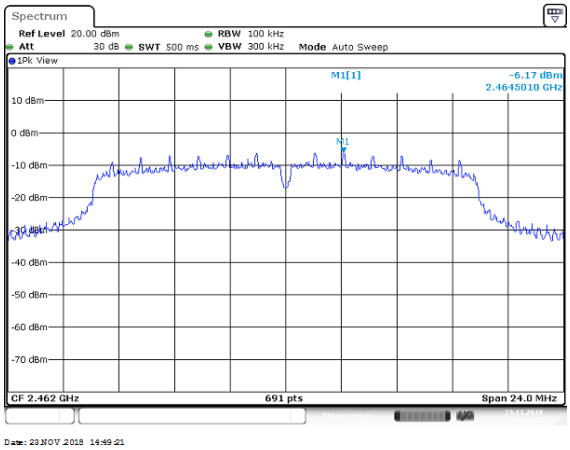
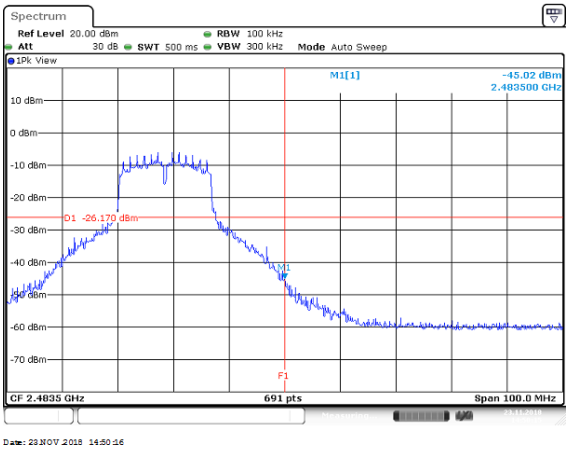
IEEE 802.11g Mode High CH

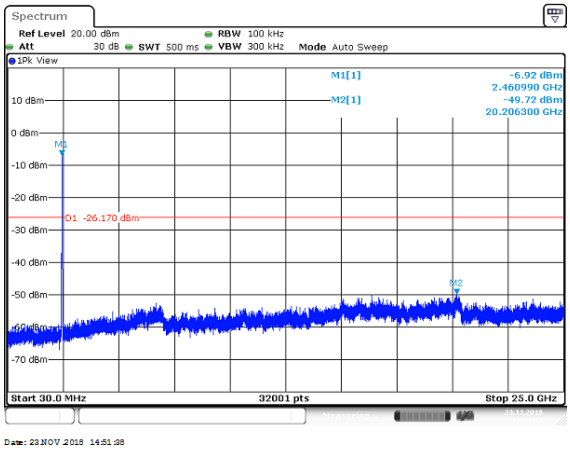
Reference Level of PSD in 100kHz



Band Edge



Spurious Emission 30MHz-25GHz



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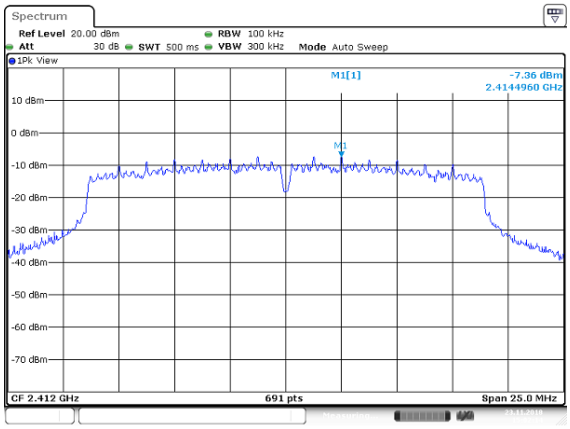
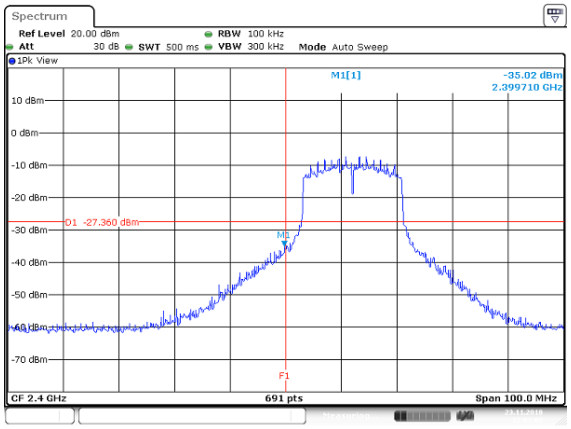
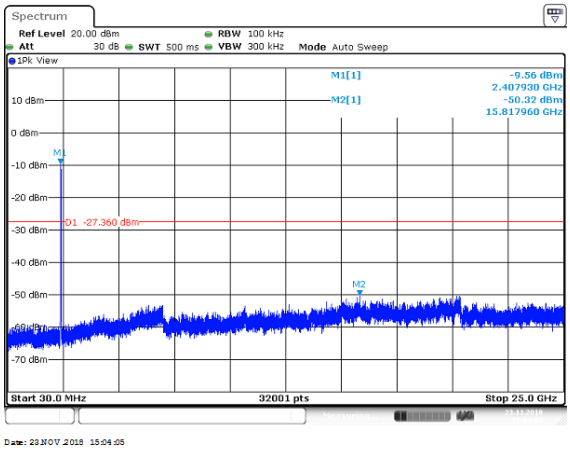
IEEE 802.11n HT 20 Mode Low CH	
Reference Level of PSD in 100kHz	**Band Edge**
	
Spurious Emission 30MHz-25GHz	
	

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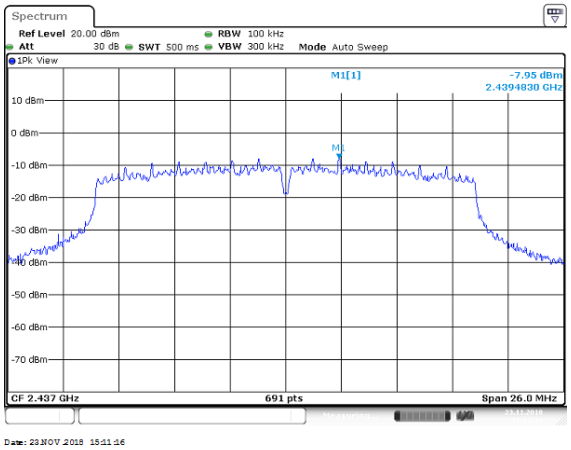
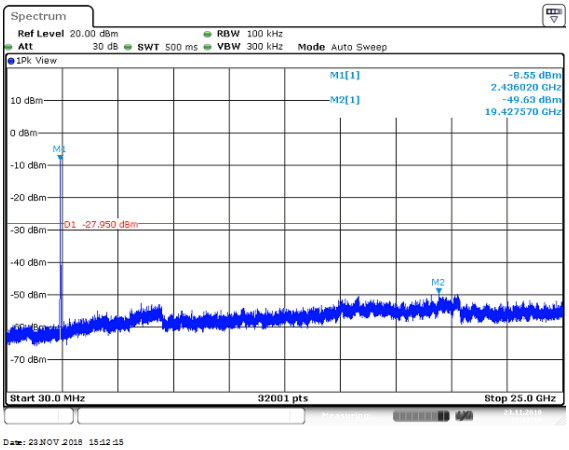
IEEE 802.11n HT 20 Mode Mid CH	
Reference Level of PSD in 100kHz	**Spurious Emission 30MHz-25GHz**
	

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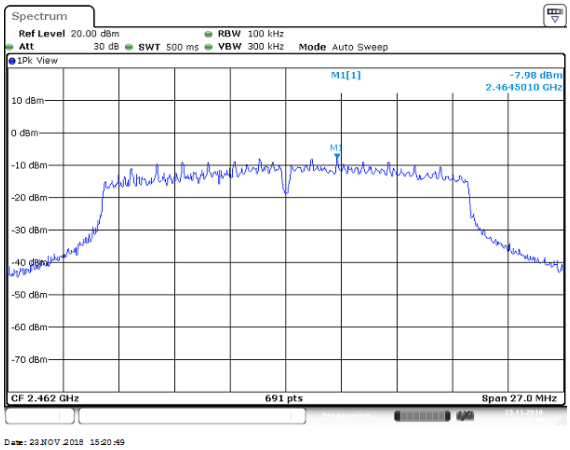
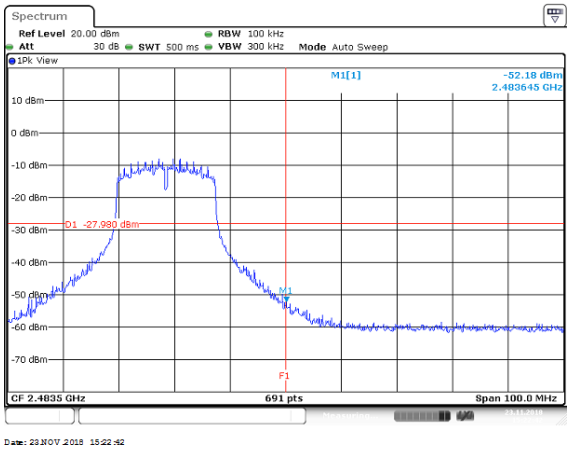
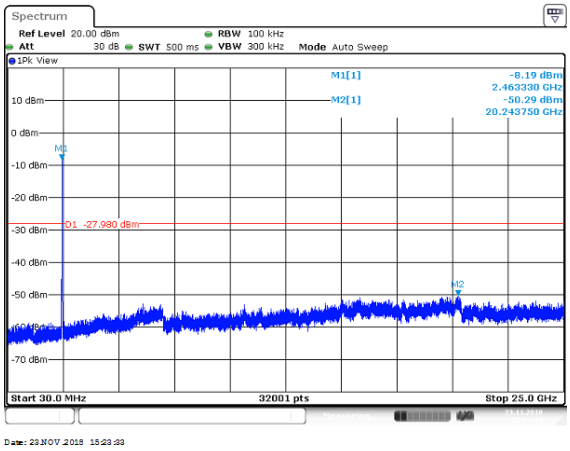
IEEE 802.11n HT 20 Mode High CH	
Reference Level of PSD in 100kHz	**Band Edge**
	
Spurious Emission 30MHz-25GHz	
	

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5.6 RADIATION BANDEDGE AND SPURIOUS EMISSION

5.6.1 Test Limit

FCC according to §15.247(d), §15.209 and §15.205,

In any 100 kHz bandwidth outside the authorized frequency band, all harmonic and spurious must be least 20 dB below the highest emission level with the authorized frequency band. Radiation emission which fall in the restricted bands must also follow the FCC section 15.209 as below limit in table.

Below 30 MHz

Frequency	Field Strength (microvolts/m)	Magnetic H-Field (microamperes/m)	Measurement Distance (metres)
9-490 kHz	2,400/F (F in kHz)	2,400/F (F in kHz)	300
490-1,705 kHz	24,000/F (F in kHz)	24,000/F (F in kHz)	30
1.705-30 MHz	30	N/A	30

Above 30 MHz

Frequency	Field Strength (microvolts/m)	Measurement Distance (metres)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

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5.6.2 Test Procedure

Test method Refer as KDB 558074 D01.

1. The EUT is placed on a turntable, Above 1 GHz is 1.5m and below 1 GHz is 0.8m above ground plane. The EUT Configured un accordance with ANSI C63.10, and the EUT set in a continuous mode.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level. And EUT is set 3m away from the receiving antenna, which is scanned from 1m to 4m above the ground plane to find out the highest emissions. Measurement are made polarized in both the vertical and the horizontal positions with antenna.
3. Span shall wide enough to full capture the emission measured. The SA from 9kHz to 26.5GHz set to the low, Mid and High channels with the EUT transmit.

Remark:

1. Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.
2. Note: No emission found between lowest internal used/generated frequency to 30MHz (9KHz~30MHz)

4. The SA setting following：

(1) Below 1G：RBW = 100kHz, VBW ≥ 3 RBW, Sweep = Auto, Detector = Peak, Trace = Max hold.

(2) Above 1G：

(2.1) For Peak measurement：RBW = 1MHz, VBW ≥ 3 RBW, Sweep = Auto, Detector = Peak, Trace = Max hold.

(2.2) For Average measurement：RBW = 1MHz, VBW

˙If Duty Cycle ≥ 98%, VBW=10Hz.

˙If Duty Cycle < 98%, VBW=1/T.

Configuration	Duty Cycle (%)	T(ms)	1/T (kHz)	VBW Setting
802.11b	98%	3.6400	0.275	300Hz
802.11g	87%	0.6100	1.639	1.8KHz
802.11n HT 20	67%	0.1600	6.250	6.8KHz

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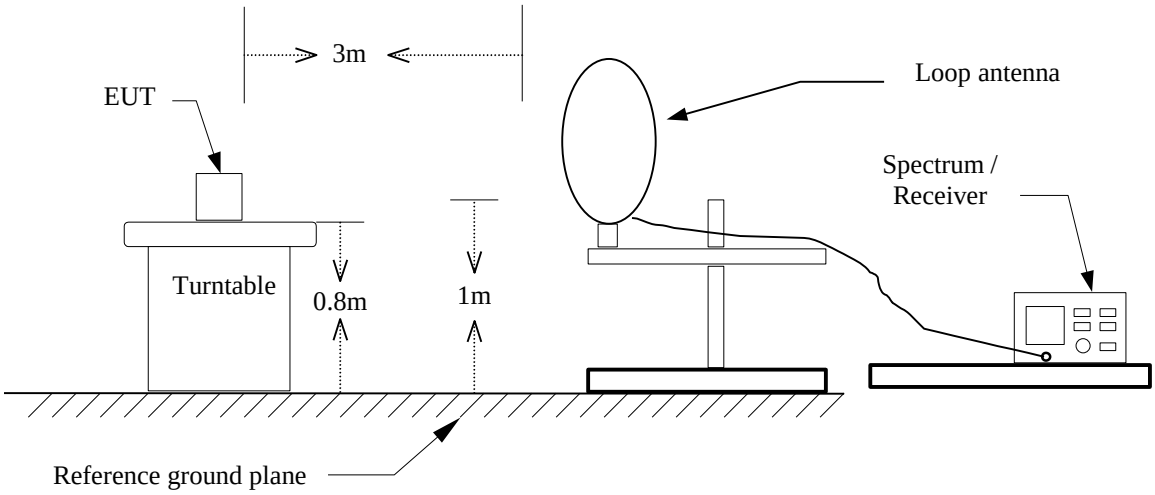
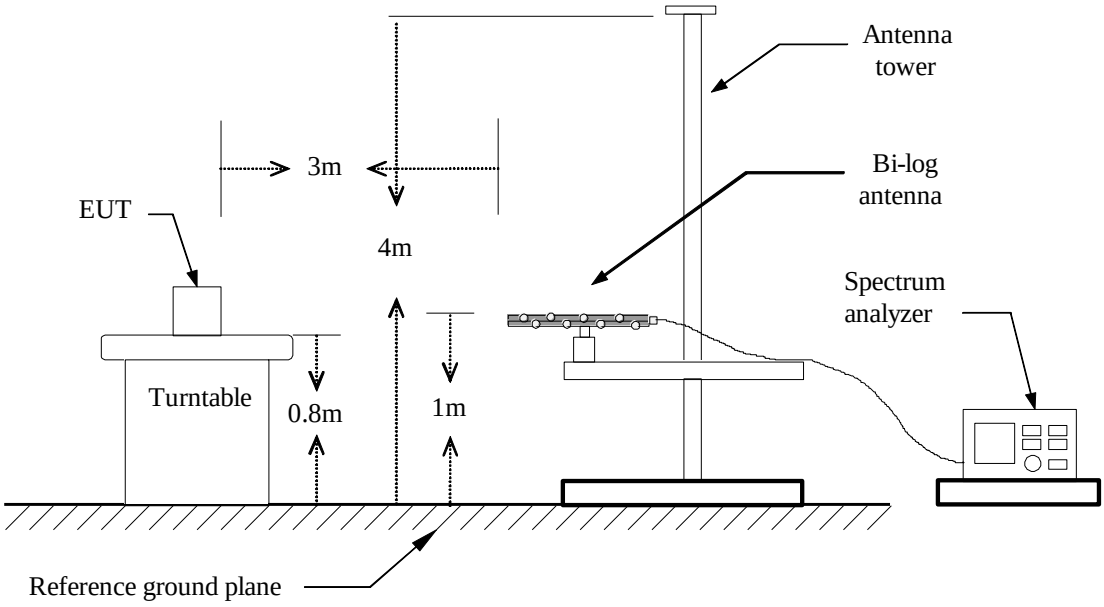
5.6.3 Test Setup

9kHz ~ 30MHz



30MHz ~ 1GHz



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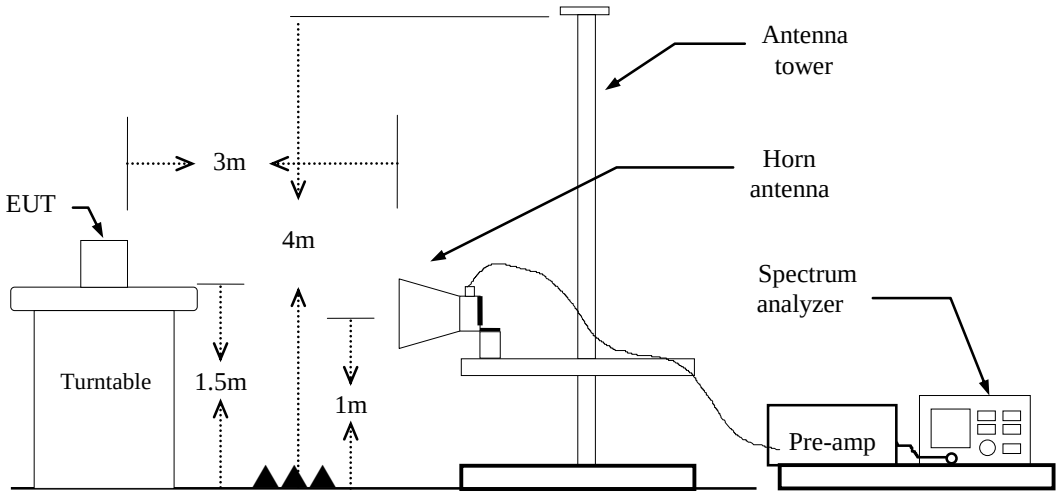
Above 1 GHz



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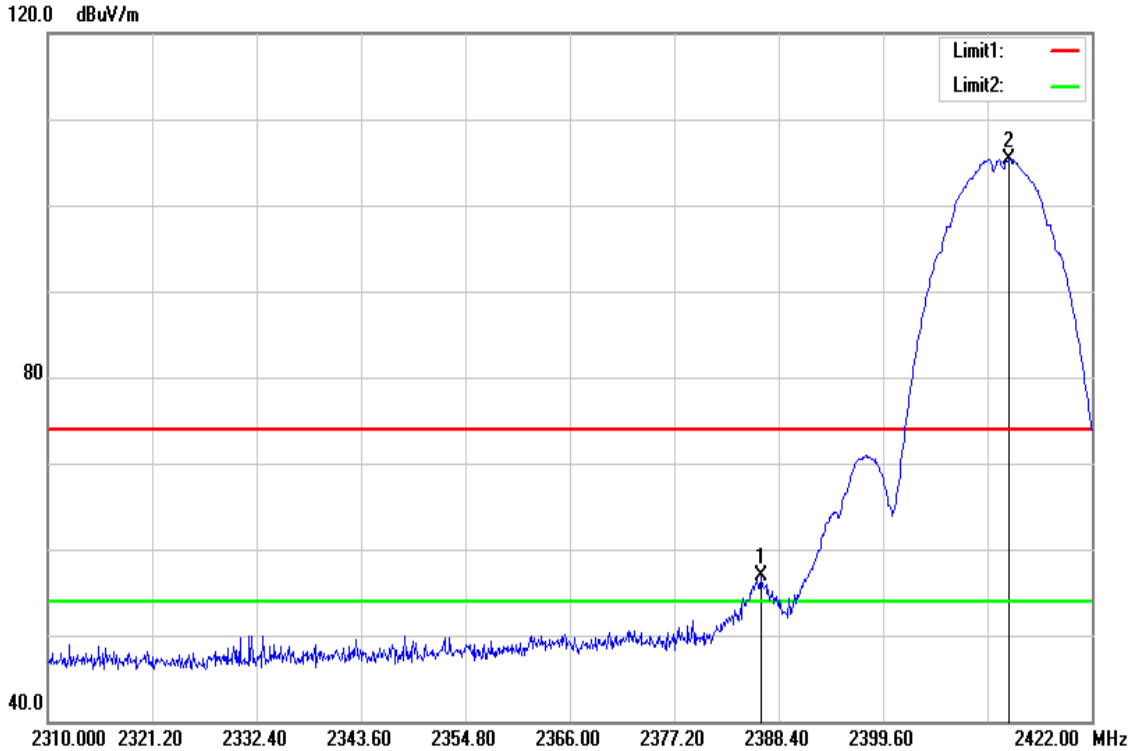
5.6.4 Test Result

Band Edge Test Data

Test Mode	IEEE 802.11b Low CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Band Edge	Test Date	November 22, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2386.496	59.96	-3.12	56.84	74.00	-17.16	peak
2413.152	108.46	-3.07	105.39	74.00	31.39	peak

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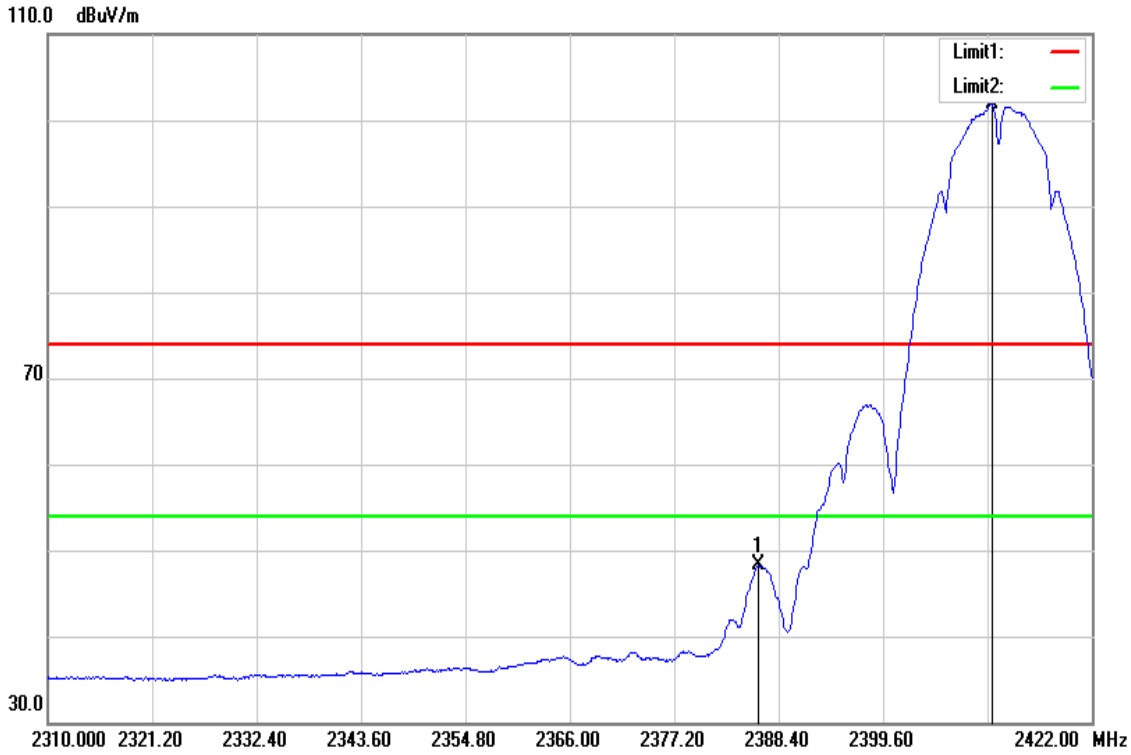
Test Mode	IEEE 802.11b Low CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Band Edge	Test Date	November 22, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Average		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2386.272	51.37	-3.12	48.25	54.00	-5.75	AVG
2411.248	104.93	-3.08	101.85	54.00	47.85	AVG

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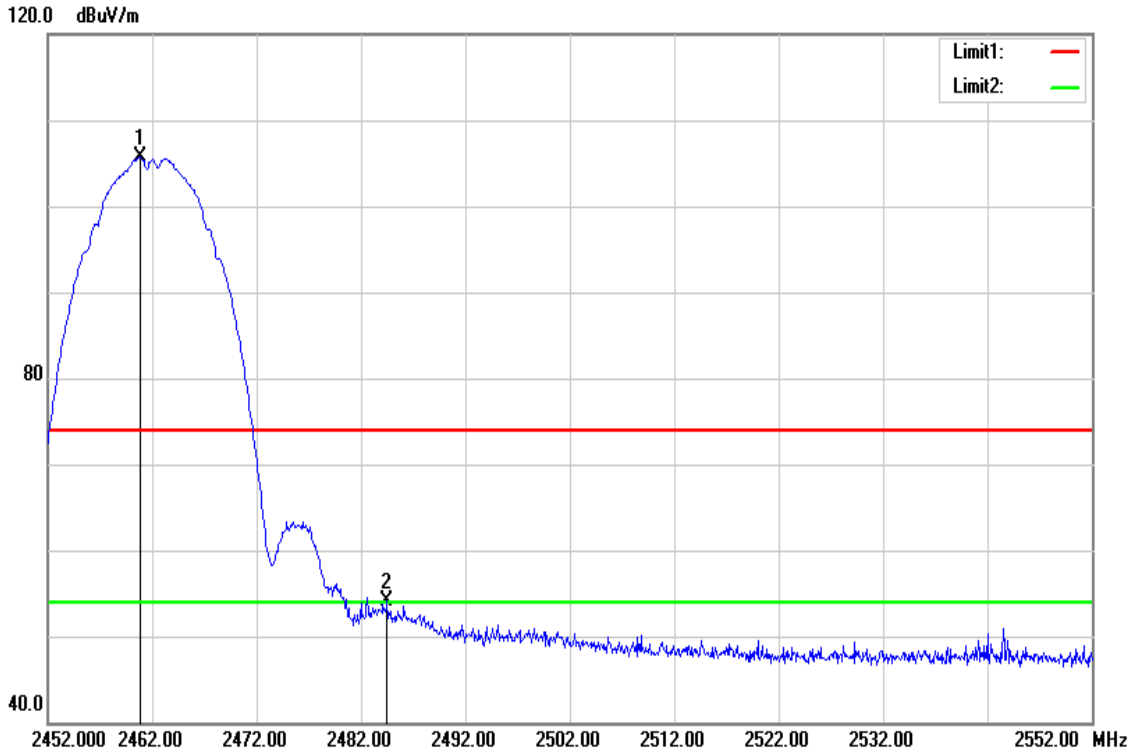
Test Mode	IEEE 802.11b High CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Band Edge	Test Date	November 22, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2460.900	108.47	-2.84	105.63	74.00	31.63	peak
2484.500	56.75	-2.70	54.05	74.00	-19.95	peak

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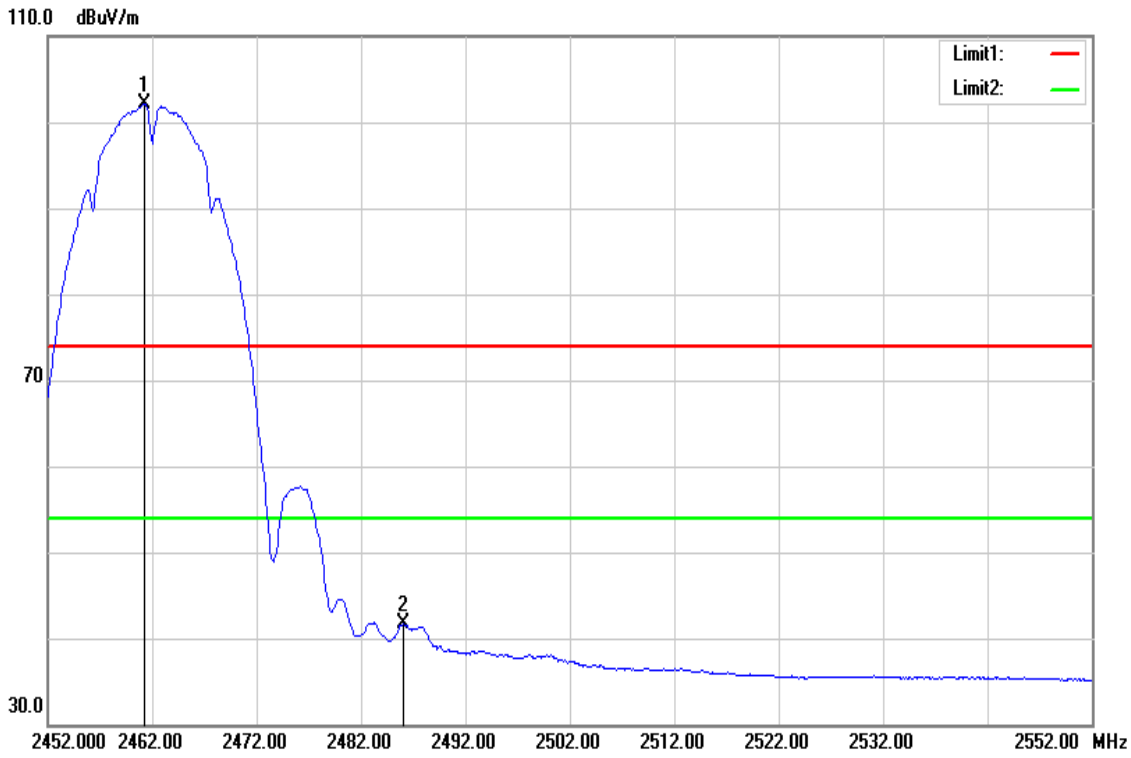
Test Mode	IEEE 802.11b High CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Band Edge	Test Date	November 22, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Average		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2461.300	105.03	-2.84	102.19	54.00	48.19	AVG
2486.000	44.40	-2.70	41.70	54.00	-12.30	AVG

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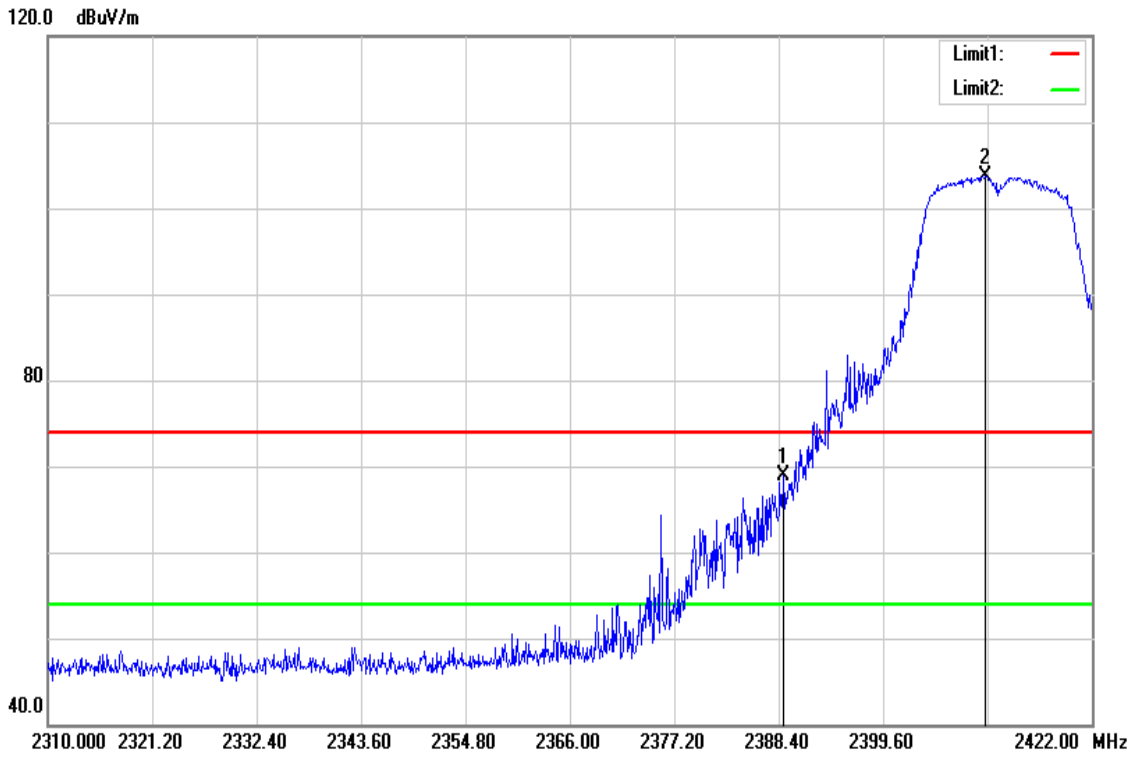
Test Mode	IEEE 802.11g Low CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Band Edge	Test Date	November 22, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2388.960	71.95	-3.13	68.82	74.00	-5.18	peak
2410.576	106.85	-3.08	103.77	74.00	29.77	peak

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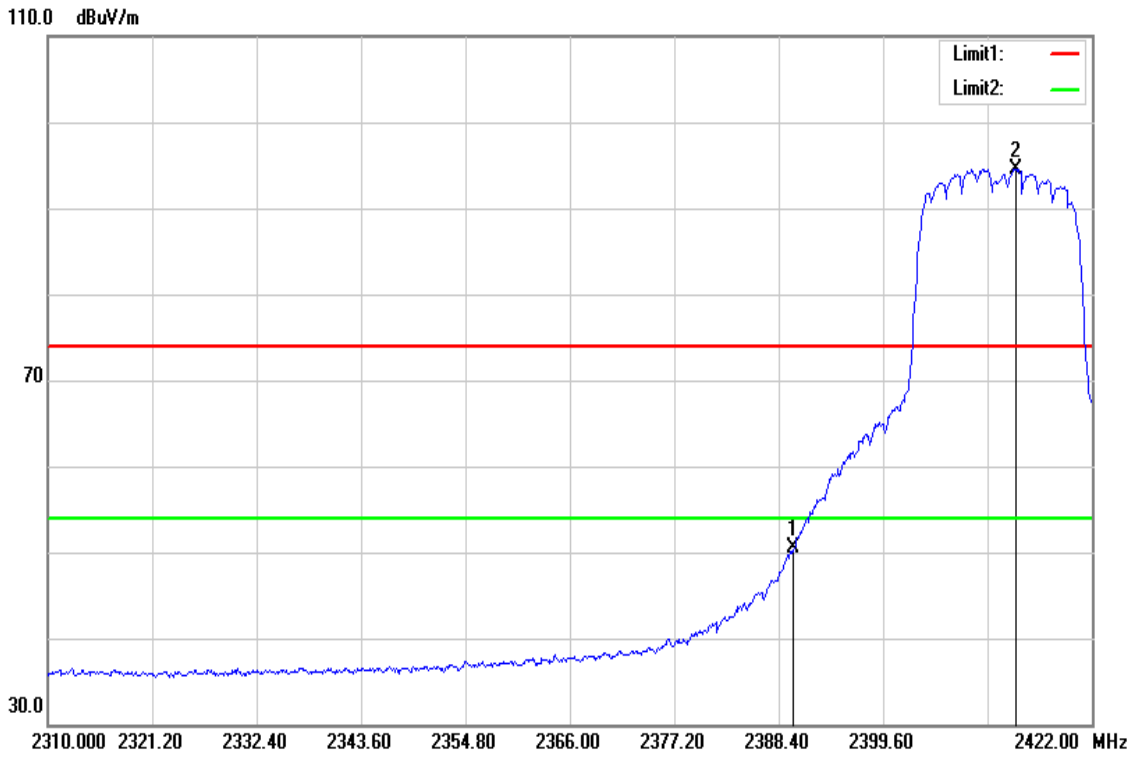
Test Mode	IEEE 802.11g Low CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Band Edge	Test Date	November 22, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Average		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2390.000	53.54	-3.13	50.41	54.00	-3.59	AVG
2413.824	97.65	-3.06	94.59	54.00	40.59	AVG

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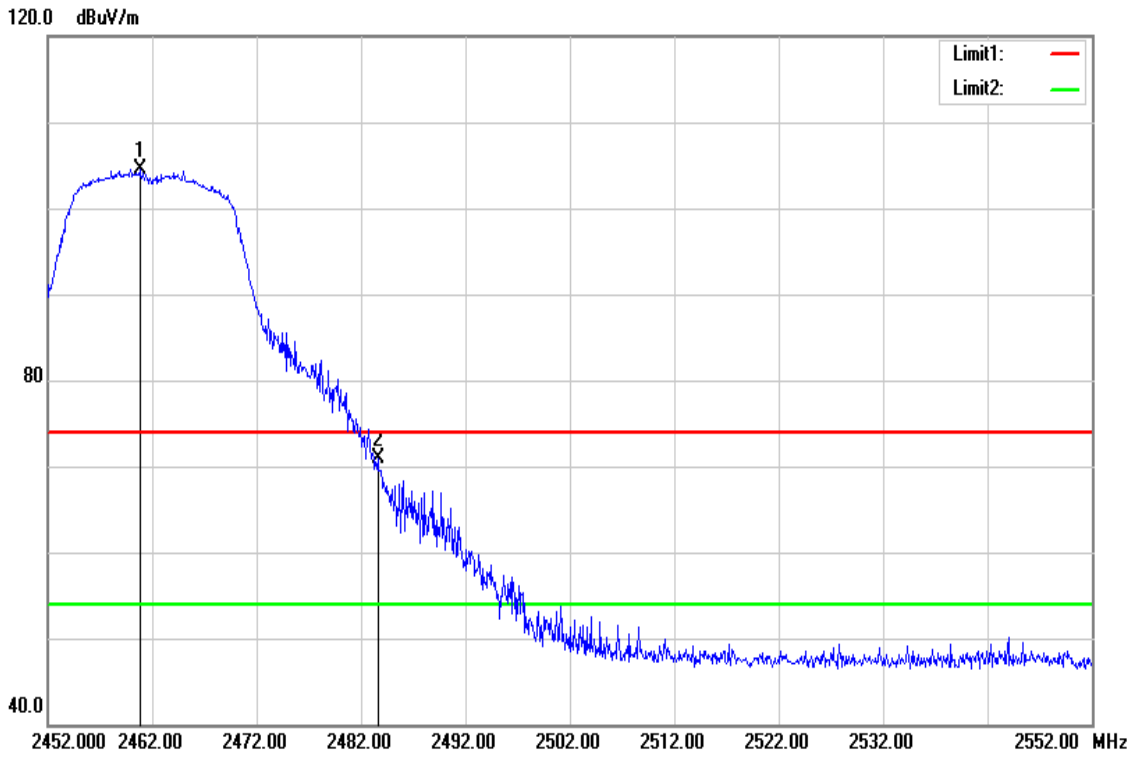
Test Mode	IEEE 802.11g High CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Band Edge	Test Date	November 22, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2460.800	107.36	-2.84	104.52	74.00	30.52	peak
2483.600	73.55	-2.71	70.84	74.00	-3.16	peak

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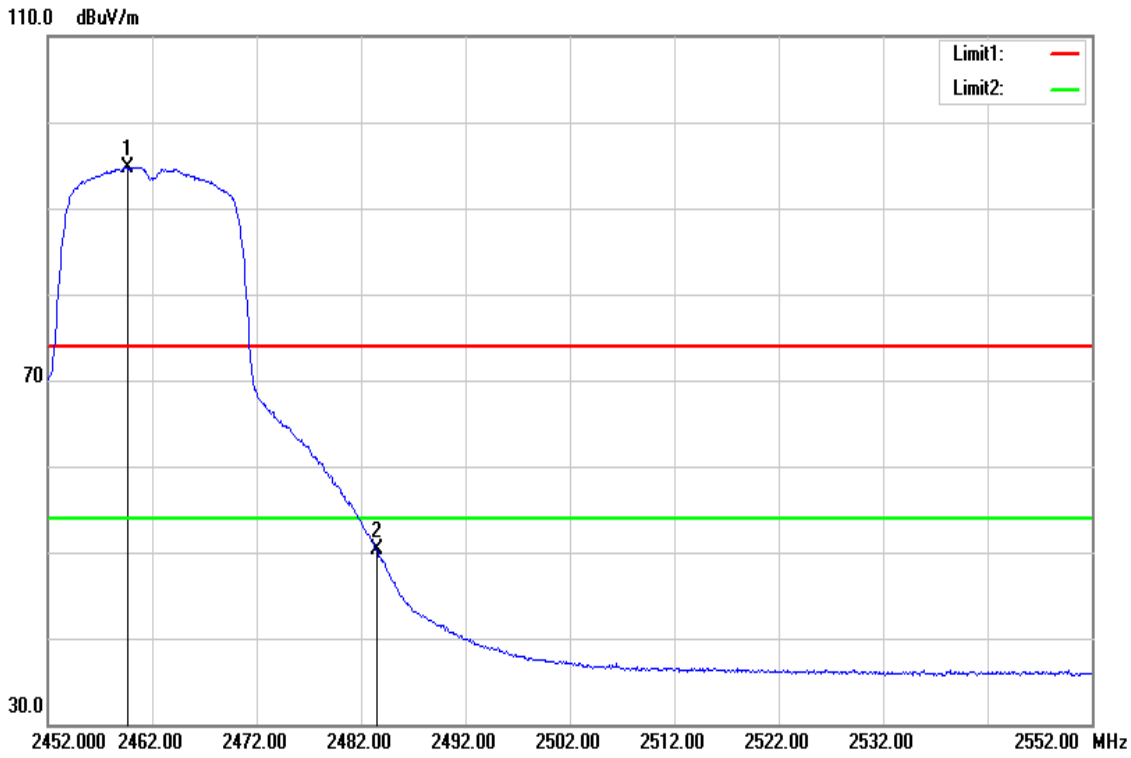
Test Mode	IEEE 802.11g High CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Band Edge	Test Date	November 22, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Average		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2459.600	97.62	-2.84	94.78	54.00	40.78	AVG
2483.500	52.93	-2.71	50.22	54.00	-3.78	AVG

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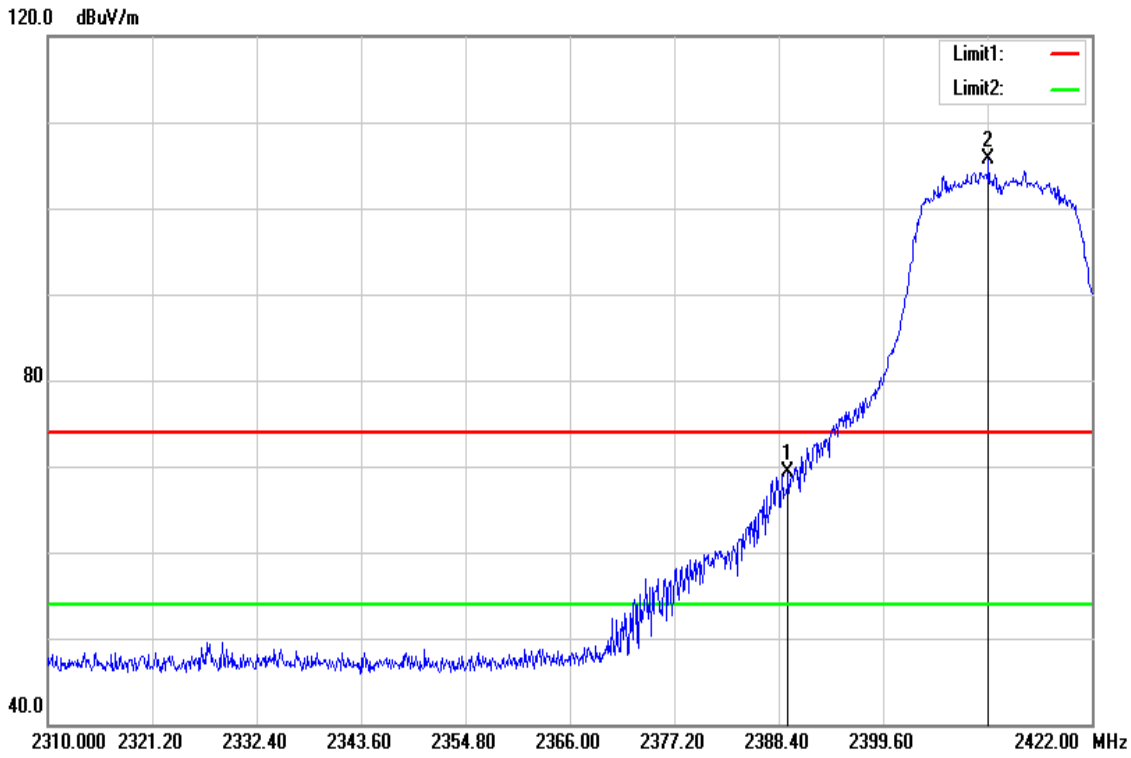
Test Mode	IEEE 802.11n HT20 Low CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Band Edge	Test Date	November 22, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2389.408	72.43	-3.13	69.30	74.00	-4.70	peak
2410.912	108.69	-3.08	105.61	74.00	31.61	peak

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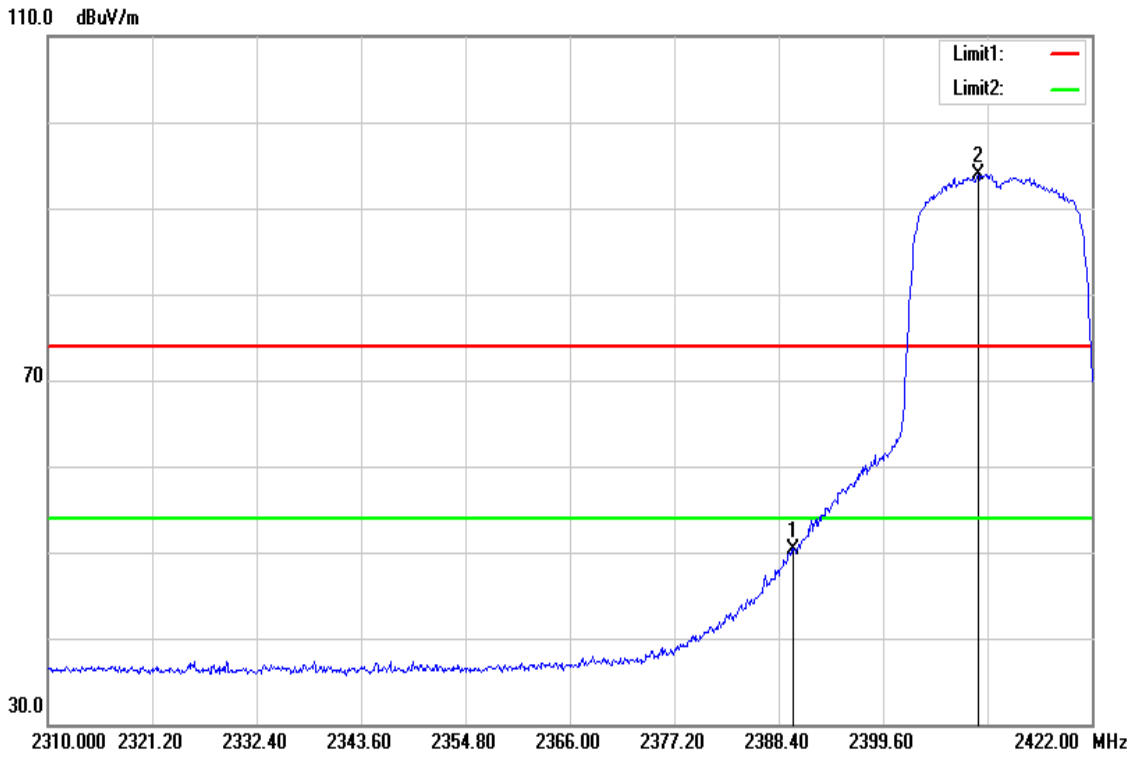
Test Mode	IEEE 802.11n HT20 Low CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Band Edge	Test Date	November 22, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Average		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2390.000	53.49	-3.13	50.36	54.00	-3.64	AVG
2409.792	97.05	-3.09	93.96	54.00	39.96	AVG

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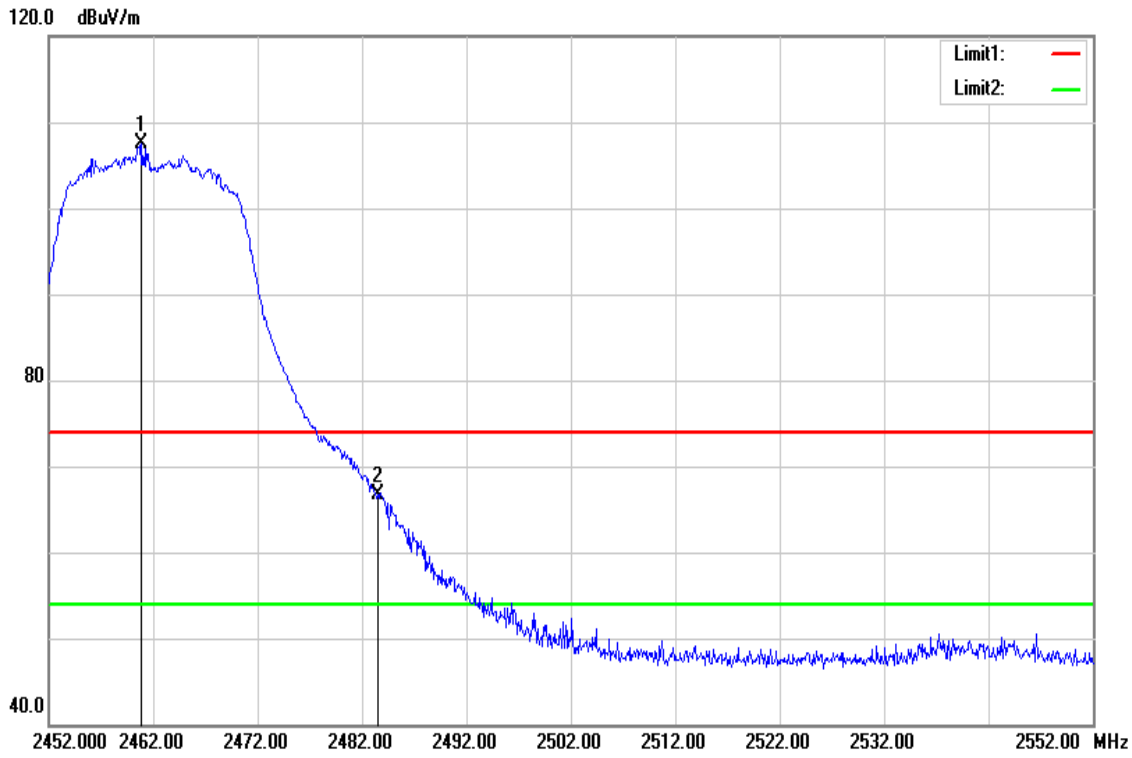
Test Mode	IEEE 802.11n HT 20 High CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Band Edge	Test Date	November 22, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2460.900	110.31	-2.84	107.47	74.00	33.47	peak
2483.500	69.41	-2.71	66.70	74.00	-7.30	peak

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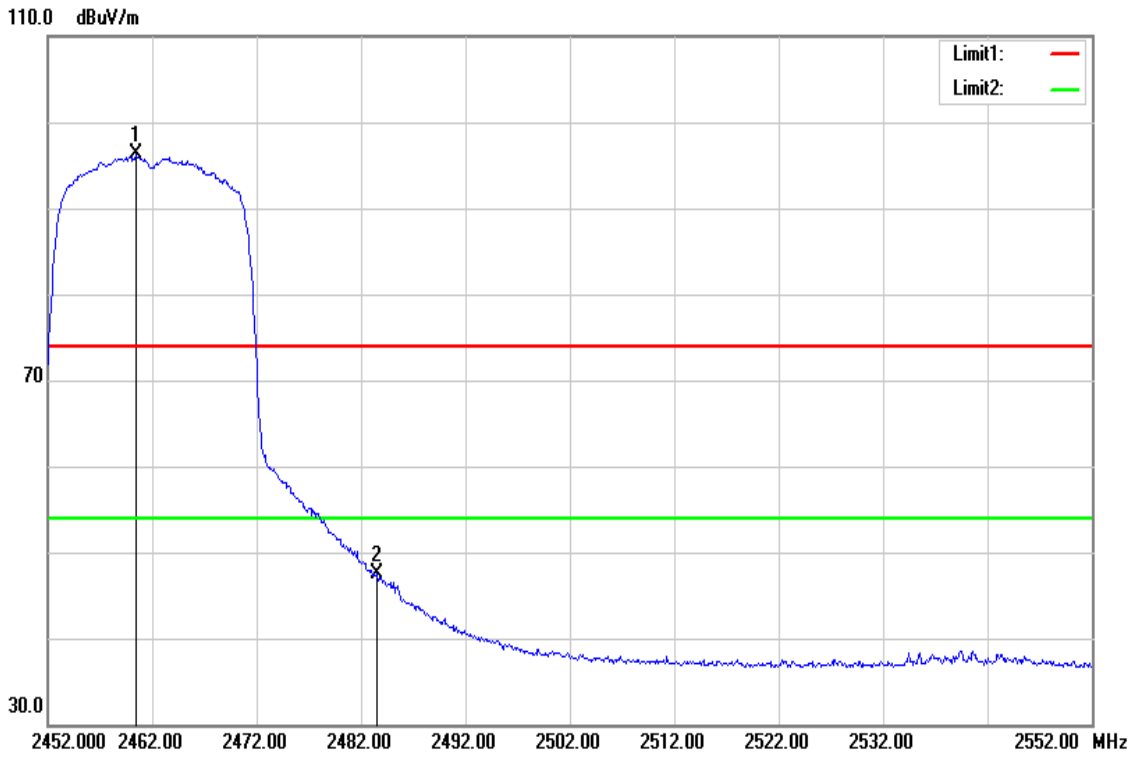
Test Mode	IEEE 802.11n HT 20 High CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Band Edge	Test Date	November 22, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Average		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2460.500	99.05	-2.84	96.21	54.00	42.21	AVG
2483.500	50.14	-2.71	47.43	54.00	-6.57	AVG

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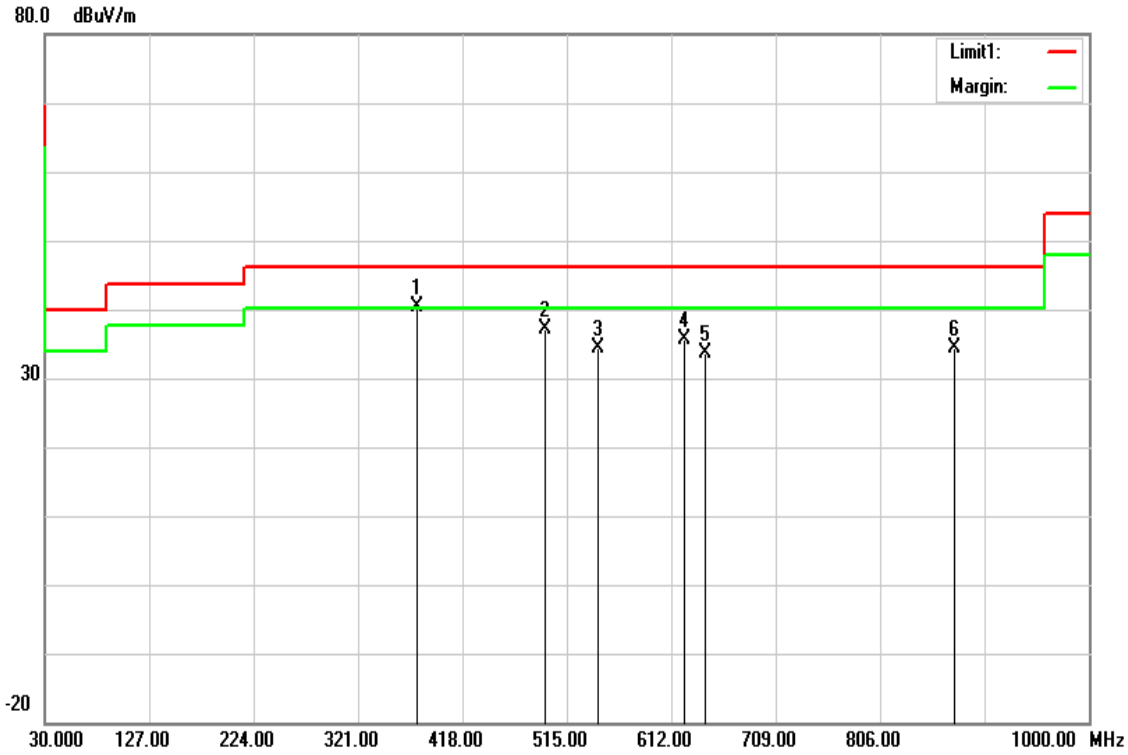
Below 1G Test Data

Test Mode	Mode 1	Temp/Hum	23.8(℃) / 55%RH
Test Item	30MHz-1GHz	Test Date	November 22, 2018
Polarize	Vertical	Test Engineer	Jerry Chuang
Detector	Quasi-peak		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
375.3200	45.87	-5.58	40.29	46.02	-5.73	QP
494.6300	39.31	-2.27	37.04	46.02	-8.98	peak
544.1000	35.78	-1.50	34.28	46.02	-11.74	peak
624.6100	35.45	0.14	35.59	46.02	-10.43	peak
643.0400	32.98	0.60	33.58	46.02	-12.44	peak
874.8700	30.16	4.18	34.34	46.02	-11.68	peak

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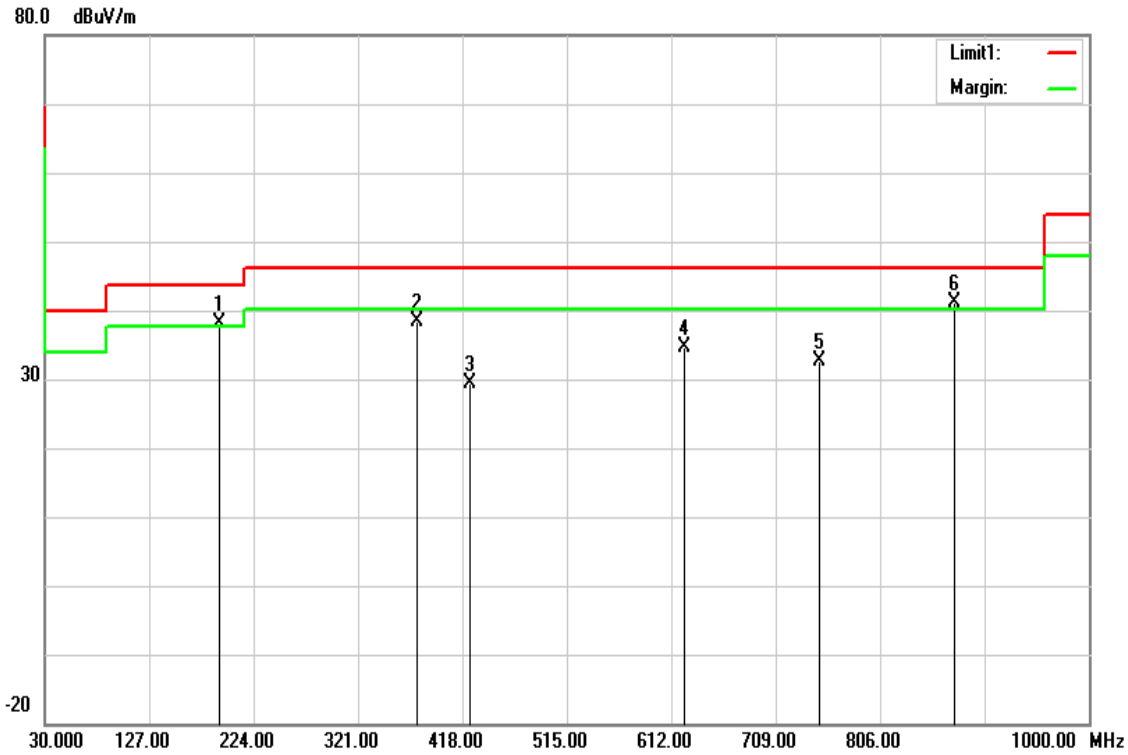
Test Mode	Mode 1	Temp/Hum	23.8(℃) / 55%RH
Test Item	30MHz-1GHz	Test Date	November 22, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Quasi-peak		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB	Remark
191.9900	47.49	-9.44	38.05	43.52	-5.47	QP
375.3200	44.06	-5.58	38.48	46.02	-7.54	peak
424.7900	33.27	-3.88	29.39	46.02	-16.63	peak
624.6100	34.53	0.14	34.67	46.02	-11.35	peak
749.7400	30.63	2.03	32.66	46.02	-13.36	peak
874.8700	36.90	4.18	41.08	46.02	-4.94	peak

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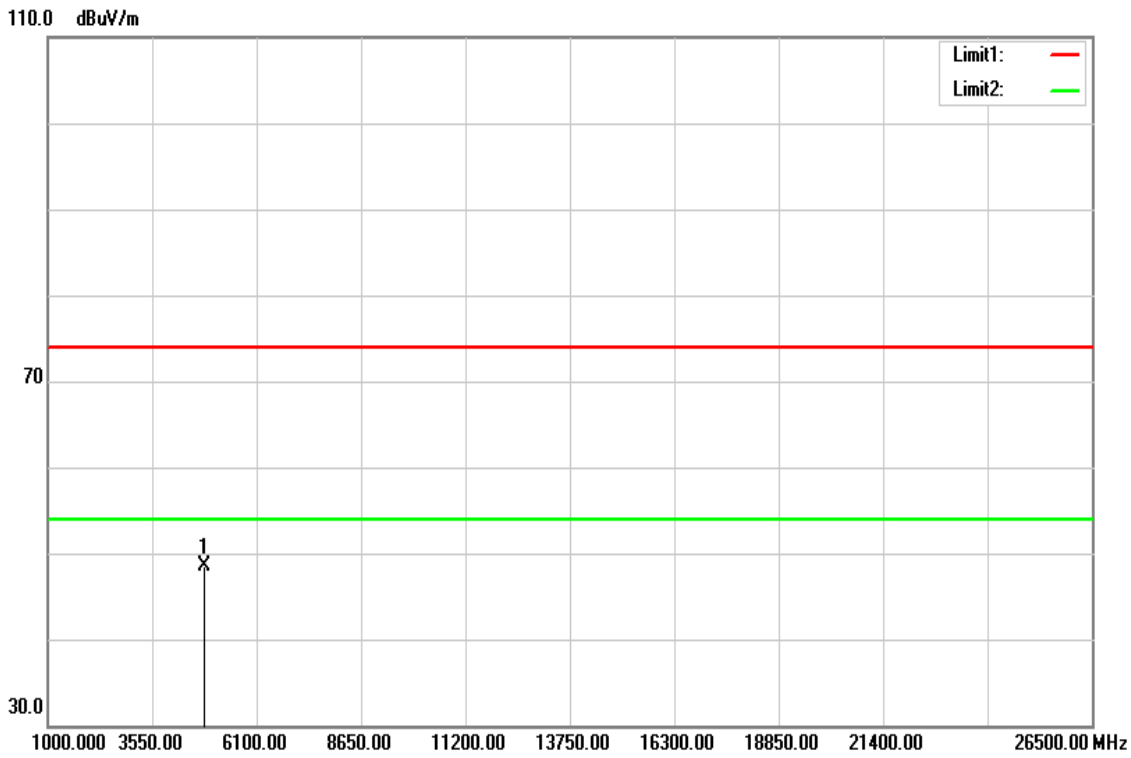
Above 1G Test Data

Test Mode	IEEE 802.11b Low CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Harmonic	Test Date	November 22, 2018
Polarize	Vertical	Test Engineer	Jerry Chuang
Detector	Peak		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4827.000	45.18	3.25	48.43	74.00	-25.57	peak
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

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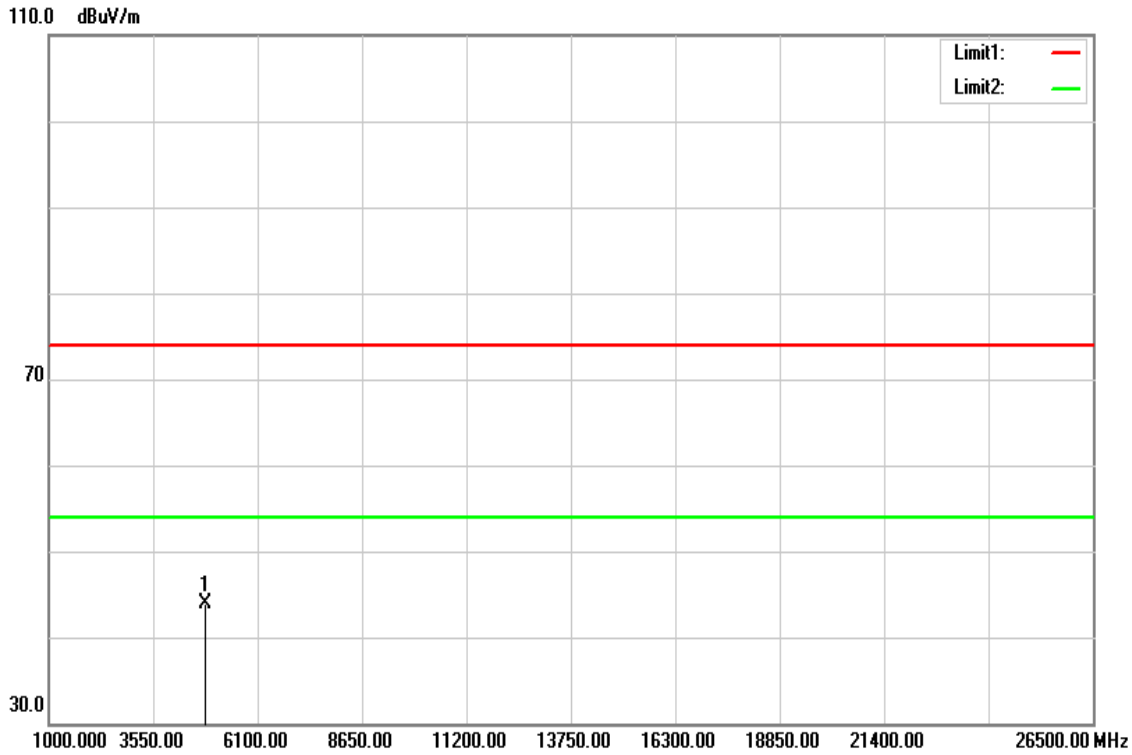
Test Mode	IEEE 802.11b Low CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Harmonic	Test Date	November 22, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4827.000	40.73	3.25	43.98	74.00	-30.02	peak
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

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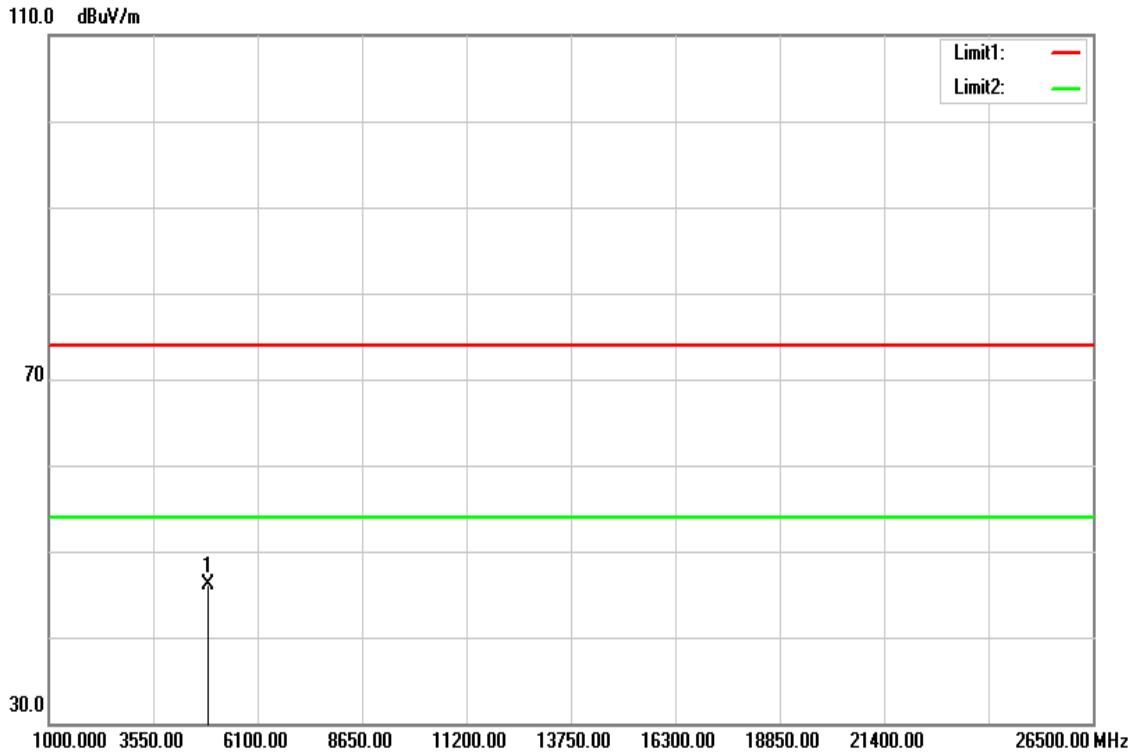
Test Mode	IEEE 802.11b Mid CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Harmonic	Test Date	November 22, 2018
Polarize	Vertical	Test Engineer	Jerry Chuang
Detector	Peak		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4876.000	42.50	3.57	46.07	74.00	-27.93	peak
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

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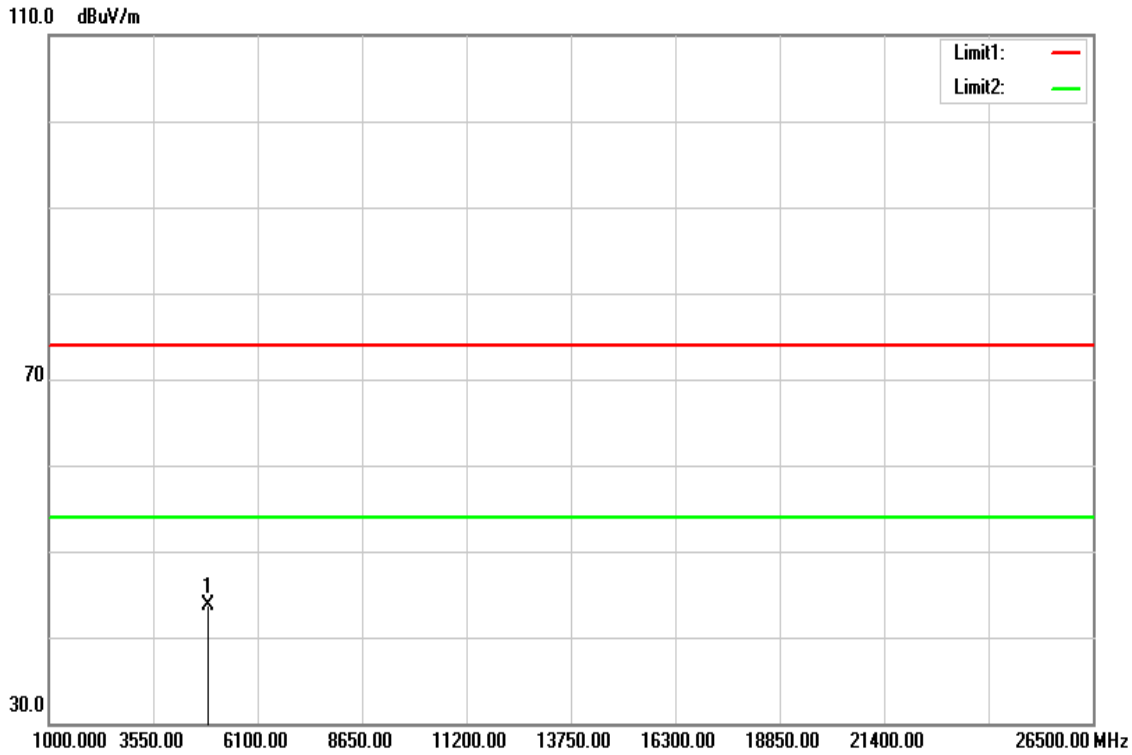
Test Mode	IEEE 802.11b Mid CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Harmonic	Test Date	November 22, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4876.000	40.16	3.57	43.73	74.00	-30.27	peak
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

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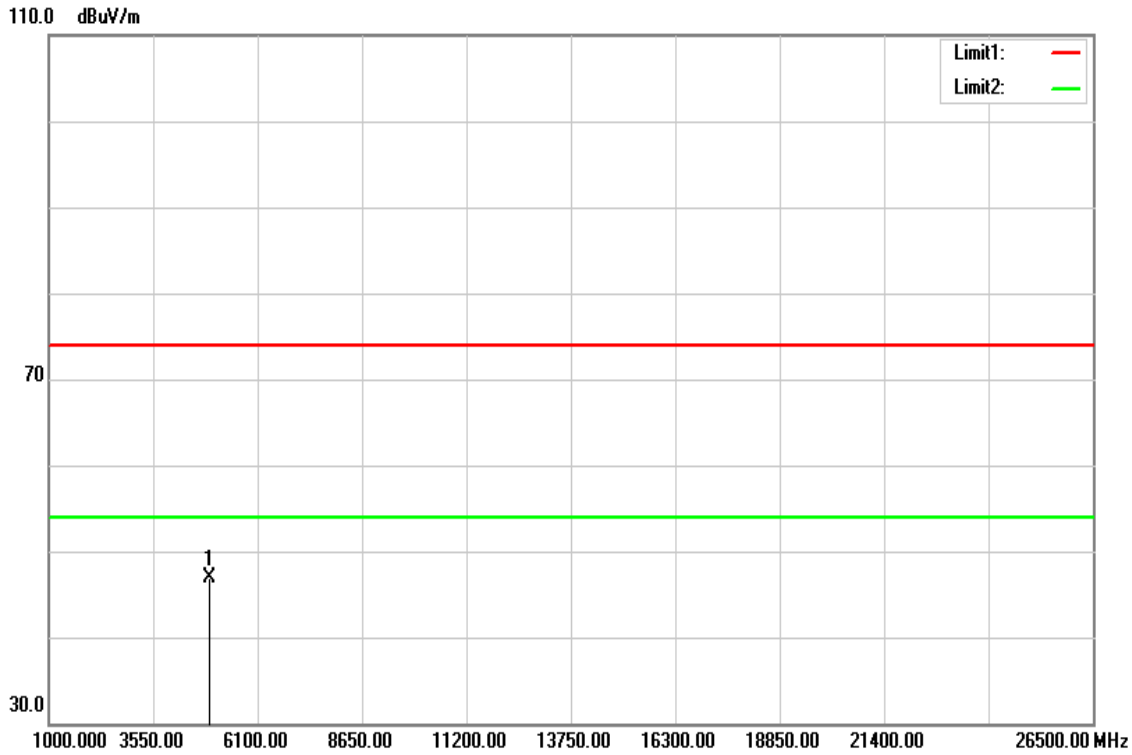
Test Mode	IEEE 802.11b High CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Harmonic	Test Date	November 22, 2018
Polarize	Vertical	Test Engineer	Jerry Chuang
Detector	Peak		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4925.000	42.93	3.90	46.83	74.00	-27.17	peak
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

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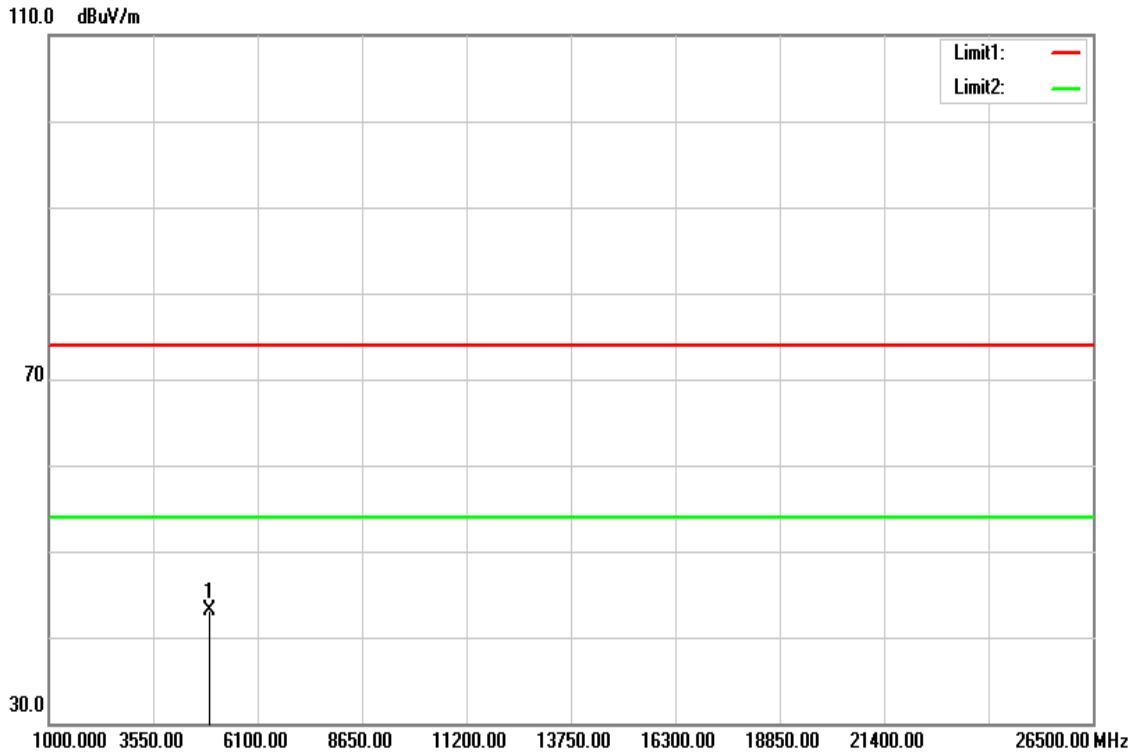
Test Mode	IEEE 802.11b High CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Harmonic	Test Date	November 22, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4925.000	39.25	3.90	43.15	74.00	-30.85	peak
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

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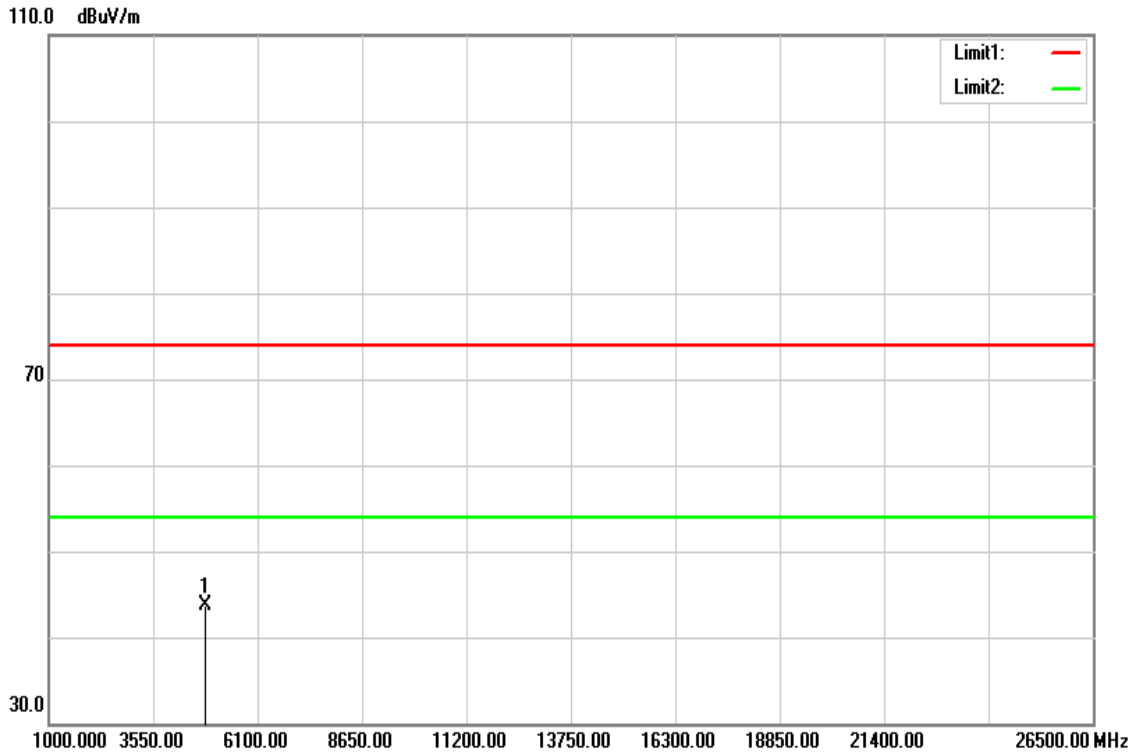
Test Mode	IEEE 802.11g Low CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Harmonic	Test Date	November 22, 2018
Polarize	Vertical	Test Engineer	Jerry Chuang
Detector	Peak		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4820.000	40.51	3.20	43.71	74.00	-30.29	peak
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

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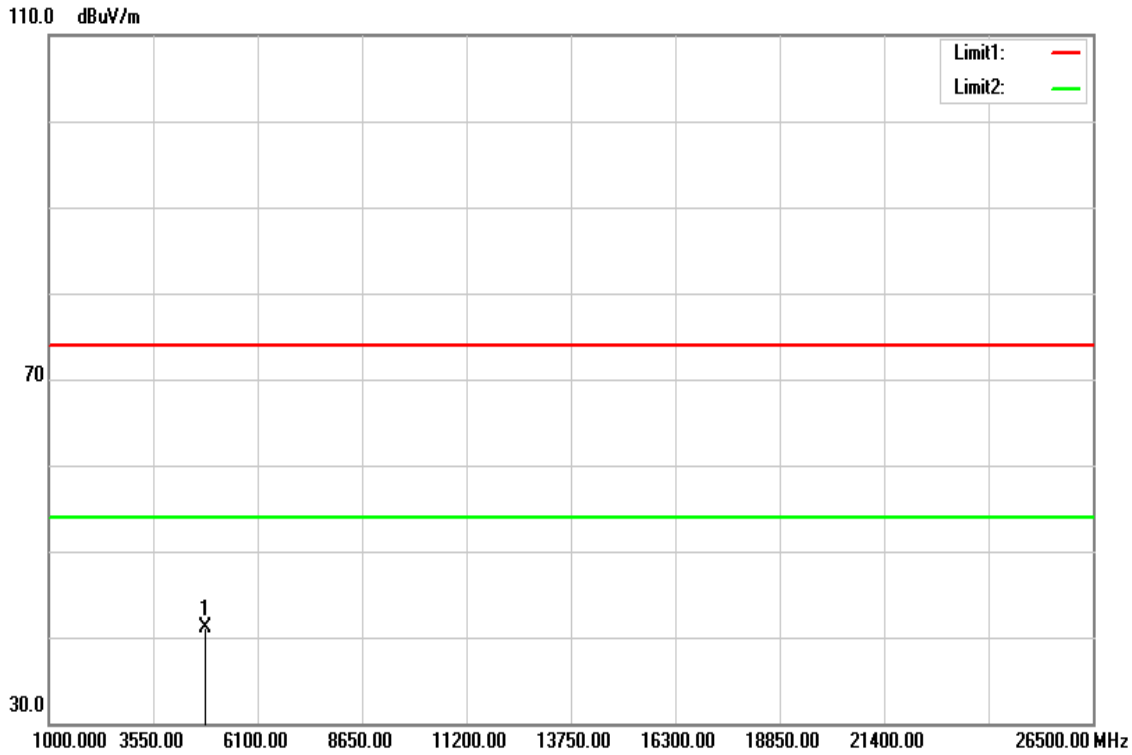
Test Mode	IEEE 802.11g Low CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Harmonic	Test Date	November 22, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4824.000	37.84	3.23	41.07	74.00	-32.93	peak
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

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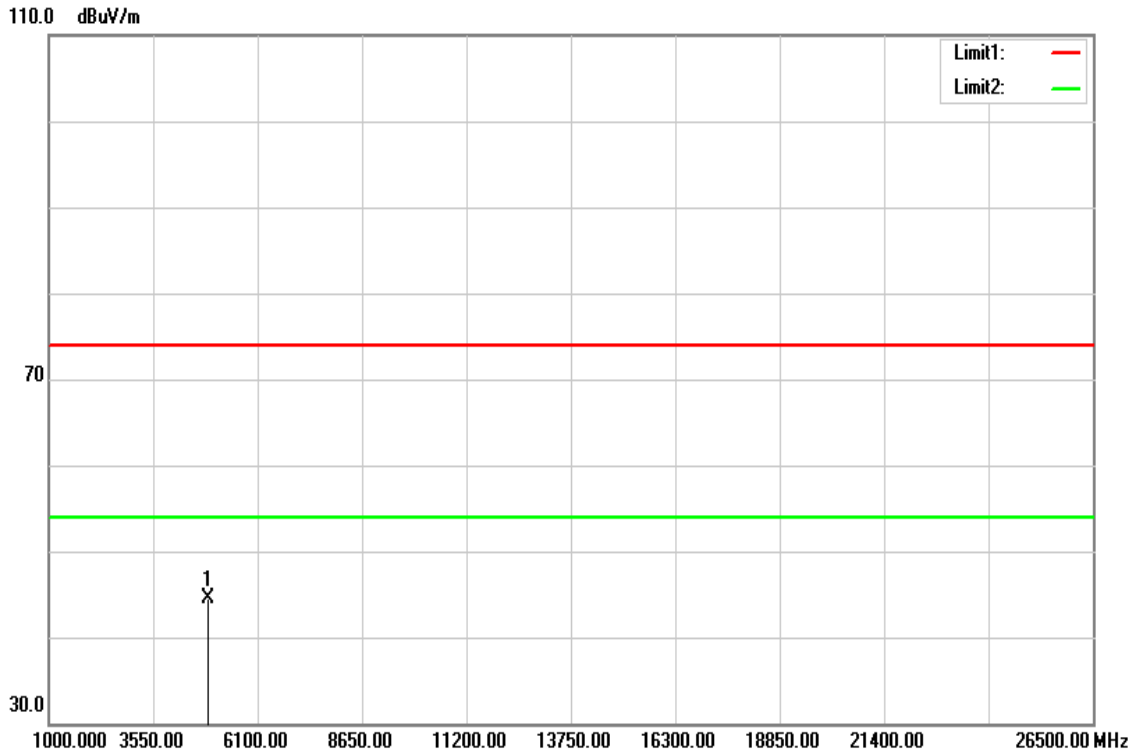
Test Mode	IEEE 802.11g Mid CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Harmonic	Test Date	November 22, 2018
Polarize	Vertical	Test Engineer	Jerry Chuang
Detector	Peak		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4876.000	40.98	3.57	44.55	74.00	-29.45	peak
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

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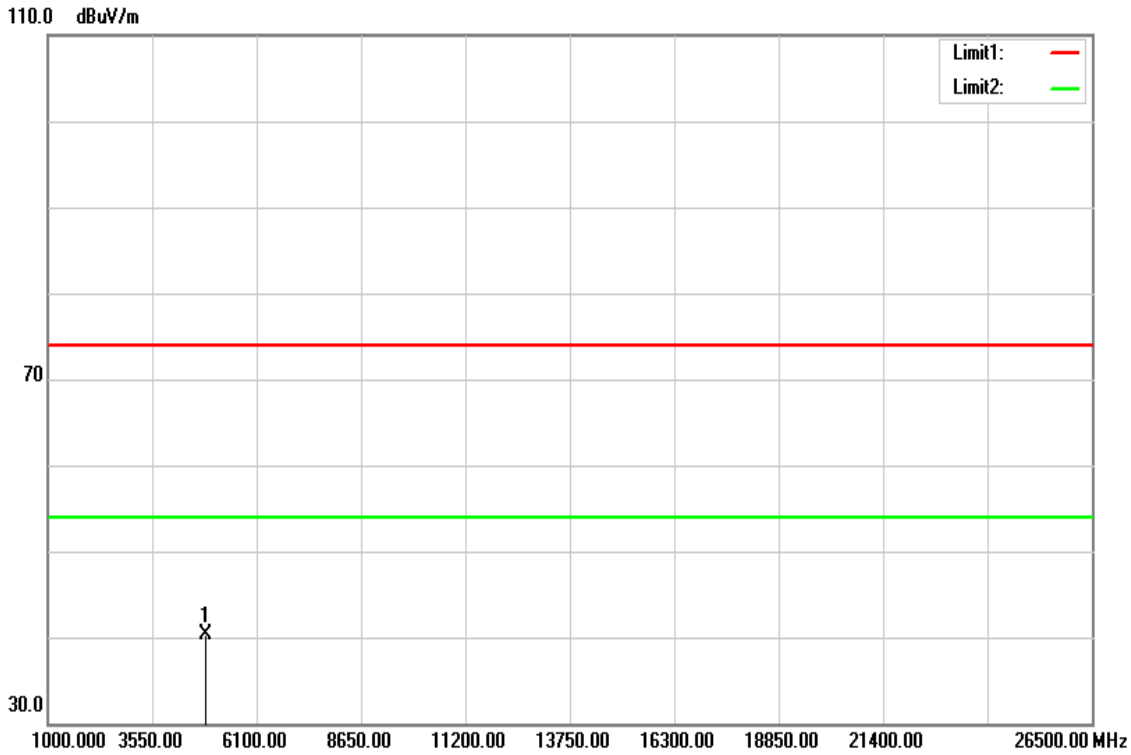
Test Mode	IEEE 802.11g Mid CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Harmonic	Test Date	November 22, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4874.000	36.68	3.56	40.24	74.00	-33.76	peak
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

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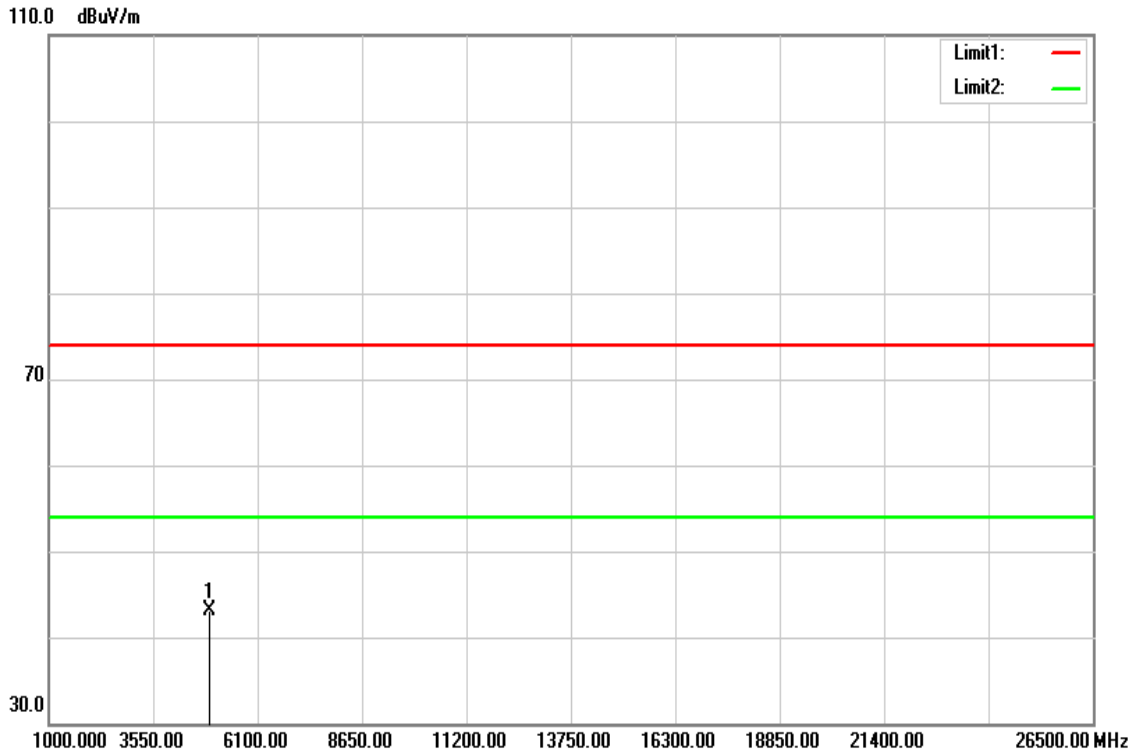
Test Mode	IEEE 802.11g High CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Harmonic	Test Date	November 22, 2018
Polarize	Vertical	Test Engineer	Jerry Chuang
Detector	Peak		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4925.000	39.25	3.90	43.15	74.00	-30.85	peak
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

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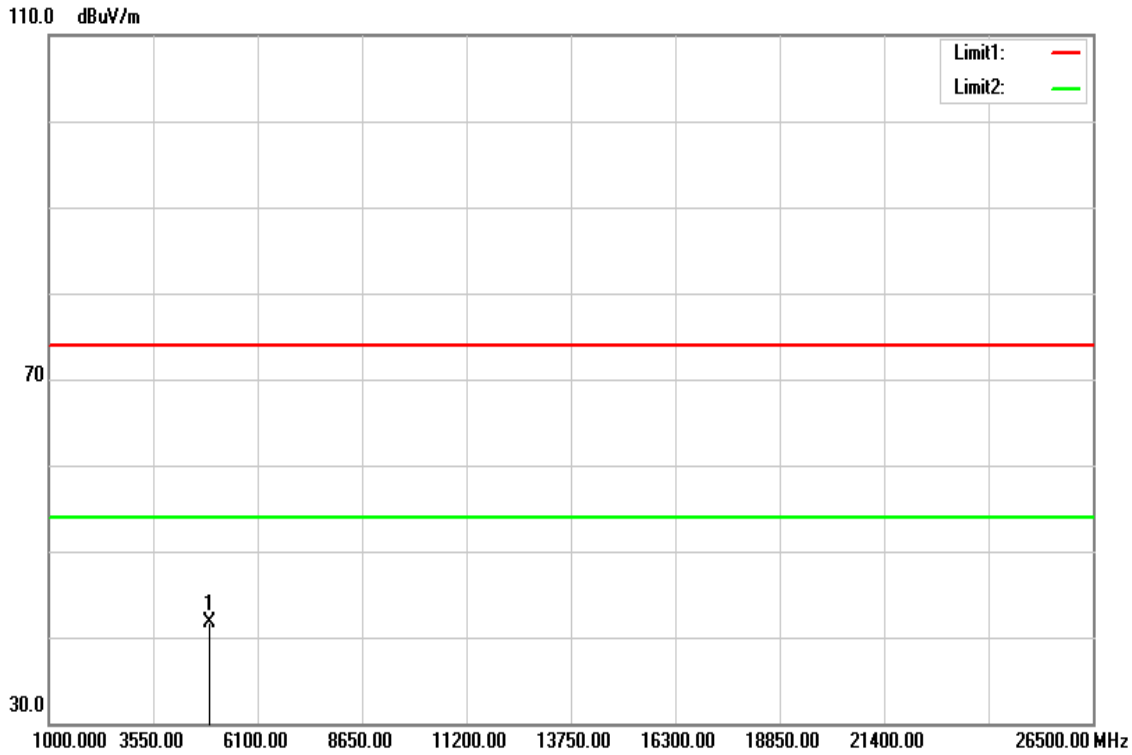
Test Mode	IEEE 802.11g High CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Harmonic	Test Date	November 22, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4924.000	37.89	3.89	41.78	74.00	-32.22	peak
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

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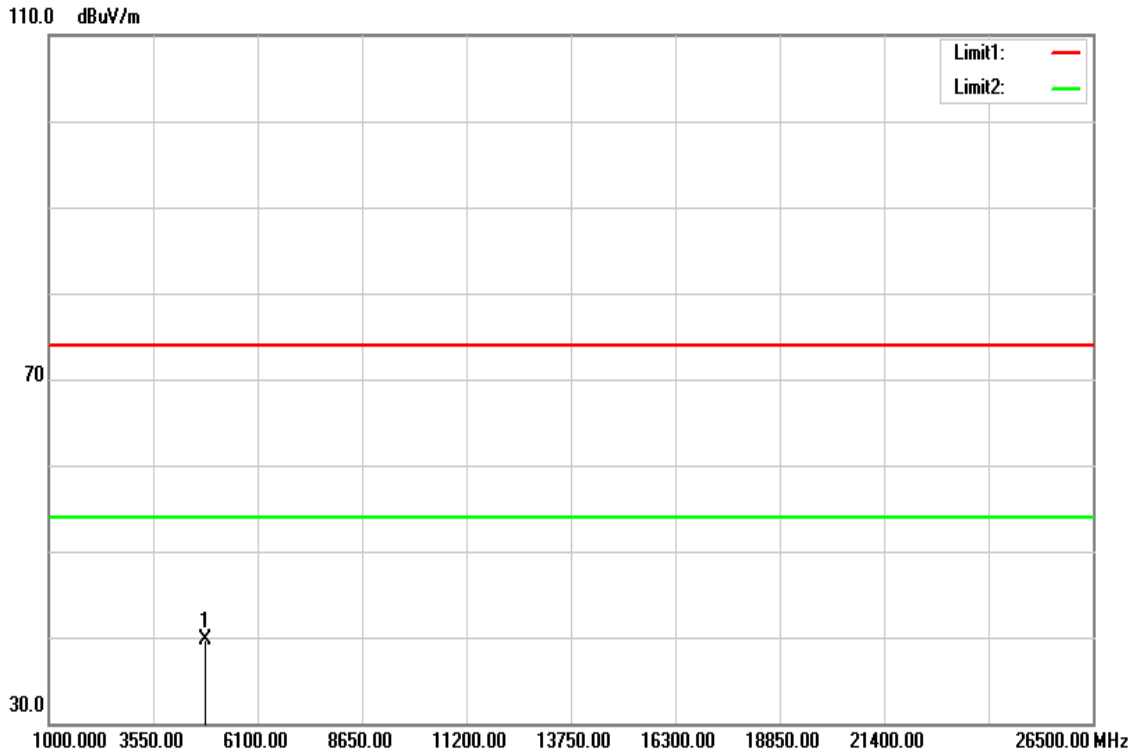
Test Mode	IEEE 802.11n HT 20 Low CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Harmonic	Test Date	November 22, 2018
Polarize	Vertical	Test Engineer	Jerry Chuang
Detector	Peak		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4824.000	36.51	3.23	39.74	74.00	-34.26	peak
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

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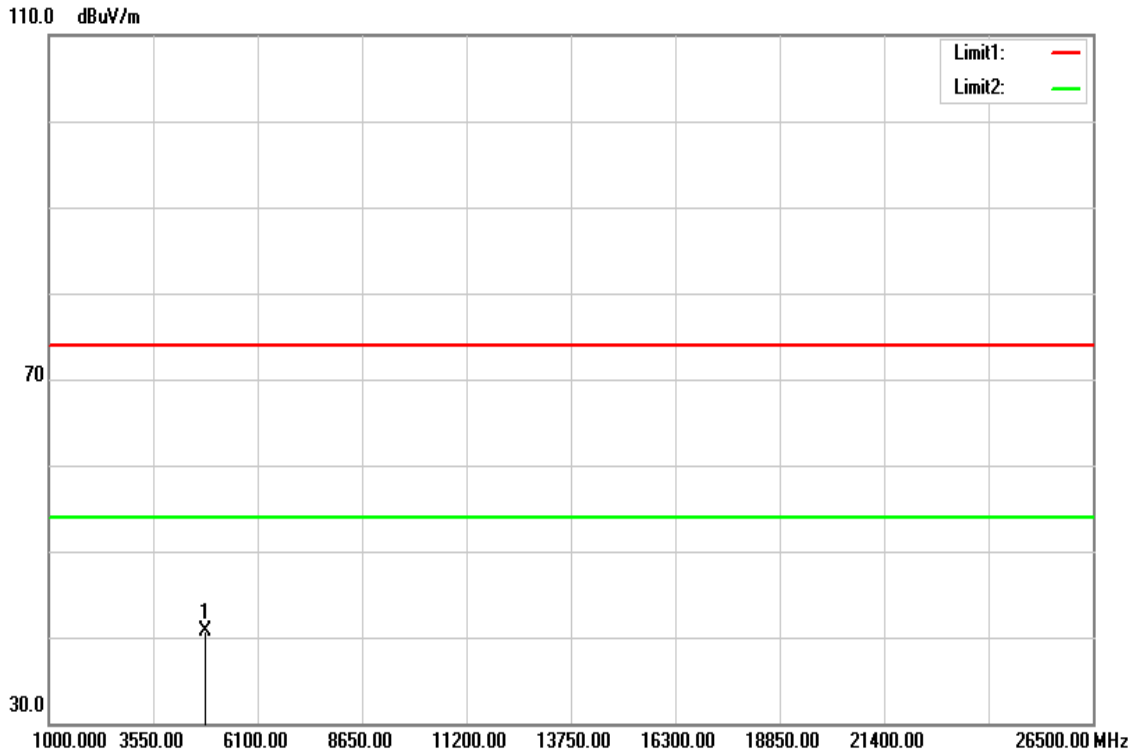
Test Mode	IEEE 802.11n HT 20 Low CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Harmonic	Test Date	November 22, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4824.000	37.42	3.23	40.65	74.00	-33.35	peak
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

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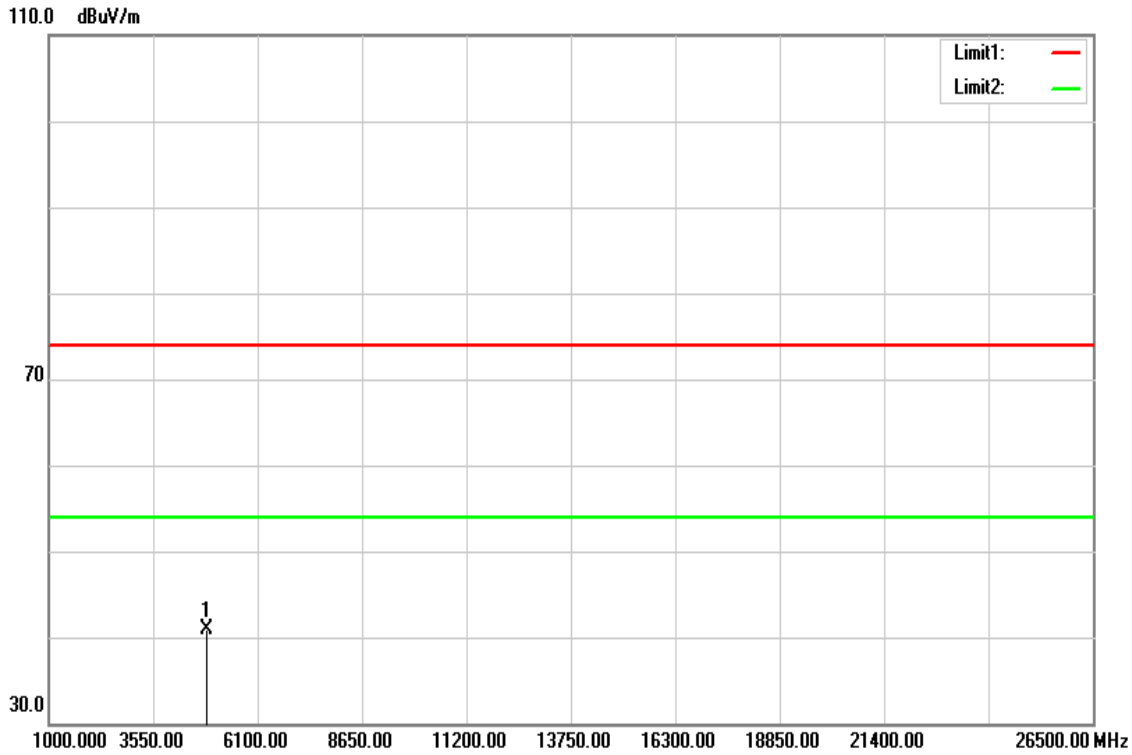
Test Mode	IEEE 802.11n HT 20 Mid CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Harmonic	Test Date	November 22, 2018
Polarize	Vertical	Test Engineer	Jerry Chuang
Detector	Peak		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4874.000	37.36	3.56	40.92	74.00	-33.08	peak
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

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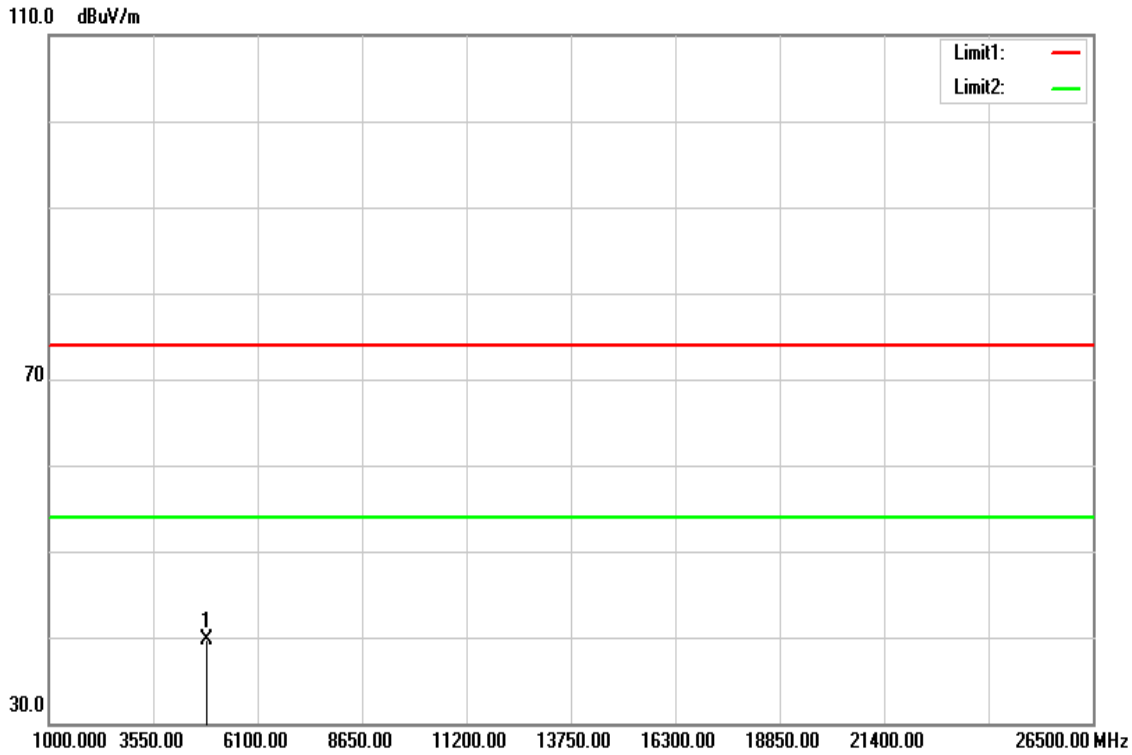
Test Mode	IEEE 802.11n HT 20 Mid CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Harmonic	Test Date	November 22, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4874.000	36.21	3.56	39.77	74.00	-34.23	peak
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

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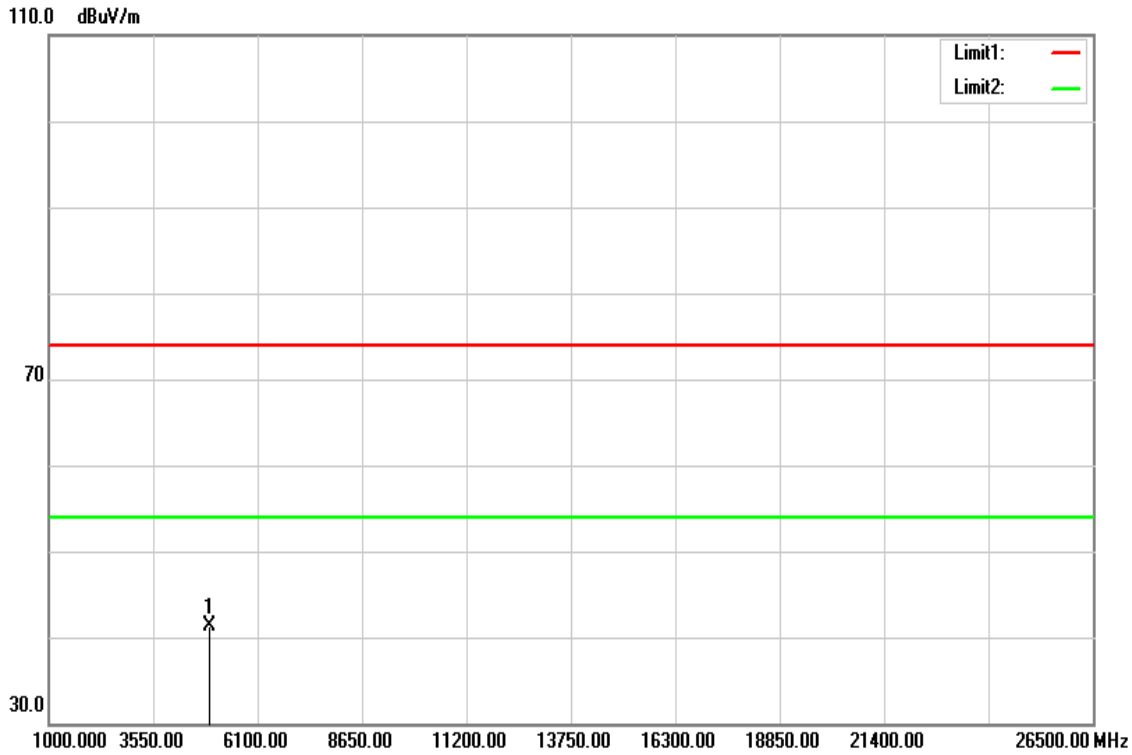
Test Mode	IEEE 802.11n HT 20 High CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Harmonic	Test Date	November 22, 2018
Polarize	Vertical	Test Engineer	Jerry Chuang
Detector	Peak		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4924.000	37.33	3.89	41.22	74.00	-32.78	peak
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

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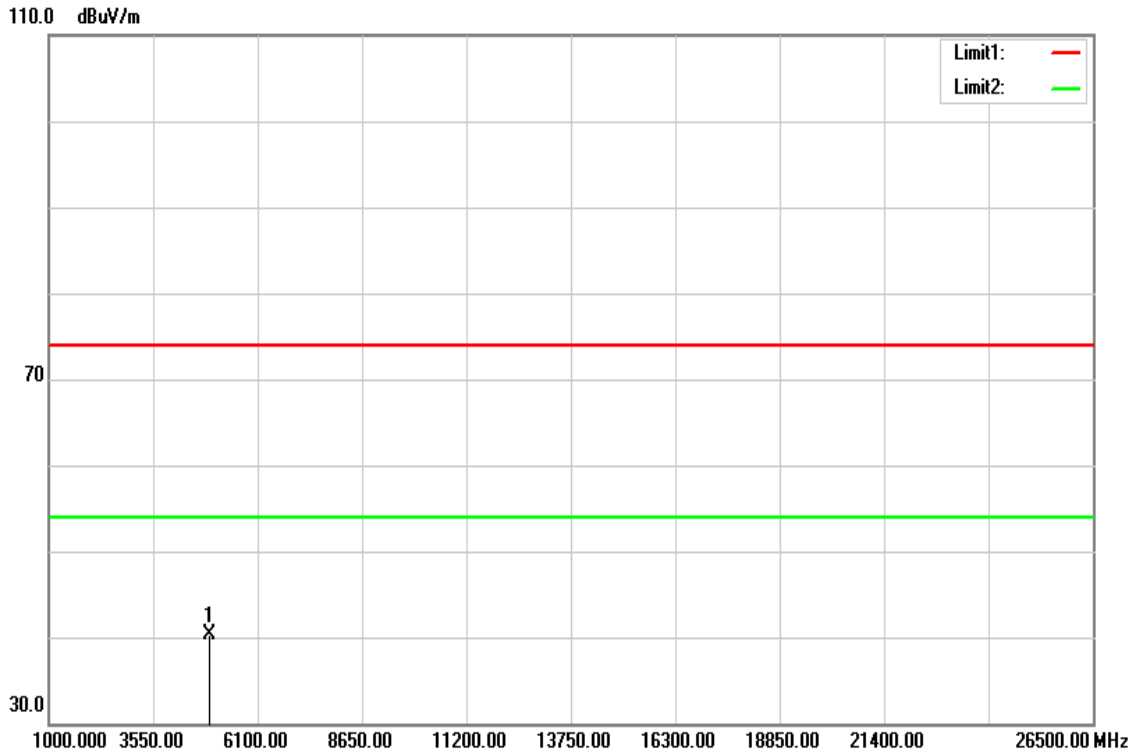
Test Mode	IEEE 802.11n HT 20 High CH	Temp/Hum	23.8(℃) / 55%RH
Test Item	Harmonic	Test Date	November 22, 2018
Polarize	Horizontal	Test Engineer	Jerry Chuang
Detector	Peak		



Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4924.000	36.37	3.89	40.26	74.00	-33.74	peak
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *For above 1GHz, the EUT peak value was under average limit, therefore the Average value compliance with the average limit*

- End of Test Report -

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