



Test report No. : 4788402176A-US-R2-V0
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Issued date : Apr. 16, 2018
FCC ID : 2AMPP-FB00000

RADIO TEST REPORT

Applicant : Sunrise Technology Co., Ltd
Model Name : FB00000
FCC ID : 2AMPP-FB00000
Test Regulation : FCC 47 CFR Part 15 Subpart E (Section 15.407)
Test Result : Complied

Date of Test : Mar. 20, 2018 ~ Apr. 16, 2018

Date of Sample Received : Mar. 15, 2018

Prepared By : Alan Liu
Project Engineer / Alan Liu

Representative Test Engineer : WaterNil Guan
Engineer / WaterNil Guan

Approved By : John Cheng
Project Engineer/ John Cheng



The tested sample is in compliance with the above regulation.
The test results in the report apply only to the sample tested and are traceable to the national or international standards.
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Doc No: 17-EM-F0878 / 2.1



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1. Attestation of Test Results

Applicant

Company Name: Sunrise Technology Co., Ltd
Address: No.28, Longshan St., Xitun Dist., Taichung City 407, Taiwan

Manufacturer

Company Name: Sunrise Technology Co., Ltd
Address: No.28, Longshan St., Xitun Dist., Taichung City 407, Taiwan

APPLICABLE STANDARDS	
STANDARD	Test Results
FCC 47 CFR PART 15 Subpart E (Section 15.407)	PASS

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2. Summary of Test Results

Summary of Test Results		
Test Items	FCC Rules	Test Result
26 dB Bandwidth	FCC 15.407 (a)	PASS
99% Bandwidth	Reference only	PASS
Maximum Conducted Output Power	FCC 15.407 (a) 789033 D02 General U-NII Test Procedures New Rules v02r01	PASS
Power Spectral Density	FCC 15.407 (a) 789033 D02 General U-NII Test Procedures New Rules v02r01	PASS
Antenna Conducted Spurious Emission	FCC 15.407 (b)	PASS
Radiated Bandedge and Spurious Emission	FCC 15.407 (b) FCC 15.209 FCC 15.205 789033 D02 General U-NII Test Procedures New Rules v02r01	PASS
Conducted Emission Test For AC Power Port	FCC 15.207	PASS
Frequency Stability	FCC 15.407 (g)	PASS

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3. Test Methodology

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15.407, FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04 and ANSI C63.10-2013.

4. Facilities and Accreditation

Test Location	Underwriters Laboratories Taiwan Co., Ltd.
Address	Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan
Accreditation Certificate	Underwriters Laboratories Taiwan Co., Ltd. is accredited by TAF, Laboratory Code 3398. The full scope of accreditation can be viewed at http://accreditation.taftw.org.tw/taf/public/basic/viewApplyItems.action?unitNo=3398

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5. Measurement Uncertainty

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor $k=2$.

Test Item	Measurement Frequency Range	K	U(dB)
Conducted disturbance at mains terminals ports	0.15 MHz ~ 30 MHz	2	2.6
RF Conducted	9 kHz - 40 GHz	2	1.0
Radiated disturbance below 30 MHz	9 kHz - 30 MHz	2	2.4
Radiated disturbance below 1 GHz	30 MHz ~ 1 GHz	2	5.5
Radiated disturbance above 1 GHz	1 GHz ~ 40 GHz	2	5.0

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6. Equipment under Test

6.1. Description of EUT

Product Name	Dual-band WiFi Module
Brand Name	Sunrise
Model Name	FB00000
Radio Technology and Operating Frequency	IEEE 802.11a: 5180 MHz - 5240 MHz
Modulation	64QAM, 16QAM, QPSK, BPSK for OFDM
Beamforming Function	Without beamforming
Power Supply	DC 3.2~4.5 V
Hardware Version	N/A
Software Version	N/A

6.2. Maximum Output Power

Frequency Range (MHz)	Number of Transmit ANTs (NTX)	IEE Std. 802.11	Channel Number	Max Output Power (dBm)
5180-5240	1	a	36-48[4]	11.20

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6.3. Channel List

UNII-1 for 802.11a (20 MHz)			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220
40	5200	48	5240

6.4. Test Condition

Test Item	Test Site No.	Relative Humidity	Temperature	Voltage	Test Engineer
Antenna Port Conducted Measurement	SR4	55%	22°C	120 Vac/60 Hz	WaterNil Guan
Radiated Spurious Emission	966-1	52%	25°C	120 Vac/60 Hz	WaterNil Guan
AC power Line Conducted Emission	SR1	54%	26°C	120 Vac/60 Hz	WaterNil Guan

FCC Test Firm Registration Number: 498077.

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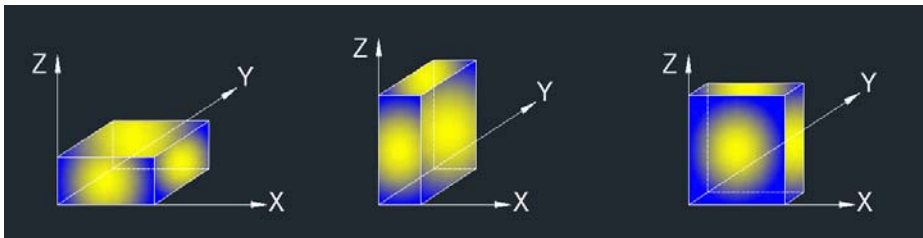
6.5. Description Of Available Antennas

Antenna	Brand Name	Model Name	Antenna Type	Connector Type	Antenna Gain(dBi)
Chain(0)	Shenzhen Xiangboyi Technology Co. Ltd	XBY20170262 (L=220MM)	PCB Antenna	IPEX I	2

6.6. Operating Mode and Worst Case of EUT

For below 1 GHz radiated emission, above 18 GHz radiated emission and AC power line conducted emission and were performed with the EUT set to transmit at the channel with highest output power as worst-case.

X axis, Y axis, Z axis positions:



The fundamental of the EUT's antenna was investigated in three orthogonal axes X/Y/Z, it was determined that Y axis was worst-case . Therefore, all final radiated testing was performed with the EUT's antenna in Y axis.

Final test mode of conducted test items and radiated spurious emission are considering the modulation and worse data rates as below:

802.11a mode: 6 Mbps

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7. Test Equipment

Test Equipment List					
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
Radiated Spurious Emission					
Spectrum Analyzer	Keysight	N9010A	MY56070821	Nov. 28, 2017	1 year
Loop Antenna	ETS lindgren	6502	00213440	Dec. 7, 2017	1 year
Trilog-Broadband Antenna with 5dB Attenuator	Schwarzbeck & EMCI	VULB 9168 & N-6-05	VULB 9168-773 & AT-N0539	Feb. 12, 2018	1 year
Horn Antenna (1-18 GHz)	Schwarzbeck	BBHA 9120 D	BBHA 9120D-01686	Jan. 23, 2018	1 year
Horn Antenna(18-40 GHz)	Schwarzbeck	BBHA 9170	BBHA9170750	Jan.12, 2018	1 year
Preamplifier (30-1000 MHz)	EMCI	RMC330E	980404	Jan. 9, 2018	1 year
Preamplifier (1-18 GHz)	EMCI	EMC051835B E	980407	Jan. 10, 2018	1 year
Preamplifier (18-40 GHz)	EMCI	EMC184040S EE	980408	Mar. 13, 2018	1 year
RF Cable (9 KHz~18 GHz)	UltraPhase & EMC Instrument	A1K50-UP0358-A1K50-1500&EMC106-NM-SM-2500/8000	170111-3&170104/170223	Feb. 1, 2018	1 year
RF Cable (18 GHz~40 GHz)	UltraPhase	K1K50-UP0264-K1K50-500/2500/4000	170214-3/170214-3/170214-1	Feb. 1, 2018	1 year

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Test Equipment List					
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
Antenna Port Conducted Measurement					
Spectrum Analyzer	Keysight	N9010A	MY56070834	Nov. 20, 2017	1 year
Power meter	Anrisu	MA2411B	1531202	Dec. 14, 2017	1 year
Power sensor	Anrisu	ML2495A	1645002	Dec. 14, 2017	1 year
AC power Line Conducted Emission					
EMI Test Receiver	Rohde & Schwarz	ESR7	101753	Nov. 28, 2017	1 year
Two-Line V-Network	Rohde & Schwarz	ENV216	102136	Aug. 2, 2017	1 year
Impuls-Begrenzer Pulse Limiter	Rohde & Schwarz	ESH3-Z2	102219-Qt	July 31, 2017	1 year
Cables	Huber+Suhner	RG 214/U	FCC-BCICF-4 RF	Feb. 1, 2018	1 year
UL Software					
Description		Name		Version	
Radiated measurement		EMC-RI		1.0.0.0	
Conducted measurement		Keysight.TestSystem		1.0.0.0	
AC power Line Conducted Emission		EZ_EMG		1.1.4.2	

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8. Description of Test Setup

Support Equipment

Item	Equipment	Brand Name	Model Name	P/N
1	N/A	N/A	N/A	N/A

Accessory

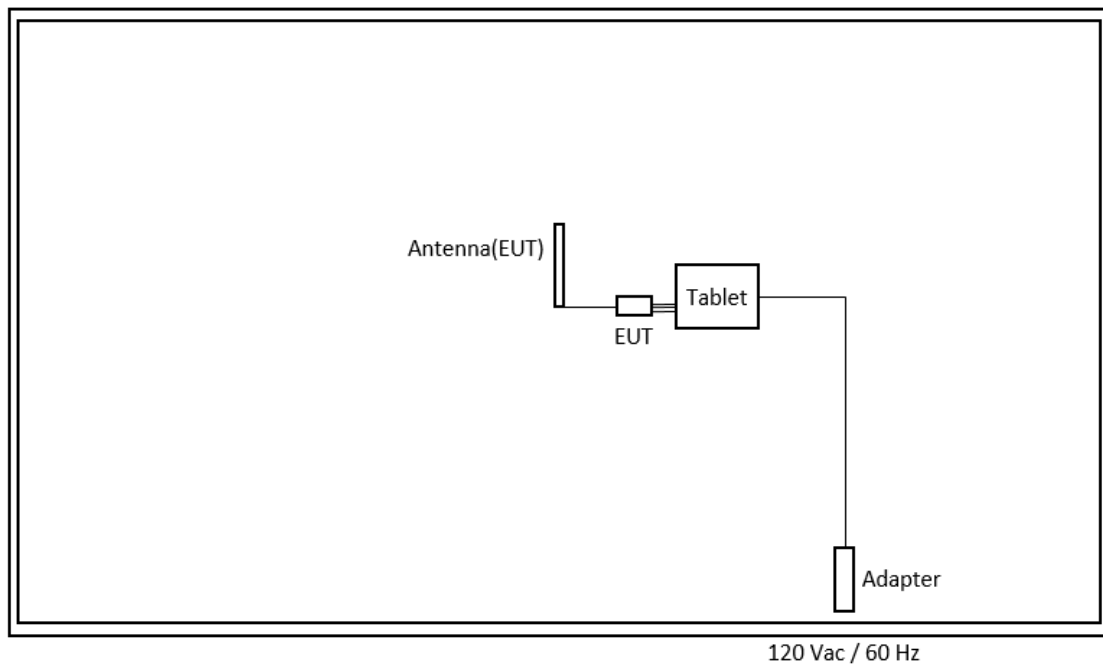
Item	Accessory	Brand Name	Model Name	Description
1	Tablet	N/A	N/A	N/A
2	Adapter	N/A	N/A	N/A

Note: The accessory that is test tools are prepared by client.

Test Setup

The EUT was worked in engineering mode with a software through a Tablet.

Setup Diagram for Test



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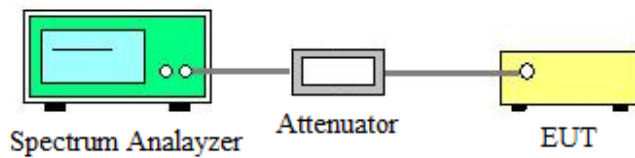
9. Test Result

9.1. Duty Cycle

Requirements

N/A

Test Setup



Test Data

Mode	On Time (ms)	Period (ms)	Duty Cycle x (Linear)	Duty cycle (%)	Duty cycle Correction Factor (dB)	1/B Min VBW (KHz)
802.11a	1.394	1.435	0.9714	97.14%	0.13	0.717

Note: Duty Cycle Correction Factor = $10 \times \log(1/x)$.
Where: x is Duty Cycle (Linear) Where: B is On Time

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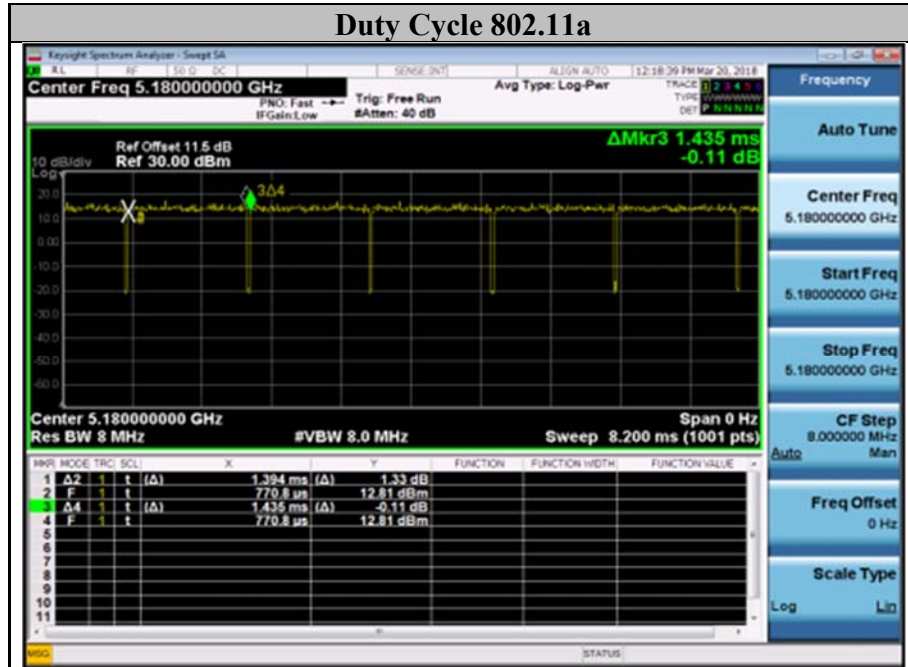
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9.2. 26 dB Bandwidth

Requirements

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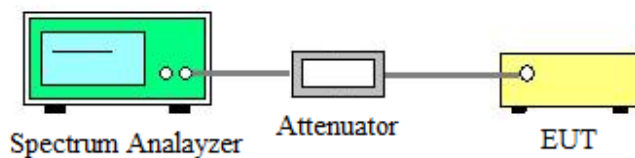
Test Procedure

Connect the EUT to the spectrum analyzer and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	For 26 dB Bandwidth: approximately 1% of the emission bandwidth.
VBW	For 26 dB Bandwidth : $> 3 \times \text{RBW}$
Trace	Max hold
Sweep	Auto couple

Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 26/99% dB relative to the maximum level measured in the fundamental emission.

Test Setup



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Test Data

Mode	Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
802.11a Chain0	36	5180	28.44
	44	5220	28.35
	48	5240	26.78

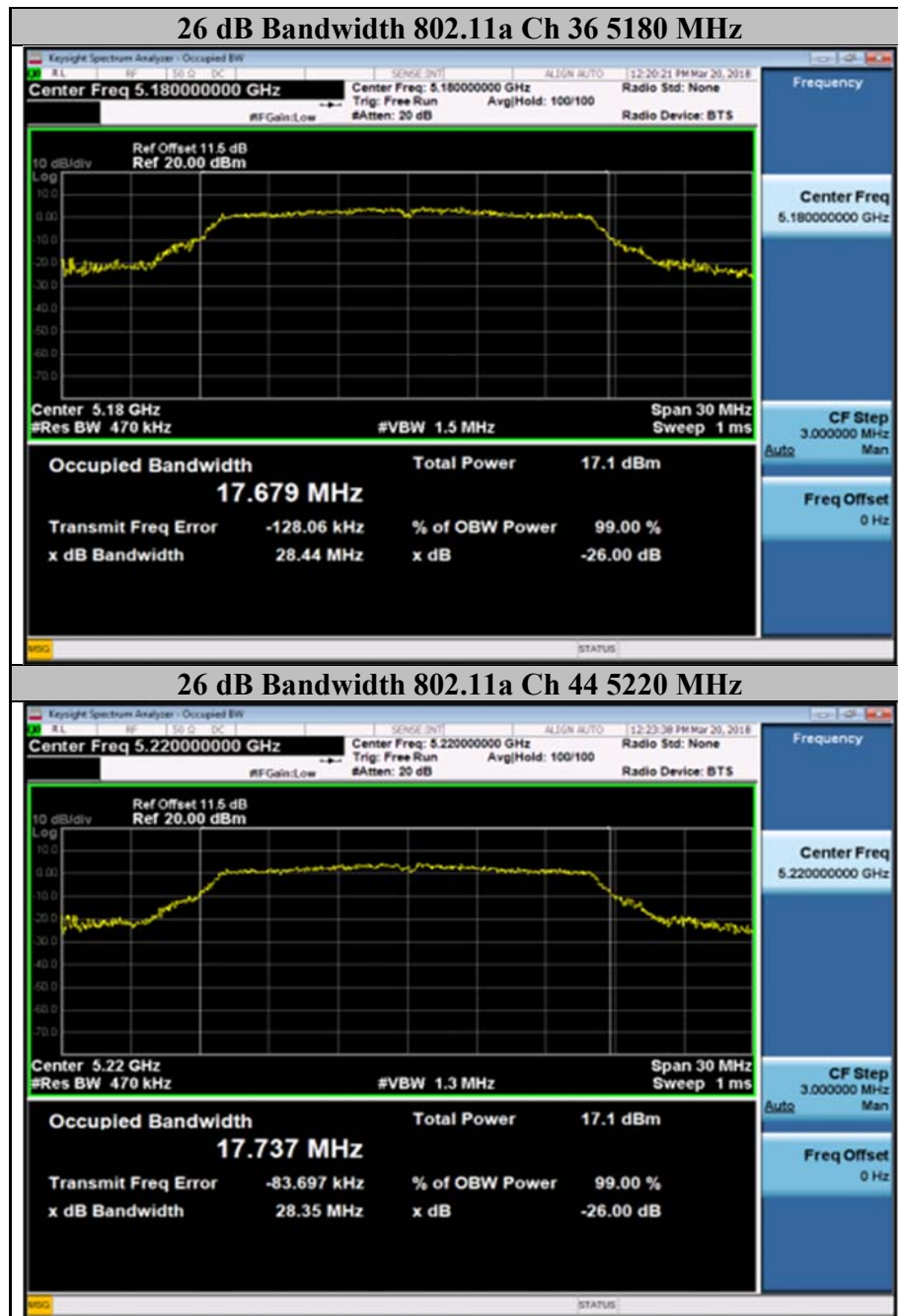
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9.3. 99% Bandwidth

Requirements

For reporting purpose only.

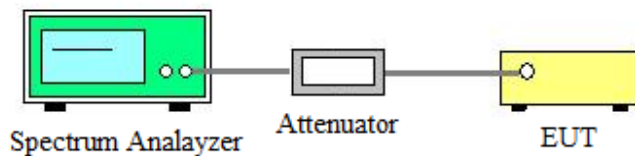
Test Procedure

Connect the EUT to the spectrum analyzer and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	For 99% Bandwidth: approximately 1%~5% of the emission bandwidth.
VBW	For 99% Bandwidth : $> 3 \times \text{RBW}$
Trace	Max hold
Sweep	Auto couple

Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 26/99% dB relative to the maximum level measured in the fundamental emission.

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Test Data

Mode	Channel	Frequency (MHz)	99% Bandwidth (MHz)
802.11a	36	5180	17.149
	44	5220	17.098
	48	5240	17.156

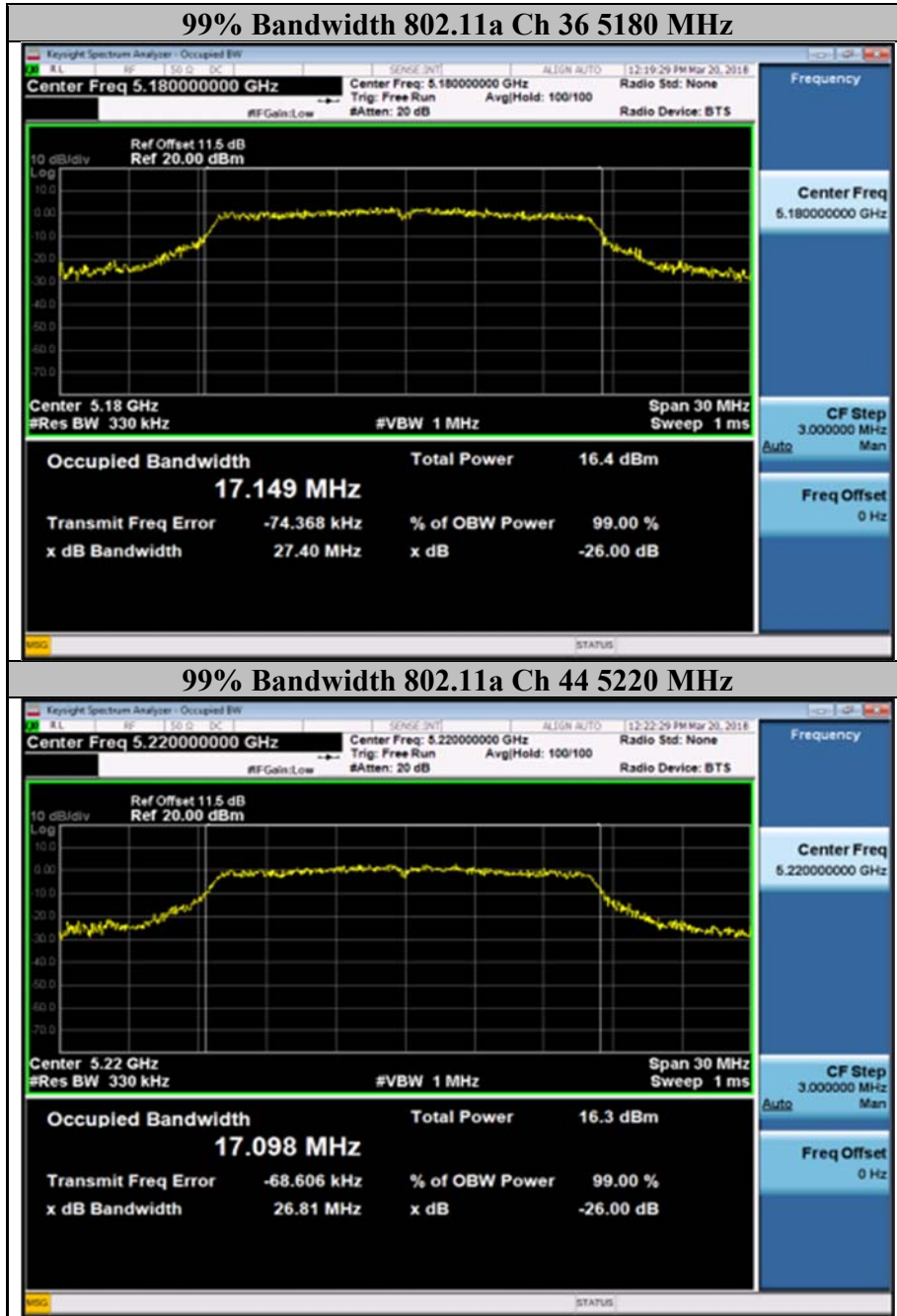
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9.4. Maximum Conducted Output Power

Requirements

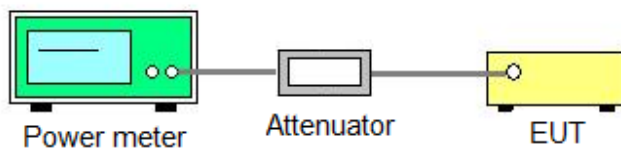
Operation Band	EUT Category		Limit
U-NII-1	<input type="checkbox"/>	Outdoor Access Point	1 Watt (30 dBm) (Note 1)
	<input type="checkbox"/>	Fixed point-to- point Access Point	1 Watt (30 dBm)
	<input type="checkbox"/>	Indoor Access Point	1 Watt (30 dBm)
	<input checked="" type="checkbox"/>	Mobile and Portable client device	250 mW (24 dBm)
U-NII-2A			250 mW (24 dBm) or 11 dBm + 10 log B*
U-NII-2C			250 mW (24 dBm) or 11 dBm + 10 log B*
U-NII-3			1 Watt (30 dBm)

Note 1: Max. e.i.r.p \leq 125 mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon

Test procedure

- Refer to KDB 789033 D02 General UNII Test Procedures New Rules v02r01
- Connect the EUT to the a broadband peak RF power meter, the power meter shall have a video bandwidth that is greater than or equal to the bandwidth and shall utilize a fast-responding diode detector.

Test Setup



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Test Data

Mode	Channel	Frequency (MHz)	Output Power (Average) (dBm)	Total Power (Average) (dBm)	Limit (dBm)	Margin (dB)
802.11a	36	5180	11.04	11.04	24	-12.96
	44	5220	11.06	11.06	24	-12.94
	48	5240	11.20	11.20	24	-12.8

Note: Margin (dB) = Total Power (Average) (dBm) - Limit (dBm)

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9.5. Power Spectral Density

Requirements

Operation Band	EUT Category		Limit
U-NII-1	<input type="checkbox"/>	Outdoor Access Point	17 dBm/ MHz
	<input type="checkbox"/>	Fixed point-to- point Access Point	
	<input type="checkbox"/>	Indoor Access Point	
	<input checked="" type="checkbox"/>	Mobile and Portable client device	11 dBm/ MHz
U-NII-2A			11 dBm/ MHz
U-NII-2C			11 dBm/ MHz
U-NII-3			30 dBm/ 500 kHz

Test Procedure

Connect the EUT to the spectrum analyzer and use the following settings:
For U-NII-1, U-NII-2A and U-NII-2C band:

Center Frequency	The center frequency of the channel under test
Detector	RMS
RBW	1 MHz
VBW	$\geq 3 \times \text{RBW}$
Span	Encompass the entire emissions bandwidth (EBW) of the signal
Trace	Max hold
Sweep	Auto couple

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For U-NII-3:

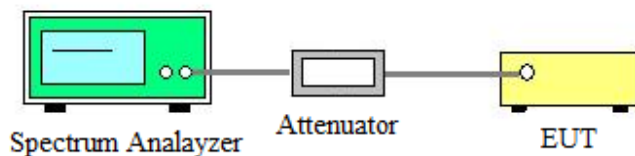
Center Frequency	The center frequency of the channel under test
Detector	RMS
RBW	500 kHz
VBW	$\geq 3 \times \text{RBW}$
Span	Encompass the entire emissions bandwidth (EBW) of the signal
Trace	Max hold
Sweep	Auto couple

Remark:

- For UNII-3, according to KDB publication 789033 D02 General UNII Test Procedures New Rules v02r01, section II.F.5., it is acceptable to set RBW at 1 MHz and VBW at 3 MHz if the spectrum analyzer does not have 500 kHz RBW.
- The value measured with RBW=1 MHz is to be added with $10\log(500 \text{ kHz}/1 \text{ MHz})$ which is -3 dB. For example, if the measured value is +10 dBm using RBW=1 MHz (that is +10 dBm/MHz), then the converted value will be +7 dBm/500 kHz.

Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.

Test Setup



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Test Data

Mode	Ch.	Freq. (MHz)	PSD (dBm/MHz)	Duty Cycle Factor (dB)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)
802.11a	36	5180	0.188	0.13	0.318	11	-10.682
	44	5220	0.401	0.13	0.531	11	-10.469
	48	5240	0.402	0.13	0.532	11	-10.468

Note:

1. Total PSD (dBm/MHz) = PSD (dBm/MHz) + Duty Cycle Factor (dB)
2. Margin (dB) = Total PSD (dBm/MHz) - Limit (dBm/MHz)

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FCC ID : 2AMPP-FB00000



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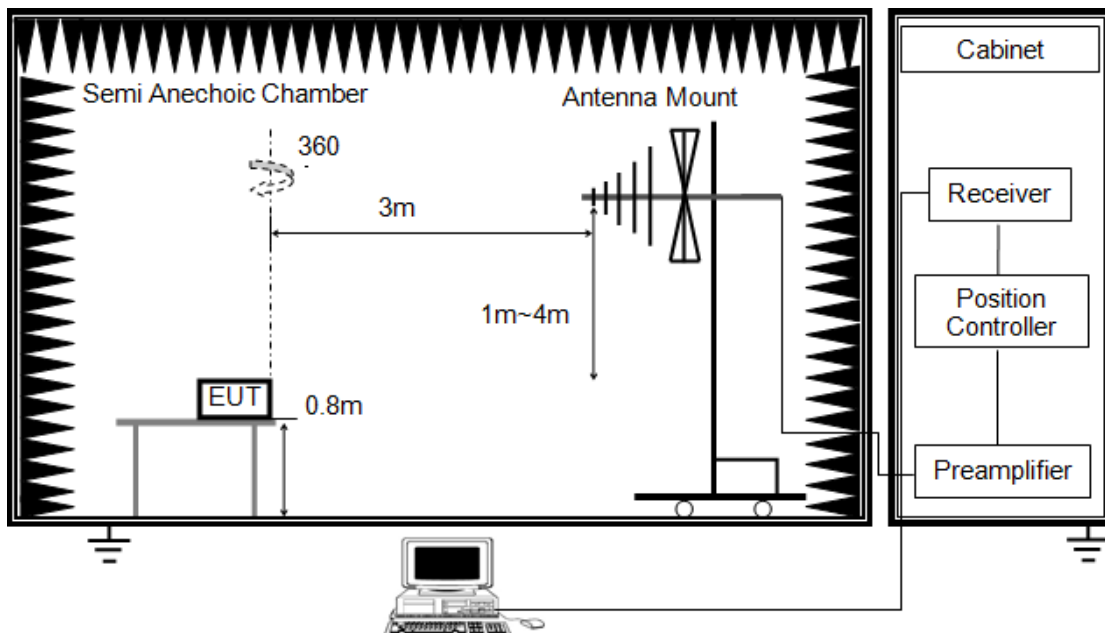
9.6. Radiated Spurious Emission

Requirements

Frequency(MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Procedures

[For below 1 GHz]



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The setting of the spectrum analyzer:

RBW	120 KHz
VBW	300 KHz
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

Note:

- a. The testing follows the guidelines in ANSI C63.10-2013.
- b. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- c. The EUT was placed on a turntable with 0.8 meter above ground.
- d. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
- e. For measurement below 1 GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
- f. For the actual test configuration, please refer to the related item in this test report

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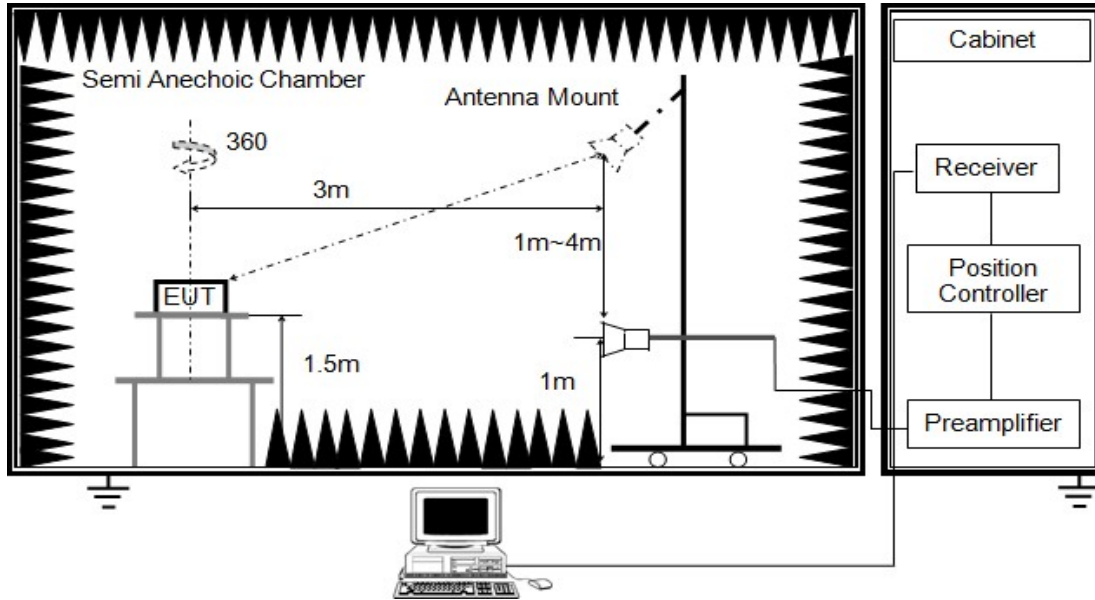
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[For above 1 GHz]



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The setting of the spectrum analyzer:

RBW	1 MHz
VBW	PEAK: 3 MHz AVG: see note f
Sweep	Auto
Detector	Peak
Trace	Max hold

Note:

- a. The testing follows the guidelines in ANSI C63.10-2013.
- b. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- c. The EUT was placed on a turntable with 1.5m above ground.
- d. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
- e. For measurement above 1 GHz, the emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the limit specified in Section 15.209.
- f. For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector. For the Duty Cycle and Correction Factor please refer to clause 9.1. DUTY CYCLE. The EUT is configured to transmit with $D \geq 98\%$, then set $VBW \leq RBW / 100$, but not less than 10 Hz.
- g. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

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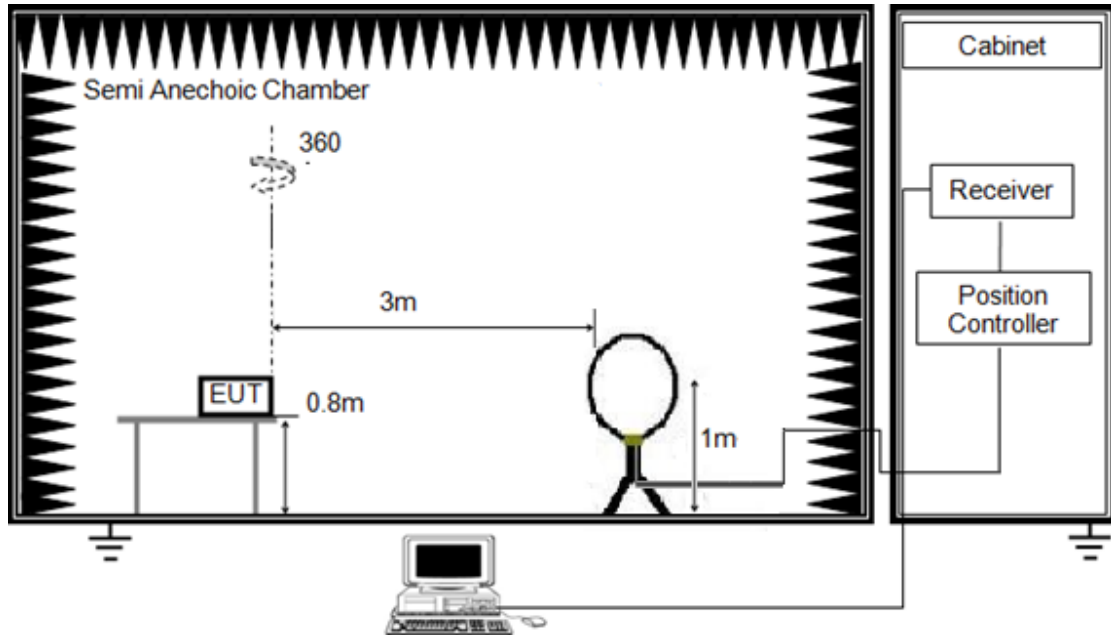
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[For below 30 MHz]



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The setting of the spectrum analyzer

RBW	200 Hz (From 9 kHz to 0.15 MHz)/ 9 KHz (From 0.15 MHz to 30 MHz)
VBW	200 Hz (From 9 kHz to 0.15 MHz)/ 9 KHz (From 0.15 MHz to 30 MHz)
Sweep	Auto
Detector	Peak/QP/Average
Trace	Max hold

Note:

- a. The testing follows the guidelines in ANSI C63.10-2013
- b. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- c. The EUT was placed on a turntable with 0.8 meter above ground.
- d. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
- e. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
- f. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

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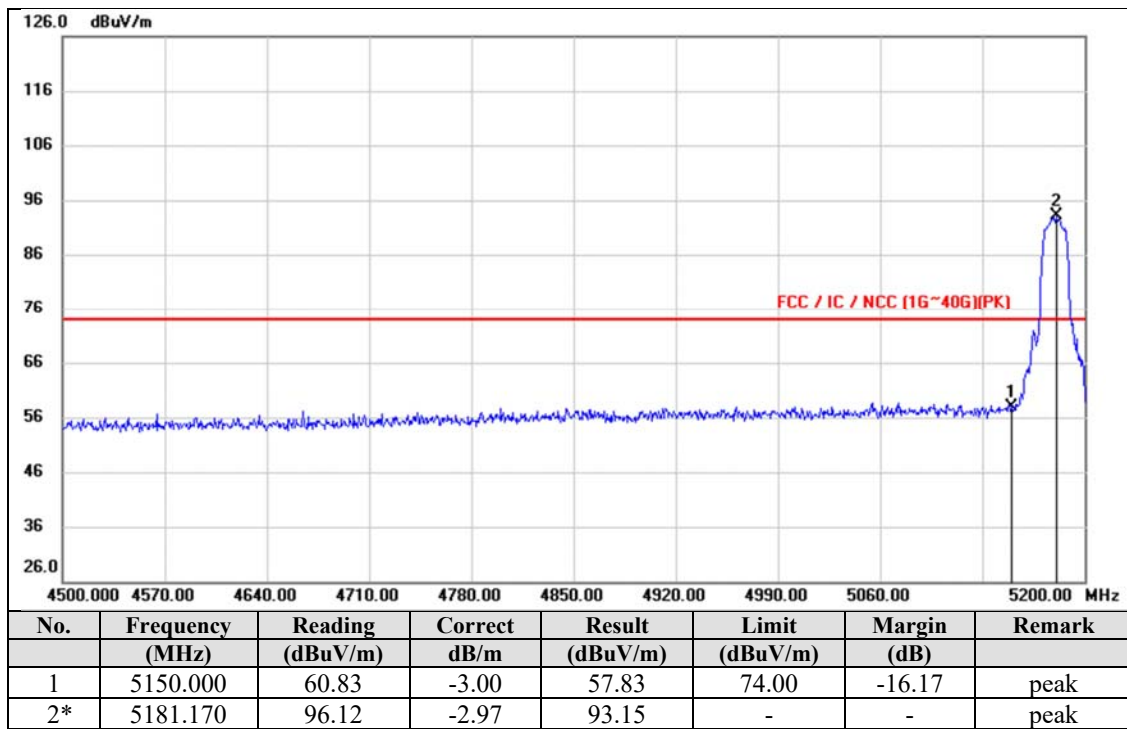
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Test Data

Restricted Band Edge 802.11a Ch 36 5180 MHz Horizontal



Note :

1. Correct = Antenna factor + Cable loss - Amplifier Factor
 2. Result = Reading + Correct
 3. Margin = Result - Limit
- *. Fundamental Frequency which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.

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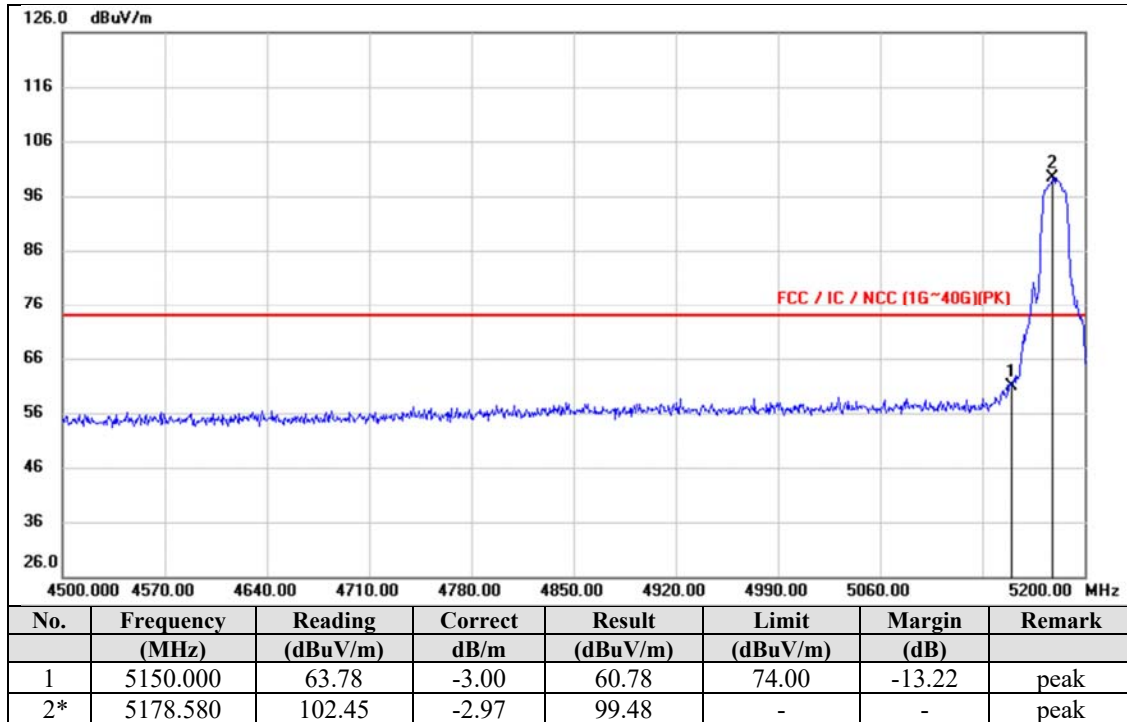
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Restricted Band Edge 802.11a Ch 36 5180 MHz Vertical



Note :

1. Correct = Antenna factor + Cable loss - Amplifier Factor
 2. Result = Reading + Correct
 3. Margin = Result - Limit
- *. Fundamental Frequency which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.

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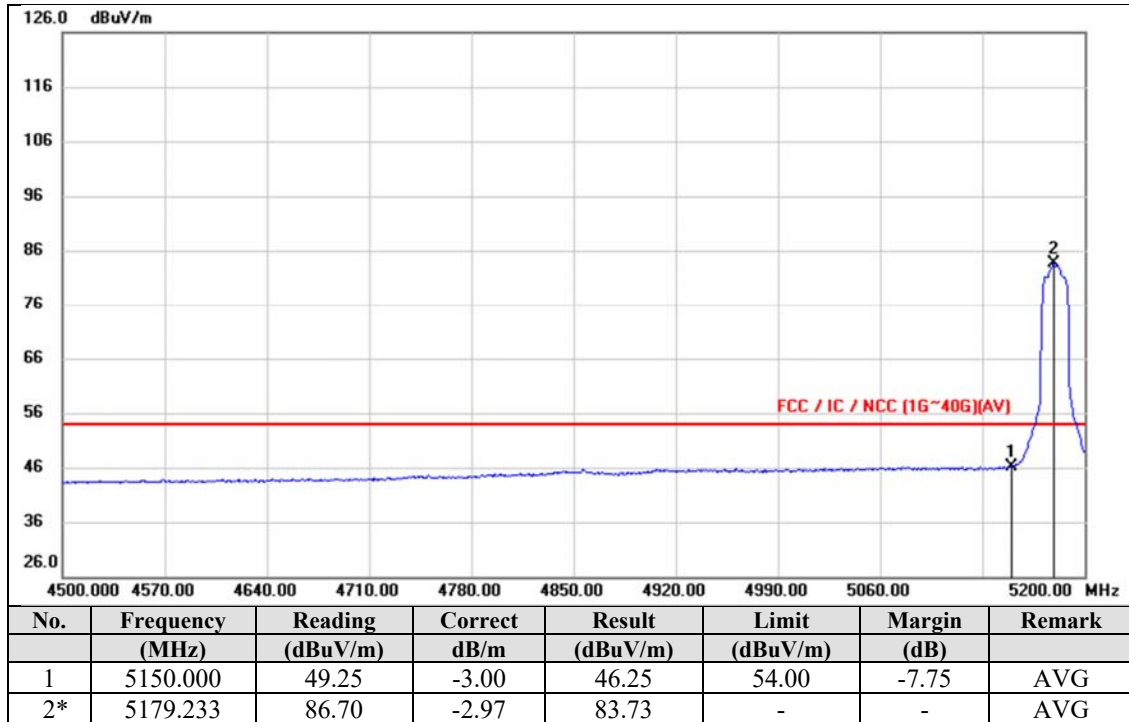
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Restricted Band Edge 802.11a Ch 36 5180 MHz Horizontal



Note :

1. Correct = Antenna factor + Cable loss - Amplifier Factor
 2. Result = Reading + Correct
 3. Margin = Result - Limit
 4. VBW = 1 kHz
- *. Fundamental Frequency which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.

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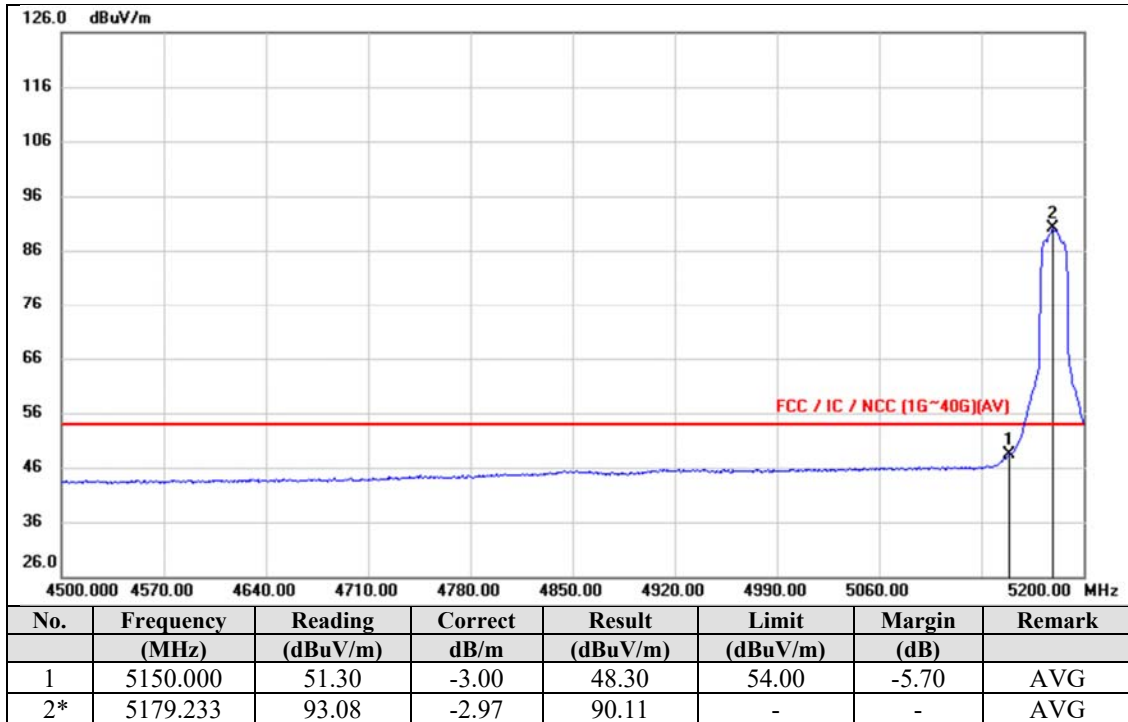
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Restricted Band Edge 802.11a Ch 36 5180 MHz Vertical



Note :

1. Correct = Antenna factor + Cable loss - Amplifier Factor
 2. Result = Reading + Correct
 3. Margin = Result - Limit
 4. VBW = 1 kHz
- *. Fundamental Frequency which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.

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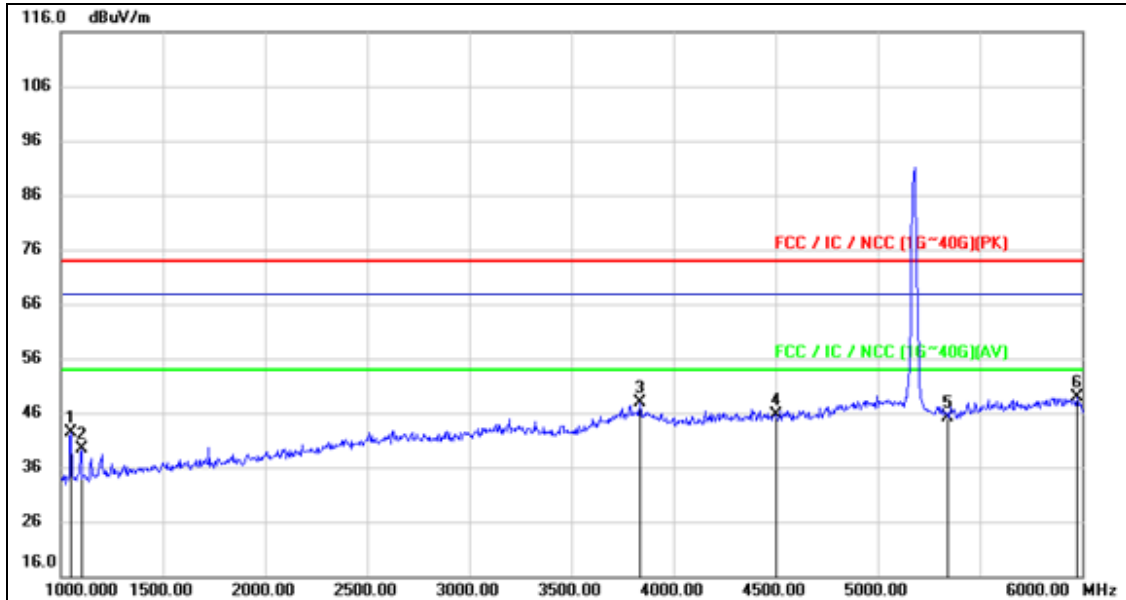
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Spurious Emission 802.11a Ch 36 5180 MHz 1-6 GHz Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1050.333	55.39	-12.98	42.41	74.00	-31.59	peak
2	1100.000	52.06	-12.79	39.27	74.00	-34.73	peak
3	3839.167	53.69	-5.93	47.76	74.00	-26.24	peak
4	4500.000	49.75	-4.16	45.59	74.00	-28.41	peak
5	5350.000	47.92	-2.82	45.10	74.00	-28.90	peak
6	5979.667	50.56	-1.71	48.85	68.20	-19.35	peak

Note :

1. Correct = Antenna factor + Cable loss - Amplifier Factor
2. Result = Reading + Correct
3. Margin = Result - Limit

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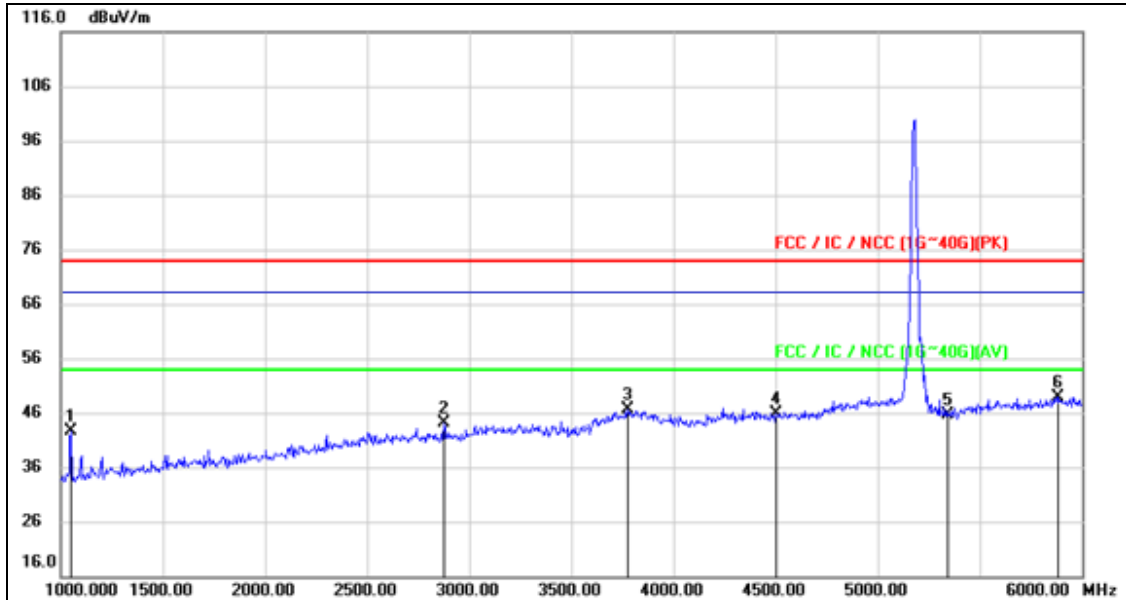
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Spurious Emission 802.11a Ch 36 5180 MHz 1-6 GHz Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1050.167	55.68	-12.98	42.70	74.00	-31.30	peak
2	2879.667	51.73	-7.60	44.13	74.00	-29.87	peak
3	3777.000	52.77	-6.04	46.73	74.00	-27.27	peak
4	4500.000	50.16	-4.16	46.00	74.00	-28.00	peak
5	5350.000	48.33	-2.82	45.51	74.00	-28.49	peak
6	5886.667	50.86	-1.90	48.96	68.20	-19.24	peak

Note :

1. Correct = Antenna factor + Cable loss - Amplifier Factor
2. Result = Reading + Correct
3. Margin = Result - Limit

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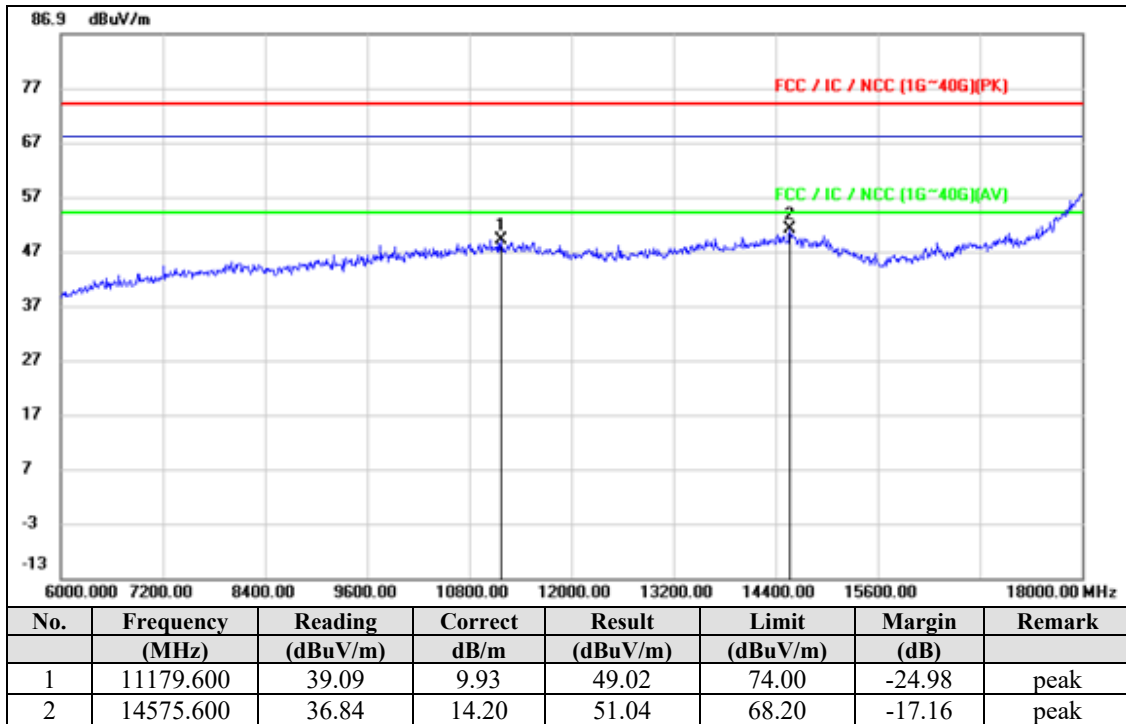
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Spurious Emission 802.11a Ch 36 5180 MHz 6-18 GHz Horizontal



Note :

1. Correct = Antenna factor + Cable loss - Amplifier Factor
2. Result = Reading + Correct
3. Margin = Result - Limit
4. The 18 GHz signal is background noise floor.

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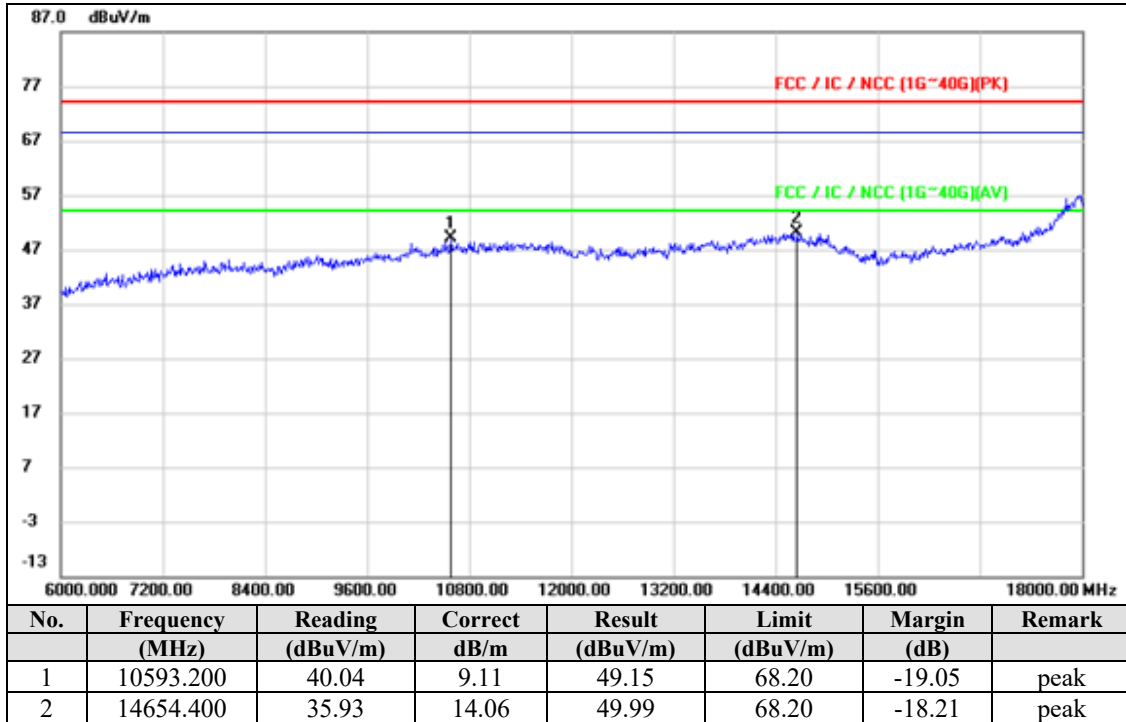
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Spurious Emission 802.11a Ch 36 5180 MHz 6-18 GHz Vertical



Note :

1. Correct = Antenna factor + Cable loss - Amplifier Factor
2. Result = Reading + Correct
3. Margin = Result - Limit
4. The 18 GHz signal is background noise floor.

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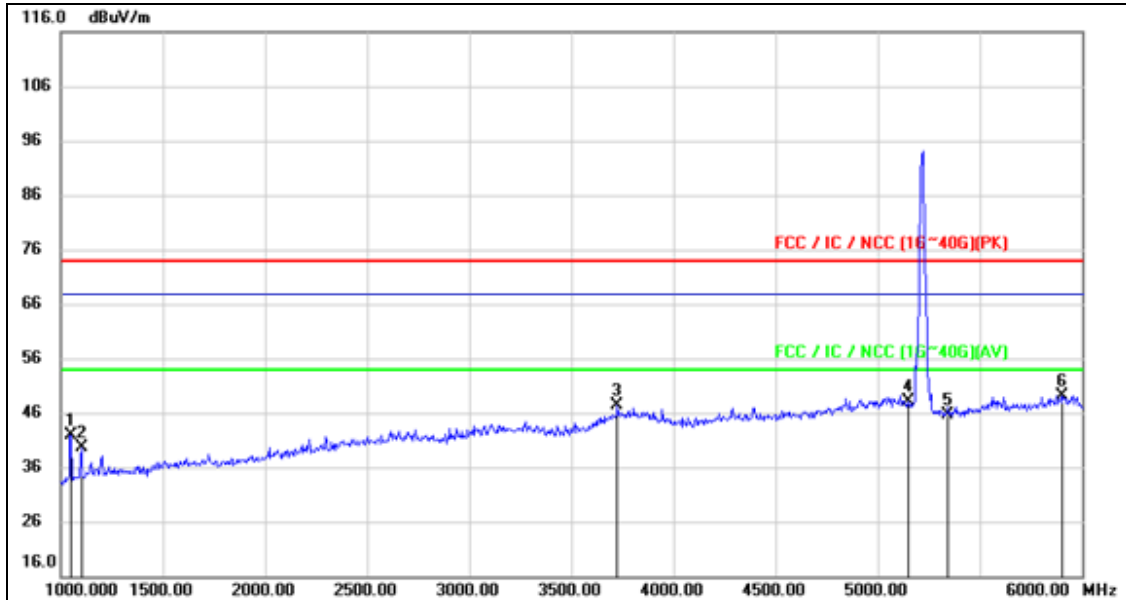
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Spurious Emission 802.11a Ch 44 5220 MHz 1-6 GHz Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1050.000	54.95	-12.98	41.97	74.00	-32.03	peak
2	1100.500	52.47	-12.79	39.68	74.00	-34.32	peak
3	3726.667	53.43	-6.12	47.31	74.00	-26.69	peak
4	5150.000	51.22	-3.00	48.22	74.00	-25.78	peak
5	5350.000	48.55	-2.82	45.73	74.00	-28.27	peak
6	5902.167	51.04	-1.87	49.17	68.20	-19.03	peak

Note :

1. Correct = Antenna factor + Cable loss - Amplifier Factor
2. Result = Reading + Correct
3. Margin = Result - Limit

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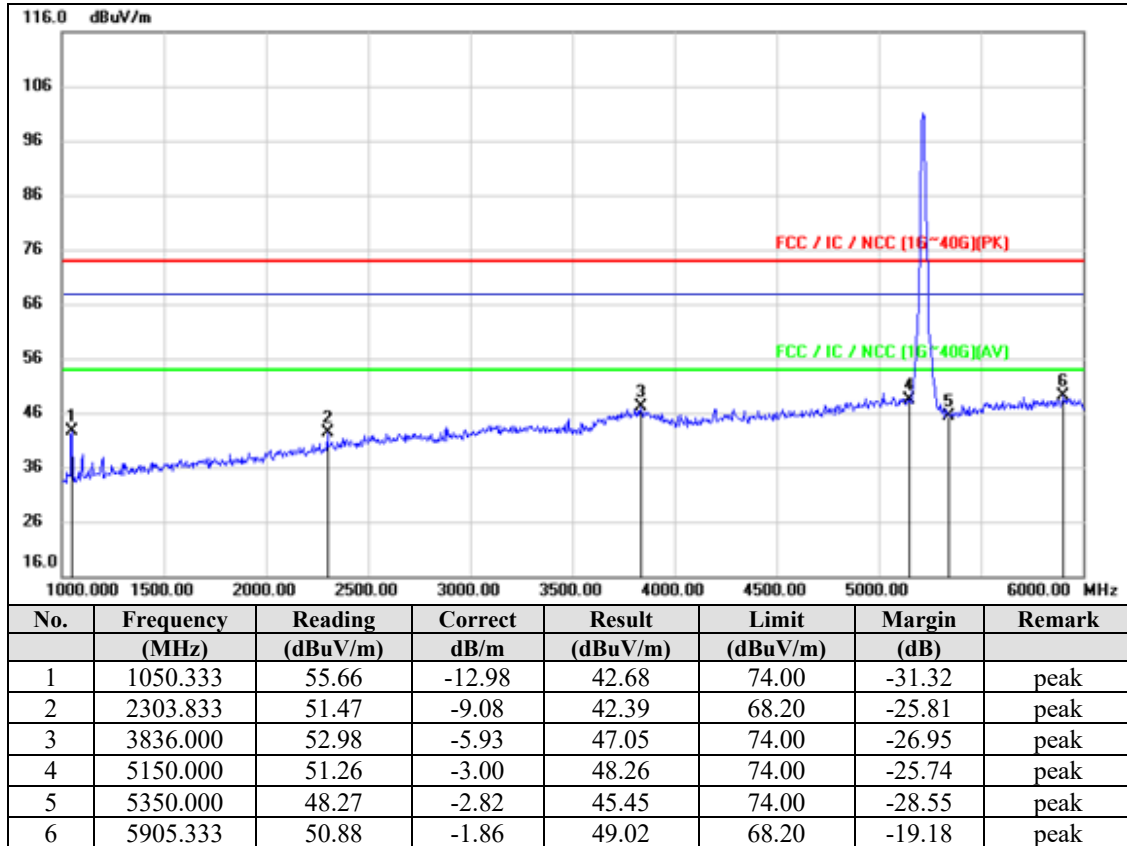
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Spurious Emission 802.11a Ch 44 5220 MHz 1-6 GHz Vertical



Note :

1. Correct = Antenna factor + Cable loss - Amplifier Factor
2. Result = Reading + Correct
3. Margin = Result - Limit

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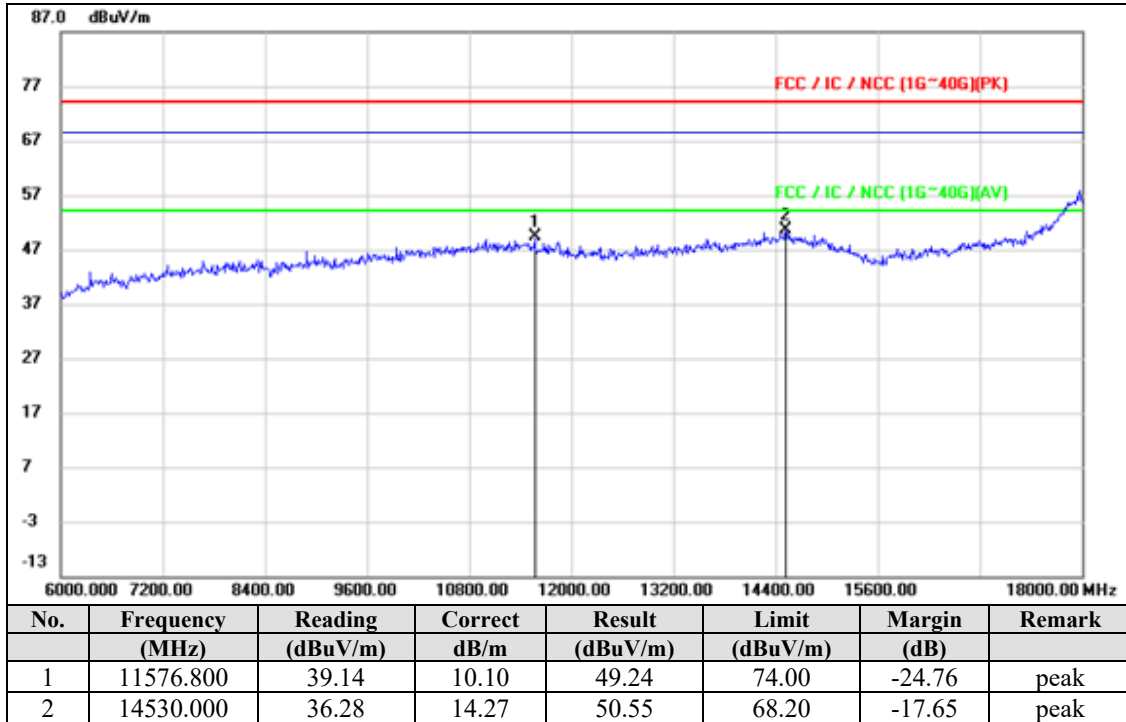
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Spurious Emission 802.11a Ch 44 5220 MHz 6-18 GHz Horizontal



Note :

1. Correct = Antenna factor + Cable loss - Amplifier Factor
2. Result = Reading + Correct
3. Margin = Result - Limit
4. The 18 GHz signal is background noise floor.

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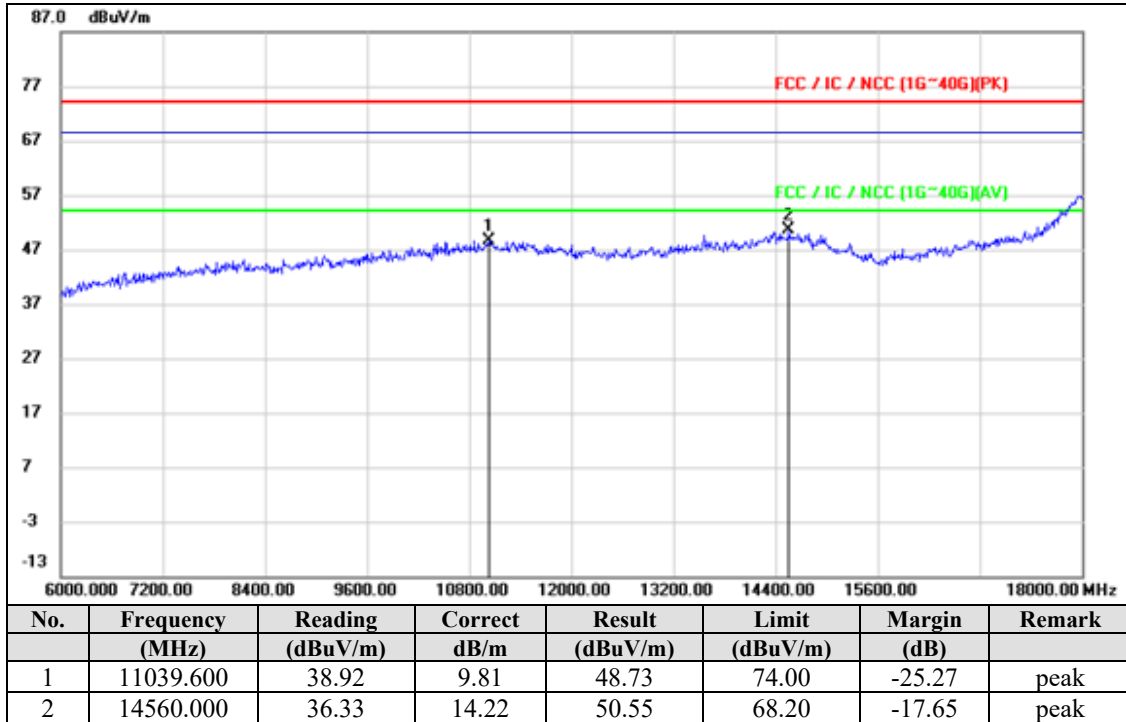
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Spurious Emission 802.11a Ch 44 5220 MHz 6-18 GHz Vertical



Note :

1. Correct = Antenna factor + Cable loss - Amplifier Factor
2. Result = Reading + Correct
3. Margin = Result - Limit
4. The 18 GHz signal is background noise floor.

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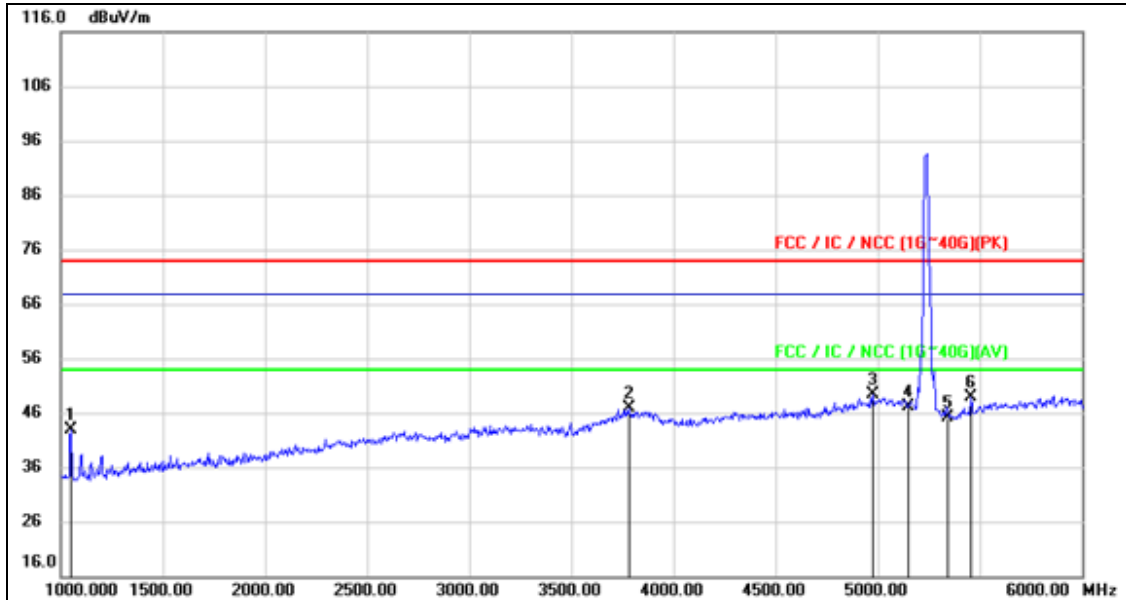
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Spurious Emission 802.11a Ch 48 5240 MHz 1-6 GHz Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1050.167	55.87	-12.98	42.89	74.00	-31.11	peak
2	3782.000	52.98	-6.03	46.95	74.00	-27.05	peak
3	4978.333	52.53	-3.16	49.37	74.00	-24.63	peak
4	5150.000	50.10	-3.00	47.10	74.00	-26.90	peak
5	5350.000	47.99	-2.82	45.17	74.00	-28.83	peak
6	5457.833	51.51	-2.74	48.77	74.00	-25.23	peak

Note :

1. Correct = Antenna factor + Cable loss - Amplifier Factor
2. Result = Reading + Correct
3. Margin = Result - Limit

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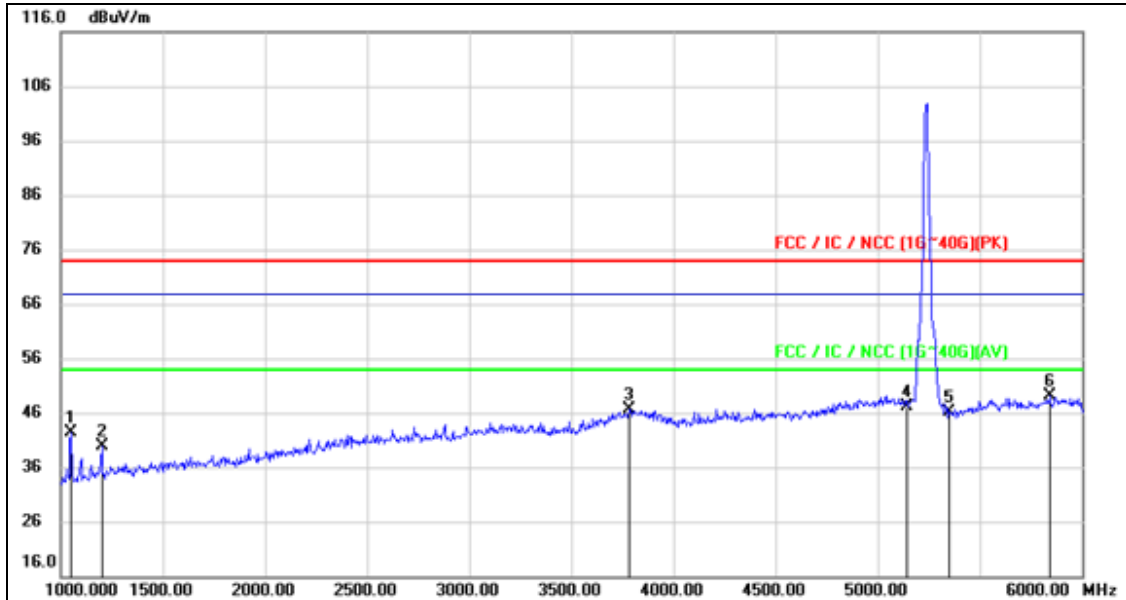
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Spurious Emission 802.11a Ch 48 5240 MHz 1-6 GHz Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1050.167	55.25	-12.98	42.27	74.00	-31.73	peak
2	1200.500	52.34	-12.40	39.94	74.00	-34.06	peak
3	3781.833	52.73	-6.03	46.70	74.00	-27.30	peak
4	5150.000	50.25	-3.00	47.25	74.00	-26.75	peak
5	5350.000	49.01	-2.82	46.19	74.00	-27.81	peak
6	5842.500	51.09	-1.99	49.10	68.20	-19.10	peak

Note :

1. Correct = Antenna factor + Cable loss - Amplifier Factor
2. Result = Reading + Correct
3. Margin = Result - Limit

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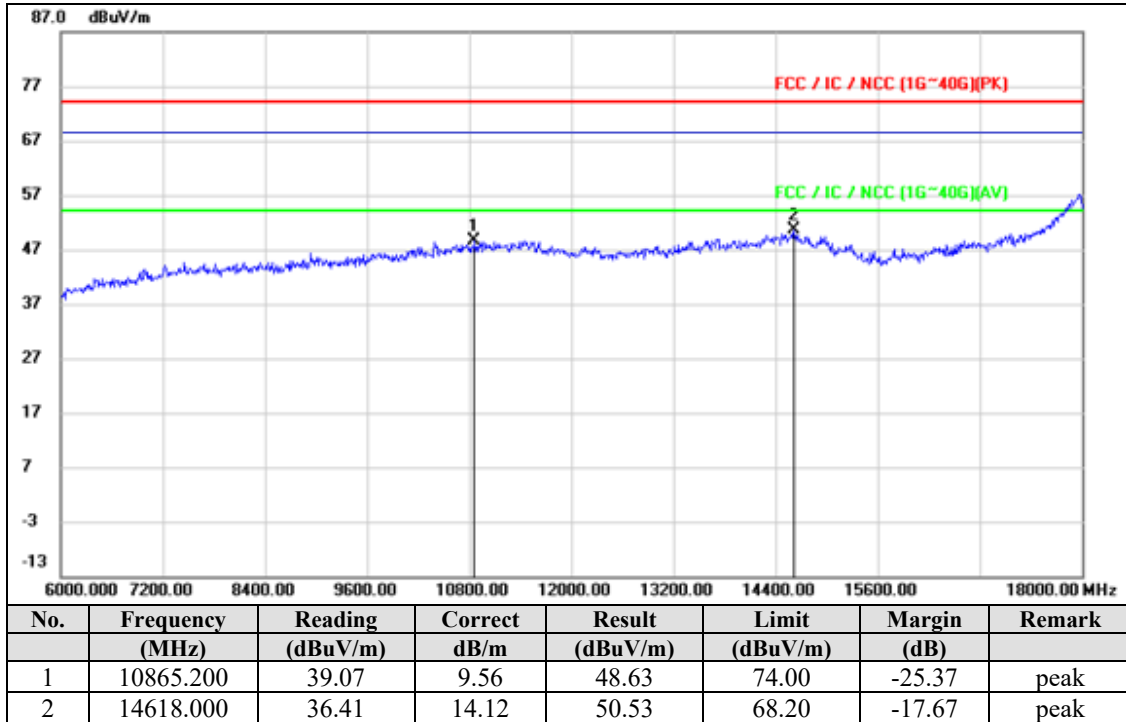
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Spurious Emission 802.11a Ch 48 5240 MHz 6-18 GHz Horizontal



Note :

1. Correct = Antenna factor + Cable loss - Amplifier Factor
2. Result = Reading + Correct
3. Margin = Result - Limit
4. The 18 GHz signal is background noise floor.

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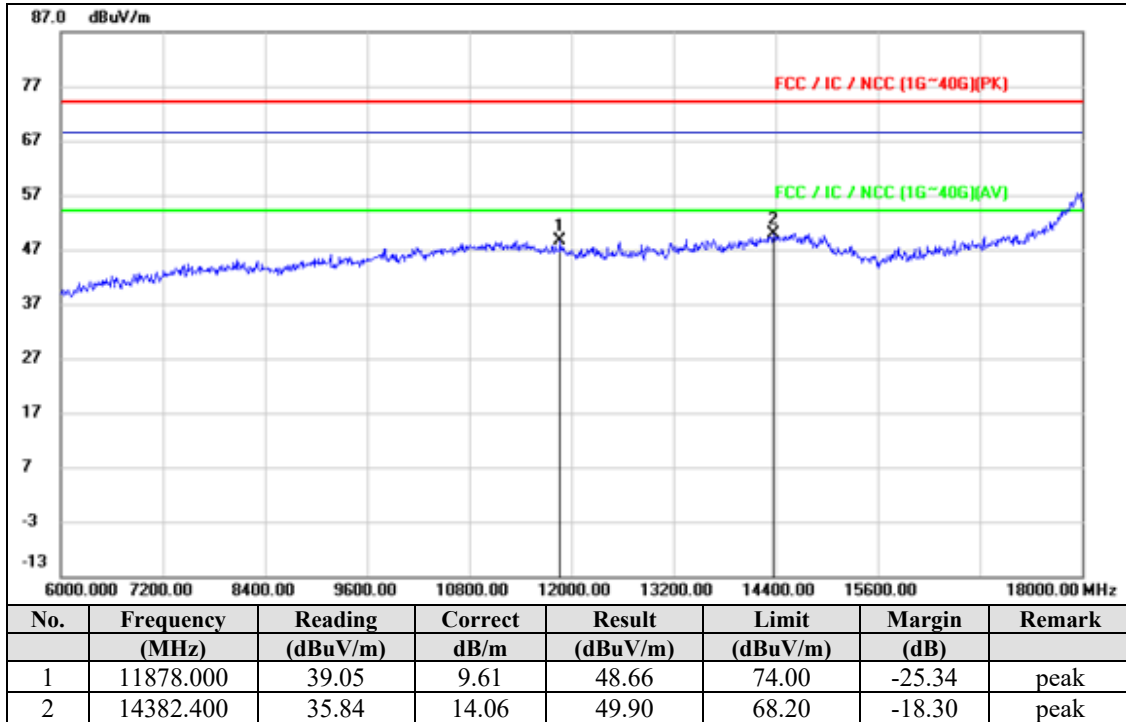
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Spurious Emission 802.11a Ch 48 5240 MHz 6-18 GHz Vertical



Note :

1. Correct = Antenna factor + Cable loss - Amplifier Factor
2. Result = Reading + Correct
3. Margin = Result - Limit
4. The 18 GHz signal is background noise floor.

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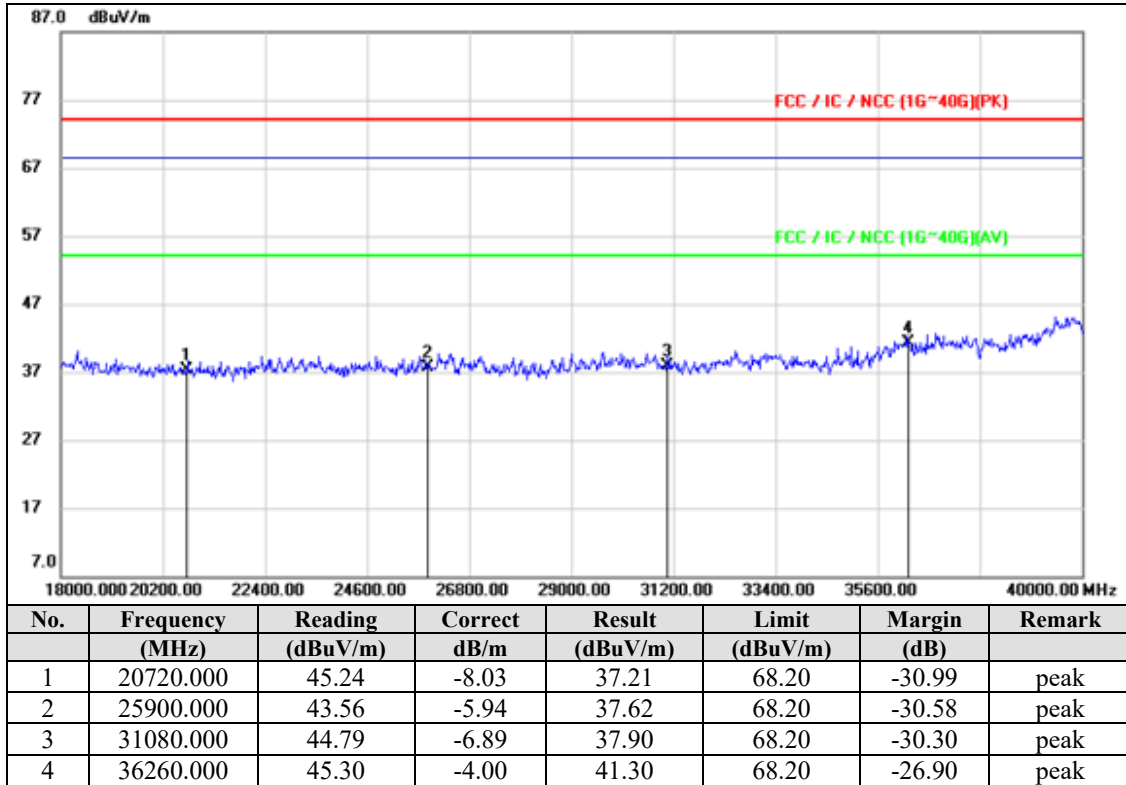
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Spurious Emission Worst case 18-40 GHz Horizontal



Note :

1. Correct = Antenna factor + Cable loss - Amplifier Factor
2. Result = Reading + Correct
3. Margin = Result - Limit

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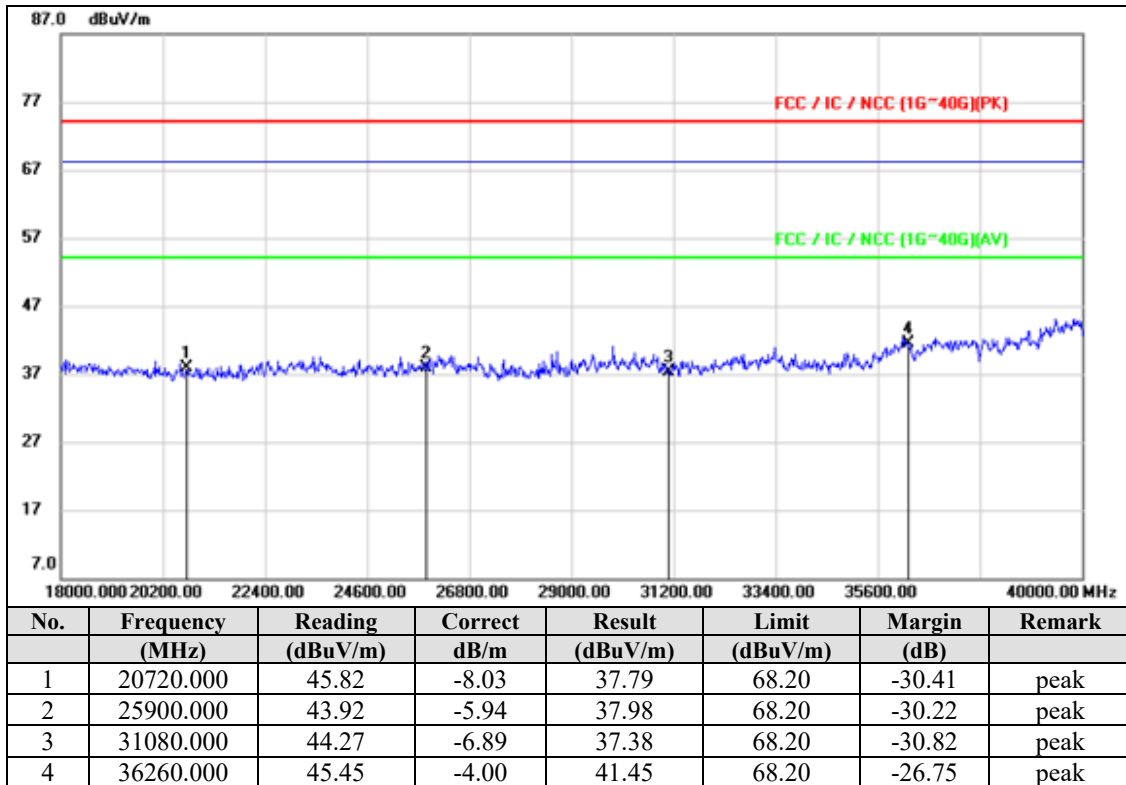
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Doc No: 17-EM-F0878 / 2.1



Spurious Emission Worst case 18-40 GHz Vertical



Note :

1. Correct = Antenna factor + Cable loss - Amplifier Factor
2. Result = Reading + Correct
3. Margin = Result - Limit

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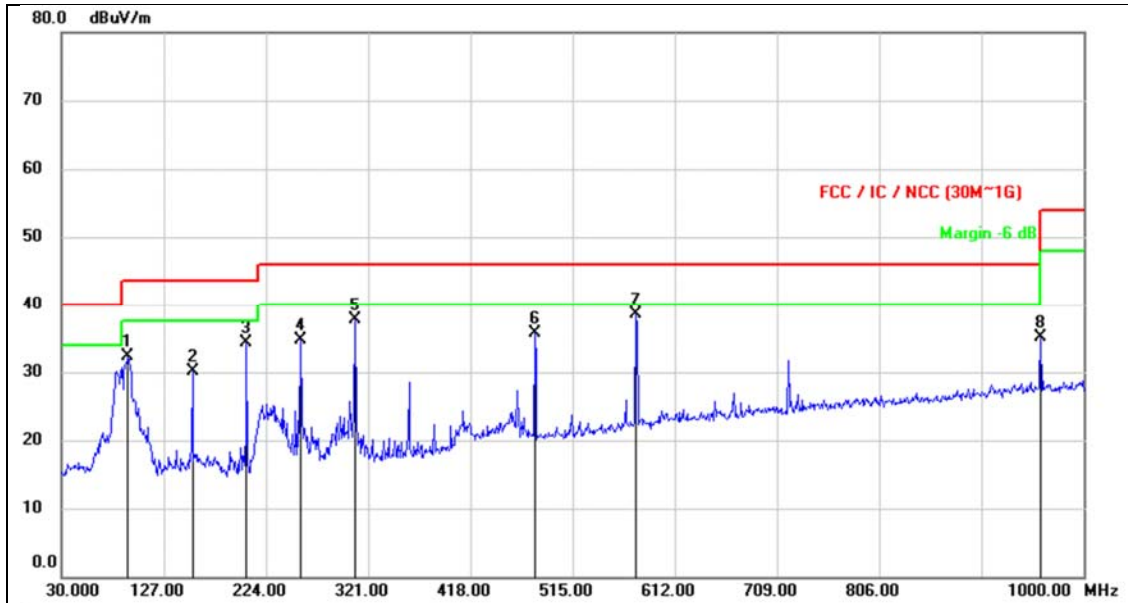
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Spurious Emission Worst case 30-1000 MHz Horizontal



No.	Frequency (KHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	93.2440	53.48	-21.26	32.22	43.50	-11.28	peak
2	154.2893	45.42	-15.37	30.05	43.50	-13.45	peak
3	205.6993	52.22	-17.98	34.24	43.50	-9.26	peak
4	257.1417	50.87	-16.11	34.76	46.00	-11.24	peak
5	308.5840	51.97	-14.28	37.69	46.00	-8.31	peak
6	480.0153	45.87	-10.15	35.72	46.00	-10.28	peak
7	576.0453	46.66	-8.11	38.55	46.00	-7.45	peak
8	960.0683	37.07	-2.03	35.04	54.00	-18.96	peak

Note :

1. Correct = Antenna factor + Cable loss
2. Result = Reading + Correct
3. Margin = Result - Limit

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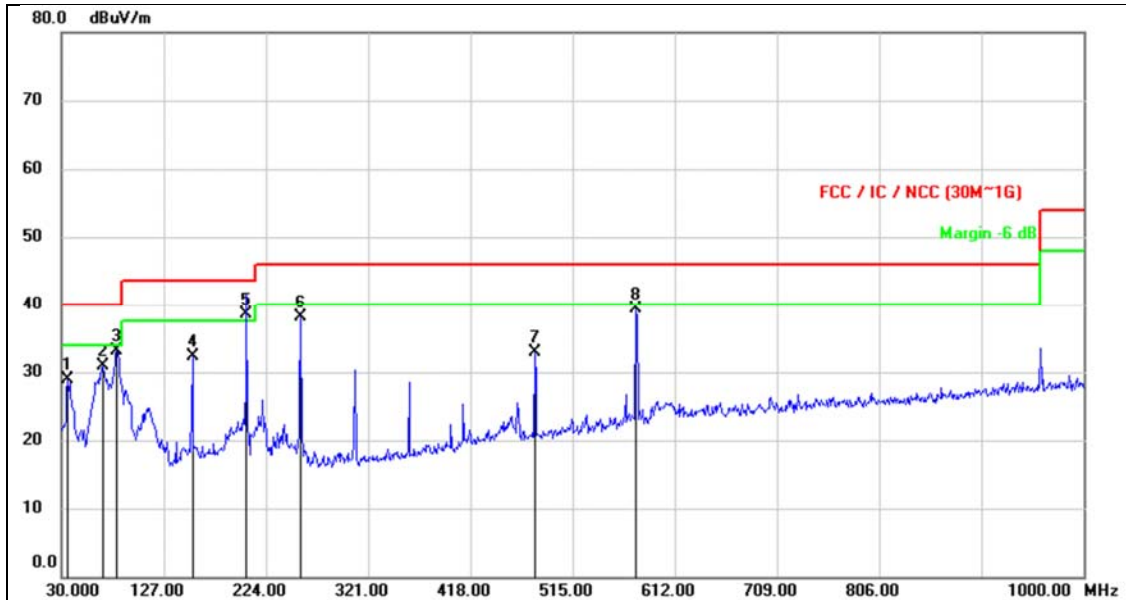
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Spurious Emission Worst case 30-1000 MHz Vertical



No.	Frequency (KHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	35.9493	45.08	-16.19	28.89	40.00	-11.11	peak
2	69.6730	48.61	-17.74	30.87	40.00	-9.13	peak
3	83.3177	53.56	-20.49	33.07	40.00	-6.93	peak
4	154.2893	47.75	-15.37	32.38	43.50	-11.12	peak
5	205.6993	56.40	-17.98	38.42	43.50	-5.08	QP
6	257.1417	54.27	-16.11	38.16	46.00	-7.84	peak
7	480.0153	42.97	-10.15	32.82	46.00	-13.18	peak
8	576.0130	47.43	-8.11	39.32	46.00	-6.68	peak

Note :

1. Correct = Antenna factor + Cable loss
2. Result = Reading + Correct
3. Margin = Result - Limit

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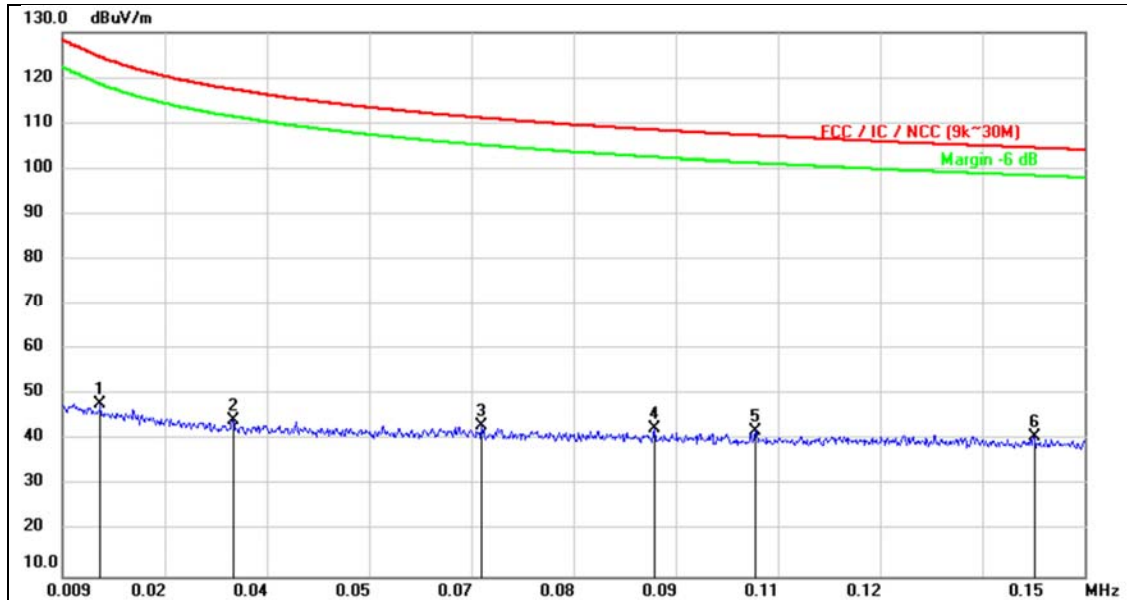
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Spurious Emission Worst case 9-150 kHz 0°



No.	Frequency (KHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.0143	29.40	18.59	47.99	124.57	-76.58	peak
2	0.0325	30.10	14.20	44.30	117.44	-73.14	peak
3	0.0669	30.65	12.54	43.19	111.12	-67.93	peak
4	0.0906	30.30	12.21	42.51	108.46	-65.95	peak
5	0.1047	29.88	11.99	41.87	107.24	-65.37	peak
6	0.1431	28.81	12.02	40.83	104.52	-63.69	peak

Note :

1. Correct = Antenna factor + Cable loss
2. Result = Reading + Correct
3. Margin = Result - Limit

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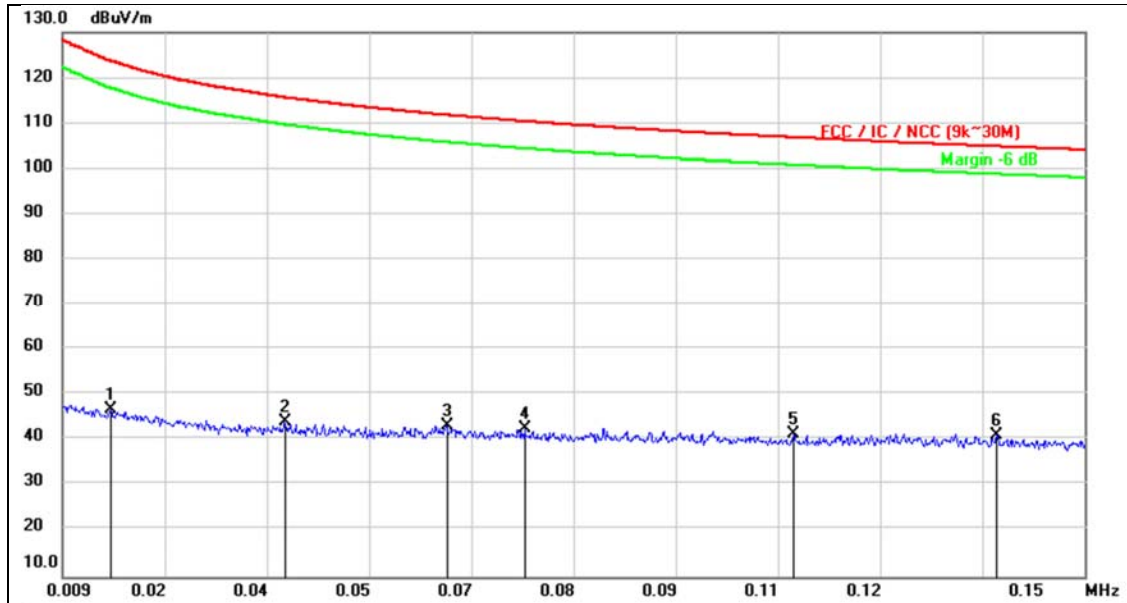
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Doc No: 17-EM-F0878 / 2.1



Spurious Emission Worst case 9-150 kHz 90°



No.	Frequency (KHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.0156	28.51	18.24	46.75	123.78	-77.03	peak
2	0.0397	30.28	13.63	43.91	115.64	-71.73	peak
3	0.0620	30.65	12.61	43.26	111.77	-68.51	peak
4	0.0728	29.95	12.47	42.42	110.38	-67.96	peak
5	0.1100	29.46	11.90	41.36	106.83	-65.47	peak
6	0.1380	28.92	12.07	40.99	104.84	-63.85	peak

Note :

1. Correct = Antenna factor + Cable loss
2. Result = Reading + Correct
3. Margin = Result - Limit

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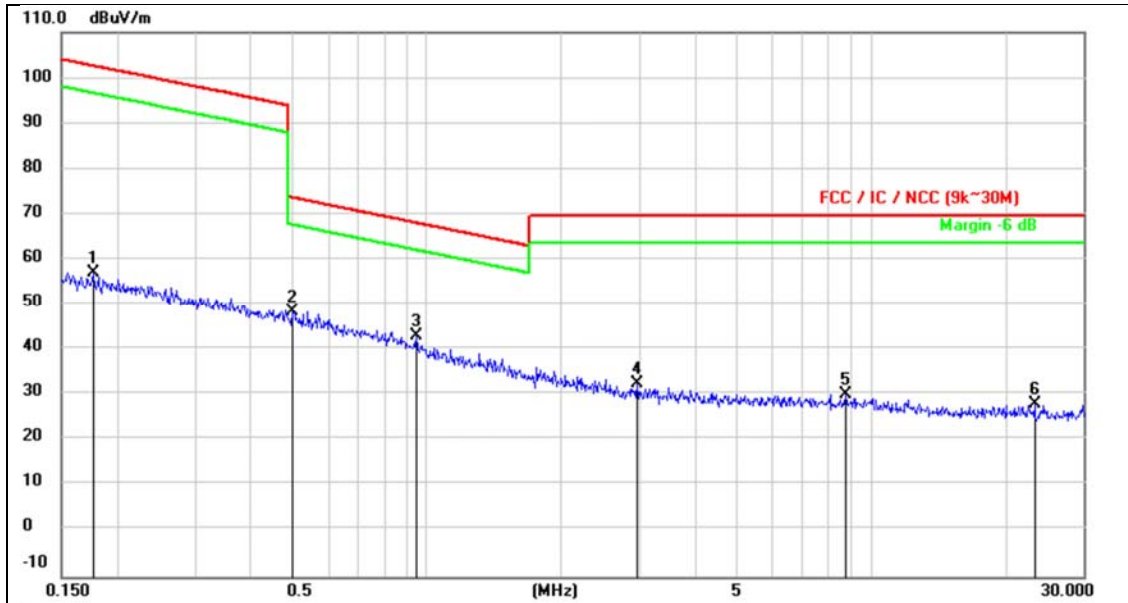
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Spurious Emission Worst case 150 kHz-30 MHz 0°



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.1773	45.08	11.87	56.95	102.63	-45.68	peak
2	0.4985	36.46	11.80	48.26	73.65	-25.39	peak
3	0.9434	30.99	11.95	42.94	68.12	-25.18	peak
4	2.9630	21.22	11.21	32.43	69.54	-37.11	peak
5	8.7401	18.53	11.66	30.19	69.54	-39.35	peak
6	23.2757	17.21	10.77	27.98	69.54	-41.56	peak

Note :

1. Correct = Antenna factor + Cable loss
2. Result = Reading + Correct
3. Margin = Result - Limit

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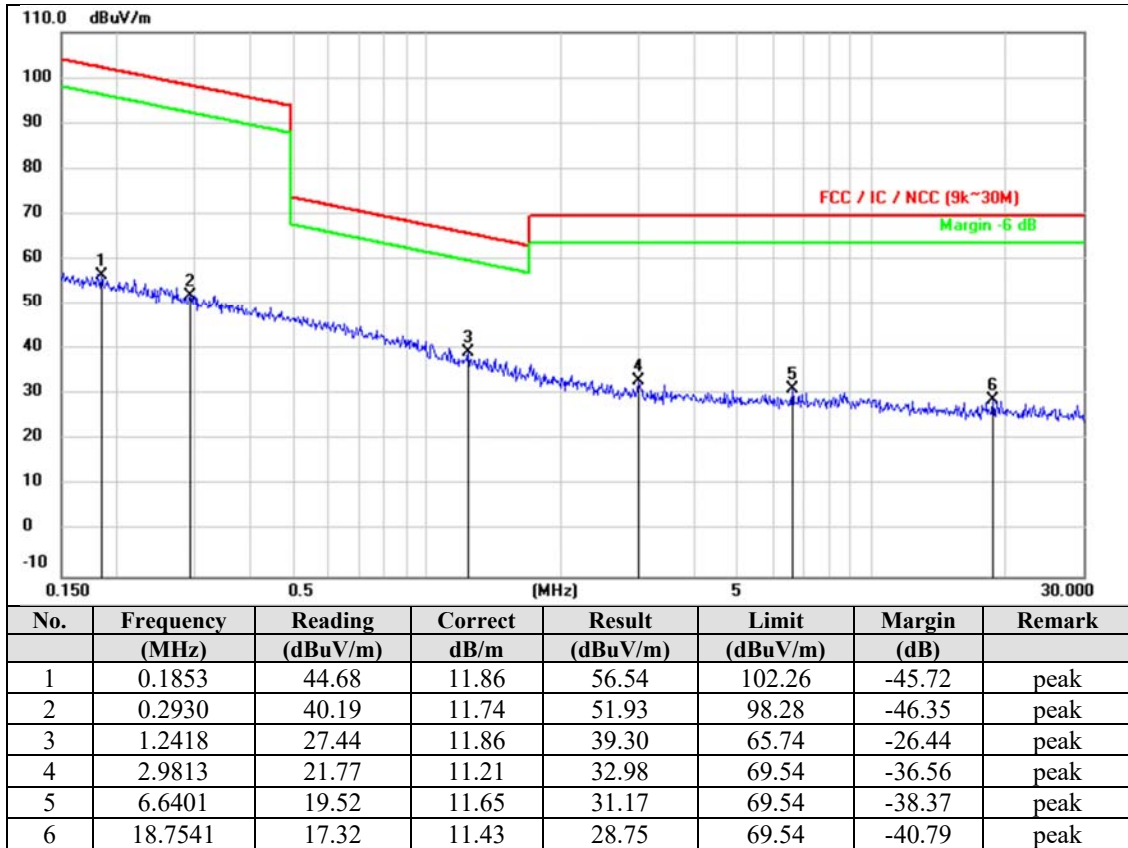
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Spurious Emission Worst case 150 kHz-30 MHz 90°



Note :

1. Correct = Antenna factor + Cable loss
2. Result = Reading + Correct
3. Margin = Result - Limit

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9.7. Frequency Stability

Requirements

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

Test Procedure

- a. The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
- b. Turn the EUT on and couple its output to a spectrum analyzer.
- c. Turn the EUT off and set the chamber to the highest temperature specified.
- d. Allow sufficient time (approximately 30 minutes) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 Minutes.
- e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
- f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 Minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

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Test Data

UNII-1 5180 MHz		Frequency Stability(ppm)			
Temperature (°C)	Voltage (V)	0 minute	2 minutes	5 minutes	10 minutes
50	120	-5.91	-5.98	-5.98	-5.98
40	120	-4.25	-4.40	-4.56	-4.63
30	120	-1.70	-1.89	-2.01	-2.16
20	120	2.70	1.74	1.62	1.43
10	120	3.86	4.17	4.56	4.40
0	120	7.53	7.84	7.95	8.22
-10	120	10.39	10.25	10.66	10.89
-20	120	11.24	11.27	11.39	11.74
20	138	2.70	1.74	1.62	1.43
20	102	2.32	1.74	1.60	1.41

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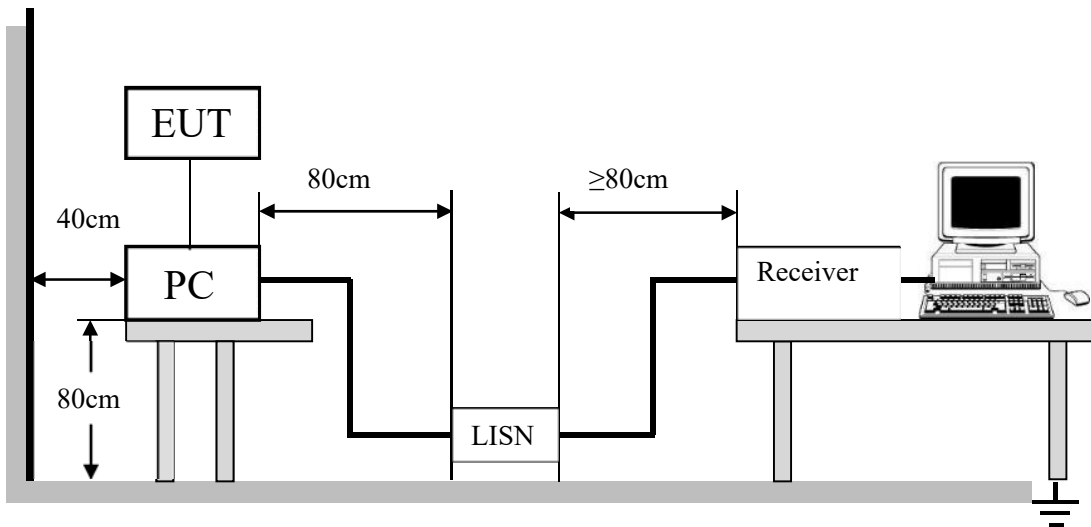


9.8. AC Power Line Conducted Emission

Requirements

Frequency of Emission(MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

Test Procedures



The EUT was put on a table of non-conducting material that was 80cm high. The vertical conducting wall of shielding was located 40cm to the rear of the EUT. The power line of the EUT was connected to the AC mains through an Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) was used to test the emissions from both sides of AC line. According to the requirements in Section 6.2 of ANSI C63.10 -2013. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver was set at 9 kHz.

The arrangement of the equipment was installed to meet the standards and operating in a manner, which tended to maximize its emission characteristics in a normal application.

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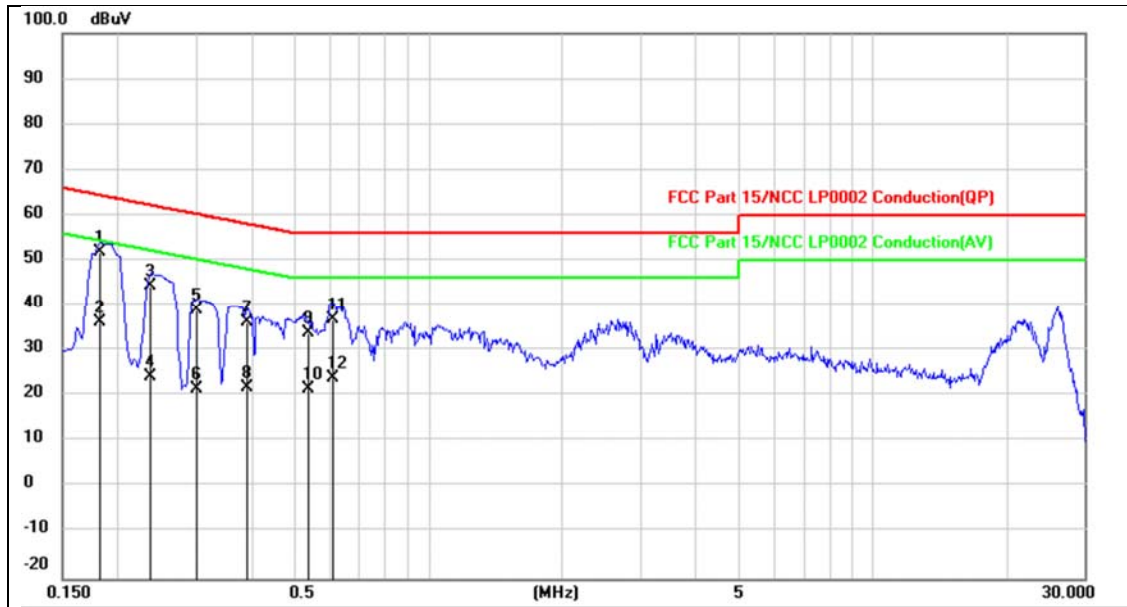
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Test Data

Line



No.	Frequency (MHz)	Reading (dBuV)	Correct dB	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1819	32.19	19.58	51.77	64.40	-12.63	QP
2	0.1819	16.66	19.58	36.24	54.40	-18.16	AVG
3	0.2362	24.64	19.59	44.23	62.23	-18.00	QP
4	0.2362	4.64	19.59	24.23	52.23	-28.00	AVG
5	0.2993	19.45	19.60	39.05	60.26	-21.21	QP
6	0.2993	1.83	19.60	21.43	50.26	-28.83	AVG
7	0.3913	16.61	19.59	36.20	58.04	-21.84	QP
8	0.3913	2.41	19.59	22.00	48.04	-26.04	AVG
9	0.5389	14.36	19.58	33.94	56.00	-22.06	QP
10	0.5389	2.10	19.58	21.68	46.00	-24.32	AVG
11	0.6114	17.41	19.58	36.99	56.00	-19.01	QP
12	0.6114	4.33	19.58	23.91	46.00	-22.09	AVG

Note :

1. Correct = LISN factor + Cable loss + Pulse Limiter
2. Result = Reading + Correct
3. Margin = Result - Limit

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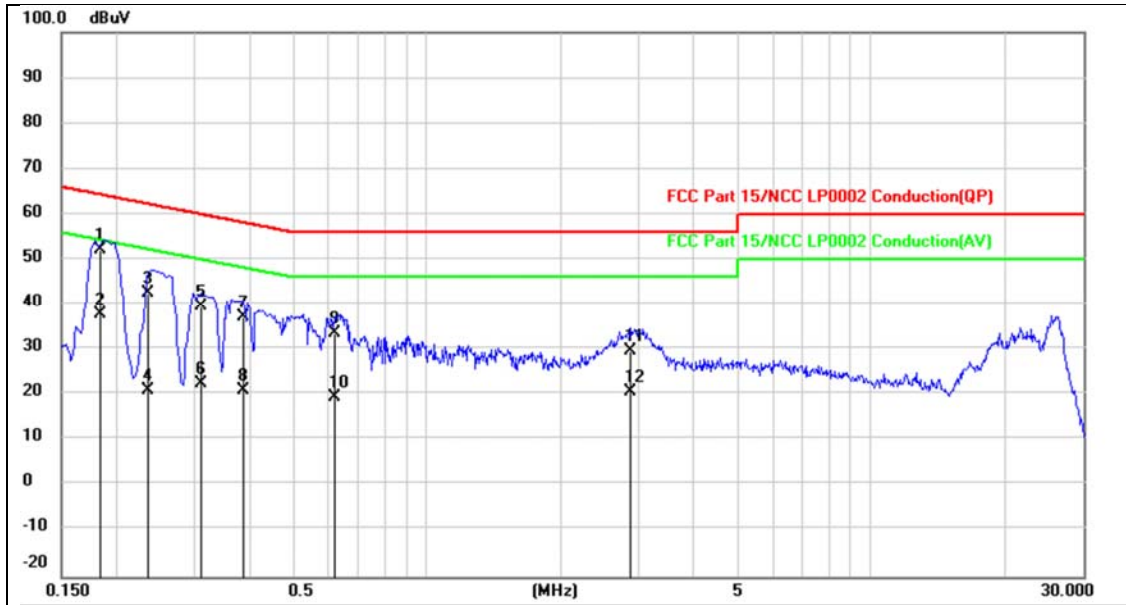
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Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1827	32.56	19.59	52.15	64.36	-12.21	QP
2	0.1827	18.05	19.59	37.64	54.36	-16.72	AVG
3	0.2343	23.05	19.60	42.65	62.30	-19.65	QP
4	0.2343	1.43	19.60	21.03	52.30	-31.27	AVG
5	0.3089	19.94	19.62	39.56	60.00	-20.44	QP
6	0.3089	2.95	19.62	22.57	50.00	-27.43	AVG
7	0.3837	17.69	19.61	37.30	58.20	-20.90	QP
8	0.3837	1.38	19.61	20.99	48.20	-27.21	AVG
9	0.6186	13.88	19.60	33.48	56.00	-22.52	QP
10	0.6186	-0.29	19.60	19.31	46.00	-26.69	AVG
11	2.8713	10.01	19.68	29.69	56.00	-26.31	QP
12	2.8713	1.02	19.68	20.70	46.00	-25.30	AVG

Note :

1. Correct = LISN factor + Cable loss + Pulse Limiter
2. Result = Reading + Correct
3. Margin = Result - Limit

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