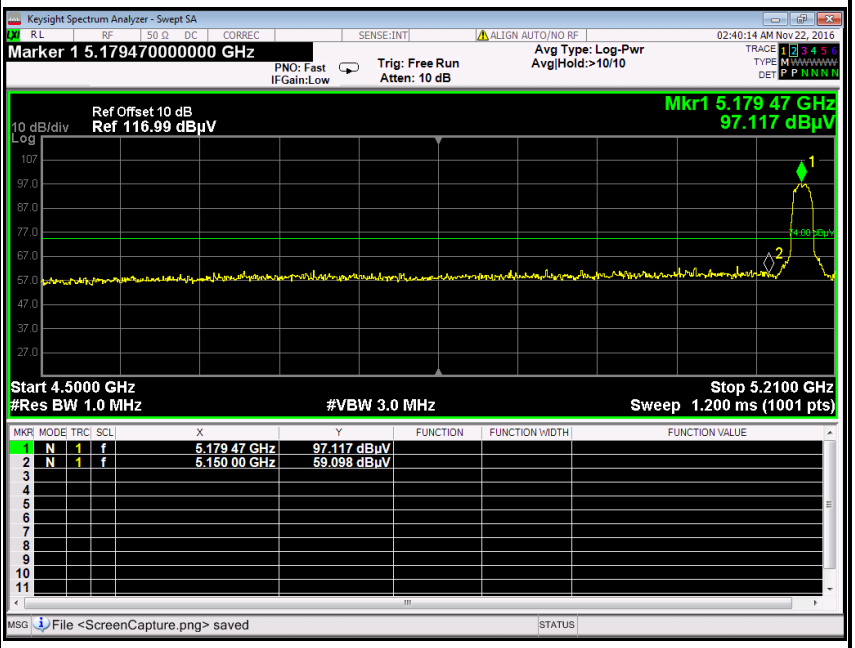
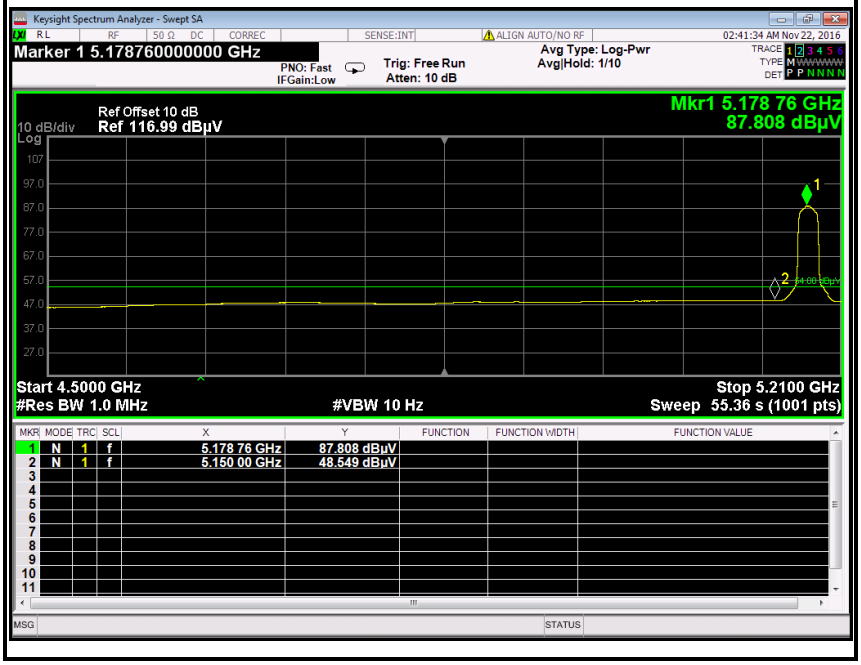
Test Plot

IEEE 802.11a mode / 5180MHz

Detector mode: Peak **Polarity: Vertical**

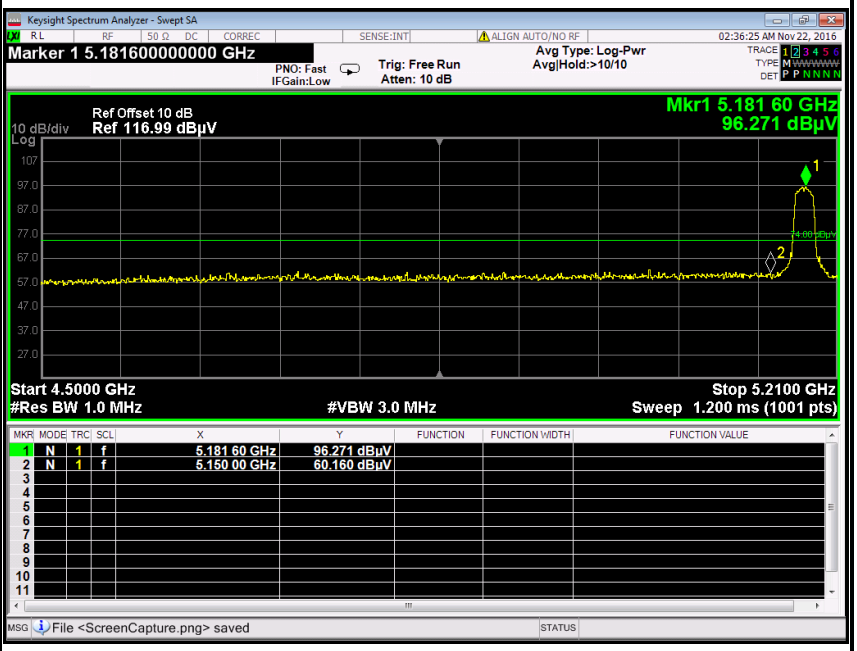


Detector mode: Average **Polarity: Vertical**

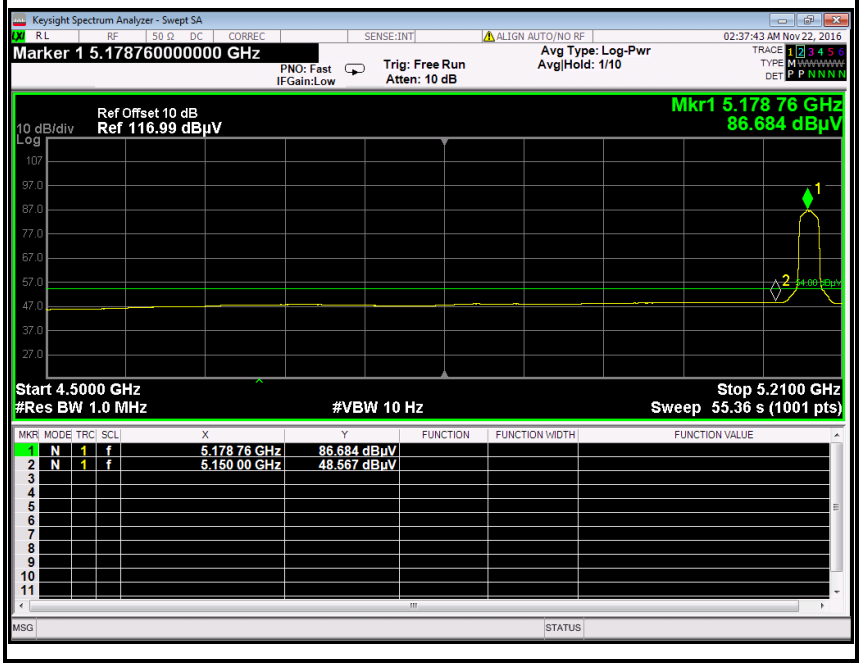


No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Pole
1	5150.0000	64.70	5.60	59.10	74.00	-14.90	Peak	Vertical
2	5150.0000	54.15	5.60	48.55	54.00	-5.45	Average	Vertical

Detector mode: Peak **Polarity: Horizontal**



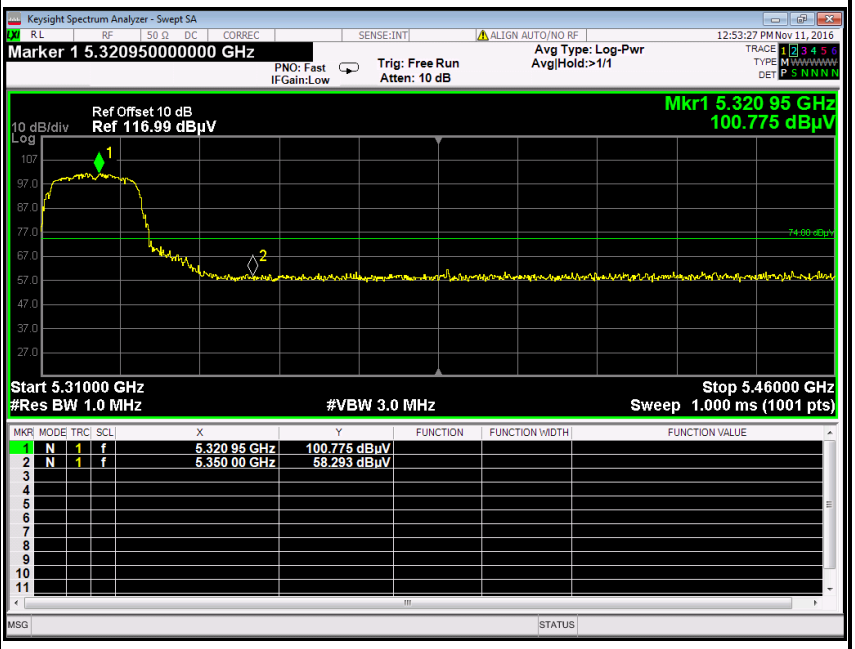
Detector mode: Average **Polarity: Horizontal**



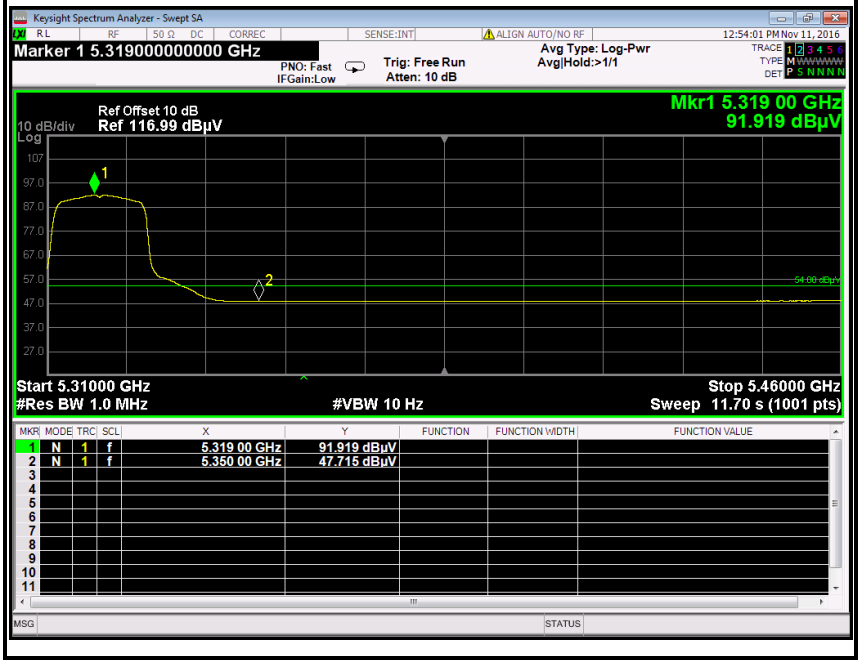
No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Pole
1	5350.0000	65.76	5.60	60.16	74.00	-13.84	Peak	Vertical
2	5350.0000	54.17	5.60	48.57	54.00	-5.43	Average	Vertical

IEEE 802.11a mode / 5320MHz

Detector mode: Peak **Polarity: Vertical**

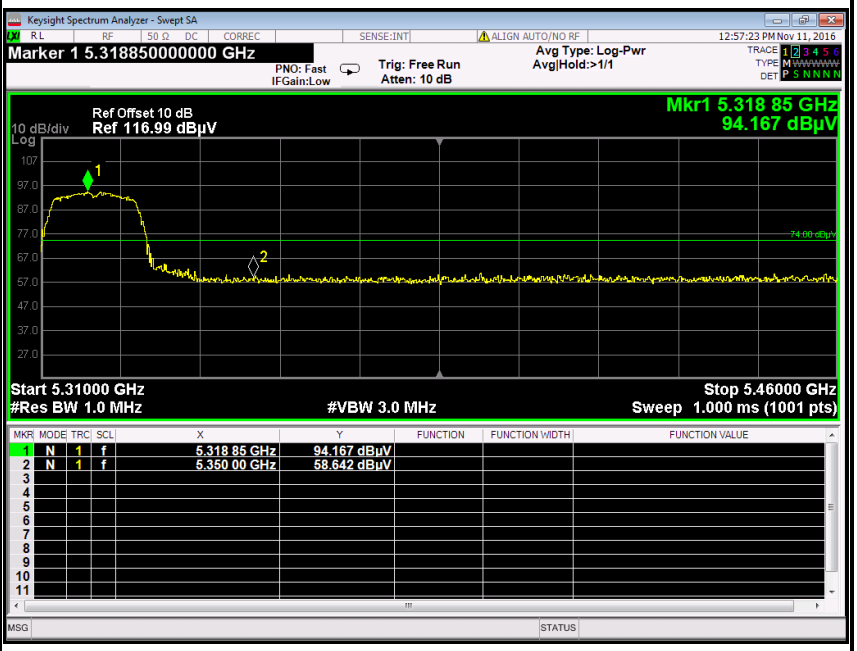


Detector mode: Average **Polarity: Vertical**

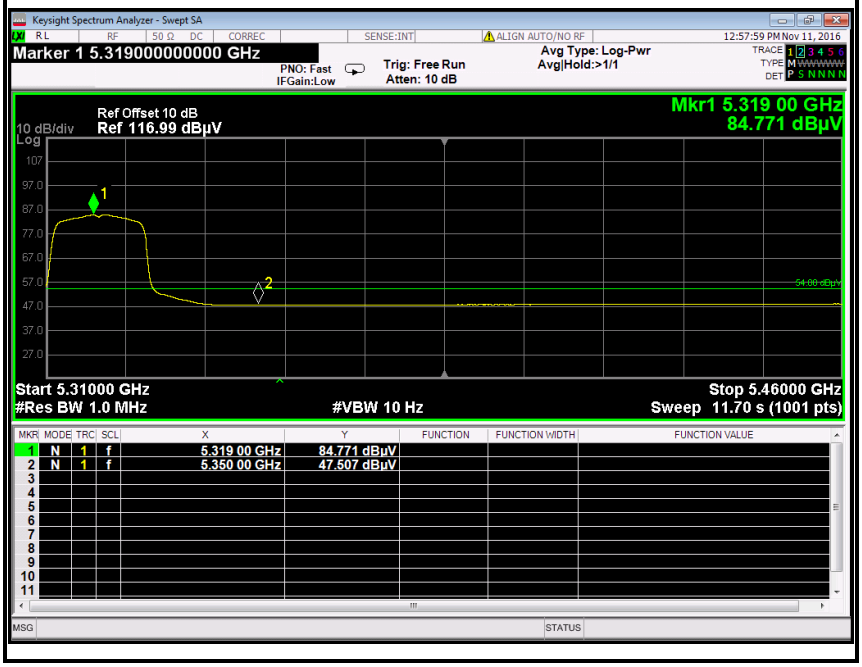


No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Pole
1	5350.0000	63.89	5.60	58.29	74.00	-15.71	Peak	Vertical
2	5350.0000	53.32	5.60	47.72	54.00	-6.29	Average	Vertical

Detector mode: Peak **Polarity: Horizontal**



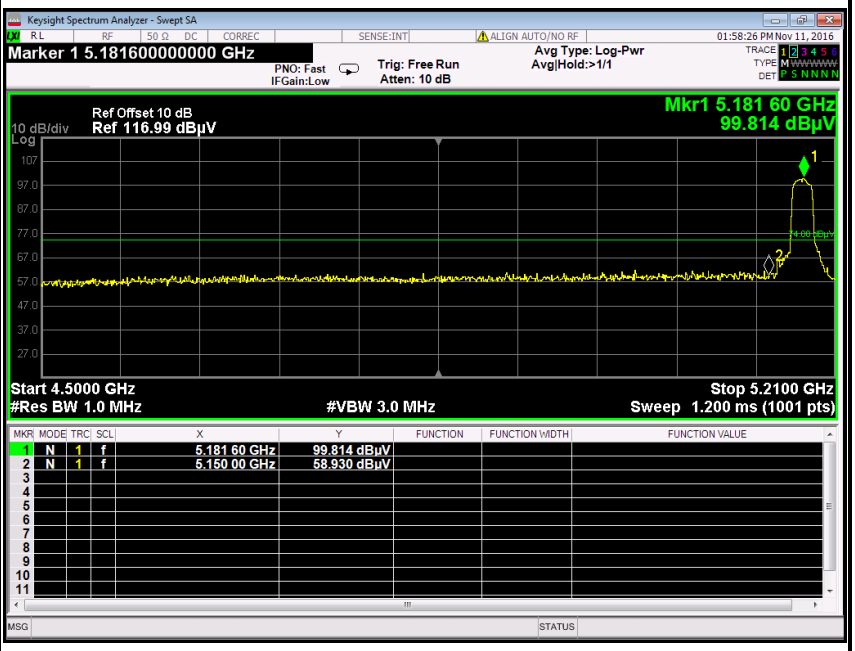
Detector mode: Average **Polarity: Horizontal**



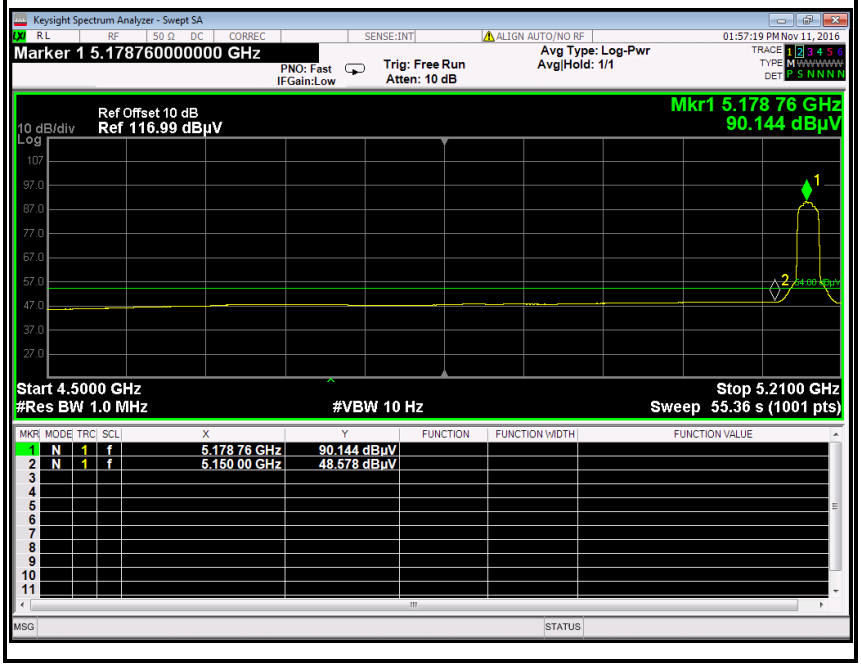
No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Pole
1	5350.0000	64.24	5.60	58.64	74.00	-15.36	Peak	Horizontal
2	5350.0000	53.11	5.60	47.51	54.00	-6.49	Average	Horizontal

IEEE 802.11n HT 20 MHz mode / 5180 MHz

Detector mode: Peak **Polarity: Vertical**

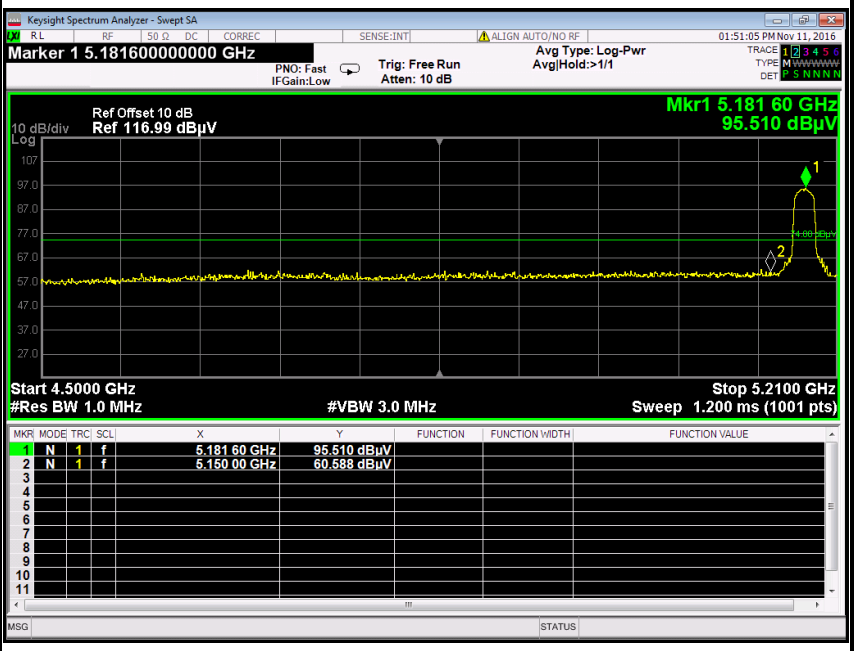


Detector mode: Average **Polarity: Vertical**

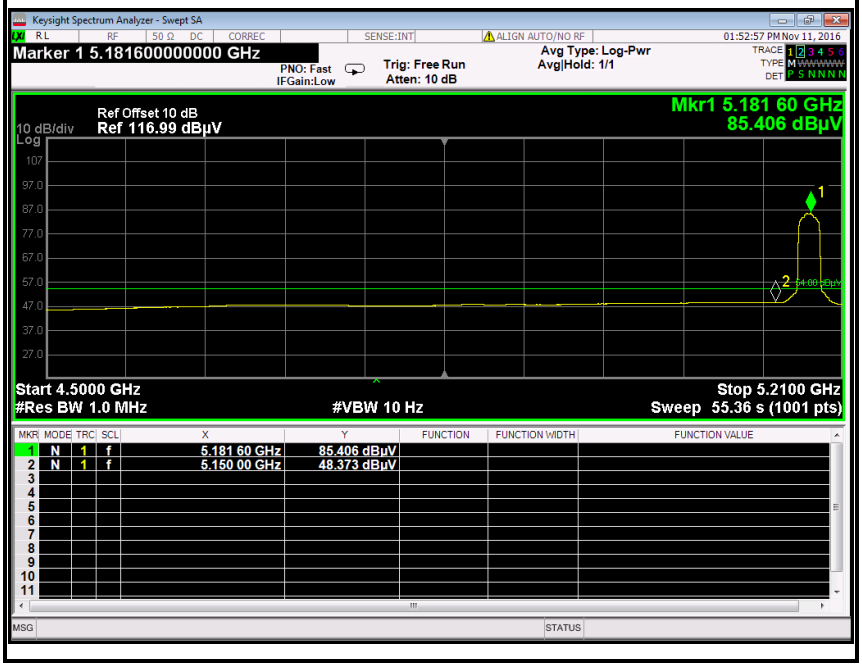


No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Pole
1	5150.0000	64.53	5.60	58.93	74.00	-15.07	Peak	Vertical
2	5150.0000	54.18	5.60	48.58	54.00	-5.42	Average	Vertical

Detector mode: Peak **Polarity: Horizontal**



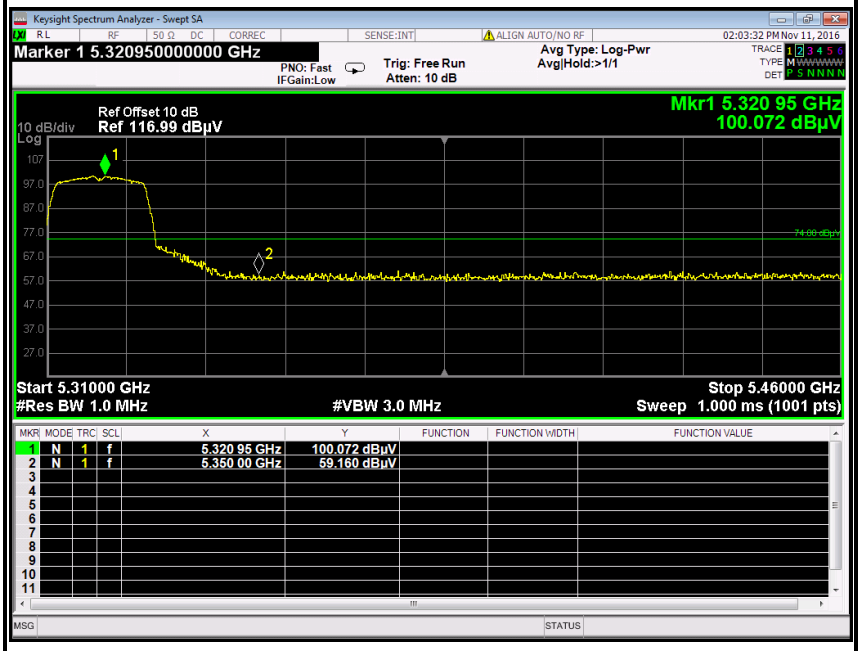
Detector mode: Average **Polarity: Horizontal**



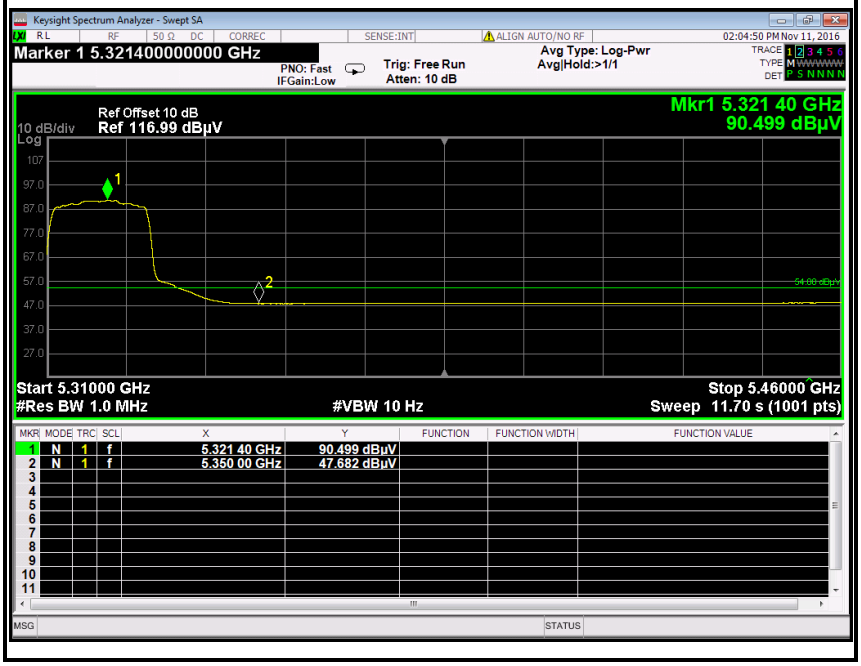
No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Pole
1	5150.0000	66.19	5.60	60.59	74.00	-13.41	Peak	Horizontal
2	5150.0000	53.97	5.60	48.37	54.00	-5.63	Average	Horizontal

IEEE 802.11n HT 20 MHz mode / 5320 MHz

Detector mode: Peak **Polarity: Vertical**

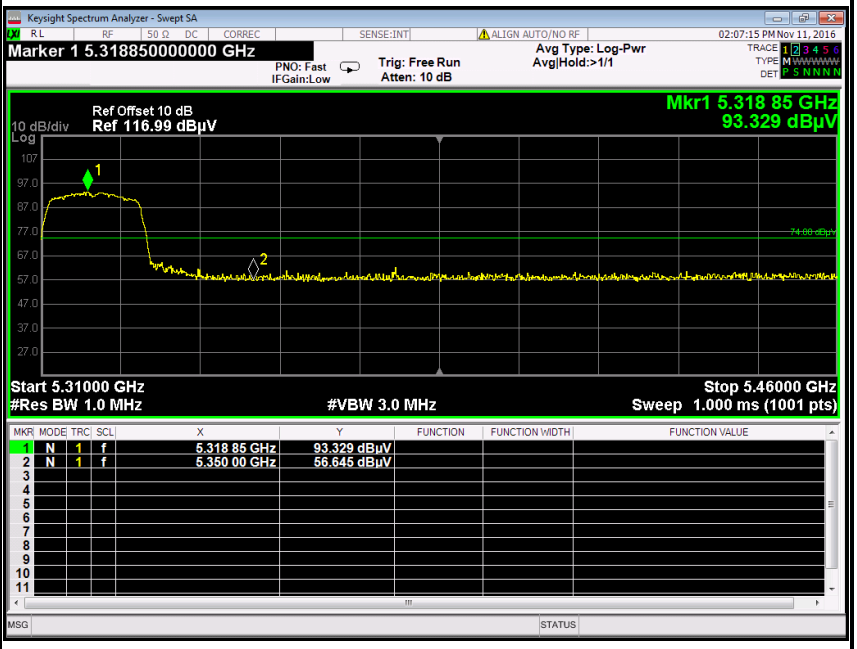


Detector mode: Average **Polarity: Vertical**

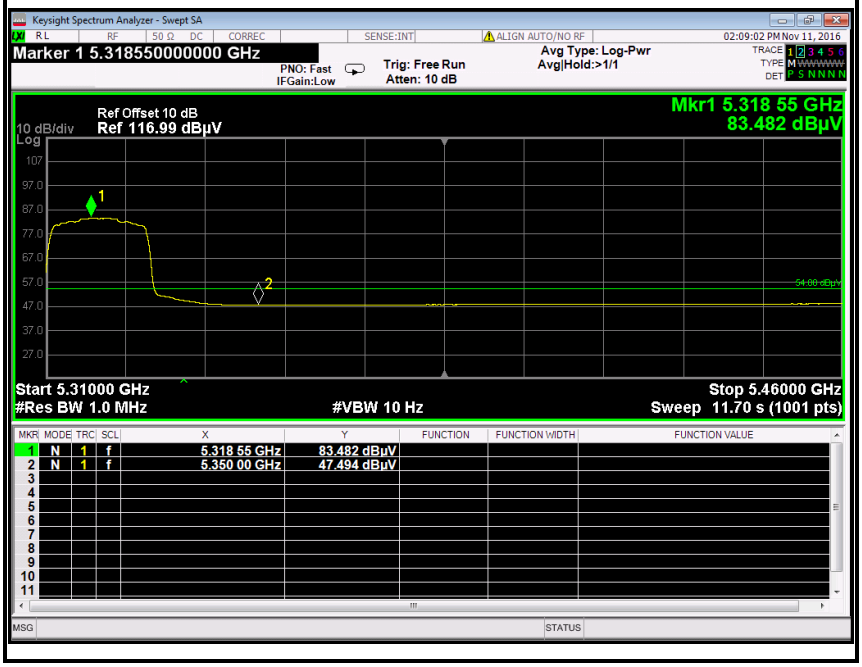


No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Pole
1	5350.0000	64.76	5.60	59.16	74.00	-14.84	Peak	Vertical
2	5350.0000	53.28	5.60	47.68	54.00	-6.32	Average	Vertical

Detector mode: Peak **Polarity: Horizontal**



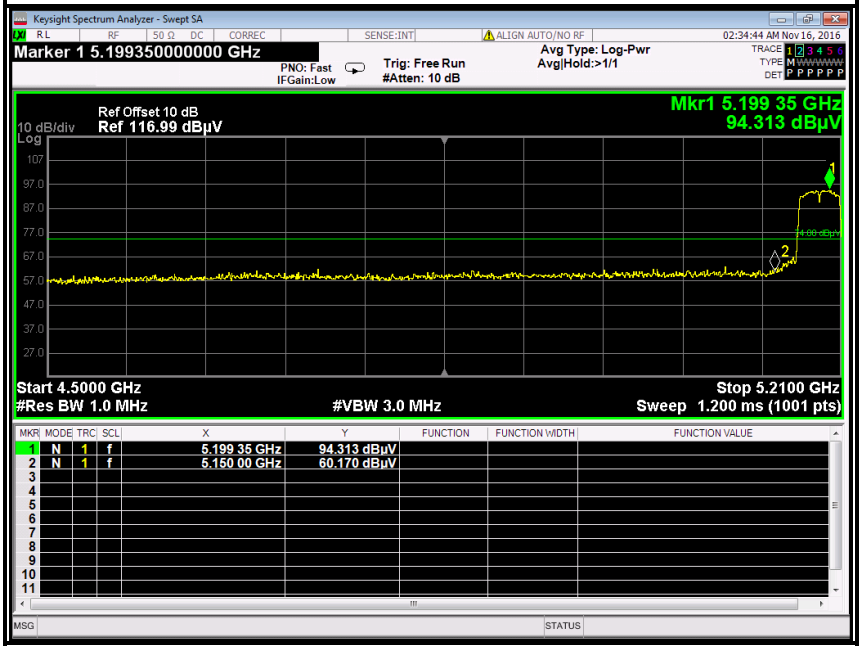
Detector mode: Average **Polarity: Horizontal**



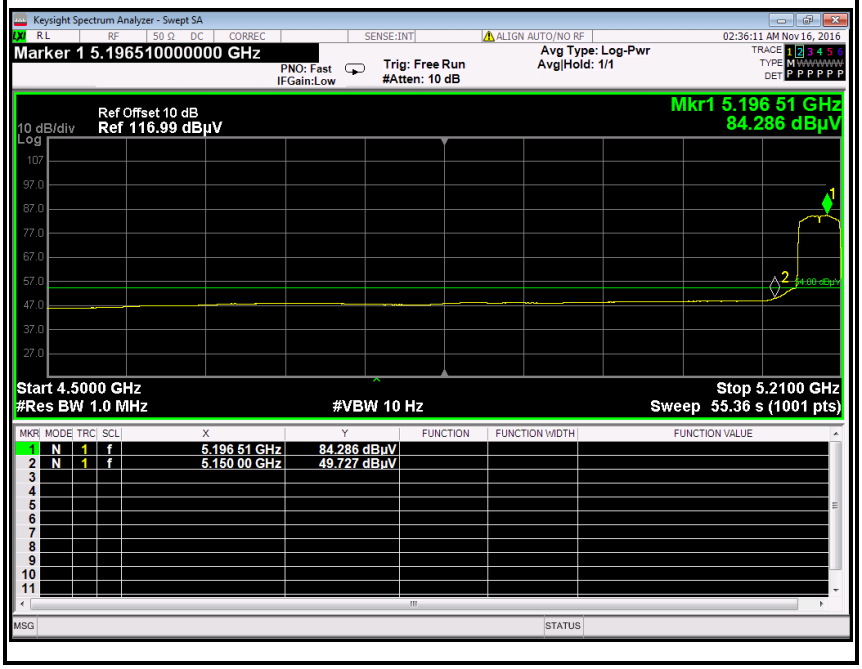
No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Pole
1	5350.0000	62.25	5.60	56.65	74.00	-17.36	Peak	Horizontal
2	5350.0000	53.09	5.60	47.49	54.00	-6.51	Average	Horizontal

IEEE 802.11n HT 40 MHz mode / 5190 MHz

Detector mode: Peak **Polarity: Vertical**

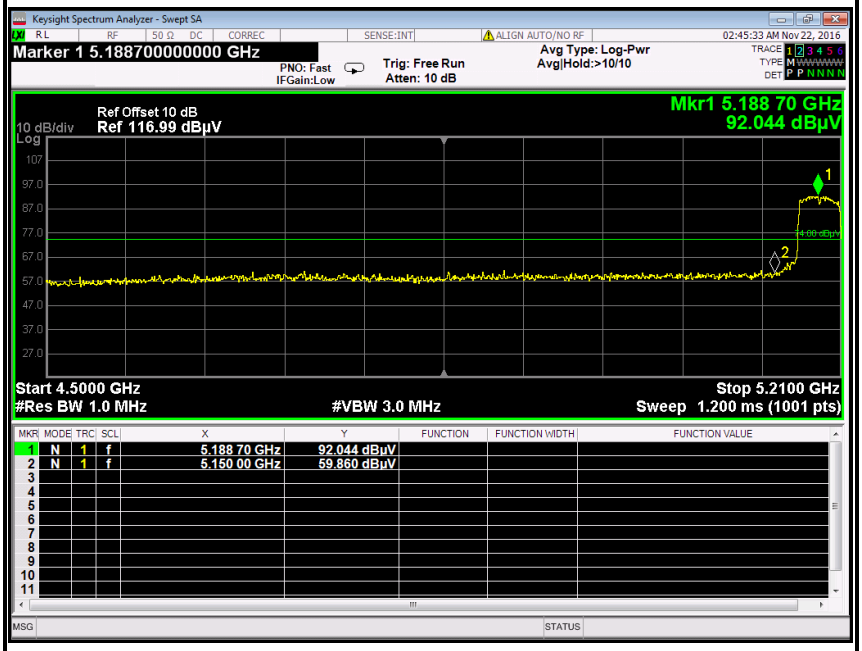


Detector mode: Average **Polarity: Vertical**

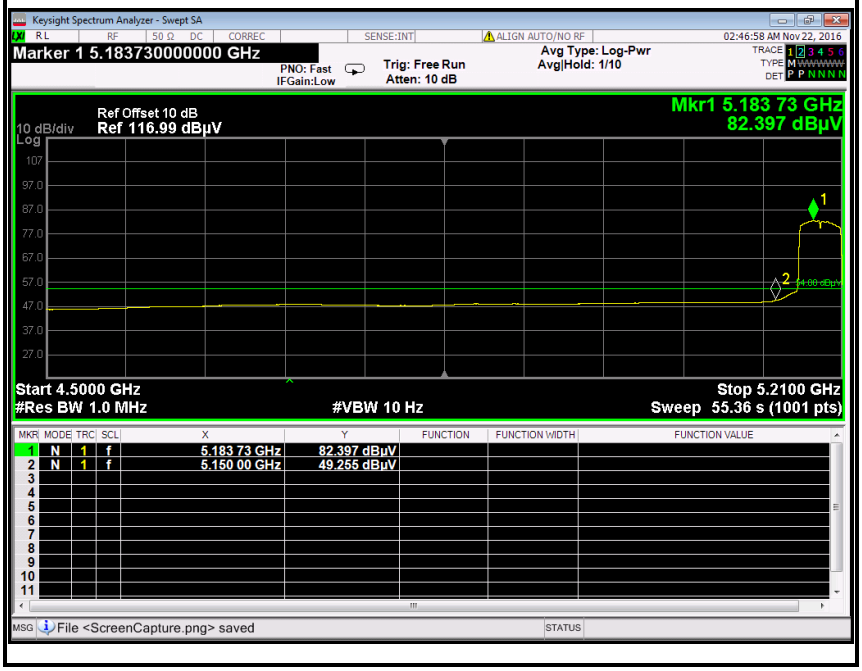


No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Pole
1	5150.0000	65.77	5.60	60.17	74.00	-13.83	Peak	Vertical
2	5150.0000	55.33	5.60	49.73	54.00	-4.27	Average	Vertical

Detector mode: Peak **Polarity: Horizontal**



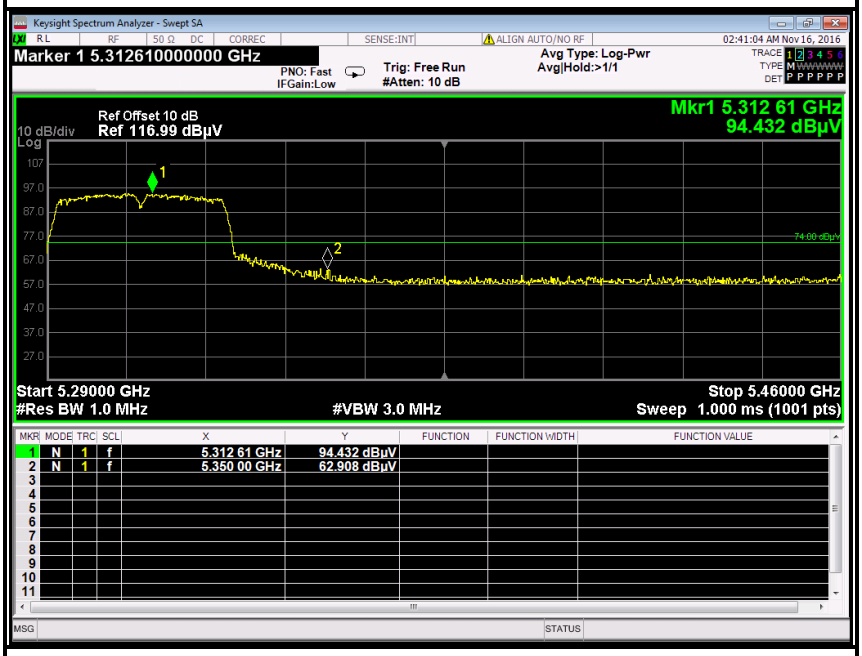
Detector mode: Average **Polarity: Horizontal**



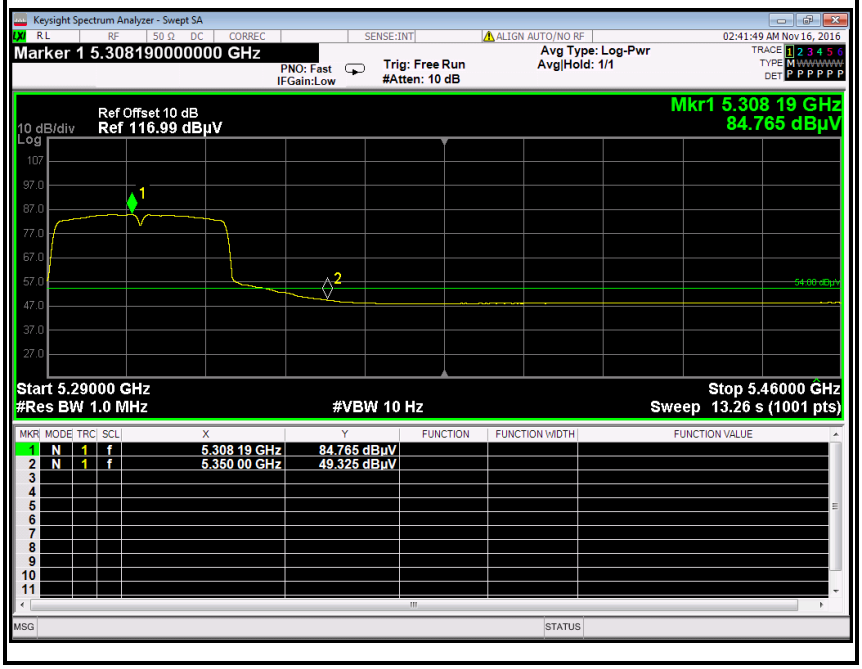
No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Pole
1	5150.0000	65.46	5.60	59.86	74.00	-14.14	Peak	Horizontal
2	5150.0000	54.86	5.60	49.26	54.00	-4.75	Average	Horizontal

IEEE 802.11n HT 40 MHz mode / 5310 MHz

Detector mode: Peak **Polarity: Vertical**

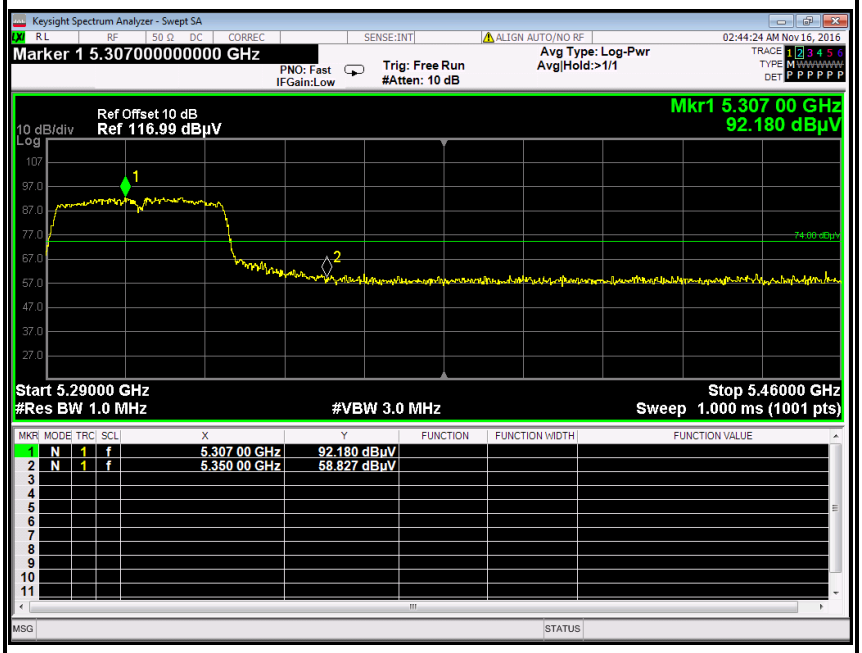


Detector mode: Average **Polarity: Vertical**

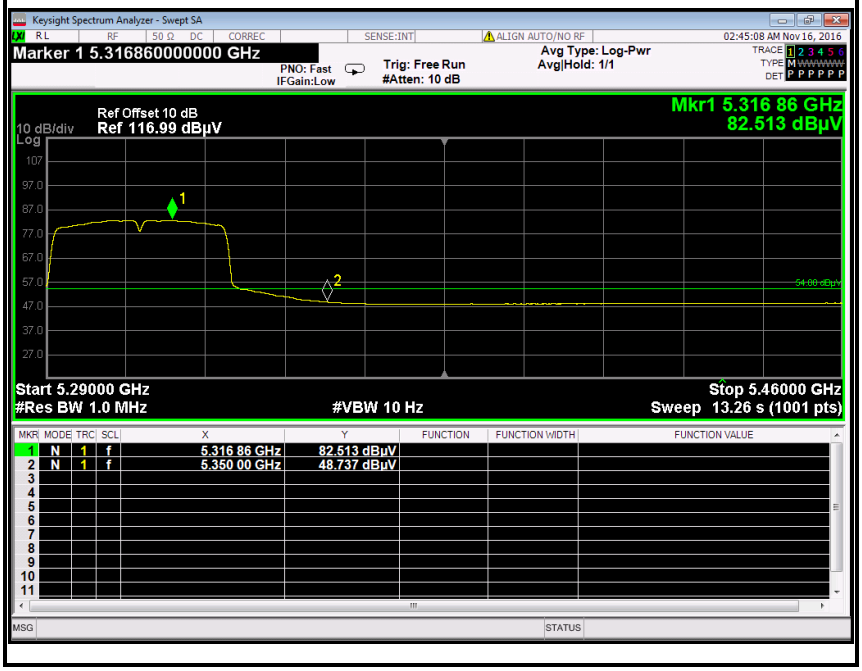


No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Pole
1	5350.0000	68.51	5.60	62.91	74.00	-11.09	Peak	Vertical
2	5350.0000	54.93	5.60	49.33	54.00	-4.68	Average	Vertical

Detector mode: Peak **Polarity: Horizontal**



Detector mode: Average **Polarity: Horizontal**



No.	Frequency (MHz)	Reading (dBuV)	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Pole
1	5350.0000	64.43	5.60	58.83	74.00	-15.17	Peak	Horizontal
2	5350.0000	54.34	5.60	48.74	54.00	-5.26	Average	Horizontal

6.6 PEAK POWER SPECTAL DENSITY

6.6.1 LIMIT

According to §15.407(a) & FCC R&O FCC 14-30

(1) For the band 5.15-5.25 GHz.

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

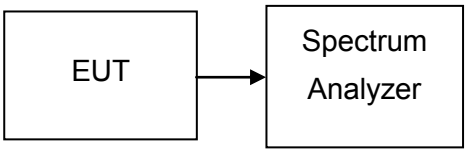
Note to paragraph (a)(3): The Commission strongly recommends that parties employing U-NII devices to provide critical communications services should determine if there are any nearby Government radar systems that could affect their operation.

6.6.2MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	02/21/2016	02/20/2017

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

6.6.3 TEST CONFIGURATION



6.6.4 TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
   Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. For devices operating in the bands 5.15-5.25 GHz,Set the spectrum analyzer as RBW = 1MHz, VBW = 3MHz, Span > 26dB bandwidth, Sweep=1ms
3. For devices operating in the bands 5.725-5.85 GHz,Set the spectrum analyzer as RBW = 470kHz, VBW = 3MHz, Span > 26dB bandwidth, Sweep=1ms
4. Record the max. reading.
5. Repeat the above procedure until the measurements for all frequencies are completed

6.6.5 TEST RESULTS

Test Data

Test mode: IEEE 802.11a mode / 5180 ~ 5240MHz

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margain	Result
Low	5180	3.929	11	-7.071	PASS
Mid	5200	4.200		-6.800	PASS
High	5240	4.537		-6.463	PASS

Test mode: IEEE 802.11a mode / 5260~ 5320MHz

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margain	Result
Low	5260	4.910	11	-6.090	PASS
Mid	5300	5.441		-5.559	PASS
High	5320	5.553		-5.447	PASS

Test mode: IEEE 802.11a mode / 5500 ~ 5700MHz

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margain	Result
Low	5500	4.428	11	-6.572	PASS
Mid	5580	2.993		-8.007	PASS
High	5700	2.988		-8.012	PASS

Test mode: IEEE 802.11a mode / 5745 ~ 5825MHz

Channel	Frequency (MHz)	PPSD (dBm)	factor	Limit (dBm)	Margain	Result
Low	5745	2.751	0.27	30	-26.979	PASS
Mid	5785	2.940	0.27		-26.790	PASS
High	5825	2.613	0.27		-27.117	PASS

Remark: factor =10*log10(500/RBW)

Test mode: IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margain	Result
Low	5180	4.203	11	-6.797	PASS
Mid	5200	4.128		-6.872	PASS
High	5240	4.588		-6.412	PASS

Test mode: IEEE 802.11n HT 20 MHz mode / 5260~ 5320MHz

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margain	Result
Low	5260	4.711	11	-6.289	PASS
Mid	5300	5.078		-5.922	PASS
High	5320	5.557		-5.443	PASS

Test mode: IEEE 802.11n HT 20 MHz mode / 5500 ~ 5700MHz

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margain	Result
Low	5500	4.094	11	-6.906	PASS
Mid	5580	2.483		-8.517	PASS
High	5700	3.578		-7.422	PASS

Test mode: IEEE 802.11n HT 20 MHz mode / 5745 ~ 5825MHz

Channel	Frequency (MHz)	PPSD (dBm)	factor	Limit (dBm)	Margain	Result
Low	5745	2.181	0.27	30	-27.549	PASS
Mid	5785	2.261	0.27		-27.469	PASS
High	5825	2.523	0.27		-27.207	PASS

Remark: factor =10*log10(500/RBW)

Test mode: IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margain	Result
Low	5190	0.867	11	-10.133	PASS
High	5230	1.036		-9.964	PASS

Test mode: IEEE 802.11n HT 40 MHz mode / 5270 ~ 5310MHz

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margain	Result
Low	5270	1.369	11	-9.631	PASS
High	5310	2.433		-8.567	PASS

Test mode: IEEE 802.11n HT 40 MHz mode / 5510 ~ 5670MHz

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margain	Result
Low	5510	-0.516	11	-11.516	PASS
Mid	5550	-0.372		-11.372	PASS
High	5670	-0.505		-11.505	PASS

Test mode: IEEE 802.11n HT 40 MHz mode / 5755 ~ 5795MHz

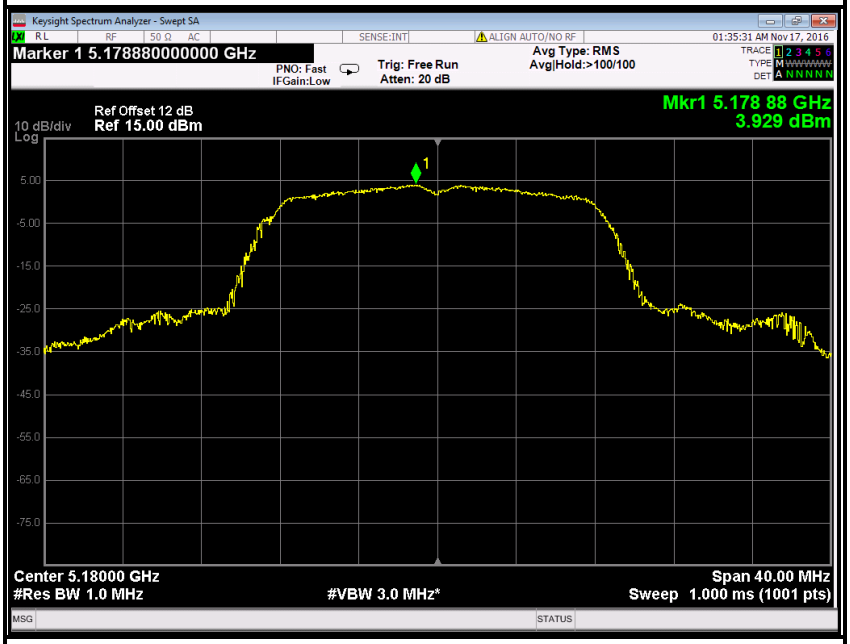
Channel	Frequency (MHz)	PPSD (dBm)	factor	Limit (dBm)	Margain	Result
Low	5755	2.523	0.27	30	-27.207	PASS
High	5795	-0.445	0.27		-30.175	PASS

Remark: factor =10*log10(500/RBW)

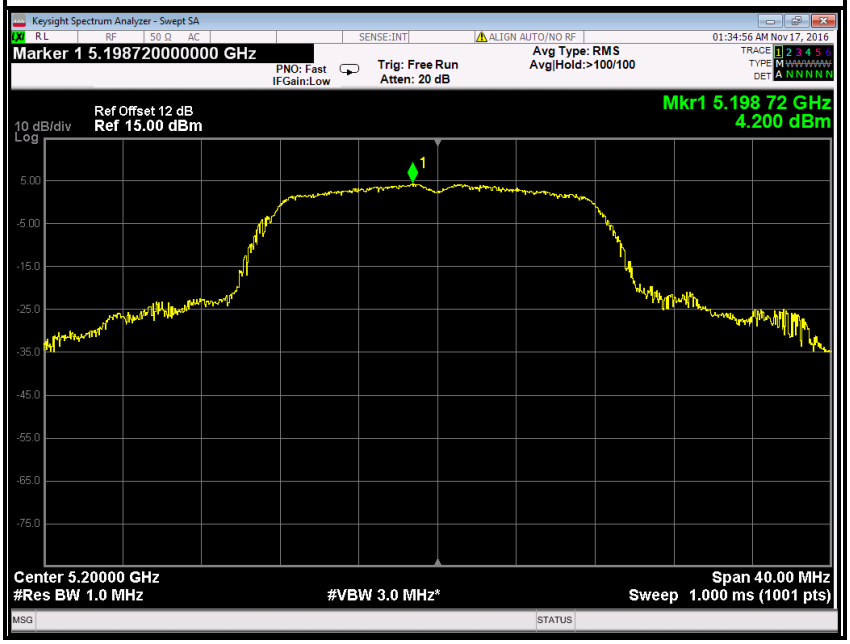
Test Plot

IEEE 802.11a mode / 5180 ~ 5240MHz

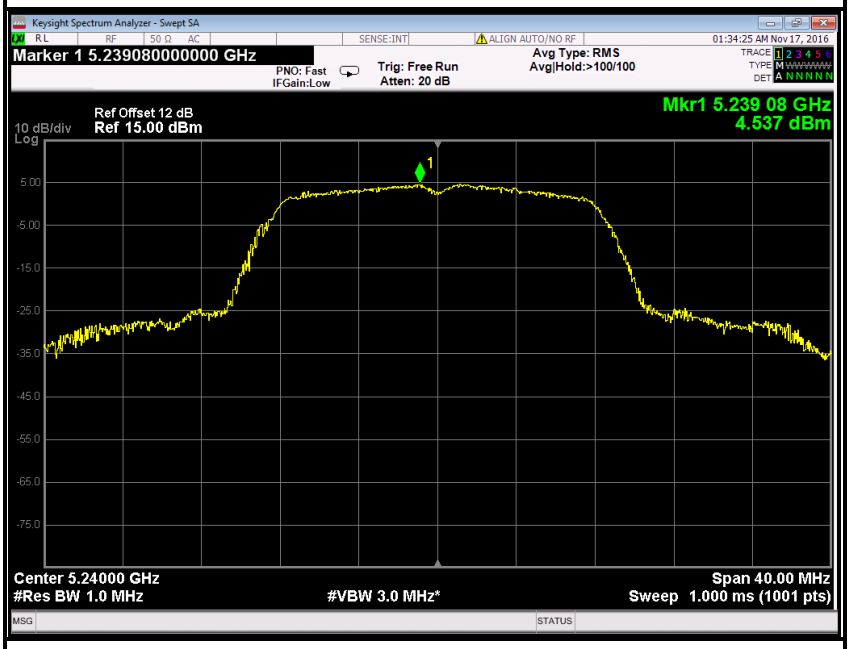
PPSD (CH Low)



PPSD (CH Mid)

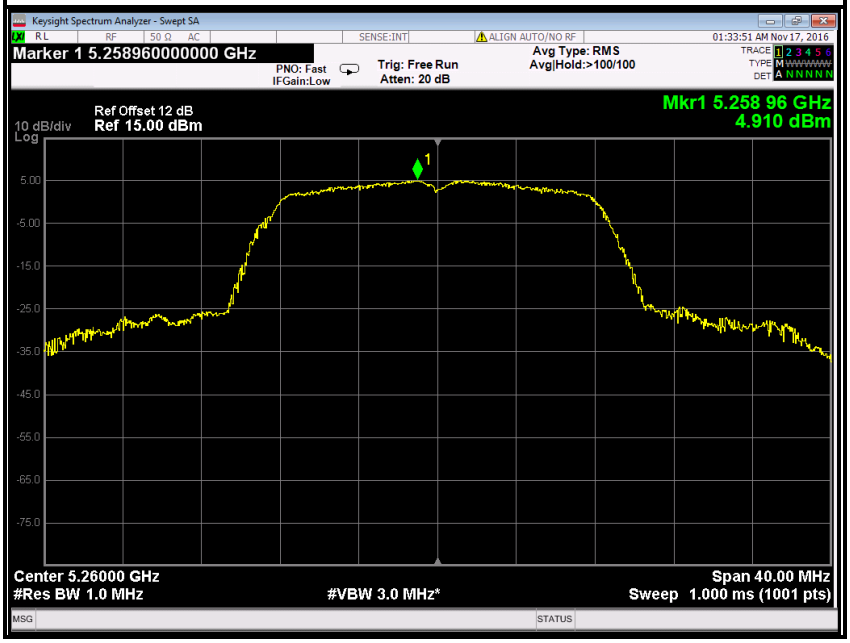


PPSD (CH High)

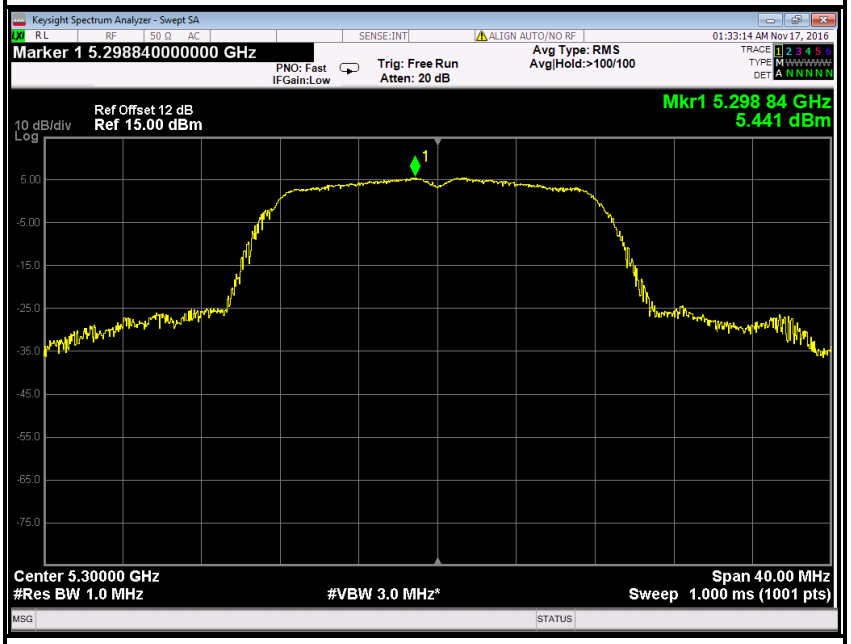


IEEE 802.11a mode / 5260~ 5320MHz

PPSD (CH Low)



PPSD (CH Mid)



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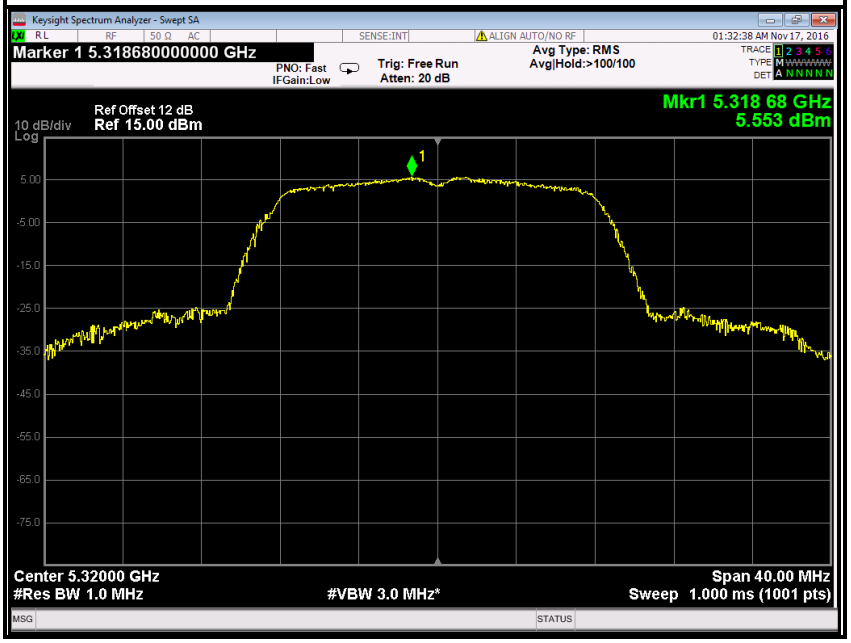

IEEE 802.11a mode / 5500 ~ 5700MHz

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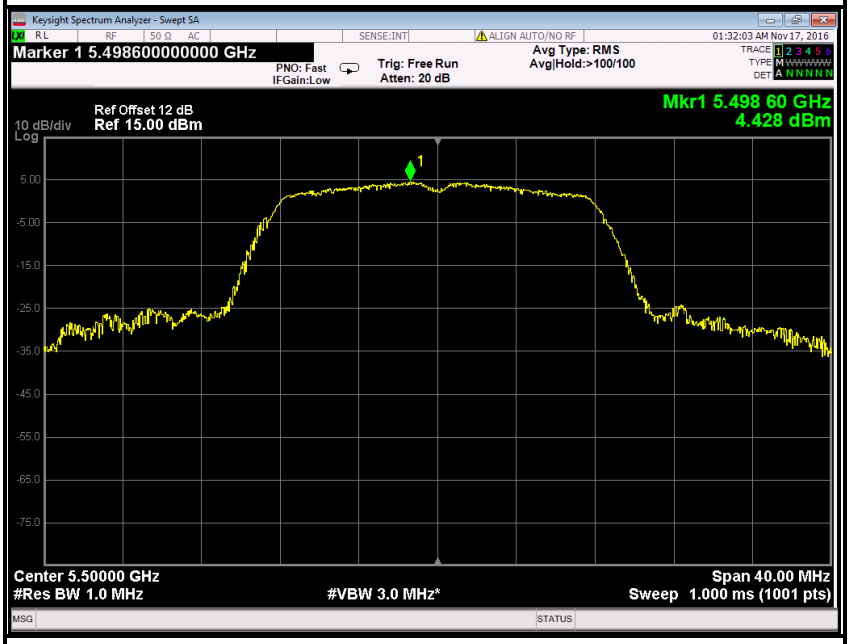

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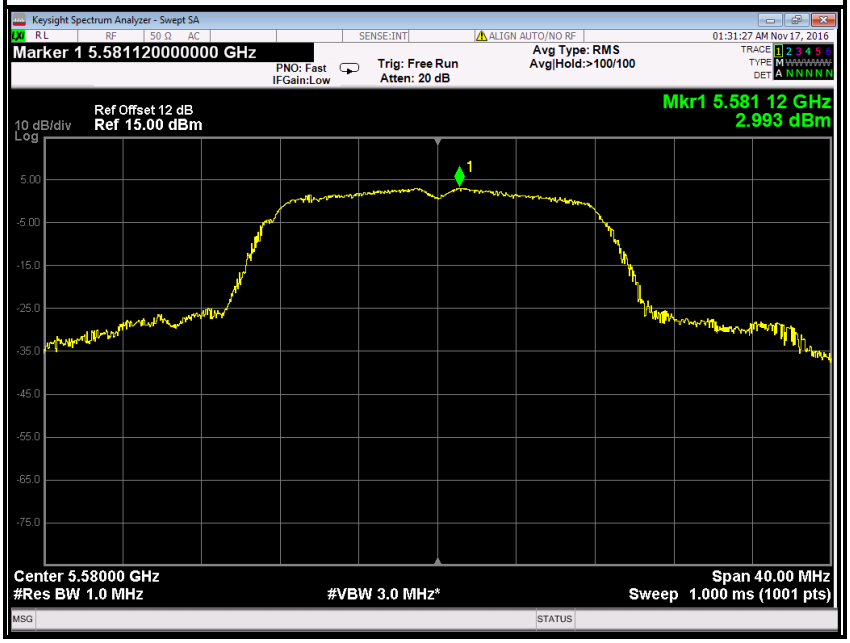
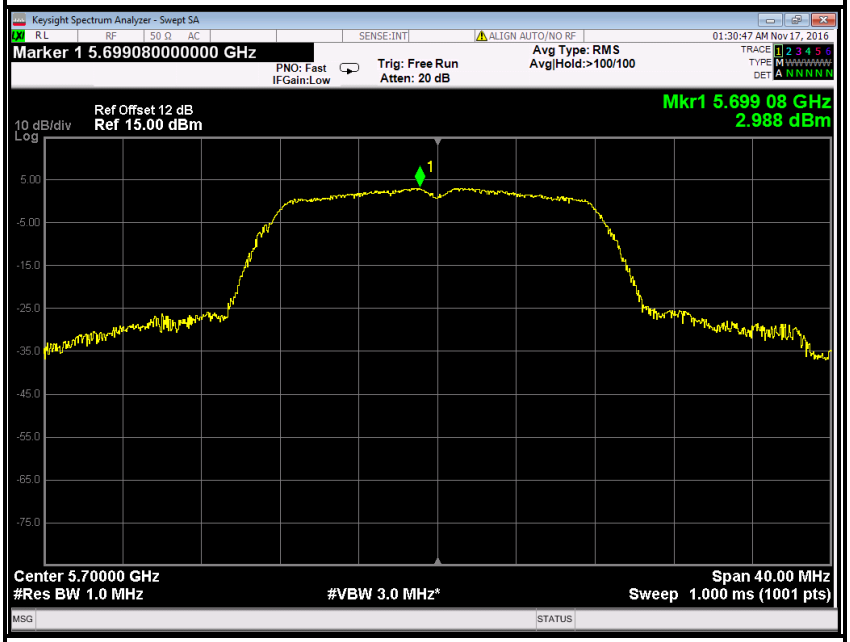
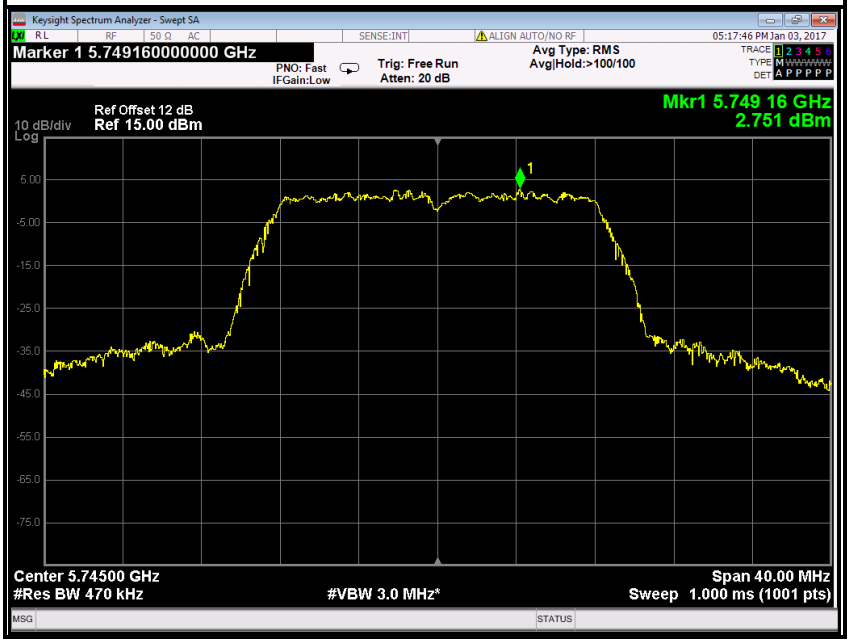


PPSD (CH High)



IEEE 802.11a mode / 5745 ~ 5825MHz

PPSD (CH Low)



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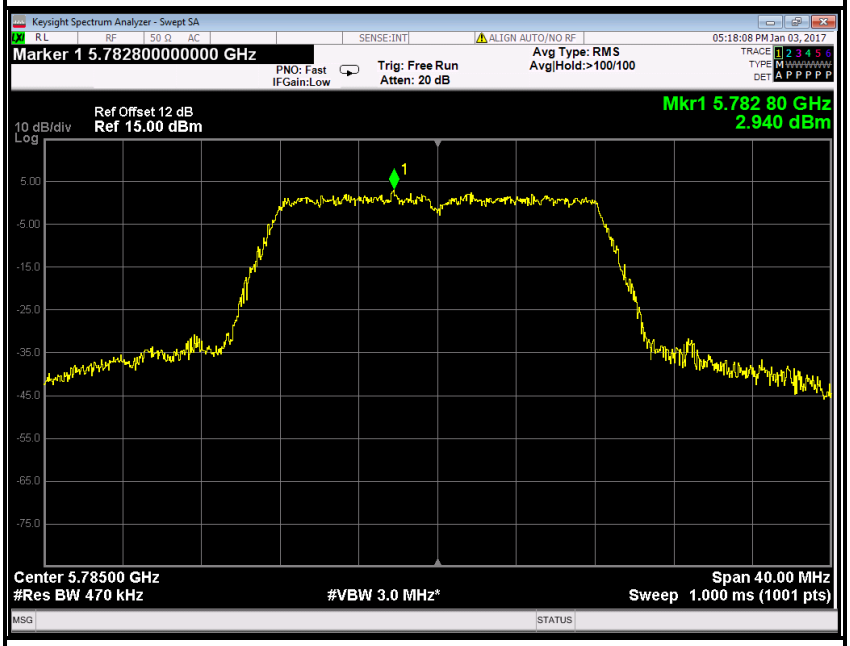
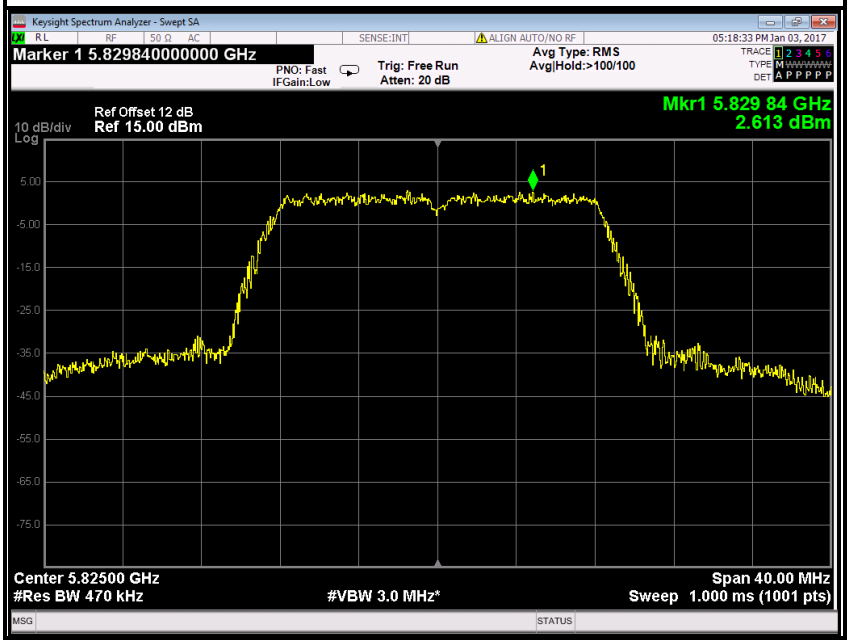
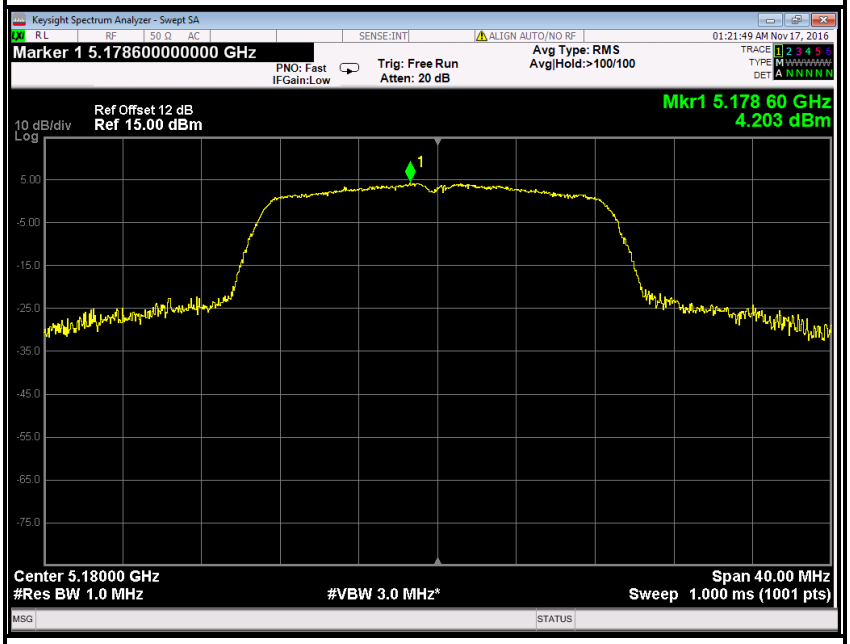


PPSD (CH High)



IEEE 802.11n HT 20 MHz mode / 5180 ~ 5240MHz
PPSD (CH Low)



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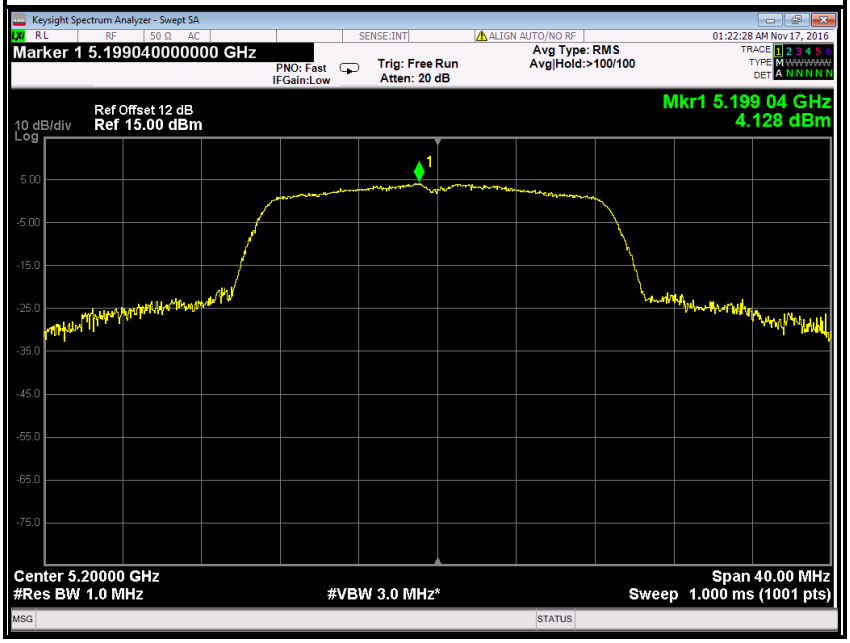

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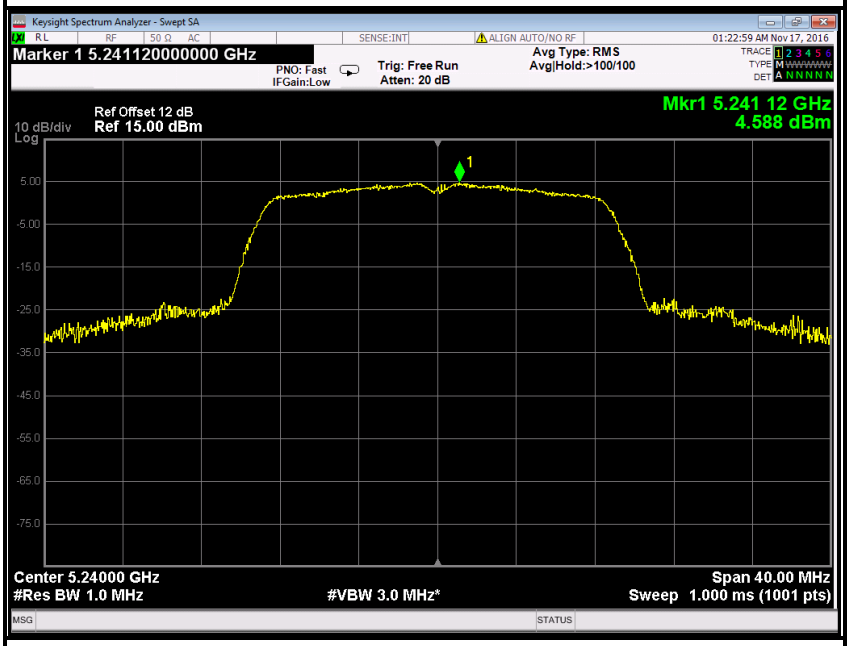
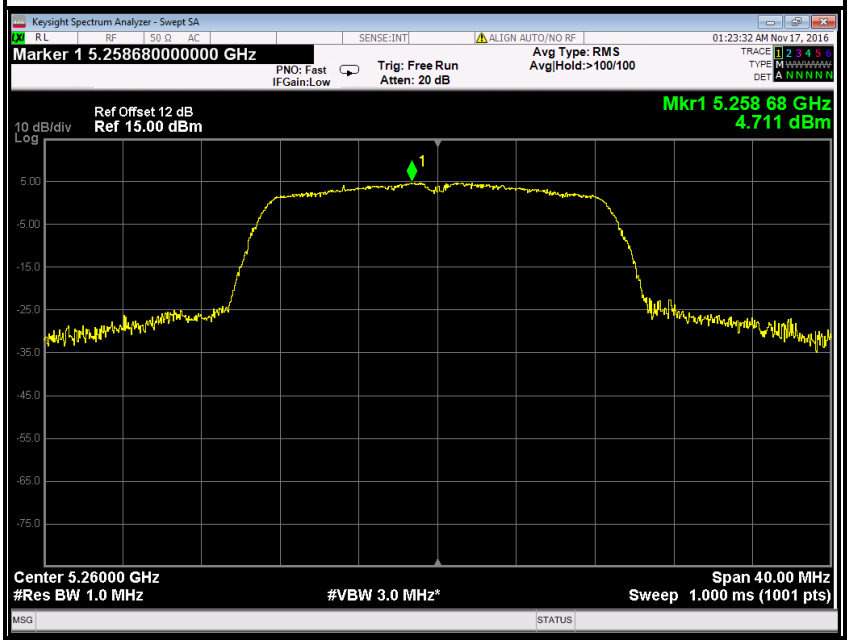


IEEE 802.11n HT 20 MHz mode / 5260~ 5320MHz

PPSD (CH Low)



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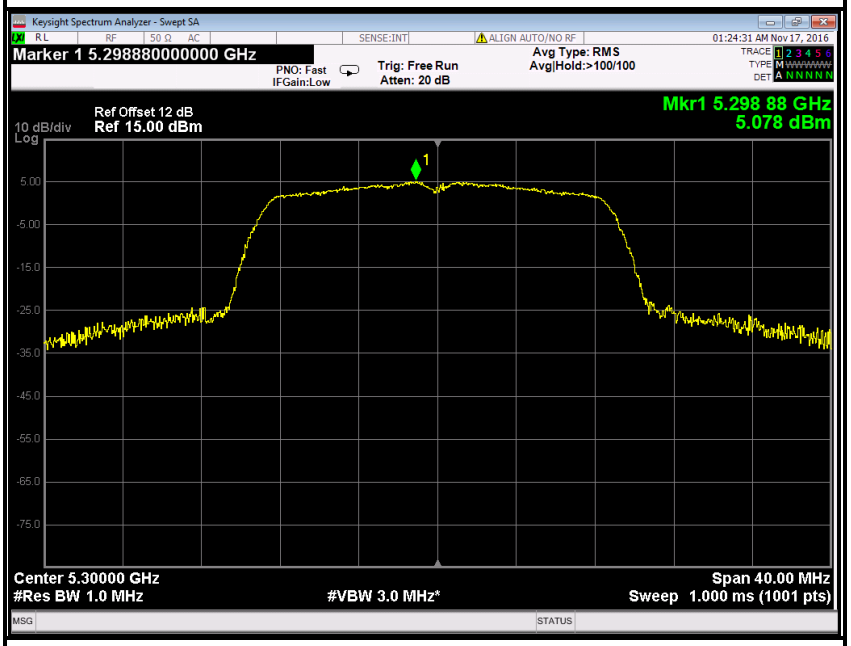

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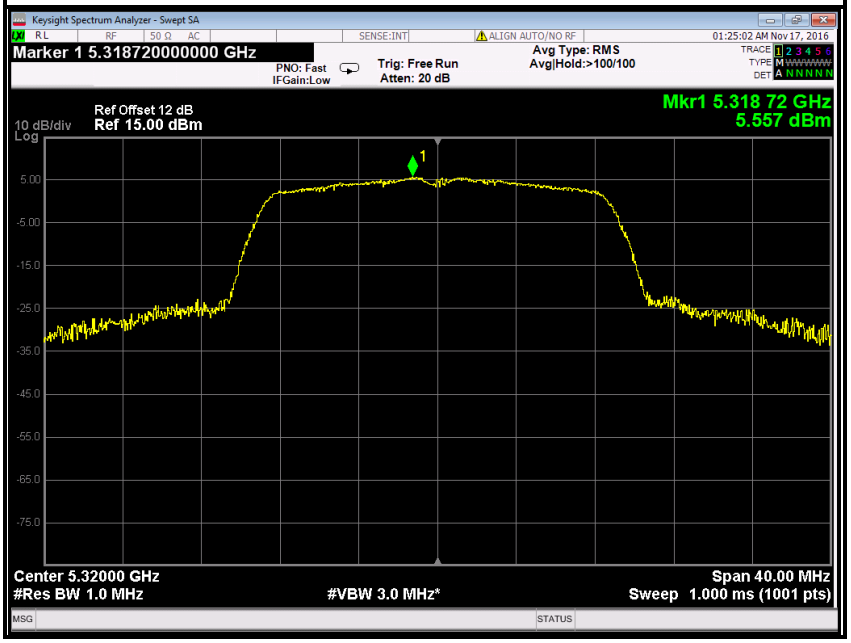
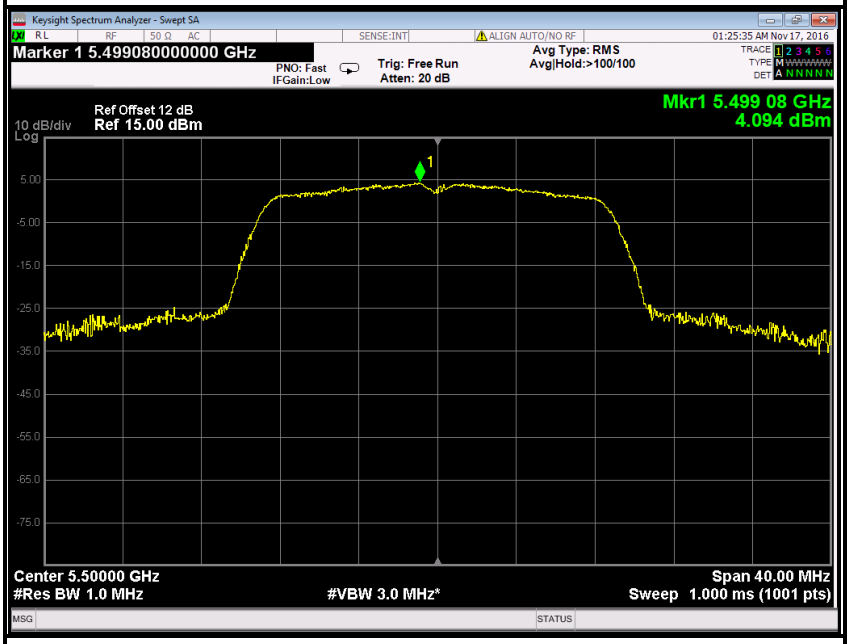


IEEE 802.11n HT 20 MHz mode / 5500 ~ 5700MHz

PPSD (CH Low)



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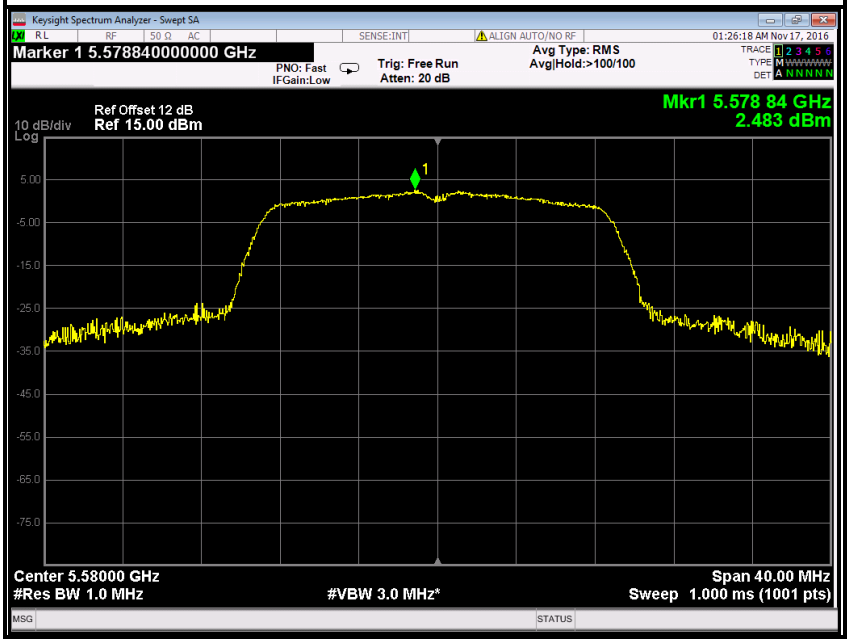
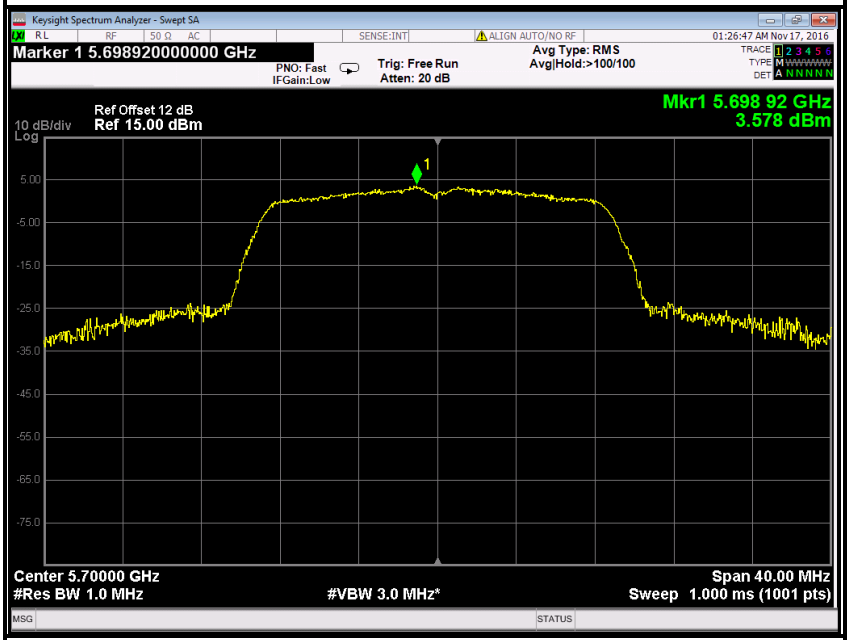
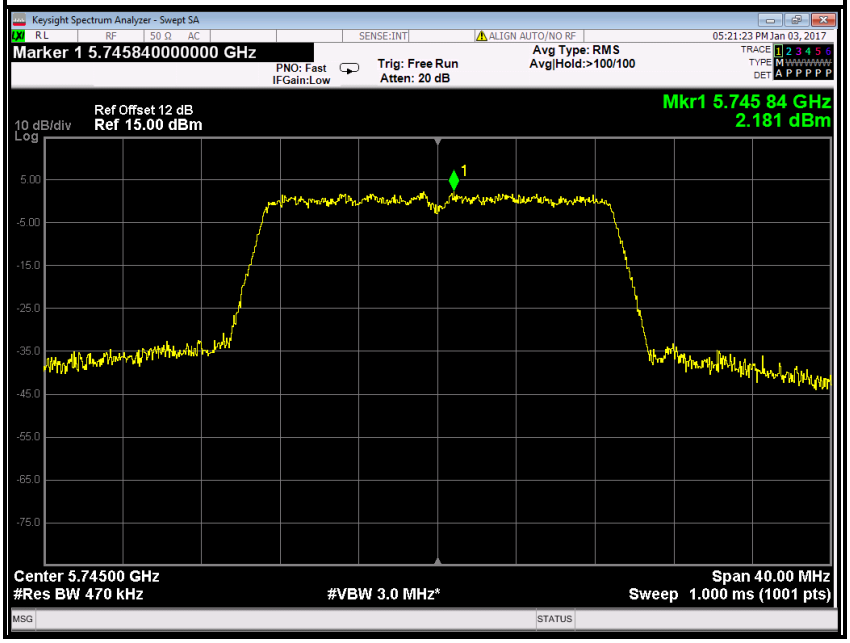


PPSD (CH High)



IEEE 802.11n HT 20 MHz mode / 5745 ~ 5825MHz

PPSD (CH Low)



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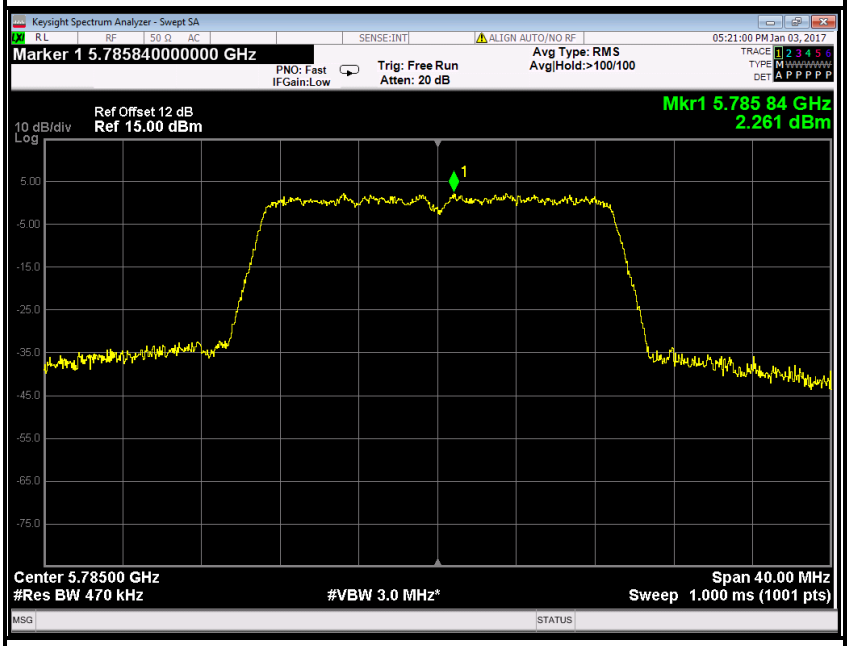

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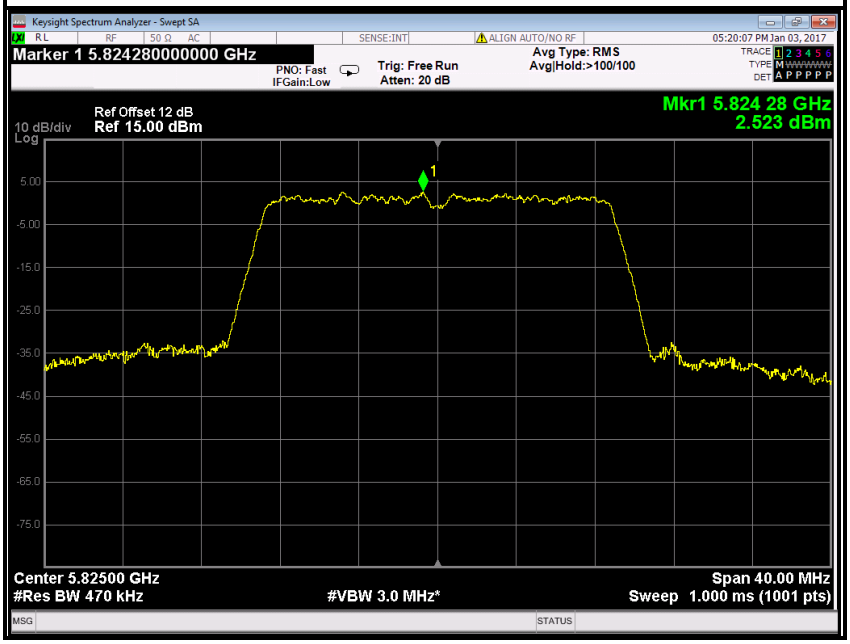
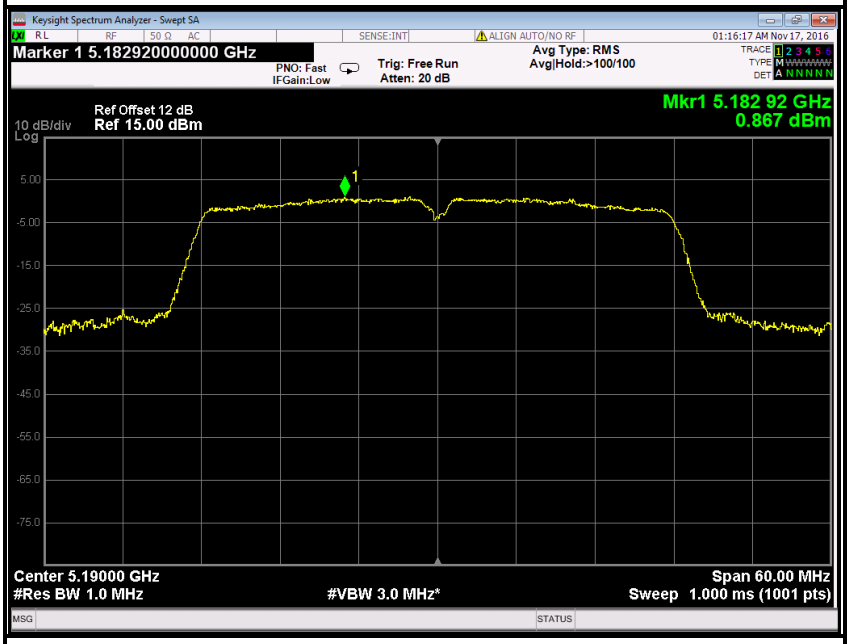
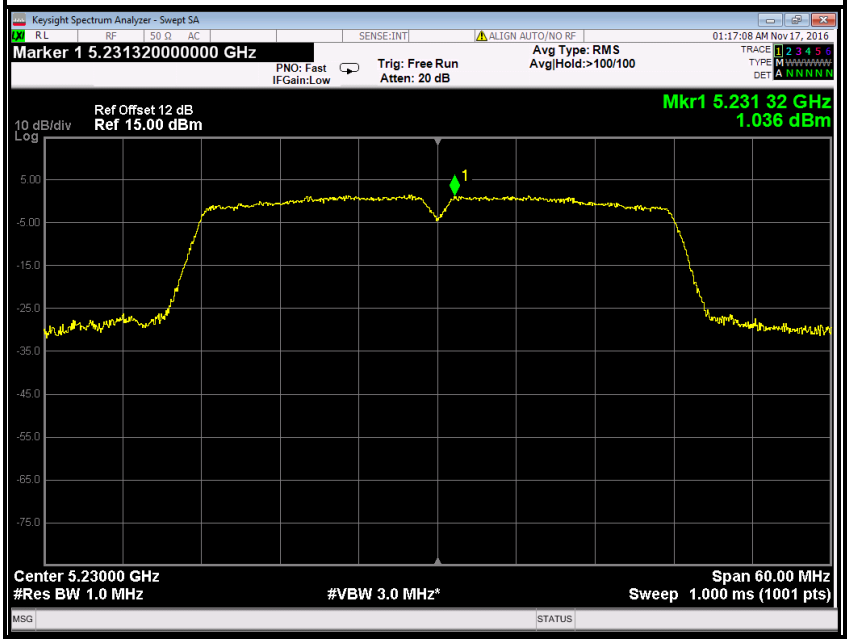


IEEE 802.11n HT 40 MHz mode / 5190 ~ 5230MHz
PPSD (CH Low)

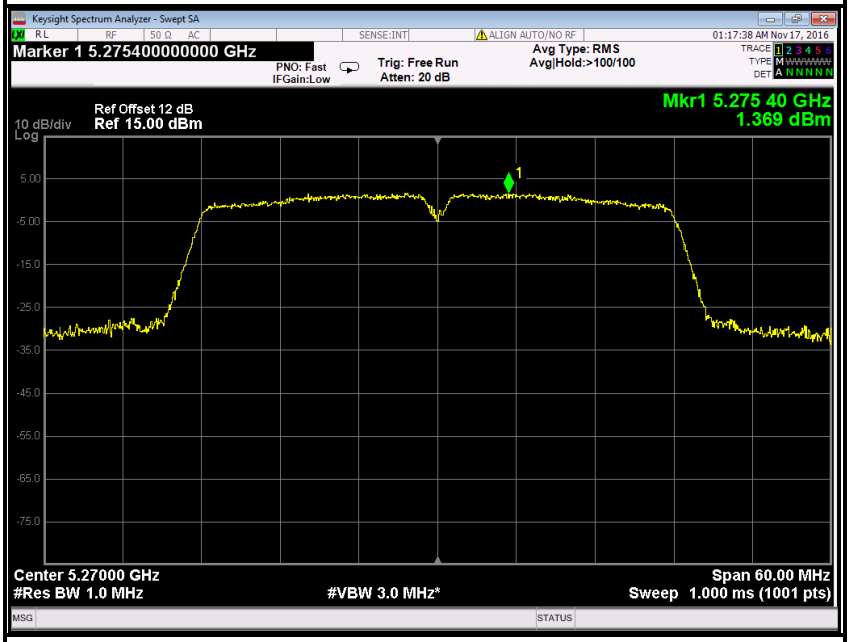


PPSD (CH High)

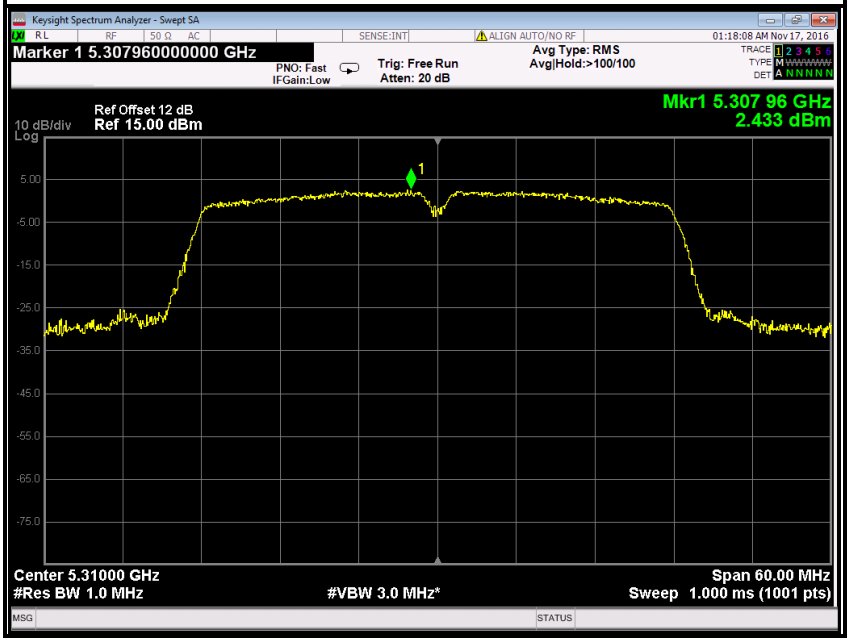


IEEE 802.11n HT 40 MHz mode / 5270 ~ 5310MHz

PPSD (CH Low)

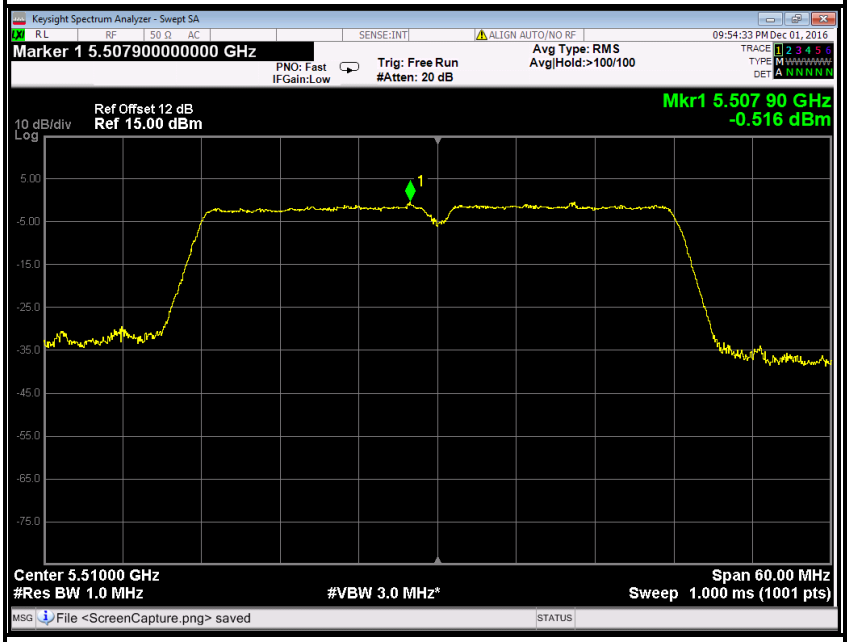


PPSD (CH High)

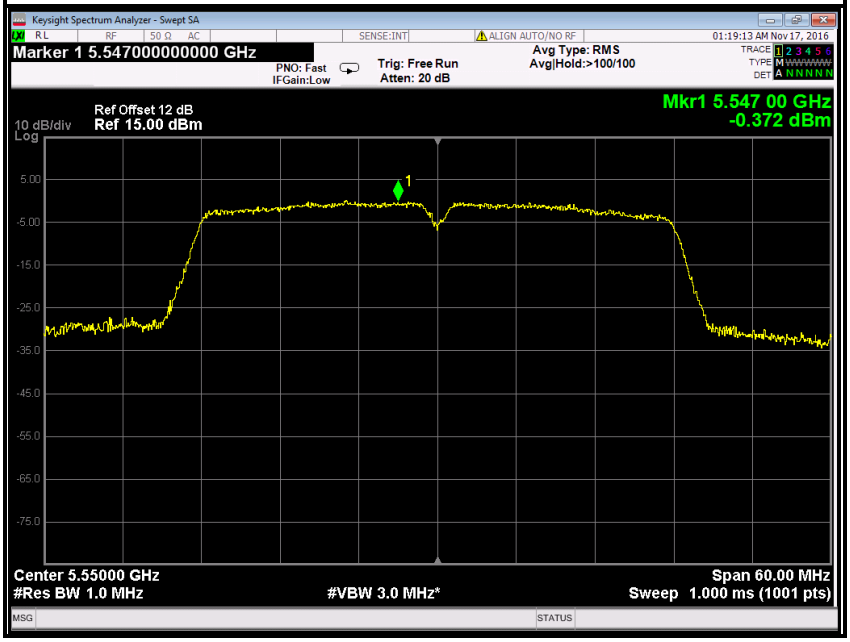


IEEE 802.11n HT 40 MHz mode / 5510 ~ 5670MHz

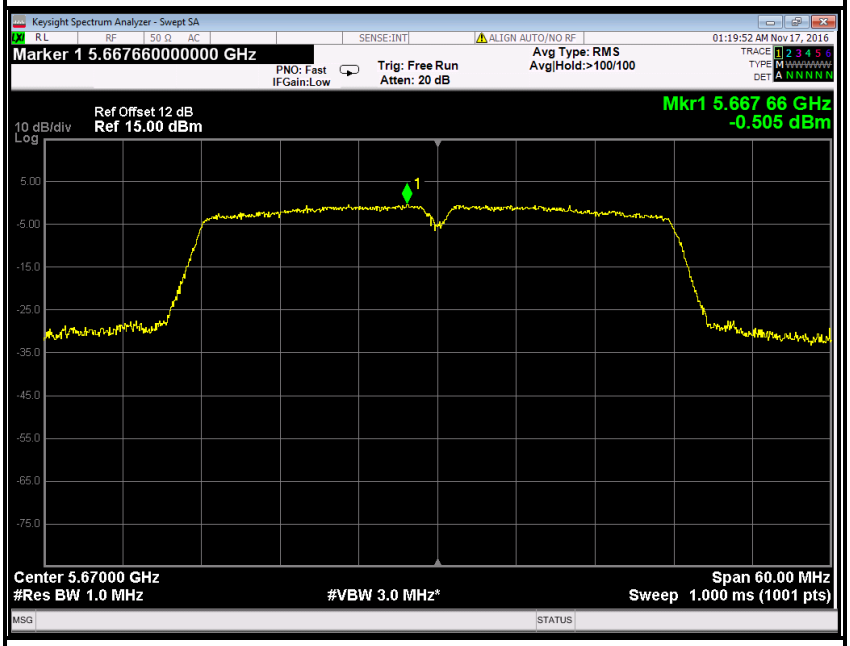
PPSD (CH Low)



PPSD (CH Mid)

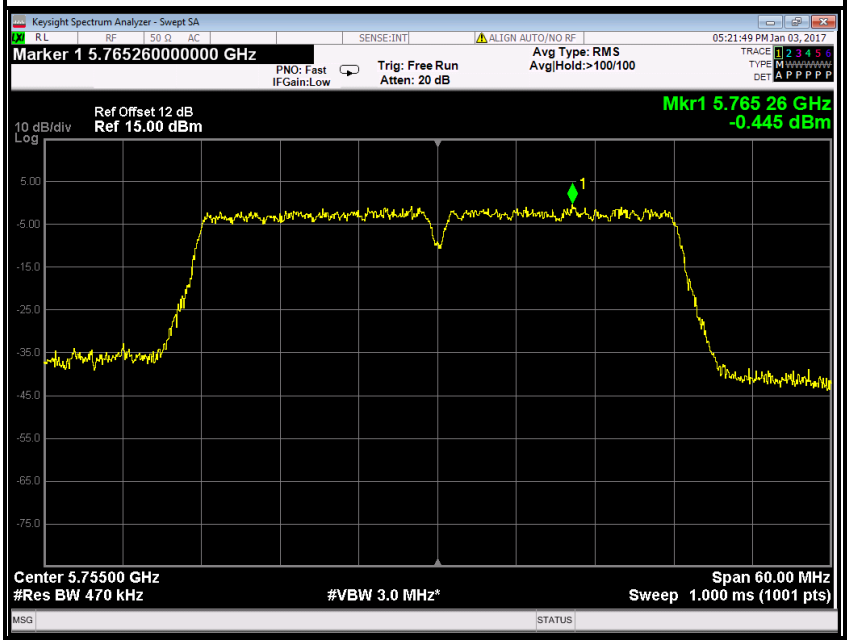


PPSD (CH High)

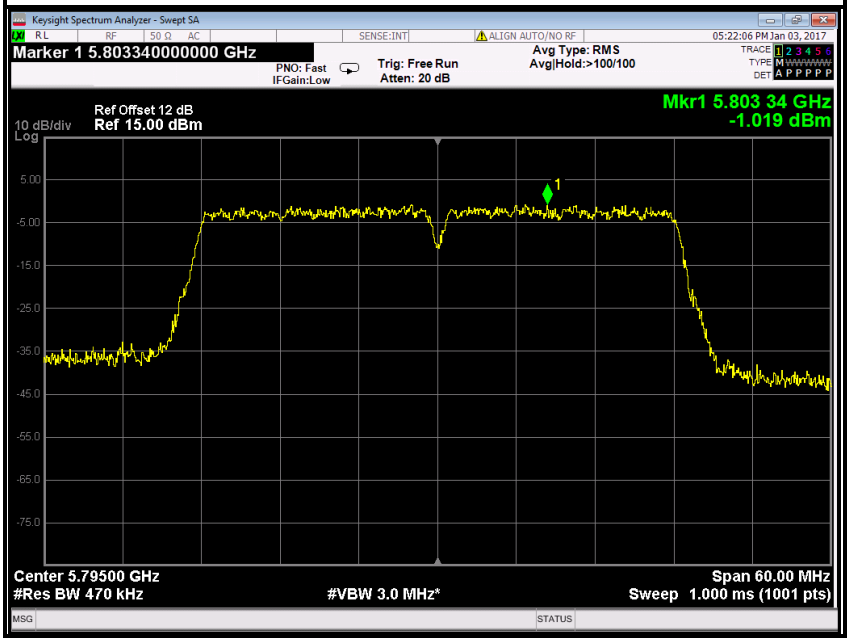


IEEE 802.11n HT 40 MHz mode / 5755 ~ 5795MHz

PPSD (CH Low)



PPSD (CH High)



6.7 RADIATED UNDESIABLE EMISSION

6.7.1 LIMIT

1. According to §15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

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

Remark: *Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.*

2. In the emission table above, the tighter limit applies at the band edges.

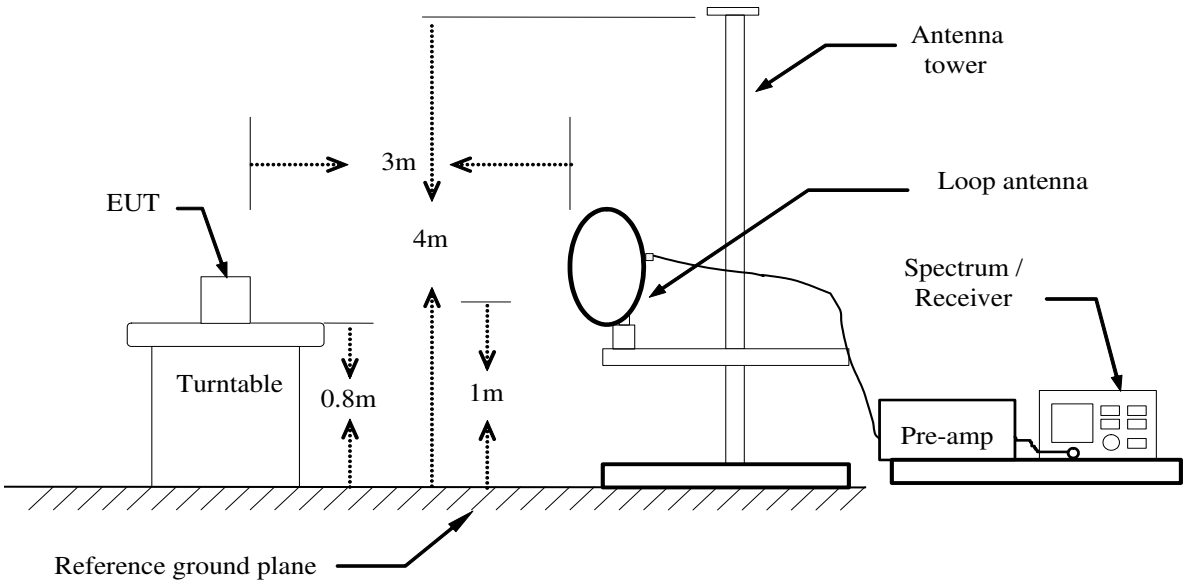
Frequency (MHz)	Field Strength (μV/m at 3-meter)	Field Strength (dBμV/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

6.7.2 TEST INSTRUMENTS

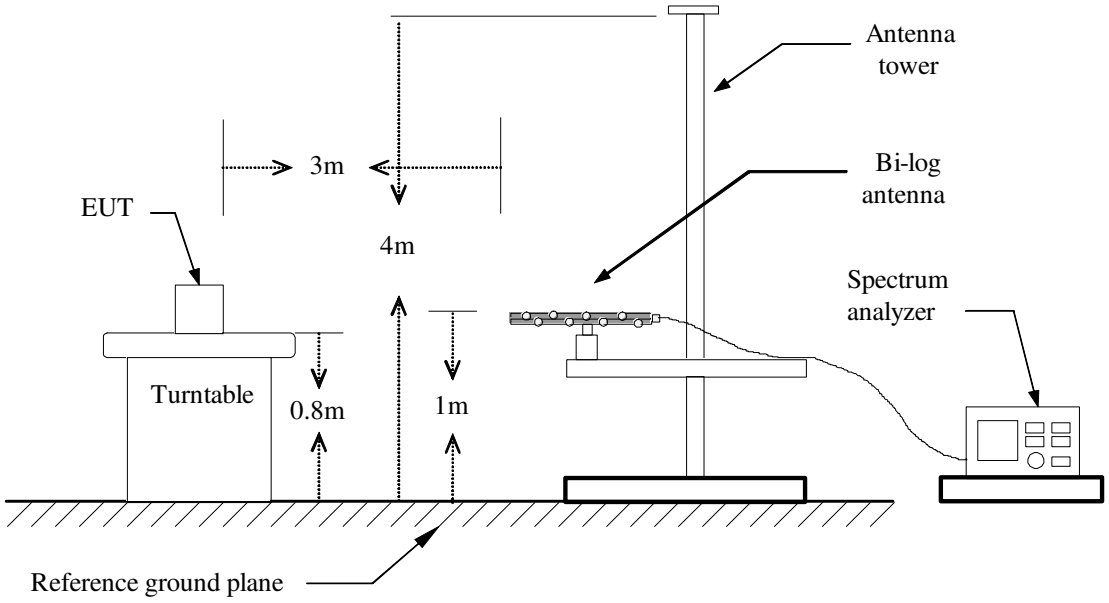
Radiated Emission Test Site 966(2)					
Name of Equipment	**Manufacturer**	**Model Number**	**Serial Number**	**Last Calibration**	**Due Calibration**
PSA Series Spectrum Analyzer	Agilent	E4446A	US44300399	02/21/2016	02/20/2017
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	02/21/2016	02/20/2017
Amplifier	EMEC	EM330	060661	03/18/2016	03/17/2017
High Noise Amplifier	Agilent	8449B	3008A01838	02/21/2016	02/20/2017
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170-497	02/28/2016	02/27/2017
Bilog Antenna	SCHAFFNER	CBL6143	5082	02/21/2016	02/20/2017
Horn Antenna	SCHWARZBECK	BBHA9120	D286	02/28/2016	02/27/2017
Loop Antenna	COM-POWER	AL-130	121044	09/25/2016	09/24/2017
Turn Table	N/A	N/A	N/A	N.C.R	N.C.R
Controller	Sunol Sciences	SC104V	022310-1	N.C.R	N.C.R
Controller	CT	N/A	N/A	N.C.R	N.C.R
Temp. / Humidity Meter	Anymetre	JR913	N/A	02/21/2016	02/20/2017
Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
Test S/W	FARAD	LZ-RF / CCS-SZ-3A2			

6.7.3 TEST CONFIGURATION

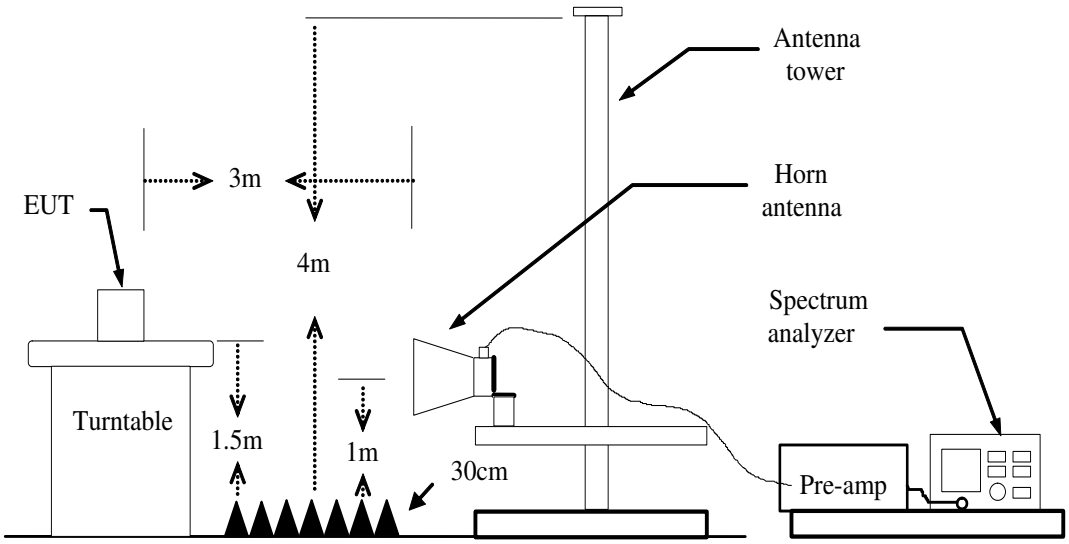
Below 30MHz



Below 1 GHz



Above 1 GHz



For the actual test configuration, please refer to the related item – Photographs of the TEST CONFIGURATION.

6.7.4 MEASURING SETTING

The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP/AVG
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP/AVG
Start ~ Stop Frequency	30MHz~1000MHz / RB 100kHz for QP

6.7.5 TEST PROCEDURE

1) Sequence of testing 9 kHz to 30 MHz
Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions.

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Pre measurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna height is 0.8 meter.

--- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

Final measurement:

--- Identified emissions during the pre measurement the software maximizes by rotating the turntable position (0° to 360°) and by rotating the elevation axes (0° to 360°).

--- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QPK detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the pre measurement and the limit will be stored.

2) Sequence of testing 30 MHz to 1 GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Pre measurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height changes from 1 to 3 meter.

--- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter.

--- The final measurement will be done with QP detector with an EMI receiver.

--- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

3) Sequence of testing 1 GHz to 18 GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Pre measurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height scan range is 1 meter to 2.5 meter.

--- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.

--- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.
--- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the pre measurement with marked maximum final measurements and the limit will be stored.

4) Sequence of testing above 18 GHz
Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 1 meter.

--- The EUT was set into operation.

Pre measurement:

--- The antenna is moved spherical over the EUT in different polarisations of the antenna.

Final measurement:

--- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak and Average detector.
--- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

6.7.6 DATA SAMPLE

Below 1GHz

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
XXX.XXXX	36.37	-12.20	24.17	40.00	-15.83	V	QP

Frequency (MHz) = Emission frequency in MHz
Reading (dBuV) = Uncorrected Analyzer / Receiver reading
Correct Factor (dB/m) = Antenna factor + Cable loss – Amplifier gain
Result (dBuV/m) = Reading (dBuV) + Corr. Factor (dB/m)
Limit (dBuV/m) = Limit stated in standard
Margin (dB) = Result (dBuV/m) – Limit (dBuV/m)
Q.P. = Quasi-peak Reading

Above 1GHz

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
XXXX.XXXX	62.09	-11.42	50.67	74.00	-23.33	V	Peak
XXXX.XXXX	49.78	-11.42	38.36	54.00	-15.64	V	AVG

Frequency (MHz) = Emission frequency in MHz
Reading (dBuV) = Uncorrected Analyzer / Receiver reading
Correction Factor (dB/m) = Antenna factor + Cable loss – Amplifier gain
Result (dBuV/m) = Reading (dBuV) + Corr. Factor (dB/m)
Limit (dBuV/m) = Limit stated in standard
Margin (dB) = Result (dBuV/m) – Limit (dBuV/m)
Peak = Peak Reading
AVG = Average Reading

Calculation Formula

Margin (dB) = Result (dBuV/m) – Limits (dBuV/m)
Result (dBuV/m) = Reading (dBuV) + Correction Factor

6.7.7 TEST RESULTS

Below 1 GHz

Test Mode: TX **Tested by:** Jacksan Luo

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** November 18, 2016

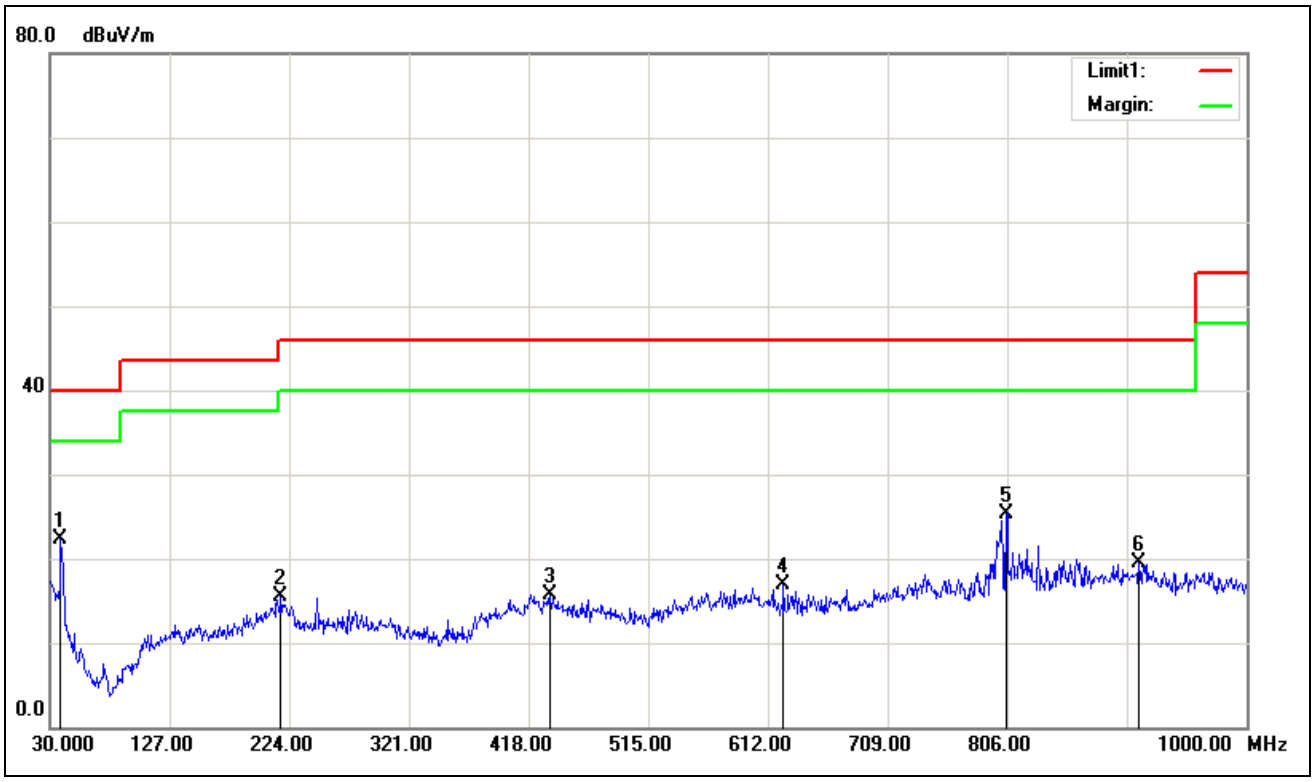
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
38.07	-15.79	22.28	40.00	-17.72	38.07	V	QP
36.12	-20.67	15.45	46.00	-30.55	36.12	V	QP
31.30	-15.64	15.66	46.00	-30.34	31.30	V	QP
29.63	-12.73	16.90	46.00	-29.10	29.63	V	QP
36.26	-10.94	25.32	46.00	-20.68	36.26	V	QP
29.06	-9.53	19.53	46.00	-26.47	29.06	V	QP
36.15	-20.56	15.59	46.00	-30.41	36.15	H	QP
36.28	-15.55	20.73	46.00	-25.27	36.28	H	QP
29.89	-12.76	17.13	46.00	-28.87	29.89	H	QP
28.68	-12.31	16.37	46.00	-29.63	28.68	H	QP
38.41	-11.12	27.29	46.00	-18.71	38.41	H	QP
28.73	-9.42	19.31	46.00	-26.69	28.73	H	QP

Pre-scan all mode and recorded the worst case results in this report (802.11a (Low Mid)).

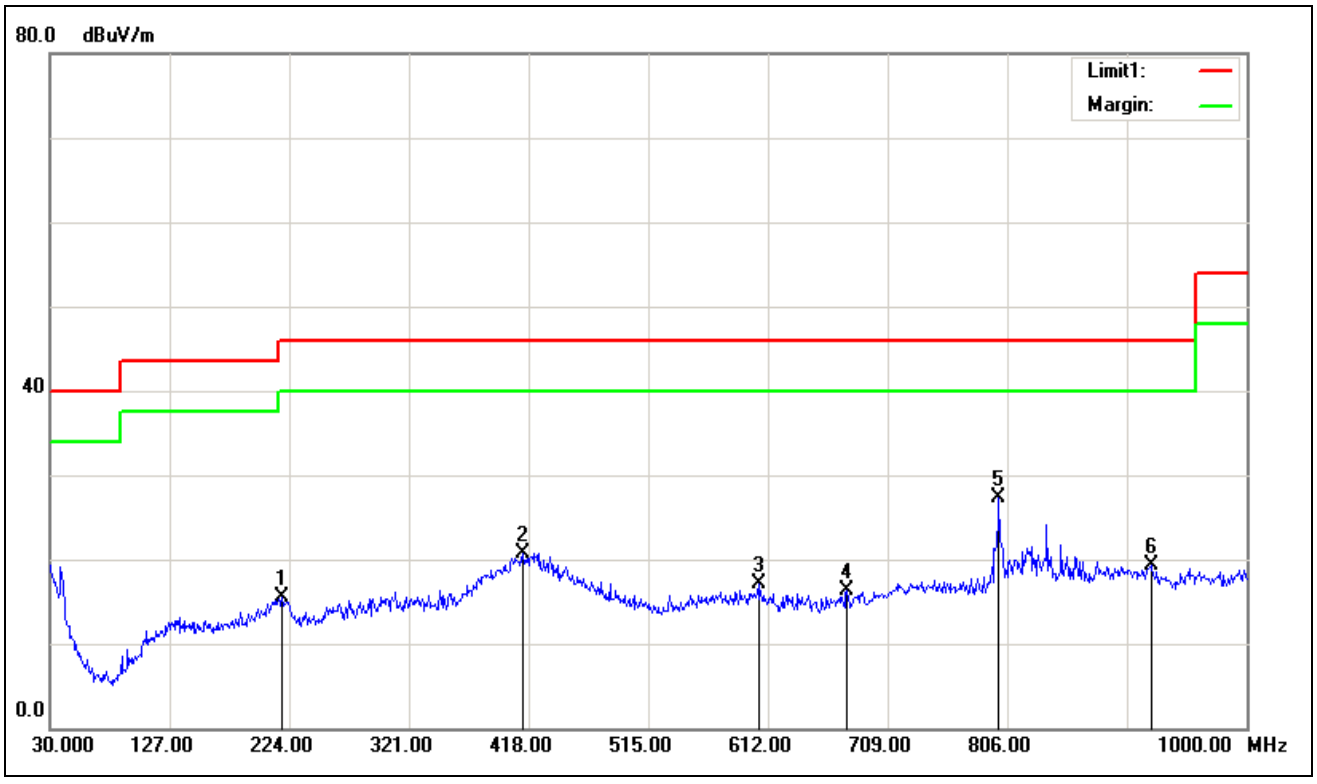
Remark:

1. *No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz)*
2. *Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.*
3. *Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m).*

Vertical



Horizontal



Above 1 GHz

1GHz~6GHz

Test Mode: TX **Tested by:** Jacksan Luo

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** November 18, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1195.000	48.36	-7.81	40.55	74.00	-33.45	V	peak
2010.000	46.37	-4.95	41.42	74.00	-32.58	V	peak
2665.000	46.59	-1.96	44.63	74.00	-29.37	V	peak
3695.000	43.99	0.30	44.29	74.00	-29.71	V	peak
4520.000	42.44	3.42	45.86	74.00	-28.14	V	peak
5075.000	42.45	5.11	47.56	74.00	-26.44	V	peak
1450.000	47.79	-6.97	40.82	74.00	-33.18	H	Peak
2060.000	47.00	-4.67	42.33	74.00	-31.67	H	Peak
2665.000	46.86	-1.96	44.90	74.00	-29.10	H	Peak
3360.000	45.32	-0.76	44.56	74.00	-29.44	H	peak
4030.000	43.45	1.70	45.15	74.00	-28.85	H	peak
5025.000	43.53	5.02	48.55	74.00	-25.45	H	peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

6GHz~18GHz

Test Mode: TX / IEEE 802.11a / 5180MHz /(CH Low) **Tested by:** Jacksan Luo

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** November 7, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
7356.000	30.59	8.39	38.98	74.00	-35.02	V	peak
7704.000	30.98	9.07	40.05	74.00	-33.95	V	peak
9384.000	30.65	10.21	40.86	74.00	-33.14	V	peak
10632.000	30.55	13.94	44.49	74.00	-29.51	V	peak
11148.000	30.12	15.01	45.13	74.00	-28.87	V	peak
12624.000	29.86	16.71	46.57	74.00	-27.43	V	peak
7140.000	30.53	7.97	38.50	74.00	-35.50	H	Peak
7644.000	31.01	8.96	39.97	74.00	-34.03	H	Peak
9432.000	30.84	10.34	41.18	74.00	-32.82	H	Peak
10344.000	30.44	13.05	43.49	74.00	-30.51	H	peak
11256.000	30.34	14.97	45.31	74.00	-28.69	H	peak
13284.000	28.62	18.70	47.32	74.00	-26.68	H	peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

Test Mode: TX / IEEE 802.11a / 5200MHz /(CH Mid) **Tested by:** Jacksan Luo

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** November 7, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
7368.000	30.97	8.42	39.39	74.00	-34.61	V	peak
8316.000	31.00	9.48	40.48	74.00	-33.52	V	peak
9468.000	30.80	10.45	41.25	74.00	-32.75	V	peak
10608.000	30.41	13.86	44.27	74.00	-29.73	V	peak
12144.000	30.19	15.12	45.31	74.00	-28.69	V	peak
13224.000	28.82	18.54	47.36	74.00	-26.64	V	peak
7368.000	30.55	8.42	38.97	74.00	-35.03	H	Peak
8316.000	31.15	9.48	40.63	74.00	-33.37	H	Peak
9468.000	30.65	10.45	41.10	74.00	-32.90	H	Peak
10608.000	30.67	13.86	44.53	74.00	-29.47	H	peak
11628.000	30.50	14.80	45.30	74.00	-28.70	H	peak
13236.000	28.92	18.57	47.49	74.00	-26.51	H	peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

Test Mode: TX / IEEE 802.11a / 5240MHz /(CH High) **Tested by:** Jacksan Luo

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** November 7, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
7740.000	31.44	9.14	40.58	74.00	-33.42	V	peak
9432.000	30.64	10.34	40.98	74.00	-33.02	V	peak
10104.000	30.42	12.30	42.72	74.00	-31.28	V	peak
11196.000	30.42	14.99	45.41	74.00	-28.59	V	peak
12444.000	30.10	16.11	46.21	74.00	-27.79	V	peak
13092.000	28.70	18.19	46.89	74.00	-27.11	V	peak
7500.000	30.80	8.68	39.48	74.00	-34.52	H	Peak
8208.000	31.12	9.54	40.66	74.00	-33.34	H	Peak
9456.000	31.41	10.41	41.82	74.00	-32.18	H	Peak
10656.000	30.18	14.01	44.19	74.00	-29.81	H	peak
11256.000	30.22	14.97	45.19	74.00	-28.81	H	peak
13068.000	28.86	18.13	46.99	74.00	-27.01	H	peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*

Test Mode: TX / IEEE 802.11a / 5260MHz /(CH Low) **Tested by:** Jacksan Luo

Ambient temperature: 24°C **Relative humidity:** 52% RH **Date:** November 7, 2016

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
7488.000	30.83	8.65	39.48	74.00	-34.52	V	peak
8220.000	30.78	9.53	40.31	74.00	-33.69	V	peak
9996.000	30.77	11.97	42.74	74.00	-31.26	V	peak
11136.000	30.14	15.02	45.16	74.00	-28.84	V	peak
11652.000	30.34	14.79	45.13	74.00	-28.87	V	peak
13284.000	28.62	18.70	47.32	74.00	-26.68	V	peak
7212.000	30.97	8.11	39.08	74.00	-34.92	H	Peak
8412.000	31.23	9.42	40.65	74.00	-33.35	H	Peak
10200.000	30.57	12.60	43.17	74.00	-30.83	H	Peak
11280.000	30.43	14.96	45.39	74.00	-28.61	H	peak
12396.000	30.22	15.95	46.17	74.00	-27.83	H	peak
13428.000	28.48	19.08	47.56	74.00	-26.44	H	peak

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.*
3. *Average test would be performed if the peak result were greater than the average limit.*
4. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
5. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
6. *Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).*