EMC
TEST REPORT

Report No.: **160300003TWN-001**
Model No.: **PLTN-RB1V1**
Issued Date: **Apr. 18, 2016**

Applicant: **Peloton Interactive LLC**
158 West 27th Street Fourth Floor New York, NY 10001

Test Method/ Standard: **47 CFR FCC Part 15.407**
KDB 789033 D02 v01r02
ANSI C63.10 2013
KDB 662911 D01 v02r01

Test Site: **93910**

Test By: **Intertek Testing Services Taiwan Ltd.**
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Testing Laboratory
0597

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Revision History

Report No.	Issue Date	Revision Summary
160300003TWN-001	Apr. 18, 2016	Original report

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1. Summary of Test Data

Test Requirement	Applicable Rule (Section 15.407)	Result
Maximum Conducted Output Power	15.407 (a)(1)/(2)/(3) KDB 789033 D02 v01r02	Pass
Power Spectrum Density	15.407 (a)(1)/(2)/(3) KDB 789033 D02 v01r02	Pass
Minimum Emission Bandwidth	15.407(a)(5), 15.407(e) KDB 789033 D02 v01r02	Pass
Emissions In Restricted Frequency Bands (Radiated emission measurements)	15.407(b), 15.209	Pass
Emission on The Band Edge	15.407(b), 15.209	Pass
AC Line Conducted Emission	15.407(b)(6) 15.207	Pass
Antenna requirement	15.203	Pass

2. General information

2.1 Identification of the EUT

Product:	Peloton Console
Model No.:	PLTN-RB1V1
Operating Frequency:	1. 5180 MHz ~ 5240 MHz for 802.11a, 802.11n(HT 20) 2. 5190 MHz ~ 5200 MHz for 802.11n (HT 40) 3. 5190 MHz ~ 5240 MHz for 802.11ac (VHT 20) 4. 5190 MHz ~ 5230 MHz for 802.11ac (VHT 40) 5. 5210 MHz for 802.11ac (VHT 80)
Channel Number:	1. 4 channels for 802.11a, 802.11n(HT 20) 2. 2 channels for 802.11n (HT 40) 3. 3 channels for 802.11ac (VHT 20) 4. 2 channels for 802.11ac (VHT 40) 5. 1 channels for 802.11ac (VHT 80)
Access scheme:	OFDM
Modulation	64QAM, 16QAM, QPSK, BPSK
Rated Power:	DC 12 V from adapter
Power Cord:	N/A
Sample Received:	Mar. 01, 2016
Sample condition:	Workable
Test Date(s):	Mar. 02, 2016 ~ Mar. 18, 2016
Note 1:	This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.
Note 2:	When determining the test conclusion, the Measurement Uncertainty of test has been considered.

2.2 Description of EUT

The EUT is a Peloton Console, and was defined as information technology equipment.

Product SW version :	eng.RUBY.211
Product HW version :	FP
Radio SW version :	eng.RUBY.211
Radio HW version :	FP
Test SW Version :	eng.RUBY.211

For more detail features, please refer to user's Manual.

2.3 Antenna description

The EUT uses a permanently connected antenna.

Antenna Gain	: -3.76 dBi
Antenna Type	: PIFA Antenna
Connector Type	: I-PEX

2.4 Adapter information

The EUT will be supplied with a power supply from below list:

No.	Brand	Model no.	Specification
Adapter	ADAPTER TECH.	ATS050T-P121	I/P: 100-240Vac, 50-60Hz, 1.2A O/P: 12Vdc, 4.2A

2.5 Operation mode

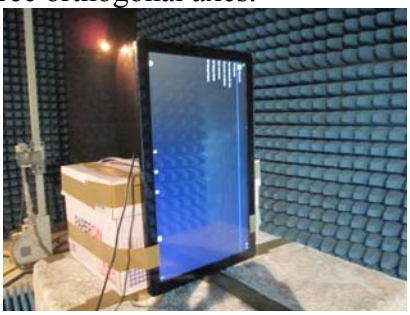
The EUT is supplied with DC 12 V from adapter (Test voltage: 120Vac, 60Hz).

TX-MODE is based on “Engineer mode” and the program can select different frequency and modulation.

The signal is maximized through rotation and placement in the three orthogonal axes.

X axis

Y axis



Z axis

After verifying three axes, we found the maximum electromagnetic field was occurred at Y axis. The final test data was executed under this configuration.

With individual verifying, the maximum output power was found out 6 Mbps data rate for 802.11a mode, 6.5 Mbps data rate for 802.11n HT20 mode, 13.5 Mbps data rate for 802.11n HT 40 mode and 29.3 Mbps data rate for 802.11ac VHT 80 mode.

The final tests were executed under these conditions recorded in this report individually.

Please refer the details below:

802.11a ch40 chain0		**802.11n HT20 ch40 chain0**		**802.11n HT40 ch38 chain0**	
Data rate	**AV (dBm)**	**Data rate**	**AV (dBm)**	**Data rate**	**AV (dBm)**
6	12.03	MCS0	11.36	MCS0	11.75
9	11.98	MCS1	11.32	MCS1	11.69
12	11.96	MCS2	11.29	MCS2	11.56
18	11.96	MCS3	11.27	MCS3	10.67
24	11.94	MCS4	11.18	MCS4	10.14
36	11.91	MCS5	11.05	MCS5	8.94
48	11.90	MCS6	10.97	MCS6	7.92
54	11.87	MCS7	10.89	MCS7	7.75
802.11ac VHT20 ch40 chain0		**802.11ac VHT40 ch38 chain0**		**802.11ac VHT80 ch42 chain0**	
Data rate	**AV (dBm)**	**Data rate**	**AV (dBm)**	**Data rate**	**AV (dBm)**
MCS0	11.42	MCS0	11.77	MCS0	11.69
MCS1	11.37	MCS1	11.60	MCS1	11.54
MCS2	11.34	MCS2	11.44	MCS2	9.92
MCS3	11.28	MCS3	11.28	MCS3	8.74
MCS4	11.21	MCS4	10.35	MCS4	6.20
MCS5	11.17	MCS5	9.32	MCS5	5.62
MCS6	11.11	MCS6	8.28	MCS6	4.97
MCS7	11.05	MCS7	7.90	MCS7	4.91

2.6 Applied test modes and channels

Test items	Mode	Data Rate (Mbps)	Channel	Antenna
Maximum Conducted Output Power	802.11a	6	36,40,48	Chain0
	802.11 n (HT20)	6.5	36,40,48	Chain0
	802.11 ac (VHT20)	6.5	36,40,48	Chain0
	802.11 n (HT40)	13.5	38,46	Chain0
	802.11 ac (VHT40)	13.5	38,46	Chain0
	802.11 ac (VHT80)	29.3	42	Chain0
Power Spectrum Density	802.11a	6	36,40,48	Chain0
	802.11 n (HT20)	6.5	36,40,48	Chain0
	802.11 ac (VHT20)	6.5	36,40,48	Chain0
	802.11 n (HT40)	13.5	38,46	Chain0
	802.11 ac (VHT40)	13.5	38,46	Chain0
	802.11 ac (VHT80)	29.3	42	Chain0
Emission BW	802.11a	6	36,40,48	Chain0
	802.11 n (HT20)	6.5	36,40,48	Chain0
	802.11 ac (VHT20)	6.5	36,40,48	Chain0
	802.11 n (HT40)	13.5	38,46	Chain0
	802.11 ac (VHT40)	13.5	38,46	Chain0
	802.11 ac (VHT80)	29.3	42	Chain0
Radiated spurious Emission 9kHz~1GHz	Normal Link			
Emissions In Restricted Frequency Bands (Radiated emission measurements)	802.11a	6	36,40,48	Chain0
	802.11 n (HT20)	6.5	36,40,48	Chain0
	802.11 ac (VHT20)	6.5	36,40,48	Chain0
	802.11 n (HT40)	13.5	38,46	Chain0
	802.11 ac (VHT40)	13.5	38,46	Chain0
	802.11 ac (VHT80)	29.3	42	Chain0
Emission on The Band Edge	802.11a	6	36,40,48	Chain0
	802.11 n (HT20)	6.5	36,40,48	Chain0
	802.11 ac (VHT20)	6.5	36,40,48	Chain0
	802.11 n (HT40)	13.5	38,46	Chain0
	802.11 ac (VHT40)	13.5	38,46	Chain0
	802.11 ac (VHT80)	29.3	42	Chain0
AC Line Conducted Emission	Normal Link			

2.7 Power setting of test software

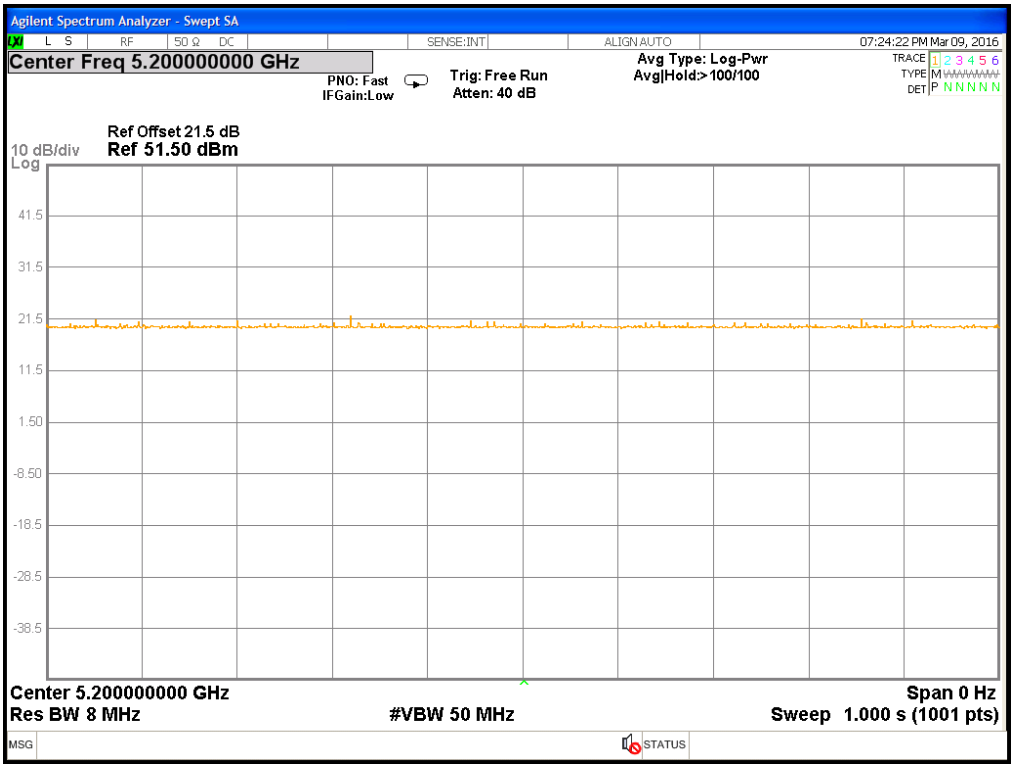
Channels & power setting software provided by the client was used to change the operating channels as well as the output power level and is going to be installed in the final end product.

Mode	Channel	Frequency	Power setting
802.11a	36	5180	13.5
	40	5200	13.5
	48	5240	13.5
802.11n (HT 20)	36	5180	13
	40	5200	13
	48	5240	13
802.11ac (VHT 20)	36	5190	13
	40	5230	13
	48	5755	13
802.11n (HT 40)	38	5180	13
	46	5200	13
802.11ac (VHT 40)	38	5190	13
	46	5230	13
802.11ac (VHT 80)	42	5210	13

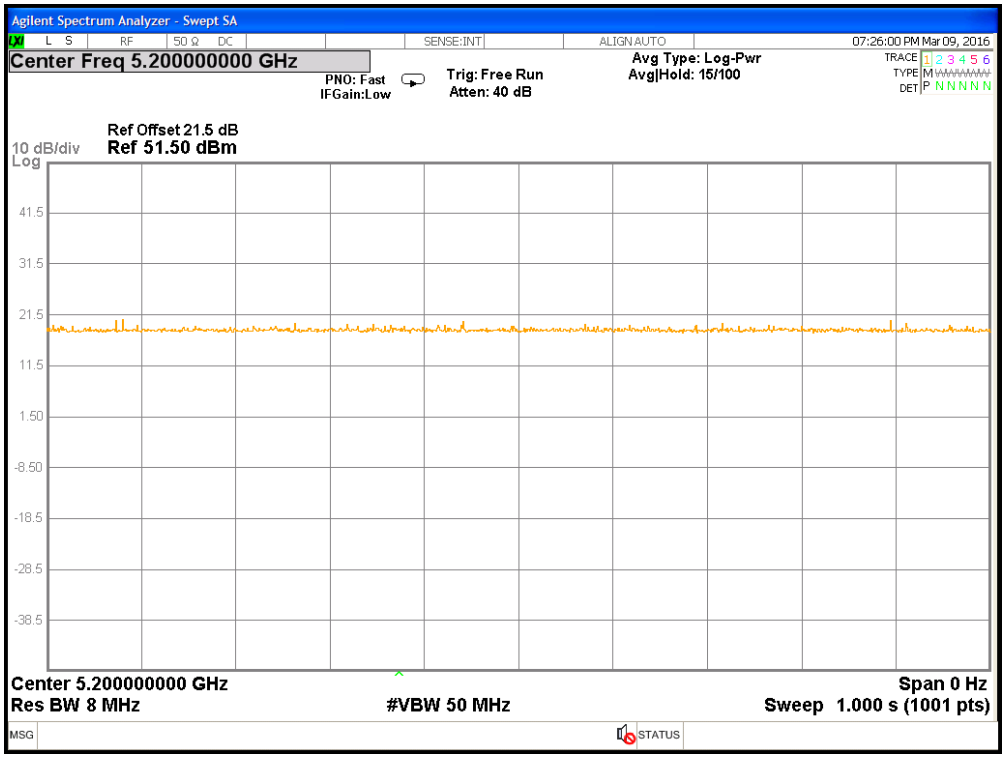
Note: The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.

Mode	Channel	Frequency (MHz)	Data rate	Signal on time(s)	Total signal transmit time(s)	Duty cycle	Duty Cycle factor
802.11a	40	5200	6	1	1	1.000	0.000
802.11n (HT20)	40	5200	6.5	1	1	1.000	0.000
802.11ac (VHT20)	40	5200	6.5	1	1	1.000	0.000
802.11n (HT40)	38	5190	13.5	1	1	1.000	0.000
802.11ac (VHT40)	38	5190	13.5	1	1	1.000	0.000
802.11ac (VHT80)	42	5210	29.3	1	1	1.000	0.000

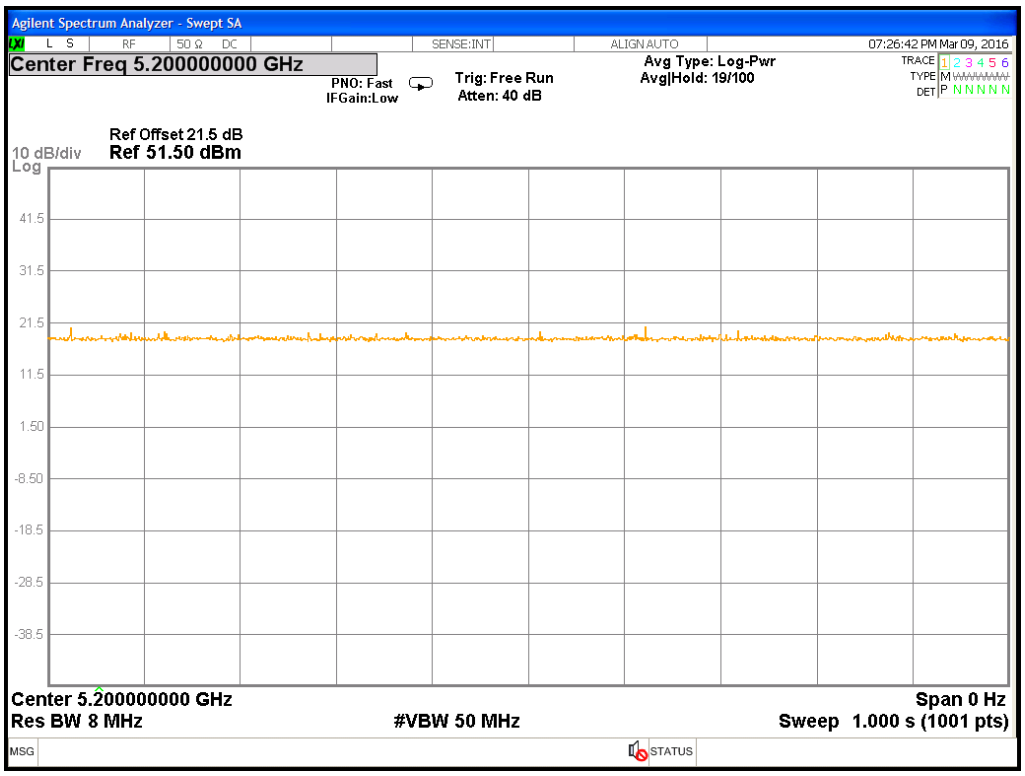
Chain0 : Duty cycle @ 802.11a mode Ch 40



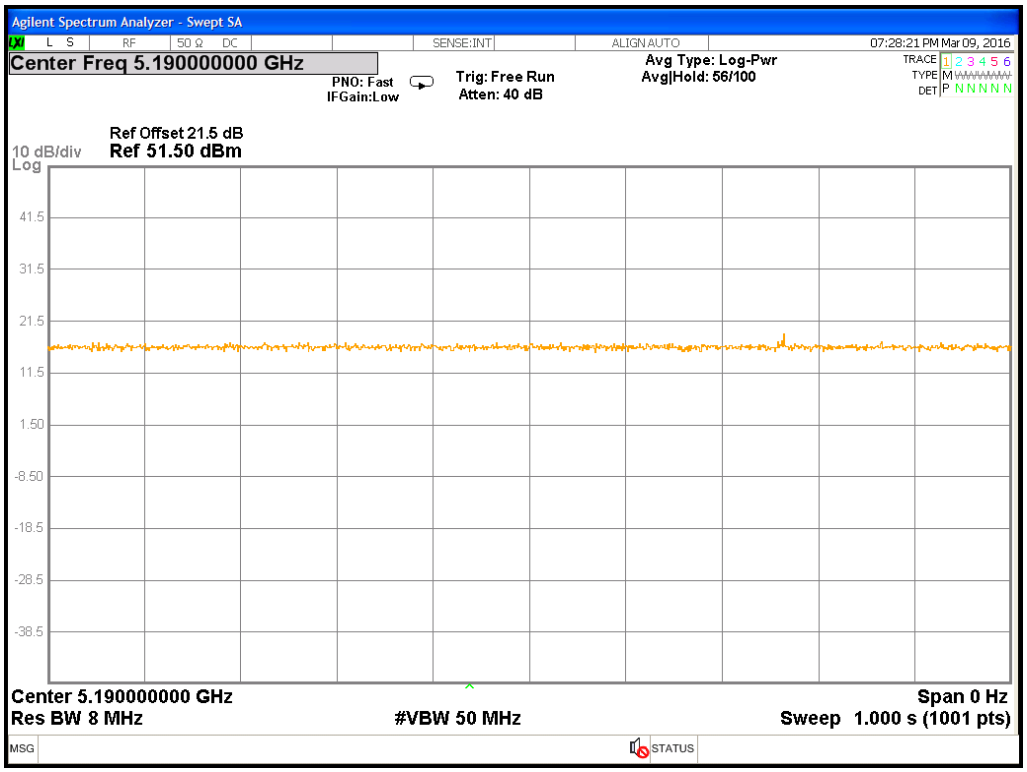
Chain0 : Duty cycle @ 802.11n(HT20) mode Ch 40



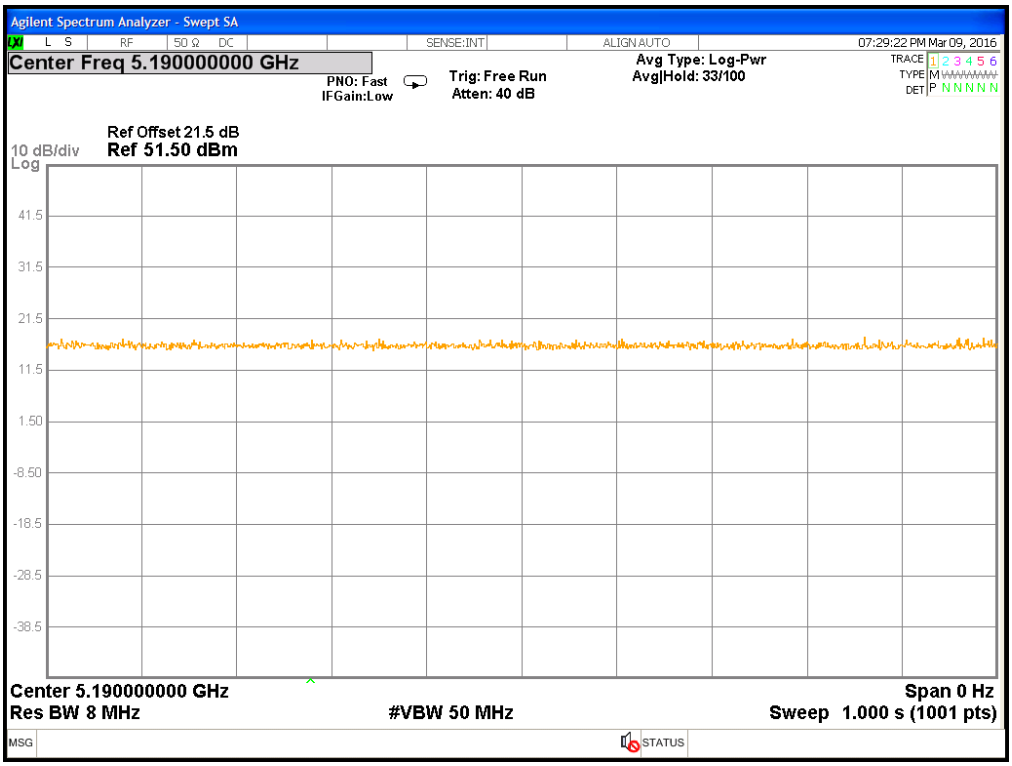
Chain0 : Duty cycle @ 802.11ac(VHT20) mode Ch 40



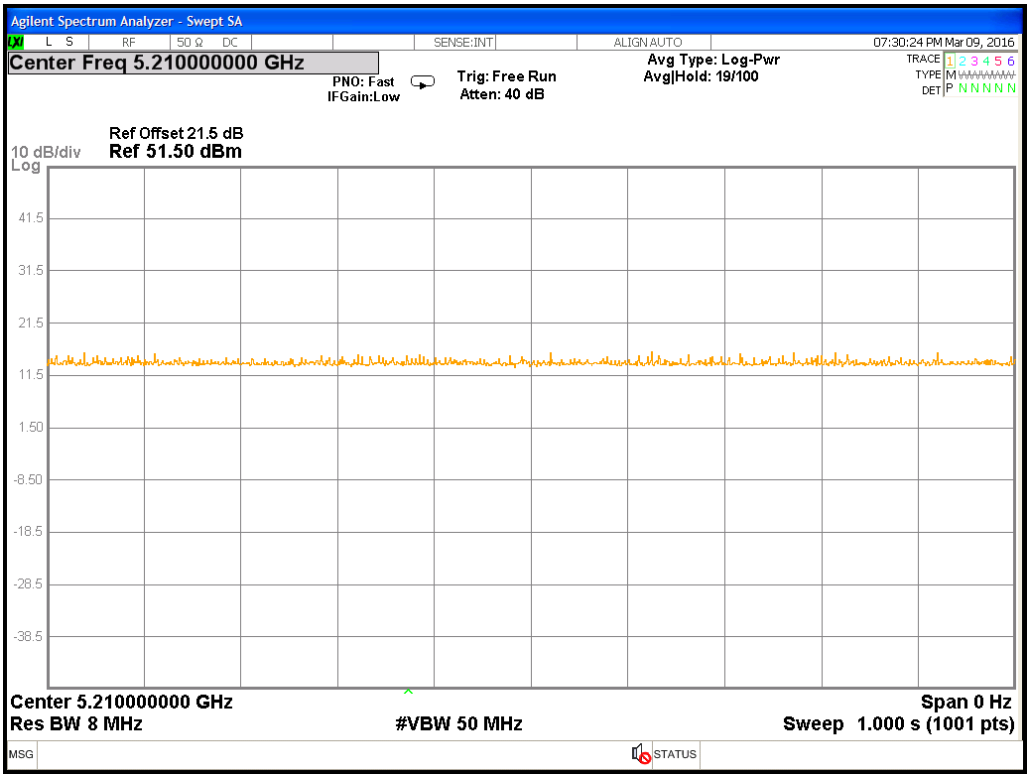
Chain0 : Duty cycle @ 802.11n(HT40) mode Ch 38



Chain0 : Duty cycle @ 802.11ac(VHT40) mode Ch 38



Chain0 : Duty cycle @ 802.11ac(VHT80) mode Ch 42



3. Maximum Conducted Output Power

3.1 Operating environment

Temperature:	25	℃
Relative Humidity:	50	%
Atmospheric Pressure	1008	hPa
Channel number	36,40,48 for 20MHz BW 38,46 for 40MHz BW 42 for 80MHz BW	

3.2 Limit for maximum output power

Operating Frequency (MHz)	Conducted output power limit
5150~5250	< 0.25 W (24 dBm)
5725~5850	< 1 W (30 dBm)

Operating Frequency (MHz)	Maximum E.I.R.P. limit
5150~5250	< 1 W (30 dBm)
5725~5850	< 4 W (36 dBm)

3.3 Measuring instrument setting

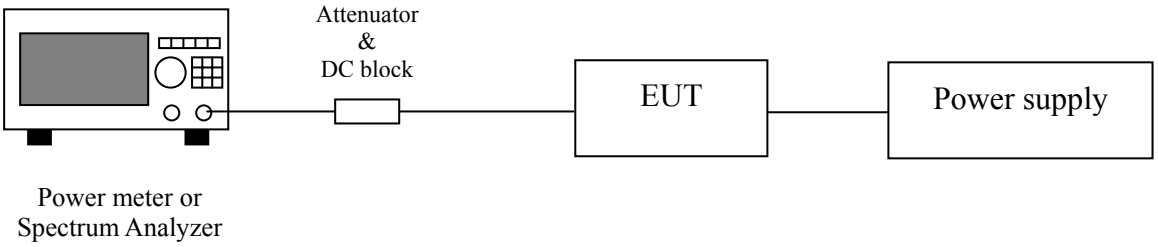
Power meter for Nominal Bandwidth less than 65MHz	
Power meter	**Setting**
Bandwidth	65MHz bandwidth is greater than the EUT emission bandwidth
Detector	Average

3.4 Test procedure

Test procedures refer to clause E) 3) b) measurement using a gated RF average power meter of KDB 789033 D02 v01r02

Test procedures refer to clause E) 2) b) Method SA-1 of KDB 789033 D02 v01r02

3.5 Test diagram



3.6 Test results

Mode	Channel	Freq. (MHz)	Output Power (AV)		Antenna Gain (dBi)	Total Output Power (dBm)	Limit of Conducted Power (dBm)	Margin (dB)	Limit of E.I.R.P. (dBm)	Margin (dB)
			dBm	mW						
802.11a	36	5180	11.45	13.96	-1.33	10.12	24.00	-12.55	30.00	-19.88
	40	5200	11.71	14.83	-1.33	10.38	24.00	-12.29	30.00	-19.62
	48	5240	11.77	15.03	-1.33	10.44	24.00	-12.23	30.00	-19.56
802.11n (HT 20)	36	5180	11.03	12.68	-1.33	9.70	24.00	-12.97	30.00	-20.30
	40	5200	11.20	13.18	-1.33	9.87	24.00	-12.80	30.00	-20.13
	48	5240	11.13	12.97	-1.33	9.80	24.00	-12.87	30.00	-20.20
802.11ac (VHT 20)	36	5180	11.42	13.87	-1.33	10.09	24.00	-12.58	30.00	-19.91
	40	5200	11.45	13.96	-1.33	10.12	24.00	-12.55	30.00	-19.88
	48	5240	11.51	14.16	-1.33	10.18	24.00	-12.49	30.00	-19.82
802.11n (HT 40)	38	5190	11.39	13.77	-1.33	10.06	24.00	-12.61	30.00	-19.94
	46	5230	11.34	13.61	-1.33	10.01	24.00	-12.66	30.00	-19.99
802.11ac (VHT 40)	38	5190	11.73	14.89	-1.33	10.40	24.00	-12.27	30.00	-19.60
	46	5230	11.68	14.72	-1.33	10.35	24.00	-12.32	30.00	-19.65
802.11ac (VHT 80)	42	5210	10.44	11.07	-1.33	9.11	24.00	-13.56	30.00	-20.89

4. Power Spectrum Density

4.1 Operating environment

Temperature:	25	℃
Relative Humidity:	50	%
Atmospheric Pressure	1008	hPa
Channel number	36,40,48 for 20MHz BW 38,46 for 40MHz BW 42 for 80MHz BW	

4.2 Limit for power spectrum density

Operating Frequency (MHz)	Power density limit
5150~5250	< 17 dBm/MHz
5725~5850	< 30 dBm/500kHz

4.3 Measuring instrument setting

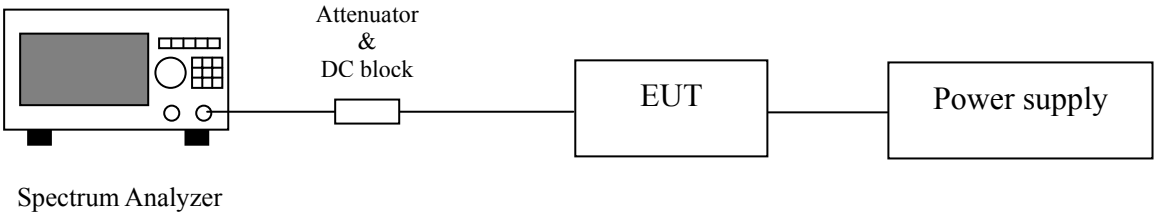
Spectrum analyzer settings (5150~5250MHz)	
Spectrum Analyzer function	**Setting**
Detector	RMS
RBW	=1MHz
VBW	≧3 MHz
Sweep	Auto couple
Trace	Average
Span	Encompass the 26 dB EBW
Attenuation	Auto
Sweep point	≥ 2 Span / RBW

Spectrum analyzer settings (5725~5850MHz)	
Spectrum Analyzer function	**Setting**
Detector	RMS
RBW	=100kHz
VBW	≧300 kHz
Sweep	Auto couple
Trace	Average
Span	Encompass the 6 dB EBW
Attenuation	Auto
Sweep point	≥ 2 Span / RBW

4.4 Test procedure

1. Set relevant parameter according to clause 4.3.
2. Trace average at least 100 traces in power averaging mode.
3. Compute power by integrating the spectrum across the 26 dB or 6dB EBW of the signal using the instrument's band power measurement function with band limits set equal to the EBW band edges
4. If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500 KHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement. The RBW is 100 kHz. So, we will add 6.989 to the results.

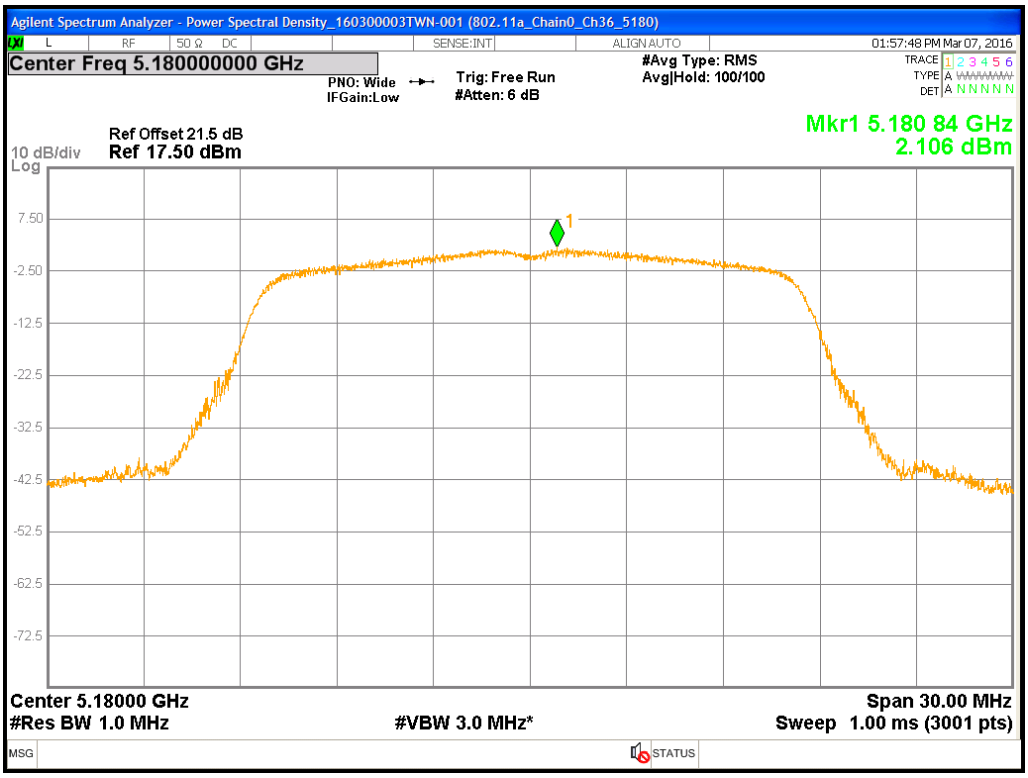
4.5 Test diagram



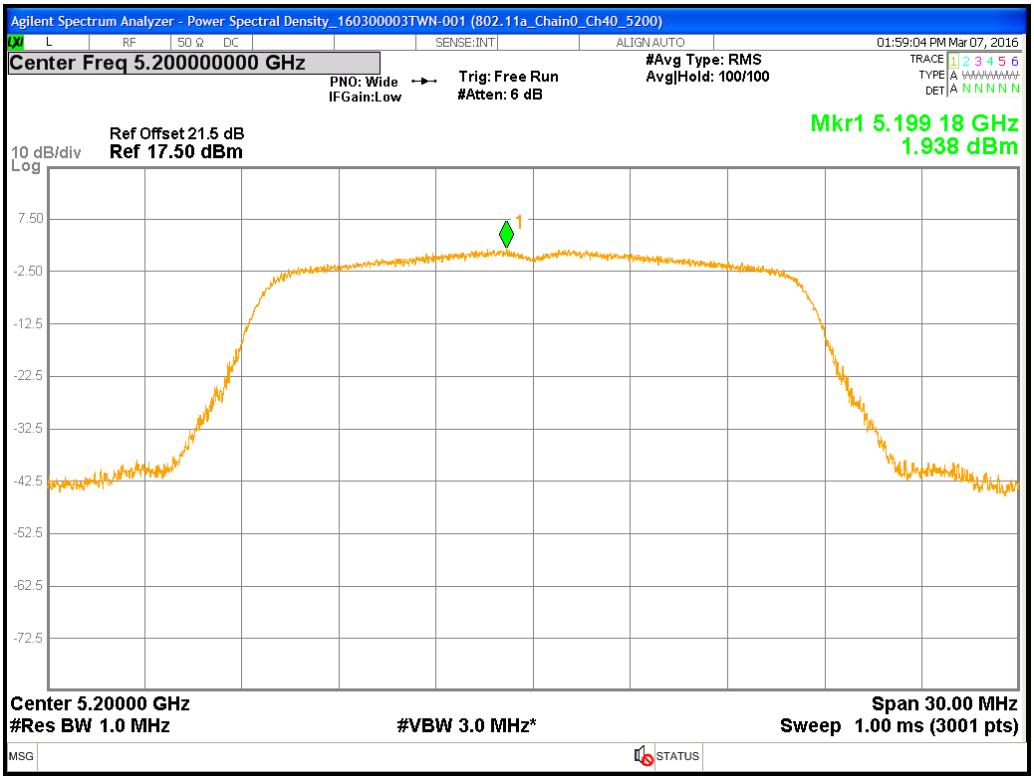
4.6 Test results

Mode	Channel	Frequency (MHz)	Data rate (Mbps)	PSD (dBm)	Limit (dBm)	Margin (dB)
802.11a	36	5180	6	2.106	11	-8.89
	40	5200		1.938	11	-9.06
	48	5240		1.862	11	-9.14
802.11n (HT20)	36	5180	6.5	1.032	11	-9.97
	40	5200		1.108	11	-9.89
	48	5240		0.971	11	-10.03
802.11ac (VHT20)	36	5180	6.5	1.086	11	-9.91
	40	5200		1.031	11	-9.97
	48	5240		1.250	11	-9.75
802.11n (HT40)	38	5190	13.5	-2.062	11	-13.06
	46	5230		-2.259	11	-13.26
802.11ac (VHT40)	38	5190	13.5	-2.400	11	-13.40
	46	5230		-2.282	11	-13.28
802.11ac (VHT80)	42	5210	29.3	-5.747	11	-16.75

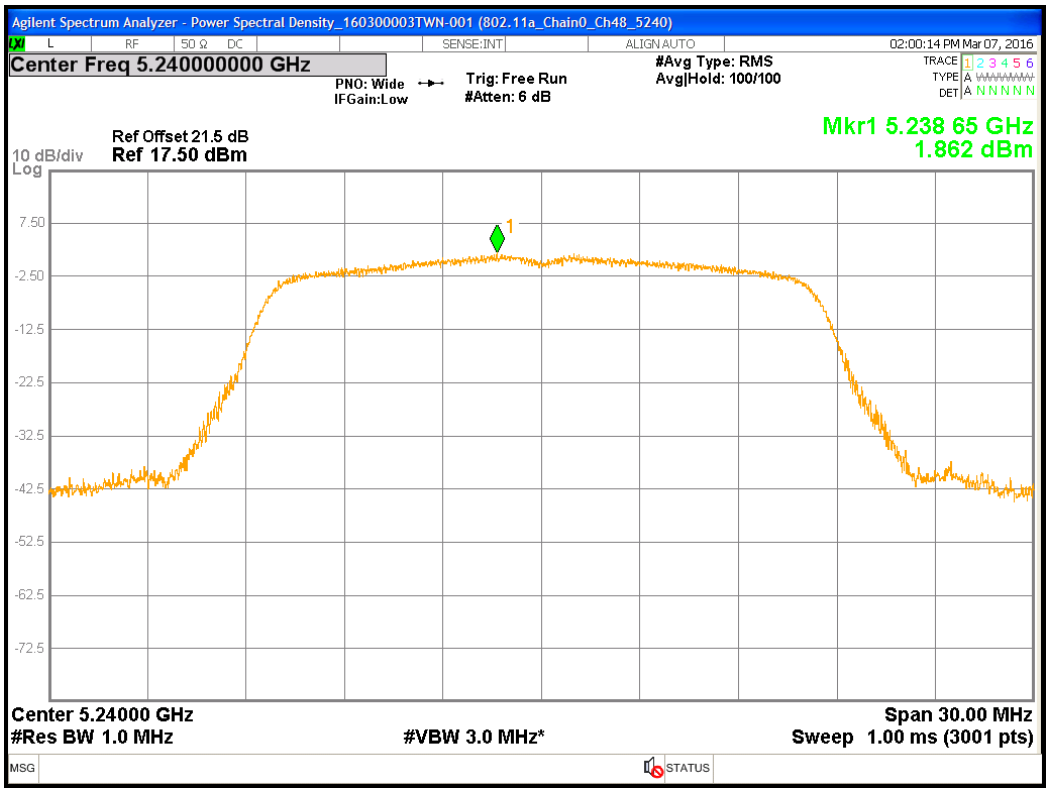
Chain0 : Power Spectral Density @ 802.11a mode Ch36



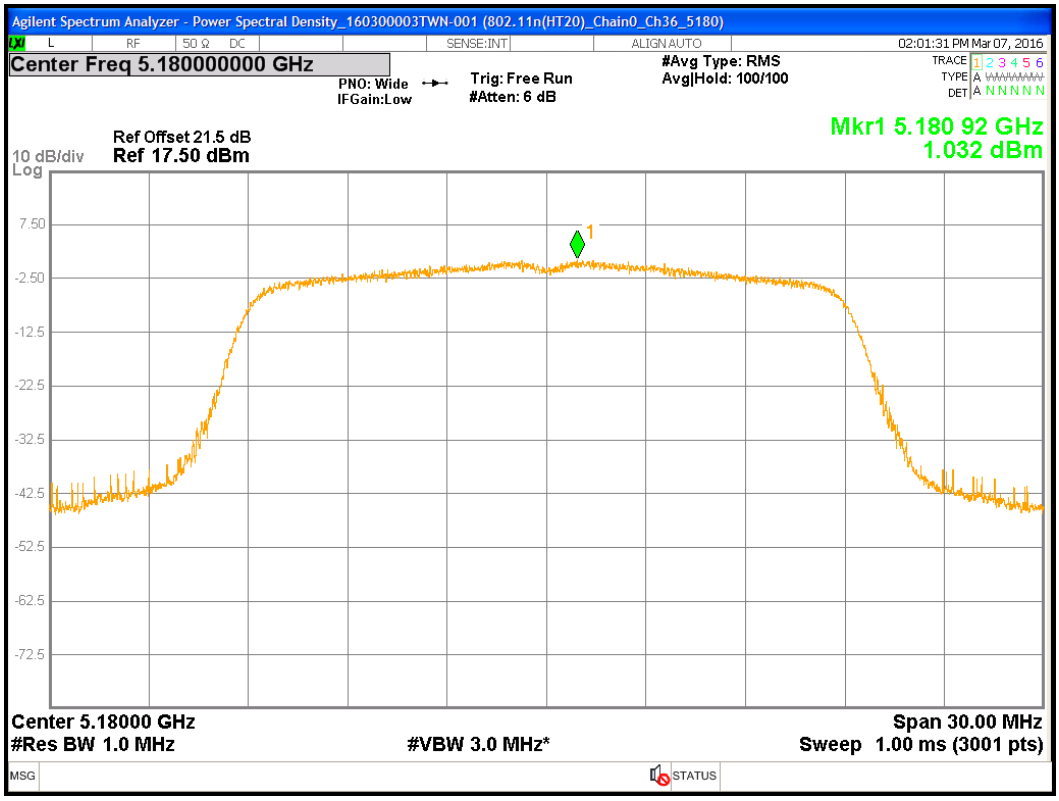
Chain0 : Power Spectral Density @ 802.11a mode Ch40



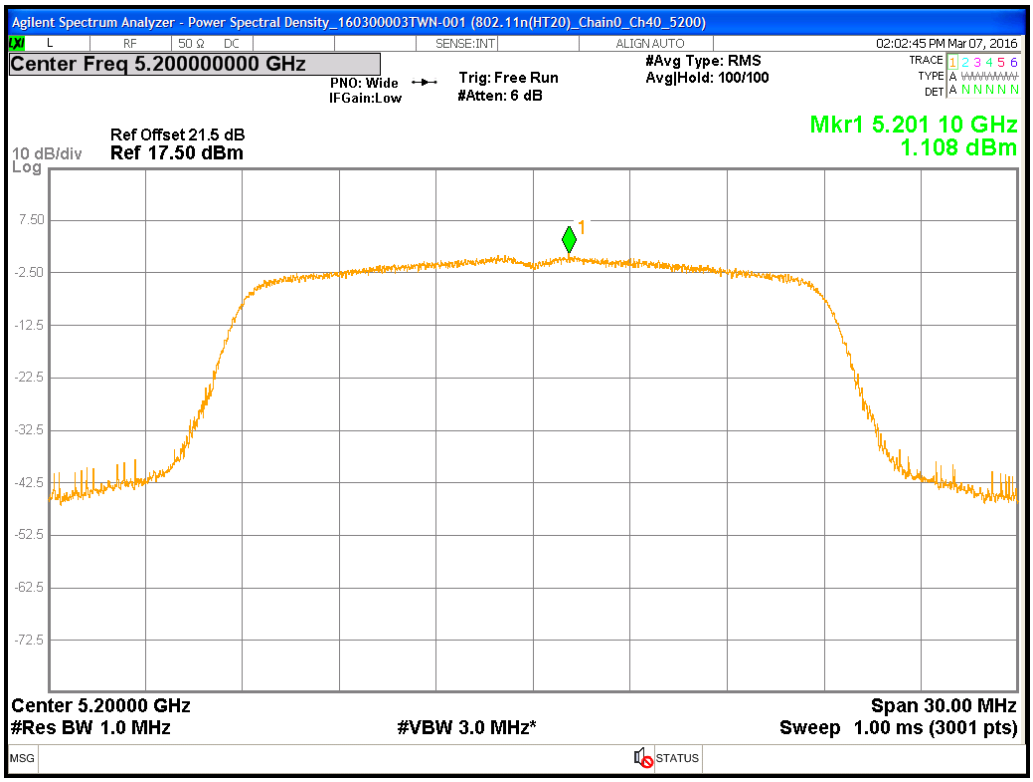
Chain0 : Power Spectral Density @ 802.11a mode Ch48



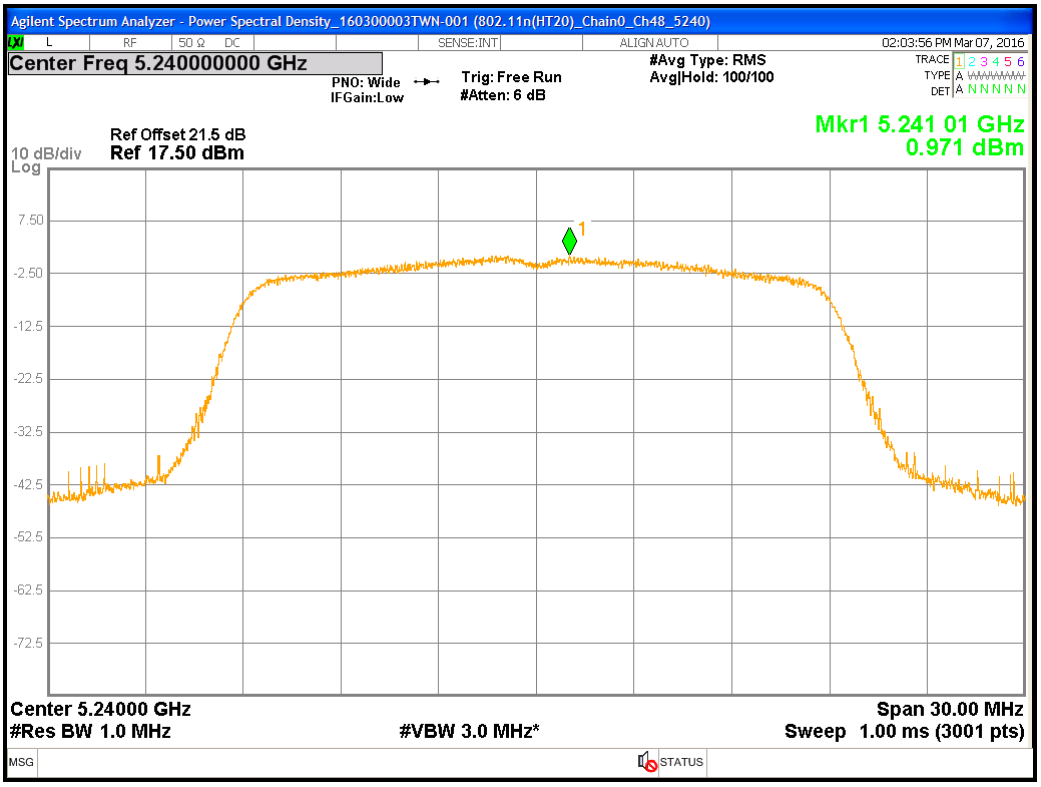
Chain0 : Power Spectral Density @ 802.11n(HT20) mode Ch36



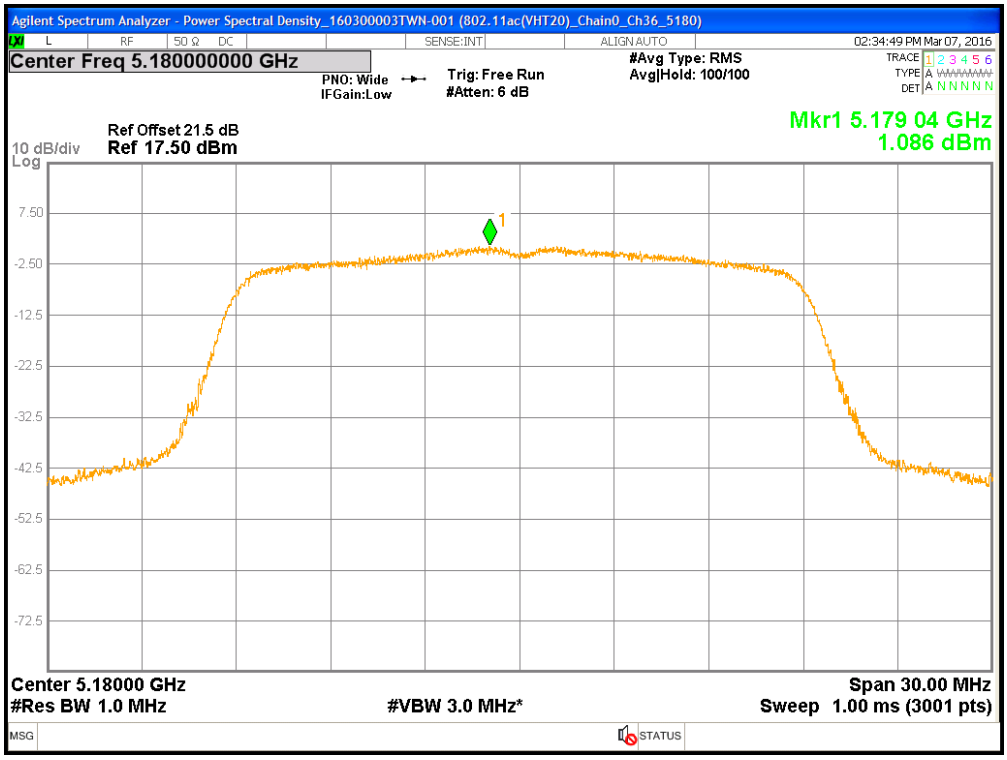
Chain0 : Power Spectral Density @ 802.11n(HT20) mode Ch40



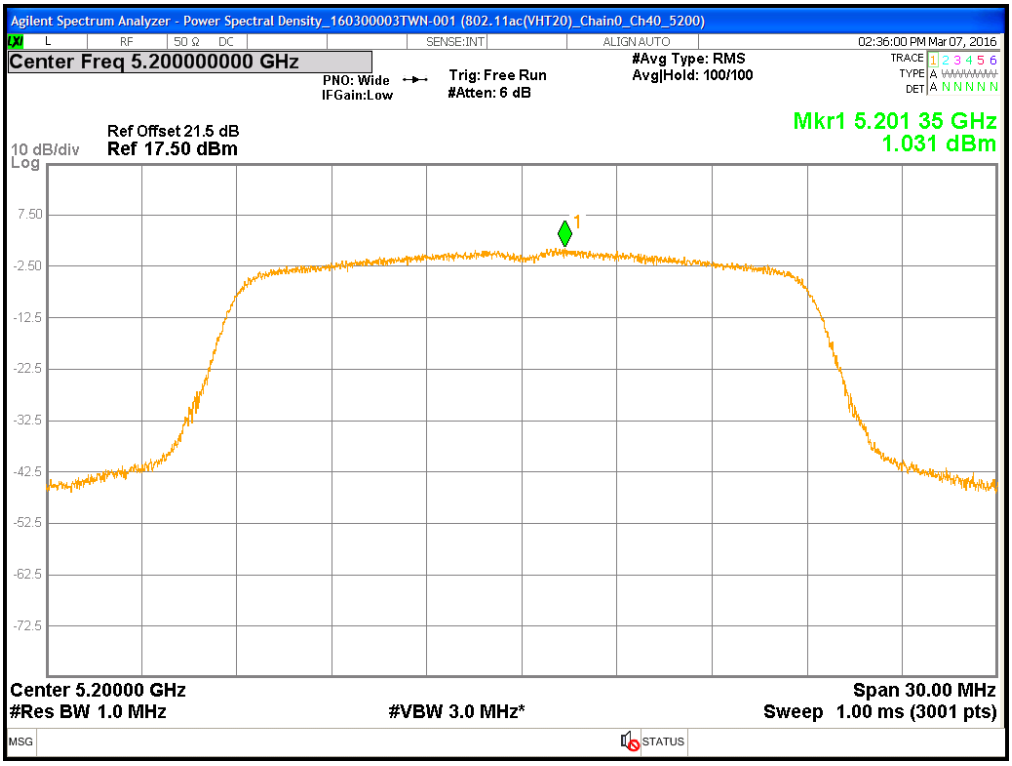
Chain0 : Power Spectral Density @ 802.11n(HT20) mode Ch48



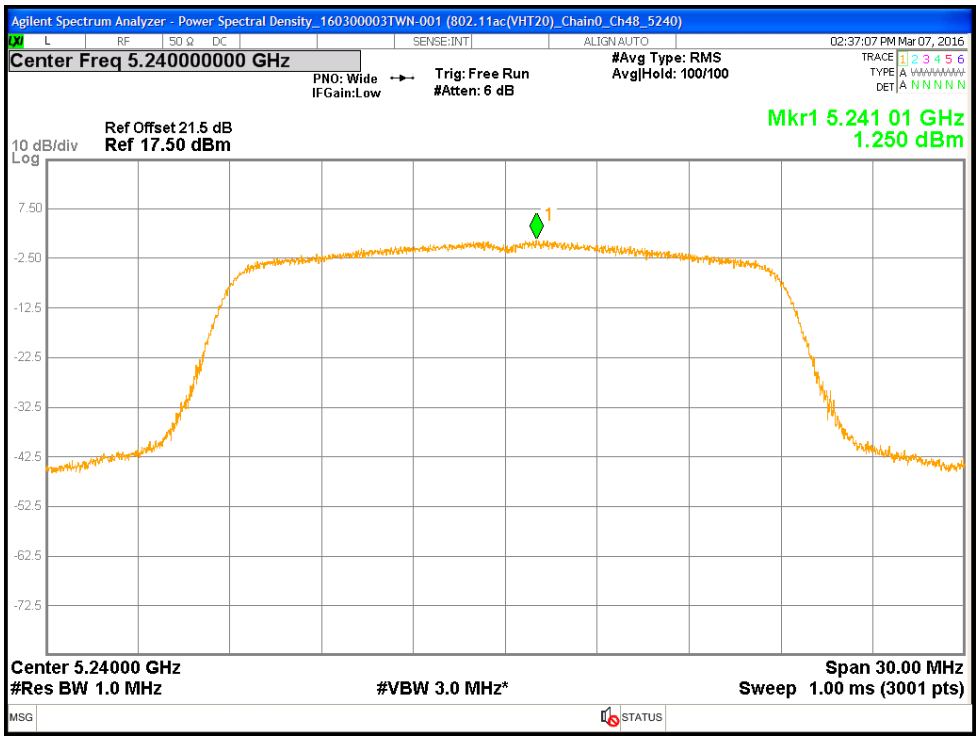
Chain0 : Power Spectral Density @ 802.11ac(VHT20) mode Ch36



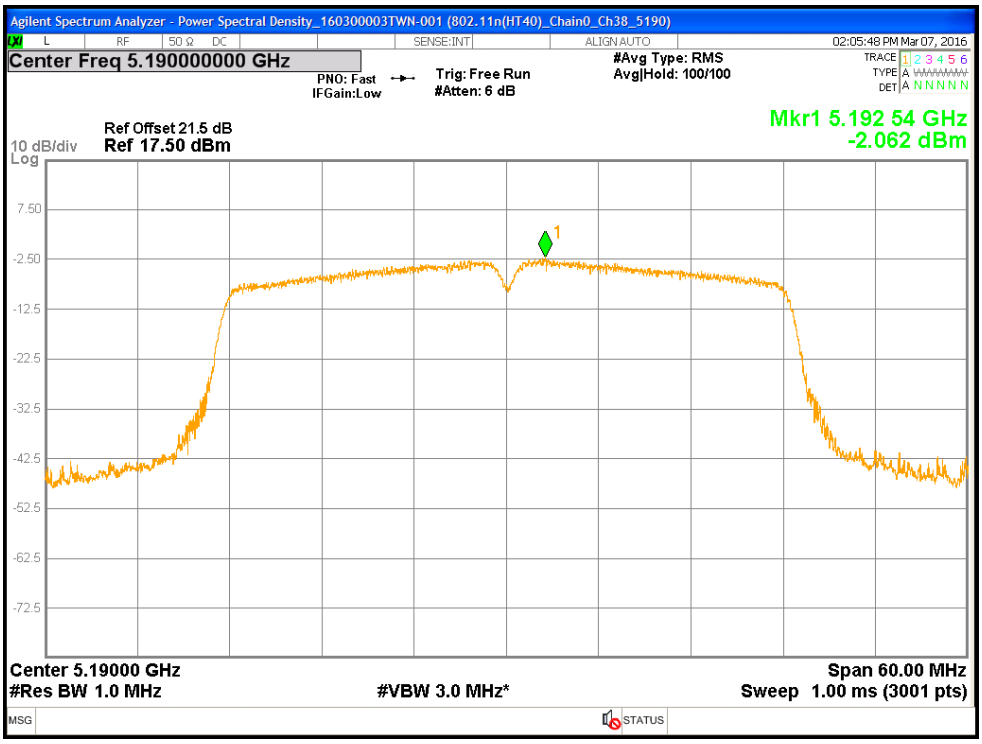
Chain0 : Power Spectral Density @ 802.11ac(VHT20) mode Ch40



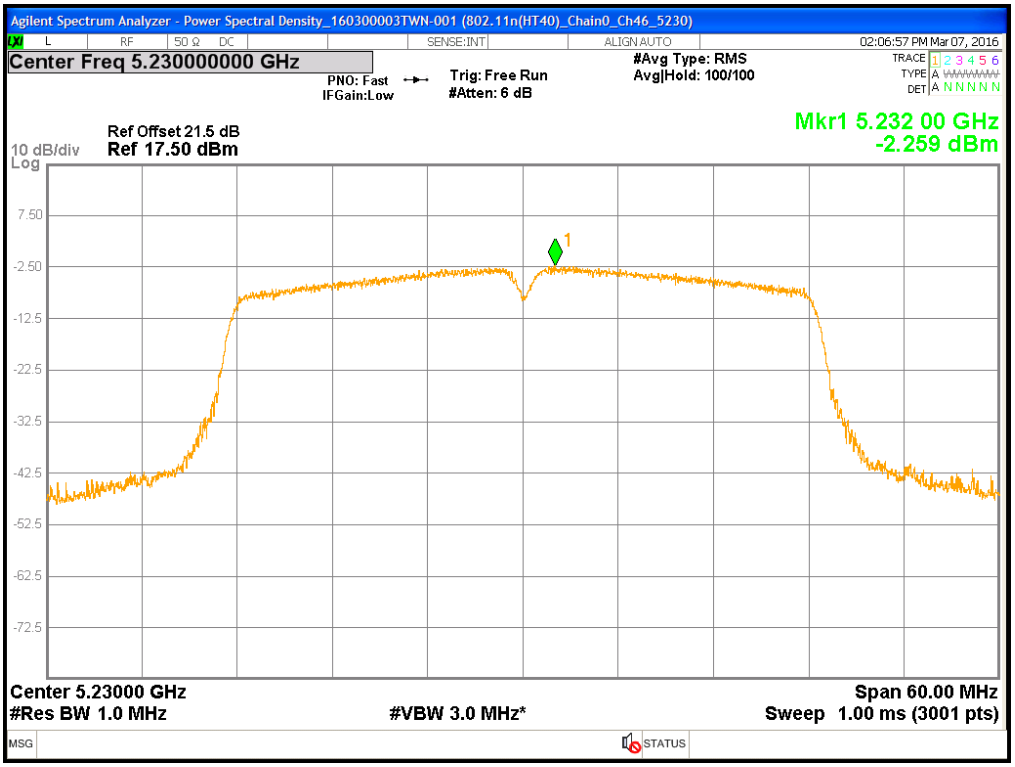
Chain0 : Power Spectral Density @ 802.11ac(VHT20) mode Ch48



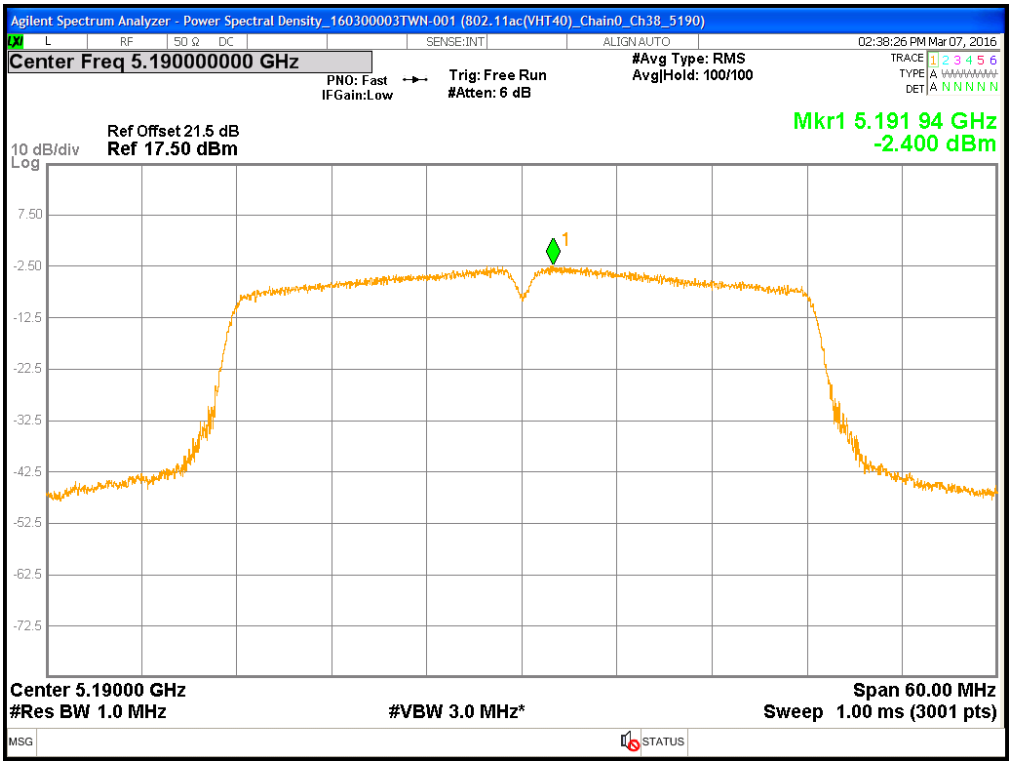
Chain0 : Power Spectral Density @ 802.11n(HT40) mode Ch38



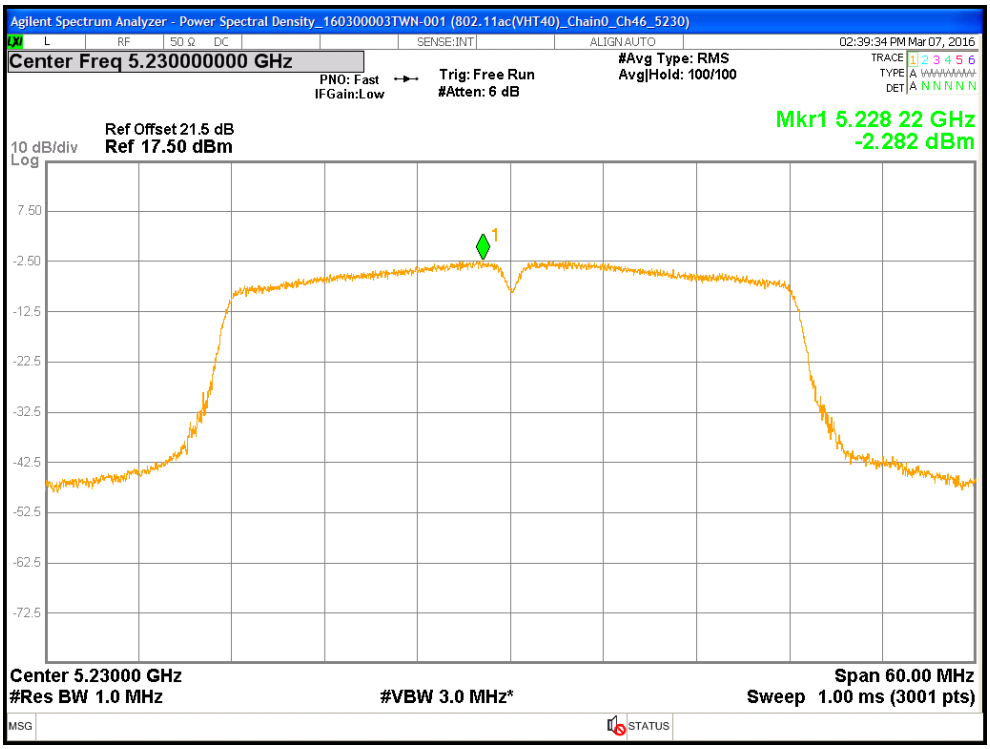
Chain0 : Power Spectral Density @ 802.11n(HT40) mode Ch46



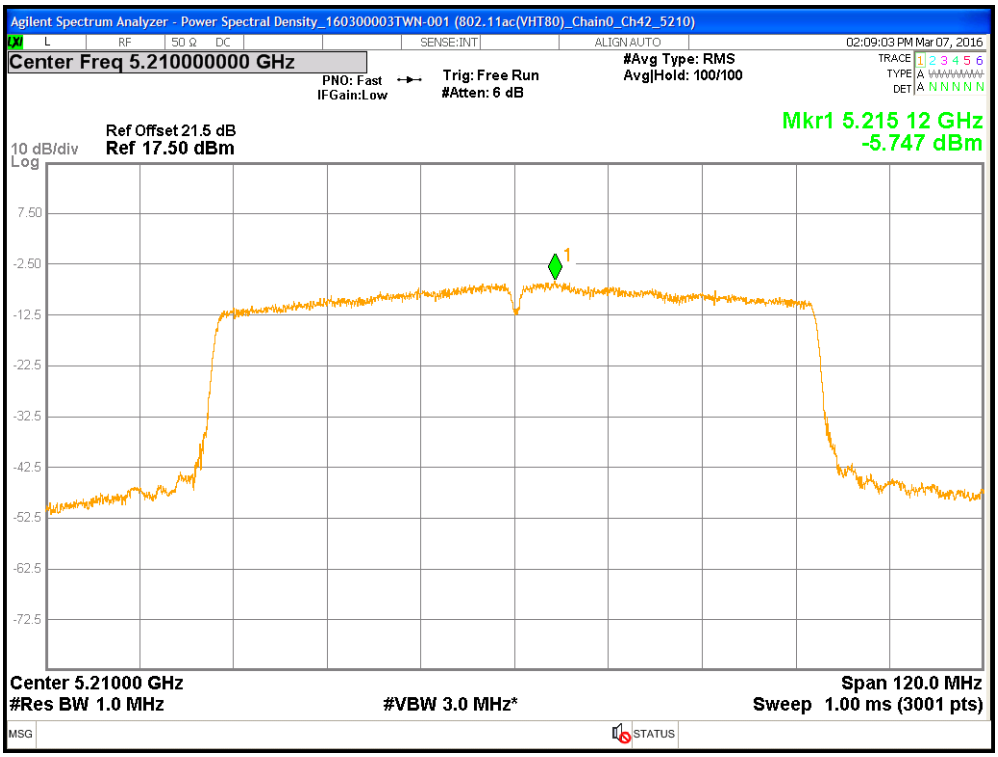
Chain0 : Power Spectral Density @ 802.11ac(VHT40) mode Ch38



Chain0 : Power Spectral Density @ 802.11ac(VHT40) mode Ch46



Chain0 : Power Spectral Density @ 802.11ac(VHT80) mode Ch42



5. Minimum Bandwidth

5.1 Operating environment

Temperature:	25	℃
Relative Humidity:	50	%
Atmospheric Pressure	1008	hPa
Requirement & Test method	15.407(a)(5) 15.407(e) KDB 789033 D02 v01r02	

5.2 Limit for minimum emission bandwidth.

Within the 5.15-5.25 GHz, the 26 dB bandwidth is for reporting purpose only.
Within the 5.725-5.85 GHz, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

5.3 Measuring instrument setting

For 5.15-5.25 GHz

Spectrum analyzer settings	
Spectrum Analyzer function	**Setting**
Detector	Peak
RBW	Approximately 1% of the EBW
VBW	> RBW
Trace mode	Max hold

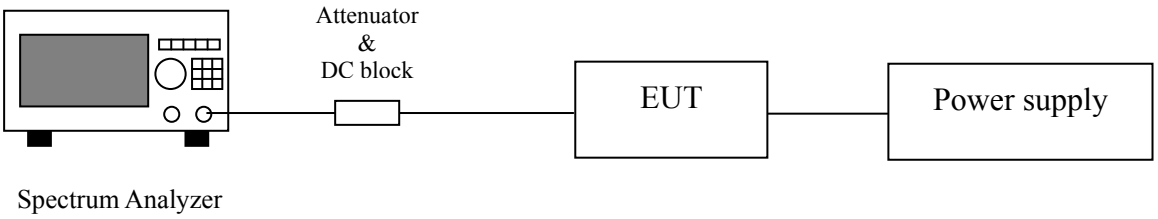
For 5.725-5.85 GHz

Spectrum analyzer settings	
Spectrum Analyzer function	**Setting**
Detector	Peak
RBW	100kHz
VBW	≧3 x RBW
Sweep	Auto couple
Trace mode	Max hold

5.4 Test procedure

1. The transmitter output was connected to the spectrum analyzer.
2. Test was performed in accordance with section C of KDB 789033 D02 v01r02.
3. For the 5.725-5.85 GHz, measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.
4. For the 5.15-5.25 GHz and 5.725-5.85 GHz, measure the maximum width of the emission that is 26 dB down from the maximum of the emission.

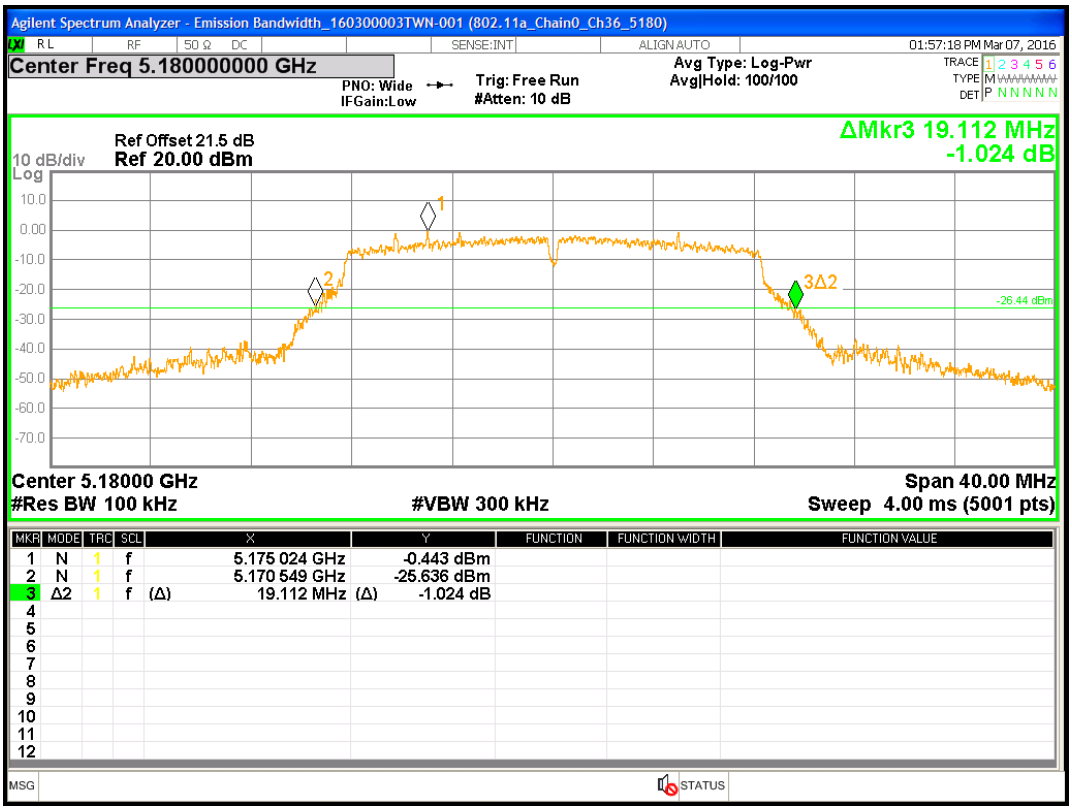
5.5 Test diagram



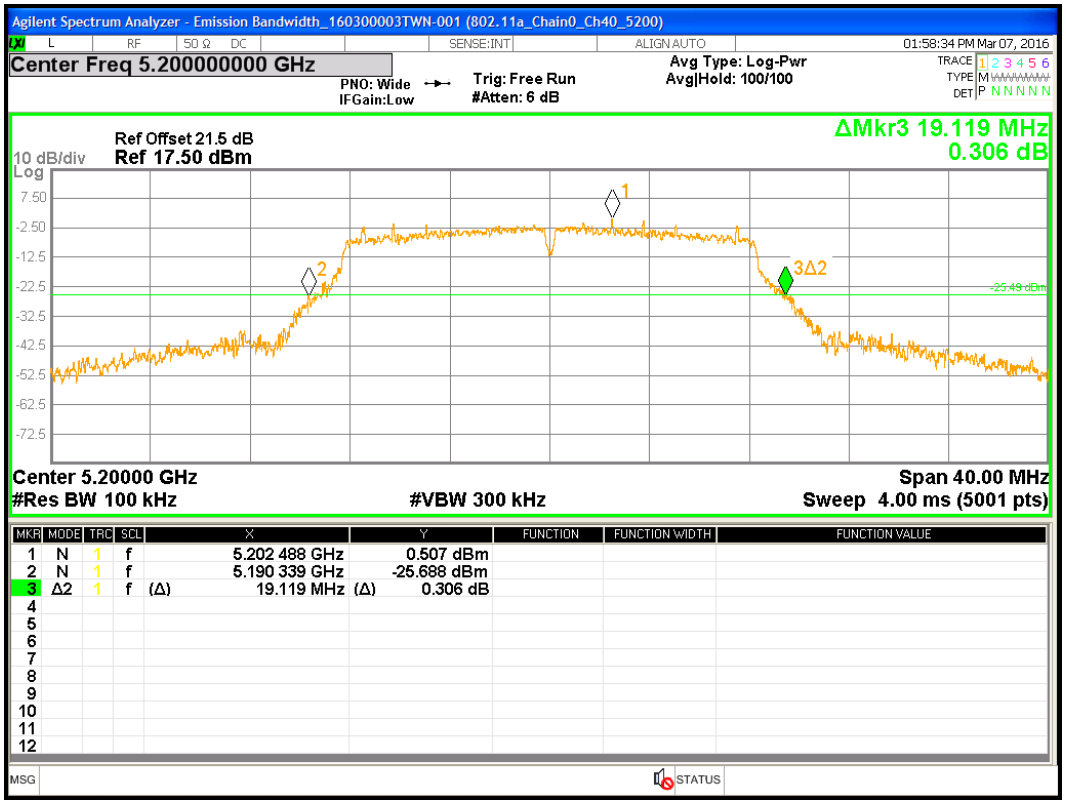
5.6 Test results

Mode	Channel	Frequency (MHz)	26dB Bandwidth (MHz)	26dB Upper Frequency (MHz)	Limit (MHz)	Test Result
802.11a	36	5180	19.112		5250	Pass
	40	5200	19.119			Pass
	48	5240	18.778	5249.337		Pass
802.11n (HT 20)	36	5180	19.433		5250	Pass
	40	5200	19.348			Pass
	48	5240	19.425	5249.658		Pass
802.11ac (VHT 20)	36	5180	19.113		5250	Pass
	40	5200	19.386			Pass
	48	5240	19.327	5249.786		Pass
802.11n (HT 40)	38	5190	38.098		5250	Pass
	46	5230	37.668	5248.907		Pass
802.11ac (VHT 40)	38	5190	37.7		5250	Pass
	46	5230	37.944	5248.983		Pass
802.11ac (VHT80)	42	5210	77.912	5248.997	5250	Pass

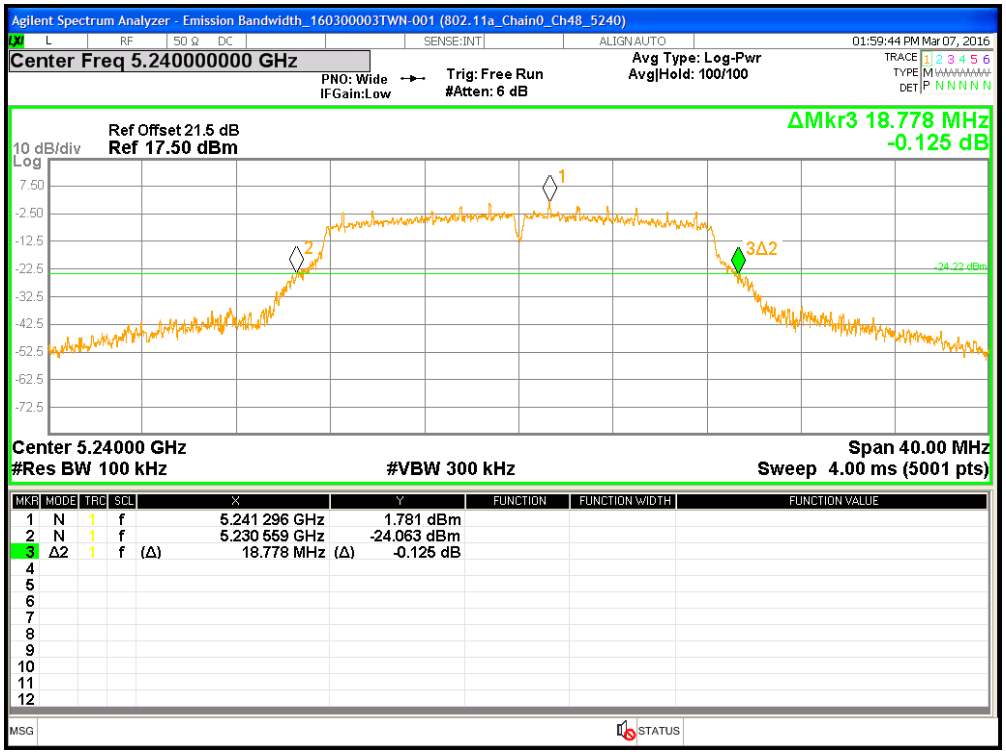
Chain0 : 26dB Bandwidth @ 802.11a mode Ch36



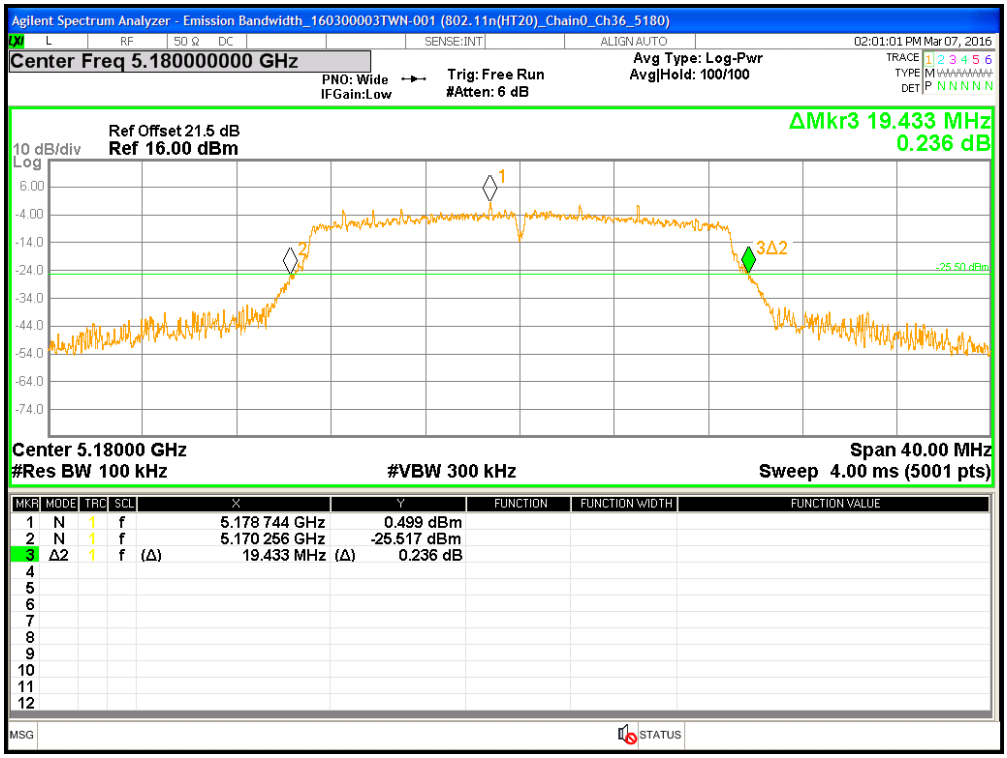
Chain0 : 26dB Bandwidth @ 802.11a mode Ch40



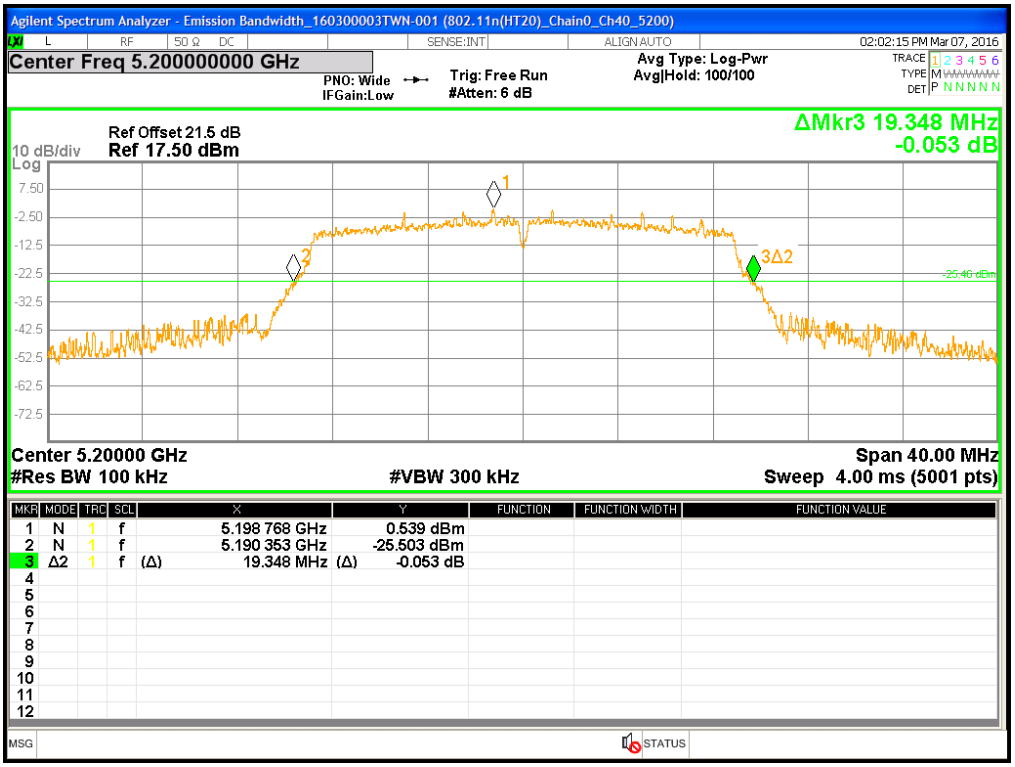
Chain0 : 26dB Bandwidth @ 802.11a mode Ch48



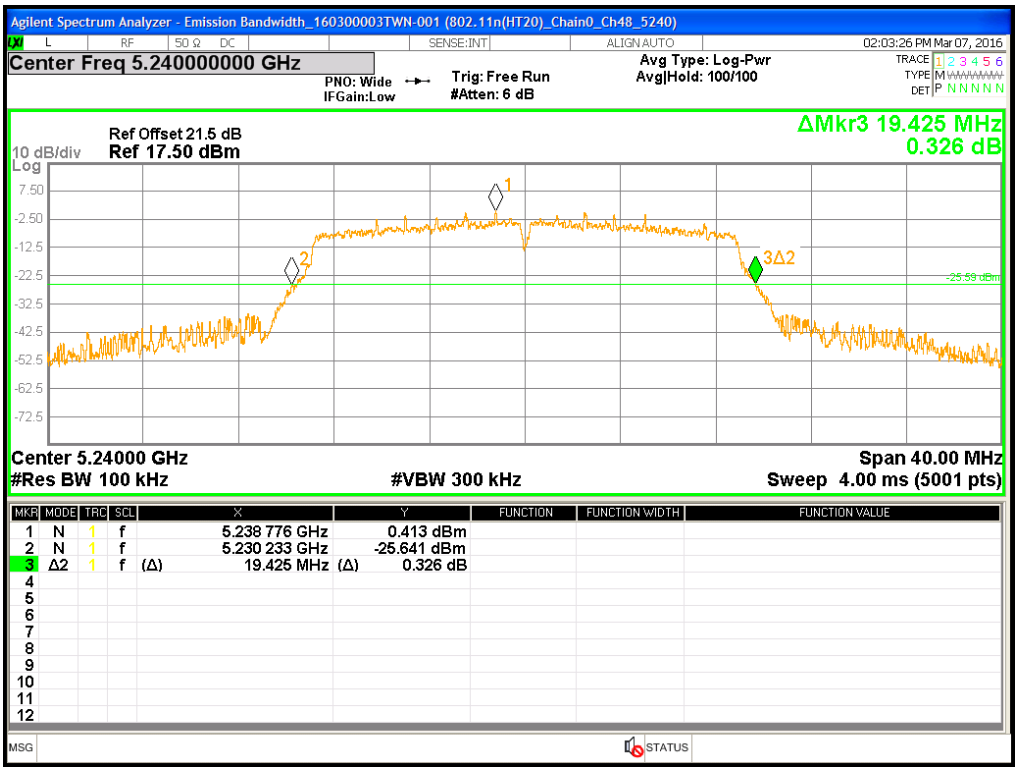
Chain0 : 26dB Bandwidth @ 802.11n(HT20) mode Ch36



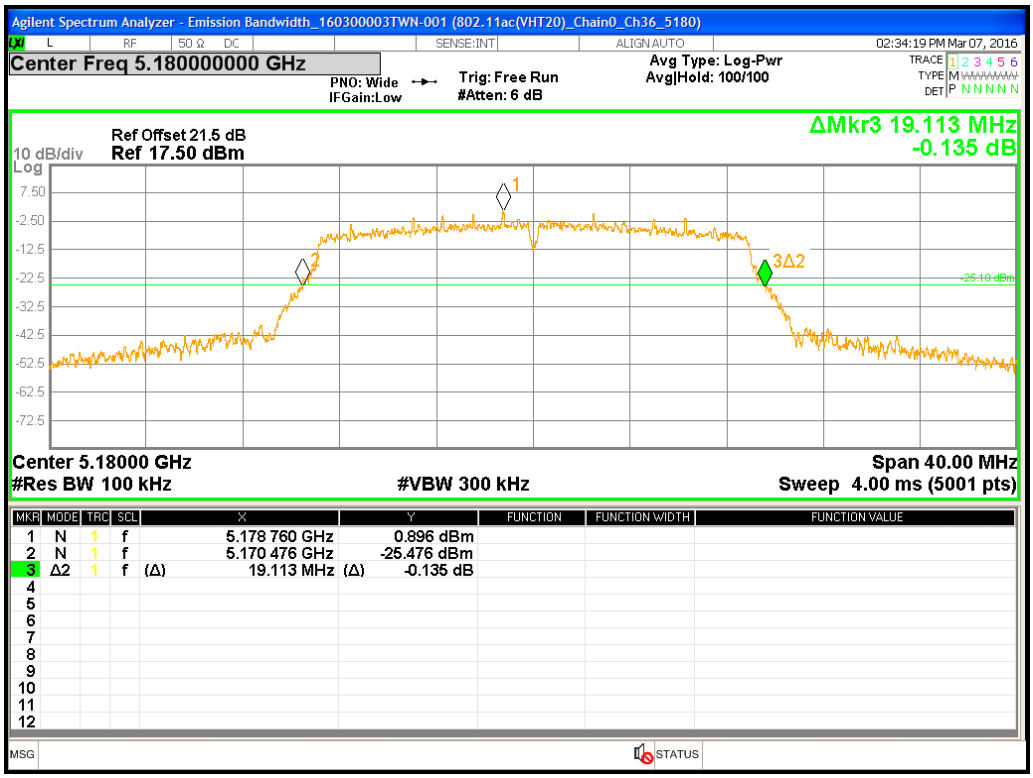
Chain0 : 26dB Bandwidth @ 802.11n(HT20) mode Ch40



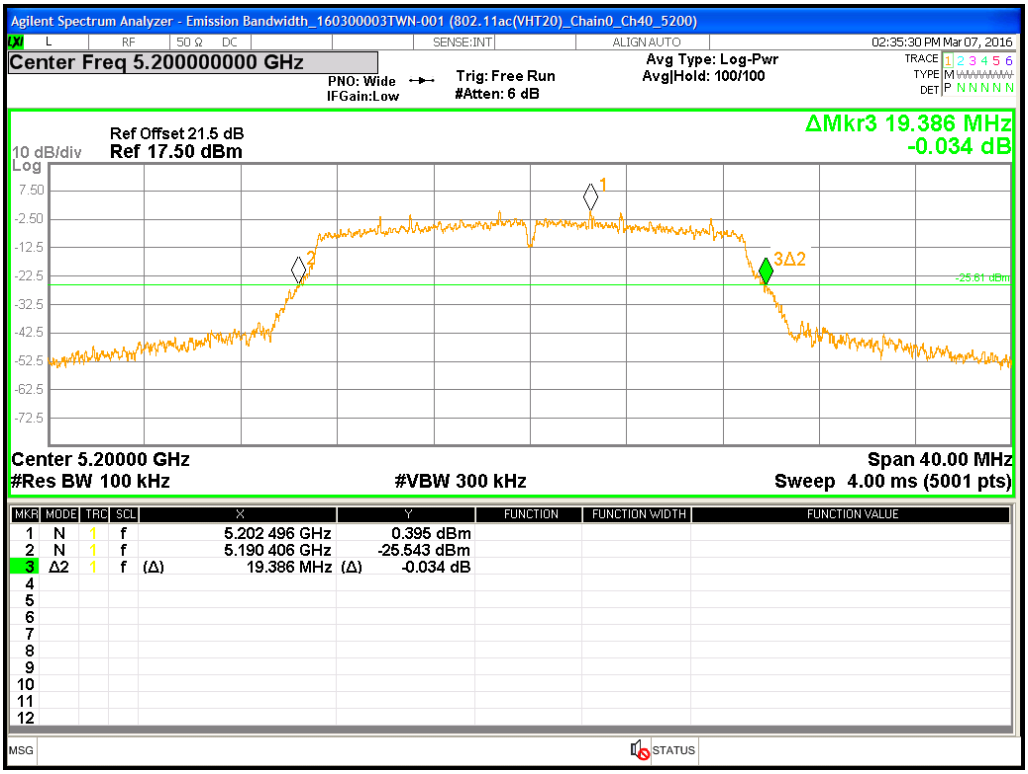
Chain0 : 26dB Bandwidth @ 802.11n(HT20) mode Ch48



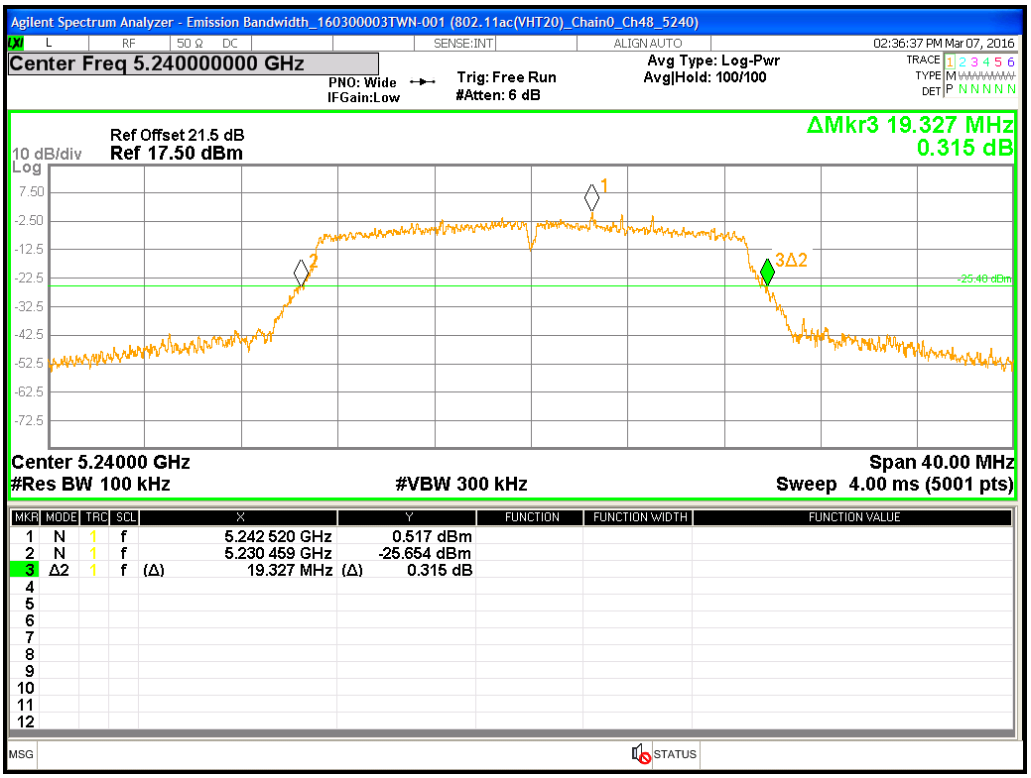
Chain0 : 26dB Bandwidth @ 802.11ac(VHT20) mode Ch36



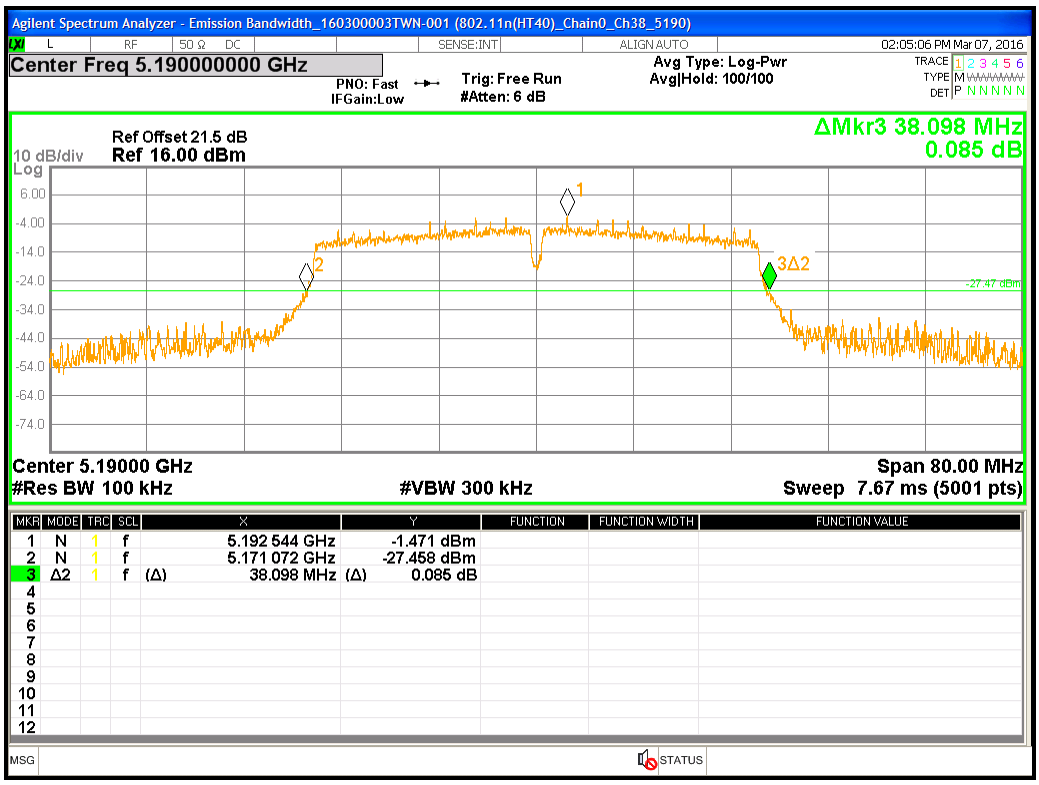
Chain0 : 26dB Bandwidth @ 802.11ac(VHT20) mode Ch40



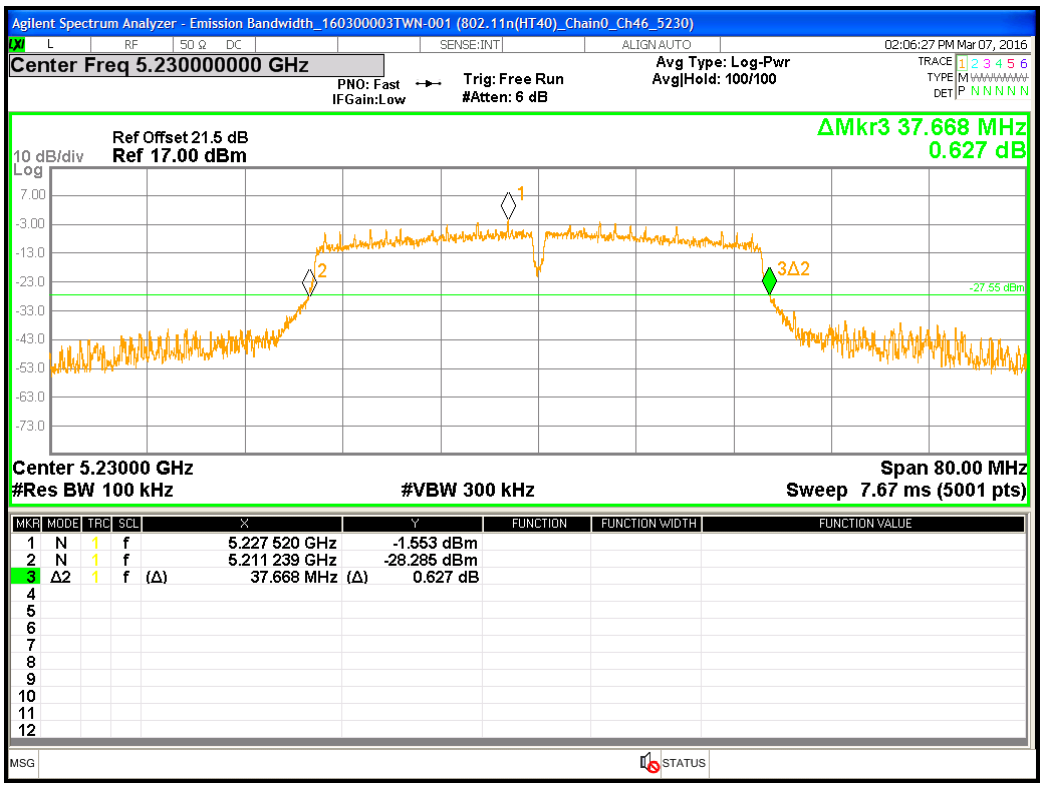
Chain0 : 26dB Bandwidth @ 802.11ac(VHT20) mode Ch48



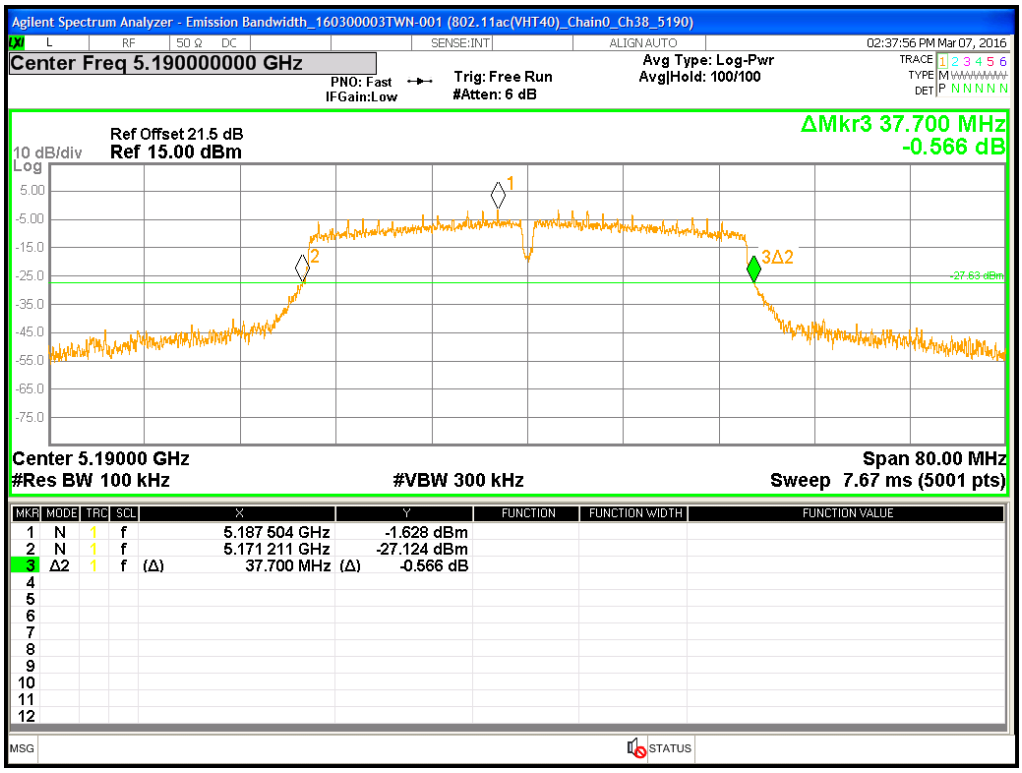
Chain0 : 26dB Bandwidth @ 802.11n(HT40) mode Ch38



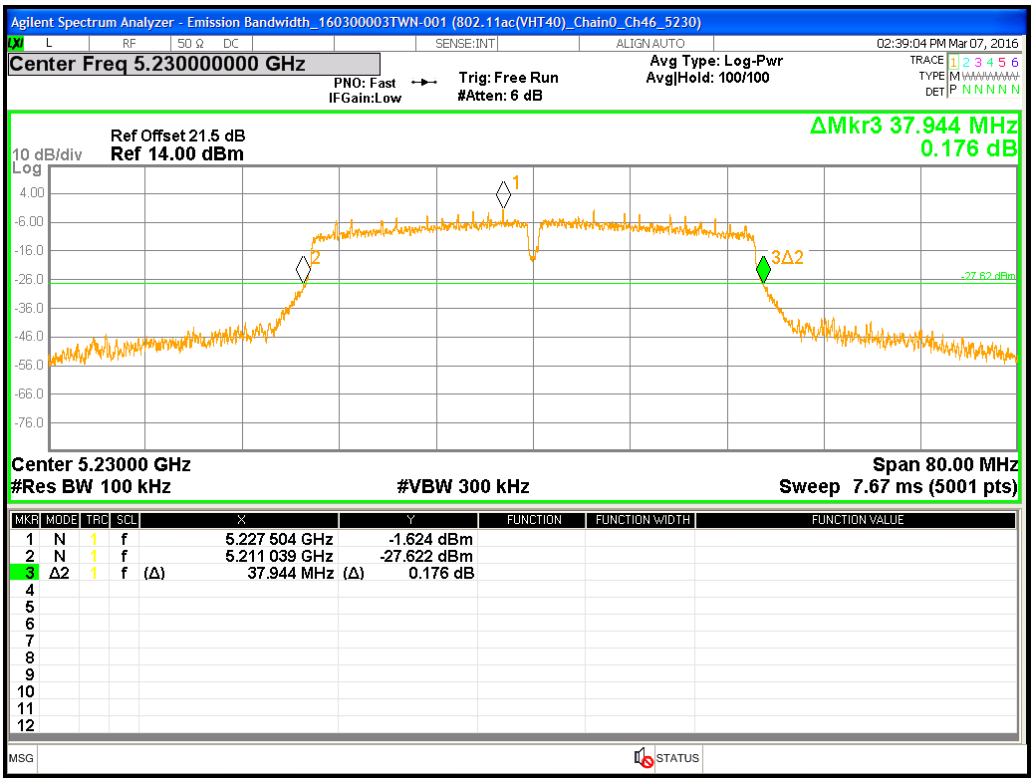
Chain0 : 26dB Bandwidth @ 802.11n(HT40) mode Ch46



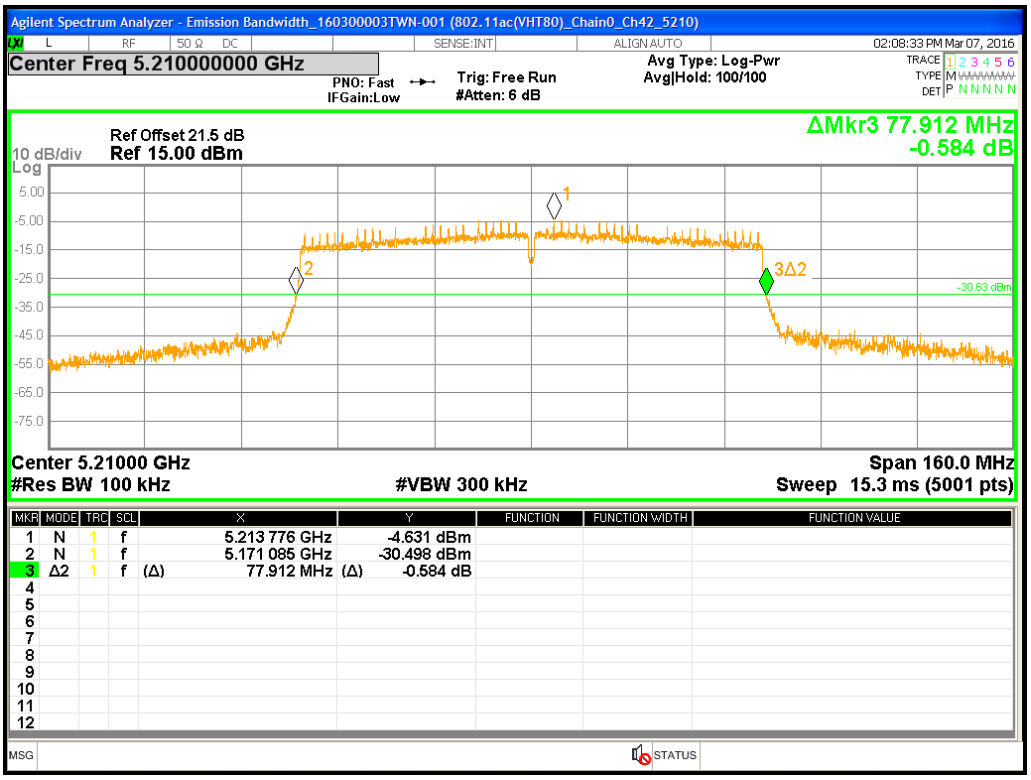
Chain0 : 26dB Bandwidth @ 802.11ac(VHT40) mode Ch38



Chain0 : 26dB Bandwidth @ 802.11ac(VHT40) mode Ch46



Chain0 : 26dB Bandwidth @ 802.11ac(VHT80) mode Ch42



6. Emissions in Restricted Frequency Bands (Radiated emission measurements)

6.1 Operating environment

Temperature:	25	℃
Relative Humidity:	55	%
Atmospheric Pressure	1008	hPa
Channel number	36,40,48 for 20MHz BW 38,46 for 40MHz BW 42 for 80MHz BW	

6.2 Limit for emission in restricted frequency bands (Radiated emission measurement)

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

Remark:

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

As specified in 15.407(b), For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band:
All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

However, an out-of-band emission that complies with both the average and peak limits of 15.209 is not required to satisfy the -27 dBm/MHz or -17 dBm/MHz peak emission limit.

6.3 Measuring instrument setting

Below 1GHz measurement

Receiver settings	
Receiver function	**Setting**
Detector	QP
RBW	9-150 kHz ; 200-300 Hz 0.15-30 MHz; 9-10 kHz 30-1000 MHz; 100-120 kHz
VBW	≧3 x RBW
Sweep	Auto couple
Attenuation	Auto

Above 1GHz measurement

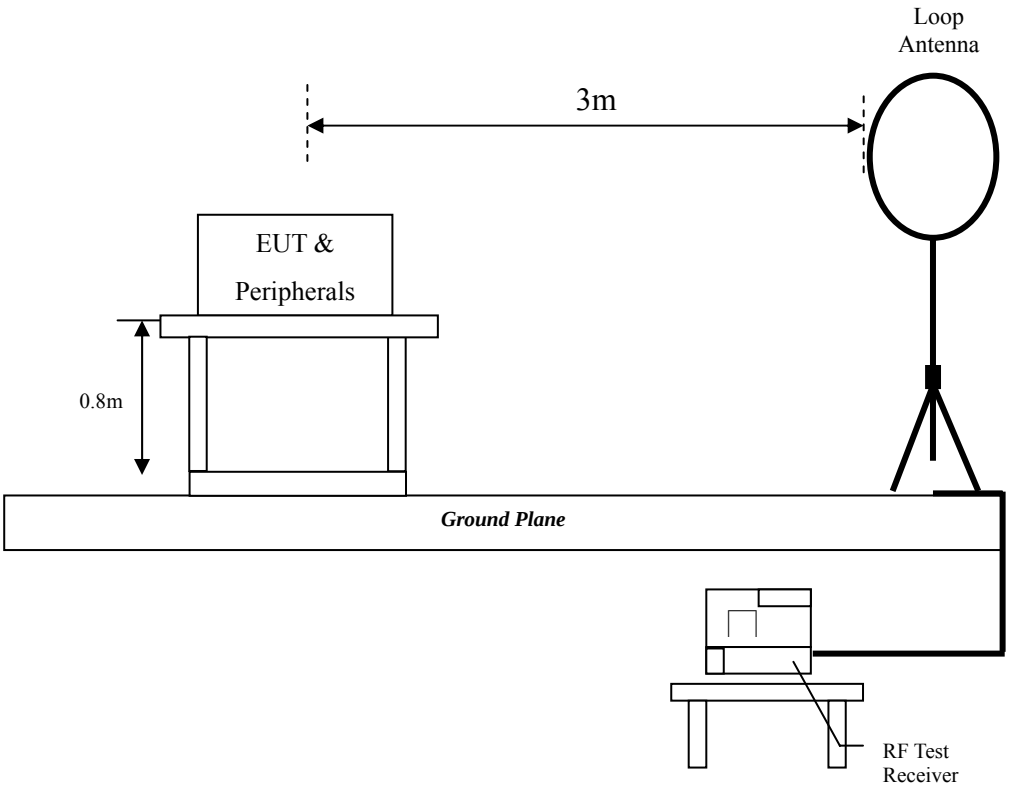
Spectrum analyzer settings	
Spectrum Analyzer function	**Setting**
Detector	Peak
RBW	1MHz
VBW	3MHz for Peak; 10Hz for Average
Sweep	Auto couple
Start Frequency	1GHz
Stop Frequency	Tenth harmonic
Attenuation	Auto

6.4 Test procedure

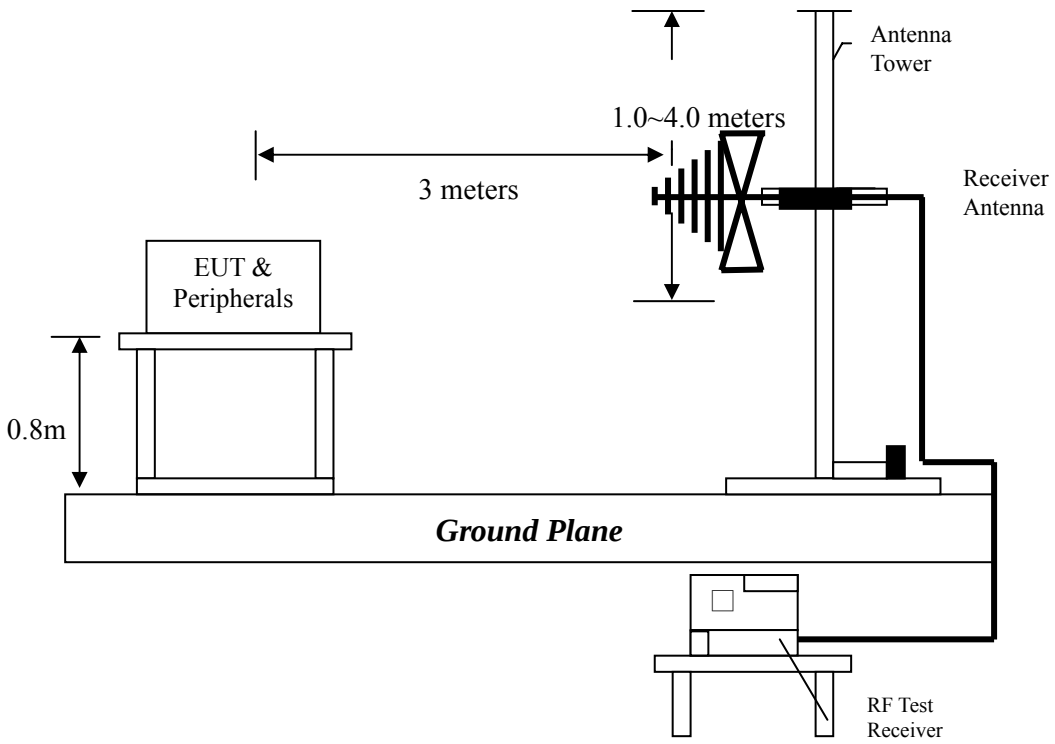
1. Configure the EUT according to ANSI C63.10: 2013 The EUT was placed on the top of the turntable 1.5 meter above ground for above 1GHz and placed on the top of the turntable 0.8 meter above ground for below 1GHz. The center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the companion devices. The turntable was rotated by 360 degree to find the position of the maximum emission level.
3. The height of the receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of the both horizontal and vertical polarization
4. If find the frequencies above the limit or below within 3dB, the antenna tower was scan (from 1m to 4m) and then the turntable was rotated to find the maximum reading.
5. Set the test-receiver system to peak or CISPR quasi-peak detector with specified bandwidth under maximum hold mode.
6. For emissions above 1GHz, use 1MHz VBW and 3MHz RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
   Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.
7. If the emissions level of the EUT in peak mode was 3dB lower than the average limit specified then testing will be stopped and peak values of the EUT will be reported. Otherwise, the emissions which do not have 3dB margin will be measured using the quasi-peak method for below 1GHz.
8. For testing above 1GHz, The emissions level of the EUT in peak mode was lower than average limit, then testing will be stopped and peak values of the EUT will be reported, otherwise, the emission will be measured in average mode again and reported.
9. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be quasi-peak measured by receiver.

6.5 Test configuration

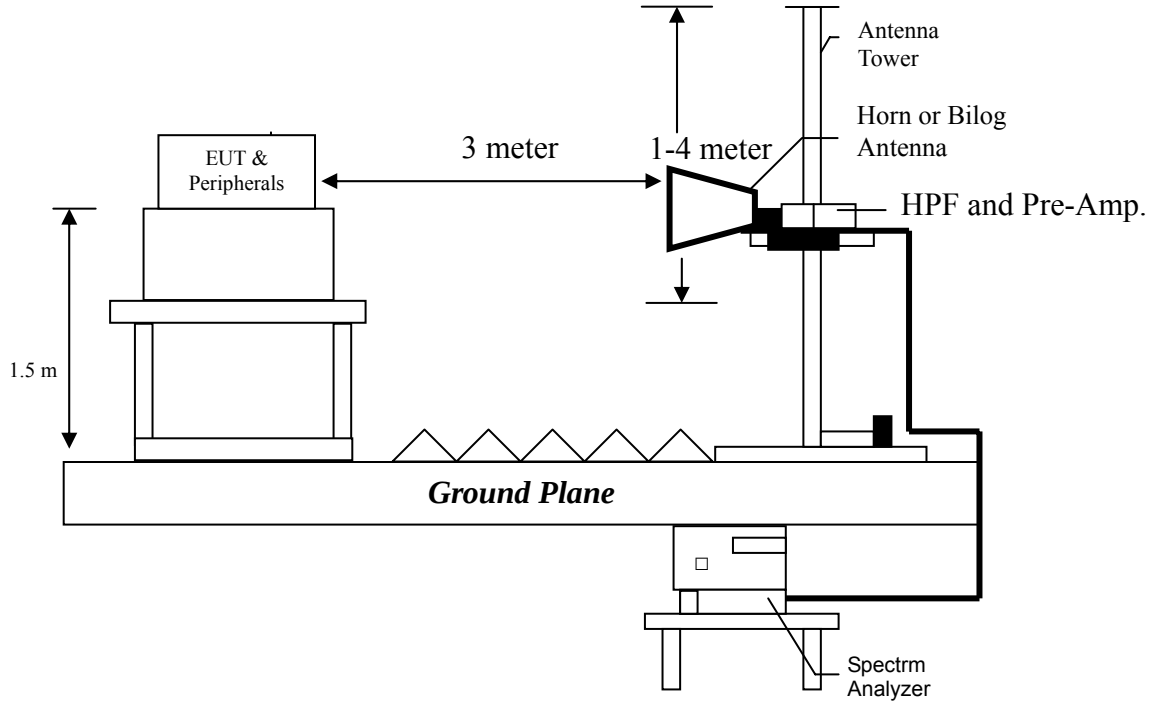
6.5.1 Radiated emission from 9 kHz to 30MHz using Loop Antenna



6.5.2 Radiated emission below 1GHz using Bilog Antenna



6.5.3 Radiated emission above 1GHz using Horn Antenna



6.6 Test results

6.6.1 Measurement results: frequencies from 9 kHz to 30MHz

EUT: PLTN-RB1V1

Frequency (MHz)	Detection value	Factor (dB/m)	Reading (dBµV)	Value (dBµV/m)	Limit @ 3m (dBµV/m)	Tolerance (dB)
0.12	QP	20.77	8.80	29.57	106.02	-76.45
3.91	QP	21.77	9.44	31.21	69.54	-38.33
22.36	QP	22.19	12.10	34.29	69.54	-35.25

Remark: Corr. Factor = Antenna Factor + Cable Loss

6.6.2 Measurement results: frequencies from 30 MHz to 1GHz

The test was performed on EUT under 802.11a/an continuously transmitting mode. The worst case occurred at 802.11a Tx channel 40.

EUT: PLTN-RB1V1
Worst Case: 802.11a Tx channel 40

Antenna Polariz. (V/H)	Freq. (MHz)	Receiver Detector	Corr. Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
Vertical	41.64	QP	14.30	13.68	27.98	40.00	-12.02
Vertical	136.70	QP	13.75	24.50	38.25	43.50	-5.25
Vertical	243.40	QP	13.97	21.02	34.99	46.00	-11.01
Vertical	268.62	QP	14.62	16.96	31.59	46.00	-14.41
Vertical	286.08	QP	15.29	15.09	30.38	46.00	-15.62
Vertical	856.44	QP	26.80	4.52	31.33	46.00	-14.67
Horizontal	134.76	QP	13.53	24.93	38.46	43.50	-5.04
Horizontal	216.24	QP	12.86	18.38	31.24	46.00	-14.76
Horizontal	237.58	QP	13.67	27.74	41.41	46.00	-4.59
Horizontal	288.02	QP	15.33	17.07	32.39	46.00	-13.61
Horizontal	759.44	QP	25.50	5.04	30.54	46.00	-15.46
Horizontal	792.42	QP	25.91	4.48	30.39	46.00	-15.61

Remark:

1. Corr. Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Corr. Factor

6.6.3 Measurement results: frequency above 1GHz to 40GHz

EUT: PLTN-RB1V1

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
802.11a Ch_36	10360	PK	V	38.95	12.23	41.33	53.56	54.00	-0.44
	10360	PK	H	38.95	12.23	40.46	52.69	54.00	-1.31
802.11a Ch_40	10400	PK	V	38.97	12.36	40.62	52.98	54.00	-1.02
	10400	PK	H	38.97	12.36	42.27	54.63	74.00	-19.37
	10400	AV	H	38.97	12.36	31.40	43.76	54.00	-10.24
802.11a Ch_48	10480	PK	V	39.03	12.62	41.91	54.53	74.00	-19.47
	10480	AV	V	39.03	12.62	29.46	42.08	54.00	-11.92
	10480	PK	H	39.03	12.62	39.91	52.53	54.00	-1.47
802.11n (HT20) Ch_36	10360	PK	V	38.95	12.23	40.02	52.25	54.00	-1.75
	10360	PK	H	38.95	12.23	39.90	52.13	54.00	-1.87
802.11n (HT20) Ch_40	8317	PK	V	37.32	10.56	41.12	51.68	54.00	-2.32
	10400	PK	V	38.97	12.36	40.13	52.49	54.00	-1.51
	10400	PK	H	38.97	12.36	40.28	52.64	54.00	-1.36
802.11n (HT20) Ch_48	8386	PK	V	37.31	10.43	42.24	52.67	54.00	-1.33
	10480	PK	V	39.03	12.62	39.72	52.34	54.00	-1.66
	10480	PK	H	39.03	12.62	39.93	52.55	54.00	-1.45
802.11ac (VHT20) Ch_36	10360	PK	V	38.95	12.23	39.71	51.94	54.00	-2.06
	10360	PK	H	38.95	12.23	40.12	52.35	54.00	-1.65
802.11ac (VHT20) Ch_40	10400	PK	V	38.97	12.36	39.98	52.34	54.00	-1.66
	10400	PK	H	38.97	12.36	39.75	52.11	54.00	-1.89
802.11ac (VHT20) Ch_48	8386	PK	V	37.31	10.43	42.99	53.42	54.00	-0.58
	10480	PK	V	39.03	12.62	40.51	53.13	54.00	-0.87
	8386	PK	H	37.31	10.43	40.37	50.80	54.00	-3.20
	10480	PK	H	39.03	12.62	39.89	52.51	54.00	-1.49
802.11n (HT40) Ch_38	8294	PK	V	37.32	10.60	41.43	52.03	54.00	-1.97
	10380	PK	V	38.96	12.29	39.73	52.02	54.00	-1.98
	10380	PK	H	38.96	12.29	40.96	53.25	54.00	-0.75
802.11n (HT40) Ch_46	8363	PK	V	37.31	10.48	42.48	52.96	54.00	-1.04
	10460	PK	V	39.01	12.56	40.68	53.24	54.00	-0.76
	10460	PK	H	39.01	12.56	41.18	53.74	54.00	-0.26

Remark: Correction Factor = Antenna Facto + Cable Loss + High Pass Filter Loss - Pre_Amplifie rGain

EUT: PLTN-RB1V1

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBµV)	Corrected Reading (dBµV/m)	Limit @ 3 m (dBµV/m)	Margin (dB)
802.11ac (VHT40) Ch_38	8294	PK	V	37.32	10.60	41.77	52.37	54.00	-1.63
	10380	PK	V	38.96	12.29	39.58	51.87	54.00	-2.13
	10380	PK	H	38.96	12.29	39.99	52.28	54.00	-1.72
802.11ac (VHT40) Ch_46	8363	PK	V	37.31	10.48	42.67	53.15	54.00	-0.85
	10460	PK	V	39.01	12.56	39.67	52.23	54.00	-1.77
	10460	PK	H	39.01	12.56	39.75	52.31	54.00	-1.69
802.11ac (VHT80) Ch_42	8340	PK	V	37.32	10.52	41.54	52.06	54.00	-1.94
	10420	PK	V	38.99	12.43	40.48	52.91	54.00	-1.09
	10420	PK	H	38.99	12.43	39.97	52.40	54.00	-1.60

Remark: Correction Factor = Antenna Factor+ Cable Loss + High Pass Filter Loss - Pre_Amplifier Gain

7. Emission on The Band Edge

7.1 Operating environment

Temperature:	25	℃
Relative Humidity:	50	%
Atmospheric Pressure	1008	hPa
Requirement	15.407(b), 15.209	
Channel	36, 38, 42, 46, 48	

7.2 Measuring instrument setting

Spectrum analyzer settings	
Spectrum Analyzer function	**Setting**
Detector	Peak
RBW	1MHz
VBW	3MHz for Peak; 10Hz for Average
Sweep	Auto couple
Restrict bands	4500~5150MHz
	5350 ~5460MHz
Attenuation	Auto

7.3 Test procedure

The test procedure is the same as clause 6.4

7.4 Test Result

Mode	CH	Freq. (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)	Restricted band (MHz)
802.11a	36	4849.60	PK	V	39.99	0.11	62.52	62.63	74	-11.37	4500~5150
		4755.20	AV	V	40.15	-0.18	49.94	49.76	54	-4.24	
	48	5442.51	PK	V	38.36	3.27	56.87	60.14	74	-13.86	5350~5460
		5447.01	AV	V	38.34	3.30	44.93	48.23	54	-5.77	
802.11n (HT20)	36	4849.60	PK	V	39.99	0.11	63.93	64.04	74	-9.96	4500~5150
		4755.20	AV	V	40.15	-0.18	50.01	49.83	54	-4.17	
	48	5453.49	PK	V	38.32	3.34	56.64	59.98	74	-14.02	5350~5460
		5447.01	AV	V	38.34	3.30	44.93	48.23	54	-5.77	
802.11ac (VHT20)	38	4797.20	PK	V	40.07	-0.05	62.73	62.68	74	-11.32	4500~5150
		4755.20	AV	V	40.15	-0.18	49.84	49.66	54	-4.34	
	46	5446.87	PK	V	38.34	3.30	58.13	61.43	74	-12.57	5350~5460
		5446.87	AV	V	38.34	3.30	44.89	48.19	54	-5.81	
802.11n (HT40)	36	5150.00	PK	V	39.27	1.50	63.20	64.70	74	-9.30	4500~5150
		4754.80	AV	V	40.15	-0.18	49.99	49.81	54	-4.19	
	48	5394.15	PK	V	38.51	2.98	56.23	59.21	74	-14.79	5350~5460
		5350.00	AV	V	38.65	2.71	43.39	46.10	54	-7.90	
802.11ac (VHT40)	36	4782.20	PK	V	40.10	-0.10	63.23	63.13	74	-10.87	4500~5150
		4755.20	AV	V	40.15	-0.18	49.88	49.70	54	-4.30	
	48	5449.66	PK	V	38.34	3.32	56.52	59.84	74	-14.16	5350~5460
		5446.87	AV	V	38.34	3.30	44.88	48.18	54	-5.82	
802.11ac (VHT80)	38	5150.00	PK	V	39.27	1.50	65.95	67.45	74	-6.55	4500~5150
		5150.00	AV	V	39.27	1.50	47.88	49.38	54	-4.62	
	46	5399.58	PK	V	38.49	3.01	56.81	59.82	74	-14.18	5350~5460
		5447.01	AV	V	38.34	3.30	44.98	48.28	54	-5.72	

Remark: Correction Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Pre_Amplifier Gain

8. Power Line Conducted Emission

8.1 Operating environment

Temperature:	20	℃
Relative Humidity:	55	%
Atmospheric Pressure	1008	hPa
Requirement	15.207	

8.2 Limit for AC power line conducted emission

Freq. (MHz)	Conducted Limit (dBuV)	
	Q.P.	Ave.
0.15~0.50	66 – 56*	56 – 46*
0.50~5.00	56	46
5.00~30.0	60	50

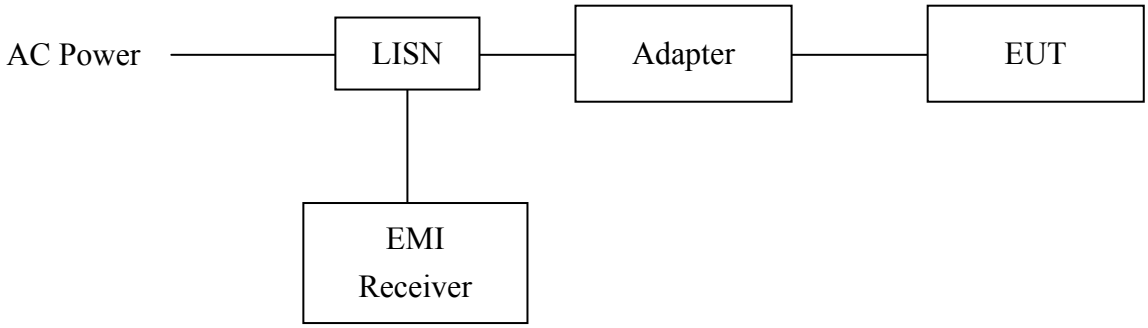
8.3 Measuring instrument setting

Receiver settings	
Receiver function	**Setting**
Detector	QP
Start frequency	0.15MHz
Stop frequency	30MHz
IF bandwidth	9 kHz
Attenuation	10dB

8.4 Test procedure

1. Configure the EUT according to ANSI C63.10:2013. The EUT or host of EHT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT or host of EUT to the power mains through a line impedance stabilization network.
3. All the companion devices are connected to the other LISN. The LISN should provide 50Uh/50ohms coupling impedance.
4. The frequency range from 150 kHz to 30MHz was searched
5. Set the test-receiver system to peak detector and specified bandwidth with maximum hold mode.
6. The measurement has to be done between each power line and ground at the power terminal.

8.5 Test diagram



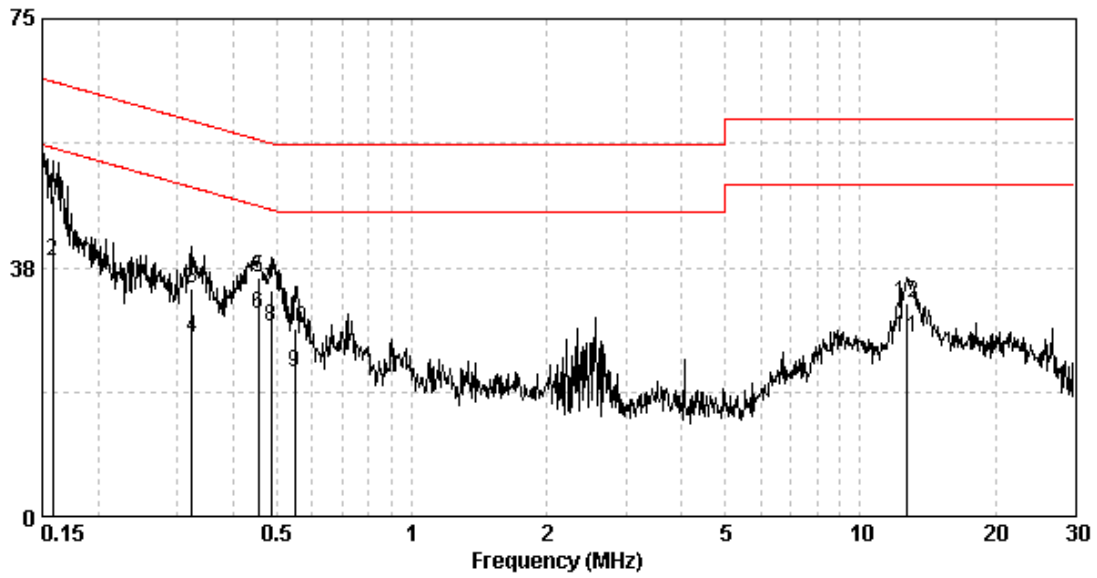
Note: The EUT was tested while in normal communication mode.

8.6 Test results

Phase: Live Line
Model No.: PLTN-RB1V1
Test Condition: Normal communication

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level AV (dBuV)	Limit Av (dBuV)	Margin (dB) Qp	Margin (dB) Av
0.158	9.74	48.46	65.56	38.34	55.56	-17.10	-17.22
0.323	9.73	34.28	59.62	26.80	49.62	-25.33	-22.82
0.454	9.73	35.99	56.80	30.55	46.80	-20.81	-16.26
0.486	9.73	34.09	56.23	28.65	46.23	-22.14	-17.58
0.549	9.75	28.33	56.00	21.59	46.00	-27.67	-24.41
12.649	9.89	32.20	60.00	26.79	50.00	-27.80	-23.21

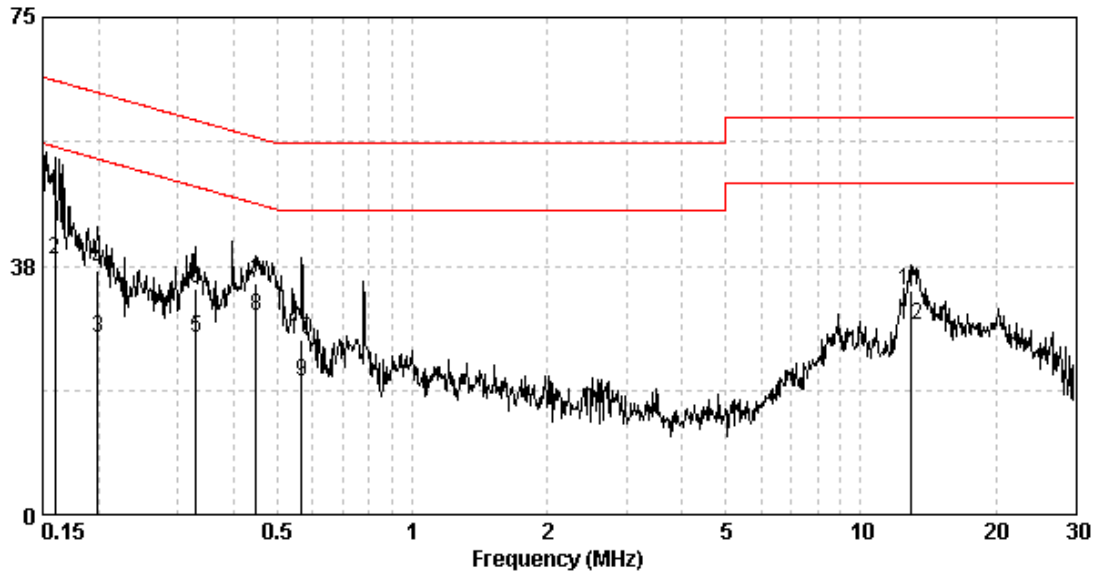
Remark:
1. Correction Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)



Phase: Neutral Line
Model No.: PLTN-RB1V1
Test Condition: Normal communication

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level AV (dBuV)	Limit Av (dBuV)	Margin (dB) Qp	Margin (dB) Av
0.160	9.74	47.34	65.47	38.39	55.47	-18.13	-17.08
0.199	9.74	36.83	63.67	26.64	53.67	-26.84	-27.02
0.330	9.73	34.01	59.44	26.74	49.44	-25.43	-22.70
0.449	9.73	34.91	56.89	30.03	46.89	-21.98	-16.86
0.567	9.75	26.35	56.00	19.96	46.00	-29.65	-26.04
12.920	9.92	33.85	60.00	28.46	50.00	-26.15	-21.54

Remark:
1. Correction Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)



Appendix A: Test equipment list

Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
ESCI EMI Test Receiver	Rohde & Schwarz	ESCI	100018	2015/12/02	2016/11/30
Spectrum Analyzer	Rohde & Schwarz	FSP30	100137	2015/08/18	2016/08/16
Horn Antenna (1-18G)	SHWARZBECK	BBHA 9120 D	9120D-456	2014/08/29	2017/08/27
Horn Antenna (14-42G)	SHWARZBECK	BBHA 9170	BBHA9170159	2014/09/16	2017/09/14
Broadband Antenna	SHWARZBECK	VULB 9168	9168-172	2013/08/08	2016/08/06
Pre-Amplifier	EMC Co.	EMC12635SE	980205	2015/10/7	2016/10/05
Pre-Amplifier	MITEQ	JS4-26004000--27-8A	828825	2015/09/15	2016/09/13
Power Meter	Anritsu	ML2495A	0844001	2015/11/11	2016/11/09
Power Sensor	Anritsu	MA2411B	0738452	2015/11/11	2016/11/09
Two-Line V-Network	Rohde & Schwarz	ENV216	101159	2015/06/08	2016/06/06
Artificial Mains Network (LISN)	Schaffner	MN2050D	1586	2015/05/27	2016/05/25
CON-1 Cable	SUHNER	BNC / RG-58	1521946	2015/05/09	2016/05/07
Test software	Audix	e3	4.2004-1-12k	NCR	NCR
Signal Analyzer	Agilent	N9030A	MY51380492	2015/09/21	2016/09/19
966-2(A) Cable 9kHz~26.5GHz	SUHNER	SMA / EX 100	N/A	2015/05/06	2016/05/05
966-2(B) Cable 9kHz~26.5GHz	SUHNER	SMA / SUCOFLEX 104P	CB0005	2015/05/06	2016/05/04

Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
RF Cable 9kHz~26.5GHz	SUHNER	SUCOFLEX 102	CB0006	2015/05/06	2016/05/05
966-2_3m Semi-Anechoic Chamber	966_2	CEM-966_2	N/A	2016/02/24	2017/02/22
Hight Pass Filter	Reactel	7HS-3G/18G-S11	N/A	2015/06/06	2016/06/04
Active Loop Antenna	SCHWARZBECK MESS-ELEKTRONIC	FMZB1519	1519-067	2016/03/03	2017/03/02
EMI Test Receiver	Rohde & Schwarz	ESR-7	101232	2015/12/02	2016/11/30
Test software	ADT	Radiated test system	7.5.14	NCR	NCR

Note: No Calibration Required (NCR).

Appendix B: Measurement Uncertainty

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of *k*=2.
95 % confidence level using a coverage factor of *k*=2.

Item	Uncertainty
Vertically polarized radiated disturbances from 30 MHz ~ 1 GHz in a semi-anechoic chamber at a distance of 3 m	5.14 dB
Horizontally polarized radiated disturbances from 30 MHz ~ 1 GHz in a semi-anechoic chamber at a distance of 3 m	5.22 dB
Vertically polarized Radiated disturbances from 1 GHz ~ 18 GHz in a semi-anechoic chamber at a distance of 3 m	3.64 dB
Horizontally polarized Radiated disturbances from 1 GHz ~ 18 GHz in a semi-anechoic chamber at a distance of 3 m	3.64 dB
Vertically polarized Radiated disturbances from 18 GHz ~ 40 GHz in a semi-anechoic chamber at a distance of 3 m	2.7 dB
Horizontally polarized Radiated disturbances from 18 GHz ~ 40 GHz in a semi-anechoic chamber at a distance of 3 m	2.7 dB
Radiated disturbances from 9 kHz ~ 30 MHz in a semi-anechoic chamber at a distance of 3 m	3.53 dB
Emission on the Band Edge Test	3.64 dB
20 dB Bandwidth	0.85 dB
AC Power Line Conducted Emission	2.47 dB