HCT CO.,LTD.

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FCC UNII REPORT

Certification

Applicant Name:
LG Electronics Inc.

Address:
222 LG-ro Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do, Korea

Date of Issue:
February 14, 2018

Test Site/Location:
HCT CO., LTD., 74,Seoicheon-ro 578beon-gil,Majang-myeo,Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

Report No.: HCT-RF-1801-FC007-R1

FCC ID	**: BEJLGSBW41**
APPLICANT	**: LG Electronics Inc.**

Model:	LGSBW41
EUT Type:	WIFI/BT Combo module
Modulation type	OFDM
FCC Classification:	Unlicensed National Information Infrastructure(UNII)
FCC Rule Part(s):	Part 15.407

Band	Mode	Channel Bandwidth (MHz)	Frequency Range (MHz)	Ant.0 Power (dBm)	Ant.1 Power (dBm)	Ant. 0 & 1 Power (dBm)
UNII3	802.11a	20	5745 – 5825	16.33	14.82	18.58
	802.11n	20	5745 – 5825	16.22	14.68	18.49
	802.11n	40	5755 – 5795	15.34	14.01	17.70

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from thisequipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC under normal use and maintenance.

Report prepared by : Jung Ki Lim
Engineer of Telecommunication testing center

Approved by : Jong Seok Lee
Manager of Telecommunication testing center

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Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-1801-FC007	January 18, 2018	- First Approval Report
HCT-RF-1801-FC007-R1	February 14, 2018	- Revised the output power on page 1. (Ant. 0 & 1 sum)

Table of Contents

1. GENERAL INFORMATION

Applicant:	LG Electronics Inc.
Address:	222 LG-ro Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do, Korea
FCC ID:	BEJLGSBW41
EUT Type:	WIFI/BT Combo module
Model:	LGSBW41
Date(s) of Tests:	January 08, 2018 ~ January 18, 2018
Place of Tests:	HCT Co., Ltd. 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea

2. EUT DESCRIPTION

Model	LGSBW41	
EUT Type	WIFI/BT Combo module	
Power Supply	DC 3.5 V	
Frequency Range	TX_20 MHz BW:	5745 MHz - 5825 MHz (UNII 3)
	40 MHz BW:	5755 MHz - 5795 MHz (UNII 3)
	RX_20 MHz BW:	5745 MHz - 5825 MHz (UNII 3)
	40 MHz BW:	5755 MHz - 5795 MHz (UNII 3)
Modulation Type	OFDM(802.11a, 802.11n)	
Antenna Specification	Ant.0:	Manufacturer: LG Innotek Antenna type: PCB Antenna Peak Gain : 2.49 dBi (5.8 GHz)
	Ant.1:	Manufacturer: LG Innotek Antenna type: PCB Antenna Peak Gain :2.50 dBi (5.8 GHz)
	Directional Antenna Gain	5.51 dBi

2.1 EUT OPERATING MODE

▣ Operating mode

Mode	Operating Mode	Operating Ant.
802.11a/n	SISO	Ant 0
		Ant 1
	CDD	Ant 0 & 1

Note :

We have done all test case. Worst case is CDD for 802.11a/n mode.

So, we attached the result of CDD for 802.11a/n mode

▣ The EUT was operation in special test mode.

The value of the power parameters of the test software, please refer to the table below

-	Ch. 149	Ch. 157	Ch. 165
802.11a : Tx power was setup as	56	60	65
802.11n(HT20) : Tx power was setup as	56	60	65

-	Ch. 151	Ch. 159
802.11n(HT40) : Tx power was setup as	56	65

3. TEST METHODOLOGY

The measurement procedure described in FCC KDB 789033 D02 General UNII Test Procedures New Rules v02 dated December 8, 2017 entitled “Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part15, Subpart E” and ANSI C63.10(Version : 2013) ‘the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices’ were used in the measurement.

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.407 under the FCC Rules Part 15 Subpart E.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2013) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane below 1GHz. Above 1GHz with 1.5m using absorbers between the EUT and receive antenna. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 8 of ANSI C63.10. (Version: 2013)

3.4 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.
Channel low, mid and high with highest data rate (worst case) is chosen for full testing.

4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is traceable to recognized national standards.
Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2006).

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated July 07, 2015 (Registration Number: 90661)

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.
Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.
All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

6. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203, §15.407

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

* The antennas of this E.U.T are permanently attached.
* The E.U.T Complies with the requirement of §15.203, §15.407

▣ Directional Gain Calculations

▪ If any transmit signals are correlated with each other (CDD)

Directional gain = $10*\log[(10^{G1/20} + 10^{G2/20}+\ldots+10^{GN/20})^2/N]$ dBi

▣ Antenna Gain

5GHz Band (UNII 3)

Antenna Gain	Ant 0	2.49 dBi
	Ant 1	2.50 dBi
Directional Antenna Gain	Ant 0 & 1	5.51 dBi

7. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4:2014.

All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence.

Parameter	Expanded Uncertainty (±dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.82
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80
Radiated Disturbance (1 GHz ~ 18 GHz)	5.70

8. SUMMARY OF TEST RESULTS

8.1 FCC Part

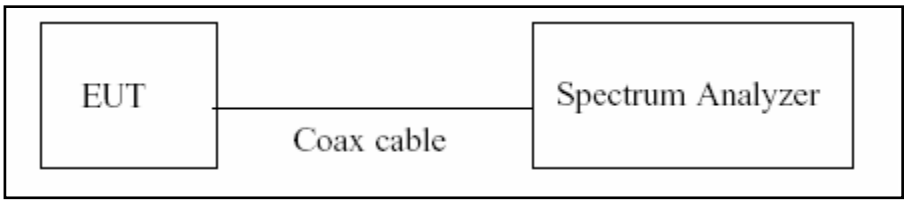
Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
26dB Bandwidth	§15.407 (for Power Measurement)	N/A	CONDUCTED	PASS
6 dB Bandwidth	§15.407(e)	>500 kHz (5725-5850 MHz)		PASS
Maximum Conducted Output Power	§15.407(a)	<1 W (5725-5850 MHz)		PASS
Peak Power Spectral Density	§15.407(a)	<30 dBm/500 kHz(5725-5850 MHz)		PASS
Frequency Stability	§15.407(g)	NA		PASS
AC Conducted Emissions 150 kHz-30 MHz	15.207	<FCC 15.207 limits		PASS
Undesirable Emissions	§15.407(b)	cf. Section 9.6.1 (UNII 3)	RADIATED	PASS
General Field Strength Limits(Restricted Bands and Radiated Emission Limits)	15.205, 15.407(b)(5), (6)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		PASS

9. TEST RESULT

9.1 DUTY CYCLE

The zero-span mode on a spectrum analyzer or EMI receiver ,if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set RBW ≥ EBW if possible; otherwise, set RBW to the largest available value. Set VBW ≥ RBW. Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are > 50/*T*, where *T* is defined in section B)1)a), and the number of sweep points across duration *T* exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if *T* ≤ 16.7 microseconds.)

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer. We tested according to the zero-span measurement method, (B.2 in KDB 789033 D02 v02)
The largest availble value of RBW is 8 MHz and VBW is 50 MHz. The zero-span method of measuring duty cycle shall not be used if T ≤ 6.25 microseconds. (50/6.25 = 8)
The zero-span method was used becaure all measured T data are > 6.25 microseconds and both RBW and VBW are > 50/*T*.

1. RBW = 8 MHz (the largest availble value)
2. VBW = 8 MHz (≥ RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on}/ T_{total} and Duty Cycle Factor = 10*log(1/Duty Cycle)

▣ Duty Cycle Factor

Ant.0

Mode	Data Rate	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
5.8 GHz Band 802.11a	6 Mbps	2.062	2.086	0.98830409	0.051
	9 Mbps	1.386	1.408	0.98446369	0.068
	12 Mbps	1.044	1.067	0.97807757	0.096
	18 Mbps	0.704	0.728	0.96705107	0.146
	24 Mbps	0.532	0.556	0.95680346	0.192
	36 Mbps	0.364	0.387	0.94008264	0.268
	48 Mbps	0.276	0.300	0.92000000	0.362
	54 Mbps	0.248	0.272	0.91278875	0.396
5.8 GHz Band 802.11n_20 MHz BW	MCS0_6.5 Mbps	1.907	1.932	0.98736844	0.055
	MCS1_13 Mbps	0.967	0.991	0.97598870	0.106
	MCS2_19.5 Mbps	0.652	0.675	0.96680498	0.147
	MCS3_26 Mbps	0.497	0.519	0.95687332	0.191
	MCS4_39 Mbps	0.340	0.364	0.93548564	0.290
	MCS5_52 Mbps	0.260	0.284	0.91692826	0.377
	MCS6_58.5 Mbps	0.236	0.260	0.90924696	0.413
	MCS7_65 Mbps	0.216	0.240	0.90167018	0.450
5.8 GHz Band 802.11n_40 MHz BW	MCS0_13.5 Mbps	0.931	0.954	0.97651664	0.103
	MCS1_27 Mbps	0.480	0.503	0.95361652	0.206
	MCS2_40.5 Mbps	0.329	0.351	0.93617015	0.286
	MCS3_54 Mbps	0.252	0.275	0.91856061	0.369
	MCS4_81 Mbps	0.176	0.199	0.88687783	0.521
	MCS5_108 Mbps	0.140	0.163	0.86003683	0.655
	MCS6_121.5 Mbps	0.128	0.151	0.85089463	0.701
	MCS7_135 Mbps	0.116	0.139	0.83766234	0.769

Ant.1

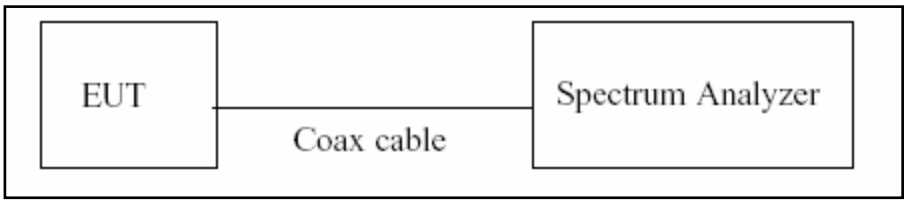
Mode	Data Rate	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
5.8 GHz Band 802.11a	6 Mbps	2.062	2.086	0.98830409	0.051
	9 Mbps	1.386	1.408	0.98446369	0.068
	12 Mbps	1.044	1.067	0.97807757	0.096
	18 Mbps	0.704	0.727	0.96782178	0.142
	24 Mbps	0.532	0.556	0.95680346	0.192
	36 Mbps	0.364	0.387	0.94008264	0.268
	48 Mbps	0.276	0.300	0.92000000	0.362
	54 Mbps	0.248	0.272	0.91456359	0.388
5.8 GHz Band 802.11n_20 MHz BW	MCS0_6.5 Mbps	1.907	1.932	0.98736844	0.055
	MCS1_13 Mbps	0.967	0.992	0.97500000	0.110
	MCS2_19.5 Mbps	0.652	0.675	0.96524437	0.154
	MCS3_26 Mbps	0.496	0.519	0.95482485	0.201
	MCS4_39 Mbps	0.340	0.364	0.93548564	0.290
	MCS5_52 Mbps	0.260	0.284	0.91692826	0.377
	MCS6_58.5 Mbps	0.236	0.260	0.90924696	0.413
	MCS7_65 Mbps	0.216	0.240	0.90167018	0.450
5.8 GHz Band 802.11n_40 MHz BW	MCS0_13.5 Mbps	0.932	0.955	0.97619083	0.105
	MCS1_27 Mbps	0.480	0.502	0.95541401	0.198
	MCS2_40.5 Mbps	0.329	0.351	0.93723843	0.281
	MCS3_54 Mbps	0.252	0.274	0.91710997	0.376
	MCS4_81 Mbps	0.176	0.199	0.88656733	0.523
	MCS5_108 Mbps	0.140	0.163	0.85974857	0.656
	MCS6_121.5 Mbps	0.128	0.151	0.84768212	0.718
	MCS7_135 Mbps	0.116	0.139	0.83754513	0.770

9.2 EMISSION BANDWIDTH AND MINIMUM EMISSION BANDWIDTH MEASUREMENT

The bandwidth at 26 dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum power control level, as defined in KDB 789033 D02 v02, at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26 dB bandwidth.

The 26 dB bandwidth is used to determine the conducted power limits.

▣ TEST CONFIGURATION



▣ TEST PROCEDURE (26dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.
The Spectrum Analyzer is set to(C.1 in KDB 789033 D02 v02)

1. RBW = approximately 1 % of the emission bandwidth
2. VBW > RBW
3. Detector = Peak
4. Trace mode = max hold
5. Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1 %.

Note : We tested 26 dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer. X dB is set 26 dB.

In order to simplify the report, attached plots were only the most wide channel.

▣ TEST PROCEDURE (for the band 5.725-5.85 GHz, 6 dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to(C.2 in KDB 789033 D02 v02)

1. RBW = 100 kHz
2. VBW ≥ 3*RBW
3. Detector = Peak
4. Trace mode = max hold
5. Allow the trace to stabilize
6. 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 lever measured in the fundamental emission.

Note : We tested 6 dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer. X dB is set 6 dB.

▣ TEST RESULTS for Ant.0_802.11a

Conducted 26 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	19.95	N/A	Pass
5785	157	23.44	N/A	Pass
5825	165	29.96	N/A	Pass

▣ TEST Plot for Ant.0_802.11a

802.11a UNII 3 BAND 26dB Bandwidth (CH 165)

Note : In order to simplify the report, attached plots were only the most wide channel.

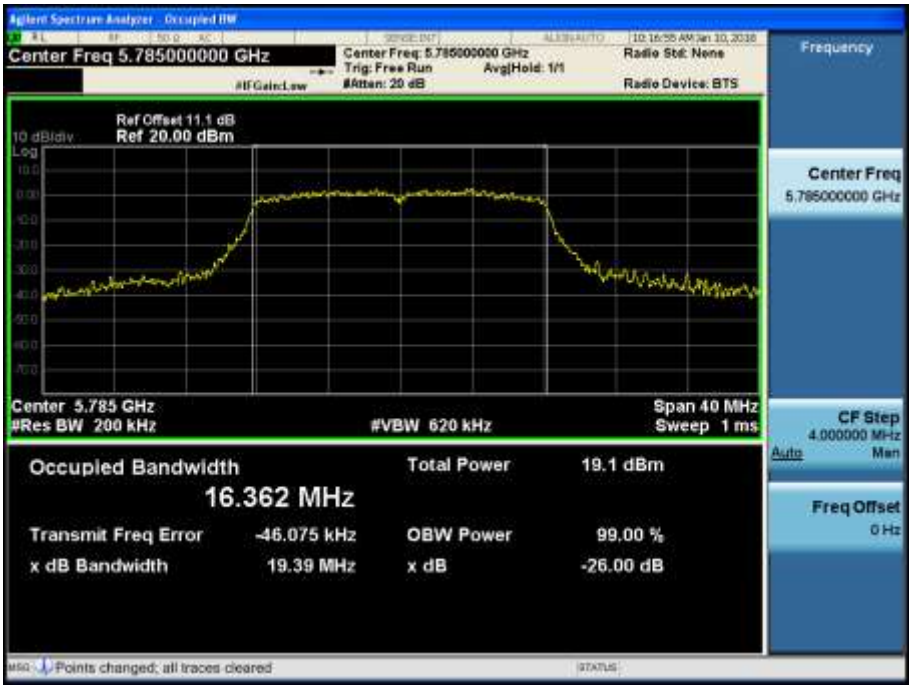
▣ TEST RESULTS for Ant.1_802.11a

Conducted 26 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	19.11	N/A	Pass
5785	157	19.39	N/A	Pass
5825	165	19.20	N/A	Pass

▣ TEST Plot for Ant.1_802.11a

802.11a UNII 3 BAND 26dB Bandwidth (CH 157)



Note : In order to simplify the report, attached plots were only the most wide channel.

▣ TEST RESULTS for Ant.0_802.11n_HT20

Conducted 26 dB Bandwidth Measurements for 802.11n_HT20

802.11n_HT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	21.56	N/A	Pass
5785	157	24.35	N/A	Pass
5825	165	27.47	N/A	Pass

▣ TEST Plot for Ant.0_802.11n_HT20

802.11n_HT20 UNII 3 BAND 26dB Bandwidth(CH 165)

Note : In order to simplify the report, attached plots were only the most wide channel.

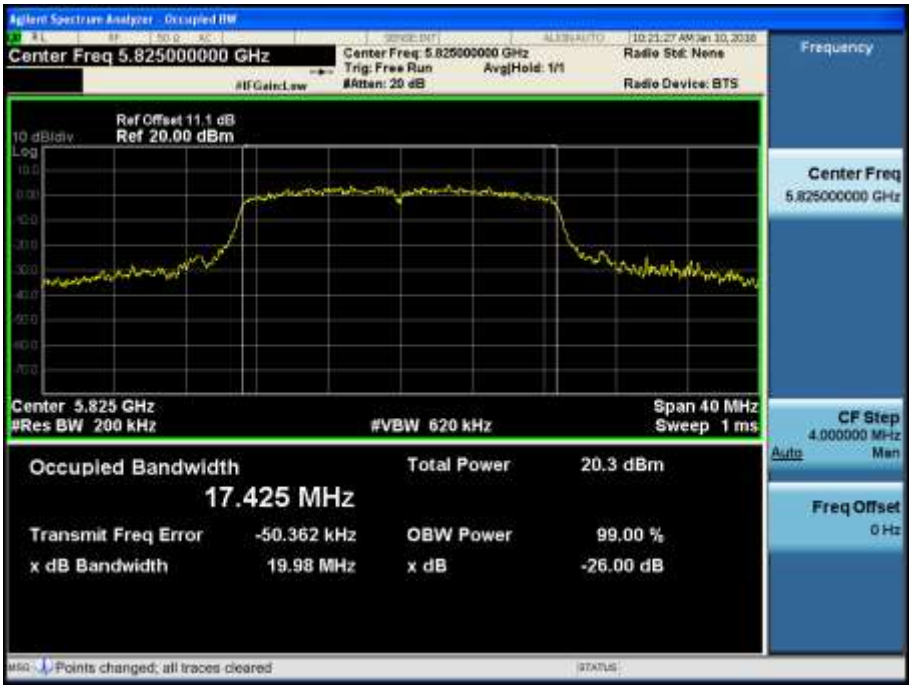
▣ TEST RESULTS for Ant.1_802.11n_HT20

Conducted 26 dB Bandwidth Measurements for 802.11n_HT20

802.11n_HT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	19.58	N/A	Pass
5785	157	19.82	N/A	Pass
5825	165	19.98	N/A	Pass

▣ TEST Plot for Ant.1_802.11n_HT20

802.11n_HT20 UNII 3 BAND 26dB Bandwidth(CH 165)



Note : In order to simplify the report, attached plots were only the most wide channel.

▣ TEST RESULTS for Ant.0_802.11n_HT40

Conducted 26 dB Bandwidth Measurements for 802.11n_HT40

802.11n_HT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	39.65	N/A	Pass
5795	159	63.15	N/A	Pass

▣ TEST Plot for Ant.0_802.11n_HT40

802.11n_HT40 UNII 3 BAND 26dB Bandwidth (CH 159)

Note : In order to simplify the report, attached plots were only the most wide channel.

▣ TEST RESULTS for Ant.1_802.11n_HT40

Conducted 26 dB Bandwidth Measurements for 802.11n_HT40

802.11n_HT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	39.83	N/A	Pass
5795	159	41.69	N/A	Pass

▣ TEST Plot for Ant.1_802.11n_HT40

802.11n_HT40 UNII 3 BAND 26dB Bandwidth (CH 159)

Note : In order to simplify the report, attached plots were only the most wide channel.

Conducted 6 dB Bandwidth

▣ TEST RESULTS for Ant.0_802.11a/n_HT20

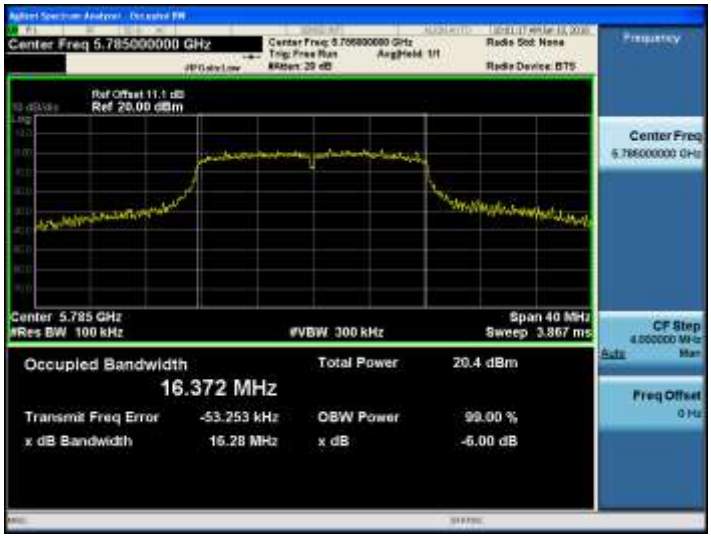
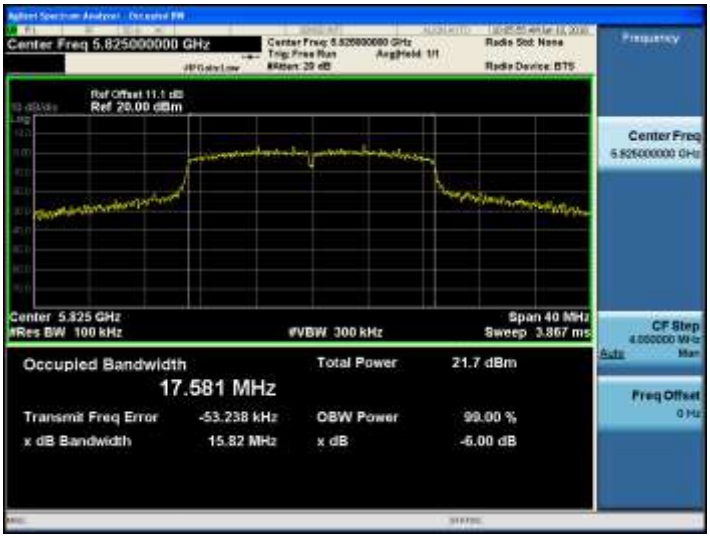
Conducted 6 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	15.54	0.5	Pass
5785	157	16.28	0.5	Pass
5825	165	15.54	0.5	Pass

Conducted 6 dB Bandwidth Measurements for 802.11n_HT20

802.11n_HT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	15.73	0.5	Pass
5785	157	15.47	0.5	Pass
5825	165	15.82	0.5	Pass

▣ TEST PlotS for 802.11a/n_HT20

802.11a UNII 3 BAND 6dB Bandwidth (CH.157)	802.11n_HT20 UNII 3 BAND 6dB Bandwidth(CH.165)
	

Note : In order to simplify the report, attached plots were only the most wide channel.

▣ TEST RESULTS for Ant.1_802.11a/n_HT20

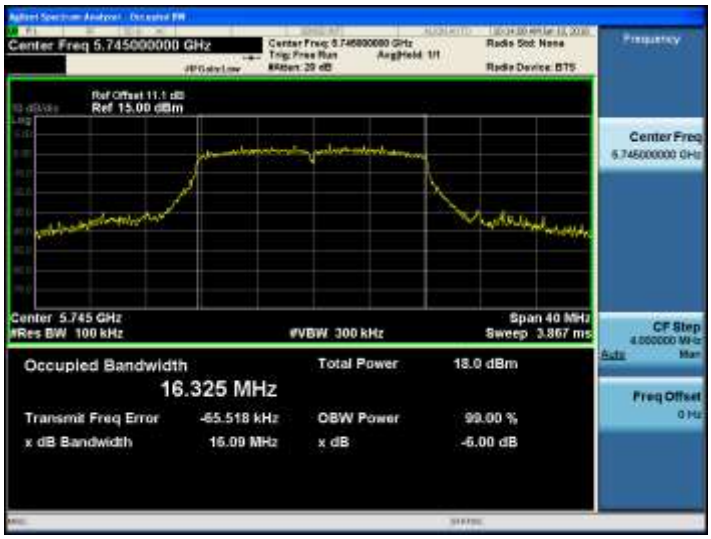
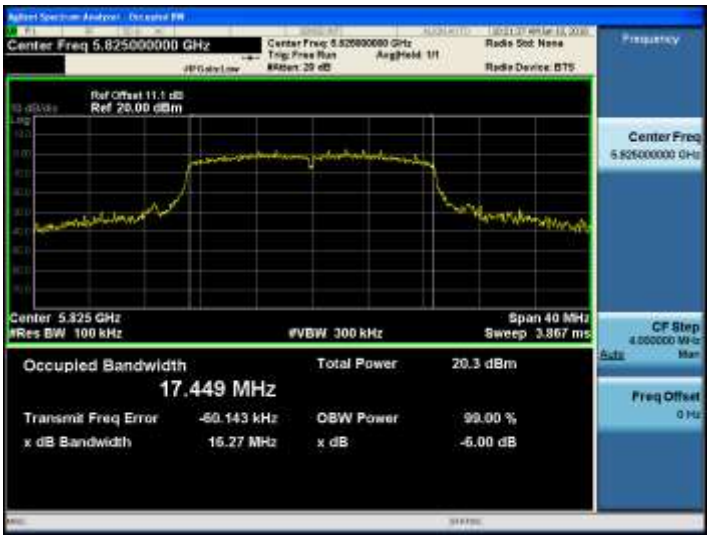
Conducted 6 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	16.09	0.5	Pass
5785	157	15.79	0.5	Pass
5825	165	15.75	0.5	Pass

Conducted 6 dB Bandwidth Measurements for 802.11n_HT20

802.11n_HT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	15.43	0.5	Pass
5785	157	16.00	0.5	Pass
5825	165	16.27	0.5	Pass

▣ TEST PlotS for Ant.1_802.11a/n_HT20

802.11a UNII 3 BAND 6dB Bandwidth (CH.149)	802.11n_HT20 UNII 3 BAND 6dB Bandwidth(CH.165)
	

Note : In order to simplify the report, attached plots were only the most wide channel.

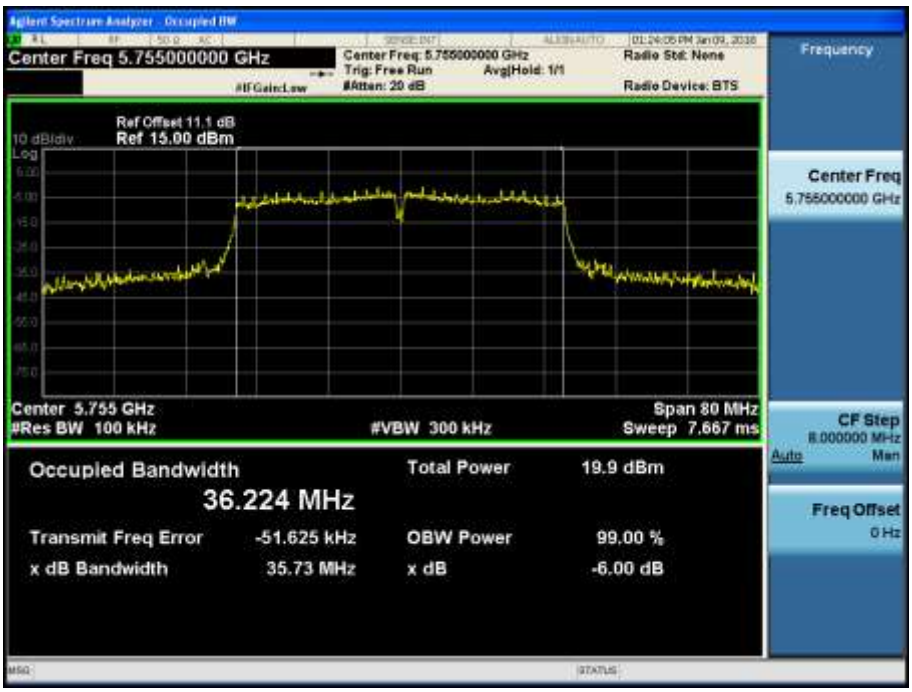
▣ TEST RESULTS for Ant.0_802.11n_HT40

Conducted 6 dB Bandwidth Measurements for 802.11n_HT40

802.11n_HT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.73	0.5	Pass
5795	159	34.04	0.5	Pass

▣ TEST Plots for Ant.0_802.11n_HT40

802.11n_40 MHz UNII 3 BAND 6dB Bandwidth (CH.151)



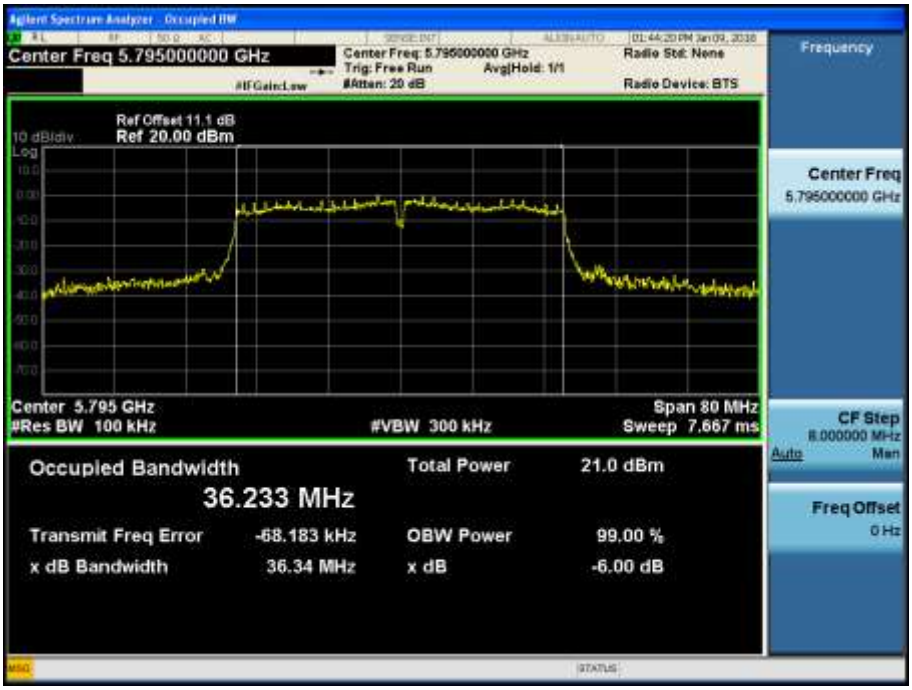
▣ TEST RESULTS for Ant.1_802.11n_HT40

Conducted 6 dB Bandwidth Measurements for 802.11n_HT40

802.11n_HT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	36.05	0.5	Pass
5795	159	36.34	0.5	Pass

▣ TEST Plots for Ant.1_802.11n_HT40

802.11n_40 MHz UNII 3 BAND 6dB Bandwidth (CH.159)



9.3 OUTPUT POWER MEASUREMENT

A transmitter antenna terminal of EUT is connected to the input of a Power meter or Spectrum Analyzer .Measurement is made while the EUT is operating in transmission mode at the appropriate frequencies.

▣ LIMIT

Band	Mode	Limit (dBm)
UNII 3	802.11a,n	30.00

Maximum Conducted Output Power:

Operating Mode	Band	Mode	Operating Ant.	Ant. Gain (dBi)	Limit (dBm)
SISO	UNII 3	802.11a/n	Ant 0	2.49	30.00
			Ant 1	2.50	30.00
MIMO	UNII 3		Ant 0 & 1	5.51	30.00

Note : 1. If all antenna gains are not equal,

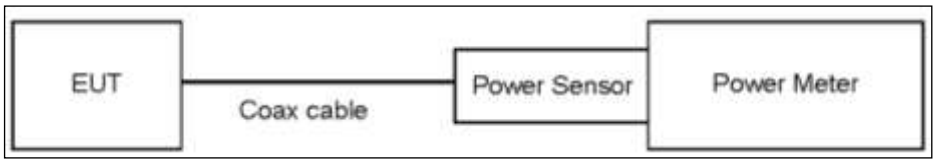
Directional gain = $10*\log[(10^{G1/20} + 10^{G2/20}+\ldots+10^{GN/20})^2/N]$ dBi

(according to KDB662911 D01 v02r01)

2. Limit is calculated by antenna gain.

3. The limits of maximum conducted power were applied the antenna gain. Therefore, if conducted power is pass, e.i.r.p. is also pass. So, we attached only conducted power table.

▣ TEST CONFIGURATION(20 MHz BW)



▣ TEST PROCEDURE(20 MHz BW)

▪ Average Power (Procedure E.3.a in KDB 789033 D02 v02).

1. Measure the duty cycle.
2. Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
3. Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

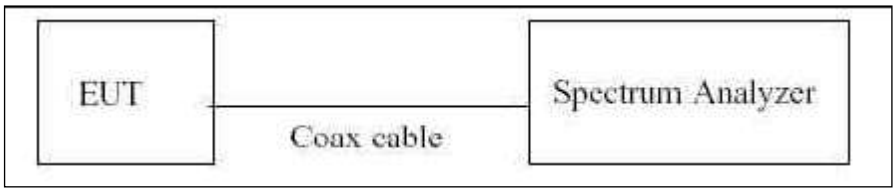
Note :

Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 3	11.1

(Actual value of loss for the attenuator and cable combination)

▣ TEST CONFIGURATION(40 MHz BW & 80 MHz BW)



▣ TEST PROCEDURE(40 MHz BW & 80 MHz BW)

▪ Average Power

The transmitter output is connected to the Spectrum Analyzer. We use the spectrum analyzer's integrated band power measurement function. We tested according to Method SA-2 in KDB 789033 D02 v02.

The Spectrum Analyzer is set to

1. Measure the duty cycle.
2. Set span to encompass the 26 dB EBW of the signal.
3. RBW = 1 MHz.
4. VBW ≥ 3 MHz.
5. Number of points in sweep ≥ 2*span/RBW.
6. Sweep time = auto.
7. Detector = RMS.
8. Do not use sweep triggering. Allow the sweep to "free run".
9. Trace average at least 100 traces in power averaging(RMS) mode
10. Integrated bandwidth = OBW
11. Add 10log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

▣ Sample Calculation (Conducted)

Output Power = Reading Value + ATT loss + Cable loss(1 ea) + Duty Cycle Factor

▣ Sample Calculation (EIRP)

Output Power = Reading Value + ATT loss + Cable loss(1 ea) + Duty Cycle Factor + Ant gain

Note: 1. Spectrum reading values are not plot data. The power results in plot is already including the actual values of loss for the attenuator and cable combination.

2. Spectrum offset = Attenuator loss + Cable loss

3. Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 3	11.1

(Actual value of loss for the attenuator and cable combination)

Ant.0

802.11a (UNII 3)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11a Mode: 5745~5825)

802.11a Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor (dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5745	149	6 Mbps	13.93	0.05	13.98	30
		9 Mbps	13.89	0.07	13.96	30
		12 Mbps	13.95	0.10	14.05	30
		18 Mbps	13.89	0.15	14.03	30
		24 Mbps	13.78	0.19	13.97	30
		36 Mbps	13.73	0.27	14.00	30
		48 Mbps	13.60	0.36	13.97	30
		54 Mbps	13.52	0.40	13.91	30
5785	157	6 Mbps	14.97	0.05	15.02	30
		9 Mbps	14.94	0.07	15.01	30
		12 Mbps	14.94	0.10	15.03	30
		18 Mbps	14.85	0.15	15.00	30
		24 Mbps	14.80	0.19	14.99	30
		36 Mbps	14.68	0.27	14.95	30
		48 Mbps	14.69	0.36	15.05	30
		54 Mbps	14.67	0.40	15.06	30
5825	165	6 Mbps	16.24	0.05	16.29	30
		9 Mbps	16.21	0.07	16.28	30
		12 Mbps	16.23	0.10	16.33	30
		18 Mbps	16.06	0.15	16.21	30
		24 Mbps	16.02	0.19	16.21	30
		36 Mbps	15.94	0.27	16.21	30
		48 Mbps	15.90	0.36	16.26	30
		54 Mbps	15.79	0.40	16.18	30

Ant.1

802.11a (UNII 3)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11a Mode: 5745~5825)

802.11a Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor (dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5745	149	6 Mbps	12.70	0.05	12.75	30
		9 Mbps	12.70	0.07	12.77	30
		12 Mbps	12.68	0.10	12.77	30
		18 Mbps	12.56	0.14	12.71	30
		24 Mbps	12.57	0.19	12.76	30
		36 Mbps	12.51	0.27	12.78	30
		48 Mbps	12.37	0.36	12.73	30
		54 Mbps	12.33	0.39	12.72	30
5785	157	6 Mbps	13.53	0.05	13.58	30
		9 Mbps	13.56	0.07	13.63	30
		12 Mbps	13.54	0.10	13.63	30
		18 Mbps	13.41	0.14	13.55	30
		24 Mbps	13.36	0.19	13.55	30
		36 Mbps	13.28	0.27	13.55	30
		48 Mbps	13.24	0.36	13.60	30
		54 Mbps	13.14	0.39	13.53	30
5825	165	6 Mbps	14.69	0.05	14.74	30
		9 Mbps	14.63	0.07	14.69	30
		12 Mbps	14.63	0.10	14.73	30
		18 Mbps	14.60	0.14	14.74	30
		24 Mbps	14.63	0.19	14.82	30
		36 Mbps	14.51	0.27	14.78	30
		48 Mbps	14.38	0.36	14.75	30
		54 Mbps	14.34	0.39	14.72	30

▣ TEST RESULTS_Sum Data of Ant.0 and Ant.1 (UNII 3)

Conducted Output Power Measurements (802.11a Mode: 5745~5825)

802.11a Mode		Rate (Mbps)	Sum Power of Ant.0 & 1	Limit (dBm)
Frequency [MHz]	Channel No.			
5745	149	6 Mbps	16.40	30
		9 Mbps	16.40	30
		12 Mbps	16.44	30
		18 Mbps	16.41	30
		24 Mbps	16.40	30
		36 Mbps	16.42	30
		48 Mbps	16.38	30
		54 Mbps	16.35	30
5785	157	6 Mbps	17.34	30
		9 Mbps	17.36	30
		12 Mbps	17.37	30
		18 Mbps	17.32	30
		24 Mbps	17.31	30
		36 Mbps	17.29	30
		48 Mbps	17.37	30
		54 Mbps	17.34	30
5825	165	6 Mbps	18.56	30
		9 Mbps	18.53	30
		12 Mbps	18.58	30
		18 Mbps	18.52	30
		24 Mbps	18.55	30
		36 Mbps	18.53	30
		48 Mbps	18.55	30
		54 Mbps	18.49	30

Ant.0

802.11n_HT20 (UNII 3)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11n_HT20 Mode: 5745~5825)

802.11n Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor (dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5745	149	MCS0_6.5 Mbps	13.80	0.06	13.86	30
		MCS1_13 Mbps	13.77	0.11	13.88	30
		MCS2_19.5 Mbps	13.69	0.15	13.84	30
		MCS3_26 Mbps	13.64	0.19	13.83	30
		MCS4_39 Mbps	13.65	0.29	13.94	30
		MCS5_52 Mbps	13.44	0.38	13.81	30
		MCS6_58.5 Mbps	13.41	0.41	13.83	30
		MCS7_65 Mbps	13.47	0.45	13.92	30
5785	157	MCS0_6.5 Mbps	14.82	0.06	14.88	30
		MCS1_13 Mbps	14.83	0.11	14.94	30
		MCS2_19.5 Mbps	14.74	0.15	14.89	30
		MCS3_26 Mbps	14.66	0.19	14.85	30
		MCS4_39 Mbps	14.61	0.29	14.90	30
		MCS5_52 Mbps	14.52	0.38	14.90	30
		MCS6_58.5 Mbps	14.53	0.41	14.95	30
		MCS7_65 Mbps	14.45	0.45	14.90	30
5825	165	MCS0_6.5 Mbps	16.12	0.06	16.17	30
		MCS1_13 Mbps	16.02	0.11	16.12	30
		MCS2_19.5 Mbps	15.96	0.15	16.11	30
		MCS3_26 Mbps	15.92	0.19	16.11	30
		MCS4_39 Mbps	15.82	0.29	16.11	30
		MCS5_52 Mbps	15.75	0.38	16.12	30
		MCS6_58.5 Mbps	15.81	0.41	16.22	30
		MCS7_65 Mbps	15.74	0.45	16.19	30

Ant.1

802.11n_HT20 (UNII 3)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11n_HT20 Mode: 5745~5825)

802.11n Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor (dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5745	149	MCS0_6.5 Mbps	12.59	0.06	12.65	30
		MCS1_13 Mbps	12.47	0.11	12.58	30
		MCS2_19.5 Mbps	12.41	0.15	12.56	30
		MCS3_26 Mbps	12.37	0.20	12.57	30
		MCS4_39 Mbps	12.35	0.29	12.64	30
		MCS5_52 Mbps	12.14	0.38	12.51	30
		MCS6_58.5 Mbps	12.18	0.41	12.59	30
		MCS7_65 Mbps	12.17	0.45	12.62	30
5785	157	MCS0_6.5 Mbps	13.39	0.06	13.45	30
		MCS1_13 Mbps	13.31	0.11	13.42	30
		MCS2_19.5 Mbps	13.37	0.15	13.53	30
		MCS3_26 Mbps	13.29	0.20	13.49	30
		MCS4_39 Mbps	13.24	0.29	13.53	30
		MCS5_52 Mbps	13.14	0.38	13.52	30
		MCS6_58.5 Mbps	13.09	0.41	13.50	30
		MCS7_65 Mbps	13.00	0.45	13.45	30
5825	165	MCS0_6.5 Mbps	14.54	0.06	14.59	30
		MCS1_13 Mbps	14.47	0.11	14.58	30
		MCS2_19.5 Mbps	14.46	0.15	14.61	30
		MCS3_26 Mbps	14.45	0.20	14.65	30
		MCS4_39 Mbps	14.39	0.29	14.68	30
		MCS5_52 Mbps	14.27	0.38	14.64	30
		MCS6_58.5 Mbps	14.26	0.41	14.67	30
		MCS7_65 Mbps	14.22	0.45	14.67	30

▣ TEST RESULTS_Sum Data of Ant.0 and Ant.1 (UNII 3)

Conducted Output Power Measurements (802.11n_HT20 Mode: 5745~5825)

802.11n Mode		Rate (Mbps)	Sum Power of Ant.0 & 1	Limit (dBm)
Frequency [MHz]	Channel No.			
5745	149	MCS0_6.5 Mbps	16.29	30
		MCS1_13 Mbps	16.26	30
		MCS2_19.5 Mbps	16.23	30
		MCS3_26 Mbps	16.23	30
		MCS4_39 Mbps	16.32	30
		MCS5_52 Mbps	16.19	30
		MCS6_58.5 Mbps	16.24	30
		MCS7_65 Mbps	16.30	30
5785	157	MCS0_6.5 Mbps	17.20	30
		MCS1_13 Mbps	17.22	30
		MCS2_19.5 Mbps	17.25	30
		MCS3_26 Mbps	17.21	30
		MCS4_39 Mbps	17.25	30
		MCS5_52 Mbps	17.25	30
		MCS6_58.5 Mbps	17.27	30
		MCS7_65 Mbps	17.22	30
5825	165	MCS0_6.5 Mbps	18.43	30
		MCS1_13 Mbps	18.39	30
		MCS2_19.5 Mbps	18.40	30
		MCS3_26 Mbps	18.42	30
		MCS4_39 Mbps	18.43	30
		MCS5_52 Mbps	18.42	30
		MCS6_58.5 Mbps	18.49	30
		MCS7_65 Mbps	18.47	30

Ant.0

802.11n_HT40 (UNII 3)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11n_HT40 Mode: 5755~5795)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor (dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5755	151	MCS0_13.5 Mbps	12.81	0.10	12.92	30
		MCS1_27 Mbps	12.61	0.21	12.82	30
		MCS2_40.5 Mbps	12.60	0.29	12.89	30
		MCS3_54 Mbps	12.45	0.37	12.82	30
		MCS4_81 Mbps	12.33	0.52	12.85	30
		MCS5_108 Mbps	12.18	0.65	12.84	30
		MCS6_121.5 Mbps	12.15	0.70	12.85	30
		MCS7_135 Mbps	12.04	0.77	12.81	30
5795	159	MCS0_13.5 Mbps	15.22	0.10	15.32	30
		MCS1_27 Mbps	15.13	0.21	15.34	30
		MCS2_40.5 Mbps	15.03	0.29	15.32	30
		MCS3_54 Mbps	14.86	0.37	15.23	30
		MCS4_81 Mbps	14.77	0.52	15.29	30
		MCS5_108 Mbps	14.68	0.65	15.34	30
		MCS6_121.5 Mbps	14.55	0.70	15.25	30
		MCS7_135 Mbps	14.52	0.77	15.29	30

Ant.1

802.11n_HT40 (UNII 3)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11n_HT40 Mode: 5755~5795)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor (dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5755	151	MCS0_13.5 Mbps	11.38	0.10	11.49	30
		MCS1_27 Mbps	11.46	0.20	11.66	30
		MCS2_40.5 Mbps	11.31	0.28	11.59	30
		MCS3_54 Mbps	11.26	0.38	11.63	30
		MCS4_81 Mbps	11.03	0.52	11.55	30
		MCS5_108 Mbps	10.85	0.66	11.51	30
		MCS6_121.5 Mbps	10.87	0.72	11.58	30
		MCS7_135 Mbps	10.74	0.77	11.51	30
5795	159	MCS0_13.5 Mbps	13.90	0.10	14.01	30
		MCS1_27 Mbps	13.75	0.20	13.94	30
		MCS2_40.5 Mbps	13.72	0.28	14.00	30
		MCS3_54 Mbps	13.57	0.38	13.95	30
		MCS4_81 Mbps	13.39	0.52	13.92	30
		MCS5_108 Mbps	13.29	0.66	13.94	30
		MCS6_121.5 Mbps	13.26	0.72	13.97	30
		MCS7_135 Mbps	13.17	0.77	13.94	30

▣ TEST RESULTS_ Sum Data of Ant.0 and Ant.1 (UNII 3)

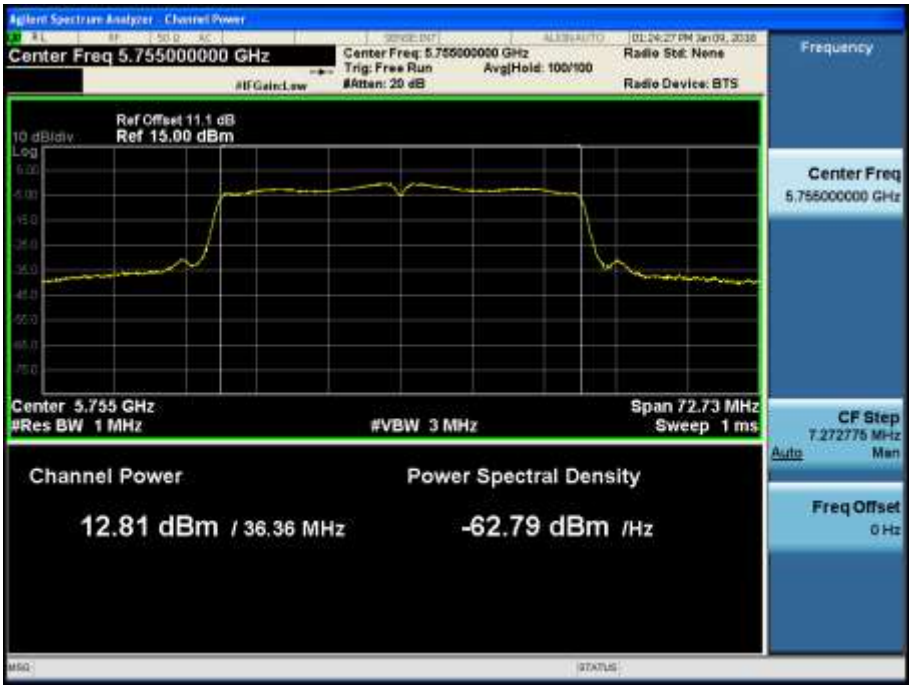
Conducted Output Power Measurements (802.11n_HT40 Mode: 5755~5795)

802.11n Mode		Rate (Mbps)	Sum Power of Ant.0 & 1	Limit (dBm)
Frequency [MHz]	Channel No.			
5755	151	MCS0_13.5 Mbps	15.24	30
		MCS1_27 Mbps	15.27	30
		MCS2_40.5 Mbps	15.27	30
		MCS3_54 Mbps	15.26	30
		MCS4_81 Mbps	15.23	30
		MCS5_108 Mbps	15.21	30
		MCS6_121.5 Mbps	15.25	30
		MCS7_135 Mbps	15.19	30
5795	159	MCS0_13.5 Mbps	17.70	30
		MCS1_27 Mbps	17.68	30
		MCS2_40.5 Mbps	17.70	30
		MCS3_54 Mbps	17.62	30
		MCS4_81 Mbps	17.64	30
		MCS5_108 Mbps	17.68	30
		MCS6_121.5 Mbps	17.64	30
		MCS7_135 Mbps	17.65	30

▣ TEST Plots for Ant.0_802.11n_HT40

802.11n_HT40 UNII 3 BAND Average Power

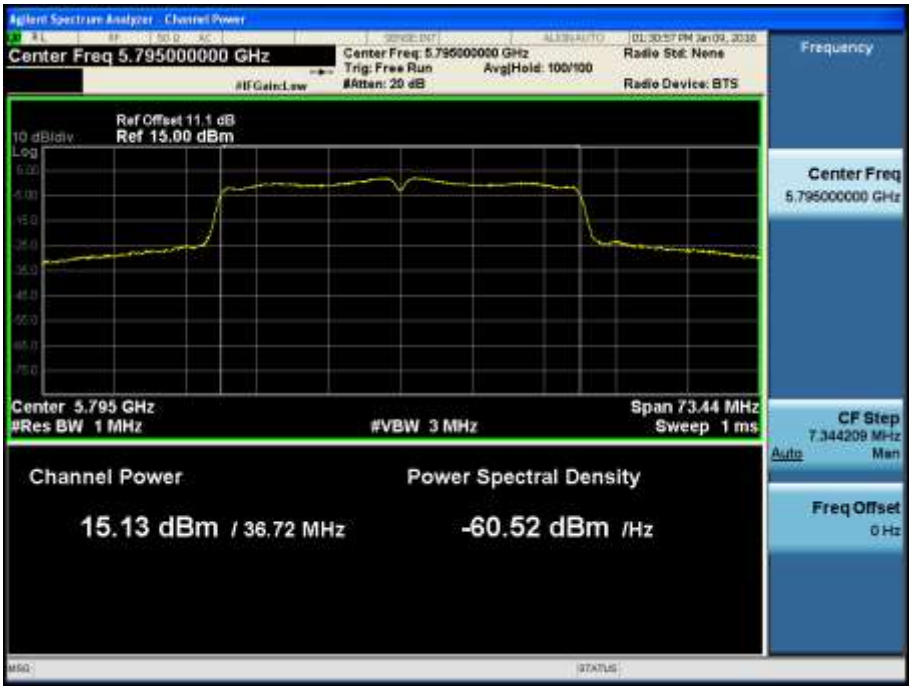
(5755 MHz ~5795 MHz) CH 151 MCS0



▣ TEST Plots for Ant.0_802.11n_HT40

802.11n_HT40 UNII 3 BAND Average Power

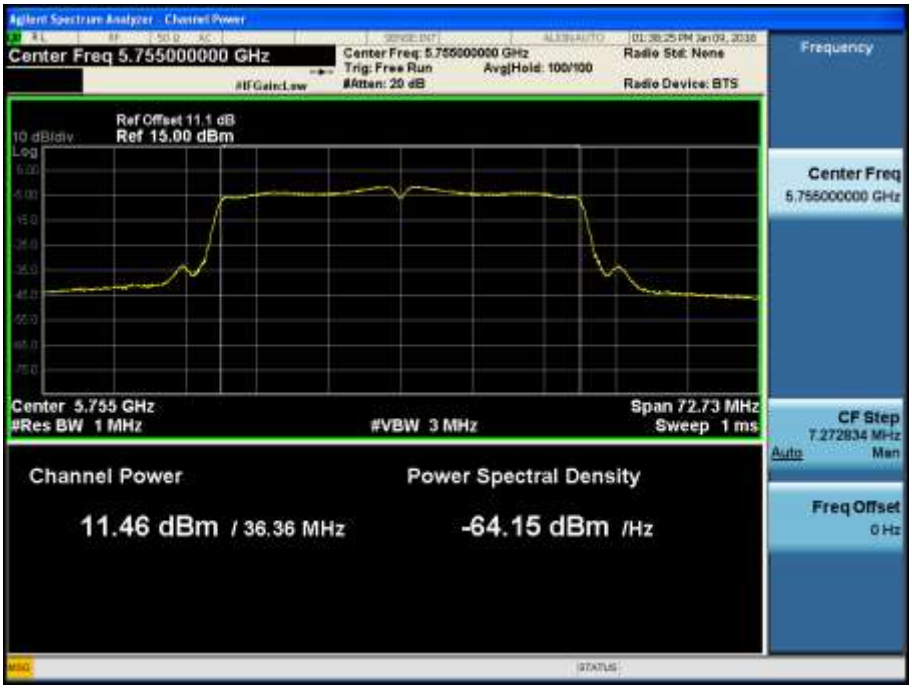
(5755 MHz ~5795 MHz) CH 159 MCS1



▣ TEST Plots for Ant.1_802.11n_HT40

802.11n_HT40 UNII 3 BAND Average Power

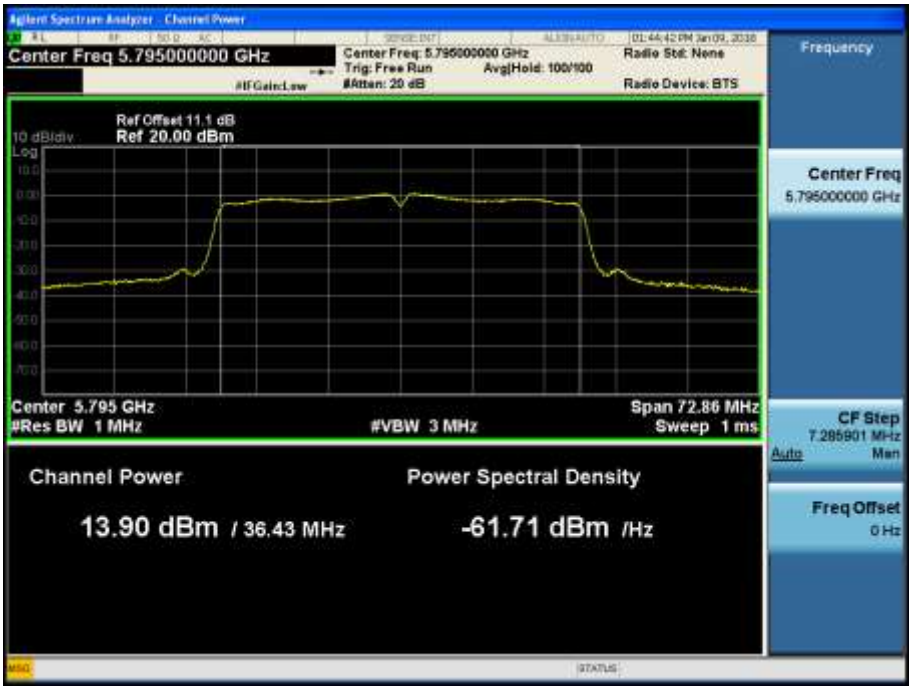
(5755 MHz ~5795 MHz) CH 151 MCS1



▣ TEST Plots for Ant.1_802.11n_HT40

802.11n_HT40 UNII 3 BAND Average Power

(5755 MHz ~5795 MHz) CH 159 MCS0



9.4 POWER SPECTRAL DENSITY

The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

▣ Limit

Power Spectral Density

Band	Mode	Limit
UNII 3	802.11a,n	30 dBm/500 kHz

Ant 0 & 1

Power Spectral Density

Operating Mode	Band	Mode	Operating Ant.	Ant. Gain (dBi)	Limit
SISO	UNII 3	802.11a,n	Ant 0	2.49	30 dBm/500 kHz
			Ant 1	2.50	30 dBm/500 kHz
CDD	UNII 3		Ant 0 & 1	5.51	30 dBm/500 kHz

Note : 1. If all antenna gains are not equal,

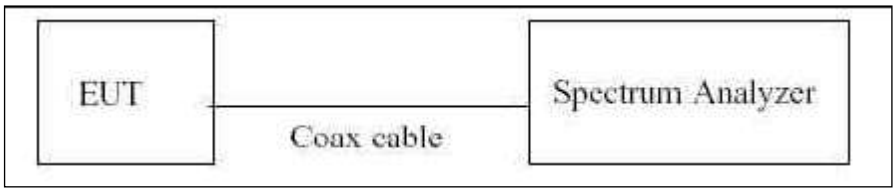
Directional gain = $10*\log[(10^{G1/20} + 10^{G2/20}+\ldots+10^{GN/20})^2/N]$ dBi

(according to KDB662911 D01 v02r01)

2. Limit is calculated by antenna gain.

3. The limits of maximum conducted power were applied the antenna gain. Therefore, if conducted power is pass, e.i.r.p. is also pass. So, we attached only conducted power table.

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

We tested according to Method in KDB 789033 D02 v02.

The spectrum analyzer is set to :

1. Set span to encompass the entire emission bandwidth(EBW) of the signal.
2. RBW = 1 MHz(510 kHz for UNII 3)
3. VBW ≥ 3 MHz
4. Number of points in sweep ≥ 2*span/RBW.
5. Sweep time = auto.
6. Detector = RMS(i.e., power averaging), if available. Otherwise, use sample detector mode.
7. Do not use sweep triggering. Allow the sweep to “free run”.
8. Trace average at least 100 traces in power averaging(RMS) mode
9. Use the peak search function on the spectrum analyzer to find the peak of the spectrum.
10. If Method SA-2 was used, add 10 log(1/x), where x is the duty cycle, to the peak of the spectrum.

▣ SAMPLE CALCULATION

PSD = Reading Value + ATT loss + Cable loss(1 ea) + Duty Cycle Factor

Ex) PSD = -3 dBm + 10 dB + 0.8 dB + 0.2 dB = 8.0 dBm

Note :

1. Spectrum reading values are not plot data. The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. We apply to the offset of Ant.0 ant.1 respectively.
   The offset of the 5 GHz band on Ant.0,1 are 11.1dB
   Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 3	11.1

(Actual value of loss for the attenuator and cable combination)

Ant.0

▣ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5745	149	802.11a (SISO)	-0.873	0.096	-0.777	30	Pass
5785	157		0.173	0.396	0.569		Pass
5825	165		1.500	0.096	1.596		Pass

Ant.1

▣ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5745	149	802.11a (SISO)	-1.954	0.268	-1.686	30	Pass
5785	157		-1.020	0.068	-0.952		Pass
5825	165		0.488	0.192	0.680		Pass

▣ Sum Data of Ant.0 and Ant.1

▣ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result		
			Measured Power Density (dBm)	Limit (dBm)	Pass/Fail
5745	149	802.11a (CDD)	1.79	30	Pass
5785	157		2.85		Pass
5825	165		4.16		Pass

▣ TEST Plot for 802.11a 20MHz BW_Ant.0

802.11a UNII 3 BAND PSD CH 165

▣ TEST Plot for 802.11a 20MHz BW_Ant.1

802.11a UNII 3 BAND PSD CH 165

Ant.0

▣ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5745	149	802.11n_ HT20 (SISO)	-1.233	0.290	-0.943	30	Pass
5785	157		-0.132	0.413	0.281		Pass
5825	165		1.054	0.413	1.467		Pass

Ant.1

▣ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5745	149	802.11n_ HT20 (SISO)	-2.122	0.055	-2.067	30	Pass
5785	157		-1.036	0.290	-0.746		Pass
5825	165		0.042	0.290	0.332		Pass

▣ Sum Data of Ant.0 and Ant.1

▣ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result		
			Measured Power Density (dBm)	Limit (dBm)	Pass/Fail
5745	149	802.11n_ HT20 (CDD)	1.52	30	Pass
5785	157		2.79		Pass
5825	165		3.93		Pass

▣ TEST Plot for 802.11n_HT20_Ant.0

802.11n_HT20 UNII 3 BAND PSD CH 165

▣ TEST Plot for 802.11n_HT20_Ant.1

802.11n_HT20 UNII 3 BAND PSD CH 165

Ant.0

▣ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5755	151	802.11n _HT40 (SISO)	-2.944	0.103	-2.841	30	Pass
5795	159		-0.424	0.206	-0.218		Pass

Ant.1

▣ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5755	151	802.11n _HT40 (SISO)	-4.437	0.198	-4.239	30	Pass
5795	159		-1.899	0.105	-1.794		Pass

▣ Sum Data of Ant.0 and Ant.1

▣ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result		
			Measured Power Density (dBm)	Limit (dBm)	Pass/Fail
5755	151	802.11n _HT40 (CDD)	-0.50	30	Pass
5795	159		2.04		Pass

▣ TEST Plot for 802.11n_HT40_Ant.0

802.11n_HT40 UNII 3 BAND PSD CH 159

▣ TEST Plot for 802.11n_HT40_Ant.1

802.11n_HT40 UNII 3 BAND PSD CH 159

9.5 FREQUENCY STABILITY

The EUT was placed inside an environmental chamber as the temperature in the chamber was varied between -30 ℃ and 50 ℃. The temperature was incremented by 10 ℃ intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded.

[Ant.0]

20 MHz BW

OPERATING BAND: UNII Band 3

OPERATING FREQUENCY: 5,745,000,000 Hz

CHANNEL: 149

REFERENCE VOLTAGE: 3.3 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.50	+20(Ref)	5745019.45	19.45
100%		-30	5745024.76	24.76
100%		-20	5745029.19	29.19
100%		-10	5745032.68	32.68
100%		0	5745036.37	36.37
100%		+10	5745040.08	40.08
100%		+30	5745049.61	49.61
100%		+40	5745054.01	54.01
100%		+50	5745058.67	58.67
max	3.68	+20	5745041.31	41.31
min	3.33	+20	5745037.29	37.29

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

40 MHz BW

OPERATING BAND: UNII Band 3

OPERATING FREQUENCY: 5,755,000,000 Hz

CHANNEL: 151

REFERENCE VOLTAGE: 3.3 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.5	+20(Ref)	5755021.25	21.25
100%		-30	5755022.45	22.45
100%		-20	5755027.27	27.27
100%		-10	5755032.27	32.27
100%		0	5755036.22	36.22
100%		+10	5755040.01	40.01
100%		+30	5755049.84	49.84
100%		+40	5755054.88	54.88
100%		+50	5755059.08	59.08
max	3.675	+20	5755041.05	41.05
min	3.325	+20	5755037.11	37.11

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

[Ant.1]

20 MHz BW

OPERATING BAND: UNII Band 3

OPERATING FREQUENCY: 5,745,000,000 Hz

CHANNEL: 149

REFERENCE VOLTAGE: 3.3 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.50	+20(Ref)	5745020.13	20.13
100%		-30	5745021.82	21.82
100%		-20	5745026.74	26.74
100%		-10	5745030.72	30.72
100%		0	5745035.75	35.75
100%		+10	5745040.46	40.46
100%		+30	5745048.70	48.7
100%		+40	5745052.30	52.3
100%		+50	5745056.06	56.06
max	3.68	+20	5745039.97	39.97
min	3.33	+20	5745034.42	34.42

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

40 MHz BW

OPERATING BAND: UNII Band 3

OPERATING FREQUENCY: 5,755,000,000 Hz

CHANNEL: 151

REFERENCE VOLTAGE: 3.3 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.5	+20(Ref)	5755020.78	20.78
100%		-30	5755025.68	25.68
100%		-20	5755029.88	29.88
100%		-10	5755033.95	33.95
100%		0	5755037.58	37.58
100%		+10	5755041.29	41.29
100%		+30	5755049.73	49.73
100%		+40	5755053.24	53.24
100%		+50	5755057.97	57.97
max	3.675	+20	5755041.37	41.37
min	3.325	+20	5755038.68	38.68

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

9.6 RADIATED MEASUREMENT

9.6.1 RADIATED SPURIOUS EMISSIONS.

Test Requirements and limit, §15.205, §15.209, §15.407

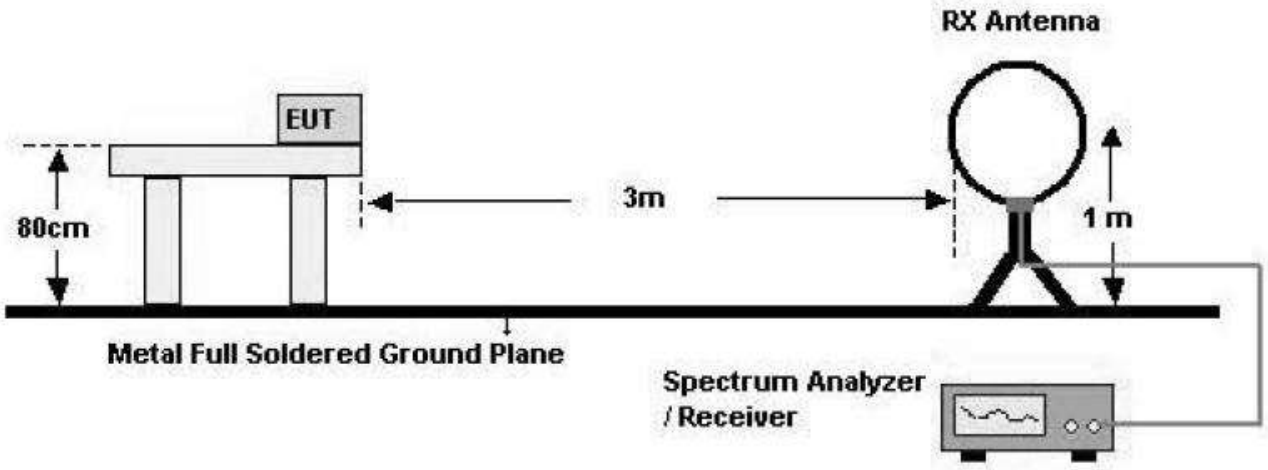
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

▣ §15.407, KDB 789033 D02v02

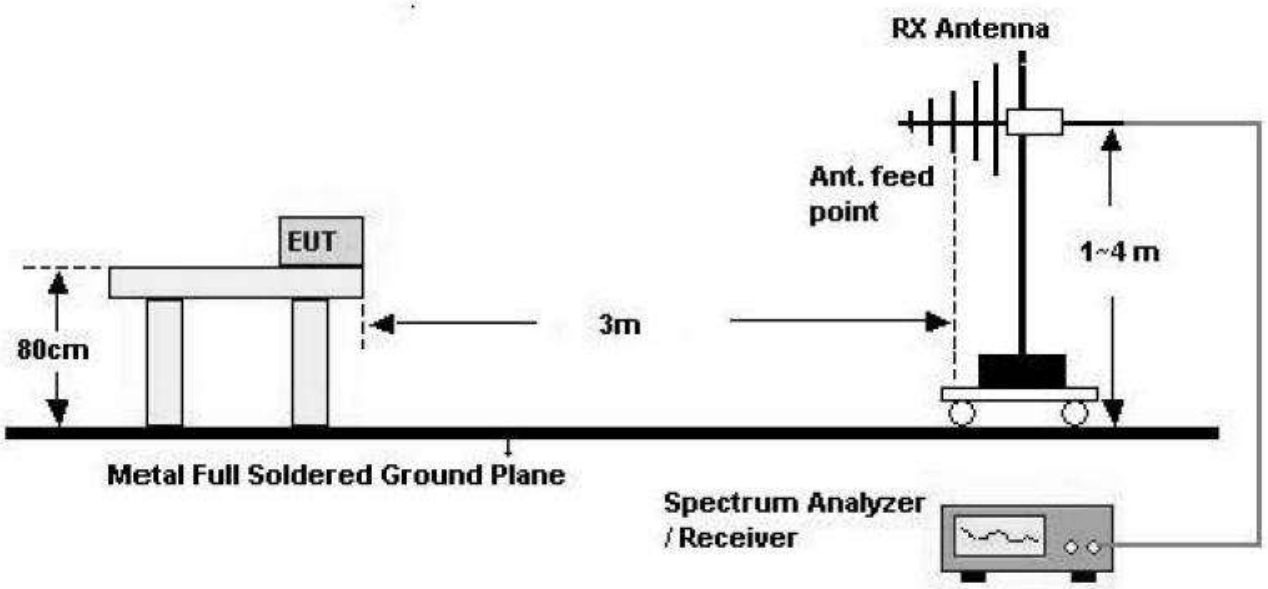
All harmonics that do not lie in a restricted band are subject to a peak limit of -27 dBm/MHz. At a distance of 3 meters the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2 dB to the EIRP limit of -27 dBm/MHz to obtain the limit for out of band spurious emissions of 68.2 dBμV/m. Espectally, for transmitter operating in the 5725 Mhz – 5850 MHz : 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.

Test Configuration

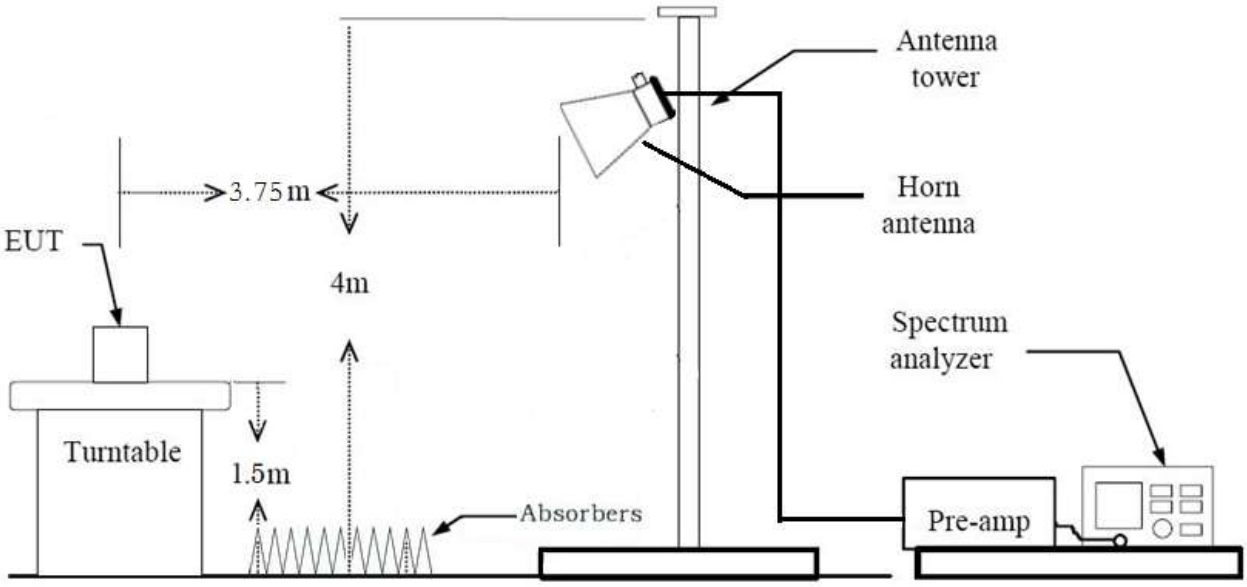
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



TEST PROCEDURE USED

ANSI C63.10:2013

Method G)5) in KDB 789033 D02 v02 (Peak)

Method G)6)d) in KDB 789033 D02 v02 (Average)

. Spectrum setting:

- Peak.

1. RBW = 1 MHz
2. VBW ≥ 3 MHz
3. Detector = Peak
4. Sweep Time = auto
5. Trace mode = max hold
6. Allow sweeps to continue until the trace stabilizes.
7. Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately 1/x, where x is the duty cycle.

- Average (Method VB :Averaging using reduced video bandwidth)

1. RBW = 1 MHz
2. VBW
   2.1. If the EUT is configured to transmit with duty cycle ≥ 98 percent, set VBW ≤ RBW/100(i.e., 10 kHz) but not less than 10 Hz.
   2.2. If the EUT duty cycle is < 98 percent, set VBW ≥ 1/T, where T is the minimum transmission duration.
3. The analyzer is set to linear detector mode.
4. Detector = Peak.
5. Sweep time = auto.
6. Trace mode = max hold.
7. Allow max hold to run for at least 50 traces if the transmitted signal is continuous or has at least 98 percent duty cycle. For lower duty cycles, increase the minimym number of traces by a factor of 1/x, where x is the duty cycle.

Note :

1. We used the Method VB for 802.11a/n_HT20, n_HT40 mode to perform the average filed strength measurements.
2. The actual setting value of VBW for 802.11a/n_HT20, n_HT40
3. According to SVSWR requirement in ANSI 63.4-2014, We performed the radiated test at 3.75 m distance from center of turn table. So, we applied the distance factor(reference distance : 3 m).
4. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Mode	Worst Data rate (Mbps)	T_{on} (ms)	T_{total} (ms)	Duty Cycle (%)	VBW(1/T) (Hz)	The actual setting value of VBW (Hz)
a	**6**	**2.062**	**2.086**	**0.98830409**	**485**	**1000**
n_HT20	**MCS 0**	**1.907**	**1.932**	**0.98736844**	**524**	**1000**
n_HT40	**MCS 0**	**0.931**	**0.954**	**0.97651664**	**1074**	**3000**

TEST RESULTS

9 kHz – 30MHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
㎒	dB㎶	dB /m	dB	(H/V)	dB㎶/m	dB㎶/m	dB
No Critical peaks found							

Notes:

1. Measuring frequencies from 9 kHz to the 30MHz.
2. The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
3. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
4. Limit line = specific Limits (dBuV) + Distance extrapolation factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
6. The test results for below 30 MHz is correlated to an open site.
   The result on OATS is about 2 dB higher than semi-anechoic chamber (10 m chamber)

TEST RESULTS

Below 1 GHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
㎒	dB㎶	dB /m	dB	(H/V)	dB㎶/m	dB㎶/m	dB
No Critical peaks found							

Notes:

1. Measuring frequencies from 30 MHz to the 1 GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Above 1 GHz

[MIMO]

Band :	UNII 3
Operation Mode:	802.11 a
Operating Frequency	5745MHz
Channel No.	149 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11490	65.18	-0.59	V	64.59	73.98	9.39	PK
11490	50.12	-0.59	V	49.53	53.98	4.45	AV
17235	50.79	3.63	V	54.42	68.20	13.78	PK
11490	65.95	-0.59	H	65.36	73.98	8.62	PK
11490	50.80	-0.59	H	50.21	53.98	3.77	AV
17235	51.63	3.63	H	55.26	68.20	12.94	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
6. Distance extrapolation factor = 20 log (test distance / specific distance) (dB

Band :	UNII 3
Operation Mode:	802.11 a
Operating Frequency	5785 MHz
Channel No.	157 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11570	64.32	-0.97	V	63.35	73.98	10.63	PK
11570	49.98	-0.97	V	49.01	53.98	4.97	AV
17355	48.74	5.02	V	53.76	68.20	14.44	PK
11570	65.50	-0.97	H	64.53	73.98	9.45	PK
11570	50.49	-0.97	H	49.52	53.98	4.46	AV
17355	49.56	5.02	H	54.58	68.20	13.62	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
6. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 3
Operation Mode:	802.11 a
Operating Frequency	5825 MHz
Channel No.	165 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11650	64.58	-1.70	V	62.88	73.98	11.10	PK
11650	49.86	-1.70	V	48.16	53.98	5.82	AV
17475	48.37	5.75	V	54.12	68.20	14.08	PK
11650	65.23	-1.70	H	63.53	73.98	10.45	PK
11650	50.50	-1.70	H	48.80	53.98	5.18	AV
17475	49.16	5.75	H	54.91	68.20	13.29	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna
6. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 3
Operation Mode:	802.11 n_HT20
Operating Frequency	5745 MHz
Channel No.	149 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11490	64.82	-0.59	V	64.23	73.98	9.75	PK
11490	50.08	-0.59	V	49.49	53.98	4.49	AV
17235	51.52	3.63	V	55.15	68.20	13.05	PK
11490	65.57	-0.59	H	64.98	73.98	9.00	PK
11490	50.70	-0.59	H	50.11	53.98	3.87	AV
17235	51.84	3.63	H	55.47	68.20	12.73	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
6. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 3
Operation Mode:	802.11 n_HT20
Operating Frequency	5785 MHz
Channel No.	157 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11570	64.18	-0.97	V	63.21	73.98	10.77	PK
11570	48.91	-0.97	V	47.94	53.98	6.04	AV
17355	48.63	5.02	V	53.65	68.20	14.55	PK
11570	64.53	-0.97	H	63.56	73.98	10.42	PK
11570	49.73	-0.97	H	48.76	53.98	5.22	AV
17355	49.06	5.02	H	54.08	68.20	14.12	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
6. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 3
Operation Mode:	802.11 n_HT20
Operating Frequency	5825 MHz
Channel No.	165 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11650	62.89	-1.70	V	61.19	73.98	12.79	PK
11650	49.27	-1.70	V	47.57	53.98	6.41	AV
17475	49.58	5.75	V	55.33	68.20	12.87	PK
11650	63.71	-1.70	H	62.01	73.98	11.97	PK
11650	49.86	-1.70	H	48.16	53.98	5.82	AV
17475	49.68	5.75	H	55.43	68.20	12.77	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
6. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII3
Operation Mode:	802.11n_HT40
Operating Frequency	5755 MHz
Channel No.	151 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11510	62.11	-0.63	V	61.48	73.98	12.50	PK
11510	50.13	-0.63	V	49.50	53.98	4.48	AV
17265	48.65	4.53	V	53.18	68.20	15.02	PK
11510	62.38	-0.63	H	61.75	73.98	12.23	PK
11510	50.70	-0.63	H	50.07	53.98	3.91	AV
17265	49.64	4.53	H	54.17	68.20	14.03	PK

*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
6. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

Band :	UNII 3
Operation Mode:	802.11n_HT40
Operating Frequency	5795 MHz
Channel No.	159 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-Amp G.+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11590	62.13	-0.53	V	61.60	73.98	12.38	PK
11590	50.16	-0.53	V	49.63	53.98	4.35	AV
17385	48.78	4.95	V	53.73	68.20	14.47	PK
11590	62.85	-0.53	H	62.32	73.98	11.66	PK
11590	50.94	-0.53	H	50.41	53.98	3.57	AV
17385	49.02	4.95	H	53.97	68.20	14.23	PK

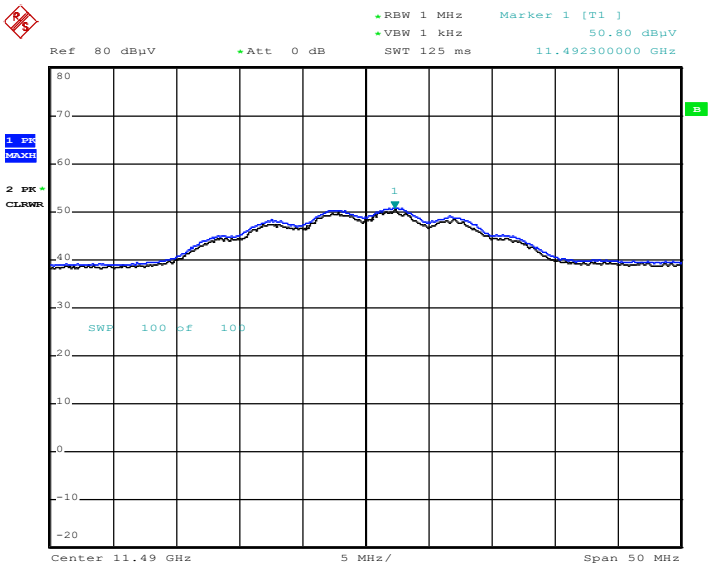
*AN. : Antenna Factor / CL : Cable Loss / Amp.G. : Amplifier Gain / D.F. : Distance Factor

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain + Distance Factor
5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
6. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

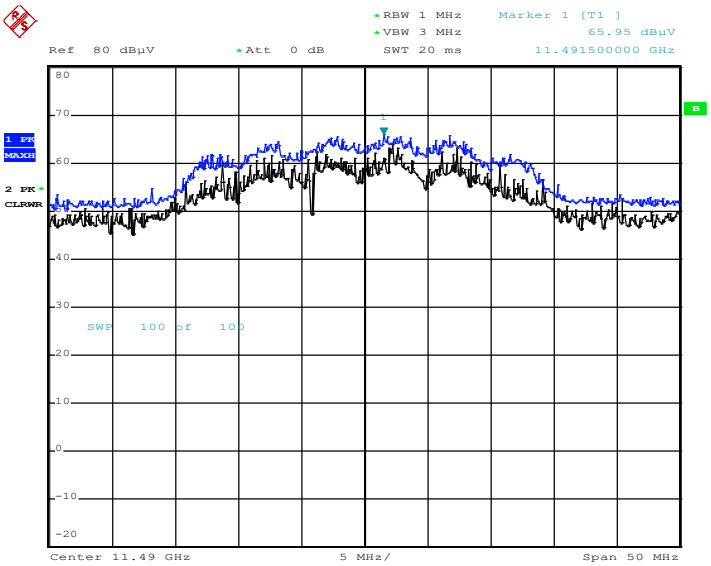
▣ RESULT PLOTS

Radiated Spurious Emissions plot –Average Reading (802.11a, Ch.149 2nd Harmonic, Y-H)



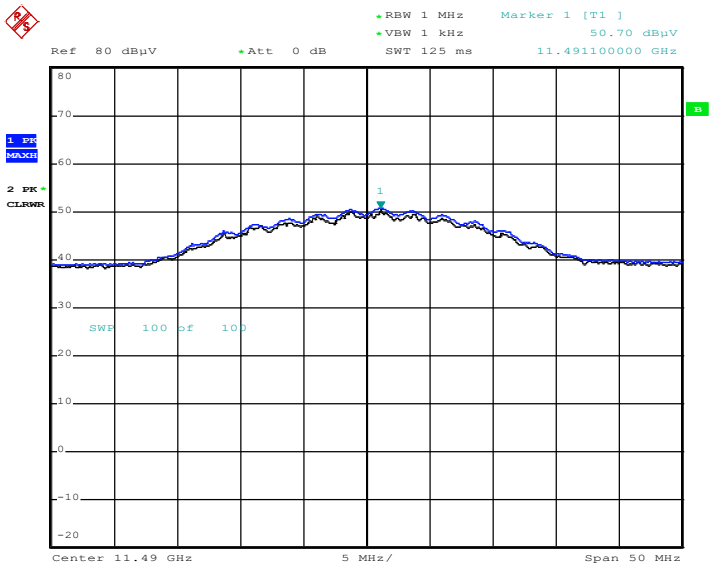
Date: 9.JAN.2018 11:31:10

Radiated Spurious Emissions plot –Peak Reading (802.11a, Ch.149 2nd Harmonic, Y-H)



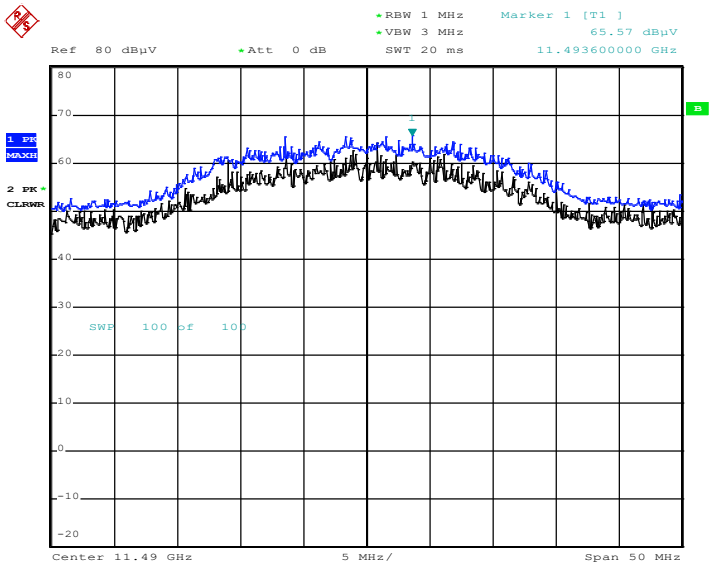
Date: 9.JAN.2018 11:31:35

Radiated Spurious Emissions plot – Average Reading(802.11n_HT20, Ch.149 2nd Harmonic, Y-H)



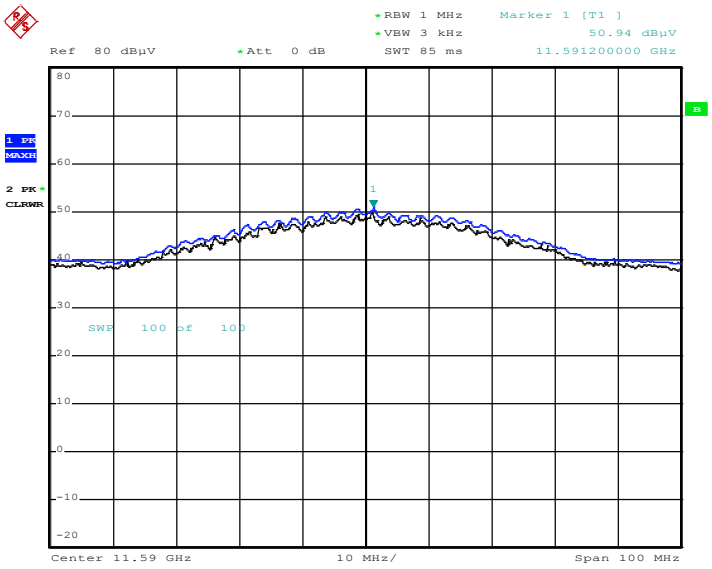
Date: 9.JAN.2018 11:28:45

Radiated Spurious Emissions plot – Peak Reading(802.11n_HT20, Ch.149 2nd Harmonic, Y-H)



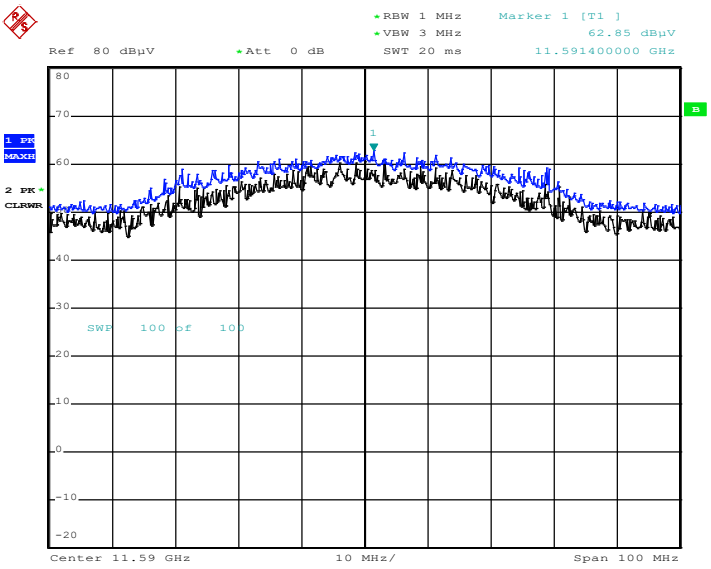
Date: 9.JAN.2018 11:29:07

Radiated Spurious Emissions plot – Average Reading (802.11n_HT40, Ch.159 2nd Harmonic, Y-H)



Date: 9.JAN.2018 10:25:48

Radiated Spurious Emissions plot – Peak Reading (802.11n_HT40, Ch.159 2nd Harmonic, Y-H)



Date: 9.JAN.2018 10:26:08

Note : Only the worst case plots for Radiated Spurious Emissions.

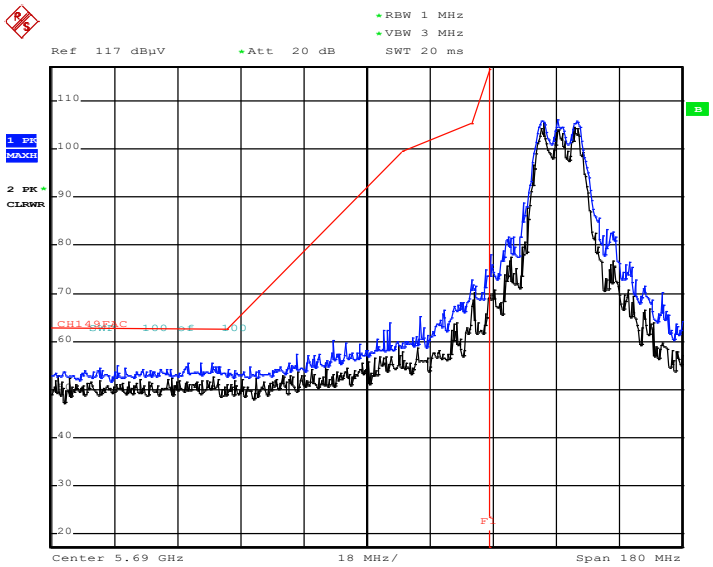
9.6.2 RADIATED RESTRICTED BAND EDGE MEASUREMENTS

Test Requirements and limit, §15.247(d) §15.205, §15.209

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a) (See section 15.205(c)).

▣ RESULT PLOTS (UNII 3)

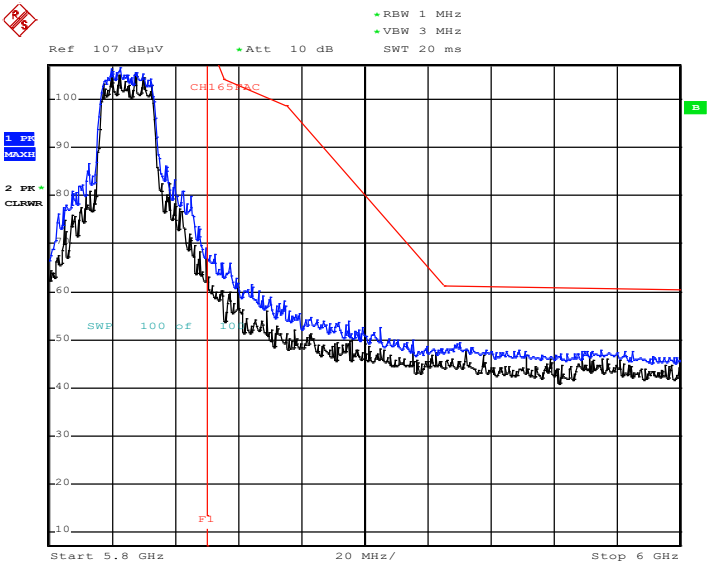
Radiated Restricted Band Edges plot – Peak Reading (802.11a)_149ch



Date: 9.JAN.2018 11:38:28

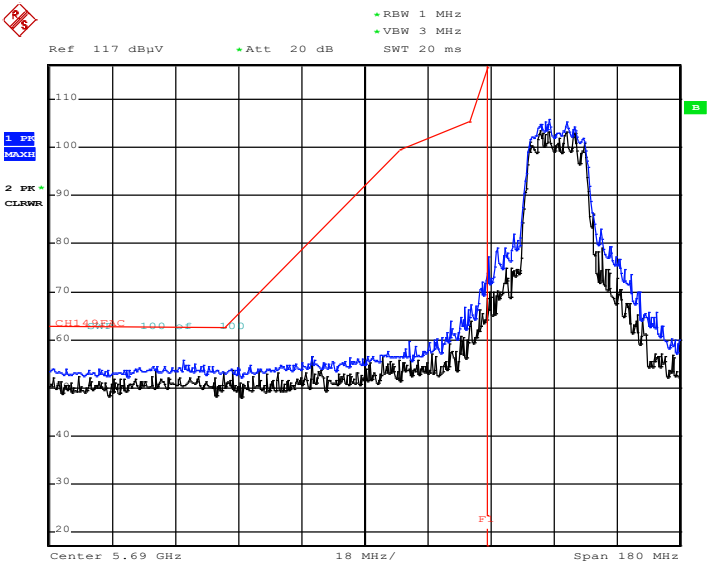
9

Radiated Restricted Band Edges plot – Peak Reading (802.11a) _165ch



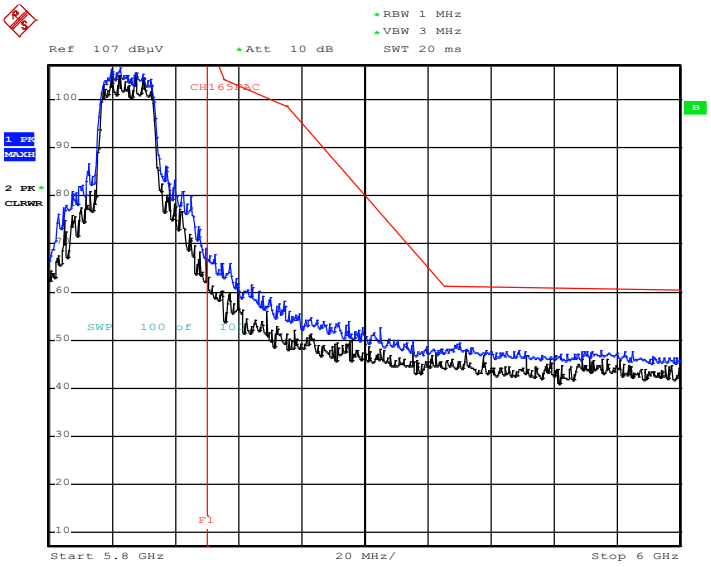
Date: 9.JAN.2018 13:06:41

Radiated Restricted Band Edges plot – Peak Reading (802.11n_HT20)_149ch



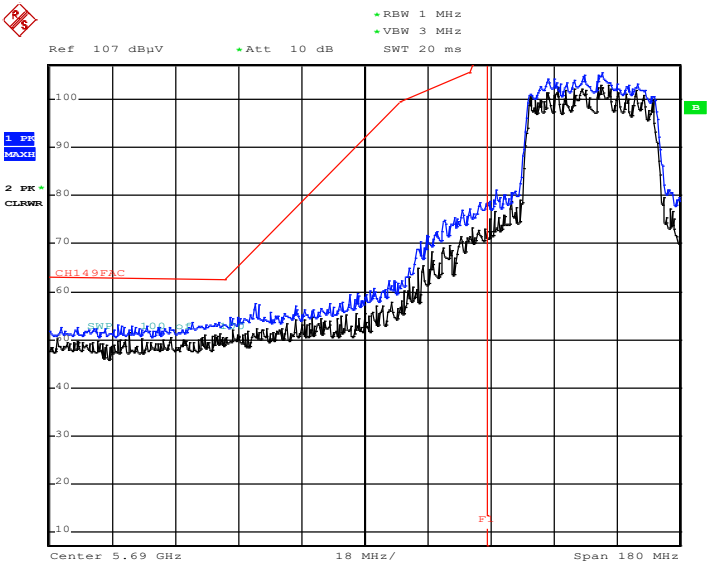
Date: 9.JAN.2018 11:39:12

Radiated Restricted Band Edges plot – Peak Reading (802.11n_HT20)_165ch



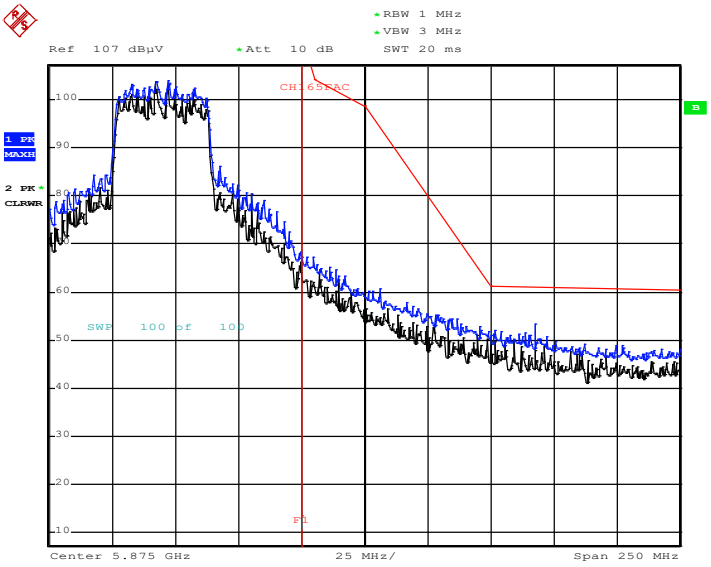
Date: 9.JAN.2018 13:06:41

Radiated Restricted Band Edges plot – Peak Reading (802.11n_HT40)_151ch



Date: 9.JAN.2018 13:25:20

Radiated Restricted Band Edges plot – Peak Reading (802.11n_HT40)_155ch



Date: 9.JAN.2018 11:42:37

9.7 POWERLINE CONDUCTED EMISSIONS

Test Requirements and limit, §15.207

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

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

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference groundplane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.

Sample Calculation

Quasi-peak(Final Result) = Reading Value + Correction Factor

▣ RESULT PLOTS

Conducted Emissions (Line 1)

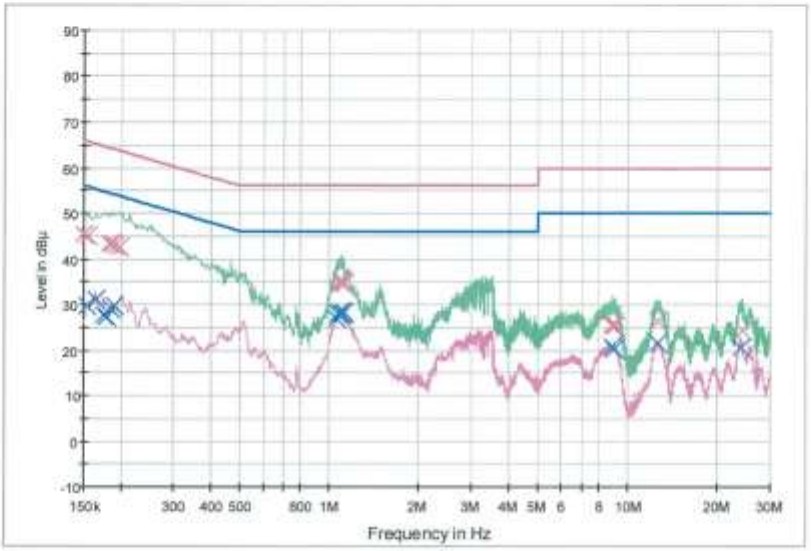
EMI Auto Test(17) 1 / 2

HCT TEST Report

Common Information

EUT:	LGSBW41
Manufacturer:	LG
Test Site:	SHIELD ROOM
Operating Conditions:	WLAN 5G_L1

FCC CLASS B_Exten Cable



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	45.3	9.000	Off	L1	9.7	20.7	66.0
0.156000	44.9	9.000	Off	L1	9.7	20.8	65.7
0.184000	43.3	9.000	Off	L1	9.7	21.0	64.3
0.188000	43.3	9.000	Off	L1	9.7	20.8	64.1
0.192000	43.0	9.000	Off	L1	9.7	20.9	63.9
0.198000	42.7	9.000	Off	L1	9.7	21.0	63.7
1.084000	35.2	9.000	Off	L1	9.8	20.8	56.0
1.090000	34.7	9.000	Off	L1	9.8	21.3	56.0
1.098000	35.0	9.000	Off	L1	9.8	21.0	56.0
1.106000	35.0	9.000	Off	L1	9.8	21.0	56.0
1.110000	34.8	9.000	Off	L1	9.8	21.2	56.0
1.118000	34.4	9.000	Off	L1	9.8	21.6	56.0
8.884000	25.5	9.000	Off	L1	10.1	34.5	60.0
8.906000	25.4	9.000	Off	L1	10.1	34.6	60.0
8.970000	25.8	9.000	Off	L1	10.1	34.2	60.0
9.120000	25.2	9.000	Off	L1	10.1	34.8	60.0
12.650000	26.4	9.000	Off	L1	10.2	33.6	60.0
24.224000	24.2	9.000	Off	L1	10.5	35.8	60.0

Final Result 2

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EMI Auto Test(17) 2 / 2

Frequency (MHz)	CAverage (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.154000	29.8	9.000	Off	L1	9.7	26.0	55.8
0.164000	31.1	9.000	Off	L1	9.7	24.1	55.3
0.174000	27.7	9.000	Off	L1	9.7	27.1	54.8
0.178000	27.2	9.000	Off	L1	9.7	27.4	54.6
0.186000	28.9	9.000	Off	L1	9.7	25.3	54.2
0.190000	29.5	9.000	Off	L1	9.7	24.5	54.0
1.058000	27.0	9.000	Off	L1	9.8	19.0	46.0
1.076000	27.9	9.000	Off	L1	9.8	18.1	46.0
1.088000	28.2	9.000	Off	L1	9.8	17.8	46.0
1.098000	28.3	9.000	Off	L1	9.8	17.7	46.0
1.106000	28.1	9.000	Off	L1	9.8	17.9	46.0
1.124000	28.2	9.000	Off	L1	9.8	17.8	46.0
8.876000	20.7	9.000	Off	L1	10.1	29.3	50.0
8.970000	20.3	9.000	Off	L1	10.1	29.7	50.0
12.652000	21.6	9.000	Off	L1	10.2	28.4	50.0
12.656000	21.7	9.000	Off	L1	10.2	28.3	50.0
23.886000	20.4	9.000	Off	L1	10.5	29.6	50.0
23.944000	20.7	9.000	Off	L1	10.5	29.3	50.0

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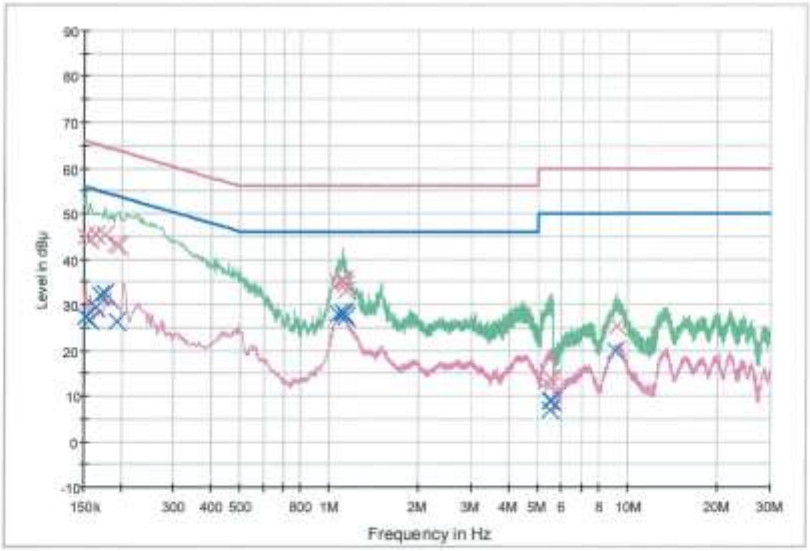
EMI Auto Test(17) 1 / 2

HCT TEST Report

Common Information

EUT:	LGSBW41
Manufacturer:	LG
Test Site:	SHIELD ROOM
Operating Conditions:	WLAN 5G_N

FCC CLASS B_Exten Cable



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.152000	45.1	9.000	Off	N	9.7	20.8	65.9
0.158000	44.1	9.000	Off	N	9.7	21.4	65.6
0.164000	45.1	9.000	Off	N	9.7	20.1	65.3
0.176000	45.2	9.000	Off	N	9.7	19.5	64.7
0.192000	43.2	9.000	Off	N	9.7	20.7	63.9
0.196000	42.9	9.000	Off	N	9.7	20.8	63.8
1.072000	34.6	9.000	Off	N	9.8	21.4	56.0
1.102000	35.5	9.000	Off	N	9.8	20.5	56.0
1.114000	35.2	9.000	Off	N	9.8	20.8	56.0
1.120000	34.4	9.000	Off	N	9.8	21.6	56.0
1.126000	34.3	9.000	Off	N	9.8	21.7	56.0
1.136000	33.1	9.000	Off	N	9.8	22.9	56.0
5.502000	12.0	9.000	Off	N	10.0	48.0	60.0
5.506000	12.2	9.000	Off	N	10.0	47.8	60.0
5.512000	13.7	9.000	Off	N	10.0	46.3	60.0
5.528000	12.1	9.000	Off	N	10.0	47.9	60.0
5.560000	13.5	9.000	Off	N	10.0	46.5	60.0
9.198000	25.4	9.000	Off	N	10.2	34.6	60.0

Final Result 2

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EMI Auto Test(17) 2 / 2

Frequency (MHz)	CAverage (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.152000	27.3	9.000	Off	N	9.7	28.6	55.9
0.158000	26.6	9.000	Off	N	9.7	29.0	55.6
0.164000	29.4	9.000	Off	N	9.7	25.9	55.3
0.170000	32.0	9.000	Off	N	9.7	23.0	55.0
0.176000	32.3	9.000	Off	N	9.7	22.3	54.7
0.194000	26.4	9.000	Off	N	9.7	27.5	53.9
1.072000	27.9	9.000	Off	N	9.8	18.1	46.0
1.076000	28.1	9.000	Off	N	9.8	17.9	46.0
1.110000	28.3	9.000	Off	N	9.8	17.7	46.0
1.116000	27.9	9.000	Off	N	9.8	18.1	46.0
1.120000	27.9	9.000	Off	N	9.8	18.1	46.0
1.136000	27.3	9.000	Off	N	9.8	18.7	46.0
5.502000	7.0	9.000	Off	N	10.0	43.0	50.0
5.512000	8.9	9.000	Off	N	10.0	41.1	50.0
5.524000	6.8	9.000	Off	N	10.0	43.2	50.0
5.528000	6.9	9.000	Off	N	10.0	43.1	50.0
5.560000	9.0	9.000	Off	N	10.0	41.0	50.0
9.094000	19.8	9.000	Off	N	10.2	30.2	50.0

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10. LIST OF TEST EQUIPMENT

10.1 LIST OF TEST EQUIPMENT(Conducted Test)

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Rohde & Schwarz	ENV216 / LISN	12/20/2017	Annual	102245
Rohde & Schwarz	ESCI / Test Receiver	06/27/2017	Annual	100033
EXP	EX-TH400/Temperature Chamber	06/01/2017	Annual	N/A
Agilent	N9020A / Signal Analyzer	06/13/2017	Annual	MY51110085
Agilent	N9030A / Signal Analyzer	11/22/2017	Annual	MY49431210
Agilent	N1911A / Power Meter	04/17/2017	Annual	MY45100523
Agilent	N1921A / Power Sensor	04/17/2017	Annual	MY52260025
Hewlett Packard	11667B / Power Splitter	06/12/2017	Annual	05001
Hewlett Packard	E3632A / DC Power Supply	06/30/2017	Annual	KR75303960
Agilent	8493C / Attenuator(10 dB)	07/10/2017	Annual	07560
Rohde & Schwarz	EMC32 / Software	N/A	N/A	N/A

10.2 LIST OF TEST EQUIPMENT(Radiated Test)

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Audix	AM4000 / Antenna Position Tower	N/A	N/A	N/A
Audix	Turn Table	N/A	N/A	N/A
Innco system	CO3000 / Controller(Antenna mast)	N/A	N/A	CO3000-4p
Rohde & Schwarz	Loop Antenna	04/19/2017	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	04/06/2017	Biennial	760
Schwarzbeck	BBHA 9120D / Horn Antenna	05/02/2017	Biennial	9120D-937
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	12/04/2017	Biennial	BBHA9170541
Rohde & Schwarz	FSP(9 kHz ~ 30 GHz) / Spectrum Analyzer	09/06/2017	Annual	100688
Rohde & Schwarz	FSP(9 kHz ~ 40 GHz) / Spectrum Analyzer	07/27/2017	Annual	100843
Wainwright Instruments	WHK3.0/18G-10EF / High Pass Filter	06/12/2017	Annual	8
Wainwright Instruments	WHFX7.0/18G-8SS / High Pass Filter	05/15/2017	Annual	29
Wainwright Instruments	WRCJV2400/2483.5-2370/2520-60/12SS / Band Reject Filter	06/30/2017	Annual	2
Wainwright Instruments	WRCJV5100/5850-40/50-8EEK / Band Reject Filter	01/03/2018	Annual	2
Api tech.	18B-03 / Attenuator (3 dB)	06/12/2017	Annual	1
Agilent	8493C-10 / Attenuator(10 dB)	07/19/2017	Annual	08285
CERNEX	CBLU1183540 / Power Amplifier	07/11/2017	Annual	22964
CERNEX	CBL06185030 / Power Amplifier	07/11/2017	Annual	22965
CERNEX	CBL18265035 / Power Amplifier	01/10/2018	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	06/30/2017	Annual	25956