HCT CO., LTD.

CERTIFICATE OF COMPLIANCE

FCC Certification

Applicant Name:
LG Electronics MobileComm U.S.A., Inc.

Address:
1000 Sylvan Avenue, Englewood Cliffs NJ 07632

Date of Issue:
January 15, 2014

Test Site/Location:
HCT CO., LTD., 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea

Report No.: HCTR1401F010

HCT FRN: 0005866421

FCC ID	**: ZNFD405**
APPLICANT	**: LG Electronics MobileComm U.S.A., Inc.**

FCC Model(s):	LG-D405
Additional FCC Model(s):	D405, LGD405
EUT Type:	Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA Phone with Bluetooth and WLAN
Max. RF Output Power:	Wi-Fi 802.11b(19.28 dBm) / Wi-Fi 802.11g (20.74 dBm) / Wi-Fi 802.11n (19.87 dBm)
Frequency Range:	2412 MHz - 2462 MHz (2.4 GHz Band)
Modulation type	CCK/DSSS/OFDM
FCC Classification:	Digital Transmission System(DTS)
FCC Rule Part(s):	Part 15.247

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment 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.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a)

Report prepared by
: Jong Seok Lee
Test engineer of RF Team

Approved by
: Chang Seok Choi
Manager of RF Team

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCTR1401F010	January 15, 2014	- First Approval Report

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1. GENERAL INFORMATION

Applicant:	LG Electronics MobileComm U.S.A., Inc.
Address:	1000 Sylvan Avenue, Englewood Cliffs NJ 07632
FCC ID:	ZNFD405
EUT Type:	Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA Phone with Bluetooth and WLAN
Model name(s):	LG-D405
Additional Model name(s):	D405, LGD405
Date(s) of Tests:	December 22, 2013 ~ January 08, 2014
Place of Tests:	HCT Co., Ltd. 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea. (IC Recognition No. : 5944A-3)

2. EUT DESCRIPTION

EUT Type	Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA Phone with Bluetooth and WLAN	
FCC Model Name	LG-D405	
Additional FCC Model Name	D405, LGD405	
Power Supply	DC 3.8 V	
Battery type	Li-ion Battery(Standard)	
Frequency Range	TX: 2412 MHz ~ 2462 MHz RX: 2412 MHz ~ 2462 MHz	
Max. RF Output Power	Peak	Wi-Fi 802.11b(19.28 dBm) / Wi-Fi 802.11g (20.74 dBm) / Wi-Fi 802.11n (19.87 dBm)
	Average	Wi-Fi 802.11b (16.02 dBm) / Wi-Fi 802.11g (9.71 dBm) / Wi-Fi 802.11n (8.70 dBm)
Modulation Type	DSSS/CCK(802.11b), OFDM(802.11g, 802.11n)	
Antenna Specification	Manufacturer: LS Mtron Co. Ltd. Antenna type: Internal Antenna Peak Gain : 2.425 dBi	

3. TEST METHODOLOGY

FCC KDB 558074 D01 DTS Meas Guidance v03r01 dated April 09, 2013 entitled “Guidance for Performing Compliance Measurements on Digital Transmission Systems(DTS) and the measurement procedure described in the American National Standard for Testing Unlicensed Wireless Devices(ANSI C63.4-2003) Operating Under §15.247” 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 15.247 under the FCC Rules Part 15 Subpart C.

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 13.1.4.1 of ANSI C63.4. (Version :2003) 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. 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 13.1.4.1 of ANSI C63.4. (Version: 2003)

Conducted Antenna Terminal

See Section from 9.1 to 9.2.(KDB 558074)

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.

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 :2003) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated June 21, 2011 (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:

"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

7. SUMMARY TEST OF RESULTS

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
6 dB Bandwidth	§15.247(a)(2)	> 500 kHz	CONDUCTED	PASS
Conducted Maximum Peak Output Power	§15.247(b)(3)	< 1 Watt		PASS
Power Spectral Density	§15.247(e)	< 8 dBm / 3 kHz Band		PASS
Band Edge(Out of Band Emissions)	§15.247(d)	Conducted < 20 dBc		PASS
AC Power line Conducted Emissions	§15.207	cf. Section 8.6		PASS
Radiated Spurious Emissions	§15.205, 15.209	cf. Section 8.5.1	RADIATED	PASS
Radiated Restricted Band Edge	§15.247(d), 15.205, 15.209	cf. Section 8.5.2		PASS

8. TEST RESULT

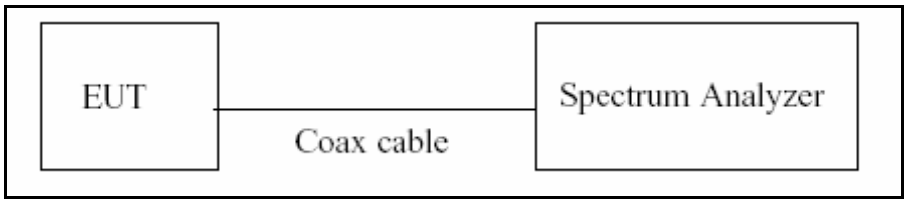
8.1 DUTY CYCLE

▣ TEST PROCEDURE

According to KDB 558074)6)b), issued 04/09/2013)

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 ≥ OBW 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 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 accroding to the zero-span measurement method, 6.0)b) in KDB 558074(issued 04/09/2013)

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 because 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

Mode	Data Rate	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
b	1 Mbps	12.180	12.300	0.99024390	0.043
	2 Mbps	6.195	6.315	0.98099762	0.083
	5.5 Mbps	2.365	2.471	0.95710239	0.190
	11 Mbps	1.280	1.380	0.92753623	0.327
g	6 Mbs	2.025	2.130	0.95070423	0.220
	9 Mbs	1.358	1.455	0.93333333	0.300
	12 Mbs	1.023	1.125	0.90933333	0.413
	18 Mbs	0.688	0.790	0.87088608	0.600
	24 Mbs	0.522	0.622	0.83922830	0.761
	36 Mbs	0.354	0.454	0.77973568	1.081
	48 Mbs	0.271	0.371	0.73045822	1.364
	54 Mbs	0.243	0.342	0.71052632	1.484
n	6.5 Mbs	1.875	1.980	0.94696970	0.237
	13 Mbs	0.948	1.050	0.90285714	0.444
	19.5 Mbs	0.639	0.741	0.86234818	0.643
	26 Mbs	0.486	0.585	0.83076923	0.805
	39 Mbs	0.334	0.434	0.76958525	1.137
	52 Mbs	0.255	0.354	0.72033898	1.425
	58.5 Mbs	0.231	0.330	0.70000000	1.549
	65 Mbs	0.211	0.310	0.68064516	1.671

Note : Duty Cycle Factor = 10*log(1/Duty Cycle). where, Duty Cycle = T_{on} / T_{total}

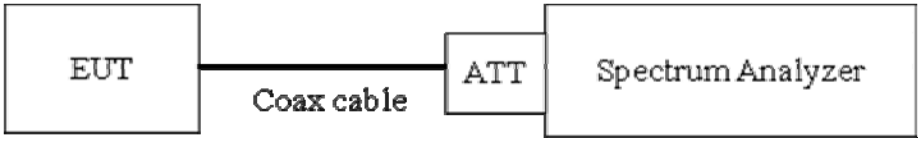
8.2 6dB BANDWIDTH (802.11b/g/n)

Test Requirements and limit, §15.247(a)(2)

The bandwidth at 6dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the receive antenna while the EUT is operating in transmission mode at the appropriate frequencies.

The minimum permissible 6dB bandwidth is 500 kHz.

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to (Page 5 in KDB 558074, issued 04/09/2013)

RBW = 100 kHz

VBW ≥ 3 x RBW

Detector = Peak

Trace mode = max hold

Sweep = auto couple

Allow the trace to stabilize

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

▣ TEST RESULTS

Conducted 6dB Bandwidth Measurements for 802.11b

802.11b Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
2412	1	7.626	0.500	Pass
2437	6	7.149	0.500	Pass
2462	11	8.007	0.500	Pass

Conducted 6dB Bandwidth Measurements for 802.11g

802.11g Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
2412	1	16.42	0.500	Pass
2437	6	16.41	0.500	Pass
2462	11	16.43	0.500	Pass

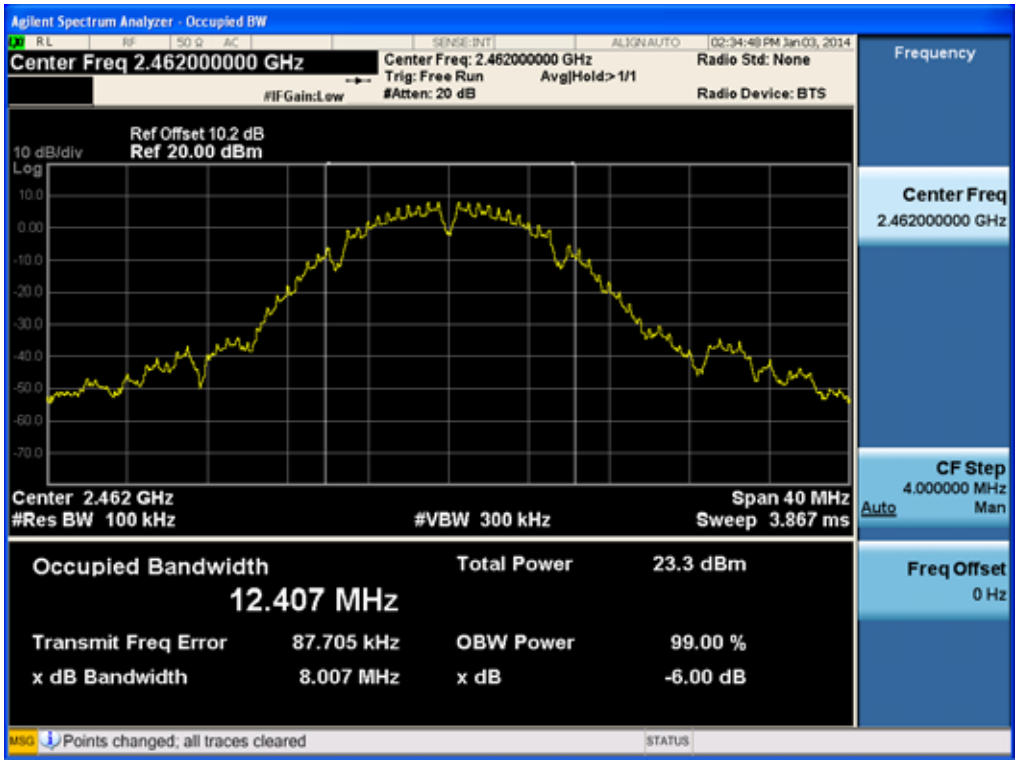
Conducted 6dB Bandwidth Measurements for 802.11n_20 MHz BW

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
2412	1	17.64	0.500	Pass
2437	6	17.62	0.500	Pass
2462	11	17.64	0.500	Pass

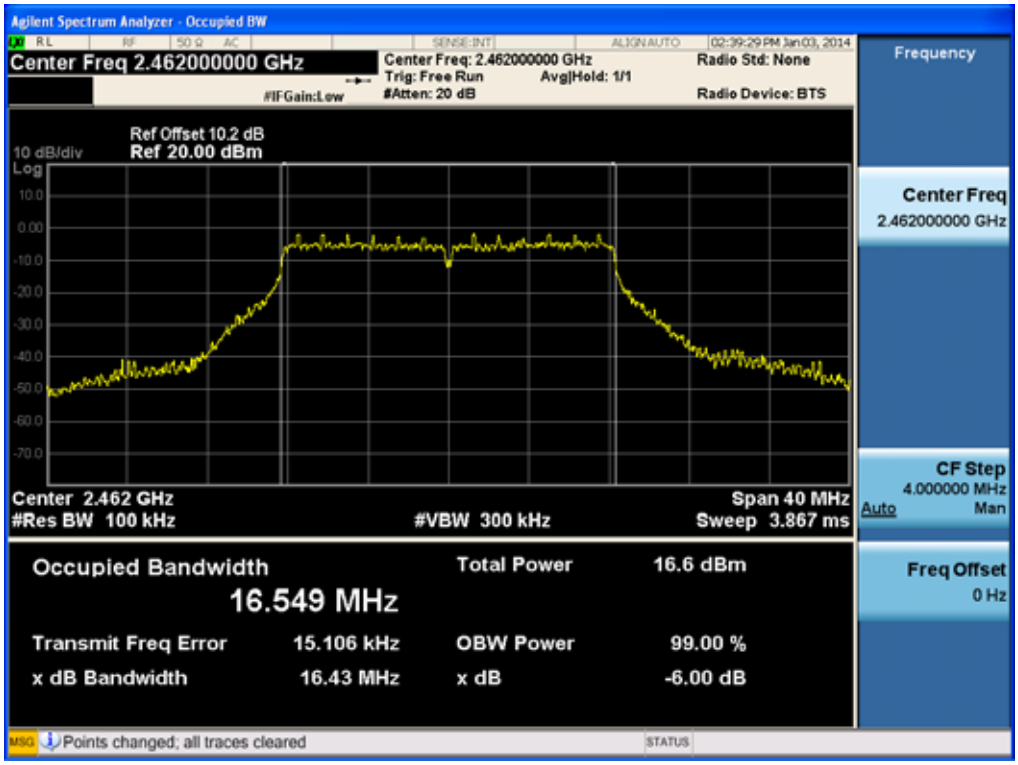
Note : In order to simplify the report, attached plots were only the most wide 6 dB BW channel.

▣ RESULT PLOTS

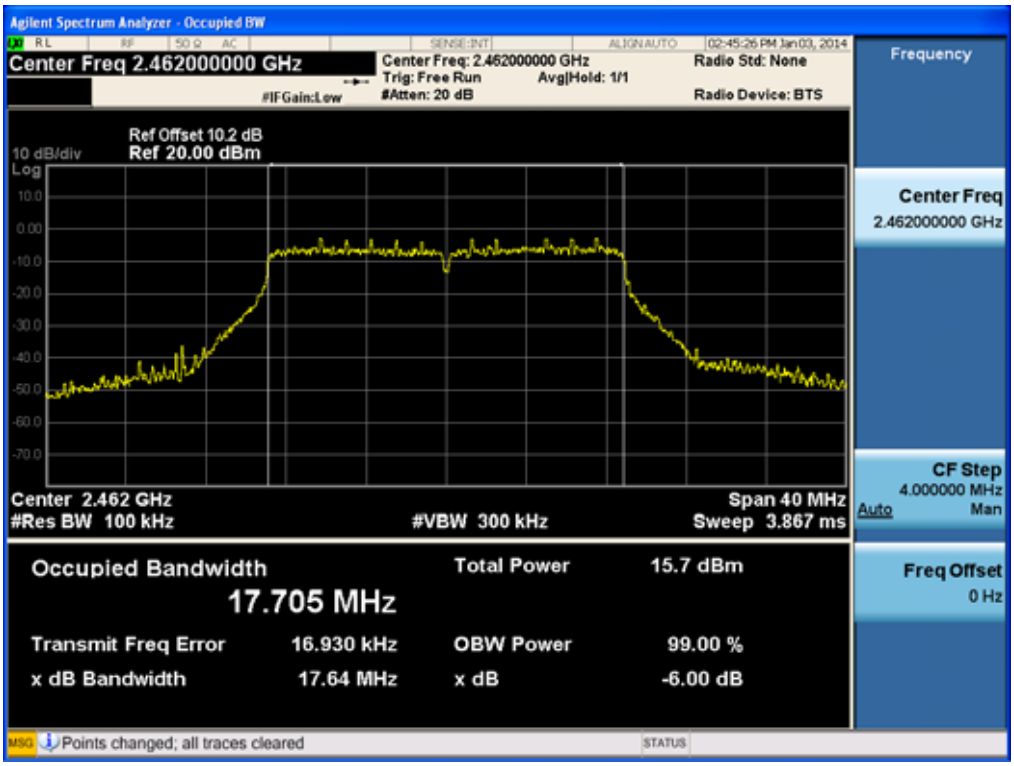
6dB Bandwidth plot (802.11b-CH 11)



6dB Bandwidth plot (802.11g-CH 11)



6dB Bandwidth plot (802.11n-CH 11)



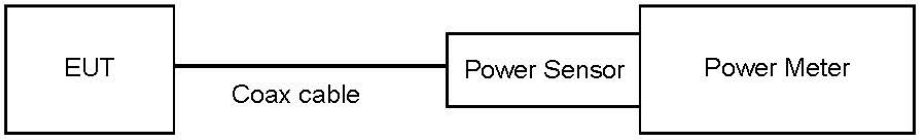
8.3 OUTPUT POWER (802.11b/g/n)

Test Requirements and limit, §15.247(b)(3)

The transmitter output is connected to the input of an RF power sensor. Measurement is made using a broadband power meter capable of making peak and average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

The maximum permissible conducted output power is 1 Watt.

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

- Peak Power (Procedure 9.1.3 in KDB 558074, issued 04/09/2013)
  1. Measure the peak power of the transmitter.
- Average Power (Procedure 9.2.3.1 in KDB 558074, issued 04/09/2013)
  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 :

1. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB. So, 20.2 dB is offset for 2.4 GHz Band.
   Actual value of loss for the attenuator and cable combination is below table.

Band	Frequency(MHz)	Loss(dB)
2.4 GHz	2412	10.21
	2437	10.24
	2462	10.24

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

▣ TEST RESULTS-Peak

Conducted Output Power Measurements (802.11b Mode)

802.11b Mode		Rate	Measured	Limit
Frequency[MHz]	Channel No.	(Mbps)	Power(dBm)	(dBm)
2412	1	1 Mbps	19.04	30
		2 Mbps	19.06	30
		5.5 Mbps	19.07	30
		11 Mbps	19.17	30
2437	6	1 Mbps	19.05	30
		2 Mbps	19.06	30
		5.5 Mbps	19.11	30
		11 Mbps	19.22	30
2462	11	1 Mbps	19.15	30
		2 Mbps	19.17	30
		5.5 Mbps	19.19	30
		11 Mbps	19.28	30

Conducted Output Power Measurements (802.11g Mode)

802.11g Mode		Rate	Measured	Limit
Frequency[MHz]	Channel No.	(Mbps)	Power(dBm)	(dBm)
2412	1	6 Mbps	19.71	30
		9 Mbps	20.15	30
		12 Mbps	19.90	30
		18 Mbps	20.04	30
		24 Mbps	19.98	30
		36 Mbps	20.27	30
		48 Mbps	20.09	30
		54 Mbps	19.78	30
2437	6	6 Mbps	20.11	30
		9 Mbps	20.19	30
		12 Mbps	20.34	30
		18 Mbps	20.20	30
		24 Mbps	20.70	30
		36 Mbps	20.06	30
		48 Mbps	20.18	30
		54 Mbps	20.34	30
2462	11	6 Mbps	20.13	30
		9 Mbps	20.23	30
		12 Mbps	20.40	30
		18 Mbps	20.35	30
		24 Mbps	20.14	30
		36 Mbps	20.74	30
		48 Mbps	20.36	30
		54 Mbps	20.60	30

Conducted Output Power Measurements (802.11n Mode)

802.11n Mode		Rate	Measured	Limit
Frequency[MHz]	Channel No.	(Mbps)	Power(dBm)	(dBm)
2412	1	6.5 Mbps	19.07	30
		13 Mbps	19.06	30
		19.5 Mbps	19.24	30
		26 Mbps	19.04	30
		39 Mbps	19.07	30
		52 Mbps	19.53	30
		58.5 Mbps	19.47	30
		65 Mbps	19.21	30
2437	6	6.5 Mbps	19.05	30
		13 Mbps	19.36	30
		19.5 Mbps	19.31	30
		26 Mbps	19.40	30
		39 Mbps	19.87	30
		52 Mbps	19.25	30
		58.5 Mbps	19.59	30
		65 Mbps	19.33	30
2462	11	6.5 Mbps	19.24	30
		13 Mbps	19.20	30
		19.5 Mbps	19.40	30
		26 Mbps	19.46	30
		39 Mbps	19.34	30
		52 Mbps	19.31	30
		58.5 Mbps	19.48	30
		65 Mbps	19.28	30

▣ TEST RESULTS-Average

Conducted Output Power Measurements (802.11b Mode)

802.11b Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2412	1	1 Mbps	15.78	0.043	15.82	30
		2 Mbps	15.69	0.083	15.77	30
		5.5 Mbps	15.71	0.190	15.90	30
		11 Mbps	15.55	0.327	15.87	30
2437	6	1 Mbps	15.83	0.043	15.87	30
		2 Mbps	15.80	0.083	15.88	30
		5.5 Mbps	15.79	0.190	15.98	30
		11 Mbps	15.64	0.327	15.97	30
2462	11	1 Mbps	15.91	0.043	15.95	30
		2 Mbps	15.84	0.083	15.92	30
		5.5 Mbps	15.83	0.190	16.02	30
		11 Mbps	15.68	0.327	16.01	30

Conducted Output Power Measurements (802.11g Mode)

802.11g Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2412	1	6 Mbps	9.22	0.220	9.44	30
		9 Mbps	9.13	0.300	9.43	30
		12 Mbps	9.04	0.413	9.45	30
		18 Mbps	8.89	0.600	9.49	30
		24 Mbps	8.70	0.761	9.46	30
		36 Mbps	8.40	1.081	9.49	30
		48 Mbps	8.13	1.364	9.49	30
		54 Mbps	8.00	1.484	9.49	30
2437	6	6 Mbps	9.49	0.220	9.71	30
		9 Mbps	9.38	0.300	9.68	30
		12 Mbps	9.28	0.413	9.69	30
		18 Mbps	9.09	0.600	9.69	30
		24 Mbps	8.89	0.761	9.65	30
		36 Mbps	8.60	1.081	9.68	30
		48 Mbps	8.31	1.364	9.68	30
		54 Mbps	8.19	1.484	9.68	30
2462	11	6 Mbps	9.45	0.220	9.67	30
		9 Mbps	9.38	0.300	9.68	30
		12 Mbps	9.24	0.413	9.66	30
		18 Mbps	9.08	0.600	9.68	30
		24 Mbps	8.89	0.761	9.65	30
		36 Mbps	8.59	1.081	9.67	30
		48 Mbps	8.30	1.364	9.67	30
		54 Mbps	8.19	1.484	9.68	30

Conducted Output Power Measurements (802.11n Mode)

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2412	1	6.5 Mbps	8.29	0.237	8.53	30
		13 Mbps	8.10	0.444	8.55	30
		19.5 Mbps	7.92	0.643	8.57	30
		26 Mbps	7.71	0.805	8.52	30
		39 Mbps	7.41	1.137	8.54	30
		52 Mbps	7.12	1.425	8.54	30
		58.5 Mbps	7.00	1.549	8.55	30
		65 Mbps	6.89	1.671	8.56	30
2437	6	6.5 Mbps	8.39	0.237	8.63	30
		13 Mbps	8.20	0.444	8.65	30
		19.5 Mbps	8.02	0.643	8.66	30
		26 Mbps	7.81	0.805	8.62	30
		39 Mbps	7.50	1.137	8.64	30
		52 Mbps	7.21	1.425	8.64	30
		58.5 Mbps	7.09	1.549	8.64	30
		65 Mbps	6.98	1.671	8.65	30
2462	11	6.5 Mbps	8.43	0.237	8.67	30
		13 Mbps	8.24	0.444	8.68	30
		19.5 Mbps	8.06	0.643	8.70	30
		26 Mbps	7.85	0.805	8.65	30
		39 Mbps	7.54	1.137	8.68	30
		52 Mbps	7.25	1.425	8.68	30
		58.5 Mbps	7.14	1.549	8.69	30
		65 Mbps	7.02	1.671	8.69	30

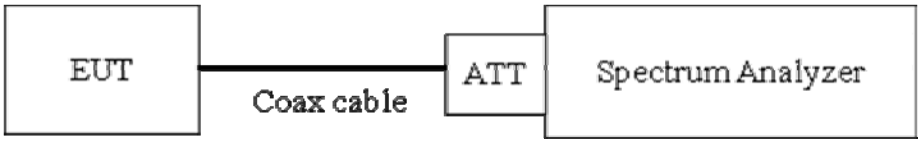
8.4 POWER SPECTRAL DENSITY (802.11b/g/n)

Test Requirements and limit, §15.247(e)

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

Minimum Standard – the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

We tested according to Procedure 10.2 in KDB 558074, issued 04/09/2013

The spectrum analyzer is set to :

Set analyzer center frequency to DTS channel center frequency.

Span = 1.5 times the DTS channel bandwidth.

RBW = 3 kHz ≤ RBW ≤ 100 kHz.

VBW ≥ 3 x RBW.

Sweep = auto couple

Detector = peak

Trace Mode = max hold

Allow trace to fully stabilize.

Use the peak marker function to determine the maximum amplitude level within the RBW.

If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

▣ Sample Calculation

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

= -5 dBm + 10 dB + 0.8 dB = 5.8 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 in the 2.4 GHz range that was rounded off to the closest tenth dB. So, 10.2 dB is offset for 2.4 GHz Band.

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

Band	Frequency(MHz)	Loss(dB)
2.4 GHz	2412	10.21
	2437	10.24
	2462	10.24

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

▣ TEST RESULTS

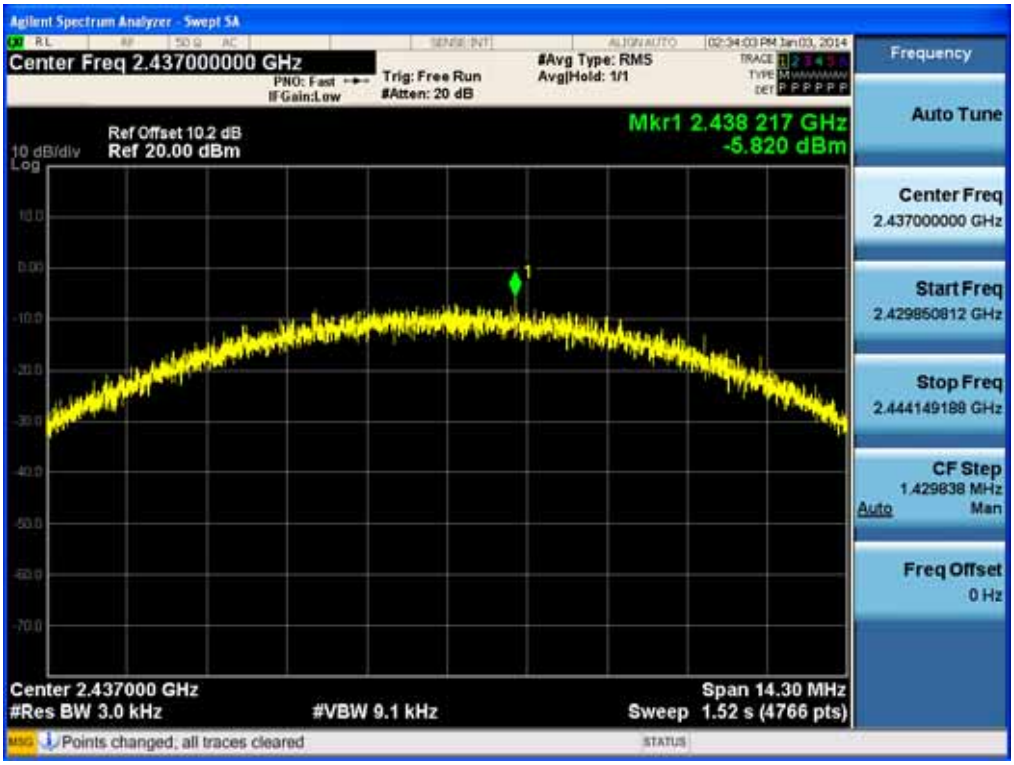
Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result		
			PSD (dBm)	Limit (dBm)	Pass/Fail
2412	1	802.11b	-6.349	8	Pass
2437	6		-5.820	8	Pass
2462	11		-6.165	8	Pass
2412	1	802.11g	-15.043	8	Pass
2437	6		-15.348	8	Pass
2462	11		-16.528	8	Pass
2412	1	802.11n	-17.791	8	Pass
2437	6		-17.467	8	Pass
2462	11		-17.770	8	Pass

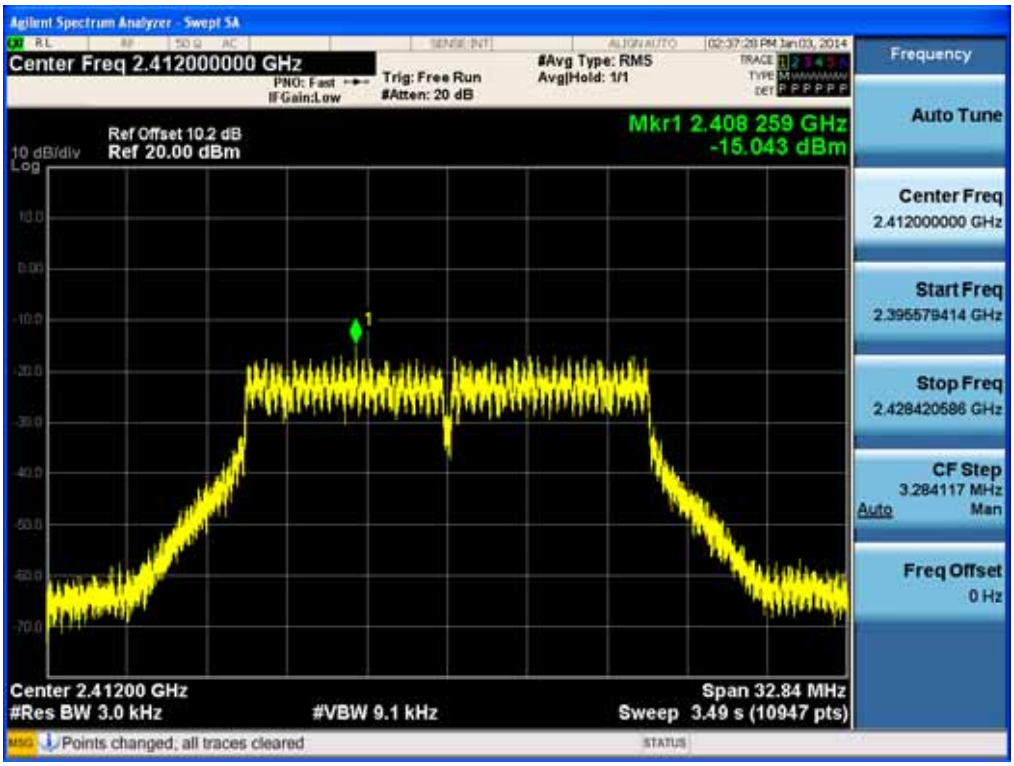
Note : In order to simplify the report, attached plots were only the highest PSD channel.

▣ RESULT PLOTS

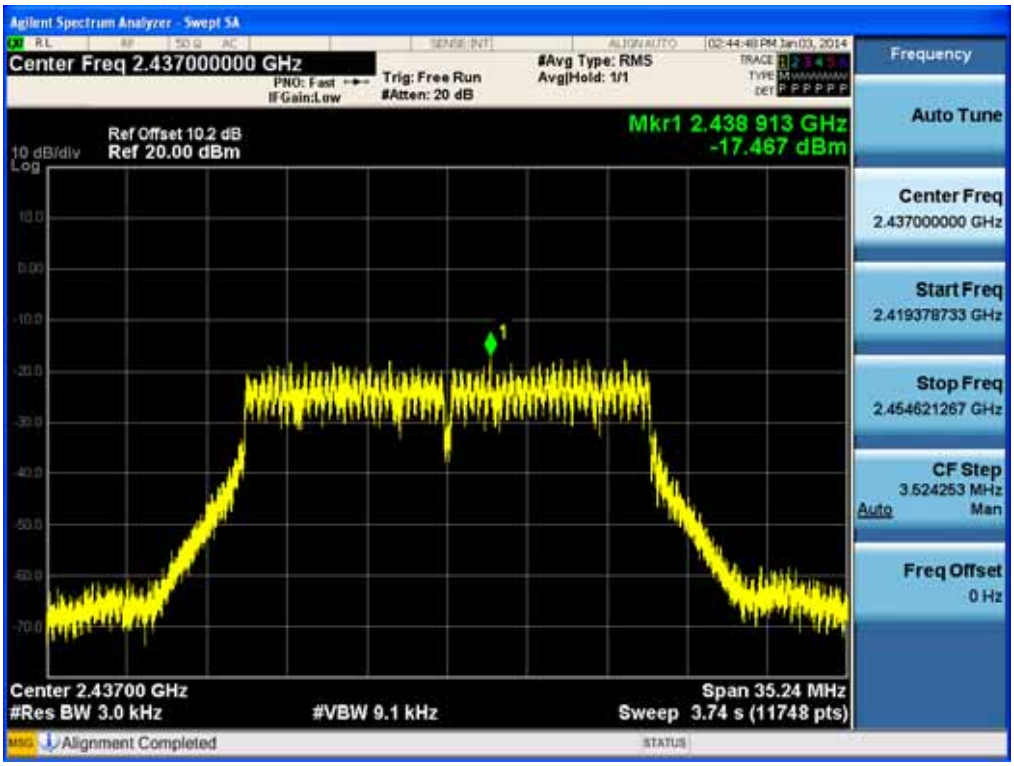
Power Spectral Density (802.11b-CH 6)



Power Spectral Density (802.11g-CH 1)



Power Spectral Density (802.11n-CH 6)



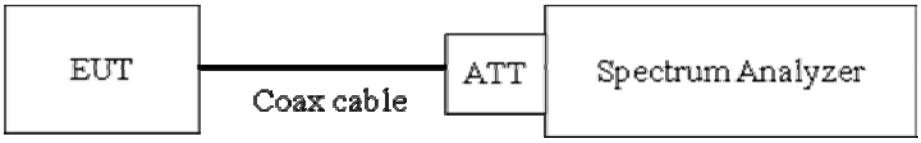
8.5 OUT OF BAND EMISSIONS AT THE BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS

Test Requirements and limit, §15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

Limit : 20 dBc

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. (Procedure 11.0 in KDB 558074, issued 04/09/2013)

RBW = 100 kHz

VBW ≥ 3 x RBW

Set span to encompass the spectrum to be examined

Detector = Peak

Trace Mode = max hold

Sweep time = auto couple

Ensure that the number of measurement points ≥ Span/RBW

Allow trace to fully stabilize.

Use peak marker function to determine the maximum amplitude level.

Measurements are made over the 30 MHz to 10th harmonic range with the transmitter set to the lowest, middle, and highest channels.

Note :

1. The band edge 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 in the 2.4 GHz range that was rounded off to the closest tenth dB. So, 10.2 dB is

offset for 2.4 GHz Band. Actual value of loss for the attenuator and cable combination is below table.

Band	Frequency(MHz)	Loss(dB)
2.4 GHz	2412	10.21
	2437	10.24
	2462	10.24

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

4. In case of conducted spurious emissions test, please check factors blow table.

5. In order to simplify the report, attached plots were only the worst case channel.

▣ FACTORS FOR FREQUENCY

Freq(MHz)	Factor(dB)
30	9.95
100	10.01
200	10.03
300	10.04
400	10.05
500	10.04
600	10.03
700	10.09
800	10.10
900	10.08
1000	10.11
2000	10.25
2400*	10.19
2500*	10.26
3000	10.27
4000	10.22
5000	10.48
5700*	10.42
5800*	10.48
6000	10.48
7000	10.57
8000	10.45
9000	10.50
10000	10.64
11000	10.69
12000	10.75

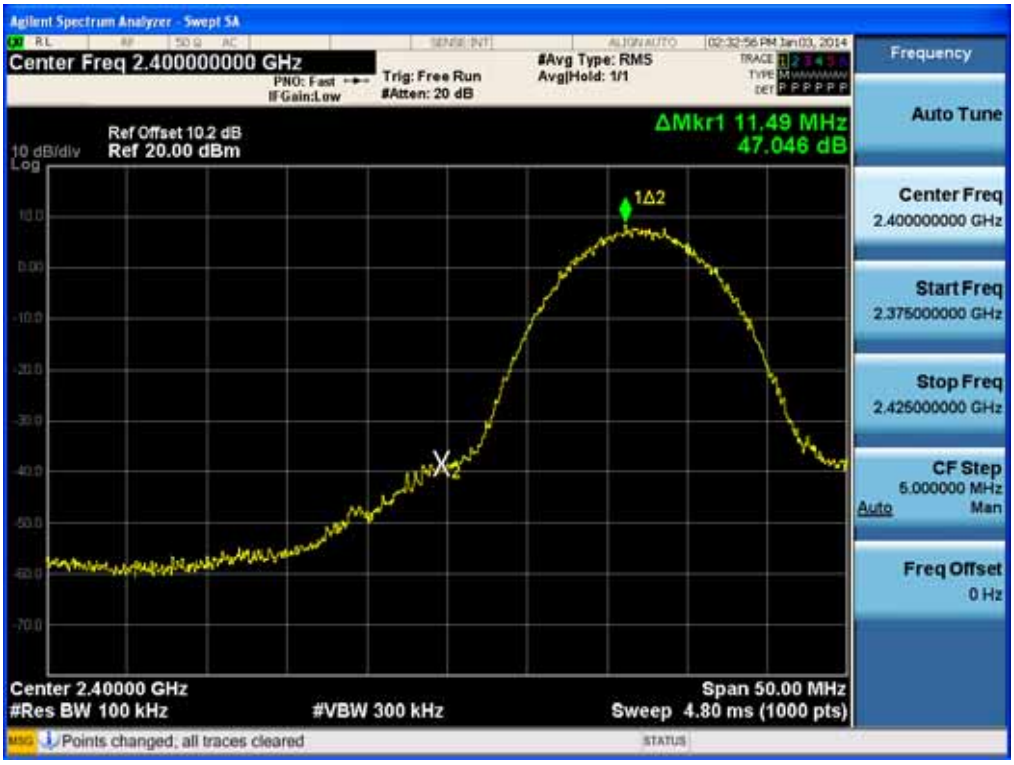
13000	10.92
14000	11.90
15000	11.00
16000	11.03
17000	10.93
18000	10.96
19000	10.85
20000	12.11
21000	11.17
22000	10.99
23000	11.12
24000	11.10
25000	11.42

Note : 1. '*' is fundamental frequency range.

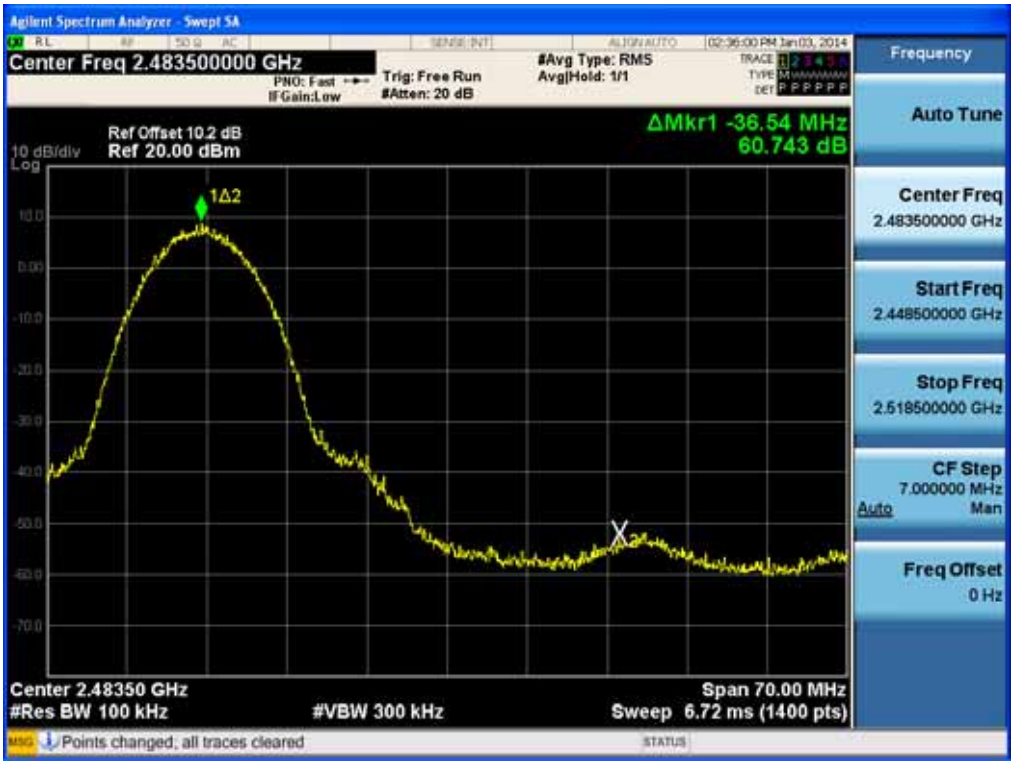
2. Factor = Cable loss + Attenuator loss

▣ RESULT PLOTS

BandEdge (802.11b-CH1)

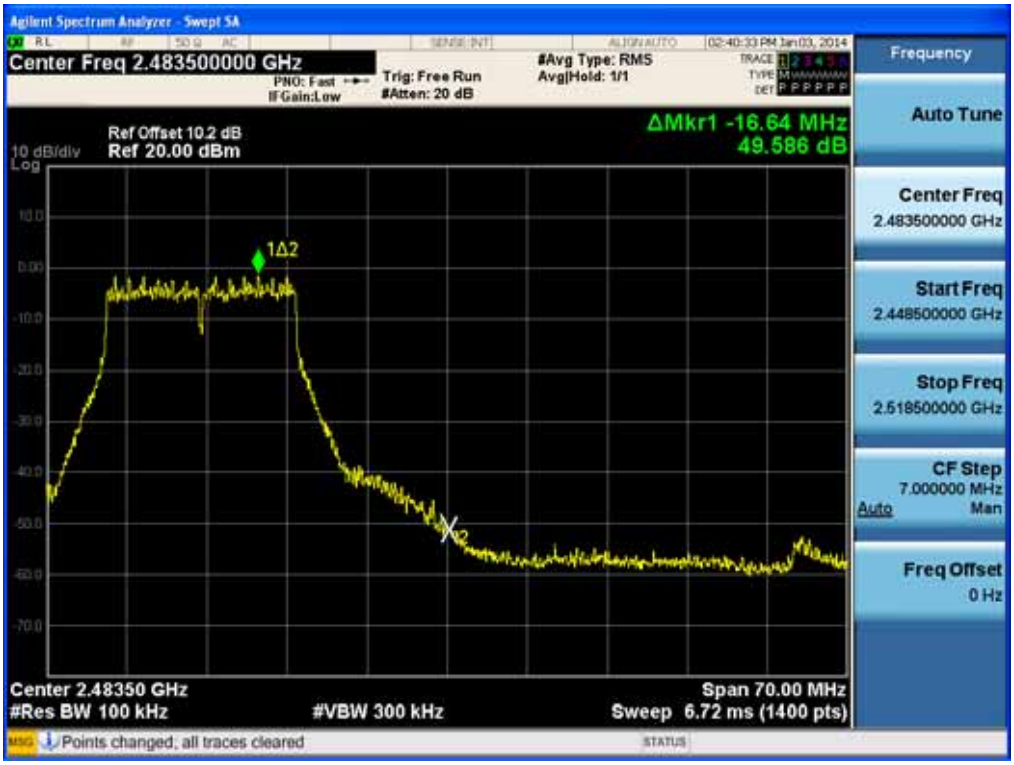


BandEdge (802.11b-CH11)



BandEdge (802.11g-CH1)

BandEdge (802.11g-CH11)

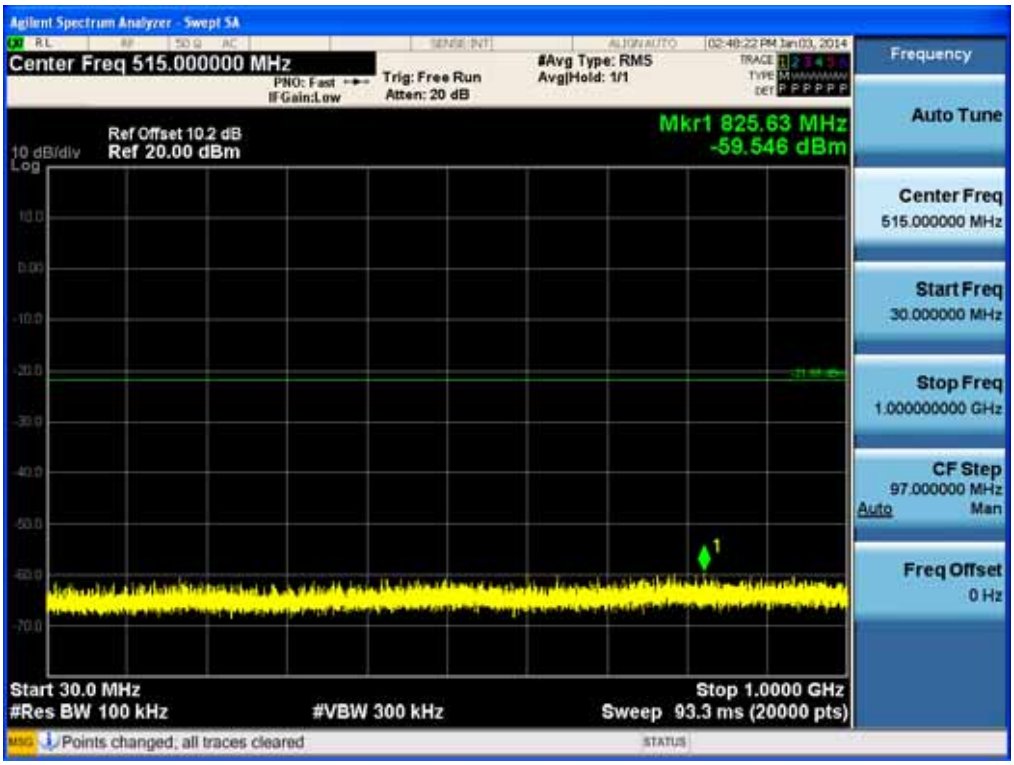


Band Edge (802.11n-CH1)

Band Edge (802.11n-CH11)

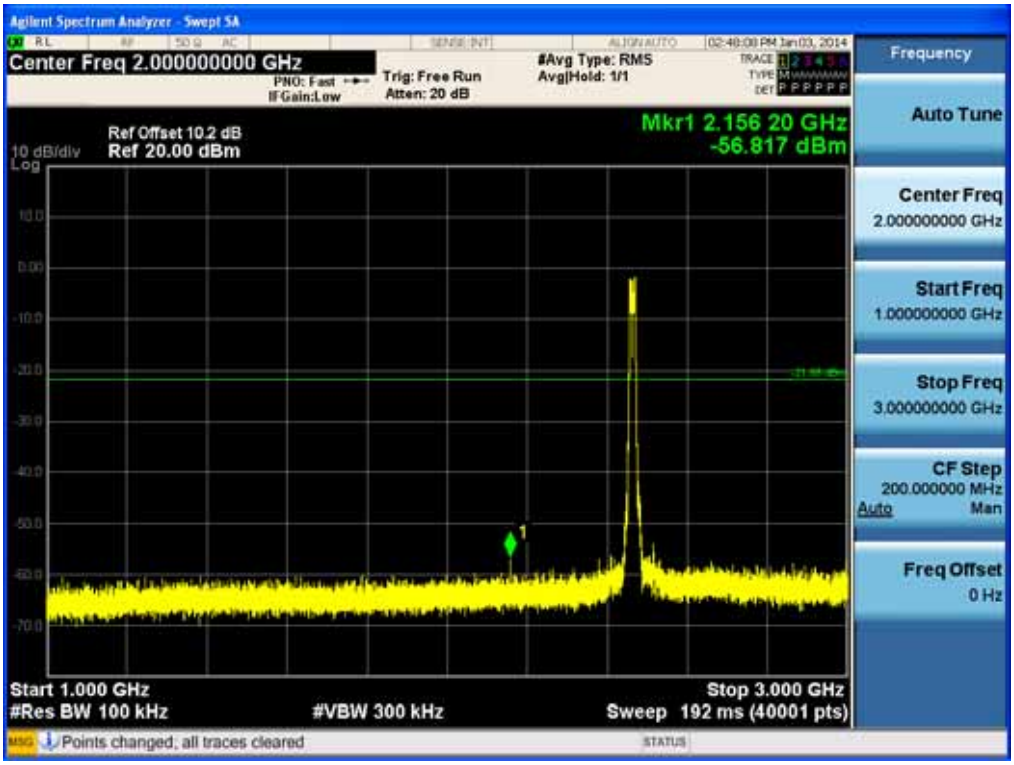
30 MHz ~ 1 GHz

Conducted Spurious Emission (802.11g_Ch.11_36 Mbps)



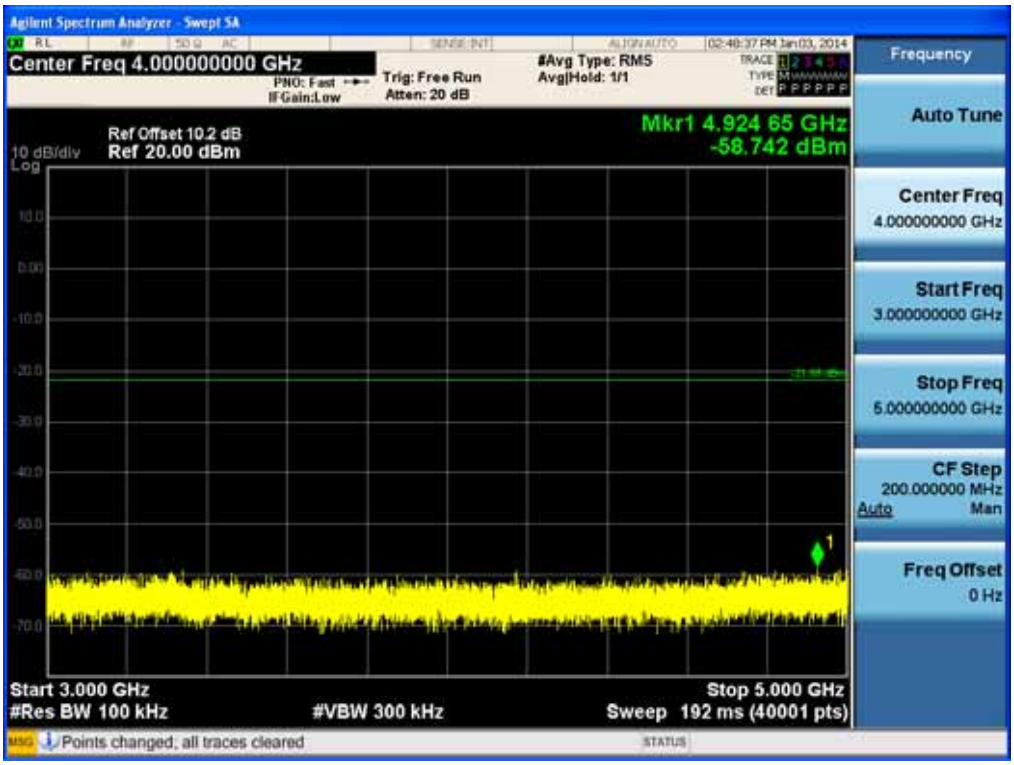
1 GHz ~ 3 GHz

Conducted Spurious Emission (802.11g_Ch.11_36 Mbps)



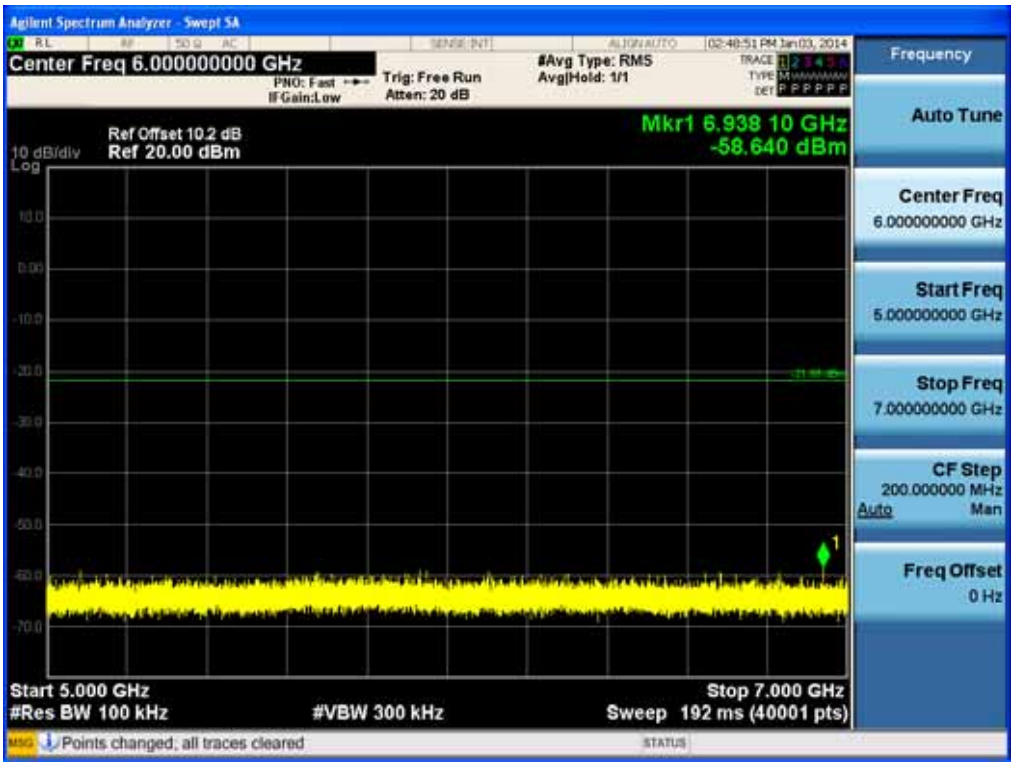
3 GHz ~ 5 GHz

Conducted Spurious Emission (802.11g_Ch.11_36 Mbps)



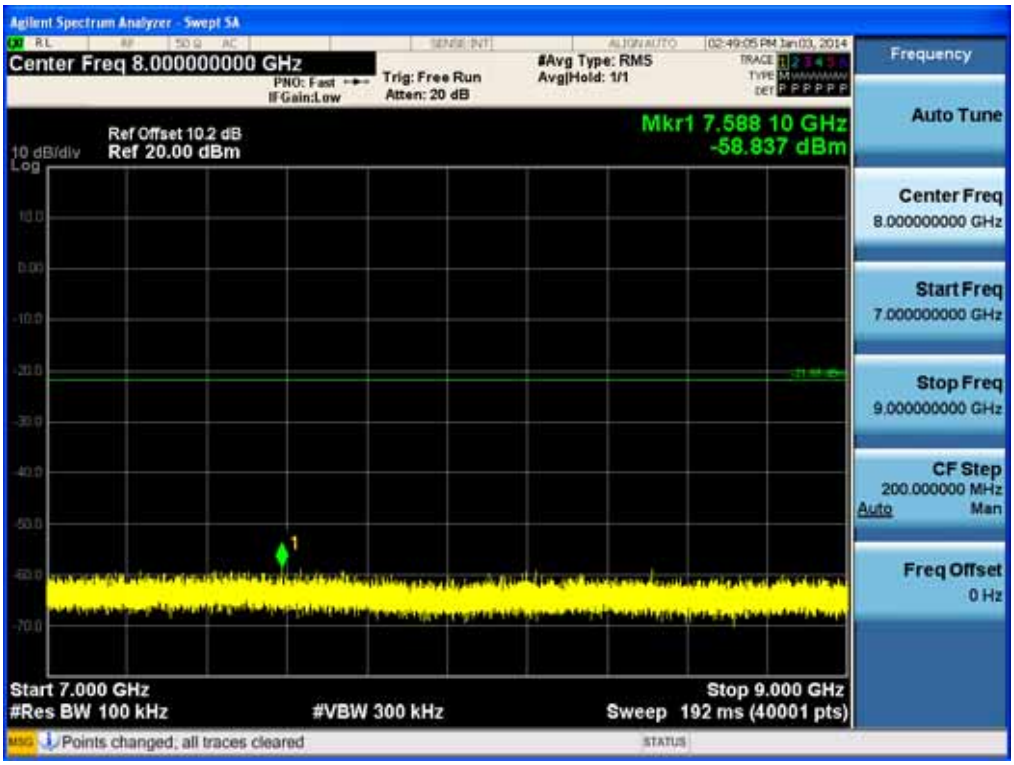
5 GHz ~ 7 GHz

Conducted Spurious Emission (802.11g_Ch.11_36 Mbps)



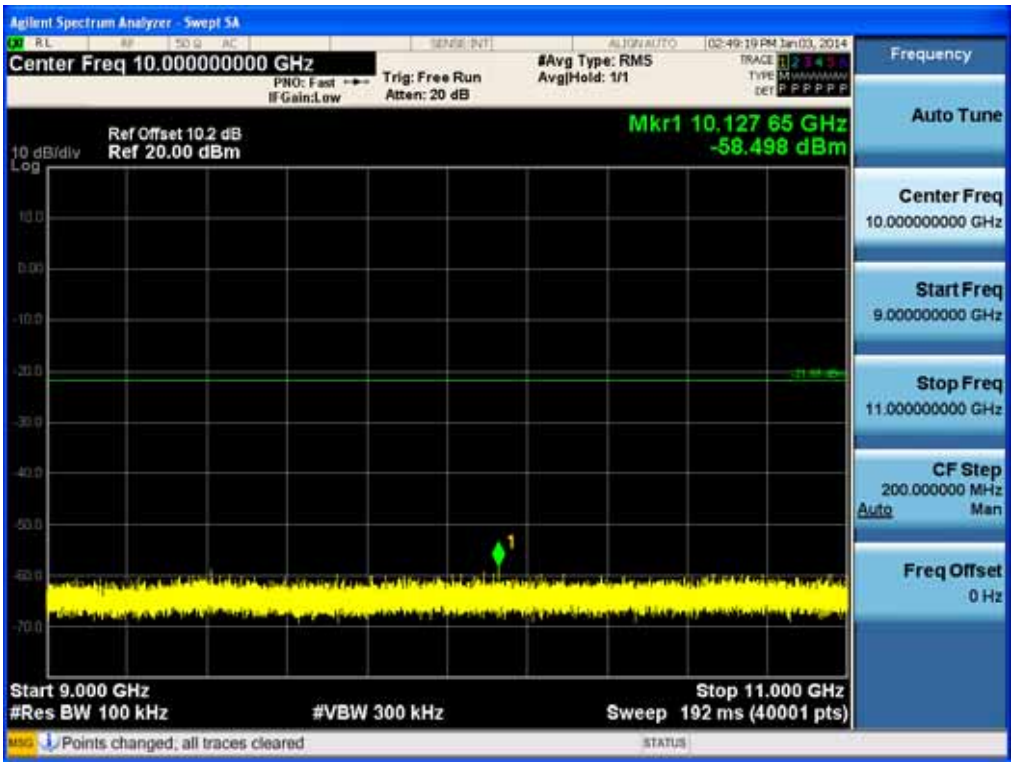
7 GHz ~ 9 GHz

Conducted Spurious Emission (802.11g_Ch.11_36 Mbps)



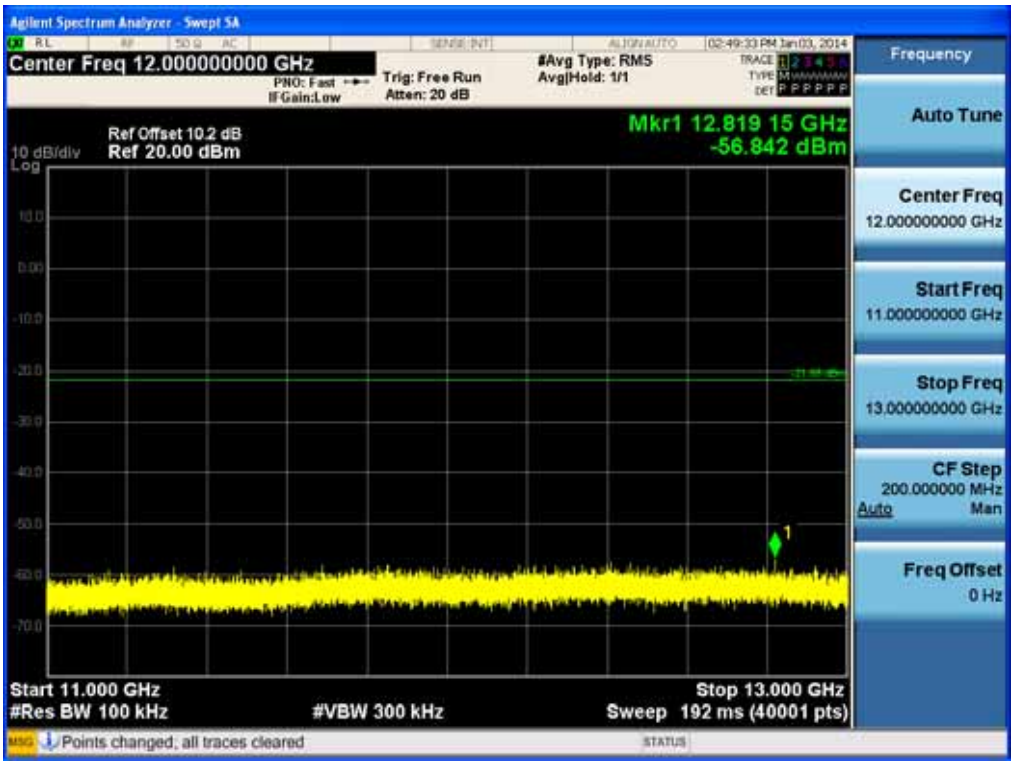
9 GHz ~ 11 GHz

Conducted Spurious Emission (802.11g_Ch.11_36 Mbps)



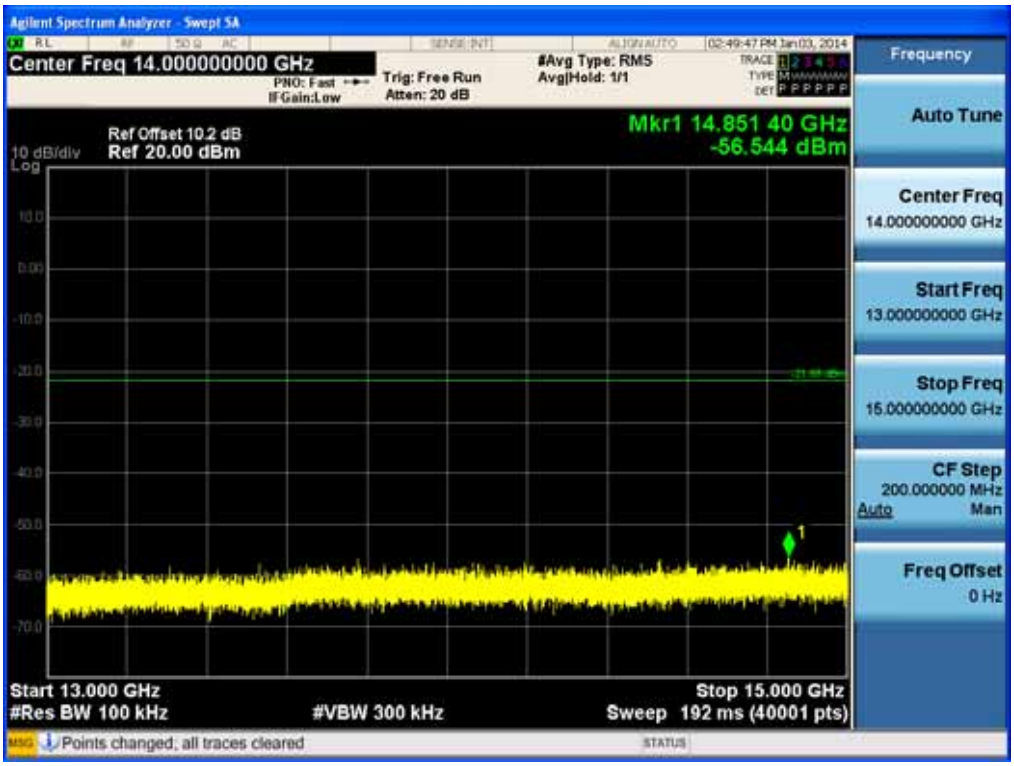
11 GHz ~ 13 GHz

Conducted Spurious Emission (802.11g_Ch.11_36 Mbps)



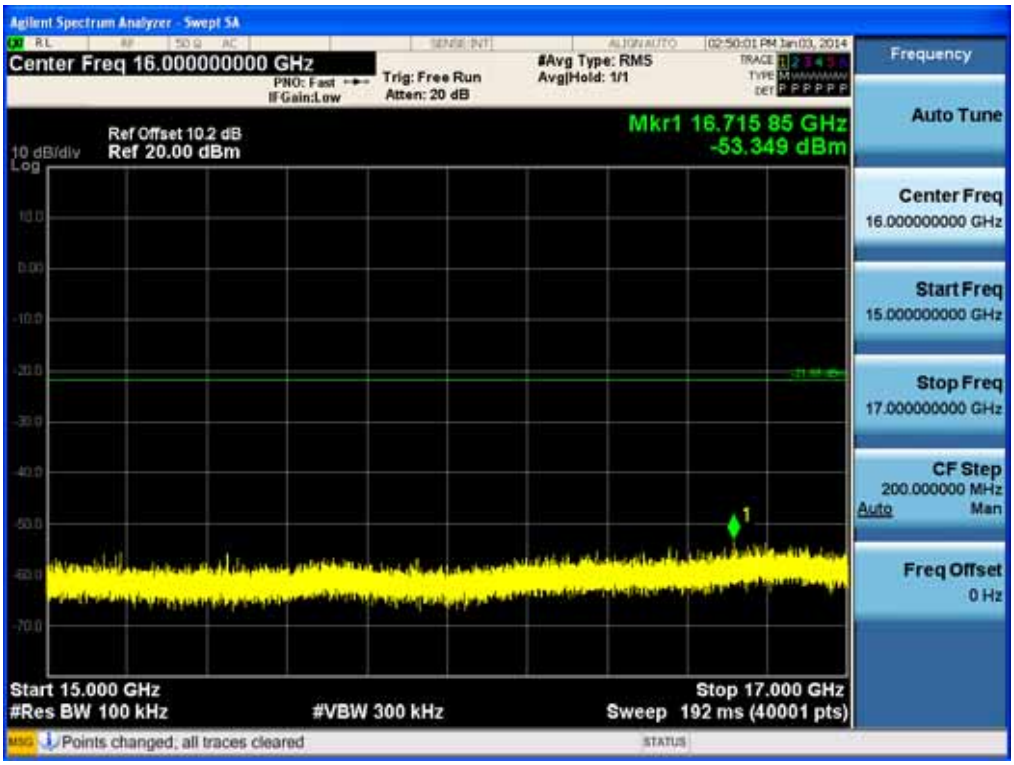
13 GHz ~ 15 GHz

Conducted Spurious Emission (802.11g_Ch.11_36 Mbps)



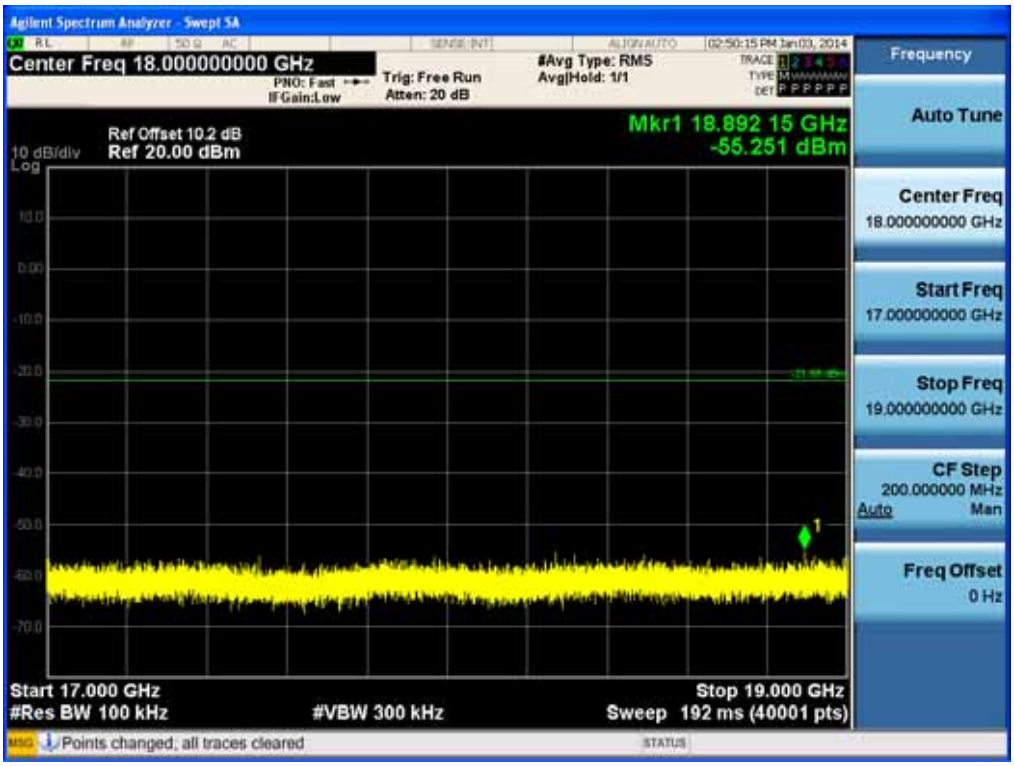
15 GHz ~ 17 GHz

Conducted Spurious Emission (802.11g_Ch.11_36 Mbps)



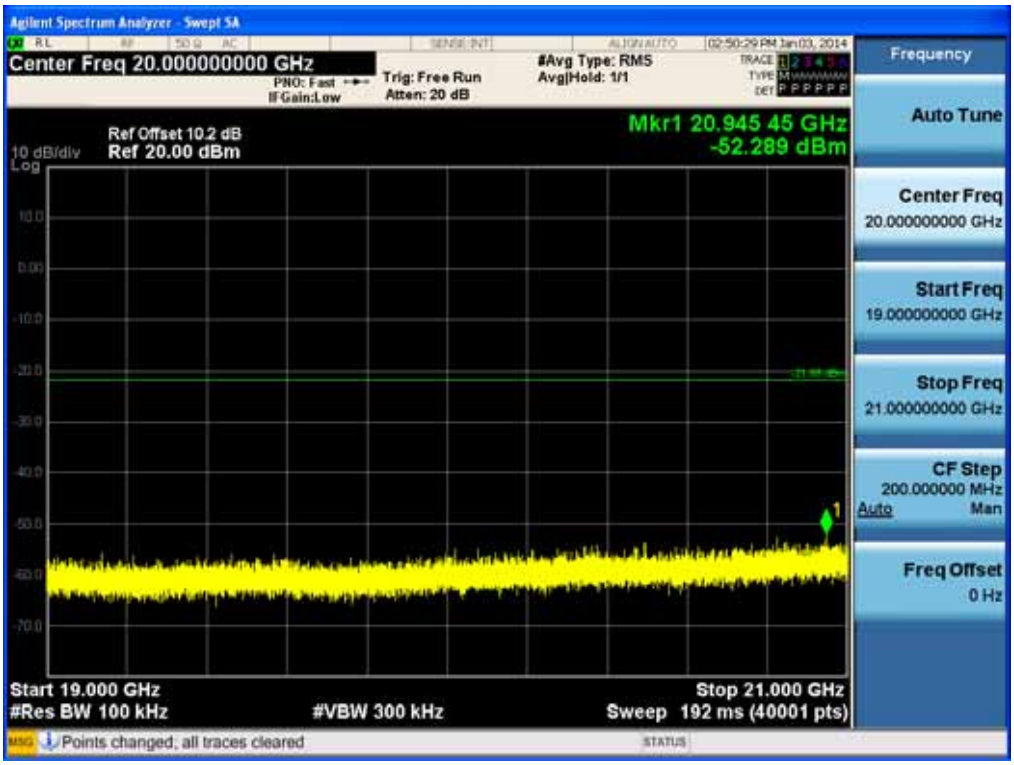
17 GHz ~ 19 GHz

Conducted Spurious Emission (802.11g_Ch.11_36 Mbps)



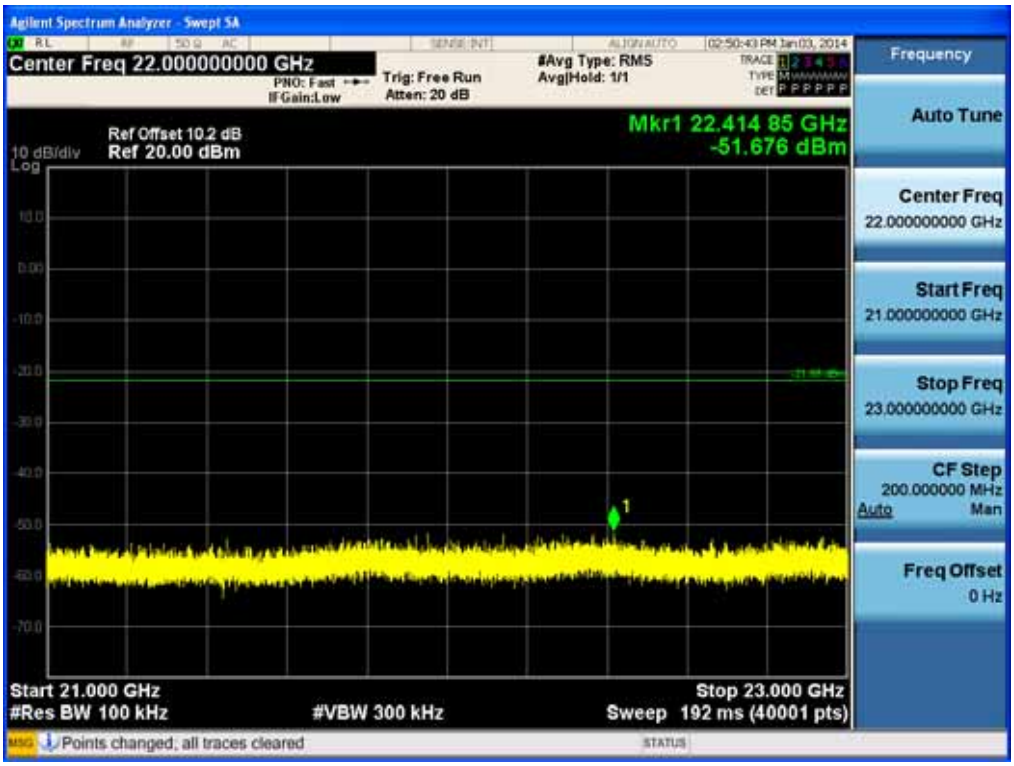
19 GHz ~ 21 GHz

Conducted Spurious Emission (802.11g_Ch.11_36 Mbps)



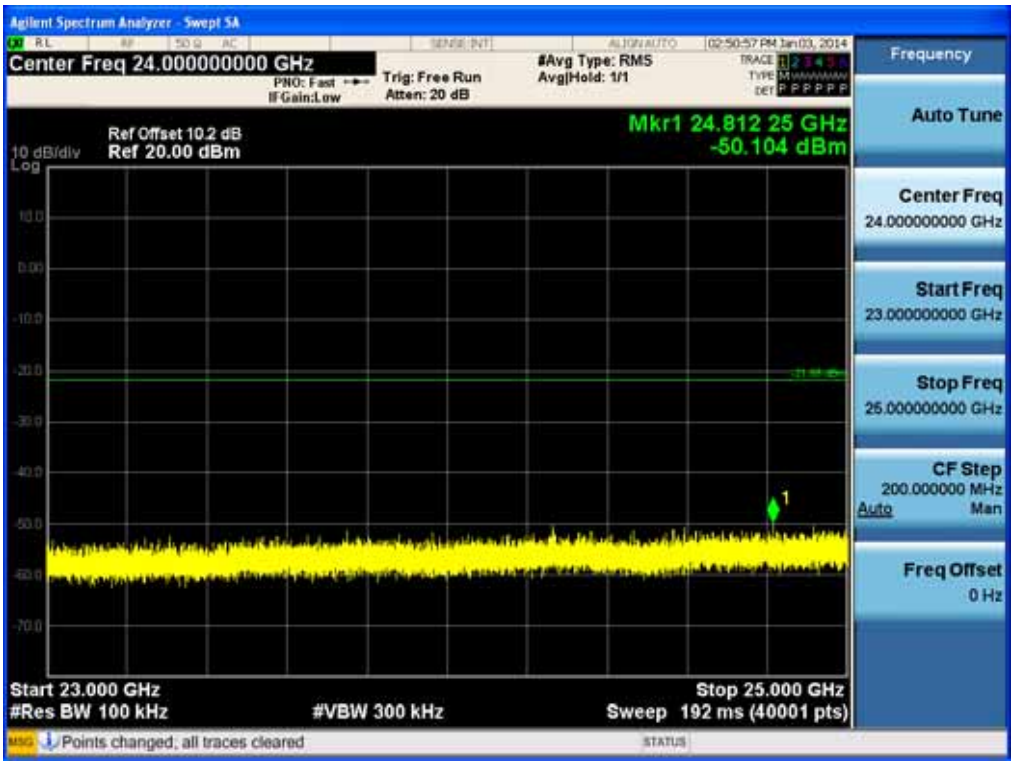
21 GHz ~ 23 GHz

Conducted Spurious Emission (802.11g_Ch.11_36 Mbps)



23 GHz ~ 25 GHz

Conducted Spurious Emission (802.11g_Ch.11_36 Mbps)



8.6 RADIATED MEASUREMENT.

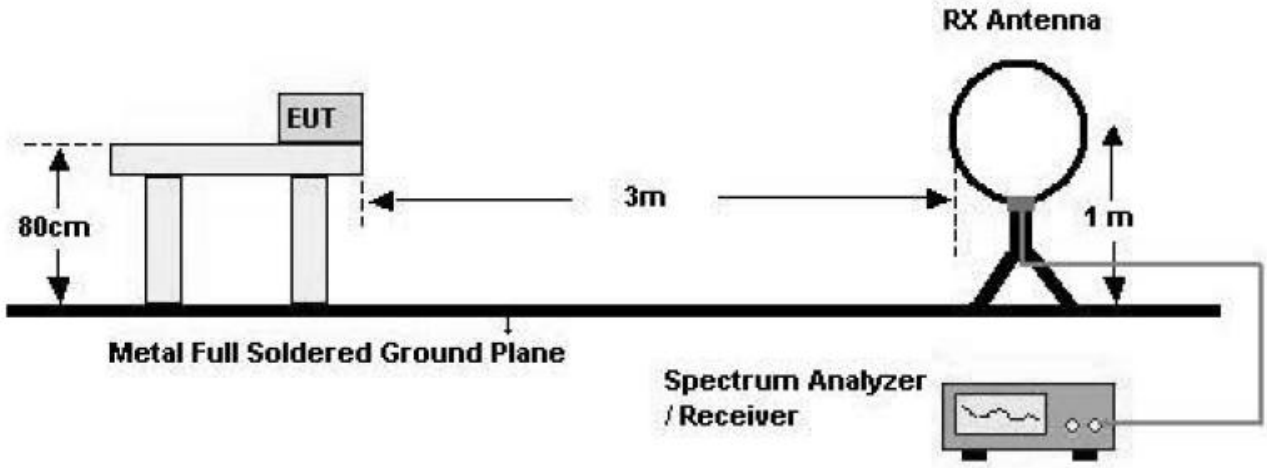
8.6.1 RADIATED SPURIOUS EMISSIONS.

Test Requirements and limit, §15.205, §15.209

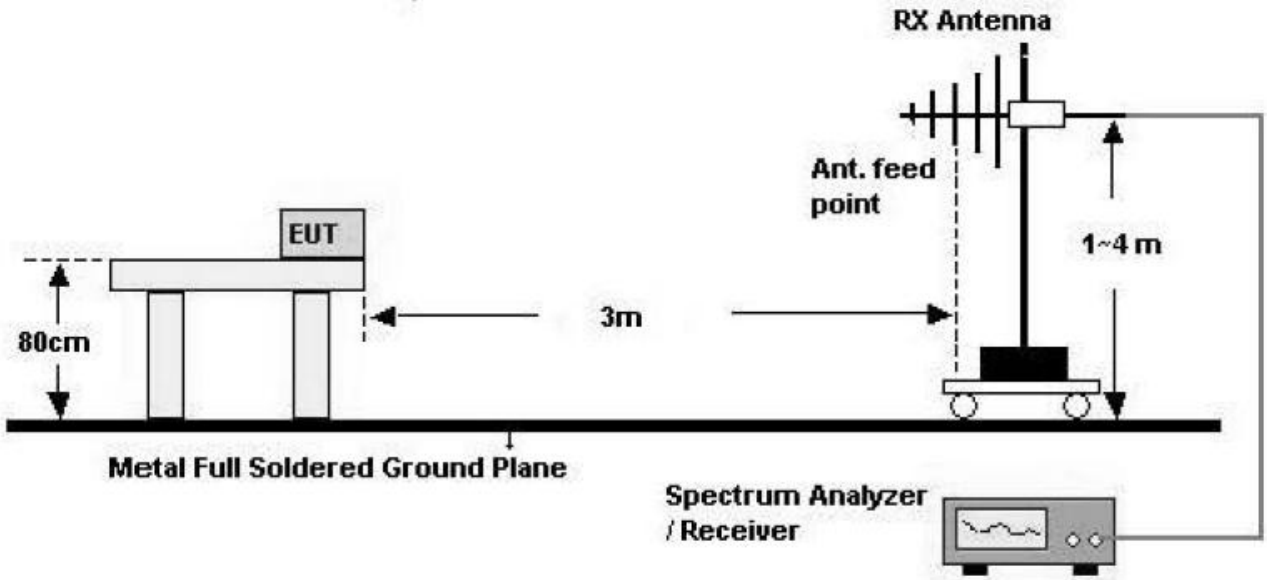
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

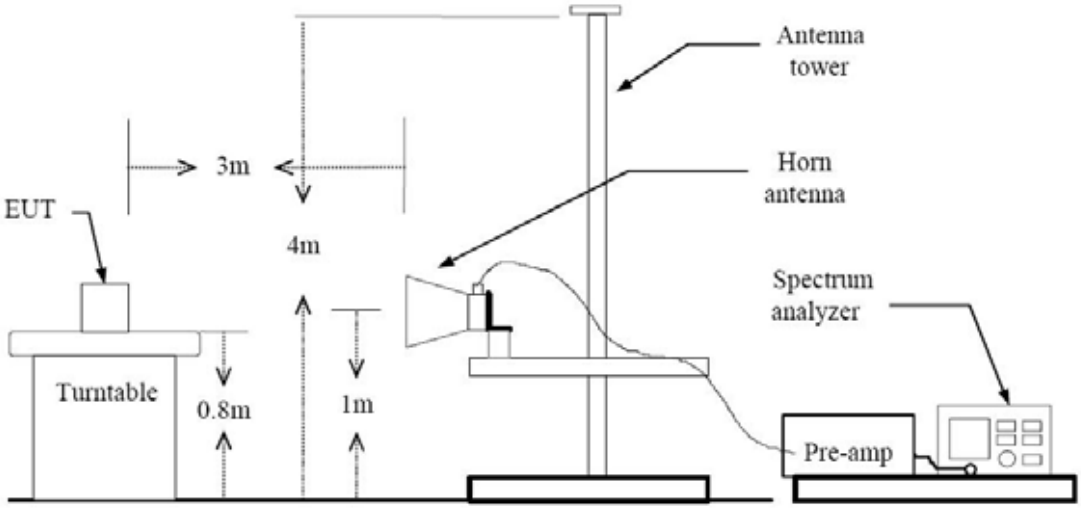
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



TEST PROCEDURE USED

ANSI C63.4(2003)

Method 12.2.4 in KDB 558074, issued 04/09/2013 (Peak)

Method 12.2.5.1 in KDB 558074, issued 04/09/2013(Average Case 1)

Method 12.2.5.3 in KDB 558074, issued 04/09/2013(Average Case 2)

Spectrum Setting

- Peak

Peak emission levels are measured by setting the instrument as follows:

RBW = cf. Table 1.

VBW ≥ 3 x RBW.

Detector = Peak.

Sweep time = auto.

Trace mode = max hold.

Allow sweeps to continue until the trace stabilizes.

(Note that the required measurement time may be longer for low duty cycle applications).

Table 1 —RBW as a function of frequency

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

- Average

Case 1

If the EUT can be configured or modified to transmit continuously (duty cycle ≥ 98 percent then the average emission levels shall be measured using the following method (with EUT transmitting continuously).

RBW = 1 MHz (unless otherwise specified).

VBW ≥3 x RBW.

Detector = RMS, if span/(# of points in sweep) ≤ (RBW/2). Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.

Averaging type = power (i.e., RMS).

1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
2) Some instruments require linear display mode in order to use linear voltage averaging. Log or dB averaging shall not be used.

Sweep time = auto.

Perform a trace average of at least 100 traces.

Case 2

If continuous transmission of the EUT (i.e., duty cycle ≥ 98 percent) cannot be achieved and the duty cycle is not constant (i.e., duty cycle variations exceed ± 2 percent), then the following procedure shall be used:

Set RBW = 1 MHz.

Set VBW ≥ 1/T.

Video bandwidth mode or display mode

1) The instrument shall be set to ensure that video filtering is applied in the power domain. Typically, this requires setting the detector mode to RMS and setting the Average-VBW Type to Power (RMS).
2) As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to “Voltage” regardless of the display mode.

Detector = Peak.

Sweep time = auto.

Trace mode = max hold.

Allow max hold to run for at least 50 times (1/duty cycle) traces.

Note :

1. We used the case 1 for 802.11b mode and the case 2 for 802.11g/n to perform the average filed strength measurements for RSE and radiated band edge test.
2. The actual setting value of VBW for 802.11g/n

Mode	Worst Data rate (Mbps)	T_{on} (ms)	T_{total} (ms)	Duty Cycle (%)	VBW(1/T) (Hz)	The actual setting value of VBW (Hz)
g	6	2.025	2.130	95.07	494	1000
n	6.5	1.875	1.980	94.70	533	1000

TEST RESULTS

9 kHz – 30MHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
㎒	dBμV	dB /m	dB	(H/V)	dBμV/m	dBμV/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.

TEST RESULTS

Below 1 GHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
㎒	dBμV	dB /m	dB	(H/V)	dBμV/m	dBμV/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

Operation Mode:	802.11 b
Transfer Rate:	1 Mbps
Operating Frequency	2412
Channel No.	01 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4824	54.69	-4.25	V	50.44	73.98	23.54	PK
4824	46.22	-4.25	V	41.97	53.98	12.01	AV
7236	52.85	5.21	V	58.06	73.98	15.92	PK
7236	41.35	5.21	V	46.56	53.98	7.42	AV
4824	55.14	-4.25	H	50.89	73.98	23.09	PK
4824	47.17	-4.25	H	42.92	53.98	11.06	AV
7236	52.87	5.21	H	58.08	73.98	15.90	PK
7236	41.36	5.21	H	46.57	53.98	7.41	AV

Operation Mode:	802.11 g
Transfer Rate:	6 Mbps
Operating Frequency	2412
Channel No.	01 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4824	53.21	-4.25	V	48.96	73.98	25.02	PK
4824	39.45	-4.25	V	35.20	53.98	18.78	AV
7236	52.80	5.21	V	58.01	73.98	15.97	PK
7236	39.39	5.21	V	44.60	53.98	9.38	AV
4824	53.24	-4.25	H	48.99	73.98	24.99	PK
4824	39.46	-4.25	H	35.21	53.98	18.77	AV
7236	52.84	5.21	H	58.05	73.98	15.93	PK
7236	39.41	5.21	H	44.62	53.98	9.36	AV

Operation Mode:	802.11 n
Transfer Rate:	6.5 Mbps
Operating Frequency	2412
Channel No.	01 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4824	52.71	-4.25	V	48.46	73.98	25.52	PK
4824	39.31	-4.25	V	35.06	53.98	18.92	AV
7236	52.90	5.21	V	58.11	73.98	15.87	PK
7236	39.43	5.21	V	44.64	53.98	9.34	AV
4824	52.72	-4.25	H	48.47	73.98	25.51	PK
4824	39.33	-4.25	H	35.08	53.98	18.90	AV
7236	52.94	5.21	H	58.15	73.98	15.83	PK
7236	39.45	5.21	H	44.66	53.98	9.32	AV

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
5. We have done 802.11b/g/n mode and all data rate. Worst data rate is the lowest data of each mode.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Operation Mode: 802.11 b

Transfer Rate: 1 Mbps

Operating Frequency 2437

Channel No. 06 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4874	53.24	-3.93	V	49.31	73.98	24.67	PK
4874	43.48	-3.93	V	39.55	53.98	14.43	AV
7311	53.12	4.97	V	58.09	73.98	15.89	PK
7311	41.38	4.97	V	46.35	53.98	7.63	AV
4874	53.65	-3.93	H	49.72	73.98	24.26	PK
4874	44.34	-3.93	H	40.41	53.98	13.57	AV
7311	53.14	4.97	H	58.11	73.98	15.87	PK
7311	41.38	4.97	H	46.35	53.98	7.63	AV

Operation Mode: 802.11 g

Transfer Rate: 6 Mbps

Operating Frequency 2437

Channel No. 06 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4874	52.61	-3.93	V	48.68	73.98	25.30	PK
4874	38.73	-3.93	V	34.80	53.98	19.18	AV
7311	52.86	4.97	V	57.83	73.98	16.15	PK
7311	39.41	4.97	V	44.38	53.98	9.60	AV
4874	52.64	-3.93	H	48.71	73.98	25.27	PK
4874	38.74	-3.93	H	34.81	53.98	19.17	AV
7311	52.87	4.97	H	57.84	73.98	16.14	PK
7311	39.42	4.97	H	44.39	53.98	9.59	AV

Operation Mode:	802.11 n
Transfer Rate:	6.5 Mbps
Operating Frequency	2437
Channel No.	06 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4874	51.94	-3.93	V	48.01	73.98	25.97	PK
4874	38.62	-3.93	V	34.69	53.98	19.29	AV
7311	53.24	4.97	V	58.21	73.98	15.77	PK
7311	39.33	4.97	V	44.30	53.98	9.68	AV
4874	51.96	-3.93	H	48.03	73.98	25.95	PK
4874	38.63	-3.93	H	34.70	53.98	19.28	AV
7311	53.26	4.97	H	58.23	73.98	15.75	PK
7311	39.34	4.97	H	44.31	53.98	9.67	AV

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
5. We have done 802.11b/g/n mode and all data rate. Worst data rate is the lowest data of each mode.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Operation Mode: 802.11 b

Transfer Rate: 1 Mbps

Operating Frequency 2462

Channel No. 11 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4924	52.89	-3.75	V	49.14	73.98	24.84	PK
4924	43.92	-3.75	V	40.17	53.98	13.81	AV
7386	52.81	5.60	V	58.41	73.98	15.57	PK
7386	41.32	5.60	V	46.92	53.98	7.06	AV
4924	53.31	-3.75	H	49.56	73.98	24.42	PK
4924	44.87	-3.75	H	41.12	53.98	12.86	AV
7386	52.83	5.60	H	58.43	73.98	15.55	PK
7386	41.33	5.60	H	46.93	53.98	7.05	AV

Operation Mode: 802.11 g

Transfer Rate: 6 Mbps

Operating Frequency 2462

Channel No. 11 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4924	52.00	-3.75	V	48.25	73.98	25.73	PK
4924	38.14	-3.75	V	34.39	53.98	19.59	AV
7386	52.62	5.60	V	58.22	73.98	15.76	PK
7386	39.33	5.60	V	44.93	53.98	9.05	AV
4924	52.04	-3.75	H	48.29	73.98	25.69	PK
4924	38.16	-3.75	H	34.41	53.98	19.57	AV
7386	52.66	5.60	H	58.26	73.98	15.72	PK
7386	39.35	5.60	H	44.95	53.98	9.03	AV

Operation Mode:	802.11 n
Transfer Rate:	6.5 Mbps
Operating Frequency	2462
Channel No.	11 Ch

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4924	51.46	-3.75	V	47.71	73.98	26.27	PK
4924	38.03	-3.75	V	34.28	53.98	19.70	AV
7386	53.11	5.60	V	58.71	73.98	15.27	PK
7386	39.32	5.60	V	44.92	53.98	9.06	AV
4924	51.48	-3.75	H	47.73	73.98	26.25	PK
4924	38.06	-3.75	H	34.31	53.98	19.67	AV
7386	53.13	5.60	H	58.73	73.98	15.25	PK
7386	39.33	5.60	H	44.93	53.98	9.05	AV

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
5. We have done 802.11b/g/n mode and all data rate. Worst data rate is the lowest data of each mode.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

8.6.2 RADIATED RESTRICTED BAND EDGES

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)).

Operation Mode:	802.11g
Transfer Rate:	6 Mbps
Operating Frequency	2412 MHz, 2462 MHz
Channel No.	01 Ch, 11 Ch

Frequency [MHz]	Reading dBuV	AN.+CL [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2390.0	26.91	33.90	H	60.81	73.98	13.17	PK
2390.0	12.78	33.90	H	46.68	53.98	7.30	AV
2390.0	26.87	33.90	V	60.77	73.98	13.21	PK
2390.0	12.77	33.90	V	46.67	53.98	7.31	AV
2483.5	28.71	33.99	H	62.70	73.98	11.28	PK
2483.5	12.92	33.99	H	46.91	53.98	7.07	AV
2483.5	28.52	33.99	V	62.51	73.98	11.47	PK
2483.5	12.48	33.99	V	46.47	53.98	7.51	AV

Operation Mode:	802.11b
Transfer Rate:	1 Mbps
Operating Frequency	2412 MHz, 2462 MHz
Channel No.	01 Ch, 11 Ch

Frequency [MHz]	Reading dBuV	AN.+CL [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2390.0	25.57	33.90	H	59.47	73.98	14.51	PK
2390.0	14.45	33.90	H	48.35	53.98	5.63	AV
2390.0	25.51	33.90	V	59.41	73.98	14.57	PK
2390.0	14.42	33.90	V	48.32	53.98	5.66	AV
2483.5	25.51	33.99	H	59.50	73.98	14.48	PK
2483.5	14.52	33.99	H	48.51	53.98	5.47	AV
2483.5	25.45	33.99	V	59.44	73.98	14.54	PK
2483.5	14.38	33.99	V	48.37	53.98	5.61	AV

Operation Mode:	802.11n
Transfer Rate:	6.5 Mbps
Operating Frequency	2412 MHz, 2462 MHz
Channel No.	01 Ch, 11 Ch

Frequency [MHz]	Reading dBuV	AN.+CL [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2390.0	27.17	33.90	H	61.07	73.98	12.91	PK
2390.0	12.99	33.90	H	46.89	53.98	7.09	AV
2390.0	27.15	33.90	V	61.05	73.98	12.93	PK
2390.0	12.97	33.90	V	46.87	53.98	7.11	AV
2483.5	30.43	33.99	H	64.42	73.98	9.56	PK
2483.5	12.98	33.99	H	46.97	53.98	7.01	AV
2483.5	30.39	33.99	V	64.38	73.98	9.60	PK
2483.5	12.96	33.99	V	46.95	53.98	7.03	AV

Notes:

1. Total = Reading Value + Antenna Factor + Cable Loss
2. We have done 802.11b/g/n mode and all data rate. Worst data rate is the lowest data of each mode.
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

8.7 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 ground plane.
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.
5. We are performed the AC Power Line Conducted Emission test for 36 Mbps, Ch.11 and 802.11g. Because 802.11g mode is worst case.

▣ RESULT PLOTS

Conducted Emissions (Line 1)

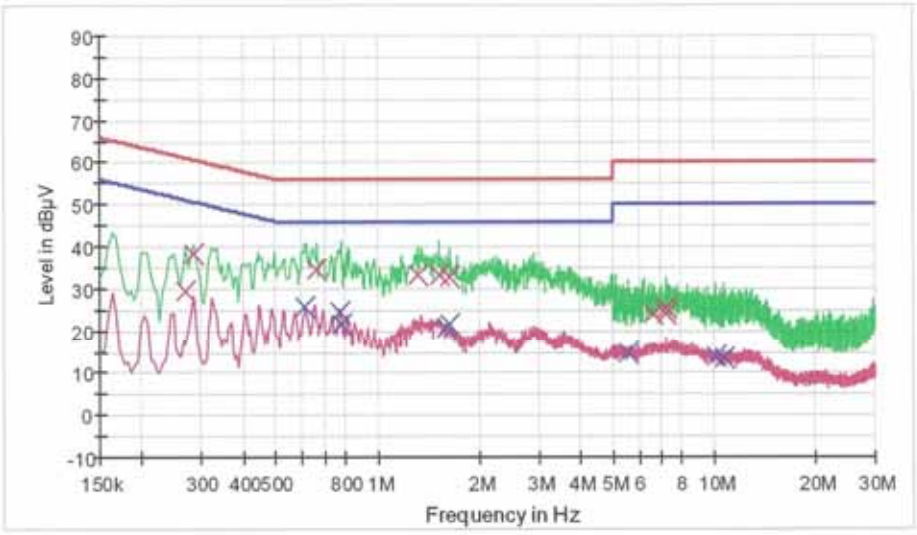
Test 1 / 2

HCT TEST Report

Common Information

EUT:	LG-D405
Manufacturer:	LG
Test Site:	SHIELD ROOM
Operating Conditions:	WLAN MODE
Operator Name:	JS LEE

FCC CLASS B



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.271500	29.3	9.000	On	L1	9.8	31.8	61.1
0.285000	38.5	9.000	On	L1	9.8	22.2	60.7
0.662000	34.5	9.000	On	L1	9.8	21.5	56.0
1.319000	33.3	9.000	On	L1	9.9	22.7	56.0
1.526000	33.4	9.000	On	L1	9.9	22.6	56.0
1.643000	33.1	9.000	On	L1	9.9	22.9	56.0
6.566000	23.9	9.000	On	L1	10.3	36.1	60.0
7.169000	24.1	9.000	On	L1	10.3	35.9	60.0
7.214000	25.2	9.000	On	L1	10.3	34.8	60.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.612500	25.7	9.000	On	L1	9.8	20.3	46.0
0.774500	24.6	9.000	On	L1	9.8	21.4	46.0
0.783500	21.4	9.000	On	L1	9.8	24.6	46.0

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Test 2 / 2

Frequency (MHz)	CAverage (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
1.602500	20.5	9.000	On	L1	9.9	25.5	46.0
1.638500	21.3	9.000	On	L1	9.9	24.7	46.0
5.553500	14.9	9.000	On	L1	10.2	35.1	50.0
10.130000	13.8	9.000	On	L1	10.5	36.2	50.0
10.724000	13.4	9.000	On	L1	10.5	36.6	50.0

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Conducted Emissions (Line 2)

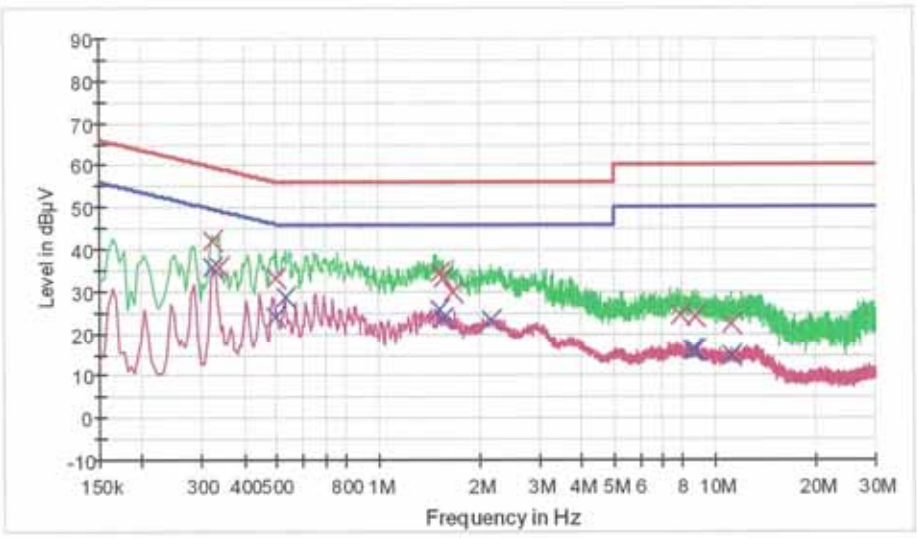
Test 1 / 2

HCT TEST Report

Common Information

EUT:	LG-D405
Manufacturer:	LG
Test Site:	SHIELD ROOM
Operating Conditions:	WLAN MODE
Operator Name:	JS LEE

FCC CLASS B



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.325500	41.9	9.000	On	N	10.0	17.7	59.6
0.339000	36.0	9.000	On	N	10.0	23.2	59.2
0.500000	33.3	9.000	On	N	10.0	22.7	56.0
1.530500	34.4	9.000	On	N	10.1	21.6	56.0
1.571000	33.1	9.000	On	N	10.1	22.9	56.0
1.674500	29.8	9.000	On	N	10.1	26.2	56.0
7.929500	24.5	9.000	On	N	10.6	35.5	60.0
8.757500	24.2	9.000	On	N	10.6	35.8	60.0
11.237000	22.5	9.000	On	N	10.8	37.5	60.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.325500	35.8	9.000	On	N	10.0	13.8	49.6
0.500000	24.2	9.000	On	N	10.0	21.8	46.0
0.531500	28.5	9.000	On	N	10.0	17.5	46.0

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Test 2 / 2

Frequency (MHz)	CAverage (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
1.526000	25.6	9.000	On	N	10.1	20.4	46.0
1.571000	23.8	9.000	On	N	10.1	22.2	46.0
2.160500	23.3	9.000	On	N	10.2	22.7	46.0
8.546000	15.9	9.000	On	N	10.6	34.1	50.0
8.757500	15.9	9.000	On	N	10.6	34.1	50.0
11.237000	14.8	9.000	On	N	10.8	35.2	50.0

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9. LIST OF TEST EQUIPMENT

Manufacturer	Model / Equipment	Calibration Interval	Calibration Due	Serial No.
Rohde & Schwarz	ENV216/ LISN	Annual	02/06/2014	100073
Schwarzbeck	VULB 9160/ TRILOG Antenna	Biennial	12/17/2014	3150
Rohde & Schwarz	ESI 40 / EMI TEST RECEIVER	Annual	04/16/2014	831564103
Agilent	E4440A/ Spectrum Analyzer	Annual	04/25/2014	US45303008
Agilent	N9020A/ SIGNAL ANALYZER	Annual	05/14/2014	MY51110063
HD	MA240/ Antenna Position Tower	N/A	N/A	556
EMCO	1050/ Turn Table	N/A	N/A	114
HD GmbH	HD 100/ Controller	N/A	N/A	13
Rohde & Schwarz	SCU-18/ Signal Conditioning Unit	Annual	09/10/2014	10094
CERNEX	CBL18265035 / POWER AMP	Annual	07/24/2014	22966
CERNEX	CBL26405040 / POWER AMP	Annual	04/16/2014	19660
Schwarzbeck	BBHA 9120D/ Horn Antenna	Biennial	07/05/2015	1151
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	Biennial	10/30/2014	BBHA9170124
Rohde & Schwarz	FSP / Spectrum Analyzer	Annual	02/08/2014	839117/011
Agilent	N1911A/Power Meter	Annual	01/22/2014	MY45100523
Agilent	N1921A /POWER SENSOR	Annual	07/11/2014	MY45241059
Wainwright Instrument	WHF3.0/18G-10EF / High Pass Filter	Annual	02/08/2014	F6
Wainwright Instrument	WHNX6.0/26.5G-6SS / High Pass Filter	Annual	04/16/2014	1
Wainwright Instrument	WHNX7.0/18G-8SS / High Pass Filter	Annual	04/16/2014	29
Wainwright Instrument	WRCJ2400/2483.5-2370/2520-60/14SS / Band Reject Filter	Annual	03/19/2014	1
Hewlett Packard	11636B/Power Divider	Annual	10/22/2014	11377
Agilent	87300B/Directional Coupler	Annual	12/18/2014	3116A03621
Hewlett Packard	11667B / Power Splitter	Annual	05/29/2014	05001
DIGITAL	EP-3010 /DC POWER SUPPLY	Annual	10/29/2014	3110117
ITECH	IT6720 / DC POWER SUPPLY	Annual	11/05/2014	010002156287001199
TESCOM	TC-3000C / BLUETOOTH TESTER	Annual	04/24/2014	3000C000276
Rohde & Schwarz	CBT / BLUETOOTH TESTER	Annual	04/25/2014	100422
Rohde & Schwarz	LOOP ANTENNA	Biennial	08/14/2014	100179
Agilent	8493C / Attenuator(10 dB)	Annual	07/24/2014	76649
WEINSCHEL	2-3 / Attenuator(3 dB)	Annual	10/28/2014	BR0617
CERNEX	CBL06185030 / POWER AMP	Annual	07/24/2014	22965
CERNEX	CBLU1183540 / POWER AMP	Annual	07/24/2014	22964