EXHIBIT 9

Section 2.1033 (b)(6) TEST REPORT

A report of measurements showing compliance with the pertinent FCC technical requirements. This report shall identify the test procedure used (e.g., specify the FCC test procedure, or industry test procedure that was used), the date the measurements were made, the location where the measurements were made, and the device that was tested (model and serial number, if available). The report shall include sample calculations showing how the measurement results were converted

Response

A test report for 5.8GHz UNII-3 is attached.

CERTIFICATION TEST REPORT OF FCC PART 15 SUBPART E

Applicant	Alcatel-Lucent, Inc.
FCC ID	AS5BBTRX-10A
Product Name	MetroCell Access Point Module
Model Name	9764 MCO Wi-Fi AP V1.0
Test Standard(s)	47 CFR FCC Part 15 Subpart E, Section 15.407
Test Frequency Range	5725-5825 MHz
Test Date	February 22 – November 14, 2013
Submission Type	Original Equipment
Operating Mode(s)	Master of U-NII Device
Test Report Number	2012-0268 FCC 5.8GHz UNII-3
Test Laboratory	Global Product Compliance Laboratory 600-700 Mountain Avenue Room 5B-108 Murray Hill, New Jersey 07974-0636 USA

Note: The test results documented in this report refer exclusively to the test model/sample specified, under the conditions and modes of operation as described herein. This report shall not be reproduced, in whole or in part without the approval of Alcatel-Lucent Global Product Compliance Laboratory. This report must not be used by the recipient to claim product endorsement by NVLAP or any other agency of the U.S. Government.

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1. ATTESTATION OF TEST RESULTS

Company Name	Alcatel-Lucent, Inc.
FCC ID	AS5BBTRX-10A
Product Name	MetroCell Access Point Module
Model Name	9764 MCO Wi-Fi AP V1.0
Serial Number	LBALLU-RT124600209 (Conducted) LBALLU-RT131980172 (conducted) LBALLU-RT131380091 (Frequency Stability) LBALLU-RT131980174 (Radiated) LBALLU-RT131980277 (Radiated)
Part No	3BK60912AAAB ICS01 REV 04 (Medium Gain) 3BK60926AAAB ICS01 REV 04 (High Gain)
Test Standard(s)	47 CFR FCC Part 15 Subpart E, Section 15.407
Reference(s)	• FCC Part 15 Subpart E §15.407 • FCC KDB 789033, Measurement Guidelines for U-NII Device Part 15 Subpart E, v01r03, April 8, 2013. • FCC KDB 662911D01, Emissions Testing of Transmitters with Multiple Outputs in the Same Band, 4/8/2013, v02
Test Frequency Range	5725-5825 MHz
Date Tested	February 22 – November 14, 2013
Operating Mode(s)	Master of U-NII Device
Test Laboratory	Global Product Compliance Laboratory Alcatel-Lucent USA, Inc 600-700 Mountain Avenue Room 5B-108 Murray Hill, New Jersey 07974-0636 USA

The above product has been evaluated and found to be in compliance with the Commission's Rules and Regulations set forth in the above standards. The data and the descriptions about the test setup, procedures and configuration presented in this report are accurate.

Note: Alcatel-Lucent Global Product Compliance Laboratory represents to the client that testing was done in accordance with standard procedures as applicable, and that reported test results are accurate within generally accepted commercial ranges of accuracy in accordance with the scope of our NVLAP Accreditation. Alcatel-Lucent Global Product Compliance reports only apply to the specific samples

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2. SUMMARY OF TEST RESULTS

Applied Standards: 47 CFR FCC Part Subpart E Section 15.407		
Section	**Description of Tests**	**Results In Compliance**
4.4	**Occupied Bandwidth**	**Yes**
4.5	**Maximum power output**	**Yes**
4.6	**Peak Power Spectrum Density**	**Yes**
4.7	**Peak Excursion**	**Yes**
4.8	**Unwanted Out-of-Band Emissions**	**Yes**
4.9	**Unwanted Radiated Emissions**	**Yes**
4.10	**Frequency Stability**	**Yes**
4.11	**AC Power Line Conducted Emissions**	**Yes**

3. GENERAL INFORMATION

3.1. Product Descriptions

Table 3.1.1 Product Specifications

Specification Items	Description
Product Type	WiFi (2Tx, 2Rx)
Radio Type	Intentional Transceiver
Power Type	5.3VDC through the 20 pin interface connector between MetroCell Base Station and Wifi AP
IEEE Specifications	802.11a and 11n for 20MHz and 802.11n for 40MHz.
Modulation	OFDM (BPSK, QPSK, 16QAM, 64QAM)
Data Rate (Mbps)	802.11a: 6Mpbs and 802.11n: MCS0 for 1S and MCS8 for 2S
Operating Frequency Range	5725 - 5825MHz
Channel Bandwidth	20/40MHz
Max Conducted Power	18dBm per chain and 21dBm total
Min Conducted Power	0dBm per chain and 3dBm total
Max EIRP Power	26dBm per chain and 29 dBm total
Min EIRP Power	-2dBm per chain and 1dBm total
Operating Mode	Master
Software Version (Master)	WiNG5.x
Hardware Version (Master)	9764 MCO Wi-Fi AP V1.0
Antenna	Refer to Section 3.3

3.2. Accessories

An Alcatel-Lucent WiFi test board TSC2028, which provide power conversion from -48VDC to 5VDC, was used for all required conducted testing at antenna ports. The 9764 Alcatel-Lucent 9764 LightRadio™ PCS MCO, a FCC certified small base station, was used in the radiated testing. The MCO Wi-Fi AP is a plug-in module and is installed on the bottom of the 9764 MCO for high-density hotspots. The WiFi AP gets its DC power supply from its interface connector with the MCO in real operation. The MCO is unmodified and is commercially available per FCC requirement given in 2.1033(b)(8).

3.3. Antenna Information

There are two different types of antenna modules equipped for this AP product: high-gain antenna module and medium-gain antenna module. Each antenna module consists of a 2.4GHz antenna and a 5GHz antenna. Each antenna has two built-in ports and two antenna elements where two antenna elements are connected to Tx/Rx Port 1 and Tx/Rx Port 2, respectively.

The information on antennas is provided below:

Table 3.3.1 Antenna Data from Manufactuerer

Ant	Model Name	Antenna Type	Tx/Rx Port	Gain		Freq	
				2.4 GHz	5 GHz	2.4 GHz	5 GHz
1	EMM00024-AC3	Embedded, IFA Elements on PCBA	Tx/Rx 1/2	3.5dBi (typical) and 3.7dBi (Max)	5.5dBi (typical) and 6.1dBi (Max)	2.4-2.5 GHz	4.9-5.875 GHz
2	EMM00043-AC3	Embedded MIMO Antenna Module, Dual Slant Dipole	Tx/Rx 1/2	5.7dBi (typical) and 5.8dBi (Max)	6.9dBi (typical) and 7.9dBi (Max)	2.4-2.5 GHz	5.1-5.875 GHz

The gain and beamwidth at azimuth and elevation 0° and 90° were measured for both antenna modules above at Port 1 and Port 2, respectively. The 3D maximum antenna gains for each antenna at Port 1 and Port 2 were thus verified as below.

The above antennas #1 and #2 are referred as “Medium Gain Antenna” and “High Gain Antenna” in this report, respectively.

Table 3.3.2 Measured Antenna Data

Antenna	Model	Ant Input Impedance	Measured Max Gain (dBi)	
			Port 1	Port 2
1	EMM00024-AC3 (Medium Gain)	50 Ω	6.33	5.84
2	EMM00043-AC3 (High Gain)	50 Ω	7.84	8.24

The compliance with the EUT equipped with both antennas were evaluated.

The antenna gains were measured in a 4m x 4m x 4m full anechoic chamber with a vector network analyzer at Laird Technologies, the vendor of the antenna. The full anechoic chamber has 23 probes, spaced at 15º in elevation, with an internal arch diameter of 2.4 meters.

4. REQUIRED MEASUREMENTS AND RESULTS

4.1. Regulatory Requirements

The tests in this report were performed for Unlicensed-National Information Infrastructure Devices Operating in the 5725-5825 MHz Bands in accordance with FCC CFR 47 Part 15 Subpart E, FCC KDB 789033, Measurement Guidelines for U-NII Device Part 15 Subpart E, v01r03, April 8, 2013 and FCC KDB 662911D01, Emissions Testing of Transmitters with Multiple Outputs in the Same Band, 5/28/2013, v02.

The FCC CFR 47 Section 15.407 specified the requirements for power output, power spectrum density, peak excursion, undesirable emissions in restricted and non-restricted spectrum, and frequency stability:

(1) Power and Power Spectrum Density Limits (FCC 15.407 (a)(3)).

For UNII devices operating in the 5725-5825 MHz band, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 1W or 17 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 17 dBm in any 1 MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) Peak Excursion Limit (FCC 15.407 (a)(6)).

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1MHz bandwidth or the emission bandwidth whichever is less.

(3) Undesirable Emission Limits (FCC 15.407 (b)(4)).

The peak emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

> For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz.

(4) Unwanted Emission Limits (FCC 15.407 (b)(6, 7)).

The unwanted emissions below 1 GHz must comply with the general field strength limits set forth in 15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in 15.207.

The provisions of 15.205 apply to intentional radiators operating in UNII-3 band.

(5) Frequency Stability (FCC 15.407 (g)).

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

4.2. UNII-3 Band Carrier Frequencies

Table 4.2.1 5.8GHz UNII-3 Frequency Channel Plan (5725 -5825MHz)

Channel No.	Freq (MHz)	Channel Bandwidth
149	5745	20MHz
153	5765	
157	5785	
161	5805	
151 (149+, 153-)	5755 (5745, 5765)	40MHz
159 (157+, 161-)	5795 (5785, 5805)	

Table 4.2.2 5.8GHz UNII-3 Channels Used for Testing

Channel No.	Freq (MHz)	Channel Bandwidth
149	5745	20MHz
153	5765	
161	5805	
151 (149+, 153-)	5755 (5745, 5765)	40MHz
159 (157+, 161-)	5795 (5785, 5805)	

4.3. Test Configurations and Setup

All measurements were performed with the EUT transmitting at continuous transmission with at least 98% duty cycle at the maximum power control level.

All signal types, modulation types and bandwidth modes were evaluated for both conducted and radiated testing:

Table 4.3.1 Configurations and Power Levels Tested For 5.8GHz UNII-3
20MHz Carrier Bandwidth

Mode	Modulation	Data Rate (Mbps)	N_{ss}	Power Setting for Medium Gain Antenna (dBm)	Power Setting for High Gain Antenna (dBm)
.11a - 2Tx	OFDM/CDD	6	1	18	18
HT20-2Tx-1S	OFDM/CDD	MCS0	1	18	18
HT20-2Tx-2S	OFDM/SM	MCS8	2	18	18

Table 4.3.2 Configurations and Power Levels Tested For 5.8GHz UNII-3
40MHz Carrier Bandwidth

Mode	Modulation	Data Rate (Mbps)	N_{ss}	Power Setting for Medium Gain Antenna (dBm)	Power Setting for High Gain Antenna (dBm)
HT40-2Tx-1S	OFDM/CDD	MCS0	1	18	18 (151)/17(159)
HT40-2Tx-2S	OFDM/SM	MCS8	2	18	18 (151)/17(159)

From the Tables 4.3.1 and 4.3.2, it can seen that the highest power level settings for both medium gain antenna and high gain antenna are same for most of channels. For the channels which have the same power levels for both medium gain and high gain antennas, only one set of measurement was performed and the limits for high gain antenna which give lower limits were used for the required measurements.

The test setup diagrams are given below.

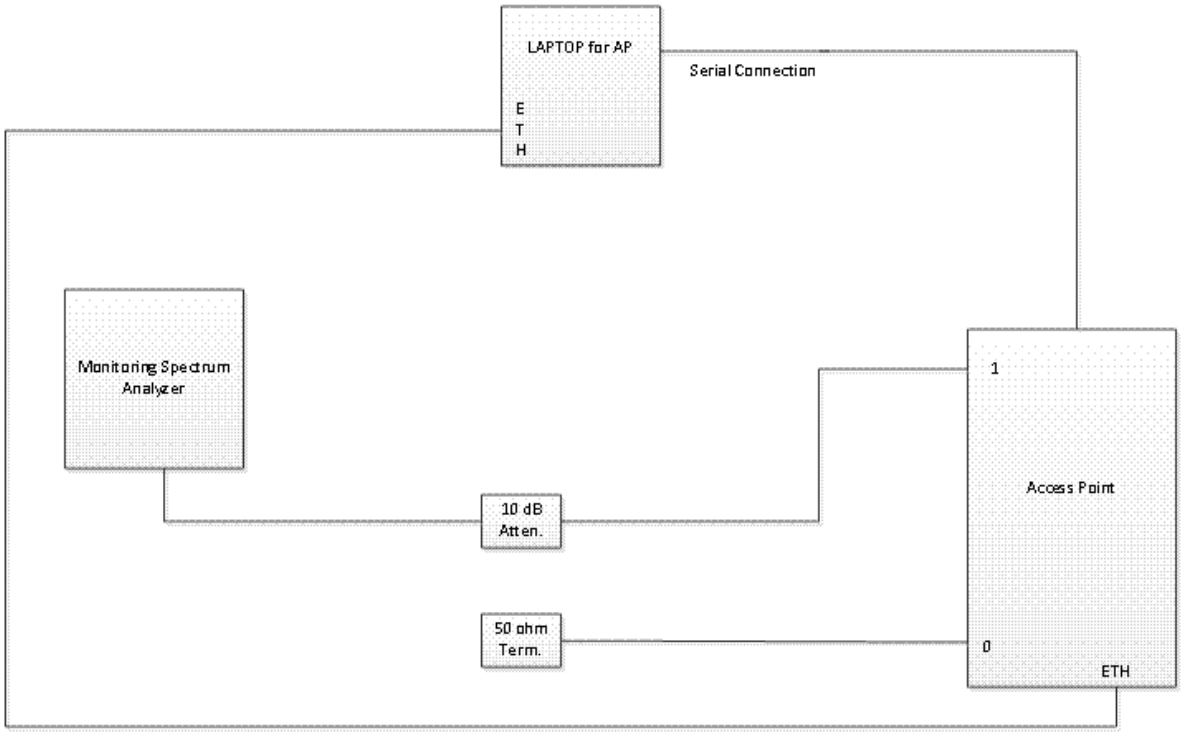


Figure 4.3.1 Setup Diagram of Conducted Test

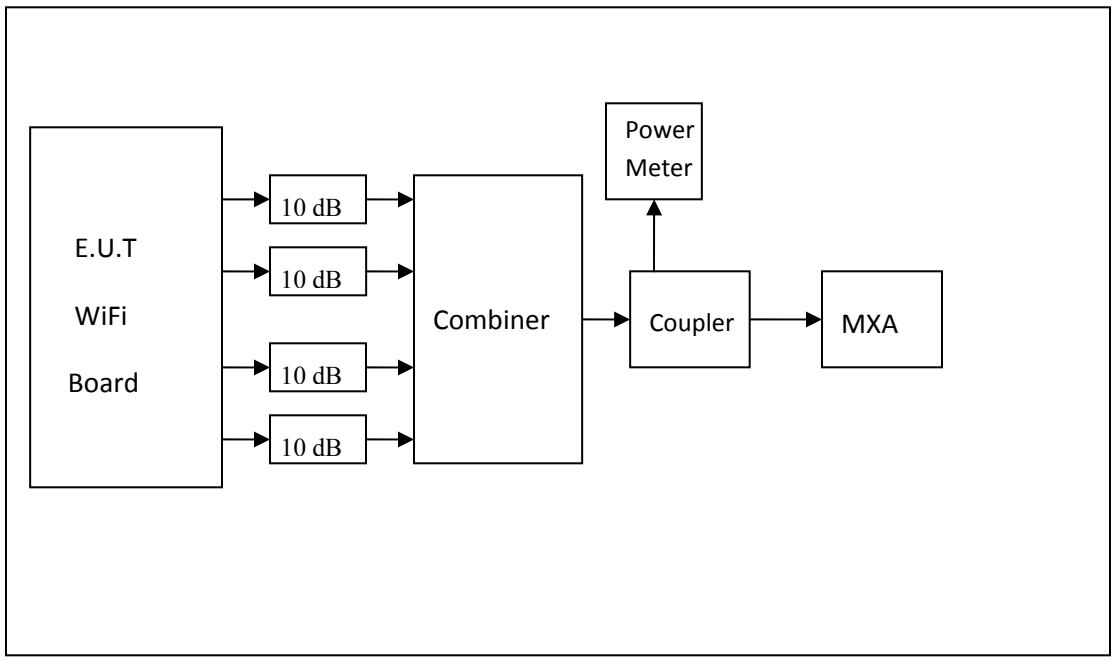


Figure 4.3.2 The Setup Diagram of Frequency Stability Test (Only WiFi Board Is Installed Inside the Chamber)

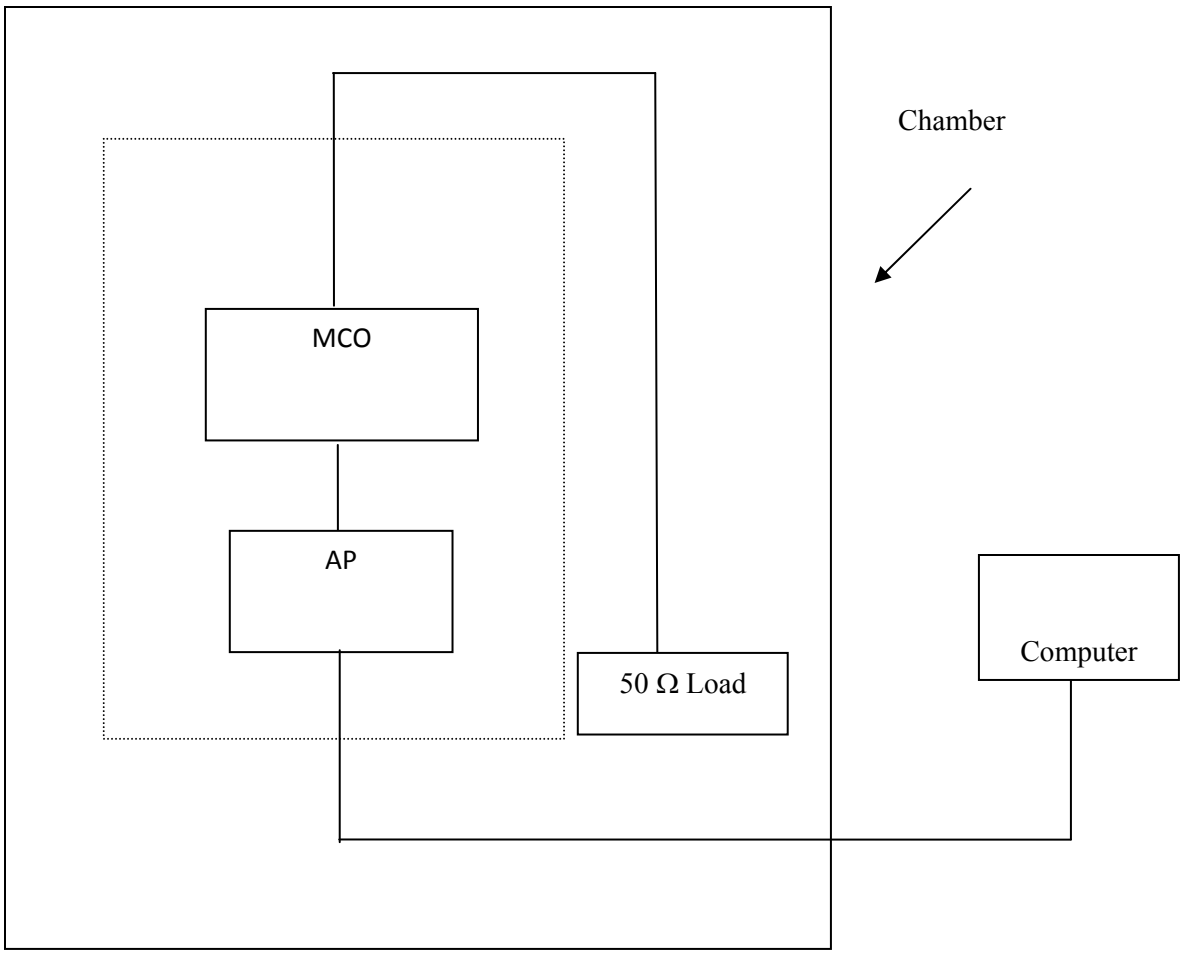


Figure 4.3.3 Setup Diagram of Radiated Test

4.4. MEASUREMENT REQUIRED: OCCUPIED BANDWIDTH – FCC SECTION 15.407 (a)(3)

The 26dB emissions bandwidth was measured at the both antenna ports with the configurations and power levels given in Tables 4.3.1 and 4.3.2 for all channels listed in Table 4.2.2 unless specified in the results. The measurement follows the procedures given in KDB 789033. The automatic bandwidth measurement function of the spectrum analyzer was utilized where the resolution bandwidth (RBW) is initially set to 1% of the bandwidth, that is 200kHz for 20MHz and 400kHz for 40MHz, the video bandwidth (VBW) was set to 1MHz, and the peak detector with maximum hold and auto sweep was used. The RBW might be readjusted as needed until the RBW/EBW ration is approximately 1%

For UNII-3, the 26dB emissions bandwidth measured was in the range of 21.20-31.48 MHz for 20MHz carriers and 42.76-49.96 MHz for 40MHz carriers with the power setting of 18dBm per port. The measured results are tabluated below. Four plots which have the smallest and widest emissions bandwidth at two ports are provided below.

Table 4.4.1 26dB Emissions Bandwidth for 5.8GHz UNII-3 20MHz Carrier (18dBm/Port)

Ch No/ Freq (MHz)	Mode	Modulation	Data Rate (Mbps)	Port 1 (MHz)	Port 2 (MHz)
149/5745	.11a - 2Tx	OFDM/CDD	6	22.07	31.48
	HT20-2Tx-1S	OFDM/CDD	MCS0	23.02	30.19
	HT20-2Tx-2S	OFDM/SM	MCS8	21.35	26.19
153/5765	.11a - 2Tx	OFDM/CDD	6	22.64	28.13
	HT20-2Tx-1S	OFDM/CDD	MCS0	22.10	28.87
	HT20-2Tx-2S	OFDM/SM	MCS8	21.29	24.24
161/5805	.11a - 2Tx	OFDM/CDD	6	22.05	25.01
	HT20-2Tx-1S	OFDM/CDD	MCS0	22.36	24.87
	HT20-2Tx-2S	OFDM/SM	MCS8	21.20	22.00

Table 4.4.2 26dB Emissions Bandwidth for 5.8GHz UNII-3 40MHz Carrier (18dBm/Port)

Ch No (Pri, Sec)/ Freq (MHz)	Mode	Modulation	Data Rate (Mbps)	Port 1 (MHz)	Port 2 (MHz)
151 (149+, 153-)/ 5755 (5745, 5765)	HT40-2Tx-1S	OFDM/CDD	MCS0	46.13	49.96
	HT40-2Tx-2S	OFDM/SM	MCS8	43.55	49.50
159 (157+, 161-)/ 5795 (5785, 5805)	HT40-2Tx-1S	OFDM/CDD	MCS0	45.93	47.55
	HT40-2Tx-2S	OFDM/SM	MCS8	42.79	44.54

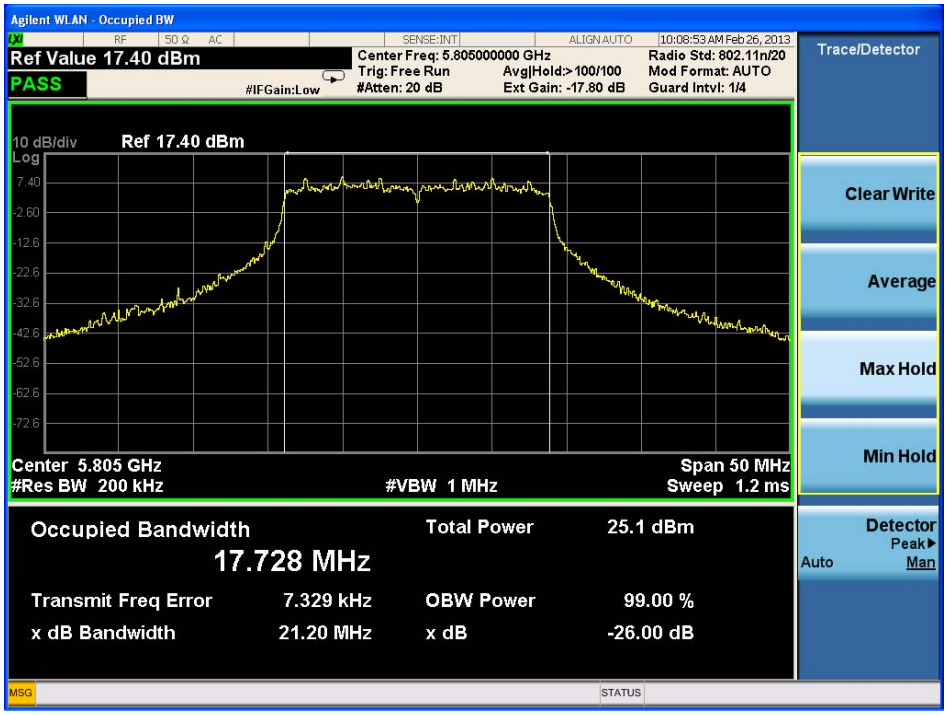


Figure 4.4.1 The Minimum 26dB Emission Bandwidth Measured (21.20MHz) for 802.11n (20 MHz-2TX-2S) Carrier at Ch 161/5805MHz, 18dBm, OFDM/SM, MCS8, Port 1.

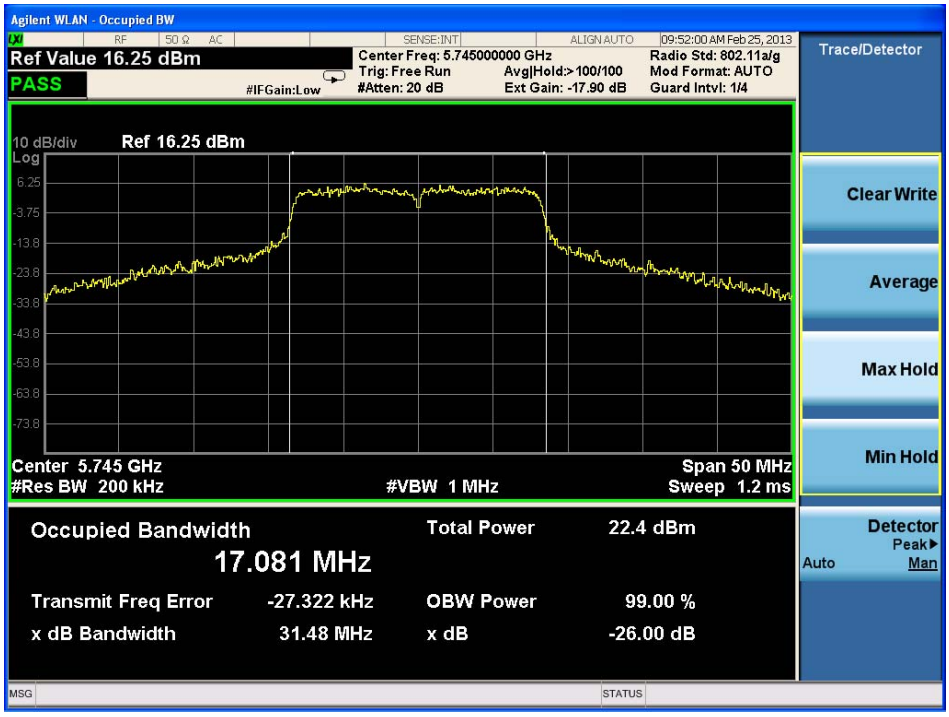


Figure 4.4.2 The Maximum 26dB Emission Bandwidth Measured (31.48MHz) for 802.11a (20MHz-2Tx) Carrier at Ch 149/5745MHz, 18dBm, OFDM/CDD, 6 Mbps, Port 2.

Figure 4.4.3 The Minimum 26dB Emission Bandwidth Measured (42.79MHz) for 802.11n (HT40-2Tx-2S) Carrier at Ch 159/5795MHz, 18dBm, OFDM/SM, MCS8, Port 1.

Figure 4.4.4 The Maximum 26dB Emission Bandwidth Measured (49.96MHz) for 802.11n (HT40-2Tx-1S) Carrier at Ch 151/5755MHz, 18dBm, OFDM/CDD, MCS0, Port 2.

Results:

The minimum 26dB emissions bandwidth of the EUT measured at its antenna transmitting terminals across the UNII-3 band for all operation modes with 18dBm per port are a) 21.2MHz for 20MHz carriers and 42.76MHz for 40MHz carriers, respectively. The maximum 26dB emissions bandwidth of the EUT measured at its antenna transmitting terminals across the UNII-3 band for all operation modes at 18dBm per port are a) 31.48 MHz for 20MHz carriers and 49.96 MHz for 40MHz carriers, respectively. The results and measurements are in full compliance with the Rules of the Commission.

4.5. MEASUREMENT REQUIRED: MAXIMUM POWER OUTPUT – FCC SECTION 15.407 (a)(3)(4)

The maximum output power was measured at the both antenna ports with the configurations and power levels given in Tables 4.3.1 and 4.3.2 for all channels listed in Table 4.2.2. The measurement follows the procedures given in KDB 789033.

The limit is Min {1W (30dBm), 17dBm+10Log B} where B is 26 dB emission bandwidth. The maximum conducted output power shall be reduced by the amount in dB that the antenna gain exceeds 6 dBi.

The minimum 26dB emission bandwidth measured is 21.2MHz for 20MHz carriers and 42.76MHz for 40MHz carriers. Therefore, the power limit is 30dBm before the antenna gain reduction.

For multiple antennas with equal transmit power but unequal gains, per KDB 662911 D01 v02, the directional antenna gain of uncorrelated signals is equal to

$$\text{Directional Gain} = 10\log\left[\frac{10^{\frac{G1}{10}}+10^{\frac{G2}{10}}+\cdots+10^{\frac{GN}{10}}}{N_{ANT}}\right] dBi, \qquad \text{and}$$

the direntional antenna gain of correlated signals is equal to

$$\text{Directional Gain} = 10\log\left[\frac{\left(10^{G_1/20}+10^{G_2/20}+\ldots..+10^{G_N/20}\right)^2}{N_{ANT}}\right] dBi,$$

where G_1, G_2 ..., G_N are antenna gains.

For the spatial mulplexing (SM) trasnmissions of 802.11n MCS8-15, the EUT operates with two uncorrelated spatial data streams on two transmitting ports. Therefore the Array Gain 10 *log* (N_{ANT}/N_{SS}) = 0 in calculating the directional antenna gain.

For Cyclic Delay Diversity (CDD) transmissions, per KDB 662911 D01 v02 for 802.11 devices, the directional antenna gain may be calculated by using either of the following methods:

i. Directional Gain = Max{ G_1, G_2 ..., G_N} + Array Gain
   a. For power measurements, Array Gain = 0 if $N_{ANT} \leq 4$;
   b. For power sepctrum density (PSD) measurement, Array Gain = 10 *log* (N_{ANT}/N_{SS}) dB, where N_{ss} is number of spatial streams and N_{ss} = 1 was suggested by the FCC for calculating the worst directional gain.

ii. Calculate the directional gain by using the formula for correlated signals provided above.

For the power limit, the directional antenna gain for CDD set equal to the gain of the antenna having the highest gain and the directional antenna gain for SM was calculated by using the equation above for uncorrelated signals. The calculated limits for the combined maximum transmitting power and PSD are tabulated below.

Table 4.5.1. Maximum Total Transmitting Power and PSD Limits at Antenna Ports for 5.8GHz Medium Gain Antennas

Mode	Modulation	Data Rate (Mbps)	N_{ss}	Directional Gain for Spectral Density (dBi)	Directional Gain for Total Power (dBi)	Total SD (dBm/MHz)	Total Power (dBm)
.11a - 2Tx	OFDM/CDD	6	1	9.10	6.33	13.90	29.67
HT20-2Tx-1S	OFDM/CDD	MCS0	1	9.10	6.33	13.90	29.67
HT20-2Tx-2S	OFDM/SM	MCS8	2	6.09	6.09	16.91	29.91
HT40-2Tx-1S	OFDM/CDD	MCS0	1	9.10	6/33	13.90	29.67
HT40-2Tx-2S	OFDM/SM	MCS8	2	6.09	6.09	16.91	29.91

Table 4.5.2. Maximum Total Transmitting Power and PSD Limits at Antenna Ports for 5.8GHz High Gain Antennas

Mode	Modulation	Data Rate (Mbps)	N_{ss}	Directional Gain for PSD (dBi)	Directional Gain for Total Power (dBi)	Total PSD (dBm/MHz)	Total Power (dBm)
.11a - 2Tx	OFDM/CDD	6	1	11.05	8.24	11.95	27.76
HT20-2Tx-1S	OFDM/CDD	MCS0	1	11.05	8.24	11.95	27.76
HT20-2Tx-2S	OFDM/SM	MCS8	2	8.04	8.04	14.96	27.96
HT40-2Tx-1S	OFDM/CDD	MCS0	1	11.05	8.24	11.95	27.76
HT40-2Tx-2S	OFDM/SM	MCS8	2	8.04	8.04	14.96	27.96

The output power was first verified by a Power Meter and then measured by a spectrum analyzer. The RBW and VBW were set to 1MHz and 3MHz, respectively. The RMS detector and trace average were used. The output power was calculated by integrating the spectrum across the 26 dB BW of the carrier using the spectrum analyzer's band power measurement function with band limits set equal to the 26dB BW band edges. The total combined output power is calculated by summing the measured output power in mW at the various antenna ports.

For UNII-3 band, the maximum total output power measured among all operation modes supported for was 20.15dBm for 20MHz carriers and 18.81dBm for 40MHz carriers. They are all below the FCC required limits. They are all below the FCC required limits.

The measurement results and the plots which have maximum total ouput power for both 20MHz and 40MHz carriers are provided below.

Table 4.5.3 Maximum Mean Combined RF Power Output at Antenna Ports for 5.8GHz UNII-3 20MHz Carrier for High Gain Antenna (18dBm/port)

Ch No/ Freq (MHz)	Mode	Modulation	Data Rate (Mbps)	Total Power Limit (dBm)	Total Power (dBm)
149 /5745	.11a - 2Tx	OFDM/CDD	6	27.76	18.97
	HT20-2Tx-1S	OFDM/CDD	MCS0	27.76	18.81
	HT20-2Tx-2S	OFDM/SM	MCS8	27.96	18.73
153 /5765	.11a - 2Tx	OFDM/CDD	6	27.76	19.22
	HT20-2Tx-1S	OFDM/CDD	MCS0	27.76	19.13
	HT20-2Tx-2S	OFDM/SM	MCS8	27.96	19.13
161 /5805	.11a - 2Tx	OFDM/CDD	6	27.76	20.04
	HT20-2Tx-1S	OFDM/CDD	MCS0	27.76	20.04
	HT20-2Tx-2S	OFDM/SM	MCS8	27.96	20.15

Table 4.5.4 Maximum Mean Combined RF Power Output at Antenna Ports for 5.8GHz UNII-3 40MHz Carrier for Medium Gain Antenna

Ch No/ Freq (MHz)	Mode	Modulation	Data Rate (Mbps)	Power Setting (dBm)	Total Power Limit (dBm)	Total Power (dBm)
151 (149+, 153-)/ 5755 (5745, 5765)	HT40-2Tx-1S	OFDM/CDD	MCS0	18	29.67	18.81
	HT40-2Tx-2S	OFDM/SM	MCS8	18	29.91	18.48
159 (157+, 161-)/ 5795 (5785, 5805)	HT40-2Tx-1S	OFDM/CDD	MCS0	18	29.67	19.49
	HT40-2Tx-2S	OFDM/SM	MCS8	18	29.91	19.18

Table 4.5.5 Maximum Mean Combined RF Power Output at Antenna Ports for 5.8GHz UNII-3 40MHz Carrier for High Gain Antenna

Ch No/ Freq (MHz)	Mode	Modulation	Data Rate (Mbps)	Power Setting (dBm)	Total Power Limit (dBm)	Total Power (dBm)
151 (149+, 153-)/ 5755 (5745, 5765)	HT40-2Tx-1S	OFDM/CDD	MCS0	18	27.76	18.81
	HT40-2Tx-2S	OFDM/SM	MCS8	18	27.96	18.48
159 (157+, 161-)/ 5795 (5785, 5805)	HT40-2Tx-1S	OFDM/CDD	MCS0	17	27.76	17.10
	HT40-2Tx-2S	OFDM/SM	MCS8	17	27.96	16.87

Figure 4.5.1 The Mean Output Power Measured for 802.11n (20MHz-2Tx-2S) Carrier at Channel 161/5805MHz, 18dBm, OFDM/SM, MCS8, at Two Ports. (17.17dBm+17.11dBm = 20.15dBm)

Figure 4.5.2 The Mean Output Power Measured for 802.11n (40MHz-2Tx-1S) Carrier at Channel 159/5795MHz, 18dBm, Medium Gain Antenna, OFDM/CDD, MCS0, at Two Ports. (16.50dBm+16.46dBm = 19.49dBm)

Results:

The maximum combined mean RF power outputs of the EUT at its antenna transmitting terminals across the UNII-3 band for all operation modes are a) 20.15dBm (103.5mW, for both Medium Gain antenna and high gain antenna) for 20MHz carriers and b) 19.49dBm (88.92mW, medium gain antenna) and 18.48dBm (70.47mW, high gain antenna) for 40MHz carriers, respectively. They are all below FCC required limits and are in full compliance with the Rules of the Commission.

4.6. MEASUREMENT REQUIRED: PEAK POWER SPECTRUM DENSITY – FCC SECTION 15.407 (a)(3)(5)

The peak power spectrum density (PPSD) measures the maximum value of the time average of the PSD measured during a period of continuous transmission.

The PPSD was measured at the both antenna ports with the configurations and power levels given in Tables 4.3.1 and 4.3.2 for all channels listed in Table 4.2.2. The measurement follows the procedures given in KDB 789033.

The limit is 17dBm/MHz. The peak conducted PSD shall be reduced by the amount in dB that the antenna gain exceeds 6 dBi.

For the PSD limit, the directional antenna gain for CDD was calculated by using the equation given in Section 4.5 for correlated signals and the directional antenna gain for SM was calculated by using the equation given in Section 4.5 for uncorrelated signals. The PSD limits calculated are given in Table 4.5.1 and 4.5.2.

The PSD was measured by a spectrum analyzer. The RBW and VBW were set to 1MHz and 3MHz, respectively. The RMS detector and trace average were used. The PPSD can be found by using either the peak search function on the instrument to find the peak of the spectrum or the spectrum analyzer's PSD function. The total combined PSD is calculated by summing the measured output power in mW/MHz at the various antenna ports.

For the 20MHz carriers, the power setting, 18dBm per port, is same for both medium gain antenna and high gain antenna. Therefore, the PPSD limits for high gain antenna were used. The total PPSD was obtained by summing the PPSD from the values measured at both antenna ports. For the 40MHz carriers, the total PPSD was calculated by summing the PPSD measured at both ports for both medium gain antenna and high gain antenna.

For UNII-3 band, the total PPSD measured with the minimum margin among all operation modes was 8.41dBm/MHz for 20MHz carriers with both high-gain and medium-gain antennas, 4.30dBm/MHz for 40MHz carriers with high-gain antenna and 4.81dBm/MHz for 40MHz carriers with medium-gain antenna. They are all below the FCC required limits.

The measurement results are given below. The PPSD plots which have the smallest margin for both low gain and high gain antennas are provided in Figures 4.6.1-4.6.4.

Table 4.6.1 PPSD at Antenna Ports for 5.8GHz UNII-3 20MHz Carrier for High Gain Antenna (18dBm/port)

Ch No/ Freq (MHz)	Mode	Modulation	Data Rate (Mbps)	Total PPSD Limit (dBm/MHz)	Total PPSD (dBm/ MHz)
149 /5745	.11a - 2Tx	OFDM/CDD	6	11.95	7.64
	HT20-2Tx-1S	OFDM/CDD	MCS0	11.95	6.97
	HT20-2Tx-2S	OFDM/SM	MCS8	14.96	6.78
153 /5765	.11a - 2Tx	OFDM/CDD	6	11.95	7.64
	HT20-2Tx-1S	OFDM/CDD	MCS0	11.95	7.57
	HT20-2Tx-2S	OFDM/SM	MCS8	14.96	7.14
161 /5805	.11a - 2Tx	OFDM/CDD	6	11.95	8.41
	HT20-2Tx-1S	OFDM/CDD	MCS0	11.95	8.03
	HT20-2Tx-2S	OFDM/SM	MCS8	14.96	8.38

Table 4.6.2 PPSD at Antenna Ports for 5.8GHz UNII-3 40MHz Carrier for Medium Gain Antenna

Ch No/ Freq (MHz)	Mode	Modulation	Data Rate (Mbps)	Power Setting (dBm/ port)	Total PPSD (dBm/ MHz)	Total PPSD (dBm/ MHz)
151 (149+, 153-)/ 5755 (5745, 5765)	HT40-2Tx-1S	OFDM/CDD	MCS0	18	13.90	4.30
	HT40-2Tx-2S	OFDM/SM	MCS8	18	16.91	3.54
159 (157+, 161-)/ 5795 (5785, 5805)	HT40-2Tx-1S	OFDM/CDD	MCS0	18	13.90	4.81
	HT40-2Tx-2S	OFDM/SM	MCS8	18	16.91	4.55

Table 4.6.3 PPSD at Antenna Ports for 5.8GHz UNII-3 40MHz Carrier for High Gain Antenna

Ch No/ Freq (MHz)	Mode	Modulation	Data Rate (Mbps)	Power Setting (dBm/port)	Total PPSD Limit (dBm/ MHz)	Total PPSD (dBm/ MHz)
151 (149+, 153-)/ 5755 (5745, 5765)	HT40-2Tx-1S	OFDM/CDD	MCS0	18	11.95	4.30
	HT40-2Tx-2S	OFDM/SM	MCS8	18	14.96	3.54
159 (157+, 161-)/ 5795 (5785, 5805)	HT40-2Tx-1S	OFDM/CDD	MCS0	17	11.95	2.74
	HT40-2Tx-2S	OFDM/SM	MCS8	17	14.96	2.53

Figure 4.6.1 The PPSD for 20MHz Carriers wth Minimum Margin Measured for 802.11a (20MHz-2Tx) Carrier at Channel 161/5805MHz, 18dBm, OFDM/CDD, 6Mbps, at Two Ports.

Figure 4.6.2 The PPSD for 40MHz Carriers with Minimum Margin Measured for 802.11n (40MHz-2Tx-1S) Carrier at Channel 151/5755MHz, 18dBm (High Gain Antenna), OFDM/CDD, MCS0, at Two Ports.

Results:

The smallest margins of the combined PPSD of the EUT at its antenna transmitting terminals across the UNII-3 band for all operation modes are 3.54dB for 20MHz bandwidth and 7.65dB for 40MHz bandwidth for both medium gain antenna and high gain antenna, respectively. They are all below FCC required limits and are in full compliance with the Rules of the Commission.

4.7. MEASUREMENT REQUIRED: PEAK EXCURSION– FCC SECTION 15.407 (a)(6)

The Peak Excursion measures the ratio of the maximum of the peak-max-hold spectrum to the maximum of the average spectrum.

The limit specified by the FCC is that the ratio of the Peak Excursion of the Modulation Envelope (measured using a peak hold function) to the Maximum Conducted Output Power (measured above) shall not exceed 13dB across any 1MHz bandwidth or the emission bandwidth whichever is less.

KDB 789033 stated that compliance with the peak excursion requirement of Section 15.407(a)(6) shall be demonstrated by confirming that the ratio of the maximum of the peak-max-hold spectrum to the maximum of the average spectrum for continuous transmission does not exceed 13 dB. For MIMO devices, testing of a single output port is sufficient to demonstrate compliance with the peak excursion requirement.

Therefore Peak Excursion = P_{max} (dBm/MHz) /PPSD (dBm/MHz), where P_{max} is the PSD measured with peak detector and max hold and the PPSD is the peak PSD measured with average detector and average trace. The PPSD was measured in Section 4.6. The P_{max} is measured by the same approach for PPSD measurement except with Peak Detector and Max Hold. The peak search function was used in finding the maximum values in both P_{max} and PPSD measurement.

The peak excursion was measured at both antenna ports (though only one is sufficient) and the results are tabulated below. The maximum peak excursion measured across the UNII-3 band for all operation modes and 18dBm power setting per port are 10.76 dB/MHz for 20MHz bandwidth and 10.71dB/MHz for 40MHz bandwidth, respectively. They are all below FCC required limit. The plots with the worst peak excursion data for both 20MHz and 40 MHz carrier were provided in Figures 4.7.1 and 4.7.2.

Table 4.7.1 Peak Excursion at Antenna Ports for 5.8GHz UNII-3 20MHz Carrier for Medium Gain and High Gain Antennas (18dBm/Port)

Ch No/Freq (MHz)	Mode	Modulation	Data Rate (Mbps)	P1			P2		
				Pmax (dBm)	PPSD (dBm /MHz	Pmax/ PPSD	Pmax (dBm)	PPSD (dBm/ MHz)	Pmax/ PPSD
149/5745	.11a - 2Tx	OFDM/CDD	6	15.30	4.54	10.76	13.26	4.71	8.55
153/5765	HT20-2Tx-1S	OFDM/CDD	MCS0	14.42	4.87	9.55	13.33	4.22	9.11
161/5805	HT20-2Tx-2S	OFDM/SM	MCS8	15.54	5.40	10.14	15.40	5.33	10.07

Table 4.7.2 Peak Excursion at Antenna Ports for 5.8GHz UNII-3 40MHz Carrier for Medium Gain Antenna (18dBm/Port)

Ch No/Freq (MHz)	Mode	Modulation	Data Rate (Mbps)	P1			P2		
				Pmax (dBm)	PPSD (dBm/ MHz)	Pmax/ PPSD	Pmax (dBm)	PPSD (dBm/ MHz)	Pmax/ PPSD
151/5755	HT40-2Tx-1S	OFDM/CDD	MCS0	11.13	1.83	9.30	10.17	0.68	9.49
159/5795	HT40-2Tx-2S	OFDM/SM	MCS8	12.26	1.55	10.71	11.37	1.52	9.85

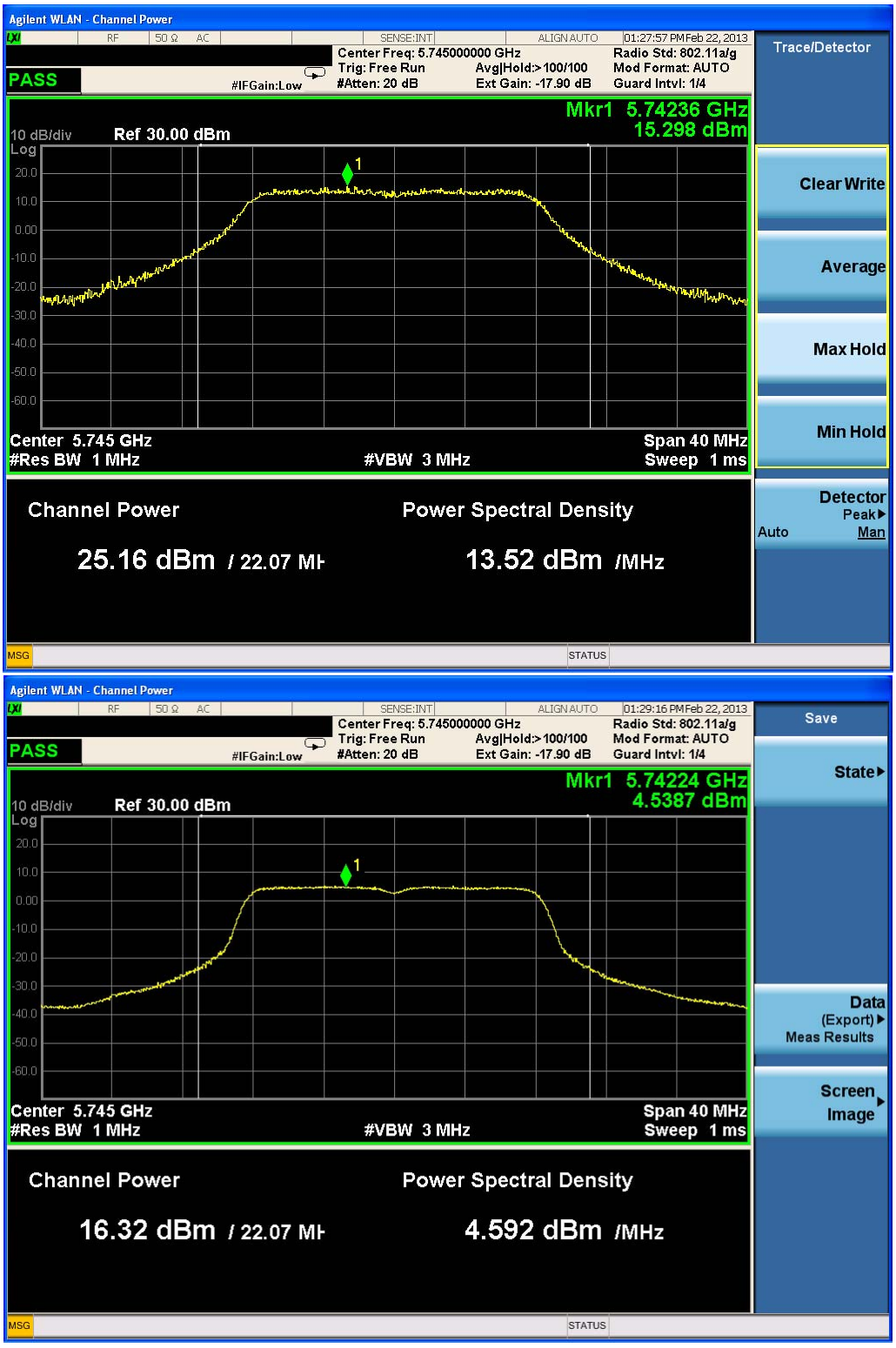


Figure 4.7.1 Peak excursion (P_{max} – PPSD) Measured for 802.11a (20MHz-2Tx) Carrier at Channel 49/5745MHz, 18dBm, OFDM/CDD, 6 Mbps and Port 1 ((a) P_{max} = 15.3 dBm/MHz, (b) PPSD = 4.54 dBm/MHz. P_{max} - PPSD = 10.76 dBm/MHz.)

Figure 4.7.2 Peak excursion (P_{max} – PPSD) Measured for 802.11n (40MHz-2Tx-2S) Carrier at Channel 159/5795MHz, 18dBm, OFDM/SM, MCS8 and Port 1 ((a) P_{max} = 12.26 dBm/MHz, (b) PPSD = 1.55 dBm/MHz. P_{max} - PPSD = 10.71 dBm/MHz.)

Results:

The maximum peak excursion measured at its antenna transmitting terminals across the UNII-3 band for all operation modes are all below FCC required limits and are in full compliance with the Rules of the Commission.

4.8. MEASUREMENT REQUIRED: UNWANTED OUT-OF-BAND EMISSIONS – FCC SECTION 15.407 (b)(4)

The out-of-band emissions must be below a) -27dBm/MHz EIRP peak limit for frequency spectrum 10 MHz or greater above or below the band edges and b) -17 dBm/MHz EIRP peak limit for the frequency range 10MHz within the band edge (see Section 4.1) .

KDB 789033 H)3)b)(iii) provided the guidance on EIRP calculation. It was stated that "A value representative of an upper bound on out-of-band antenna gain (in dBi) shall be added to the measured antenna-port conducted emission power to compute EIRP within the specified measurement bandwidth. The upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands or 2 dBi, whichever is greater. However, for devices that operate in multiple bands using the same transmit antenna, the highest gain of the antenna within the operating band nearest to the out-of-band frequency being measured may be used in lieu of the overall highest gain when measuring emissions at frequencies within 20 percent of the absolute frequency at the nearest edge of that band, but in no case shall a value less than 2 dBi be selected."

The EIRP emissions contributed by each port are equal to the conducted emissions measured at the antenna terminal plus the maximum in-band antenna gain for that port. The information on the antenna gain is provided in Table 3.3.2. For CDD (802.11a and 802.11n-1S) scheme, the maximum EIRP emissions from both ports are equal to the combined emissions in mW/MHz from Port 1 and Port 2. For SM scheme (802.11n-2S), the maximum EIRP emissions from both ports are equal to the EIRP emissions from the port which has the highest EIRP emissions. Therefore, for -27dBm/MHz EIRP peak limit, the conducted limits is -35 dBm/MHz peak for CDD (802.11a and 802.11n-1S) *total combined* emissions and is -35 dBm/MHz peak for SM (802.11n-2S) emissions from *each port*. For -17dBm/MHz EIRP peak limit, the conducted limits is -25 dBm/MHz peak for CDD (802.11a and 802.11n-1S) *total combined* emissions and is -25 dBm/MHz peak for SM (802.11n-2S) emissions from *each port*. The KDB 789033 H)2)c)(i) also stated that "an out-of-band emission that complies with both the average and peak limits of 15.209 is not required to satisfy the -27 dBm/MHz or -17 dBm/MHz peak emission limit."

The out-of-band emissions were measured at the both antenna ports with the configurations and power levels given in Tables 4.3.1 and 4.3.2 for all channels listed in Table 4.2.2. The measurement follows the procedures given in KDB 789033, where peak detector and max hold, 1MHz RBW, 3MHz VBW and auto sweep were utilized. For the emissions near the band edges, the same procedure as in the out-of-band spurious emissions was used first. If the results fail, then the integration approach given in KDB 789033 H)3)d) was used for band edge measurement, where 100kHz RBW, 300kHz VBW, peak detector and maximum hold were used.

The out-of-band conducted emissions measured near the band edges (within 10MHz from the band edges) for all modes at both ports are all below -25dBm/MHz peak limits. For 20MHz bandwidth carriers, the minimum margin is 4.1dB for the left band edge (5725MHz) and 9.6dB for the right band edge (5825MHz). For 40MHz bandwidth carriers, the minimum margin is 1.5dB for the left band edge (5725MHz) and 4.6dB for the right band edge (5825MHz).

The plots with the minimum conucted emissions margins near the band edges for both 20MHz and 40MHz bandwidth carriers and all modes were provided in Figures 4.8.1 and 4.8.2.

The out-of-band conducted emissions, not within 10MHz from the band edges, were measured in the frequency spectrum from 10MHz to 27GHz for all modes at both ports. For 40MHz bandwidth carriers, the emissions are all below -35dBm/MHz peak limit for either CDD (combined from two ports) or SM (per port). For 20MHz bandwidth carriers, the out-of-band conducted emissions measured in the frequency spectrum less than 1GHz and above 18GHz (up to 27GHz) are all below -38dBm/MHz peak limit per port and there were no noticeable spurs above noise floor detected. Figures 4.8.3 and 4.8.4 show the typical conducted emissions below 1GHz and above 18GHz at both ports. For the out-of-band emissions measured in the frequency spectrum between 1GHz and 18GHz, but not within 10MHz from the band edges, only the emissions of the 2^{nd} and 3^{rd} harmonics of the carriers were detected. The emissions at the 2^{nd} harmonics of the carriers were all below -38dBm/MHz peak limit per port. The worst emission is at the 3^{rd} harmonics of the 20MHz bandwidth carrier at Channel 149/5745MHz, 802.11a-2Tx, 18dBm (High Gain Antenna), OFDM/CDD, 6Mpbs. Therefore, the radiated emissions of the 20MHz bandwdith carrier at Channel 149/5745MHz, 18dBm (High Gain Antenna) were evaluated for all three modulations: 802.11a-2Tx (OFDM/CDD and 6Mpbs), 802.11n-2Tx-1S (OFDM/CDD and MCS0) and 802.11n-2Tx-2S (OFDM/SM and MCS8). Their radiated emissions measured were all below the average and peak limits of 15.209.

Therefore, per KDB 7089033 guidance, the out-of-band emissions for all operation modes in the frequency spectrum 10MHz away from the band edges are all in compliance with FCC requirements by demonstrating either below -27dBm/MHz peak EIRP limit with conducted measurement at antenna ports or below 15.209 radiated average and peak limits with radiated measurement.

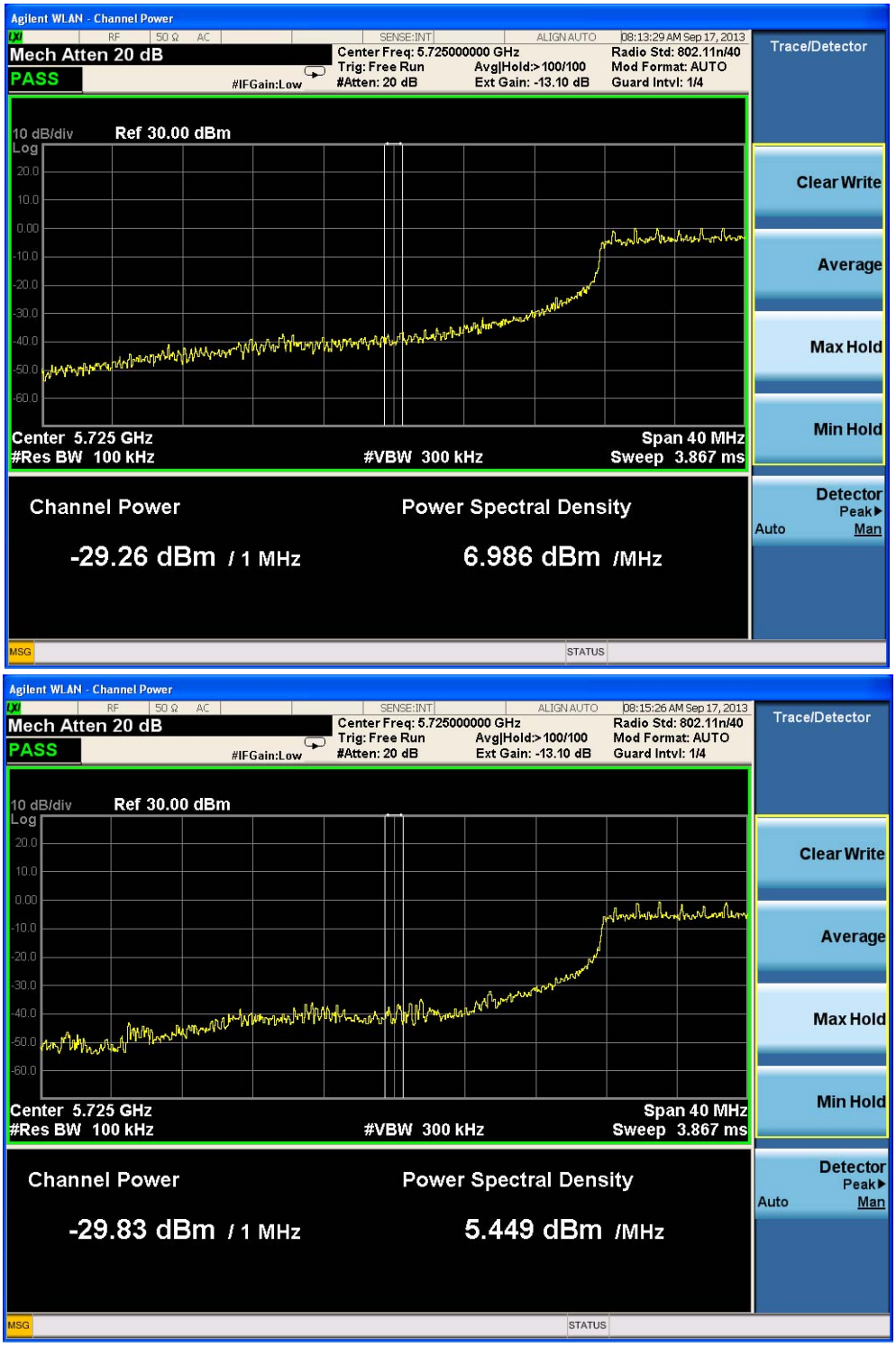
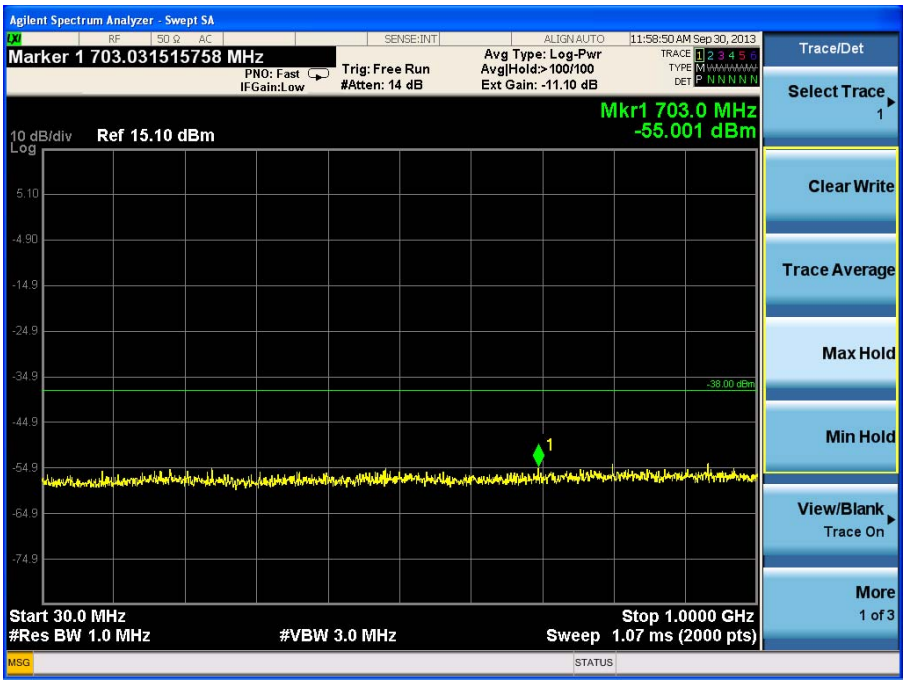
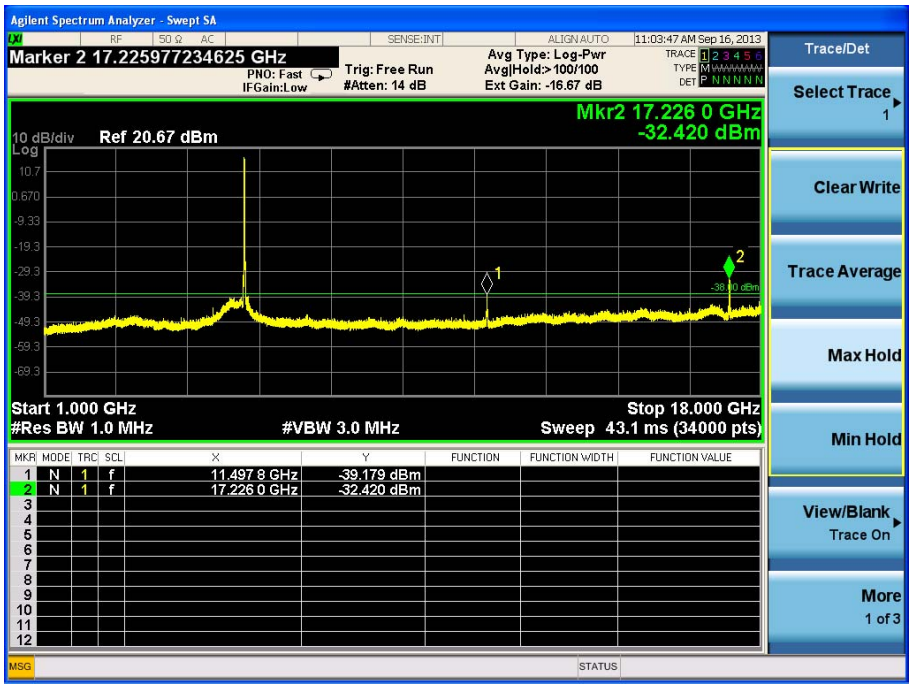


Figure 4.8.1 The Out-of-Band Emissions near Left Band Edge (5.725GHz) with Minimum Margin Measured for 802.11n (40MHz-2Tx-1S) Carrier at Channel 151/5755MHz, 18dBm (High Gain Antenna), OFDM/CDD, MCS0, at Two Ports. (-29.26dBm/MHz-29.83dBm/MHz = -26.53dBm/MHz, below -25 dBm/MHz Limit)

Figure 4.8.2 The Out-of-Band Emissions near Band Edge (5.825GHz) Measured for 802.11n (40MHz-2Tx-1S) Carrier at Channel 159/5795MHz, 17dBm (High Gain Antenna), OFDM/SM, MCS0, at Two Ports. (-33.24dBm/MHz - 32.11dBm/MHz = -29.63dBm/MHz, below -25 dBm/MHz Limit)


Agilent Spectrum Analyzer - Swept SA
Marker 1 703.031515758 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 14 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Ext Gain: -11.10 dB
11:58:50 AM Sep 30, 2013
Mkr1 703.0 MHz
-55.001 dBm
10 dB/div
Log
Ref 15.10 dBm
5.10
-4.90
-14.9
-24.9
-34.9
-44.9
-54.9
-64.9
-74.9
-38.00 dBm
Start 30.0 MHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 1.0000 GHz
Sweep 1.07 ms (2000 pts)
Trace/Det
Select Trace 1
Clear Write
Trace Average
Max Hold
Min Hold
View/Blank Trace On
More 1 of 3
MSG
STATUS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Marker 2 17.225977234625 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 14 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
Ext Gain: -16.67 dB
11:03:47 AM Sep 16, 2013
Mkr2 17.226 0 GHz
-32.420 dBm
10 dB/div
Log
Ref 20.67 dBm
10.7
0.670
-9.33
-19.3
-29.3
-39.3
-49.3
-59.3
-69.3
Start 1.000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 18.000 GHz
Sweep 43.1 ms (34000 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 11.497 8 GHz -39.179 dBm
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MSG
STATUS

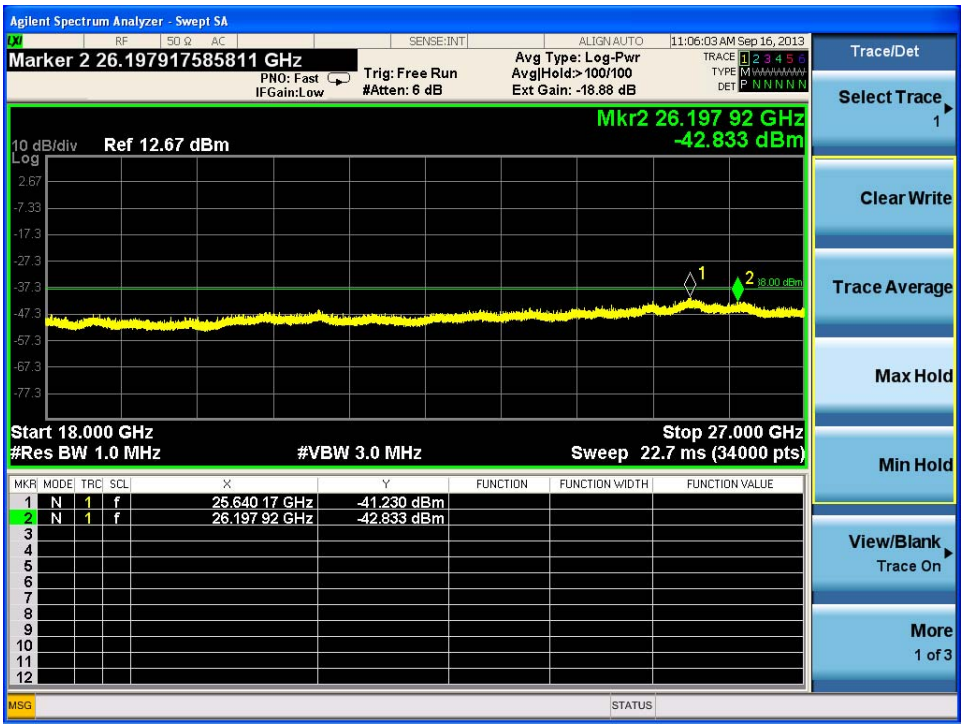
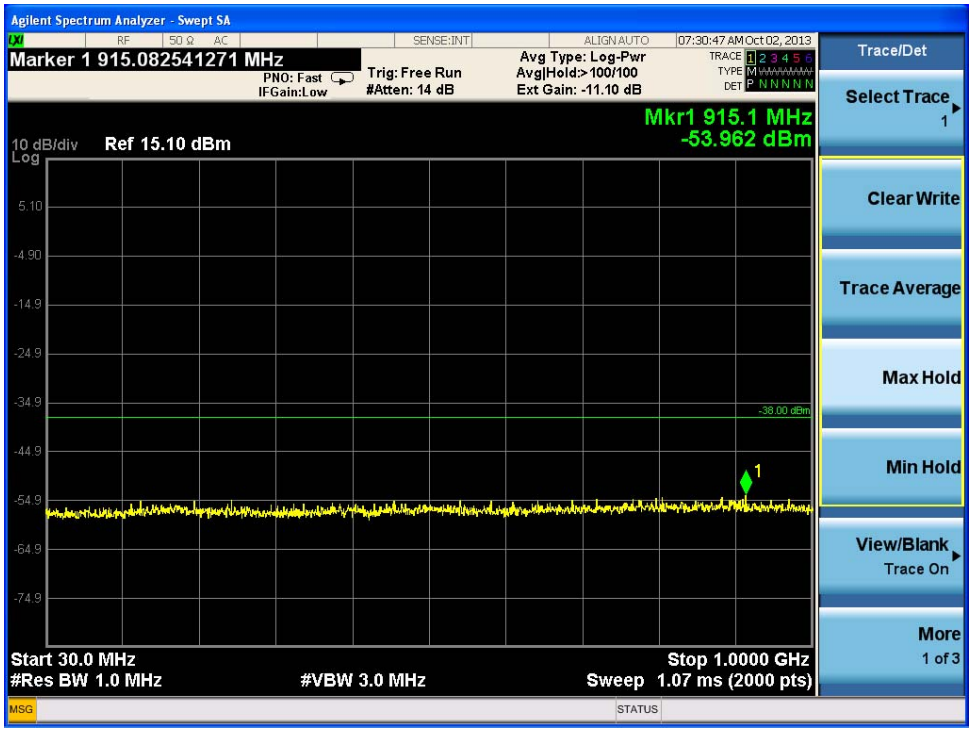


Figure 4.8.3 The Highest Out-of-Band Conducted Emissions Measured for 802.11a (20MHz-2Tx) Carrier at Channel 149/5745MHz, 18dBm, High Gain Antenna, Peak Detector, Max Hold, OFDM/CDD, 6 Mbps, Port 1.



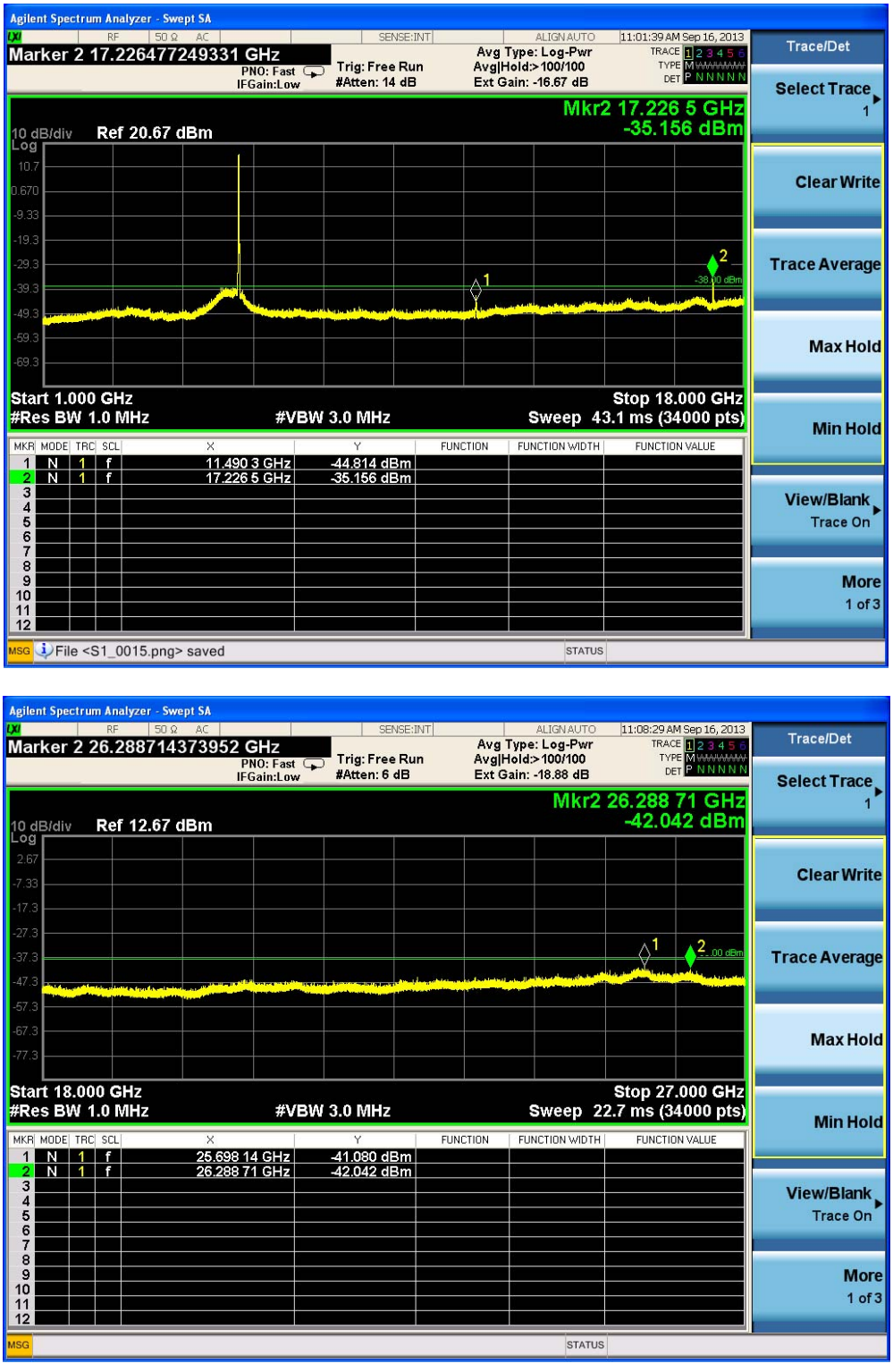


Figure 4.8.4 The Highest Out-of-Band Conducted Emissions Measured for 802.11a (20MHz-2Tx) Carrier at Channel 149/5745MHz, 18dBm, High Gain Antenna, Peak Detector, Max Hold, OFDM/CDD, 6 Mbps, Port 2.

The total combined peak emissions at the 3rd harmonic of the carrier for high gain antenna are -30.56dBm/MHz (-32.42dBm/MHz -35.15dBm/MHz = -30.56dBm/MHz), see Figures 4.8.3 and 4.8.4. The radiated measurement plots for the EUT equipped with high gain antennas at channel 149/5745MHz, 20MHz carrier for all three modulations are provided in Figures 4.8.5, 6 &7. There the radiated emissions at the 3rd harmonics of the 5745MHz carrier are below both the average and peak limits of 15.209 which are same as Part 15 Subpart B Class B limits.

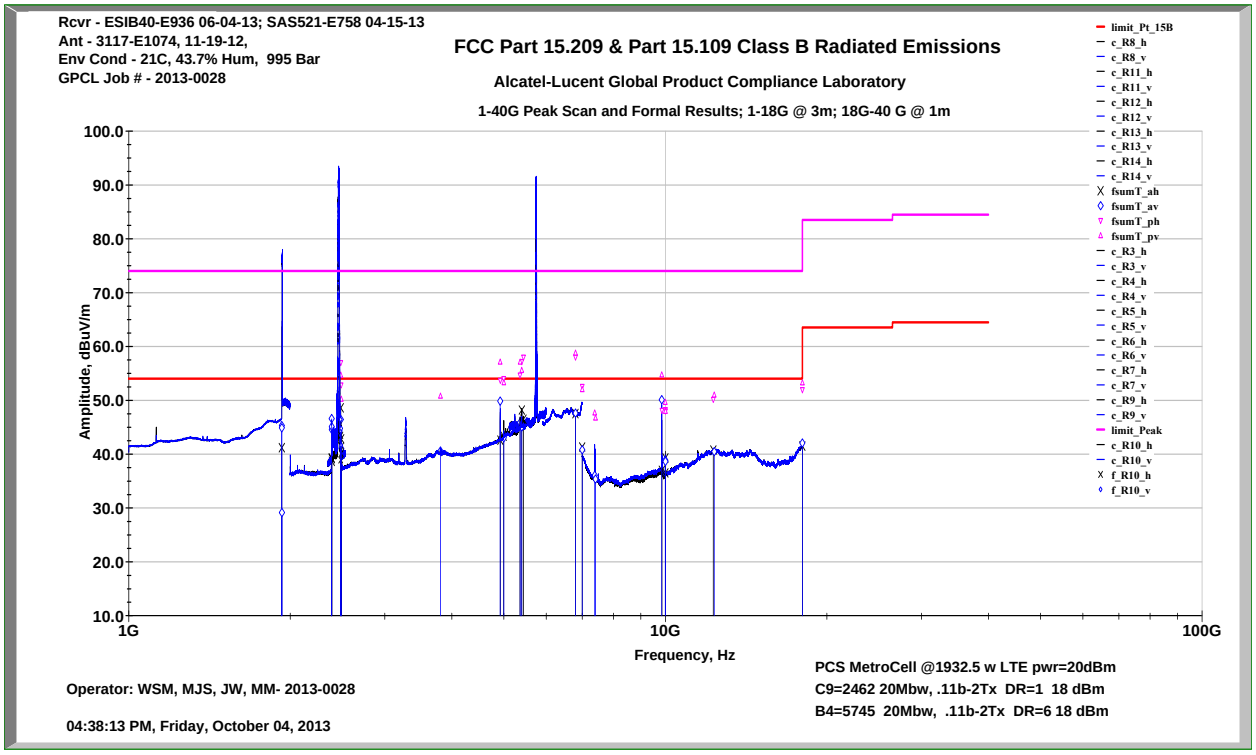


Figure 4.8.5 The Radiated Emissions Measured with Peak and Quasi-Peak/Average Values from 1GHz to 18GHz for 802.11a (20MHz-2Tx) Carrier at Channel 149/5745MHz, 20dBm, High Gain Antenna, 6Mbps, against FCC Part 15.209 Limits.

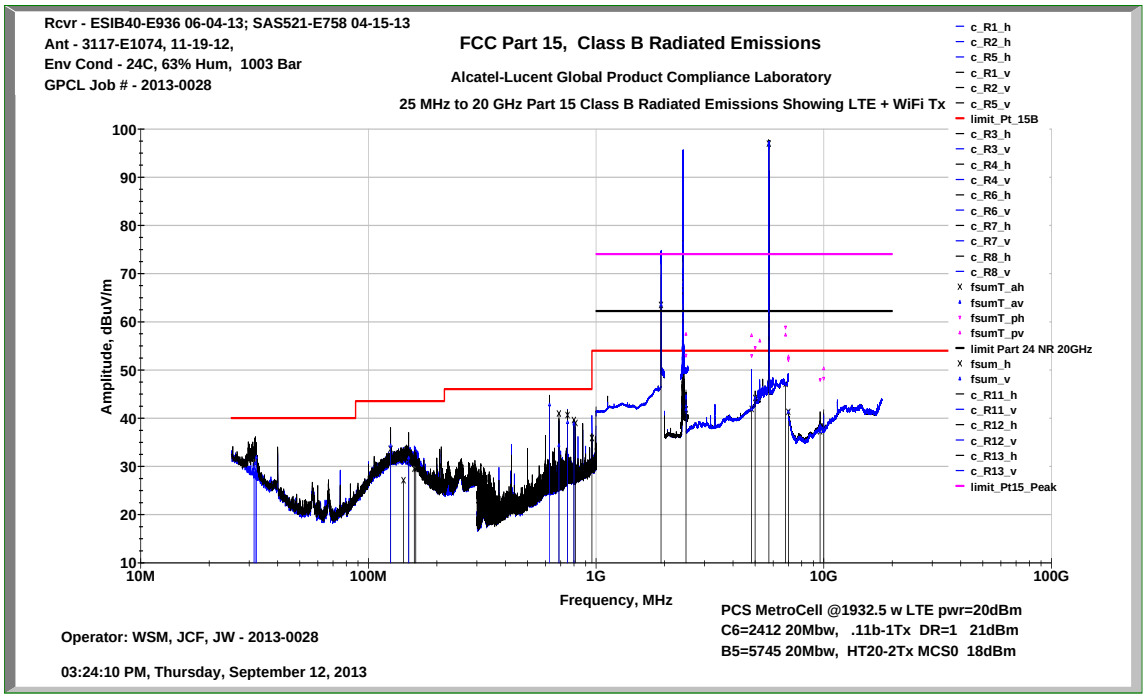


Figure 4.8.6 The Radiated Emissions Measured with Peak and Quasi-Peak/Average Values from 25MHz to 18GHz for 802.11n (20MHz-2Tx-1S) Carrier at Channel 149/5745MHz, 20dBm, High Gain Antenna, MCS0, against FCC Part 15.209 Limits.

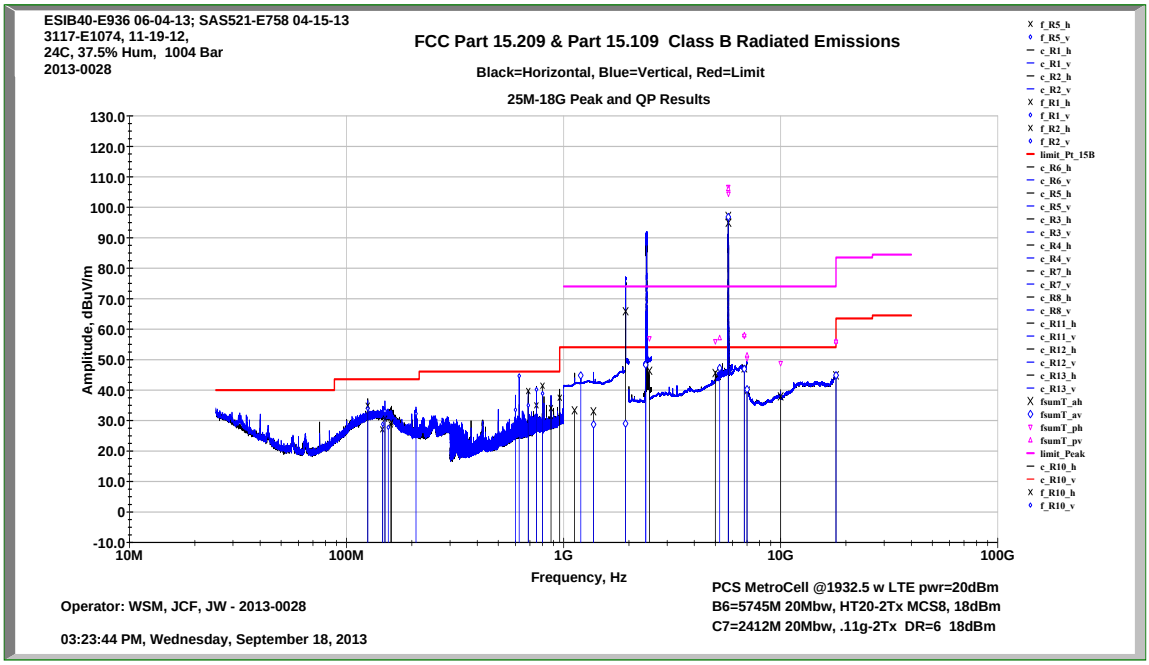


Figure 4.8.7 The Radiated Emissions Measured with Peak and Quasi-Peak/Average Values from 25MHz to 18GHz for 802.11n (20MHz-2Tx-2S) Carrier at Channel 149/5745MHz, 20dBm, High Gain Antenna, MCS8, against FCC Part 15.209 Limits.

Results:

The unwanted out-of-band emissions of MCO Wi-Fi AP in UNII-3 operation for all operation modes and carrier bandwidths are in full compliance with the Rules of the Commission.

4.9. MEASUREMENT REQUIRED: UNWANTED RADIATED EMISSIONS – FCC SECTION 15.407 (b)(6,7)

The FCC requirements specified in 15.407(b)(6) are provided in Section 4.1(3), where FCC states that unwanted emissions below 1 GHz must comply with the general field strength limits set forth in 15.209. The spurious emissions in 15.205 (a) restricted bands must meet 15.209 (a) limits which are given in Table 4.9.1. The restricted bands of operation given in 15.205(a) are provided in Table 4.9.2.

Table 4.9.1. FCC 15.209 Radiated Emissions Limits

Frequency (MHz)	Field Stength at 3m (dB uV/m)		RBW (kHz)	Detector
	FCC 15.109 Class B	FCC 15.209		
10 - 30		49.5	9	QP
30 - 88	40	40		
88 - 216	43.5	43.5		
216 - 230	46	46	120	QP
230 - 960	46	46		
960 - 1000	54	54		
1000 - 3000	54	54		Ave.
	74	74	1000	Peak
> 3000 - 5 f_c	54	74		Ave.
	74	74	1000	Peak
5 f_c - 10 f_c / 40GHz		54		Ave.
		74	1000	Peak

Table 4.9.2 FCC 15.205 Restricted Bands of Operation

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])
13.36 - 13.41			

Since the 9764 MCO Wi-Fi AP module is an optional component attached to a 9764 MCO Outdoor in public places for high-density hotspots, both 9764 MCO Wi-Fi AP (EUT) and the MCO were evaluated

together for radiated emissions. The 9764 Wi-Fi AP was installed on the bottom of the Alcatel-Lucent 1900 LTE -48VDC Metro Cell Metro Dock (Gigabit Ethernet) which represents the worst case scenario for radiated emissions in real deployment. The Metro Cell is transmitting a 5MHz LTE carrier at A Block Ch50 1932.5MHz. The EUT with antennas equipped transmits at both ports in the UNII-3 band with the configurations and power levels for high gain antenna given in Tables 4.3.1 and 4.3.2 for all lower and upper edge channels listed in Table 4.2.2. The FCC 15.407(8) stated that when measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency block edges as the design of the equipment permits. The lowest oscillator frequency in the AP is 25MHz. The emissions were investigated from 25MHz to 40GHz per FCC Sections 15.205 and 15.209. The recommendations of ANSI C63.4–2009 were followed for EUT testing setup and cabling. The measurement guidance given in KDB 789033 was followed.

The test setup diagram is given in Section 4.3.

The radiated spurious emissions were measured with both 5.8 GHz UNII-3 carriers and 2.4GHz ISM carriers transmitting simultaneously. In each band (5.8GHz UNII-3 or 2.4GHz ISM), two carriers were transmitting in MIMO (Multiple Input Multiple Output). The compliance for the restricted bands near the transmitting band was closely examined with the carriers placed near to that band edge as well. The radiated emissions measured in the frequency spectrum below 1GHz and in the restricted bands for all operation modes and carrier bandwidths with maximum high gain power levels were all below 15.209 limits. The worse cases from the high gain antennas measurement were remeasured with the maximum median gain power level and median gain antennas as well and their emissions were all below 15.209 limits. The worst case plot, where the minimum margin from MCO Wi-Fi AP operating in 5.8GHz UNII-3 is 1.6dB at 40GHz (noise floor), is provided in Figure 4.9.1.

The FCC 15.109 Class B limits are identical to the 15.209 limits between 30MHz and 30GHz. Therefore, the MCO Wi-Fi AP is in compliance with both 15.407 (b)(6,7) requirements for intentional radiators and the 15.109 Class B requirements for unintentional radiators.

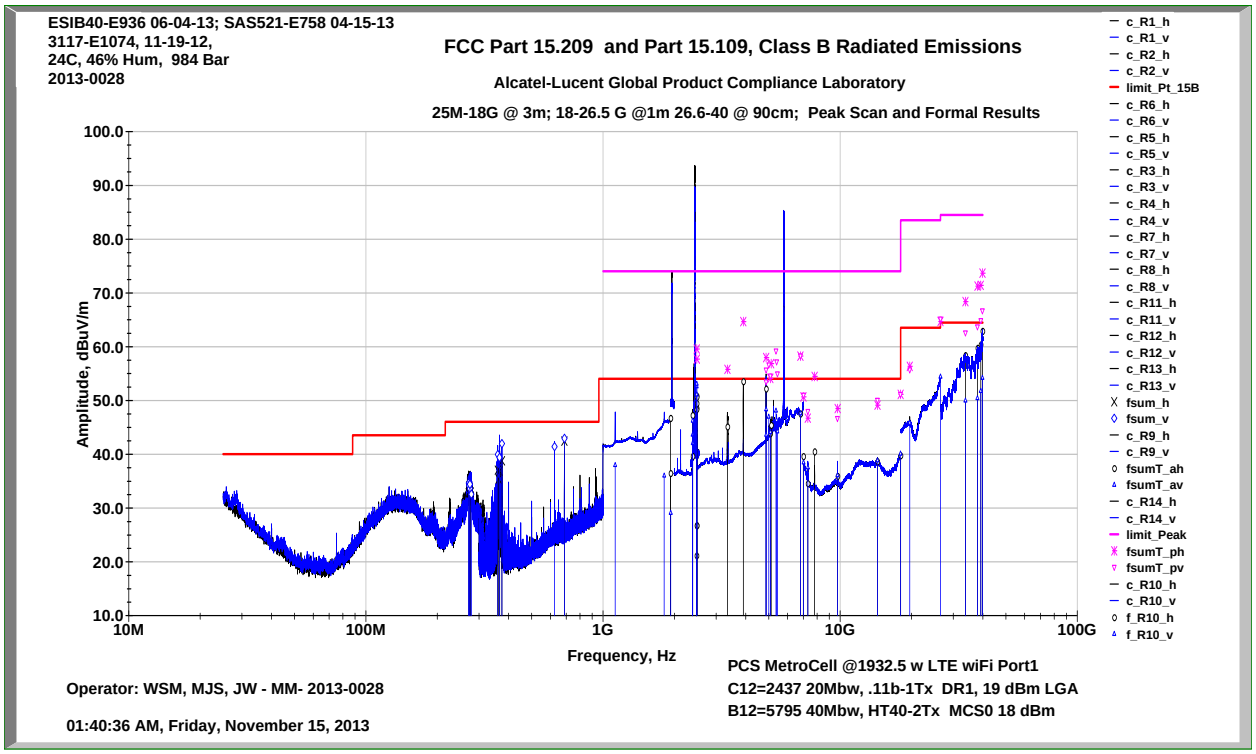


Figure 4.9.1 The Radiated Emissions Measured with Peak and Quasi-Peak/Average Values from 25MHz to 40GHz for 802.11n (40MHz-2Tx-1S) Carrier at Channel 159/5795MHz, 18dBm, Median Gain Antennas, MCS0, against FCC Part 15.209 and 15.109 Class B Limits.

Results:

The unwanted radiated emissions of MCO Wi-Fi AP in UNII-3 operation for all operation modes and carrier bandwidths are below FCC 15.209 limits and FCC 15.109 Class B limits and in full compliance with the Rules of the Commission.

4.10. MEASUREMENT REQUIRED: FREQUENCY STABILITY– FCC SECTION 15.407 (g)

This test evaluates the frequency difference between the actual transmit carrier frequency and the specified transmit frequency assignment.

The FCC requirement on the frequency stability is given in Section 4.1. The IEEE 802.11n-2009 Section 20.3.21.4 specified the transmitter center frequency tolerance shall be ± 20 ppm maximum for the 5 GHz band. The different transmit chain center frequencies (LO) and each transmit chain symbol clock frequency shall all be derived from the same reference oscillator.

The frequency stability testing was conducted on the MCO Wi-Fi AP Outdoor. It receives its +5.3VDC power from its interface with MCO. The design tolerance of 5.3VDC voltage supply is ±3%.

The WiFi AP was installed in an environmental chamber. The test setup diagram is given in Section 4.3. The Wi-Fi AP transmits an 18dBm carrier at Channel 153, 5765MHz, 802.11n, HT40-2Tx-1S, MCS3, 16QAM. The stability of the output frequency of the WiFi AP was measured (10 samples average) at one antenna transmitting port: 1) from –35 °C to +55 °C in 10 °C steps at the rated supply voltage; and 2) at 97% and 103% of the nominal supply voltage per design specification. The 97% of 5.3 VAC is 5.14 V and 103% is 5.46 V. The carrier frequency was measured at the antenna terminal at each temperature and each supply voltage by an Agilent MXA. In addition, the transmit power was monitored by the power meter to ensure proper performance throughout the test interval. At each temperature and each supply voltage, the EUT was given sufficient time for its thermal stabilization. The testing was performed during the period of October 14 ~ 16, 2013.

The frequency derivations (Δf) at the antenna port from the carrier frequency at +20°C and rated voltage at each temperature and supply voltage are summarized in the following tables.

Table 4.10.1 The Frequency Stability of WiFi AP

Stabilized Temp. (°C)	Δf 97% V_{norm} (ppm)	Δf 100% V_{norm} (ppm)	Δf 103% V_{norm} (ppm)
55	0.00	-0.21	-0.21
45	-0.22	-0.20	-0.21
35	-0.20	-0.12	-0.12
25	-0.13	-0.03	-0.03
15	-0.03	0.12	0.12
5	0.12	0.09	0.09
-5	0.09	-0.24	-0.23
-15	-0.25	-0.53	-0.54
-25	-0.50	-0.95	-0.94
-35	-0.97	-1.18	-1.18

Results:

The maximum frequency drifts at the antenna terminal of the MCO WiFi AP at the 5765MHz due to temperature and supply voltage changes are below ±20ppm IEEE requirement. The Alcatel-Lucent MCO WiFi AP demonstrated full compliance with the Rules of the Commission.

4.11. MEASUREMENT REQUIRED: AC POWER LINE CONDUCTED LIMITS – FCC SECTION 15.407(b)(6) and 15.207

The FCC requirements specified in 15.407(b)(6) are provided in Section 4.1(3), where FCC states that any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in 15.207.

FCC 15.207(c) states that measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provisions for, the use of battery chargers which permit operating while charging, AC adapters or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

The limits are given in Table 4.11.1.

Table 4.11.1. FCC 15.207 AC Power line Conducted Emissions Limits

Frequency (MHz)	15.207 (dBµV)		15.107 Class B (dBµV)		RBW
	Quasi-Peak	Average	Quasi-Peak	Average	
0.15 – 0.5	66 – 56*	56 – 46*	66 – 56*	56 – 46*	9 kHz
0.5 – 5.0	56	46	56	46	
5.0 – 30.0	60	50	60	50	

*Decreases with the logarithm of the frequency.

The 9764 MCO Wi-Fi AP module gets its DC power from 9764 MCO Outdoor. The 9764 MCO Outdoor can be AC powered. Therefore, an AC PCS LTE MCO Outdoor (Metro Dock) was used as the host unit for this testing. The AC power line conducted emissions of 9764 MCO Outdoor were evaluated with MCO Wi-Fi AP attached. Both 9764 MCO Outdoor and MCO Wi-Fi AP were transmitting at their maximum full power for the worst case scenario.

The PCS Metro Cell Metro Dock is transmitting 2x1W, 5MHz LTE carriers at B Block on both ports. The MCO Wi-Fi AP with antennas equipped transmits at both ports with a 2437MHz (20MHz bandwidth, 11g-2Tx, 6Mpbs) carrier at 22dBm and a 5765MHz (HT20-2Tx-1S, MCS8) carrier at 18dBm in MIMO. The recommendations of ANSI C63.4–2009 were followed for EUT testing setup and cabling.

The test setup photo is given in Exhibit 10.

The conducted emissions were measured at both AC power leads. The AC power line conducted emissions measured in the frequency spectrum 150kHz to 30MHz were all below 15.207 limits with a minimum margin of 11.2dB at 504kHz. The plots are provided in Figures 4.11.1 – 4.11.4.

The FCC 15.107 Class B limits are identical to the 15.207 limits. Therefore, the 9764 PCS MCO Outdoor Metro Dock with Wi-Fi AP is in compliance with 15.207 requirements for intentional radiators and the 15.107 Class B requirements for unintentional radiators.

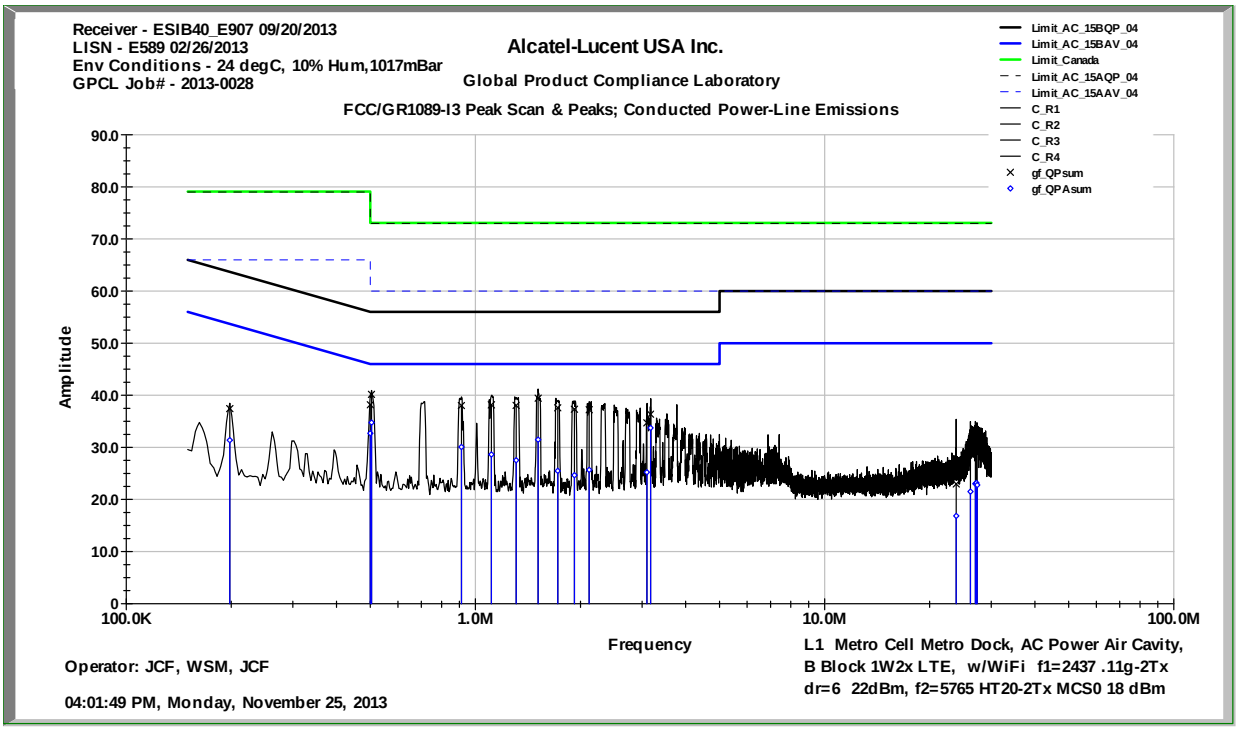


Figure 4.11.1 The Pre-Scan of Conducted Emissions on AC Power Line L1 Lead in Peak Detector.

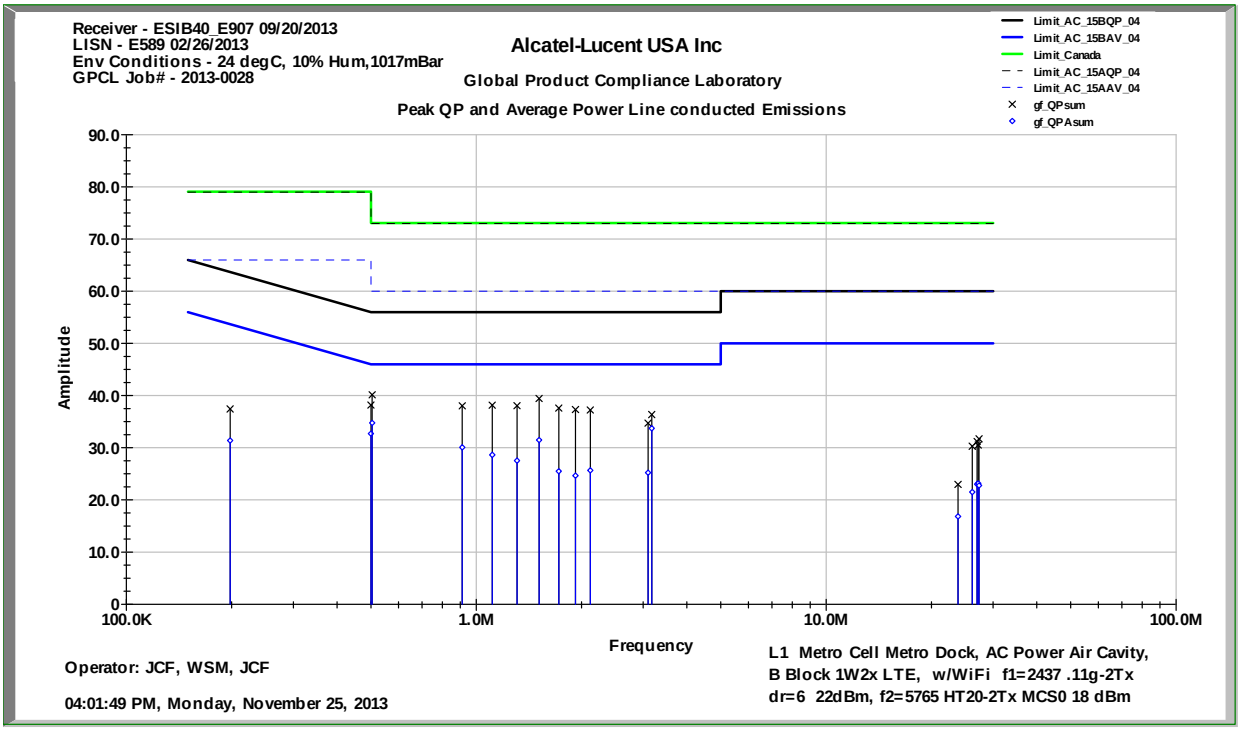


Figure 4.11.2 The Formal-Scan of Conducted Emissions on AC Power Line L1 Lead in Quisi-Peak and Average Detectors.

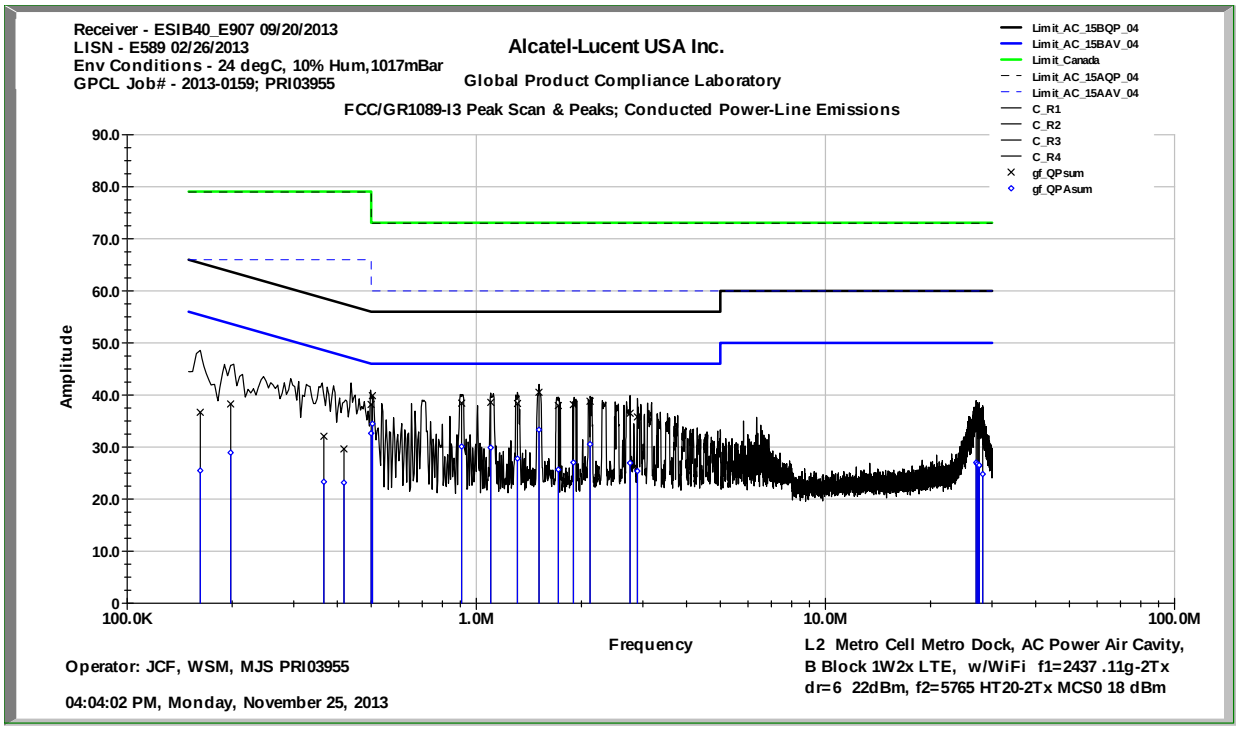


Figure 4.11.3 The Pre-Scan of Conducted Emissions on AC Power Line L2 Lead in Peak Detector.

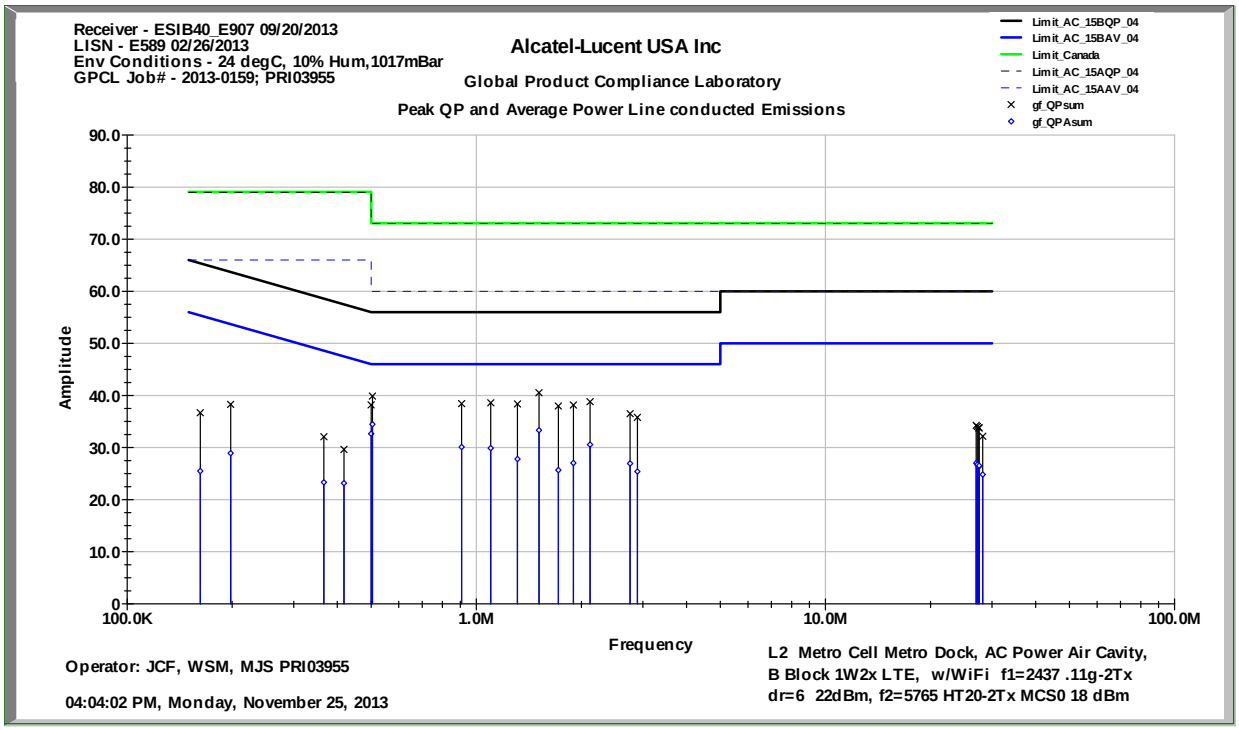


Figure 4.11.4 The Formal-Scan of Conducted Emissions on AC Power Line L2 Lead in Quisi-Peak and Average Detectors.

Results:

The AC power line conducted emissions of MCO Outdoor Metro Dock with Wi-Fi AP are below FCC 15.207 limits and FCC 15.107 Class B limits and in full compliance with the Rules of the Commission.

5. LIST OF TEST EQUIPMENT

Table 5.1 List of Test Equipment Used

Equipment	Manufacturer	Model	Serial #	Last Cal Date	Cal Cycle
MXA Signal Analyzer (20Hz-26.5GHz)	Agilent	N9020A	MY48011791	9/14/2012	15 mos
Power Supply (0-150V, 0-3.5A)	Kepco	JQE 0-150V 0-3.5A	H90565		
10 dB Attenuator (DC – 18 GHz)	N/A-CCM	6193-10	2082	N/A	N/A
RF Power Meter	Hewlett Packard	437B	3110A03795	6/12/2013	12 mos
RF Power Meter	Agilent	N1912A-P	E949	1/2/2013	12 mos
Power Sensor (0.05-18 GHz Wideband)	Agilent	N1912A	E950	1/30/2013	12 mos
EMC Receiver / SA	Rohde & Schwarz	ESIB-40	E906 / 100101	6/4/2013	12 mos
Code Domain Analyzer	Agilent	E4440A PSA	E1055	5/9/2013	24 mos
6 dB Attenuator (DC-18GHz, 5 Watt)	Weinschel	2-6dB	E890	6/5/2013	12 mos
Preamplifier (1-26.5 GHz, 30dB)	Hewlett Packard	8449B	E377	7/26/2013	12 mos
Preamplifier (26.5-40 GHz, 30dB)	MiTek	JS4-26004000-27-10P	1814238	5/29/2013	12 mos
EMI Test Receiver (20Hz to 40 GHz)	Rohde & Schwarz	ESIB40	E936	6/4/2013	12 mos
Double-Ridged Horn (1-18 GHz)	ETS Lindgren	3117	E1074	11/19/2012	24 mos
Double-Ridged Horn (18-26.5 GHz)	ETS Lindgren	3116	E520	12/26/2012	24 mos
Standard Horn (26.5-40GHz)	A.H. Systems	SAS-200/573	82-11300580 E526	5/29/2013	24 mos
Bilogical Antenna (25-2000MHz)	A.H. Systems	SAS-521-2	E758	4/15/2013	24 mos
High Pass Filter (1.99-20GHz)	Trilithic	18050-1.8-KK	E989PCS HPF-12	5/15/2013	12 mos
High Pass Filter (2.85-18GHz)	Trilithic	5HC2850/18050-1.8-KK	E988/PCS-HPF-11	8/6/2013	12 mos
High Pass Filter 84300-80039	Hewlett Packard	HPF 8.2GHz	R9812-009	8/6/2013	12 mos
Low Pass Filter (10MHz-2GHz)	Trilithic	10LC1790-3-AA	E980PCS LPF-12	5/15/2013	12 mos
Directional Coupler (2-18GHz)	Hewlett Packard	HP 772D	772D	5/15/2013	12 mos

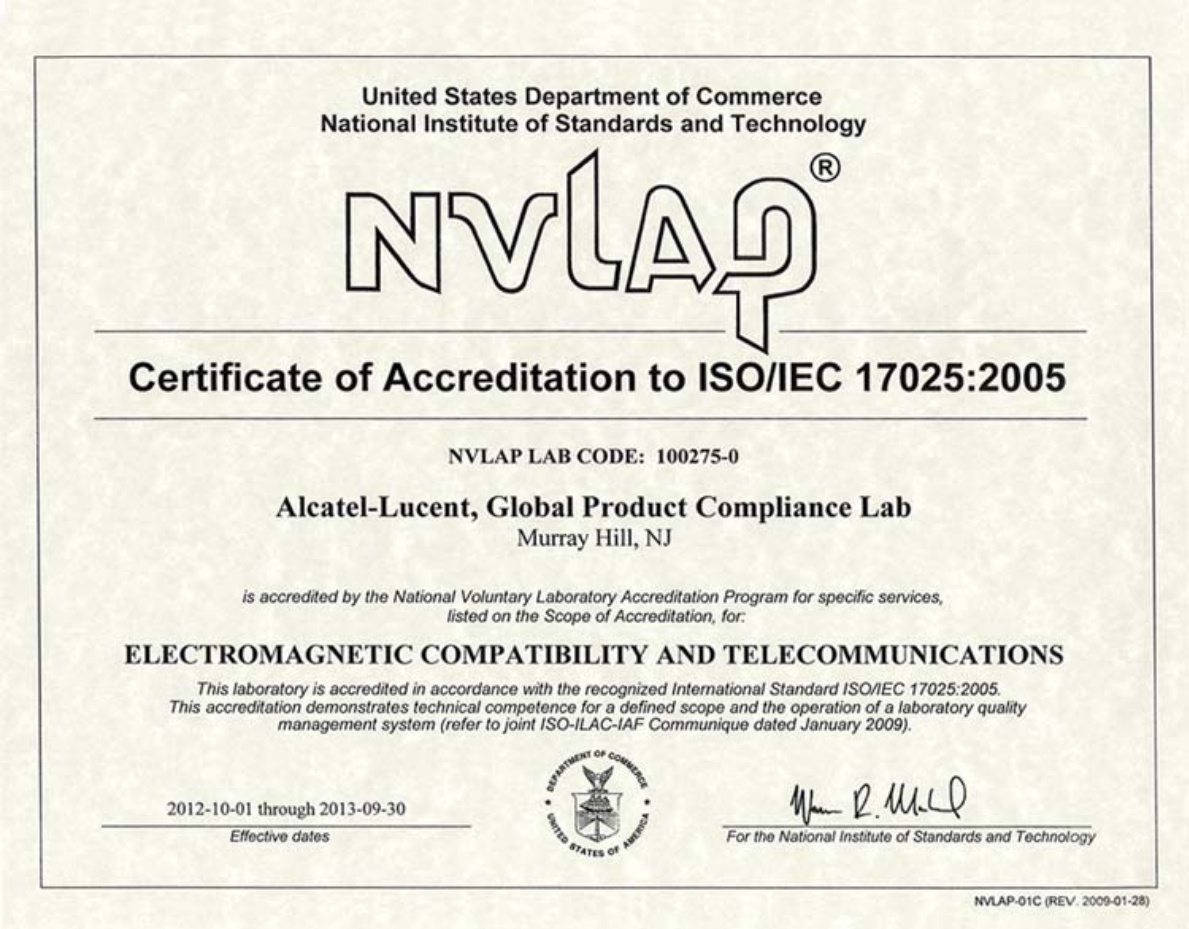
6 dB Attenuator (DC-18GHz, 5W)	Weinschel		E890	6/5/2013	12 mos
10 dB Attenuator	JFW	50F-010	SG 1	N/A	N/A
MXA Signal Analyzer	Agilent	N9020A	MY51240055	11/7/2011	24 mos
Power Supply	EA Elektronik	EA-PS 87032-050 Z	H5611	N/A	N/A
Power Meter	Rohde& Schwarz	NRP-Z11	105056	8/9/12	36 mos
Directional Coupler	Narda	4244-10	08276	N/A	N/A
Power Combiner	Pulsar	PS4-09-254/3N	0924	N/A	N/A
2 Attenuators (10W, 10dB)	Radiall	R415.710.000	N/A	N/A	N/A
Attenuator (10dB)	Radiall	R412710000	9812	N/A	N/A
Attenuator (10dB)	Radiall	R412710000	9825	N/A	N/A
EMC Receiver / SA	Rohde & Schwarz	ESIB-40	E907 / 100101	9/20/2013	12 mos
LISN 50µH 0.25 µF	Solar Electronics	9348-50-R-24-BNC	E589/018809	2/26/2013	12 mos
Attenuator, Variable, DC-18 GHz	Hewlett Packard	HP 8494B	MY42140028	N/A	N/A
Attenuator, Variable, DC-18 GHz	Hewlett Packard	HP 8495B	MY42140034	N/A	N/A
Attenuator, Fixed, 25W	MCE/Weinschel	6530-6-34 LIM	BN3226	N/A	N/A
High Pass Filter	Solar Electronics	7801-10	SM1	N/A	N/A

6. FACILITIES AND ACCREDEIATION

All measurement facilities used to collect the measurement data under normal condition are located at 600-700 Mountain Avenue, Murray Hill, New Jersey 07974-0636 USA. The field strength measurements of radiated spurious emissions are made in a FCC and IC registered 10 meter semi-anechoic chamber AR8 (FCC Site Registration Number: 328881, IC Filing Number: 6933F-8). The sites were constructed and are continuously in conformance with the requirements of ANSI C63.4 and CISPR Publication 22.

All measurement facilities used to collect the frequency stability data are located at Lorenzstrasse 10, 70435 Stuttgart, Germany.

Alcatel-Lucent Global Product Compliance Laboratory is accredited with the US Department of Commerce National Institute of Standards and Technology's National Voluntary Laboratory Accreditation Program (NVLAP) for satisfactory compliance with criteria established in Title 15, Part 7 Code of Federal Regulations for offering test services for selected test methods in Electromagnetic Compatibility; Voluntary Control Council for Interference (VCCI), Japan; Australian Communications and Media Authority (ACMA). The laboratory is ISO 9001:2008 Certified.



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This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2012-10-01 through 2013-09-30
Effective dates

For the National Institute of Standards and Technology

NVLAP-01C (REV. 2009-01-28)