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DATE: 1 December 2013

I.T.L. (PRODUCT TESTING) LTD.

FCC Radio Test Report

for

Corning MobileAccess

Equipment under test:

In-Building Distributed Antenna System

1200-AWS-AO

Written by: _____
R. Pinchuck, Documentation

Approved by: _____
A. Sharabi, Test Engineer

Approved by: _____
I. Raz, EMC Laboratory Manager

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Measurement/Technical Report for

Corning MobileAccess

In-Building Distributed Antenna System

1200-AWS-AO

FCC ID:OJFMA1200AWS

This report concerns:	Original Grant: Class II change: X Class I change:
Equipment type:	AWS Licensed Transceiver
Limits used:	47CFR Parts 2; 27

Measurement procedure used is ANSI C63.4-2003.
Substitution Method used as in ANSI/TIA-603-B: 2002

Application for Certification
prepared by:
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ITL (Product Testing) Ltd.
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Lod, 7116002
Israel
e-mail r.pinchuck@itl.co.il

Applicant for this device:
(different from "prepared by")
Steve Blum
Mobile Access Networks
8391 Old Courthouse Rd., Suite #300
Vienna, VA. 22182
U.S.A.
Tel: +1-541-758-2880
Fax: +1-703-848-0260
e-mail: blum@mobileaccess.com

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1. General Information

1.1 Administrative Information

Manufacturer:	Corning MobileAccess
Manufacturer's Address:	8391 Old Courthouse Rd. Suite #300 Vienna, VA 22182 U.S.A. Tel: +1-541-758-2880 Fax: +1-703-848-0260
Manufacturer's Representative:	Steve Blum
Equipment Under Test (E.U.T):	In-Building Distributed Antenna System
Equipment Model No.:	1200-AWS-AO
Equipment Serial No.:	0B100F4
Date of Receipt of E.U.T:	06.11.13
Start of Test:	14.11.13
End of Test:	14.11.13
Test Laboratory Location:	I.T.L (Product Testing) Ltd. Kfar Bin Nun, ISRAEL 99780
Test Specifications:	FCC Parts 2; 27

1.2 List of Accreditations

The EMC laboratory of I.T.L. is accredited by the following bodies:

1. The American Association for Laboratory Accreditation (A2LA) (U.S.A.), Certificate No. 1152.01.
2. The Federal Communications Commission (FCC) (U.S.A.), Registration No. 90715.
3. The Israel Ministry of the Environment (Israel), Registration No. 1104/01.
4. The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) (Japan), Registration Numbers: C-1350, R-1285.
5. Industry Canada (Canada), IC File No.: 46405-4025; Site No. IC 4025B-1.
6. TUV Product Services, England, ASLLAS No. 97201.

I.T.L. Product Testing Ltd. is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with I.T.L.'s terms of accreditation unless stated otherwise in the report.

1.3 Product Description

The MobileAccess AWS 1200 Add-on module is a high power module, supporting a single frequency band, 2110-2155 MHz in the Downlink mode and 1710-1755 MHz in the Uplink mode.

It is designed to be integrated with a host *RHU 1000* module. The RHU 1000 module provides the following functionality for both units:

- Optical interface (to the BU) and conversion
- RF interface (to antennas) and conversion
- Control signals

Emission Designator: G7D

1.4 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4: 2003. Radiated testing was performed at an antenna to EUT distance of 3 meters.

1.5 Test Facility

The radiated emissions tests were performed at I.T.L.'s testing facility at Kfar Bin-Nun, Israel. This site is a FCC listed test laboratory (FCC Registration No. 90715, date of listing September 2, 2009).
I.T.L.'s EMC Laboratory is also accredited by A2LA, certificate No. 1152.01.

1.6 Measurement Uncertainty

Radiated Emission

Radiated Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4) for open site 30-1000MHz:

Expanded Uncertainty (95% Confidence, K=2):
± 4.96 dB

2. System Test Configuration

2.1 Justification

A FCC Grant was issued for the E.U.T. on May 7, 2009. The LTE modulation has been added to the AWS band requiring a C2PC. The following tests were performed:

RF power output
Occupied bandwidth
Spurious emissions at antenna terminals
Band edge spectrum
Spurious radiated emissions

2.2 EUT Exercise Software

The E.U.T is operated by the Embedded SW version 3.5 b00 and managed by the NMS SW version 22.05.01. The SW is used by the professional installers to operate, maintain and calibrate the unit. The main features are enabling and disabling transmission and adjusting unit output power per a given input signal.

2.3 Special Accessories

No special accessories were needed in order to achieve compliance.

2.4 Equipment Modifications

No modifications were necessary in order to achieve compliance.

2.5 Configuration of Tested System

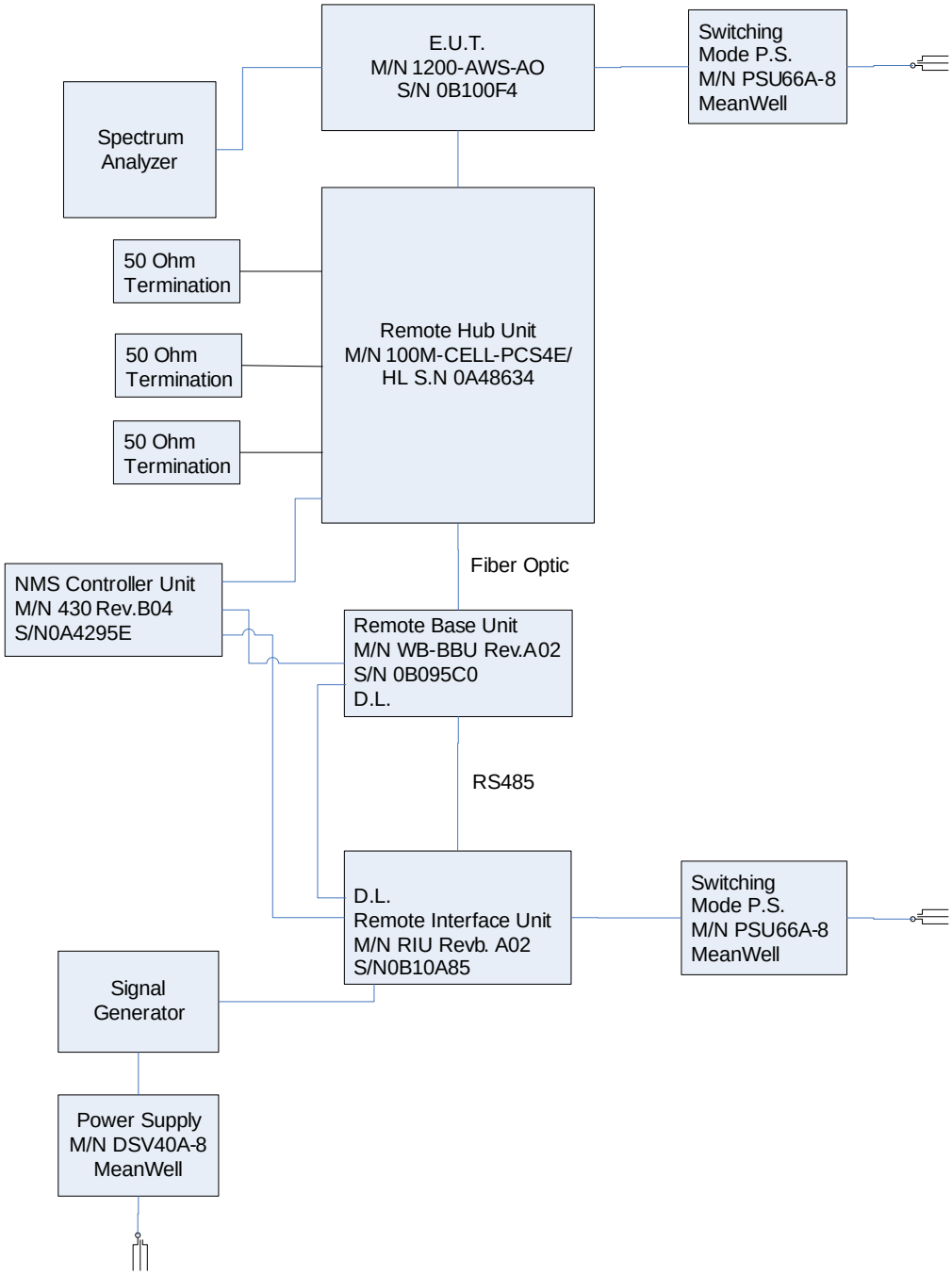

Figure 1. Test Set-up

3. Test Set-up Photos

Figure 2. Radiated Emission Test

Figure 3. Radiated Emission Test

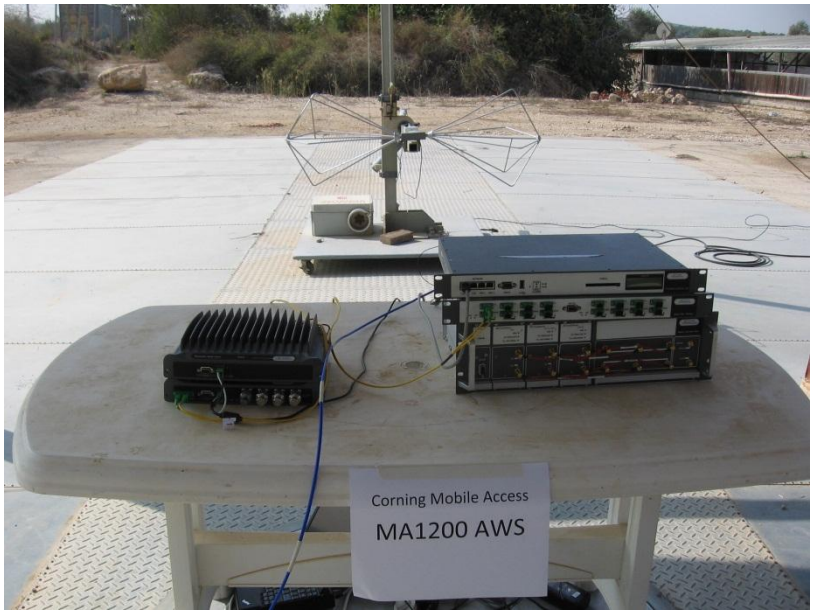

Figure 4. Radiated Emission Test

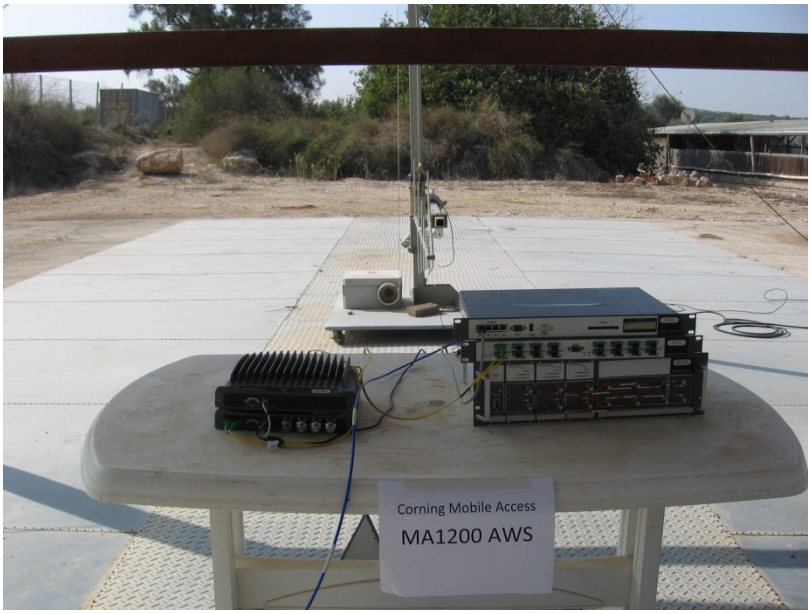

Figure 5. Radiated Emission Test

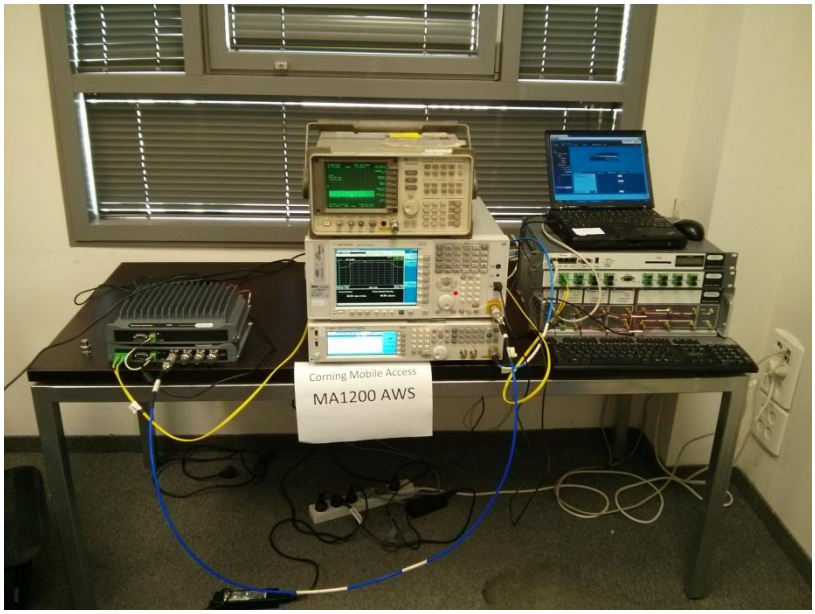

Figure 6. Conducted Emission Test

4. RF Power Output

4.1 Test Specification

FCC Part 27, Subpart C (27.50(d))

4.2 Test procedure

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator (20 dB) and an appropriate coaxial cable . The E.U.T. RF output was LTE modulated. Special attention was taken to prevent Spectrum Analyzer RF input overload. The Spectrum Analyzer was set to 100KHz RBW.

Emission Designator: G7D

	emission bandwidth of 1 MHz or less (EIRP)	emission bandwidth greater than 1 MHz (EIRP)
(d)(1)any county with population density of 100 or fewer persons per square mile	3280 watts	3280 watts/MHz
any geographic location other than that described in paragraph (d)(1)	1640 watts	1640 watts/MHz

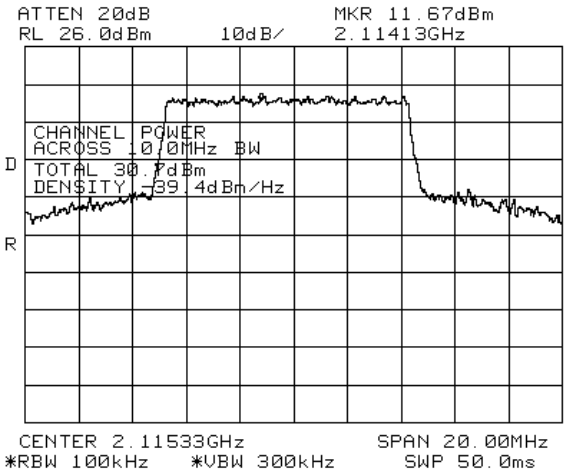

Figure 7.— LTE – Low Channel – QPSK

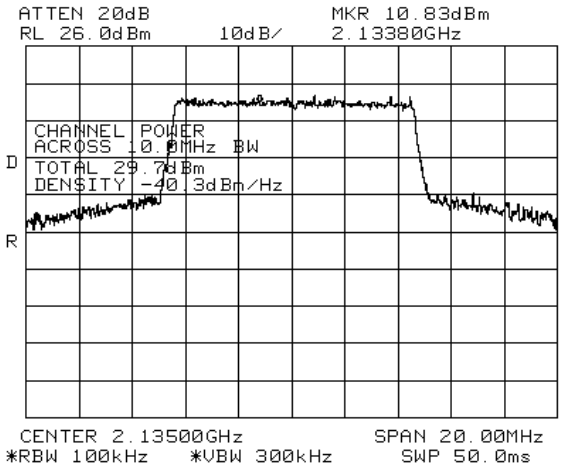

Figure 8.— LTE – Mid Channel – QPSK

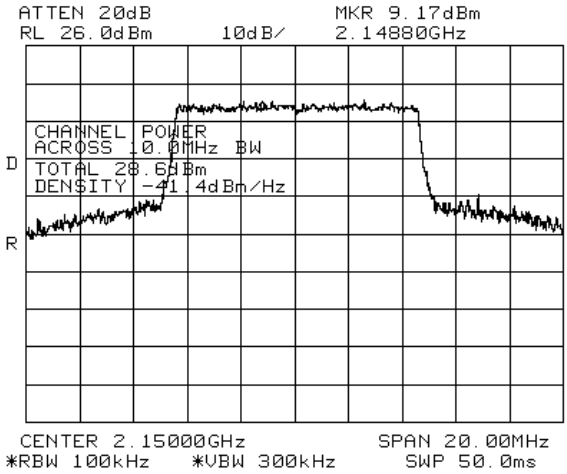

Figure 9.— LTE – High Channel – QPSK

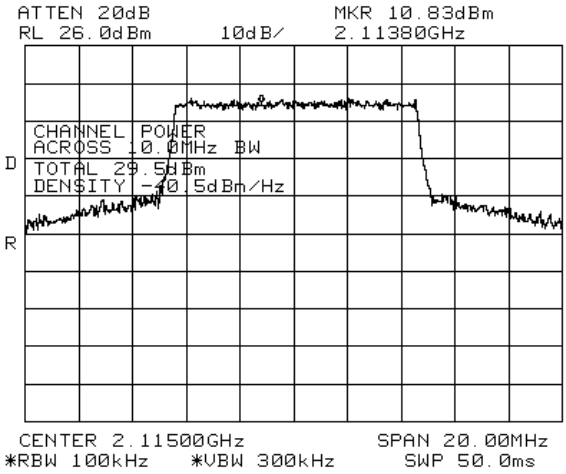

Figure 10.— LTE – Low Channel – 16QAM

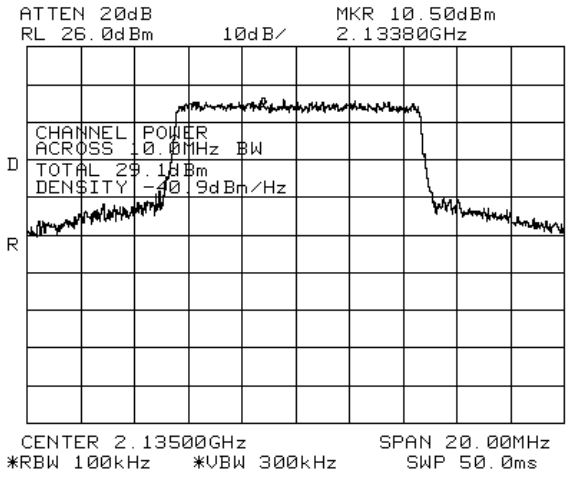

Figure 11.— LTE – Mid Channel - 16QAM

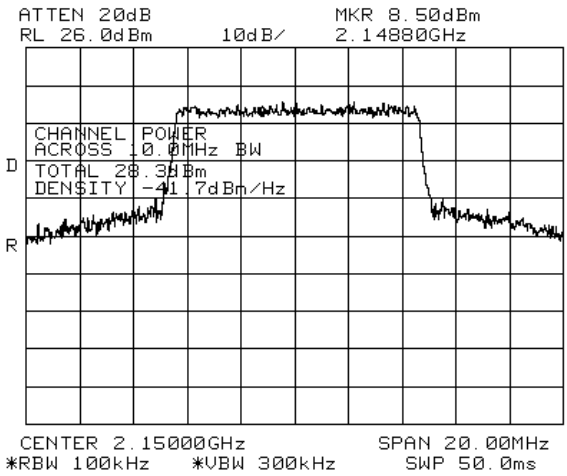

Figure 12.— LTE – High Channel – 16QAM

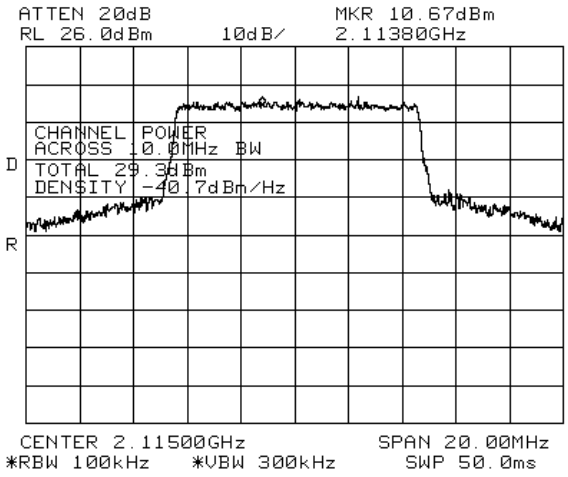

Figure 13.— LTE – Low Channel – 64QAM

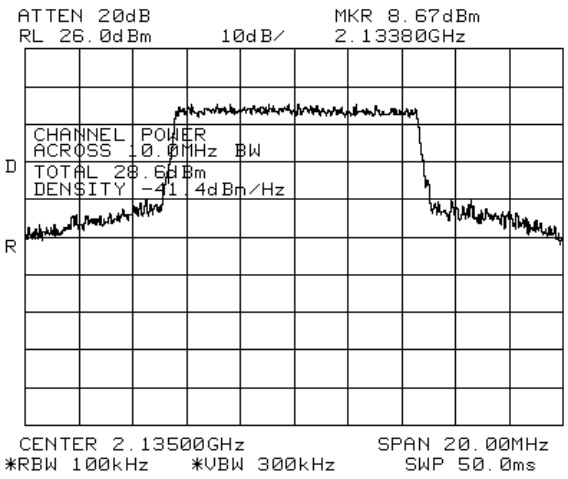

Figure 14.— LTE – Mid Channel - 64QAM

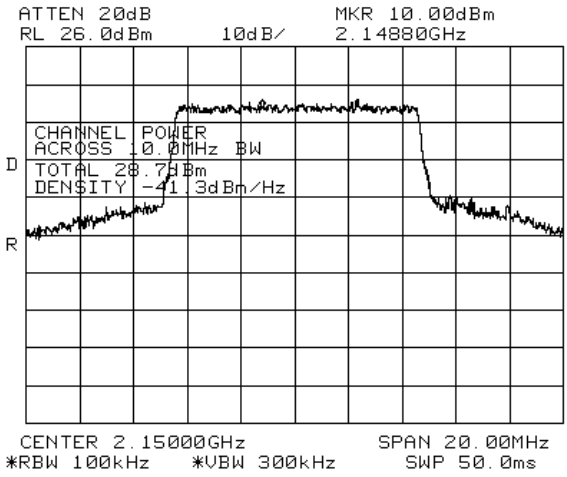

Figure 15.— LTE – High Channel – 64QAM

4.3 Results table

E.U.T. Description: In-Building Distributed Antenna System
Model No.: 1200-AWS-AO
Serial Number: 0B100F4
Specification: FCC Part 27, Subpart C, Section 27.50 (d)

Modulation	Operation Frequency (MHz)	Reading (dBm)
QPSK	2115.0	30.7
QPSK	2135.0	29.7
QPSK	2150.0	28.6
16QAM	2115.0	29.5
16QAM	2135.0	29.1
16QAM	2150.0	28.3
64QAM	2115.0	29.3
64QAM	2135.0	28.6
64QAM	2150.0	28.7

Figure 16 RF Power Output

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 10.12.13

Typed/Printed Name: A. Sharabi

4.4 Test Equipment Used.

RF Power Output

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	Agilent	N9010A EXA	MY49061070	July 28, 2013	1 year
Spectrum Analyzer	HP	8564E	3313U00346	February 28, 2013	1 year
Signal Generator	Agilent	N5172B EXG	MY51350549	December 28, 2012	1 year
Attenuator	MCE	46-30-34	BN4927	November 12, 2013	1 year
Cable	Mini-Circuits	30091	-	November 12, 2013	1 year

Figure 17 Test Equipment Used

5. Occupied Bandwidth

5.1 Test Specification

FCC Part 2, Section 1049

5.2 Test Procedure

The E.U.T. was set to the applicable test frequency and modulation. The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator (at the output test) and an appropriate coaxial cable. The spectrum analyzer was set to proper resolution B.W.
The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limit, the mean powers radiated are each equal to 0.5% of the total mean power radiated by a given emission.
Occupied bandwidth measured was repeated in the input terminal of the E.U.T.

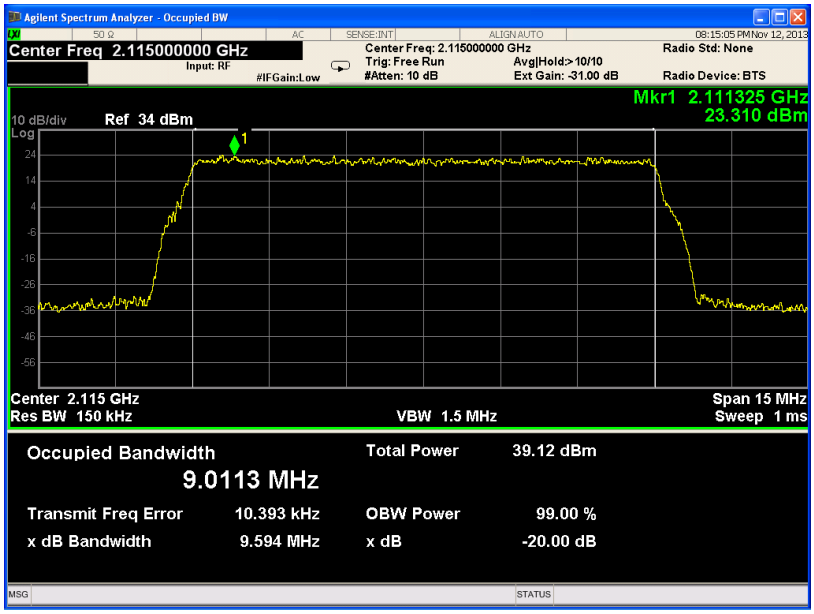

Figure 18.— 16QAM (LOW CHANNEL) IN

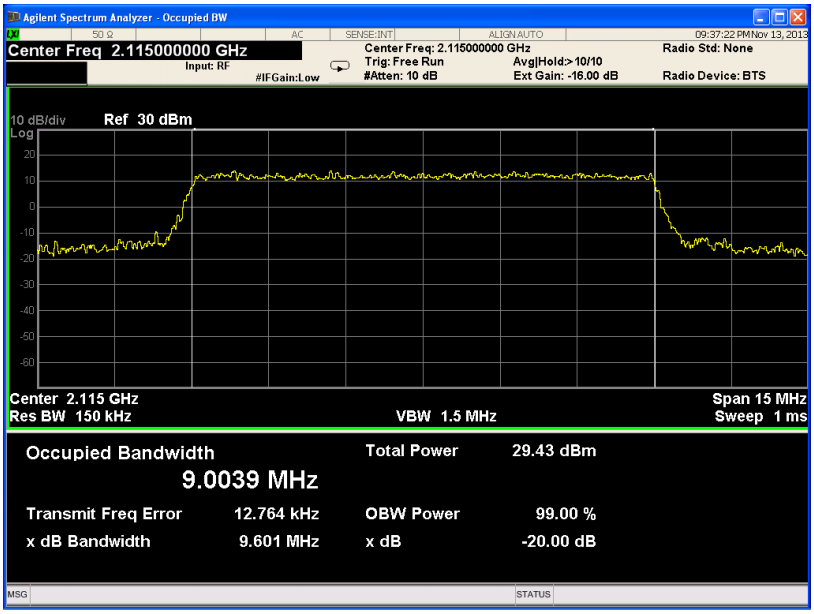

Figure 19.— 16QAM (LOW CHANNEL) OUT

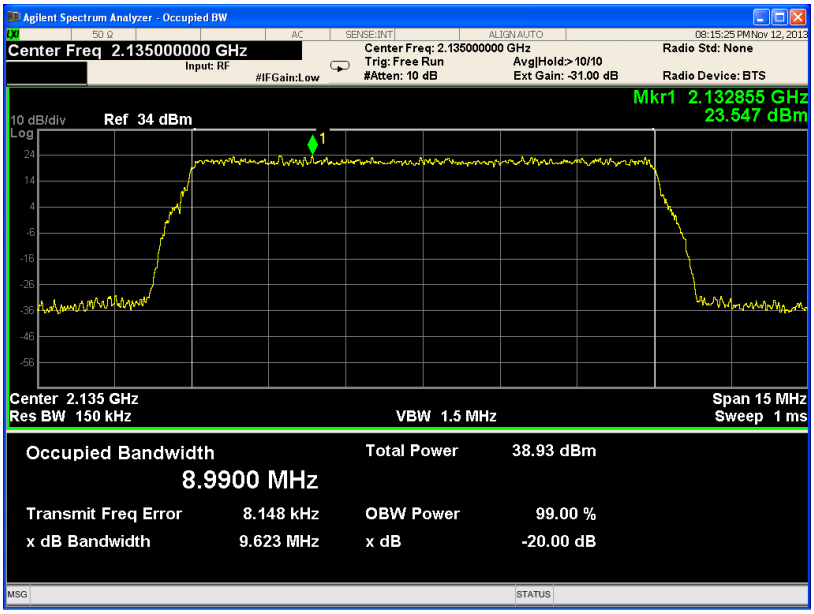

Figure 20.— 16QAM (MID CHANNEL) IN

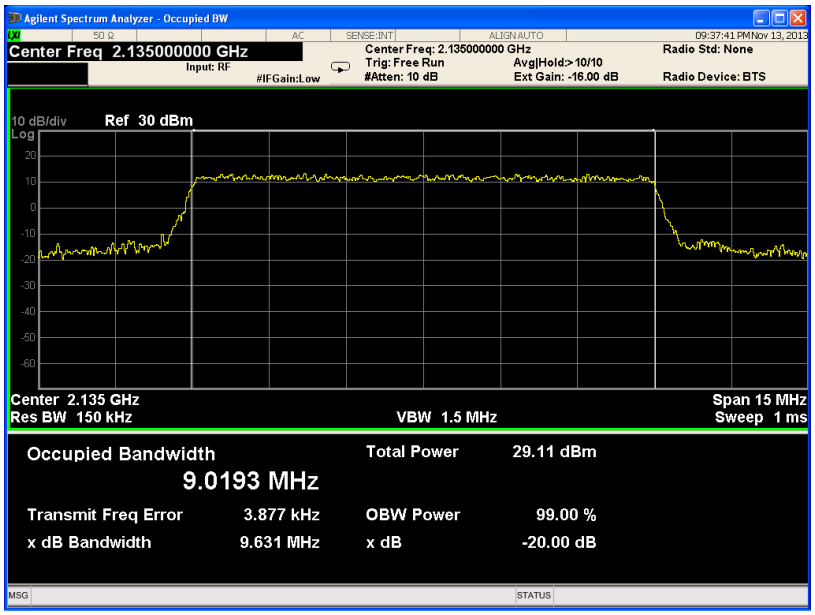

Figure 21.— 16QAM (MID CHANNEL) OUT

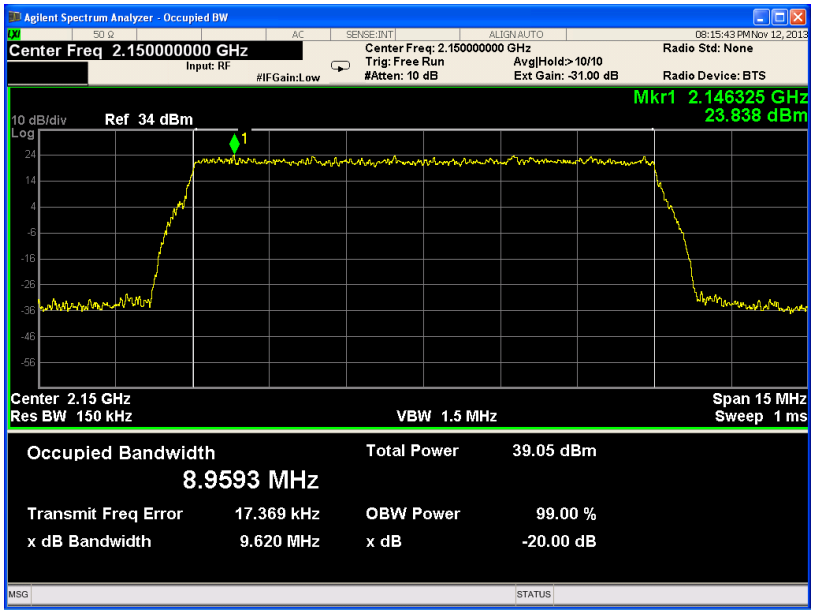

Figure 22.— 16 QAM (HIGH CHANNEL) IN

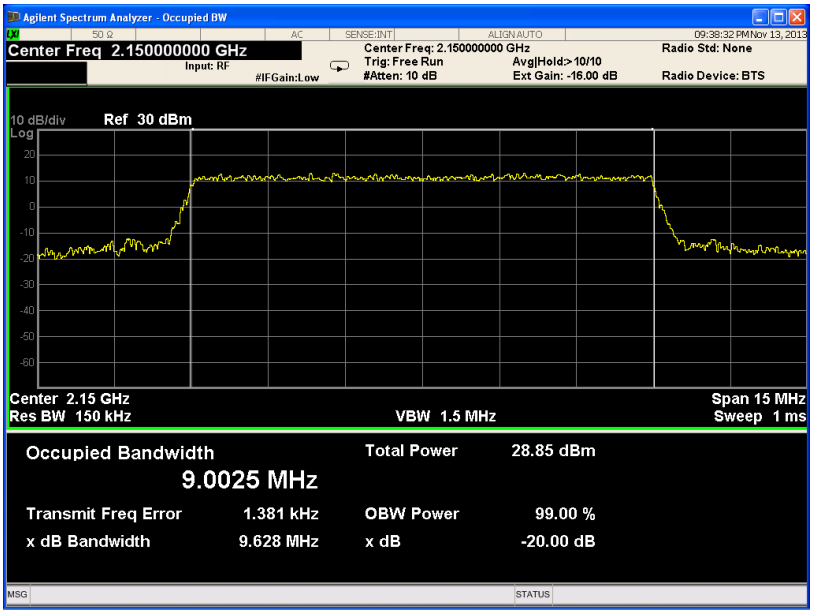

Figure 23.— 16QAM (HIGH CHANNEL) OUT

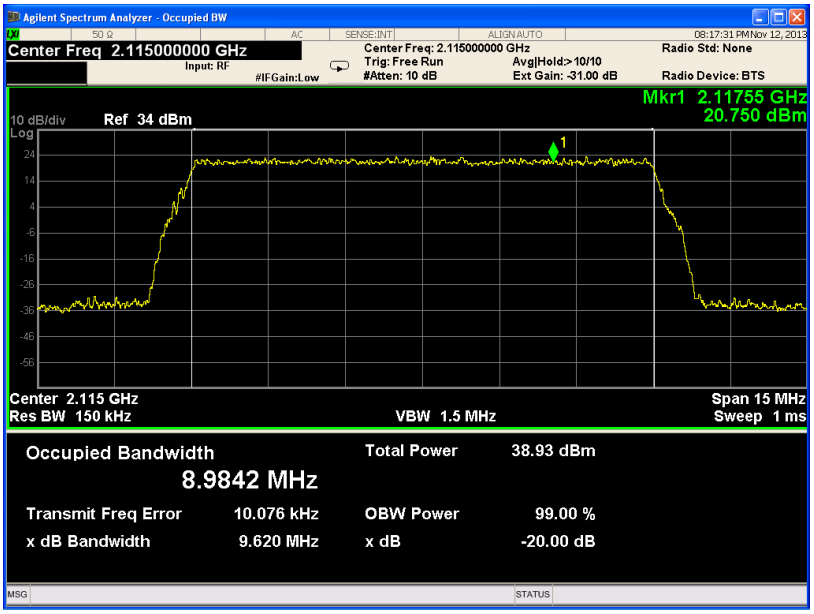

Figure 24.— 64QAM (LOW CHANNEL) IN

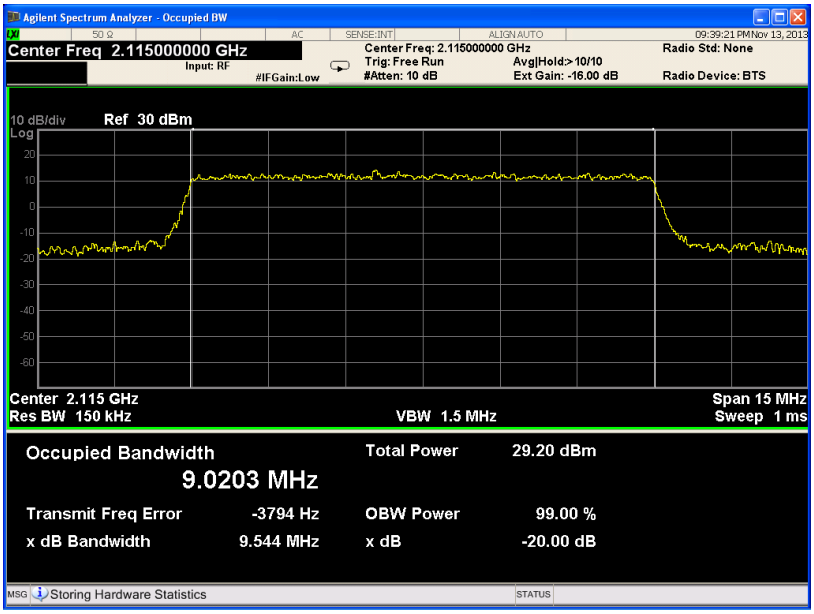

Figure 25.— 64QAM (LOW CHANNEL) OUT

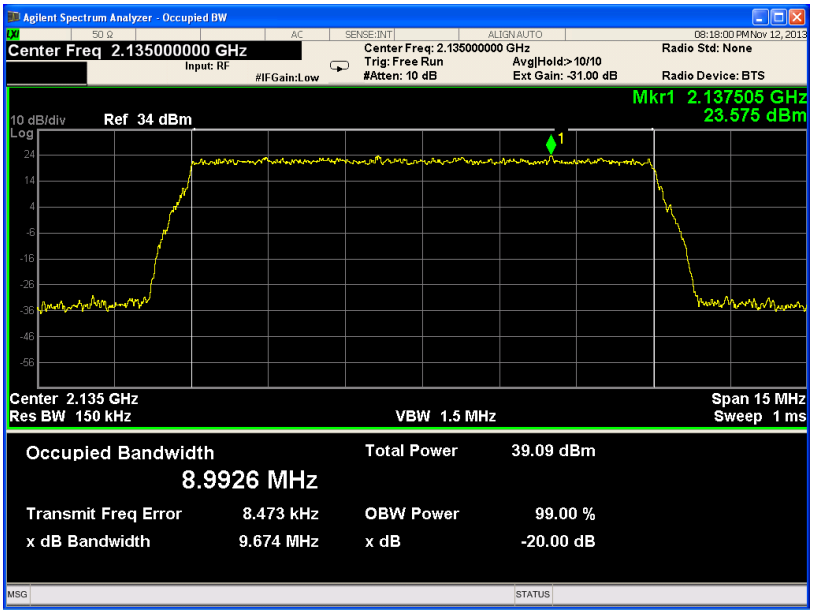

Figure 26.— 64QAM (MID CHANNEL) IN

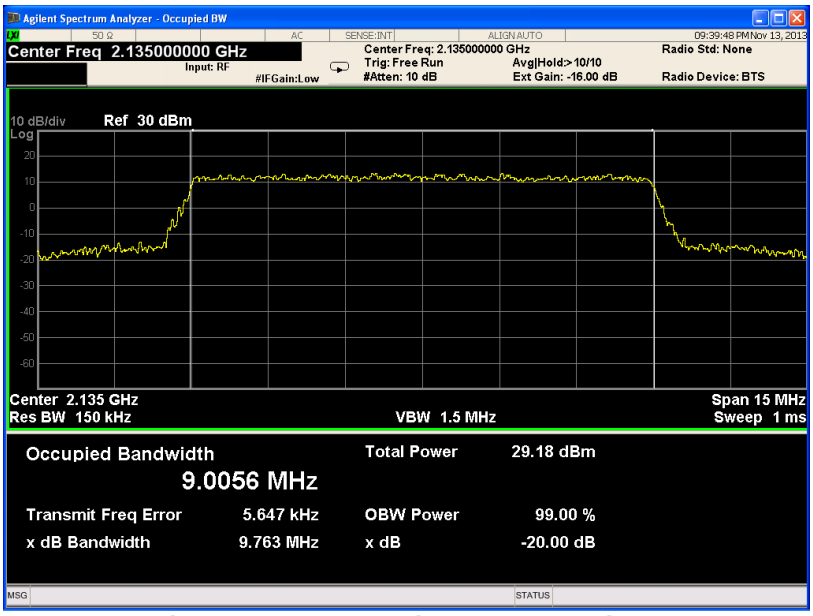

Figure 27.— 64QAM (MID CHANNEL) OUT

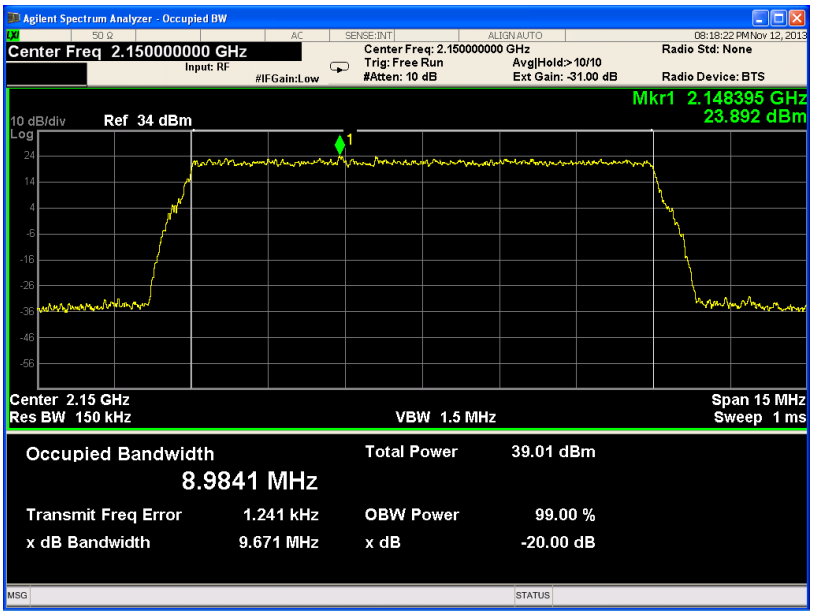

Figure 28.— 64QAM (HIGH CHANNEL) IN

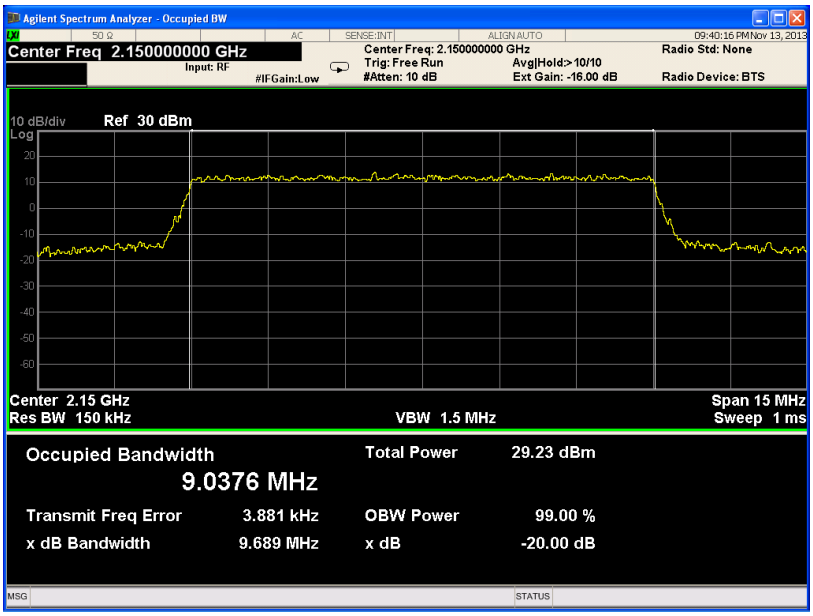

Figure 29.— 64QAM (HIGH CHANNEL) OUT

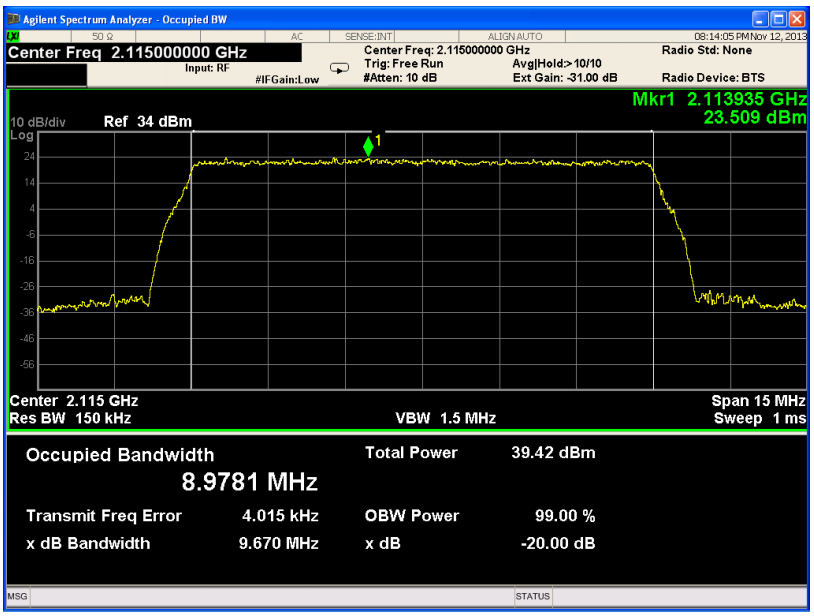

Figure 30.— QPSK (LOW CHANNEL) IN

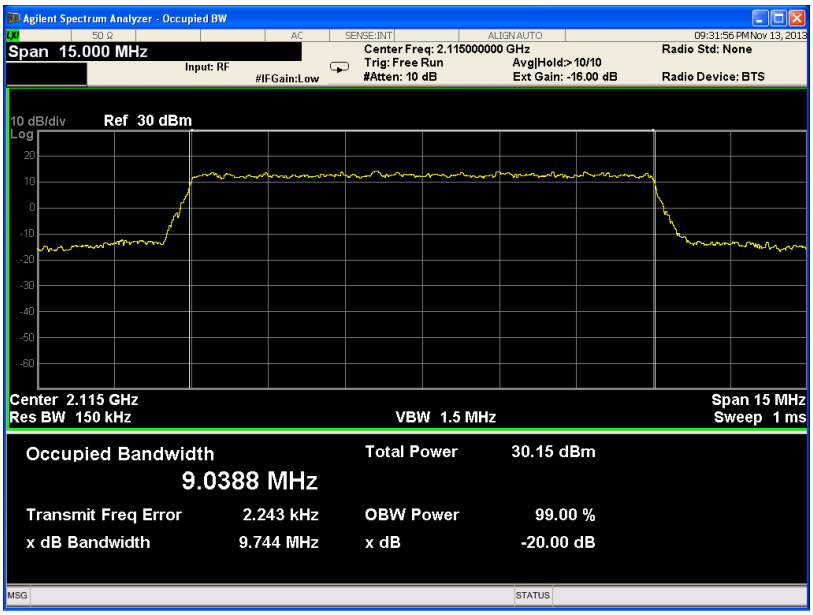

Figure 31.— QPSK (LOW CHANNEL) OUT

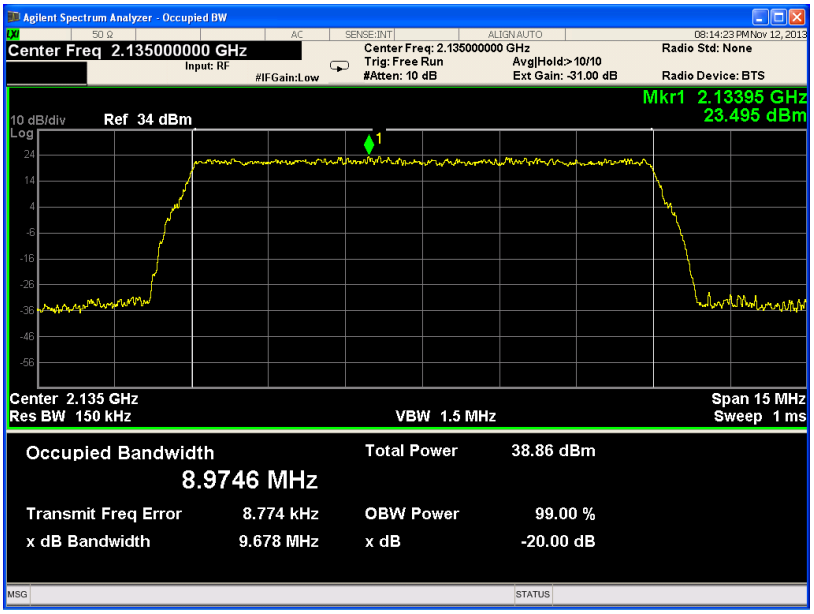

Figure 32.— QPSK (MID CHANNEL) IN

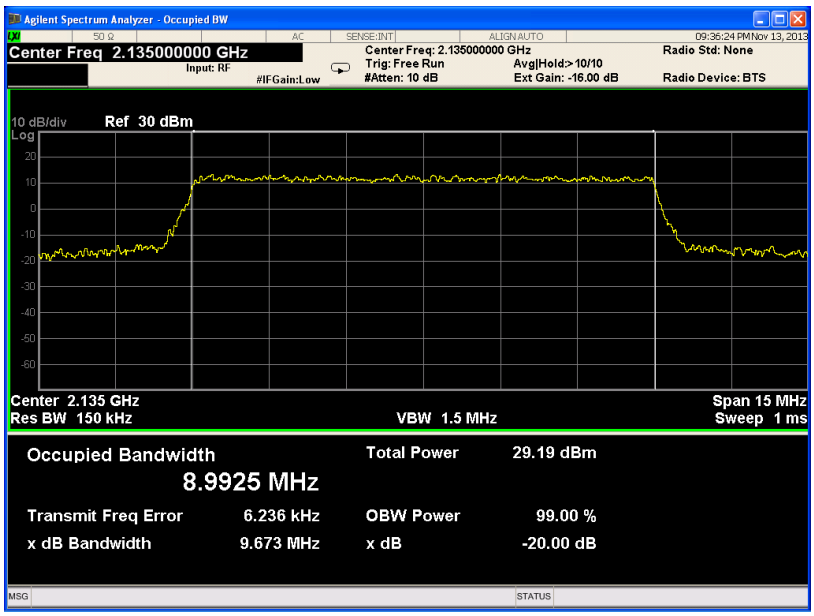

Figure 33.— QPSK (MID CHANNEL) OUT

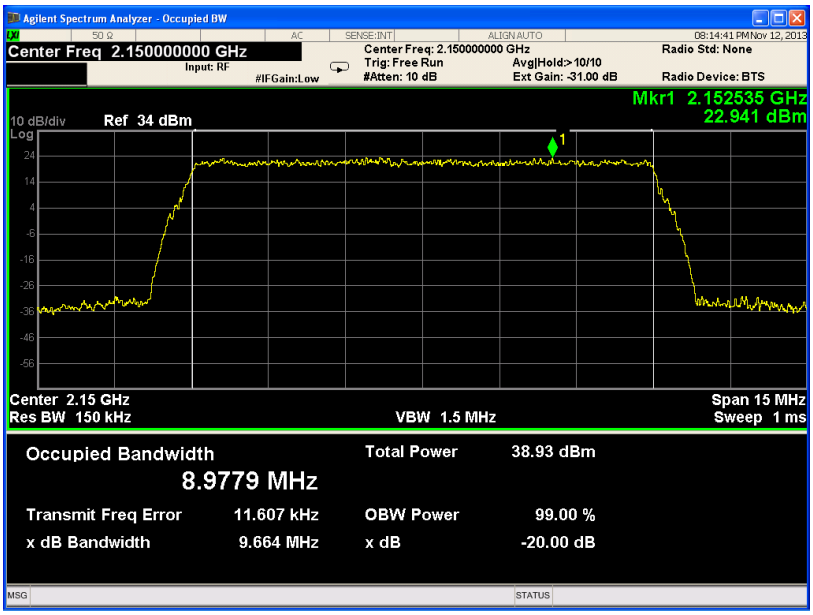

Figure 34.— QPSK (HIGH CHANNEL) IN

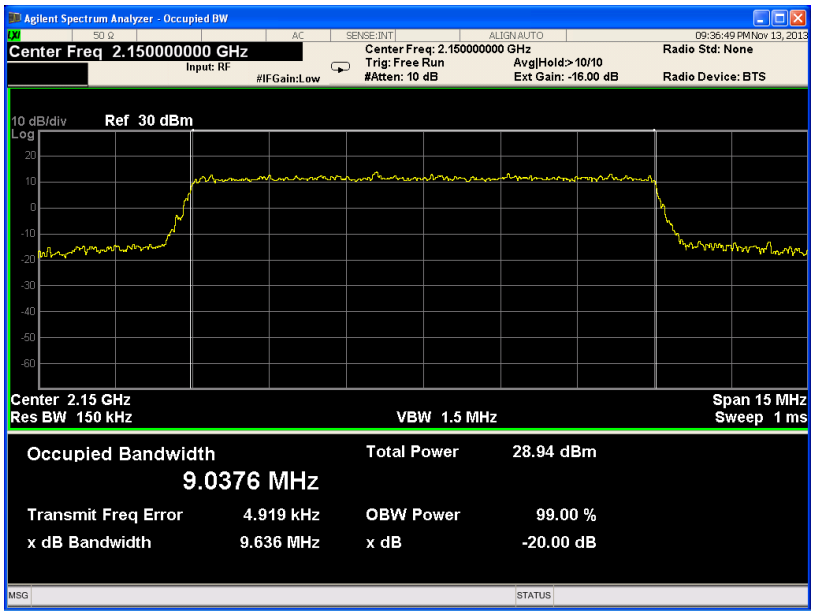

Figure 35.— QPSK (HIGH CHANNEL) OUT

5.3 Results Table

E.U.T. Description: In-Building Distributed Antenna System
Model No.: 1200-AWS-AO
Serial Number: 0B100F4
Specification: FCC Part 2, Section 1049

Modulation	Input/ Output	Operating Frequency	Reading
		(MHz)	(MHz)
16QAM	Input	Low	9.0113
	Output	Low	9.0039
	Input	Mid	8.9900
	Output	Mid	9.0193
	Input	High	8.9593
	Output	High	9.0025
64 QAM	Input	Low	8.9842
	Output	Low	9.0203
	Input	Mid	8.9926
	Output	Mid	9.0056
	Input	High	8.9841
	Output	High	9.0376
QPSK	Input	Low	8.9781
	Output	Low	9.0388
	Input	Mid	8.9746
	Output	Mid	8.9925
	Input	High	8.9779
	Output	High	9.0376

Figure 36 Occupied Bandwidth

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date:10.12.2013

Typed/Printed Name: A. Sharabi

5.4 Test Equipment Used.

Occupied Bandwidth

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	Agilent	N9010A EXA	MY49061070	July 28, 2013	1 year
Spectrum Analyzer	HP	8564E	3313U00346	February 28, 2013	1 year
Signal Generator	Agilent	N5172B EXG	MY51350549	December 28, 2012	1 year
Attenuator	MCE	46-30-34	BN4927	November 12, 2013	1 year
Cable	Mini-Circuits	30091	-	November 12, 2013	1 year

Figure 37 Test Equipment Used

6. Spurious Emissions at Antenna Terminals

6.1 Test Specification

FCC Part 27, Subpart C, Section 27.53 (g)

6.2 Test procedure

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + log (P) dB, yielding –13dBm.
The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator and an appropriate coaxial cable.

6.3 Results

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 10.12.2013

Typed/Printed Name: A. Sharabi

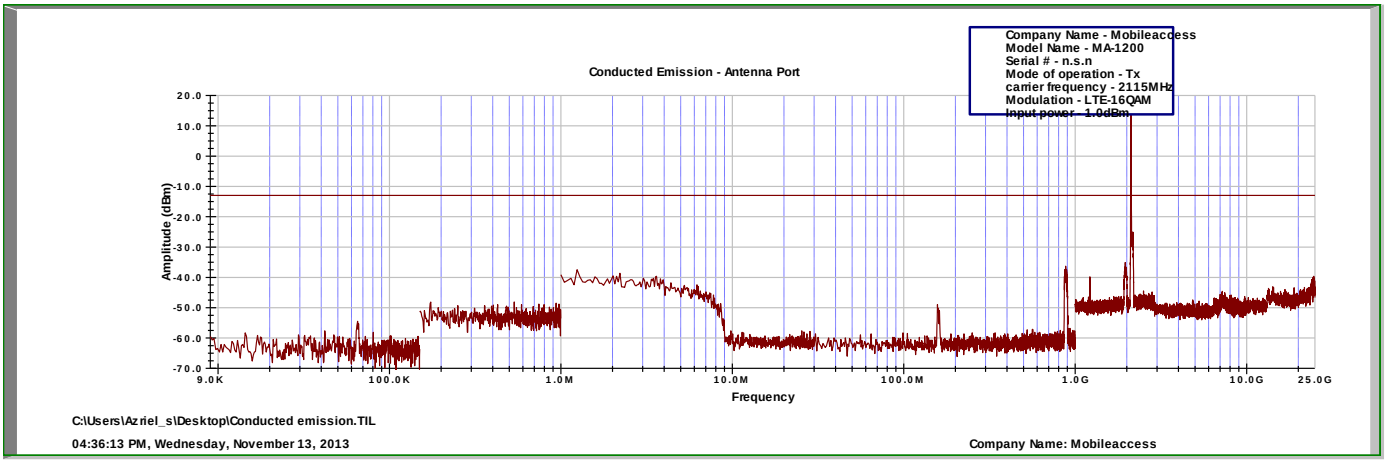

Figure 38.— 16QAM (Low)

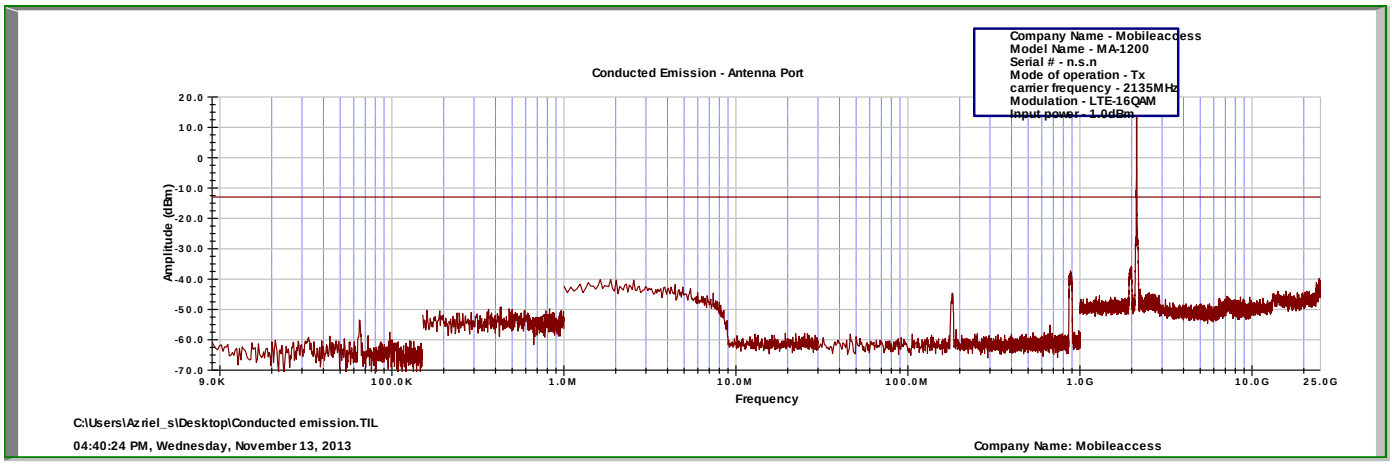

Figure 39.— 16QAM (Mid)

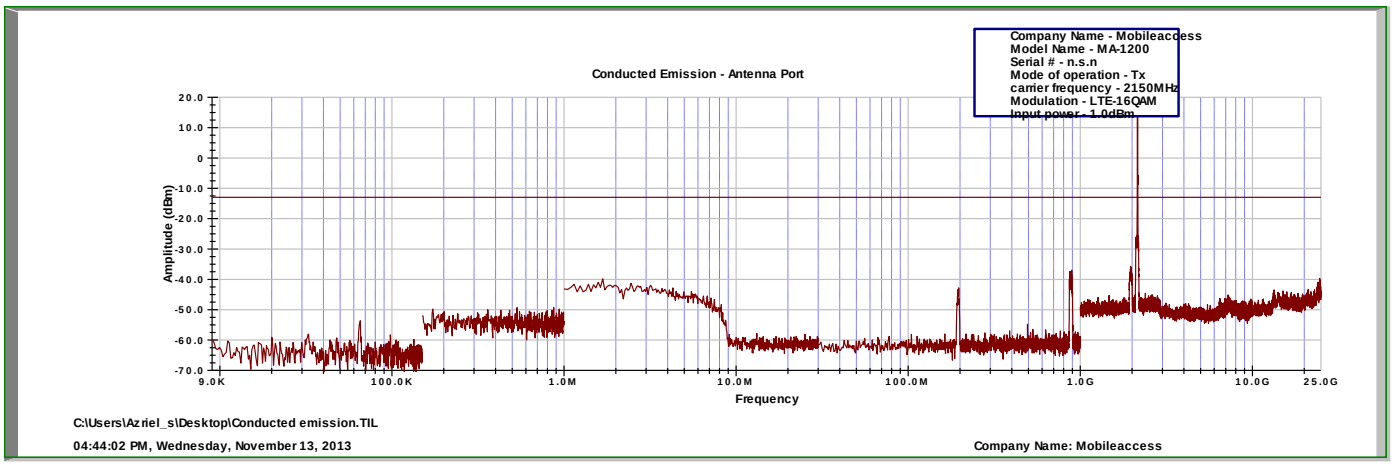

Figure 40.— 16QAM (High)

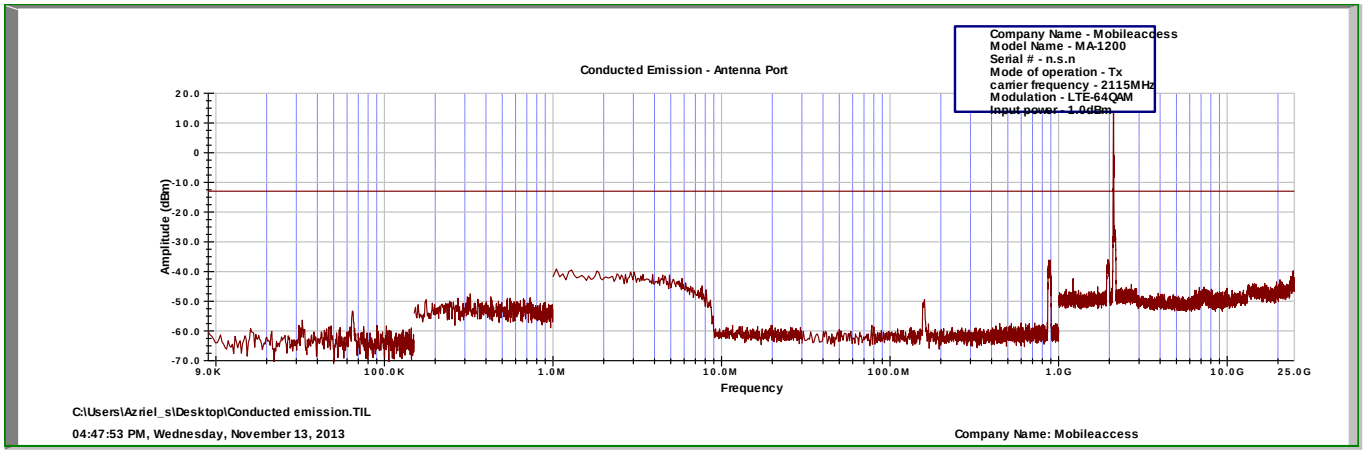

Figure 41.— 64QAM (Low)

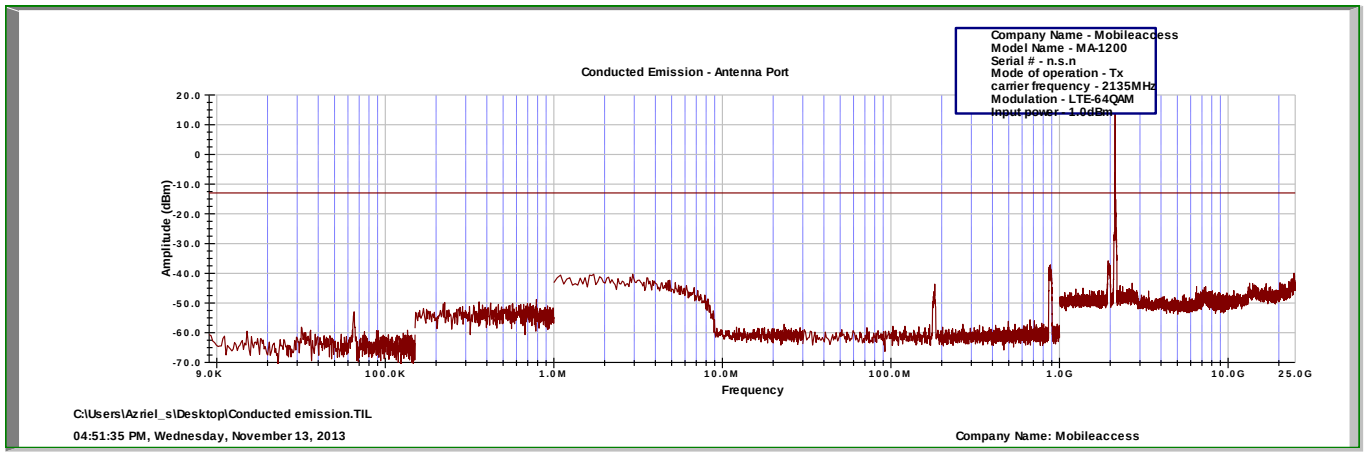

Figure 42.— 64QAM (Mid)

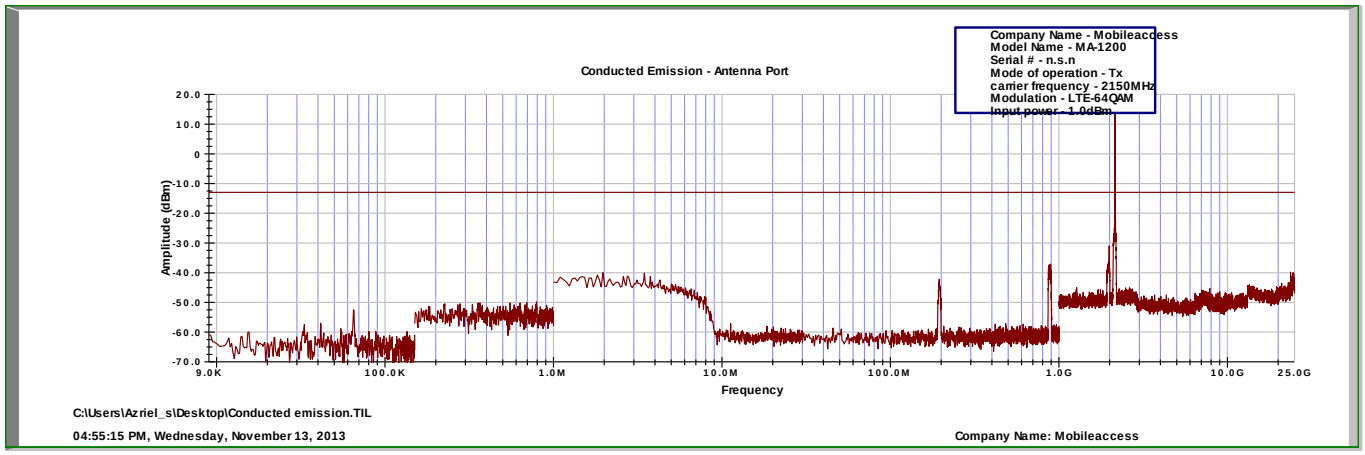

Figure 43.— 64QAM (High)

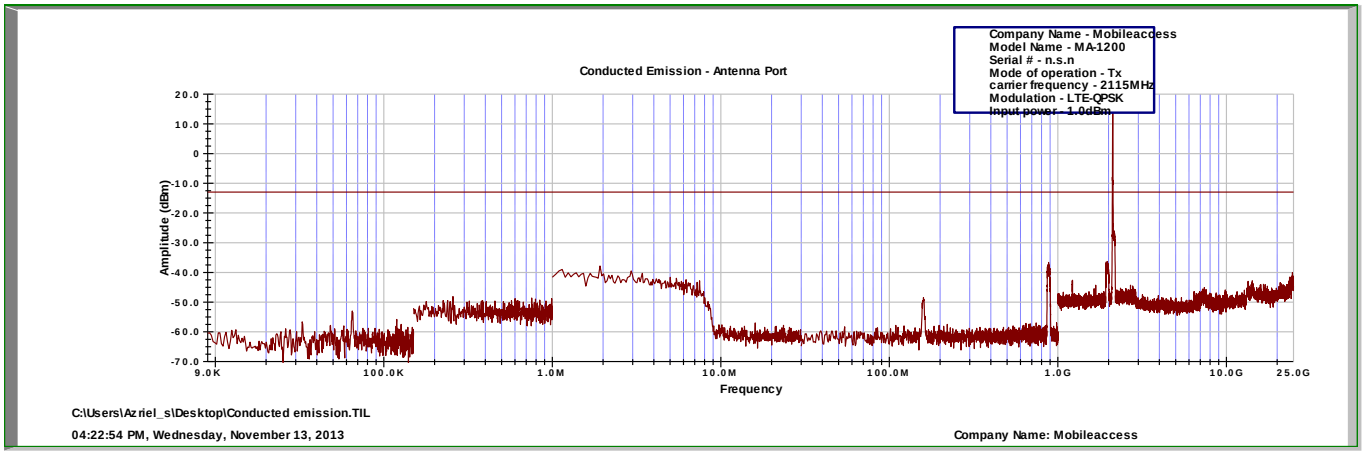

Figure 44.— QPSK (Low)

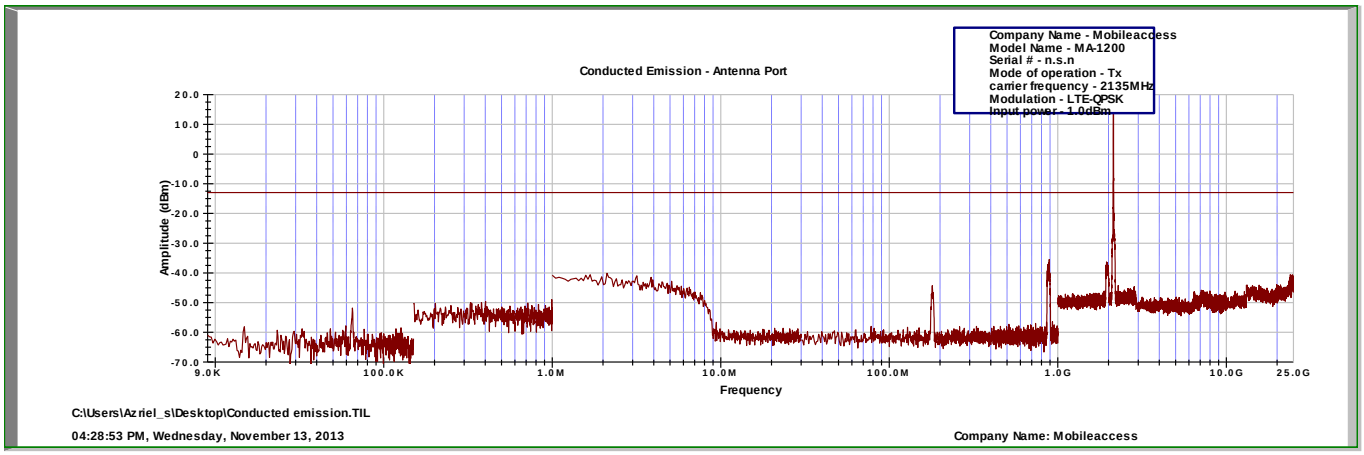

Figure 45.— QPSK (Mid)

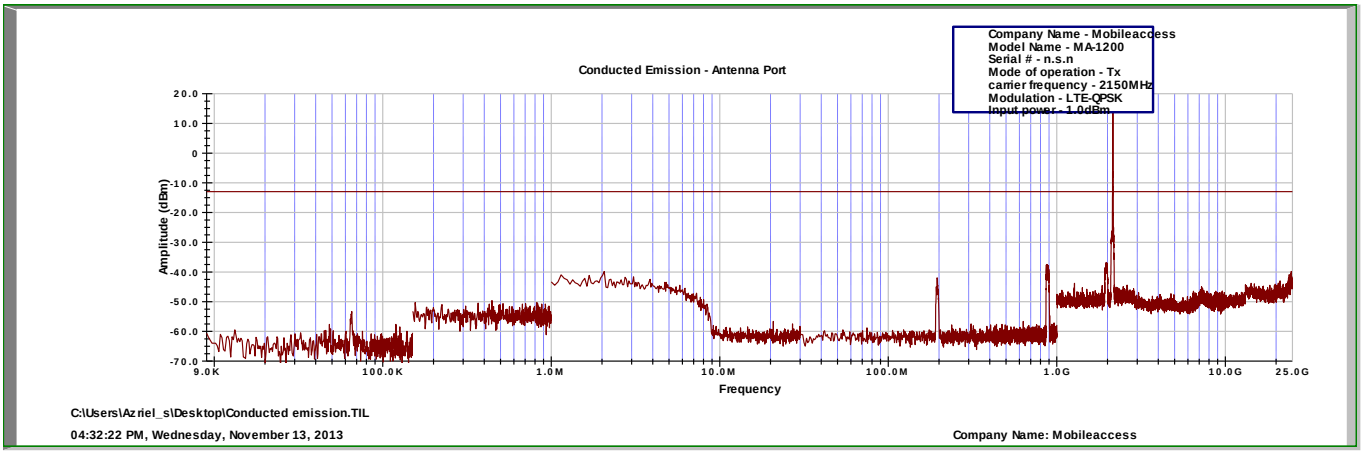

Figure 46.— QPSK (High)

6.4 Test Equipment Used.

Spurious Emissions at Antenna Terminals

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	Agilent	N9010A EXA	MY49061070	July 28, 2013	1 year
Spectrum Analyzer	HP	8564E	3313U00346	February 28, 2013	1 year
Signal Generator	Agilent	N5172B EXG	MY51350549	December 28, 2012	1 year
Attenuator	MCE	46-30-34	BN4927	November 12, 2013	1 year
Cable	Mini-Circuits	30091	-	November 12, 2013	1 year

Figure 47 Test Equipment Used

7. Band Edge Spectrum

7.1 Test Specification

FCC Part 27, Subpart C, Section 27.53 (m 4-6)

7.2 Test procedure

Enclosed are spectrum analyzer plots for the lowest operation frequency and the highest operation frequency in which the E.U.T. is planned to be used.

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + log (P) dB, yielding –13dBm.
The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator and an appropriate coaxial cable
The spectrum analyzer was set to 30kHz R.B.W.

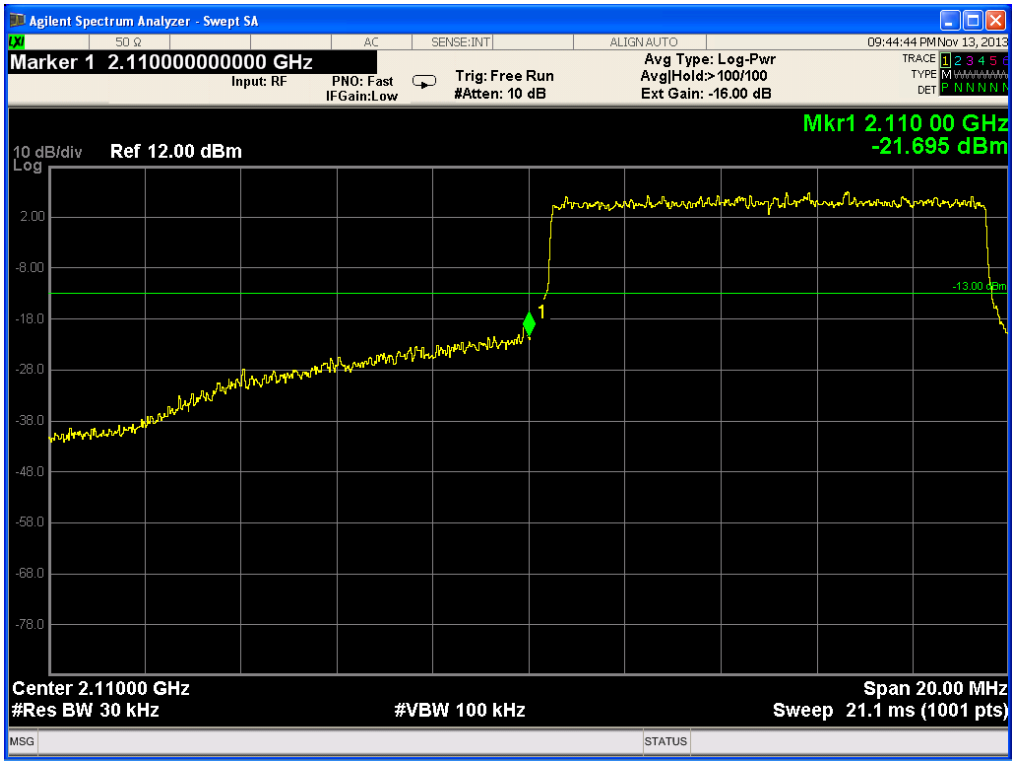

Figure 48.— 16QAM - LOW

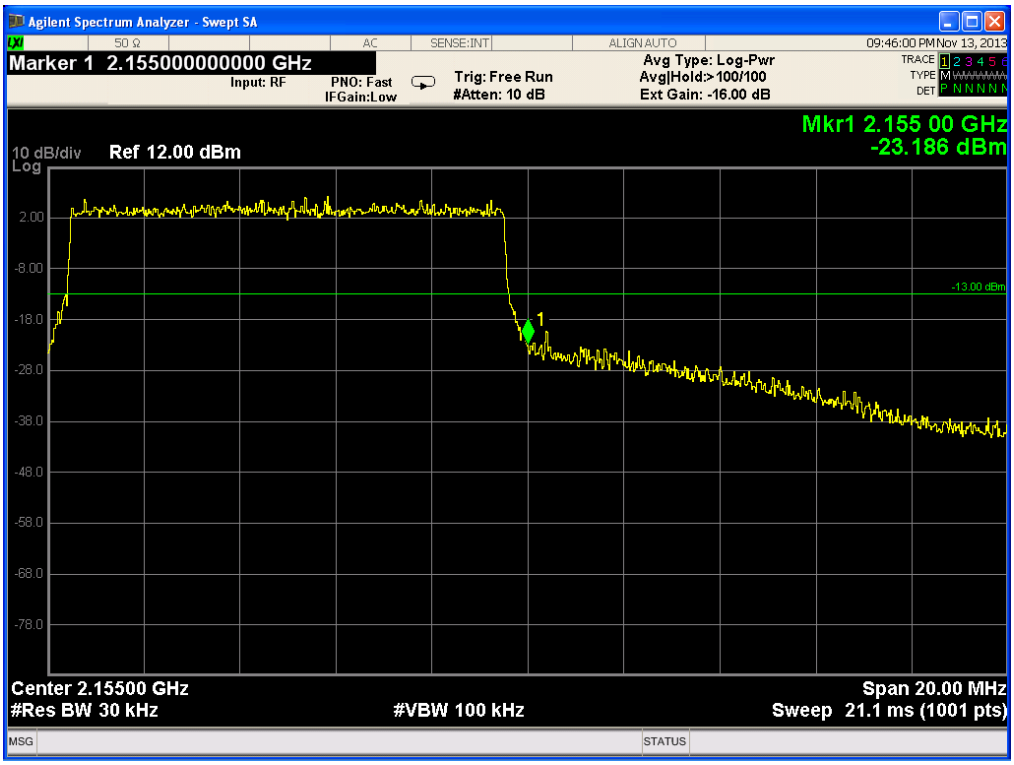

Figure 49.— 16QAM HIGH

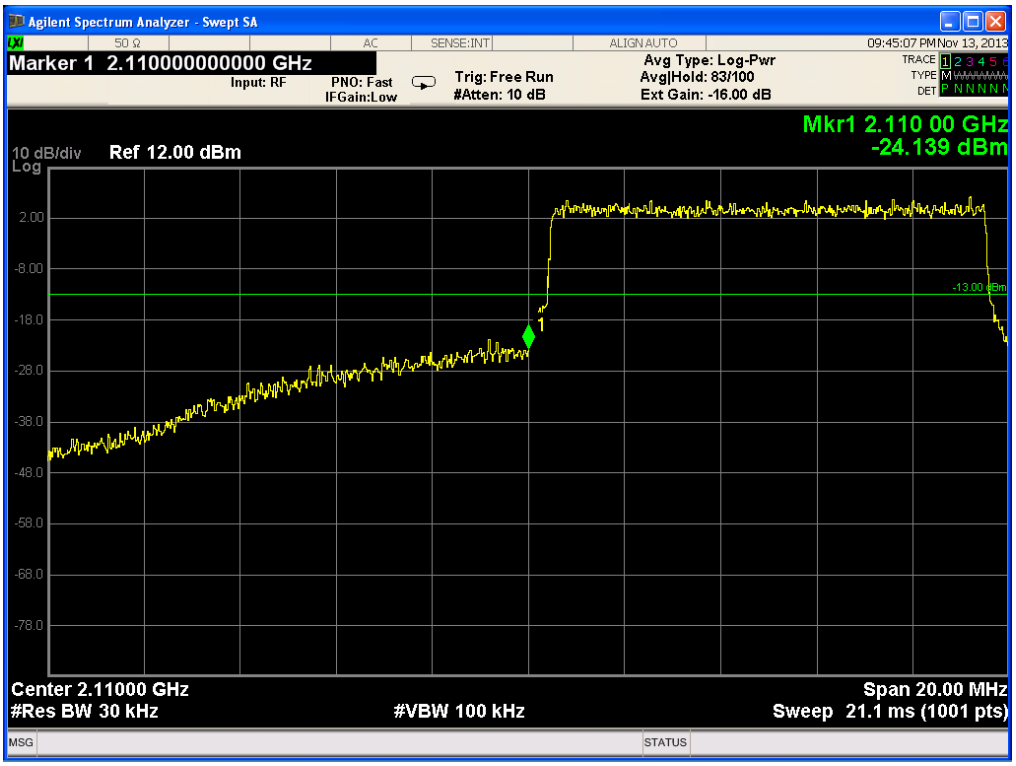

Figure 50.— 64QAM LOW

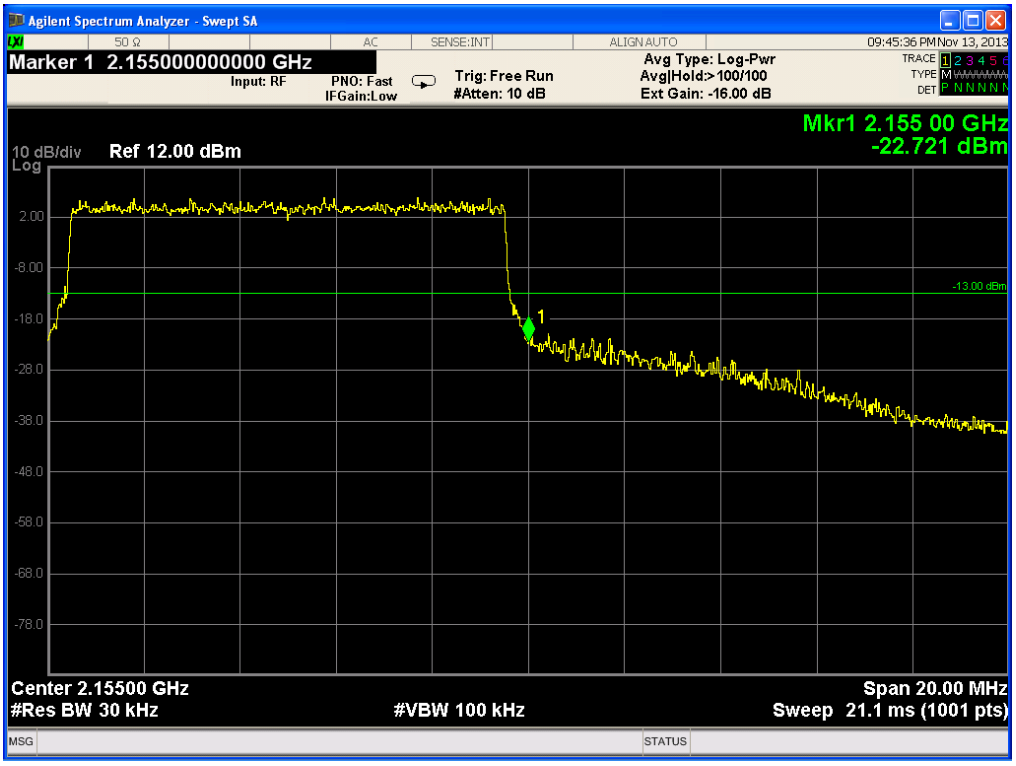

Figure 51.— 64QAM HIGH

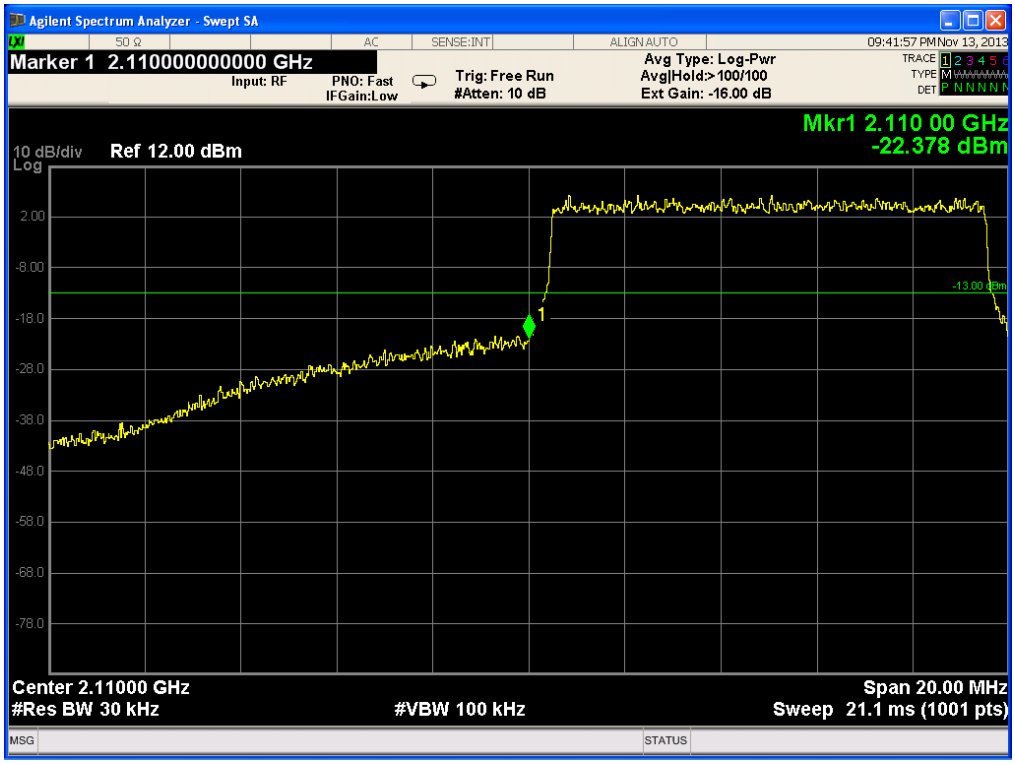

Figure 52.— QPSK LOW

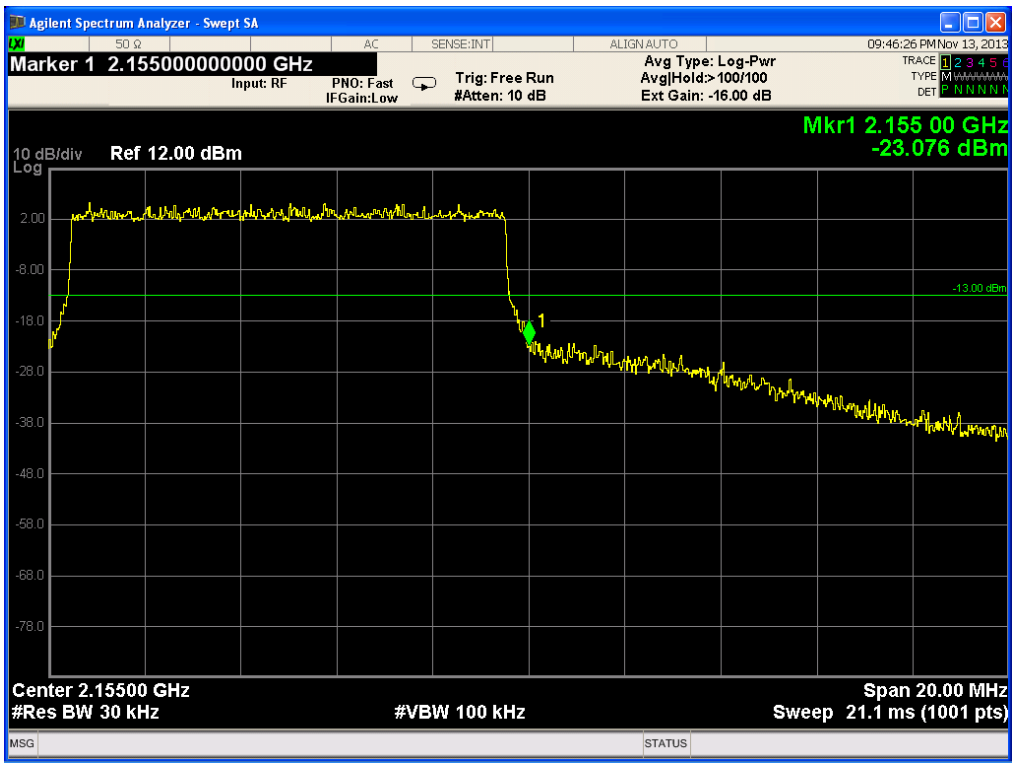

Figure 53.— QPSK HIGH

1.1 Results

E.U.T. Description: In-Building Distributed Antenna System
Model No.: 1200-AWS-AO
Serial Number: 0B100F4
Specification: FCC Part 27, Subpart C, Section 27.53 (m 4-6)

Modulation	Operation Frequency (MHz)	Band Edge Frequency (MHz)	Reading (dBm)	Specification (dBm)
16QAM	2115.00	2110.0	-21.695	-13.0
16QAM	2150.00	2155.0	-23.186	-13.0
64QAM	2115.00	2110.0	-24.139	-13.0
64QAM	2150.00	2155.0	-22.721	-13.0
QPSK	2115.00	2110.0	-22.378	-13.0
QPSK	2150.00	2155.0	-23.076	-13.0

Figure 54 Band Edge Spectrum Results AWS

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 10.12.13

Typed/Printed Name: A. Sharabi

7.3 Test Equipment Used.

Band Edge Spectrum

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	Agilent	N9010A EXA	MY49061070	July 28, 2013	1 year
Spectrum Analyzer	HP	8564E	3313U00346	February 28, 2013	1 year
Signal Generator	Agilent	N5172B EXG	MY51350549	December 28, 2012	1 year
Attenuator	MCE	46-30-34	BN4927	November 12, 2013	1 year
Cable	Mini-Circuits	30091	-	November 12, 2013	1 year

Figure 55 Test Equipment Used

8. Spurious Radiated Emission

8.1 Test Specification

FCC, Part 27, Subpart C Section 27.53 (g)

8.2 Test Procedure

The test method was based on ANSI/TIA-603-B: 2002, Section 2.2.12 Unwanted Emissions: Radiated Spurious.
The power of any emission outside of the authorized operating frequency ranges (2110-2155 MHz) must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB, yielding –13dBm.

(a) The E.U.T. operation mode and test set-up are as described in Section 3. A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 1.
The frequency range 9 kHz-20 GHz was scanned, and the list of the highest emissions was verified and updated accordingly.
The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.
The emissions were measured at a distance of 3 meters.

(b) The E.U.T. was replaced by a substitution antenna (dipole 30MHz-1GHz, Horn Antenna above 1GHz) driven by a signal generator. The height was readjusted for maximum reading. The signal generator level was adjusted to obtain the same reading on the EMI receiver as in step (a).
The signals observed in step (a) were converted to radiated power using:
P_d(dBm) = P_g(dBm) – Cable Loss (dB) + Substitution Antenna Gain (dB)
P_d = Dipole equivalent power (result).
P_g = Signal generator output level.

The E.U.T. was operated at the frequency of 2115.0, 2135. 0, 2150.0 MHz with LTE modulation.

Carrier Channel (MHz)	Freq. (MHz)	Antenna Pol.	Maximum Peak Level (dBµV/m)	Signal Generator RF Output (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	Effective Radiated Power Level (dBm)	Spec. (dBm)	Margin (dB)
2115.0	4230.0	V	54.0	-49.39	4.45	9.12	-44.72	-13.0	-31.72
2115.0	4230.0	H	55.9	-47.25	4.45	9.12	-42.58	-13.0	-29.58
2135.0	4270.0	V	51.0	-53.07	4.45	9.38	-48.14	-13.0	-35.14
2135.0	4270.0	H	51.9	-51.71	4.45	9.38	-46.78	-13.0	-33.78
2150.0	4300.0	V	51.9	-52.17	4.45	9.38	-47.24	-13.0	-34.24
2150.0	4300.0	H	49.9	-53.71	4.45	9.38	-48.78	-13.0	-35.78

8.3 Test Results

JUDGEMENT: Passed by 29.58 dB

The E.U.T met the requirements of the FCC, Part 27, Subpart C, Section 27.53 (g) specifications.

TEST PERSONNEL:

Tester Signature: _____ Date: 10.12.13

Typed/Printed Name: A. Sharabi

8.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
EMI Receiver	HP	85422E	3906A00276	February 26, 2013	1Year
RF Filter Section	HP	85420E	3705A00248	February 26, 2013	1Year
Antenna Biconical	EMCO	3104	2606	August 30, 2013	1Year
Antenna Log Periodic	ARA	LPD-2010/A	1038	April 2, 2013	1 Year
Double Ridged Waveguide Horn Antenna	EMCO	3115	29845	March 14, 2012	2 Years
Horn Antenna	ARA	SWH-28	1007	January 26, 2011	3 Years
Horn Antenna	ETS	3115	29845	March 14, 2012	2 Years
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	August 21, 2013	1 Year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 28, 2013	1 Year
Spectrum Analyzer	HP	8592L	3826A01204	February 28, 2013	1 Year
Spectrum Analyzer	HP	8564E	3442A00275	February 28, 2013	1 Year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A

9. APPENDIX A - CORRECTION FACTORS

9.1 Correction factors for CABLE

from EMI receiver to test antenna at 3 meter range.

FREQUENCY (MHz)	CORRECTION FACTOR (dB)
10.0	0.3
20.0	0.6
30.0	0.8
40.0	0.9
50.0	1.1
60.0	1.2
70.0	1.3
80.0	1.4
90.0	1.6
100.0	1.7
150.0	2.0
200.0	2.3
250.0	2.7
300.0	3.1
350.0	3.4
400.0	3.7
450.0	4.0
500.0	4.3
600.0	4.7
700.0	5.3
800.0	5.9
900.0	6.3
1000.0	6.7

FREQUENCY (MHz)	CORRECTION FACTOR (dB)
1200.0	7.3
1400.0	7.8
1600.0	8.4
1800.0	9.1
2000.0	9.9
2300.0	11.2
2600.0	12.2
2900.0	13.0

NOTES:

1. The cable type is RG-214.

2. The overall length of the cable is 27 meters.

3. The above data is located in file 27MO3MO.CBL on the disk marked "Radiated Emission Tests EMI Receiver".

9.2 Correction factors for CABLE

from EMI receiver to test antenna at 3 meter range.

FREQUENCY (GHz)	CORRECTION FACTOR (dB)
1.0	1.2
2.0	1.6
3.0	2.0
4.0	2.4
5.0	3.0
6.0	3.4
7.0	3.8
8.0	4.2
9.0	4.6
10.0	5.0
12.0	5.8

NOTES:

1. The cable type is RG-8.

2. The overall length of the cable is 10 meters.

9.3 Correction factors for CABLE

from spectrum analyzer to test antenna above 2.9 GHz

FREQUENCY (GHz)	CORRECTION FACTOR (dB)	FREQUENCY (GHz)	CORRECTION FACTOR (dB)
1.0	1.9	14.0	9.1
2.0	2.7	15.0	9.5
3.0	3.5	16.0	9.9
4.0	4.2	17.0	10.2
5.0	4.9	18.0	10.4
6.0	5.5	19.0	10.7
7.0	6.0	20.0	10.9
8.0	6.5	21.0	11.2
9.0	7.0	22.0	11.6
10.0	7.5	23.0	11.9
11.0	7.9	24.0	12.3
12.0	8.3	25.0	12.6
13.0	8.7	26.0	13.0

NOTES:

1. The cable type is SUCOFLEX 104 E manufactured by SUHNER.

2. The cable is used for measurements above 2.9 GHz.

3. The overall length of the cable is 10 meters.

9.4 Correction factors for LOG PERIODIC ANTENNA

Type SAS-200/511
at 3 meter range.

FREQUENCY (GHz)	ANTENNA FACTOR (dB)
1.0	24.9
1.5	27.8
2.0	29.9
2.5	31.2
3.0	32.8
3.5	33.6
4.0	34.3
4.5	35.2
5.0	36.2
5.5	36.7
6.0	37.2
6.5	38.1

FREQUENCY (GHz)	ANTENNA FACTOR (dB)
7.0	38.6
7.5	39.2
8.0	39.9
8.5	40.4
9.0	40.8
9.5	41.1
10.0	41.7
10.5	42.4
11.0	42.5
11.5	43.1
12.0	43.4
12.5	44.4
13.0	44.6

NOTES:

1. *Antenna serial number is 253.*
2. *The above lists are located in file number SAS3M0.ANT for a 3 meter range.*
3. *The files mentioned above are located on the disk marked "Antenna Factors".*

9.5 Correction factors for Double-Ridged Waveguide Horn

Model: 3115, S/N 29845
at 3 meter range.

FREQUENCY (GHz)	ANTENNA FACTOR (dB 1/m)	ANTENNA Gain (dBi)	FREQUENCY (GHz)	ANTENNA FACTOR (dB 1/m)	ANTENNA Gain (dBi)
1.0	24.8	5.4	10.0	38.8	11.4
1.5	26.1	7.6	10.5	38.9	11.8
2.0	28.6	7.7	11.0	39.0	12.1
2.5	29.8	8.4	11.5	39.6	11.8
3.0	31.4	8.4	12.0	39.8	12.0
3.5	32.4	8.7	12.5	39.6	12.5
4.0	33.7	8.6	13.0	40.0	12.5
4.5	33.4	9.9	13.5	39.8	13.0
5.0	34.5	9.7	14.0	40.2	13.0
5.5	35.1	9.9	14.5	40.6	12.9
6.0	35.4	10.4	15.0	41.3	12.4
6.5	35.6	10.8	15.5	39.5	14.6
7.0	36.2	10.9	16.0	38.8	15.5
7.5	37.3	10.4	16.5	40.0	14.6
8.0	37.7	10.6	17.0	41.4	13.4
8.5	38.3	10.5	17.5	44.8	10.3
9.0	38.5	10.8	18.0	47.2	8.1
9.5	38.7	11.1			