DATE: 27 May 2010

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

FCC Radio Test Report

for

Mobile Access Networks

Equipment under test:

VE Distributed Antenna System Comprising:
VE Control Unit P/N VCU-LTE700-12E
VE Access Point P/N VAP-LTE700E

VE LTE700

Written by: _____

D. Shidlowsky, Documentation

Approved by: _____

A. Sharabi, Test Engineer

Approved by: _____

I. Raz, EMC Laboratory Manager

Measurement/Technical Report for

FCC ID: OJFVELTE700

This report concerns:	Original Grant: X Class II change: Class I change:
Equipment type:	Licensed Non-Broadcast Station Transmitter

Limits used:
47CFR Part 27 Subpart C

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

Application for Certification prepared by:

Ishaishou Raz
ITL (Product Testing) Ltd.
Kfar Bin Nun
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Israel
e-mail sraz@itl.co.il

Applicant for this device:
(different from "prepared by")

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Mobile Access Networks
8391 Old Courthouse Rd., Suite #300
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1. General Information

1.1 Administrative Information

Manufacturer:	Mobile Access Networks
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):	VE Distributed Antenna System Comprising: VE Control Unit P/N VCU-LTE700-12E VE Access Point P/N VAP-LTE700E
Equipment Model No.:	VE LTE700
Equipment Serial No.:	VCU: 00101200039 VAP: 00101600038
Date of Receipt of E.U.T:	09.05.10
Start of Test:	09.05.10
End of Test:	17.05.10
Test Laboratory Location:	I.T.L (Product Testing) Ltd. Kfar Bin Nun, ISRAEL 99780
Test Specifications:	FCC Part 27 Subpart C

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.
7. Nemko (Norway), Authorization No. ELA 207.

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**VE** LTE 700 MHz MIMO solution provides enhanced, cost effective, in-building LTE MIMO coverage for any small to large-sized enterprise environment. This solution is quickly and easily deployed using the existing Ethernet cabling infrastructure without affecting existing LAN services or performance.

The MobileAccess**VE** solution distributes LTE MIMO service to VE Access Pods (VAPs) installed throughout the enterprise and which distribute the services via integrated internal antennas (or optional external antennas), and provide Ethernet connectivity (and PoE pass-through) to LAN terminals. **VE** seamlessly coexists with the Enterprise LAN and does not consume LAN capacity.

The VAPs are distributed on each floor and plug into existing standard Ethernet jacks. They are powered via PoE technology and managed via a VE Control Unit (VCU) located in the floor's telco closet. For site coverage that requires more than one VCU, several VCUs can be aggregated under a single Master VCU. The Master VCU provides the interface to the carrier's capacity sources and management.

This enhanced LTE 700 MIMO coverage solution can be quickly and easily installed with minimal disturbance to the enterprise. In less than a few hours and with no additional cables being required, a scalable and flexible solution is provided at a significantly lower total installation cost.

In a single-tier installation the VCU is connected to both the service provider's equipment and the Ethernet switch, and distributes Ethernet and mobile services to up to 12 VAPs distributed over one more adjacent floors.

Multi-tier installation includes the Master VCU that supports up to 12 Slave VCUs. In this type of installation the provider's services are fed to the Master VCU through which the Slave VCUs are controlled and managed.

The system is professionally installed.

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 03 September 2009).
I.T.L.'s EMC Laboratory is also accredited by A2LA, certificate No. 1152.01.

1.6 Measurement Uncertainty

Conducted Emission

The uncertainty for this test is 2 dB.

Radiated Emission

The Open Site complies with the ±4 dB Normalized Site Attenuation requirements of ANSI C63.4-2003. In accordance with Paragraph 5.4.6.1 of this standard, this tolerance includes instrumentation calibration errors, measurement technique errors, and errors due to site anomalies.

2. System Test Configuration

2.1 Justification

The test setup was configured to closely resemble the standard installation.
The EUT consists of the VCU and the VAP.
The LTE source signal is represented in the setup by appropriate signal generator.
An "Exercise" SW on the computer was used to enable / disable transmission of the VAP, while the EUT output was connected to the spectrum analyzer.

Both MIMO channels transmit during the testing.

2.2 EUT Exercise Software

The Element Management System EngGUI ver. 2.5 build 03 used for commands delivery. These commands are used to enable / disable of VAP transmission.
APod Embedded SW version 2.5 build 04
VCU Embedded SW version 2.5 build 03

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

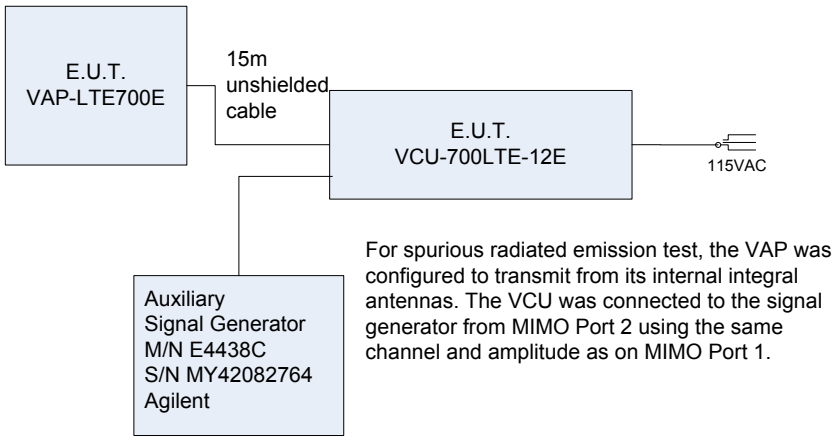

Figure 1. Test Set-up

3. Conducted Emission From AC Power Lines

3.1 Test Specification

F.C.C., Part 15, Subpart C

3.2 Test Procedure

The E.U.T operation mode and test set-up are as described in Section 3.1. In order to minimize background noise interference, the conducted emission testing was performed inside a shielded room, with the E.U.T placed on an 0.8 meter high wooden table, 0.4 meter from the room's vertical wall.

The E.U.T was powered from 115 V AC / 60 Hz via a 50 Ohm / 50 µHn Line Impedance Stabilization Network (LISN) on the phase and neutral lines. The LISN's were grounded to the shielded room ground plane (floor), and were kept at least 0.8 meters from the nearest boundary of the E.U.T

The center of the E.U.T AC cable was folded back and forth, in order to form a bundle less than 0.40 meters and a total cable length of 1 meter.

The emission voltages at the LISN's outputs were measured using a computerized receiver, complying with CISPR 16 requirements. The specification limits are loaded to the receiver via a 3.5" floppy disk and are displayed on the receiver's spectrum display.

A frequency scan between 0.15 and 30 MHz was performed at 9 kHz I.F. band width, and using peak detection.

The spectral components having the highest level on each line were measured using a quasi-peak and average detector.

3.3 Measured Data

JUDGEMENT: Passed by 10.1 dB

The margin between the emission levels and the specification limit is, in the worst case, 10.1 dB for the phase line at 9.999 MHz and 11.0 dB at 10.000 MHz for the neutral line.

The EUT met the F.C.C. Part 15, Subpart C specification requirements.

The details of the highest emissions are given in *Figure 2* to *Figure 5*.

TEST PERSONNEL:

Tester Signature: _____ Date: 01.06.10

Typed/Printed Name: A. Sharabi

Conducted Emission

E.U.T Description	VE Distributed Antenna System Comprising: VE Control Unit P/N VCU-LTE700-12E VE Access Point P/N VAP-LTE700E
Type	VE LTE700
Serial Number:	VCU: 00101200039 VAP: 00101600038

Specification: F.C.C., Part 15, Subpart C
Lead: Phase
Detectors: Peak, Quasi-peak, Average

Signal Number	Frequency (MHz)	Peak (dBuV)	QP (dBuV)	QP Delta L 1 (dB)	Avg (dBuV)	Av Delta L 2 (dB)	Corr (dB)
1	0.201563	54.0	52.3	-11.3	40.9	-12.7	0.0
2	0.300503	38.4	32.0	-28.2	21.7	-28.6	0.0
3	2.326438	17.5	15.9	-40.0	15.6	-30.4	0.0
4	4.729964	26.9	21.7	-34.3	16.2	-29.8	0.0
5	9.999869	40.1	39.9	-20.1	39.8	-10.1	0.0
6	19.999236	23.0	20.6	-39.4	14.7	-35.3	0.0

Figure 2. Detectors: Peak, Quasi-peak, AVERAGE .

Note: QP Delta/Av Delta refer to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Conducted Emission

E.U.T Description	VE Distributed Antenna System Comprising: VE Control Unit P/N VCU-LTE700-12E VE Access Point P/N VAP-LTE700E
Type	VE LTE700
Serial Number:	VCU: 00101200039 VAP: 00101600038

Specification: F.C.C., Part 15, Subpart C
Lead: Phase
Detectors: Peak, Quasi-peak, Average

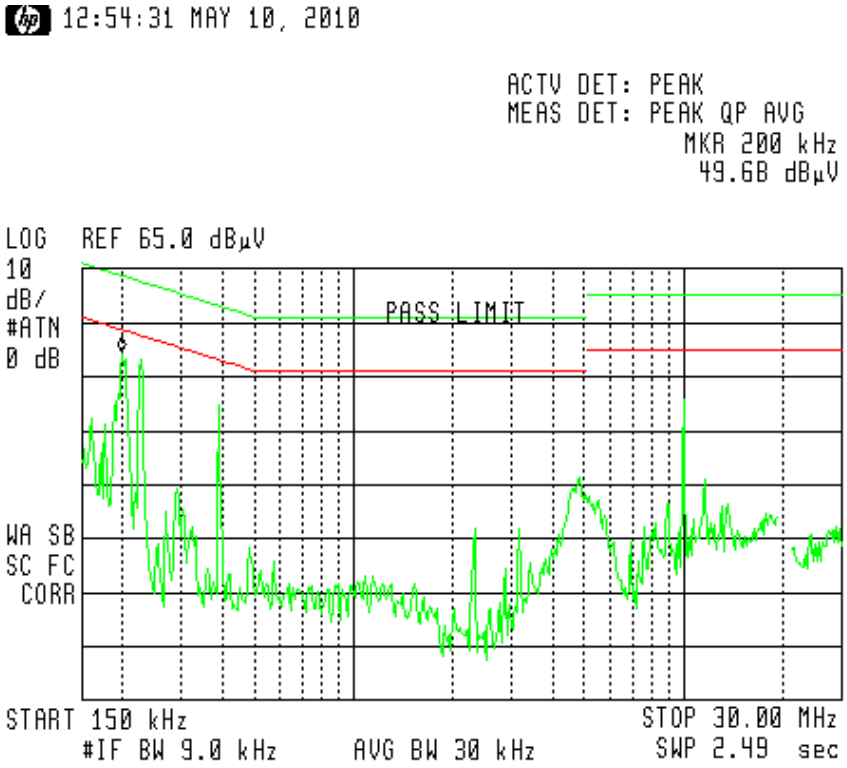

Figure 3. Detectors: Peak, Quasi-peak, Average

Conducted Emission

E.U.T Description	VE Distributed Antenna System Comprising: VE Control Unit P/N VCU-LTE700-12E VE Access Point P/N VAP-LTE700E
Type	VE LTE700
Serial Number:	VCU: 00101200039 VAP: 00101600038

Specification: F.C.C., Part 15, Subpart C
Lead: Neutral
Detectors: Peak, Quasi-peak, Average

Signal Number	Frequency (MHz)	Peak (dBuV)	QP (dBuV)	QP Delta L 1 (dB)	Avg (dBuV)	Av Delta L 2 (dB)	Corr (dB)
1	0.204424	47.9	45.9	-17.6	35.0	-18.5	0.0
2	0.296167	33.3	24.0	-36.4	12.4	-38.0	0.0
3	4.516258	28.3	25.0	-31.0	16.3	-29.7	0.0
4	10.000750	39.6	39.1	-20.9	39.0	-11.0	0.0
5	20.239030	23.8	18.0	-42.0	10.8	-39.2	0.0
6	24.037616	20.9	18.9	-41.1	17.7	-32.3	0.0

Figure 4. Detectors: Peak, Quasi-peak, AVERAGE

Note: QP Delta/Av Delta refer to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Conducted Emission

E.U.T Description	VE Distributed Antenna System Comprising: VE Control Unit P/N VCU-LTE700-12E VE Access Point P/N VAP-LTE700E
Type	VE LTE700
Serial Number:	VCU: 00101200039 VAP: 00101600038

Specification:	F.C.C., Part 15, Subpart C
Lead:	Neutral
Detectors:	Peak, Quasi-peak, Average

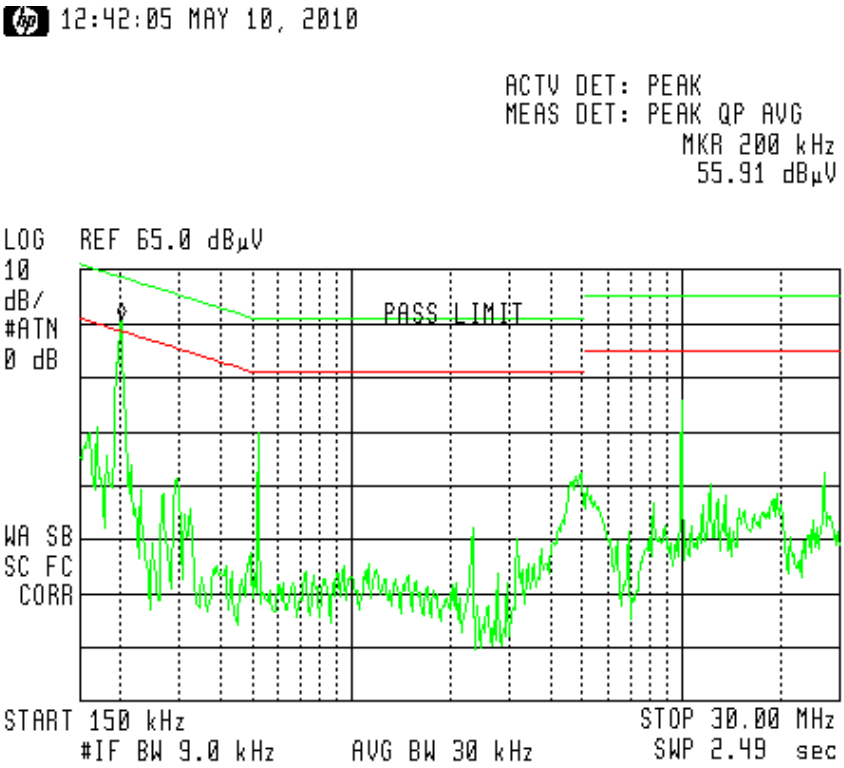

Figure 5 Conducted Emission: NEUTRAL
Detectors: Peak, Quasi-peak, Average

3.4 Test Instrumentation Used, Conducted Measurement

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Period
LISN	Fischer	FCC-LISN-2A	127	March 3, 2010	1 Year
LISN	Fischer	FCC-LISN-2A	128	March 3, 2010	1 Year
EMI Receiver	HP	85422E	3906A00276	November 10, 2009	1Year
RF Filter Section	HP	85420E	3705A00248	November 10, 2009	1Year
Printer	HP	LaserJet 2200	JPKGC19982	N/A	N/A

4. Maximum Peak Output Power

4.1 Test Specification

FCC Part 27, Subpart C (27.50(h)(2))

4.2 Test procedure

Peak Power Output must not exceed 1000 W. The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator (21 dB) and an appropriate coaxial cable. The E.U.T. RF output was, 64QAM 16QAQM and QPSK at 10 MHz bandwidth at the 746-758 MHz bands. Special attention was taken to prevent Spectrum Analyzer RF input overload. The Spectrum Analyzer was set to 100 kHz RBW.

Signal generator output power was 0 dBm.

Antenna type :Dipole antenna with N type connector (Antenna Gain : 10 dBi)

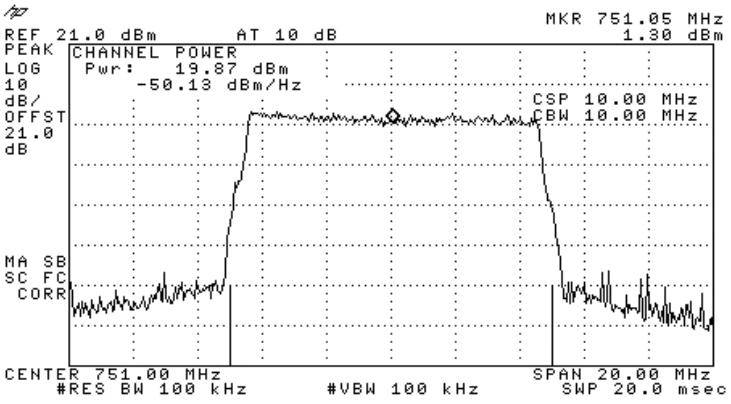

Figure 6.— 751.00 MHz QPSK

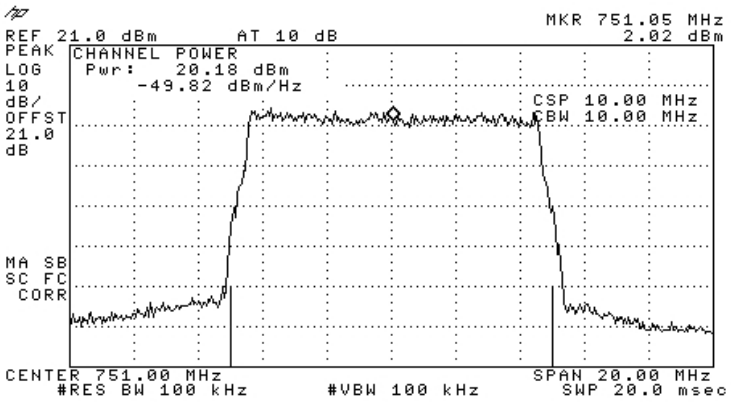

Figure 7.— 751.00 MHz 16QAM

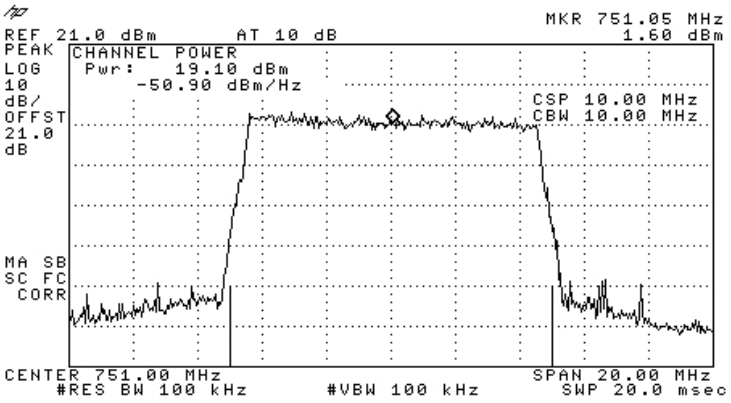

Figure 8.— 751.00 MHz 64QAM

4.3 Results table

E.U.T. Description: VE Distributed Antenna System Comprising:
VE Control Unit P/N VCU-LTE700-12E
VE Access Point P/N VAP-LTE700E
Model No.: VE LTE700
Serial Number: VCU: 00101200039 VAP: 00101600038
Specification: FCC Part 27, Subpart C, Section 27.50 (h) (2)

Modulation	Operation Frequency (MHz)	Reading (dBm)	Antenna Gain (dB)	Reading (EIRP) (dBm)	Reading (EIRP) (mW)	MIMO Total (EIRP) (W)	Specification (W)
QPSK	751.00	19.87	10	29.87	970.51	1.94	1000
16QAM	751.00	20.18	10	30.18	1042.32	2.08	1000
64QAM	751.00	19.1	10	29.1	812.83	1.63	1000

Note: The peak output power is the combined maximum conducted output power.

Figure 9 Maximum Peak Power Output

JUDGEMENT: Passed

TEST PERSONNEL:
Tester Signature: _____ Date: 01.06.10
Typed/Printed Name: A. Sharabi

4.4 Test Equipment Used.

Maximum Peak Output Power

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	HP	8592L	3826A01204	March 14, 2010	1 year
Signal Generator	Agilent	E4438C	MY42082764	June 10, 2009	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G 2W20	October 19, 2009	1 year
Cable	TestLINE	18	11556	January 4, 2010	1 year

Figure 10 Test Equipment Used

5. Emission Bandwidth

5.1 Test Specification

FCC Part 2, Section 1049; FCC Part 27 Section 27.53(m)(6)

5.2 Test Procedure

The E.U.T. was set to the applicable test frequency with QPSK, 16QAM, and 64QAM modulation in the 746-758MHz band.
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 (21.0dB).
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.

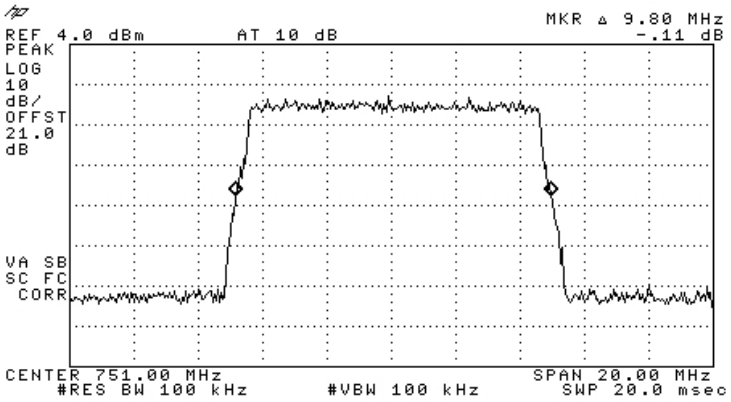

Figure 11.— 751.00 MHz QPSK IN

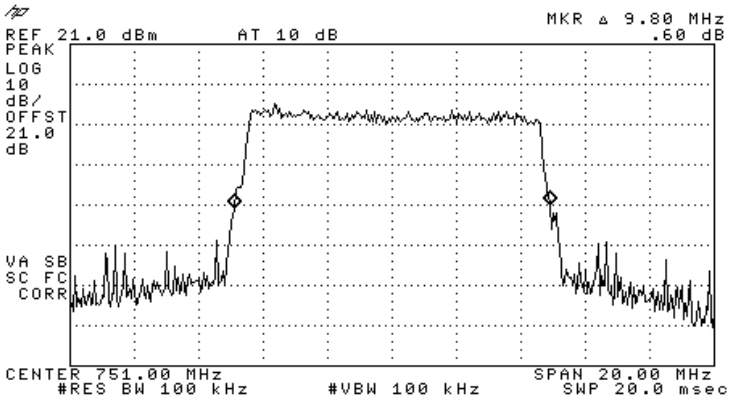

Figure 12.— 751.00 MHz QPSK OUT

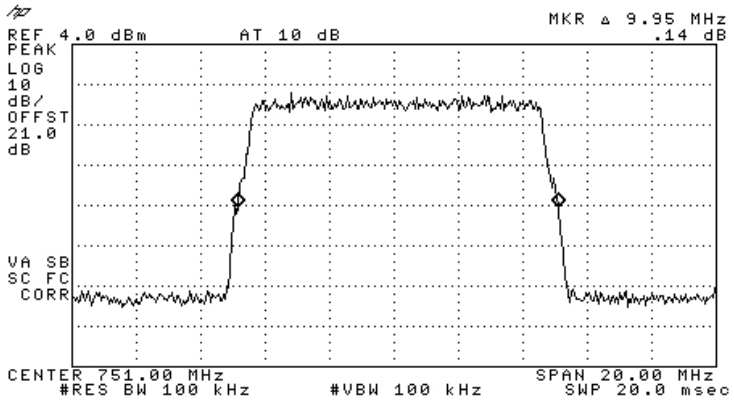

Figure 13.— 751.00 MHz 16QAM IN

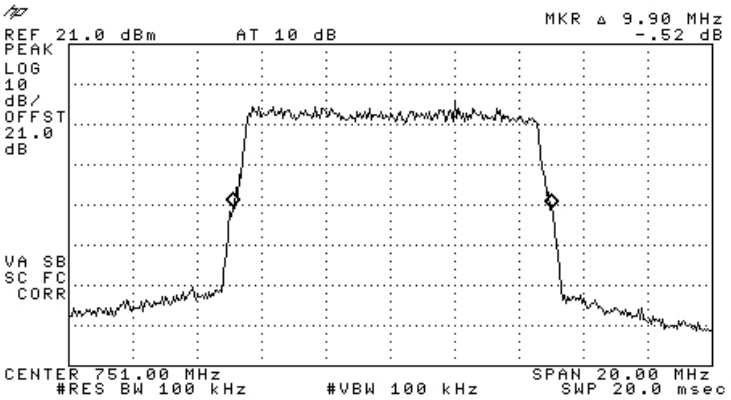

Figure 14.— 751.00 MHz 16QAM OUT

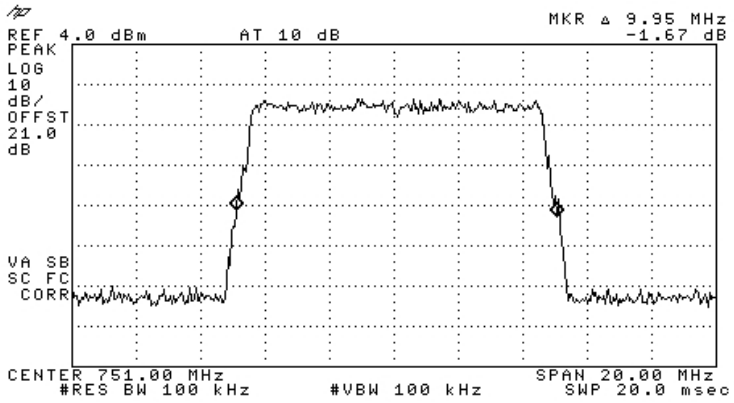

Figure 15.— 751.00 MHz 64QAM IN

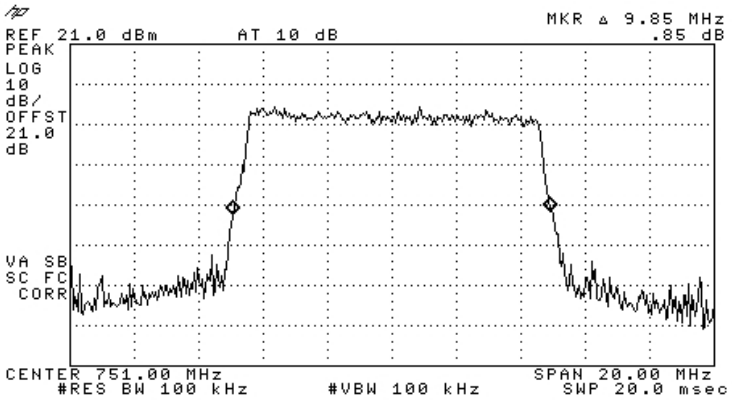

Figure 16.— 751.00 MHz 64QAM OUT

5.3 Results Table

E.U.T. Description: VE Distributed Antenna System Comprising:
VE Control Unit P/N VCU-LTE700-12E
VE Access Point P/N VAP-LTE700E
Model No.: VE LTE700
Serial Number: VCU: 00101200039 VAP: 00101600038
Specification: FCC Part 2, Section 1049; FCC Part 27 Section 27.53(m)(6)

Operating Frequency (MHz)	Modulation		Reading (26dBc) (MHz)
751.00	QPSK	Input	9.80
		Output	9.80
	16QAM	Input	9.95
		Output	9.90
	64QAM	Input	9.95
		Output	9.85

Figure 17 Emission Bandwidth

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: _____ Date: 01.06.10

Typed/Printed Name: A. Sharabi

5.4 Test Equipment Used.

Occupied Bandwidth

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	HP	8592L	3826A01204	March 14, 2010	1 year
Signal Generator	Agilent	E4438C	MY42082764	June 10, 2009	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G2W20	October 19, 2009	1 year
Cable	TestLINE	18	11556	January 4, 2010	1 year

Figure 18 Test Equipment Used

6. Conducted Spurious Emissions

6.1 Test Specification

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

6.2 Test procedure

The power of any emission outside of the authorized operating frequency ranges 746 MHz-757MHz must be attenuated below the transmitting power (P) by a factor of 43+ 10 log (P) dB.

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator and an appropriate coaxial cable (20.2dB).
The signal generator was configured for 0dBm output power and 10 MHz LTE signal, modulated with QPSK, 16QAM, and 64QAM.

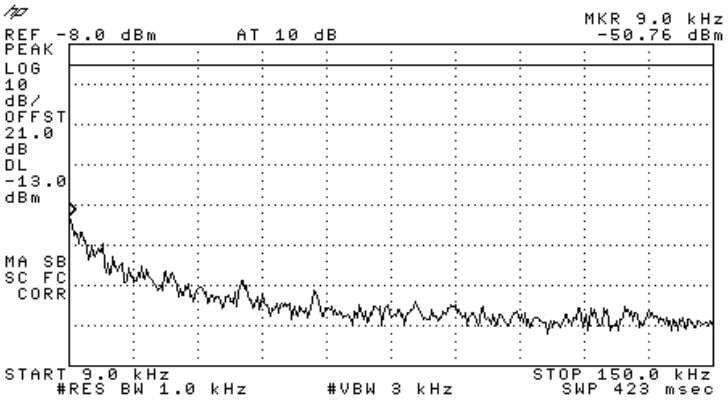

Figure 19.— 751.00 MHZ QPSK

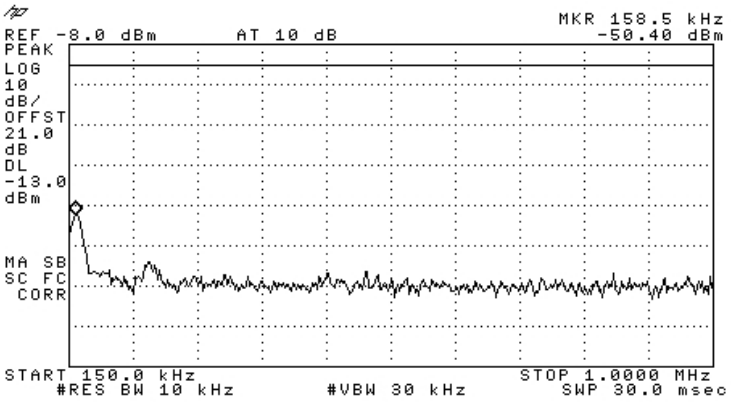

Figure 20.— 751.00 MHZ QPSK

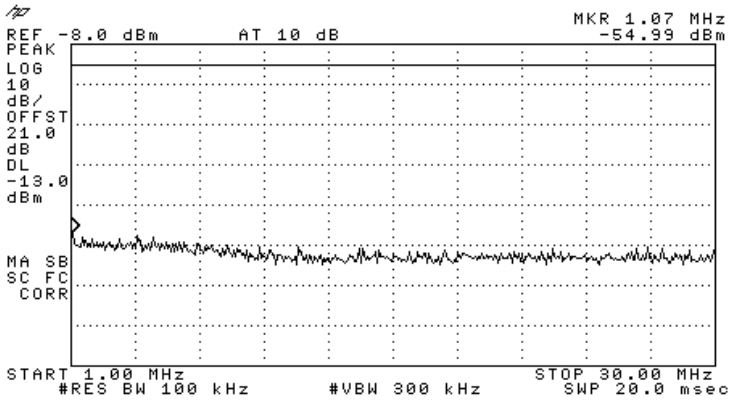

Figure 21.— 751.00 MHZ QPSK

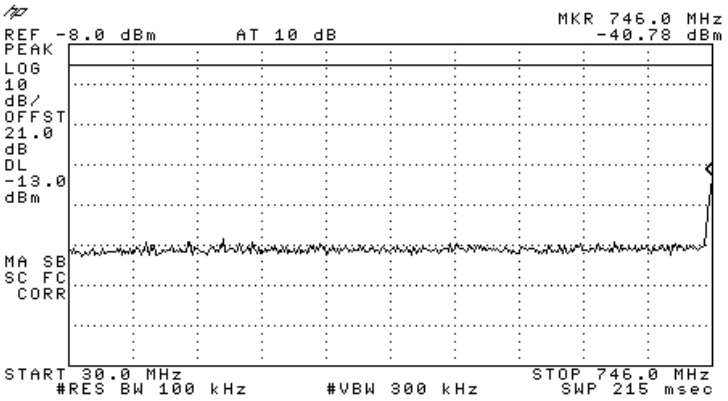

Figure 22.— 751.00 MHZ QPSK

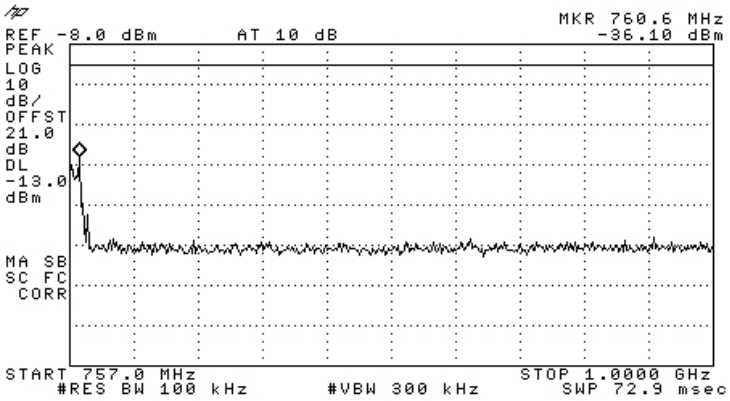

Figure 23.— 751.00 MHZ QPSK

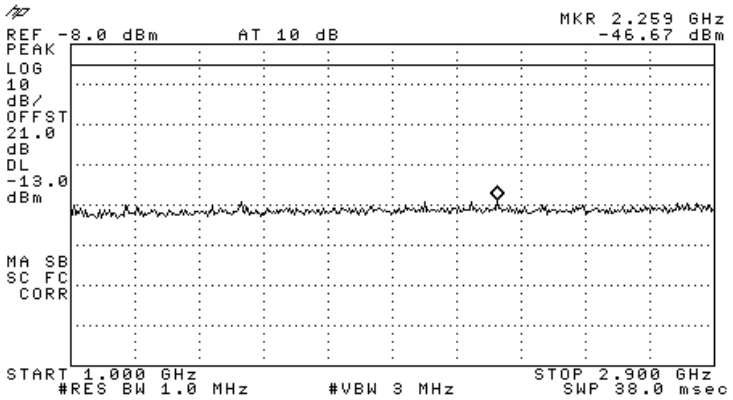

Figure 24.— 751.00 MHZ QPSK

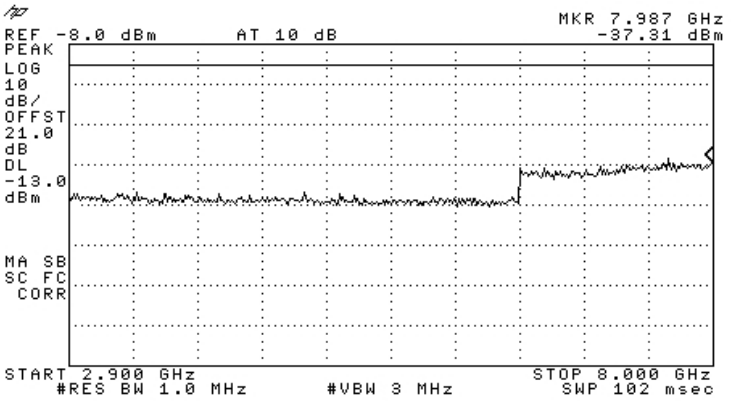

Figure 25.— 751.00 MHZ QPSK

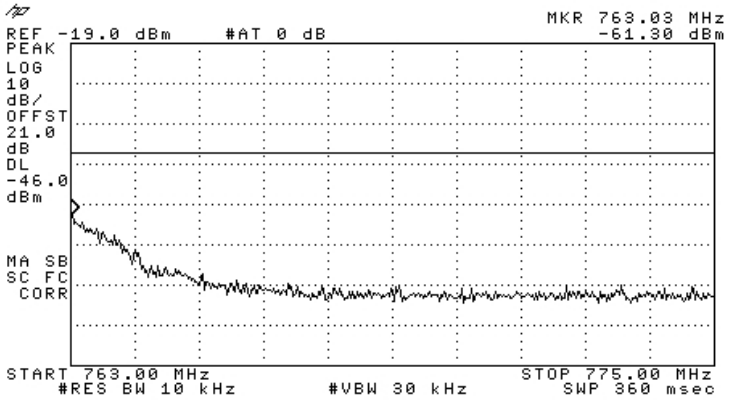

Figure 26.— 751.00 MHZ QPSK

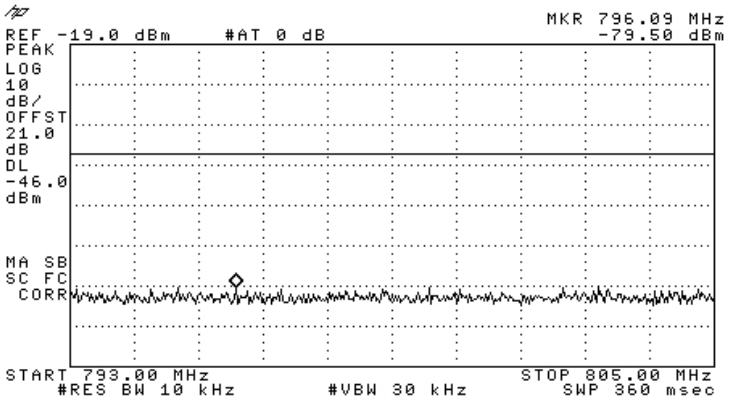

Figure 27.— 751.00 MHZ QPSK

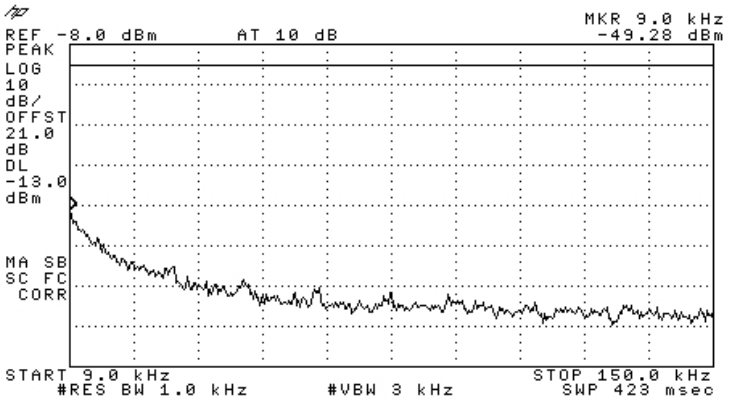

Figure 28.— 751.00 MHZ 16QAM

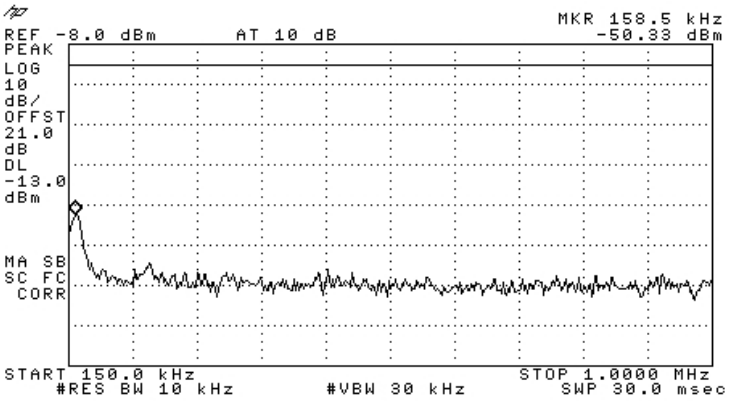

Figure 29.— 751.00 MHZ 16QAM

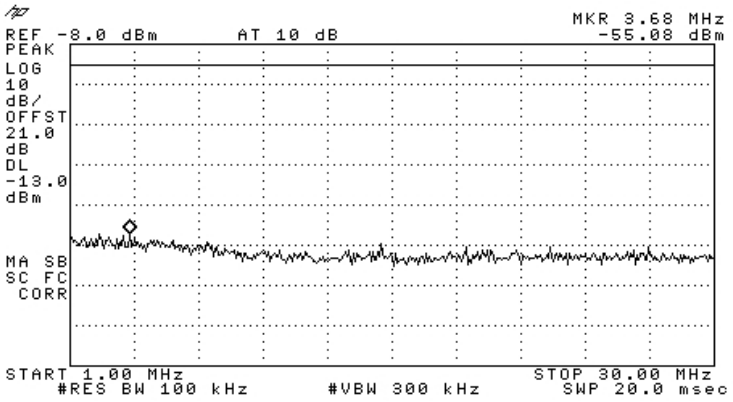

Figure 30.— 751.00 MHZ 16QAM

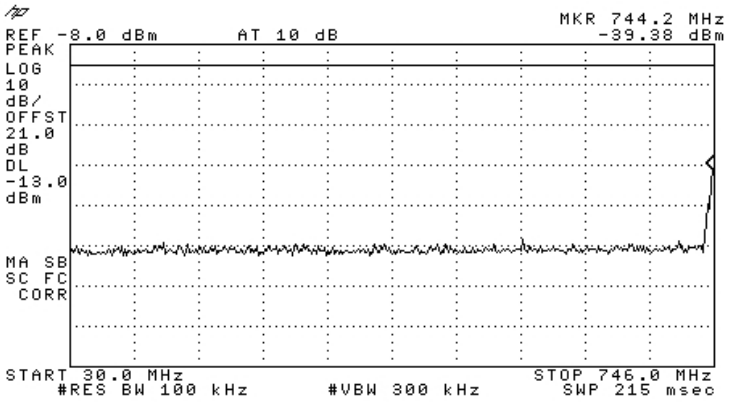

Figure 31.— 751.00 MHZ 16QAM

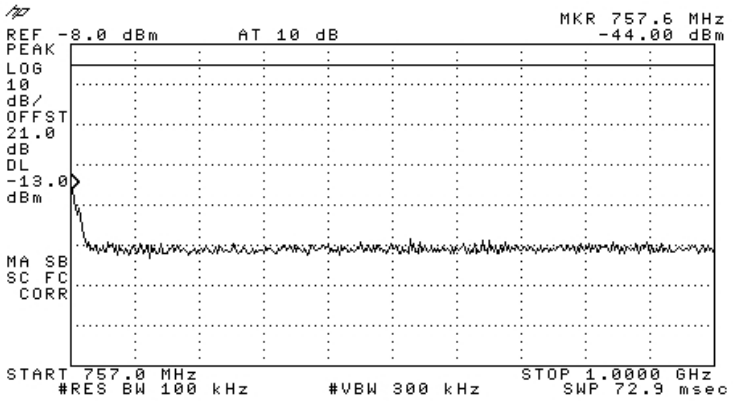

Figure 32.— 751.00 MHZ 16QAM

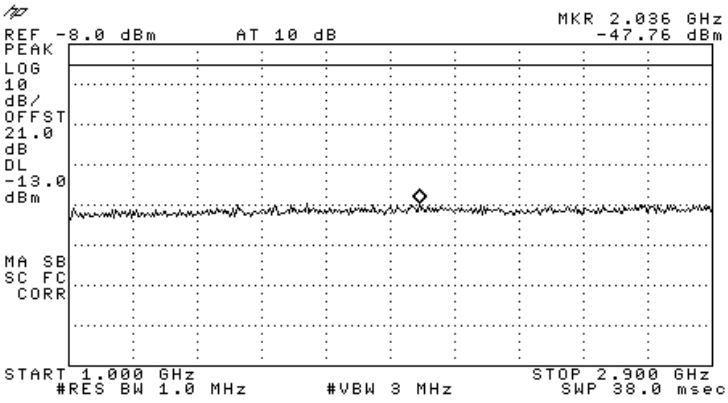

Figure 33.— 751.00 MHZ 16QAM

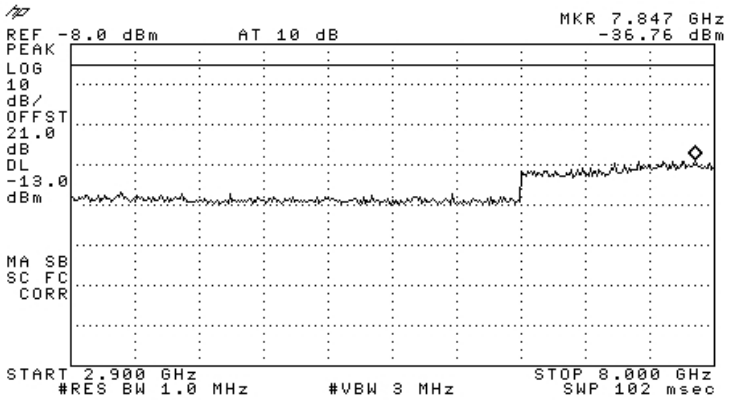

Figure 34.— 751.00 MHZ 16QAM

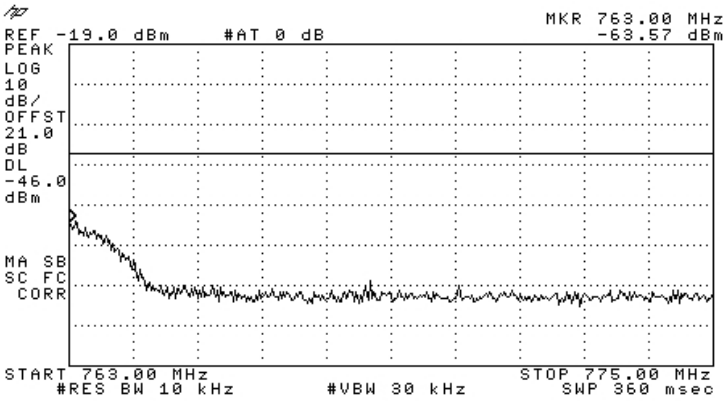

Figure 35.— 751.00 MHZ 16QAM

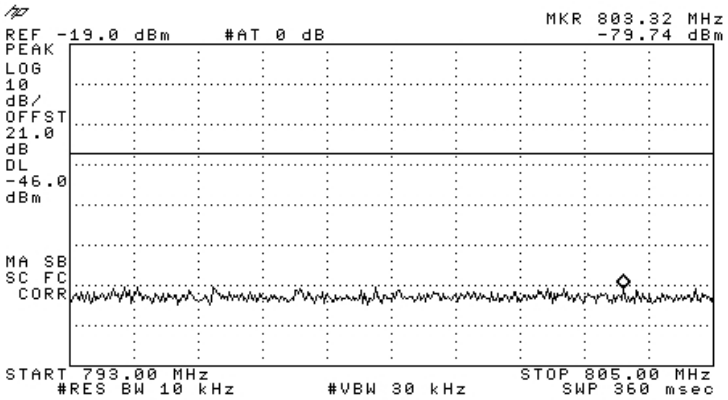

Figure 36.— 751.00 MHZ 16QAM

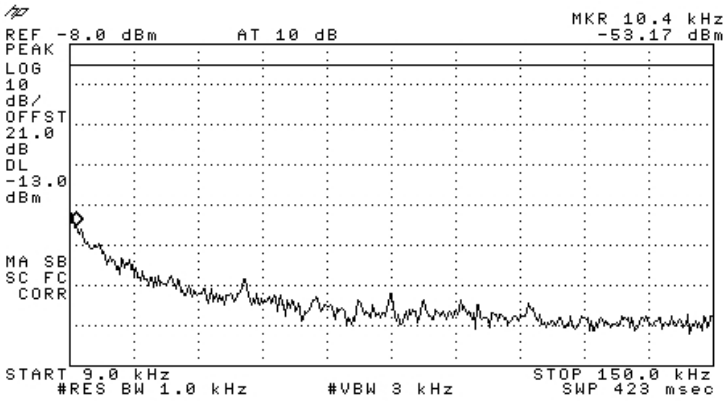

Figure 37.— 751.00 MHZ 64QAM

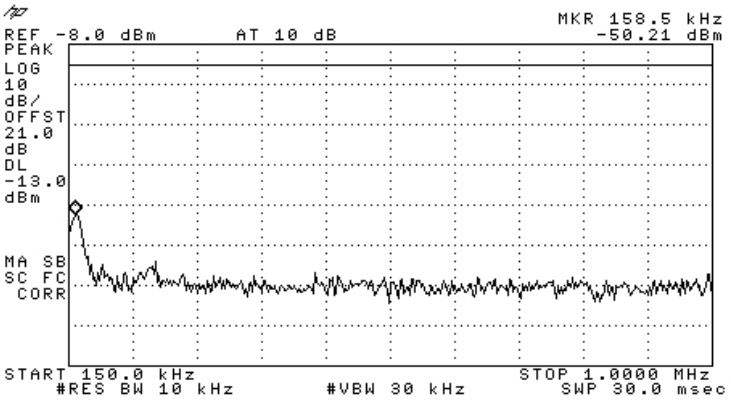

Figure 38.— 751.00 MHZ 64QAM

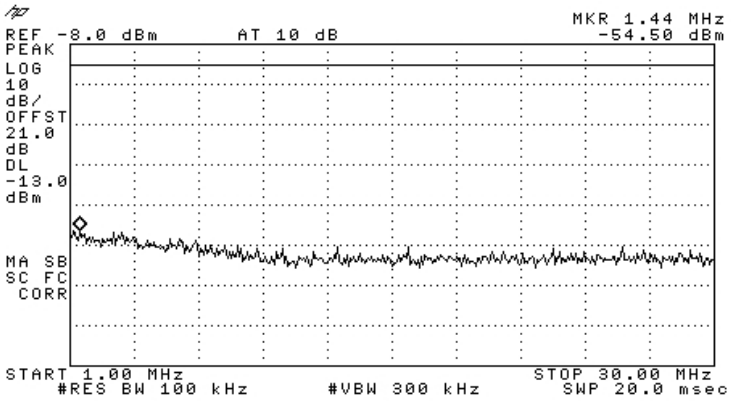

Figure 39.— 751.00 MHZ 64QAM

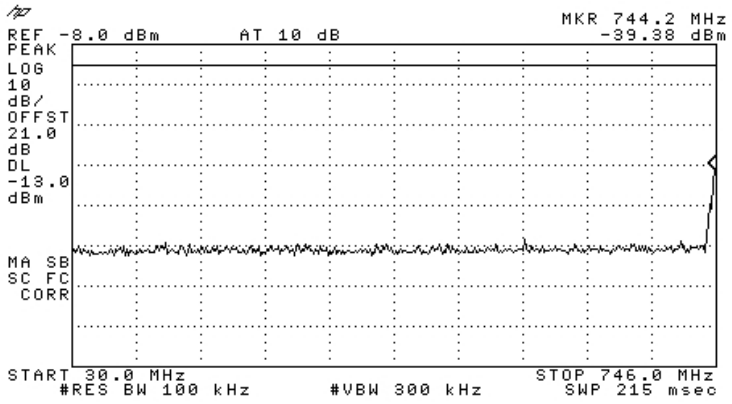

Figure 40.— 751.00 MHZ 64QAM

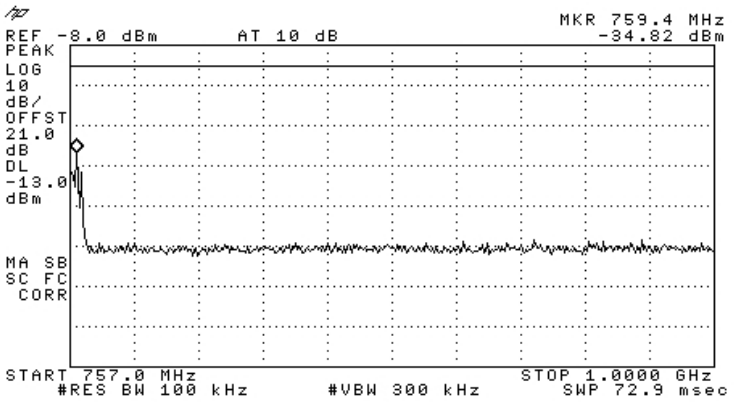

Figure 41.— 751.00 MHZ 64QAM

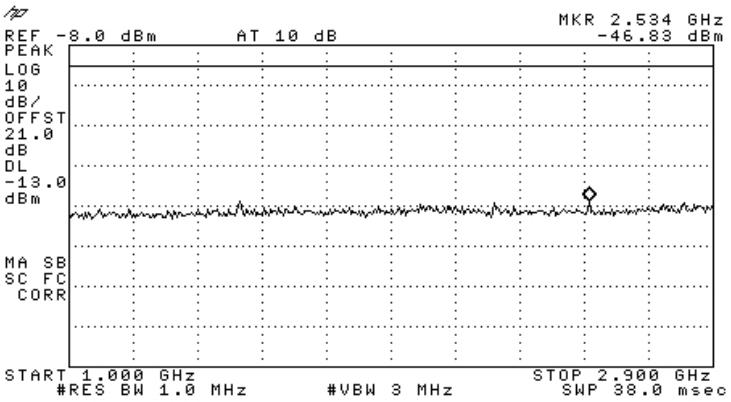

Figure 42.— 751.00 MHZ 64QAM

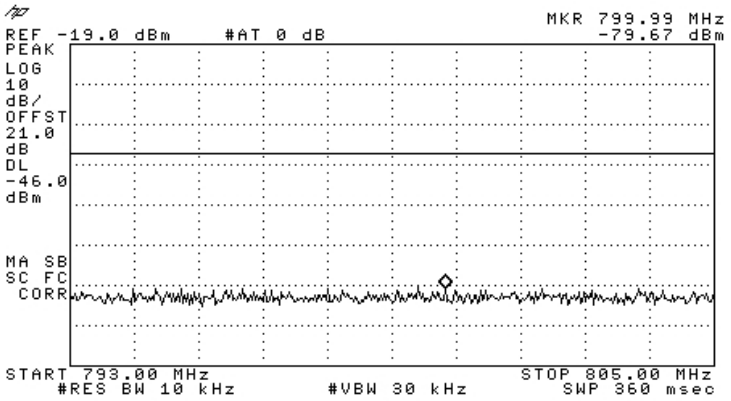

Figure 43.— 751.00 MHZ 64QAM

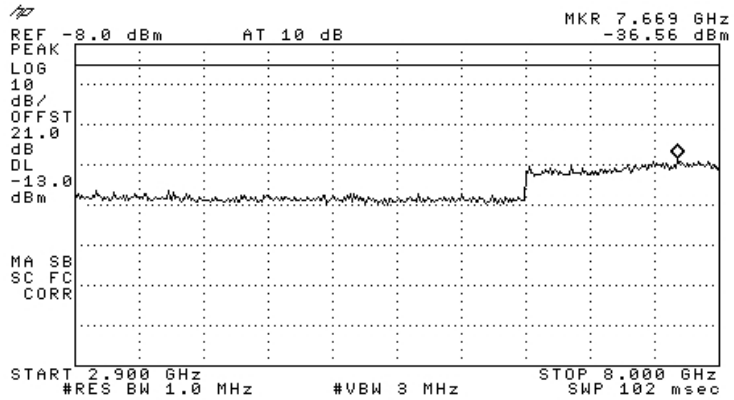

Figure 44.— 751.00 MHZ 64QAM

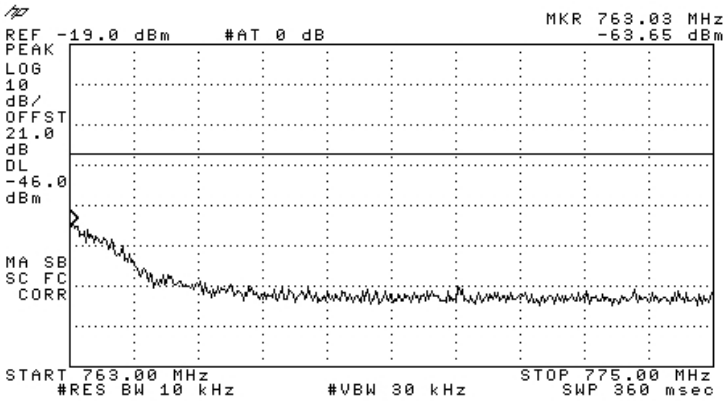

Figure 45.— 751.00 MHZ 64QAM

6.3 Results table

E.U.T. Description: VE Distributed Antenna System Comprising:
VE Control Unit P/N VCU-LTE700-12E
VE Access Point P/N VAP-LTE700E
Model No.: VE LTE700
Serial Number: VCU: 00101200039 VAP: 00101600038
Specification: FCC Part 27, Sub-part C, Section 27.53 (m)

Modulation	Operation Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
QPSK	760.6	-36.10	-13.0	-23.10
16QAM	7847.00	-36.76	-13.0	-23.76
64QAM	759.4	-34.82	-13.0	-21.82

Figure 46 Conducted Spurious Emission Results

JUDGEMENT: Passed by 23.76 dB

TEST PERSONNEL:

Tester Signature:  Date: 01.06.10

Typed/Printed Name: A. Sharabi

6.4 Test Equipment Used.

Spurious Emissions at Antenna Terminals

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	HP	8592L	3826A01204	March 14, 2010	1 year
Signal Generator	Agilent	E4438C	MY42082764	June 10, 2009	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G2W20	October 19, 2009	1 year
Cable	TestLINE	18	11556	January 4, 2010	1 year

Figure 47 Test Equipment Used

7. Band Edge Measurements

7.1 Test Specification

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

7.2 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 (21.0 dB).
The spectrum analyzer was set to 100 kHz R.B.W.

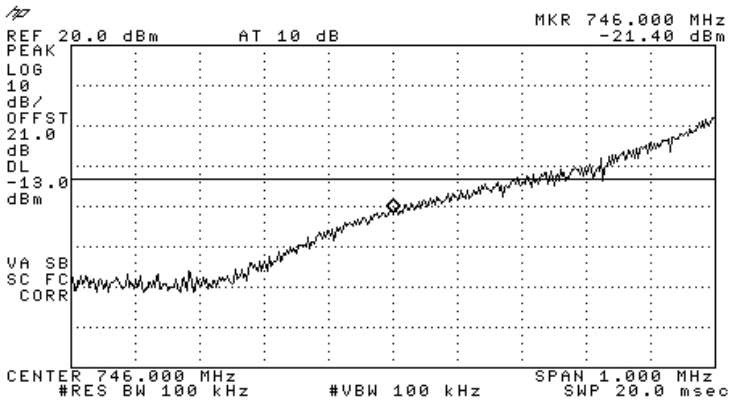

Figure 48.— 751.00 MHz QPSK

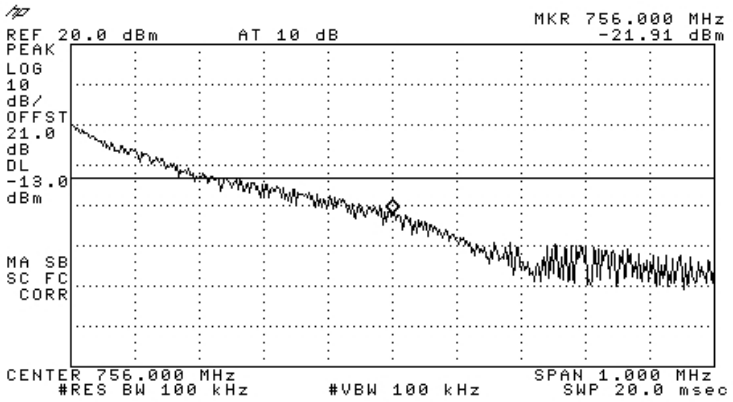

Figure 49.— 751.00 MHz QPSK

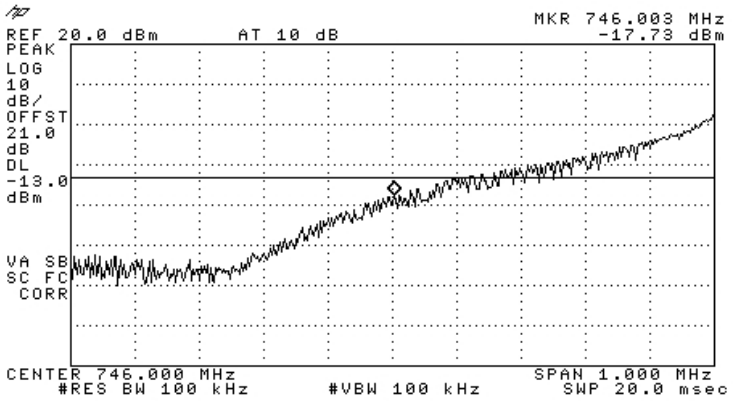

Figure 50.— 751.00 MHz 16QAM

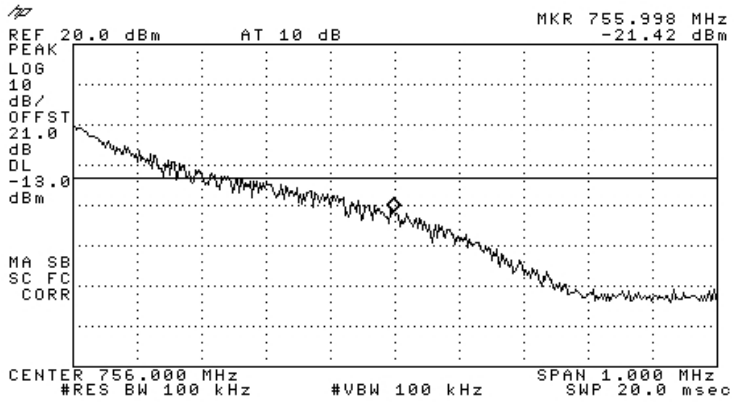

Figure 51.— 751.00 MHz 16QAM

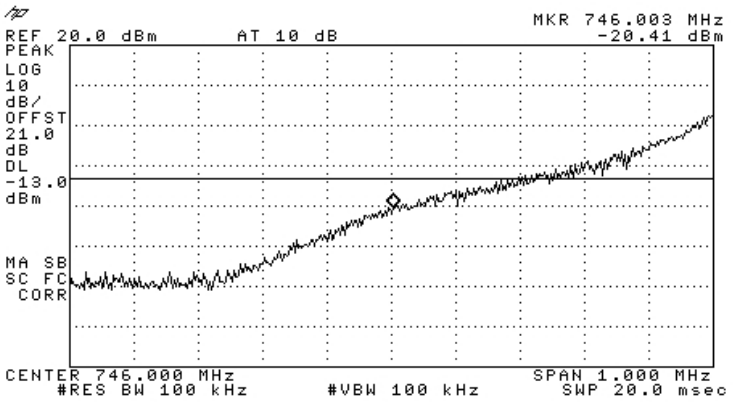

Figure 52.— 751.00 MHz 64QAM

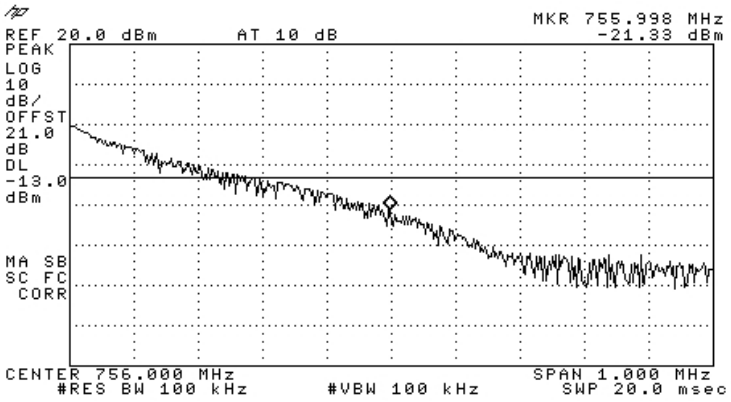

Figure 53.— 751.00 MHz 64QAM

7.3 Results table

E.U.T. Description: VE Distributed Antenna System Comprising:
VE Control Unit P/N VCU-LTE700-12E
VE Access Point P/N VAP-LTE700E
Model No.: VE LTE700
Serial Number: VCU: 00101200039 VAP: 00101600038
Specification: FCC Part 27, Sub-part C, Section 27.53 (m)

Operation Frequency (MHz)	Bandwidth	Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
751.00	QPSK	746.000	-21.40	-13.0	-8.40
		756.000	-21.91	-13.0	-8.91
	16QAM	746.003	-17.73	-13.0	-4.73
		755.998	-21.42	-13.0	-8.42
	64QAM	746.003	-20.41	-13.0	-7.41
		755.998	-21.33	-13.0	-8.33

Figure 54 Band Edge Measurements Results

JUDGEMENT: Passed by 4.7

TEST PERSONNEL:

Tester Signature: _____ Date: 01.06.10

Typed/Printed Name: A. Sharabi

7.4 Test Equipment Used.

Band Edge Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	HP	8592L	3826A01204	March 14, 2010	1 year
Signal Generator	Agilent	E4438C	MY42082764	June 10, 2009	1 year
Attenuator	Jyebao	-	FAT-AM5AF5G6G2W20	October 19, 2009	1 year
Cable	TestLINE	18	11556	January 4, 2010	1 year

Figure 55 Test Equipment Used

8. Spurious Radiated Emission

8.1 Test Specification

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

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 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 controller was connected to 2 signal generators on the same RF channel (one OFDMA modulated and the other CW).
Both Signal generators were 0dBm output power.
The VAP unit was configured to work with the internal integrated antenna.
The E.U.T. was tested in downlink mode.

2nd Harmonic:

Modulation (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)
QPSK	1502.00	V	60.16	-41.13	5.15	7.6	-38.68	-13.0	-25.68
QPSK	1502.00	H	60.80	-40.63	5.15	7.6	-38.18	-13.0	-25.18
16QAM	1502.00	V	59.42	-41.87	5.15	7.6	-39.42	-13.0	-26.42
16QAM	1502.00	H	60.25	-41.18	5.15	7.6	-38.73	-13.0	-25.73
64QAM	1502.00	V	60.34	-40.95	5.15	7.6	-38.50	-13.0	-25.50
64QAM	1502.00	H	60.21	-41.22	5.15	7.6	-38.77	-13.0	-25.77

3rd Harmonic:

Modulation (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)
QPSK	2253.00	V	65.95	-35.63	7.1	8.12	-34.61	-13.0	-21.61
QPSK	2253.00	H	65.43	-36.95	7.1	8.12	-35.93	-13.0	-22.93
16QAM	2253.00	V	65.59	-35.99	7.1	8.12	-34.97	-13.0	-21.97
16QAM	2253.00	H	66.48	-35.9	7.1	8.12	-34.88	-13.0	-21.88
64QAM	2253.00	V	66.09	-35.49	7.1	8.12	-34.47	-13.0	-21.47
64QAM	2253.00	H	65.94	-36.44	7.1	8.12	-35.42	-13.0	-22.42

IF:

Modulation (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)
64QAM	265.00	H	50.89	-49.5	1.5	1.57	-49.43	-13.0	-36.43
64QAM	265.00	V	44.41	-53.8	1.5	1.57	-53.73	-13.0	-40.73
64QAM	285.00	H	50.43	-49.7	1.5	1.57	-49.63	-13.0	-36.63
64QAM	285.00	V	43.08	-53.9	1.5	1.57	-53.83	-13.0	-40.83

8.3 Test Results

JUDGEMENT: Passed by 21.47 dB

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

TEST PERSONNEL:

Tester Signature: _____ Date: 01.06.10

Typed/Printed Name: A. Sharabi

8.4 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3411A00102	November 10, 2009	1 year
RF Section	HP	85420E	3427A00103	November 10, 2009	1 year
Antenna Log Periodic	A.H. Systems	SAS-200/511	253	January 29, 2009	2 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	ThinkJet 2225	2738508357.0	N/A	N/A
Spectrum Analyzer	HP	8592L	3826A01204	March 14, 2010	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	January 13, 2010	1 year
Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	January 13, 2010	1 year
Signal Generator	Agilent	E4438C	MY42082764	June 10, 2009	2 years
Double Ridged Waveguide Horn Antenna	EMCO	3115	29845	March 16, 2010	2 year

9. Frequency Stability

9.1 Test Specification

Part 27 Section 27.54

9.2 Test Procedure

The E.U.T operation mode and test setup are as described in Section 2. The E.U.T. was operated with a CW signal in the downlink path.

The E.U.T. was placed inside a temperature chamber. The E.U.T. was operated from 115 VAC at normal temperature and the chamber temperature was set to +20°C.

The spectrum analyzer was set to 50.0 kHz span and 1.0 kHz resolution B.W.

The carrier frequency was measured and recorded (reference frequency reading).

The carrier frequency measurement was repeated for:

(a). +20°C and 97.5 VAC

(b). +20°C and 132.5 VAC

(c). -30°C and 97.5 VAC

(d). -30°C and 115 VAC

(e). -30°C and 132.5 VAC

(f). +50°C and 97.5 VAC

(g). +50°C and 115 VAC

(h). +50°C and 132.5 VAC

The carrier frequency was measured and recorded after at least 20 minutes of exposing the E.U.T. to the temperature.

The E.U.T. was operated at 751.00 MHz.

Frequency Stability

E.U.T Description VE Distributed Antenna System Comprising:
VE Control Unit P/N VCU-LTE700-12E
VE Access Point P/N VAP-LTE700E

Type VE LTE700

Serial Number: VCU: 00101200039 VAP: 00101600038

Specification: Part 27 Section 27.54

Operation Frequency (MHz)				Δ f(max) (kHz)	Spec. (kHz)
	Temp	Volt	Readings		
751.00	+20°C	97.5	750.99988 MHz	-0.02	±1.9
	+20°C	115	750.99990 MHz	-	±1.9
	+20°C	132.5	750.99988 MHz	-0.02	±1.9
	-30°C	97.5	750.99995 MHz	+0.05	±1.9
	-30°C	115	750.99995 MHz	+0.05	±1.9
	-30°C	132.5	750.99995 MHz	+0.05	±1.9
	+50°C	97.5	750.99995 MHz	+0.05	±1.9
	+50°C	115	750.99998 MHz	-0.08	±1.9
	+50°C	132.5	751.00003 MHz	+0.13	±1.9

Figure 56. Frequency Stability

Notes:

1. Δ f = Reference frequency – frequency reading.
2. Reference reading measured at 115 VAC, + 20°C.
3. Specification: spec: ± 1 ppm = ± 1.9 kHz

JUDGEMENT: Passed

The E.U.T met the requirements of the FCC, Part 27, Subpart C, Section 27.54 specifications.

TEST PERSONNEL:

Tester Signature: _____ Date: 01.06.10

Typed/Printed Name: A. Sharabi

9.3 Test Instrumentation Used, Radiated Measurements

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
Environmental Chamber	THERMOTRON CORP	SM 32C Mini Max	25-1030	March 4, 2009	2 Years
Digital Voltage Meter	Escort	EDM1111A	10313121	November 3, 2008	2 Years
Variable Voltage Transformer	Variac Voltage Co.	-	-	N/A	N/A
Spectrum Analyzer	HP	8594E	3809U03785	March 8, 2010	1 Year

10. APPENDIX A - CORRECTION FACTORS

10.1 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".*

10.2 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.

10.3 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.

10.4 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".

10.5 Correction factors forDouble-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			