

EXHIBIT 9**TEST REPORT**

This test report presents the measurement data required by the Commission for certifying the Alcatel-Lucent LTE 9764 700U MIMO Metro Cell 2x5W, subject of this application, for operation in the domestic 700 Upper Band C Band (Tx: 746-756 MHz and Rx: 777-787 MHz), i.e., E-UTRAN band 13, with Long Term Evolution (LTE) technology.

As stated before, the Metro 2x5W consists of a Digital/RF Analog board (DA), Power Amplifier Board (PA), Power Module and RF Filter. The Metro 2x5W has two antenna ports and supports MIMO with 2 transmit and 2 receive streams. The maximum output power is 37dBm (5W) per 10 MHz LTE carrier and per port and 10W per unit.

All testing results submitted in this report were performed on the ALU LTE 9764 700U 2x5W Metro-Cell outdoor (AC) during the period of October 1, 2012~ January 15, 2013. The above 700U 2x5W MCO passed FCC Part 15 Class A radiated emissions requirements. The performance of indoor version of the 700U 2x5W MCO will be evaluated and authorized through FCC Class I permissive change procedure once it is available.

The measurement results have demonstrated that Alcatel-Lucent 9764 LTE 700U 2x5W MCO is in full compliance with the Rules of the Commission.

SUBEXHIBIT 9.1**Section 2.1033 (c)(14) REQUIRED MEASUREMENT DATA**

The required measurement data is presented in the following exhibits as follows:

SUBEXHIBIT 9.2	Section 2.1046	Measurements Required: RF Power Output
SUBEXHIBIT 9.3	Section 2.1047	Modulation Characteristics
SUBEXHIBIT 9.4	Section 2.1049, 27.53(c)	Measurements Required: Occupied Bandwidth and Out-of-Band Emissions
SUBEXHIBIT 9.5	Sections 2.1051, 27.53(c)	Measurements Required: Spurious Emissions at Antenna Terminals
SUBEXHIBIT 9.6	Sections 2.1053, 27.53(c) & (f)	Measurements Required: Field Strength of Spurious Radiation
SUBEXHIBIT 9.7	Sections 2.1055, 27.54	Measurements Required: Frequency Stability
SUBEXHIBIT 9.8	Section 2.947	List of Test Equipment Used

SUBEXHIBIT 9.2**Section 2.1046 MEASUREMENT REQUIRED: RF POWER OUTPUT**

This test is a measurement of the total RF power level transmitted at the antenna-transmitting terminal (J4), as shown in the accompanying test set-up diagram. The radio was tuned to a channel which is transmitting in the 746-756MHz frequency band. The power level of the base station was calibrated to allow the base station to operate at the manufacturer's maximum rated mean power level, i.e., +37dBm (5W) per 10MHz LTE carrier at the antenna-transmitting terminal.

For LTE, the RF power output with QPSK, 16QAM and 64QAM modulation were measured respectively.

Power measurements were made with a Hewlett-Packard Power Meter with 8481A Power Sensor (0.01 – 18 GHz) in the average mode. The test set-up for conducting the RF power output measurement is shown in the following figure. Before the testing was started, the Base Station was given a sufficient “warm-up” period as required.

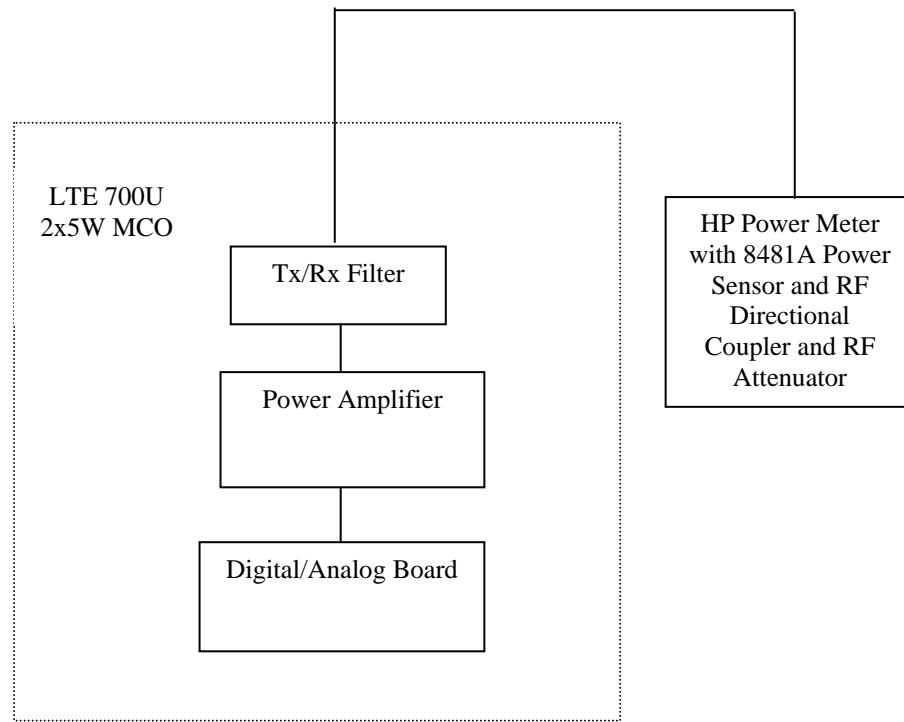
The maximum rated mean power at the antenna transmitting terminal was measured for a single LTE carrier.

The RF power output measured for each configuration was shown as “Ref Lvl” in the plots provided in SubExhibit 9.4.

Results:

The maximum rated mean RF power outputs of the Alcatel-Lucent 700U LTE 2x5W MCO at its antenna transmitting terminals is 5W (+37 dBm) per 10MHz LTE carrier per port and 10 W (+40 dBm) per MCO, within ± 1 dB derivation, and are in full compliance with the Rules of the Commission.

**FIGURE 9.2.1 TEST SET-UP FOR MEASUREMENT OF
RADIO FREQUENCY POWER OUTPUT**



SUBEXHIBIT 9.3**Section 2.1047 MEASUREMENT REQUIRED: MODULATION CHARACTERISTICS**

The ALU 700U 2x5W MCO supports LTE technology. The LTE utilizes Orthogonal Frequency Division Multiplex (OFDM) modulation techniques, where the data is distributed over a large number of closely spaced orthogonal subcarriers. The subcarriers are modulated with conventional modulation scheme, such as QPSK, 16QAM and 64QAM.

The modulation accuracy measures the ability of the transmitter to generate the ideal signal.

In LTE, the modulation characteristics for QPSK, 16QAM and 64QAM modulations are measured, which measures the difference between the ideal symbols and the measured symbols after the equalization. The measurement was performed for QPSK, 16QAM and 64QAM, respectively, where the carrier power level was adjusted to the rated maximum mean power +37dBm (5W) at the output terminal.

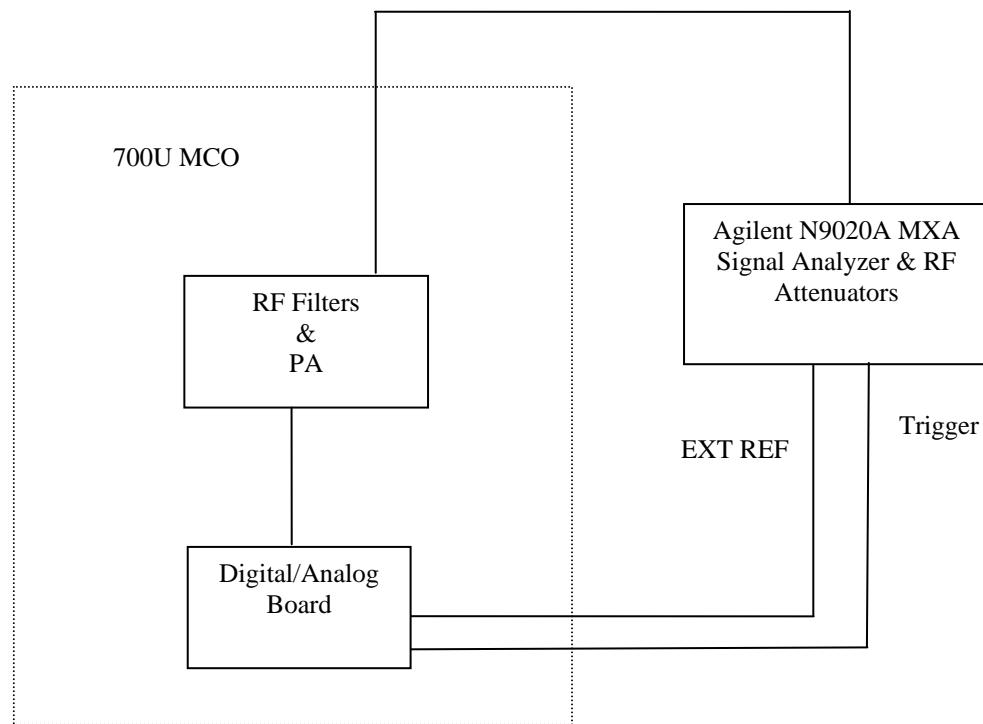
The measurements were performed at the antenna transmitting terminal of the base station system with an Agilent N9020A MXA Signal Analyzer which was calibrated in accordance with ISO 9001 process.

The test set-up diagram is given in the Figure 9.3.1, where the Agilent N9020A MXA used the external signals from the base station as its trigger source and time reference.

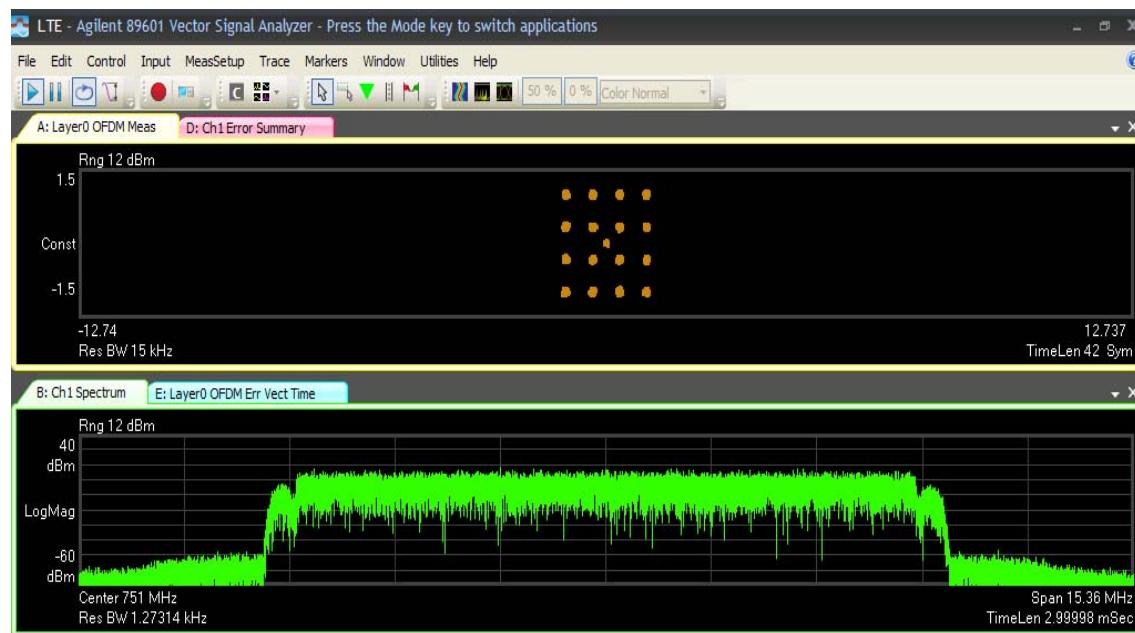
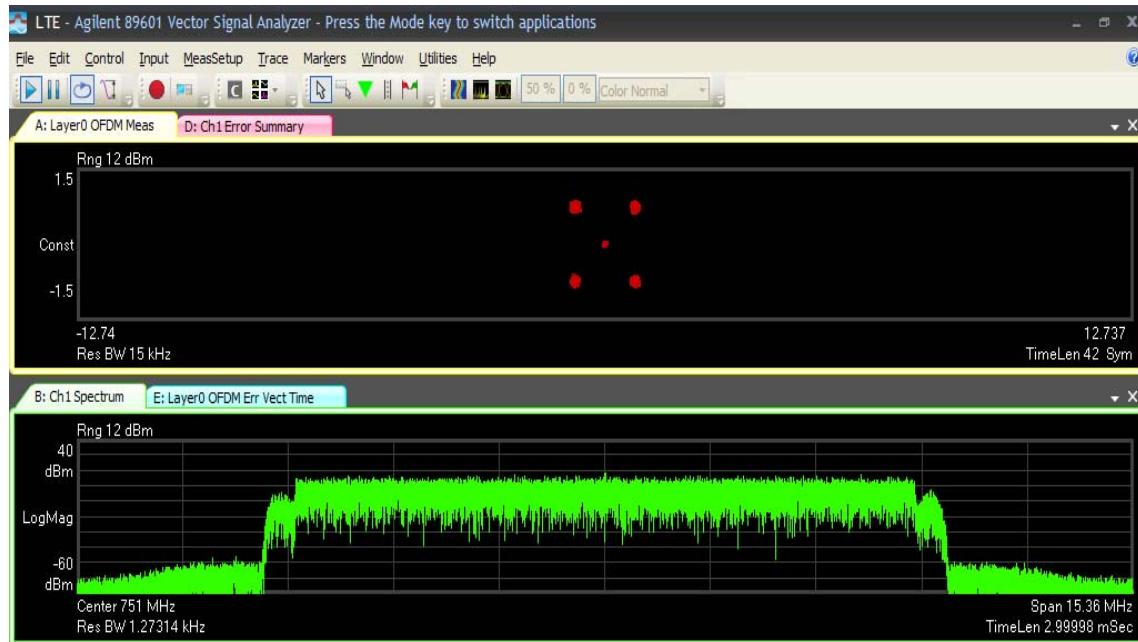
Results:

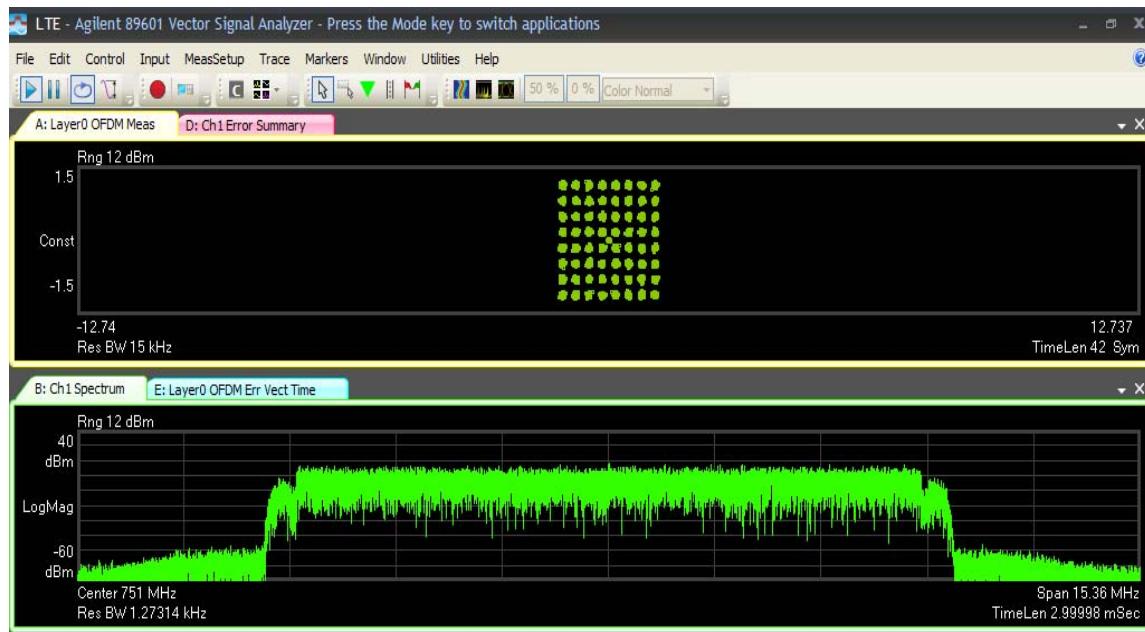
Figure 9.3.2 shows three representative screen plots of the modulation measurement at 751 MHz for a 10MHz bandwidth LTE carrier in QPSK, 16QAM and 64QAM modulations, respectively. The modulation characteristics of the LTE 700U 2x5W MCO is in full compliance with the Rules of the Commission across the Frequency Band 746 – 756 MHz.

**FIGURE 9.3.1 TEST SET-UP FOR MEASUREMENT OF MODULATION ACCURACY,
OCCUPIED BANDWIDTH AND OUT-OF-BAND EMISSIONS**



**FIGURE 9.3.2 SCREEN PLOTS OF MODULATION MEASUREMENT AT 751 MHZ, 10MHZ
LTE WITH QPSK, 16QAM AND 64QAM MODULATIONS**





SUBEXHIBIT 9.4

Section 2.1049 MEASUREMENT REQUIRED: OCCUPIED BANDWIDTH AND OUT-OF-BAND EMISSIONS

In compliance with Section 2.1049, the appropriate E-UTRA test model specified in 3GPP TS 36.141 was used for LTE carrier.

The 700U MCO 2x5W supports only one 10MHz LTE carrier per transmitting path.

The occupied bandwidth and out-of-band emissions measurements were made at the antenna transmitting terminal (J4) for one 10 MHz LTE carrier in 700U 746-756MHz band. The measurement was performed for QPSK, 16QAM and 64QAM modulations, respectively. At the carrier frequency 751MHz, the carrier power level at the antenna terminal was adjusted to the maximum rated mean power +37 dBm (5W).

The minimum emission requirements and the setting of measurement equipment for the occupied bandwidth measurement of a 700U carrier were specified in FCC Part 27.53(c). The FCC's requirements are tabulated in the following table:

Table 9.4.1 FCC Part 27.53(c) Transmitter Unwanted Emission Limits

Frequency	Required Minimum Attenuation below the Mean Carrier Power P	Minimum Resolution Bandwidth of Spectrum Analyzer
100kHz Immediately Outside and Adjacent to 746-758 and 776-788 MHz	(43 + P dBW) dBc	30 kHz
Outside the above frequency range	(43 + P dBW) dBc	100 kHz
763-775, 793-805 MHz	(76 + P dBW) dBc	6.25 kHz

The requirement of FCC Part 27.53(c) was used as the required emission limit mask in the LTE measurement.

The measurements were performed with a Rohde & Schwarz EMI Receiver, which was calibrated in accordance with ISO 9001 process. The test set-up diagram is same as the one shown in the Figure 9.3.1.

For the 99% occupied bandwidth measurement of a 10 MHz LTE carrier, the spectrum analyzer was set with a 200 kHz resolution bandwidth, 20 MHz span and auto-couple sweep time per FCC KDB 971168.

For the out-of-band measurement, the spectrum analyzer was set with a 30 kHz resolution bandwidth MHz, 100 kHz video bandwidth and 40 MHz (736-776MHz) span, as shown in the plots of the occupied bandwidth measurement attached in the following pages. The emissions outside the above spans were evaluated in Measurement Required: Out-of-block Spurious Conducted Emissions. The maximum mean output power of the LTE carrier, measured with a 3 MHz resolution bandwidth (maximum available), aligns with the top of the spectrum analyzer display reticule (Ref Lvl) minus 5.2dB. The 5.2 dB offset for LTE carrier was due to the fact that $10 \log (10\text{MHz}/3\text{MHz}) = 5.2$ dB. The top of the carrier measured with a 30 kHz resolution bandwidth, thus, was 25.2 dB below the LTE carrier power measured with a resolution bandwidth greater than the carrier bandwidth 10 MHz (if available). This 25.2dB offset was due to the fact that $10 \log (10,000\text{kHz}/30\text{kHz}) = 25.2$ dB.

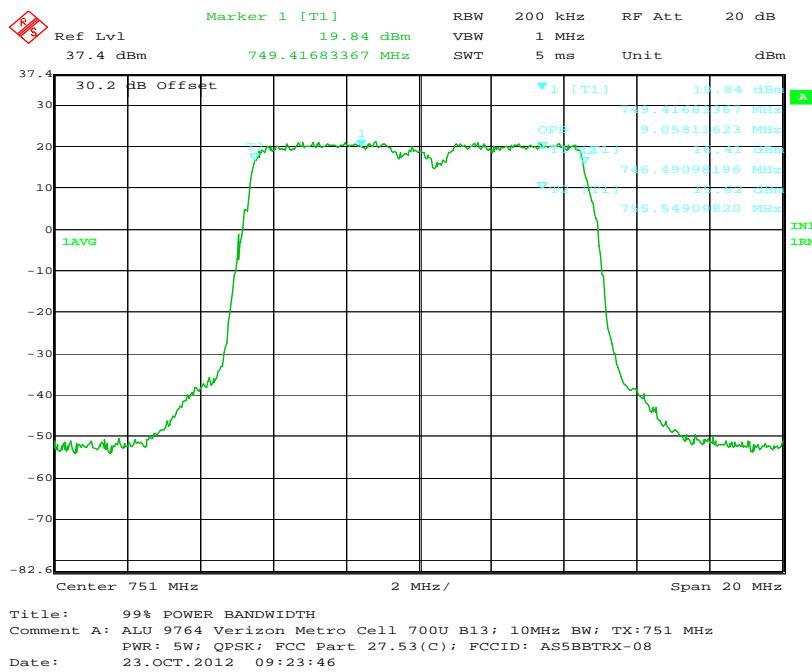
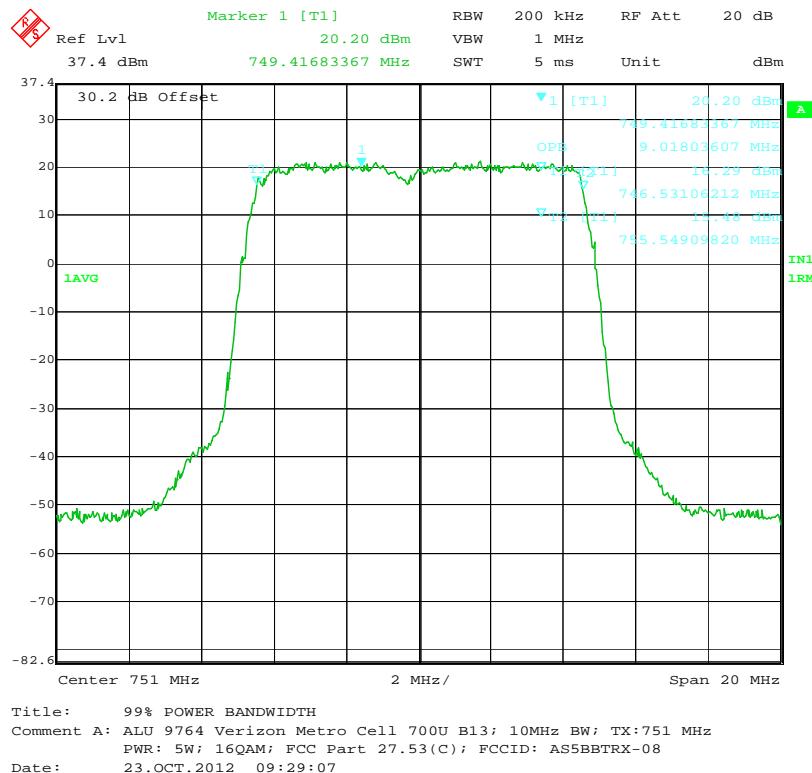
The RMS average detector was used in all above measurement.

The three 99% Occupied Bandwidth plots were submitted for one LTE carrier with QPSK, 16QAM and 64 QAM, respectively.

For one LTE carrier configuration, three emission plots are submitted for QPSK, 16QAM and 64QAM modulations, respectively. The limits specified in FCC Part 27.53(c) are displayed in the plots.

Results:

The 99% Occupied Bandwidth plots showed a bandwidth of 9.02~9.06MHz. From the occupied bandwidth and out-of-band plots attached in the following, it can be seen that all the waveforms are under the required FCC emission mask with a minimum margin of more than 3dB. The measurement results demonstrate the full compliance with the Rules of the Commission for 700U 746-756 MHz band.

FIGURE 9.4.1 99% OCCUPIED BANDWIDTH PLOTS**(a) 10MHZ LTE CHANNEL AT 751 MHZ WITH QPSK MODULATION — 9.06MHZ****(b) 10MHZ LTE CHANNEL751 MHz WITH 16QAM MODULATION — 9.02MHZ**

(c) 10MHZ LTE CHANNEL 751MHz WITH 64QAM MODULATION — 9.06MHZ

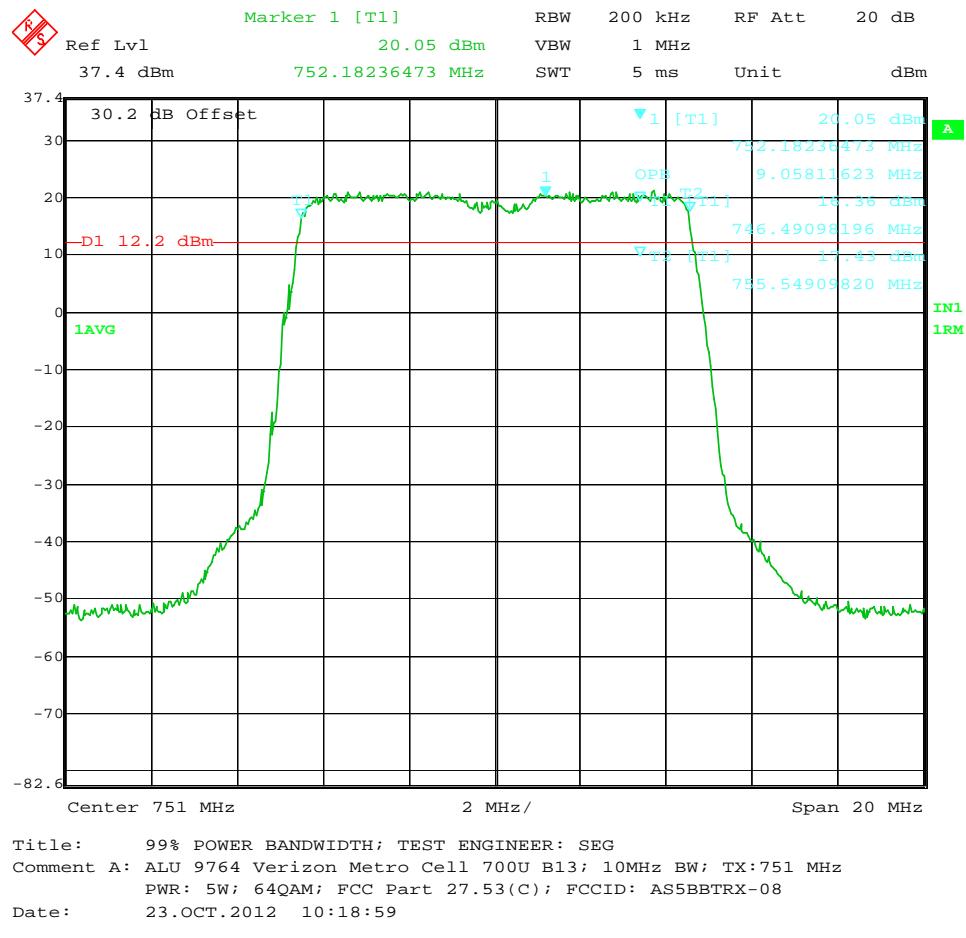
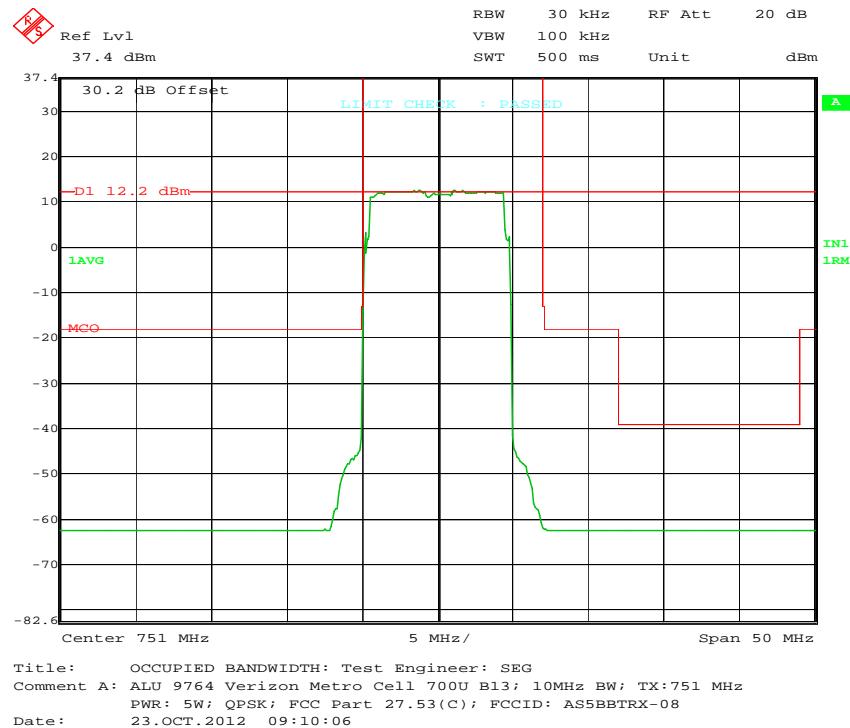
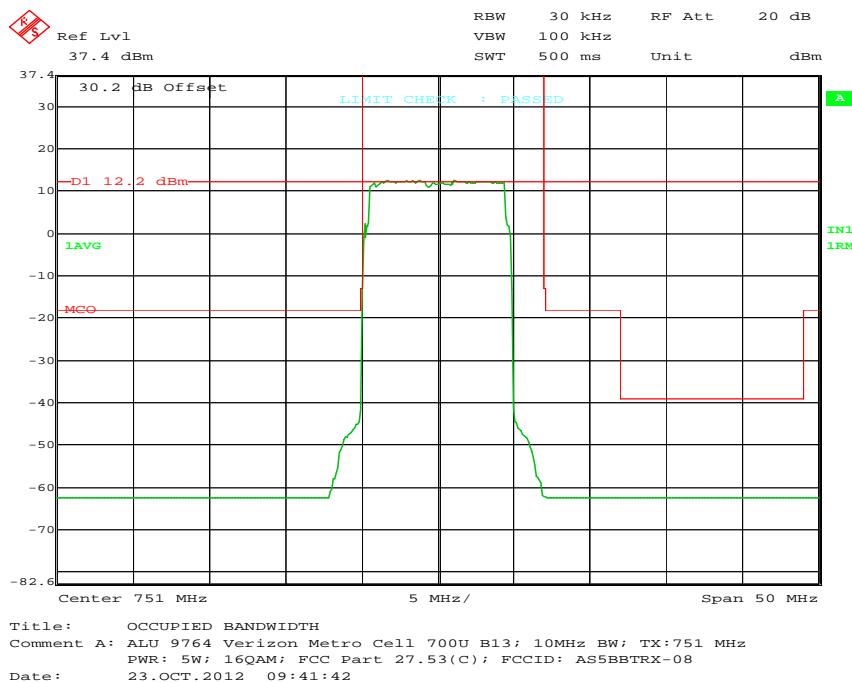
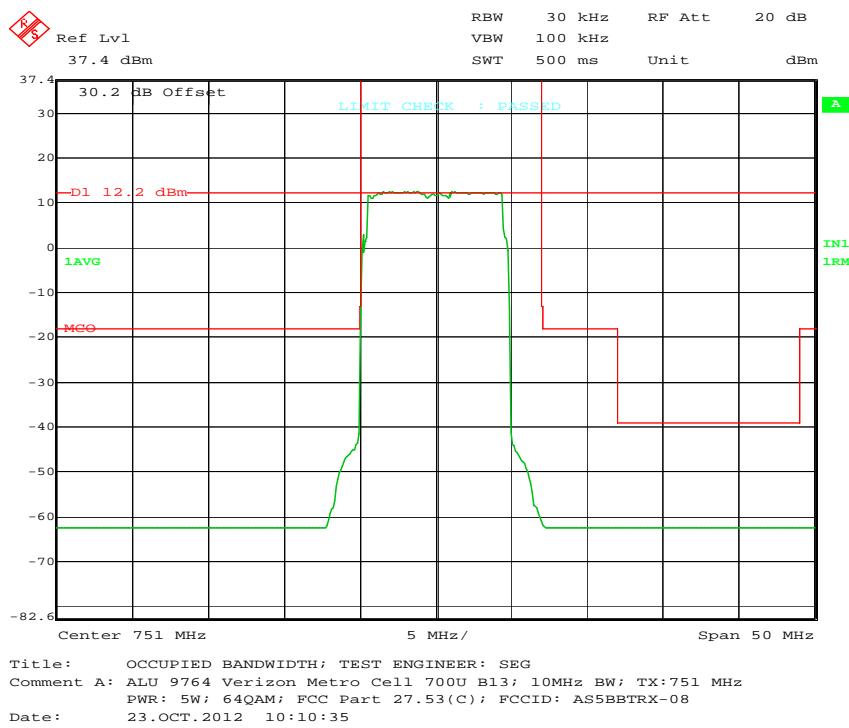


FIGURE 9.4.2 OCCUPIED BANDWIDTH AND OUT-OF-BAND EMISSIONS PLOTS**(a) LTE, 10MHz, 751MHZ, 5W, QPSK****(b) LTE, 10MHz, 751MHZ, 5W, 16QAM**

(c) LTE, 10MHz, 751MHz, 5W, 64QAM



SUBEXHIBIT 9.5**Section 2.1051 MEASUREMENT REQUIRED: SPURIOUS EMISSIONS AT THE ANTENNA TERMINALS**

The out-of-block spurious emissions at the antenna transmitting terminal were investigated from 10 MHz to the 10th harmonic of the carrier or 8 GHz, per Section 2.1057(a)(1).

The carrier setup and configurations were same as in Sub-exhibit 9.4.

The emission limitations and the setting of measurement equipment for the unwanted emissions measurement of 10MHz LTE carrier were specified in 27.53(c) and shown in Sub-exhibit 9.4.

For the mean output power of +37 dBm (5 W) at J4, the required spurious emissions attenuation per (43 + P dBW) dBc is 50dBc per 27.53(c)(1). FCC CFR 47, Sections 2.1051 and 2.1057(c) specify that the spurious emissions attenuated more than 20 dB below the permissible value need not be reported. So the reportable limit is -70 dBc.

Between the frequency range 763-775 MHz and 793-805 MHz, the required out-of-band attenuation per (76 + P dBW) dBc/6.25kHz is 71dBc/100kHz (46dB-12dB+37dB = 71dB) per FCC 27.53(c)(3), where $10\log(100\text{kHz}/6.25\text{kHz}) = 12\text{dB}$. The FCC reportable limit is -91dBc.

The measurements were performed with a Rohde & Schwarz EMI Receiver, which was calibrated in accordance with ISO 9001 process. The test set-up diagram is given in the Figure 9.3.1.

The carrier power level at the antenna transmitting terminal was calibrated before the conducted spurious emissions testing for each test.

The spectrum analyzer was set to a 100kHz resolution bandwidth. The RMS detector was used.

The spurious emissions in the frequency range of 10MHz to 8GHz are well under the required emission limit with more than 23dB margins for all QPSK, 16QAM and 64QAM modulations evaluated. Therefore, there are no reportable emissions.

Results:

Over the frequency spectrum investigated, 10MHz to 8GHz, for Alcatel-Lucent LTE 700U MCO 2x5W, no reportable out-of-block spurious emissions were detected. The out-of-block spurious emissions in the entire spectrum investigated are under the required emission limit with more than 23dB margins. The measurement results demonstrate that the subject of the application is in full compliance with the Rules of the Commission.

SUBEXHIBIT 9.6**Section 2.1053 MEASUREMENT REQUIRED: FIELD STRENGTH OF SPURIOUS RADIATION**

The field strength measurements of radiated spurious emissions were made in a FCC (Site Registration Number: 515091) and IC (Filing Number: 6933F-5) registered three meter semi-anechoic chamber AR-5 which is maintained by Alcatel-Lucent in Murray Hill, New Jersey.

The equipment under test (EUT) transmits in the domestic 700U Band (Tx: 746-756 MHz and Rx: 777-787 MHz) with LTE technology and 2x5W. The 208VAC LTE 2x5W MCO outdoor was investigated from 30 MHz to the 10th harmonic of the carrier or 8 GHz, per Section 2.1057(a)(1). The EUT was configured as in the normal mode of the installation and operation. The recommendations of ANSI C63.4-2009 were followed for EUT testing setup and cabling.

The base station was configured to transmit one LTE 10MHz carrier at 751MHz in 746-756MHz with the maximum mean power of 5W (37dBm) at each antenna port of TX1 and TX2, respectively. The test model used for configuring the LTE carrier was described in Sub-exhibit 9.4. All carriers were transmitting to non-radiating 50 Ω resistive loads.

FCC Part 27.53 (c) and 27.53 (f) are applicable to 700U transmitter. The emission limitations and the setting of measurement equipment for the conducted spurious emissions measurement of a 700U carrier were specified in 27.53(c) and shown in Sub-Exhibit 9.4. The emission limit of FCC Part 27.53(f) is provided in Table 9.6.1, where MIMO requirement/margin is not taken into account.

Table 9.6.1 FCC Part 27.53(f) Transmitter Unwanted Emission Limits

Frequency	Required Minimum Emissions (EIRP)*	Signals
1559-1610 MHz	-40dBm/MHz	Wideband Signals

* The transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

By using the relation between the electric field strength of an ideal dipole and its excitation power given in Reference Data for Radio Engineers, page 676, 4th edition, ITT Corp., the emission limit calculated for - equals

Table 9.6.2. FCC Part 27.53 Radiated Spurious Emission Limits in Electrical Field Strength at 3m Separation Distance

Limits	Frequency of Emission (MHz)	E (dB μ V/m)	Detector/RBW
-13dBm	10-8,000	84.1	Average/100kHz
-46dBm/6.25kHz	763-775 & 776-788	63.1	
-40dBm (EIRP)/MHz	1559-1610	45.0	

The field strength of radiated spurious emissions measured was determined by

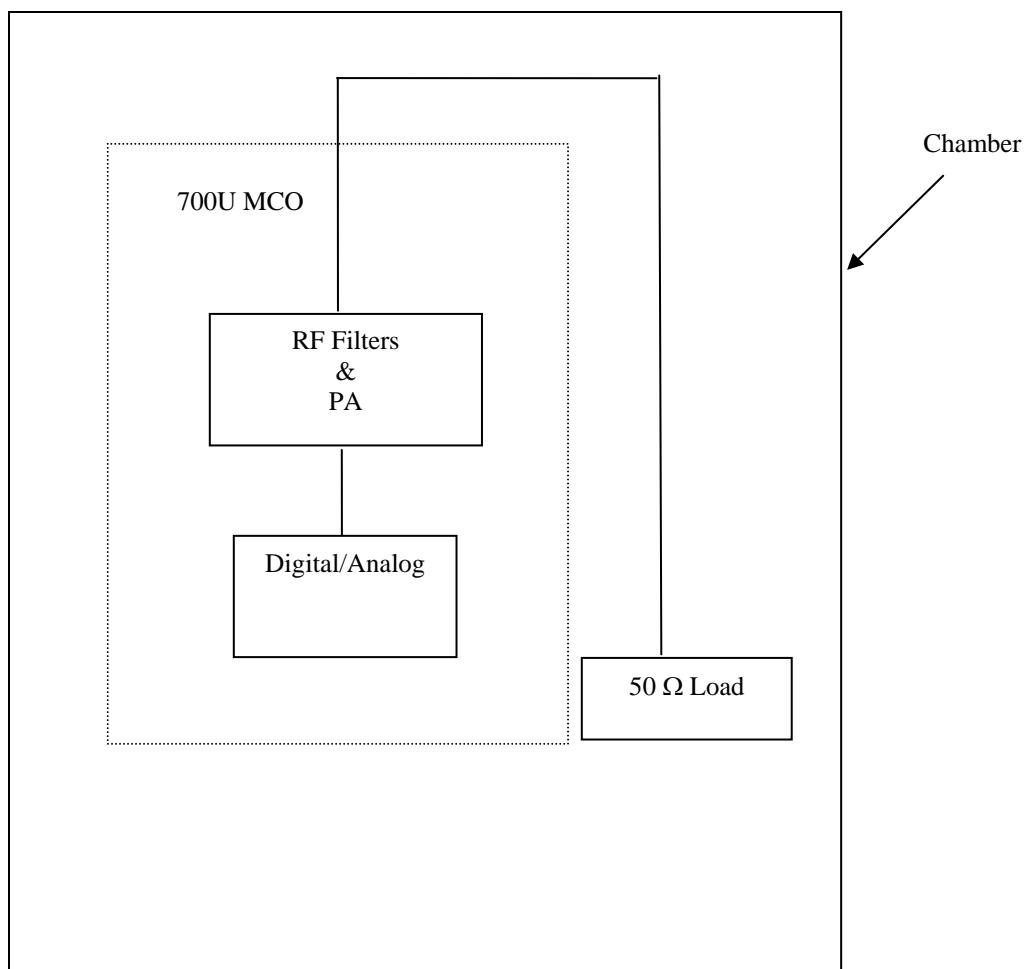
$$E (\text{dB}\mu\text{V}/\text{m}) = V_{\text{meas}} (\text{dB}\mu\text{V}) + \text{Cable Loss (dB)} + \text{Antenna Factor (dB1/m)}.$$

Sections 2.1051 and 2.1057(c) specify that the spurious emissions attenuated more than 20 dB below the permissible value need not be reported. Therefore, the reportable limits at 3 meter are 20dB below the above limits plus 3dB for 2x2 MIMO.

All the measurement equipment used, including antennas, was calibrated in accordance with ISO 9001 process. The EUT setup diagram is given in the Figure 9.6.1.

Results:

Over the frequency spectrum investigated no reportable radiated spurious emissions were detected. The measurement results of the Alcatel-Lucent 700U LTE MCO 2x5W, subject of this application, demonstrate the full compliance with the Rules of the Commission.

FIGURE 9.6.1 EUT FOR MEASUREMENT OF RADIATED SPURIOUS EMISSIONS

SUBEXHIBIT 9.7**Section 2.1055 MEASUREMENT REQUIRED: FREQUENCY STABILITY**

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

The Alcatel-Lucent LTE 700U MCO 2x5W, a small cell, was designed to transmit a 10 MHz LTE carrier in the frequency spectrum 746-756MHz. The Metro 700U 2x5W supports 2x2 MIMO with 2 antenna ports with the maximum output power of 37dBm per port. The Metro 2x5W consists of both RF and digital boards.

The frequency stabilization of the carrier frequency of the above unit is achieved by the highly stable 15 MHz reference frequency generated by an accurate Oven Controlled Crystal Oscillators (OCXO) plus proprietary phase locked loop (PLL) circuitry and GPS reference.

The frequency stability testing was conducted on the AC LTE 700U 2x5W MCO. The outdoor system was designed for a wider temperature range than the indoor frame. The primary power supplier is 110L-N/220 L-L VAC. The stability of the output frequency of the PCS RRH was measured at its antenna transmitting terminal 1) from -30 °C to +50 °C in 10 °C steps at the rated supply voltage; and 2) at 85% and 115% of the nominal supply voltage, per Section 2.1055. The primary supply voltage, 110 VAC, was varied from 85% to 115%. The 85% of 110 VAC is 93 V and 115% is 126 V. The MCO was set to transmit two LTE carriers at 751MHz at the rated RF power. The carrier frequency at 751 MHz was measured at the antenna terminal (J4) at each temperature and each supply voltage by an Agilent VSA Series Transmitter Tester, respectively. In addition, the transmit power was monitored by the power meter to ensure proper cell performance throughout the test interval.

The above 700U 2x5W MCO was installed in an environmental chamber. 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 January 7~January 15, 2013.

FCC Section 27.54 specifies that the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation. The 3GPP TS 36.104 specify the minimum standard is ± 0.050 ppm for LTE (observed over one period of one subframe (1 ms)) carriers.

The maximum frequency derivations (Δf) at the antenna terminal from the assigned carrier frequency at each temperature and supply voltage are summarized in the following tables.

**TABLE 9.7.1 FREQUENCY DERIVATION FOR LTE CARRIER AT 751MHZ
FROM -30°C TO +50°C**

Stabilized Temp. (°C)	Δf 85% V_{norm} (Hz)	Δf 100% V_{norm} (Hz)	Δf 115% V_{norm} (Hz)
-30	1.50	1.29	1.39
-20	1.30	1.21	1.59
-10	1.56	1.54	1.75
0	1.52	1.28	1.50
+10	1.61	1.30	1.48
+20	1.61	1.25	1.45
+30	1.42	1.29	1.26
+40	1.45	1.43	1.37
+50	1.32	1.12	1.40

The maximum frequency derivations (Δf) at $+25^{\circ}\text{C}$ and 85% and 115% of the supply voltage from the carrier frequency at $+20^{\circ}\text{C}$ and rated supply voltage are summarized in the following tables.

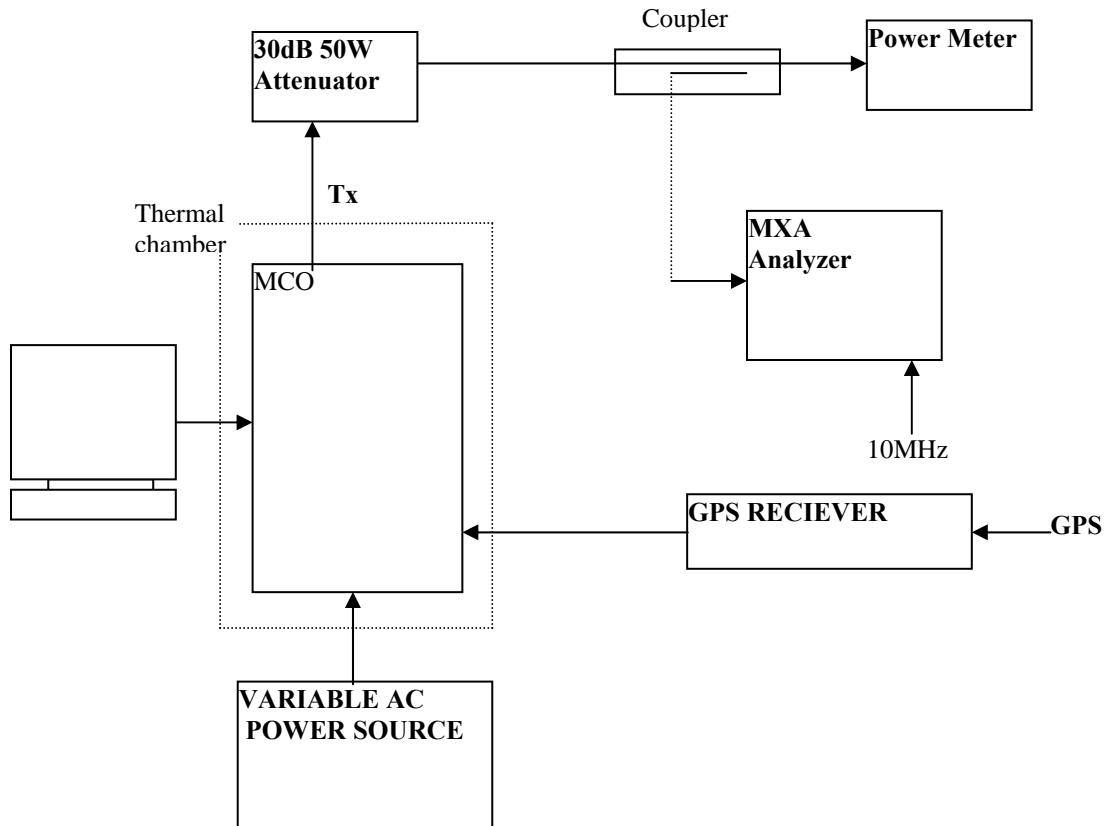
**TABLE 9.7.2 FREQUENCY DERIVATION FOR LTE CARRIER
AT 751 MHZ AT $+25^{\circ}\text{C}$ AND 100% V_{norm}**

Stabilized Temp. (°C)	Δf 85% V_{norm} (Hz)	Δf 115% V_{norm} (Hz)
25	2.67	2.7

All the measurement equipment was calibrated in accordance with ISO 9001 process. The test set-up diagram is given in the Figure 9.7.1

Results:

The maximum frequency drifts at the antenna terminal of the 700U 2x5W MCO at the 751MHz LTE carrier frequency due to temperature and supply voltage changes are below $\pm 0.05\text{ppm}$ requirement. The Alcatel-Lucent LTE 700U 2x5W MCO demonstrated full compliance with the Rules of the Commission.

FIGURE 9.7.1 SET-UP FOR MEASUREMENT OF FREQUENCY STABILITY

SUBEXHIBIT 9.8**Section 2.947 LISTING OF TEST EQUIPMENT USED**

Equipment	Manufacturer	Model	Serial No.	Calibrated Date	Due Cal. Date
Power Meter	HP	437B	3125U21135	10/2/2012	10/2/2013
Power Sensor	HP	8481A	3318A90195	7/26/2012	7/26/2013
Power Meter	Agilent	E4418B	MY4051034	10/18/2012	10/18/2013
Power Sensor	HP	HP8481A	US3729106	3/01/2012	3/01/2013
EMI Test Receiver (20Hz to 40 GHz)	Rohde & Schwarz	ESIB40	100044	6/27/2012	8/27/2013
EMI Test Receiver (20Hz to 40 GHz)	Rohde & Schwarz	ESIB40	100100	3/28/2012	3/28/2013
Signal Analyzer, MXA, 1 20Hz-26.5GHz	Agilent	N9020A	MY50510383	4/7/2011	4/7/2013
MXA	Agilent	N9020A	MY49060086	10/10/2012	10/10/2014
Spectrum Analyzer 9kHz-22GHz	Hewlett-Packard	8593E	3911A04009	9/22/2011	12/22/2012
Spectrum Analyzer 9kHz-22GHz	Hewlett-Packard	8593E	3926A04192	1/25/2012	1/25/2013
Attenuator 5dB (5W)	Weinschel	2-6	BX3438	1/23/2012	1/23/2013
Attenuator (100 W)	Weinschel	48-30-33, E961	AY8323	N/A	N/A
Directional Coupler	HP	778D, E962	18655	N/A	N/A
Bilogical Antenna 25-2000MHz	A.H. Systems	SAS-521-2	410	10/1/2012	10/1/2014
Double Ridged Horn Ant. 1-18GHz	ETS Lindgren	3117	00135198	9/9/2012	9/9/2014
Double Ridged Horn Ant. 1-18GHz	EMCO	3115	9903-5769	1/17/2012	1/17/2013
Pre-amplifier 1-26.5GHz	Hewlett-Packard	8449B	3008A00426	7/23/2012	7/23/2013
Pre-amplifier 9kHz-1GHz	Sonoma Instrument Co.	310N	186747	8/18/2012	8/18/2013
Pre-amplifier 0.1-1300 MHz	Hewlett-Packard	8447D	2944A09820	9/10/2012	9/10/2013
AC Source/Meter	Behlman	BL1350	04483	NA	NA
Multimeter	Fuke	87-III	70640221	6/6/2012	6/6/2013
Transient Limiter 9kHz-200MHz	Hewlett Packard	11947A	3107A02702	6/4/2012	6/4/2013
LISN 50uH+5 Ohm 50 Ohm	Rohde & Schwarz	ESH3-Z5	861189-017	2/21/2011	2/21/2013