FCC Test Report

for
Alcatel-Lucent USA Inc.
AWS LTE 9764 Metro Cell Outdoor Transceiver System
FCC ID: AS5BBTRX-17

Exhibit 11 Listing of Required Measurements

SECTION 2.1033(c)(14)
The data required by Section 2.1046 through 2.1057, inclusive, measured in accordance with the procedures set out in Section 2.1041.

Response: **AWS LTE 9764 Metro Cell Outdoor Transceiver System FCC ID: AS5BBTRX-17**
The lowest clock frequency in the **Alcatel-Lucent's AWS LTE 9764 Metro Cell Outdoor Transceiver System / FCC ID: AS5BBTRX-17** is the 10 MHz reference oscillator. Conducted spurious measurements were performed over the range of 10 MHz to 21.6 GHz which is above the tenth harmonic of the transmit frequency range.

The following pages include the data required for the Product Certification authorization of the **AWS LTE 9764 Metro Cell Outdoor Transceiver System / FCC ID: AS5BBTRX-17**, measured in accordance with the procedures set out in Section 2.1041 of the Rules.

Each required measurement and its corresponding exhibit number are:

Exhibit 12	Section 2.1046	Measurement of Radio Frequency Power Output
Exhibit 13	Section 2.1047	Measurement of Modulation Characteristics
Exhibit 14	Section 2.1049	Measurement of Occupied Bandwidth
Exhibit 15	Section 2.1051	Measurement of Spurious Emissions at Antenna
Exhibit 16	Section 2.1053	Field Strength of Spurious Radiation
Exhibit 17	Section 2.1055	Measurement of Frequency Stability

Exhibit 12 MEASUREMENT OF RADIO FREQUENCY POWER OUTPUT

SECTION 2.1046 Measurements required: RF power output.

For 10 MHz LTE transmit carrier operation, the **AWS LTE 9764 Metro Cell Outdoor Transceiver System** is specified to provide a continuous maximum power output of 5 Watt at each of its two transmit antenna terminals (37 dBm +2/-4 dB for each of the carriers). It also has a minimum power output at the antenna terminals of 0.05 Watts (17.0 dBm +2 / -4 dB). This power capability was demonstrated across the AWS downlink Band of 2110 MHz to 2155 MHz.

In order to adequately evaluate performance, the occupied bandwidth was measured with each of the sub-carrier modulation factors and co-plotted. The applied signal from an **AWS LTE 9764 Metro Cell Outdoor Transceiver System / AS5BBTRX-17**, met the recommended characteristics as defined in **3GPP TS 36.211 V9.1.0 (2010-03) titled:** 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and Modulation (Release 9).

The power was set to the specified 5 W maximum at each measurement frequency to verify the spectral performance at that power level at each specific frequency of interest. Power was also verified for the QPSK and 64QAM modulation configurations. .

The test arrangements used to measure the radio frequency power output of the **Alcatel-Lucent's AWS LTE 9764 Metro Cell Outdoor Transceiver System / AS5BBTRX-17** is on the following page. Measurements were made respectively at each frequency where Occupied Bandwidth measurements were performed and compliance was documented.

Exhibit 12 RF Power Test Configuration

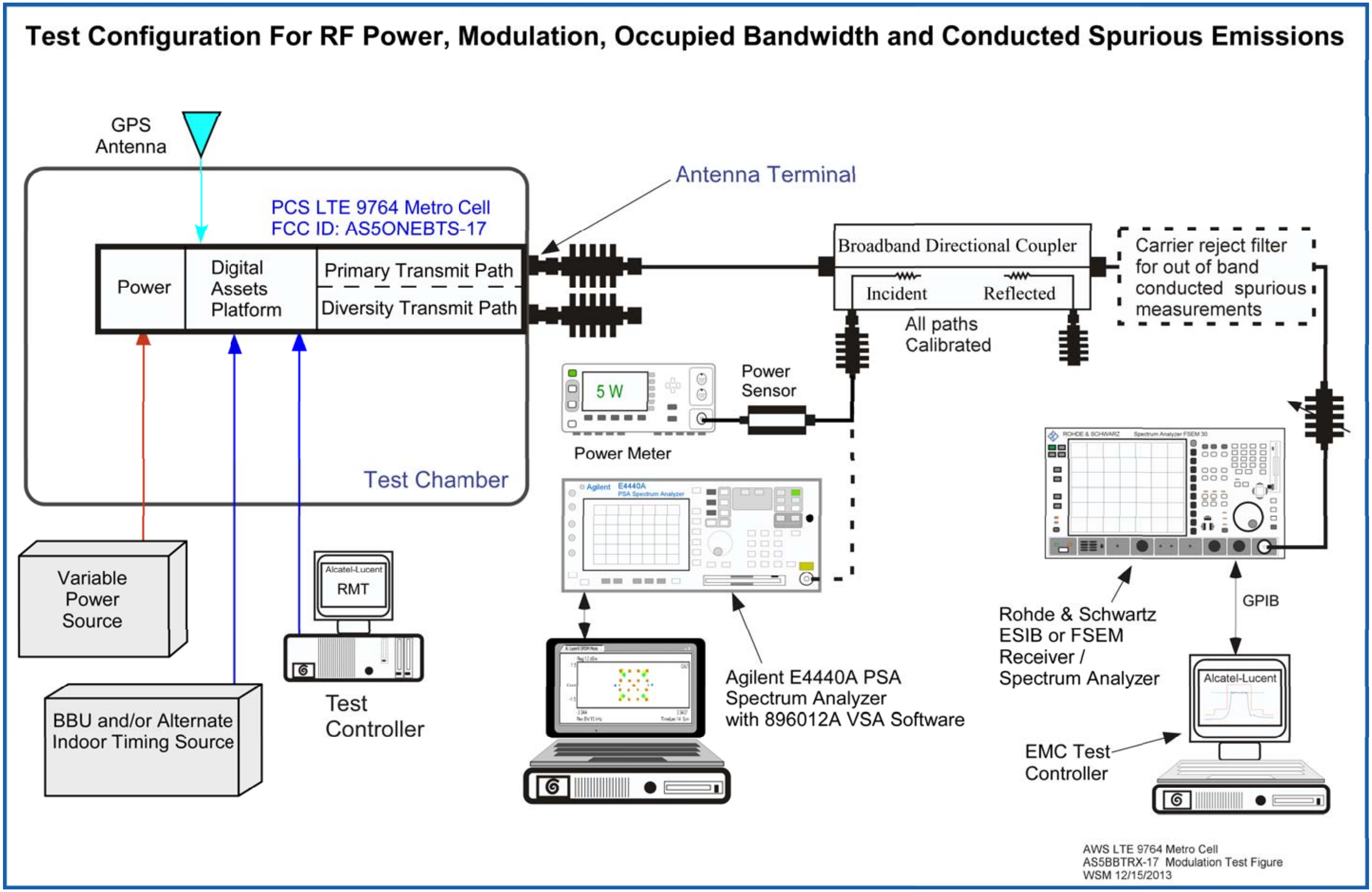


Exhibit 12 *continued*

TEST EQUIPMENT

The following Equipment used for RF Power, Modulation, Occupied bandwidth, Conducted Spurious and Radiated Spurious Measurements

Equipment	Description	Reference Number	Calibration Date
Power Meter:	Agilent N1912A P Series Power Meter	E949	01/02/2013
Power Head	Agilent N1921A 0.05-18 GHz Wideband Power Sensor	E950	01/30/2013
EMC Spectrum Analyzer	Rohde & Schwarz FSEM-30	E927 / 167437	04/24/2013
EMC Receiver / SA	Rohde & Schwarz ESIB-40	E936 / 166737	06/04/2013
Code Domain Analyzer	Agilent E4440A PSA with 896012A VSA Software.	E935/ MY45304655	1/29/2013
Computer Controller:	EG Technology, Intel Pentium PC w/WIN 2000 OS	POR-2, 4 & 6	N/A
Low Pass Filter:	10 MHz-1.93 GHz, Custom manufactured	E980 AWS LPF-12	05/15/13
High Pass Filters:	1.99-20 GHz, Custom manufactured |	E988 AWS HPF-10	05/15/13

Multi Use Laboratory Equipment (MULE)

RF Test coupler The equipment below is maintained and verified as a unit as: White 50W-Mule-Lim 15 February 2013

Directional Coupler:	HP 772D 2-18 GHz	s/n 772D
Attenuator, Variable	HP 8494B DC-18 GHz digital attenuator	MY42140028
Attenuator, Variable	HP 8495B DC-18 GHz digital attenuator	MY42140034
Attenuator, Fixed	MCE/Weinschel 6528-30-34 LIM 150W	BN4170
Test Cables:	Low loss test cables custom mfg.	

Radiated Spurious Measurement Equipment

Description	Manufacturer-Model	Serial #	Last Cal Date
Spectrum Analyzer 9kHz-22GHz	Hewlett Packard 8593E	E454	2/19/2013
EMI Test Receiver, (20Hz to 40 GHz)	Rohde & Schwarz, - ESIB40	E567	7/2/2013
Bilogical Antenna, 25 - 2000 MHz	A.H. Systems Inc. SAS-521-2	E602	10/1/2012/ 24 mo interval
Amplifier, 9 KHz-1GHz	Sonoma Instrument Co.- 310N	E512	1/28/2013
Attenuator, 6 dB DC-18GHz 5 Watt	Weinschel,- 2-6	E887	3/1/2013
Pre-Amplifier, Preamplifier 1-26.5 GHz	Hewlett Packard, - 8449B	E1151	10/17/2013
Double-Ridged Waveguide Horn, 1-18 GHz	ETS Lindgren, - 3117	E1073	9/9/2012/ 24 mo interval
High Pass Filter, PCS 2.85GHz - 18.05GHz	Trilithic - 5HC2850/18050-1.8-KK	E1116	11/21/2013
Test Receiver EMI (20Hz to 40 GHz)	Rohde & Schwarz - ESIB40	E704	3/7/2013
Double Ridged Horn 18-40 GHz	EMC Test Systems - 3116	E513	3/22/2013

Exhibit 12 *continued* Measurements required: RF power output.

AWS - Block	AWS - Channels	Number of Primary carriers	Power, W	Results Primary Terminal RF Power	Number of Diversity carriers	Power, W	Results Diversity Terminal RF Power
A	100	1	5	Compliant	1	5	Compliant
B	300	1	5	Compliant	1	5	Compliant
CD	500	1	5	Compliant	1	5	Compliant
DE	600	1	5	Compliant	1	5	Compliant
F	800	1	5	Compliant	1	5	Compliant

RESULTS:

The **AWS LTE 9764 Metro Cell Outdoor Transceiver System / AS5BBTRX-17**was configured in the test setup shown in Figure 12A. For the Primary and Diversity antenna ports the **LTE 9764 Metro Cell** delivered a minimum of 5 Watts +2/-0 dB when measured at the antenna output connection. This data is tabulated above and was recorded on the Occupied Bandwidth Data Sheets for each frequency Block.

Exhibit 13

SECTION 2.1047 MEASUREMENT OF MODULATION CHARACTERISTICS

The modulation characteristics and accuracy of the **AWS LTE 9764 Metro Cell Outdoor Transceiver System / AS5BBTRX-17** output signal is a function its **Digital, RF Analog and Power Amplifier** assembly.

13.1 - Modulation Description

The LTE spectrum while appearing similar to CDMA differs greatly in complexity . The modulation used in evaluating the **AWS LTE 9764 Metro Cell / AS5BBTRX-17** are described in the pertinent standards documents which include **3GPP TS 36.211 V9.1.0 (2010-03) titled:** 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and Modulation (Release 9). The modulation is Orthogonal Frequency Division Multiple Access (OFDMA) which is processed into an uplink IF signal. The input data stream is divided into several parallel sub-streams of reduced data rate and each sub-stream is transmitted on a separate orthogonal sub-carrier. The sub-carriers are modulated using either QPSK, 16QAM or 64QAM. There is no single measure of the modulation quality other than to verify that the subcarrier modulation constellations visual orientation match the symbol and amplitude criteria is consistent with QPSK, 16QAM and 64QAM.

13.2 Measurement Results

The **AWS LTE 9764 Metro Cell Outdoor Transceiver System** was configured in the test setup shown in Figure 13A. The antenna connection output was evaluated with an Agilent Transmitter Analyzer consisting of an Agilent E4440A PSA Spectrum Analyzer with 896012A VSA Software. Measurements were performed at the AWS Channels shown in Table 13.2.

The **AWS LTE 9764 Metro Cell Outdoor Transceiver System** transmit signal modulation parameters and constellation are shown below for AWS channel 100 in Figure 13B for QPSK and for AWS channel 800 in Figure 13C for 64QAM.

The 99%/-26dB signal bandwidth was measured using the setup of Figure 13A for F Block channel 800. The measurement performed with a resolution bandwidth of 300 kHz verified the signal is within the parameters of the emissions designator and is documented below in Figure 13D.

13.2.1 Results Summary

For each of the AWS channels tested, the **AWS LTE 9764 Metro Cell Outdoor Transceiver System** modulated sub-carriers constellations were consistent for the modulation type. All of the modulation plots include the CCDF plot which indicates the Peak to Average Ratio (PAR) of the transmitted signal. For all measurements the PAR was between 7.5 and 9 dB which is compliant with the CFR which specifies that the PAR be less than 13 dB.

Table 13.2 Tested Modulation Configurations and Results.

AWS - Block	AWS - Channels	Modulation	Primary	Diversity	Results Modulation	Results PAR
A	100	QPSK	Tested	Tested	Compliant	Compliant
A	100	64QAM	Tested	Tested	Compliant	Compliant
B	300	64QAM	Tested	Tested	Compliant	Compliant
B	300	QPSK	Tested	Tested	Compliant	Compliant
CD	500	64QAM	Tested	Tested	Compliant	Compliant
CD	500	QPSK	Tested	Tested	Compliant	Compliant
DE	600	64QAM	Tested	Tested	Compliant	Compliant
DE	600	QPSK	Tested	Tested	Compliant	Compliant
F	800	64QAM	Tested	Tested	Compliant	Compliant
F	800	QPSK	Tested	Tested	Compliant	Compliant

Figure 13A

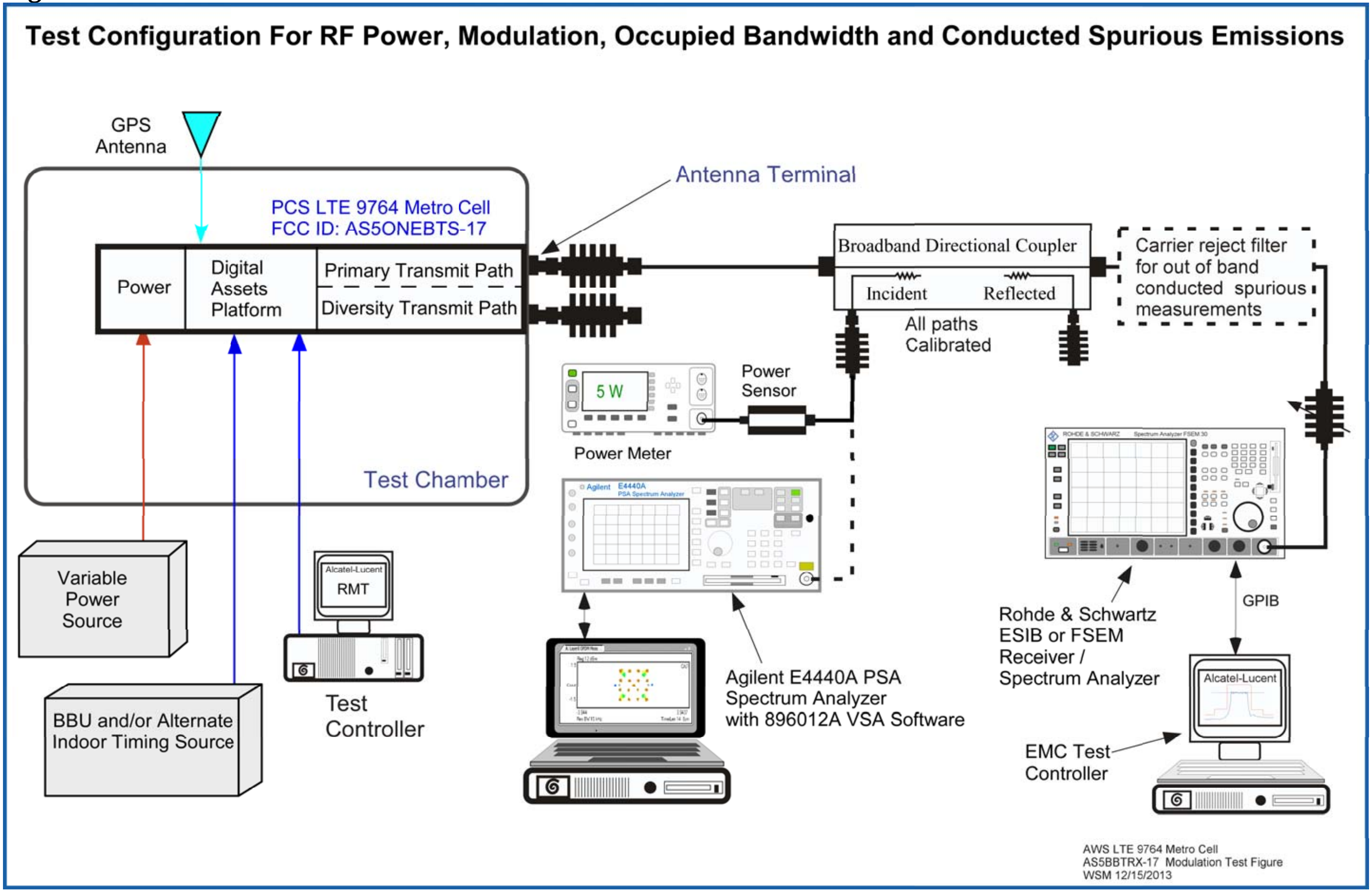
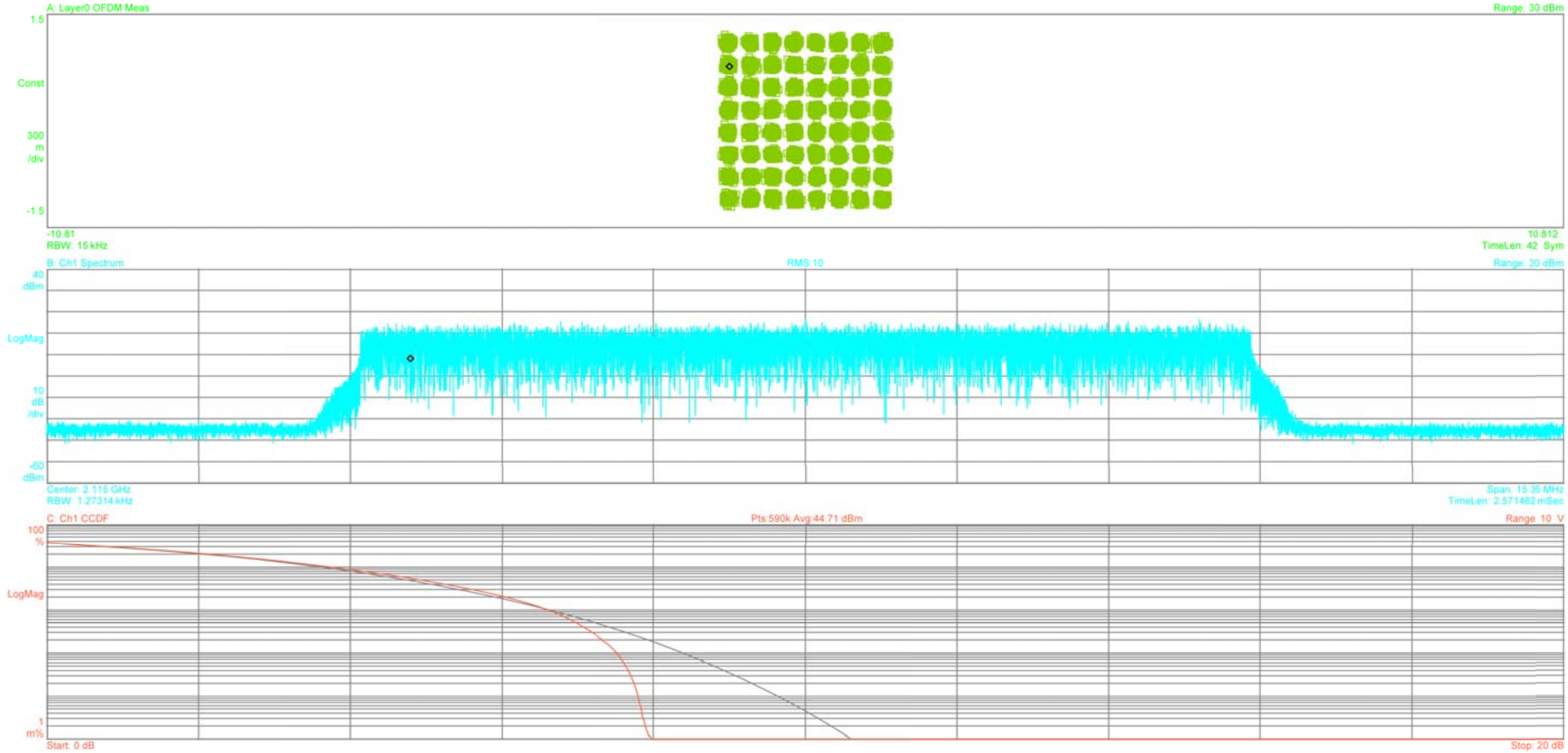

Test Configuration For RF Power, Modulation, Occupied Bandwidth and Conducted Spurious Emissions
GPS Antenna
PCS LTE 9764 Metro Cell
FCC ID: AS5ONEBTS-17
Power
Digital Assets Platform
Primary Transmit Path
Diversity Transmit Path
Test Chamber
Antenna Terminal
Broadband Directional Coupler
Incident
Reflected
All paths Calibrated
Carrier reject filter for out of band conducted spurious measurements
Power Sensor
5 W
Power Meter
Variable Power Source
BBU and/or Alternate Indoor Timing Source
Alcatel-Lucent
RMT
Test Controller
Agilent E4440A PSA Spectrum Analyzer with 896012A VSA Software
Rohde & Schwartz ESIB or FSEM Receiver / Spectrum Analyzer
GPIB
Alcatel-Lucent
EMC Test Controller
AWS LTE 9764 Metro Cell
AS5BBTRX-17 Modulation Test Figure
WSM 12/15/2013

Figure 13B Code Domain A Block, Channel 100, Primary Transmit Path 64QAM




```
Trace A  Marker:              -150 carrier          2  sym      1.3213          144.7246  deg
Trace B  Marker:        2 110 999 800 Hz        -1.797 dBm
         Power:  The Band Power limits are off scale
Trace D  Marker:
Trace E  Marker:
```

Figure 13C Code Domain F Block, Channel 800 QPSK

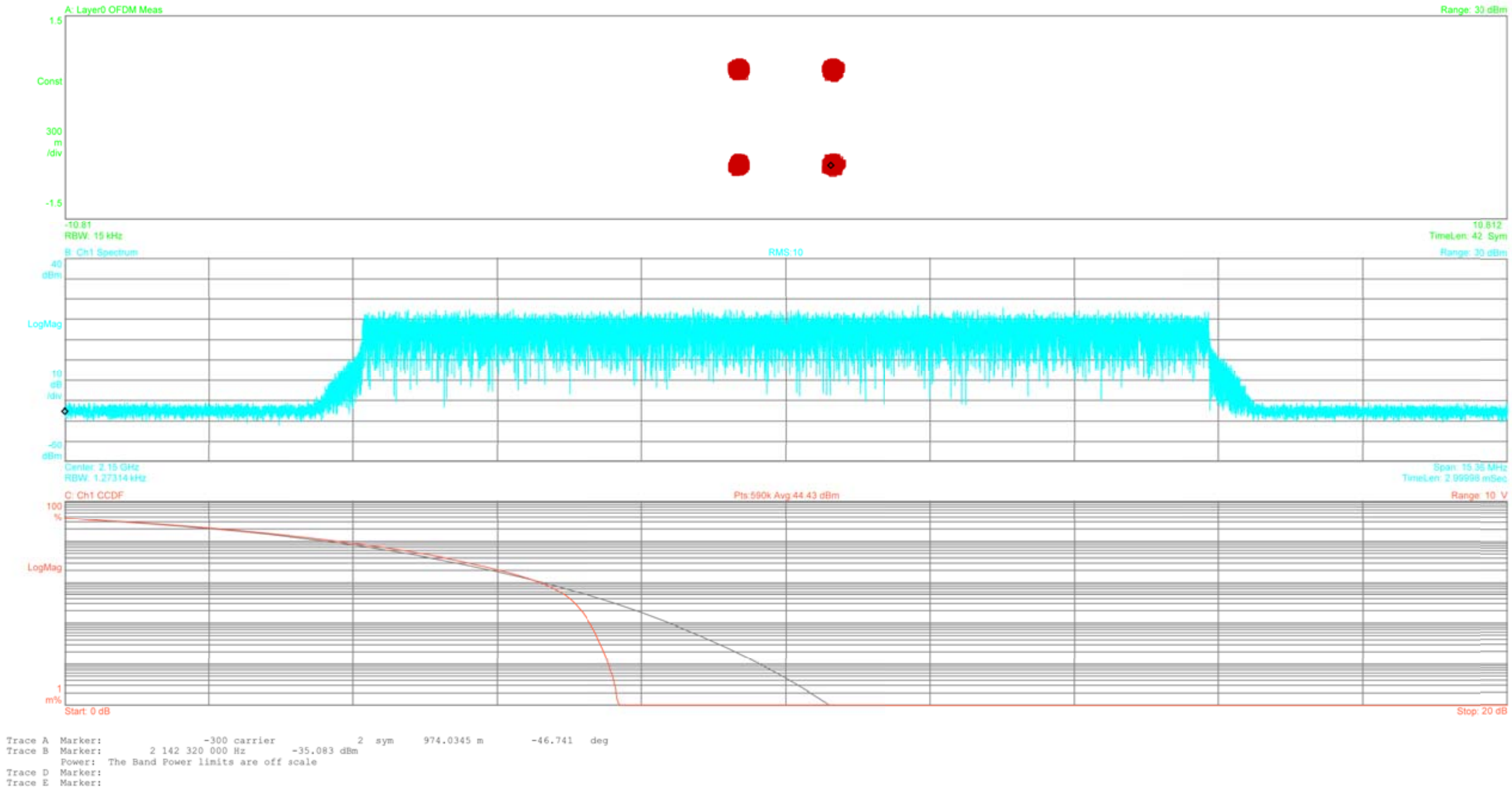


Figure 13D - The 99%/-26 dB Occupied Signal Bandwidth at 300 kHz RBW

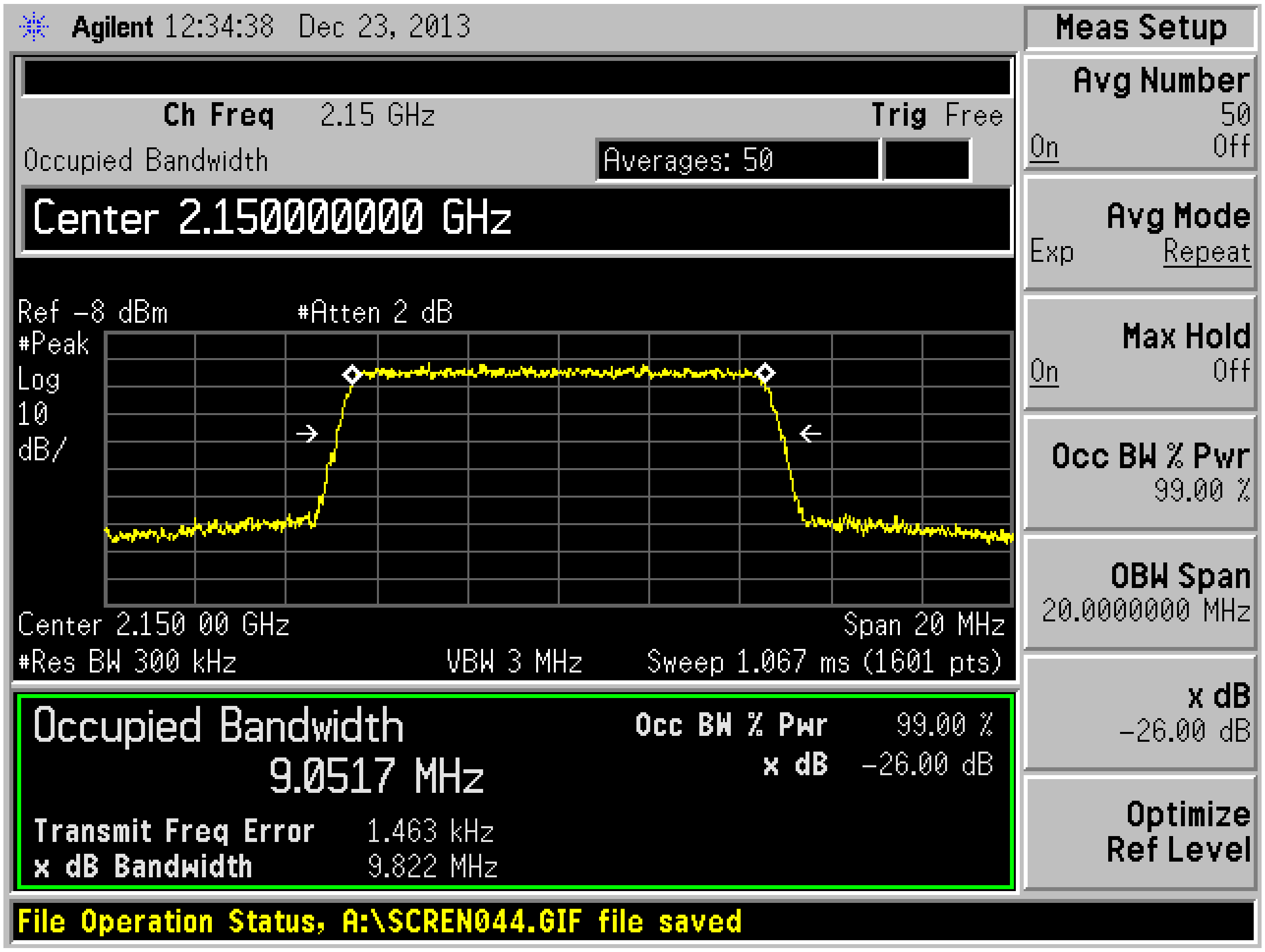


Exhibit 14 MEASUREMENT OF OCCUPIED BANDWIDTH

SECTION 2.1049 Measurement Of Occupied Bandwidth

Occupied bandwidth measurements were performed for the **10M00F9W** test configurations pertinent to full bandwidth A through F Block operation of the **AWS LTE 9764 Metro Cell Outdoor Transceiver System / AS5BBTRX-17**. This documents the typical performance of the **AWS LTE 9764 Metro Cell** while operating with one 10MHz LTE carrier in every AWS Block across the entire downlink band. All power adjustments were performed prior to other measurements. The measurements are described below.

The occupied bandwidth of the **AWS LTE 9764 Metro Cell Outdoor Transceiver System / AS5BBTRX-17** was measured using a Rohde & Schwarz FSEM-30 Spectrum Analyzer, a PC based instrumentation controller using TILE™ software and calibrated RF attenuation and coupled signal path. The RF power level was measured and adjusted via the test setup in Figure 14A. The RF output from the transmitter antenna port was reduced by a calibrated broadband attenuator to amplitudes usable by the spectrum analyzer and power meter. The attenuation factors are reflected in the displayed values of the charts. The typical occupied bandwidth measurement displays the signal adjusted to the -20.0 dBc level corresponding to the corrected RF power level for a 100 kHz resolution bandwidth (RBW). This set-point was performed as follows:

For each test the power calibration was individually verified at the transmitter antenna connection (J4) with a power meter by using the test setup depicted in Figure 14A. The power calibration was performed to calibrate the setting power meter measurement as a reference for both the measured 100 kHz Occupied Bandwidth signal at the -20.0 dBc line and a 3 MHz RBW measurement against the power calibration line which is -5.229 dB below the "Top of Mask" limit. The "Top of Mask" limit corresponds to a single carrier signal at the specified power level of 5W / 37dBm if measured with an RBW of $\geq$ 10 MHz. Since the power calibration measurements was performed with a 3 MHz RBW a power calibration line equal to 10 log(3MHz/10MHz)= -5.229 dB below the top of mask at 31.76 dBm is used as the power set point.

The transmitter output has a single 10 MHz 5W / 37dBm LTE carrier. In each occupied bandwidth measurement there are two traces which track each other a given distance apart in amplitude. One trace is the power calibration trace and this carrier is set to the power calibration line. The second trace is the occupied bandwidth measurement. This power calibration measurement is performed along with each Occupied Bandwidth measurement. The signals measured at RBW's of 3 MHz and 100 kHz were corrected for path loss and were plotted against the mask limit. As part of the calibration between the power meter measurement and the test analyzer, software was used to place the 3 MHz RBW signal at the carrier power calibration line. The carrier as measured with 3 MHz and 100 kHz RBW were corrected with the same attenuation factors. The two measurements are co-plotted on the same graph. A typical single carrier example is shown in Figure 14B which depicts the 10 MHz carrier (Channel 100, A Block, 2115 MHz) inside the mask for the 10 MHz wide A Block.

The test procedure above, calibrates the carrier power against the Mask and accurately places the occupied bandwidth measured carrier at the -20.00dBc reference line. All of the plots are presented with a sufficiently wide frequency span for the specific signals or Block of interest. This allows for ease of comparison of broadband carrier signal performance. This data was electronically recorded using the TILE™ software and electronically placed in the Occupied Bandwidth Data Sheets. These sheets present data for "Left Edge of Block", and "Right Edge of Block" for each AWS frequency Block.

Block Organization and Tests Performed

The 9764 Metro Cell product line uses a 45 MHz bandwidth transmit filter. The use of EDPD provides the in band spurious control which allows the use of a wide bandwidth filter while demonstrating compliance within the AWS band at all individual block edges. The testing of the product documented herein was performed with a single 45 MHz AWS band filter assembly.

Exhibit 14 *continued*

The demonstrations of compliance for the 10 MHz LTE carrier configurations were performed for operation in all AWS Blocks. The presented data for this initial product certification demonstrates the configurations compliance.

In order to adequately evaluate performance the modulation standards were used from the governing documents. Thus, the applied signal, from **AWS LTE 9764 Metro Cell Outdoor Transceiver System / AS5BBTRX-17**, met the recommended characteristics.

The modulation used in evaluating the **AWS LTE 9764 Metro Cell Outdoor Transceiver System / FCC ID: AS5BBTRX-17** are described in the pertinent standards documents which include **3GPP TS 36.211 V9.1.0 (2010-03) titled:** 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and Modulation (Release 9). The modulation is Orthogonal Frequency Division Multiple Access (OFDMA) which is processed into an uplink IF signal. The input data stream is divided into several parallel sub-streams of reduced data rate and each sub-stream is transmitted on a separate orthogonal sub-carrier. The sub-carriers are modulated using either QPSK or 64QAM. There is no single measure of the modulation quality other than to verify that the subcarrier modulation constellations visual orientation match the symbol and amplitude criteria is consistent with QPSK and 64QAM.

Measurement Offset

The spectrum analysis output plots shows the peak of the LTE channel signal 20.0 dB below the top of Mask reference of the spectrum analyzer for the following reason: For the LTE system there is no carrier without modulation. Since the LTE signal is broadband and 10 MHz wide, all measurements performed at narrower resolution bandwidths need be adjusted for the reduction in signal energy. The following relationship was used to provide the correct level for an unmodulated carrier vs. the modulated signal.

10*log (Resolution Bandwidth/ Transmit Bandwidth) = Signal Offset (1)

For the peak of the 10 MHz LTE signal measured with a RBW of 100 kHz the signal offset is:

Signal Offset = 10*log (100 kHz /10 MHz) = -20.0 dB

Since the 10 MHz LTE signal is wider than the 3 MHz spectrum analyzer setting used for power calibration a power calibration line must be placed below the top of mask. The offset for the power calibration line is:

Power Calibration Offset = 10*log (3 MHz /10 MHz) = -5.229 dB

Limits which are specified as appropriate at a given RBW can be measured and evaluated at other RBW's if the limit is adjusted per equation (1)

Require Levels

The Limit in 47 CFR 27.53 for emissions in the 1 MHz band immediately outside and adjacent to a licensees frequency block is:

Emissions $\leq$1 MHz outside the Block *when measured with a RBW of 1%* of the emissions Bandwidth shall be attenuated by :

-{43+10log (mean power output in watts)} = -13 dBm

The Limit in 47 CFR 27.53 for emissions outside a licensees frequency block is:
Emissions >1 MHz outside the Block, *when measured with a RBW of 1 MHz,* shall be attenuated by :
-{43+10log (mean power output in watts)} = -13 dBm.

Exhibit 14 *continued*

Adjustment for 2x MIMO

In order to account for the spectral adding of identical signals from the primary and diversity ports**,** per KDB 662911 D01 Multiple Transmitter Output v01r01, the level needs be adjusted by 10LOG(n) where n= number of outputs.

The adjustment for n=2 is: 3.01 dB = 10LOG(2)

Therefore the limit for emissions >1 MHz outside a licensees frequency block when measured with a RBW of 1 MHz is:

-13 dBm – 3.01 dB = -16.01 dBm

Adjusted Levels

The following levels apply when measurement of the above limits are performed with an RBW of 100 kHz. Measurement at a Resolution Bandwidth of 100 kHz is based on our experience with 47 CFR 27.53.

1. On any frequency removed from the carrier center frequency by greater than 5 MHz to 6 MHz the level shall not exceed -16. dBm when measured in a 100 kHz resolution bandwidth (Note 2 below).
   For a 5 Watts MIMO output the required level is –16.0 dBm/ -53 dBc.

2. For any frequency > 1MHz from the edge of the Block to the 10th harmonic of the carrier the spurious shall not exceed -26 dBm when measured in a 100 kHz resolution bandwidth (Note 3 below)
   For a 5 Watts MIMO output the required level is -26.0 dBm / -63 dBc

++

Note 2: The -16.0 dBm/ –53 dBc level was computed as follows: The limit is specified as

-{43+10log (mean power output in watts) } dB = -13 dBm

Within the 1st MHz outside the band the limit of -13 dBm is specified when measured with a 1% bandwidth. When measured with a different bandwidth the adjustment is made against 1% of the signal bandwidth. Since the carrier is a 10 MHz bandwidth signal and the 1% signal bandwidth is 100 kHz, the limit is adjusted to

-13 + 10LOG(100kHz/100 kHz) dBm = -13.0 dBm

When accounting for a 2x MIMO signal, (per KDB 662911 D01 Multiple Transmitter Output v01r01), the level needs be adjusted by 10LOG(n) where n= number of outputs. The adjustment for n=2 is:
3.01 dB = 10LOG(2)

The resultant limit for MIMO operation is -13.0 dBm – 3.01 dB = -16.01 dBm**;**
which given a 37 dBm carrier (5W) equals – 53 dBc

Note 3: The -26 dBm / -63 dBc level is computed from -13 dBm measured with a 1 MHz resolution bandwidth adjusted by :

-13 + 10LOG(100kHz/1.0 MHz) dBm = -23 dBm

When accounting for a 2x MIMO signal, (per KDB 662911 D01 Multiple Transmitter Output v01r01), the level needs be adjusted by 10LOG(n) where n= number of transmitter outputs. The adjustment for n=2 is:
3.01 dB = 10LOG(2)

The resultant limit for MIMO operation is -23 dBm – 3.01 dB = -26.01 dBm **;**
which given a 37. dBm carrier (5W) equals – 63 dBc

Exhibit 14 *continued*

Trace Description and Power Calibration

Figure 14B shows the single carrier channel 100 LTE signal measured with two different resolution bandwidths. The additional upper magenta trace displays the signal as measured with a resolution bandwidth of 3 MHz. The black trace is the same signal as measured with a 100 kHz resolution bandwidth and is the appropriate trace for the mask evaluation. The wider resolution bandwidth allows for a true power calibration of the measured signal against the power calibration line.

Mask Description for a Single 5 W Carrier application.

The Mask limits are identical for the left and right side of the AWS Blocks and are as follows:

Figure 14B shows the 10 MHz LTE Mask limit for AWS Block A (2110-1945) for AWS channel 100. The horizontal line from a to aa (a-aa) is the 37 dBm/ 0 dBc reference level. The Power Calibration reference line g-gg is below the top of mask reference line as the 3 MHz power calibration resolution bandwidth differs from the 10 MHz signal bandwidth. The g-gg line is at 37-5.229 =31.76 dBm. The peak of the 3 MHz magenta power calibration trace is shown set to this value.

The top of a typical 37.0 dBm single 10 MHz LTE carrier signal viewed at a resolution bandwidth of 100 kHz is shown at the 16.99 dBm/ -20.0 dBc line t-tt. This line is based on equations 1 and 2, and the ratio of the 10 MHz signal bandwidth and the 100 kHz resolution bandwidth of the spectrum analyzer.

The vertical line from a to b (i.e. a-b) and aa-bb are at the block edge for A Block. The horizontal lines c-b and bb-cc represent the limit for the 1st MHz outside the block. The placement of lines c-b and bb-cc is derived from evaluation of 1% of the signal bandwidth, the 100 kHz resolution bandwidth and adjustments for MIMO using the suggested value in of the rules.

Per Note 2 above, the limit for the 1st MHz outside the band with MIMO operation is **-16.0 dBm / – 53 dBc**

The vertical line, c-d and cc-dd are the transitions at 1MHz outside the specified Block.

The horizontal line d-e and dd-ee are placed at the **-26.0 dBm / -63 dBc** level below the 37 dBm / 0 dBc reference per Note 3 above. The rules require a 1 MHz resolution bandwidth for measurements 1 MHz or greater outside the AWS band. Again, equation (1) and the ratio of 1 MHz to 100 kHz provides this value. The same logic was used in determining the other block and band edge tolerances. Figure 14C depicts all of the AWS blocks. Performing the OBW measurement across all of the blocks evaluates intermodulation and performance outside the block but inside the band.

Measurement

In order to depict the tolerance lines that are required by Sec 27.53 of the FCC Rules and **3GPP TS 36.211 V9.1.0 (2010-03**, all occupied bandwidth measurements were made with a resolution bandwidth of 100 kHz and the limits were adjusted as described above using equation (1).

The measurement was performed using a automated data collection system which eliminates variability and operator error. The test profile deliberately and consistently measures the occupied bandwidth using a resolution bandwidth of 100 kHz and a sample detector with 25X averaging. The entire 55 MHz span of measurement (45 MHz +/- 5 MHz outside the band) was broken up into 14 individual 3.92 MHz spans of measurement. Each of the individual spans are less than 256 times the resolution bandwidth to eliminate aliasing. The use of smaller spans and longer sweep times are the best settings to acquire all spurious signal with the equipment used. This is based on our experience with 47 CFR 27.53, the measurements performed and guidance from 971168 D01 Licensed DTS Guidance v02.

All of the tolerance lines for the output are referenced to the top of the Occupied Bandwidth mask, which is defined as 37.0 dBm/ zero dBc. For all Occupied Bandwidth measurements of the **AWS LTE 9764 Metro Cell Outdoor Transceiver System / AS5BBTRX-17**, the output power was measured / adjusted individually to the 5 W level for each carrier and this is the 37.0 dBm value at the 0 dBc reference line.

Exhibit 14 *continued*

TABLE 14.2 AWS Occupied Bandwidth Compliance Tabulation

PCS - Block	PCS - Channel #	Number of Primary carriers	Primary Port Power, W	Results Primary Terminal Occupied Bandwidth	Number of Diversity carriers	Diversity Port Power, W	Results Primary Terminal Occupied Bandwidth
A	100	1	5	Compliant	1	5	Compliant
B	300	1	5	Compliant	1	5	Compliant
CD	500	1	5	Compliant	1	5	Compliant
DE	600	1	5	Compliant	1	5	Compliant
F	800	1	5	Compliant	1	5	Compliant

Exhibit 14 ***Results***

Identical measurement were performed for Primary and Diversity Transmit ports. In each case the transmitter output Occupied Bandwidth measurement was performed for the Left Edge and the Right Edge of each AWS Block. Measurements were performed for both QPSK and for 64QAM operation. Modulation parameters were measured and recorded prior to OBW measurement. A minimum margin of 10 dB was documented on each plot. The Block designation, AWS channels, center frequency and Measured RF Power were also tabulated on each Occupied Bandwidth plot. The signals are plotted for each frequency/ channel of interest. These frequencies were chosen to show the occupied bandwidth for the closest block edge channels for which this product can be operated specifically to document compliance with Section 27.53 of the Commission code. The signal used to show the occupied bandwidth is defined in table 14.1. This is the signal recommended in **3GPP TS 36.211 V9.1.0 (2010-03**. The power output level was adjusted to provide the documented value on each chart.

RESULTS: The following exhibits illustrate the spectrums investigated and document compliance.

W. Steve Majkowski NCE

Figure 14A Test Setup for Antenna Port Measurements of RF Power, Occupied Bandwidth & Conducted Spurious Emissions

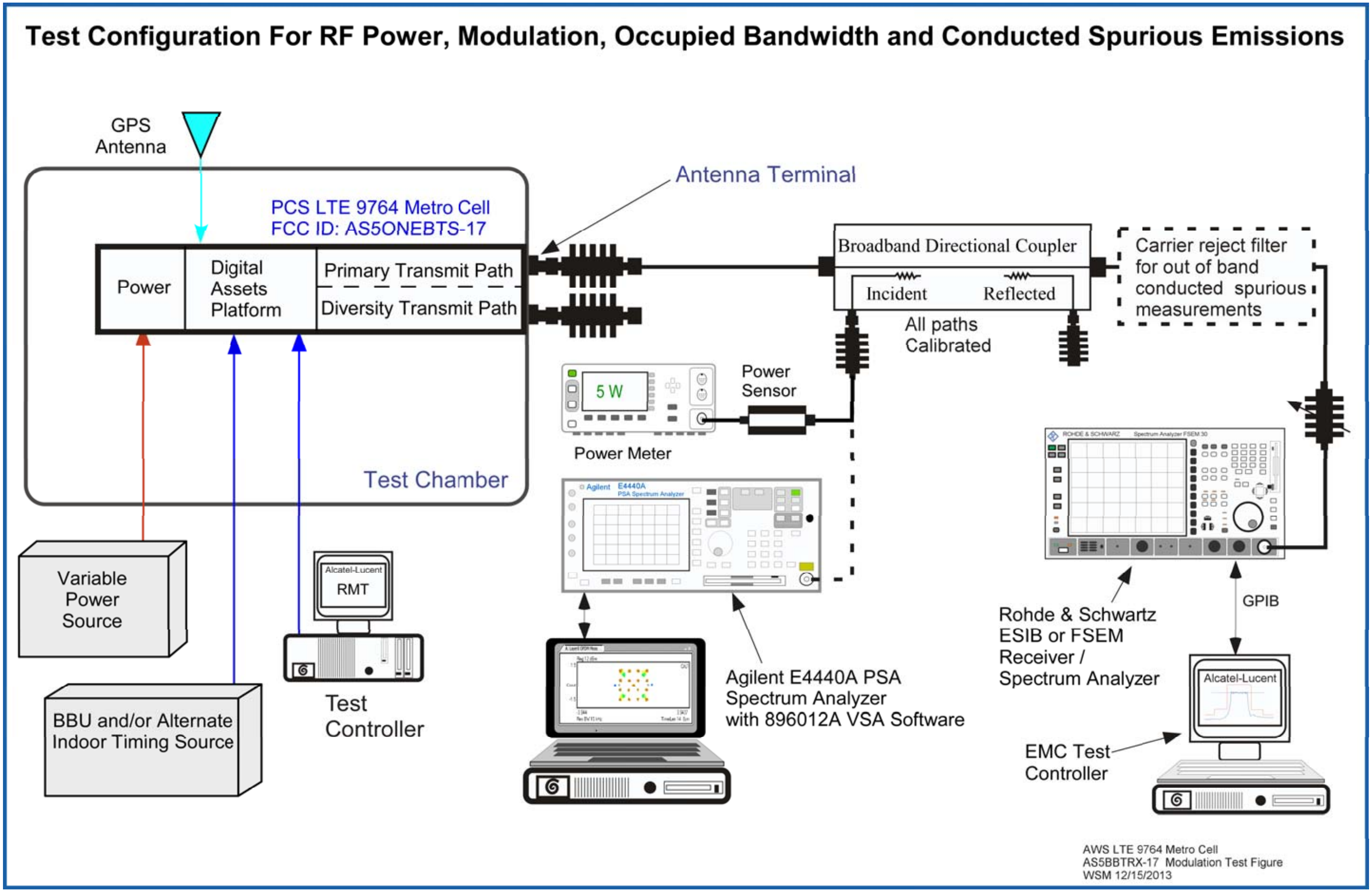


Figure 14B Occupied Bandwidth Mask for AWS Block Operation at A Block Channel 100

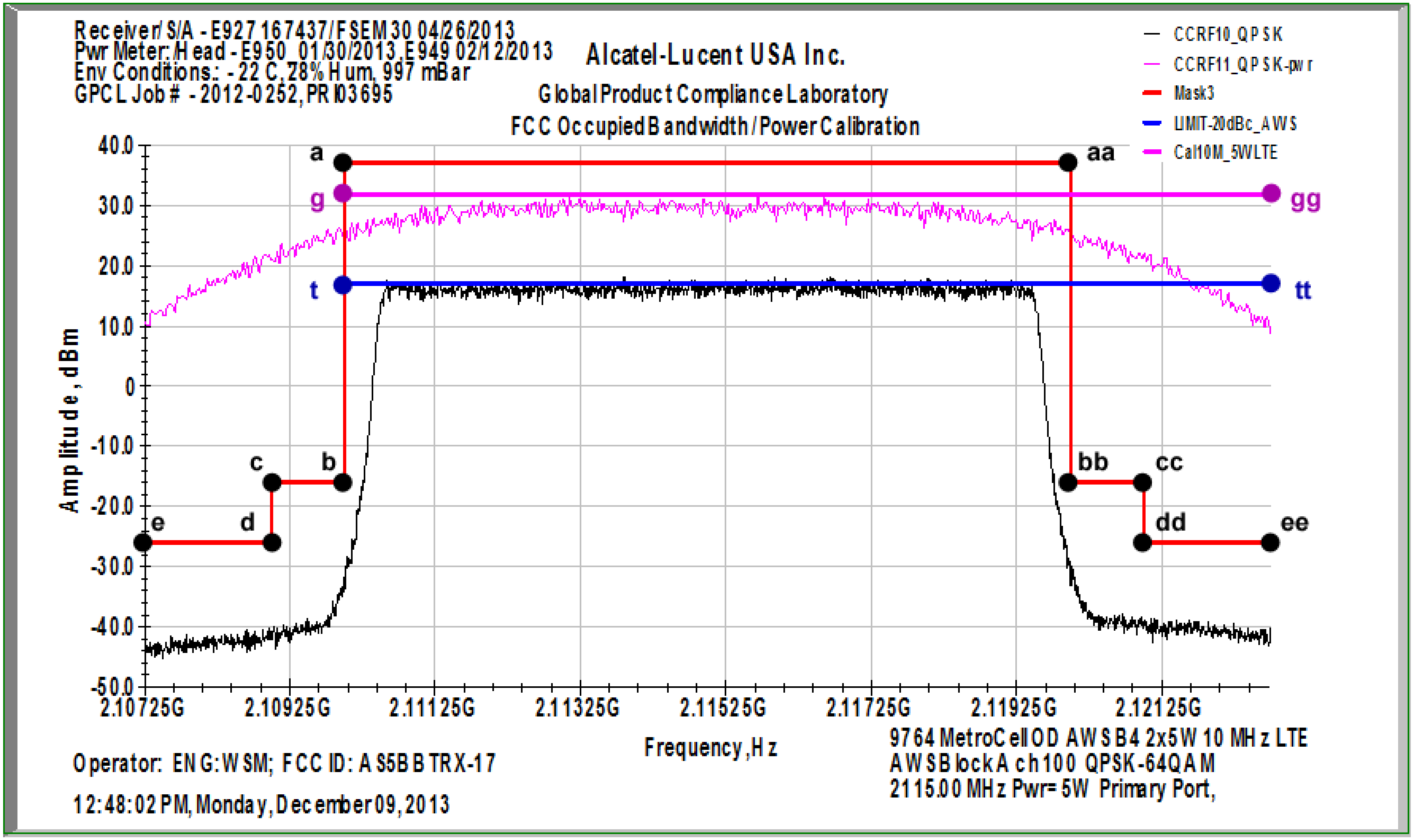
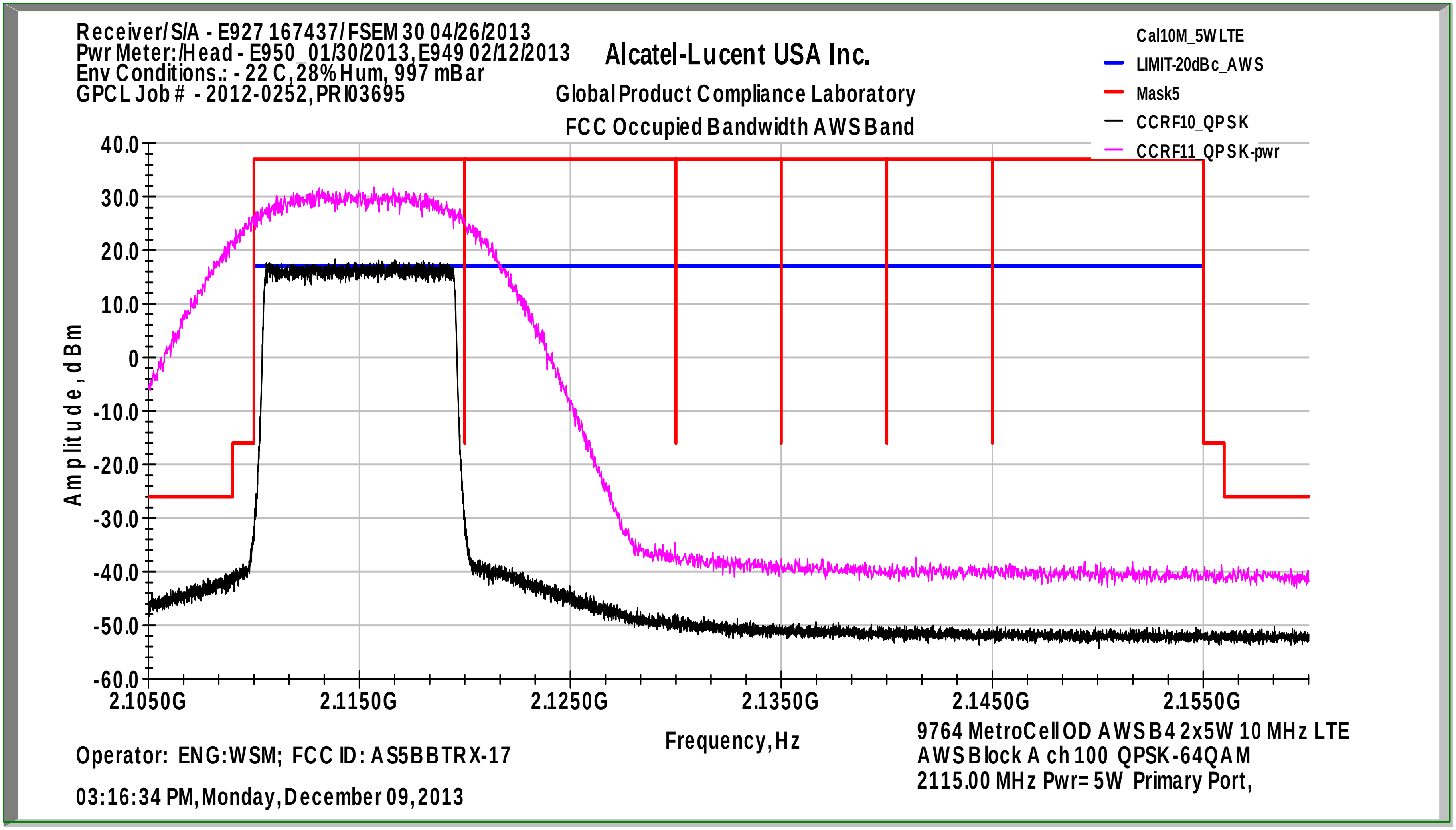


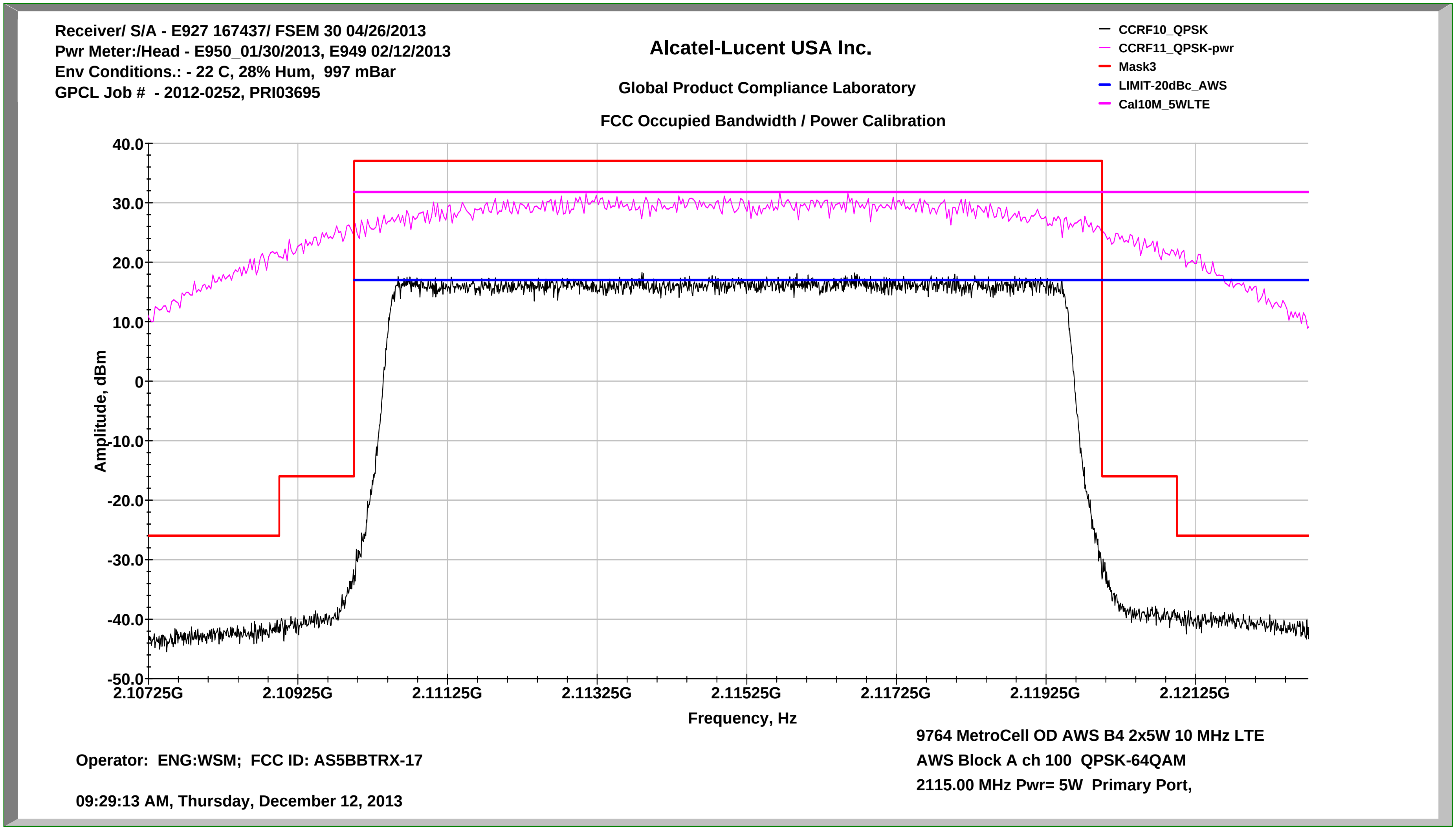
Figure 14 C Occupied Bandwidth Whole Band View



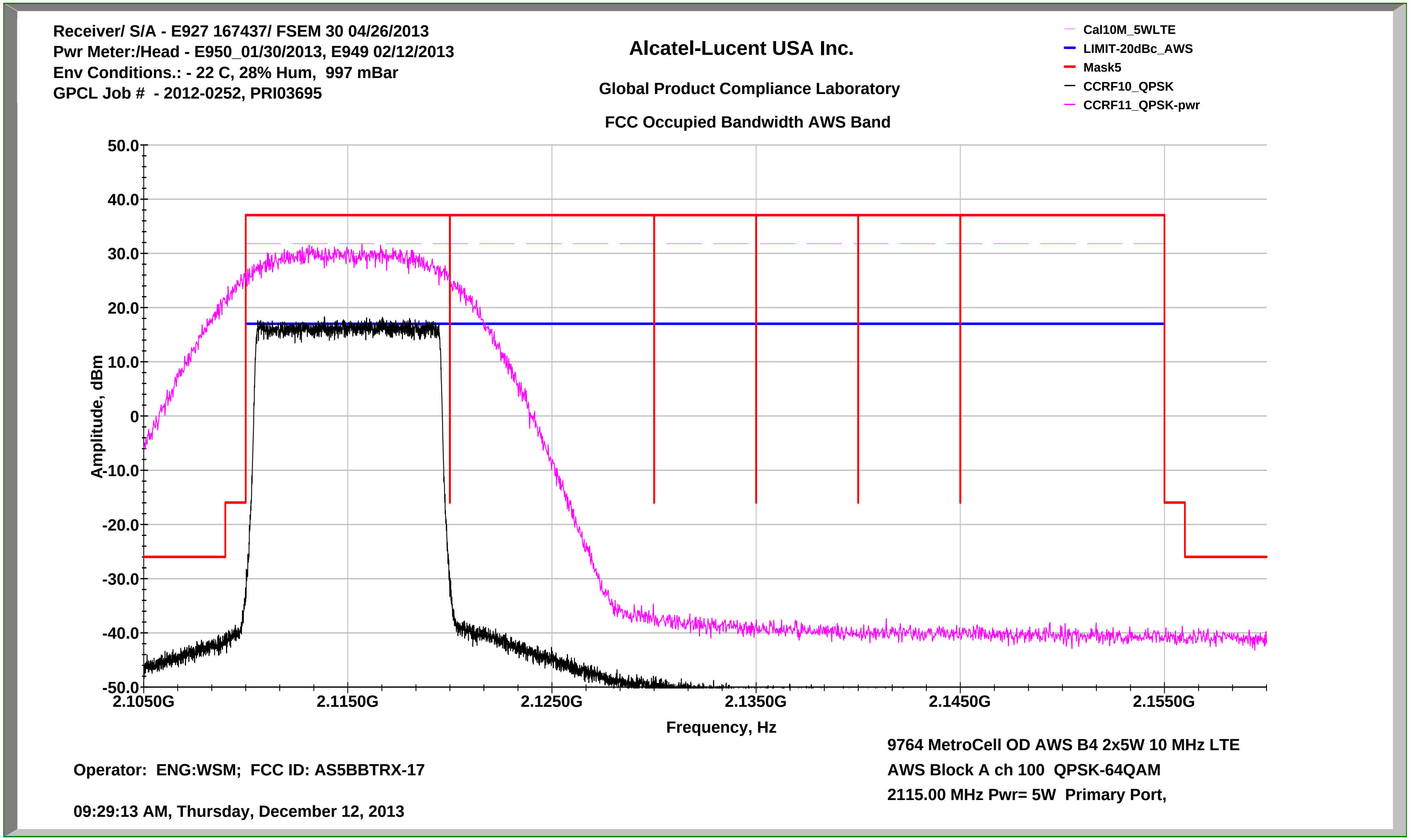
Transmitter Measurements
of
Occupied Bandwidth
for
Alcatel-Lucent USA Inc.
AWS LTE 9764 Metro Cell Outdoor Transceiver System
FCC ID: AS5BBTRX-17

W. Steve Majkowski NCE
FCC Wireless Compliance, CDMA Filing Lead
Alcatel-Lucent USA Inc.
Global Product Compliance Laboratory
Building 28-114J
600-700 Mountain Avenue, P.O. Box 636
New Providence, NJ 07974-0636
Office: 908-582-3782
email: steve.majkowski@alcatel-lucent.com

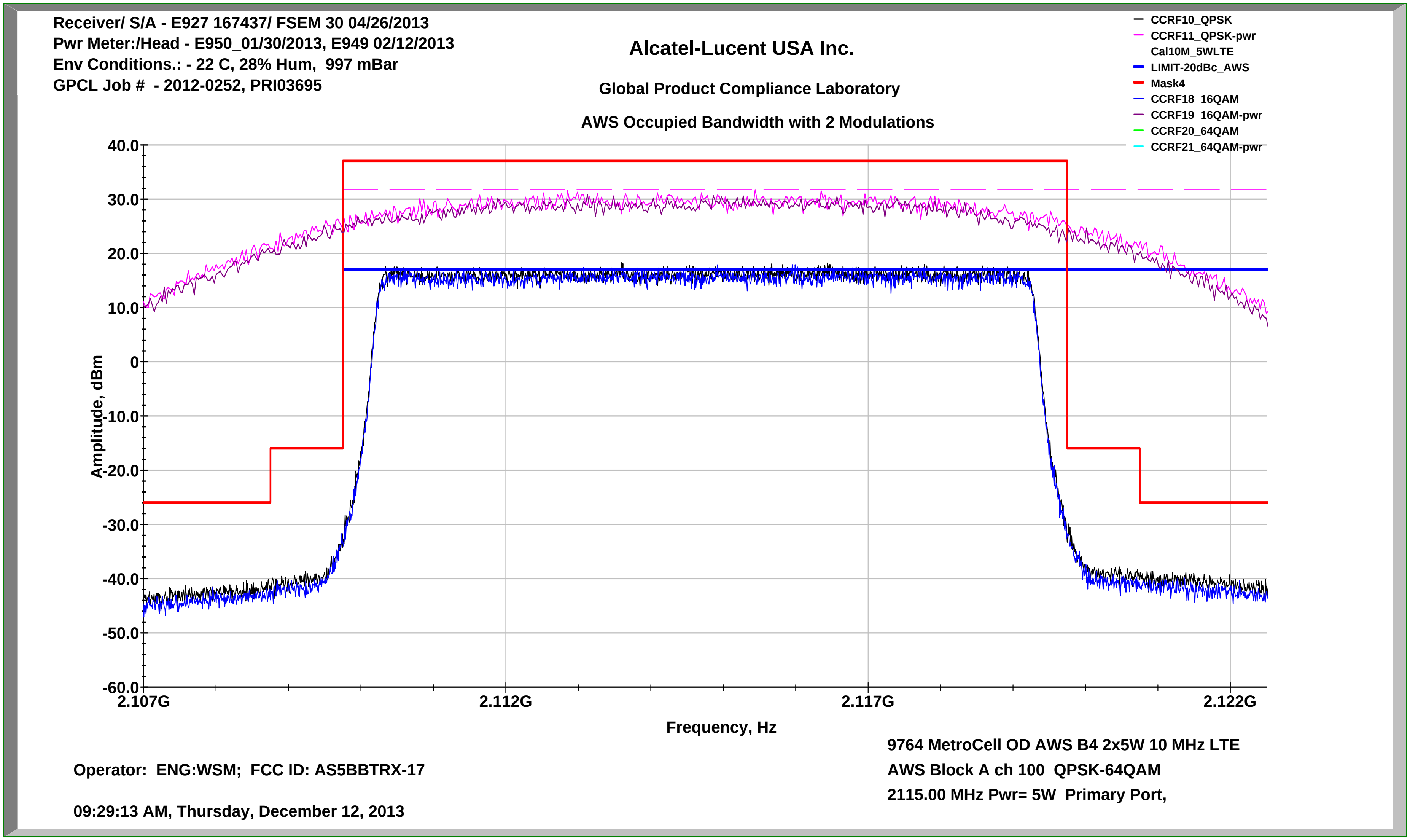
FCC Occupied Bandwidth Emissions LTE 10 MHz Ch A-100 5W/c QPSK Primary



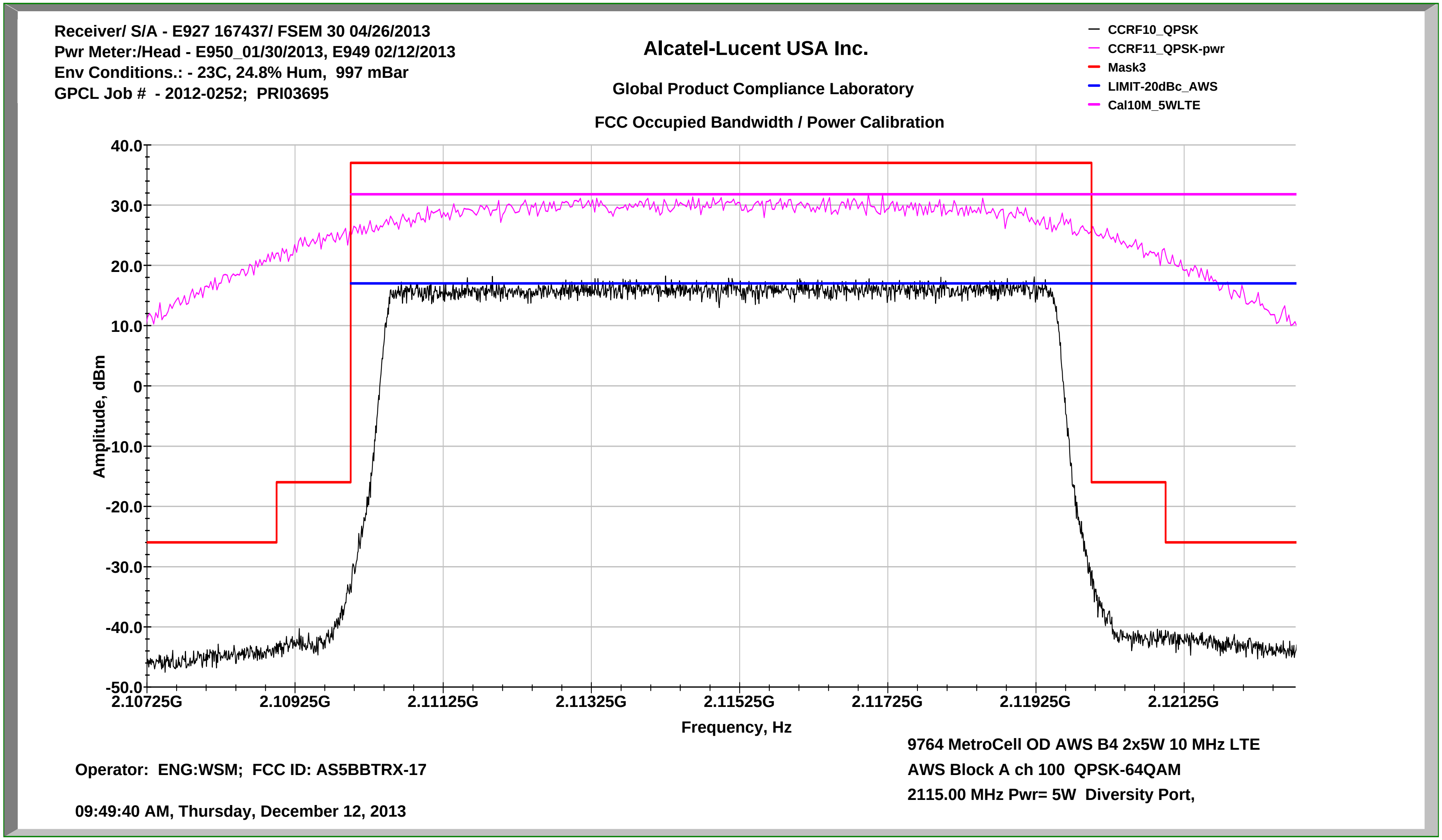
In-Band Intermodulation Graph LTE 10 MHz Ch A-100 5W/c QPSK Primary



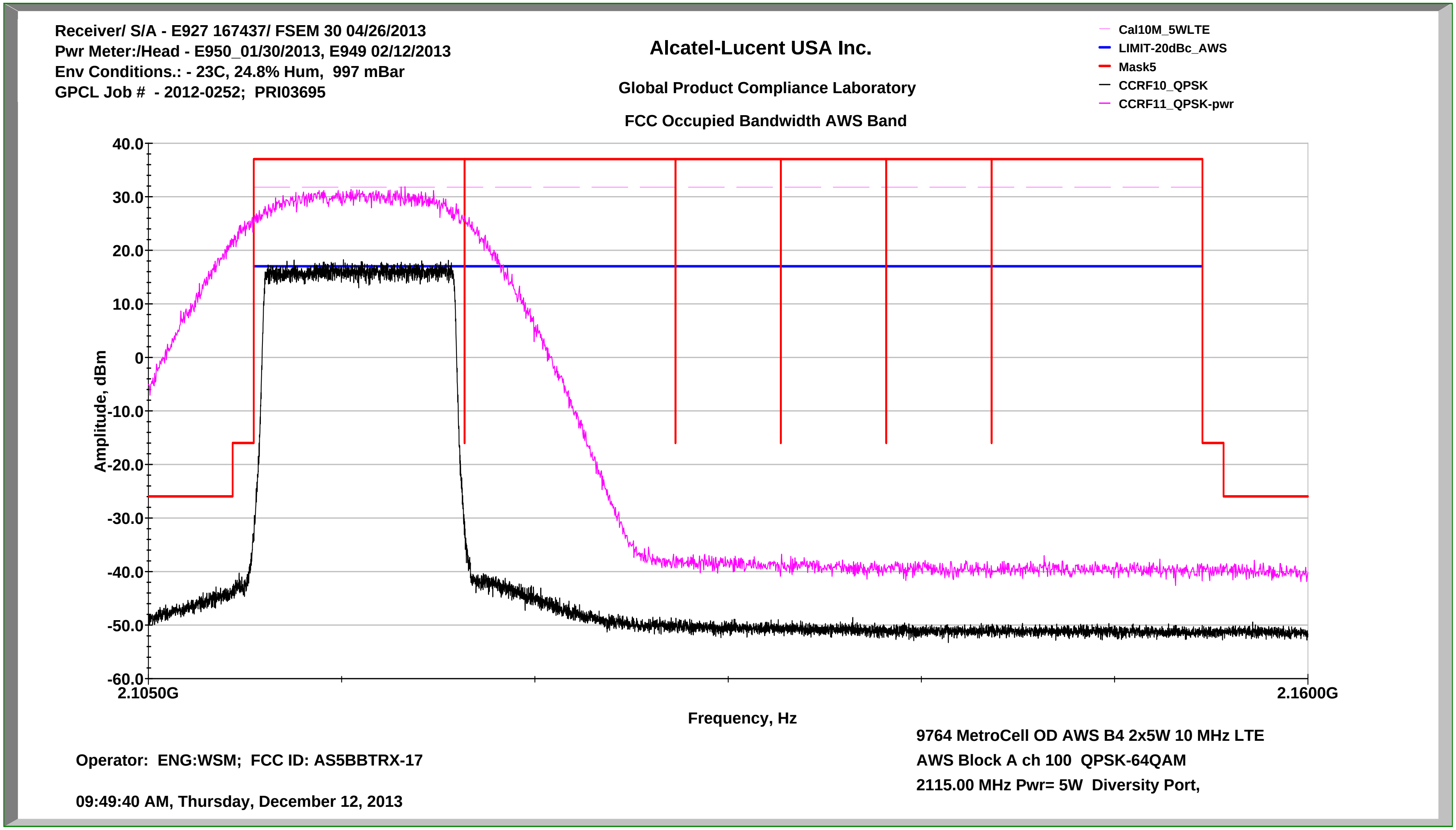
FCC Occupied Bandwidth with 2 Modulations LTE 10 MHz Ch A-100 5W/c QPSK and 64QAM Primary



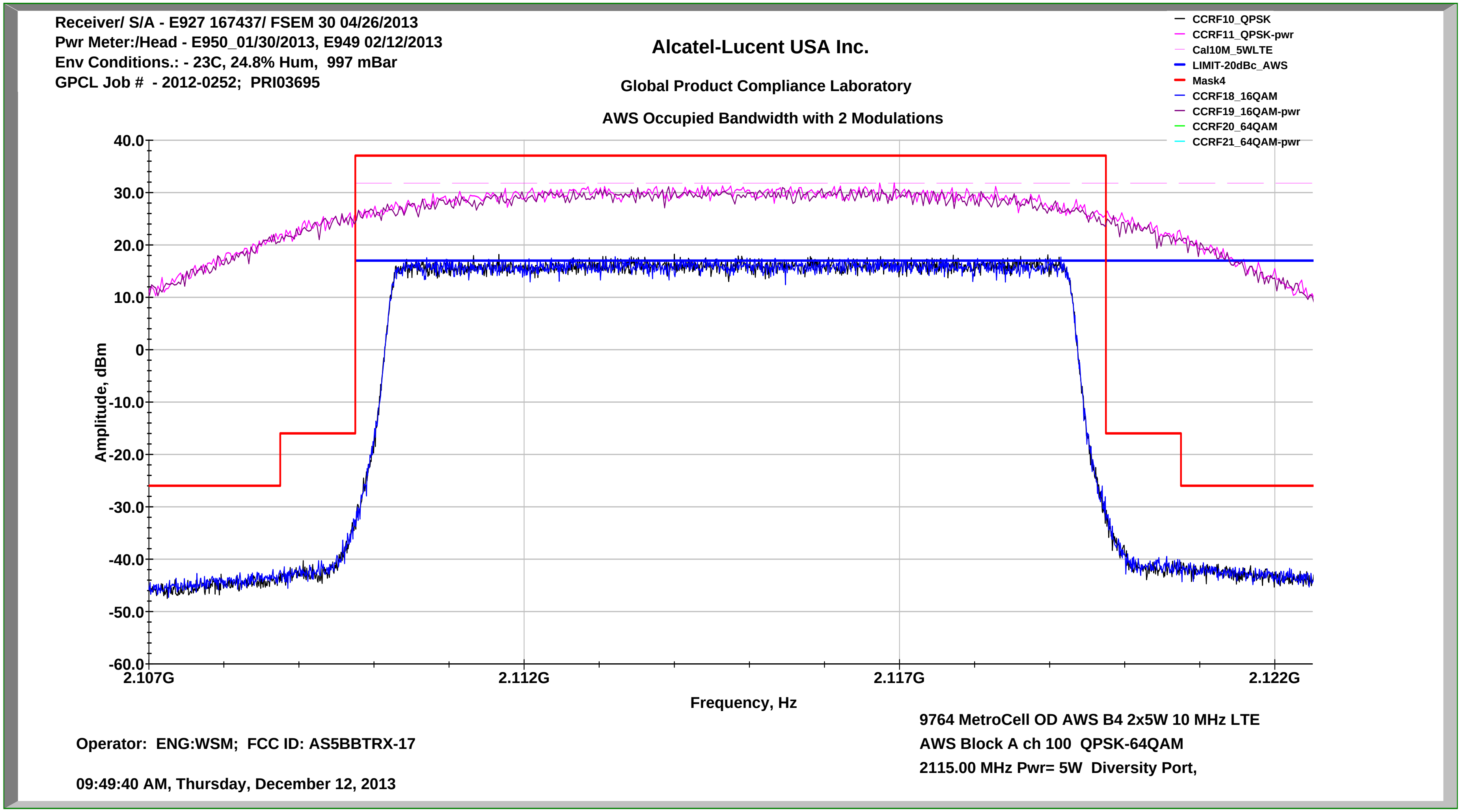
FCC Occupied Bandwidth Emissions LTE 10 MHz Ch A-100 5W/c QPSK Diversity



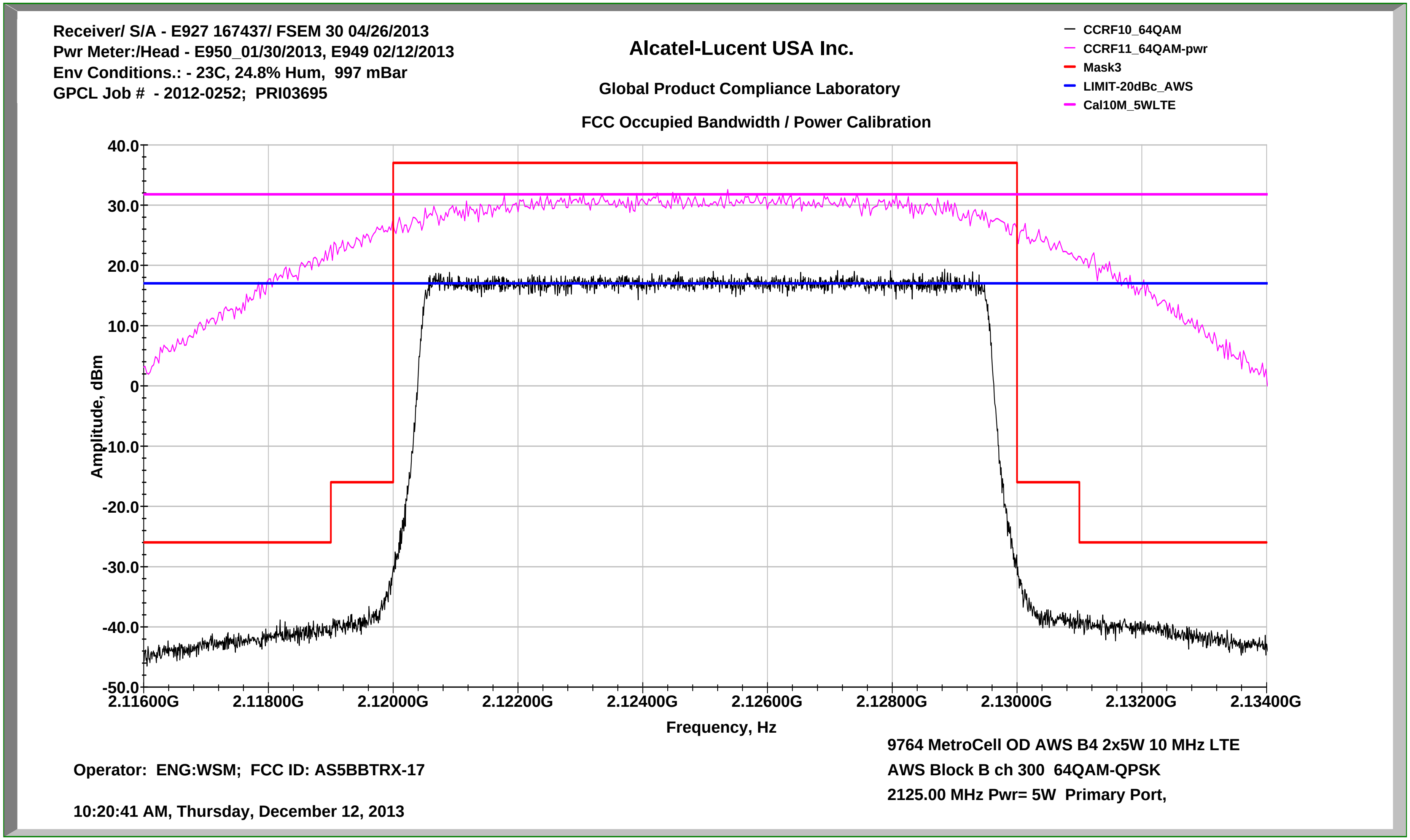
In-Band Intermodulation Graph LTE 10 MHz Ch A-100 5W/c QPSK Diversity



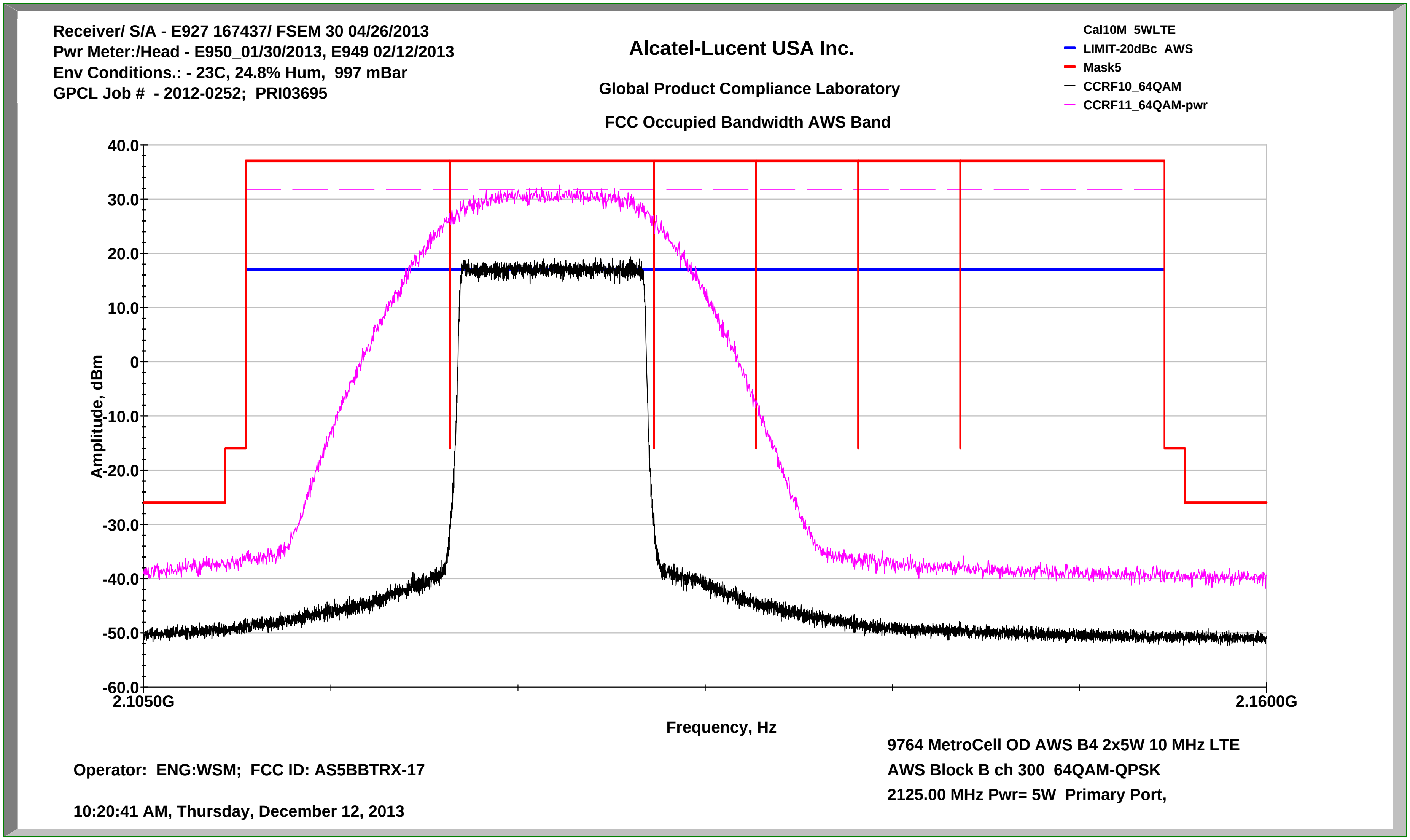
FCC Occupied Bandwidth with 2 Modulations LTE 10 MHz Ch A-100 5W/c QPSK and 64QAM Diversity



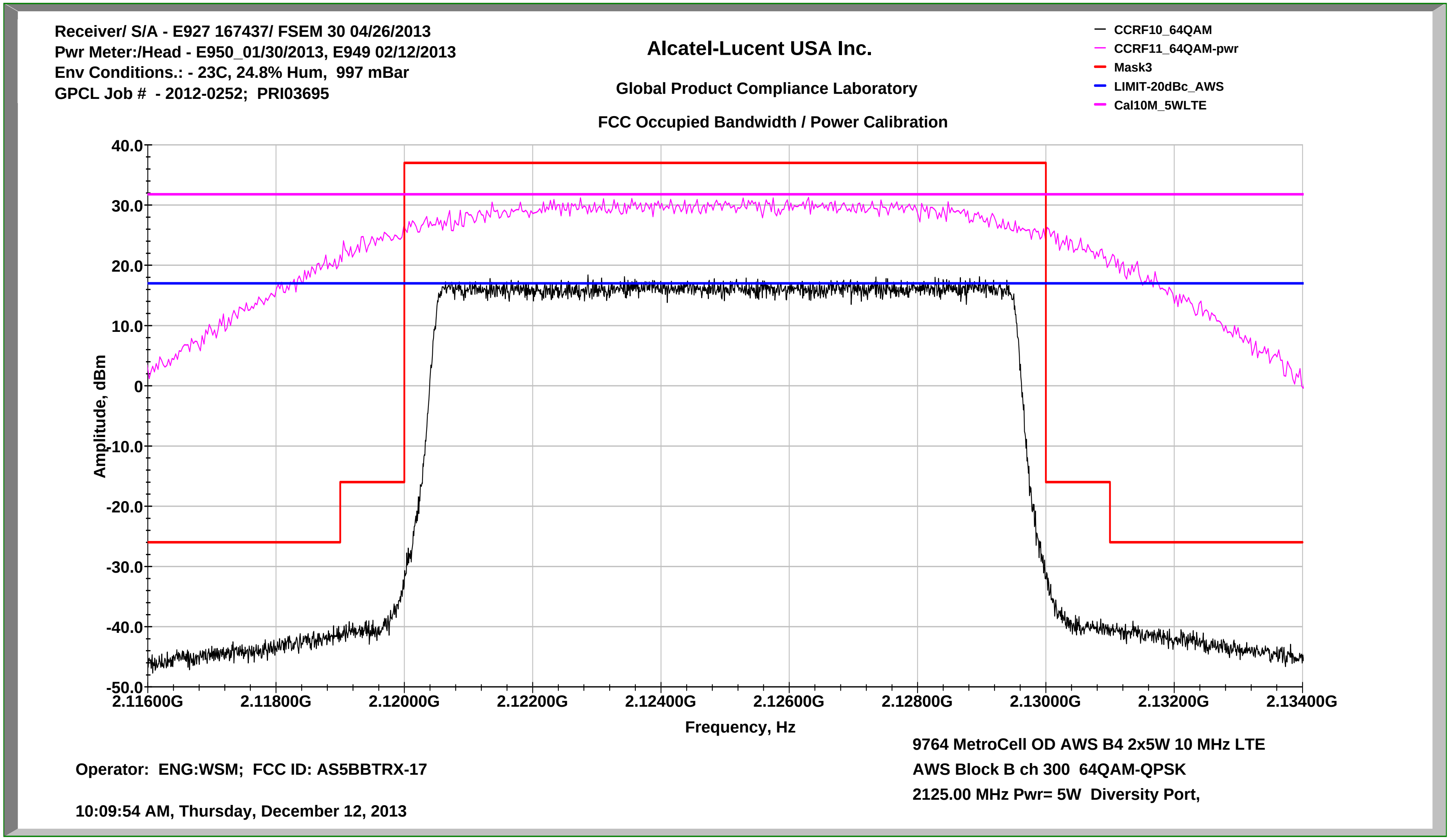
FCC Occupied Bandwidth Emissions LTE 10 MHz Ch B-300 5W/c 64QAM Primary



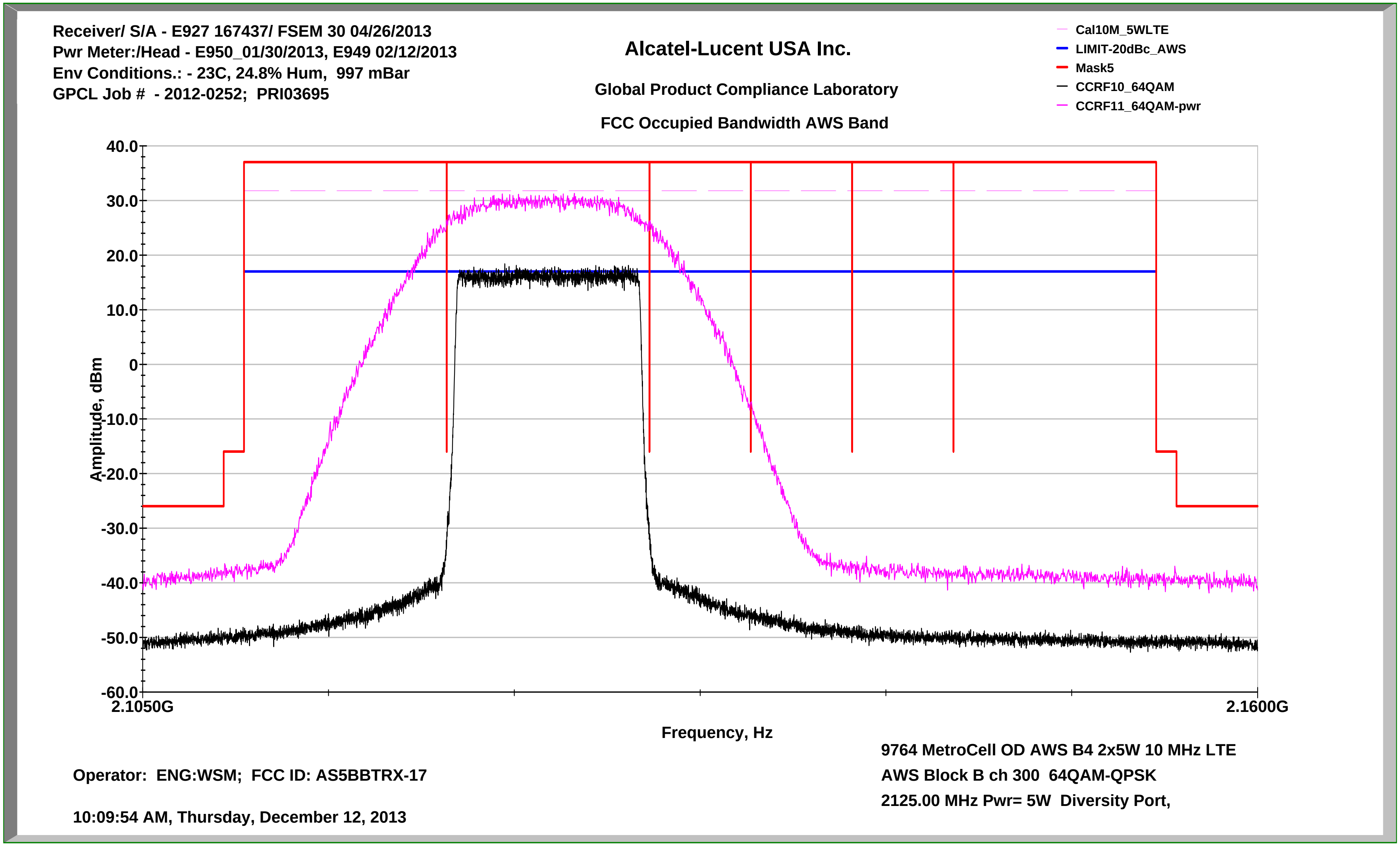
In-Band Intermodulation Graph LTE 10 MHz Ch B-300 5W/c 64QAM Primary



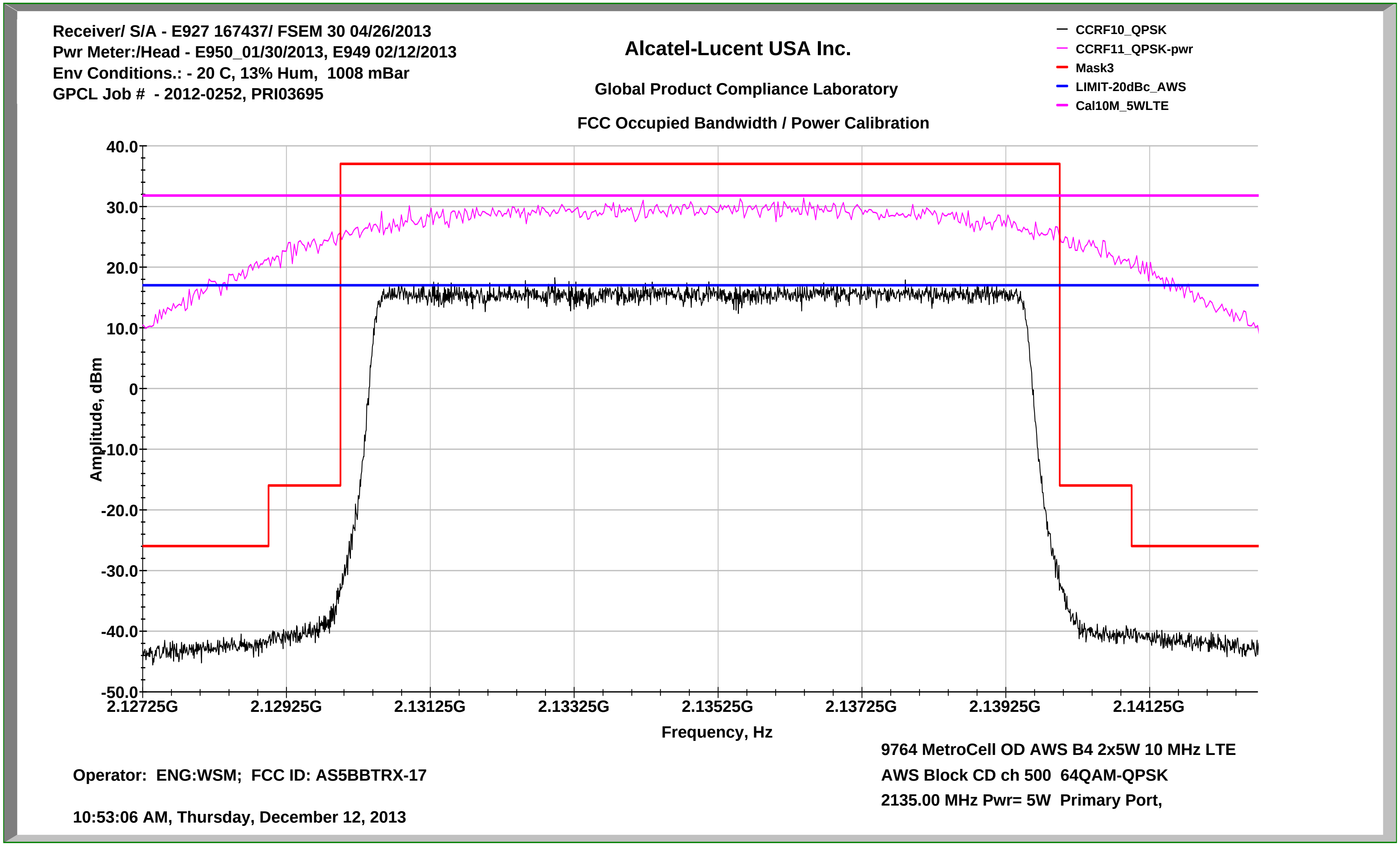
FCC Occupied Bandwidth Emissions LTE 10 MHz Ch B-300 5W/c 64QAM Diversity



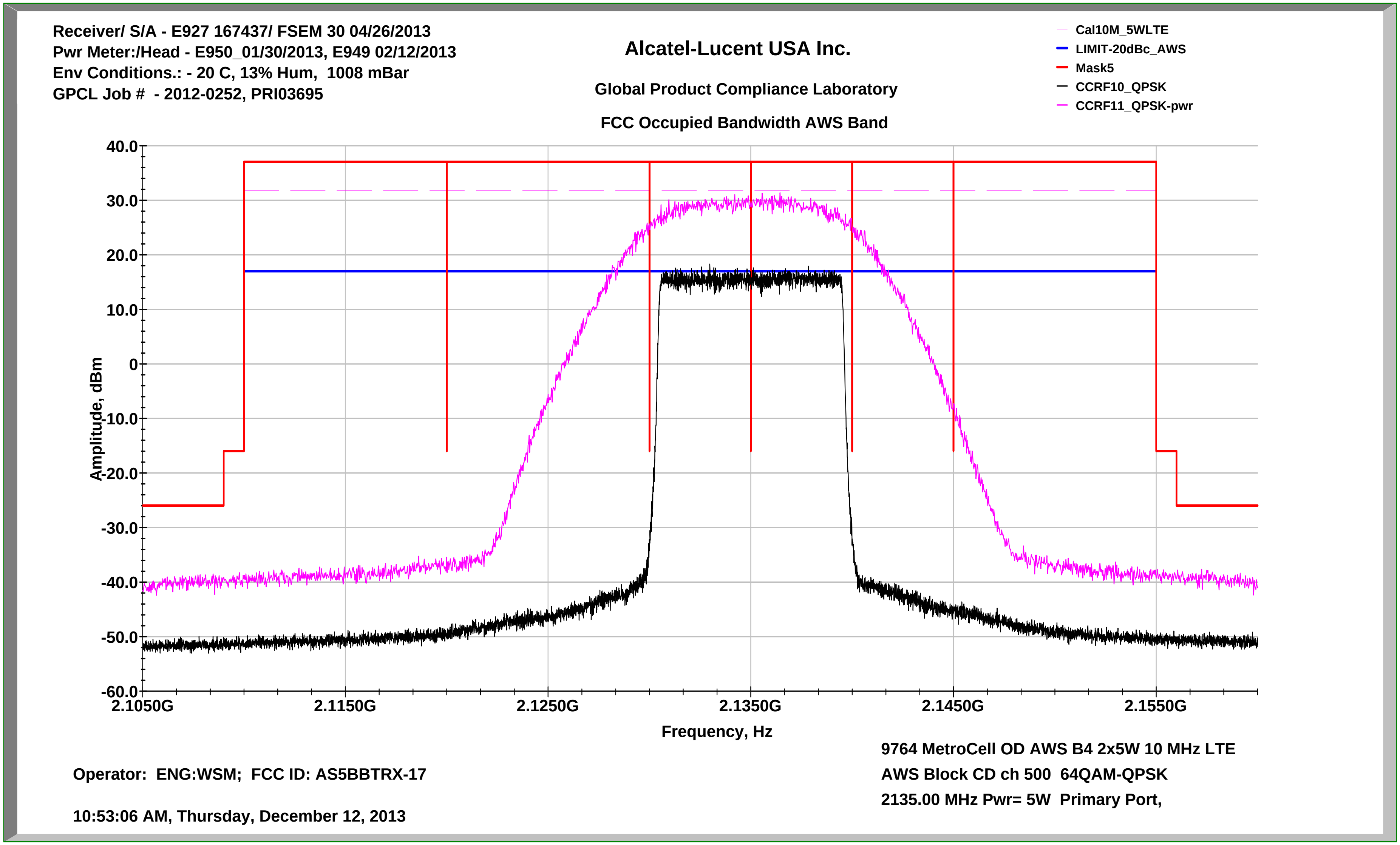
In-Band Intermodulation Graph LTE 10 MHz Ch B-300 5W/c 64QAM Diversity



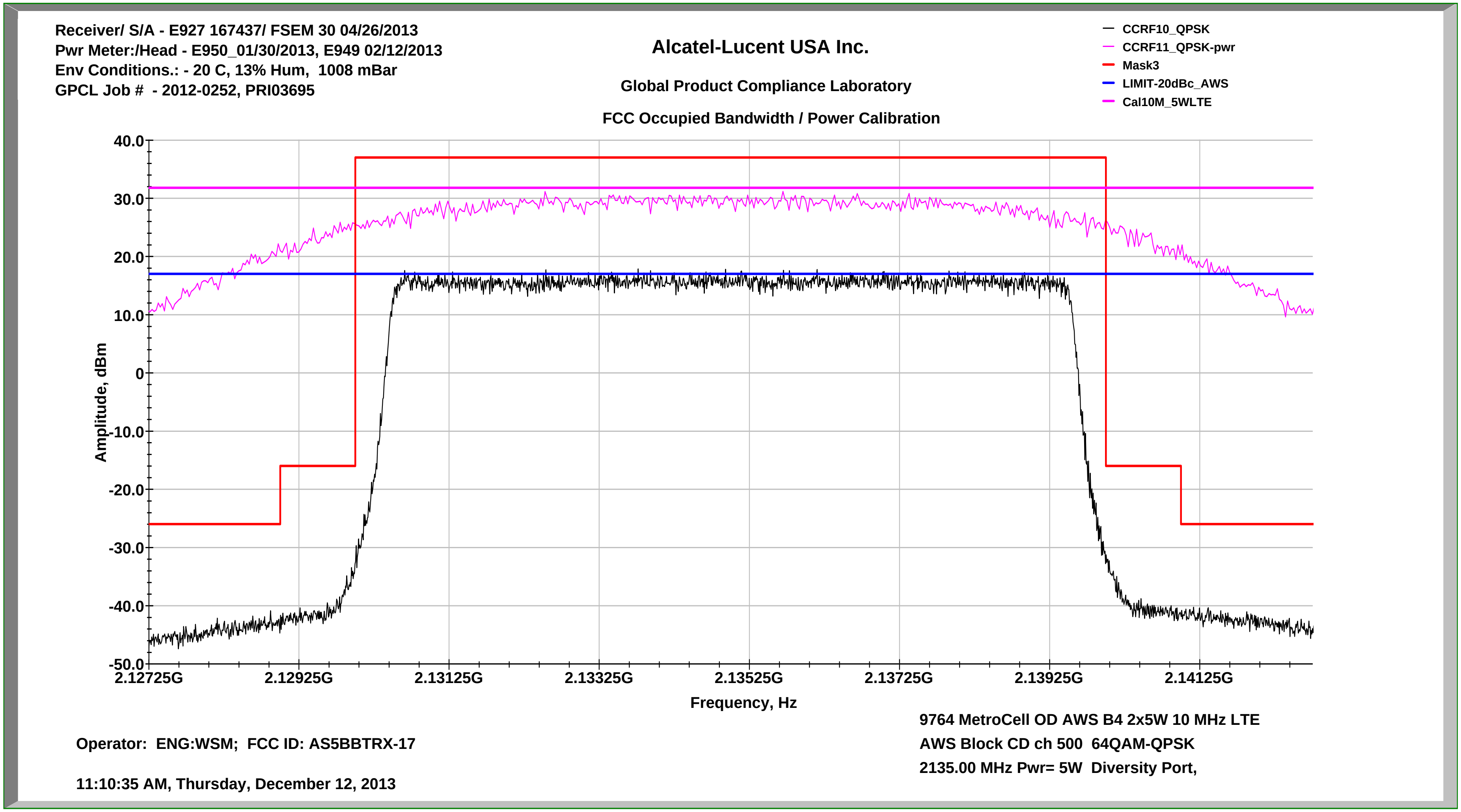
FCC Occupied Bandwidth Emissions LTE 10 MHz Ch CD-500 5W/c 64QAM Primary



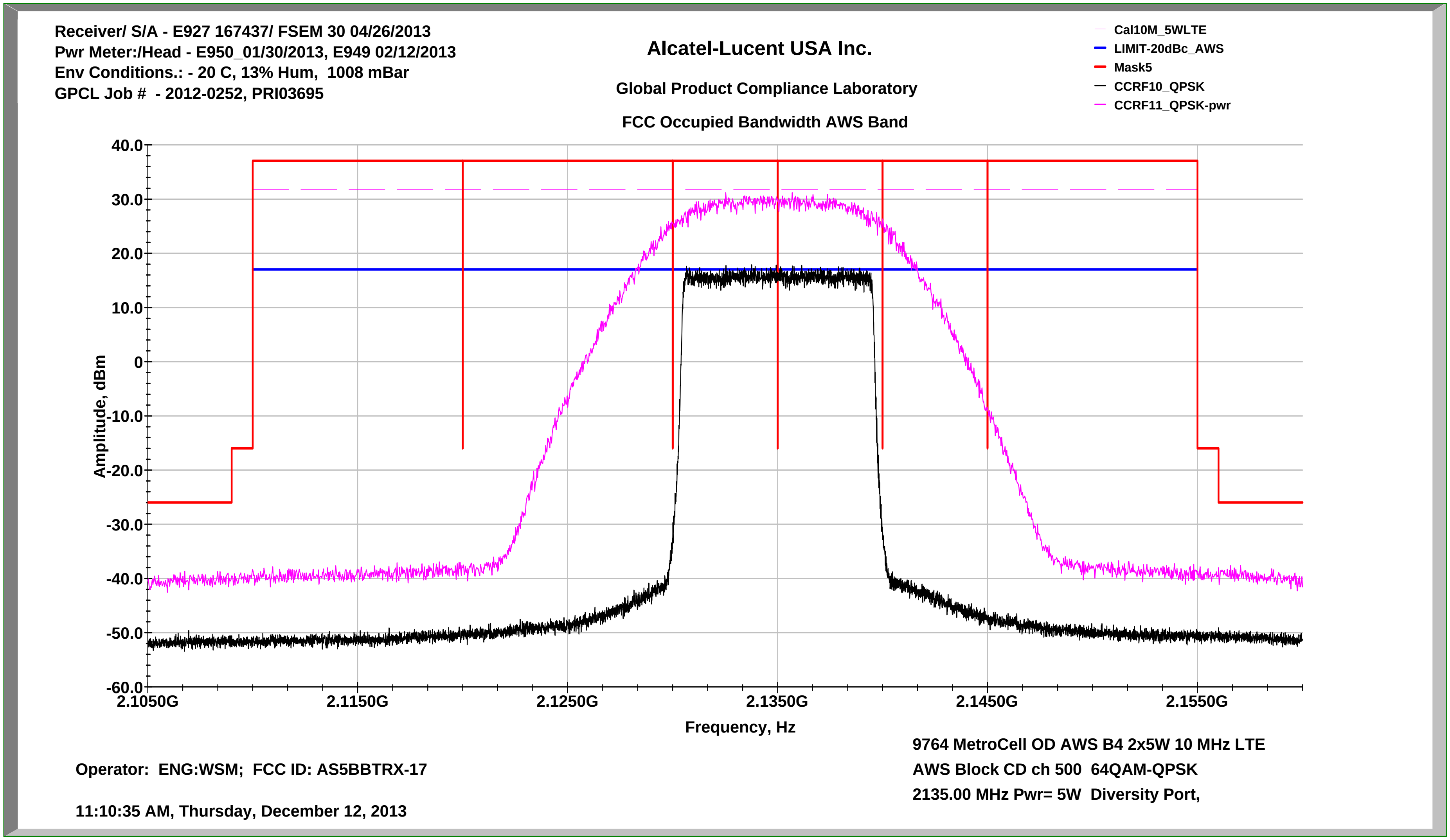
In-Band Intermodulation Graph LTE 10 MHz Ch CD-500 5W/c 64QAM Primary



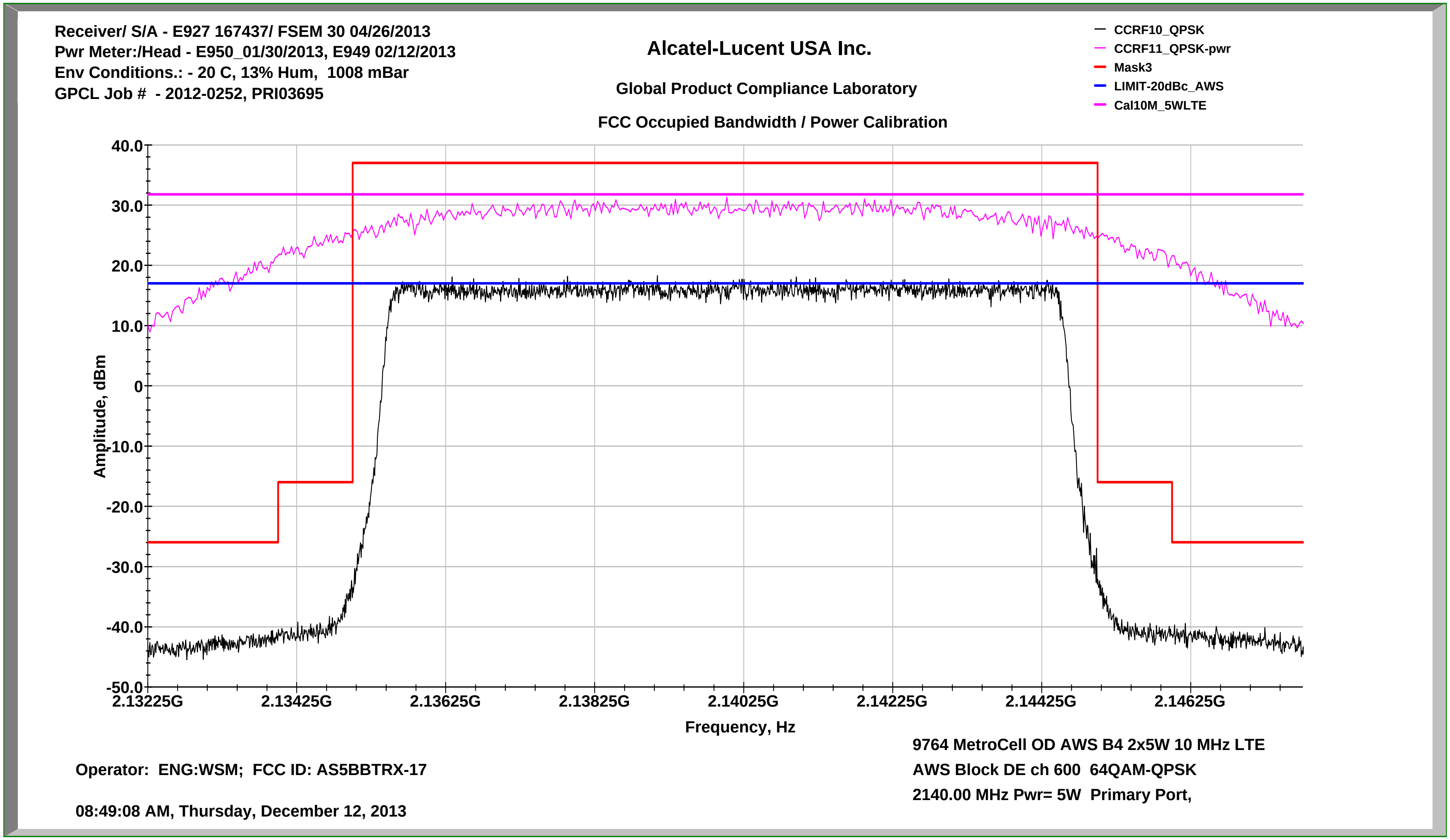
FCC Occupied Bandwidth Emissions LTE 10 MHz Ch CD-500 5W/c 64QAM Diversity



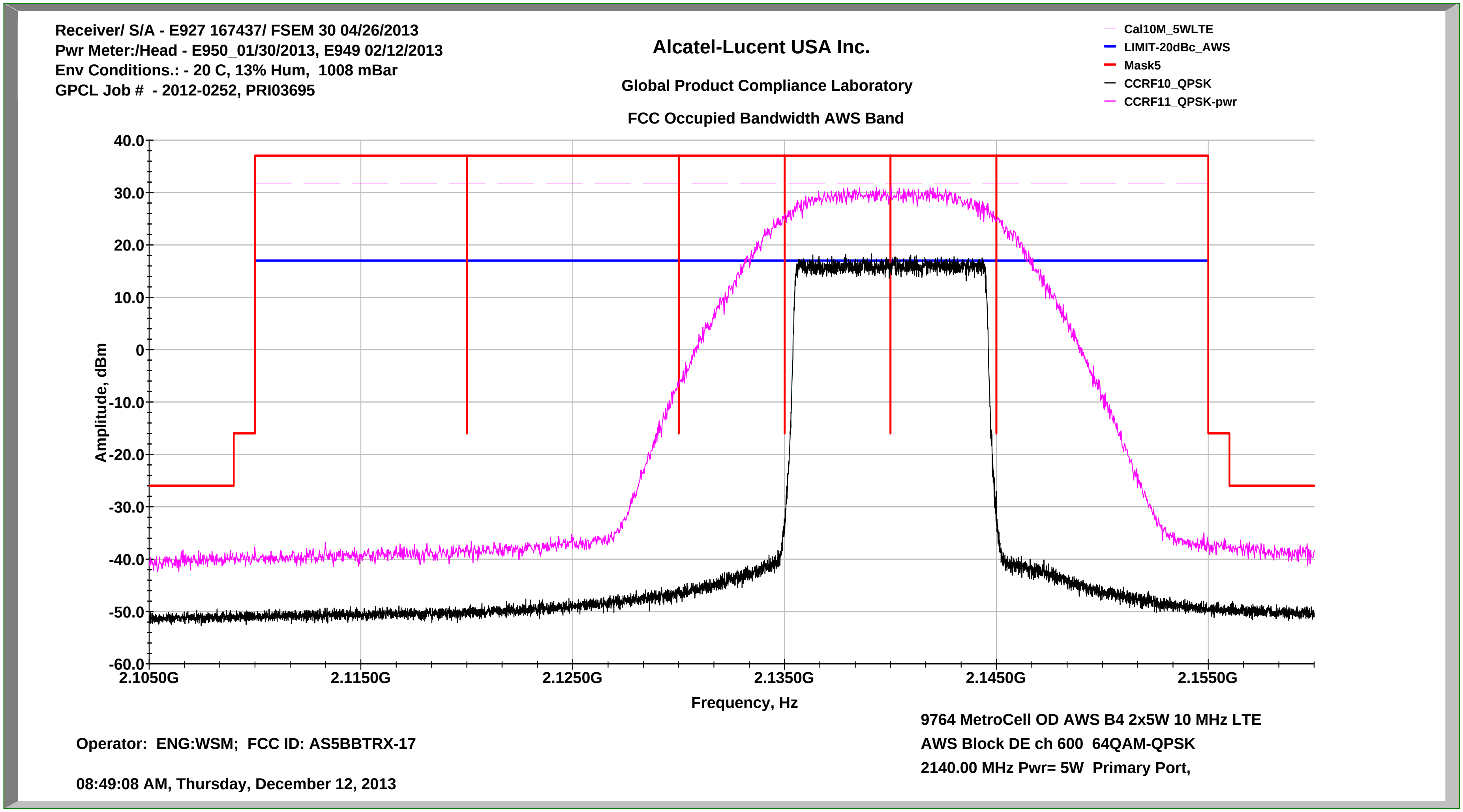
In-Band Intermodulation Graph LTE 10 MHz Ch CD-500 5W/c 64QAM Diversity



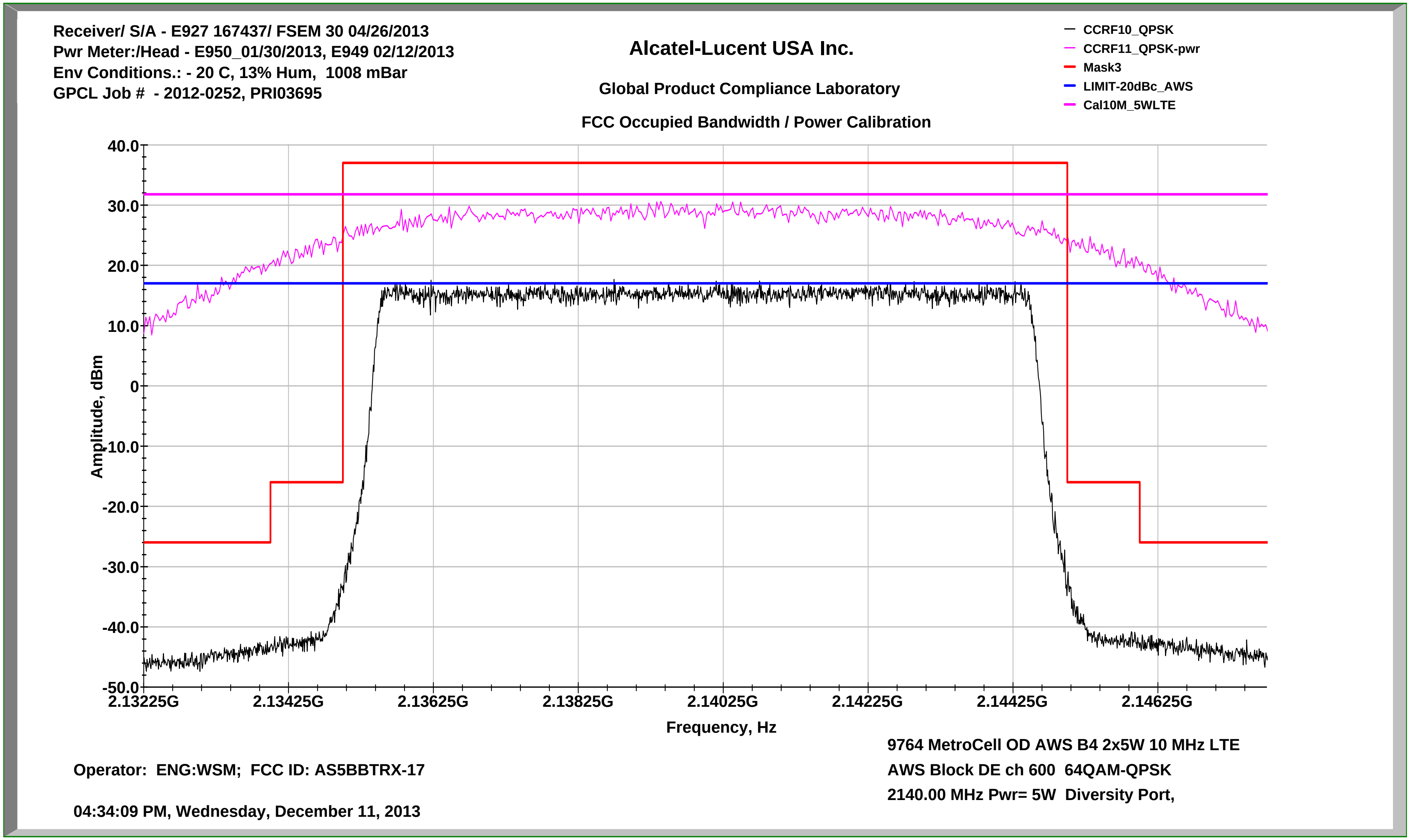
FCC Occupied Bandwidth Emissions LTE 10 MHz Ch DE-600 5W/c 64QAM Primary



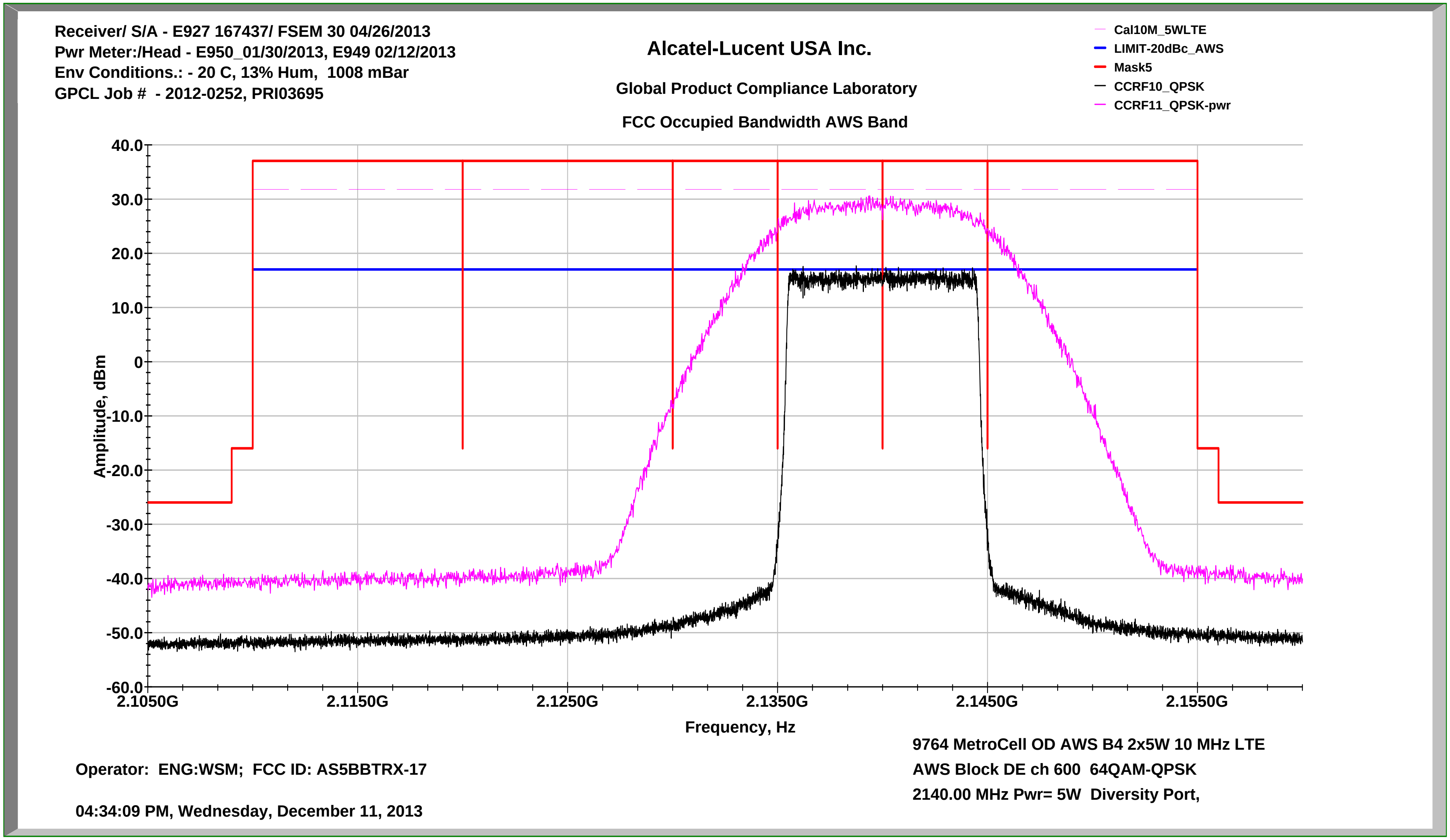
In-Band Intermodulation Graph LTE 10 MHz Ch DE-600 5W/c 64QAM Primary



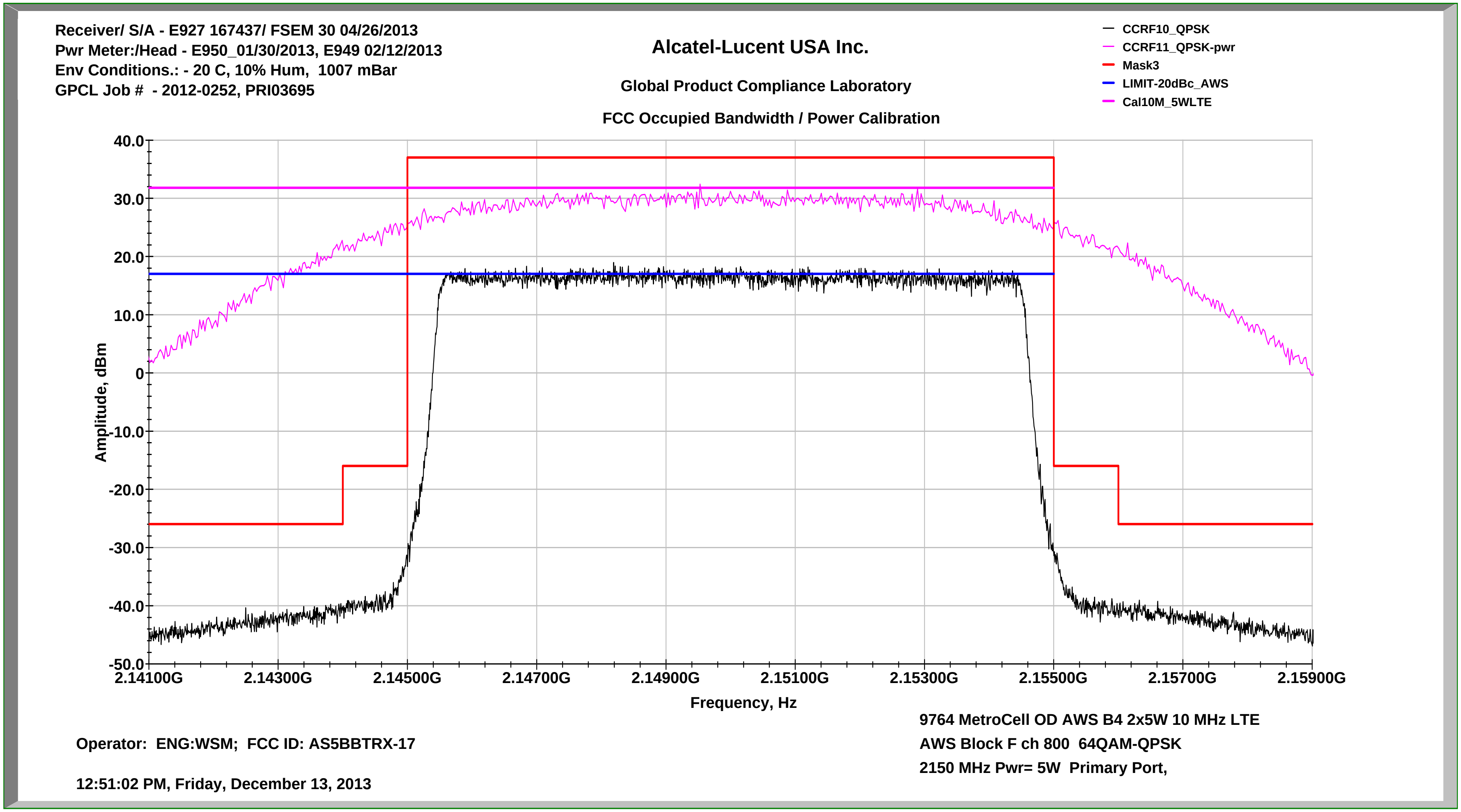
FCC Occupied Bandwidth Emissions LTE 10 MHz Ch DE-600 5W/c 64QAM Diversity



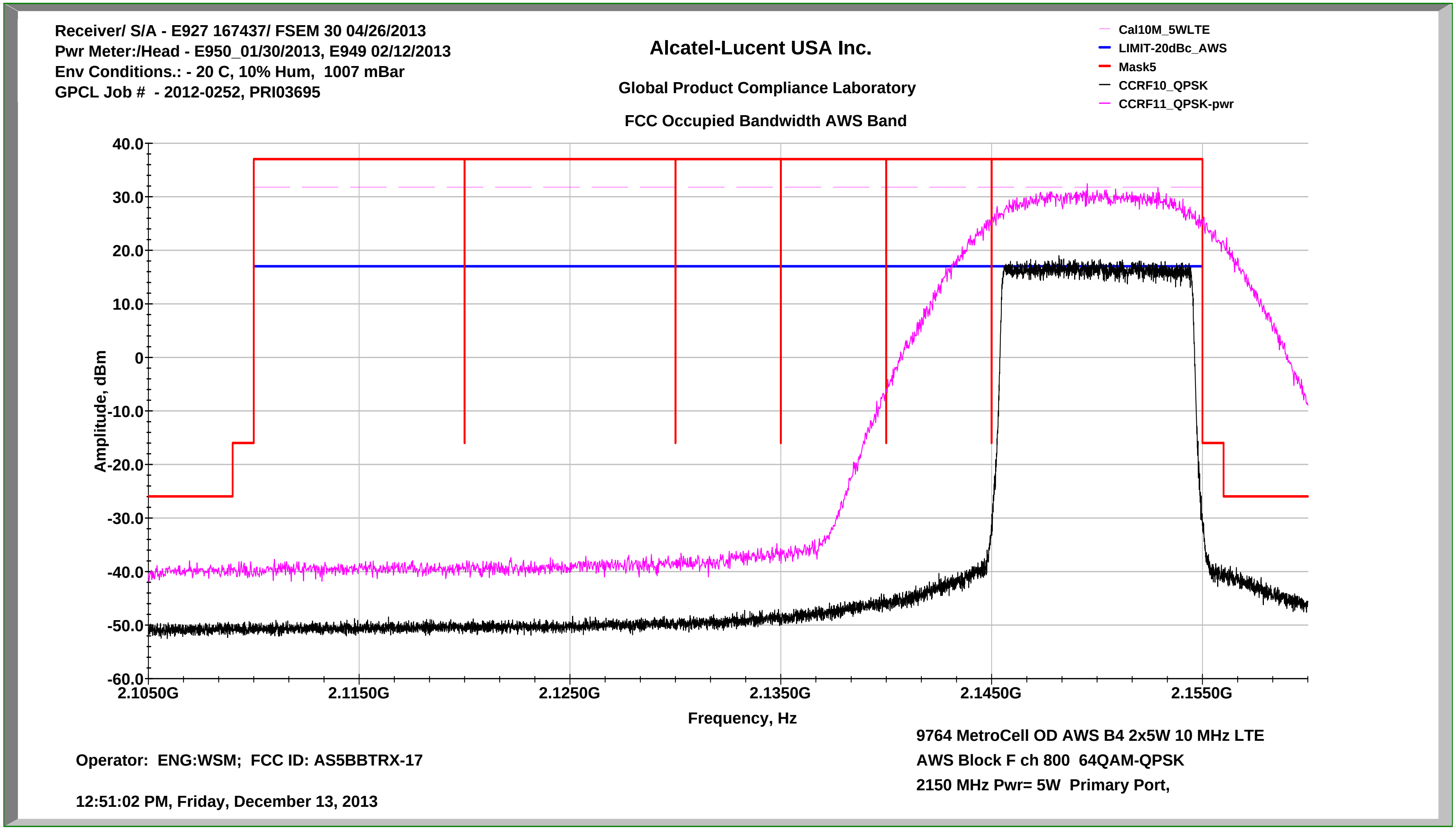
In-Band Intermodulation Graph LTE 10 MHz Ch DE-600 5W/c 64QAM Diversity



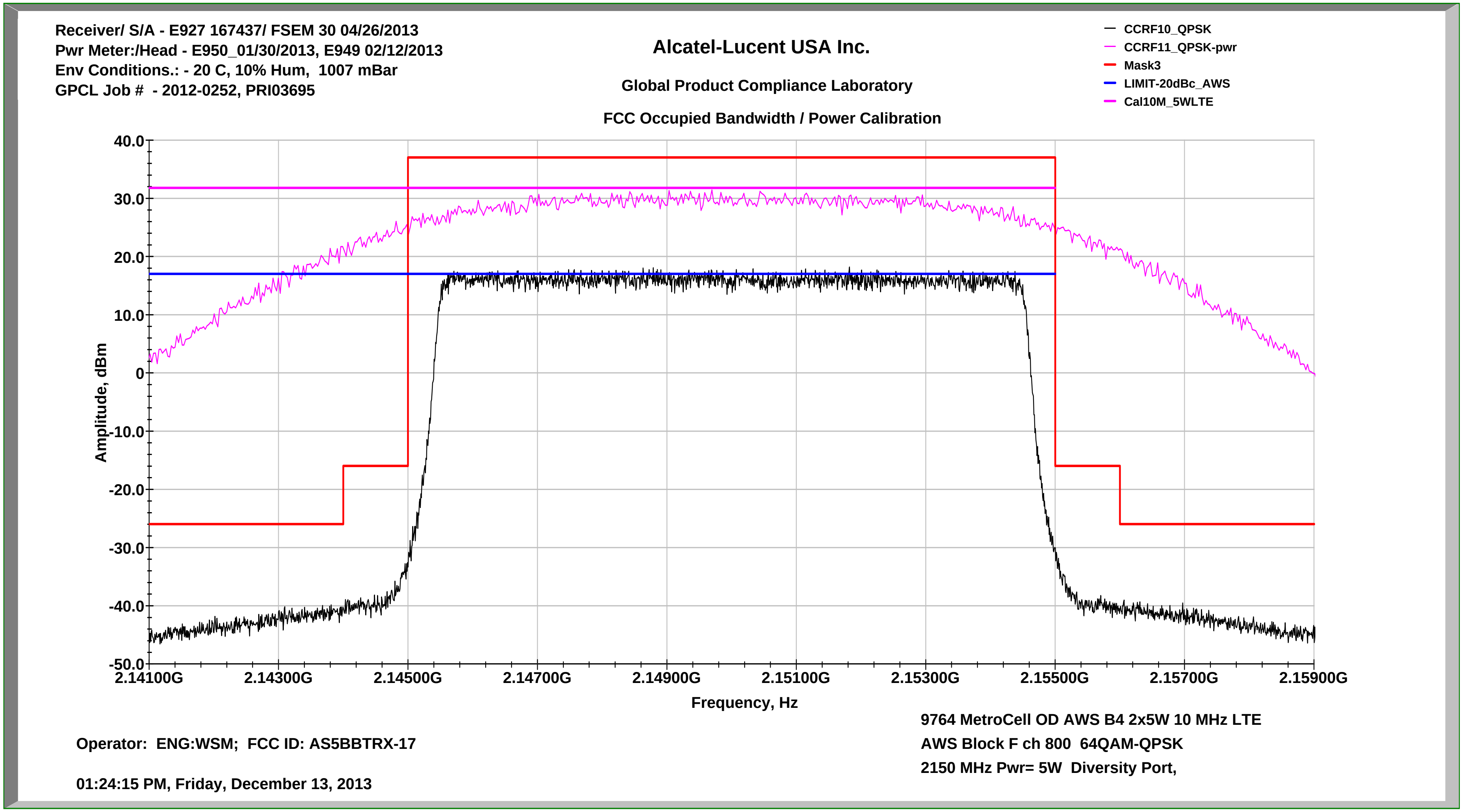
FCC Occupied Bandwidth Emissions LTE 10 MHz Ch F-800 5W/c 64QAM Primary



In-Band Intermodulation Graph LTE 10 MHz Ch F-800 5W/c 64QAM Primary



FCC Occupied Bandwidth Emissions LTE 10 MHz Ch F-800 5W/c 64QAM Diversity



In-Band Intermodulation Graph LTE 10 MHz Ch F-800 5W/c 64QAM Diversity

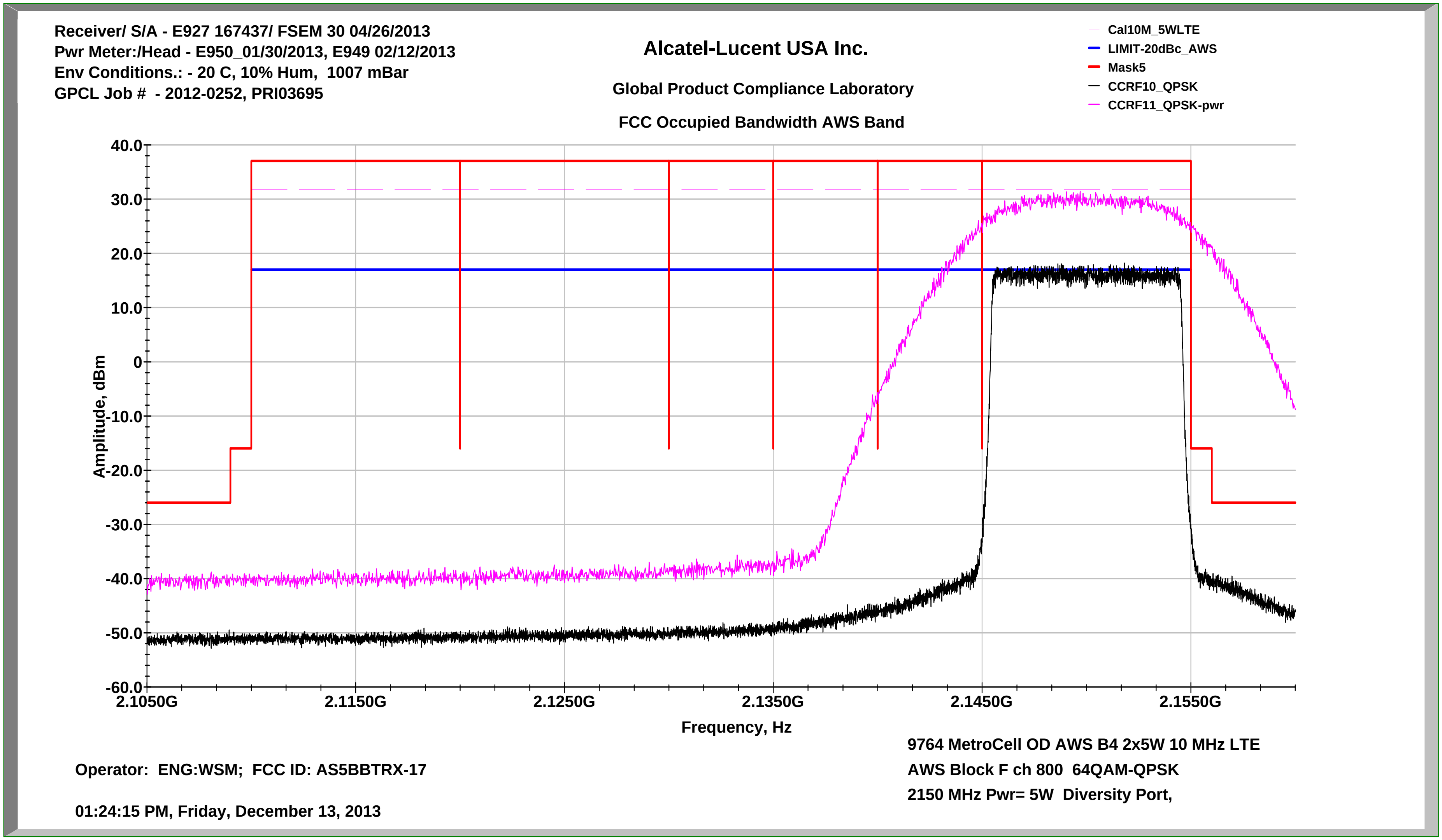


Exhibit 15: SPURIOUS EMISSIONS AT ANTENNA TERMINALs

Section 2.1051 Spurious Emissions at Antenna Terminals

Spurious Emissions at the antenna terminals were investigated over the frequency range of 10 MHz to 21.6 GHz which is beyond the 10th harmonic of the carrier frequency. A test coupler which incorporates a low inter-mod broadband RF attenuator was used to reduce the transceiver's amplitude to a level usable by the spectrum analyzer. The test coupler is shown in Figure 15A which documents the test configuration used for the measurements. In this set up the complete RF test path was calibrated over the 10 MHz-21.6 GHz range and it allows for RF power to be measured and monitored during the test.

The spurious measurements were made using an automated test system. The test system consists of a Rohde & Schwarz FSEM30 Spectrum Analyzer (or ESIB40 Test Receiver), a PC based computer test controller, calibrated test hardware and a TILE ™ software program to acquire the test data. This system allows measurement and presentation of the data in an accurate and compact form for FCC review. The volume of collected data is greater than 2 x10^6 data points over the frequency range of 10 MHz to 21.6 GHz.

Required Limit
The required emission limitation specified in **47CFR 27.53 1-Oct-2010** was applied to these tests. Based upon the criterion given in Section 27.53 of the Code and as developed in Exhibit 14, the required emission limit in 47 CFR 27.53 for emissions outside a licensees frequency block is:
Emissions >1 MHz outside the Block, *when measured with a RBW of 1 MHz*, shall be attenuated by :

-{43+10log (mean power output in watts)} = -13 dBm.

In order to account for the spectral adding of identical signals from the primary and diversity ports**,** per KDB 662911 D01 Multiple Transmitter Output v01r01, the level needs be adjusted by 10LOG(n) where n= number of outputs.

The adjustment for n=2 is: 3.01 dB = 10LOG(2)

Therefore the limit for emissions >1 MHz outside a licensees frequency block when measured with a RBW of 1 MHz is:

-13 dBm – 3.01 dB = -16.01 dBm

The carrier signal shown on these plots was measured at a resolution Bandwidths of 3 MHz. This was done so that the carrier plot correctly depicts the carrier output power in relation to the spurious signals and the defined limit.

Operational Configuration
The modulation used in this evaluation are described in the pertinent standards documents which include **3GPP TS 36.211 V9.1.0 (2010-03) titled:** 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and Modulation (Release 9). The modulation is Orthogonal Frequency Division Multiple Access (OFDMA) which is processed into an uplink IF signal. The input data stream is divided into several parallel sub-streams of reduced data rate and each sub-stream is transmitted on a separate orthogonal sub-carrier. The sub-carriers are modulated using either QPSK, or 64QAM. There is no single measure of the modulation quality other than to verify that the subcarrier modulation constellations visual orientation match the symbol and amplitude criteria is consistent with QPSK and 64QAM.

Exhibit 15 *continued*

TABLE 15.2 AWS Conducted Spurious Compliance Tabulation

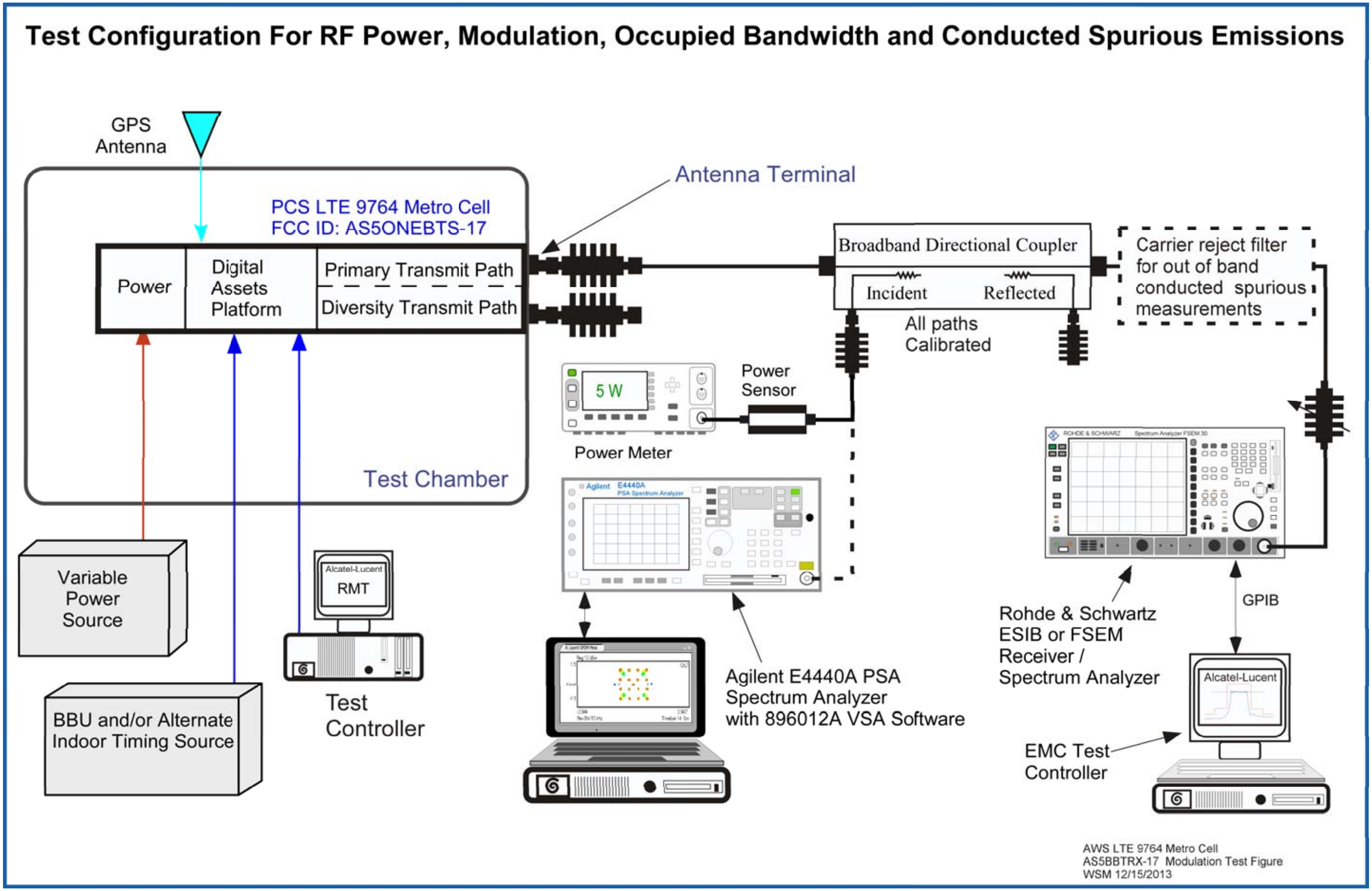
AWS - Block	AWS - Channels	Modulation	Primary	Diversity	Results Conducted Spurious
A	100	QPSK & 64QAM	X	X	Compliant
B	300	64QAM	X	X	Compliant
CD	500	64QAM	X	X	Compliant
DE	600	64QAM	X	X	Compliant
F	800	QPSK & 64QAM	X	X	Compliant

Test Results Summary:

Conducted Spurious measurements were performed for the primary and diversity antenna ports of the **AWS LTE 9764 Metro Cell Outdoor Transceiver System / FCC ID: AS5BBTRX-17.** The AWS LTE 9764 Metro Cell was configured with an output power of one watt and 64QAM. Conducted Transmit Spurious measurements were performed as part of the test profile for Occupied bandwidth. Every AWS Block Edge measurements configuration therefore included a Conducted Transmit Spurious measurements as documented in Table 15.2.

The attached spectral plots are representative of the Conducted Spurious compliance performance of the **AWS LTE 9764 Metro Cell Outdoor Transceiver System / FCC ID: AS5BBTRX-17.** The compliance for all of the representative transmit configurations are documented in Table 15.2. This Table lists AWS Blocks/ Channels tested the amplifier configuration and the status of the performance. The performance data, charts and tables all show that there are no “Out of Block” harmonics or spurious emissions above the applicable limit of –16.01 dBm. The attached table and sample data plots document the results.

Figure 15A Test Setup for Antenna Port Measurement of Transmit Power, Occupied Bandwidth and Conducted Spurious Emissions

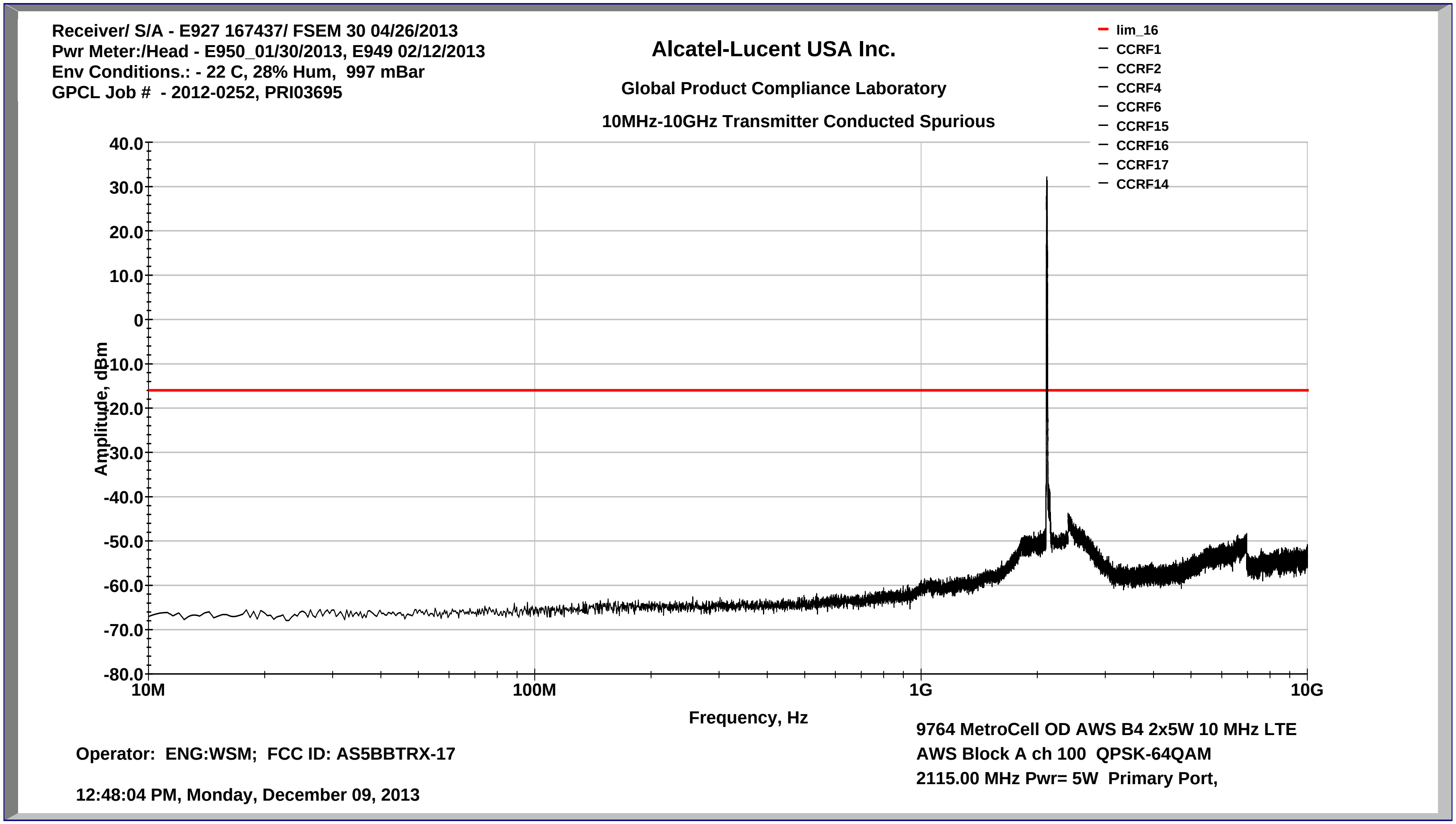


Transmitter Measurements
of
Conducted Spurious Emissions
for
Alcatel-Lucent USA Inc.

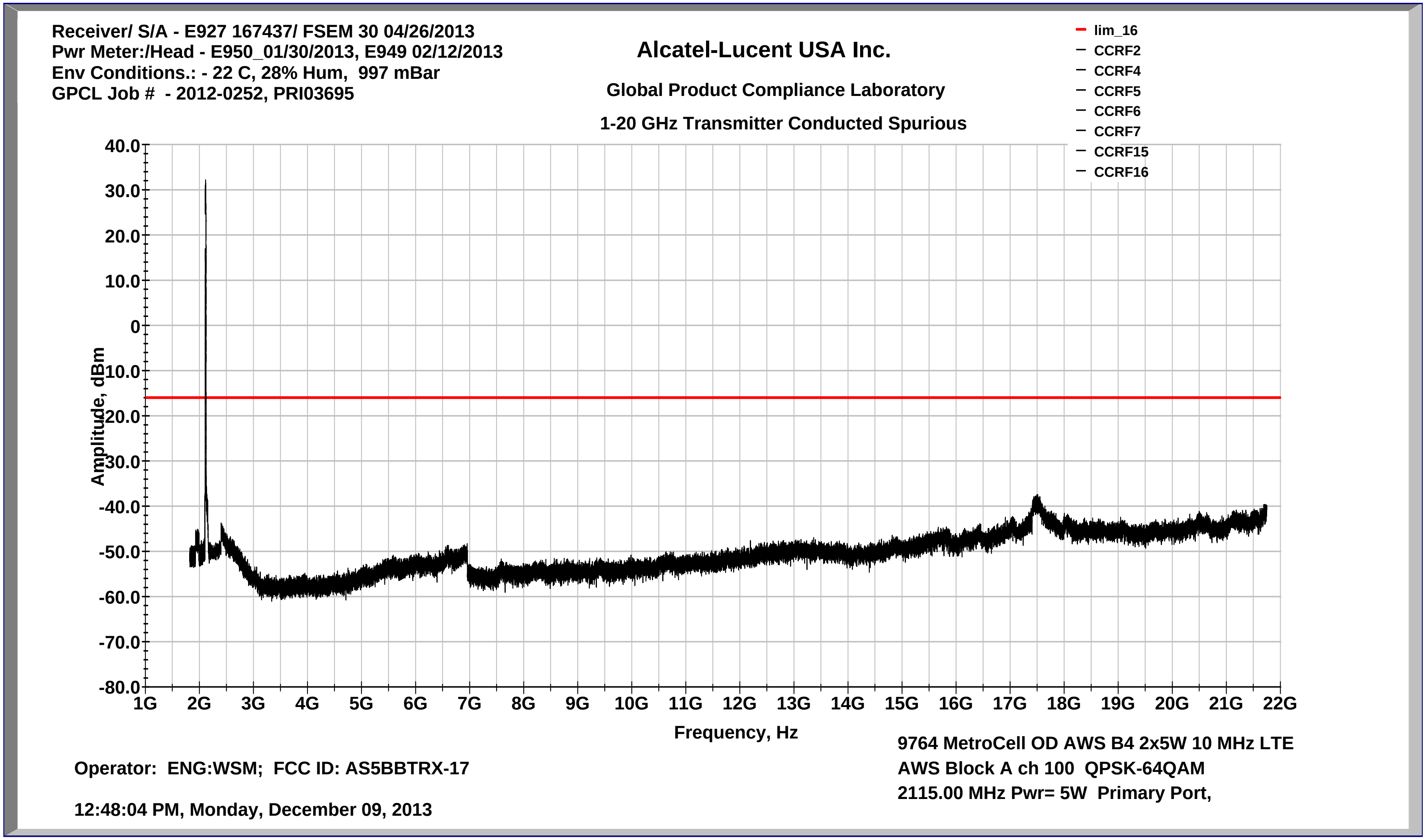
AWS LTE 9764 Metro Cell Outdoor Transceiver System
FCC ID: AS5BBTRX-17

W. Steve Majkowski NCE
FCC Wireless Compliance, CDMA Filing Lead
Alcatel-Lucent USA Inc.
Global Product Compliance Laboratory
Building 28-114J
600-700 Mountain Avenue, P.O. Box 636
New Providence, NJ 07974-0636
Office: 908-582-3782
email: steve.majkowski@alcatel-lucent.com

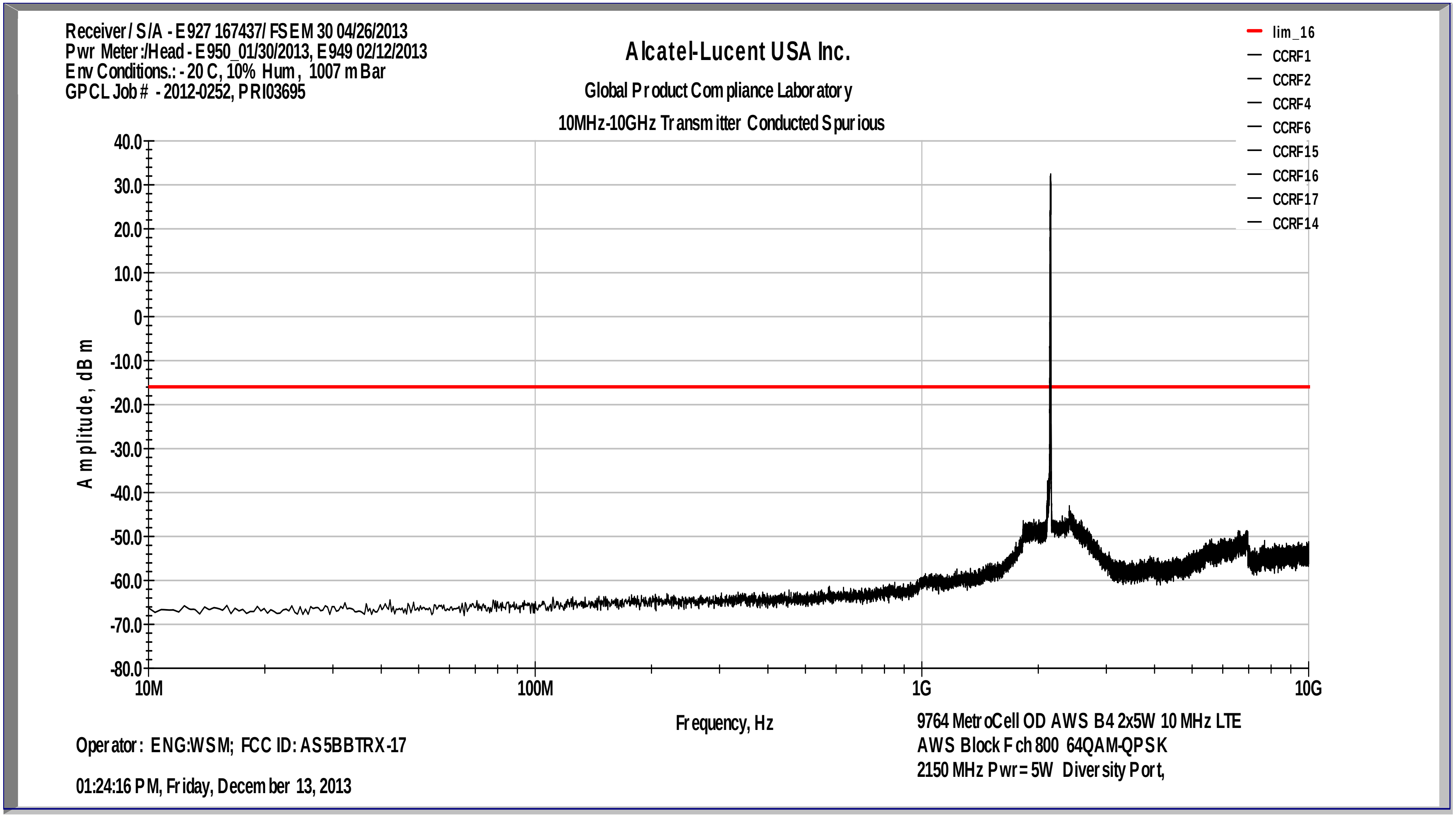
Conducted Spurious Emissions 10 MHz – 10 GHz LTE 10 MHz Ch A-100 5W/c QPSK Primary



Conducted Spurious Emissions 1 – 20 GHz LTE 10 MHz Ch A-100 5W/c QPSK Primary



Conducted Spurious Emissions 10 MHz – 10 GHz LTE 10 MHz Ch F-800 5W/c 64QAM Diversity



Conducted Spurious Emissions 1 – 20 GHz LTE 10 MHz Ch F-800 5W/c 64QAM Diversity

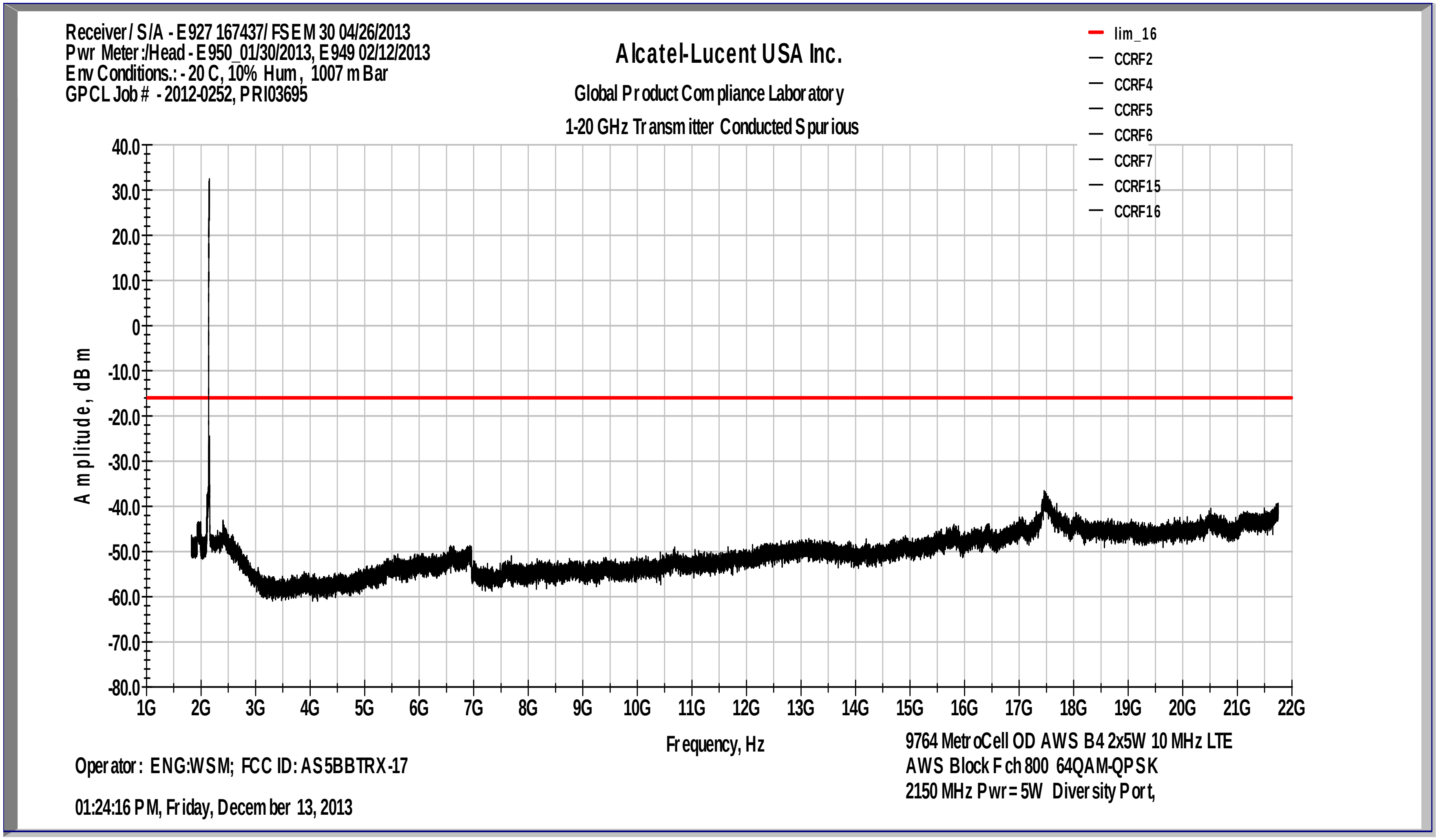


Exhibit 16 FIELD STRENGTH OF SPURIOUS RADIATION

SECTION 2.1053 Field Strength Of Spurious Radiation

Field strength measurements of radiated spurious emissions were evaluated in the AR6 Semi-Anechoic 3m Full Compliance Chamber maintained by Alcatel-Lucent USA Inc. Global Product Compliance Laboratory in Murray Hill, New Jersey. A complete description and full measurement data for the site have been placed on file with the Commission.

The **AWS LTE 9764 Metro Cell Outdoor Transceiver System / FCC ID: AS5BBTRX-17** was configured into a representative field installation and was tested when operating in each AWS block. The spectrum from 10 MHz to the tenth harmonic of the carrier (21.6 GHz) was searched for spurious radiation. Measurements were made using both horizontally and vertically polarized broadband antennas. Per FCC regulations, the comparison of out of band spurious emissions directly to the limit is appropriately made using the substitution method. However, when the emissions are more than 20 dB below the specification limit, the use of field strength measurements for compliance determination is acceptable and those emissions are considered not reportable (Section 2.1053 and the FCC Interpretive database for 2.1053). For this case the evaluation of acceptable radiated field strength is as follows.

The calculated emission levels were found by:

Pmeas (dBm) + Cable Loss(dB) + Antenna Factor(dB) + 107 (dBµV/dBm) -Amplifier Gain (dB)
= Field Strength (dBµV/m)

Section 24.53 and 2.1053 contains the requirements for the levels of spurious radiation as a function of the EIRP of the unmodulated carrier. The reference level for the unmodulated carrier is calculated as the field produced by an isotropic radiator excited by the transmitter output power according to the following relation taken from Reference Data for Radio Engineers, page 27-7, 6th edition, IT&T Corp.

$$E = (120\pi P)^{1/2} = [(30*P)^{1/2}] / R$$

$$20 \log (E*10^6) - (43 + 10 \log P) = 71.77 \text{ dB } \mu V/\text{meter}$$

Where: E = Field Intensity in Volts/ meter R = Distance in meters = 10 m
P = Transmitted Power in watts = 1 W

RESULTS:
For this particular test, the field strength of any spurious radiation, measured at 10m, is required to be less than 71.8 dBµV/meter. Emissions equal to or less than 51.8 dBµV/meter are not reportable and may be verified using field strength measurements and broadband antennas. Over the out of band spectrum investigated from 10 MHz to beyond the tenth harmonic of the carrier (20GHz), no reportable spurious emissions were detected. This demonstrates that the **AWS LTE 9764 Metro Cell Outdoor Transceiver System / FCC ID: AS5BBTRX-17**, the subject of this application, complies with Sections 2.1053, 27.53 and 2.1057 of the Rules.

Although not required for certification, additional testing to 47CFR Part 15 documented compliance with the Class B requirements for radiated emissions and power line conducted emissions.

Exhibit 17 MEASUREMENT OF FREQUENCY STABILITY

SECTION 2.1055 Measurement of Frequency Stability

The following frequency stability test data for the **AWS LTE 9764 Metro Cell, FCC ID: AS5BBTRX-17** was measured as installed and tested, per Figure 17A. An AC powered and a -48V DC powered version of the **AWS LTE 9764 Metro Cell Outdoor** were individually tested over their specified temperature range of -30 deg C to +50 deg C while operating at full rated power. Software and hardware controls internal to the **AWS LTE 9764 Metro Cell** will disable the transmitter should either the internal temperatures exceed the maximum range or the frequency stability of the transmitter be compromised.

Testing

Frequency Stability Testing was performed on a system level using the **-48Vdc AWS LTE 9764 Metro Cell Outdoor** with a transmit frequency of 2132.5 MHz. The testing was performed from 11/18/2013 through 11/19/2013 on a **-48Vdc AWS LTE 9764 Metro Cell Outdoor** at 2132.5 MHz, which was located in the T-15 Thermal chamber of the Alcatel-Lucent GPCL test facility located in Bldg 4, Room 4-280, Murray Hill, NJ. The temperatures to which the UUT were subjected to comprised high temperature (+50ºC, system ambient) and low temperature (-30ºC system ambient). The system level Frequency Stability testing of the UUT yielded results in compliance with established design criteria. Frequency Stability performance was verified by measuring Frequency Tolerance at EAC using an MXA Signal Analyzer. Frequency Tolerance is a measurement of the difference between the actual transmit frequency and the assigned frequency (2132.5 MHz). The frequency stability performance of the **9764 Metro Cell Outdoor Transceiver System**, was also investigated over the voltage range of 85% to 115% of nominal line voltage. (-48VDC +/- 15%) .

The frequency stability performance of the **9764 Metro Cell Outdoor Transceiver System, FCC ID: AS5BBTRX-17**, complies with the 0.05 ppm performance criteria as stated in the 731 form and it meets the requirements of 47 CFR Part 27.54. The summary of the results are below followed by the data.

Results Summary:

The test data documented that the maximum frequency deviation of the **AWS LTE 9764 Metro Cell** 2132.5 MHz transmit carrier, when measured over voltage and temperature, was +0.0006 ppm (1.401 Hz). The specification for conformance with the 731 form is +/- 0.05 ppm (+/- 106.625 Hz). The product conforms with Part 27.54 requirements.

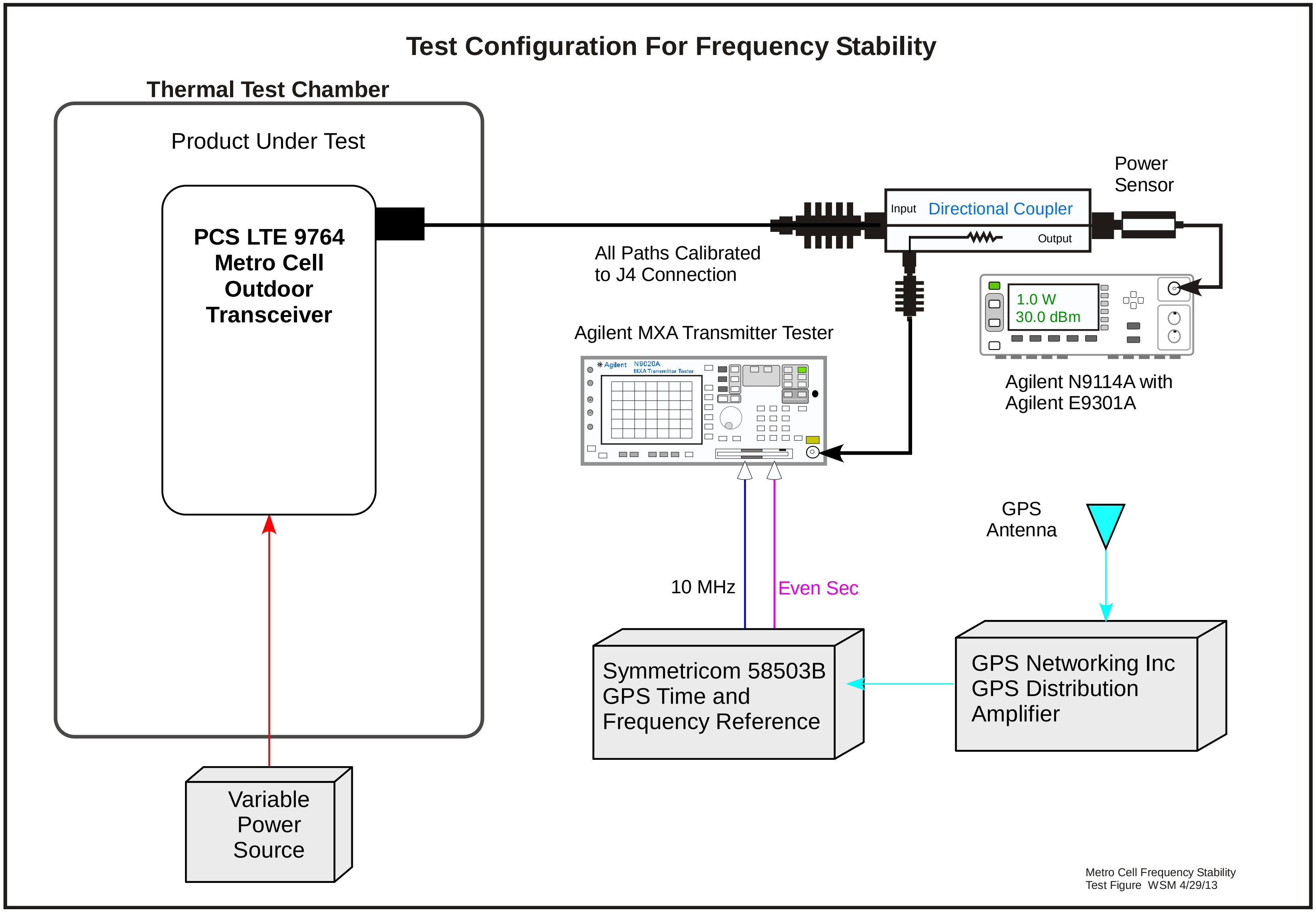
Frequency Stability performance was verified by measuring Frequency Tolerance at EAC using an MXA Signal Analyzer. Frequency Tolerance is a measurement of the difference between the actual transmit frequency and the assigned frequency (2132.5MHz).

UUT: PRI03965 - 9764-DC MCO 2x5W AWS B 4, SN: LBALLU-RT134180232 .

Instrument Used for Measurement

Instrument Type	Serial Number	Vendor	Cal Due Date
MXA Signal Analyzer	MY52091033	AGILENT N9020A	11/08/2014
Power Meter	MY52400032	AGILENT N1914A	10/05/2014
Power Sensor	MY52280001	AGILENT E9301A	10/06/2014
Multimeter	JP35001820	HP 971A	02/28/2014
Power supply	9907B10B1038	SORENSON, MODEL NO DCR 80-62T	N/A

Figure 17A


Test Configuration For Frequency Stability
Thermal Test Chamber
Product Under Test
PCS LTE 9764 Metro Cell Outdoor Transceiver
All Paths Calibrated to J4 Connection
Input
Directional Coupler
Output
Power Sensor
1.0 W
30.0 dBm
Agilent N9114A with Agilent E9301A
Agilent MXA Transmitter Tester
GPS Antenna
10 MHz
Even Sec
Symmetricom 58503B GPS Time and Frequency Reference
GPS Networking Inc GPS Distribution Amplifier
Variable Power Source
Metro Cell Frequency Stability Test Figure WSM 4/29/13

Frequency Block Tested: ***PRI03965 - 9764-DC Power-LR MCO 2x5W v1.0 AWS BAND 4 (10-MHz) (CF = 2132.5MHz)***

1. (a)Set the power supply to nominal Voltage. (b) Record the frequency at ~25°C. (c)Raise EUT operating temperature to 50°C. (d)Record the frequency difference. (e) Repeat step (d) at each 10°C step down to -30°C. Result will be 10 readings and take temperature readings to establish thermal stability at each point.

Baseline Measurement at +25°C

Transmit Frequency Deviation at +25°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.244
0.5	0.885
1.0	0.339
1.5	0.413
2.0	0.317
2.5	0.592
3.0	0.465
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +50°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.178
0.5	0.356
1.0	1.260
1.5	0.991
2.0	0.290
2.5	0.391
3.0	0.537
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +40°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.866
0.5	1.401
1.0	1.019
1.5	0.247
2.0	0.779
2.5	0.713
3.0	0.127
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +30°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.258
0.5	1.330
1.0	0.416
1.5	0.501
2.0	0.168
2.5	0.730
3.0	0.271
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +20°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.842
0.5	1.027
1.0	0.477
1.5	0.509
2.0	1.091
2.5	0.341
3.0	0.127
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +10°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.222
0.5	0.319
1.0	0.263
1.5	0.499
2.0	0.465
2.5	0.612
3.0	0.626
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625Hz
FCC RESULT	PASS

Transmit Frequency Deviation at 0°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.582
0.5	0.941
1.0	0.466
1.5	0.547
2.0	0.235
2.5	0.700
3.0	0.403
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625Hz
FCC RESULT	PASS

Transmit Frequency Deviation at -10°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.561
0.5	0.367
1.0	0.319
1.5	0.473
2.0	0.425
2.5	0.506
3.0	0.479
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625Hz
FCC RESULT	PASS

Transmit Frequency Deviation at -20°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	1.117
0.5	0.989
1.0	0.735
1.5	0.632
2.0	0.461
2.5	0.257
3.0	0.311
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625Hz
FCC RESULT	PASS

Transmit Frequency Deviation at -30°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.836
0.5	0.591
1.0	0.554
1.5	0.342
2.0	0.726
2.5	0.913
3.0	0.634
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625Hz
FCC RESULT	PASS

Supply Voltage Variation Data

Upon return to +25°C.

2. At ambient, vary voltage to +15% and -15% of nominal and record frequency difference. Result will be 12 readings for each voltage (nominal, ~+ 3%, ~+6%, ~+%9, ~+12%, +15%, and nominal, ~- 3%, ~-6%, ~-%9, ~-12%, -15%).

Transmit Frequency Deviation at +25°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.435
0.5	0.448
1.0	0.821
1.5	0.497
2.0	0.927
2.5	0.313
3.0	0.595
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at 103% of Nominal Voltage, -49.44VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.379
0.5	0.687
1.0	0.418
1.5	0.649
2.0	0.100
2.5	0.273
3.0	0.775
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at 106% of Nominal Voltage, -50.88VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.254
0.5	0.309
1.0	0.940
1.5	0.373
2.0	0.435
2.5	0.534
3.0	0.689
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625Hz
FCC RESULT	PASS

Supply Voltage Variation Data *continued*

Transmit Frequency Deviation at +25°C at 109% of Nominal Voltage, -52.32VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.347
0.5	0.931
1.0	0.779
1.5	0.762
2.0	0.505
2.5	0.512
3.0	0.607
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at 112% of Nominal Voltage, -53.76VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.431
0.5	0.776
1.0	0.424
1.5	0.209
2.0	0.966
2.5	0.617
3.0	-0.944
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at 115% of Nominal Voltage, -55.20VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.140
0.5	0.296
1.0	0.218
1.5	0.382
2.0	0.554
2.5	0.271
3.0	0.659
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625Hz
FCC RESULT	PASS

Supply Voltage Variation Data *continued*

Transmit Frequency Deviation at +25°C at 100% of Nominal Voltage, -48.0VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.980
0.5	0.432
1.0	0.406
1.5	0.318
2.0	0.466
2.5	0.320
3.0	0.396
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at -3% of Nominal Voltage, -46.56VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.214
0.5	0.476
1.0	0.855
1.5	0.134
2.0	0.320
2.5	0.909
3.0	0.771
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at -6% of Nominal Voltage, -45.12VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.736
0.5	0.192
1.0	0.141
1.5	0.291
2.0	0.274
2.5	0.833
3.0	0.551
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625Hz
FCC RESULT	PASS

Supply Voltage Variation Data *continued*

Transmit Frequency Deviation at +25°C at -9% of Nominal Voltage, -43.68VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.240
0.5	0.194
1.0	0.411
1.5	0.916
2.0	0.364
2.5	0.428
3.0	0.263
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at -12% of Nominal Voltage, -42.24VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.378
0.5	0.433
1.0	0.391
1.5	0.483
2.0	0.212
2.5	0.376
3.0	0.251
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at -15% of Nominal Voltage, -40.80VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.277
0.5	0.678
1.0	0.321
1.5	0.372
2.0	0.403
2.5	0.338
3.0	0.647
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625Hz
FCC RESULT	PASS