Measurements of
Transmitter Occupied Bandwidth
for
Alcatel-Lucent USA Inc.
LTE PCS 9228 Base Station Macro
FCC ID: AS5ONEBTS-10

Operational Configuration
Emissions Designator 5M00F9W
at 48W/carrier

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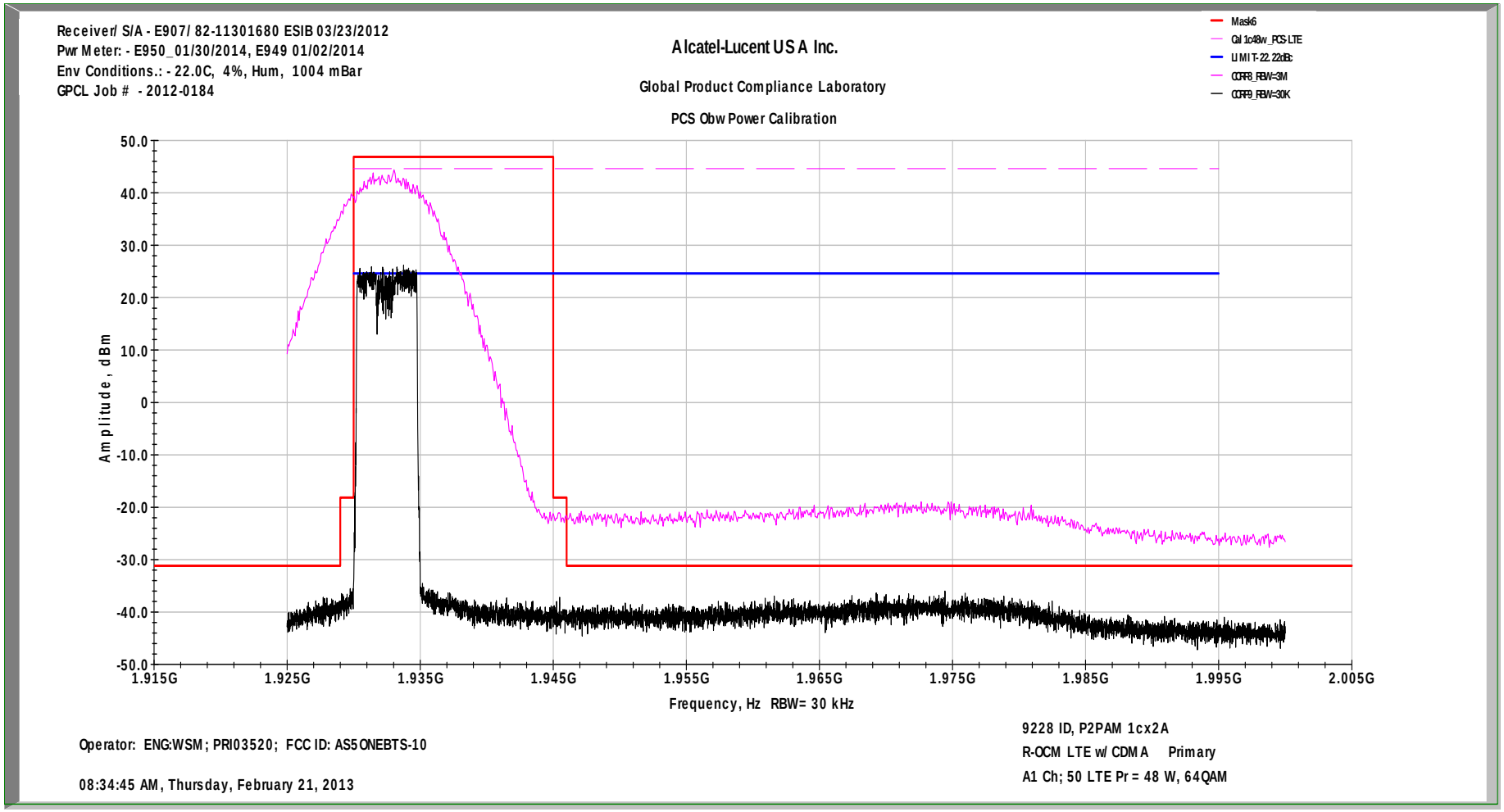
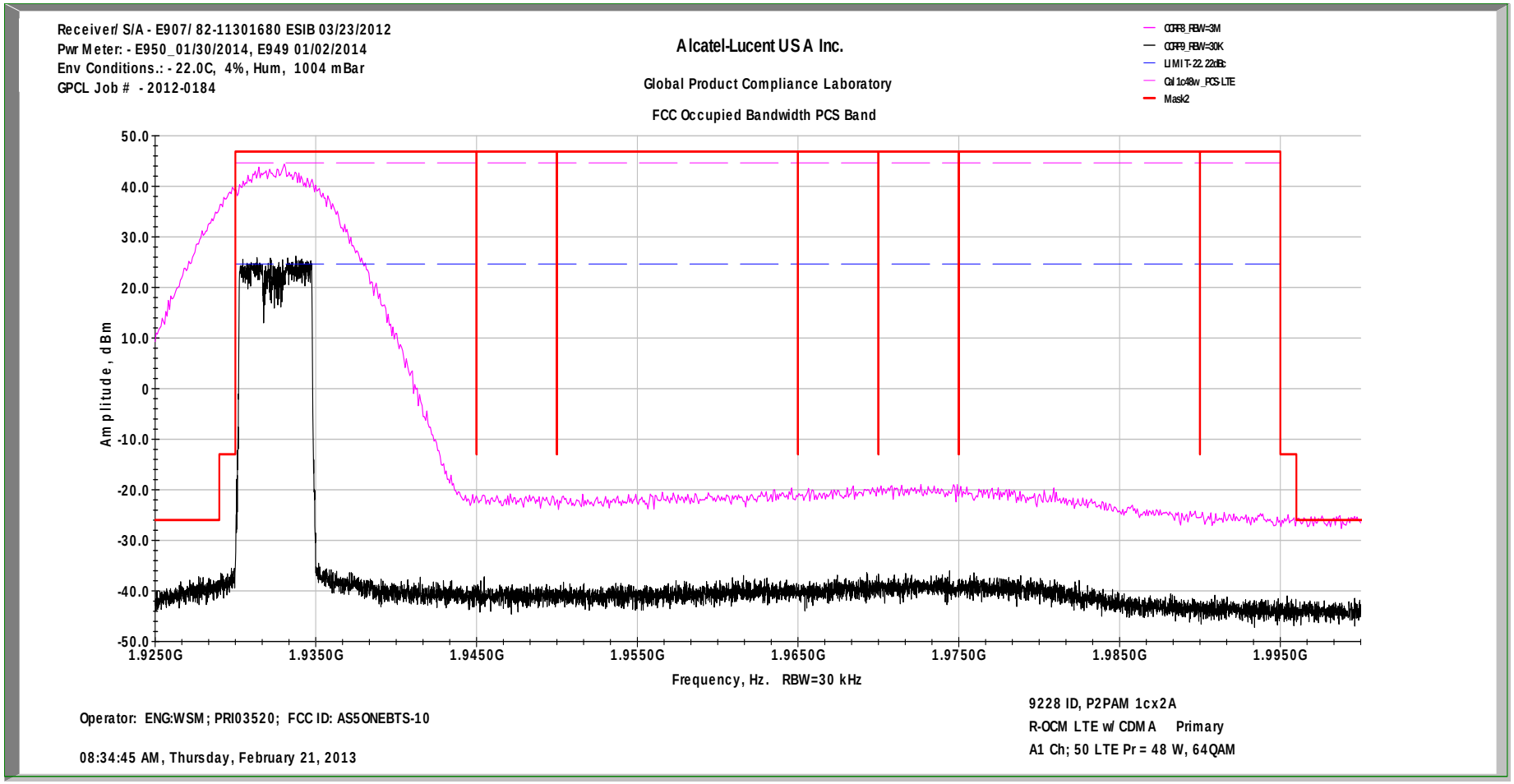
email: steve.majkowski@alcatel-lucent.com

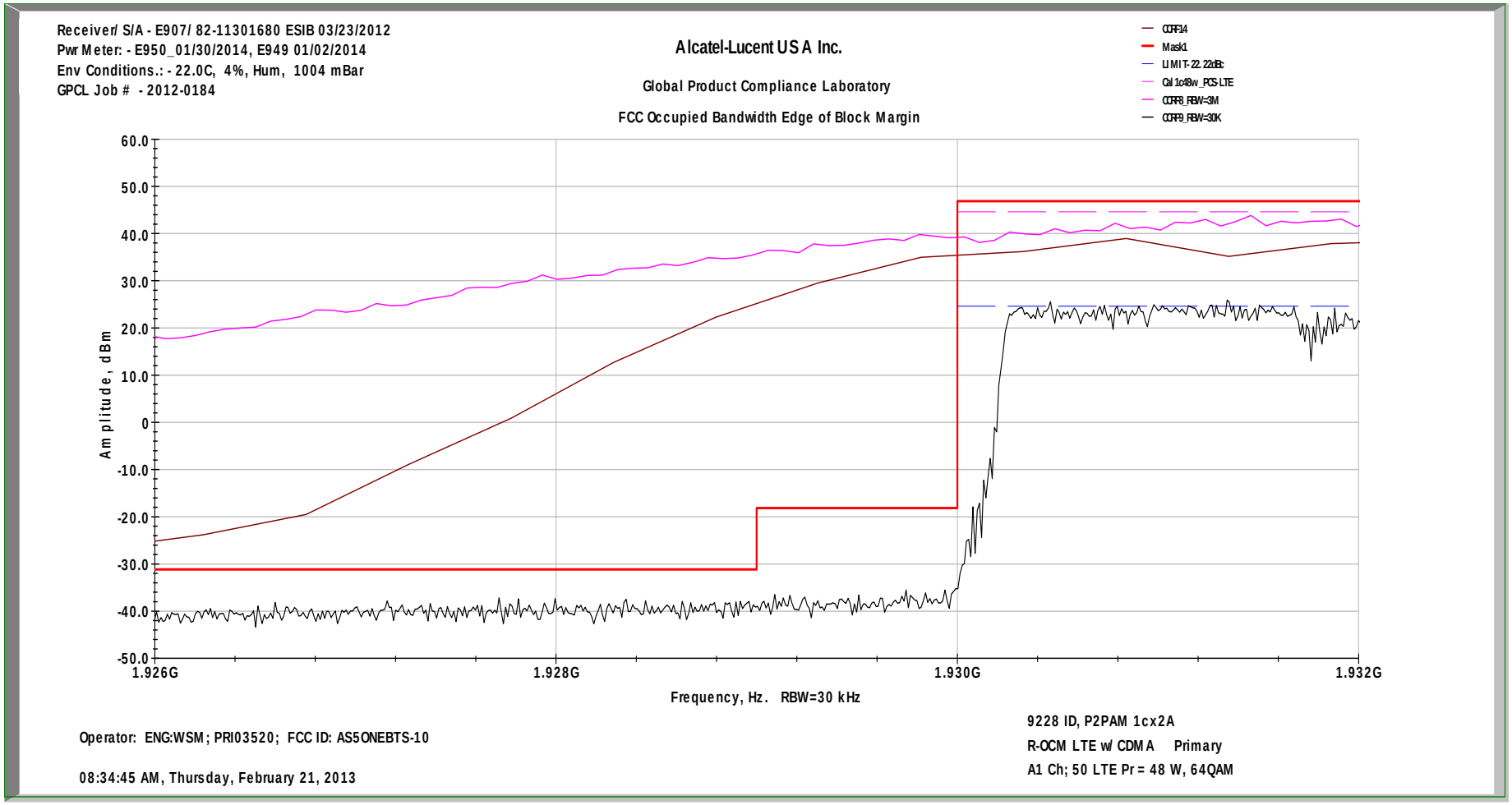
FCC Occupied Bandwidth Emissions LTE5 MHz Ch A-50 1cx2A 48W/c 64QAM Primary Tx1



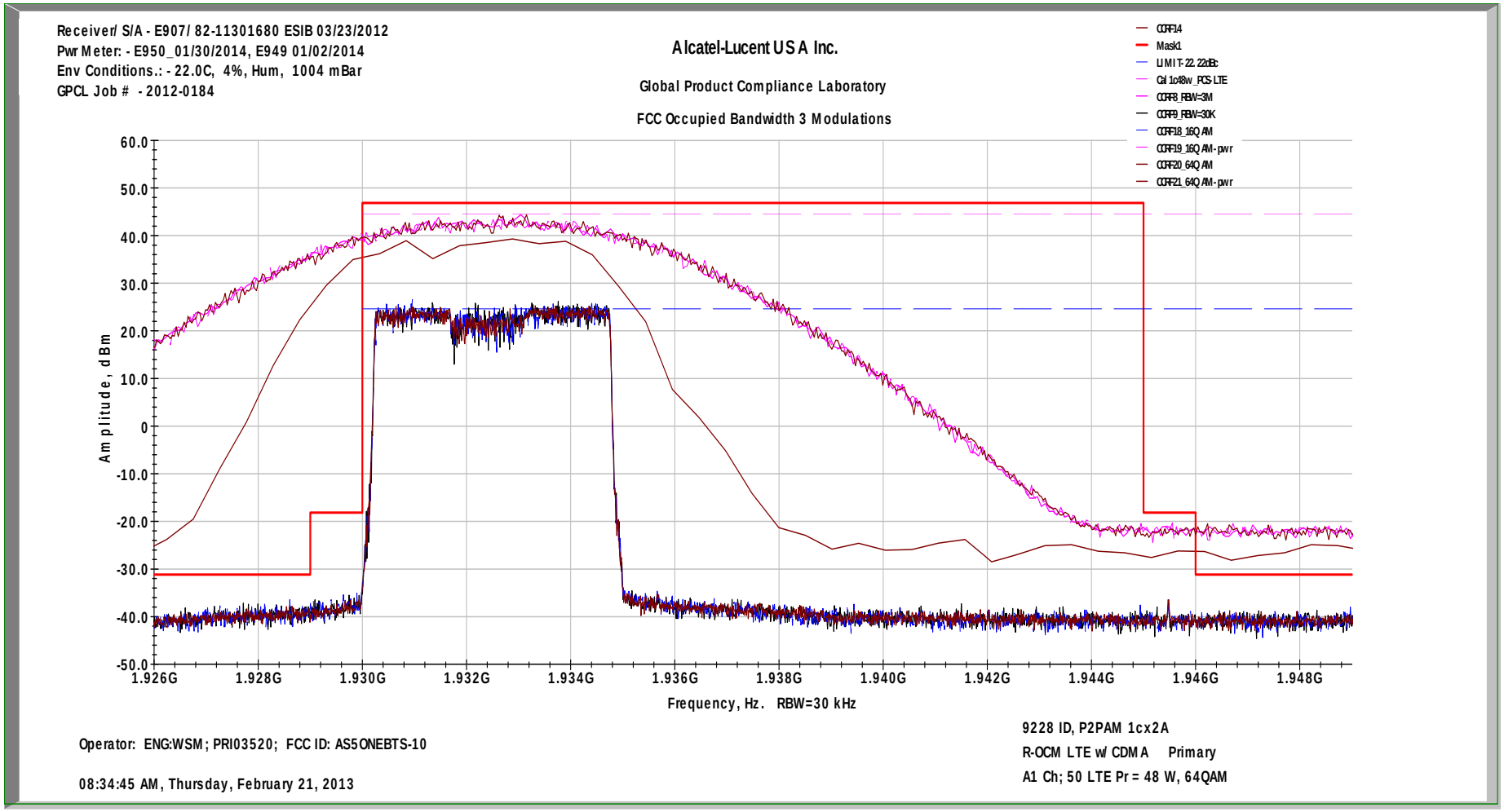
In-Band Intermodulation Graph LTE5 MHz Ch A-50 1cx2A 48W/c 64QAM Primary Tx1



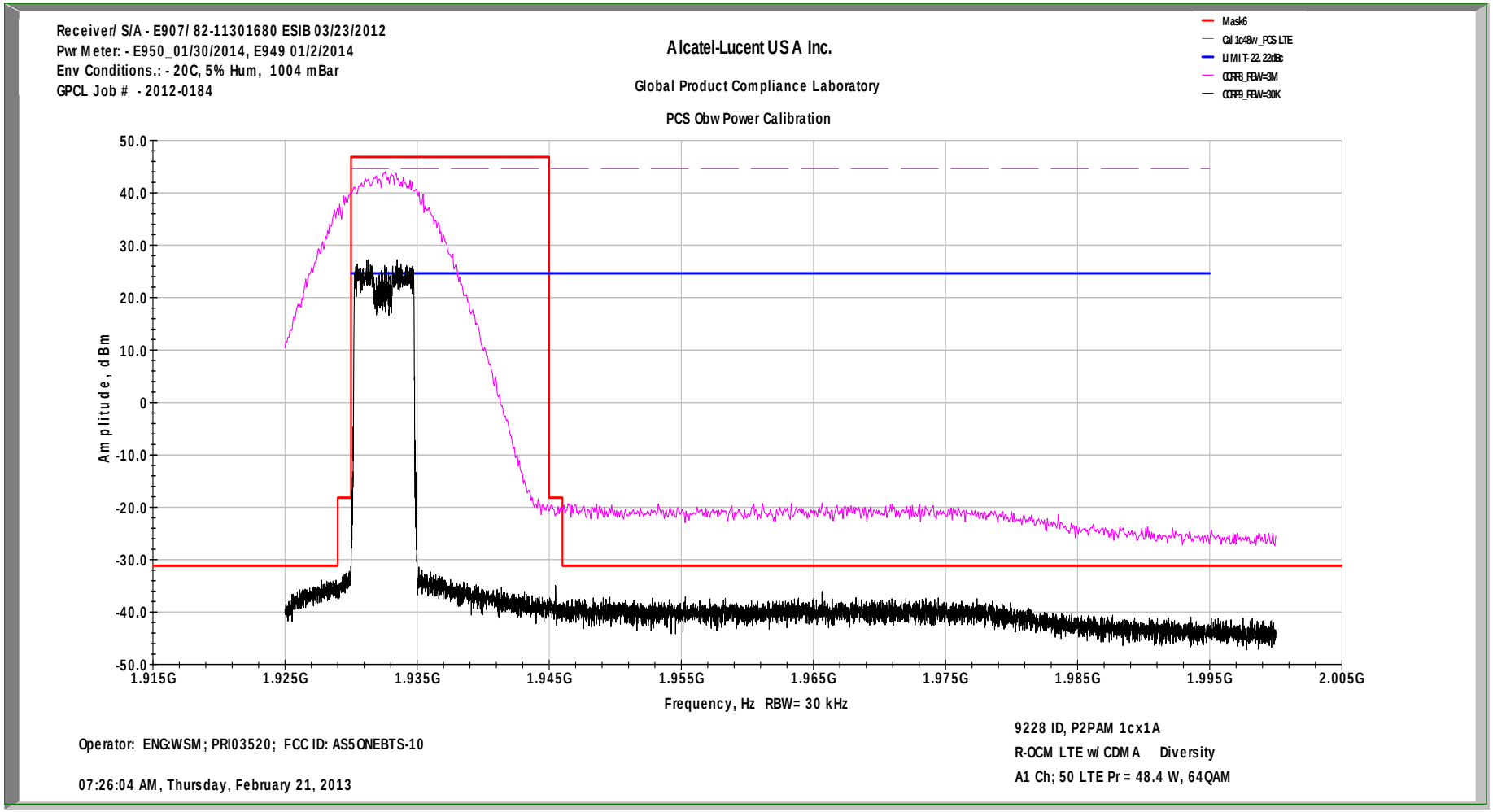
FCC Edge of Block Margin LTE5 MHz Ch A-50 1cx2A 48W/c 64QAM Primary Tx1



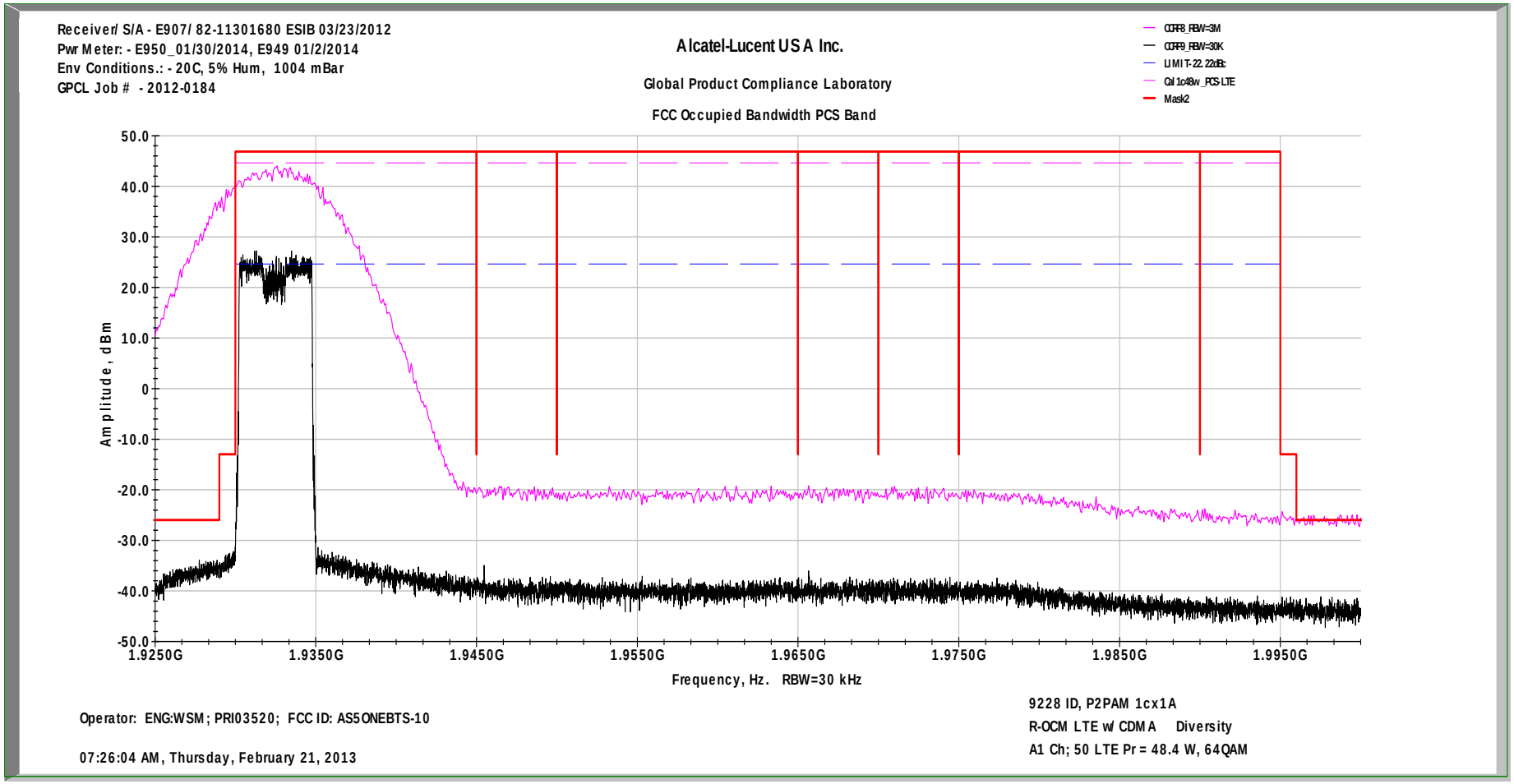
FCC Occupied Bandwidth with 3 Modulations LTE5 MHz Ch A-50 1cx2A 48W/c QPSK, 16QAM and 64QAM Primary Tx1



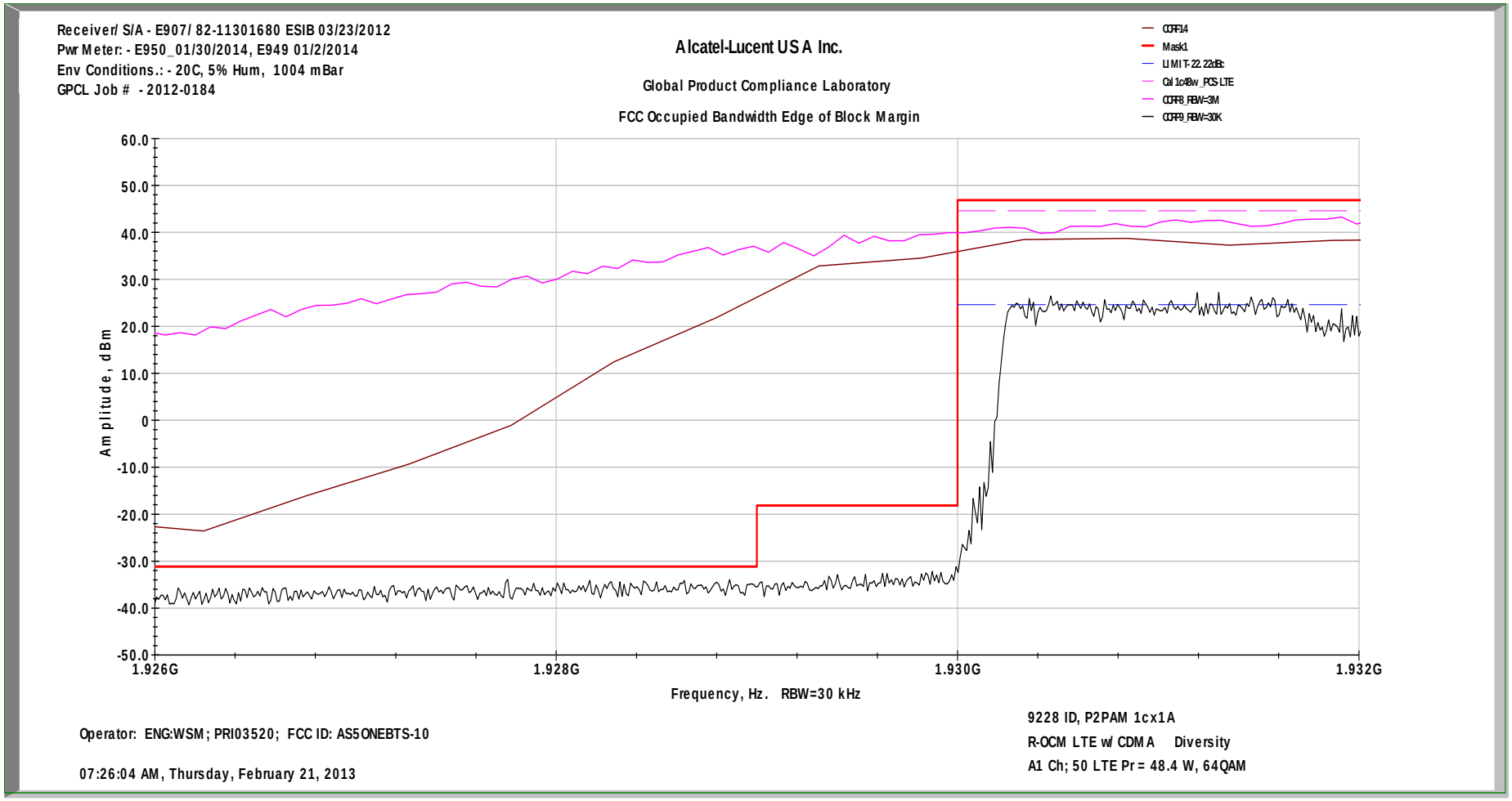
FCC Occupied Bandwidth Emissions LTE5 MHz Ch A-50 1cx1A 48W/c 64QAM Diversity Tx2



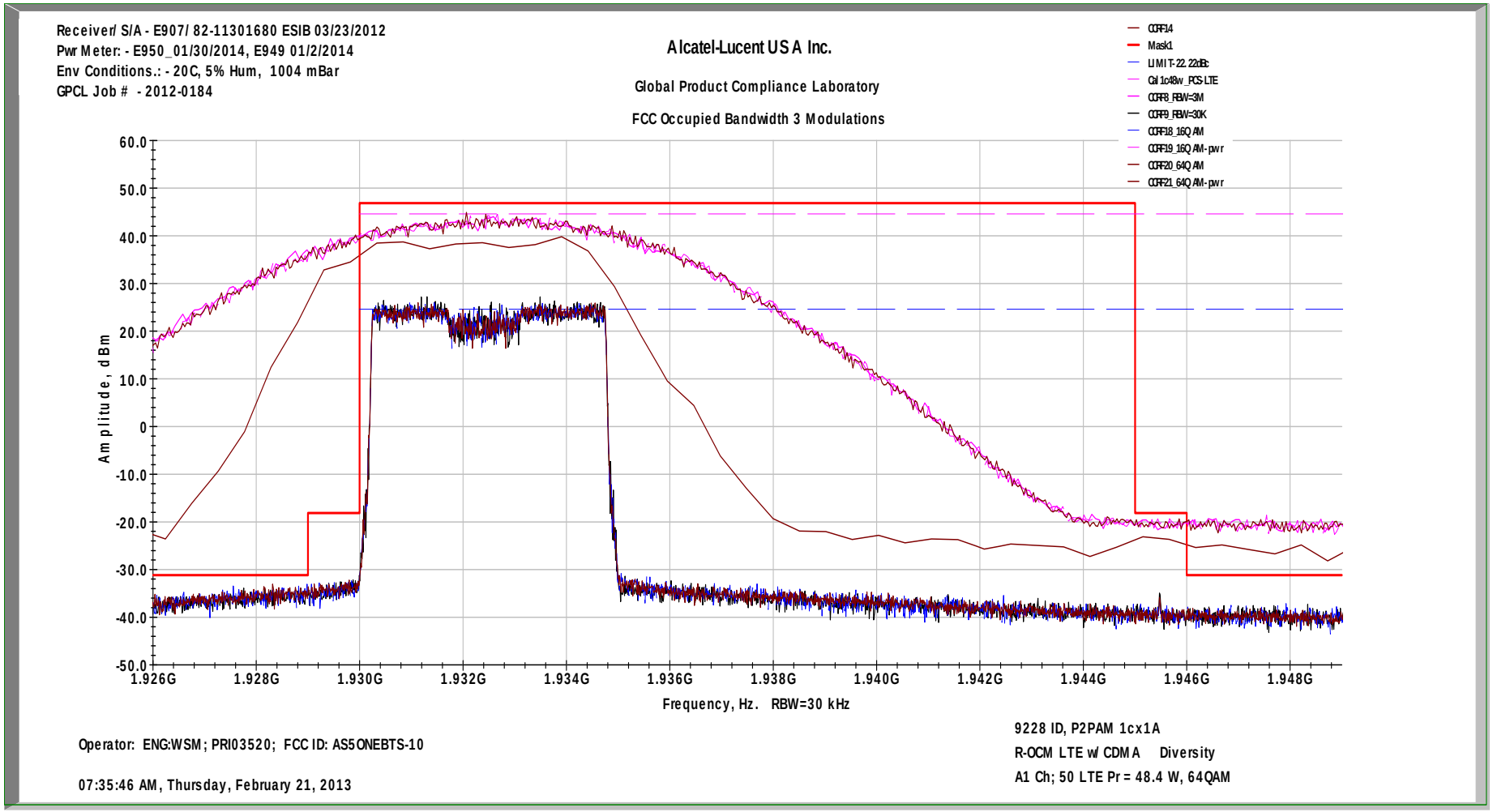
In-Band Intermodulation Graph LTE5 MHz Ch A-50 1cx1A 48W/c 64QAM Diversity Tx2



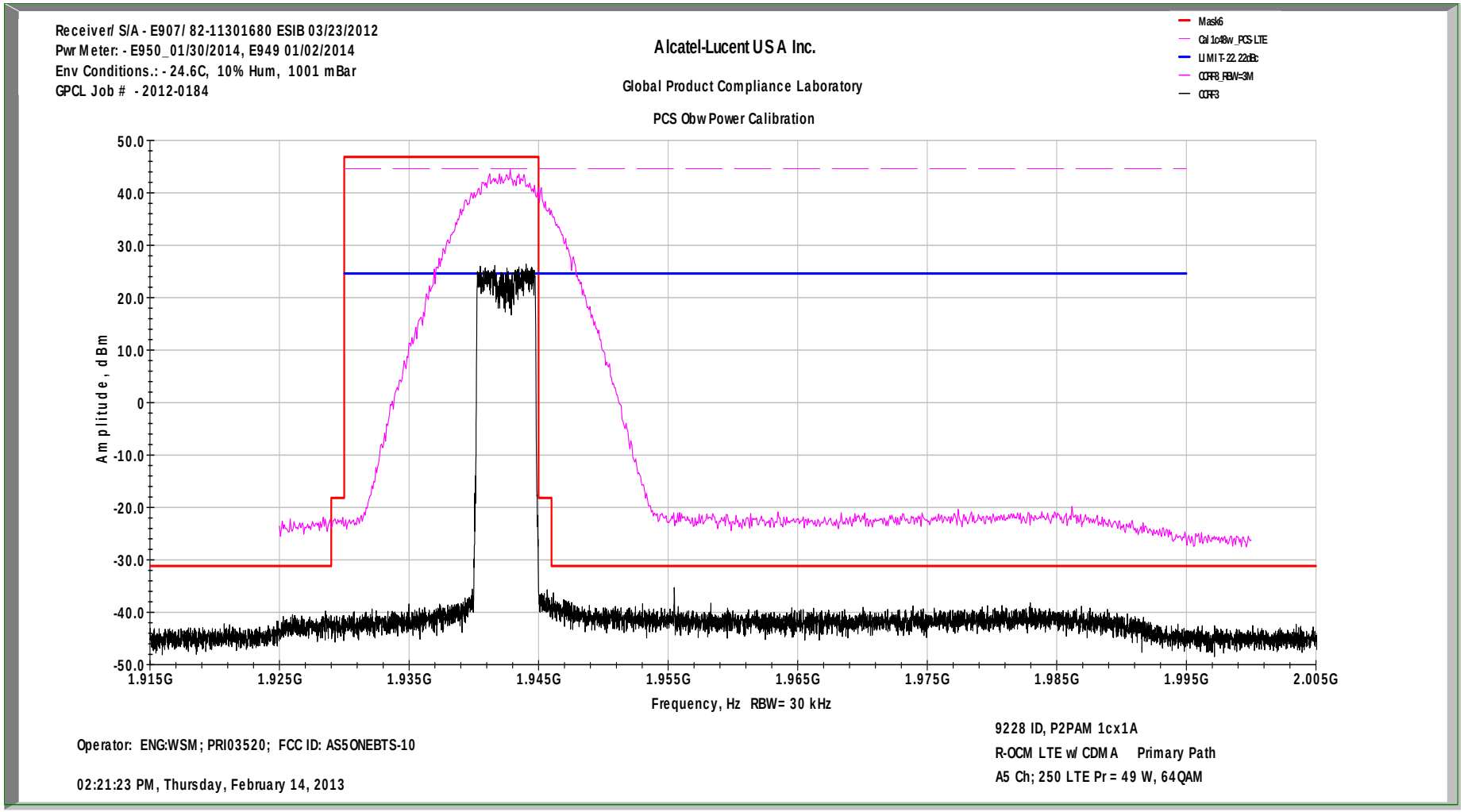
FCC Edge of Block Margin LTE5 MHz Ch A-50 1cx1A 48W/c 64QAM Diversity Tx2



FCC Occupied Bandwidth with 3 Modulations LTE5 MHz Ch A-50 1cx1A 48W/c QPSK, 16QAM and 64QAM Diversity Tx2



FCC Occupied Bandwidth Emissions LTE5 MHz Ch A-250 1cx2A 48W/c 64QAM Primary Tx1



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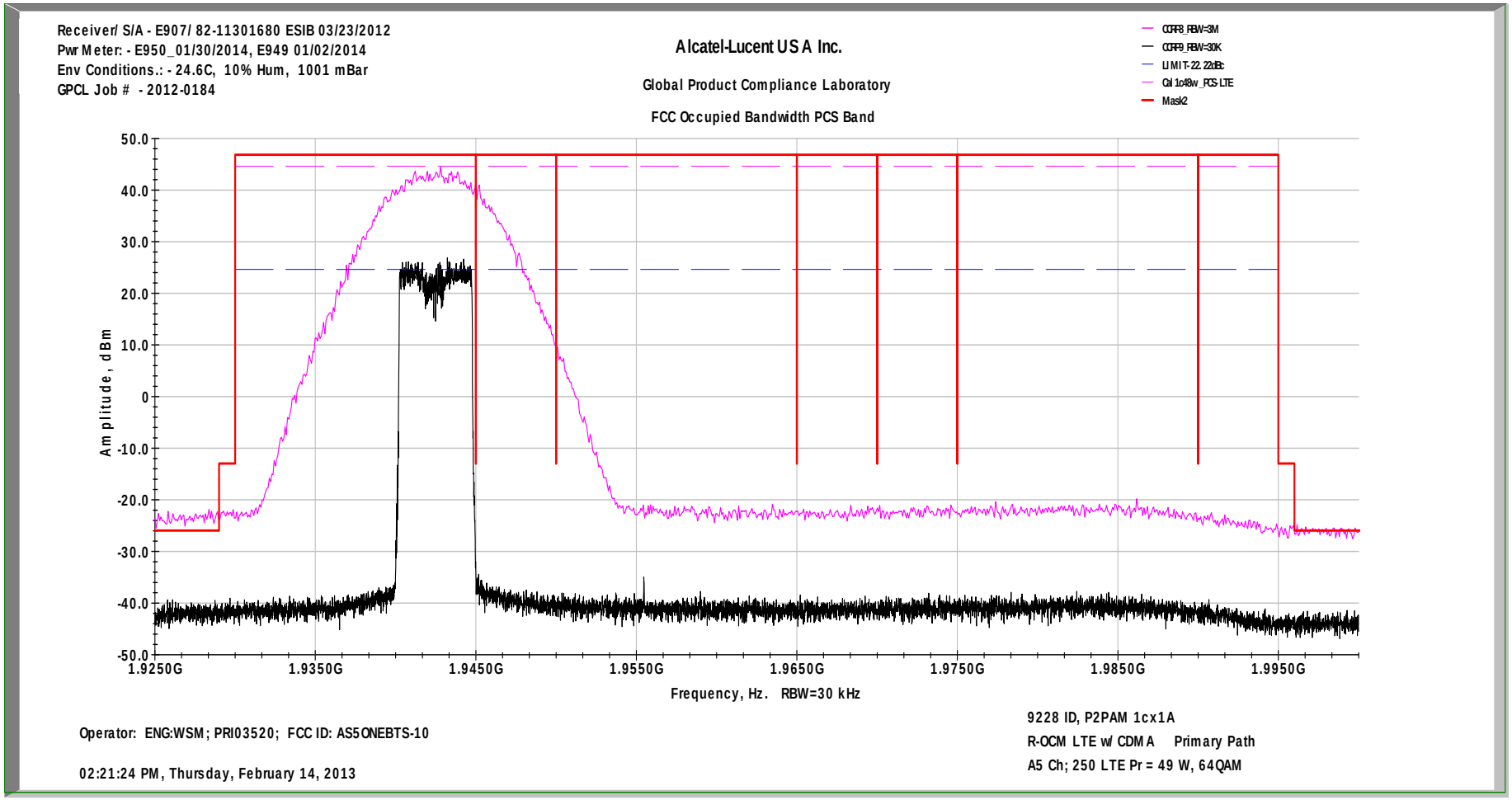
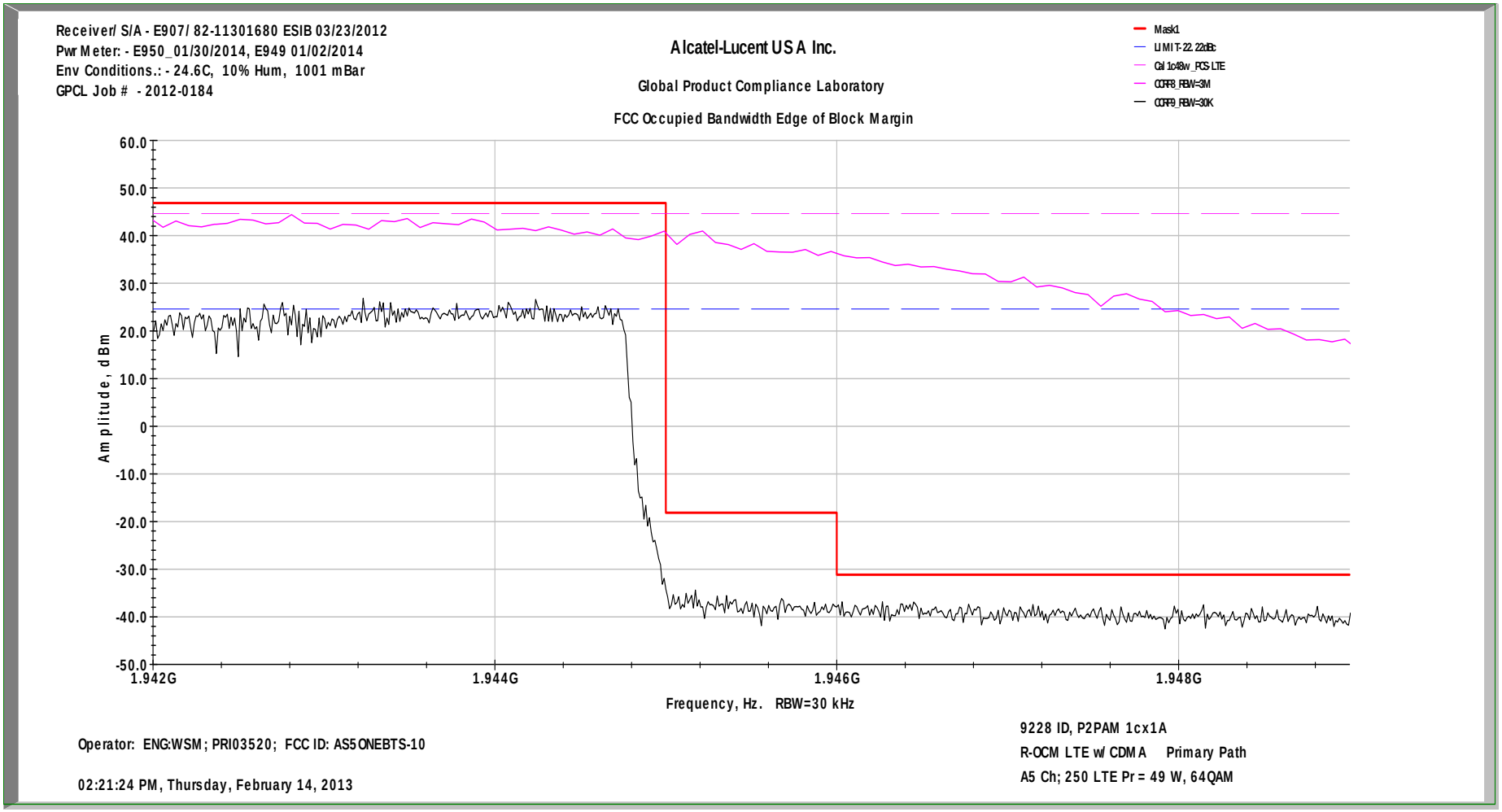
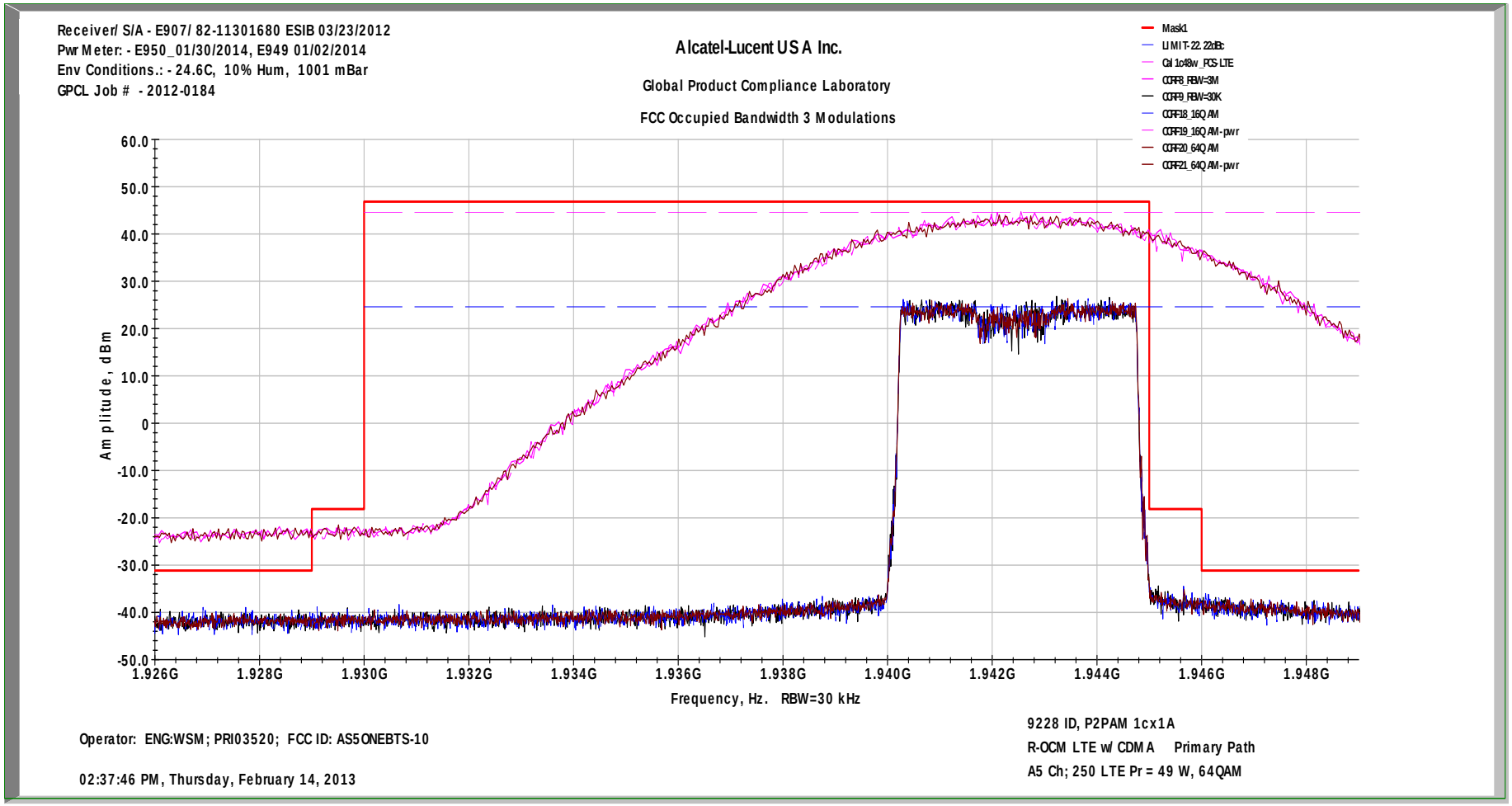


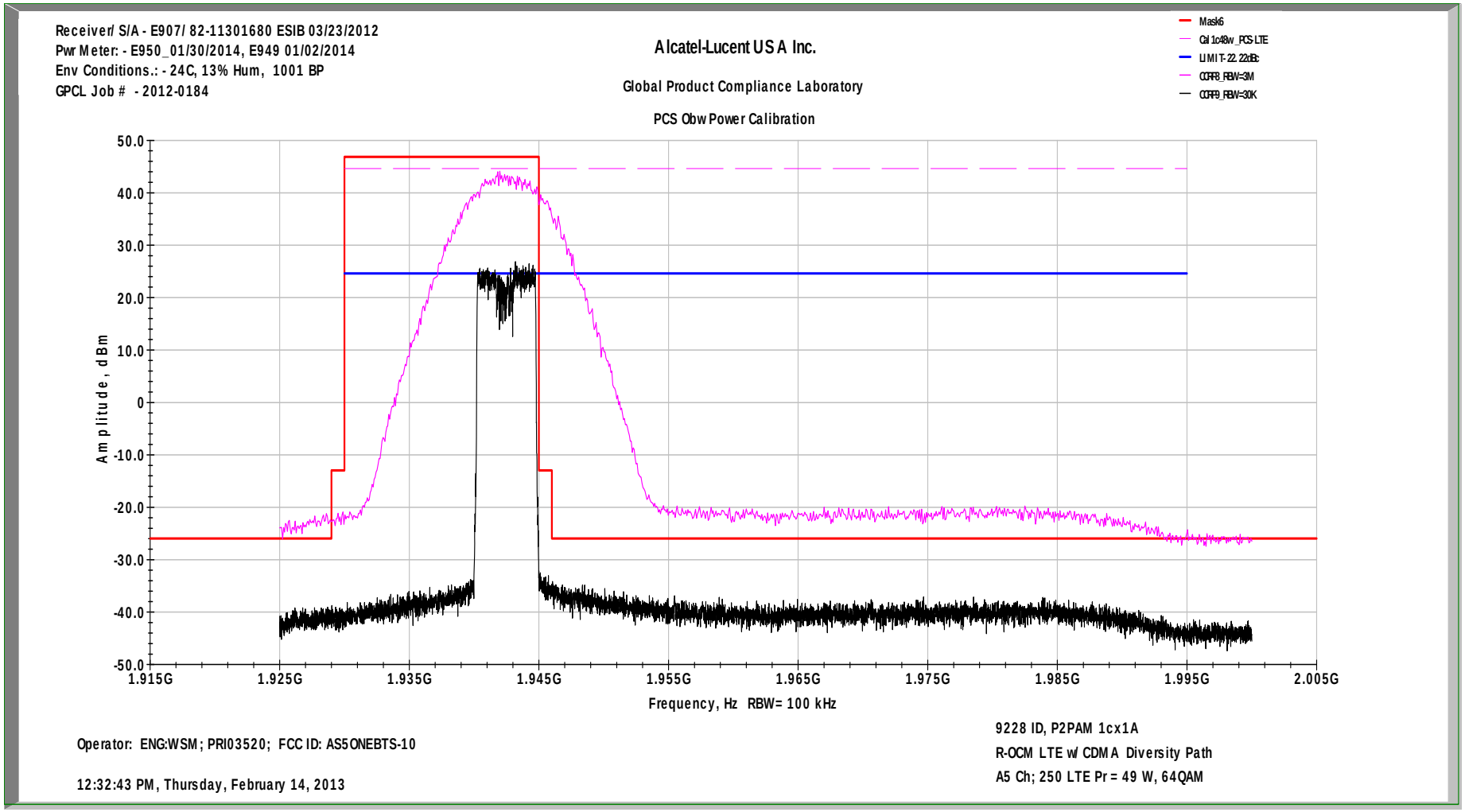
FCC Edge of Block Margin LTE5 MHz Ch A-250 1cx2A 48W/c 64QAM Primary Tx1



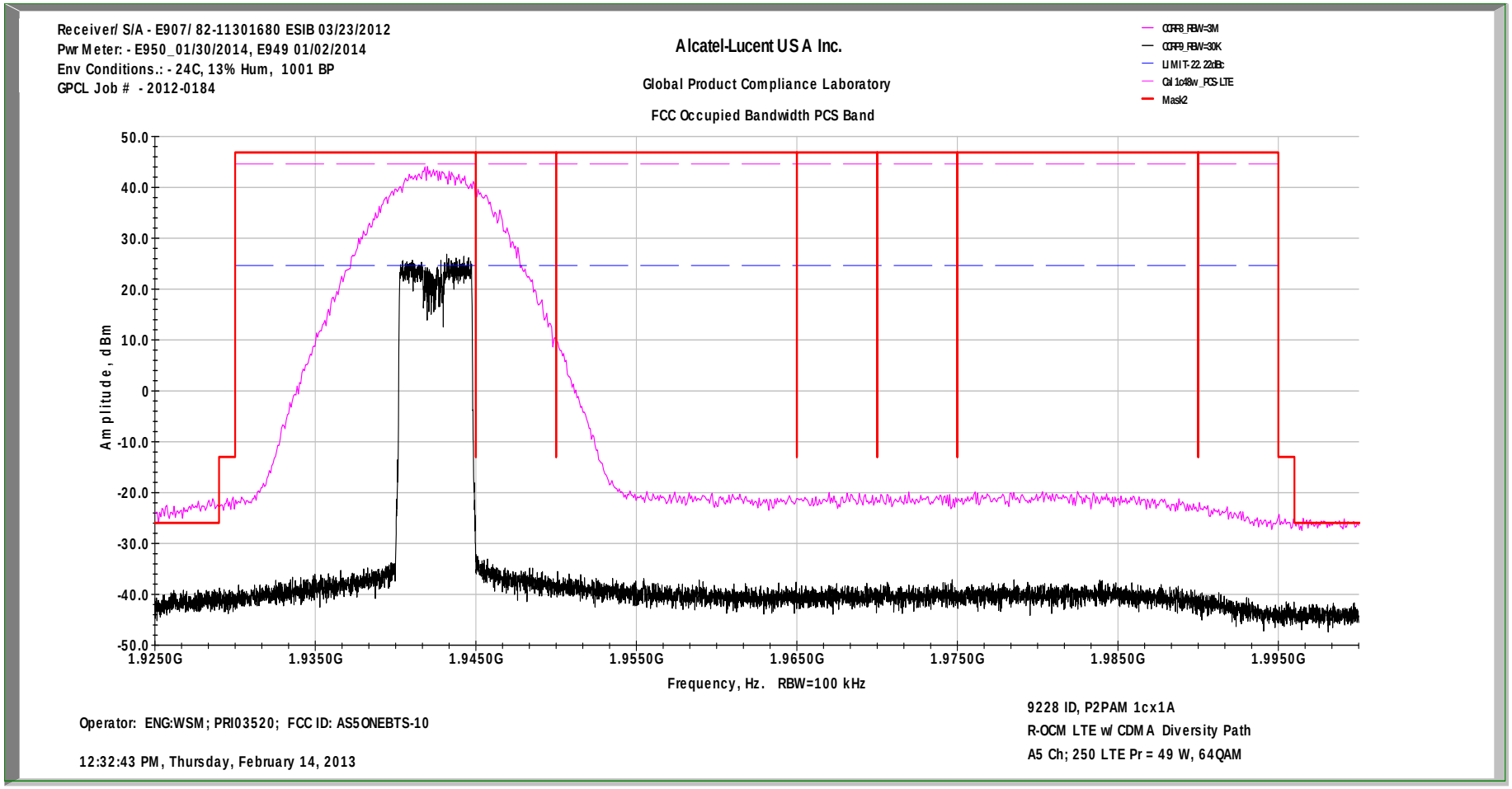
FCC Occupied Bandwidth with 3 Modulations LTE5 MHz Ch A-250 1cx2A 48W/c QPSK, 16QAM and 64QAM Primary Tx1



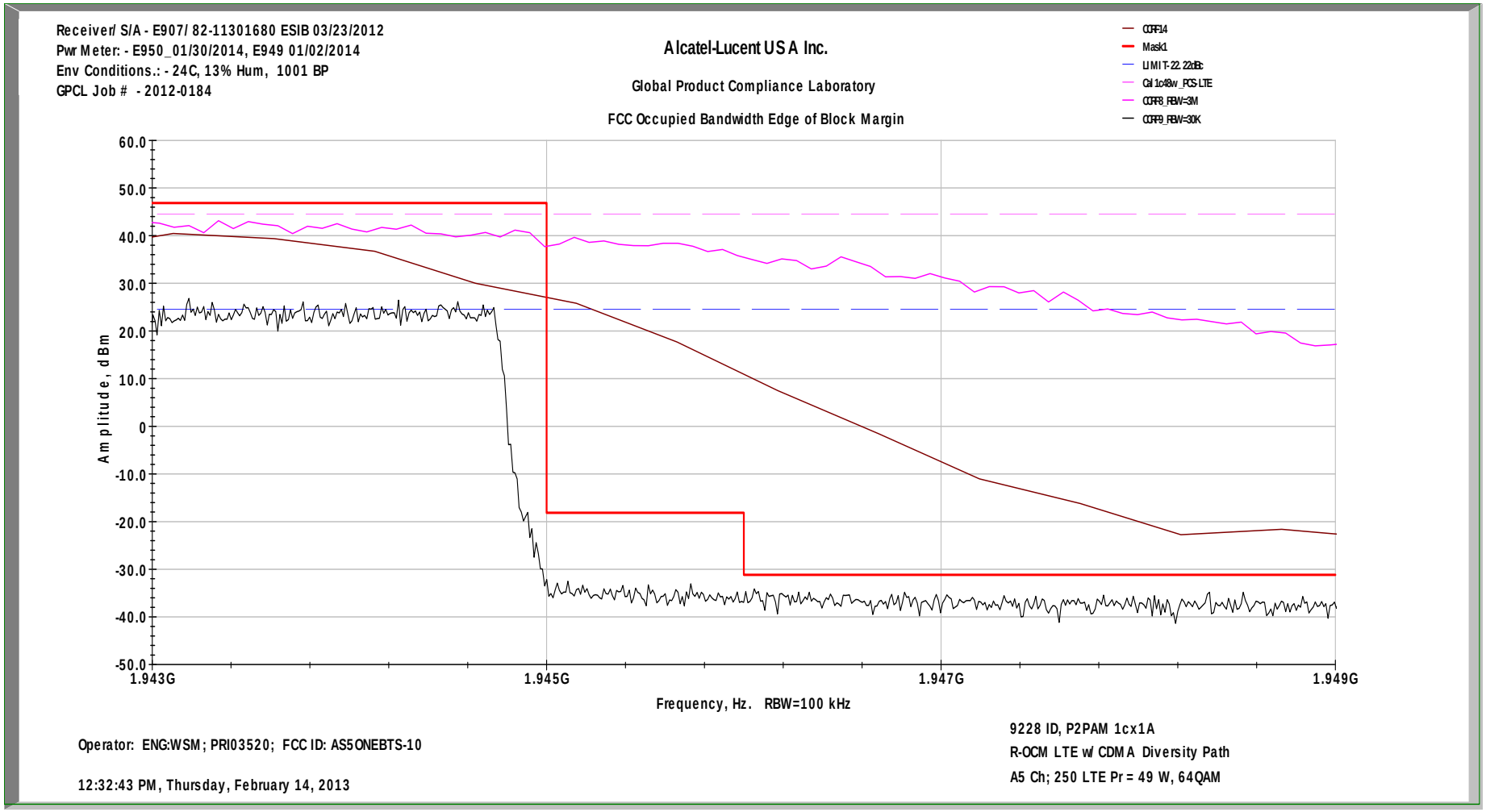
FCC Occupied Bandwidth Emissions LTE5 MHz Ch A-250 1cx1A 48W/c 64QAM Diversity Tx2



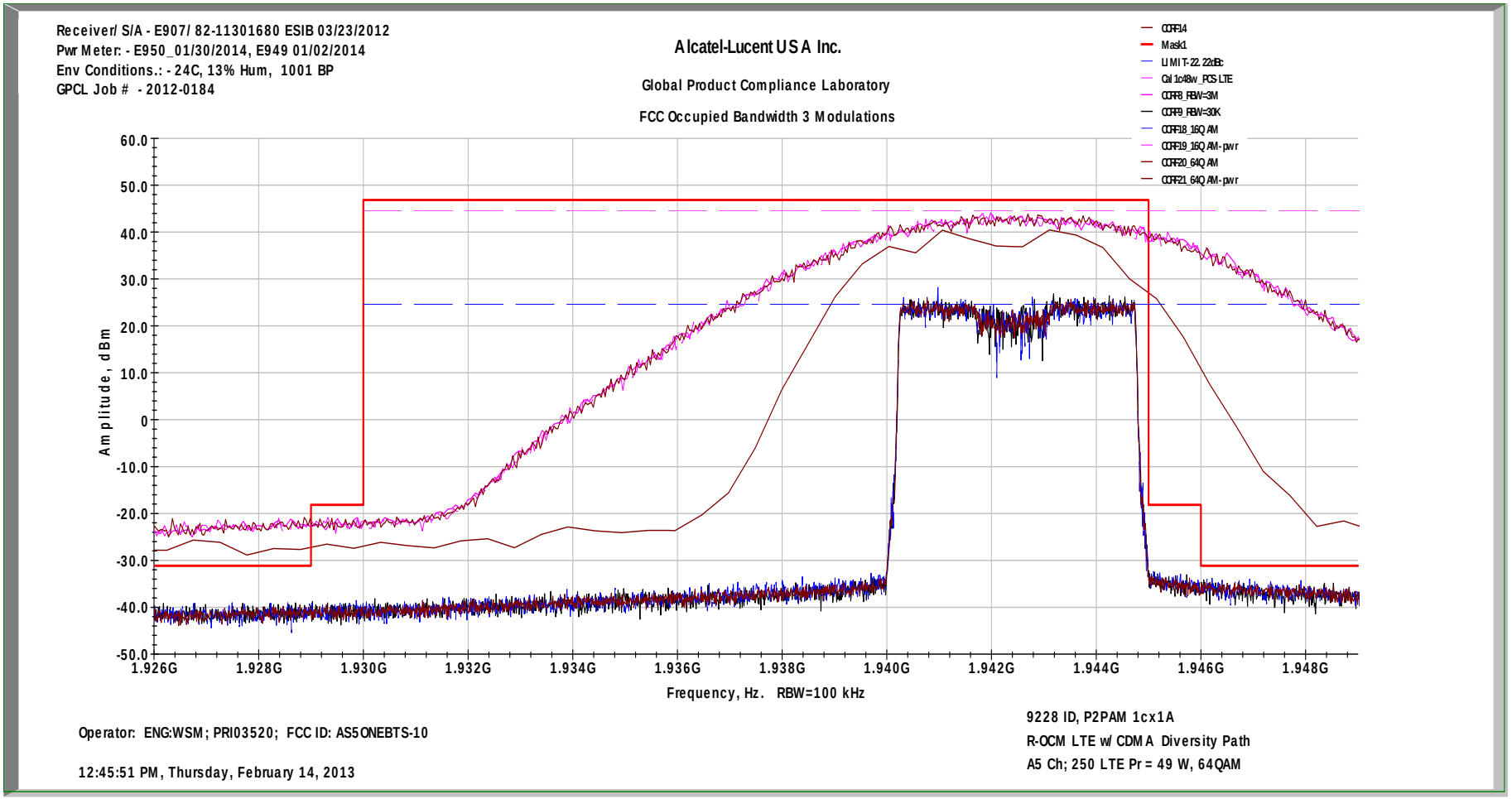
In-Band Intermodulation Graph LTE5 MHz Ch A-250 1cx1A 48W/c 64QAM Diversity Tx2



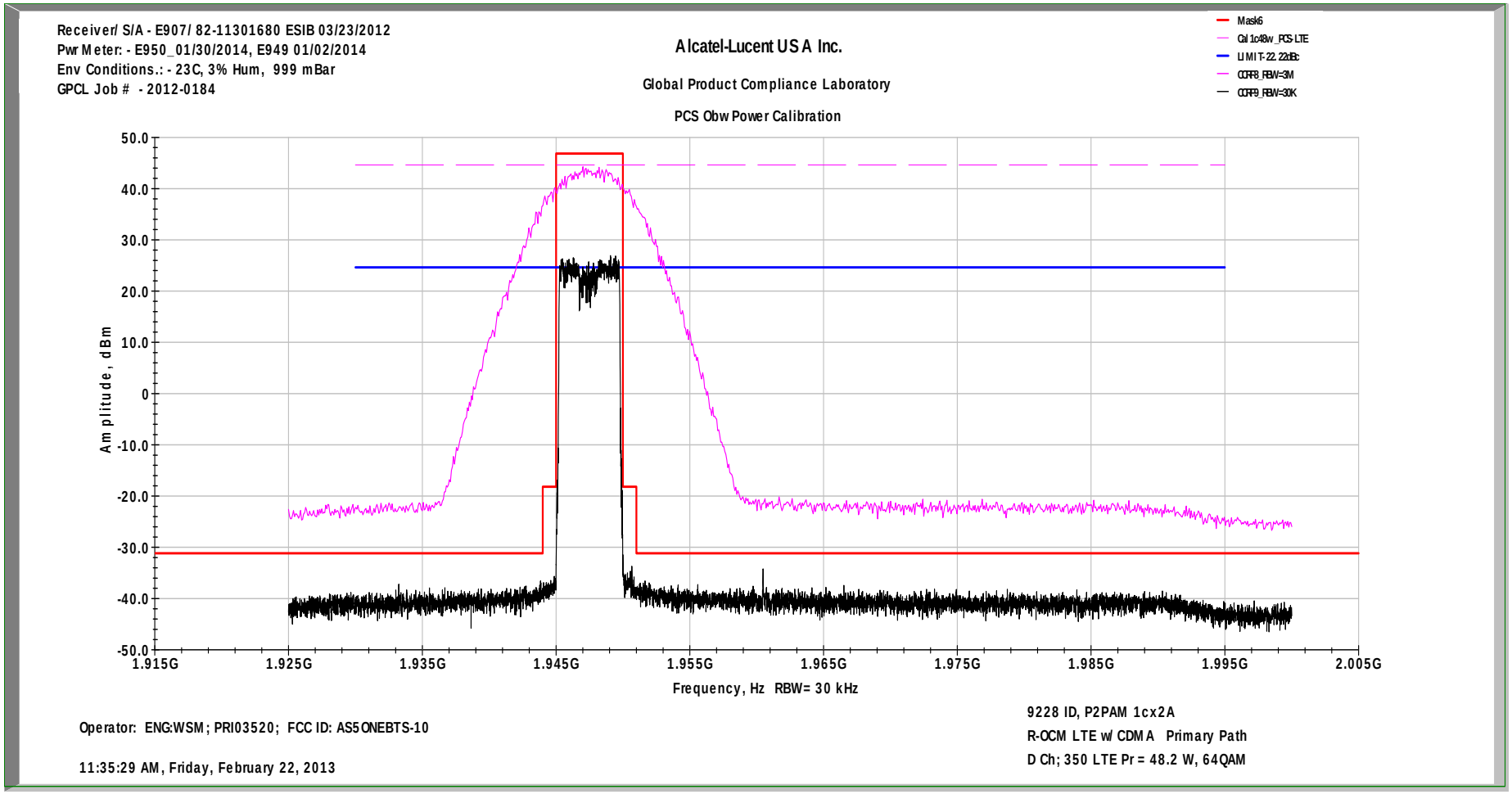
FCC Edge of Block Margin LTE5 MHz Ch A-250 1cx1A 48W/c 64QAM Diversity Tx2



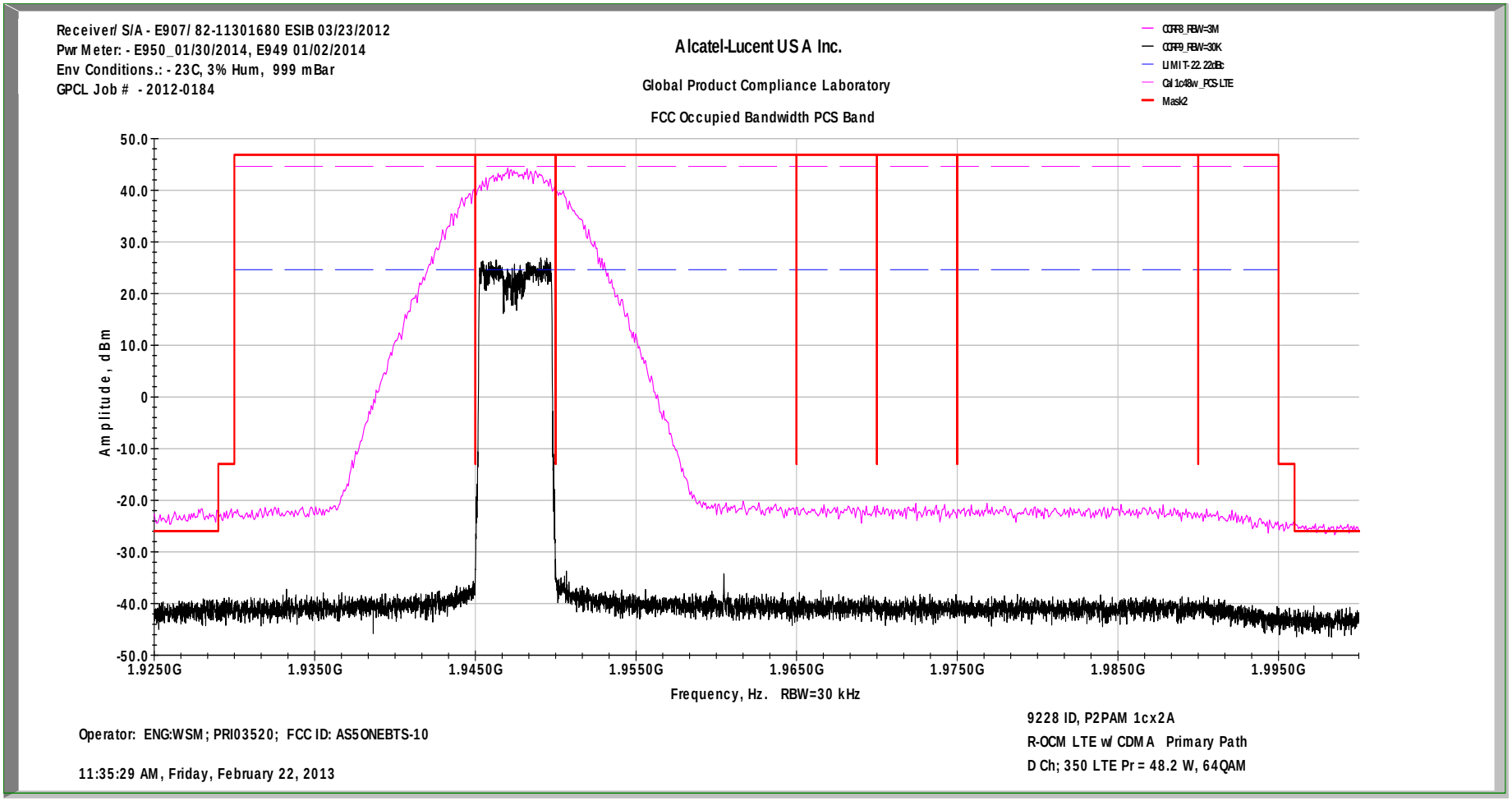
FCC Occupied Bandwidth with 3 Modulations LTE5 MHz Ch A-250 1cx1A 48W/c QPSK, 16QAM and 64QAM Diversity Tx2



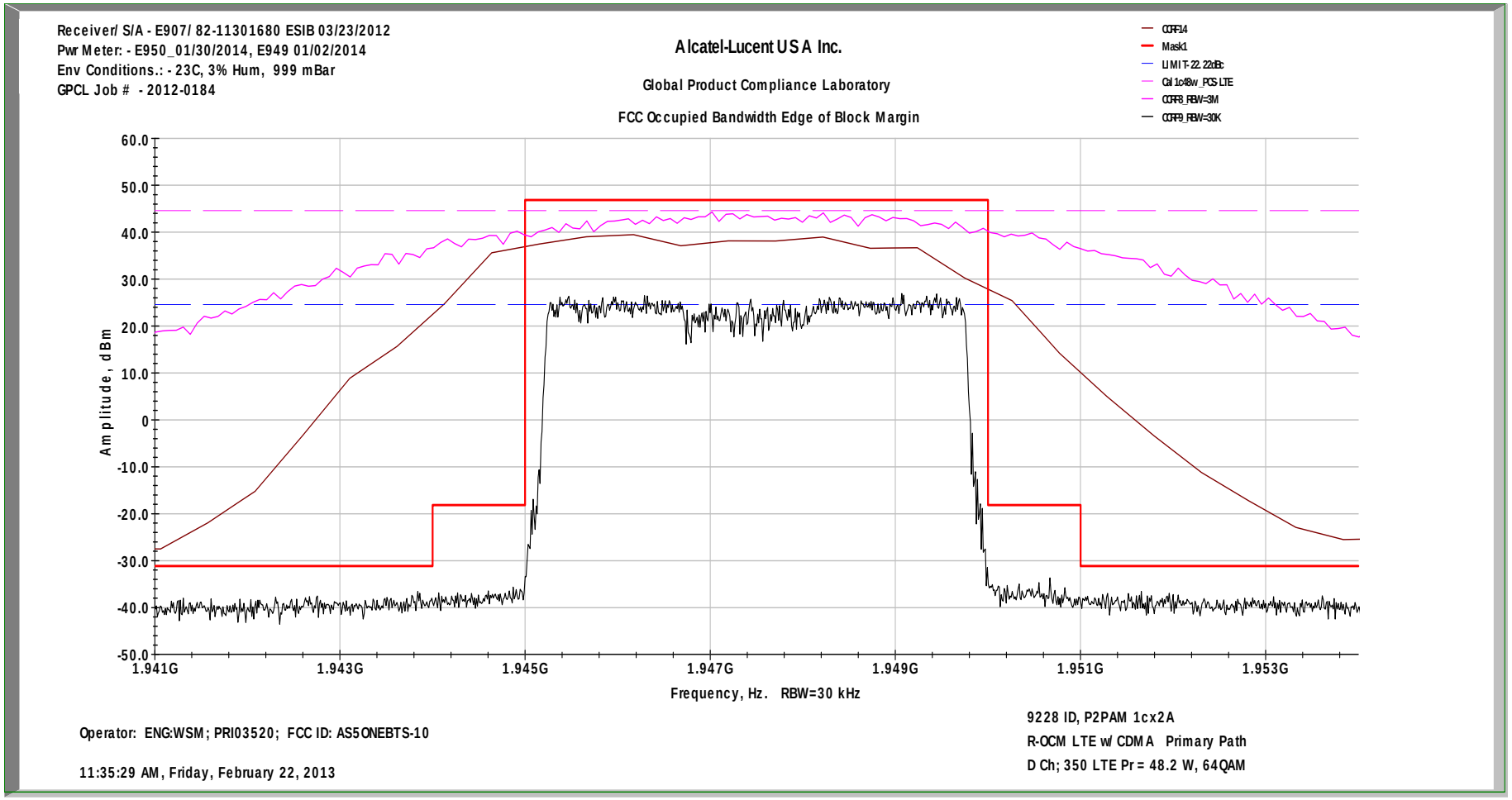
FCC Occupied Bandwidth Emissions LTE5 MHz Ch D-350 1cx2A 48W/c 64QAM Primary Tx1



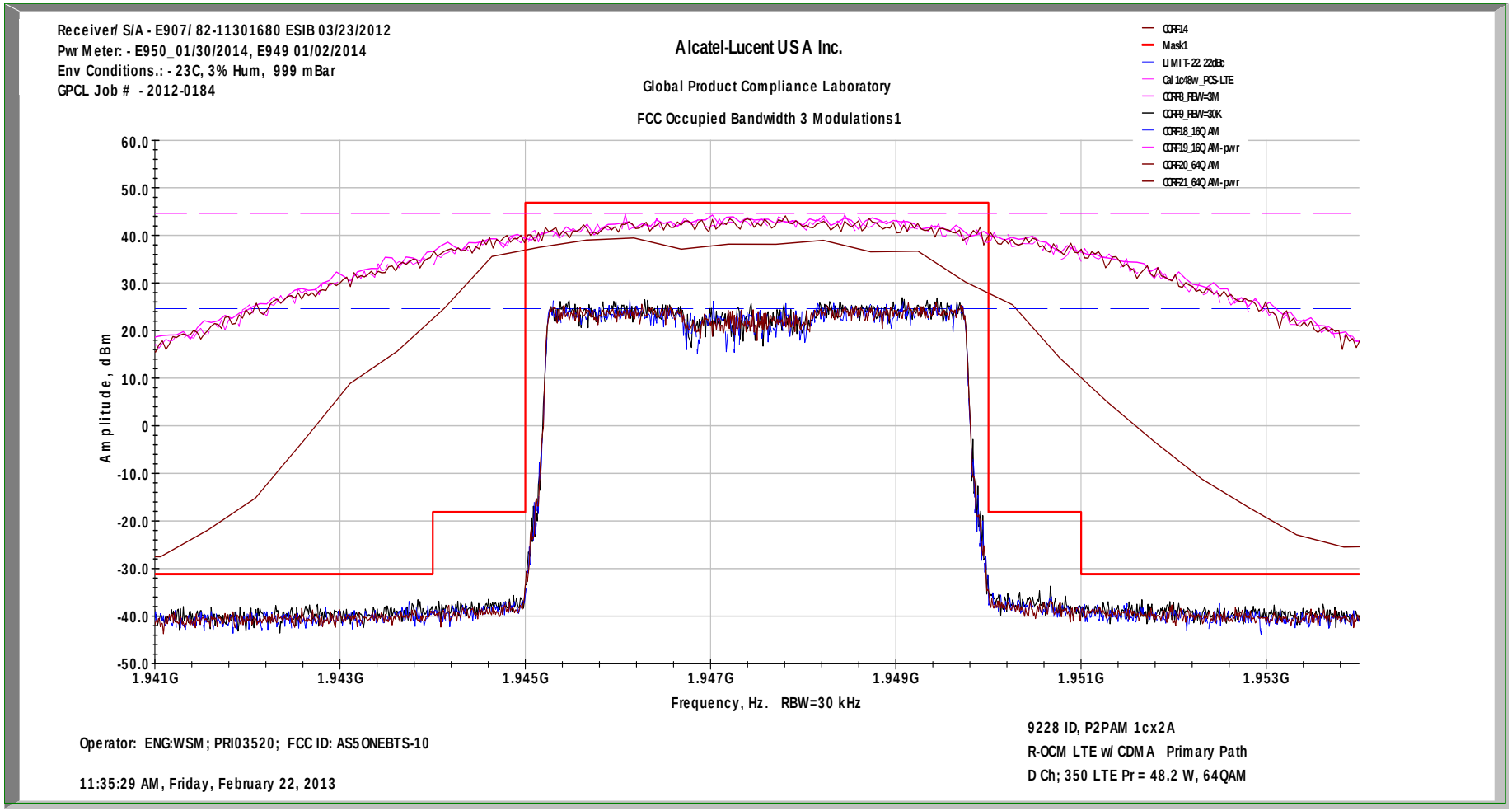
In-Band Intermodulation Graph LTE5 MHz Ch D-350 1cx2A 48W/c 64QAM Primary Tx1



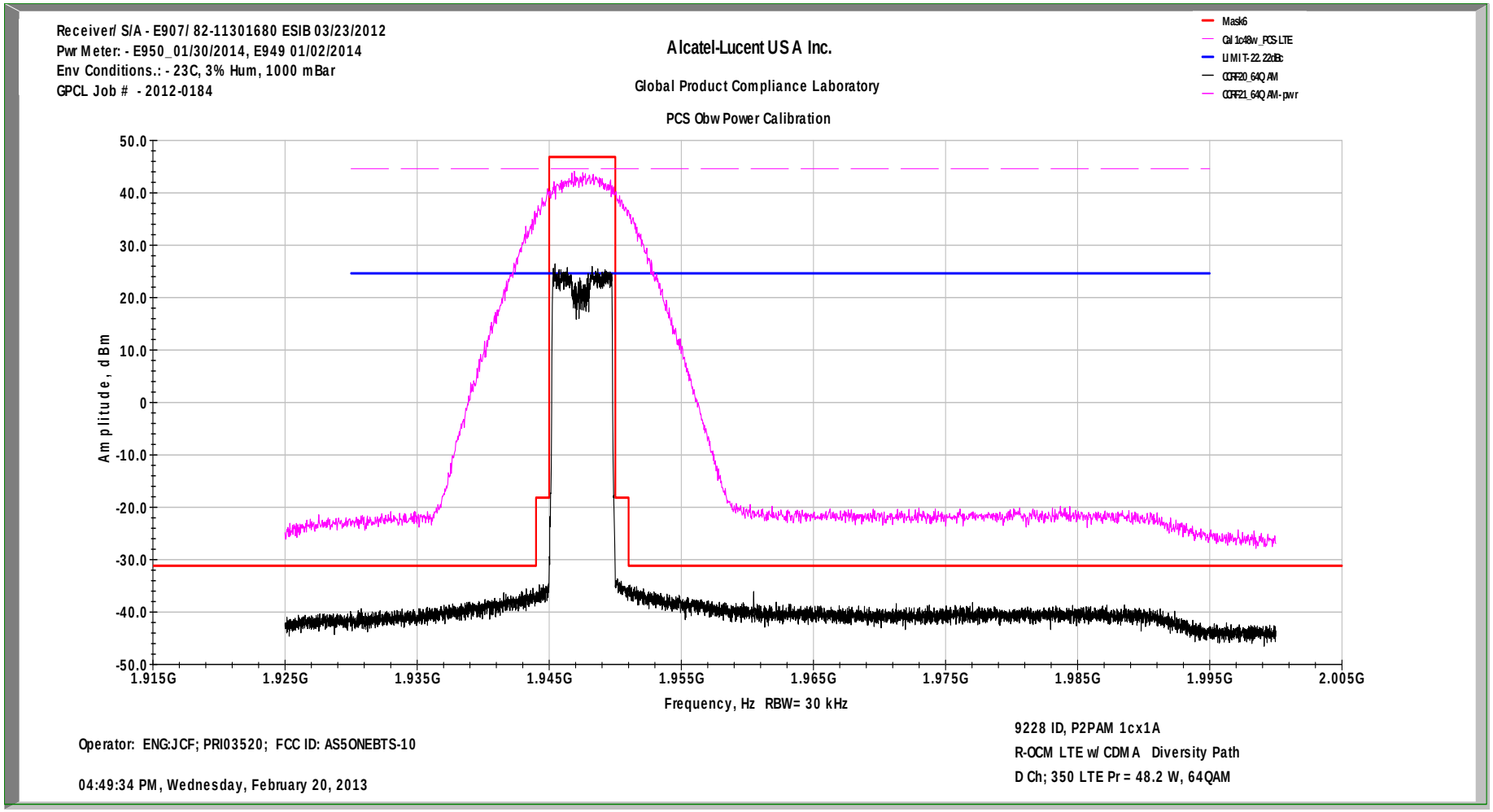
FCC Edge of Block Margin LTE5 MHz Ch D-350 1cx2A 48W/c 64QAM Primary Tx1



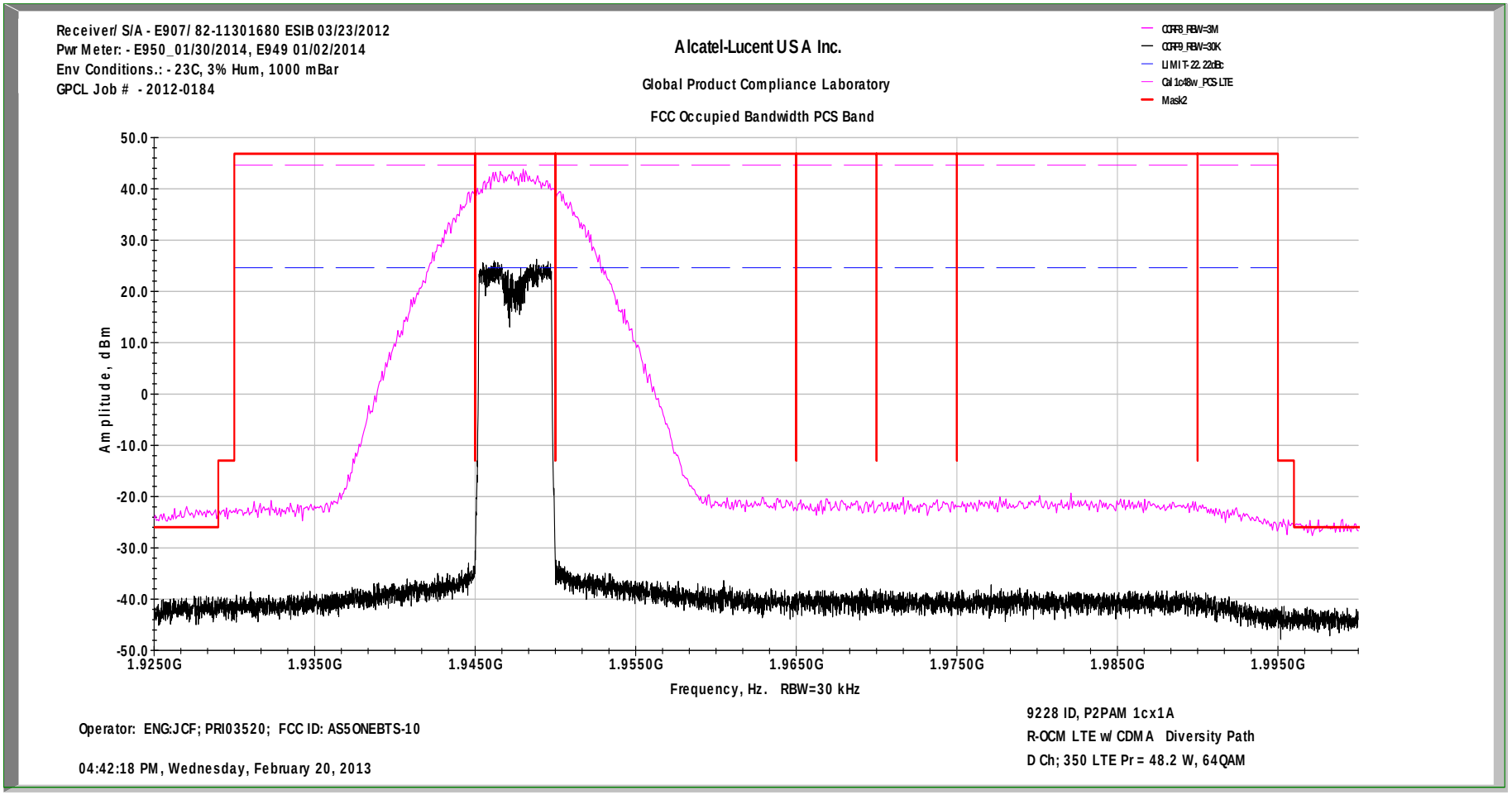
FCC Occupied Bandwidth with 3 Modulations LTE5 MHz Ch D-350 1cx2A 48W/c QPSK, 16QAM and 64QAM Primary Tx1



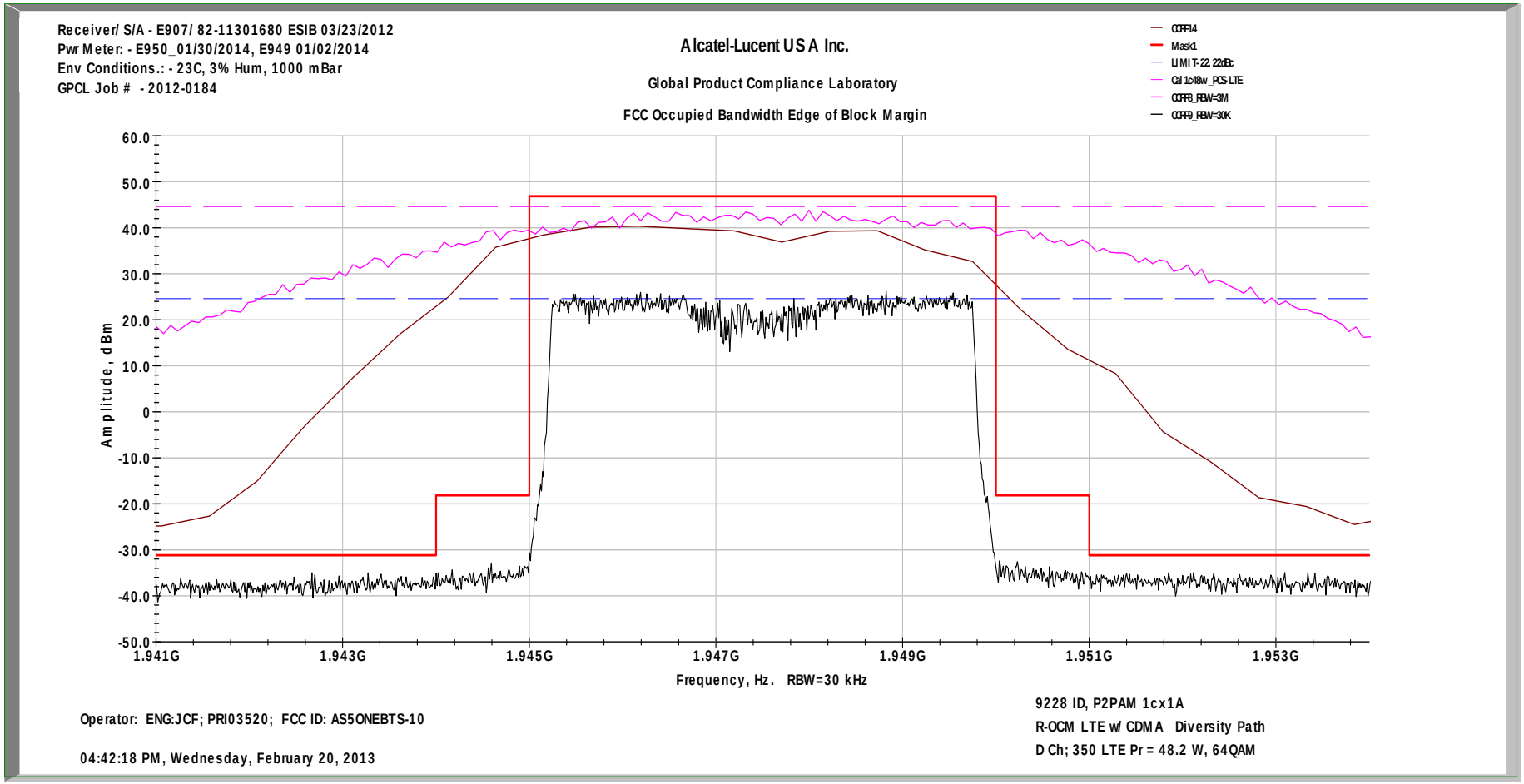
FCC Occupied Bandwidth Emissions LTE5 MHz Ch D-350 1cx1A 48W/c 64QAM Diversity Tx2



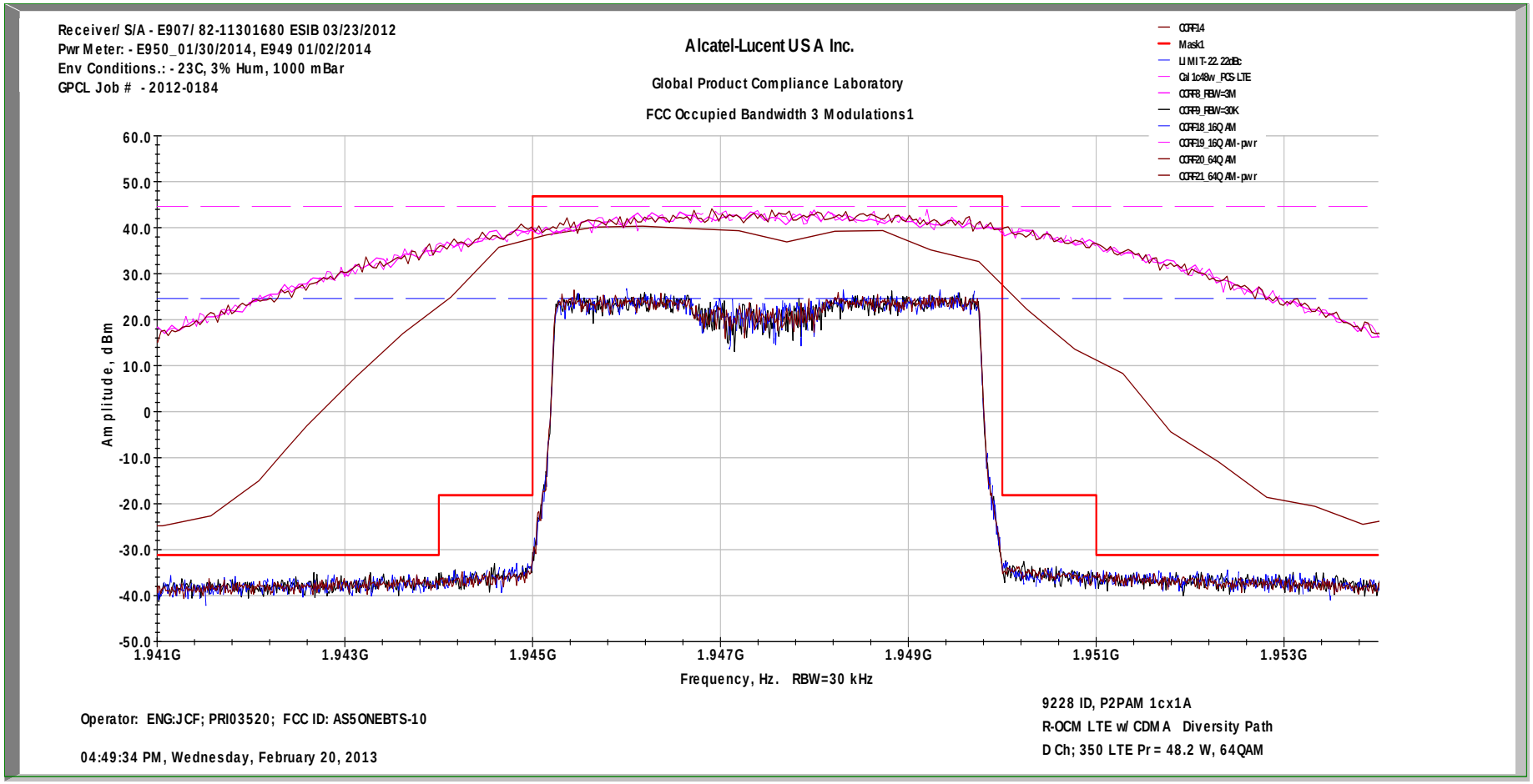
In-Band Intermodulation Graph LTE5 MHz Ch D-350 1cx1A 48W/c 64QAM Diversity Tx2



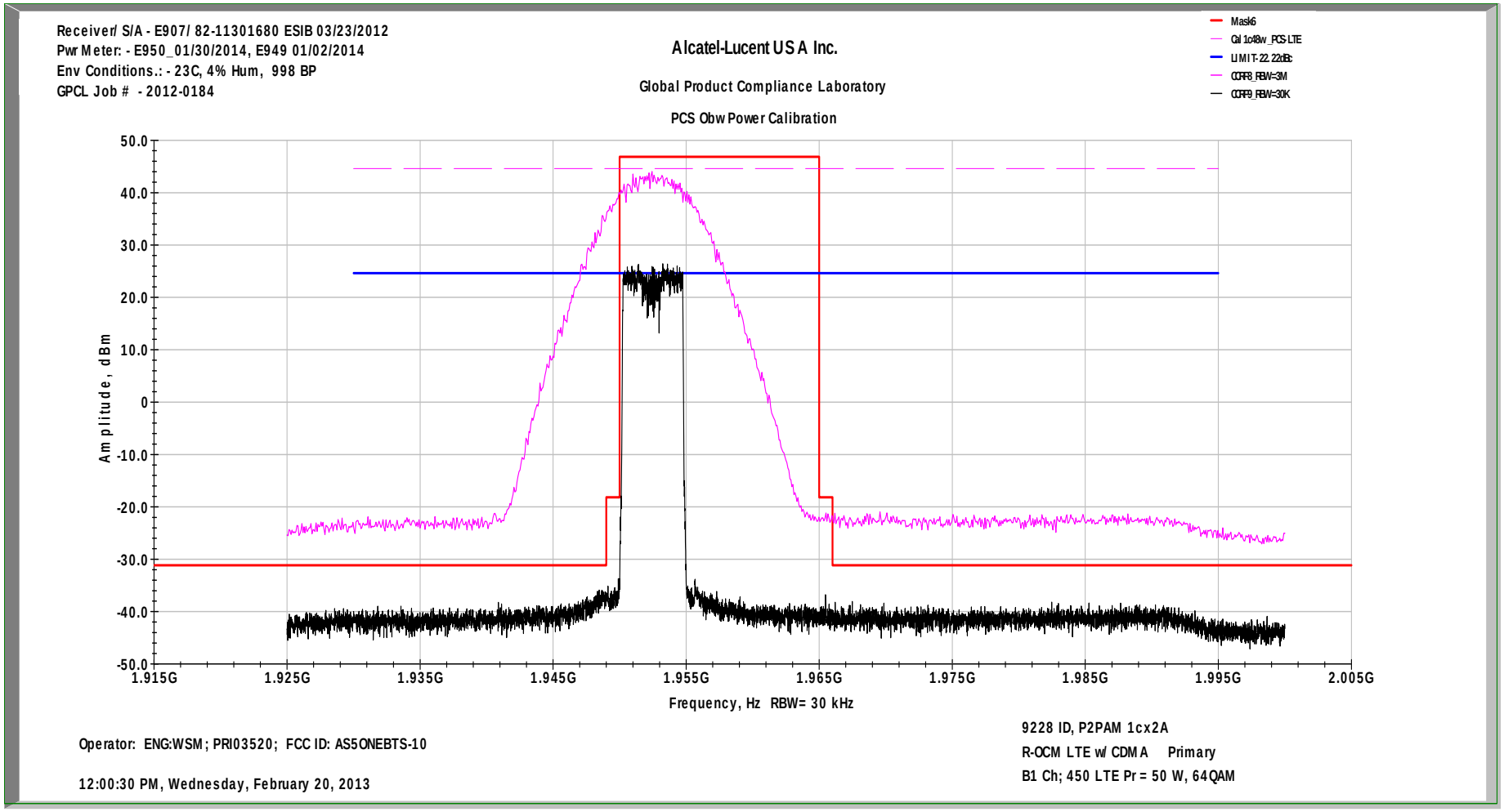
FCC Edge of Block Margin LTE5 MHz Ch D-350 1cx1A 48W/c 64QAM Diversity Tx2



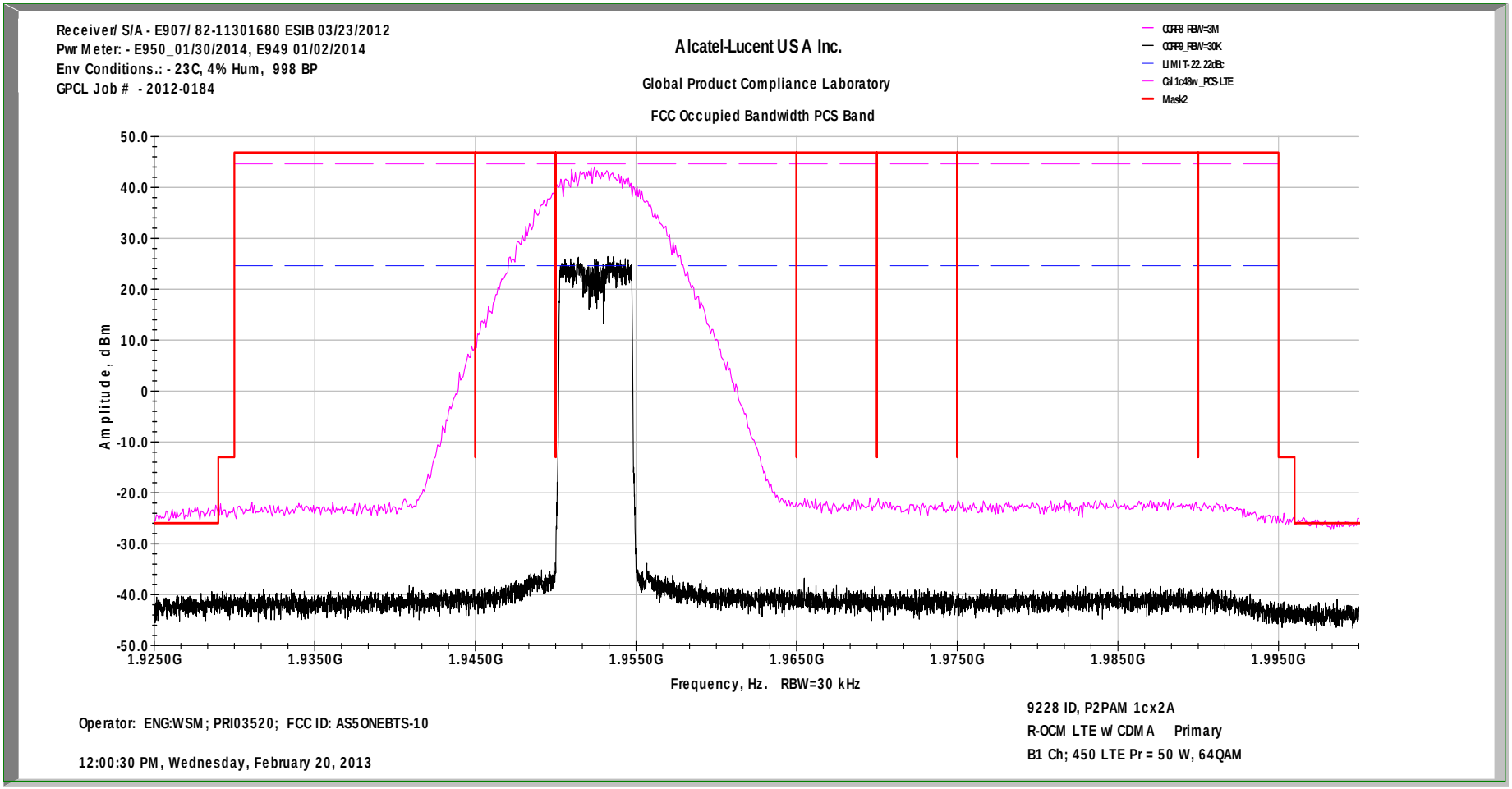
FCC Occupied Bandwidth with 3 Modulations LTE5 MHz Ch D-350 1cx1A 48W/c QPSK, 16QAM and 64QAM Diversity Tx2



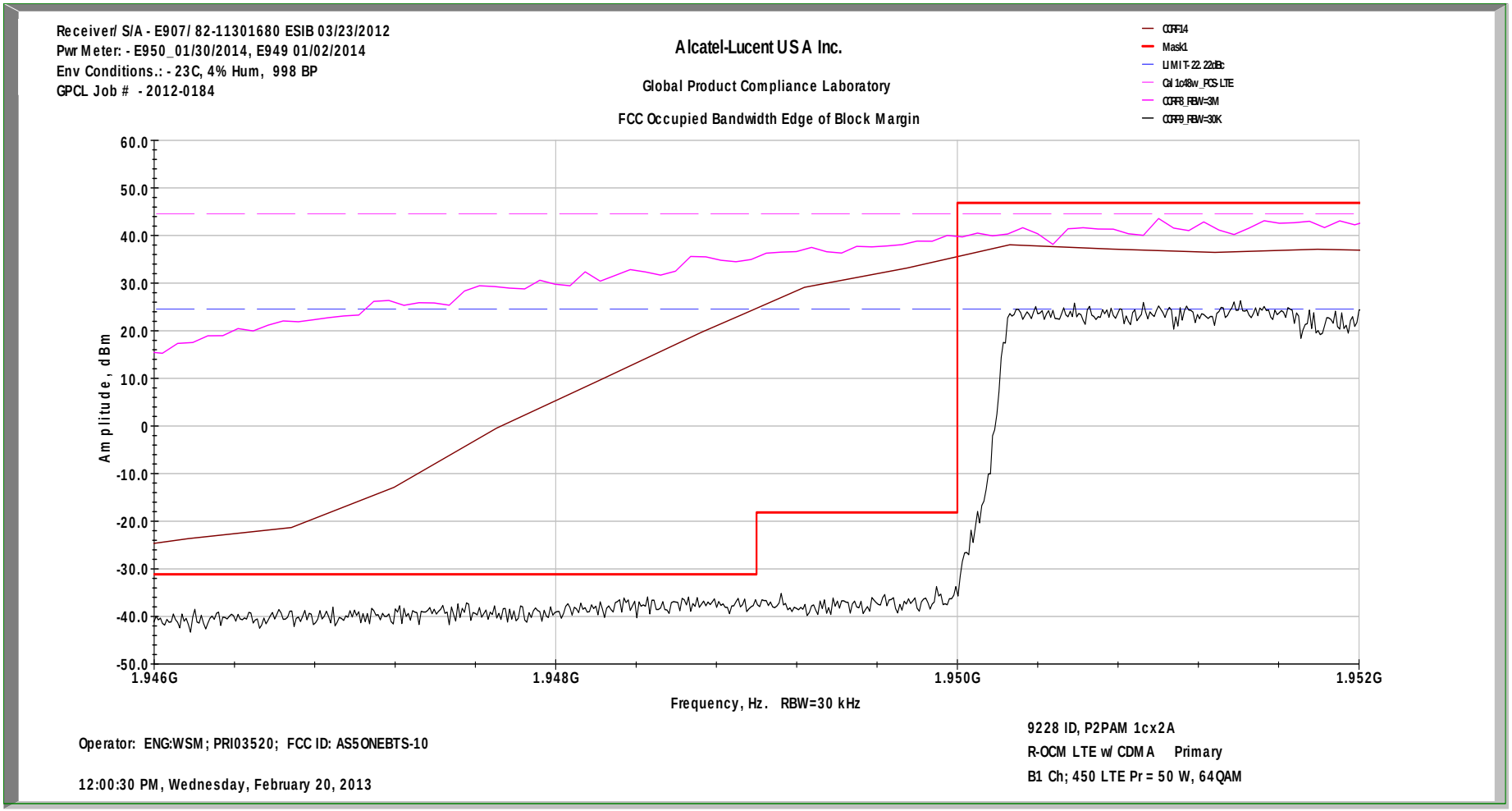
FCC Occupied Bandwidth Emissions LTE5 MHz Ch B-450 1cx2A 48W/c 64QAM Primary Tx1



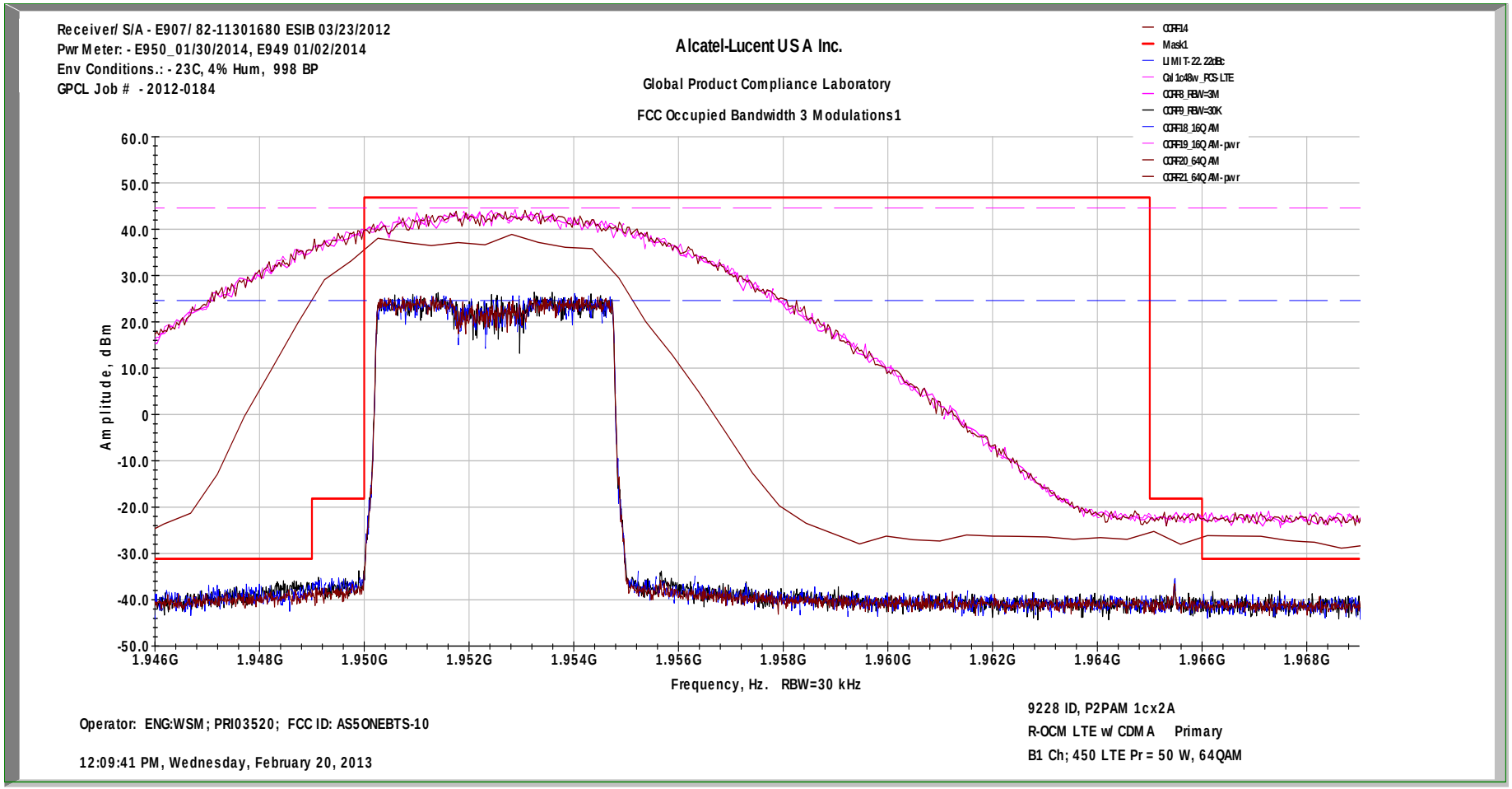
In-Band Intermodulation Graph LTE5 MHz Ch B-450 1cx2A 48W/c 64QAM Primary Tx1



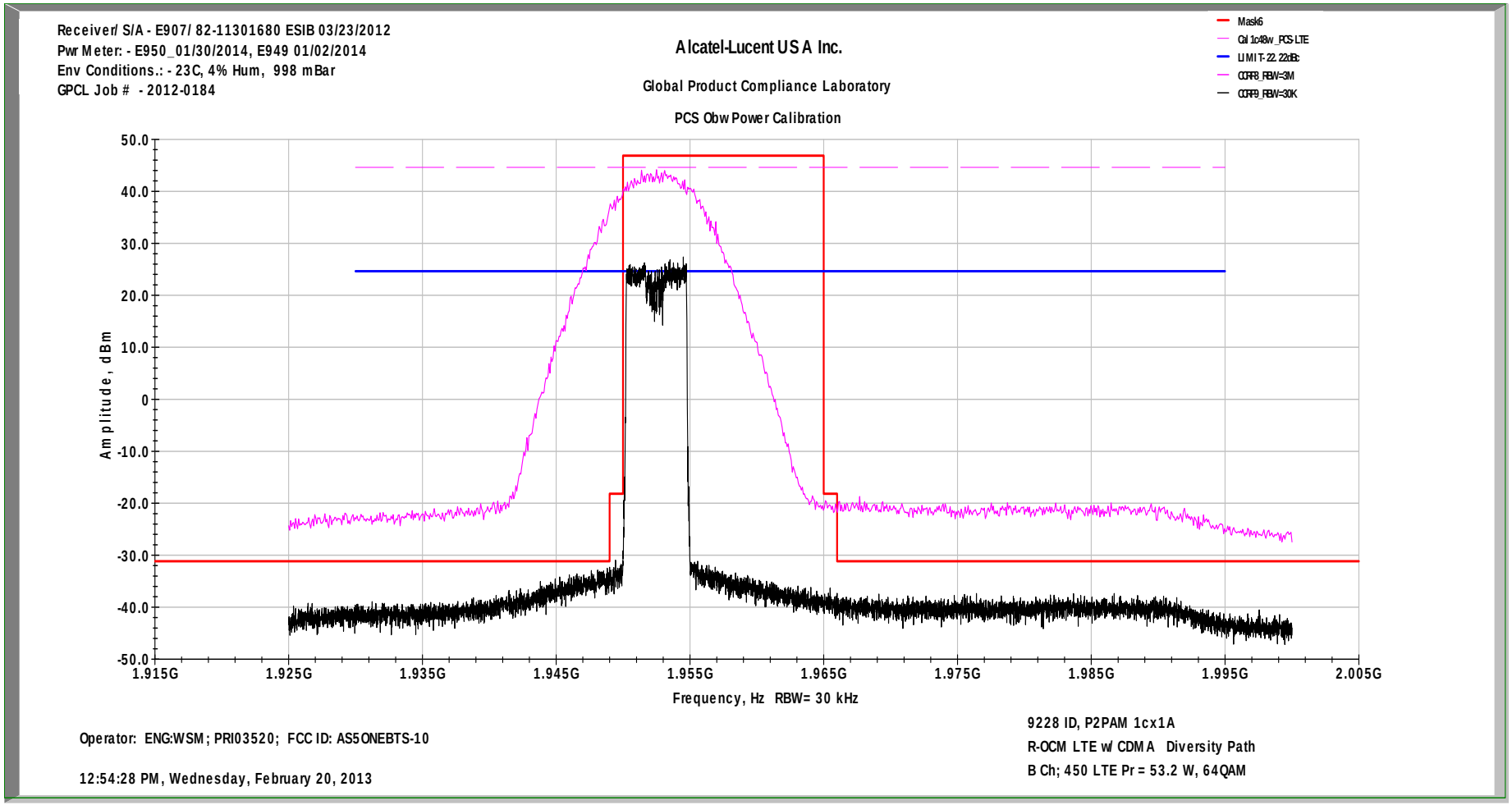
FCC Edge of Block Margin LTE5 MHz Ch B-450 1cx2A 48W/c 64QAM Primary Tx1



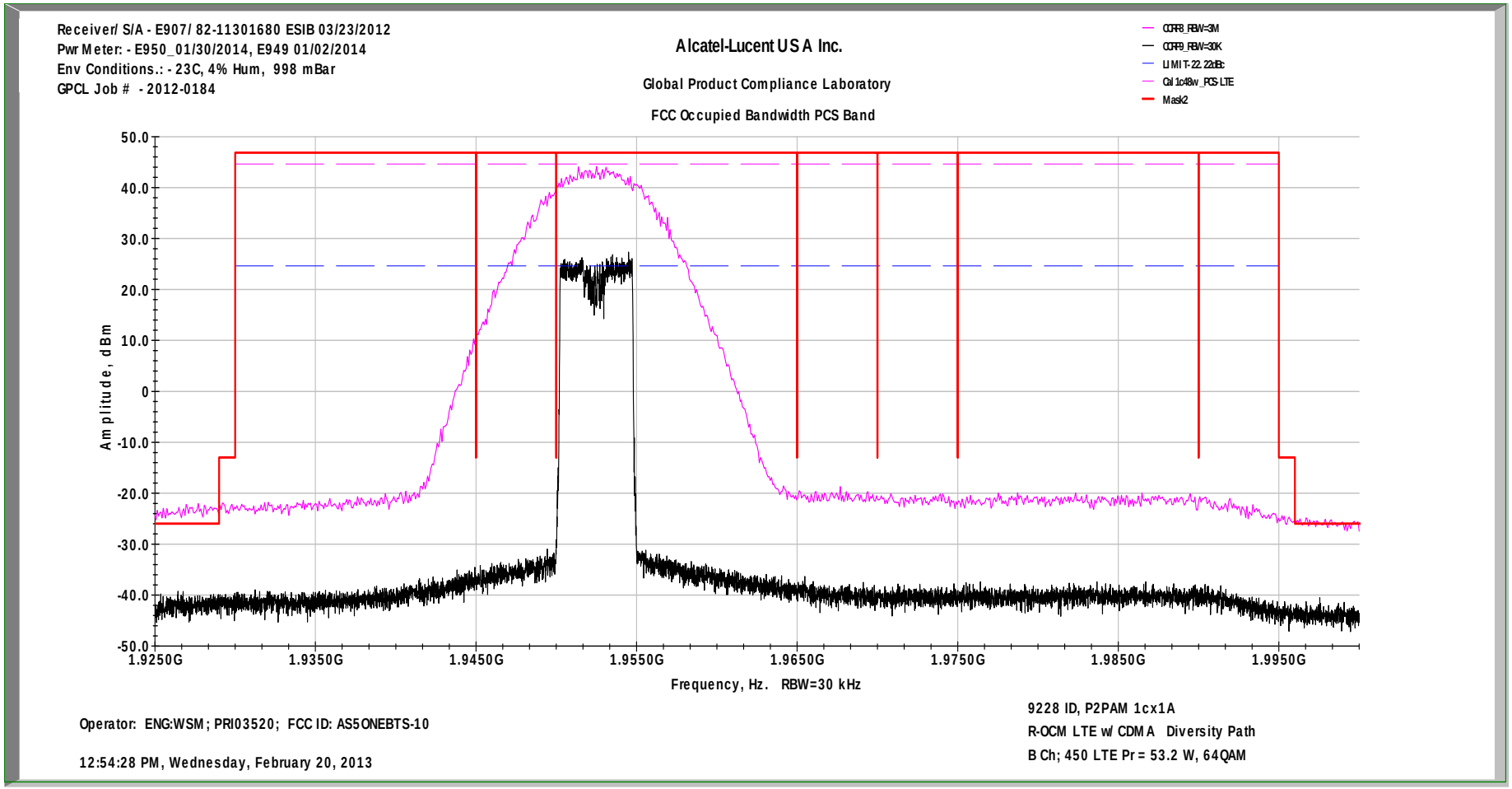
FCC Occupied Bandwidth with 3 Modulations LTE5 MHz Ch B-450 1cx2A 48W/c QPSK, 16QAM and 64QAM Primary Tx1



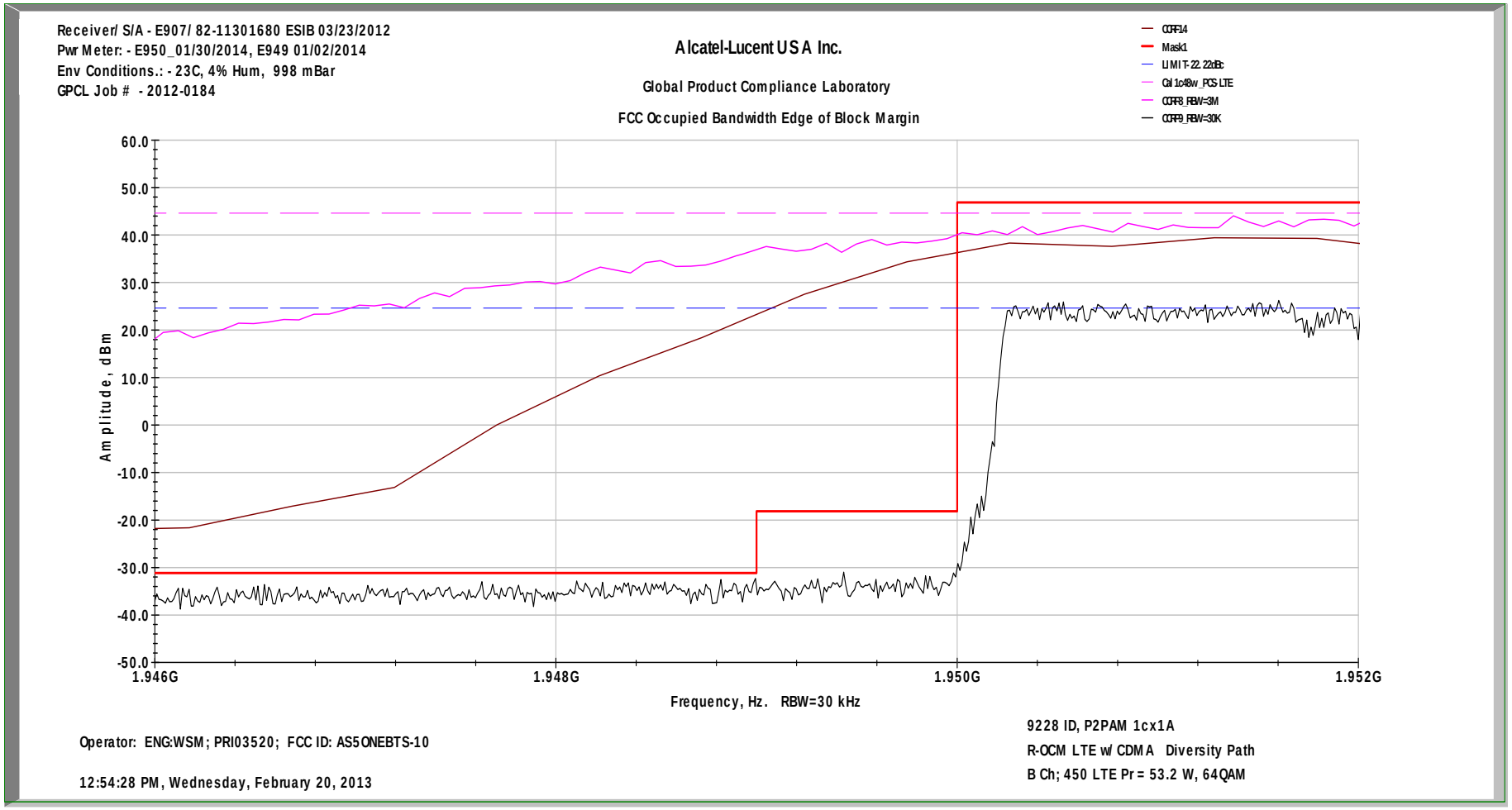
FCC Occupied Bandwidth Emissions LTE5 MHz Ch B-450 1cx1A 48W/c 64QAM Diversity Tx2



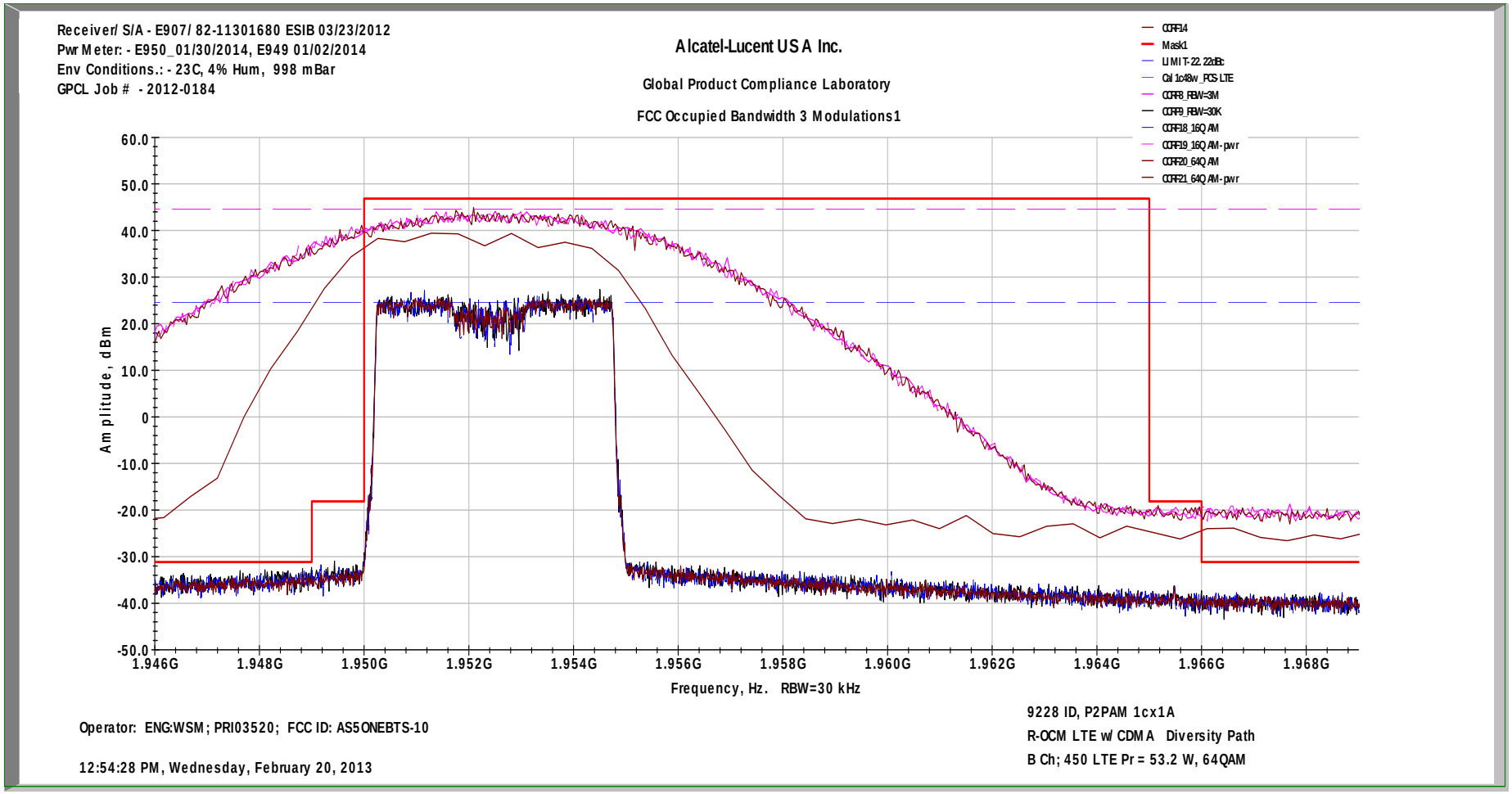
In-Band Intermodulation Graph LTE5 MHz Ch B-450 1cx1A 48W/c 64QAM Diversity Tx2



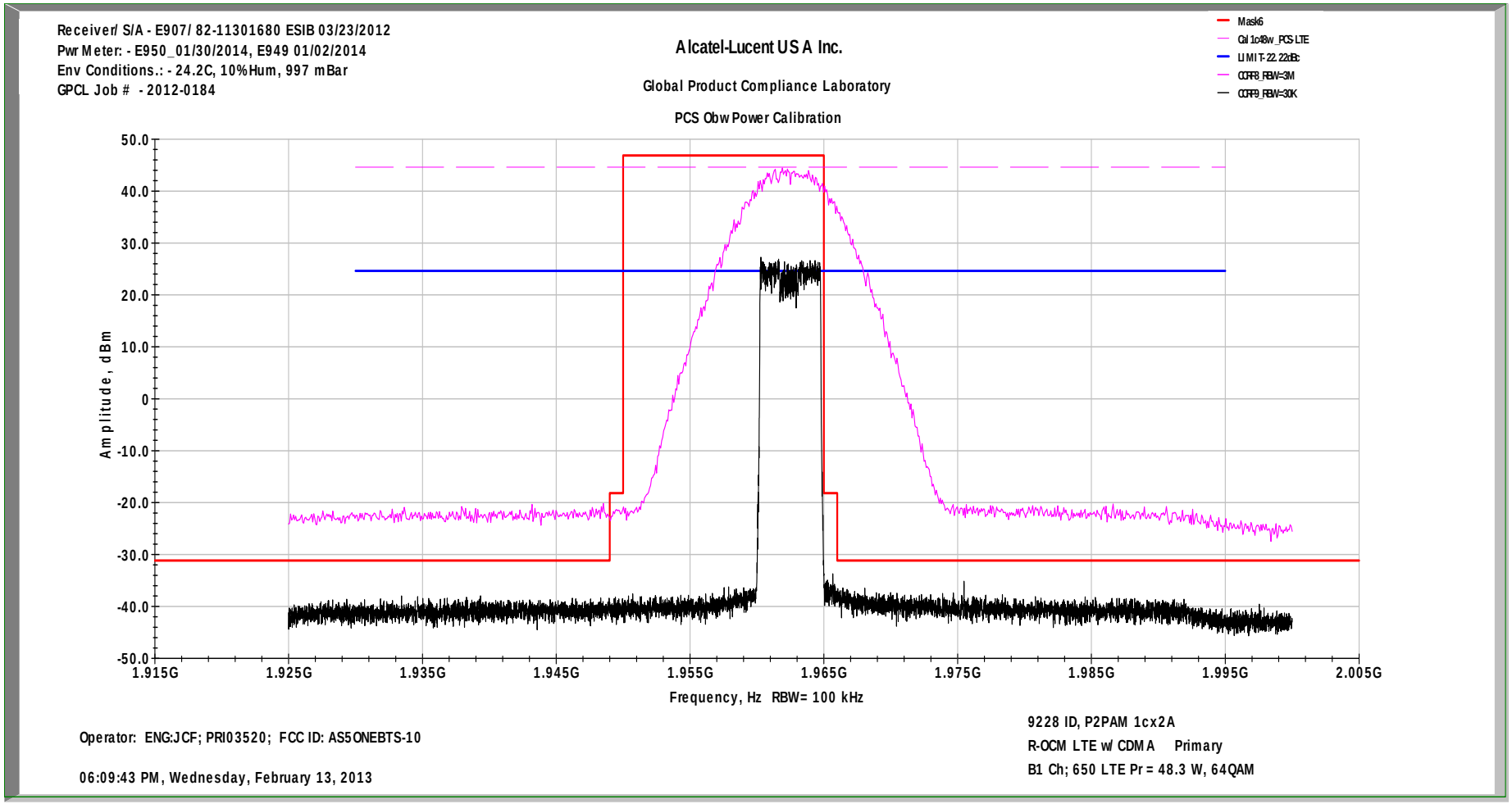
FCC Edge of Block Margin LTE5 MHz Ch B-450 1cx1A 48W/c 64QAM Diversity Tx2



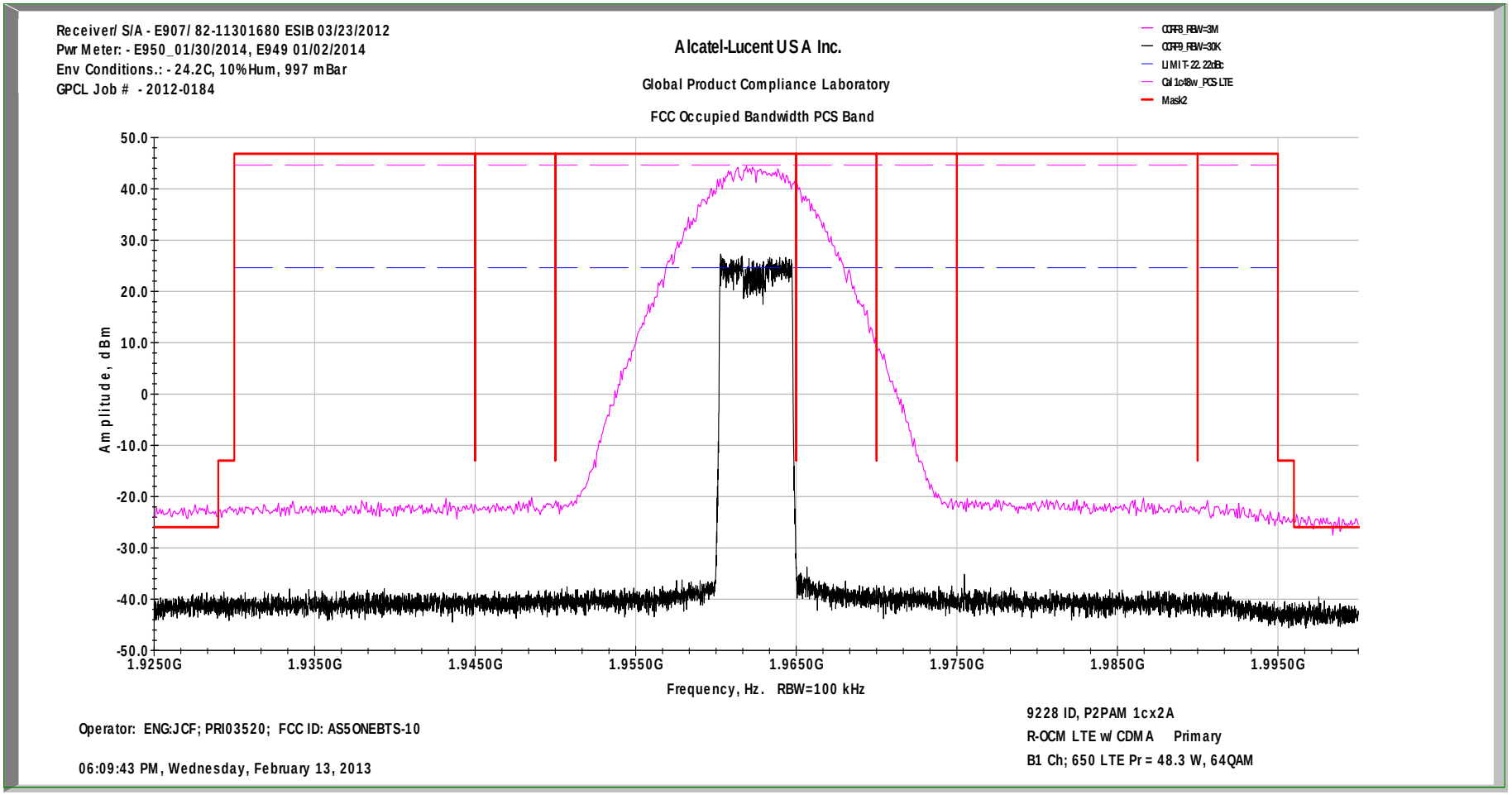
FCC Occupied Bandwidth with 3 Modulations LTE5 MHz Ch B-450 1cx1A 48W/c QPSK, 16QAM and 64QAM Diversity Tx2



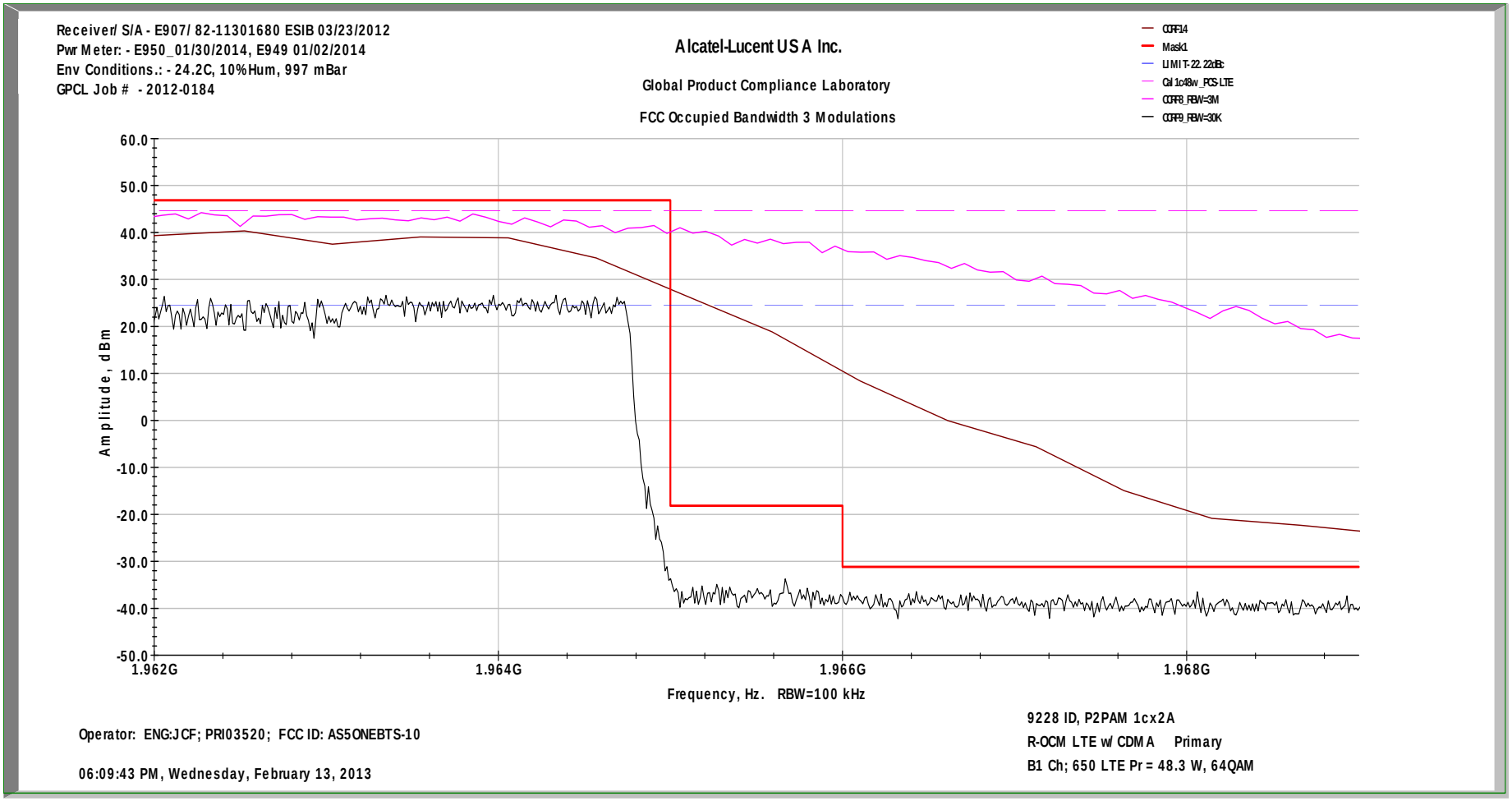
FCC Occupied Bandwidth Emissions LTE5 MHz Ch B-650 1cx2A 48W/c 64QAM Primary Tx1



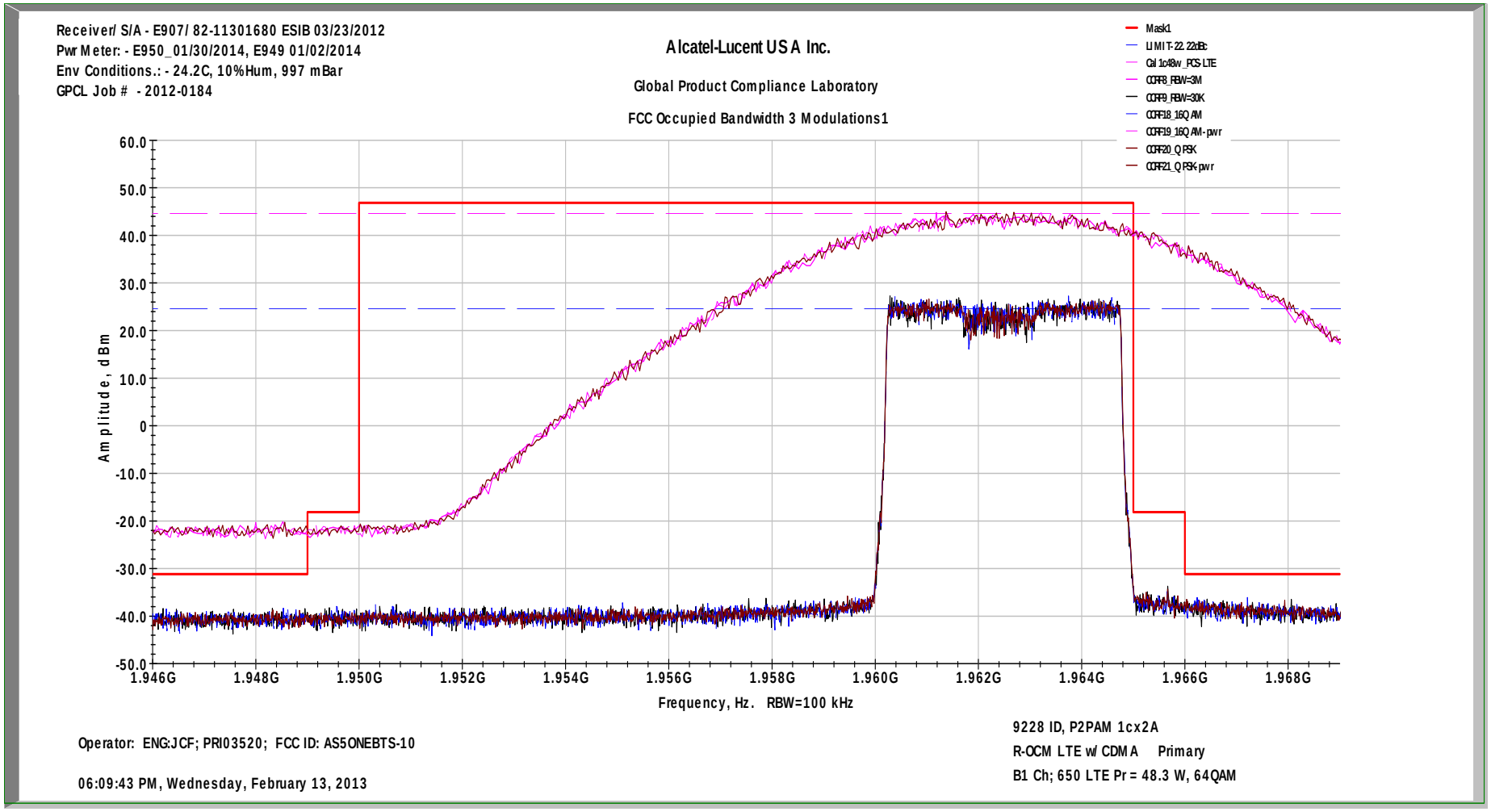
In-Band Intermodulation Graph LTE5 MHz Ch B-650 1cx2A 48W/c 64QAM Primary Tx1



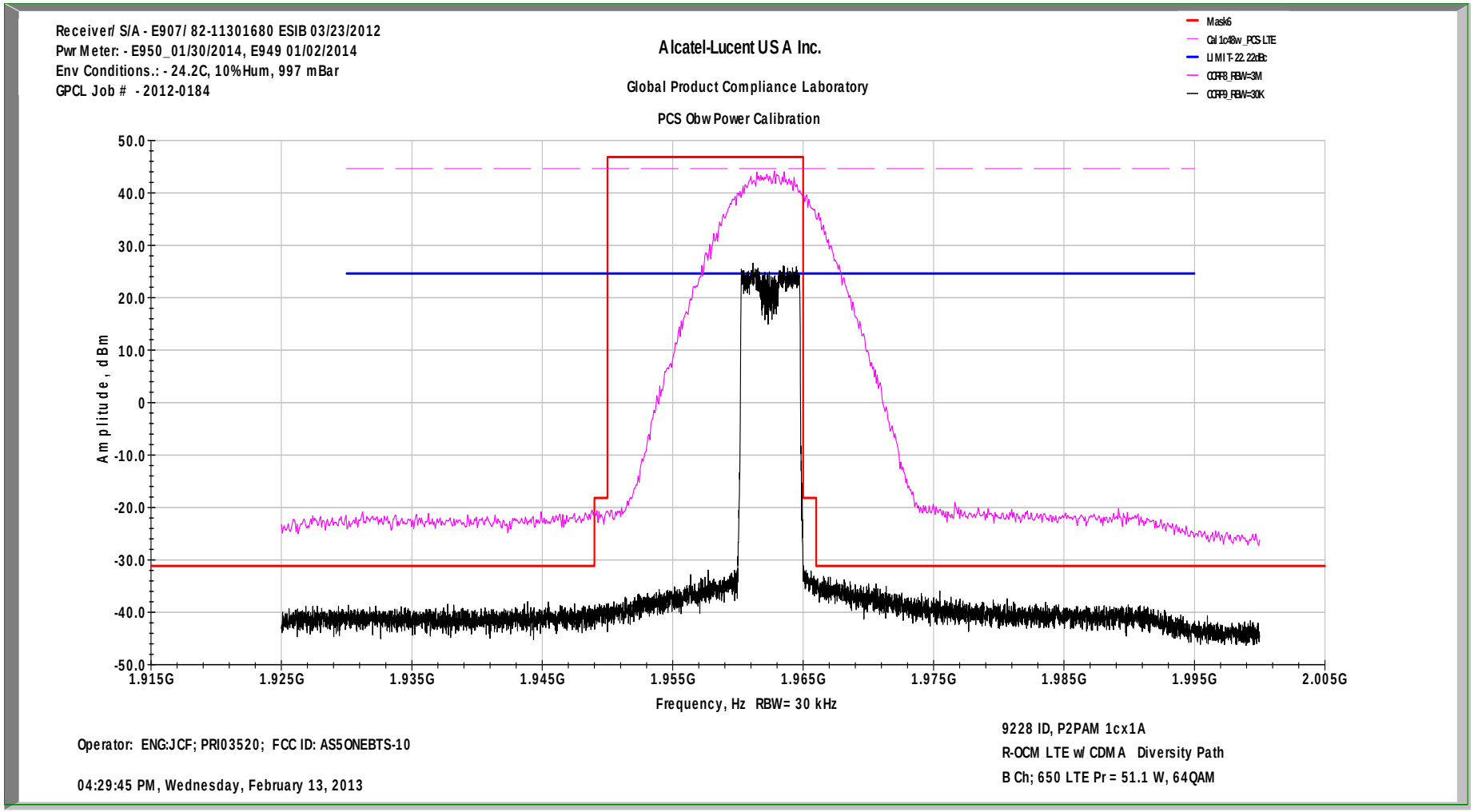
FCC Edge of Block Margin LTE5 MHz Ch B-650 1cx2A 48W/c 64QAM Primary Tx1



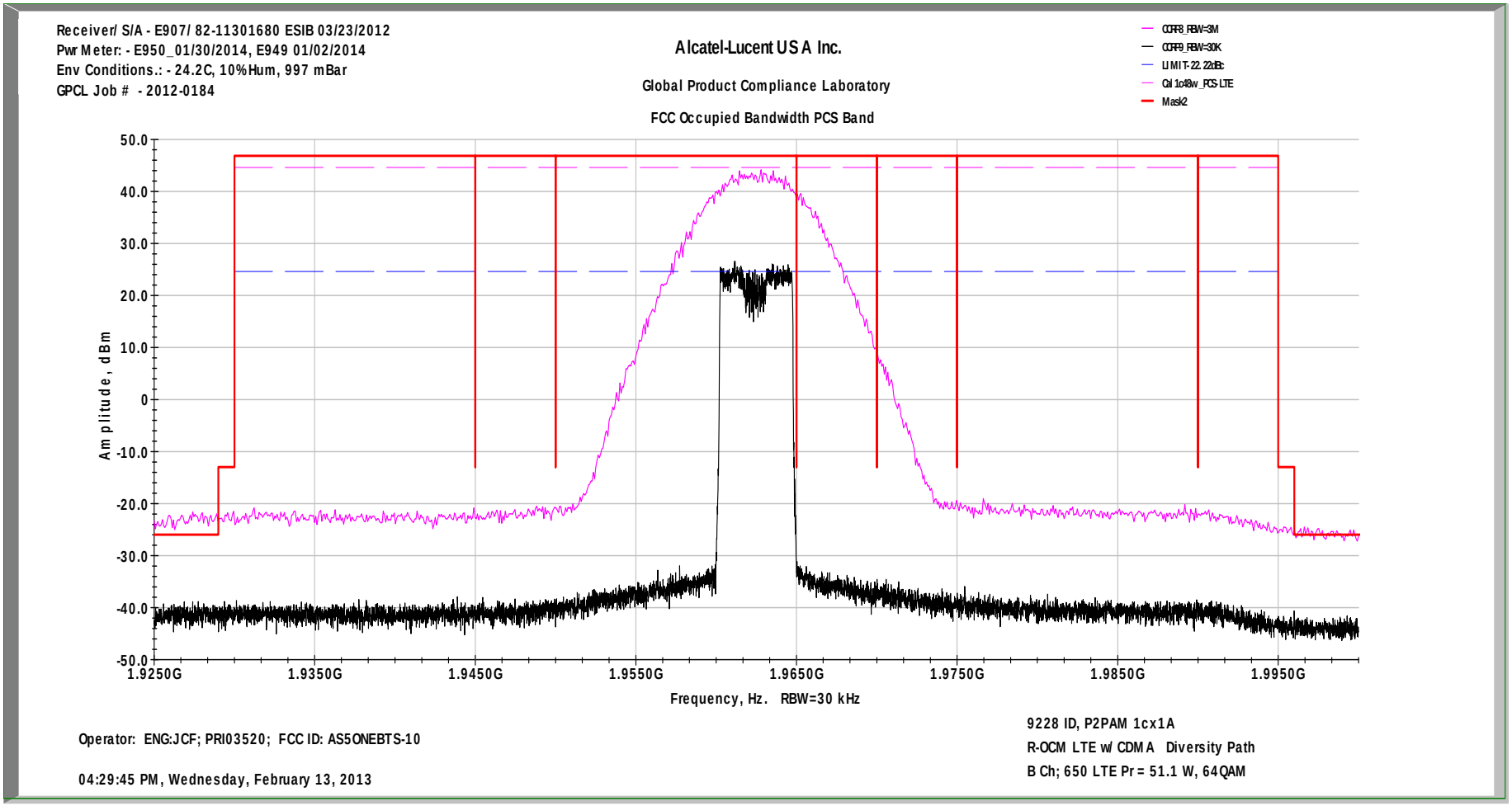
FCC Occupied Bandwidth with 3 Modulations LTE5 MHz Ch B-650 1cx2A 48W/c QPSK, 16QAM and 64QAM Primary Tx1



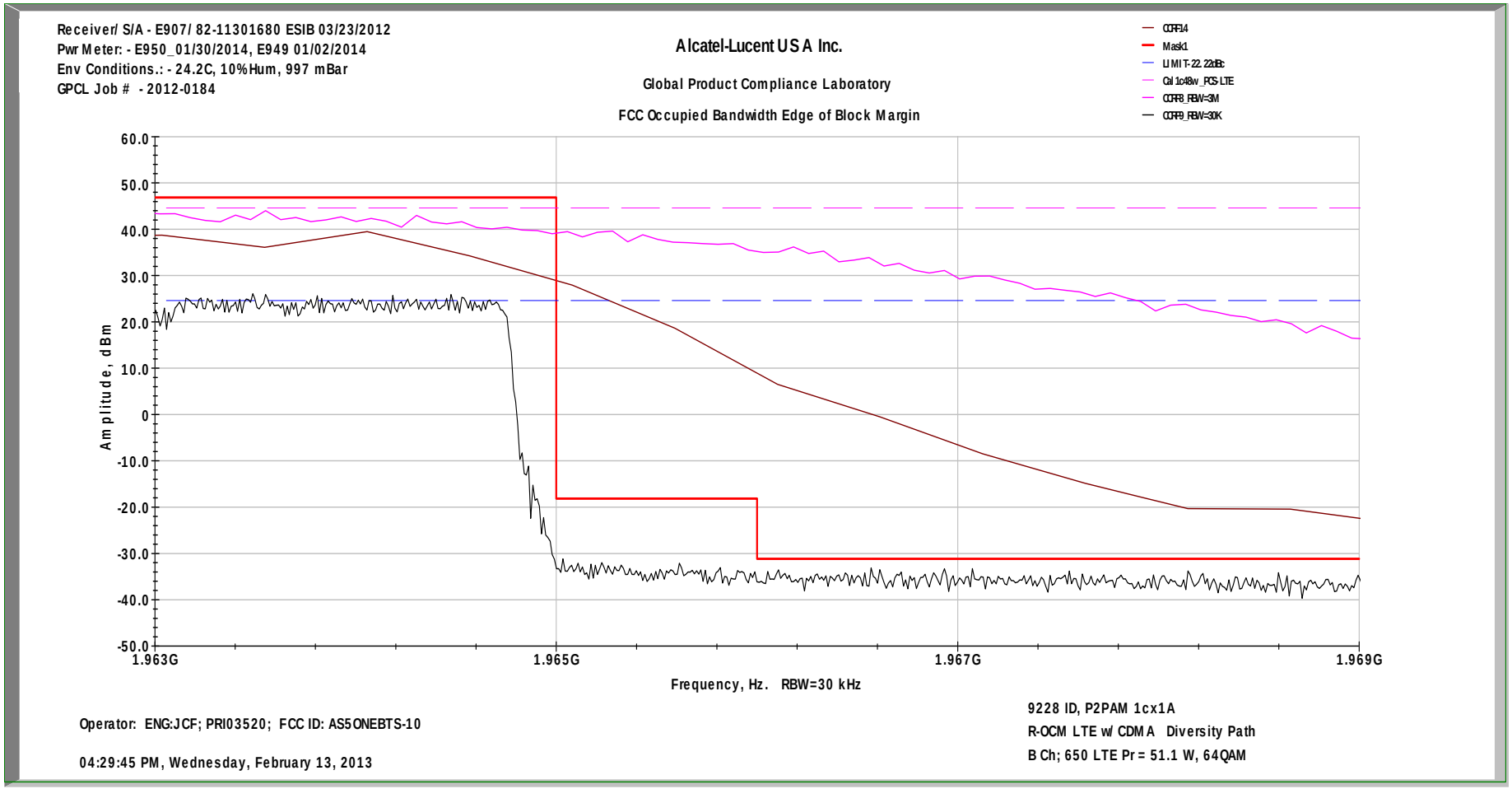
FCC Occupied Bandwidth Emissions LTE5 MHz Ch B-650 1cx1A 48W/c 64QAM Diversity Tx2



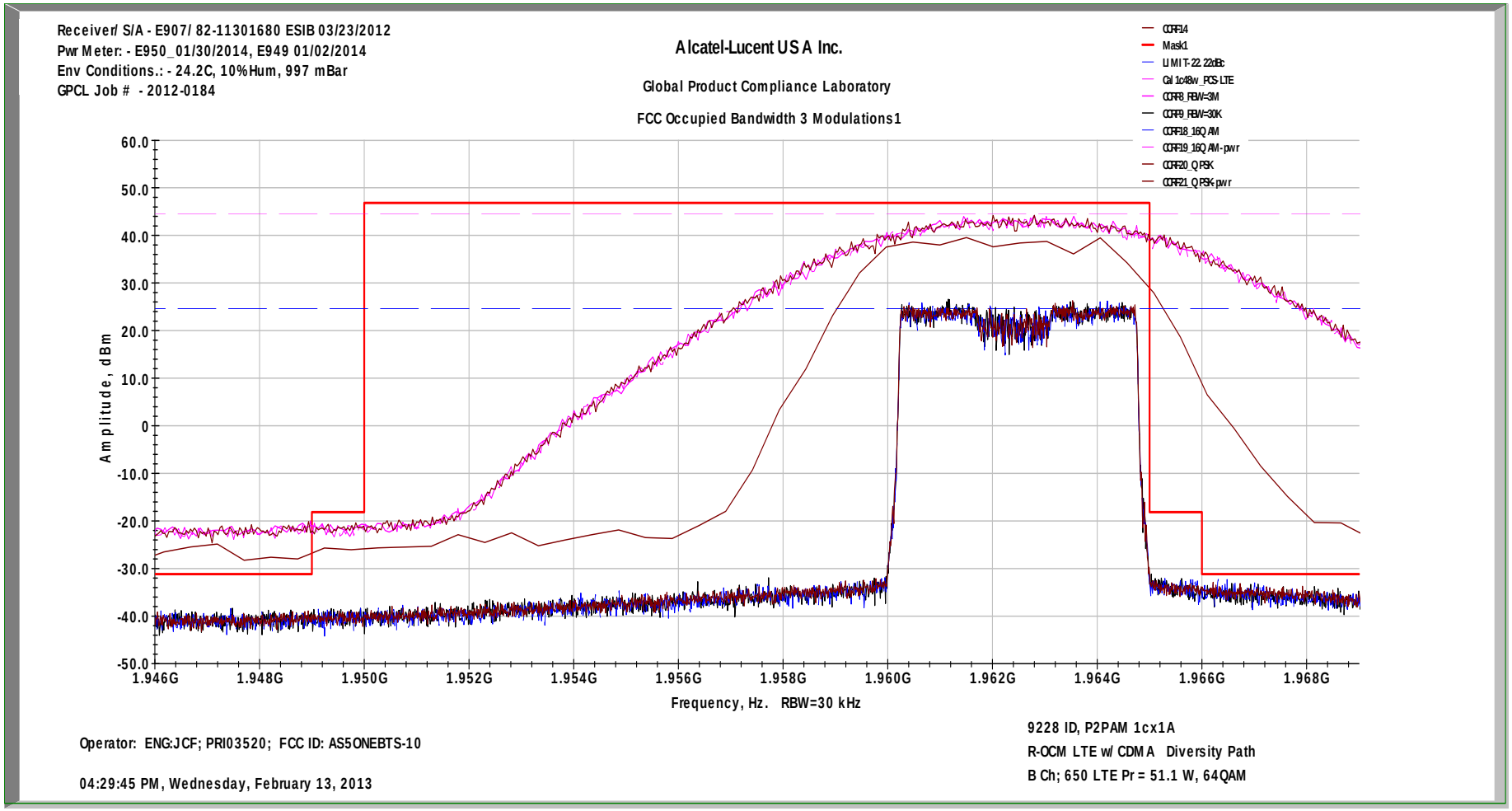
In-Band Intermodulation Graph LTE5 MHz Ch B-650 1cx1A 48W/c 64QAM Diversity Tx2



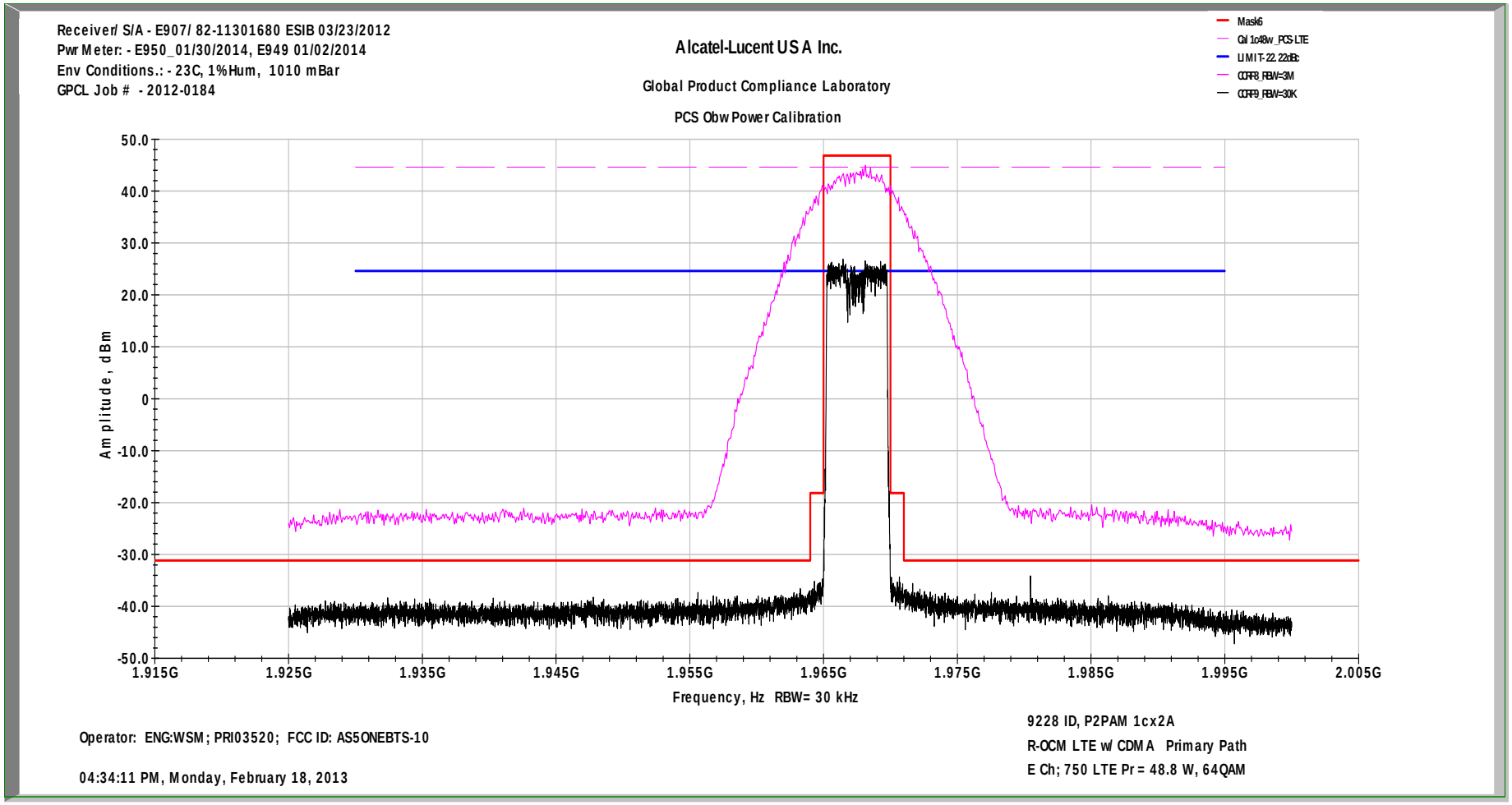
FCC Edge of Block Margin LTE5 MHz Ch B-650 1cx1A 48W/c 64QAM Diversity Tx2



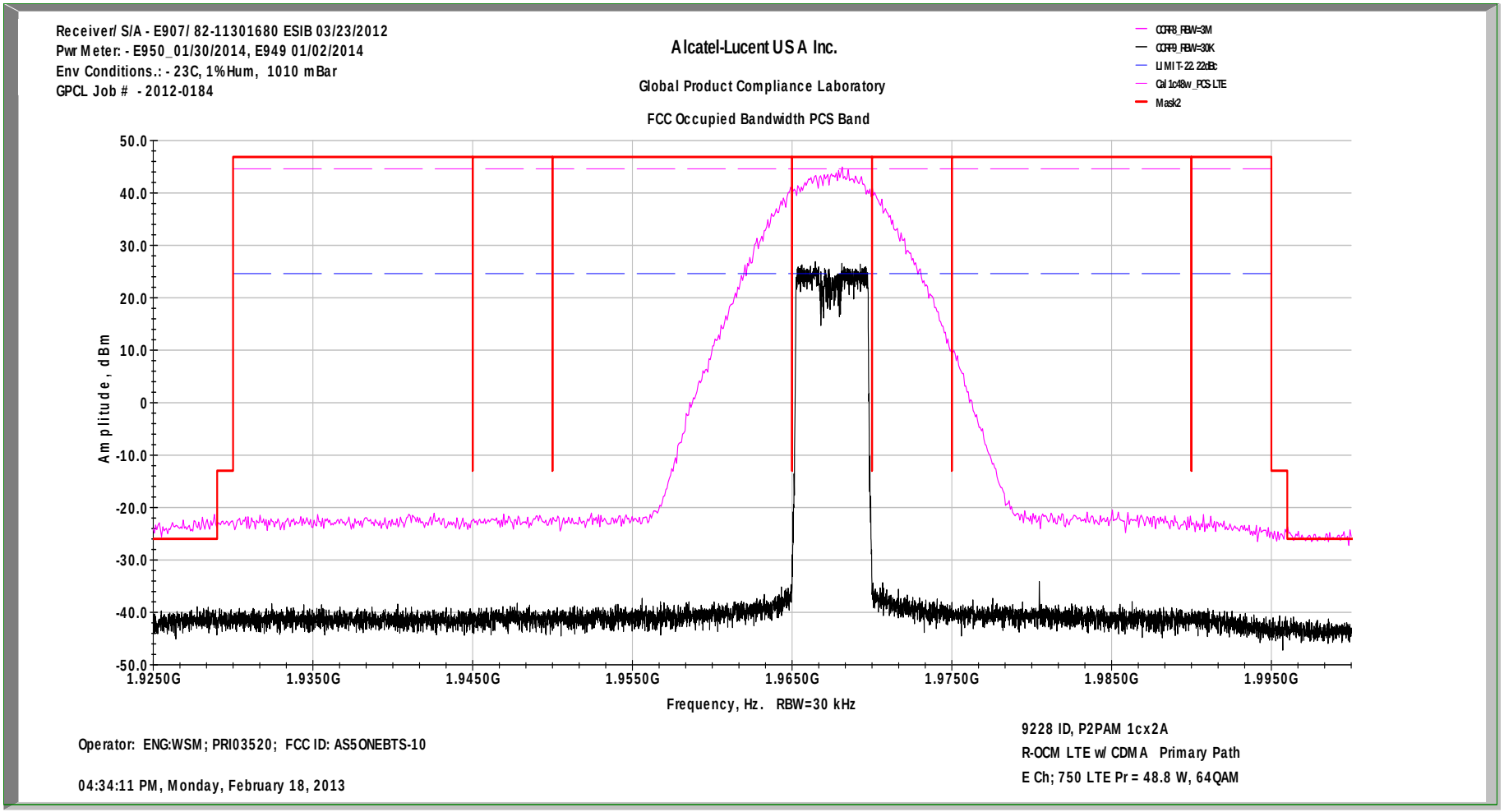
FCC Occupied Bandwidth with 3 Modulations LTE5 MHz Ch B-650 1cx1A 48W/c QPSK, 16QAM and 64QAM Diversity Tx2



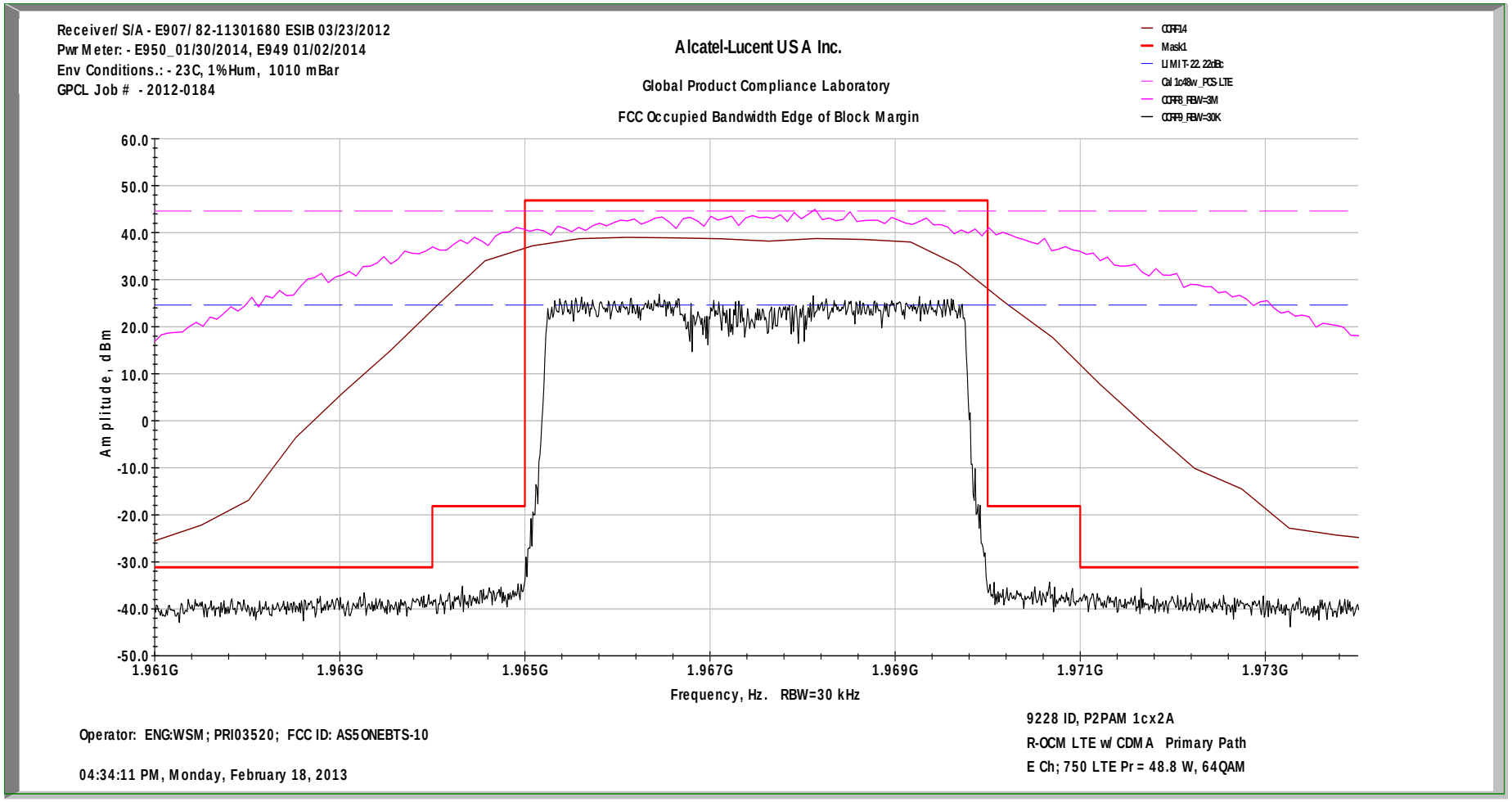
FCC Occupied Bandwidth Emissions LTE5 MHz Ch E-750 1cx2A 48W/c 64QAM Primary Tx1



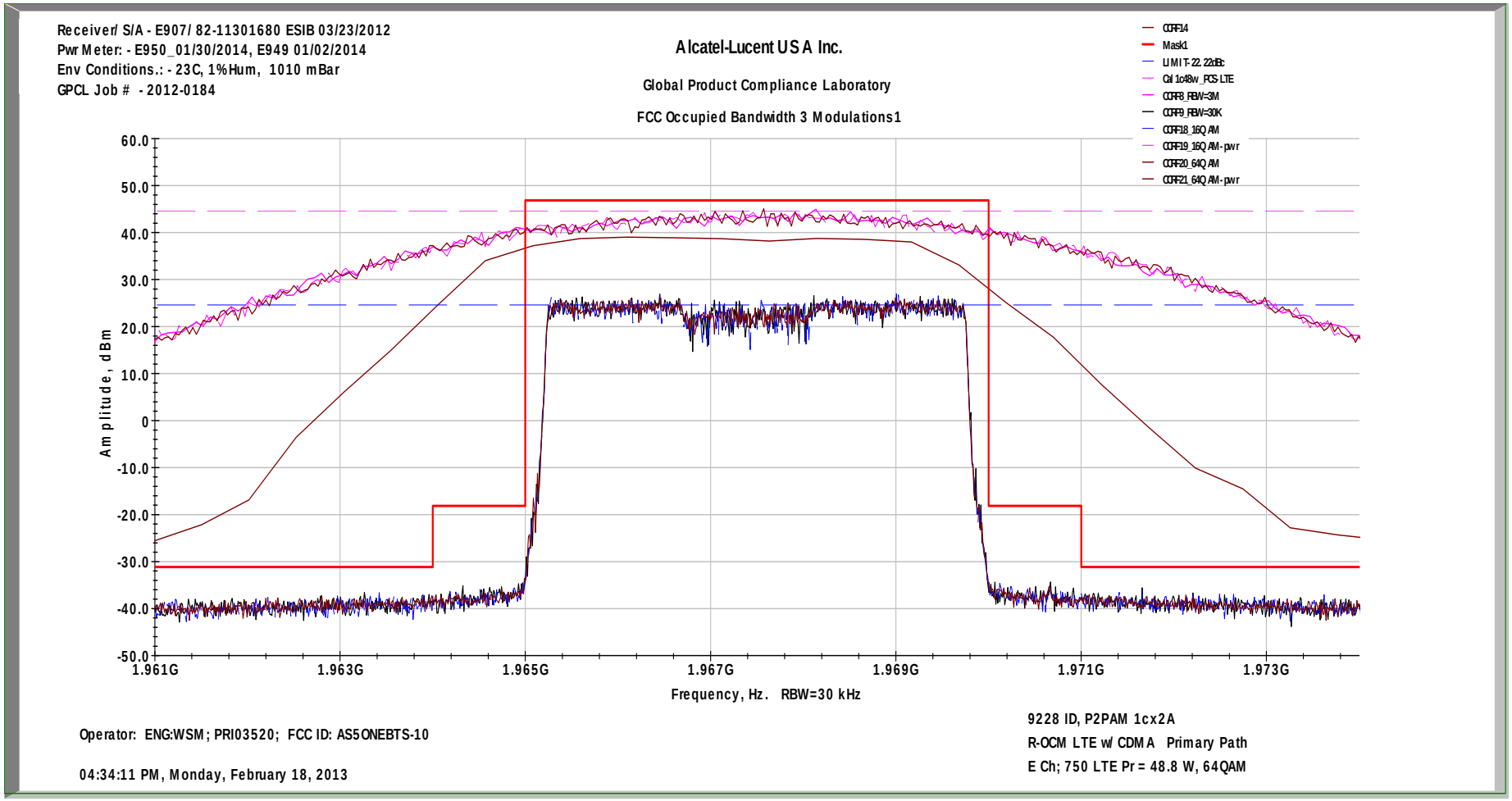
In-Band Intermodulation Graph LTE5 MHz Ch E-750 1cx2A 48W/c 64QAM Primary Tx1



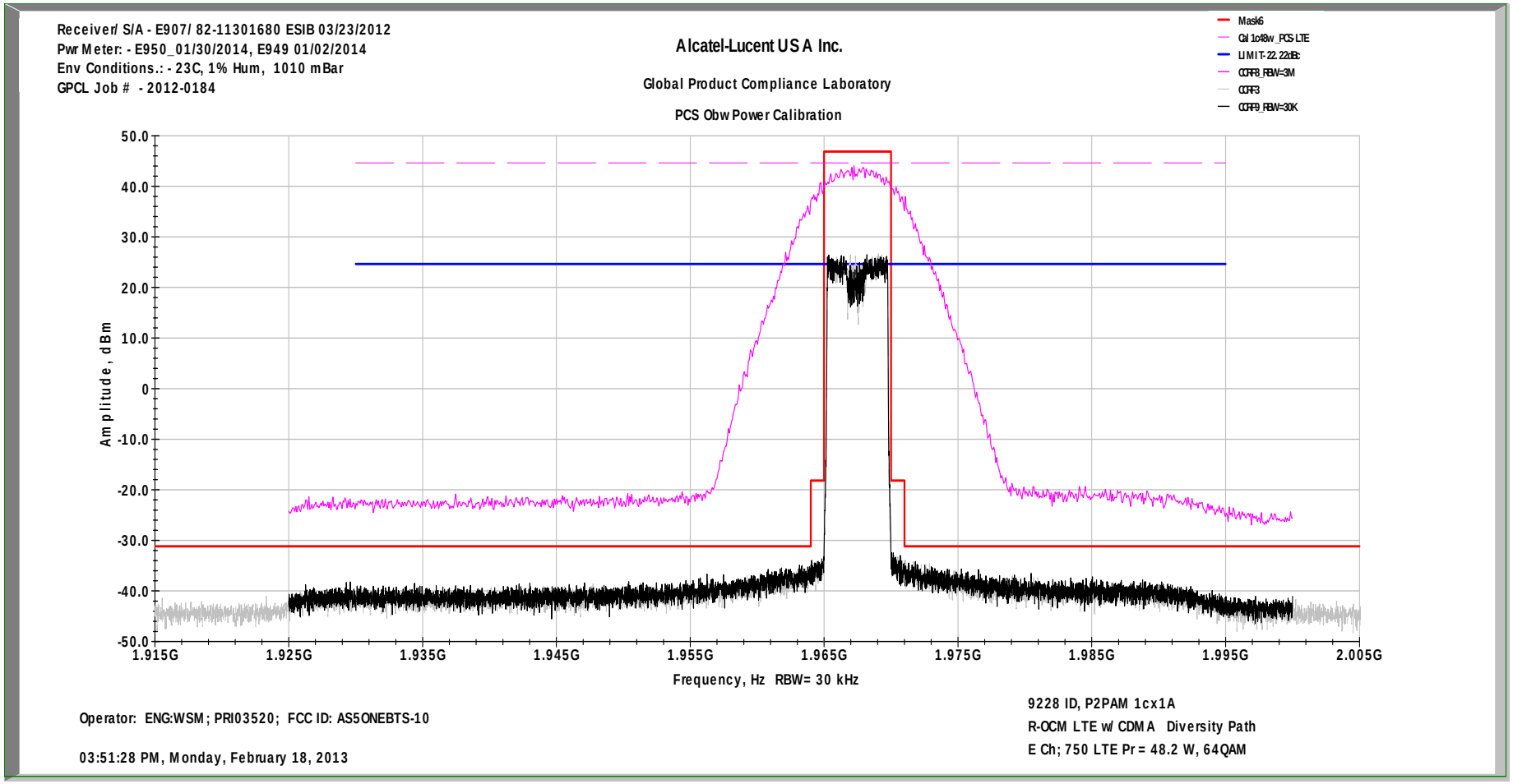
FCC Edge of Block Margin LTE5 MHz Ch E-750 1cx2A 48W/c 64QAM Primary Tx1



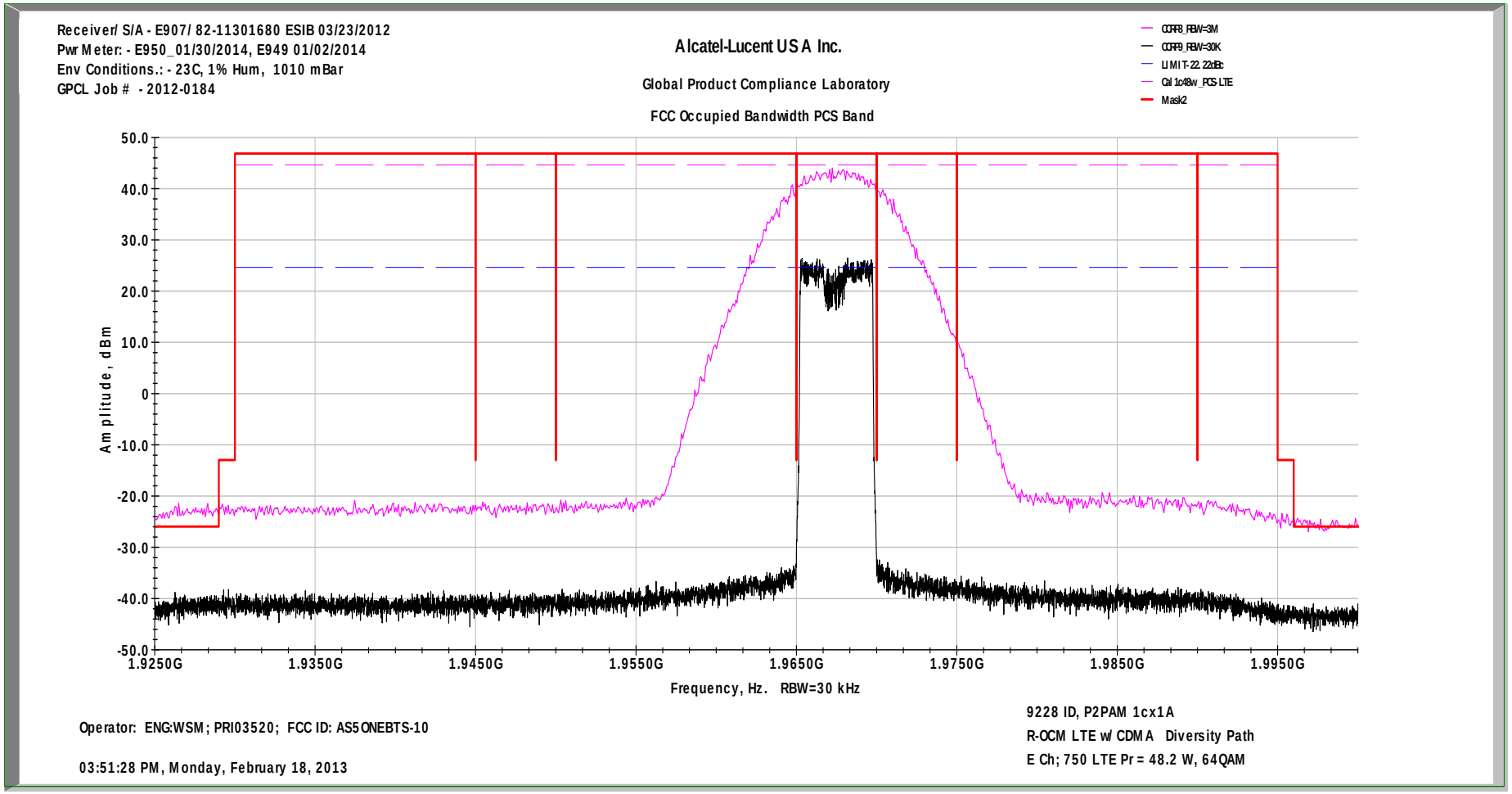
FCC Occupied Bandwidth with 3 Modulations LTE5 MHz Ch E-750 1cx2A 48W/c QPSK, 16QAM and 64QAM Primary Tx1



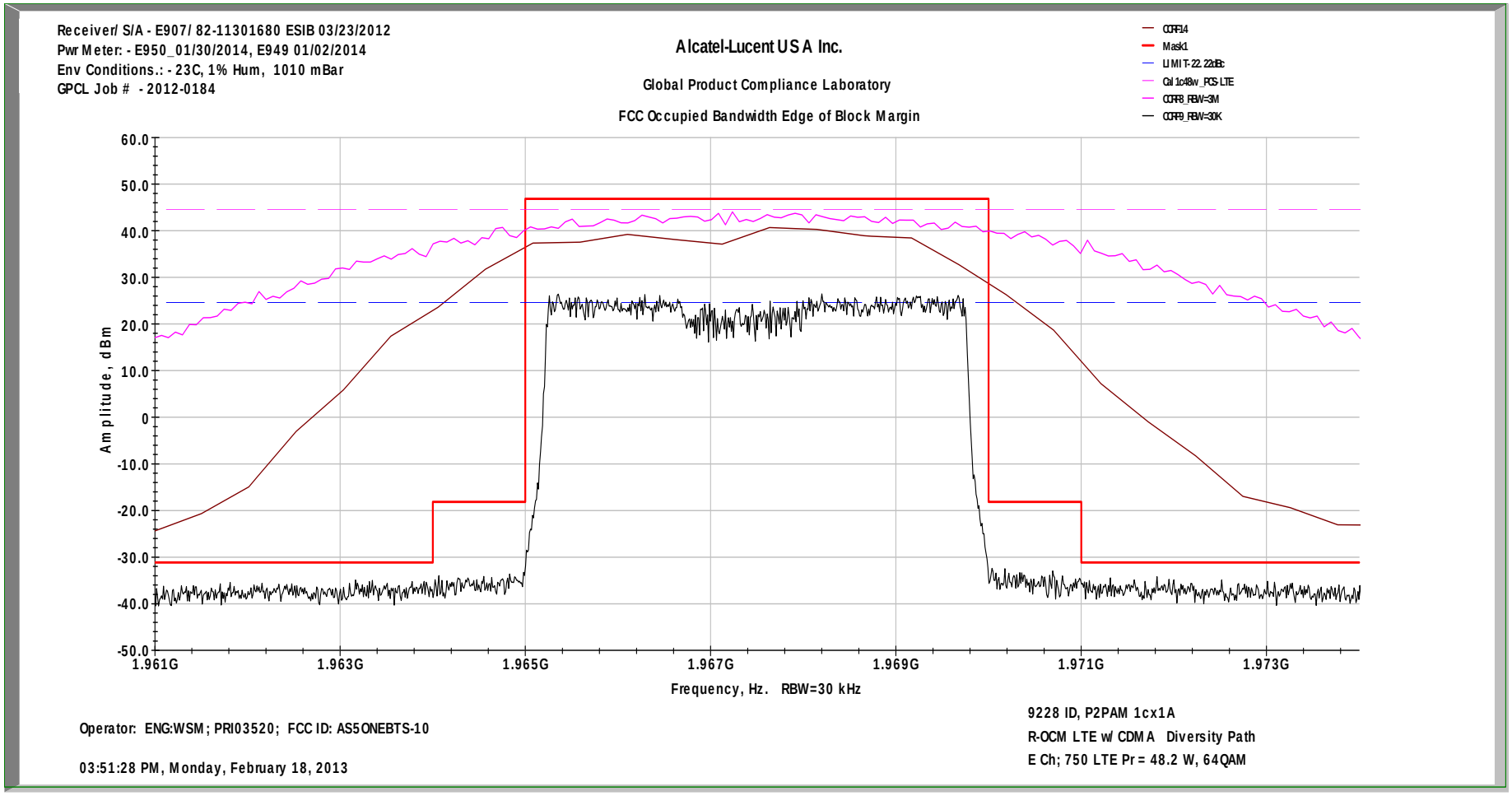
FCC Occupied Bandwidth Emissions LTE5 MHz Ch E-750 1cx1A 48W/c 64QAM Diversity Tx2



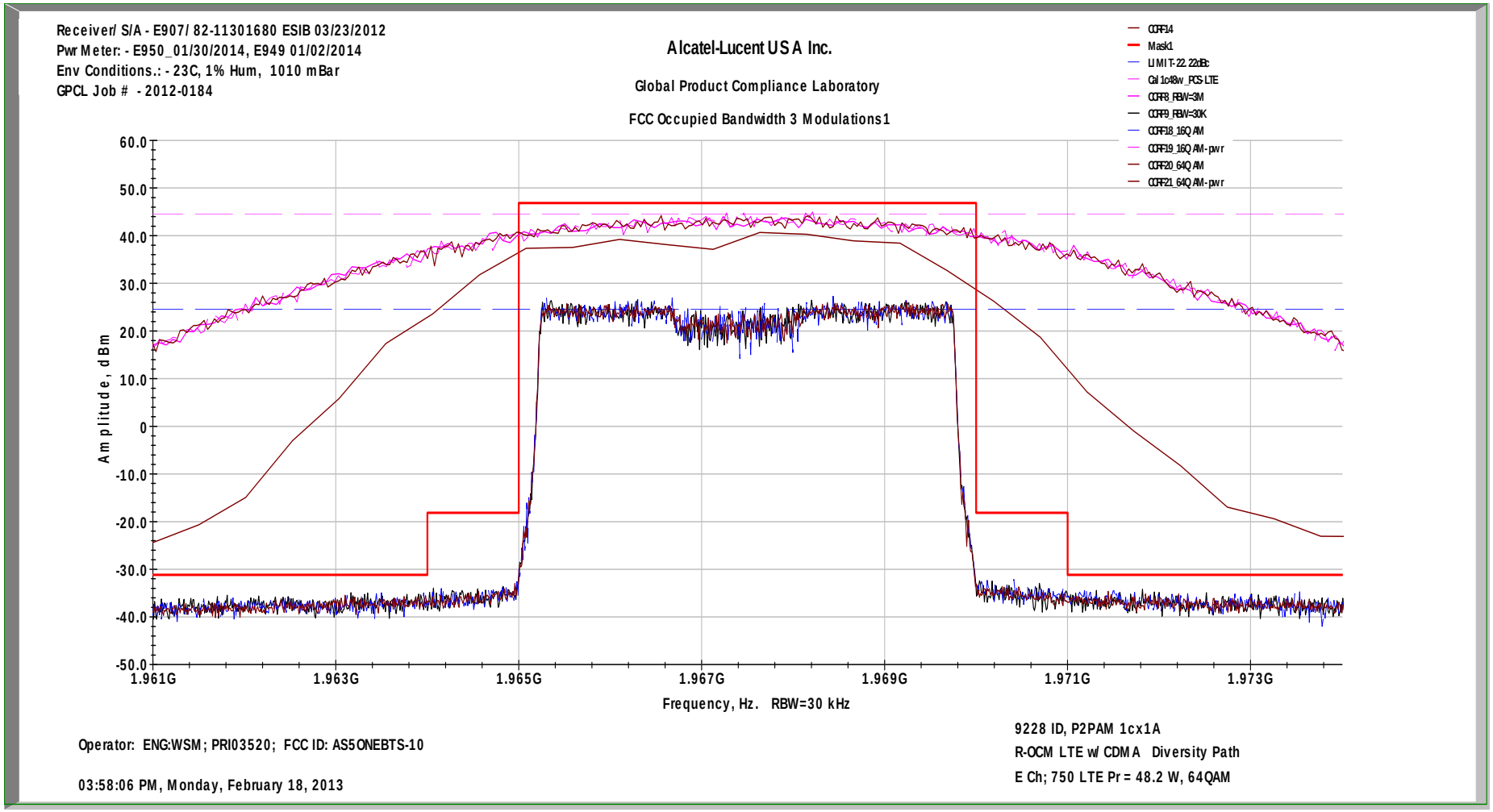
In-Band Intermodulation Graph LTE5 MHz Ch E-750 1cx1A 48W/c 64QAM Diversity Tx2



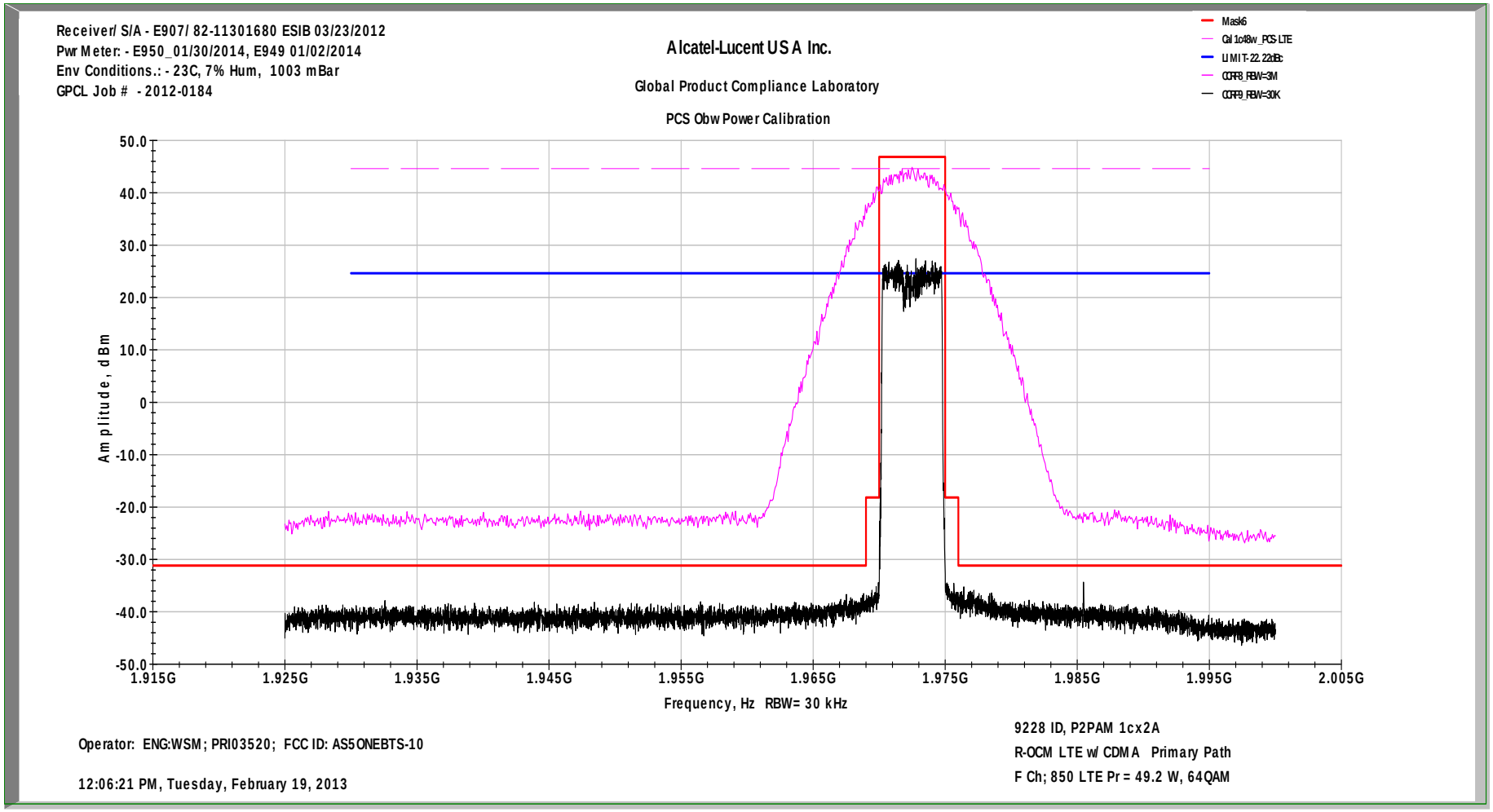
FCC Edge of Block Margin LTE5 MHz Ch E-750 1cx1A 48W/c 64QAM Diversity Tx2



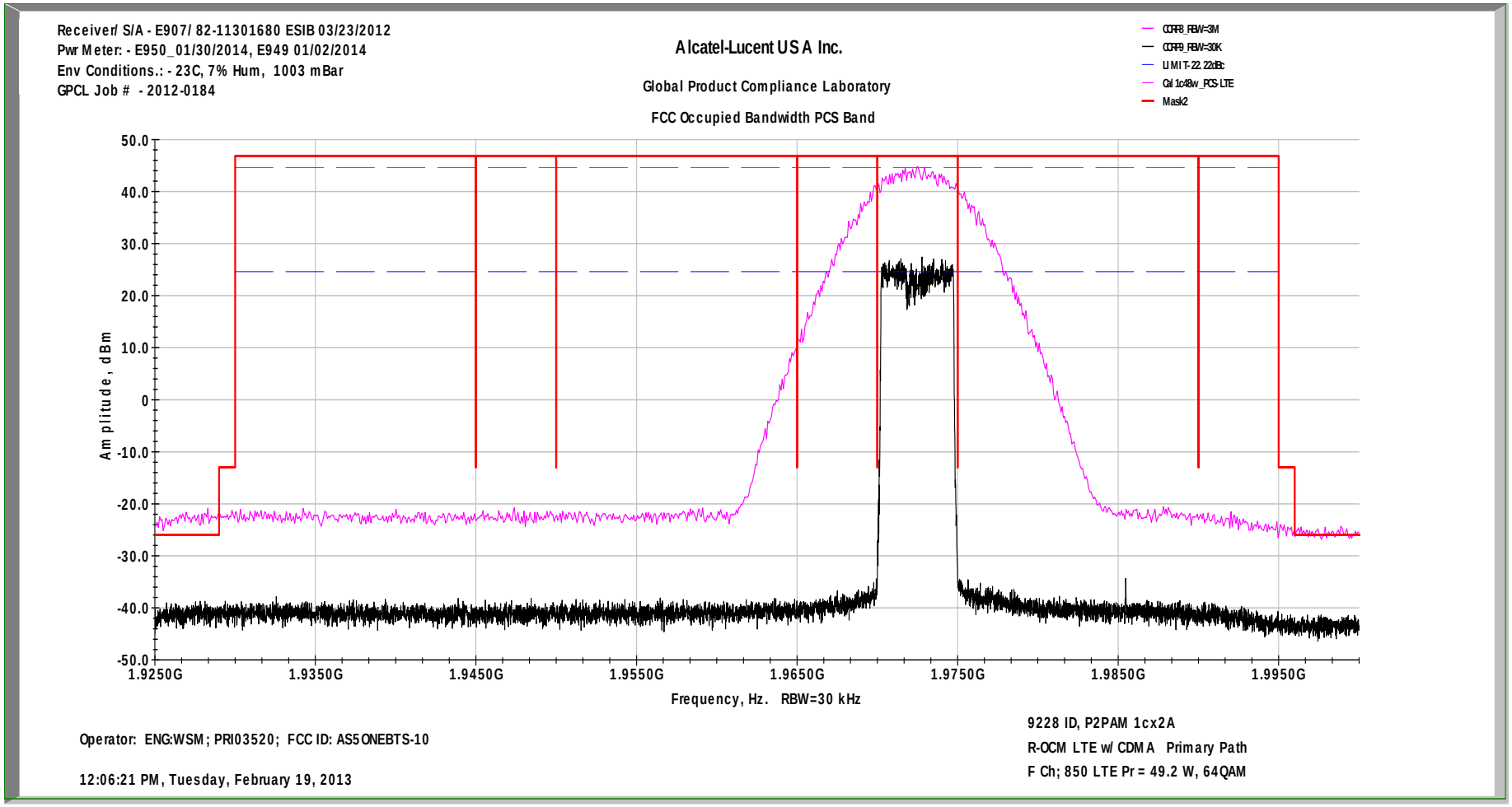
FCC Occupied Bandwidth with 3 Modulations LTE5 MHz Ch E-750 1cx1A 48W/c QPSK, 16QAM and 64QAM Diversity Tx2



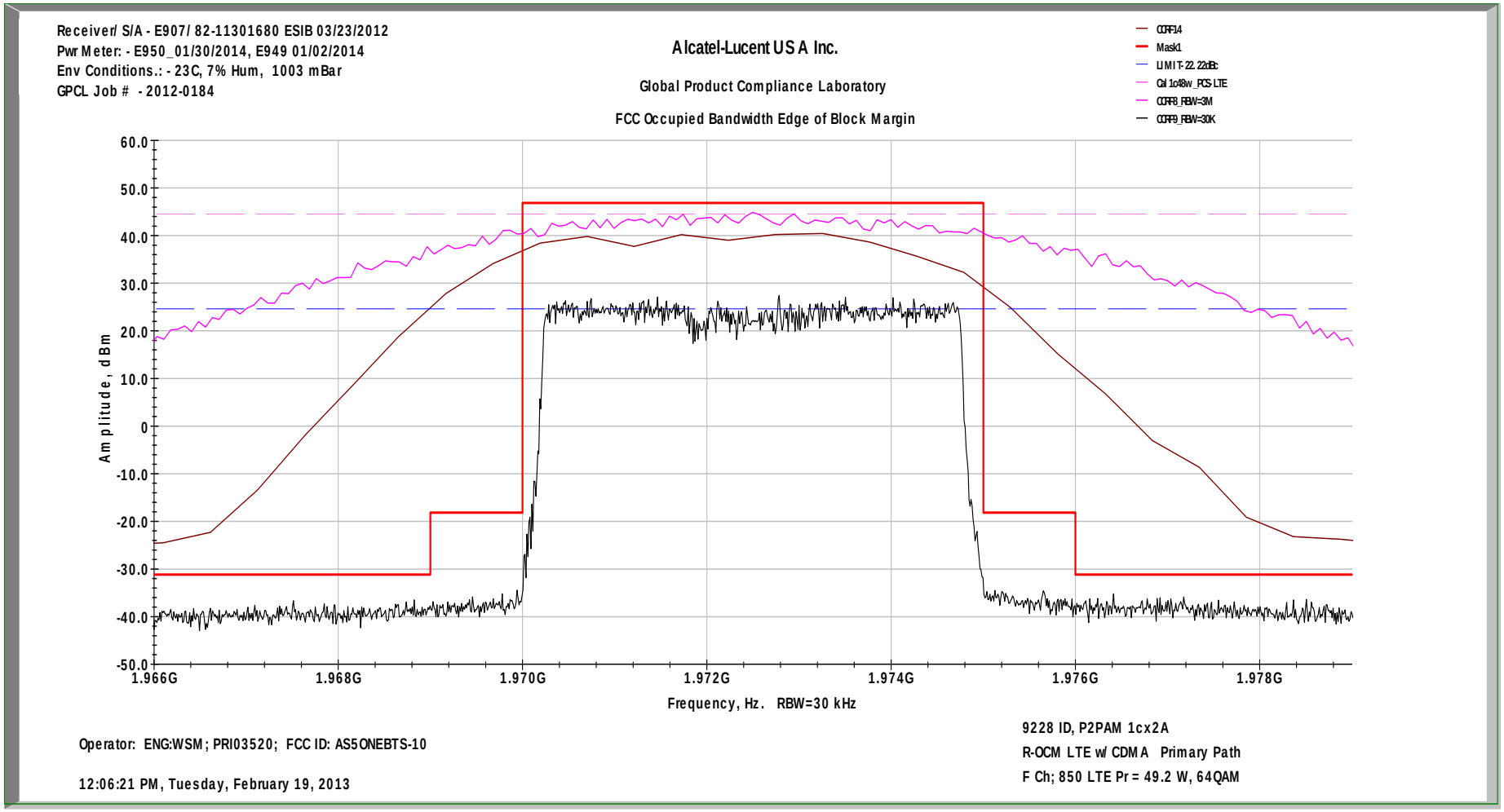
FCC Occupied Bandwidth Emissions LTE5 MHz Ch F-850 1cx2A 48W/c 64QAM Primary Tx1



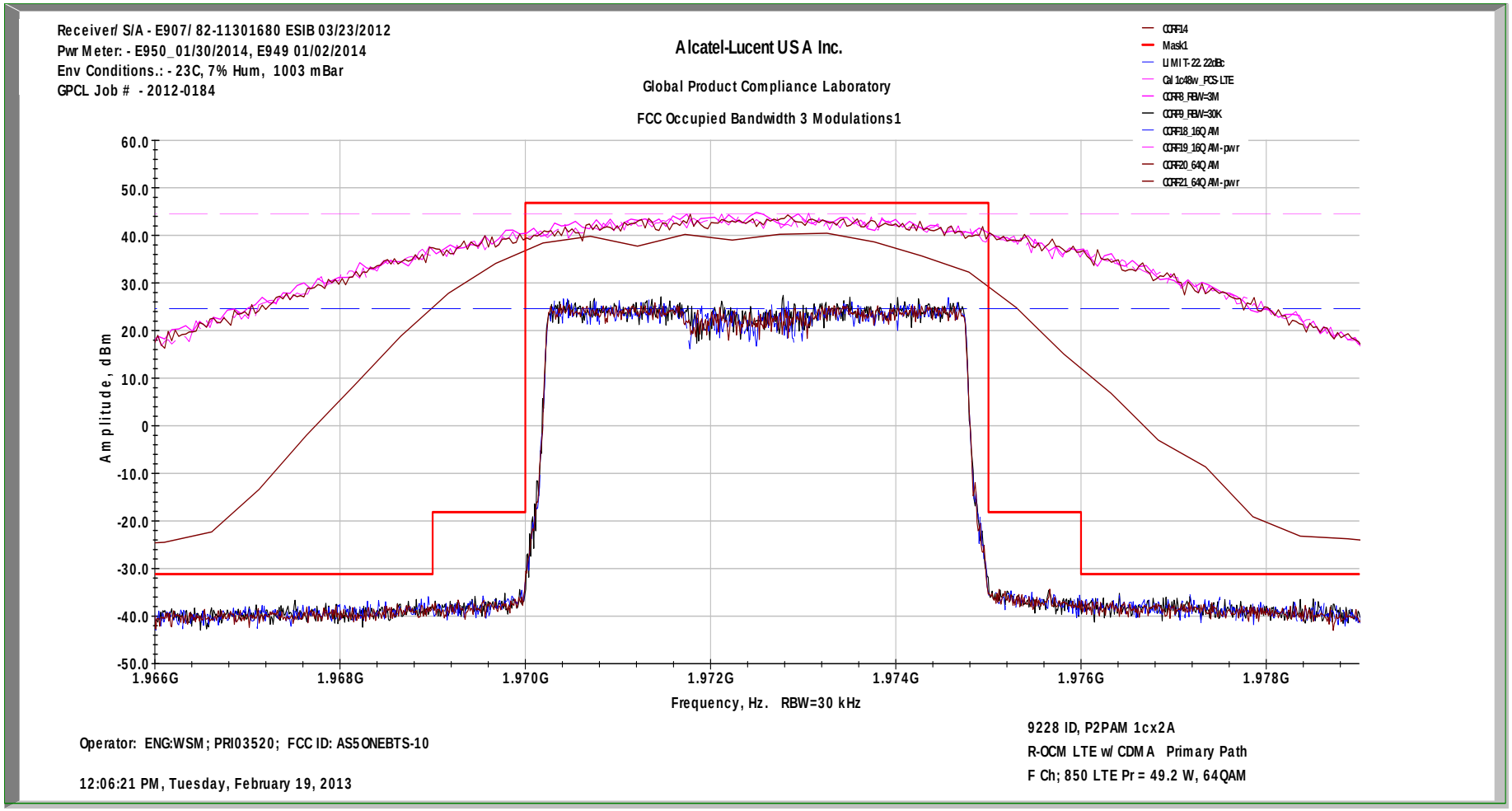
In-Band Intermodulation Graph LTE5 MHz Ch F-850 1cx2A 48W/c 64QAM Primary Tx1



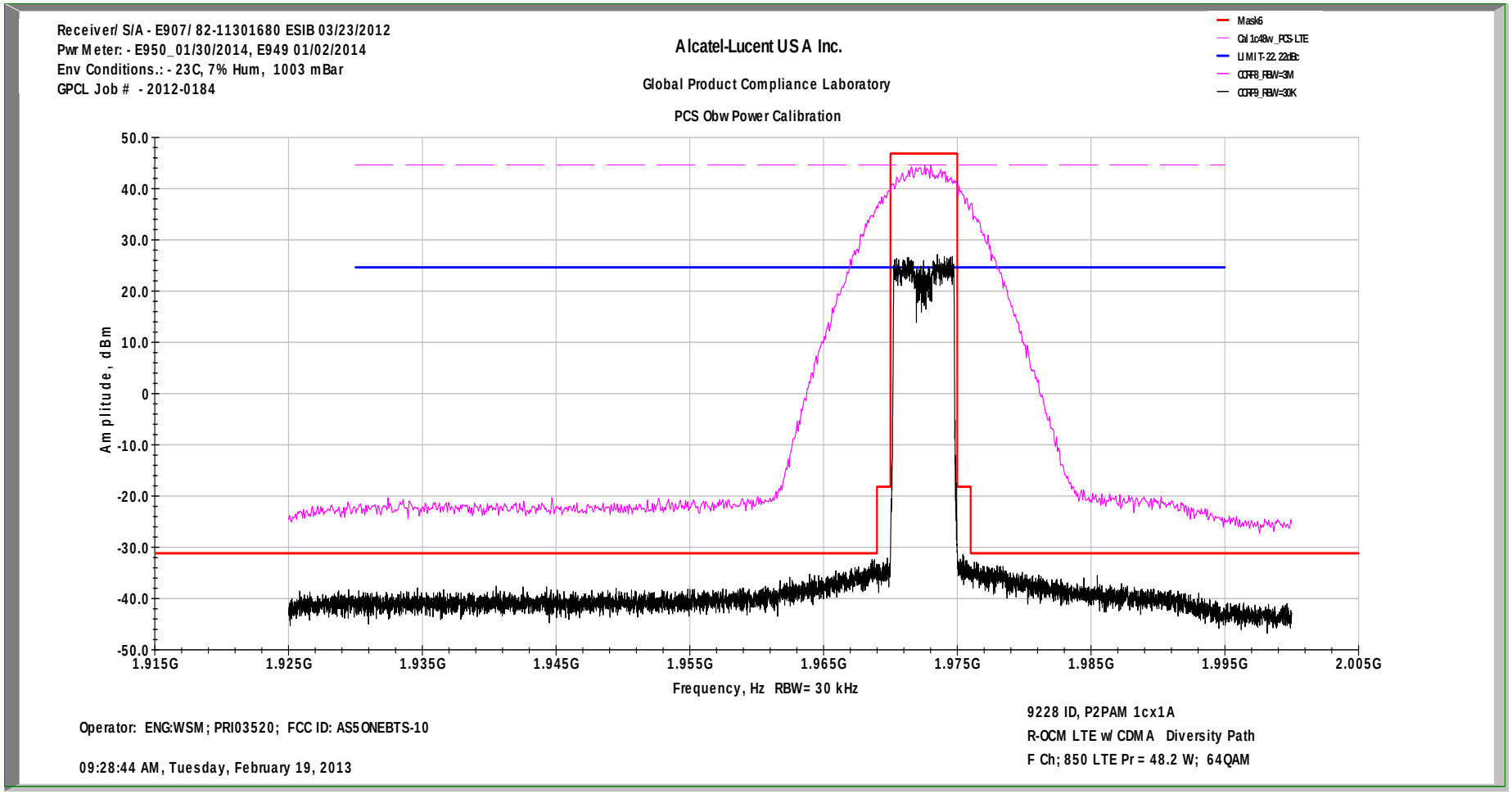
CC Edge of Block Margin LTE5 MHz Ch F-850 1cx2A 48W/c 64QAM Primary Tx1



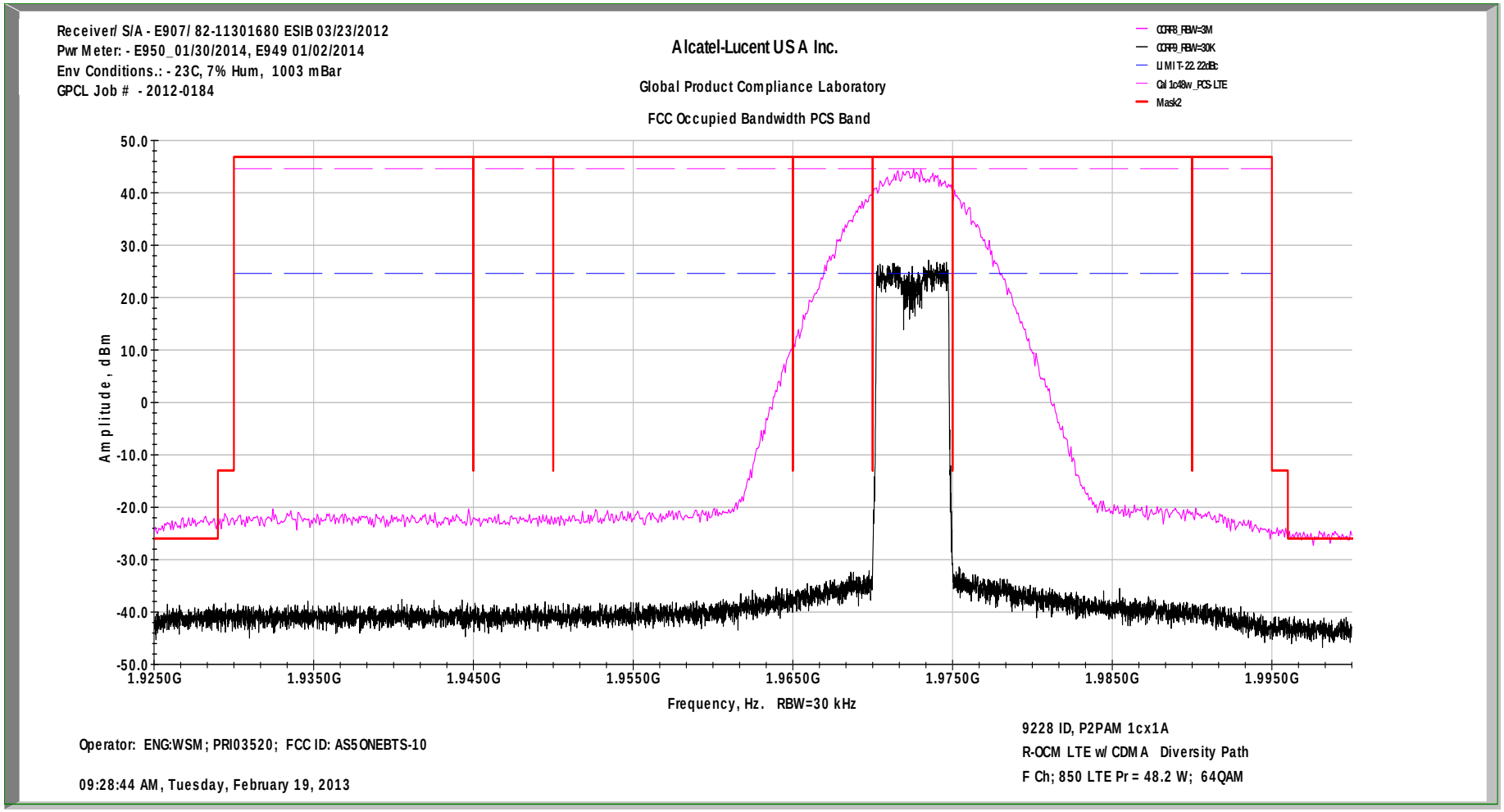
FCC Occupied Bandwidth with 3 Modulations LTE5 MHz Ch F-850 1cx2A 48W/c QPSK, 16QAM and 64QAM Primary Tx1



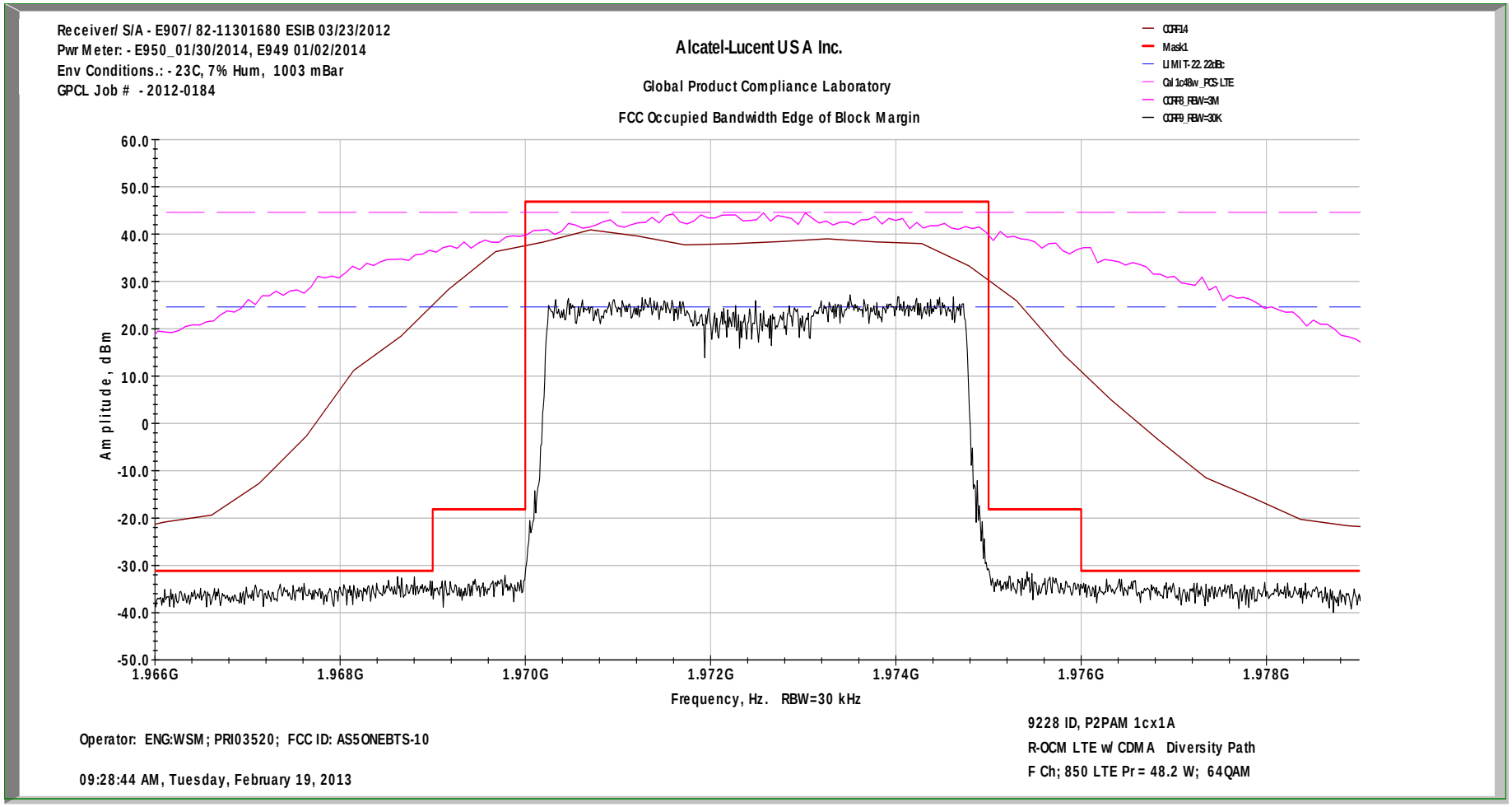
FCC Occupied Bandwidth Emissions LTE5 MHz Ch F-850 1cx1A 48W/c 64QAM Diversity Tx2



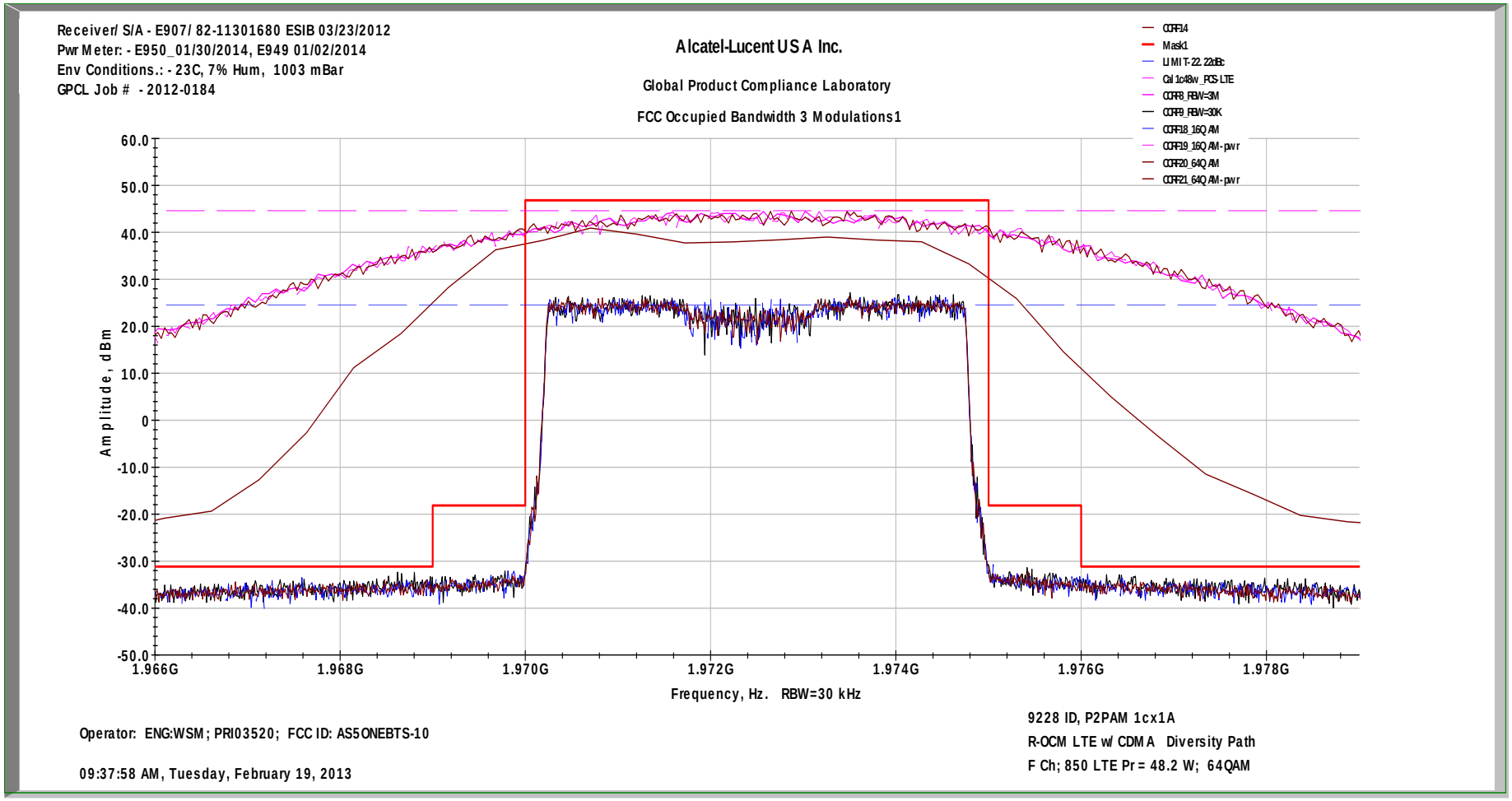
In-Band Intermodulation Graph LTE5 MHz Ch F-850 1cx1A 48W/c 64QAM Diversity Tx2



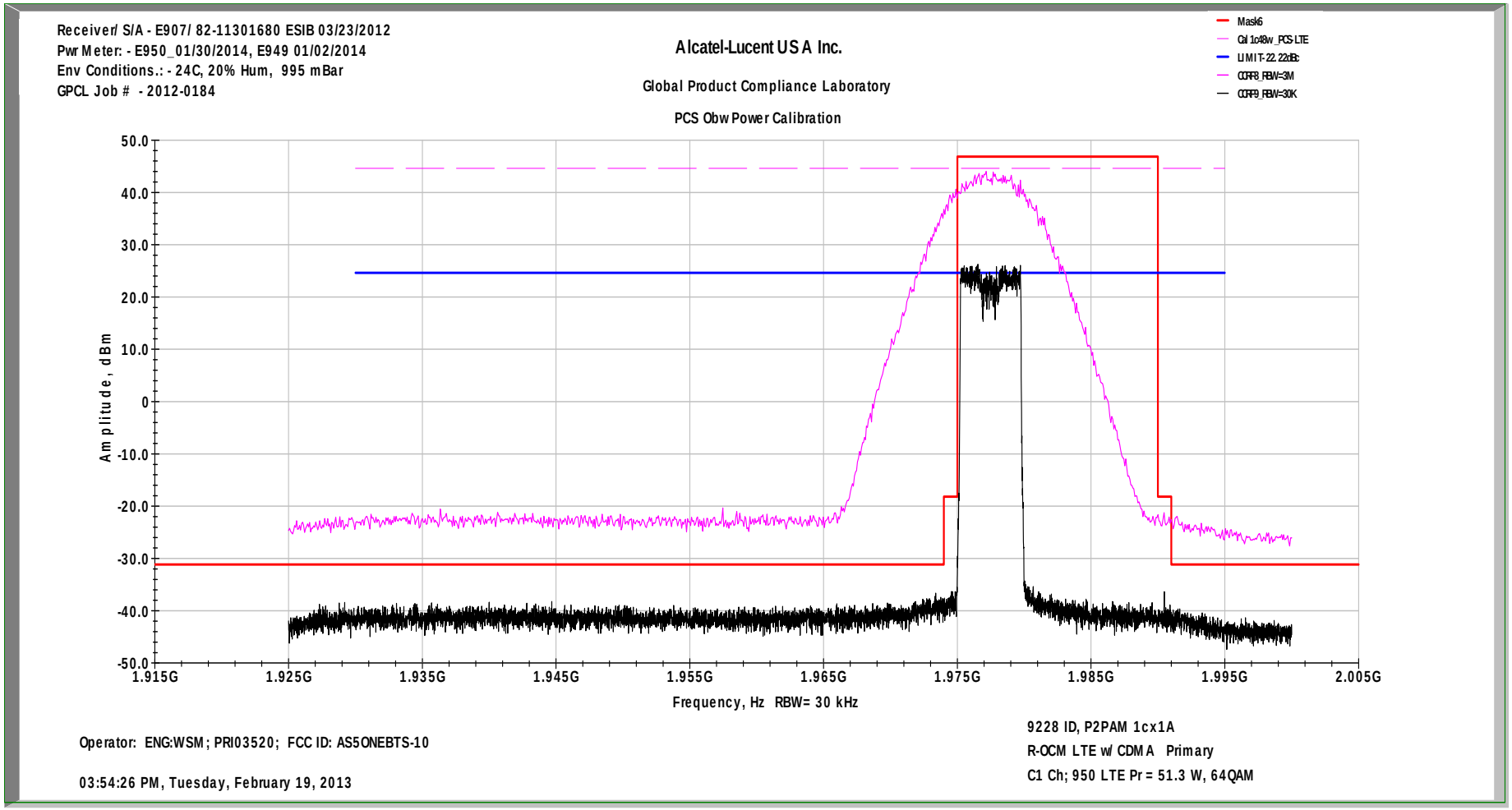
FCC Edge of Block Margin LTE5 MHz Ch F-850 1cx1A 48W/c 64QAM Diversity Tx2



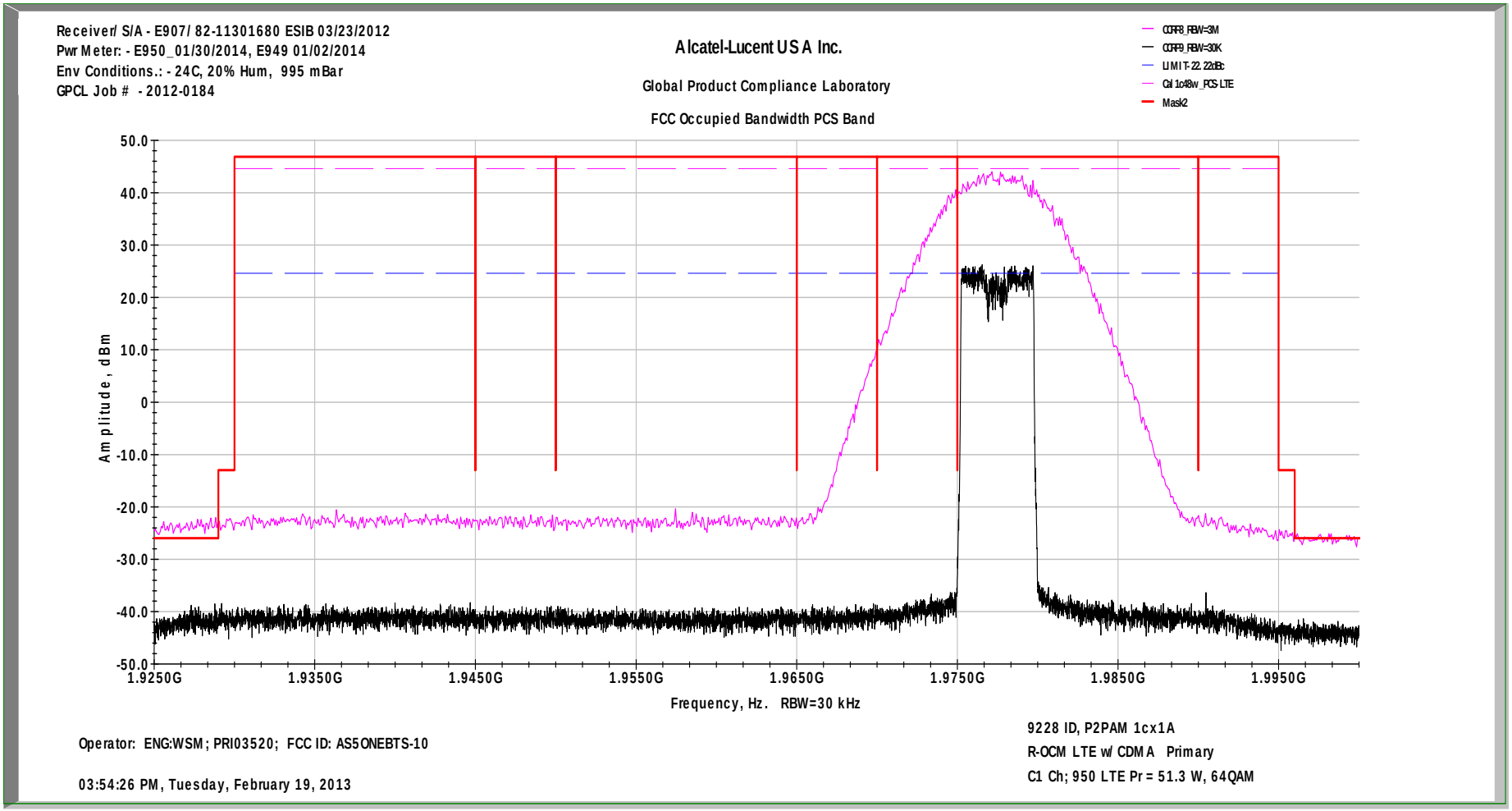
FCC Occupied Bandwidth with 3 Modulations LTE5 MHz Ch F-850 1cx1A 48W/c QPSK, 16QAM and 64QAM Diversity Tx2



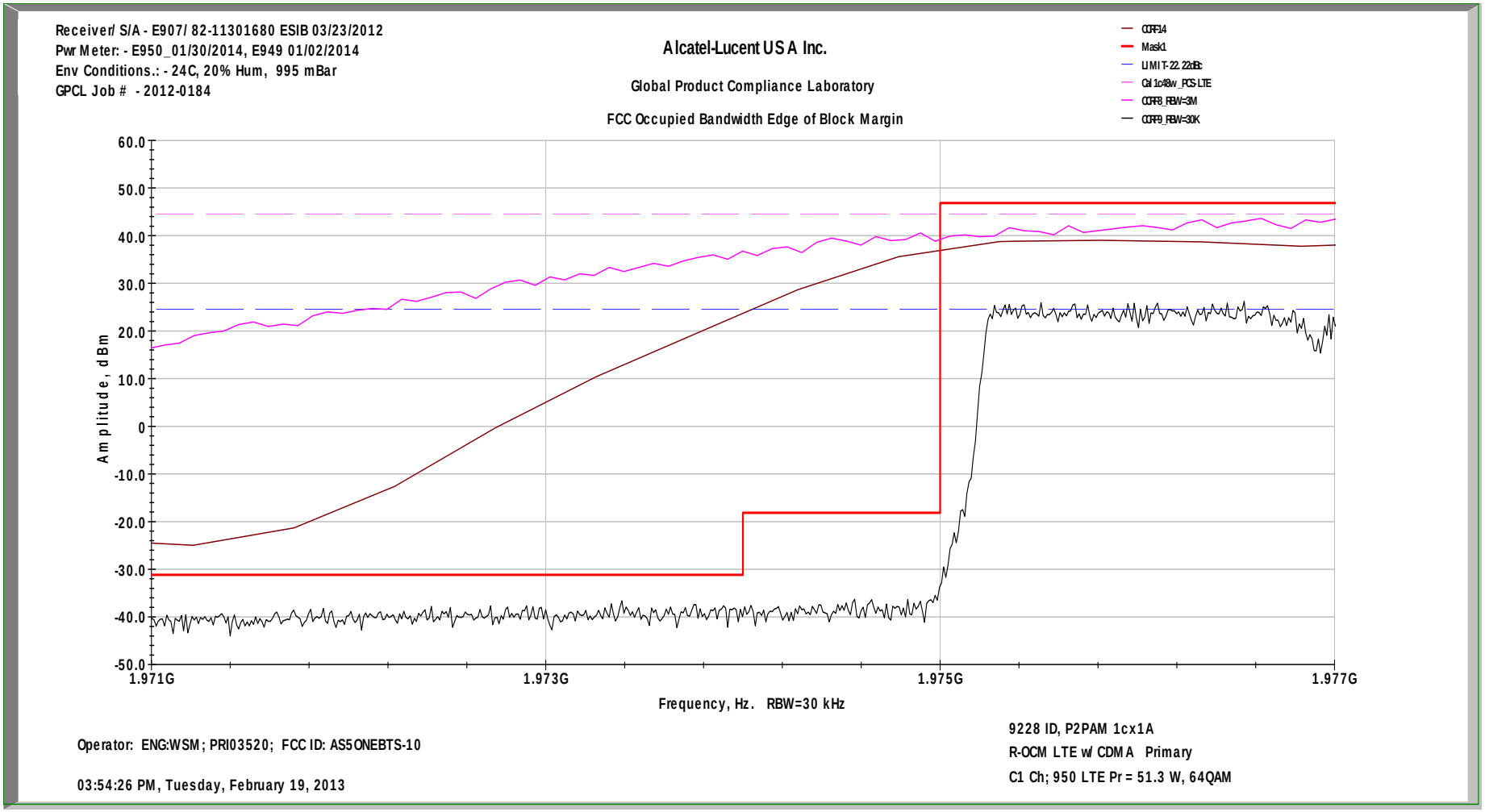
FCC Occupied Bandwidth Emissions LTE5 MHz Ch C-950 1cx2A 48W/c 64QAM PrimaryTx1



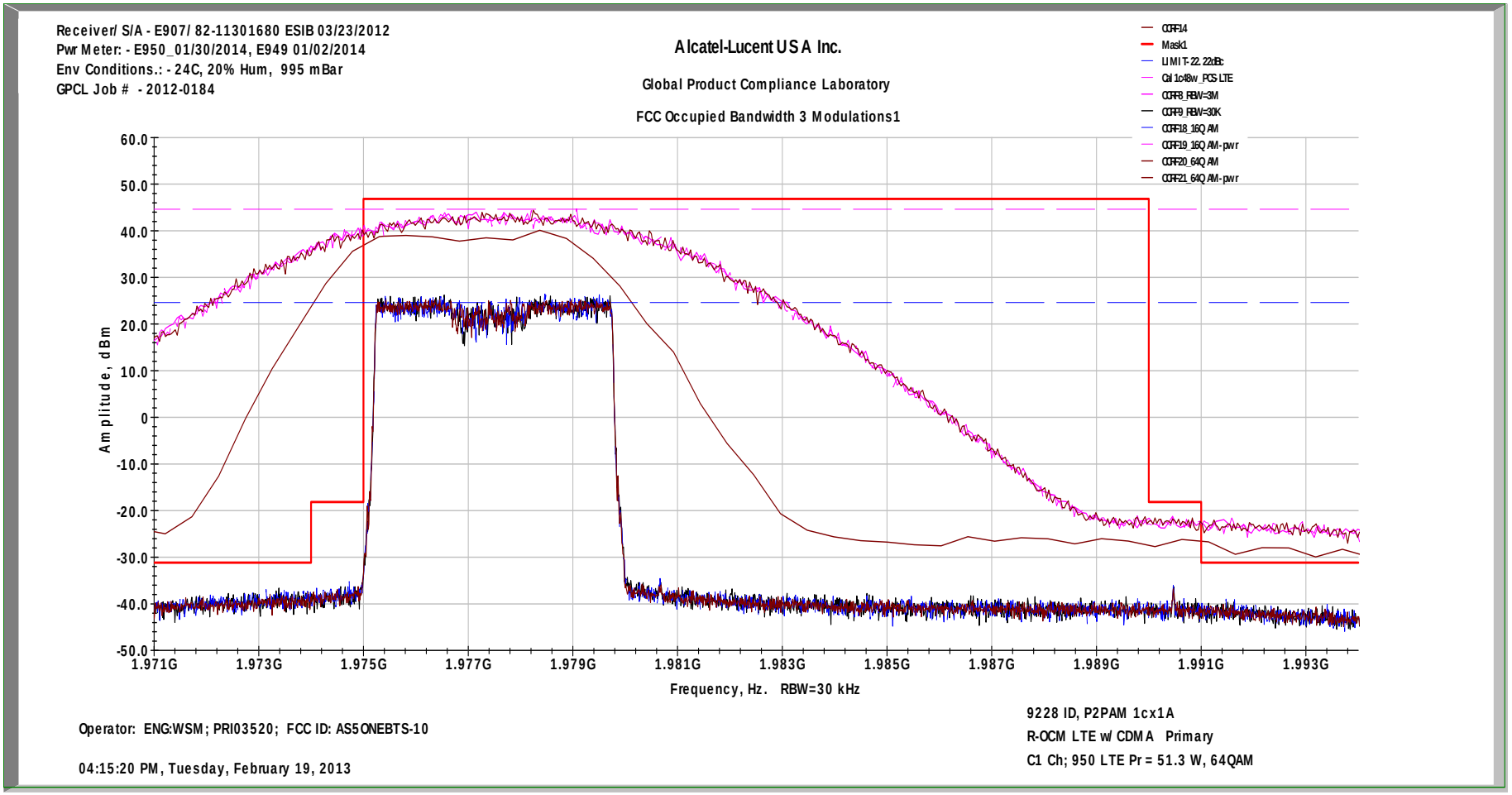
In-Band Intermodulation Graph LTE5 MHz Ch C-950 1cx2A 48W/c 64QAM PrimaryTx1



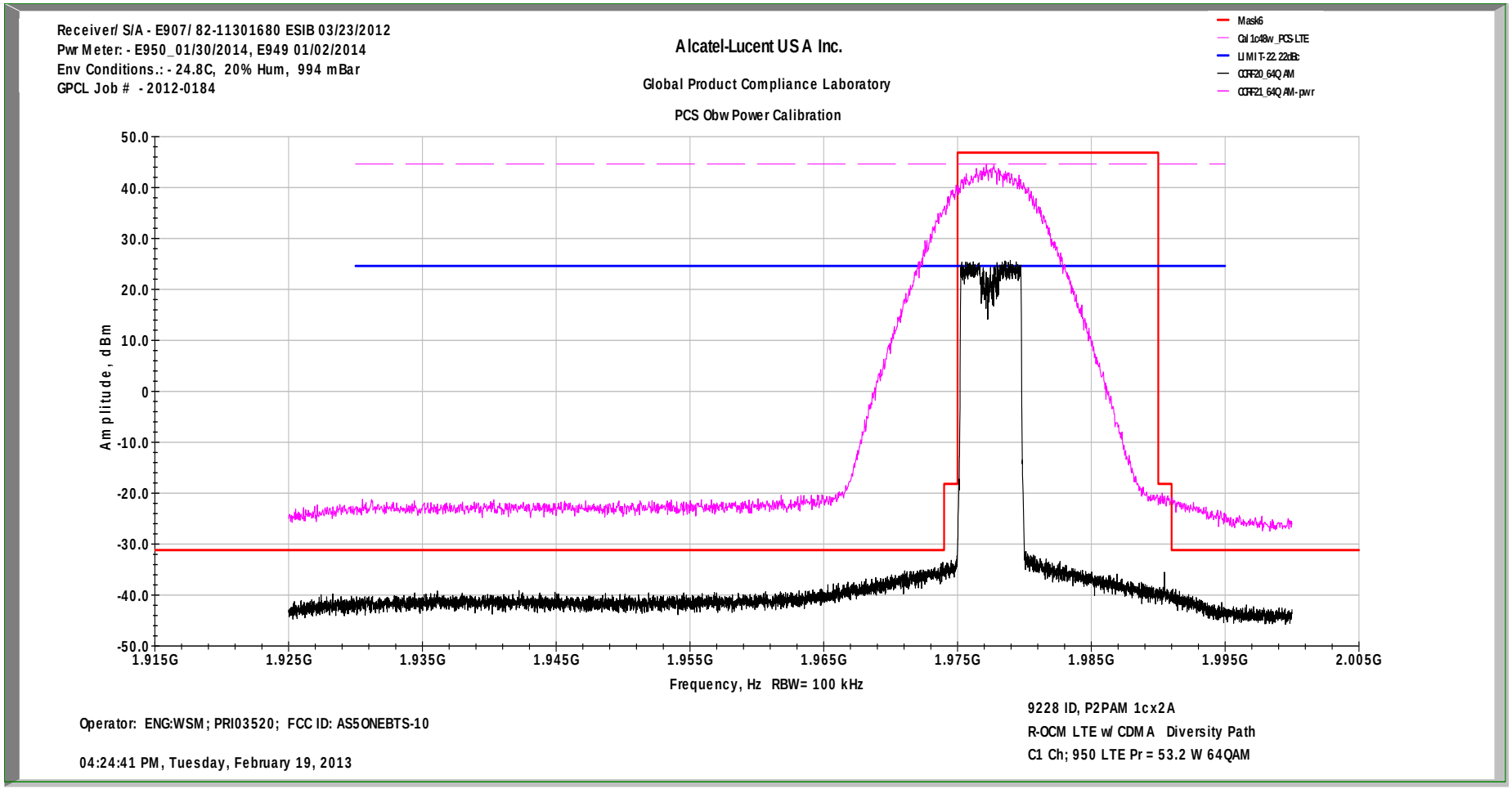
FCC Edge of Block Margin LTE5 MHz Ch C-950 1cx2A 48W/c 64QAM PrimaryTx1



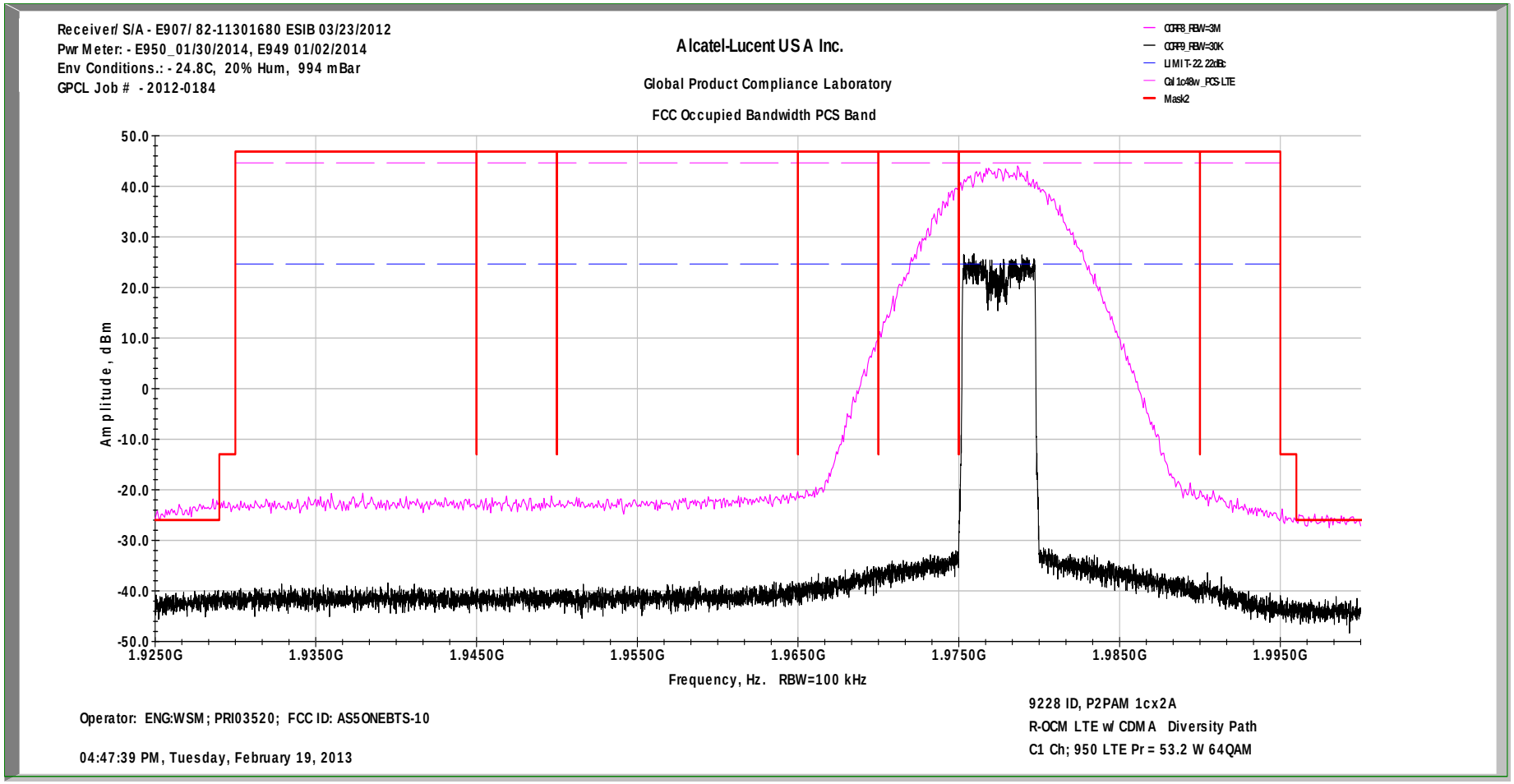
FCC Occupied Bandwidth with 3 Modulations LTE5 MHz Ch C-950 1cx2A 48W/c QPSK, 16QAM and 64QAM PrimaryTx1



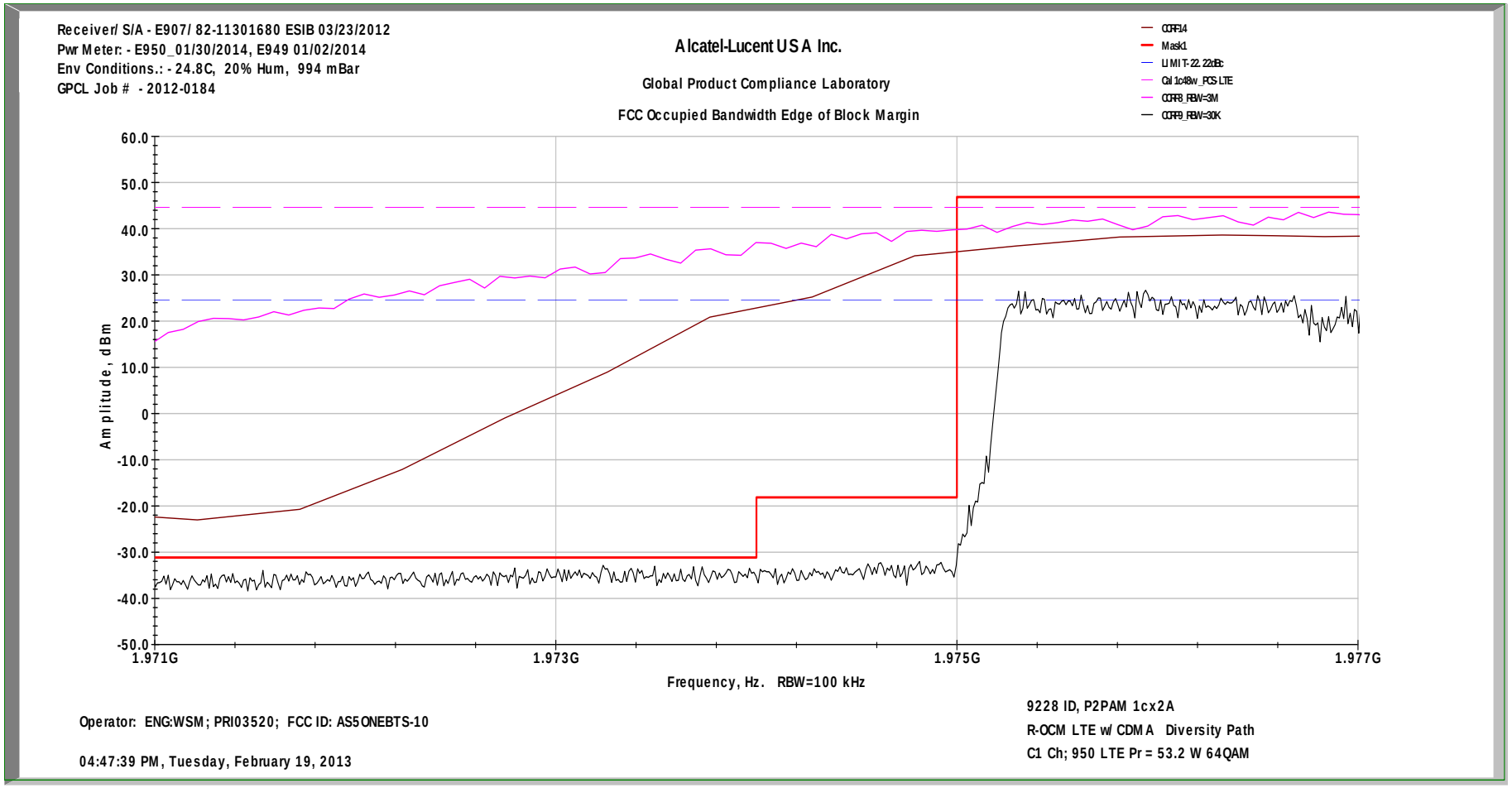
FCC Occupied Bandwidth Emissions LTE5 MHz Ch C-950 1cx1A 48W/c 64QAM Diversity Tx2



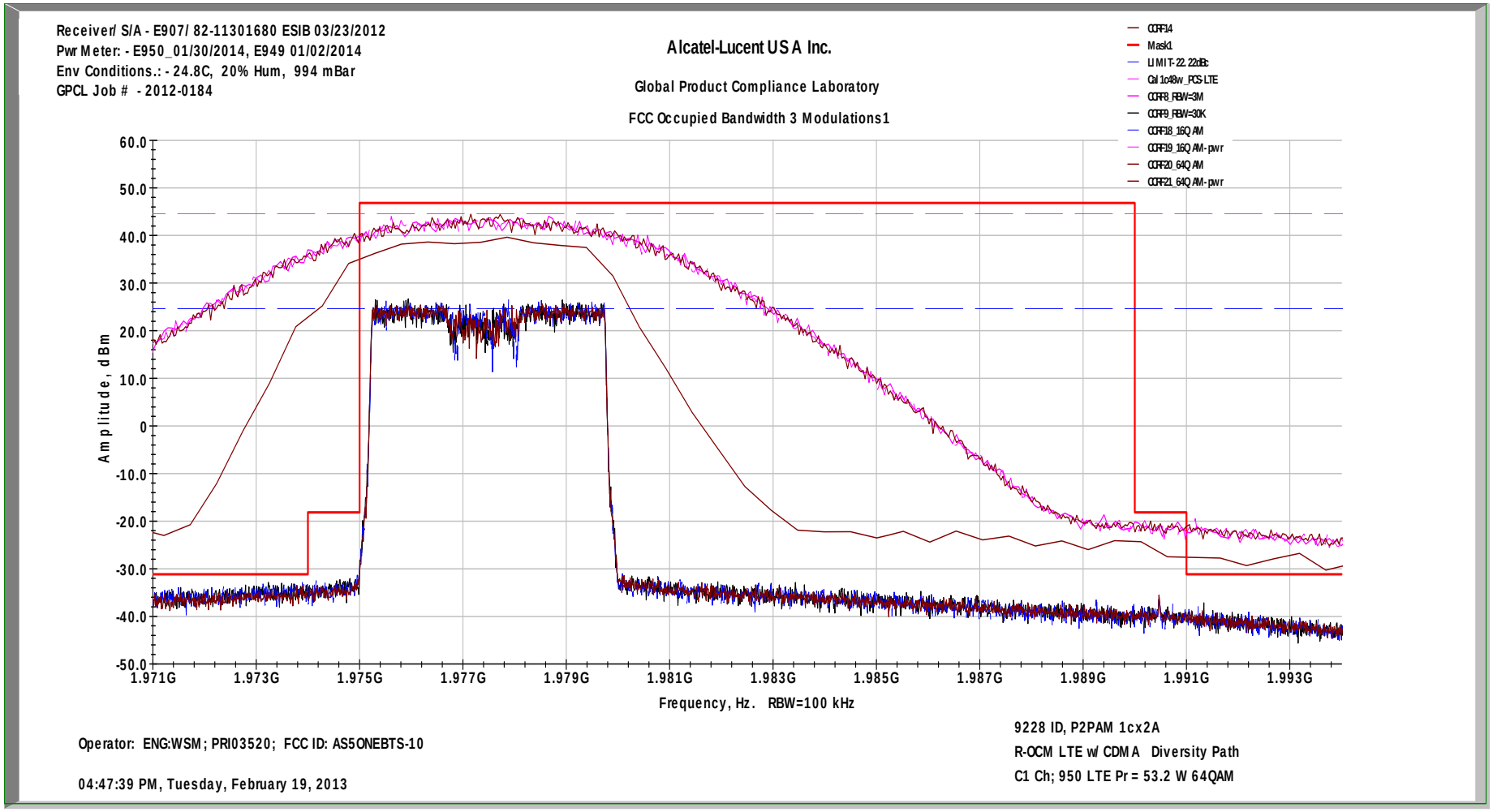
In-Band Intermodulation Graph LTE5 MHz Ch C-950 1cx1A 48W/c 64QAM Diversity Tx2



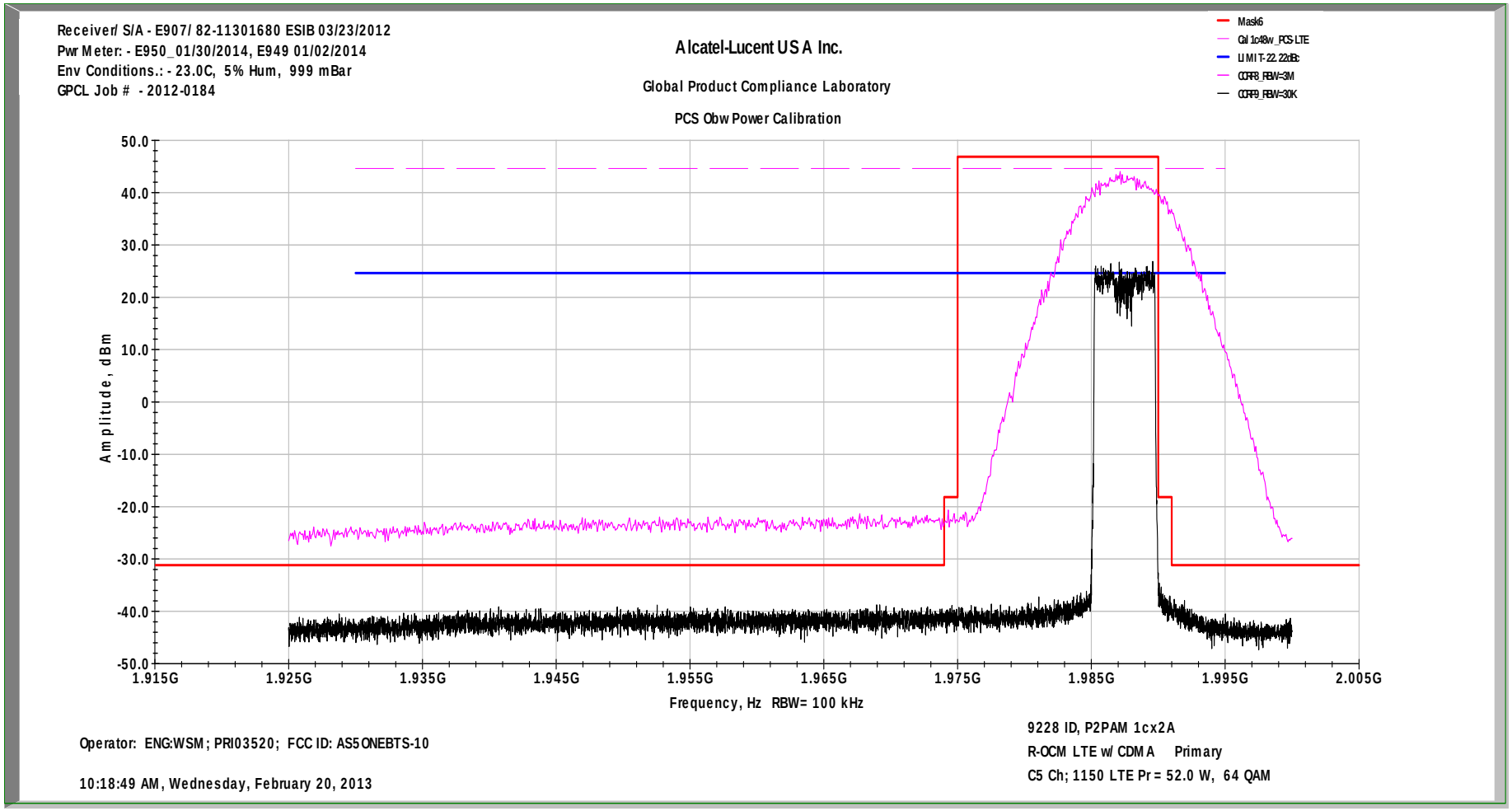
FCC Edge of Block Margin LTE5 MHz Ch C-950 1cx1A 48W/c 64QAM Diversity Tx2



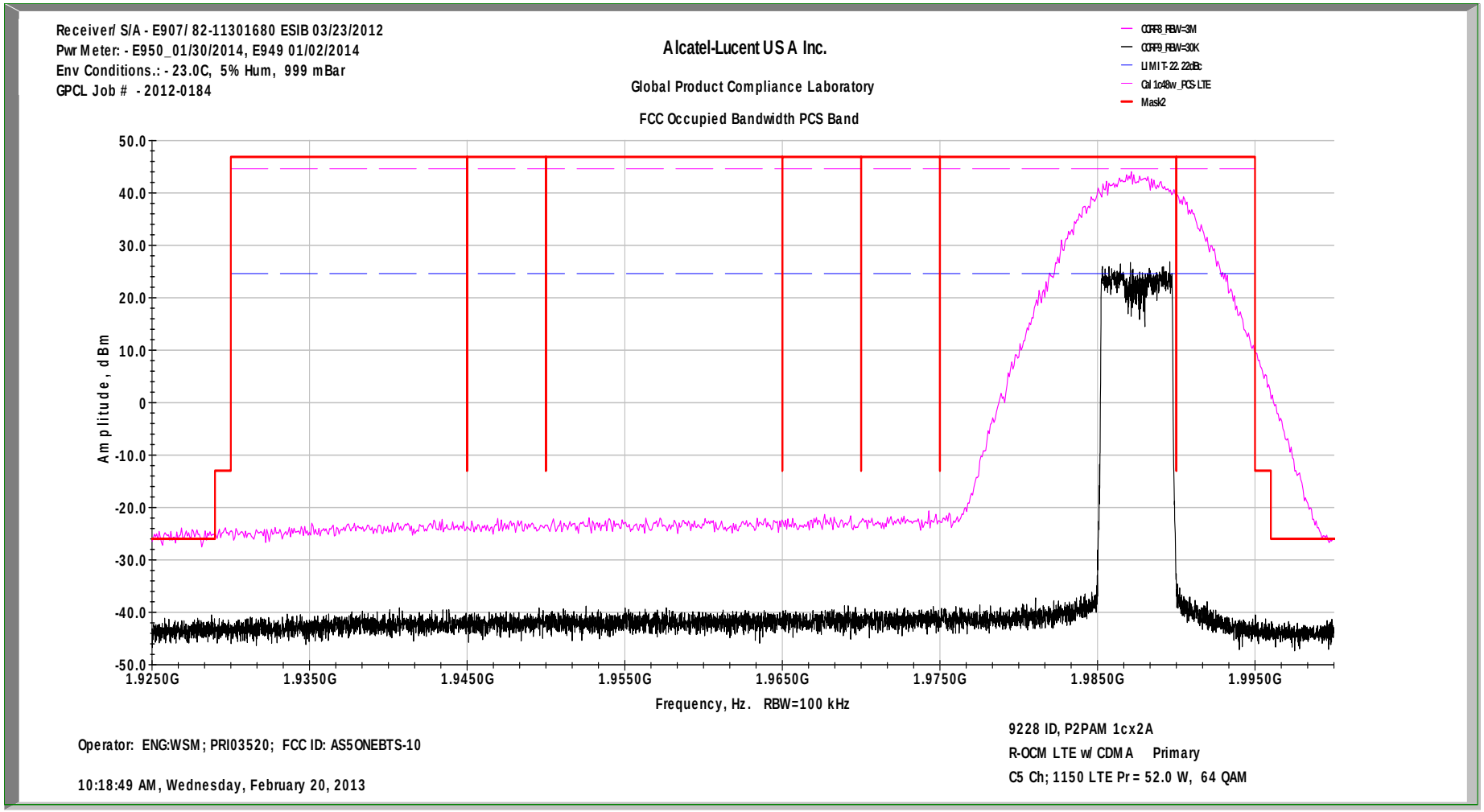
FCC Occupied Bandwidth with 3 Modulations LTE5 MHz Ch C-950 1cx1A 48W/c QPSK, 16QAM and 64QAM Tx1



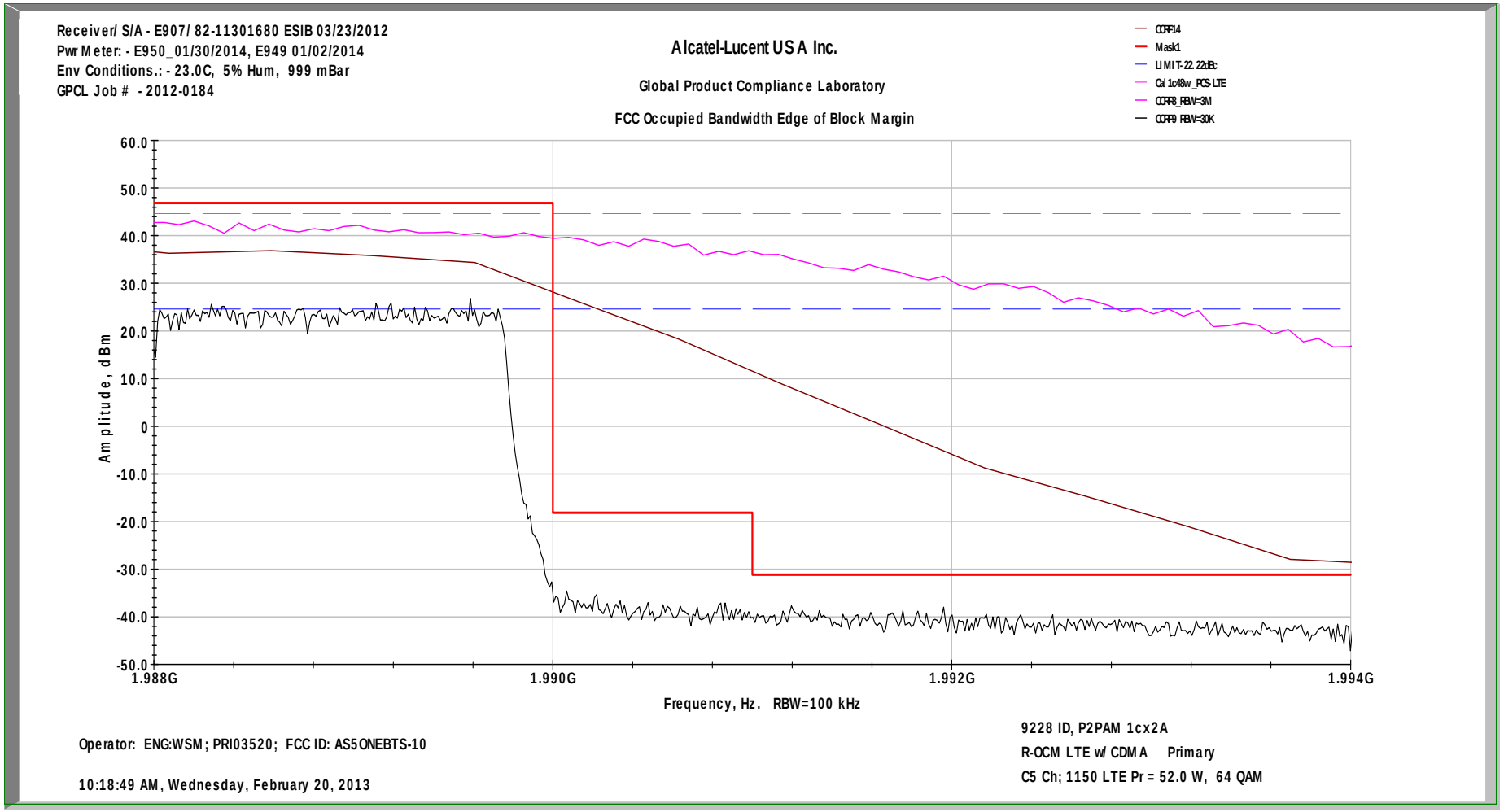
FCC Occupied Bandwidth Emissions LTE5 MHz Ch C-1150 1cx2A 48W/c 64QAM Primary Tx1



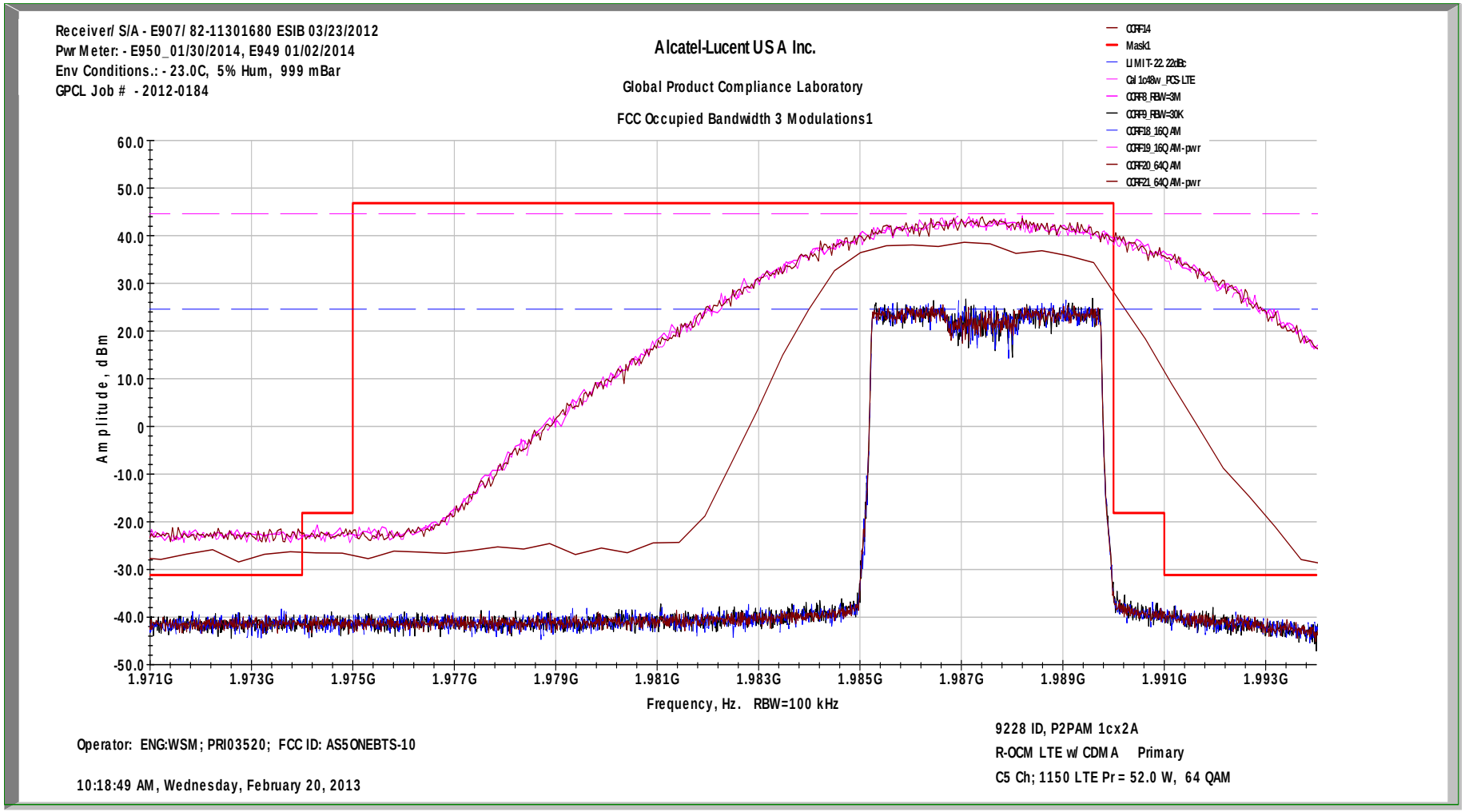
In-Band Intermodulation Graph LTE5 MHz Ch C-1150 1cx2A 48W/c 64QAM Primary Tx1



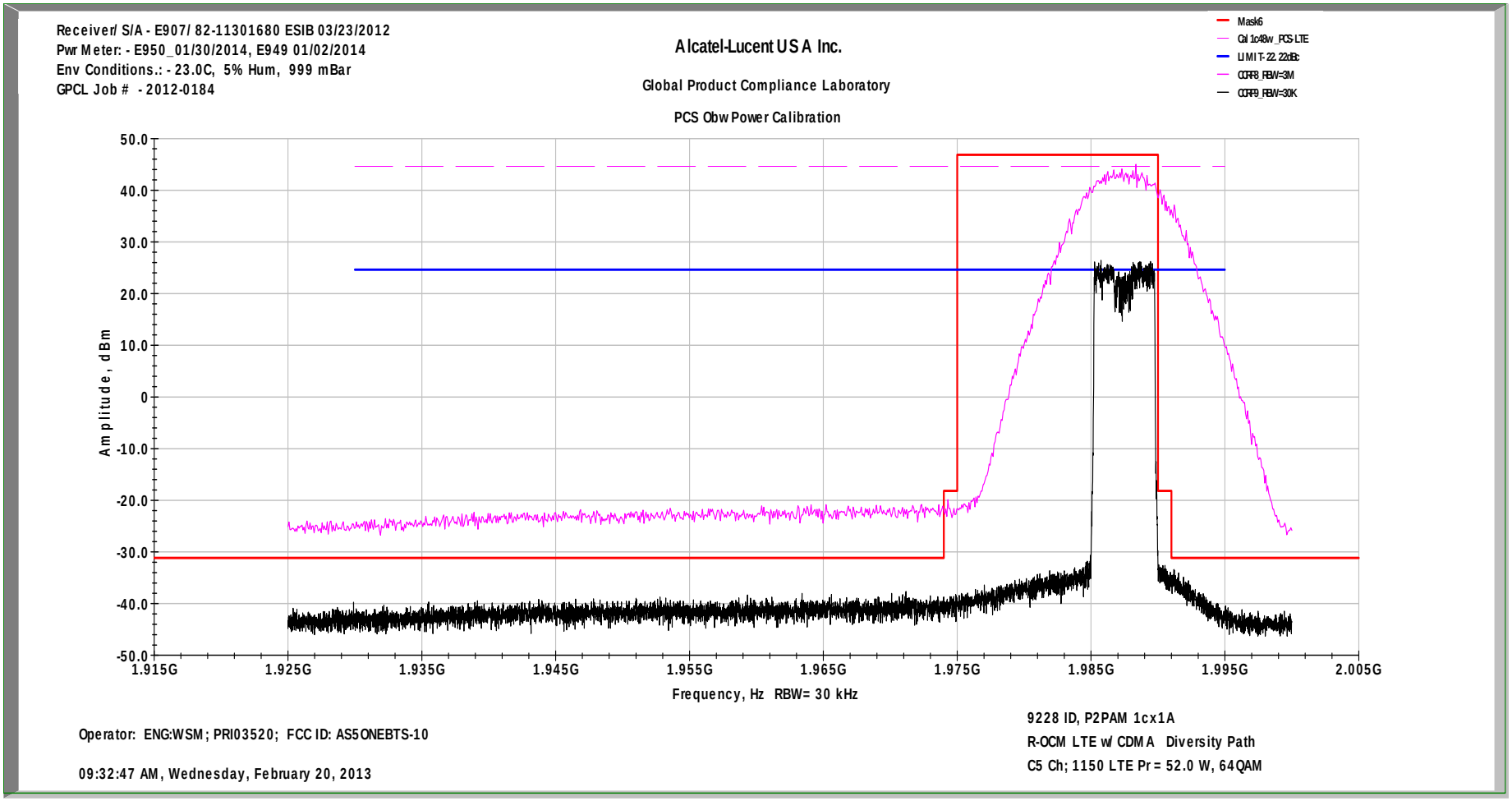
FCC Edge of Block Margin LTE5 MHz Ch C-1150 1cx2A 48W/c 64QAM Primary Tx1



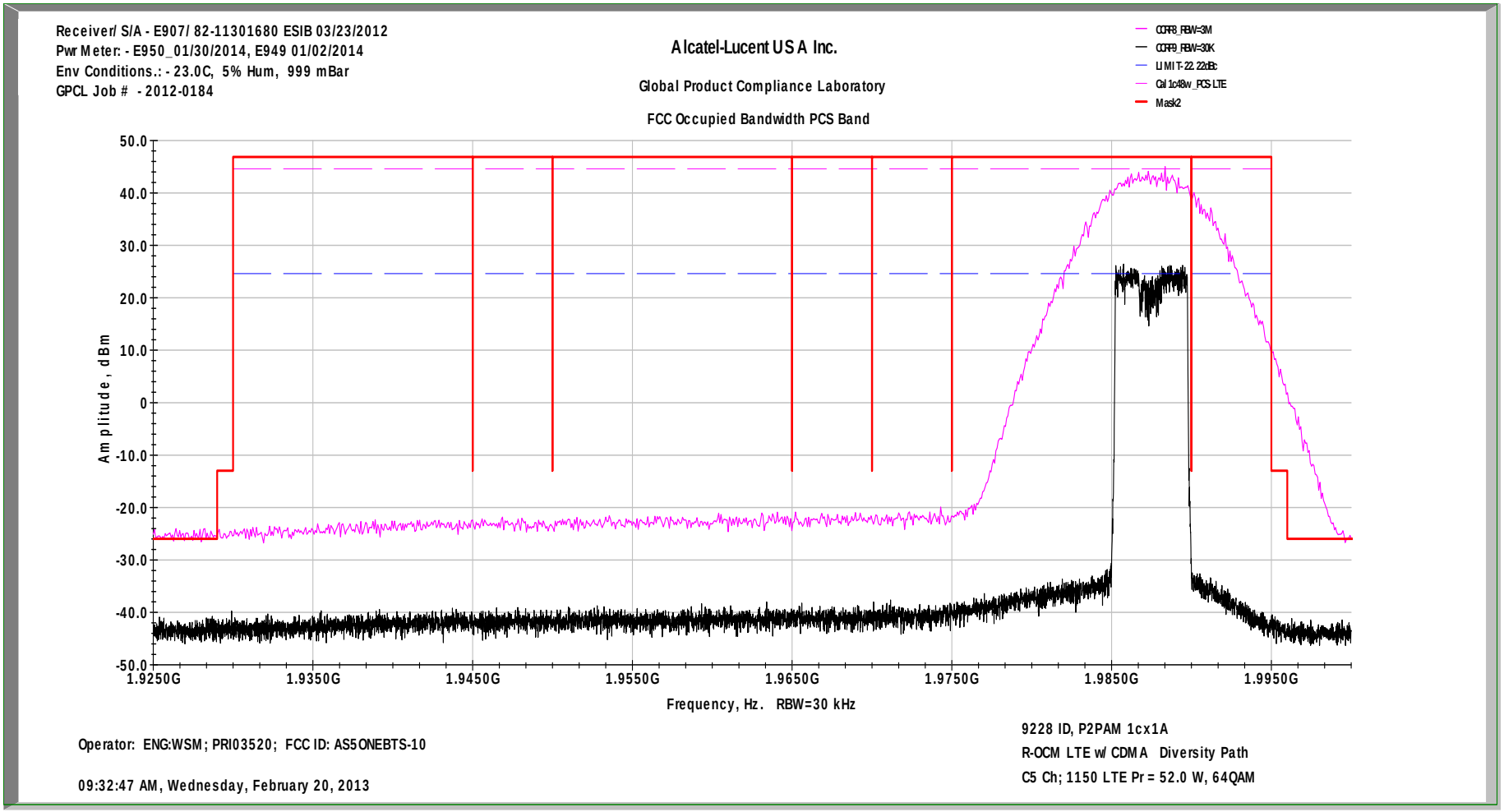
FCC Occupied Bandwidth with 3 Modulations LTE5 MHz Ch C-1150 1cx2A 48W/c QPSK, 16QAM and 64QAM Primary Tx1



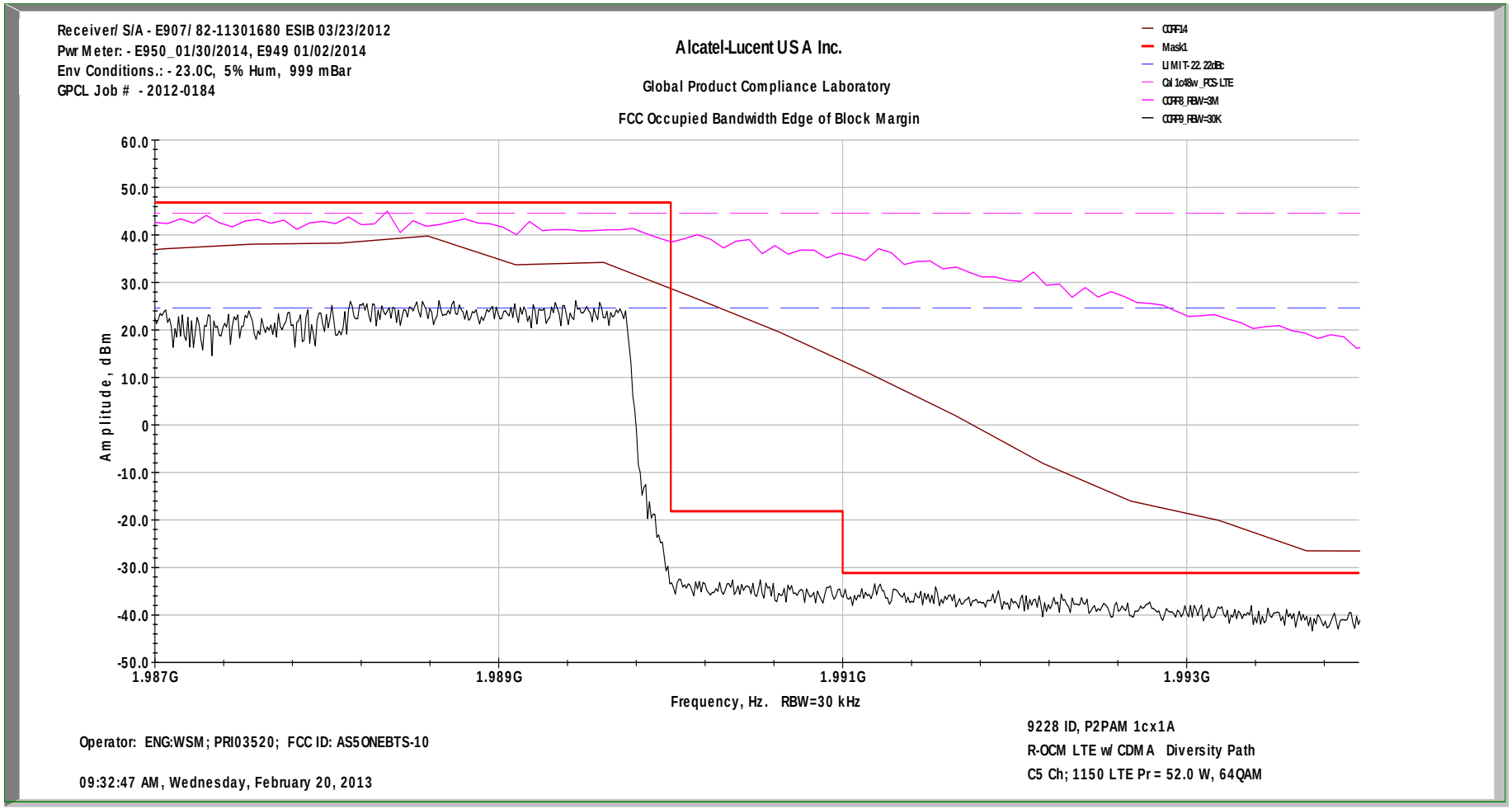
FCC Occupied Bandwidth Emissions LTE5 MHz Ch C-1150 1cx1A 48W/c 64QAM Diversity Tx2



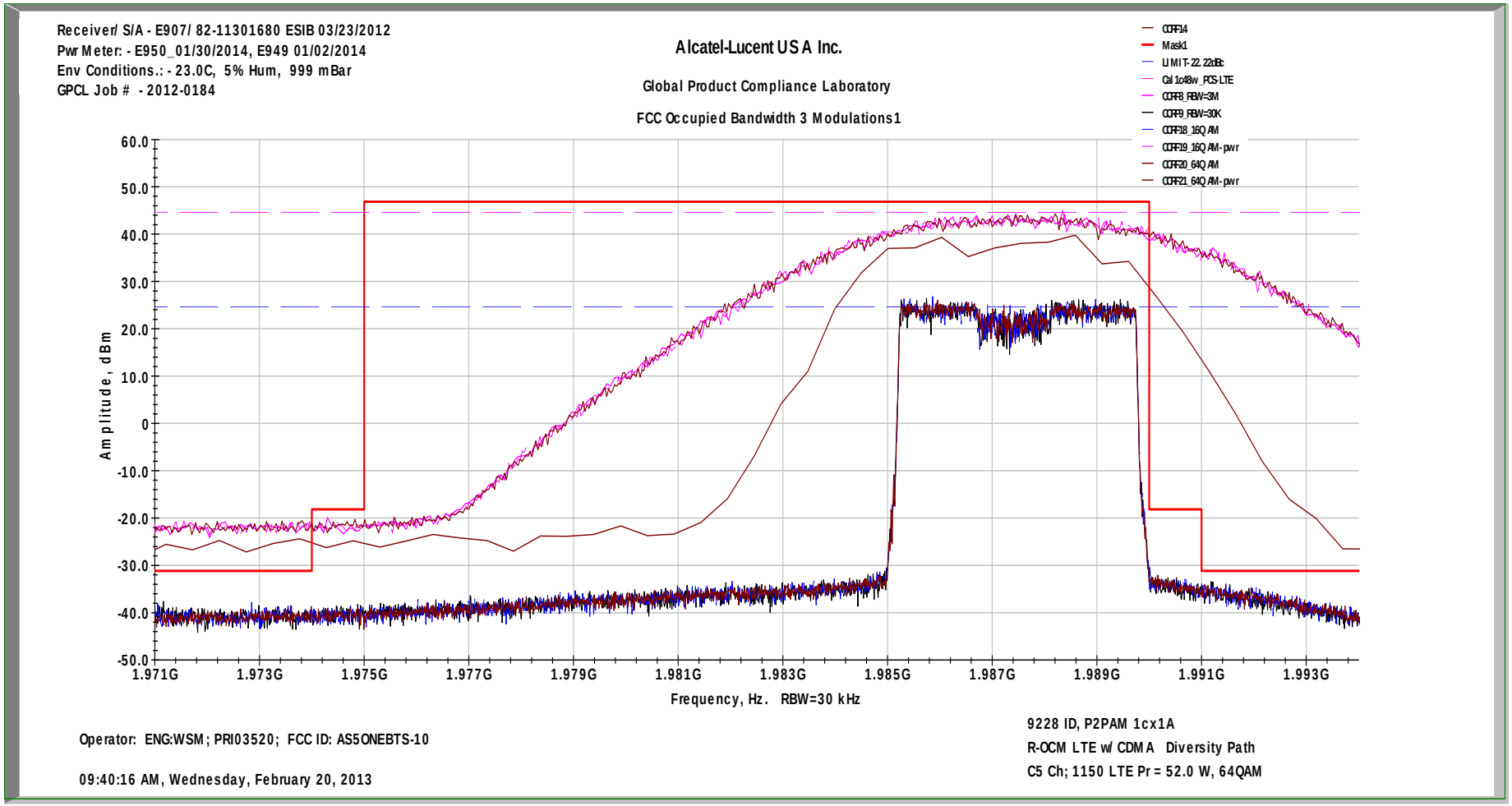
In-Band Intermodulation Graph LTE5 MHz Ch C-1150 1cx1A 48W/c 64QAM Diversity Tx2



FCC Edge of Block Margin LTE5 MHz Ch C-1150 1cx1A 48W/c 64QAM Diversity Tx2



FCC Occupied Bandwidth with 3 Modulations LTE5 MHz Ch C-1150 1cx1A 48W/c QPSK, 16QAM and 64QAM Diversity Tx2



15. Exhibit 15: Conducted Spurious Emissions At Antenna Terminals

Section 2.1051 Spurious Emissions at Antenna Terminals

15.1 Conducted Spurious Overview

Spurious Emissions at the antenna terminals were investigated over the frequency range of 10 MHz to 20 GHz which is beyond the 10th harmonic of the carrier frequency. The RF output from the transmitter was reduced, to an amplitude usable by the spectrum analyzer, by use of a broadband attenuator. The complete RF test path was calibrated over the 10 MHz - 20 GHz range. The RF power level was measured and monitored prior to and during the test via the test setup in Figure 15A. The spurious measurements were made using an automated test system. The test system consists of a Rohde & Schwarz FSEM30 Spectrum Analyzer (or ESIB 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 20 GHz.

The required emission limitation specified in Section 24.238 of Title 47 CFR was applied to these tests. Based upon the criterion given in Section 24.238 of Title 47 CFR (1-Oct-2010) and as developed in Exhibit 14, the required emission limit for MIMO operation is -16.01 dBm when measured with a resolution bandwidth of 1 MHz. The measurements of the spurious signals were therefore made using a resolution bandwidth of 1 MHz. All spurious and harmonics of the LTE Carrier was also shown to be lower than the -16.01 dBm limit.

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 and accurately depicts the carrier output power in relation to the spurious signals and the defined limit. In this application the **PCS Base Station System** has a maximum power output of 120 Watts at the antenna terminals when using 3 40W P2PAM amplifiers. (46.02 dBm/amplifier +2/-4 dB). The signal applied to the **PCS Base Station System** is as defined in **3GPP TS 36.211 V9.1.0 (2010-03).** The power was set to the specified 32 or 48 W/carrier maximum for the specific emissions designator at each measurement frequency to verify the spectral performance at that power level at each specific frequency of interest. The test was performed for the 64QAM modulation configuration.

15.2 Test Results Summary:

Conducted Spurious measurements were performed for the **PCS Base Station System** configurations supporting 3 MHz LTE carrier operation at 32 Watts/c and for the 5 MHz LTE carrier operation at 48 Watts/c. Conducted Transmit Spurious measurements were performed as part of the test profile for Occupied bandwidth. Every PCS Block Edge measurements configuration for both Primary and Diversity ports included a Conducted Transmit Spurious measurements as documented below.

The attached spectral plots are representative of the Conducted Spurious compliance performance of the **PCS Base Station System.** The compliance for all of the representative transmit configurations are documented in Table 15.1. This Table lists PCS 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. The results are compliant with FCC requirements.

15.2.1 Measurement of the 3 MHz Carrier Configuration

The attached spectral plots are representative of the Conducted Spurious compliance performance of the **PCS Base Station System** operating with the **3M00F9W** Emissions Designator. The compliance for all of the representative transmit configurations are documented in the Table below. 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. The results are compliant with FCC requirements.

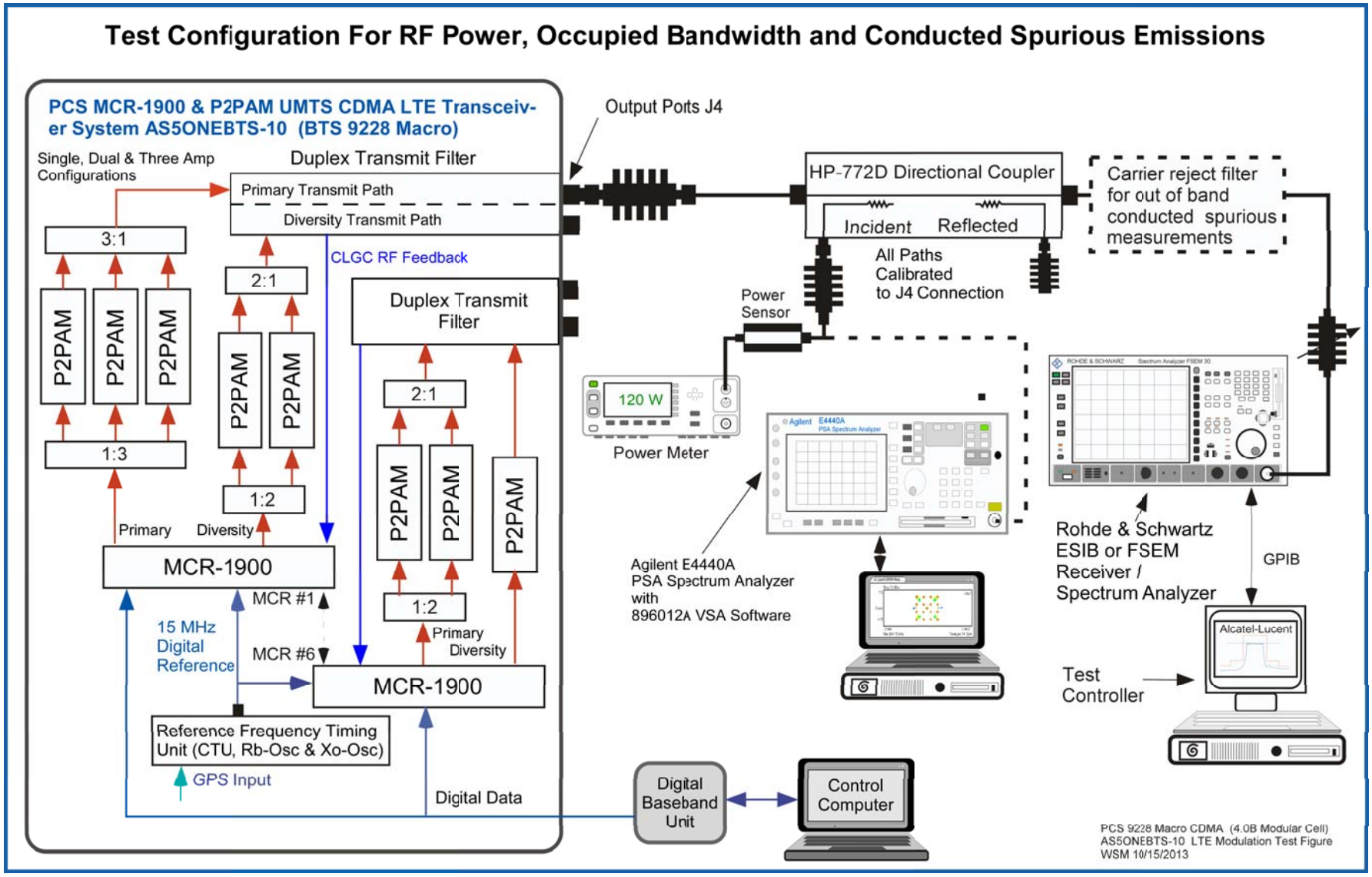
PCS - Block	PCS Channel #	Primary Conducted Spurious Compliance	Diversity Conducted Spurious Compliance
A	30	Compliant	Compliant
A	270	Compliant	Compliant
D	330	Compliant	Compliant
D	370	Compliant	Compliant
B	430	Compliant	Compliant
B	670	Compliant	Compliant
E	730	Compliant	Compliant
E	770	Compliant	Compliant
F	830	Compliant	Compliant
F	870	Compliant	Compliant
C	930	Compliant	Compliant
C	1170	Compliant	Compliant

15.2.2 Measurement of the 5 MHz Carrier Configuration

The attached spectral plots are representative of the Conducted Spurious compliance performance of the **PCS Base Station System** operating with the **5M00F9W** Emissions Designator. The compliance for all of the representative transmit configurations are documented in the Table below. 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. The results are compliant with FCC requirements..

PCS - Block	PCS Channel #	Primary Conducted Spurious Compliance	Diversity Conducted Spurious Compliance
A	50	Compliant	Compliant
A	250	Compliant	Compliant
D	350	Compliant	Compliant
B	450	Compliant	Compliant
B	650	Compliant	Compliant
E	750	Compliant	Compliant
F	850	Compliant	Compliant
C	950	Compliant	Compliant
C	1150	Compliant	Compliant

Figure 15A Test Setup for Antenna Port Measurement of Conducted Spurious Emissions



Measurements of
Transmitter Conducted Spurious Emissions
of
Alcatel-Lucent USA Inc.
LTE PCS 9228 Base Station Macro
FCC ID: AS5ONEBTS-10
Operational Configuration
with
Emissions Designator 3M00F9W
at 32W/carrier

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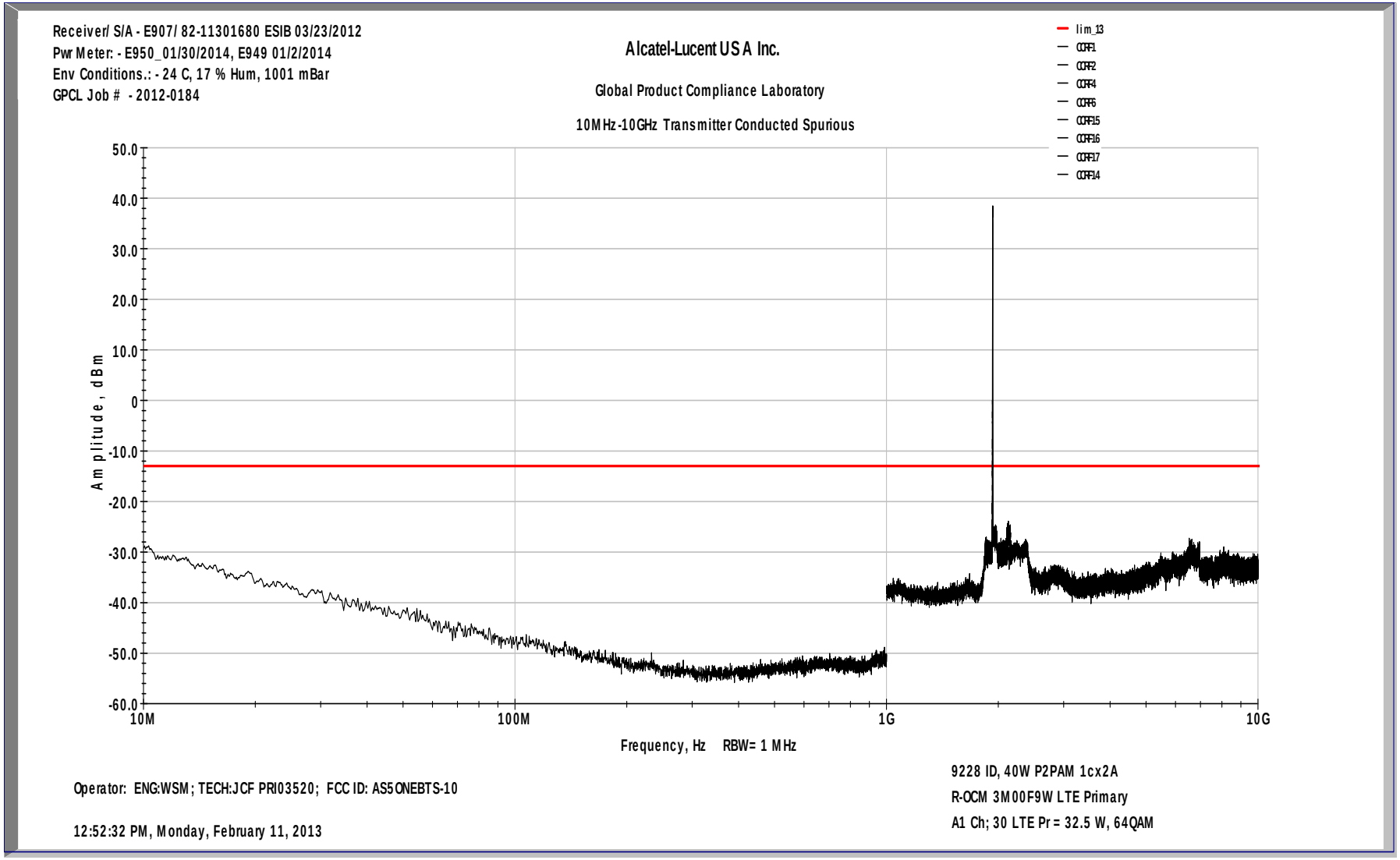
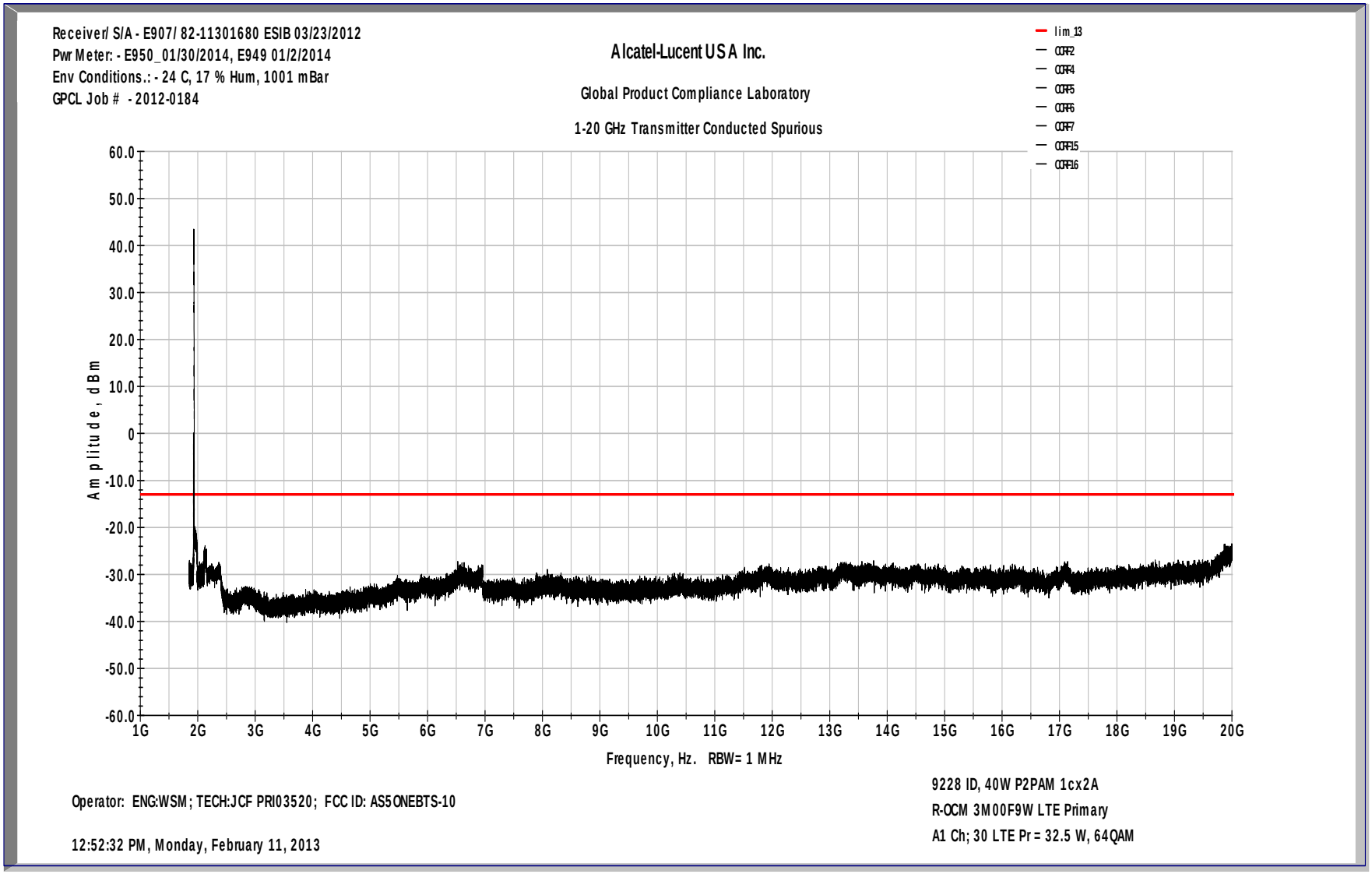
email: steve.majkowski@alcatel-lucent.com

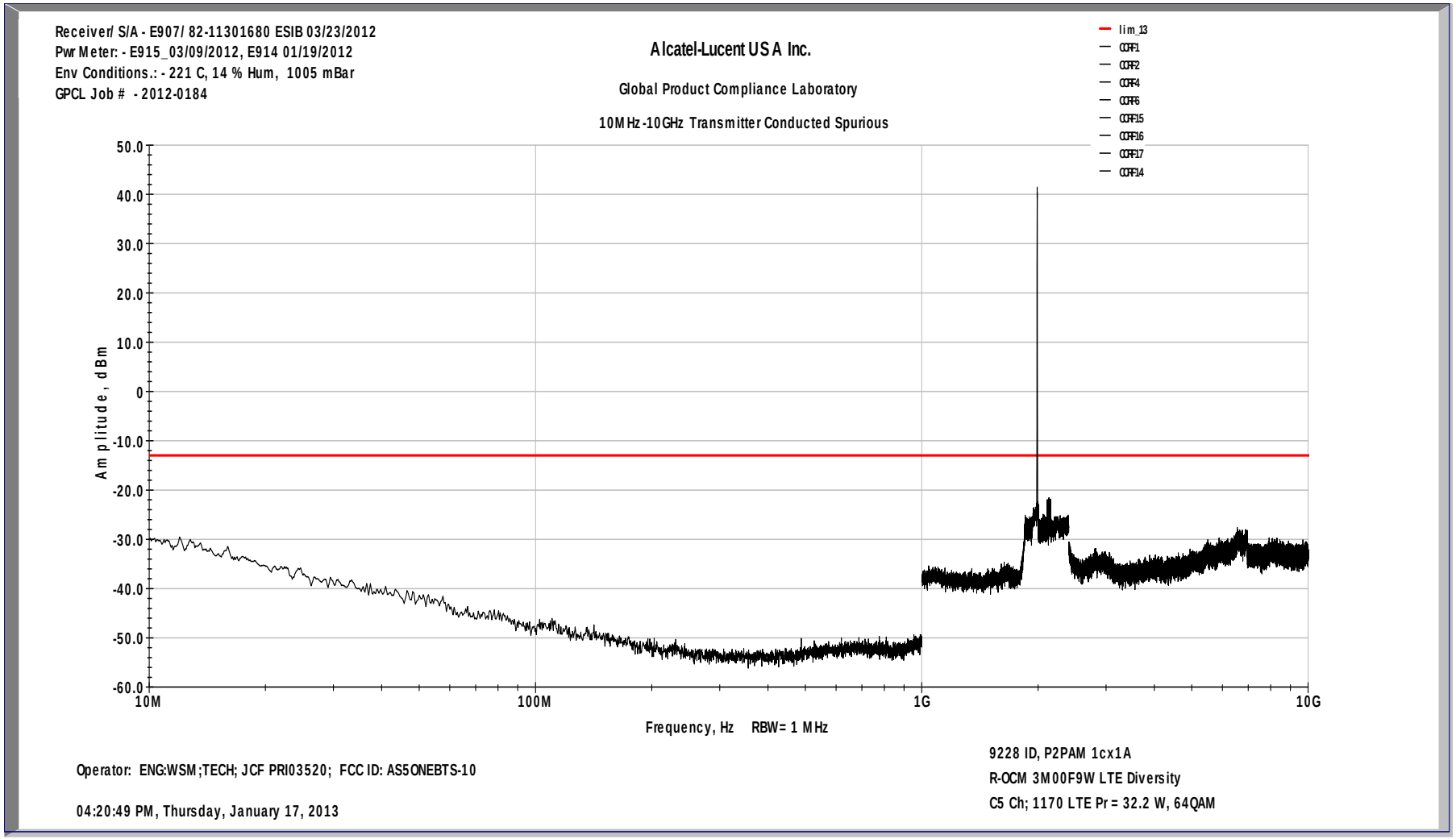
Conducted Spurious Emissions 10 MHz – 10 GHz LTE/CDMA 3 MHz Ch A-30 1cx2A 32W/c 64QAM Primary Tx1



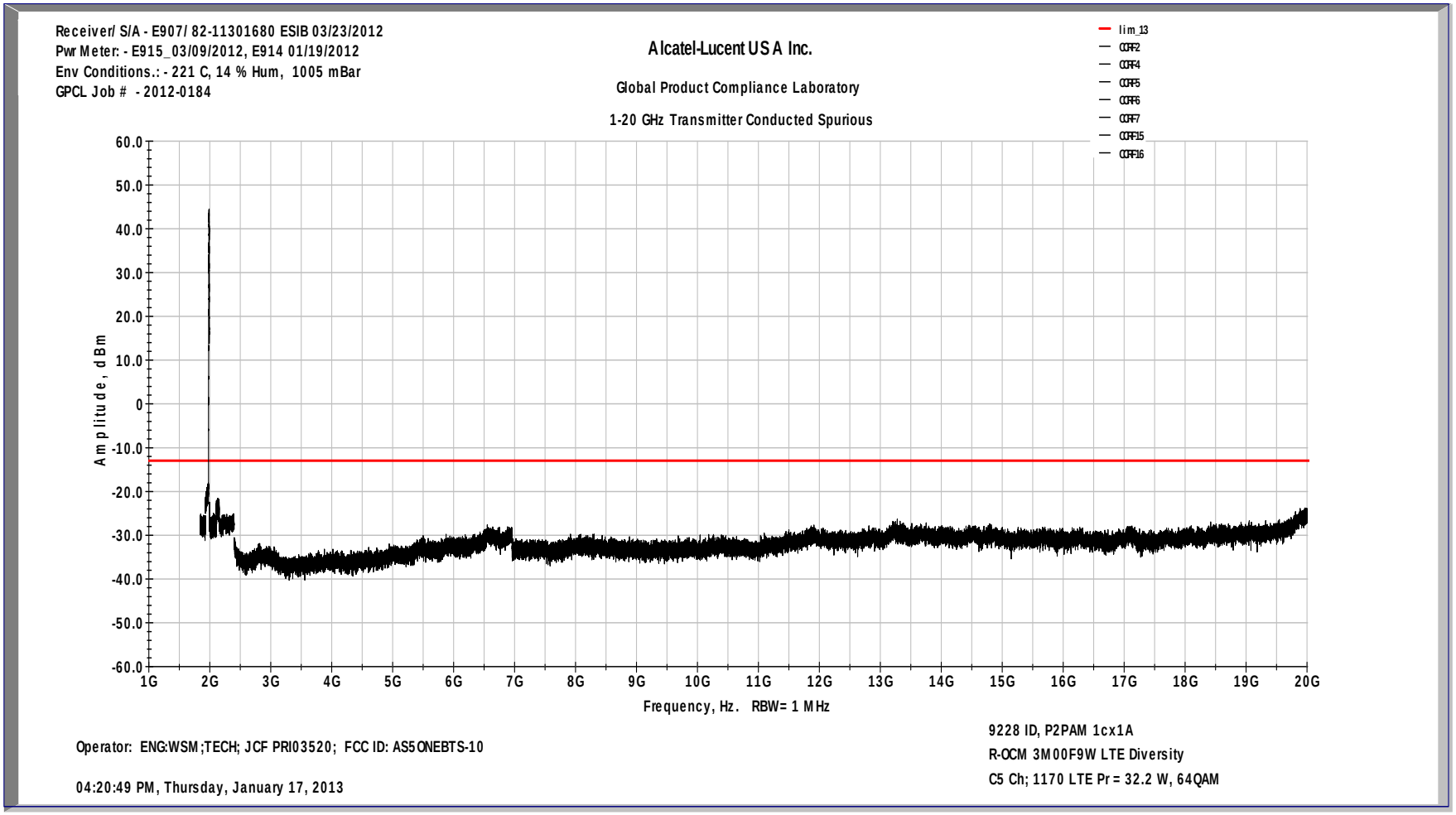
Conducted Spurious Emissions 1 – 20 GHz LTE/CDMA 3 MHz Ch A-30 1cx2A 32W/c 64QAM Primary Tx1



Conducted Spurious Emissions 10 MHz – 10 GHz LTE/CDMA 3 MHz Ch C-1170 1cx1A 32W/c 64QAM Diversity Tx2



Conducted Spurious Emissions 1 – 20 GHz LTE/CDMA 3 MHz Ch C-1170 1cx1A 32W/c 64QAM Diversity Tx2



Measurements of
Transmitter Conducted Spurious Emissions
of
Alcatel-Lucent USA Inc.
LTE PCS 9228 Base Station Macro
FCC ID: AS5ONEBTS-10
Operational Configuration
with
Emissions Designator 5M00F9W
at 48W/carrier

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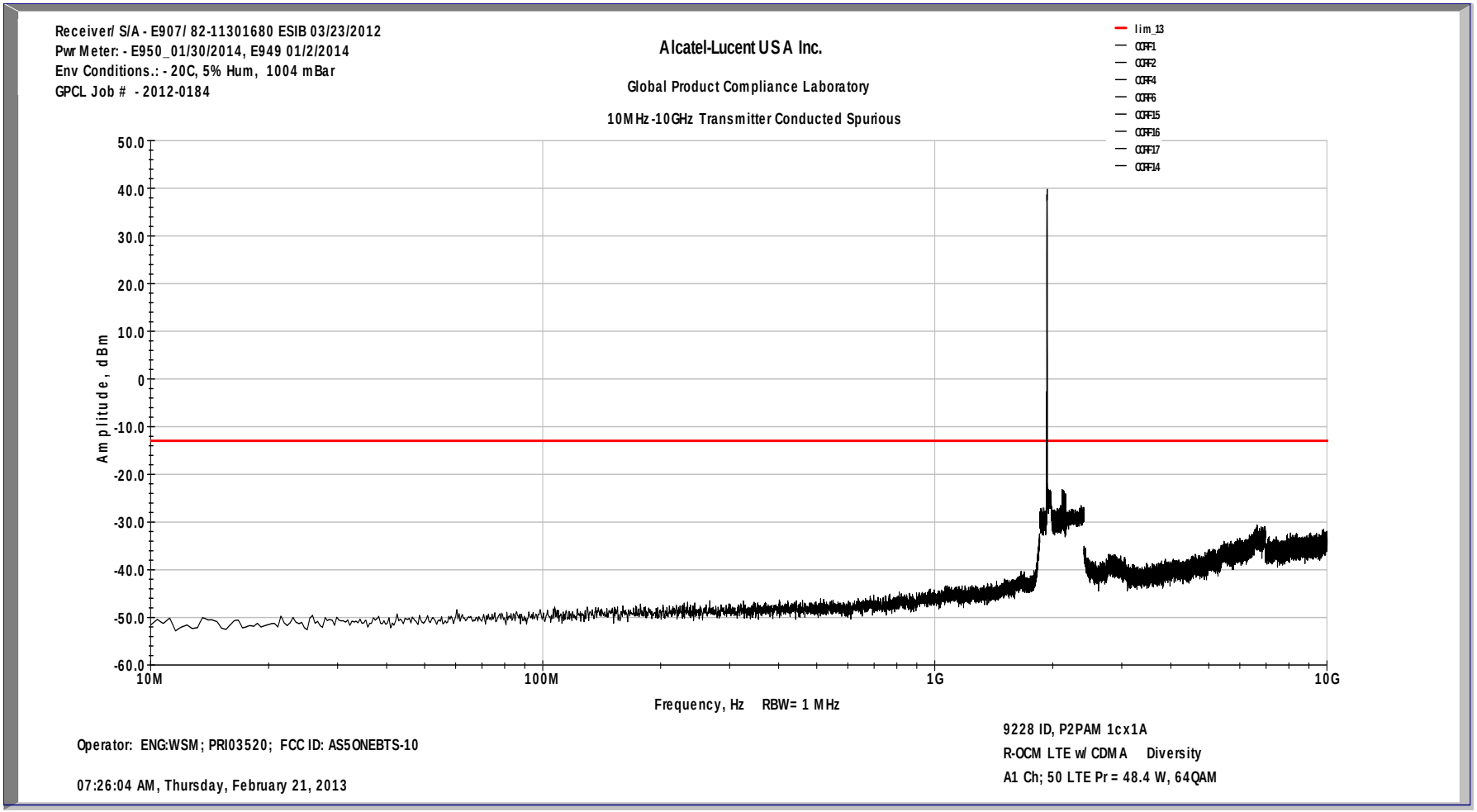
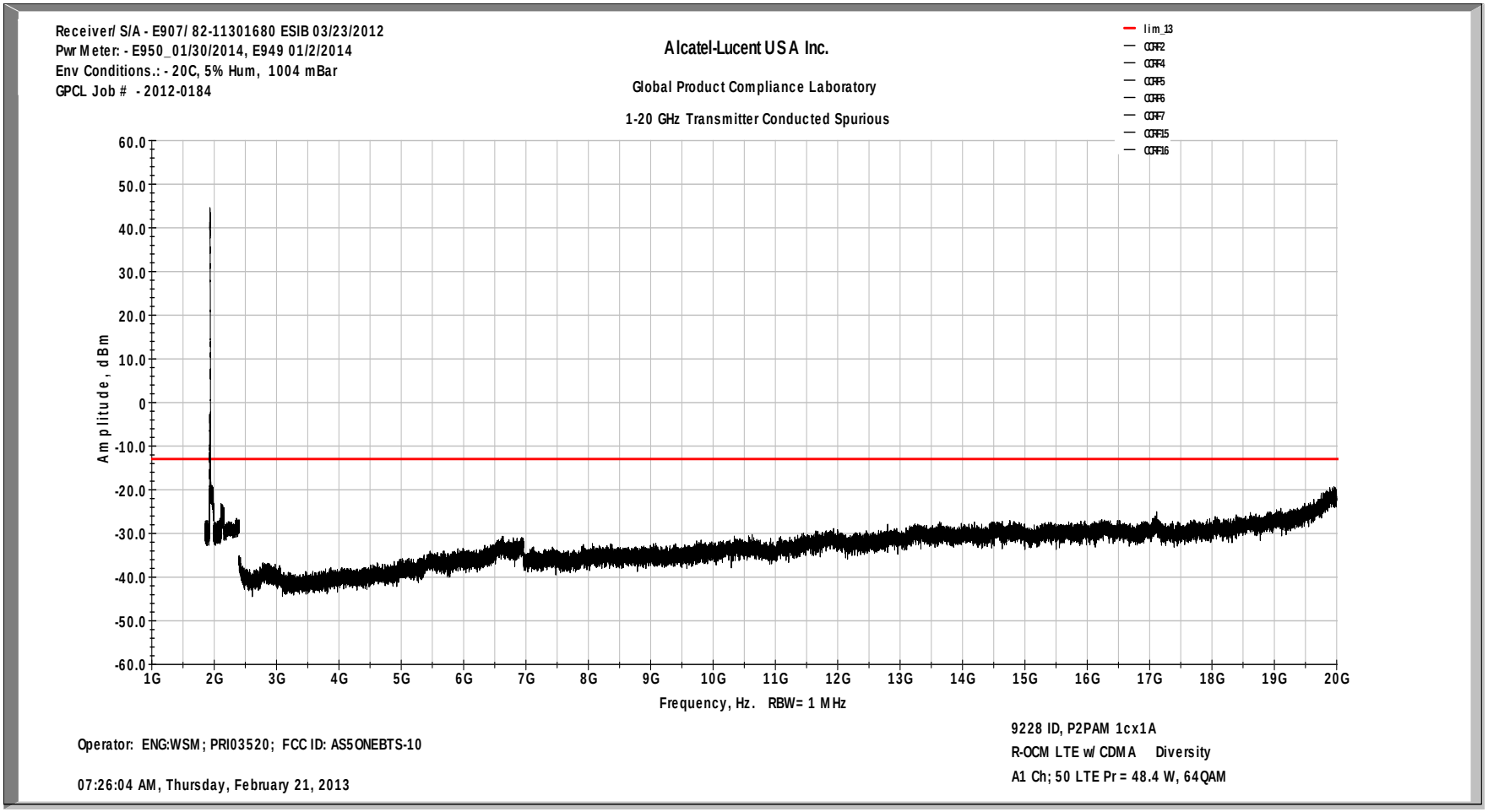
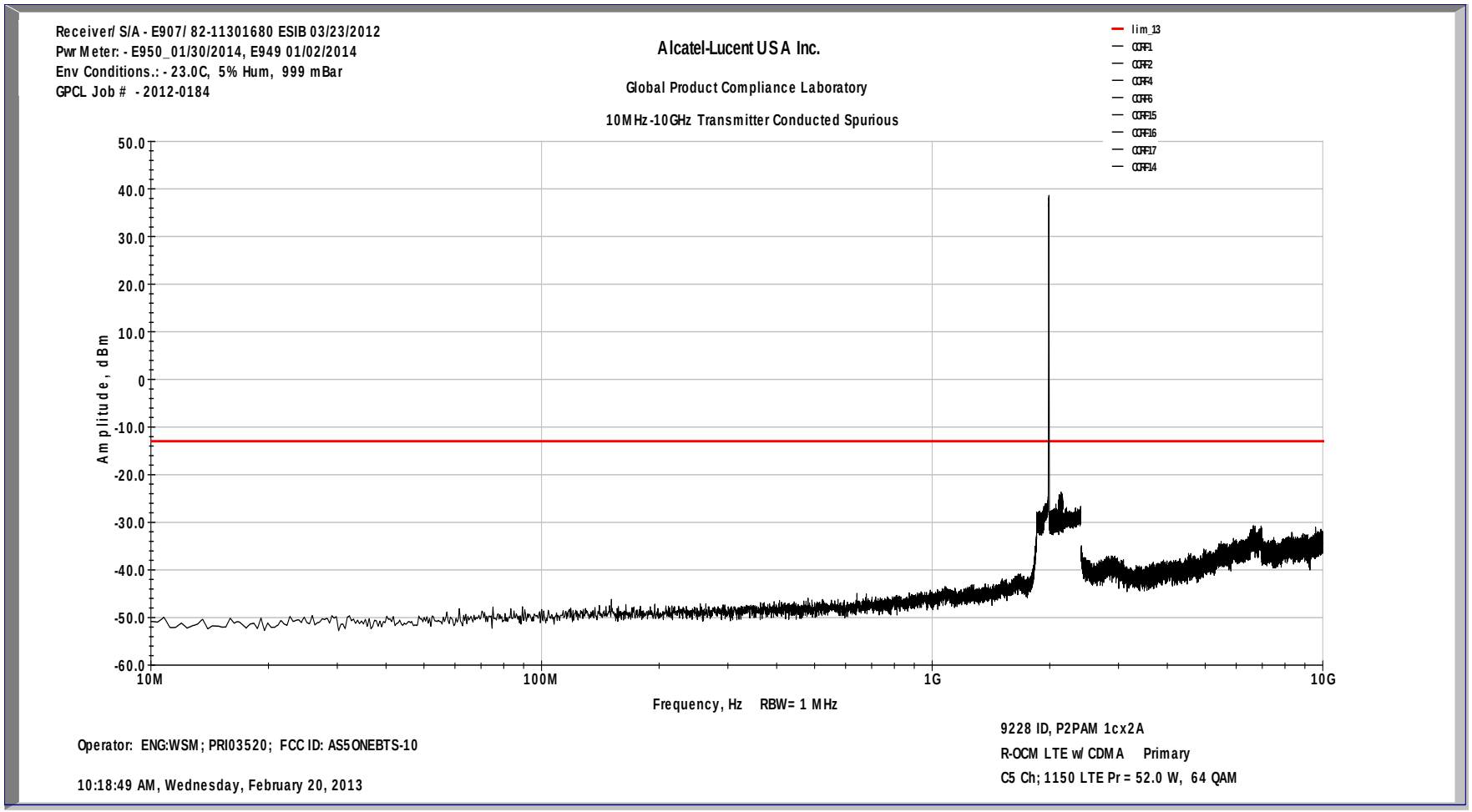
Conducted Spurious Emissions 10 MHz – 10 GHz LTE5 MHz Ch A-50 1cx1A 48W/c 64QAM Diversity Tx2



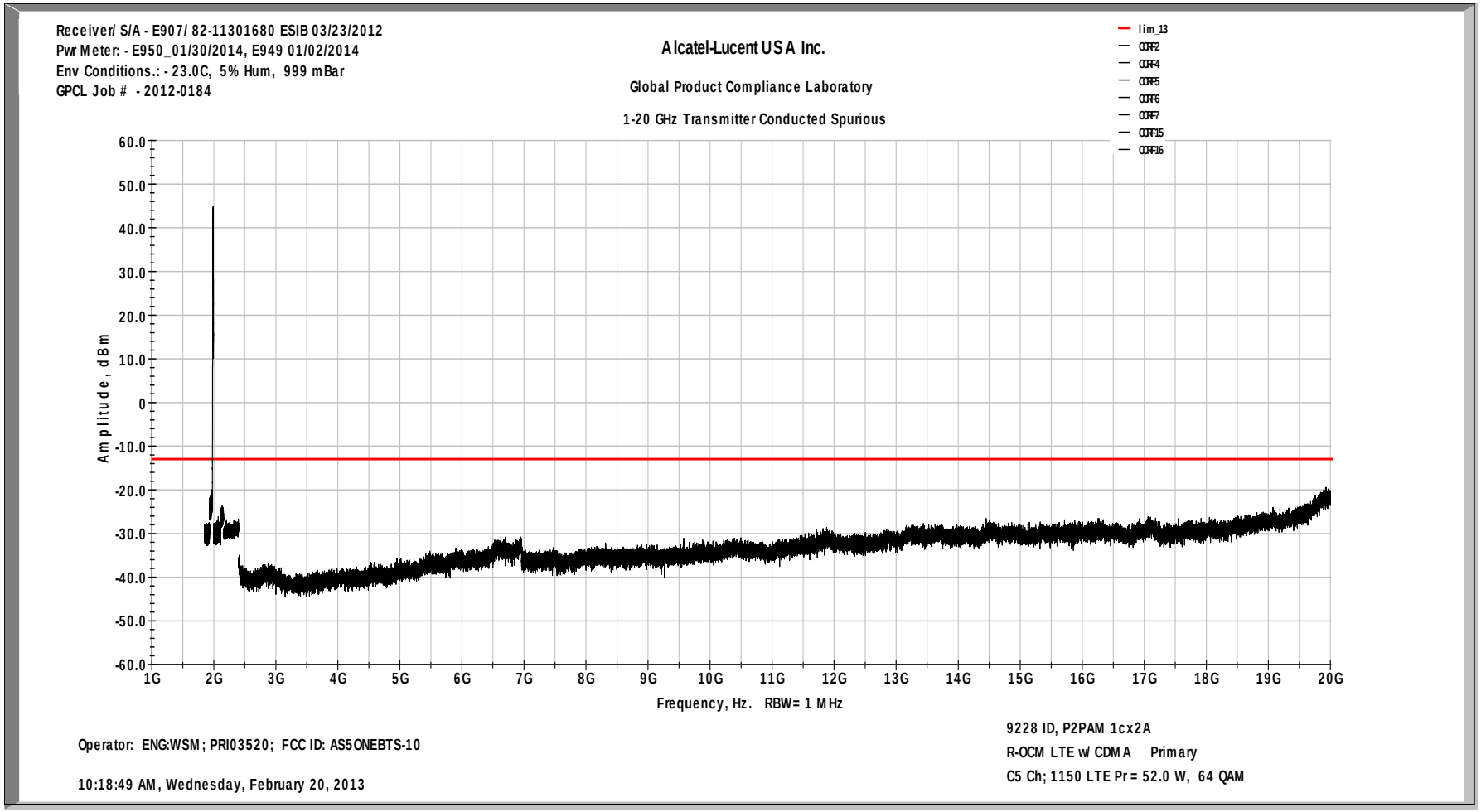
Conducted Spurious Emissions 1 – 20 GHz LTE5 MHz Ch A-50 1cx1A 48W/c 64QAM Diversity Tx2



Conducted Spurious Emissions 10 MHz – 10 GHz LTE5 MHz Ch C-1150 1cx2A 48W/c 64QAM Primary Tx1



Conducted Spurious Emissions 1 – 20 GHz LTE5 MHz Ch C-1150 1cx2A 48W/c 64QAM Primary Tx1



16. Exhibit 16: Field Strength Of Spurious Radiation

SECTION 2.1053 Field Strength of Spurious Radiation

16.1 Field Strength of Spurious Radiation Overview

Field strength measurements of radiated spurious emissions were evaluated in a 3m semi anechoic compliance chamber maintained by Alcatel-Lucent USA Inc Bell Laboratories 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.

16.2 Test Configuration

The three **MCR1900s** were configured with n=12 **P2PAMs** and all other associated equipment in a **PCS Indoor LTE PCS 9228 Base Station Macro** frame. This formed a three transmit sector **PCS Base Station Systems/ FCC ID: AS5ONEBTS-10** configured with the LTE carrier. Each sector was configured to a specific PCS Block in a 2xMIMO configuration. The spectrum from 10 MHz to beyond the tenth harmonic of the highest frequency carrier (20 GHz) was searched for spurious radiation. Measurements were made using both horizontally and vertically polarized broadband antennas. Measurements were made while operating in PCS Blocks A, D, B, E, F and C for both the 3M00F9W and the 5M00F9W LTE carriers.

16.3 Test Methodology

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 24.238 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.

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

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

Where: E = Field Intensity in Volts/ meter
P_t = Transmitted Power in watts = 32 and/or 48 W/ Carrier
R = Distance in meters = 10 m
$P = P_t/4\pi R^2$ Power density in W/m^2

16.4 RESULTS:

For this particular test, the field strength of any spurious radiation, measured at 10m, is required to be less than 71.7 dBμV/meter. Emissions equal to or less than 51.7 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 (20 GHz), no reportable spurious emissions were detected. This demonstrates that the **PCS Base Station System/ FCC ID: AS5ONEBTS-10**, the subject of this application, complies with Sections 2.1053, 24.238 and 2.1057 of the Rules. The product was also shown to be compliant with Part 15 Class B outside the transmit band.

17. Measurement Of Frequency Stability

SECTION 2.1055 Measurement of Frequency Stability

The design and performance of the Frequency generating and stabilizing circuitry of the **PCS Base Station System** specifically the PCS MCR-1900 has not changed. The frequency stability performance remains within the parameters as previously filed.

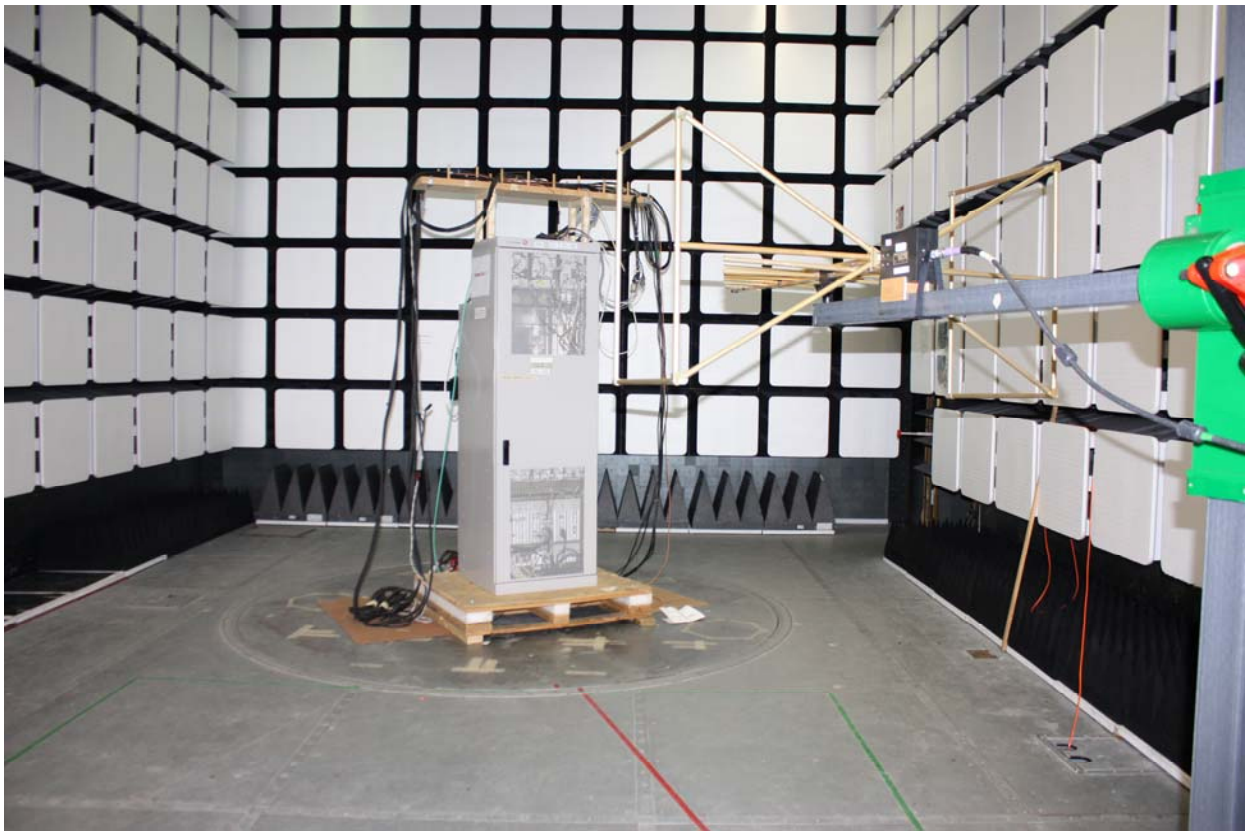
17.1 Previous results:

The previously filed data documented that the maximum frequency drift at the antenna terminal of the **PCS Base Station System/ FCC ID: AS5ONEBTS-10** due to temperature and supply voltage is 0.00151 ppm which is below 3GPP2 ±0.05ppm requirement. The Alcatel-Lucent **PCS Base Station System** demonstrated full compliance with the Rules of the Commission.

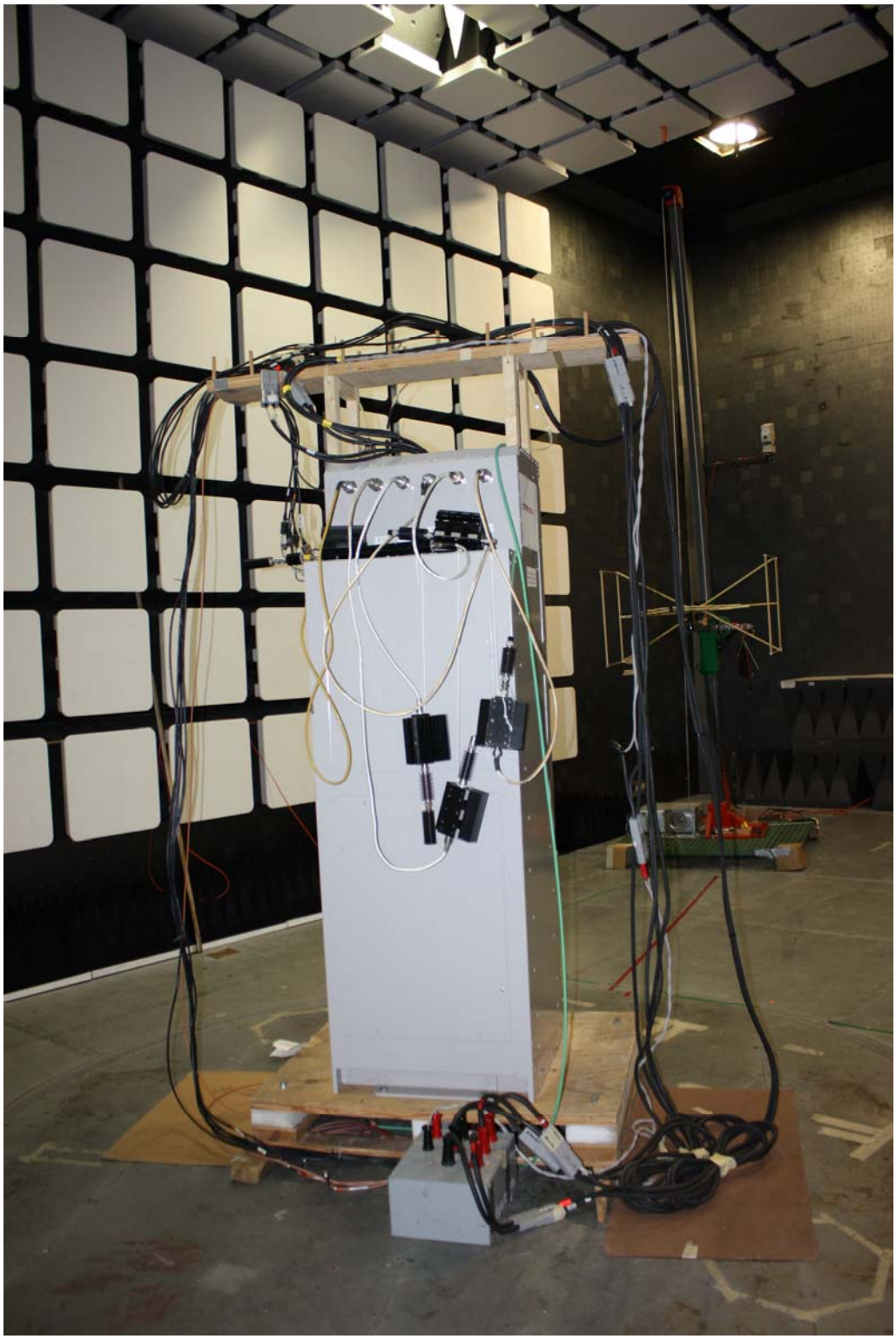
18. Exhibit 18 Photographs of the Test Setups

The following photographs document the test setups.

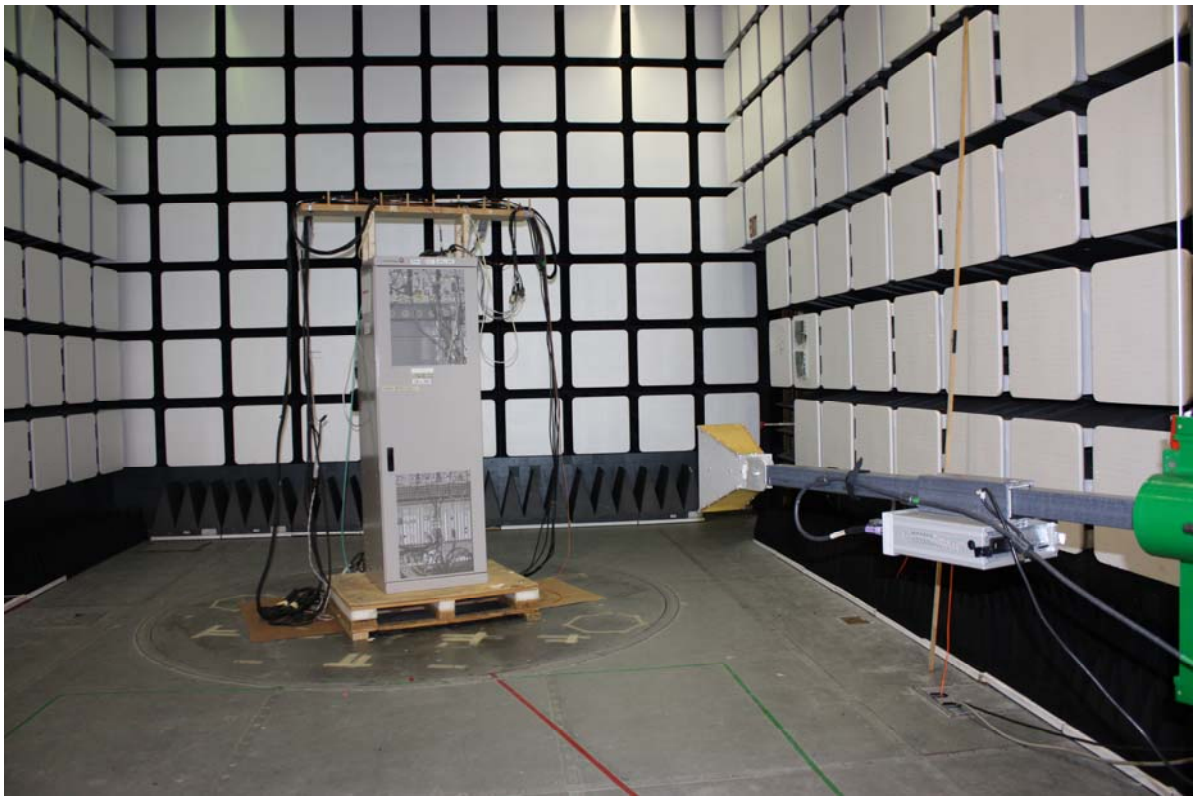
Radiated Emissions Test Photograph 30 MHz – 1 GHz



Radiated Emissions Rear View 30 MHz – 1 GHz



Radiated Emissions 1-18 GHz



Radiated Emissions 18-20 GHz