12. Exhibit 12 FCC Test Report

FCC Test Report of Alcatel-Lucent AWS LTE **B66a RRH 4x45** Outdoor Transceiver System
Multi Carrier Operation under **FCC ID: AS5BBTRX-28**

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.

12.1 Listing of Required Measurements

The data required by Section 2.1046 through 2.1057, inclusive, measured in accordance with the procedures set out in Section 2.1041.

Response: In **Alcatel-Lucent's AWS LTE RRH 4x45 Band 66 Outdoor Transceiver System / FCC ID: AS5BBTRX-28**, the lowest clock frequency is the 10 MHz reference oscillator. Conducted spurious measurements were performed over the range of 10 MHz to 21.8 GHz which is above the tenth harmonic of the transmit frequency range.

The following pages document the data required for the Product Certification authorization of the Alcatel-Lucent's **Remote Radio Head 4x25-B66 Transceiver System / FCC ID: AS5BBTRX-28**, measured in accordance with the procedures set out in Section 2.1041 of the Rules. The Unit under Test, UUT Herein, was identified as serial number LBALLU=YD1601033VX for Antenna Port and Radiated Emission testing. Frequency stability testing was performed with an identical model, serial number LBALLU-YD155102XNY.

Each required measurement and its corresponding exhibit number are:

FCC Filing Exhibit	FCC Regulation	Description
Exhibit 12.1	Section 2.1033(c)(14)	Listing of Required Measurements
Exhibit 12.2		Listing of Test Equipment
Exhibit 12.3	Section 2.1046	Measurement of Radio Frequency Power Output
Exhibit 12.4	Section 2.1047	Measurement of Modulation Characteristics
Exhibit 12.5	Section 2.1049	Measurement of Occupied Bandwidth
Exhibit 12.6	Section 2.1051	Measurement of Spurious Emissions at Antenna
Exhibit 12.7	Section 2.1053	Field Strength of Spurious Radiation
Exhibit 12.8	Section 2.1055	Measurement of Frequency Stability

12.1.1. Test Equipment

12.1.2. Antenna Port Measurements Test Equipment

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

Test Equipment List

Manufacturer	Model	Serial Number	Type	Description	GPCL ID	Last Cal	Interval	Status
Agilent Technologies	N1921A	US44510270	Power Sensor	-35 - +20 dBm 50 MHz -18 GHz	E914	6/15/2015	12	Active
Agilent Technologies	N1912A	GB44440226	Power Meter	P-Series Dual Channel	E915	6/17/2014	24	Active
Agilent Technologies	N1921A	MY45101984	Power Meter	P-Series	E950	2/19/2016	24	Active
Agilent Technologies	N1921A	MY45242502	Power Sensor	-35 - +20 dBm 50 MHz -18 GHz	E949	7/31/2015	12	Active
Rohde & Schwarz	ESIB40	100100	Test Receiver	EMI (20Hz to 40 GHz)-150 +30dBM	E908	6/22/2015	24	Active
Agilent Technologies	E4440A	MY45304655	Spectrum Analyzer	PSA Series	E935	9/16/2014	24	Active
Trilithic	10LC1790-3-AA	PCS-LPF-12	Low Pass Filter	PCS	E980	2/1/2016	12	Active
RLC Electronics	F-19391	1440-003	High Pass Filter	2.5GHz-26GHz High Pass filter	E1210	2/1/2016	12	Active
Trilithic	5HC2850/18050-1.8-KK	PCS-HPF-11	High Pass Filter	PCS	E988	2/1/2016	12	Active

12.1.2.1. Antenna Port Measurements Test Coupler

The RF Test coupler used for antenna port conducted testing is maintained and its calibration verified as a unit. The individual components are listed below. It is identified as **White LP 150W-Mule-Lim** for White-Low Power-150W-Multi Use Laboratory Equipment **(MULE)-**Low Intermod.

Manufacturer	Model	Serial Number	Type	Description	GPCL ID	Last Cal	Interval	Status
Hewlett Packard	772D	02839A0073	Directional Coupler	Dual directional coupler 2-18GHz	E1222	2/1/2016	12	Active
Hewlett Packard	8495B	157170	Attenuator	70dB Digital Attenuator	E1220	2/1/2016	12	Active
Hewlett Packard	8494B	157171	Attenuator	11 dB Digital Attenuator	E1221	2/1/2016	12	Active
Weinschel	6528-30-34-LIM	BN4170	Attenuator	DC-18GHz 30dB 150W	E1223	2/1/2016	12	Active
Weinschel	46-6-34	BH9330	Attenuator	6dB Attenuator 25W	E1229	2/1/2016	12	Active
Weinschel	7003	G3831	DC Block	Type N DC Block 9 kHz to 18 GHz		2/1/2016	12	Active
Weinschel	154DR-10	1027	Directional Coupler	Directional Coupler 1-4 GHz		2/1/2016	12	Active
Micro-Coax	UFB197C-1-0960-50U5GL	210525-009	Test Cable	Low Loss Precision N Test Cable		2/1/2016	12	Active
Micro-Coax	UFB197C-1-0240-50U5GL	210524-008	Test Cable	Low Loss Precision N Test Cable		2/1/2016	12	Active

12.1.3. Radiated Spurious Emissions Equipment

RE / AR6 / 2015-0239

Manufacturer	Model	Serial Number	Type	Description	GPCL ID	Last Cal	Interval	Status
Weinschel	2-6	BX3430	Attenuator	6 dB DC-18GHz 5 Watt	E887	3/5/2014	24	Active
Sonoma Instrument Co.	310N	185785	Amplifier	9 kHz-1GHz	E494	12/3/2015	24	Active
Rohde & Schwarz	ESIB40	100121	Test Receiver	EMI (20Hz-40 GHz) -150 +30dBM	E704	4/8/2014	24	Active
A.H. Systems Inc.	SAS-521-2	408	Bilogical Antenna	25 - 2000 MHz	E601	2/13/2015	24	Active
ETS Lindgren	3117	00135198	Horn Antenna	Double-Ridged Waveguide Horn 1-18 GHz	E1073	12/10/2014	24	Active
Trilithic	5HC2850/18050-1.8-KK	PCS-HPF-11	High Pass Filter	High Pass Filter 2.5-18 GHz	E988	2/1/2016	12	Active
EMC Test Systems	3116	2539	Horn Antenna	Double Ridged Horn 18-40 GHz	E513	3/19/2015	24	Active

12.2 **Exhibit 12.2** MEASUREMENT OF RADIO FREQUENCY POWER OUTPUT

SECTION 2.1046 Measurements required: RF power output.

For LTE transmit carrier operation, the **AWS LTE RRH 4x45 Band 66 Outdoor Transceiver System** is specified to provide a continuous maximum power output of 180 Watts for all Outputs. In 2x MIMO Mode it provides a maximum of 90 Watt at each of two transmit antenna terminals (49.54 dBm +2/-4 dB for each of the carriers). It also has a minimum power output at the antenna terminals of 1.00 Watts (30 dBm +2 / -4 dB). This power capability was demonstrated across the AWS downlink Band of 2110 MHz to 2180 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 RRH 4x45 Band 66 Outdoor Transceiver System / AS5BBTRX-28**, 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 testing was configured to set the specific carrier or carrier set to the maximum per port power value of 90 W maximum. This was done at each measurement frequency to verify the spectral performance at that power level at each specific frequency of interest. Power was verified for the multiple modulations tested. Carriers were configured with either QPSK + 16QAM or with 64QAM modulation and this data is documented on the Occupied Bandwidth data sheets. The Peak to Average Ratio (PAR) was verified to be below 13 dB as required by Part 27.50(d)(5). Representative data sheets are in Exhibit 12.3 Modulation.

The 99%/-26dB signal bandwidth was measured using the setup of Figure 12.2 for each Emissions Designator in this application (5MHz, 10 MHz, 15 MHz and 20 MHz). The measurements were performed with a resolution bandwidth of 300 kHz and verified the signal is within the parameters of the emissions designator and is documented below in section 12.3

The test arrangements used to measure the radio frequency power output of the **Alcatel-Lucent's AWS LTE B66a RRH 4x45 / AS5BBTRX-28** is on the following page. Measurements were made respectively at each frequency where Occupied Bandwidth measurements were performed and compliance was documented.

Figure 12.2 RF Power Test Configuration

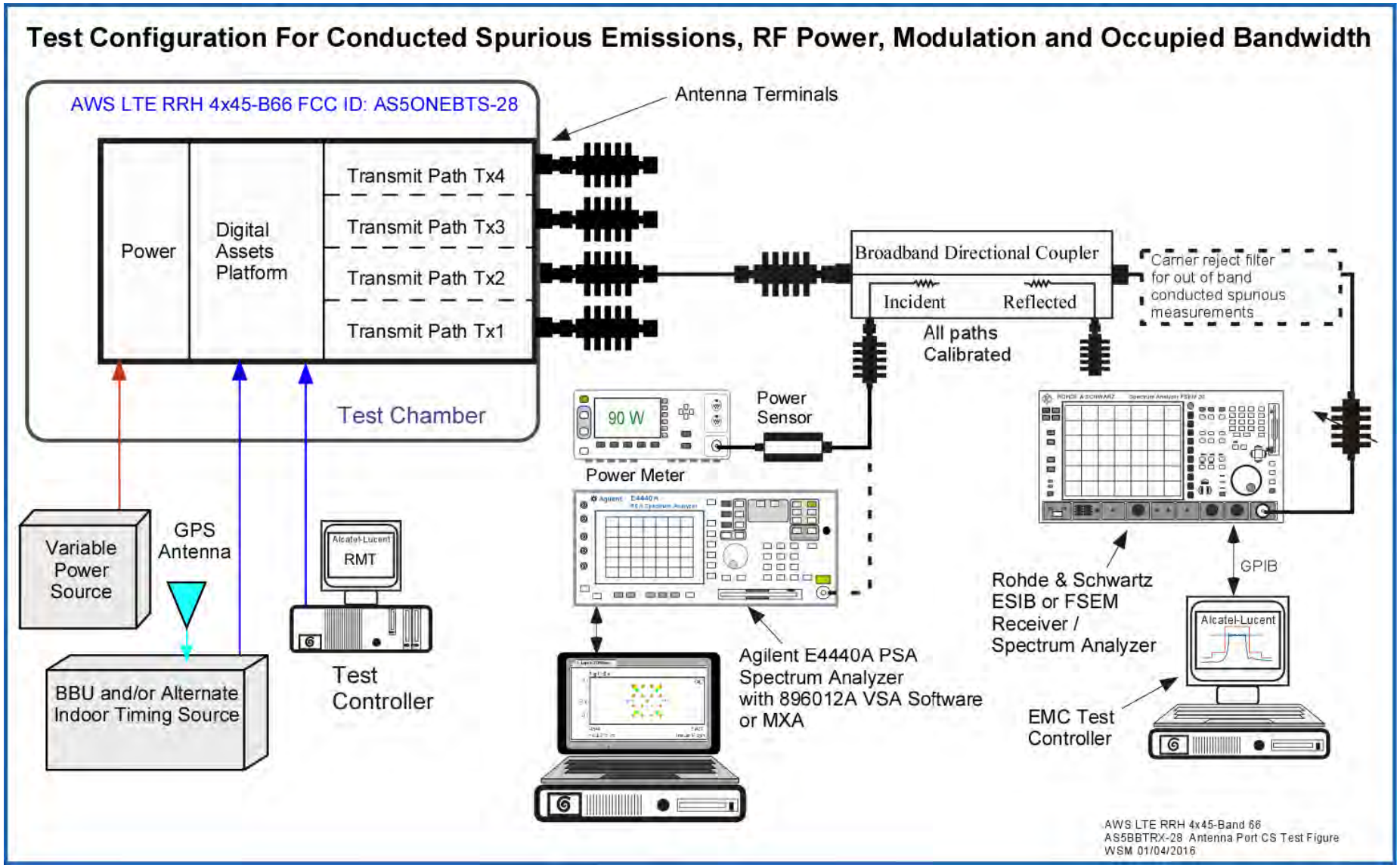

Table 12.2 Measurements required: RF power output.

Test #	AWS Block	Port	Transmit Power, 's, Watts	Signal Bandwidth, MHz	Modulation Q16=QPSK/16QAM 64=64QAM	Carrier Center Frequency, MHz	RF Power Pass / Fail
1	AB	Tx1	90	20	Q, 64	2120	Pass
2	D+E+F	Tx1	90	20	Q, 64	2145	Pass
3	BC	Tx2	90	15	Q, 64	2127.5	Pass
4	EF	Tx2	90	15	Q, 64	2147.5	Pass
5	C+D+E	Tx2	90	15	Q, 64	2137.5	Pass
6	A + C	Tx1	60 + 30	10 + 5	Q16 + 64	2115+ 2132.5	Pass
7	B + E	Tx1	60 + 30	10 + 5	Q16 + 64	2125 + 2142.5	Pass
8	CD + FL	Tx1	60 + 30	10 + 5	Q16 + 64	2135 + 2147.5	Pass
9	DE + Fr	Tx2	60 + 30	10 + 5	Q16 + 64	2140 + 2152.5	Pass
10	A+F	Tx1	40 + 40	5+5	Q16 + 64	2112.5 + 2152.5	Pass
11	A + F	Tx1	40 + 40	5+5	Q16 + 64	2117.5 + 2147.5	Pass
12	B + D	Tx1	40 + 40	5+5	Q16 + 64	2122.5 + 2137.5	Pass
13	B + F	Tx1	40 + 40	5+5	Q16 + 64	2127.5 + 2152.5	Pass
14	C+E	Tx1	40 + 40	5+5	Q16 + 64	2132.5 + 2142.5	Pass
15	AB + F	Tx2	60 + 30	20 + 5	64 + Q16	2120 + 2152.5	Pass
16	A +DEF	Tx2	30 + 60	5+20	Q16 + 64	2117.5 + 2145	Pass
17	A+EF	Tx2	30 + 60	5+15	Q16 + 64	2112.5 + 2147.5	Pass
18	AB+C	Tx2	60 + 30	15+5	64 + Q16	2117.5 + 2132.5	Pass
19	A + EF	Tx2	45 + 45	10 + 15	64 + Q16	2115 + 2147.5	Pass
20	AB + EF	Tx2	45 + 45	15 + 10	64 + Q16	2122.5 + 2145	Pass
21	A + F	Tx1	45 + 45	10+10	64 + Q16	2115 + 2150	Pass
22	B + DE	Tx1	45 + 45	10+10	64 + Q16	2125 + 2140	Pass

RESULTS:

The **AWS LTE RRH 4x45 Band 66 Outdoor Transceiver System / AS5BBTRX-28** was configured in the test setup shown in Figure 12.2. For the Primary and Diversity antenna ports the **LTE RRH 4x45 Band 66** delivered a minimum of 90 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 “Left edge” and “Right Edge” of each frequency Block.

12.3 **Exhibit 12.3 SECTION 2.1047 MEASUREMENT OF MODULATION CHARACTERISTICS**

The modulation characteristics and accuracy of the output signal of the AWS LTE **B66a RRH4x45** Outdoor Transceiver System **/ FCC ID: AS5BBTRX-28** is a function its Digital Analog and Power Amplifier assembly.

12.3.1 **Modulation Description**

The LTE spectrum while appearing similar to CDMA differs greatly in complexity . The modulation used in evaluating the **AWS LTE B66a RRH4x45 / AS5BBTRX-28** 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 with either QPSK, 16QAM or 64QAM coding. 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.

12.3.2 **Measurement**

The **B66a RRH4x45** 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 each of the AWS Channels documented in table 12.3.2. The 99%/-26 dB Occupied Signal Bandwidth was also measured for each Emissions Designator and is documented below.

12.3.3 **Results**

For each of the AWS channels tested, the **B66a RRH4x45** 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 8 and 11 dB which is compliant with the CFR which specifies that the PAR be less than 13 dB. The **B66a RRH4x45** transmit signal modulation parameters and constellation for various AWS channels is shown in Figures 12.3B through 12.3E below for combined the QPSK+16QAM and for 64QAM operation.

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Table 12.3.2 Table of Modulation and Peak to Average Ratio Measurements

Test #	AWS Block	Port	Transmit Power, 's, Watts	Signal BW, MHz	Modulation Q16=QPSK/16QAM 64=64QAM	Carrier Center Frequency, MHz	Modulation Pass / Fail	PAR Pass / Fail
1	AB	Tx1	90	20	QPSK, 64QAM	2120	Pass	Pass
2	D+E+F	Tx1	90	20	QPSK, 64QAM	2145	Pass	Pass
3	BC	Tx2	90	15	QPSK, 64QAM	2127.5	Pass	Pass
4	EF	Tx2	90	15	QPSK, 64QAM	2147.5	Pass	Pass
5	C+D+E	Tx2	90	15	QPSK, 64QAM	2137.5	Pass	Pass
6	A + C	Tx1	60 + 30	10 + 5	Q16 + 64	2115+ 2132.5	Pass	Pass
7	B + E	Tx1	60 + 30	10 + 5	Q16 + 64	2125 + 2142.5	Pass	Pass
8	CD + FL	Tx1	60 + 30	10 + 5	Q16 + 64	2135 + 2147.5	Pass	Pass
9	DE + Fr	Tx2	60 + 30	10 + 5	Q16 + 64	2140 + 2152.5	Pass	Pass
10	A+F	Tx1	40 + 40	5+5	Q16 + 64	2112.5 + 2152.5	Pass	Pass
11	A + F	Tx1	40 + 40	5+5	Q16 + 64	2117.5 + 2147.5	Pass	Pass
12	B + D	Tx1	40 + 40	5+5	Q16 + 64	2122.5 + 2137.5	Pass	Pass
13	B + F	Tx1	40 + 40	5+5	Q16 + 64	2127.5 + 2152.5	Pass	Pass
14	C+E	Tx1	40 + 40	5+5	Q16 + 64	2132.5 + 2142.5	Pass	Pass
15	AB + F	Tx2	60 + 30	20 + 5	64 + Q16	2120 + 2152.5	Pass	Pass
16	A +DEF	Tx2	30 + 60	5+20	Q16 + 64	2117.5 + 2145	Pass	Pass
17	A+EF	Tx2	30 + 60	5+15	Q16 + 64	2112.5 + 2147.5	Pass	Pass
18	AB+C	Tx2	60 + 30	15+5	64 + Q16	2117.5 + 2132.5	Pass	Pass
19	A + EF	Tx2	45 + 45	10 + 15	64 + Q16	2115 + 2147.5	Pass	Pass
20	AB + EF	Tx2	45 + 45	15 + 10	64 + Q16	2122.5 + 2145	Pass	Pass
21	A + F	Tx1	45 + 45	10+10	64 + Q16	2115 + 2150	Pass	Pass
22	B + DE	Tx1	45 + 45	10+10	64 + Q16	2125 + 2140	Pass	Pass

Figure 12.3A

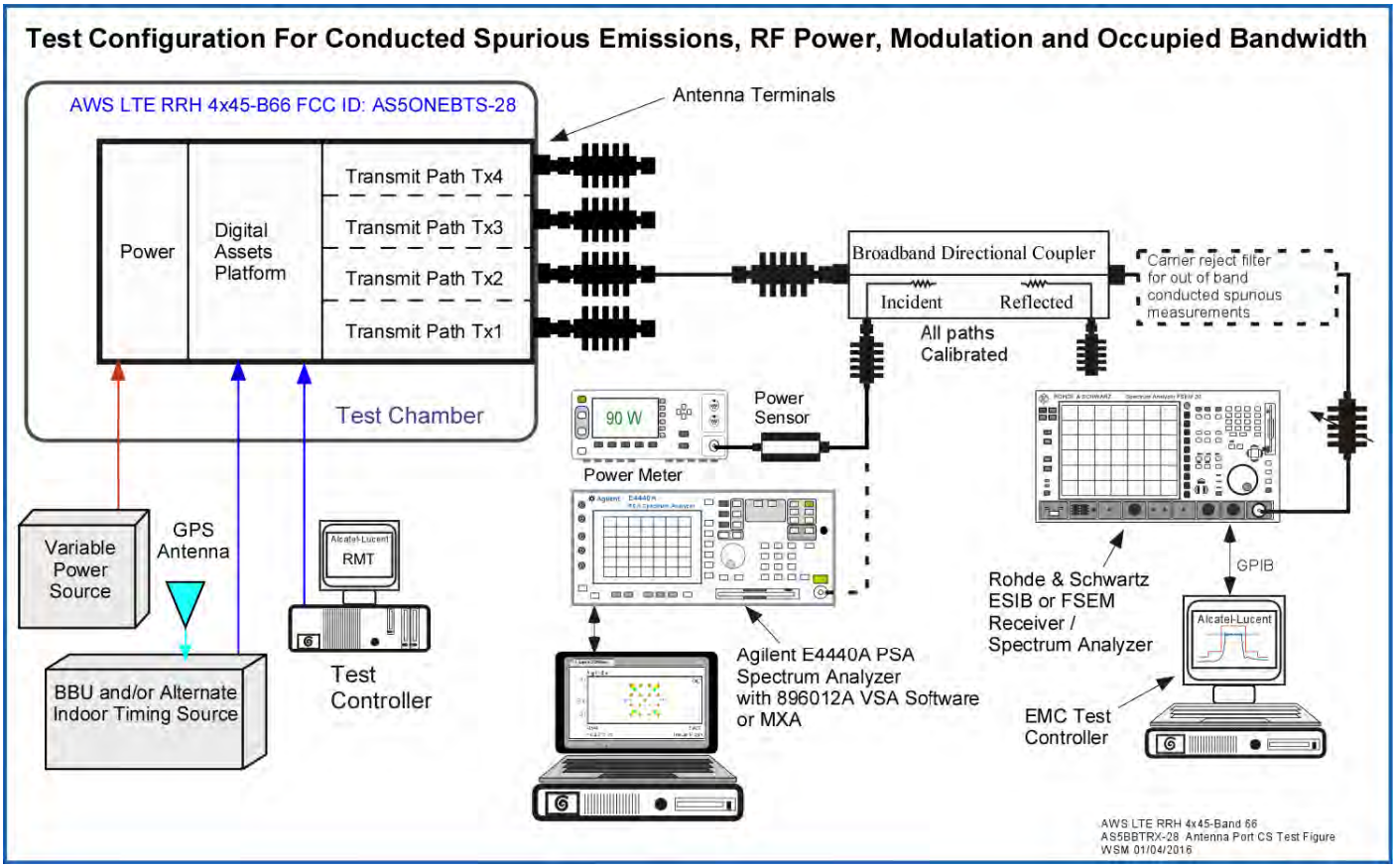

Test Configuration For Conducted Spurious Emissions, RF Power, Modulation and Occupied Bandwidth
AWS LTE RRH 4x45-B66 FCC ID: AS5ONEBTS-28
Antenna Terminals
Power
Digital Assets Platform
Transmit Path Tx4
Transmit Path Tx3
Transmit Path Tx2
Transmit Path Tx1
Test Chamber
Broadband Directional Coupler
Incident
Reflected
All paths Calibrated
Carrier reject filter for out of band conducted spurious measurements
90 W
Power Sensor
Power Meter
Variable Power Source
GPS Antenna
BBU and/or Alternate Indoor Timing Source
RMT
Test Controller
Agilent E4440A PSA Spectrum Analyzer with 896012A VSA Software or MXA
Rohde & Schwartz ESIB or FSEM Receiver / Spectrum Analyzer
GPIB
EMC Test Controller
AWS LTE RRH 4x45-Band 66
AS5BBTRX-28 Antenna Port CS Test Figure
WSM 01/04/2016

Figure 12.3B Modulation Verification and PAR, Tx2 5 MHz with QPSK-16QAM in C Block

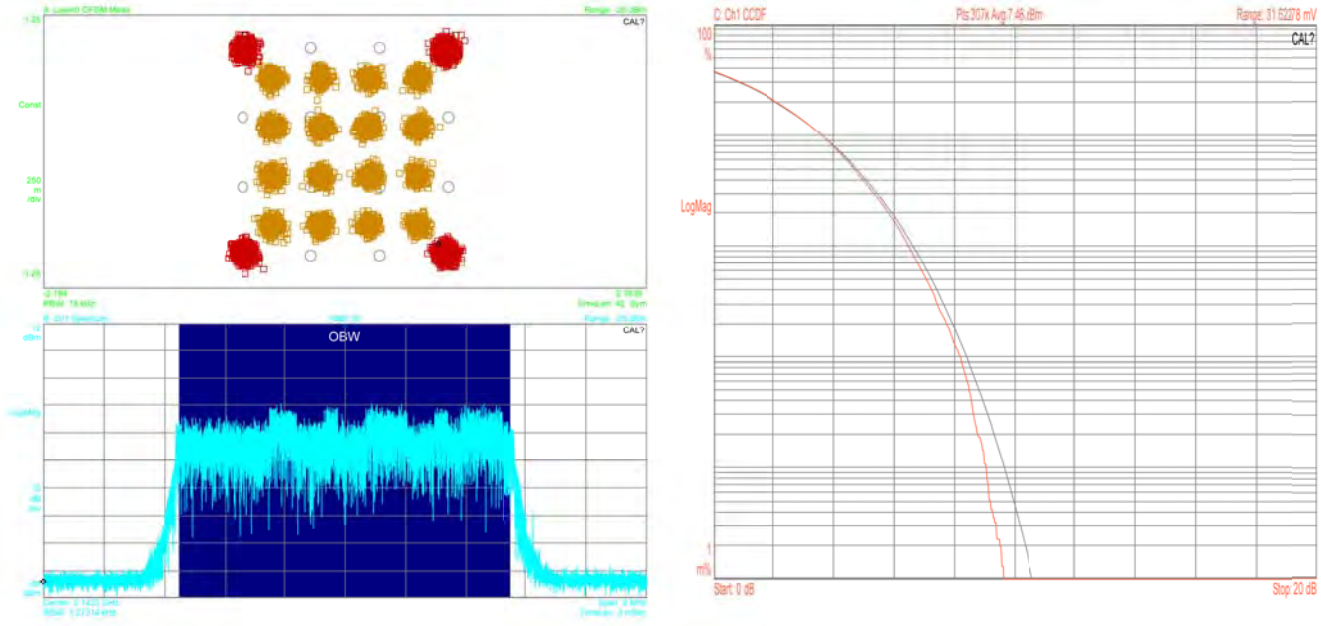


Figure 12.3C Modulation Verification and PAR, Tx2 10 MHz with 64QAM in B Block

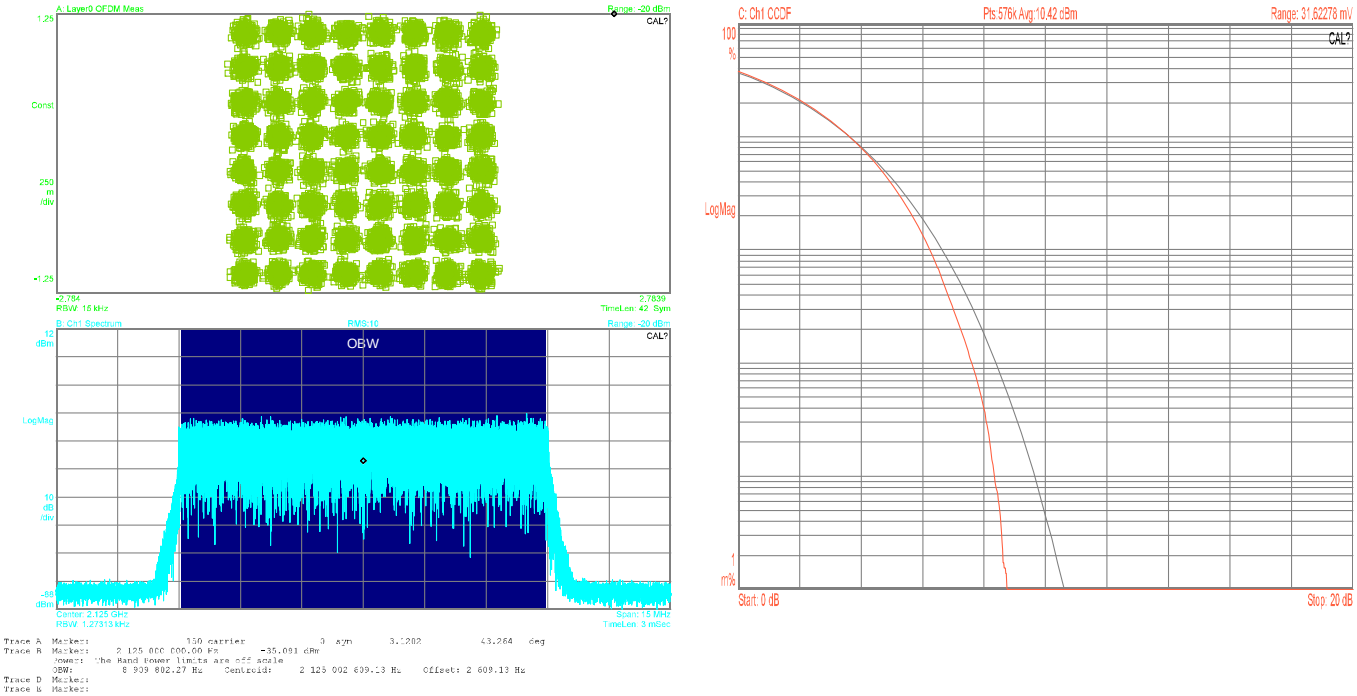


Figure 12.3D Modulation Verification and PAR, Tx2 15 MHz with 64QAM in AB Block

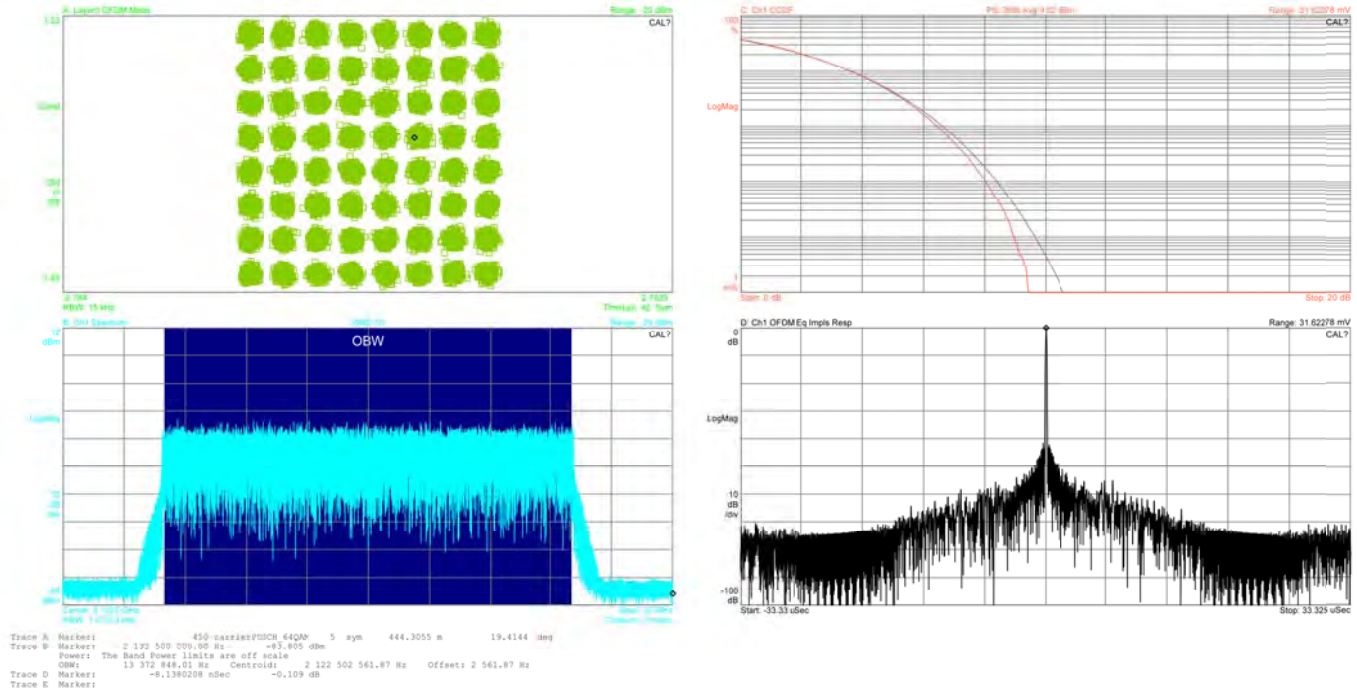
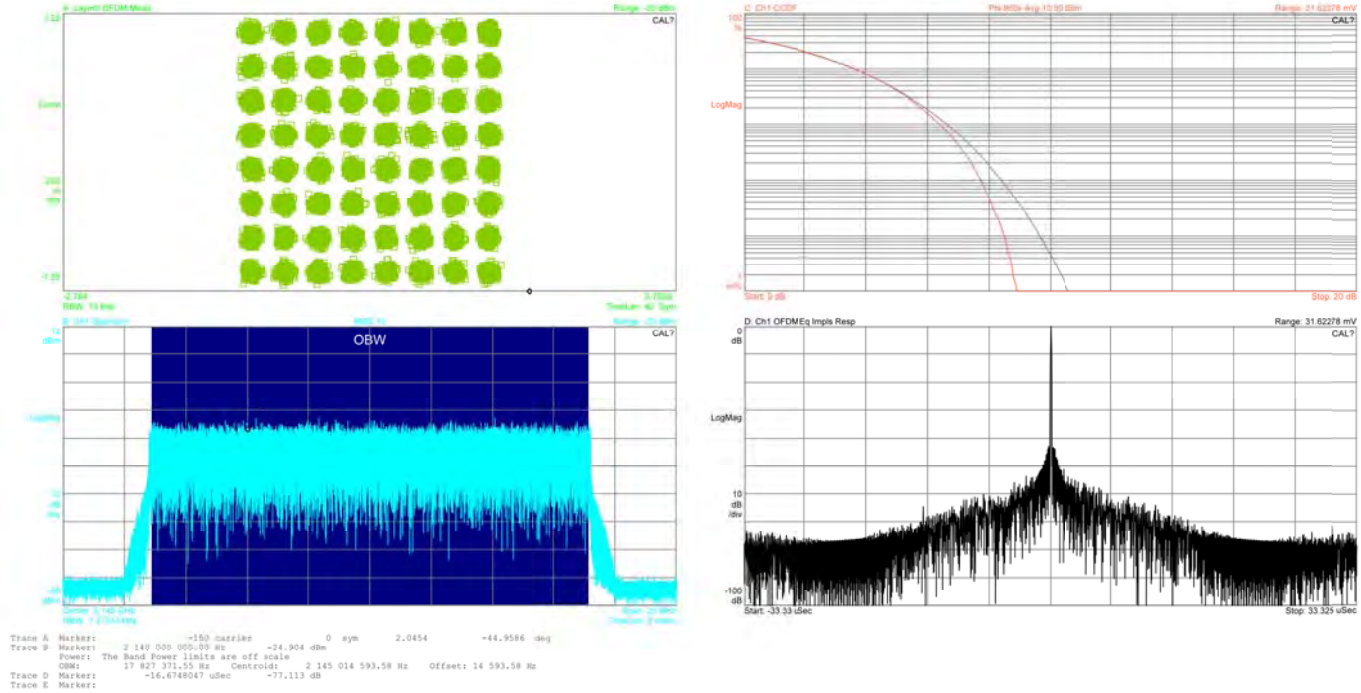
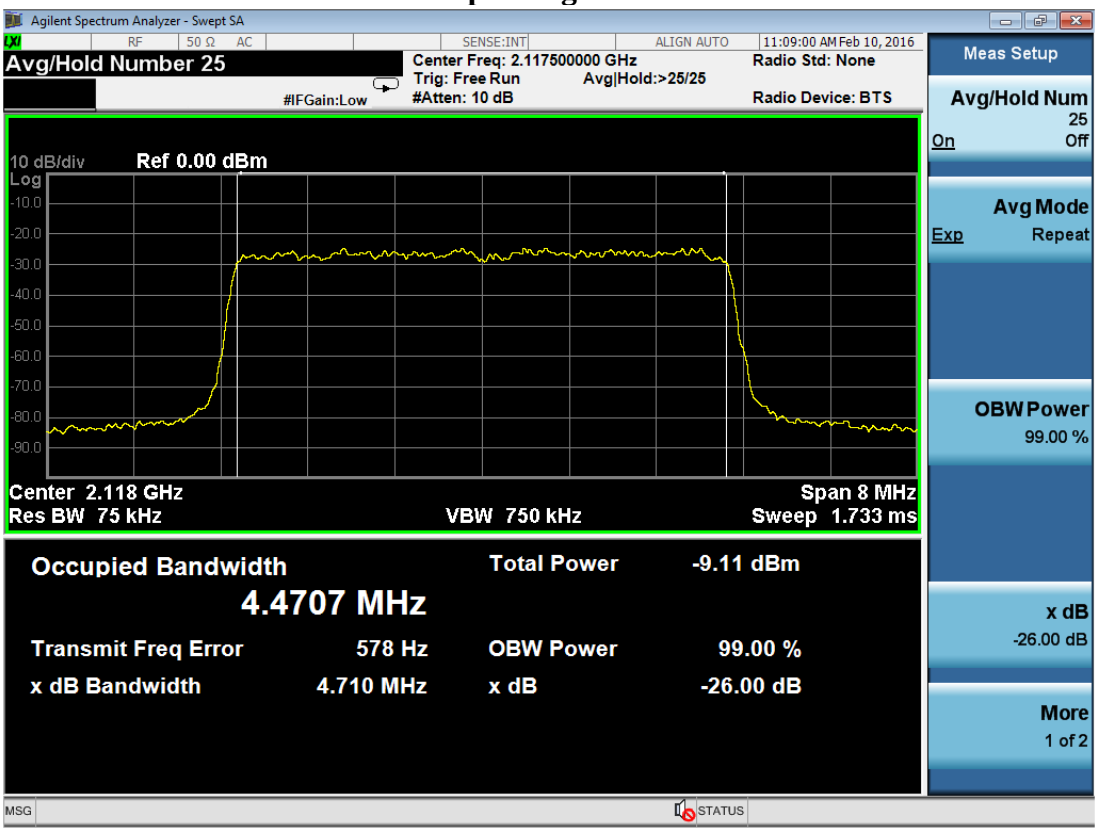


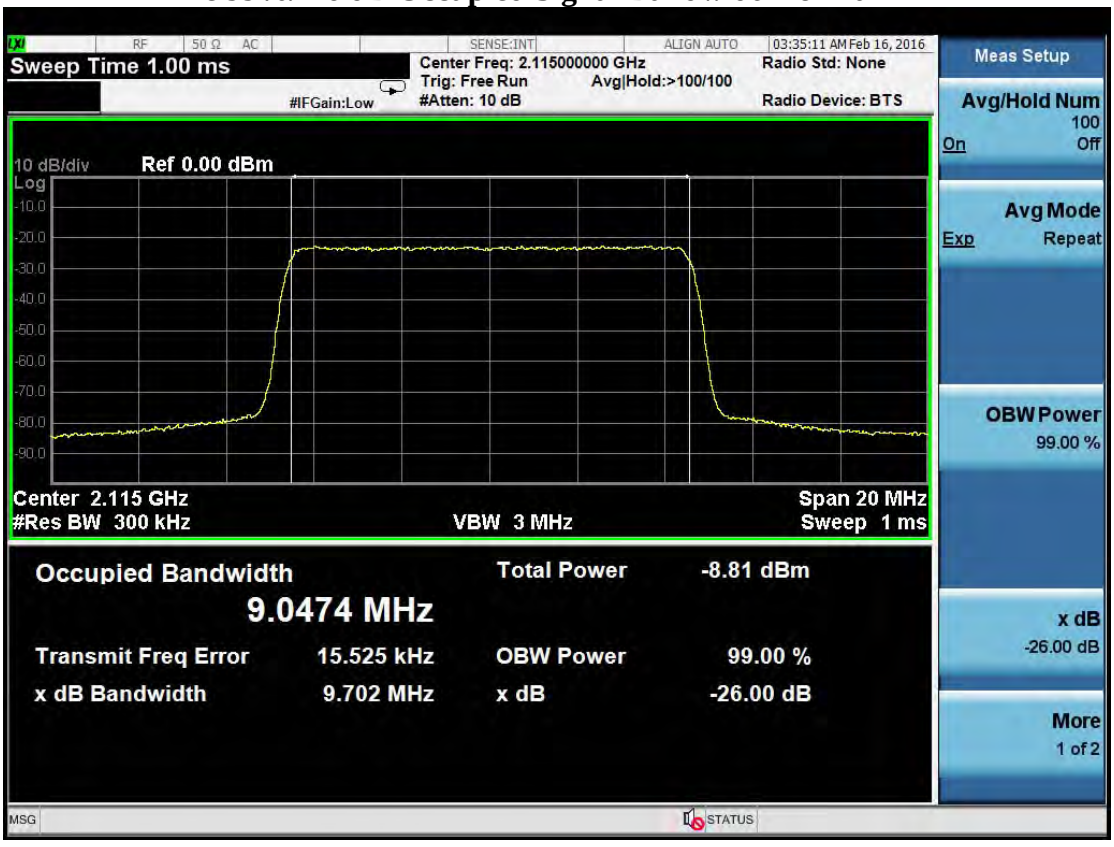
Figure 12.3E Modulation Verification and PAR, Tx1 20 MHz with 64QAM in DEF Block



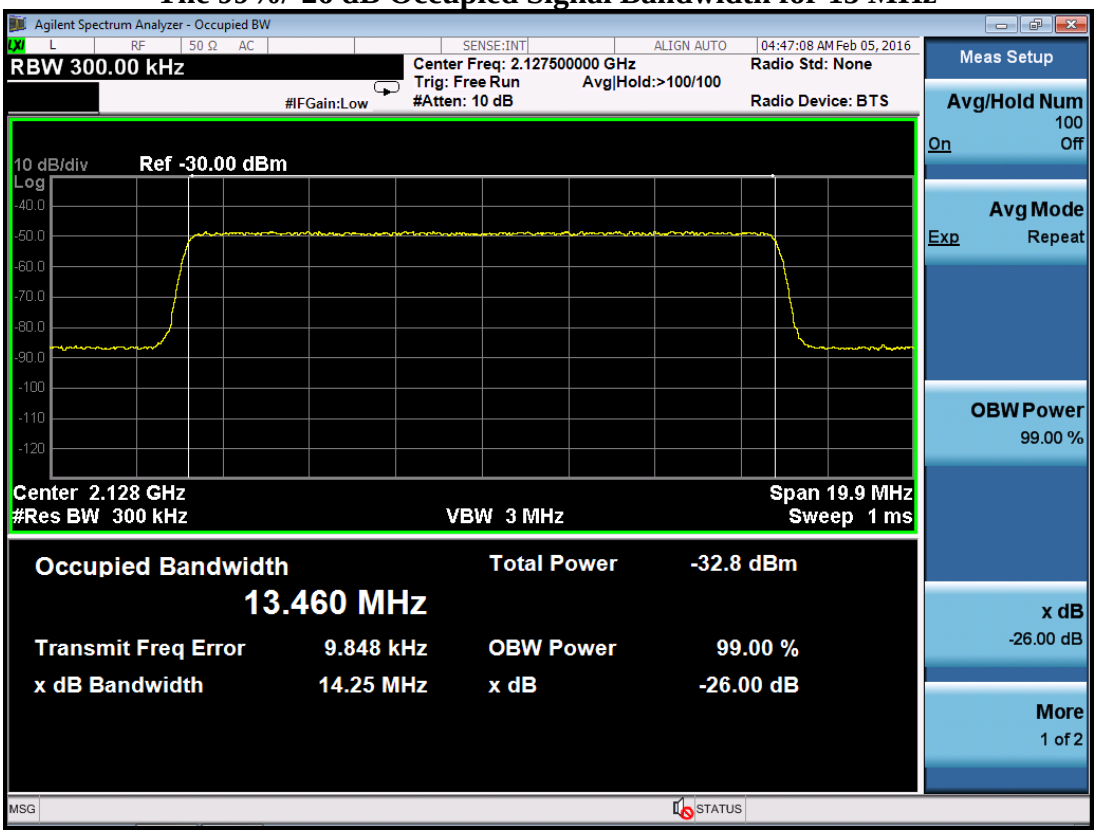
The 99%/-26 dB Occupied Signal Bandwidth for 5 MHz



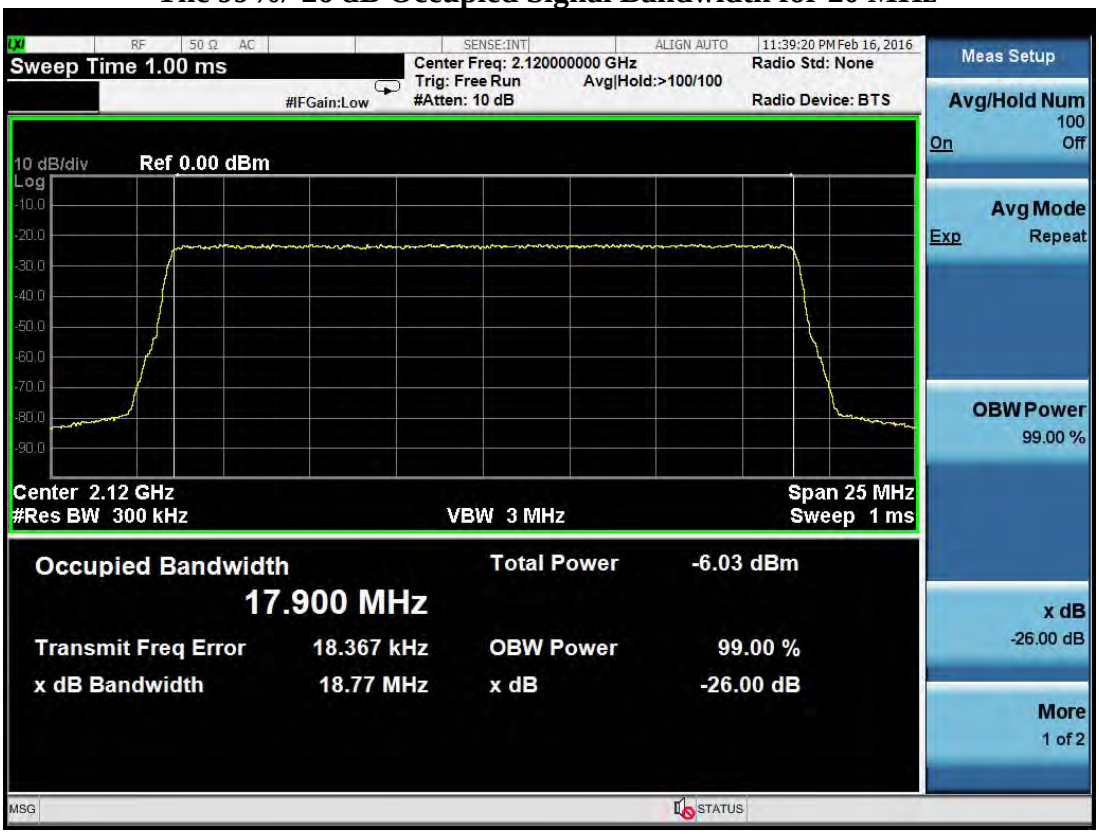
The 99%/-26 dB Occupied Signal Bandwidth for 10 MHz



The 99%/-26 dB Occupied Signal Bandwidth for 15 MHz



The 99%/-26 dB Occupied Signal Bandwidth for 20 MHz



12.4 **Exhibit 12.4 MEASUREMENT OF OCCUPIED BANDWIDTH**

12.4.1 **SECTION 2.1049 Measurement Of Occupied Bandwidth**

Occupied bandwidth measurements of the **AWS LTE B66a RRH4x45 / AS5BBTRX-28** were performed for the test configurations pertinent to AWS band operation for Blocks A through F. This documents the typical performance of the **AWS LTE B66a RRH4x45** while operating with individual and mixed bandwidth carriers for the 20 MHz, 15 MHz, 10 MHz and 5 MHz Emissions Designators. All power adjustments were performed prior to other measurements. The measurements are described below.

The occupied bandwidth of the **AWS LTE RRH 4x45 Band 66 Outdoor Transceiver System / AS5BBTRX-28** was measured using a Rohde & Schwarz ESIB-40 EMC Receiver, 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 12.4 A. The set RF output from the transmitter was reduced by calibrated broadband low intermod attenuators to amplitudes usable by the spectrum analyzer and power meter. The attenuation factors are reflected in the displayed values of the charts which display performance in absolute dBm levels.

The typical occupied bandwidth measurement displays the signal peak level adjusted to the Signal Offset Reference Level. This level is computed from:

RF Power - 10xLog(Signal BW/ RBW)

A level of 23.01dBc / 26.53dBm corresponds to the 90W RF power level for a 20 MHz bandwidth signal measured with 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 12.4A. The power calibration measurement using a RBW of 3 MHz, was performed to cross calibrate the spectrum analyzer measurement against the more accurate RF Power Meter reference measurement. The accurate placement of the power calibration trace against the calibration line results in the accurate placement of the OBW measurement against the reference line and against the mask.

The transmitter output is composed of single or dual LTE carriers whose total power is limited to 180 Watts total for all ports. For the 2x MIMO Mode addressed herein, a maximum of 90W is available at each of the antenna ports Tx1 and Tx2.

In each occupied bandwidth/power calibration 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 whose compliance is evaluated against the mask. These power calibration measurements were performed with each Occupied Bandwidth measurement. Both signals were corrected for path loss and were co-plotted along with the mask limit and reference lines. A typical single carrier example is shown in Figure 12.4B. This depicts a single 20 MHz carrier, Fc=2120 MHz operating in combined AWS Blocks A+B.

The test procedure above calibrates the carrier power against the Mask and accurately places the occupied bandwidth measured carrier at the appropriate reference line. The measurements were performed in full compliance with the requirements in the CFR and ANSI C63.26. 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 the multi-carrier performance. This data was electronically recorded using the TILE™ software and electronically placed in the Occupied Bandwidth Data Sheets. These sheets contain the data per Table 12.4.2 for multiple emissions designators and document compliant operation in each AWS frequency Block.

12.4.2 **Block Organization and Tests Performed**

The **B66a RRH4x45** product uses a 70 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..

Exhibit 12.4 *continued*

The demonstrations of compliance for the various bandwidth LTE carrier configurations were performed for 22 different test configurations demonstrating single and dual carrier operation in AWS Blocks A-F. The presented data for this initial product certification demonstrates the configurations compliance.

In order to adequately evaluate performance, the modulation factors were used from the governing documents. Thus, the applied signal, from **AWS LTE RRH 4x45 Band 66 Outdoor Transceiver System / AS5BBTRX-28**, met the recommended characteristics

The modulation used in evaluating the **AWS LTE RRH 4x45 Band 66 Outdoor Transceiver System / AS5BBTRX-28** 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.

12.4.3 **Measurement Offset**

The spectrum analysis output plots of occupied bandwidth shows the peak of the LTE channel signal at the appropriate reference line below the top of Mask for the following reason: For the LTE system there is no carrier without modulation. Since the LTE signal is broadband and 5~20 MHz wide, all measurements performed at narrower resolution bandwidths need to 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 a 20 MHz MHz LTE signal measured with a RBW of 100 kHz the signal offset is:

Signal Offset = 10*log (100 kHz /20 MHz) = -23.01 dB

Since the 20 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 /20 MHz) = -8.24 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)

12.4.4 **Require Levels**

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

Emissions ≤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(a) 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*

12.4.4.1 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

12.4.5 Adjusted Levels

The compliance mask adjusted levels were computed and are tabularized in Table 12.4.5. The table identifies the various adjusted mask levels for various signal bandwidths and measurement bandwidth. The table also identifies the appropriate power calibration and reference level for all of the test configurations. The table includes the adjustment for 2xMIMO per KDB 662911 D01 Multiple Transmitter Output v01r01.

12.4.6 Trace Description and Power Calibration

Figure 12.4B shows the single 20 MHz LTE carrier at 2120 MHz occupying Blocks A+B. The figure shows two traces which represent the signal as measured with two different resolution bandwidths. The upper magenta trace is the power calibration and it 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.

12.4.7 Mask Description for a Single 90 W Carrier application.

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

Figure 12.4B shows a 20 MHz carrier plotted against the appropriate LTE Mask limit for AWS Blocks A+B (2110-2130) for EARFCN 2050. The horizontal line from a to aa (a-aa) is the 49.54 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 20 MHz signal bandwidth. The g-gg line is at 49.54 -8.24=41.30 dBm. The peak of the 3 MHz magenta power calibration trace is shown set to this value.

The top of a typical 49.54 dBm single 20 MHz LTE 64QAM carrier signal viewed at a resolution bandwidth of 100 kHz is shown at the 26.53 dBm/ -23.01 dBc line t-tt. This line is based on equations 1 and 2, and the ratio of the 20 MHz signal bandwidth and the 100 kHz resolution bandwidth of the spectrum analyzers measurement.

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. The placement of the block edge and 1 MHz boundary vertical lines are sometimes moved outside the block by RBW/2 to appropriately account for the measurement of power inside the block.

Per Table 12.4.5, the limit for the 1st MHz outside the band with 2x MIMO operation is **-19.02 dBm / -66.80 dBc**

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

The horizontal line e-d and dd-ee are placed at the **-26.01 dBm / -73.79 dBc** level below the 49.54 dBm / 0 dBc reference per Table 12.4.5. 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 12.4C 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.

12.4.8 **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 measurements were made with the resolution bandwidth as listed in Table 12.4.3 and the limits were adjusted as described above.

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 an appropriate resolution bandwidth and a Averaging detector with 100X averaging. The entire 80 MHz span of measurement (70 MHz +/- 5 MHz outside the band) was broken up into multiple individual span of measurement to comply with the requirements of ANSI C63.26. Each of the individual spans have sufficient measurement points to comply with the requirements of ANSI C63.26 so as 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, ANSI C63.26 and the measurements performed.

All of the tolerance lines for the output are referenced to the top of the Occupied Bandwidth mask, which is defined as 49.54 dBm/ zero dBc. For all measurements of the **AWS LTE RRH 4x45 Band 66 Outdoor Transceiver System / AS5BBTRX-28** Occupied Bandwidth, the output power was measured / adjusted individually to the 90 W per port level or maximum carrier level as appropriate for combined mixed bandwidth operation and this is the the 0 dBc reference line.

TABLE 12.4.2 AWS Occupied Bandwidth Edge of Block Compliance Tabulation

Test #	AWS Block	Port	Transmit Power, 's, Watts	Signal BW, MHz	Modulation Q16=QPSK/ 16QAM 64=64QAM	Carrier Center Frequency, MHz	OBW Block Edge Carrier 1 Pass/Fail	OBW Block Edge Carrier 2 Pass/Fail
1	AB	Tx1	90	20	QPSK, 64QAM	2120	Pass	N/A
2	D+E+F	Tx1	90	20	QPSK, 64QAM	2145	Pass	N/A
3	BC	Tx2	90	15	QPSK, 64QAM	2127.5	Pass	N/A
4	EF	Tx2	90	15	QPSK, 64QAM	2147.5	Pass	N/A
5	C+D+E	Tx2	90	15	QPSK, 64QAM	2137.5	Pass	N/A
6	A + C	Tx1	60 + 30	10 + 5	Q16 + 64	2115+ 2132.5	Pass	Pass
7	B + E	Tx1	60 + 30	10 + 5	Q16 + 64	2125 + 2142.5	Pass	Pass
8	CD + FL	Tx1	60 + 30	10 + 5	Q16 + 64	2135 + 2147.5	Pass	Pass
9	DE + Fr	Tx2	60 + 30	10 + 5	Q16 + 64	2140 + 2152.5	Pass	Pass
10	A+F	Tx1	40 + 40	5+5	Q16 + 64	2112.5 + 2152.5	Pass	Pass
11	A + F	Tx1	40 + 40	5+5	Q16 + 64	2117.5 + 2147.5	Pass	Pass
12	B + D	Tx1	40 + 40	5+5	Q16 + 64	2122.5 + 2137.5	Pass	Pass
13	B + F	Tx1	40 + 40	5+5	Q16 + 64	2127.5 + 2152.5	Pass	Pass
14	C+E	Tx1	40 + 40	5+5	Q16 + 64	2132.5 + 2142.5	Pass	Pass
15	AB + F	Tx2	60 + 30	20 + 5	64 + Q16	2120 + 2152.5	Pass	Pass
16	A +DEF	Tx2	30 + 60	5+20	Q16 + 64	2117.5 + 2145	Pass	Pass
17	A+EF	Tx2	30 + 60	5+15	Q16 + 64	2112.5 + 2147.5	Pass	Pass
18	AB+C	Tx2	60 + 30	15+5	64 + Q16	2117.5 + 2132.5	Pass	Pass
19	A + EF	Tx2	45 + 45	10 + 15	64 + Q16	2115 + 2147.5	Pass	Pass
20	AB + EF	Tx2	45 + 45	15 + 10	64 + Q16	2122.5 + 2145	Pass	Pass
21	A + F	Tx1	45 + 45	10+10	64 + Q16	2115 + 2150	Pass	Pass
22	B + DE	Tx1	45 + 45	10+10	64 + Q16	2125 + 2140	Pass	Pass

Exhibit 12.4 *continued*

12.4.9 **Occupied Bandwidth Results**

Measurements were distributed between the Tx1 and Tx2 Transmit ports. In each case the transmitter output Occupied Bandwidth measurement was performed following Power measurement and Modulation verification. The twenty two different carrier combinations were distributed to maximize data for single and combined block operation demonstrating compliance with FCC "Out of Block" requirements for Left Edge and Right Edge of Bthe various blocks. Measurements for dual carriers were performed with a combined QPSK+16QAM and the 64QAM operation. Modulation parameters were measured and recorded prior to OBW measurement. Edge of block charts document the minimum margins for the various configurations. The Block designation, AWS channels, frequencies 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 **3GPP TS 36.211 V9.1.0 (2010-03**. The power output level was adjusted to provide the documented value on each chart.
The following exhibits illustrate the spectrums investigated and document compliance.

W. Steve Majkowski NCE

Table 12.4.3 Mask values for OBW and Conducted Spurious measurements at various bandwidths

Carrier Power Line a-aa		Signal Bandwidth	Measurement RBW		Power Calibration Level Line g-gg		Signal Offset Reference level Line t-tt		"n" x MIMO	MIMO Factor	1st MHz limit Lines c-b & bb-cc		Beyond the 1st MHz Limit Lines e-d & dd-ee	
			Occupied Bandwidth	RF Power										
W	dBm	MHz	MHz	MHz	dBc	dBm	dBc	dBm	integer	dB	dBm	dBc	dBm	dBc
90	49.54	20	0.1	3	-8.24	41.30	-23.01	26.53	2	3.01	-19.02	-68.56	-26.01	-75.55
90	49.54	15	0.1	3	-6.99	42.55	-21.76	27.78	2	3.01	-17.77	-67.31	-26.01	-75.55
60	47.78	10	0.1	3	-5.23	42.55	-20.00	27.78	2	3.01	-16.01	-63.79	-26.01	-73.79
40	46.02	5	0.03	3	-2.22	43.80	-22.22	23.80	2	3.01	-18.23	-64.25	-31.24	-77.26

Figure 12.4 A Test Setup for Antenna Port Measurements of RF Power, Occupied Bandwidth & Conducted Spurious Emissions

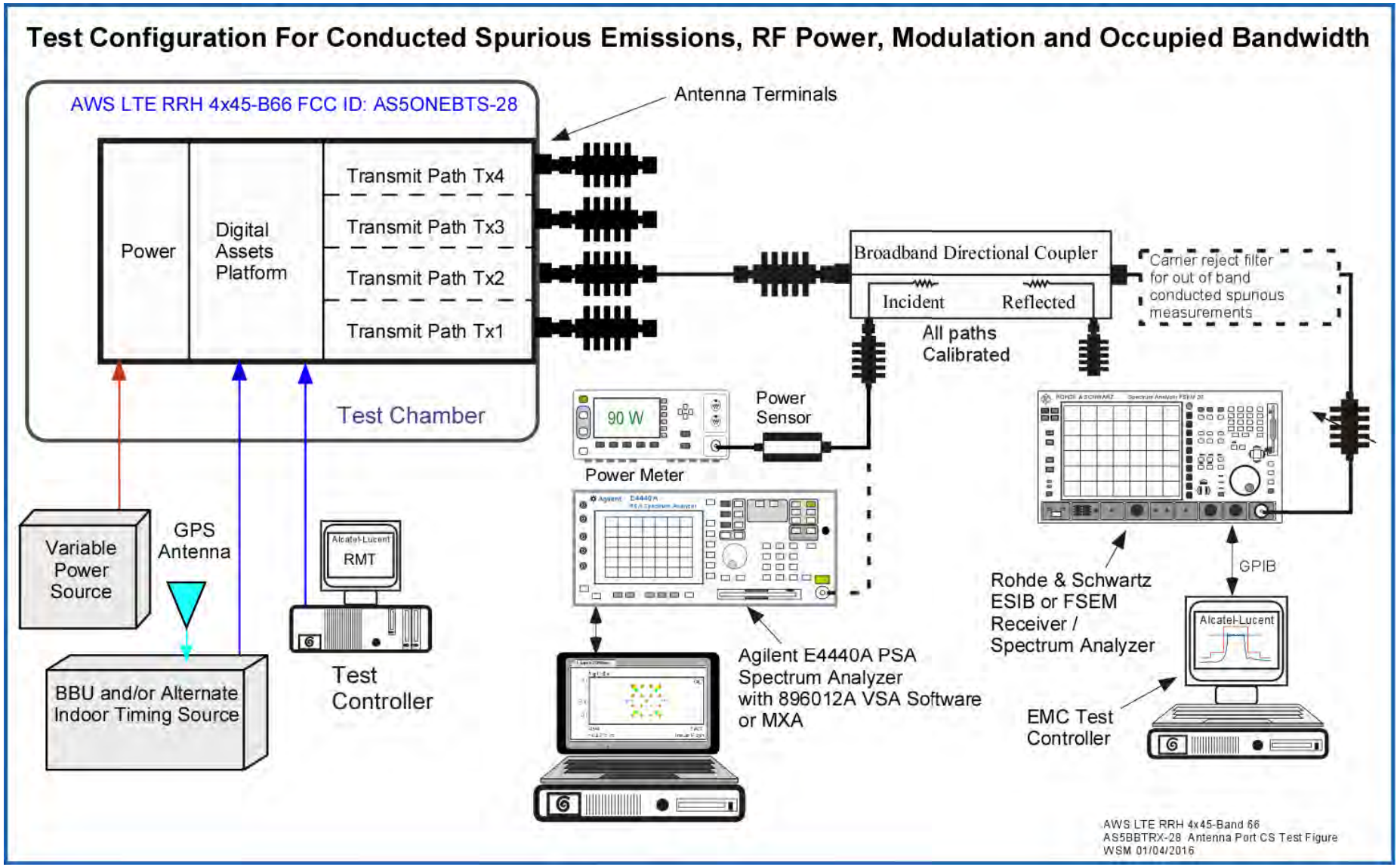


Figure 12.4B Occupied Bandwidth Mask for AWS combined Blocks AB for 20 MHz Operation.

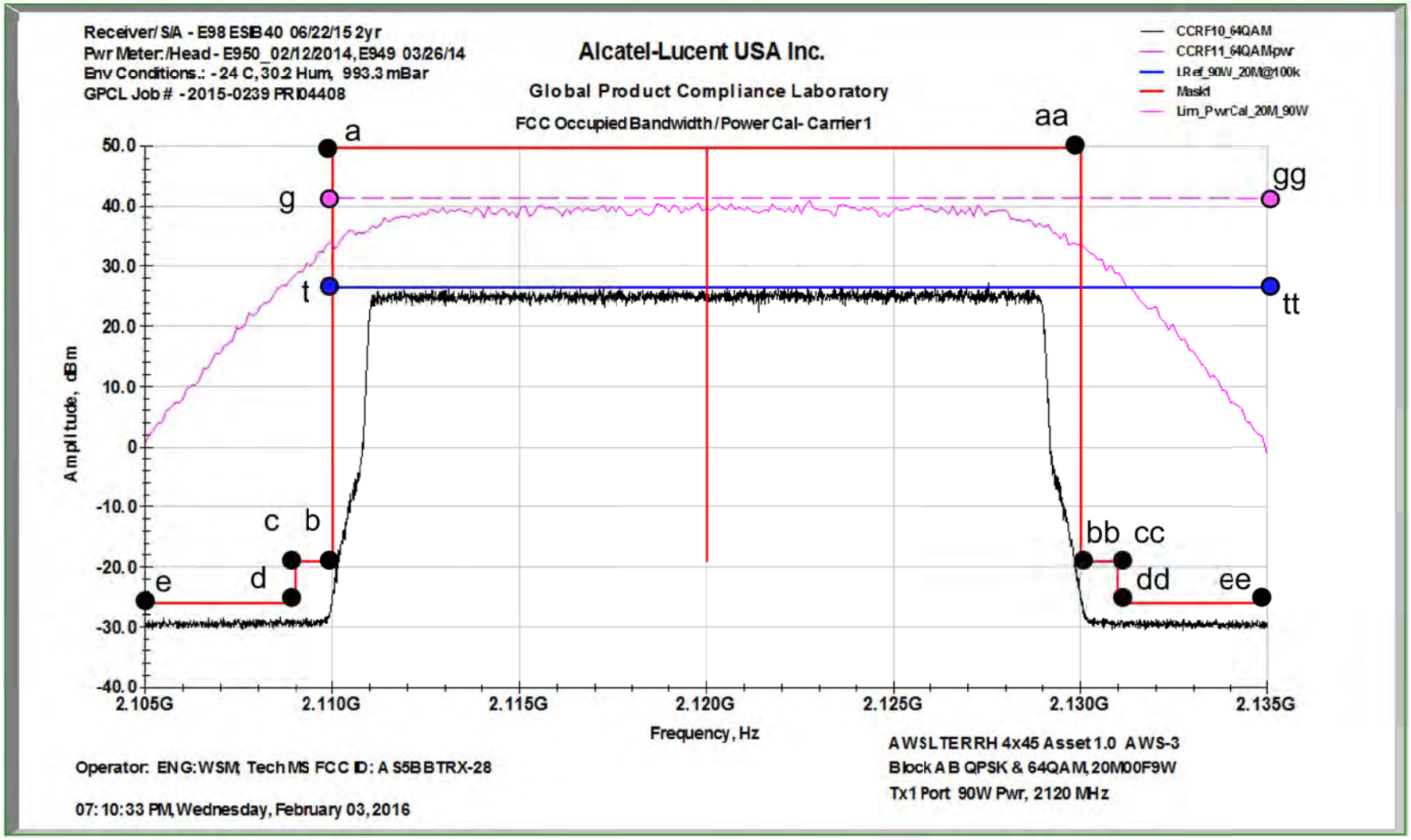
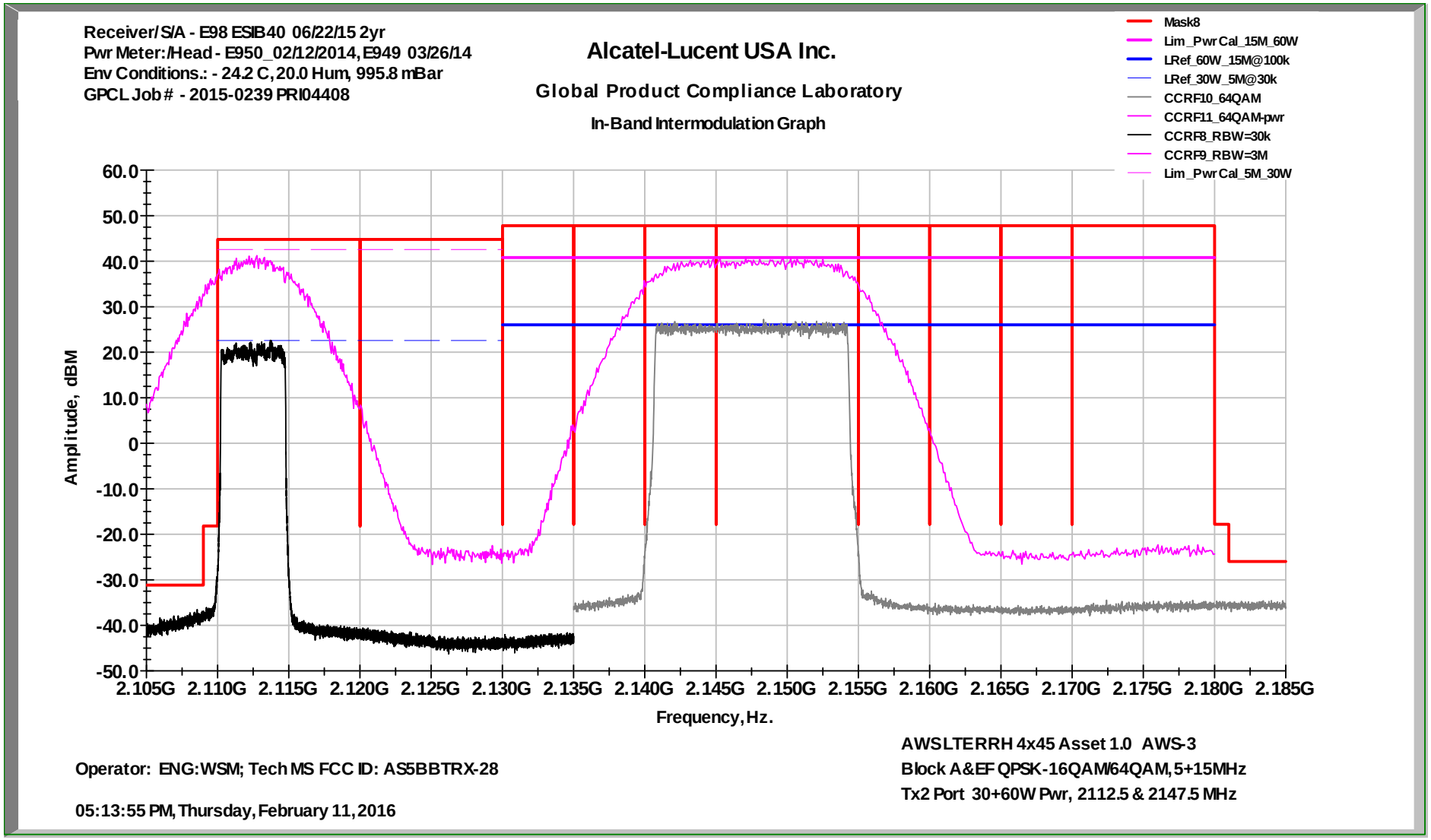


Figure 12.4 C Occupied Bandwidth Whole Band View showing a 5 MHz carrier in Block A and a 15 MHz carrier in combined Blocks EF



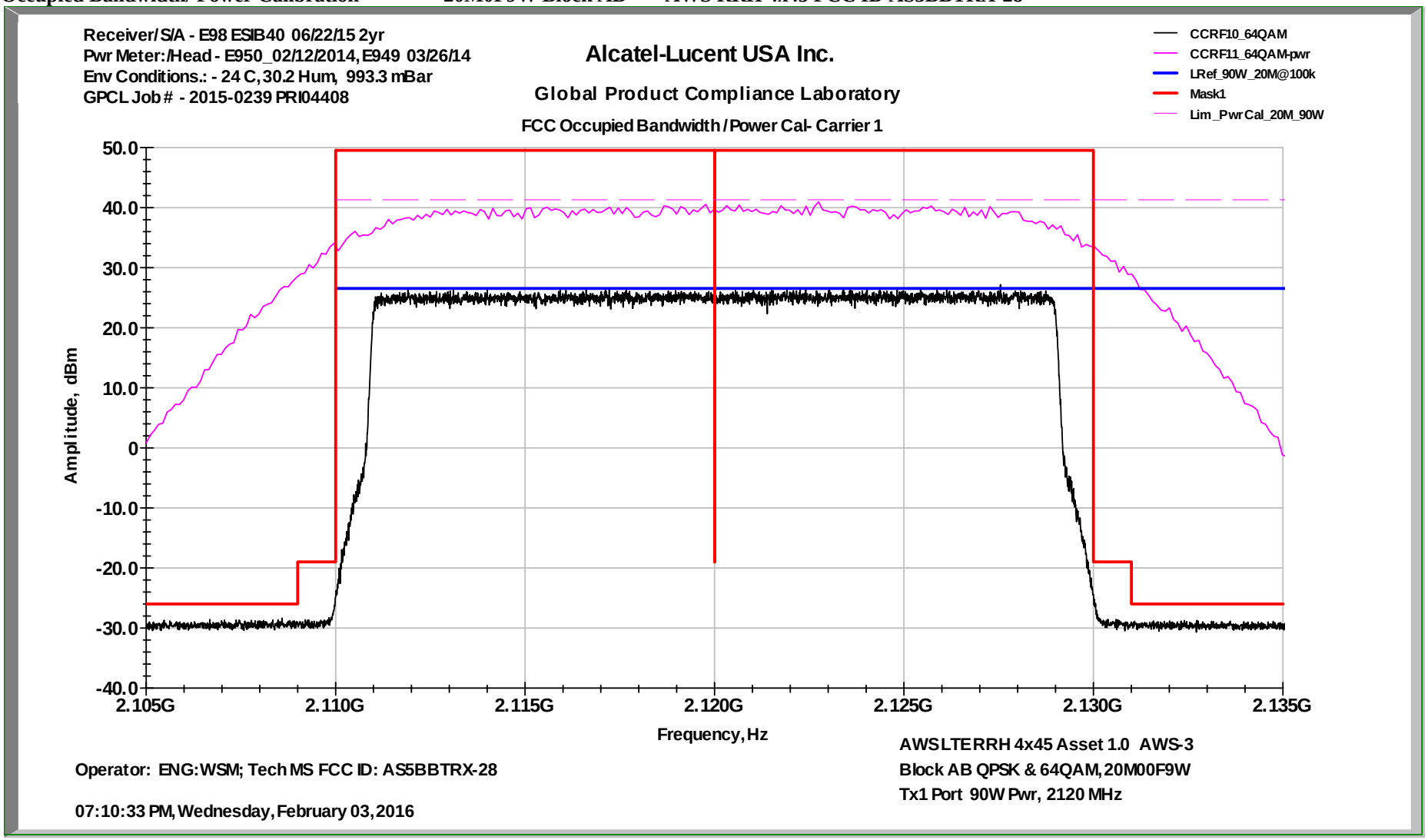
Transmitter Measurements
of
Occupied Bandwidth
for
Alcatel-Lucent USA Inc.

AWS LTE B66a RRH4x45
Outdoor Transceiver System

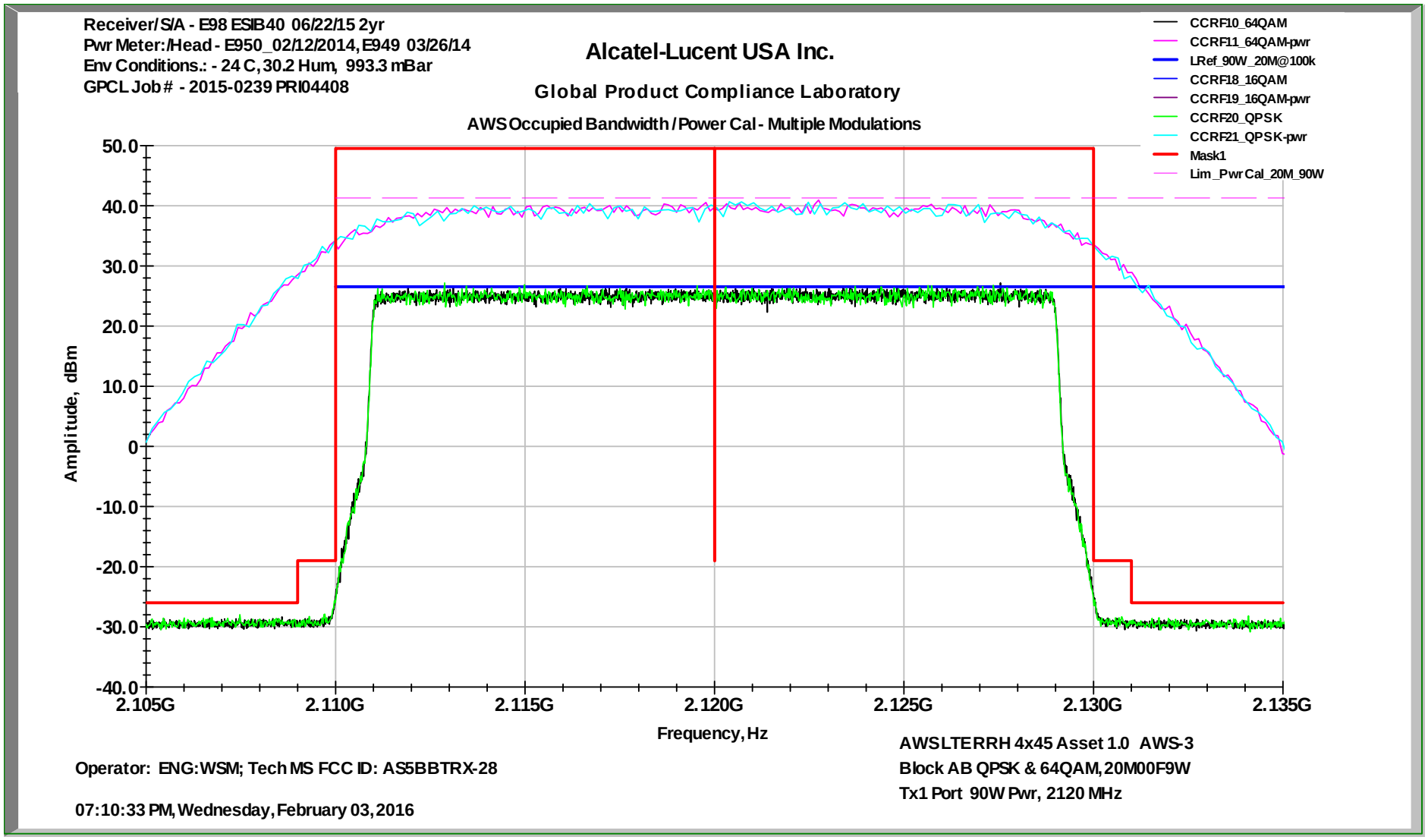
FCC ID: AS5BBTRX-28

Test Configuration #1

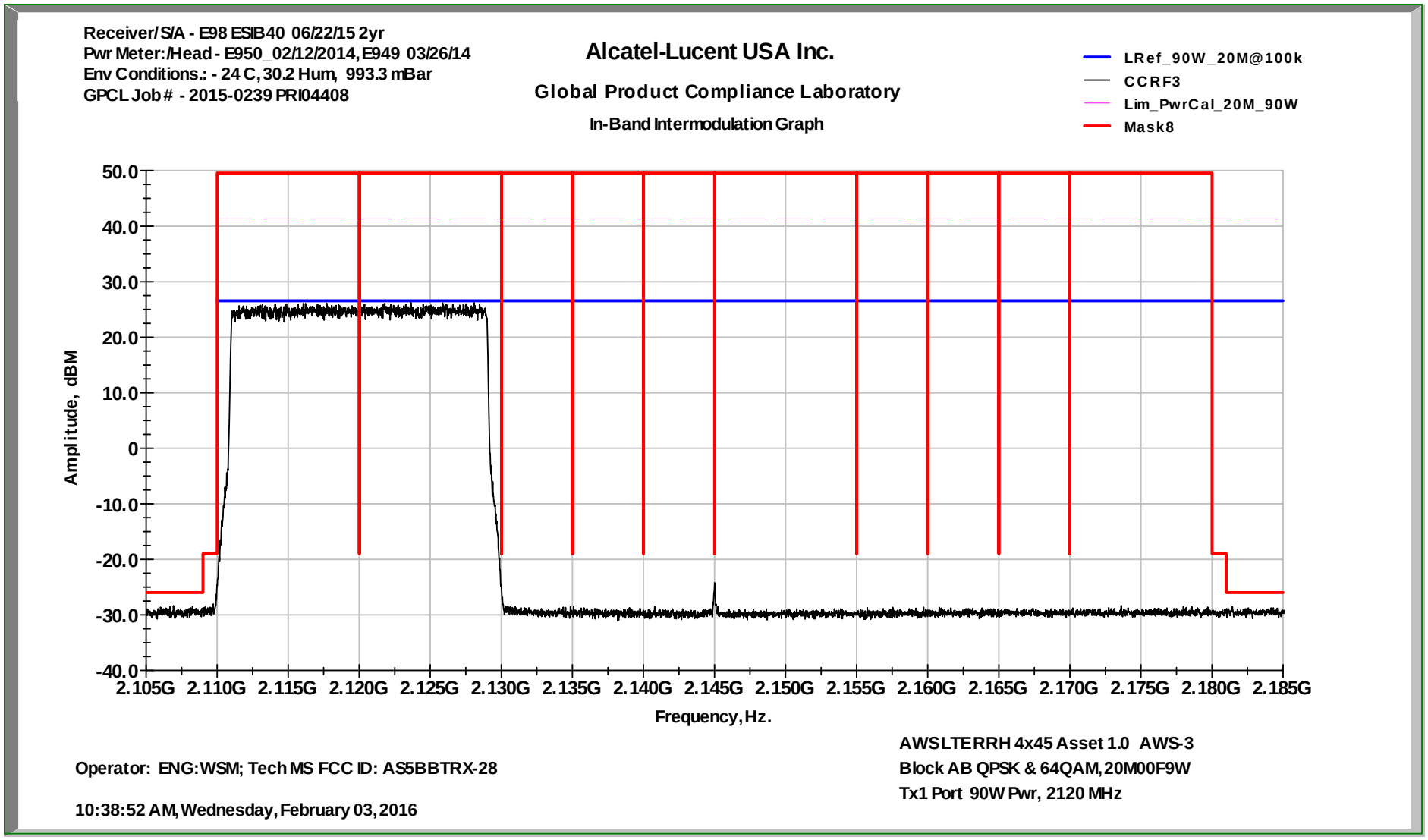
Occupied Bandwidth/ Power Calibration **20M0F9W Block AB** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



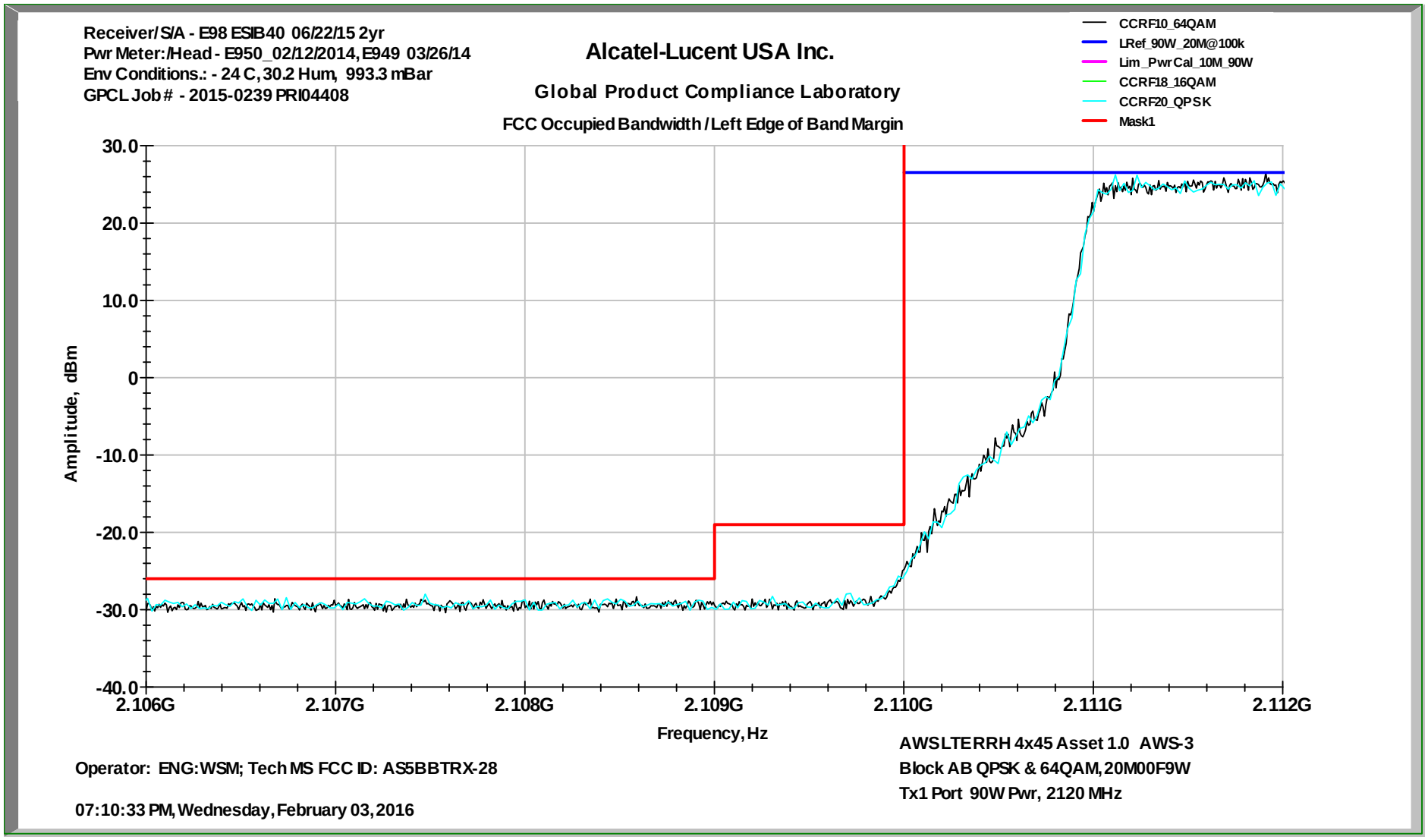
OBW/ Power Cal Multiple Modulations **20M0F9W Block AB** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



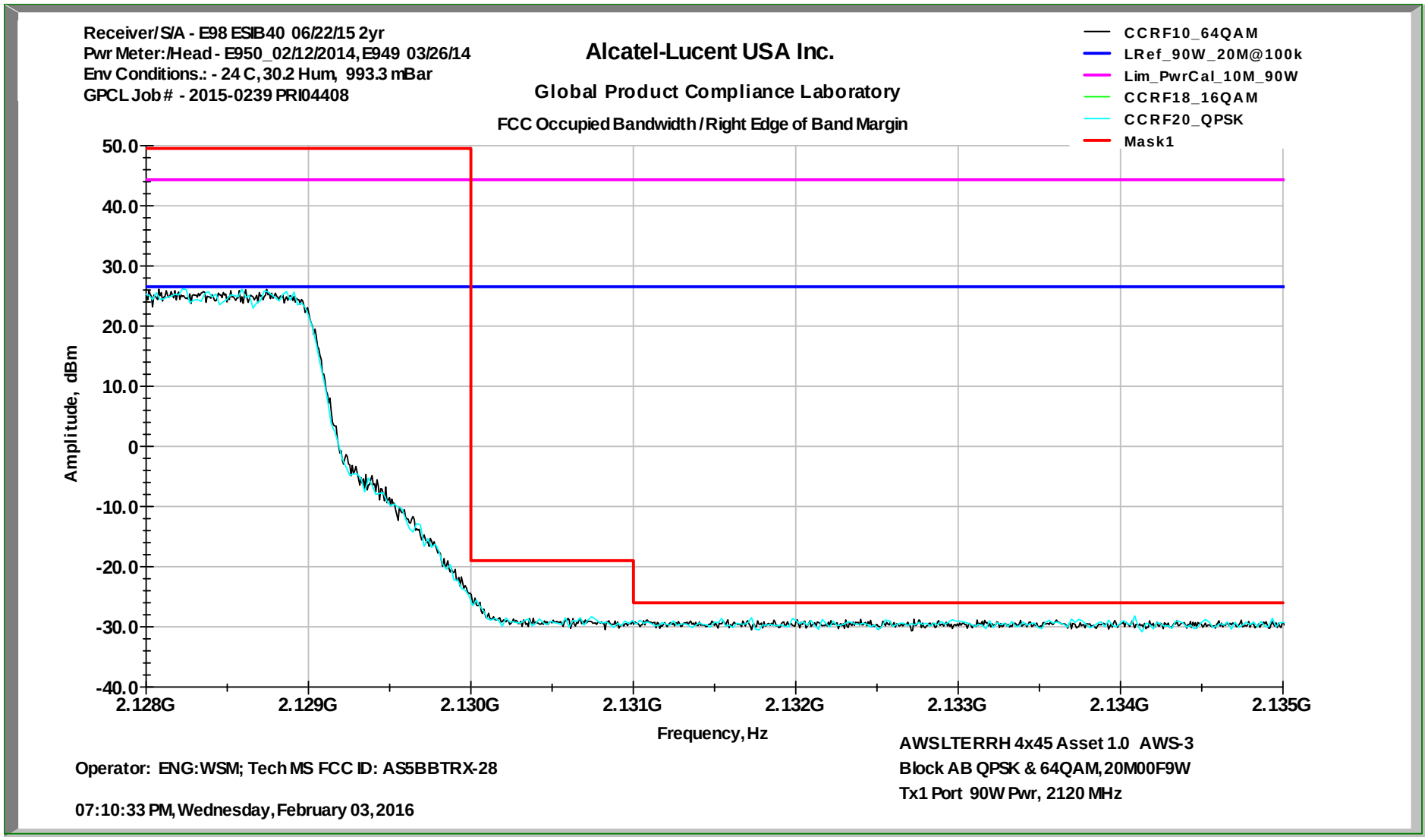
Occupied Bandwidth Whole Band View **20M0F9W Block AB** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



Occupied Bandwidth Left Edge of Block **20M0F9W Block AB** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



Occupied Bandwidth Right Edge of Block 20M0F9W Block AB AWS RRH 4x45 FCC ID AS5BBTRX-28



Test Configuration #2
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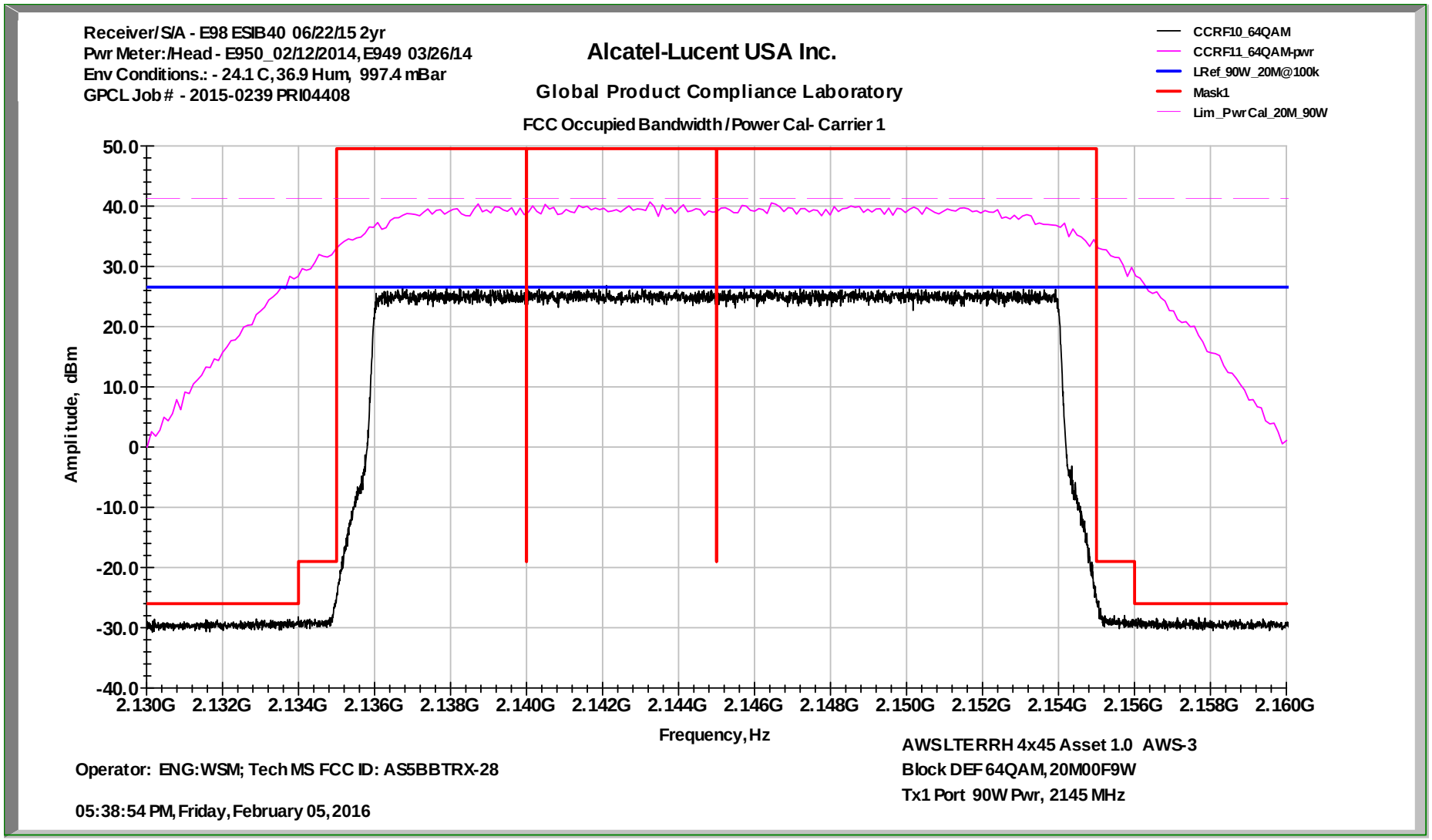
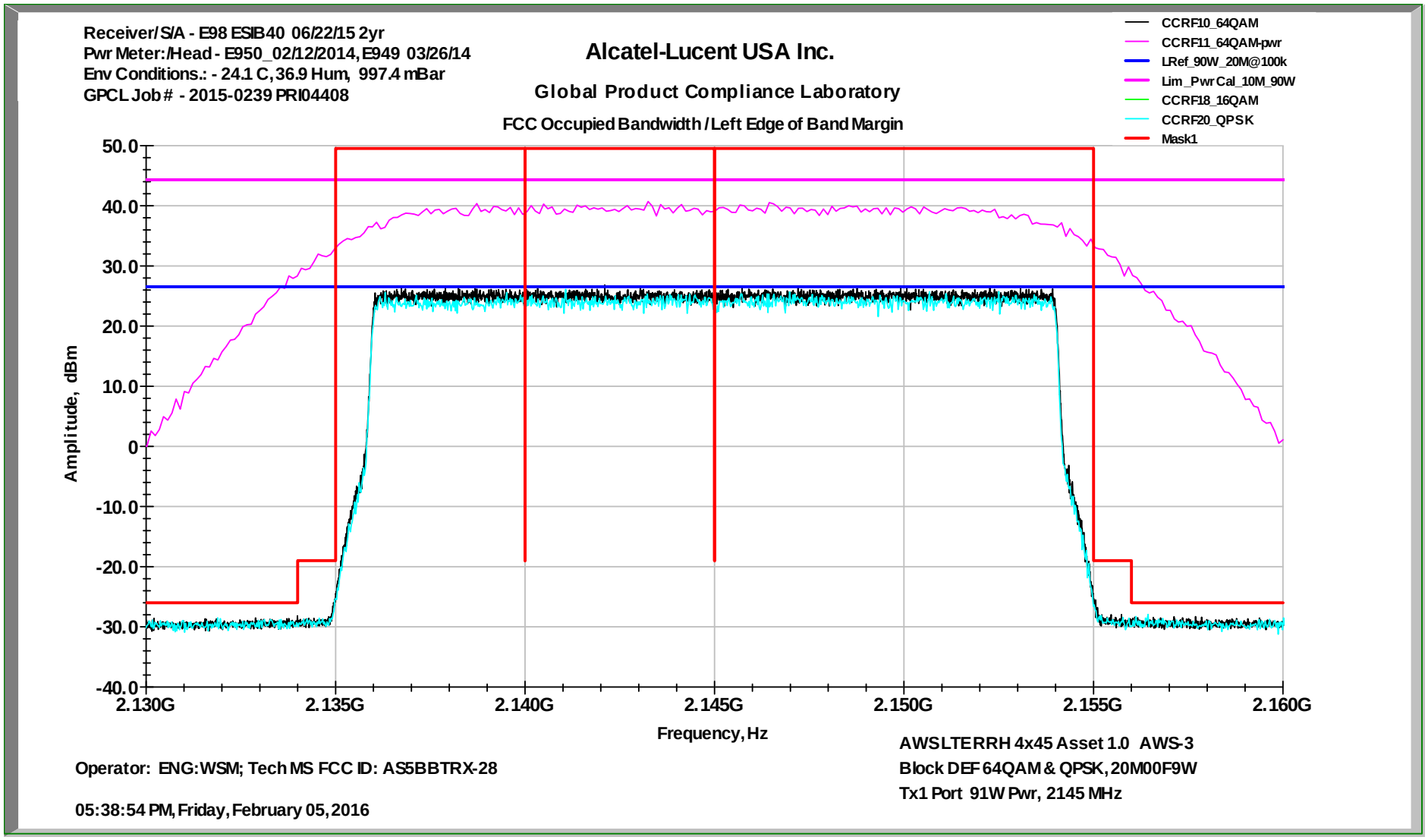
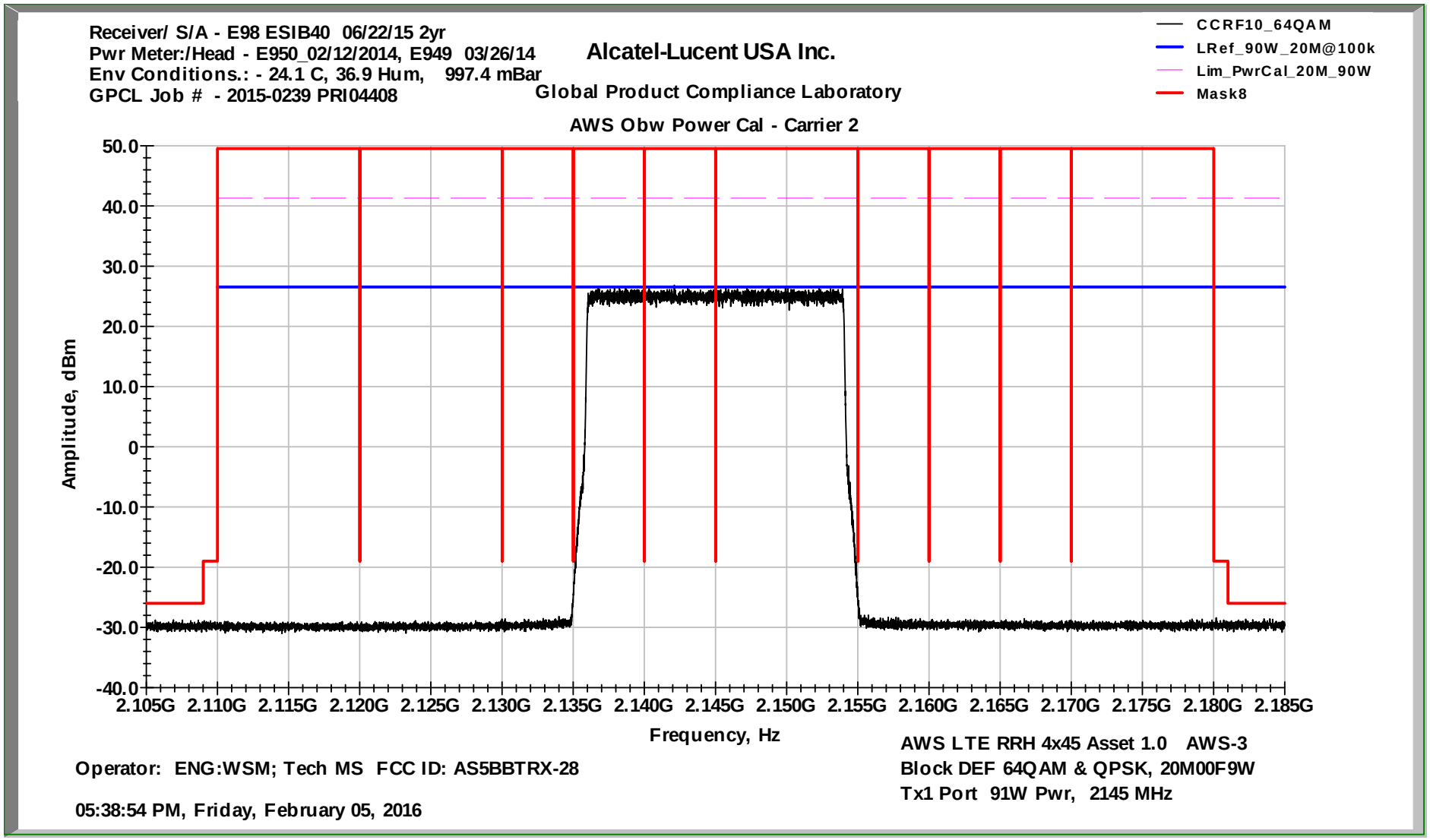
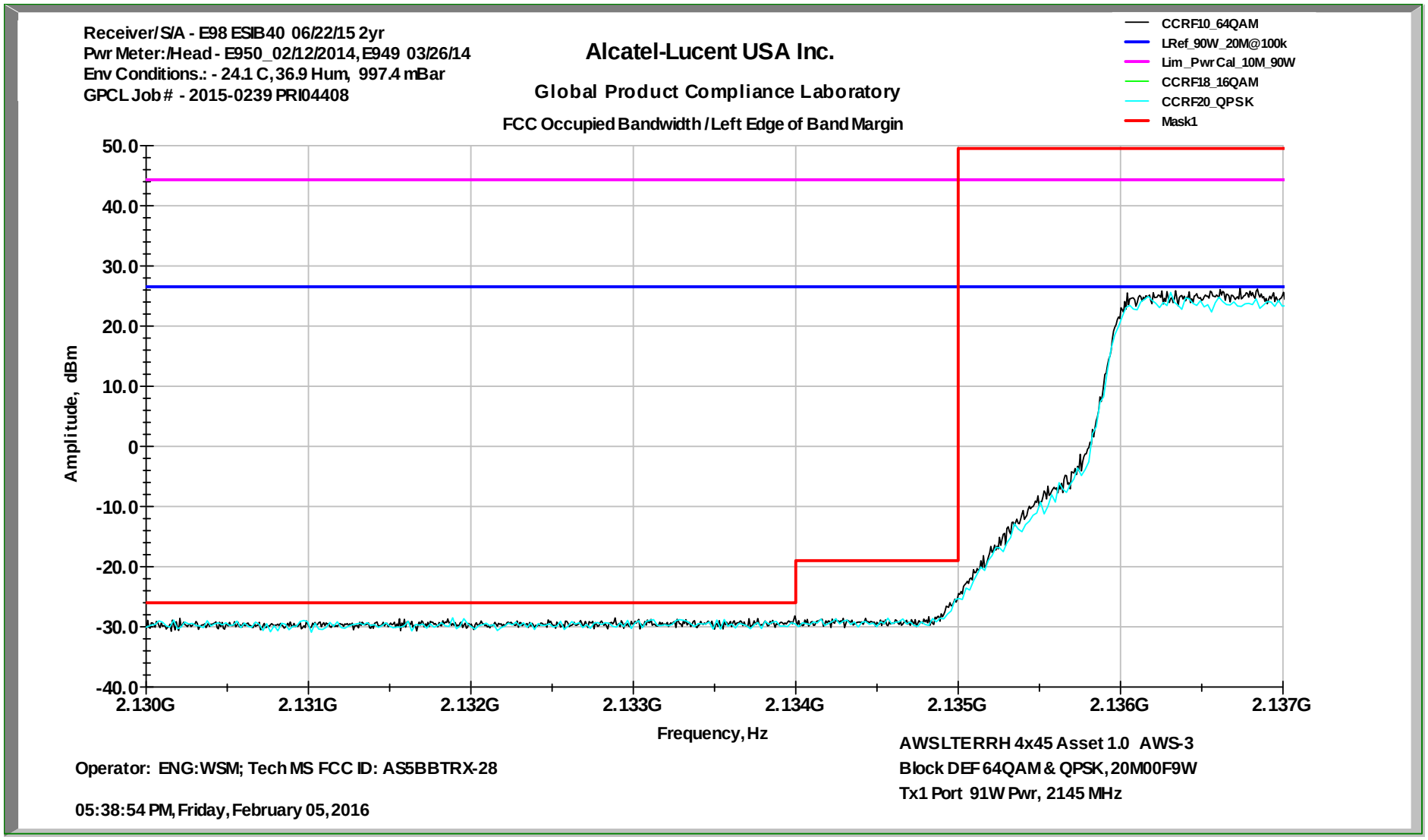



Receiver/S/A - E98 ESIB40 06/22/15 2yr
Pwr Meter:/Head - E950_02/12/2014,E949 03/26/14
Env Conditions.: - 24.1 C,36.9 Hum, 997.4 mBar
GPCL Job # - 2015-0239 PRI04408
Alcatel-Lucent USA Inc.
Global Product Compliance Laboratory
FCC Occupied Bandwidth / Left Edge of Band Margin
CCRF10_64QAM
CCRF11_64QAM-pwr
LRef_90W_20M@100k
Lim_Pwr Cal_10M_90W
CCRF18_16QAM
CCRF20_QPSK
Mask1
Amplitude, dBm
50.0
40.0
30.0
20.0
10.0
0
-10.0
-20.0
-30.0
-40.0
2.130G
2.135G
2.140G
2.145G
2.150G
2.155G
2.160G
Frequency, Hz
Operator: ENG:WSM; Tech MS FCC ID: AS5BBTRX-28
05:38:54 PM, Friday, February 05, 2016
AWSLTERRH 4x45 Asset 1.0 AWS-3
Block DEF 64QAM & QPSK, 20M00F9W
Tx1 Port 91W Pwr, 2145 MHz

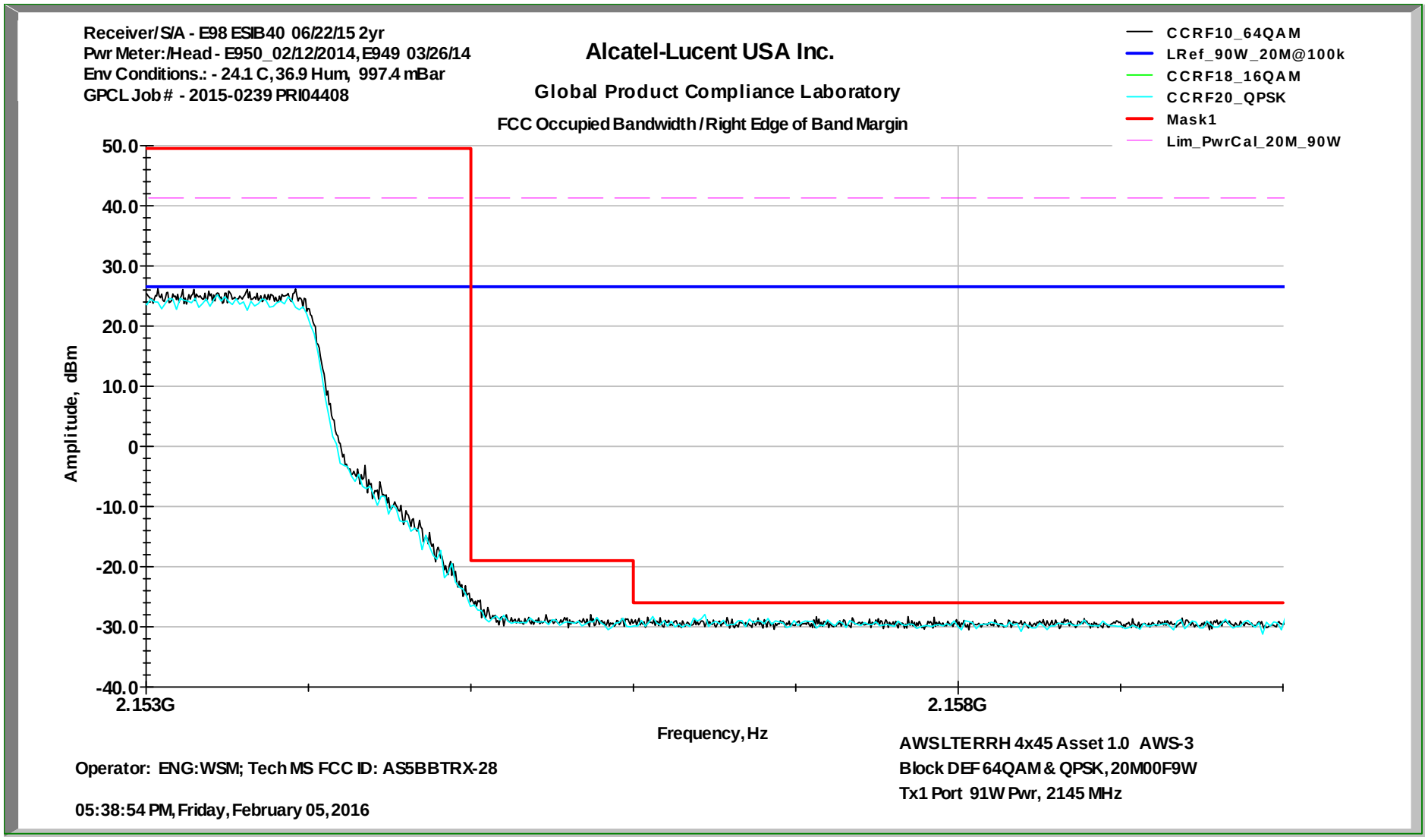
Occupied Bandwidth Whole Band View **20M0F9W Block DEF** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



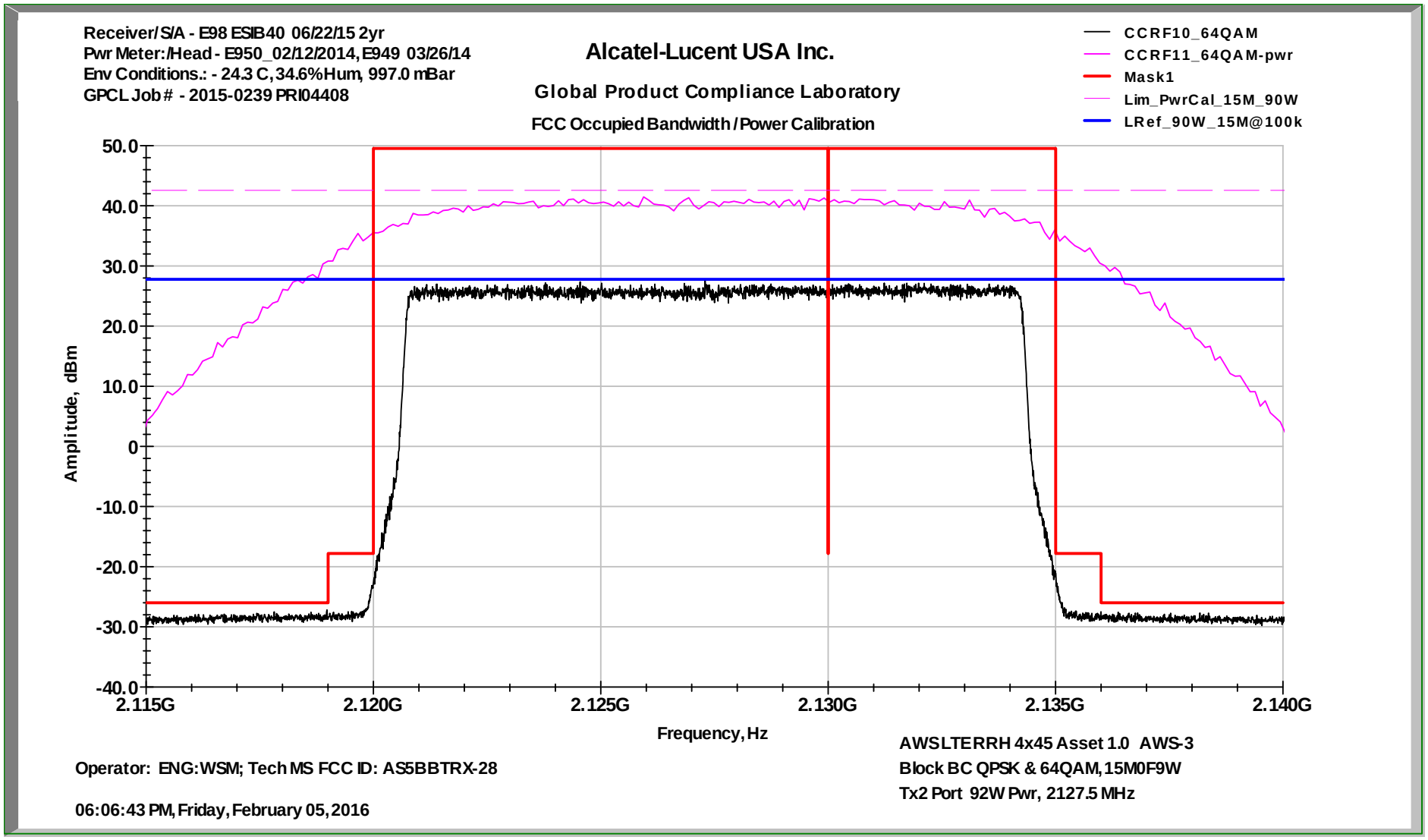
Occupied Bandwidth Left Edge of Block **20M0F9W Block DEF** **AWS RRH 4x45 FCC ID AS5BBTRX-28**

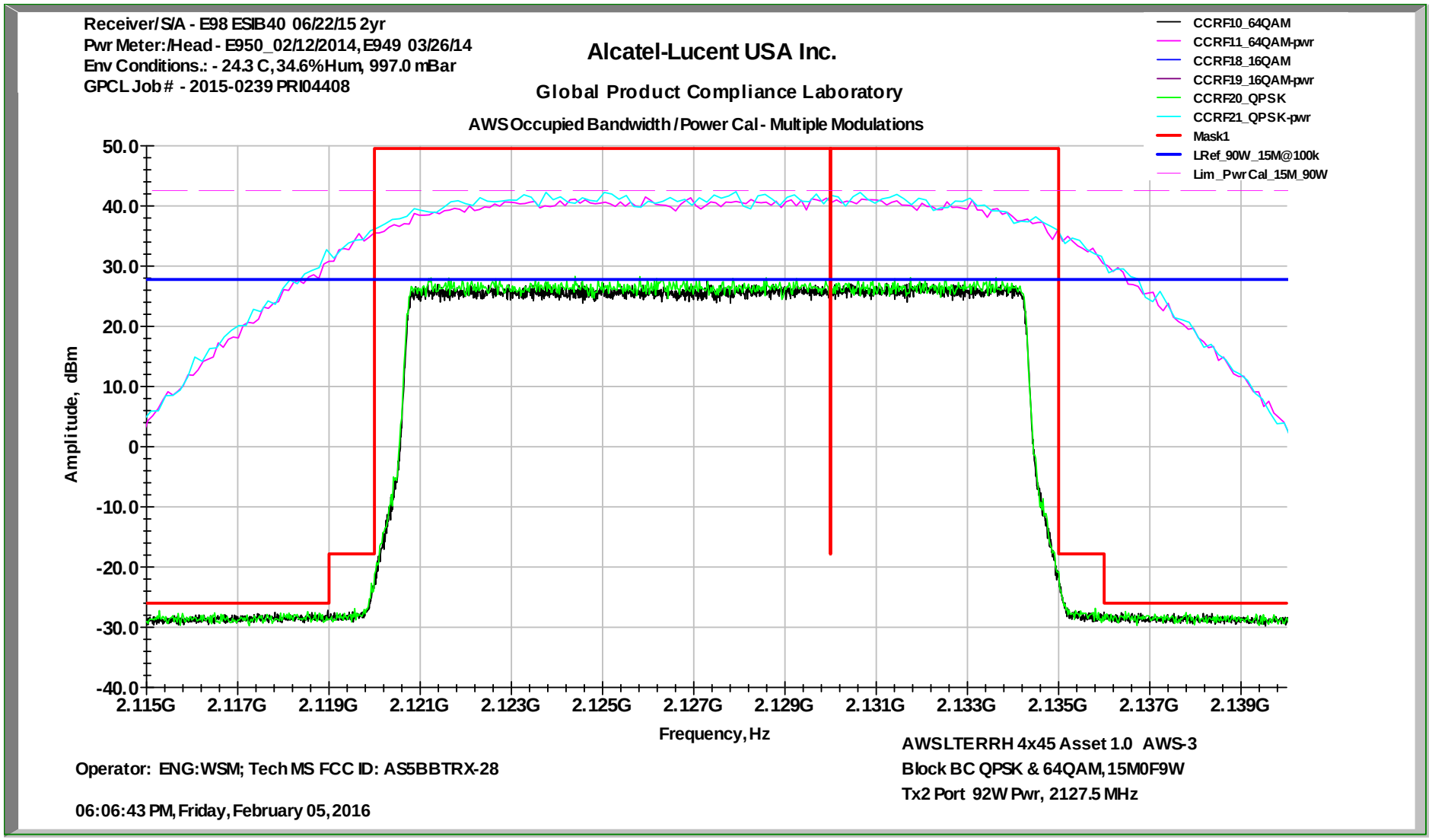


Occupied Bandwidth Right Edge of Block 20M0F9W Block DEF AWS RRH 4x45 FCC ID AS5BBTRX-28

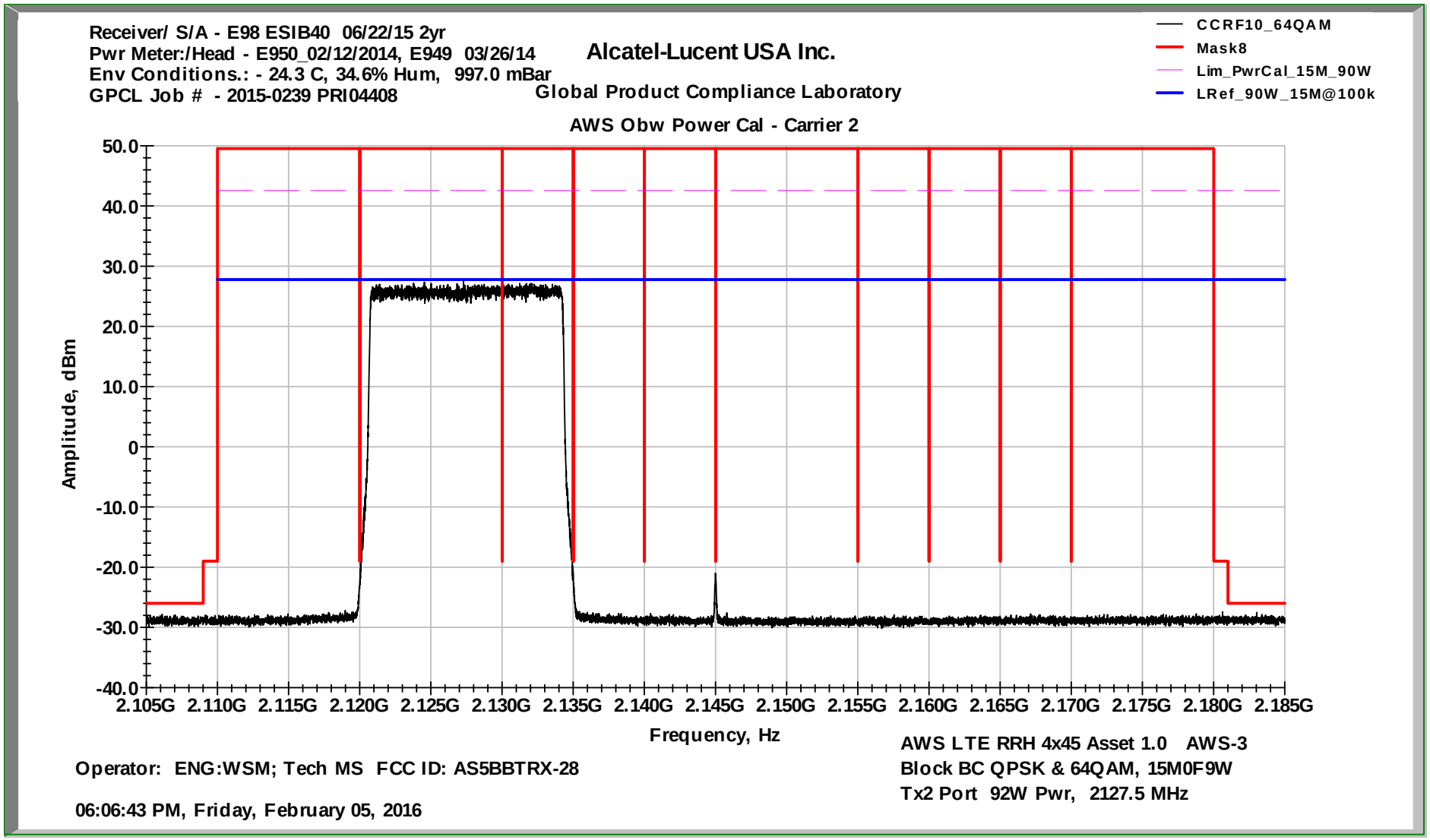


Test Configuration #3
Occupied Bandwidth/ Power Calibration **15M0F9W Block BC** **AWS RRH 4x45 FCC ID AS5BBTRX-28**

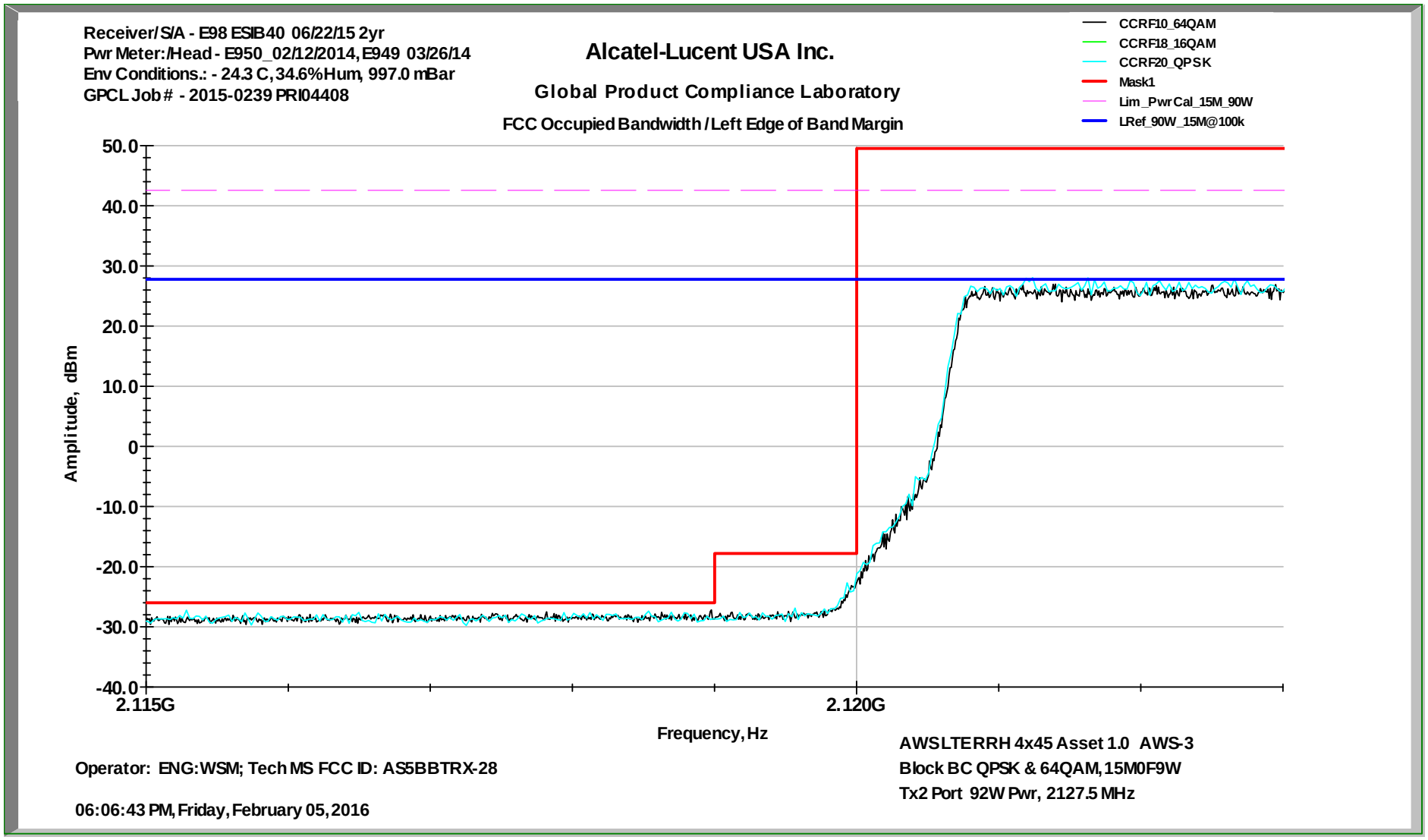



Receiver/S/A - E98 ESIB40 06/22/15 2yr
Pwr Meter:/Head - E950_02/12/2014,E949 03/26/14
Env Conditions.: - 24.3 C,34.6%Hum, 997.0 mBar
GPCL Job # - 2015-0239 PRI04408
Alcatel-Lucent USA Inc.
Global Product Compliance Laboratory
AWS Occupied Bandwidth / Power Cal - Multiple Modulations
CCRF10_64QAM
CCRF11_64QAM-pwr
CCRF18_16QAM
CCRF19_16QAM-pwr
CCRF20_QPSK
CCRF21_QPSK-pwr
Mask1
LRef_90W_15M@100k
Lim_Pwr Cal_15M_90W
Amplitude, dBm
50.0
40.0
30.0
20.0
10.0
0
-10.0
-20.0
-30.0
-40.0
2.115G
2.117G
2.119G
2.121G
2.123G
2.125G
2.127G
2.129G
2.131G
2.133G
2.135G
2.137G
2.139G
Frequency, Hz
Operator: ENG:WSM; Tech MS FCC ID: AS5BBTRX-28
06:06:43 PM, Friday, February 05, 2016
AWSLTERRH 4x45 Asset 1.0 AWS-3
Block BC QPSK & 64QAM,15M0F9W
Tx2 Port 92W Pwr, 2127.5 MHz

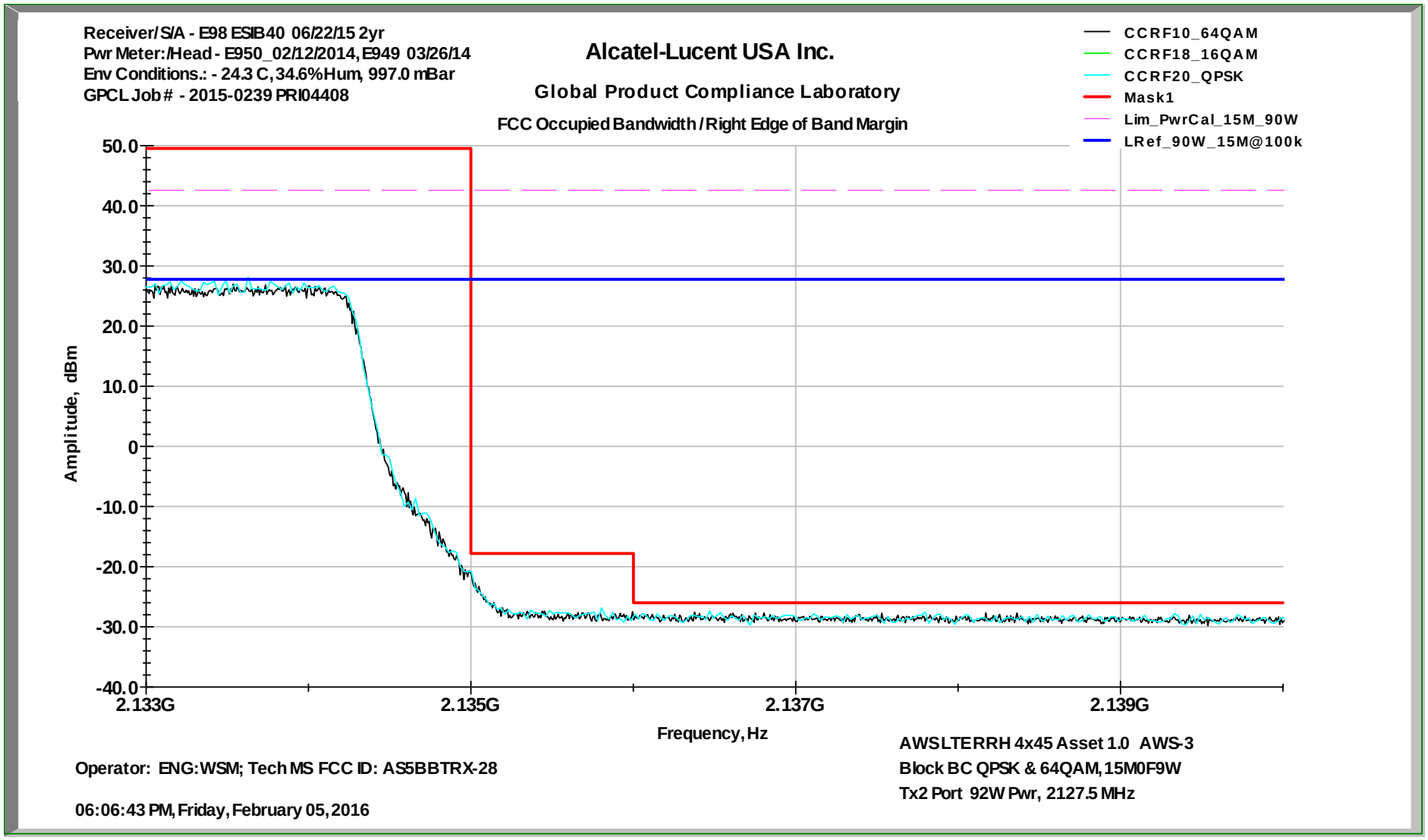
Occupied Bandwidth Whole Band View **15M0F9W Block BC** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



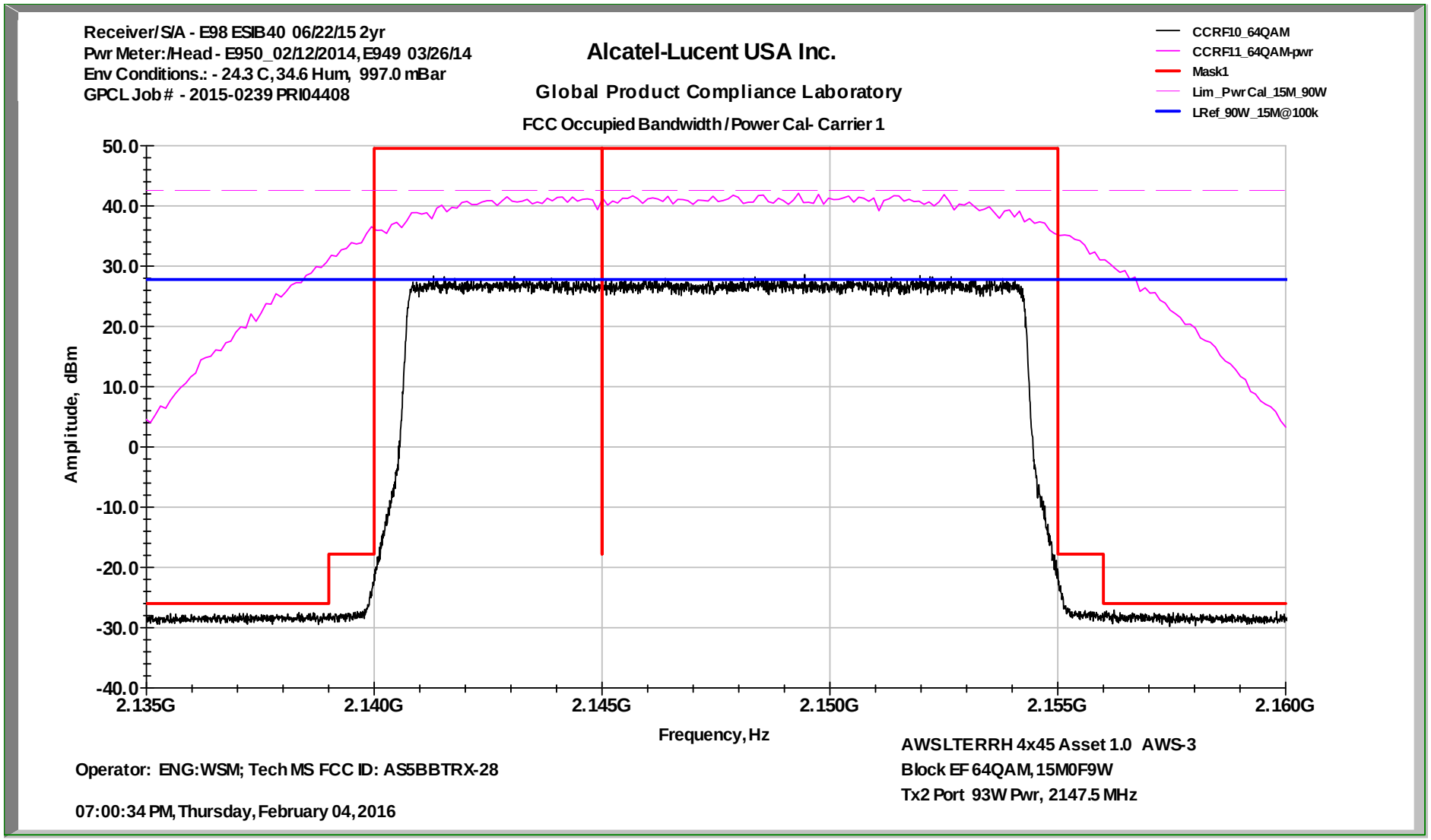
Occupied Bandwidth Left Edge of Block **15M0F9W Block BC** **AWS RRH 4x45 FCC ID AS5BBTRX-28**

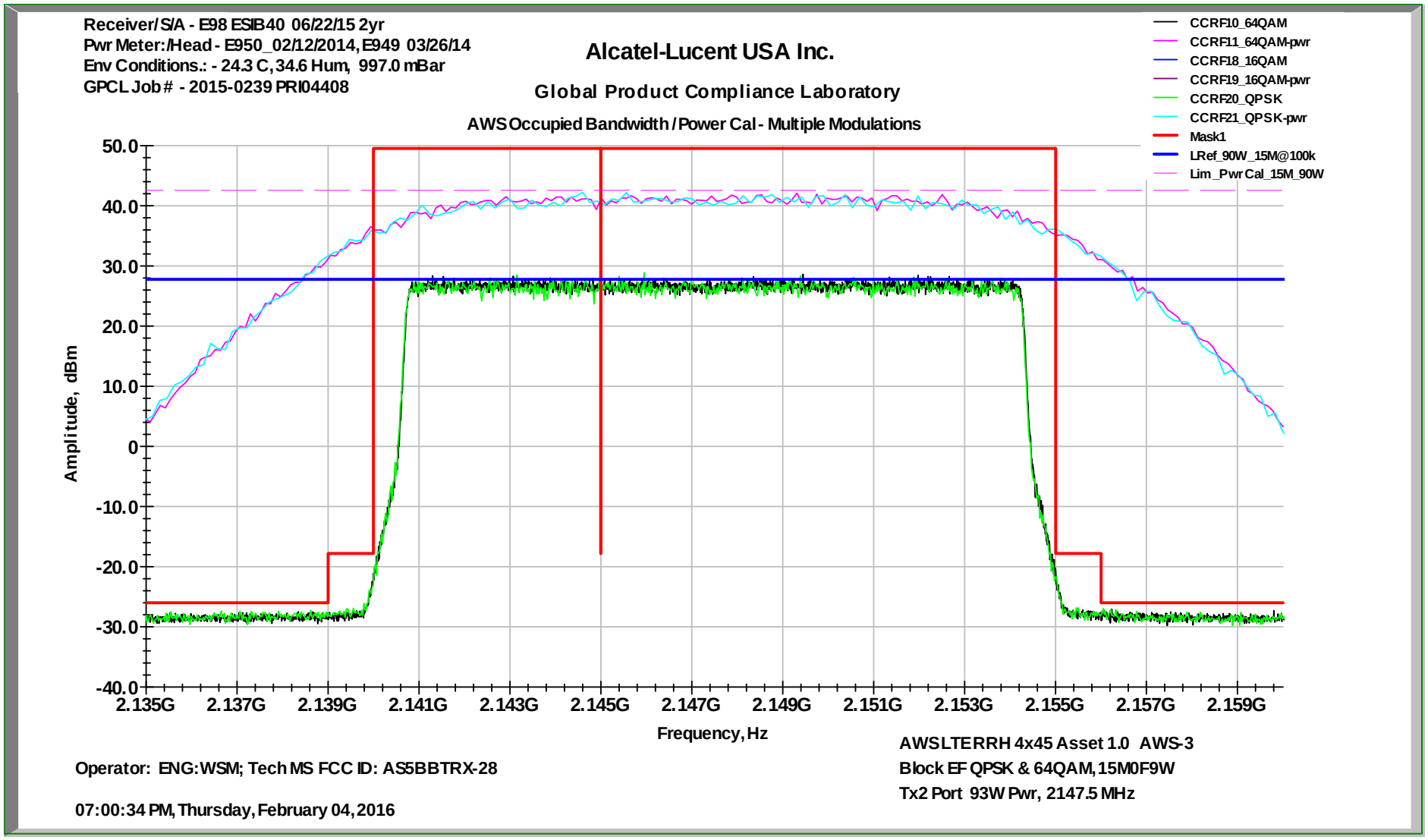


Occupied Bandwidth Right Edge of Block **15M0F9W Block BC** **AWS RRH 4x45 FCC ID AS5BBTRX-28**

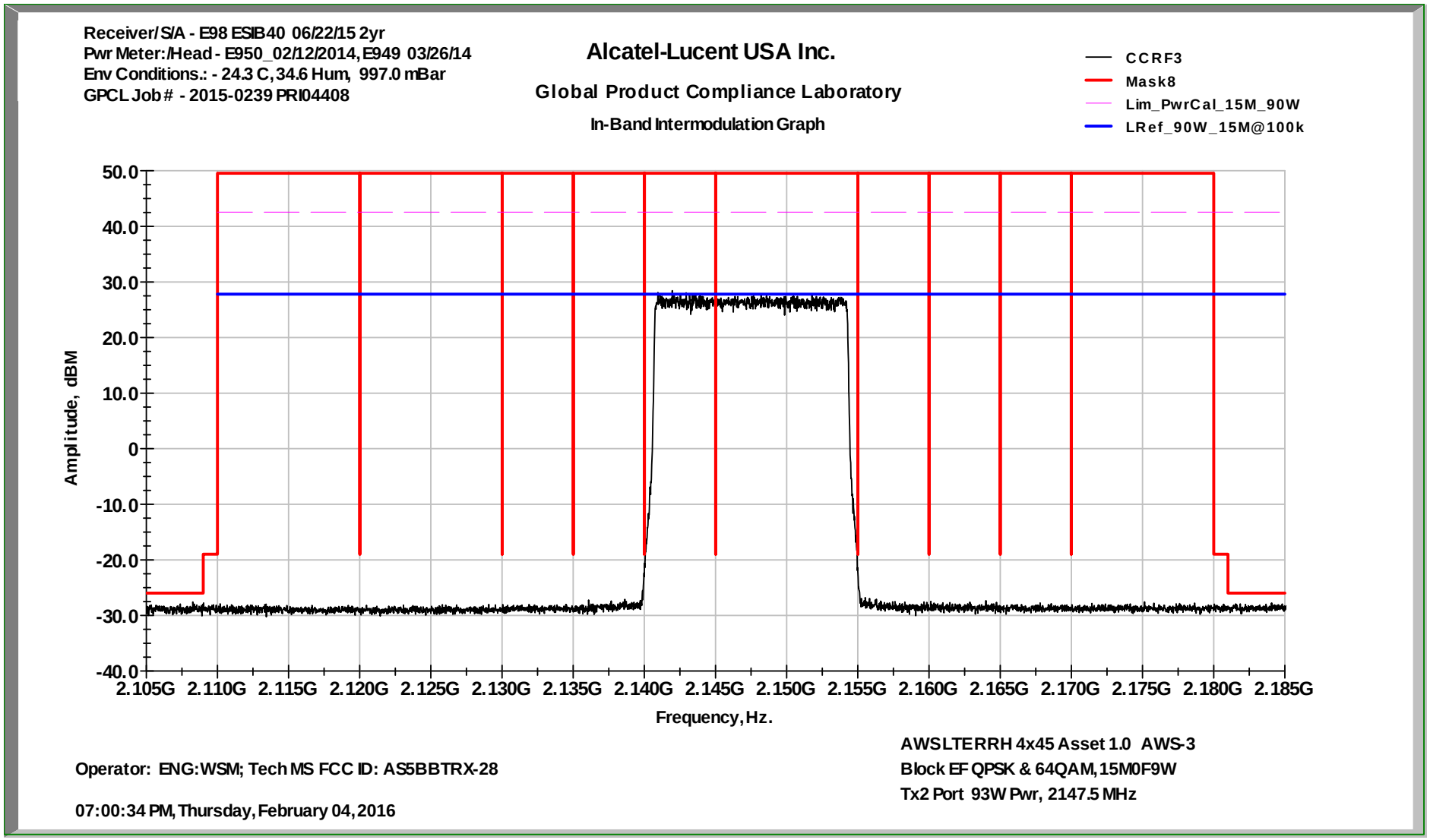


Test Configuration #4
Occupied Bandwidth/ Power Calibration **15M0F9W Block EF** **AWS RRH 4x45 FCC ID AS5BBTRX-28**

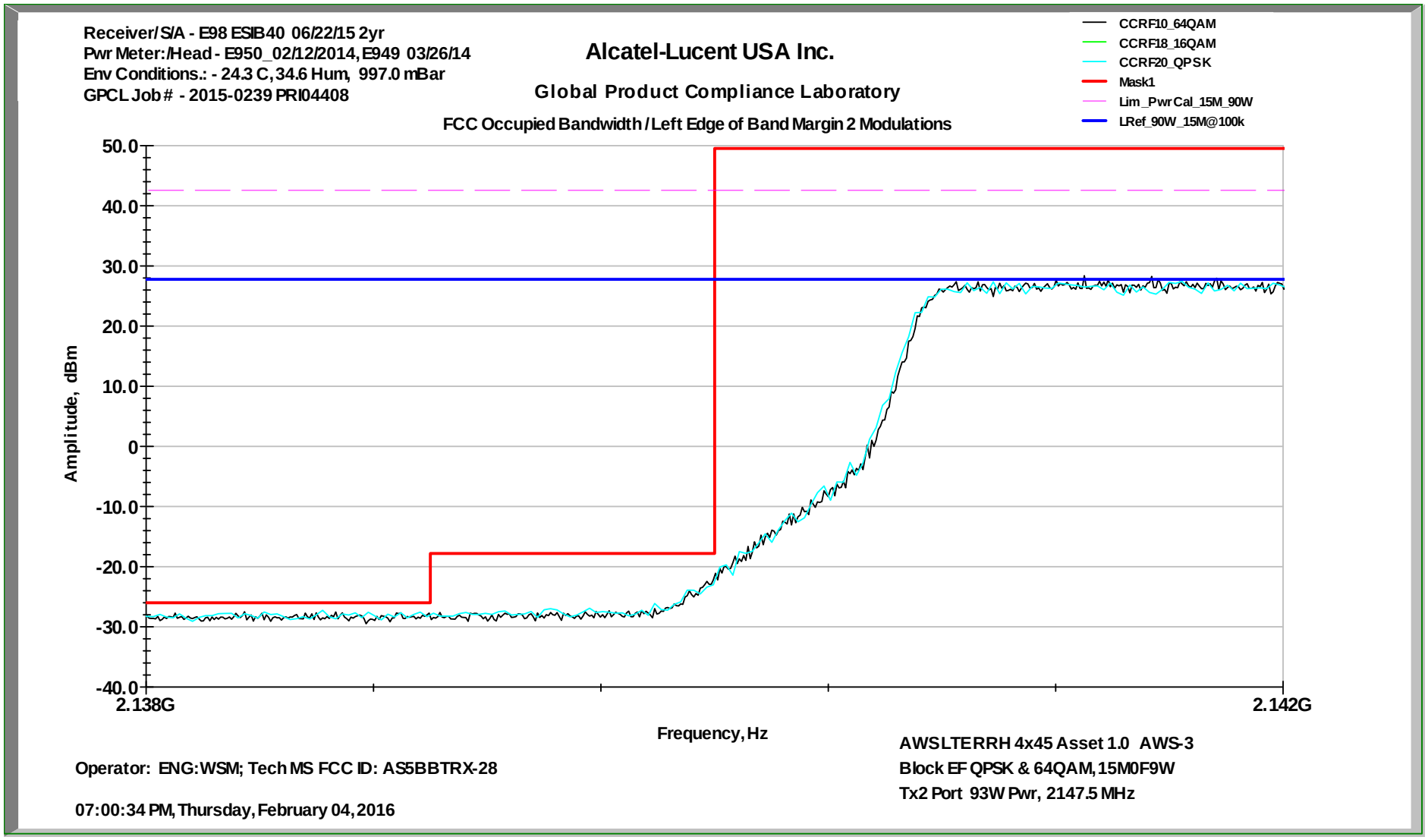



Receiver/S/A - E98 ESIB40 06/22/15 2yr
Pwr Meter:/Head - E950_02/12/2014,E949 03/26/14
Env Conditions.: - 24.3 C,34.6 Hum, 997.0 mBar
GPCL Job # - 2015-0239 PRI04408
Alcatel-Lucent USA Inc.
Global Product Compliance Laboratory
AWS Occupied Bandwidth / Power Cal - Multiple Modulations
CCRF10_64QAM
CCRF11_64QAM-pwr
CCRF18_16QAM
CCRF19_16QAM-pwr
CCRF20_QPSK
CCRF21_QPSK-pwr
Mask1
LRef_90W_15M@100k
Lim_Pwr Cal_15M_90W
Amplitude, dBm
50.0
40.0
30.0
20.0
10.0
0
-10.0
-20.0
-30.0
-40.0
2.135G
2.137G
2.139G
2.141G
2.143G
2.145G
2.147G
2.149G
2.151G
2.153G
2.155G
2.157G
2.159G
Frequency, Hz
Operator: ENG:WSM; Tech MS FCC ID: AS5BBTRX-28
07:00:34 PM, Thursday, February 04, 2016
AWSLTERRH 4x45 Asset 1.0 AWS-3
Block EF QPSK & 64QAM, 15M0F9W
Tx2 Port 93W Pwr, 2147.5 MHz

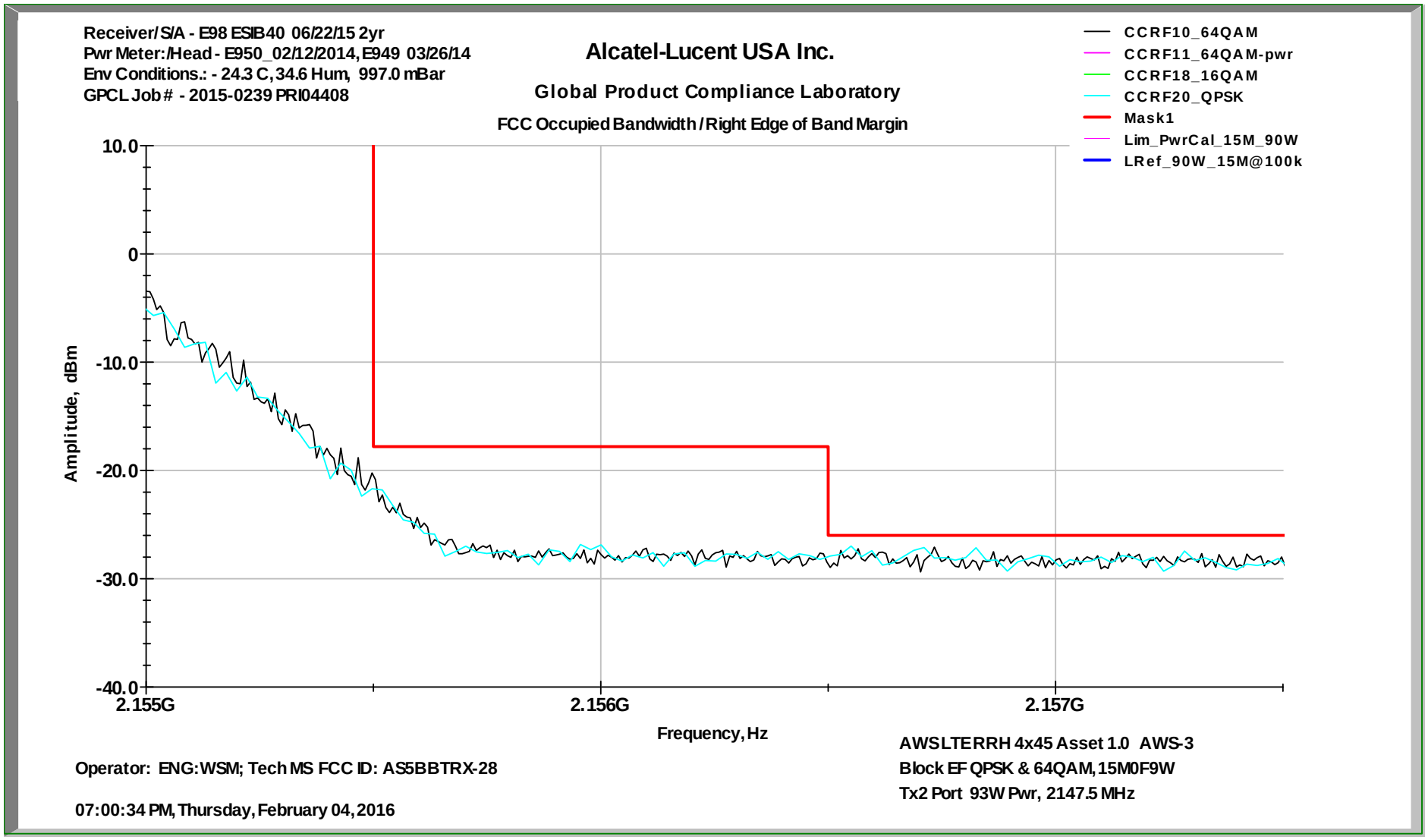
Occupied Bandwidth Whole Band View **15M0F9W Block EF** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



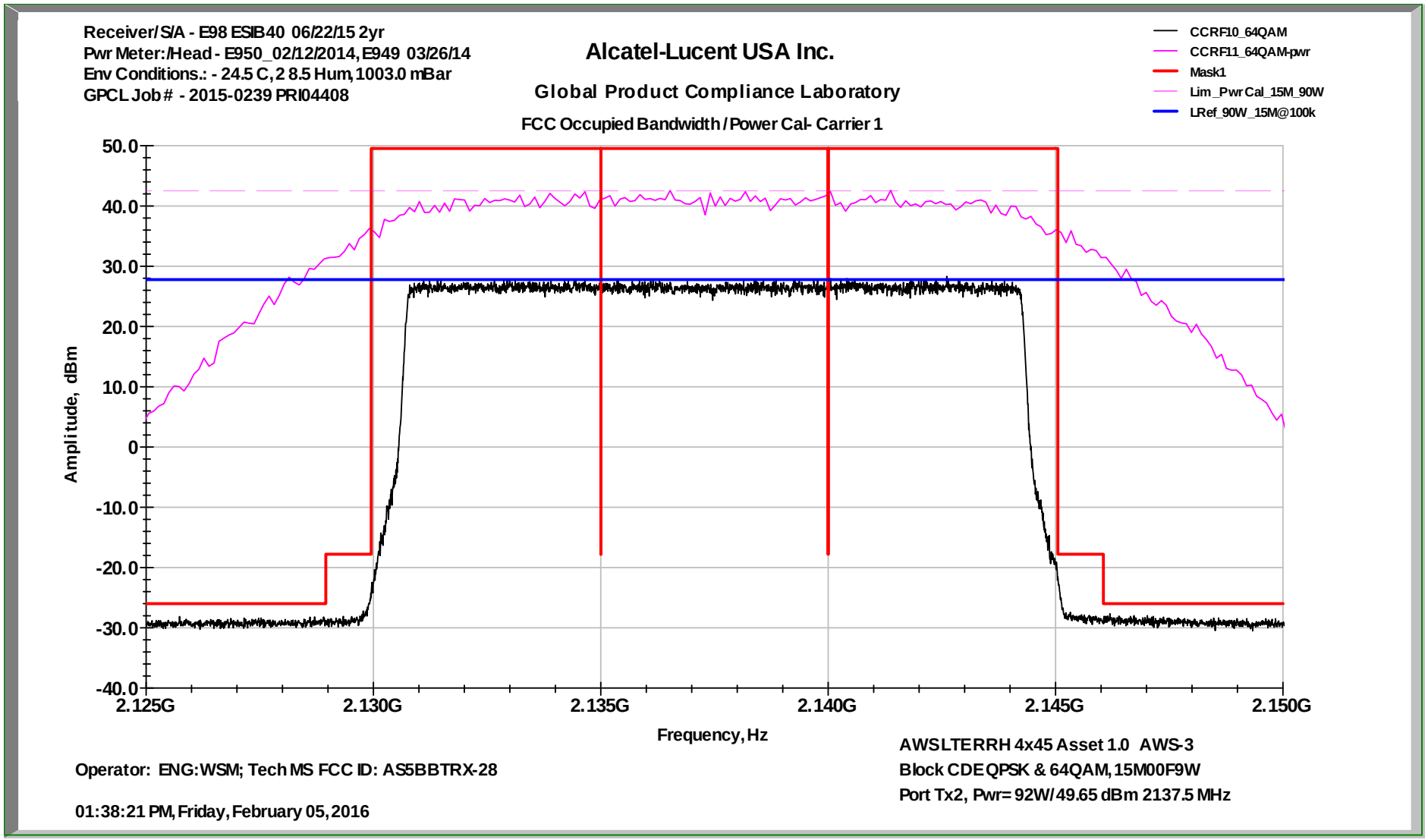
Occupied Bandwidth Left Edge of Block **15M0F9W Block EF** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



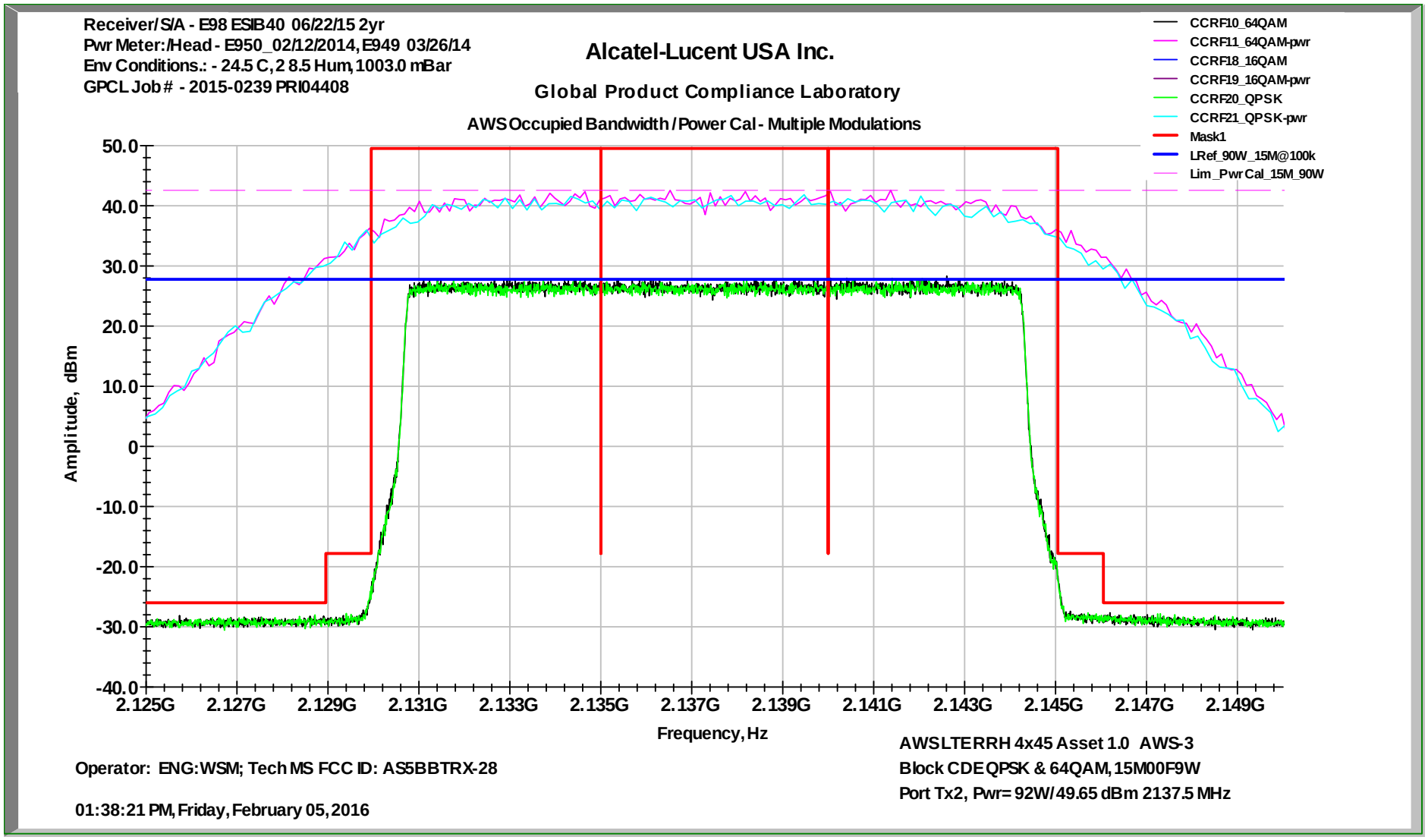
Occupied Bandwidth Right Edge of Block 15M0F9W Block EF AWS RRH 4x45 FCC ID AS5BBTRX-28



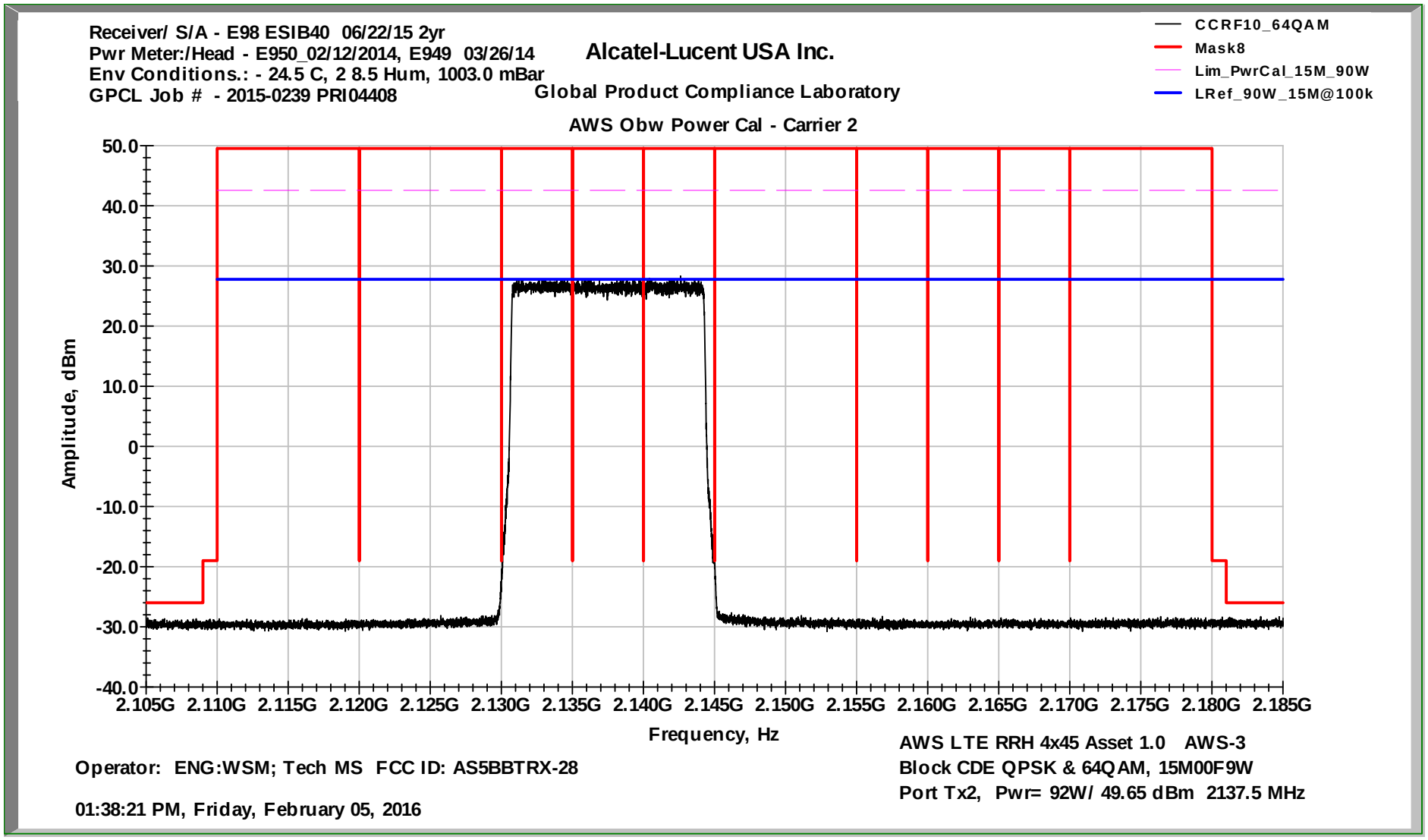
Test Configuration #5
Occupied Bandwidth/ Power Calibration **15M0F9W Block CDE AWS RRH 4x45 FCC ID AS5BBTRX-28**



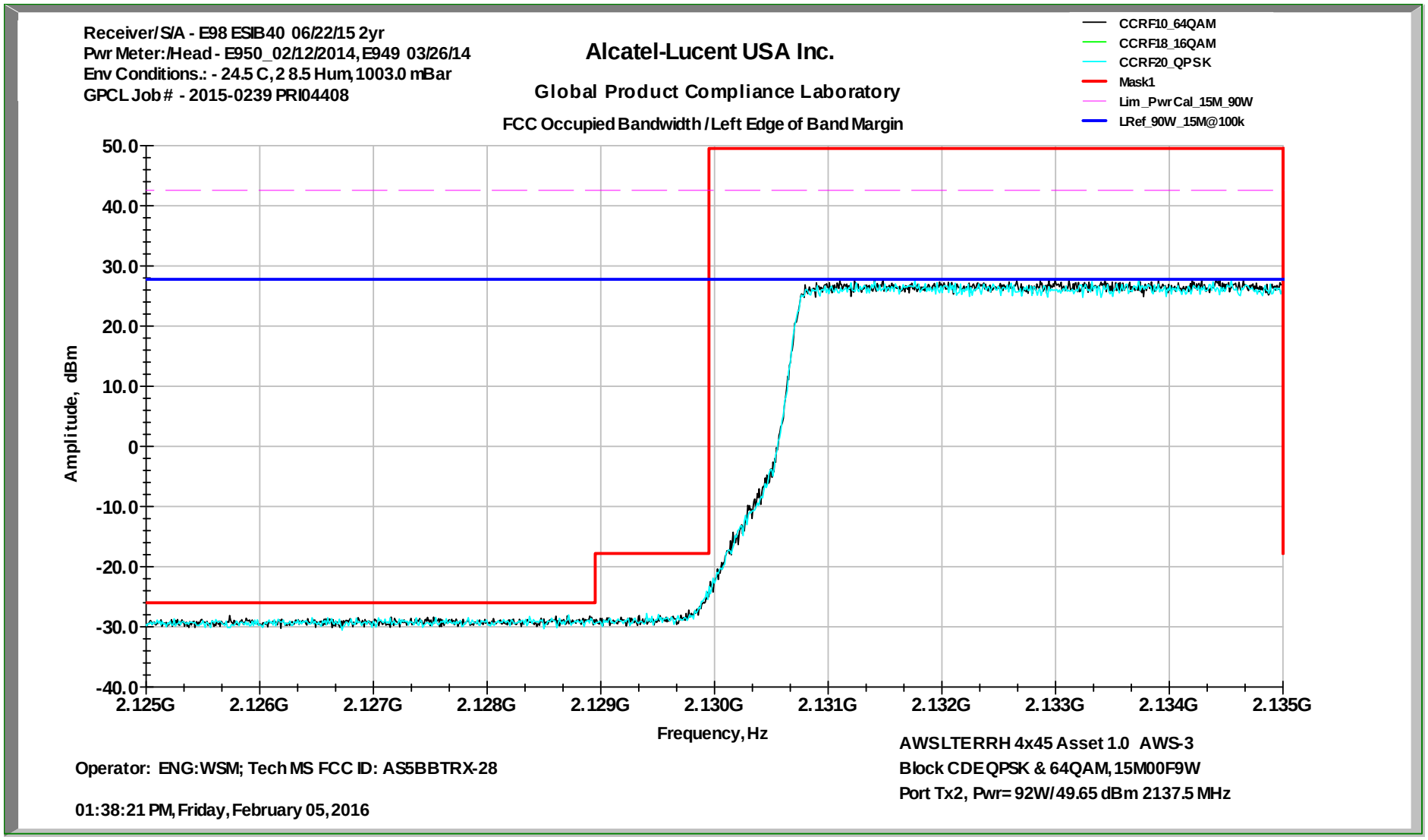
OBW/ Power Cal Multiple Modulations **15M0F9W Block CDE** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



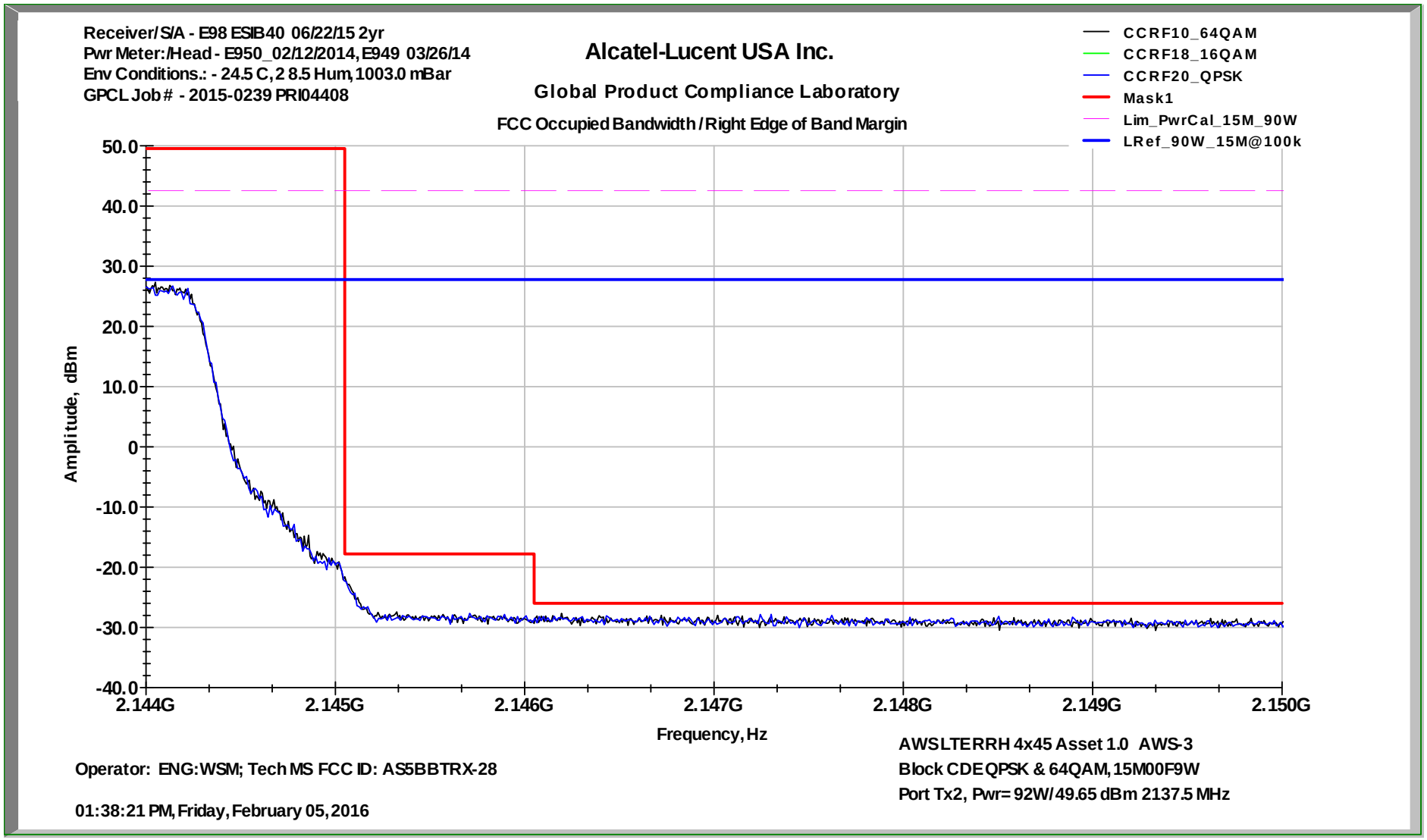
Occupied Bandwidth Whole Band View **15M0F9W Block CDE AWS RRH 4x45 FCC ID AS5BBTRX-28**



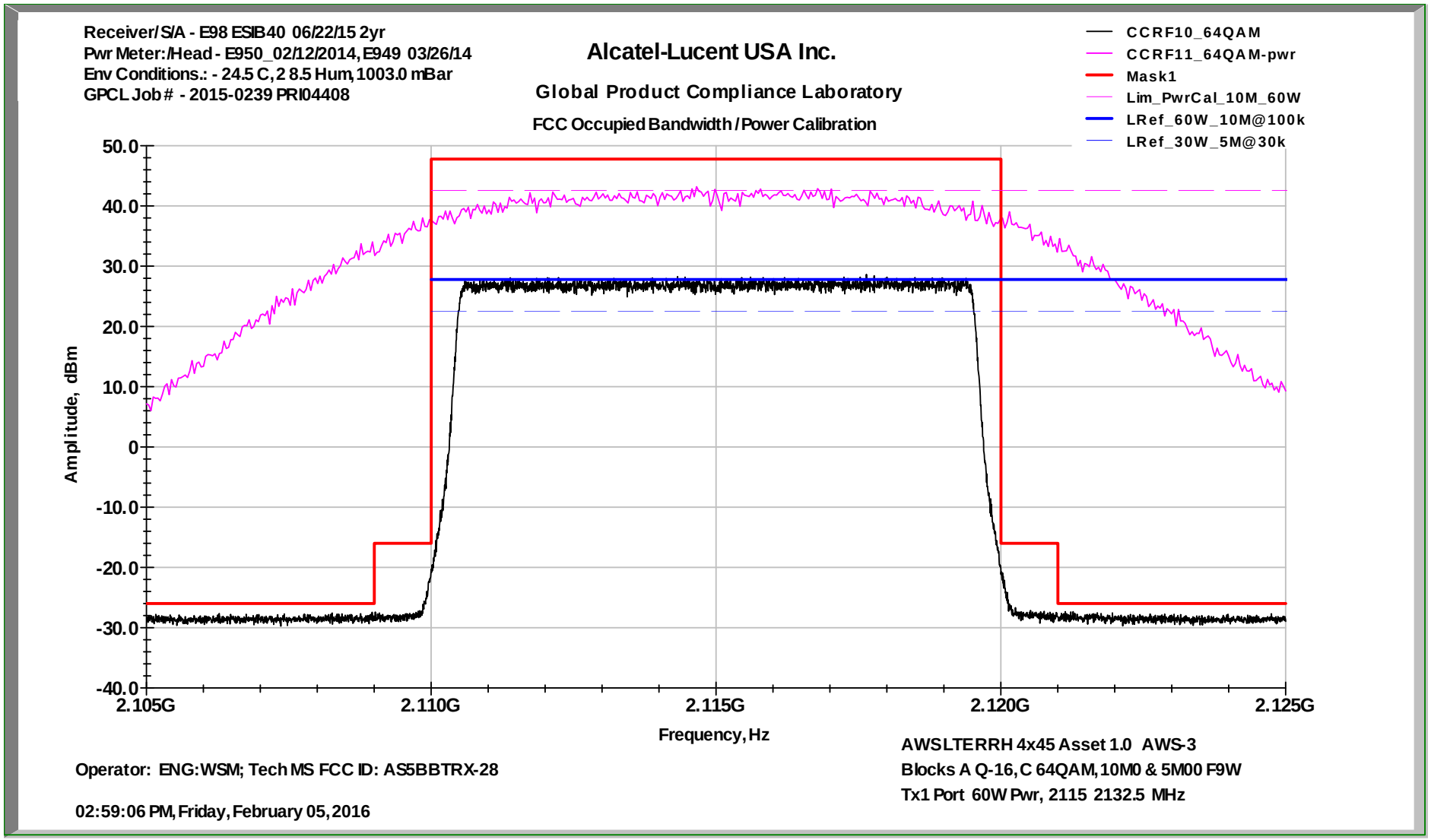
Occupied Bandwidth Left Edge of Block **15M0F9W Block CDE** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



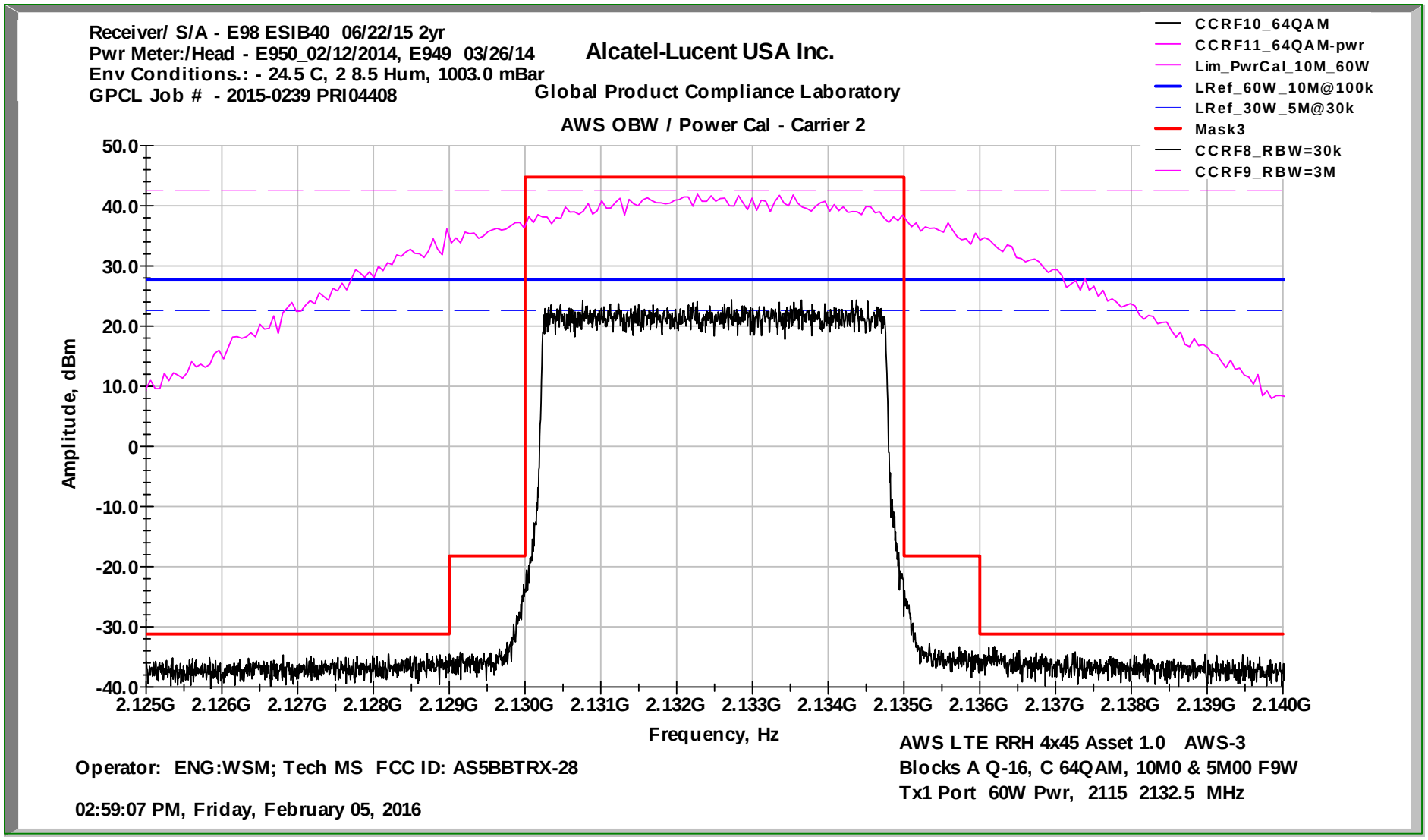
Occupied Bandwidth Right Edge of Block **15M0F9W Block CDE** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



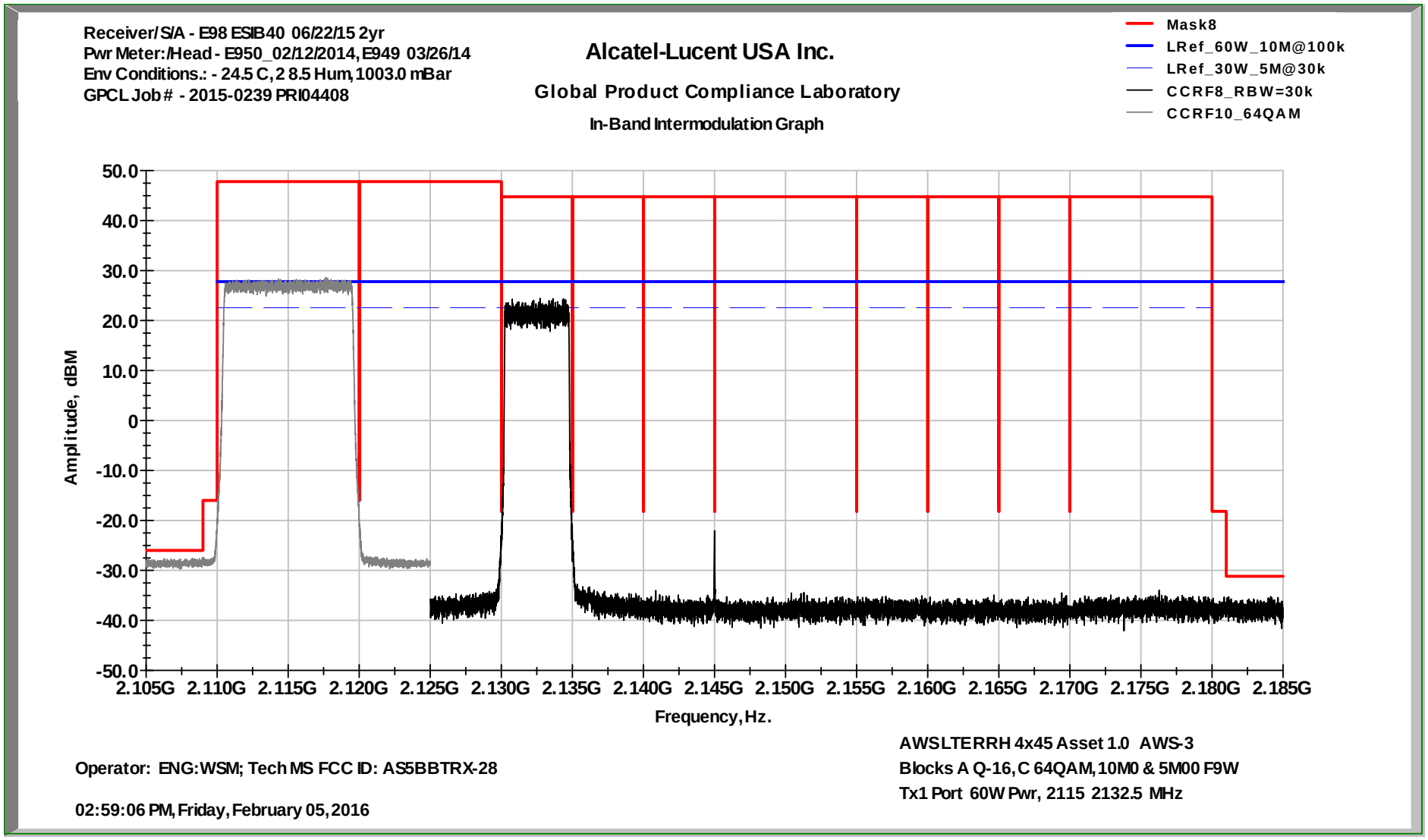
Dual Carrier #6
Occupied Bandwidth/Power Cal -Carrier 1 10&5 MHz Blocks A&C AWS RRH 4x45 FCC ID AS5BBTRX-28



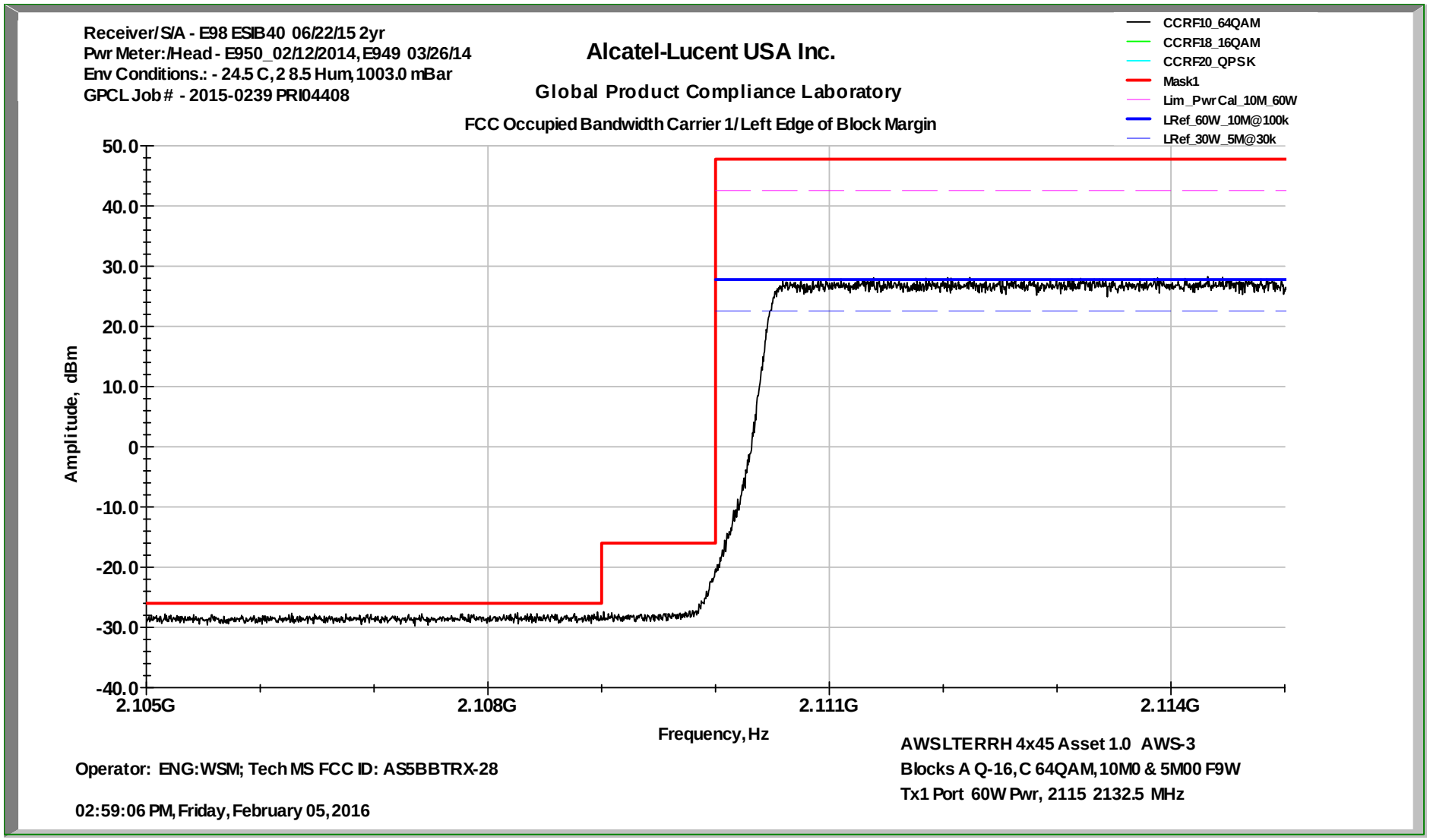
Occupied Bandwidth/Power Cal –Carrier 2 **10&5 MHz Blocks A&C AWS RRH 4x45 FCC ID AS5BBTRX-28**



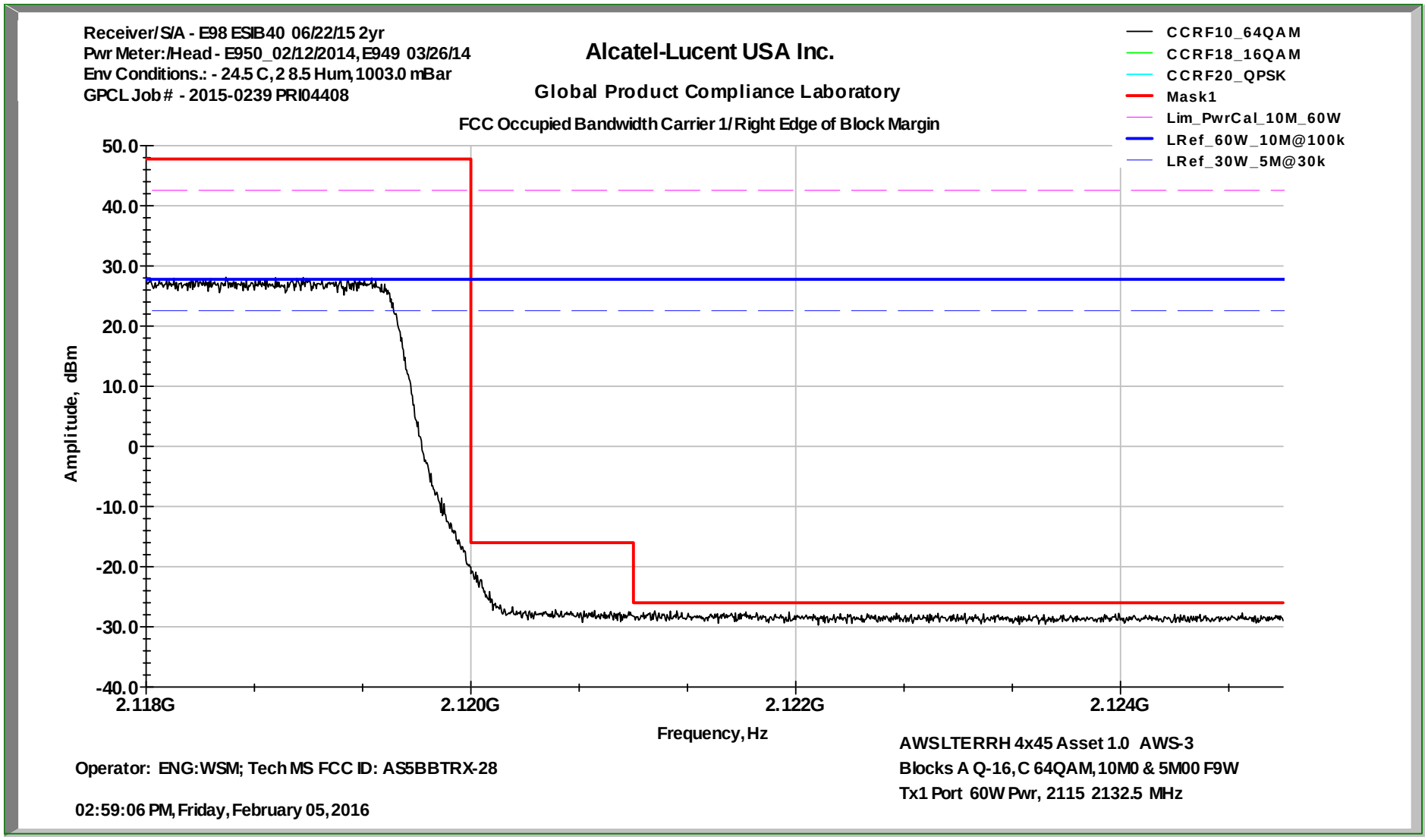
OBW Multiple Mod. Whole Band View **10&5 MHz Blocks A&C AWS RRH 4x45 FCC ID AS5BBTRX-28**



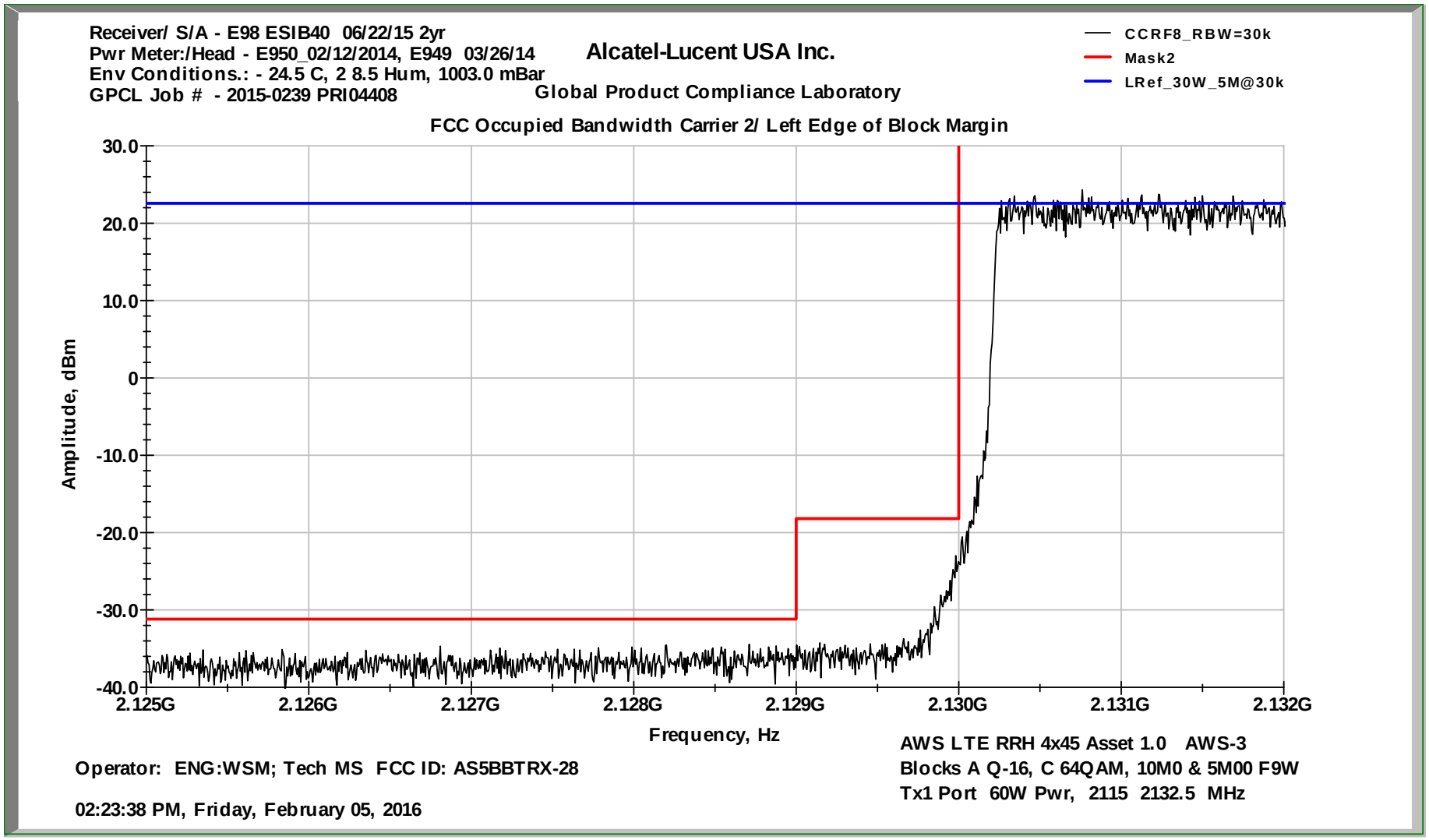
OBW Carrier 1 - Left Edge of Block **10&5 MHz Blocks A&C AWS RRH 4x45 FCC ID AS5BBTRX-28**



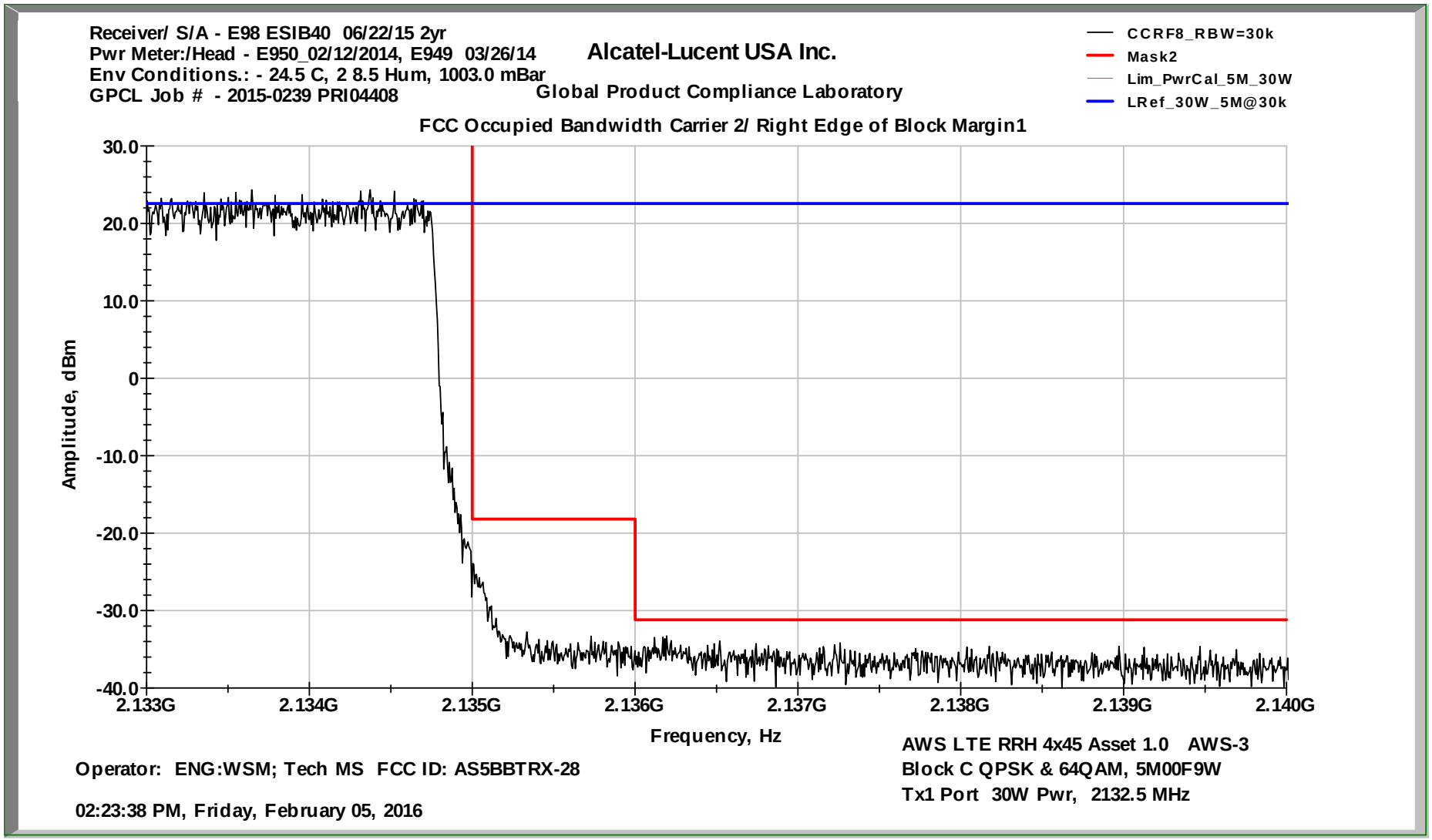
OBW Carrier 1 - Right Edge of Block **10&5 MHz Blocks A&C AWS RRH 4x45 FCC ID AS5BBTRX-28**



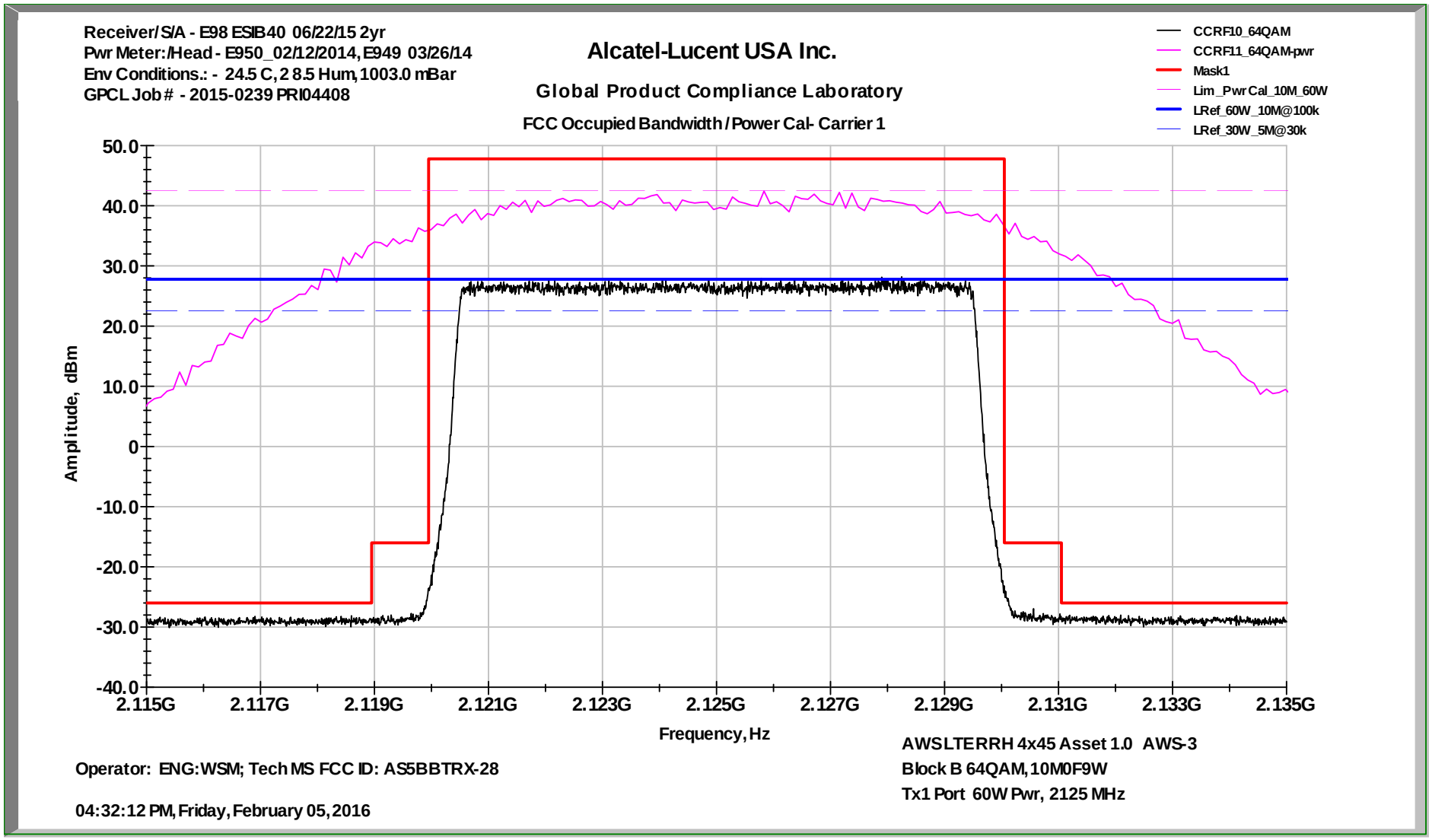
OBW Carrier 2 - Left Edge of Block **10&5 MHz Blocks A&C AWS RRH 4x45 FCC ID AS5BBTRX-28**



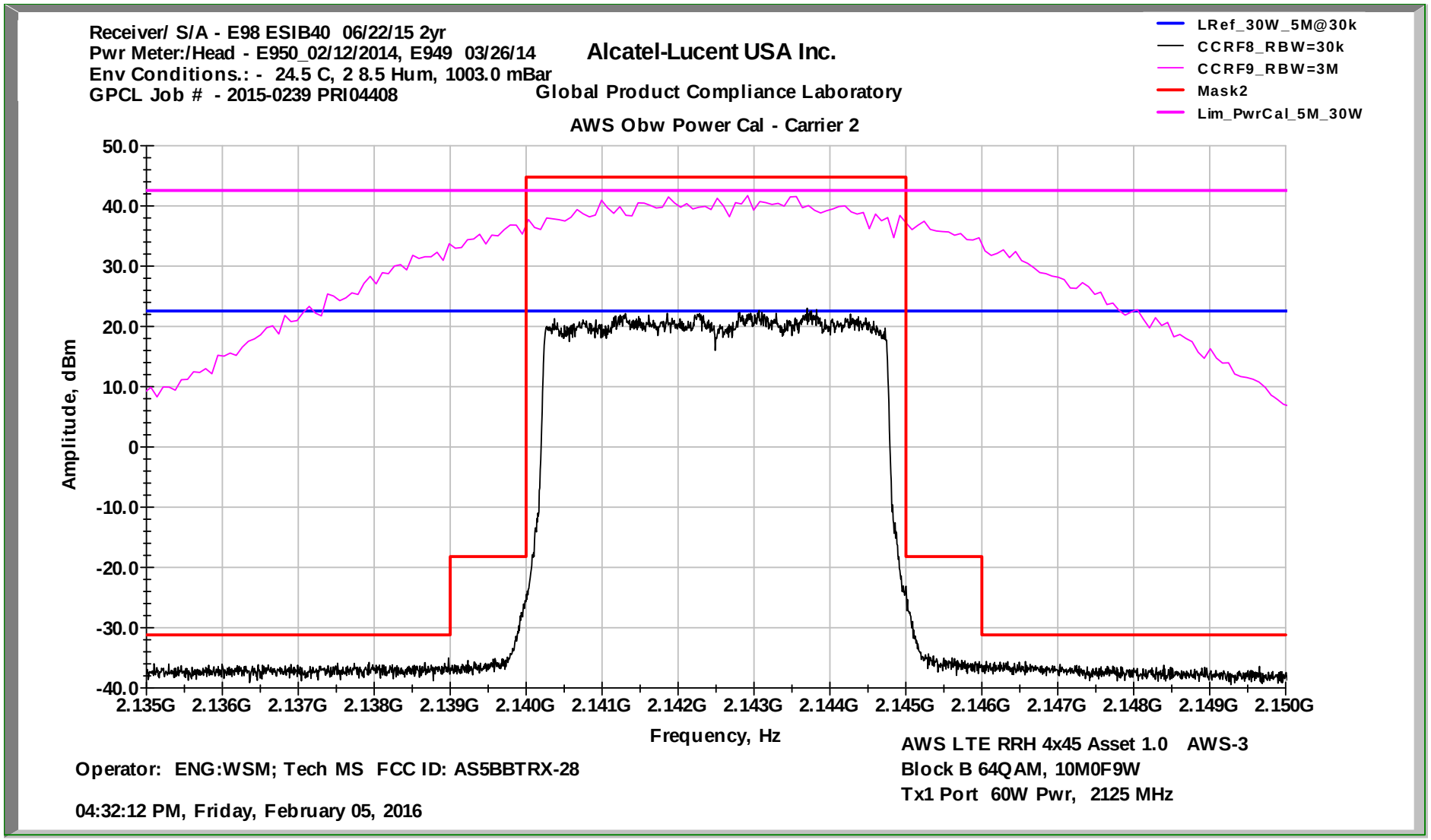
OBW Carrier 2 - Right Edge of Block **10&5 MHz Blocks A&C AWS RRH 4x45 FCC ID AS5BBTRX-28**



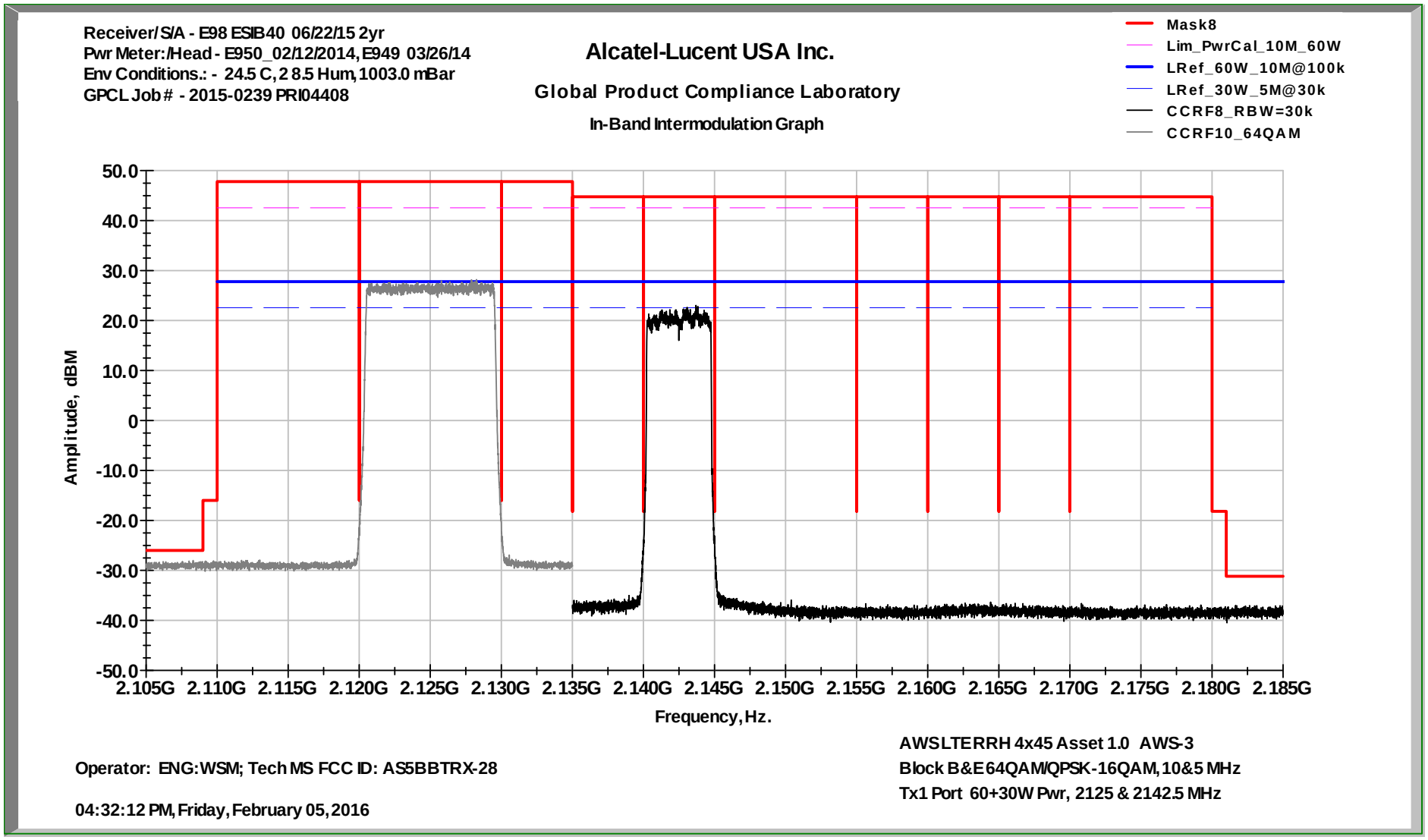
Dual Carrier #7
Occupied Bandwidth/Power Cal -Carrier 1 10&5 MHz Blocks B&E AWS RRH 4x45 FCC ID AS5BBTRX-28



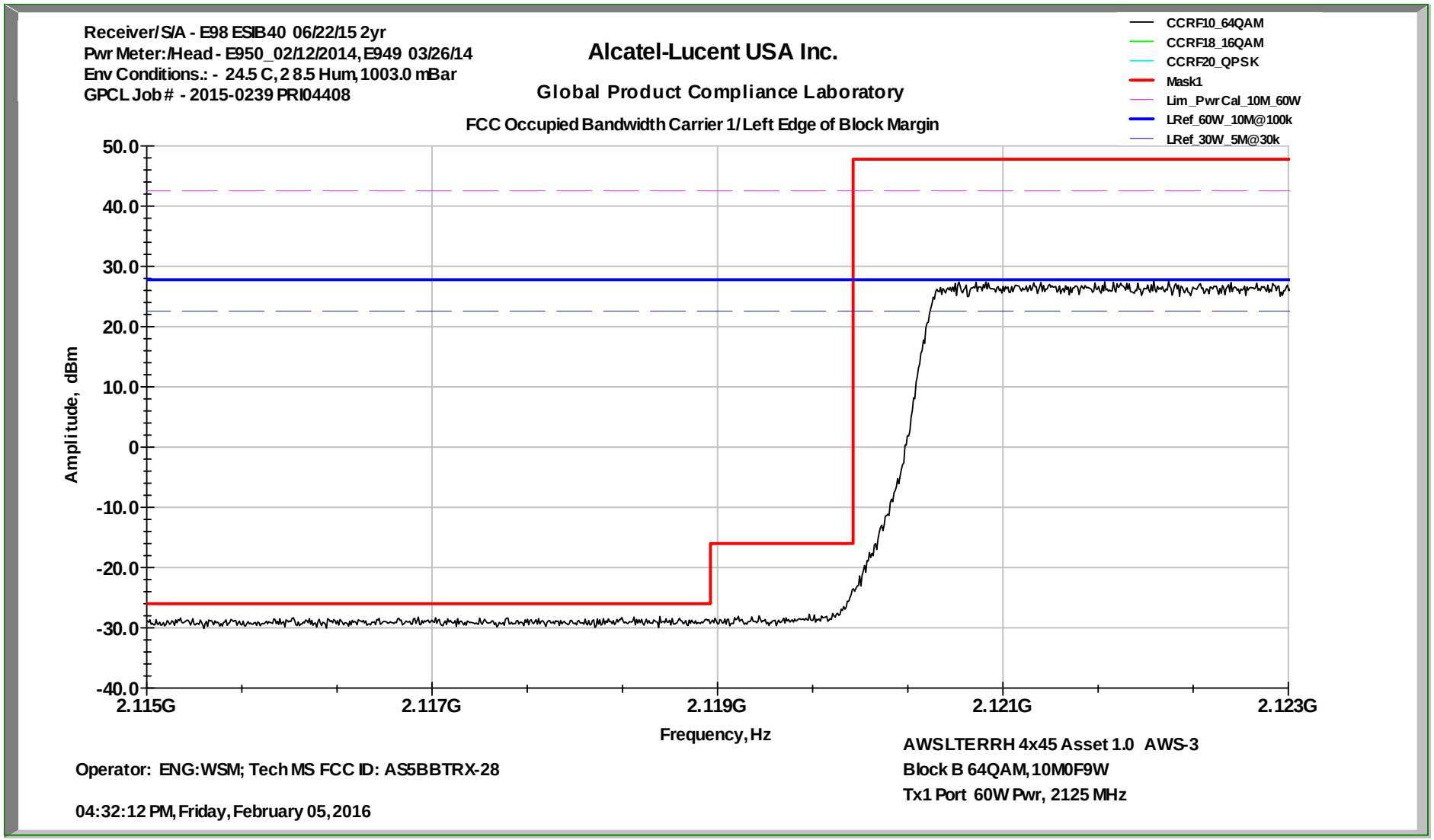
Occupied Bandwidth/Power Cal -Carrier 2 **10&5 MHz Blocks B&E AWS RRH 4x45 FCC ID AS5BBTRX-28**



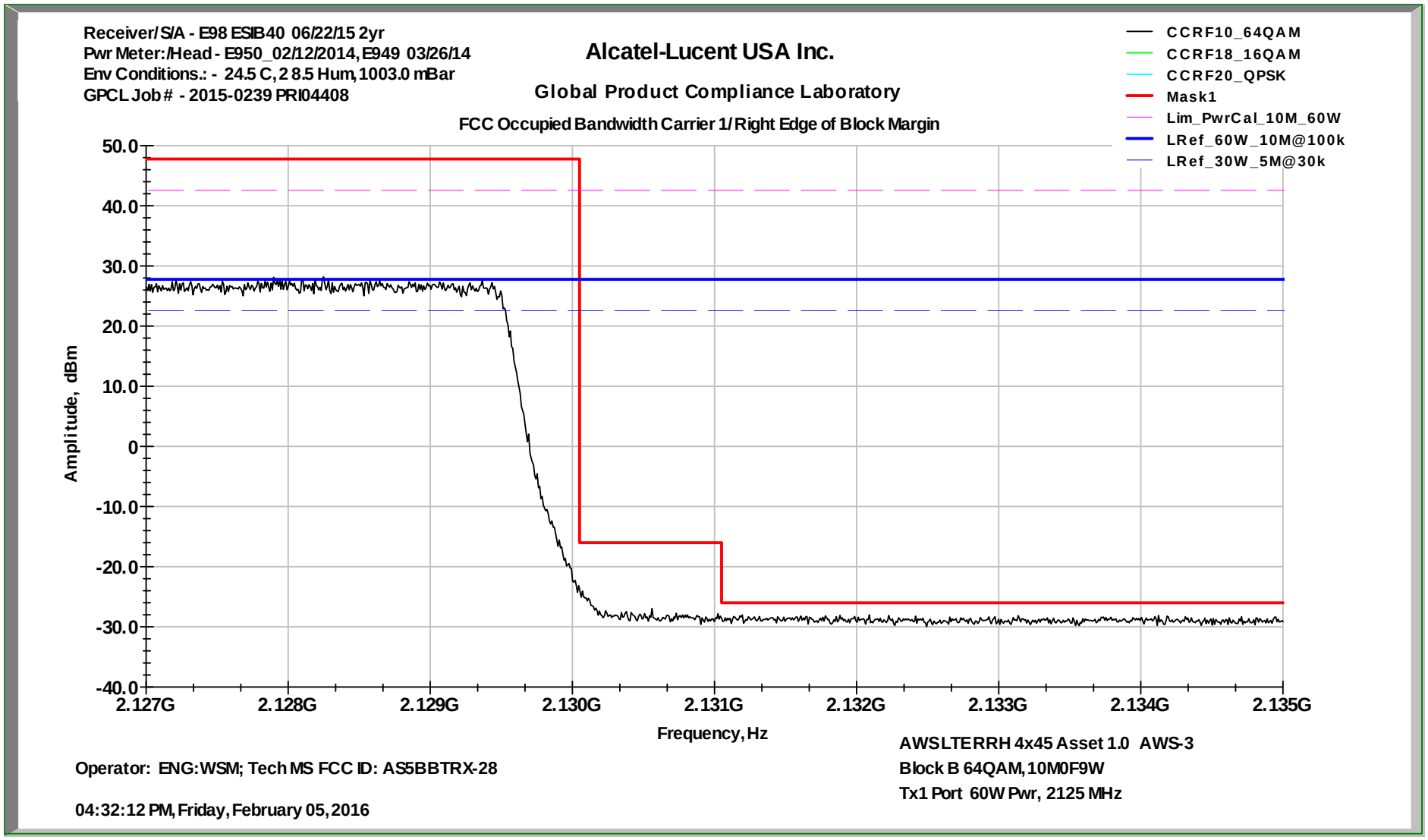
OBW Multiple Mod. Whole Band View **10&5 MHz Blocks B&E AWS RRH 4x45 FCC ID AS5BBTRX-28**



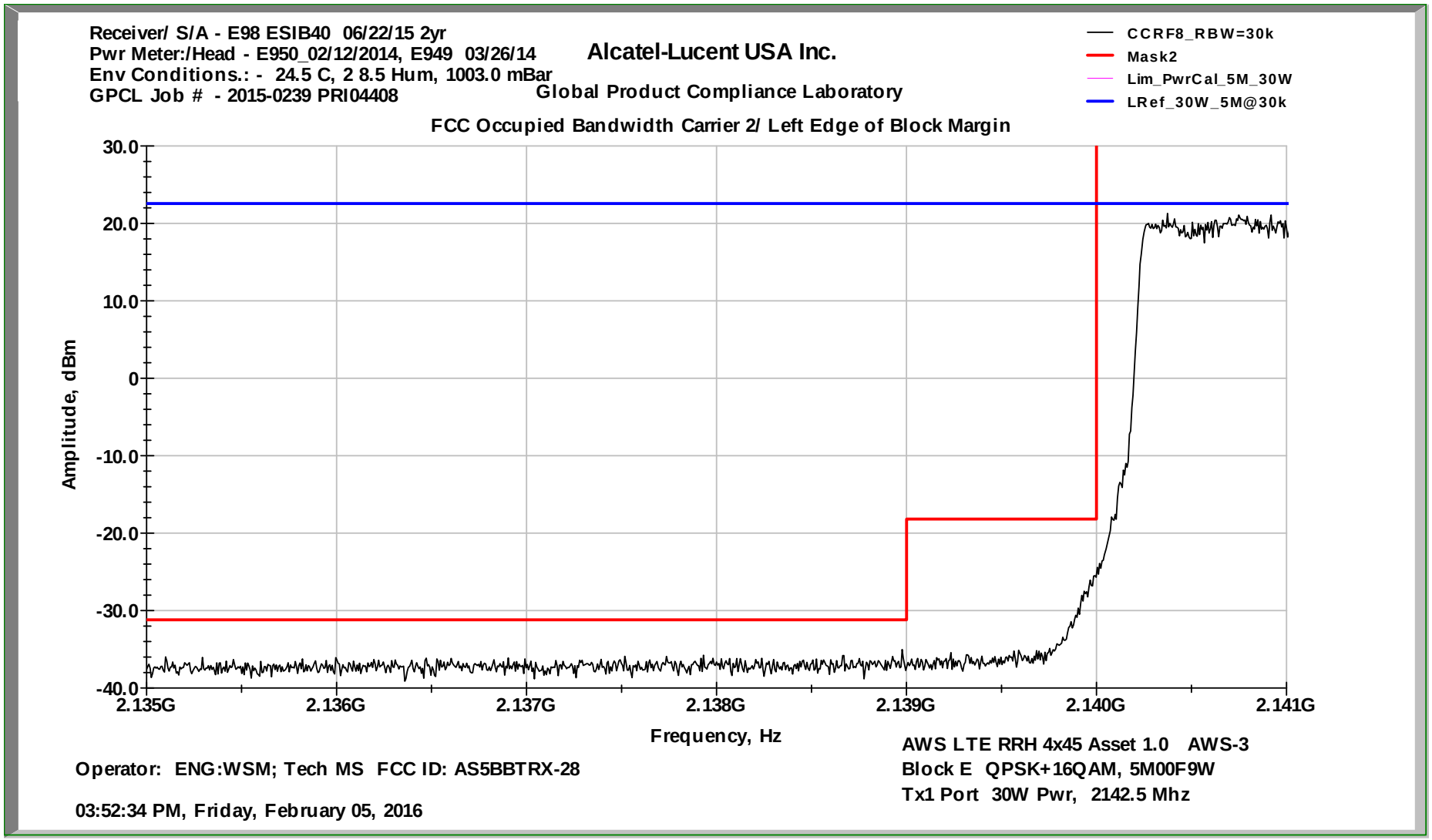
OBW Carrier 1 - Left Edge of Block **10&5 MHz Blocks B&E AWS RRH 4x45 FCC ID AS5BBTRX-28**



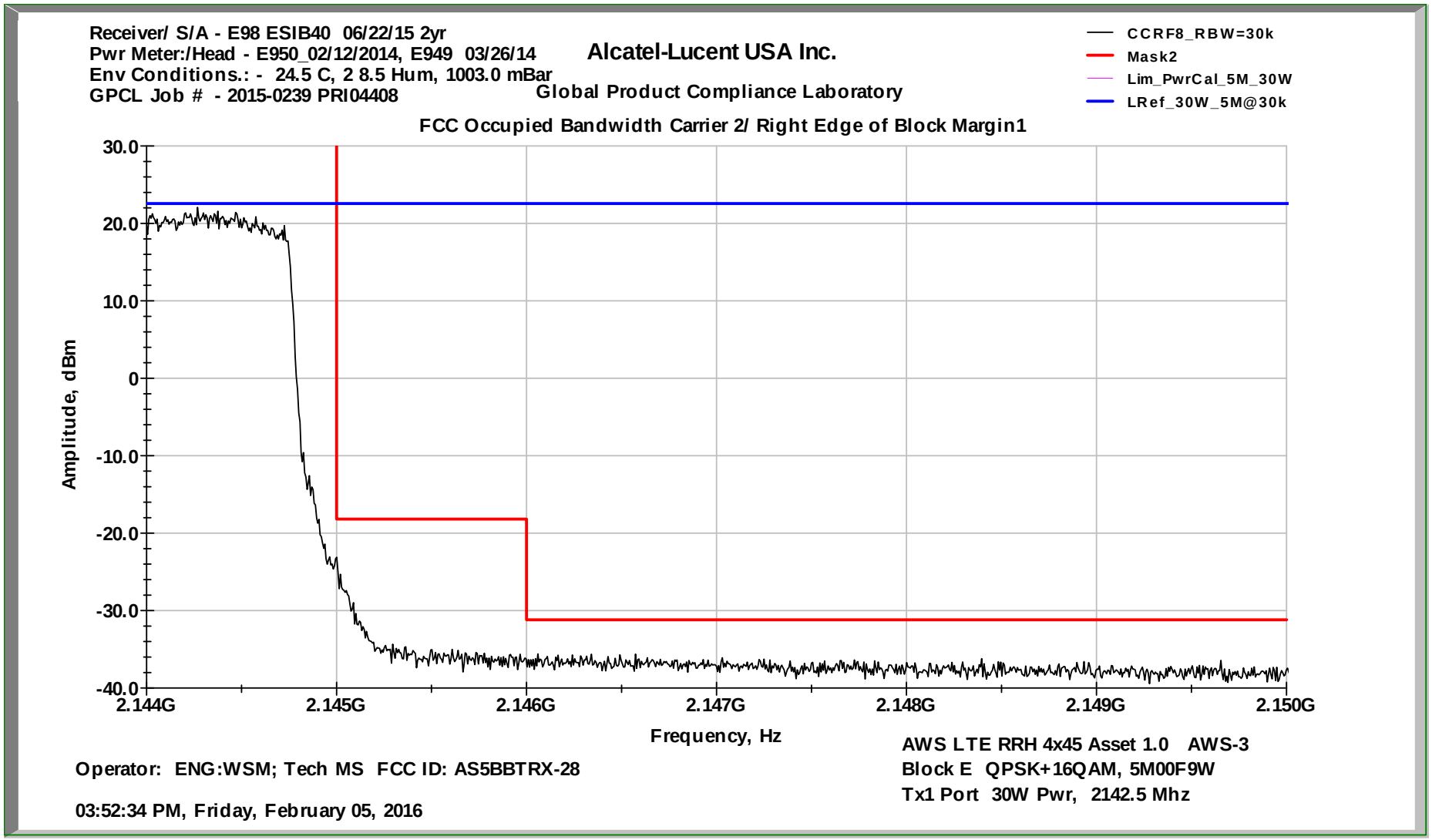
OBW Carrier 1 - Right Edge of Block **10&5 MHz Blocks B&E AWS RRH 4x45 FCC ID AS5BBTRX-28**



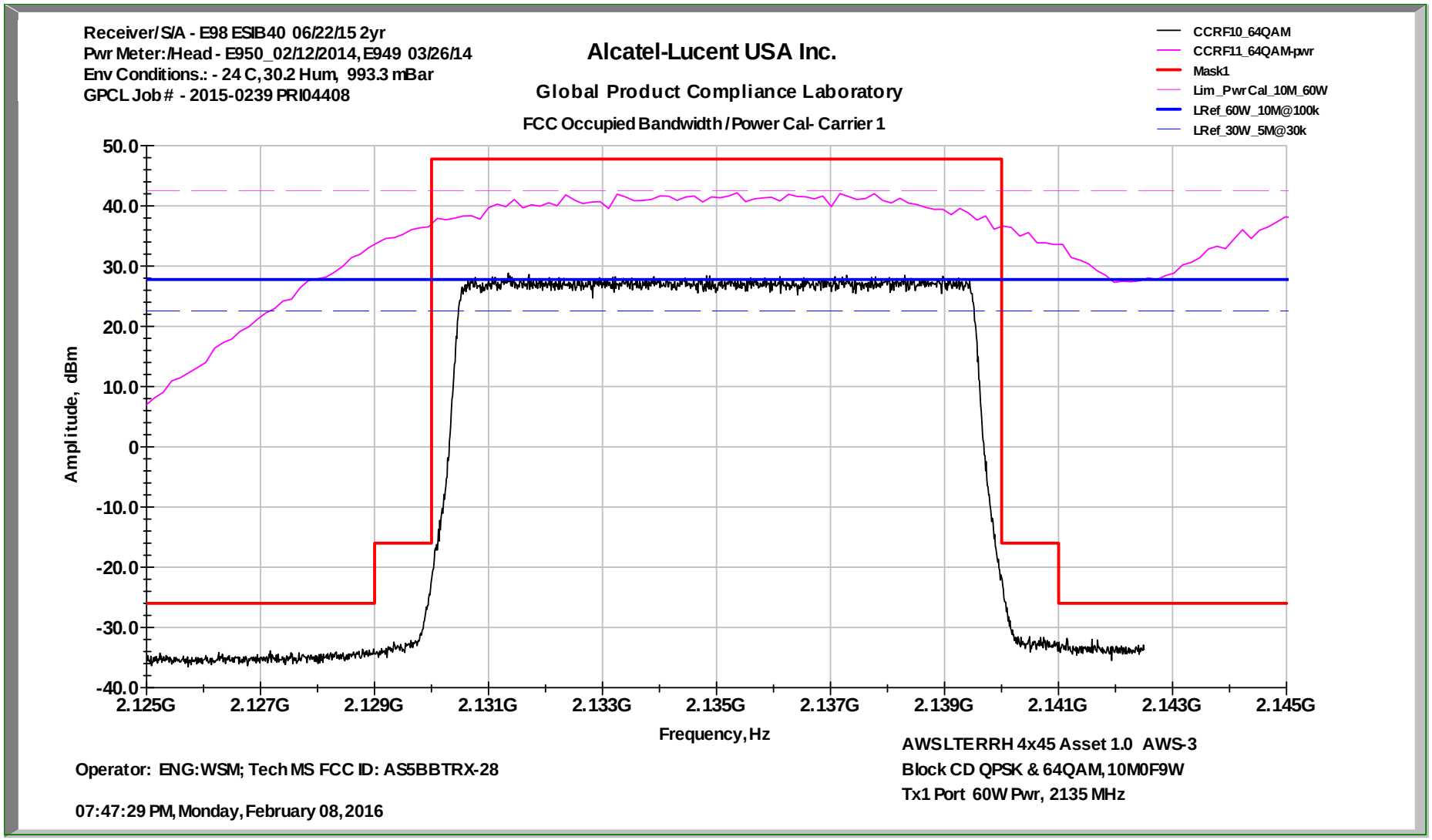
OBW Carrier 2 - Left Edge of Block **10&5 MHz Blocks B&E AWS RRH 4x45 FCC ID AS5BBTRX-28**



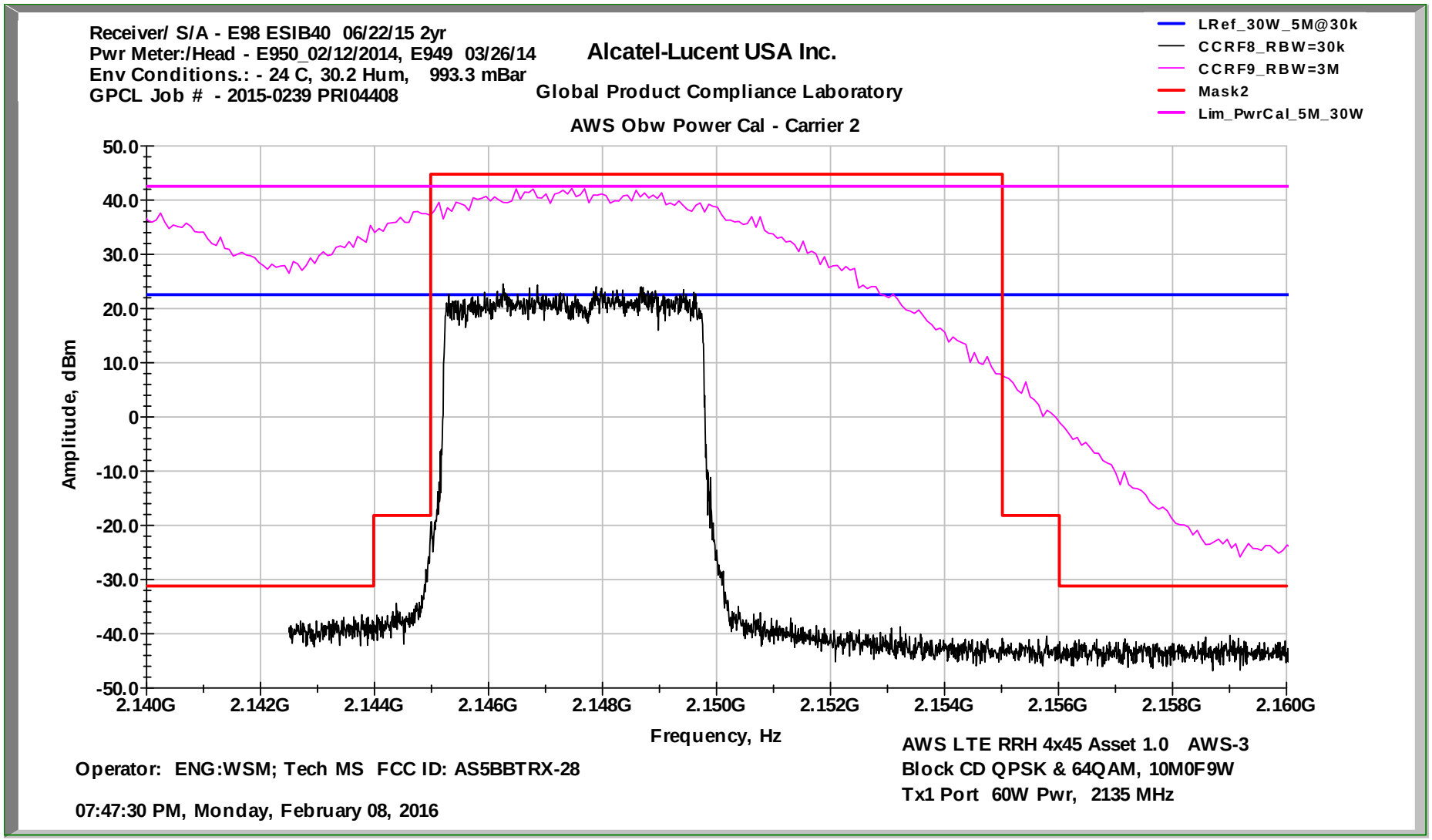
OBW Carrier 2 - Right Edge of Block **10&5 MHz Blocks B&E AWS RRH 4x45 FCC ID AS5BBTRX-28**



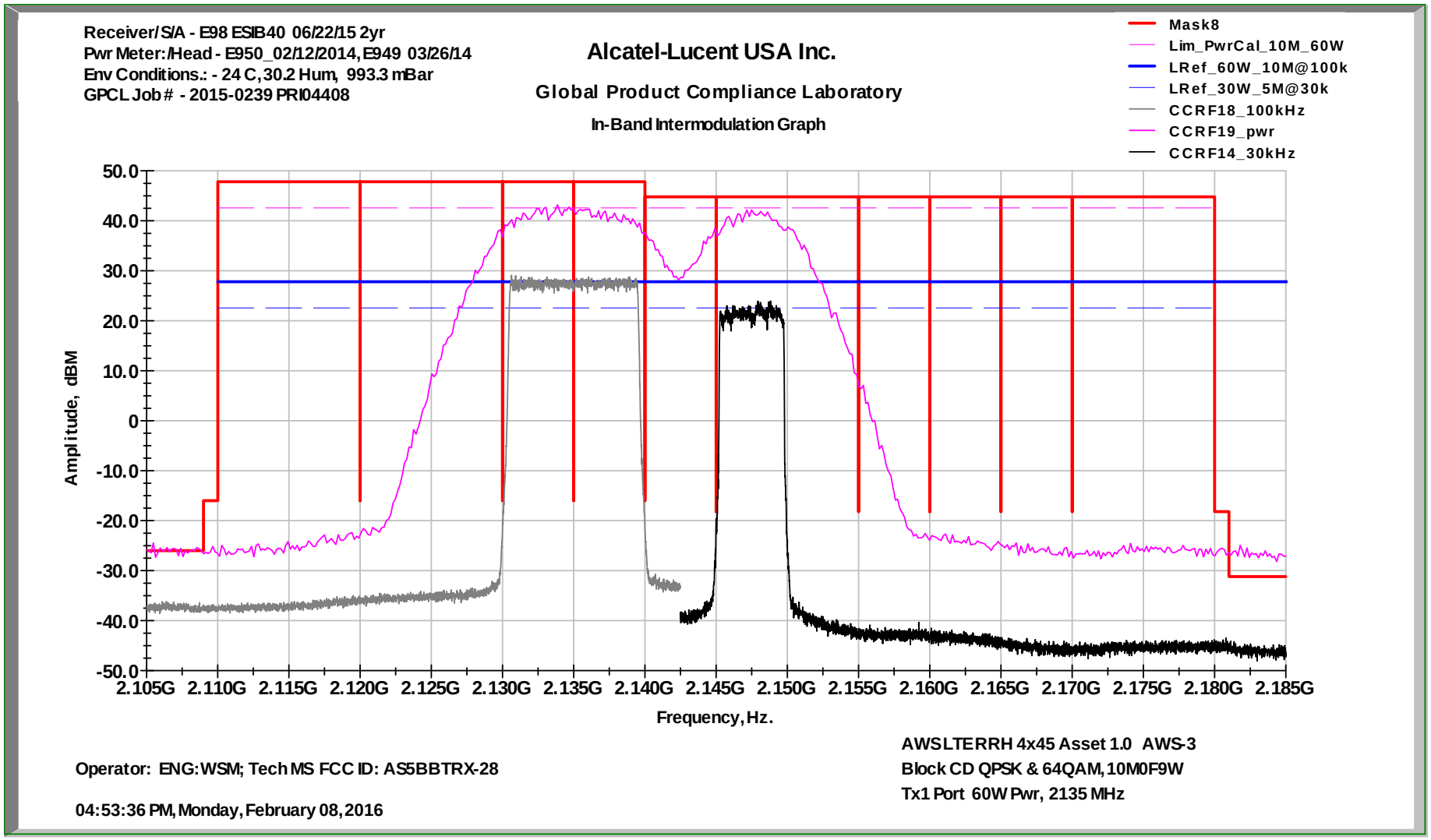
Test Configuration #8
Occupied Bandwidth/Power Cal -Carrier 1 10&5 MHz Blocks CD-F AWS RRH 4x45 FCC ID AS5BBTRX-28



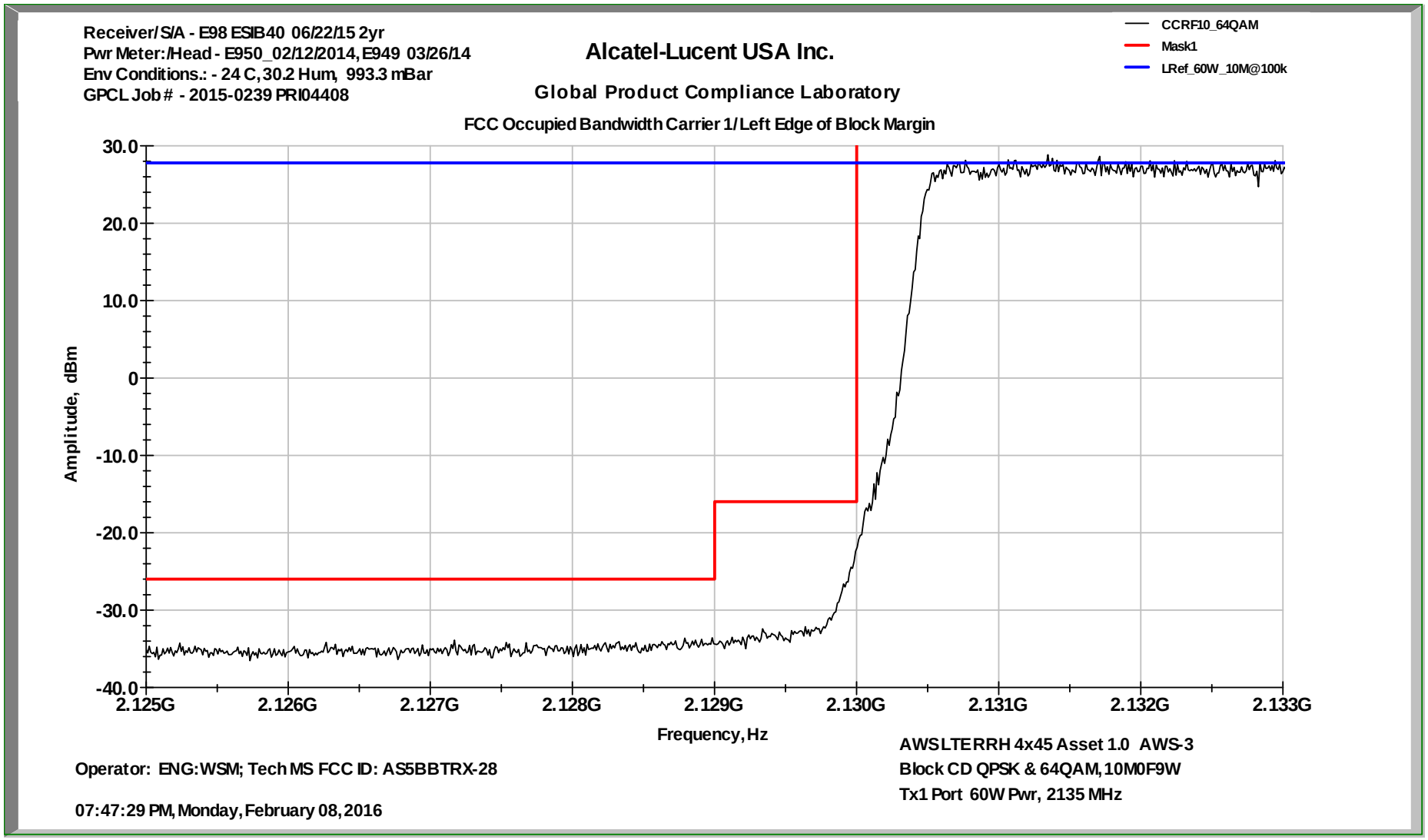
Occupied Bandwidth/Power Cal -Carrier 2 10&5 MHz Blocks CD-F AWS RRH 4x45 FCC ID AS5BBTRX-28



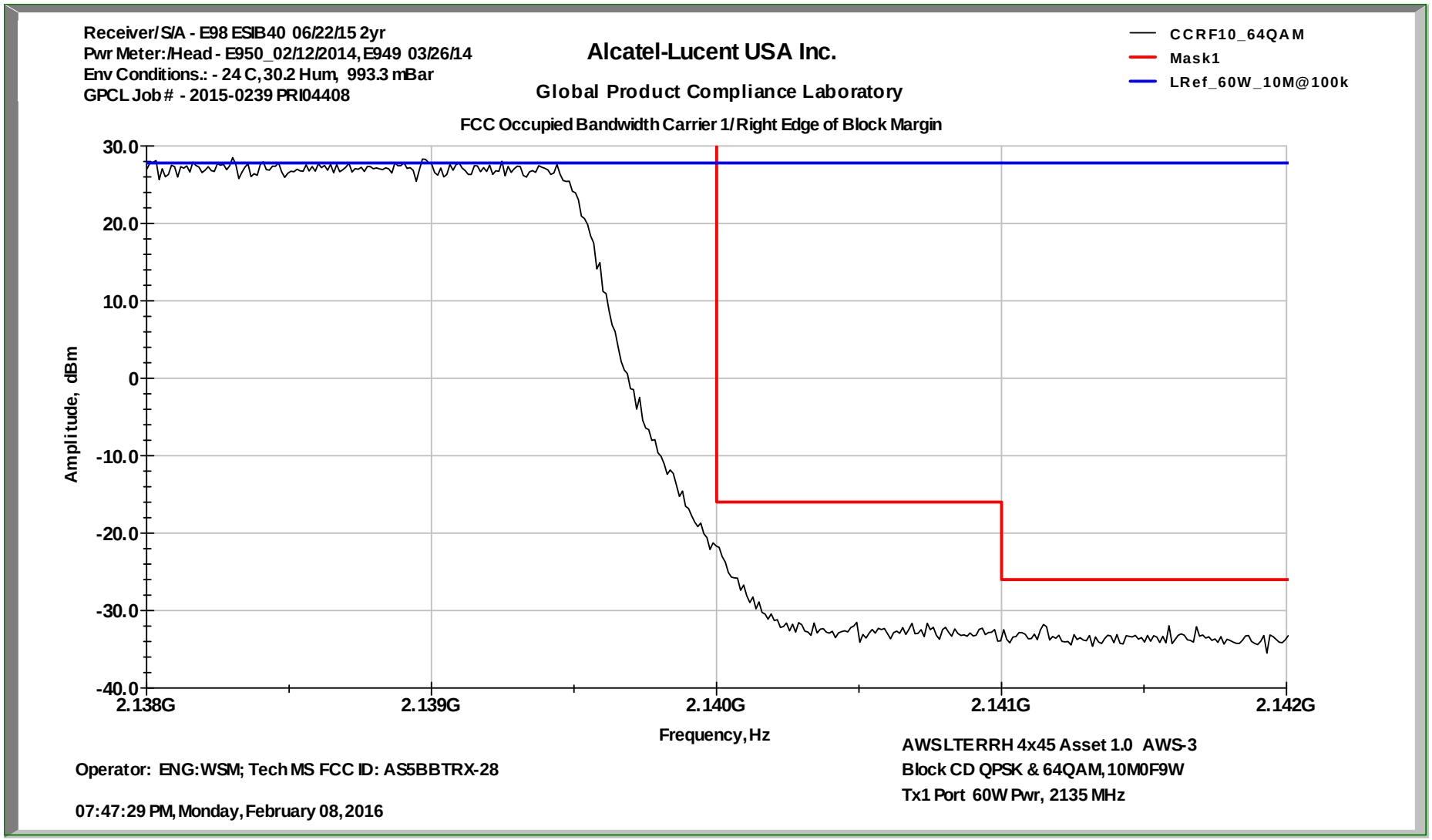
OBW Intermods. Whole Band View **10&5 MHz Blocks CD-F** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



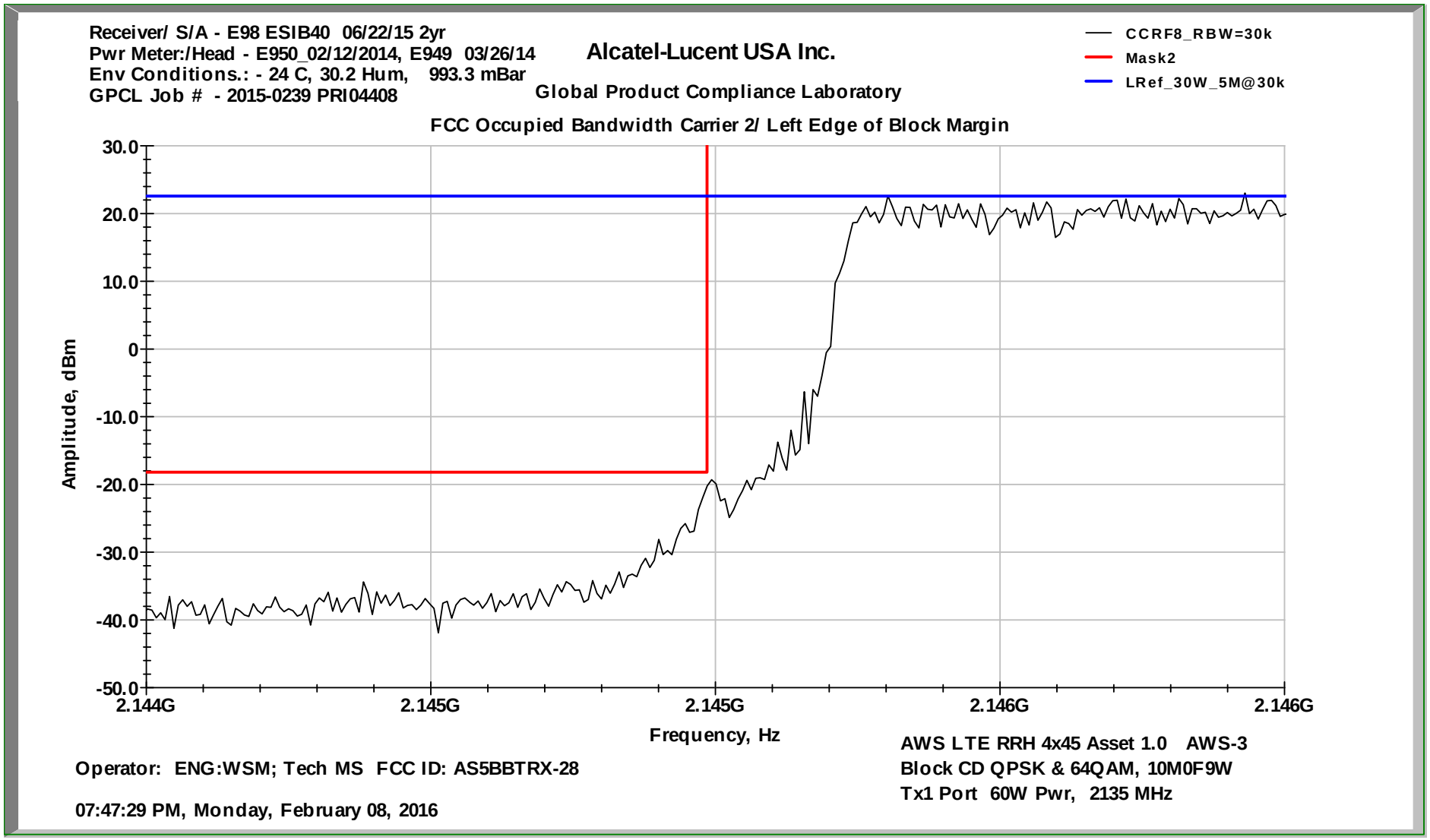
OBW Carrier 1 - Left Edge of Block **10&5 MHz Blocks CD-F** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



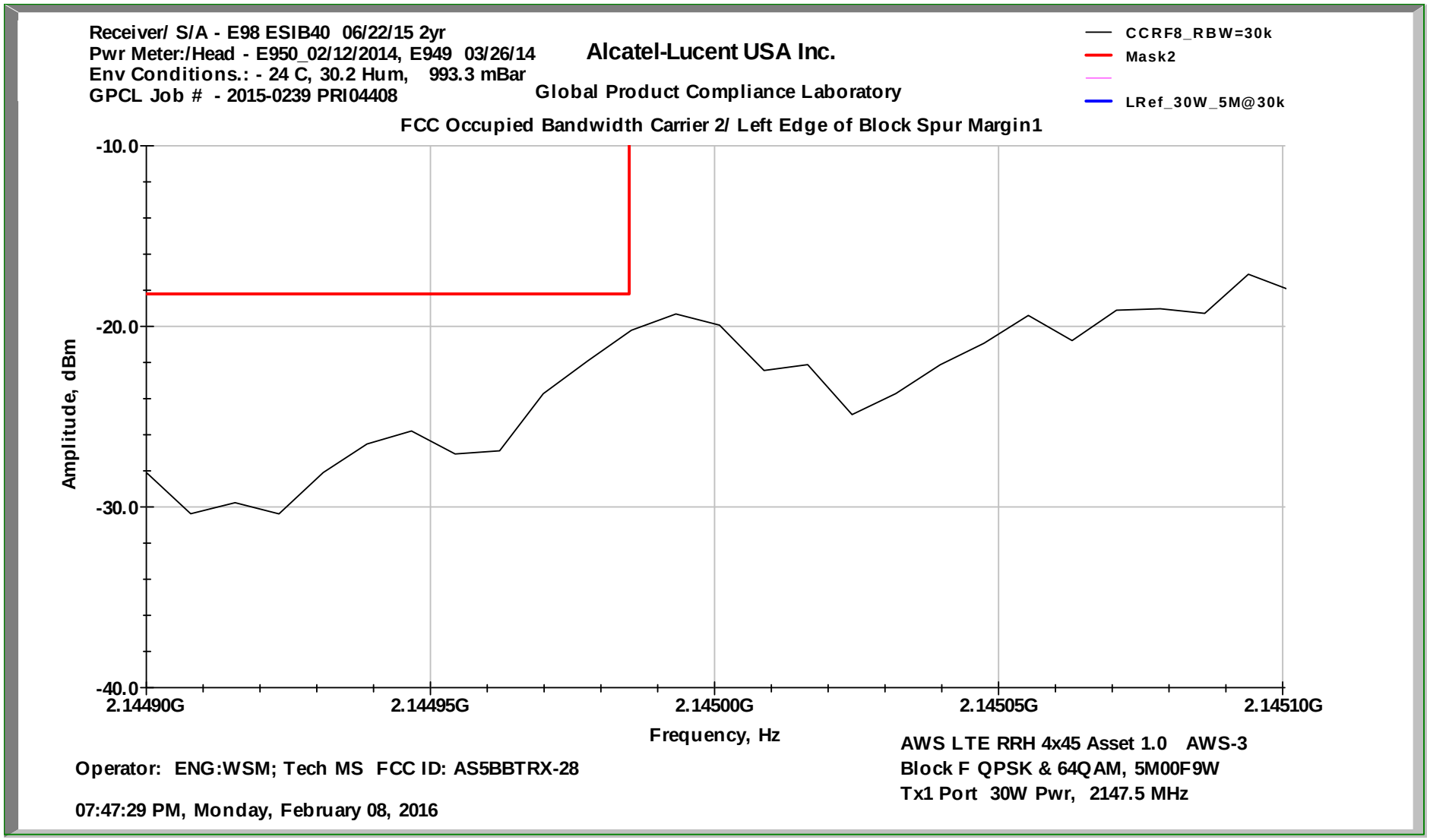
OBW Carrier 1 - Right Edge of Block 10&5 MHz Blocks CD-F AWS RRH 4x45 FCC ID AS5BBTRX-28



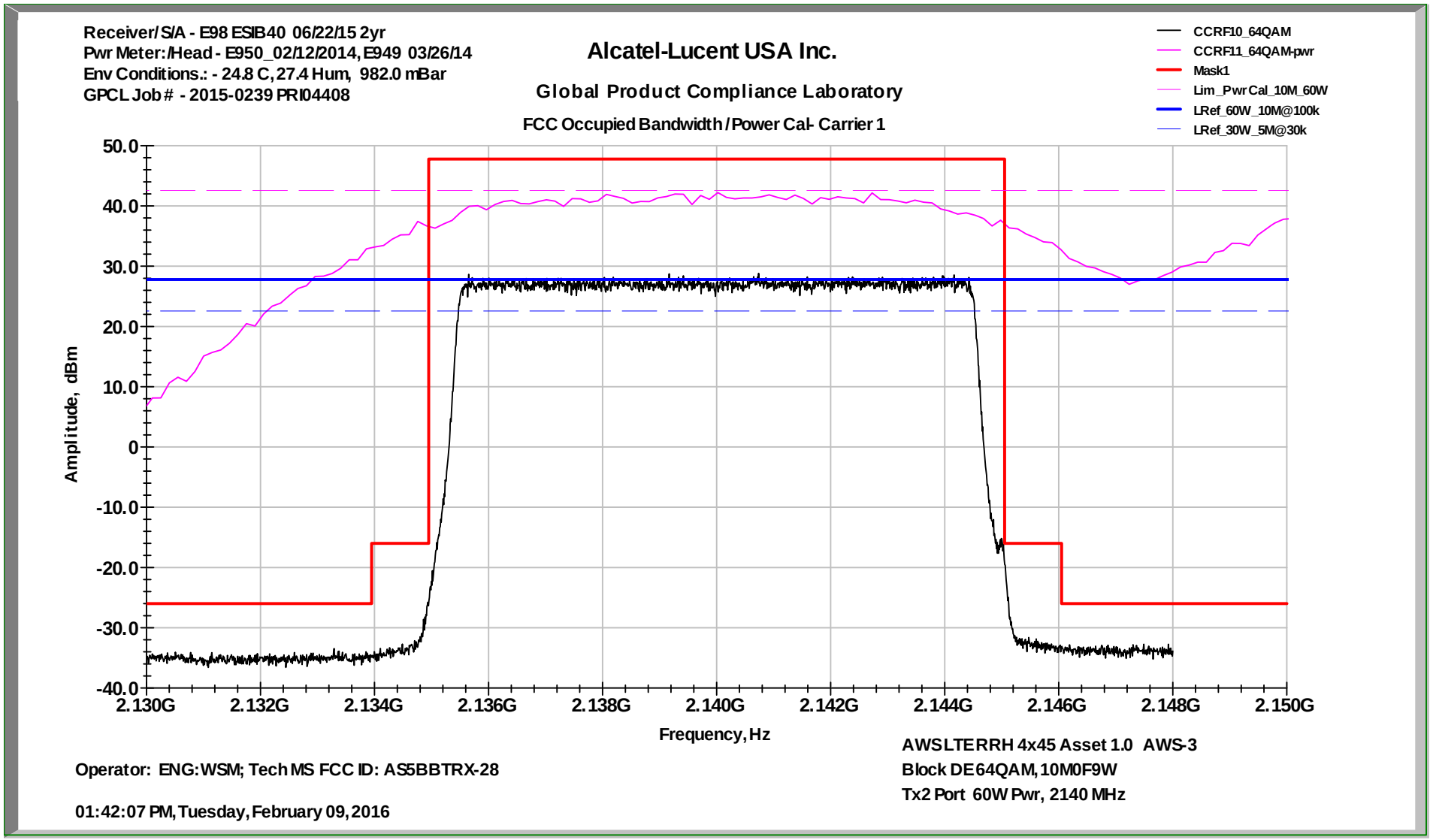
OBW Carrier 2 - Left Edge of Block **10&5 MHz Blocks CD-F** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



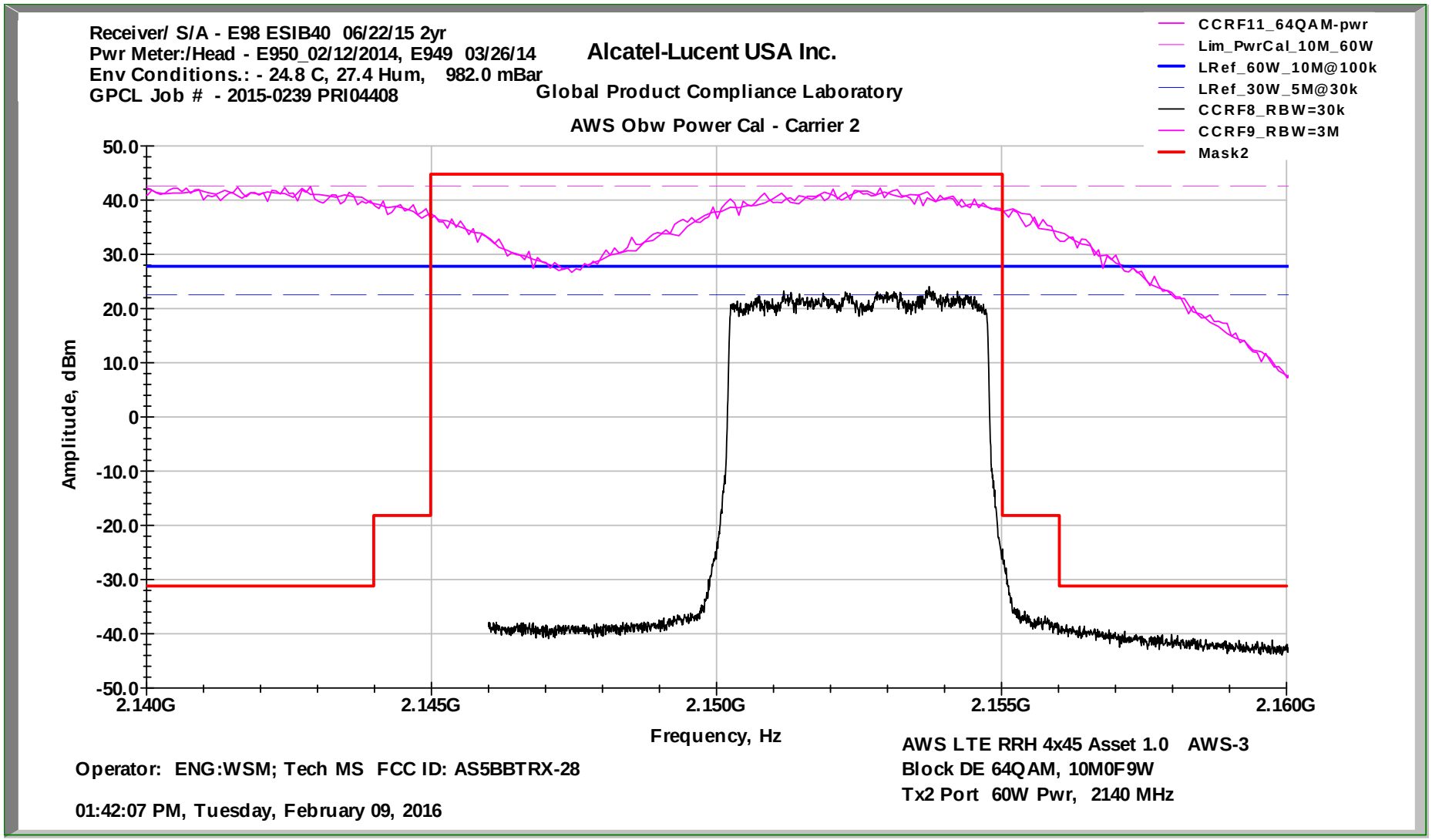
OBW Carrier 2 - Right Edge of Block **10&5 MHz Blocks CD-F AWS RRH 4x45 FCC ID AS5BBTRX-28**



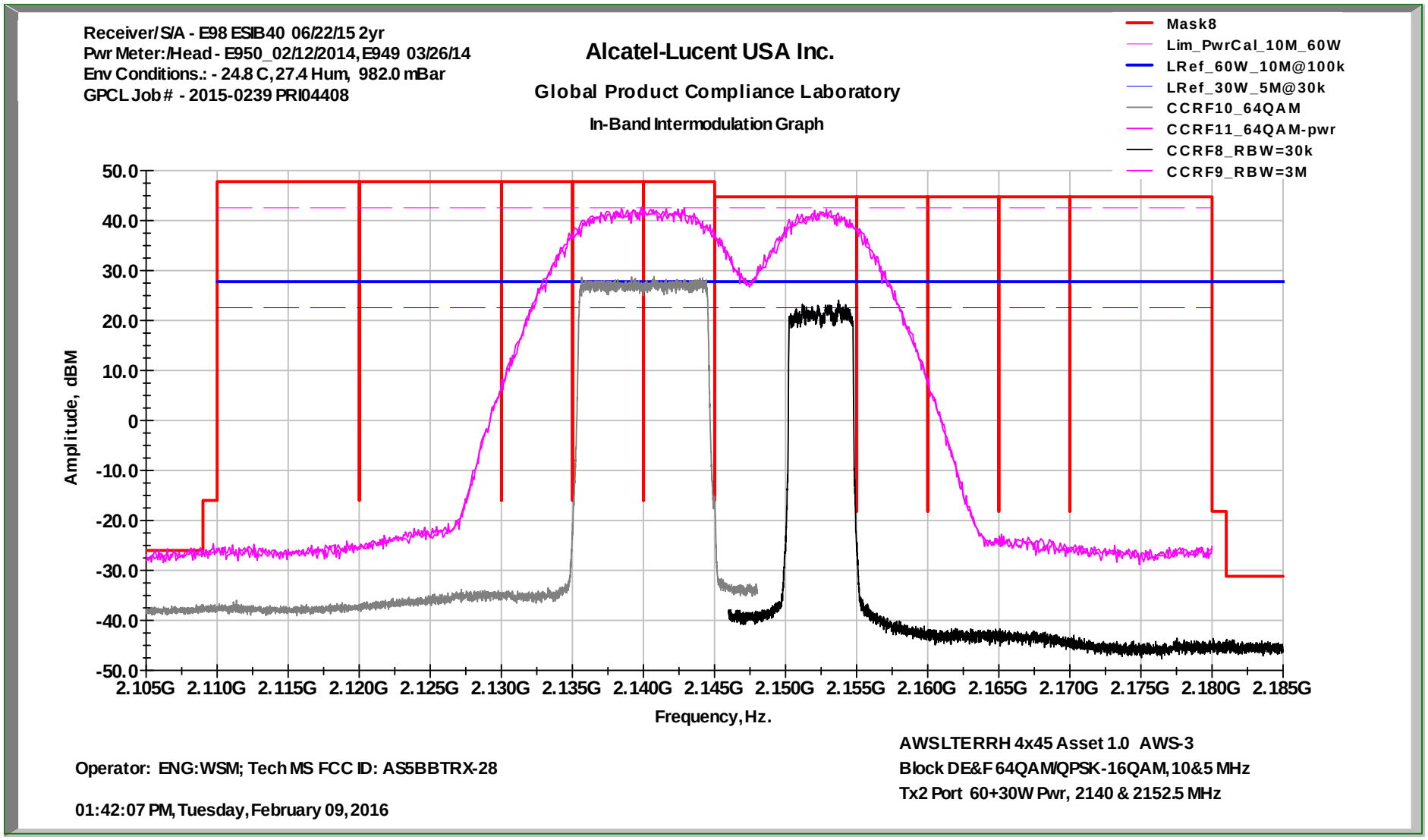
Test Configuration #9
Occupied Bandwidth/Power Cal -Carrier 1 10&5 MHz Blocks DE-F AWS RRH 4x45 FCC ID AS5BBTRX-28



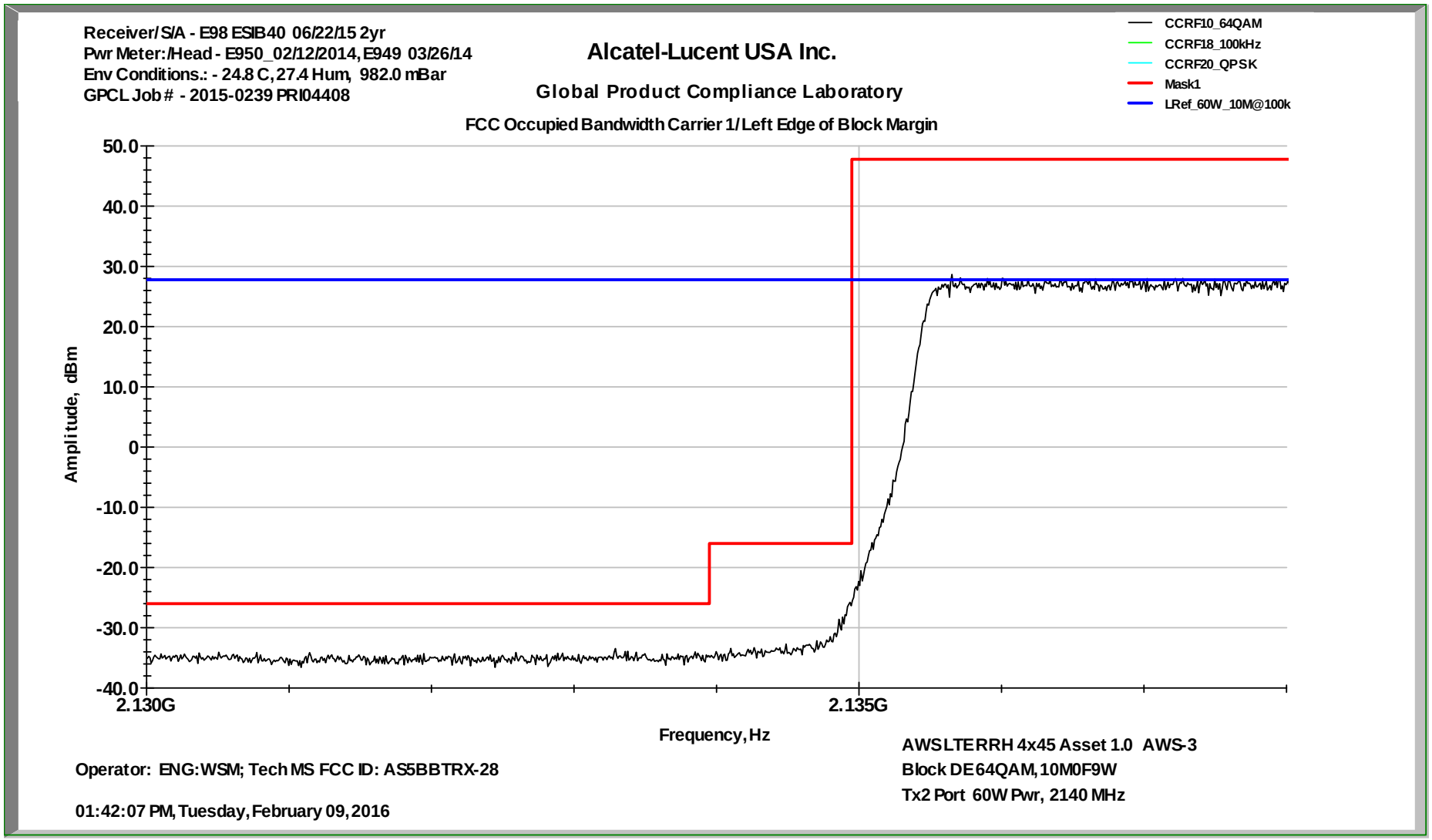
Occupied Bandwidth/Power Cal -Carrier 2 10&5 MHz Blocks DE-F AWS RRH 4x45 FCC ID AS5BBTRX-28



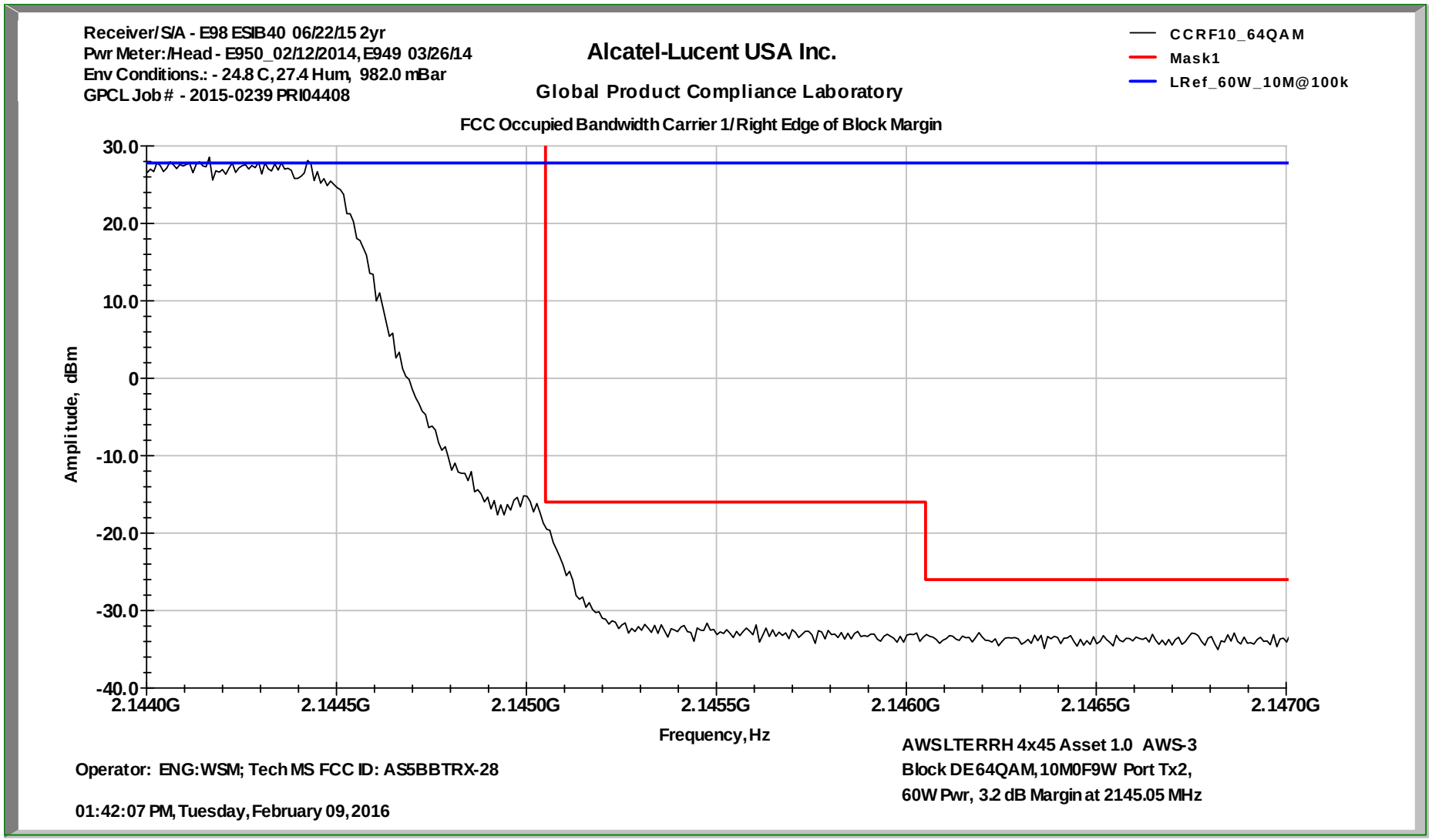
OBW Intermods. Whole Band View **10&5 MHz Blocks DE-F** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



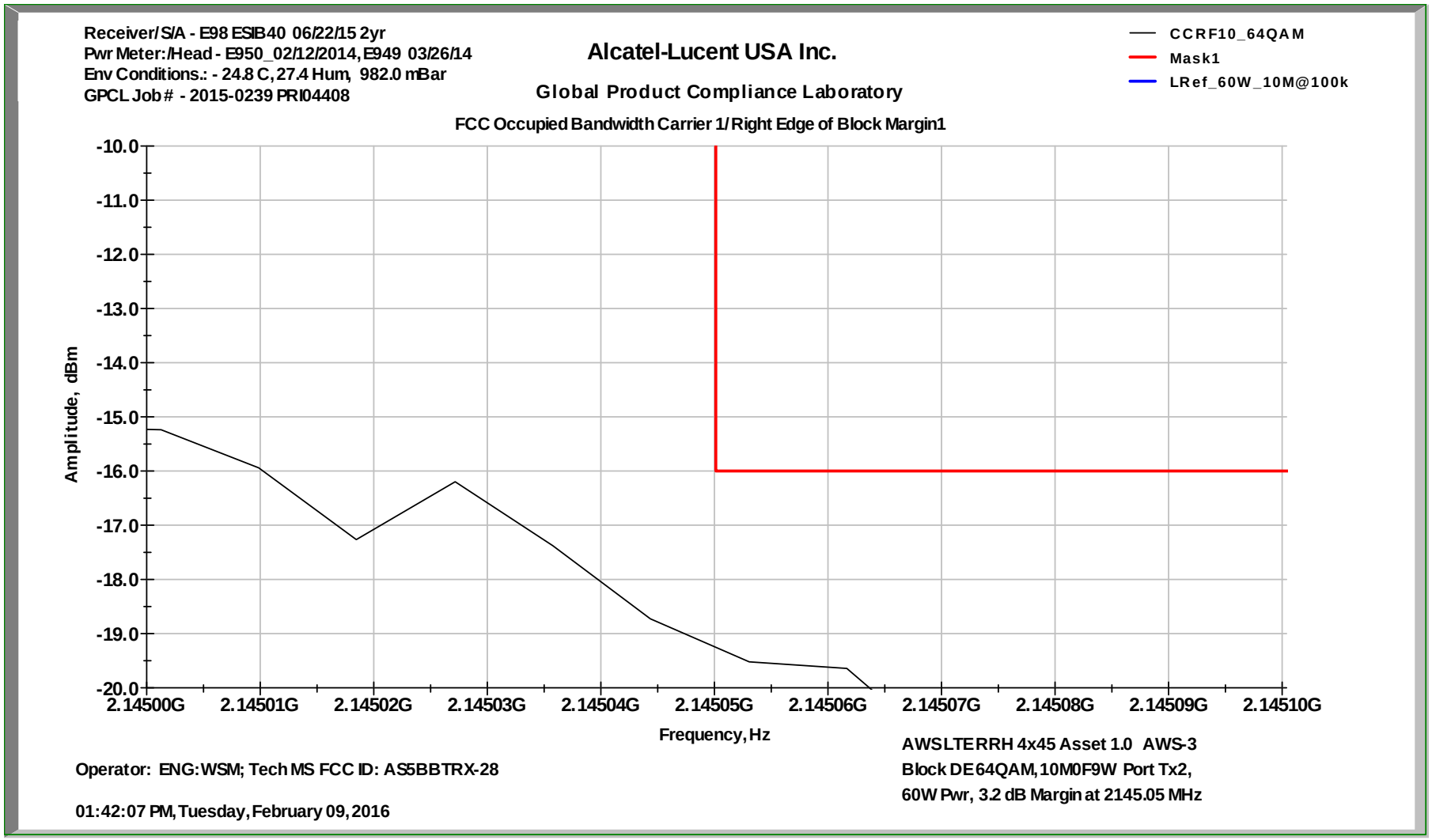
OBW Carrier 1 - Left Edge of Block **10&5 MHz Blocks DE-F** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



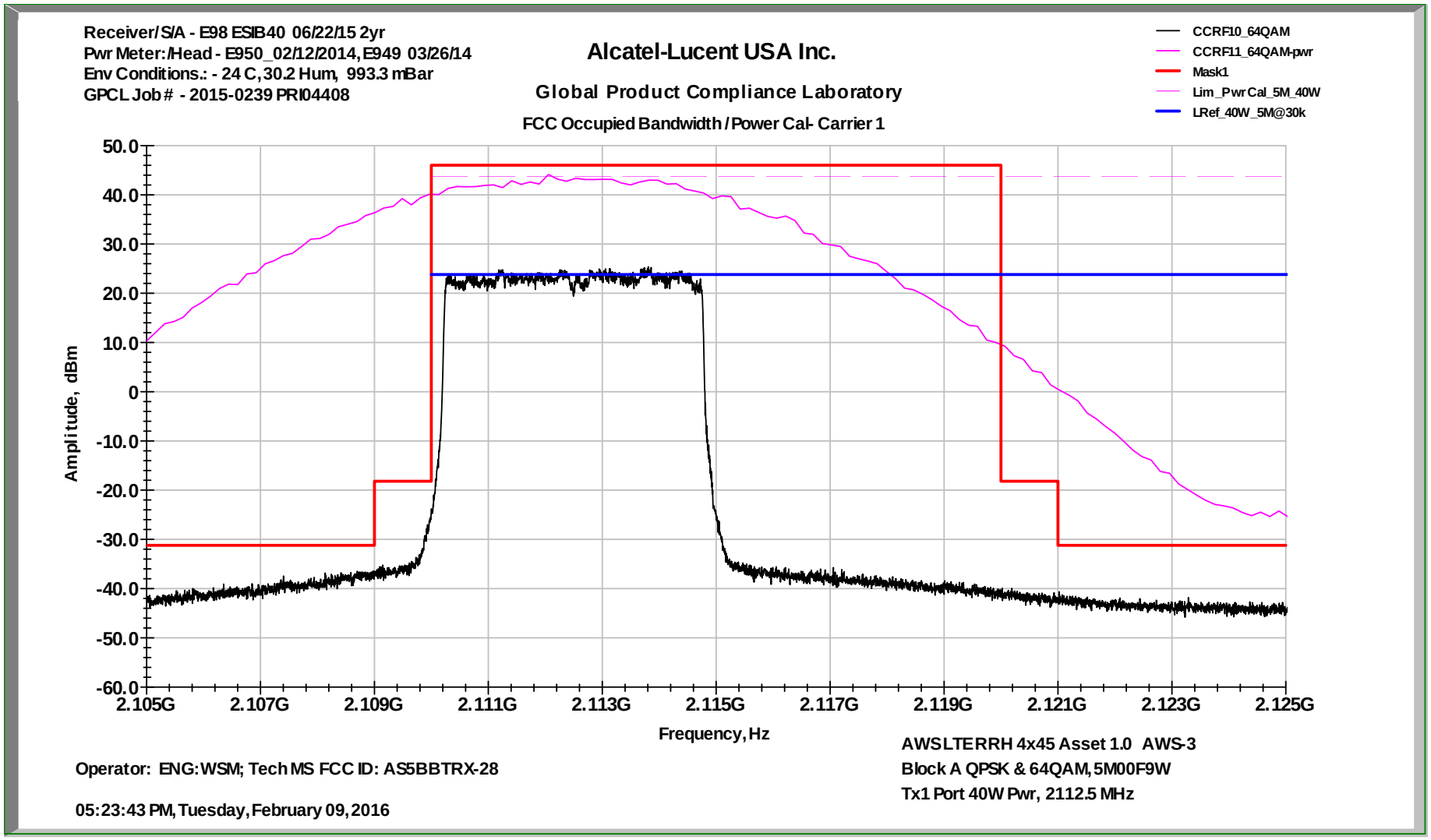
OBW Carrier 1 - Right Edge of Block 10&5 MHz Blocks DE-F AWS RRH 4x45 FCC ID AS5BBTRX-28



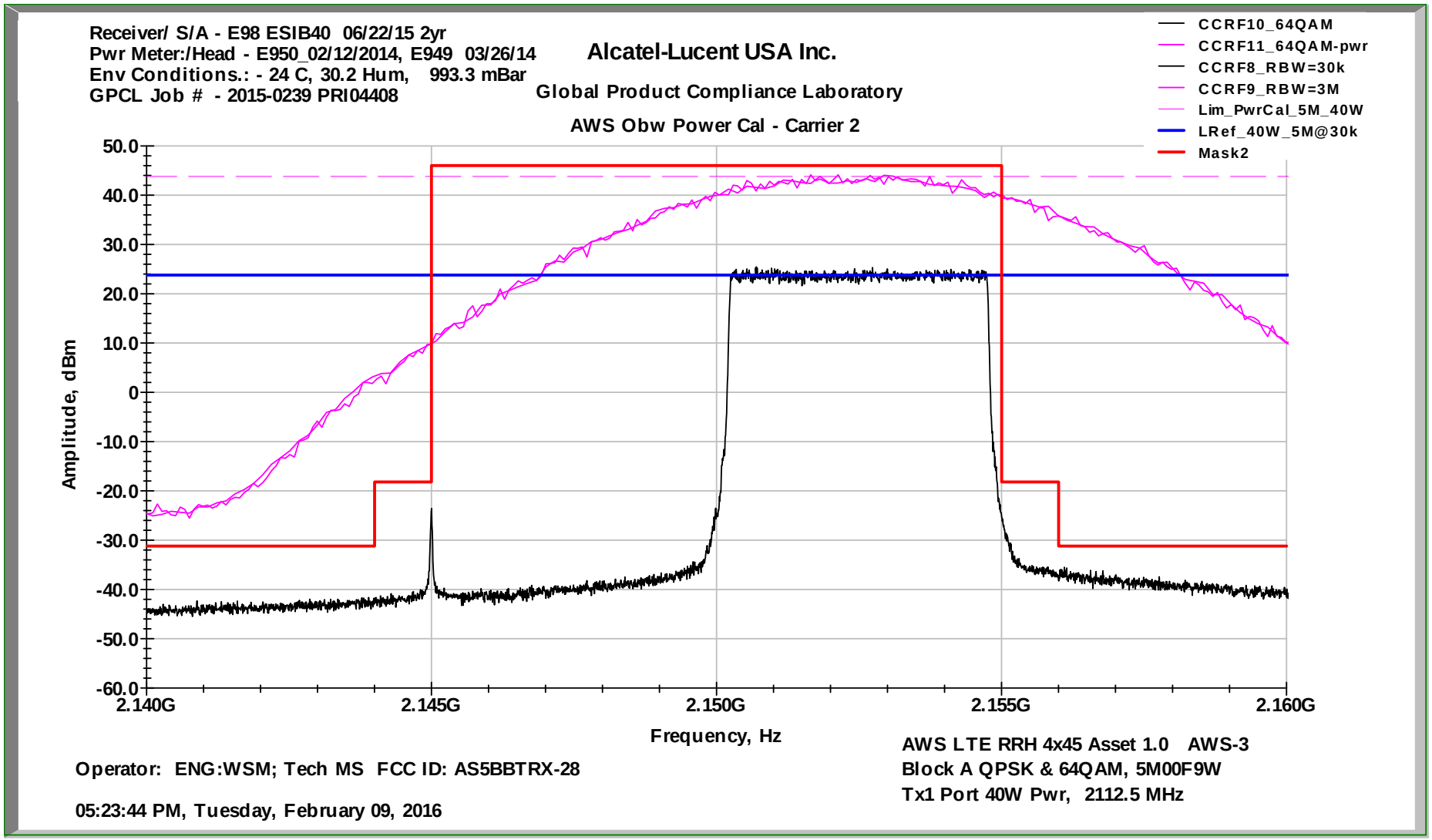
OBW Carrier 2 - Right Edge of Block **10&5 MHz Blocks DE-F** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



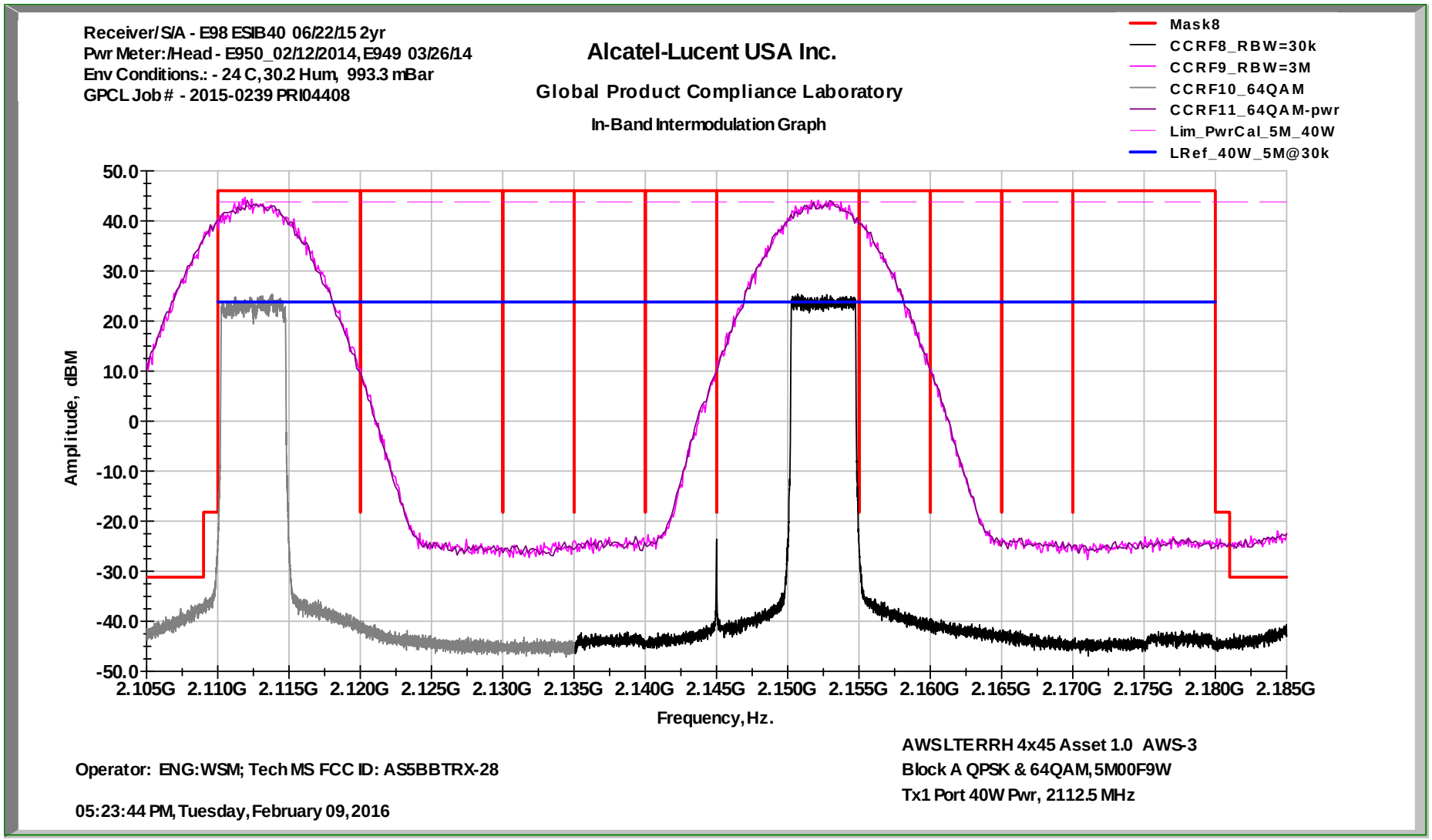
Test Configuration #10
Occupied Bandwidth/Power Cal -Carrier 1 5&5 MHz Blocks A-F AWS RRH 4x45 FCC ID AS5BBTRX-28



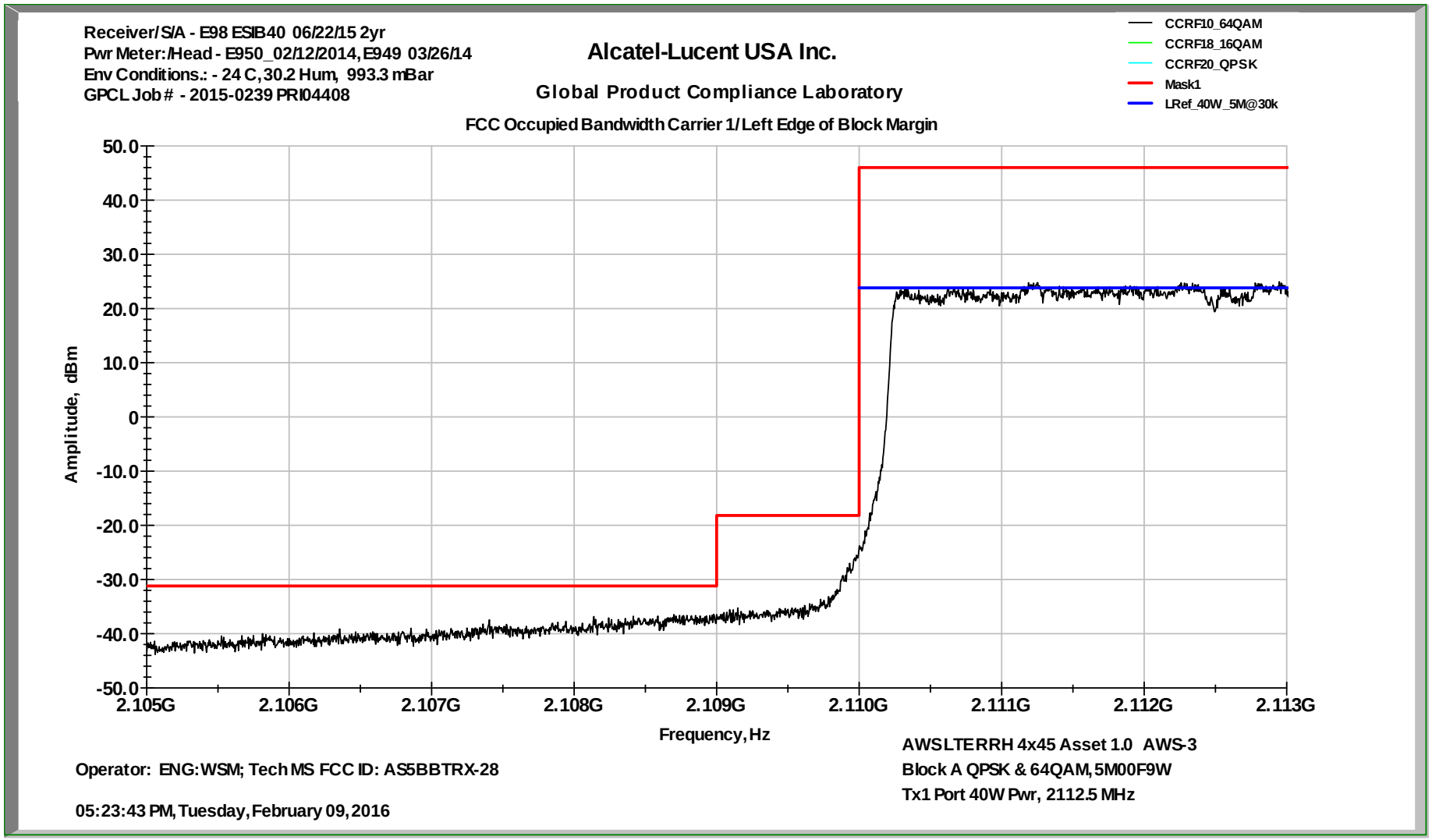
Occupied Bandwidth/Power Cal -Carrier 2 5&5 MHz Blocks A-F AWS RRH 4x45 FCC ID AS5BBTRX-28



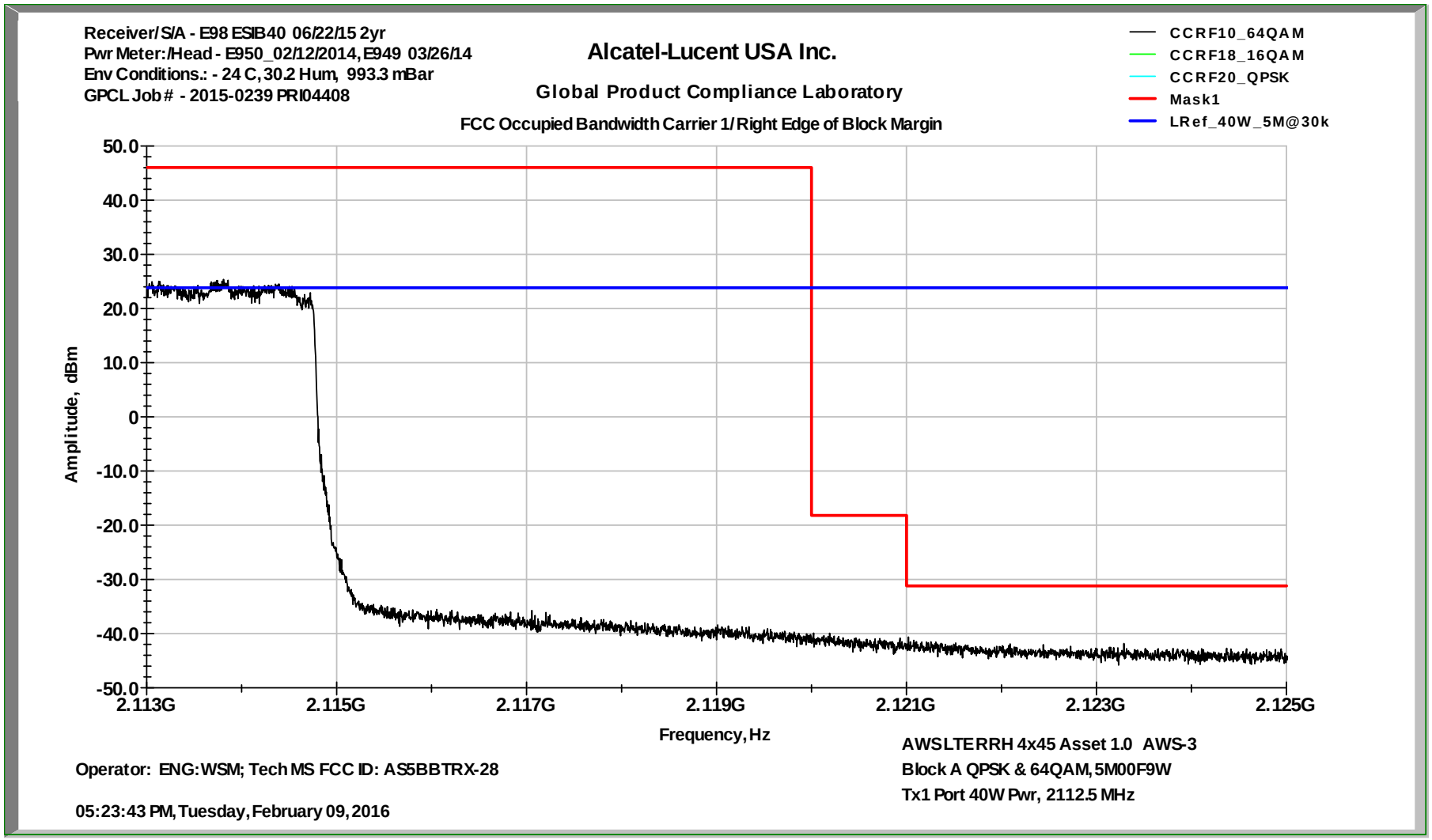
OBW Intermods. Whole Band View **5&5 MHz Blocks A-F** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



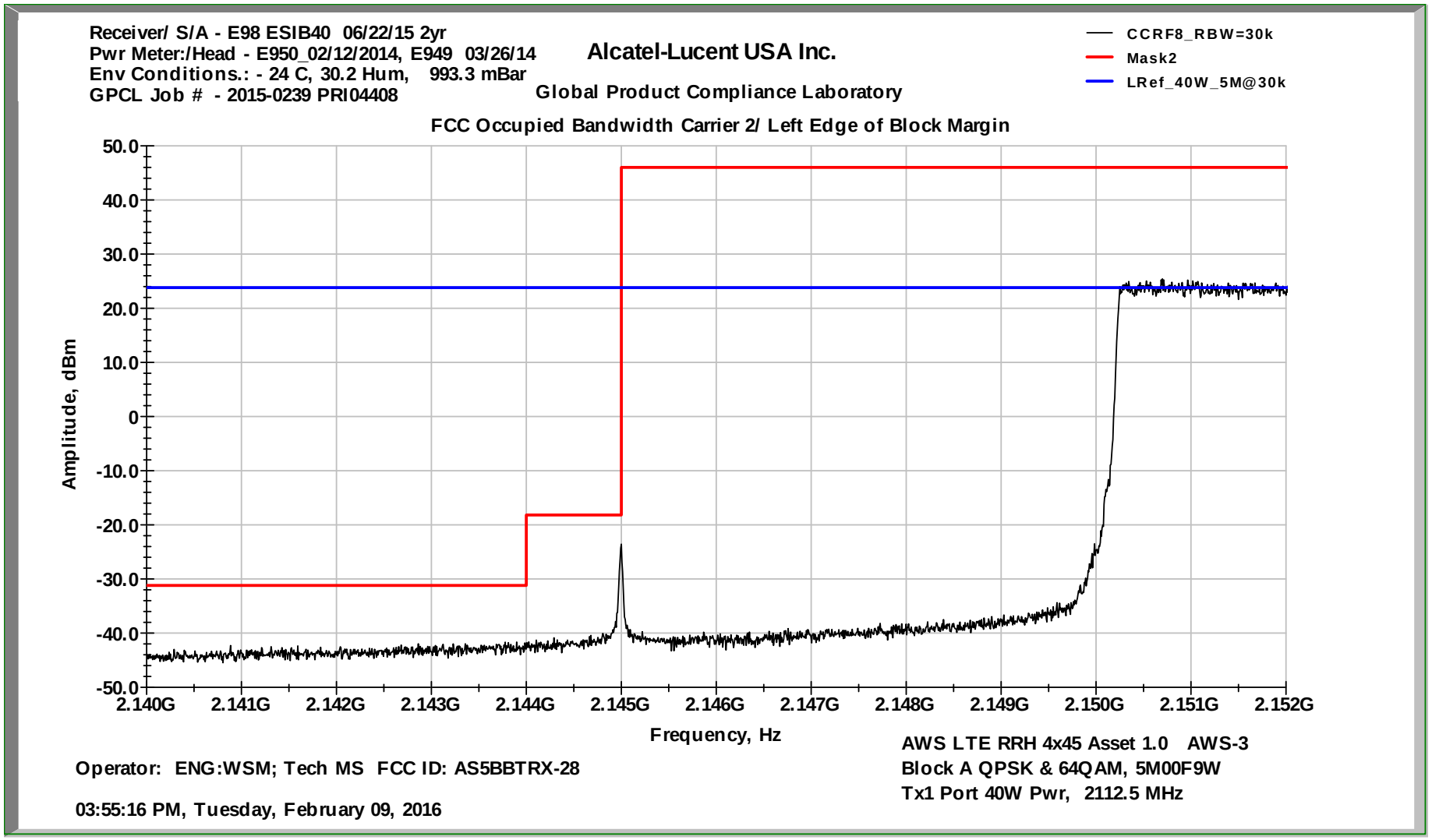
OBW Carrier 1 - Left Edge of Block **5&5 MHz Blocks A-F** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



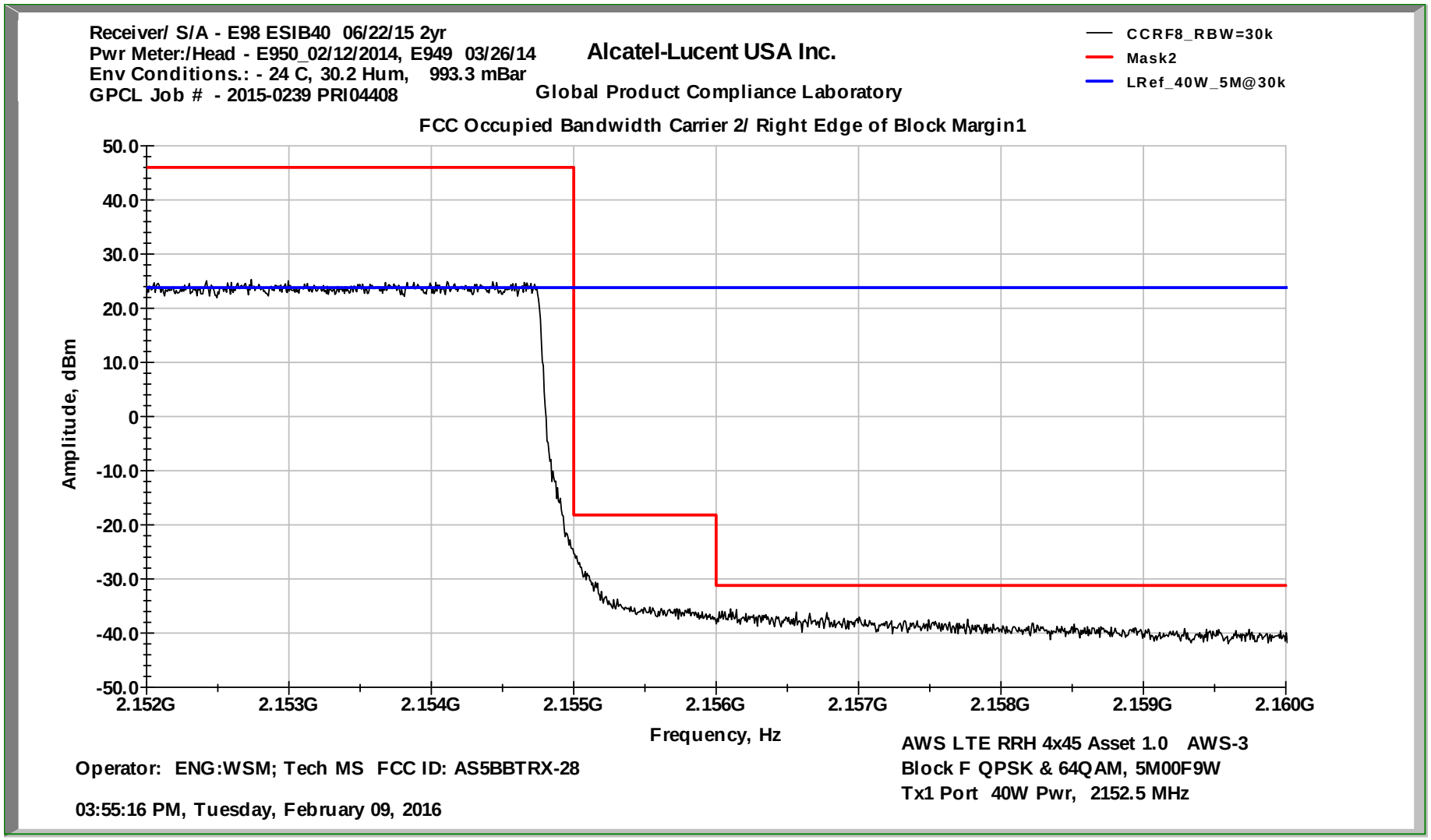
OBW Carrier 1 - Right Edge of Block **5&5 MHz Blocks A-F** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



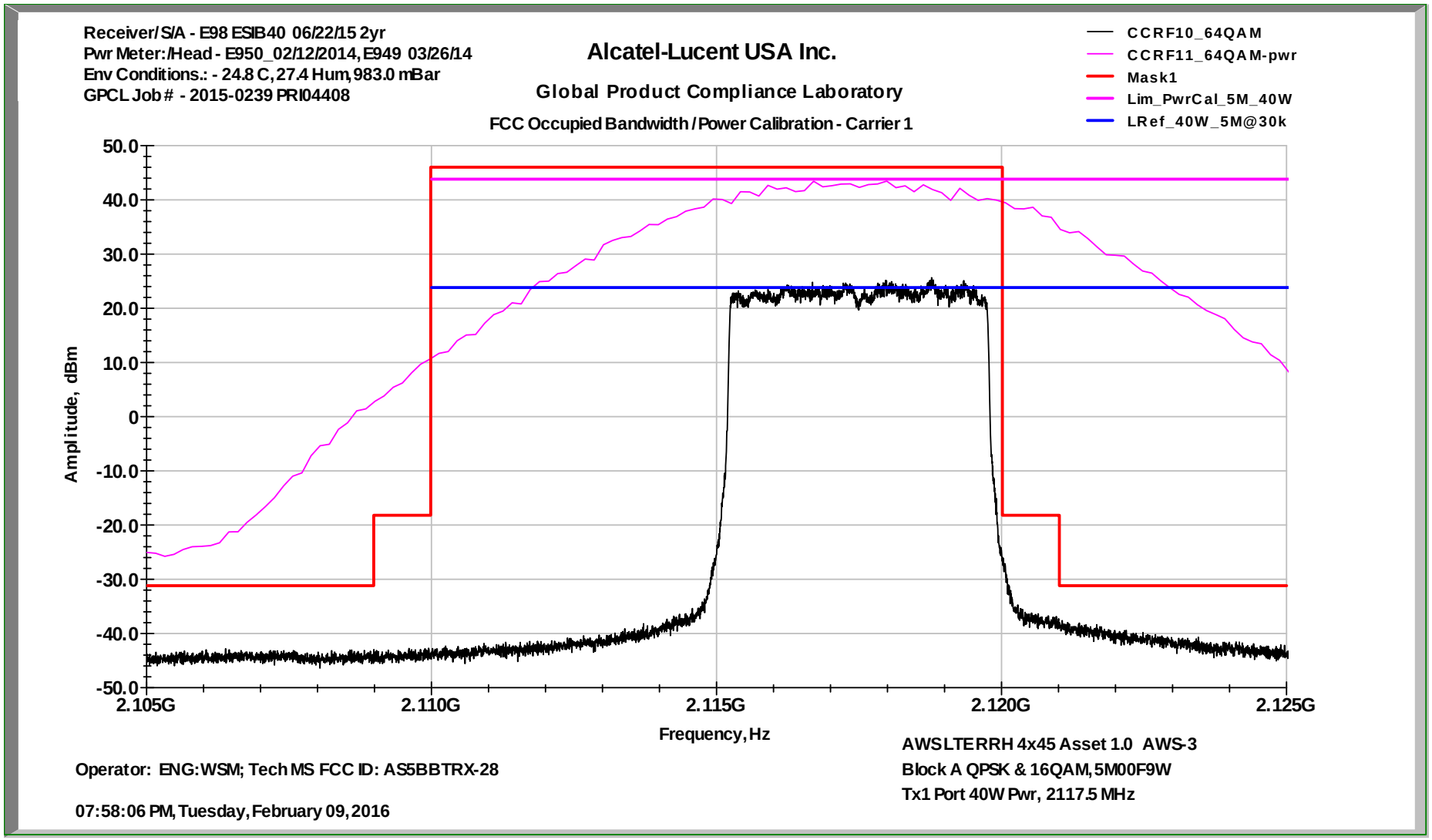
OBW Carrier 2 - Left Edge of Block **5&5 MHz Blocks A-F** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



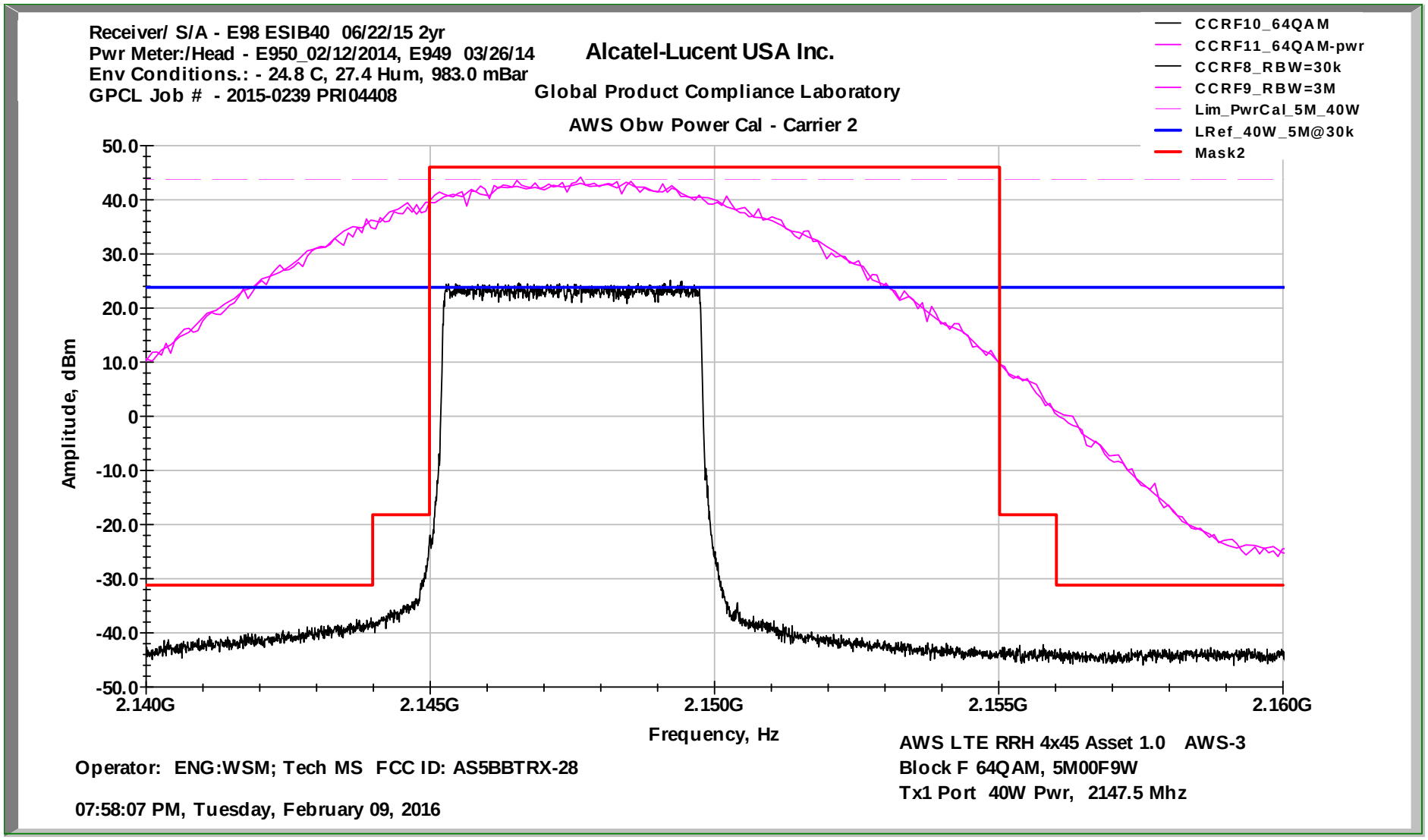
OBW Carrier 2 - Right Edge of Block 5&5 MHz Blocks A-F AWS RRH 4x45 FCC ID AS5BBTRX-28



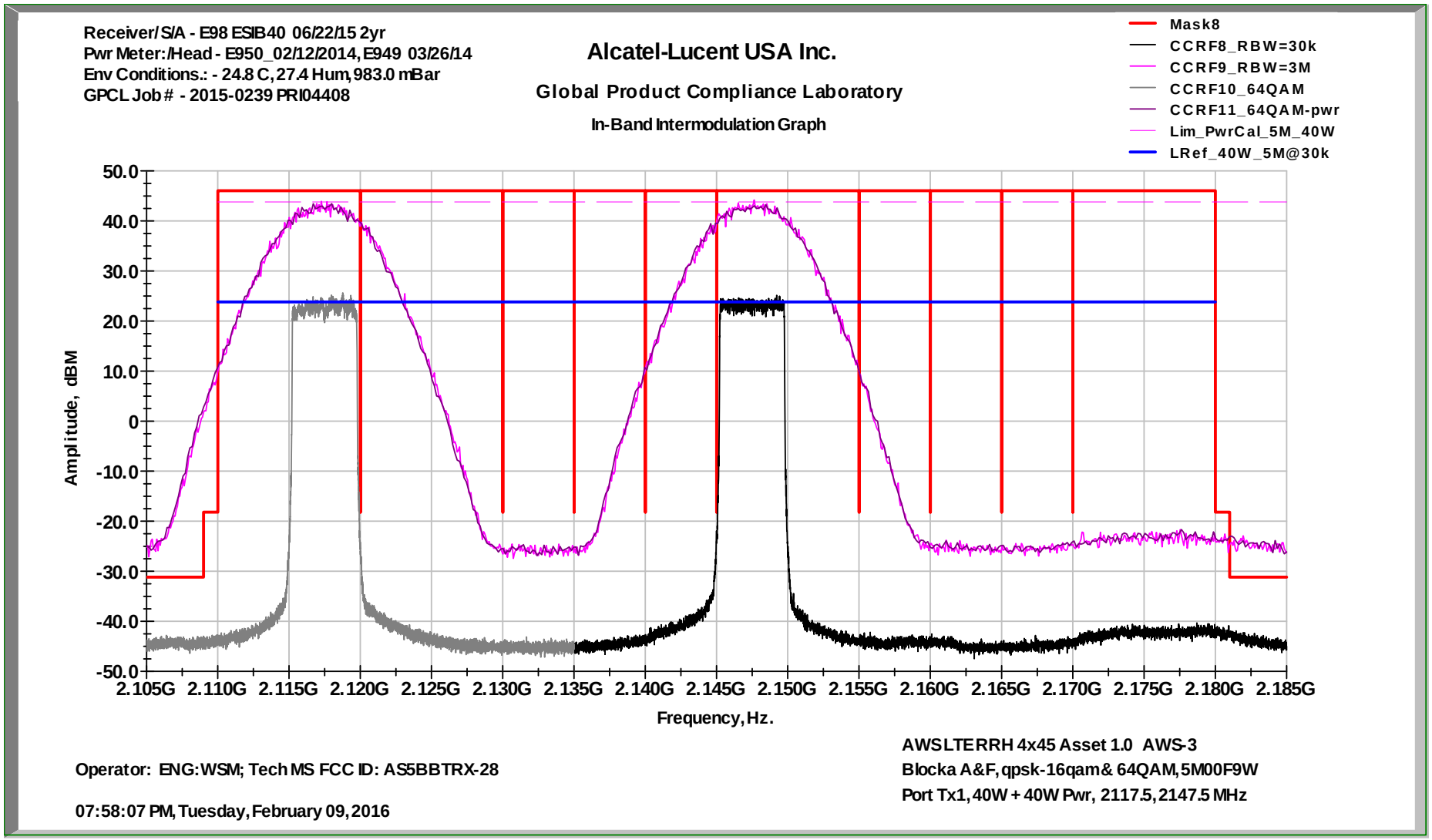
Test Configuration #11
Occupied Bandwidth/Power Cal -Carrier 1 5&5 MHz Blocks A-F AWS RRH 4x45 FCC ID AS5BBTRX-28

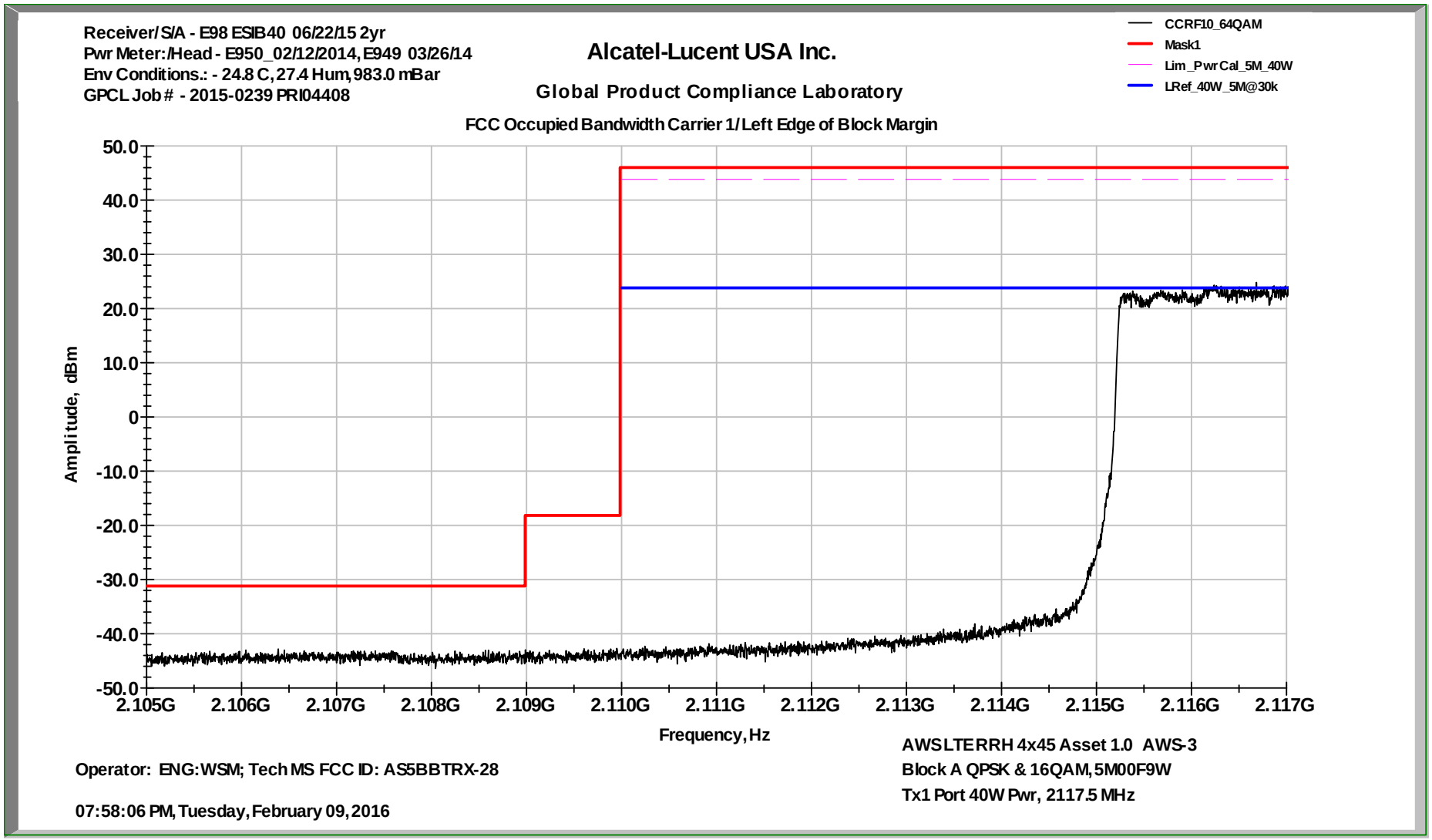


Occupied Bandwidth/Power Cal -Carrier 2 5&5 MHz Blocks A-F AWS RRH 4x45 FCC ID AS5BBTRX-28

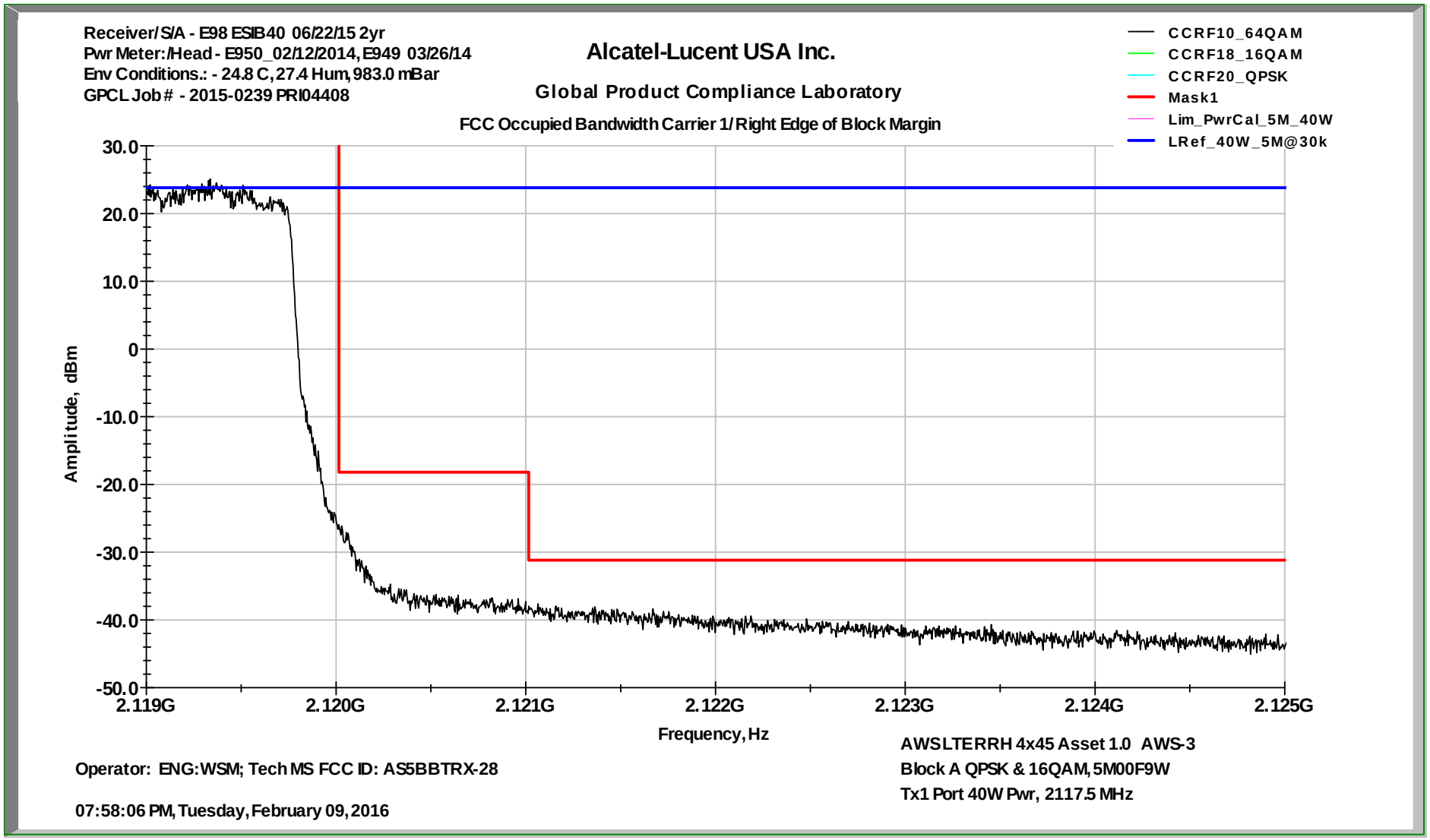


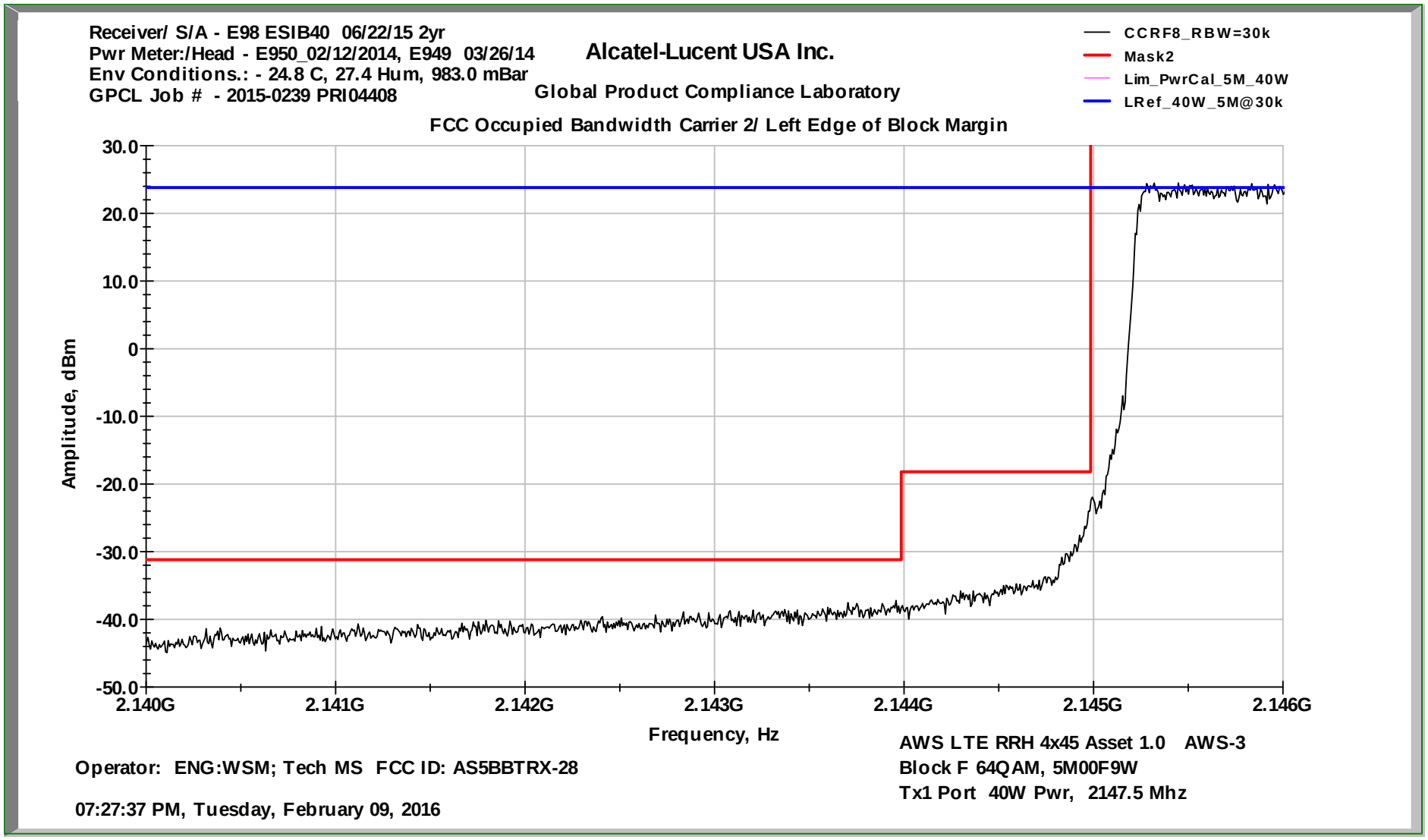
OBW Intermods. Whole Band View **5&5 MHz Blocks A-F** **AWS RRH 4x45 FCC ID AS5BBTRX-28**

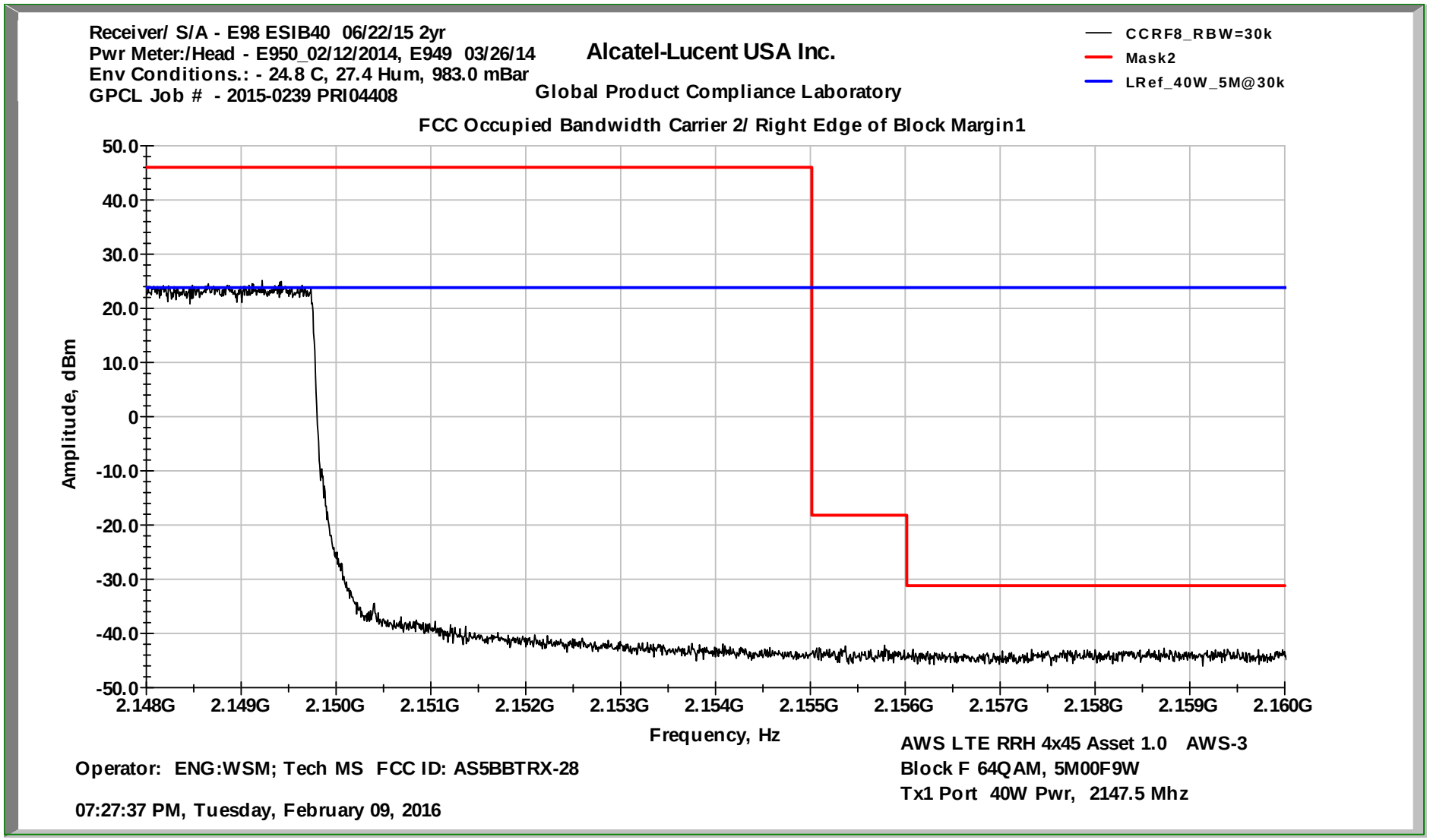



Receiver/S/A - E98 ESIB40 06/22/15 2yr
Pwr Meter:/Head - E950_02/12/2014,E949 03/26/14
Env Conditions.: - 24.8 C, 27.4 Hum, 983.0 mBar
GPCL Job # - 2015-0239 PRI04408
Alcatel-Lucent USA Inc.
Global Product Compliance Laboratory
FCC Occupied Bandwidth Carrier 1/Left Edge of Block Margin
CCRF10_64QAM
Mask1
Lim_Pwr Cal_5M_40W
LRef_40W_5M@30k
Amplitude, dBm
50.0
40.0
30.0
20.0
10.0
0
-10.0
-20.0
-30.0
-40.0
-50.0
2.105G
2.106G
2.107G
2.108G
2.109G
2.110G
2.111G
2.112G
2.113G
2.114G
2.115G
2.116G
2.117G
Frequency, Hz
Operator: ENG:WSM; Tech MS FCC ID: AS5BBTRX-28
07:58:06 PM, Tuesday, February 09, 2016
AWSLTERRH 4x45 Asset 1.0 AWS-3
Block A QPSK & 16QAM, 5M00F9W
Tx1 Port 40W Pwr, 2117.5 MHz

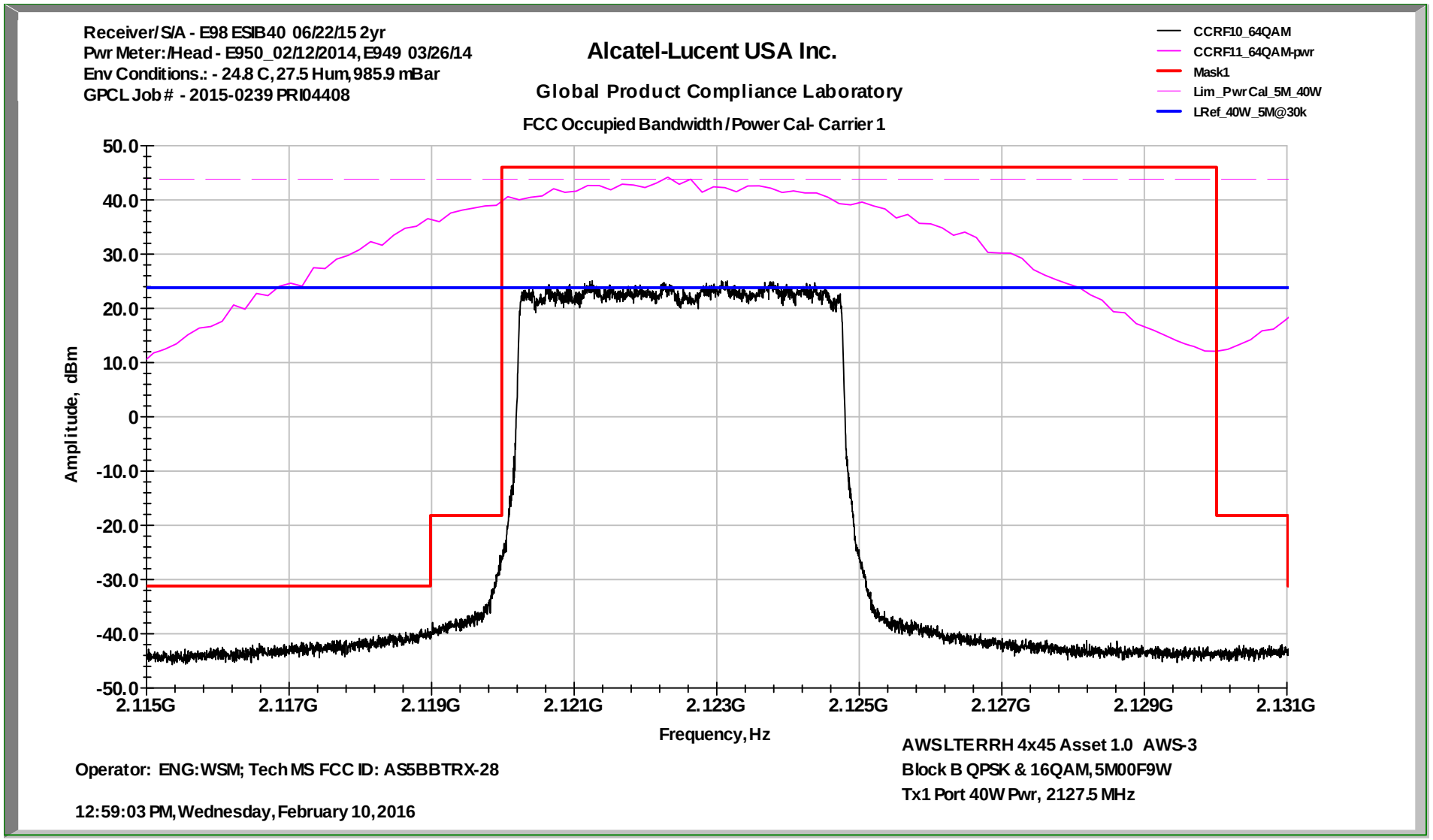
OBW Carrier 1 - Right Edge of Block **5&5 MHz Blocks A-F** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



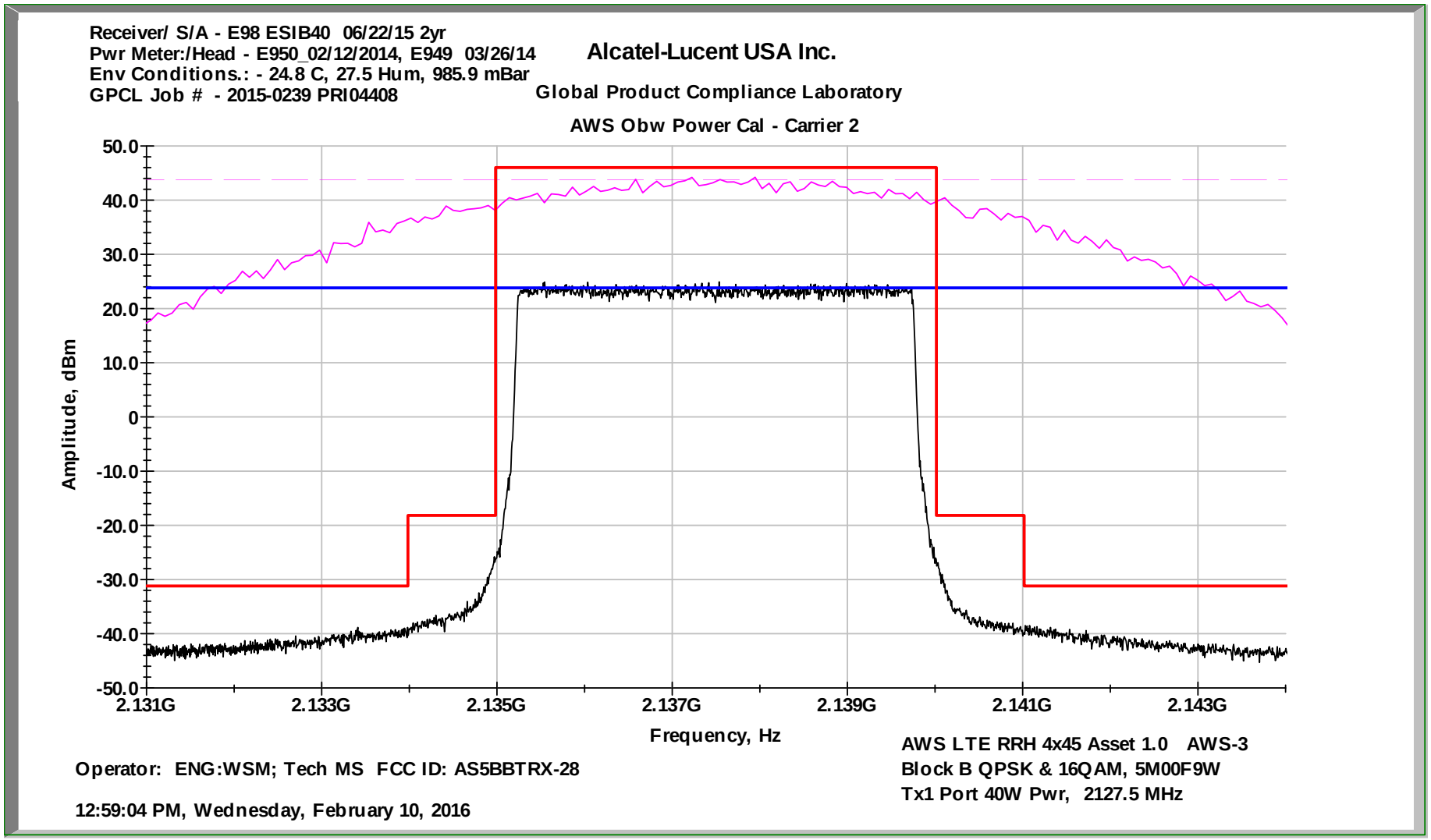

Receiver/ S/A - E98 ESIB40 06/22/15 2yr
Pwr Meter:/Head - E950_02/12/2014, E949 03/26/14
Env Conditions.: - 24.8 C, 27.4 Hum, 983.0 mBar
GPCL Job # - 2015-0239 PRI04408
Alcatel-Lucent USA Inc.
Global Product Compliance Laboratory
FCC Occupied Bandwidth Carrier 2/ Left Edge of Block Margin
CCRF8_RBW=30k
Mask2
Lim_PwrCal_5M_40W
LRef_40W_5M@30k
Amplitude, dBm
30.0
20.0
10.0
0
-10.0
-20.0
-30.0
-40.0
-50.0
2.140G
2.141G
2.142G
2.143G
2.144G
2.145G
2.146G
Frequency, Hz
Operator: ENG:WSM; Tech MS FCC ID: AS5BBTRX-28
07:27:37 PM, Tuesday, February 09, 2016
AWS LTE RRH 4x45 Asset 1.0 AWS-3
Block F 64QAM, 5M00F9W
Tx1 Port 40W Pwr, 2147.5 Mhz


Receiver/ S/A - E98 ESIB40 06/22/15 2yr
Pwr Meter:/Head - E950_02/12/2014, E949 03/26/14
Env Conditions.: - 24.8 C, 27.4 Hum, 983.0 mBar
GPCL Job # - 2015-0239 PRI04408
Alcatel-Lucent USA Inc.
Global Product Compliance Laboratory
CCRF8_RBW=30k
Mask2
LRef_40W_5M@30k
FCC Occupied Bandwidth Carrier 2/ Right Edge of Block Margin1
Amplitude, dBm
50.0
40.0
30.0
20.0
10.0
0
-10.0
-20.0
-30.0
-40.0
-50.0
2.148G
2.149G
2.150G
2.151G
2.152G
2.153G
2.154G
2.155G
2.156G
2.157G
2.158G
2.159G
2.160G
Frequency, Hz
Operator: ENG:WSM; Tech MS FCC ID: AS5BBTRX-28
07:27:37 PM, Tuesday, February 09, 2016
AWS LTE RRH 4x45 Asset 1.0 AWS-3
Block F 64QAM, 5M00F9W
Tx1 Port 40W Pwr, 2147.5 Mhz

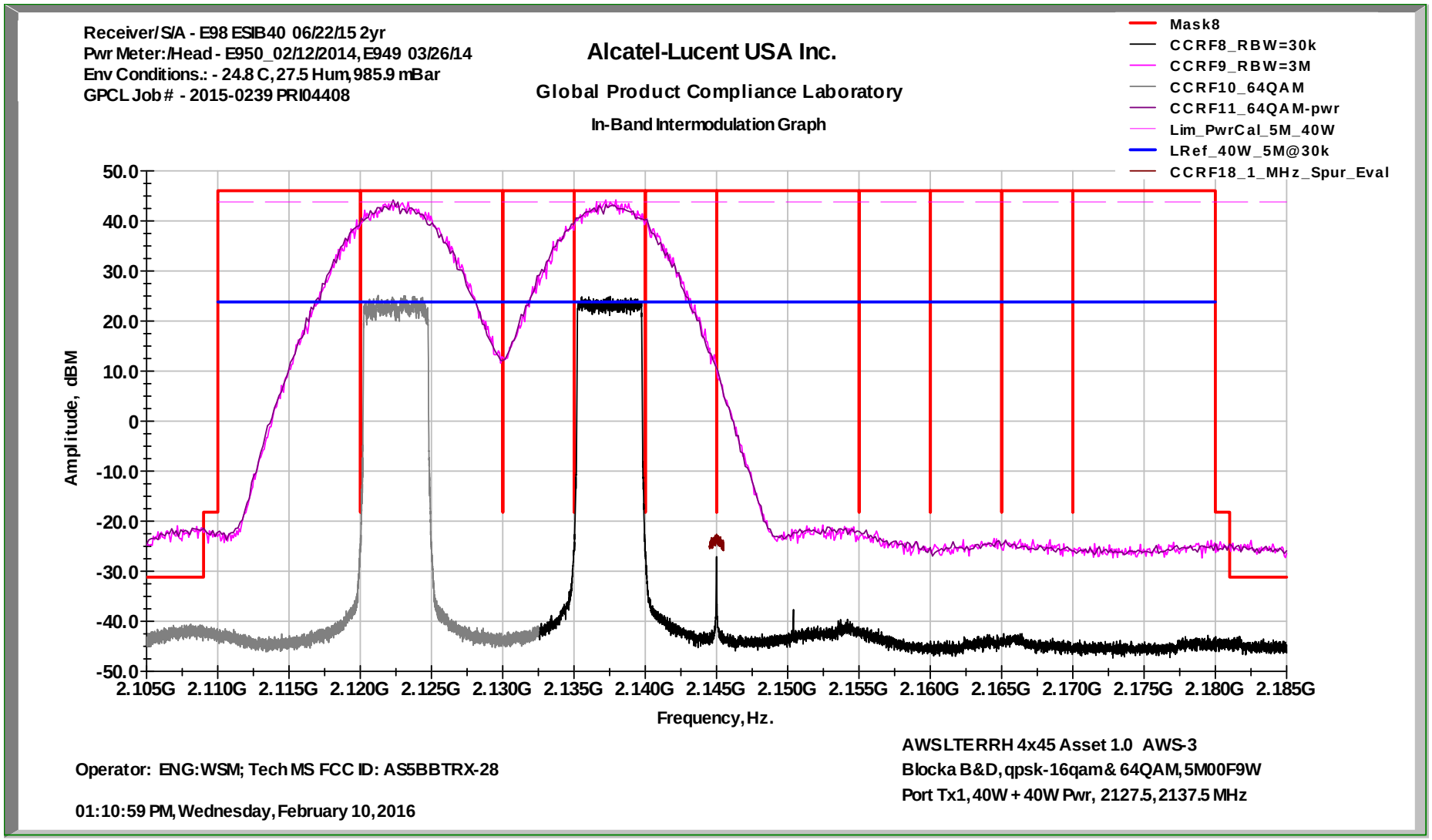
Test Configuration #12
Occupied Bandwidth/Power Cal -Carrier 1 5&5 MHz Blocks B-D AWS RRH 4x45 FCC ID AS5BBTRX-28



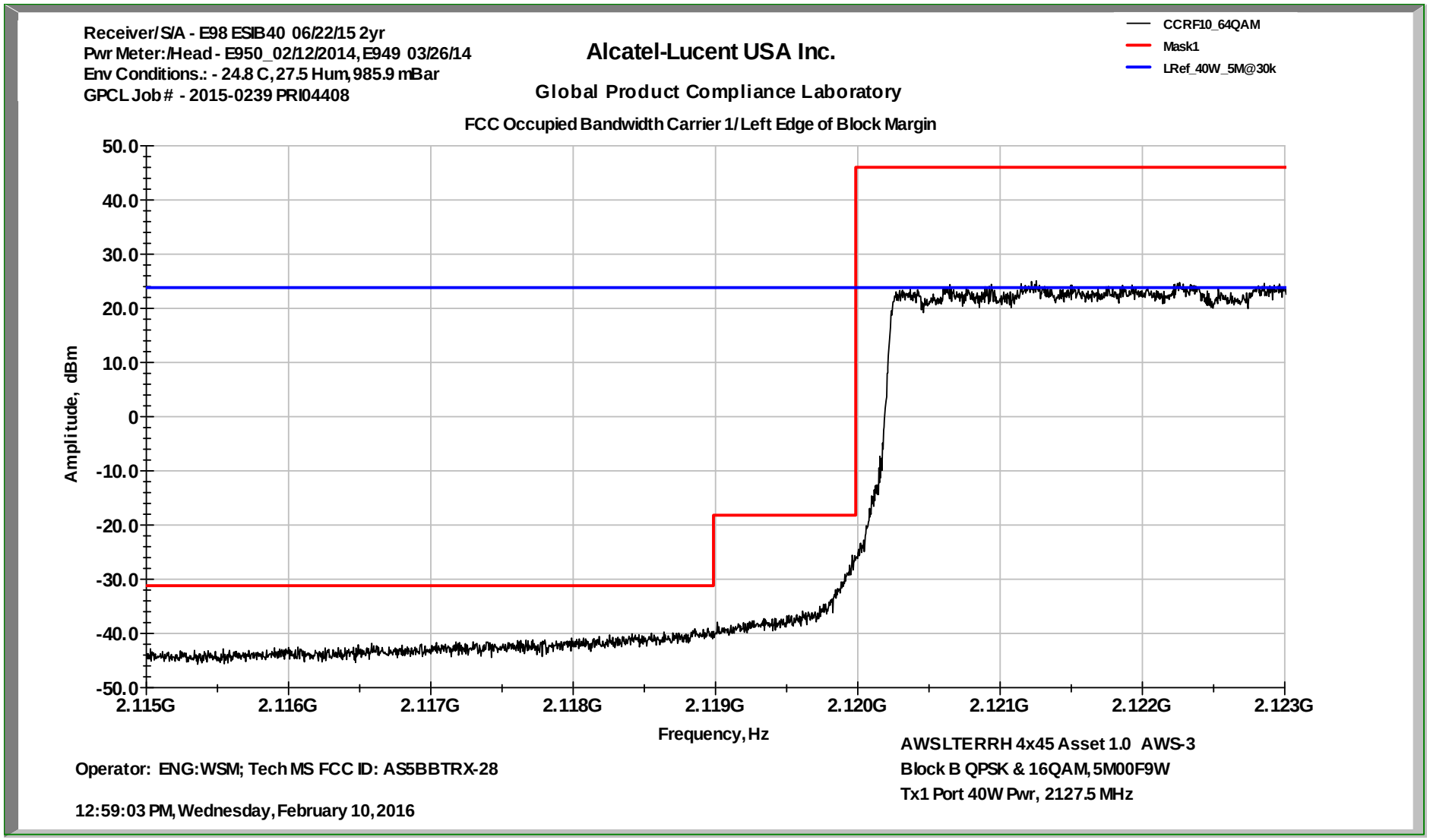
Occupied Bandwidth/Power Cal -Carrier 2 5&5 MHz Blocks B-D AWS RRH 4x45 FCC ID AS5BBTRX-28



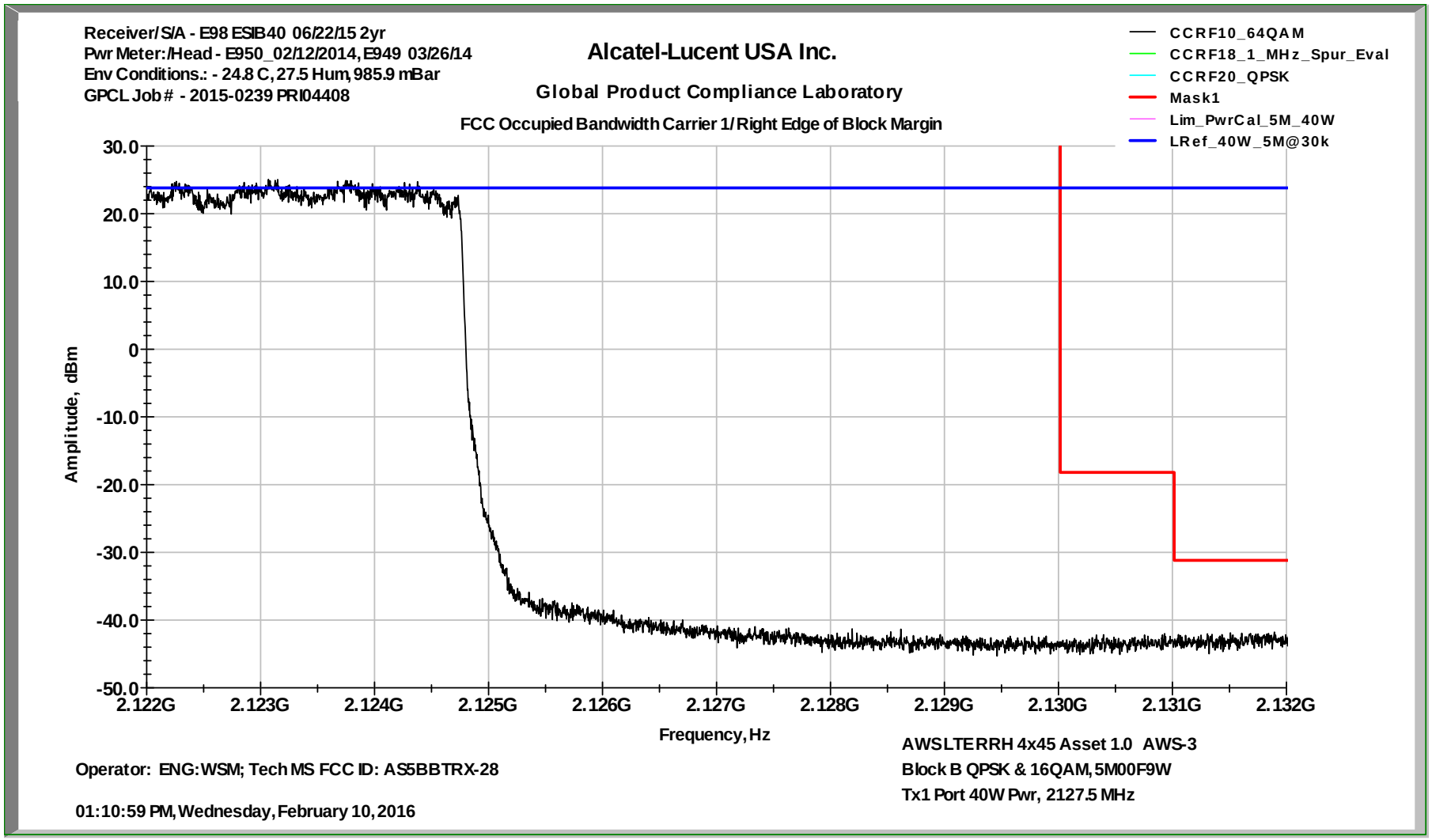
OBW Intermods. Whole Band View **5&5 MHz Blocks B-D** **AWS RRH 4x45 FCC ID AS5BBTRX-28**

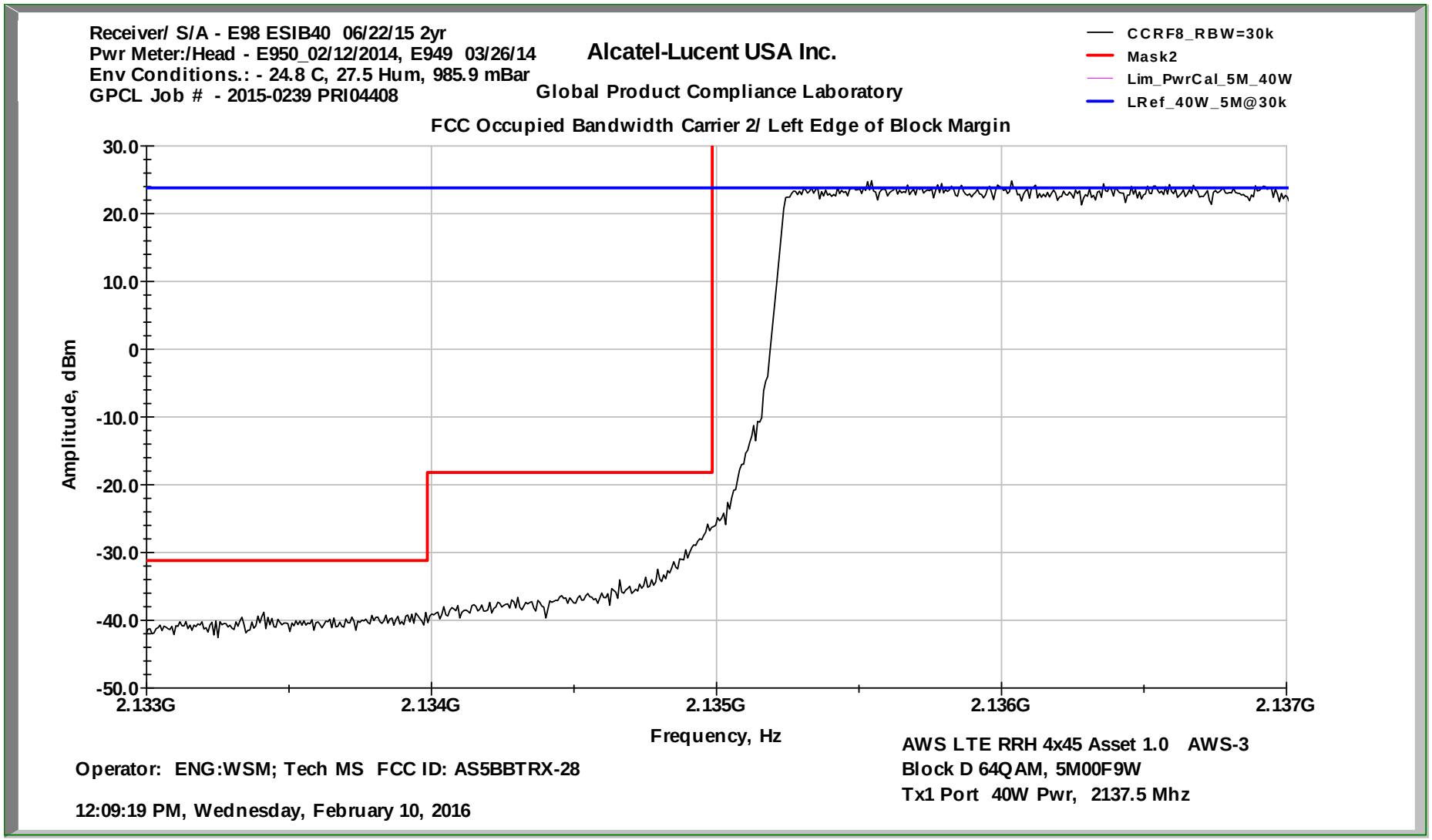


OBW Carrier 1 - Left Edge of Block **5&5 MHz Blocks B-D** **AWS RRH 4x45 FCC ID AS5BBTRX-28**

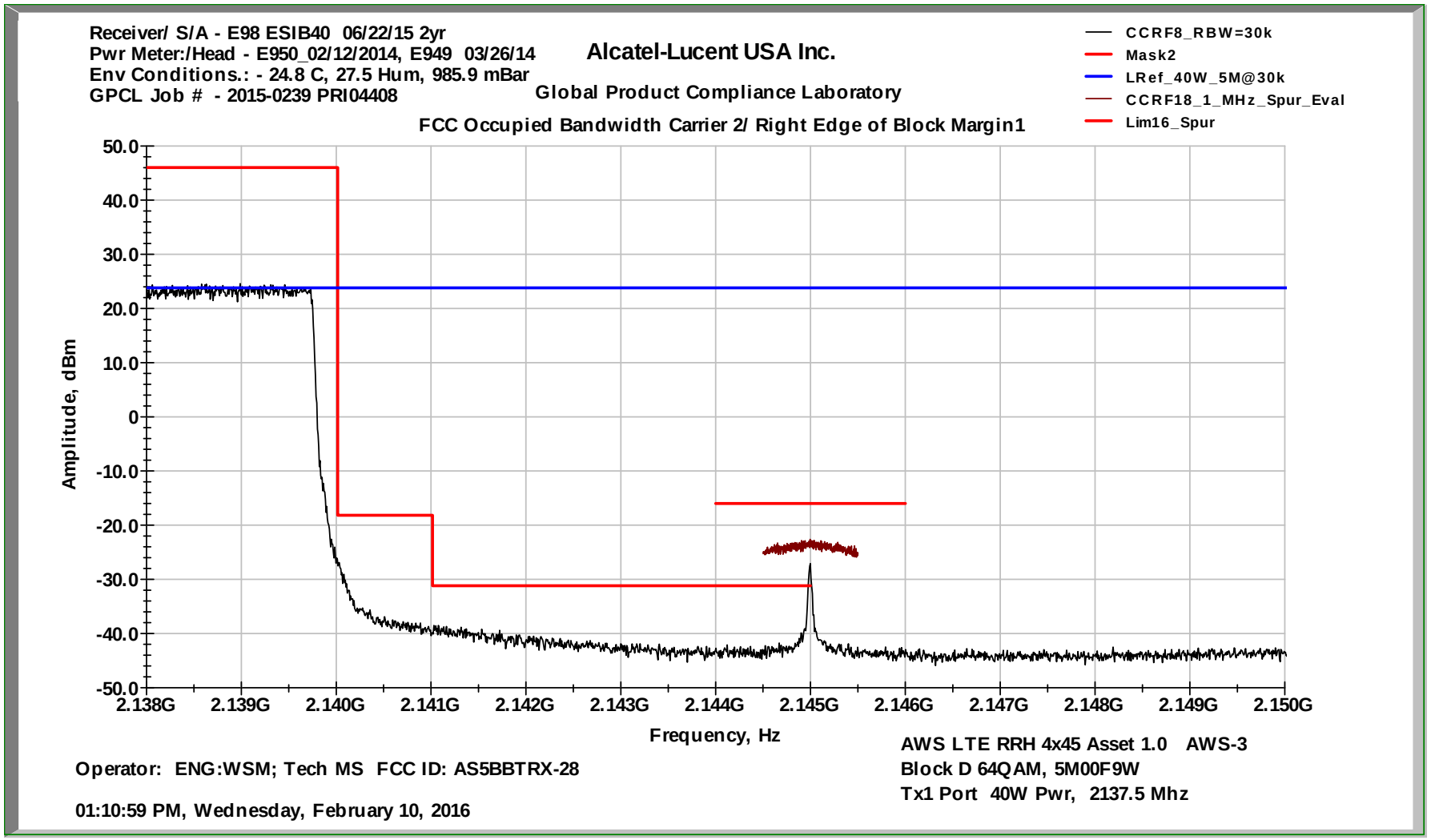


OBW Carrier 1 - Right Edge of Block **5&5 MHz Blocks B-D** **AWS RRH 4x45 FCC ID AS5BBTRX-28**

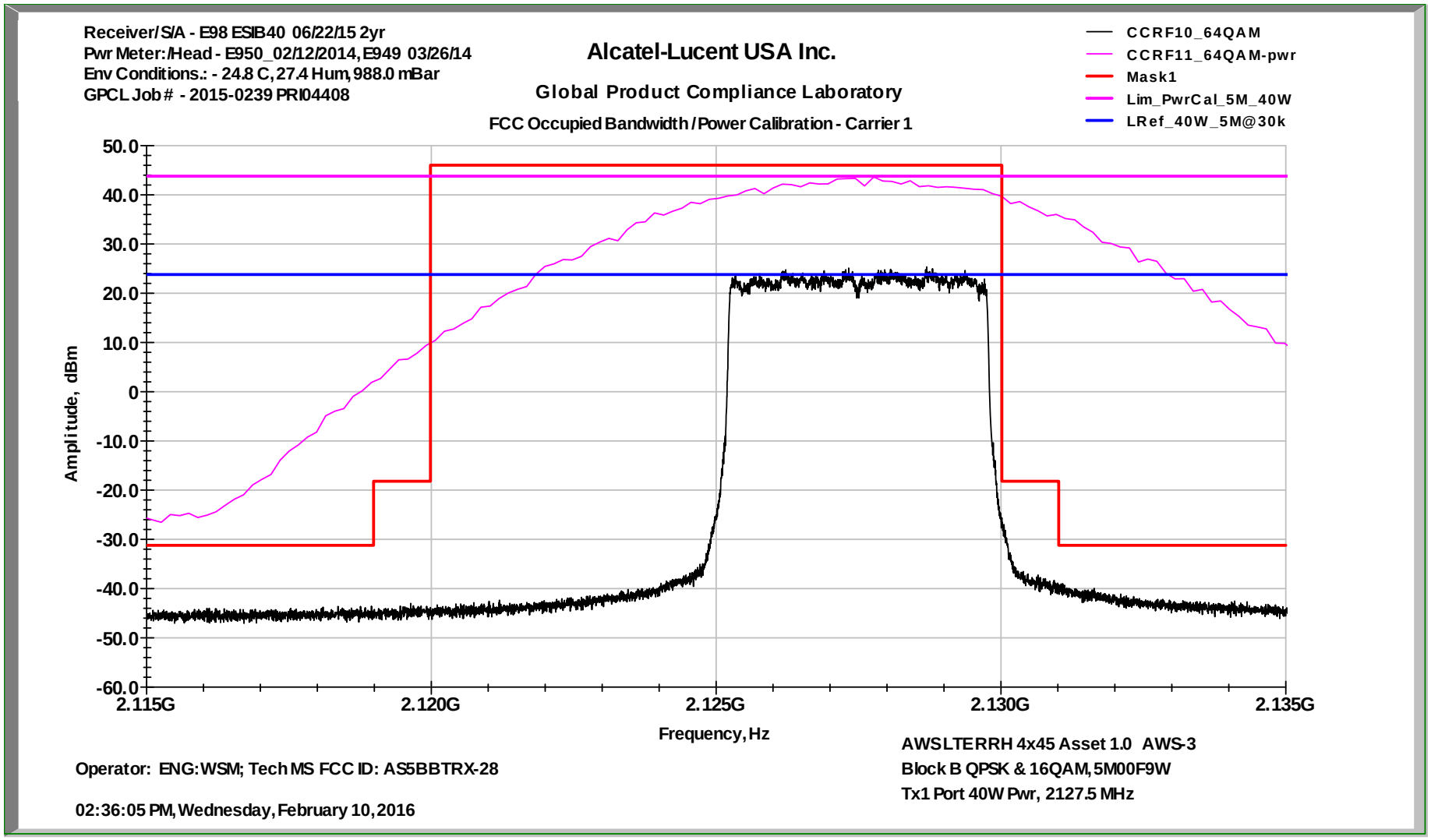



Receiver/ S/A - E98 ESIB40 06/22/15 2yr
Pwr Meter:/Head - E950_02/12/2014, E949 03/26/14
Env Conditions.: - 24.8 C, 27.5 Hum, 985.9 mBar
GPCL Job # - 2015-0239 PRI04408
Alcatel-Lucent USA Inc.
Global Product Compliance Laboratory
CCRF8_RBW=30k
Mask2
Lim_PwrCal_5M_40W
LRef_40W_5M@30k
FCC Occupied Bandwidth Carrier 2/ Left Edge of Block Margin
Amplitude, dBm
30.0
20.0
10.0
0
-10.0
-20.0
-30.0
-40.0
-50.0
2.133G
2.134G
2.135G
2.136G
2.137G
Frequency, Hz
Operator: ENG:WSM; Tech MS FCC ID: AS5BBTRX-28
12:09:19 PM, Wednesday, February 10, 2016
AWS LTE RRH 4x45 Asset 1.0 AWS-3
Block D 64QAM, 5M00F9W
Tx1 Port 40W Pwr, 2137.5 Mhz

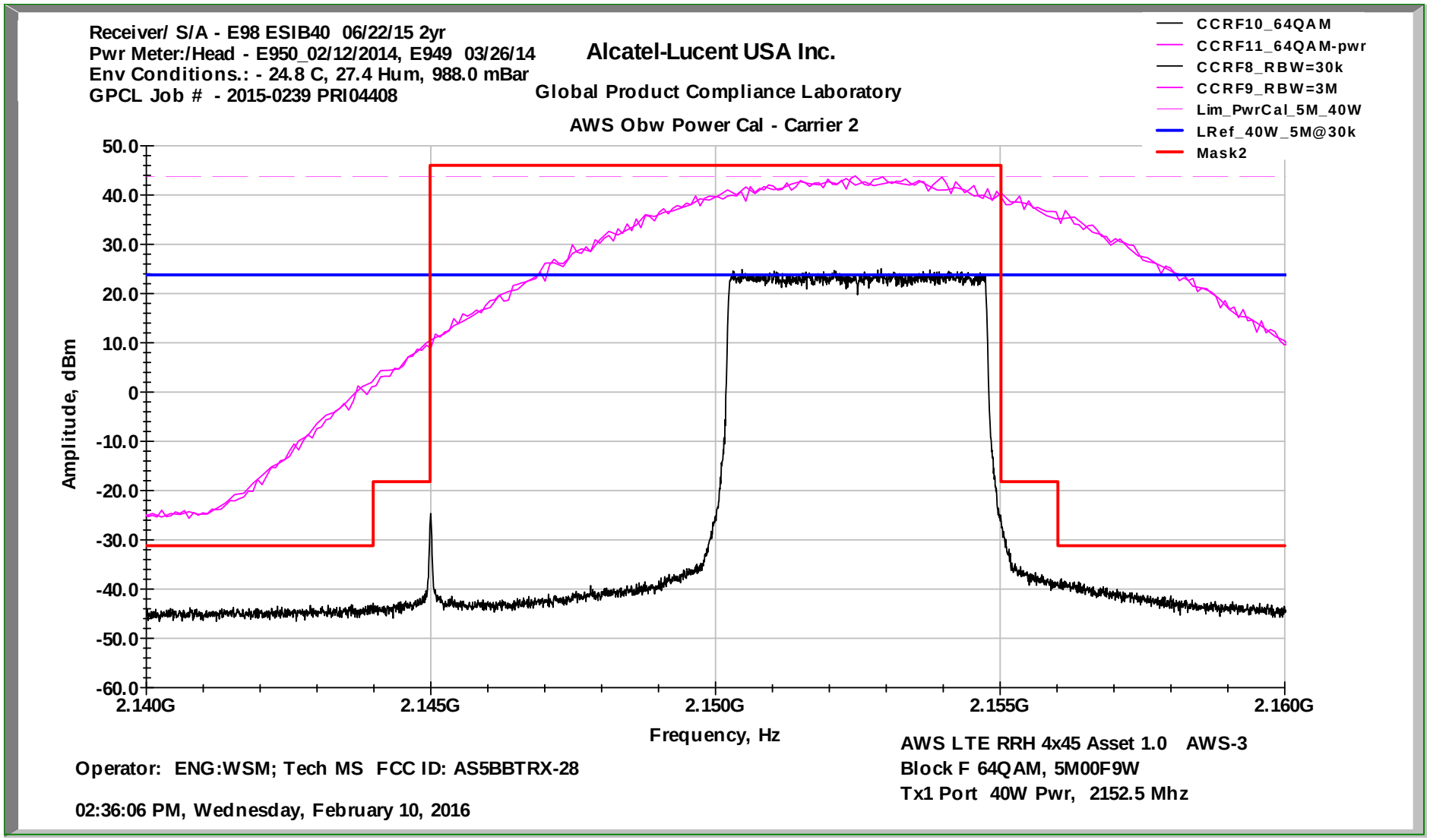
OBW Carrier 2 - Right Edge of Block **5&5 MHz Blocks B-D** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



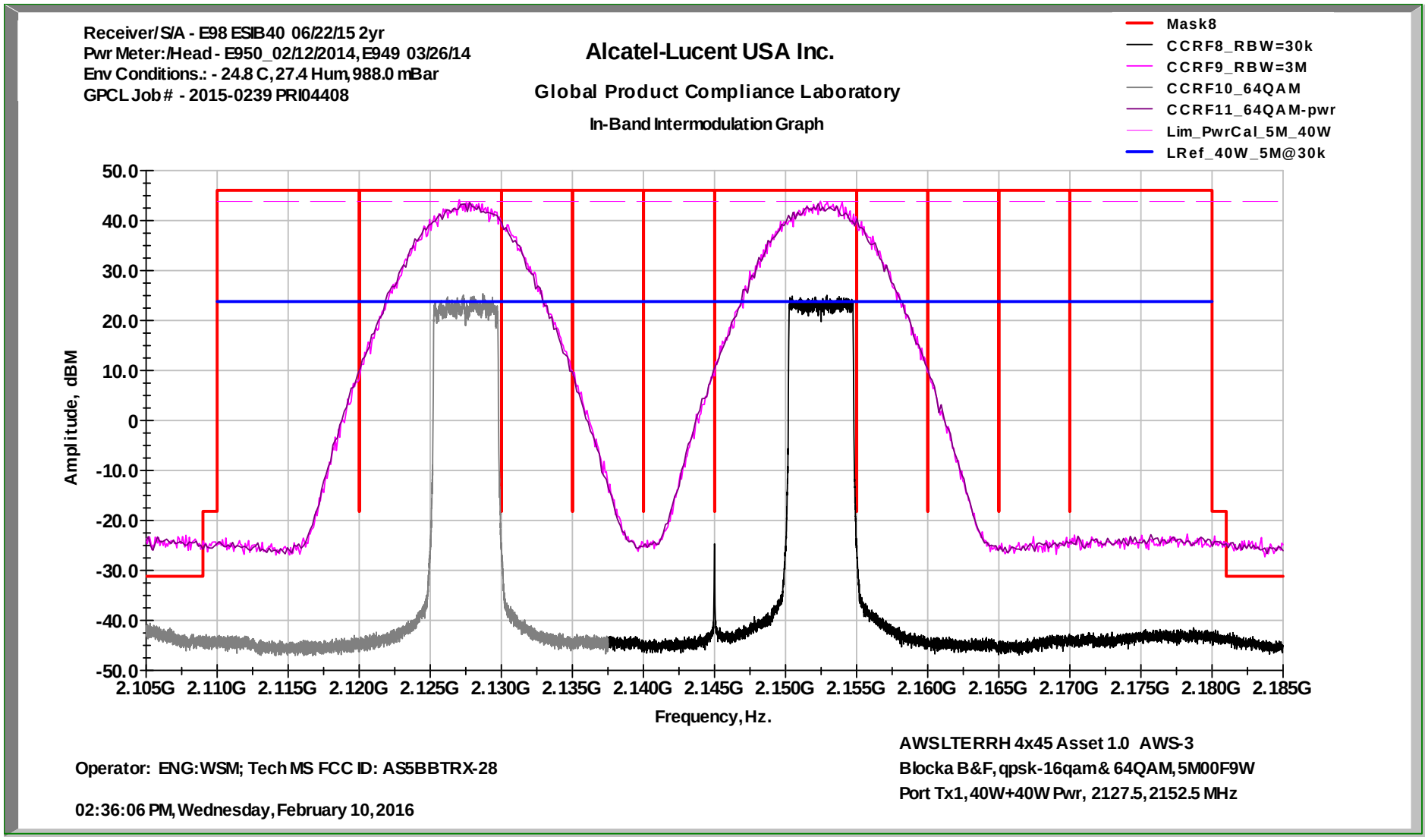
Test Configuration #13
Occupied Bandwidth/Power Cal -Carrier 1 5&5 MHz Blocks B-F AWS RRH 4x45 FCC ID AS5BBTRX-28



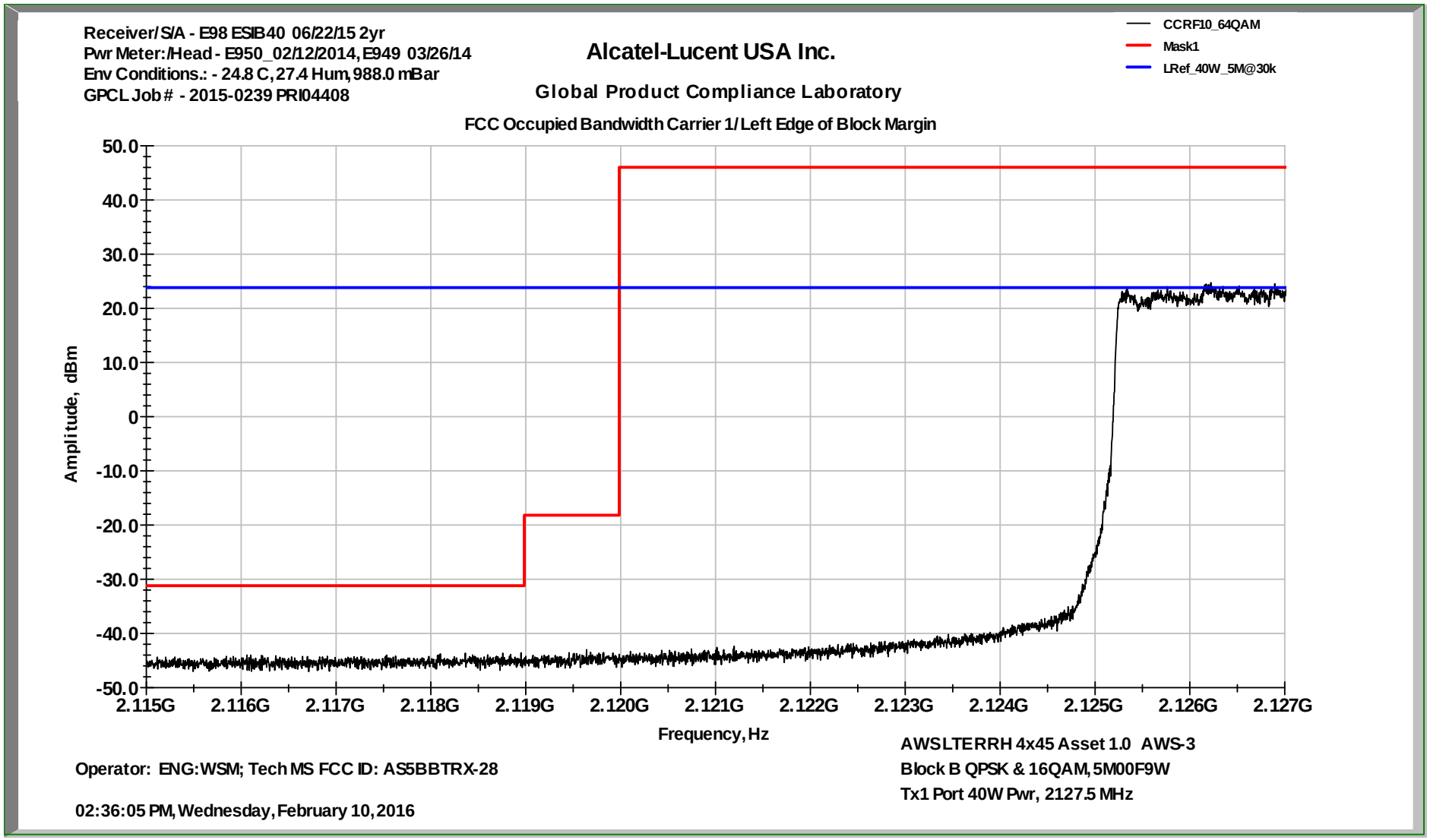
Occupied Bandwidth/Power Cal -Carrier 2 5&5 MHz Blocks B-F AWS RRH 4x45 FCC ID AS5BBTRX-28



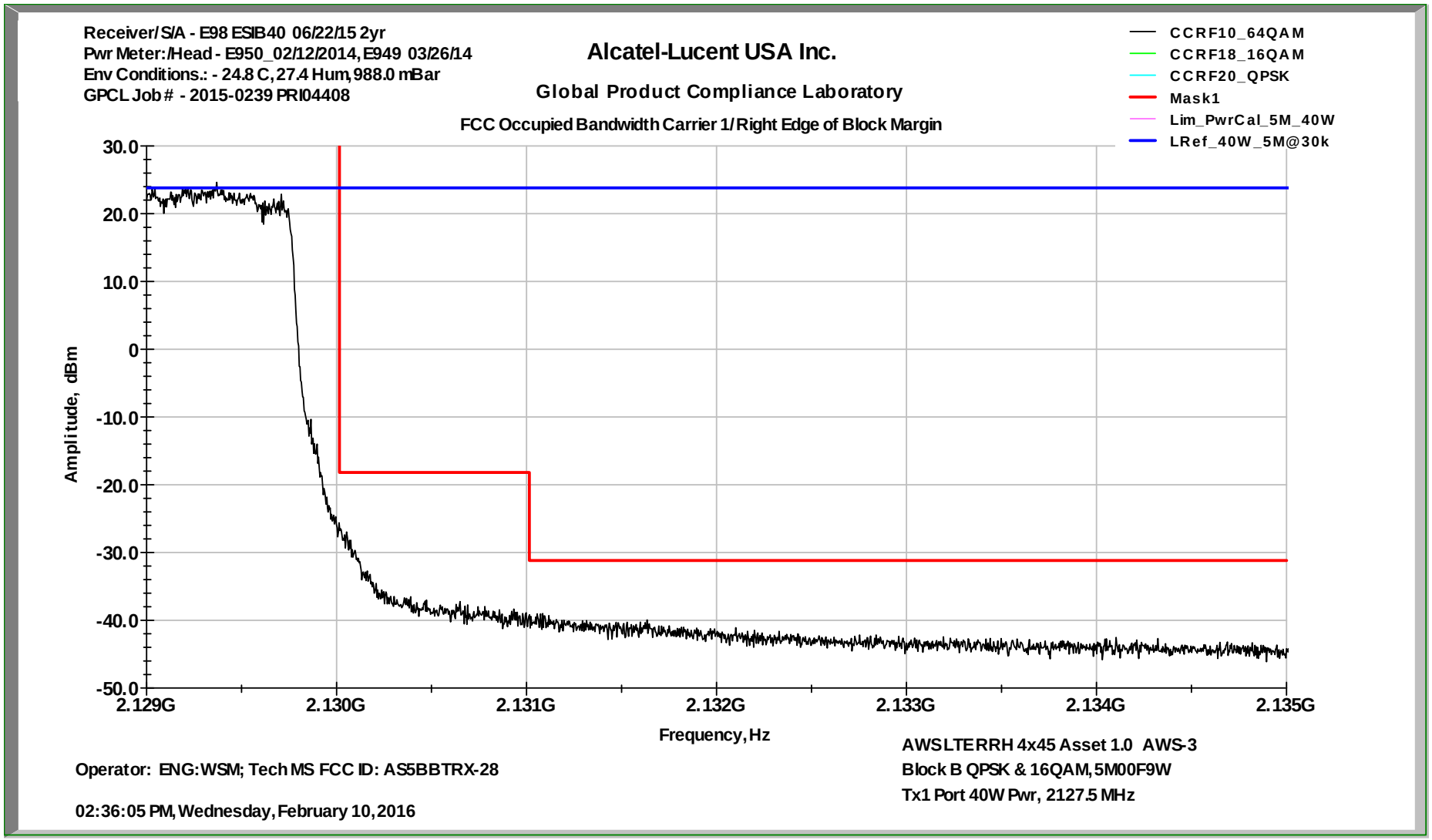
OBW Intermods. Whole Band View **5&5 MHz Blocks B-F** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



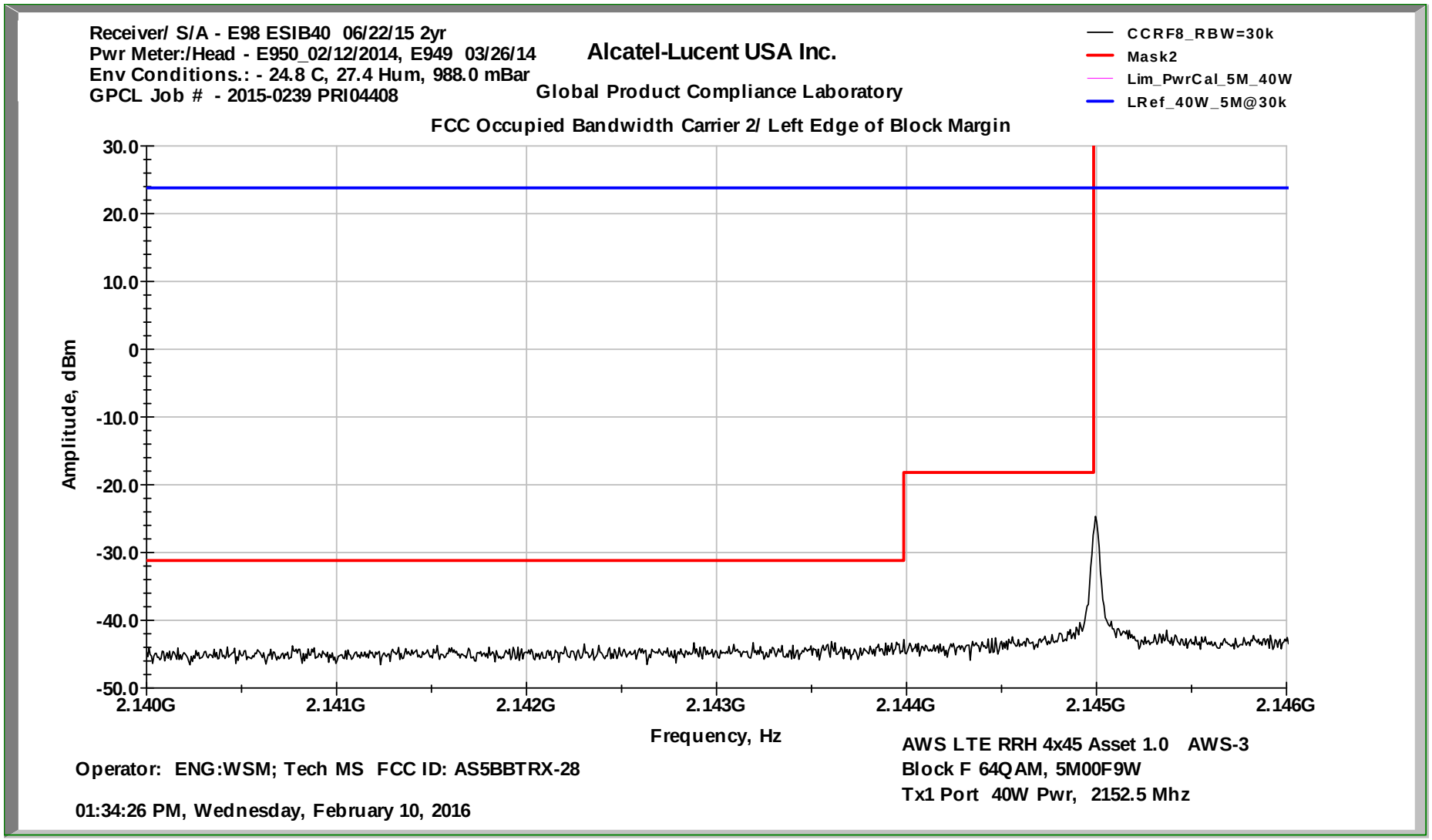
OBW Carrier 1 - Left Edge of Block **5&5 MHz Blocks B-F** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



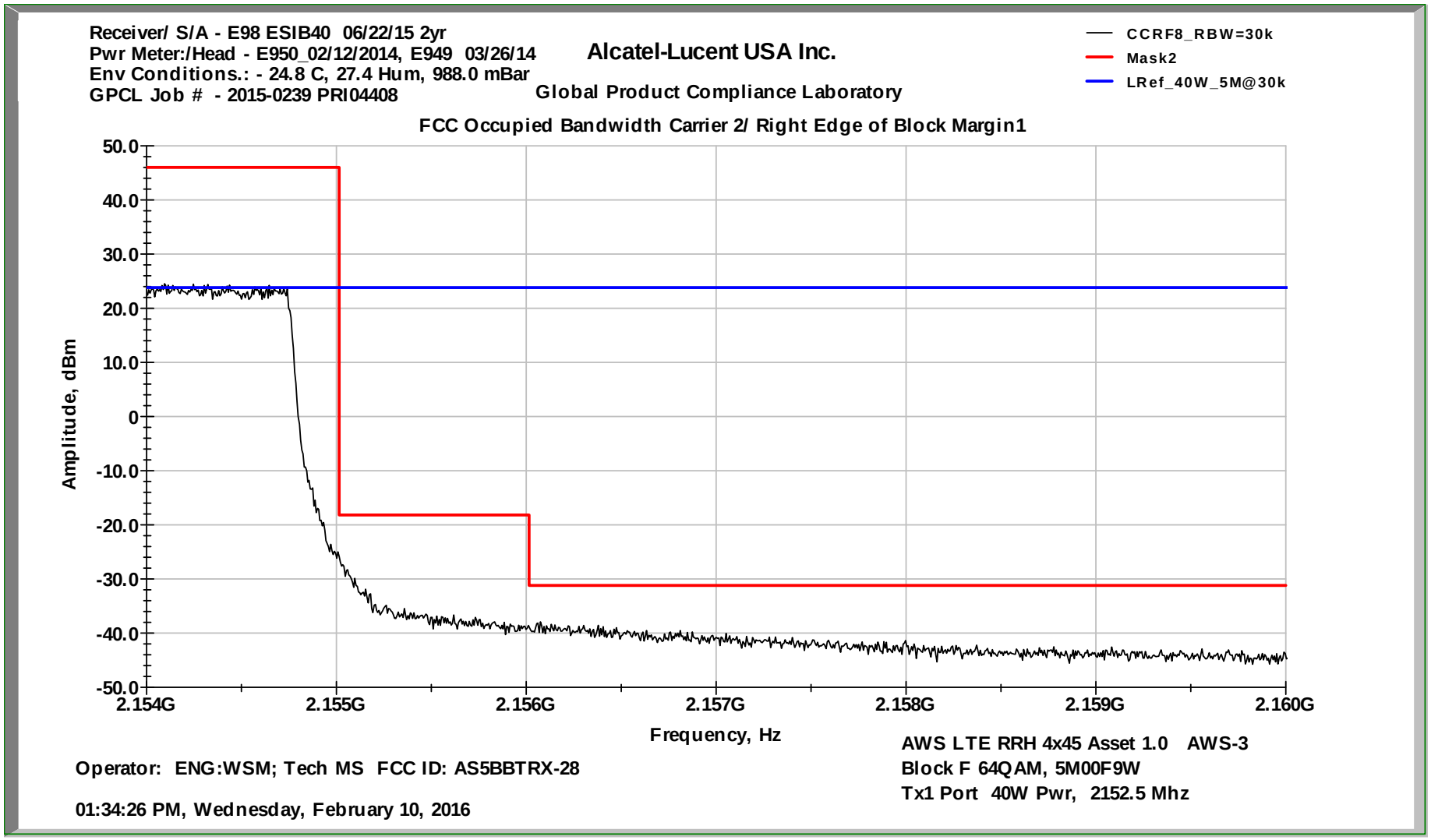
OBW Carrier 1 - Right Edge of Block **5&5 MHz Blocks B-F** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



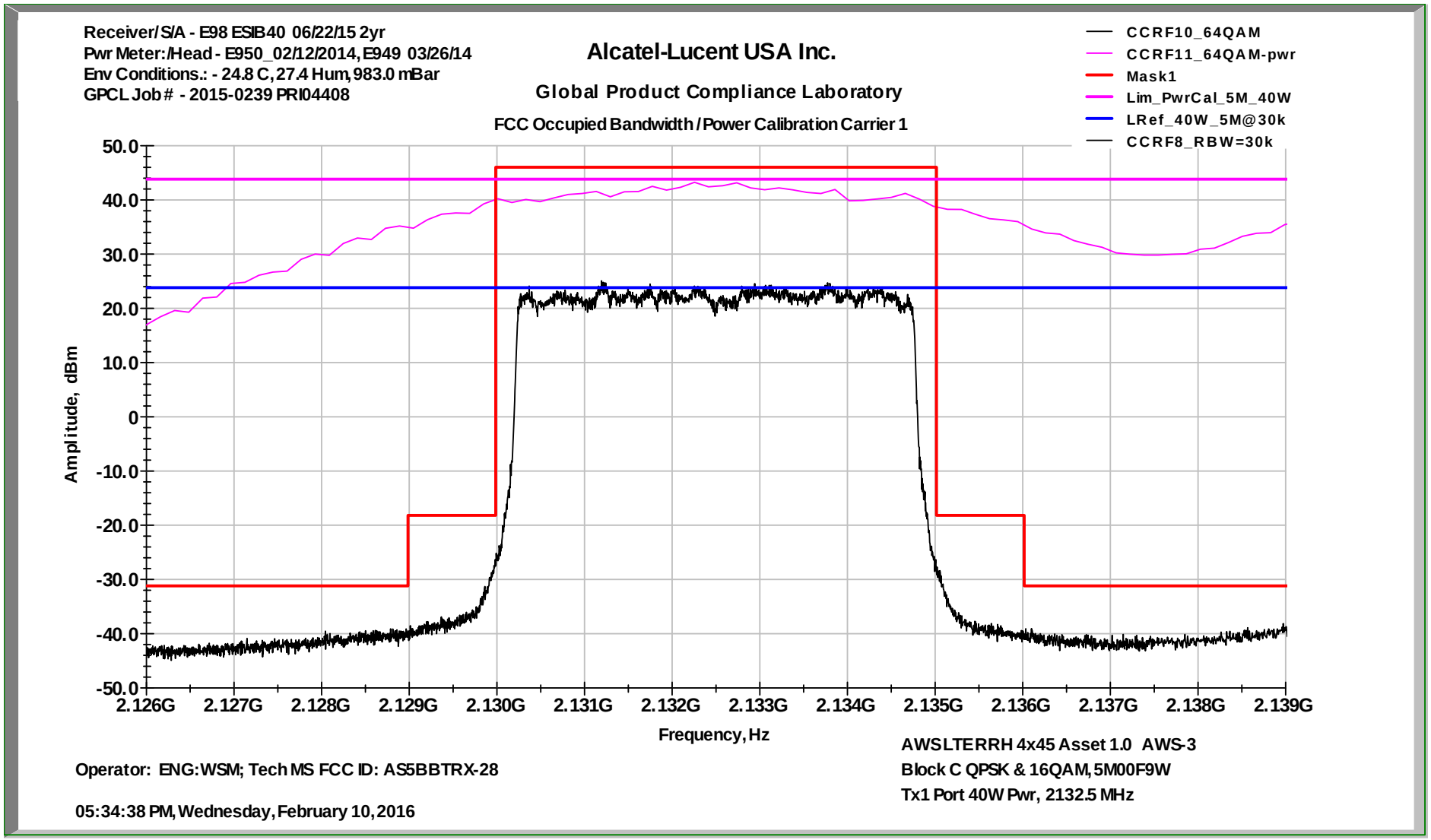
OBW Carrier 2 - Left Edge of Block **5&5 MHz Blocks B-F** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



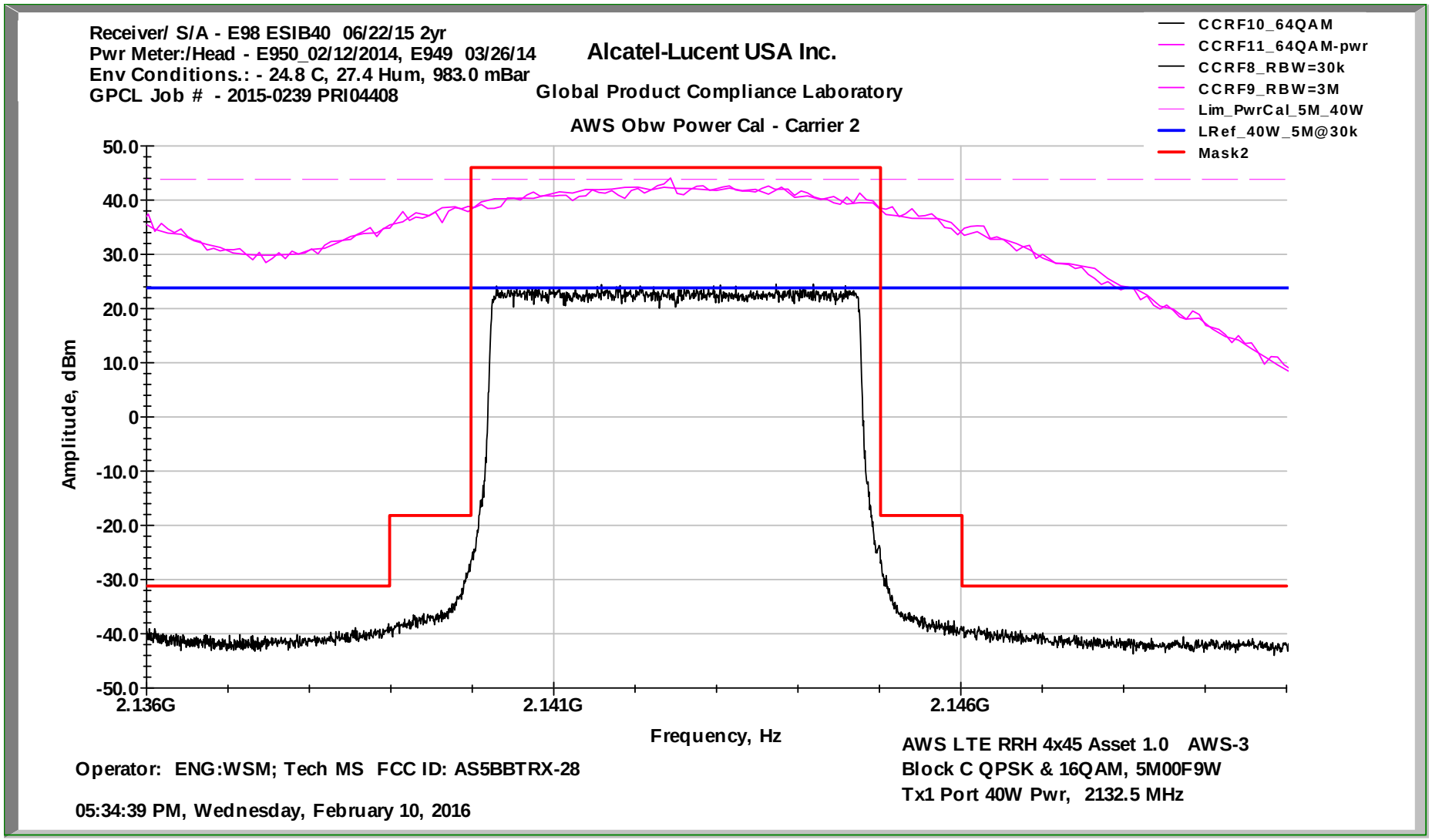
OBW Carrier 2 - Right Edge of Block **5&5 MHz Blocks B-F** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



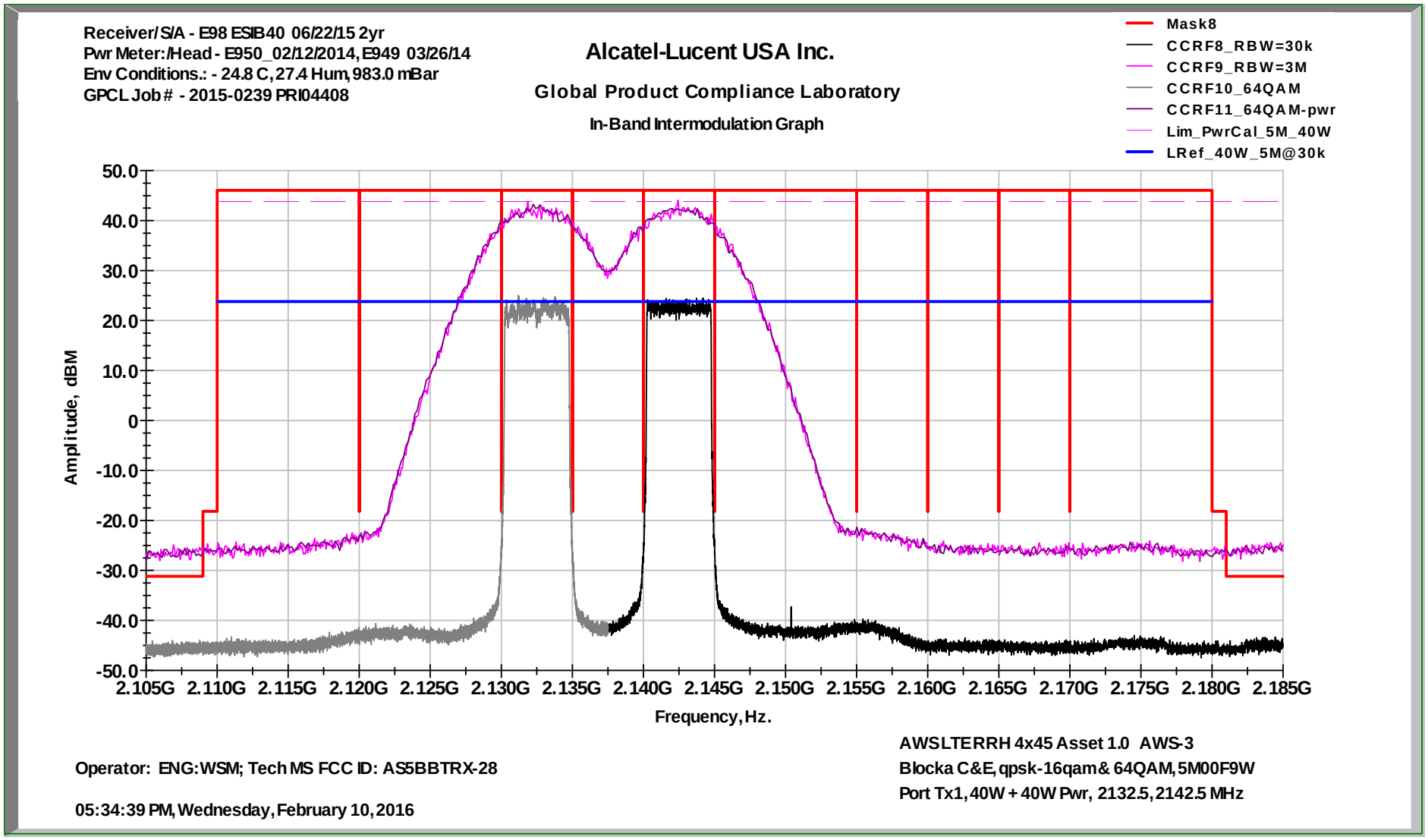
Test Configuration #14
Occupied Bandwidth/Power Cal -Carrier 1 5&5 MHz Blocks C-E AWS RRH 4x45 FCC ID AS5BBTRX-28

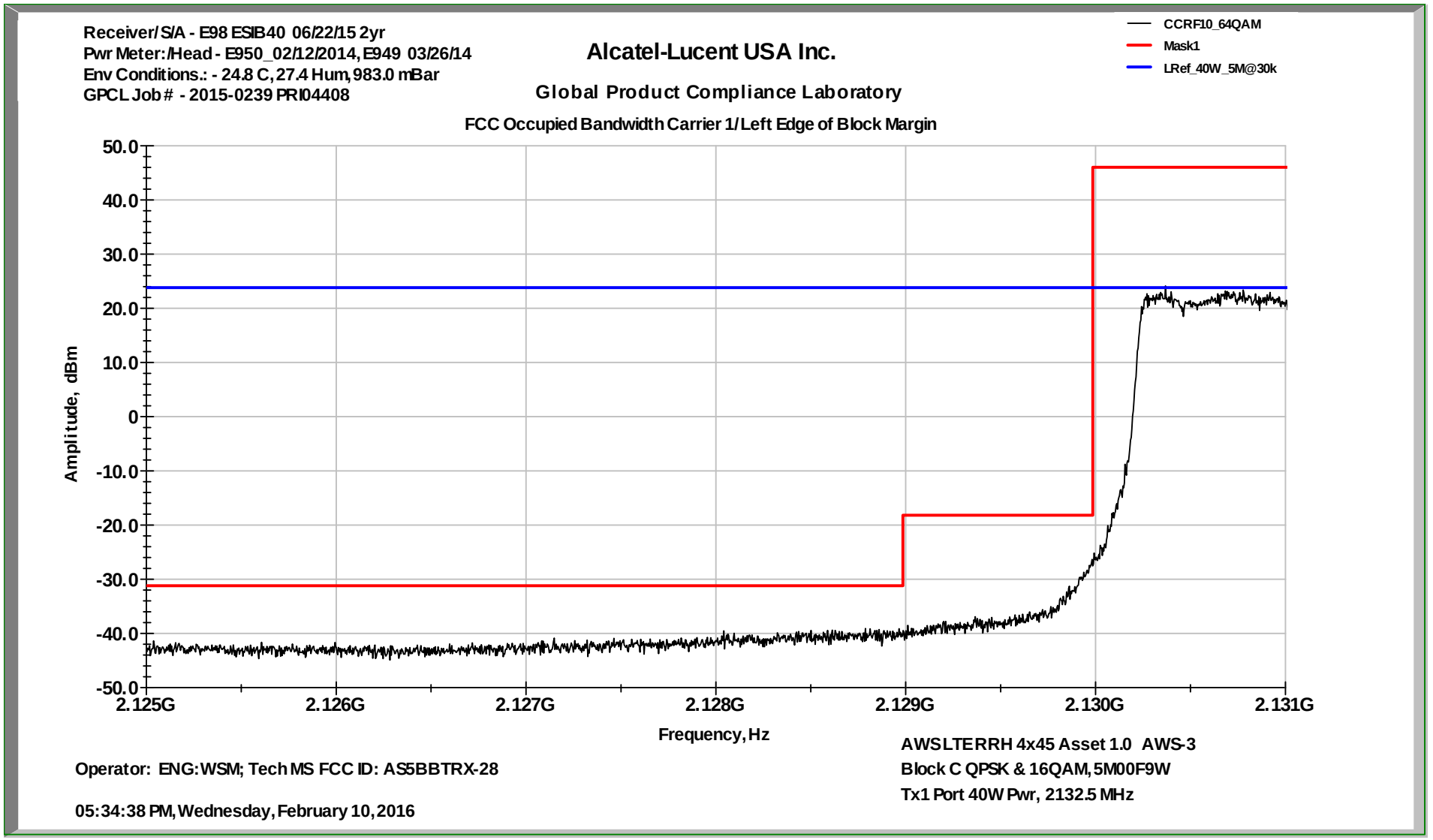


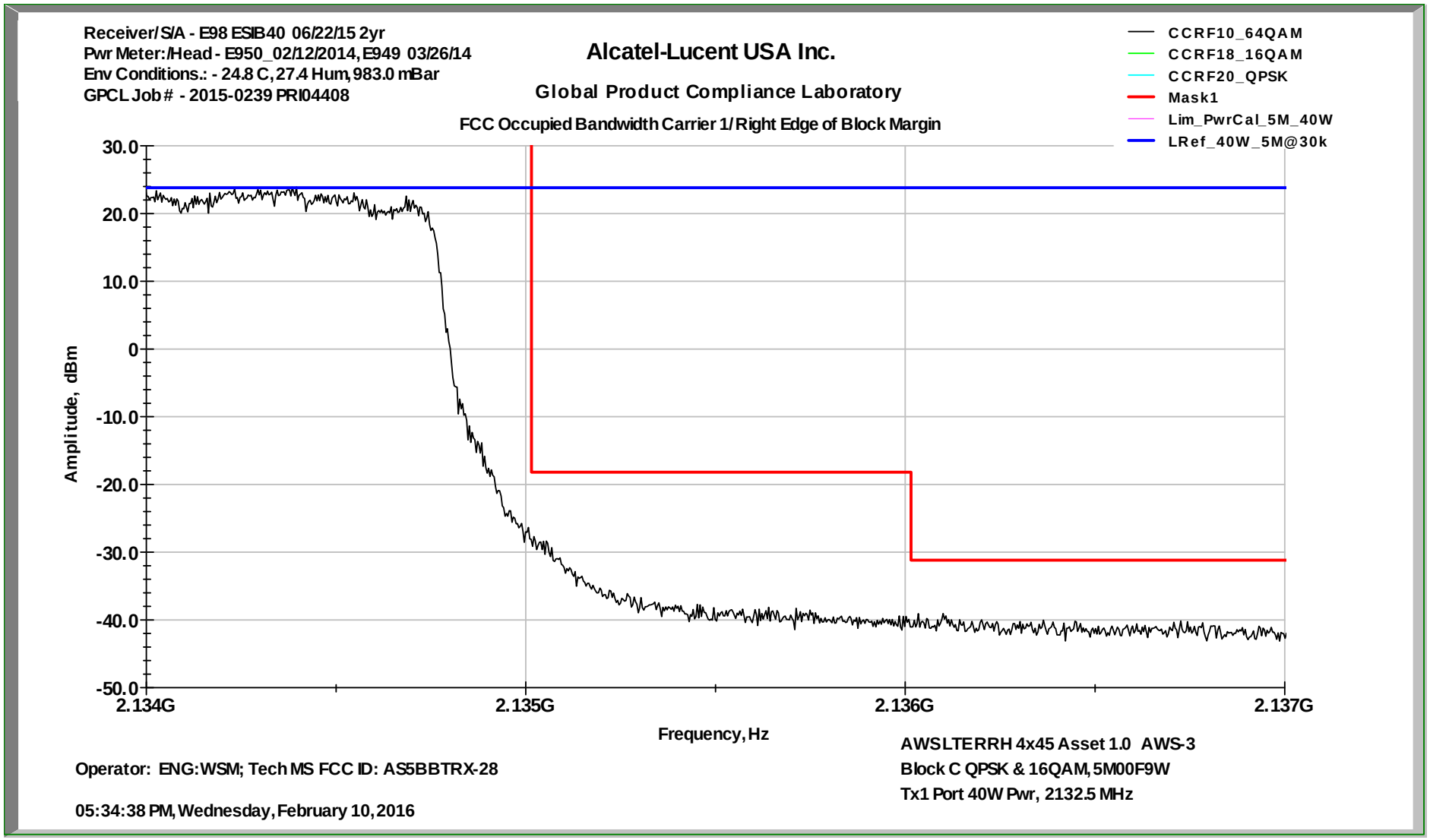
Occupied Bandwidth/Power Cal -Carrier 2 5&5 MHz Blocks C-E AWS RRH 4x45 FCC ID AS5BBTRX-28



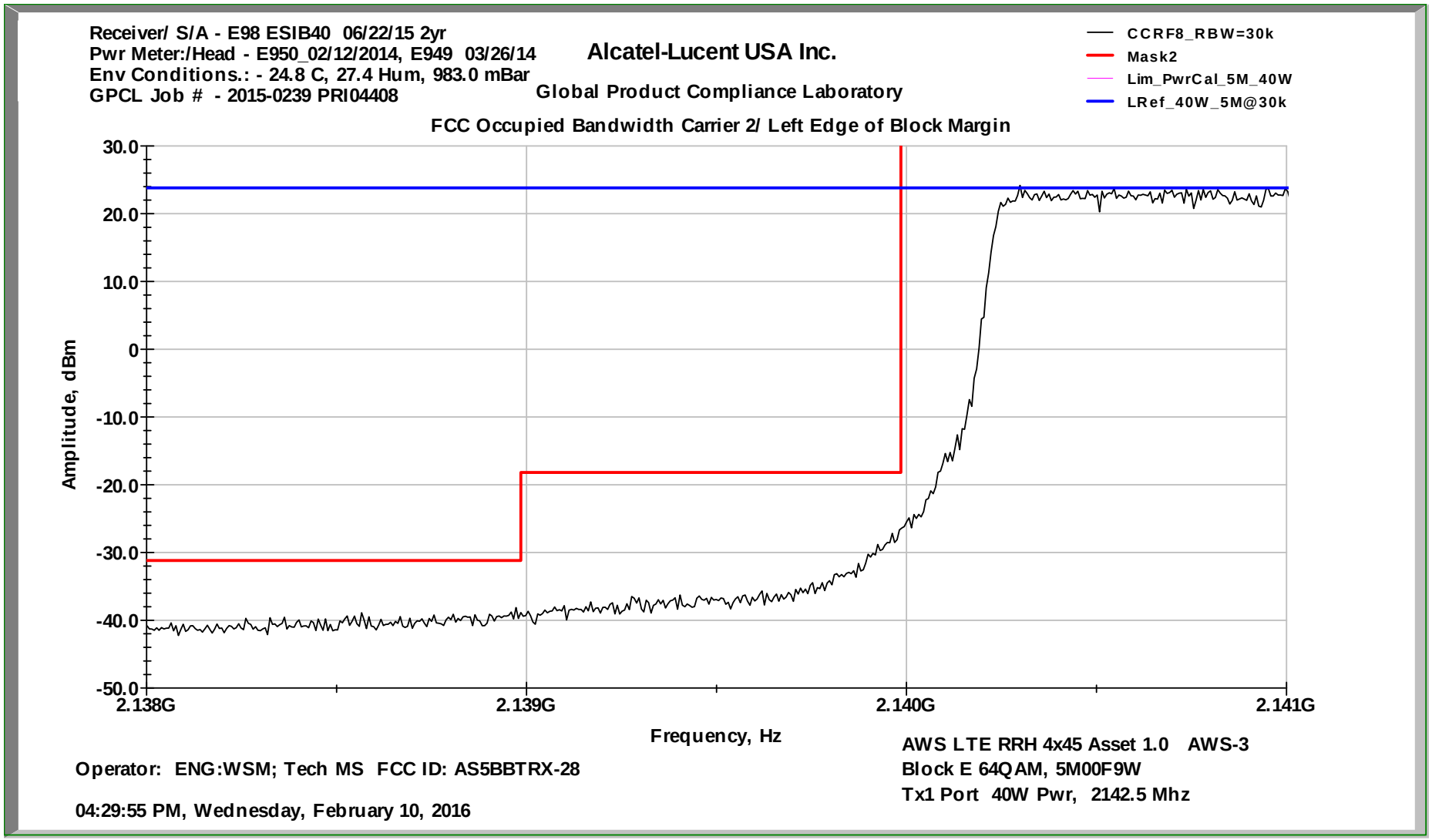
OBW Intermods. Whole Band View **5&5 MHz Blocks C-E** **AWS RRH 4x45 FCC ID AS5BBTRX-28**

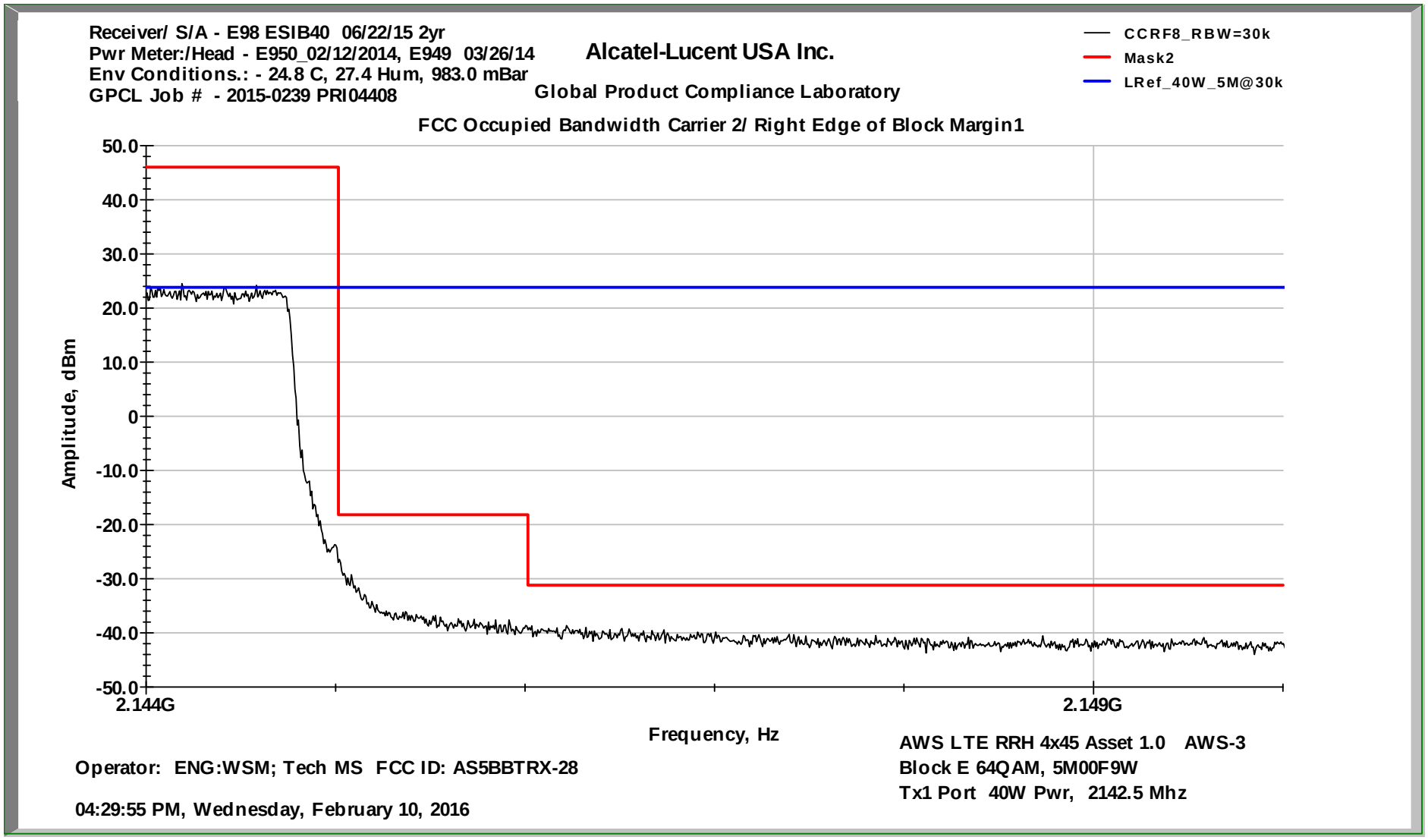



Receiver/S/A - E98 ESIB40 06/22/15 2yr
Pwr Meter:/Head - E950_02/12/2014,E949 03/26/14
Env Conditions.: - 24.8 C,27.4 Hum,983.0 mBar
GPCL Job # - 2015-0239 PRI04408
Alcatel-Lucent USA Inc.
Global Product Compliance Laboratory
FCC Occupied Bandwidth Carrier 1/Left Edge of Block Margin
CCRF10_64QAM
Mask1
LRef_40W_5M@30k
Amplitude, dBm
50.0
40.0
30.0
20.0
10.0
0
-10.0
-20.0
-30.0
-40.0
-50.0
2.125G
2.126G
2.127G
2.128G
2.129G
2.130G
2.131G
Frequency,Hz
Operator: ENG:WSM; Tech MS FCC ID: AS5BBTRX-28
05:34:38 PM,Wednesday,February 10,2016
AWSLTERRH 4x45 Asset 1.0 AWS-3
Block C QPSK & 16QAM,5M00F9W
Tx1 Port 40W Pwr, 2132.5 MHz

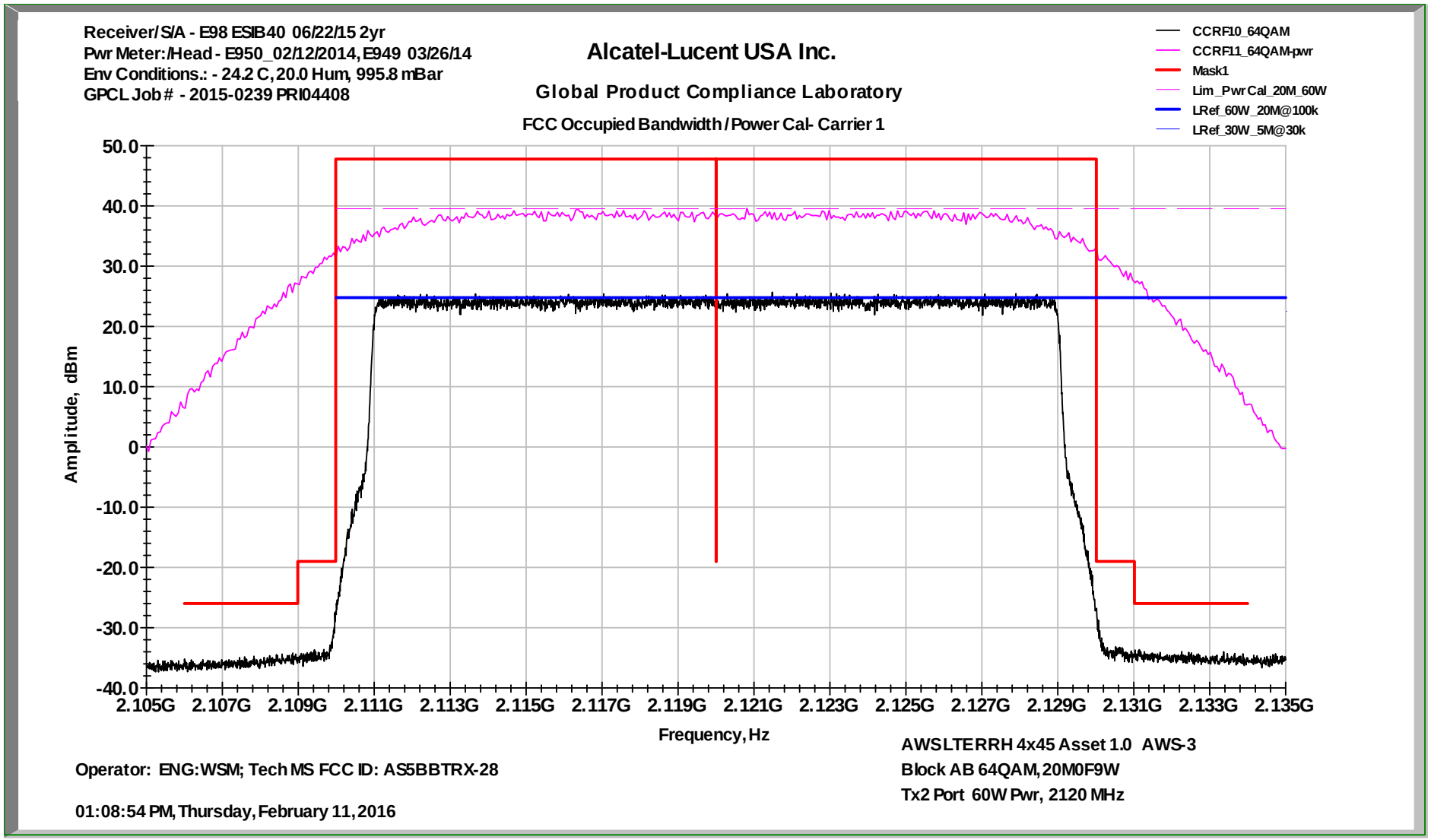

Receiver/S/A - E98 ESIB40 06/22/15 2yr
Pwr Meter:/Head - E950_02/12/2014, E949 03/26/14
Env Conditions.: - 24.8 C, 27.4 Hum, 983.0 mBar
GPCL Job # - 2015-0239 PRI04408
Alcatel-Lucent USA Inc.
Global Product Compliance Laboratory
FCC Occupied Bandwidth Carrier 1/Right Edge of Block Margin
CCRF10_64QAM
CCRF18_16QAM
CCRF20_QPSK
Mask1
Lim_PwrCal_5M_40W
LRef_40W_5M@30k
30.0
20.0
10.0
0
-10.0
-20.0
-30.0
-40.0
-50.0
Amplitude, dBm
2.134G
2.135G
2.136G
2.137G
Frequency, Hz
AWSLTERRH 4x45 Asset 1.0 AWS-3
Block C QPSK & 16QAM, 5M00F9W
Tx1 Port 40W Pwr, 2132.5 MHz
Operator: ENG:WSM; Tech MS FCC ID: AS5BBTRX-28
05:34:38 PM, Wednesday, February 10, 2016

OBW Carrier 2 - Left Edge of Block **5&5 MHz Blocks C-E** **AWS RRH 4x45 FCC ID AS5BBTRX-28**

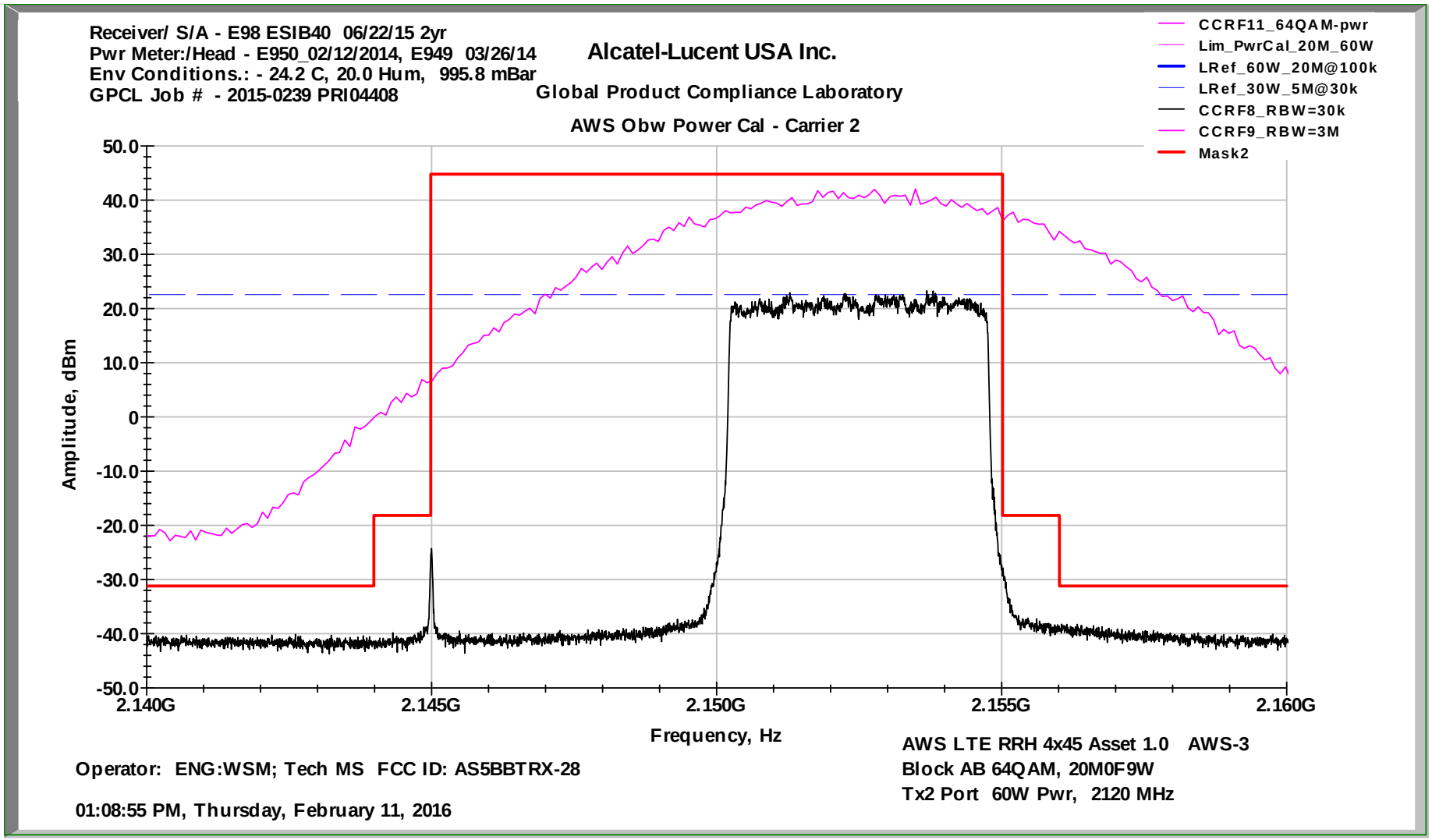



Receiver/ S/A - E98 ESIB40 06/22/15 2yr
Pwr Meter:/Head - E950_02/12/2014, E949 03/26/14
Env Conditions.: - 24.8 C, 27.4 Hum, 983.0 mBar
GPCL Job # - 2015-0239 PRI04408
Alcatel-Lucent USA Inc.
Global Product Compliance Laboratory
CCRF8_RBW=30k
Mask2
LRef_40W_5M@30k
FCC Occupied Bandwidth Carrier 2/ Right Edge of Block Margin1
Amplitude, dBm
50.0
40.0
30.0
20.0
10.0
0
-10.0
-20.0
-30.0
-40.0
-50.0
2.144G
2.149G
Frequency, Hz
Operator: ENG:WSM; Tech MS FCC ID: AS5BBTRX-28
04:29:55 PM, Wednesday, February 10, 2016
AWS LTE RRH 4x45 Asset 1.0 AWS-3
Block E 64QAM, 5M00F9W
Tx1 Port 40W Pwr, 2142.5 Mhz

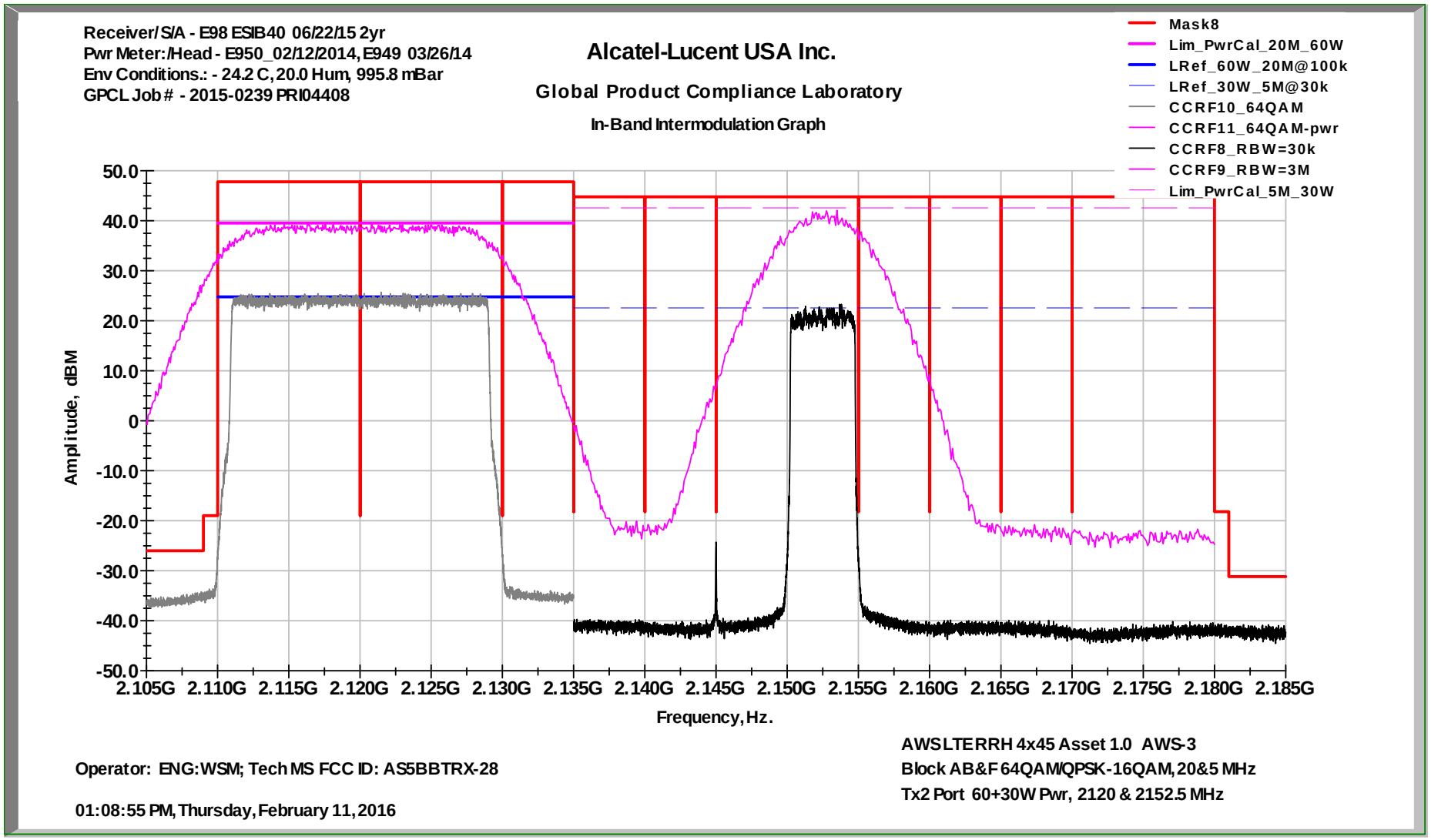
Test Configuration #15
Occupied Bandwidth/Power Cal -Carrier 1 20&5 MHz Blocks AB-F AWS RRH 4x45 FCC ID AS5BBTRX-28



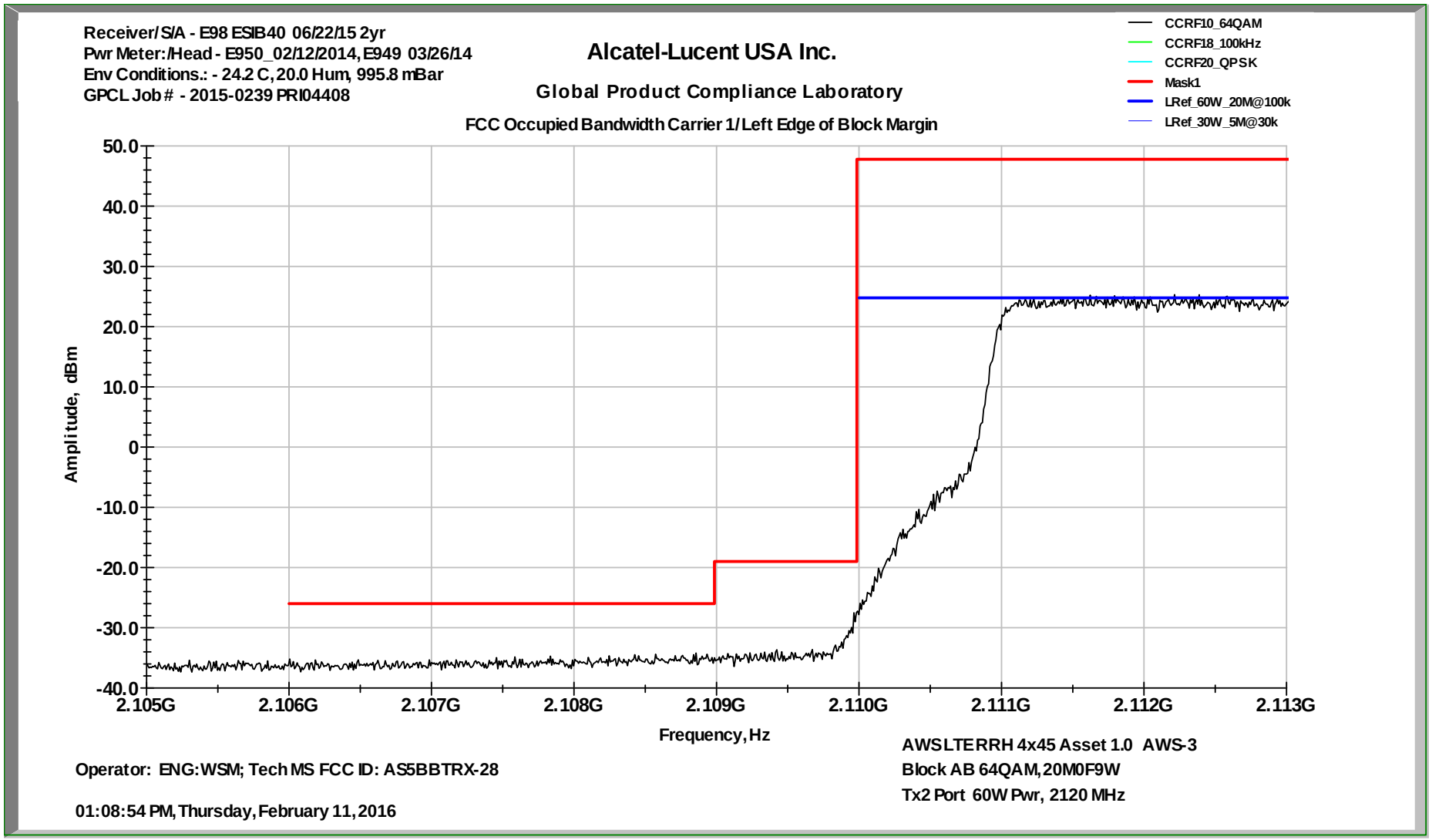
Occupied Bandwidth/Power Cal -Carrier 2 20&5 MHz Blocks AB-F AWS RRH 4x45 FCC ID AS5BBTRX-28



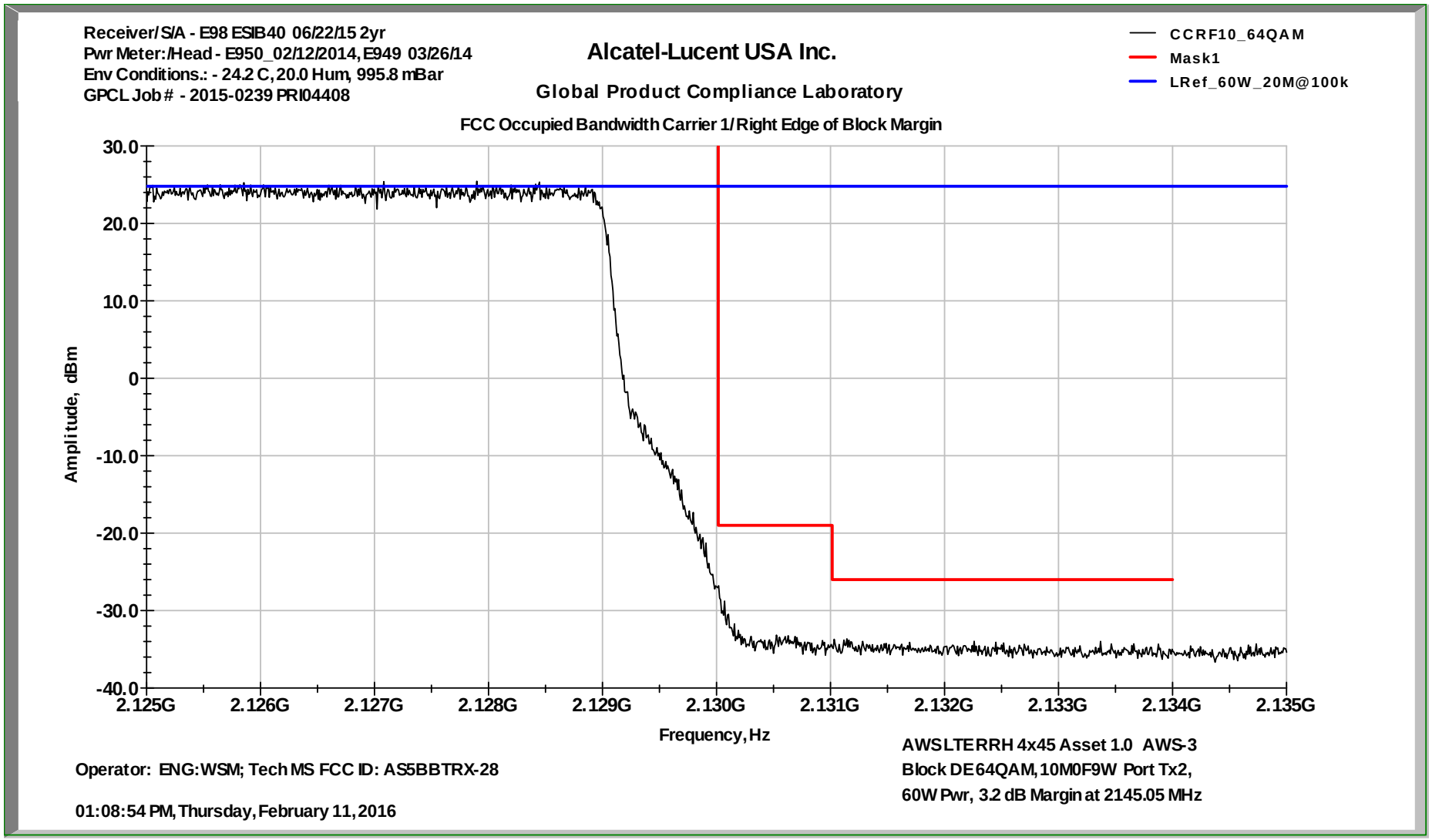
OBW Intermods. Whole Band View **20&5 MHz Blocks AB-F** **AWS RRH 4x45 FCC ID AS5BBTRX-28**

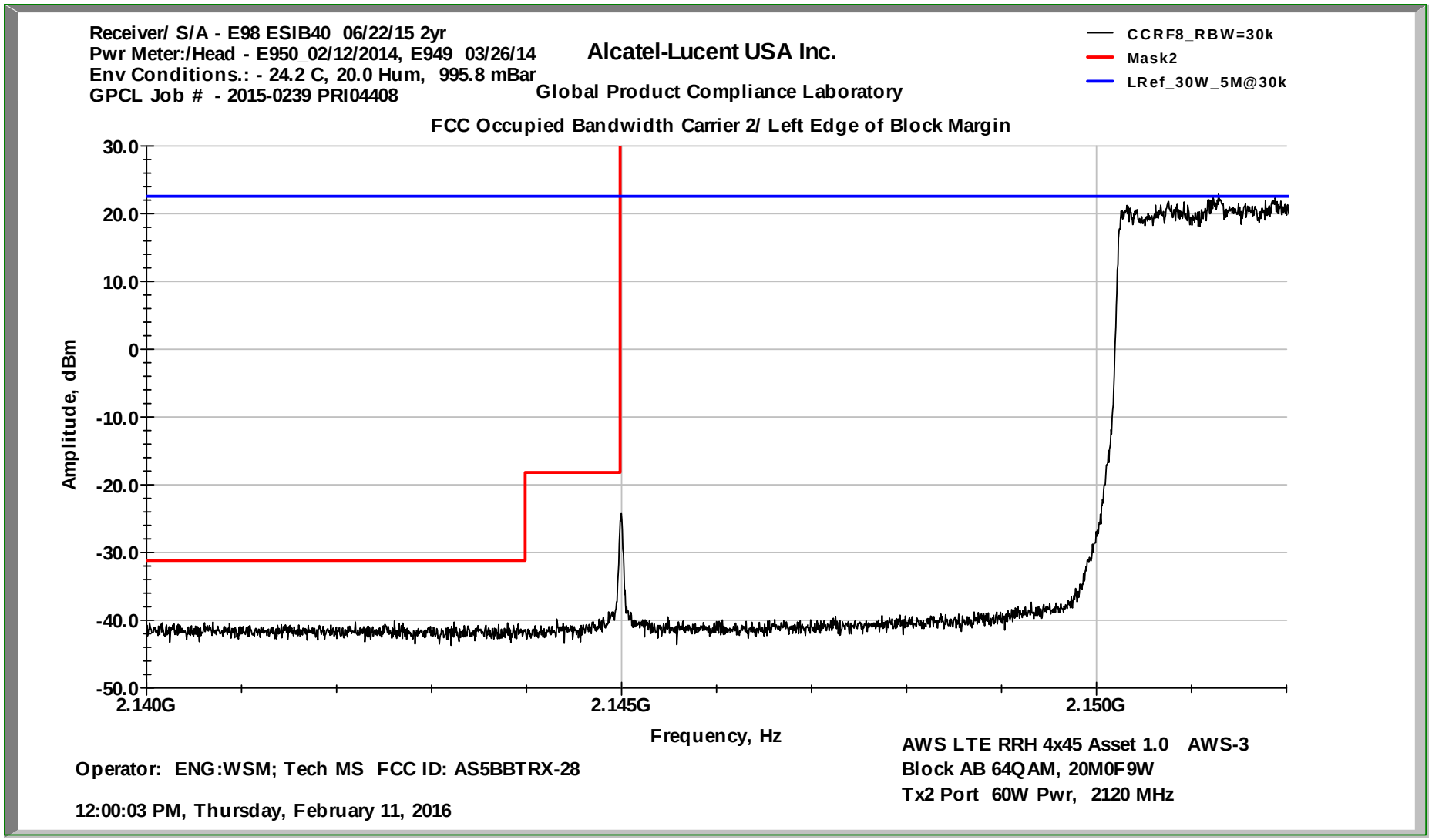


OBW Carrier 1 - Left Edge of Block **20&5 MHz Blocks AB-F** **AWS RRH 4x45 FCC ID AS5BBTRX-28**

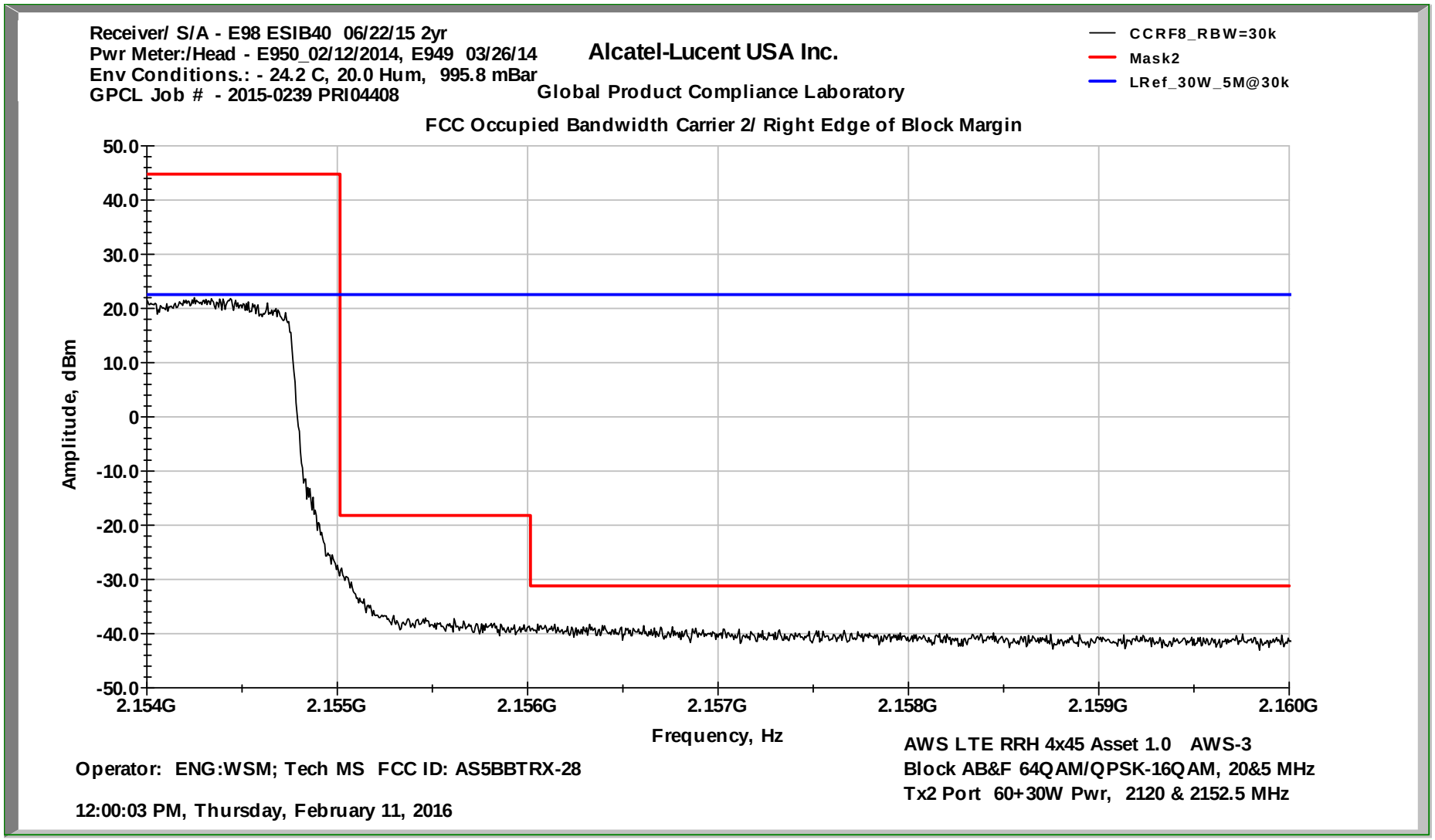


OBW Carrier 1 - Right Edge of Block **20&5 MHz Blocks AB-F** **AWS RRH 4x45 FCC ID AS5BBTRX-28**

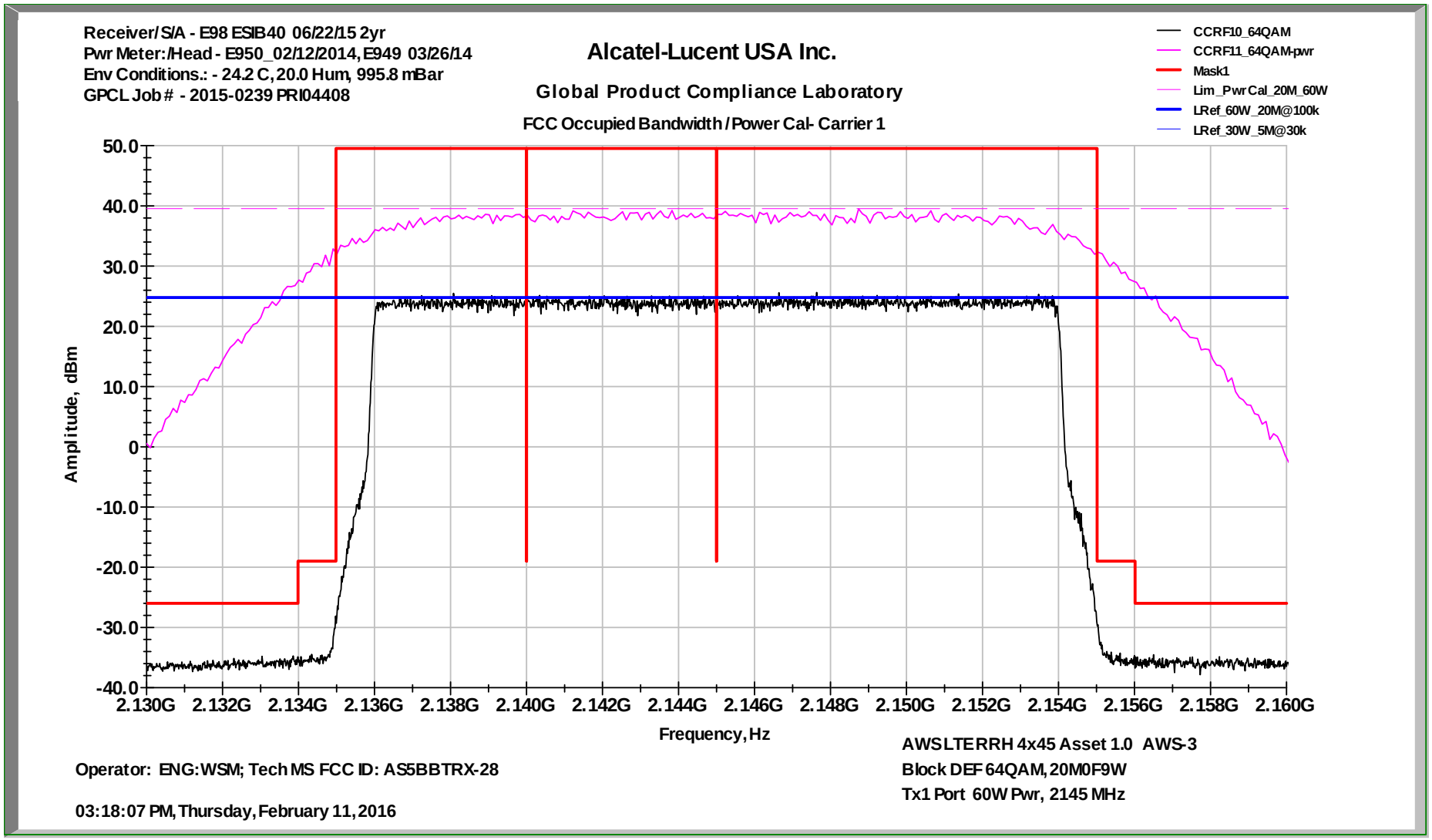



Receiver/ S/A - E98 ESIB40 06/22/15 2yr
Pwr Meter:/Head - E950_02/12/2014, E949 03/26/14
Env Conditions.: - 24.2 C, 20.0 Hum, 995.8 mBar
GPCL Job # - 2015-0239 PRI04408
Alcatel-Lucent USA Inc.
Global Product Compliance Laboratory
CCRF8_RBW=30k
Mask2
LRef_30W_5M@30k
FCC Occupied Bandwidth Carrier 2/ Left Edge of Block Margin
30.0
20.0
10.0
0
-10.0
-20.0
-30.0
-40.0
-50.0
Amplitude, dBm
2.140G
2.145G
2.150G
Frequency, Hz
Operator: ENG:WSM; Tech MS FCC ID: AS5BBTRX-28
12:00:03 PM, Thursday, February 11, 2016
AWS LTE RRH 4x45 Asset 1.0 AWS-3
Block AB 64QAM, 20M0F9W
Tx2 Port 60W Pwr, 2120 MHz

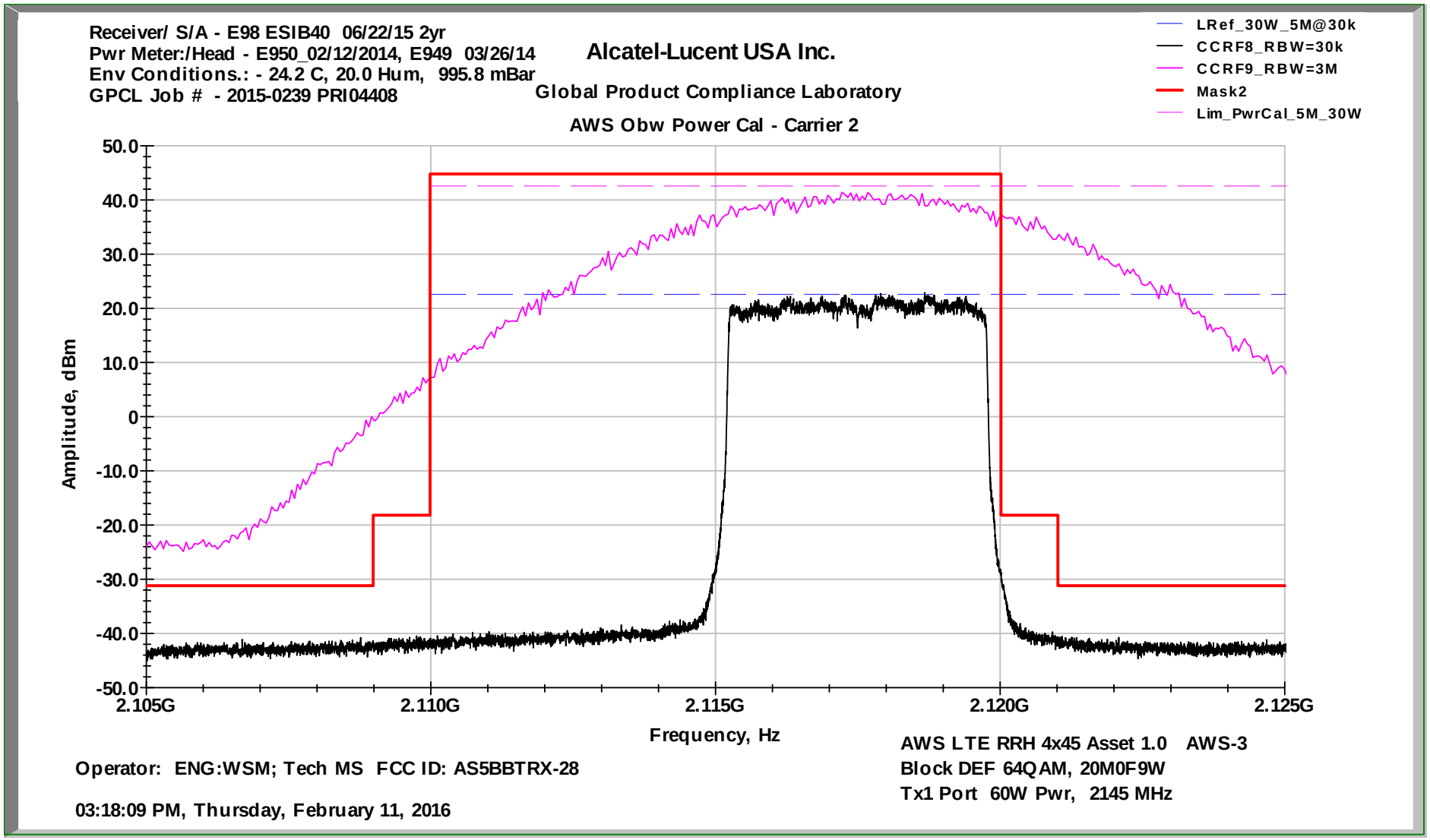
OBW Carrier 2 - Right Edge of Block **20&5 MHz Blocks AB-F AWS RRH 4x45 FCC ID AS5BBTRX**



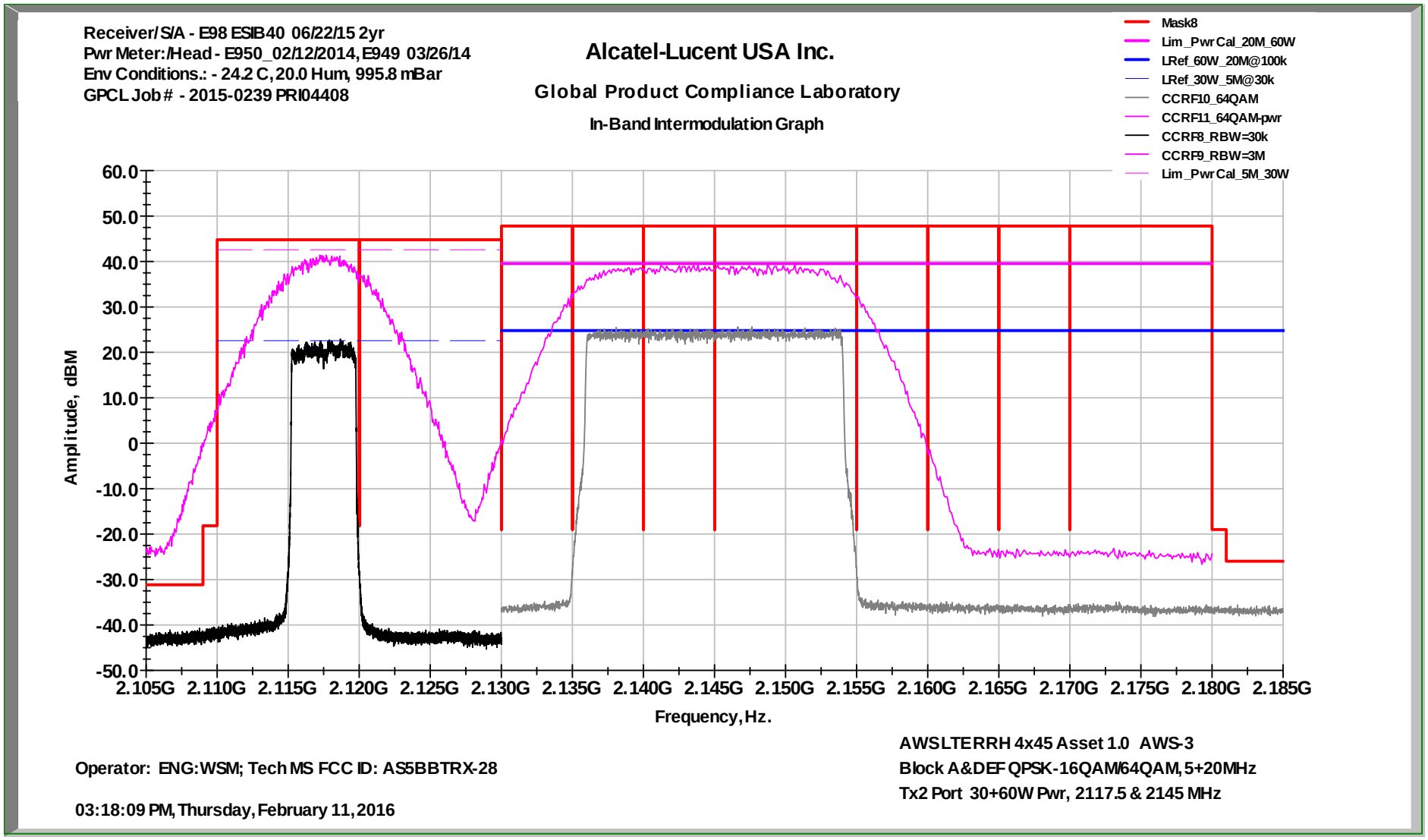
Test Configuration #16
Occupied Bandwidth/Power Cal -Carrier 1 5&20 MHz Blocks A-DEF AWS RRH 4x45 FCC ID AS5BBTRX-28



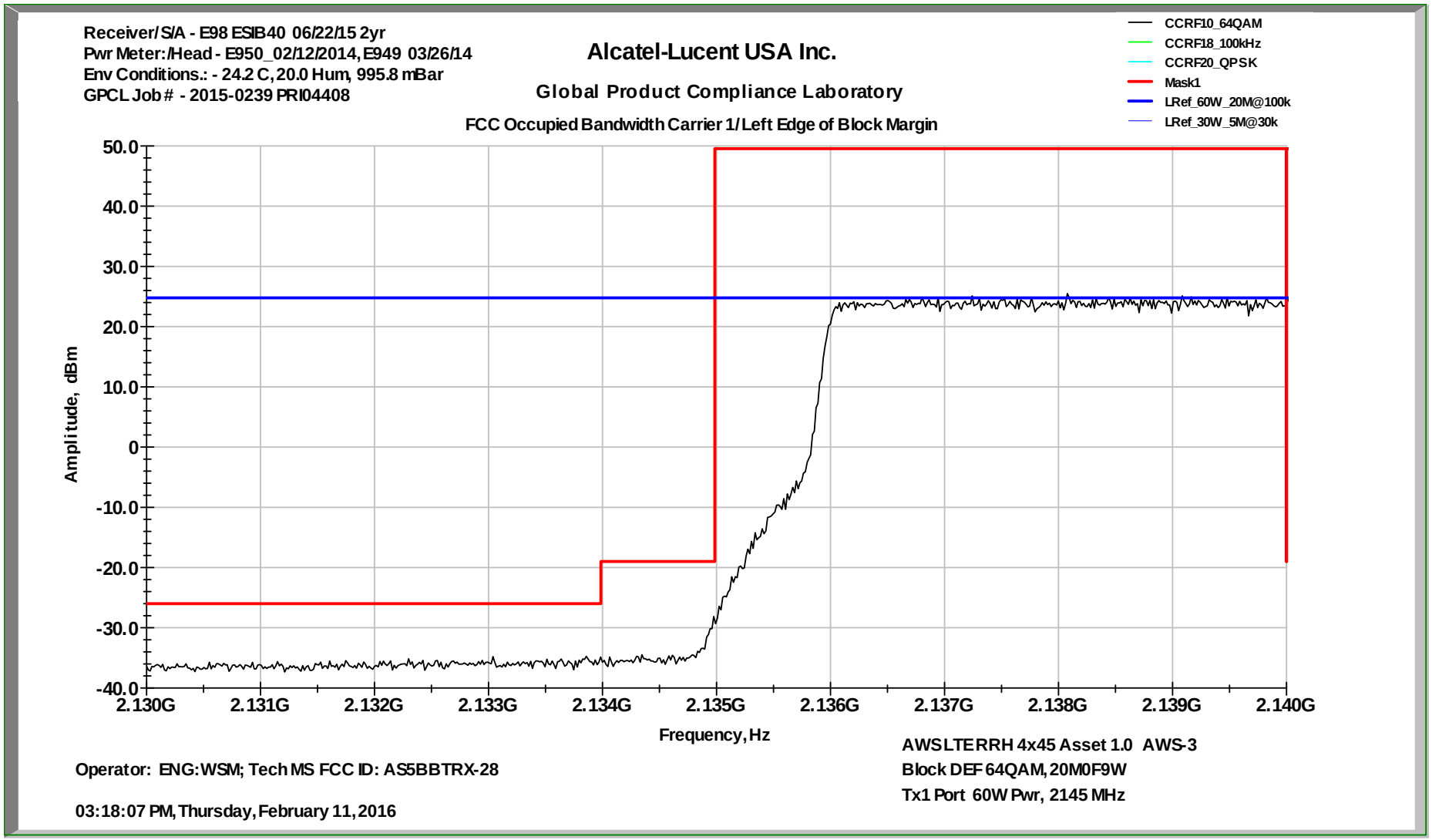
Occupied Bandwidth/Power Cal -Carrier 2 5&20 MHz Blocks A-DEF AWS RRH 4x45 FCC ID AS5BBTRX-28



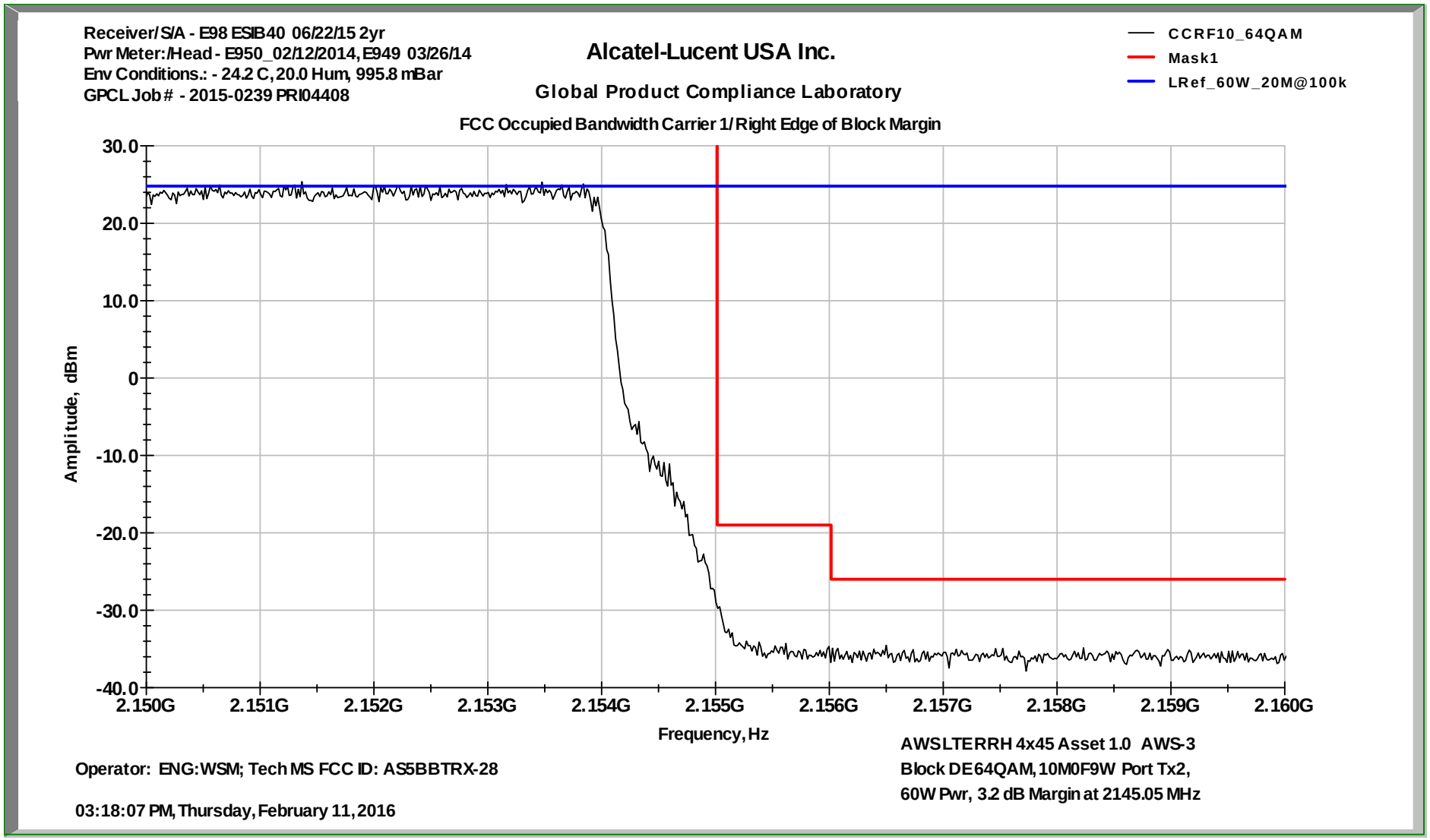
OBW InterMod. Whole Band View **5&20 MHz Blocks A-DEF AWS RRH 4x45 FCC ID AS5BBTRX-28**



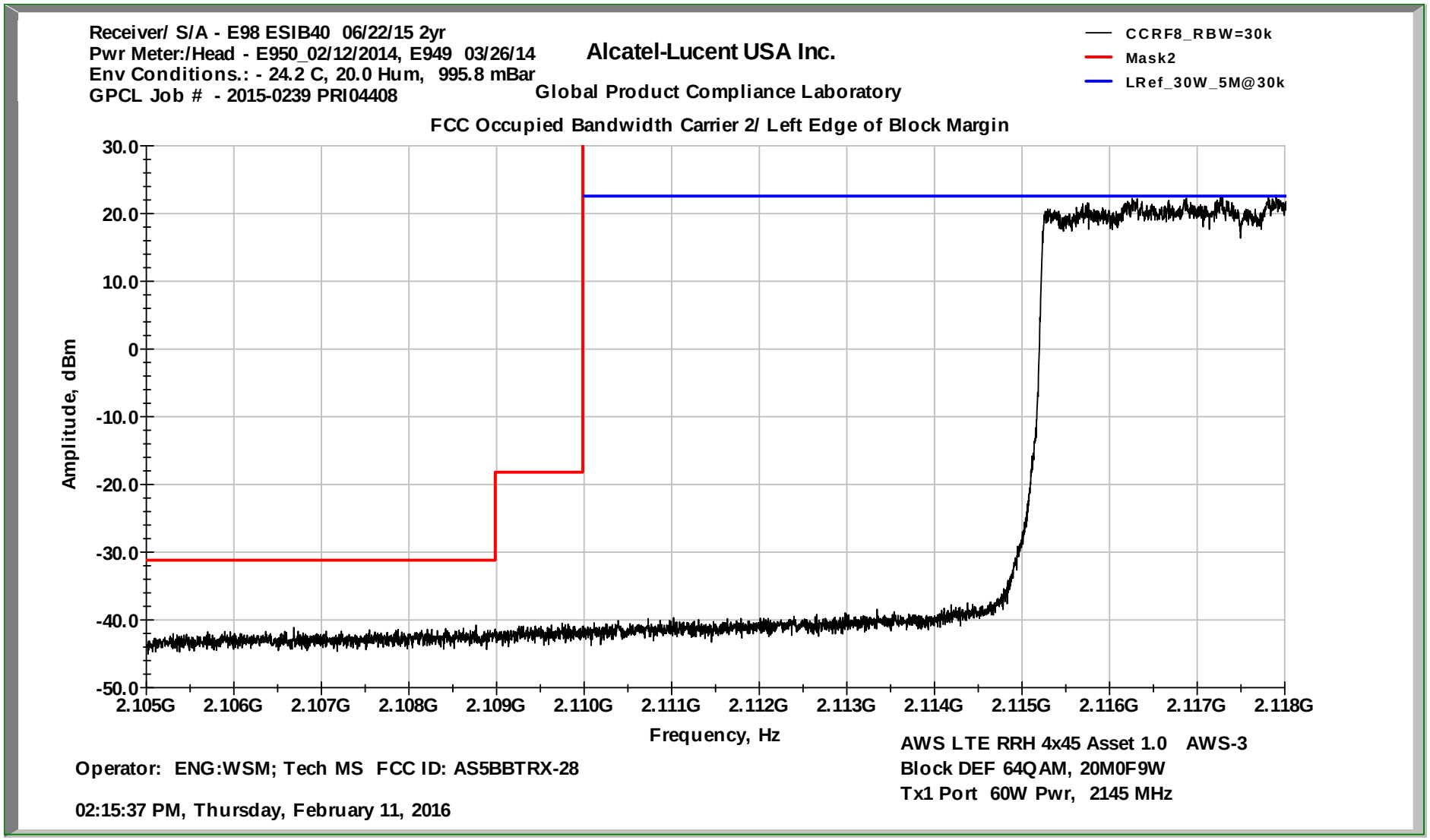
OBW Carrier 1 - Left Edge of Block **5&20 MHz Blocks A-DEF AWS RRH 4x45 FCC ID AS5BBTRX-28**



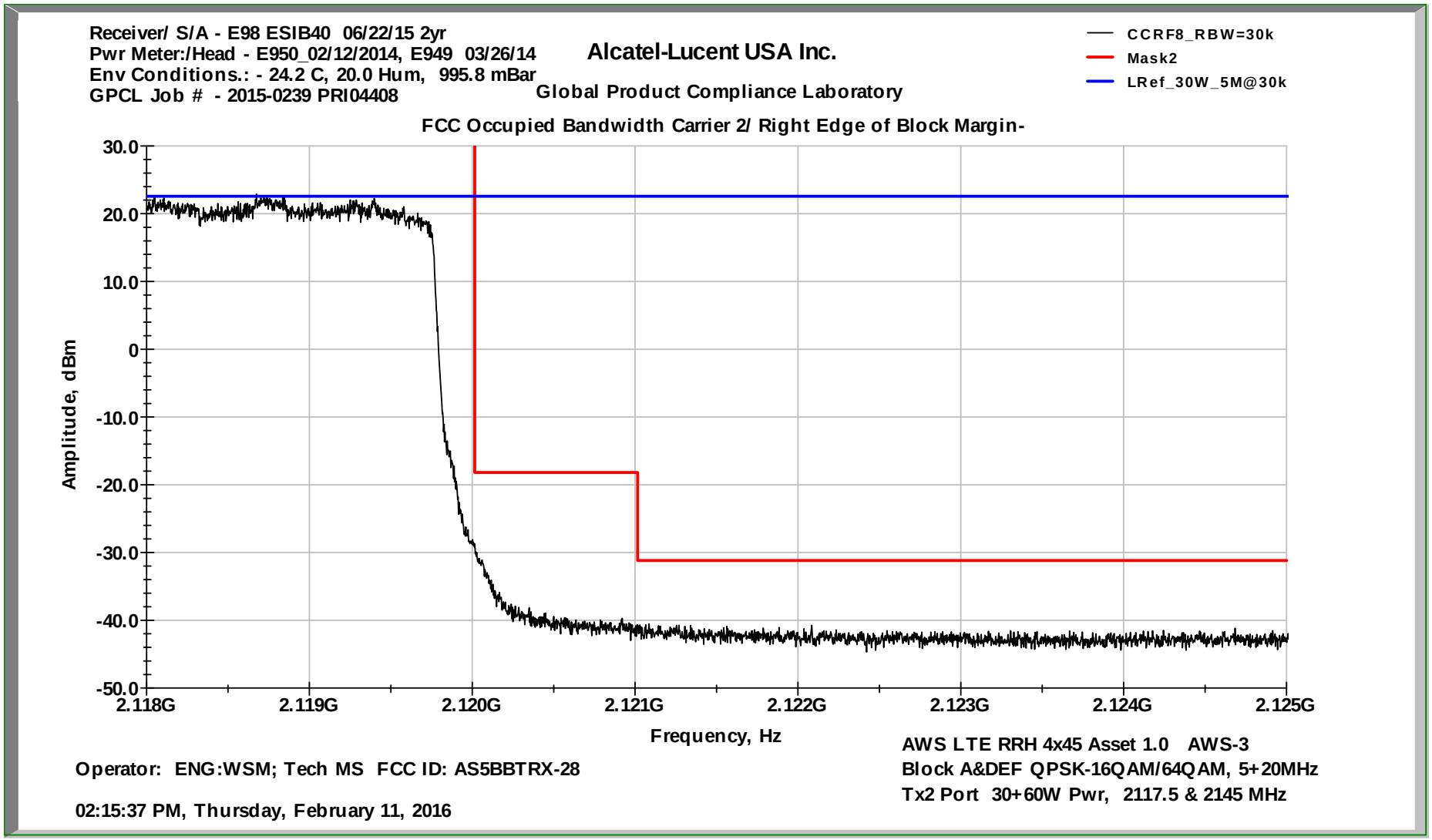
OBW Carrier 1 - Right Edge of Block **5&20 MHz Blocks A-DEF AWS RRH 4x45 FCC ID AS5BBTRX-28**



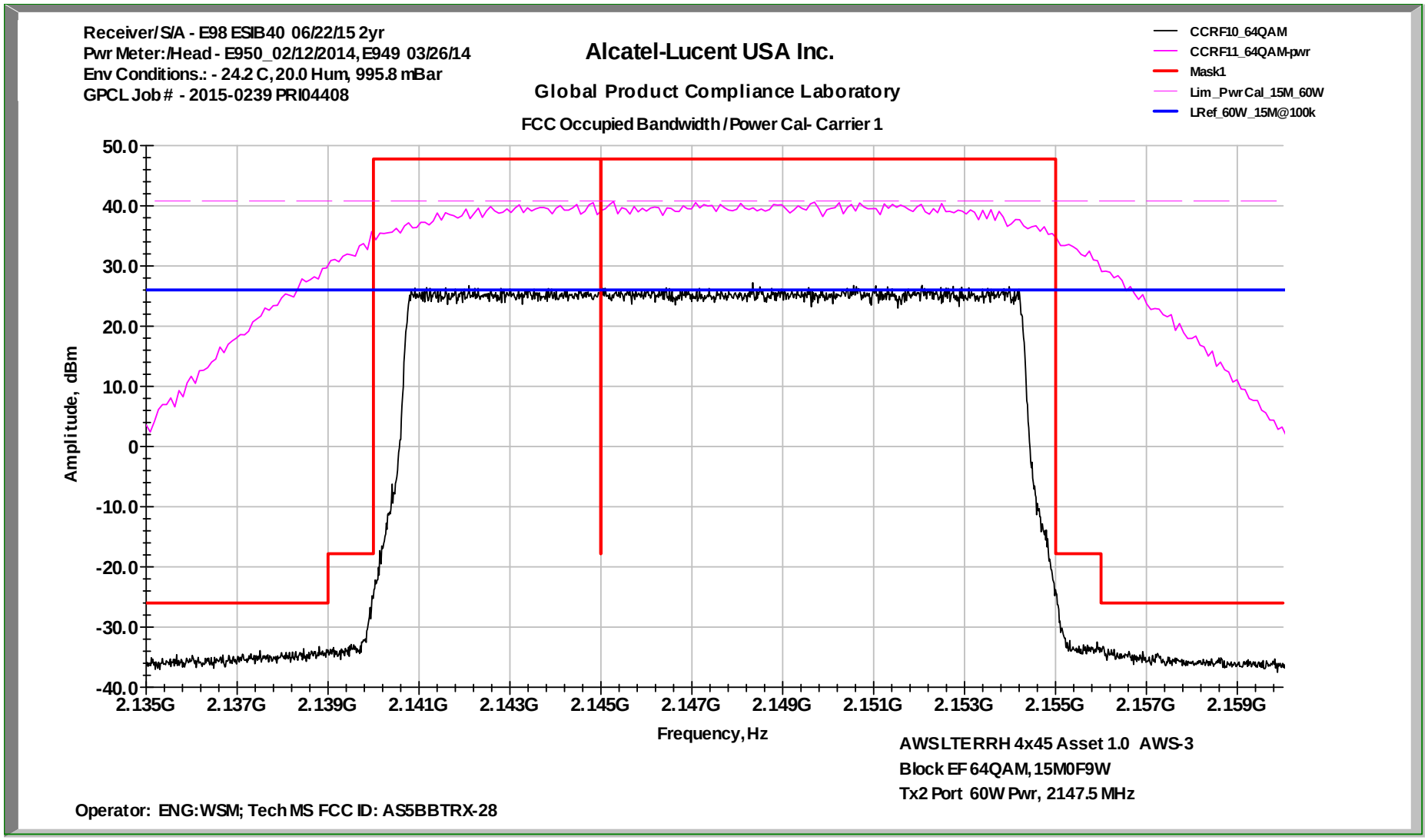
OBW Carrier 2 - Left Edge of Block **5&20 MHz Blocks A-DEF AWS RRH 4x45 FCC ID AS5BBTRX-28**



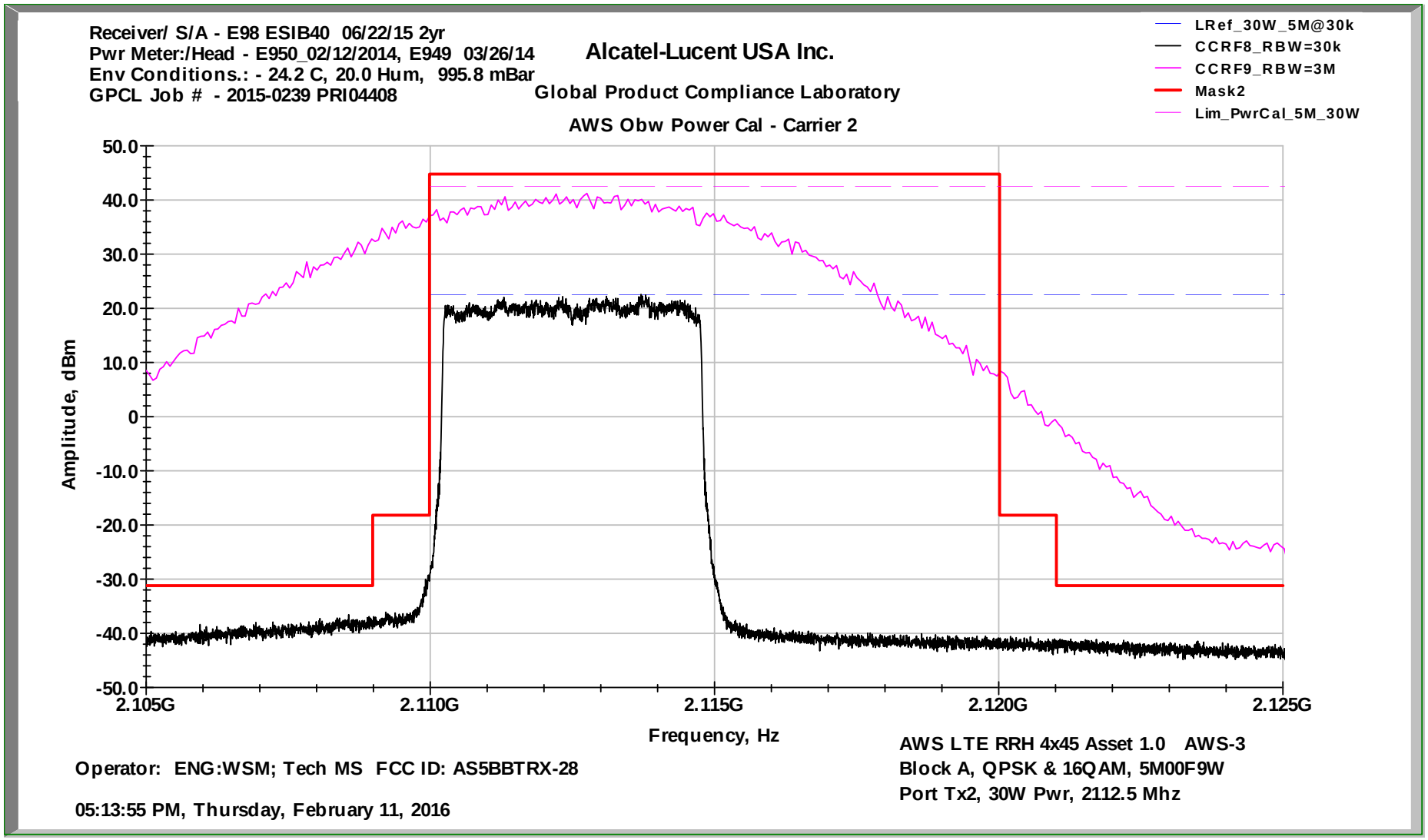
OBW Carrier 2 - Right Edge of Block **5&20 MHz Blocks A-DEF AWS RRH 4x45 FCC ID AS5BBTRX**



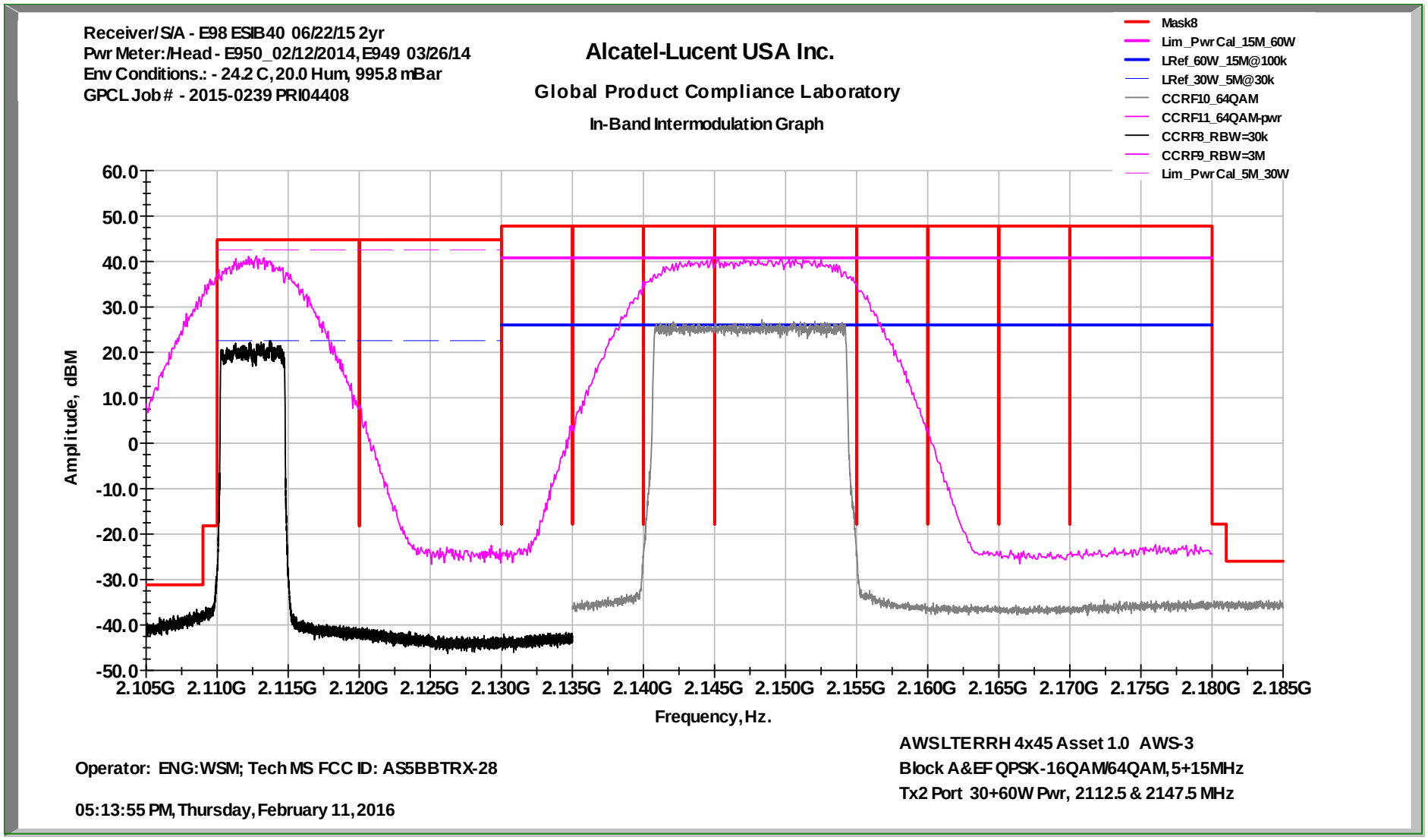
Test Configuration #17
Occupied Bandwidth/Power Cal -Carrier 1 5&15 MHz Blocks A-EF AWS RRH 4x45 FCC ID AS5BBTRX-28



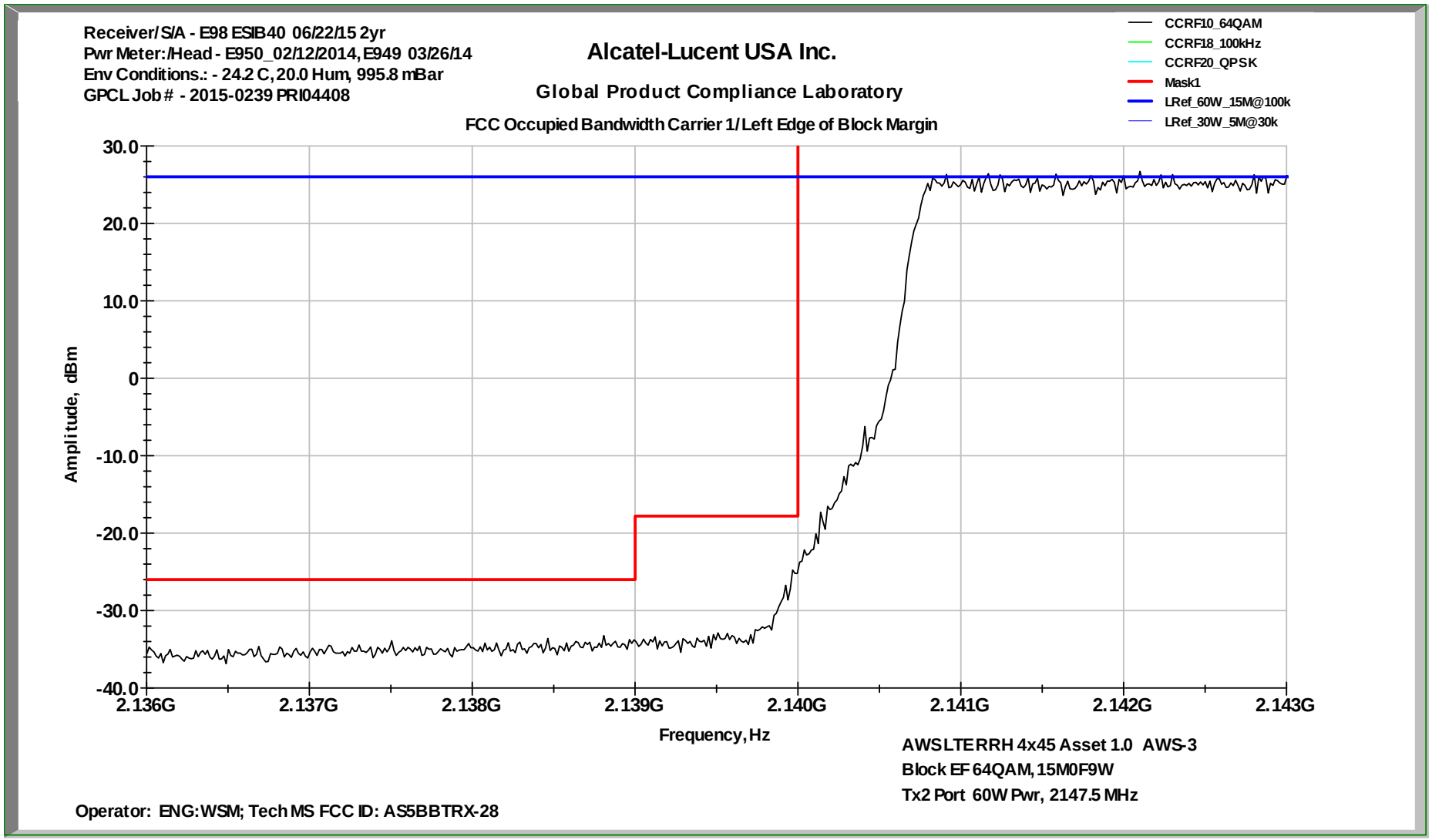
Occupied Bandwidth/Power Cal -Carrier 2 5&15 MHz Blocks A-EF AWS RRH 4x45 FCC ID AS5BBTRX-28



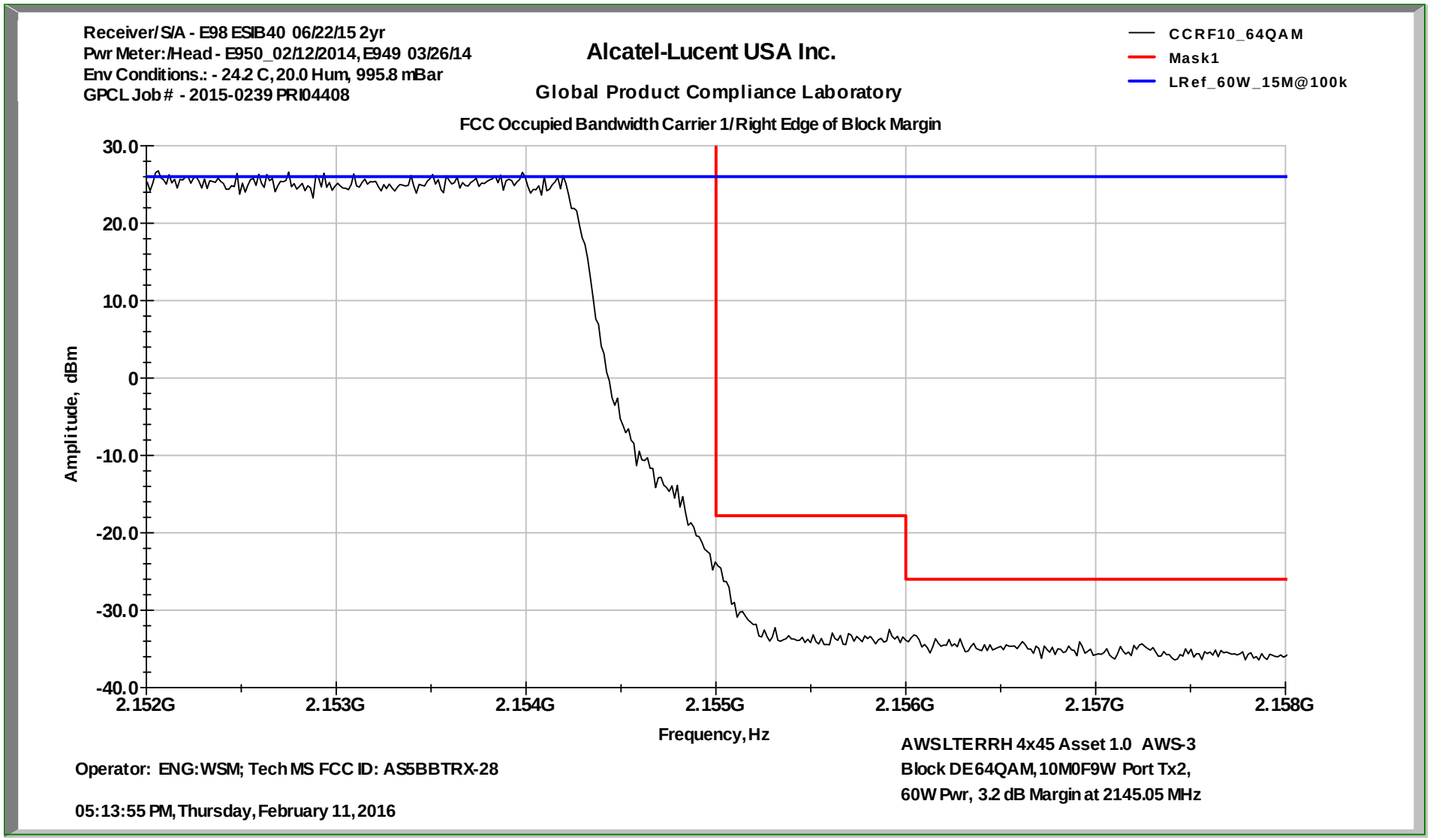
OBW InterMod. Whole Band View **5&15 MHz Blocks A-EF** **AWS RRH 4x45 FCC ID AS5BBTRX-28**

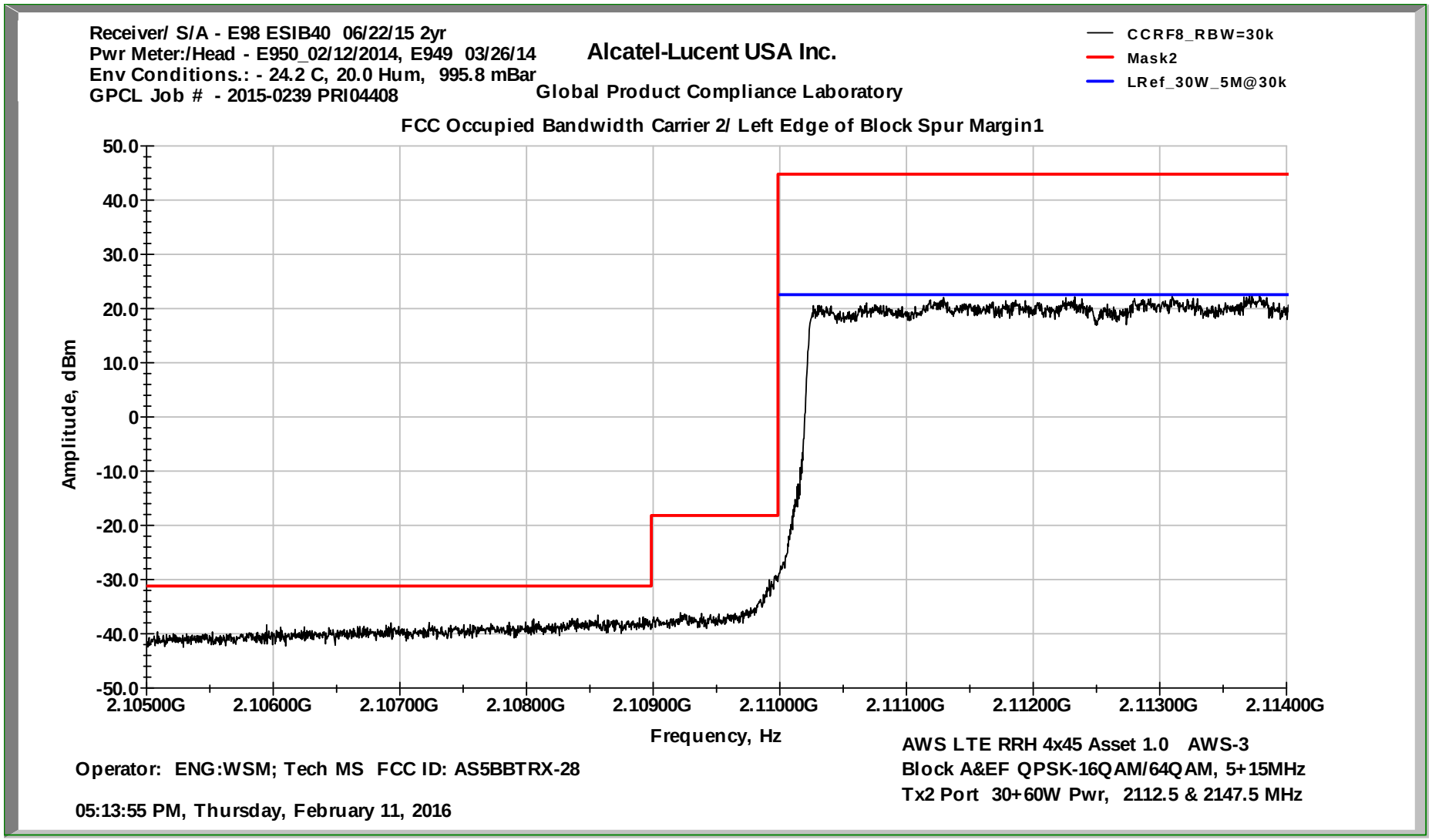


OBW Carrier 1 - Left Edge of Block **5&15 MHz Blocks A-EF** **AWS RRH 4x45 FCC ID AS5BBTRX-28**

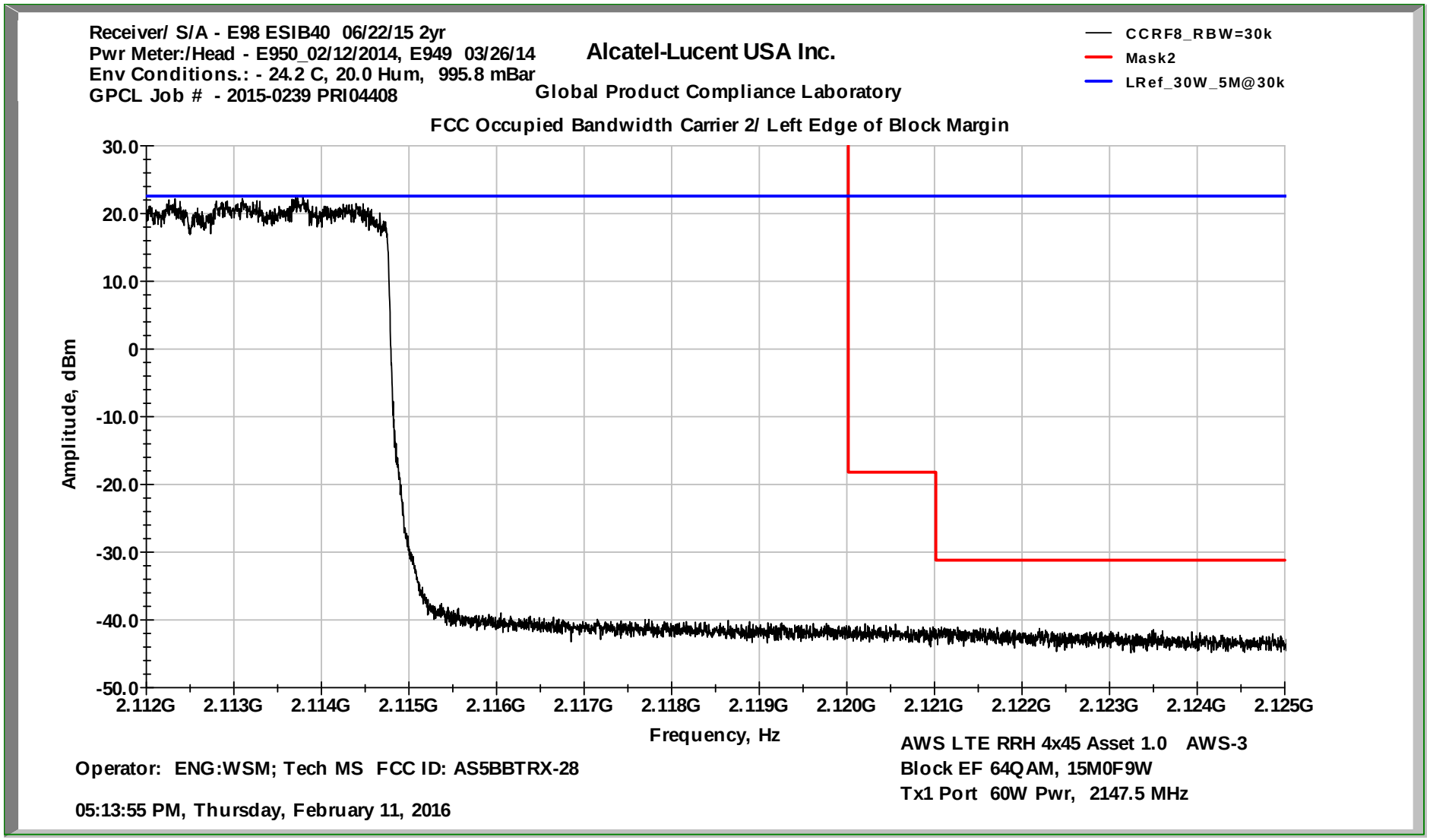


OBW Carrier 1 - Right Edge of Block **5&15 MHz Blocks A-EF** **AWS RRH 4x45 FCC ID AS5BBTRX-28**

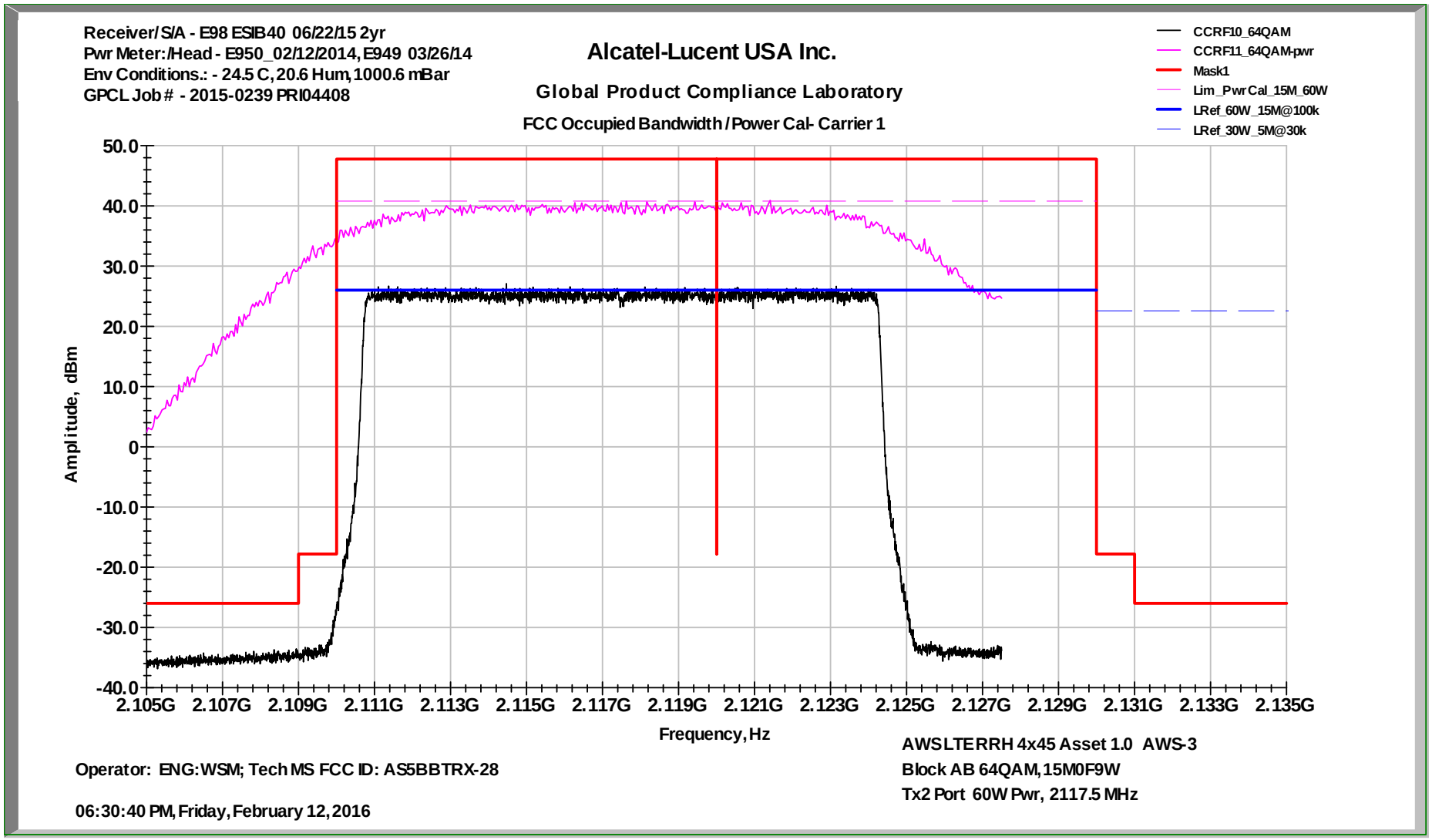



Receiver/ S/A - E98 ESIB40 06/22/15 2yr
Pwr Meter:/Head - E950_02/12/2014, E949 03/26/14
Env Conditions.: - 24.2 C, 20.0 Hum, 995.8 mBar
GPCL Job # - 2015-0239 PRI04408
Alcatel-Lucent USA Inc.
Global Product Compliance Laboratory
CCRF8_RBW=30k
Mask2
LRef_30W_5M@30k
FCC Occupied Bandwidth Carrier 2/ Left Edge of Block Spur Margin1
Amplitude, dBm
50.0
40.0
30.0
20.0
10.0
0
-10.0
-20.0
-30.0
-40.0
-50.0
2.10500G
2.10600G
2.10700G
2.10800G
2.10900G
2.11000G
2.11100G
2.11200G
2.11300G
2.11400G
Frequency, Hz
Operator: ENG:WSM; Tech MS FCC ID: AS5BBTRX-28
05:13:55 PM, Thursday, February 11, 2016
AWS LTE RRH 4x45 Asset 1.0 AWS-3
Block A&EF QPSK-16QAM/64QAM, 5+15MHz
Tx2 Port 30+60W Pwr, 2112.5 & 2147.5 MHz

OBW Carrier 2 - Right Edge of Block **5&15 MHz Blocks A-EF AWS RRH 4x45 FCC ID AS5BBTRX**



Test Configuration #18
Occupied Bandwidth/Power Cal -Carrier 1 15&5 MHz Blocks AB-C AWS RRH 4x45 FCC ID AS5BBTRX-28



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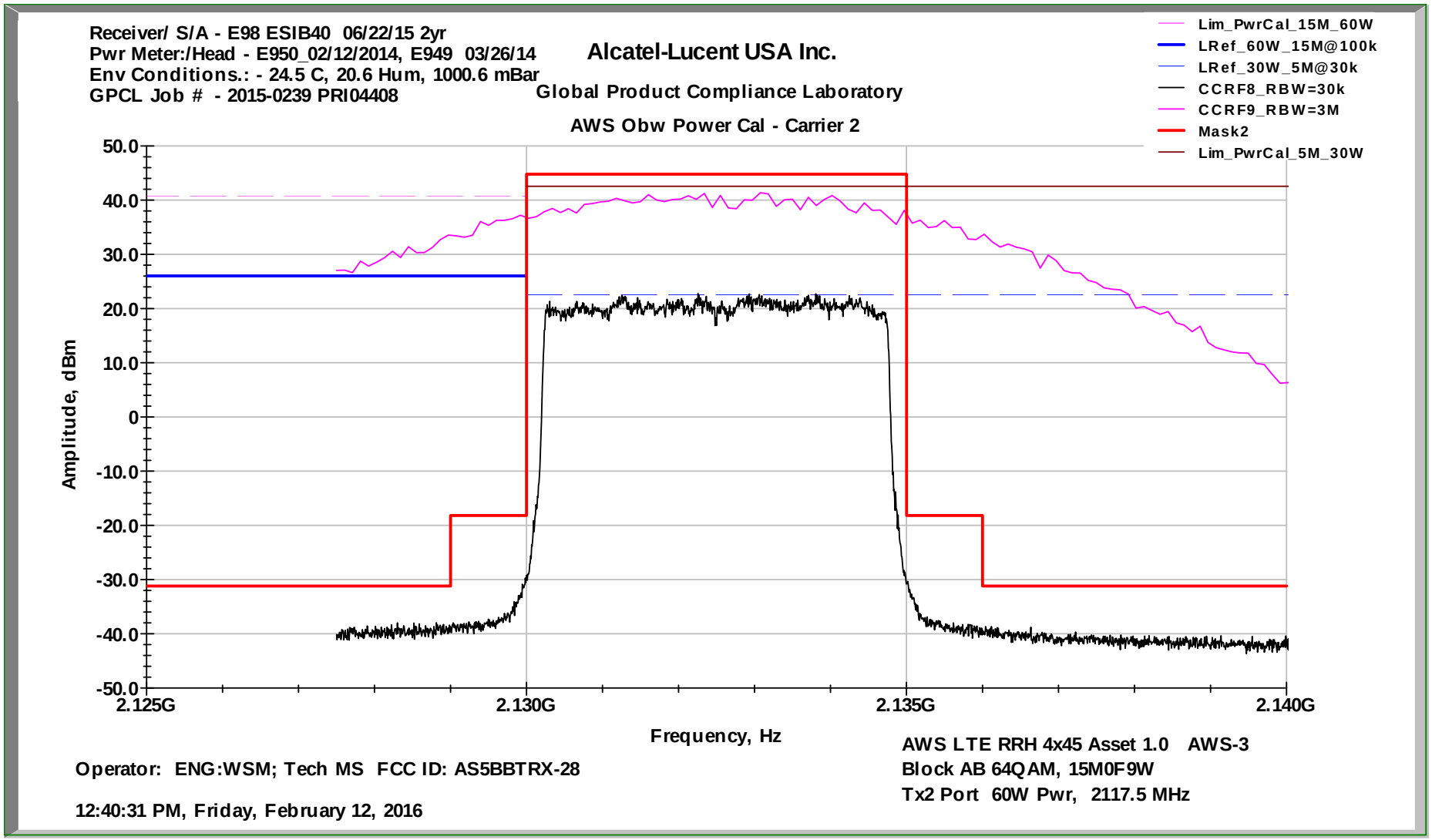
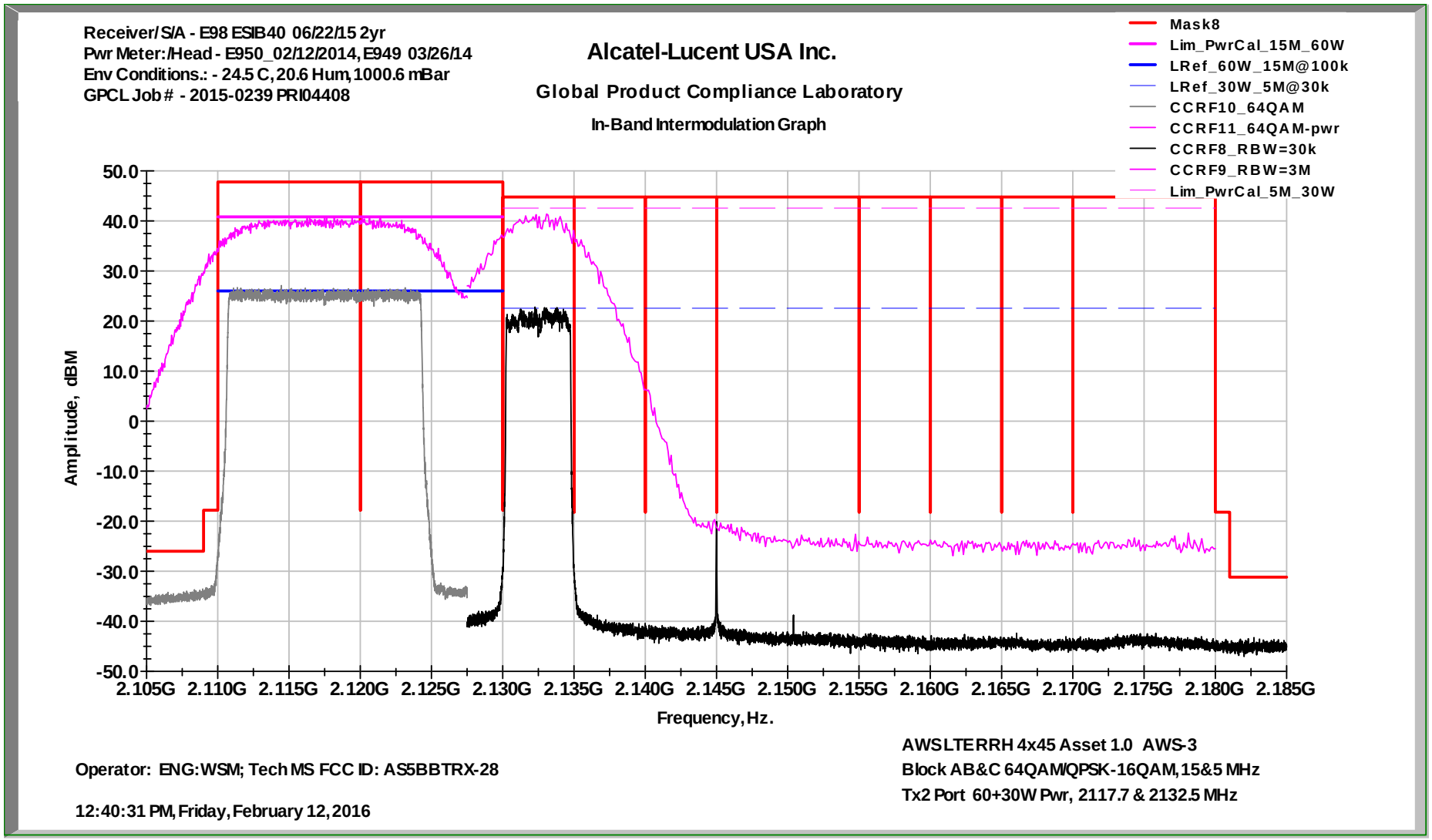
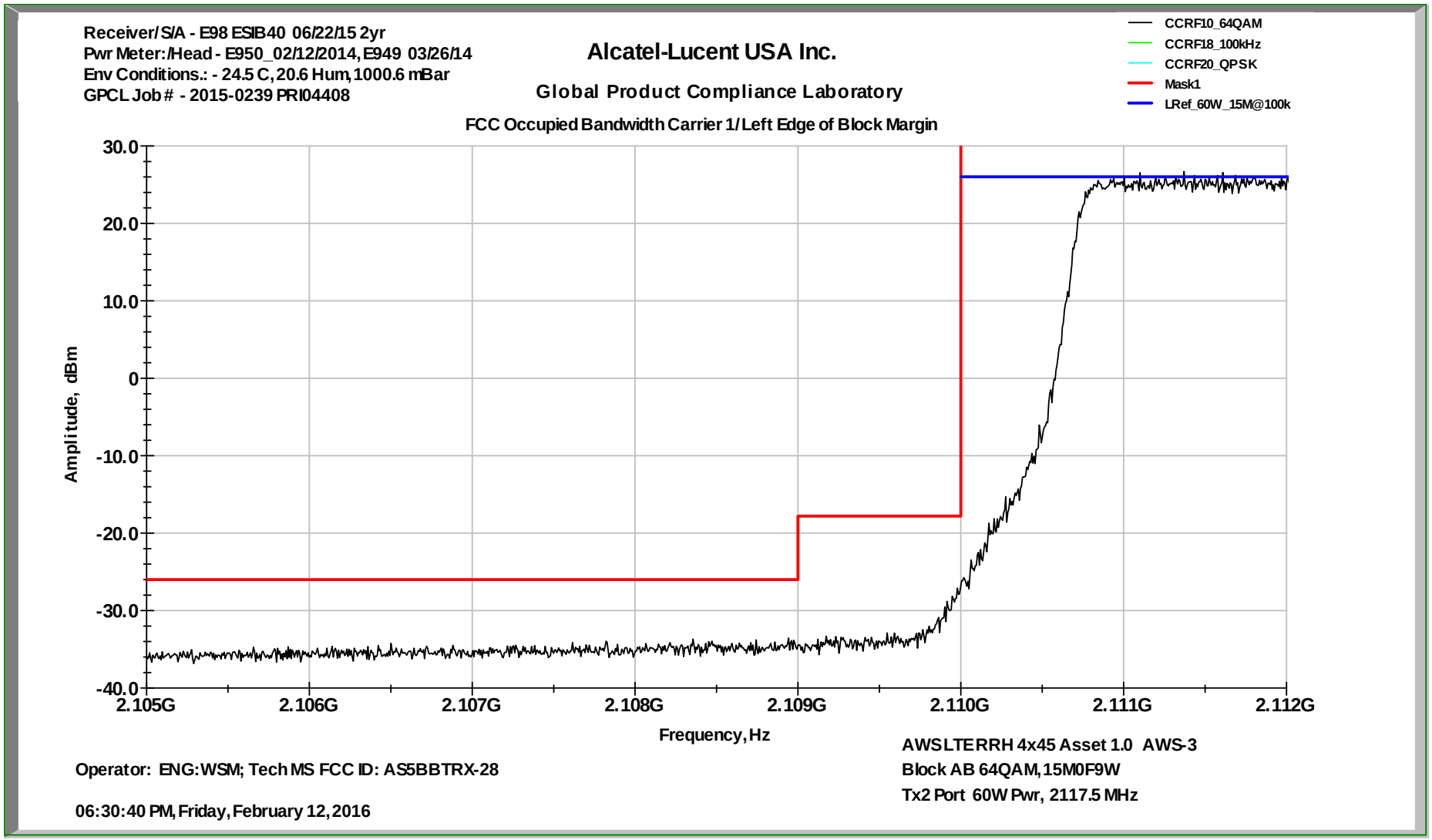


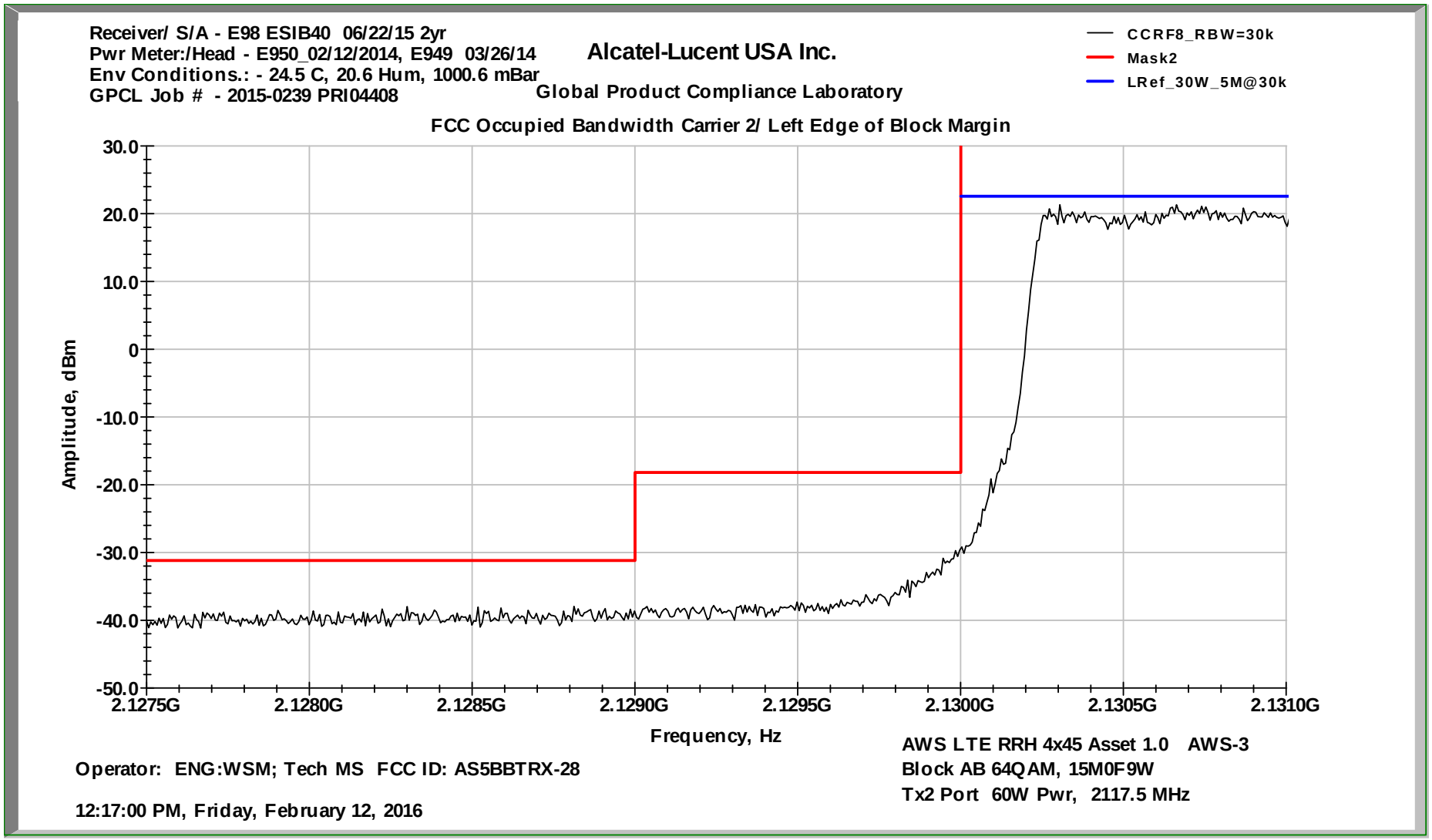
OBW InterMod. Whole Band View **15&5 MHz Blocks AB-C** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



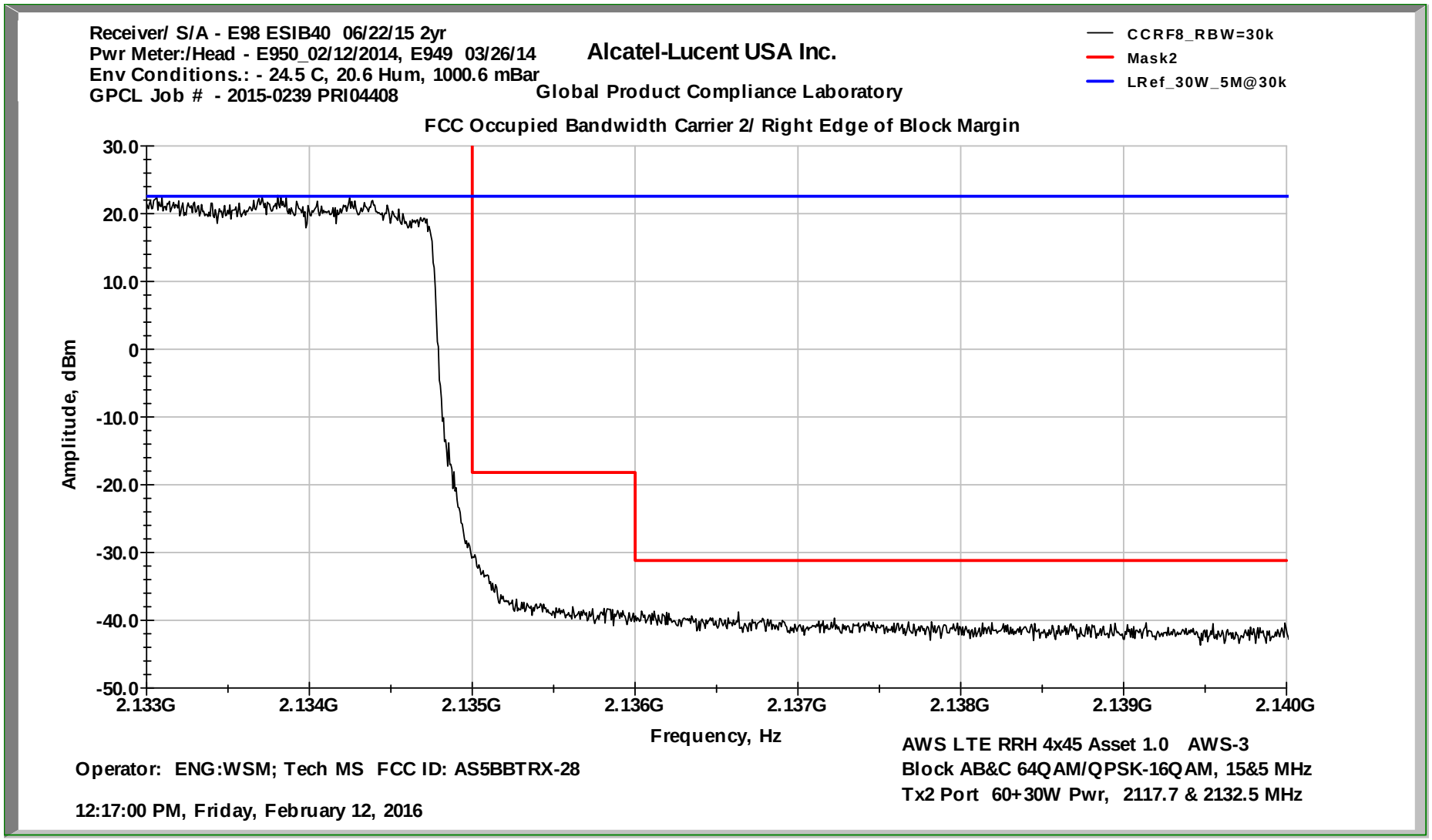
OBW Carrier 1 - Left Edge of Block 15&5 MHz Blocks AB-C AWS RRH 4x45 FCC ID AS5BBTRX-28



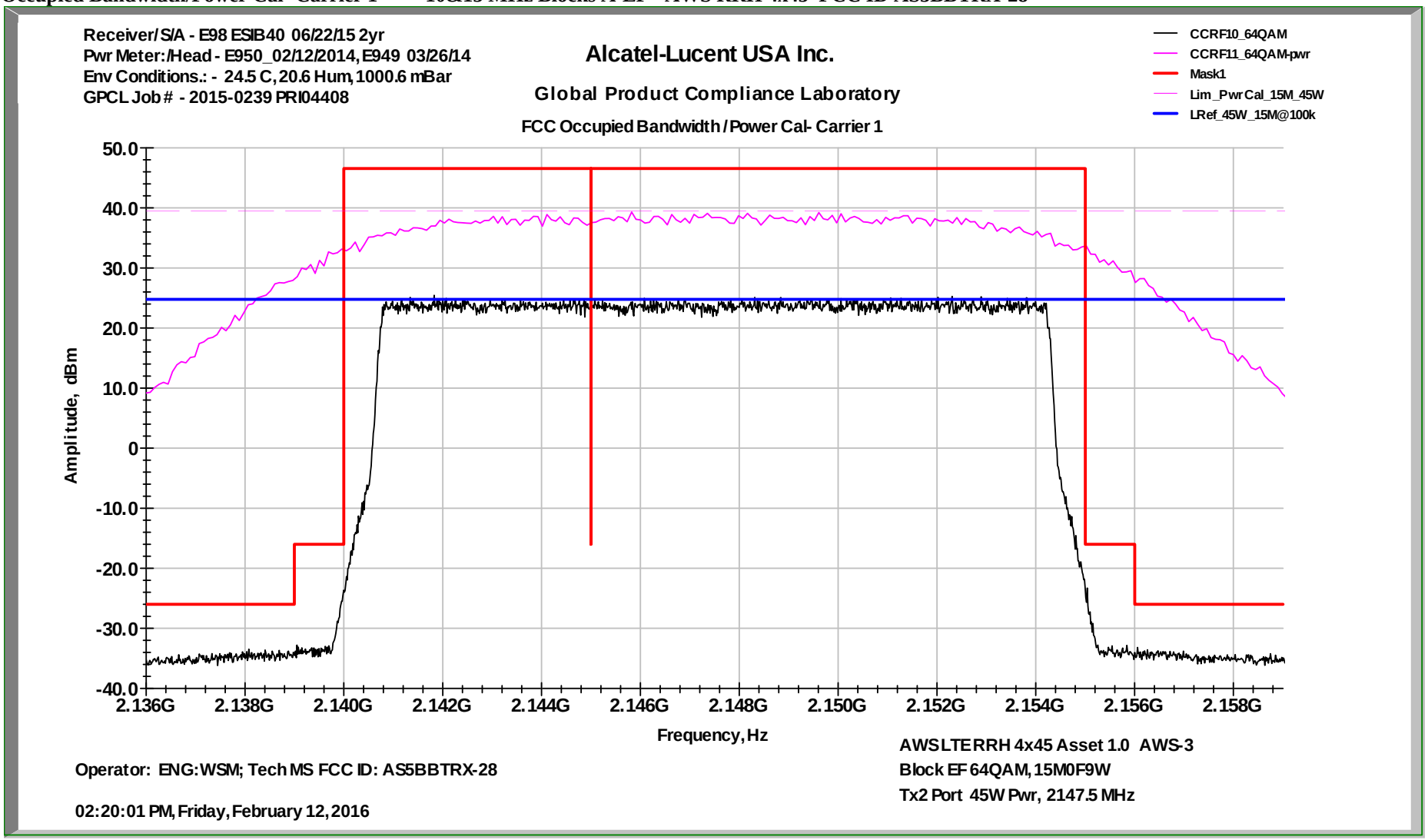
OBW Carrier 2 - Left Edge of Block **15&5 MHz Blocks AB-C** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



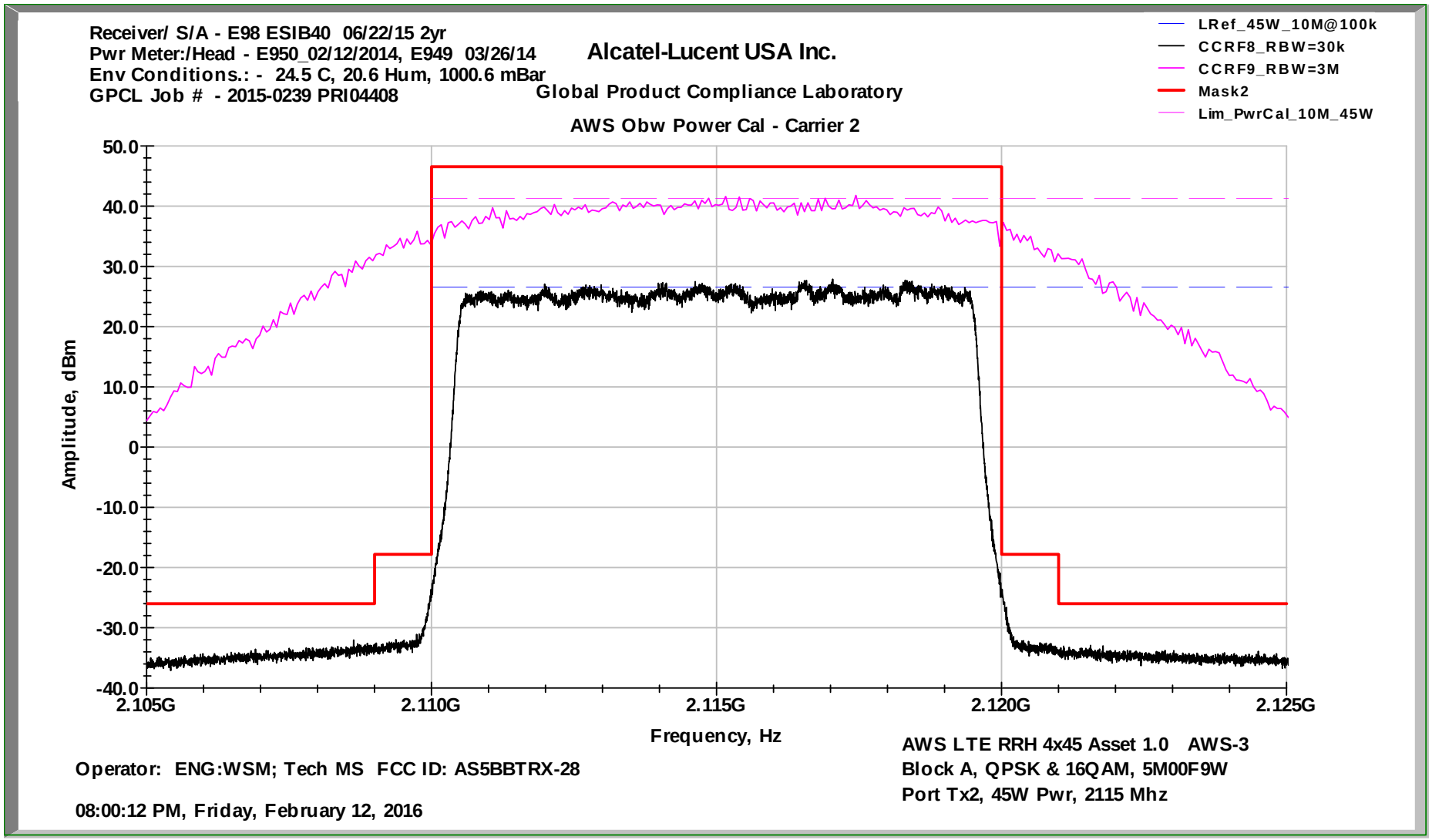
OBW Carrier 2 - Right Edge of Block **15&5 MHz Blocks AB-C AWS RRH 4x45 FCC ID AS5BBTRX**



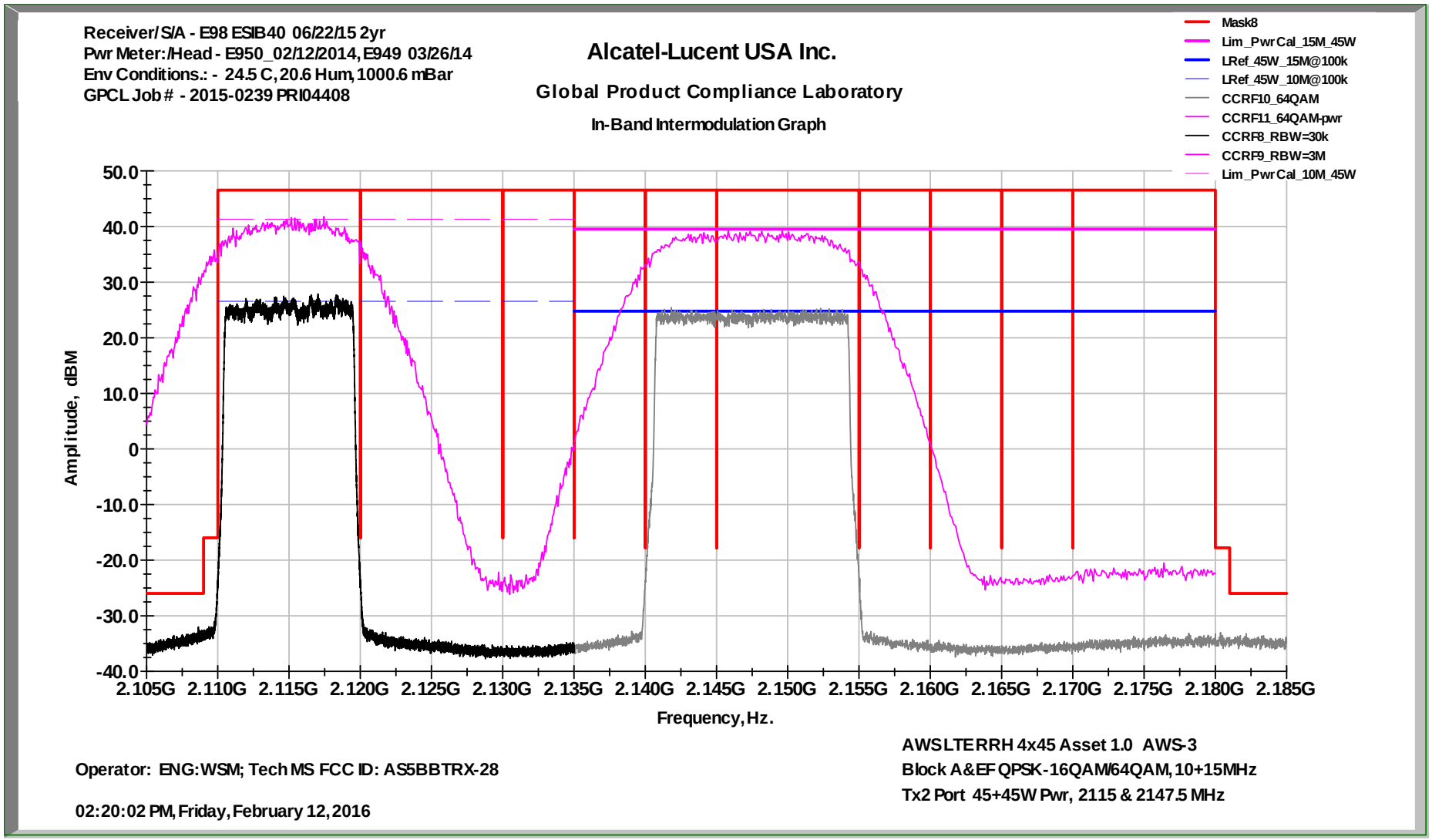
Test Configuration #19
Occupied Bandwidth/Power Cal -Carrier 1 10&15 MHz Blocks A-EF AWS RRH 4x45 FCC ID AS5BBTRX-28



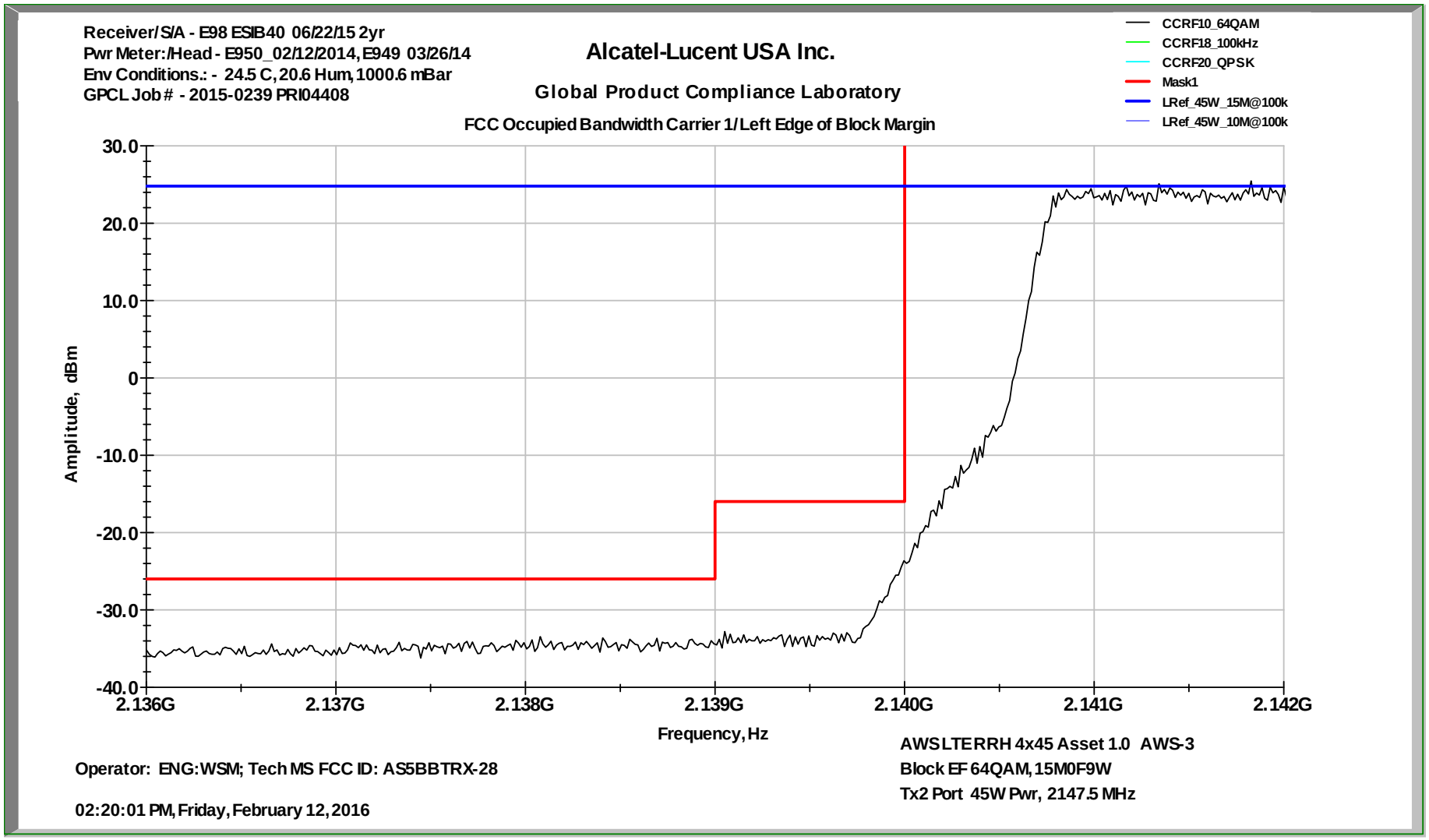
Occupied Bandwidth/Power Cal -Carrier 2 10&15 MHz Blocks A-EF AWS RRH 4x45 FCC ID AS5BBTRX-28



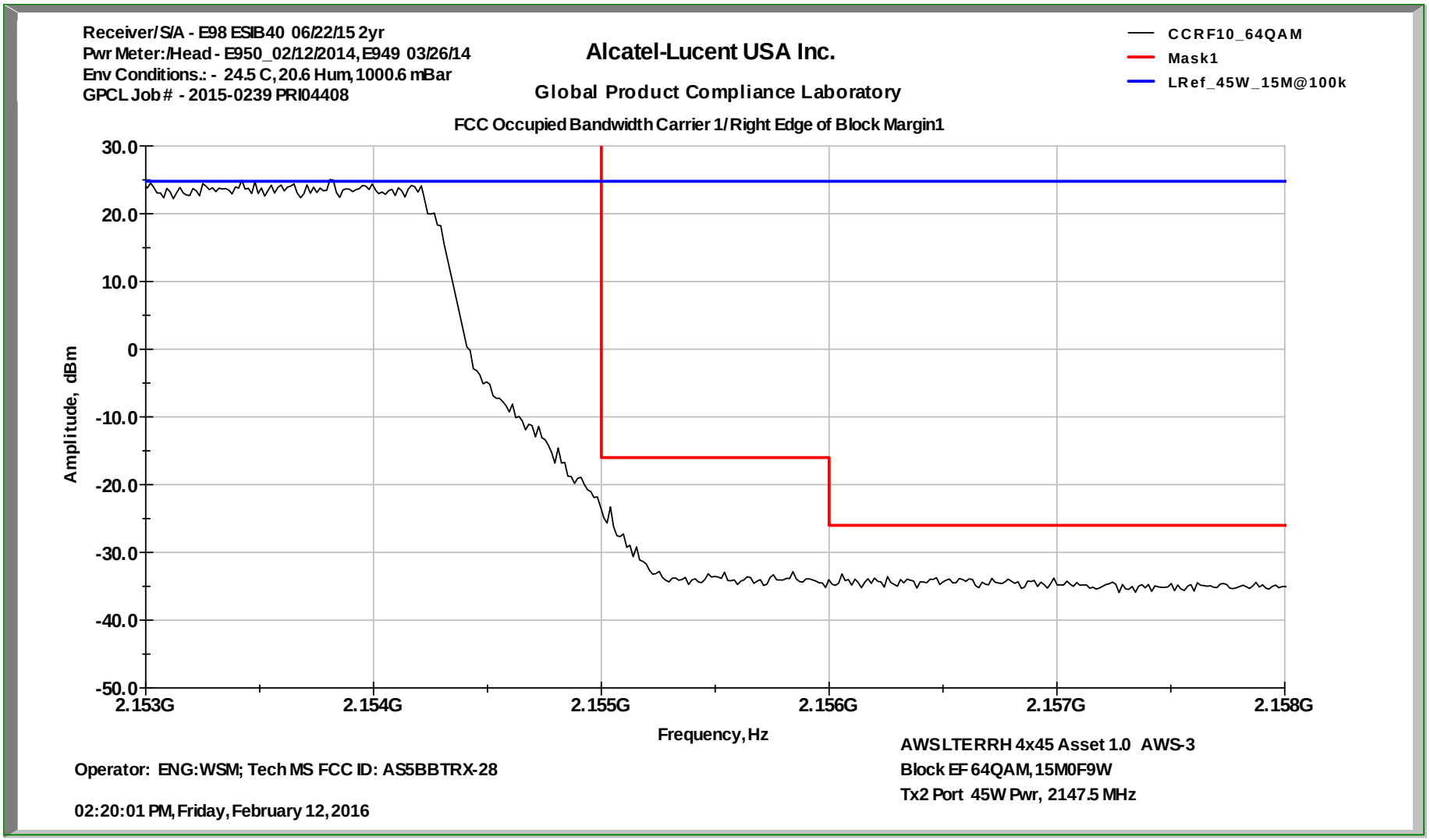
OBW InterMod. Whole Band View **10&15 MHz Blocks A-EF AWS RRH 4x45 FCC ID AS5BBTRX-28**



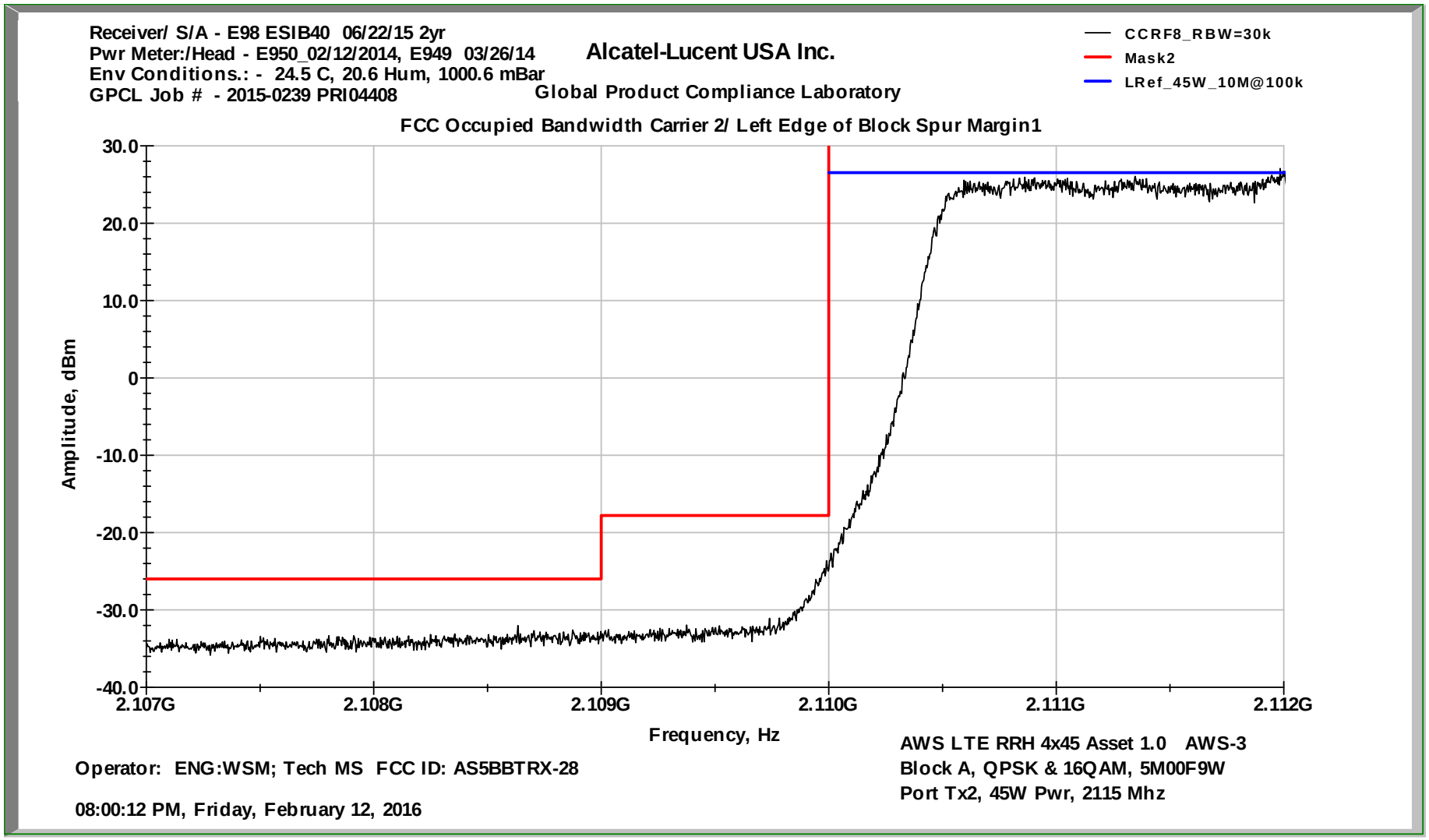
OBW Carrier 1 - Left Edge of Block **10&15 MHz Blocks A-EF AWS RRH 4x45 FCC ID AS5BBTRX-28**



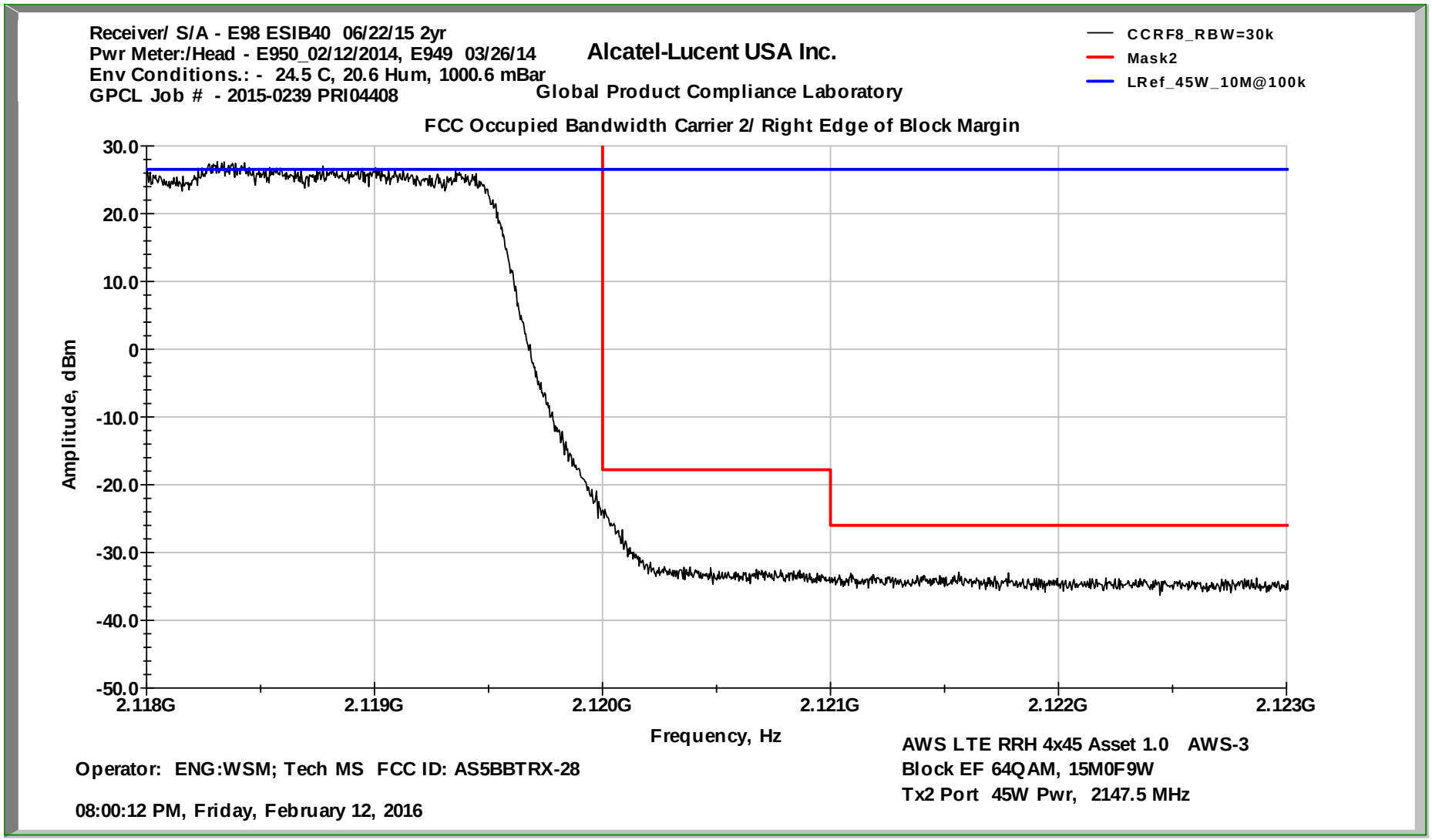
OBW Carrier 1 - Right Edge of Block **10&15 MHz Blocks A-EF AWS RRH 4x45 FCC ID AS5BBTRX-28**



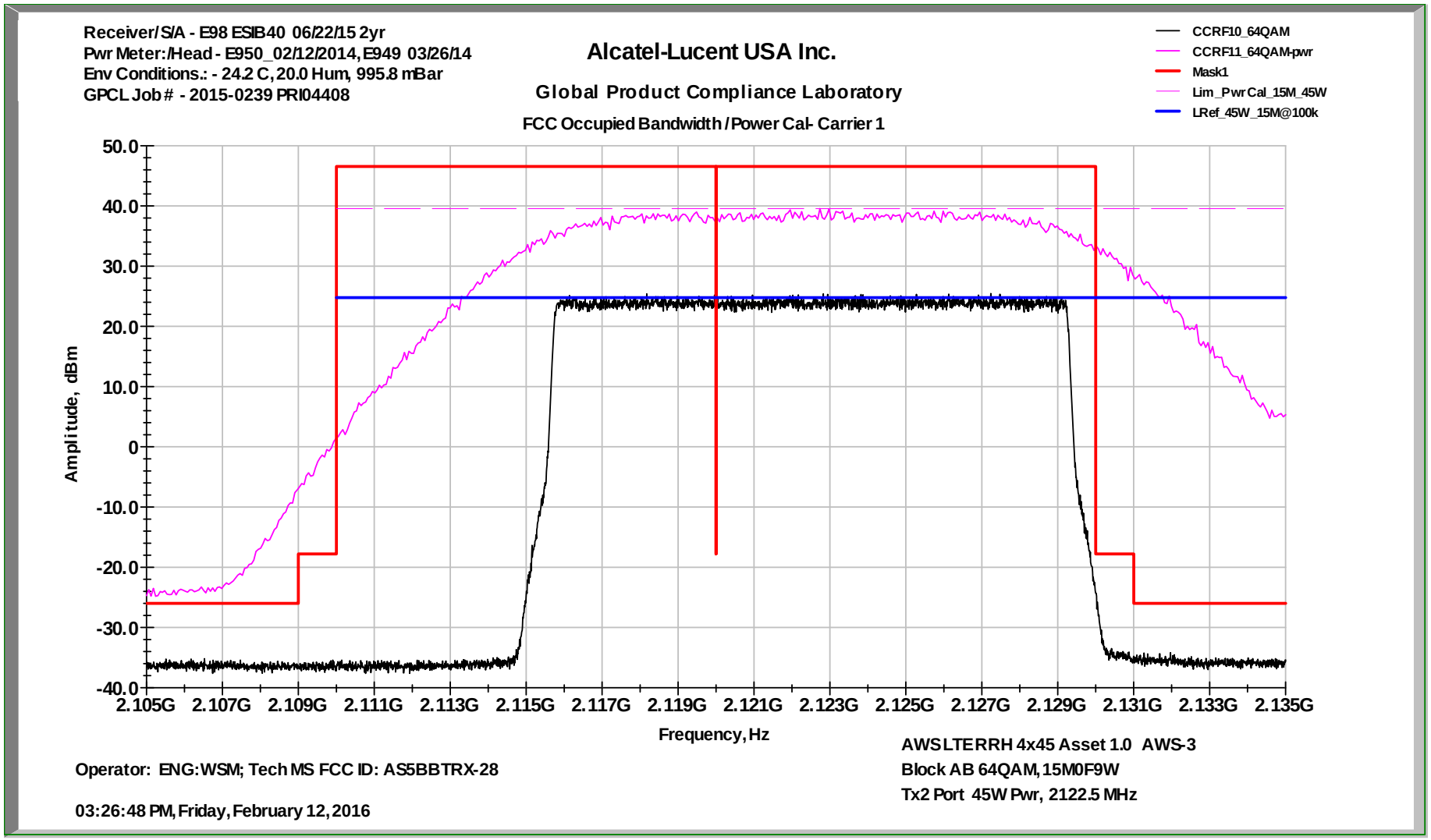
OBW Carrier 2 - Left Edge of Block **10&15 MHz Blocks A-EF AWS RRH 4x45 FCC ID AS5BBTRX-28**



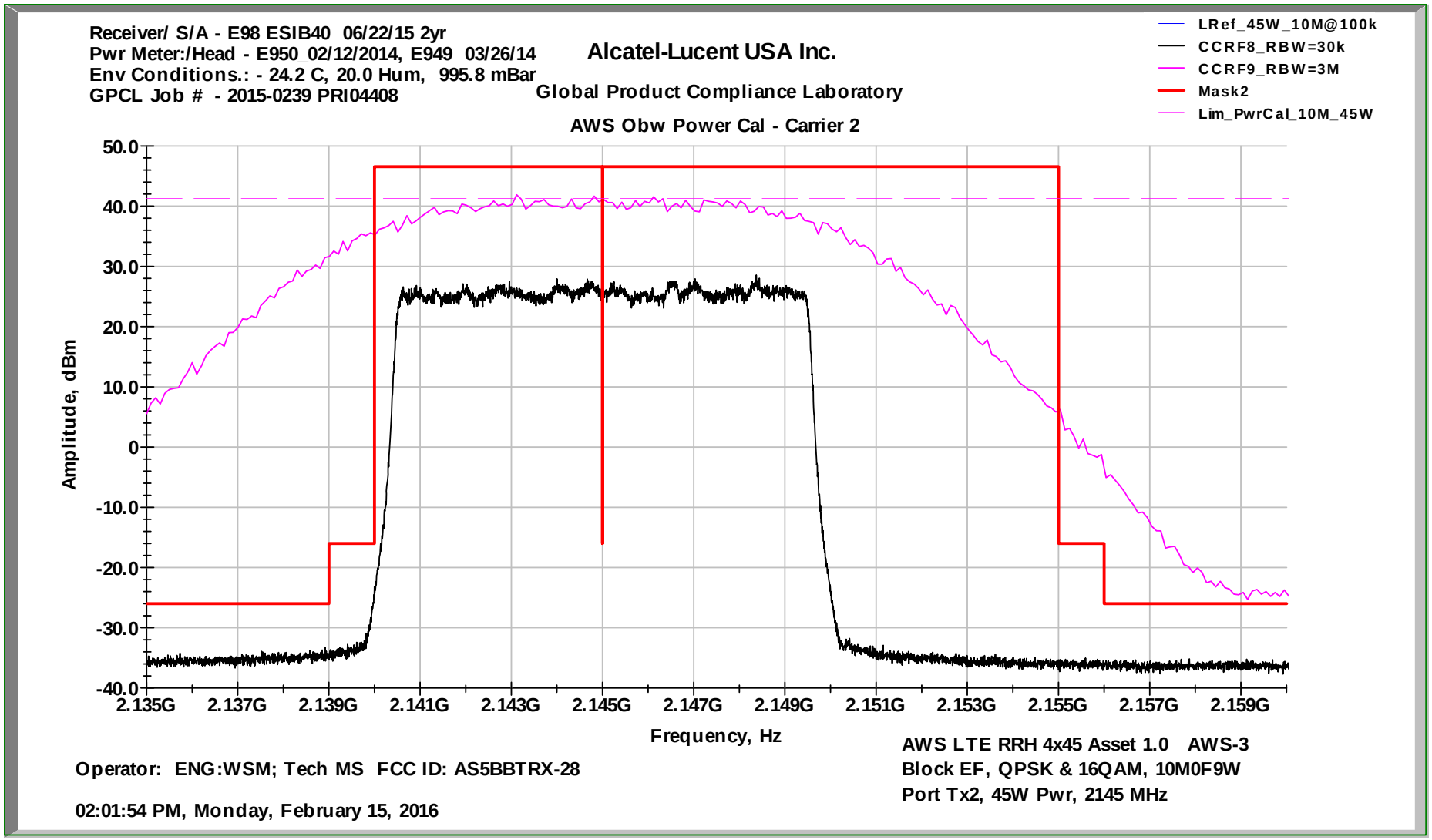
OBW Carrier 2 - Right Edge of Block **10&15 MHz Blocks A-EF AWS RRH 4x45 FCC ID AS5BBTRX**



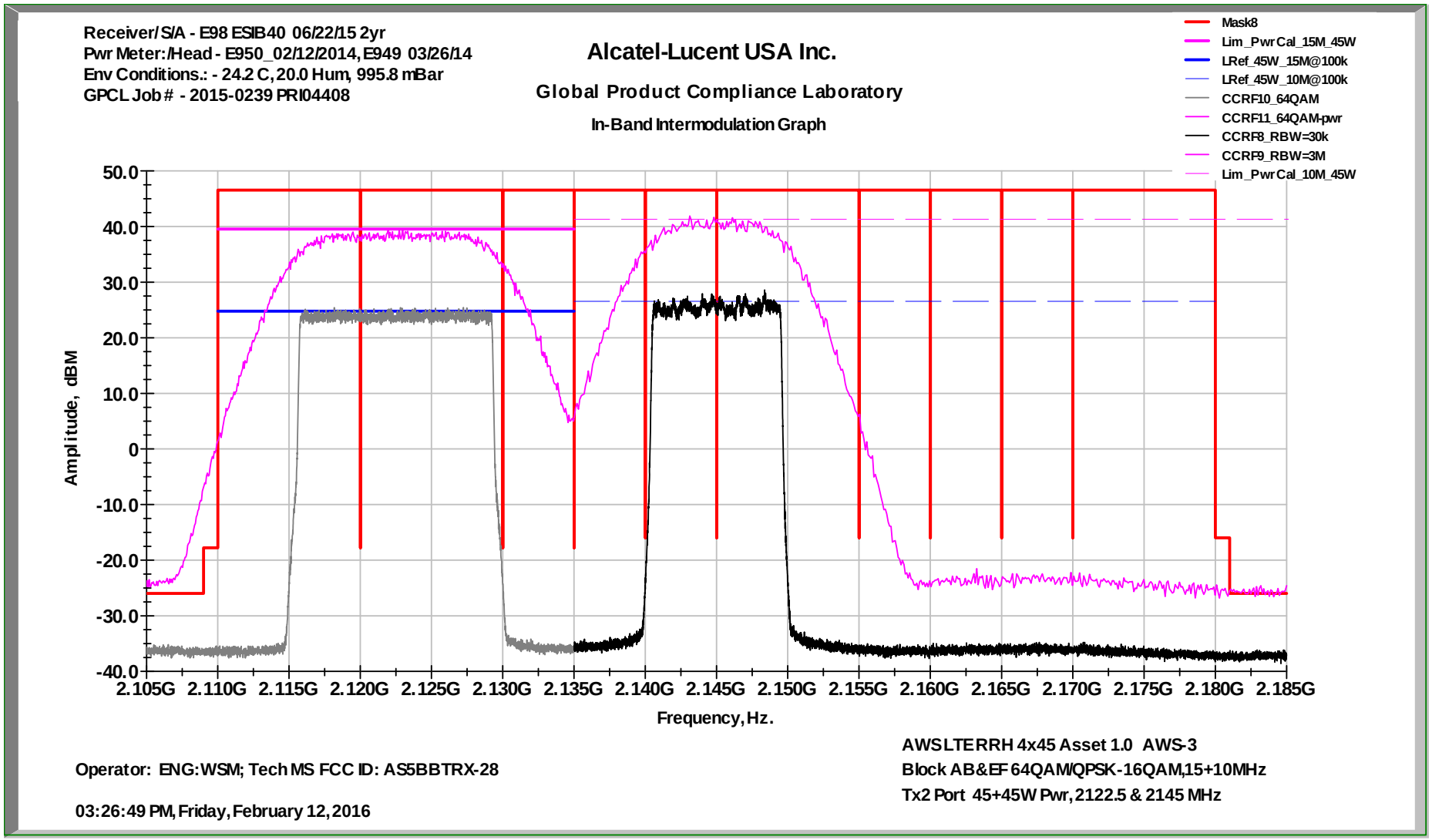
Test Configuration #20
Occupied Bandwidth/Power Cal -Carrier 1 15&10 MHz Blocks AB-F AWS RRH 4x45 FCC ID AS5BBTRX-28



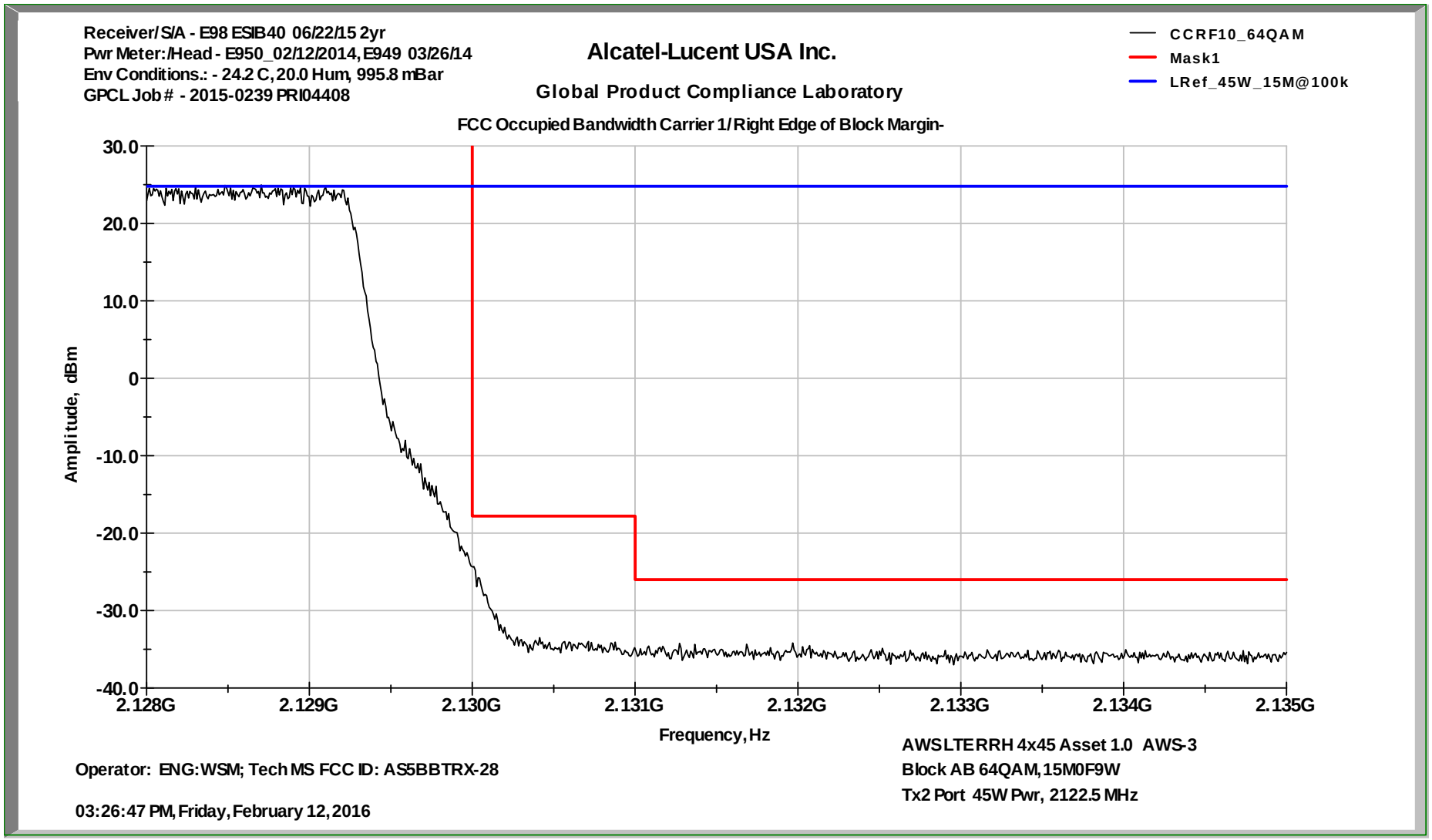
Occupied Bandwidth/Power Cal -Carrier 2 15&10 MHz Blocks AB-F AWS RRH 4x45 FCC ID AS5BBTRX-28



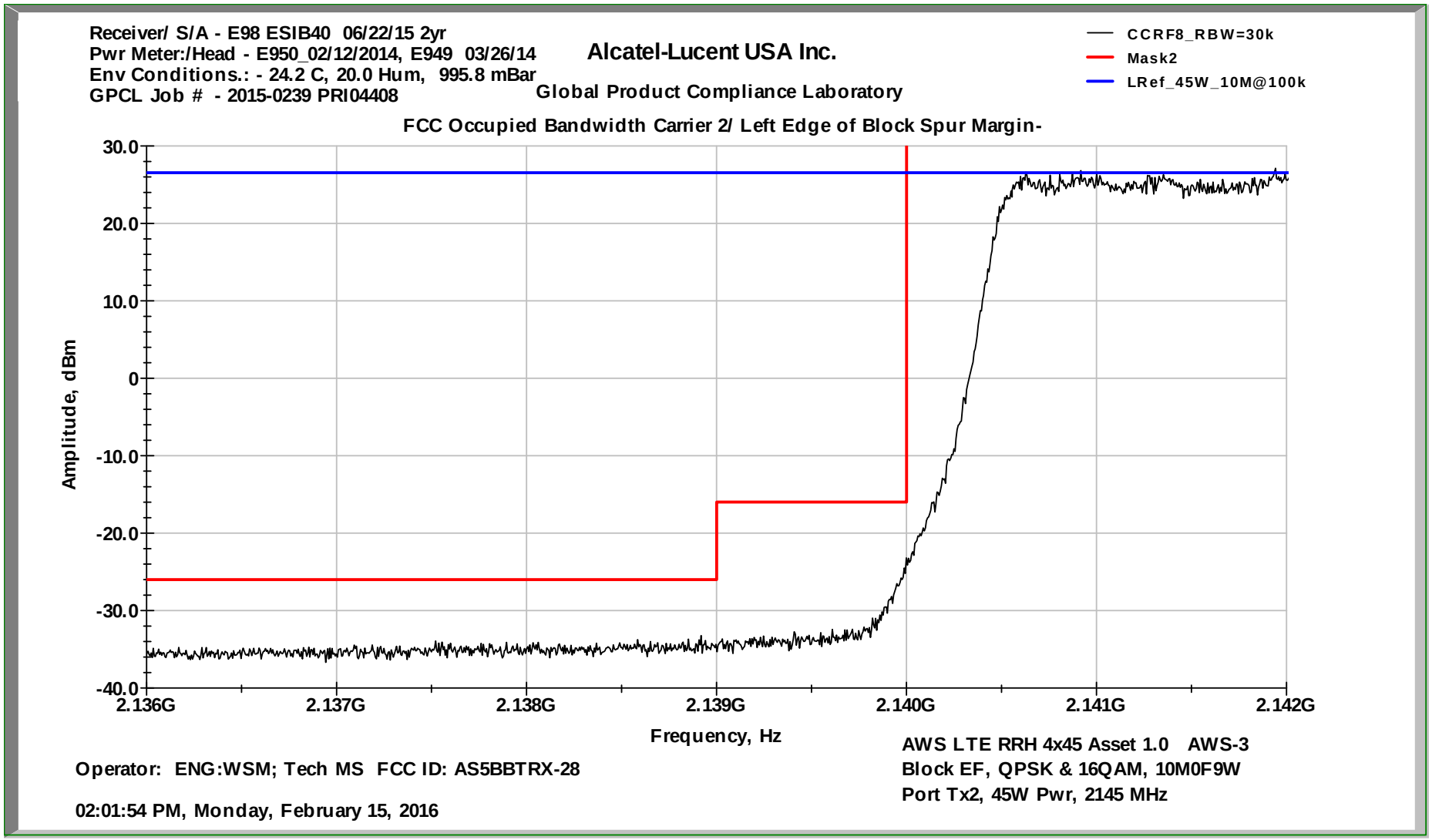
OBW InterMod. Whole Band View **15&10 MHz Blocks AB-F AWS RRH 4x45 FCC ID AS5BBTRX-28**



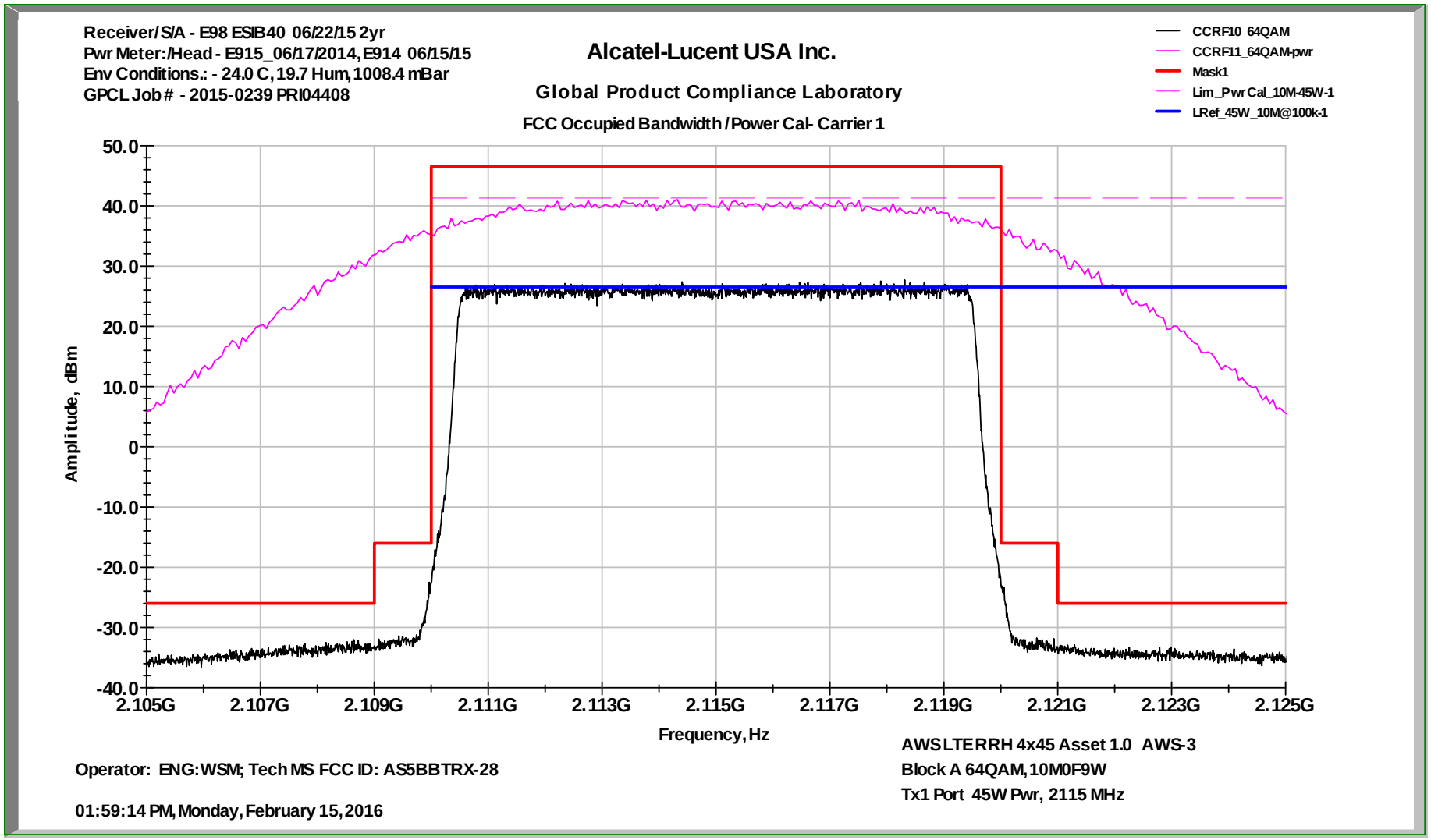
OBW Carrier 1 - Right Edge of Block 15&10 MHz Blocks AB-F AWS RRH 4x45 FCC ID AS5BBTRX-28



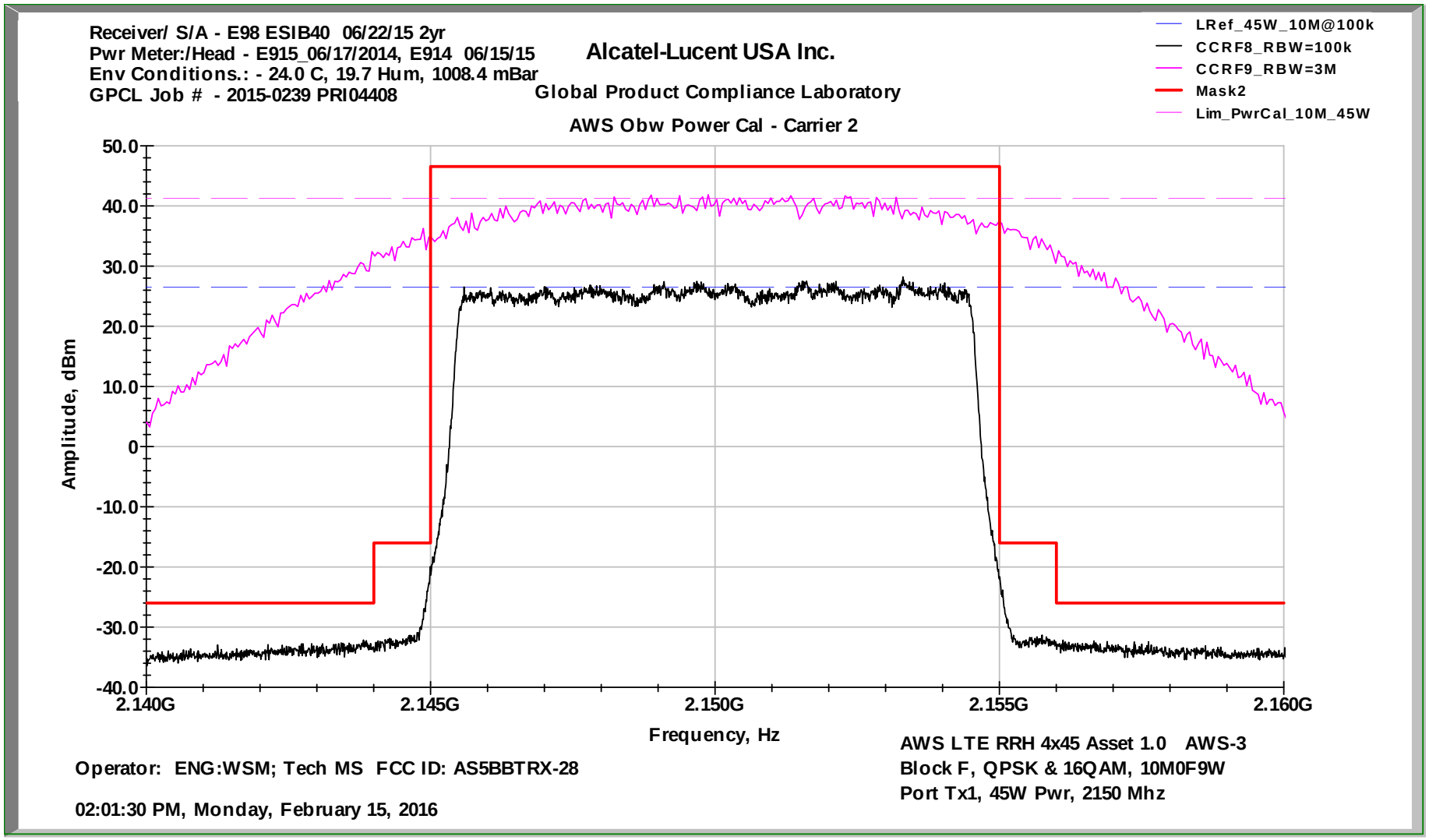
OBW Carrier 2 - Left Edge of Block **15&10 MHz Blocks AB-F AWS RRH 4x45 FCC ID AS5BBTRX-28**



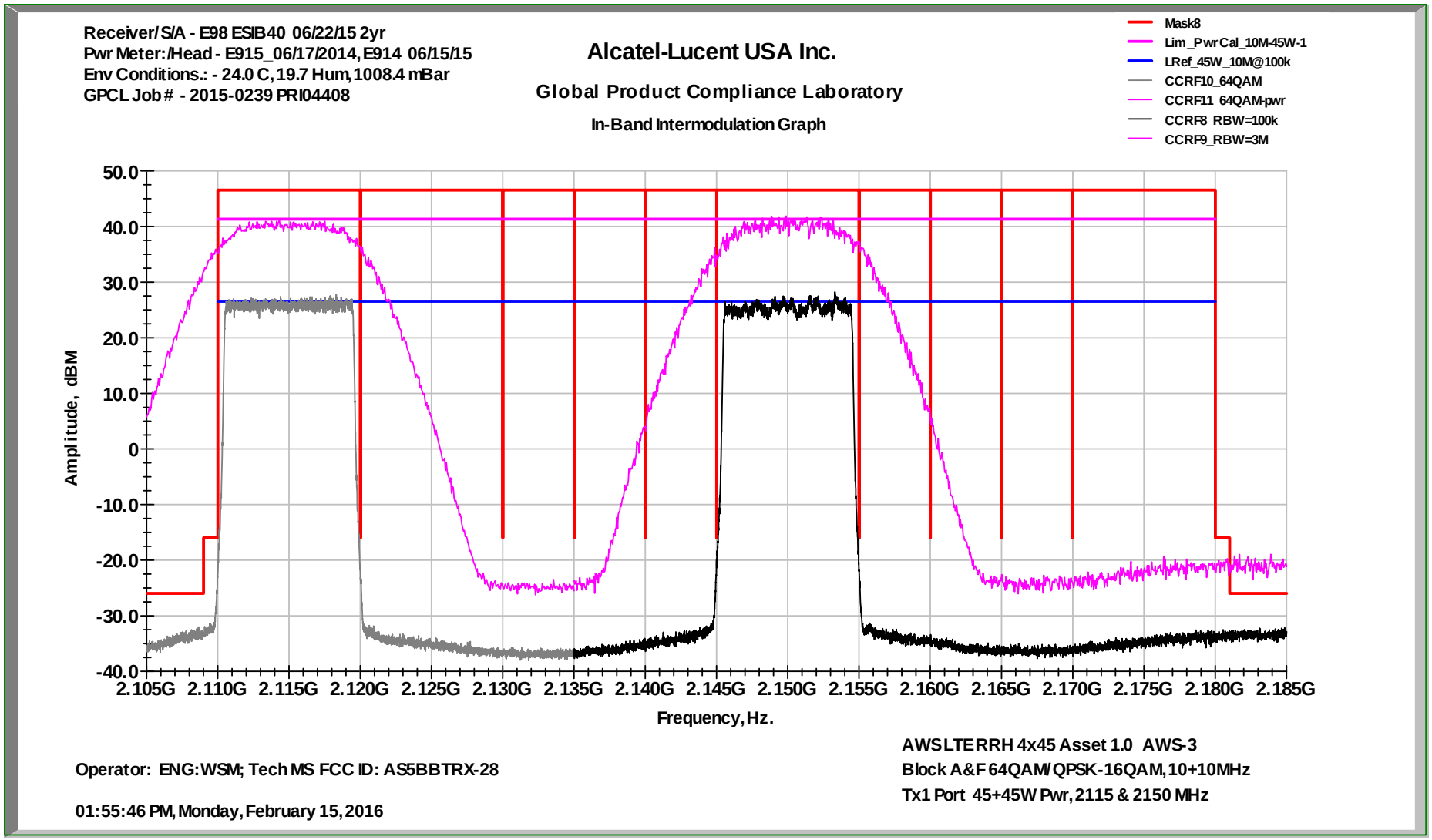
Test Configuration #21
Occupied Bandwidth/Power Cal -Carrier 1 10&10 MHz Blocks A-F AWS RRH 4x45 FCC ID AS5BBTRX-28



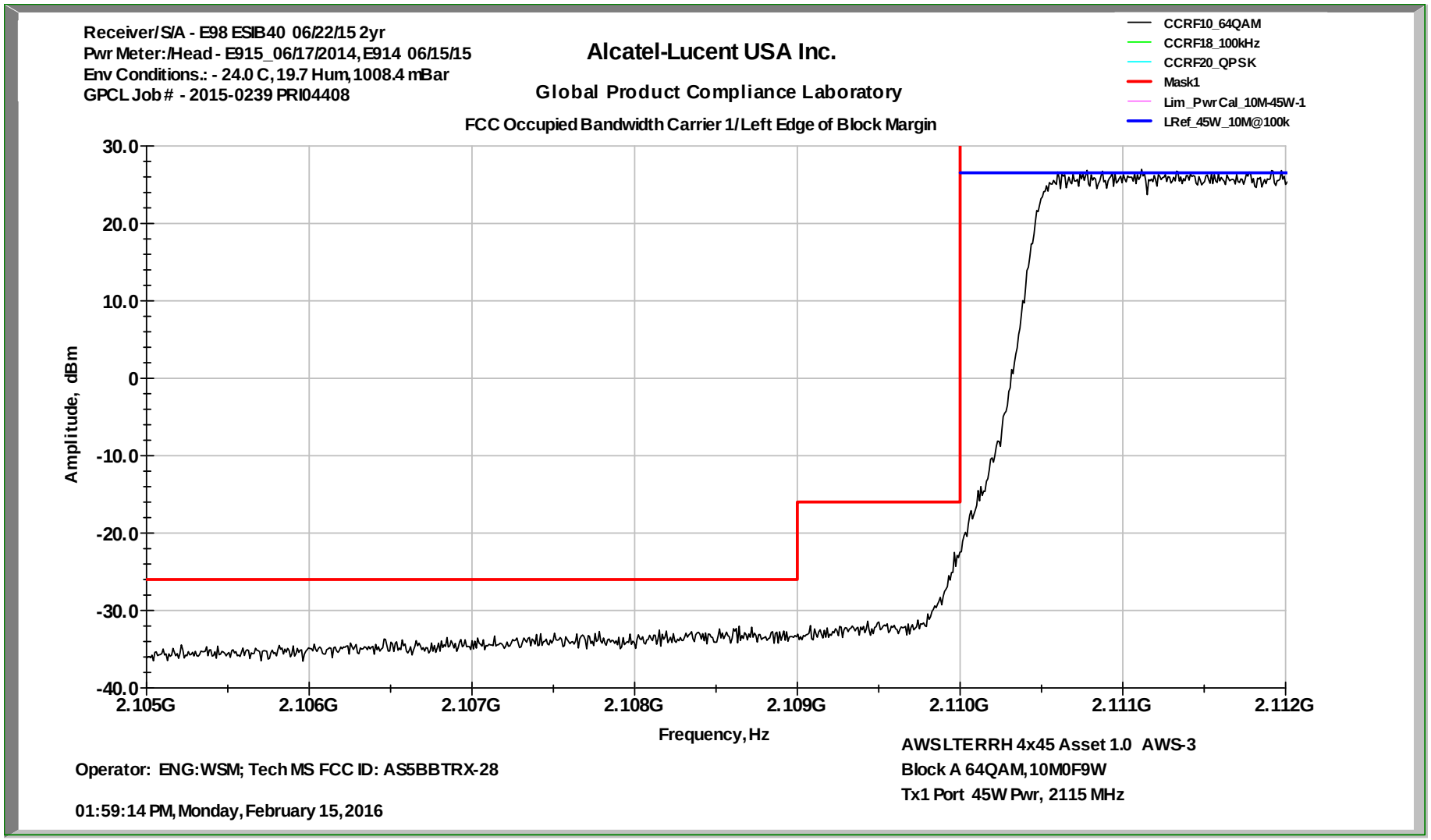
Occupied Bandwidth/Power Cal -Carrier 2 10&10 MHz Blocks A-F AWS RRH 4x45 FCC ID AS5BBTRX-28



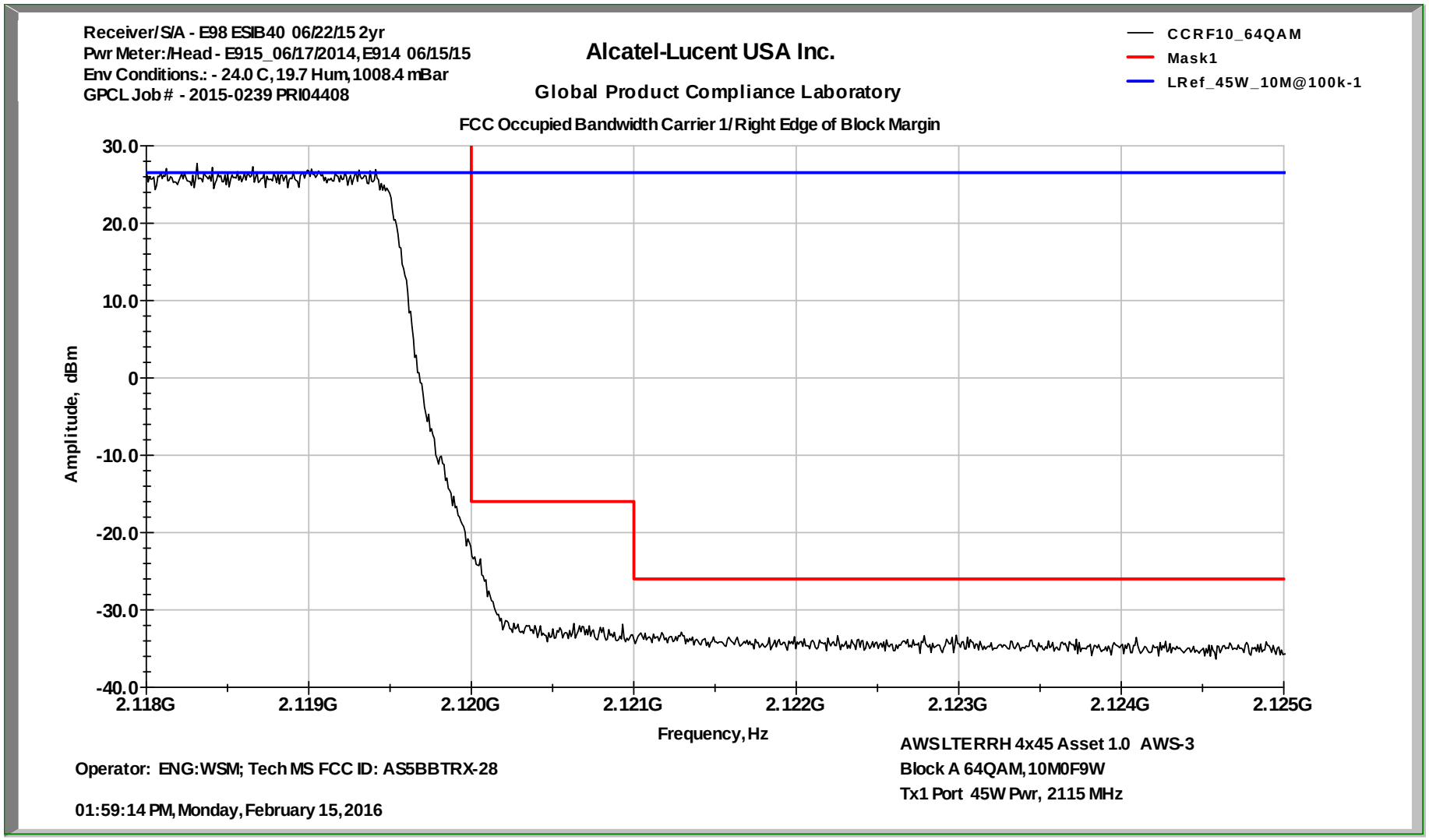
OBW InterMod. Whole Band View **10&10 MHz Blocks A-F** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



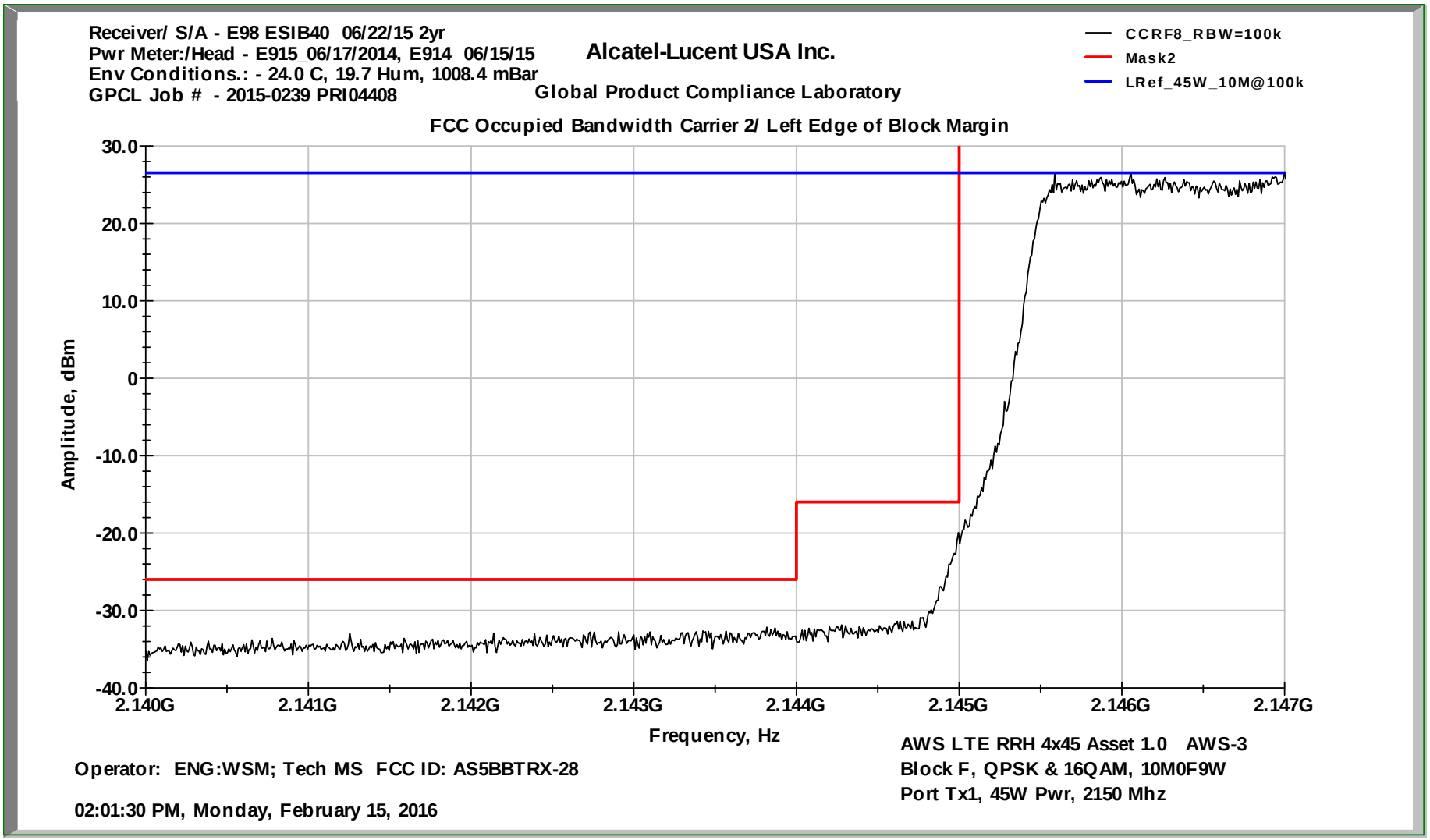
OBW Carrier 1 - Left Edge of Block **10&10 MHz Blocks A-F** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



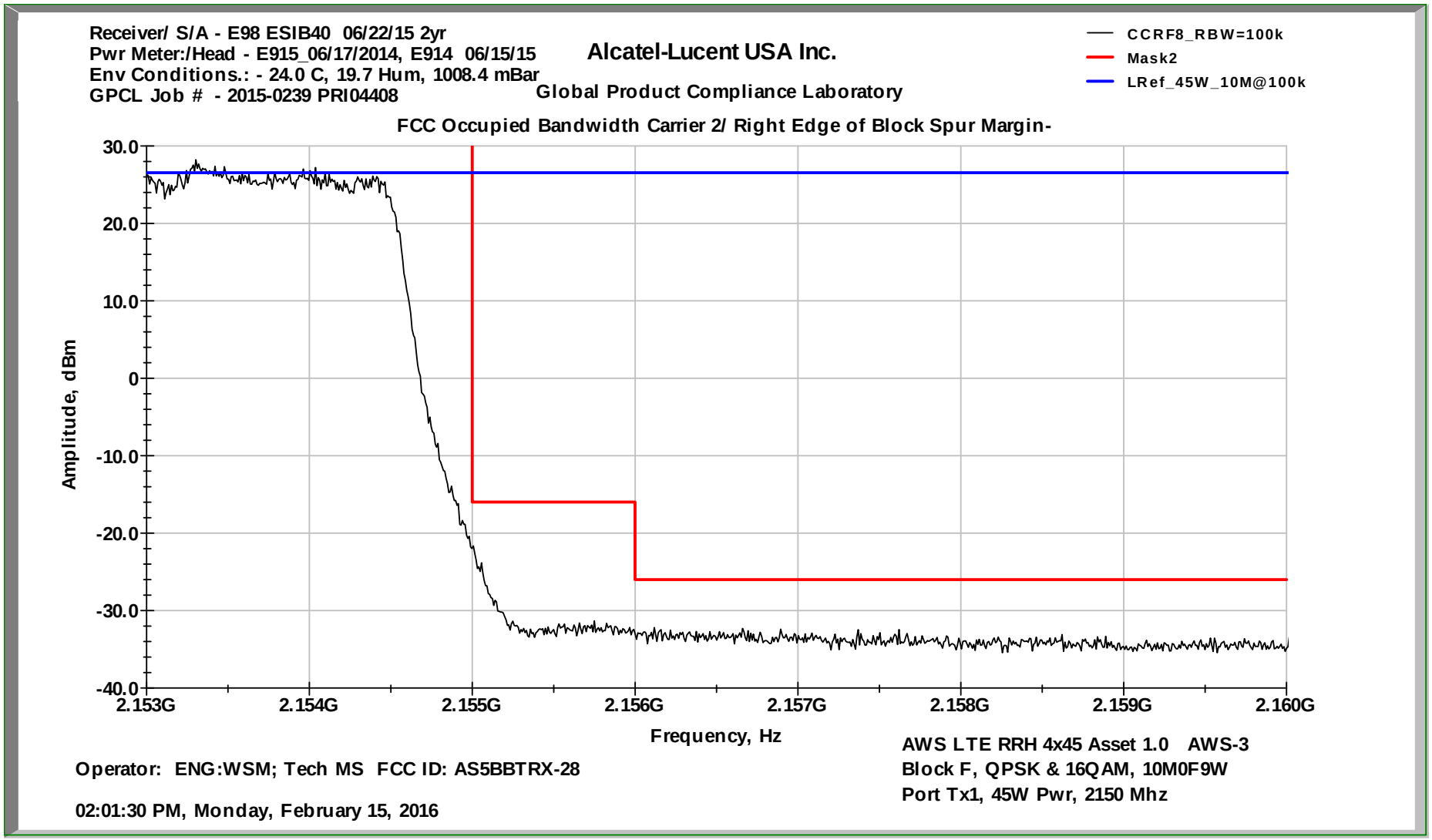
OBW Carrier 1 - Right Edge of Block **10&10 MHz Blocks A-F** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



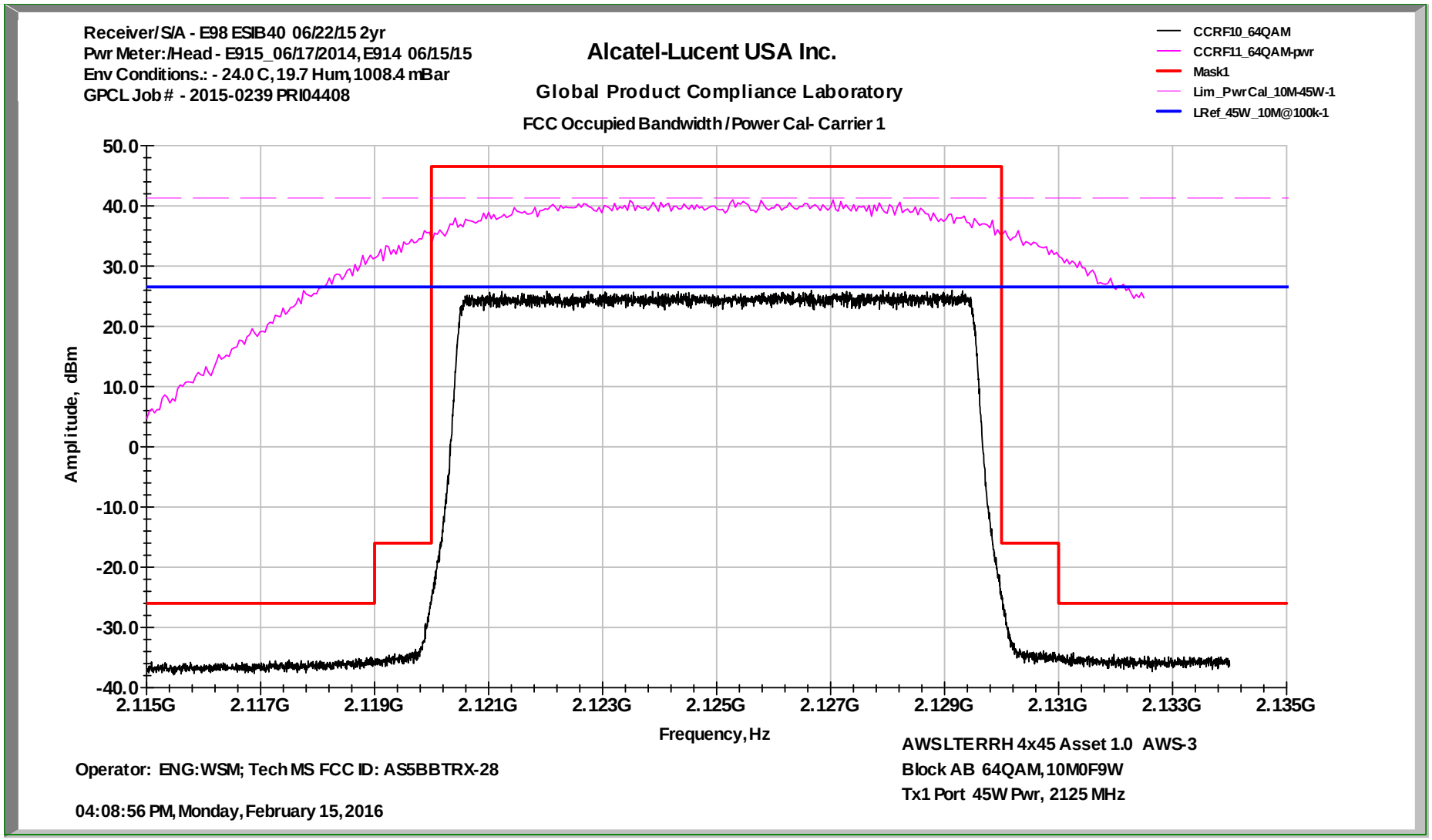
OBW Carrier 2 - Left Edge of Block **10&10 MHz Blocks A-F** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



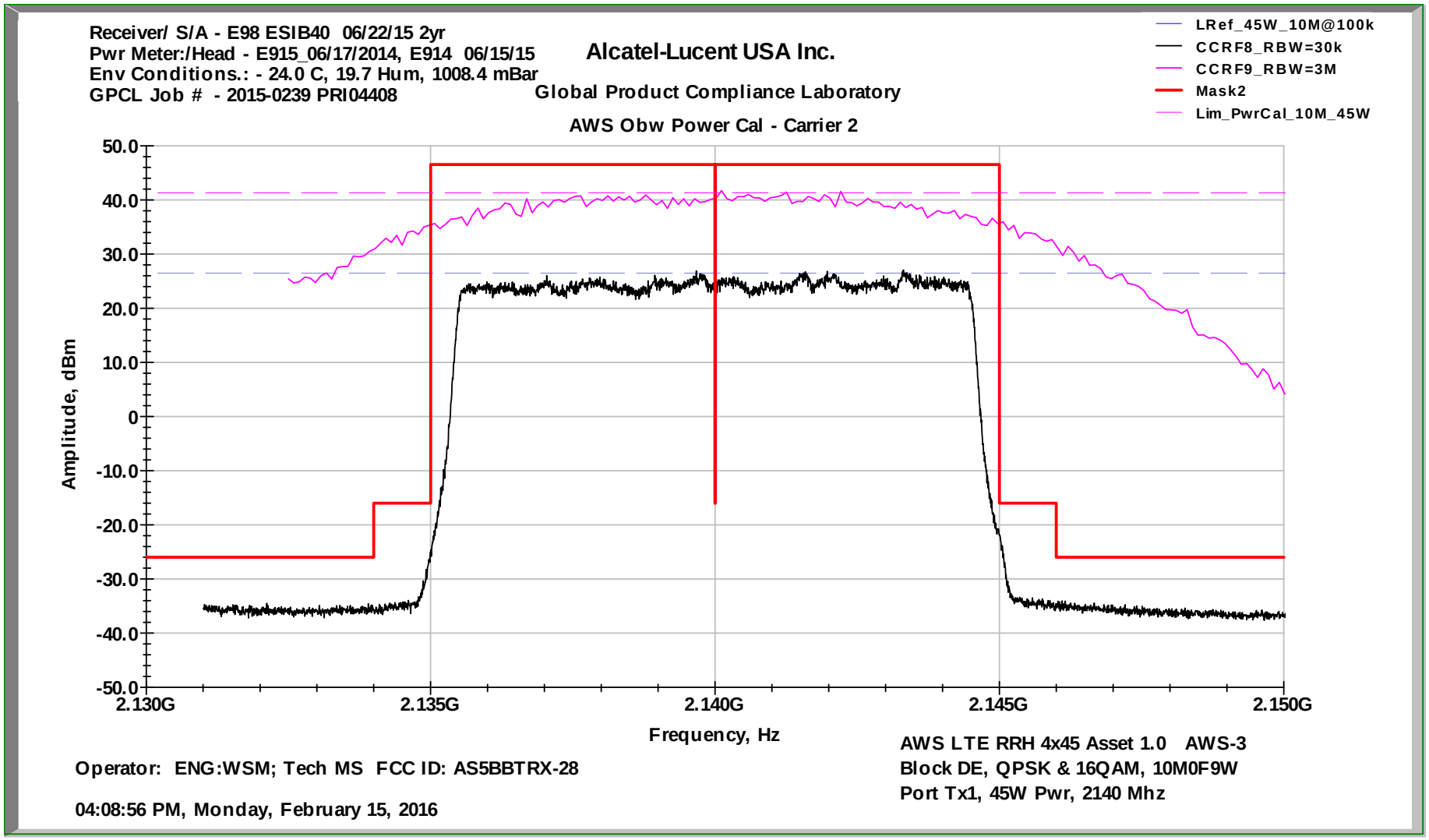
OBW Carrier 2 - Right Edge of Block **10&10 MHz Blocks A-F** **AWS RRH 4x45 FCC ID AS5BBTRX-28**



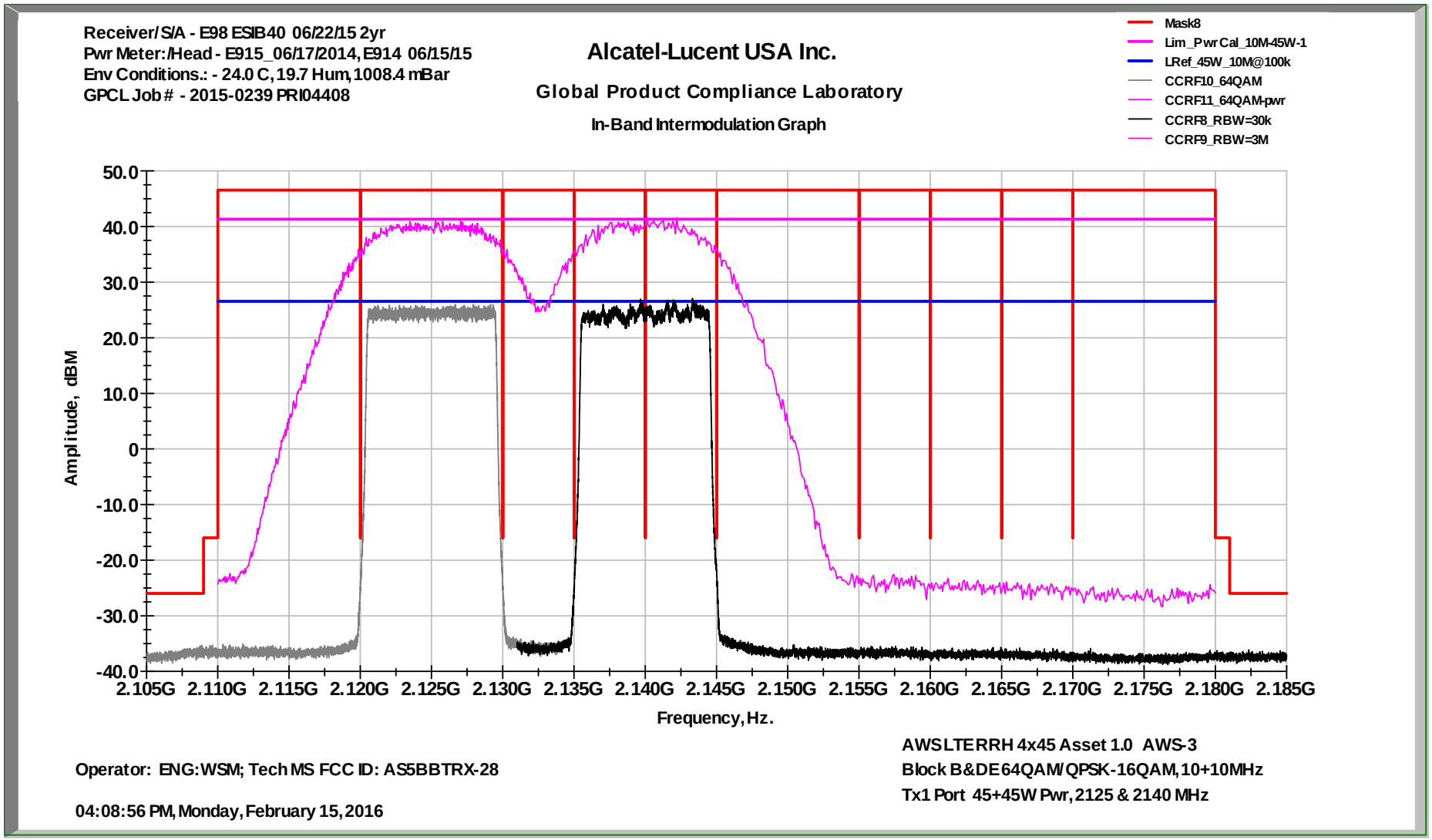
Test Configuration #22
Occupied Bandwidth/Power Cal -Carrier 1 10&10 MHz Blocks B-DE AWS RRH 4x45 FCC ID AS5BBTRX-28



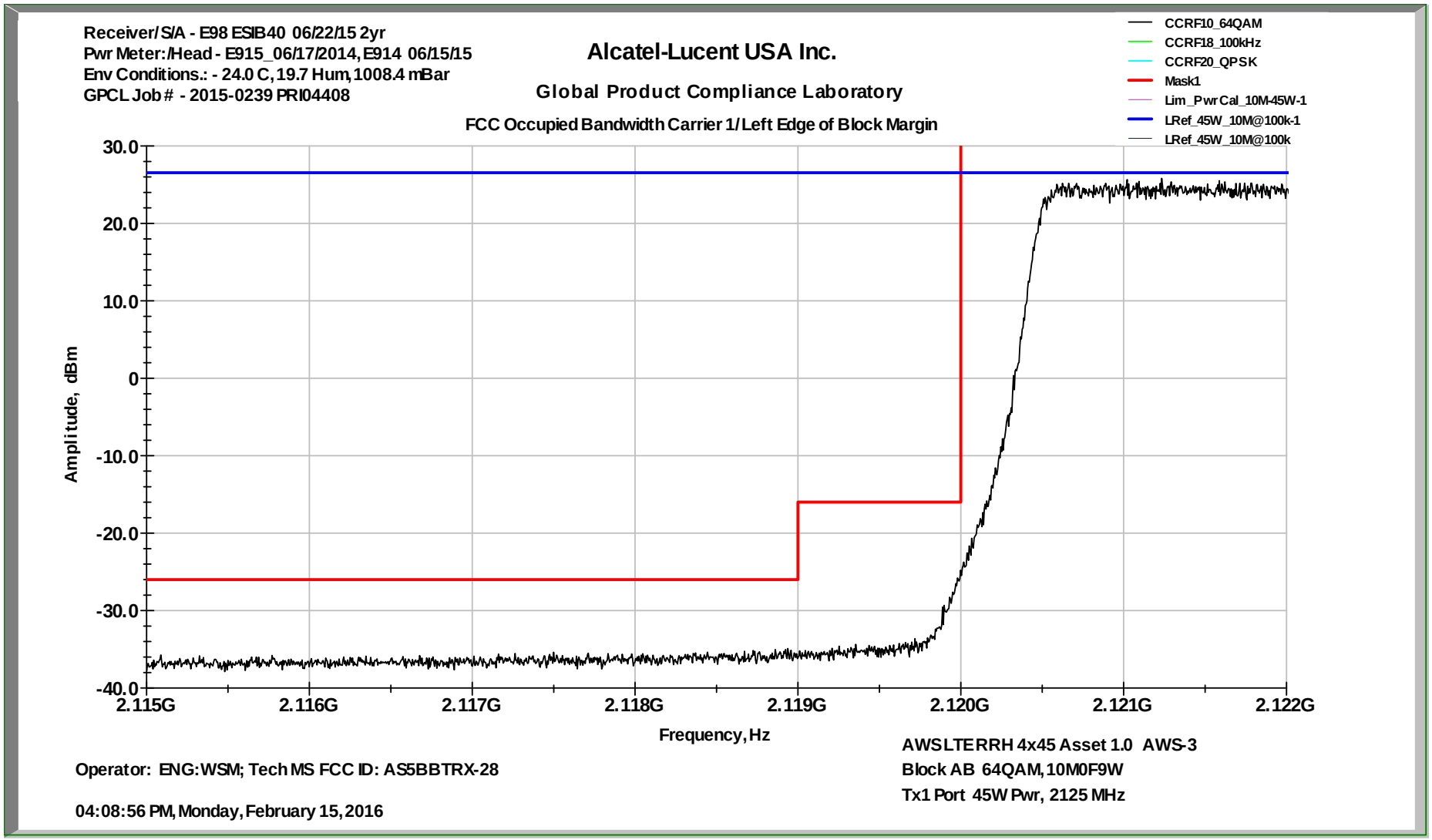
Occupied Bandwidth/Power Cal -Carrier 2 10&10 MHz Blocks B-DE AWS RRH 4x45 FCC ID AS5BBTRX-28



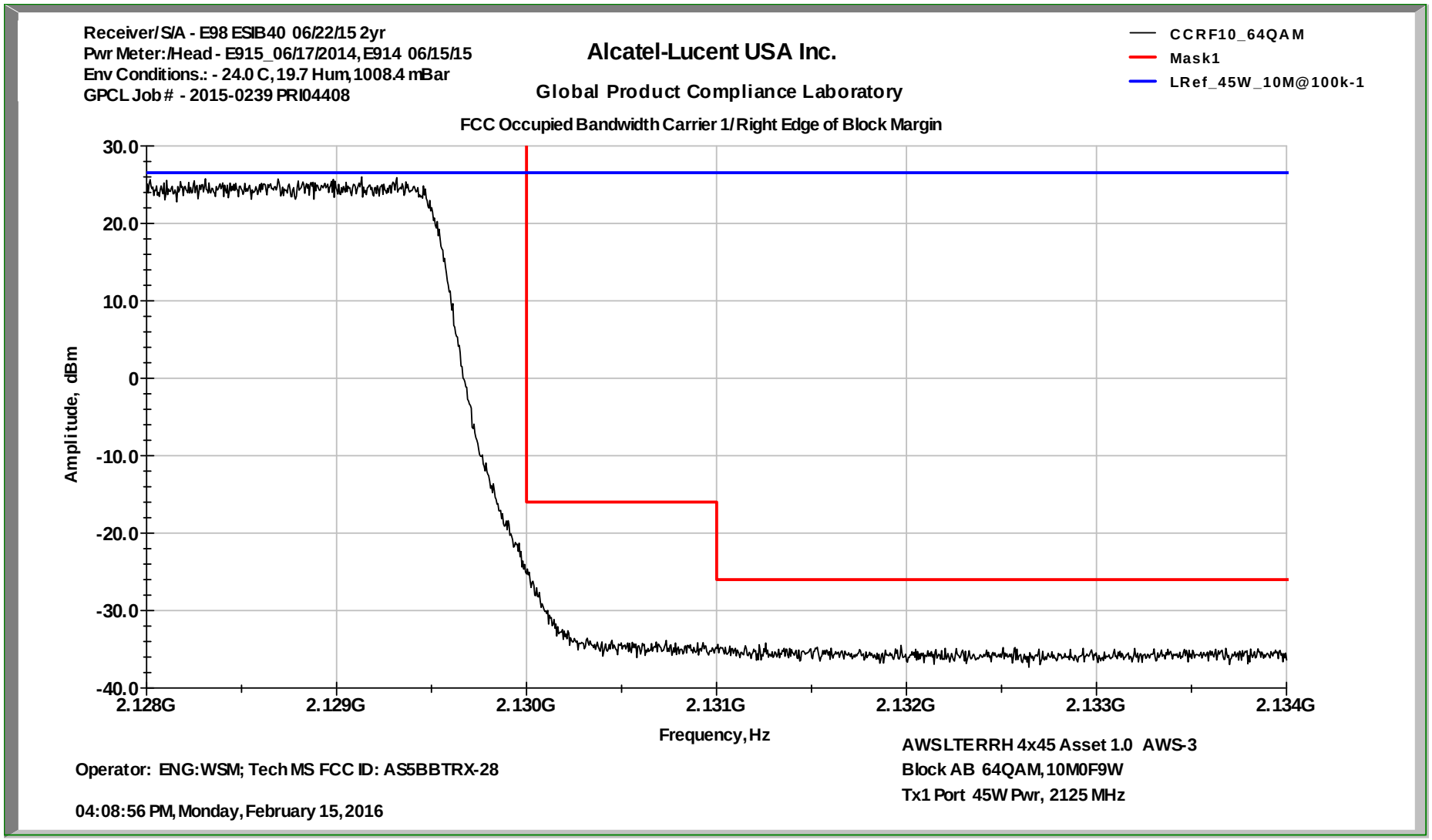
OBW InterMod. Whole Band View **10&10 MHz Blocks B-DE AWS RRH 4x45 FCC ID AS5BBTRX-28**



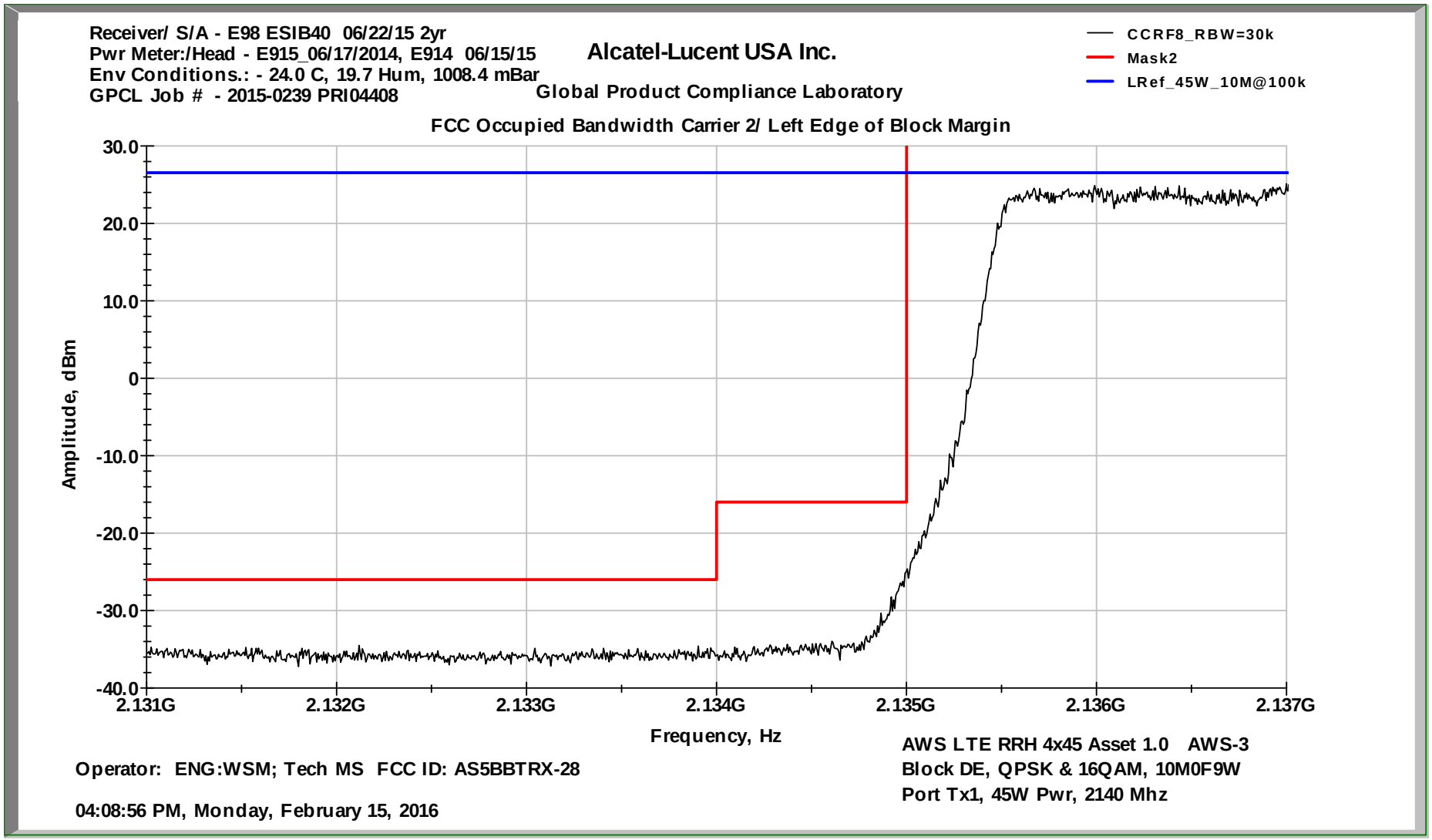
OBW Carrier 1 - Left Edge of Block **10&10 MHz Blocks AB-F AWS RRH 4x45 FCC ID AS5BBTRX-28**



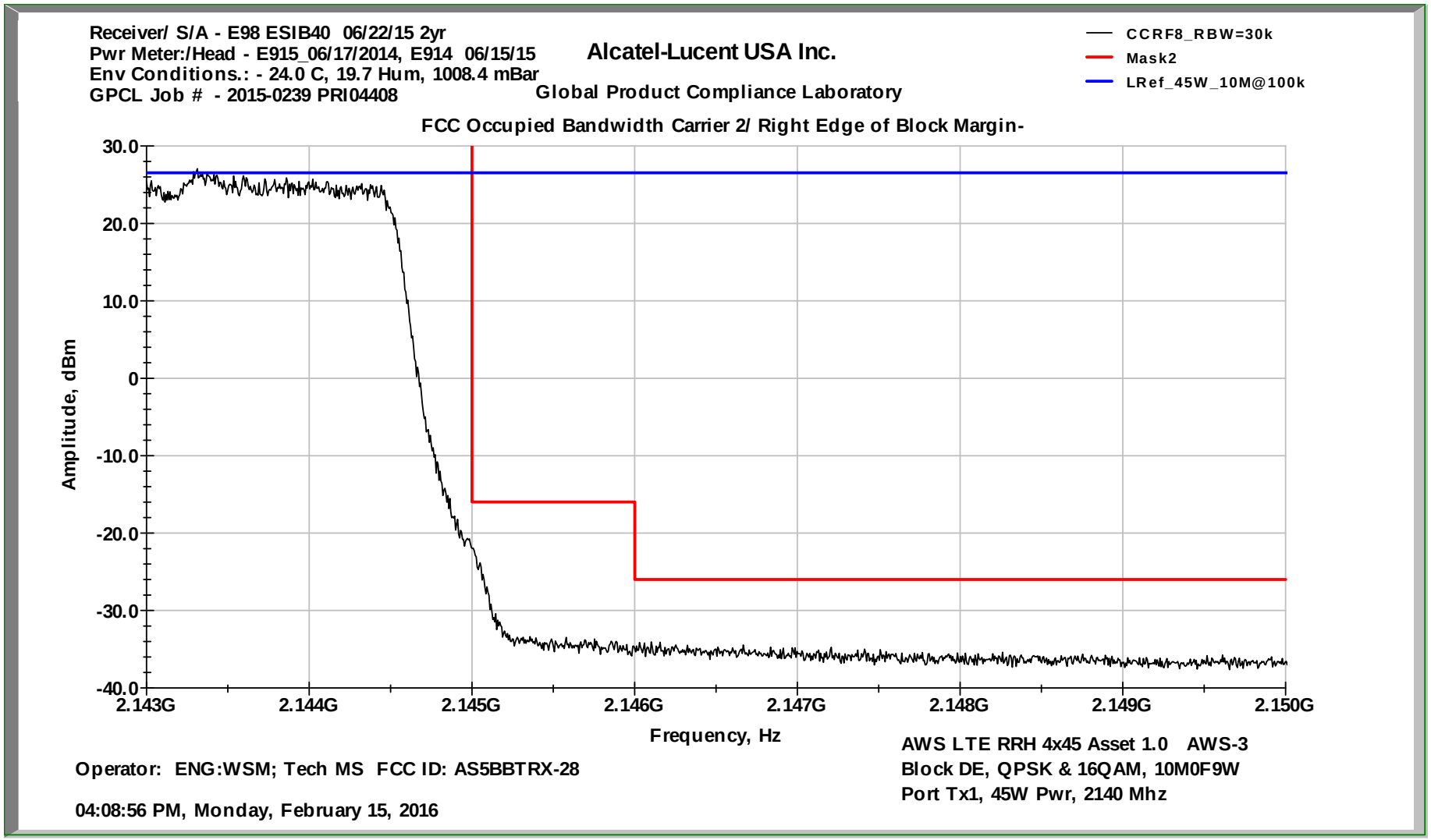
OBW Carrier 1 - Right Edge of Block **10&10 MHz Blocks B-DE AWS RRH 4x45 FCC ID AS5BBTRX-28**



OBW Carrier 2 - Left Edge of Block **10&10 MHz Blocks B-DE AWS RRH 4x45 FCC ID AS5BBTRX-28**



OBW Carrier 2 - Right Edge of Block **10&10 MHz Blocks B-DE AWS RRH 4x45 FCC ID AS5BBTRX-28**



12.7 Exhibit 12.7 SPURIOUS EMISSIONS AT ANTENNA TERMINALs

12.7.1 Section 2.1051 Spurious Emissions at Antenna Terminals

Spurious Emissions at the antenna terminals were investigated over the frequency range of 10 MHz to 21.8 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 12.7A which documents the test configuration used for the measurements. In this set up the complete RF test path was calibrated over the 10 MHz-22 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 and were performed in full compliance with ANSI C63.26 requirements. The test system consists of a Rohde & Schwarz ESIB-40 Receiver/ Spectrum Analyzer, 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 70,000 data points over the frequency range of 10 MHz to 22 GHz. This exceeds the ANSI C63.26 requirement by a factor of 1.5.

12.7.2 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)
The adjustment for n=4 is: 6.02 dB = 10LOG(4)

Therefore the limit for 2x MIMO 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 entire spectrum from 10 MHz to 22 GHz was measured with a resolution Bandwidths of 1 MHz. The carrier signal was also measured with a resolution Bandwidths of 3 MHz. This was done so that the carrier plots correctly and accurately depicts the carrier output power in relation to the spurious signals and the defined limit.

12.7.3 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 12.7 AWS Conducted Spurious Compliance Tabulation

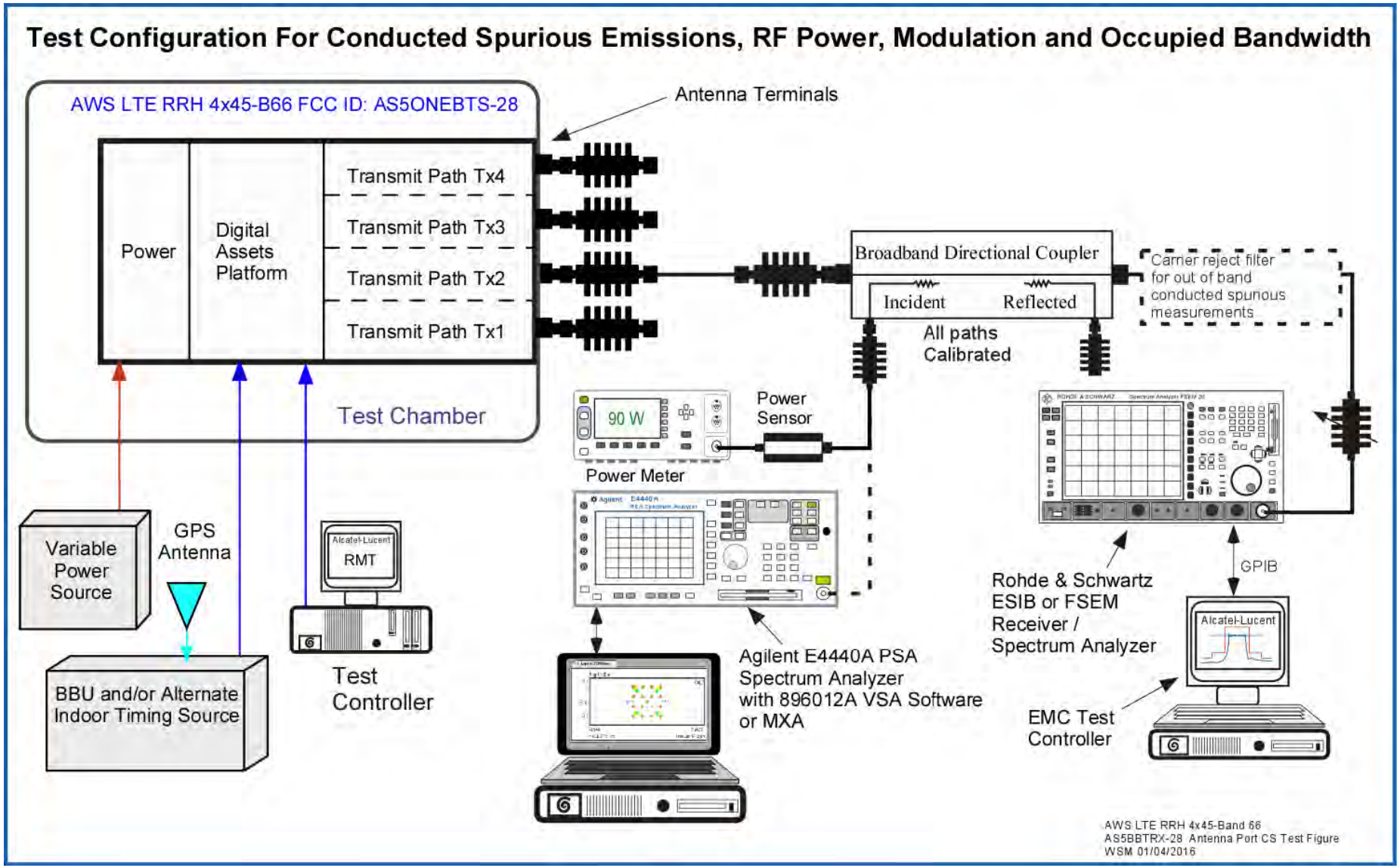
Test #	AWS Block	Port	Transmit Power, 's, Watts	Signal BW, MHz	Modulation Q16=QPSK/ 16QAM 64=64QAM	Carrier Center Frequency, MHz	Conducted Spurious Emissions Pass/Fail
1	AB	Tx1	90	20	Q, 64	2120	Pass
2	D+E+F	Tx1	90	20	Q, 64	2145	Pass
3	BC	Tx2	90	15	Q, 64	2127.5	Pass
4	EF	Tx2	90	15	Q, 64	2147.5	Pass
5	C+D+E	Tx2	90	15	Q, 64	2137.5	Pass
6	A + C	Tx1	60 + 30	10 + 5	Q16 + 64	2115+ 2132.5	Pass
7	B + E	Tx1	60 + 30	10 + 5	Q16 + 64	2125 + 2142.5	Pass
8	CD + FL	Tx1	60 + 30	10 + 5	Q16 + 64	2135 + 2147.5	Pass
9	DE + Fr	Tx2	60 + 30	10 + 5	Q16 + 64	2140 + 2152.5	Pass
10	A+F	Tx1	40 + 40	5+5	Q16 + 64	2112.5 + 2152.5	Pass
11	A + F	Tx1	40 + 40	5+5	Q16 + 64	2117.5 + 2147.5	Pass
12	B + D	Tx1	40 + 40	5+5	Q16 + 64	2122.5 + 2137.5	Pass
13	B + F	Tx1	40 + 40	5+5	Q16 + 64	2127.5 + 2152.5	Pass
14	C+E	Tx1	40 + 40	5+5	Q16 + 64	2132.5 + 2142.5	Pass
15	AB + F	Tx2	60 + 30	20 + 5	64 + Q16	2120 + 2152.5	Pass
16	A +DEF	Tx2	30 + 60	5+20	Q16 + 64	2117.5 + 2145	Pass
17	A+EF	Tx2	30 + 60	5+15	Q16 + 64	2112.5 + 2147.5	Pass
18	AB+C	Tx2	60 + 30	15+5	64 + Q16	2117.5 + 2132.5	Pass
19	A + EF	Tx2	45 + 45	10 + 15	64 + Q16	2115 + 2147.5	Pass
20	AB + EF	Tx2	45 + 45	15 + 10	64 + Q16	2122.5 + 2145	Pass
21	A + F	Tx1	45 + 45	10+10	64 + Q16	2115 + 2150	Pass
22	B + DE	Tx1	45 + 45	10+10	64 + Q16	2125 + 2140	Pass

12.7.4 **Test Results Summary:**

Conducted Spurious measurements were performed for the twenty two transmit configurations documented in Table 12.7 above. In all cases the Primary (Tx1) and Diversity (Tx2) antenna ports of the **AWS LTE B66a RRH4x45 Band / FCC ID: AS5BBTRX-28** were co-configured. Conducted Transmit Spurious measurements were then performed as part of the automated test profile for Occupied bandwidth. Every AWS Block Edge measurements configuration therefore included a Conducted Spurious measurements at the antenna transmit port as documented in Table 12.7.

The attached spectral plots are representative of the Conducted Spurious compliance performance of the **AWS LTE B66a RRH4x45 Band / FCC ID: AS5BBTRX-28.** The compliance for all of the representative transmit configurations are documented in Table 12.7. 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.

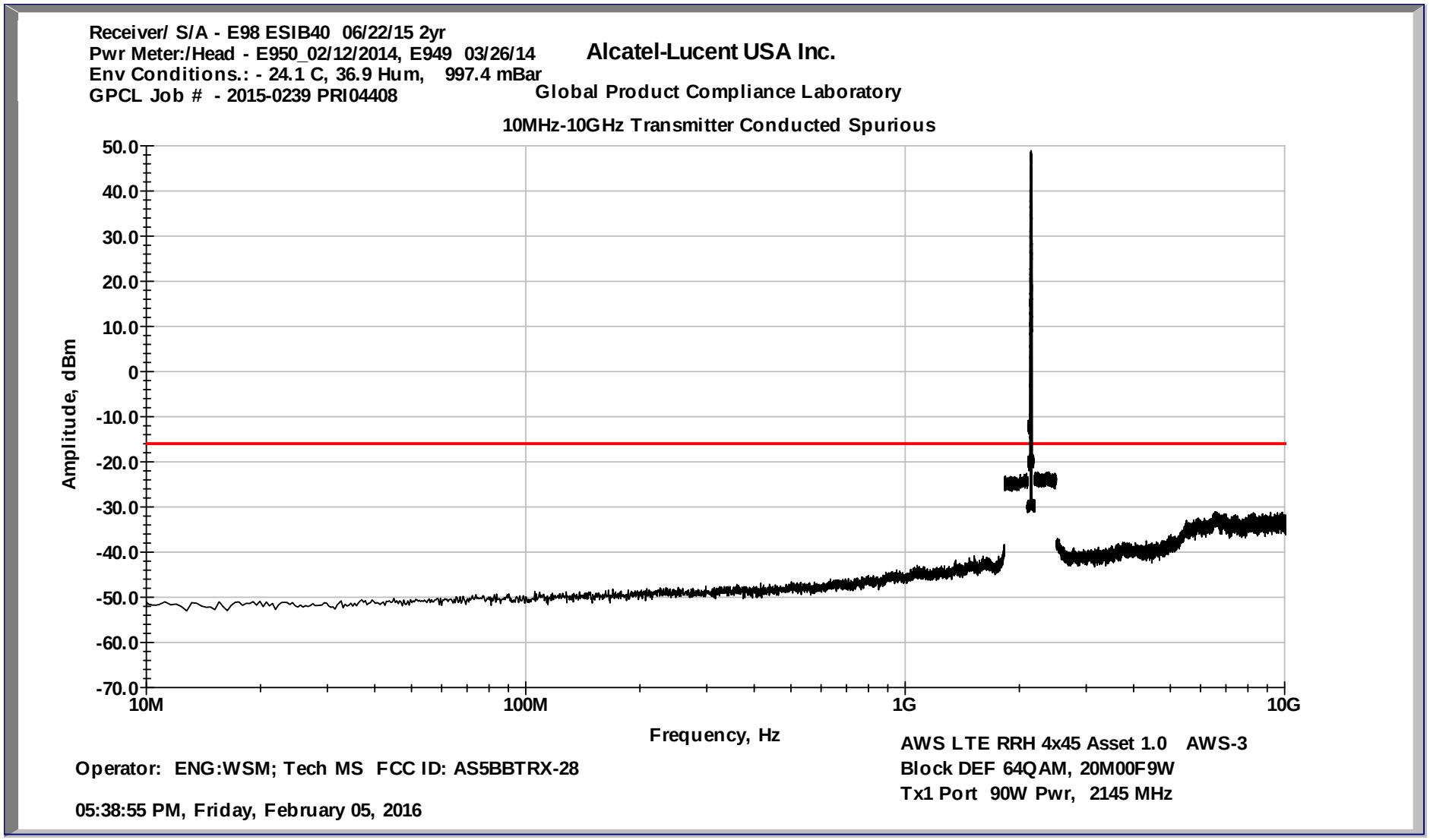
Figure 12.7A Test Setup for Antenna Port Measurement of Transmit Power, Occupied Bandwidth and Conducted Spurious Emissions



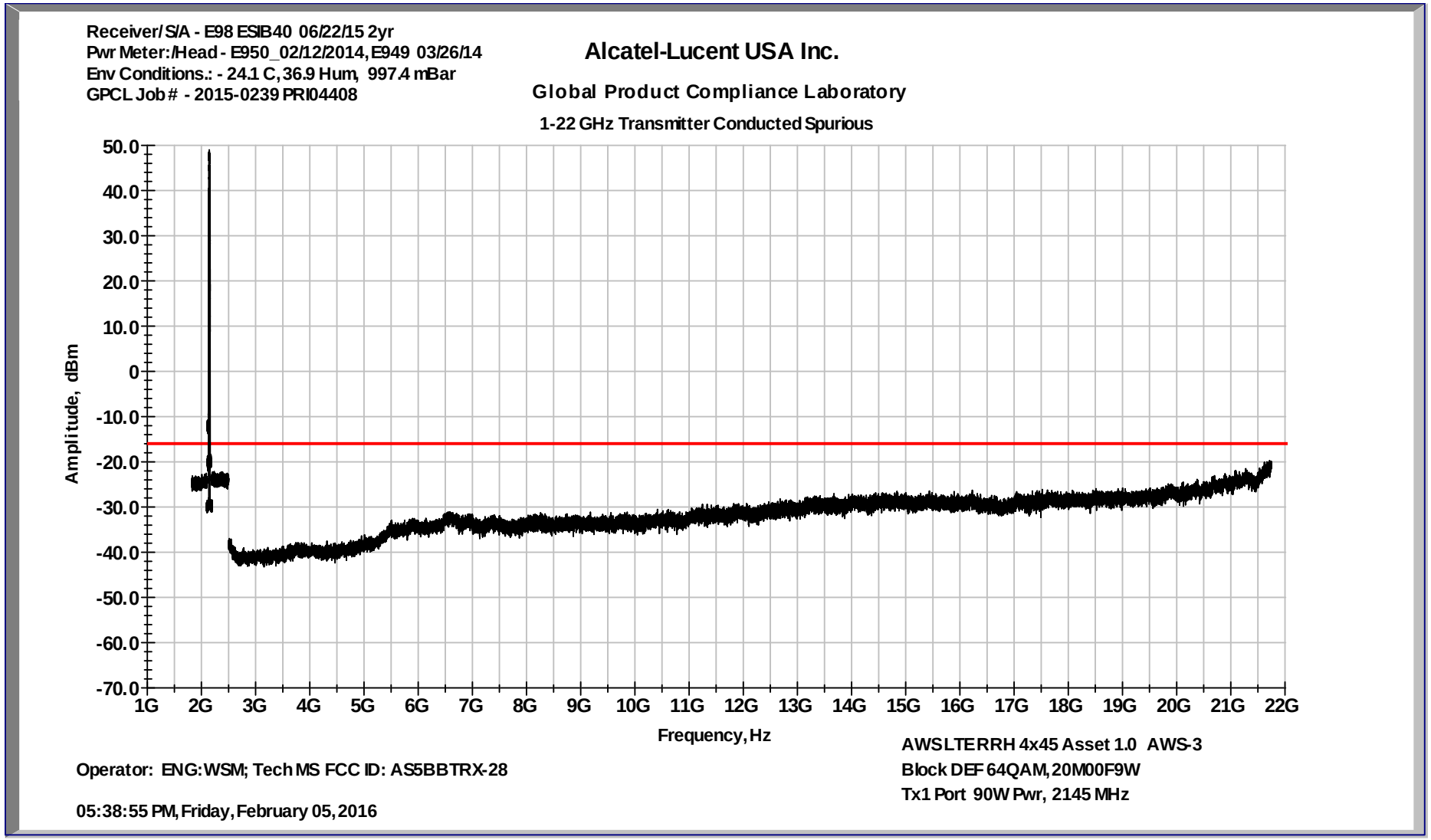
Transmitter Measurements
of
Conducted Spurious Emissions
for
Alcatel-Lucent USA Inc.

AWS LTE B66a RRH4x45
Outdoor Transceiver System
FCC ID: AS5BBTRX-28

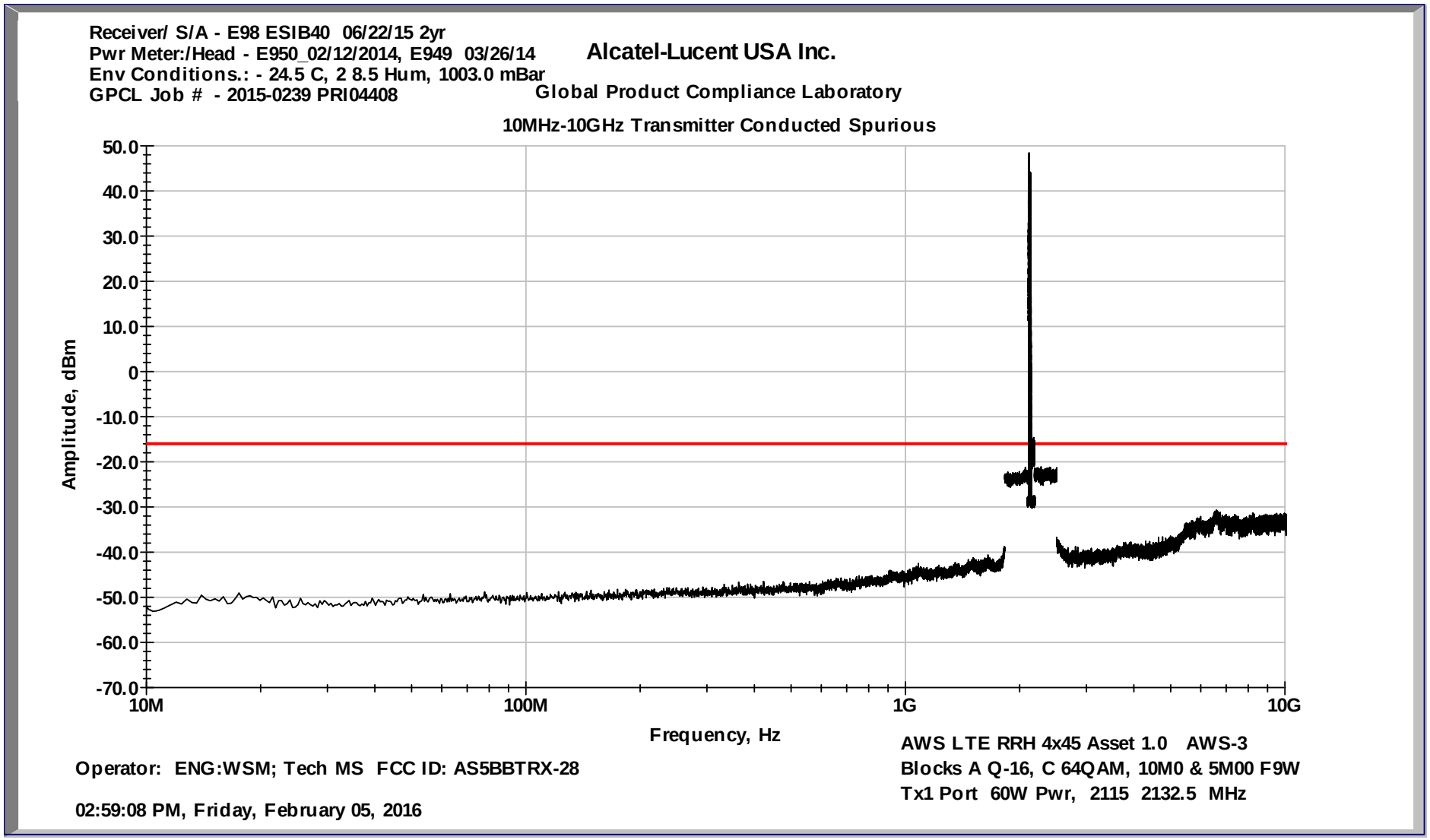
Test Configuration #2
Conducted Spurious Emissions 10MHz-1 GHz 20M0F9W Block DEF AWS RRH 4x45 FCC ID AS5BBTRX-28



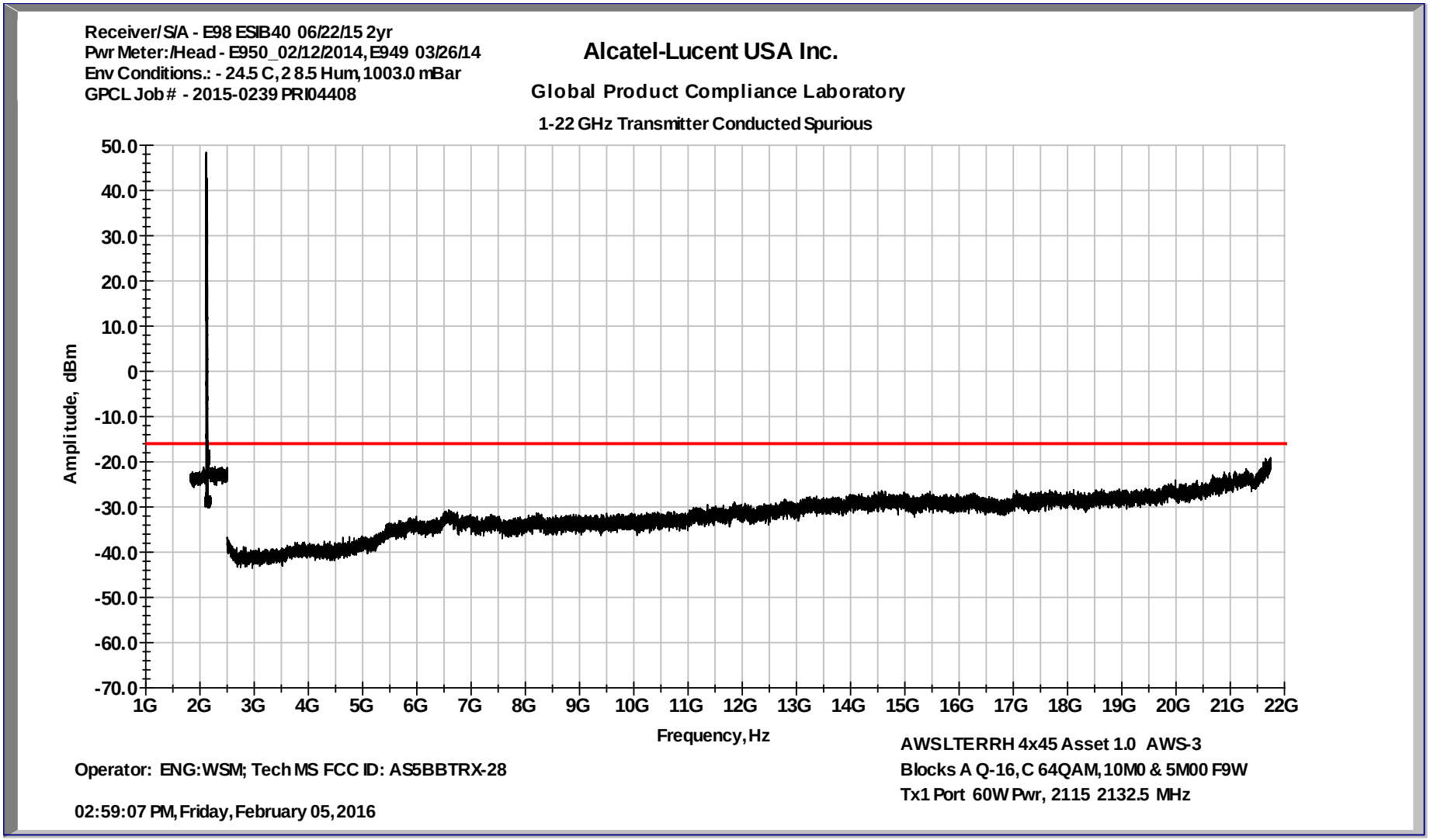
Conducted Spurious Emissions 1 -22 GHz 20M0F9W Block DEF AWS RRH 4x45 FCC ID AS5BBTRX-28



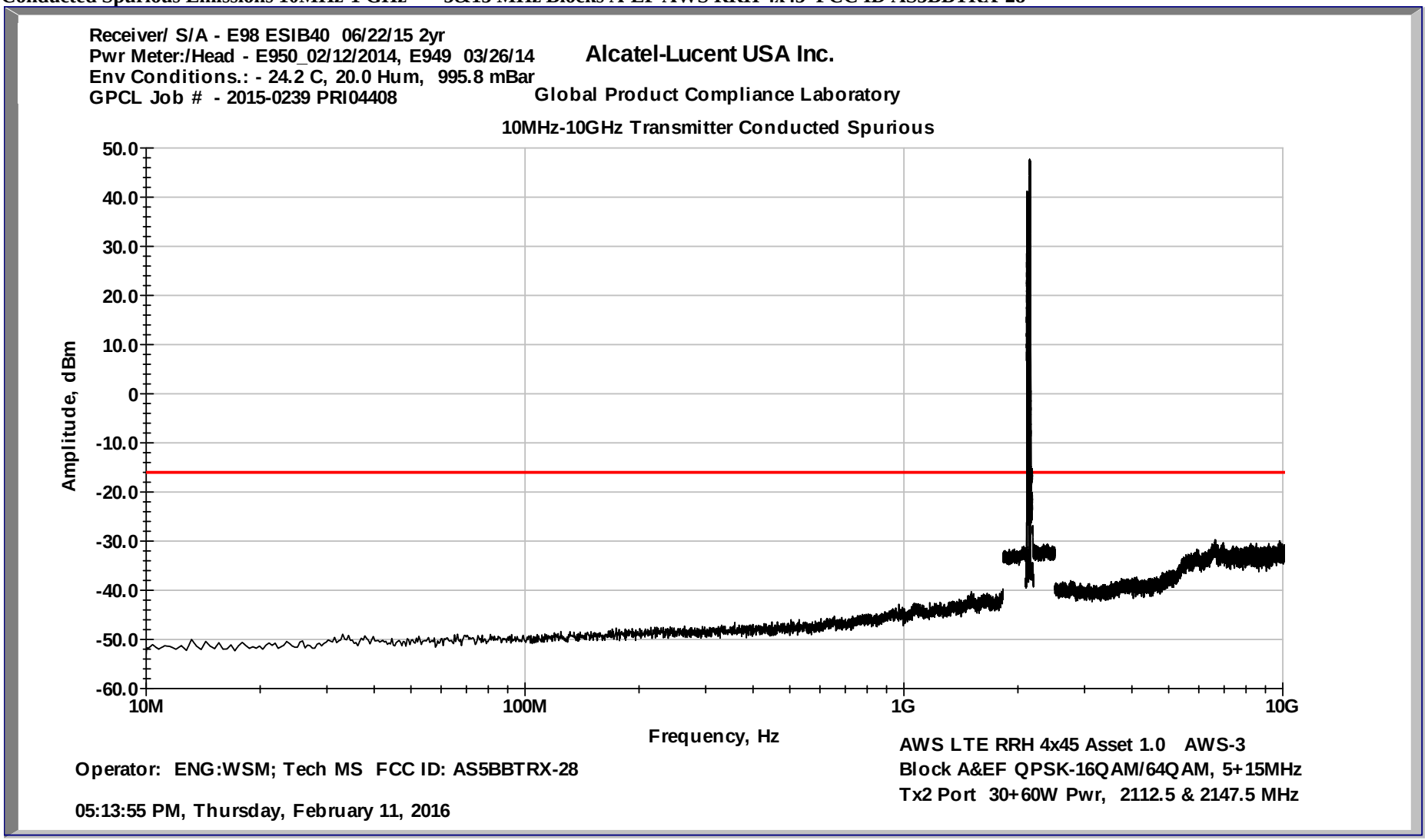
Configuration #6 Dual Carrier
Conducted Spurious Emissions 10MHz-1 GHz 10&5 MHz Blocks A&C AWS RRH 4x45 FCC ID AS5BBTRX-28



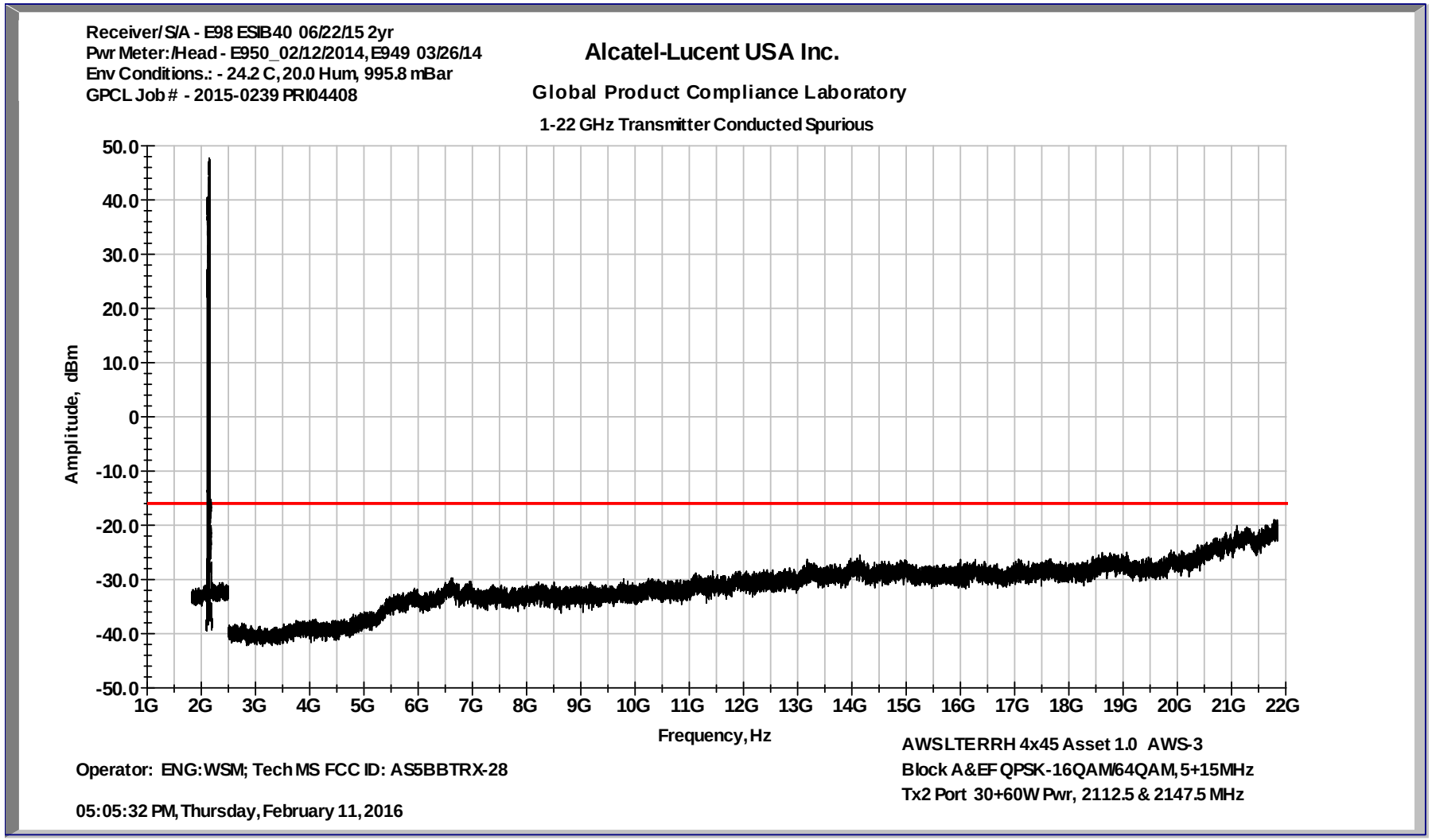
Conducted Spurious Emissions 1 -22 GHz 10&5 MHz Blocks A&C AWS RRH 4x45 FCC ID AS5BBTRX-28



Test Configuration #17
Conducted Spurious Emissions 10MHz-1 GHz 5&15 MHz Blocks A-EF AWS RRH 4x45 FCC ID AS5BBTRX-28



Conducted Spurious Emissions 1 -22 GHz **5&15 MHz Blocks A-EF AWS RRH 4x45 FCC ID AS5BBTRX-28**



12.8 **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 B66a RRH4x45 / FCC ID: AS5BBTRX-28** was configured into a representative field installation and was tested when operating in dual AWS blocks. The spectrum from 30 MHz to the tenth harmonic of the carrier (22 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 27.53 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.

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

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

Where: E = Field Intensity in Volts/ meter R = Distance in meters = 10 m
P = Transmitted Power in watts = 180 W

12.8.1 **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 (82.23 @ 3m). Emissions equal to or less than 51.8 dBμV/meter at 10m (62.23@ 3m) 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 (22GHz), no reportable spurious emissions were detected. This demonstrates that the **AWS LTE B66a RRH4x45 / FCC ID: AS5BBTRX-28**, 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. A representative set of measurement scans are included below.

12.8.2 **Test Equipment.**

Test Equipment List
RE / AR6 / 2015-0239

Manufacturer	Model	Serial Number	Type	Description	GPCL ID	Last Cal	Interval	Status
Weinschel	2-6	BX3430	Attenuator	6 dB DC-18GHz 5 Watt	E887	3/5/2014	24	Active
Sonoma Instrument Co.	310N	185785	Amplifier	9kHz-1GHz	E494	12/3/2015	24	Active
Rohde & Schwarz	ESIB40	100121	Test Receiver	EMI (20Hz to 40 GHz)-150 +30dBM	E704	4/8/2014	24	Active
A.H. Systems Inc.	SAS-521-2	408	Bilogical Antenna	25 - 2000 MHz	E601	2/13/2015	24	Active
ETS Lindgren	3117	00135198	Horn Antenna	Double-Ridged Waveguide Horn 1-18 GHz	E1073	12/10/2014	24	Active
Trilithic	5HC2850/18050-1.8-KK	PCS-HPF-11	High Pass Filter	PCS	E988	2/1/2016	12	Active
EMC Test Systems	3116	2539	Horn Antenna	Double Ridged Horn 18-40 GHz	E513	3/19/2015	24	Active
Trilithic	5HC2850/18050-1.8-KK	200113078	High Pass Filter	PCS 2.85GHz - 18.05GHz	E1116	2/1/2016	12	Active

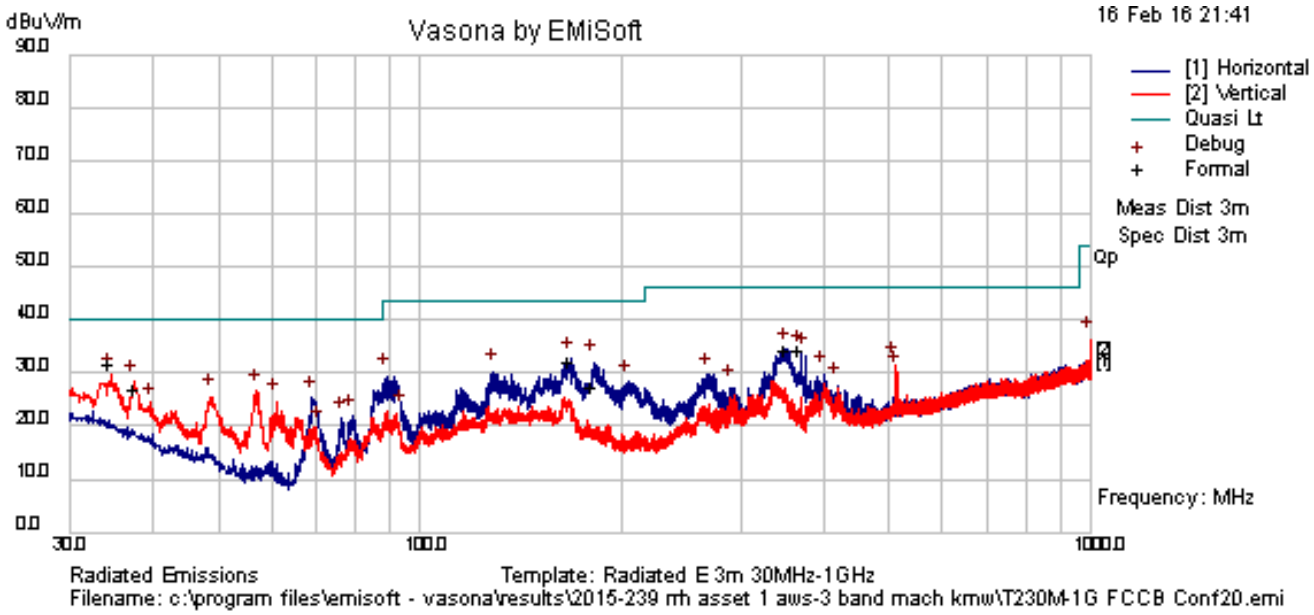
Support Equipment

Manufacturer	Model	Serial Number	Type	Description	GPCL ID or Wireless	Last Cal	Interval	Status
Hewlett Packard	437B	3125U06345	RF Power Meter		E782	3/18/2014	24	Active
Hewlett Packard	8482A	1551A02060	Power Sensor	100 KHz - 4.2GHz	E211	3/11/2015	12	Active
Fischer Custom Communications	F-203I-DCN-32mm	212	Decoupling Network		E412			Active
Agilent Technologies	N9020A	MY52090740	MXA Signal Analyzer	20Hz-26.5GHz Analyzer	UUE101	7/26/2014	24	Active

Measurements
of
Radiated Emissions
for
Alcatel-Lucent USA Inc.

AWS LTE B66a RRH4x45
Outdoor Transceiver System
FCC ID: AS5BBTRX-28

T1 Radiated Emissions 30M-1GHz FCC Class B limits Transmit Configuration 20

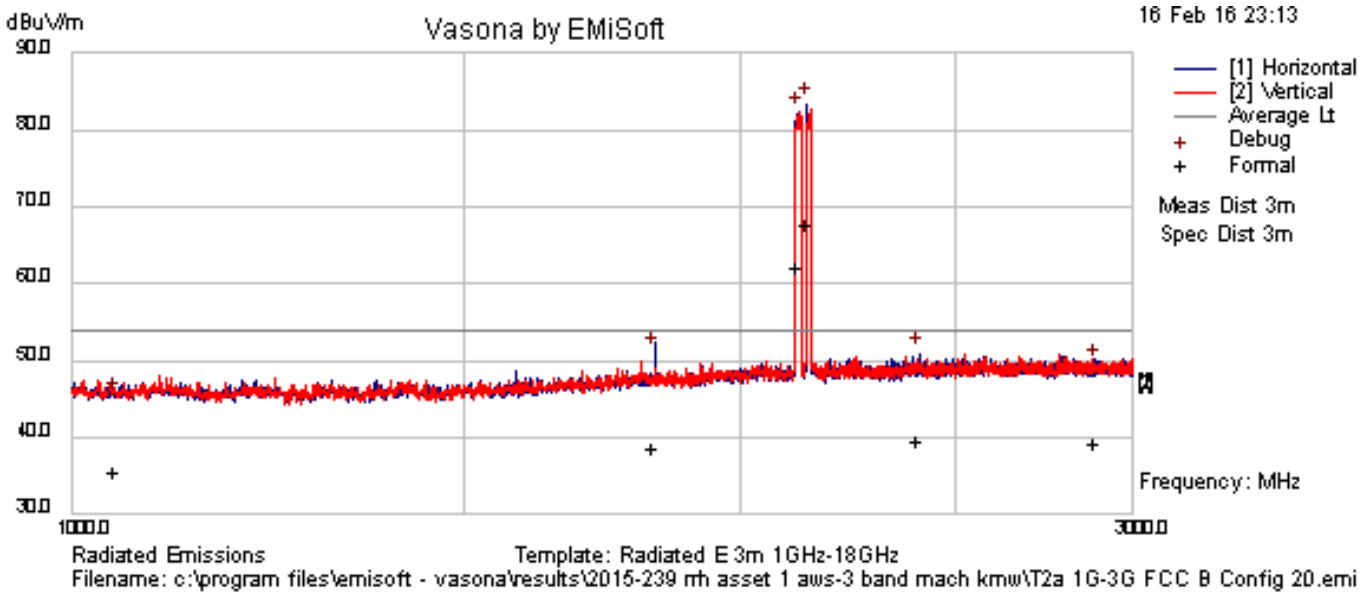


Results Title:	Radiated E 3m 30MHz-1GHz
File Name:	c:\program files\emisoft - vasona\results\2015-239 rrh asset 1 aws-3 band mach kmw\T230M-1G FCCB Conf20.emi
Test Laboratory:	GPCL AR6-MH 20C, 23%RH, 998mB
Test Engineer:	MJS
Test Software:	Vasona by EMISoft, version 2.161
Equipment:	Nokia
EUT Details:	FDD RRH for Asset 1.0 AWS-3 band with machined KMW filter. PRI04408.
Configuration:	Powered by -48Vdc 15Amps, Configuration20; A and EF 45 watts, 15M BW and 10 M BW's. 64QAM and 16 QAM with Tx 1 = 2122.5MHz and Tx 2 = 2145 MHz. 1-ASIG and 1-Alarm cable, with dc power cable untwisted. ESI-E704, Sonoma Preamp - E494, Bilog Antenna - E601, 6dB pad - E887. Radiated Emissions RE 30MHz-1Ghz to FCC Class B limits.
Date:	2016-02-16 21:41:31

FORMAL DATA												
Freq. (MHz)	**Raw (dBuV)**	**Cable (dB)**	**Factor (dB)**	**Level (dBuV/m)**	**Emission Type**	**Pol (H/V)**	**Ht (cm)**	**Az (deg)**	**Limit (dBuV/m)**	**Margin (dB)**	**Pass /Fail**	**Comments**
34.593	37.34	6.6	-15.8	28.2	Quasi Max	V	107	86	40	-11.8	Pass	
167.183	37.67	7.23	-16.5	28.44	Quasi Max	H	100	360	43.5	-15.06	Pass	
352.523	40.48	7.67	-17.2	30.91	Quasi Max	H	100	212	46	-15.09	Pass	
368.631	39.85	7.71	-16.7	30.9	Quasi Max	H	106	213	46	-15.1	Pass	
37.589	34.35	6.6	-17.5	23.42	Quasi Max	V	115	242	40	-16.58	Pass	
181.684	34.7	7.28	-18.3	23.68	Quasi Max	H	337	322	43.5	-19.82	Pass	

Note: Preview data was measured using a peak detector to identify frequencies of interest for formal measurement. Formal data consist of all frequencies in the preview list within 6 dB of specification limit or the top six frequencies. Failure in preview data does not necessarily constitute failure in formal data.

T02 Radiated Emissions 1-3GHz FCC Class B limits Transmit Configuration 20

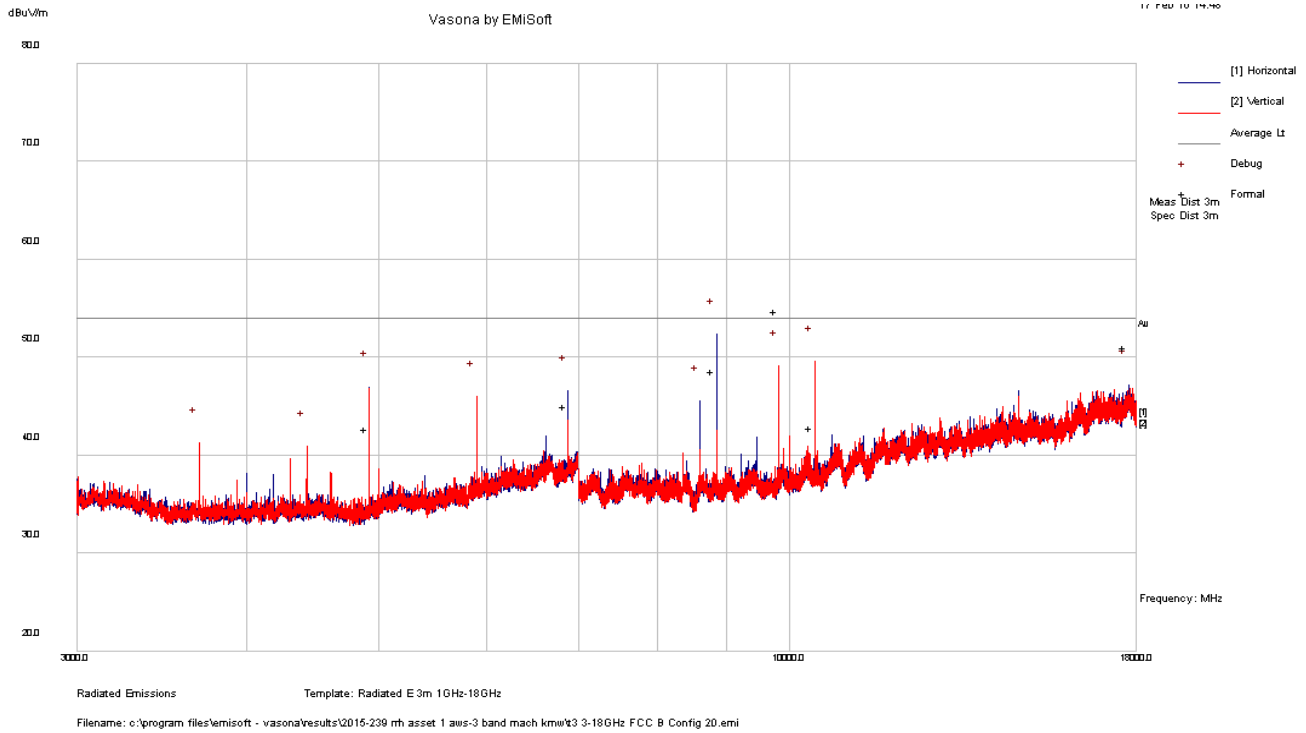


Results Title:	Radiated E 3m 1GHz-18GHz
File Name:	c:\program files\emisoft - vasona\results\2015-239 rrh asset 1 aws-3 band mach kmw\T2a 1G-3G FCC B Config 20.emi
Test Laboratory:	GPCL AR6-MH 20C, 23%RH, 998mB
Test Engineer:	MJS
Test Software:	Vasona by EMISoft, version 2.161
Equipment:	Nokia
EUT Details:	FDD RRH for Asset 1.0 AWS-3 band with machined KMW filter. PRI04408.
Configuration:	Powered by -48Vdc 15Amps, Configuration 20; Blocks AB & EF 45 watts, 15M BW and 10 M BW's. 64QAM and 16 QAM with Tx 1 = 2122.5MHz and Tx 2 = 2145 MHz. 1-ASIG and 1-Alarm cable, with dc power cable untwisted. ESI-E704, H/P - E123, Horn Antenna - E1073, 6dB pad - E887. RE 1GHz-3GHz, FCC Class B limits.
Date:	2016-02-16 23:13:33

FORMAL DATA												
Freq. (MHz)	**Raw (dBuV)**	**Cable (dB)**	**Factor (dB)**	**Level (dBuV/m)**	**Emission Type**	**Pol (H/V)**	**Ht (cm)**	**Az (deg)**	**Limit (dBuV/m)**	**Margin (dB)**	**Pass /Fail**	**Comments**
2144.51	58.97	9.45	-2.99	65.43	AvgMax	H	100	0	54	11.43	Fail	Tx
2124.44	53.5	9.46	-3.05	59.9	AvgMax	V	100	0	54	5.9	Fail	Tx
1830.59	31.08	9.59	-4.45	36.22	AvgMax	H	100	0	54	-17.78	Pass	
2404.95	30	9.35	-2.18	37.17	AvgMax	H	100	0	54	-16.83	Pass	
2891.6	29.24	9.19	-1.45	36.99	AvgMax	H	100	0	54	-17.01	Pass	
1046.65	30.96	10.08	-7.87	33.16	AvgMax	H	100	0	54	-20.84	Pass	

Note: Preview data was measured using a peak detector to identify frequencies of interest for formal measurement. Formal data consist of all frequencies in the preview list within 6 dB of specification limit or the top six frequencies. Failure in preview data does not necessarily

T3 Radiated Emissions 3G-18G FCC B Transmit Configuration Config 20

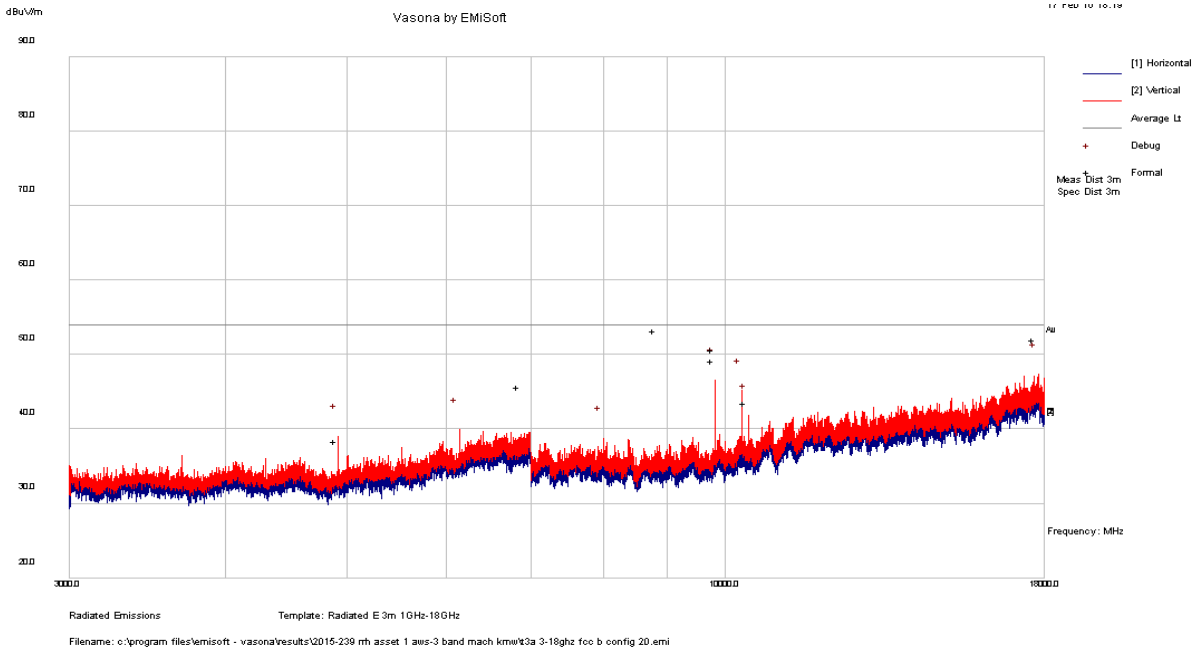


Results Title:	Radiated E 3m 1GHz-18GHz
File Name:	c:\program files\emisoft - vasona\results\2015-239 rrh asset 1 aws-3 band mach kmw\t3 3-18GHz FCC B Config 20.emi
Test Laboratory:	GPCL AR6-MH 23C, 27%RH, 998mB
Test Engineer:	MJS/GM
Test Software:	Vasona by EMISoft, version 2.161
Equipment:	Nokia
EUT Details:	FDD RRH for Asset 1.0 AWS-3 band with machined KMW filter. PRI04408.
Configuration:	Powered by -48Vdc 15Amps, Configuration 20; Blocks AB & EF 45 watts, 15M BW and 10 M BW's. 64QAM and 16 QAM with Tx 1 = 2122.5MHz and Tx 2 = 2145 MHz. 1-ASIG and 1-Alarm cable, with dc power cable untwisted. ESI-E704, H/P - E123, Horn Antenna - E1073, HPF - E988 on preamp input. Bandwidths for preliminary test are 100 k/ 300kHz, with 1M formals. Radiated Emissions RE 3GHz-18GHz to FCC Class B limits.
Date:	2016-02-17 14:48:33

FORMAL DATA												
Freq. (MHz)	**Raw (dBuV)**	**Cable (dB)**	**Factor (dB)**	**Level (dBuV/m)**	**Emission Type**	**Pol (H/V)**	**Ht (cm)**	**Az (deg)**	**Limit (dBuV/m)**	**Margin (dB)**	**Pass /Fail**	**Comments**
9830.41	42.36	6.35	2.43	51.14	AvgMax	V	109	18	54	-2.86	Pass	
17762.2	29.85	8.32	9.27	47.44	AvgMax	H	172	208	54	-6.56	Pass	
8847.43	37.11	6.19	1.75	45.05	AvgMax	H	160	311	54	-8.95	Pass	
6881.3	33.71	5.77	1.91	41.39	AvgMax	H	188	295	54	-12.61	Pass	
10444.9	29.4	6.29	3.57	39.26	AvgMax	V	218	267	54	-14.74	Pass	
4915.24	34.26	4.53	0.29	39.08	AvgMax	H	98	328	54	-14.92	Pass	

Note: Preview data was measured using a peak detector to identify frequencies of interest for formal measurement. Formal data consist of all frequencies in the preview list within 6 dB of specification limit or the top six frequencies. Failure in preview data does not necessarily constitute failure in formal data.

T3a Radiated Emissions 3G-18GHz FCC Class B limits Transmit Configuration 20

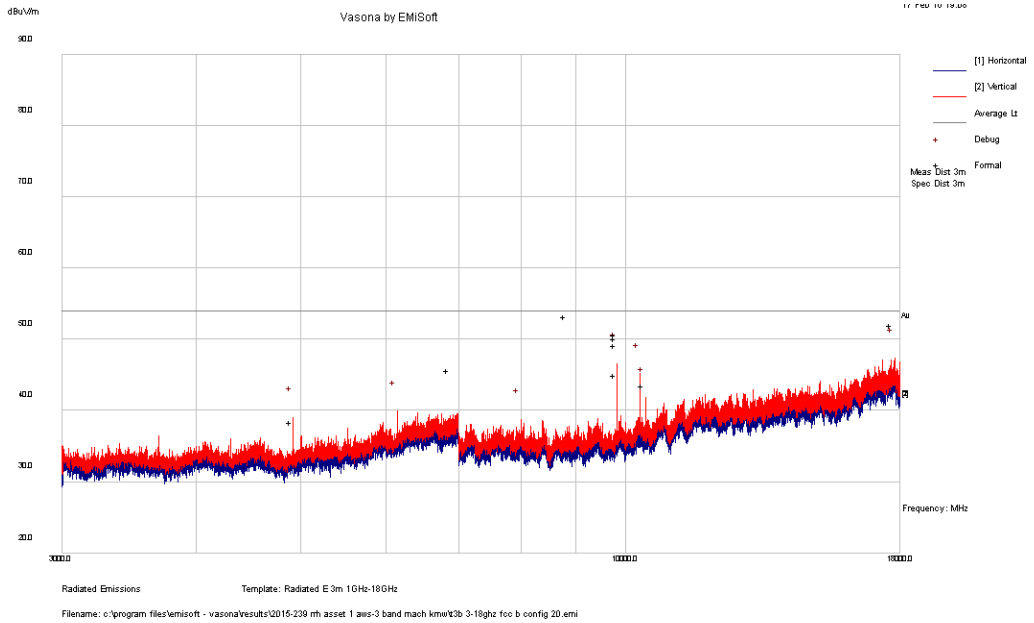


Results Title:	Radiated E 3m 1GHz-18GHz
File Name:	c:\program files\emisoft - vasona\results\2015-239 rrh asset 1 aws-3 band mach kmw\t3a 3-18ghz fcc b config 20.emi
Test Laboratory:	GPCL AR6-MH 23C, 27%RH, 998mB
Test Engineer:	MJS/GM
Test Software:	Vasona by EMISoft, version 2.161
Equipment:	Nokia
EUT Details:	FDD RRH for Asset 1.0 AWS-3 band with machined KMW filter. PRI04408.
Configuration:	Powered by -48Vdc 15Amps, Configuration 20; Blocks AB & EF 45 watts, 15M BW and 10 M BW's. 64QAM and 16 QAM with Tx 1 = 2122.5MHz and Tx 2 = 2145 MHz. 1-ASIG and 1-Alarm cable, with dc power cable untwisted. ESI-E704, H/P - E123, Horn Antenna - E1073, HPF – E1116 on preamp input. Bandwidths for preliminary test are 100 k/ 300kHz, with 1MHz RBW formals. RE 3GHz-18GHz, FCC Class B limits.
Date:	2016-02-17 18:19:13

FORMAL DATA												
Freq. (MHz)	**Raw (dBuV)**	**Cable (dB)**	**Factor (dB)**	**Level (dBuV/m)**	**Emission Type**	**Pol (H/V)**	**Ht (cm)**	**Az (deg)**	**Limit (dBuV/m)**	**Margin (dB)**	**Pass /Fail**	**Comments**
8847.43	41.2	6.14	1.75	49.09	AvgMax	H	200	292	54	-4.91	Pass	
17762.2	29.63	8.93	9.27	47.83	AvgMax	H	382	157	54	-6.17	Pass	
9830.41	37.78	6.3	2.43	46.51	AvgMax	V	98	22	54	-7.49	Pass	
9830.41	36.3	6.3	2.43	45.03	AvgMax	V	114	346	54	-8.97	Pass	
6881.3	33.51	6.08	1.91	41.51	AvgMax	H	127	306	54	-12.49	Pass	
10444.9	29.4	6.38	3.57	39.35	AvgMax	V	228	89	54	-14.65	Pass	
4915.24	29.24	4.62	0.29	34.15	AvgMax	H	120	304	54	-19.85	Pass	

Note: Preview data was measured using a peak detector to identify frequencies of interest for formal measurement. Formal data consist of all frequencies in the preview list within 6 dB of specification limit or the top six frequencies. Failure in preview data does not necessarily constitute failure in formal data.

T3b Radiated Emissions 3G-18GHz FCC B Transmit Configuration 20 Extra formals added

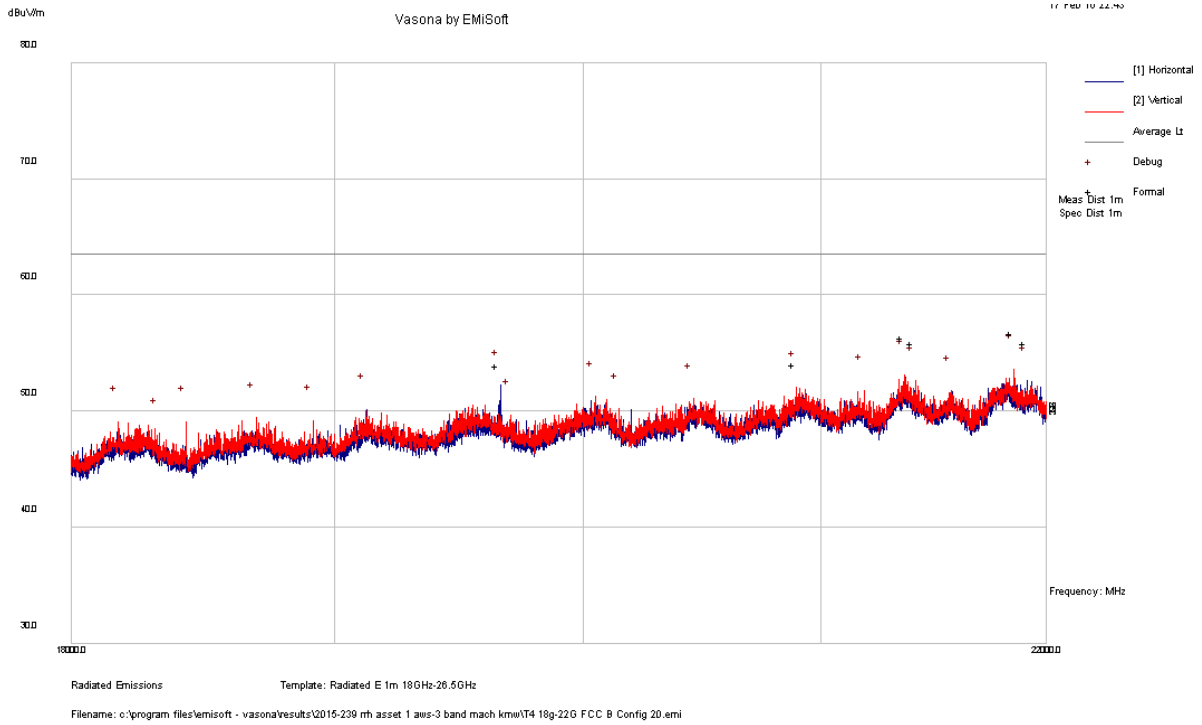


Results Title:	Radiated E 3m 1GHz-18GHz
File Name:	c:\program files\emisoft - vasona\results\2015-239 rrh asset 1 aws-3 band mach kmw\t3b 3-18ghz fcc b config 20.emi
Test Laboratory:	GPCL AR6-MH 23C, 27%RH, 998mB
Test Engineer:	MJS/GM
Test Software:	Vasona by EMISoft, version 2.161
Equipment:	Nokia
EUT Details:	FDD RRH for Asset 1.0 AWS-3 band with machined KMW filter. PRI04408.
Configuration:	Powered by -48Vdc 15Amps, Configuration 20, Blocks AB & EF 45 watts, 15M BW& 10 M BW's. 64QAM and 16 QAM with Tx 1 = 2122.5MHz and Tx 2 = 2145 MHz. 1-ASIG and 1-Alarm cable, with dc power cable untwisted. ESI-E704, H/P - E123, Horn Antenna - E1073, HPF - E1116 on preamp input. Bandwidths for preliminary test are 100 k/ 300kHz, with 1M formals. Radiated Emissions 3GHz-18Ghz to FCC Class B limits.
Date:	2016-02-17 19:08:25

FORMAL DATA												
Freq. (MHz)	**Raw (dBuV)**	**Cable (dB)**	**Factor (dB)**	**Level (dBuV/m)**	**Emission Type**	**Pol (H/V)**	**Ht (cm)**	**Az (deg)**	**Limit (dBuV/m)**	**Margin (dB)**	**Pass /Fail**	**Comments**
8847.43	41.2	6.14	1.75	49.09	AvgMax	H	200	292	54	-4.91	Pass	
17762.2	29.63	8.93	9.27	47.83	AvgMax	H	382	157	54	-6.17	Pass	
9830.41	37.78	6.3	2.43	46.51	AvgMax	V	98	22	54	-7.49	Pass	
9830.41	37.17	6.3	2.43	45.9	AvgMax	V	100	354	54	-8.1	Pass	
9830.41	36.3	6.3	2.43	45.03	AvgMax	V	114	346	54	-8.97	Pass	
6881.3	33.51	6.08	1.91	41.51	AvgMax	H	127	306	54	-12.49	Pass	
9830.41	32.05	6.3	2.43	40.78	AvgMax	V	109	358	54	-13.22	Pass	
10444.9	29.4	6.38	3.57	39.35	AvgMax	V	228	89	54	-14.65	Pass	
4915.24	29.24	4.62	0.29	34.15	AvgMax	H	120	304	54	-19.85	Pass	

Note: Preview data was measured using a peak detector to identify frequencies of interest for formal measurement. Formal data consist of all frequencies in the preview list within 6 dB of specification limit or the top six frequencies. Failure in preview data does not necessarily constitute failure in formal data.

T04 Radiated Emissions 18G-22GHz FCC B Transmit Configuration 20



Results Title:	Radiated E 1m 18GHz-26.5GHz
File Name:	c:\program files\emisoft - vasona\results\2015-239 rrh asset 1 aws-3 band mach kmw\T4 18g-22G FCC B Config 20.emi
Test Laboratory:	GPCL AR6-MH 23C, 27%RH, 998mB
Test Engineer:	MJS
Test Software:	Vasona by EMISoft, version 2.161
Equipment:	Nokia
EUT Details:	FDD RRH for Asset 1.0 AWS-3 band with machined KMW filter. PRI04408.
Configuration:	Powered by -48Vdc 15Amps, Configuration 20, Blocks AB & EF 45 watts, 15M BW and 10 M BW's. 64QAM and 16 QAM with Tx 1 = 2122.5MHz and Tx 2 = 2145 MHz. 1-ASIG and 1-Alarm cable, with dc power cable untwisted. ESI-E704, H/P - E123, Horn Antenna - E1073, Bandwidths for preliminary test are 100 k/ 300kHz, with 1M formals. RE 18GHz-22GHz to FCC Class B limits, @1 meter.
Date:	2016-02-17 22:43:52

FORMAL DATA												
Freq. (MHz)	**Raw (dBuV)**	**Cable (dB)**	**Factor (dB)**	**Level (dBuV/m)**	**Emission Type**	**Pol (H/V)**	**Ht (cm)**	**Az (deg)**	**Limit (dBuV/m)**	**Margin (dB)**	**Pass /Fail**	**Comments**
21854.5	32.16	7.84	13.73	53.74	AvgMax	V	138	49	63.5	-9.76	Pass	
21366.1	31.7	7.85	13.79	53.35	AvgMax	V	186	98	63.5	-10.15	Pass	
21914.7	31.34	7.84	13.72	52.9	AvgMax	H	196	96	63.5	-10.6	Pass	
21414.3	31.21	7.85	13.79	52.85	AvgMax	V	142	287	63.5	-10.65	Pass	
19660.5	30.28	7.28	13.36	50.92	AvgMax	H	151	337	63.5	-12.58	Pass	
20897.5	29.55	7.81	13.73	51.09	AvgMax	V	104	20	63.5	-12.41	Pass	

Note: Preview data was measured using a peak detector to identify frequencies of interest for formal measurement. Formal data consist of all frequencies in the preview list within 6 dB of specification limit or the top six frequencies. Failure in preview data does not necessarily constitute failure in formal data.

Test Equipment List
RE / AR6 / 2015-0239

Manufacturer	Model	Serial Number	Type	Description	GPCL ID	Last Cal	Interval	Status
Weinschel	2-6	BX3430	Attenuator	6 dB DC-18GHz 5 Watt	E887	3/5/2014	24	Active
Sonoma Instrument Co.	310N	185785	Amplifier	9kHz-1GHz	E494	12/3/2015	24	Active
Rohde & Schwarz	ESIB40	100121	Test Receiver	EMI (20Hz to 40 GHz)-150 +30dBM	E704	4/8/2014	24	Active
A.H. Systems Inc.	SAS-521-2	408	Bilogical Antenna	25 - 2000 MHz	E601	2/13/2015	24	Active
ETS Lindgren	3117	00135198	Horn Antenna	Double-Ridged Waveguide Horn 1-18 GHz	E1073	12/10/2014	24	Active
Trilithic	5HC2850/18050-1.8-KK	PCS-HPF-11	High Pass Filter	PCS	E988			Active
EMC Test Systems	3116	2539	Horn Antenna	Double Ridged Horn 18-40 GHz	E513	3/19/2015	24	Active
Trilithic	5HC2850/18050-1.8-KK	200113078	High Pass Filter	PCS 2.85GHz - 18.05GHz	E1116			Active

Support Equipment

Manufacturer	Model	Serial Number	Type	Description	GPCL ID or Wireless	Last Cal	Interval	Status
Hewlett Packard	437B	3125U06345	RF Power Meter		E782	3/18/2014	24	Active
Hewlett Packard	8482A	1551A02060	Power Sensor	100 KHz - 4.2GHz	E211	3/11/2015	12	Active
Fischer Custom Communications	F-203I-DCN-32mm	212	Decoupling Network		E412			Active
Agilent Technologies	N9020A	MY52090740	MXA Signal Analyzer	20Hz-26.5GHz Analyzer	UUE101	7/26/2014	24	Active

12.9 **Exhibit 17 MEASUREMENT OF FREQUENCY STABILITY**

12.9.1 **SECTION 2.1055 Measurement of Frequency Stability**

The following frequency stability test data for the **AWS LTE RRH 4x45 Band 66, FCC ID: AS5BBTRX-28** was measured as installed and tested, per Figure 12.9A.

An AC powered **AWS LTE RRH 4x45 Band 66 Outdoor** was tested over its 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 RRH 4x45 Band 66** will disable the transmitter should either the internal temperatures exceed the maximum range or the frequency stability of the transmitter be compromised.

12.9.2 **Testing**

Frequency Stability Testing was performed on a system level using the **AWS LTE RRH 4x45 Band 66 Outdoor** with a transmit frequency of 2132.5 MHz. The testing was performed from 11/12/2014 through 11/13/2014 on a **B66a RRH 4x45 B2 2x2W-AC,** S/N: LBALLU-YD155102XNY at the T-16 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 (2132.500 MHz).

The frequency stability performance of the **RRH 4x45 Band 66 Outdoor Transceiver System**, was also investigated over the voltage range of 85% to 115% of nominal line voltage. (280 VAC and 115 VAC +/- 15%) .

The frequency stability performance of the **RRH 4x45 Band 66 Outdoor Transceiver System, FCC ID: AS5BBTRX-28**, 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.

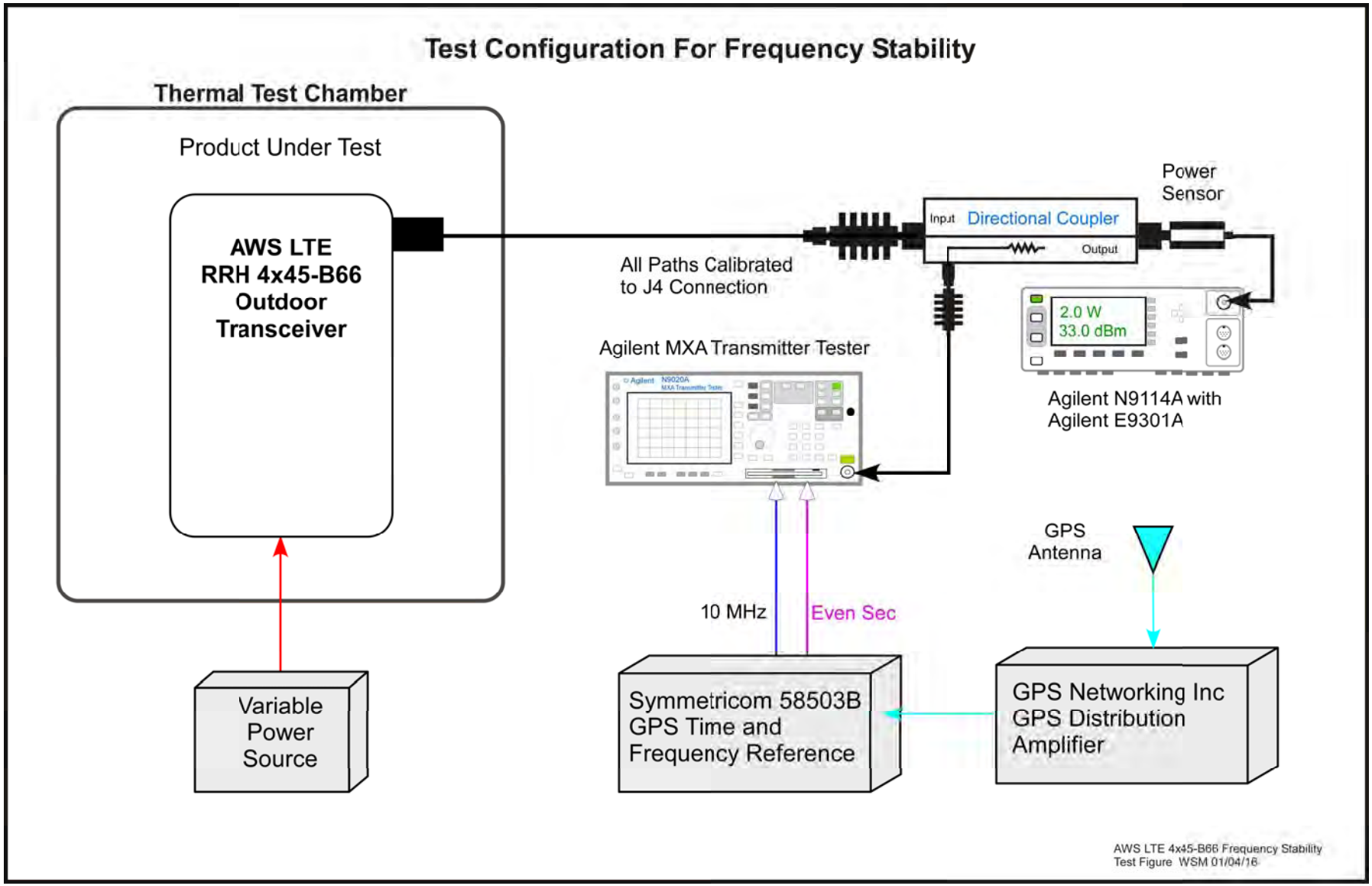
12.9.3 **Results Summary:**

The test data documented that the maximum frequency deviation of the **AWS LTE RRH 4x45 Band 66** 1950 MHz transmit carrier, when measured over voltage and temperature, was +0.00085 ppm (1.822 Hz). The reported value for conformance with the 731 form is +/- 0.05 ppm (+/- 106.625 Hz). The product also conform with Part 27.54 requirements.

Instrument Used for Measurement

Instrument Type	Serial Number	Vendor	Cal Due Date
MXA Signal Analyzer	MY5200375	AGILENT N9020A	11/17/2017
Power Meter	GB37170415	HP EPM-442A	01/11/2017
Power Sensor	MY51090017	HP 8481A	04/20/2016
Power Sensor	82-11297715	HP 8482A	03/19/2016
Multimeter	JP35001820	HP 971A	06/08/2016
Thermal Logger	S5JC04069	YOKOGAWA MV2000	03/05/2017
GPS Receiver	KR93200773	SYMMETRICOM 58503B	No Cal Req.
Power supply	13N5112J	TDK-LAMBDA GEN60-85-3P208	No Cal Req.

Figure 12.9


Test Configuration For Frequency Stability
Thermal Test Chamber
Product Under Test
AWS LTE
RRH 4x45-B66
Outdoor
Transceiver
Variable
Power
Source
All Paths Calibrated
to J4 Connection
Input
Directional Coupler
Output
Power
Sensor
2.0 W
33.0 dBm
Agilent N9114A with
Agilent E9301A
Agilent MXA Transmitter Tester
10 MHz
Even Sec
GPS
Antenna
Symmetricom 58503B
GPS Time and
Frequency Reference
GPS Networking Inc
GPS Distribution
Amplifier
AWS LTE 4x45-B66 Frequency Stability
Test Figure WSM 01/04/16

Frequency Block Tested: ***PRI04408 - FDD RRH for Asset 1.0 AWS-3 band with machined KMW filter (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	1.245
0.5	0.840
1.0	0.776
1.5	0.357
2.0	0.759
2.5	0.623
3.0	1.512
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +50°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.738
0.5	0.625
1.0	1.043
1.5	1.932
2.0	0.432
2.5	0.894
3.0	0.856
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +40°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.766
0.5	1.822
1.0	0.894
1.5	1.020
2.0	0.903
2.5	1.005
3.0	0.831
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +30°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.528
0.5	0.834
1.0	0.548
1.5	0.720
2.0	0.498
2.5	0.568
3.0	0.986
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +20°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	1.114
0.5	0.818
1.0	0.569
1.5	1.432
2.0	0.801
2.5	0.973
3.0	0.713
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +10°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.998
0.5	0.757
1.0	1.437
1.5	1.012
2.0	0.914
2.5	0.824
3.0	0.581
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at 0°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.947
0.5	1.214
1.0	1.355
1.5	0.669
2.0	0.710
2.5	0.908
3.0	0.636
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at -10°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.858
0.5	1.001
1.0	0.905
1.5	1.071
2.0	0.747
2.5	0.503
3.0	0.846
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at -20°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.527
0.5	1.135
1.0	1.501
1.5	0.942
2.0	0.609
2.5	0.780
3.0	0.837
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at -30°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.852
0.5	0.686
1.0	1.240
1.5	1.031
2.0	0.870
2.5	0.631
3.0	1.253
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625 Hz
FCC RESULT	PASS

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	0.706
0.5	0.862
1.0	1.531
1.5	0.939
2.0	0.587
2.5	1.120
3.0	0.635
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at 103% of Nominal Voltage, -49.44VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.803
0.5	1.432
1.0	1.070
1.5	0.986
2.0	0.947
2.5	0.831
3.0	0.737
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at 106% of Nominal Voltage, -50.88VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.947
0.5	0.682
1.0	0.887
1.5	0.896
2.0	1.012
2.5	0.775
3.0	0.857
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at 109% of Nominal Voltage, -52.32VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.737
0.5	1.060
1.0	1.104
1.5	0.916
2.0	0.721
2.5	0.897
3.0	0.740
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at 112% of Nominal Voltage, -53.76VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.816
0.5	1.281
1.0	0.539
1.5	0.908
2.0	0.820
2.5	0.991
3.0	1.012
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at 115% of Nominal Voltage, -55.20VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.897
0.5	0.781
1.0	1.362
1.5	1.017
2.0	0.963
2.5	0.929
3.0	0.771
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at 100% of Nominal Voltage, -48.0VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.371
0.5	0.703
1.0	1.121
1.5	0.668
2.0	1.014
2.5	0.573
3.0	0.781
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at -3% of Nominal Voltage, -46.56VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.848
0.5	1.016
1.0	0.761
1.5	0.626
2.0	0.840
2.5	0.933
3.0	0.641
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at -6% of Nominal Voltage, -45.12VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	1.022
0.5	1.010
1.0	0.703
1.5	0.605
2.0	0.570
2.5	1.310
3.0	0.756
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at -9% of Nominal Voltage, -43.68VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	1.611
0.5	0.723
1.0	0.562
1.5	0.539
2.0	0.658
2.5	0.813
3.0	0.946
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at -12% of Nominal Voltage, -42.24VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.925
0.5	0.809
1.0	0.963
1.5	0.777
2.0	0.813
2.5	0.921
3.0	1.014
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625 Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at -15% of Nominal Voltage, -40.80VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	1.003
0.5	0.736
1.0	0.384
1.5	0.803
2.0	0.687
2.5	0.834
3.0	0.981
FCC SPECIFICATION	±2132.5 MHz (±0.05ppm) ±0.05ppm = ±106.625 Hz
FCC RESULT	PASS

12.10 **Exhibit 12.10 Test Setup Photos KDB726920 Test Setup Photographs->**

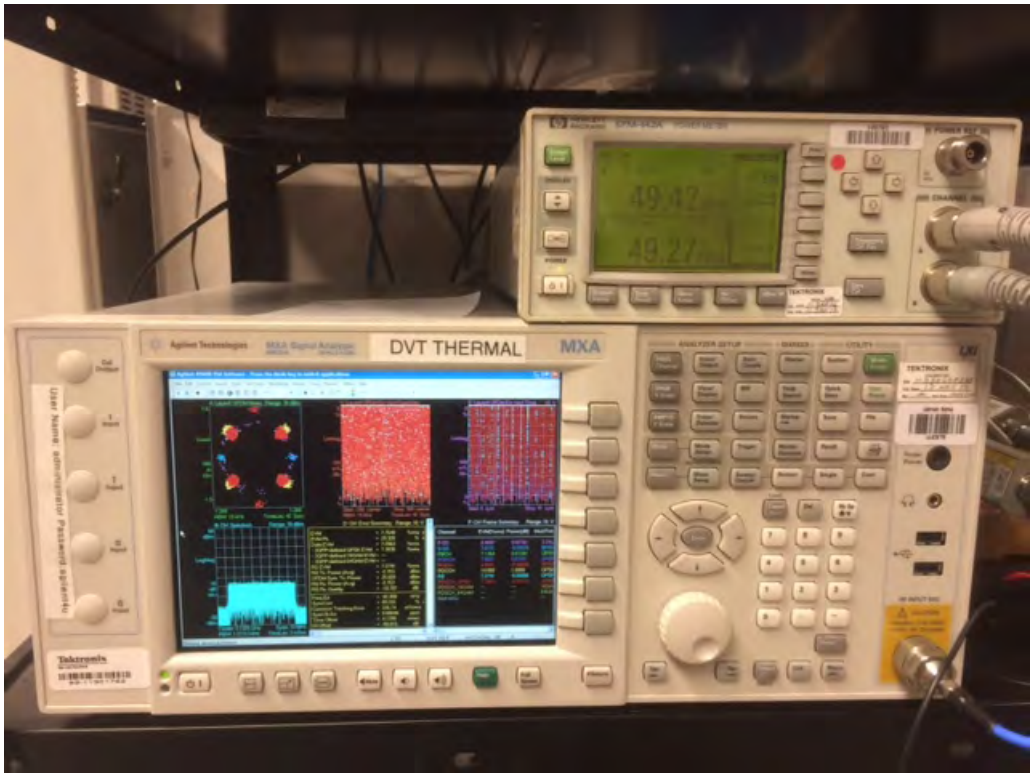
Response:
The photographs of the test setups for **AWS B66a RRH 4x45, FCC ID; FCC ID: AS5BBTRX-28** are attached below.

Test Setup for RF Power, Modulation, PAR, Occupied Bandwidth and Conducted Spurious Emissions.

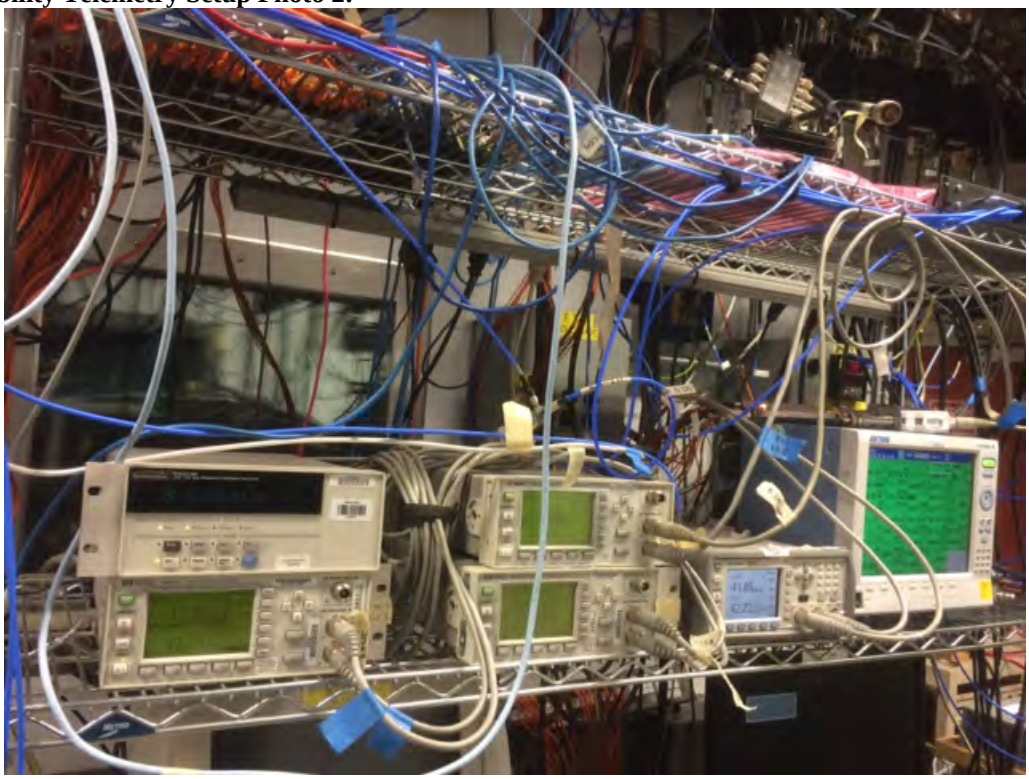
Frequency Stability Test setup Photos.

Chamber Setup Photo:

Frequency Stability Telemetry Setup Photo 1:

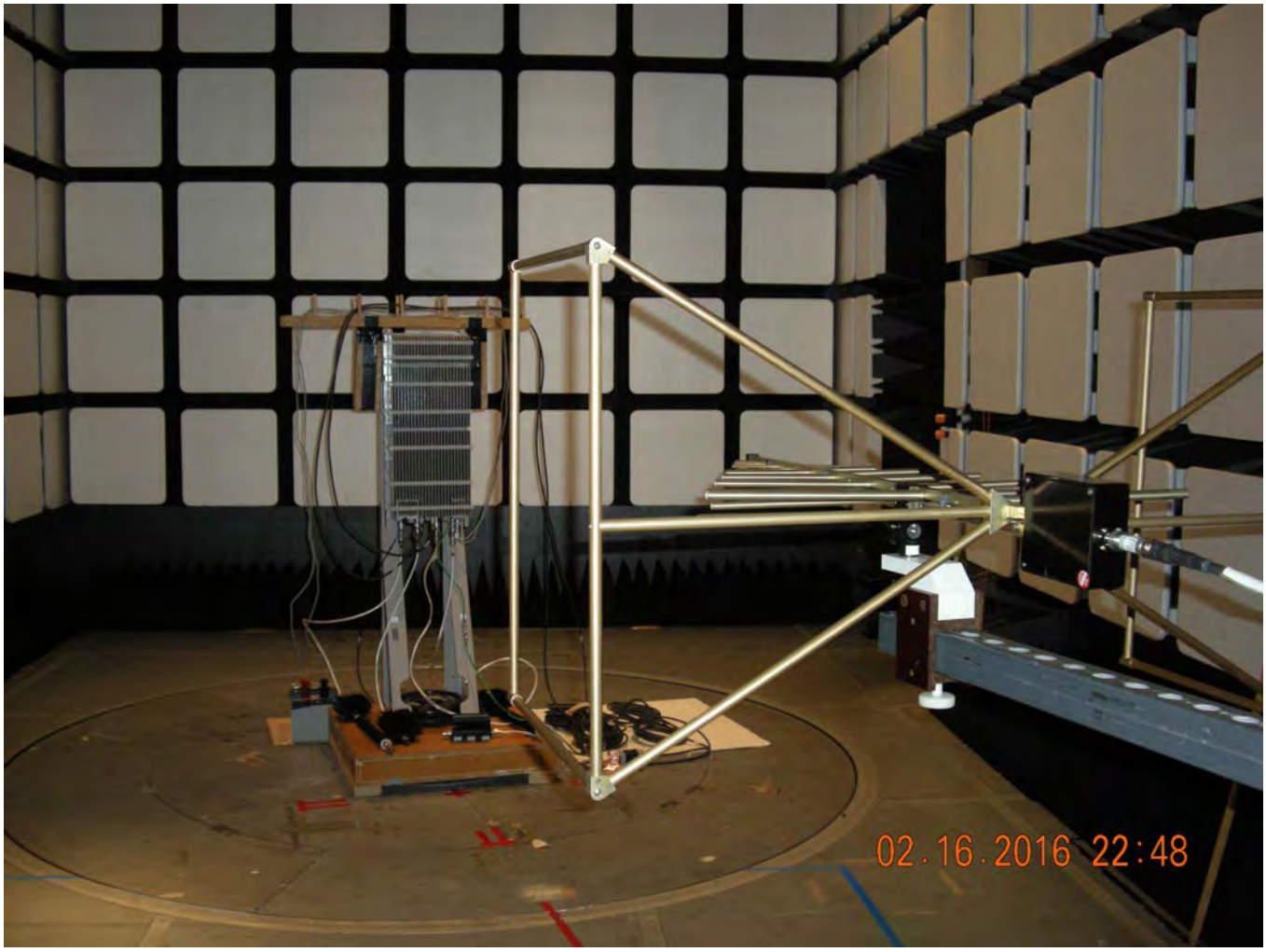


Frequency Stability Telemetry Setup Photo 2:

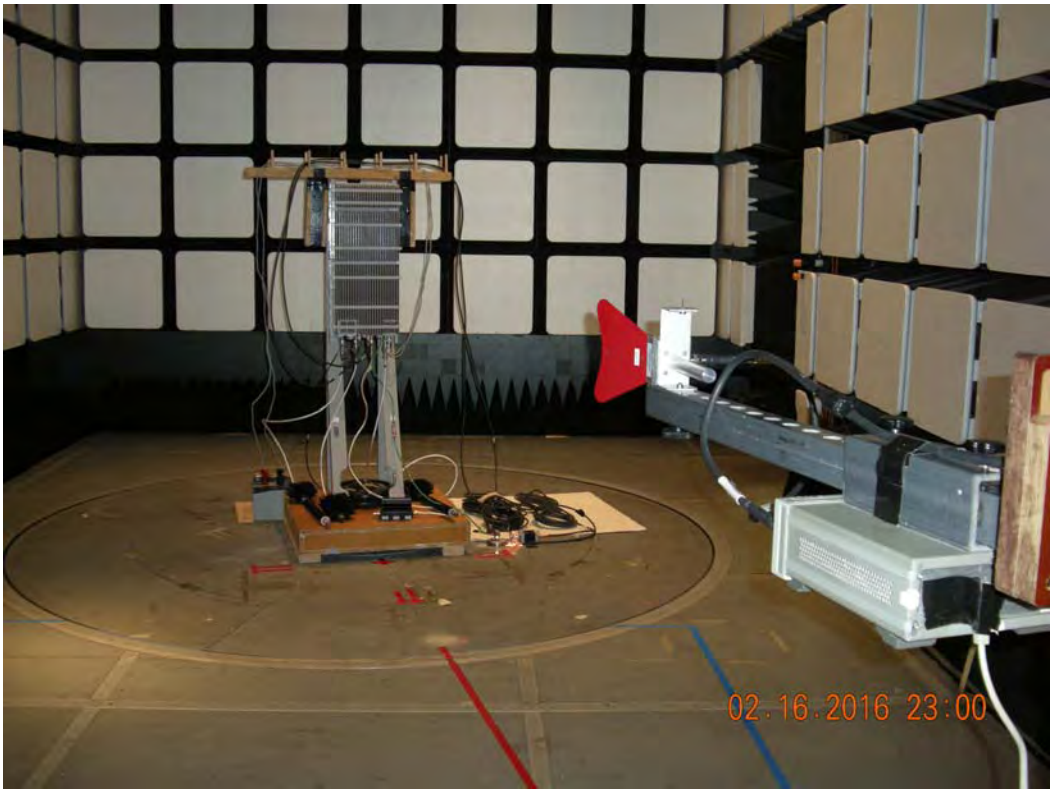


Radiated Emissions Test Setup

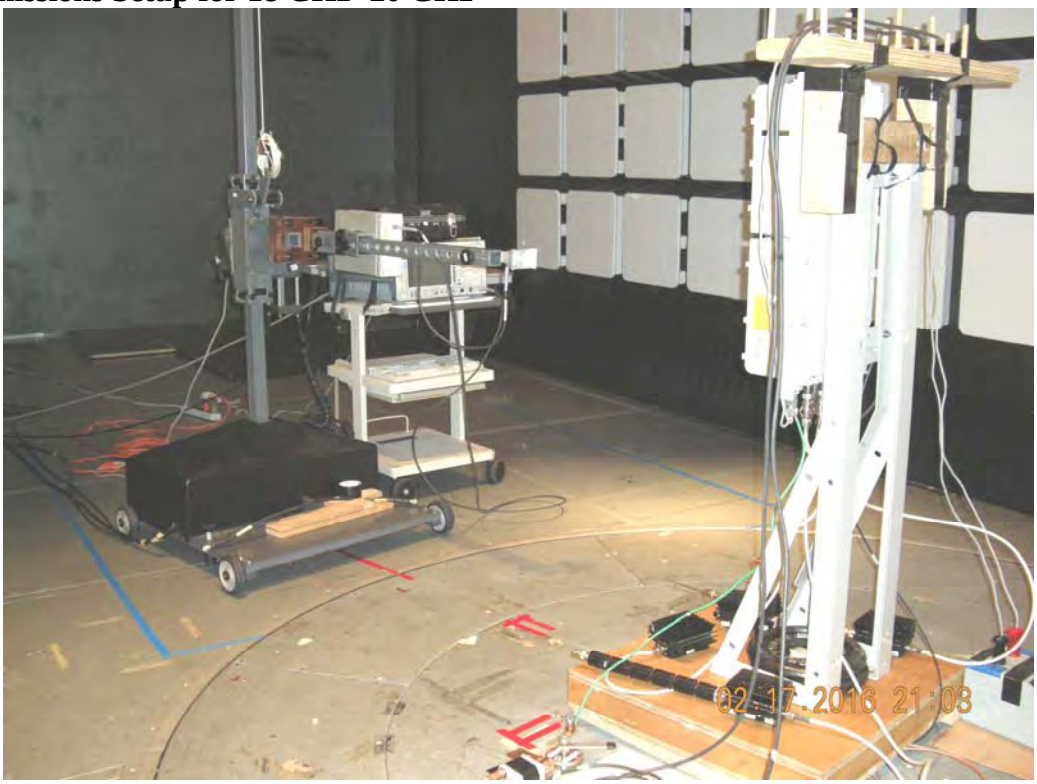
Radiated Emissions Setup for 30 MHz – 1 GHz



Radiated Emissions Setup for 1 GHz – 18 GHz

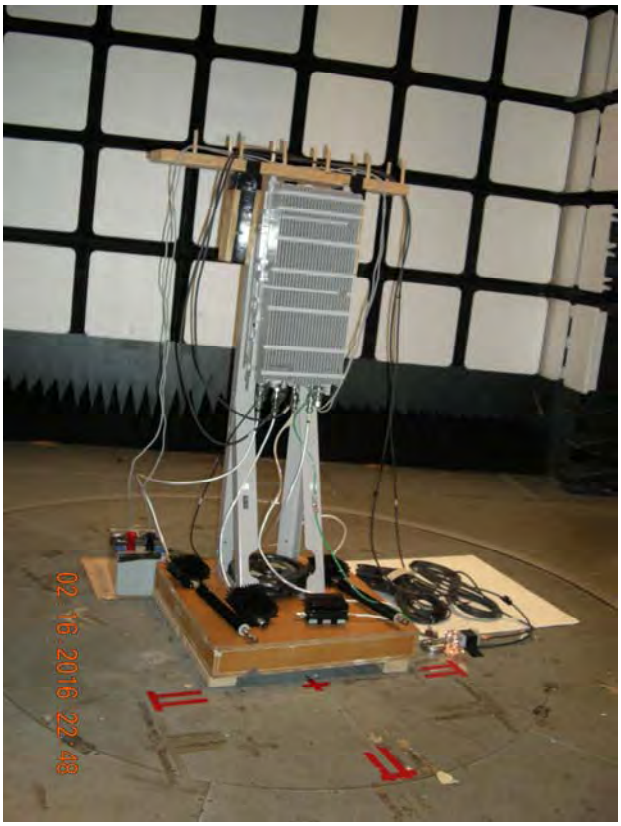


Radiated Emissions Setup for 18 GHz- 20 GHz

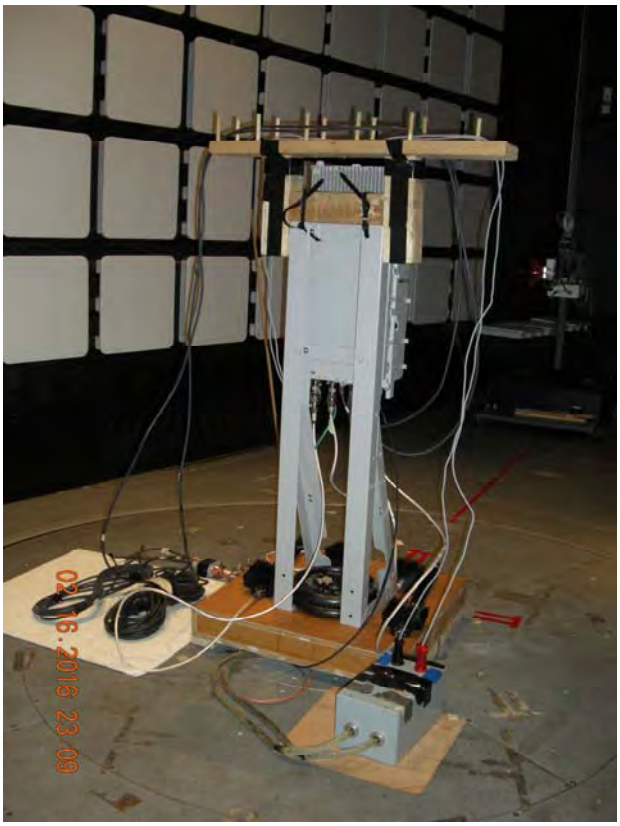


Radiated Emissions Test Configuration for B66a RRH 4x45, FCC ID; FCC ID: AS5BBTRX-28

Front



Rear



Bottom

United States Department of Commerce
National Institute of Standards and Technology

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NVLAP LAB CODE: 100275-0

Alcatel-Lucent, Global Product Compliance Lab
Murray Hill, NJ

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

Electromagnetic Compatibility & Telecommunications

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2015-09-14 through 2016-09-30
Effective Dates

DEPARTMENT OF COMMERCE · UNITED STATES OF AMERICA

For the National Voluntary Laboratory Accreditation Program