

APPLICANT: **Alcatel-Lucent**

FCC ID: **AS5BBTRX-02**
Class II Change

TEST REPORT

MEASUREMENT PER SECTION 2.1033 (C) (14) OF THE RULES

SECTION 2.1033 (c) (14)

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

RESPONSE:

The following pages include the data required for the **AS5BBTRX-02**, measured in accordance with the procedures set out in Section 2. 1033 (c) (14) of the Rules.

Each required measurement and its corresponding exhibit number are:

Measurement: 1	Section 2.1046	RF Power Output - See Measurement 3
Measurement: 2	Section 2.1047 Section 27.50(d)(5)	Modulation Characteristics Peak-to-Average ratio (PAR)
Measurement: 3	Section 2.1049	(a) Emissions Bandwidth (b) Occupied Bandwidth/Band Edge spurious Emissions
Measurement: 4	Section 2.1051	Spurious Emissions at Antenna Terminals
Measurement: 5	Section 2.1053	Field Strength of Spurious Radiation
Measurement: 6	Section 2.1055	Measurement of Frequency Stability
	Section 2.1057	Frequency Spectrum to be Investigated

Measurement 1

FCC Section 2.1046 RF Power output

Refer to Measurement 3 Occupied Bandwidth Measurement during that measurement RF Output was continuously monitored.

Measurement 2

FCC Section 2.1047 Modulation Characteristics

&

Section 27.50(d)(5)

Measurement of Peak-to-Average ratio (PAR)

Section 2.1047 Modulation Characteristics

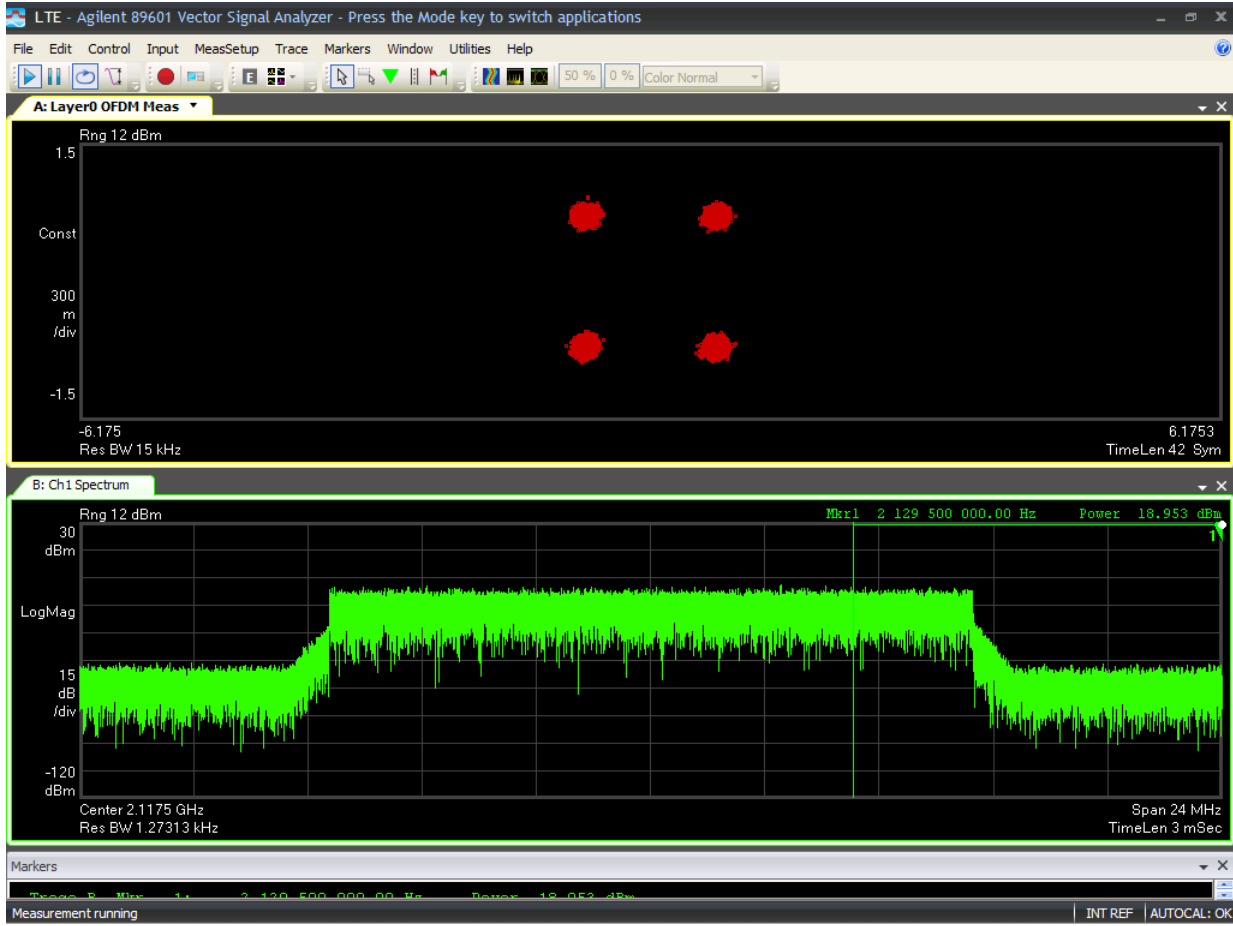
The modulation techniques used are explained in the submission as part section 2.1033 (c) (13). The RF signal at the antenna port was demodulated and verified for correctness of modulation signal used before each test was performed. The attached plots of graphs show the modulation components: In phase (I) and Quadrature (Q) components.

- (1) Quadrature Phase Shift Keying (QPSK) modulation scheme uses 2 bits are transmitted simultaneously (one per channel) and a symbol can be represented by 2 bits. Therefore there are $2^2 = 4$ states (Binary 00 to 11). The theoretical bandwidth is 2bits/second/Hz.
- (2) 16 Quadrature amplitude modulation (QAM): In 16QAM, there 16-states. There are four I values and four Q values, therefore 4 bits are available for represent a symbol. Therefore there are $2^4 = 16$ states (Binary 0000 to 1111). The theoretical bandwidth is 4bits/second/Hz.
- (3) 64 Quadrature amplitude modulation (QAM): In 64QAM: The 64QAM is similar to 16QAM and there will be 64 states and 6 bits are available to represent a symbol.

Section 27.50(d)(5) Measurement of Peak-to-Average ratio (PAR)

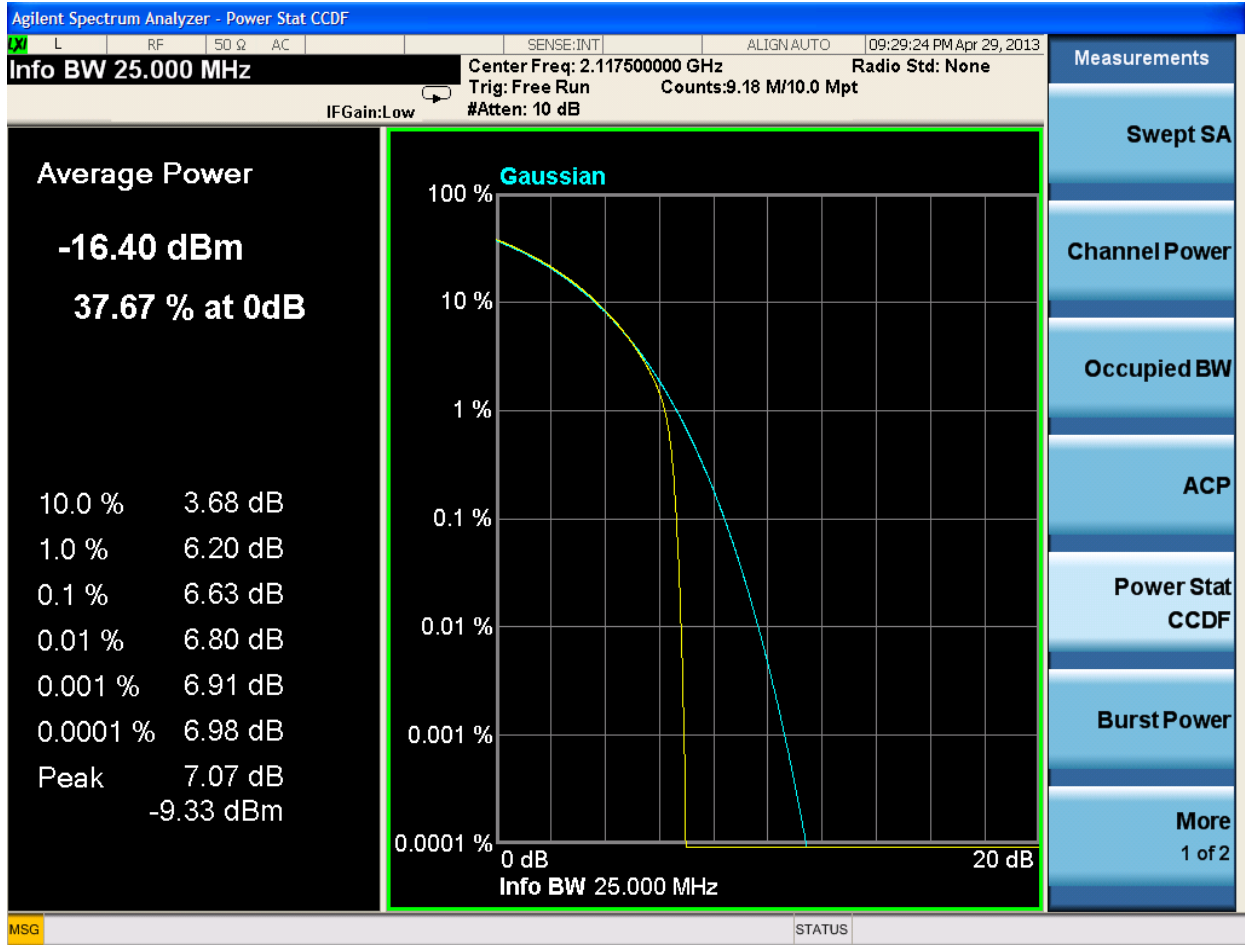
The peak-to-average (PAR) is plotted along with demodulated constellation plots. The plots show that average and peak values in dBm. The difference of peak-to-averages ratio does not exceed 13 dB as required in section 27.50(d) (5).

QPSK MODULATION
2117.5MHz (15MHz BW)



LTE 9442 RRH 2X40-AWS
FCC Part 27.53 Blocks A+B1; QPSK Modulation; PWR: 40 (2x40W MIMO)
FCCID: AS5BBTRX-02
TEST ENGINEER: JY

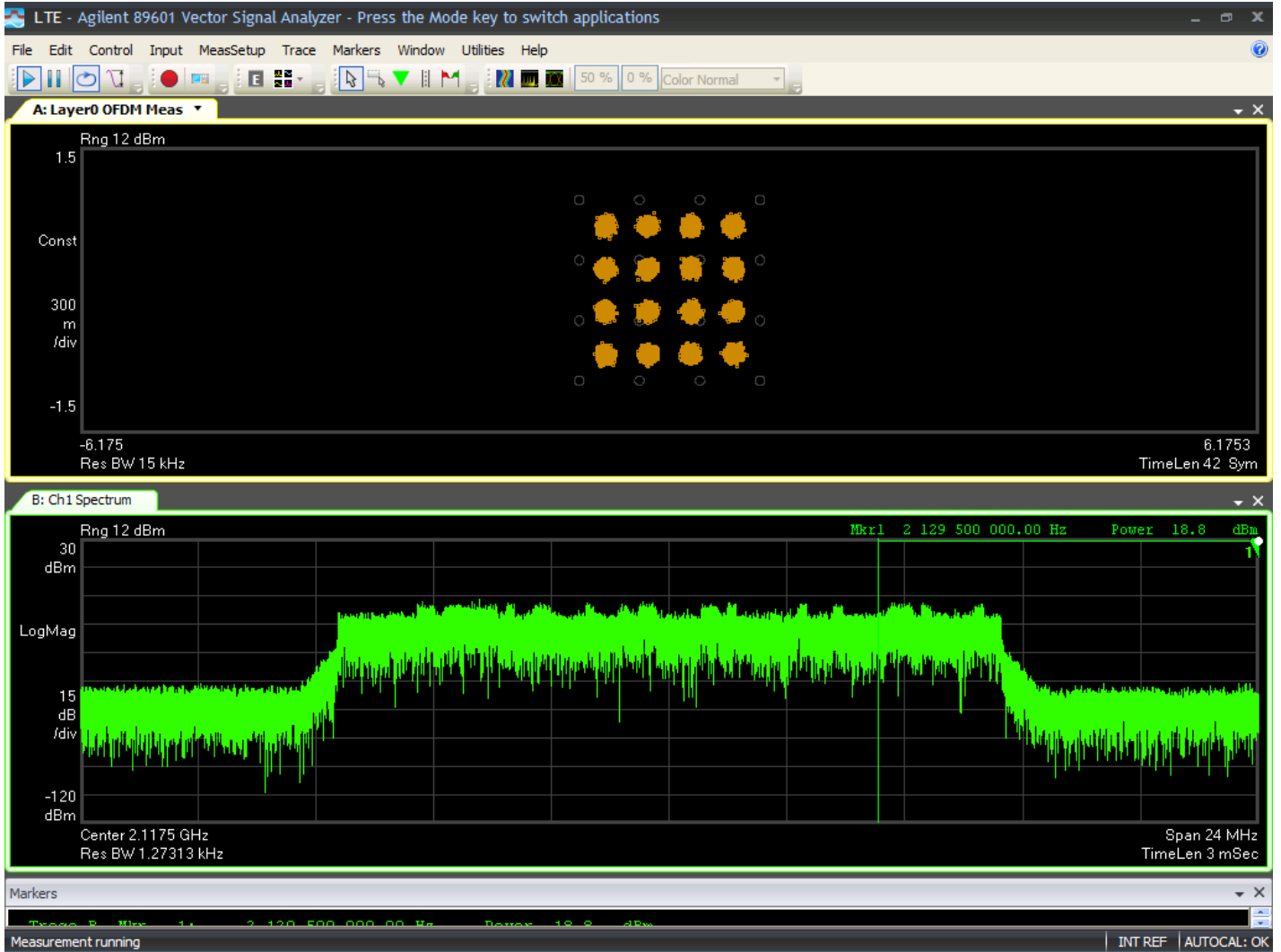
Peak to Average
QPSK
2117.5MHz (15 MHz BW)



APPLICANT: **Alcatel-Lucent**

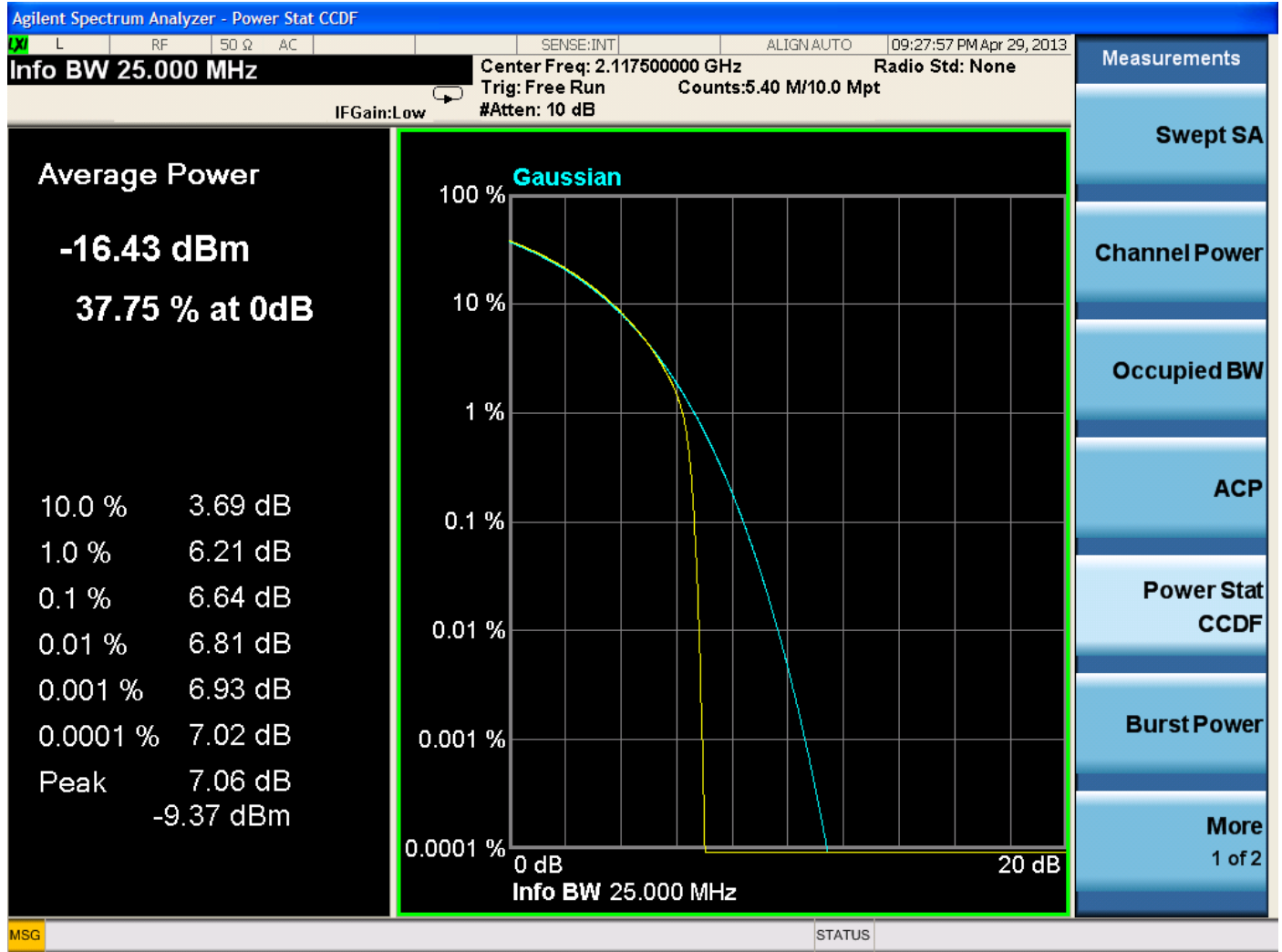
FCC ID: **AS5BBTRX-02**
Class II Change

16QAM MODULATION
2117.5MHz (15MHz BW)

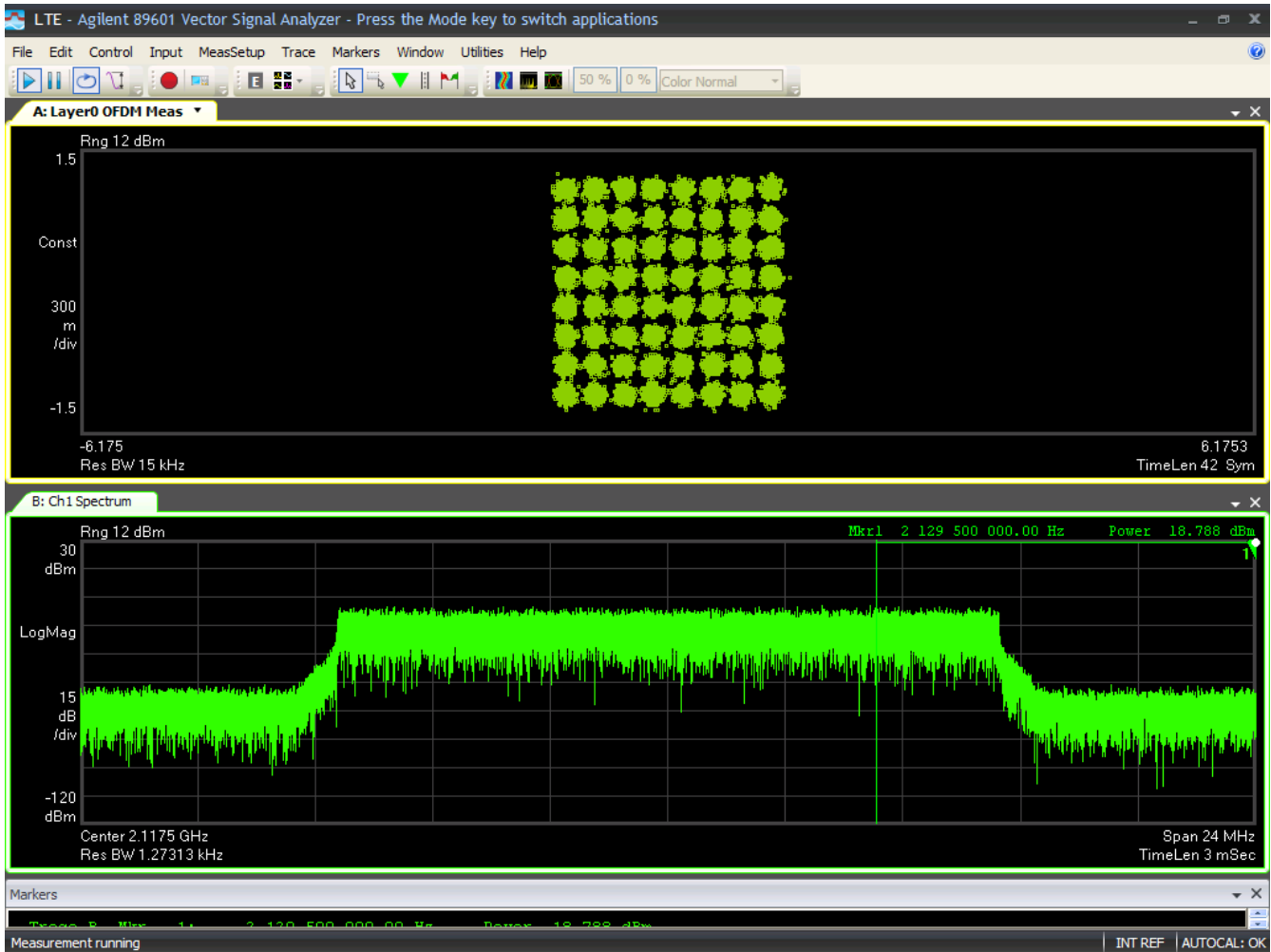


LTE 9442 RRH 2X40-AWS
FCC Part 27.53 Blocks A+B1; 16QAM Modulation; PWR: 40 (2x40W MIMO)
FCCID: AS5BBTRX-02
TEST ENGINEER: JY

Peak to Average
16QAM
2117.5MHz (15 MHz BW)

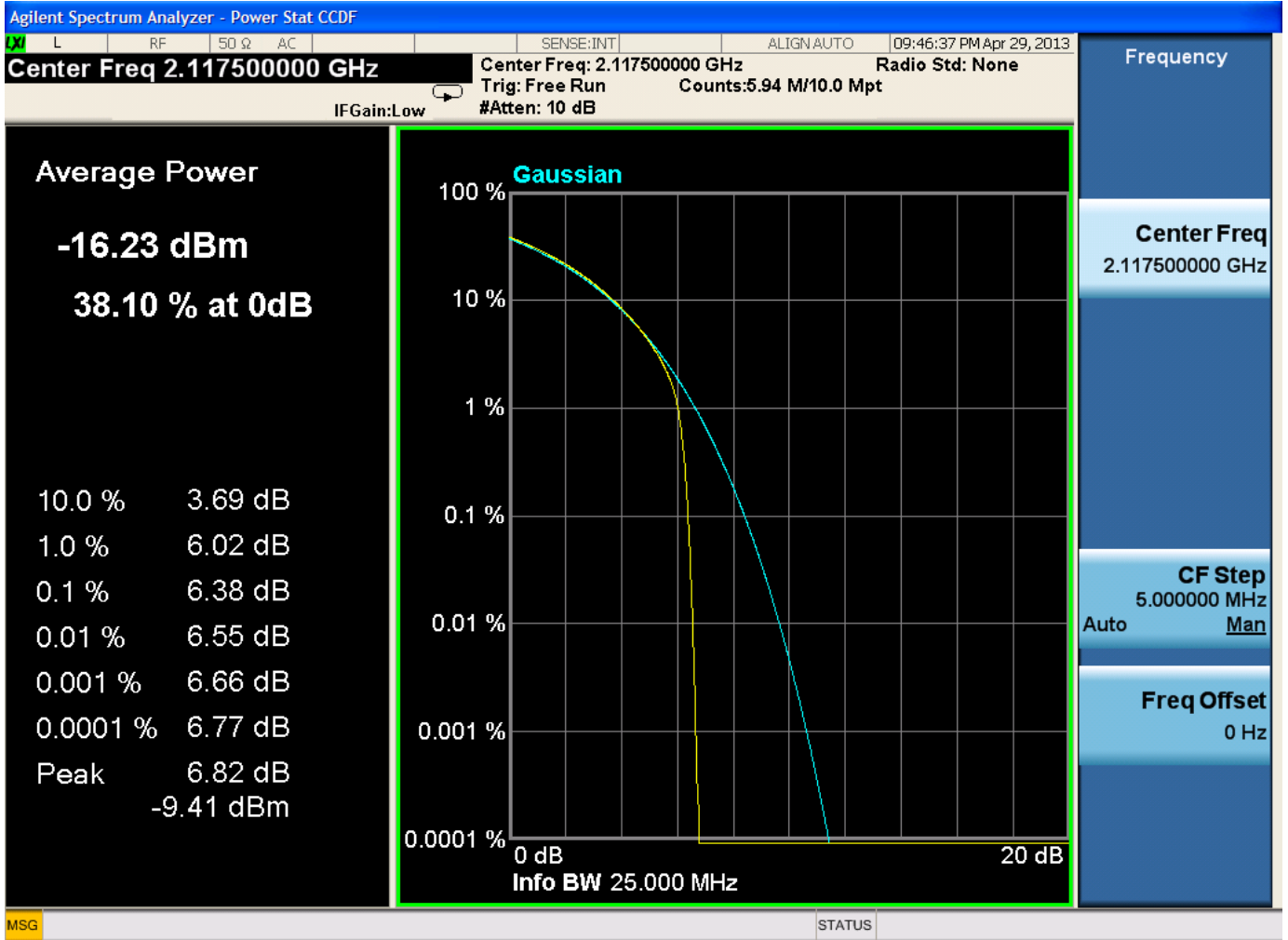


64QAM MODULATION 2117.5MHz (15MHz BW)



LTE 9442 RRH 2X40-AWS
FCC Part 27.53 Blocks A+B1; 64QAM Modulation; PWR: 40 (2x40W MIMO)
FCCID: AS5BBTRX-02
TEST ENGINEER: JY

Peak to Average
64QAM
2117.5MHz (15 MHz BW)



Measurement 3

FCC Section 2.1049

- (a) Emissions Bandwidth Measurement
- (b) Occupied Bandwidth Measurement showing spurious Emissions 1MHz close to Block edges.

Spectrum Bandwidth Measurement For Emissions Type

FCC approved measurement method for Spectrum Bandwidth.

(A) 26 dB Band width.

This method was used to measure the bandwidth at modulations and highest is recorded. The modulations used are:

1. QPSK
2. 16 QAM
3. 64 QAM

Highest Bandwidth is used for Emissions type designation: 14.28 MHz for 15 MHz Bandwidth.
Therefore, Measured Emission type: **14M28F9W** for 15MHz Bandwidth.

**MEASUREMENT OF SPECTRUM BANDWIDTH
26 dB POWER BANDWIDTH**

**(b) MEASUREMENT OF
SPECTRUM BANDWIDTH
For Emissions Type**

The occupied bandwidth of the Long Term Evolution (LTE) is measured using a Rohde & Schwarz ESI Spectrum Analyzer/Receiver and a Printer. The emissions bandwidth is provided in section 27.53 (h) (3) is used. Accordingly “The emissions bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power.”

The measurements were made on a “**LTE 9442 RRH2X40-AWS**” with **15 MHz Carrier** in the following configurations:

1. QPSK
2. 16 QAM
3. 64 QAM

Results:

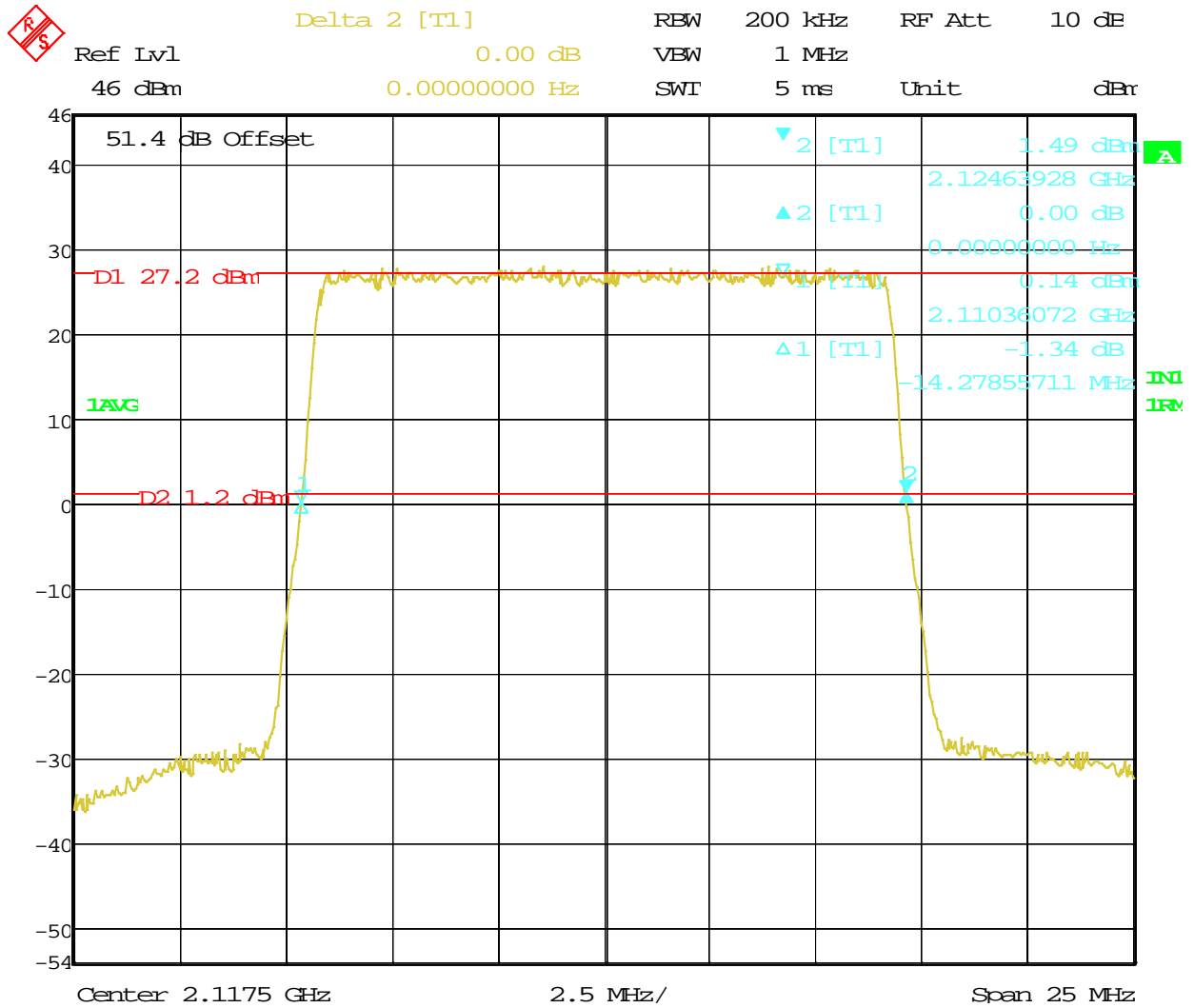
The plots are provided for QPSK, 16QAM and 64QAM modulations for 15 MHz band.
The Measured 26dB emissions bandwidth is 14.28 MHz for 15 MHz band.

Block: A+B1

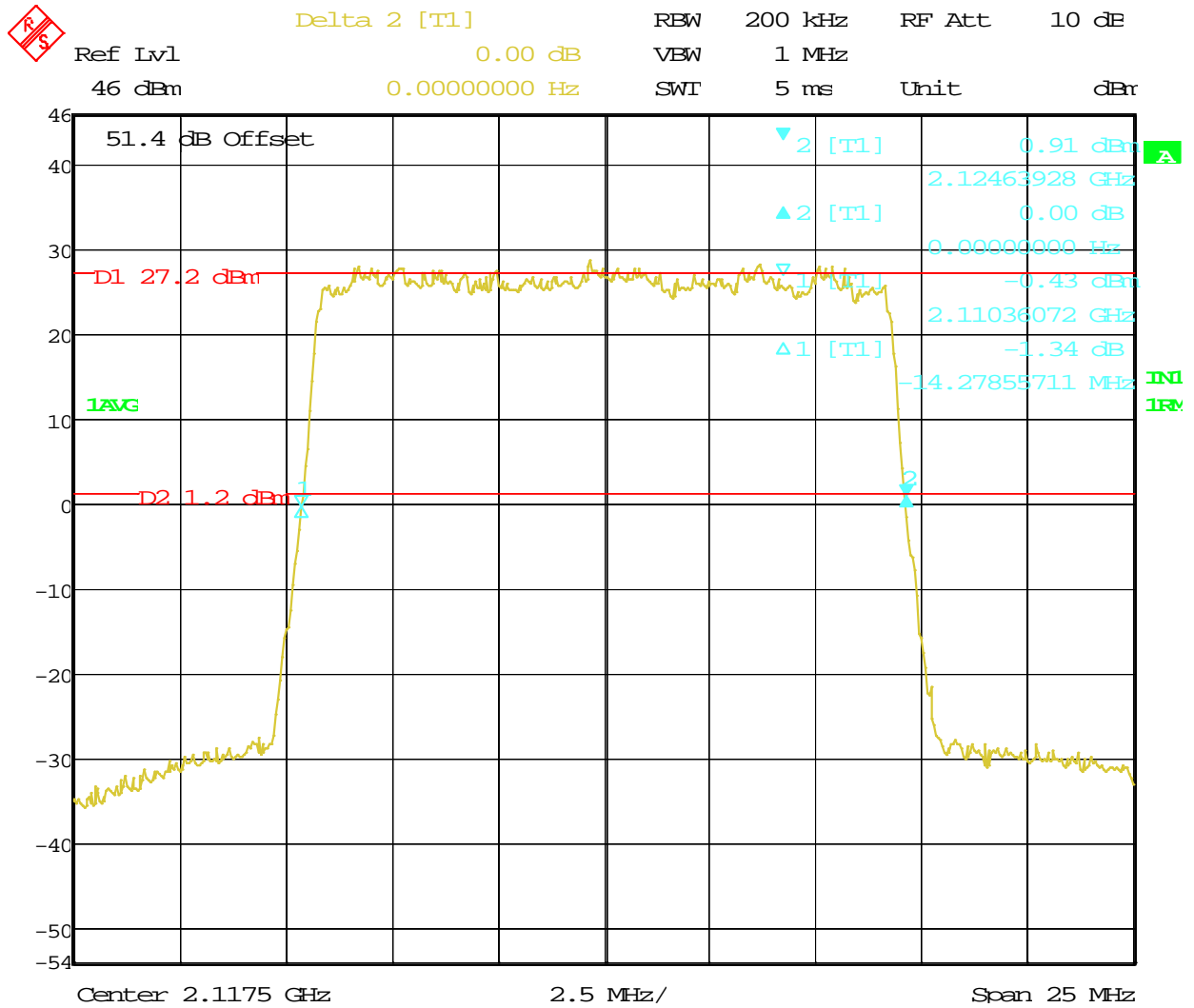
15MHz Bandwidth (2110 – 2125 MHz)

2x40 watts (MIMO)

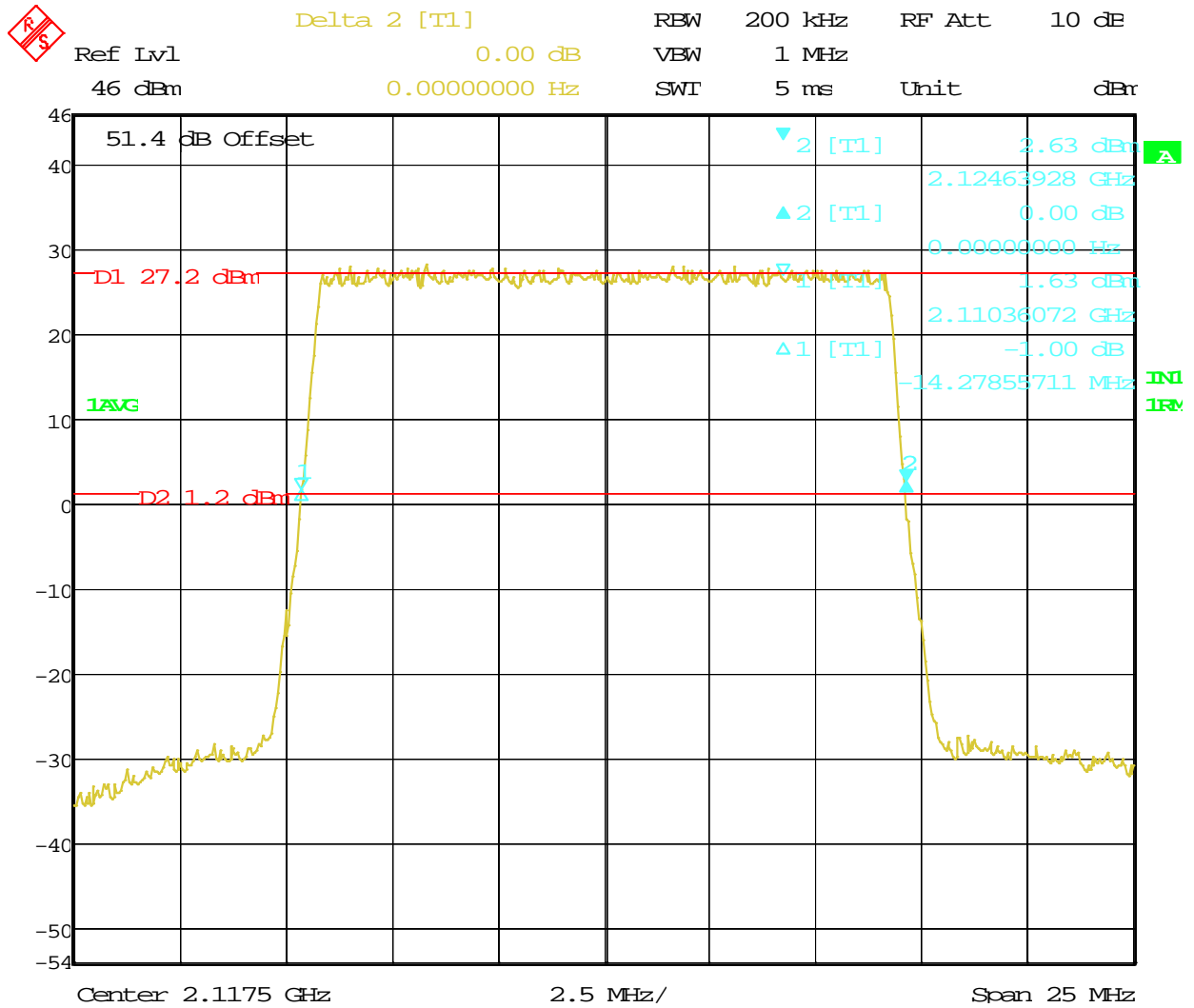
(26dB Bandwidth)



Title: 26dB BANDWIDTH; Test Engineer: JY
 Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:A+B1; 2110-2125 MHz; PWR:40W
 OPSK; FCC PRT 27; FCCID:AS5BBTRX-02; CLASS 2 CHNG
 Date: 26.APR.2013 13:43:10



Title: 26dB BANDWIDTH; Test Engineer: JY
 Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:A+B1; 2110-2125 MHz; PWR:40W
 16QAM; FCC PRT 27; FCCID:AS5BBTRX-02; CLASS 2 CHNG
 Date: 29.APR.2013 07:50:40



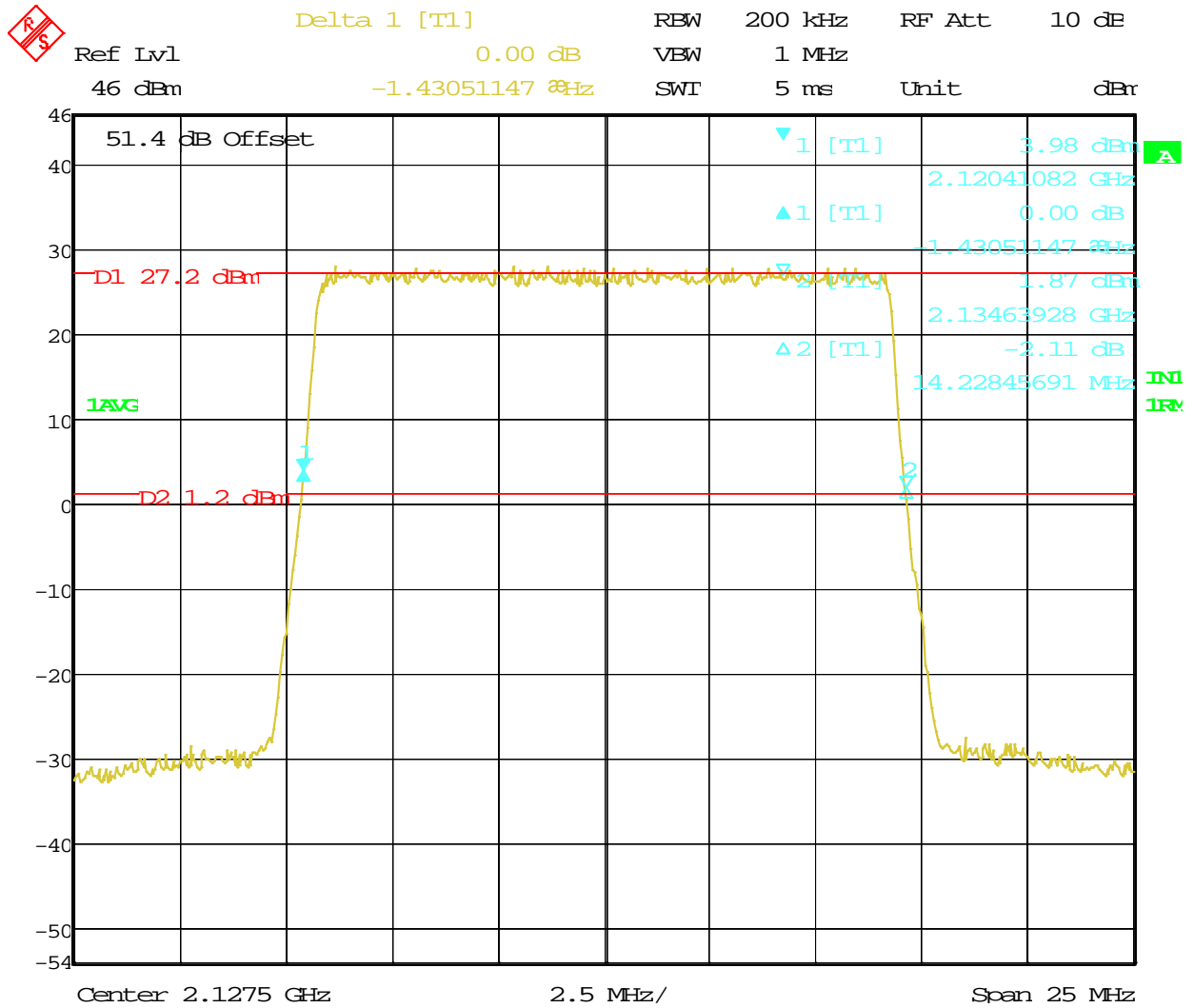
Title: 26dB BANDWIDTH; Test Engineer: JY
 Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:A+B1; 2110-2125 MHz; PWR:40W
 64QAM; FCC PRT 27; FCCID:AS5BBTRX-02; CLASS 2 CHNG
 Date: 29.APR.2013 08:52:50

Block: B+C

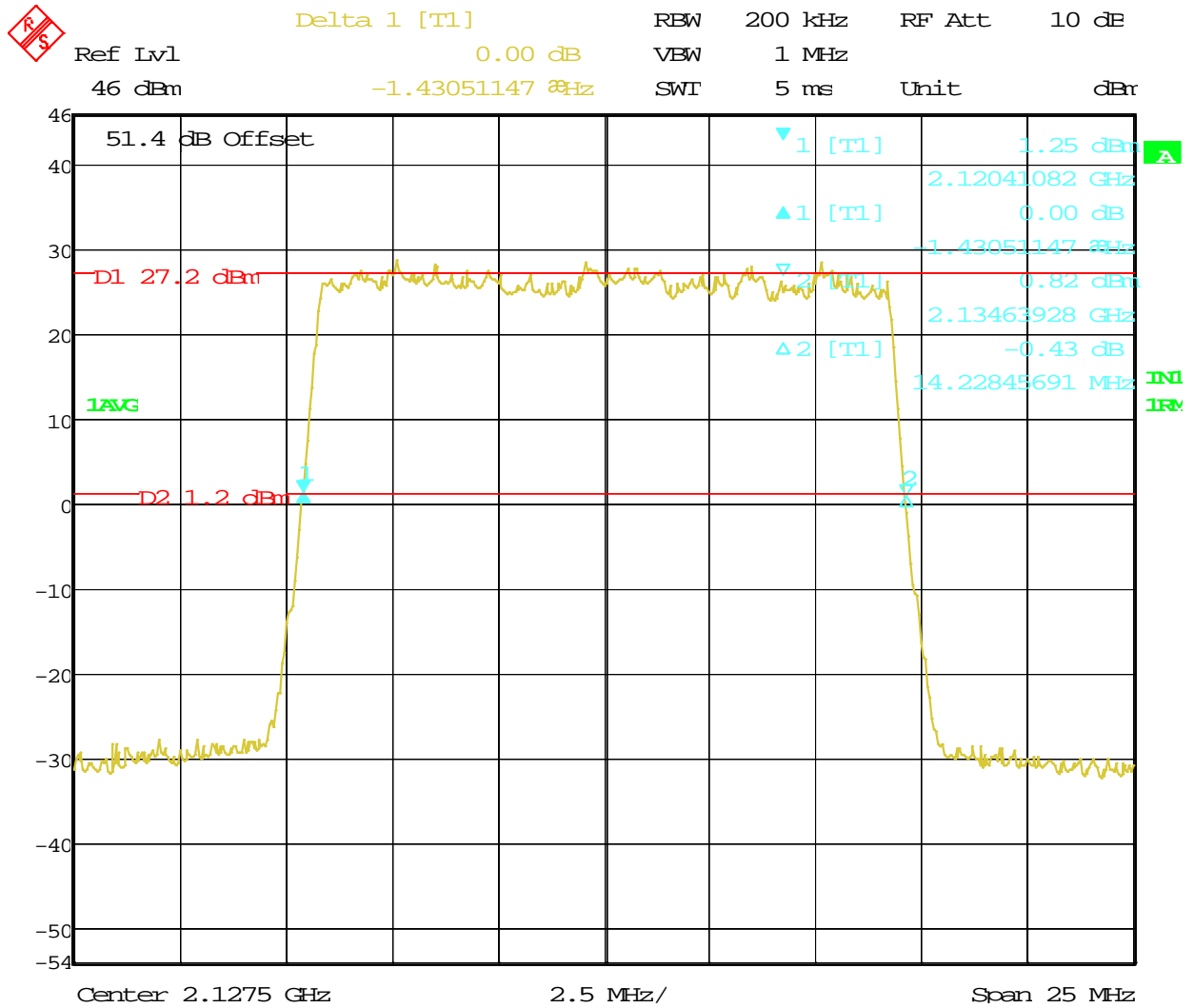
15 MHz Bandwidth 2120 – 2135 MHz

2x40 watts (MIMO)

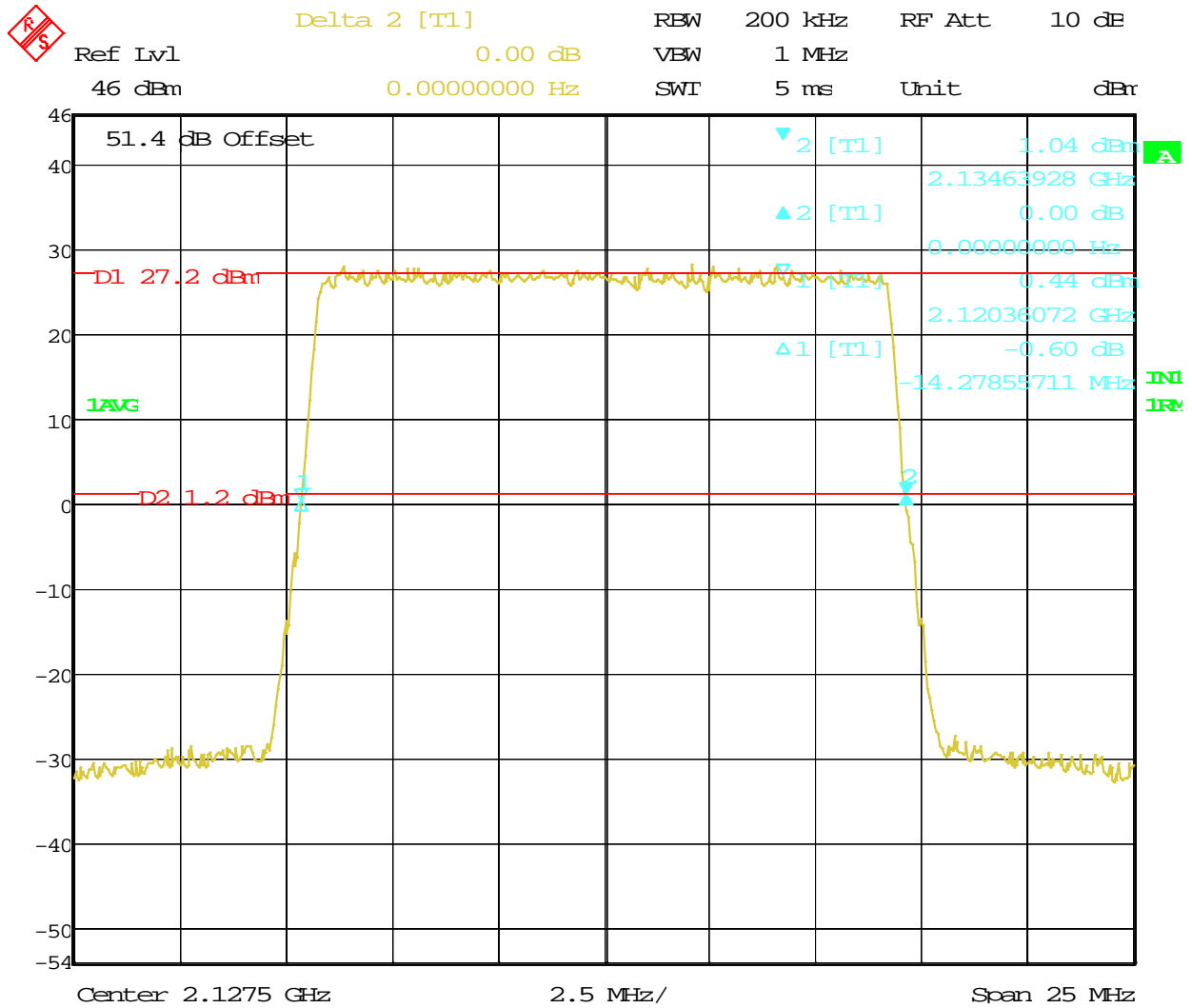
(26dB Bandwidth)



Title: 26dB BANDWIDTH; Test Engineer: JY
 Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:B+C; 2120-2135 MHz; PWR:40W
 OPSK; FCC PRT 27; FCCID:AS5BBTRX-02; CLASS 2 CHNG
 Date: 29.APR.2013 10:52:35



Title: 26dB BANDWIDTH; Test Engineer: JY
 Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:B+C; 2120-2135 MHz; PWR:40W
 16QAM; FCC PRT 27; FCCID:AS5BBTRX-02; CLASS 2 CHNG
 Date: 29.APR.2013 11:25:25



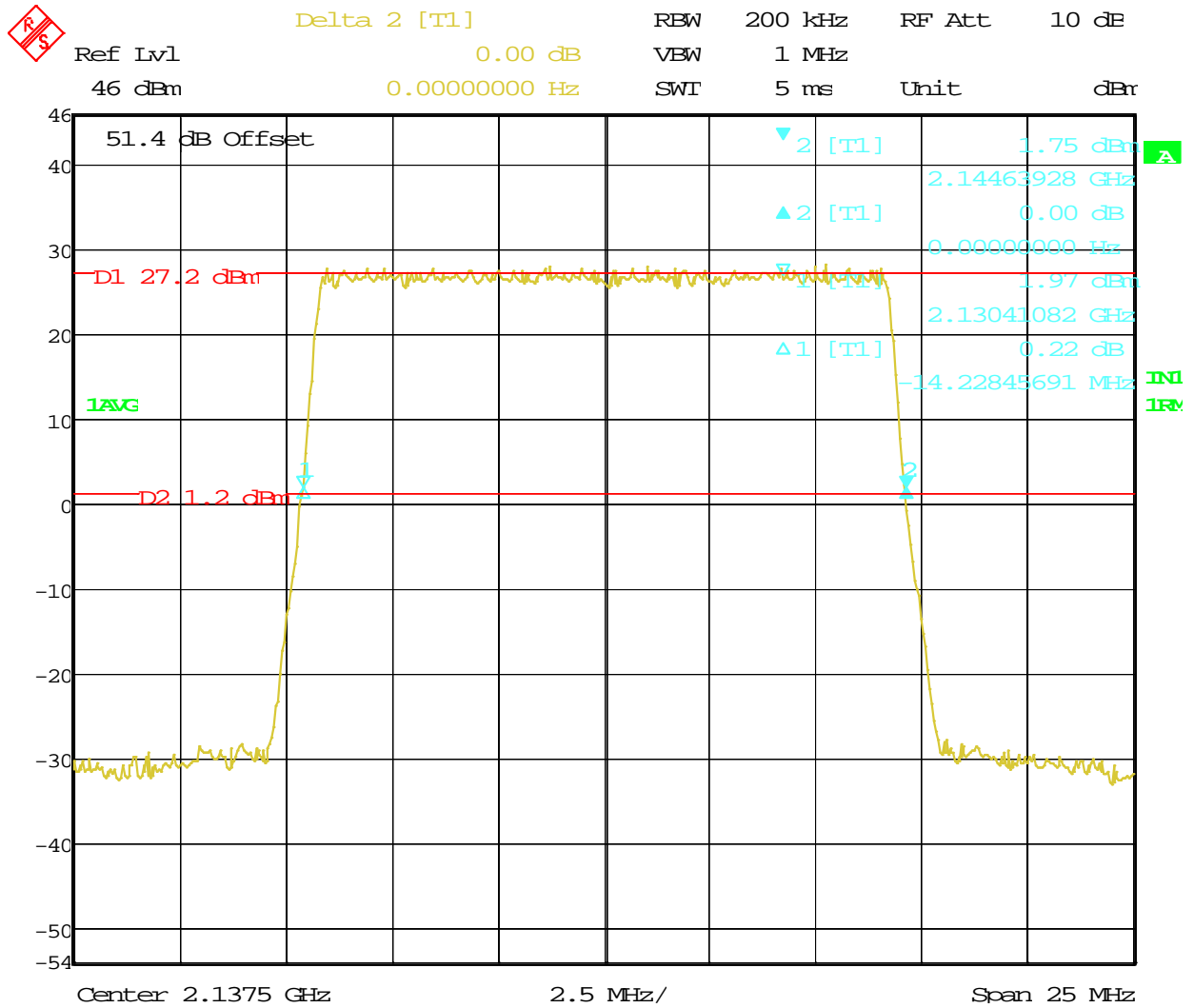
Title: 26dB BANDWIDTH; Test Engineer: JY
 Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:B+C; 2120-2135 MHz; PWR:40W
 64QAM; FCC PRT 27; FCCID:AS5BBTRX-02; CLASS 2 CHNG
 Date: 29.APR.2013 09:25:54

Block: C+D+E

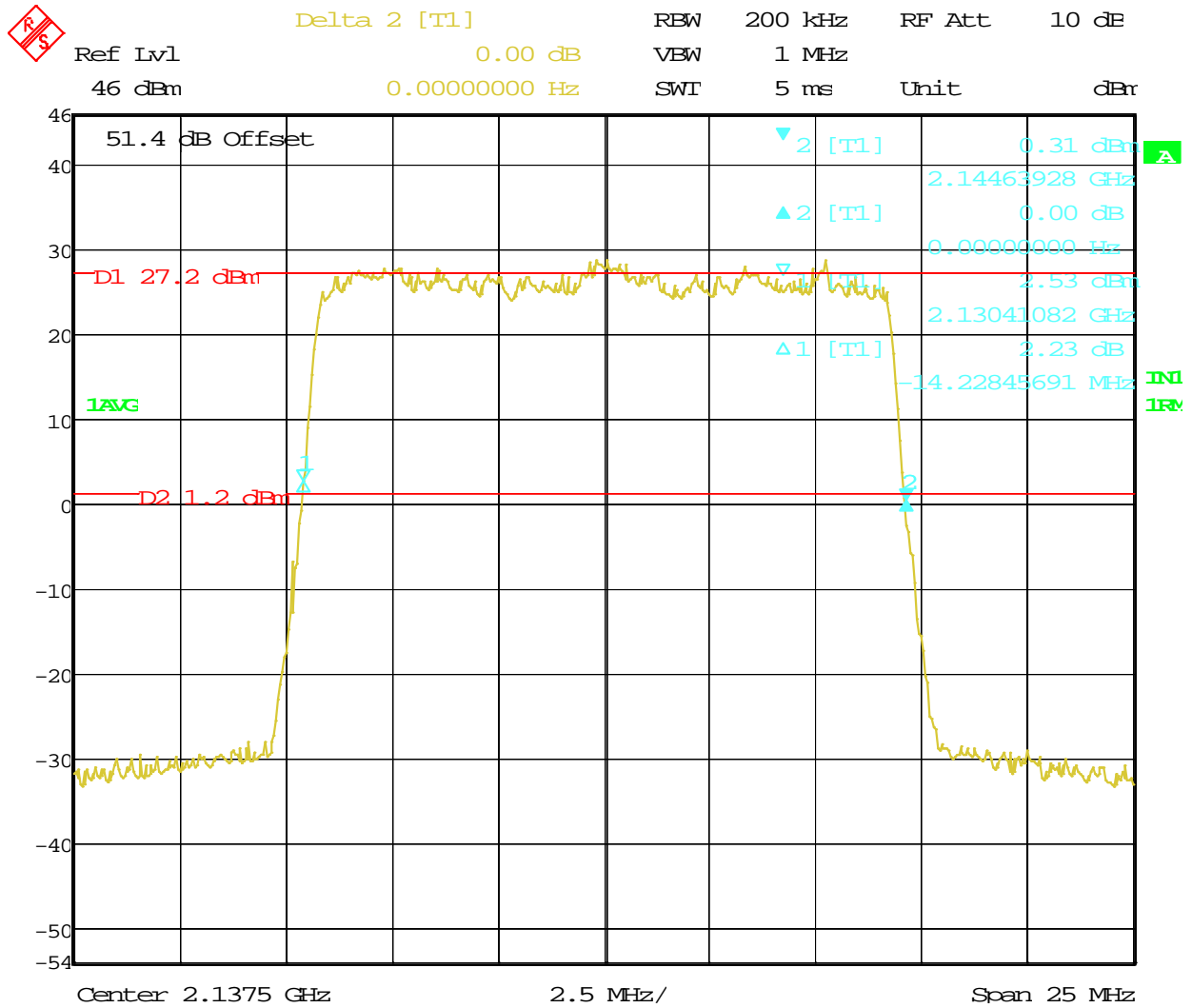
15 MHz Bandwidth 2130 – 2145 MHz

2x40 watts (MIMO)

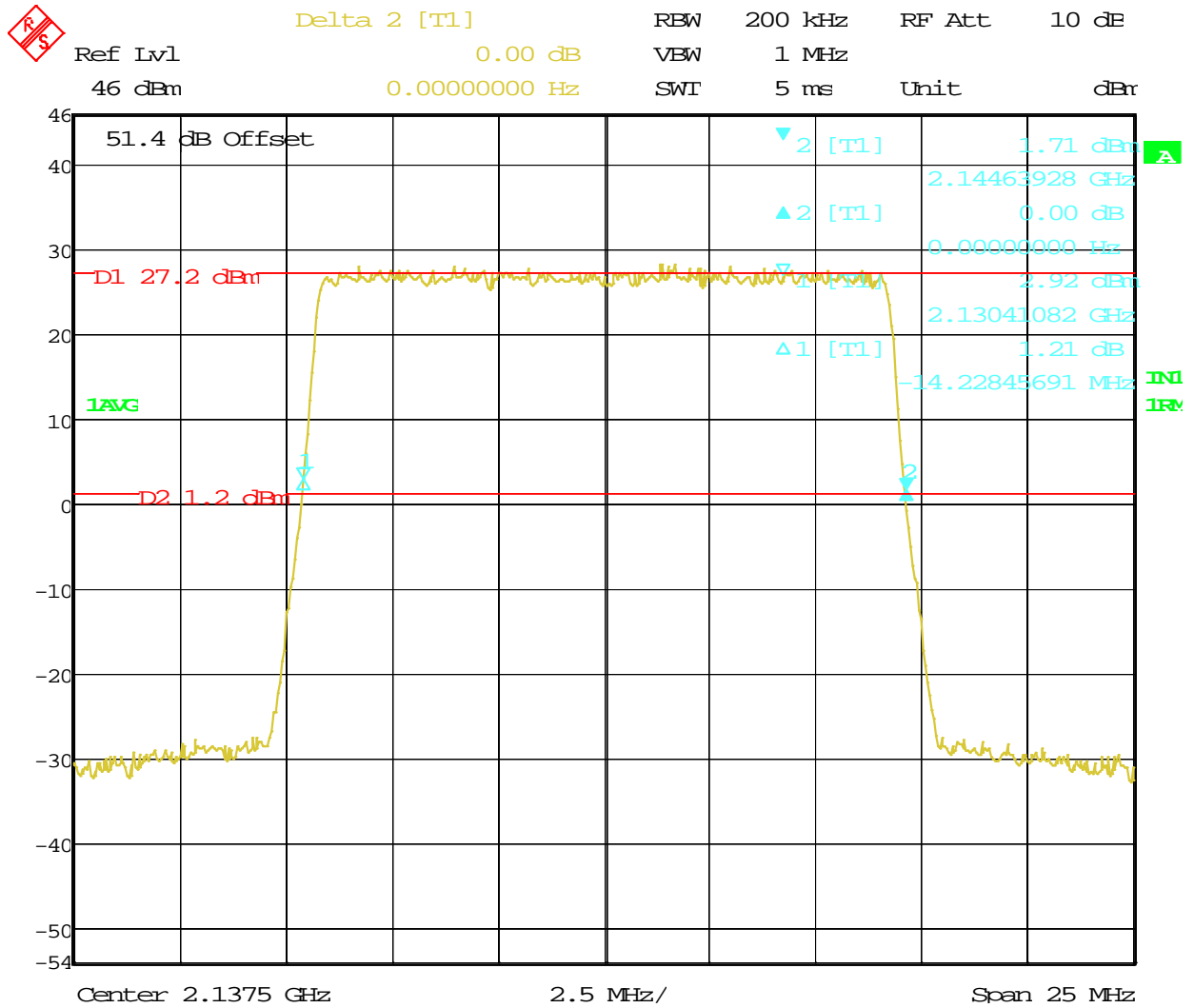
(26dB Bandwidth)



Title: 26dB BANDWIDTH; Test Engineer: JY
 Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:C+D+E; 2130-2145 MHz; PWR:40W
 OPSK; FCC PRT 27; FCCID:AS5BBTRX-02; CLASS 2 CHNG
 Date: 29.APR.2013 12:41:16



Title: 26dB BANDWIDTH; Test Engineer: JY
 Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:C+D+E; 2130-2145 MHz; PWR:40W
 16QAM; FCC PRT 27; FCCID:AS5BBTRX-02; CLASS 2 CHNG
 Date: 29.APR.2013 11:41:00



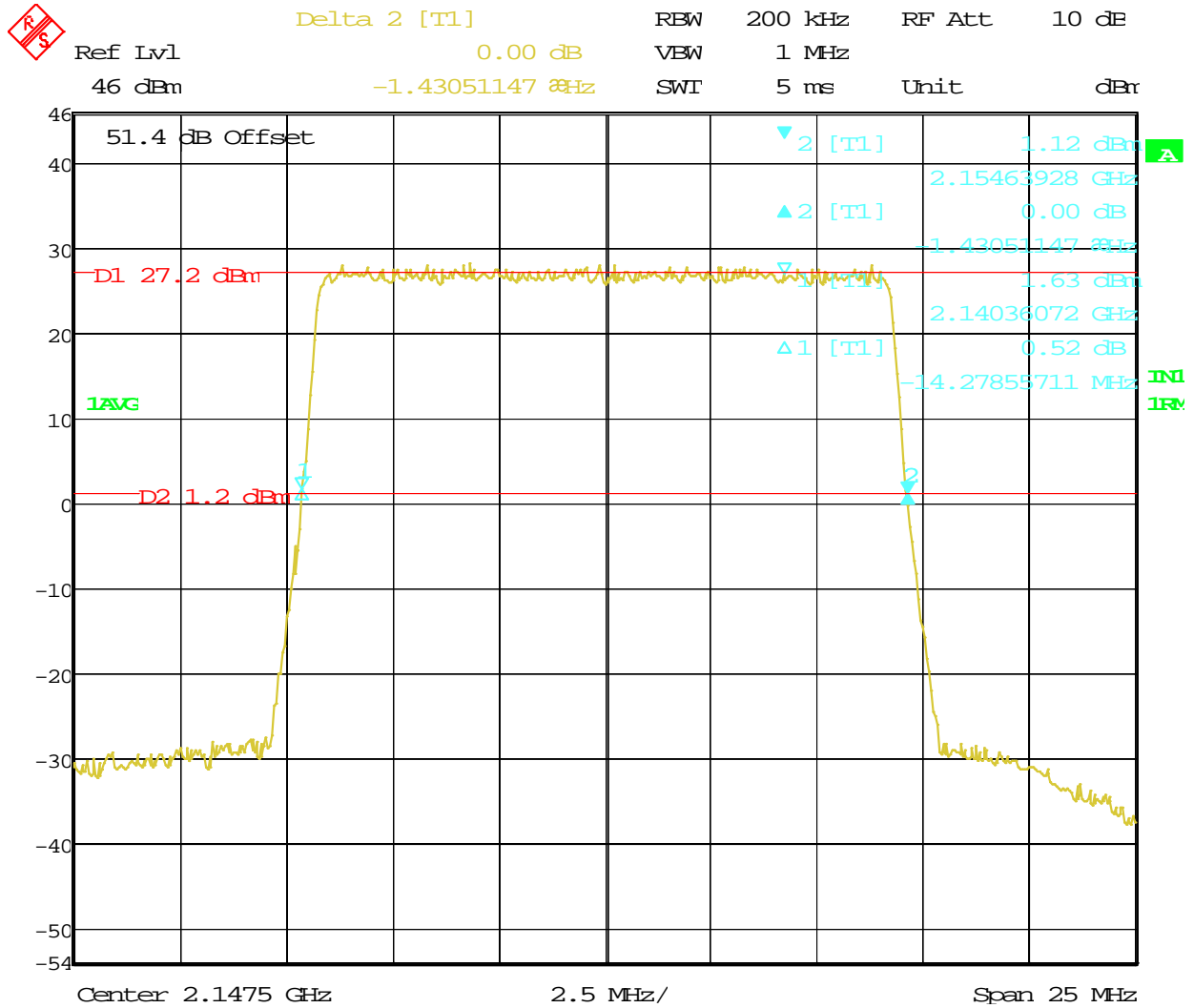
Title: 26dB BANDWIDTH; Test Engineer: JY
 Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:C+D+E; 2130-2145 MHz; PWR:40W
 64QAM; FCC PRT 27; FCCID:AS5BBTRX-02; CLASS 2 CHNG
 Date: 29.APR.2013 13:23:59

Block: E+F

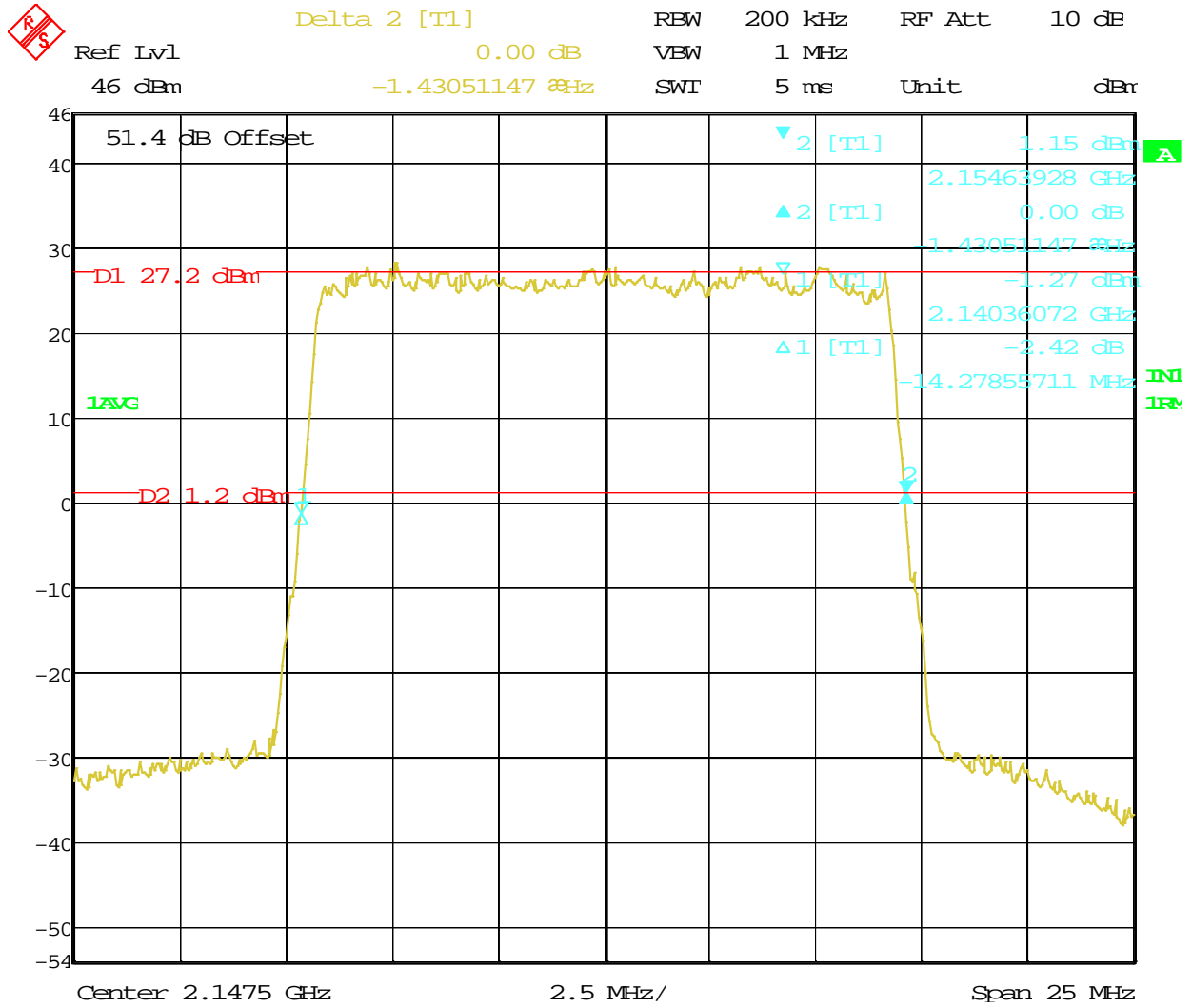
15MHz Bandwidth (2140 – 2155 MHz)

2x40 watts (MIMO)

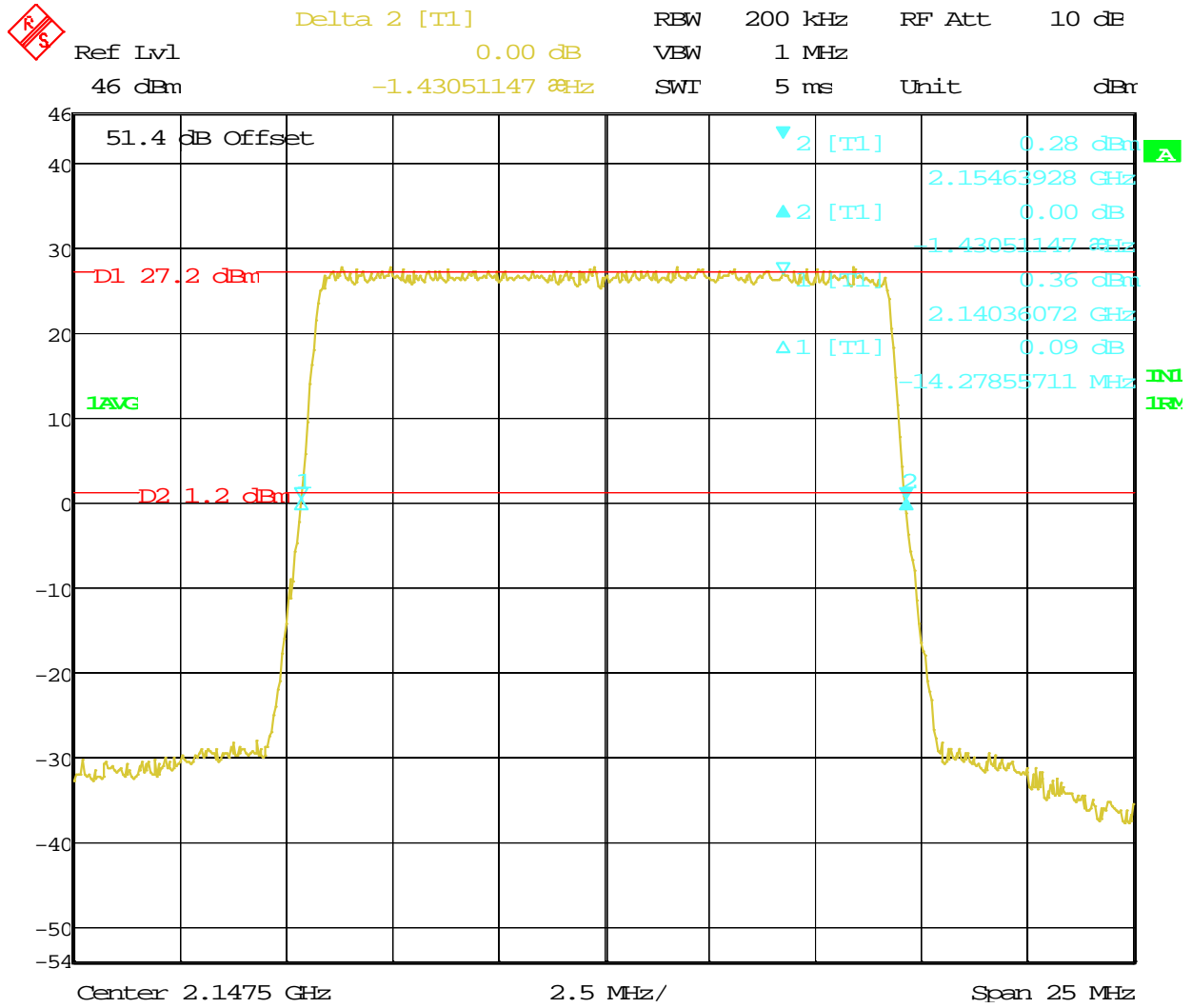
(26dB Bandwidth)



Title: 26dB BANDWIDTH; Test Engineer: JY
 Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:E+F; 2140-2155 MHz; PWR;40W
 QPSK; FCC PRT 27; FCCID:AS5BBTRX-02; CLASS 2 CHNG
 Date: 30.APR.2013 09:58:00



Title: 26dB BANDWIDTH; Test Engineer: JY
 Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:E+F; 2140-2155 MHz; PWR:40W
 16QAM; FCC PRT 27; FCCID:AS5BBTRX-02; CLASS 2 CHNG
 Date: 30.APR.2013 09:38:25



Title: 26dB BANDWIDTH; Test Engineer: JY
 Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:E+F; 2140-2155 MHz; PWR:40W
 64QAM; FCC PRT 27; FCCID:AS5BBTRX-02; CLASS 2 CHNG
 Date: 29.APR.2013 13:47:00

**MEASUREMENT OF
SPECTRUM MASK/OCCUPIED BANDWIDTH
(1MHz ADJACENT TO CHANNEL EDGE)**

Section 27.53 (H)

**MEASUREMENT OF SPECTRUM MASK
OCCUPIED BANDWIDTH**

The Spectrum mask close to the center of the carrier frequency (Occupied bandwidth) of the Long Term Evolution (LTE) Trials was measured using a Rohde & Schwarz ESI Spectrum Analyzer/Receiver and a Printer. The RF power level was measured using RF power meter as shown in the test setup in Figure A. The RF output from the LTE EAC port to spectrum analyzer was reduced (to an amplitude usable by the spectrum analyzer) by using a calibrated attenuator. This attenuation was offset on the display and the signal for single carrier was adjusted to the corrected RF power level for a 100 kHz resolution bandwidth for 20 MHz wide transmit signal. While adjusting the corrected RF power level in the spectrum analyzer, the attenuator and resolution BW of spectrum analyzer were considered.

The measurements were made on a “**LTE 9442 RRH2X40-AWS with 15 MHz carrier**”.

The reference line on the spectrum analyzer display corresponds to level measured by the RF power meter. Occupied Bandwidth plots were made at antenna terminals for an output of 40 Watts (46.0 dBm)/carrier.

The frequencies and blocks used were tabulated on the bottom of each plot. The output signals at RF filter were plotted at each frequency/block. The LTE AWS TRDUs are capable of operating in the band of 2110 MHz to 2155 MHz (Block A,B,C,D,E and F). The Base station presently tested was configured to operate at 15 MHz Bands. Blocks and bands listed in Table below Plots were provided for a single carrier. These frequencies were chosen to show the occupied bandwidth in the blocks in the frequency band in which this radio can be operated. All tests were performed for QPSK, 16QAM and 64QAM modulations.

Block edge requirements:

FCC Section 27.53(h): Based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. Pursuant to FCC OET RULES 662911 D01 and D02 for two antenna MIMO mode of operations, the FCC limit of -13dBm shall be 3dB more stringent, therefore all channel edge and out of band spurious emissions shall be -16dBm. For 15MHz BW, the one percent of emissions BW is 150 kHz. Since 200kHz Resolution BW is used. The limit of -16dBm is reduced to -14.75dBm using 10 log (200/150)

The list of Blocks tested, Bands and Power measured at External Antenna Connector (EAC)

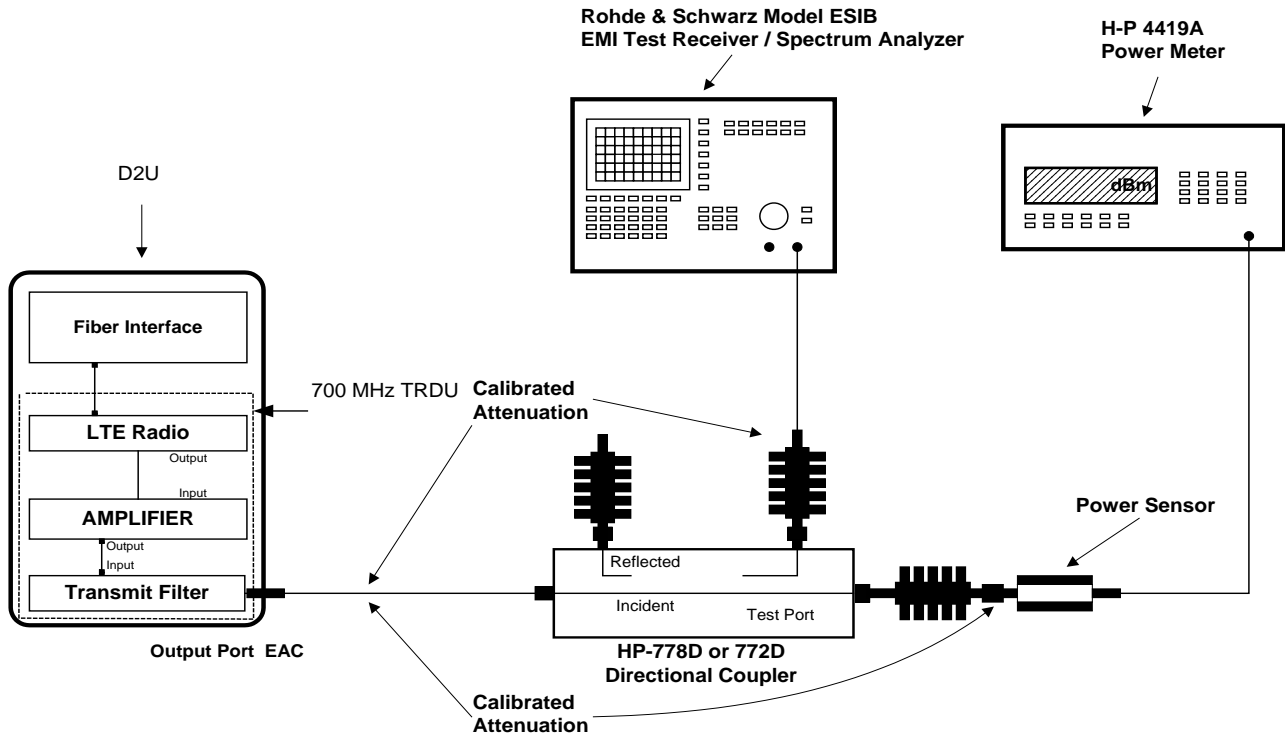
Frequency Range (MHz) & Block	Bandwidth (MHz)	Center Frequency (MHz)	Power (Watts)
2110-2025 (A+B1)	15	2117.5	40
2115-2030 (A2+B)	15	2122.5	40
2130-2145 C+D+E	15	2137.5	40
2140-2155 E+F	15	2147.5	40

Measurement uncertainty:

Frequency: 100 Hz

Amplitude: 0.5 dB

Figure A. TEST CONFIGURATION FOR SPECTRUM MASK (OCCUPIED BANDWIDTH)

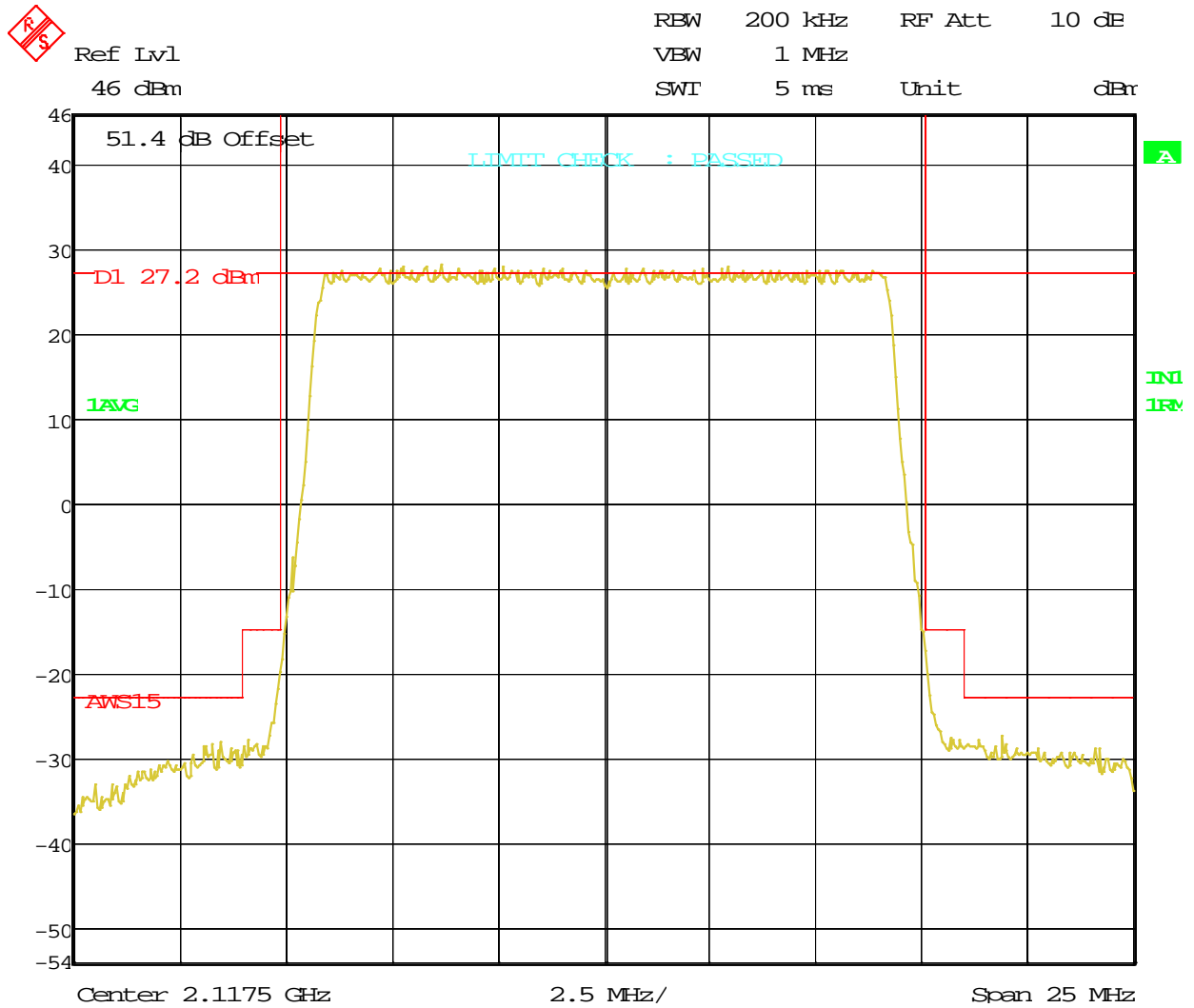


All components are calibrated over the frequency range of interest

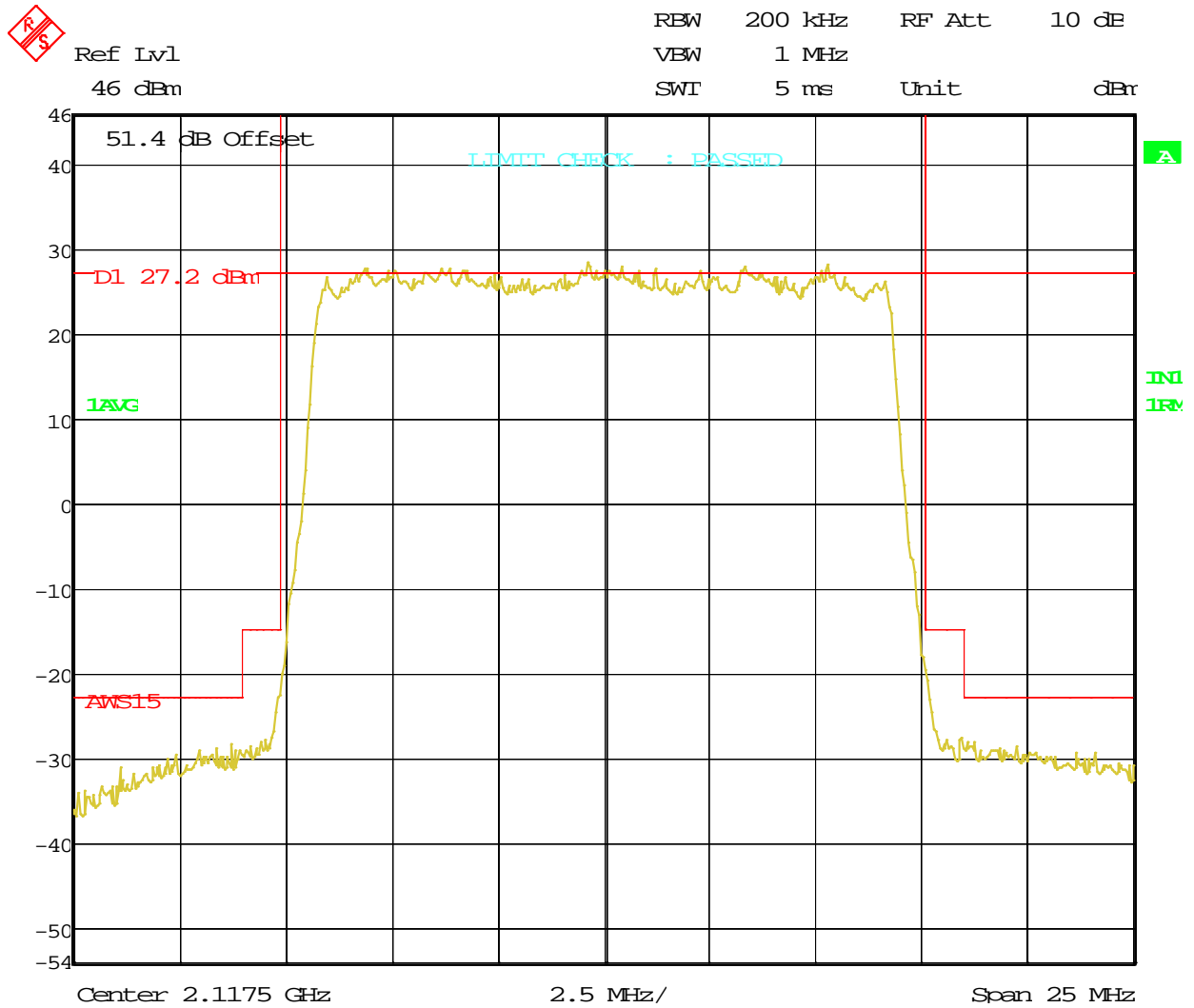
Block: A+B

15MHz Bandwidth (2110 – 2125 MHz)

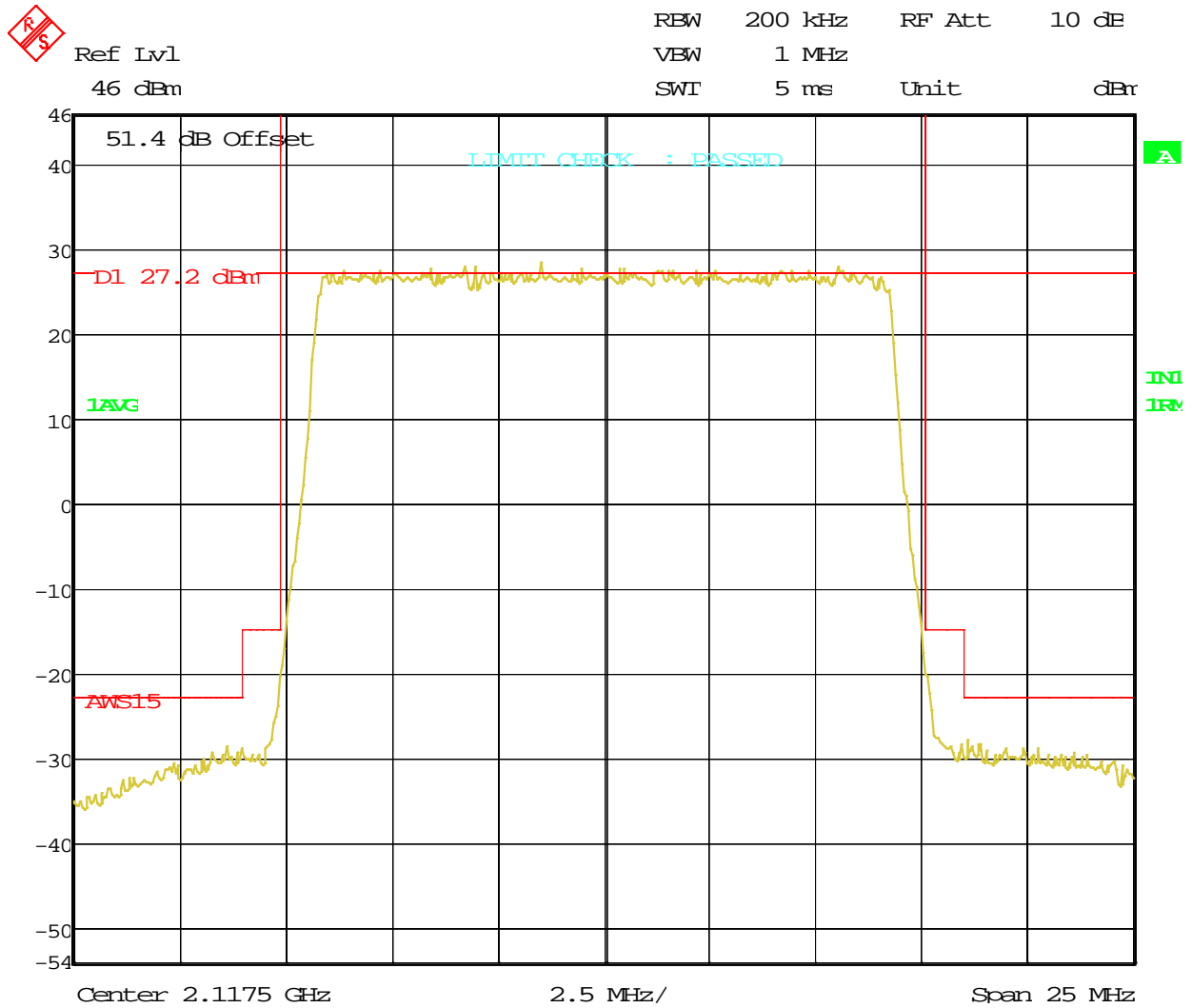
SPECTRUM MASK/OCCUPIED BANDWIDTH



Title: OCCUPIED BANDWIDTH; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:A+B1; 2110-2125 MHz; PWR:40W
OPSK; FCC PRT 27; FCCID:AS5BBTRX-02; CLASS 2 CHNG
Date: 26.APR.2013 13:43:43



Title: OCCUPIED BANDWIDTH; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:A+B1; 2110-2125 MHz; PWR:40W
16QAM; FCC PRT 27; FCCID:AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 07:19:57

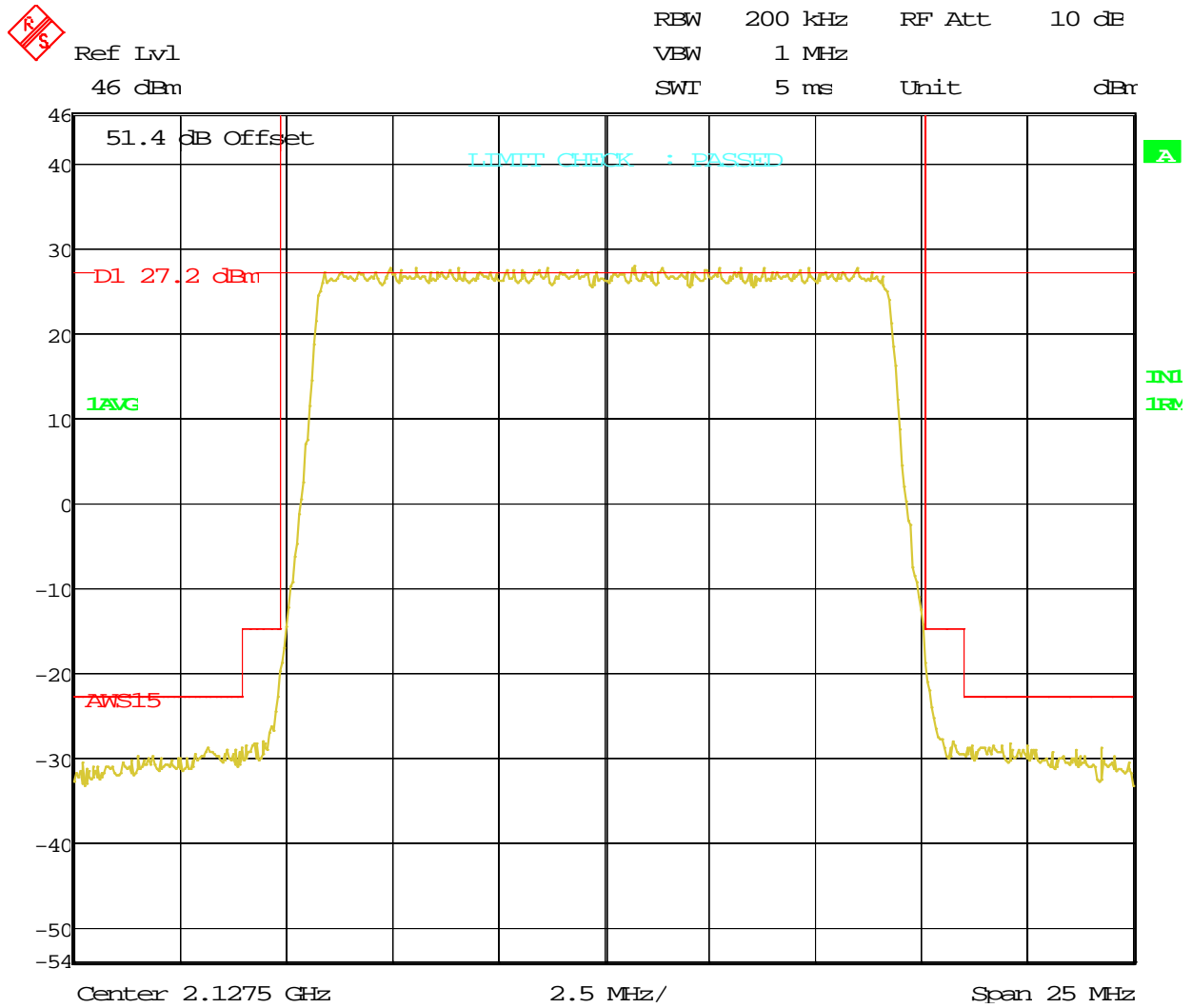


Title: OCCUPIED BANDWIDTH; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:A+B1; 2110-2125 MHz; PWR:40W
64QAM; FCC PRT 27; FCCID:AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 08:53:37

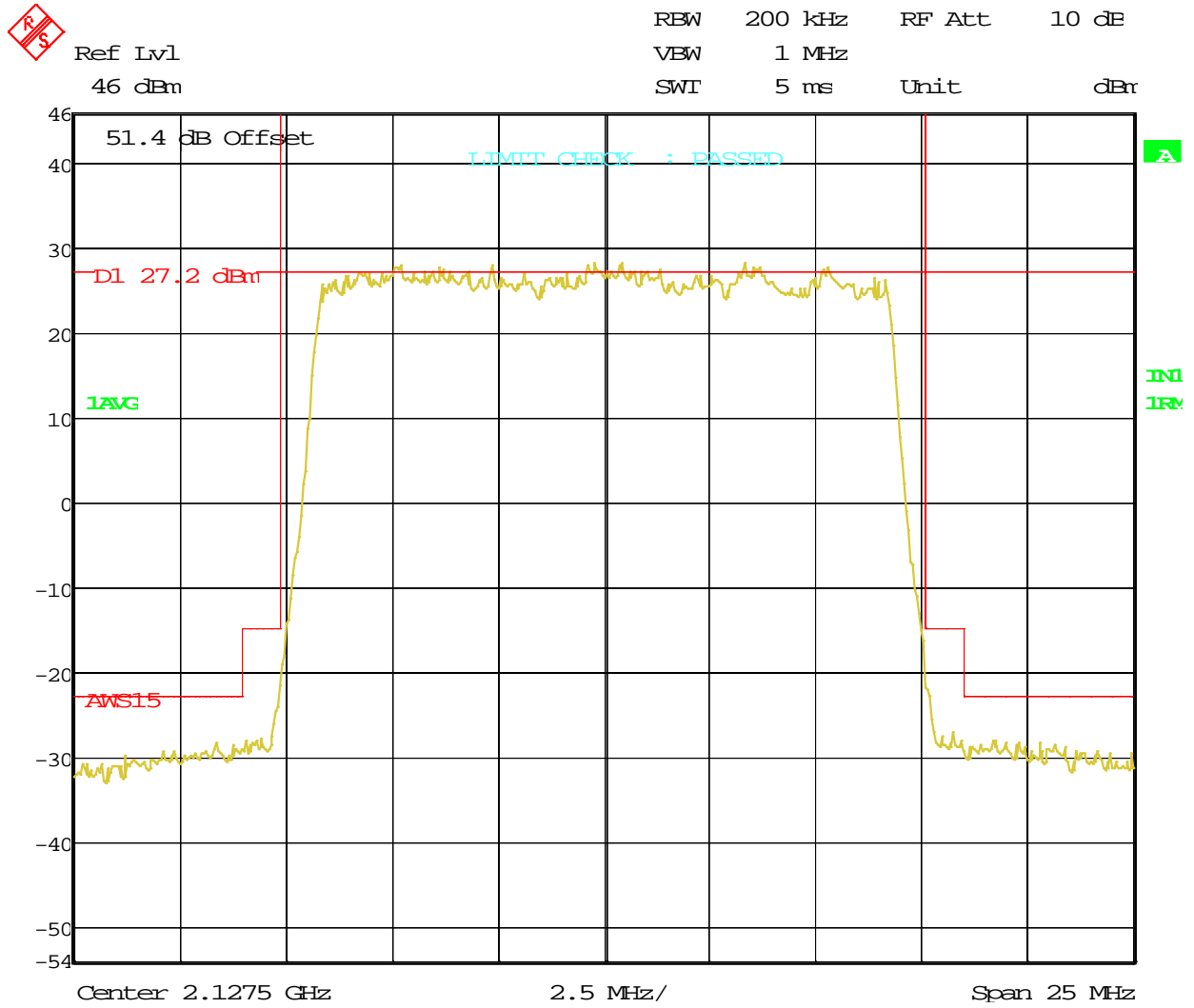
Block: B+C

15MHz Bandwidth (2120 – 2135 MHz)

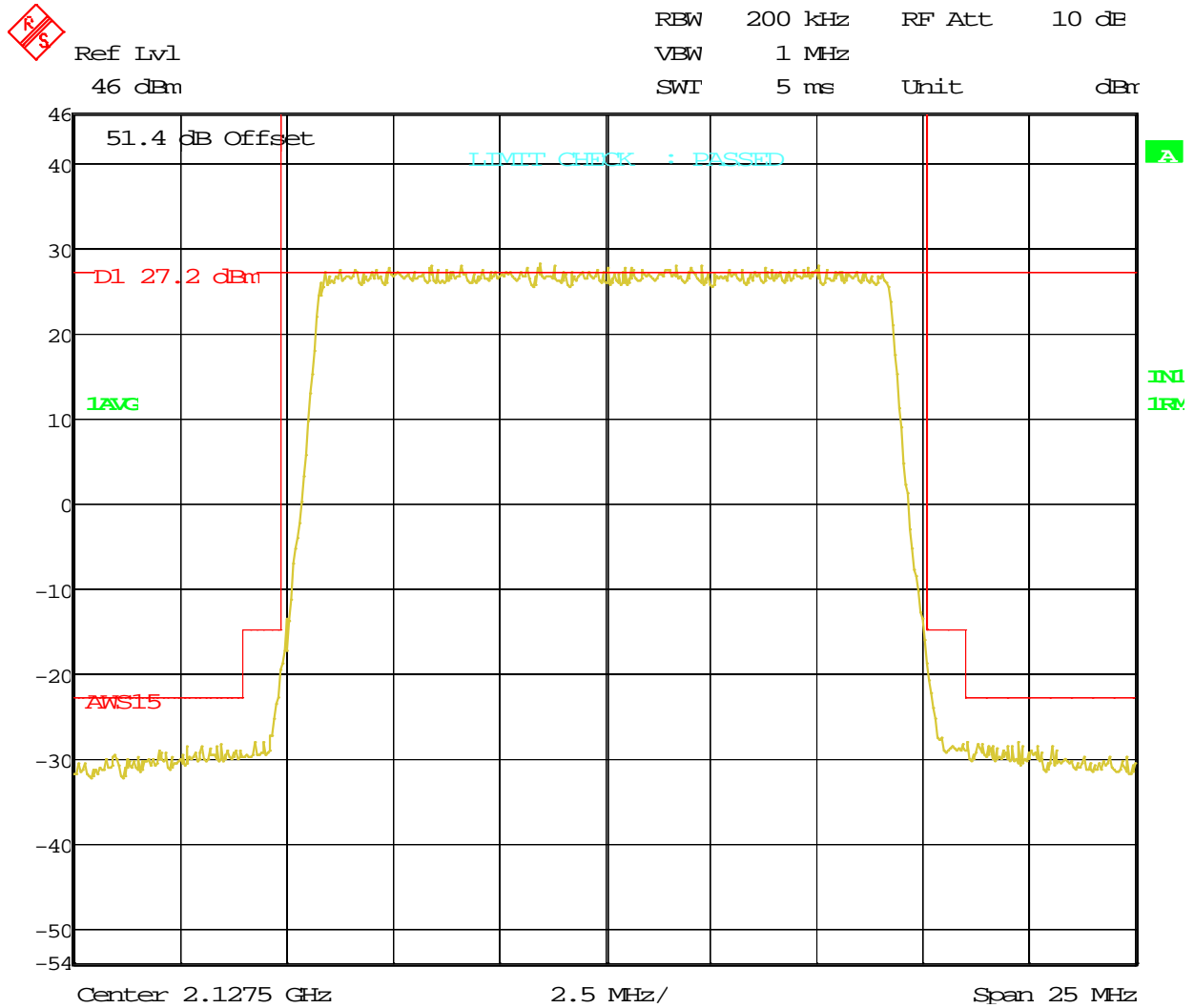
SPECTRUM MASK/OCCUPIED BANDWIDTH



Title: OCCUPIED BANDWIDTH; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:B+C; 2120-2135 MHz; PWR;40W
QPSK; FCC PRT 27; FCCID:AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 10:51:51



Title: OCCUPIED BANDWIDTH; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:B+C; 2120-2135 MHz; PWR:40W
16QAM; FCC PRT 27; FCCID:AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 11:26:04



Title: OCCUPIED BANDWIDTH; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:B+C; 2120-2135 MHz; PWR:40W
64QAM; FCC PRT 27; FCCID:AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 09:27:17

Block: C+D+E

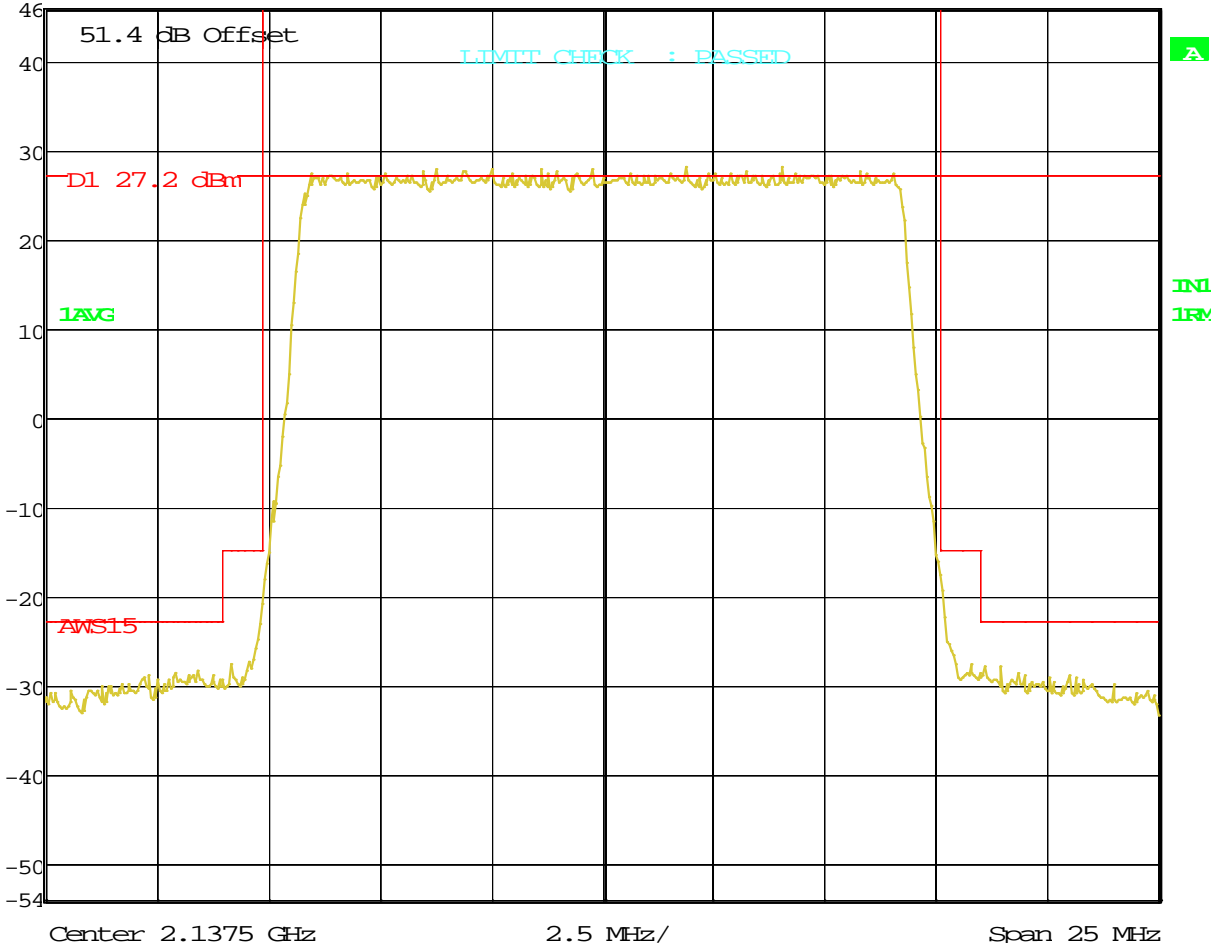
15MHz Bandwidth (2130 – 2145 MHz)

SPECTRUM MASK/OCCUPIED BANDWIDTH



Ref Lvl
46 dBm

RBW 200 kHz RF Att 10 dB
VBW 1 MHz
SWT 5 ms Unit dBm

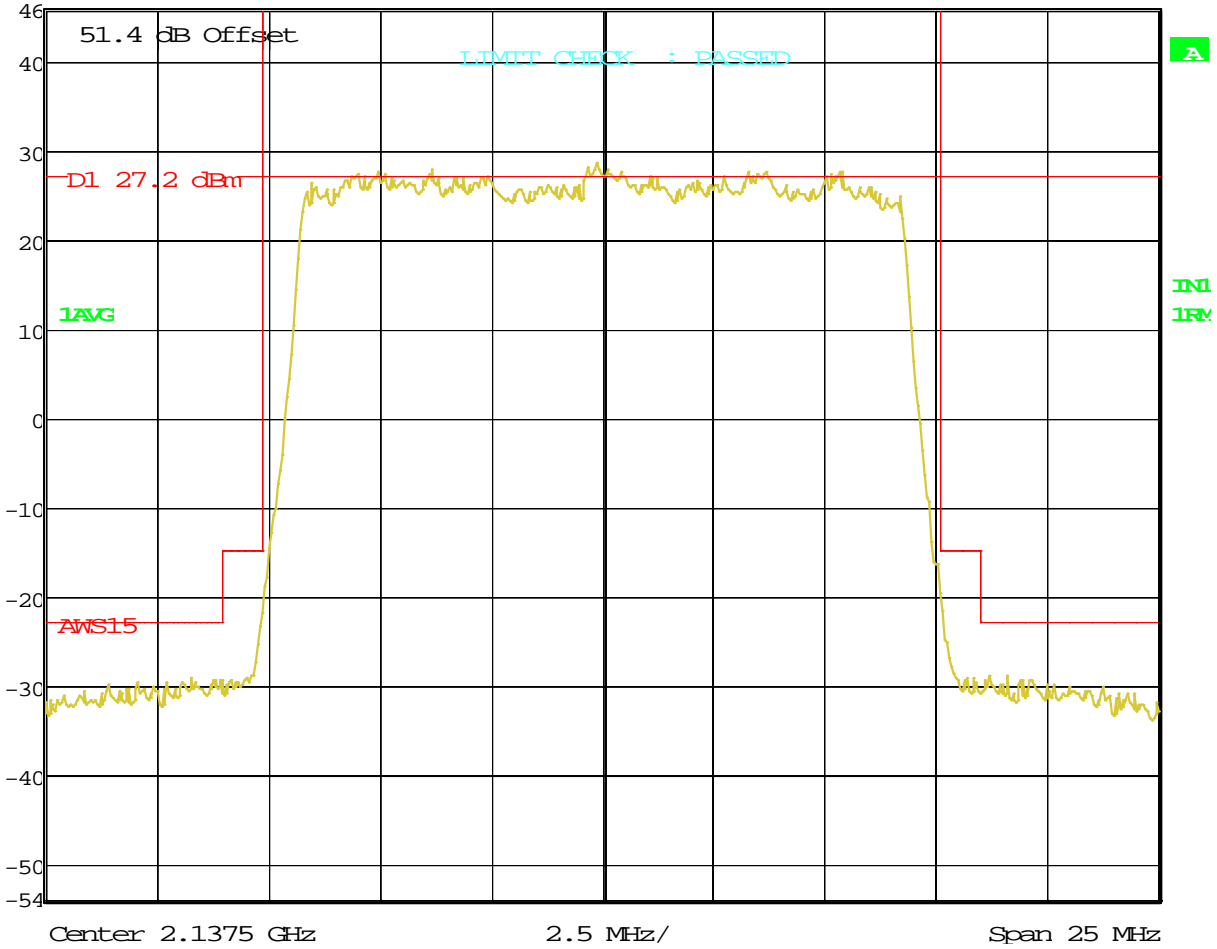


Title: OCCUPIED BANDWIDTH; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:C+D+E; 2130-2145 MHz; PWR:40W
OPSK; FCC PRT 27; FCCID:AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 12:40:07

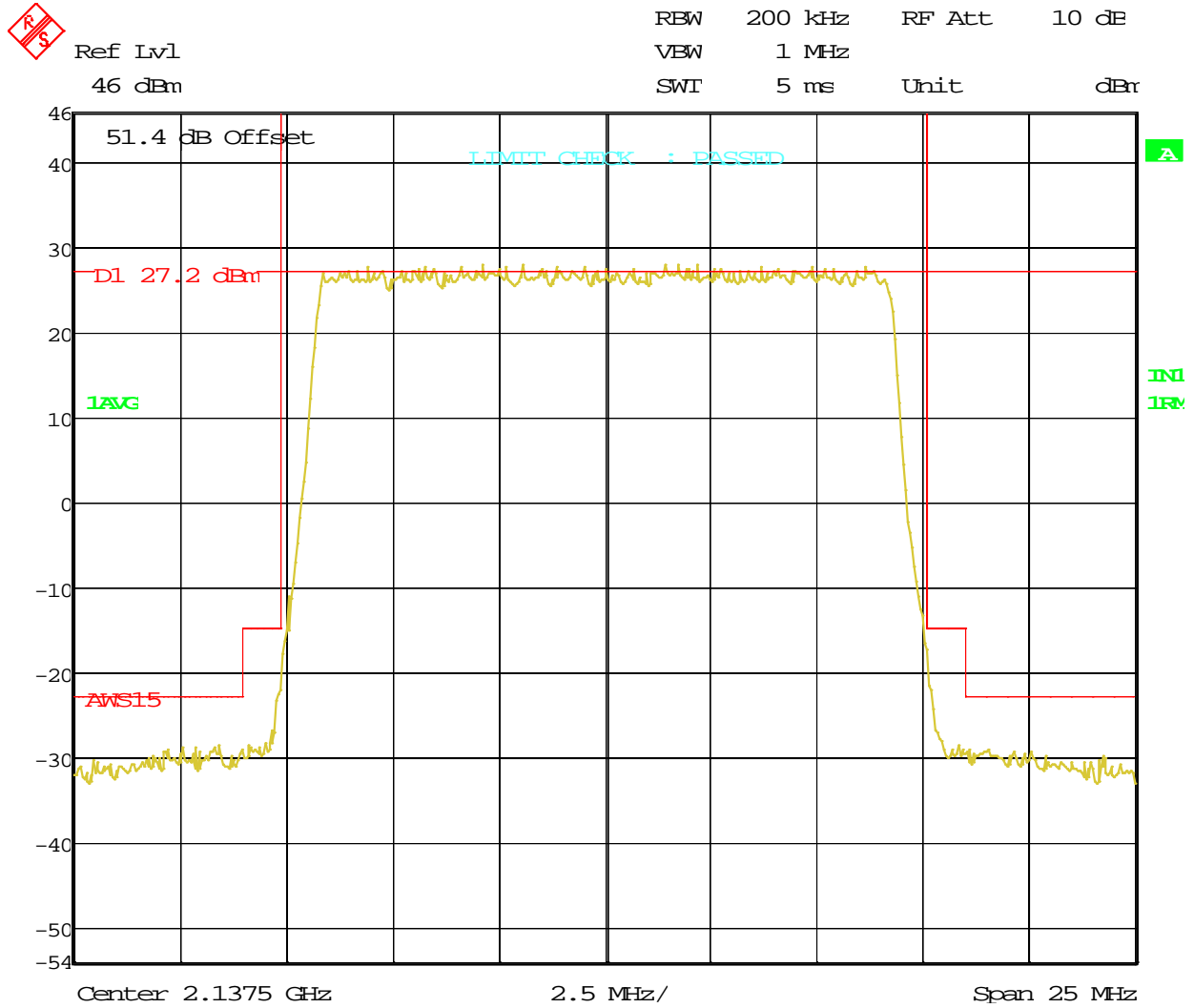


Ref Lvl
46 dBm

RBW 200 kHz RF Att 10 dB
VBW 1 MHz
SWI 5 ms Unit dBm



Title: OCCUPIED BANDWIDTH; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:C+D+E; 2130-2145 MHz; PWR;40W
16QAM; FCC PRT 27; FCCID:AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 11:39:01



Title: OCCUPIED BANDWIDTH; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:C+D+E; 2130-2145 MHz; PWR:40W
64QAM; FCC PRT 27; FCCID:AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 13:23:20

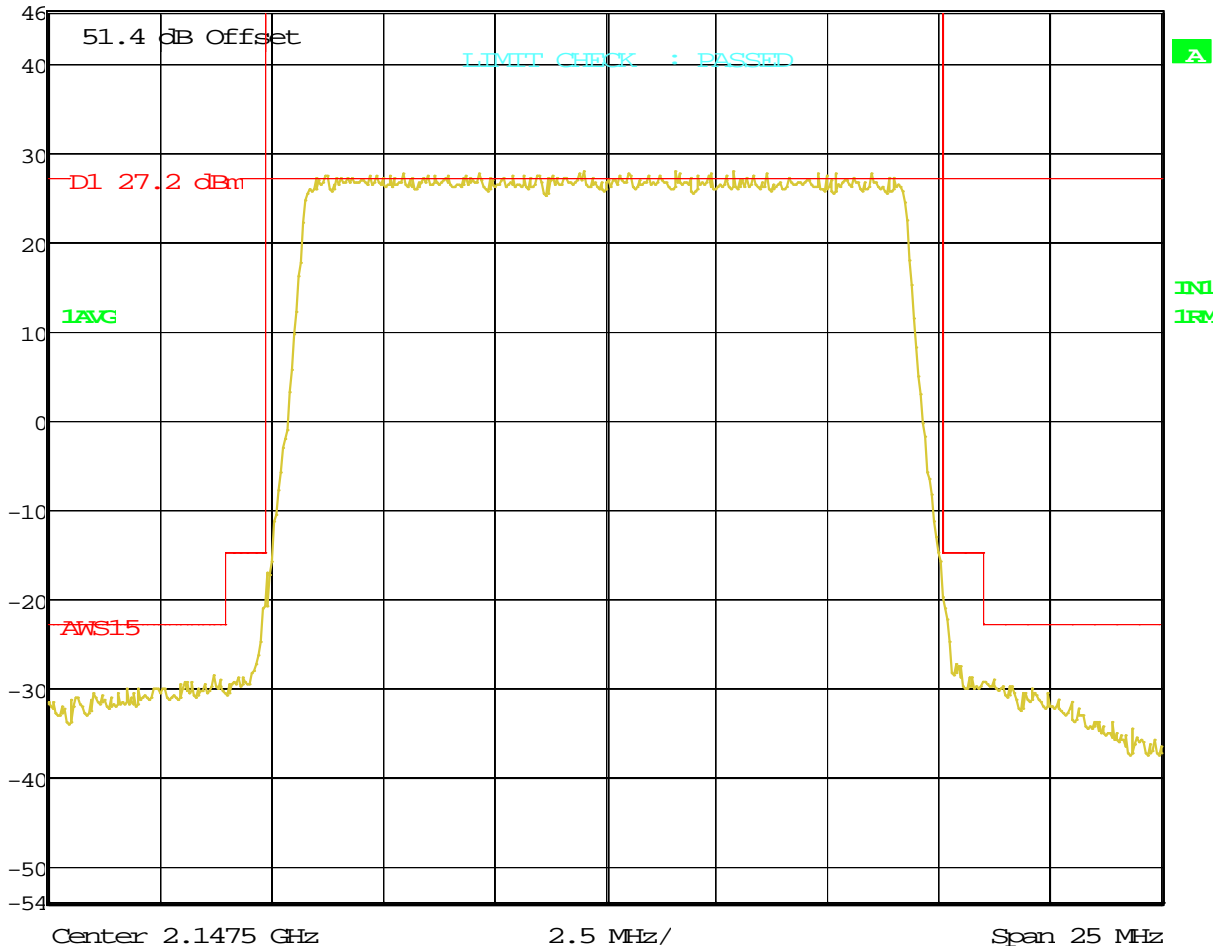
Block: E+F

15MHz Bandwidth (2140 – 2155 MHz)

SPECTRUM MASK/OCCUPIED BANDWIDTH



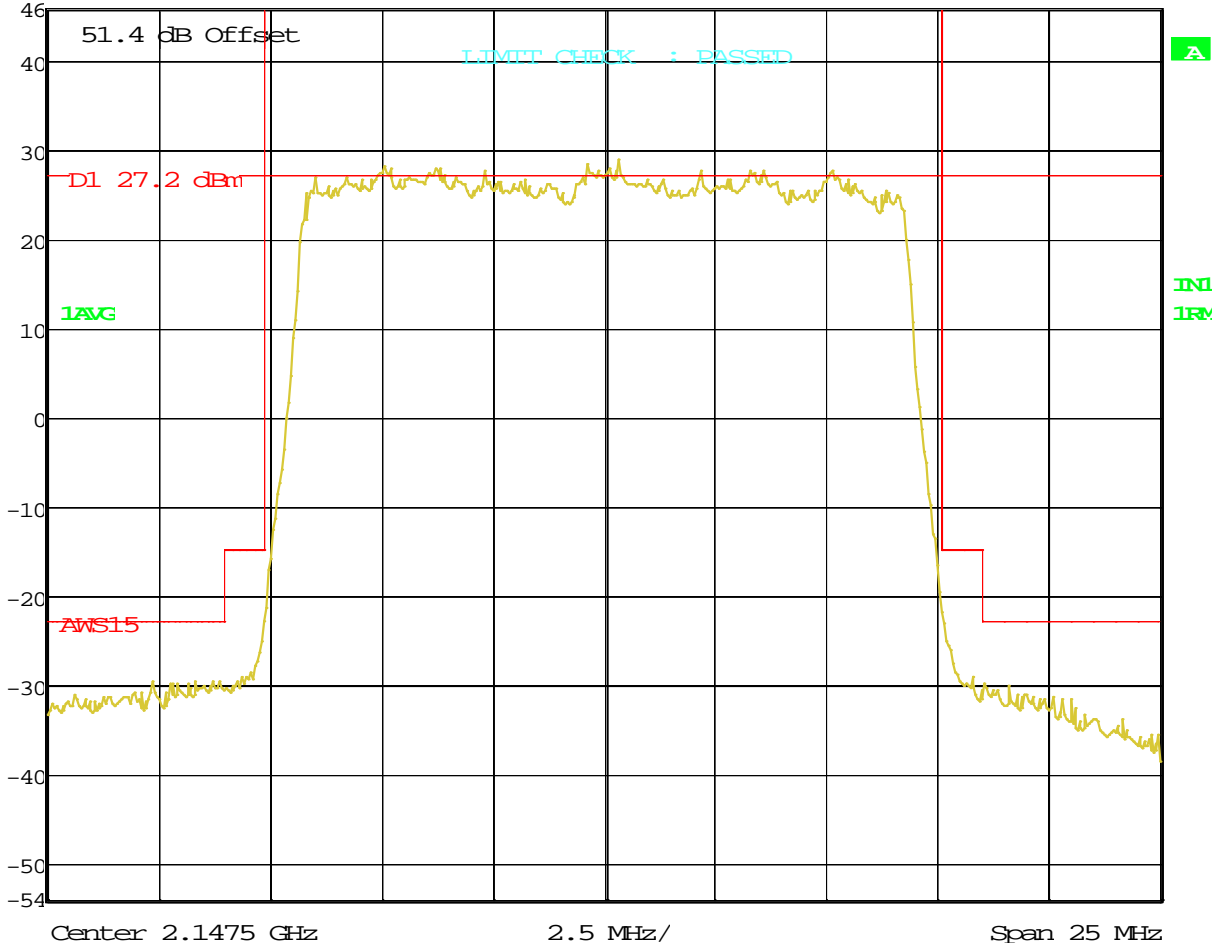
Ref Lvl 46 dBm
RBW 200 kHz RF Att 10 dB
VBW 1 MHz
SWT 5 ms Unit dBm



Title: OCCUPIED BANDWIDTH; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:E+F; 2140-2155 MHz; PWR;40W
QPSK; FCC PRT 27; FCCID:AS5BBTRX-02; CLASS 2 CHNG
Date: 30.APR.2013 09:58:40



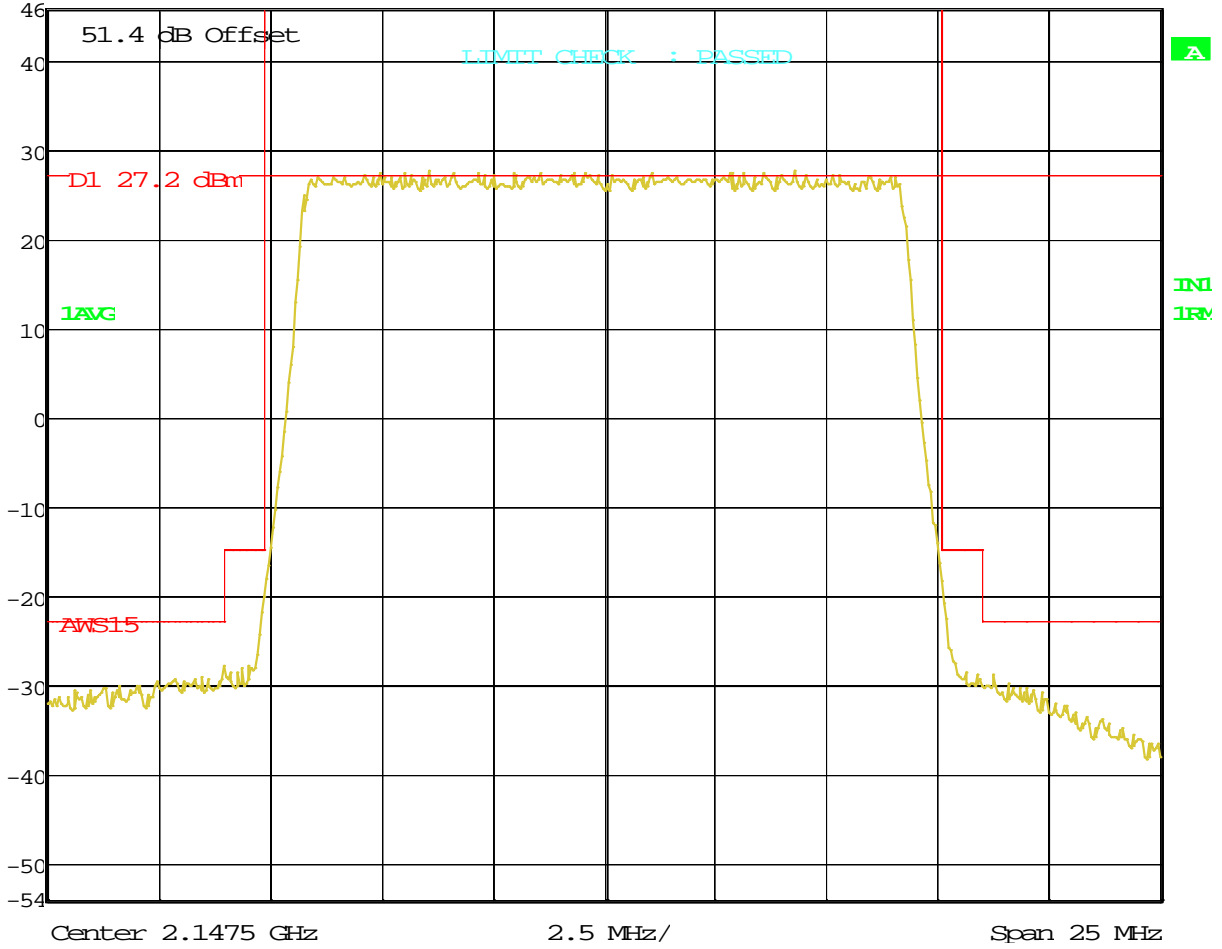
REW 200 kHz RF Att 10 dB
Ref Lvl 46 dBm
VBW 1 MHz
SWI 5 ms Unit dBm



Title: OCCUPIED BANDWIDTH; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:E+F; 2140-2155 MHz; PWR:40W
16QAM; FCC PRT 27; FCCID:AS5BBTRX-02; CLASS 2 CHNG
Date: 30.APR.2013 09:37:28



REW 200 kHz RF Att 10 dB
Ref Lvl 46 dBm
VBW 1 MHz
SWT 5 ms Unit dBm



Title: OCCUPIED BANDWIDTH; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:E+F; 2140-2155 MHz; PWR:40W
64QAM; FCC PRT 27; FCCID:AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 13:45:13

Measurement -4

**MEASUREMENT OF
SPURIOUS EMISSIONS
AT TRANSMIT ANTENNA PORT
FCC 27.53 (H)**

Reviewed By: DDM

Date: 1/19/2012

Spurious Emissions at Transmit Antenna Terminals

Spurious Emissions at the transmit-antenna terminals were investigated over the frequency range of 9 kHz to the 22 GHz. The test setup is as described in Figure A. Measurements were made using a Rohde & Schwarz ESI 40 (9 kHz to 40 GHz) EMI Test receiver and a Printer. The RF output from the transmitter was reduced (to an amplitude usable by the receivers) using calibrated attenuators. The RF power level was continuously monitored via RF Power Meter as shown in the test setup in Figure A. The required emission limitation is specified in 27.53 (h) and FCC Part 24 Subpart E section 24.238. Measurements were made at 40W per carrier for 15 MHz Bandwidth at antenna terminals. The measured spurious emission levels were plotted for the frequency range 9 kHz to 22 GHz. The measurements were made using following receiver parameters:

The list of blocks and bands, tested are listed below:

Frequency Range (MHz) & Block	Bandwidth (MHz)	Center Frequency (MHz)	Power (Watts)
2110-2025 (A+B1)	15	2117.5	40
2115-2030 (A2+B)	15	2122.5	40
2130-2145 C+D+E	15	2137.5	40
2140-2155 E+F	15	2147.5	40

FCC Section 27.53(h) Based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. Pursuant to FCC OET RULES 662911 D01 and D02 for two antenna MIMO mode of operations, the FCC limit of -13dBm shall be 3dB more stringent, therefore all channel edge and out of band spurious emissions shall be -16dBm.

The tests were performed in following modulation configurations:

- A. QPSK
- B. 16 QAM
- C. 64 QAM

RESULTS:

The magnitude of spurious emissions is within the specification limits of FCC Part 27.53(c).

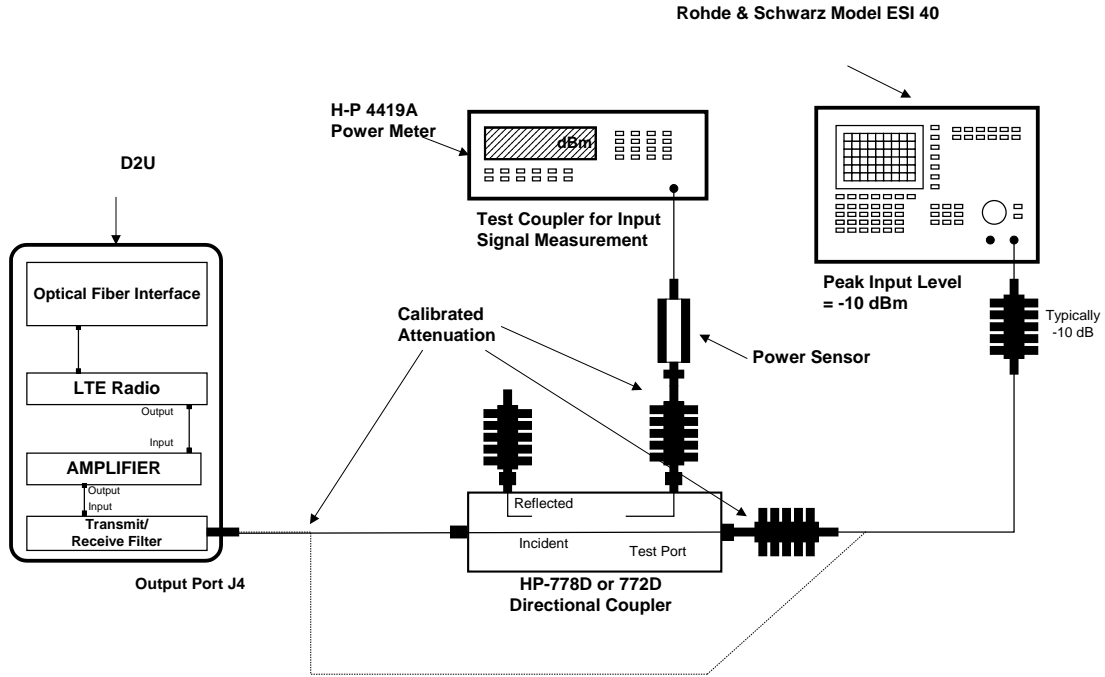
Measurement uncertainty:

9 kHz to 20 MHz: Frequency = 10 Hz, Amplitude = 0.5 dB

20 MHz to 1 GHz: Frequency = 100Hz, Amplitude = 0.5 dB

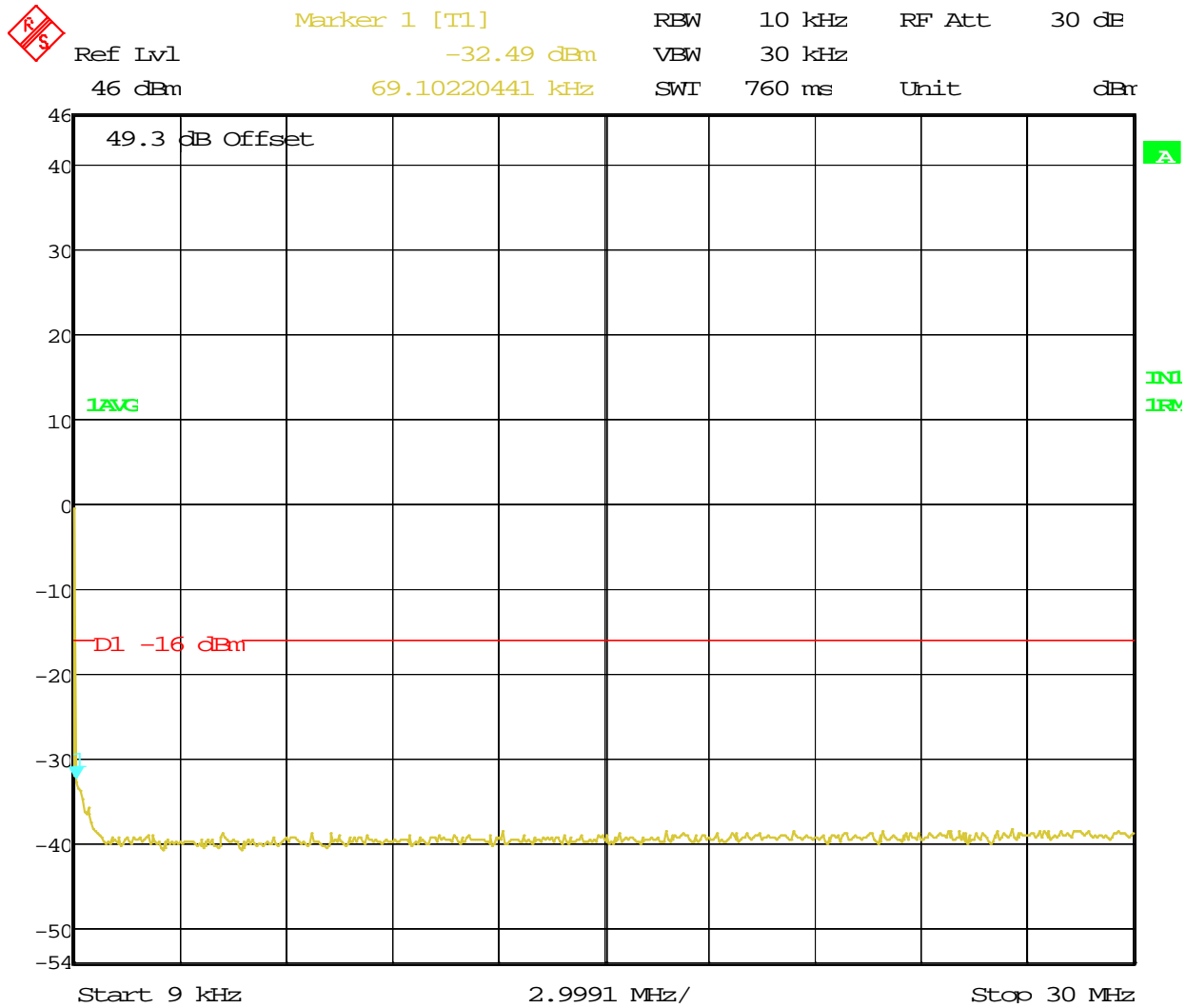
1 GHz to 22 GHz: Frequency = 10 kHz, Amplitude = 0.5 dB

Figure A. TEST CONFIGURATION FOR CONDUCTED SPURIOUS

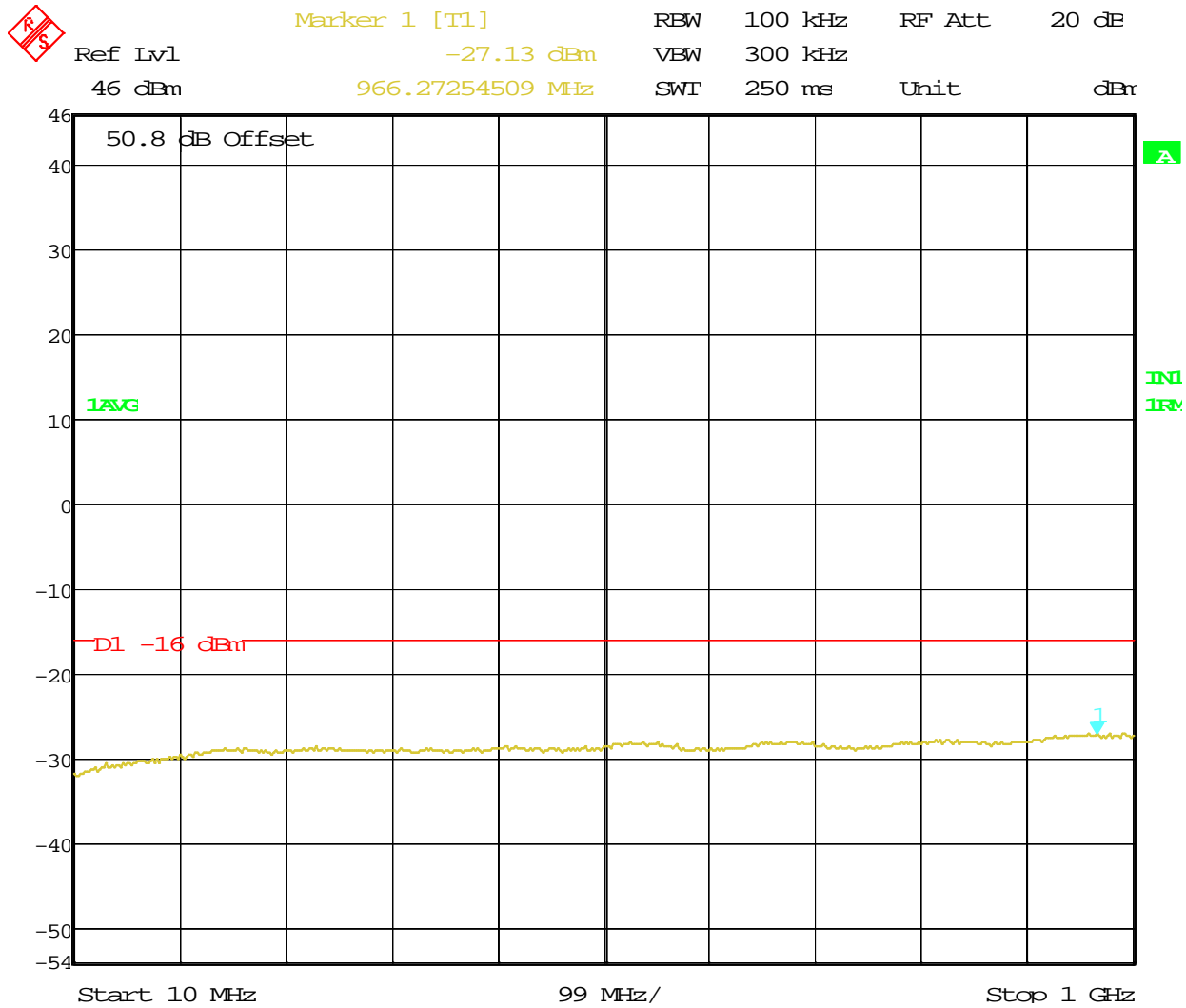


**Transmit Port
Antenna Conducted Spurious Emissions**

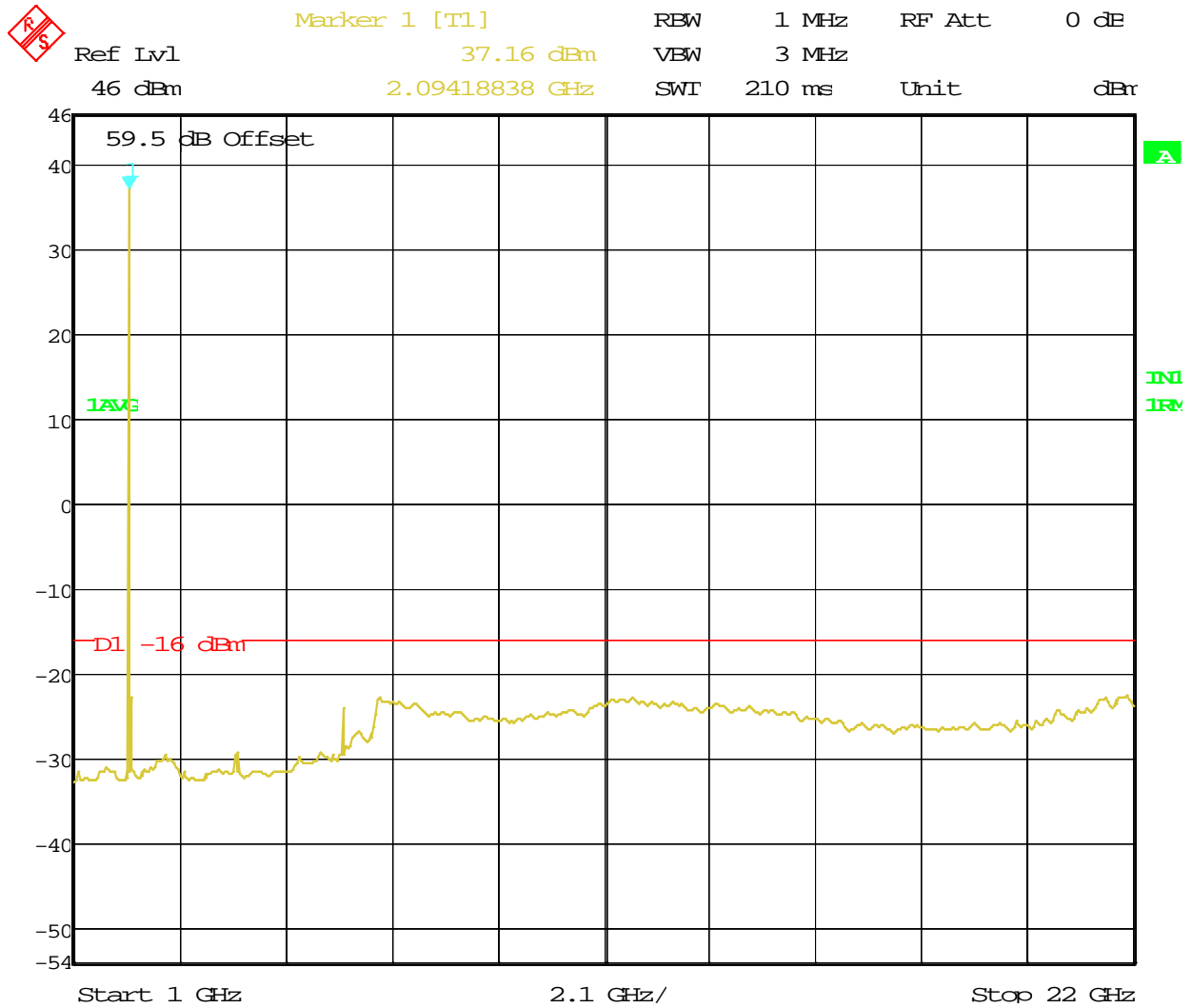
**Block: A+B1 (15 MHz BW)
QPSK Modulation
Bandwidth (2110 – 2125 MHz)
2x40 watts (MIMO)**



Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK: A+B1; 2110-2125 MHz; PWR:40W
OPSK; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 07:35:25



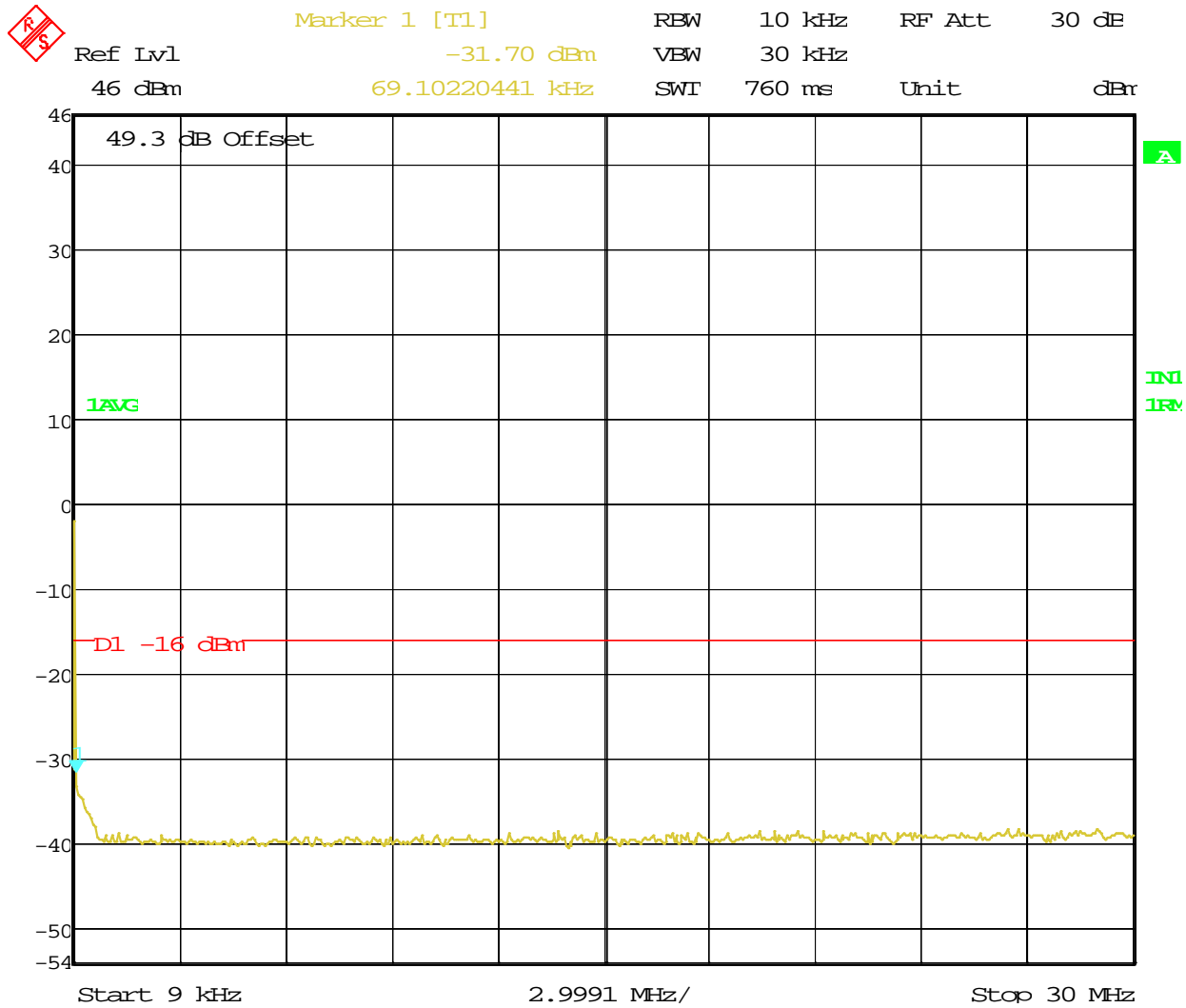
Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK: A+B1; 2110-2125 MHz; PWR:40W
OPSK; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 26.APR.2013 13:32:31



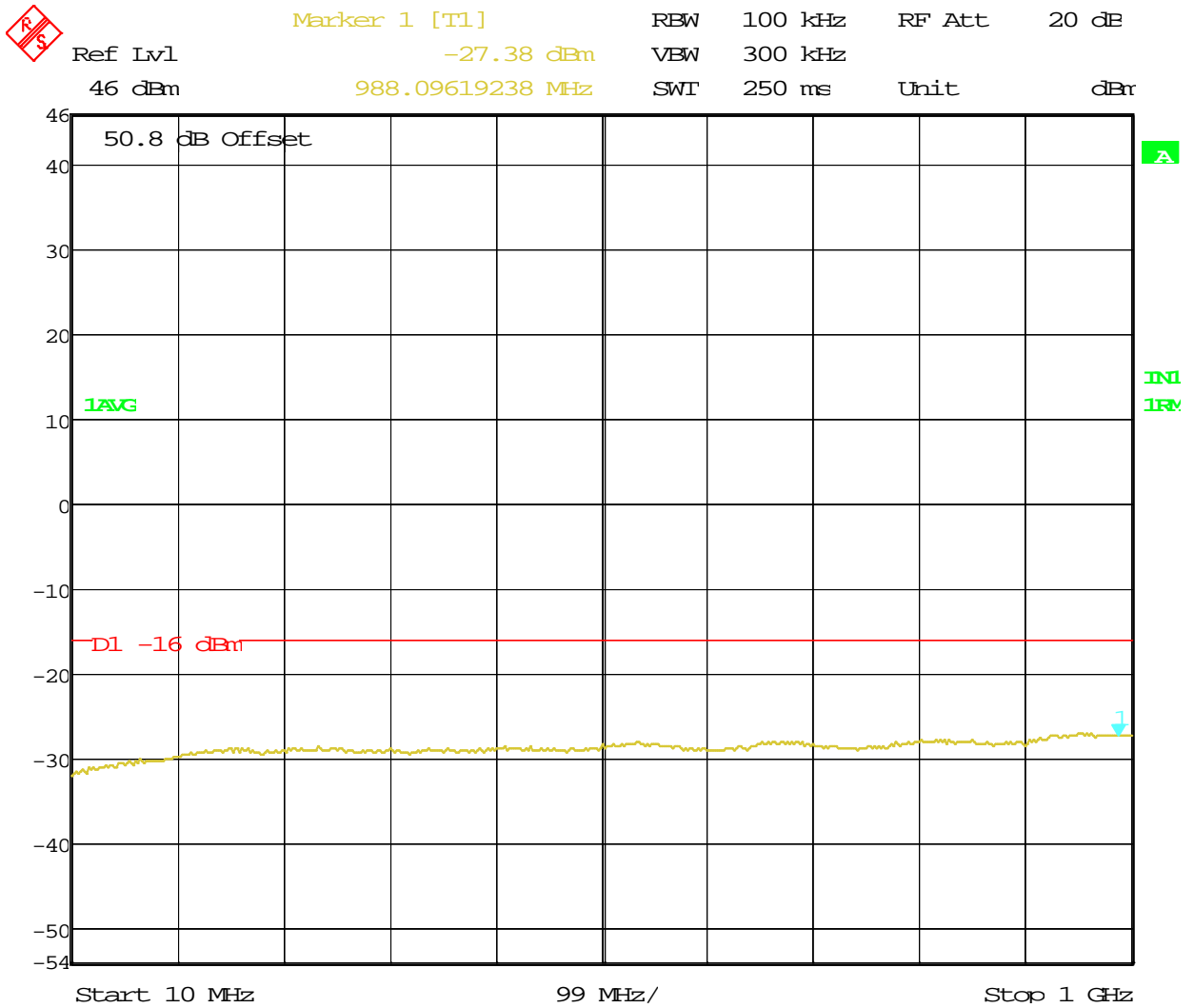
Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK: A+B1; 2110-2125 MHz; PWR:40W
OPSK; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 26.APR.2013 13:32:01

**Transmit Port
Antenna Conducted Spurious Emissions**

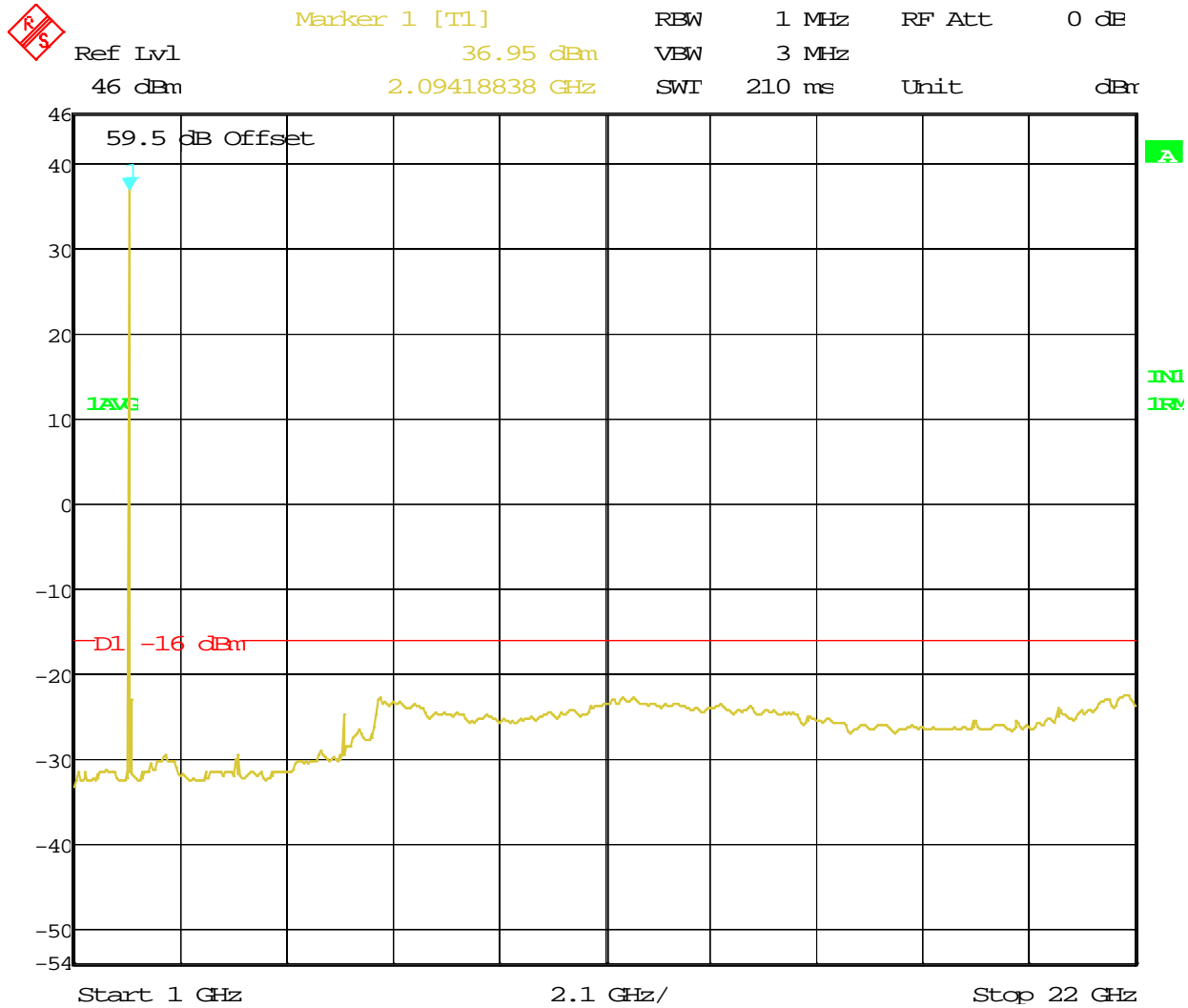
**Block: A+B1 (15 MHz BW)
16QAM Modulation
2x40 watts (MIMO)
Bandwidth (2110 – 2125 MHz)**



Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK: A+B1; 2110-2125 MHz; PWR:40W
16QAM; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 07:39:41



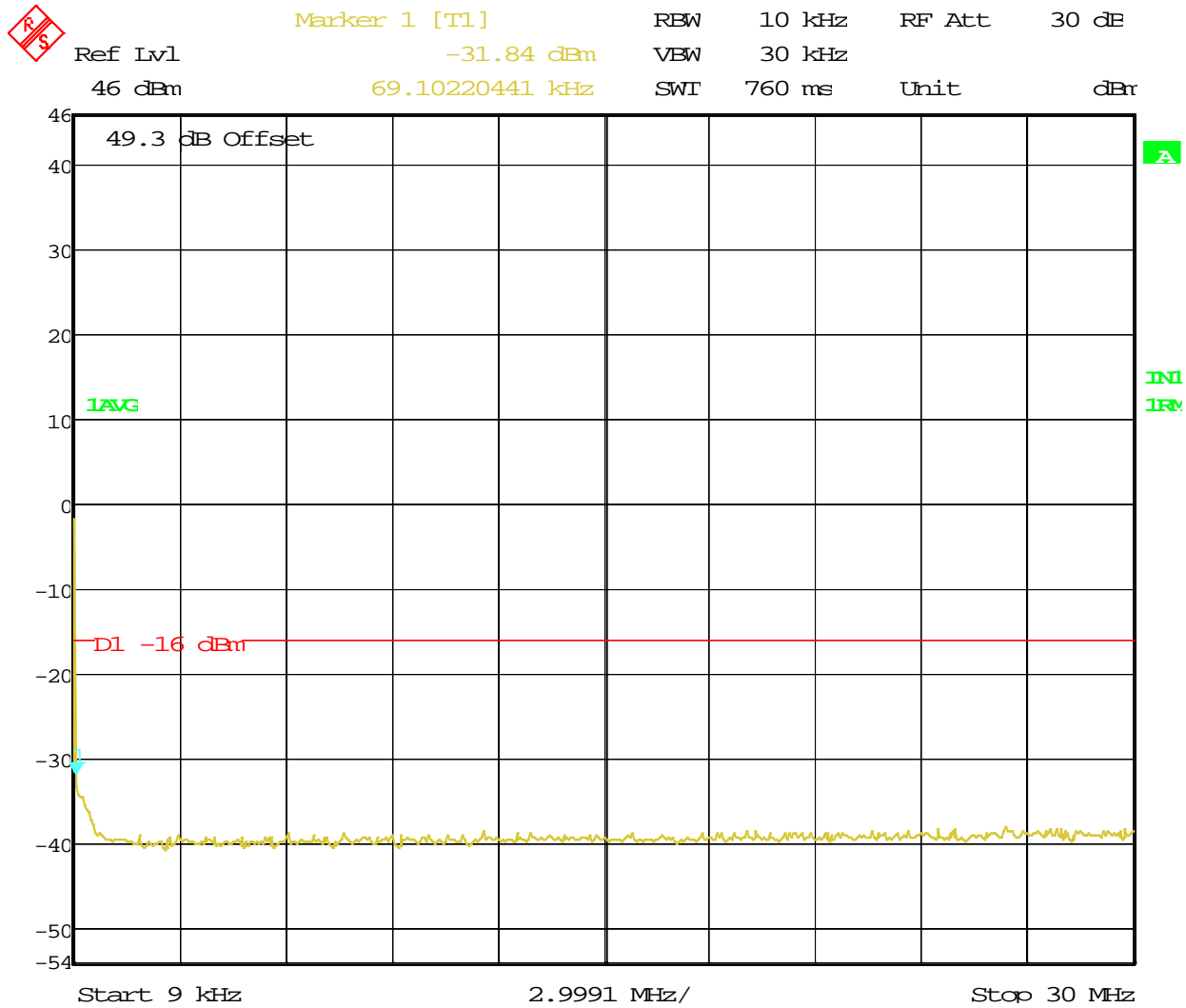
Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
 Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK: A+B1; 2110-2125 MHz; PWR:40W
 16QAM; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
 Date: 29.APR.2013 07:40:22



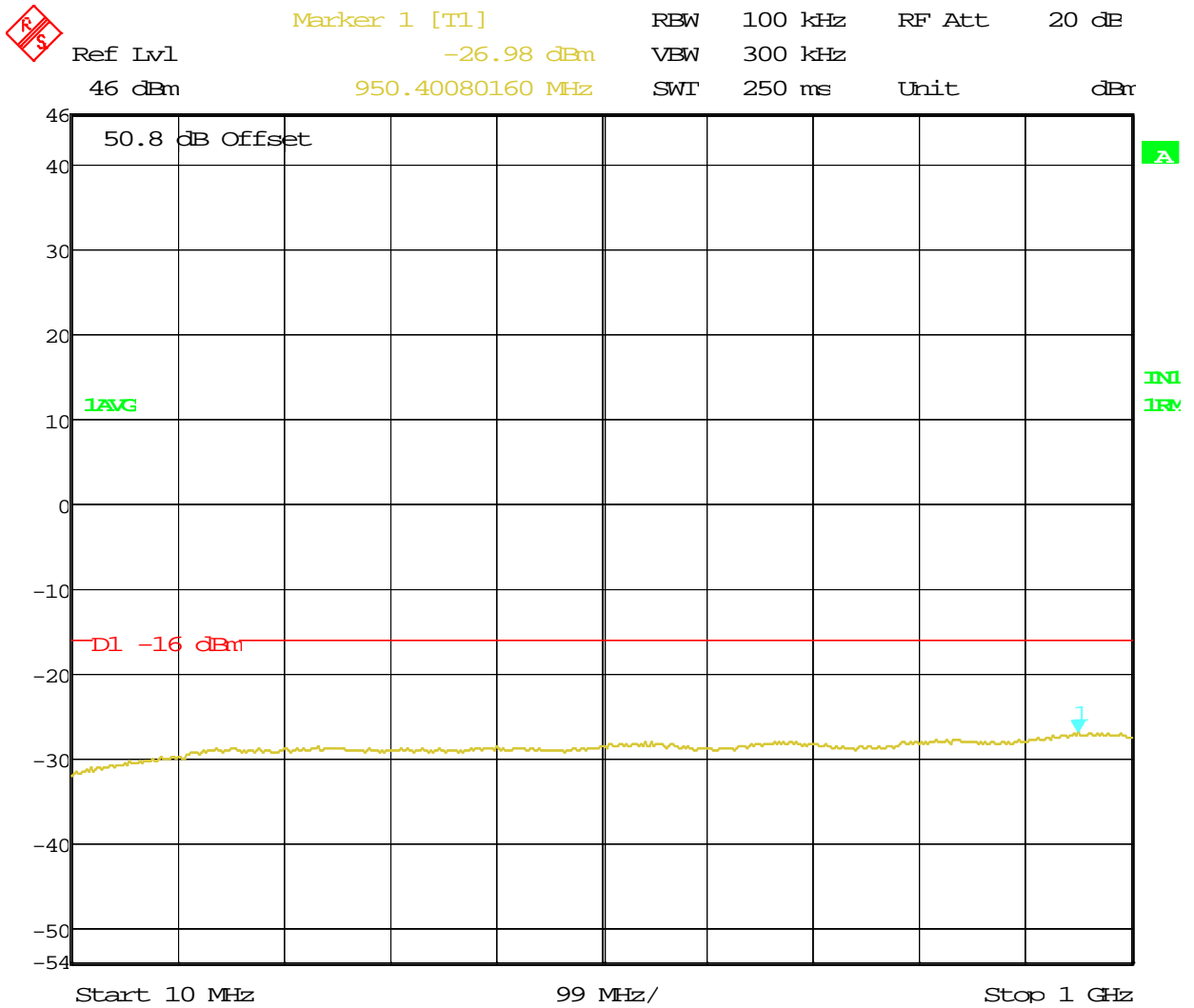
Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK: A+B1; 2110-2125 MHz; PWR:40W
16QAM; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 07:42:36

**Transmit Port
Antenna Conducted Spurious Emissions**

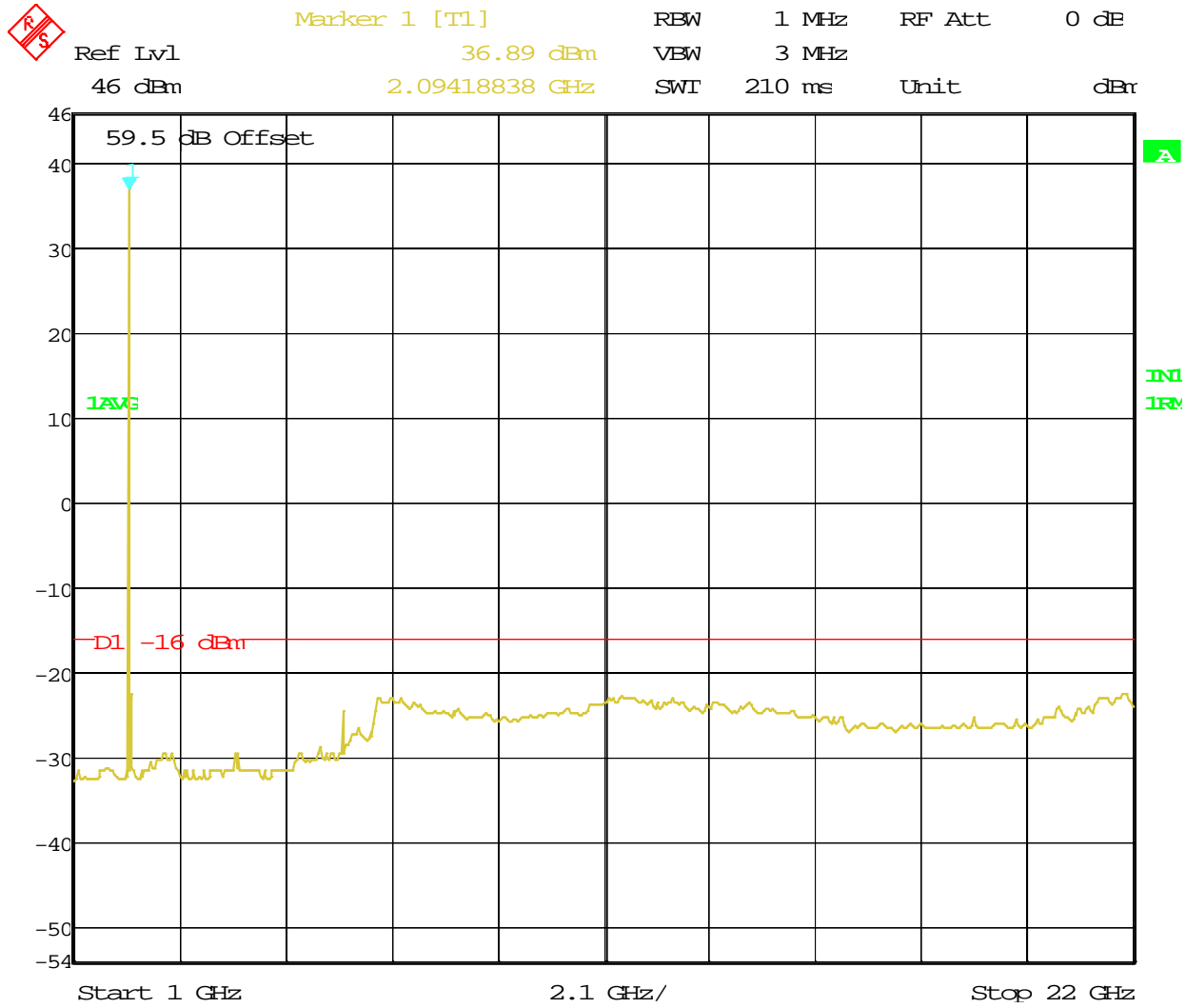
**Block: A+B1 (15 MHz BW)
64QAM Modulation
2x40 watts (MIMO)
Bandwidth (2110 – 2125 MHz)**



Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK: A+B1; 2110-2125 MHz; PWR:40W
64QAM; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 08:56:53



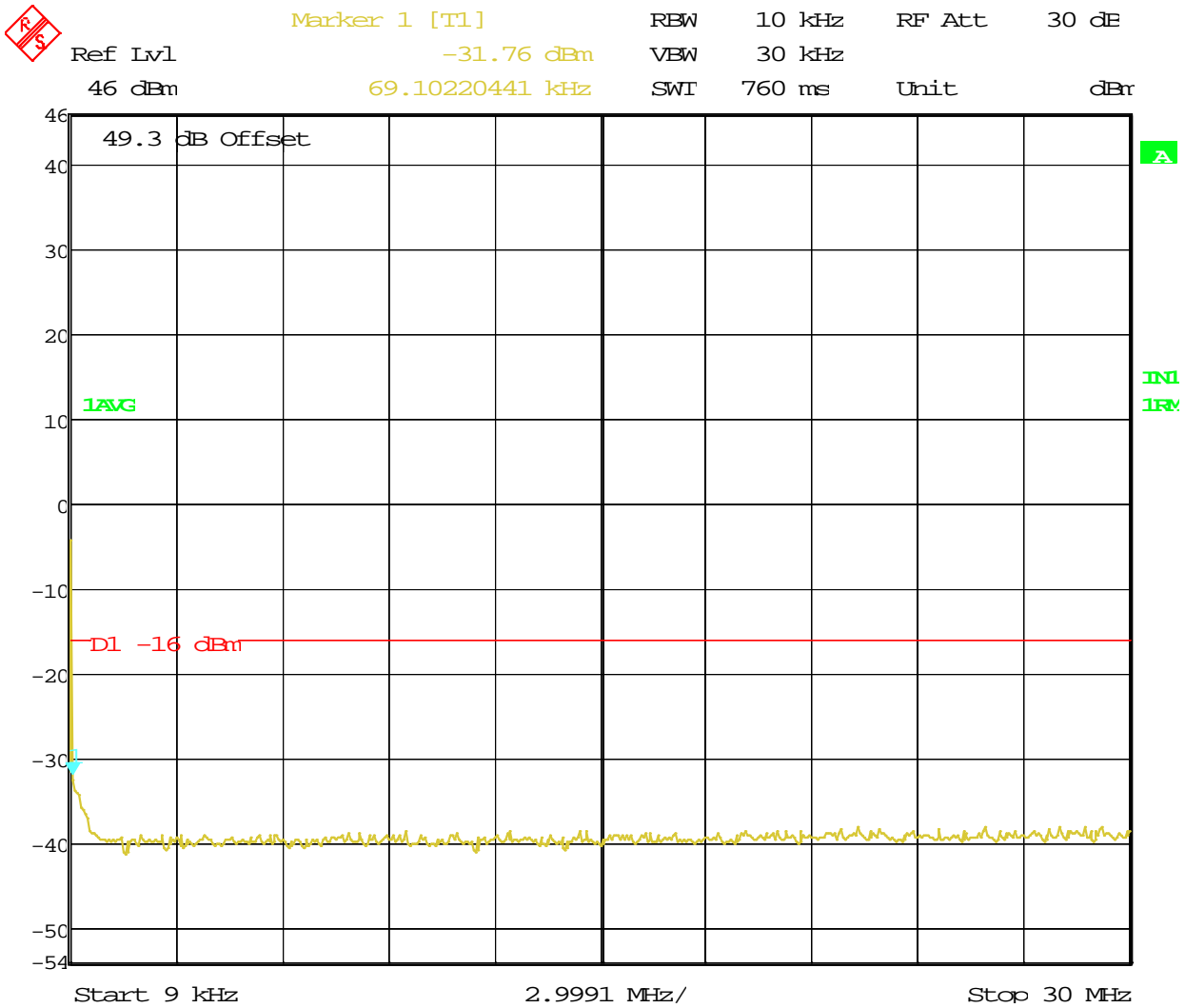
Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK: A+B1; 2110-2125 MHz; PWR:40W
64QAM; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 08:55:53



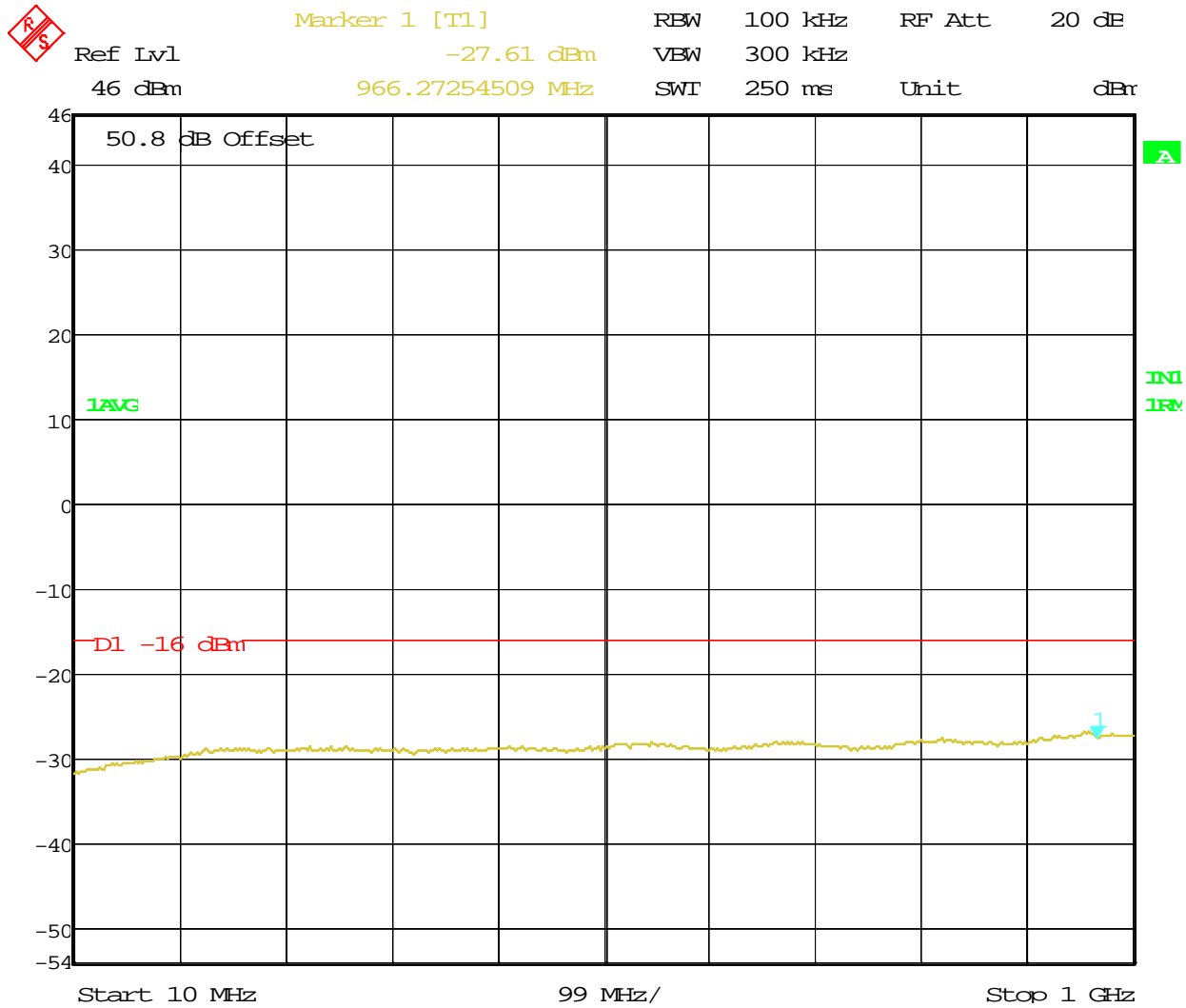
Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK: A+B1; 2110-2125 MHz; PWR:40W
64QAM; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 08:57:57

**Transmit Port
Antenna Conducted Spurious Emissions**

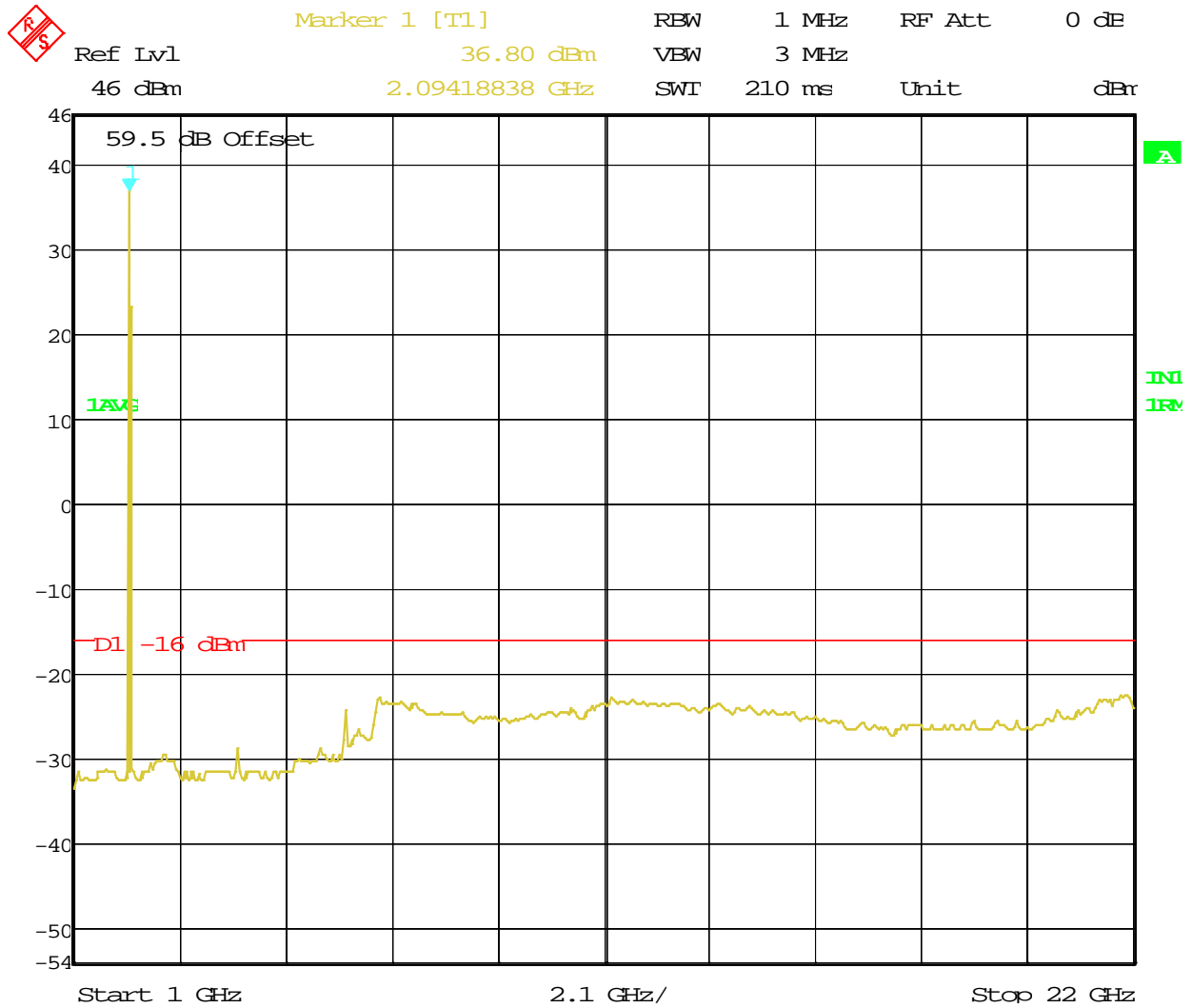
**Block: B+C (15 MHz BW)
QPSK Modulation
2x40 watts (MIMO)
Bandwidth (2120 – 2135 MHz)**



Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK: B+C; 2120-2135 MHz; PWR:40W
OPSK; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 10:48:15



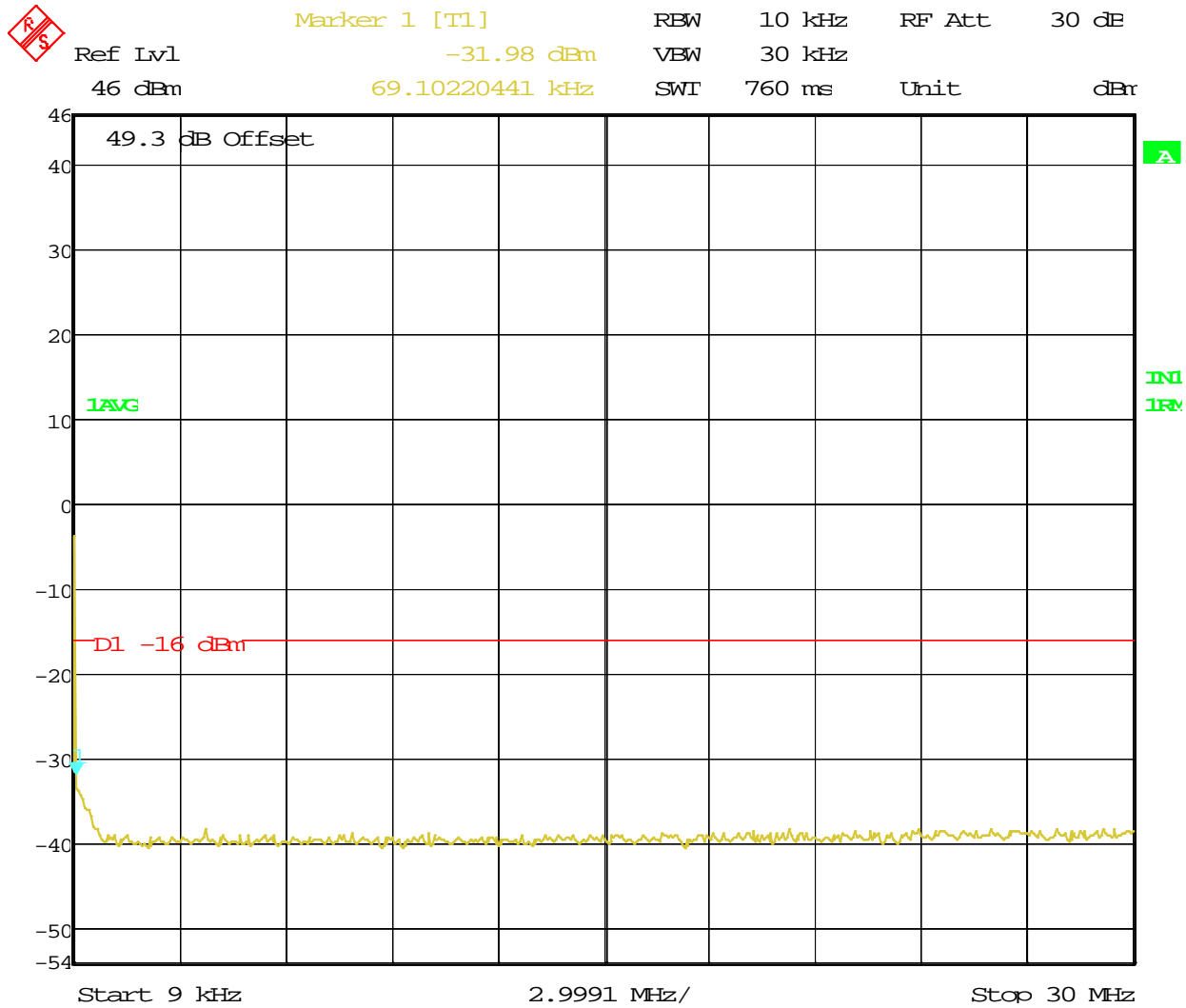
Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK: B+C; 2120-2135 MHz; PWR:40W
OPSK; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 10:48:58



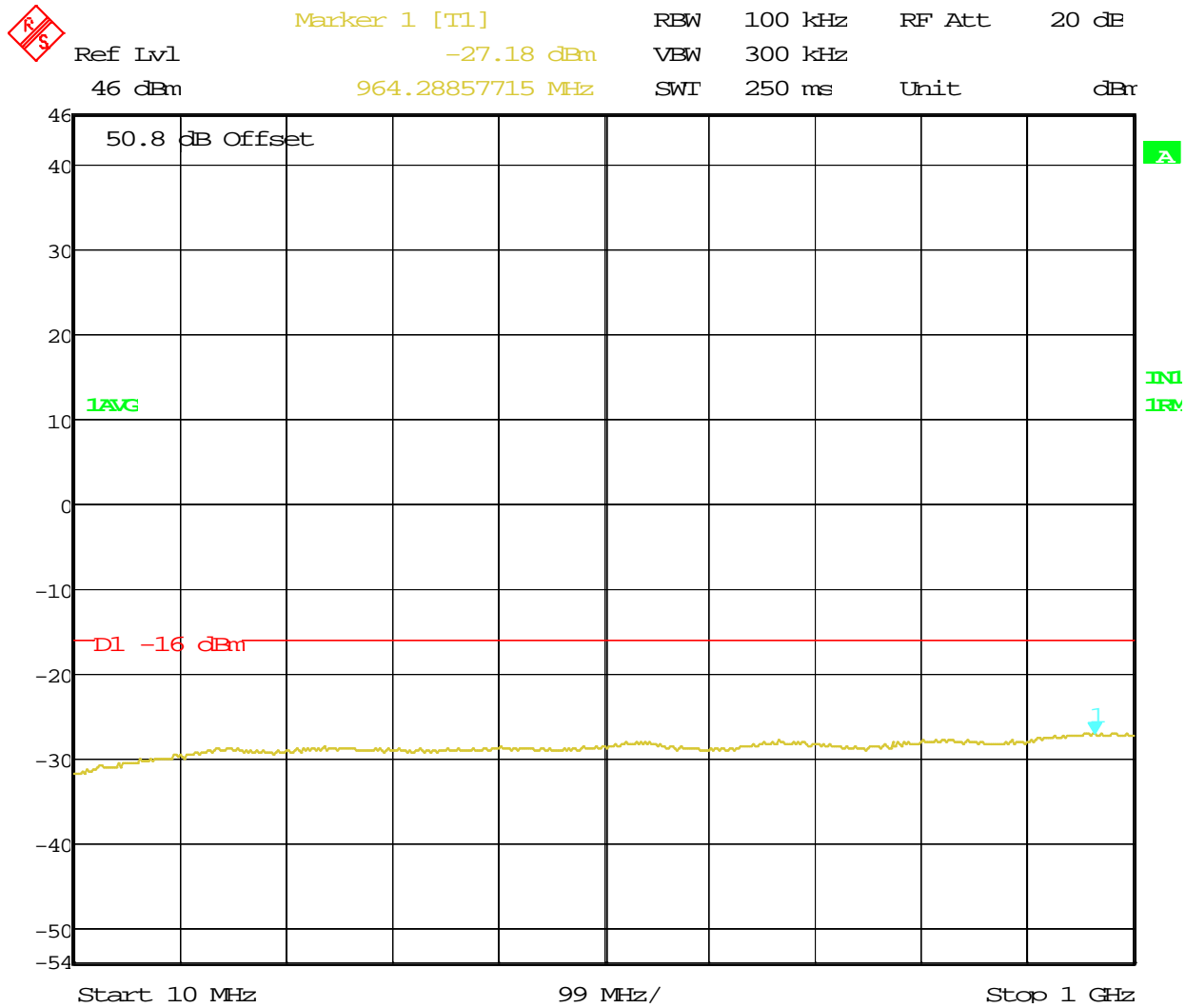
Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK: B+C; 2120-2135 MHz; PWR:40W
OPSK; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 10:49:38

**Transmit Port
Antenna Conducted Spurious Emissions**

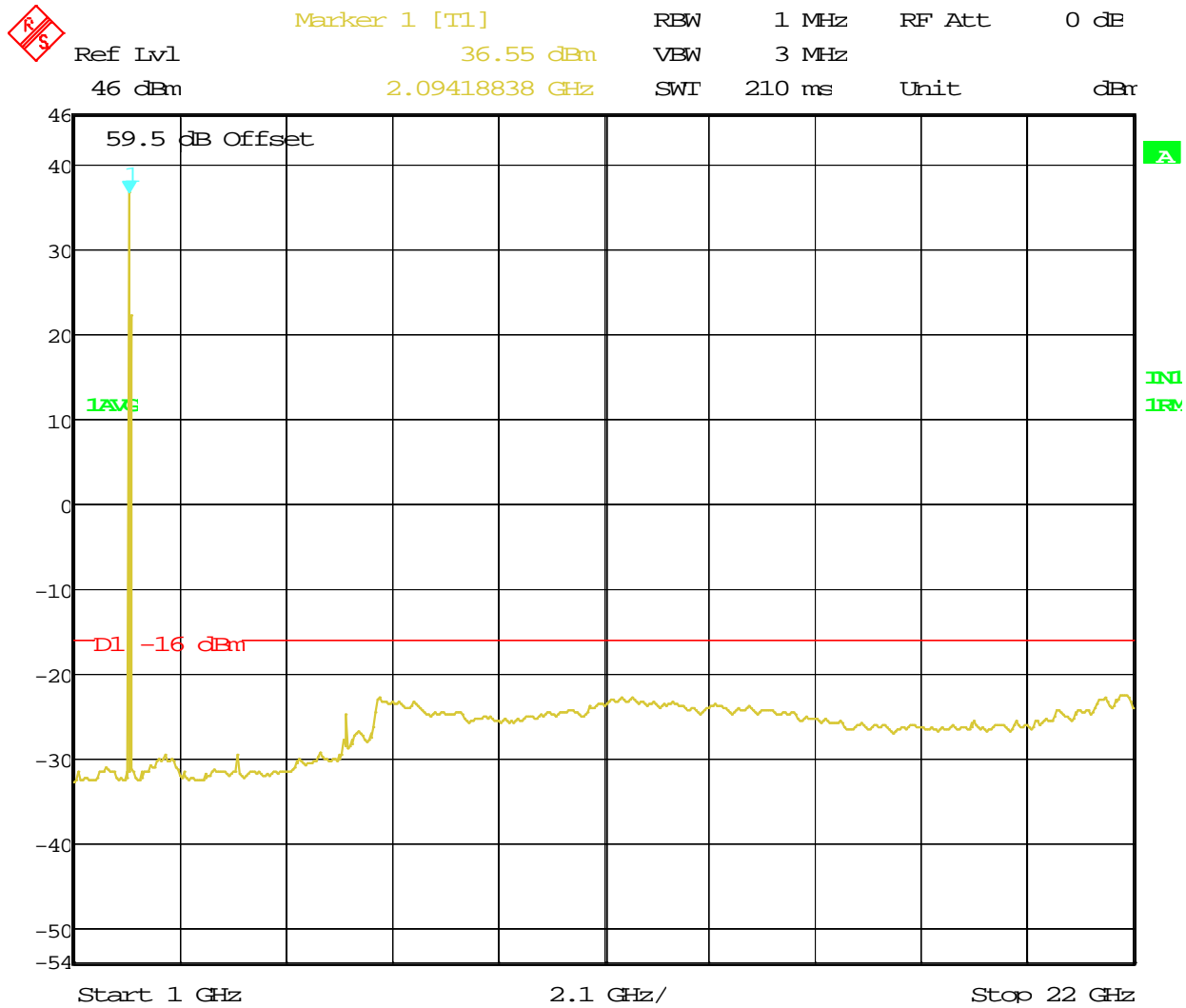
**Block: B+C (15 MHz BW)
2x40 (MIMO)
16QAM Modulation
Bandwidth (2120 – 2135 MHz)**



Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK: B+C; 2120-2135 MHz; PWR:40W
16QAM; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 10:29:50



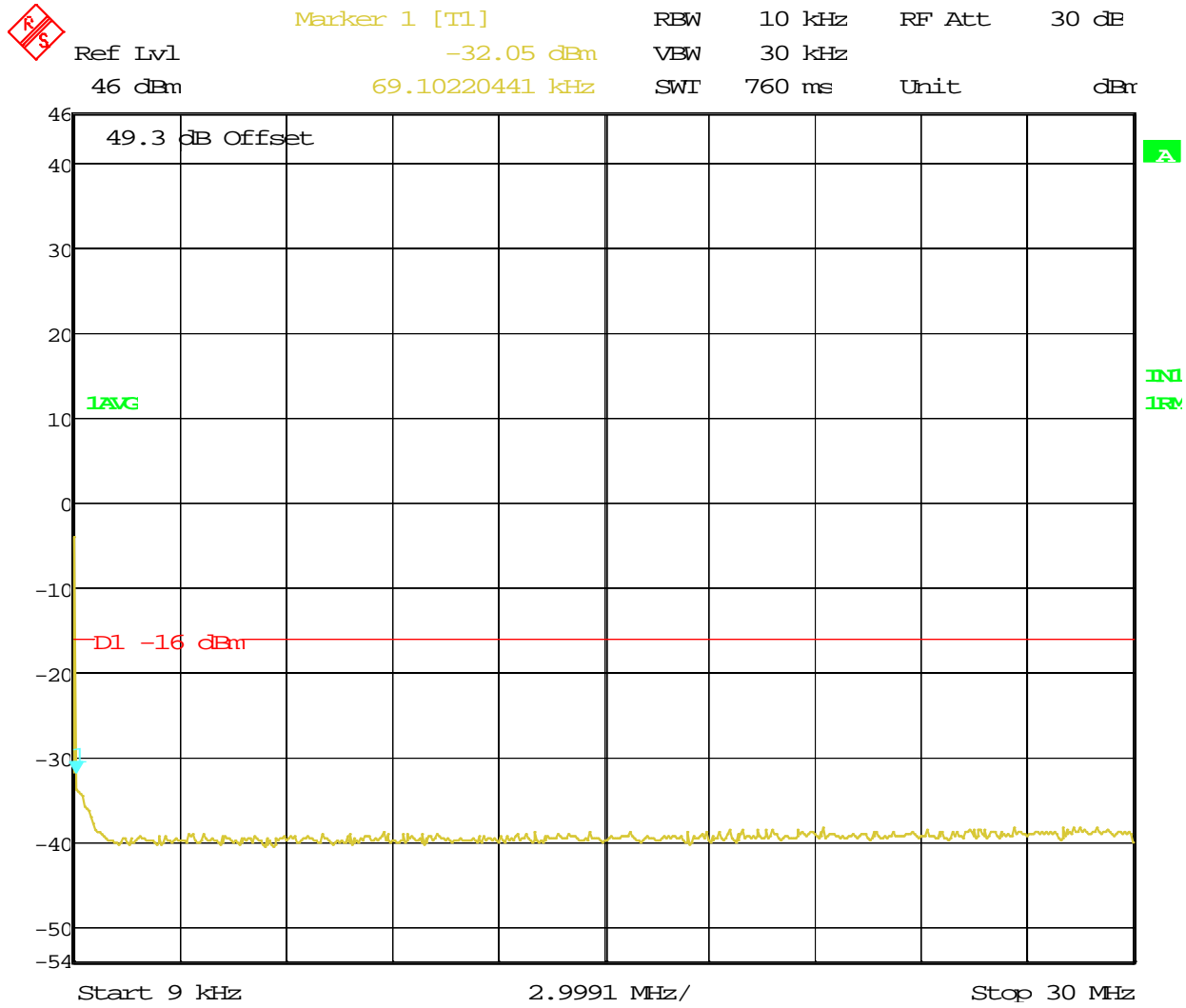
Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK: B+C; 2120-2135 MHz; PWR:40W
16QAM; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 10:30:34



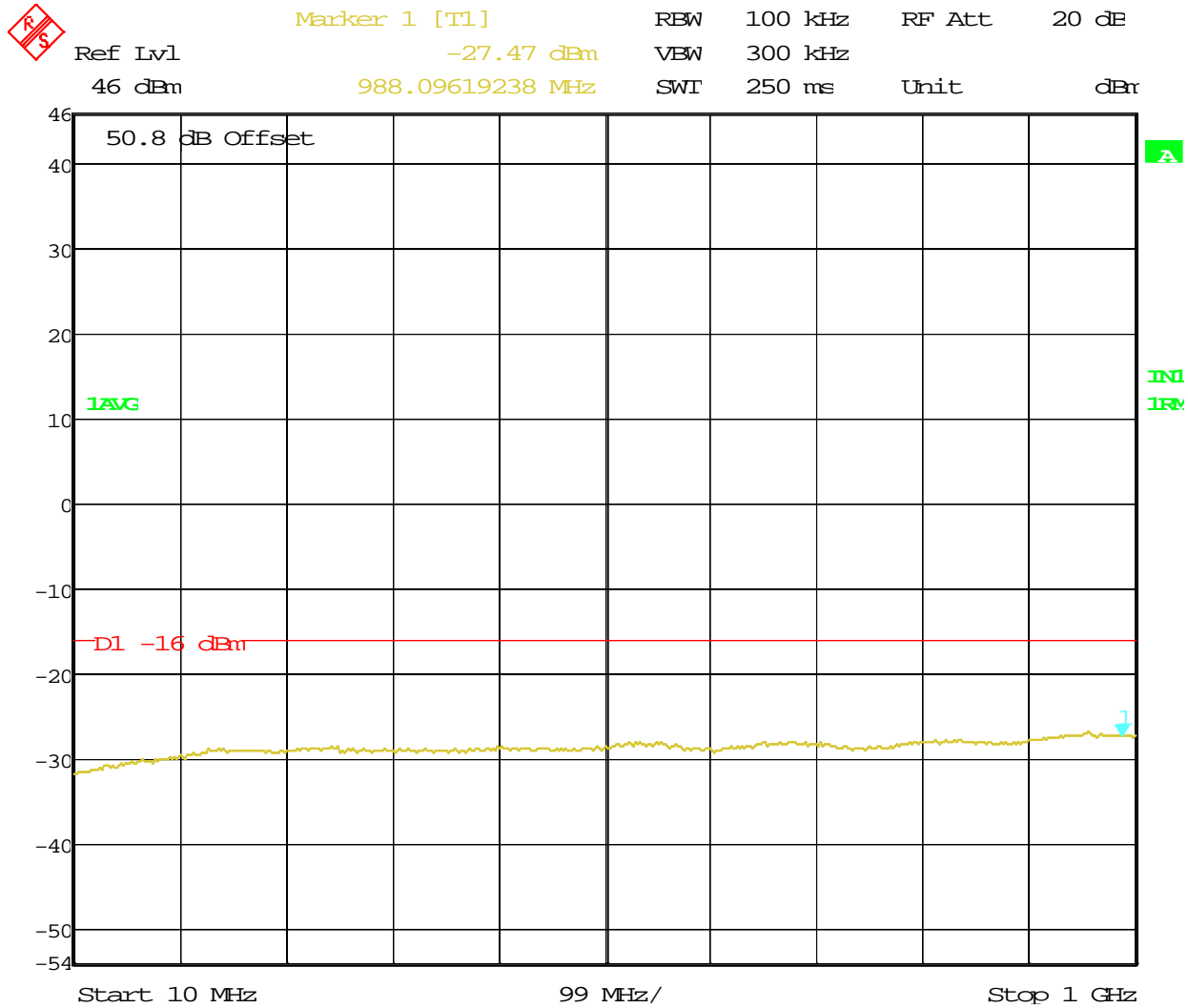
Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK: B+C; 2120-2135 MHz; PWR:40W
16QAM; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 10:31:31

**Transmit Port
Antenna Conducted Spurious Emissions**

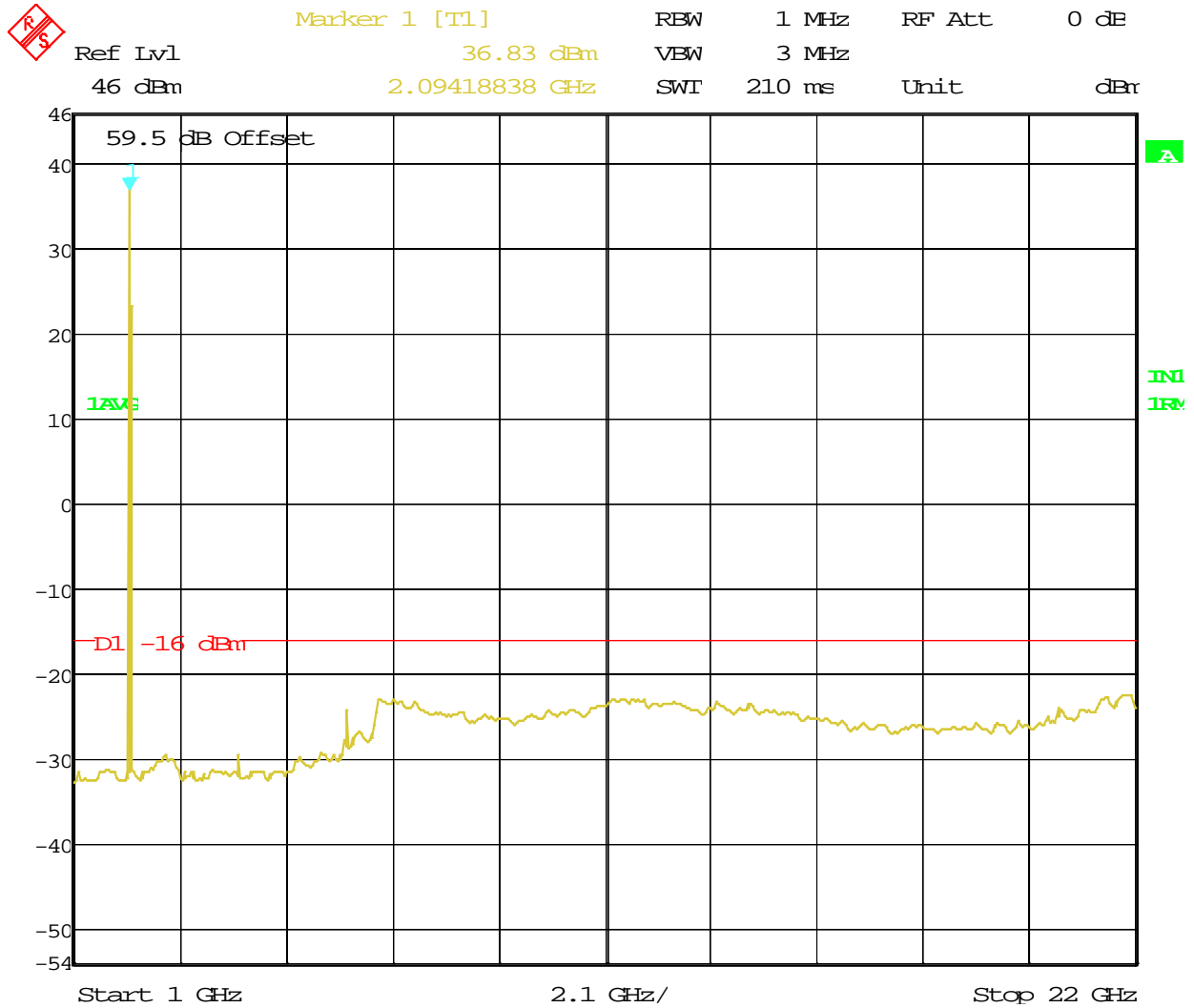
**Block: B+C (15 MHz BW)
64QAM Modulation
2x40 watts (MIMO)
Bandwidth (2120 – 2135 MHz)**



Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK: B+C; 2120-2135 MHz; PWR:40W
64QAM; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 09:46:39



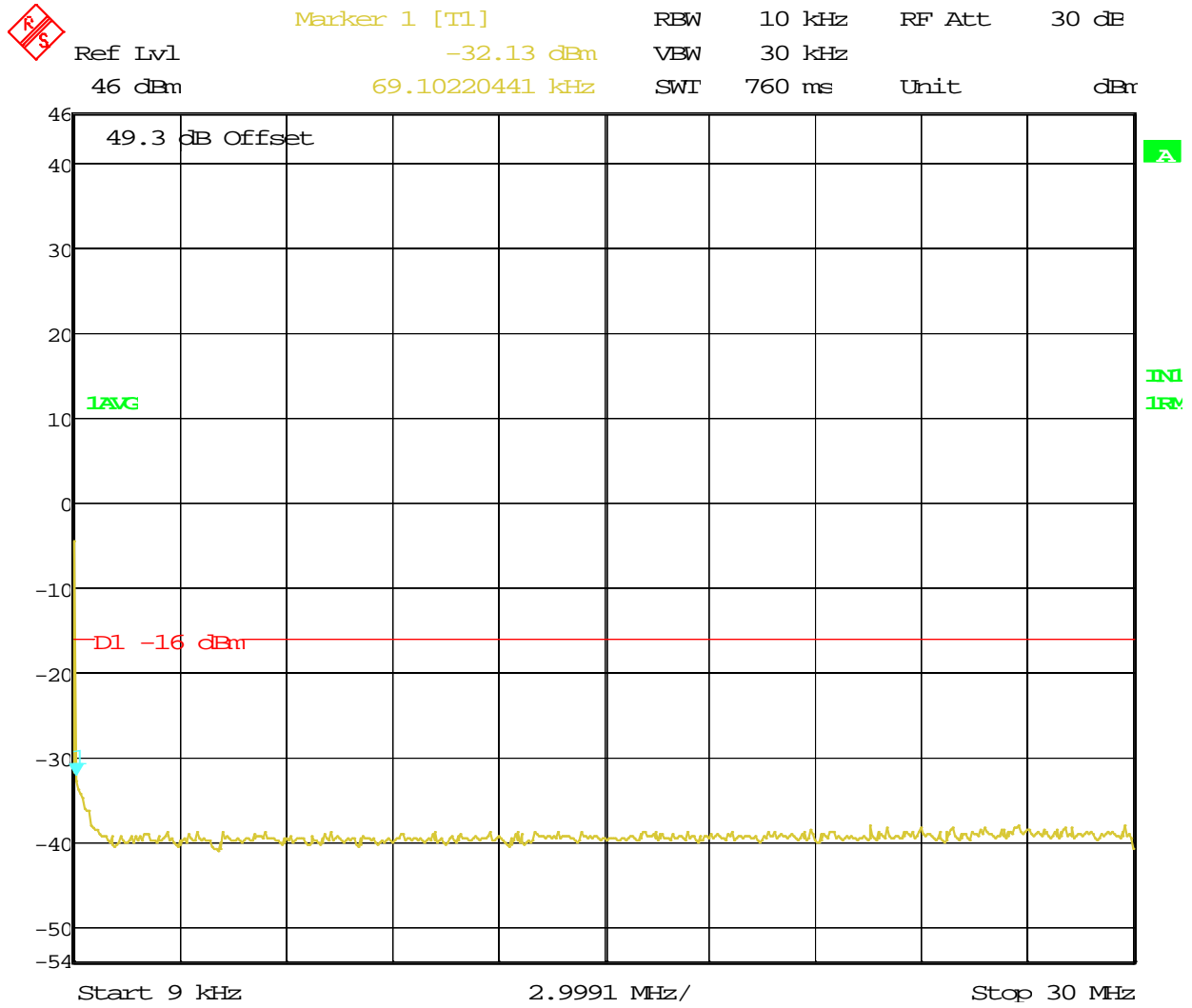
Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK: B+C; 2120-2135 MHz; PWR:40W
64QAM; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 09:48:56



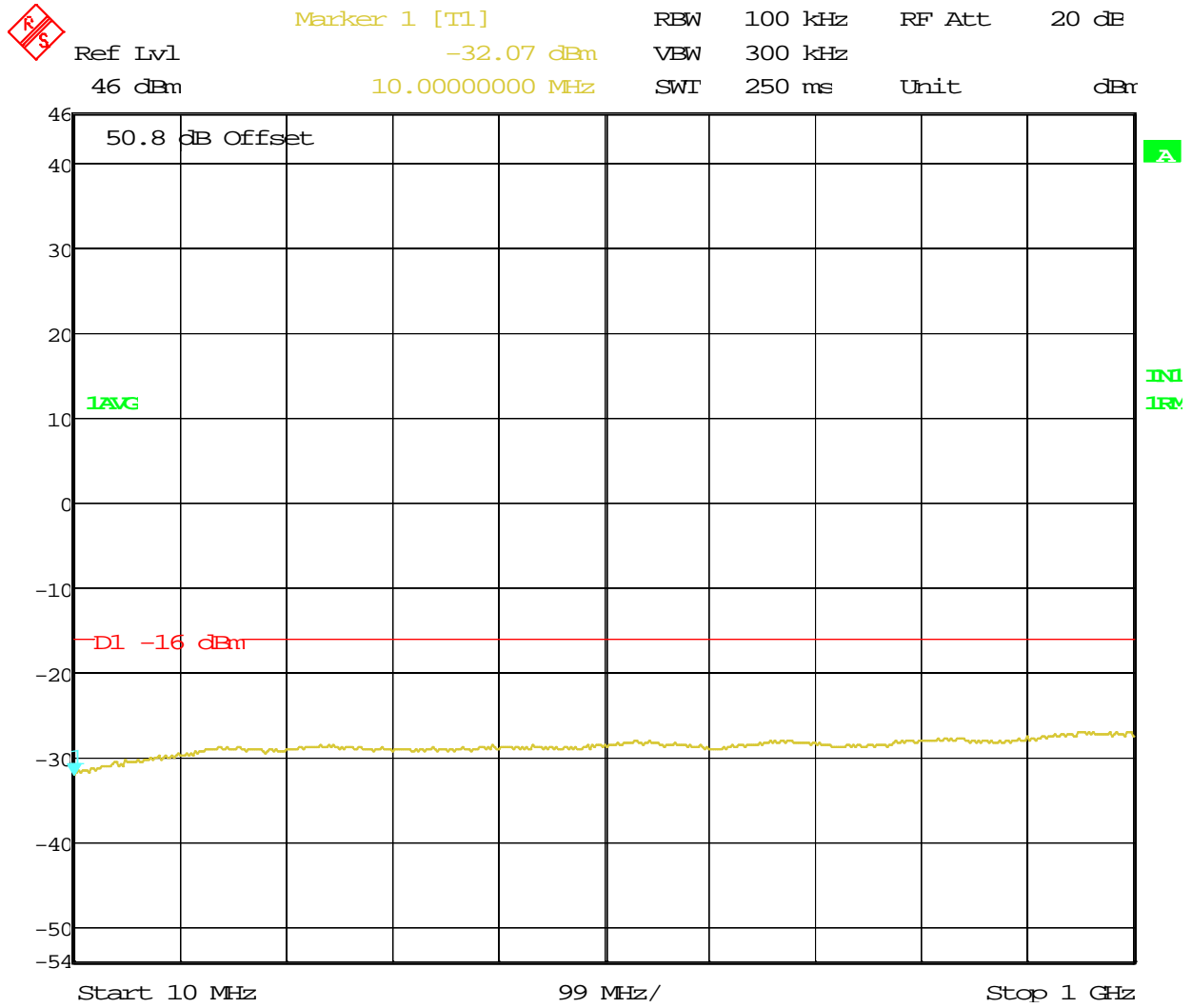
Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK: B+C; 2120-2135 MHz; PWR:40W
64QAM; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 09:50:05

**Transmit Port
Antenna Conducted Spurious Emissions**

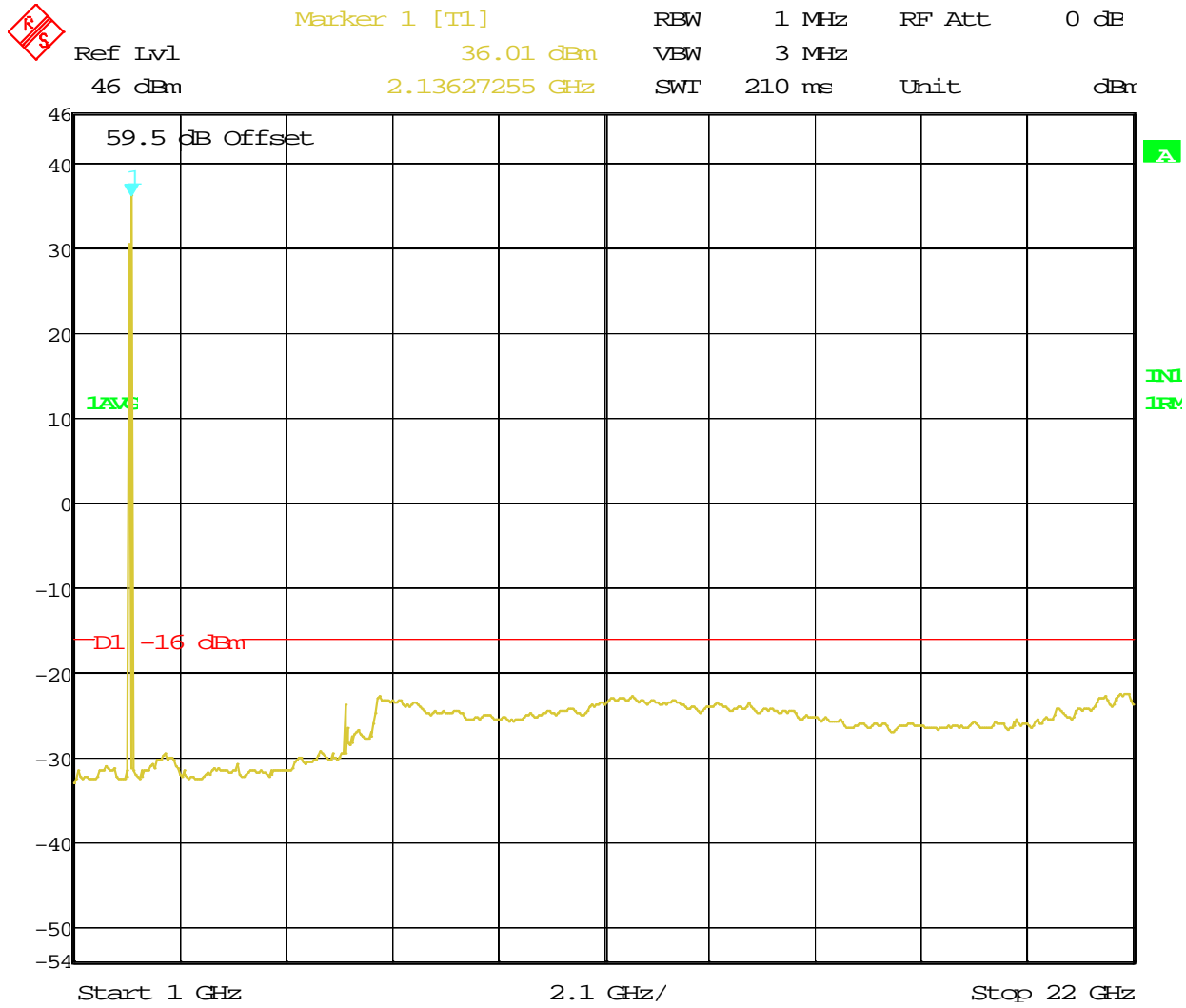
**Block: C+D+E (15 MHz BW)
QPSK Modulation
2x40 (MIMO)
Bandwidth (2135 – 2145 MHz)**



Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:C+D+E; 2130-2145 MHz; PWR:40W
QPSK; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 12:48:13



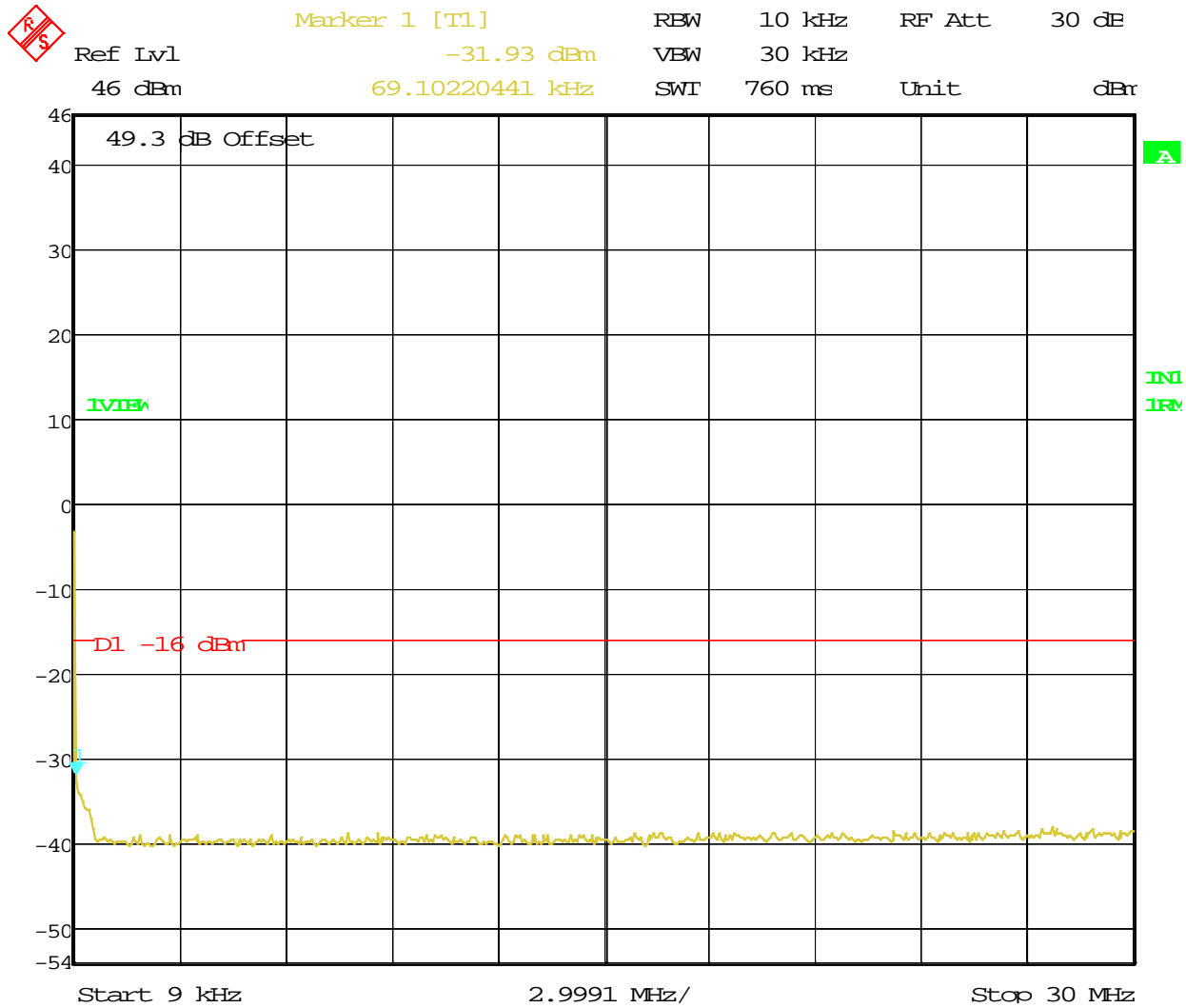
Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:C+D+E; 2130-2145 MHz; PWR:40W
QPSK; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 12:47:32



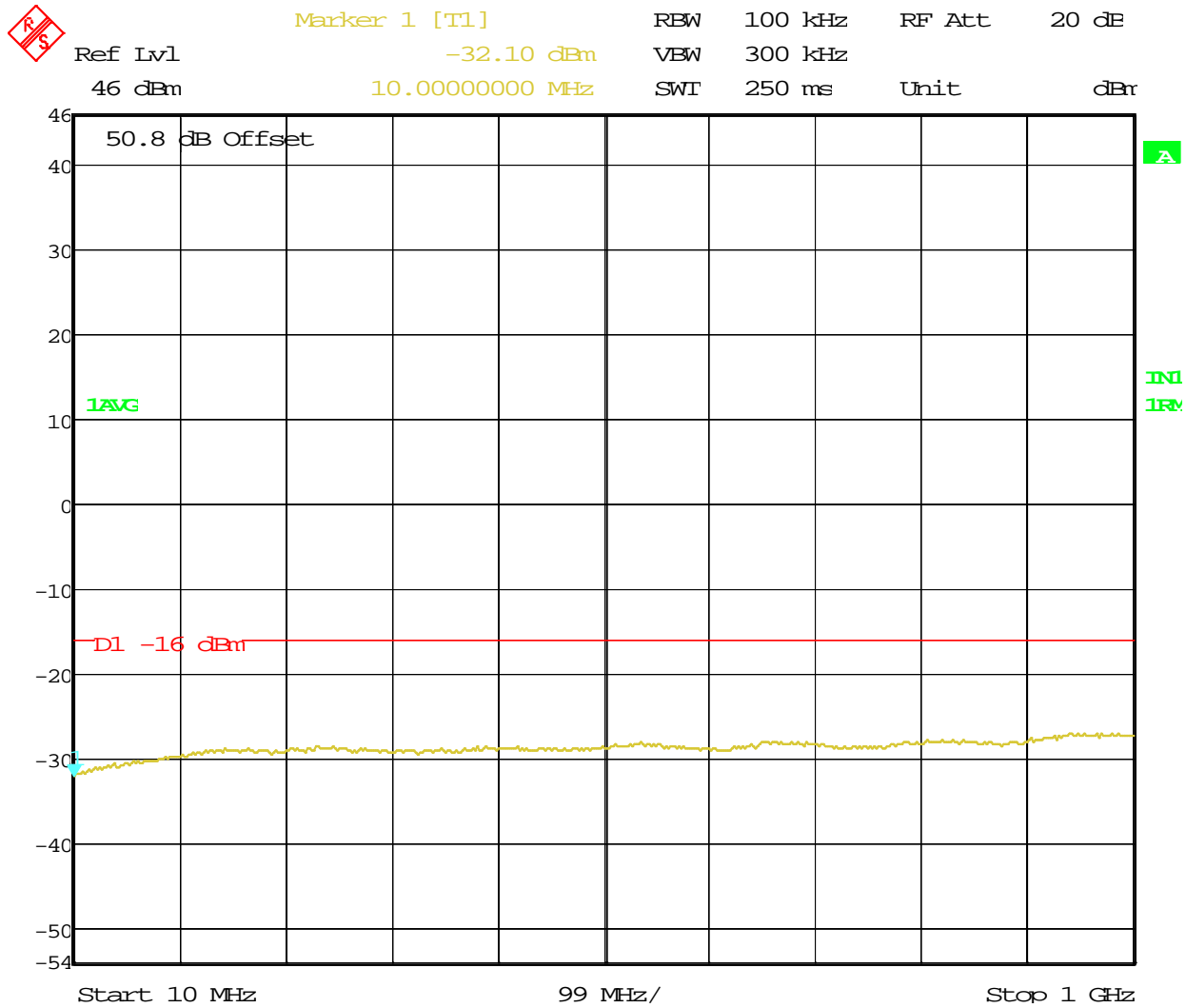
Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:C+D+E; 2130-2145 MHz; PWR:40W
QPSK; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 12:46:50

**Transmit Port
Antenna Conducted Spurious Emissions**

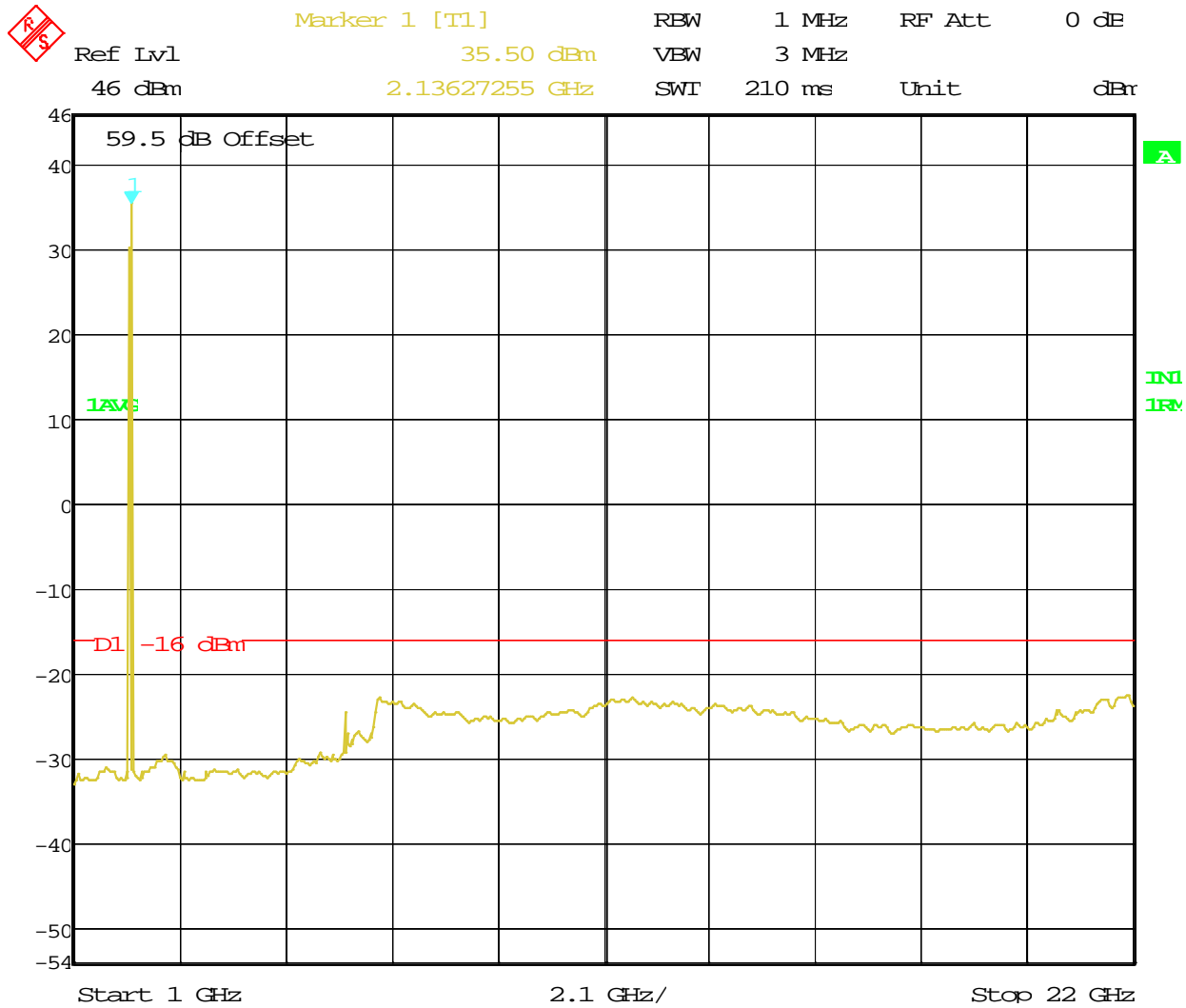
**Block: C+D+E (15 MHz BW)
16QAM Modulation
2x40 (MIMO)
Bandwidth (2130 – 2145 MHz)**



Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:C+D+E; 2130-2145 MHz; PWR:40W
16QAM; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 11:44:15



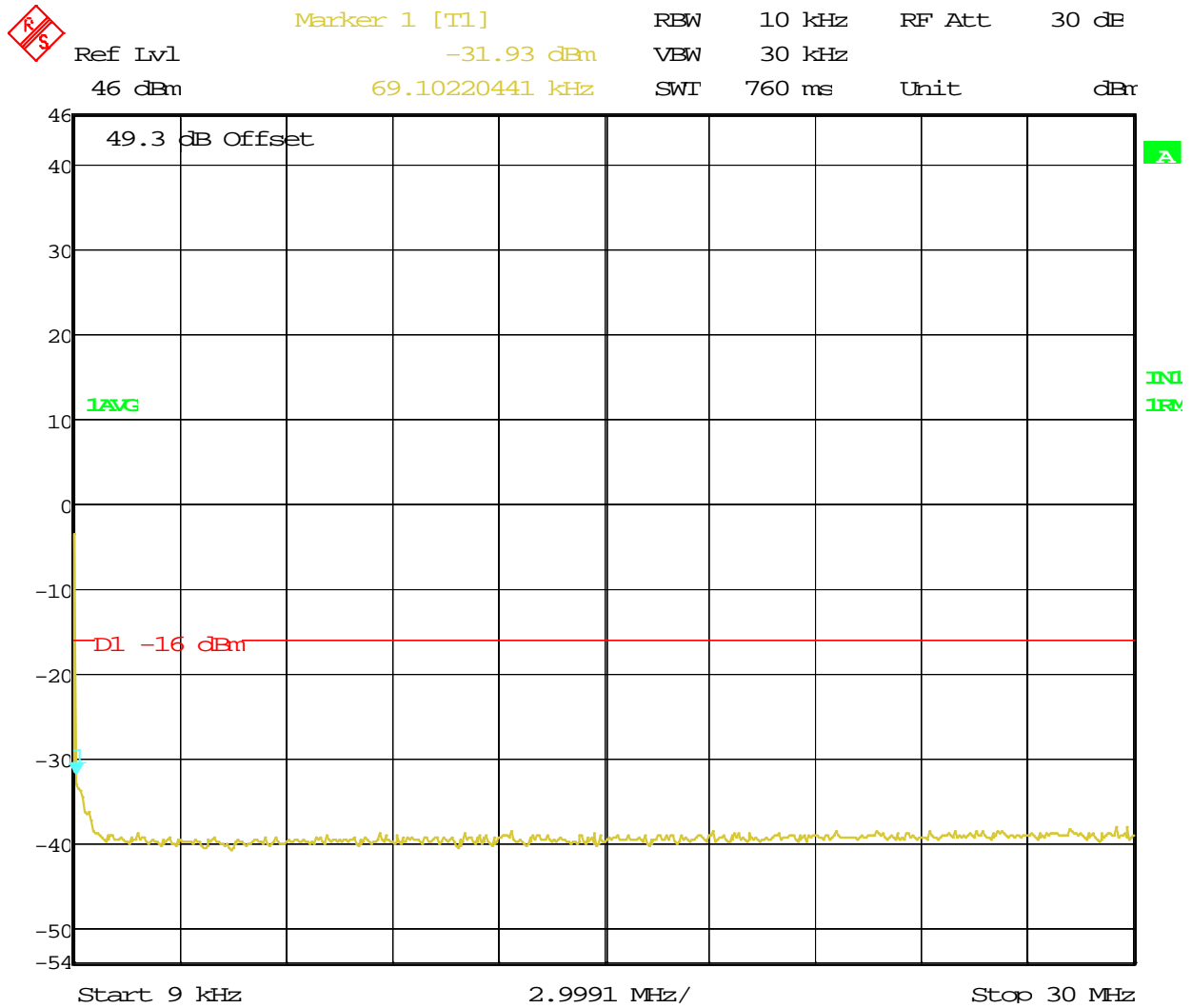
Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:C+D+E; 2130-2145 MHz; PWR:40W
16QAM; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 11:46:01



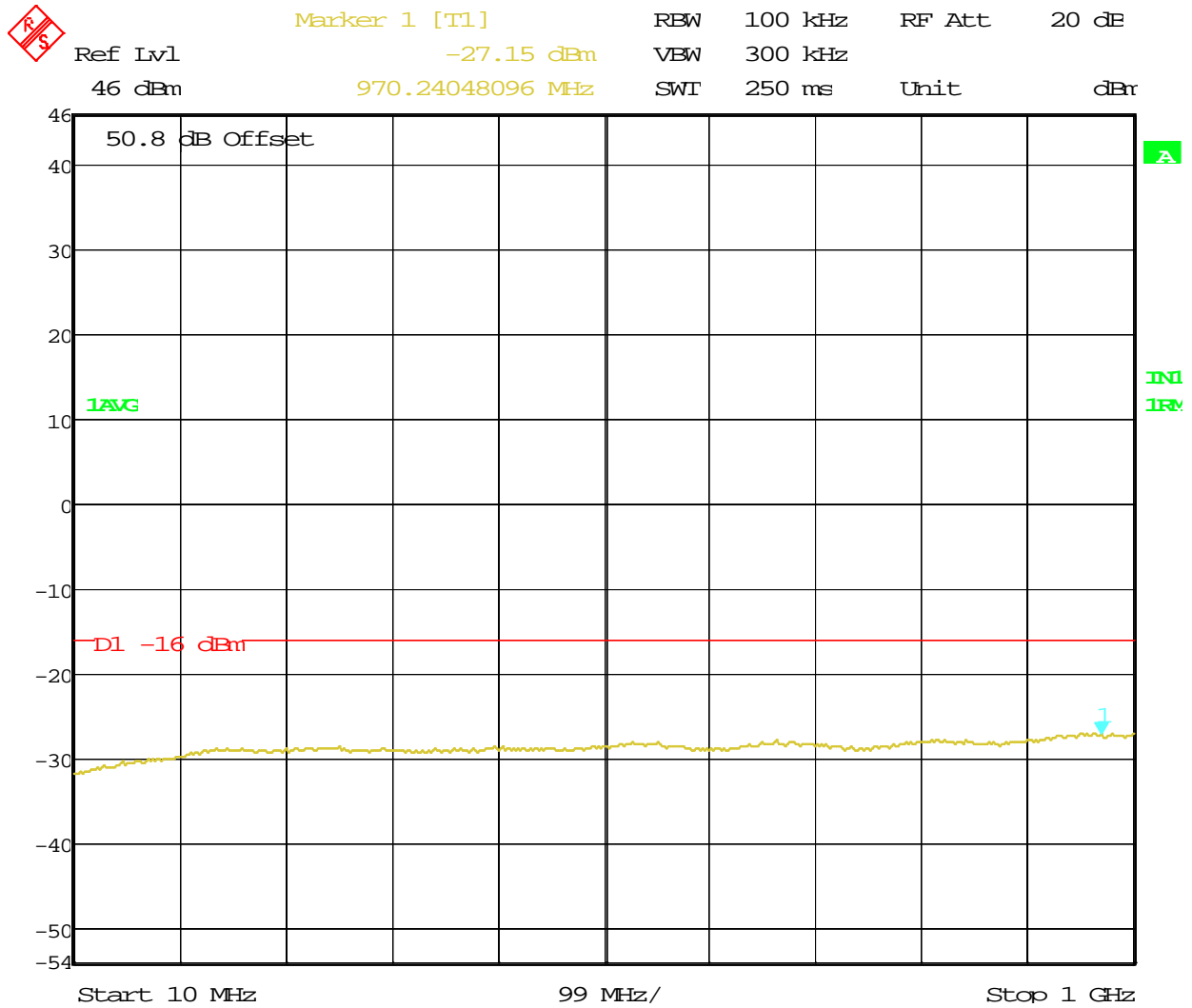
Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:C+D+E; 2130-2145 MHz; PWR:40W
16QAM; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 11:47:01

**Transmit Port
Antenna Conducted Spurious Emissions**

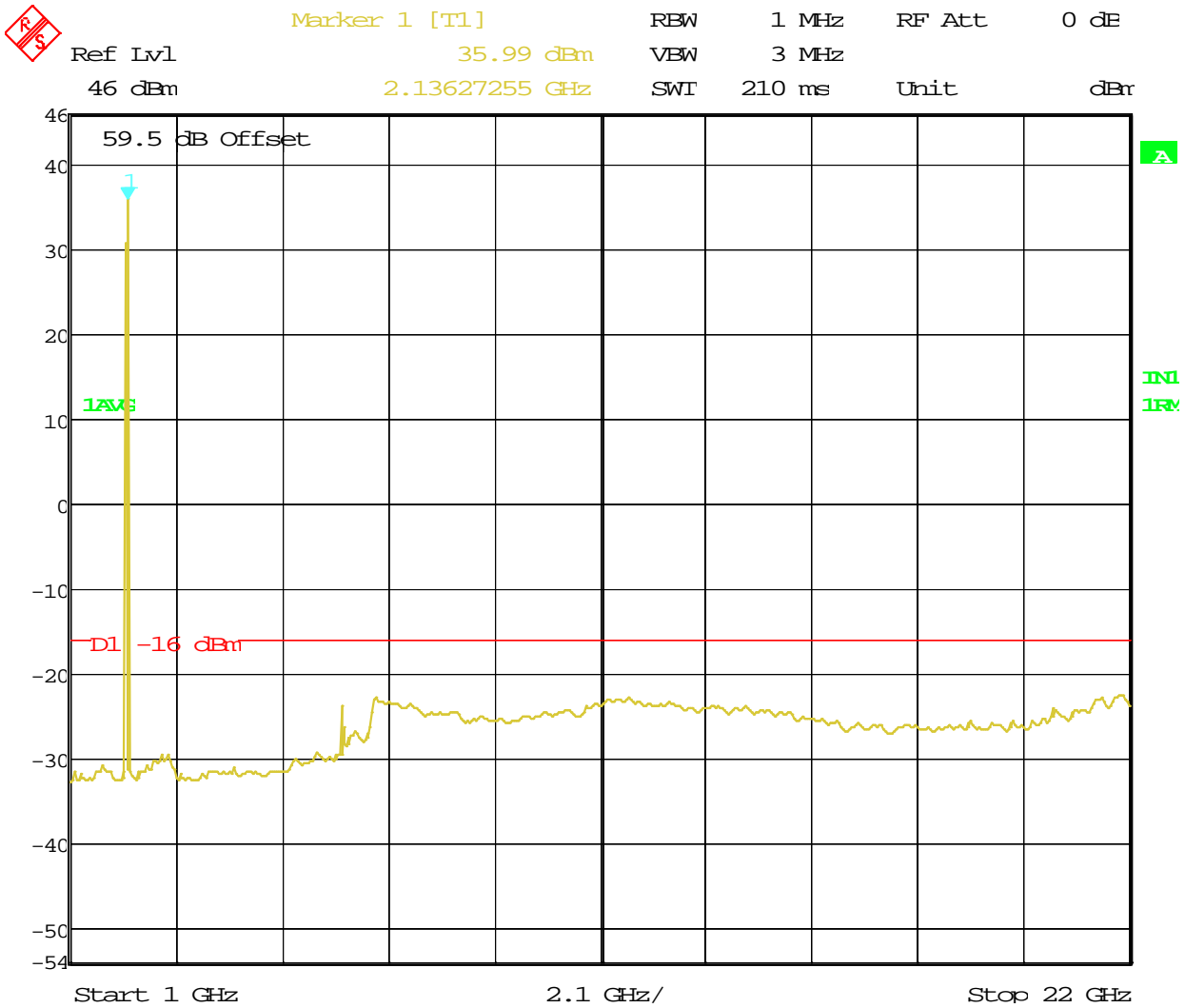
**Block: C+D+E (15MHz BW)
64QAM Modulation
2x40 (MIMO)
Bandwidth (2130 – 2145 MHz)**



Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:C+D+E; 2130-2145 MHz; PWR:40W
64QAM; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 13:25:04



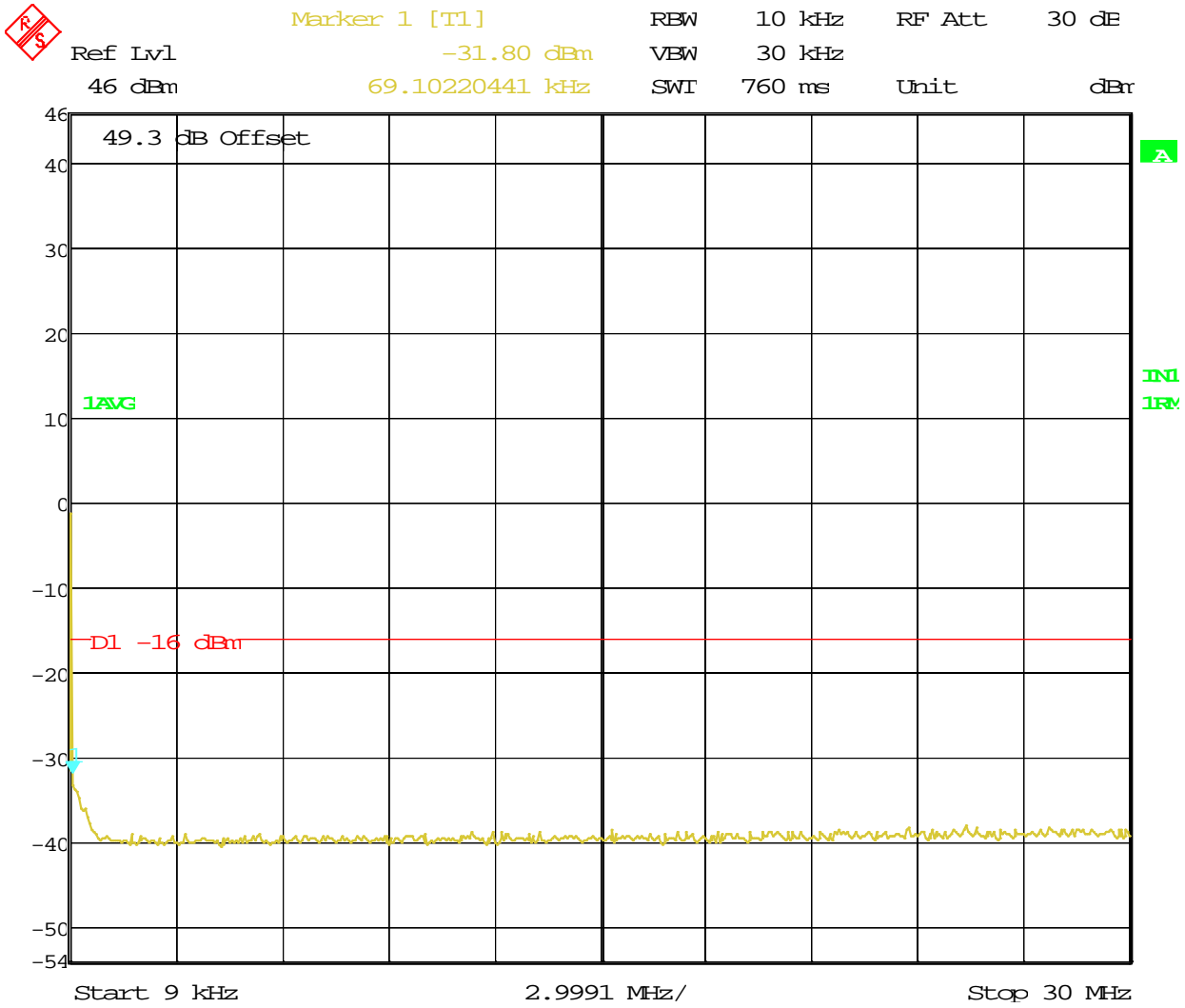
Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:C+D+E; 2130-2145 MHz; PWR:40W
64QAM; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 13:25:47



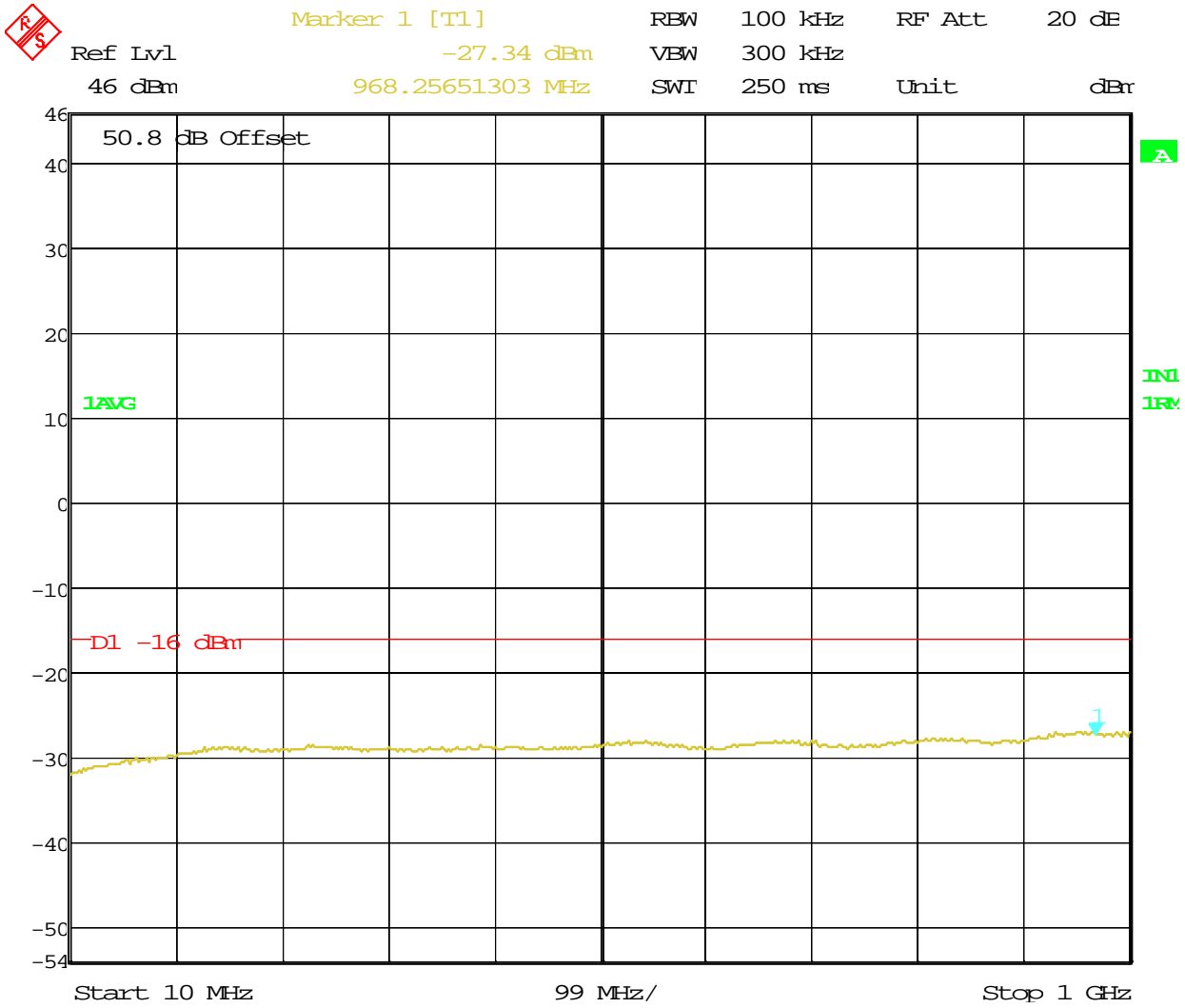
Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:C+D+E; 2130-2145 MHz; PWR:40W
64QAM; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 13:26:19

**Transmit Port
Antenna Conducted Spurious Emissions**

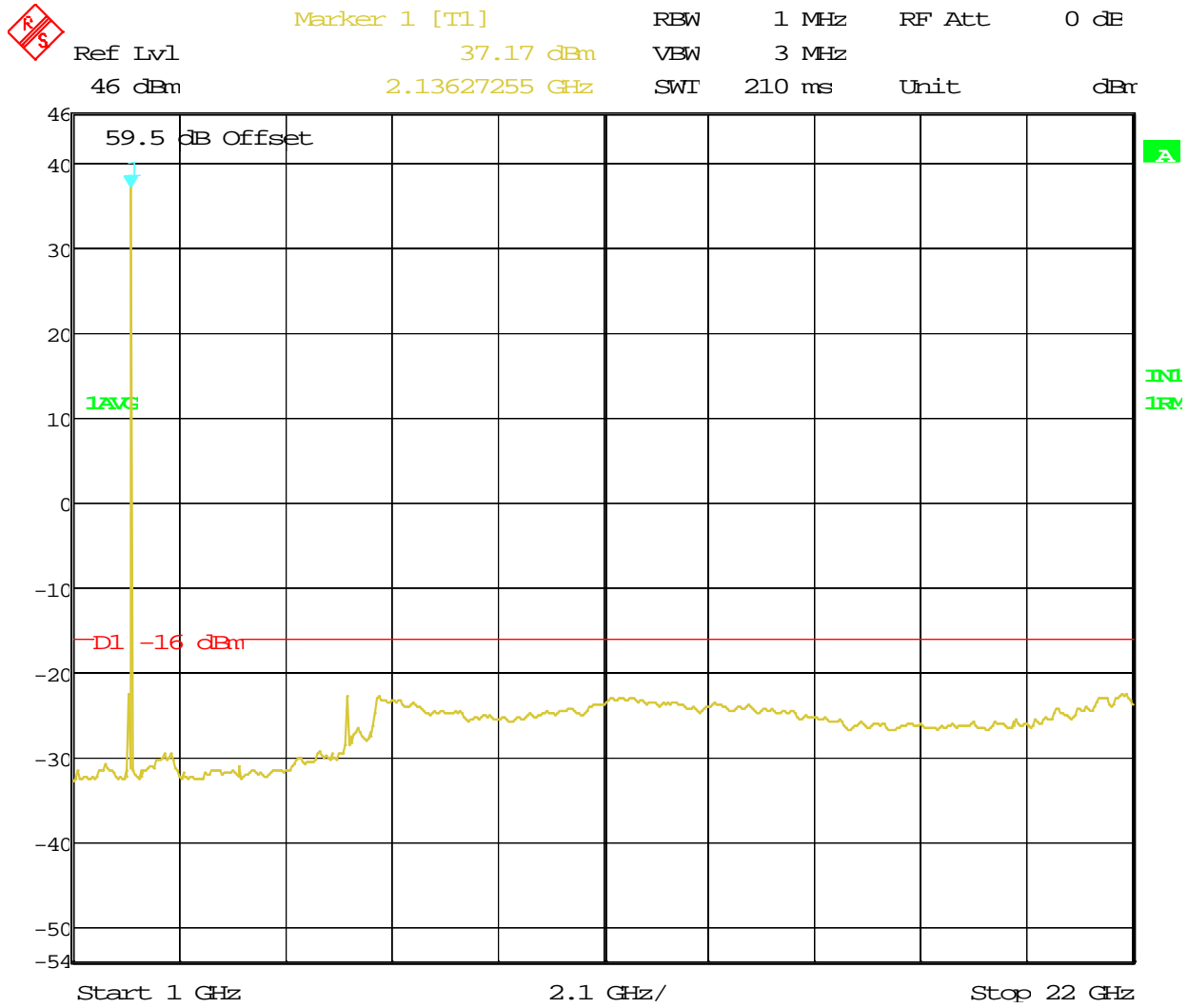
**Block: E+F (15MHz BW)
QPSK Modulation
2x40 (MIMO)
Bandwidth (2140 – 2155 MHz)**



Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:E+F; 2140-2155 MHz; PWR:40W
QPSK; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 30.APR.2013 09:59:29



Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:E+F; 2140-2155 MHz; PWR:40W
QPSK; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 30.APR.2013 10:00:04



Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:E+F; 2140-2155 MHz; PWR:40W
QPSK; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 30.APR.2013 10:00:45

**Transmit Port
Antenna Conducted Spurious Emissions**

**Block: E+F (15MHz BW)
16QAM Modulation
2x40 (MIMO)
Bandwidth (2140 – 2155 MHz)**



Marker 1 [T1]

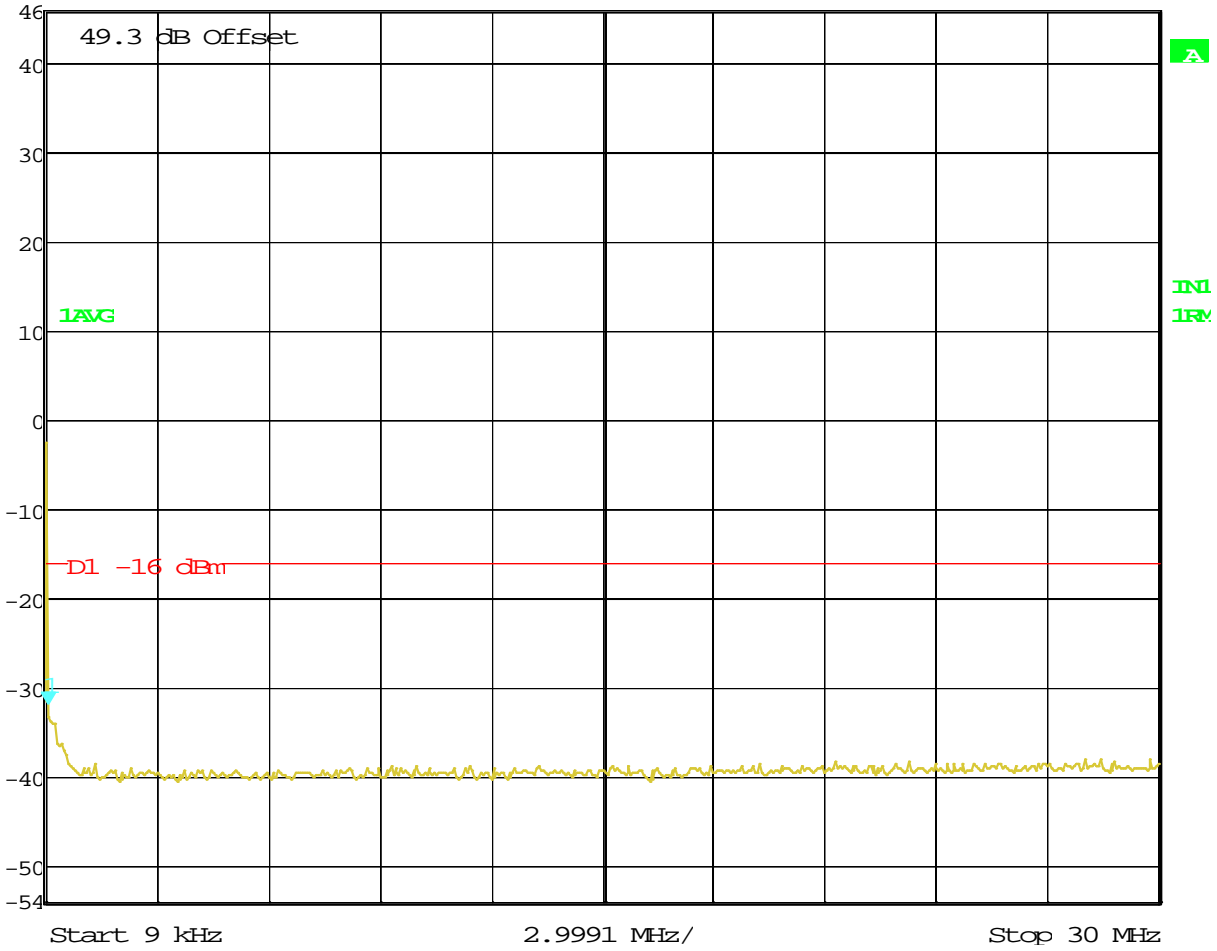
REW 10 kHz RF Att 30 dB

Ref Lvl -31.92 dBm

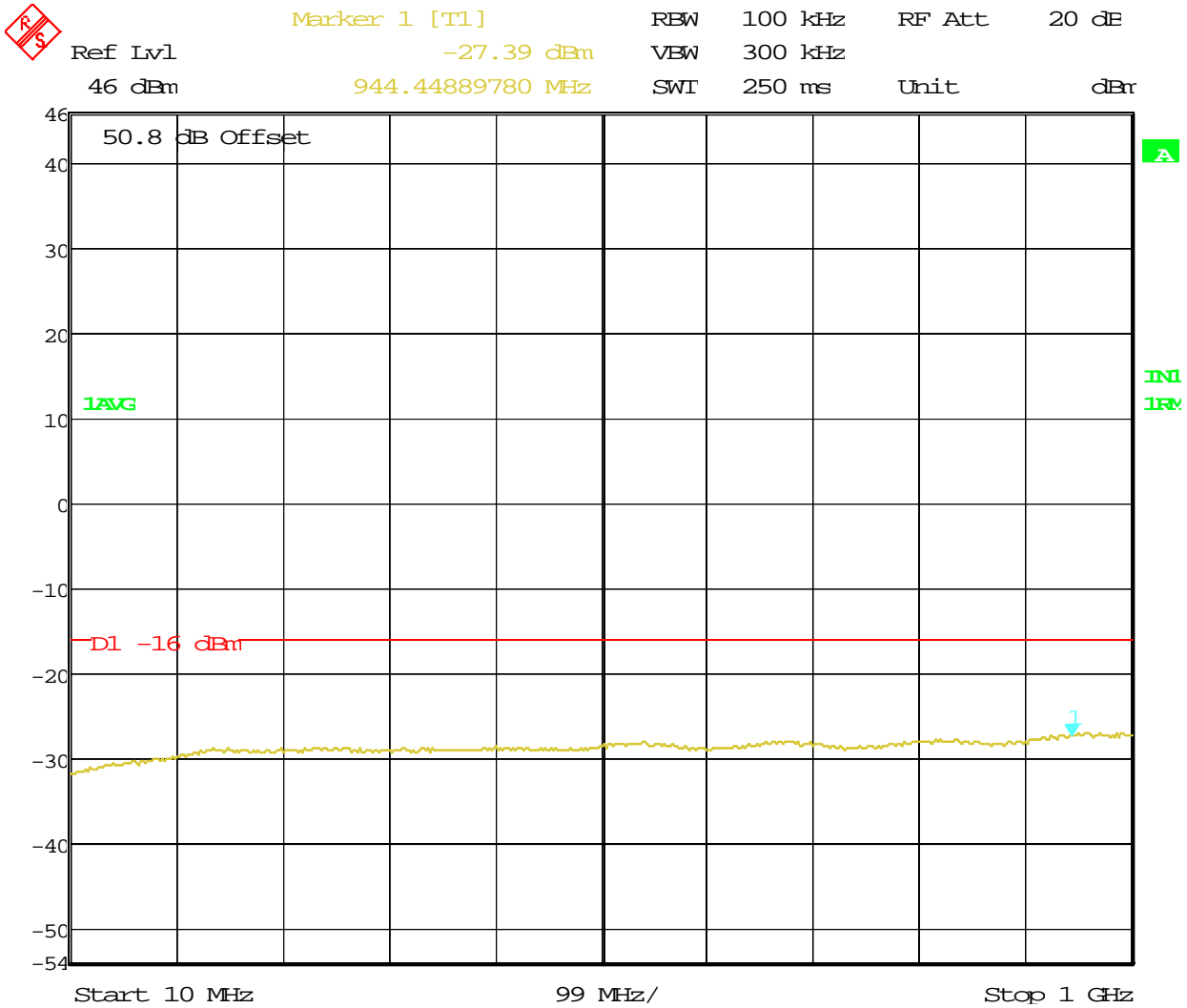
VBW 30 kHz

46 dBm 69.10220441 kHz

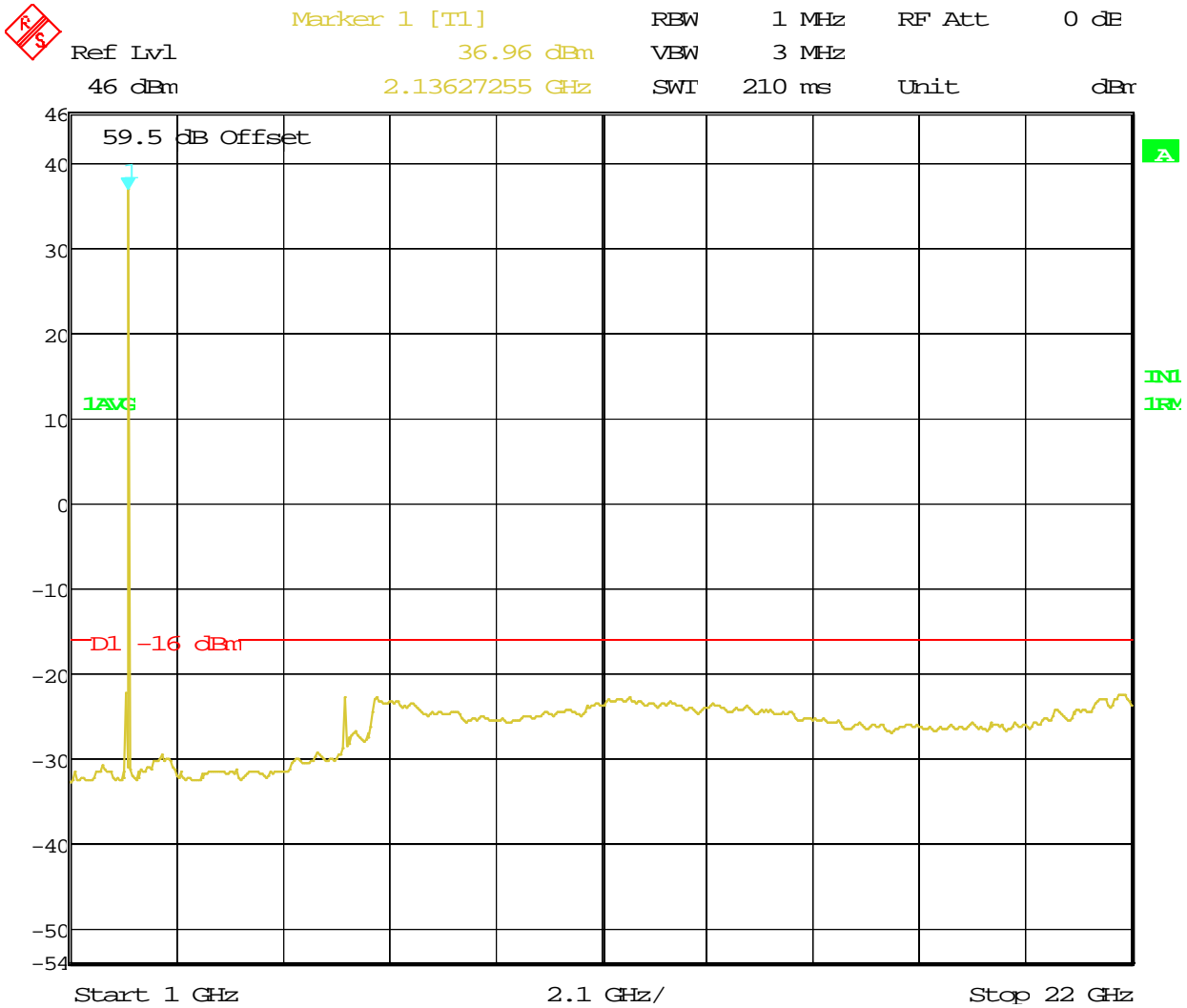
SWI 760 ms Unit dBm



Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:E+F; 2140-2155 MHz; PWR:40W
16QAM; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 30.APR.2013 09:39:26



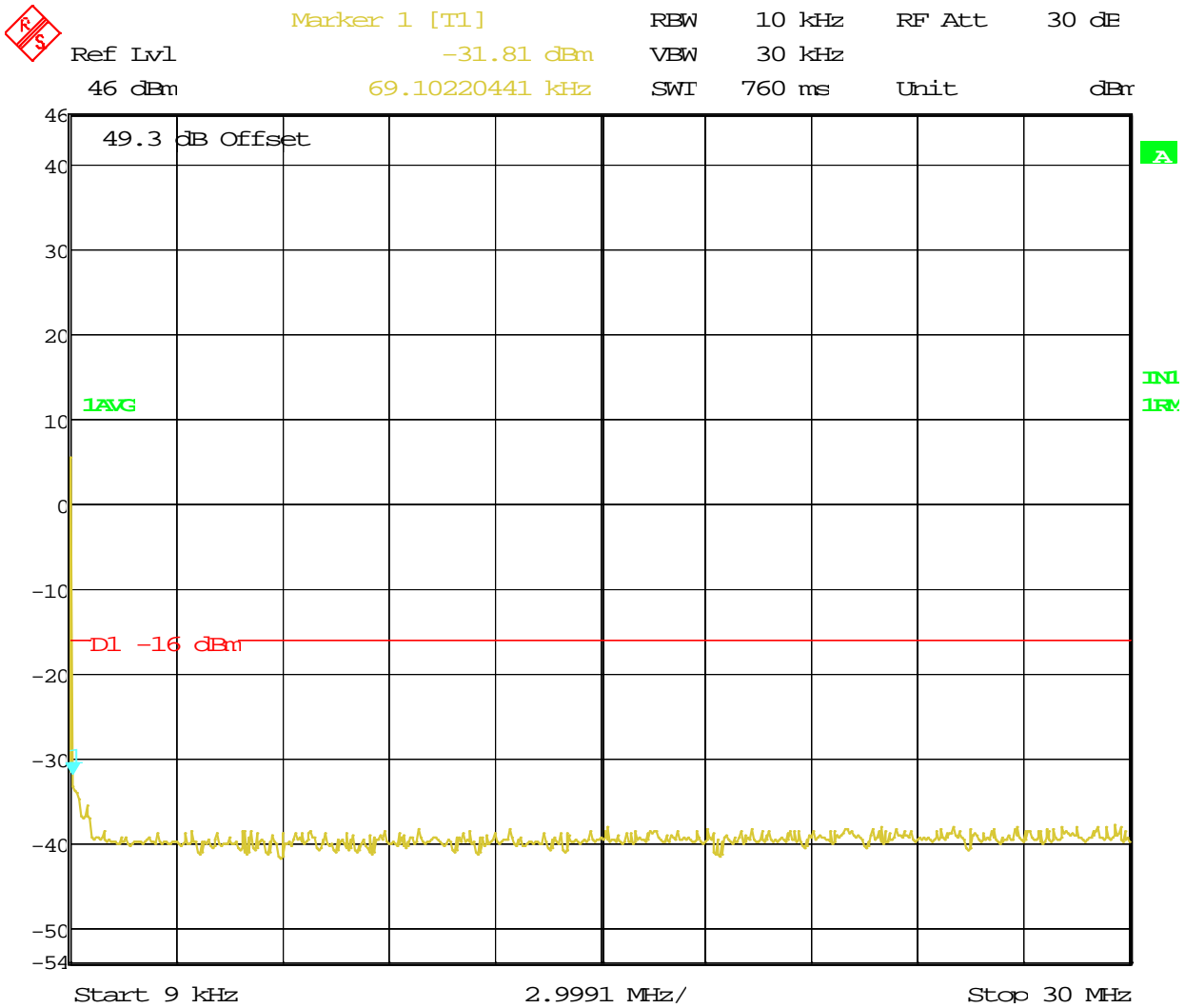
Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:E+F; 2140-2155 MHz; PWR:40W
16QAM; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 30.APR.2013 09:40:11



Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:E+F; 2140-2155 MHz; PWR:40W
16QAM; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 30.APR.2013 09:41:24

**Transmit Port
Antenna Conducted Spurious Emissions**

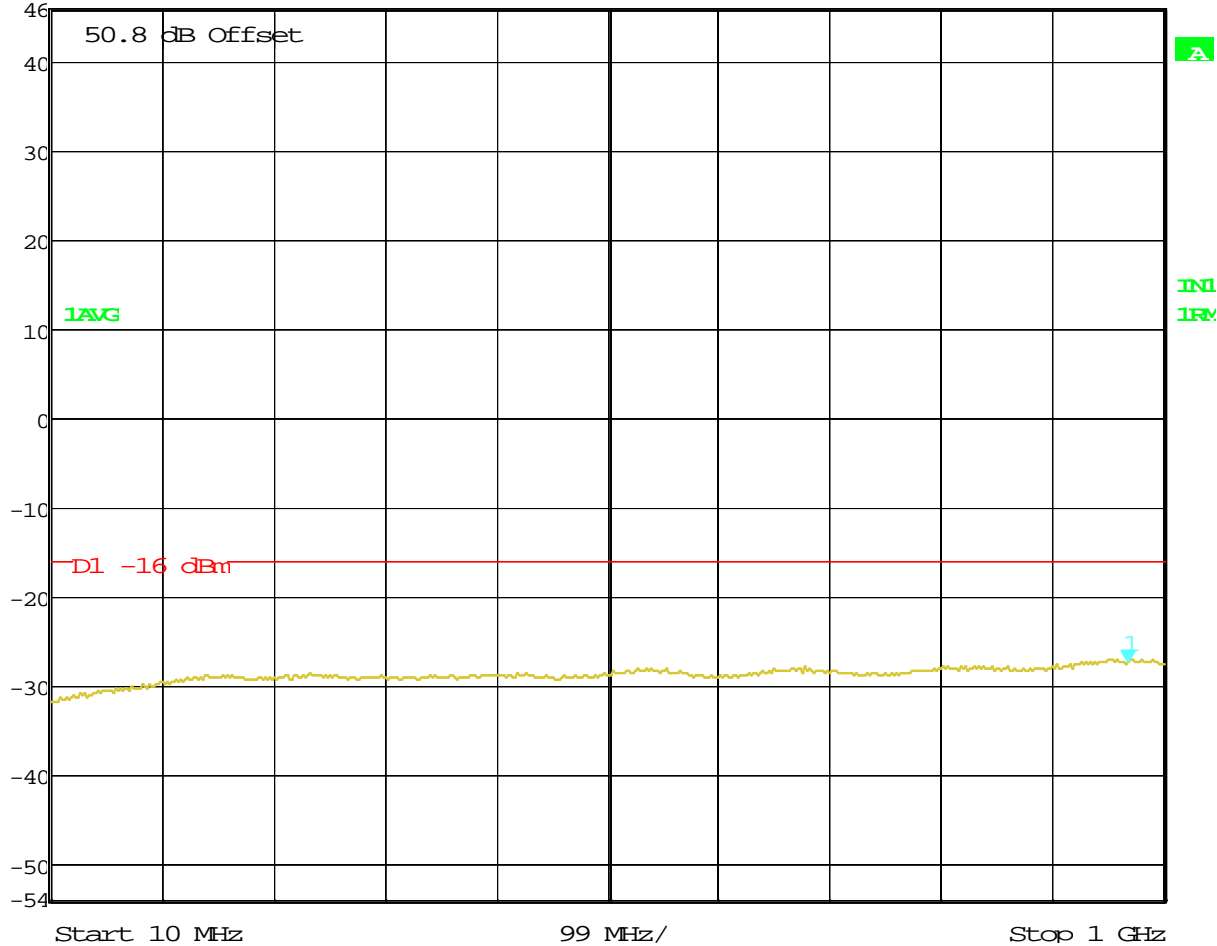
**Block: E+F (15MHz BW)
64QAM Modulation
2x40 (MIMO)
Bandwidth (2140 – 2155 MHz)**



Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:E+F; 2140-2155 MHz; PWR:40W
64QAM; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 13:50:18



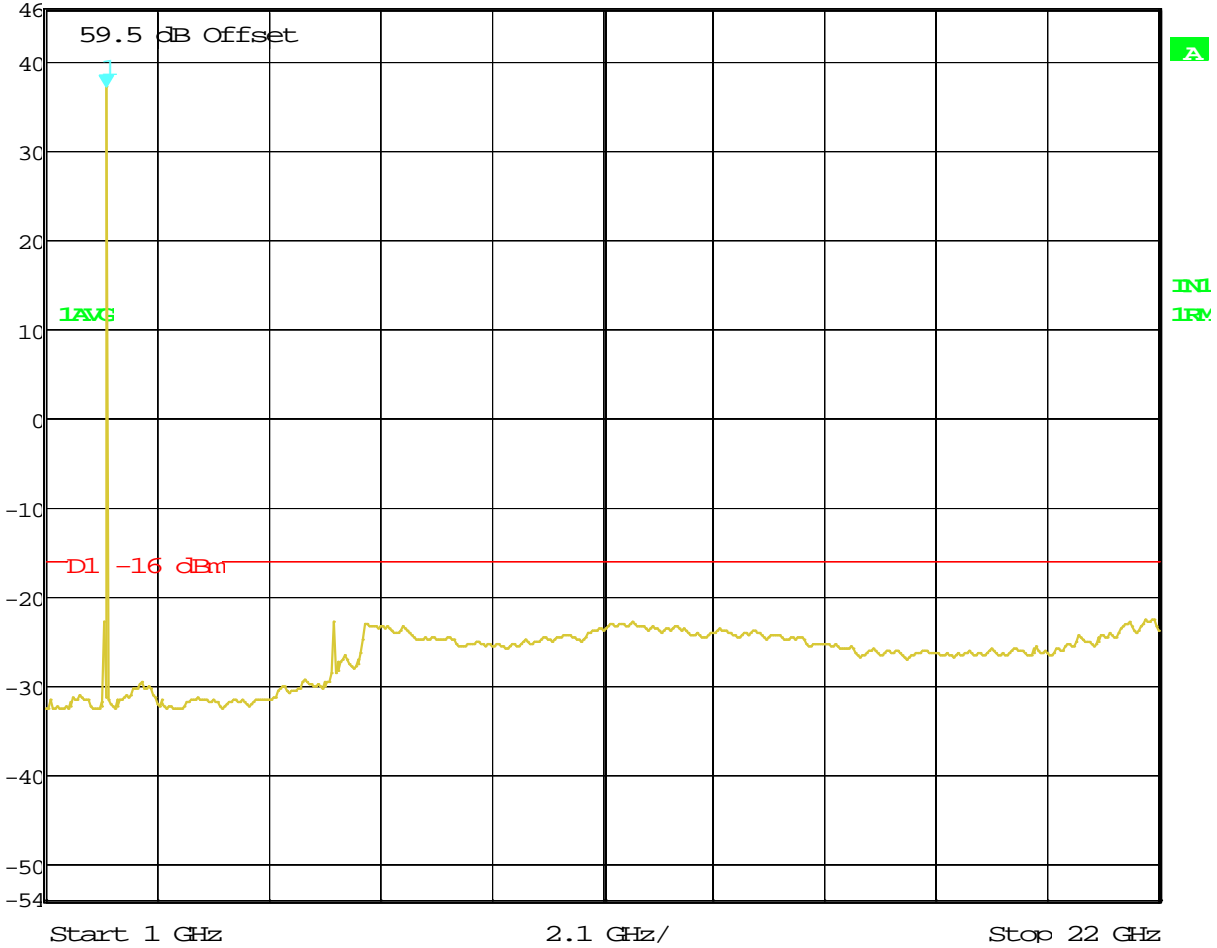
Marker 1 [T1] RBW 100 kHz RF Att 20 dB
Ref Lvl -27.34 dBm VBW 300 kHz
46 dBm 968.25651303 MHz SWI 250 ms Unit dBm



Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:E+F; 2140-2155 MHz; PWR:40W
64QAM; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 13:49:49



Marker 1 [T1] RBW 1 MHz RF Att 0 dB
Ref Lvl 37.04 dBm VBW 3 MHz
46 dBm 2.13627255 GHz SWI 210 ms Unit dBm



Title: Spurious Emissions At Tx Antenna Port; Test Engineer: JY
Comment A: 9442 RRH 2X40-AWS; -48VDC; BLK:E+F; 2140-2155 MHz; PWR:40W
64QAM; FCC PRT 27; FCCID: AS5BBTRX-02; CLASS 2 CHNG
Date: 29.APR.2013 14:08:26

Test Instrumentation List

Manufacturer	Model	Serial #	Description	Manual #	Last Cal Date	Cal Cycle Month
Rohde & Schwarz	ESIB40	100119	EMI Test Receiver (20Hz to 40 GHz)-150 +30dBm	E936	5/15/2012	12
Hewlett Packard	437B	3737U26396	RF Power Meter	E754	7/23/2012	12
Agilent	8481A	MY41096522	Power Sensor 10 MHz-18 GHz	E732	2/15/2012	13
Hewlett Packard	772D	2839A01006	Dual Directional Coupler 2-18 GHz	E371	N/A	N/A
Weinschel	66-20-34	BW7320	Attenuator 20dB 150W DC-18 GHz	E815	8/31/2011	18
Weinschel	48-30-33	AY8323	Attenuator DC - 18GHz 100 Watt	E961	N/A	N/A
Weinschel	46-10-34	BL7552	Attenuator 10dB 25W DC-18 GHz	E583	10/23/2012	12
Trilithic	5HC2850/180 50-1.8-KK	PCS-HPF-5	PCS High Pass Filter	E986	n/a	n/a

Measurement -5

FIELD STRENGTH OF SPURIOUS RADIATION SECTION 2.1053 and 27.53 (h)

MEASUREMENT: 5

SECTION 2.1053

FIELD STRENGTH OF SPURIOUS RADIATION

Field strength measurements of radiated spurious emissions were made at 3m semi anechoic room of Global Product Compliance Laboratories of Alcatel-Lucent Murray Hill, NJ. A complete description and full measurement data for the site is on file with the Commission Chamber 5 (AR5) is 515091.

The “LTE 9442 RRH2X40-AWS” with 15 MHz BW carrier was tested with a amplifiers operating with a RF output of 40W at Antenna Interface Connector (AIC). The operation of RRH was simulated using Base Band Unit (BBU)/(D2U placed outside the chamber. The interconnection between RRH and D2U was through optical fiber. The radiated emissions tests were performed with amplifiers operating with 10 MHz band width. During the tests RRH AIC were terminated with 50 ohm load. The spectrum from 10 MHz to the 10th harmonic of the carrier was searched for spurious radiation. Measurements were made according to ANSI C63.4. All emissions more than 20 dB below the specification limit were considered not reportable (Section 2.1057(c)).

All emissions more than 20 dB below the specification limit were considered not reportable (Section 2.1057(c)).

The calculated emission levels were found by:

$$\text{Measured level (dB}\mu\text{V)} + \text{Cable Loss (dB)} + \text{Antenna Factor (dB)} = \text{Field Strength (dB}\mu\text{V/m)}$$

Section 27.53 and 2.1053 contains the requirements for the levels of spurious radiation as a function of frequency.

FCC Section 27.53(h): the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10} (P)$ dB or -13dBm. Pursuant to FCC OET RULES 662911 D01 and D02 for two antenna MIMO mode of operations, the FCC limit of -13dBm shall be 3dB more stringent, therefore all channel edge and out of band spurious emissions shall be -16dBm.

The reference level for the un-modulated carriers is calculated as the field produced by an ideal isotropic antenna excited by the transmitter output power according to the following relation taken from Recommendation ITU-R, SM.329-11, “Unwanted emissions in the spurious domain” January 2011.

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

$$20 \log (E * 106) - (46 + 10 \log P) = 79.2 \text{ dB } \mu\text{V/meter}$$

E = Field Intensity in Volts/meter

P = Transmitted Power in Watts

R = Distance from the ideal isotropic antenna in meters = 3 m

RESULTS:

For this particular test, the field strength of any spurious radiation is required to be less than 79.2dBμV/meter. Reportable measurements are equal to or greater than 59. 2dBμV/meter. Over the spectrum investigated, 10 MHz

APPLICANT: **Alcatel-Lucent**

FCC ID: **AS5BBTRX-02**
Class II Change

to 10th of the carrier, no reportable spurious emissions were detected. This demonstrates that the “LTE 9442 Remote Radio Head (RRH)” the subject of this application, complies with Sections 2.1053, 27.53 (g) and 2.1057 of the Rules.

Measurement -6

MEASUREMENT OF FREQUENCY STABILITY

(Data already submitted during original filing. For this class II filing change new data is not considered required)

SECTION 2.1057

FREQUENCY SPECTRUM TO BE INVESTIGATED

Frequency Spectrum to be investigated, Measurement Bandwidth and detector function used were meet or exceed the Specification contained in Section 2.1057, 27, and 3GPP TS36.104 V8.4.0 (2008-12)

Measurement Instrumentation and Antennas

All instrumentations, antennas and test Chamber used for the purpose of tests contained in the report were in calibration and calibrations are traceable to NIST