

INTRODUCTION:

The original submittal covered a single carrier configuration for 10 MHz bandwidth, operating in a 2x5W MIMO mode.

This Class II Permissive Change requests authorization for the addition of 20 MHz bandwidth, while operating in the same 2x5W MIMO mode. Both the original and this Class II filing employ three LTE modulation schemes: QPSK, 16QAM and 64QAM. The authorized 45 MHz spectrum is specified in Rule Part 27.5: 2110 – 2155 MHz Down Link (DL) paired with 1710 – 1755 MHz Up Link (UL).

In accordance with Sec. 2.1043 *Changes In Certificated Equipment*, only the characteristics affected by the change need to be reported. As such, the applicable measurements affected are contained in the Test Report Exhibits, and all other Exhibits submitted with the initial/original filing, that remain unchanged will not be repeated. All initial exhibits, that were granted permanent confidentiality and are unchanged, continue to remain confidential, and will not be repeated with this submission.

Full compliance has been demonstrated with FCC Part 27 — Miscellaneous Wireless Communications Services, Subpart C — Technical Standards, § 27.53 Emission Limits., following the procedural requirements specified in Part 2 — Frequency Allocations And Radio Treaty Matters; General Rules And Regulations Subpart J — Equipment Authorization Procedures.

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-17**, 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

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.

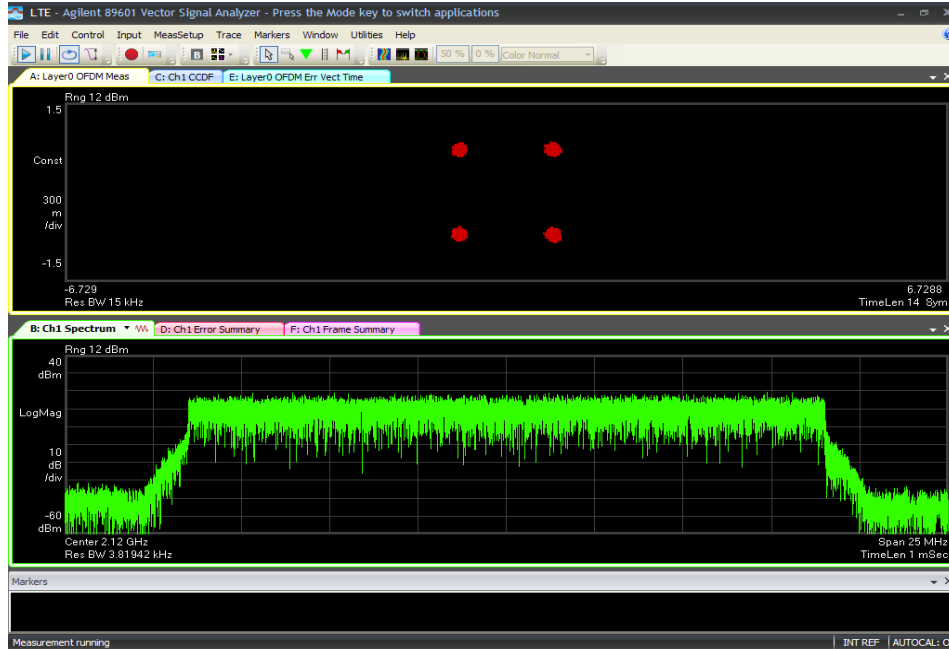
- (1) Quadrature Phase Shift Keying (QPSK) modulation scheme uses 2 bits are transmitted simultaneously (one per channel) and a symbol can be represented by 2 bits. Therefore there are $2^2 = 4$ states (Binary 00 to 11). The theoretical bandwidth is 2bits/second/Hz.
- (2) 16 Quadrature amplitude modulation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

Section 27.50(d)(5)

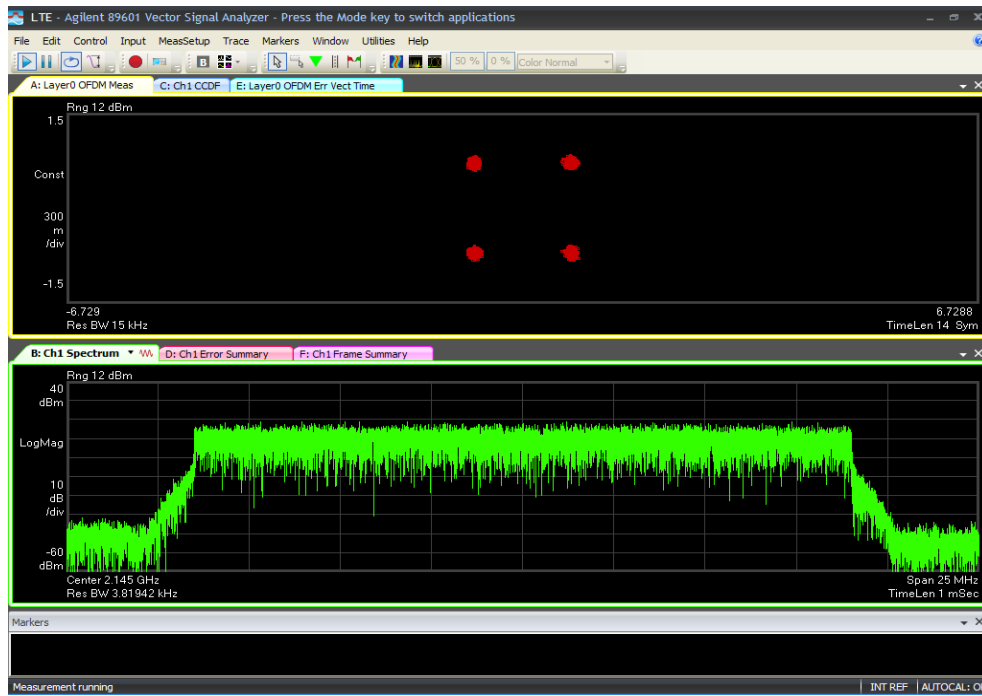
Measurement of Peak-to-Average ratio (PAR)

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 5 watts
2120MHz & 2145 MHz (20 MHz BW)**

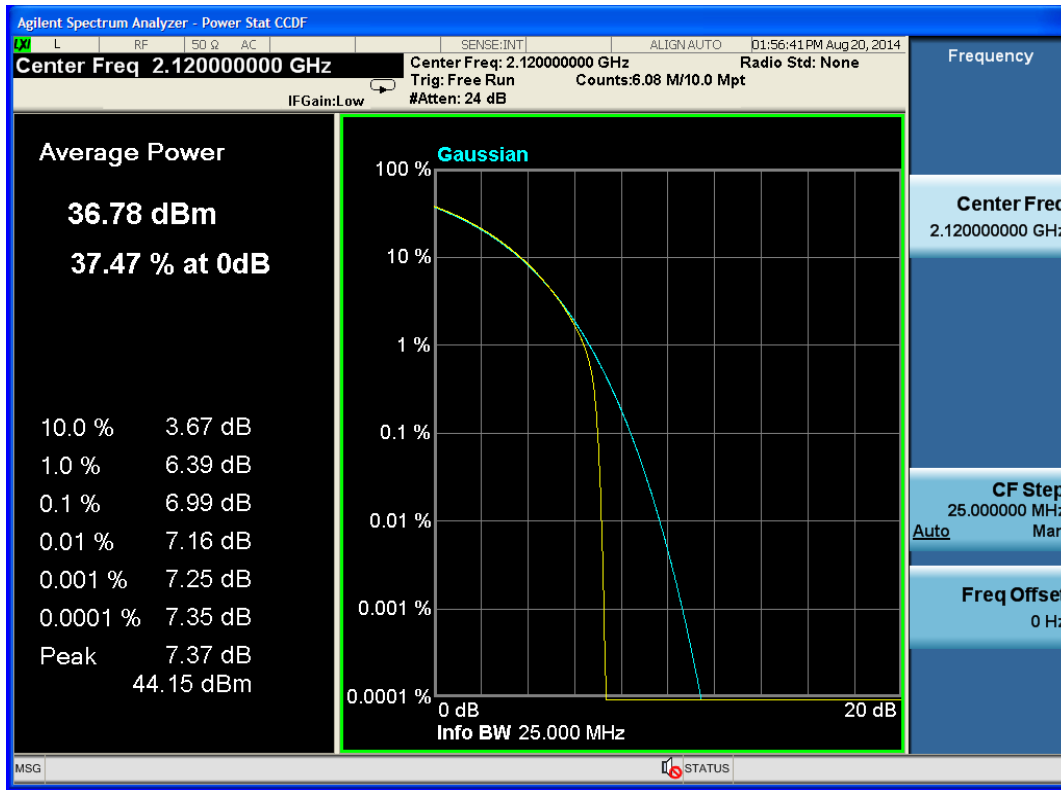


9764-DC Power-LR MCO 2x5W v1.1 AWS BAND 4 (20-MHz)(Small Cells)
FCC Part 27.53
Block A+B (2110-2130 MHz)
PWR: 5 (2x5W MIMO)
FCCID: AS5BBTRX-17
TEST ENGINEER: SEG

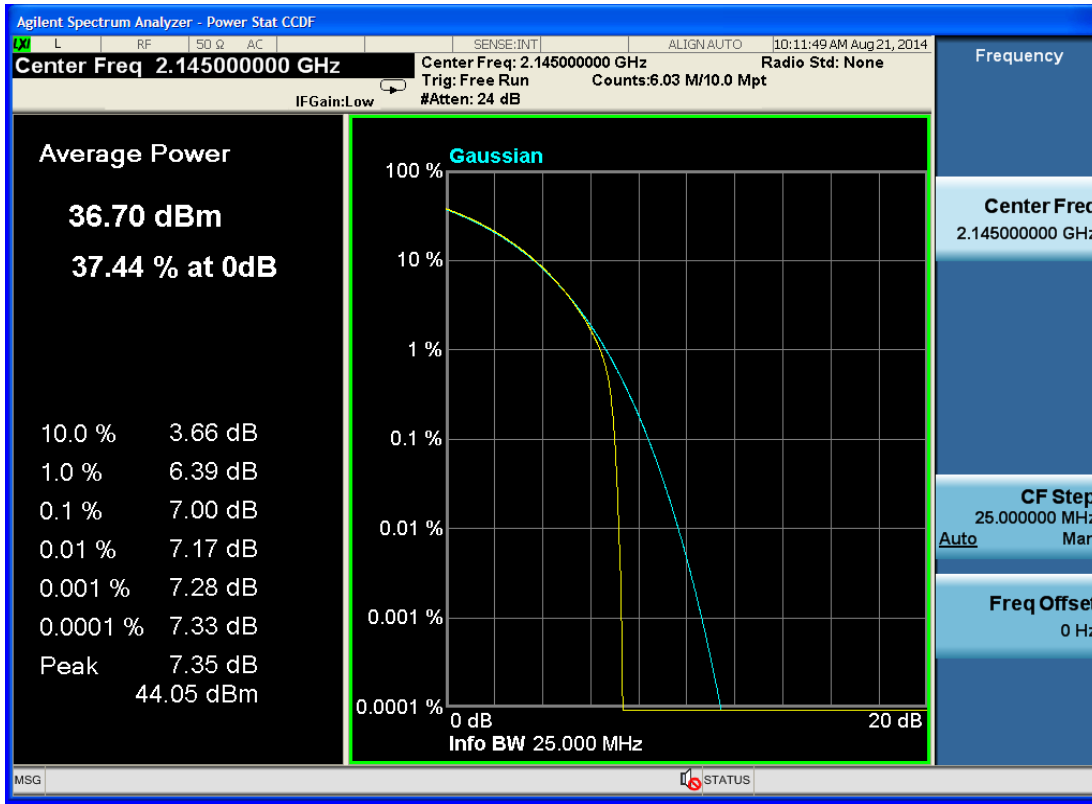


9764-DC Power-LR MCO 2x5W v1.1 AWS BAND 4 (20-MHz)(Small Cells)
FCC Part 27.53
Block D+E+F (2135-2145 MHz)
PWR: 5 (2x5W MIMO)
FCCID: AS5BBTRX-17
TEST ENGINEER: SEG

**Peak to Average
QPSK 5 watts
2120MHz & 2145MHz (20 MHz BW)**



9764-DC Power-LR MCO 2x5W v1.1 AWS BAND 4 (20-MHz)(Small Cells)
FCC Part 27.53 Block A+B (2110-2130 MHz)
PWR: 5 (2x5W MIMO)
FCCID: AS5BBTRX-17
TEST ENGINEER: SEG



9764-DC Power-LR MCO 2x5W v1.1 AWS BAND 4 (20-MHz)(Small Cells)

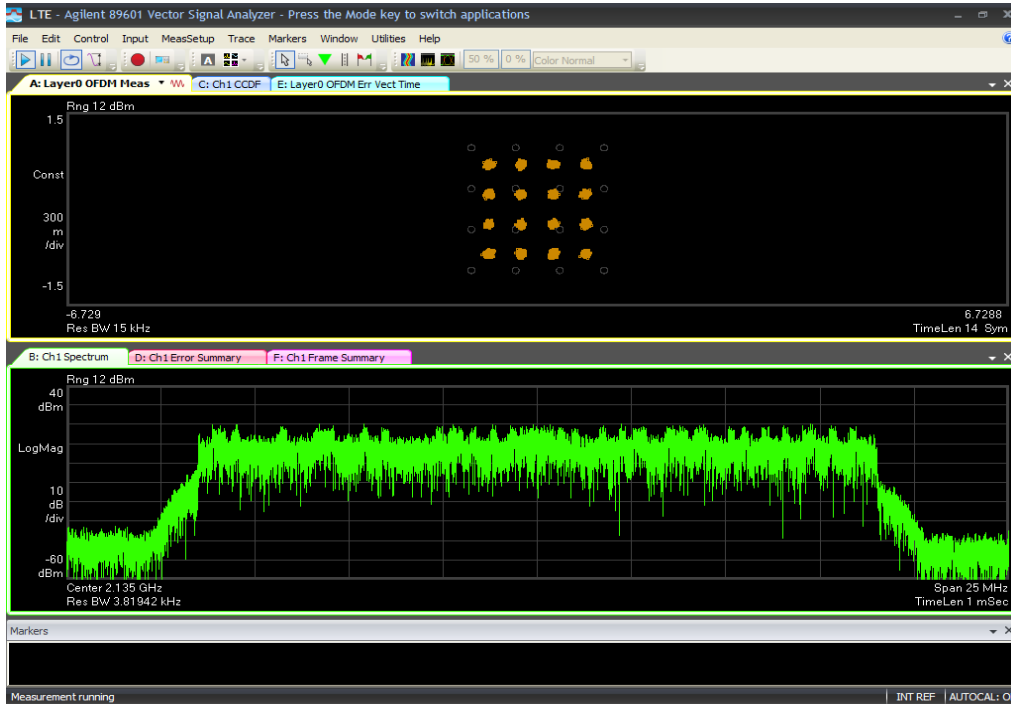
FCC Part 27.53 Block D+E+F (2135-2155 MHz)

PWR: 5 (2x5W MIMO)

FCCID: AS5BBTRX-17

TEST ENGINEER: SEG

**16QAM 5 watts
2120MHz & 2145 (20 MHz BW)**



9764-DC Power-LR MCO 2x5W v1.1 AWS BAND 4 (20-MHz)(Small Cells)

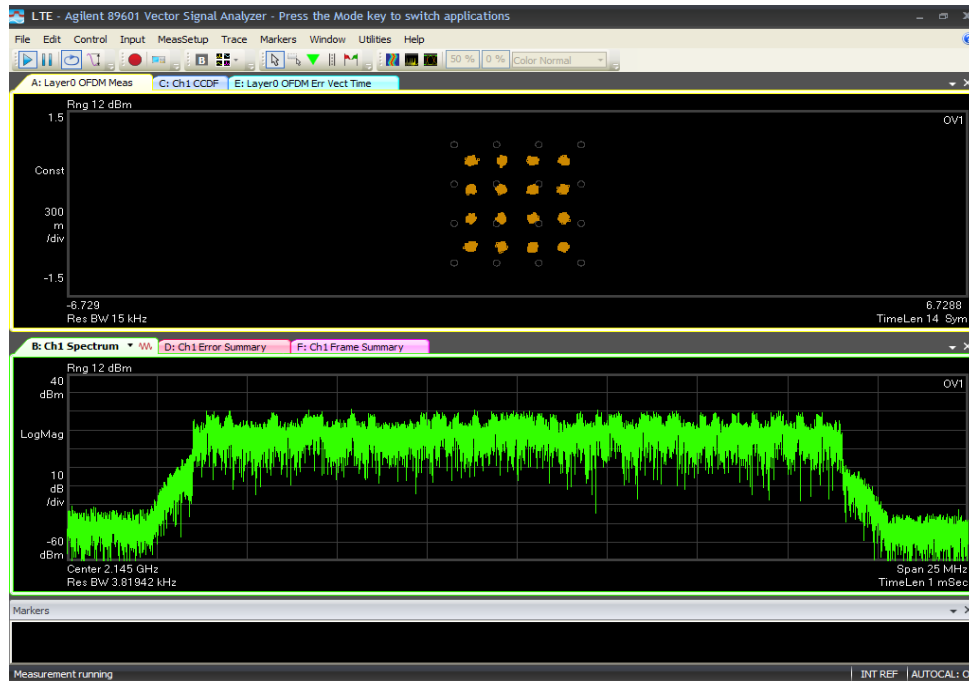
FCC Part 27.53

Block A+B (2110 - 2130 MHz)

PWR: 5 (2x5W MIMO)

FCCID: AS5BBTRX-17

TEST ENGINEER: SEG



9764-DC Power-LR MCO 2x5W v1.1 AWS BAND 4 (20-MHz)(Small Cells)

FCC Part 27.53

Block D+E+F (2135 - 2155 MHz)

PWR: 5 (2x5W MIMO)

FCCID: AS5BBTRX-17

TEST ENGINEER: SEG

**Peak to Average
16QAM 5 watts
2120MHz & 2145MHz (20 MHz BW)**



9764-DC Power-LR MCO 2x5W v1.1 AWS BAND 4 (20-MHz)(Small Cells)

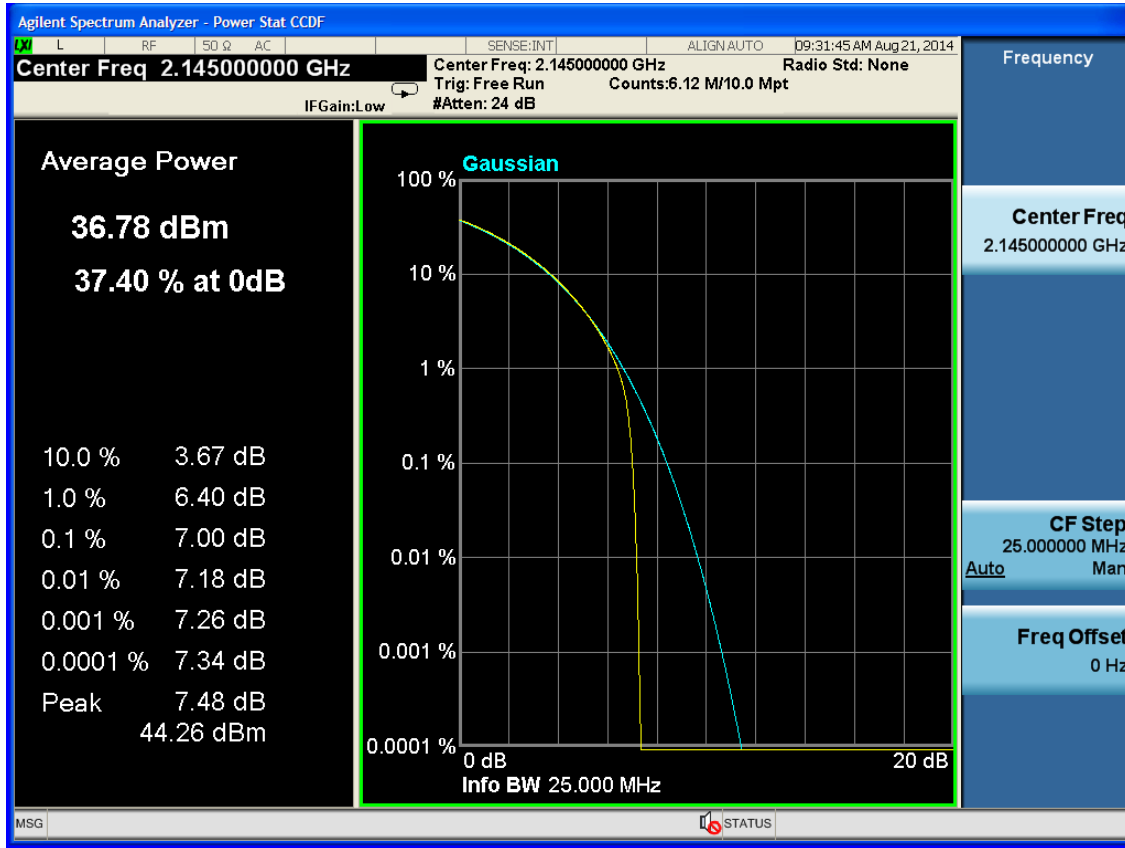
FCC Part 27.53

Block A+B (2110 - 2130 MHz)

PWR: 5 (2x5W MIMO)

FCCID: AS5BBTRX-17

TEST ENGINEER: SEG



9764-DC Power-LR MCO 2x5W v1.1 AWS BAND 4 (20-MHz)(Small Cells)

FCC Part 27.53

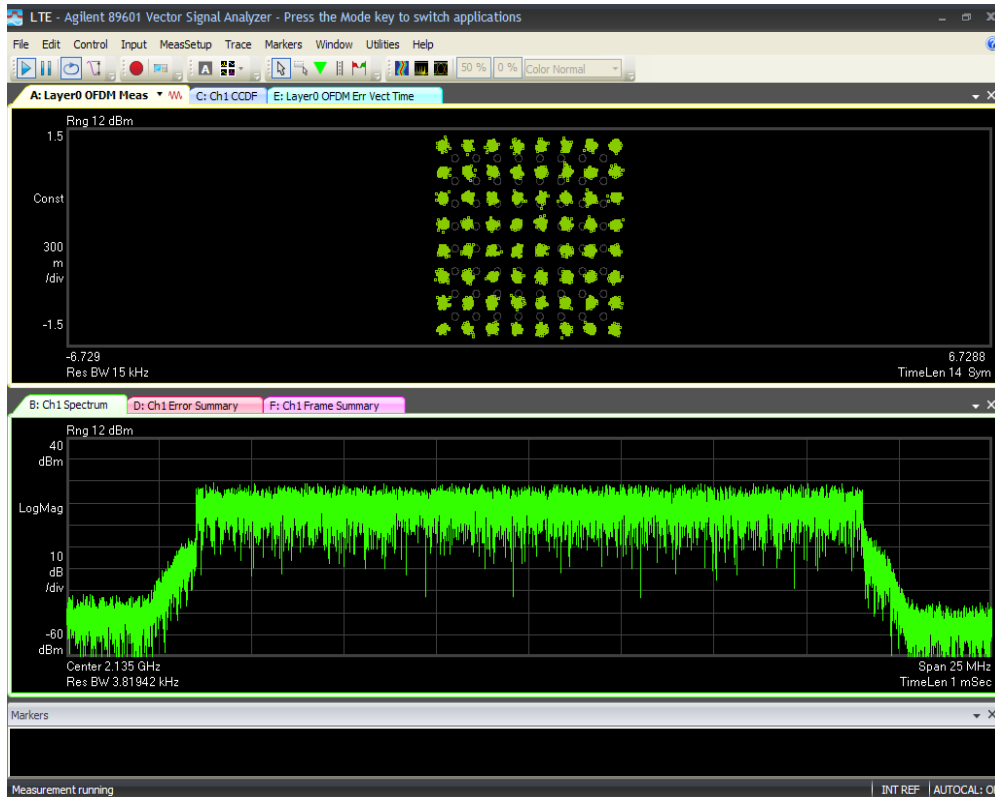
Block D+E+F (2135 - 2155 MHz)

PWR: 5 (2x5W MIMO)

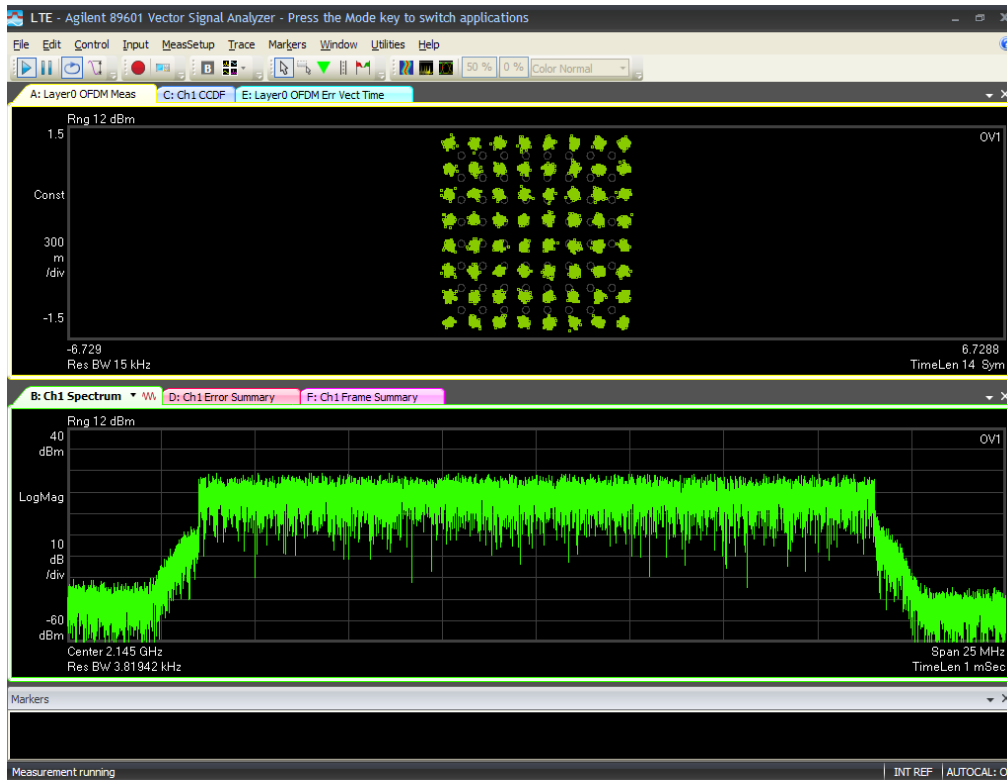
FCCID: AS5BBTRX-17

TEST ENGINEER: SEG

**64QAM 5 Watts
2135MHz & 2145MHz (20 MHz BW)**

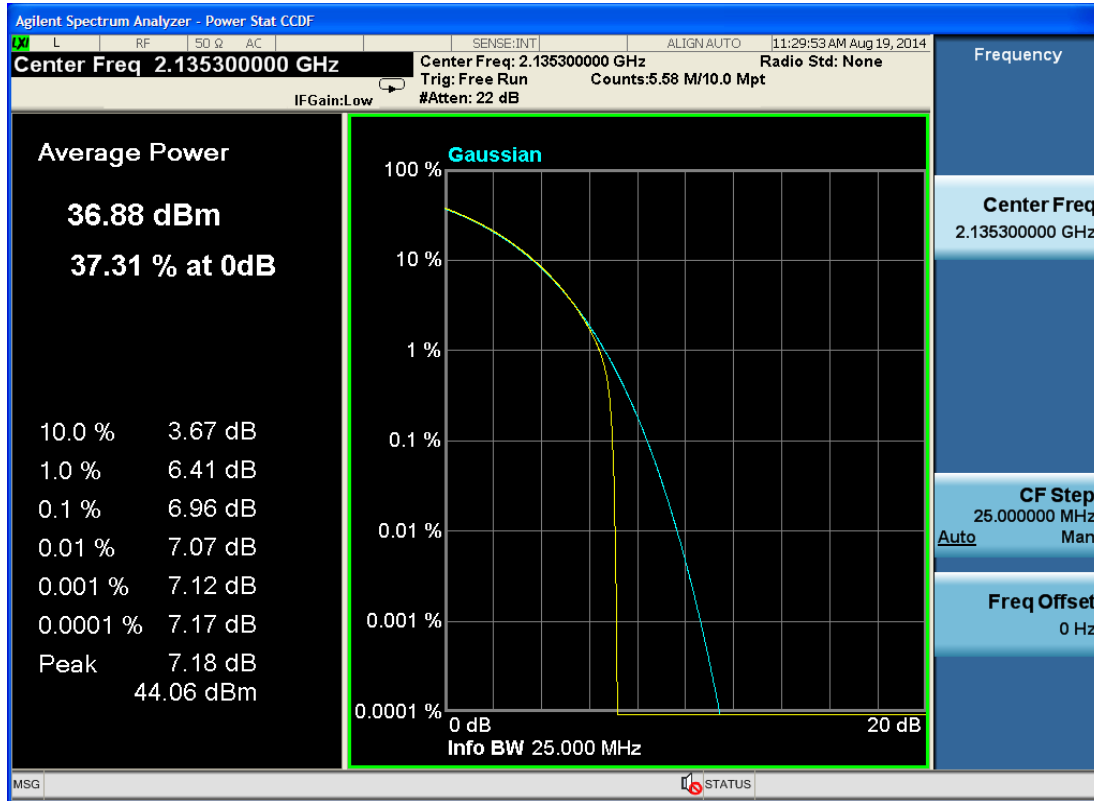


9764-DC Power-LR MCO 2x5W v1.1 AWS BAND 4 (20-MHz)(Small Cells)
FCC Part 27.53
Block: B2+C+D+E (2125 - 2145 MHz)
PWR: 5 (2x5W MIMO)
FCCID: AS5BBTRX-17
TEST ENGINEER: SEG

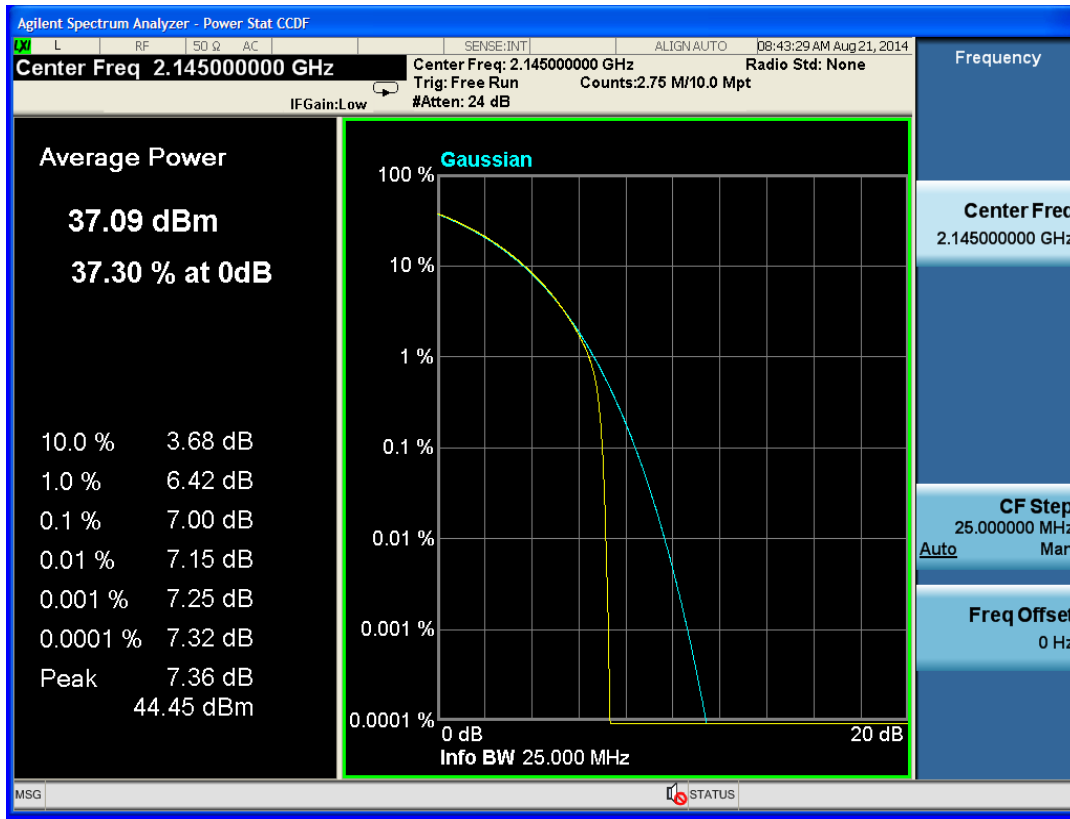


9764-DC Power-LR MCO 2x5W v1.1 AWS BAND 4 (20-MHz)(Small Cells)
FCC Part 27.53
Block: D+E+F (2135 - 2155 MHz)
PWR: 5 (2x5W MIMO)
FCCID: AS5BBTRX-17
TEST ENGINEER: SEG

**Peak to Average
64QAM 5 watts
2135MHz & 2145MHz (20 MHz BW)**



9764-DC Power-LR MCO 2x5W v1.1 AWS BAND 4 (20-MHz)(Small Cells)
FCC Part 27.53
Block: B2+C+D+E (2125 - 2145 MHz)
PWR: 5 (2x5W MIMO)
FCCID: AS5BBTRX-17
TEST ENGINEER: SEG



9764-DC Power-LR MCO 2x5W v1.1 AWS BAND 4 (20-MHz)(Small Cells)

FCC Part 27.53

Block: D+E+F (2135 - 2155 MHz)

PWR: 5 (2x5W MIMO)

FCCID: AS5BBTRX-17

TEST ENGINEER: SEG

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 two (2) measurement methods for Spectrum Bandwidth.

- (A) 99% Power Bandwidth.
- (B) 26dB Bandwidth

The 99% Power bandwidth method was used to measure the bandwidth at different modulations and highest is recorded. The modulations used are:

1. QPSK
2. 16 QAM
3. 64 QAM

The Highest measured 99% Power Bandwidth was used for Emissions type designation. The measured bandwidth was 17.91 MHz for a 20 MHz Bandwidth carrier.

Therefore, Measured Emission type: 17M91F9W for 20 MHz Bandwidth.

**MEASUREMENT OF EMISSIONS BANDWIDTH
99% 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 an HP Model 520 DeskJet Printer. The emissions bandwidth is described in section 27.53 (g) (3). 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 “9764-DC Power-LR MCO 2x5W v1.1 AWS BAND 4 (20-MHz)(Small Cells)” in the following configurations:

1. QPSK
2. 16 QAM
3. 64 QAM

Results:

The plots are provided for following modulations: QPSK, 16QAM and 64QAM.

Table for 20MHz Bandwidth Blocks

Frequency Range (MHz) & Block	Bandwidth (MHz)	Center Frequency (MHz)	Power (Watts)
2110 - 2130 (A + B)	20	2120	5
2125 - 2145 (B2 + C + D + E)	20	2135	5
2135 - 2155 (D + E + F)	20	2145	5

The measured 99% emissions power bandwidth is:

Nominal BW	Maximum BW Measured (MHz)
20 MHz 5 Watts	17.91

Block: A + B

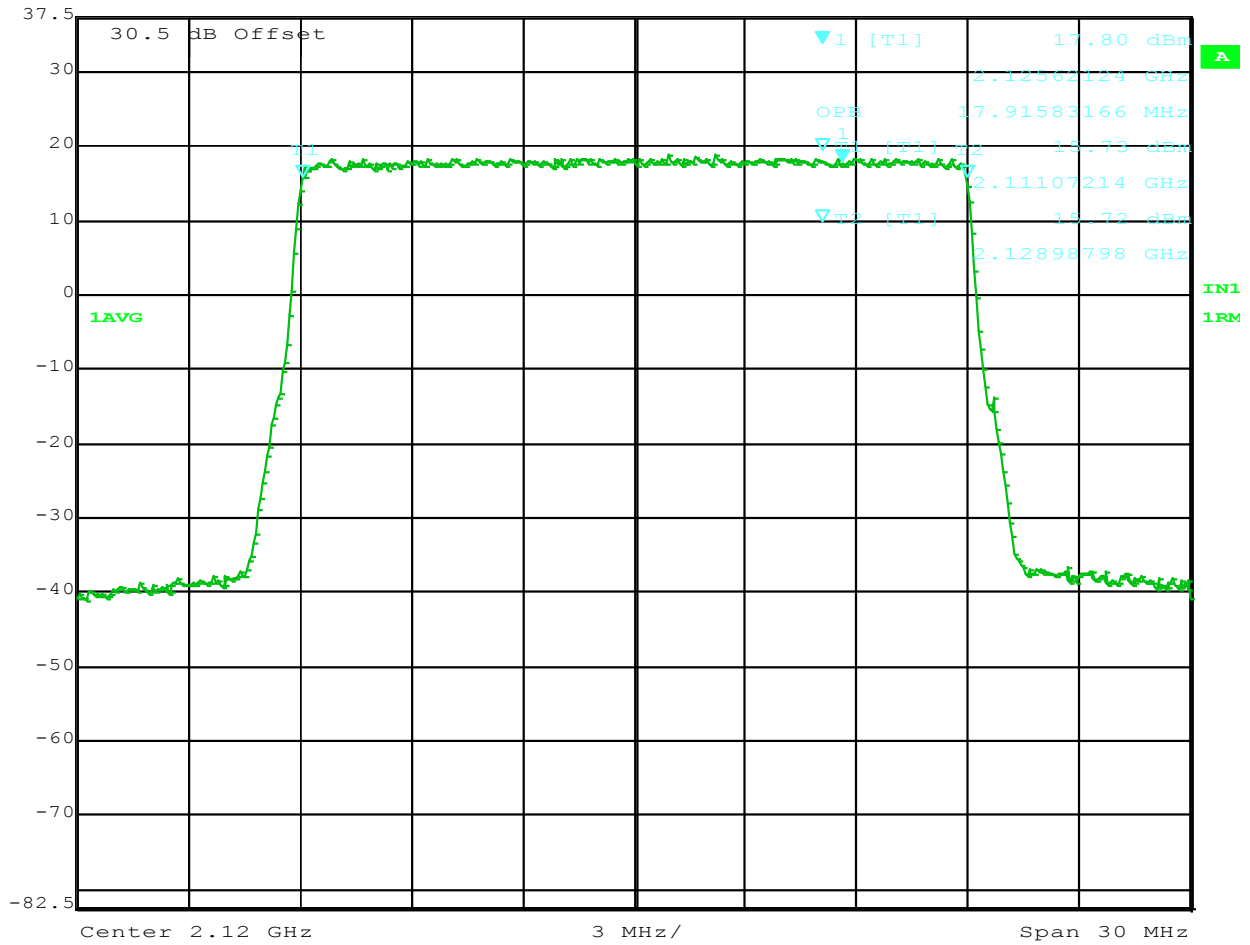
20 MHz Bandwidth (2110-2130 MHz)

2x5 watts (MIMO)

(99% Power Bandwidth)



Ref Lvl	37.5 dBm	Marker 1 [T1]	17.80 dBm	RBW	200 kHz	RF Att	20 dB
				VBW	1 MHz		
				SWT	5 ms	Unit	dBm



Title: 99% POWER BANDWIDTH: TEST ENGINEER: SEG; CLASS II CHANGE

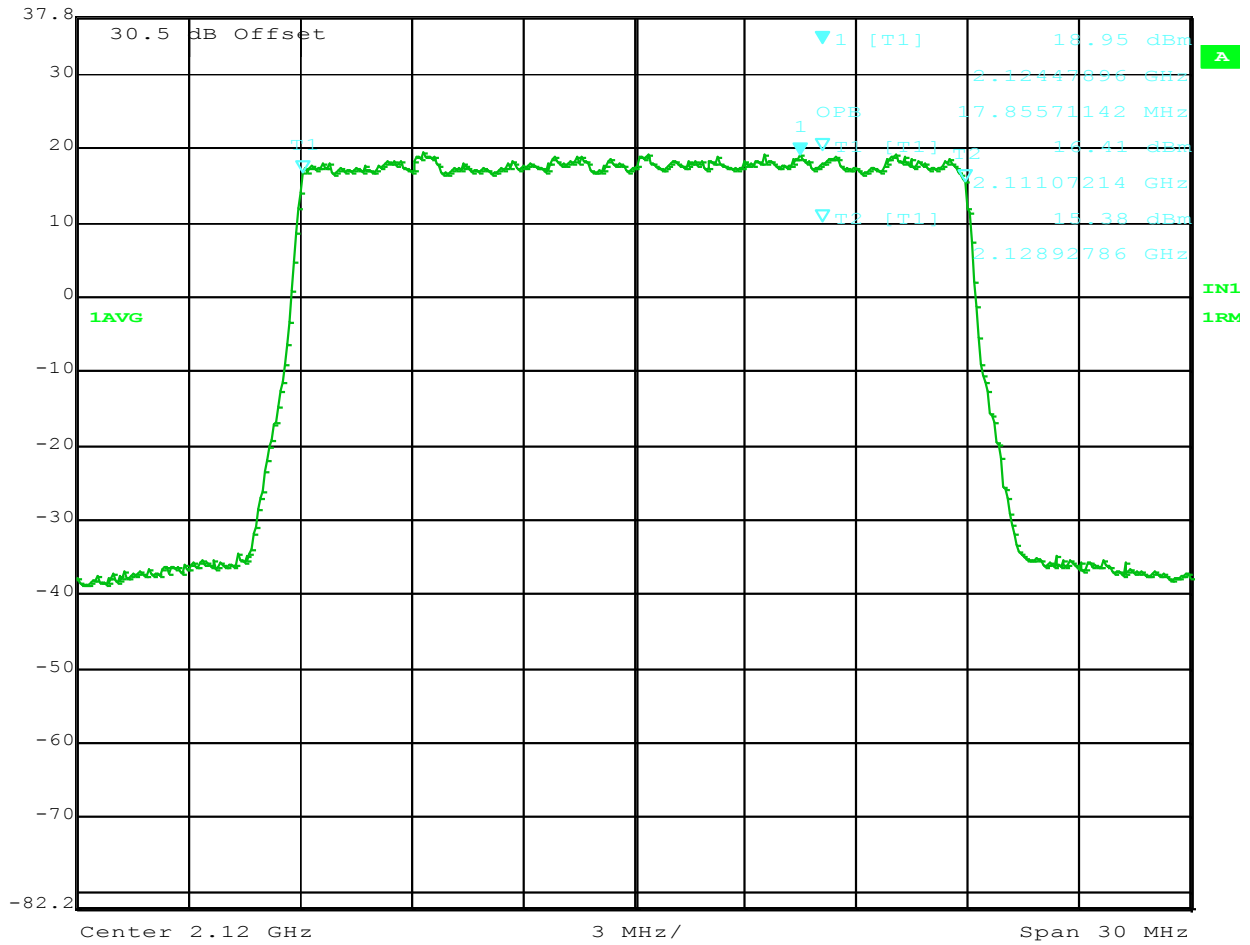
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2110-2130 MHz (A+B)

PWR: 5W; 2X2MIMO; QPSK; FCC PRT 27; FCCID:AS5BBTRX-17

Date: 20.AUG.2014 14:59:04



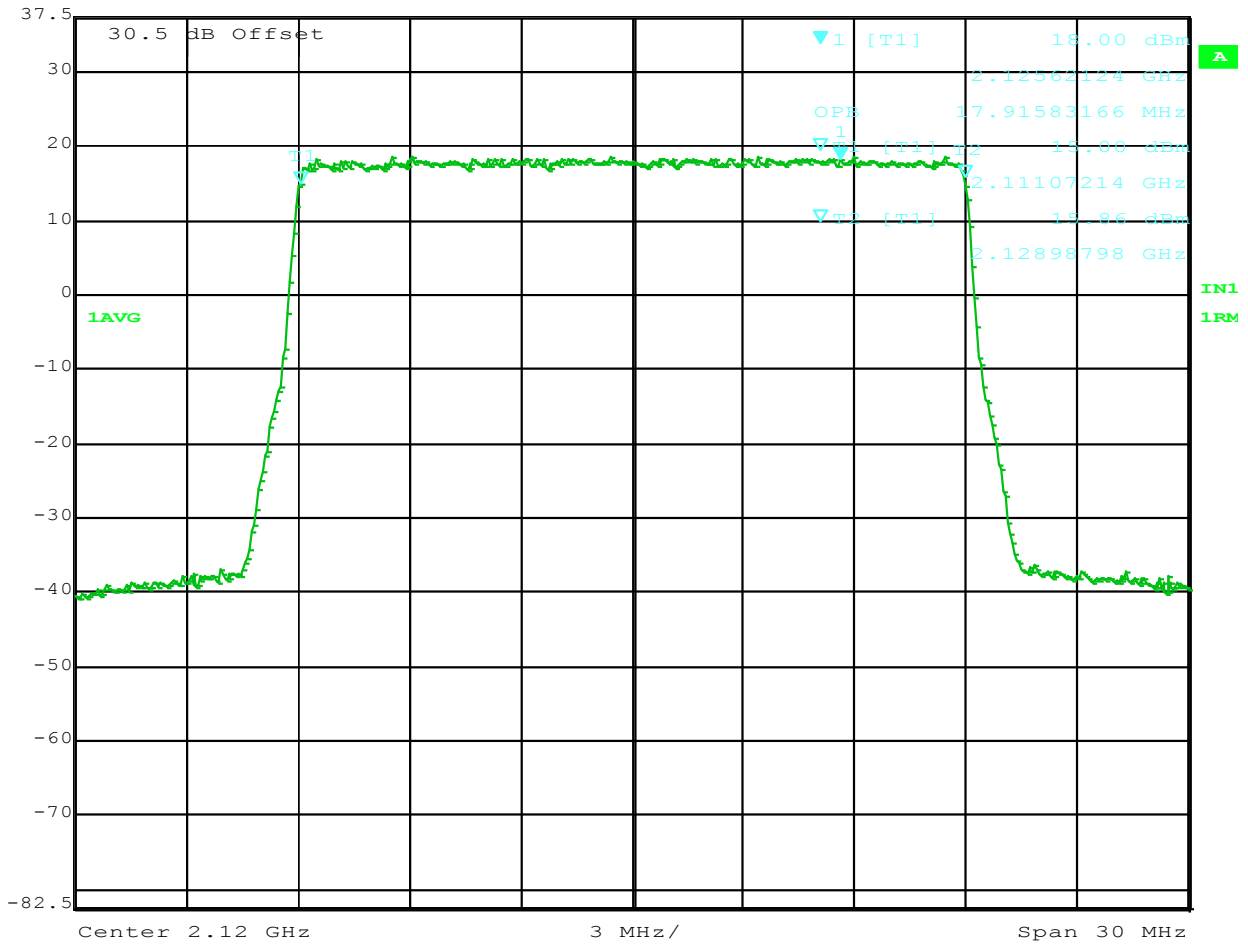
Ref Lvl	37.8 dBm	Marker 1 [T1]	18.95 dBm	RBW	200 kHz	RF Att	20 dB
			2.12447896 GHz	VBW	1 MHz		
				SWT	5 ms	Unit	dBm



Title: 99% POWER BANDWIDTH: TEST ENGINEER: SEG; CLASS II CHANGE
 Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2110-2130 MHZ (A+B)
 PWR: 5W; 2X2MIMO; 16QAM; FCC PRT 27; FCCID:AS5BBTRX-17
 Date: 20.AUG.2014 13:48:10



Ref Lvl	37.5 dBm	Marker 1 [T1]	18.00 dBm	RBW	200 kHz	RF Att	20 dB
				VBW	1 MHz		
				SWT	5 ms	Unit	dBm



Title: 99% POWER BANDWIDTH: TEST ENGINEER: SEG; CLASS II CHANGE

Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2110-2130 MHZ (A+B)

PWR: 5W; 2X2MIMO; 64QAM; FCC PRT 27; FCCID:AS5BBTRX-17

Date: 20.AUG.2014 15:33:13

Block: B2+C+D+E

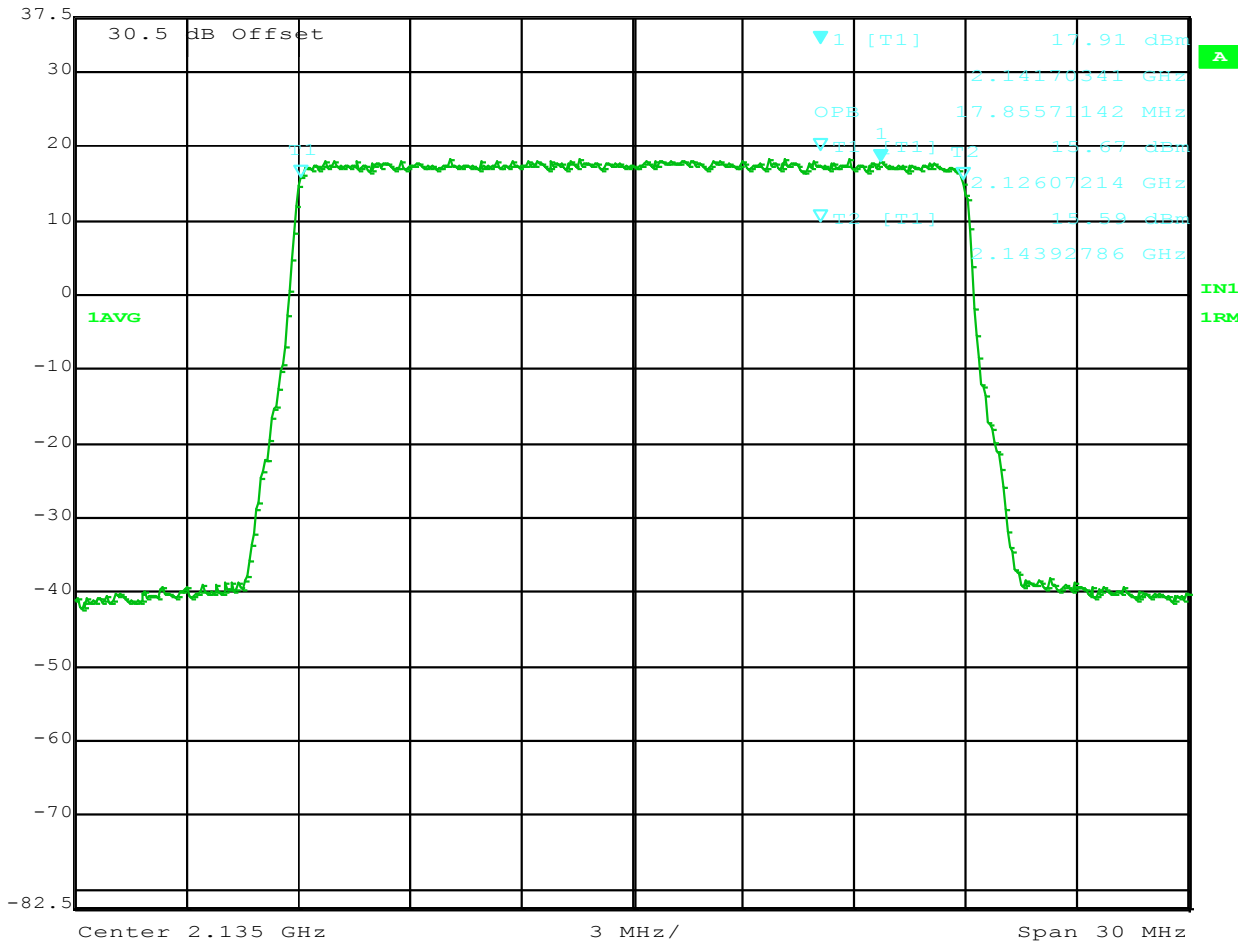
20 MHz Bandwidth (2125-2145 MHz)

2x5 watts (MIMO)

(99% Power Bandwidth)



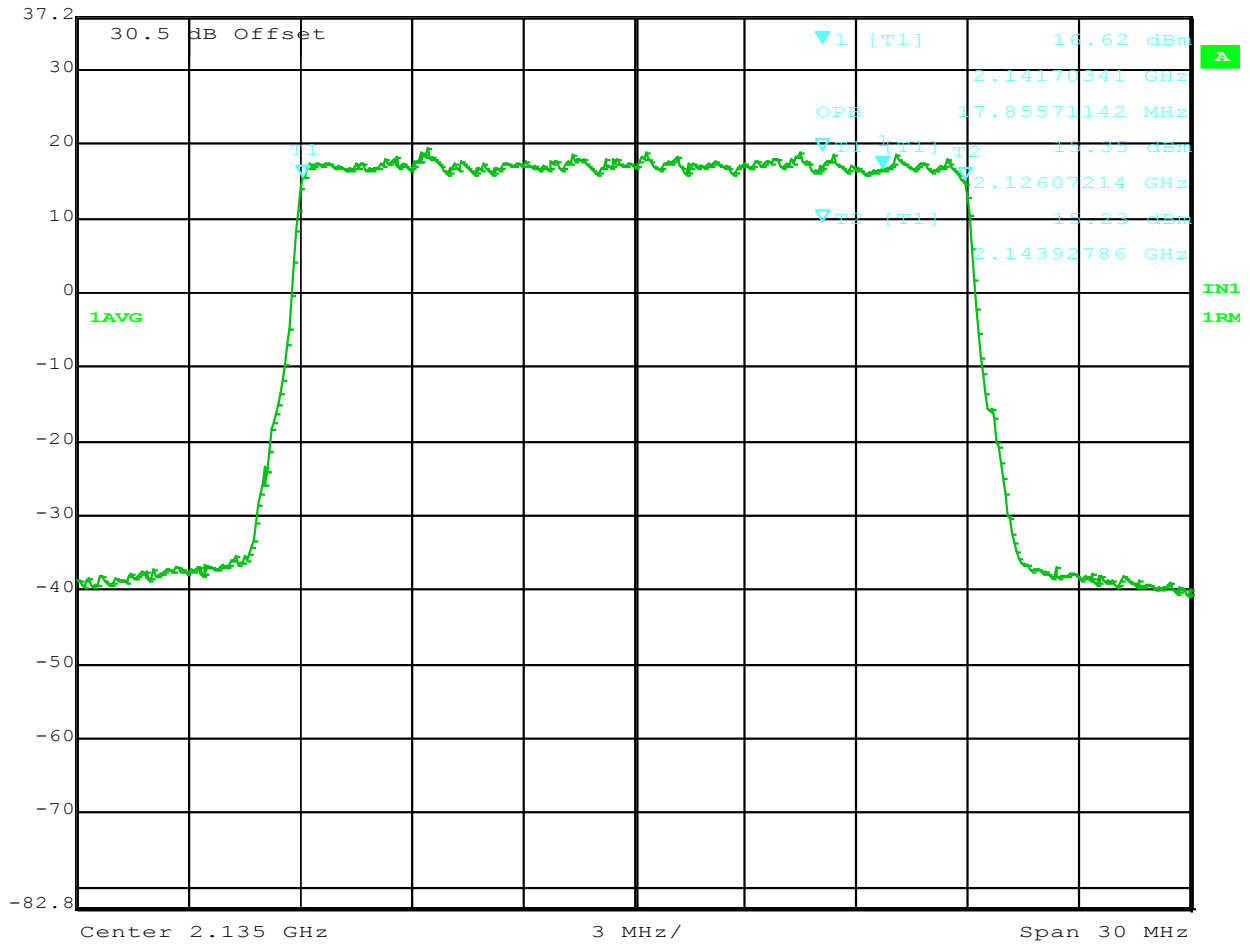
Ref Lvl	37.5 dBm	Marker 1 [T1]	17.91 dBm	RBW	200 kHz	RF Att	20 dB
			2.14170341 GHz	VBW	1 MHz		
				SWT	5 ms	Unit	dBm



Title: 99% POWER BANDWIDTH: TEST ENGINEER: SEG; CLASS II CHANGE
 Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2125-2145 MHz (B2+C+D+E)
 PWR: 5W; 2X2MIMO; QPSK; FCC PRT 27; FCCID:AS5BBTRX-17
 Date: 20.AUG.2014 08:57:21



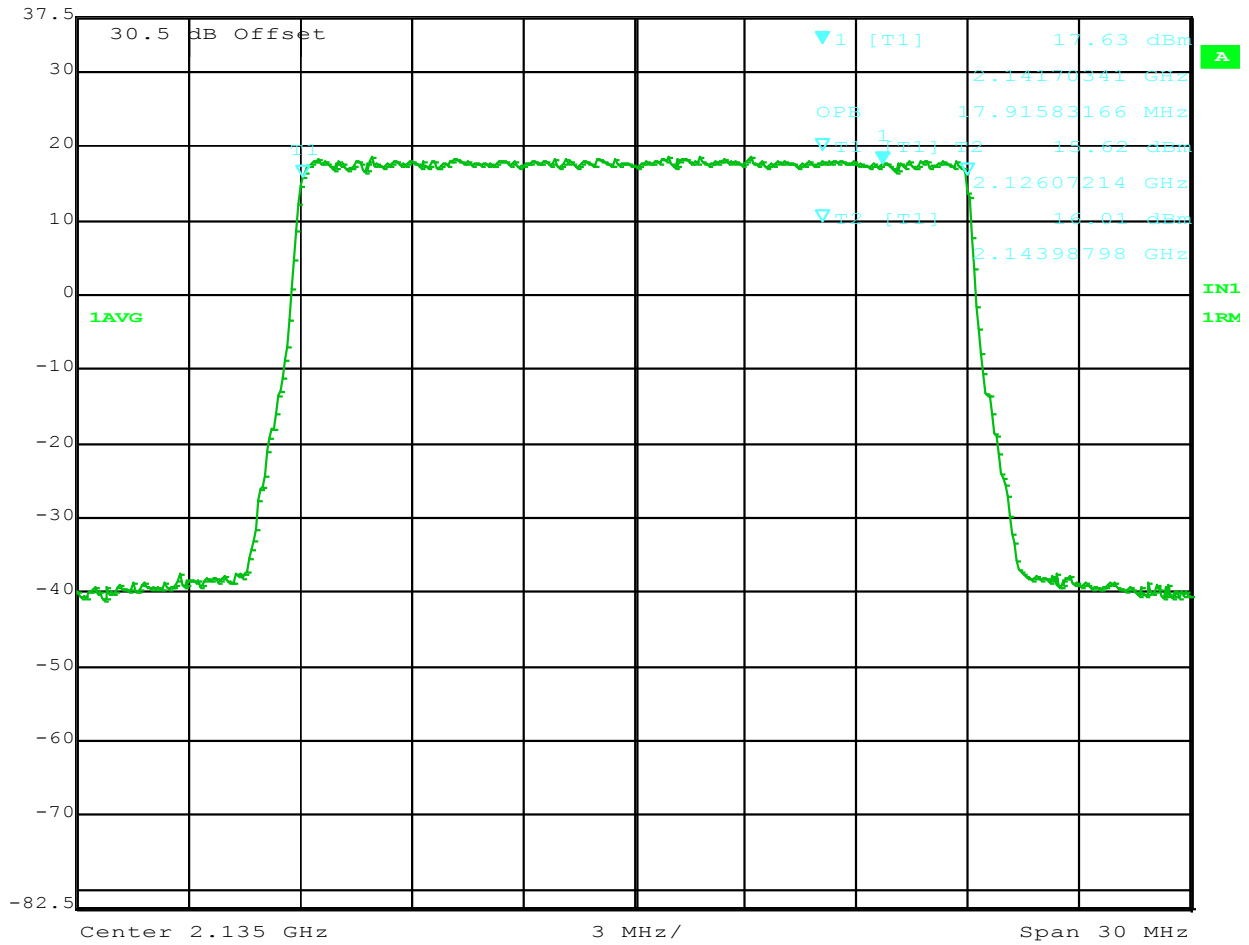
Ref Lvl	37.2 dBm	Marker 1 [T1]	2.14170341 GHz	RBW	200 kHz	RF Att	20 dB
				VBW	1 MHz		
				SWT	5 ms	Unit	dBm



Title: 99% POWER BANDWIDTH: TEST ENGINEER: SEG; CLASS II CHANGE
 Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2125-2145 MHz (B2+C+D+E)
 PWR: 5W; 2X2MIMO; 16QAM; FCC PRT 27; FCCID:AS5BBTRX-17
 Date: 20.AUG.2014 10:34:45



Ref Lvl	37.5 dBm	Marker 1 [T1]	17.63 dBm	RBW	200 kHz	RF Att	20 dB
				VBW	1 MHz		
				SWT	5 ms	Unit	dBm



Title: 99% POWER BANDWIDTH: TEST ENGINEER: SEG; CLASS II CHANGE
 Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2125-2145 MHz (B2+C+D+E)
 PWR: 5W; 2X2MIMO; 64QAM; FCC PRT 27; FCCID:AS5BBTRX-17
 Date: 19.AUG.2014 11:27:42

Block: D+E+F

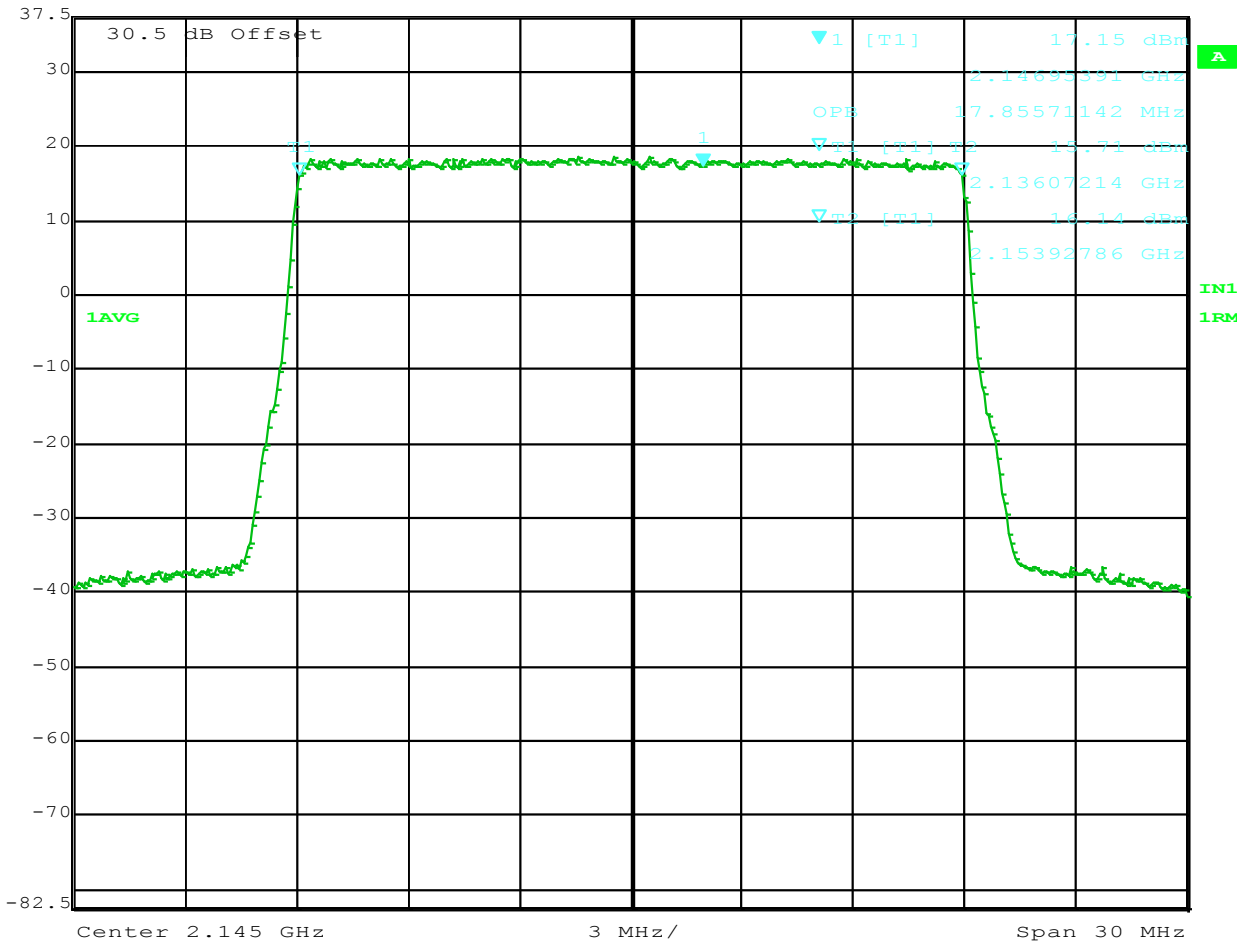
20 MHz Bandwidth (2135 - 2155 MHz)

2x5 watts (MIMO)

(99% Power Bandwidth)



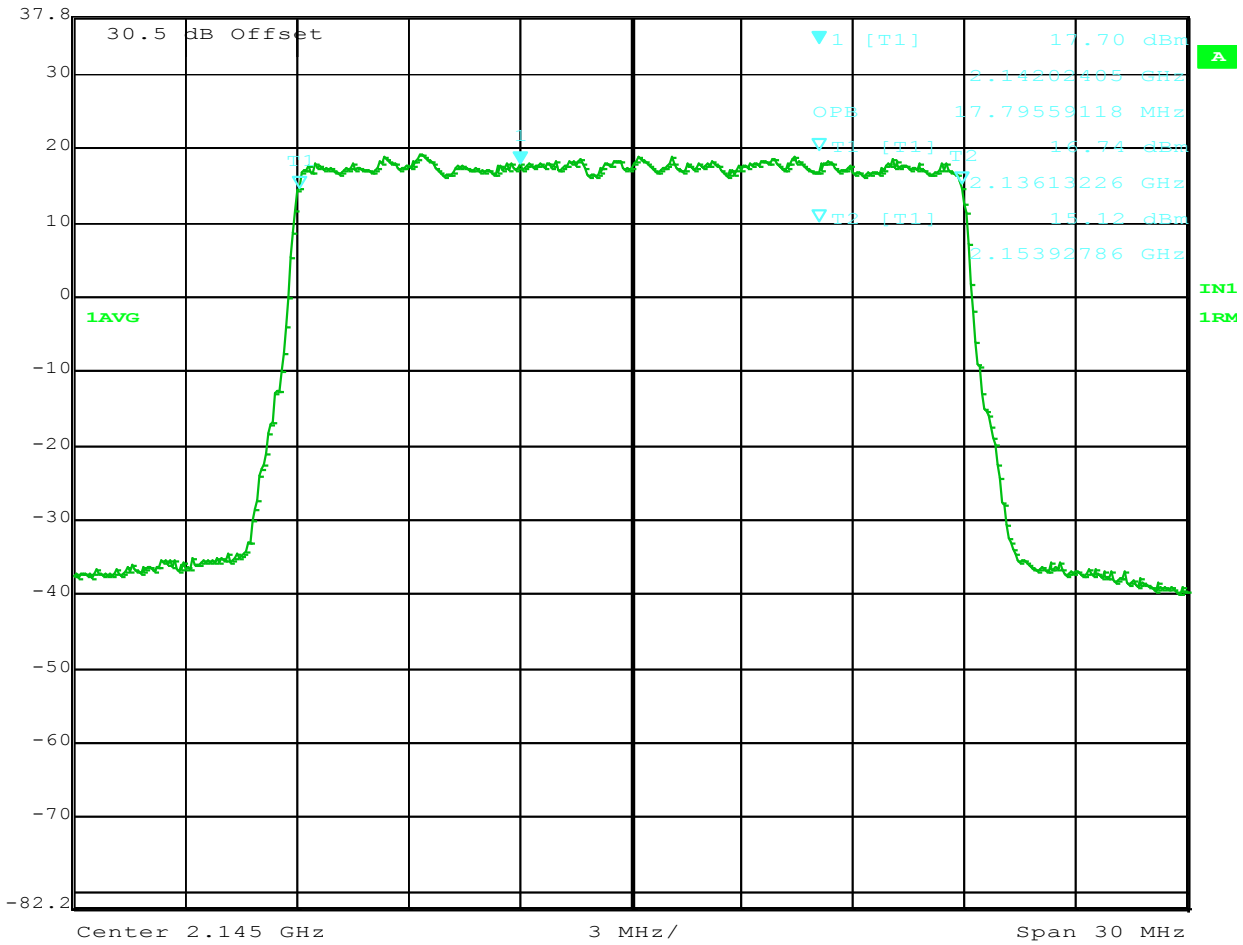
	Marker 1 [T1]	RBW	200 kHz	RF Att	20 dB
Ref Lvl	17.11 dBm	VBW	1 MHz		
37.5 dBm	2.14695391 GHz	SWT	5 ms	Unit	dBm



Title: 99% POWER BANDWIDTH: TEST ENGINEER: SEG; CLASS II CHANGE
 Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2135-2155 MHz (D+E+F)
 PWR: 5W; 2X2MIMO; QPSK; FCC PRT 27; FCCID:AS5BBTRX-17
 Date: 21.AUG.2014 11:20:36



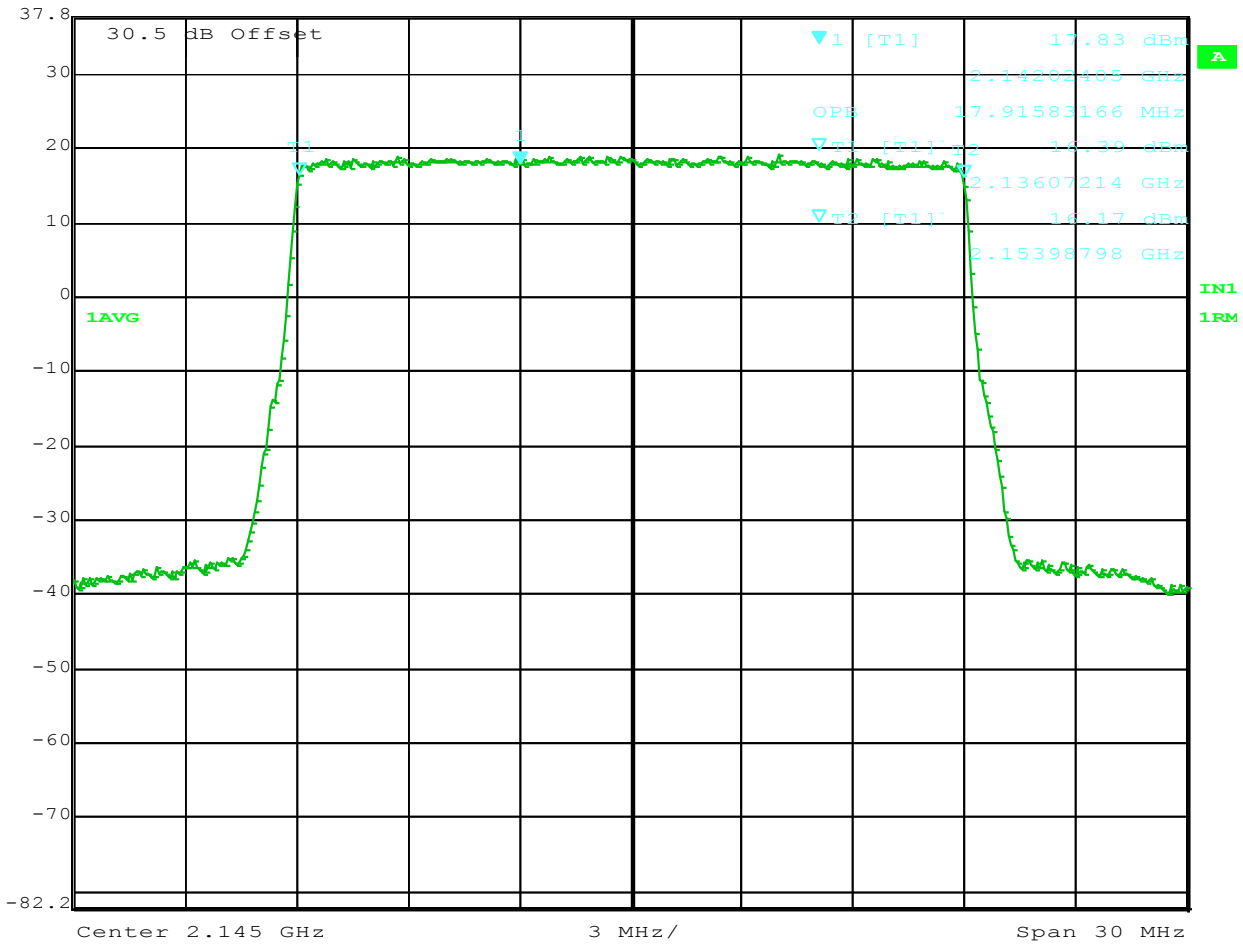
Ref Lvl	37.8 dBm	Marker 1 [T1]	17.70 dBm	RBW	200 kHz	RF Att	20 dB
			2.14202405 GHz	VBW	1 MHz		
				SWT	5 ms	Unit	dBm



Title: 99% POWER BANDWIDTH: TEST ENGINEER: SEG; CLASS II CHANGE
 Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2135-2155 MHz (D+E+F)
 PWR: 5W; 2X2MIMO; 16QAM; FCC PRT 27; FCCID:AS5BBTRX-17
 Date: 21.AUG.2014 09:53:04



	Marker 1 [T1]	RBW	200 kHz	RF Att	20 dB
Ref Lvl	17.83 dBm	VBW	1 MHz		
37.8 dBm	2.14202405 GHz	SWT	5 ms	Unit	dBm



Title: 99% POWER BANDWIDTH: TEST ENGINEER: SEG; CLASS II CHANGE
 Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2135-2155 MHz (D+E+F)
 PWR: 5W; 2X2MIMO; 64QAM; FCC PRT 27; FCCID:AS5BBTRX-17
 Date: 21.AUG.2014 09:41:30

**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) was measured using a Rohde & Schwarz ESI Spectrum Analyzer/Receiver. 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 and RF directional coupler. This combined attenuation was offset on the display and the signal for single carrier was adjusted to the corrected RF power level for a 200 kHz resolution bandwidth for 20MHz 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 “**9764-DC Power-LR MCO 2x5W v1.1 AWS BAND 4 (20-MHz)(Small Cells)**”.

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 5 Watts (37 dBm)/carrier.

The carrier frequencies and blocks measured were tabulated on the bottom of each plot. The output signals at RF filter were plotted for each frequency/block. The LTE AWS MCOs 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 20 MHz Bandwidth. Blocks and bandwidth listed in Table below 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)(3): 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.

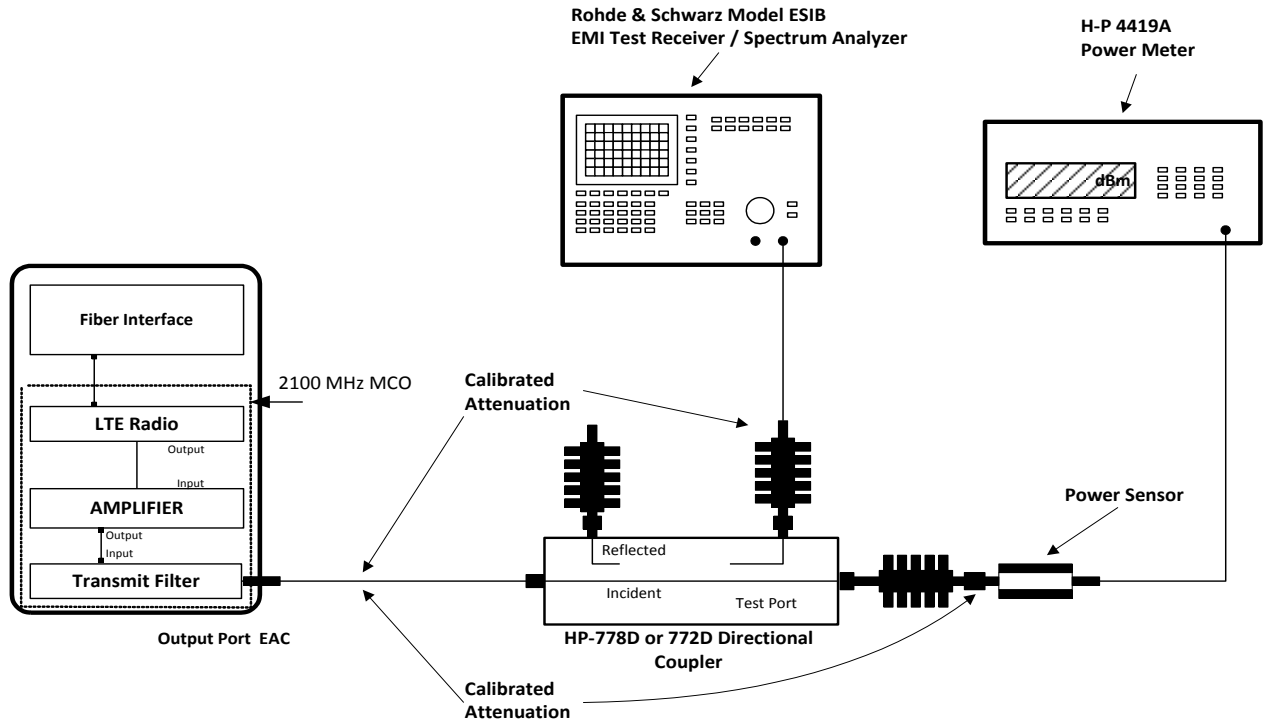
Pursuant to FCC OET RULES 662911 D01 and D02 for two antenna MIMO mode of operations, the FCC limit of -13dBm shall be 3dB more stringent, therefore all channel edge and out of band spurious emissions shall be -16dBm. For 20MHz BW, the one percent of emissions BW is 200 kHz.

The list of carriers tested is provided below:

Table for 20MHz Bandwidth Blocks

Frequency Range (MHz) & Block	Bandwidth (MHz)	Center Frequency (MHz)	Power (Watts)
2110 - 2130 (A + B)	20	2120	5
2125 - 2145 (B2 + C + D + E)	20	2135	5
2135 - 2155 (D + E + F)	20	2145	5

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



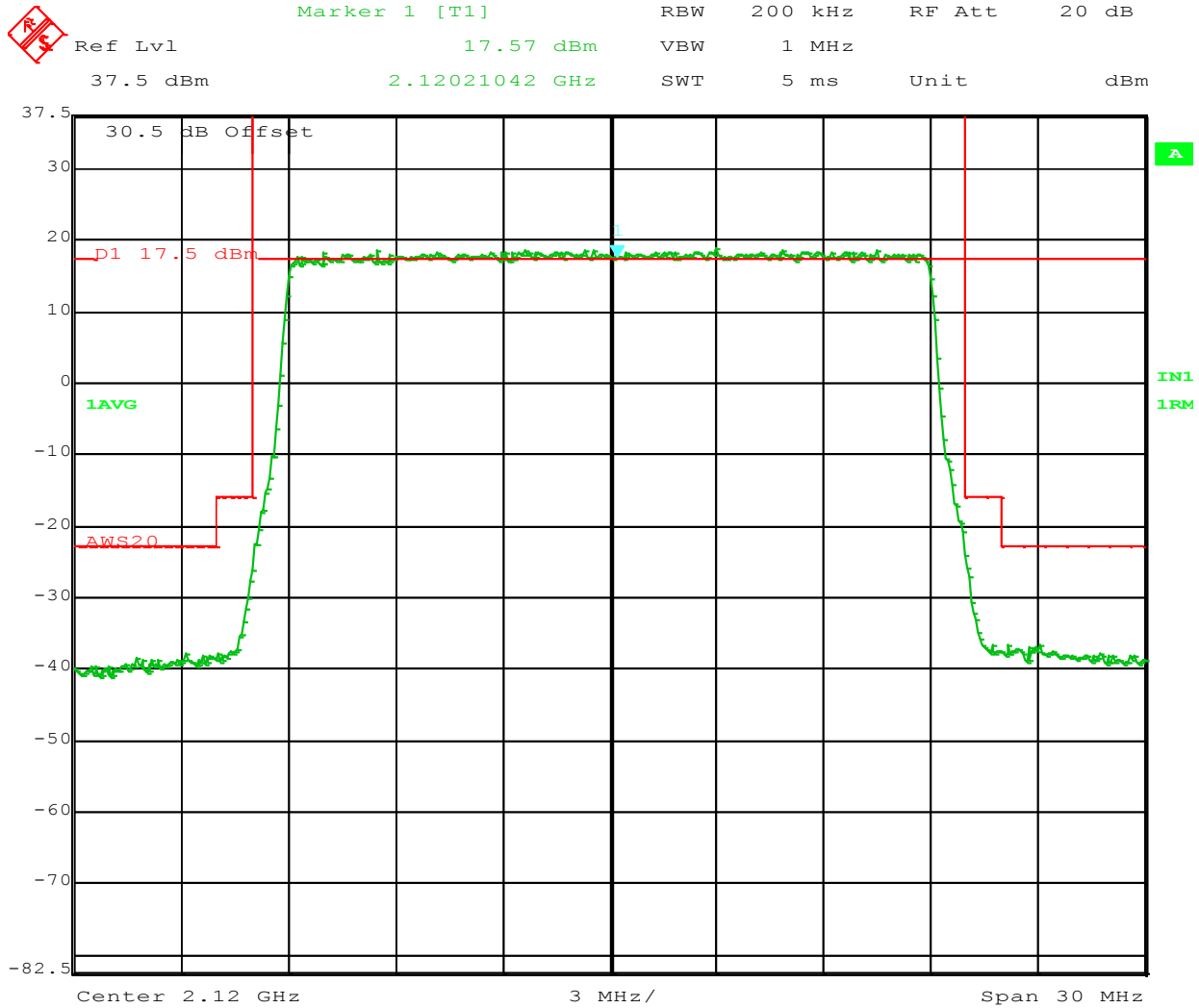
All components are calibrated over the frequency range of interest

Block: A+B

20 MHz Bandwidth (2110-2130 MHz)

2x5 watts (MIMO)

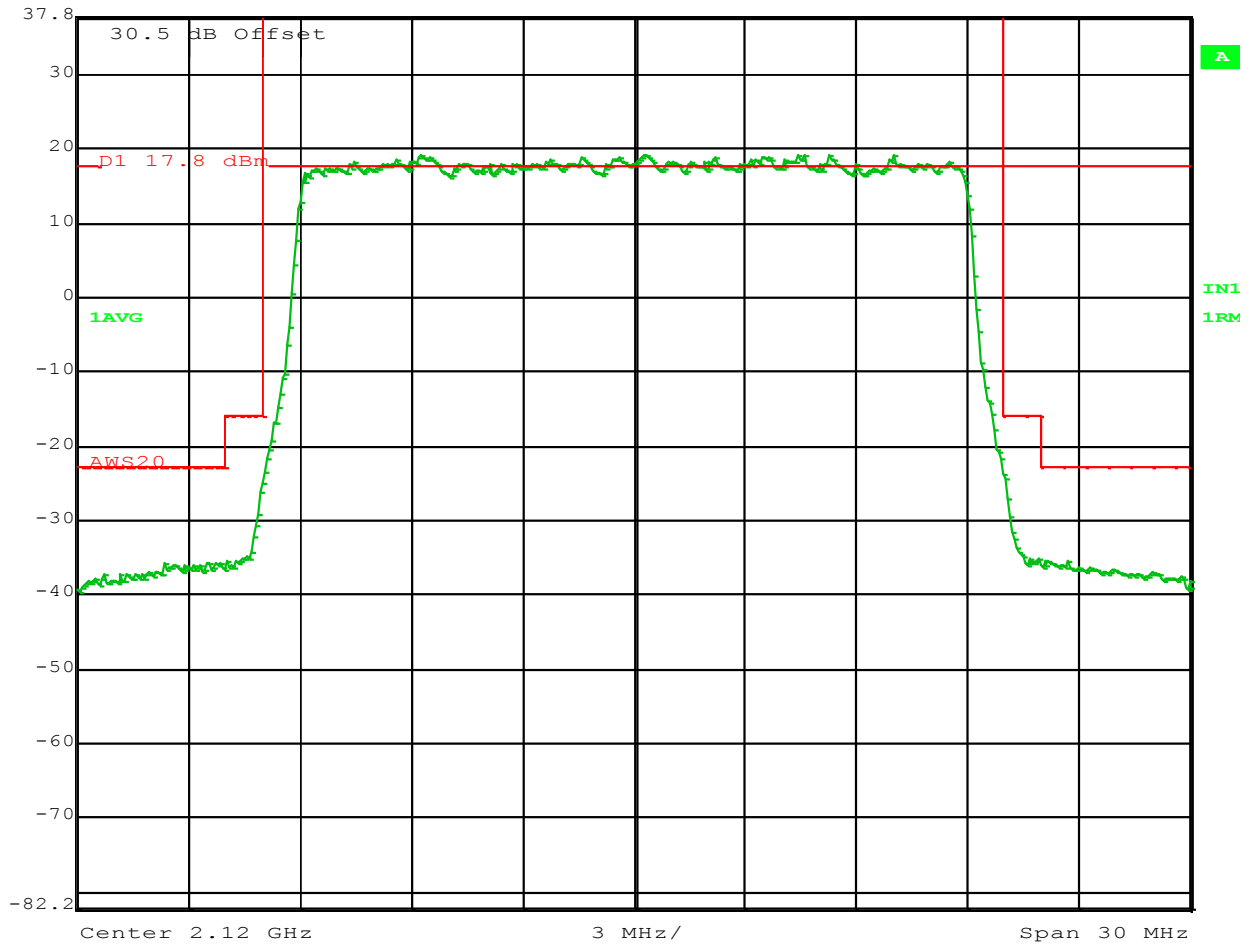
SPECTRUM MASK/OCCUPIED BANDWIDTH



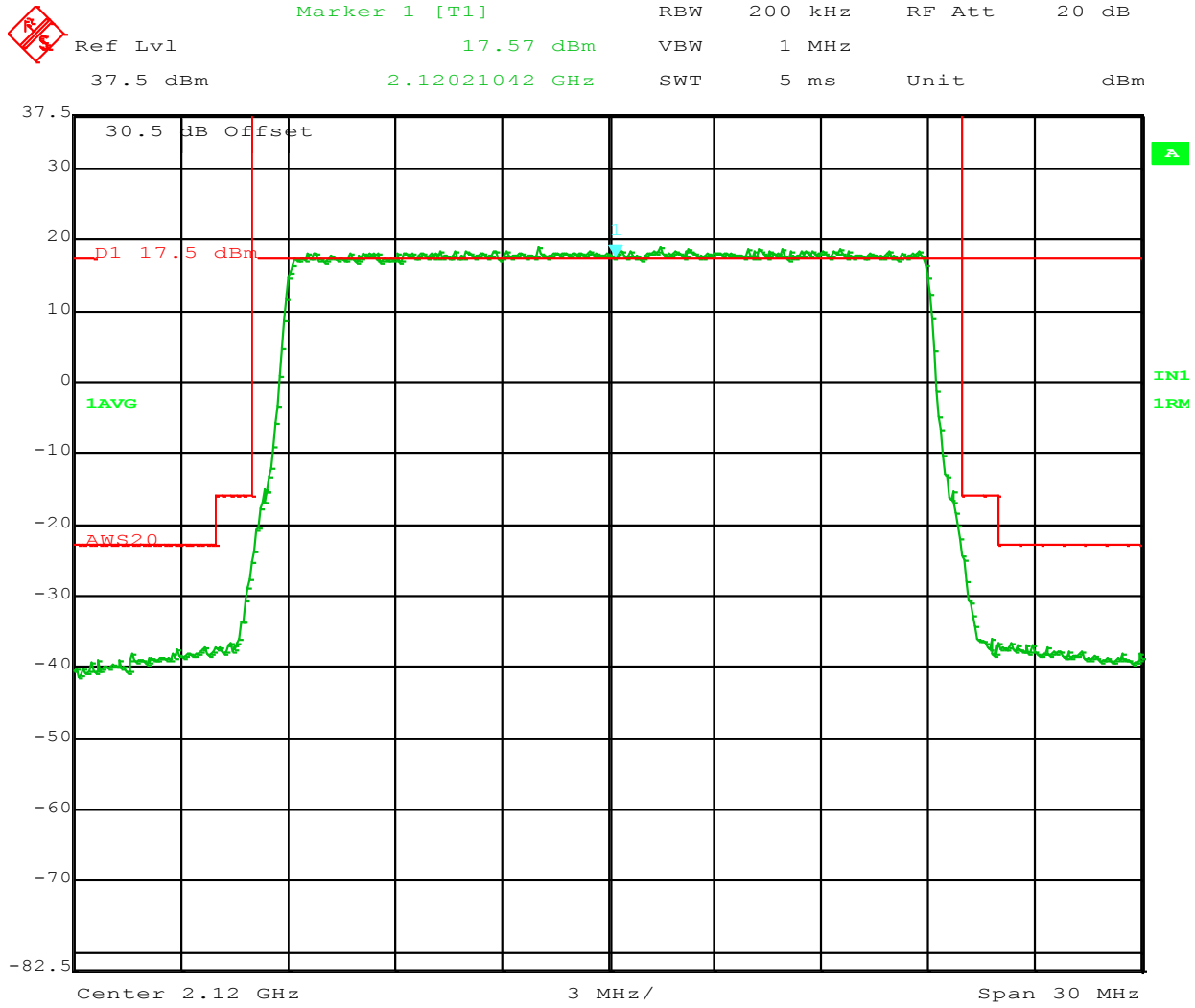
Title: OCCUPIED BANDWIDTH: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2110-2130 MHZ (A+B)
PWR: 5W; 2X2MIMO; QPSK; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 20.AUG.2014 14:36:36



Ref Lvl 37.8 dBm
RBW 200 kHz RF Att 20 dB
VBW 1 MHz
SWT 5 ms Unit dBm



Title: OCCUPIED BANDWIDTH: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2110-2130 MHZ (A+B)
PWR: 5W; 2X2MIMO; 16QAM; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 20.AUG.2014 13:44:30



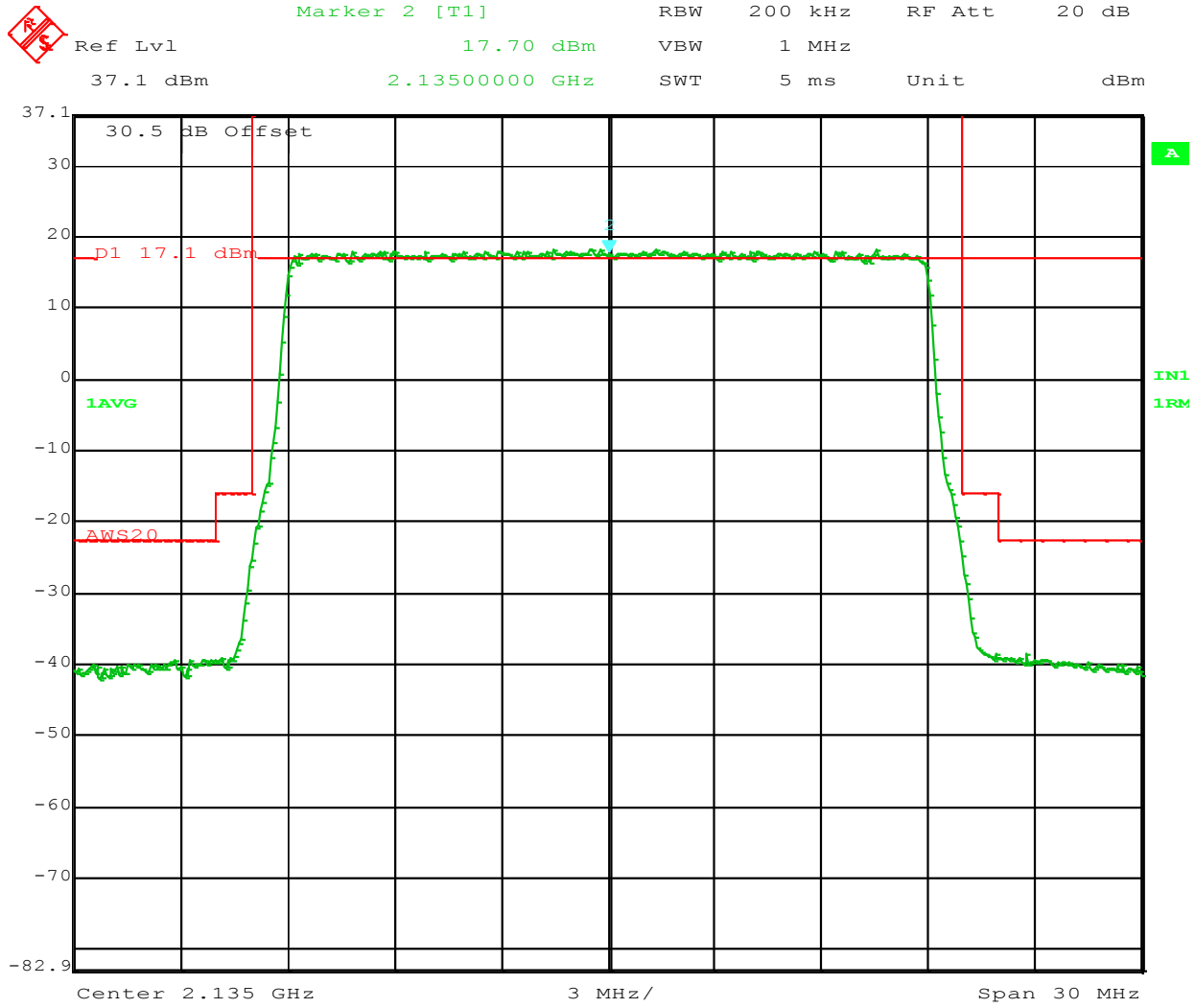
Title: OCCUPIED BANDWIDTH: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2110-2130 MHZ (A+B)
PWR: 5W; 2X2MIMO; 64QAM; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 20.AUG.2014 15:35:15

Block: B2+C+D+E

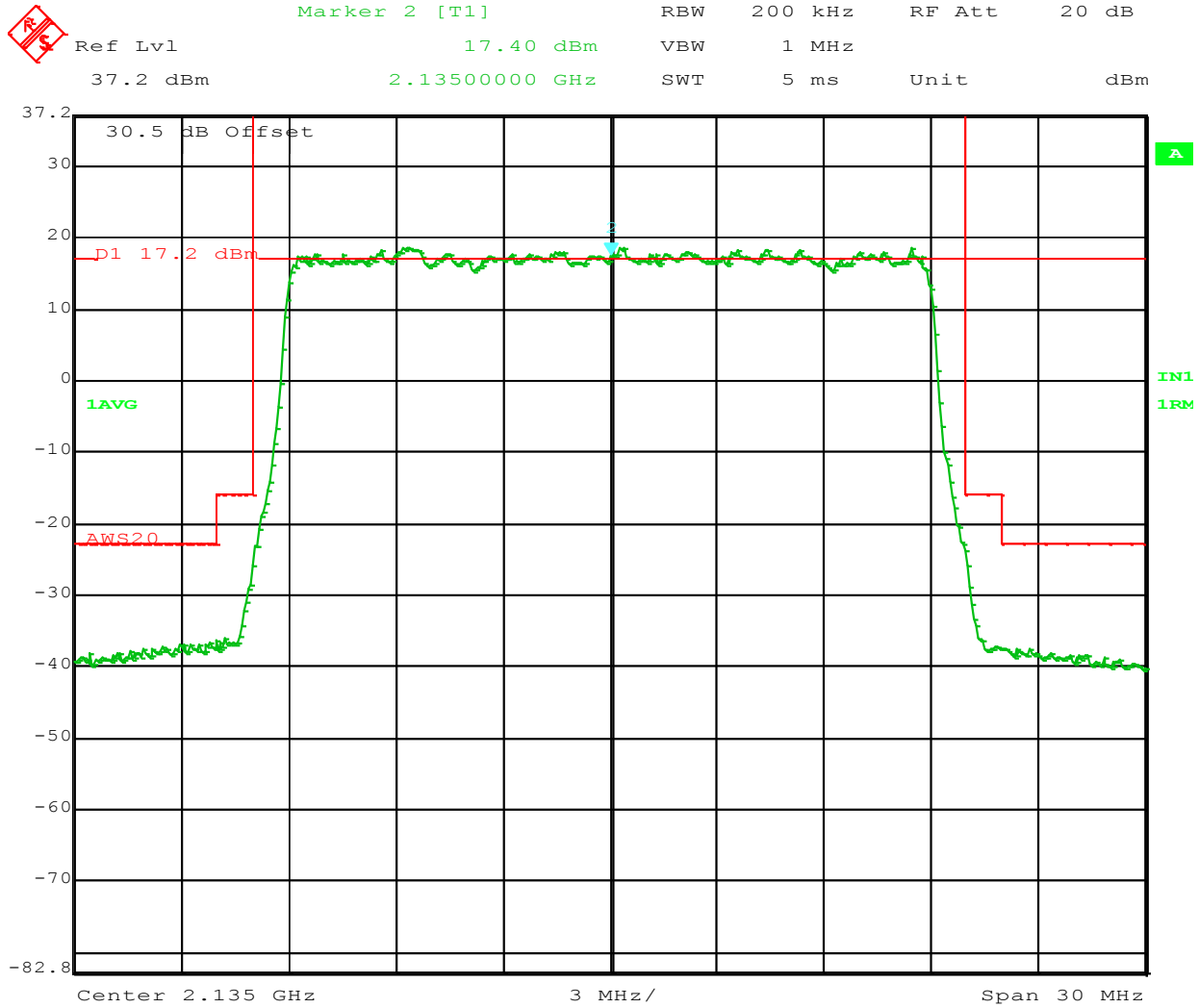
20 MHz Bandwidth (2125 - 2145 MHz)

2x5 watts (MIMO)

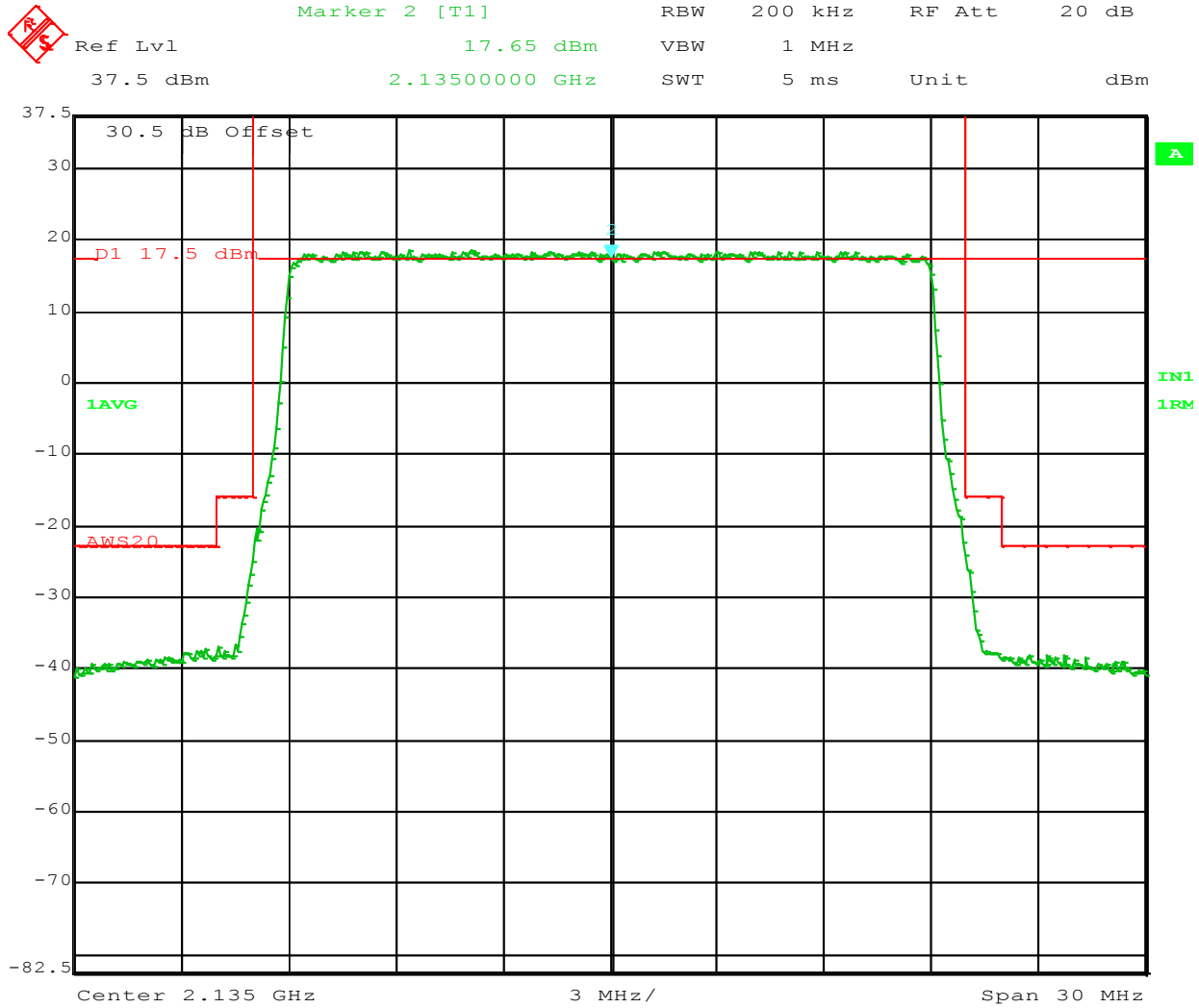
SPECTRUM MASK/OCCUPIED BANDWIDTH



Title: OCCUPIED BANDWIDTH: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2125-2145 MHZ (B2+C+D+E)
PWR: 5W; 2X2MIMO; QPSK; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 20.AUG.2014 08:55:16



Title: OCCUPIED BANDWIDTH: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2125-2145 MHZ (B2+C+D+E)
PWR: 5W; 2X2MIMO; 16QAM; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 20.AUG.2014 10:37:16



Title: OCCUPIED BANDWIDTH: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2125-2145 MHZ (B2+C+D+E)
PWR: 5W; 2X2MIMO; 64QAM; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 19.AUG.2014 11:06:55

Block: D+E+F

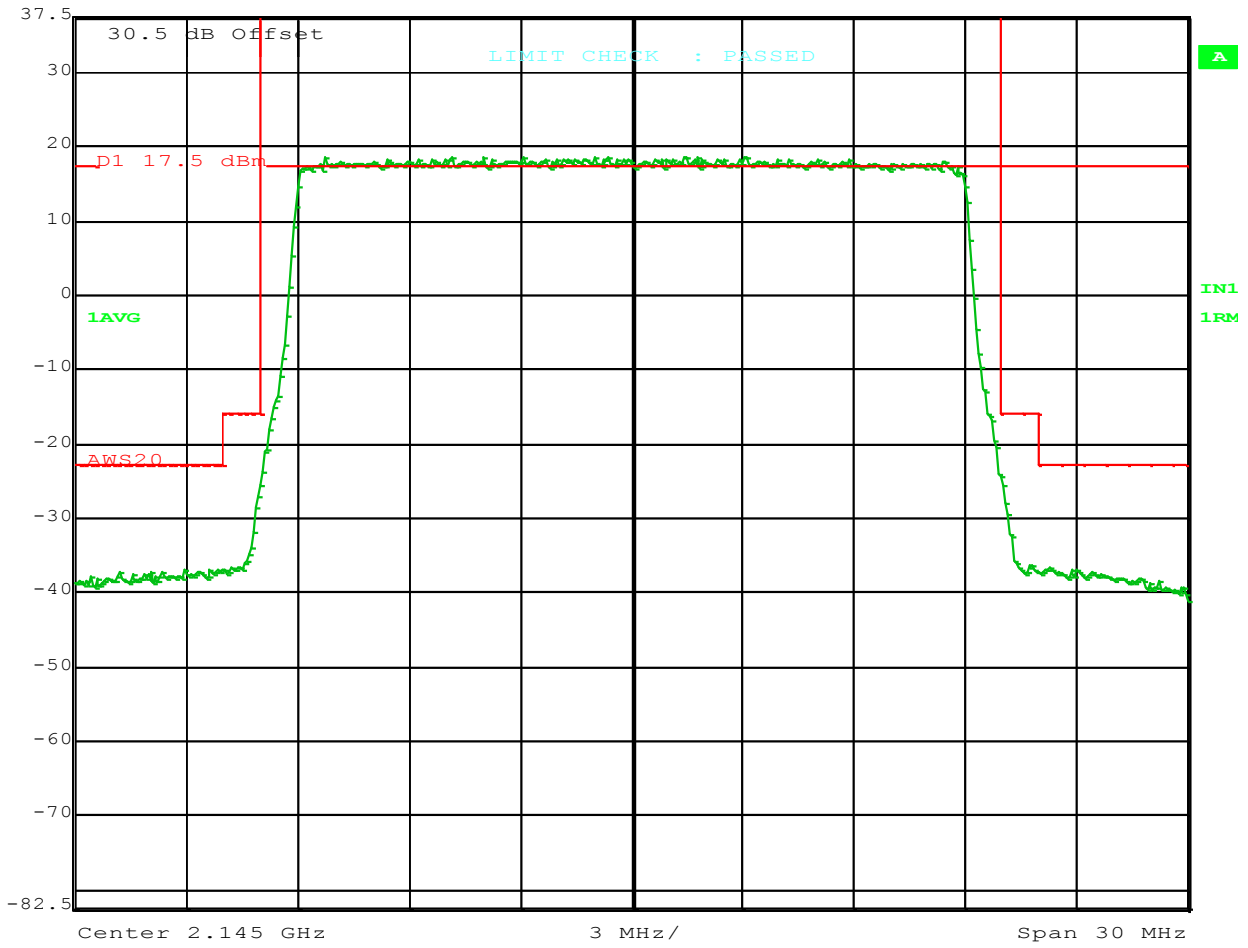
20 MHz Bandwidth (2135 - 2155 MHz)

2x5 watts (MIMO)

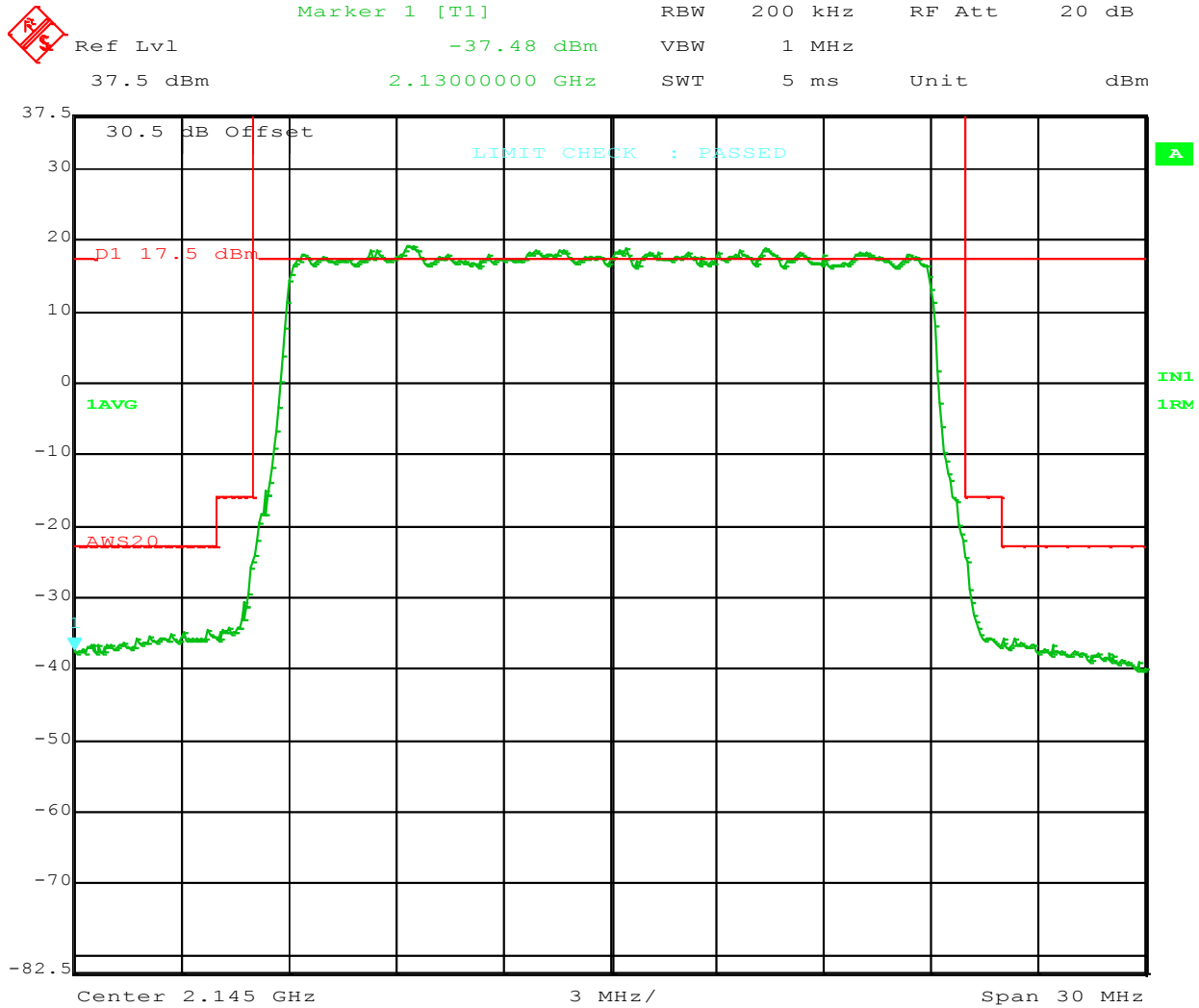
SPECTRUM MASK/OCCUPIED BANDWIDTH



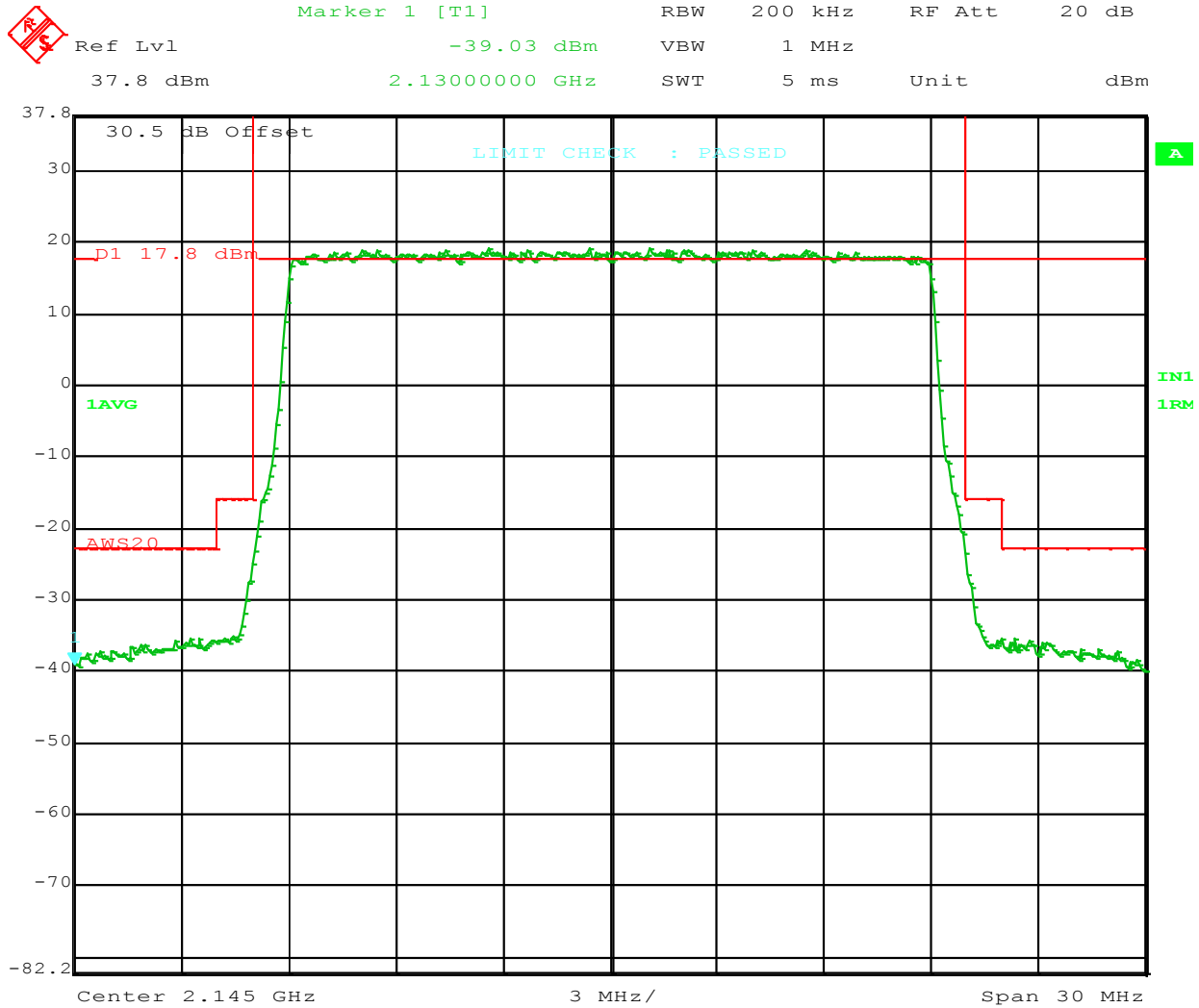
Ref Lvl 37.5 dBm
RBW 200 kHz RF Att 20 dB
VBW 1 MHz
SWT 5 ms Unit dBm



Title: OCCUPIED BANDWIDTH: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2135-2155 MHz (D+E+F)
PWR: 5W; 2X2MIMO; QPSK; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 21.AUG.2014 11:24:16



Title: OCCUPIED BANDWIDTH: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2135-2155 MHz (D+E+F)
PWR: 5W; 2X2MIMO; 16QAM; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 21.AUG.2014 09:56:06



Title: OCCUPIED BANDWIDTH: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2135-2155 MHz (D+E+F)
PWR: 5W; 2X2MIMO; 64QAM; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 21.AUG.2014 09:26:44

Measurement 4

FCC Section 2.1051 and 27.53 (h) Spurious Emissions at Antenna Transmit Terminals

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

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 B. Measurements were made using a Rohde & Schwarz ESI 40 (9 kHz to 40 GHz) EMI Test receiver and a HP Model 520 DeskJet 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 B. The required emission limitation is specified in 27.53 (h). Measurements were made at 5W per carrier for 20 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:

Frequency Range	Resolution Bandwidth
9 kHz to 30 MHz	10 kHz
30 MHz to 1 GHz	100 kHz
1 GHz to 22 GHz	1 MHz

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

Table for 20MHz Bandwidth Blocks

Frequency Range (MHz) & Block	Bandwidth (MHz)	Center Frequency (MHz)	Power (Watts)
2110 - 2130 (A + B)	20	2120	5
2125 - 2145 (B2 + C + D + E)	20	2135	5
2135 - 2155 (D + E + F)	20	2145	5

FCC Section 27.53(h)(3) 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(h).

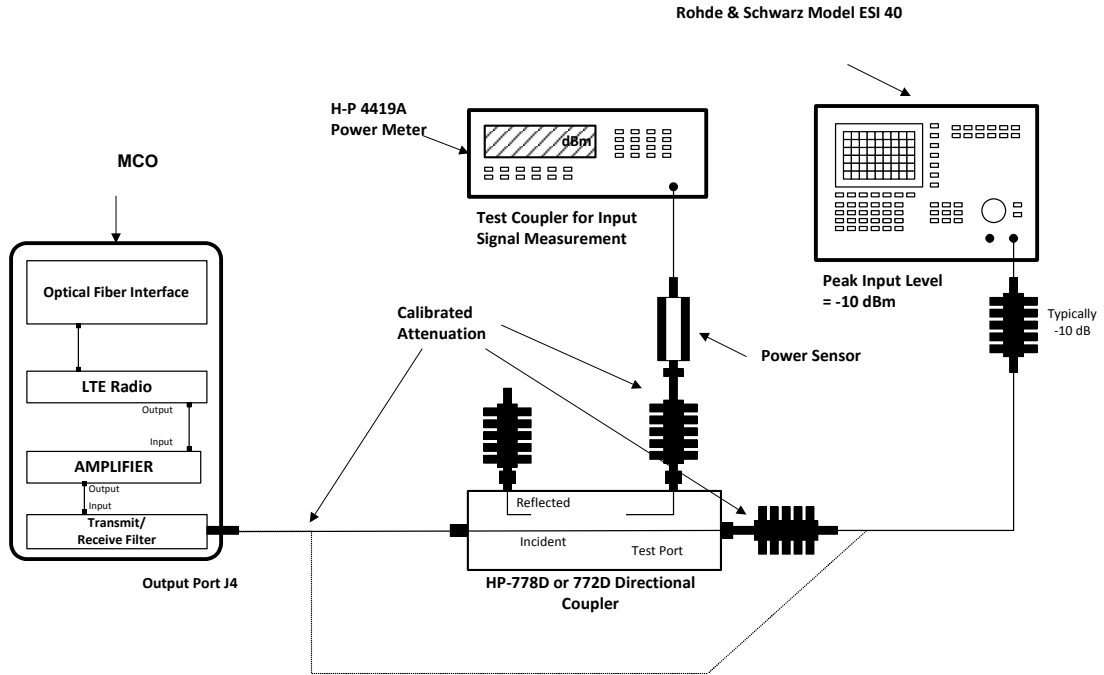
Measurement uncertainty:

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 10 GHz: Frequency = 10 kHz, Amplitude = 0.5 dB

Figure B. TEST CONFIGURATION FOR CONDUCTED SPURIOUS

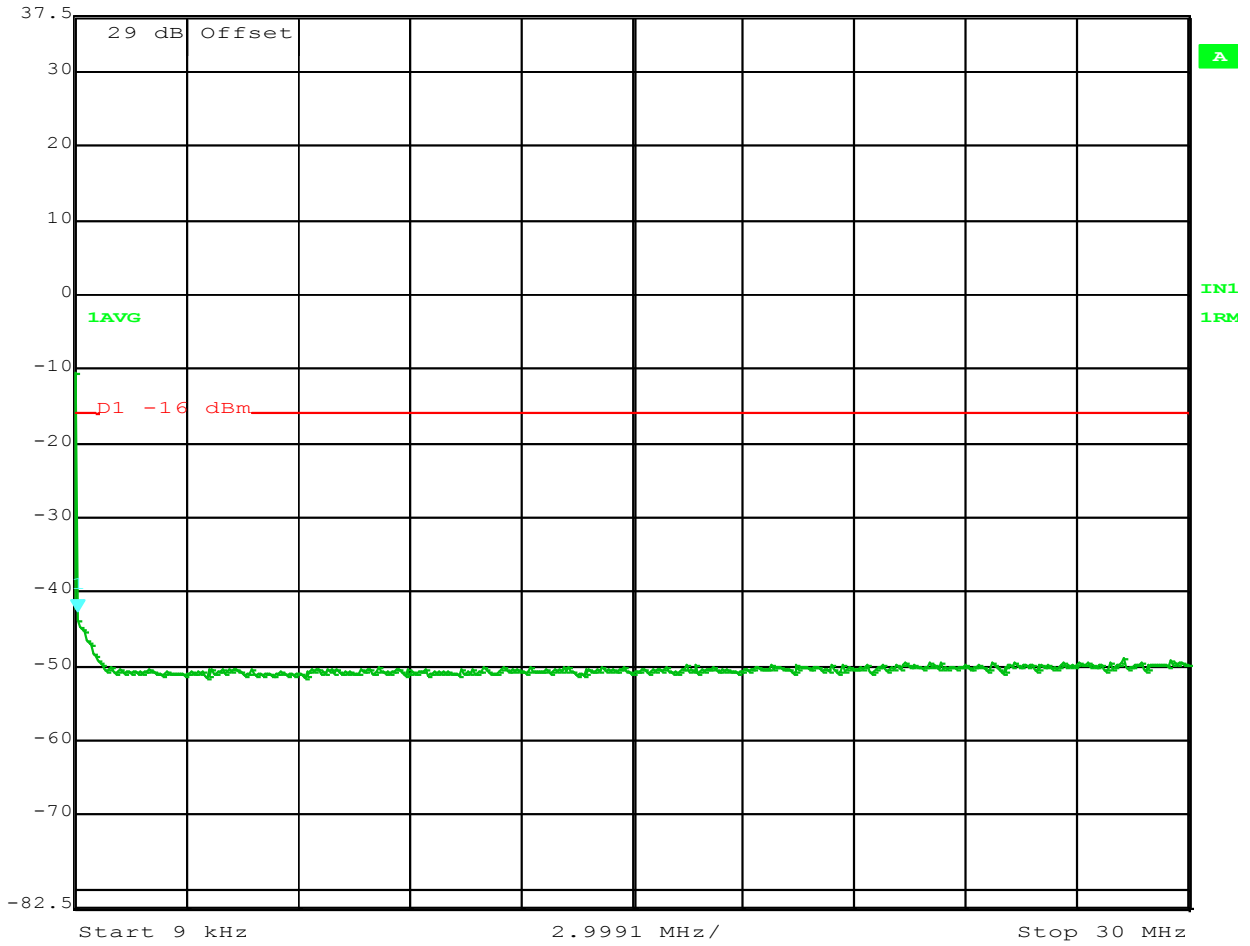


**Transmit Port
Antenna Conducted Spurious Emissions**

**Block: A+B
20 MHz Bandwidth (2110 - 2130 MHz)
2x5 watts (MIMO)
QPSK Modulation**



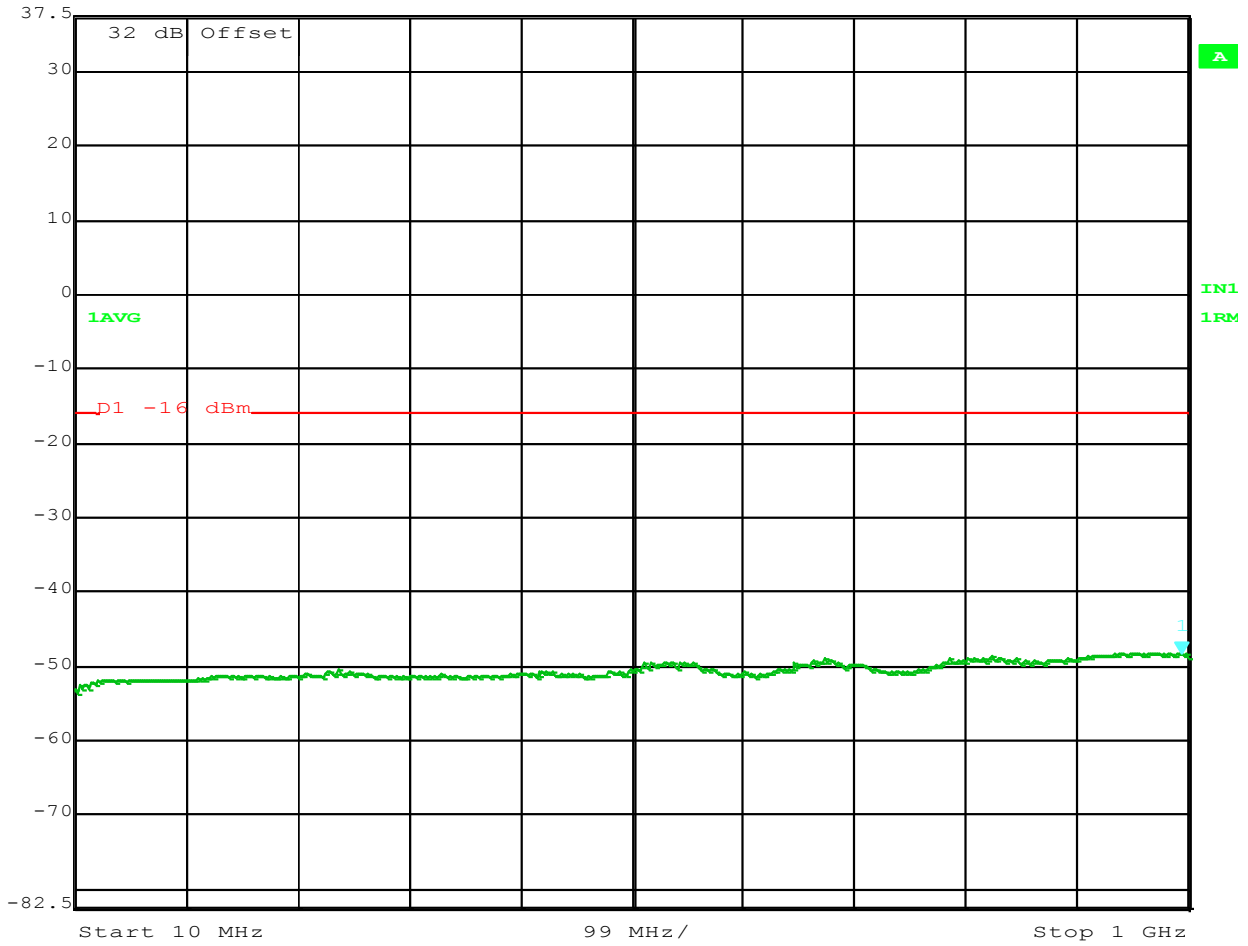
Marker 1 [T1] RBW 10 kHz RF Att 40 dB
Ref Lvl -42.66 dBm VBW 30 kHz
37.5 dBm 69.10220441 kHz SWT 760 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2110-2130 MHz (A+B)
PWR: 5W; 2X2MIMO; QPSK; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 20.AUG.2014 14:29:46



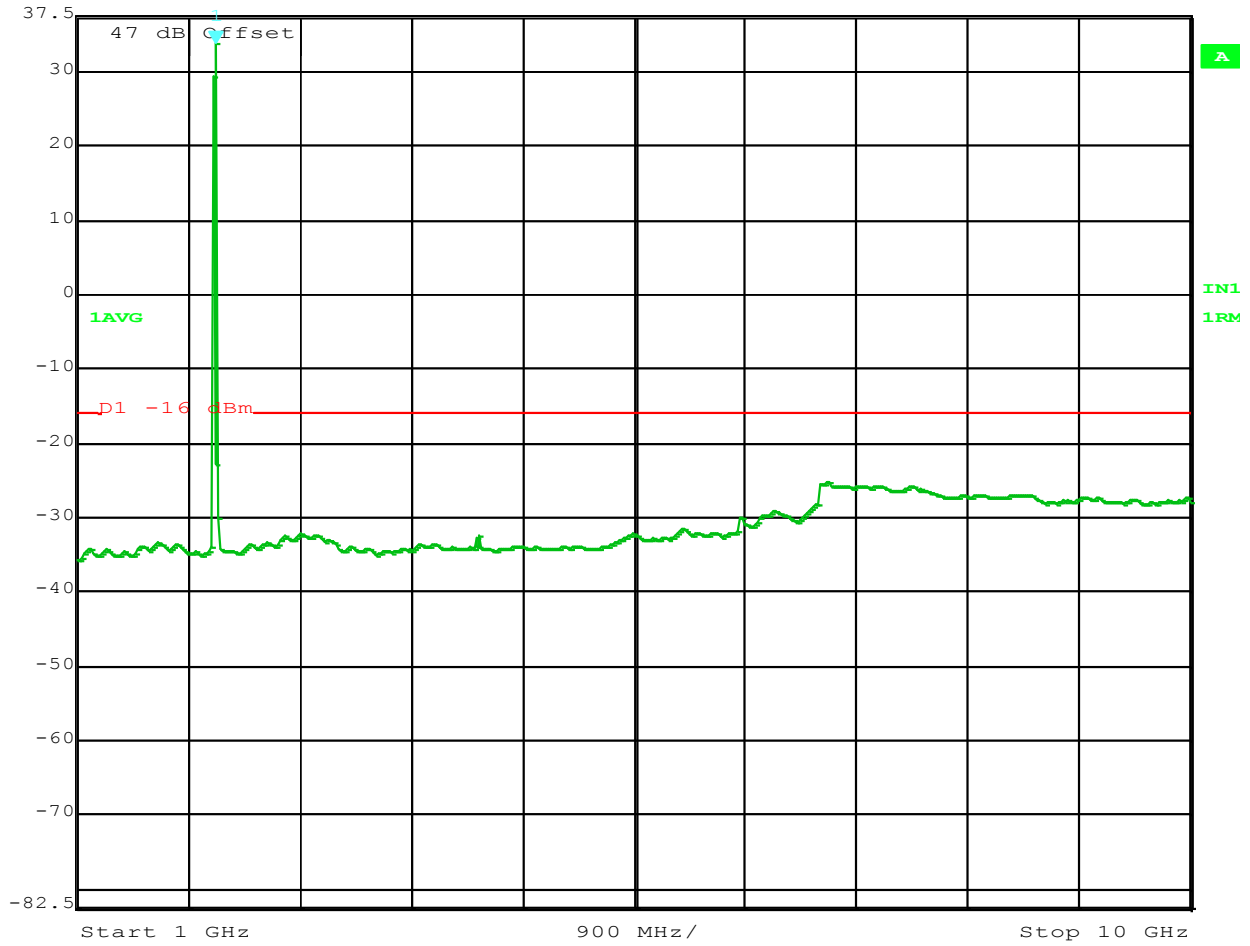
Marker 1 [T1] RBW 100 kHz RF Att 20 dB
Ref Lvl -48.50 dBm VBW 300 kHz
37.5 dBm 994.04809619 MHz SWT 250 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2110-2130 MHz (A+B)
PWR: 5W; 2X2MIMO; QPSK; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 20.AUG.2014 14:27:58



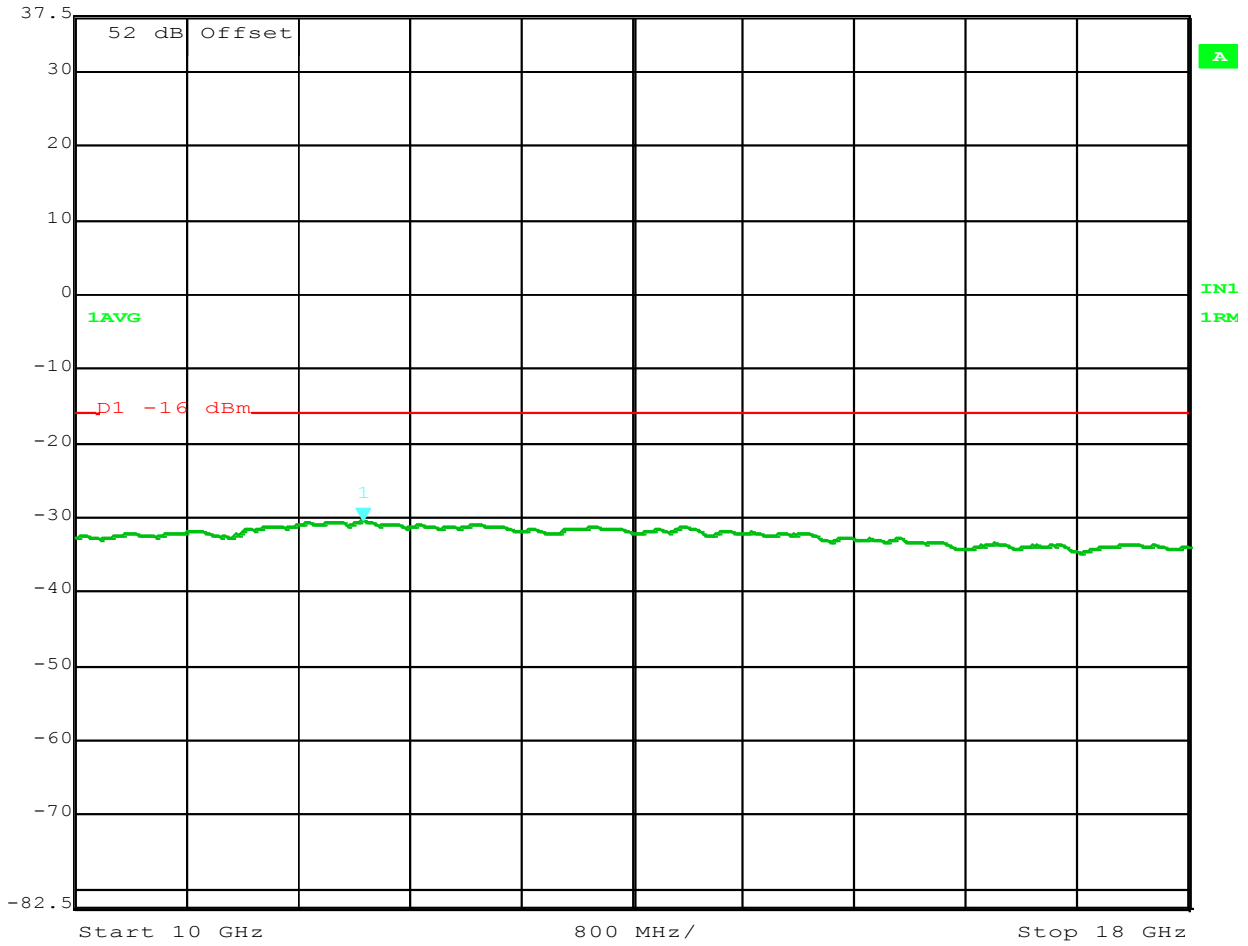
Marker 1 [T1] RBW 1 MHz RF Att 10 dB
Ref Lvl 33.64 dBm VBW 3 MHz
37.5 dBm 2.11823647 GHz SWT 90 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2110-2130 MHz (A+B)
PWR: 5W; 2X2MIMO; QPSK; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 20.AUG.2014 14:25:59



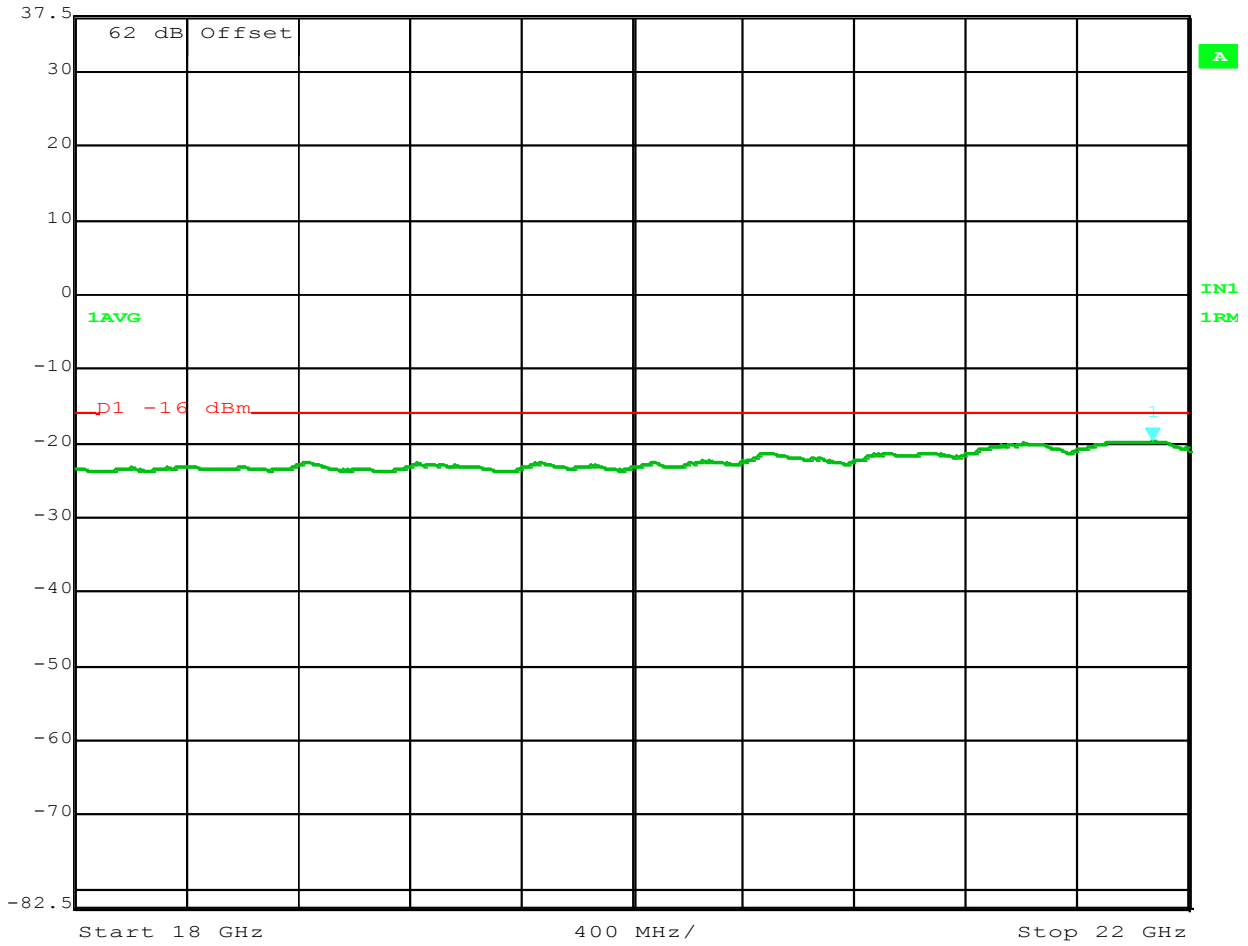
Marker 1 [T1] RBW 1 MHz RF Att 0 dB
 Ref Lvl -30.52 dBm VBW 3 MHz
 37.5 dBm 12.06813627 GHz SWT 80 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
 Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2110-2130 MHz (A+B)
 PWR: 5W; 2X2MIMO; QPSK; FCC PRT 27; FCCID:AS5BBTRX-17
 Date: 20.AUG.2014 14:23:49



Marker 1 [T1] RBW 1 MHz RF Att 0 dB
Ref Lvl -19.67 dBm VBW 3 MHz
37.5 dBm 21.87174349 GHz SWT 40 ms Unit dBm



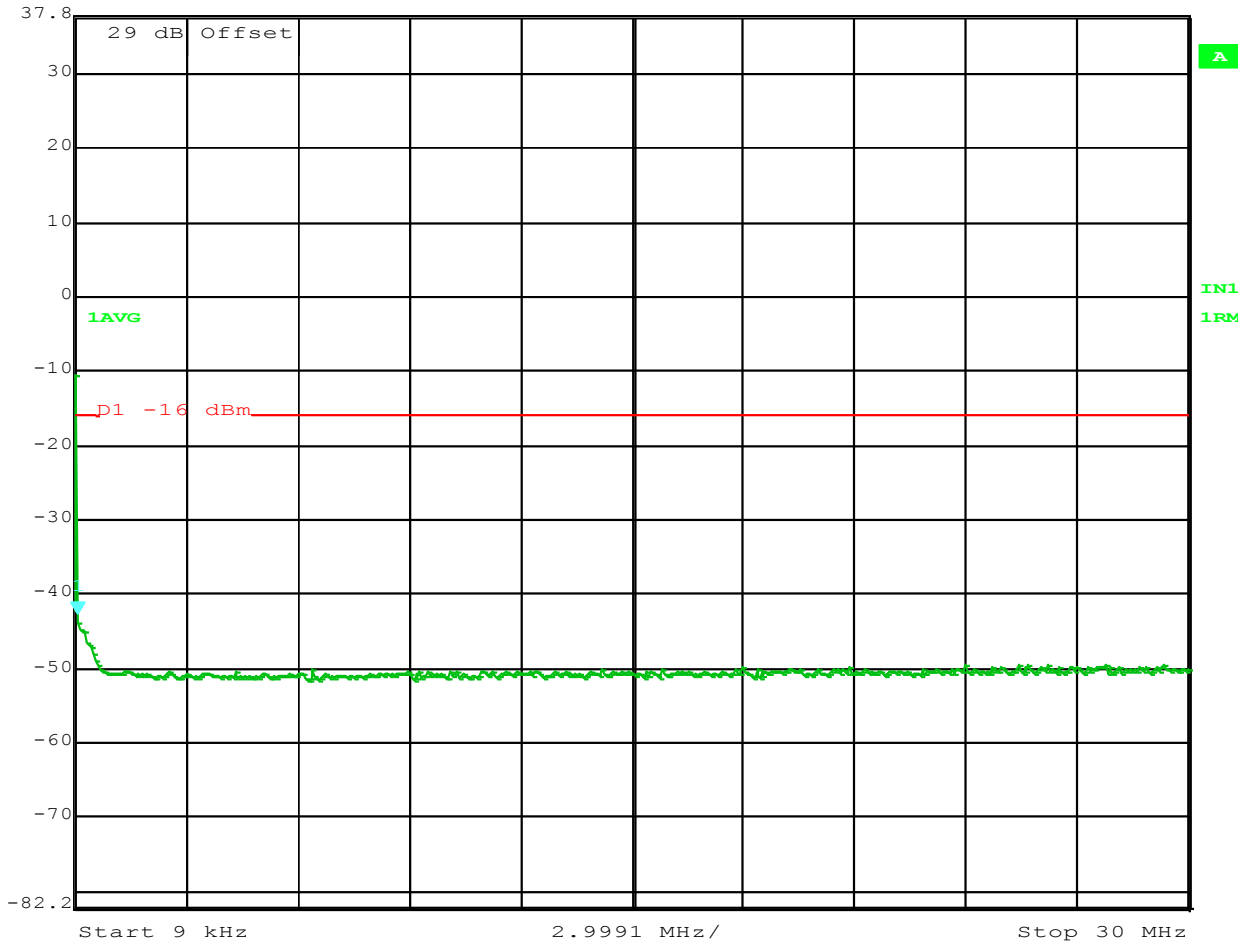
Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2110-2130 MHz (A+B)
PWR: 5W; 2X2MIMO; QPSK; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 20.AUG.2014 14:18:24

**Transmit Port
Antenna Conducted Spurious Emissions**

**Block: A+B
20 MHz Bandwidth (2110 - 2130 MHz)
2x5 watts (MIMO)
16QAM Modulation**



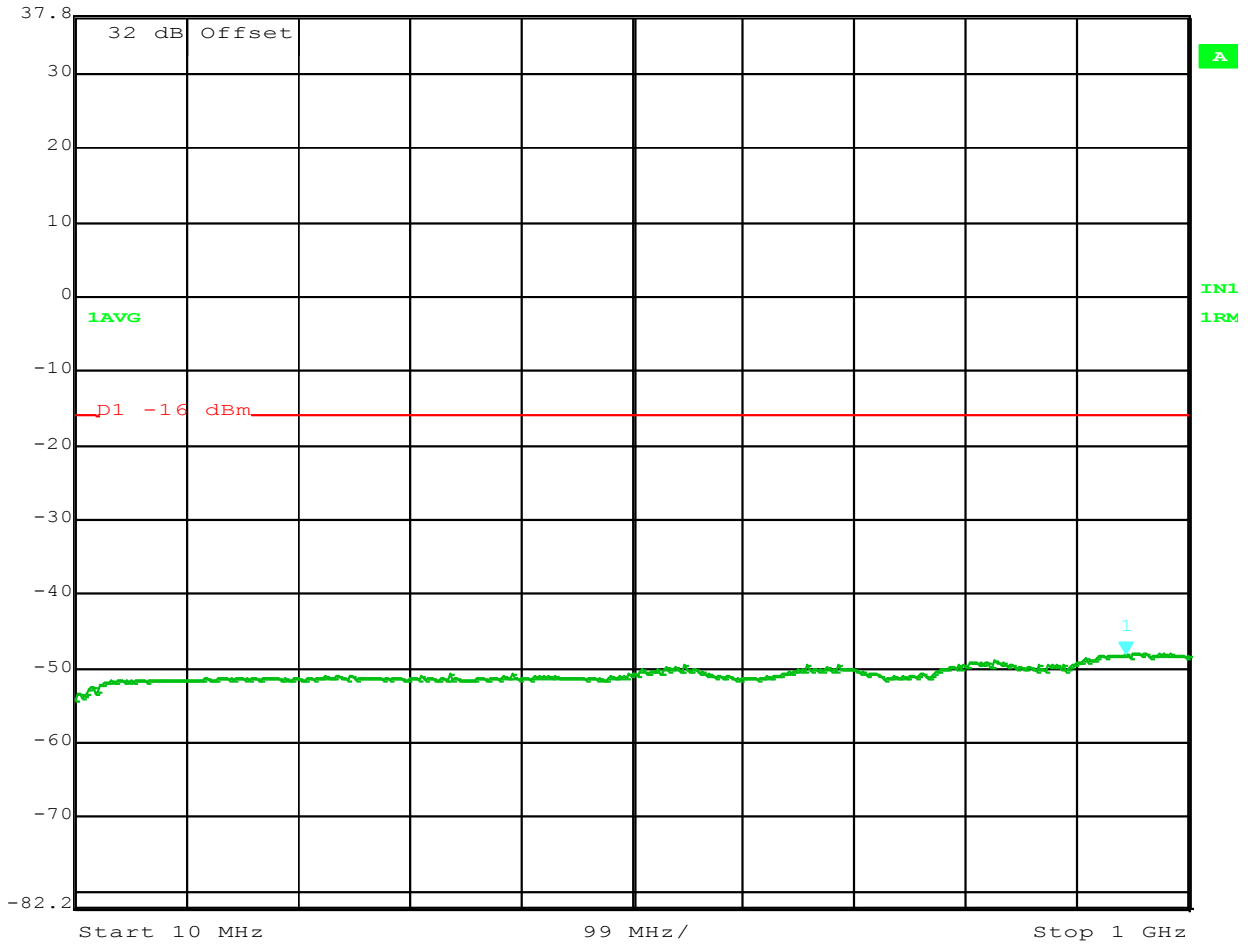
Marker 1 [T1] RBW 10 kHz RF Att 40 dB
Ref Lvl -42.70 dBm VBW 30 kHz
37.8 dBm 69.10220441 kHz SWT 760 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2110-2130 MHz (A+B)
PWR: 5W; 2X2MIMO; 16QAM; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 20.AUG.2014 13:54:34



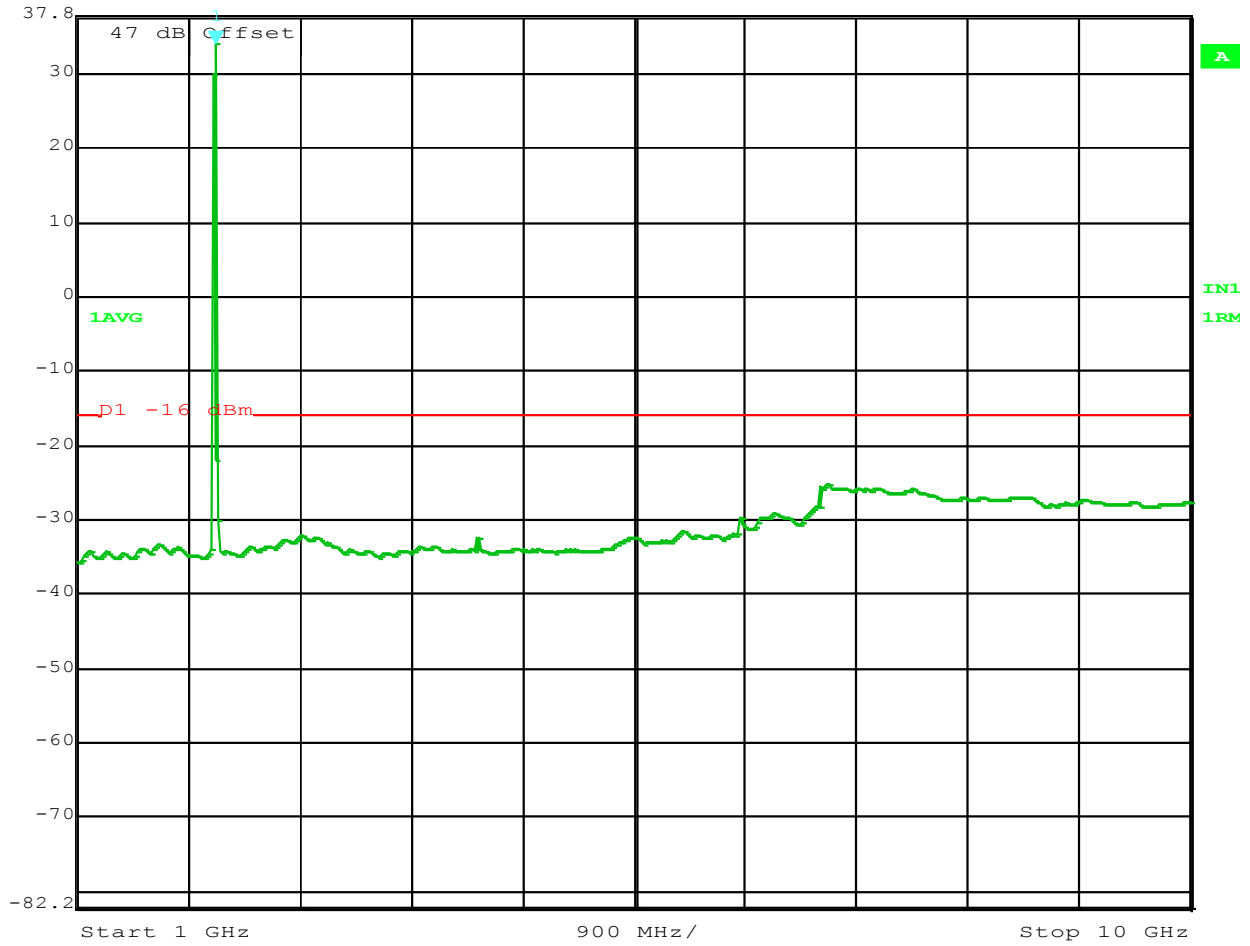
Marker 1 [T1] RBW 100 kHz RF Att 20 dB
Ref Lvl -48.29 dBm VBW 300 kHz
37.8 dBm 944.44889780 MHz SWT 250 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2110-2130 MHz (A+B)
PWR: 5W; 2X2MIMO; 16QAM; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 20.AUG.2014 13:52:57



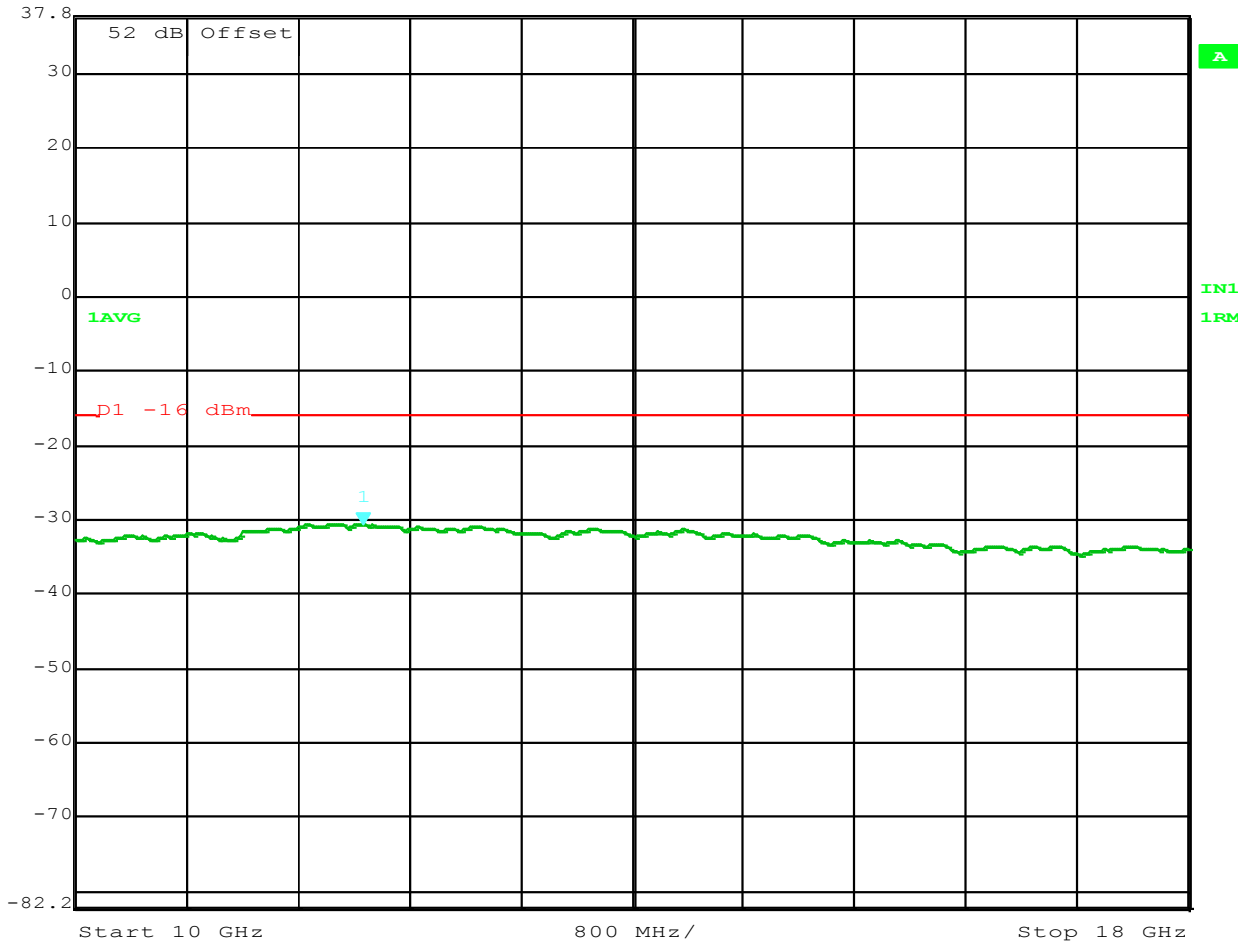
Marker 1 [T1] RBW 1 MHz RF Att 10 dB
Ref Lvl 33.91 dBm VBW 3 MHz
37.8 dBm 2.11823647 GHz SWT 90 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2110-2130 MHz (A+B)
PWR: 5W; 2X2MIMO; 16QAM; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 20.AUG.2014 14:00:45



	Marker 1 [T1]	RBW	1 MHz	RF Att	0 dB
Ref Lvl	-30.63 dBm	VBW	3 MHz		
37.8 dBm	12.06813627 GHz	SWT	80 ms	Unit	dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE

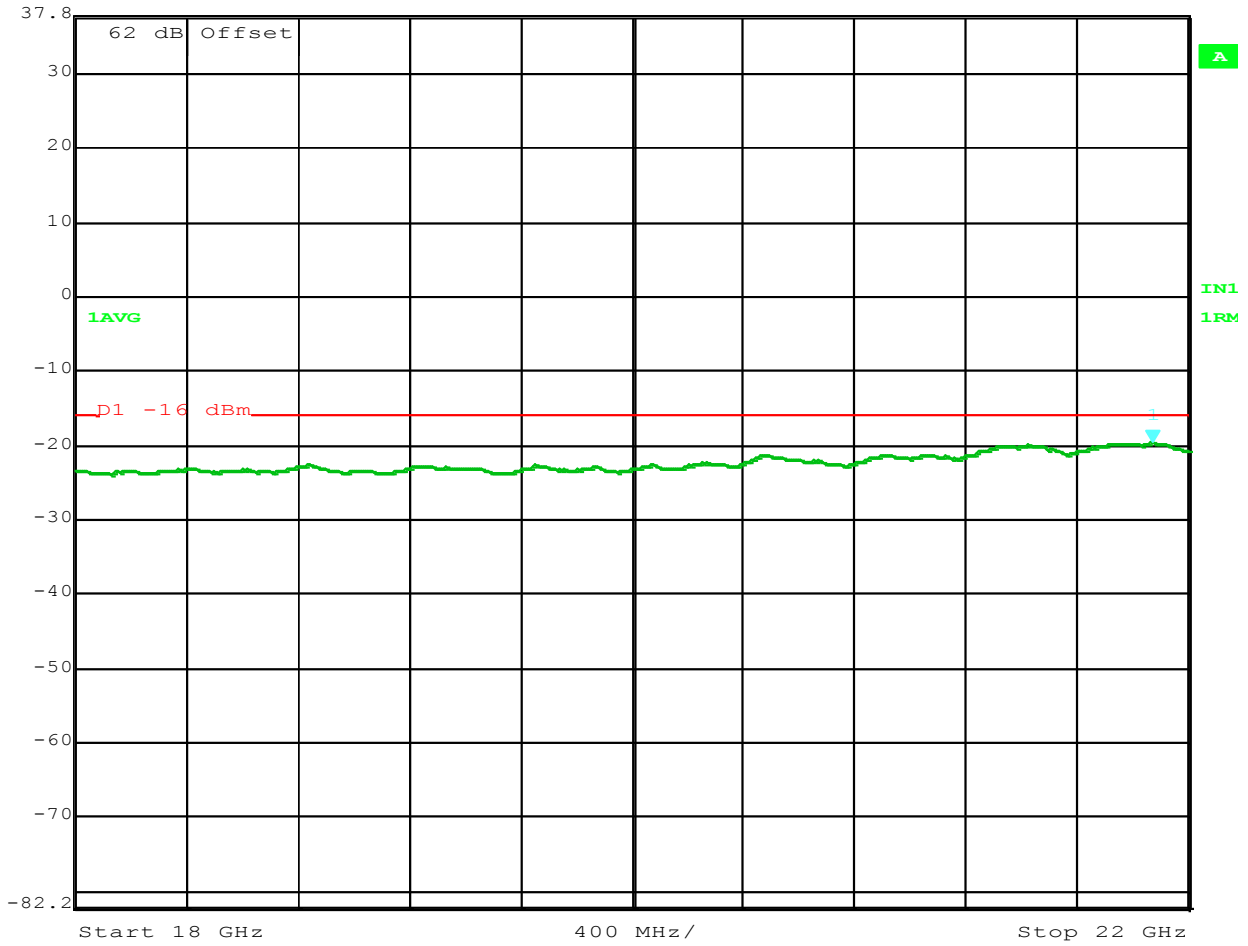
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2110-2130 MHz (A+B)

PWR: 5W; 2X2MIMO; 16QAM; FCC PRT 27; FCCID:AS5BBTRX-17

Date: 20.AUG.2014 13:58:51



Marker 1 [T1] RBW 1 MHz RF Att 0 dB
Ref Lvl -19.71 dBm VBW 3 MHz
37.8 dBm 21.87174349 GHz SWT 40 ms Unit dBm



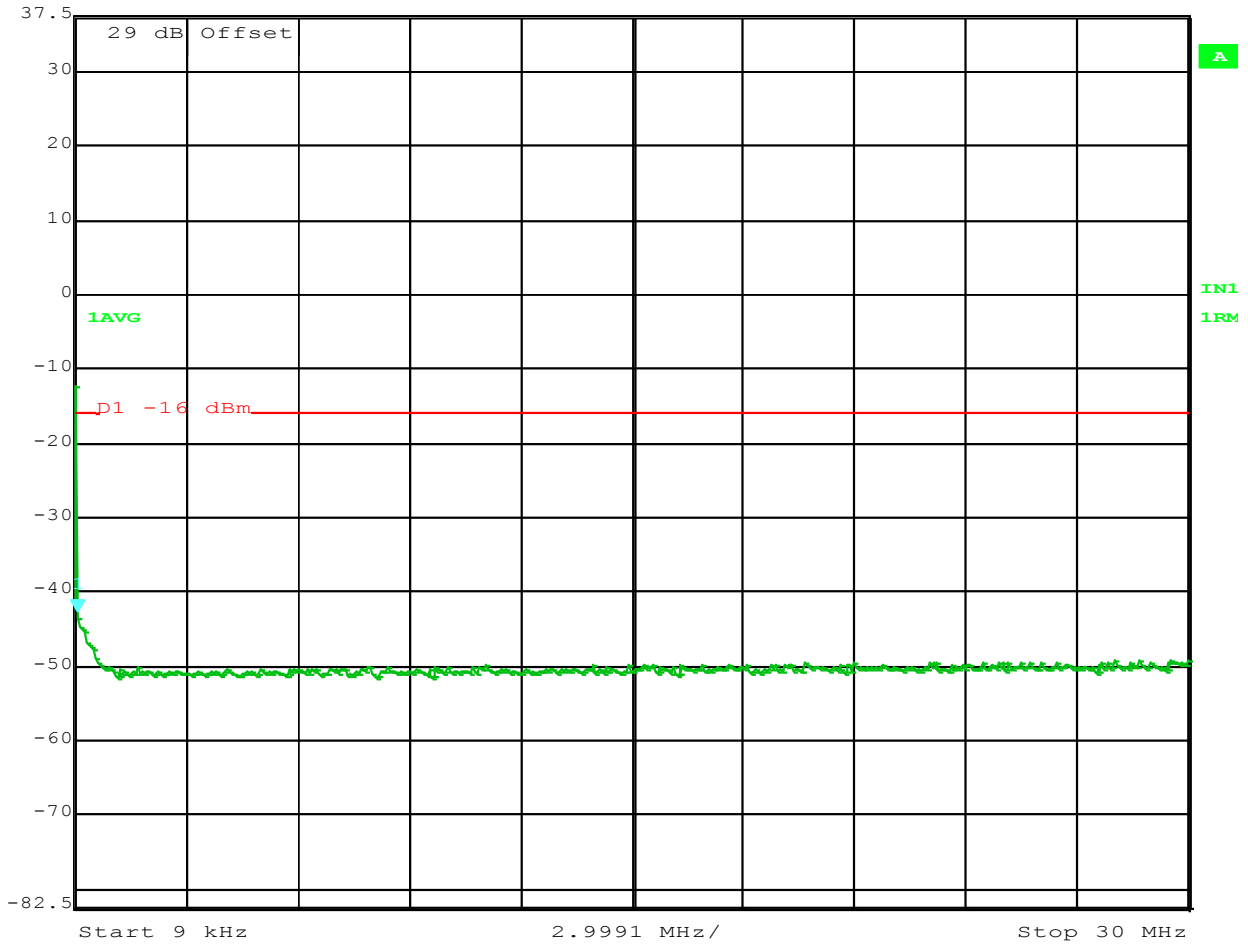
Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2110-2130 MHz (A+B)
PWR: 5W; 2X2MIMO; 16QAM; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 20.AUG.2014 14:02:08

**Transmit Port
Antenna Conducted Spurious Emissions**

**Block: A+B
20 MHz Bandwidth (2110 - 2130 MHz)
2x5 watts (MIMO)
64QAM Modulation**



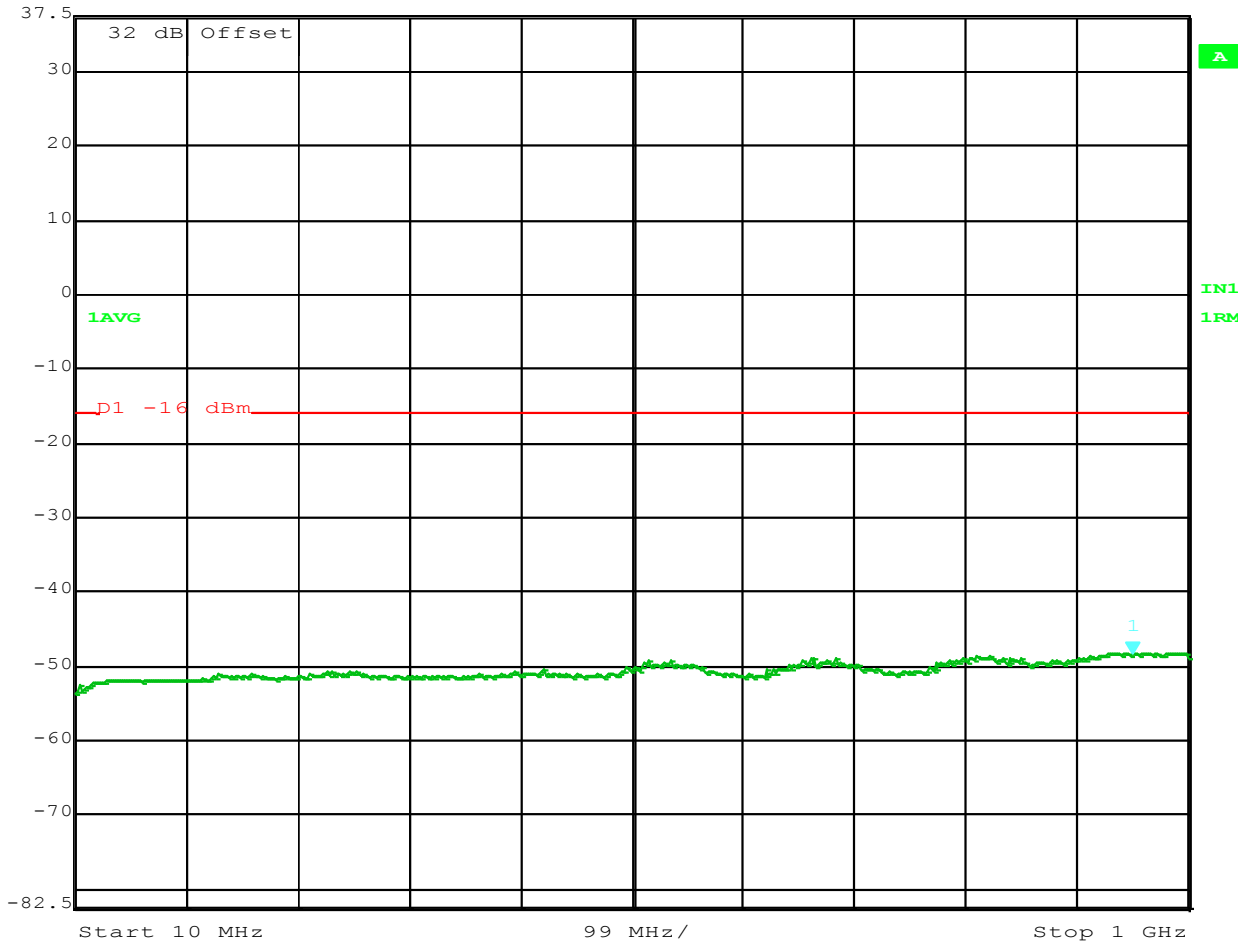
Marker 1 [T1] RBW 10 kHz RF Att 40 dB
Ref Lvl -42.71 dBm VBW 30 kHz
37.5 dBm 69.10220441 kHz SWT 760 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2110-2130 MHz (A+B)
PWR: 5W; 2X2MIMO; 64QAM; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 21.AUG.2014 08:16:50



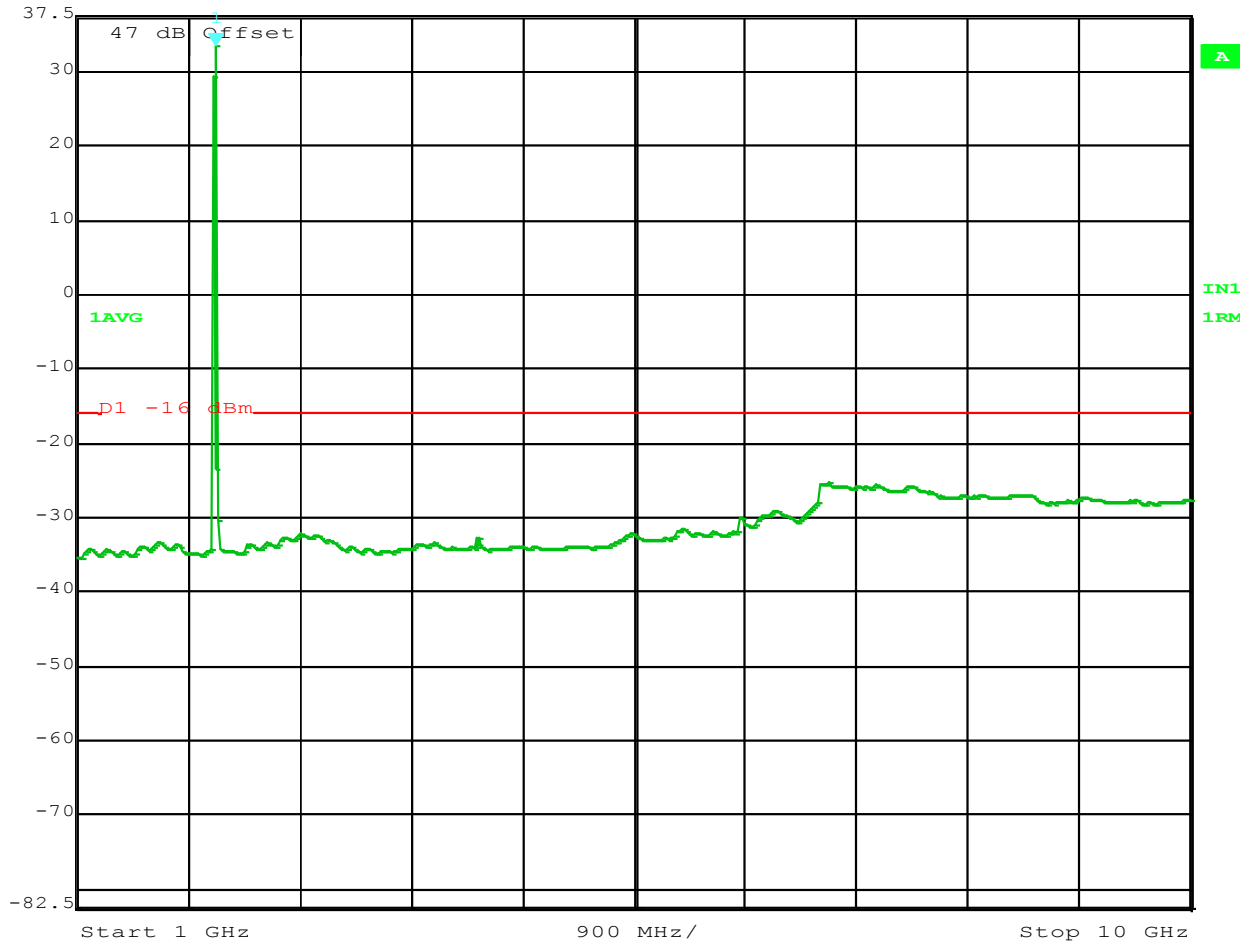
Marker 1 [T1] RBW 100 kHz RF Att 20 dB
Ref Lvl -48.52 dBm VBW 300 kHz
37.5 dBm 950.40080160 MHz SWT 250 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2110-2130 MHz (A+B)
PWR: 5W; 2X2MIMO; 64QAM; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 21.AUG.2014 08:18:44



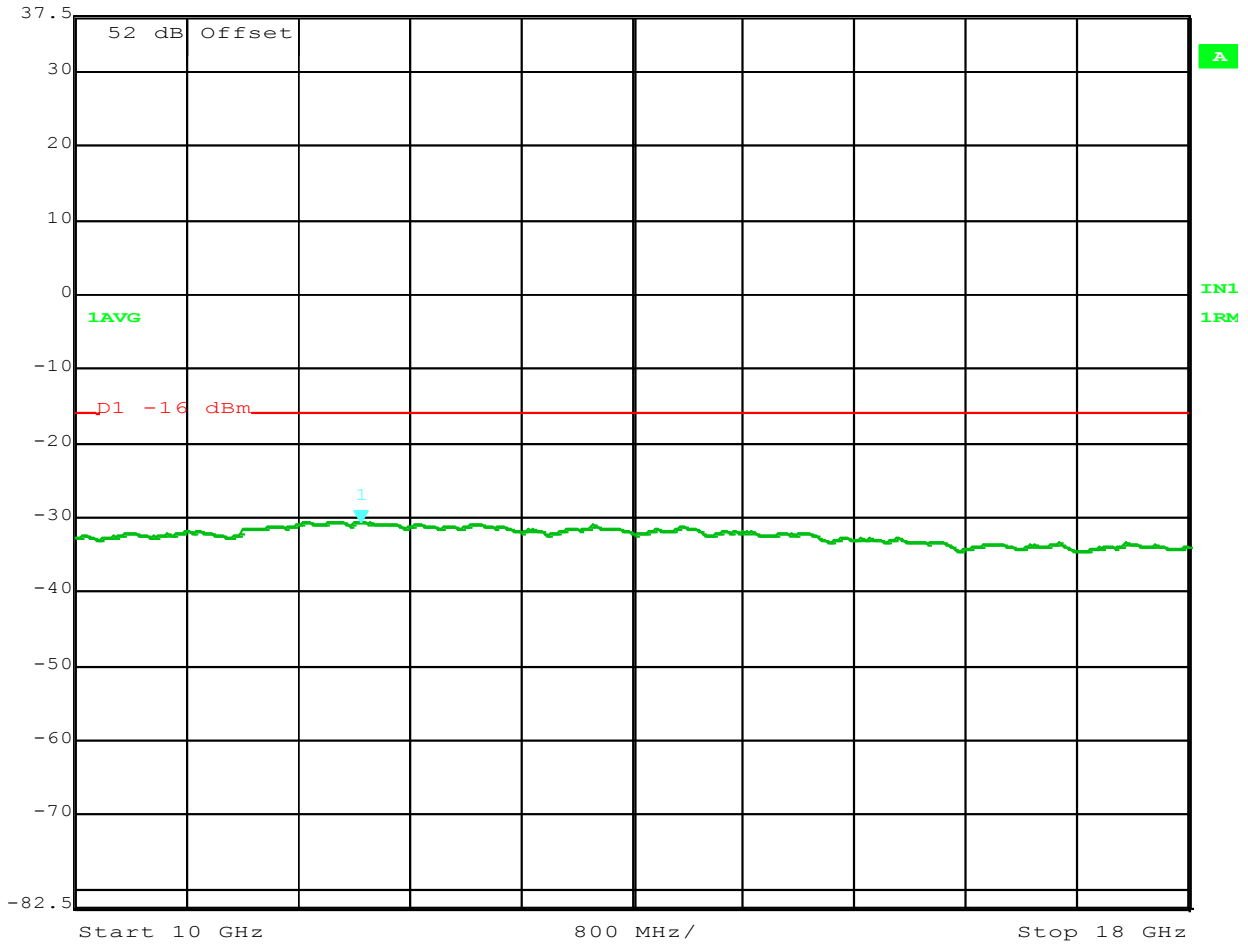
Marker 1 [T1] RBW 1 MHz RF Att 10 dB
Ref Lvl 33.52 dBm VBW 3 MHz
37.5 dBm 2.11823647 GHz SWT 90 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2110-2130 MHz (A+B)
PWR: 5W; 2X2MIMO; 64QAM; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 21.AUG.2014 08:20:42



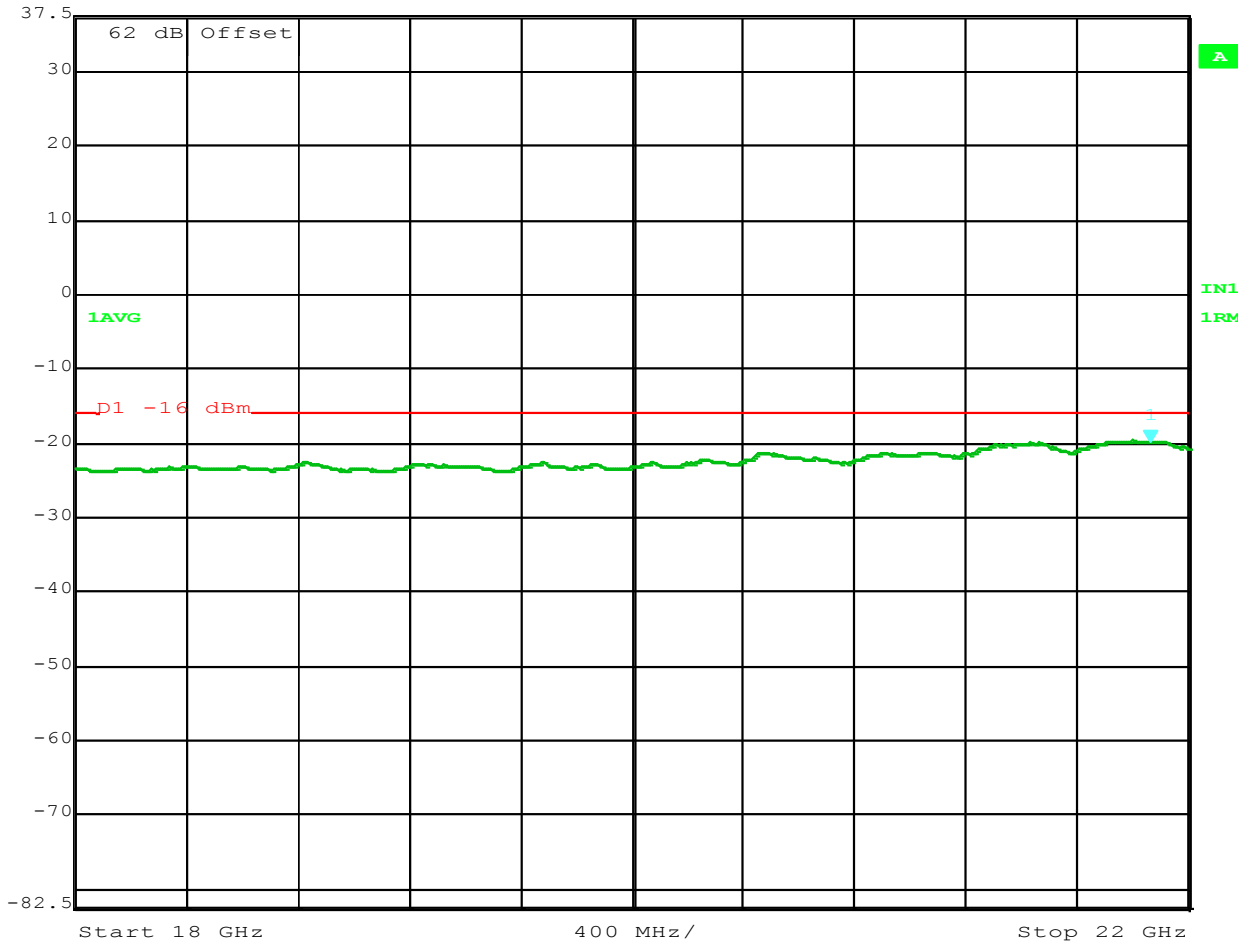
Marker 1 [T1] RBW 1 MHz RF Att 0 dB
Ref Lvl -30.63 dBm VBW 3 MHz
37.5 dBm 12.05210421 GHz SWT 80 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2110-2130 MHz (A+B)
PWR: 5W; 2X2MIMO; 64QAM; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 21.AUG.2014 08:22:04



Marker 1 [T1] RBW 1 MHz RF Att 0 dB
Ref Lvl -19.82 dBm VBW 3 MHz
37.5 dBm 21.86372745 GHz SWT 40 ms Unit dBm



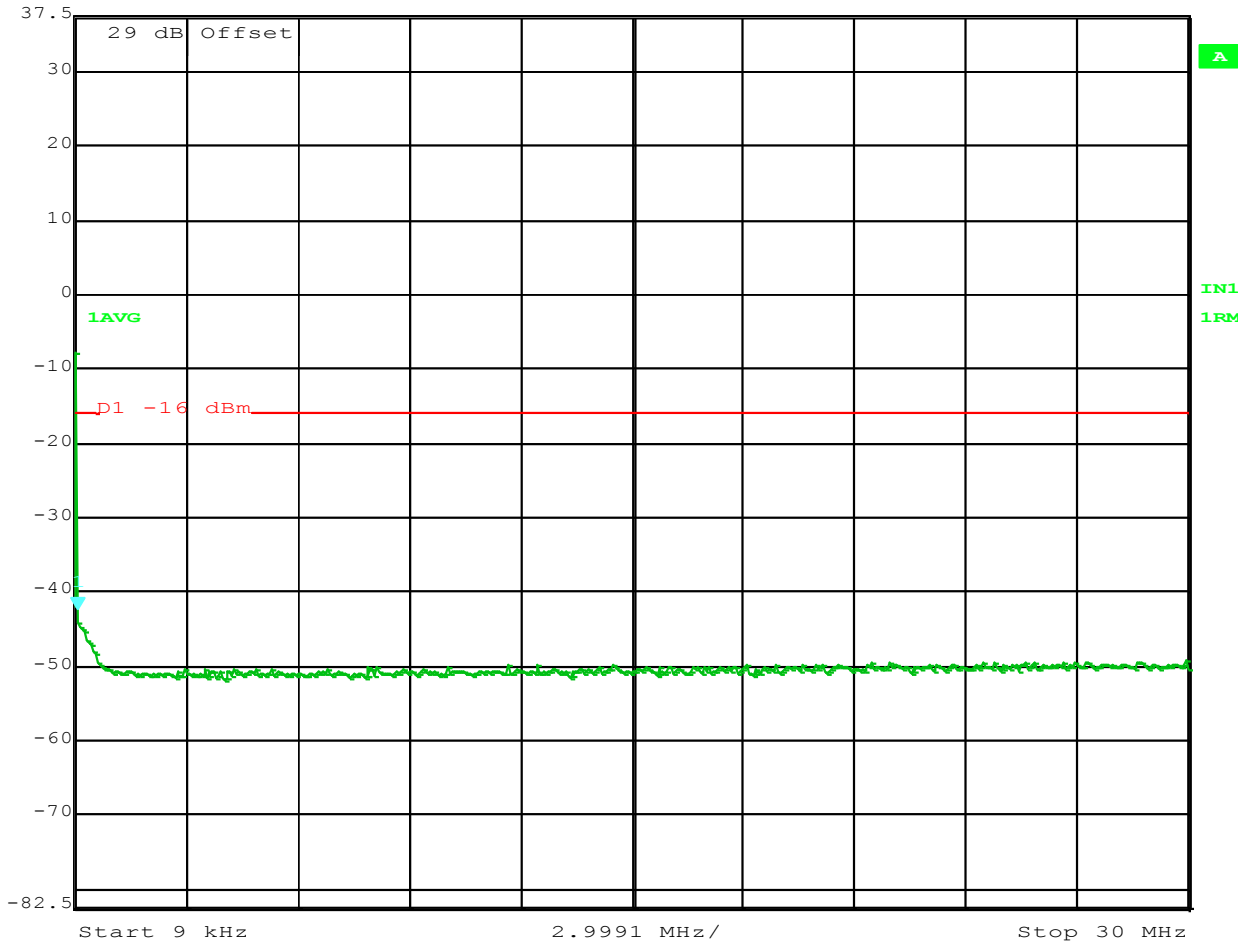
Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2110-2130 MHz (A+B)
PWR: 5W; 2X2MIMO; 64QAM; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 21.AUG.2014 08:23:29

**Transmit Port
Antenna Conducted Spurious Emissions**

**Block: B2+C+D+E
20 MHz Bandwidth (2125 - 2145 MHz)
2x5 watts (MIMO)
QPSK Modulation**



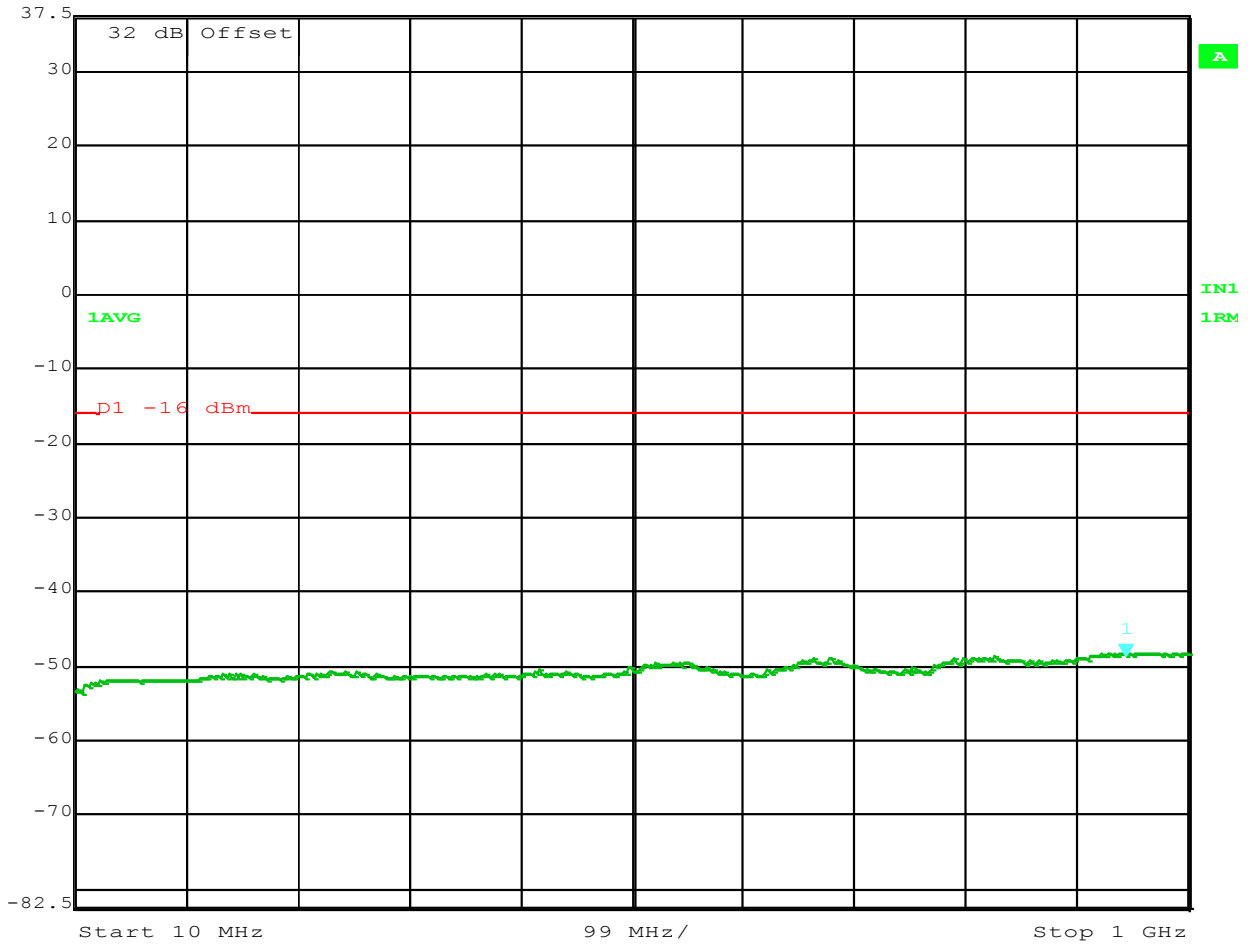
Marker 1 [T1] RBW 10 kHz RF Att 40 dB
Ref Lvl -42.44 dBm VBW 30 kHz
37.5 dBm 69.10220441 kHz SWT 760 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2125-2145 MHZ (B2+C+D+E)
PWR: 5W; 2X2MIMO; QPSK; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 20.AUG.2014 08:20:40



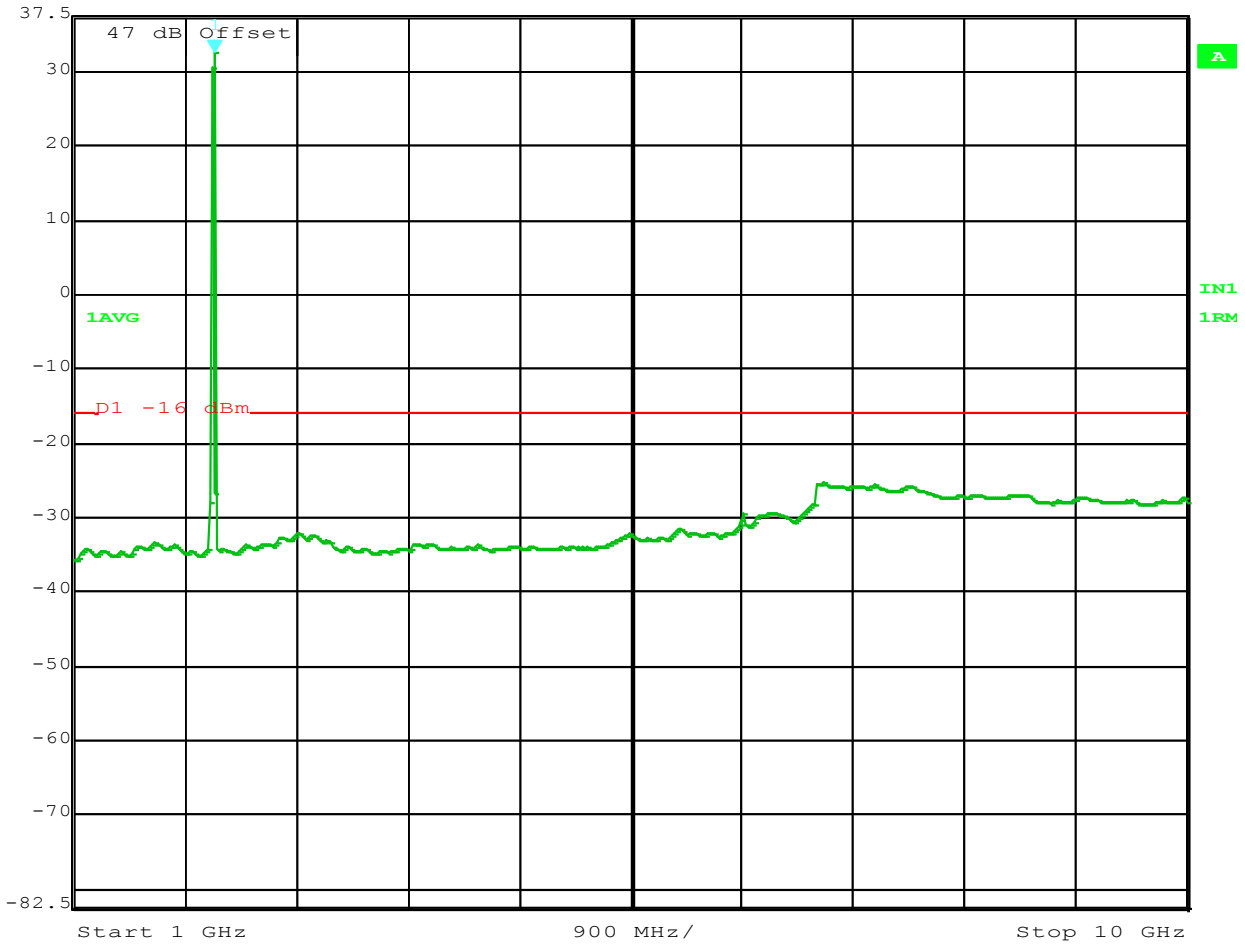
Marker 1 [T1] RBW 100 kHz RF Att 20 dB
Ref Lvl -48.64 dBm VBW 300 kHz
37.5 dBm 944.44889780 MHz SWT 250 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2125-2145 MHz (B2+C+D+E)
PWR: 5W; 2X2MIMO; QPSK; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 20.AUG.2014 08:47:46



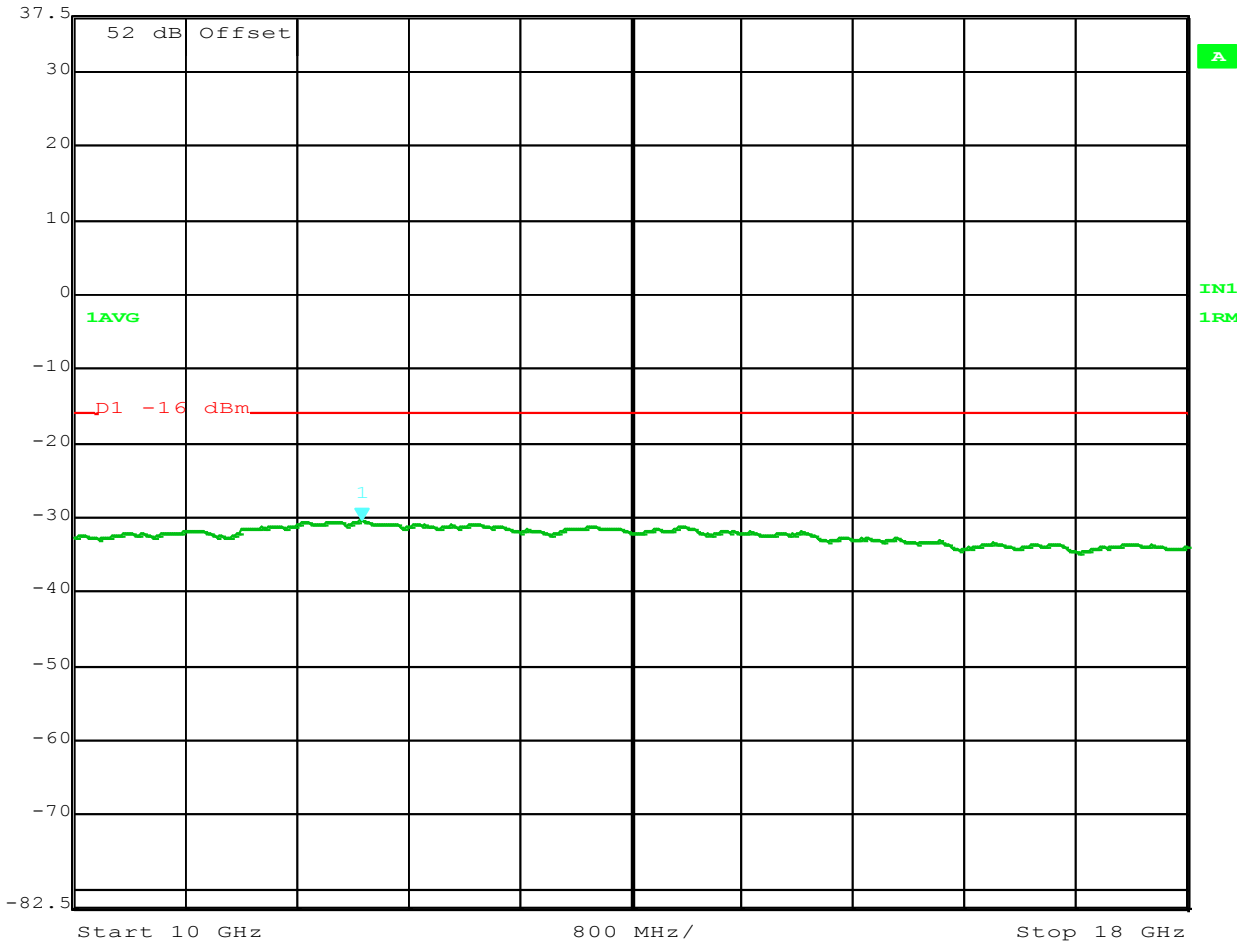
Marker 1 [T1] RBW 1 MHz RF Att 10 dB
Ref Lvl 32.58 dBm VBW 3 MHz
37.5 dBm 2.13627255 GHz SWT 90 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2125-2145 MHz (B2+C+D+E)
PWR: 5W; 2X2MIMO; QPSK; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 19.AUG.2014 15:26:02



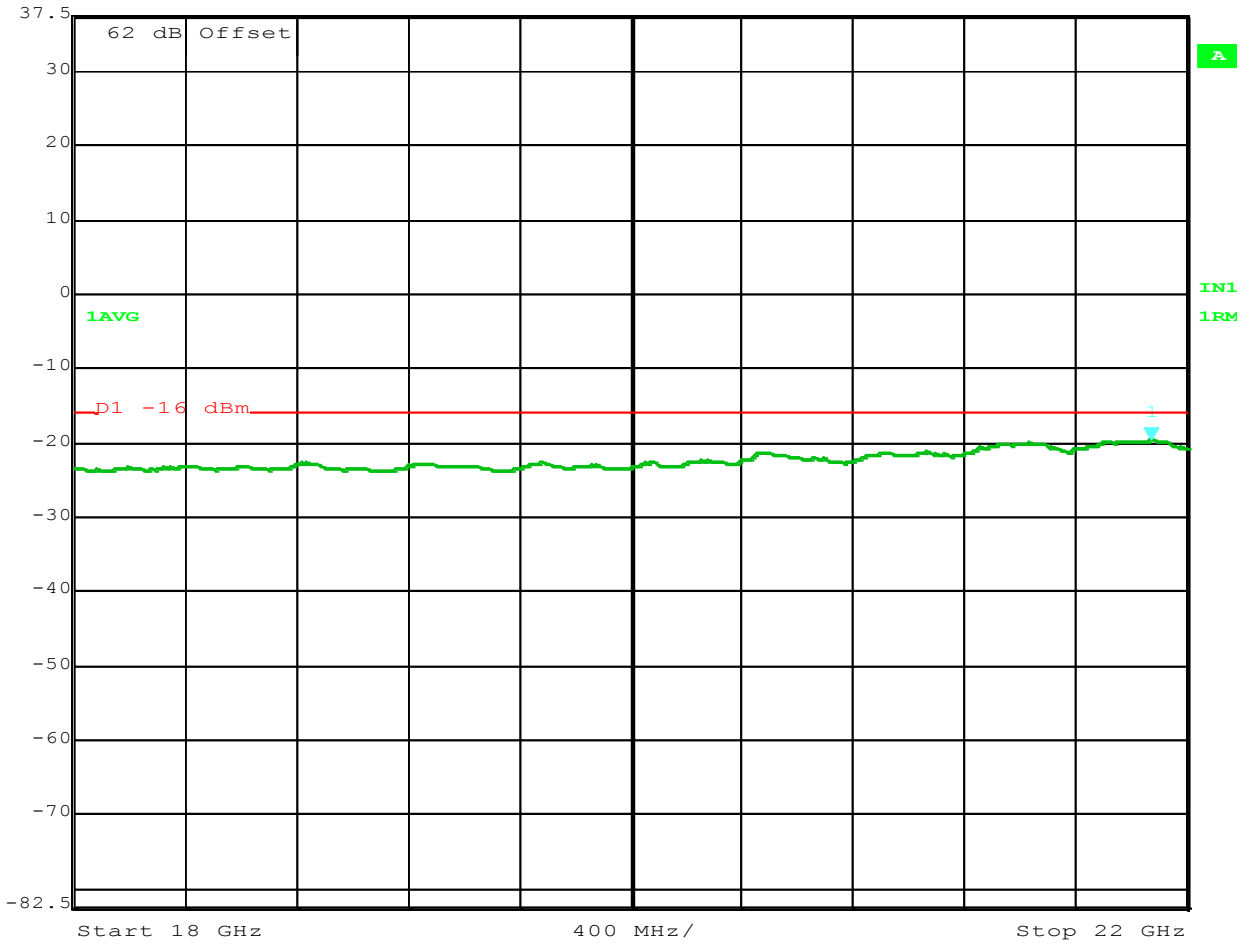
Marker 1 [T1] RBW 1 MHz RF Att 0 dB
Ref Lvl -30.55 dBm VBW 3 MHz
37.5 dBm 12.06813627 GHz SWT 80 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2125-2145 MHZ (B2+C+D+E)
PWR: 5W; 2X2MIMO; QPSK; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 19.AUG.2014 15:27:27



Marker 1 [T1] RBW 1 MHz RF Att 0 dB
 Ref Lvl -19.74 dBm VBW 3 MHz
 37.5 dBm 21.87174349 GHz SWT 40 ms Unit dBm



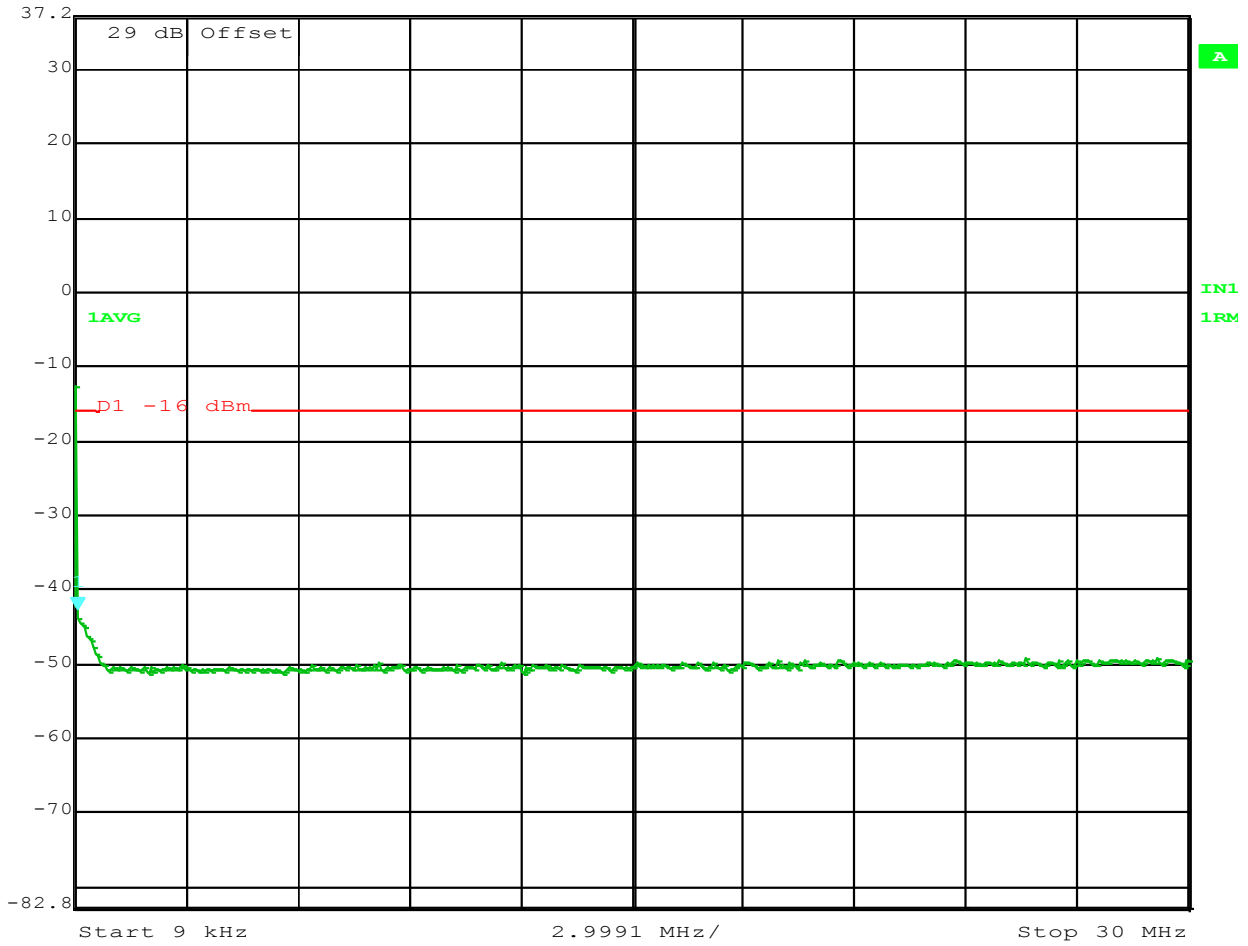
Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
 Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2125-2145 MHz (B2+C+D+E)
 PWR: 5W; 2X2MIMO; QPSK; FCC PRT 27; FCCID:AS5BBTRX-17
 Date: 19.AUG.2014 15:34:10

**Transmit Port
Antenna Conducted Spurious Emissions**

**Block: B2+C+D+E
20 MHz Bandwidth (2125 - 2145 MHz)
2x5 watts (MIMO)
16QAM Modulation**



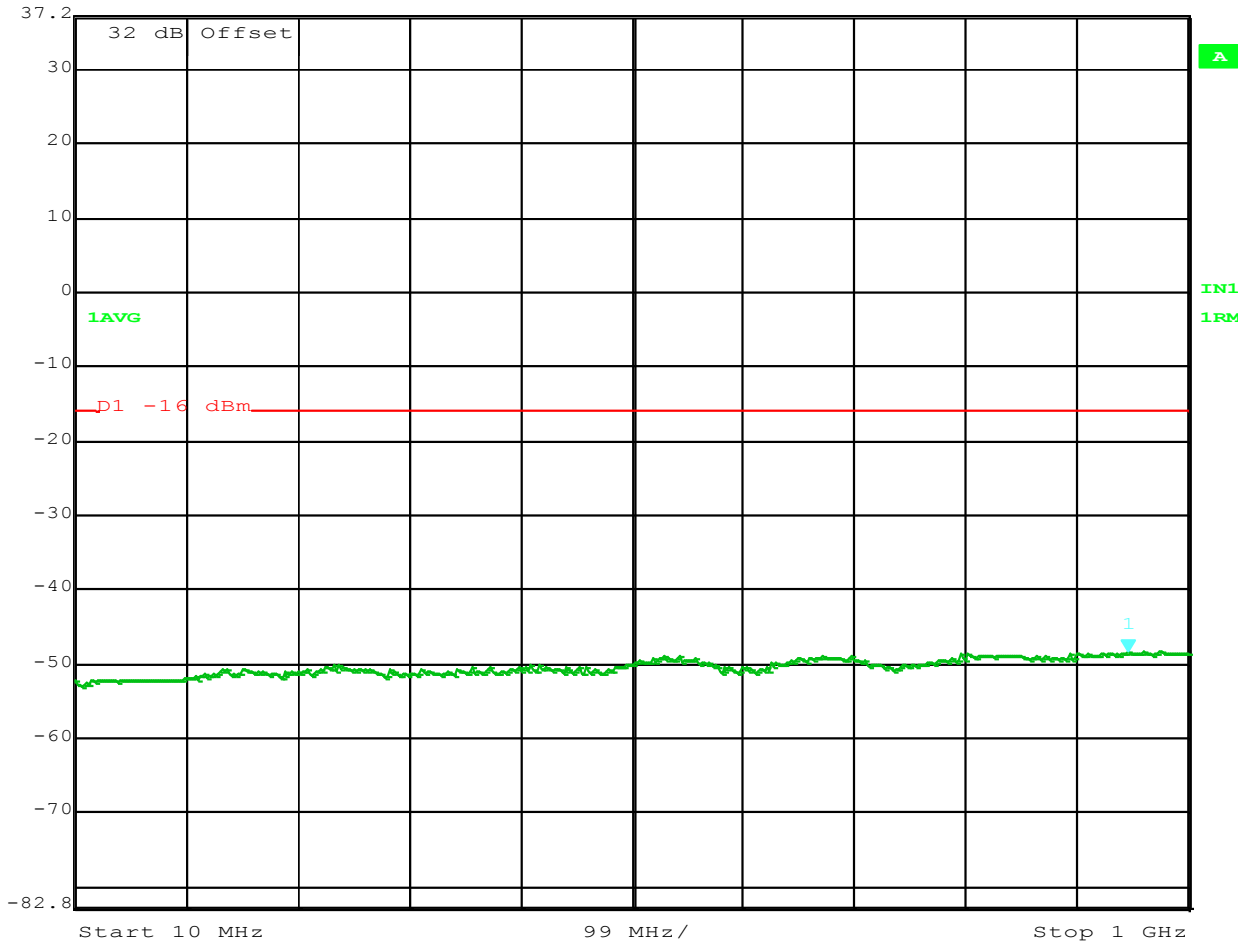
Marker 1 [T1] RBW 10 kHz RF Att 40 dB
Ref Lvl -42.61 dBm VBW 30 kHz
37.2 dBm 69.10220441 kHz SWT 760 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2125-2145 MHZ (B2+C+D+E)
PWR: 5W; 2X2MIMO; 16QAM; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 20.AUG.2014 10:16:24



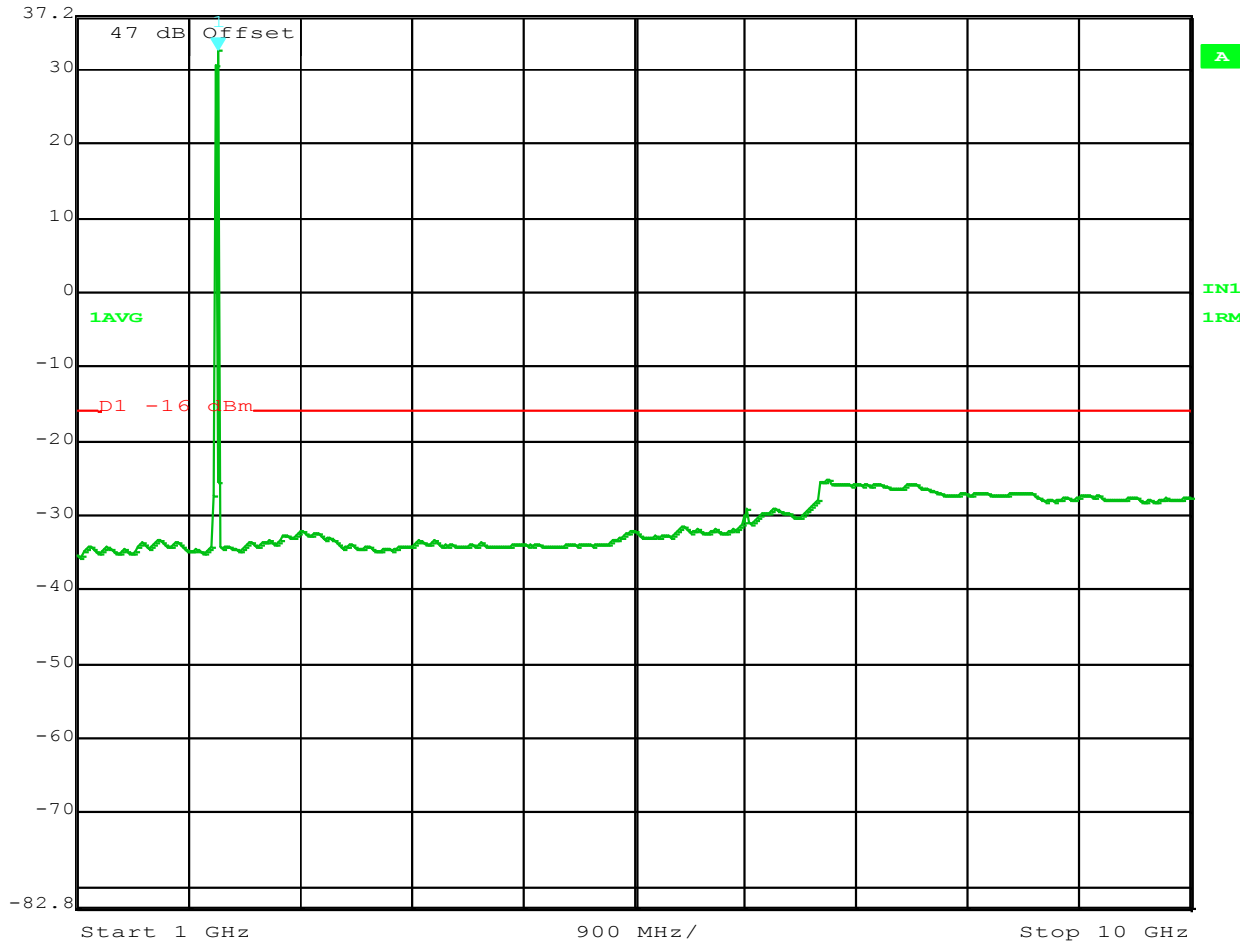
Marker 1 [T1] RBW 100 kHz RF Att 20 dB
Ref Lvl -48.58 dBm VBW 300 kHz
37.2 dBm 946.43286573 MHz SWT 250 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2125-2145 MHz (B2+C+D+E)
PWR: 5W; 2X2MIMO; 16QAM; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 20.AUG.2014 10:17:40



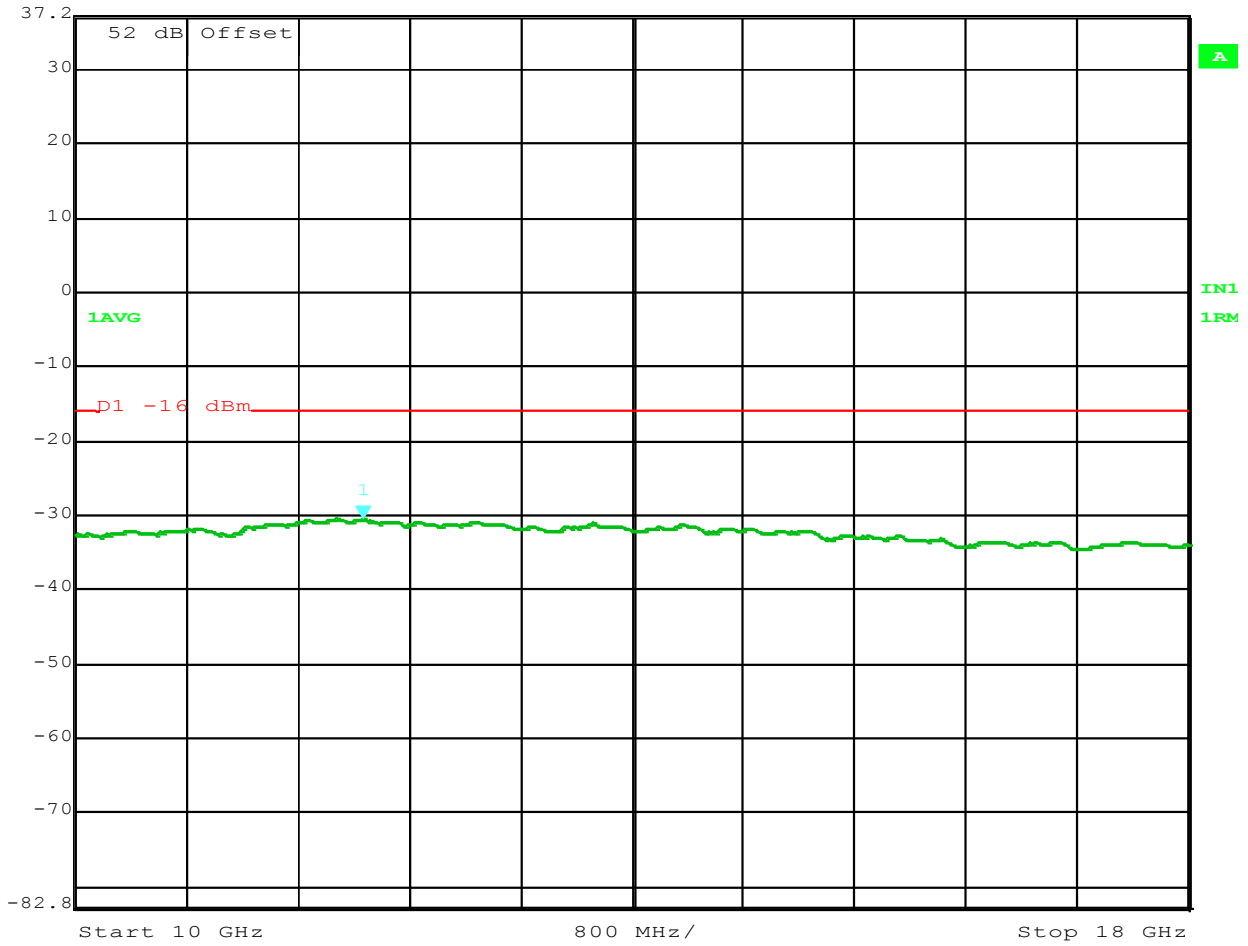
Marker 1 [T1] RBW 1 MHz RF Att 10 dB
Ref Lvl 32.55 dBm VBW 3 MHz
37.2 dBm 2.13627255 GHz SWT 90 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2125-2145 MHZ (B2+C+D+E)
PWR: 5W; 2X2MIMO; 16QAM; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 20.AUG.2014 10:23:20



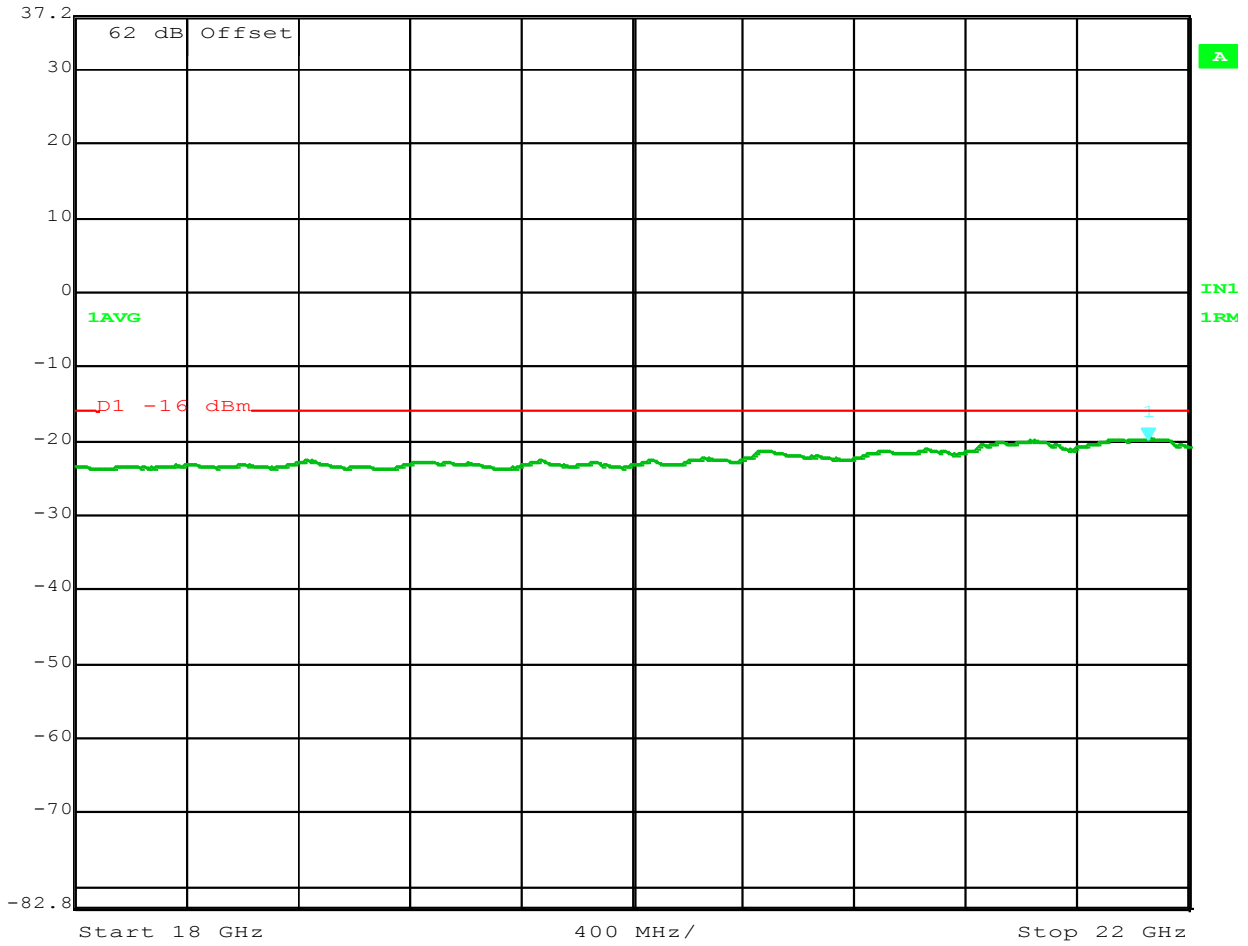
Marker 1 [T1] RBW 1 MHz RF Att 0 dB
 Ref Lvl -30.55 dBm VBW 3 MHz
 37.2 dBm 12.06813627 GHz SWT 80 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
 Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2125-2145 MHZ (B2+C+D+E)
 PWR: 5W; 2X2MIMO; 16QAM; FCC PRT 27; FCCID:AS5BBTRX-17
 Date: 20.AUG.2014 10:25:03



Marker 1 [T1] RBW 1 MHz RF Att 0 dB
 Ref Lvl -19.85 dBm VBW 3 MHz
 37.2 dBm 21.85571142 GHz SWT 40 ms Unit dBm



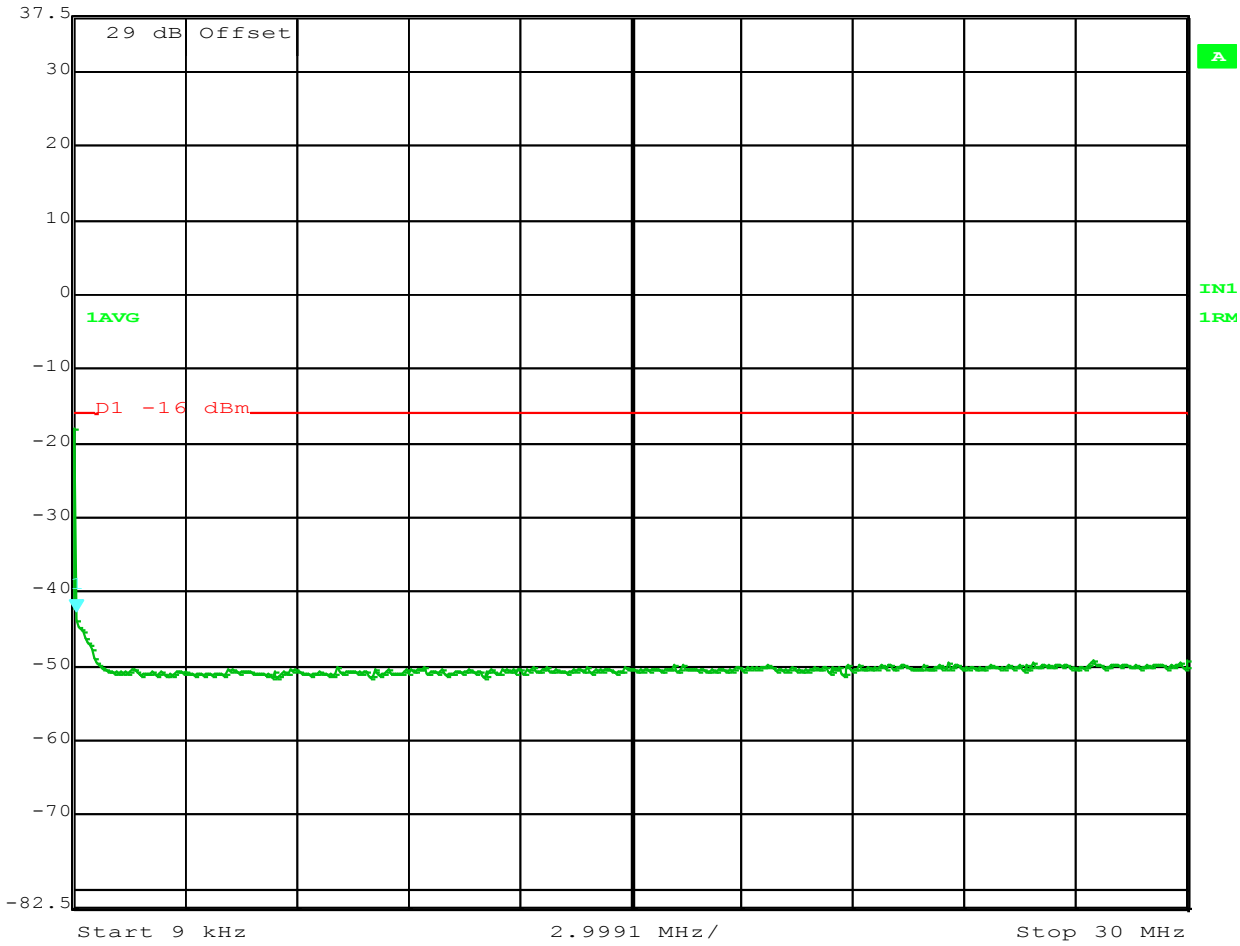
Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
 Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2125-2145 MHZ (B2+C+D+E)
 PWR: 5W; 2X2MIMO; 16QAM; FCC PRT 27; FCCID:AS5BBTRX-17
 Date: 20.AUG.2014 10:26:37

**Transmit Port
Antenna Conducted Spurious Emissions**

**Block: B2+C+D+E
20 MHz Bandwidth (2125 - 2145 MHz)
2x5 watts (MIMO)
64QAM Modulation**



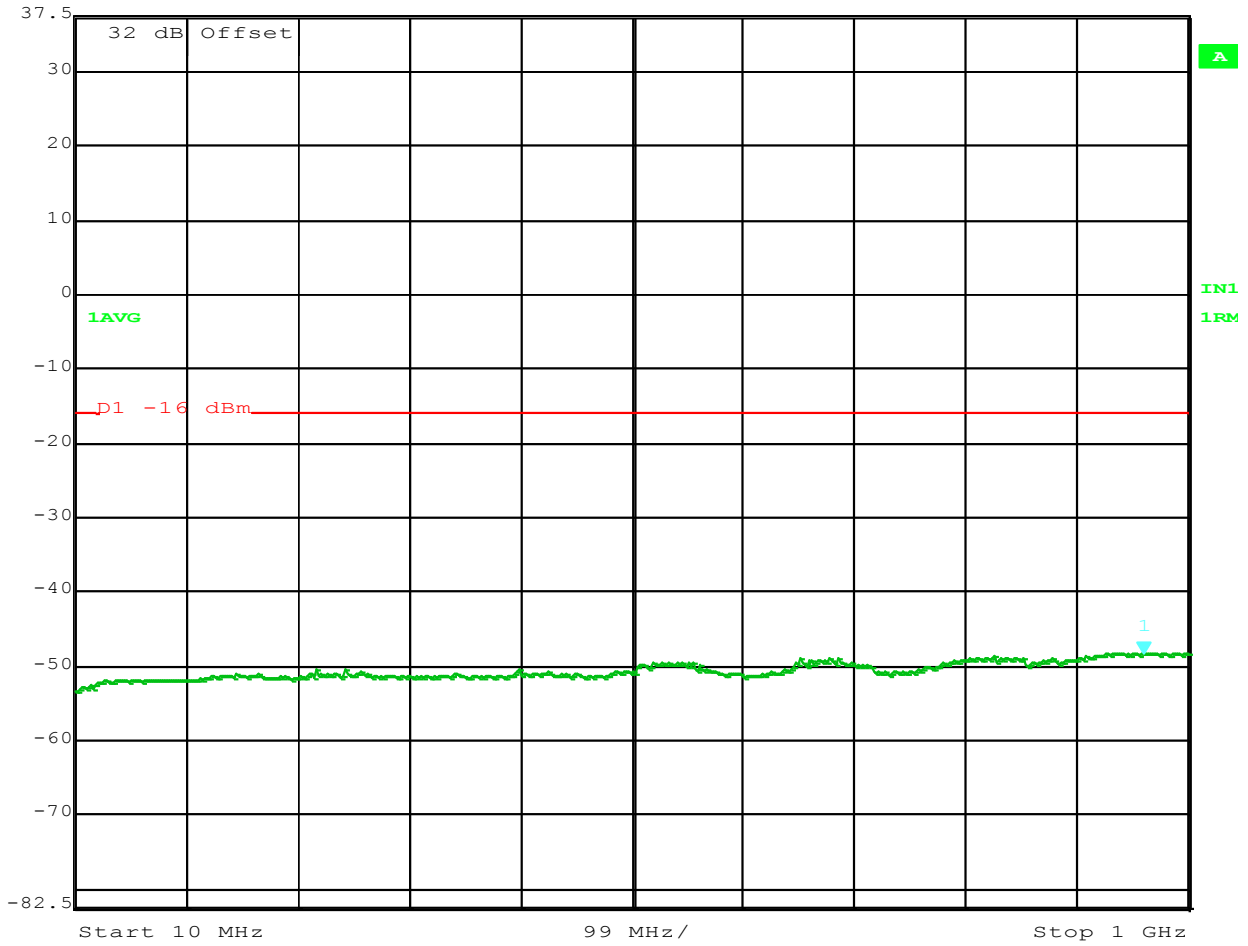
Marker 1 [T1] RBW 10 kHz RF Att 40 dB
Ref Lvl -42.83 dBm VBW 30 kHz
37.5 dBm 69.10220441 kHz SWT 760 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2125-2145 MHZ (B2+C+D+E)
PWR: 5W; 2X2MIMO; 64QAM; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 19.AUG.2014 11:40:31



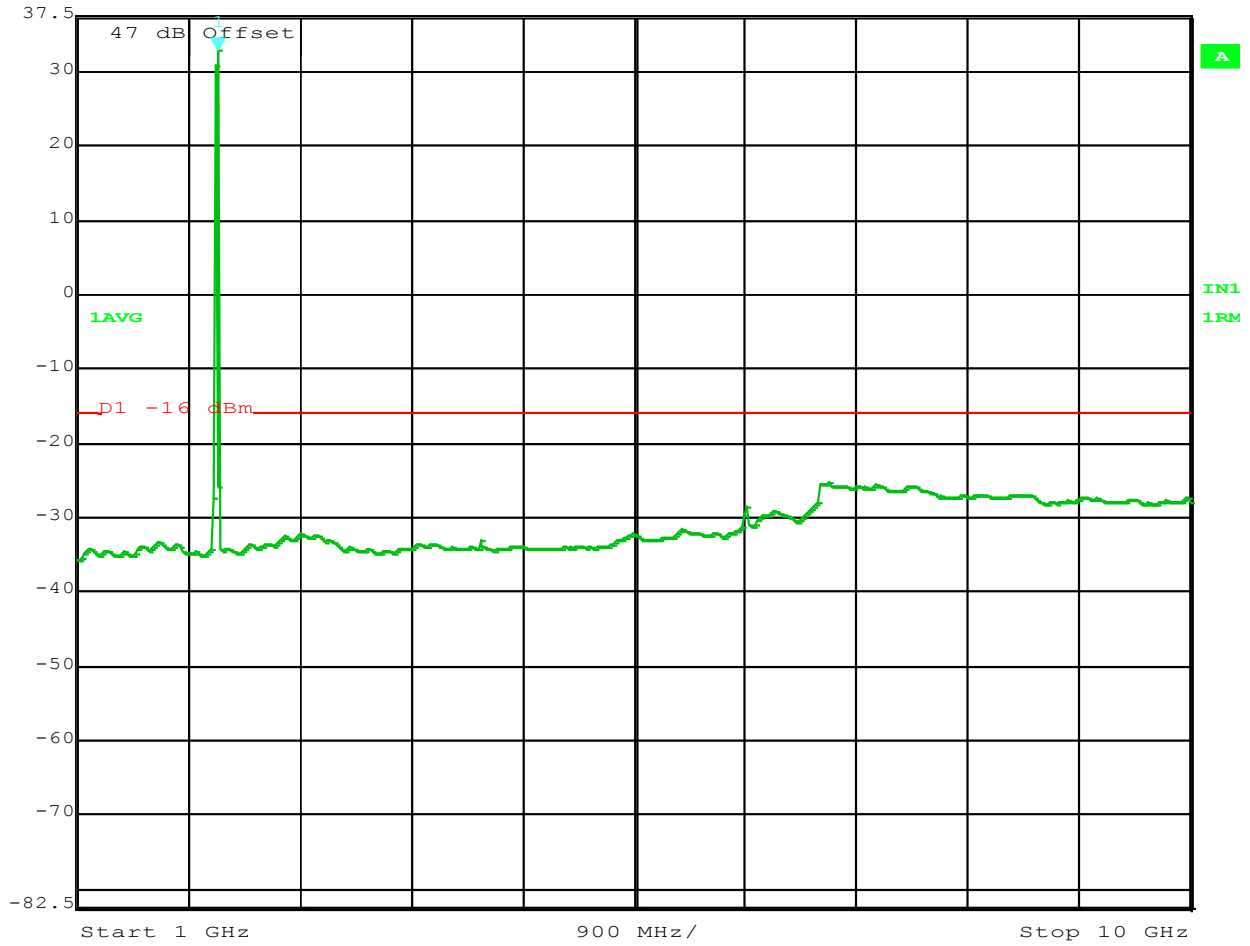
Marker 1 [T1] RBW 100 kHz RF Att 20 dB
 Ref Lvl -48.54 dBm VBW 300 kHz
 37.5 dBm 960.32064128 MHz SWT 250 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
 Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2125-2145 MHz (B2+C+D+E)
 PWR: 5W; 2X2MIMO; 64QAM; FCC PRT 27; FCCID:AS5BBTRX-17
 Date: 19.AUG.2014 11:53:47



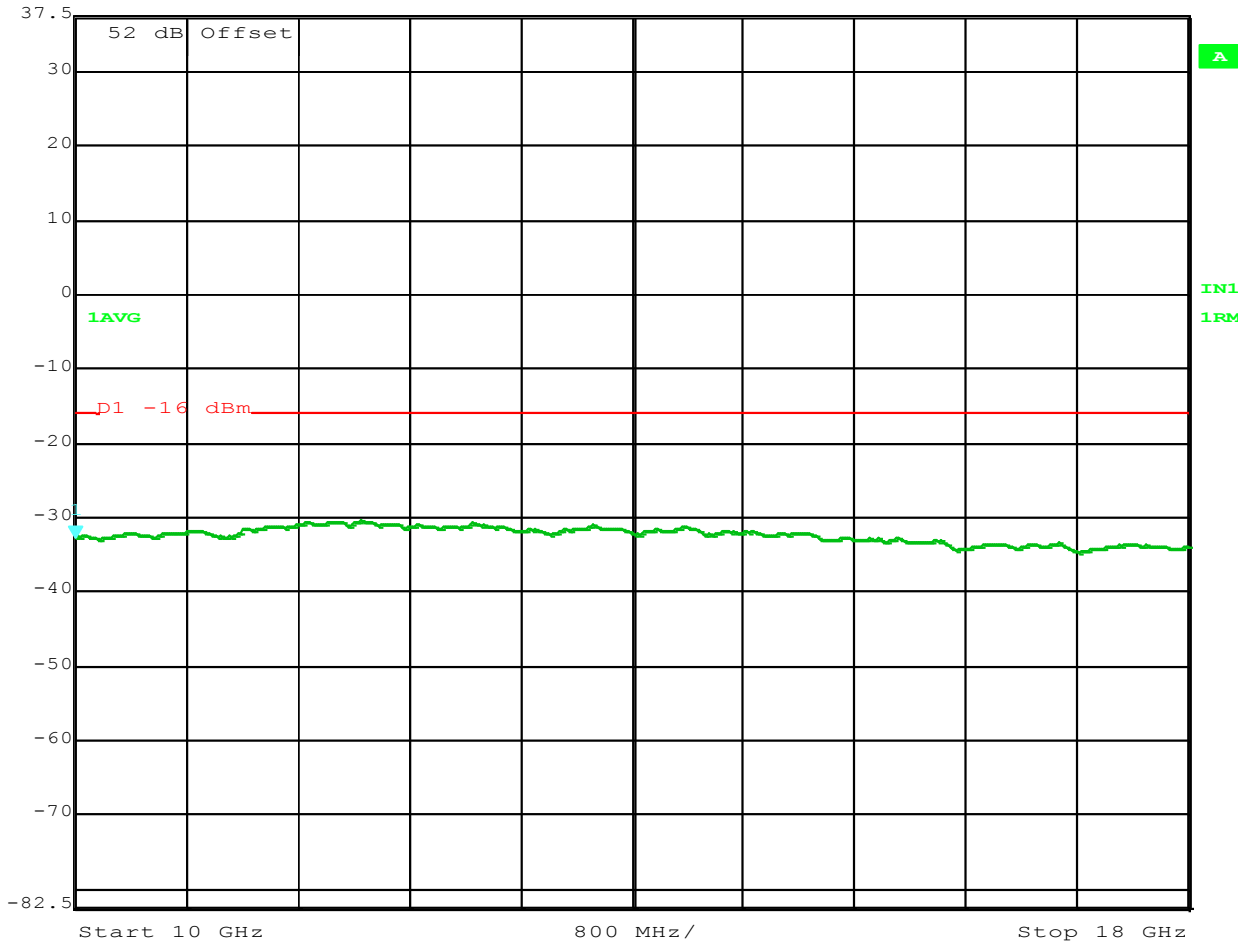
Ref Lvl	37.5 dBm	Marker 1 [T1]	32.94 dBm	RBW	1 MHz	RF Att	10 dB
			2.13627255 GHz	VBW	3 MHz		
				SWT	90 ms	Unit	dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2125-2145 MHZ (B2+C+D+E)
PWR: 5W; 2X2MIMO; 64QAM; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 19.AUG.2014 12:25:45



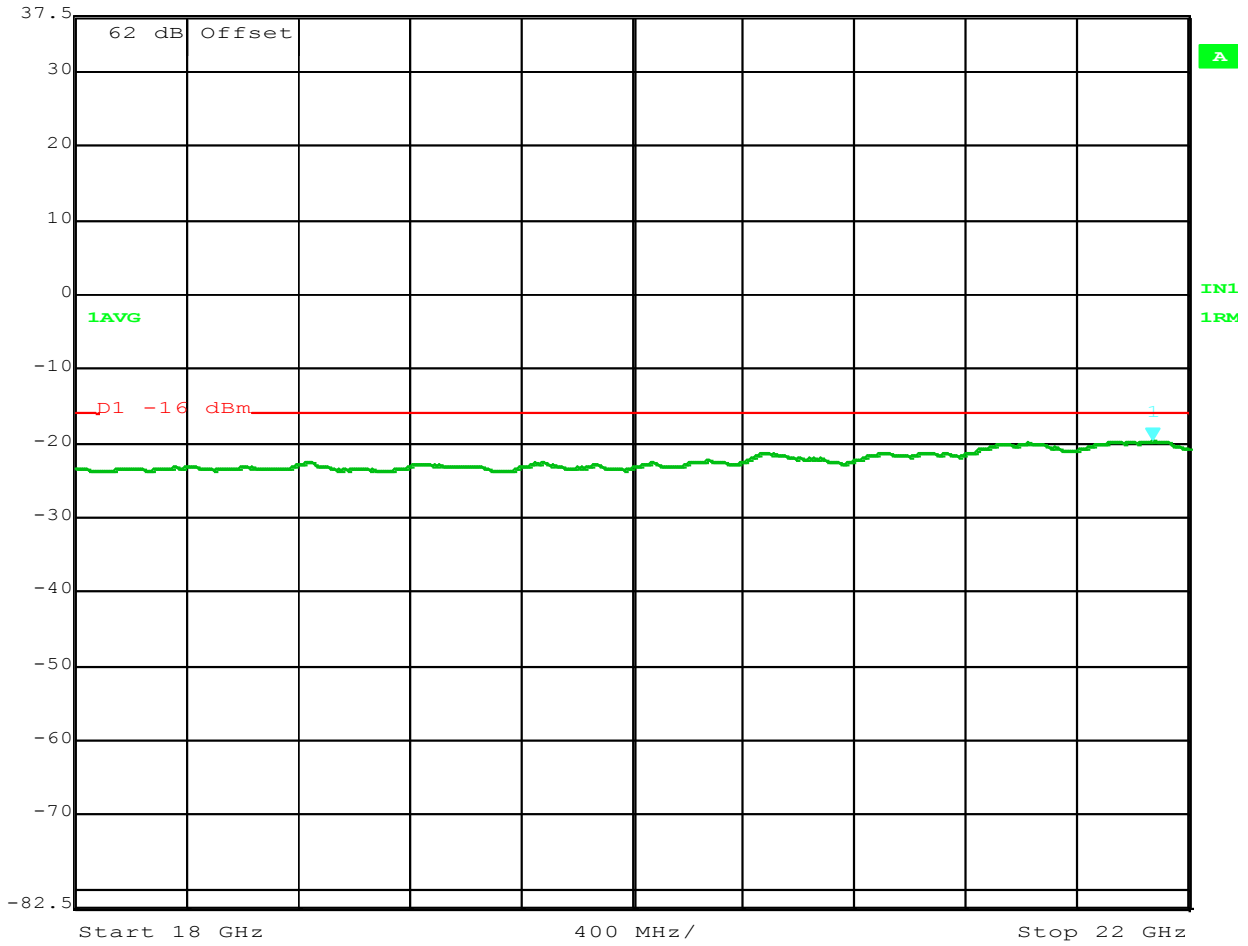
Marker 1 [T1] RBW 1 MHz RF Att 0 dB
 Ref Lvl -32.98 dBm VBW 3 MHz
 37.5 dBm 10.0000000 GHz SWT 80 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
 Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2125-2145 MHZ (B2+C+D+E)
 PWR: 5W; 2X2MIMO; 64QAM; FCC PRT 27; FCCID:AS5BBTRX-17
 Date: 19.AUG.2014 12:29:01



Marker 1 [T1] RBW 1 MHz RF Att 0 dB
 Ref Lvl -19.77 dBm VBW 3 MHz
 37.5 dBm 21.87174349 GHz SWT 40 ms Unit dBm



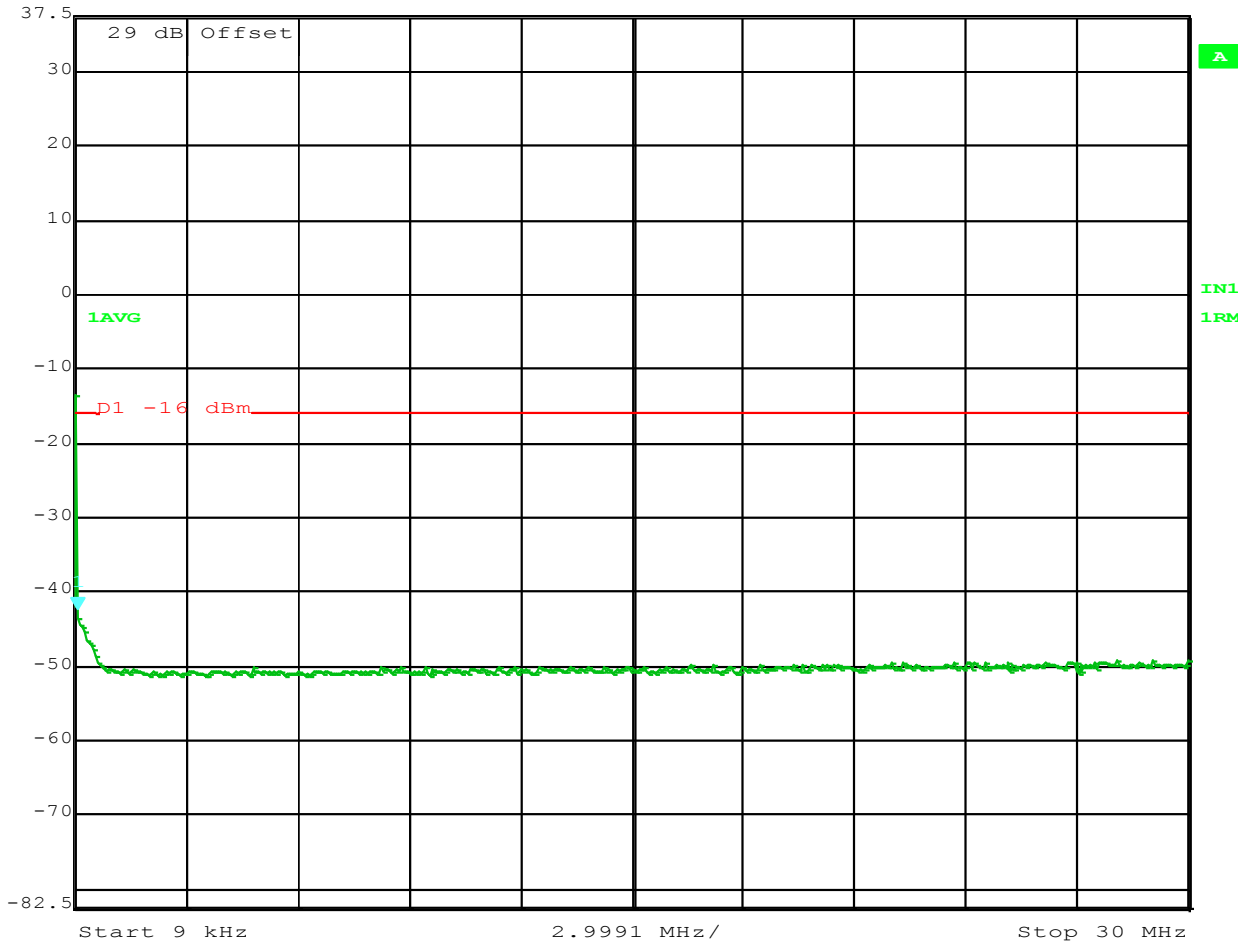
Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
 Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2125-2145 MHZ (B2+C+D+E)
 PWR: 5W; 2X2MIMO; 64QAM; FCC PRT 27; FCCID:AS5BBTRX-17
 Date: 20.AUG.2014 07:15:27

**Transmit Port
Antenna Conducted Spurious Emissions**

**Block: D+E+F
20 MHz Bandwidth (2135 - 2155 MHz)
2x5 watts (MIMO)
QPSK Modulation**



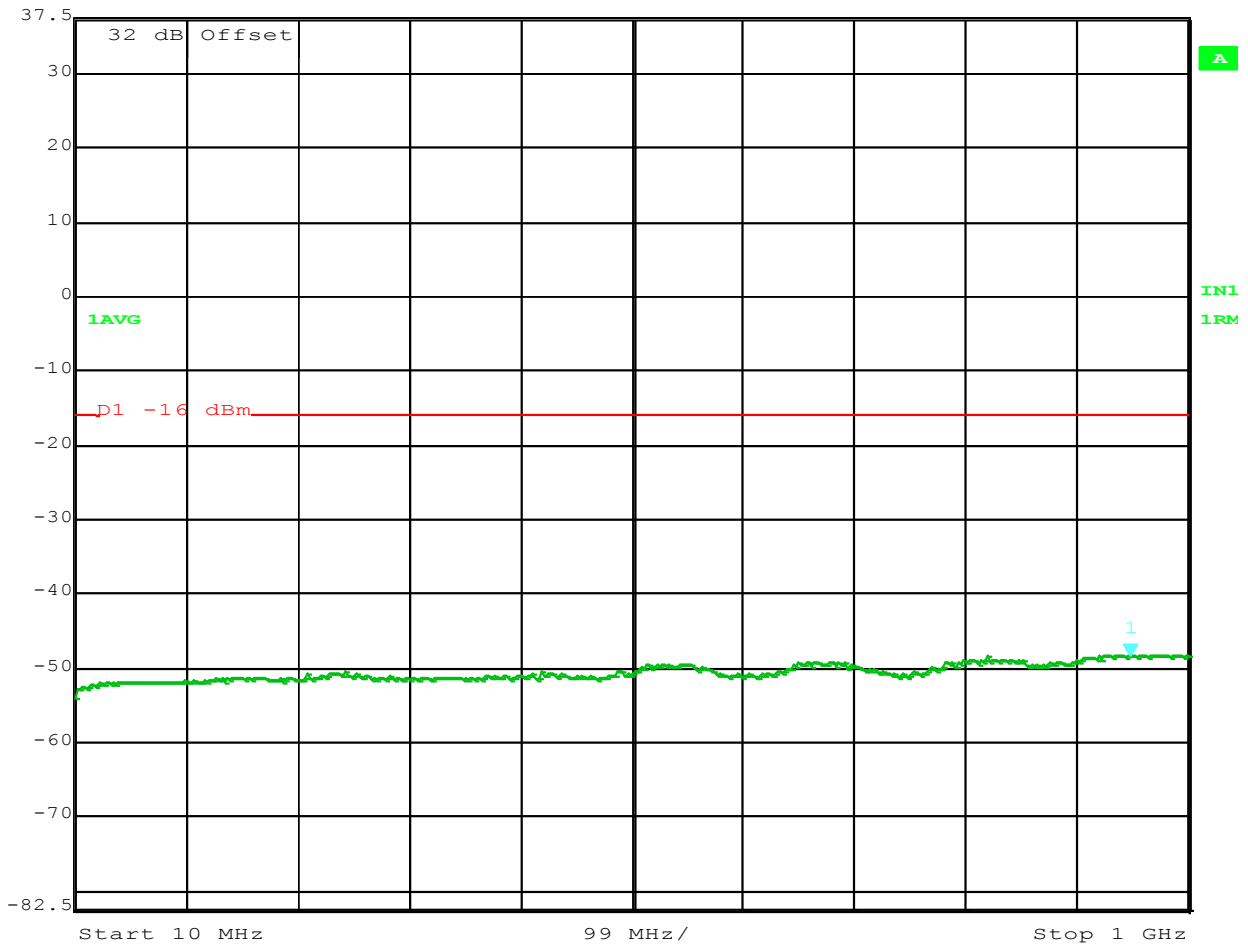
Marker 1 [T1] RBW 10 kHz RF Att 40 dB
 Ref Lvl -42.57 dBm VBW 30 kHz
 37.5 dBm 69.10220441 kHz SWT 760 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
 Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2135-2155 MHz (D+E+F)
 PWR: 5W; 2X2MIMO; QPSK; FCC PRT 27; FCCID:AS5BBTRX-17
 Date: 21.AUG.2014 11:08:56



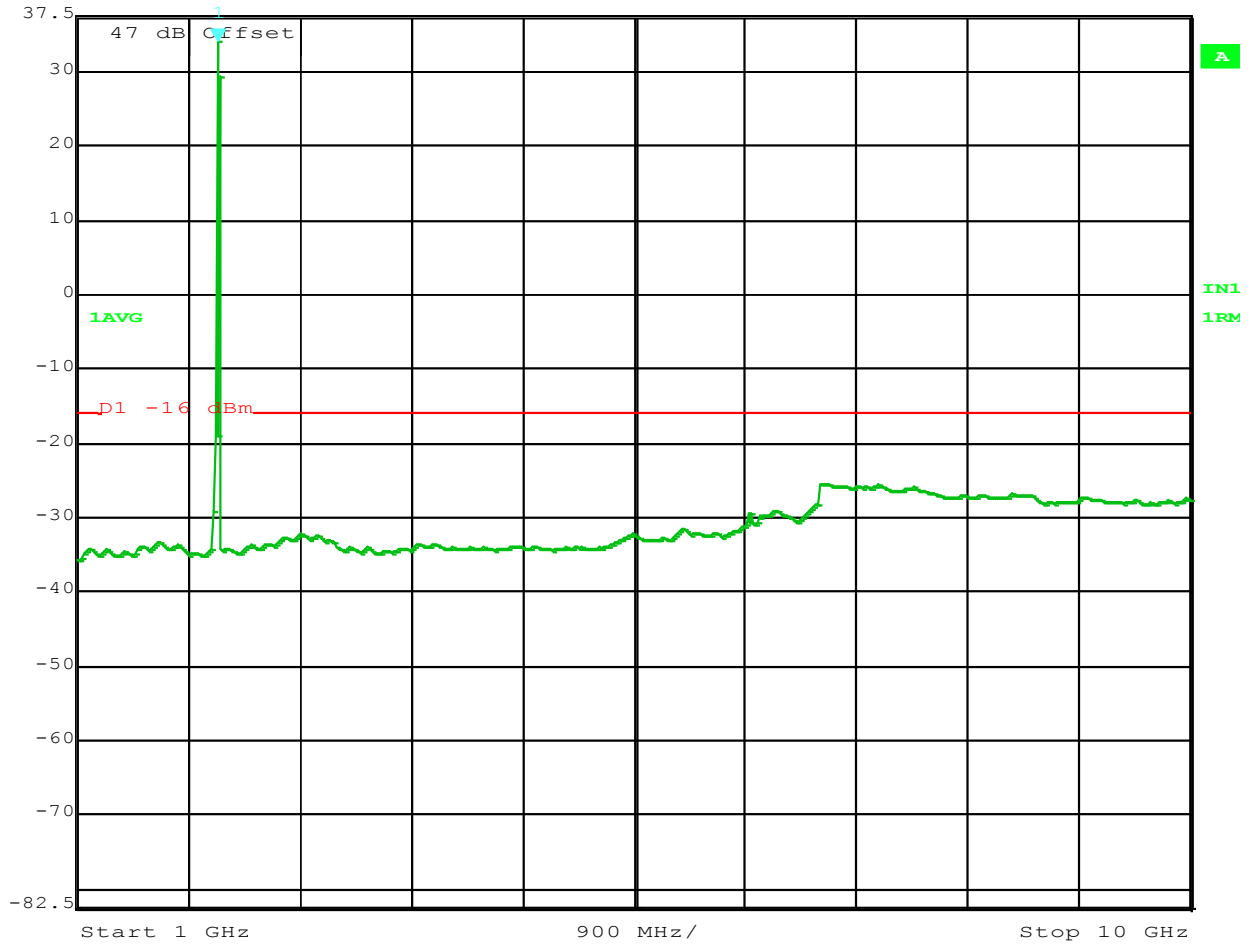
Marker 1 [T1] RBW 100 kHz RF Att 20 dB
 Ref Lvl -48.47 dBm VBW 300 kHz
 37.5 dBm 948.41683367 MHz SWT 250 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
 Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2135-2155 MHz (D+E+F)
 PWR: 5W; 2X2MIMO; QPSK; FCC PRT 27; FCCID:AS5BBTRX-17
 Date: 21.AUG.2014 11:06:46



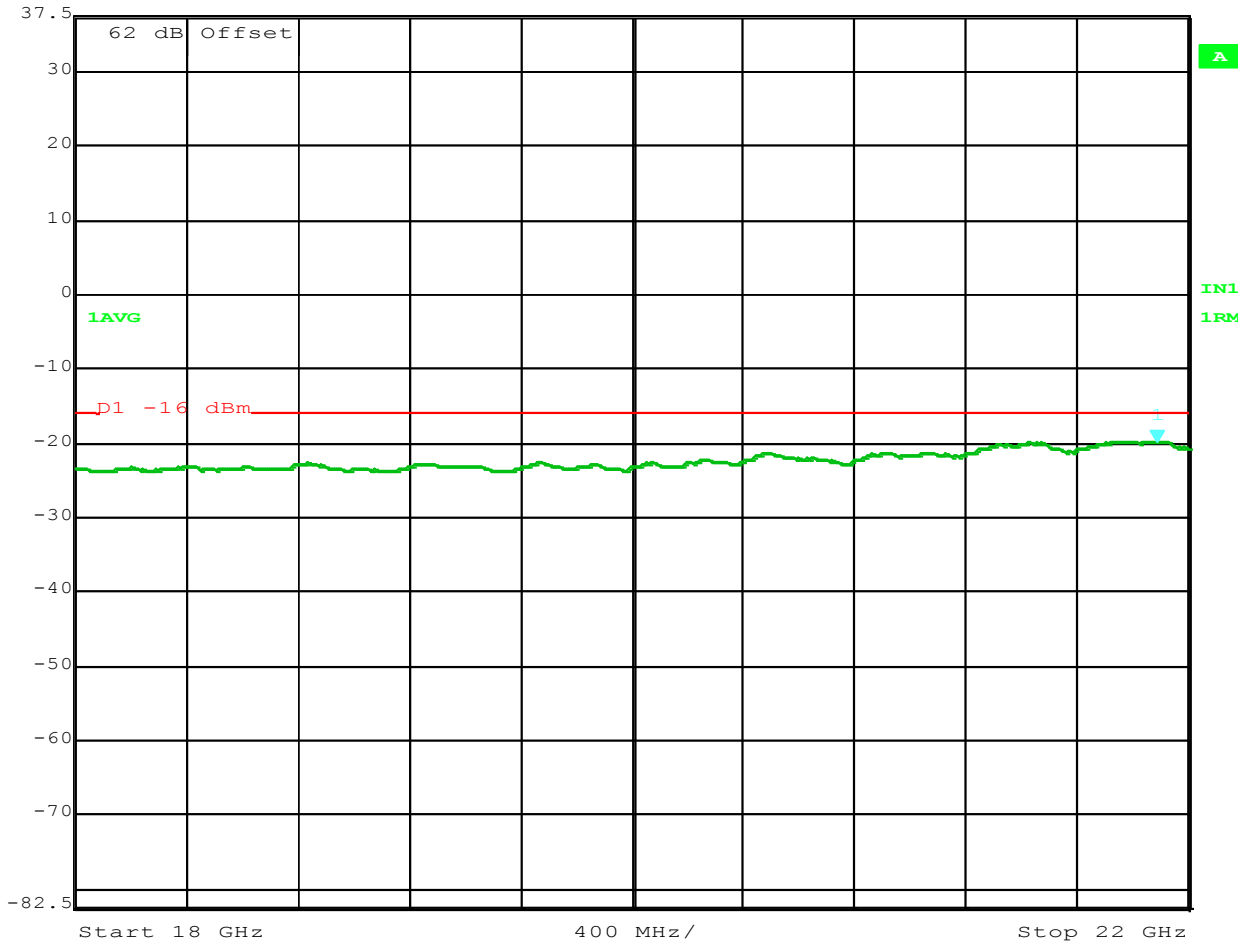
Ref Lvl	37.5 dBm	Marker 1 [T1]	2.13627255 GHz	RBW	1 MHz	RF Att	10 dB
				VBW	3 MHz		
				SWT	90 ms	Unit	dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2135-2155 MHz (D+E+F)
PWR: 5W; 2X2MIMO; QPSK; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 21.AUG.2014 11:11:04



Marker 1 [T1] RBW 1 MHz RF Att 0 dB
 Ref Lvl -19.84 dBm VBW 3 MHz
 37.5 dBm 21.88777555 GHz SWT 40 ms Unit dBm



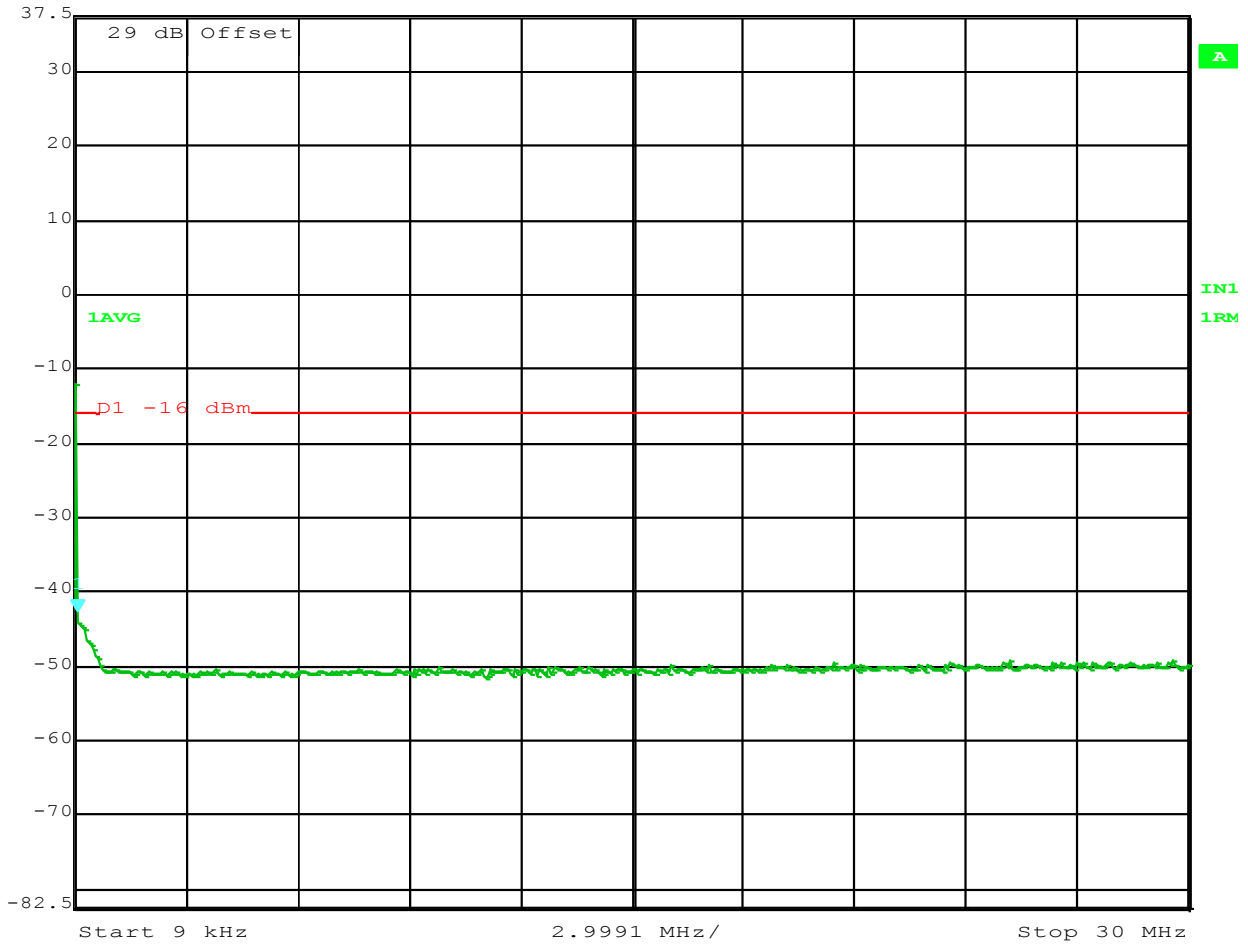
Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
 Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2135-2155 MHz (D+E+F)
 PWR: 5W; 2X2MIMO; QPSK; FCC PRT 27; FCCID:AS5BBTRX-17
 Date: 21.AUG.2014 11:13:09

**Transmit Port
Antenna Conducted Spurious Emissions**

**Block: D+E+F
20 MHz Bandwidth (2135 - 2155 MHz)
2x5 watts (MIMO)
16QAM Modulation**



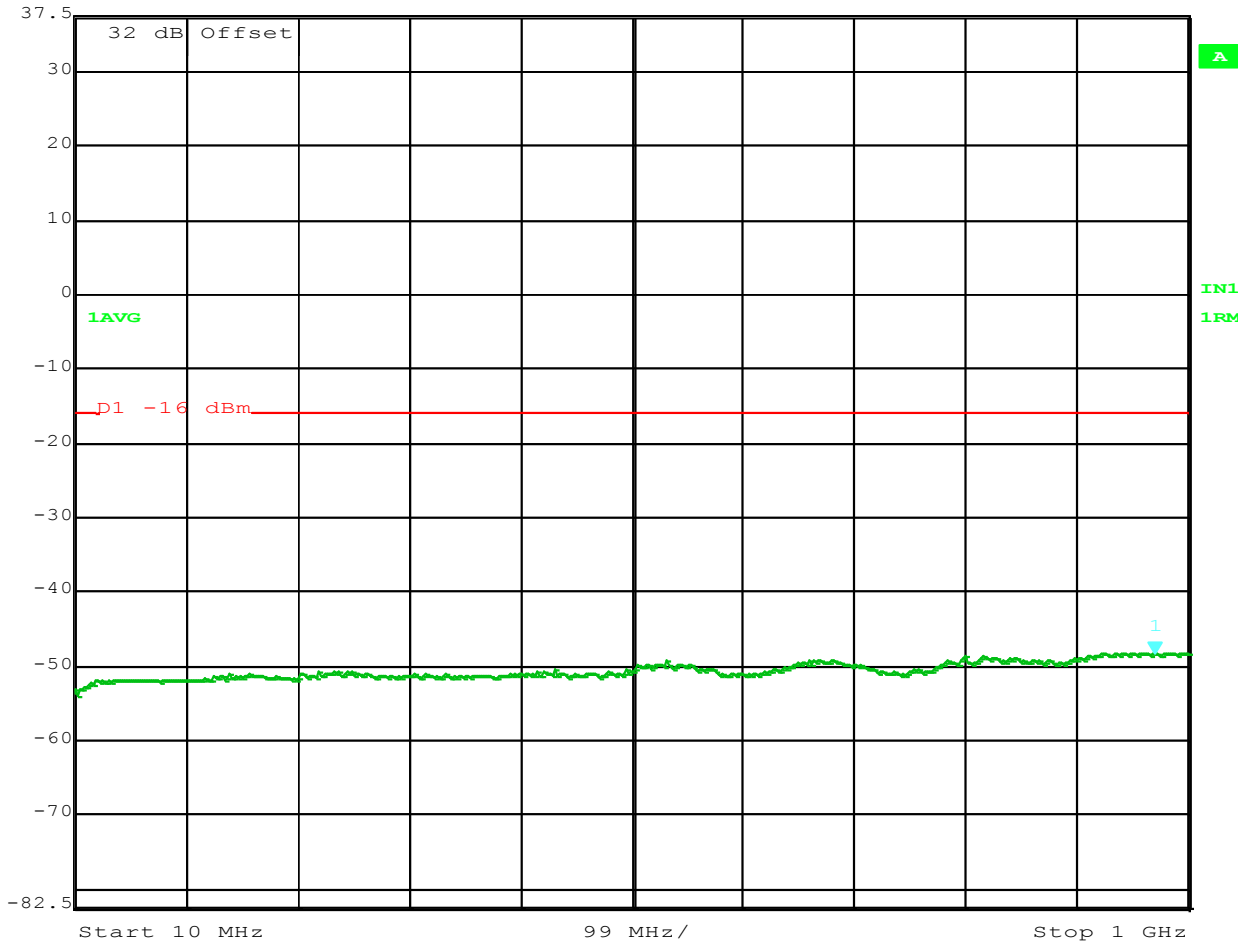
Marker 1 [T1] RBW 10 kHz RF Att 40 dB
Ref Lvl -42.63 dBm VBW 30 kHz
37.5 dBm 69.10220441 kHz SWT 760 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2135-2155 MHz (D+E+F)
PWR: 5W; 2X2MIMO; 16QAM; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 21.AUG.2014 10:09:46



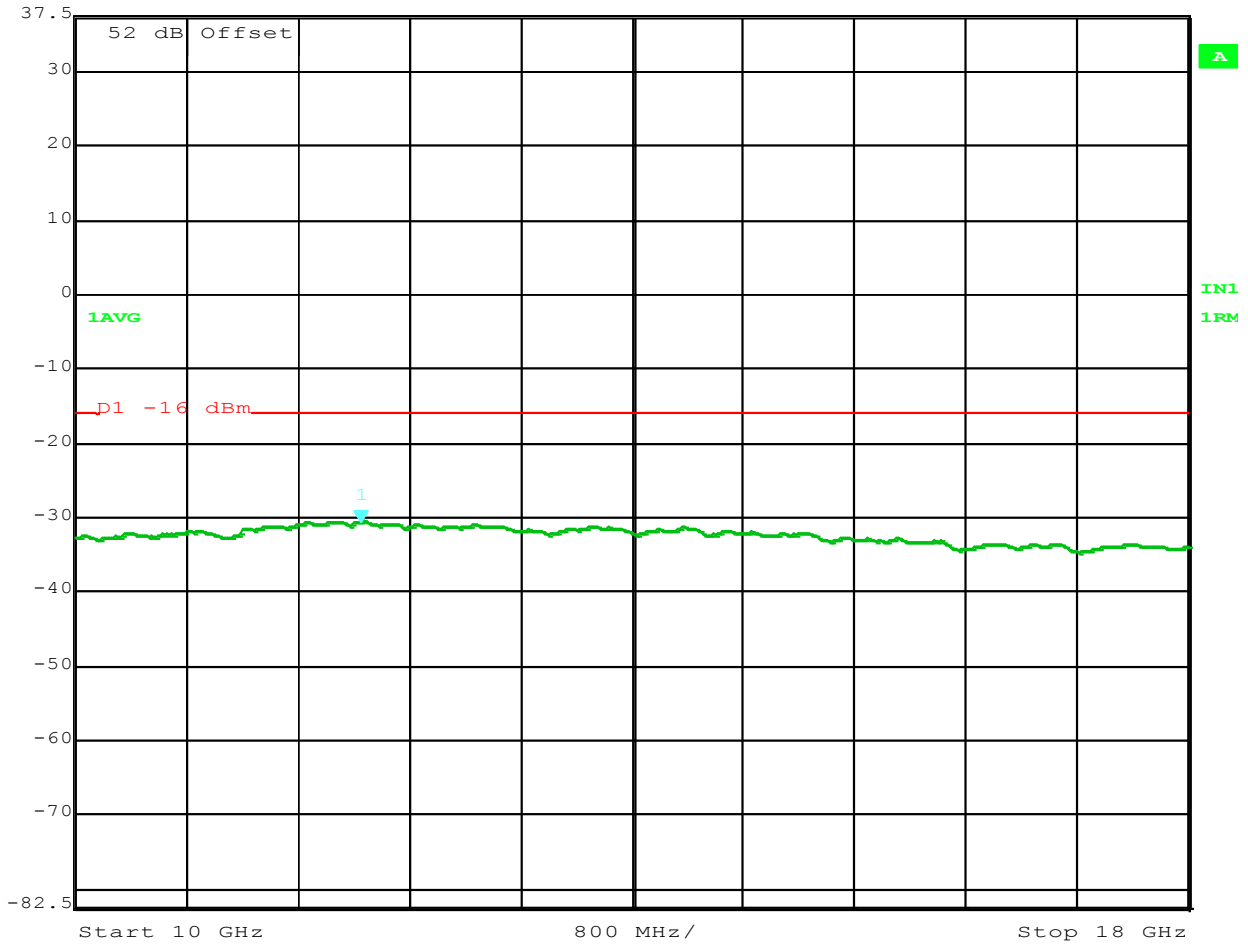
Marker 1 [T1] RBW 100 kHz RF Att 20 dB
Ref Lvl -48.49 dBm VBW 300 kHz
37.5 dBm 970.24048096 MHz SWT 250 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2135-2155 MHz (D+E+F)
PWR: 5W; 2X2MIMO; 16QAM; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 21.AUG.2014 10:11:06



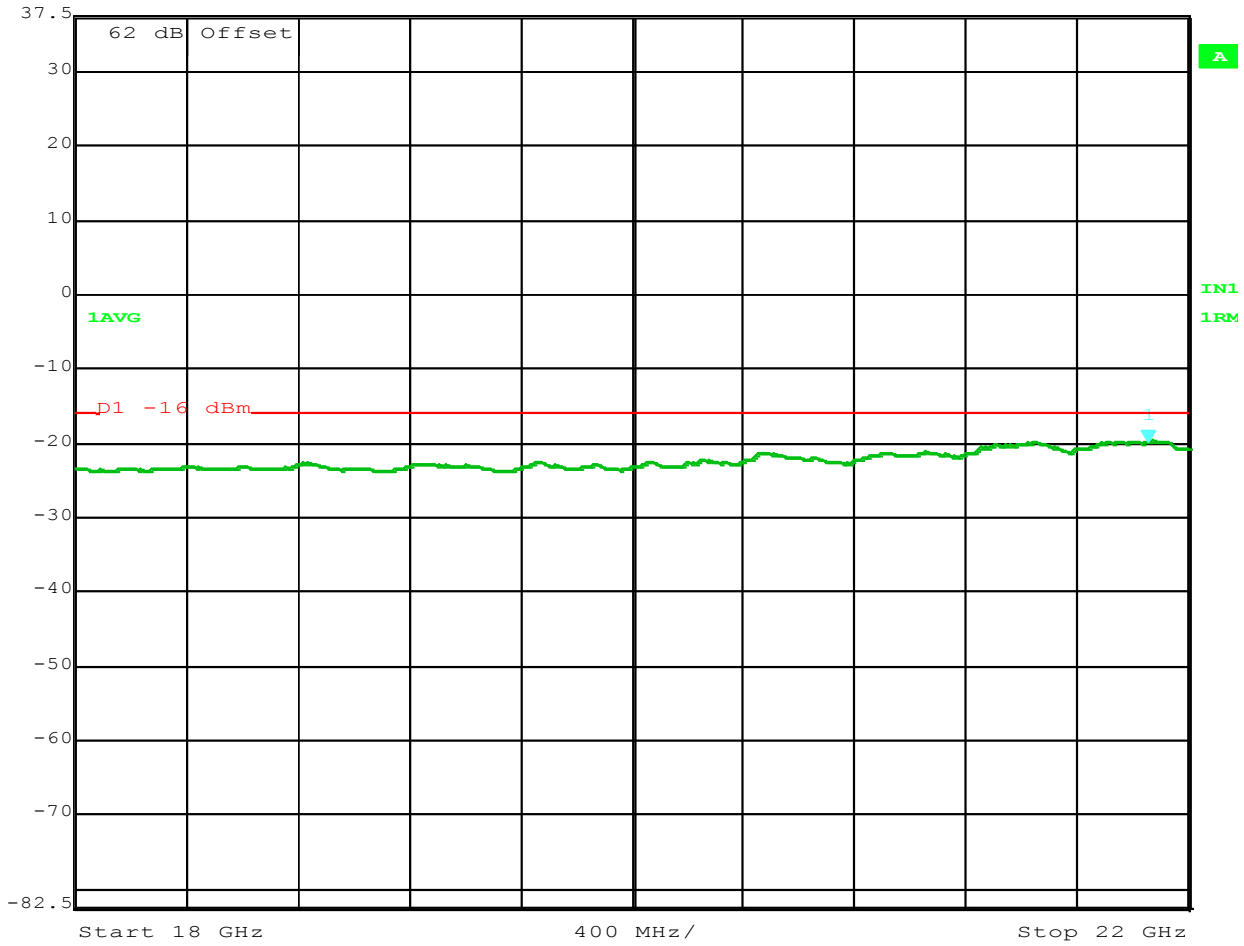
Ref Lvl	37.5 dBm	Marker 1 [T1]	-30.60 dBm	RBW	1 MHz	RF Att	0 dB
				VBW	3 MHz		
			12.05210421 GHz	SWT	80 ms	Unit	dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
 Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2135-2155 MHz (D+E+F)
 PWR: 5W; 2X2MIMO; 16QAM; FCC PRT 27; FCCID:AS5BBTRX-17
 Date: 21.AUG.2014 10:14:06



Marker 1 [T1] RBW 1 MHz RF Att 0 dB
 Ref Lvl -19.94 dBm VBW 3 MHz
 37.5 dBm 21.85571142 GHz SWT 40 ms Unit dBm



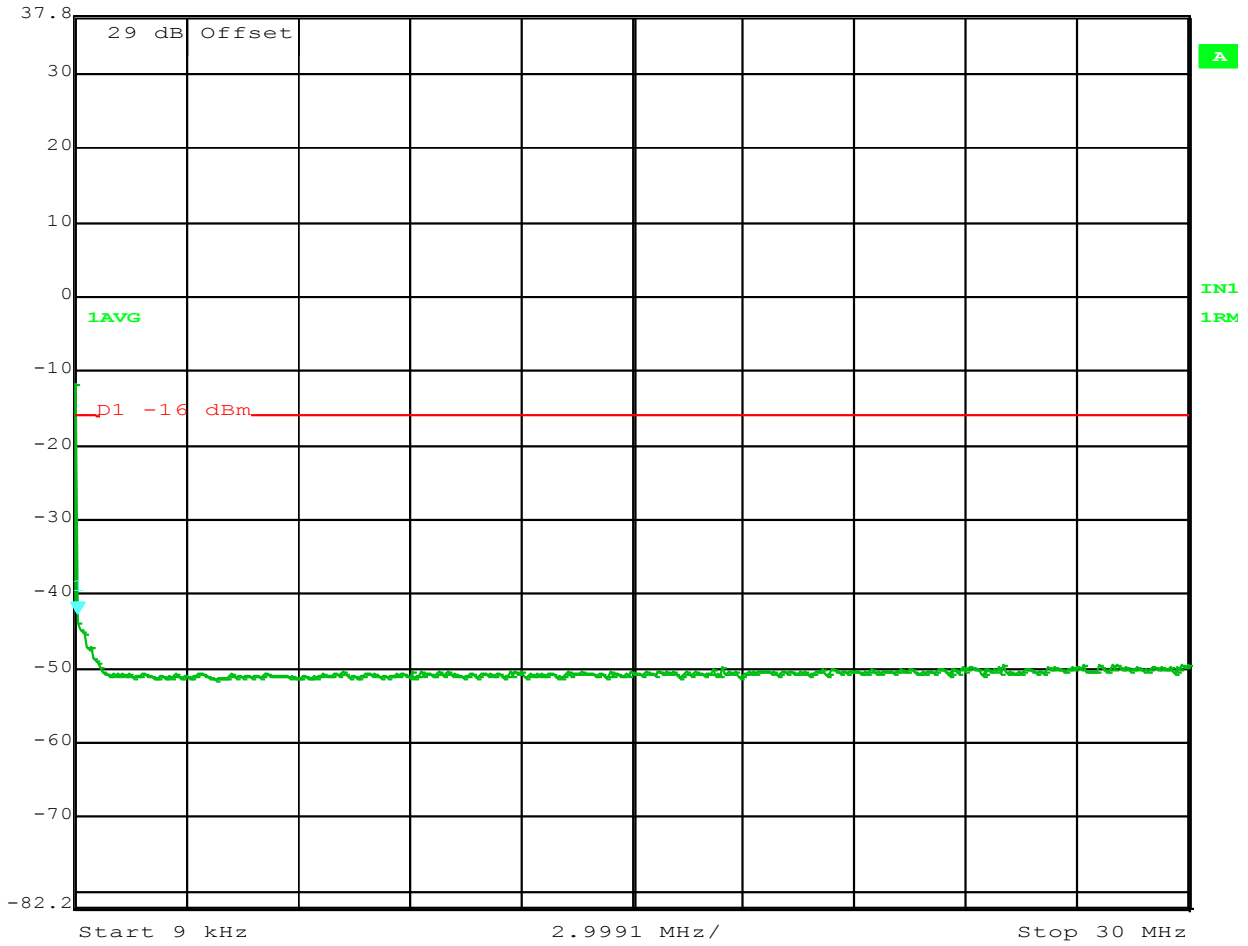
Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
 Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2135-2155 MHz (D+E+F)
 PWR: 5W; 2X2MIMO; 16QAM; FCC PRT 27; FCCID:AS5BBTRX-17
 Date: 21.AUG.2014 10:16:00

**Transmit Port
Antenna Conducted Spurious Emissions**

**Block: D+E+F
20 MHz Bandwidth (2135 - 2155 MHz)
2x5 watts (MIMO)
64QAM Modulation**



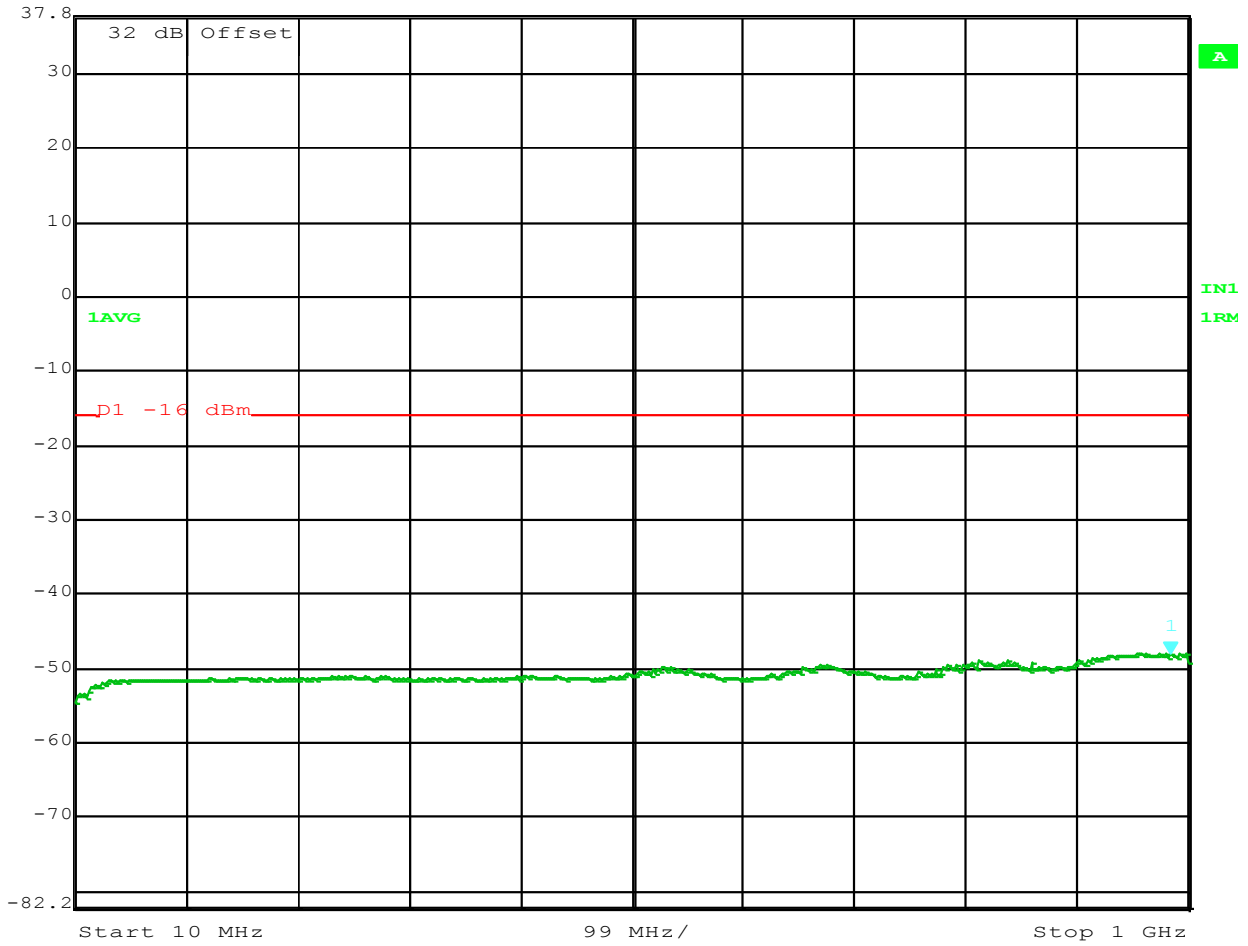
Marker 1 [T1] RBW 10 kHz RF Att 40 dB
Ref Lvl -42.60 dBm VBW 30 kHz
37.8 dBm 69.10220441 kHz SWT 760 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2135-2155 MHz (D+E+F)
PWR: 5W; 2X2MIMO; 64QAM; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 21.AUG.2014 09:13:32



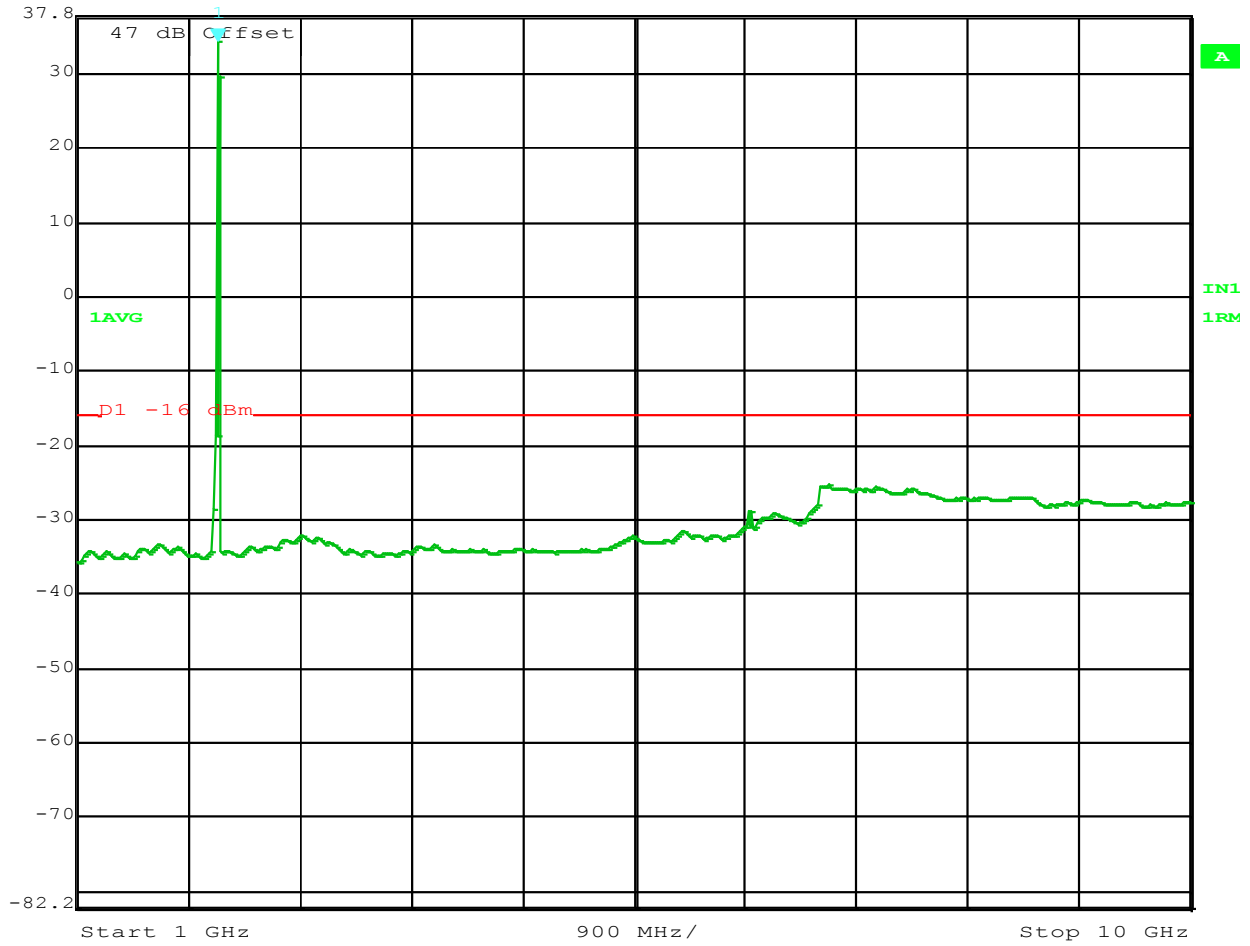
Marker 1 [T1] RBW 100 kHz RF Att 20 dB
Ref Lvl -48.26 dBm VBW 300 kHz
37.8 dBm 984.12825651 MHz SWT 250 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2135-2155 MHz (D+E+F)
PWR: 5W; 2X2MIMO; 64QAM; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 21.AUG.2014 09:10:49



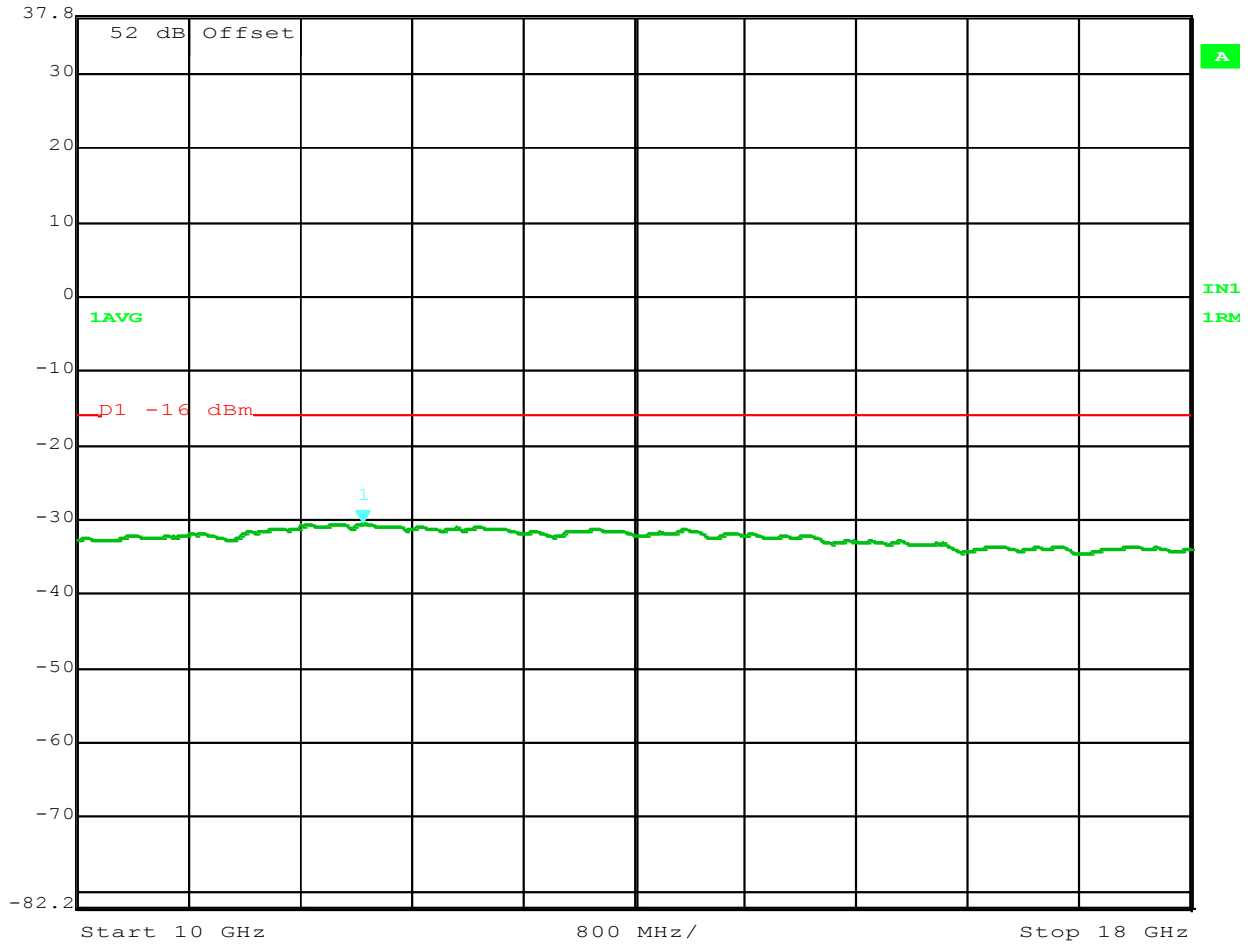
Marker 1 [T1] RBW 1 MHz RF Att 10 dB
Ref Lvl 34.37 dBm VBW 3 MHz
37.8 dBm 2.13627255 GHz SWT 90 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2135-2155 MHz (D+E+F)
PWR: 5W; 2X2MIMO; 64QAM; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 21.AUG.2014 09:08:48



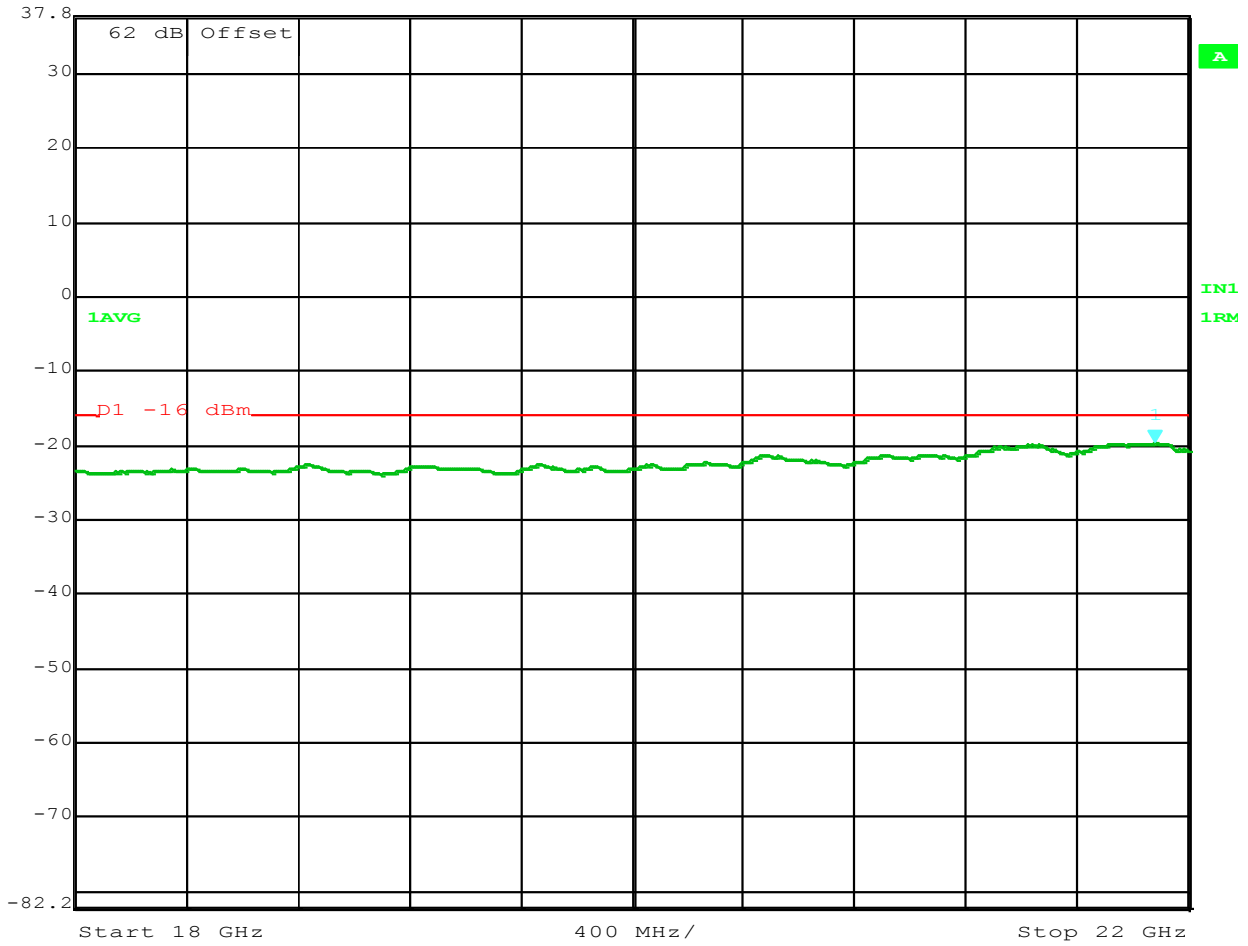
Marker 1 [T1] RBW 1 MHz RF Att 0 dB
Ref Lvl -30.56 dBm VBW 3 MHz
37.8 dBm 12.05210421 GHz SWT 80 ms Unit dBm



Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2135-2155 MHz (D+E+F)
PWR: 5W; 2X2MIMO; 64QAM; FCC PRT 27; FCCID:AS5BBTRX-17
Date: 21.AUG.2014 09:07:03



Marker 1 [T1] RBW 1 MHz RF Att 0 dB
 Ref Lvl -19.78 dBm VBW 3 MHz
 37.8 dBm 21.87975952 GHz SWT 40 ms Unit dBm

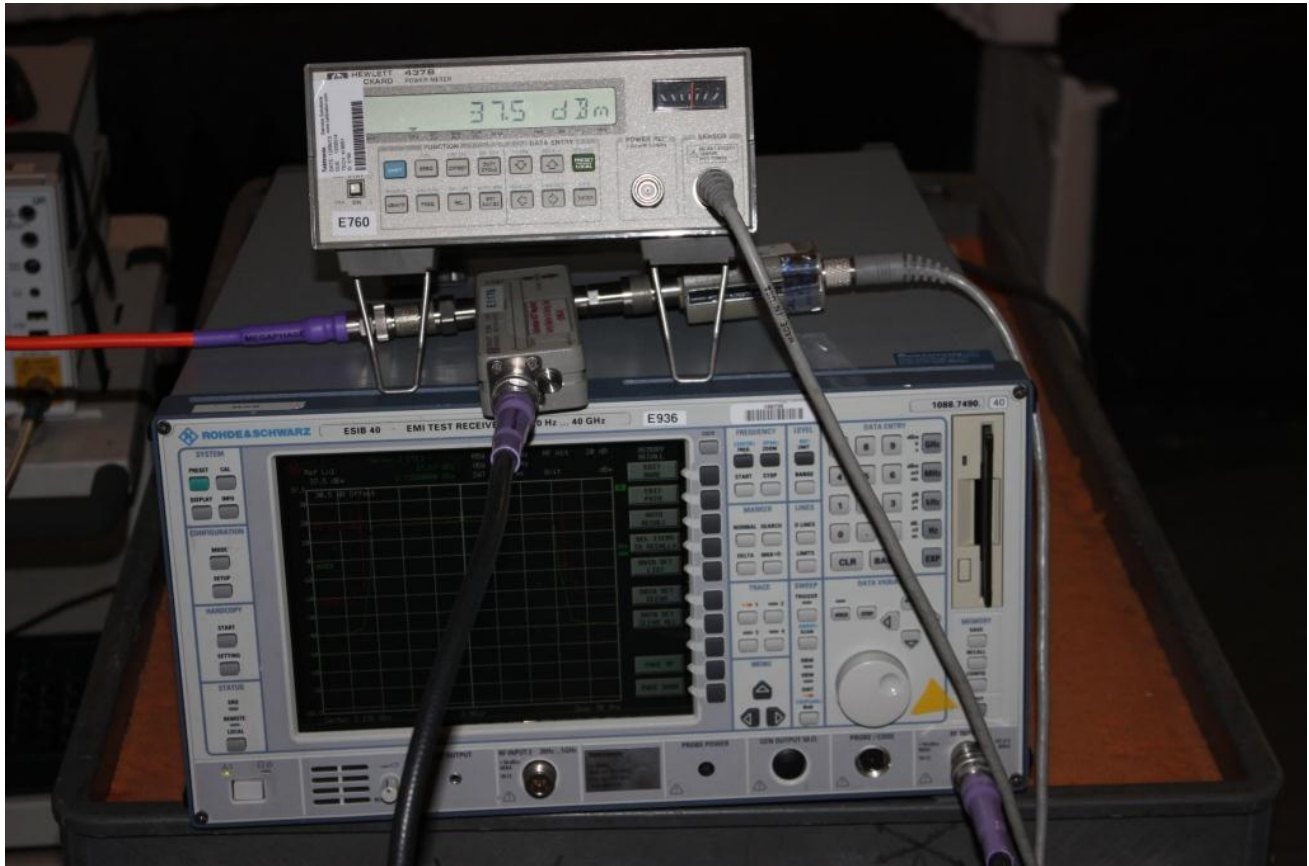


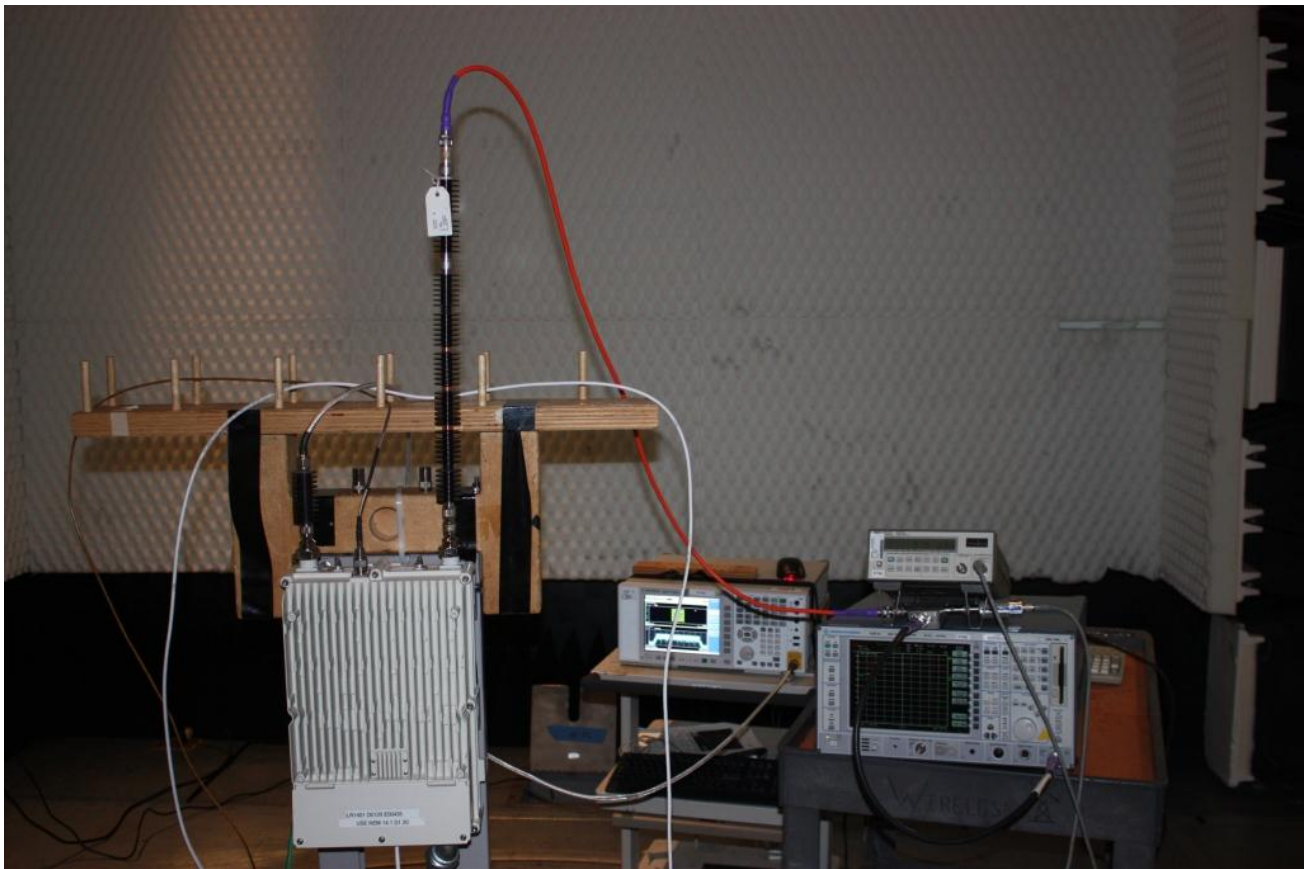
Title: TX SPURIOUS EMISSIONS: TEST ENGINEER: SEG; CLASS II CHANGE
 Comment A: LR MCO 2X5W v1.1 AWS B4(20MHz)-DC; 2135-2155 MHz (D+E+F)
 PWR: 5W; 2X2MIMO; 64QAM; FCC PRT 27; FCCID:AS5BBTRX-17
 Date: 21.AUG.2014 09:04:51

Test Instrumentation List

Manufacturer	Model	Serial Number	Type	Description	GPCL ID	Last Cal	Interval	Status
Agilent	773D	2839A01399	Directional Coupler	2-18GHz 50W average	E1176	N/A	N/A	Active
Weinschel	2-6	BW2239	Attenuator	6 dB DC-18GHz 5 Watt	E890	6/5/2013	24	Active
Weinschel	47-10-34	BX8022	Attenuator	10 dB , 50 Watt	E820	1/24/2014	24	Active
Hewlett Packard	437B	3125U06345	RF Power Meter		E782	3/18/2014	24	Active
Agilent	8481A	MY41090318	Power Sensor	10MHz to 18GHz	E1173	3/4/2014	12	Active
Weinschel	66-20-34	BW7319	Attenuator	20dB 150W DC-18 GHz	E816	1/13/2014	24	Active
Rhode & Swartz	ESIB-40	100119	Test Receiver	EMI (20Hz to 40 GHz) -150 +30dBm	E936	6/4/2013	24	Active
Agilent	N9020A	MY50510383	MXA Analyzer	20 Hz – 3.6 GHz	N/A	5/1/2013	24	Active

PHOTOGRAPHS OF EUT DURING OCCUPIED BANDWIDTH & SPURIOUS EMISSIONS TESTING





Measurement -5

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

9764-DC Power-LR MCO 2x5W v1.1 AWS BAND 4 (20-MHz)(Small Cells)

SECTION 2.1053

FIELD STRENGTH OF SPURIOUS RADIATION

Field strength measurements of radiated spurious emissions were made at 3 m semi anechoic room of Global Product Compliance Laboratory of Alcatel-Lucent Murray Hill. A complete description and full measurement data for the site is on file with the Commission (FCC File 995653).

The “9764-DC Power-LR MCO 2x5W v1.1 AWS BAND 4 (20-MHz)(Small Cells) with FCCID: AS5BBTRX-17” was tested with an RF output of 5 W at each **Antenna Interface Connector (AIC)**. The radiated emissions tests were performed with the MCO operating with 20 MHz bandwidth in the frequency blocks combinations listed for Antenna Conducted spurious emissions. All tests were performed with the MCO operating in QPSK and 64QAM modulations, respectively. During testing, the MCO AICs were terminated with 50 ohm loads. The spectrum from 10 MHz to the 10th harmonic (22 GHz) 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.

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

$$20 \log (E * 10^6) - (46 + 10 \log P) = 79.2 \text{ dB } \mu\text{V/meter}$$

E = Field Intensity in Volts/meter

P = Transmitted Power in Watts

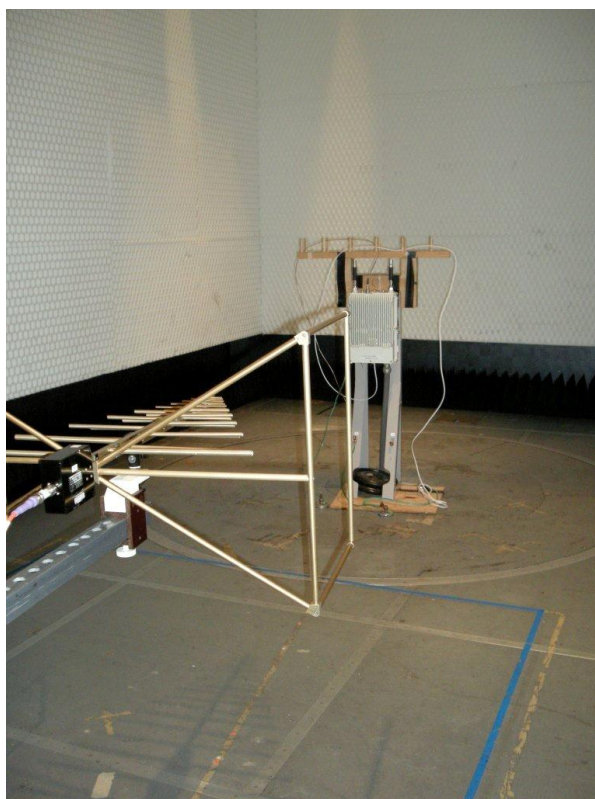
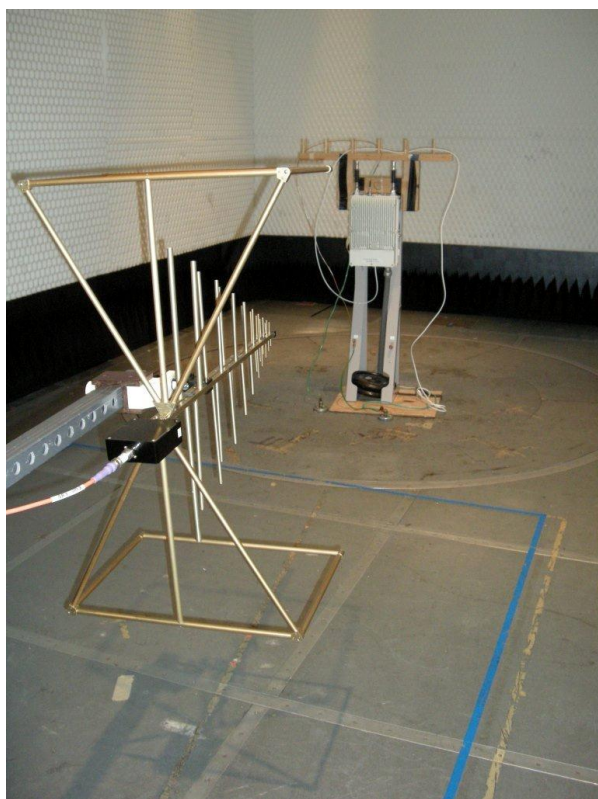
R = Distance from the ideal isotropic antenna in meters = 3 m

RESULTS:

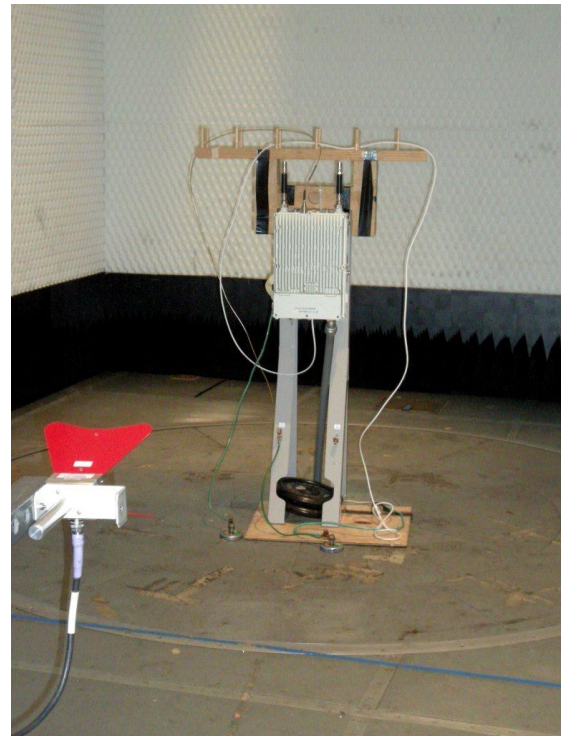
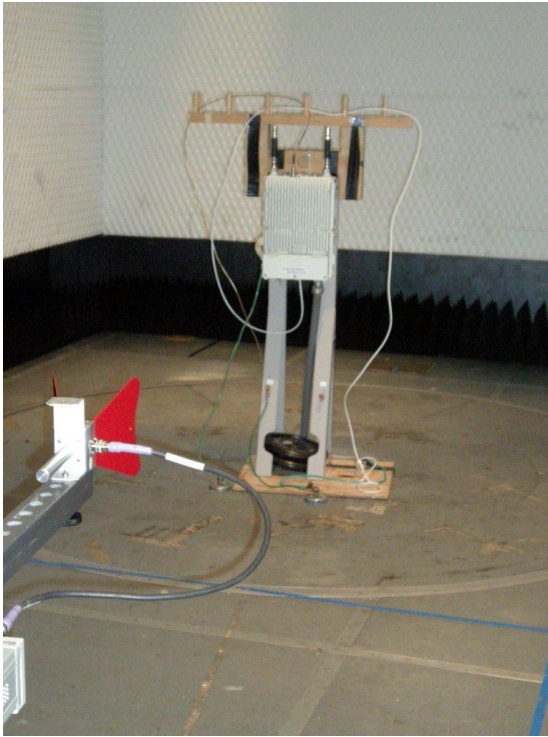
For this particular test, the field strength of any spurious radiation is required to be less than 79.2dBμV/meter. Reportable measurements are equal to or greater than 59.2dBμV/meter. Over the spectrum investigated, 10 MHz to 10th of the carrier (22 GHz), no reportable spurious emissions were detected. This demonstrates that the “9764-DC Power-LR MCO 2x5W v1.1 AWS BAND 4 (20-MHz)(Small Cells)” the subject of this application, complies with Sections 2.1053, 27.53 (h) and 2.1057 of the Rules.

PHOTOGRAPHS OF EUT DURING SPURIOUS RADIATION TESTING

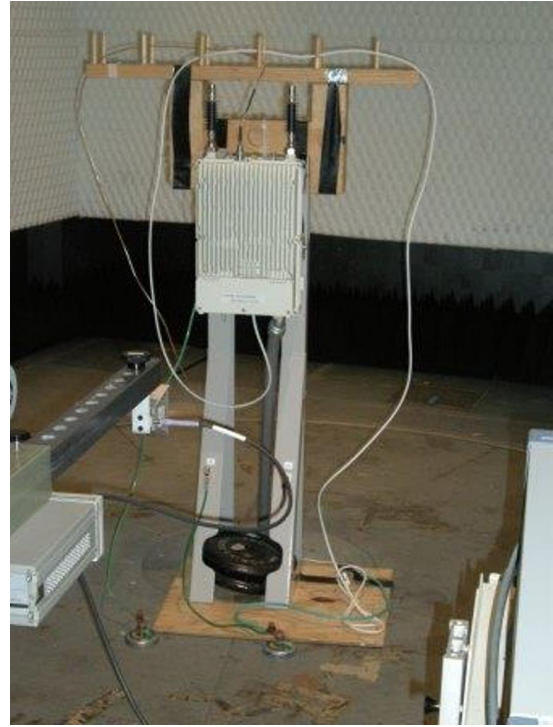
30 MHz – 1 GHz



1 GHz – 18 GHz



18 GHz – 22 GHz



TEST INSTRUMENTATION

Manufacturer	Model	Serial Number	Type	Description	GPC L ID	Last Cal	Interval	Status
Hewlett Packard	8593E	3911A04003	Spectrum Analyzer	9kHz-22GHz	E374	6/4/2014	24	Active
Sonoma Instrument Co.	310	185794	Amplifier	9kHz-1GHz	E507	6/17/2014	24	Active
Weinschel	2-6	BX3433	Attenuator	6dB 5 Watt DC-18GHz	E888	3/5/2014	24	Active
A.H. Systems Inc.	SAS-521-2	408	Biological Antenna	25-2000MHz	E601	2/15/2013	24	Active
Rohde & Schwarz	ESIB40	100044	Test Receiver	EMI Receiver (20Hz - 40GHz) -150 to +30dBm	E567	2/7/2014	24	Active
Agilent	8449B	3008A01740	Amplifier	Pre-Amplifier 1-26.5GHz	E1166	1/17/2014	24	Active
Trilithic	5HC2850/18050-1.8-KK	PCS-HPF-11	High Pass Filter	PCS	E988	N/A	0	Active
ETS Lindgren	3117	00135198	Horn Antenna	Double-Ridged Waveguide Horn 1-18GHz	E1073	9/9/2012	24	Active
EMC Test Systems	3116	2539	Horn Antenna	Double Ridged Horn 18-40GHz	E513	3/22/2013	24	Active

Measurement -6

MEASUREMENT OF FREQUENCY STABILITY

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

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