

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-15**, 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.

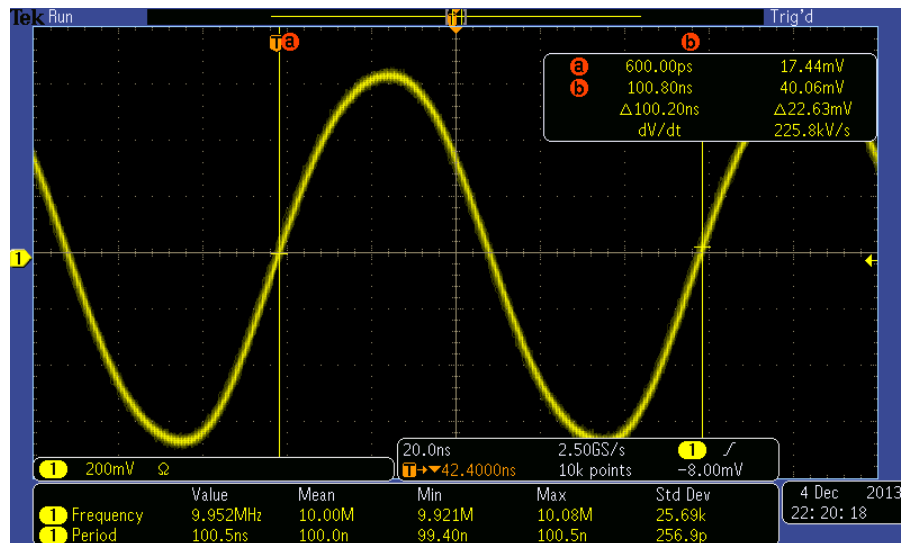
Time domain LTE (TD-LTE) Modulation is similar to Frequency domain LTE. However TD-LTE uses a single carrier frequency for both uplink and downlink. The TD-RRH transceiver divides the communication time into transmission and reception periods depending on user needs.

Therefore gating technique is used for measuring transmit power and occupied BW. Reference signal derived from GPS and frame trigger from the RRH were input into analyzer. This enables analyzer to measure power and occupied BW only during the transmit cycle.

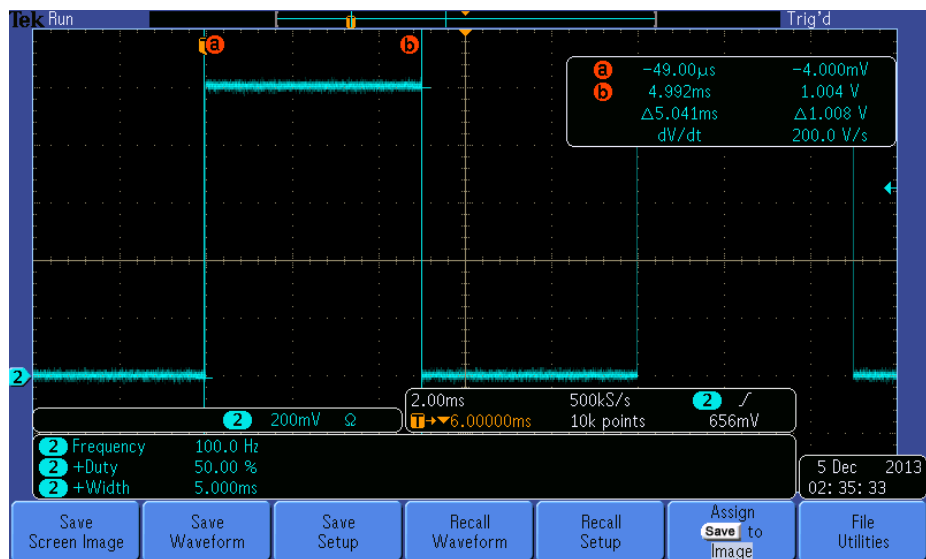
Occupied Bandwidth Measurement:

Spectrum Analyzer was used for Gated spectrum measurements. In addition to RF input from TD-RRH, this analyzer uses following additional inputs:

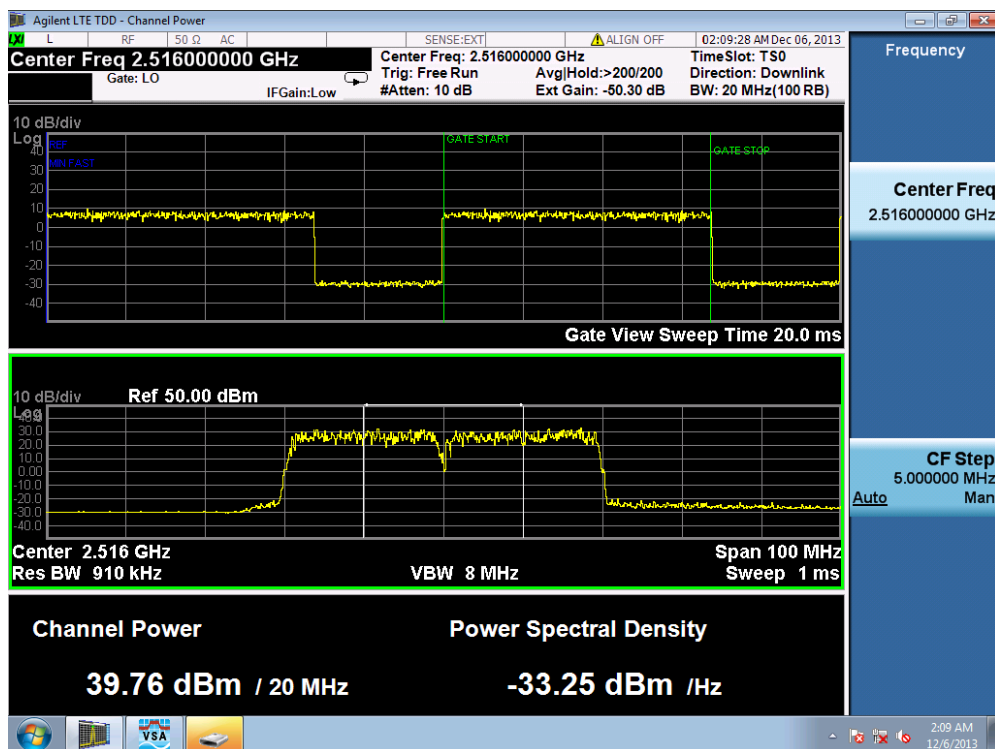
- (1) A 10MHz signal from GPS receiver as reference input signal (Plot 1)
- (2) A 100Hz 50% duty cycle square wave (frame trigger) from the TD-RRH as trigger input (Plot 2)
- (3) Using signals (1) and (2) Spectrum Analyzer produces a trigger pulse having 10ms period and 66.98% duty cycle square wave (Plot 3). Spectrum Analyzer uses this trigger pulse for performing gated measurement.



Plot 1



Plot 2



Plot 3

Gated Power Measurements:

Similarly Signals provided in plot 1&2 were used as inputs to power meters for measuring RF power accurately.

Section 27.50(d)(5)

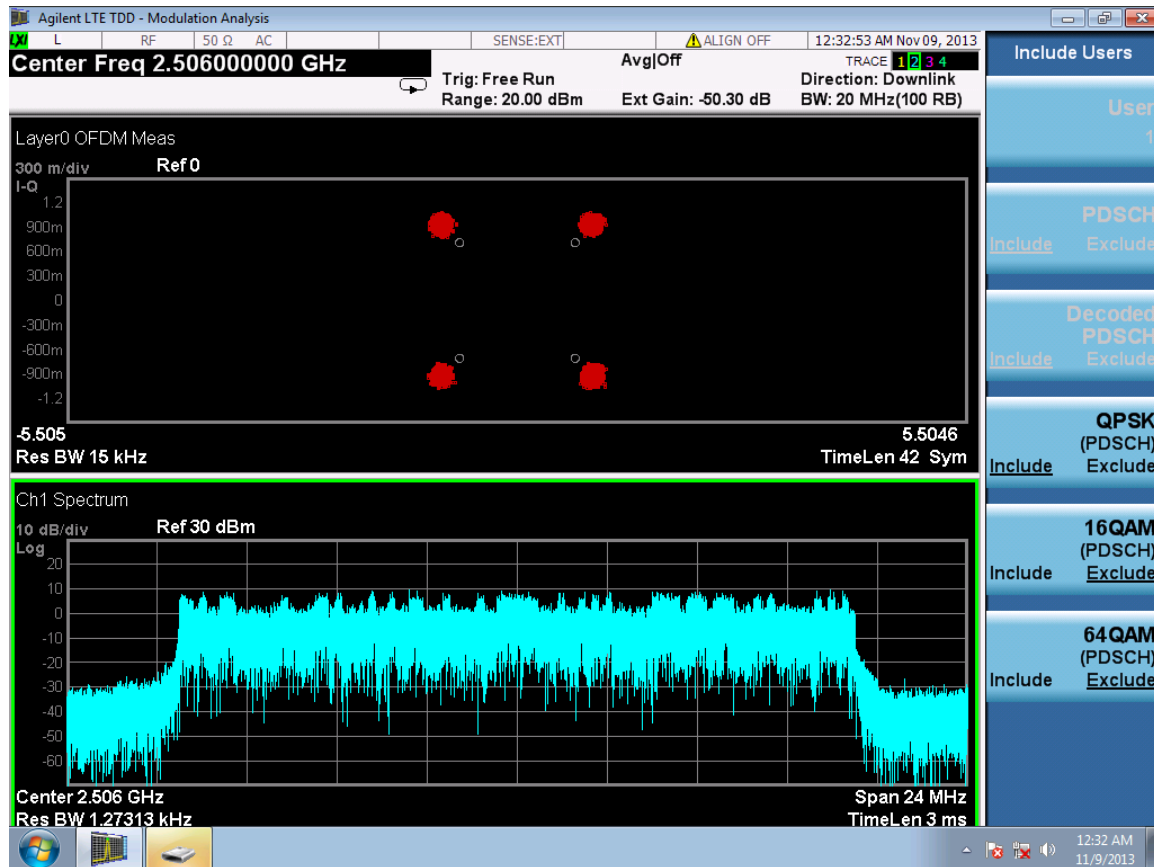
Measurement of Peak-to-Average ratio (PAR)

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).

The list of blocks and bands, tested for QPSK, 16QAM and 64QAM are listed below:

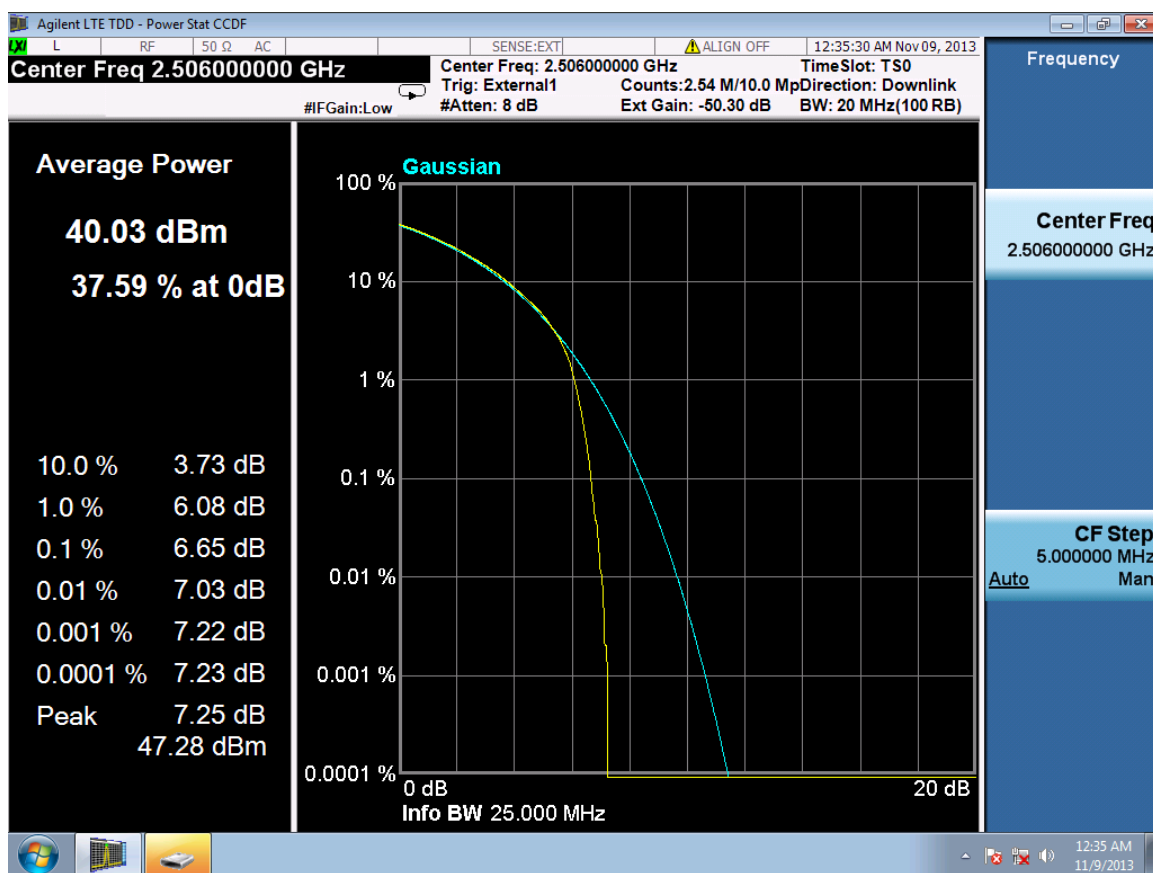
Blocks	Bandwidth (MHz)	Frequency (MHz)	Power (Watts)
Lower	20	2496-2516	10
Middle	20	2568-2588	10
Higher	20	2670-2690	10
Lower	20+20	2496-2536	20
Middle	20+20	2568-2608	20
Higher	20+20	2650-2690	20

QPSK
2506 MHz (20 MHz BW)

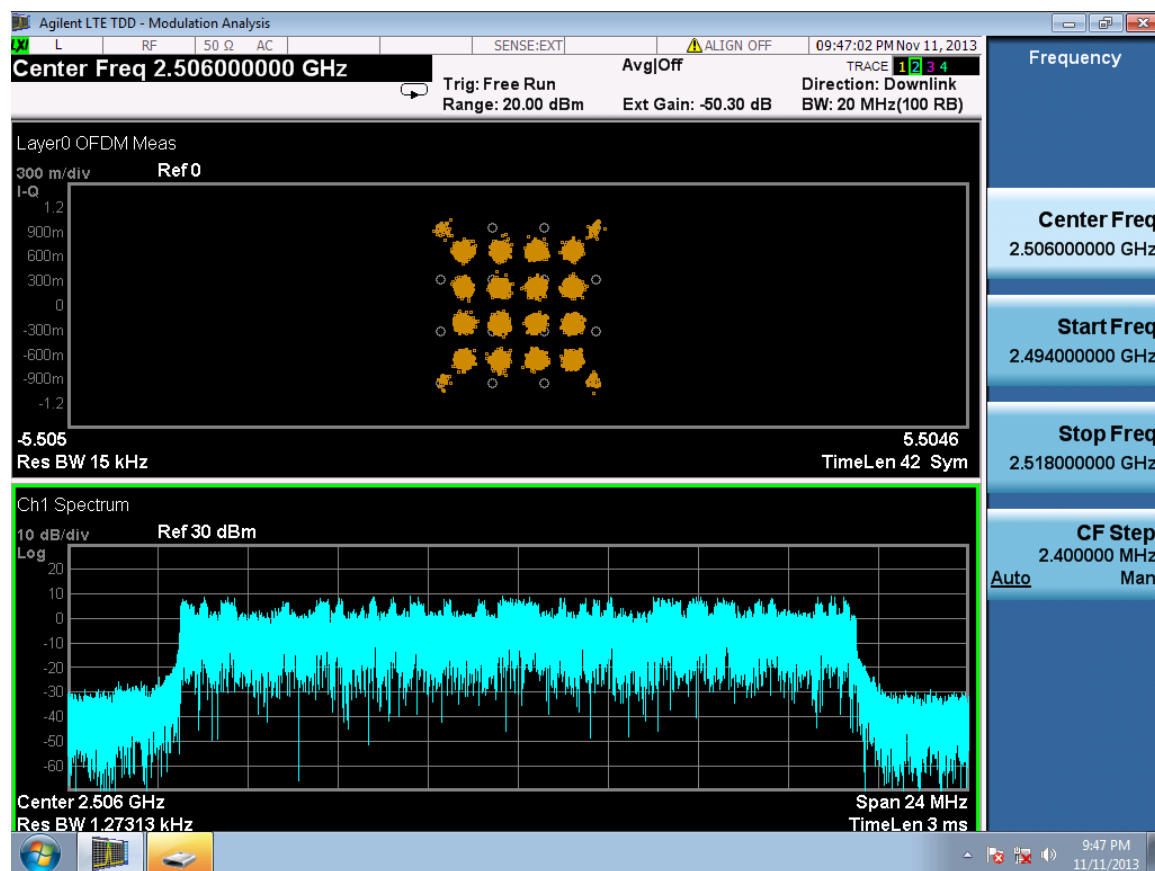


TD-RRH8X20 (BC41) 2.5GHz
FCC Part 27.53; PWR: 10 (8x10W MIMO)
FCCID: AS5BBTRX-15
TEST ENGINEER: JY

Peak to Average
QPSK
2506MHz (20 MHz BW)

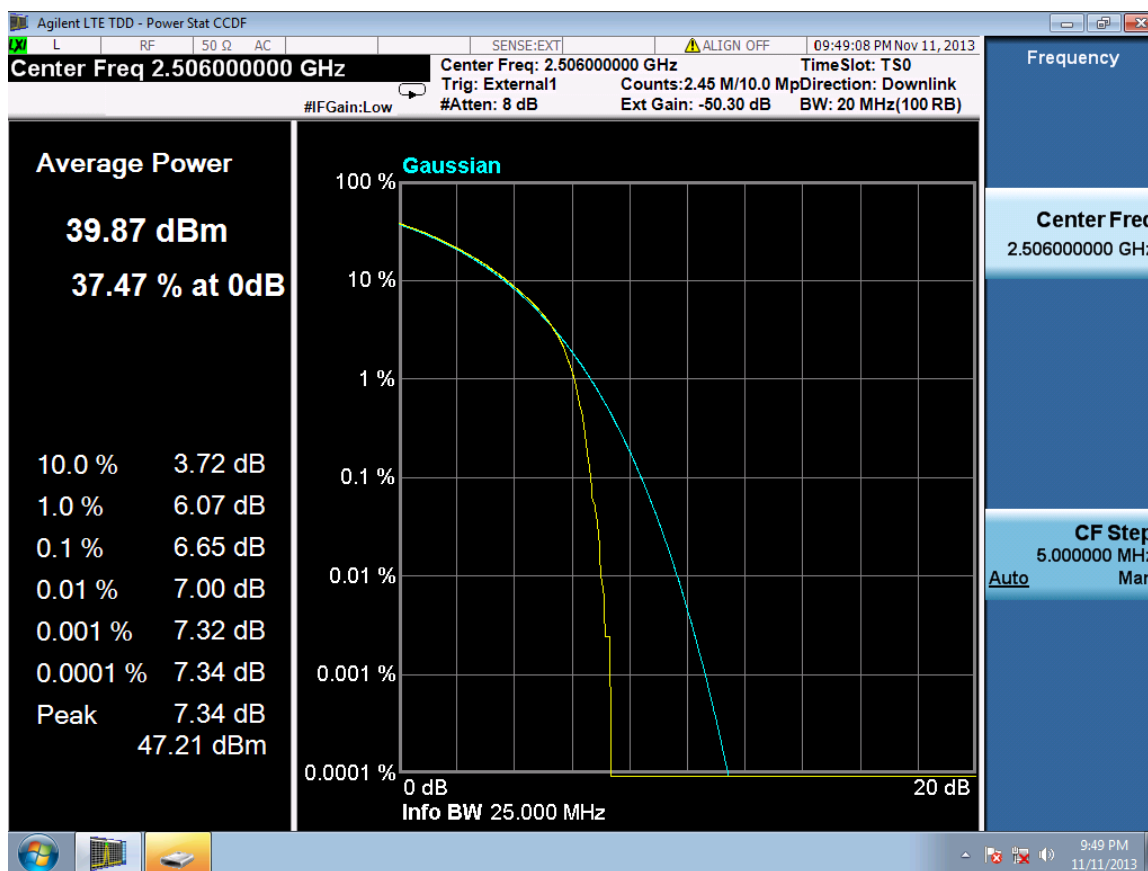


16QAM
2506MHz (20 MHz BW)

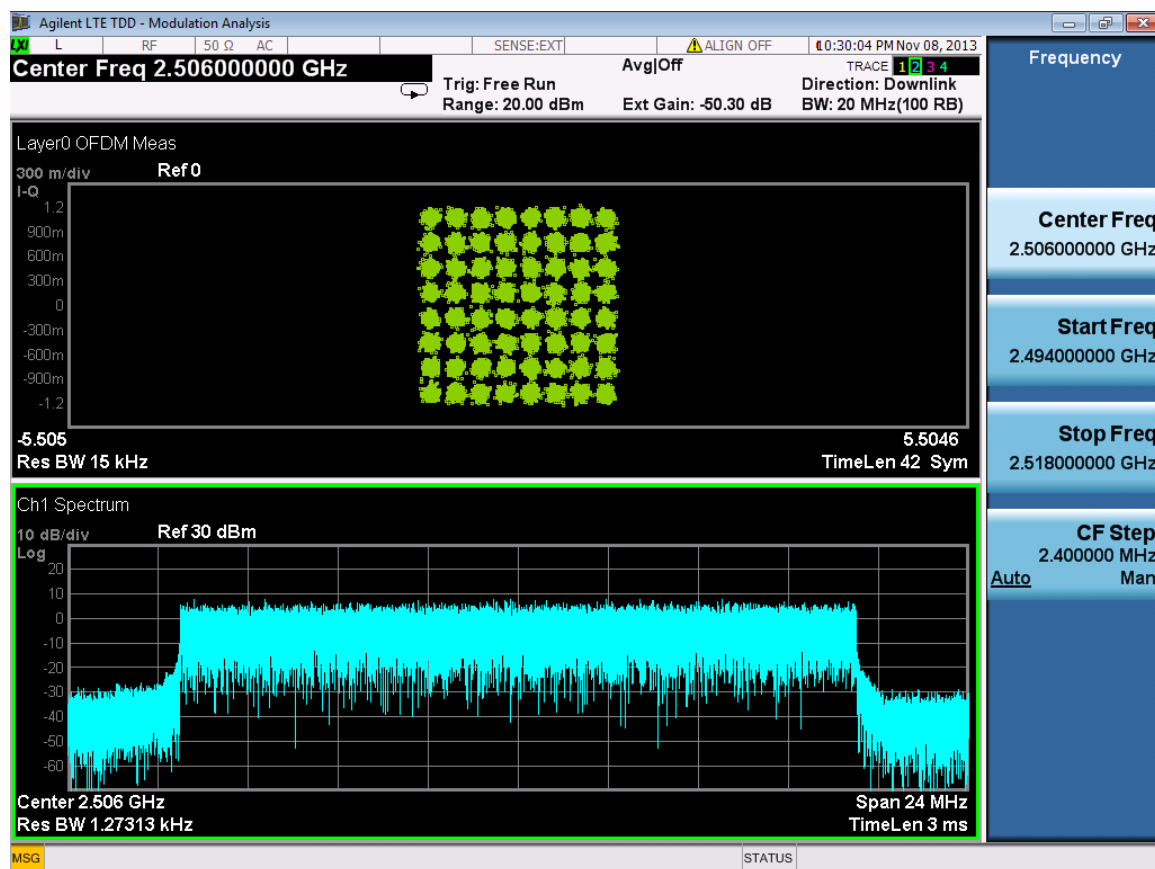


TD-RRH8X20 (BC41) 2.5GHz
FCC Part 27.53; PWR: 10 (8x10W MIMO)
FCCID: AS5BBTRX-15
TEST ENGINEER: JY

Peak to Average
16QAM
2506MHz (20 MHz BW)

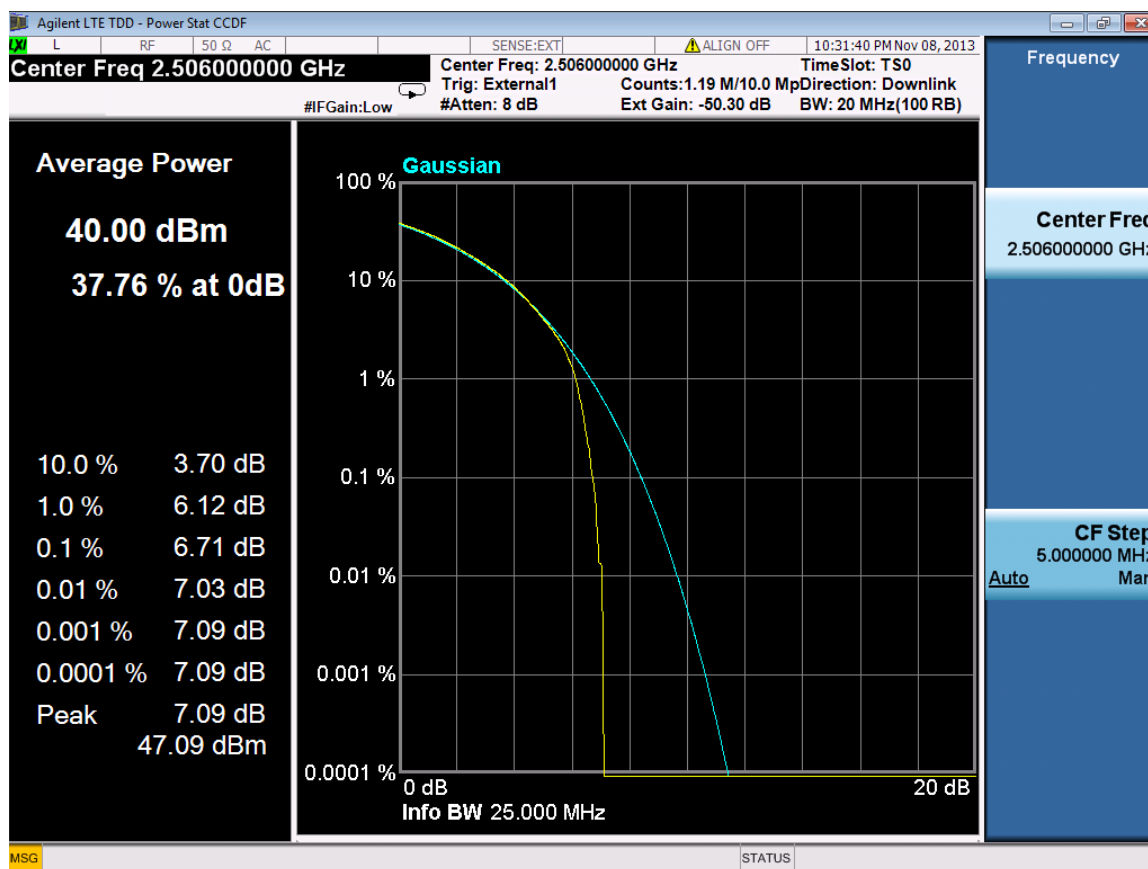


64QAM
2506MHz (20 MHz BW)

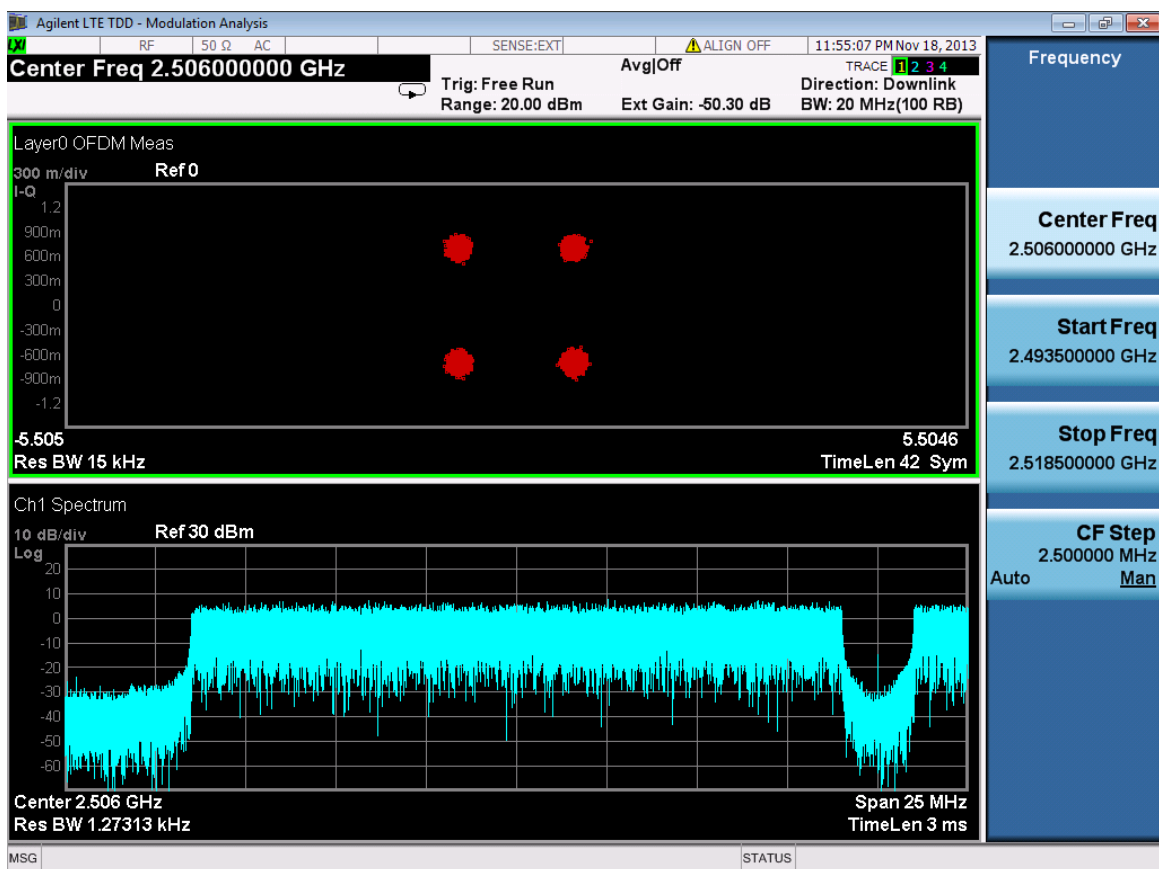


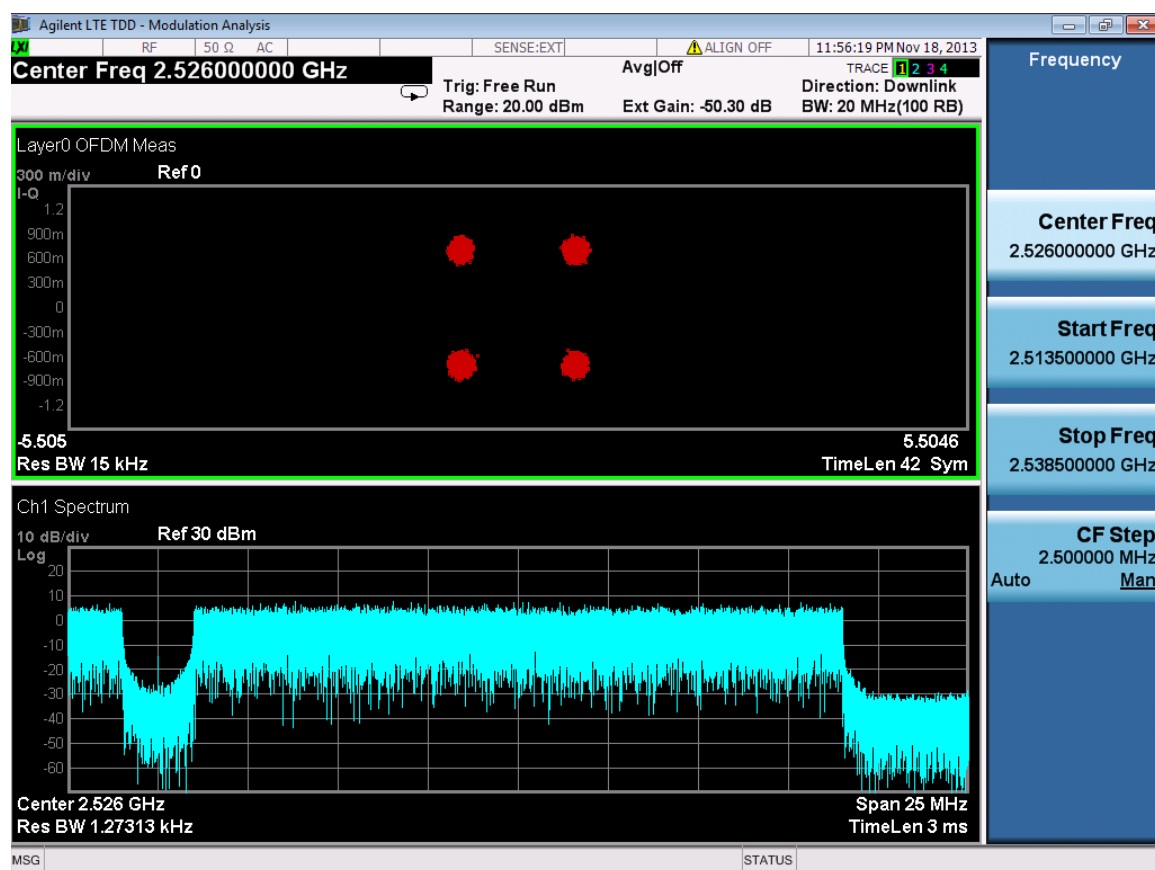
TD-RRH8X20 (BC41) 2.5GHz
FCC Part 27.53; PWR: 10 (8x10W MIMO)
FCCID: AS5BBTRX-15
TEST ENGINEER: JY

Peak to Average
64QAM
2506MHz (20 MHz BW)



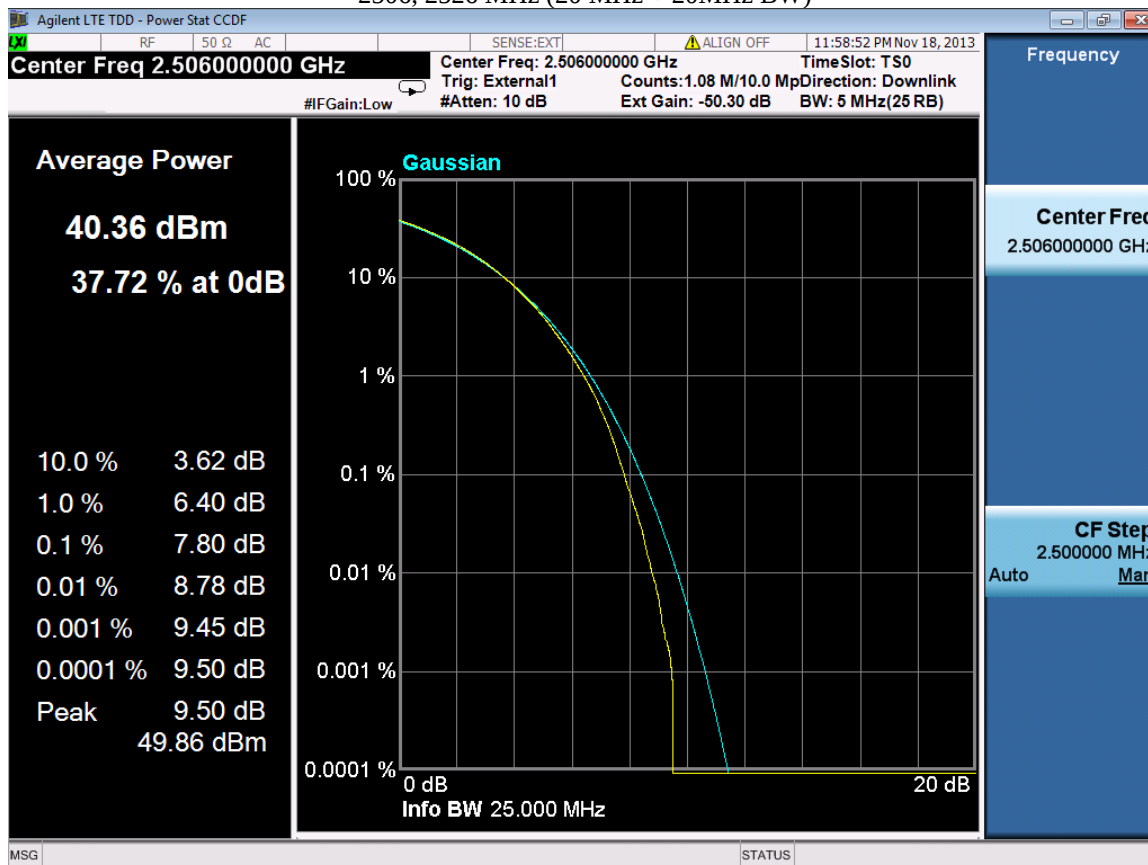
QPSK
2506, 2526 MHz (20 MHz + 20MHz BW)

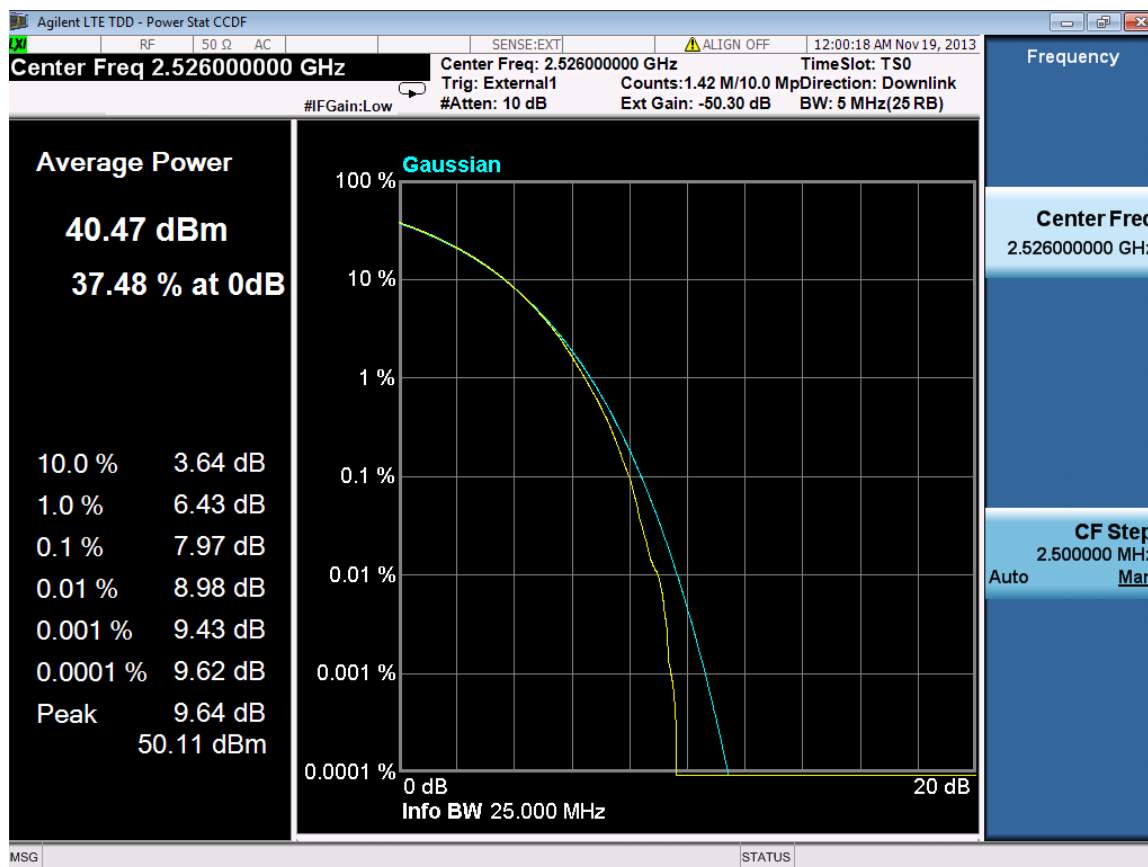




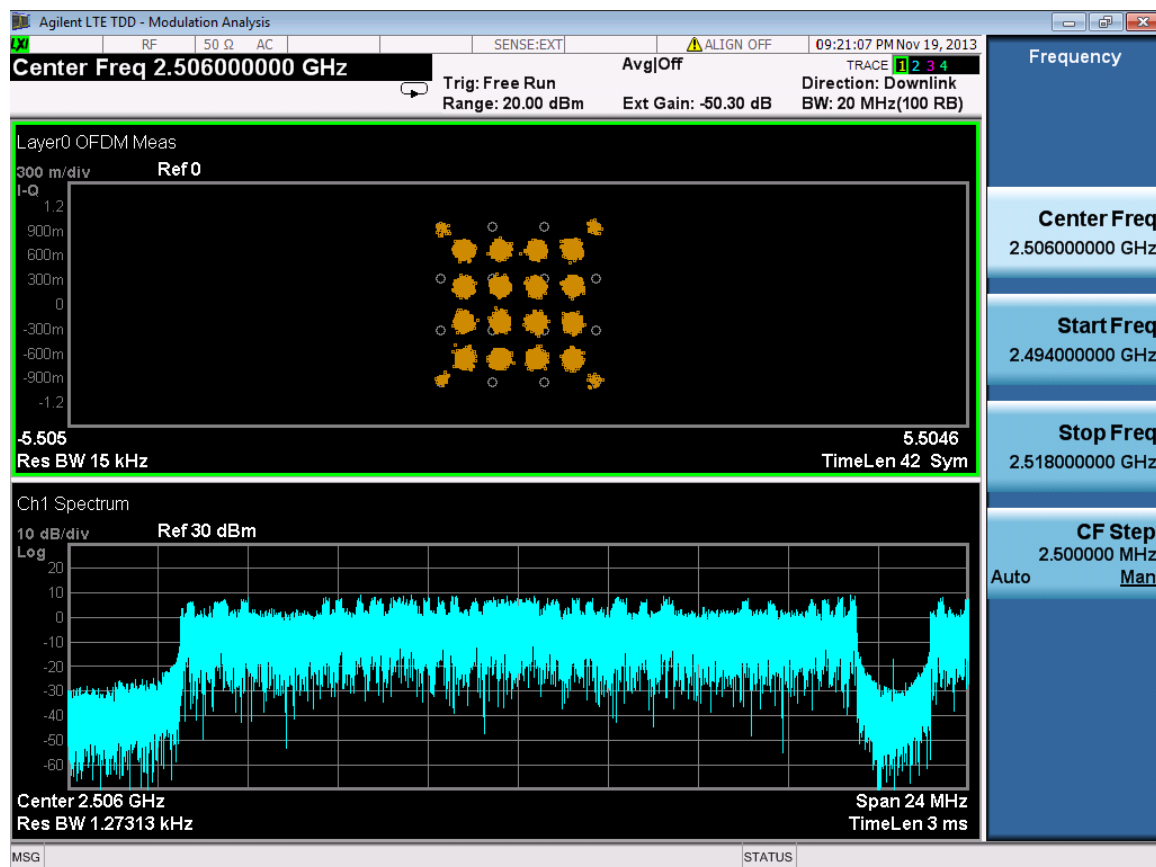
TD-RRH8X20 (BC41) 2.5GHz
FCC Part 27.53; PWR: 20 (8x20W MIMO)
FCCID: AS5BBTRX-15
TEST ENGINEER: JY

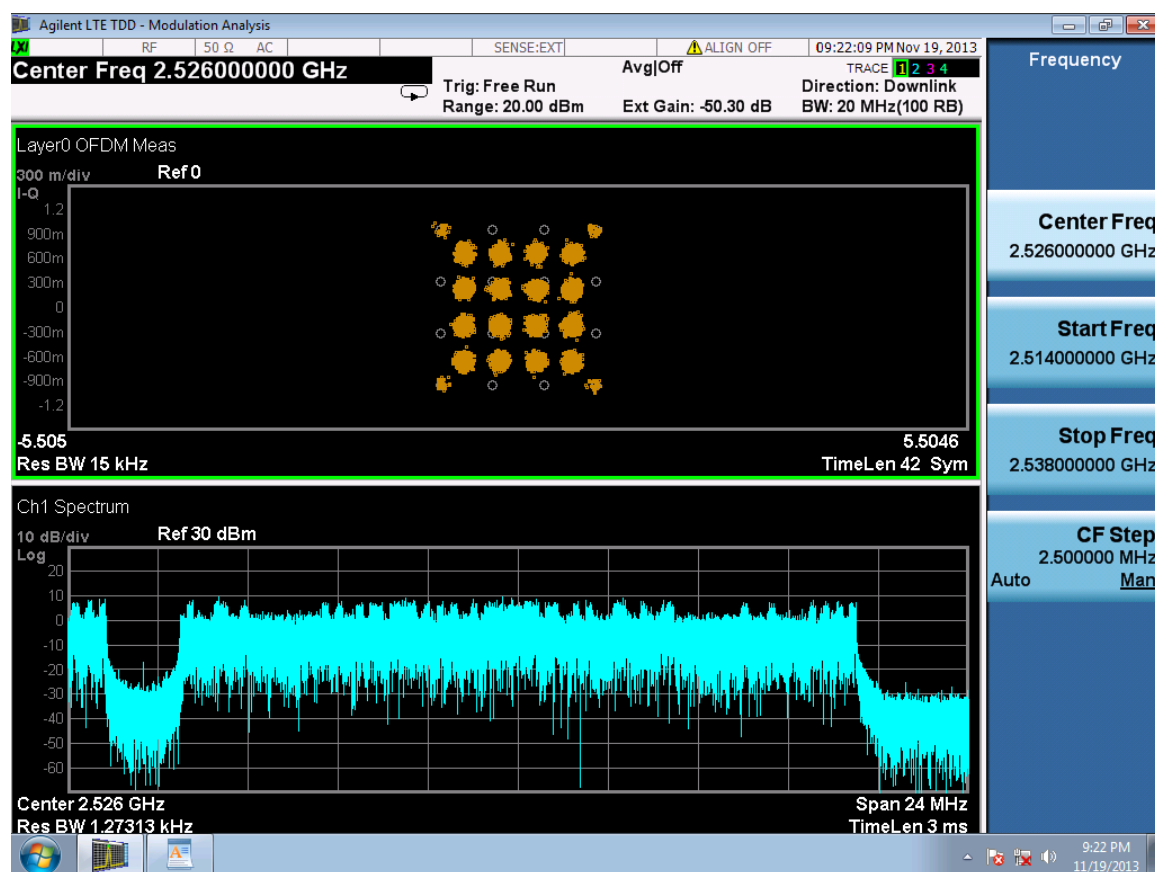
Peak to Average
QPSK
2506, 2526 MHz (20 MHz + 20MHz BW)





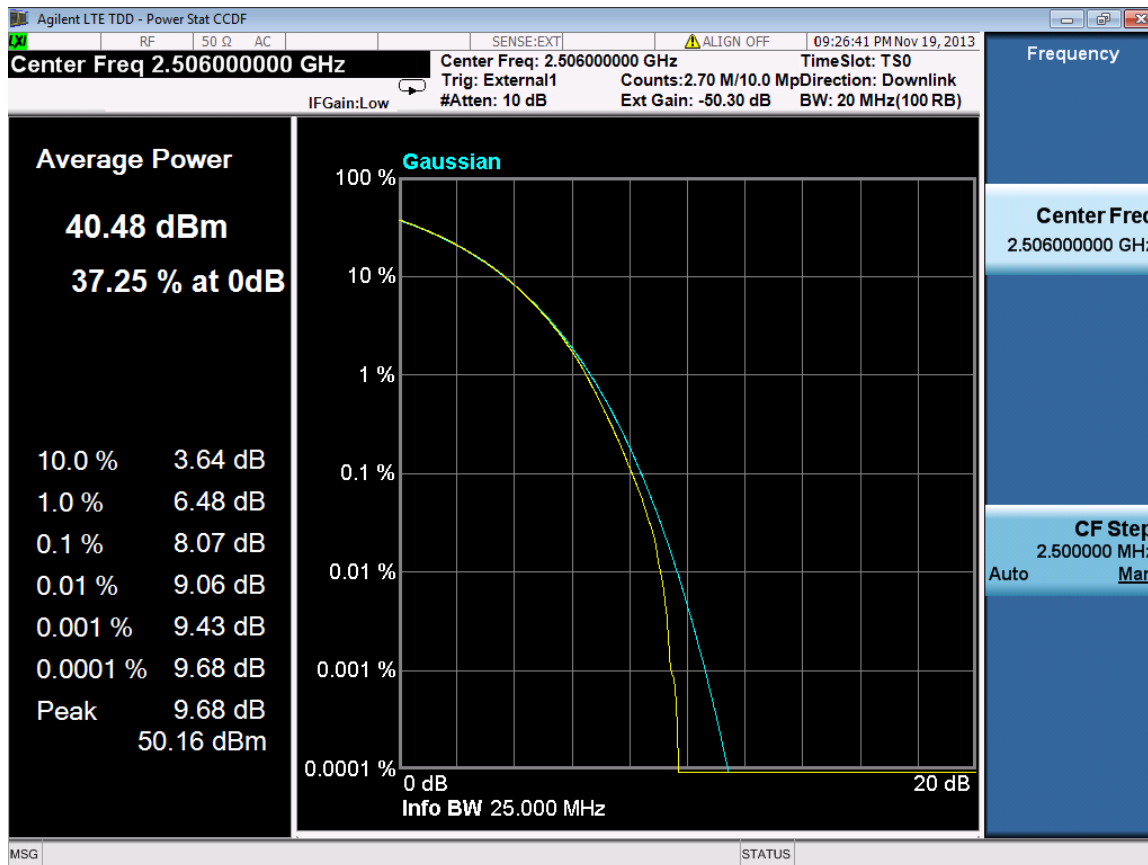
16QAM
2506, 2526 MHz (20 MHz + 20MHz BW)

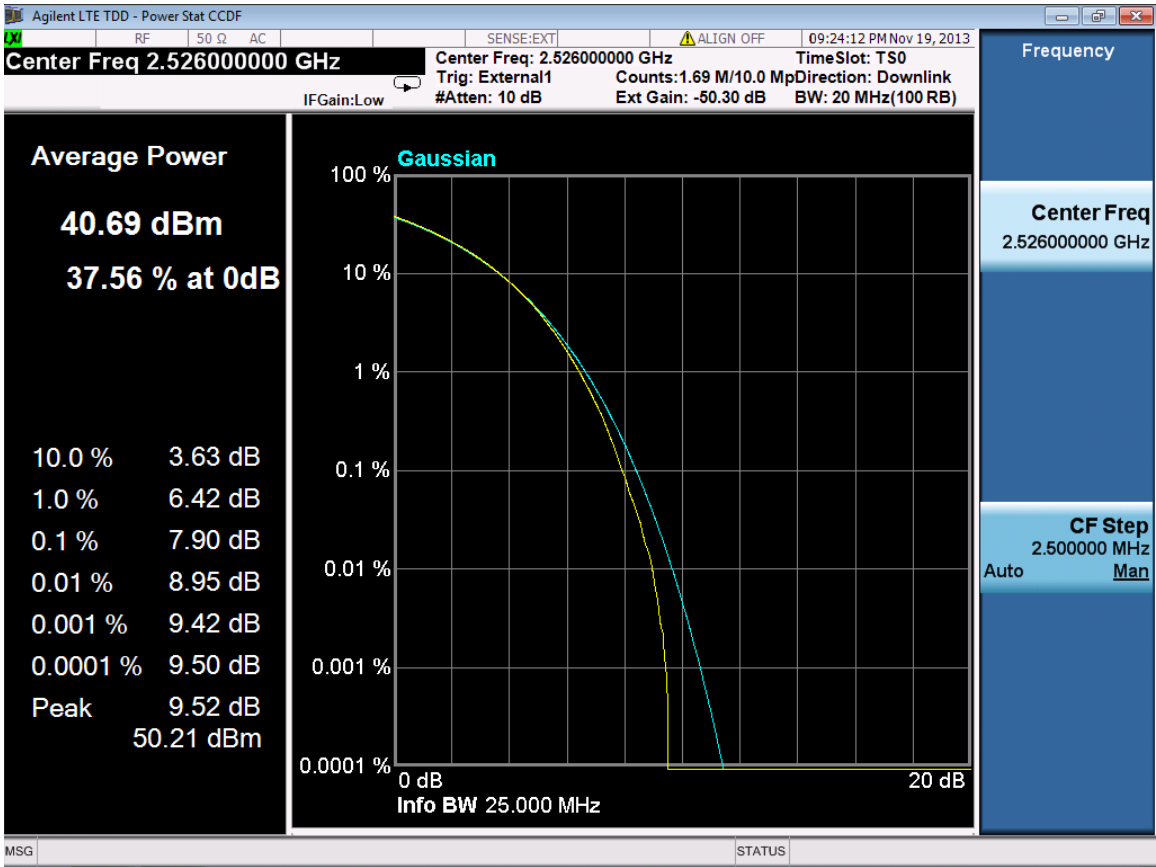




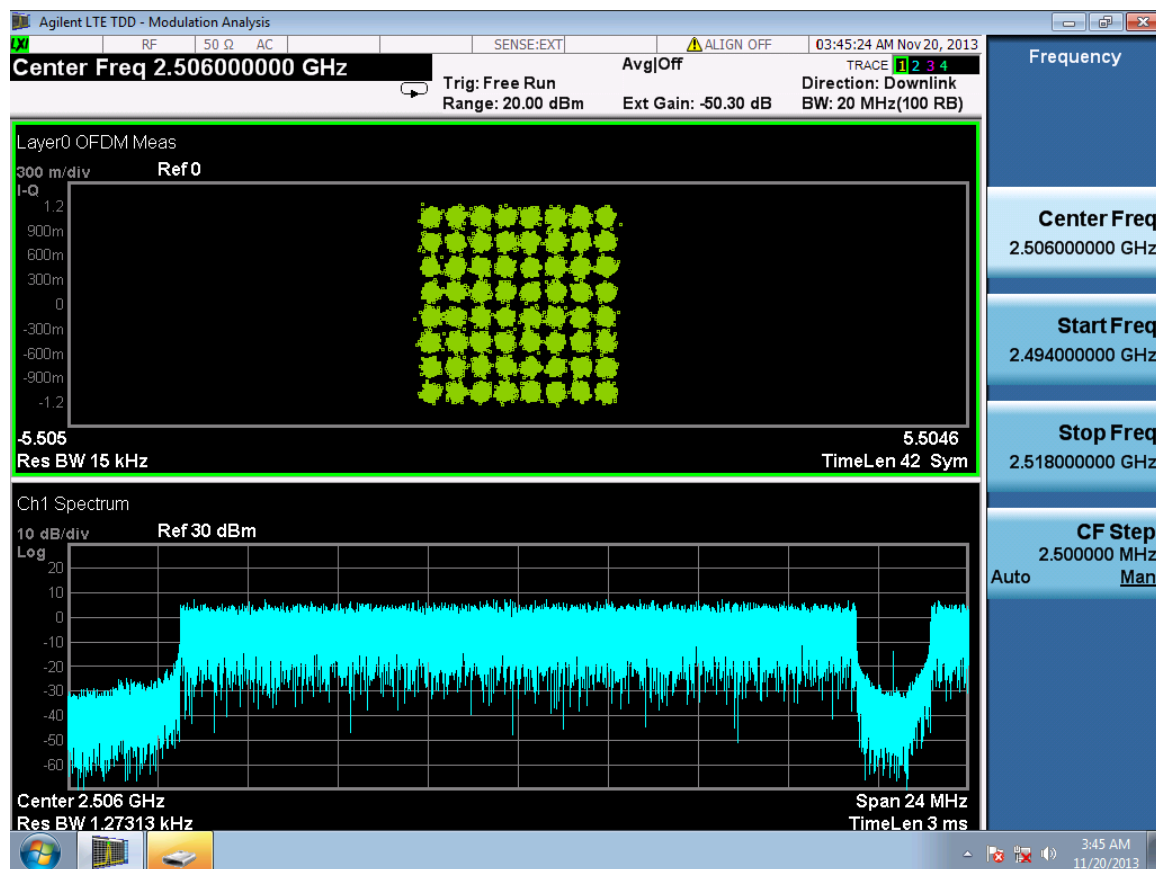
TD-RRH8X20 (BC41) 2.5GHz
FCC Part 27.53; PWR: 20 (8x20W MIMO)
FCCID: AS5BBTRX-15
TEST ENGINEER: JY

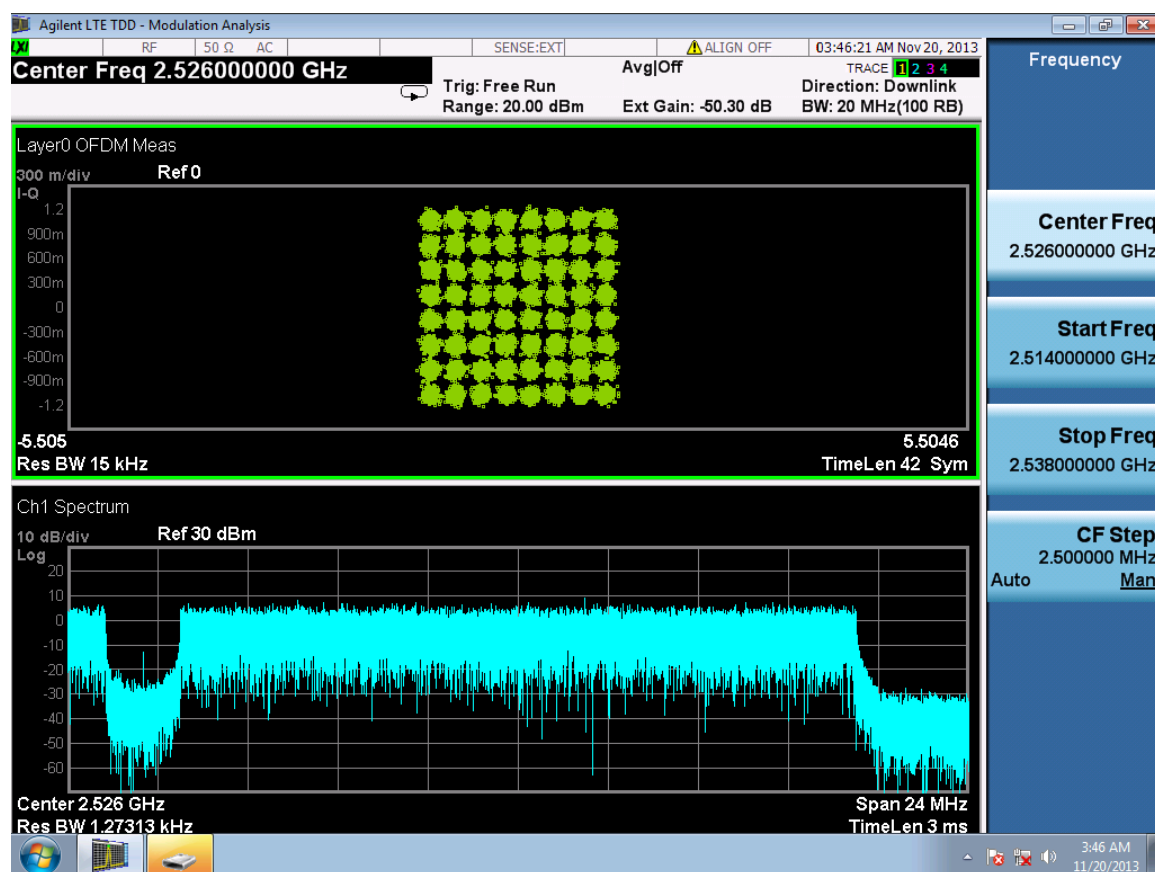
Peak to Average
16QAM
2506, 2526MHz (20 MHz + 20MHz BW)





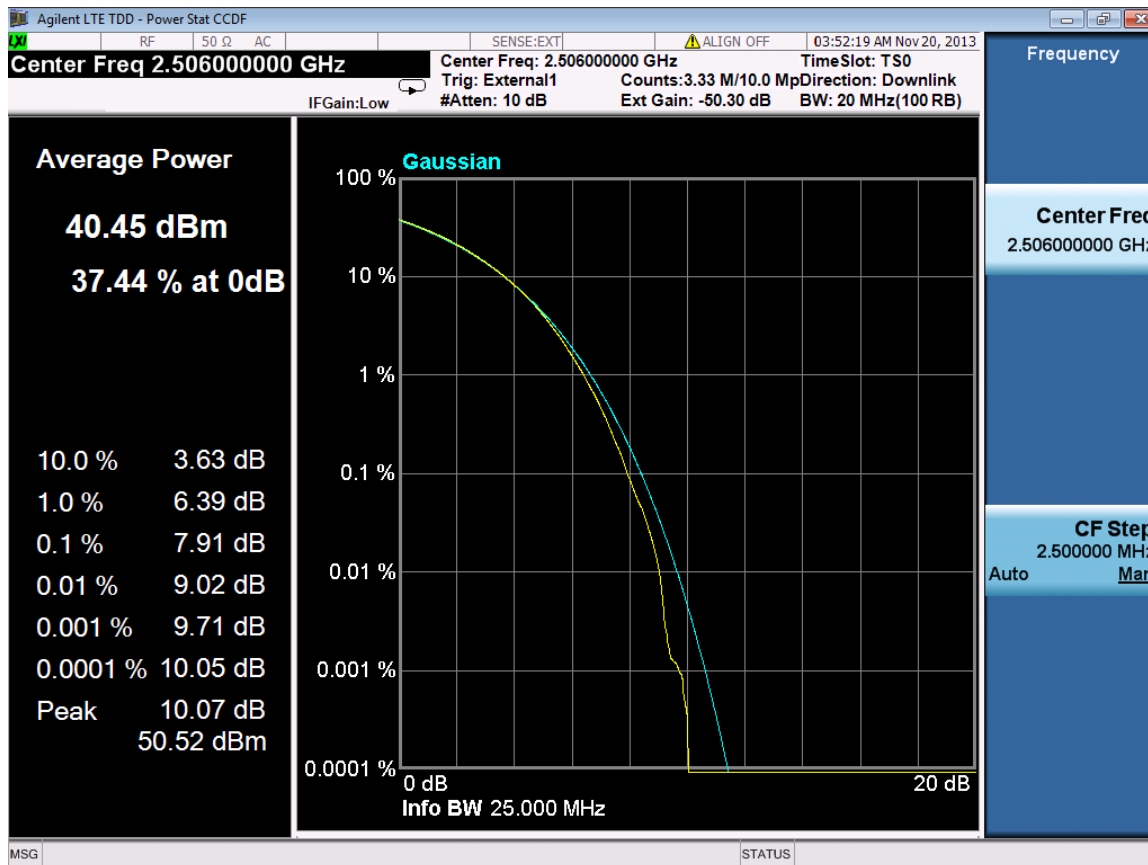
64QAM
2506, 2526 MHz (20 MHz + 20MHz BW)

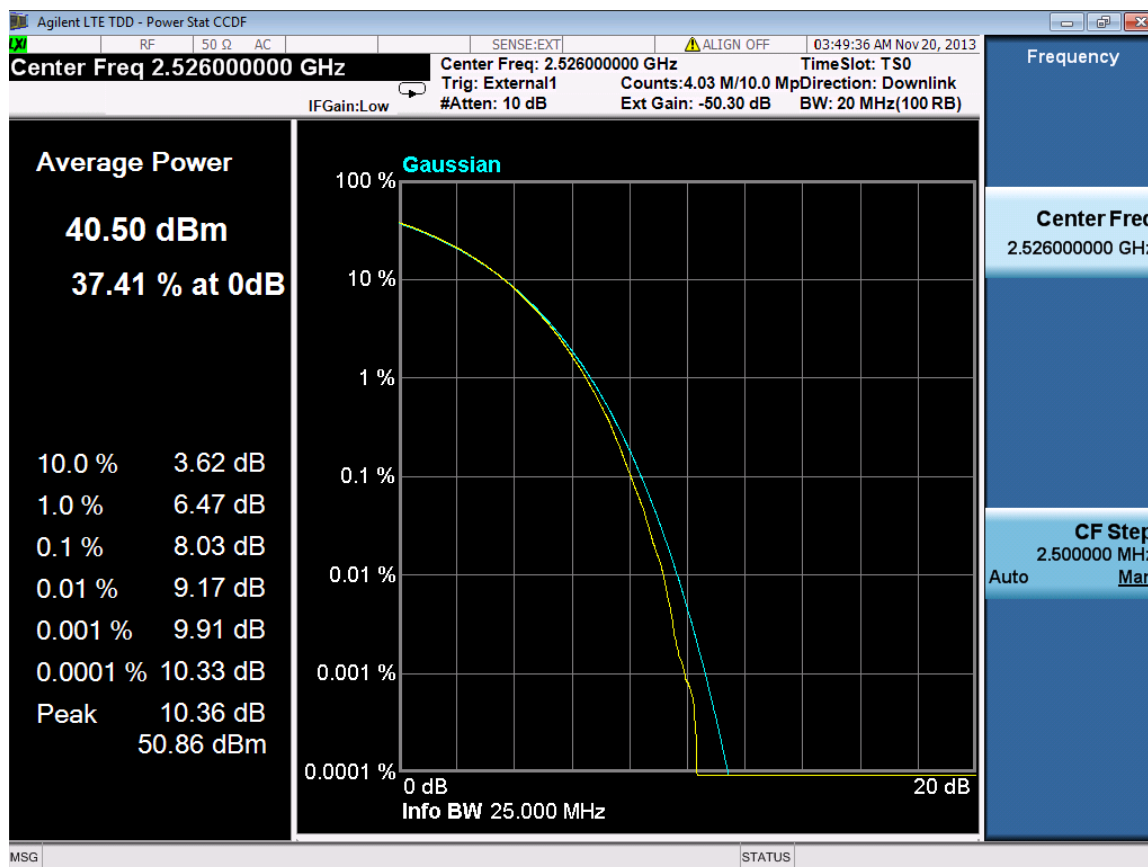




TD-RRH8X20 (BC41) 2.5GHz
FCC Part 27.53; PWR: 20 (8x20W MIMO)
FCCID: AS5BBTRX-15
TEST ENGINEER: JY

Peak to Average
64QAM
2506, 2526 MHz (20 MHz + 20 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: 18.50 MHz for 20 MHz Bandwidth, and 38.70MHz for 40 MHz Bandwidth.

Therefore:

Measured Emission type: **9M48F9W** for 20 MHz Bandwidth.

Measured Emission type: **18M85F9W** for 40 MHz Bandwidth.

**MEASUREMENT OF EMISSIONS 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 ESU 40 Spectrum Analyzer/Receiver. The emissions bandwidth is described in section 27.53 (m) (v) (6) 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 “TD-RRH8X20” enclosure in the following configurations:

1. QPSK
2. 16 QAM
3. 64 QAM

Results:

The plots are provided for QPSK, 16QAM and 64QAM modulations for 20 MHz band and 40MHz bandwidth. The Measured 26dB emissions bandwidth is 18.50 MHz for 20 MHz bandwidth and 38.70 MHz for 40 MHz bandwidth.

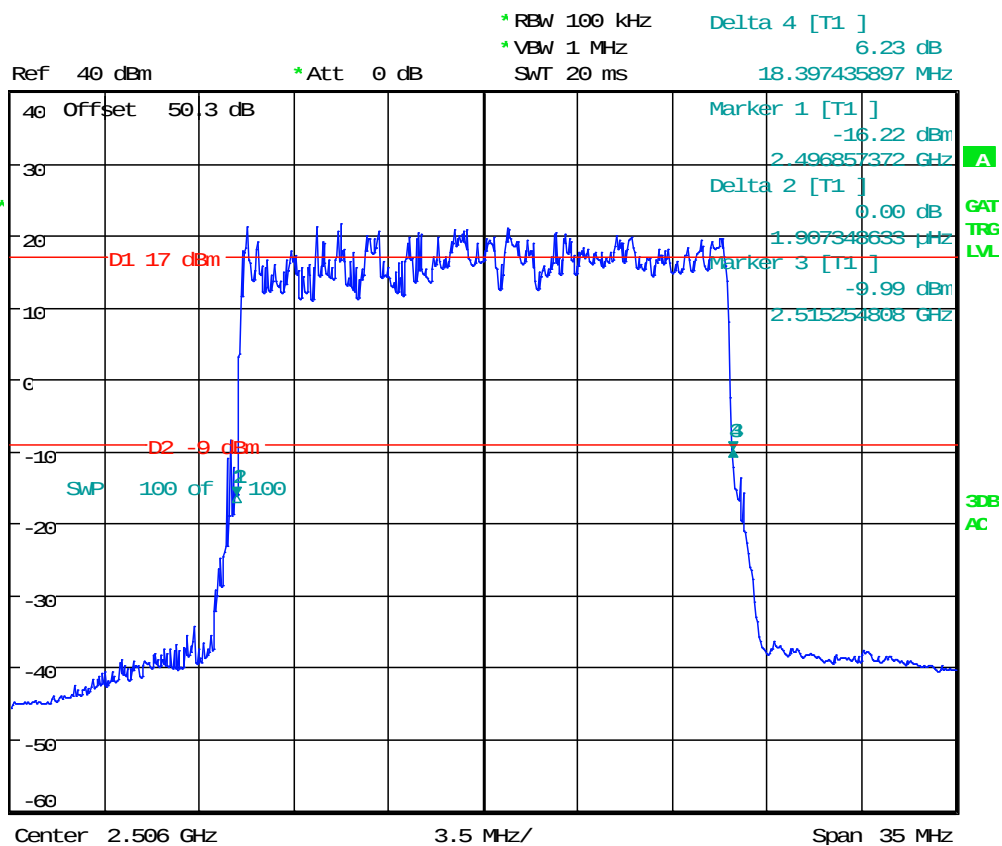
**20 MHz Bandwidth 2496 – 2516 MHz
(Lower)**

8x10 watts (MIMO)

(26dB Bandwidth)



1 RV
AVC



26dB BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2496-2516 MHz

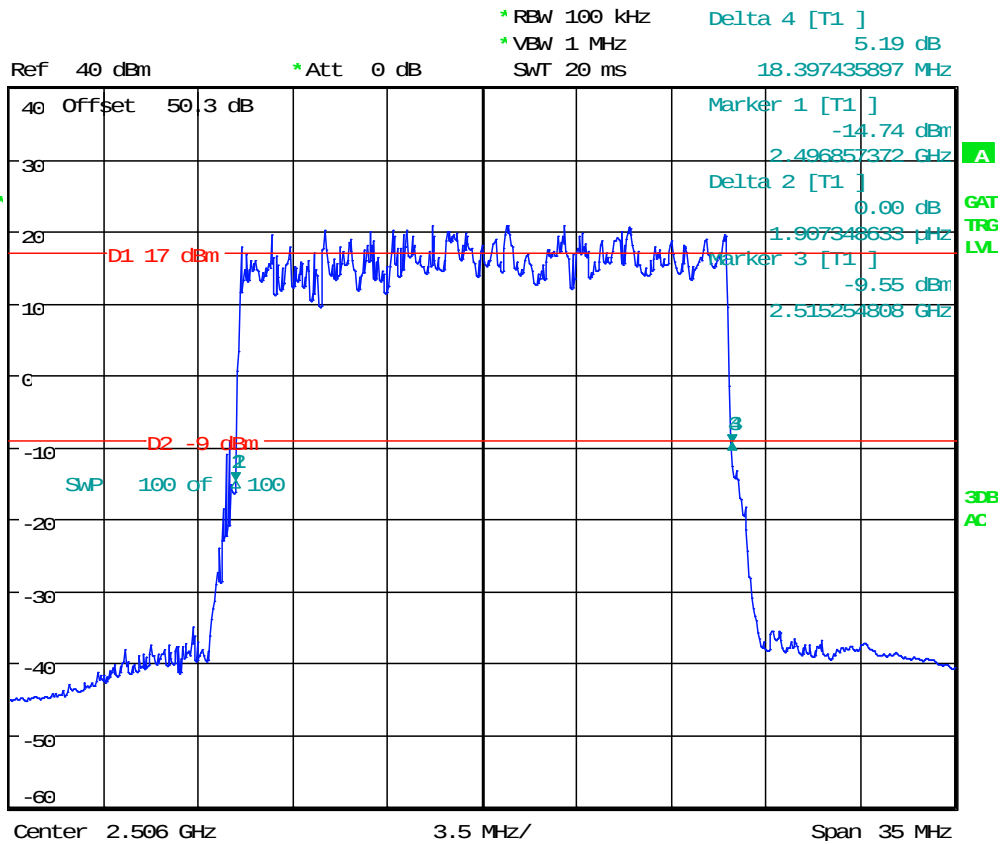
20MHz BW; PWR:10W; QPSK

Date: 8.NOV.2013 13:45:02

FCC Part 27; FCC ID:AS5BBTRX-15



1 RV
AVC



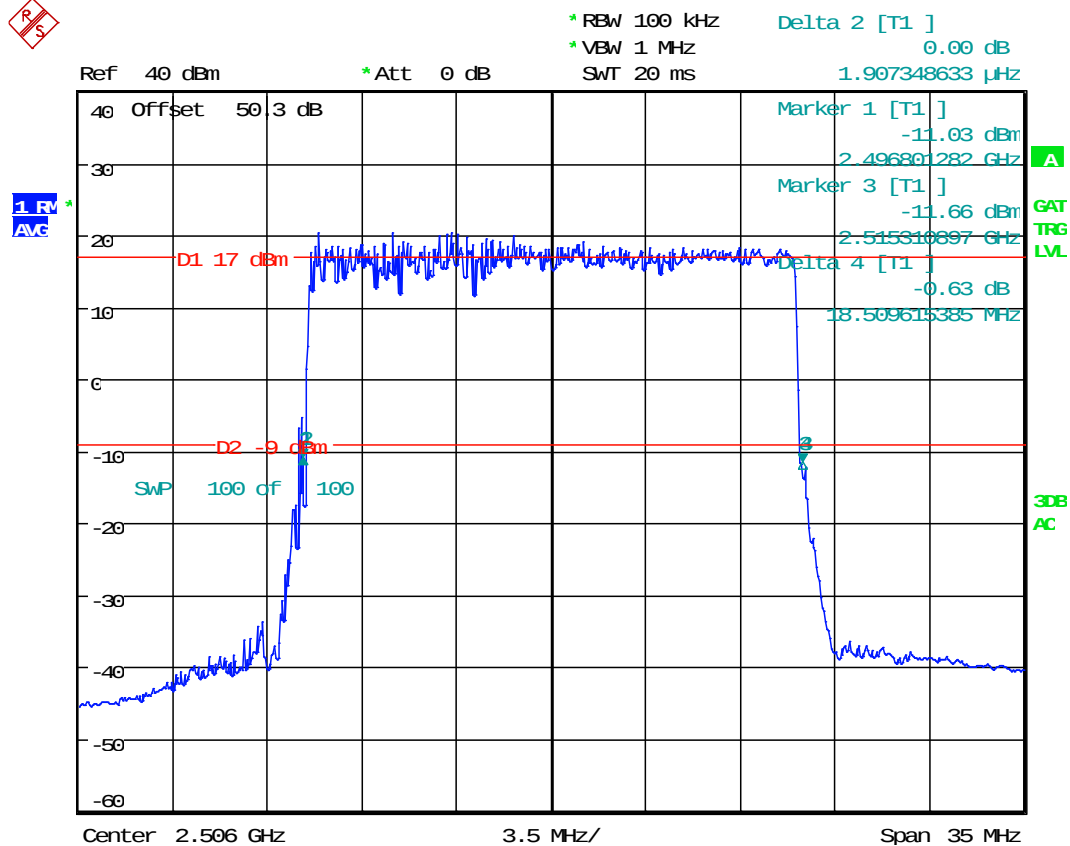
26dB BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2496-2516 MHz

20MHz BW; PWR:10W; 16QAM

Date: 11.NOV.2013 10:06:14

FCC Part 27; FCC ID:AS5BBTRX-15



26dB BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2496-2516 MHz

20MHz BW; PWR:10W; 64QAM

Date: 8.NOV.2013 10:47:39

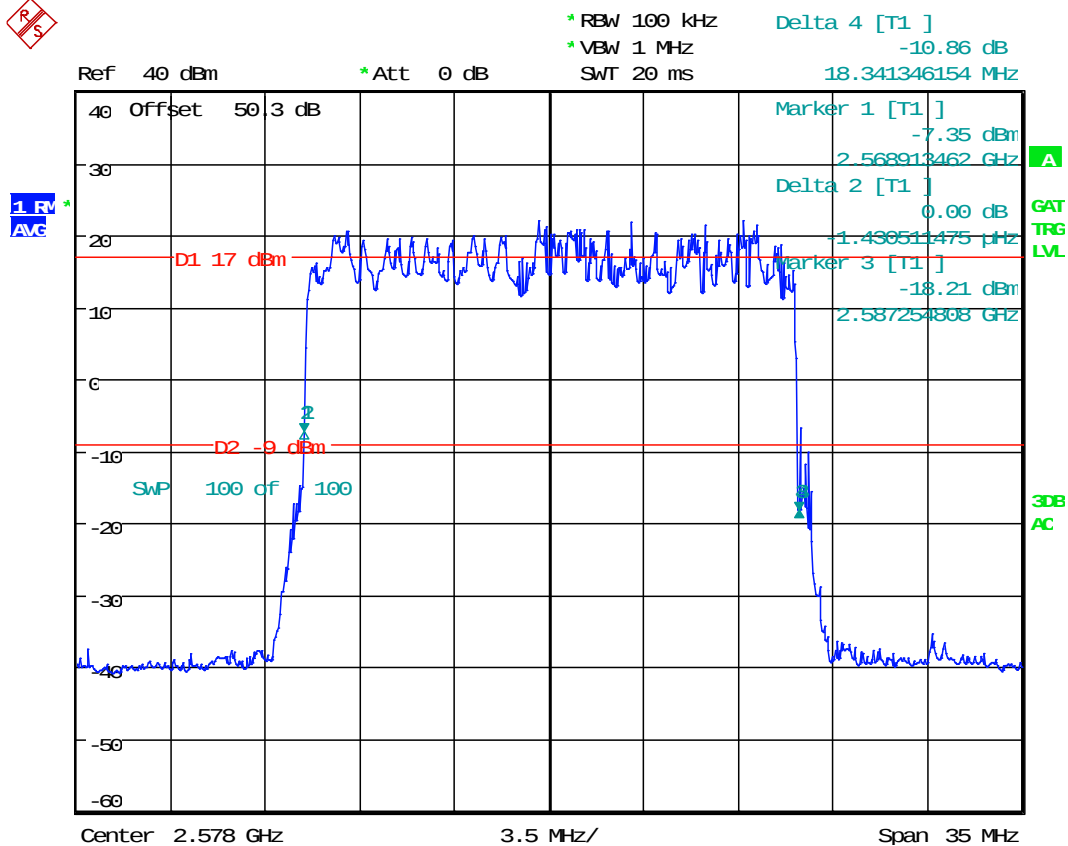
FCC Part 27; FCC ID:AS5BBTRX-15

20 MHz Bandwidth 2568 – 2588 MHz

(Middle)

8x10 watts (MIMO)

(26dB Bandwidth)



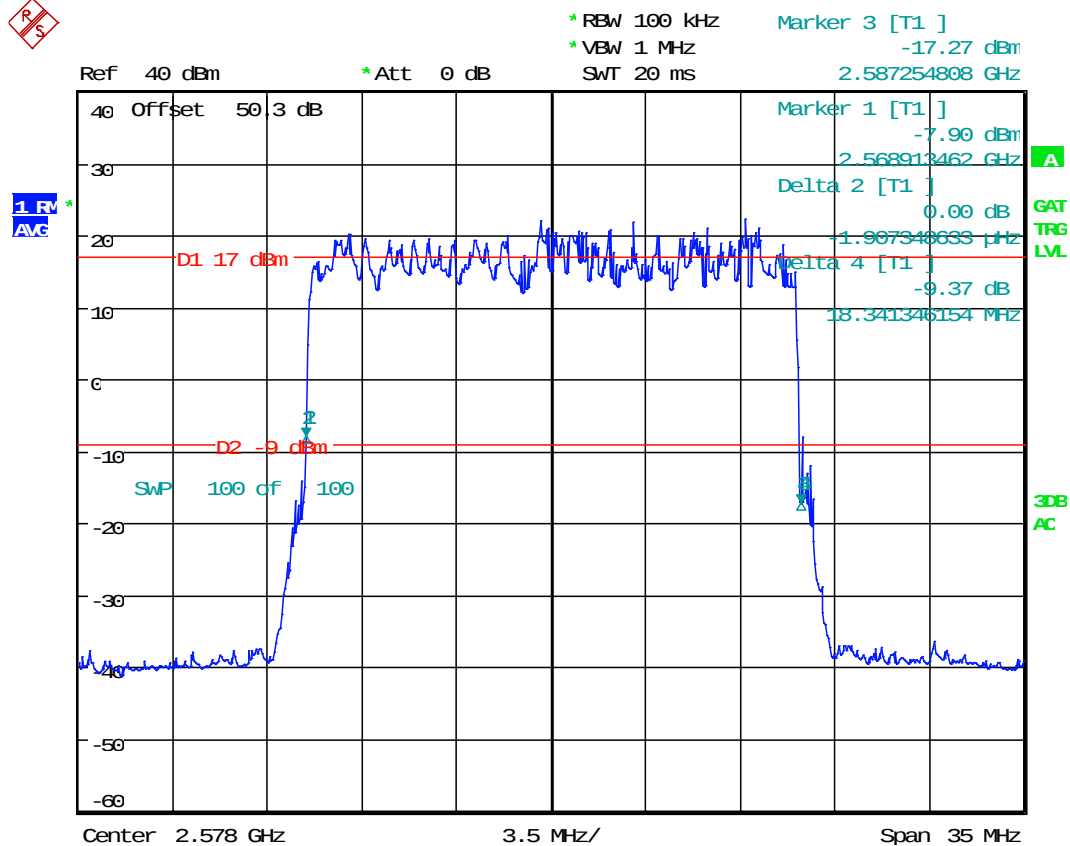
26dB BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2568-2588 MHz

20MHz BW; PWR:10W; QPSK

Date: 8.NOV.2013 14:00:12

FCC Part 27; FCC ID:AS5BBTRX-15



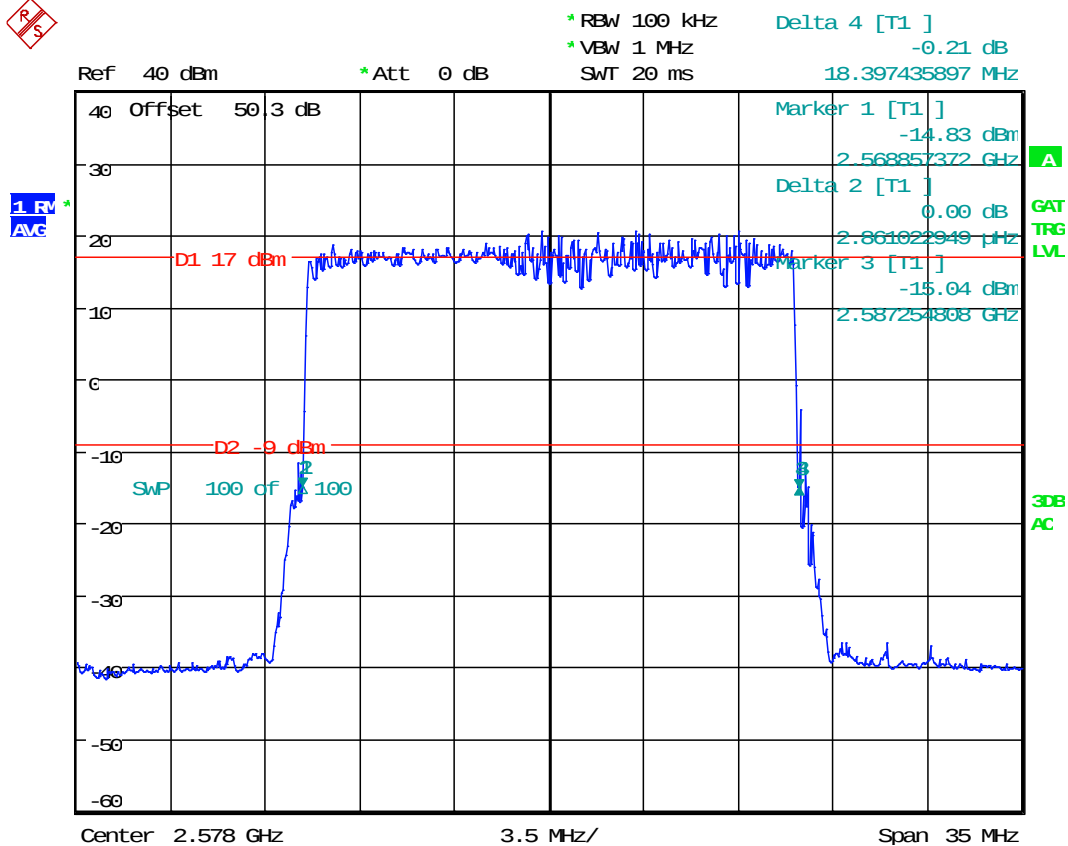
26dB BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2568-2588 MHz

20MHz BW; PWR:10W; 16QAM

Date: 8.NOV.2013 14:44:32

FCC Part 27; FCC ID:AS5BBTRX-15



26dB BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2568-2588 MHz

20MHz BW; PWR:10W; 64QAM

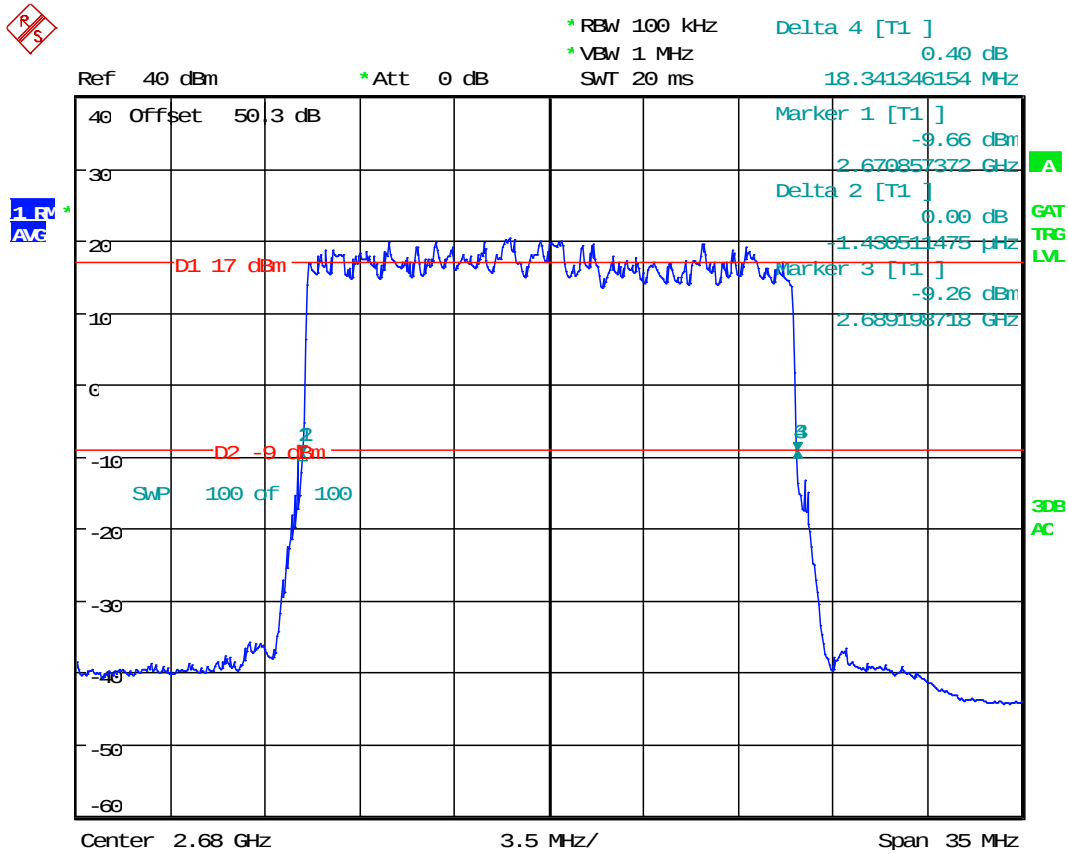
Date: 8.NOV.2013 06:43:10

FCC Part 27; FCC ID:AS5BBTRX-15

**20 MHz Bandwidth 2670 – 2690 MHz
(Higher)**

8x10 watts (MIMO)

(26dB Bandwidth)



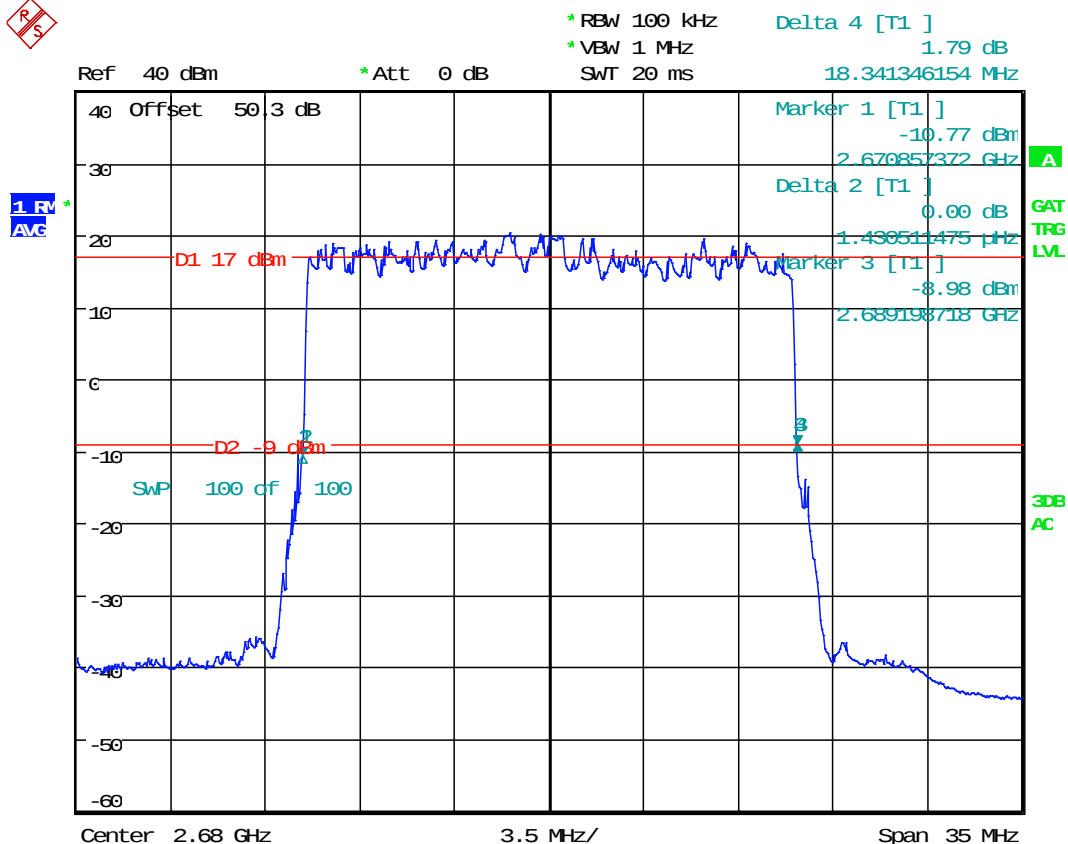
26dB BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2670-2690 MHz

20MHz BW; PWR:10W; QPSK

Date: 8.NOV.2013 15:24:06

FCC Part 27; FCC ID:AS5BBTRX-15



26dB BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2670-2690 MHz

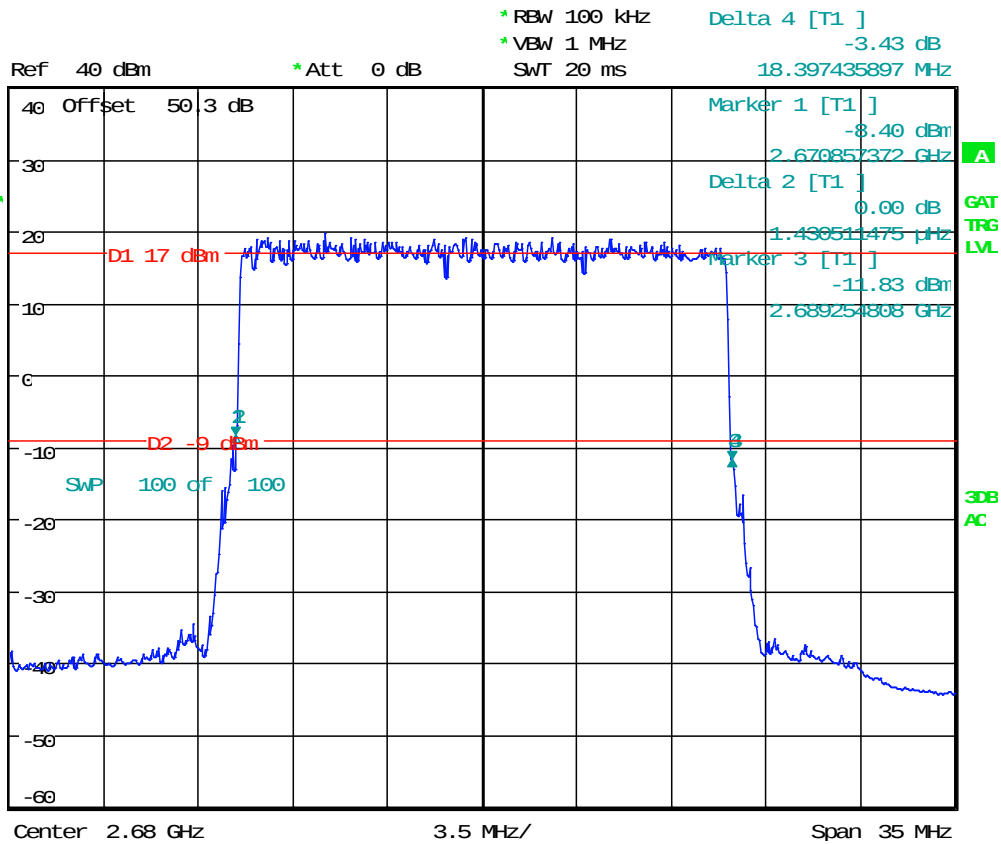
20MHz BW; PWR:10W; 16QAM

Date: 8.NOV.2013 15:49:43

FCC Part 27; FCC ID:AS5BBTRX-15



1 RV
AVC



26dB BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2670-2690 MHz

20MHz BW; PWR:10W; 64QAM

Date: 7.NOV.2013 16:03:17

FCC Part 27; FCC ID:AS5BBTRX-15

40 MHz Bandwidth (20MHz+20MHz)

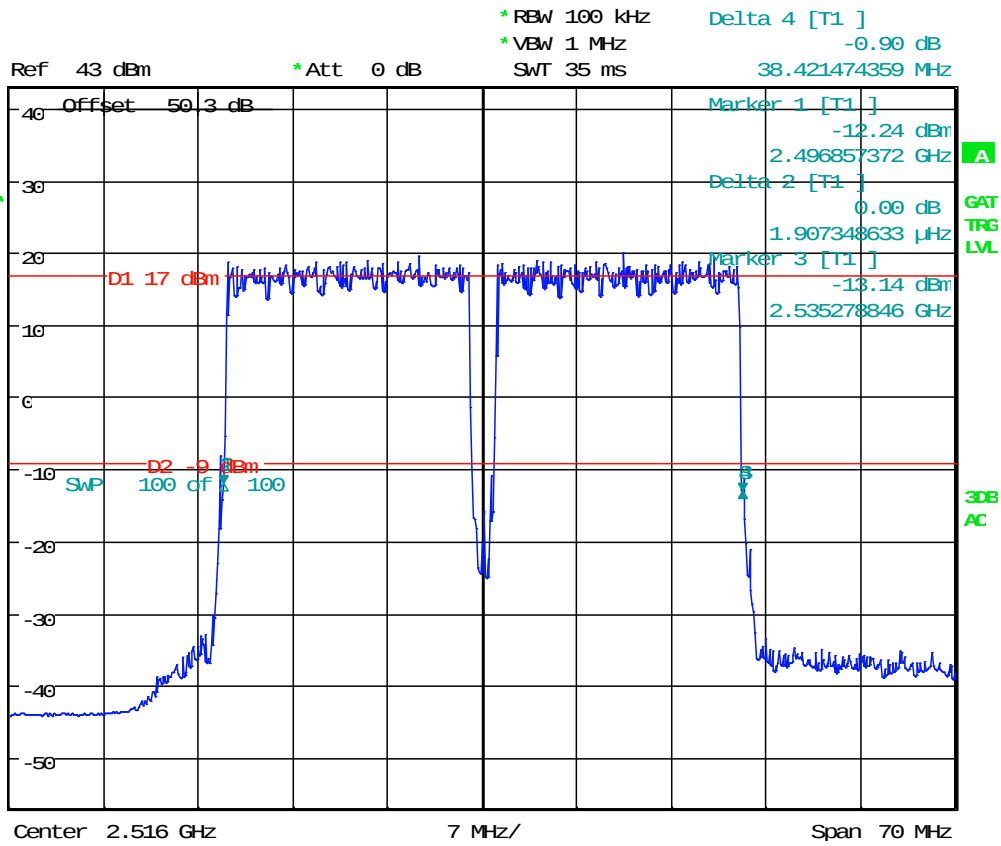
**2496 – 2536 MHz
(Lower)**

8x20 watts (MIMO)

(26dB Bandwidth)



1 RV
AVG



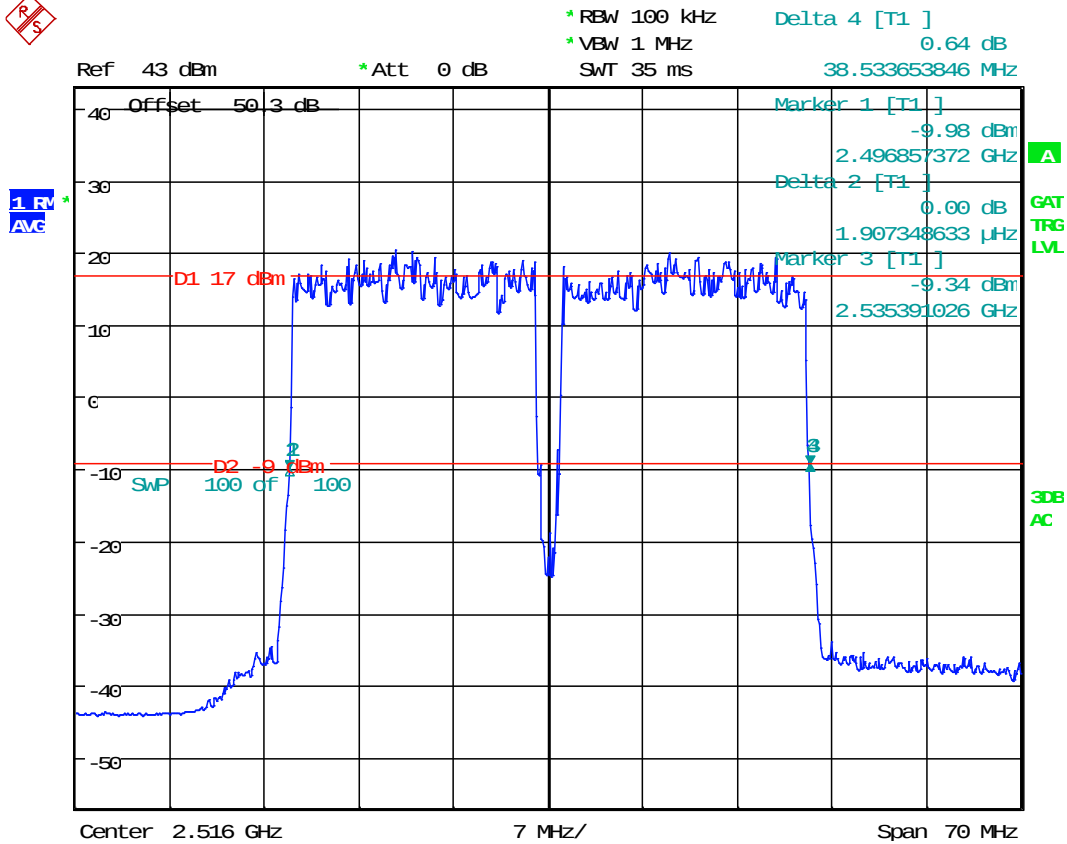
26dB BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2496-2536 MHz (20MHz+20MHz)

40MHz BW; PWR:20W; QPSK

Date: 18.NOV.2013 11:18:45

FCC Part 27; FCC ID:AS5BBTRX-15



26dB BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2496-2536 MHz (20MHz+20MHz)

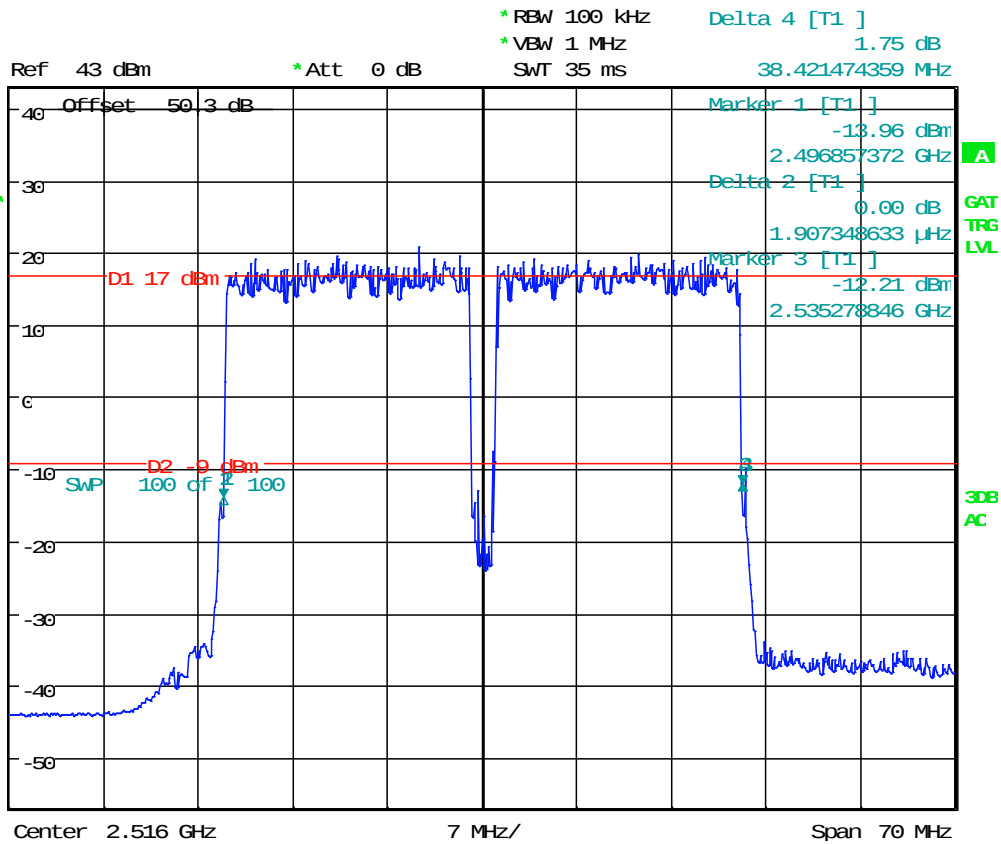
40MHz BW; PWR:20W;16QAM

Date: 19.NOV.2013 09:49:21

FCC Part 27; FCC ID:AS5BBTRX-15



1 RV
AVC



26dB BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2496-2536 MHz (20MHz+20MHz)

40MHz BW; PWR:20W; 64QAM

Date: 19.NOV.2013 15:56:12

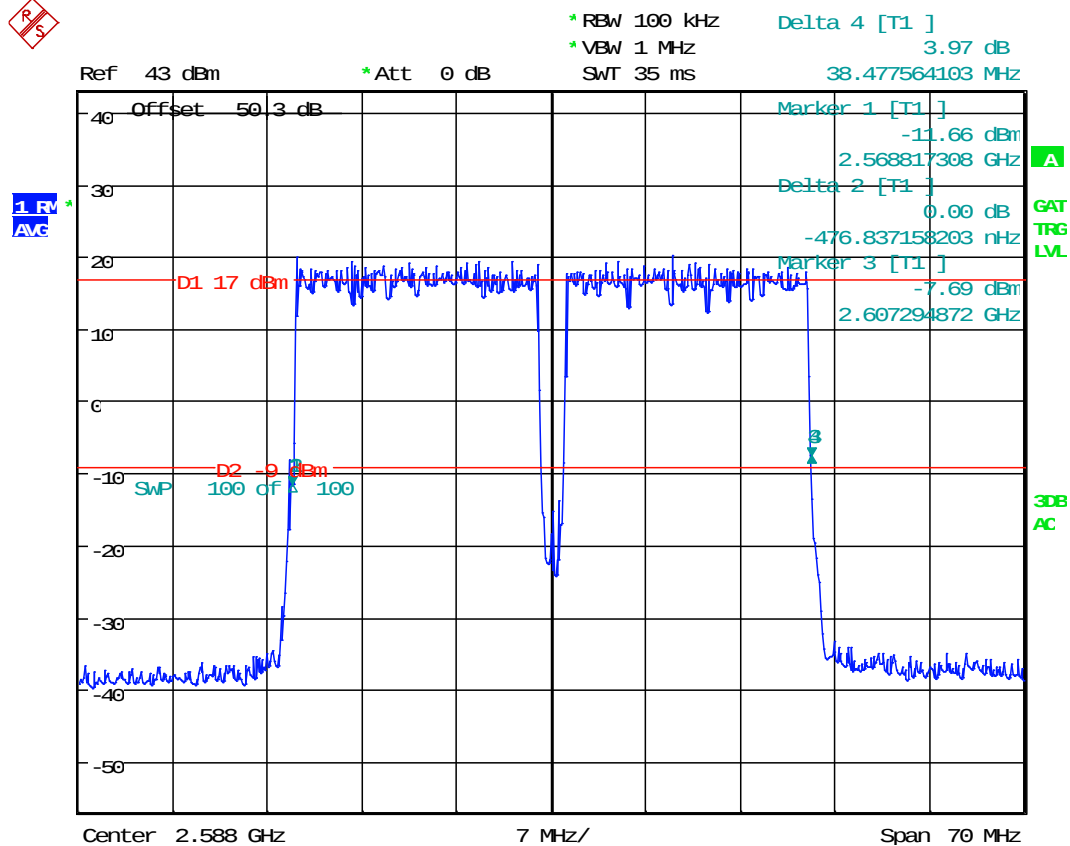
FCC Part 27; FCC ID:AS5BBTRX-15

40 MHz Bandwidth (20MHz+20MHz)

**2568 – 2608 MHz
(Middle)**

8x20 watts (MIMO)

(26dB Bandwidth)



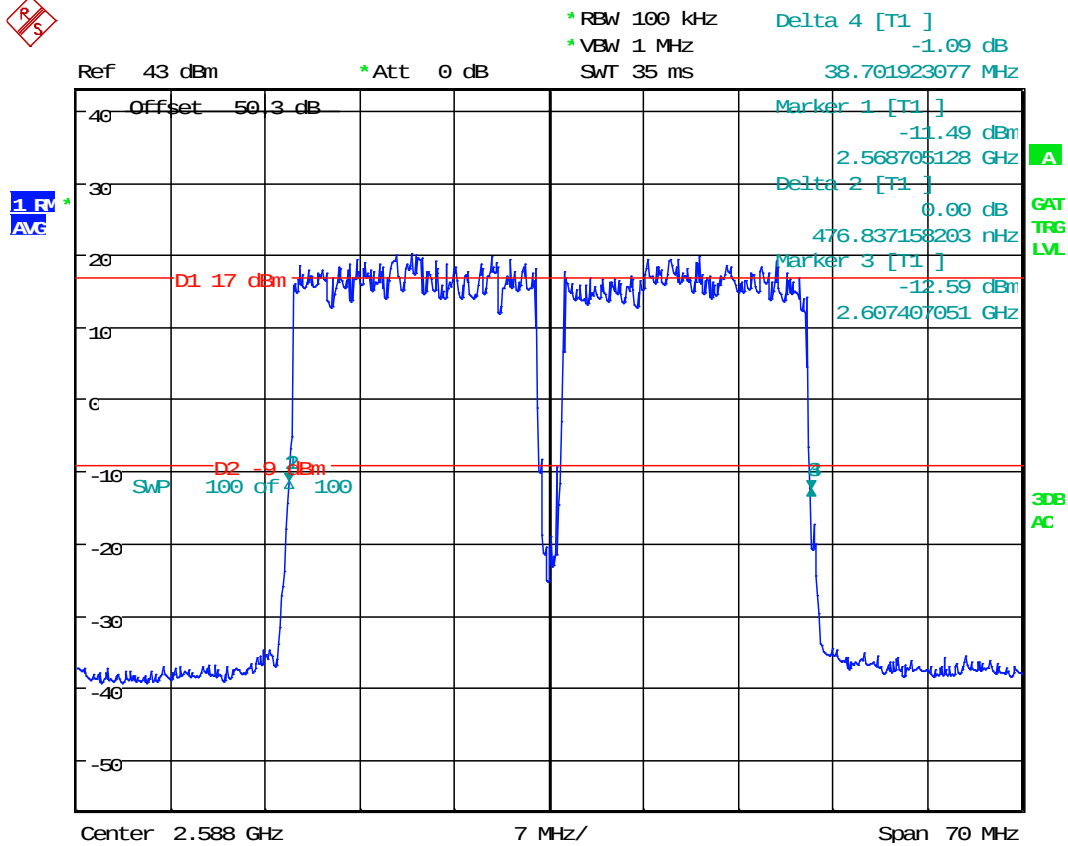
26dB BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2568-2608 MHz (20MHz+20MHz)

40MHz BW; PWR:20W; QPSK

Date: 18.NOV.2013 14:12:44

FCC Part 27; FCC ID:AS5BBTRX-15



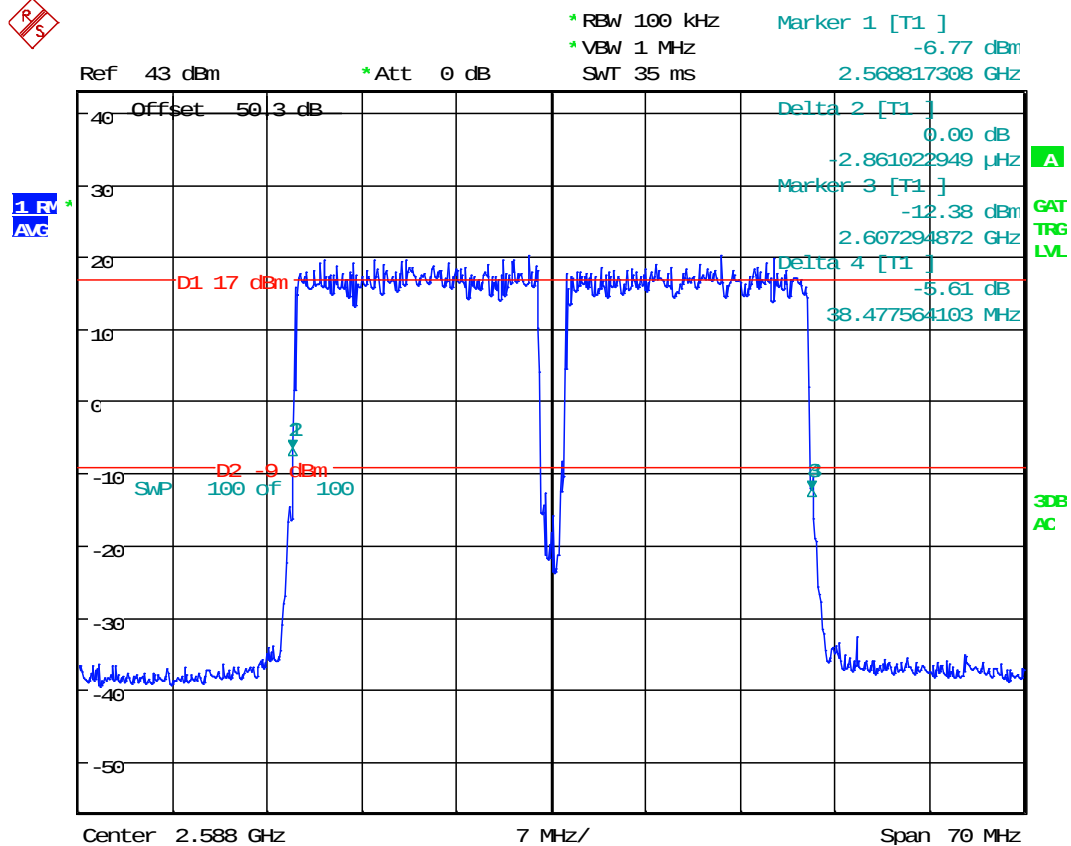
26dB BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2568-2608 MHz (20MHz+20MHz)

40MHz BW; PWR:20W; 16QAM

Date: 19.NOV.2013 07:28:57

FCC Part 27; FCC ID:AS5BBTRX-15



26dB BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2568-2608 MHz (20MHz+20MHz)

40MHz BW; PWR:20W; 64QAM

Date: 19.NOV.2013 14:25:12

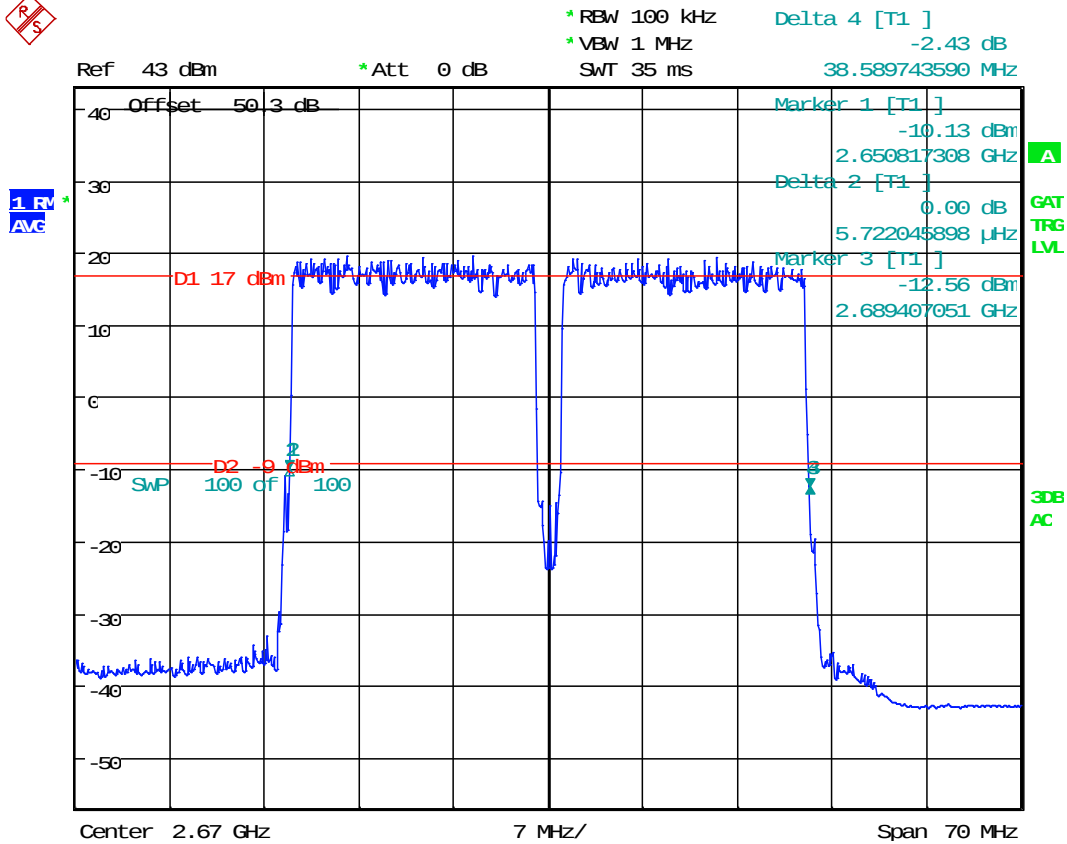
FCC Part 27; FCC ID:AS5BBTRX-15

40 MHz Bandwidth (20MHz+20MHz)

**2650 – 2690 MHz
(Higher)**

8x20 watts (MIMO)

(26dB Bandwidth)



26dB BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2650-2690 MHz (20MHz+20MHz)

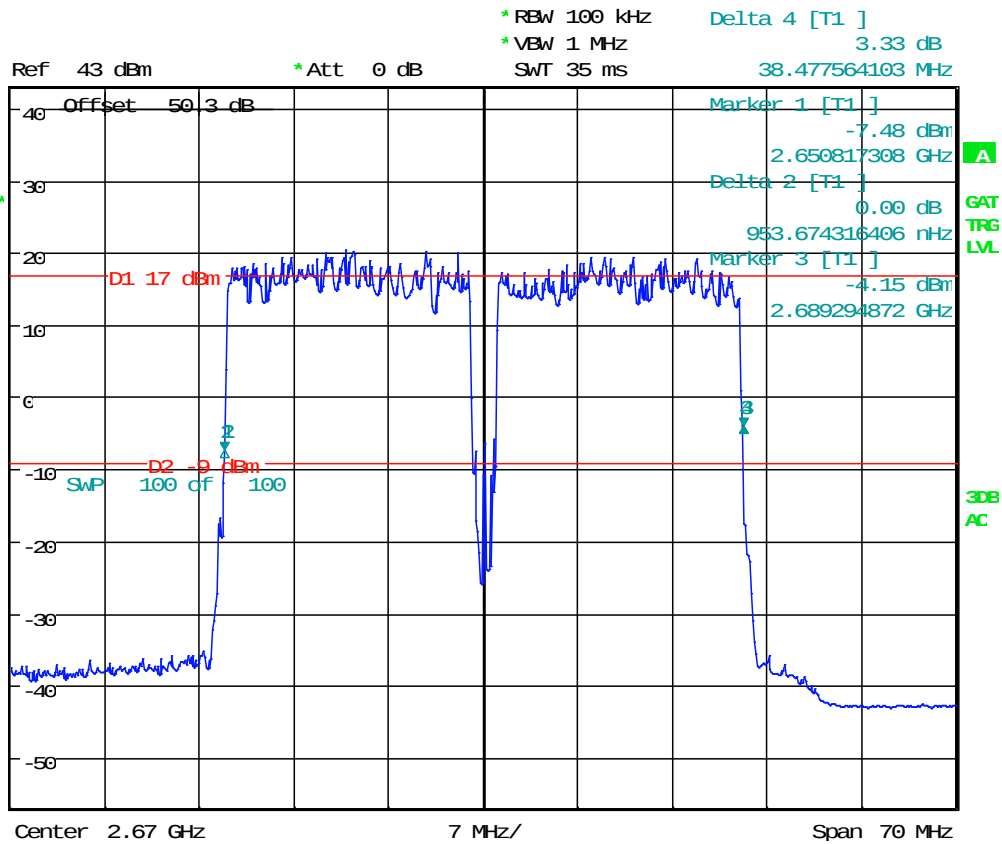
40MHz BW; PWR:20W; QPSK

Date: 18.NOV.2013 13:10:14

FCC Part 27; FCC ID:AS5BBTRX-15



1 RV
AVC



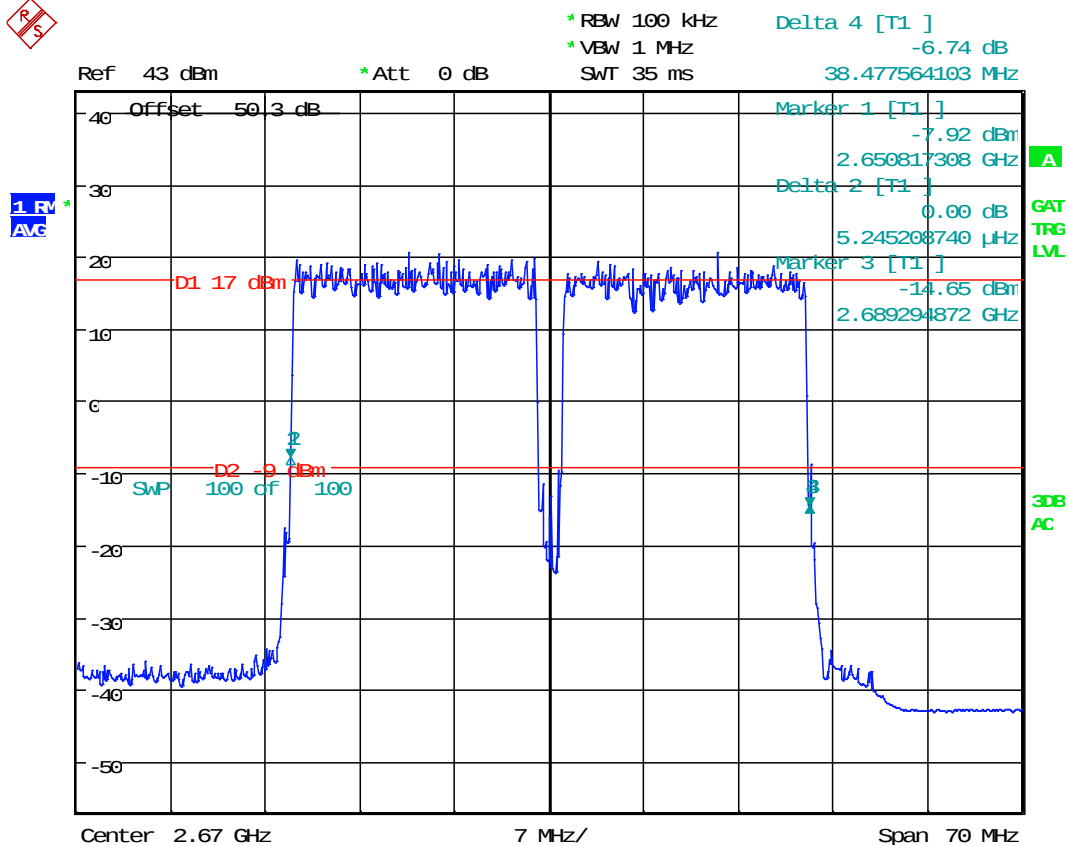
26dB BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2650-2690 MHz (20MHz+20MHz)

40MHz BW; PWR:20W; 16QAM

Date: 19.NOV.2013 11:19:30

FCC Part 27; FCC ID:AS5BBTRX-15



26dB BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2650-2690 MHz (20MHz+20MHz)

40MHz BW; PWR:20W; 64QAM

Date: 19.NOV.2013 13:40:00

FCC Part 27; FCC ID:AS5BBTRX-15

**MEASUREMENT OF
SPECTRUM MASK/OCCUPIED BANDWIDTH
(1MHz ADJACENT TO CHANNEL EDGE)
Section 27.53 (m) (v)**

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) were measured using a Rohde & Schwarz ESU Spectrum Analyzer/Receiver and. 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 20MHz wide transmit signal, and 100 kHz resolution bandwidth for 40 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 "TD-RRH8X20 (BC41) in RRH enclosure".

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 10 Watts (40 dBm)/carrier for 20MHz wide signal and 20 Watts (43 dBm)/carrier for 40MHz wide signal.

Reference signal derived from GPS and frame trigger from the RRH were input into analyzer. This enables analyzer to measure power and occupied BW only during cycle of the transmitter providing accurate measurements. Reference, trigger and duty cycle wave forms are provided in Measurement: (2) Modulation characteristics (response to FCC Section 2.1047)

The frequencies and blocks used were tabulated on the bottom of each plot. The output signals at RF filter were plotted for first, middle and last channels of each frequency band. The TD-RRH8X20 (BC41) is capable of operating in the band of 2496 MHz to 2690MHz. The Base station presently tested was configured to operate at 20 MHz and 40 MHz blocks. 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 (m) (v) (6): Based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified).

Pursuant to FCC OET RULES 662911 D01 and D02 for Eight antenna MIMO mode of operations, the FCC limit of -13dBm shall be 9dB more stringent, therefore all channel edge and out of band spurious emissions shall be -22dBm. Further limits are adjusted for lower resolution BW using 10 log (100kHz/1% of channel BW)

FCC, OET Measurement Guidance for Certification of Licensed Digital Transmitters dated June 7, 2013 has been used for all measurements

.

The list of blocks and bands, tested for QPSK, 16QAM and 64QAM are listed below:

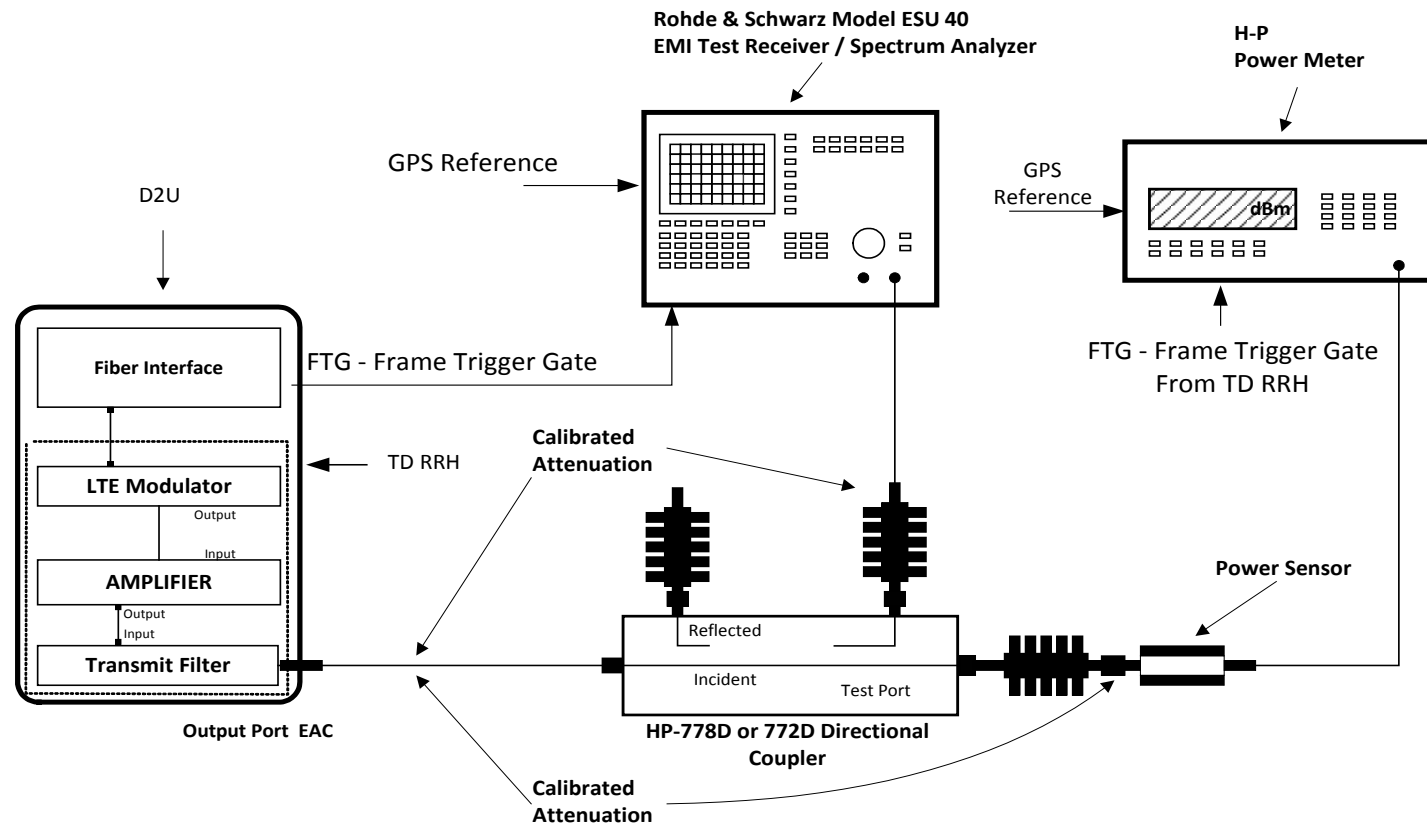
Blocks	Bandwidth (MHz)	Frequency (MHz)	Power (Watts)
Lower	20	2496-2516	10
Middle	20	2568-2588	10
Higher	20	2670-2690	10
Lower	20+20	2496-2536	20
Middle	20+20	2568-2608	20
Higher	20+20	2650-2690	20

Measurement uncertainty:

Frequency: 100 Hz

Amplitude: 0.5 dB

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



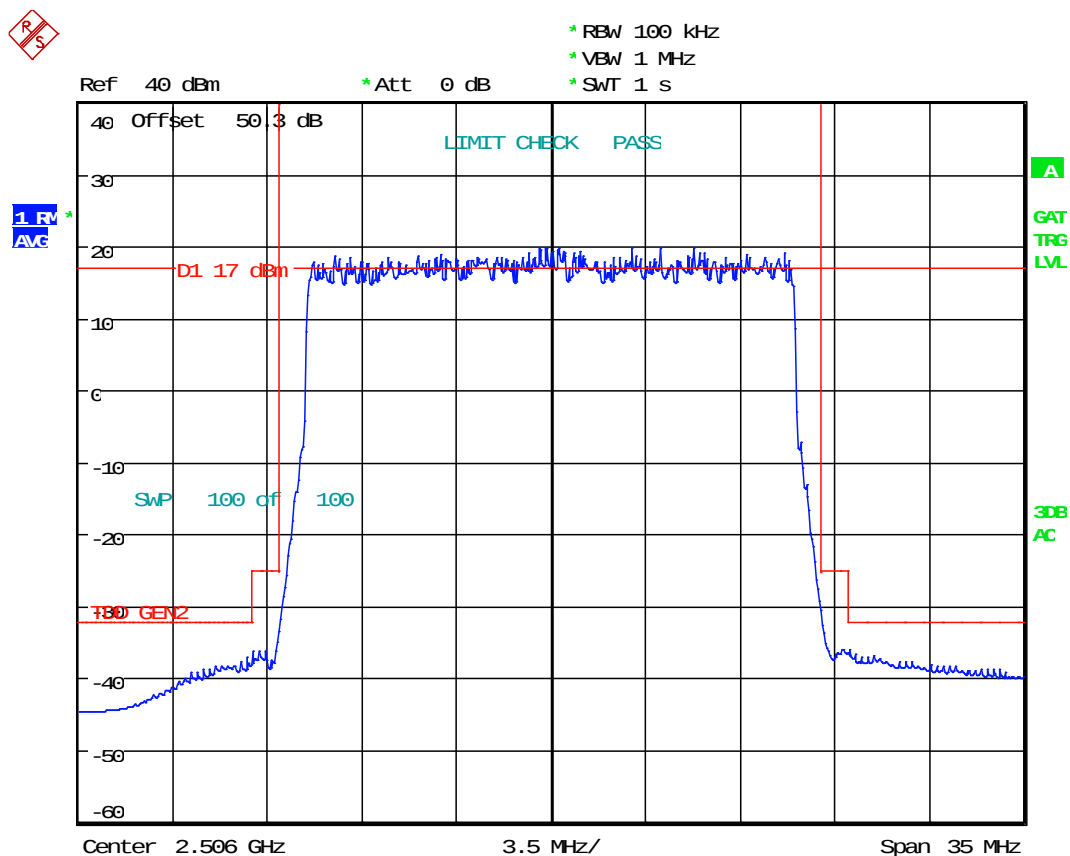
All components are calibrated over the frequency range of interest

**20 MHz Bandwidth (2496 – 2516 MHz)
(Lower)**

8x10watts (MIMO)

SPECTRUM MASK/OCCUPIED BANDWIDTH

(QPSK, 16QAM and 64QAM Modulations)



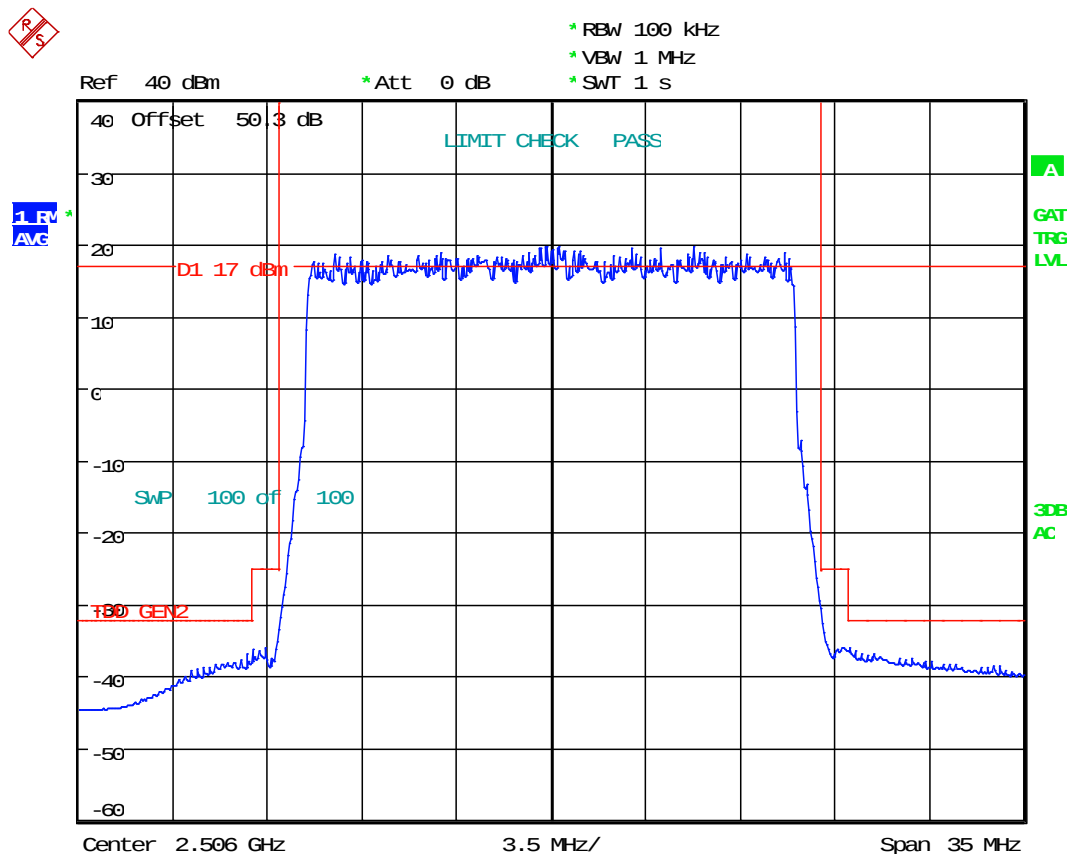
OCCUPIED BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2496-2516 MHz

20MHz BW; PWR:10W; QPSK

Date: 8.NOV.2013 13:43:37

FCC Part 27; FCC ID:AS5BBTRX-15



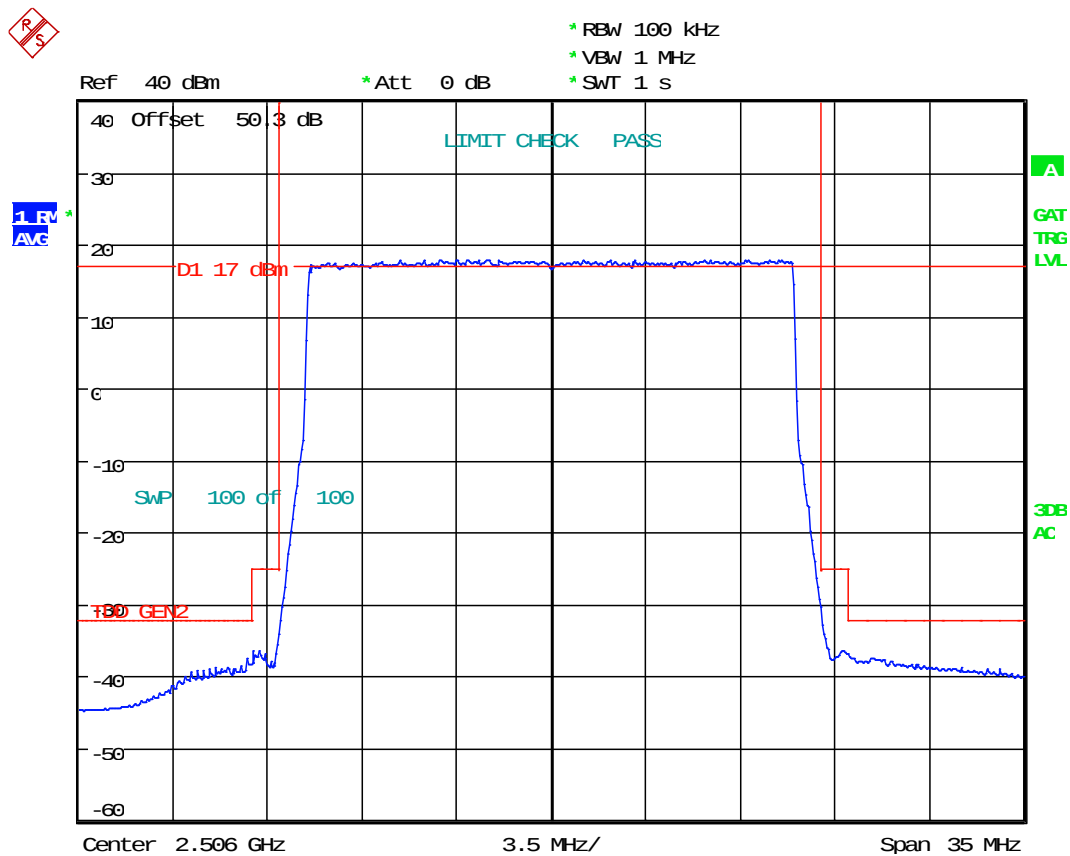
OCCUPIED BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2496-2516 MHz

20MHz BW; PWR:10W; 16QAM

Date: 11.NOV.2013 10:04:11

FCC Part 27; FCC ID:AS5BBTRX-15



OCCUPIED BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2496-2516 MHz

20MHz BW; PWR:10W; 64QAM

Date: 8.NOV.2013 10:45:13

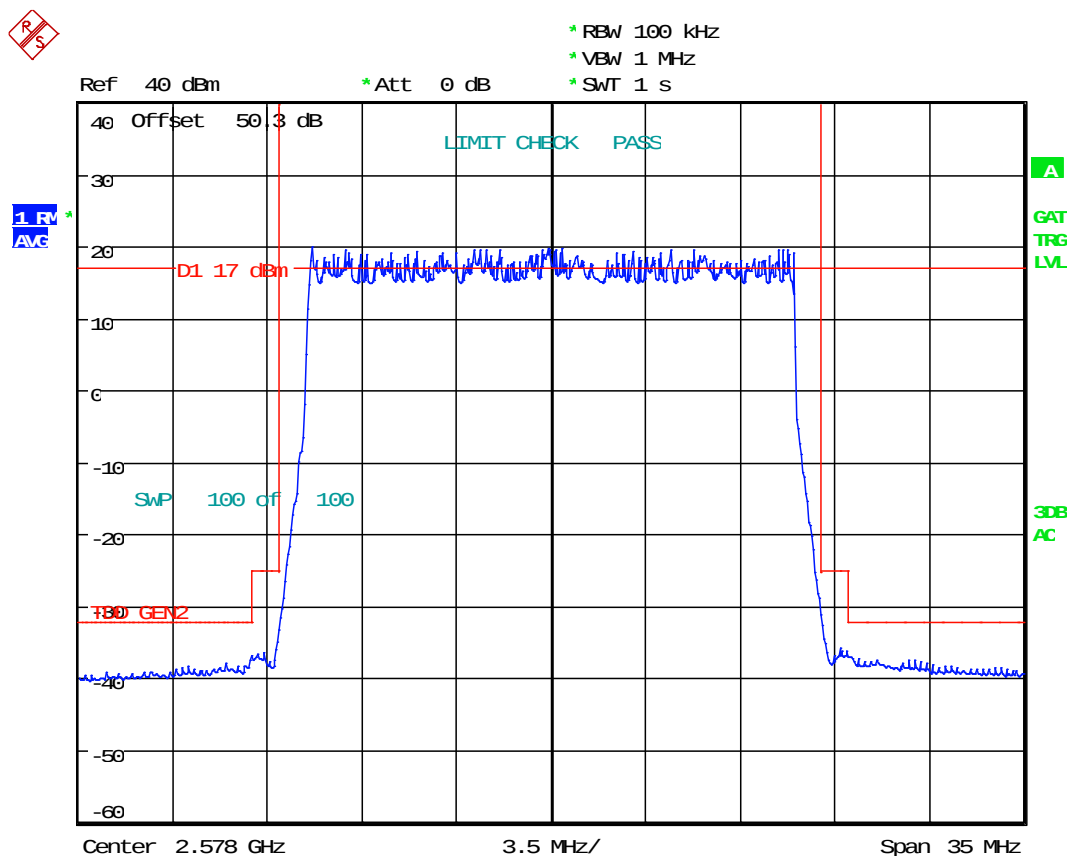
FCC Part 27; FCC ID:AS5BBTRX-15

**20 MHz Bandwidth (2568 – 2588 MHz)
(Middle)**

8x10 watts (MIMO)

SPECTRUM MASK/OCCUPIED BANDWIDTH

(QPSK, 16QAM and 64QAM Modulations)



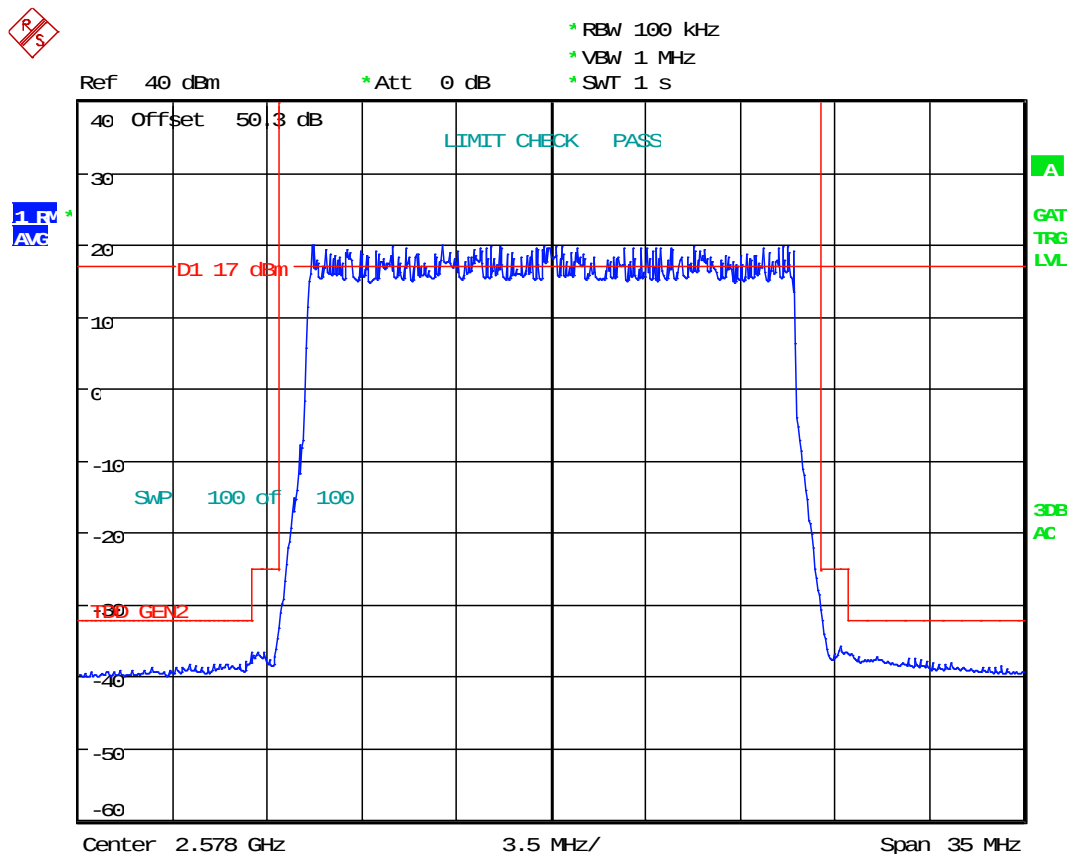
OCCUPIED BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2568-2588 MHz

20MHz BW; PWR:10W; QPSK

Date: 8.NOV.2013 13:57:18

FCC Part 27; FCC ID:AS5BBTRX-15



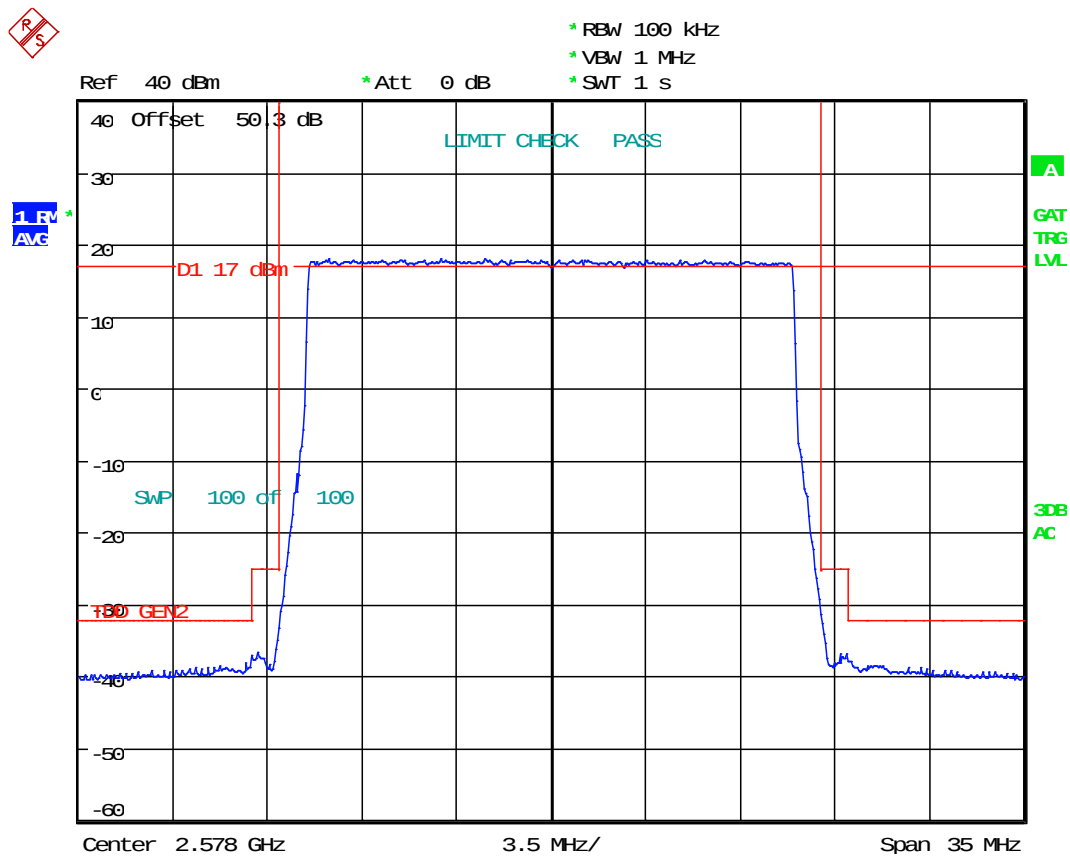
OCCUPIED BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2568-2588 MHz

20MHz BW; PWR:10W; 16QAM

Date: 8.NOV.2013 14:41:31

FCC Part 27; FCC ID:AS5BBTRX-15



OCCUPIED BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2568-2588 MHz

20MHz BW; PWR:10W; 64QAM

Date: 8.NOV.2013 06:32:22

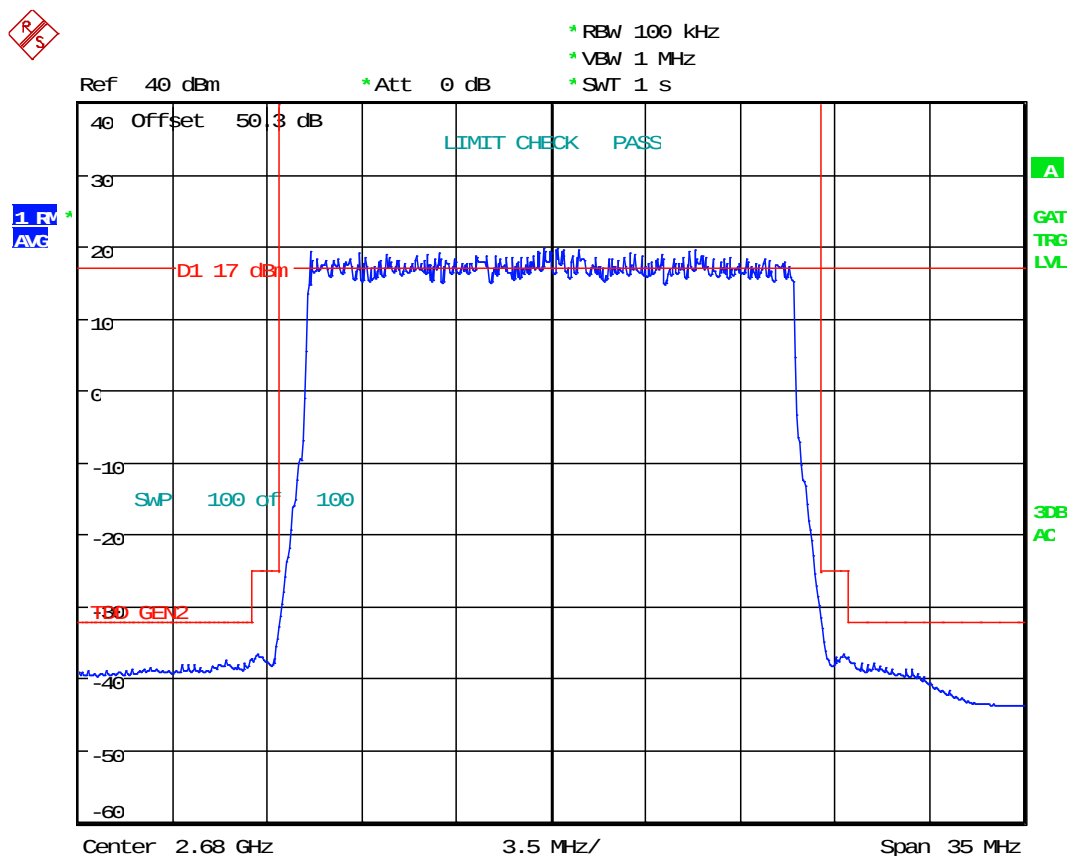
FCC Part 27; FCC ID:AS5BBTRX-15

**20 MHz Bandwidth (2670 – 2690 MHz)
(Higher)**

8x10 watts (MIMO)

SPECTRUM MASK/OCCUPIED BANDWIDTH

(QPSK, 16QAM and 64QAM Modulations)



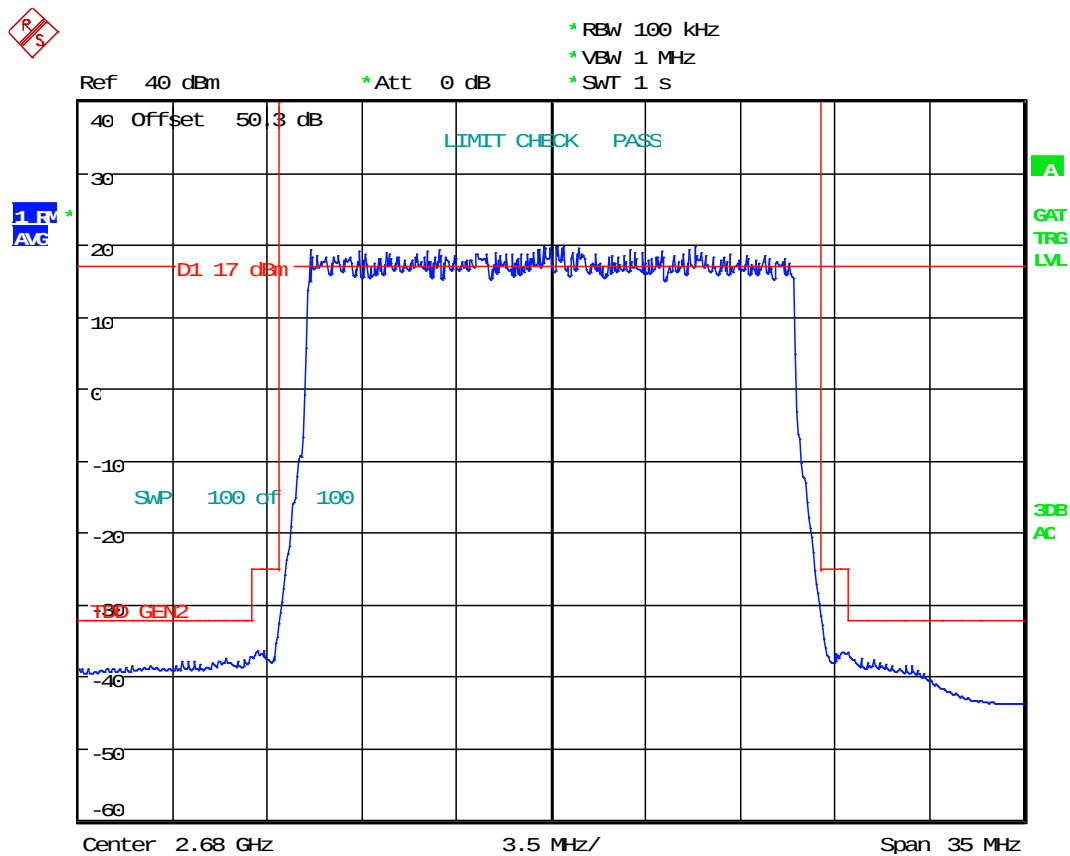
OCCUPIED BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2670-2690 MHz

20MHz BW; PWR:10W; QPSK

Date: 8.NOV.2013 15:20:52

FCC Part 27; FCC ID:AS5BBTRX-15



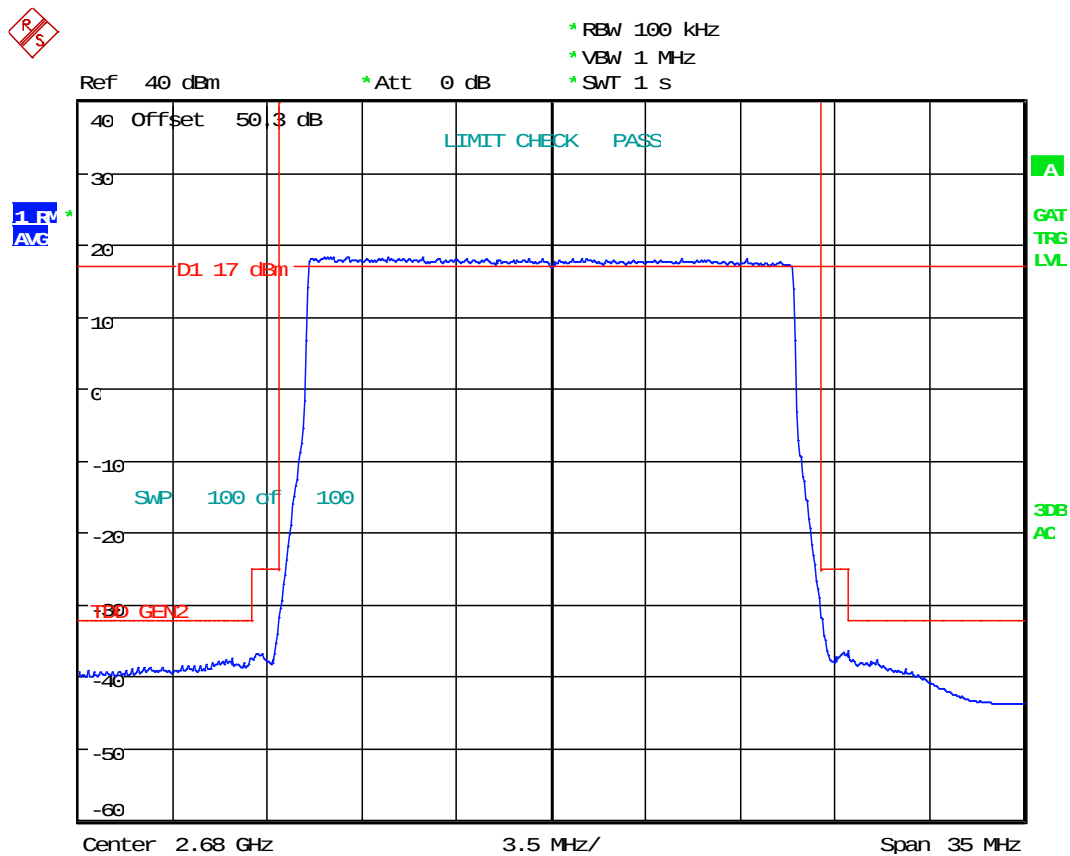
OCCUPIED BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2670-2690 MHz

20MHz BW; PWR:10W; 16QAM

Date: 8.NOV.2013 15:43:41

FCC Part 27; FCC ID:AS5BBTRX-15



OCCUPIED BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2670-2690 MHz

20MHz BW; PWR:10W; 64QAM

Date: 7.NOV.2013 16:14:42

FCC Part 27; FCC ID:AS5BBTRX-15

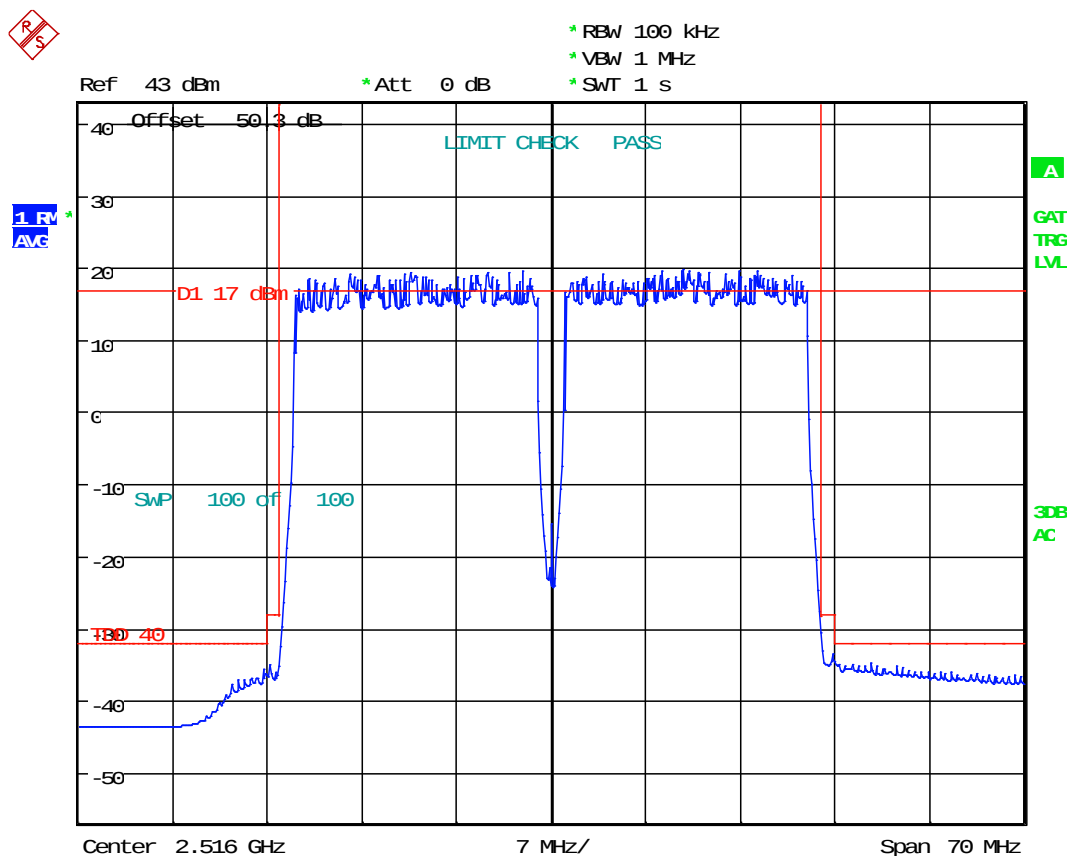
40 MHz Bandwidth (20MHz + 20MHz)

**2496 – 2536 MHz
(Lower)**

8x20 watts (MIMO)

SPECTRUM MASK/OCCUPIED BANDWIDTH

(QPSK, 16QAM and 64QAM Modulations)



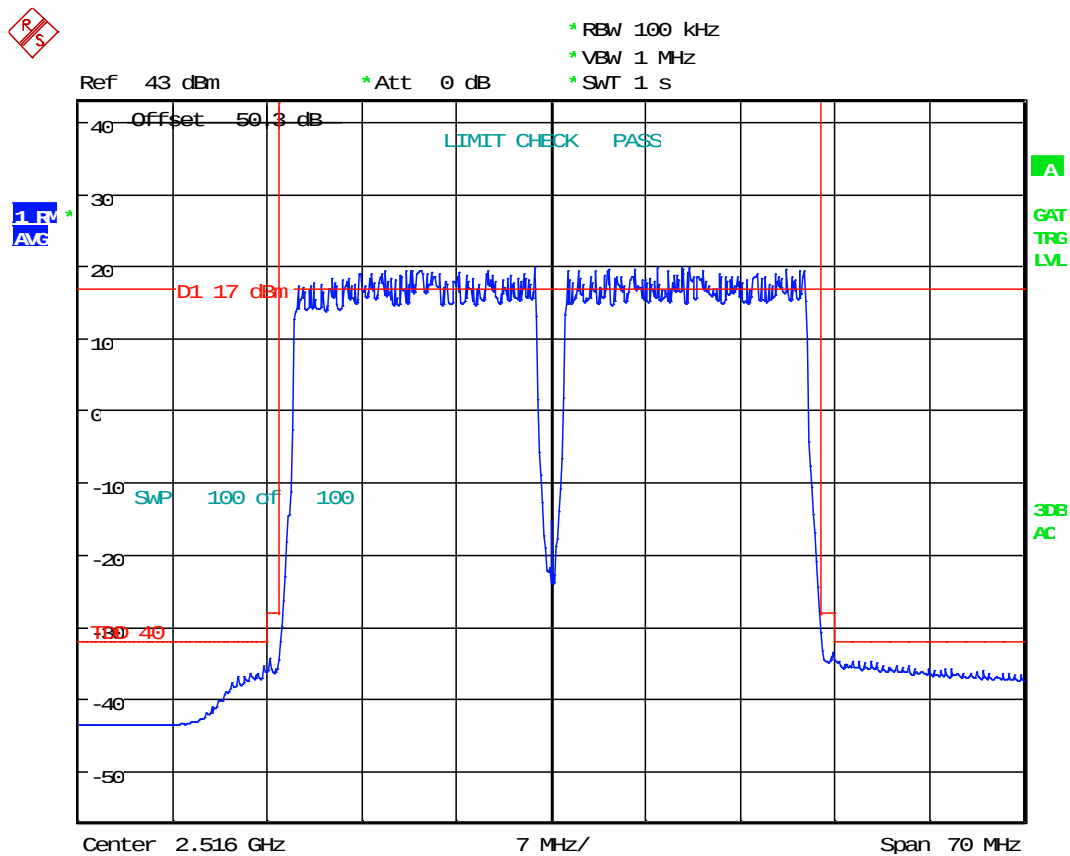
OCCUPIED BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2496-2536 MHz (20MHz+20MHz)

40MHz BW; PWR:20W; QPSK

Date: 3.DEC.2013 10:00:02

FCC Part 27; FCC ID:AS5BBTRX-15



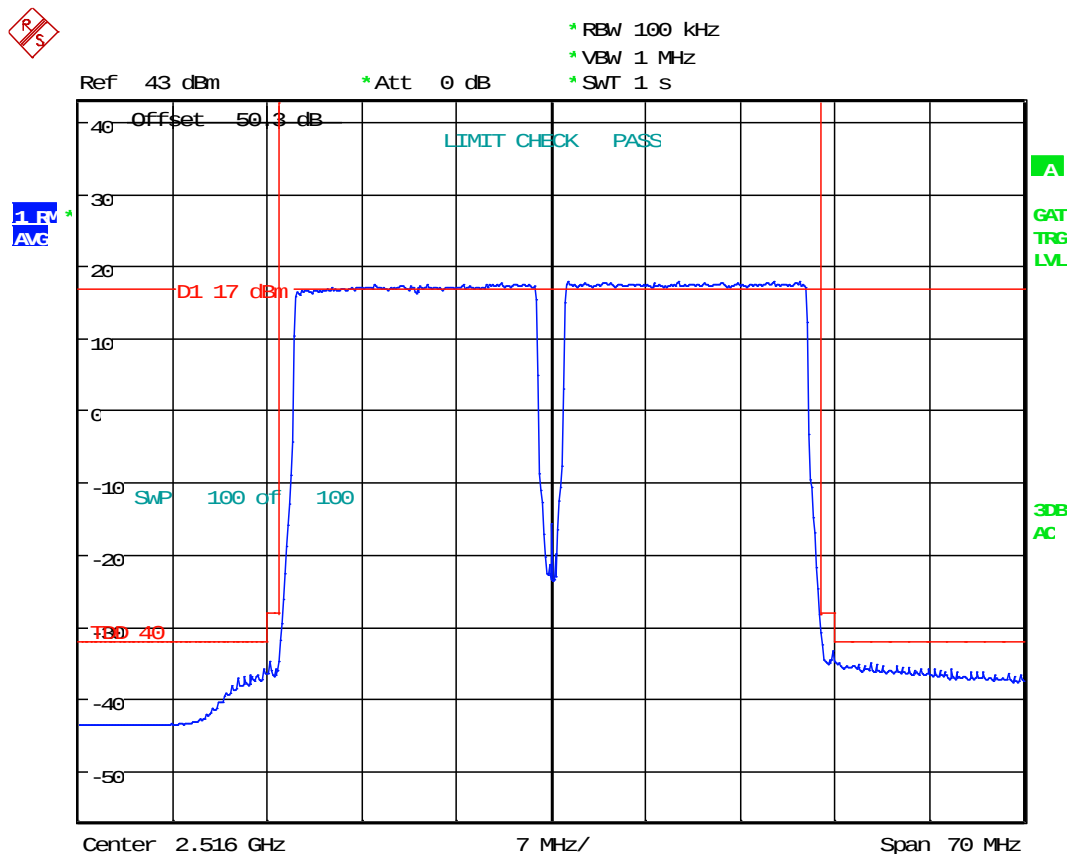
OCCUPIED BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2496-2536 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;16QAM

Date: 3.DEC.2013 09:49:45

FCC Part 27; FCC ID:AS5BBTRX-15



OCCUPIED BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2496-2536 MHz (20MHz+20MHz)

40MHz BW; PWR:20W; 64QAM

Date: 22.NOV.2013 11:24:14

FCC Part 27; FCC ID:AS5BBTRX-15

40 MHz Bandwidth (20MHz + 20MHz)

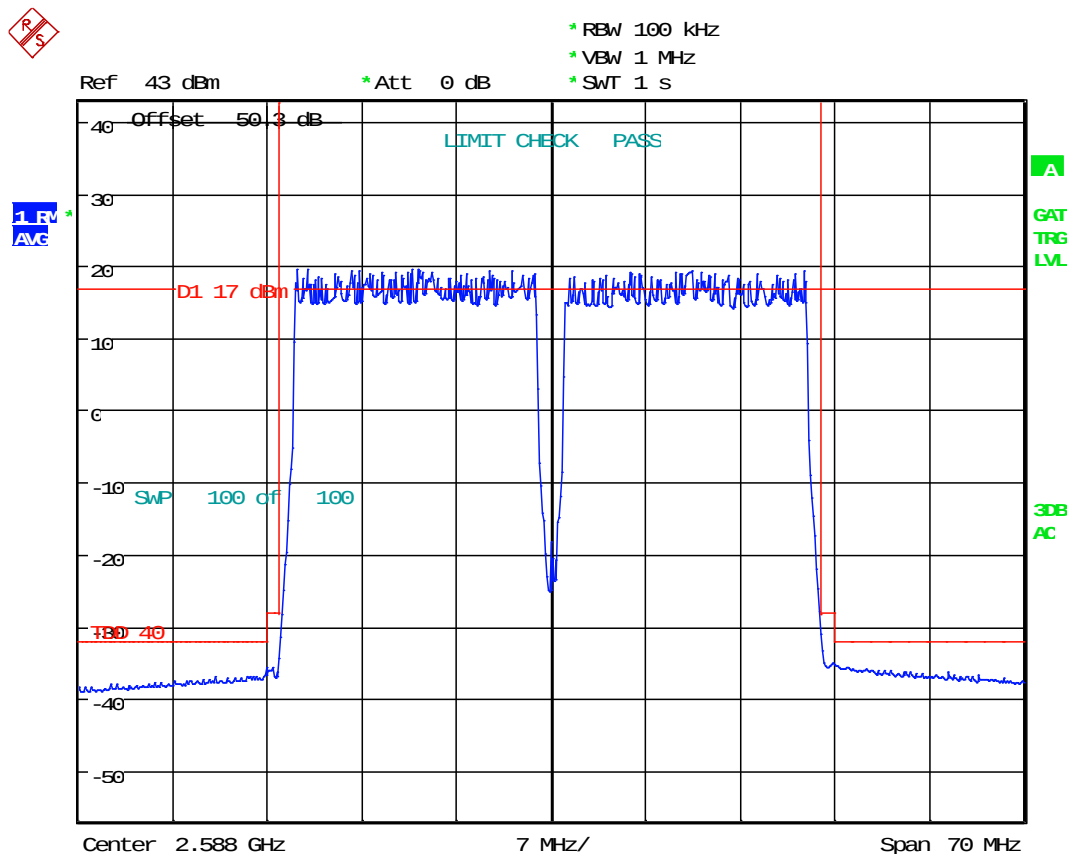
(Middle)

2568 – 2608 MHz

8x20 watts (MIMO)

SPECTRUM MASK/OCCUPIED BANDWIDTH

(QPSK, 16QAM and 64QAM Modulations)



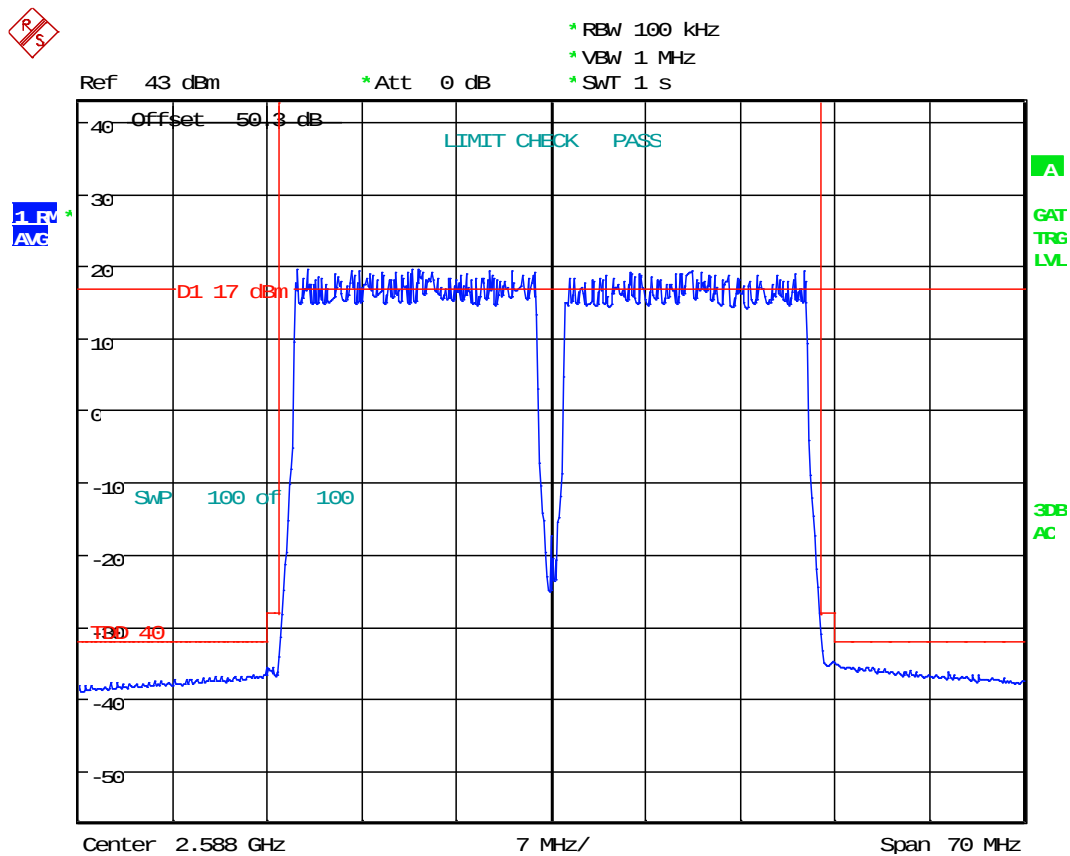
OCCUPIED BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2568-2608 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;QPSK

Date: 20.NOV.2013 11:55:42

FCC Part 27; FCC ID:AS5BBTRX-15



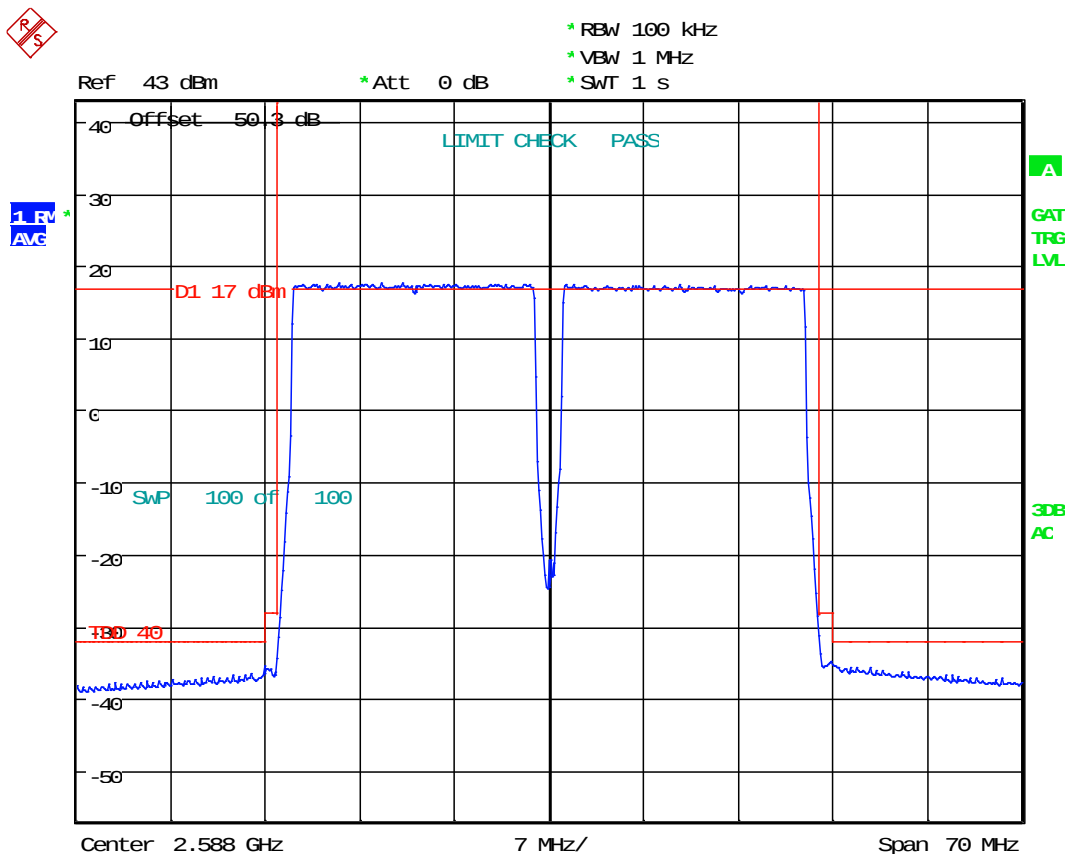
OCCUPIED BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2568-2608 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;16QAM

Date: 20.NOV.2013 12:01:29

FCC Part 27; FCC ID:AS5BBTRX-15



OCCUPIED BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2568-2608 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;64QAM

Date: 20.NOV.2013 10:54:23

FCC Part 27; FCC ID:AS5BBTRX-15

40 MHz Bandwidth (20MHz + 20MHz)

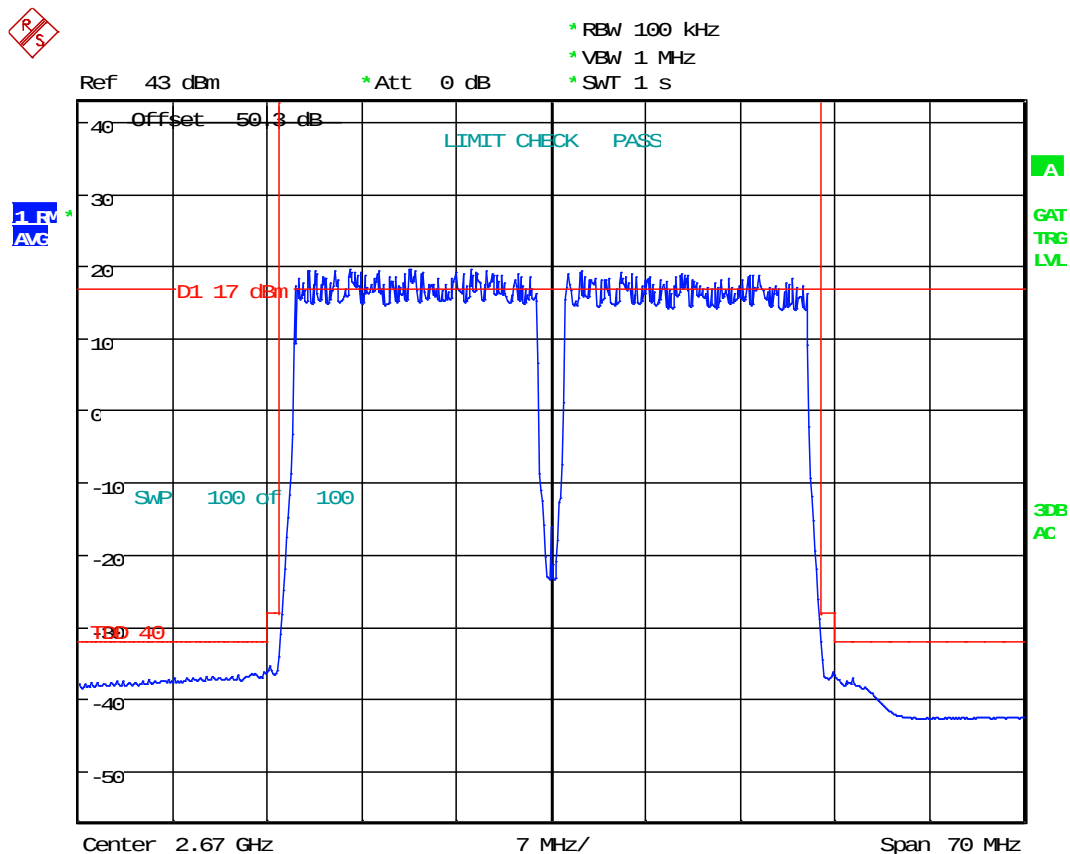
(Higher)

2650 – 2690 MHz

8x20 watts (MIMO)

SPECTRUM MASK/OCCUPIED BANDWIDTH

(QPSK, 16QAM and 64QAM Modulations)

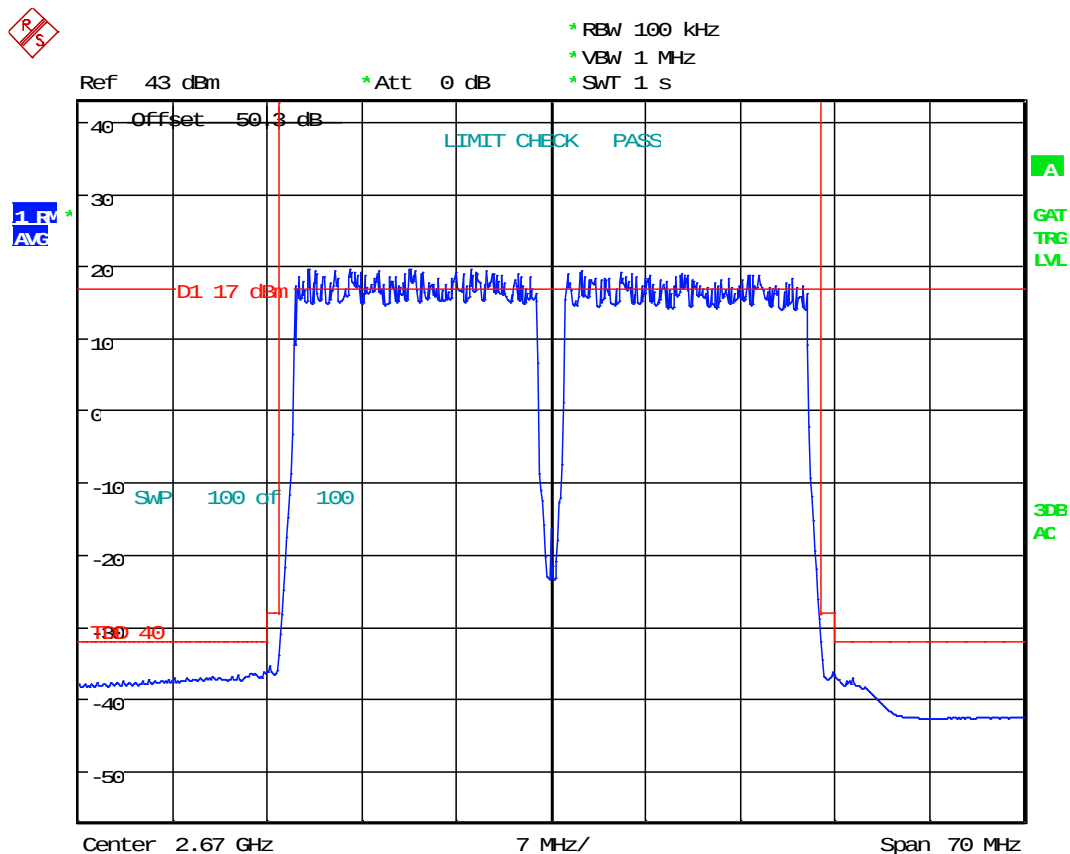


OCCUPIED BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2650-2690 MHz (20MHz+20MHz)

40MHz BW; PWR:20W; QPSK

Date: 20.NOV.2013 11:40:14

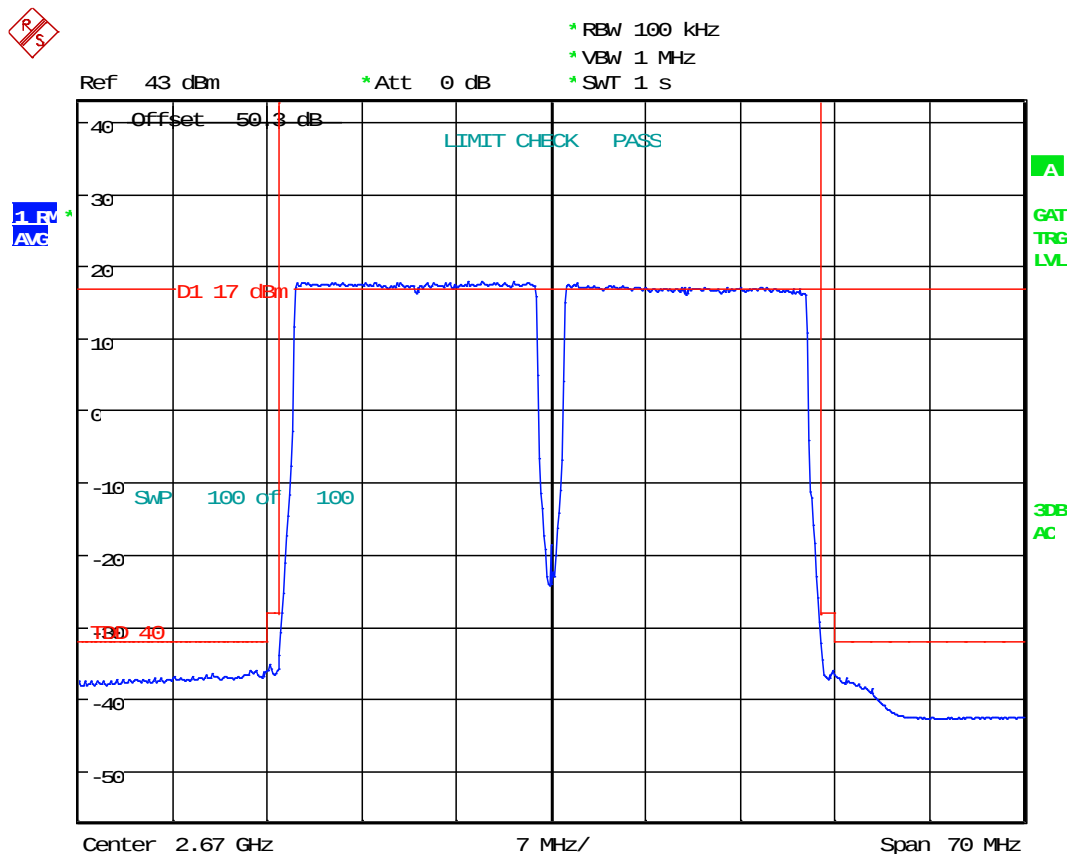


OCCUPIED BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2650-2690 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;16QAM

Date: 20.NOV.2013 11:43:47



OCCUPIED BANDWIDTH; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2650-2690 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;64QAM

Date: 20.NOV.2013 11:05:03

Measurement 4

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

Spurious Emissions at Transmit Antenna Terminals

Spurious Emissions at the transmit-antenna terminals were investigated over the frequency range of 9 kHz to the 27 GHz. The test setup is as described in Figure A. Measurements were made using a Rohde & Schwarz ESU (20Hz to 40 GHz) EMI Test receiver. 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 (m) (v). Measurements were made at 10W per carrier for 20 MHz Bandwidth, and 20W per carrier for 40MHz Bandwidth at antenna terminals. The measured spurious emission levels were plotted for the frequency range 9 kHz to 27 GHz. The measurements were made using following receiver parameters:

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

Blocks	Bandwidth (MHz)	Frequency (MHz)	Power (Watts)
Lower	20	2496-2516	10
Middle	20	2568-2588	10
Higher	20	2670-2690	10
Lower	20+20	2496-2536	20
Middle	20+20	2568-2608	20
Higher	20+20	2650-2690	20

FCC Section 27.53(m)(v) Based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater

Pursuant to FCC OET RULES 662911 D01 and D02 for two antenna MIMO mode of operations, the FCC limit of -13dBm and Eight MIMO the limit shall be 9dB more stringent, therefore all channel edge and out of band spurious emissions shall be -22dBm.

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(m) (v).

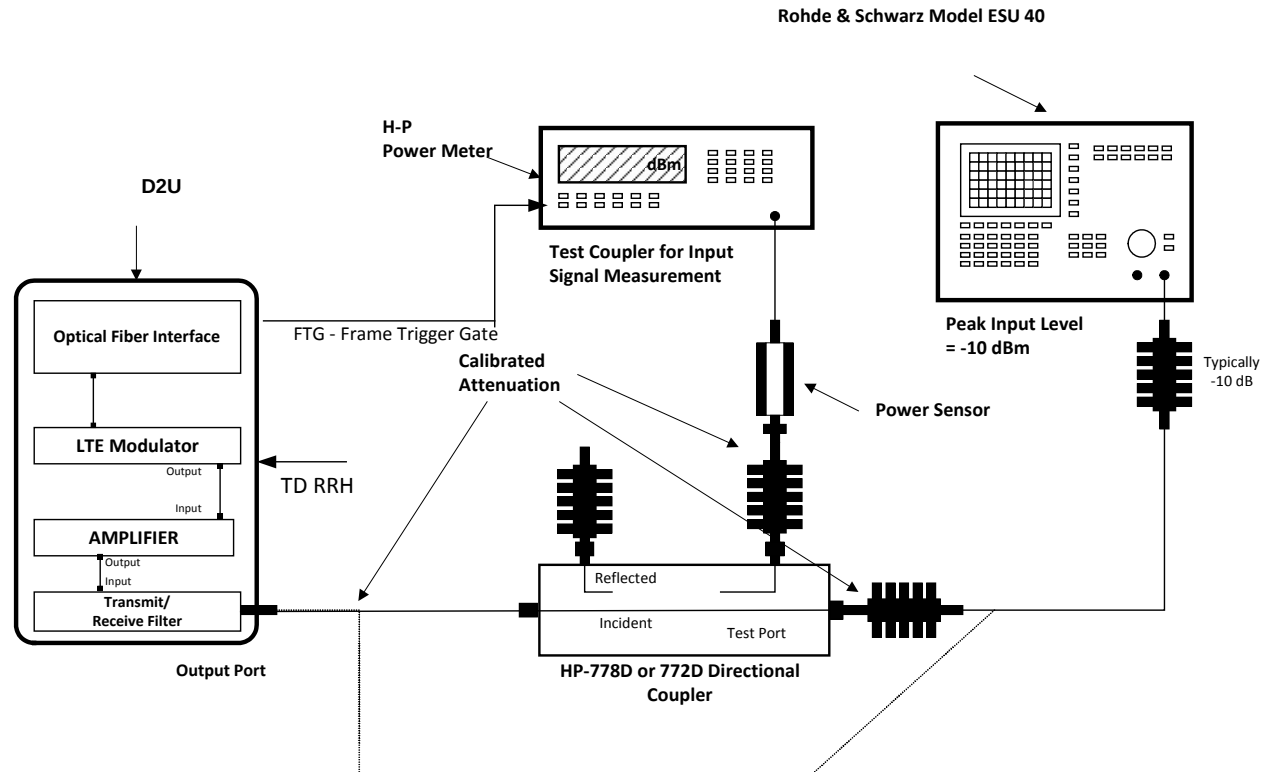
Measurement uncertainty:

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

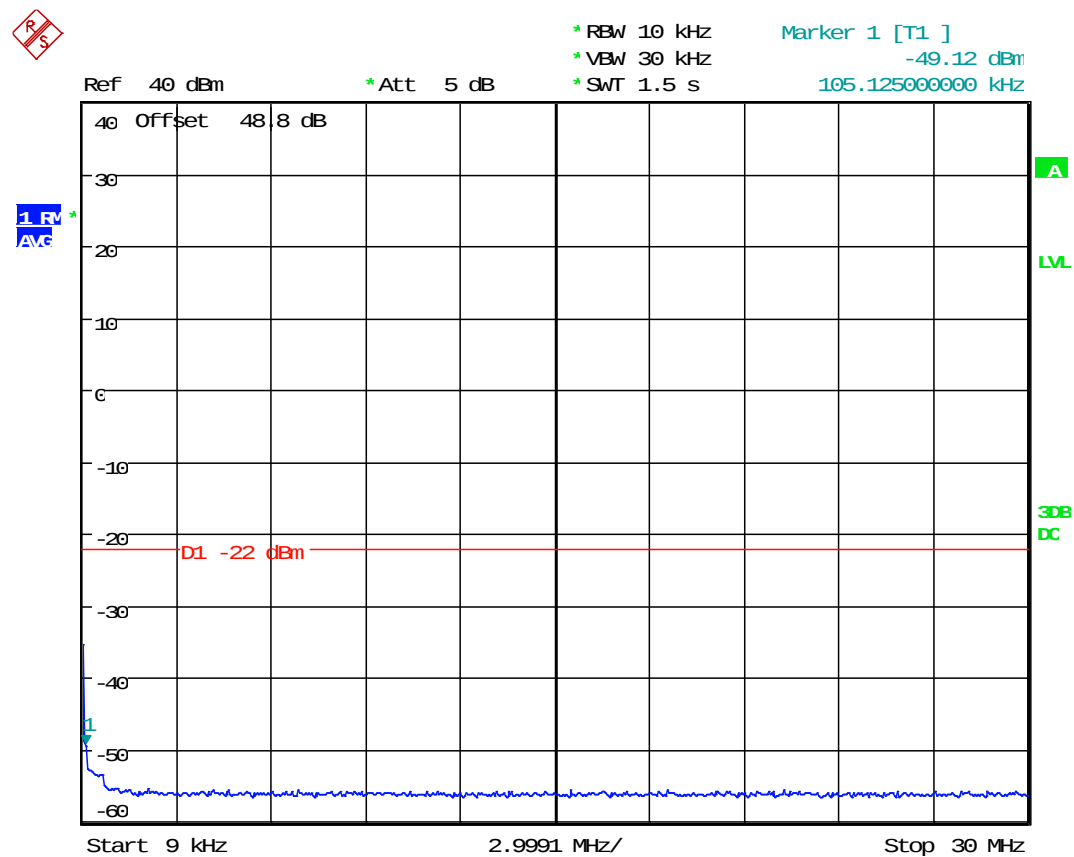
Figure A. TEST CONFIGURATION FOR CONDUCTED SPURIOUS



**Transmit Port
Antenna Conducted Spurious Emissions**

**20 MHz BW
QPSK Modulation
8x10 watts (MIMO)**

**Bandwidth 2496 – 2516 MHz
(Lower)**



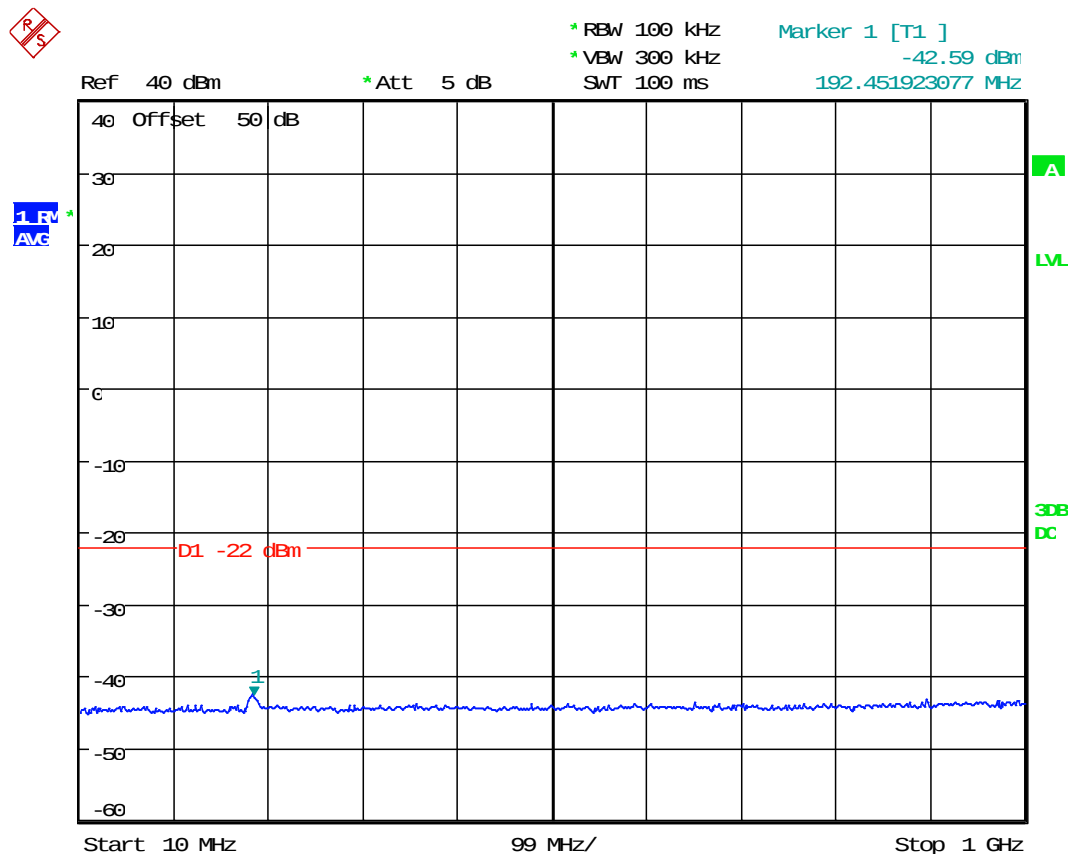
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2496-2516 MHz

20MHz BW; PWR:10W; QPSK

Date: 8.NOV.2013 13:16:01

FCC Part 27; FCC ID:AS5BBTRX-15



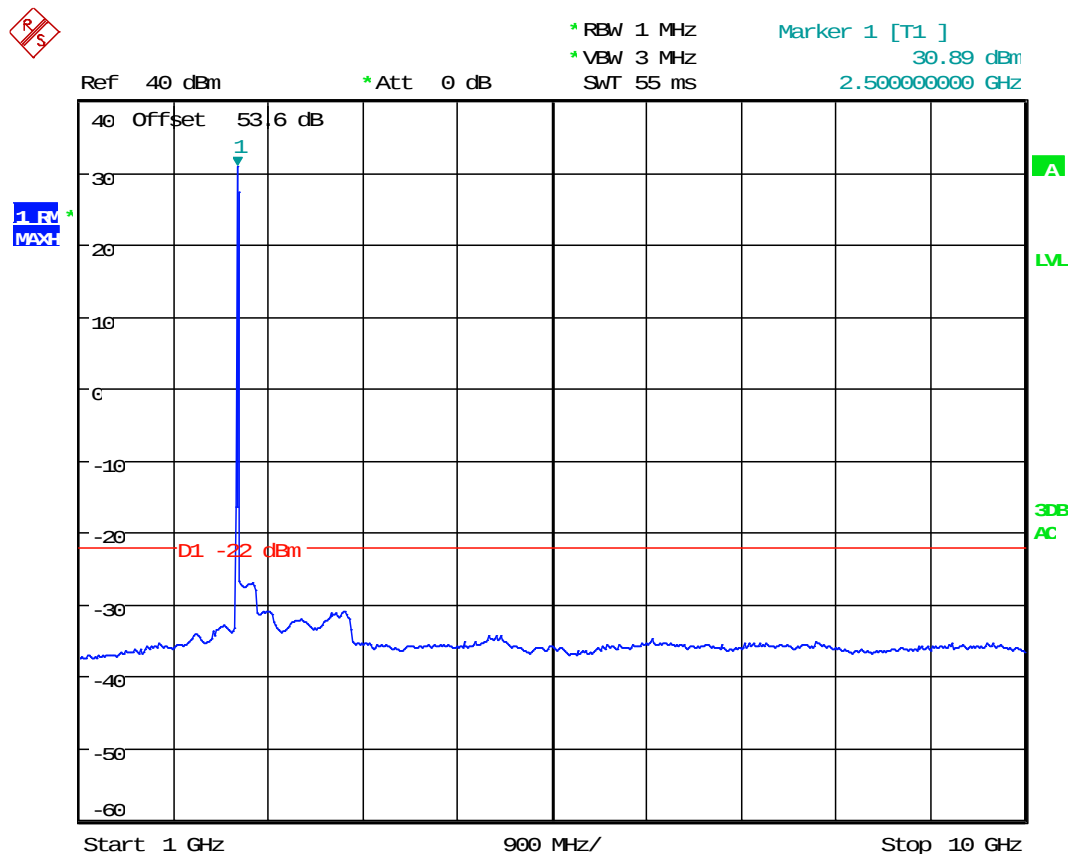
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2496-2516 MHz

20MHz BW; PWR:10W; QPSK

Date: 8.NOV.2013 13:18:37

FCC Part 27; FCC ID:AS5BBTRX-15



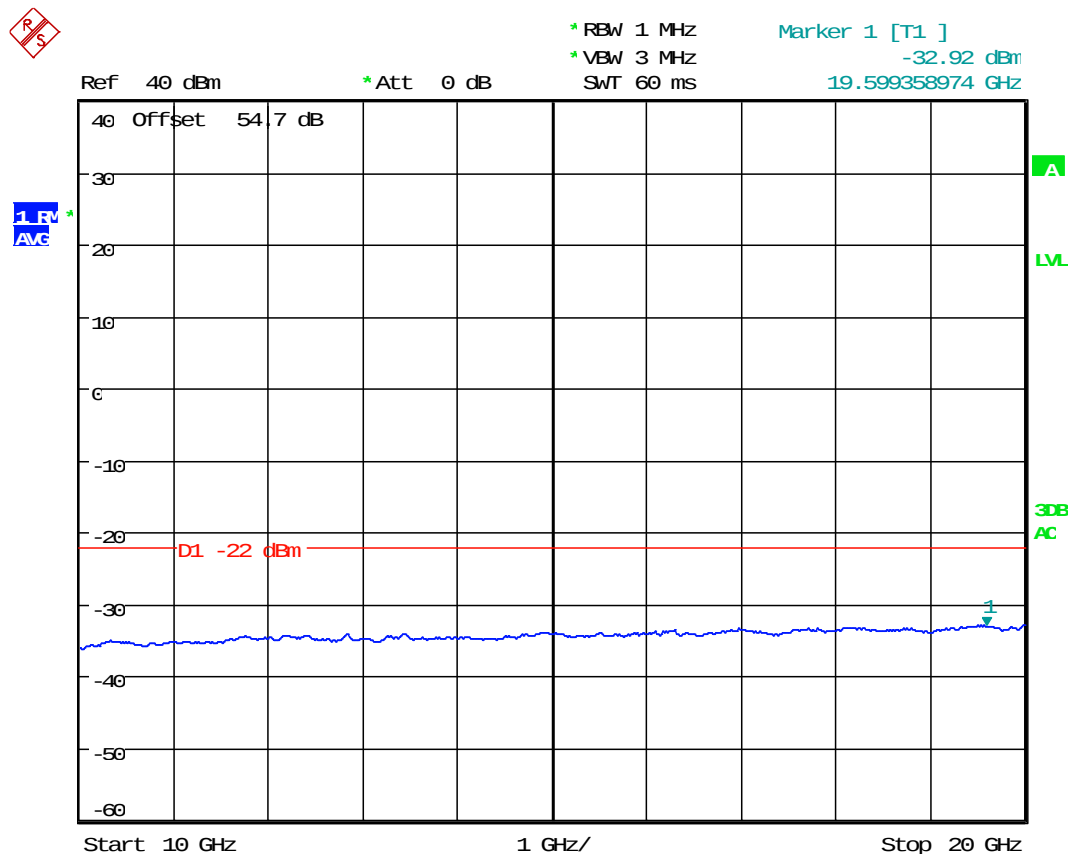
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2496-2516 MHz

20MHz BW; PWR:10W; QPSK

Date: 8.NOV.2013 13:25:04

FCC Part 27; FCC ID:AS5BBTRX-15



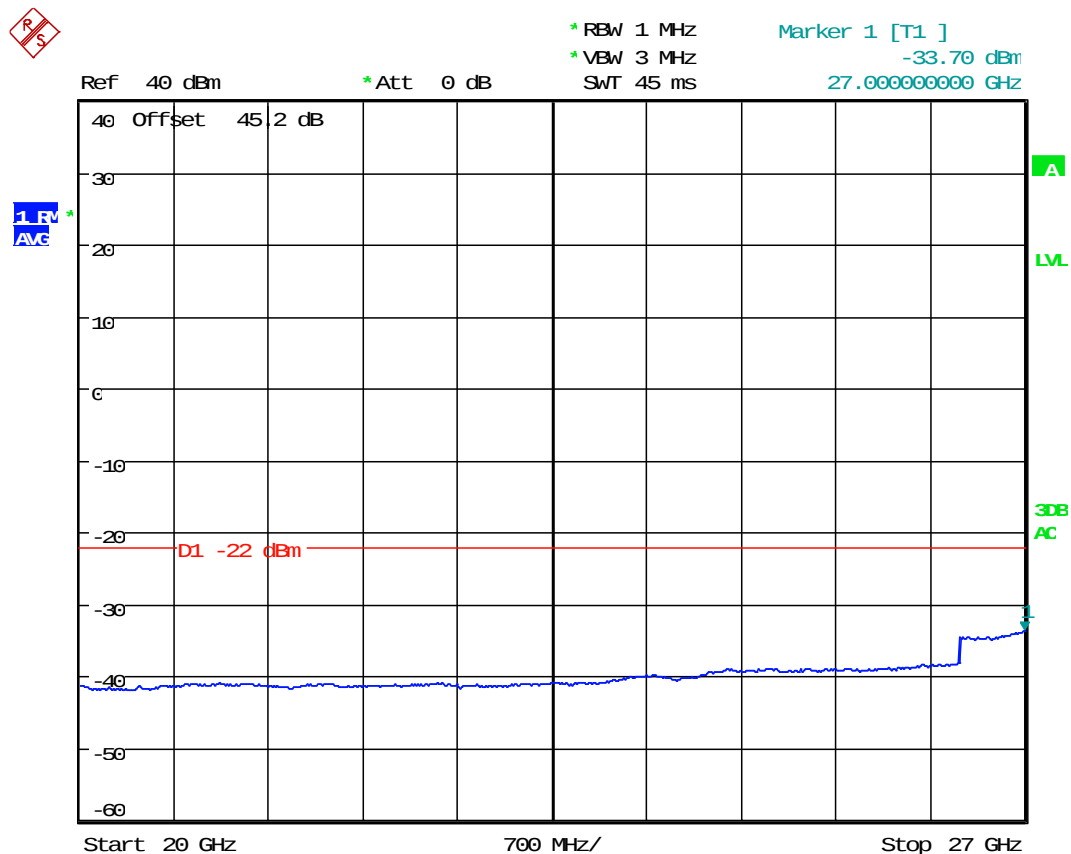
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2496-2516 MHz

20MHz BW; PWR:10W; QPSK

Date: 8.NOV.2013 13:28:00

FCC Part 27; FCC ID:AS5BBTRX-15



Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2496-2516 MHz

20MHz BW; PWR:10W; QPSK

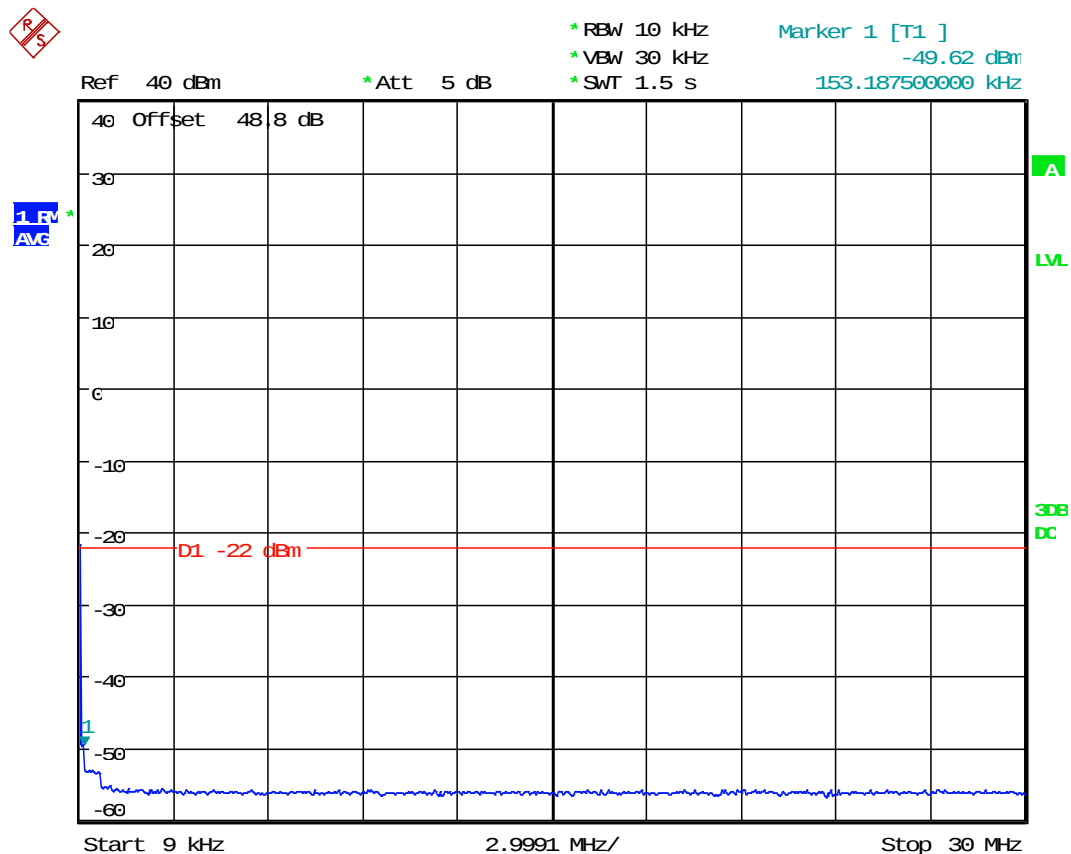
Date: 8.NOV.2013 13:25:22

FCC Part 27; FCC ID:AS5BBTRX-15

**Transmit Port
Antenna Conducted Spurious Emissions**

**20 MHz BW
16QAM Modulation
8x10 watts (MIMO)**

**Bandwidth 2496 – 2516 MHz
(Lower)**



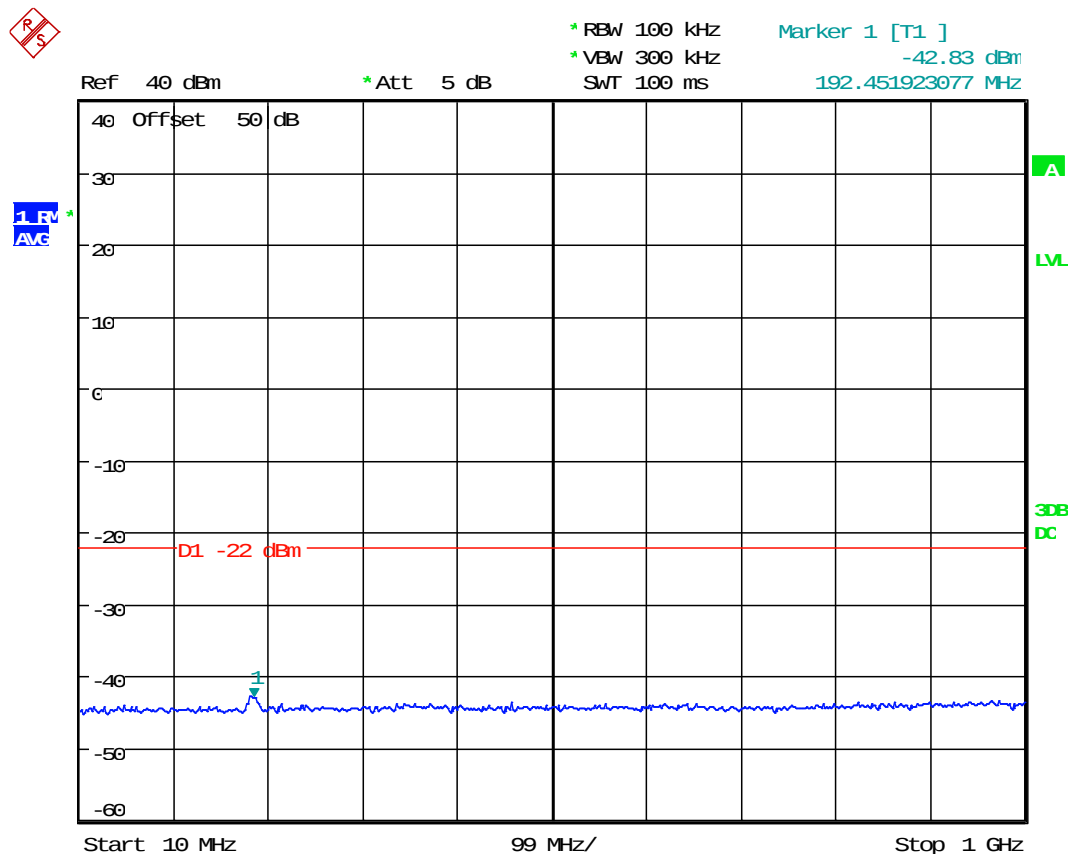
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2496-2516 MHz

20MHz BW; PWR:10W; 16QAM

Date: 11.NOV.2013 10:07:02

FCC Part 27; FCC ID:AS5BBTRX-15



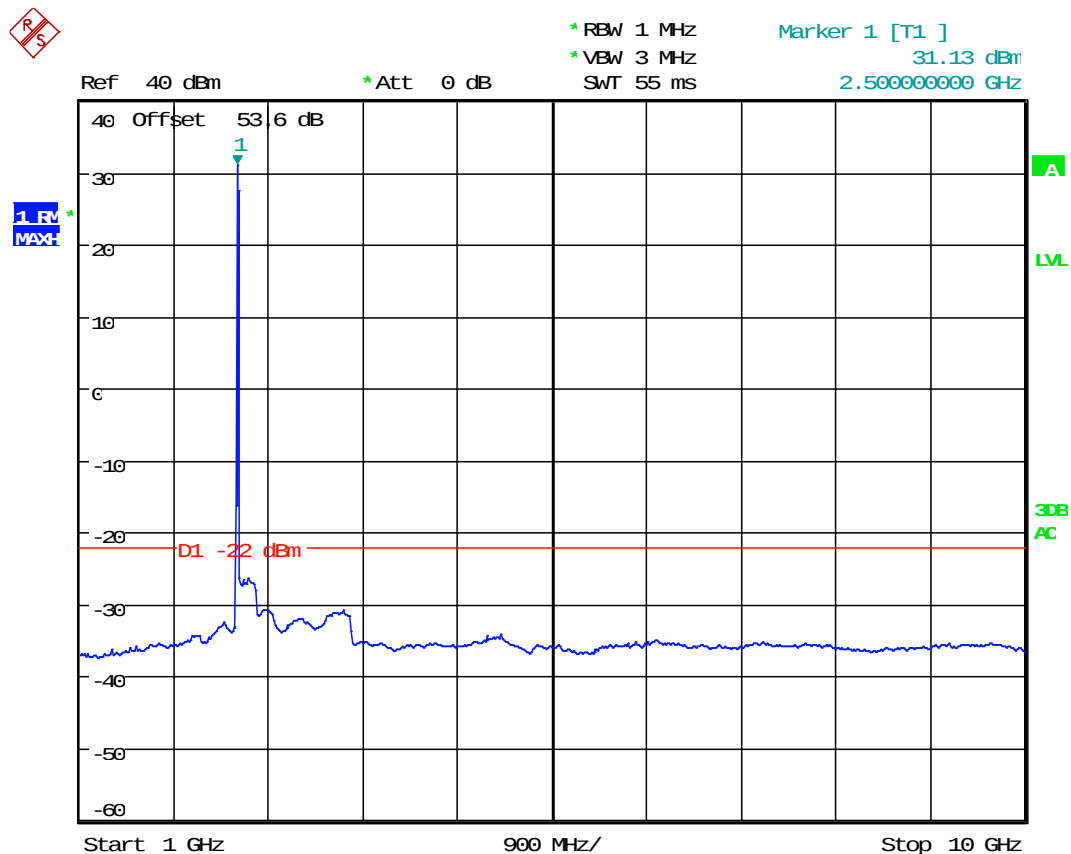
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2496-2516 MHz

20MHz BW; PWR:10W; 16QAM

Date: 11.NOV.2013 10:07:33

FCC Part 27; FCC ID:AS5BBTRX-15



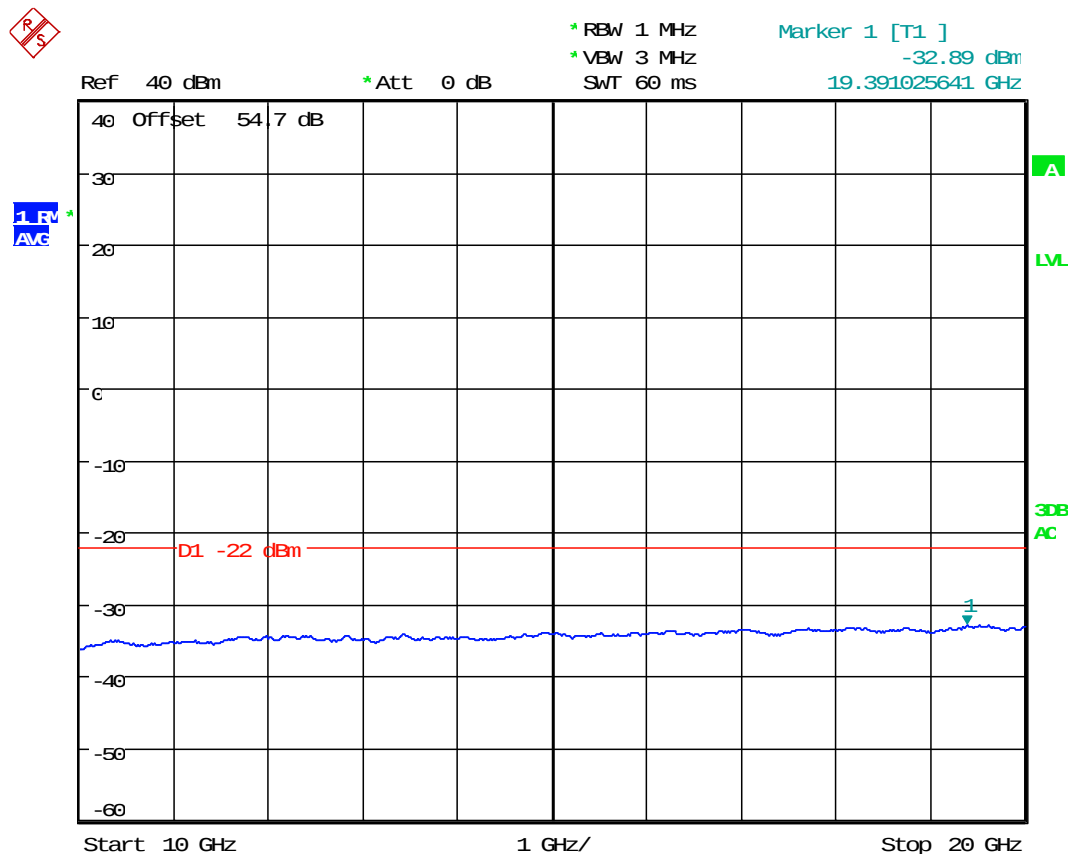
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2496-2516 MHz

20MHz BW; PWR:10W; 16QAM

Date: 11.NOV.2013 10:08:33

FCC Part 27; FCC ID:AS5BBTRX-15



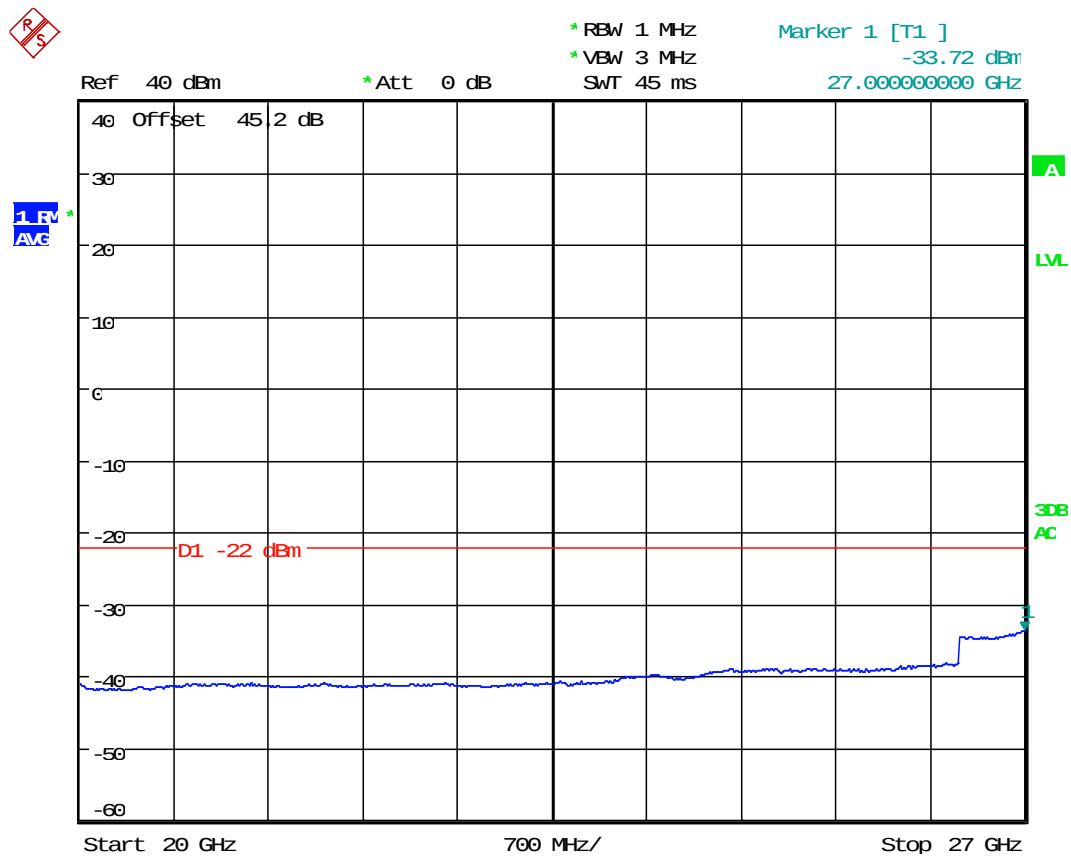
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2496-2516 MHz

20MHz BW; PWR:10W; 16QAM

Date: 11.NOV.2013 10:10:15

FCC Part 27; FCC ID:AS5BBTRX-15



Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2496-2516 MHz

20MHz BW; PWR:10W; 16QAM

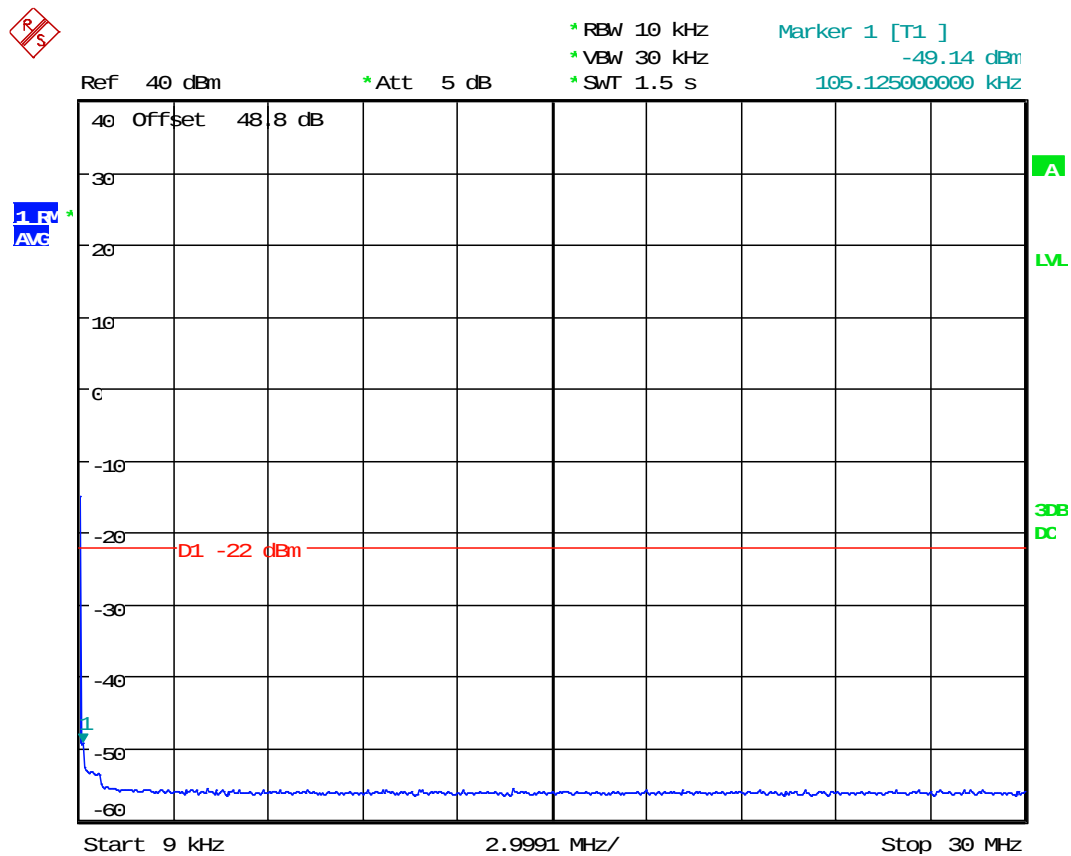
Date: 11.NOV.2013 10:10:44

FCC Part 27; FCC ID:AS5BBTRX-15

**Transmit Port
Antenna Conducted Spurious Emissions**

**20 MHz BW
64QAM Modulation
8x10 watts (MIMO)**

**Bandwidth 2496 – 2516 MHz
(Lower)**



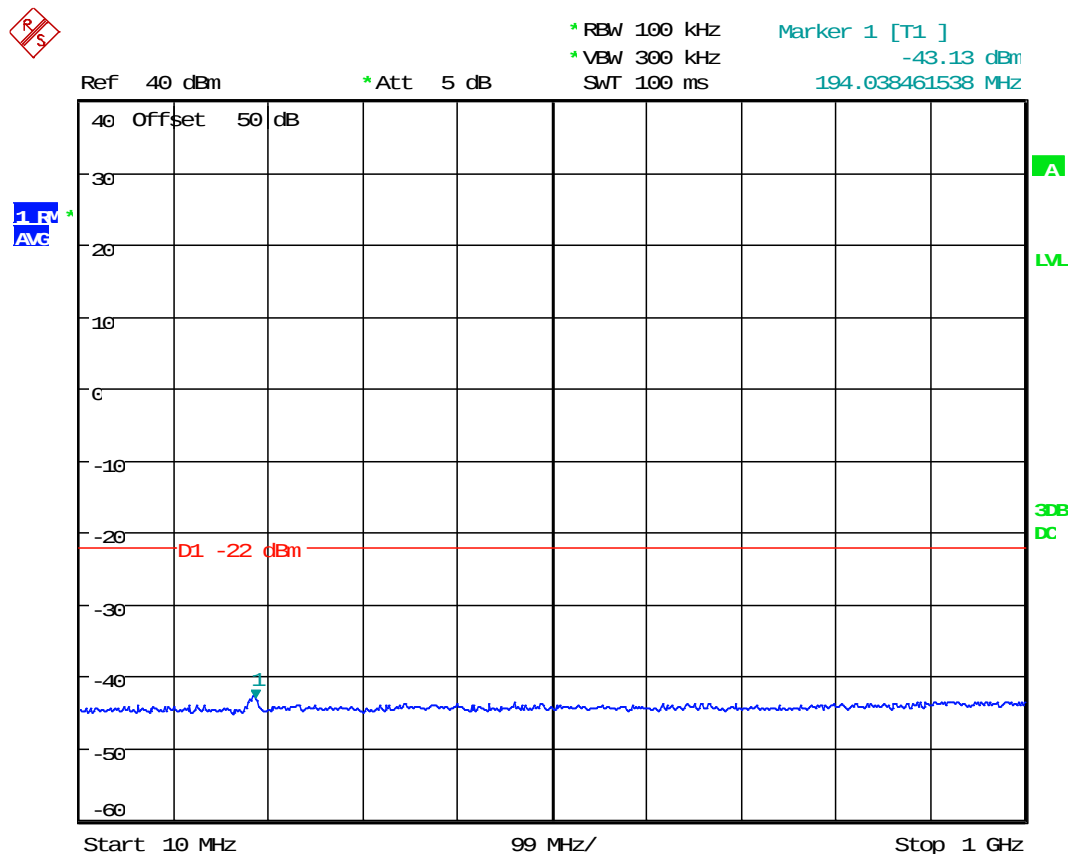
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2496-2516 MHz

20MHz BW; PWR:10W; 64QAM

Date: 8.NOV.2013 10:48:54

FCC Part 27; FCC ID:AS5BBTRX-15



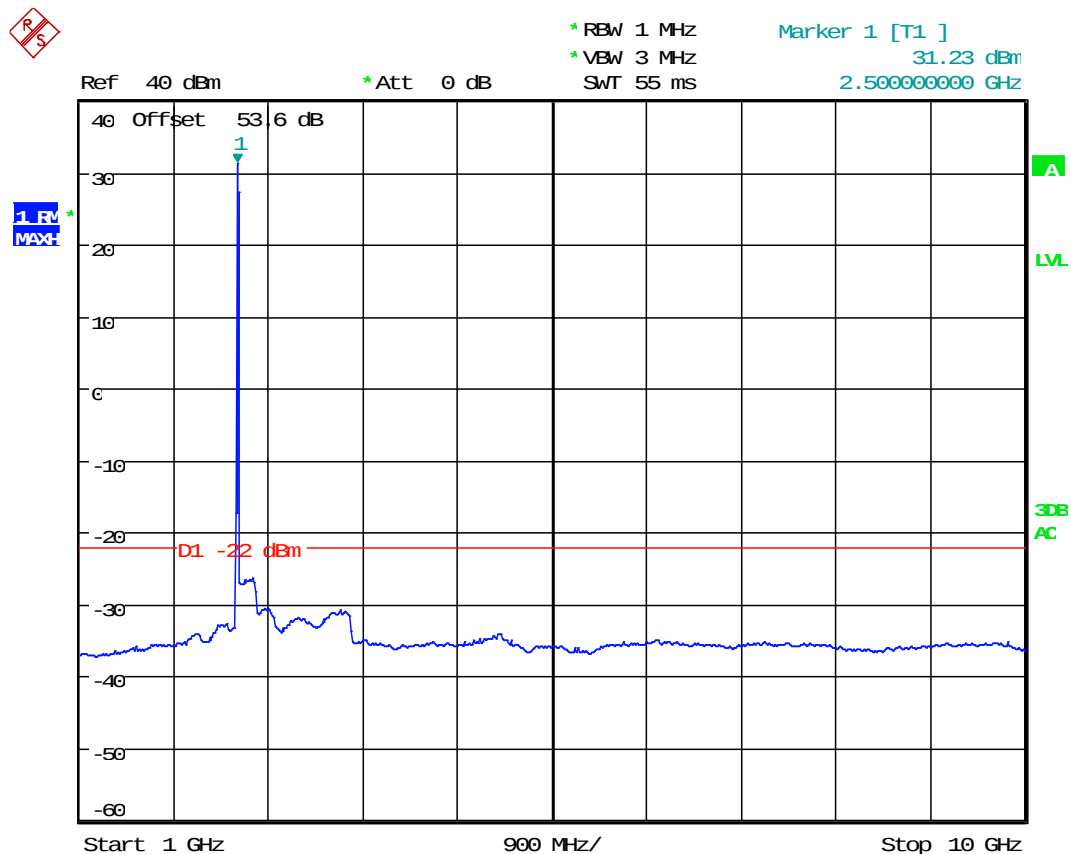
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2496-2516 MHz

20MHz BW; PWR:10W; 64QAM

Date: 8.NOV.2013 10:49:40

FCC Part 27; FCC ID:AS5BBTRX-15



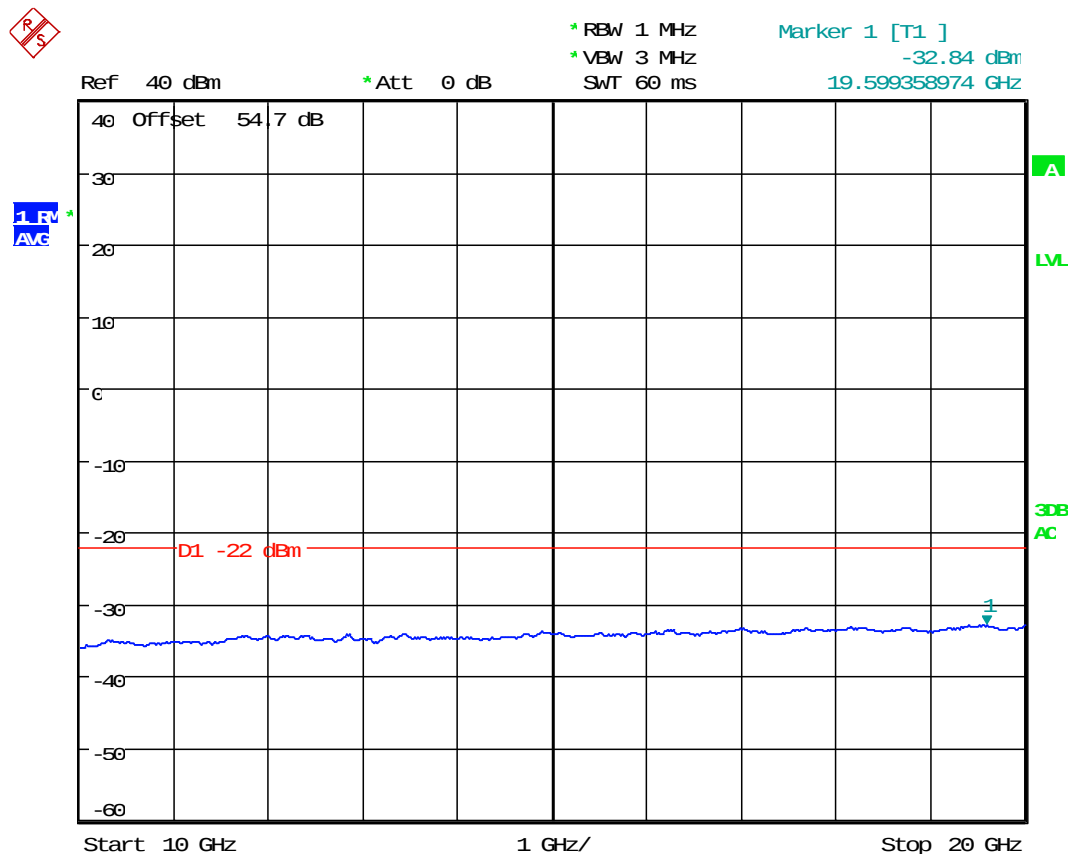
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2496-2516 MHz

20MHz BW; PWR:10W; 64QAM

Date: 8.NOV.2013 10:50:34

FCC Part 27; FCC ID:AS5BBTRX-15



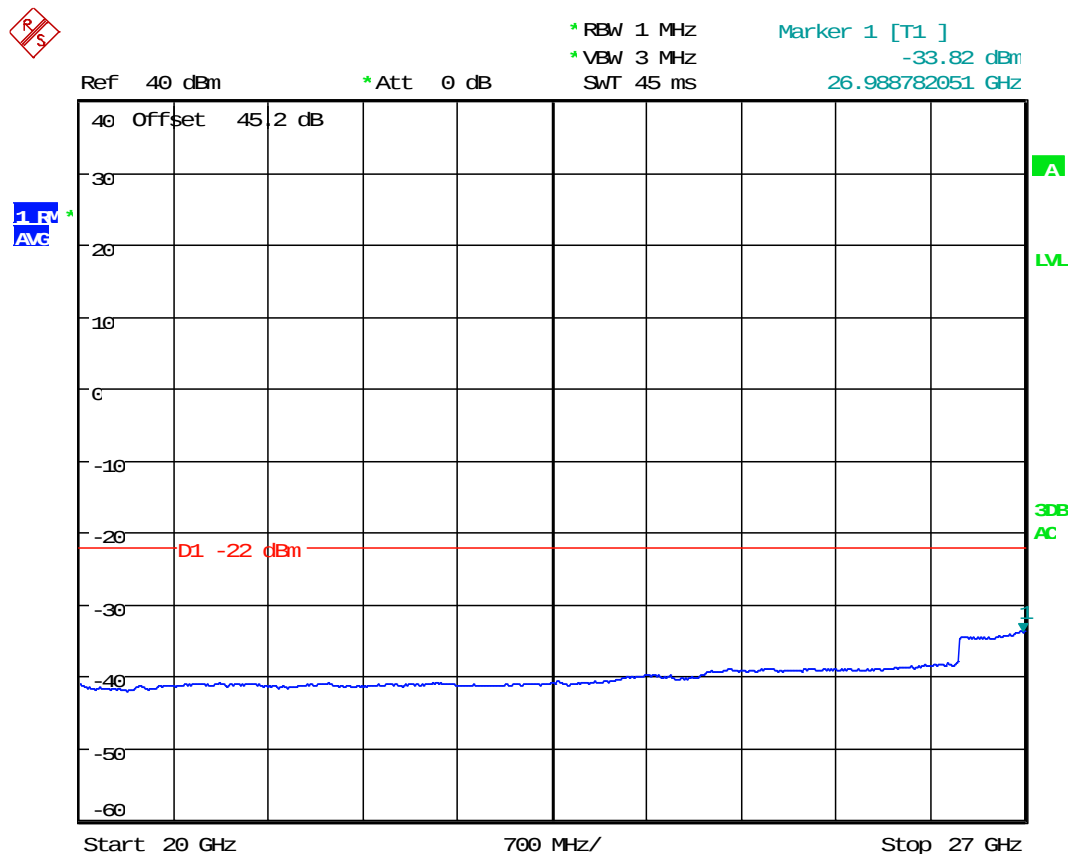
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2496-2516 MHz

20MHz BW; PWR:10W; 64QAM

Date: 8.NOV.2013 10:51:12

FCC Part 27; FCC ID:AS5BBTRX-15



Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2496-2516 MHz

20MHz BW; PWR:10W; 64QAM

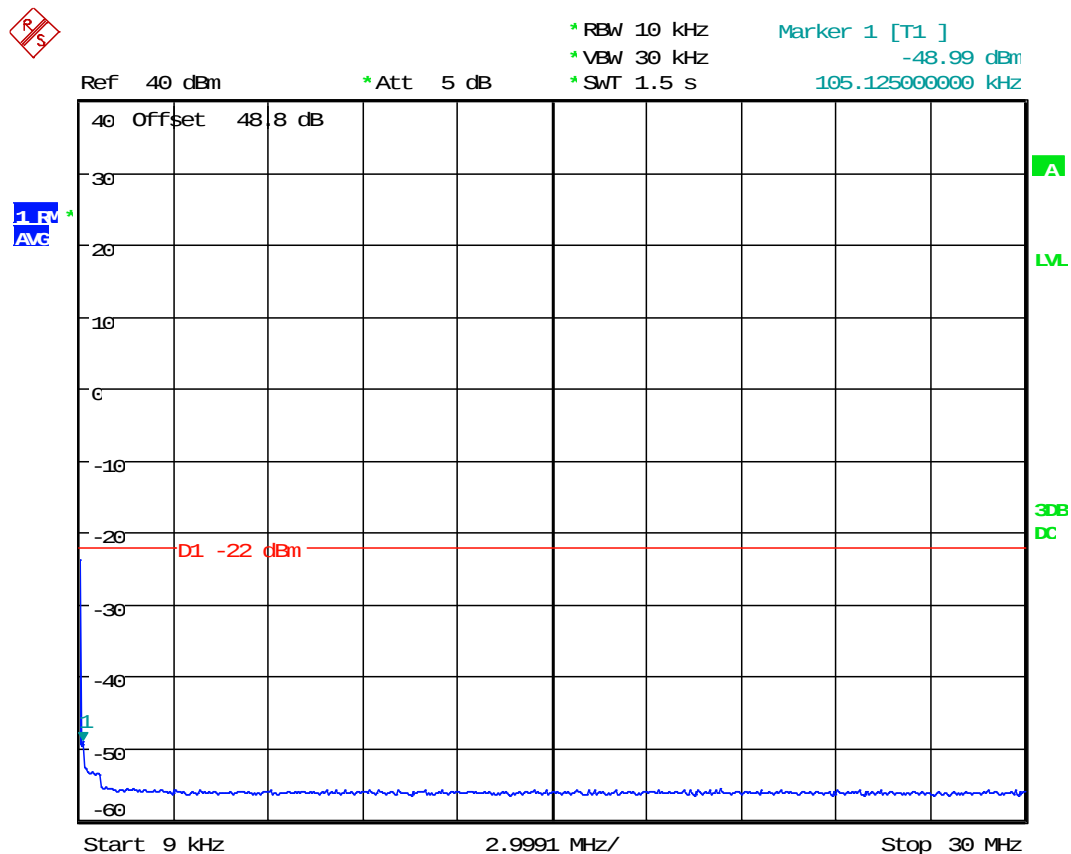
Date: 8.NOV.2013 10:51:49

FCC Part 27; FCC ID:AS5BBTRX-15

**Transmit Port
Antenna Conducted Spurious Emissions**

**20 MHz BW
QPSK Modulation
Bandwidth 2568 – 2588 MHz
(Middle)**

8x10 watts (MIMO)



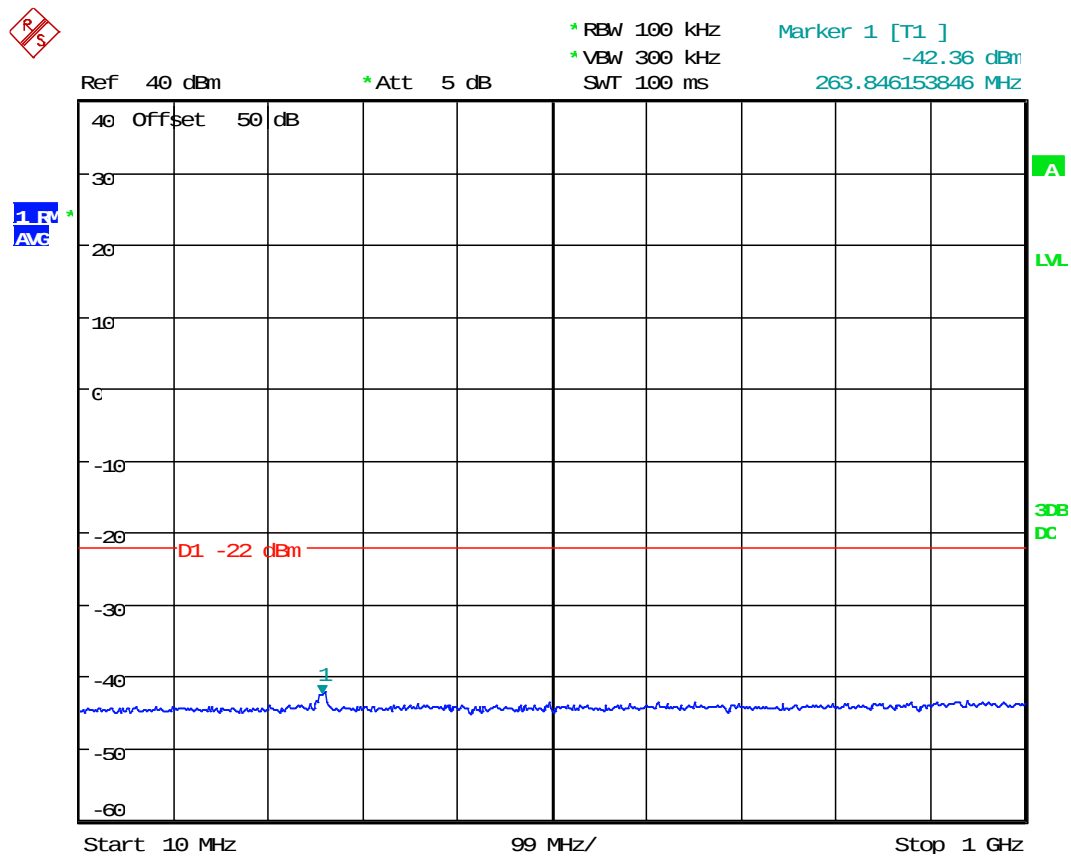
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2568-2588 MHz

20MHz BW; PWR:10W; QPSK

Date: 8.NOV.2013 14:04:35

FCC Part 27; FCC ID:AS5BBTRX-15



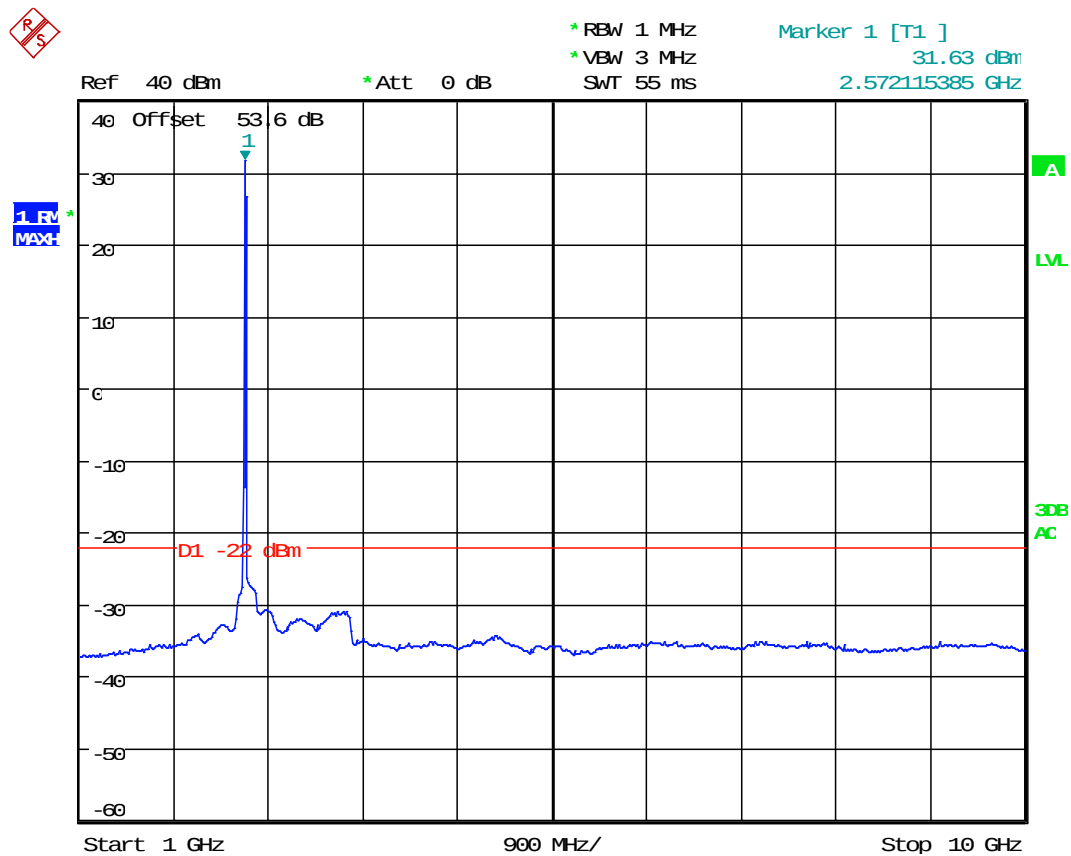
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2568-2588 MHz

20MHz BW; PWR:10W; QPSK

Date: 8.NOV.2013 14:05:42

FCC Part 27; FCC ID:AS5BBTRX-15



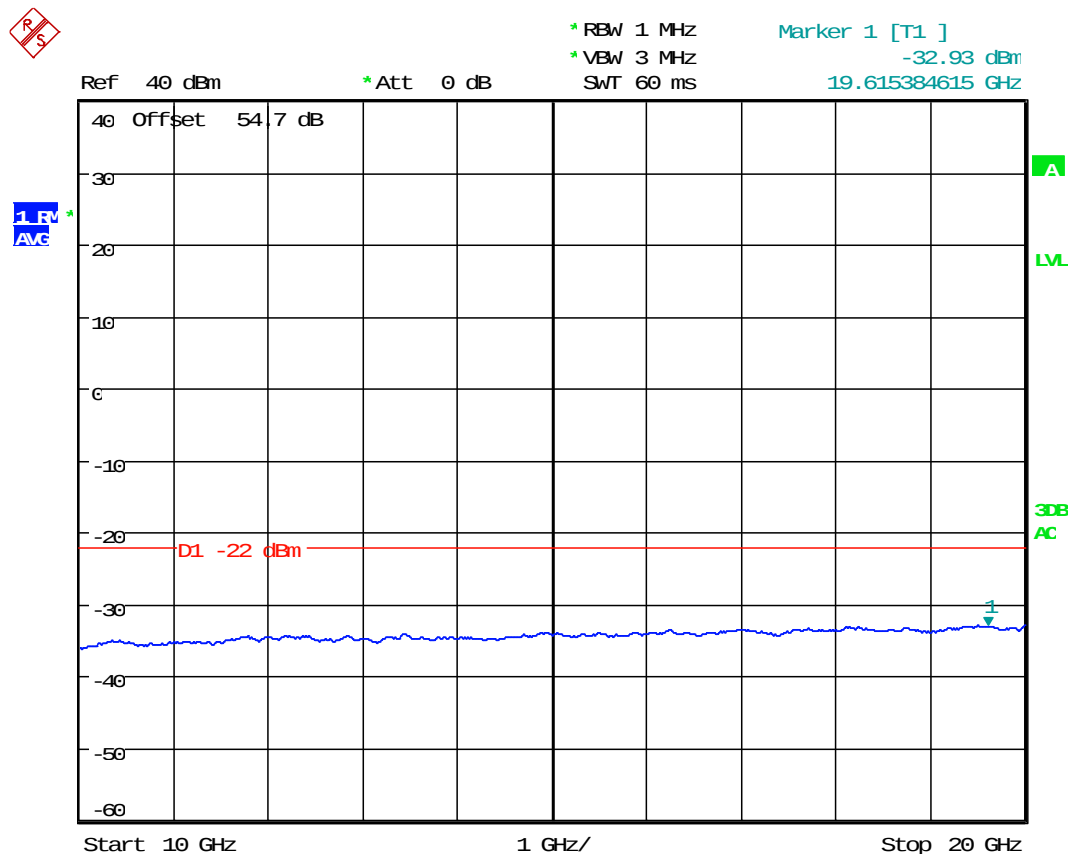
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2568-2588 MHz

20MHz BW; PWR:10W; QPSK

Date: 8.NOV.2013 14:12:57

FCC Part 27; FCC ID:AS5BBTRX-15



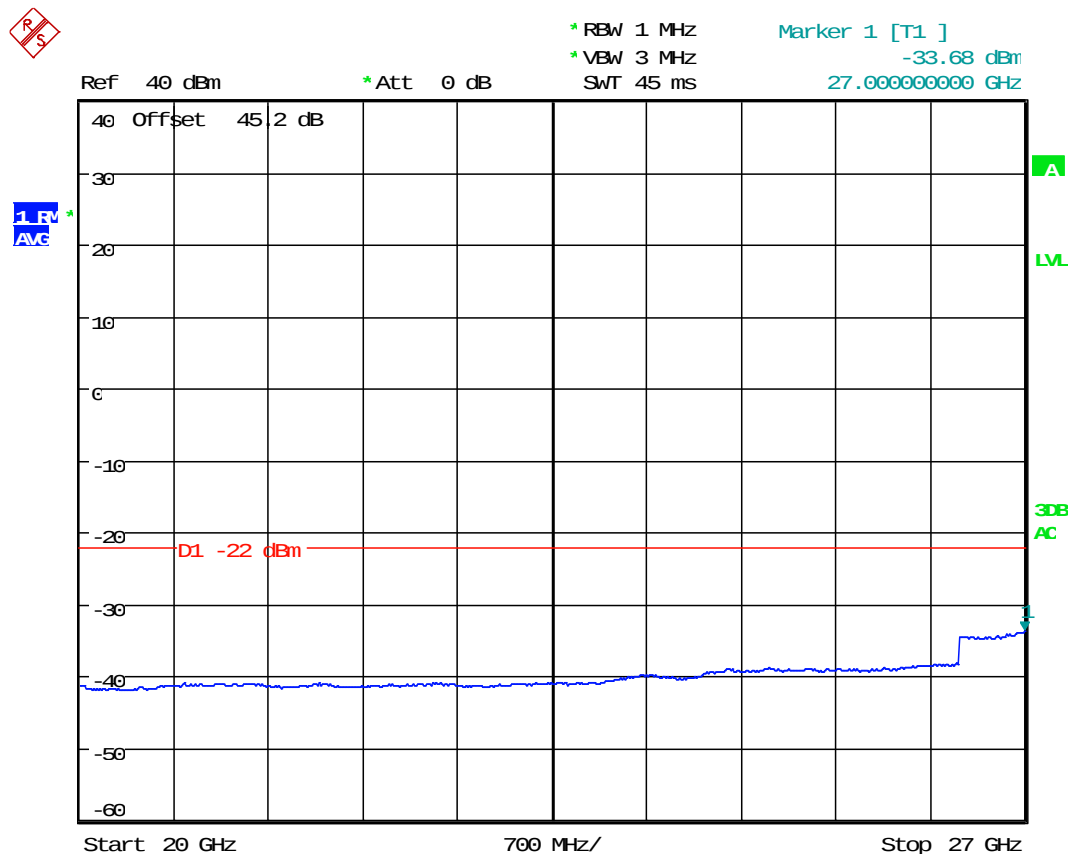
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2568-2588 MHz

20MHz BW; PWR:10W; QPSK

Date: 8.NOV.2013 14:14:03

FCC Part 27; FCC ID:AS5BBTRX-15



Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2568-2588 MHz

20MHz BW; PWR:10W; QPSK

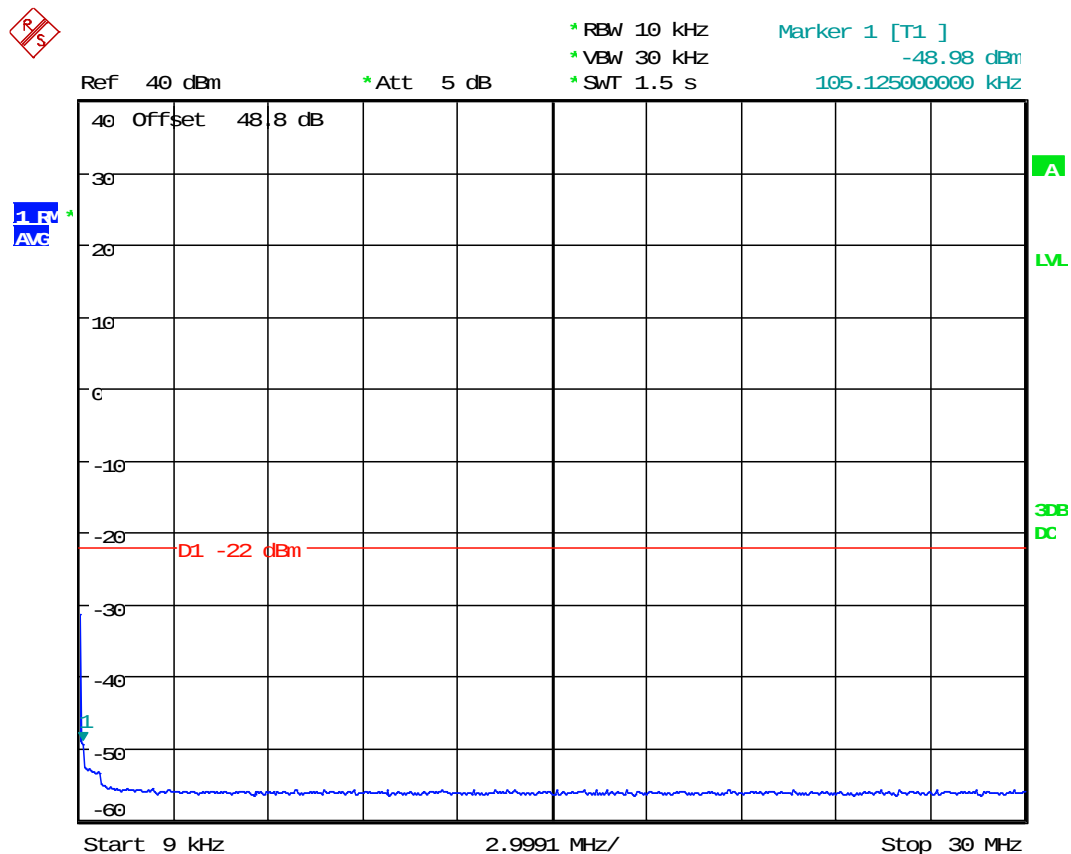
Date: 8.NOV.2013 14:14:54

FCC Part 27; FCC ID:AS5BBTRX-15

**Transmit Port
Antenna Conducted Spurious Emissions**

**20 MHz BW
16QAM Modulation
8x10 watts (MIMO)**

**Bandwidth 2568 – 2588 MHz
(Middle)**



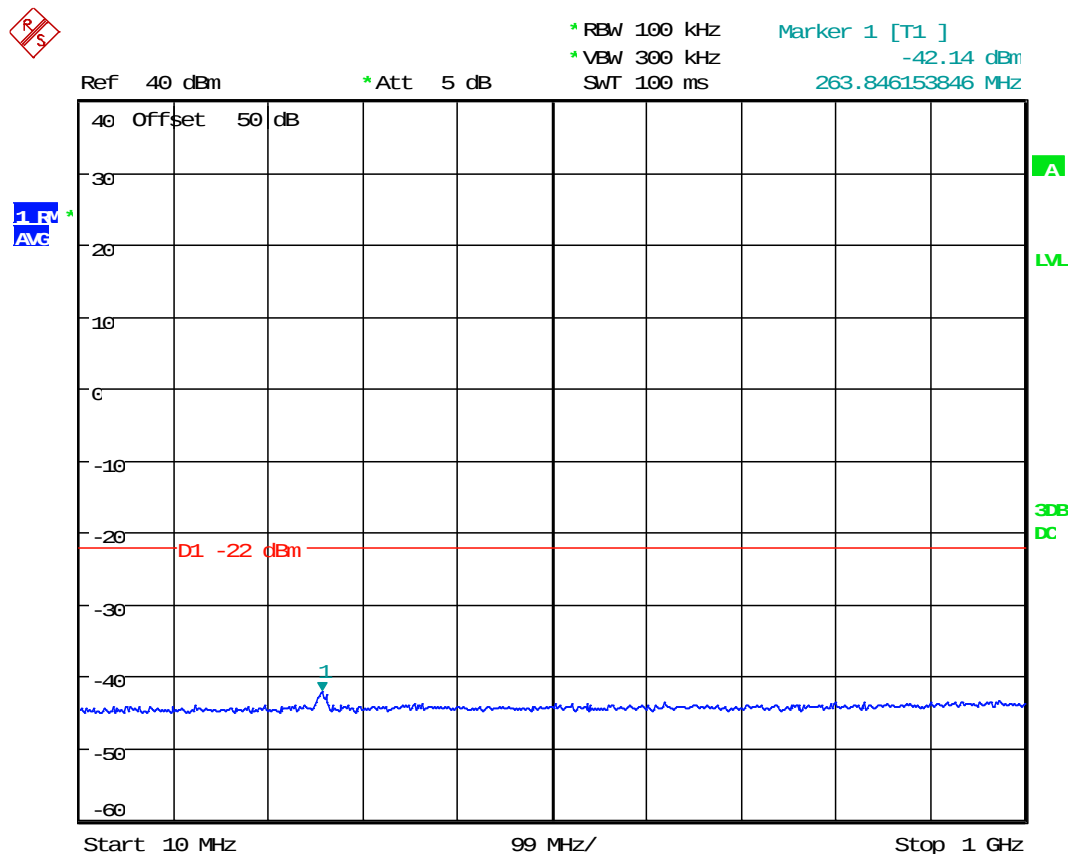
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2566-2588 MHz

20MHz BW; PWR:10W; 16QAM

Date: 8.NOV.2013 14:46:48

FCC Part 27; FCC ID:AS5BBTRX-15



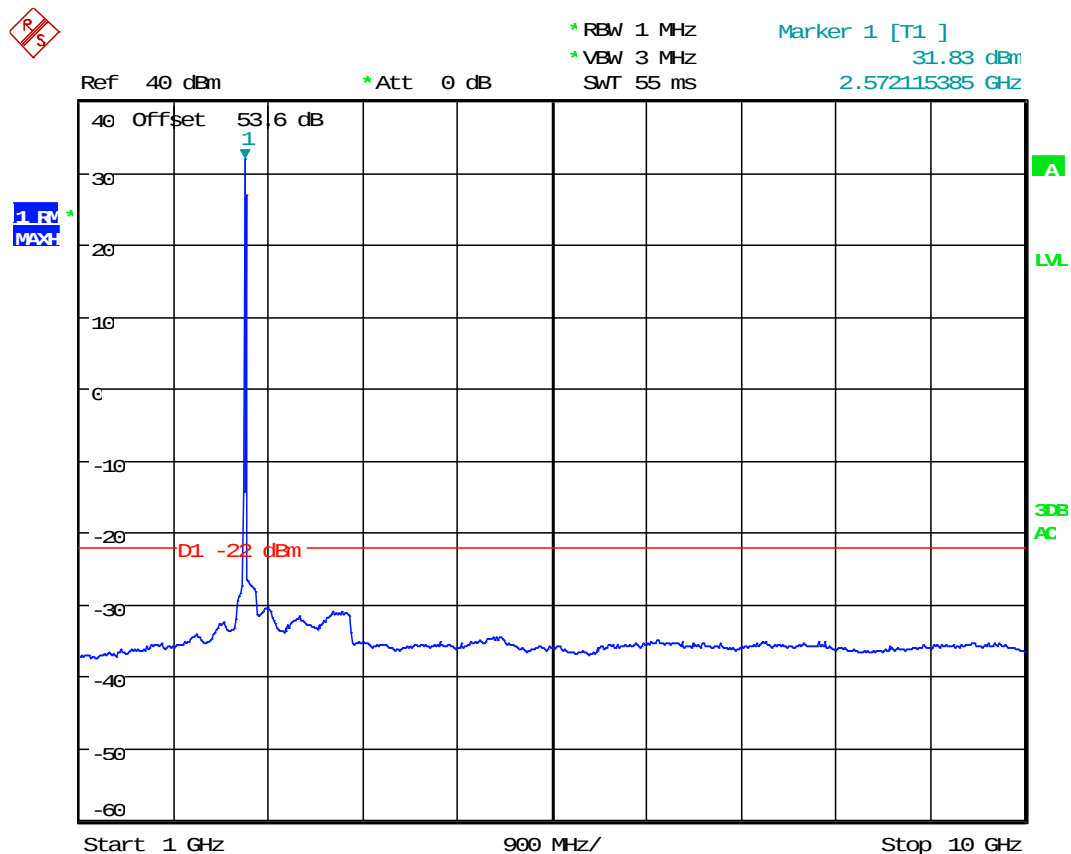
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2568-2588 MHz

20MHz BW; PWR:10W; 16QAM

Date: 8.NOV.2013 14:47:43

FCC Part 27; FCC ID:AS5BBTRX-15



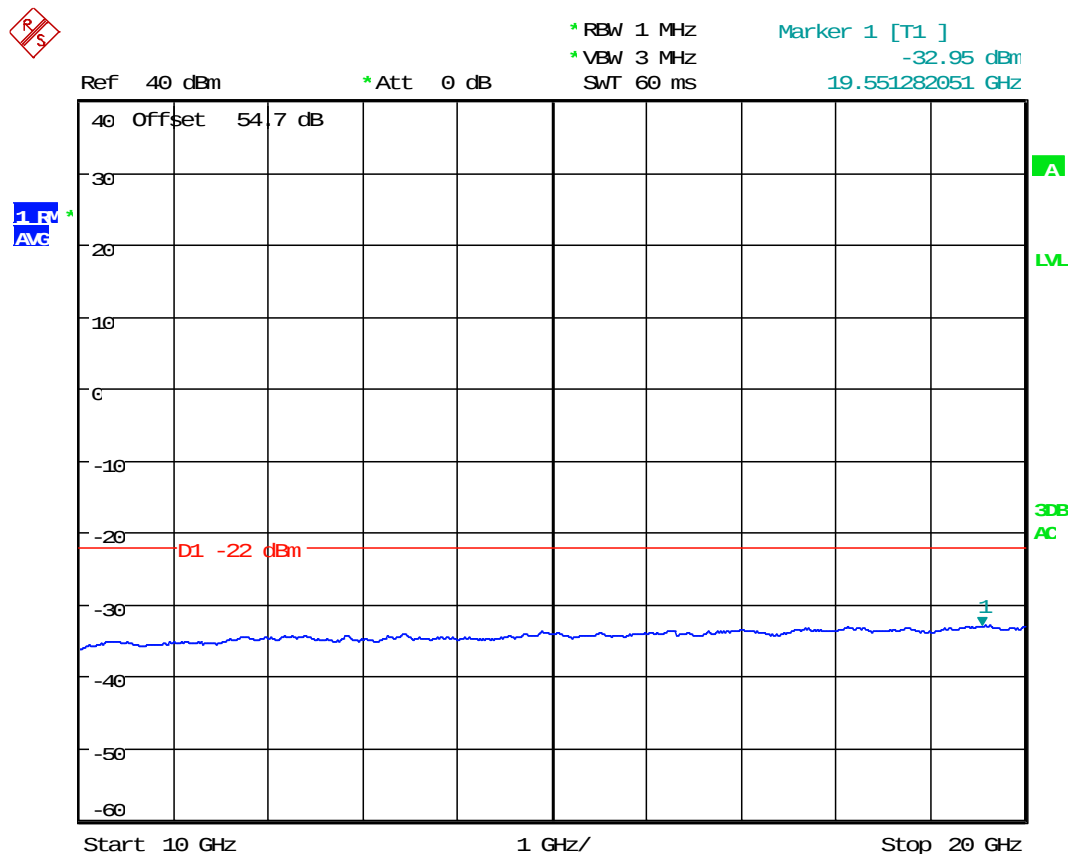
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2568-2588 MHz

20MHz BW; PWR:10W; 16QAM

Date: 8.NOV.2013 14:48:39

FCC Part 27; FCC ID:AS5BBTRX-15



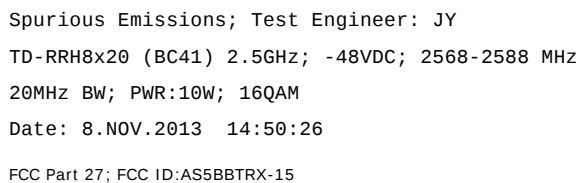
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2568-2588 MHz

20MHz BW; PWR:10W; 16QAM

Date: 8.NOV.2013 14:49:40

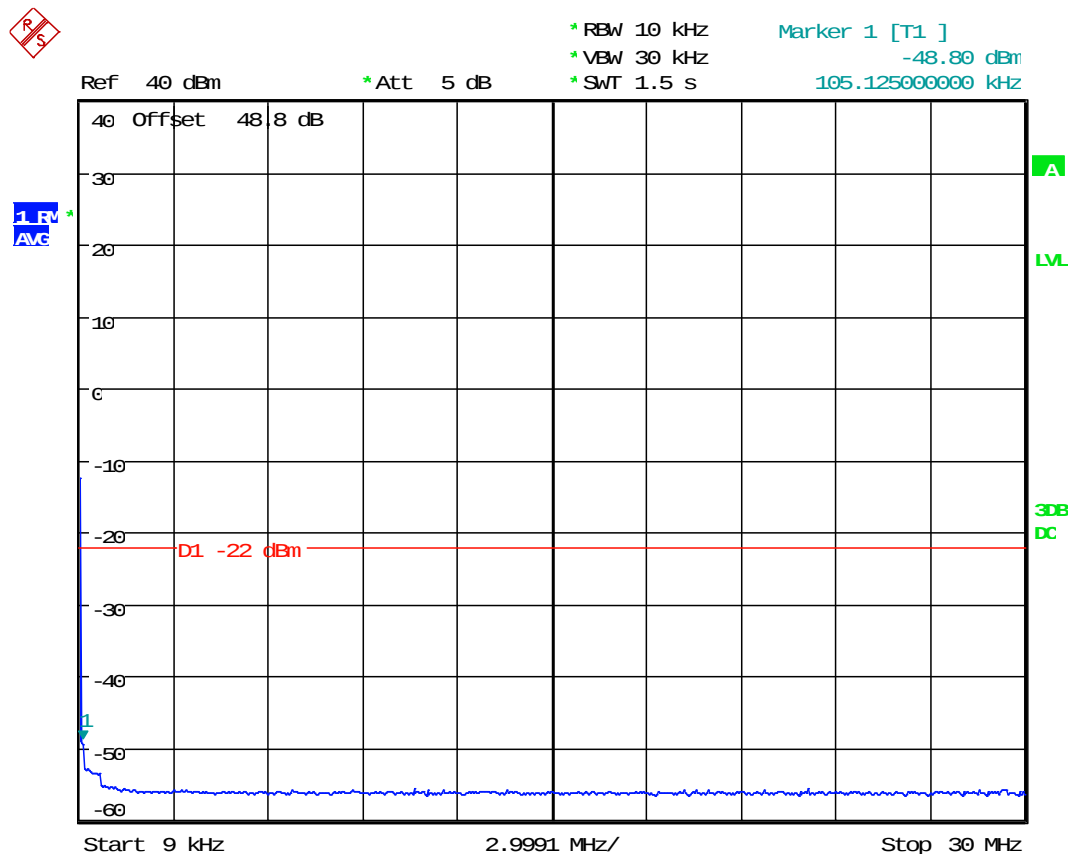
FCC Part 27; FCC ID:AS5BBTRX-15



**Transmit Port
Antenna Conducted Spurious Emissions**

**20 MHz BW
64QAM Modulation
8x10 (MIMO)**

**Bandwidth 2568 – 2588 MHz
(Middle)**



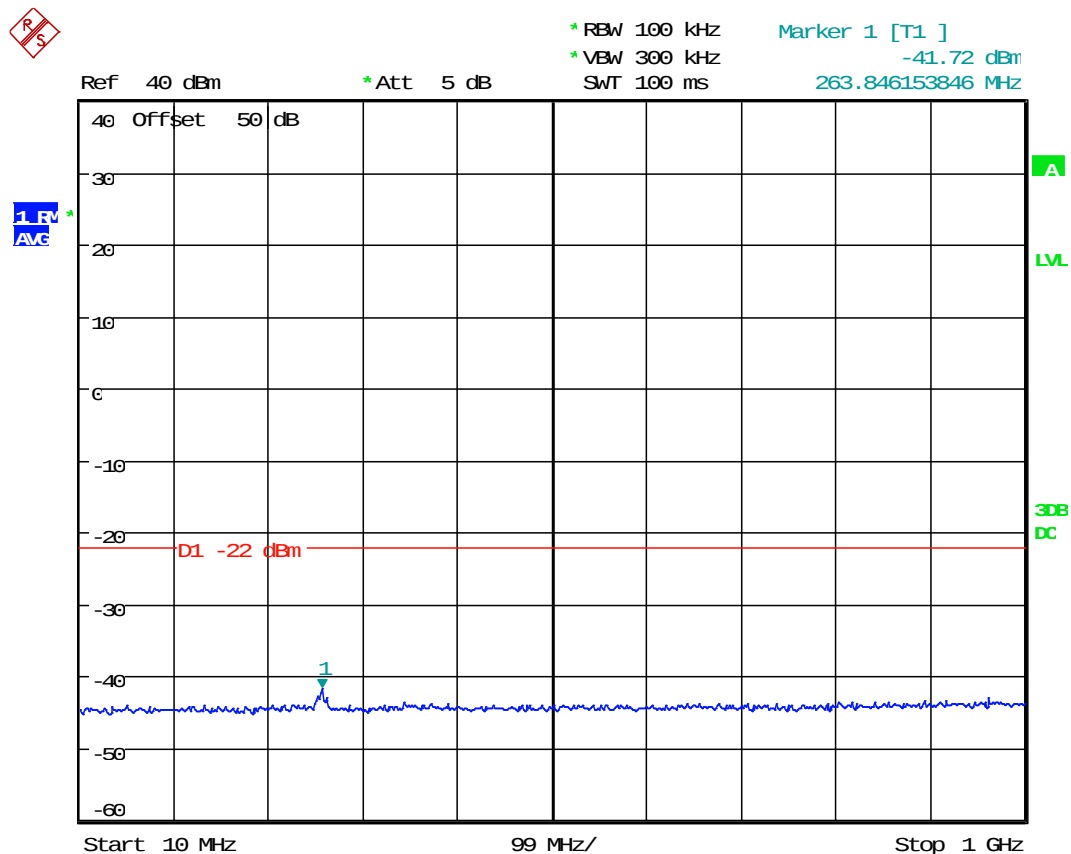
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2568-2588 MHz

20MHz BW; PWR:10W; 64QAM

Date: 8.NOV.2013 06:44:23

FCC Part 27; FCC ID:AS5BBTRX-15



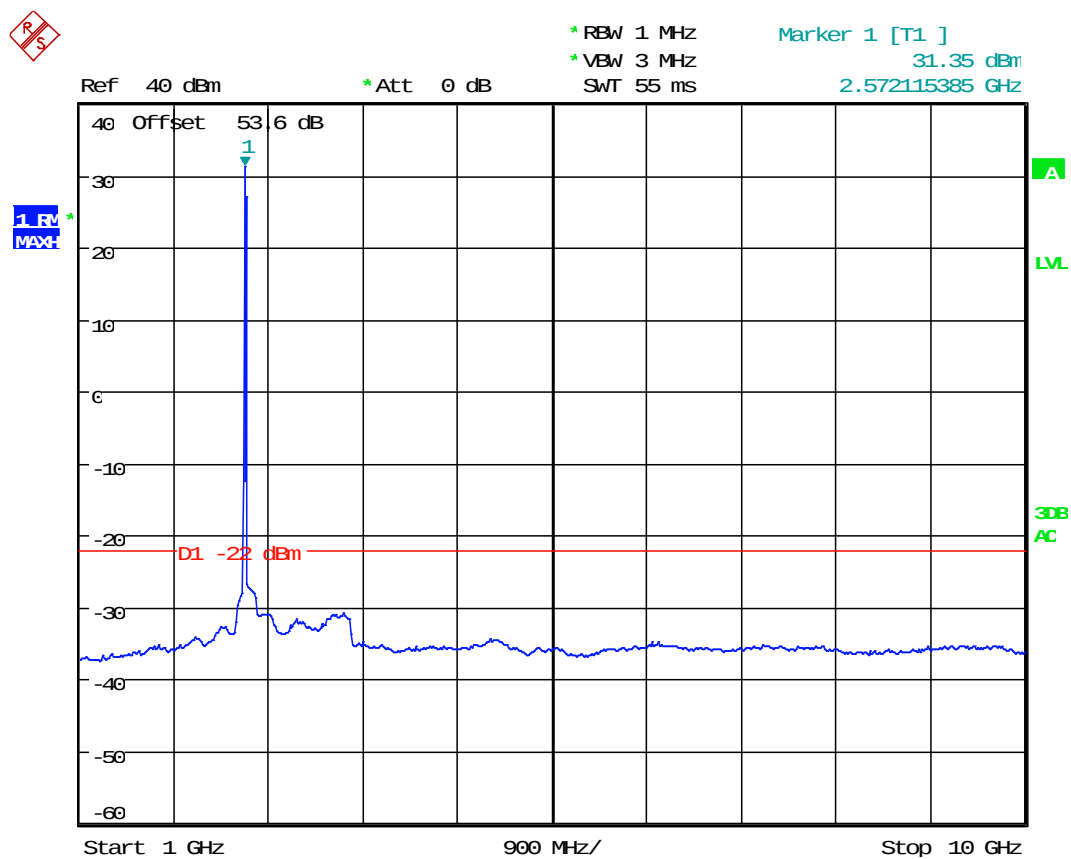
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2568-2588 MHz

20MHz BW; PWR:10W; 64QAM

Date: 8.NOV.2013 06:45:42

FCC Part 27; FCC ID:AS5BBTRX-15



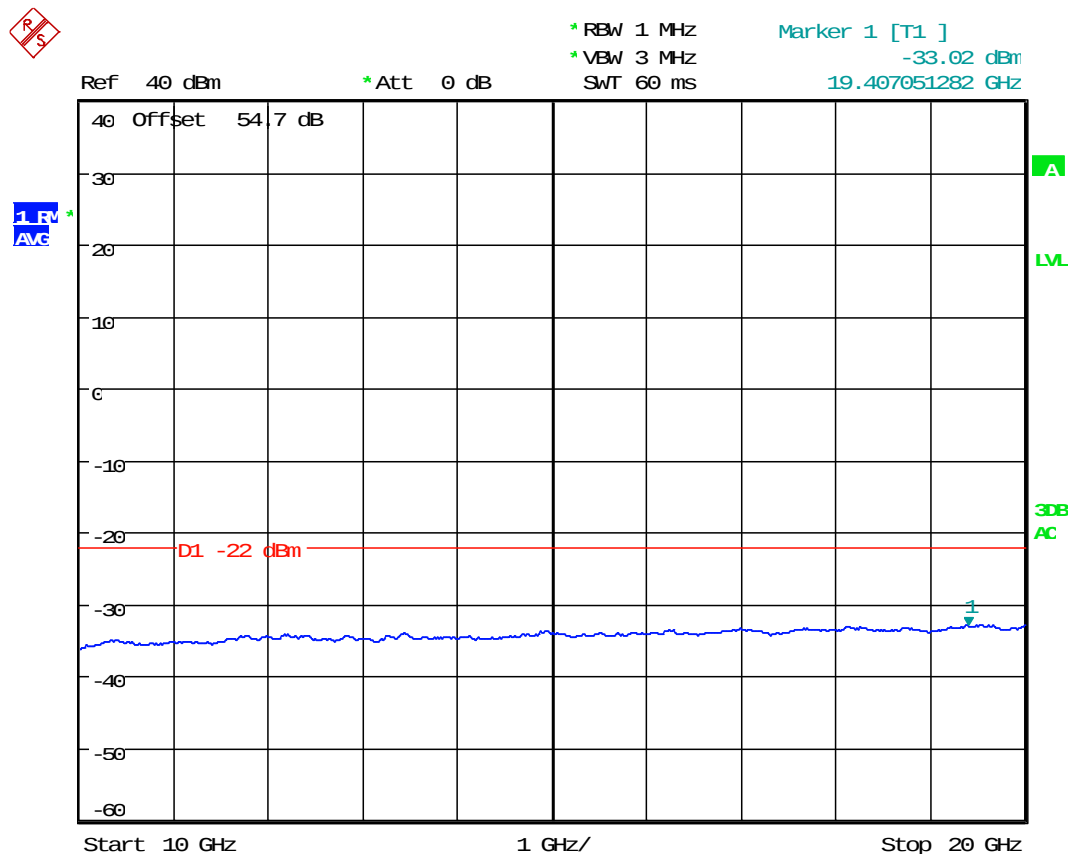
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2568-2588 MHz

20MHz BW; PWR:10W; 64QAM

Date: 8.NOV.2013 06:46:56

FCC Part 27; FCC ID:AS5BBTRX-15



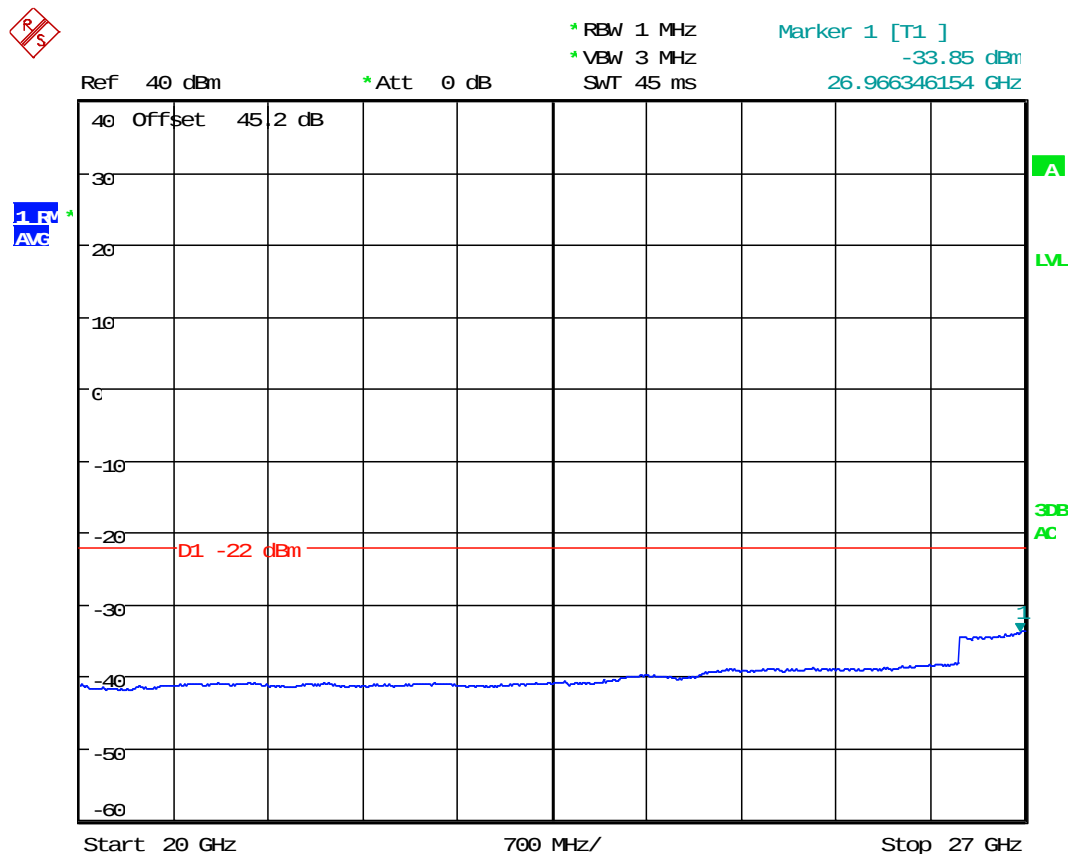
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2568-2588 MHz

20MHz BW; PWR:10W; 64QAM

Date: 8.NOV.2013 06:49:14

FCC Part 27; FCC ID:AS5BBTRX-15



Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2568-2588 MHz

20MHz BW; PWR:10W; 64QAM

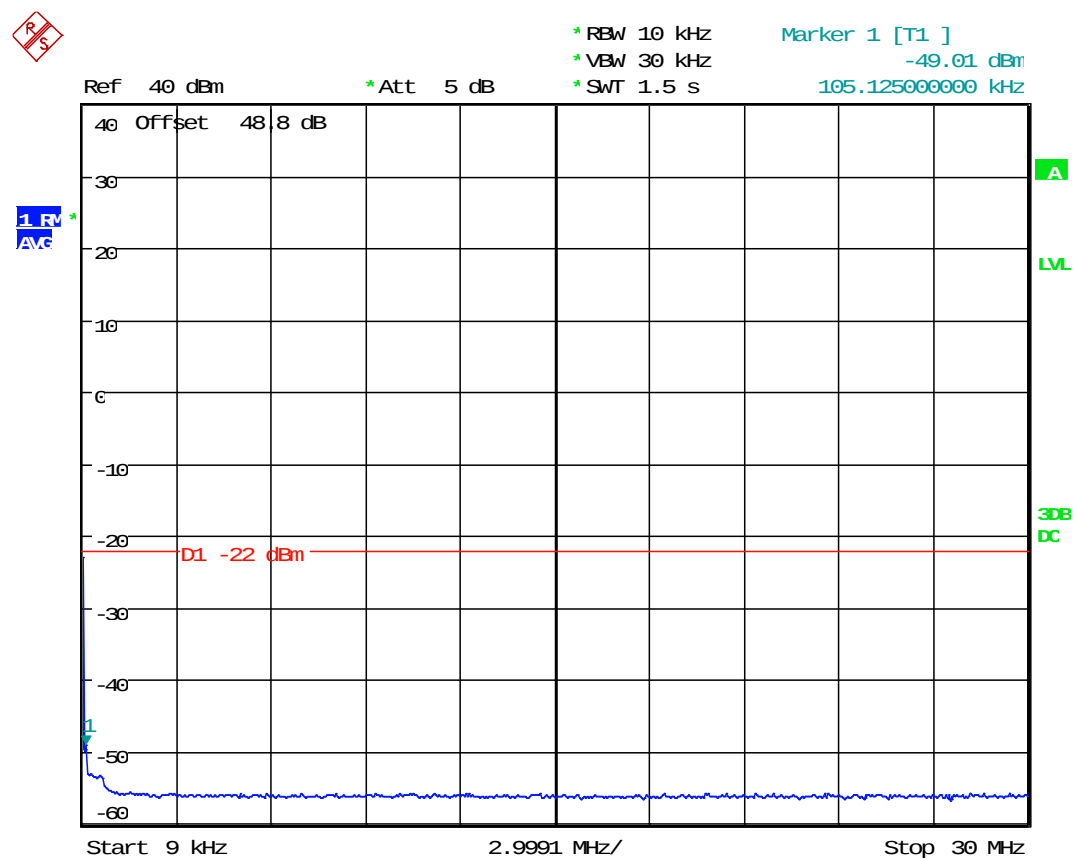
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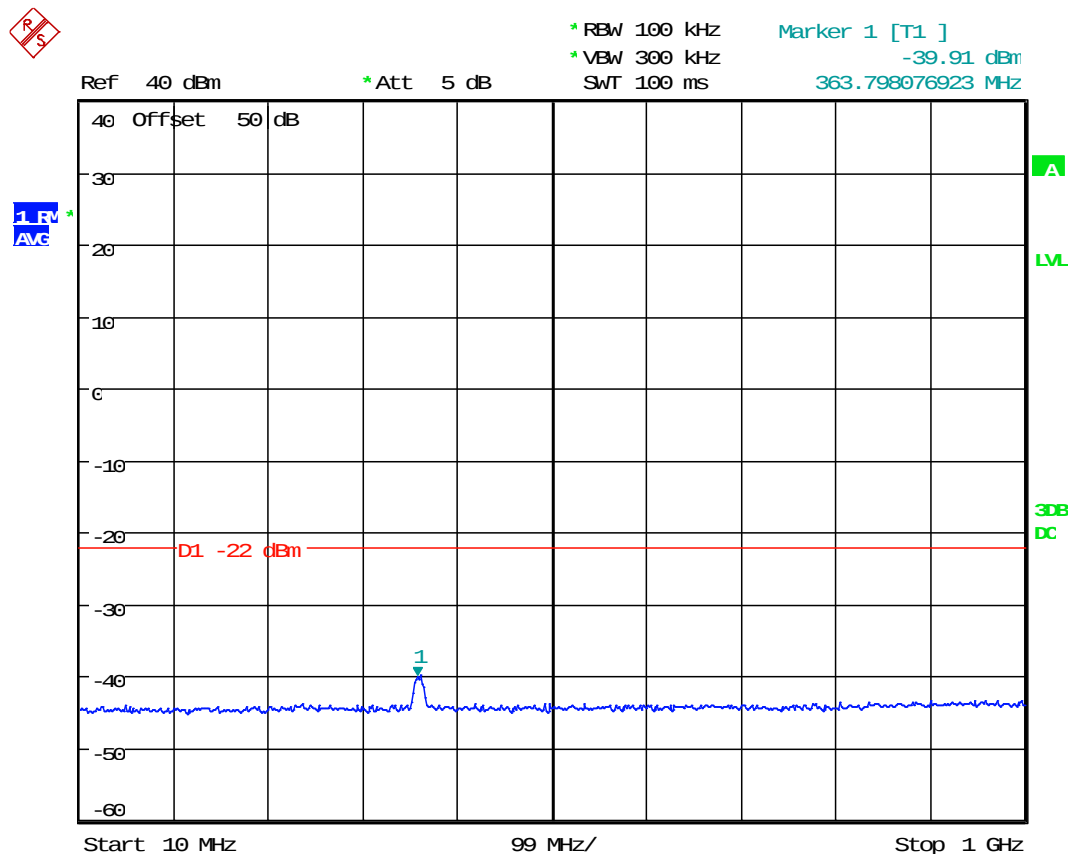
**Transmit Port
Antenna Conducted Spurious Emissions**

**20 MHz BW
QPSK Modulation
8x10 (MIMO)**

**Bandwidth 2670 – 2690 MHz
(Higher)**



Spurious Emissions; Test Engineer: JY
 TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2670-2690 MHz
 20MHz BW; PWR:10W; QPSK
 Date: 8.NOV.2013 15:26:16
 FCC Part 27; FCC ID:AS5BBTRX-15



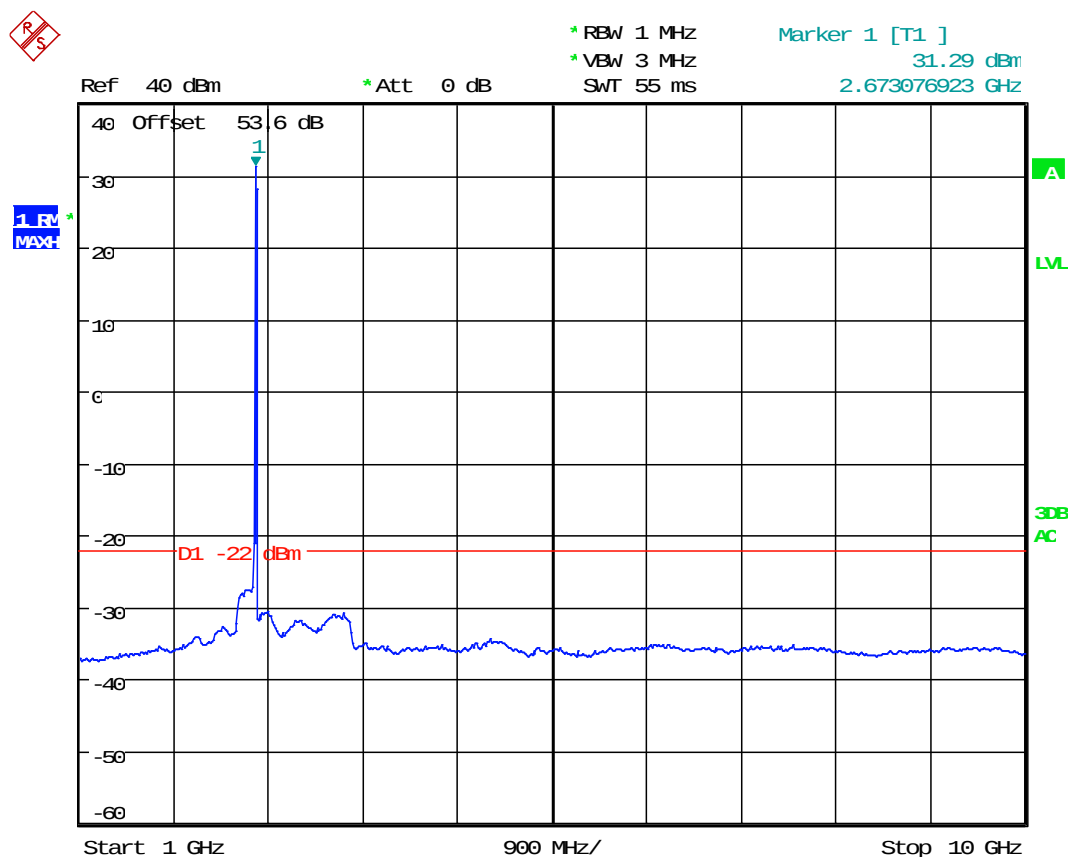
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2670-2690 MHz

20MHz BW; PWR:10W; QPSK

Date: 8.NOV.2013 15:27:06

FCC Part 27; FCC ID:AS5BBTRX-15



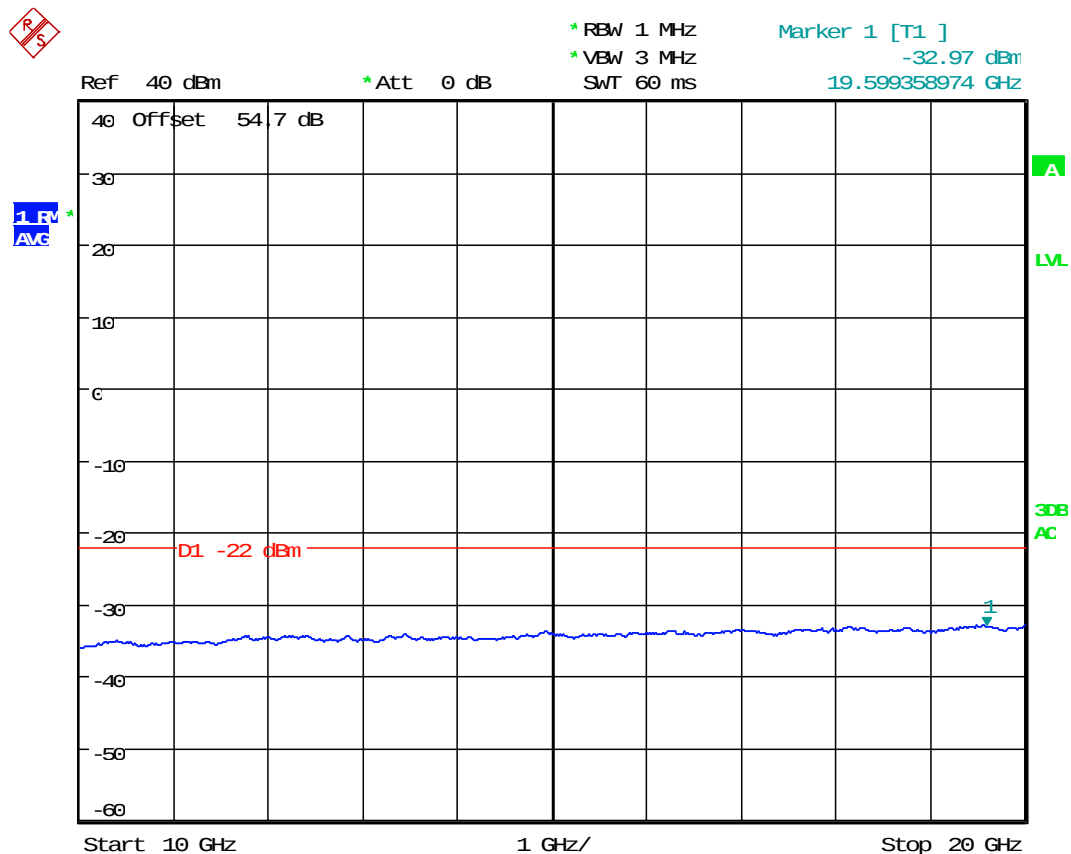
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2670-2690 MHz

20MHz BW; PWR:10W; QPSK

Date: 8.NOV.2013 15:27:55

FCC Part 27; FCC ID:AS5BBTRX-15



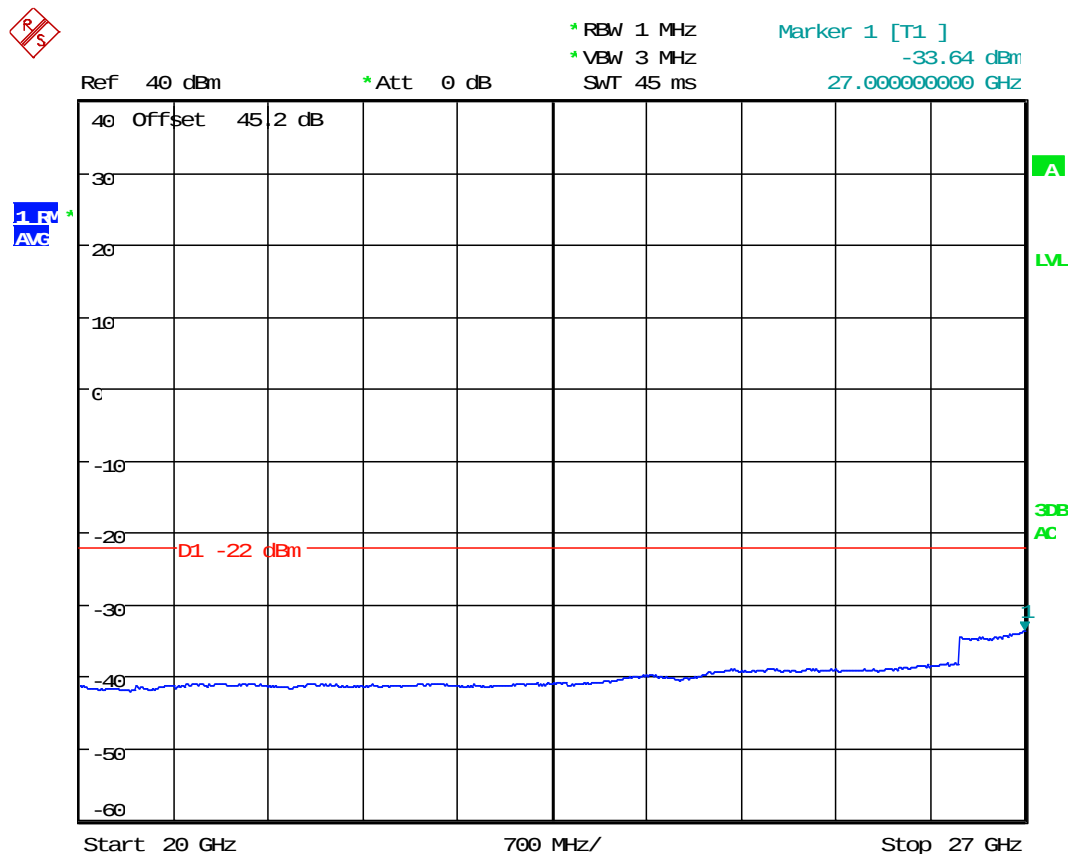
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2670-2690 MHz

20MHz BW; PWR:10W; QPSK

Date: 8.NOV.2013 15:32:35

FCC Part 27; FCC ID:AS5BBTRX-15



Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2670-2690 MHz

20MHz BW; PWR:10W; QPSK

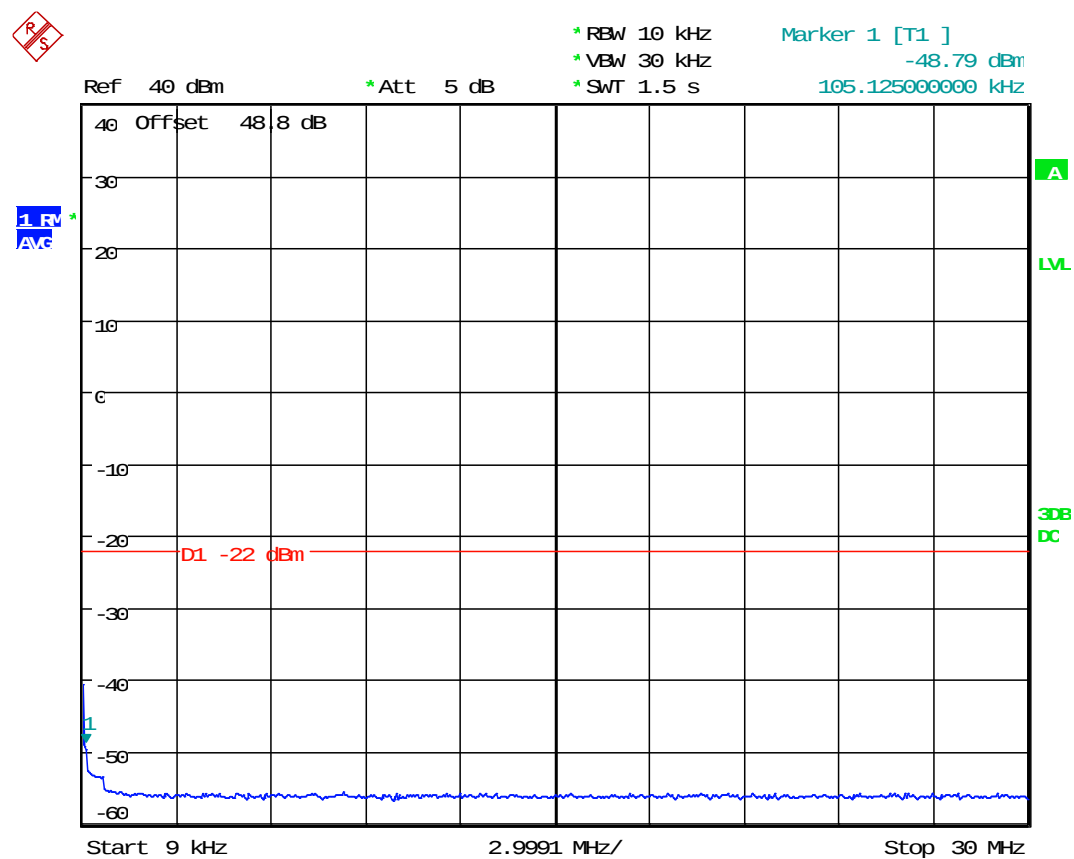
Date: 8.NOV.2013 15:29:36

FCC Part 27; FCC ID:AS5BBTRX-15

**Transmit Port
Antenna Conducted Spurious Emissions**

**20 MHz BW
16QAM Modulation
8x10 (MIMO)**

**Bandwidth 2670 – 2690 MHz
(Higher)**



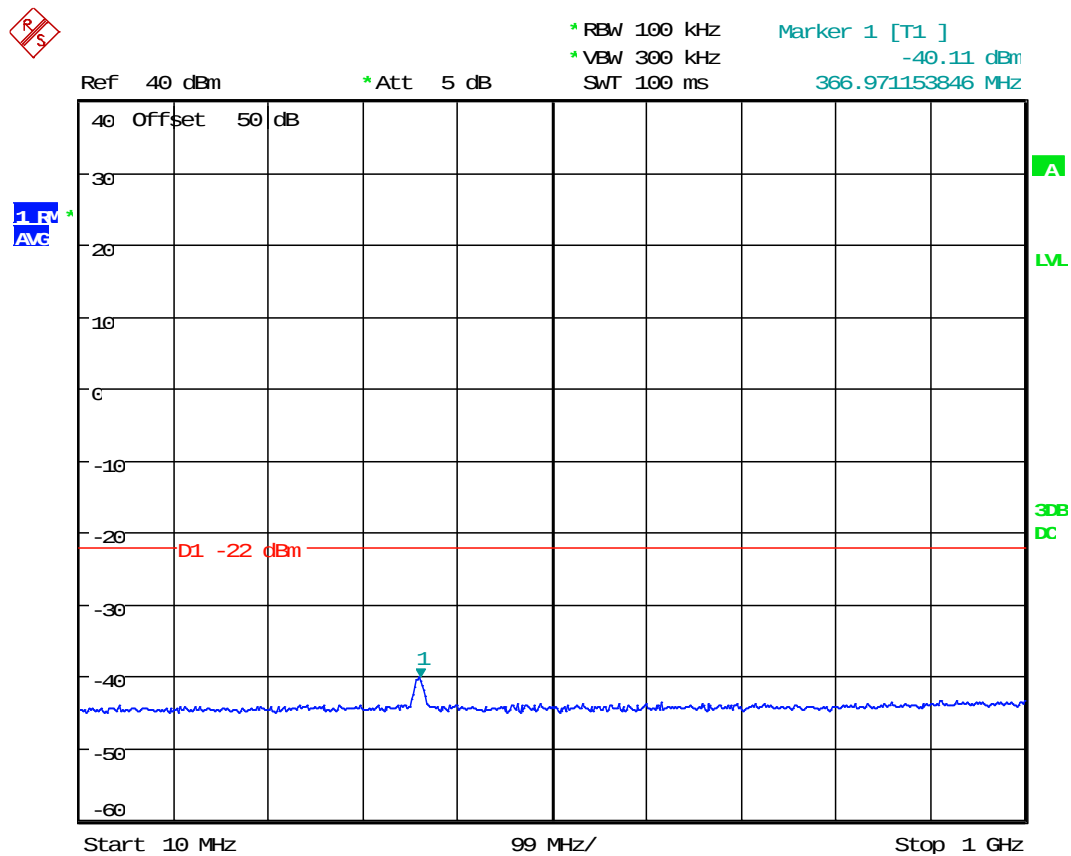
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2670-2690 MHz

20MHz BW; PWR:10W; 16QAM

Date: 8.NOV.2013 15:50:27

FCC Part 27; FCC ID:AS5BBTRX-15



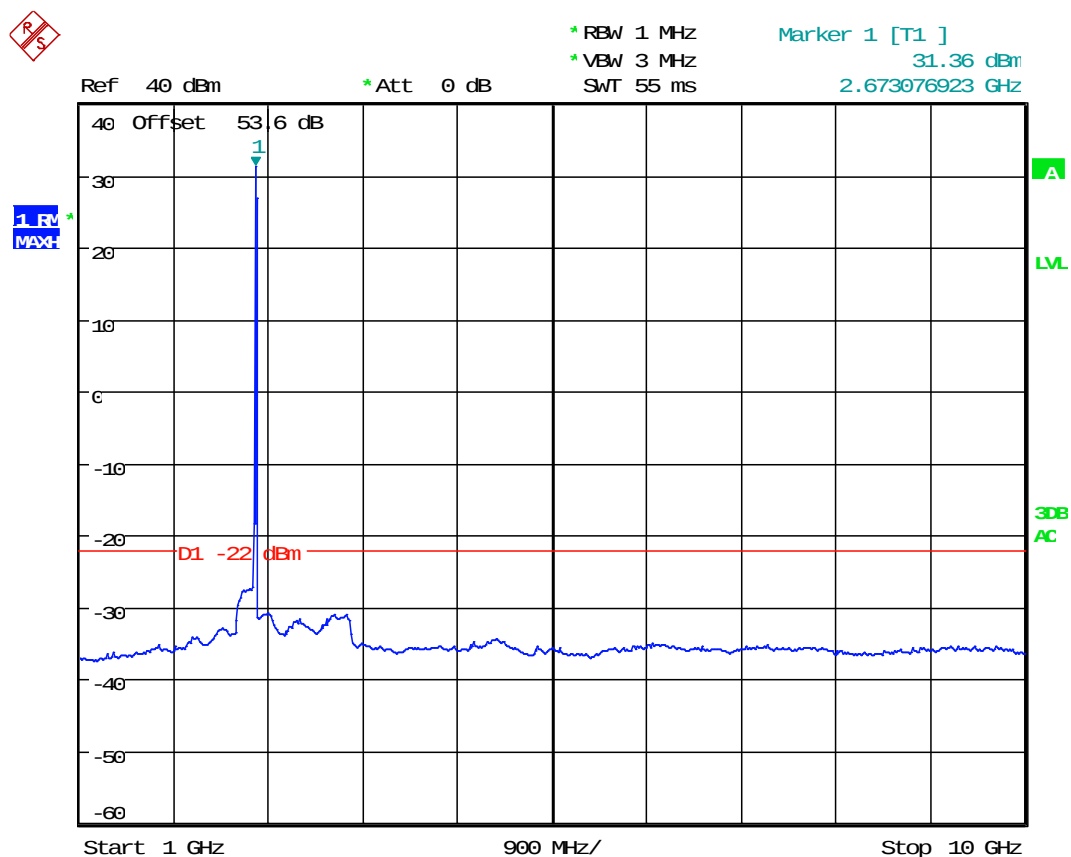
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2670-2690 MHz

20MHz BW; PWR:10W; 16QAM

Date: 8.NOV.2013 15:51:12

FCC Part 27; FCC ID:AS5BBTRX-15



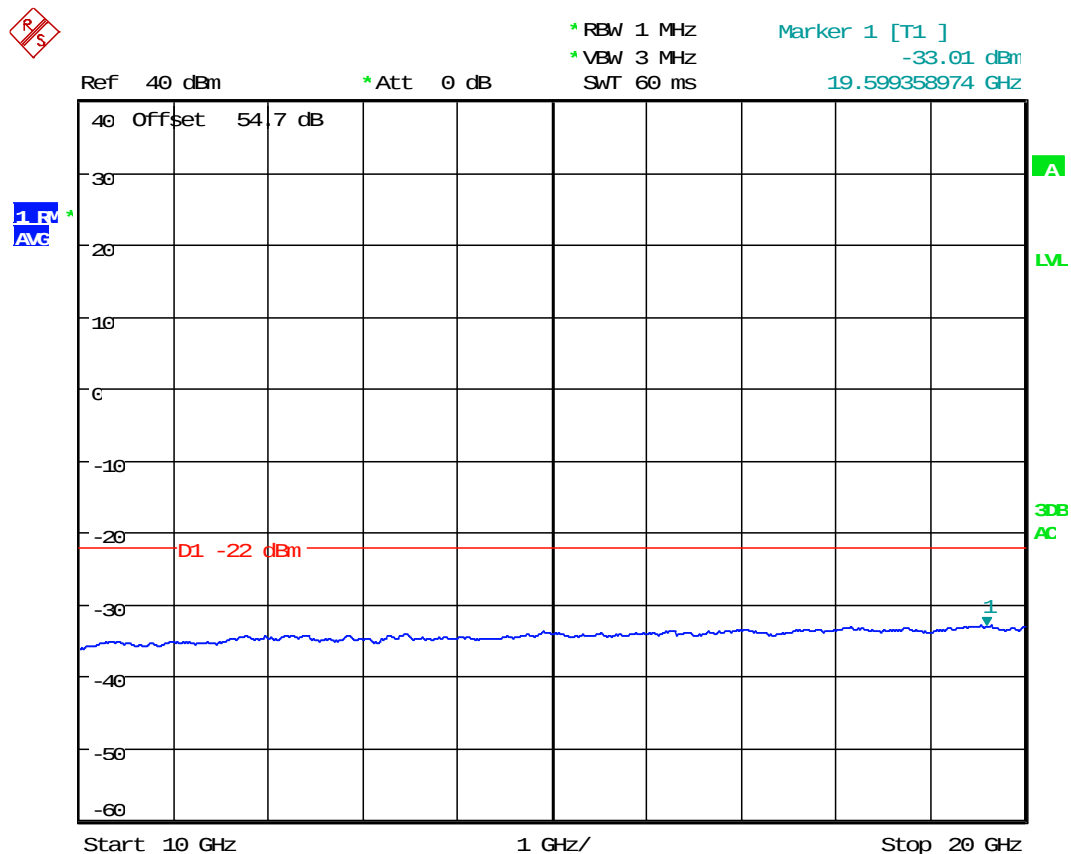
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2670-2690 MHz

20MHz BW; PWR:10W; 16QAM

Date: 8.NOV.2013 15:51:58

FCC Part 27; FCC ID:AS5BBTRX-15



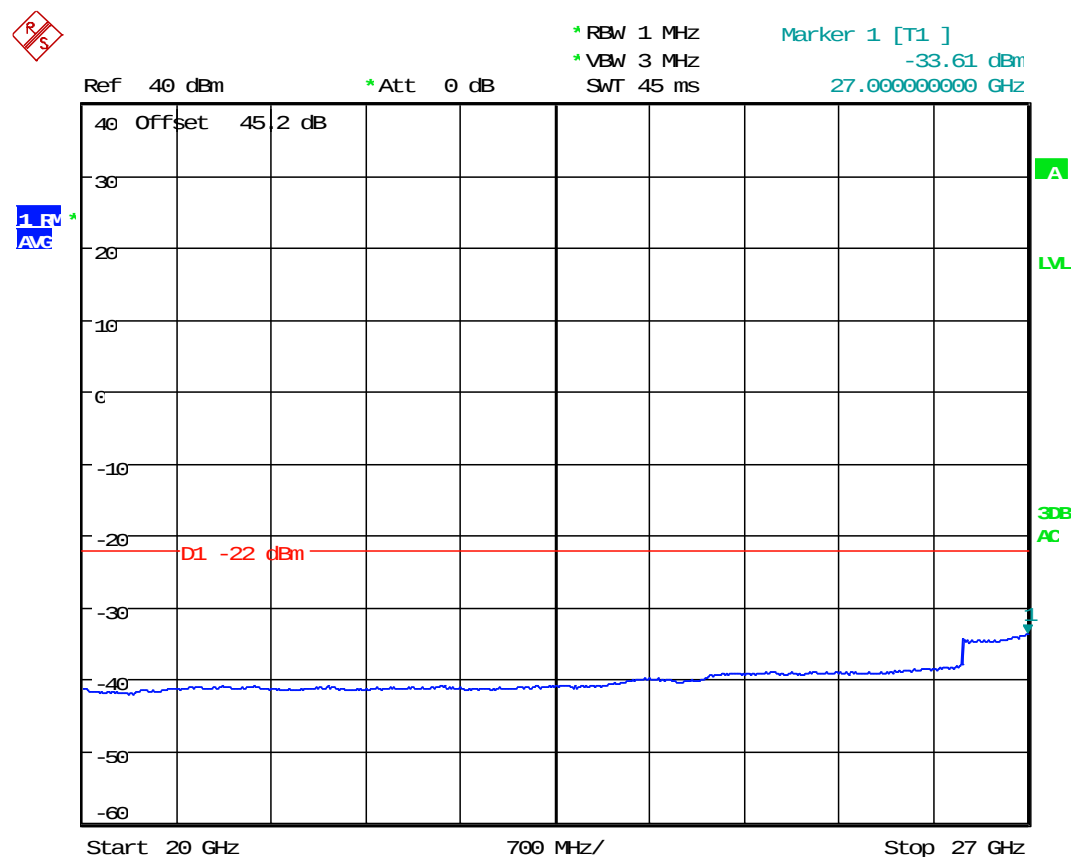
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2670-2690 MHz

20MHz BW; PWR:10W; 16QAM

Date: 8.NOV.2013 15:52:41

FCC Part 27; FCC ID:AS5BBTRX-15



Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2670-2690 MHz

20MHz BW; PWR:10W; 16QAM

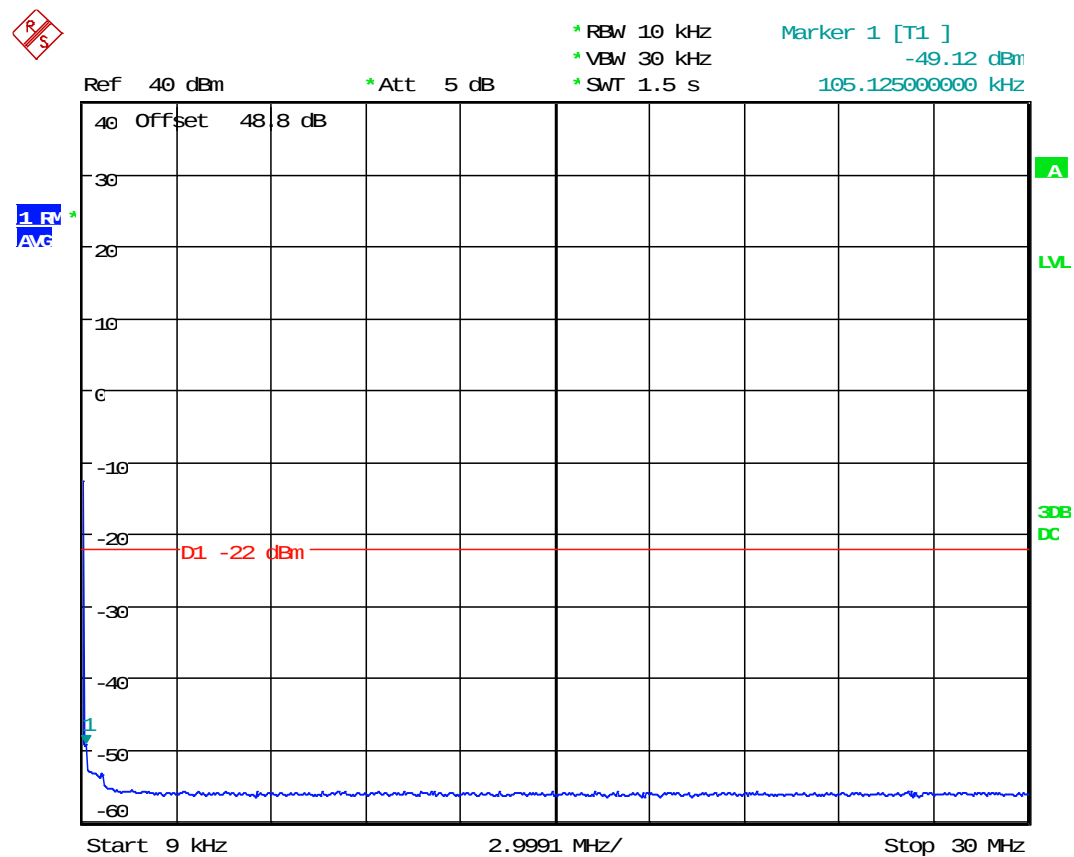
Date: 8.NOV.2013 15:53:23

FCC Part 27; FCC ID:AS5BBTRX-15

**Transmit Port
Antenna Conducted Spurious Emissions**

**20 MHz BW
64QAM Modulation
8x10 (MIMO)**

**Bandwidth 2670 – 2690 MHz
(Higher)**



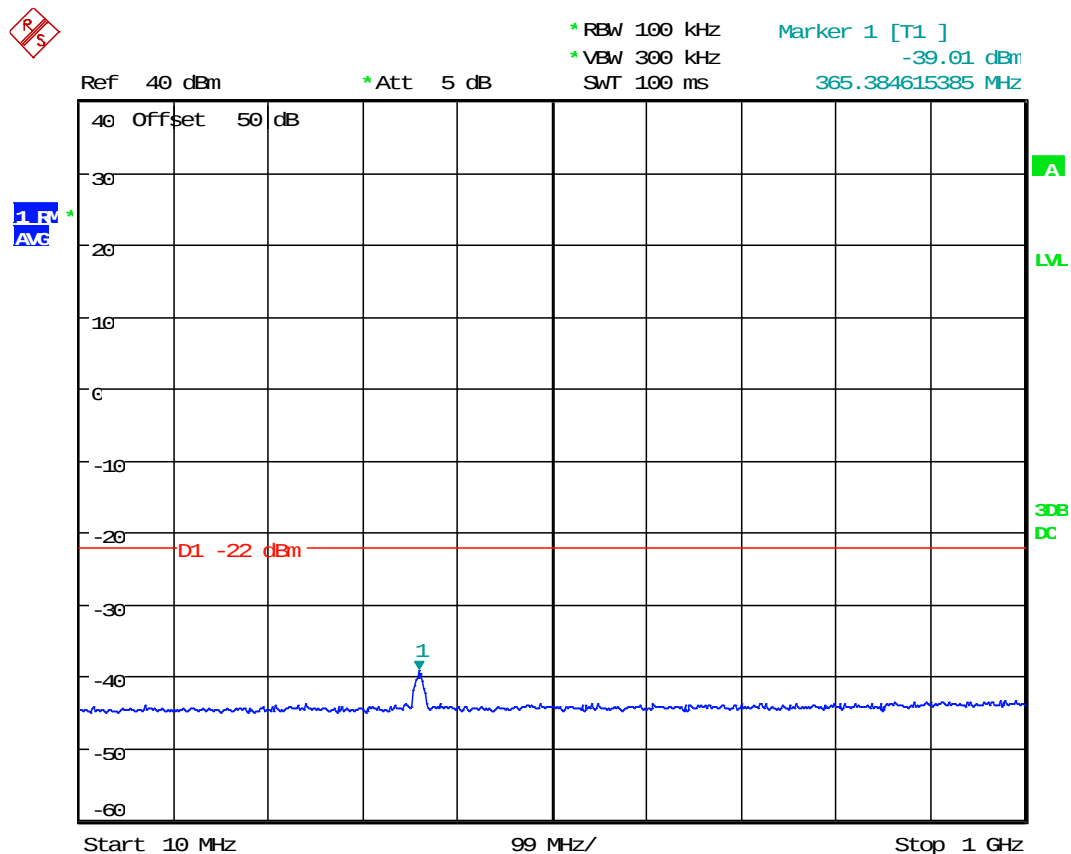
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2670-2690 MHz

20MHz BW; PWR:10W; 64QAM

Date: 7.NOV.2013 16:04:32

FCC Part 27; FCC ID:AS5BBTRX-15



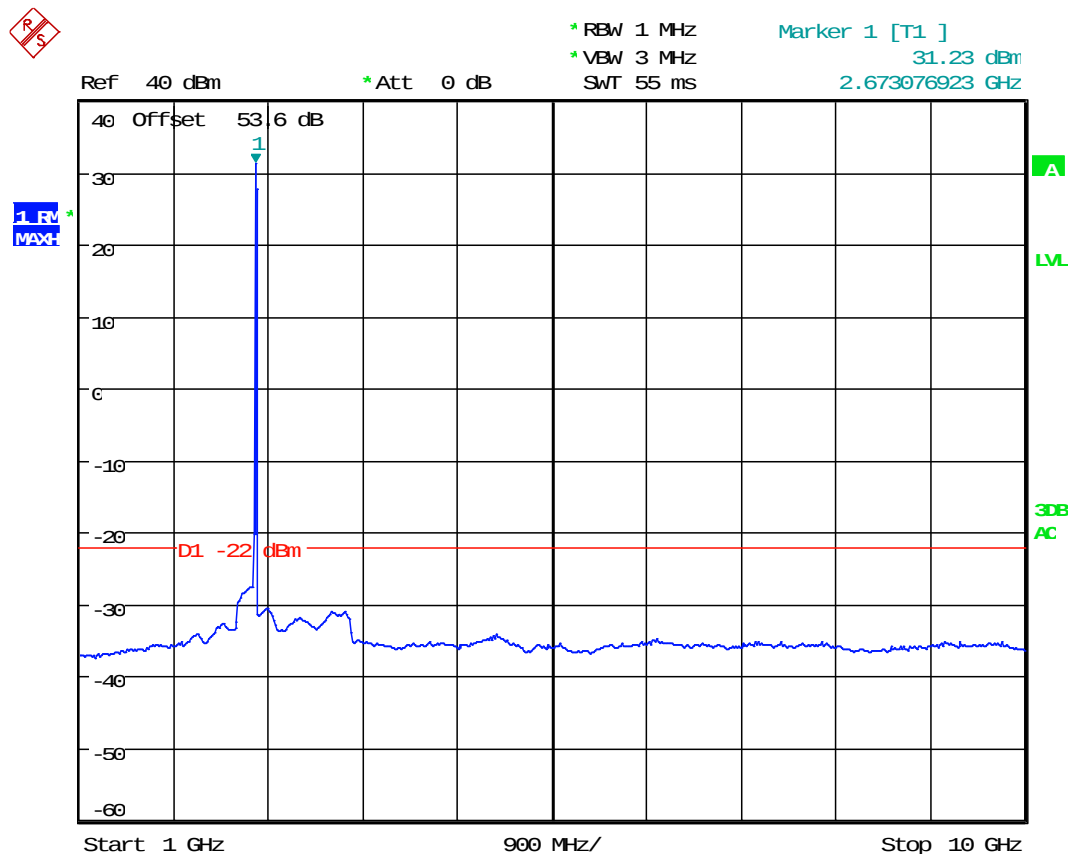
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2670-2690 MHz

20MHz BW; PWR:10W; 64QAM

Date: 7.NOV.2013 16:05:30

FCC Part 27; FCC ID:AS5BBTRX-15



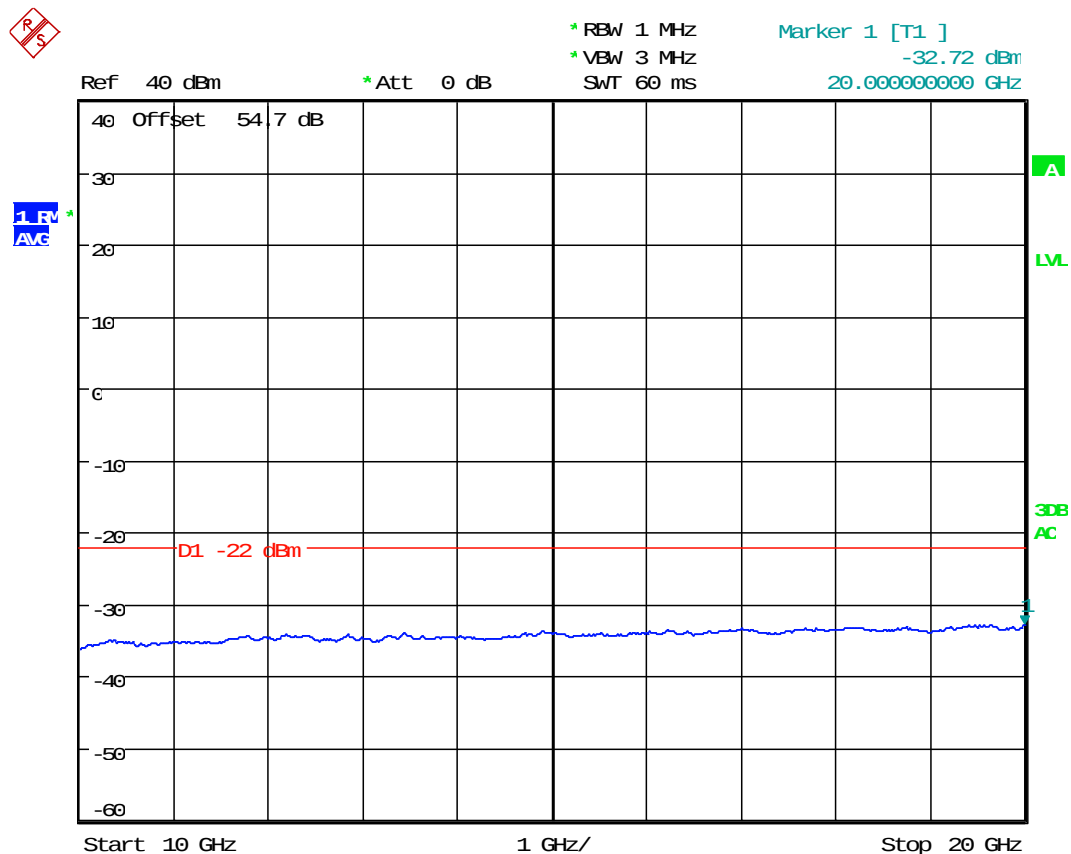
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2670-2690 MHz

20MHz BW; PWR:10W; 64QAM

Date: 7.NOV.2013 16:07:21

FCC Part 27; FCC ID:AS5BBTRX-15



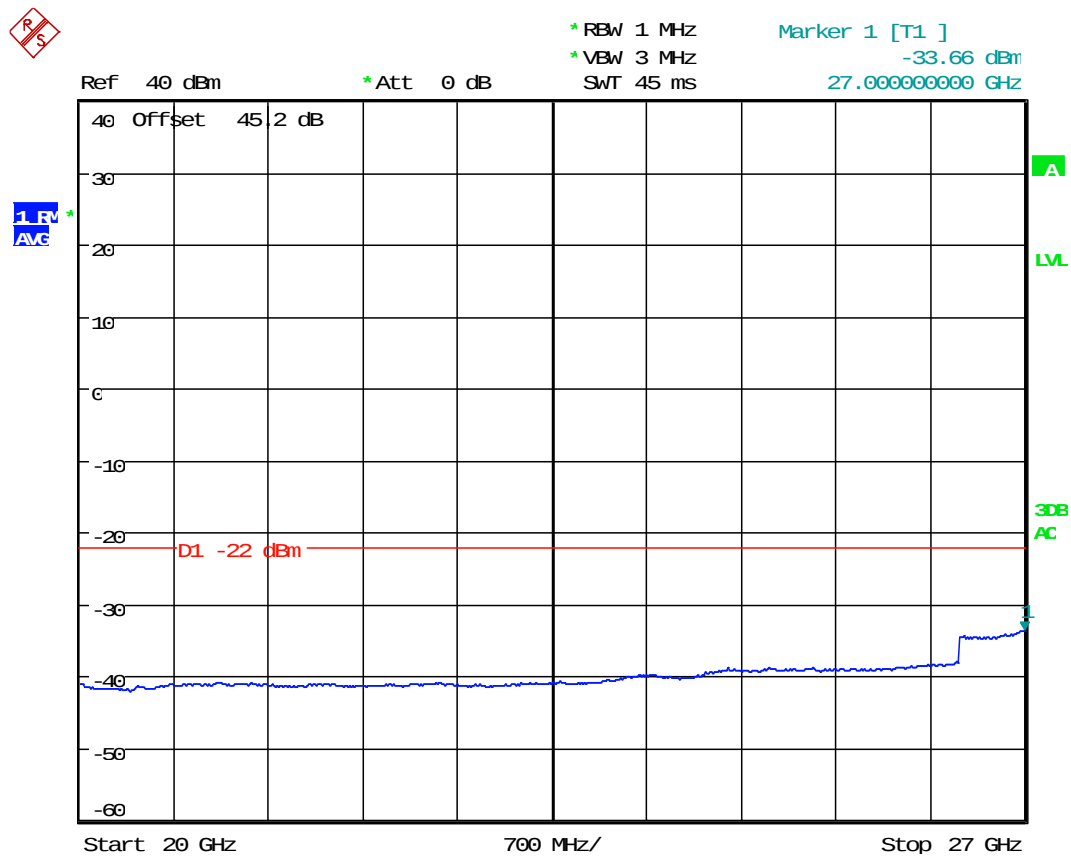
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2670-2690 MHz

20MHz BW; PWR:10W; 64QAM

Date: 7.NOV.2013 16:08:18

FCC Part 27; FCC ID:AS5BBTRX-15



Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz; -48VDC; 2670-2690 MHz

20MHz BW; PWR:10W; 64QAM

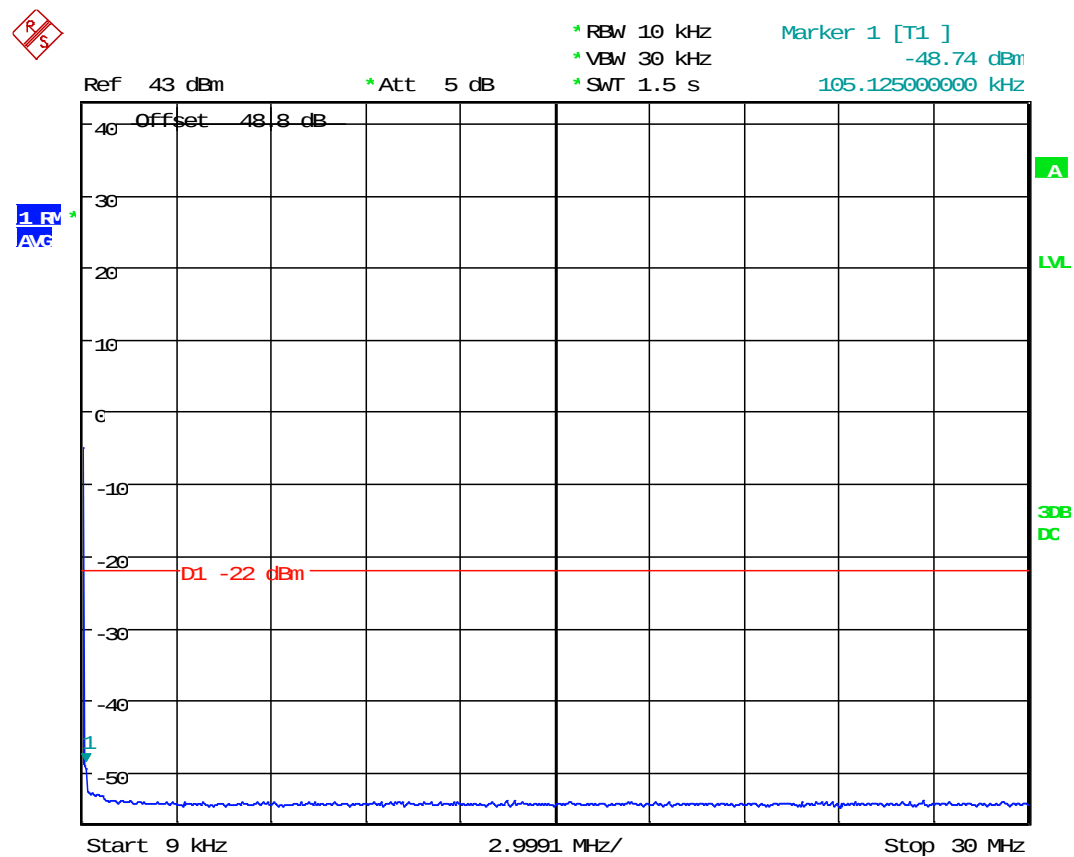
Date: 7.NOV.2013 16:09:32

FCC Part 27; FCC ID:AS5BBTRX-15

**Transmit Port
Antenna Conducted Spurious Emissions**

**40 MHz BW (20MHz + 20MHz)
QPSK Modulation
8x20 (MIMO)**

**Bandwidth 2496 – 2536 MHz
(Lower)**



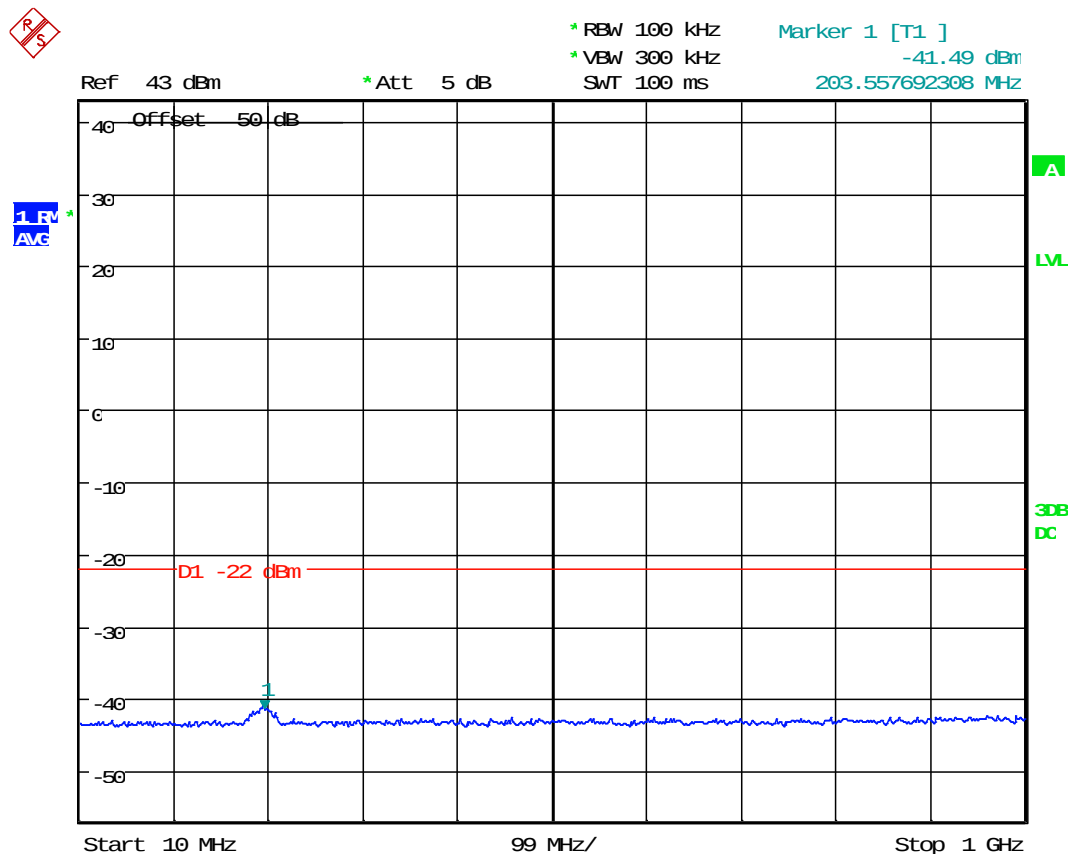
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2496-2536 MHz(20MHz+20MHz)

40MHz BW; PWR:20W; QPSK

Date: 18.NOV.2013 11:19:47

FCC Part 27; FCC ID:AS5BBTRX-15



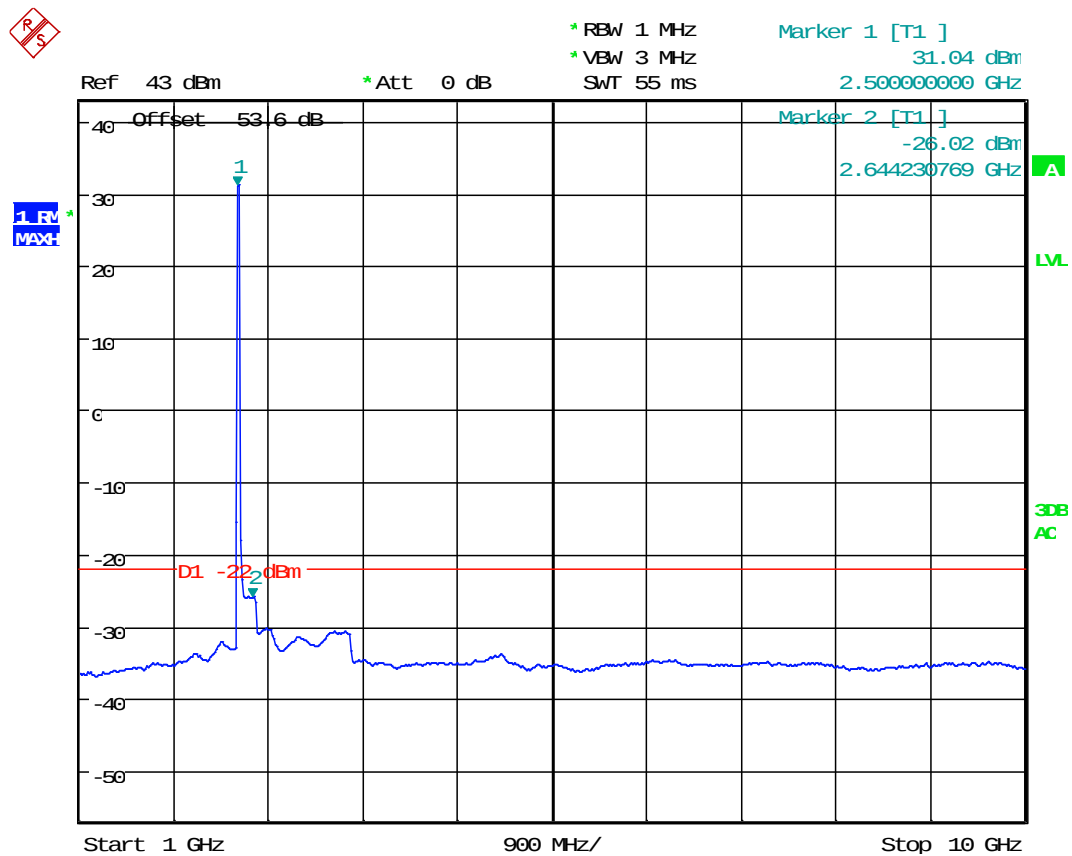
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2496-2536 MHz(20MHz+20MHz)

40MHz BW; PWR:20W; QPSK

Date: 18.NOV.2013 11:20:43

FCC Part 27; FCC ID:AS5BBTRX-15



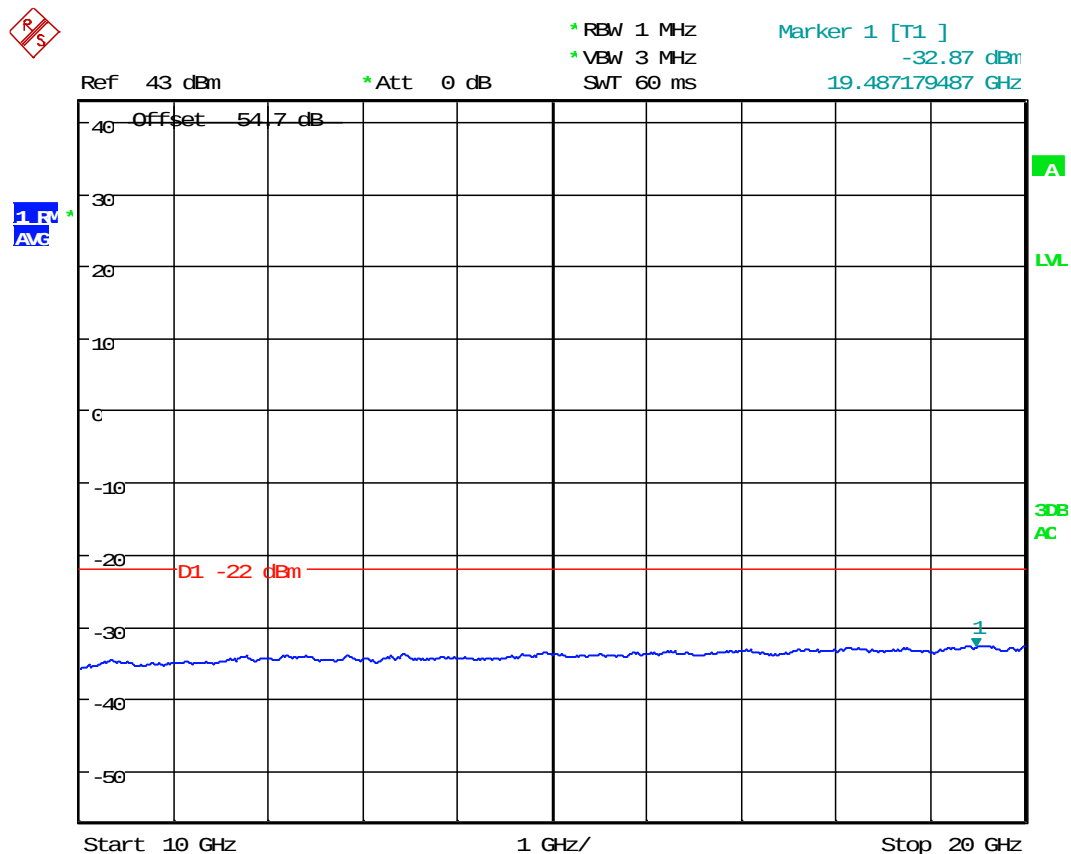
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2496-2536 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;QPSK

Date: 3.DEC.2013 10:21:55

FCC Part 27; FCC ID:AS5BBTRX-15



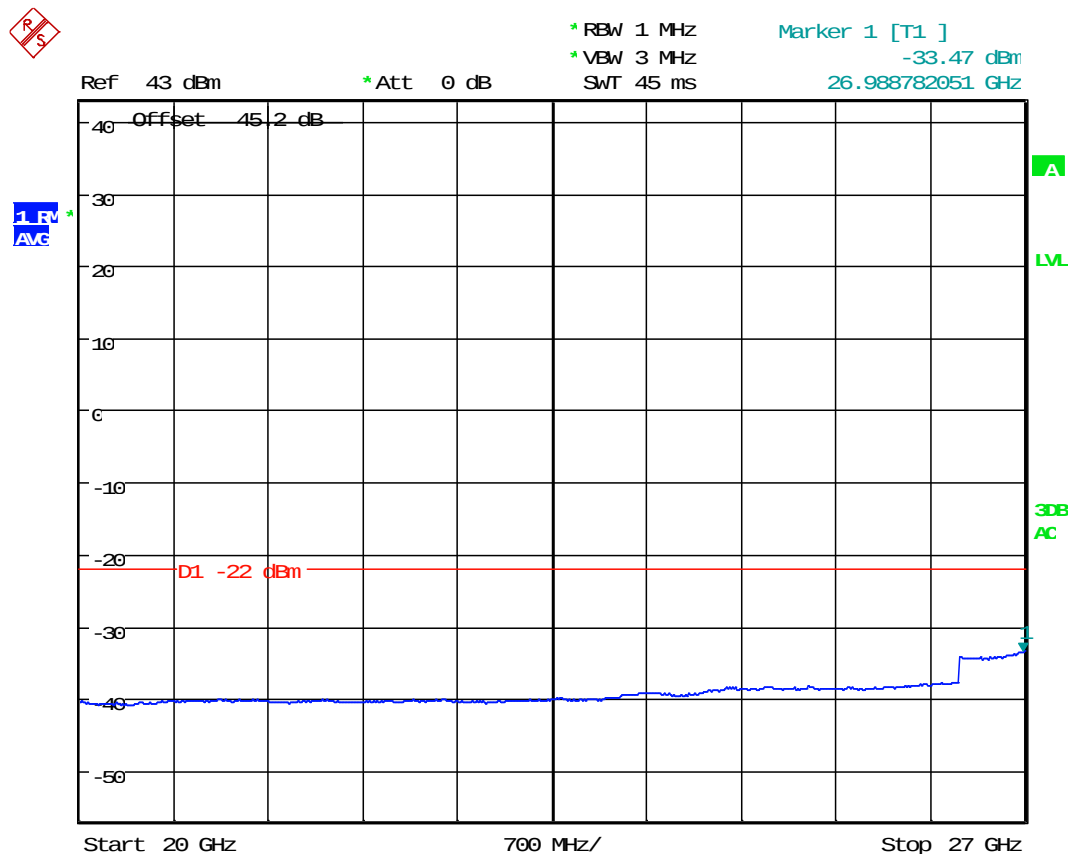
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2496-2536 MHz(20MHz+20MHz)

40MHz BW; PWR:20W; QPSK

Date: 18.NOV.2013 11:26:24

FCC Part 27; FCC ID:AS5BBTRX-15



Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2496-2536 MHz(20MHz+20MHz)

40MHz BW; PWR:20W; QPSK

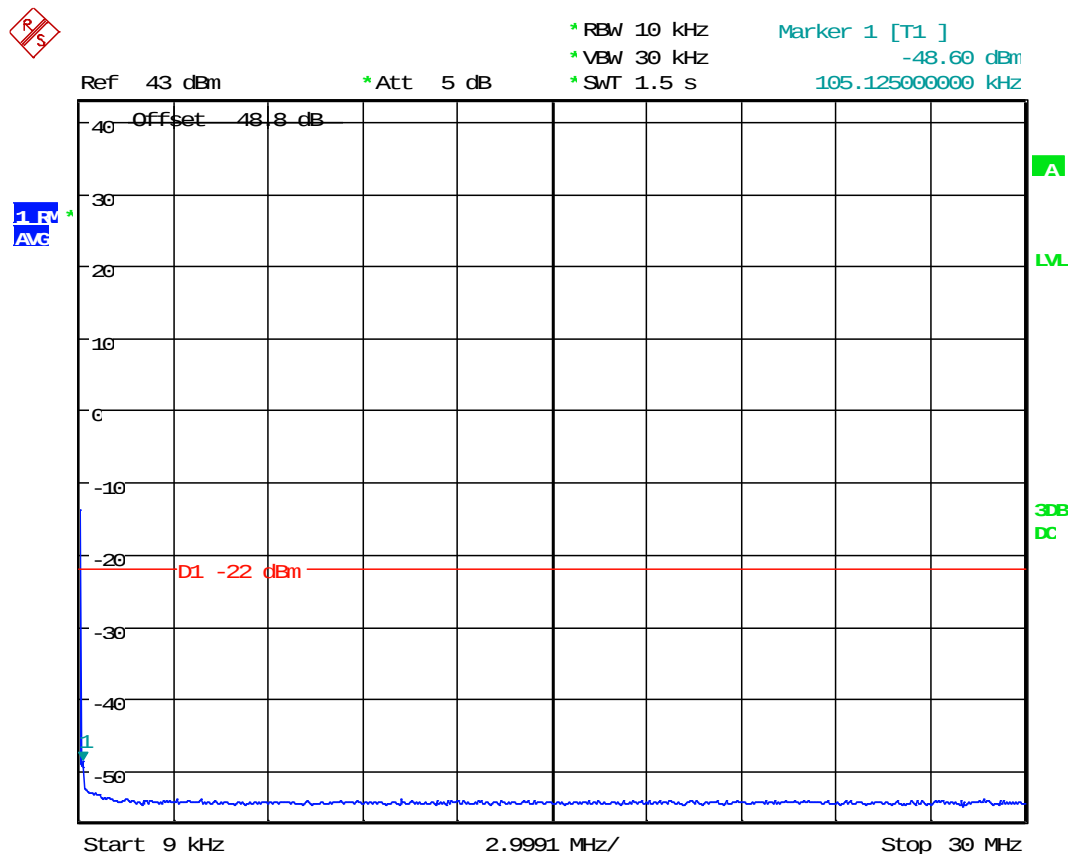
Date: 18.NOV.2013 11:26:56

FCC Part 27; FCC ID:AS5BBTRX-15

**Transmit Port
Antenna Conducted Spurious Emissions**

**40 MHz BW (20MHz + 20MHz)
16QAM Modulation
8x20 (MIMO)**

**Bandwidth 2496 – 2536 MHz
(Lower)**



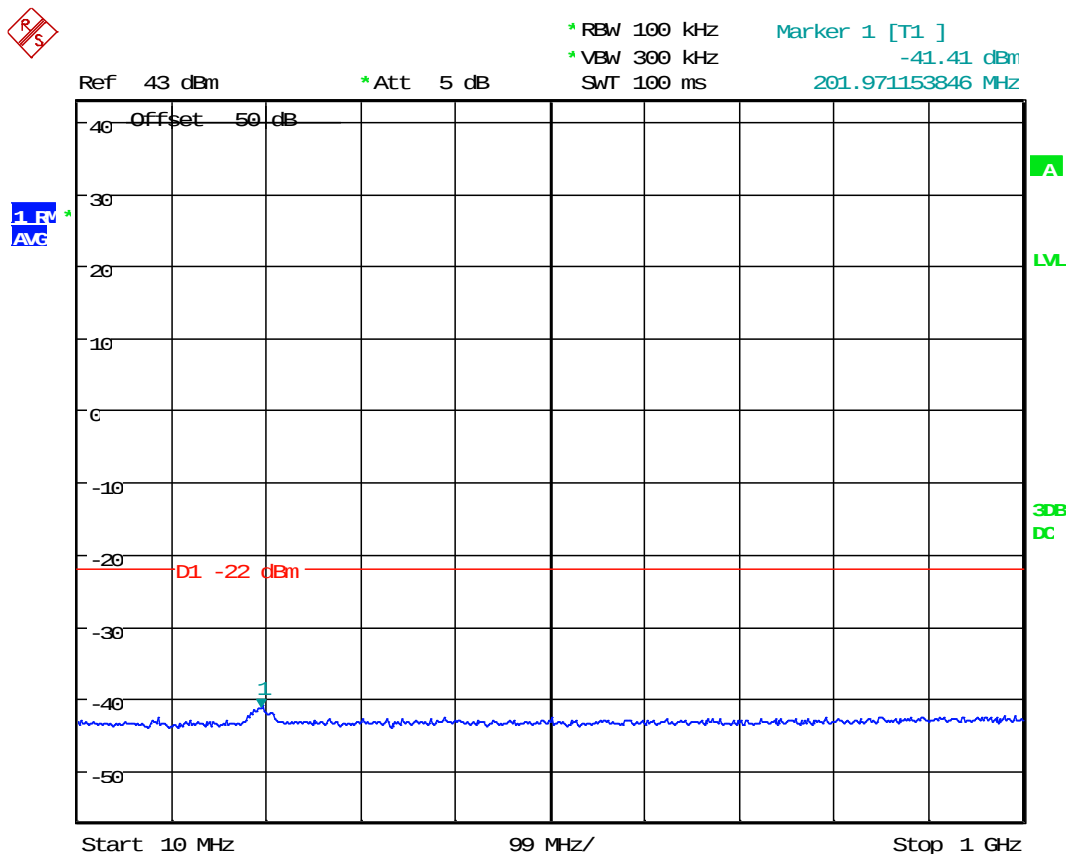
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2496-2536 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;16QAM

Date: 19.NOV.2013 09:58:09

FCC Part 27; FCC ID:AS5BBTRX-15



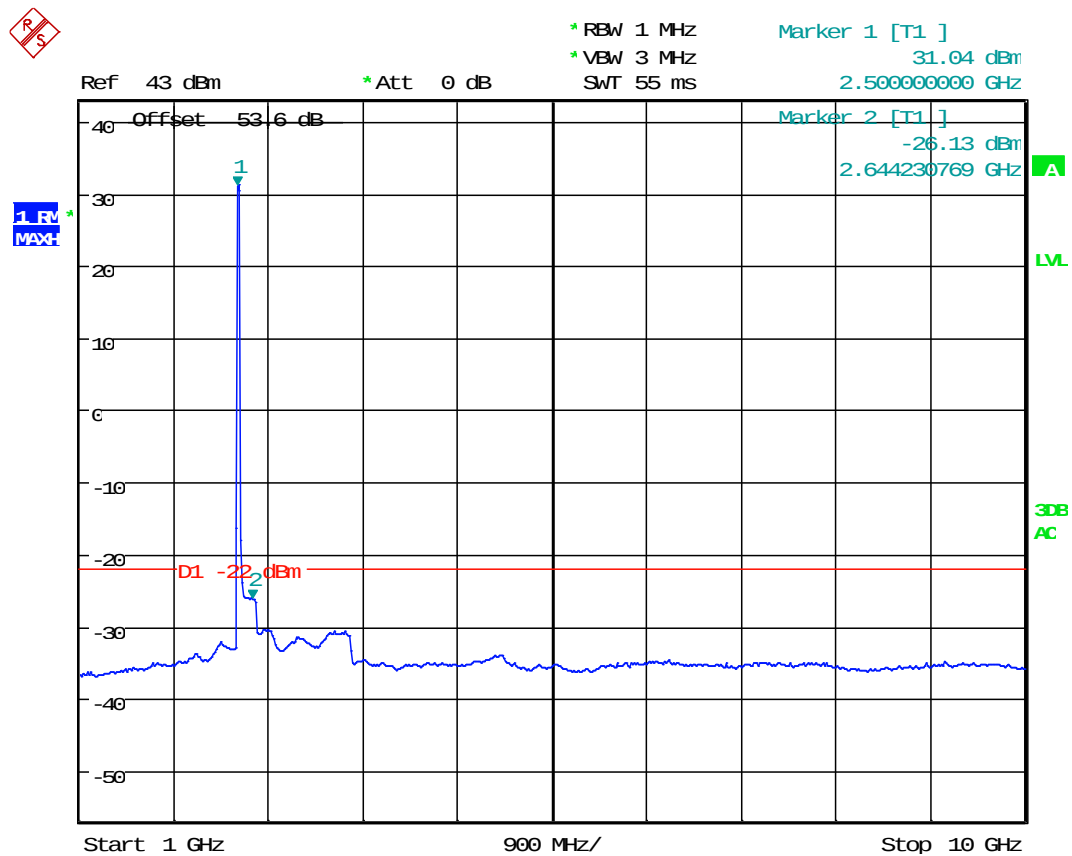
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2496-2536 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;16QAM

Date: 19.NOV.2013 09:59:06

FCC Part 27; FCC ID:AS5BBTRX-15



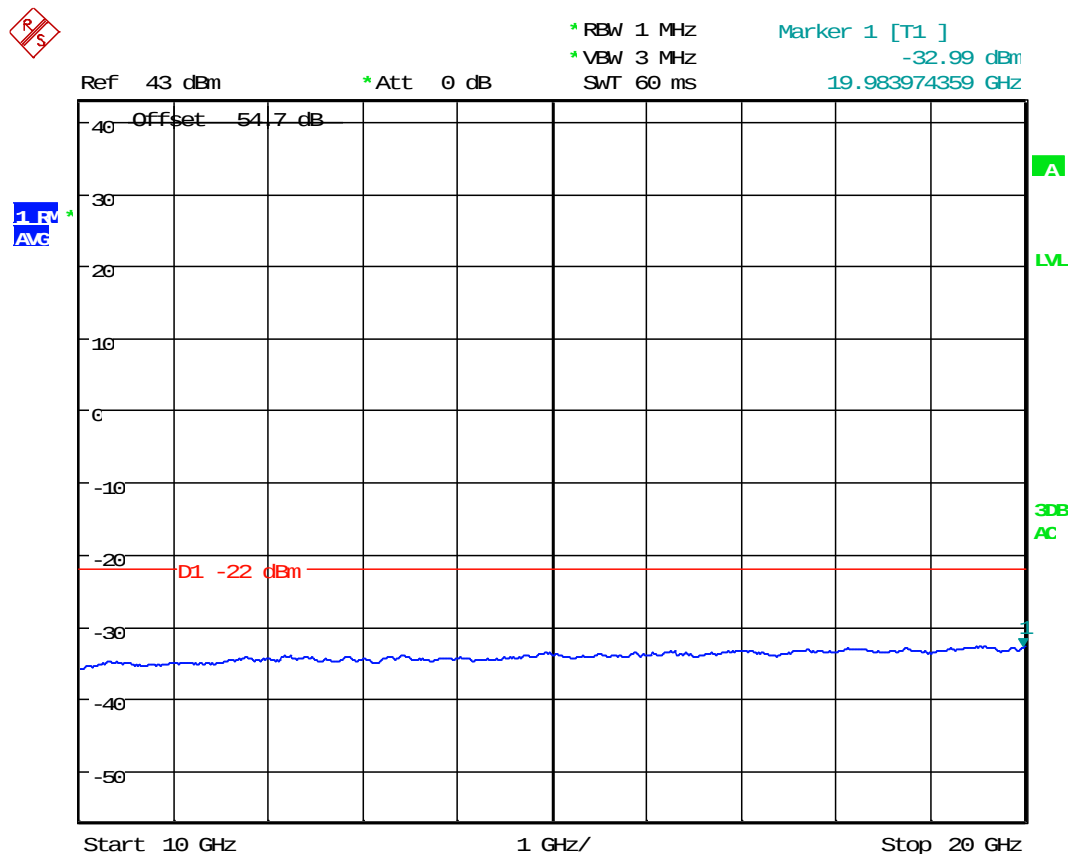
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2496-2536 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;16QAM

Date: 3.DEC.2013 10:20:52

FCC Part 27; FCC ID:AS5BBTRX-15



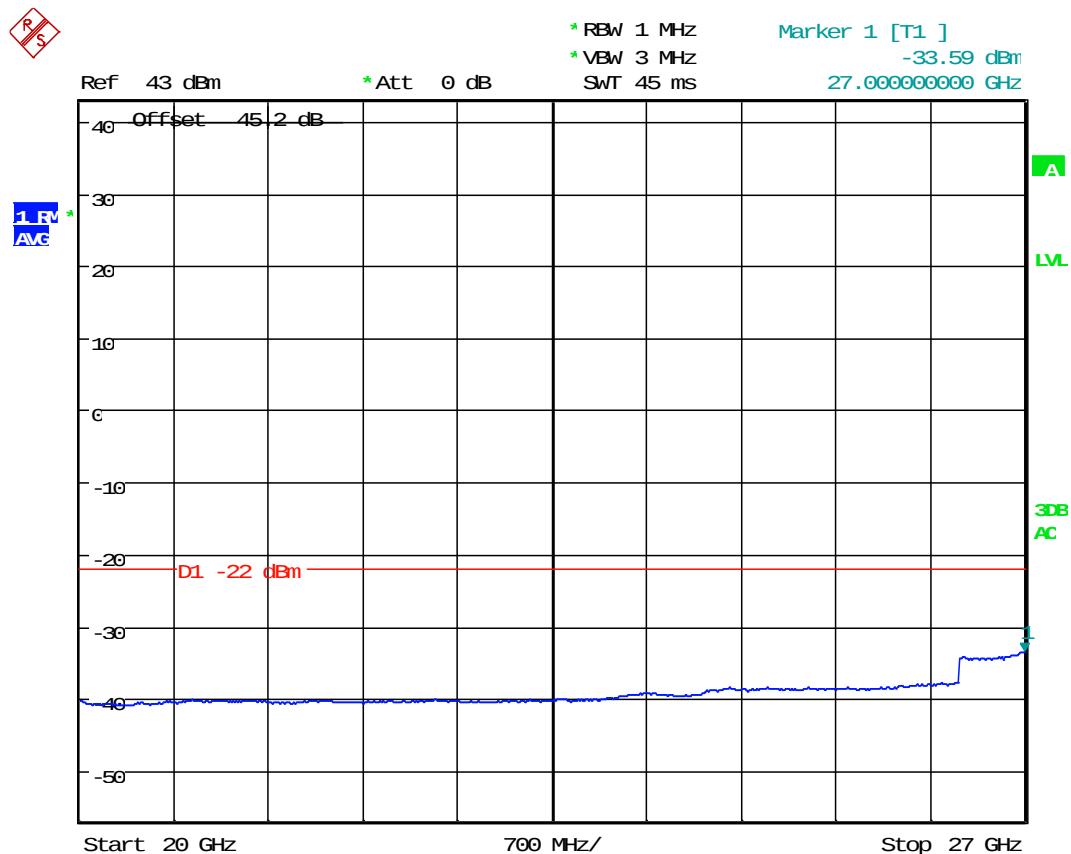
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2496-2536 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;16QAM

Date: 19.NOV.2013 10:01:38

FCC Part 27; FCC ID:AS5BBTRX-15



Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2496-2536 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;16QAM

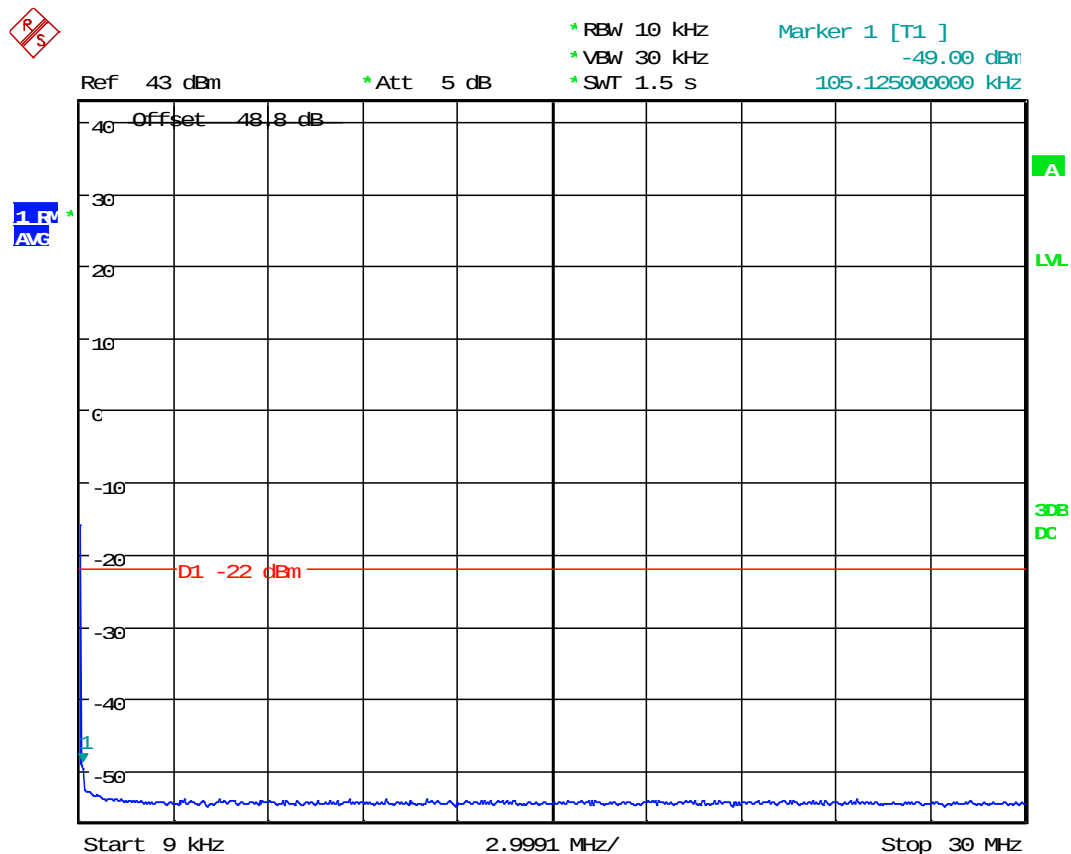
Date: 19.NOV.2013 10:02:15

FCC Part 27; FCC ID:AS5BBTRX-15

**Transmit Port
Antenna Conducted Spurious Emissions**

**40 MHz BW (20MHz + 20MHz)
64QAM Modulation
8x20 (MIMO)**

**Bandwidth 2496 – 2536 MHz
(Lower)**



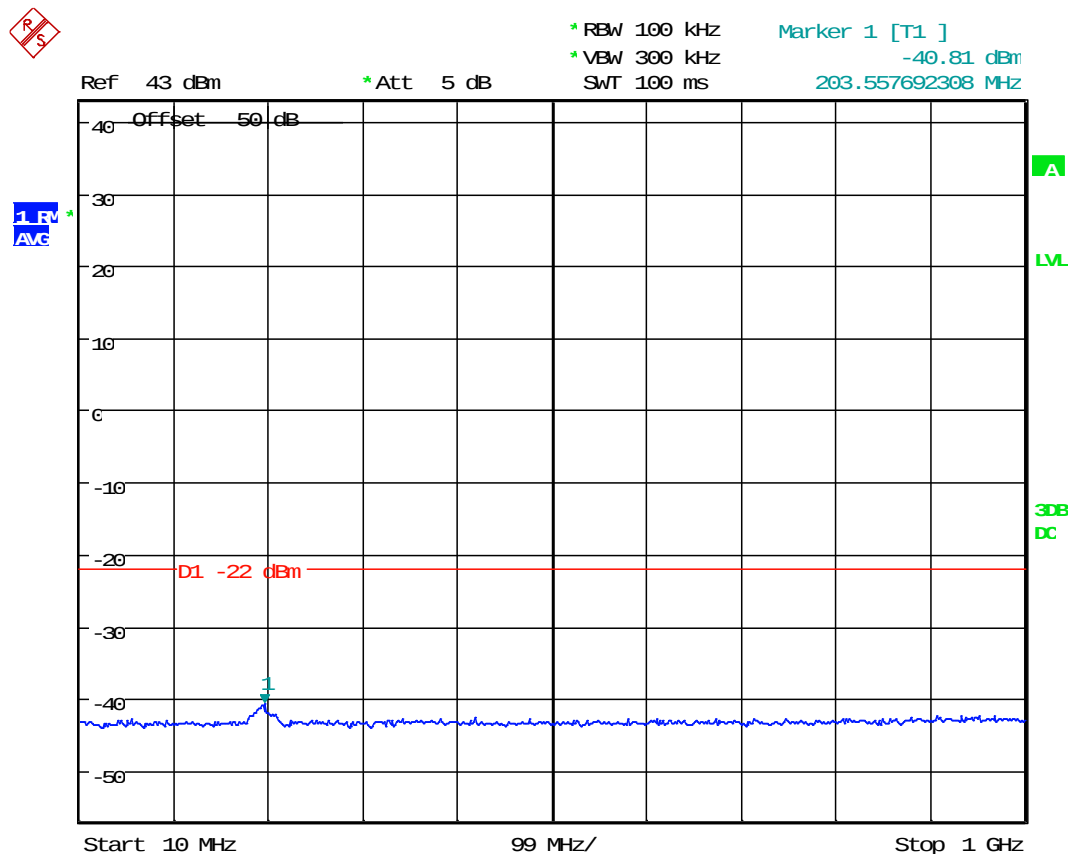
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2496-2536 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;64QAM

Date: 19.NOV.2013 15:56:50

FCC Part 27; FCC ID:AS5BBTRX-15



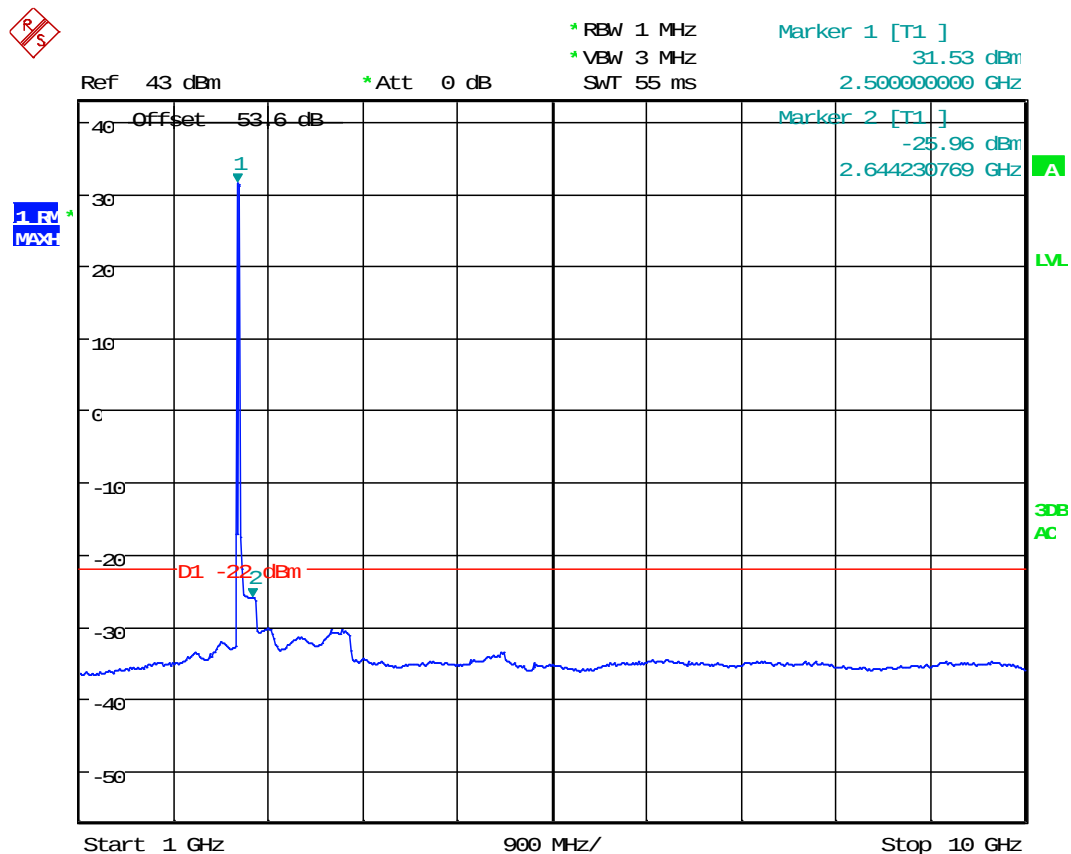
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2496-2536 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;64QAM

Date: 19.NOV.2013 15:57:20

FCC Part 27; FCC ID:AS5BBTRX-15



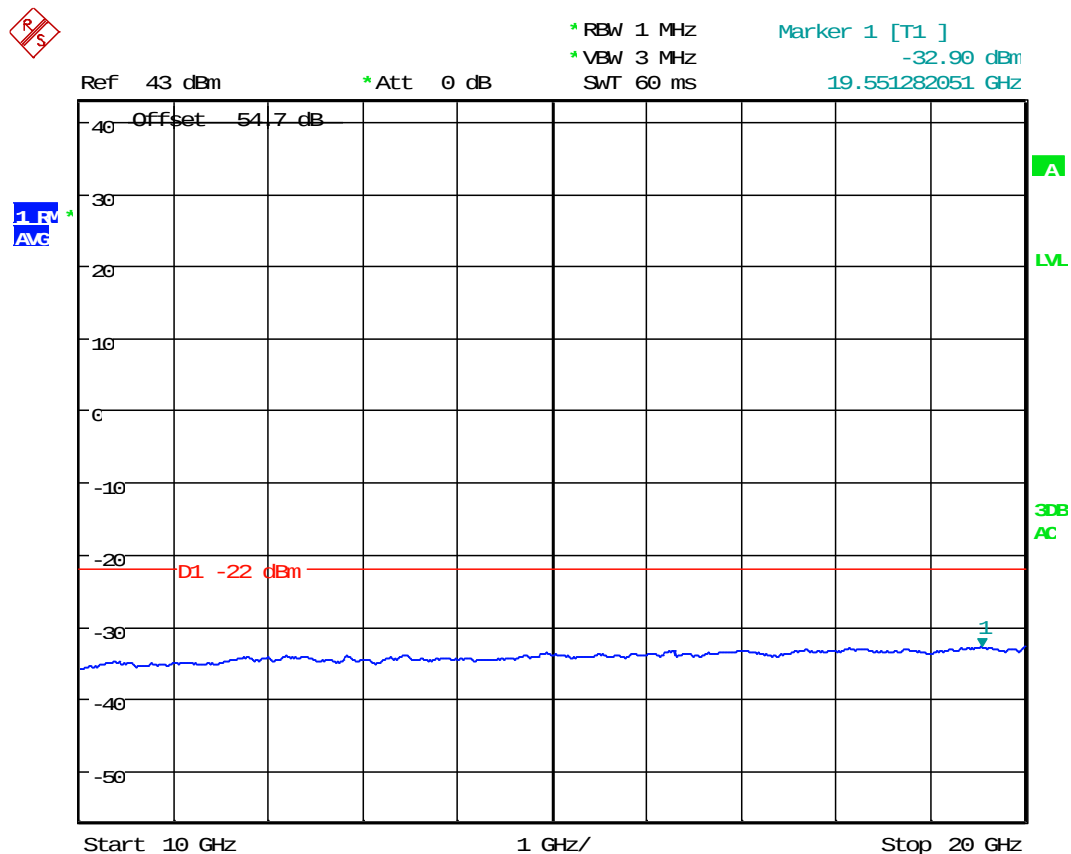
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2496-2536 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;64QAM

Date: 3.DEC.2013 10:18:09

FCC Part 27; FCC ID:AS5BBTRX-15



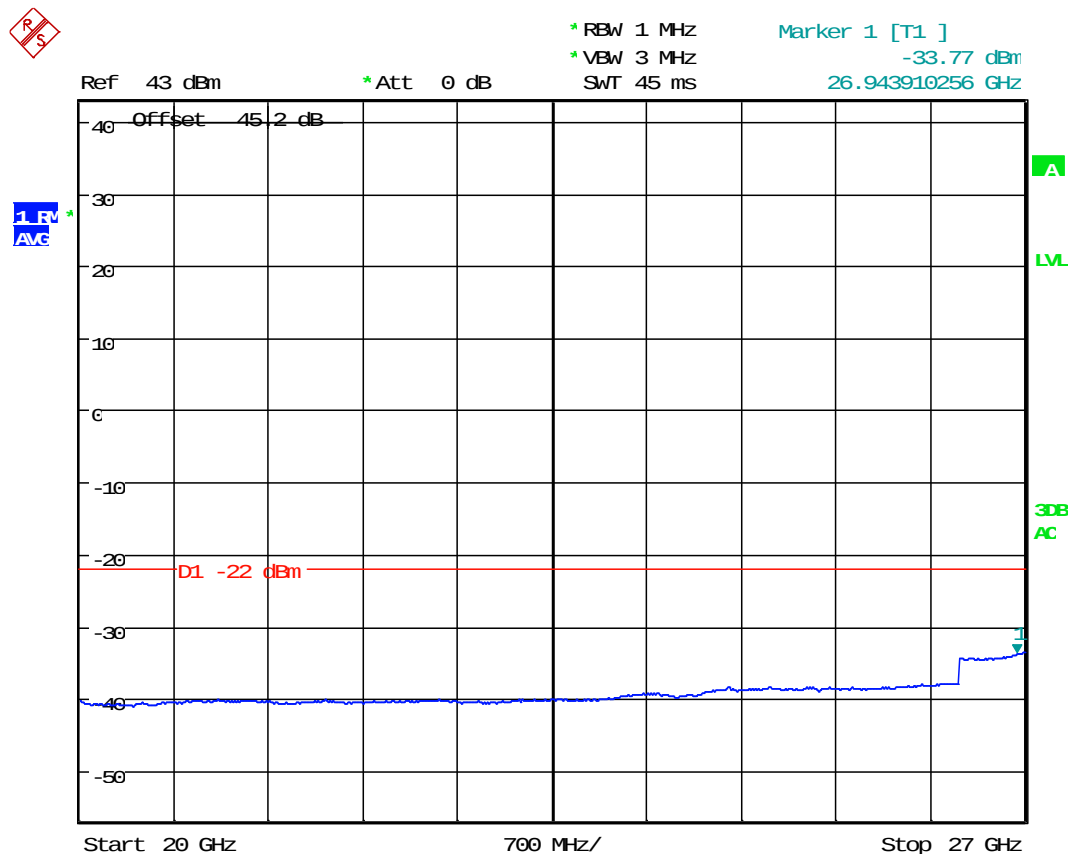
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2496-2536 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;64QAM

Date: 19.NOV.2013 15:58:41

FCC Part 27; FCC ID:AS5BBTRX-15



Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2496-2536 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;64QAM

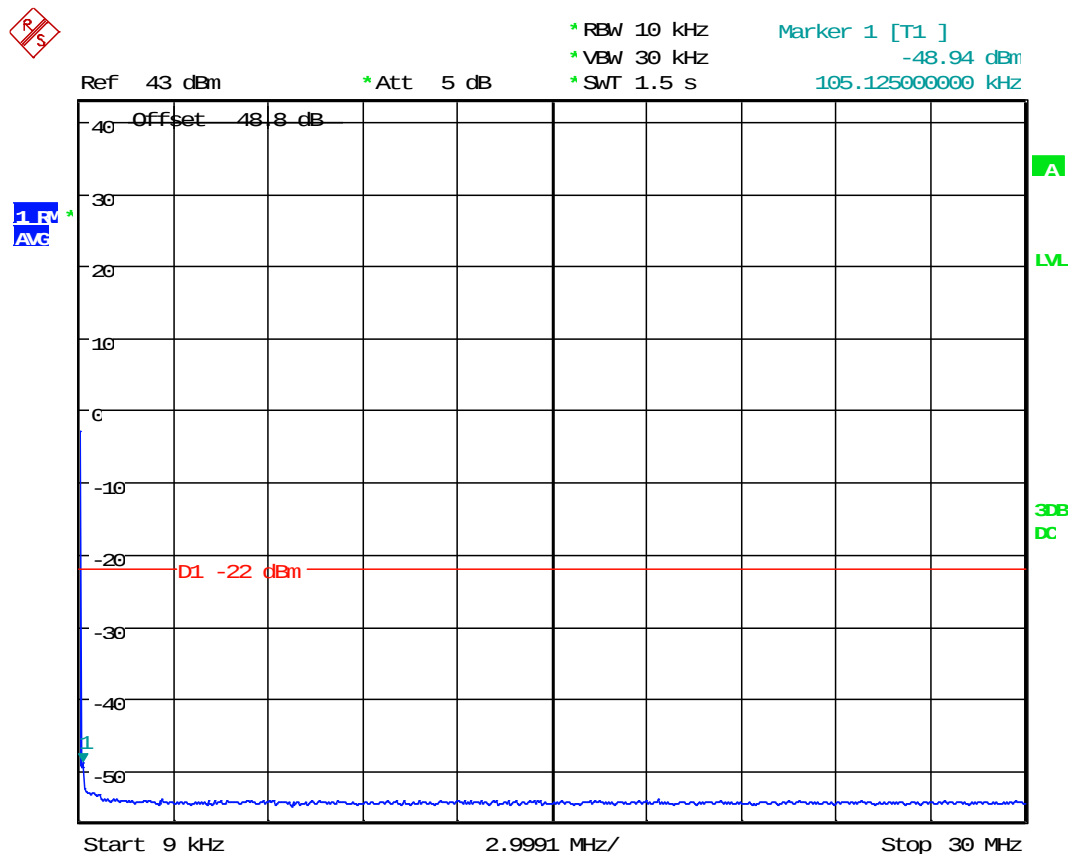
Date: 19.NOV.2013 15:59:10

FCC Part 27; FCC ID:AS5BBTRX-15

**Transmit Port
Antenna Conducted Spurious Emissions**

**40 MHz BW (20MHz + 20MHz)
QPSK Modulation
8x20 (MIMO)**

**Bandwidth 2568 – 2608 MHz
(Middle)**



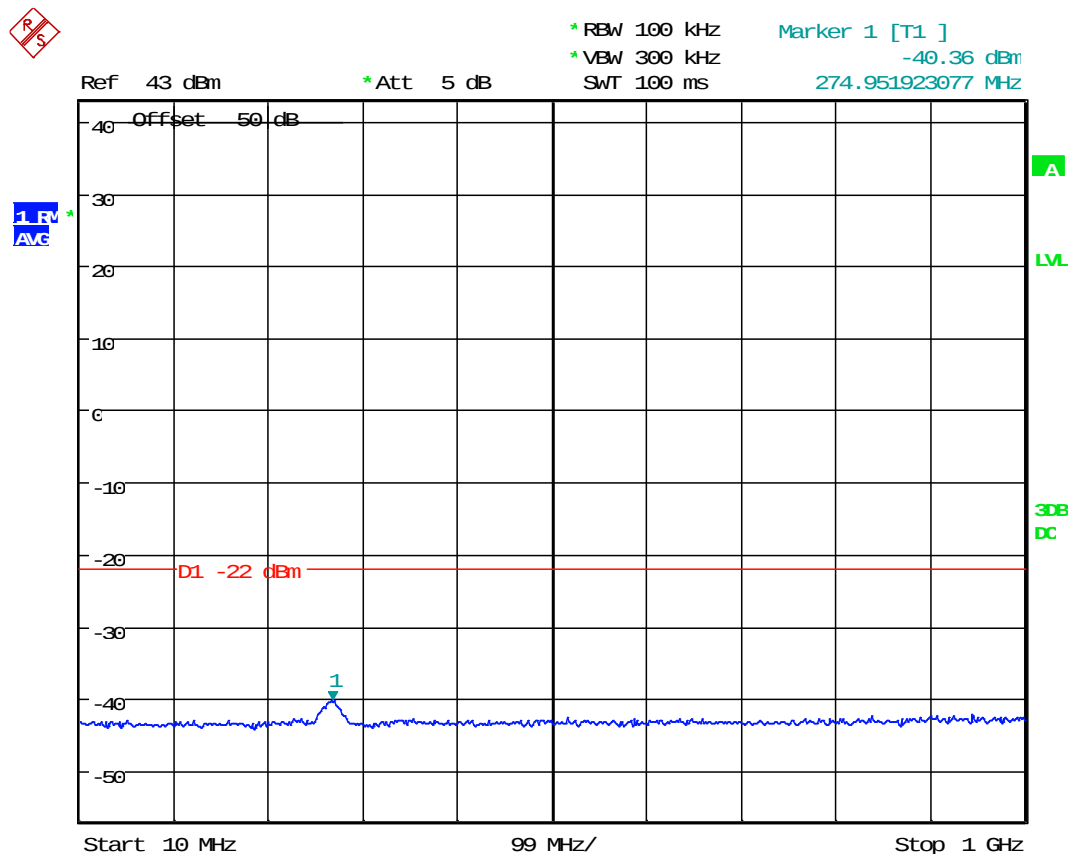
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2568-2608 MHz(20MHz+20MHz)

40MHz BW; PWR:20W; QPSK

Date: 18.NOV.2013 14:13:57

FCC Part 27; FCC ID:AS5BBTRX-15



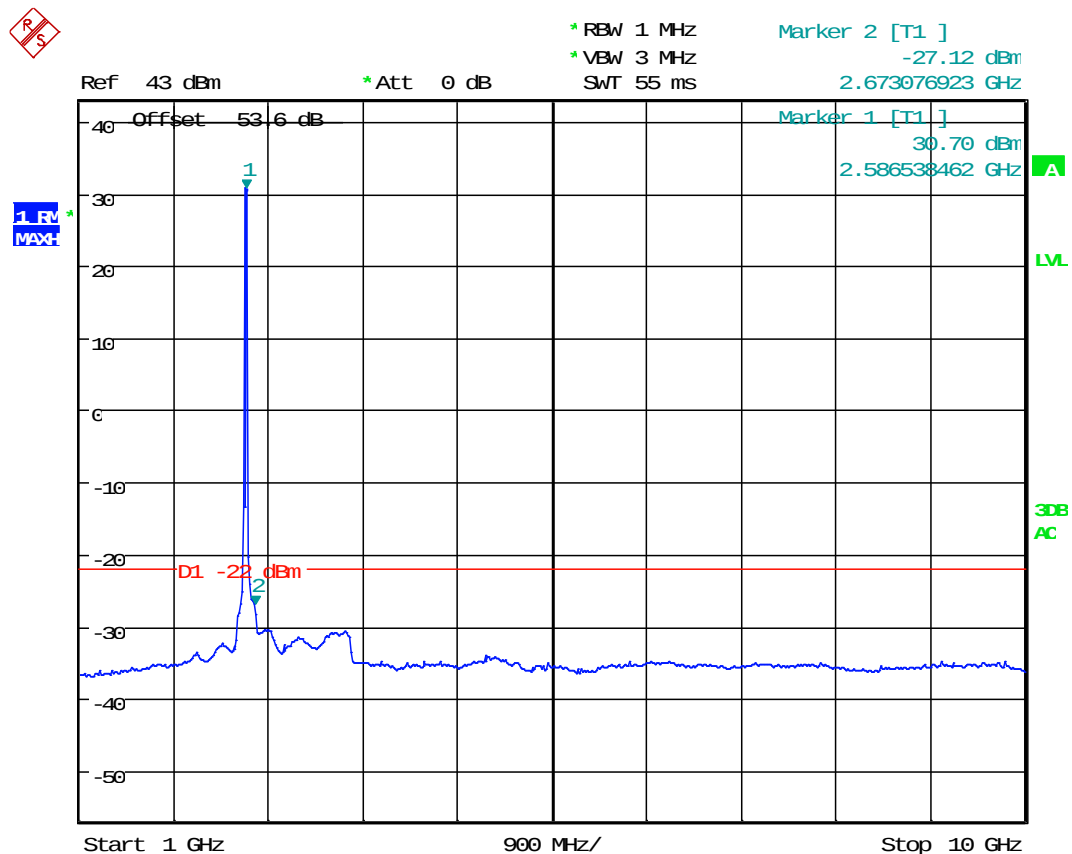
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2568-2608 MHz(20MHz+20MHz)

40MHz BW; PWR:20W; QPSK

Date: 18.NOV.2013 14:43:47

FCC Part 27; FCC ID:AS5BBTRX-15



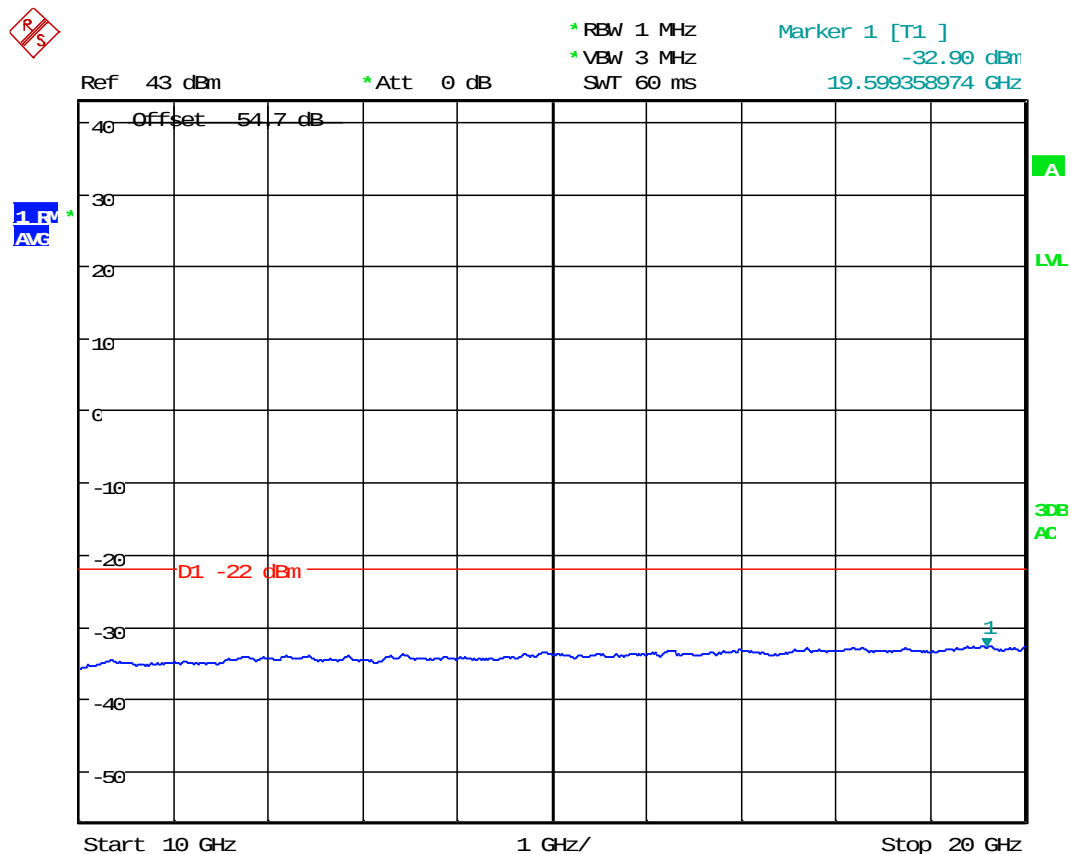
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2568-2608 MHz(20MHz+20MHz)

40MHz BW; PWR:20W; QPSK

Date: 18.NOV.2013 14:22:52

FCC Part 27; FCC ID:AS5BBTRX-15



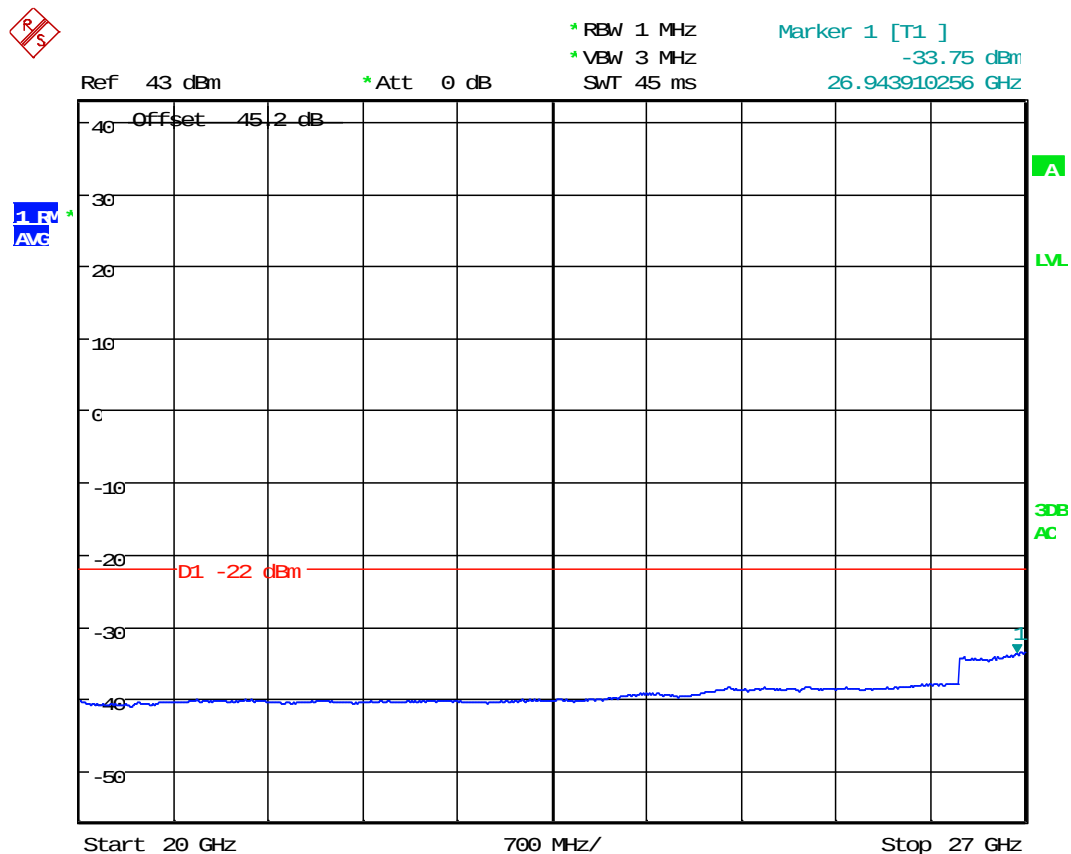
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2568-2608 MHz(20MHz+20MHz)

40MHz BW; PWR:20W; QPSK

Date: 18.NOV.2013 14:23:49

FCC Part 27; FCC ID:AS5BBTRX-15



Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2568-2608 MHz(20MHz+20MHz)

40MHz BW; PWR:20W; QPSK

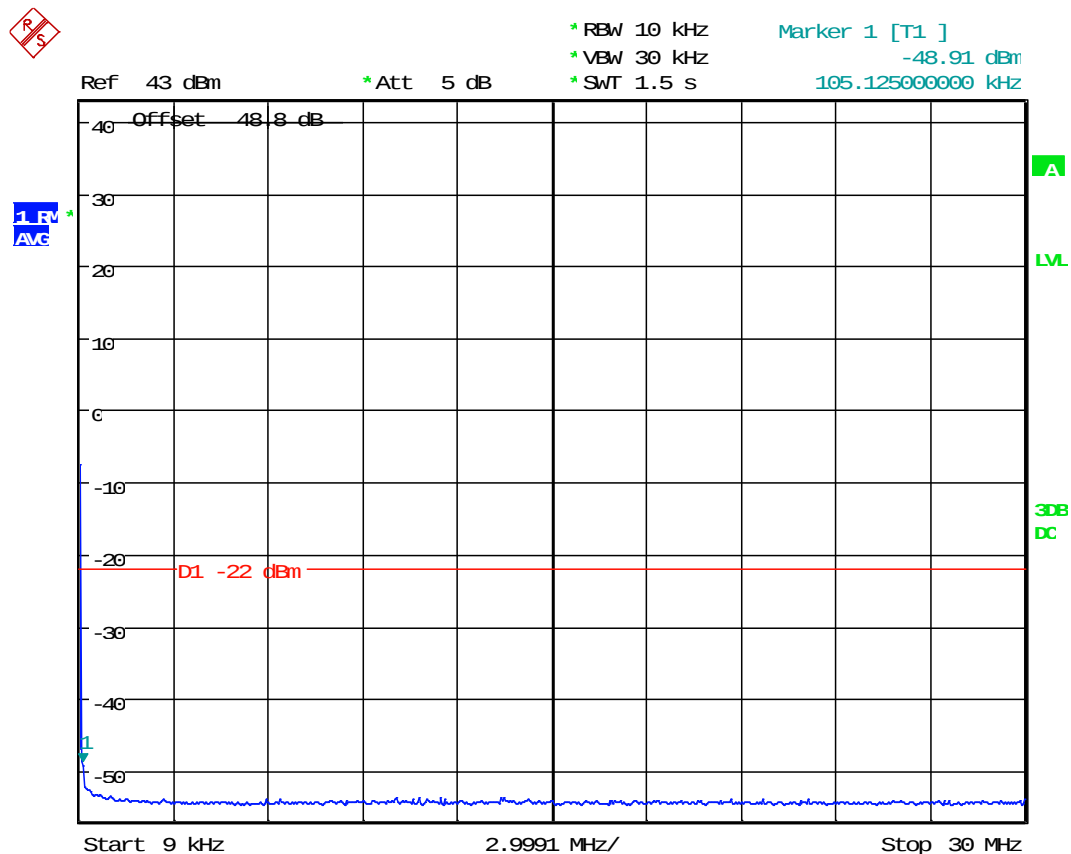
Date: 18.NOV.2013 14:44:30

FCC Part 27; FCC ID:AS5BBTRX-15

**Transmit Port
Antenna Conducted Spurious Emissions**

**40 MHz BW (20MHz + 20MHz)
16QAM Modulation
8x20 (MIMO)**

**Bandwidth 2568 – 2608 MHz
(Middle)**



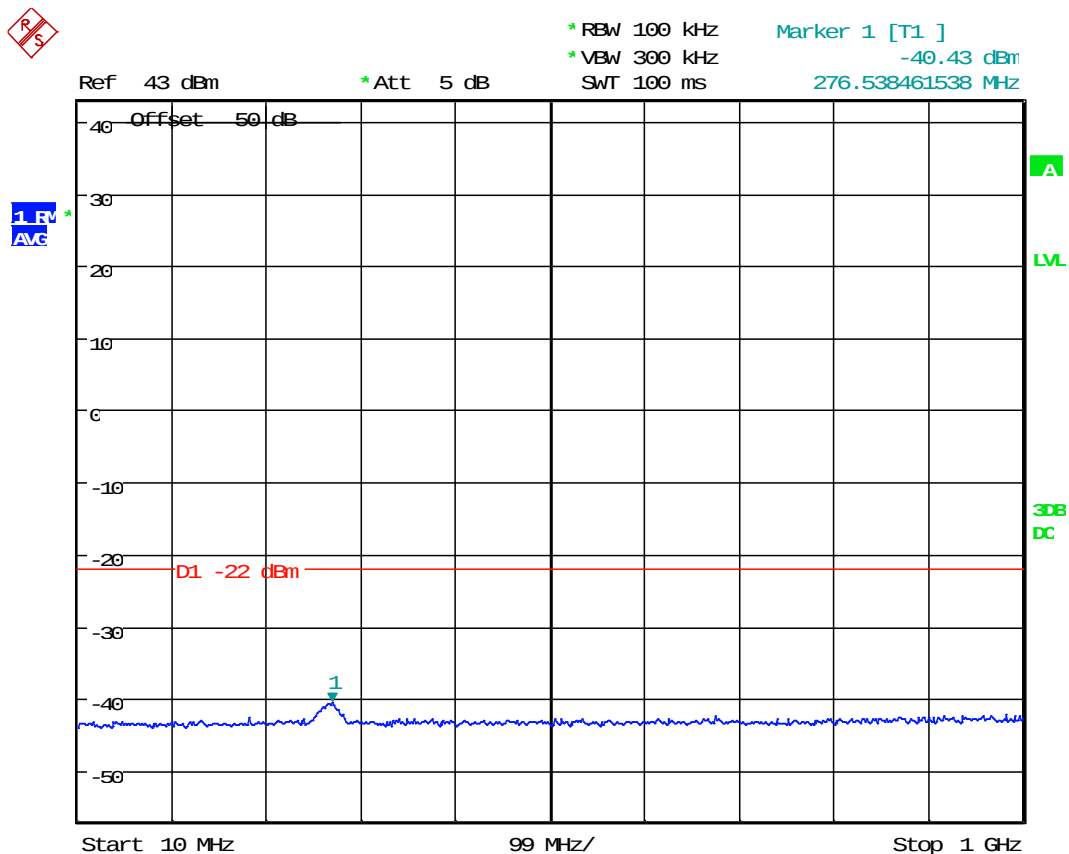
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2568-2608 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;16QAM

Date: 19.NOV.2013 07:31:10

FCC Part 27; FCC ID:AS5BBTRX-15



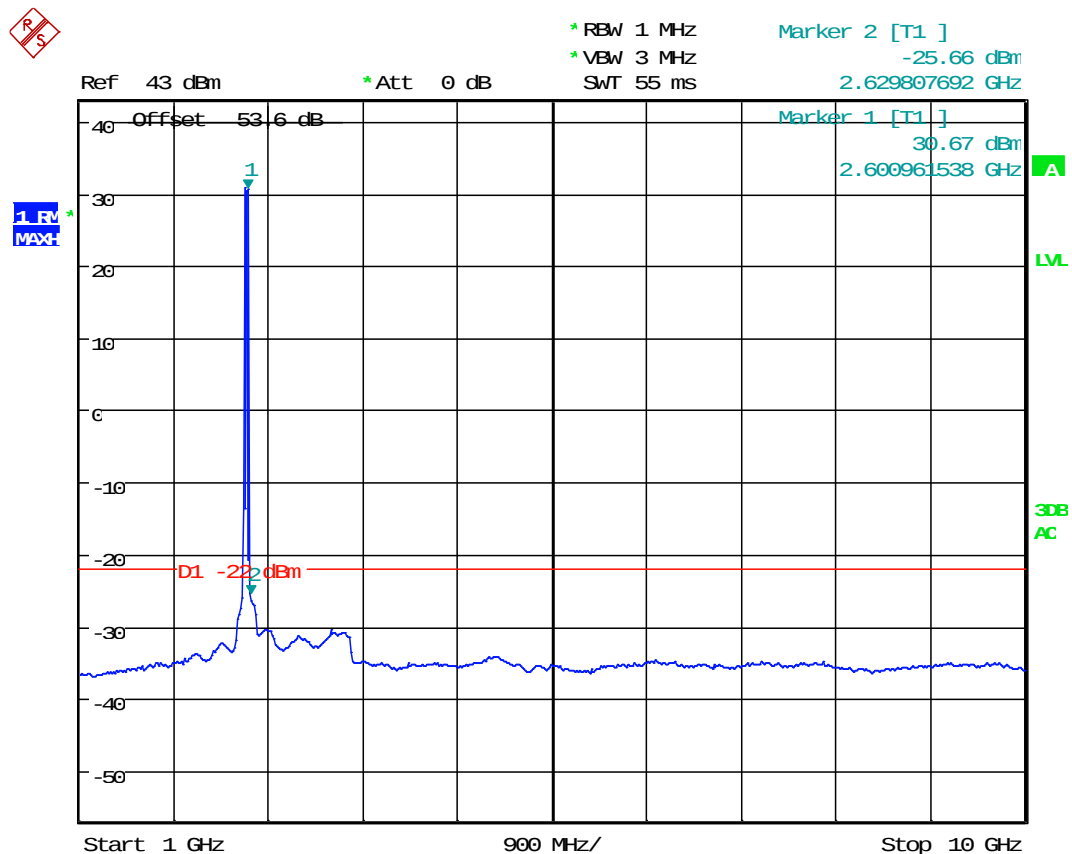
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2568-2608 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;16QAM

Date: 19.NOV.2013 07:31:58

FCC Part 27; FCC ID:AS5BBTRX-15



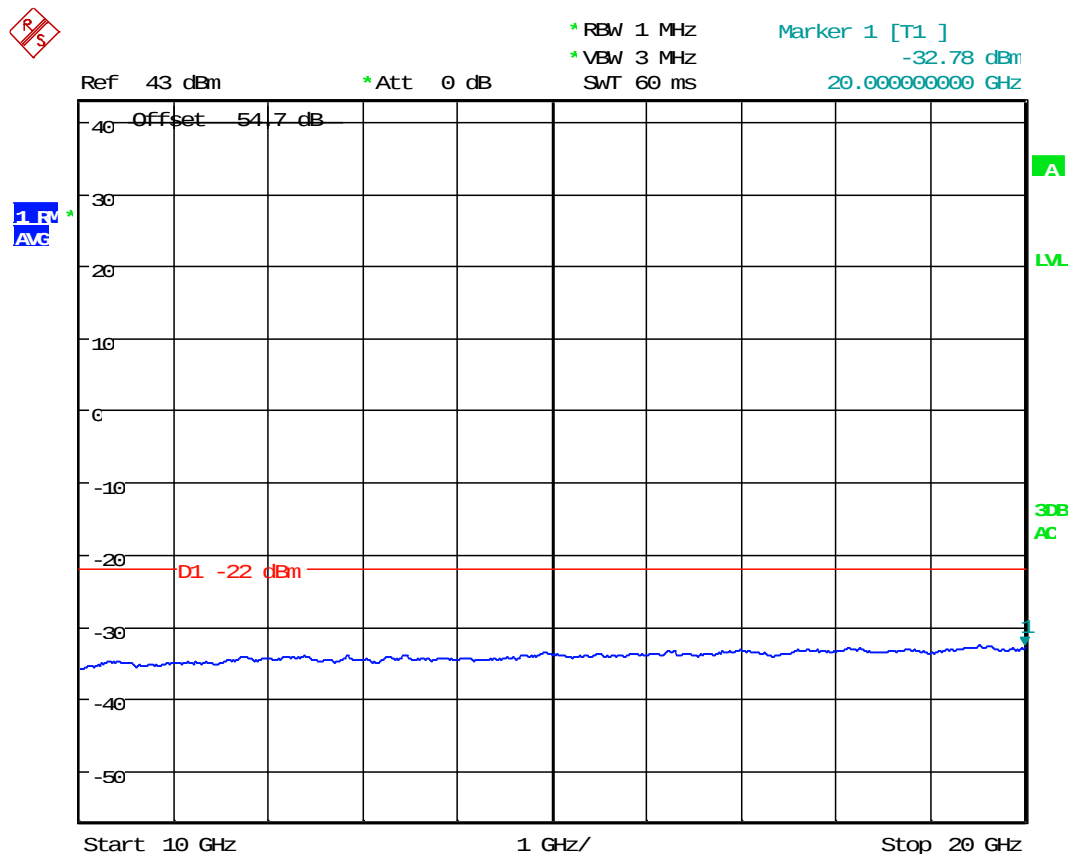
Spurious Emissions; Test Engineer: JY

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40MHz BW; PWR:20W;16QAM

Date: 19.NOV.2013 07:33:27

FCC Part 27; FCC ID:AS5BBTRX-15



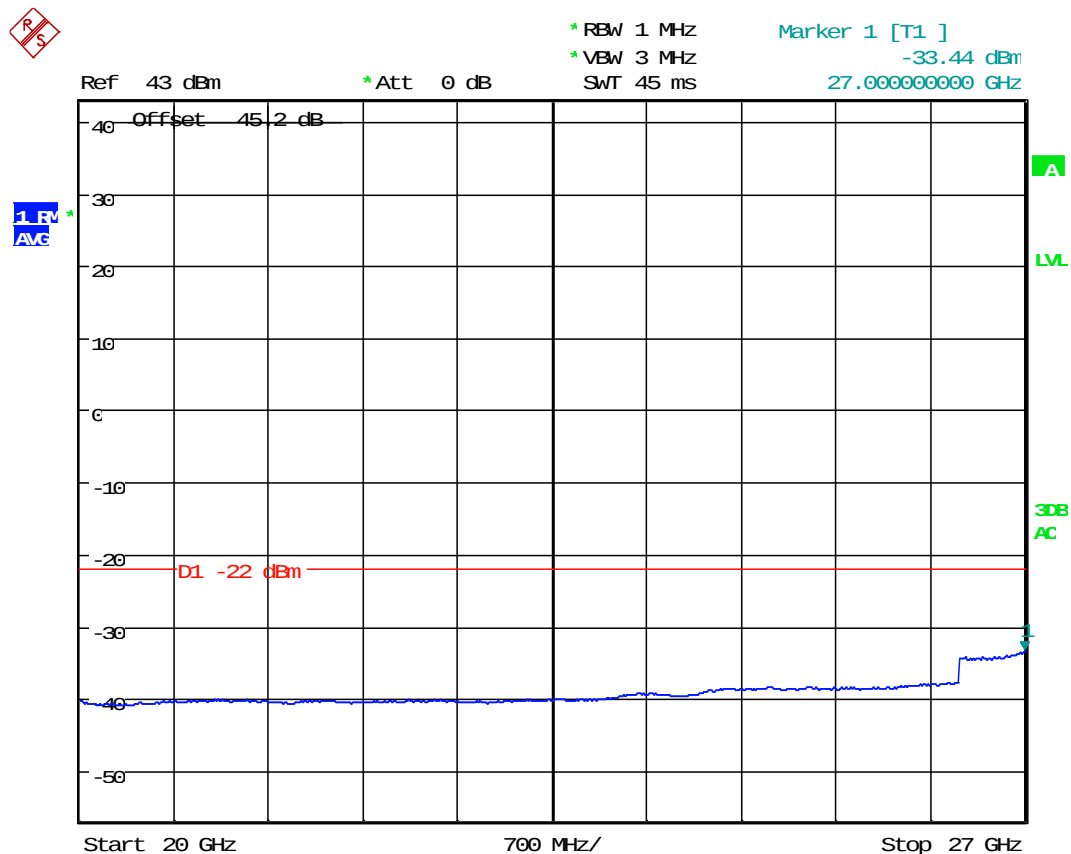
Spurious Emissions; Test Engineer: JY

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40MHz BW; PWR:20W;16QAM

Date: 19.NOV.2013 07:34:22

FCC Part 27; FCC ID:AS5BBTRX-15



Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2568-2608 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;16QAM

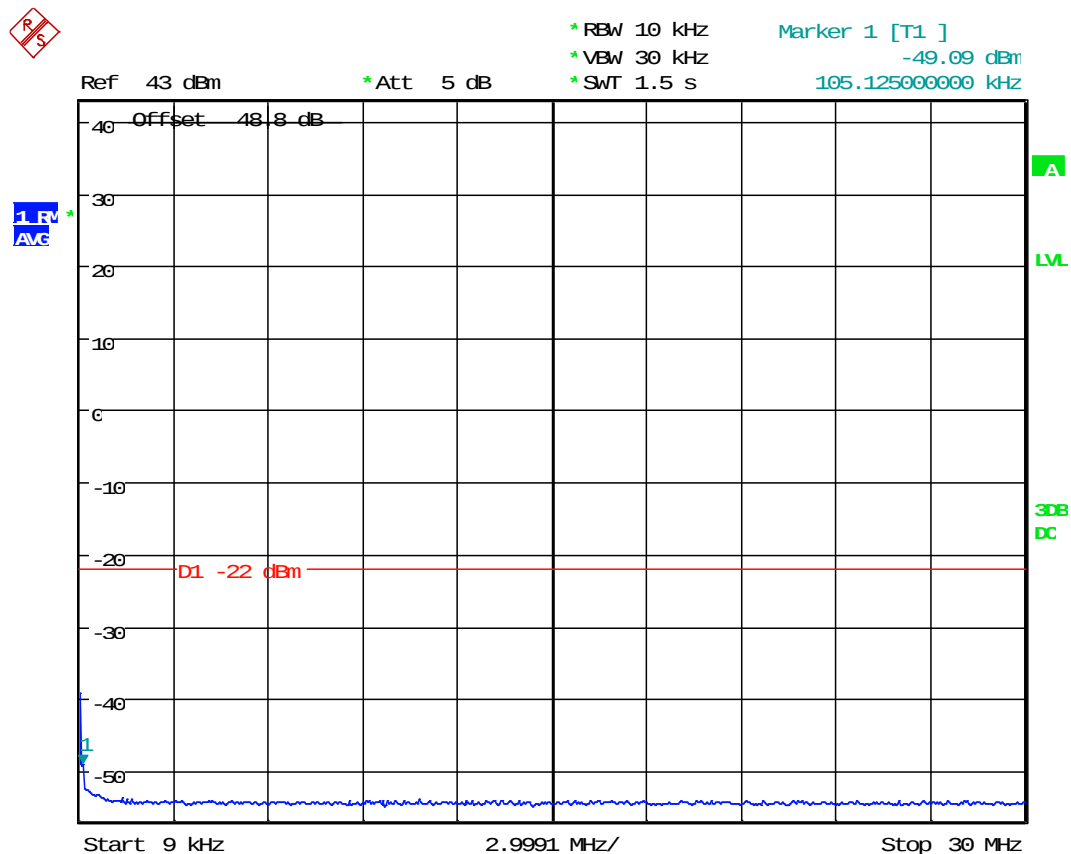
Date: 19.NOV.2013 07:35:12

FCC Part 27; FCC ID:AS5BBTRX-15

**Transmit Port
Antenna Conducted Spurious Emissions**

**40 MHz BW (20MHz + 20MHz)
64QAM Modulation
8x20 (MIMO)**

**Bandwidth 2568 – 2608 MHz
(Middle)**



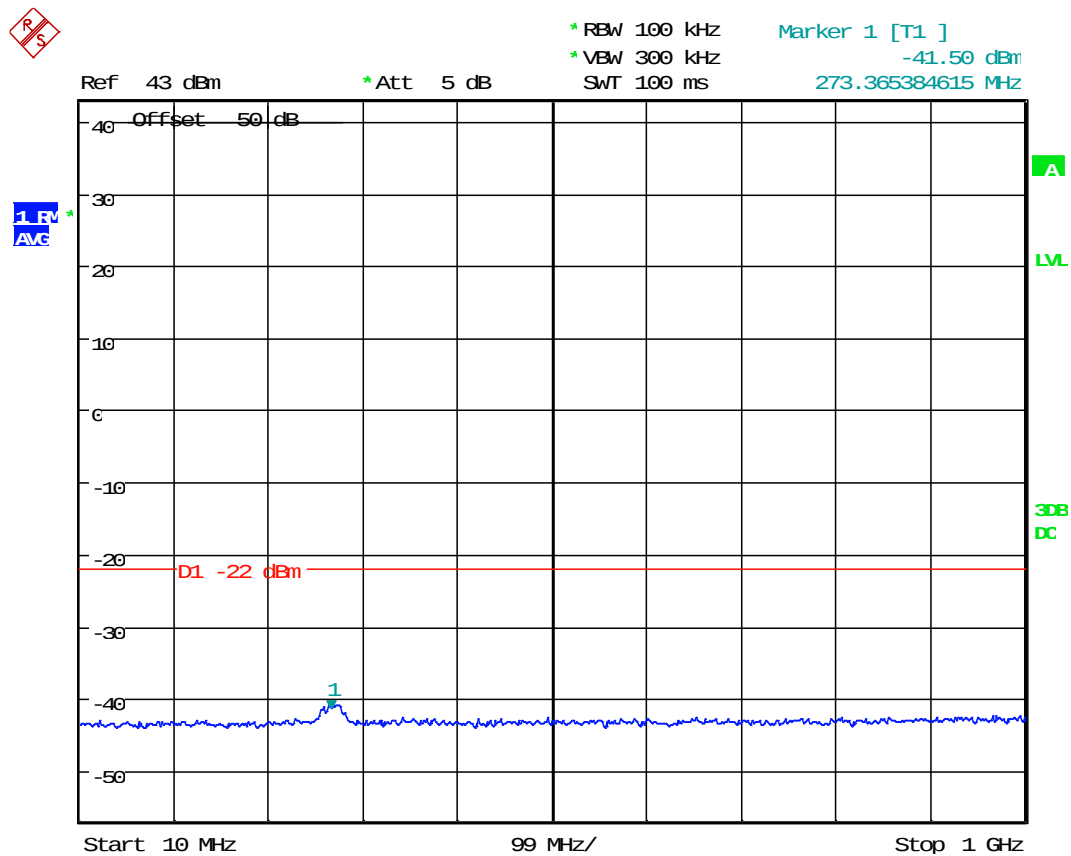
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2568-2608 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;64QAM

Date: 19.NOV.2013 14:27:13

FCC Part 27; FCC ID:AS5BBTRX-15



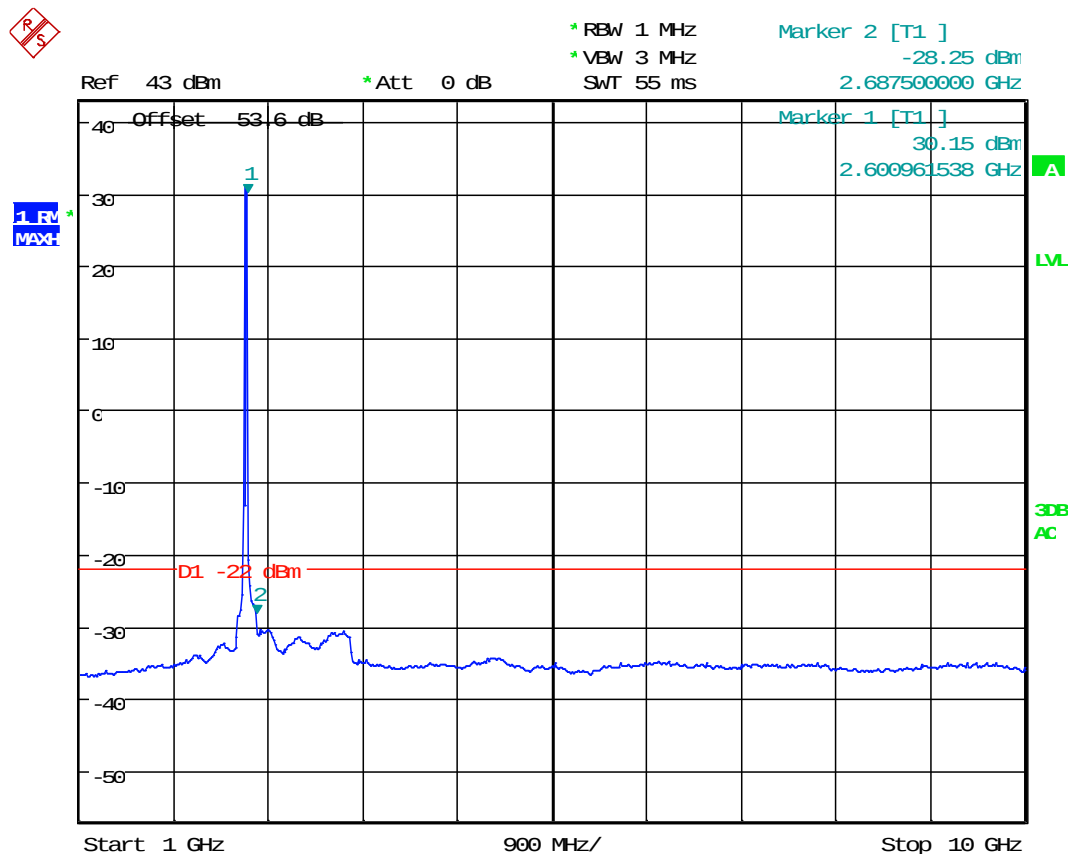
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2568-2608 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;64QAM

Date: 19.NOV.2013 14:28:27

FCC Part 27; FCC ID:AS5BBTRX-15



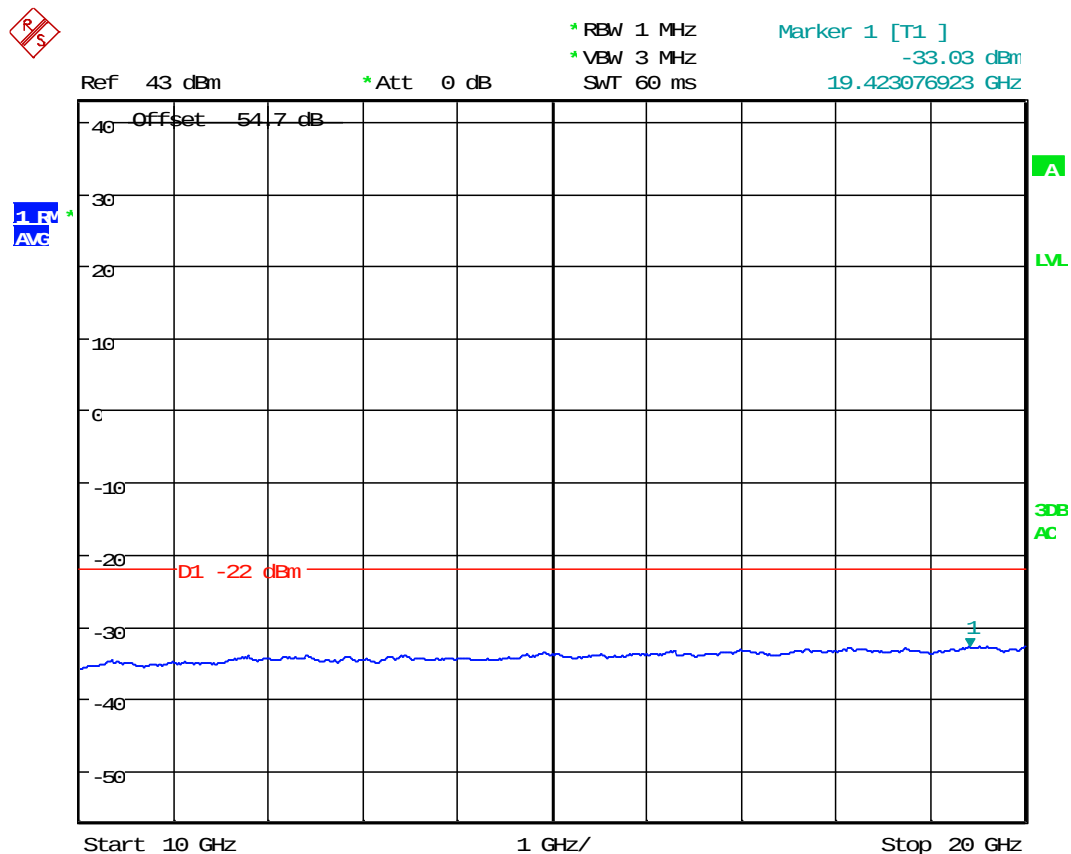
Spurious Emissions; Test Engineer: JY

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40MHz BW; PWR:20W;64QAM

Date: 19.NOV.2013 14:29:45

FCC Part 27; FCC ID:AS5BBTRX-15



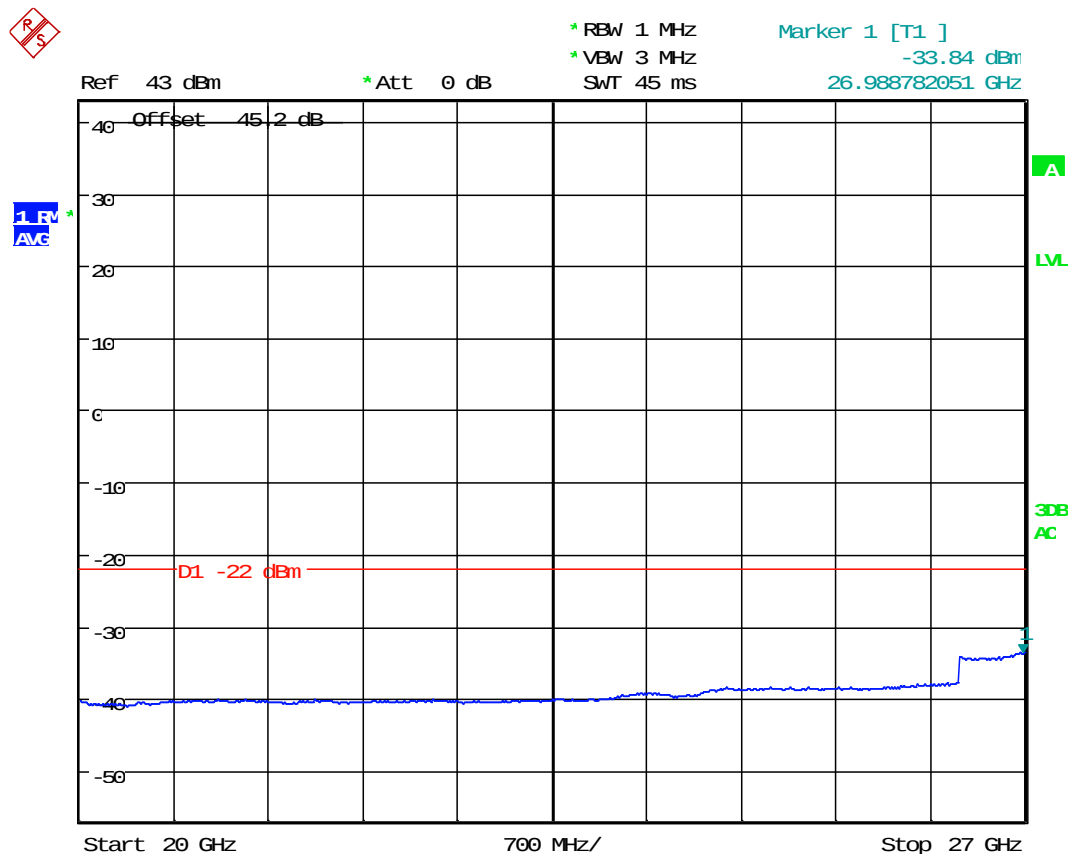
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2568-2608 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;64QAM

Date: 19.NOV.2013 14:30:33

FCC Part 27; FCC ID:AS5BBTRX-15



Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2568-2608 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;64QAM

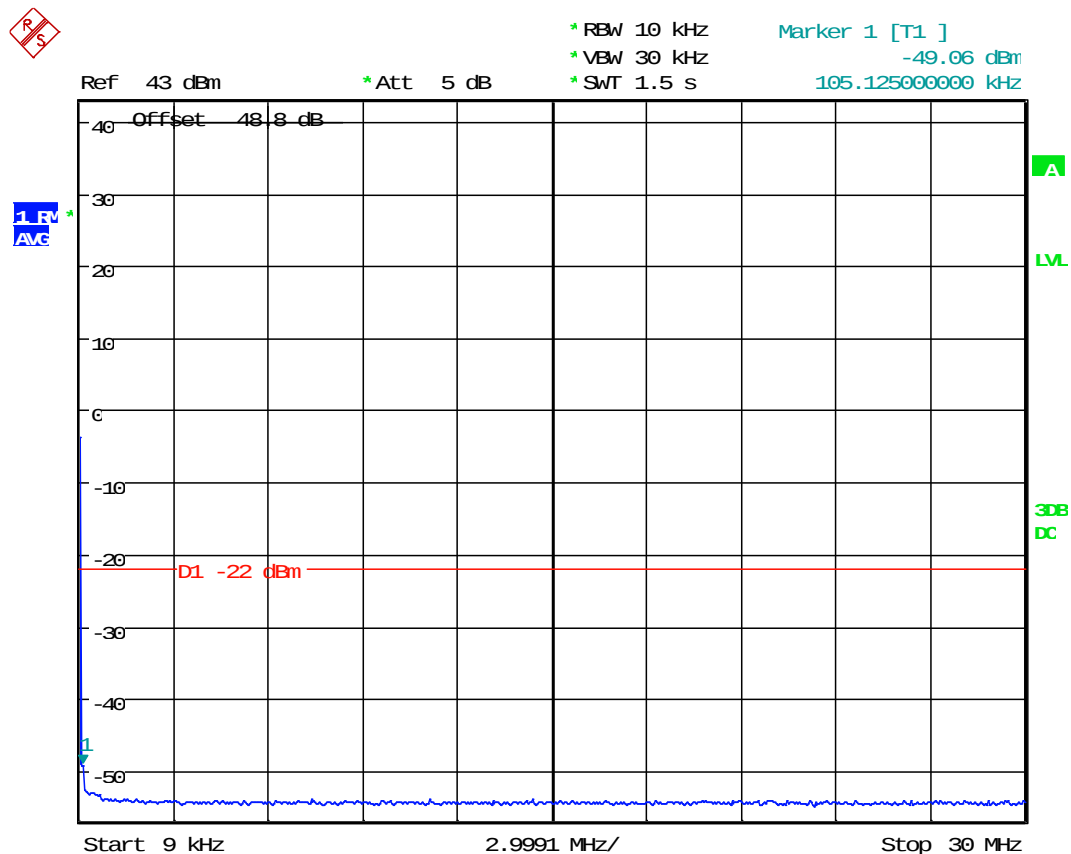
Date: 19.NOV.2013 14:31:34

FCC Part 27; FCC ID:AS5BBTRX-15

**Transmit Port
Antenna Conducted Spurious Emissions**

**40 MHz BW (20MHz + 20MHz)
QPSK Modulation
8x20 (MIMO)**

**Bandwidth 2650 – 2690 MHz
(Higher)**



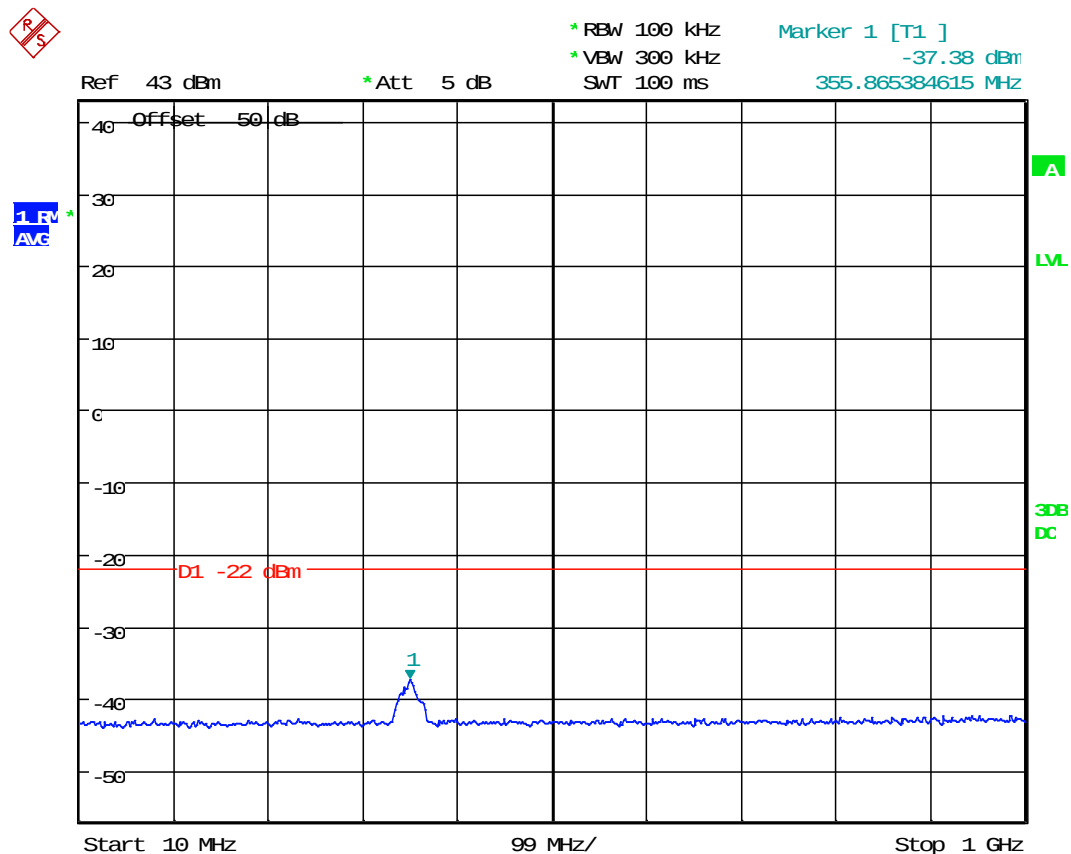
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2650-2690 MHz(20MHz+20MHz)

40MHz BW; PWR:20W; QPSK

Date: 18.NOV.2013 13:11:45

FCC Part 27; FCC ID:AS5BBTRX-15



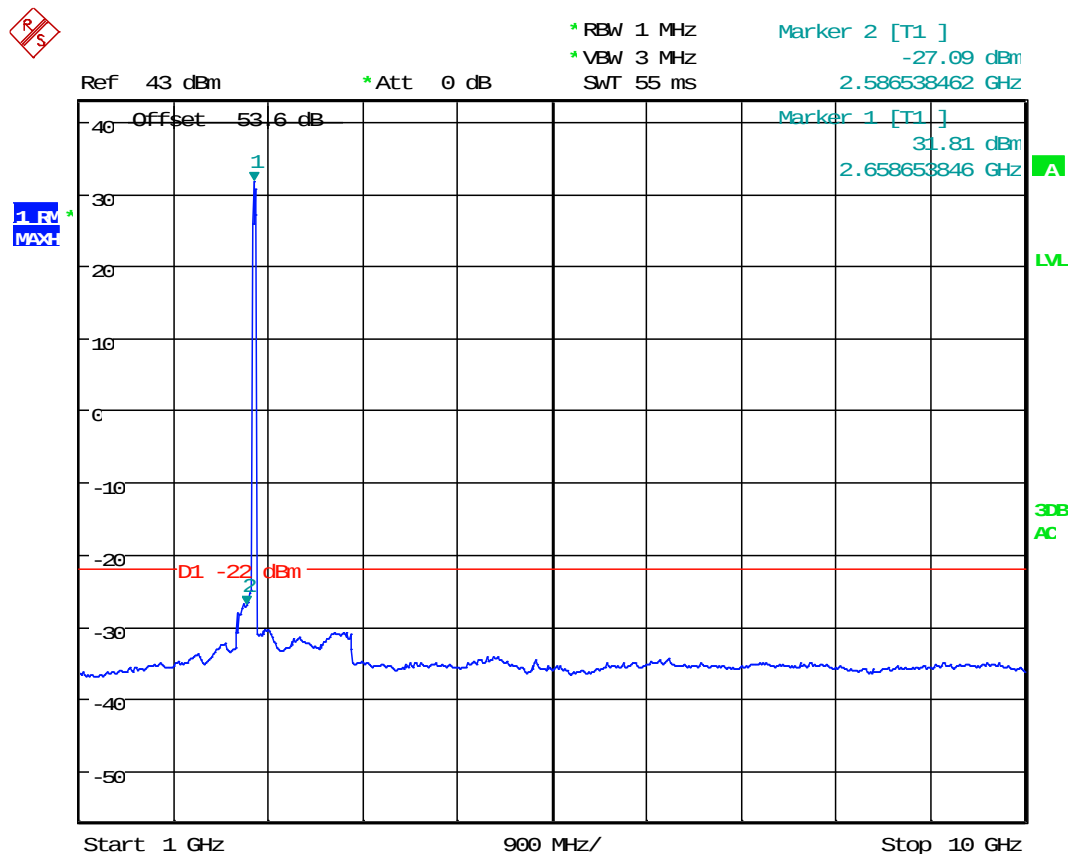
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2650-2690 MHz(20MHz+20MHz)

40MHz BW; PWR:20W; QPSK

Date: 18.NOV.2013 13:12:46

FCC Part 27; FCC ID:AS5BBTRX-15



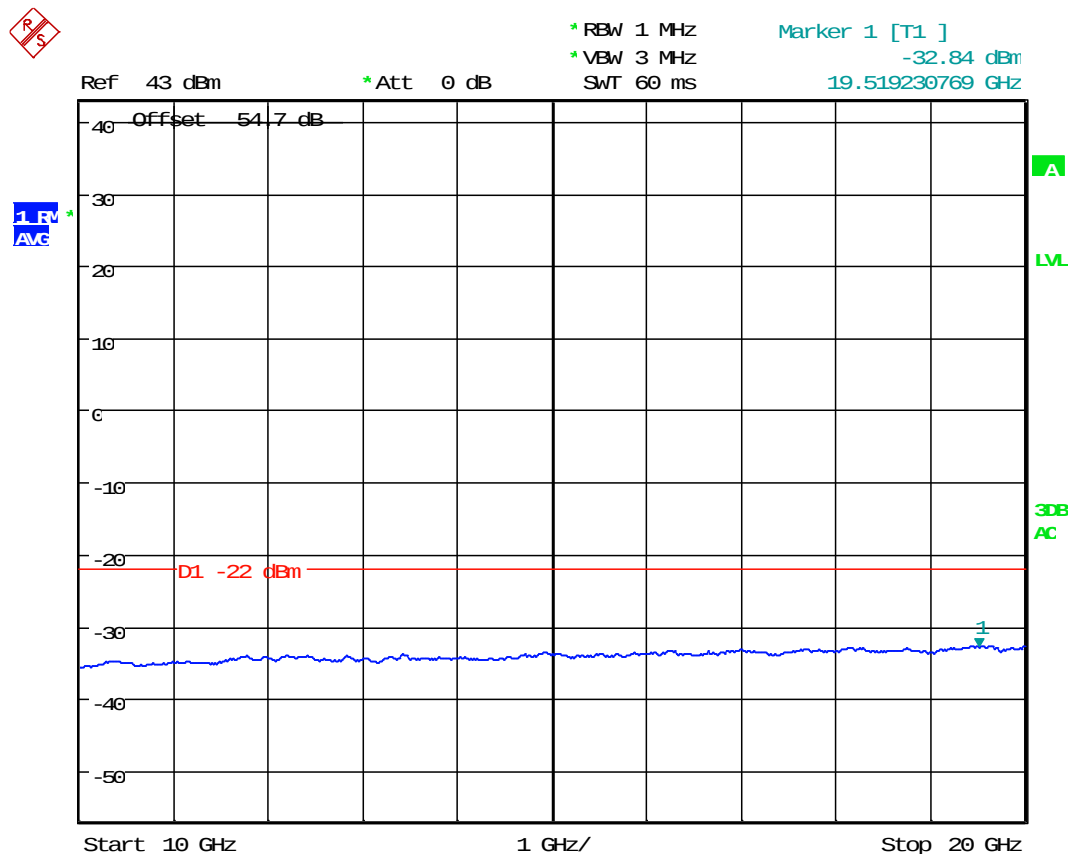
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2650-2690 MHz(20MHz+20MHz)

40MHz BW; PWR:20W; QPSK

Date: 18.NOV.2013 13:15:30

FCC Part 27; FCC ID:AS5BBTRX-15



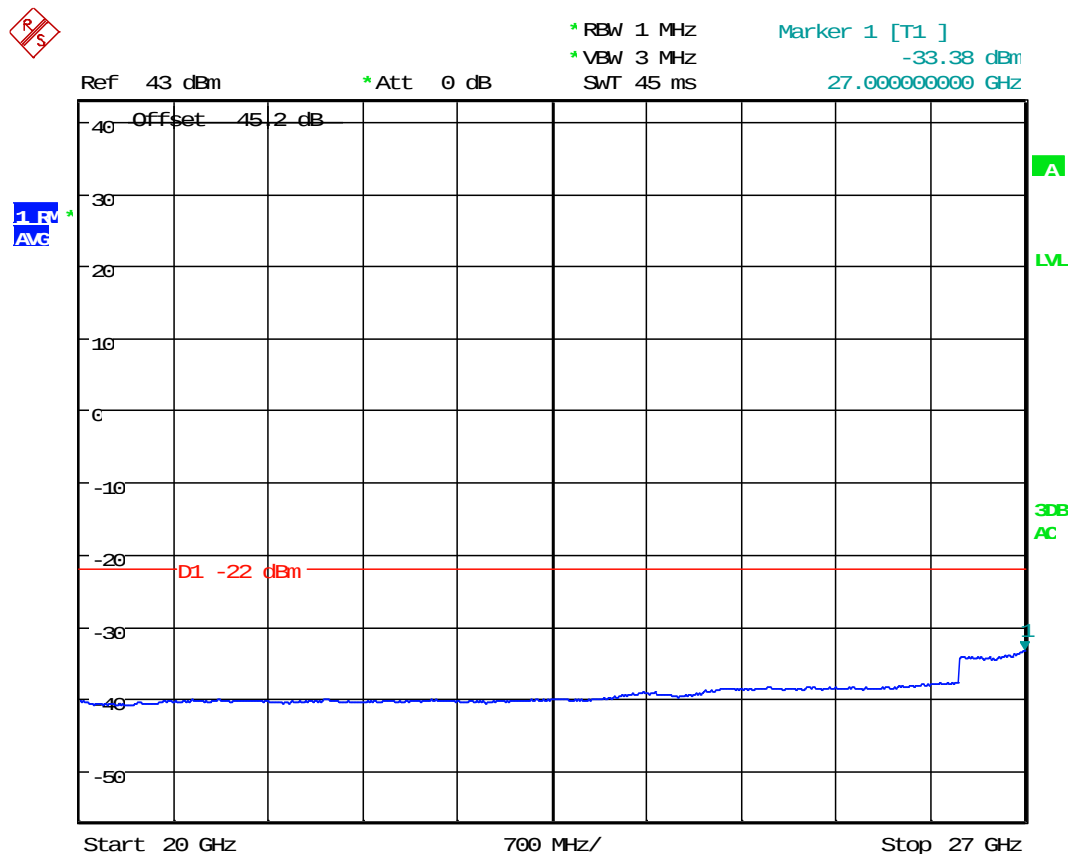
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2650-2690 MHz(20MHz+20MHz)

40MHz BW; PWR:20W; QPSK

Date: 18.NOV.2013 13:19:04

FCC Part 27; FCC ID:AS5BBTRX-15



Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2650-2690 MHz(20MHz+20MHz)

40MHz BW; PWR:20W; QPSK

Date: 18.NOV.2013 13:19:55

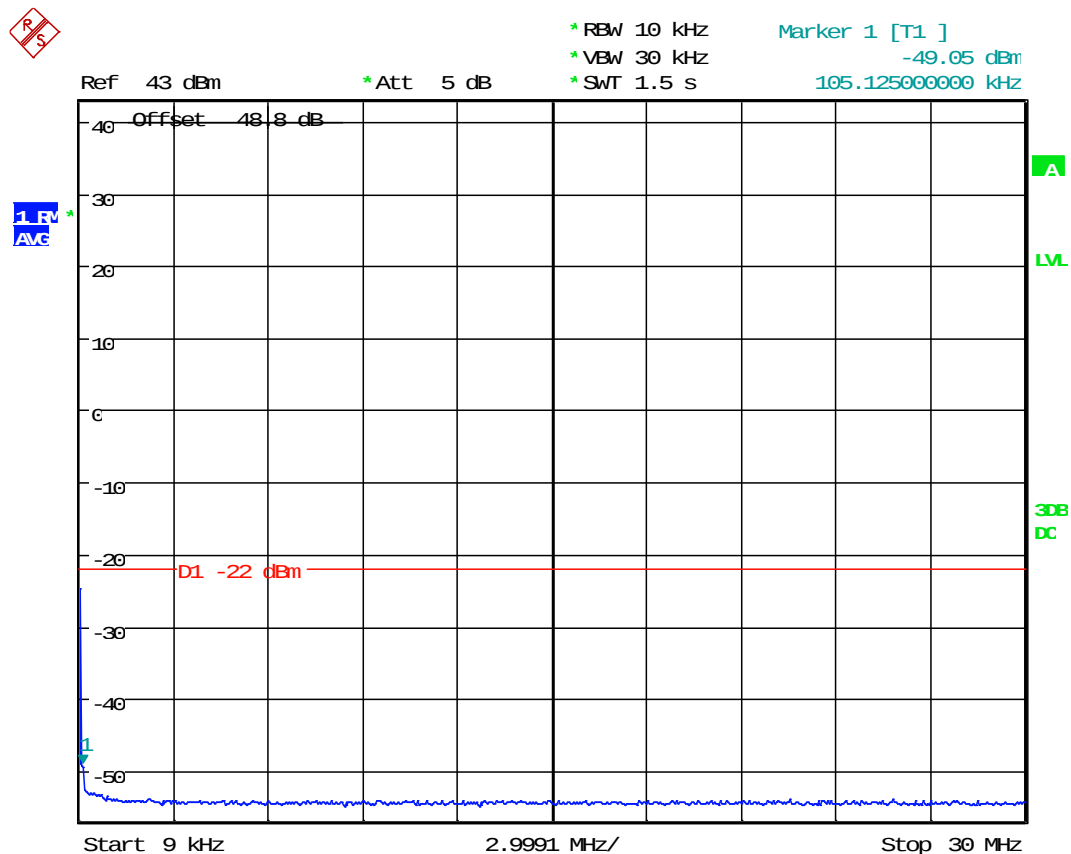
Part 27; FCC ID:AS5BBTRX-15

FCC

**Transmit Port
Antenna Conducted Spurious Emissions**

**40 MHz BW (20MHz + 20MHz)
16QAM Modulation
8x20 (MIMO)**

**Bandwidth 2650 – 2690 MHz
(Higher)**



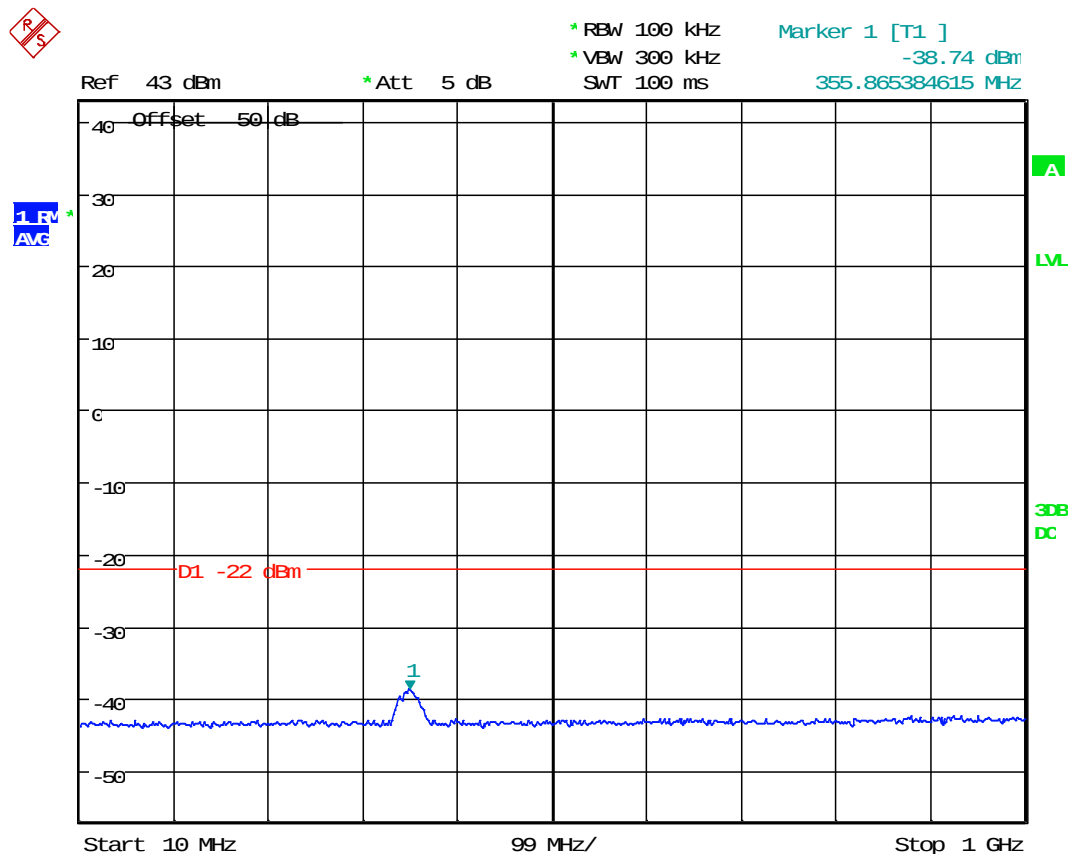
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2650-2690 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;16QAM

Date: 19.NOV.2013 11:07:11

FCC Part 27; FCC ID:AS5BBTRX-15



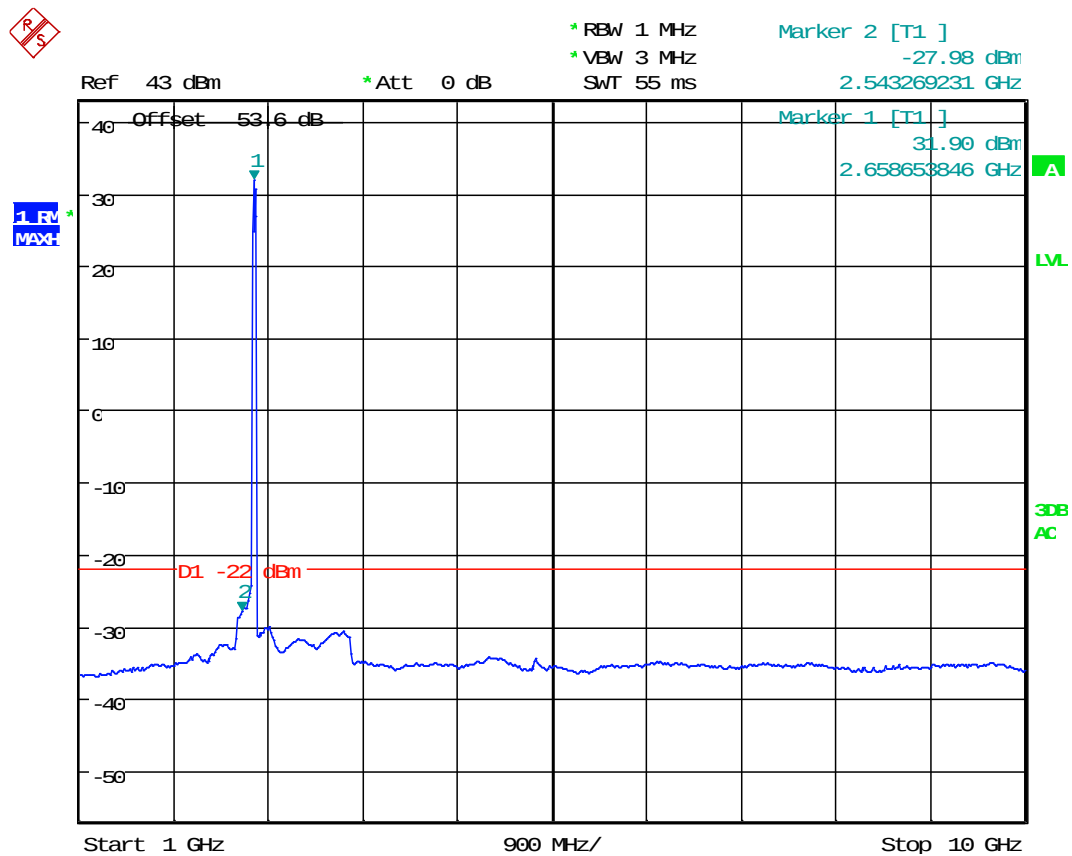
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2650-2690 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;16QAM

Date: 19.NOV.2013 11:07:57

FCC Part 27; FCC ID:AS5BBTRX-15



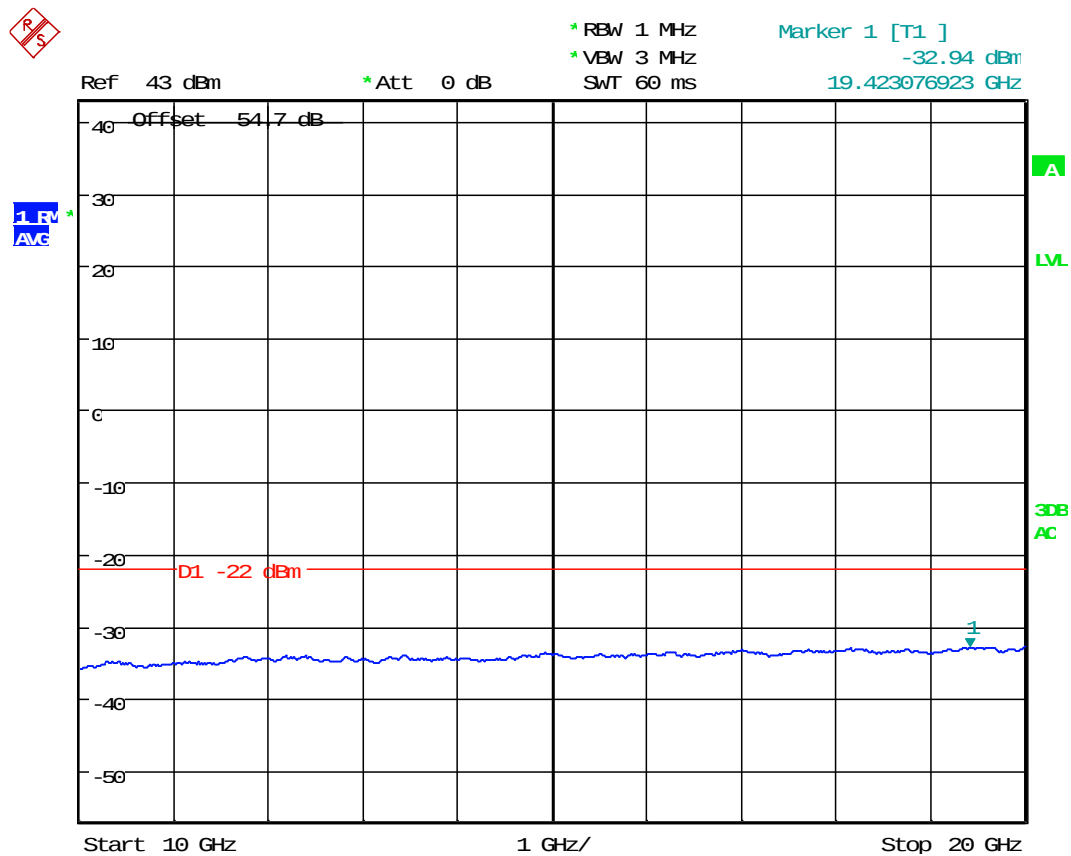
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2650-2690 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;16QAM

Date: 19.NOV.2013 11:13:55

FCC Part 27; FCC ID:AS5BBTRX-15



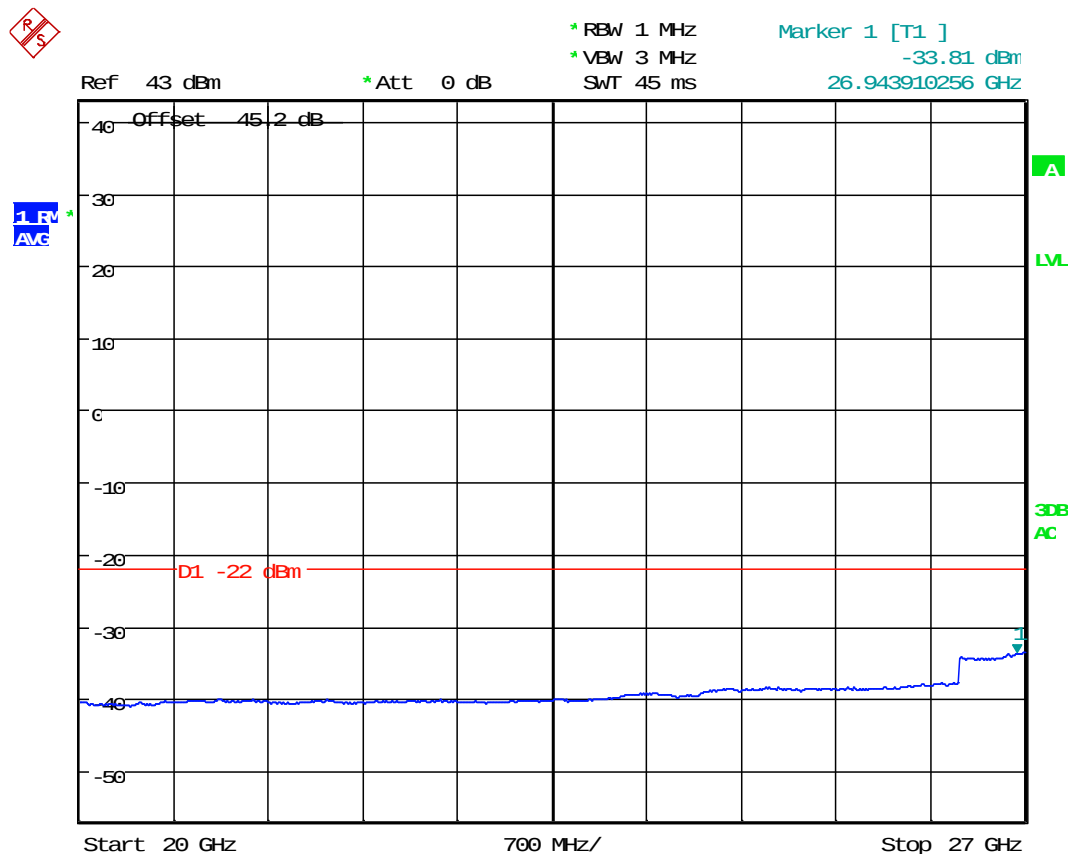
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2650-2690 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;16QAM

Date: 19.NOV.2013 11:10:25

FCC Part 27; FCC ID:AS5BBTRX-15



Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2650-2690 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;16QAM

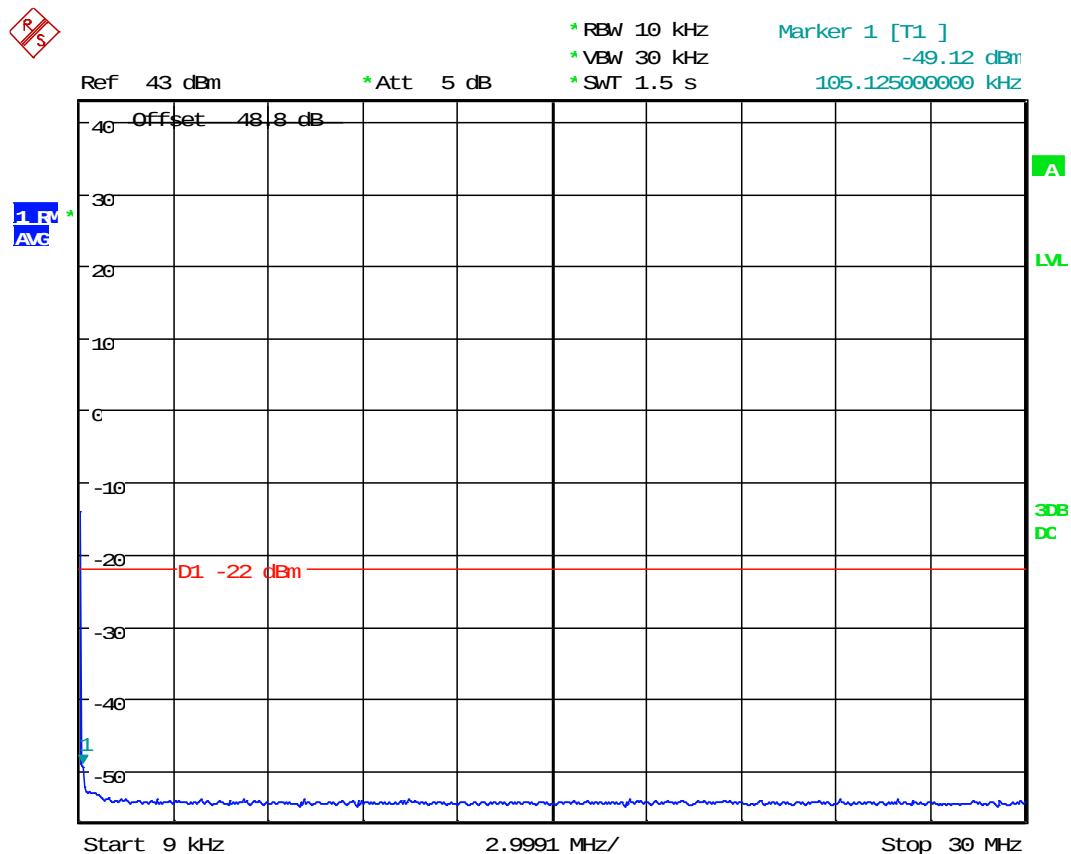
Date: 19.NOV.2013 11:12:05

FCC Part 27; FCC ID:AS5BBTRX-15

**Transmit Port
Antenna Conducted Spurious Emissions**

**40 MHz BW (20MHz + 20MHz)
64QAM Modulation
8x20 (MIMO)**

**Bandwidth 2650 – 2690 MHz
(Higher)**



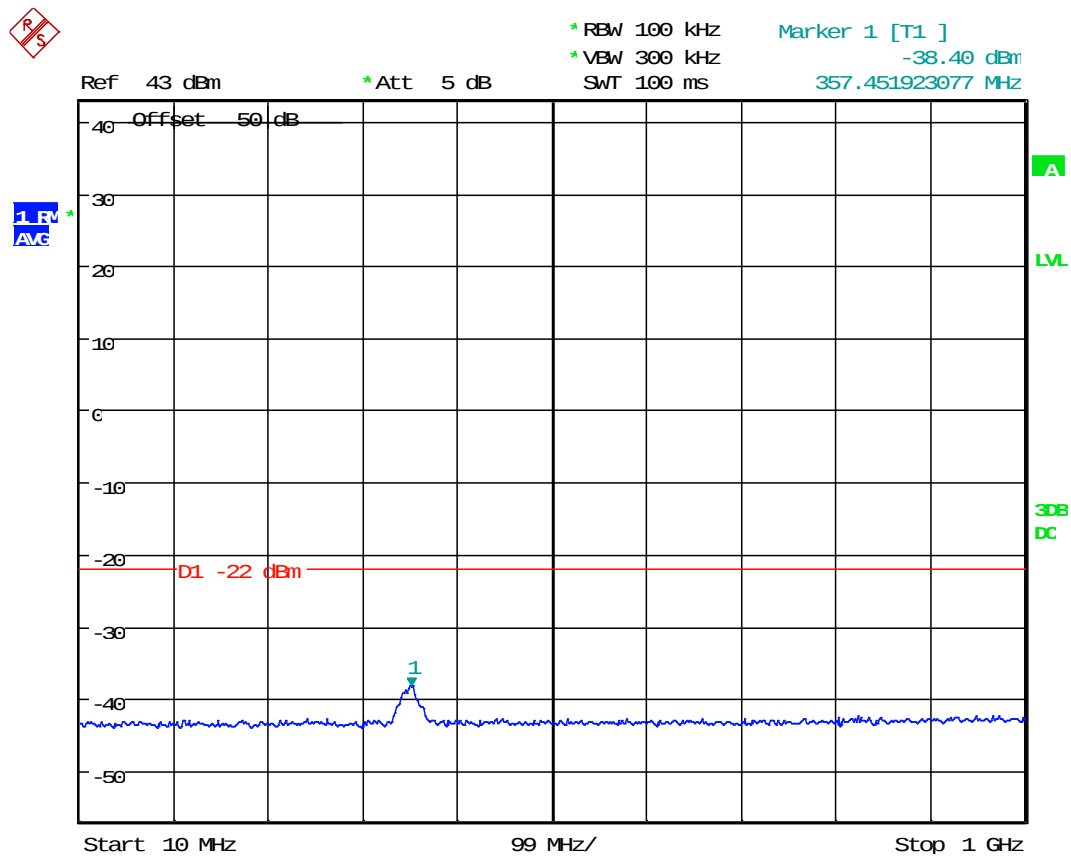
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2650-2690 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;64QAM

Date: 19.NOV.2013 13:40:45

FCC Part 27; FCC ID:AS5BBTRX-15



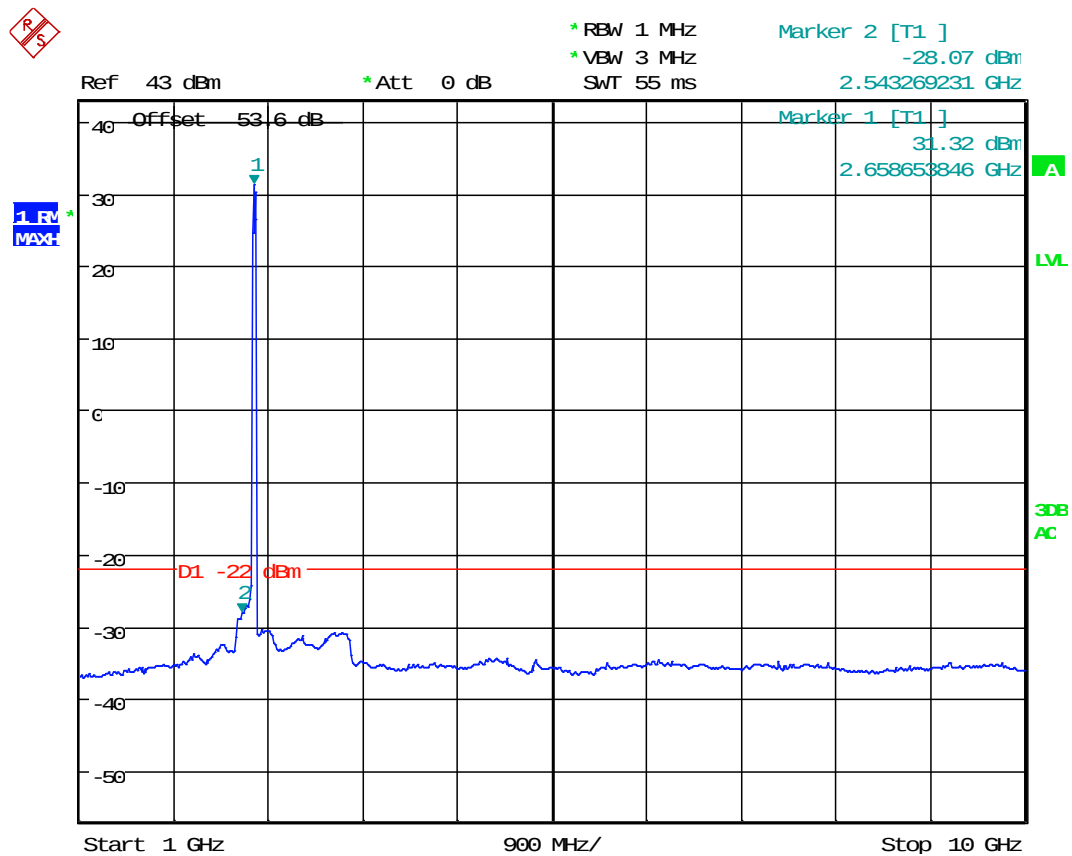
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2650-2690 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;64QAM

Date: 19.NOV.2013 13:41:25

FCC Part 27; FCC ID:AS5BBTRX-15



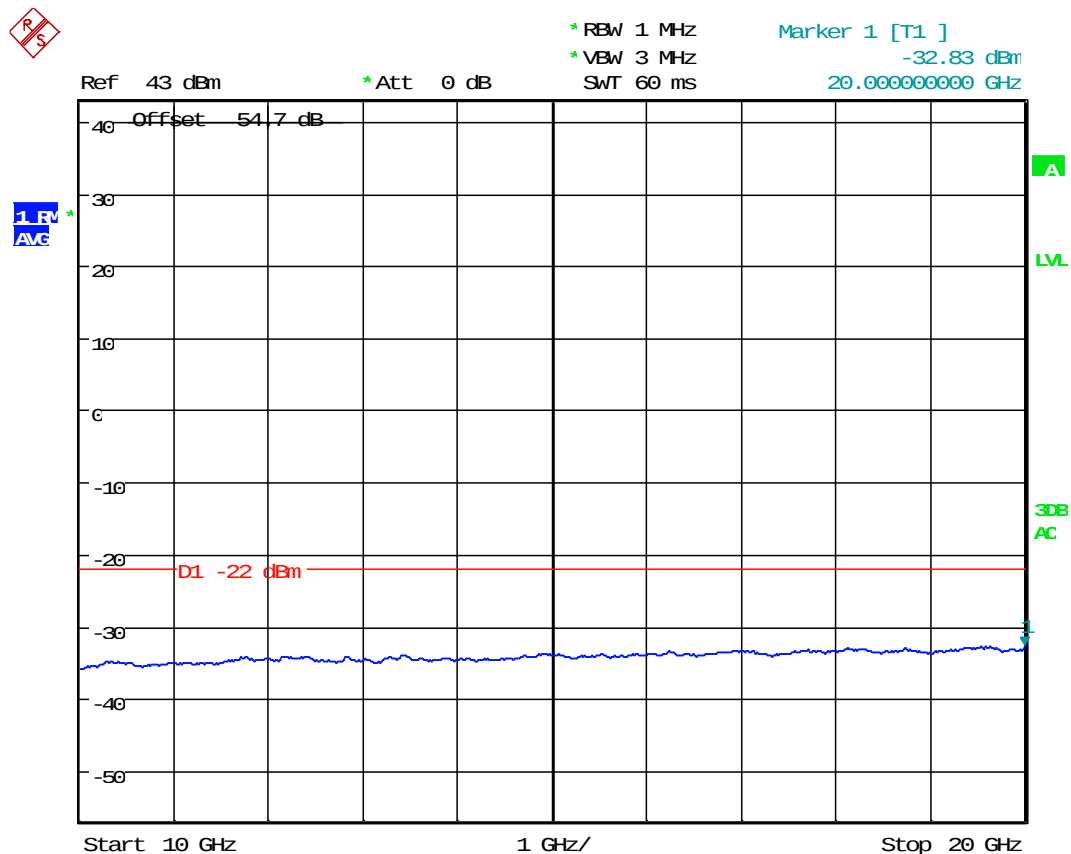
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2650-2690 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;64QAM

Date: 19.NOV.2013 13:42:28

FCC Part 27; FCC ID:AS5BBTRX-15



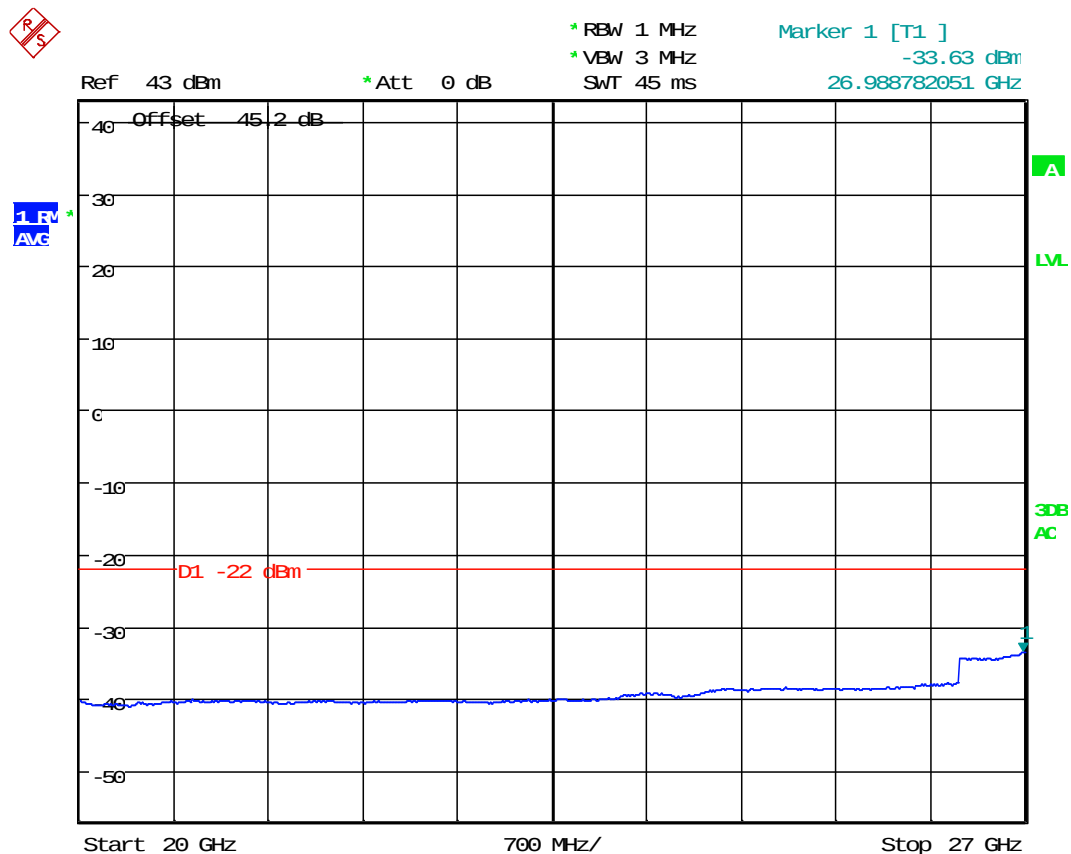
Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2650-2690 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;64QAM

Date: 19.NOV.2013 13:43:28

FCC Part 27; FCC ID:AS5BBTRX-15



Spurious Emissions; Test Engineer: JY

TD-RRH8x20 (BC41) 2.5GHz;-48VDC;2650-2690 MHz(20MHz+20MHz)

40MHz BW; PWR:20W;64QAM

Date: 19.NOV.2013 13:44:49

FCC Part 27; FCC ID:AS5BBTRX-15

TEST INSTRUMENTATION

Table 3
Test Equipment List

Manufacturer	Model	Serial #	Description	Manual #	Last Cal Date	Cal Cycle Month
Rohde & Schwarz	ESU40	100246	EMI Test Receiver 20Hz - 40GHz -155 dBm +30 dBm	E954	4/29/2013	12
LeCroy	204MXI	LCRY0612M224 04	Oscilloscope 2 GHz 10 GS/s	E798	3/27/2013	12
Weinschel	46-20-34	BX2063	Attenuator 20dB 25W DC-18GHz	E795	5/17/2013	24
Weinschel	47-10-34	BX8022	10 dB Attenuator, 50 Watt	E820	1/29/2013	12
Weinschel	48-30-33	AY8323	Attenuator DC - 18GHz 100 Watt	E961		0
LeCroy	204MXI	LCRY0612M224 04	Oscilloscope 2 GHz 10 GS/s	E798	3/27/2013	12
Agilent	8990B	MY51000233	Peak Power Analyzer		10/1/2013	12
Agilent	N1923A	MY53070016	Wideband Power Sensor		10/1/2013	12

Measurement -5

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

LTE TRDU2X60-AWS**SECTION 2.1053****FIELD STRENGTH OF SPURIOUS RADIATION**

Field strength measurements of radiated spurious emissions were made at 5 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 439234).

The “**LTE TD-RRH8X20-25** with FCCID: AS5BBTRX-15” was tested at a RF output of **10 Watt at Antenna Interface Connector (AIC) for 4 transmitters and 20 Watt at AIC for 4 transmitters for 20MHz and 40MHz bands respectively. Two of the 10W transmitters were operating QPSK and other two were operating 64QAM and 16QAM respectively. Similarly two of the 20W transmitters were operating QPSK and other two were operating 64QAM and 16QAM respectively.** These tests were performed in TD-RRH enclosure. The D2Us Base band units (BBU) connected through Fiber optic interface but placed outside the chamber.. During testing, the **TD-RRH8X20-25** AICs were terminated with 50 ohm load. The spectrum from 10 MHz to the 10th harmonic (27 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 (m) and 2.1053 contains the requirements for the levels of spurious radiation as a function of frequency.

FCC Section 27.53(m): 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 eight antenna MIMO mode of operations, the FCC limit of -13dBm shall be 9dB more stringent, therefore all channel edge and out of band spurious emissions shall be -22dBm.

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.

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

$$20 \log (E \cdot 106) - (52 + 10 \log P) = 73.2 \text{ dB } \mu\text{V/meter}$$

E = Field Intensity in Volts/meter

P = Transmitted Power in Watts

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

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

Alcatel-Lucent - Proprietary

Use Pursuant to Company Instructions.

RESULTS:

For this particular test, the field strength of any spurious radiation is required to be less than 73.2 dB μ V/meter. Reportable measurements are equal to or greater than 53.2 dB μ V/meter. Over the spectrum investigated, 10 MHz to 10th of the carrier (27GHz), no reportable spurious emissions were detected. This demonstrates that the “LTE TD-RRH8X20-25” the subject of this application, complies with Sections 2.1053, 27.53 (m) and 2.1057 of the Rules.

TEST INSTRUMENTATION

Manufacturer	Model	Serial #	Description	Manual #	Last Cal Date	Cal Cycle Month
A.H. Systems	SAS-521-2	408	Biological Antenna 25 - 2000 MHz	E601	2/15/2013	24
Weinschel	2-6	BX3430	6 dB Attenuator DC-18GHz 5 Watt	E887	3/1/2013	12
Sonoma Instrument Co.	310N	185826	Amplifier 9KHz-1GHz	E512	1/28/2013	12
Hewlett Packard	8593E	3926A04192	Spectrum Analyzer 9 KHz-22 GHz	E454	2/19/2013	12
EMC Test Systems	3116	2539	Double Ridged Horn 18-40 GHz	E513	3/22/2013	24
Trilithic	5HC2850/180 50-1.8-KK	200113078	PCS High Pass Filter 2.85GHz - 18.05GHz	E1116	n/a	0
Rohde & Schwarz	ESIB40	100044	EMI Test Receiver (20Hz to 40 GHz)-150 +30dBm	E567	7/2/2013	24
ETS Lindgren	3117	00135198	Double-Ridged Waveguide Horn 1-18 GHz	E1073	9/9/2012	24
Hewlett Packard	8449B	3008A00426	Preamplifier 1-26.5 GHz	E123	7/26/2013	24

Measurement -6

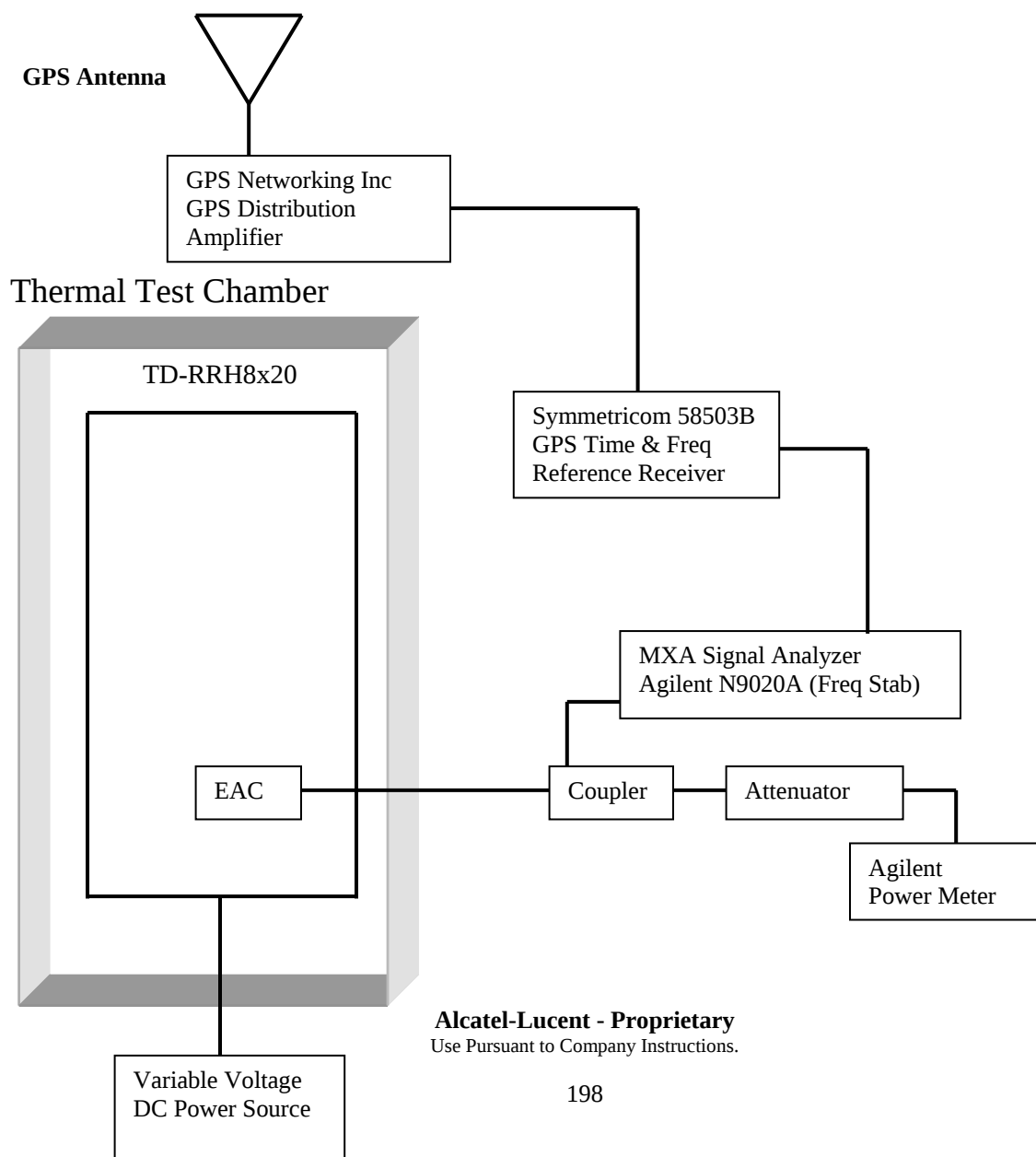
MEASUREMENT OF FREQUENCY STABILITY

MEASUREMENT OF FREQUENCY STABILITY

The frequency stabilization and accuracy of the LTE signals modulated and amplified by the **LTE TD-RRH8X20-25** is a function of the input signal which is derived from GPS signals. The system provide for automatic timing synchronization upon reacquisition of GPS lock.

The **TD-RRH8X20-25** was subjected to the FCC specified environments while operating at full rated power of 8x20W at External Antenna Connector (EAC) port. The carrier Frequency deviations were measured. The nominal Voltage input to this device is -48V DC. The **TD-RRH8X20-25** is designed to operate in the Voltage range of -48VDC in the temperature range of -30C to 50C. The carrier frequency is designed to be within an accuracy of 106.6Hz (.05ppm) in the temperature range -30C to 50C. The frequency stability tests were for the voltage -40.8VDC to -55.20VDC range and for the temperature -30C to 50C range. The measurement setup is depicted in Block diagram below:

FIGURE A: TEST SET-UP



Alcatel-Lucent - Proprietary
Use Pursuant to Company Instructions.

Frequency Block Tested: Band 41 TD RRH8x20 (CF = 2.583GHz)

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

Baseline Measurement at +25°C

Transmit Frequency Deviation at +25°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.584
0.5	0.808
1.0	0.324
1.5	0.799
2.0	0.375
2.5	0.631
3.0	0.850
FCC SPECIFICATION	±740 MHz (±0.05ppm) ±0.05ppm = ±129.15Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +50°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.339
0.5	0.760
1.0	0.392
1.5	0.489
2.0	1.137
2.5	0.304
3.0	0.840
FCC SPECIFICATION	±2583 MHz (±0.05ppm) ±0.05ppm = ±129.15Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +40°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.671
0.5	0.677
1.0	0.265
1.5	0.293
2.0	1.160
2.5	0.372
3.0	0.513
FCC SPECIFICATION	±2583 MHz (±0.05ppm) ±0.05ppm = ±129.15Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +30°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.320
0.5	0.338
1.0	0.797
1.5	0.639
2.0	0.914
2.5	0.931
3.0	0.554
FCC SPECIFICATION	±2583 MHz (±0.05ppm) ±0.05ppm = ±129.15Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +20°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.954
0.5	0.417
1.0	0.360
1.5	0.809
2.0	-0.516
2.5	-0.557
3.0	-0.448
FCC SPECIFICATION	±2583 MHz (±0.05ppm) ±0.05ppm = ±129.15Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +10°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.528
0.5	0.811
1.0	0.392
1.5	0.596
2.0	-0.833
2.5	0.934
3.0	-0.906
FCC SPECIFICATION	±2583 MHz (±0.05ppm) ±0.05ppm = ±129.15Hz
FCC RESULT	PASS

Transmit Frequency Deviation at 0°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.105
0.5	0.968
1.0	0.194
1.5	0.512
2.0	-0.861
2.5	0.612
3.0	0.184
FCC SPECIFICATION	±2583 MHz (±0.05ppm) ±0.05ppm = ±129.15Hz
FCC RESULT	PASS

Transmit Frequency Deviation at -10°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.906
0.5	0.583
1.0	0.727
1.5	0.741
2.0	0.540
2.5	0.813
3.0	0.587
FCC SPECIFICATION	±2583 MHz (±0.05ppm) ±0.05ppm = ±129.15Hz
FCC RESULT	PASS

Transmit Frequency Deviation at -20°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.367
0.5	0.486
1.0	0.915
1.5	0.115
2.0	0.361
2.5	0.173
3.0	0.864
FCC SPECIFICATION	±2583 MHz (±0.05ppm) ±0.05ppm = ±129.15Hz
FCC RESULT	PASS

Transmit Frequency Deviation at -30°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.836
0.5	0.714
1.0	0.901
1.5	0.913
2.0	0.341
2.5	0.413
3.0	0.936
FCC SPECIFICATION	±2583 MHz (±0.05ppm) ±0.05ppm = ±129.15Hz
FCC RESULT	PASS

Upon return to +25°C.

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

Transmit Frequency Deviation at +25°C at 100% of Nominal Voltage, -48VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.230
0.5	0.426
1.0	0.632
1.5	0.991
2.0	0.366
2.5	0.630
3.0	0.837
FCC SPECIFICATION	±2583 MHz (±0.05ppm) ±0.05ppm = ±129.15Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at 103% of Nominal Voltage, -49.44VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.610
0.5	0.238
1.0	0.883
1.5	0.669
2.0	0.928
2.5	0.516
3.0	0.681
FCC SPECIFICATION	±2583 MHz (±0.05ppm) ±0.05ppm = ±129.15Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at 106% of Nominal Voltage, -50.88VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.584
0.5	0.740
1.0	0.508
1.5	0.604
2.0	0.464
2.5	0.329
3.0	0.661
FCC SPECIFICATION	±2583 MHz (±0.05ppm) ±0.05ppm = ±129.15Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at 109% of Nominal Voltage, -52.32VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.409
0.5	0.630
1.0	0.292
1.5	0.718
2.0	0.481
2.5	0.491
3.0	0.206
FCC SPECIFICATION	±2583 MHz (±0.05ppm) ±0.05ppm = ±129.15Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at 112% of Nominal Voltage, -53.76VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.940
0.5	0.581
1.0	0.208
1.5	0.450
2.0	0.127
2.5	0.495
3.0	-0.892
FCC SPECIFICATION	±2583 MHz (±0.05ppm) ±0.05ppm = ±129.15Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at 115% of Nominal Voltage, -55.20VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.644
0.5	0.417
1.0	0.588
1.5	0.681
2.0	0.310
2.5	0.312
3.0	0.576
FCC SPECIFICATION	±2583 MHz (±0.05ppm) ±0.05ppm = ±129.15Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at 100% of Nominal Voltage, -48.0VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.351
0.5	0.492
1.0	0.584
1.5	0.516
2.0	0.610
2.5	0.597
3.0	0.455
FCC SPECIFICATION	±2583 MHz (±0.05ppm) ±0.05ppm = ±129.15Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at -3% of Nominal Voltage, -46.56VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.760
0.5	0.728
1.0	0.407
1.5	0.616
2.0	0.125
2.5	0.617
3.0	0.745
FCC SPECIFICATION	±2583 MHz (±0.05ppm) ±0.05ppm = ±129.15Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at -6% of Nominal Voltage, -45.12VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.667
0.5	0.531
1.0	0.269
1.5	0.978
2.0	0.380
2.5	0.988
3.0	0.678
FCC SPECIFICATION	±2583 MHz (±0.05ppm) ±0.05ppm = ±129.15Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at -9% of Nominal Voltage, -43.68VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.698
0.5	0.487
1.0	0.530
1.5	0.456
2.0	0.481
2.5	0.673
3.0	0.709
FCC SPECIFICATION	±2583 MHz (±0.05ppm) ±0.05ppm = ±129.15Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at -12% of Nominal Voltage, -42.24VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.645
0.5	0.707
1.0	0.232
1.5	0.682
2.0	0.536
2.5	0.772
3.0	0.341
FCC SPECIFICATION	±2583 MHz (±0.05ppm) ±0.05ppm = ±129.15Hz
FCC RESULT	PASS

Transmit Frequency Deviation at +25°C at -15% of Nominal Voltage, -40.80VDC	
Time (minutes)	Transmit Carrier Deviation (Hz)
0	0.643
0.5	0.472
1.0	0.733
1.5	0.661
2.0	0.908
2.5	0.244
3.0	0.710
FCC SPECIFICATION	±2583 MHz (±0.05ppm) ±0.05ppm = ±129.15Hz
FCC RESULT	PASS

Instrument Used for Measurement

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

**FREQUENCY SPECTRUM TO BE INVESTIGATED
SECTION 2.1057**

SECTION 2.1057

FREQUENCY SPECTRUM TO BE INVESTIGATED

Frequency Spectrum to be investigated, Measurement Bandwidth and detector function used 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