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FCC Certification Test Report

Class II Permissive Change

Product Evaluated

B25 RRH 4X30

(FCC ID: AS5BBTRX-22)

Customer

Alcatel-Lucent USA, Inc

600-700 Mountain Avenue
Murray Hill, New Jersey 07974-0636 USA

Test Laboratory

Global Product Compliance Laboratory

Alcatel-Lucent USA, Inc
600-700 Mountain Avenue, Rm 5B-108
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Date: October 17, 2016

Revisions

Date	Revision	Section	Change
10/17/2016	0		Initial Release

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Signed: Steve Gordon 10/17/2016
Compliance Engineer

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Signed: Raymond J Johnson 10/17/2016
Technical Manager

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1. ATTESTATION OF TEST RESULTS

Company Name	Alcatel-Lucent USA, Inc.
FCC ID	AS5BBTRX-22
Product Name	**B25 RRH 4X30**
Model Name	**B25 RRH 4X30**
Part No	3JR53349ABAA01
Serial Number(s)	# LBALLU-YD160603Q6H
Test Standard(s)	47 CFR FCC Part 24
Reference(s)	• 47 CFR FCC Part 2 and Part 24 • FCC KDB 971168 D01 • ANSI C63.26 (2015)
Operating Frequency Band	PCS (Tx: 1930-1995 MHz and Rx: 1850-1910MHz), E-UTRAN Band 25
Technology	LTE
Test Frequency Range	10MHz – 20GHz
Operation Mode(s)	2x2 MIMO & 4x4 MIMO
Submission Type	Class II Permissiove Change
FCC Part 15 Subpart B Compliance	Compliance with Class B
Test Date	September 13 – October 7, 2016
Test Laboratory	Global Product Compliance Laboratory 600-700 Mountain Avenue, Rm 5B-108 Murray Hill, New Jersey 07974-0636 USA

This is to certify that the above product has been evaluated and found to be in compliance with the Rules and Regulations set forth in the above standard(s). The data and the descriptions about the test setup, procedures and configuration presented in this report are accurate. The results of testing in this report apply only to the product/system which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Per the requirement of Section 2.911(d) Certification of Technical Test Data, I hereby certify that the technical test data are the results of tests either performed or supervised by me.

Steve Gordon
Member of Technical Staff
Global Product Compliance Laboratory
Alcatel-Lucent USA, Inc

2. SUMMARY OF THE TEST RESULTS

47 CFR FCC Sections	Description of Tests	Compliance Results	Notes
2.1046	**RF Power Output**	**Yes**	
2.1047	**Modulation Characteristics**	**YES**	
2.1049, 24.238	**(a) Occupied Bandwidth** **(b) Out-of-Band Emissions**	**Yes**	
2.1051, 24.238	**Spurious Emissions at Antenna Terminals**	**Yes**	
2.1053, 24.238	**Field Strength of Spurious Radiation**	**Yes**	
2.1055, 24.235	**Measurement of Frequency Stability**	**NR**	

NR: Not Required
NA: Not Applicable

2.1 Measurement Uncertainty

The results of the calculations to estimate uncertainties for the several test methods and standards are shown in the Table below. These are the worst-case values.

Worst-Case Estimated Measurement Uncertainties

Standard, Method or Procedure	Condition	Frequency MHz	Expanded Uncertainty (k=2)
a. Classical Emissions, (*e.g.*, ANSI C63.4, CISPR 11, 14, 22, *etc.*, using ESHS 30,	Conducted Emissions	0.009 - 30	±3.5 dB
	Radiated Emissions (AR-4 Semi-Anechoic Chamber)	30 MHz – 200MHz H 30 MHz – 200 MHz V 200 MHz – 1000 MHz H 200 MHz – 1000 MHz V 1 GHz- 18 GHz	±4.79 dB ±5.12 dB ±4.79 dB ±4.91 dB ±3.3 dB

2.2 Measurement uncertainty for Antenna Port Testing:

- 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

3. GENERAL INFORMATION

3.1 Product Descriptions

The equipment under test (EUT) has the following specifications.

Table 3.1.1 Product Specifications

Specification Items	Description
Product Type	Compact Base Station (4Tx, 4Rx), 4x4 MIMO
Radio Type	Intentional Transceiver
Power Type	-48VDC
Modulation	QPSK, 16QAM, 64QAM
Operating Frequency Range	Tx 1930-1995 MHz/Rx 1850-1910 MHz
Channel Bandwidth	5, 10, 15, 20 MHz, 5+5 MHz and 10+15 MHz
Max Conducted Power (Rated)	47.8 dBm per port for 2xMIMO , 44.8 dBm per port for 4xMIMO
Software Version	NEM LR16.2_D1.12
Hardware Version	RRH 4x30 MIMO
Antenna(s)	Refer to Section 3.2

The EUT supports the following carrier configurations:

Table 3.1.2 EUT Supported Configurations

Carrier Bandwidth (MHz)	Maximum No of Carriers per Path	Technology	Supported?
5	1	LTE	√
10	1	LTE	√
15	1	LTE	√
20	1	LTE	√
5+5	2	LTE	√
10+15	2	LTE	√

The operating band consists of the following blocks and spectrum:

Table 3.1.3 EUTRAN 25, PCS Band

Blocks	Tx Frequency (MHz)	Rx Frequency (MHz)	Bandwidth (MHz)
A	1930 - 1945	1850 - 1865	15
D	1945 - 1950	1865 - 1870	5
B	1950 - 1965	1870 - 1885	15
E	1965 - 1970	1885 - 1890	5
F	1970 - 1975	1890 - 1895	5
C	1975 - 1990	1895 - 1910	15
G	1990 - 1995	1910 - 1915	5

3.2 Antenna Information

The product does not incorporate integrated antennas.

4. REQUIRED MEASUREMENTS AND RESULTS

The EUT is a Class II Permissive Change. Per 47CFR FCC Section 2.1033(c)(14), the following certification tests are required by Section 2.1046 through Section 2.1057. The measurement was conducted in accordance with the procedures set out in Section 2.1041.

47 CFR FCC Sections	Description of Tests	Required	Notes
2.1046	**RF Power Output**	**Yes**	
2.1047	**Modulation Characteristics**	**Yes**	
2.1049, 24.238	**(a) Occupied Bandwidth** **(b) Out-of-Band Emissions**	**Yes**	
2.1051, 24.238	**Spurious Emissions at Antenna Terminals**	**Yes**	
2.1053, 24.238	**Field Strength of Spurious Radiation**	**Yes**	
2.1055, 24.235	**Measurement of Frequency Stability**	**NR**	

4.1 Section 2.1046 MEASUREMENT REQUIRED: RF POWER OUTPUT

This test is a measurement of the total RF power level transmitted at the antenna-transmitting terminal, as shown in the accompanying test set-up diagram. The radio was tuned to a channel which is transmitting continuously in its operating frequency band. The power level of the base station was calibrated to allow the base station to operate at the manufacturer's maximum rated mean power level, i.e., +44.8dBm (30W) per port for 4x30 MIMO and +47.8 dBm (60W) per port for 2x60 MIMO at the antenna-transmitting terminal.

4.1.1 RF Power Output Measurement

Power measurements were conducted with a broadband Power Meter in the average mode per KDB 971168 D01. Before the testing was started, the Base Station was given a sufficient "warm-up" period as required.

The measured RF power at each of the antenna transmitting terminals of the Alcatel-Lucent **B25 RRH 4X30** was measured to be 30W (+44.8 dBm ± 1 dB) for single carriers 4xMIMO and dual carriers 4xMIMO (5+5 MHz) LTE carriers; also 60W (47.8dBm) for dual carriers 2xMIMO (10+15 MHz) LTE carriers. The power was measured across the 1930 – 1995 MHz PCS frequency band. This power was verified in each PCS Block as identified in the Table below. In 2x60 MIMO or 4x30 MIMO mode this is 160 W (+52 dBm) per RRH.

The maximum rated mean power at the antenna transmitting terminal was measured with QPSK, 16QAM and 64QAM modulation respectively, across the entire operating frequency band.

The maximum rated mean RF power outputs of the EUT measured are given in Table 4.1.1. The RF power output measured for each configuration was also shown as "Ref Lvl" in the plots provided in Sections 4.3 and 4.4.

Table 4.1.1 The Maximum Average RF Output Power of the EUT- Measured

Transmit Configuration	Measurement Configuration	Maximum Average RF Output Power		Maximum Derivation
		Watts	dBm	dB
2XMIMO	Per Antenna Port	60	47.8	⩽±1
4XMIMO	Per Antenna Port	30	44.8	

4.1.1.1 RF Power Output Results:

The maximum mean RF power outputs of the EUT measured at its antenna transmitting terminals were measured in full compliance with the Rules of the Commission and are listed above.

4.1.2 Peak-to-Average Power Ratio Measurement

The Peak-to-Average Power Ratio (PAPR) of the EUT has also been measured per KDB 971168 D01 procedures for 5 MHz, 10 MHz, 15 MHz and 20 MHz carriers at QPSK, 16QAM and 64QAM, respectively. The PAPR values (0.1% probability) of the EUT measured are all below 13dB. The maximum PAPR value measured is given in Table 4.1.2 and the plot below.

Table 4.1.2 The Maximum PAPR Value at 0.1% probability of the EUT

Configuration	Maximum PAPR Value at 0.1% probability (dB)
1967.5 MHz, 16QAM, 5MHz BW	8.39
1935 MHz, QPSK, 10MHz BW	8.42
1962.5 MHz, 16QAM, 15MHz BW	7.94
1940MHz, QPSK, 20MHz BW	7.98

4.1.2.1 Peak-to-Average Power Ratio Results:

The maximum Peak-to-Average Power Ratio (PAPR) of the EUT measured at its antenna transmitting terminals were measured to be in full compliance with the ≤ 13 dB Rules of the Commission and are listed above.

Figure 4.1.1 Test Set-Up for Measurement of

Radio Frequency Power Output

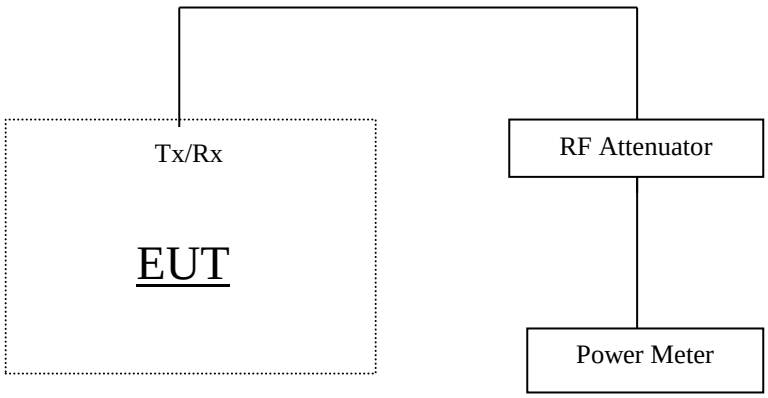
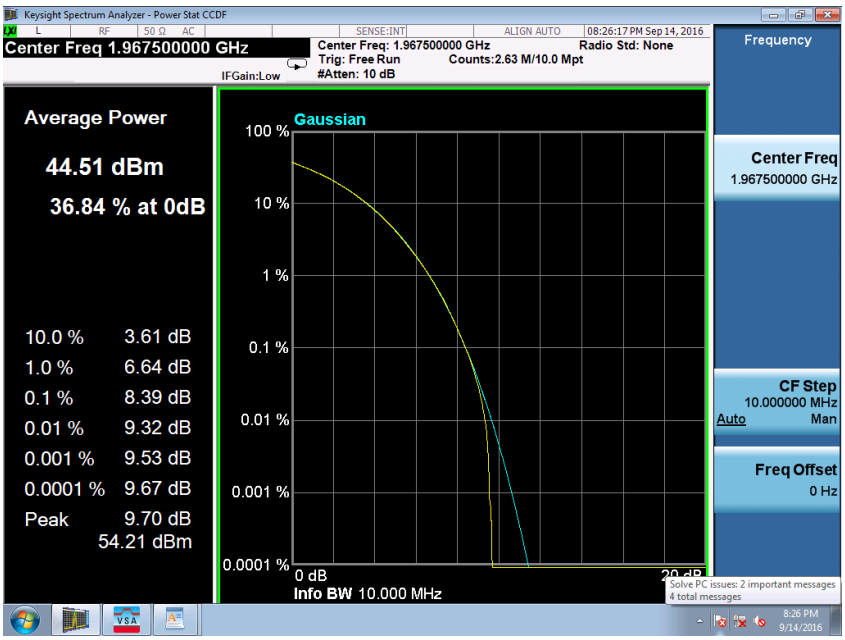
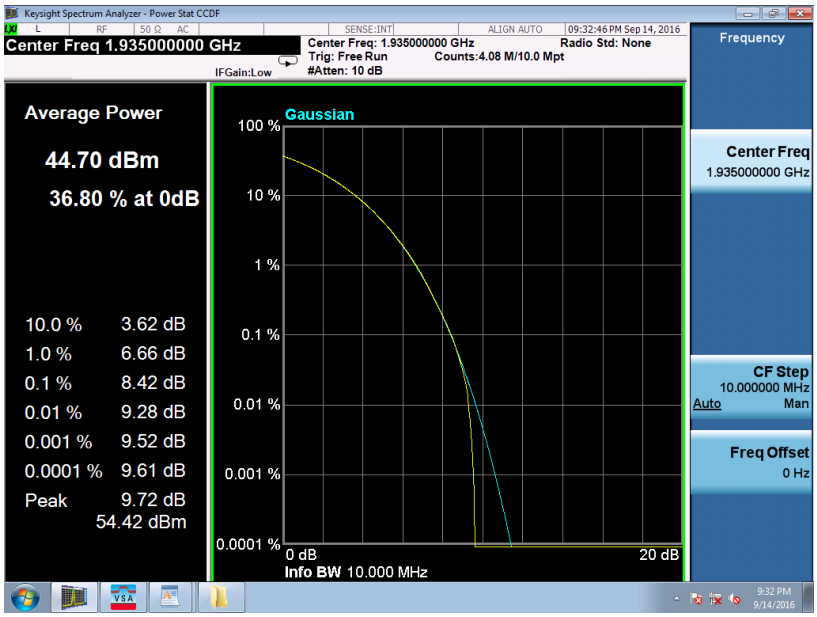


Figure 4.1.2 PAPR Plot Measured with the Maximum Value

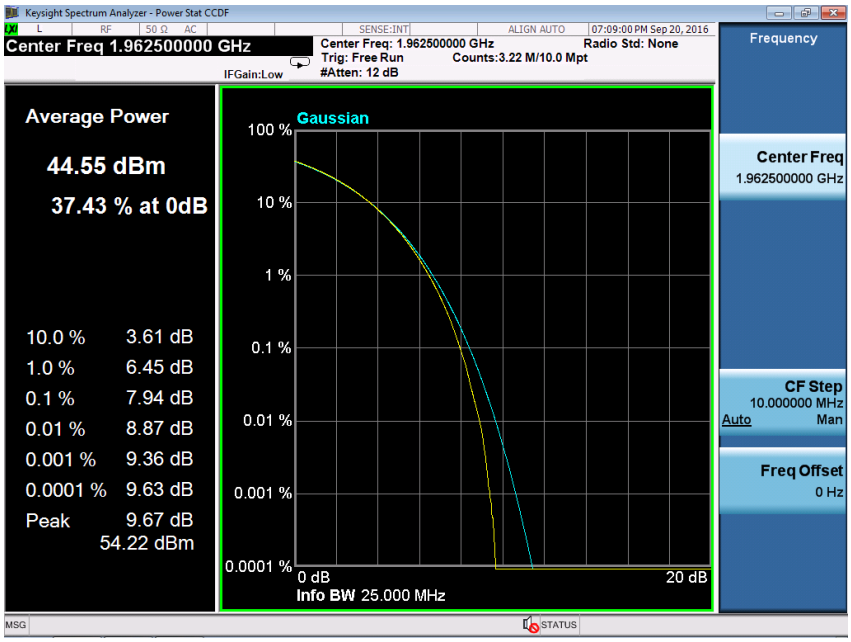
5 MHz Bandwidth



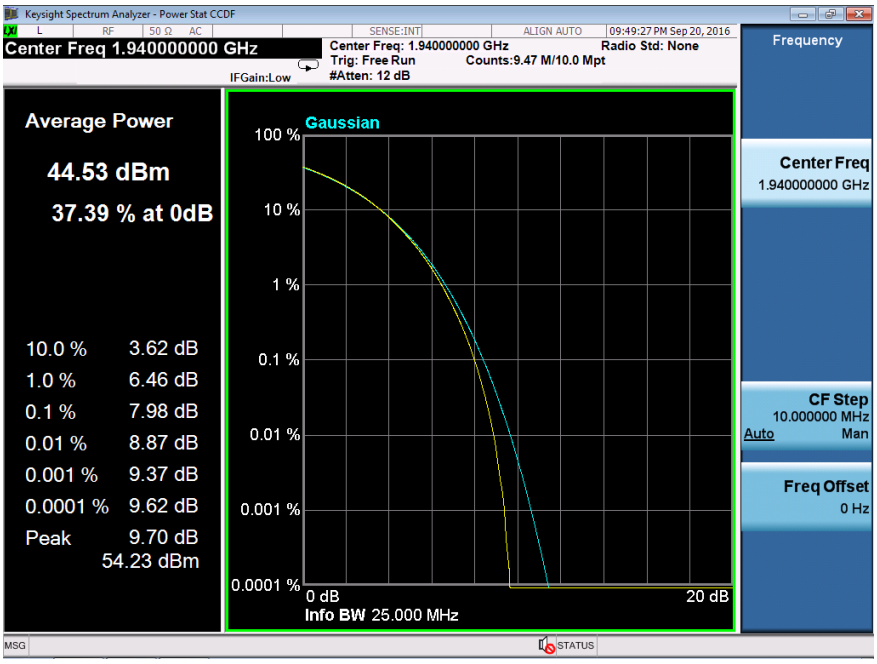
10 MHz Bandwidth



15 MHz Bandwidth



20 MHz Bandwidth



4.2 Section 2.1047 MEASUREMENT REQUIRED: MODULATION CHARACTERISTICS

The **B25 RRH 4X30** supports LTE technologies. LTE utilizes Orthogonal Frequency Division Multiplexing (OFDM) which splits the carrier frequency bandwidth into many small subcarriers. Each individual subcarrier is modulated with QPSK, 16QAM and 64QAM digital modulation formats.

In QPSK, there are 4 possible symbol states and each symbol carries 2 bits of information. In 16QAM, there are 16 possible symbol states and each 16-QAM symbol carries 4 bits of information. While in 64QAM, there are 64 possible symbol states and each 64-QAM symbol carries 6 bits of information. Higher-order modulation, where the constellations become more dense, is more sensitive to poor channel conditions than the lower-order modulation.

The modulation characteristics measurement of LTE carriers measures the difference between the ideal symbols and the measured symbols after the equalization. The measurement was performed for QPSK, 16QAM and 64QAM, respectively, where the carrier power level was adjusted to the maximum rated mean power at the antenna terminal.

4.2.1 Modulation Characteristics Measurement

The measurements were performed at the antenna transmitting terminal of the base station system with a signal analyzer which was calibrated in accordance with ISO 9001 process.
The test set-up diagram is given in the Figure 4.2.1, where the signal analyzer used the external signals from the base station as its trigger source and time reference.
Figure 4.2.2 shows three representative screen plots of the modulation measurement for an LTE carrier in QPSK, 16QAM and 64QAM modulations, respectively.

4.2.1.1 Modulation Measurements Results:

The modulation characteristics of the EUT measured are in full compliance with the Rules of the Commission.

Figure 4.2.1 Test Set-Up for Measurement of Modulation Characteristics, Occupied Bandwidth and Out-of-Band Emissions

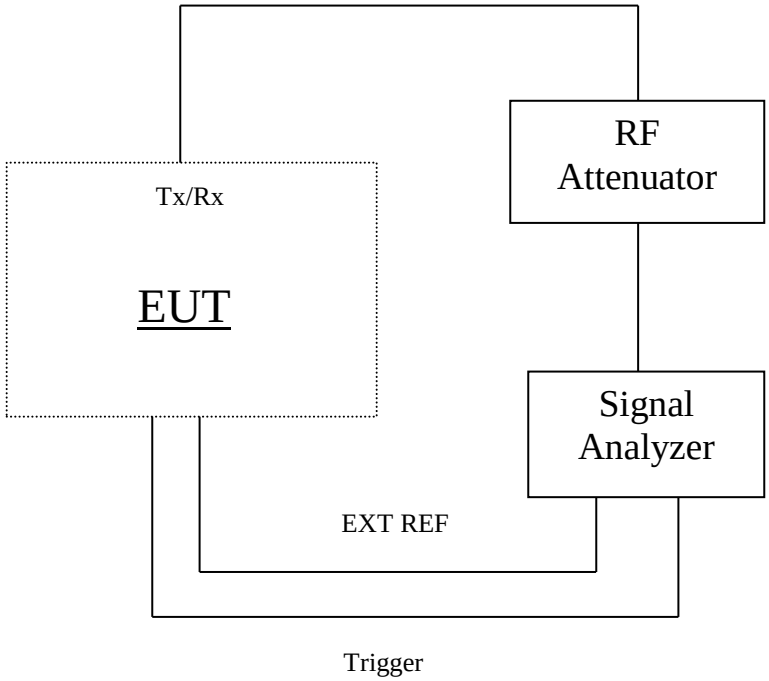
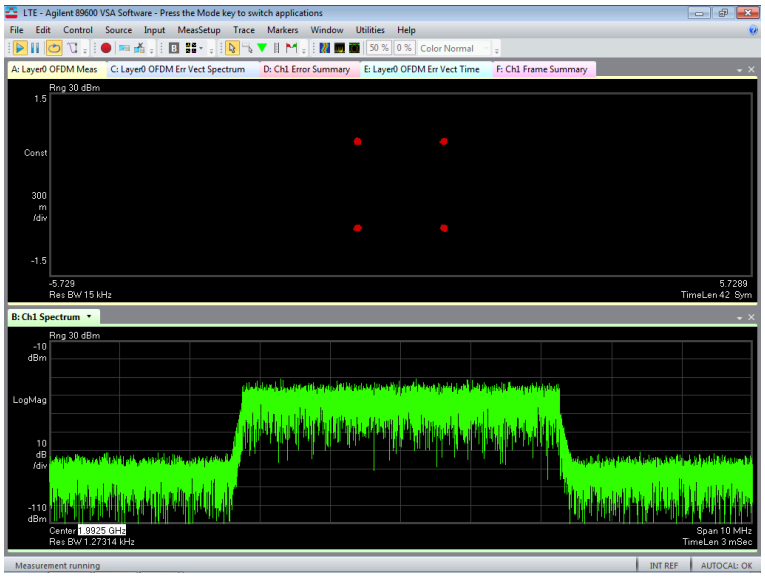
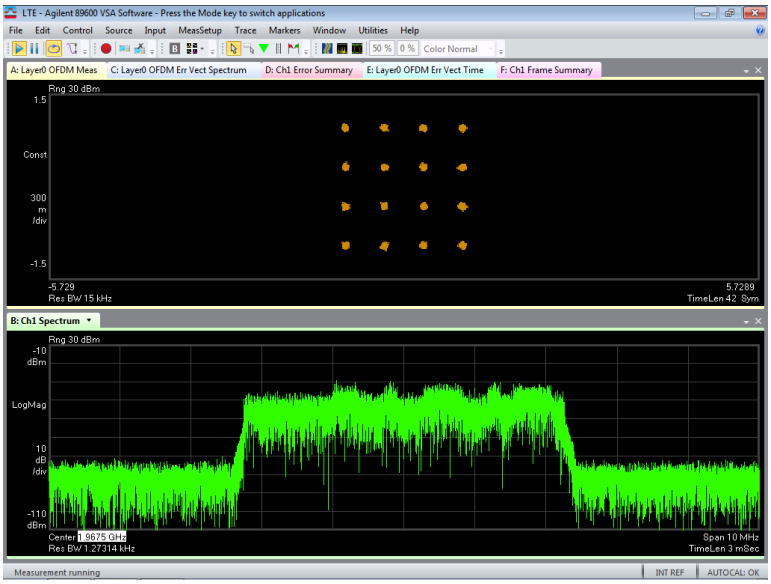
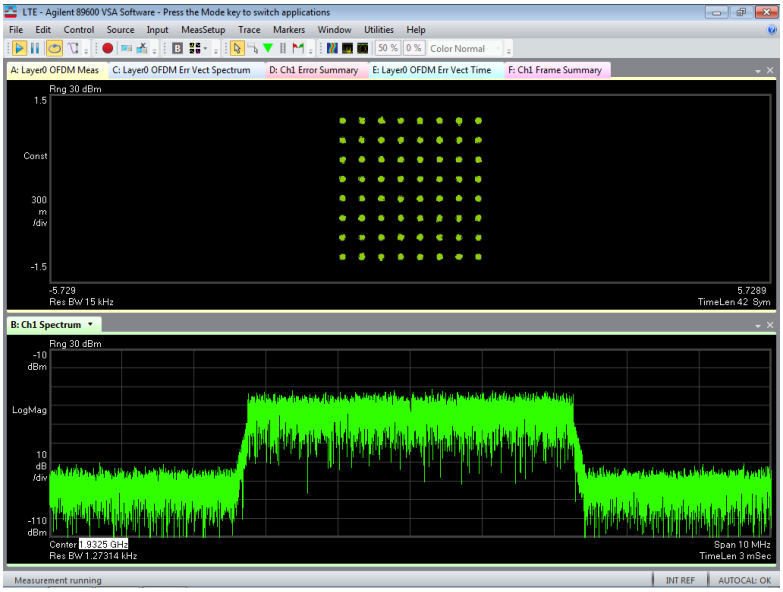


FIGURE 4.2.2 Modulation Measurements

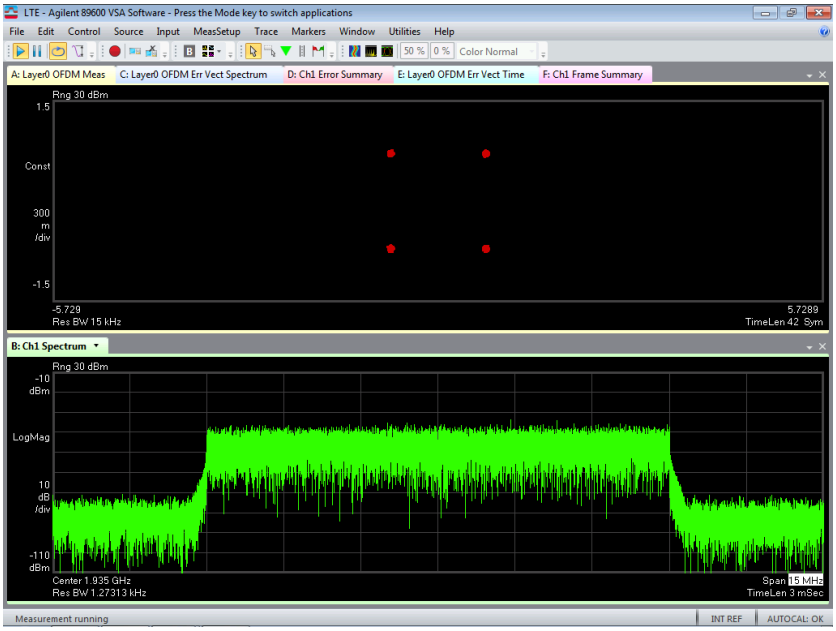
5 MHz Bandwidth

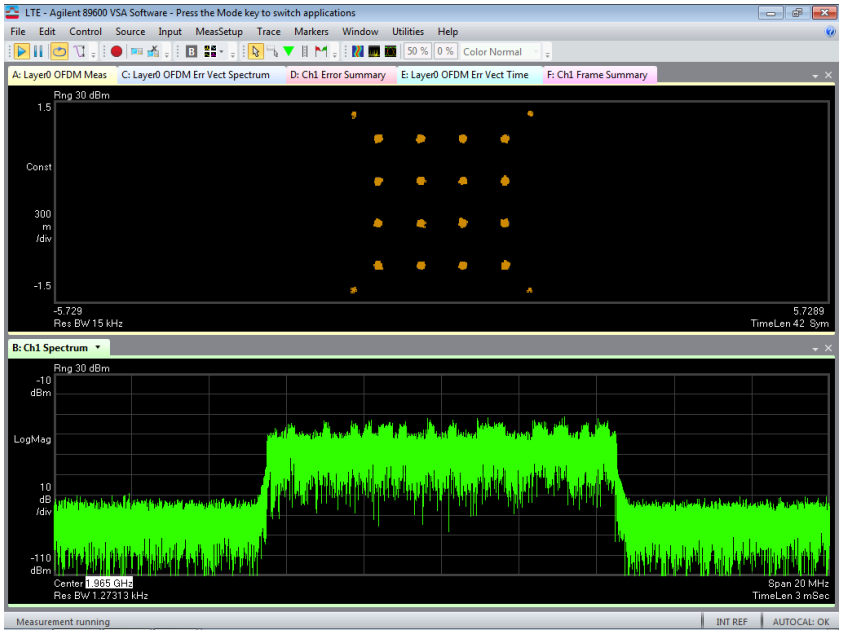


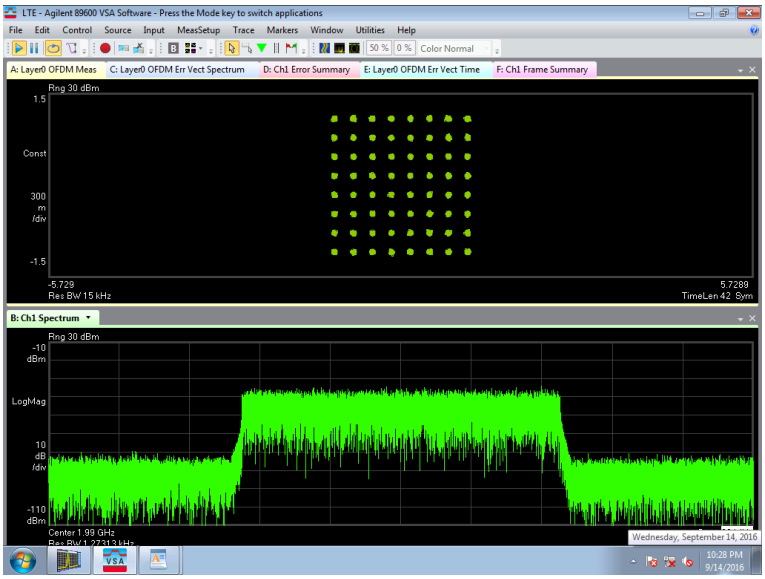




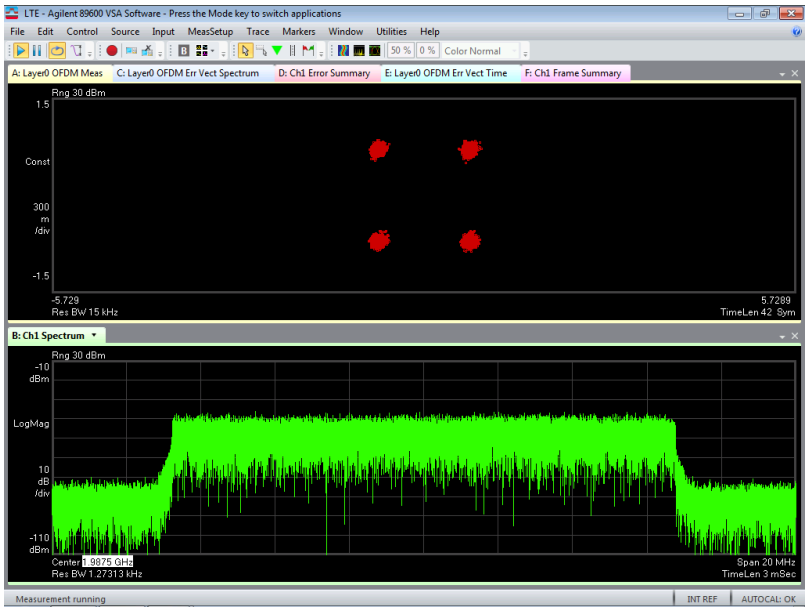
10 MHz Bandwidth

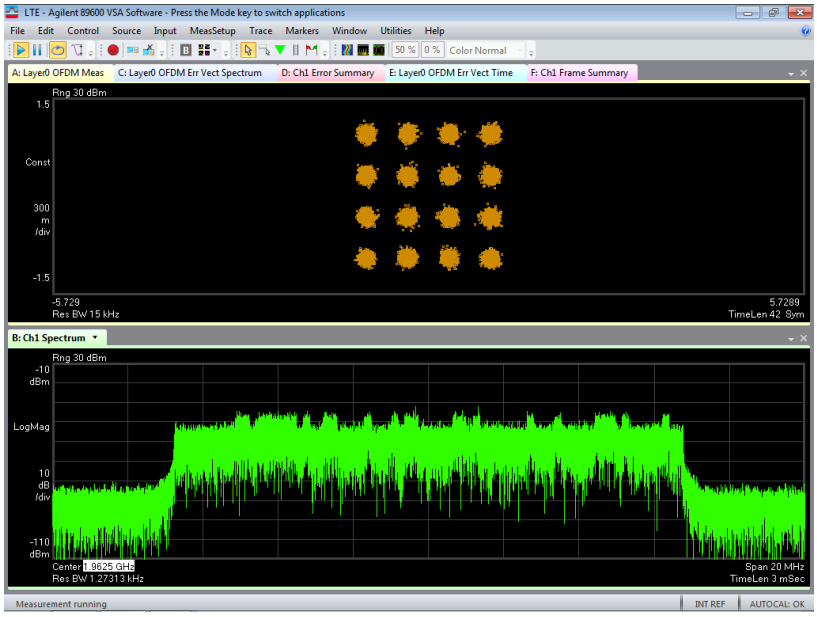


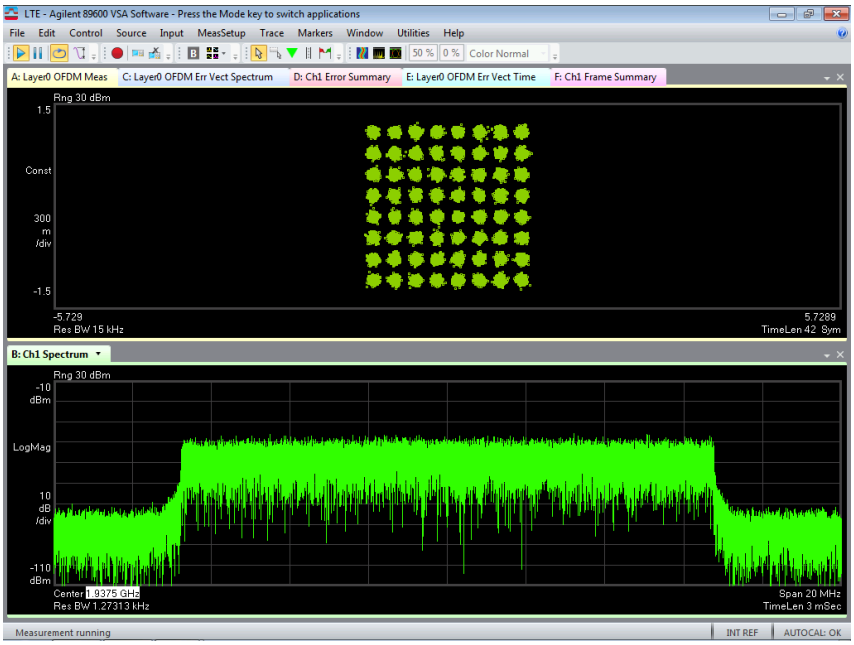




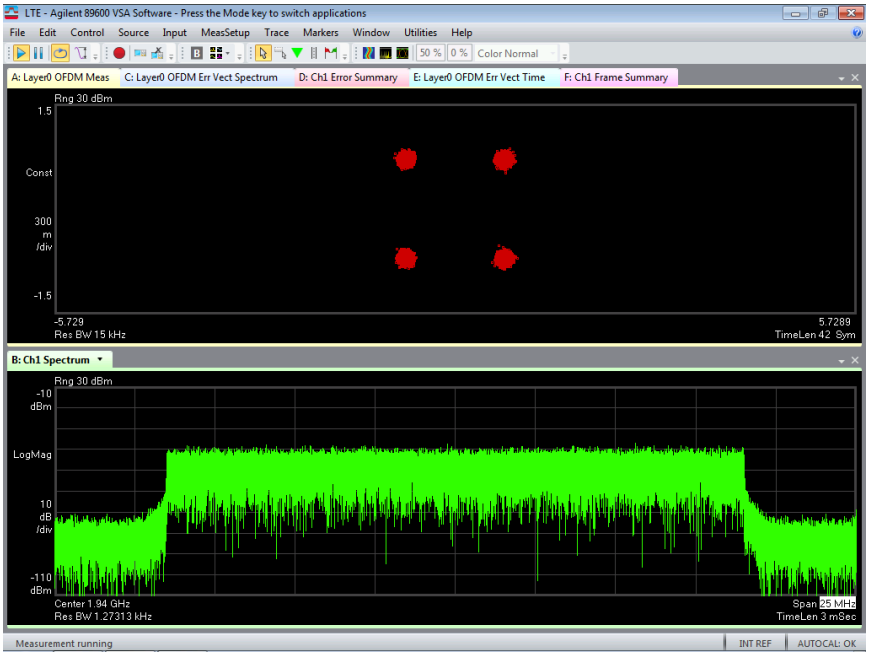
15 MHz Bandwidth

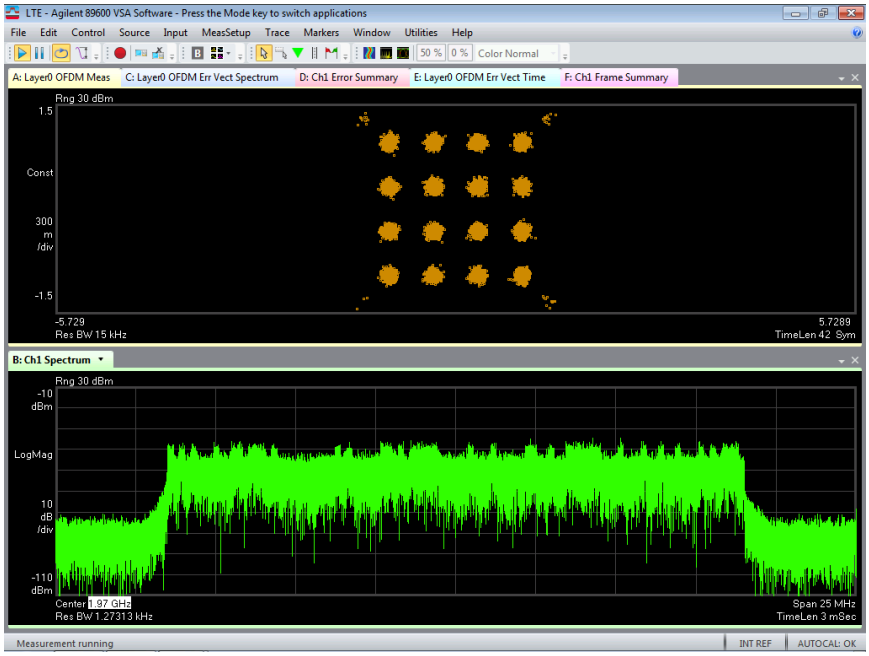


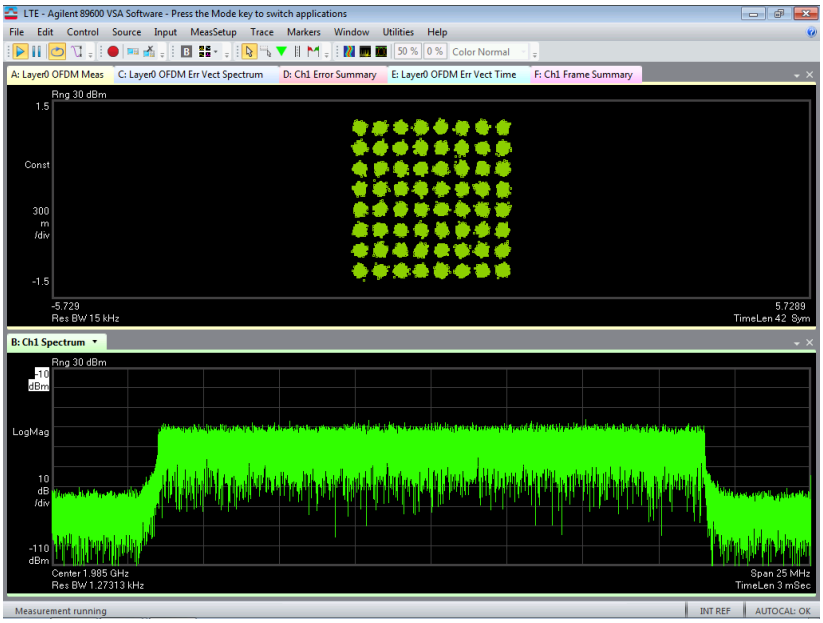




20 MHz Bandwidth







4.3 Section 2.1049 MEASUREMENT REQUIRED: OCCUPIED BANDWIDTH AND OUT-OF-BAND EMISSIONS

This test measures the Occupied Bandwidth of the transmitting carrier and the Out-of Band Emissions in the frequency spectrum immediately outside and adjacent to the transmitting carrier(s).

The occupied bandwidth (OBW) is usually defined either as the 99% power OBW or a relative OBW. The 99% OBW is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean power radiated or conducted are each equal to 0.5 percent of the total mean power radiated or conducted by a given emission. The relative OBW 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 by at least X dB below the transmitter power, where the value of X is typically specified as 26.

Per KDB 971168 D01 v02r02, the relative OBW must be measured and reported when it is specified in the applicable rule part; otherwise, the 99% OBW shall be measured and reported. The OBW shall be measured when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment is operated.

The **B25 RRH 4X30** Distributed Base station system supports single-carrier and multiple-carrier configurations with CDMA and LTE technologies.

Requirements
The minimum emission requirements and the setting of measurement equipment for the occupied bandwidth measurement of a PCS carrier were specified in FCC Part 24. The FCC's requirements are tabulated in the following table:

Table 4.3 FCC Part 24.238 Transmitter Unwanted Emission Limits

Frequency	Required Minimum Attenuation below the Mean Carrier Power *P*	Minimum Resolution Bandwidth of Spectrum Analyzer
1MHz Bands Immediately Outside the Transmitting Frequency Band	(43 + *P* dBW) dBc	12.5kHz for a 1.25MHz carrier 50kHz for a 5MHz carrier; 100 kHz for 10 MHz carrier
Outside the Above Frequency Band	(43 + *P* dBW) dBc	1MHz

The requirement of FCC Part 24.238 was used as the required emission limit mask in the LTE measurement.

The Limit in 47 CFR 24.238(a)(b) for emissions in the 1 MHz band immediately outside and adjacent to a licensees frequency block is:
Emissions ≤1 MHz outside the Block *when measured with a RBW of 1%* of the emissions Bandwidth shall be attenuated by: -{43+10log (mean power output in watts)} = -13 dBm

The Limit in 47 CFR 24.238(a) for emissions outside a licensees frequency block is:

Emissions >1 MHz outside the Block, *when measured with a RBW of 1 MHz*, shall be attenuated by:
-{43+10log (mean power output in watts)} = -13 dBm.
The sampling average was used in all measurement. The limits were lowered by 6dB due to 4x4 MIMO operation for LTE carriers, where 10*log*4= 6dB.

Per KDB 971168 D01 v02r02, the relative OBW must be measured and reported when it is specified in the applicable rule part; otherwise, the 99% OBW shall be measured and reported. The OBW shall be measured when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment is operated.

The occupied bandwidth and out-of-band emissions measurements were made at the antenna transmitting terminal for QPSK, 16QAM and 64QAM modulations, respectively. The appropriate E-UTRA test model specified in 3GPP TS 36.141 was used for LTE carriers.

The measurements were performed with a spectrum analyzer in compliance with the procedure and requirements of ANSI C63.26. The test set-up diagram is same as the one shown in the Figure 4.3.1.

The 99% occupied bandwidth measurement of an LTE carrier was measured per FCC KDB 971168.
For the out-of-band emissions measurement, the spectrum analyzer was set with a resolution bandwidth which is equal to at least 1% of carrier bandwidth and a video bandwidth which is equal to at least 3xRBW as shown in the plots of the occupied bandwidth measurement attached in the following pages. The emissions outside the above spans were evaluated in Measurement Required: Out-of-block Spurious Conducted Emissions. The top of the carrier measured with a resolution bandwidth which is equal to 1% of carrier bandwidth was 20 dB below the LTE carrier power measured with a resolution bandwidth greater than the carrier bandwidth (if available) or a wideband power meter. This 20dB offset was due to the fact that 10 log (BW/1% *BW) = 20 dB. The RMS average detector was used in all above measurements. The measurement met the requirements of ANSI C63.26 paragraphs 5.2.4.4.1 and 5.7 which require that the number of points in the sweep be > 2 × Span/RBW.

For multiple carriers, the measurements were made at the antenna terminal for various configurations from adjacent channels to farthest separated channels across the operating band. The measurement was performed for QPSK, 16QAM and 64QAM modulations, respectively. The total carrier power level at the antenna terminal was adjusted to the maximum rated mean power +44.8 dBm (30W) per port for 4xMIMO configurations and 47.8 dBm (60W) for 2xMIMO configurations.

4.3.1.1 Mask Parameters

(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

(b) Measurement procedure. Compliance with these rules is 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). The emission 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 26 dB below the transmitter power.

The mask of the emission limit displayed in the CDMA measurement plots is the requirement of 3GPP2 C.S0010/C.S0032 which is tighter than FCC Part 24.238. FCC Part 24.238 requirements start from the block edges only.

4.3.2 Results:

The occupied bandwidth plots which gave the widest occupied bandwidth for each bandwidth with QPSK, 16QAM and 64 QAM were submitted, respectively. The limits specified in FCC Part 24.238 are displayed in the plots where 3dB margin for 4x4 MIMO is included.

From the out-of-band emissions plots attached below, it can be seen that all the emissions are under the required FCC emission masks for MIMO operation.

The measurement results of the occupied bandwidth and the out-of-band emissions demonstrate the full compliance with the Rules of the Commission for the operating band.

Table 4.4 Compliance Tabulation of Occupied Bandwidth Measurements

10 + 15 MHz Bandwidth (2x60MIMO)

Block	Center Frequency MHz	Modulation	RF Power Level (Watts)	Occupied Bandwidth and Out of Band Emissions Measurement	Compliance Status
A + D	1935 & 1947.5	QPSK/16QAM, 64QAM	60	Yes	Compliant
F - G	1975 &1987.5	QPSK/16QAM, 64QAM	60	Yes	Compliant
A + B	1935 & 1952.5	QPSK/16QAM, 64QAM	60	Yes	Compliant
B - F	1957.5 &1975	QPSK/16QAM, 64QAM	60	Yes	Compliant
E - G	1970 &1987.5	QPSK/16QAM, 64QAM	60	Yes	Compliant

5 + 5 MHz Bandwidth (4x30MIMO)

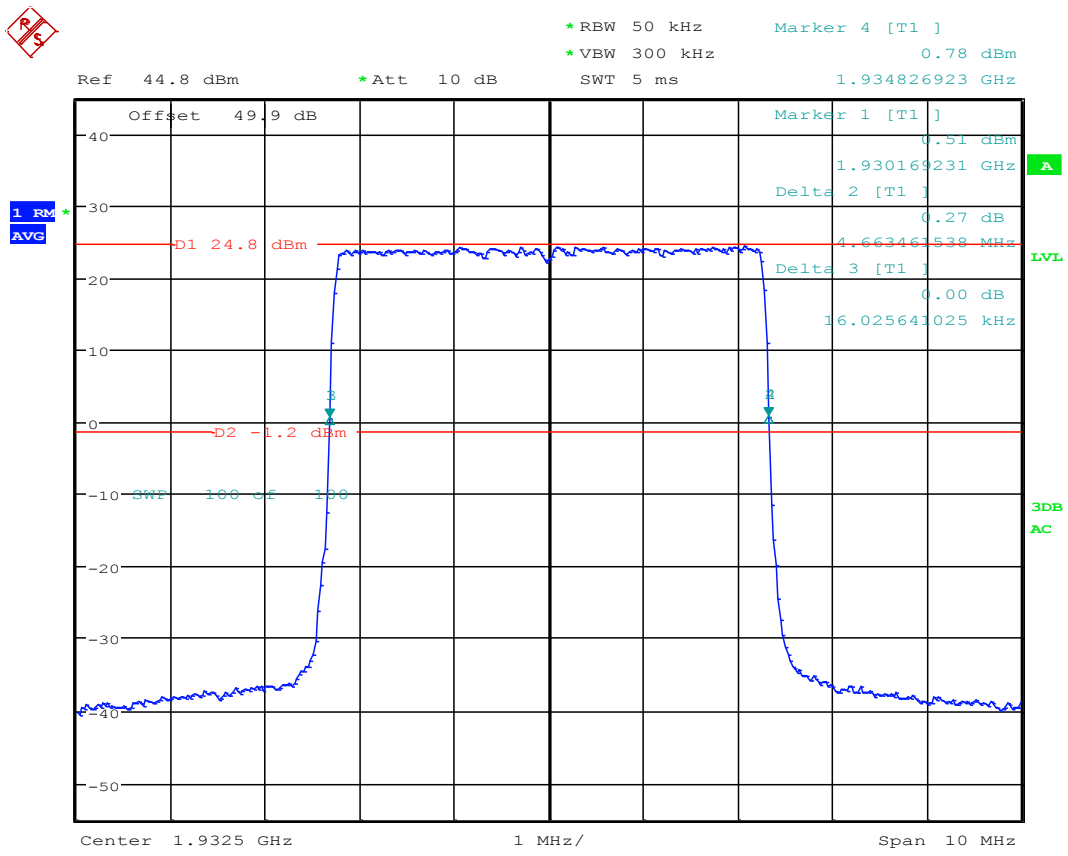
Block	Center Frequency MHz	Modulation	RF Power Level (Watts)	Occupied Bandwidth and Out of Band Emissions Measurement	Compliance Status
A	1932.5 & 1937.5	64QAM, QPSK/16QAM	30	Yes	Compliant
B + E	1962.5 &1967.5	64QAM, QPSK/16QAM	30	Yes	Compliant
C2 + G	1987.5 & 1992.5	64QAM, QPSK/16QAM	30	Yes	Compliant
A	1932.5 &1942.5	64QAM, QPSK/16QAM	30	Yes	Compliant
C2 + G	1982.5 &1992.5	64QAM, QPSK/16QAM	30	Yes	Compliant
A - G	1932.5 &1992.5	64QAM, QPSK/16QAM	30	Yes	Compliant

Single Carriers (4x30MIMO)

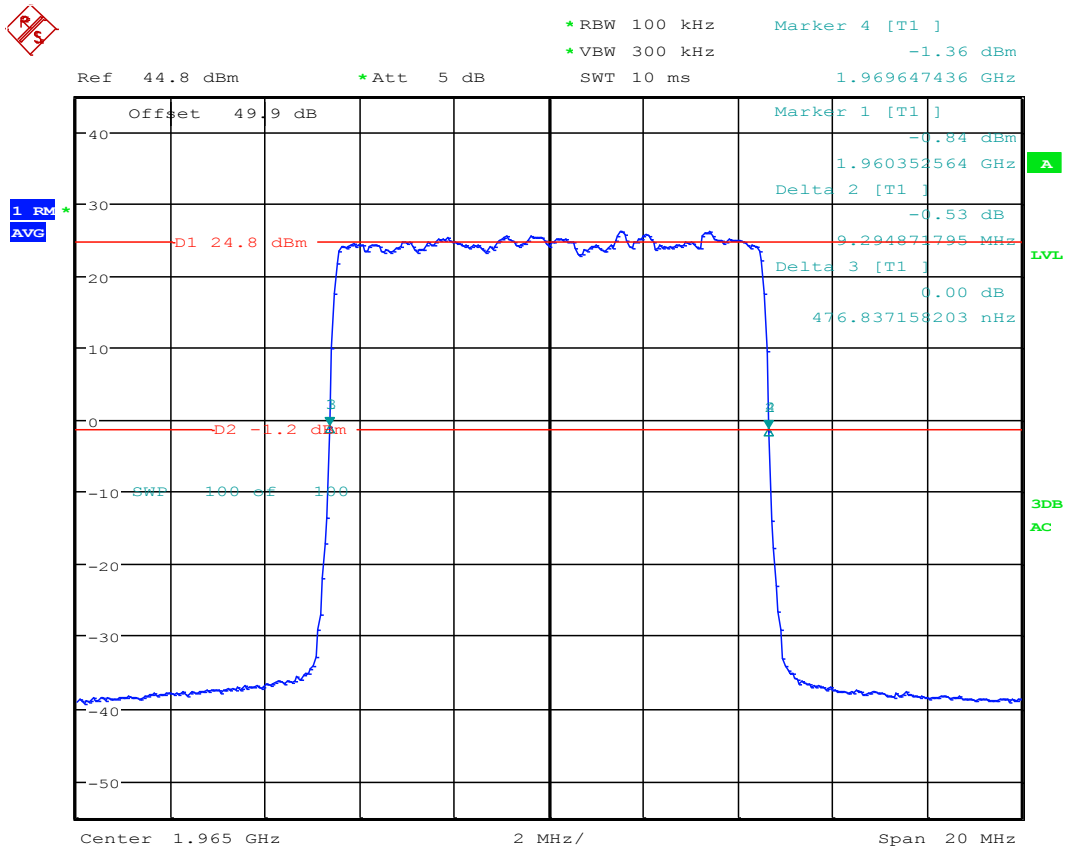
Block	Bandwidth MHz	Center Frequency MHz	Modulation	RF Power Level (Watts)	Occupied Bandwidth and Out of Band Emissions Measurement	Compliance Status
A	5	1932.5	QPSK	30	Yes	Compliant
E	5	1967.5	16QAM	30	Yes	Compliant
G	5	1992.5	QPSK	30	Yes	Compliant
A	10	1935	QPSK	30	Yes	Compliant
E	10	1965	16QAM	30	Yes	Compliant
G	10	1990	64QAM	30	Yes	Compliant
A	15	1937.5	QPSK	30	Yes	Compliant
E	15	1962.5	16QAM	30	Yes	Compliant
G	15	1987.5	64QAM	30	Yes	Compliant
A	20	1940	QPSK	30	Yes	Compliant
E	20	1970	16QAM	30	Yes	Compliant
G	20	1985	64QAM	30	Yes	Compliant

FIGURE 4.3.1- RELATIVE BANDWIDTH (26dB) PLOTS

(Worst Case)



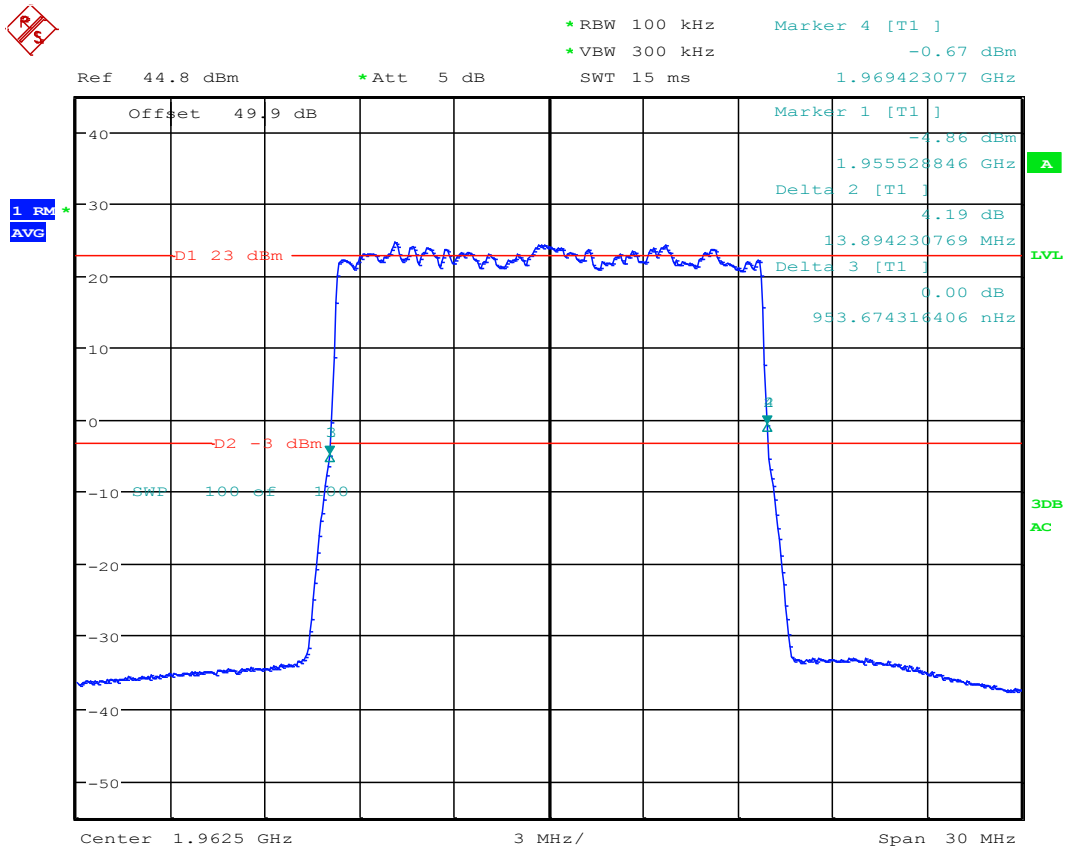
26dB Bandwidth; Test Eng:JY; LTE B25 RRH AR1.0; 1932.5M
64QAM; 5M BW; BLK A; Port 3; 30W ; FCC ID-AS5BBTRX-22
Date: 13.SEP.2016 16:00:28



26dB Bandwidth; Test Eng:JY; LTE B25 RRH AR1.0; 1965M

16QAM; 10M BW; BLK E; Port 4; 30W; FCC ID-AS5BBTRX-22

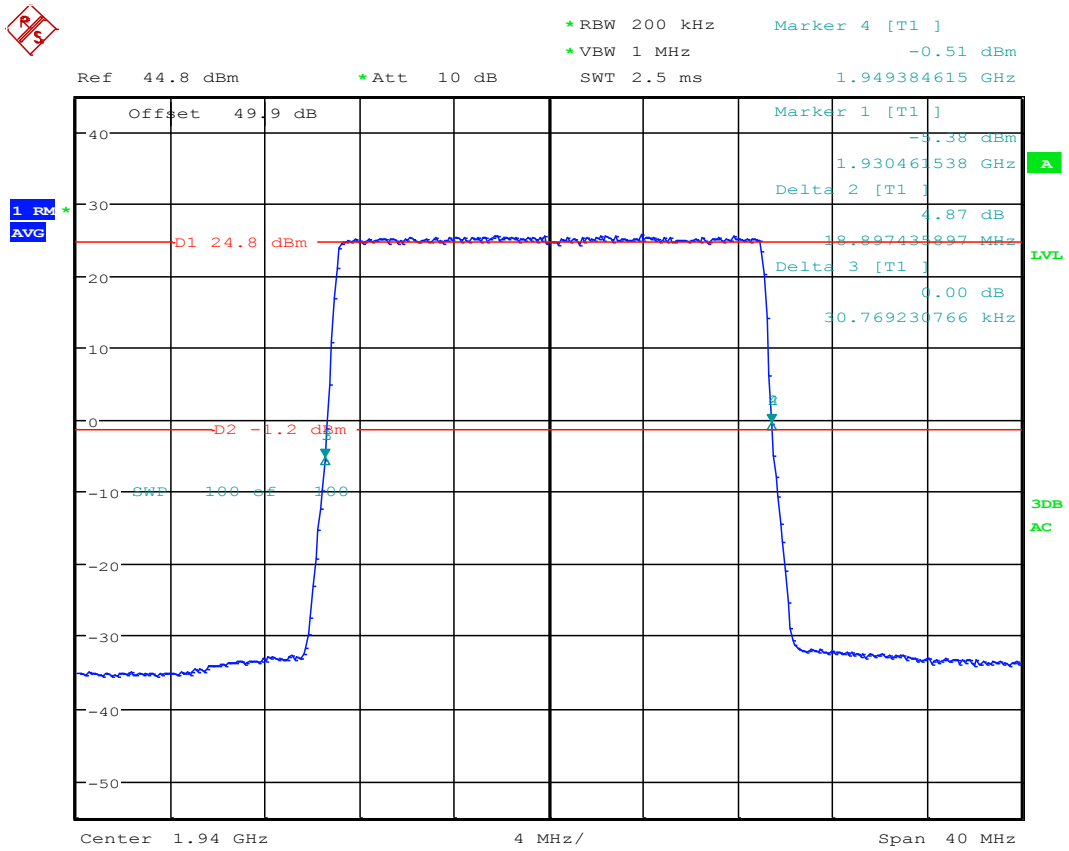
Date: 14.SEP.2016 13:49:54



26dB Bandwidth; Test Eng:JY; LTE B25 RRH AR1.0; 1962.5M

16QAM; 15M BW; BLK E; Port 3; 30W; FCC ID-AS5BBTRX-22

Date: 20.SEP.2016 09:03:16



Occupied Bandwidth; Test Eng:JY; LTE B25 RRH AR1.0; 1940M

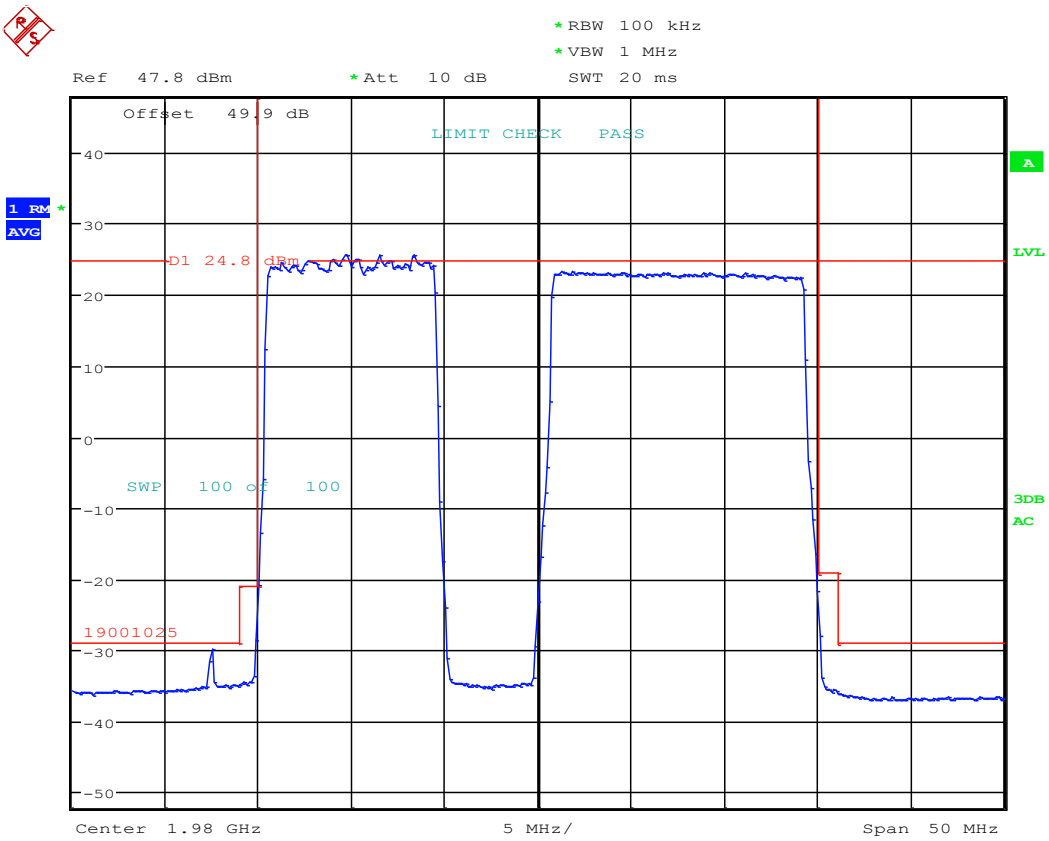
QPSK; 20M BW; BLK A; Port 4; 30W ; FCC ID-AS5BBTRX-22

Date: 20.SEP.2016 11:55:30

Out of Band Emissions

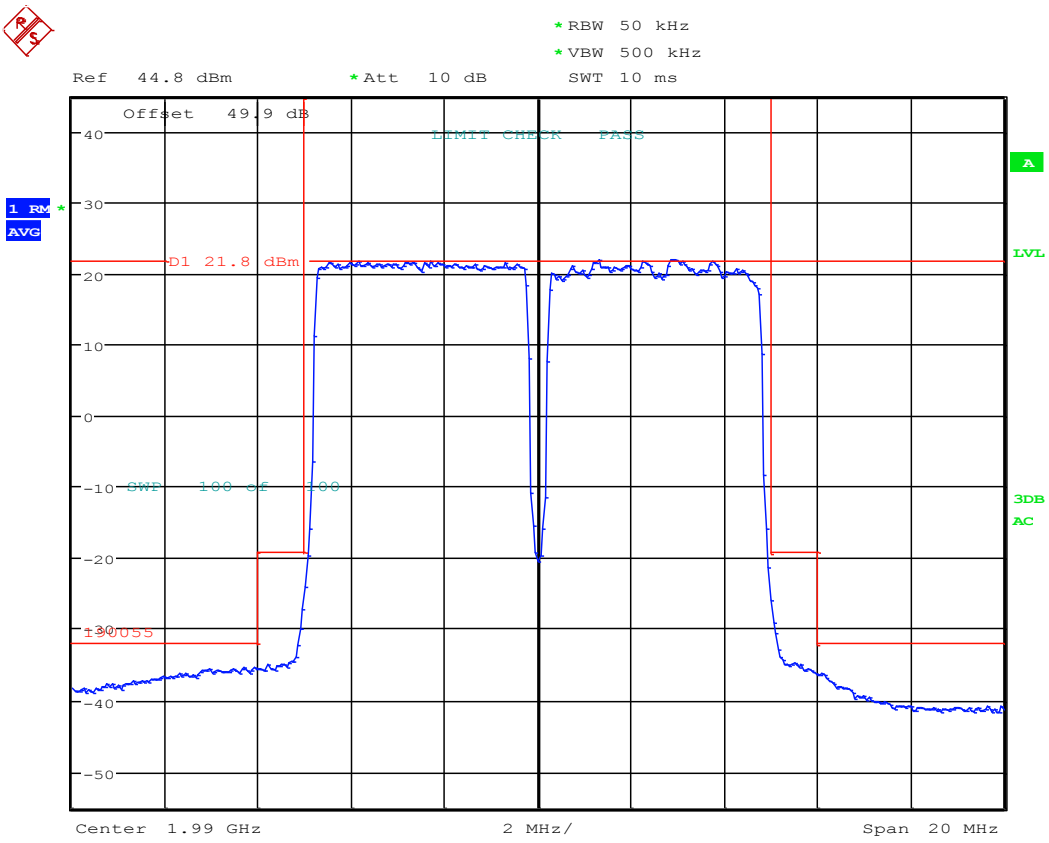
(Worst Case)

10 + 15 MHz Bandwidth
Dual Carriers



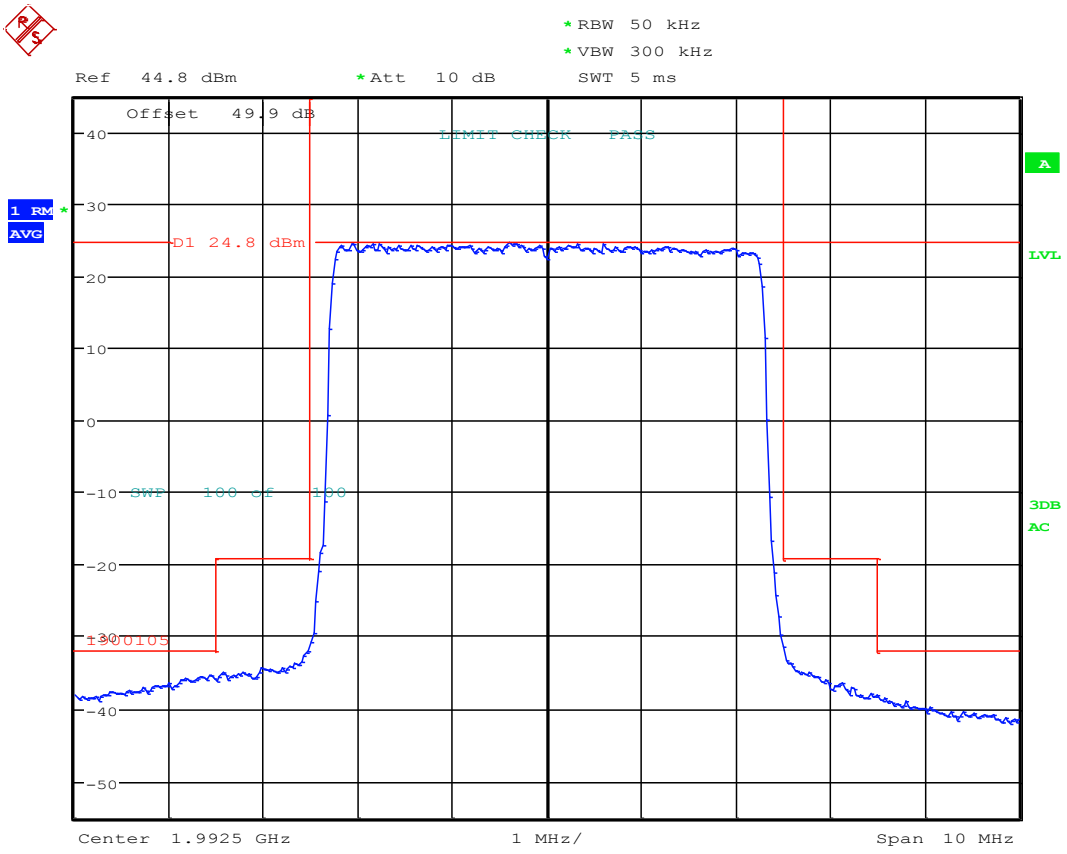
Occupied Bandwidth; Test Eng:SG; LTE B25 RRH AR1.0; 1987.5M:
64QAM
1970M:QPSK/16QAM; 10+15M BW; BLK E/G; Port 2; 30W
Date: 3.OCT.2016 14:34:51

5 + 5 MHz Bandwidth
Dual Carriers



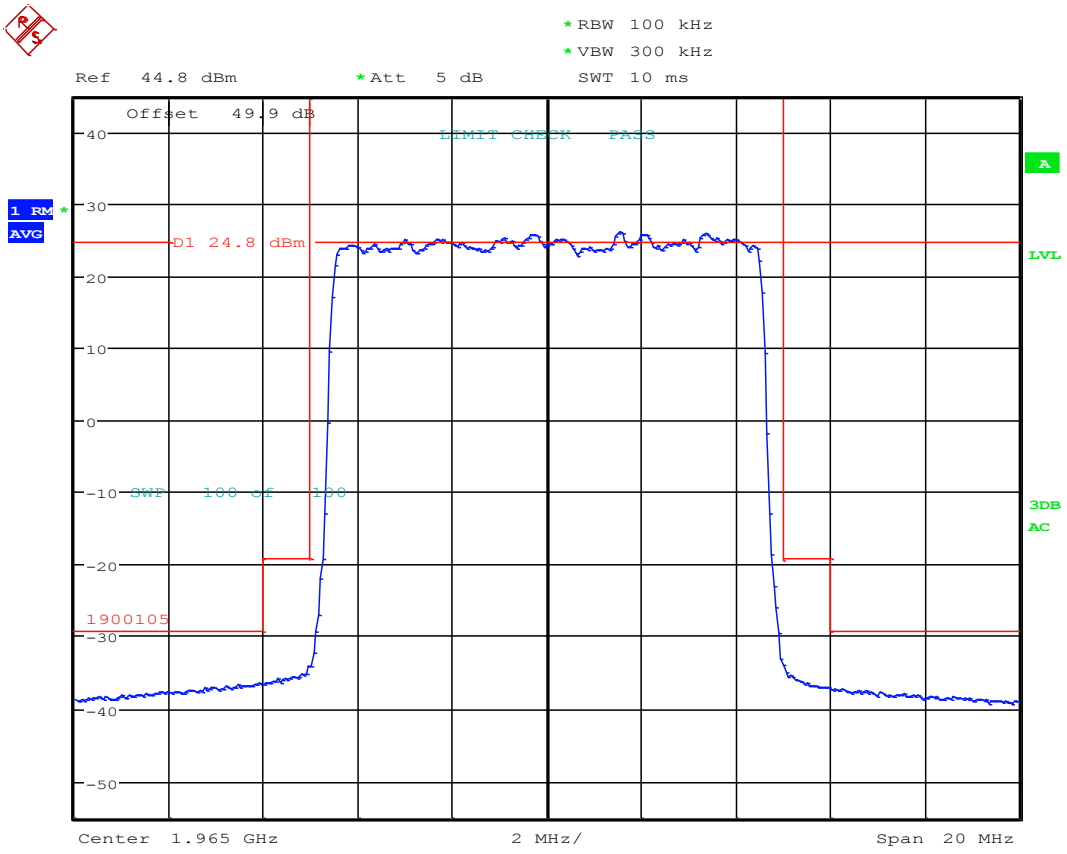
Occupied Bandwidth; Test Eng:SG; LTE B25 RRH AR1.0; 1987.5M:
64QAM
1992.5M:QPSK/16QAM; 5+5M BW; BLK A; Port 4; 30W
Date: 27.SEP.2016 09:43:01

5 MHz Bandwidth
Singlel Carrier



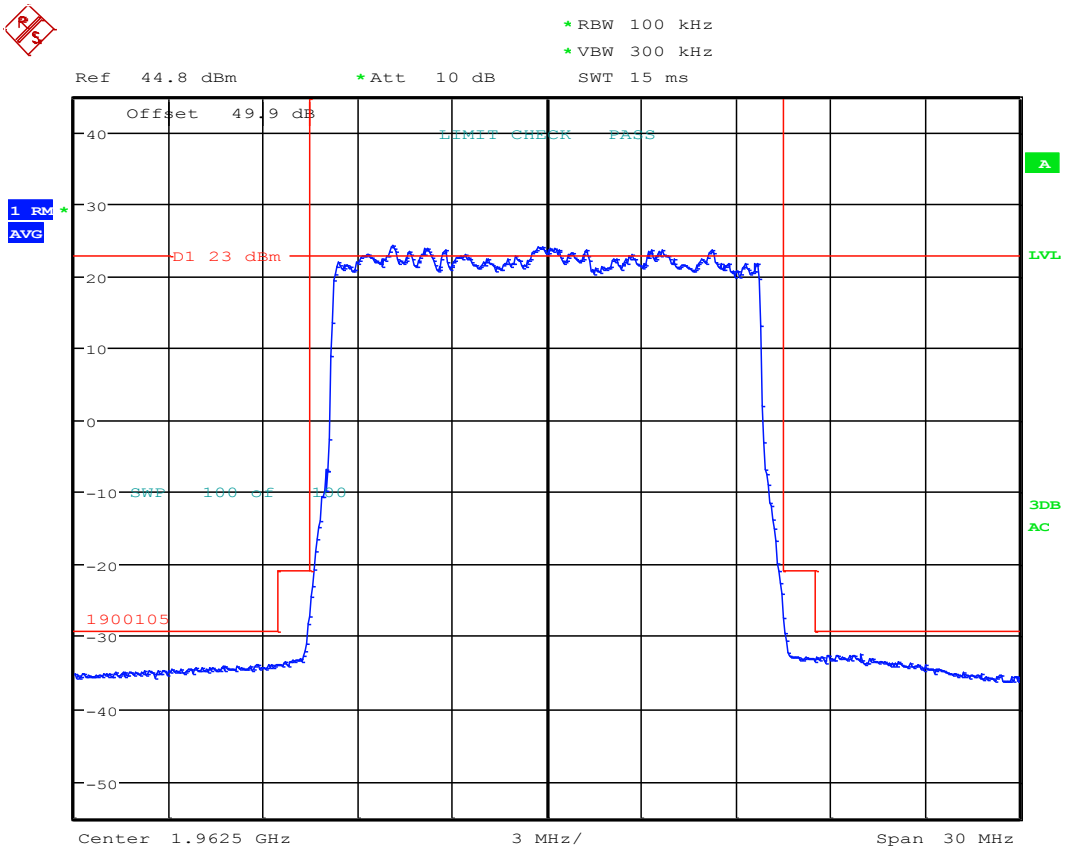
Occupied Bandwidth; Test Eng:JY; LTE B25 RRH AR1.0; 1992.5M
QPSK; 5M BW; BLK G; Port 3; 30W ; FCC ID-AS5BBTRX-22
Date: 13.SEP.2016 16:44:58

10 MHz Bandwidth
Singlel Carrier



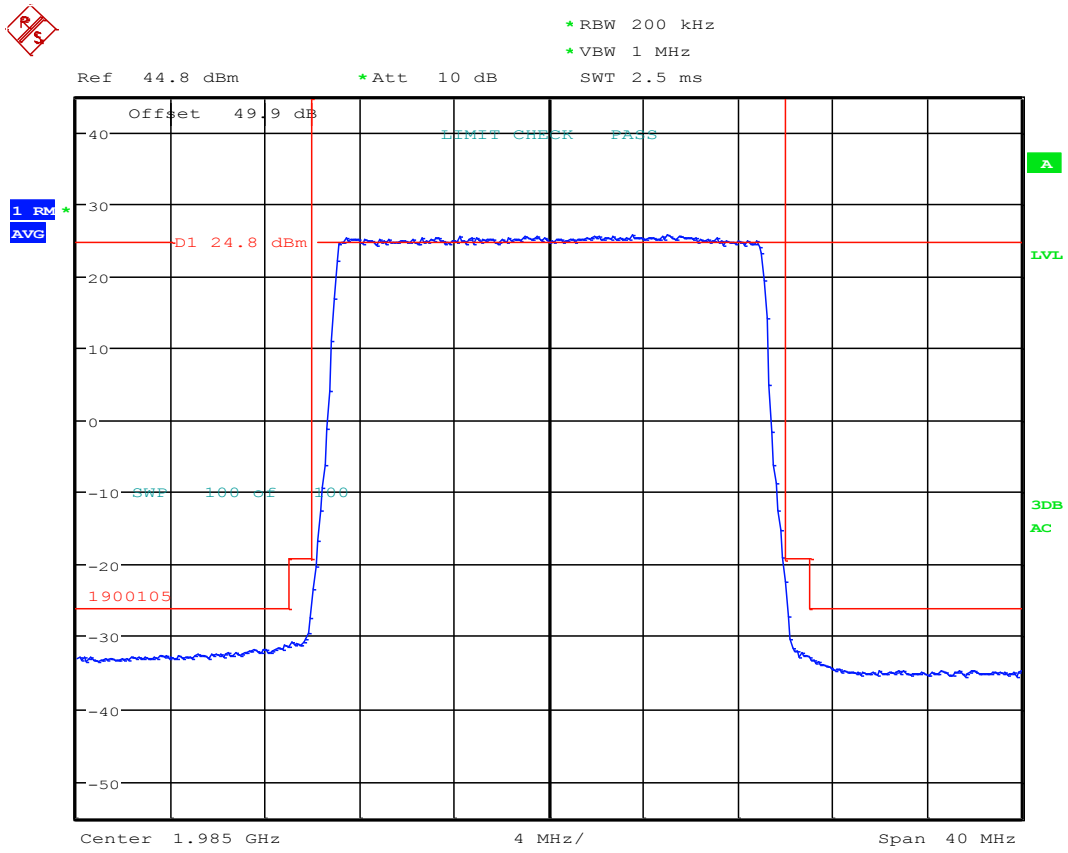
Occupied Bandwidth; Test Eng:JY; LTE B25 RRH AR1.0; 1965M
16QAM; 10M BW; BLK E; Port 4; 30W; FCC ID-AS5BBTRX-22
Date: 14.SEP.2016 13:48:13

15 MHz Bandwidth
Singlel Carrier



Occupied Bandwidth; Test Eng:JY; LTE B25 RRH AR1.0; 1962.5M
16QAM; 15M BW; BLK E; Port 3; 30W ; FCC ID-AS5BBTRX-22
Date: 20.SEP.2016 09:01:44

20 MHz Bandwidth
Singlel Carrier



Occupied Bandwidth; Test Eng:JY; LTE B25 RRH AR1.0; 1985M
64QAM; 20M BW; BLK G; Port 3; 30W ; FCC ID-AS5BBTRX-22
Date: 20.SEP.2016 13:08:36

4.4 Section 2.1051 MEASUREMENT REQUIRED: SPURIOUS EMISSIONS AT THE ANTENNA TERMINALS

This test measures the emissions of spurious signals which may come from harmonic, parasitic, intermodulation and frequency conversion products and are outside the necessary bandwidth but exclude out-of-band emissions.

The out-of-block spurious emissions at the antenna transmitting terminal were investigated from 10 MHz to the 10th harmonic of the carrier, per Section 2.1057(a)(1).

The measurement configurations and carrier setup were same as in Section 4.3. The emission limits and the setting of measurement equipment for the unwanted emissions measurement were given in Table 4.3.3 and provided in Table 4.4.1, where per FCC CFR 47, Sections 2.1051 and 2.1057(c), the spurious emissions attenuated more than 20 dB below the permissible value need not be reported.

Table 4.4.1 Conducted Spurious Emissions Limit

Frequency of Emission (MHz)	Required Limit (4x4 MIMO) (dBm)	Reportable Limit (dBm)	Detector/RBW
10 - 20,000	-19	-39	Average/1MHz

The measurements were performed with a spectrum analyzer, which was calibrated in accordance with ISO 9001 process. The carrier power level at the antenna transmitting terminal was calibrated before the conducted spurious emissions testing for each test. The spectrum analyzer was set to a 1MHz resolution bandwidth. The RMS average detector was used. The measurement met the requirements in ANSI C63.26 which requires in 5.2.4.4.1 and 5.7 that the number of points in the sweep be > 2 × Span/RBW.

The measurement met the requirements of ANSI C63.26 paragraphs 5.2.4.4.1 and 5.7 which requires that the number of points in the sweep be > 2 × Span/RBW.

The spurious emissions in the frequency range measured are well under the required reportable emission limit for all carrier bandwidth with QPSK, 16QAM and 64QAM modulations evaluated. Therefore, there are no reportable emissions.

4.4.1 Results:

Over the required frequency spectrum investigated for the EUT, no reportable out-of-block spurious emissions were detected. The out-of-block spurious emissions in the entire spectrum investigated are under the required reportable emission limit. The measurement results demonstrate that the subject of the application is in full compliance with the Rules of the Commission.

SPURIOUS EMISSIONS DATA

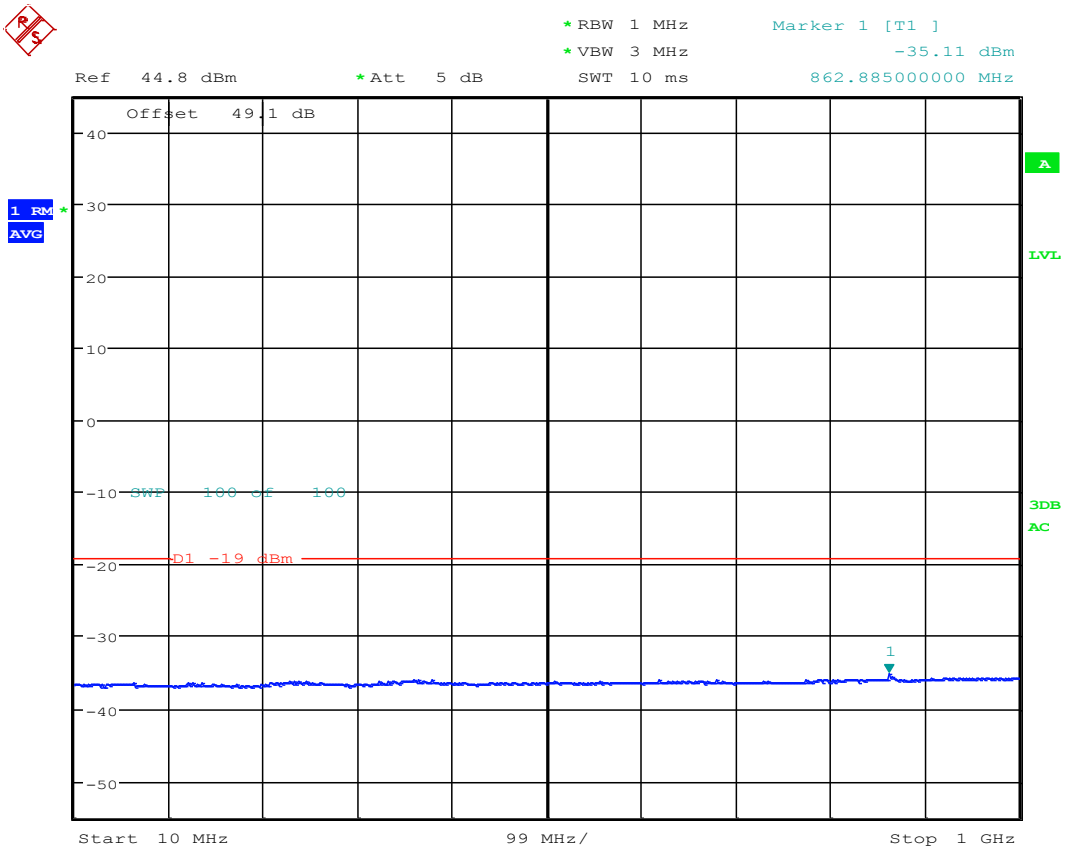
(Worst Case)

5 MHz Bandwidth

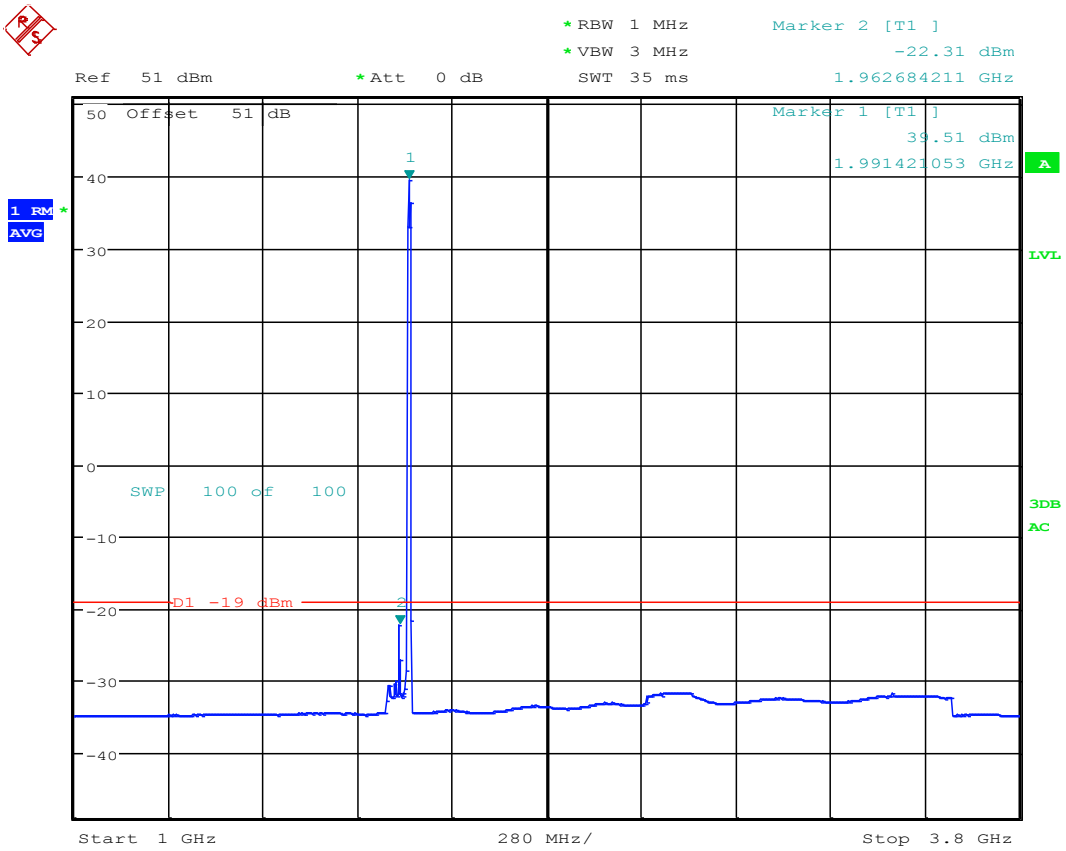
Block: G

Frequency: 1992 MHz

Modulation: QPSK



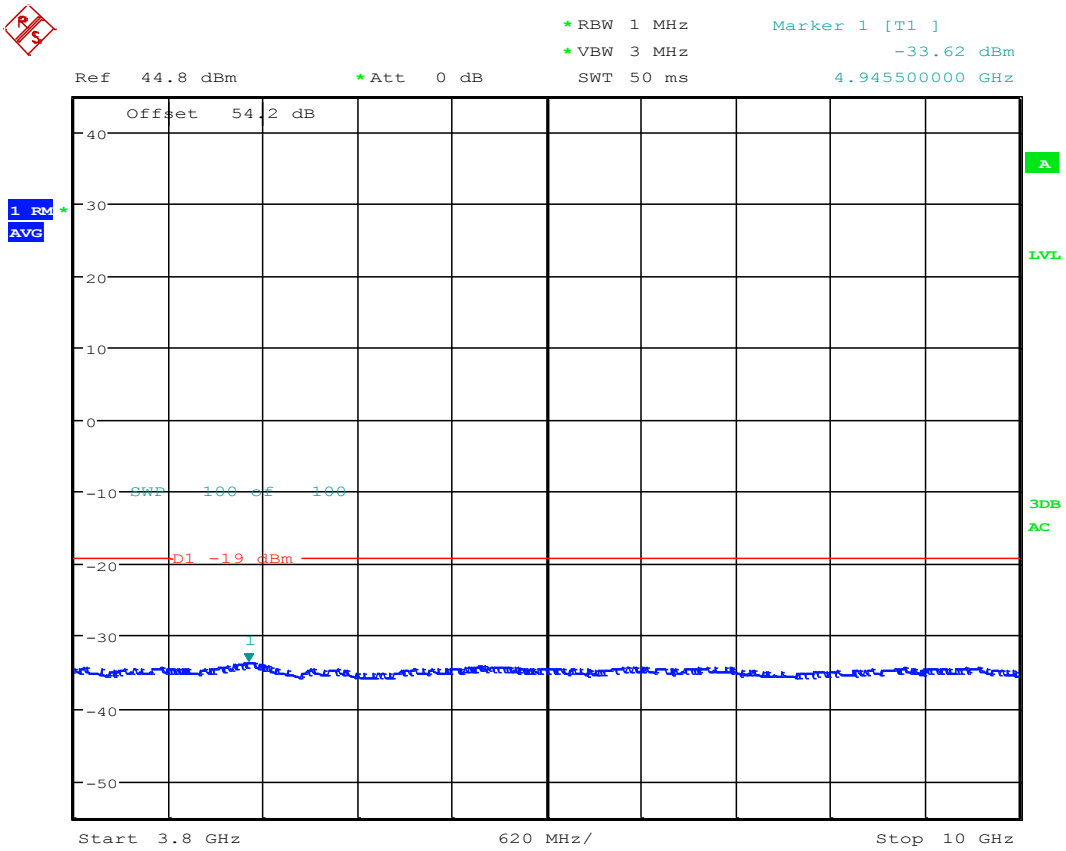
TX Spurious; Test Eng:JY; LTE B25 RRH AR1.0; 1992.5M
QPSK; 5M BW; BLK G; Port 3; 30W ; FCC ID-AS5BBTRX-22
Date: 13.SEP.2016 16:50:30



TX Spurious; Test Eng:JY; LTE B25 RRH AR1.0; 1992.5M

QPSK; 5M BW; BLK G; Port 3; 30W ; FCC ID-AS5BBTRX-22

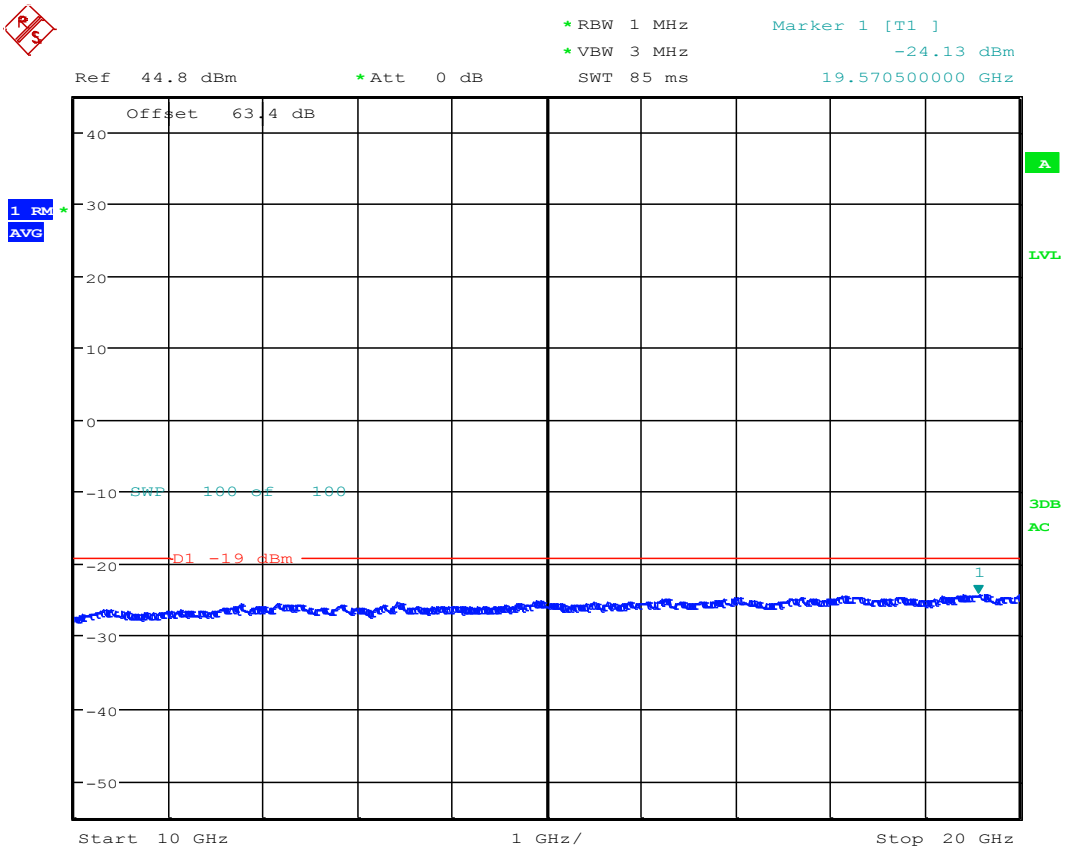
Date: 13.SEP.2016 16:51:55



TX Spurious; Test Eng:JY; LTE B25 RRH AR1.0; 1992.5M

QPSK; 5M BW; BLK G; Port 3; 30W; HPF; FCC ID-AS5BBTRX-22

Date: 13.SEP.2016 16:53:46



TX Spurious; Test Eng:JY; LTE B25 RRH AR1.0; 1992.5M

QPSK; 5M BW; BLK G; Port 3; 30W ; HPF; FCC ID-AS5BBTRX-22

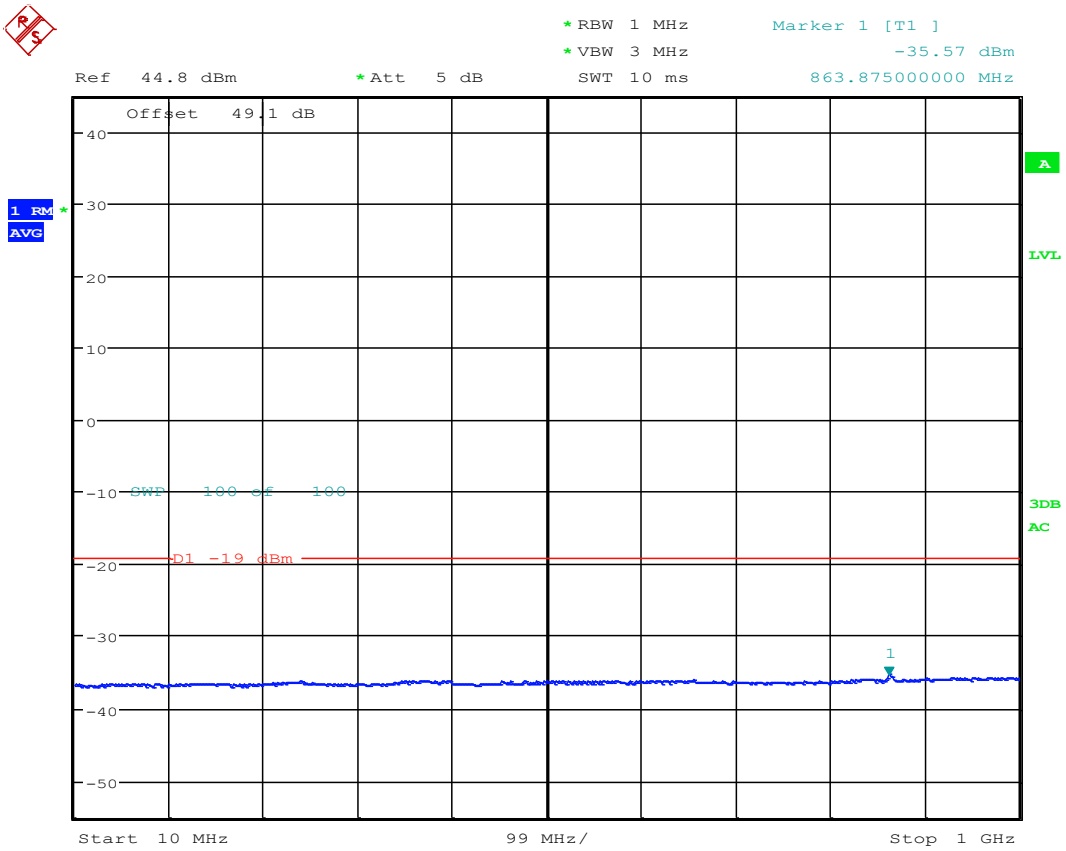
Date: 13.SEP.2016 16:55:04

10 MHz Bandwidth

Block: A

Frequency: 1935 MHz

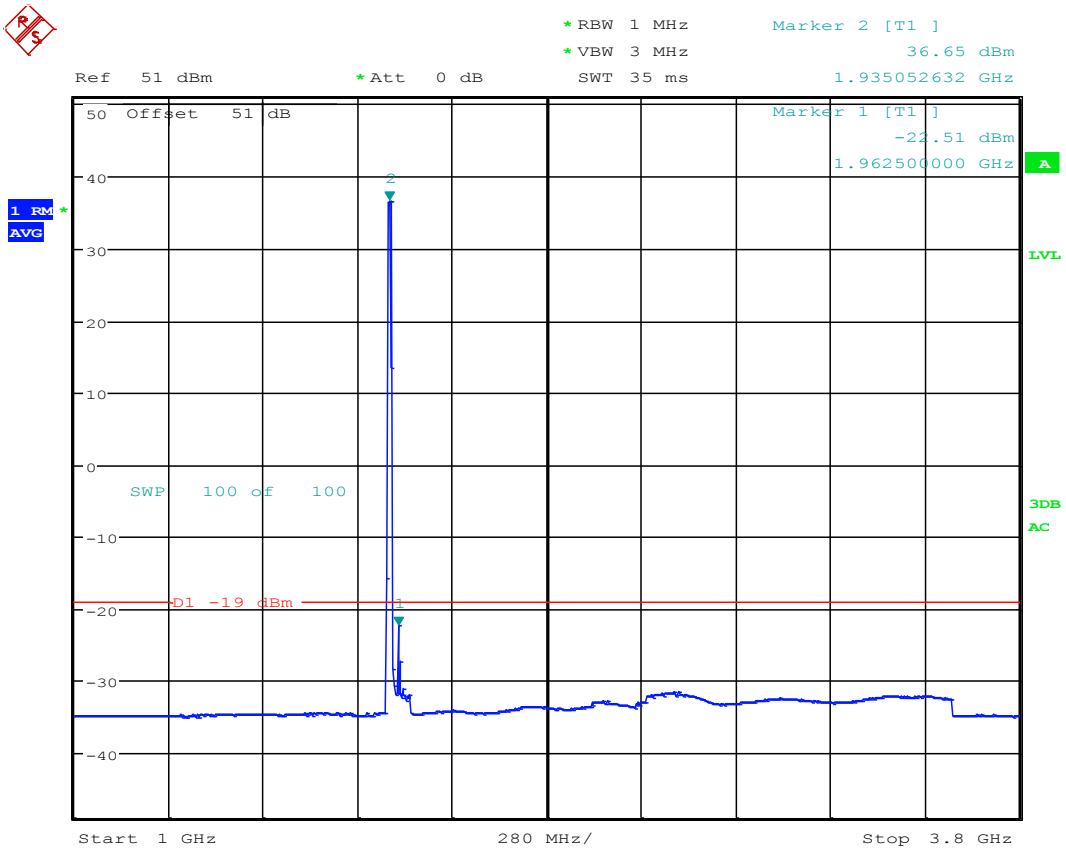
Modulation: QPSK



TX Spurious; Test Eng:JY; LTE B25 RRH AR1.0; 1935M

QPSK; 10M BW; BLK A; Port 3; 30W ; FCC ID-AS5BBTRX-22

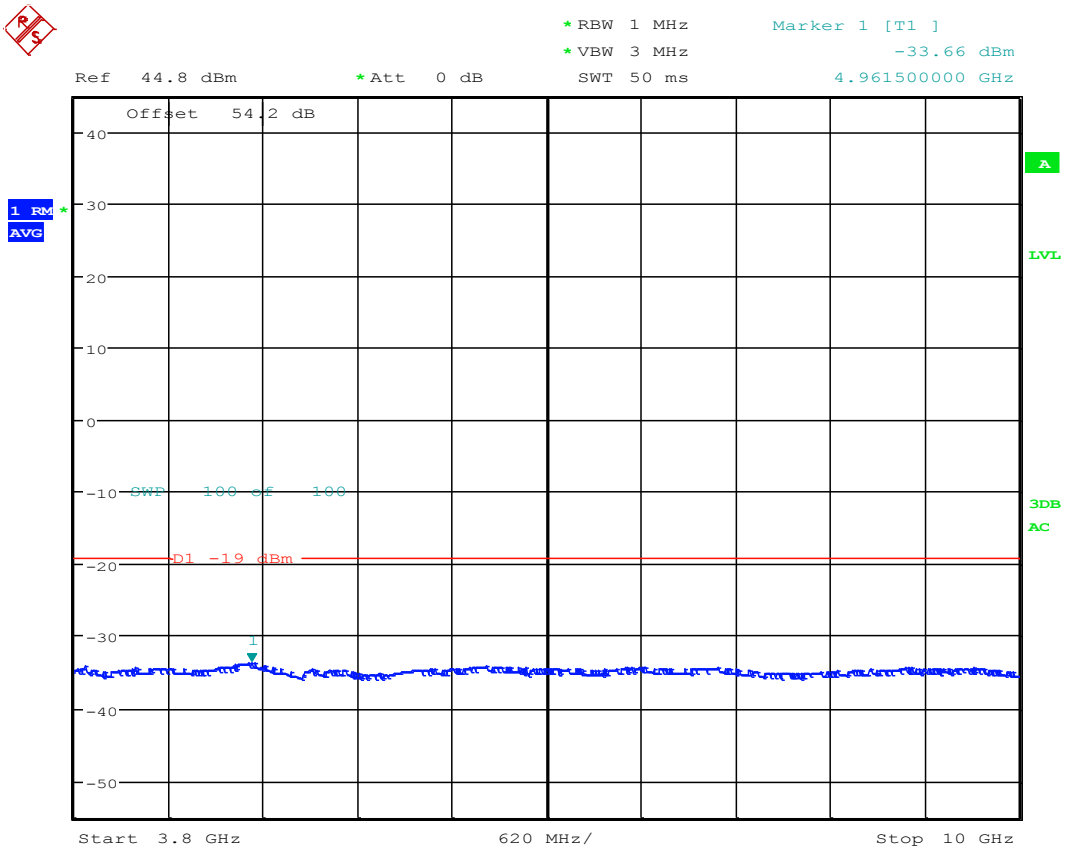
Date: 14.SEP.2016 11:27:42



TX Spurious; Test Eng:JY; LTE B25 RRH AR1.0; 1935M

QPSK; 10M BW; BLK A; Port 3; 30W ; FCC ID-AS5BBTRX-22

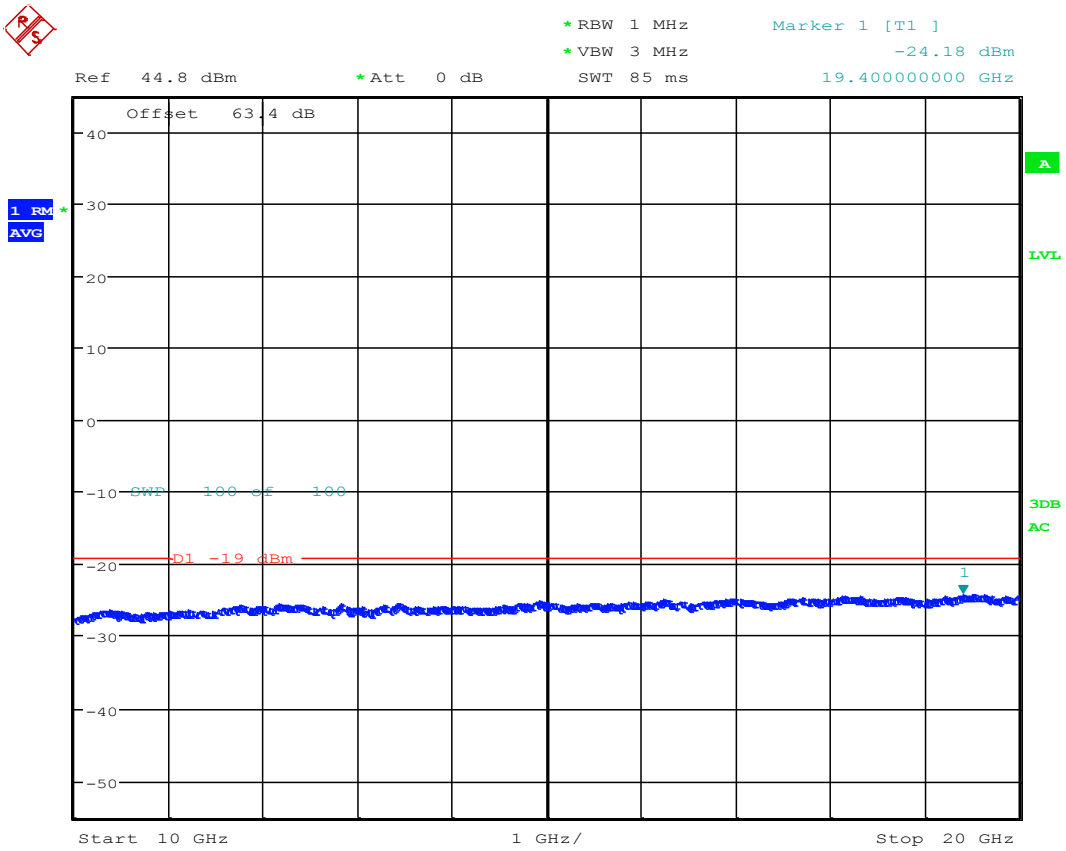
Date: 14.SEP.2016 11:28:29



TX Spurious; Test Eng:JY; LTE B25 RRH AR1.0; 1935M

QPSK; 10M BW; BLK A; Port 3; 30W ; HPF; FCC ID-AS5BBTRX-22

Date: 14.SEP.2016 11:30:05



TX Spurious; Test Eng:JY; LTE B25 RRH AR1.0; 1935M

QPSK; 10M BW; BLK A; Port 3; 30W ; HPF; FCC ID-AS5BBTRX-22

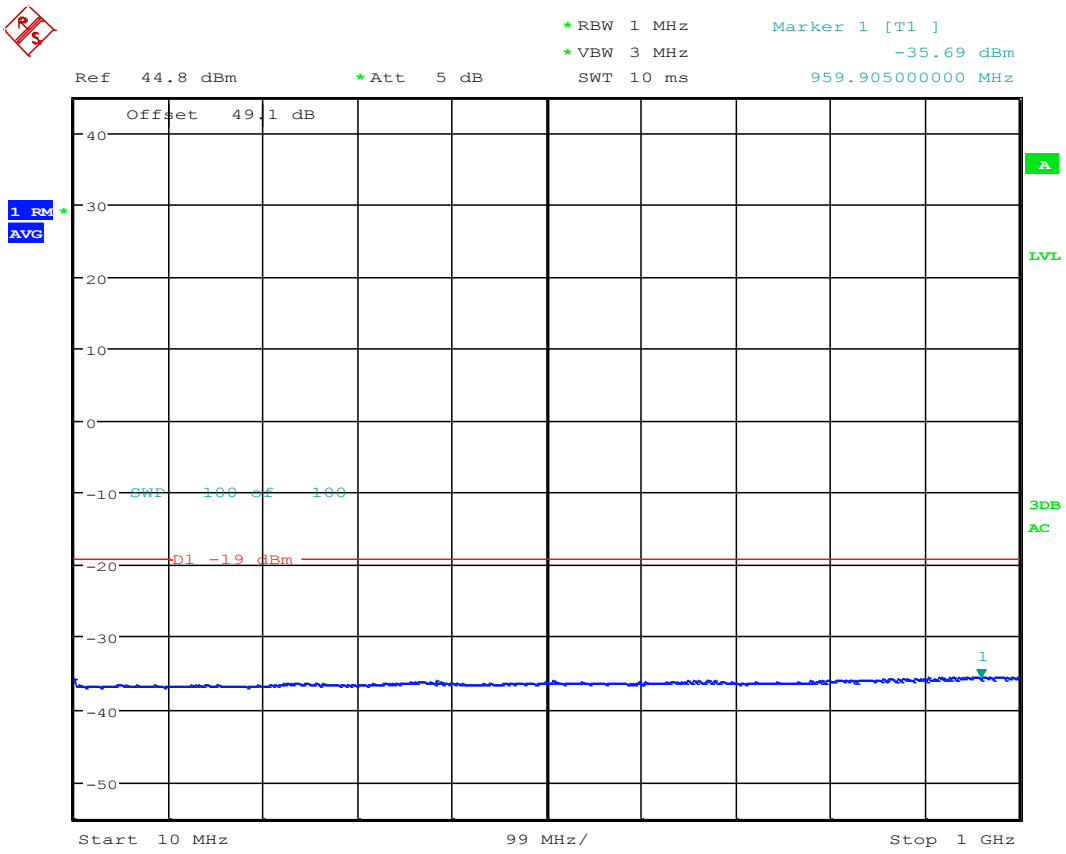
Date: 14.SEP.2016 11:31:05

15 MHz Bandwidth

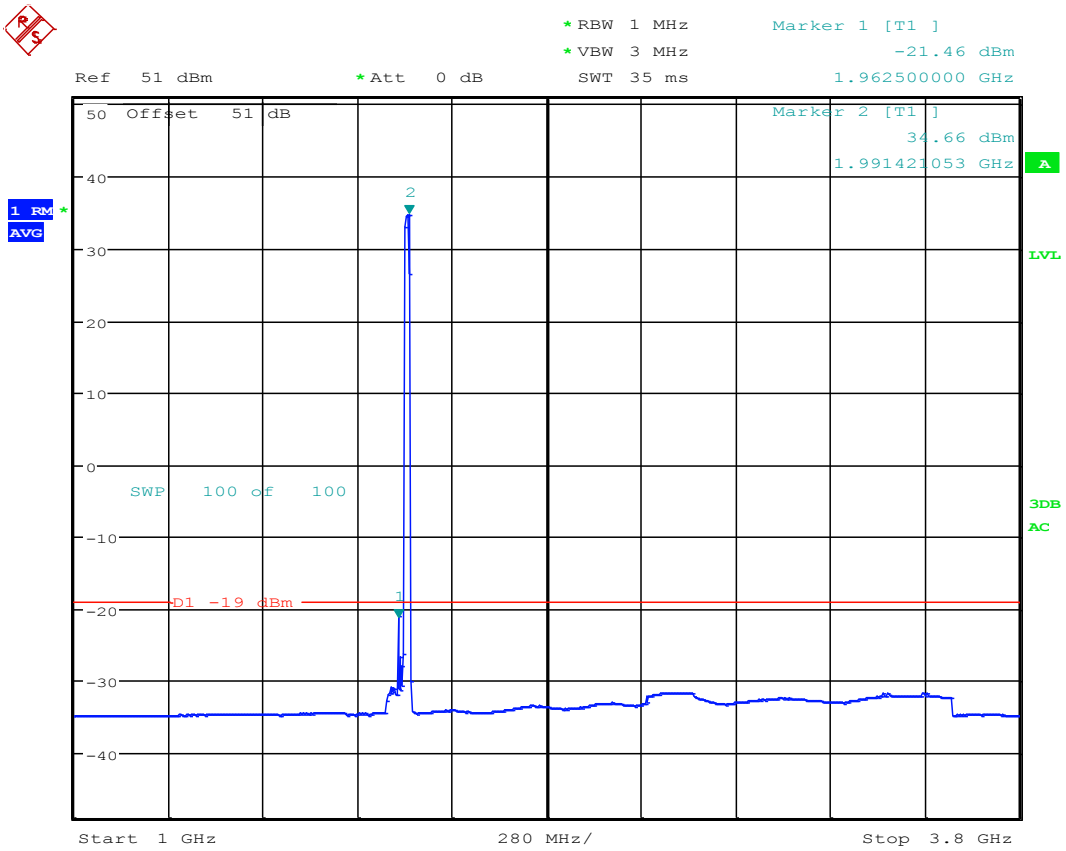
Block: G

Frequency: 1987.5 MHz

Modulation: QPSK



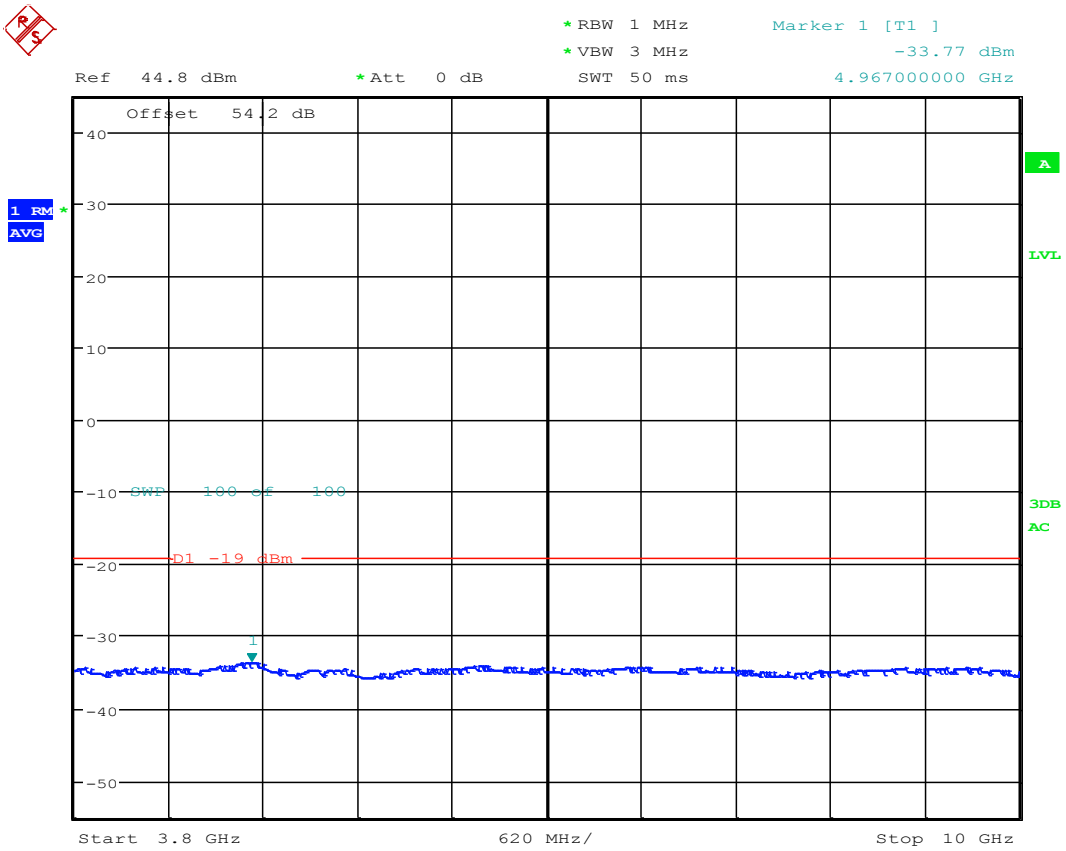
TX Spurious; Test Eng:JY; LTE B25 RRH AR1.0; 1987.5M
QPSK; 15M BW; BLK G; Port 3; 30W; FCC ID-AS5BBTRX-22
Date: 20.SEP.2016 08:22:58



TX Spurious; Test Eng:JY; LTE B25 RRH AR1.0; 1987.5M

QPSK; 15M BW; BLK G; Port 3; 30W ; FCC ID-AS5BBTRX-22

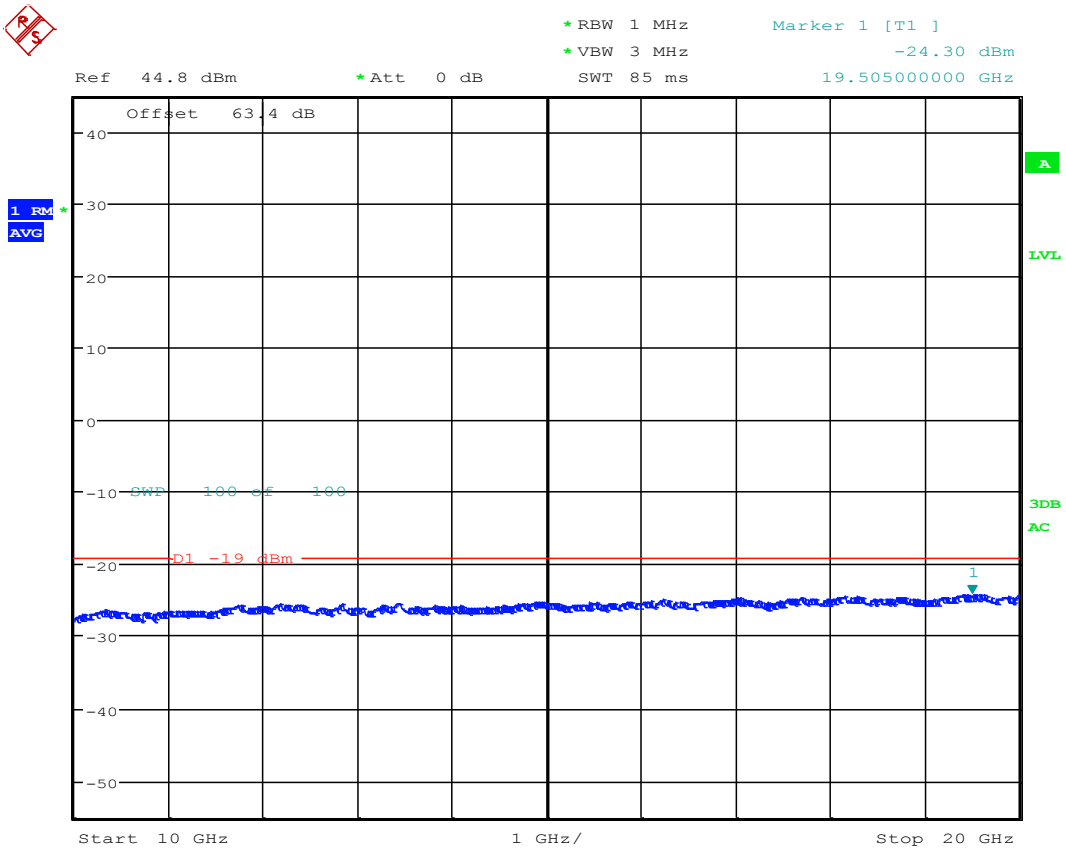
Date: 20.SEP.2016 08:24:25



TX Spurious; Test Eng:JY; LTE B25 RRH AR1.0; 1987.5M

QPSK; 15M BW; BLK G; Port 3; 30W; HPF; FCC ID-AS5BBTRX-22

Date: 20.SEP.2016 08:36:10



TX Spurious; Test Eng:JY; LTE B25 RRH AR1.0; 1987.5M

QPSK; 15M BW; BLK G; Port 3; 30W; HPF; FCC ID-AS5BBTRX-22

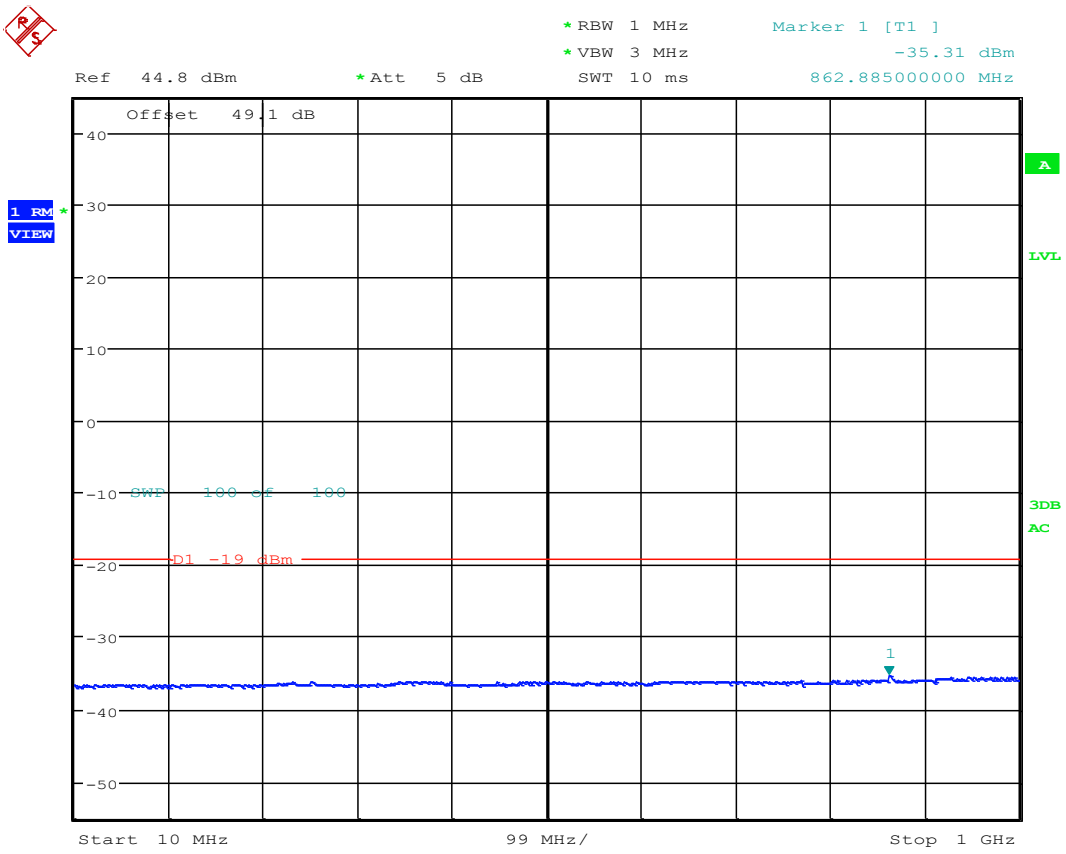
Date: 20.SEP.2016 08:28:33

20 MHz Bandwidth

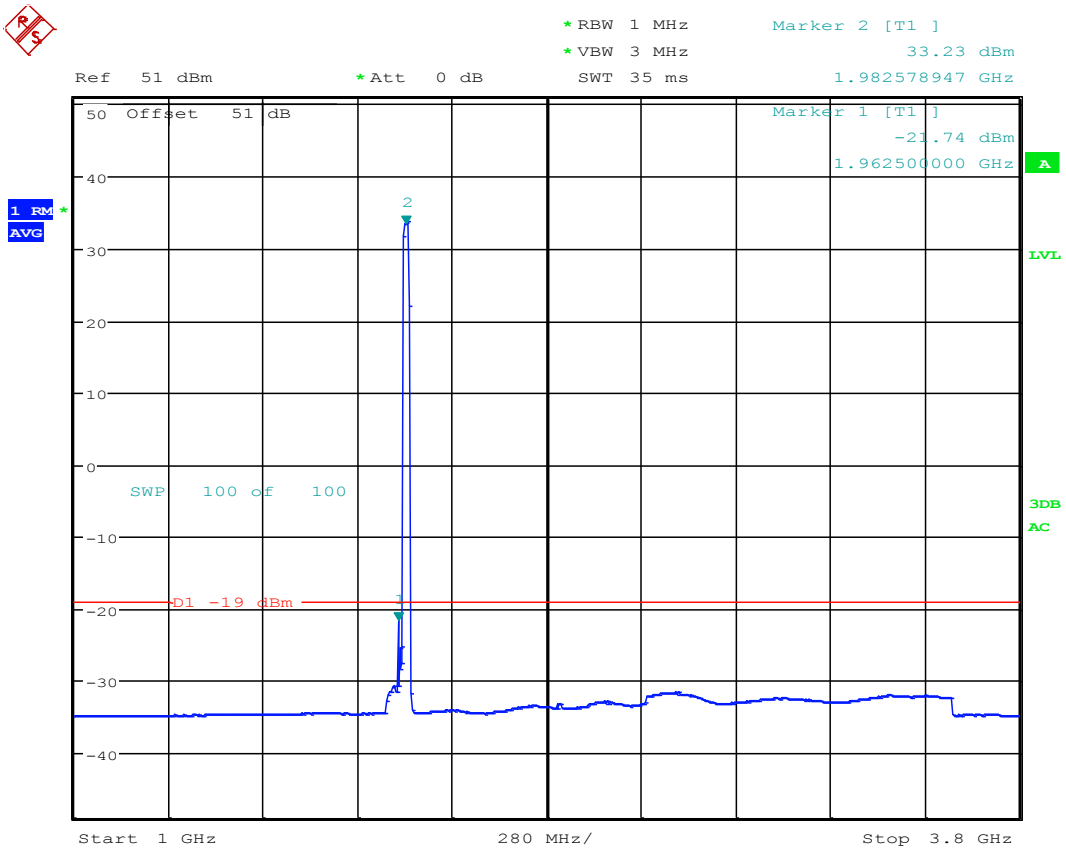
Block: G

Frequency: 1985 MHz

Modulation: 64QAM



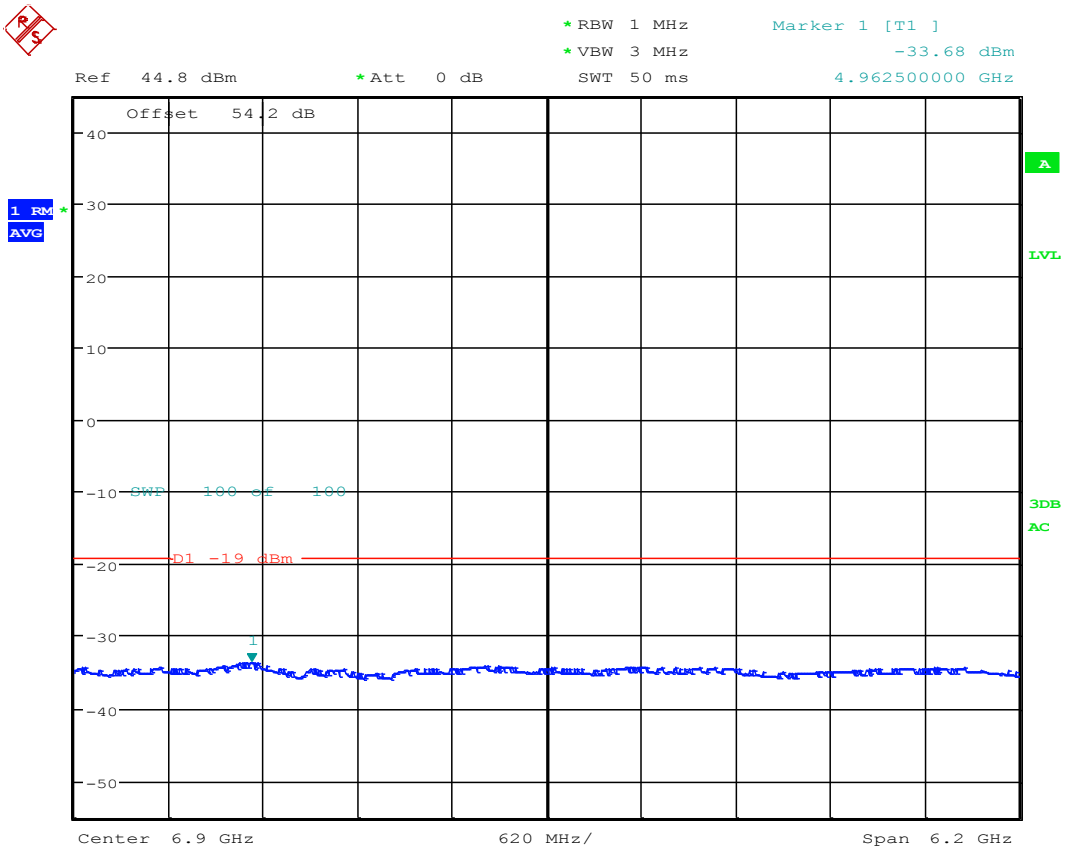
TX Spurious; Test Eng:JY; LTE B25 RRH AR1.0; 1985M
64QAM; 20M BW; BLK G; Port 3; 30W; FCC ID-AS5BBTRX-22
Date: 20.SEP.2016 13:18:27



TX Spurious; Test Eng:JY; LTE B25 RRH AR1.0; 1985M

64QAM; 20M BW; BLK G; Port 3; 30W ; FCC ID-AS5BBTRX-22

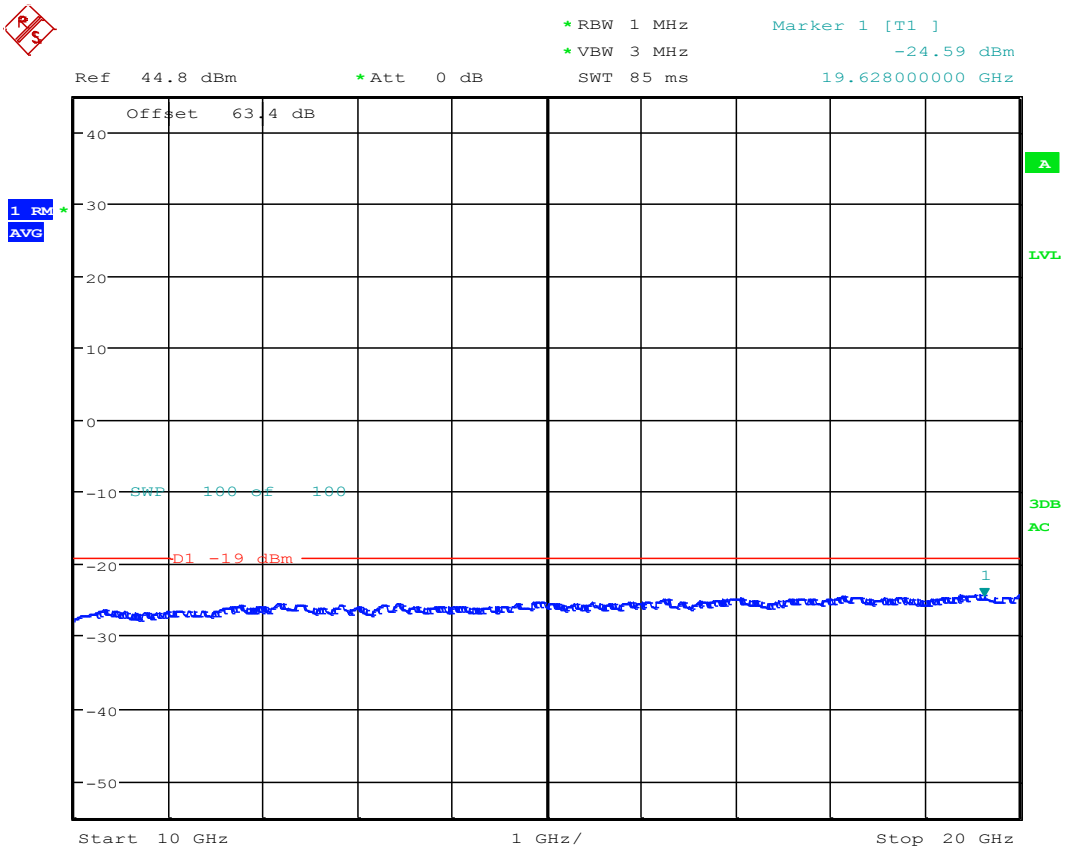
Date: 20.SEP.2016 13:22:13



TX Spurious; Test Eng:JY; LTE B25 RRH AR1.0; 1985M

64QAM; 20M BW; BLK G; Port 3; 30W; HPF; FCC ID-AS5BBTRX-22

Date: 20.SEP.2016 13:24:51



TX Spurious; Test Eng:JY; LTE B25 RRH AR1.0; 1985M

64QAM; 20M BW; BLK G; Port 3; 30W; HPF; FCC ID-AS5BBTRX-22

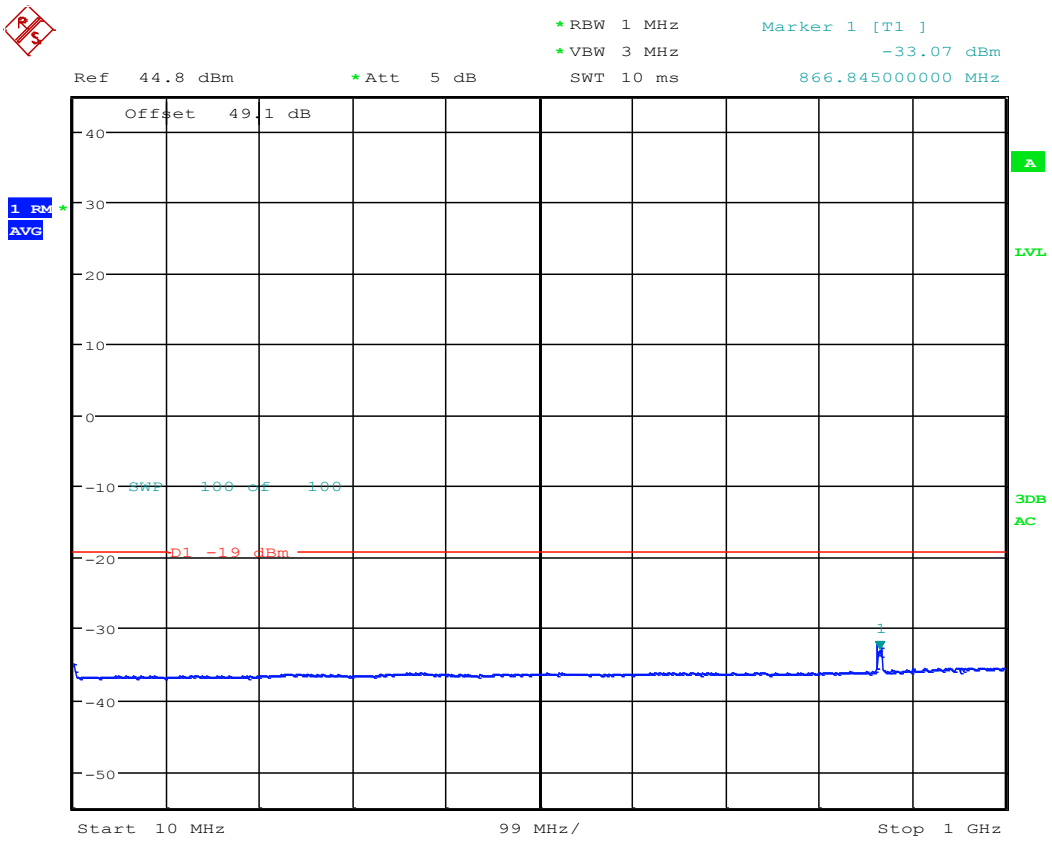
Date: 20.SEP.2016 13:36:42

5+5 MHz Bandwidth

Blocks: C+G

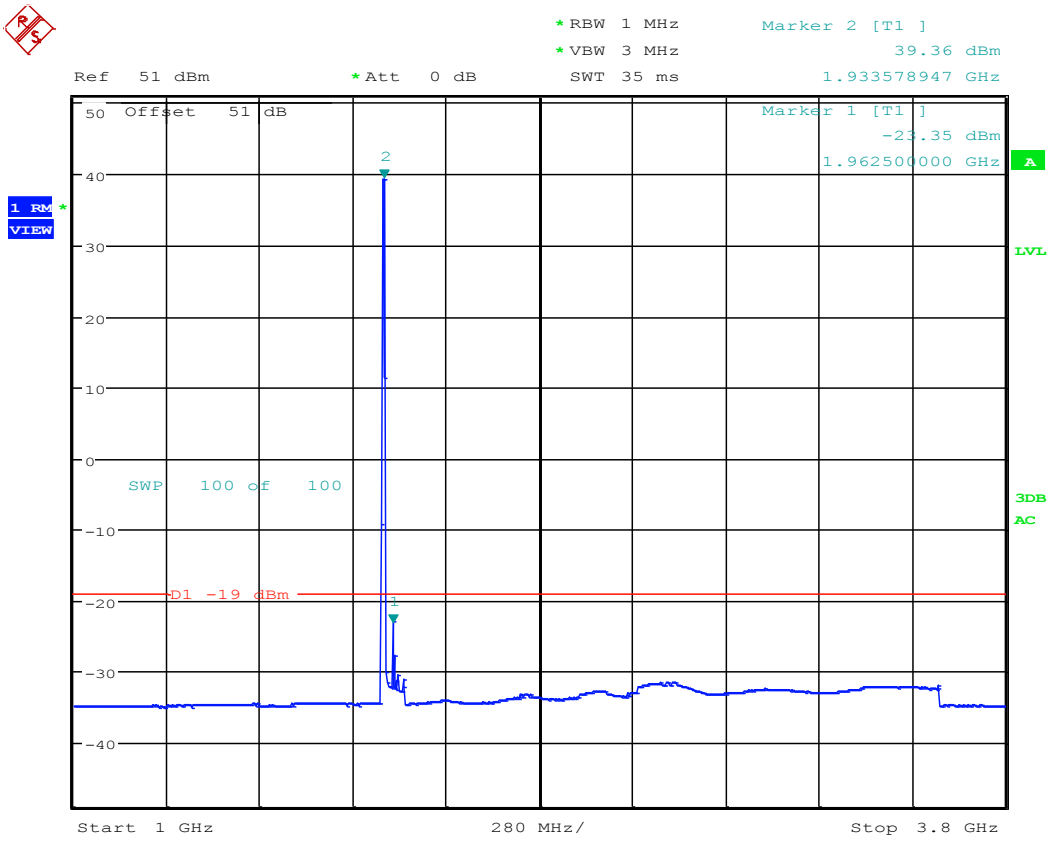
Frequency: 1982.5 MHz, 1992.5 MHz

Modulation: 64QAM, QPSK/16QAM



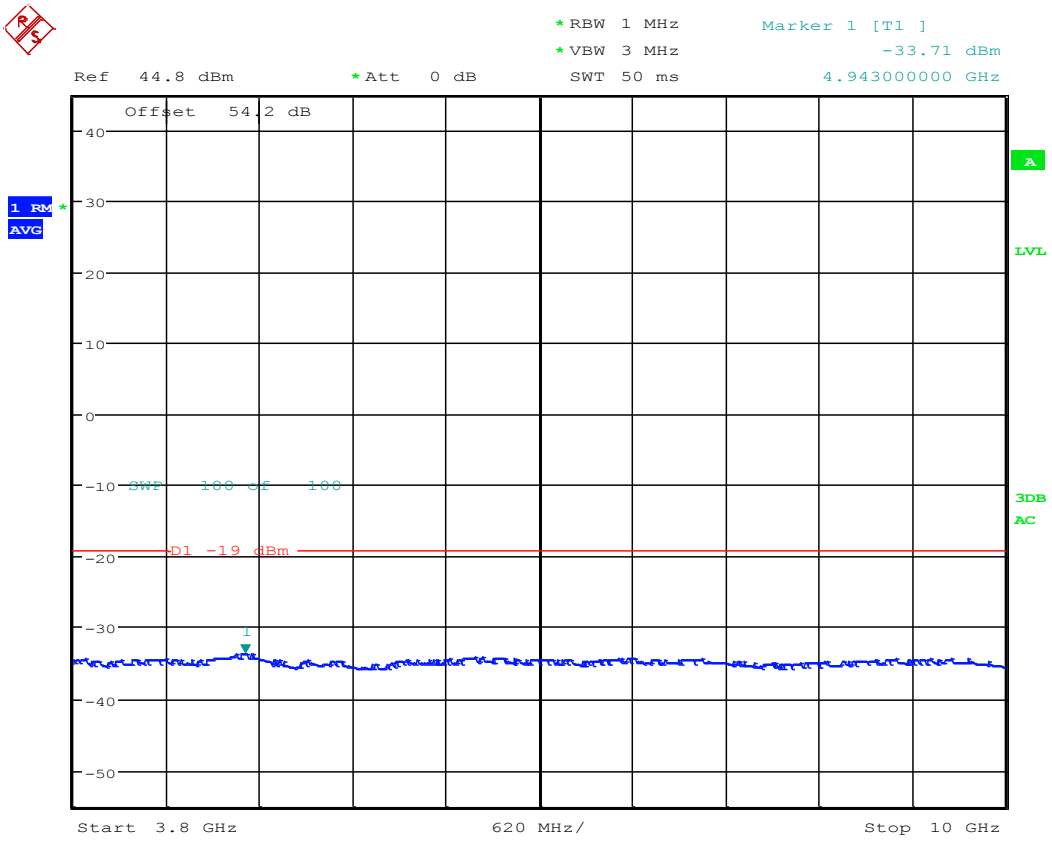
TX Spurious; Test Eng:SG; LTE B25 RRH AR1.0; 1982.5:64QAM
1992.5M:QPSK/16QAM; 5+5M BW; BLK A; Port 3; 30W
Date: 27.SEP.2016 14:20:46

Blocks: C+G
Non-Contiguous
FCCID: AS5BBTRX-22



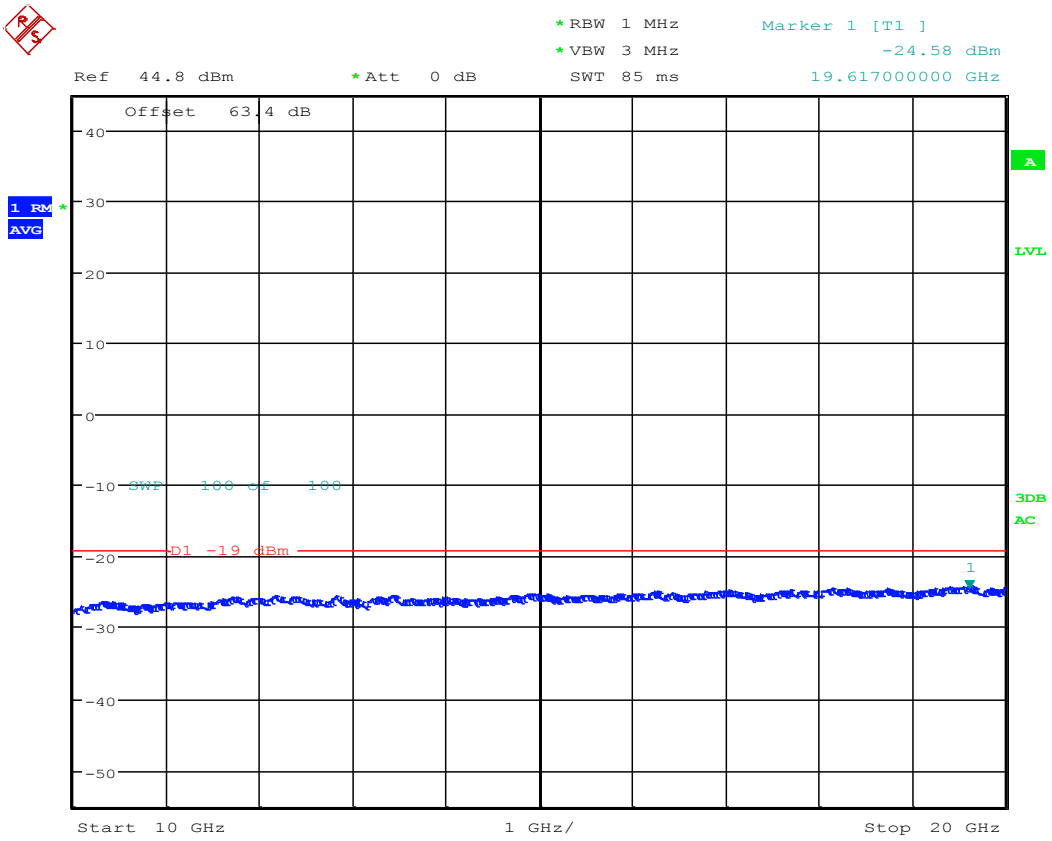
TX Spurious; Test Eng:SG; LTE B25 RRH AR1.0; 1982.5M:64QAM
1992.5M:QPSK/16QAM; 5+5M BW; BLK A; Port 3; 30W
Date: 27.SEP.2016 14:23:27

Blocks: C+G
Non-Contiguous
FCCID: AS5BBTRX-22



TX Spurious; Test Eng:SG; LTE B25 RRH AR1.0; 1982.5M:64QAM
1992.5M:QPSK/16QAM; 5+5M BW; BLK A; Port 3; 30W ; HPF
Date: 27.SEP.2016 14:27:59

Blocks: C+G
Non-Contiguous
FCCID: AS5BBTRX-22



TX Spurious; Test Eng:SG; LTE B25 RRH AR1.0; 1982.5M:64QAM
1992.5M:QPSK/16QAM; 5+5M BW; BLK A; Port 3; 30W ; HPF
Date: 27.SEP.2016 14:30:28

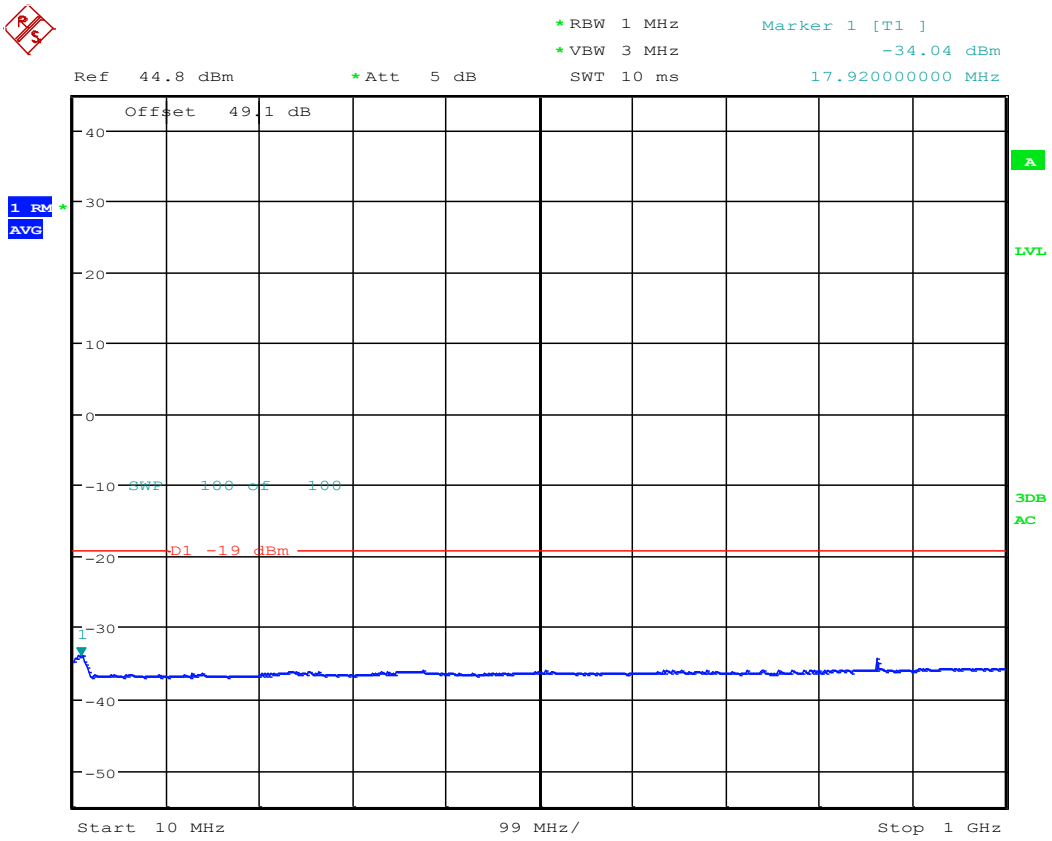
Blocks: C+G
Non-Contiguous
FCCID: AS5BBTRX-22

10+15 MHz Bandwidth

Blocks: B thru F

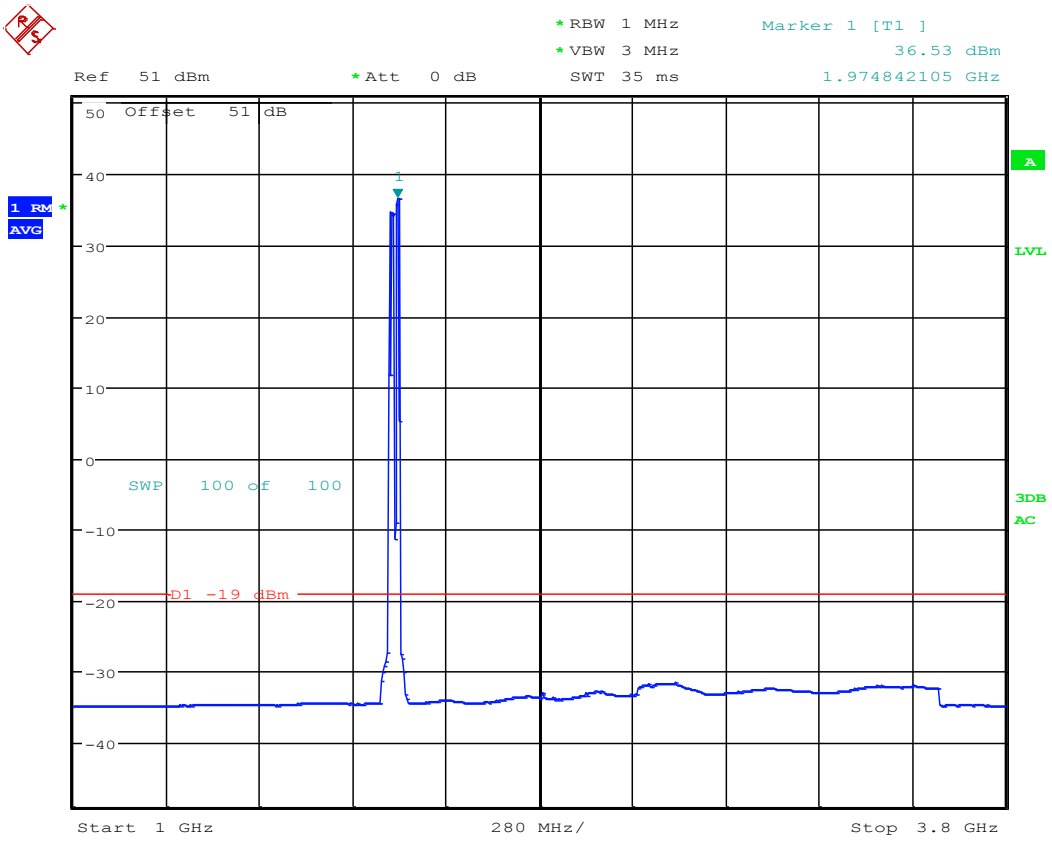
Frequency: 1975 MHz, 1957.5 MHz

Modulations: 64QAM, QPSK/16QAM



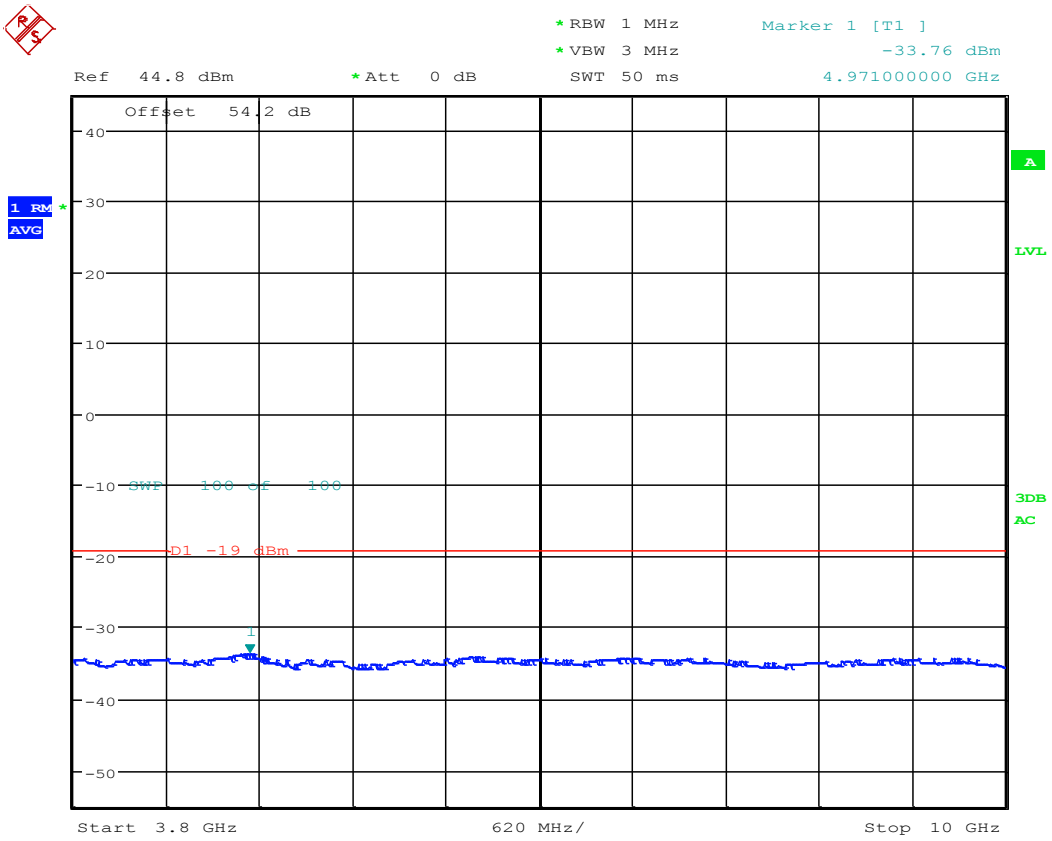
TX Spurious; Test Eng:SG; LTE B25 RRH AR1.0; 1975:64QAM
1957.5M:QPSK/16QAM; 15+10M BW; BLK B/F; Port 2; 30W
Date: 3.OCT.2016 10:22:27

PWR: 30W/CR
FCCID: AS5BBTRX-22



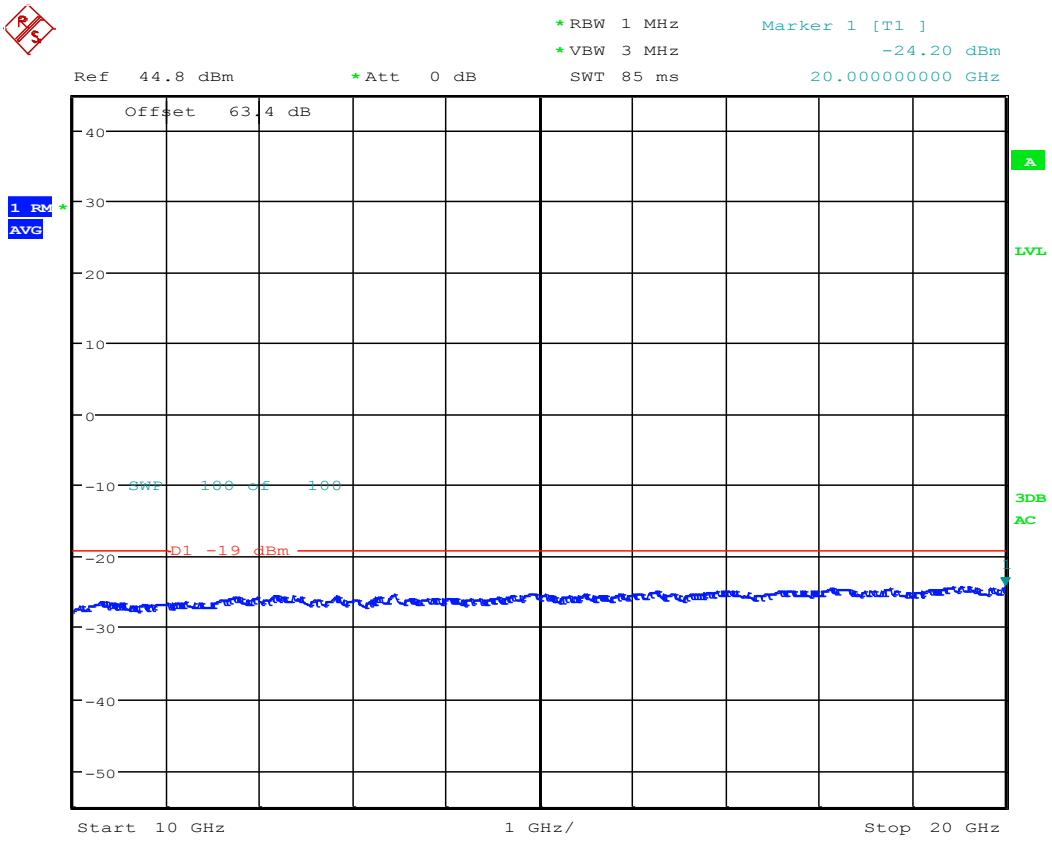
TX Spurious; Test Eng:SG; LTE B25 RRH AR1.0; 1975M:64QAM
1957.5M:QPSK/16QAM; 15+10M BW; BLK B/F; Port 2; 30W
Date: 3.OCT.2016 10:24:37

PWR: 30W/CR
FCCID: AS5BBTRX-22



TX Spurious; Test Eng:SG; LTE B25 RRH AR1.0; 1975M:64QAM
1957.5M:QPSK/16QAM; 15+10M BW; BLK B/F; Port 2; 30W ; HPF
Date: 3.OCT.2016 10:57:48

PWR: 30W/CR
FCCID: AS5BBTRX-22



TX Spurious; Test Eng:SG; LTE B25 RRH AR1.0; 1975M:64QAM
1957.5M:QPSK/16QAM; 15+10M BW; BLK B/F; Port 2; 30W ; HPF
Date: 3.OCT.2016 11:03:00

PWR: 30W/CR
FCCID: AS5BBTRX-22

Section 2.1055 MEASUREMENT REQUIRED: FREQUENCY STABILITY

This measurement evaluates the frequency difference between the actual transmit carrier frequency and the specified transmit frequency assignment. Only the portion of the transmitter system containing the frequency determining and stabilizing circuitry need be put in an environmental chamber and subjected to the temperature variation test per FCC Section 2.1055. The unit which provides baseband signals, such as BBU (baseband unit), can be located outside the chamber if it is a separated unit.

4.4.2 Frequency Stability Results:

This EUT was previously tested during the original filing process. For this Class II Permissive Change, new data is not required.

4.5 Section 2.1053 MEASUREMENT REQUIRED: FIELD STRENGTH OF SPURIOUS RADIATION

The field strength measurements of radiated spurious emissions were made in a FCC (Site Registration Number: 439234) and IC (Filing Number: 6933F-5) registered three meter semi-anechoic chamber AR-4 which is maintained by Alcatel-Lucent in Murray Hill, New Jersey.

The **B25 RRH 4X30** (EUT) was configured in semi-anechoic chamber AR-4 as in the normal field installation and the recommendations of ANSI C63.4–2009 were followed for EUT testing setup and cabling. The EUT was configured to operate per the E-UTRA test model specified in 3GPP TS 36.141.

The base station was configured to transmit a 2x MIMO 10+15 MHz LTE carrier in A+D Block at 1935 MHz and 1987.5 MHz in Blocks C2 +G with the maximum mean power of 30W (44.8dBm) per carrier. All carriers were transmitting to non-radiating 50 Ω resistive loads.

Table 4.5.1 EUT Configurations

Config No	**No of Carriers/Port**	**Tx1 (freq)**	**Tx2 (CH/freq)**	**Power/c (dBm)**	**Carrier BW** (MHz)	**Modulations**
1	2	1935 MHz	1987.5 MHz	44.8	10 + 15	QPSK/16QAM & 64QAM

Section 24.238 and 2.1053 contains the requirements for the levels of spurious radiation as a function of the EIRP of the unmodulated carrier. The reference level for the unmodulated carrier is calculated as the field produced by an isotropic radiator excited by the transmitter output power according to the following relation taken from Reference Data for Radio Engineers, page 27-7, 6th edition, IT&T Corp.

$E = (120\pi P)^{½} = [(30*P)^{1/2}] / R$

$20 \log (E*10^{6}) - (43 + 10 \log P) = 82.23$ dB μV/meter

Where: E = Field Intensity in Volts/ meter R = Distance in meters = 3 m

P = Transmitted Power in watts = 30 W

RESULTS:

For this particular test, the field strength of any spurious radiation, measured at 3m, is required to be less than 82.23 dBμV/meter. Emissions equal to or less than 62.23 dBμV/meter are not reportable and may be verified using field strength measurements and broadband antennas. Over the out of band spectrum investigated from 10 MHz to beyond the tenth harmonic of the carrier (20GHz), no reportable spurious emissions were detected. This demonstrates that the B25 RRH 4X30 / FCC ID: AS5BBTRX-22, the subject of this application, complies with Sections 2.1053, 24.238 and 2.1057 of the Rules.

The field strength of radiated spurious emissions measured was determined by

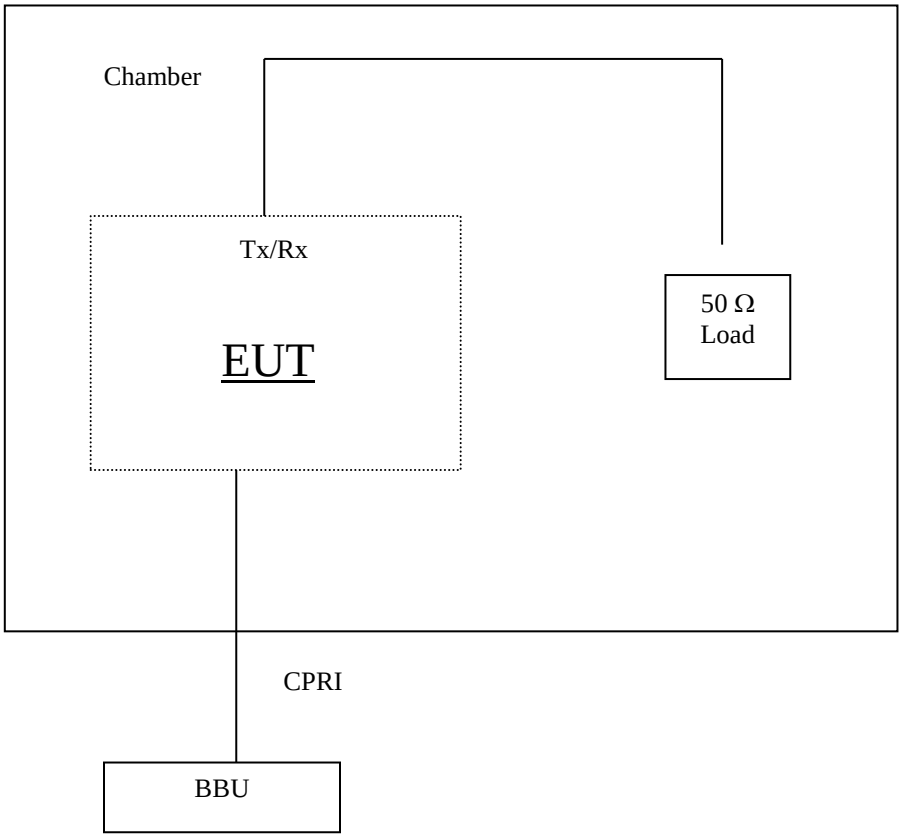
$$E(\text{dB}\mu\text{V/m}) = V_{meas}(\text{dB}\mu\text{V}) + \text{Cable Loss (dB)} + \text{Antenna Factor (dBi/m)}.$$

Field strength measurements of radiated spurious emissions were made at a semi anechoic room of Global Product Compliance Laboratories of Alcatel-Lucent Murray Hill which was detailed in Section 6. The recommendations of ANSI C63.4 and ANSI C63.26 were followed for EUT testing setup, cabling, and measurement approach and procedures. All the measurement equipment used, including antennas, was calibrated in accordance with ISO 9001 process. The EUT setup diagram is given in the Figure 4.6.1. The minimum margin measured per Table 4.6.2 is more than 20dB.

4.5.1 Field Strength of Radiated Emissions Results:

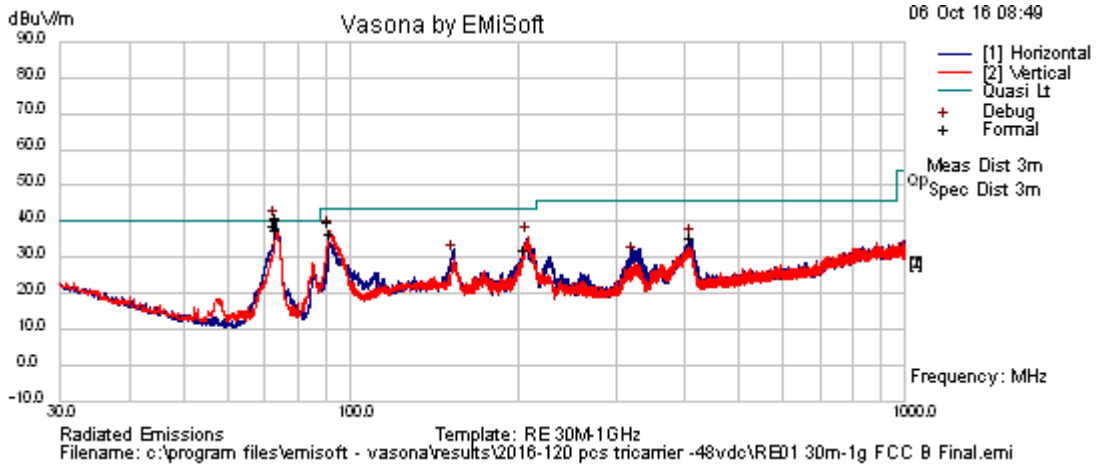
Over the frequency spectrum investigated no reportable radiated spurious emissions were detected. The measurement results of the EUT, subject of this application, demonstrate the full compliance with the Rules of the Commission.

Figure 4.6.1 Test Set-Up for Measurement of Radiated Spurious Emissions



Radiated Emissions Data

T1 RE 30MHz-1GHz FCC B Final



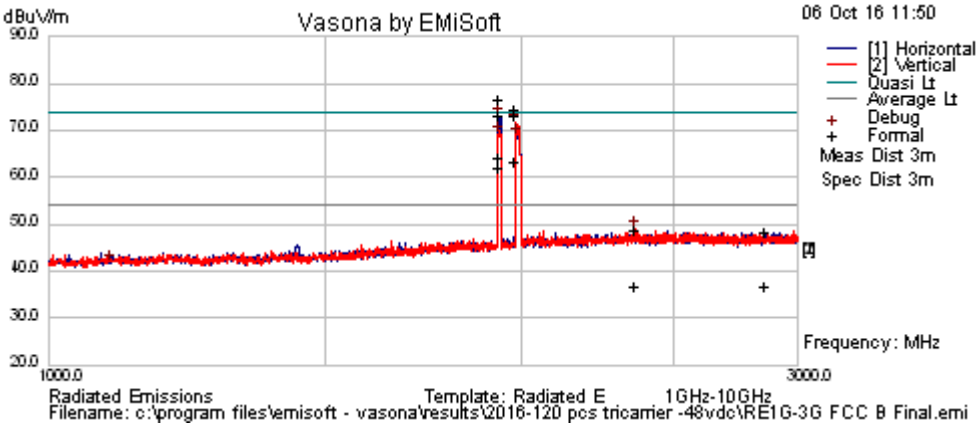
Results Title:	RE 30M-1GHz
File Name:	c:\program files\emisoft - vasona\results\2016-120 pcs tricarrier -48vdc\RE01 30m-1g FCC B Final.emi
Test Laboratory:	AR4-MH, 25C, 41% RH
Test Engineer:	FEC
Test Software:	Vasona by EMI Soft, version 2.161
Equipment:	Nokia
EUT Details:	PCS Tri Carrier, PRI04670, B25. B25 RRH4x30 eNB Configurations for FOA (LTE RF-Assets) Product(s)
Configuration:	Powered by -48vdc, 10.9 Amp Tx1 and TX2 =2 Carriers 1935MHz QPSK / 16QAM 10MHz BW 30 watts @1987.5MHz 64QAM 15MHz BW 30w 1-Alarm cable, 1-ASIG cable. SA=E7405A-E692, Bilog Antenna = E766, 6dB =E1130.
Date:	2016-10-06 08:49:09

FORMAL DATA												
Freq. (MHz)	**Raw (dBuV)**	**Cable (dB)**	**Factor (dB)**	**Level (dBuV/m)**	**Emission Type**	**Pol (H/V)**	**Ht (cm)**	**Az (deg)**	**Limit (dBuV/m)**	**Margin (dB)**	**Pass /Fail**	**Comments**
73.5	56.17	6.6	-24.9	37.87	Quasi Max	H	277	11	40	-2.13	Pass	
73.5	55.34	6.6	-24.9	37.04	Quasi Max	H	380	12	40	-2.96	Pass	
73.32	53.58	6.6	-24.9	35.25	Quasi Max	H	152	0	40	-4.75	Pass	
73.679	52.53	6.6	-24.9	34.26	Quasi Max	V	196	329	40	-5.74	Pass	
91.62	51.14	6.68	-21.1	36.73	Quasi Max	V	103	275	43.5	-6.77	Pass	
91.816	47.55	6.69	-21	33.19	Quasi Max	H	149	0	43.5	-10.31	Pass	
411.12	39.09	7.66	-14.8	31.92	Quasi Max	H	103	58	46	-14.08	Pass	
206.88	41.52	7.16	-20	28.69	Quasi Max	V	185	318	43.5	-14.81	Pass	

PREVIEW DATA												
Freq. (MHz)	**Raw (dBuV)**	**Cable (dB)**	**Factor (dB)**	**Level (dBuV/m)**	**Emission Type**	**Pol (H/V)**	**Ht (cm)**	**Az (deg)**	**Limit (dBuV/m)**	**Margin (dB)**	**Pass /Fail**	**Comments**
73.32	58.34	6.6	-24.9	40.01	Preview	H	205	0	40	0.01	Pass	
73.559	55.69	6.6	-24.9	37.4	Debug	V	101	315	40	-2.6	Pass	
91.44	51.65	6.68	-21.2	37.18	Preview	V	105	270	43.5	-6.32	Pass	
208.32	48.42	7.16	-20	35.61	Preview	V	105	0	43.5	-7.89	Pass	
92.2164	47.33	6.69	-20.9	33.1	Debug	H	101	315	43.5	-10.4	Pass	
411.12	42.3	7.66	-14.8	35.14	Preview	H	105	90	46	-10.86	Pass	
152.677	37.79	6.99	-14.5	30.3	Debug	H	103	315	43.5	-13.2	Pass	
324.329	38.56	7.44	-16.1	29.95	Debug	H	101	315	46	-16.05	Pass	

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

T2 RE 1GHz - 3GHz FCC B Final



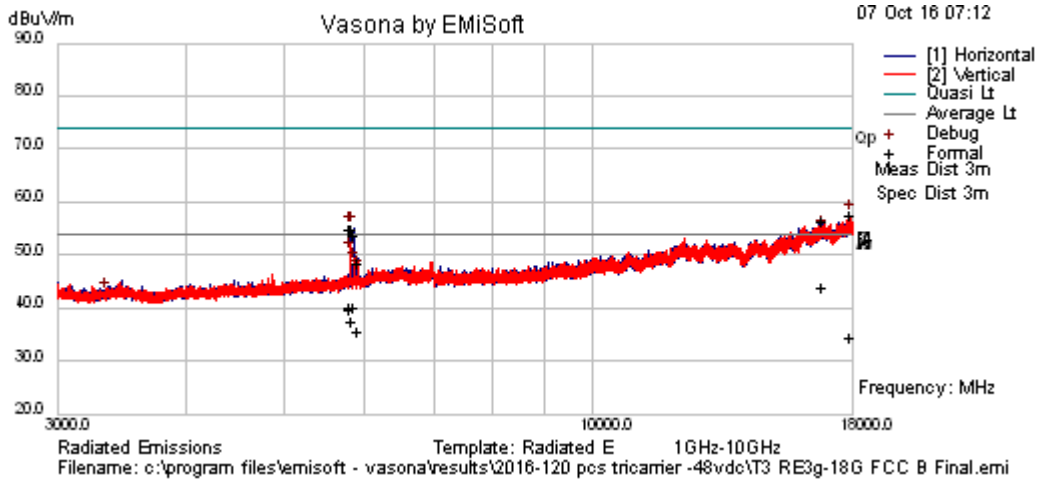
Results Title:	Radiated E 1GHz-10GHz
File Name:	c:\program files\emisoft - vasona\results\2016-120 pcs tricarrier -48vdc\RE1G-3G FCC B Final.emi
Test Laboratory:	AR4-MH, 25C, 41% RH
Test Engineer:	FEC / MJS
Test Software:	Vasona by EMI Soft, version 2.161
Equipment:	Nokia
EUT Details:	PCS Tri Carrier, PRI04670, B25. B25 RRH4x30 eNB Configurations for FOA (LTE RF-Assets) Product(s)
Configuration:	Powered by -48vdc, 10.9 Amp Tx1 and TX2 =2 Carriers 1935MHz QPSK / 16QAM 10MHz BW 30w1987.5MHz 64QAM 15MHz BW 30w 1-Alarm cable, 1-ASIG cable. ESI-40 -E907, Horn Antenna = E1074, 6dB =E1130. Res. 1MBW / Video 3MHz.
Date:	2016-10-06 11:50:29

FORMAL DATA												
Freq. (MHz)	**Raw (dBuV)**	**Cable (dB)**	**Factor (dB)**	**Level (dBuV/m)**	**Emission Type**	**Pol (H/V)**	**Ht (cm)**	**Az (deg)**	**Limit (dBuV/m)**	**Margin (dB)**	**Pass /Fail**	**Comments**
2359.94	42.71	8.68	-4.58	46.81	Quasi Max	V	154	154	74	-27.19	Pass	
1934.88	71.94	8.59	-6.06	74.48	Quasi Max	V	113	17	74	0.48	Fail	
1983.83	69.7	8.63	-5.76	72.57	Quasi Max	V	103	307	74	-1.43	Pass	
1982.64	68.29	8.63	-5.77	71.16	Quasi Max	H	201	156	74	-2.84	Pass	
1937.97	68.41	8.59	-6.04	70.96	Quasi Max	H	180	46	74	-3.04	Pass	
2861.57	41.4	8.72	-4.05	46.07	Quasi Max	V	329	327	74	-27.93	Pass	
1934.88	59.36	8.59	-6.06	61.89	AvgMax	V	113	17	54	7.89	Fail	
2359.94	30.46	8.68	-4.58	34.55	AvgMax	V	154	154	54	-19.45	Pass	
1982.64	58.58	8.63	-5.77	61.44	AvgMax	H	201	156	54	7.44	Fail	
1983.83	58.42	8.63	-5.76	61.3	AvgMax	V	103	307	54	7.3	Fail	
1937.97	57.19	8.59	-6.04	59.74	AvgMax	H	180	46	54	5.74	Fail	
2861.57	29.78	8.72	-4.05	34.45	AvgMax	V	329	327	54	-19.55	Pass	

PREVIEW DATA												
Freq. (MHz)	**Raw (dBuV)**	**Cable (dB)**	**Factor (dB)**	**Level (dBuV/m)**	**Emission Type**	**Pol (H/V)**	**Ht (cm)**	**Az (deg)**	**Limit (dBuV/m)**	**Margin (dB)**	**Pass /Fail**	**Comments**
1937.97	70.26	8.59	-6.04	72.82	Preview	H	305	45	54	18.82	Fail	
1982.98	68.77	8.63	-5.76	71.63	Preview	V	105	315	54	17.63	Fail	
1937.02	66.44	8.59	-6.05	68.99	Debug	V	103	315	54	14.99	Fail	
1988.43	65.66	8.63	-5.73	68.56	Debug	H	103	315	54	14.56	Fail	
2359.94	44.8	8.68	-4.58	48.89	Preview	V	105	0	54	-5.11	Pass	
2861.57	41.69	8.72	-4.05	46.36	Debug	V	103	315	54	-7.64	Pass	
1094.27	44.68	7.69	-10.7	41.66	Debug	V	103	315	54	-12.34	Pass	

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

T3 RE 3GHz -18GHz FCC B Final



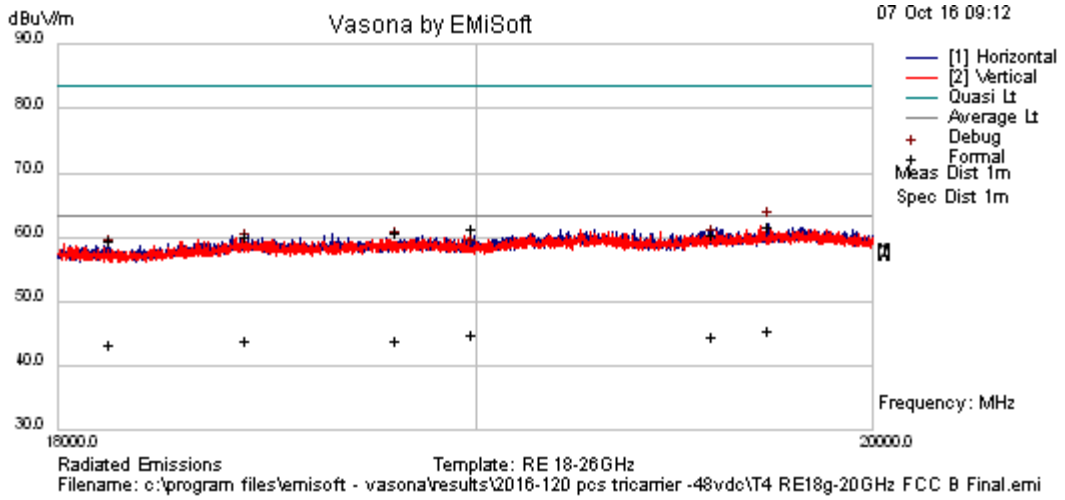
Results Title:	Radiated E 1GHz-10GHz
File Name:	c:\program files\emisoft - vasona\results\2016-120 pcs tricarrier -48vdc\T3 RE3g-18G FCC B Final.emi
Test Laboratory:	AR4-MH, 25C, 41% RH
Test Engineer:	FEC / MJS
Test Software:	Vasona by EMI Soft, version 2.161
Equipment:	Nokia
EUT Details:	PCS Tri Carrier, PRI04670, B25. B25 RRH4x30 eNB Configurations for FOA (LTE RF-Assets) Product(s)
Configuration:	Powered -48vdc, 10.9 Amp Tx1 and TX2 =2 Carriers 1935MHz QPSK / 16QAM 10MHz BW 30w1987.5MHz 64QAM 15MHz BW 30w, 1-Alarm cable, 1-ASIG cable. ESI-40 =E907, Horn Antenna = E1074, PCS-HPF-E986. Res. 1MBW / Video 3MHz.
Date:	2016-10-07 07:12:52

FORMAL DATA												
Freq. (MHz)	**Raw (dBuV)**	**Cable (dB)**	**Factor (dB)**	**Level (dBuV/m)**	**Emission Type**	**Pol (H/V)**	**Ht (cm)**	**Az (deg)**	**Limit (dBuV/m)**	**Margin (dB)**	**Pass /Fail**	**Comments**
16875.6	25.95	8.84	6.76	41.55	AvgMax	V	257	10	54	-12.45	Pass	
5810.71	33.09	5.71	-1.11	37.7	AvgMax	H	174	327	54	-16.3	Pass	
5857.03	32.9	5.75	-1.07	37.58	AvgMax	V	103	237	54	-16.42	Pass	
5807.51	32.67	5.71	-1.11	37.26	AvgMax	V	155	347	54	-16.74	Pass	
5846.8	30.5	5.74	-1.08	35.16	AvgMax	H	103	269	54	-18.84	Pass	
17956.2	37.9	10.08	6.93	54.91	Quasi Max	V	332	345	74	-19.09	Pass	
16875.6	38.26	8.84	6.76	53.86	Quasi Max	V	257	10	74	-20.14	Pass	
5912.29	28.46	5.8	-1.02	33.24	AvgMax	V	163	195	54	-20.76	Pass	
5810.71	47.85	5.71	-1.11	52.45	Quasi Max	H	174	327	74	-21.55	Pass	
5846.8	47.72	5.74	-1.08	52.38	Quasi Max	H	103	269	74	-21.62	Pass	
5807.51	47.72	5.71	-1.11	52.32	Quasi Max	V	155	347	74	-21.68	Pass	
17956.2	14.8	10.08	6.93	31.81	AvgMax	V	332	345	54	-22.19	Pass	
5857.03	46.53	5.75	-1.07	51.21	Quasi Max	V	103	237	74	-22.79	Pass	
5912.29	41.27	5.8	-1.02	46.04	Quasi Max	V	163	195	74	-27.96	Pass	

PREVIEW DATA												
Freq. (MHz)	**Raw (dBuV)**	**Cable (dB)**	**Factor (dB)**	**Level (dBuV/m)**	**Emission Type**	**Pol (H/V)**	**Ht (cm)**	**Az (deg)**	**Limit (dBuV/m)**	**Margin (dB)**	**Pass /Fail**	**Comments**
17956.2	40.31	10.08	6.93	57.32	Preview	V	196	154	54	3.32	Fail	
5847.4	50.42	5.74	-1.08	55.08	Preview	H	105	330	54	1.08	Fail	
5812.04	50.32	5.71	-1.11	54.93	Preview	H	105	264	54	0.93	Fail	
16875.6	38.66	8.84	6.76	54.26	Debug	V	103	352	54	0.26	Fail	
5808.76	45.49	5.71	-1.11	50.09	Debug	V	103	352	54	-3.91	Pass	
5857.03	43.65	5.75	-1.07	48.33	Debug	V	103	352	54	-5.67	Pass	
5913.78	42.1	5.8	-1.02	46.88	Debug	V	103	352	54	-7.12	Pass	
3346.48	41.87	4.17	-3.62	42.42	Debug	V	103	352	54	-11.58	Pass	

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

T4 RE 18 GHz – 20 GHz FCC B Final



Results Title:	RE 18-26GHz
File Name:	c:\program files\emisoft - vasona\results\2016-120 pcs tricarrier -48vdc\T4 RE18g-20GHz FCC B Final.emi
Test Laboratory:	AR4-MH, 25C, 40% RH
Test Engineer:	FEC / MJS
Test Software:	Vasona by EMI Soft, version 2.161
Equipment:	Nokia
EUT Details:	PCS Tri Carrier, PRI04670, B25. B25 RRH4x30 eNB Configurations for FOA (LTE RF-Assets) Product(s)
Configuration:	Powered by -48vdc, 10.9 Amp Tx1 and TX2 =2 Carriers 1935MHz QPSK / 16QAM 10MHz BW 30w @1987.5MHz 64QAM 15MHz BW 30w, 1-Alarm cable, 1-ASIG cable. ESI-40-E907, Horn Antenna - E513, Pre amp - E377, Settings set for Res. 1MBW / Video 3MHz.
Date:	2016-10-07 09:12:37

FORMAL DATA												
Freq. (MHz)	**Raw (dBuV)**	**Cable (dB)**	**Factor (dB)**	**Level (dBuV/m)**	**Emission Type**	**Pol (H/V)**	**Ht (cm)**	**Az (deg)**	**Limit (dBuV/m)**	**Margin (dB)**	**Pass /Fail**	**Comments**
19732.8	25.06	7.3	10.95	43.32	AvgMax	H	103	102	63.5	-20.18	Pass	
18992.7	24.54	7.11	10.9	42.55	AvgMax	H	104	285	63.5	-20.95	Pass	
19591.2	23.98	7.26	11.04	42.27	AvgMax	V	146	144	63.5	-21.23	Pass	
18441.5	24.54	6.96	10.33	41.82	AvgMax	H	187	140	63.5	-21.68	Pass	
18806.5	23.98	7.06	10.7	41.74	AvgMax	V	146	265	63.5	-21.76	Pass	
18120.8	24.26	6.87	10.08	41.2	AvgMax	V	159	238	63.5	-22.3	Pass	
19732.8	41.11	7.3	10.95	59.36	Quasi Max	H	103	102	83.5	-24.14	Pass	
18992.7	41.11	7.11	10.9	59.12	Quasi Max	H	104	285	83.5	-24.38	Pass	
18806.5	40.85	7.06	10.7	58.61	Quasi Max	V	146	265	83.5	-24.89	Pass	
19591.2	40.07	7.26	11.04	58.36	Quasi Max	V	146	144	83.5	-25.14	Pass	
18441.5	40.59	6.96	10.33	57.87	Quasi Max	H	187	140	83.5	-25.63	Pass	
18120.8	40.46	6.87	10.08	57.4	Quasi Max	V	159	238	83.5	-26.1	Pass	

PREVIEW DATA												
Freq. (MHz)	**Raw (dBuV)**	**Cable (dB)**	**Factor (dB)**	**Level (dBuV/m)**	**Emission Type**	**Pol (H/V)**	**Ht (cm)**	**Az (deg)**	**Limit (dBuV/m)**	**Margin (dB)**	**Pass /Fail**	**Comments**
19732.8	43.79	7.3	10.95	62.04	Preview	H	105	330	63.5	-1.46	Pass	
19591.2	40.96	7.26	11.04	59.26	Debug	V	103	352	63.5	-4.24	Pass	
18806.5	40.96	7.06	10.7	58.73	Debug	V	103	352	63.5	-4.77	Pass	
18441.5	41.1	6.96	10.33	58.39	Debug	H	103	352	63.5	-5.11	Pass	
18992.7	39.66	7.11	10.9	57.68	Debug	H	103	352	63.5	-5.82	Pass	
18120.8	40.6	6.87	10.08	57.54	Debug	V	103	352	63.5	-5.96	Pass	

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

4.6 LIST OF TEST EQUIPMENT

Asset ID	Manufacturer	Type	Details	Model	Serial	Calibration Date	Calibration Due	Calibration Type	Status
E766	A.H. Systems Inc.	Bilogical Antenna	25 - 2000 MHz	SAS-521-2	457	2014-12-29	2016-12-29	Requires Calibration	Active
E692	Agilent Technologies	Spectrum Analyzer	EMC 100Hz - 26.5GHz	E7405A	MY44210223	2016-05-26	2018-05-26	Requires Calibration	Active
E513	EMC Test Systems	Horn Antenna	Double Ridged Horn 18-40 GHz	3116	2539	2015-03-19	2017-03-19	Requires Calibration	Active
E1074	ETS Lindgren	Horn Antenna	Double-Ridged Waveguide Horn 1-18 GHz	3117	00135194	2014-11-25	2016-11-25	Requires Calibration	Active
E377	Hewlett Packard	Pre-Amplifier	Preamplifier 1-26.5 GHz	8449B	3008A01267	2016-09-23	2018-09-23	Requires Calibration	Active
E907	Rohde & Schwarz	Test Receiver	EMI (20Hz to 40 GHz)-150 +30dBM	ESIB40	100101	2015-09-22	2017-09-22	Requires Calibration	Active
E494	Sonoma Instrument Co.	Amplifier	9kHz-1GHz	310N	185785	2015-12-03	2017-12-03	Requires Calibration	Active
E588	Sunol Sciences Corp	System Controller		SC99V	32802-1			Calibration Not Required	Active
E986	Trilithic	High Pass Filter	PCS	5HC2850/18050-1.8-KK	PCS-HPF-5			Calibration Not Required, Must Be Verified	Active
E1130	Weinschel	Attenuator	6dB	2/6	CD2545	2015-02-27	2017-02-27	Requires Calibration	Active

4.7 FACILITIES AND ACCREDITATION

All measurement facilities at Alcatel-Lucent Global Product Compliance Laboratory (GPCL) used to collect the measurement data in the test report are located at 600-700 Mountain Avenue, Murray Hill, New Jersey 07974-0636 USA.

The field strength measurements of radiated spurious emissions are made in a FCC and IC registered three meter semi-anechoic chamber AR4 (FCC Site Registration Number: 439234, IC Filing Number: 6933F-7) which is maintained by Alcatel-Lucent in Murray Hill, New Jersey. The sites were constructed and are continuously in conformance with the requirements of ANSI C63.4 and CISPR Publication 22.

Alcatel-Lucent Global Product Compliance Laboratory is accredited with the US Department of Commerce National Institute of Standards and Technology's National Voluntary Laboratory Accreditation Program (NVLAP) for satisfactory compliance with criteria established in Title 15, Part 7 Code of Federal Regulations for offering test services for selected test methods in Electromagnetic Compatibility; Voluntary Control Council for Interference (VCCI), Japan; Australian Communications and Media Authority (ACMA). The laboratory is ISO 9001:2008 Certified.

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 100275-0

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

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

Electromagnetic Compatibility & Telecommunications

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

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

DEPARTMENT OF COMMERCE · UNITED STATES OF AMERICA

For the National Voluntary Laboratory Accreditation Program