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NVLAP LAB CODE: 100275-0

FCC Certification Test Report

Class II Permissive Change

Product Evaluated

PCS RRH 4x45W

(FCC ID: AS5BBTRX-05)

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
Murray Hill, New Jersey 07974-0636 USA

Date: October 5, 2016

Revisions

Date	Revision	Section	Change
10/5/2016	0		Initial Release

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Prepared By: Steve Gordon

Signed: Steve Gordon 10/5/2016
Compliance Engineer

Approved By: Ray Johnson

Signed: Raymond J Johnson 10/5/2016
Technical Manager

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1. ATTESTATION OF TEST RESULTS

Company Name	Alcatel-Lucent USA, Inc.
FCC ID	AS5BBTRX-05
Product Name	PCS RRH 4x45W
Model Name	RRH 1900 – 4x45
Part No	109787622
Serial Number(s)	13W252P10189
Test Standard(s)	47 CFR FCC Part24
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 X
Technology	LTE
Test Frequency Range	10MHz – 20GHz
Operation Mode(s)	4x4 MIMO
Submission Type	Class II Permissiove Change
FCC Part 15 Subpart B Compliance	Compliance with Class B
Test Date	July 29 – September 30, 2015
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	10+5 MHz
Max Conducted Power (Rated)	43dBm per carrier, 46 dBm per port
Software Version	NEM LR16.2_D1.12
Hardware Version	RRH 4x45 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?
1.25	2	CDMA	√
10+5	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., +46dBm (40W) per LTE carrier 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 PCS RRH 4x45W was measured to be are 40W (+46 dBm ± 1 dB) for 10 +5 MHz LTE carrier. 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 4x4 MIMO mode this is 160 W (+52 dBm) per RRH in 4x4 MIMO

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
				⩽±1
4XMIMO	Per Antenna Port	40	46	

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 both 5 MHz and 10 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)
Ch G, 64QAM, 5MHz	8.24

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

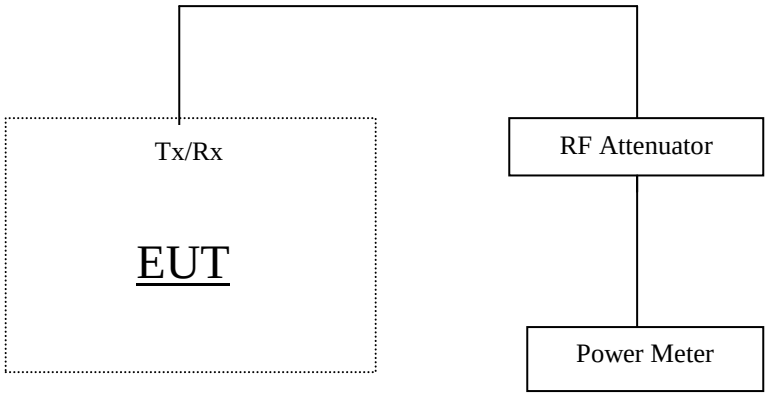
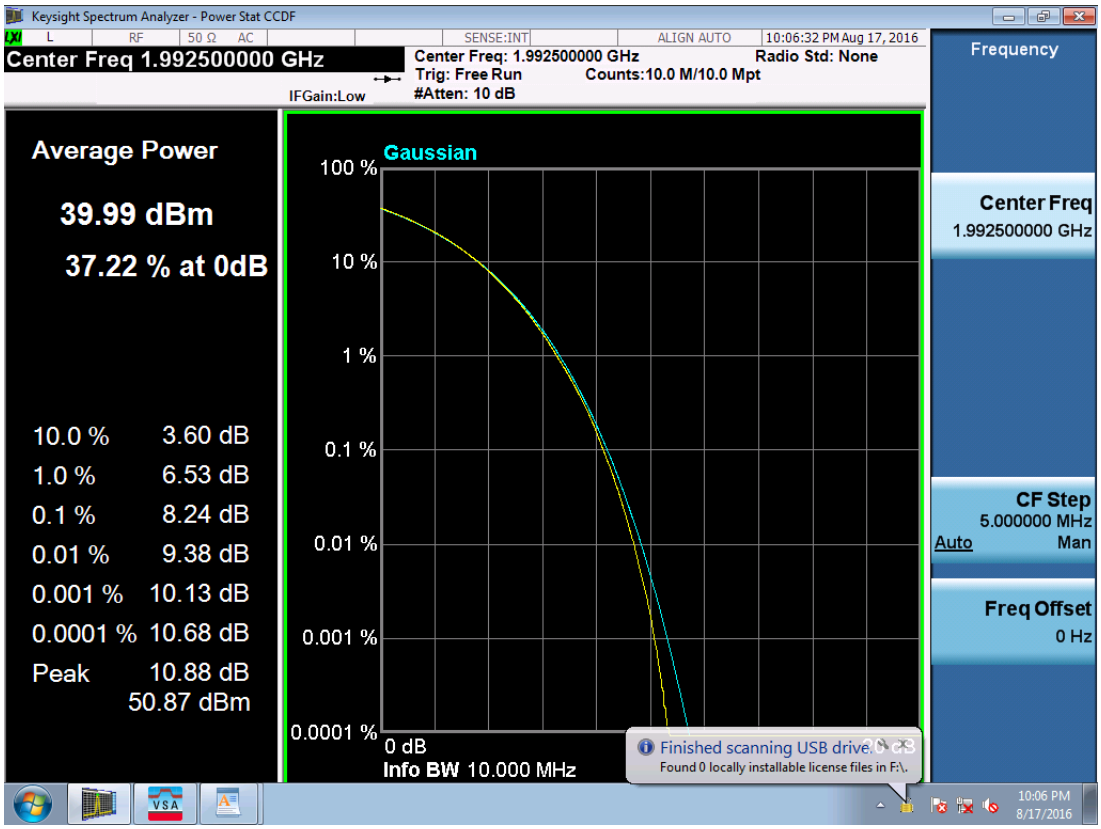


Figure 4.1.2 PAPR Plot Measured with the Maximum Value

Provide a PAPR plot with the maximum value measured.



4.2 Section 2.1047 MEASUREMENT REQUIRED: MODULATION CHARACTERISTICS

The PCS 4x45W RRH supports both CDMA and LTE technologies. The 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

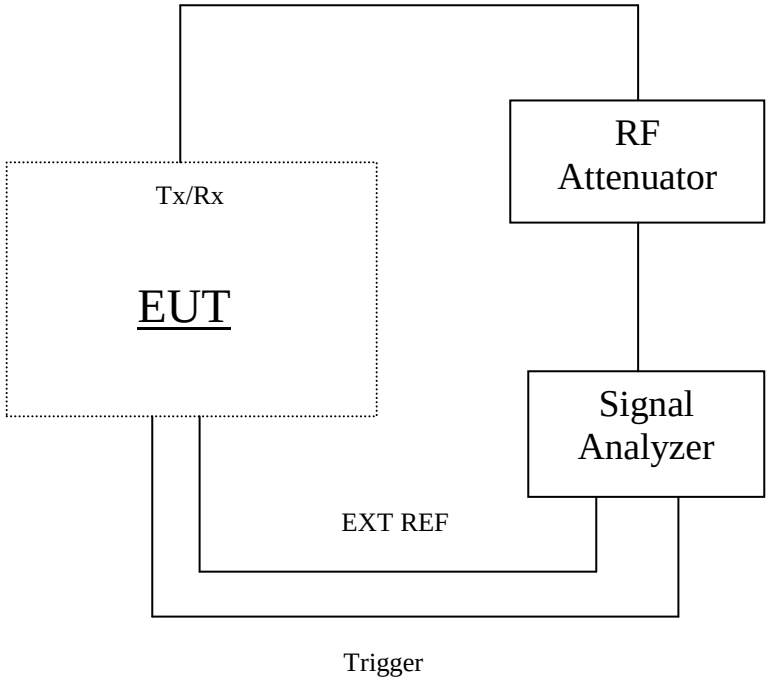
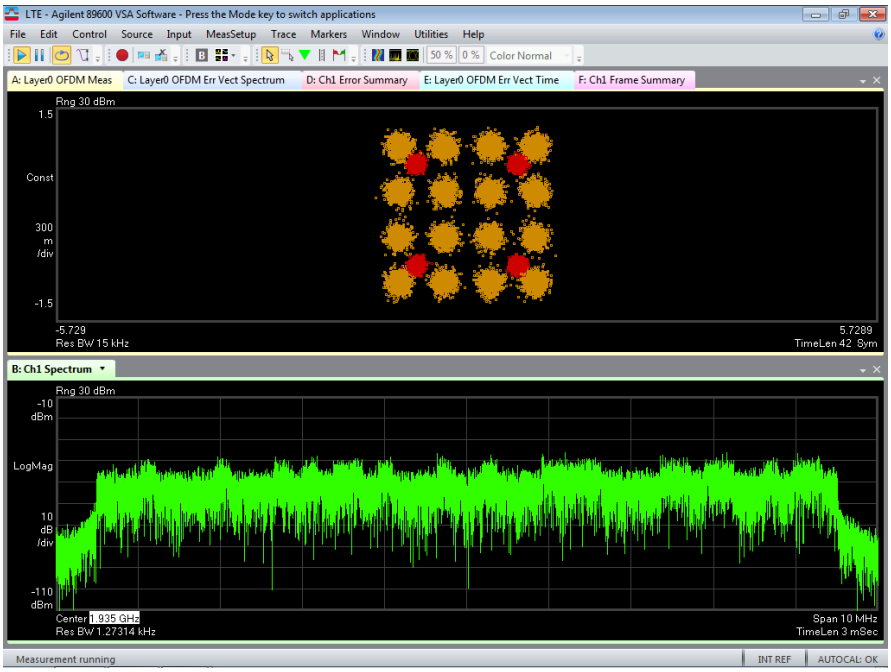
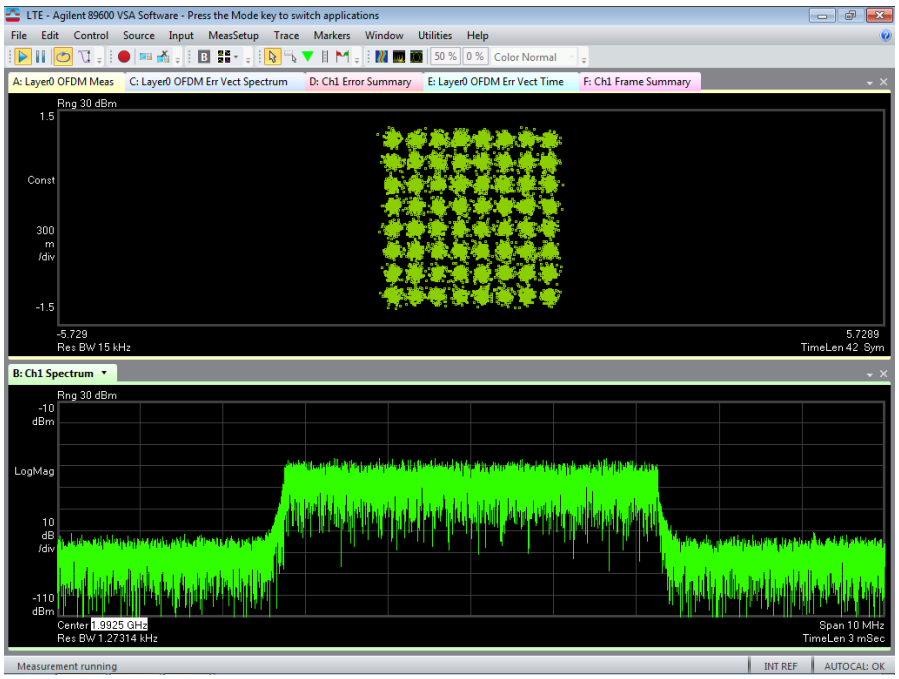


FIGURE 4.2.2 Modulation Measurement for a 1935 MHz LTE Carrier with QPSK, 16QAM AND 1992.5 MHz 64QAM Modulations





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

In compliance with Section 2.1049, the appropriate E-UTRA test model specified in 3GPP TS 36.141 was used for configuring LTE carriers. All the CDMA voice carriers were configured with a combination of the Pilot, Sync, Paging and Traffic channels. The Pilot/Sync/Page channels were set up according to the recommended test model for base stations given in 3GPP2 C.S0010 with 37 traffic channels. All CDMA2000 data carriers were configured with time-division multiplexed Pilot Channel, the MAC Channel, and the Forward Traffic Channels at full data rate. The Pilot/MAC/Traffic/Control channels were setup according to the recommended test model for base stations given in 3GPP2 C.S.0032.

The PCS RRH 4x45W Distributed Base station system supports single-carrier and multiple-carrier configurations with CDMA and LTE technologies. The RRH can operate in an LTE-only mode or a CDMA-only mode or a CDMA and LTE mixed mode.

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 requirements for a CDMA carrier in a multiple carrier configuration specified in 3GPP2 C.S0010-D and C.S.0032-C Section 4.4 was followed for Suppression Inside the Licensee's Frequency Block(s)

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 +46 dBm (40W) per port.

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.

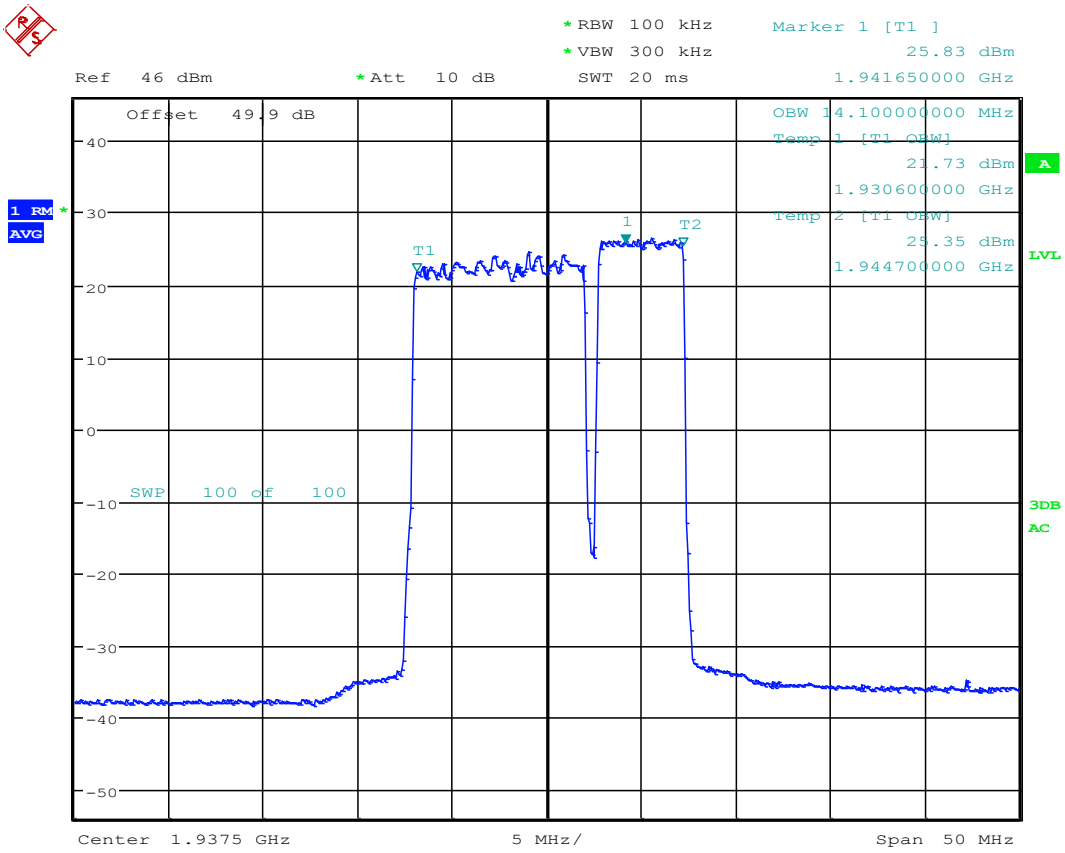
From the out-of-band emissions plots attached below, it can be seen that all the emissions are under the required FCC emission masks for MIMO operation.

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

Block	Center Frequency MHz	Modulation	RF Power Level (Watts)	Occupied Bandwidth and Out of Band Emissions Measurement	Compliance Status
A	1935 & 1942.5	QPSK, 16QAM, 64QAM	40	Yes	Compliant
A+D	1935 &1947.5	QPSK, 16QAM, 64QAM	40	Yes	Compliant
C1C2+ G	1980 & 1992.5	QPSK, 16QAM, 64QAM	40	Yes	Compliant
A&G	1935 &1992.5	QPSK, 16QAM, 64QAM	40	Yes	Compliant

FIGURE 4.3.1- 99% POWER BANDWIDTH PLOTS



99% Bandwidth; Test Eng:JY; 65MHz LTE CDMA RRH

LTE-1935(QPSK/16QAM),1942.5(64QAM);10W/C

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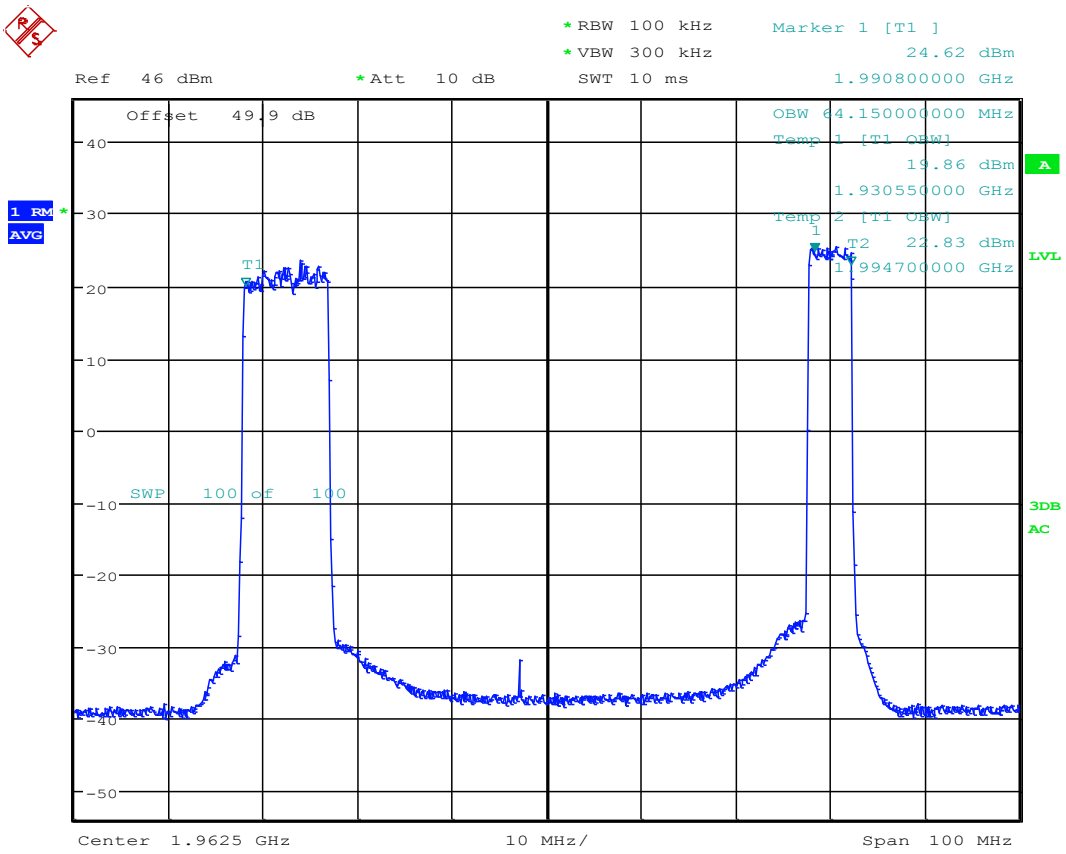
FCC ID-AS5BBTRX-05



99% Bandwidth; Test Eng:JY; 65MHz LTE CDMA RRH

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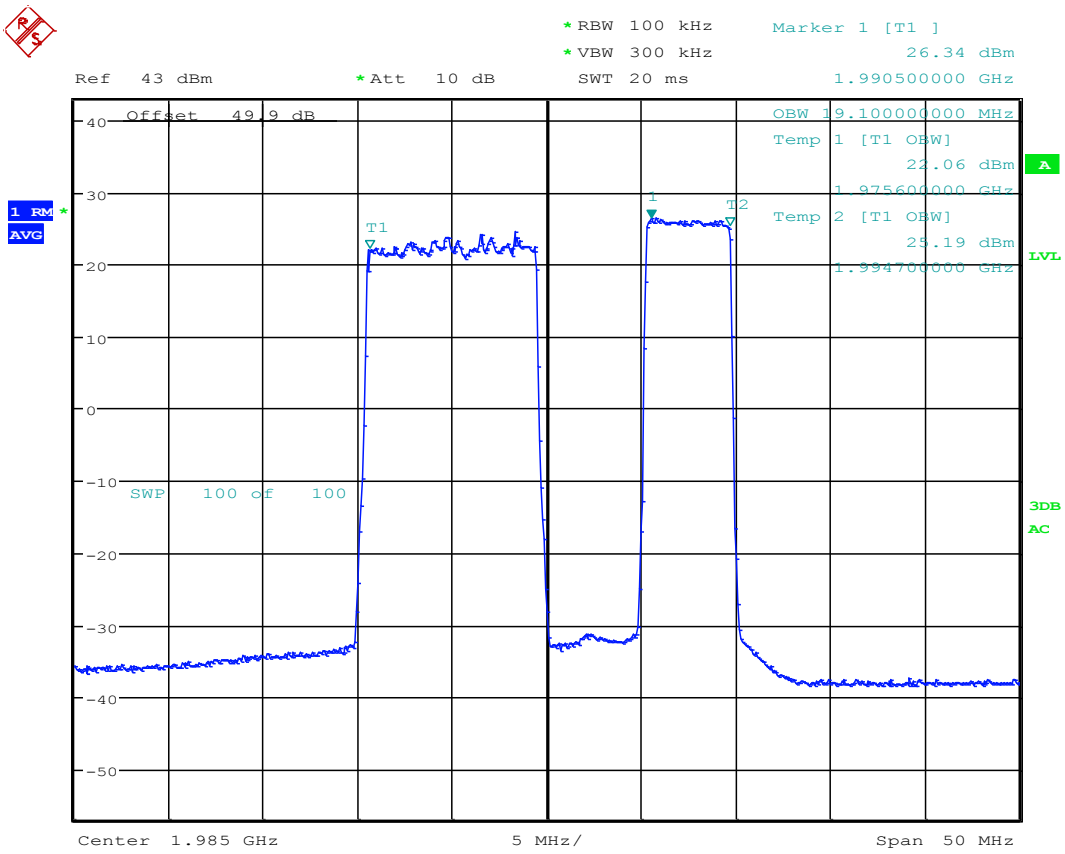
FCC ID-AS5BBTRX-05



99% Bandwidth; Test Eng:JY; 65MHz LTE CDMA RRH

LTE-1980(QPSK/16QAM),1992.5(64QAM);10W/C

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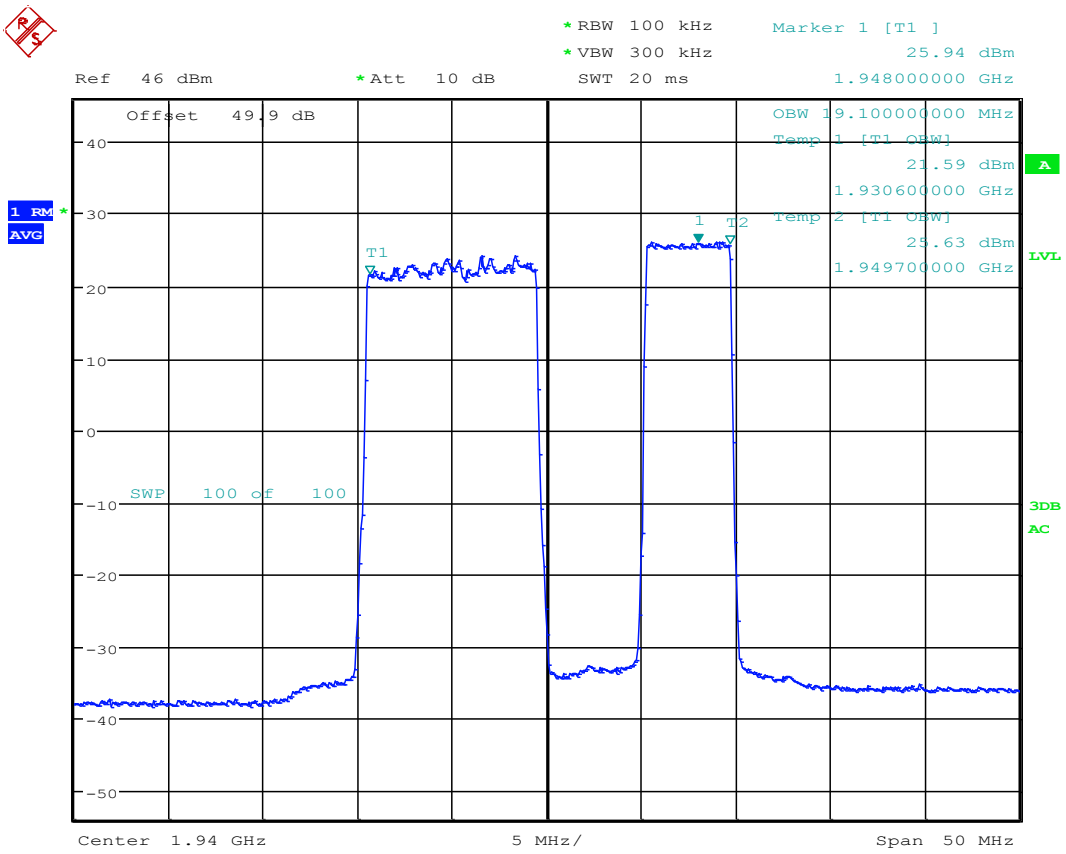


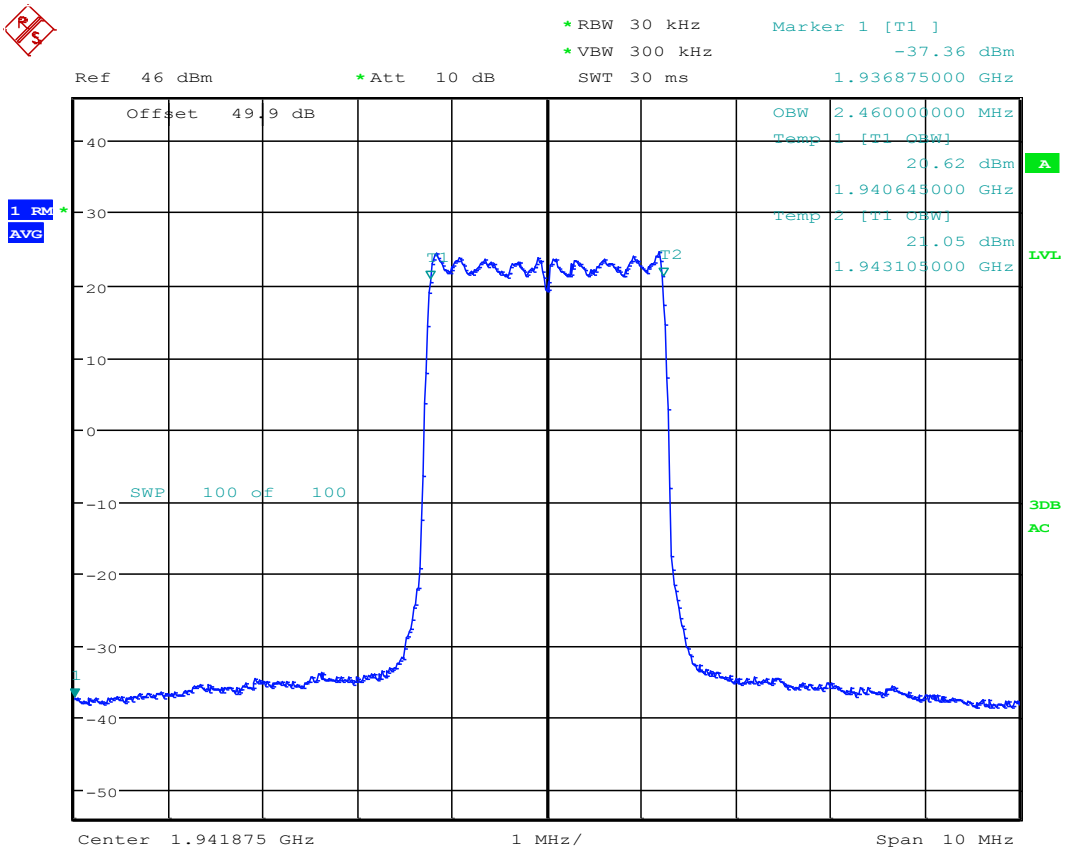
99% Bandwidth; Test Eng:JY; 65MHz LTE CDMA RRH

LTE-1935(QPSK/16QAM),1947.5(64QAM);10W/C

Date: 17.AUG.2016 18:04:42

FCC ID-AS5BBTRX-05

99% Power Bandwidth: LTE ONLY & LTE/CDMA



99% Bandwidth; Test Eng:JY; 65MHz LTE CDMA RRH

LTE-1985(QPSK/16QAM),1992.5(64QAM);CDMA-1941.25,1942.5;10W/C

Date: 30.AUG.2016 17:17:10

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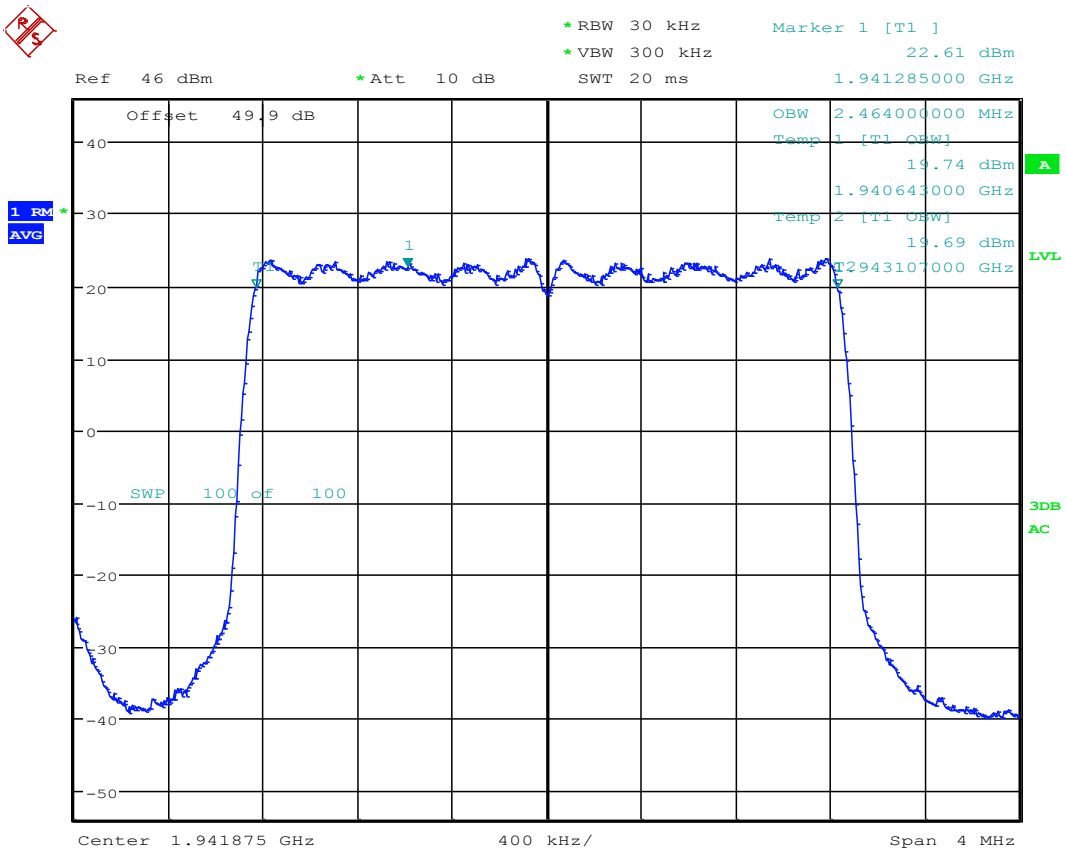

99% Bandwidth; Test Eng:JY; 65MHz LTE CDMA RRH

LTE-1935(QPSK/16QAM),1947.5(64QAM);CDMA-1941.25,1942.5;10W/C

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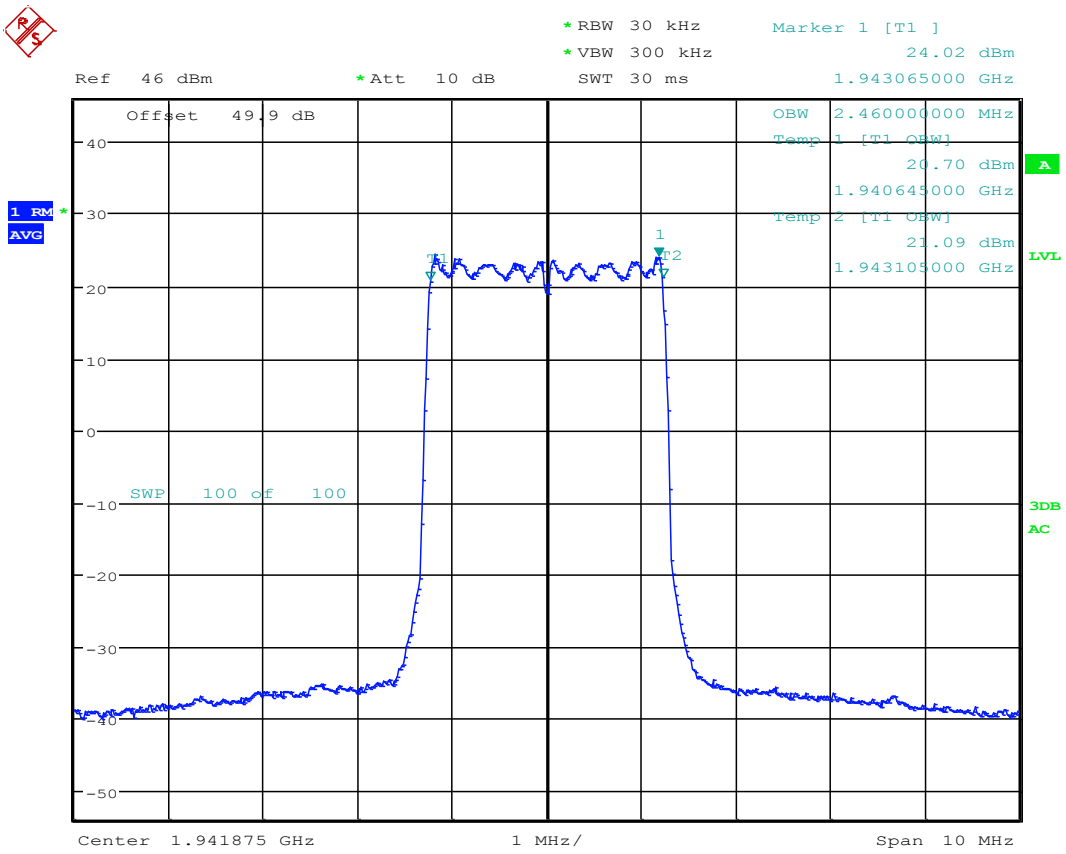

99% Bandwidth; Test Eng:JY; 65MHz LTE CDMA RRH

LTE-1980(QPSK/16QAM),1992.5(64QAM);CDMA-1941.25,1942.5;10W/C

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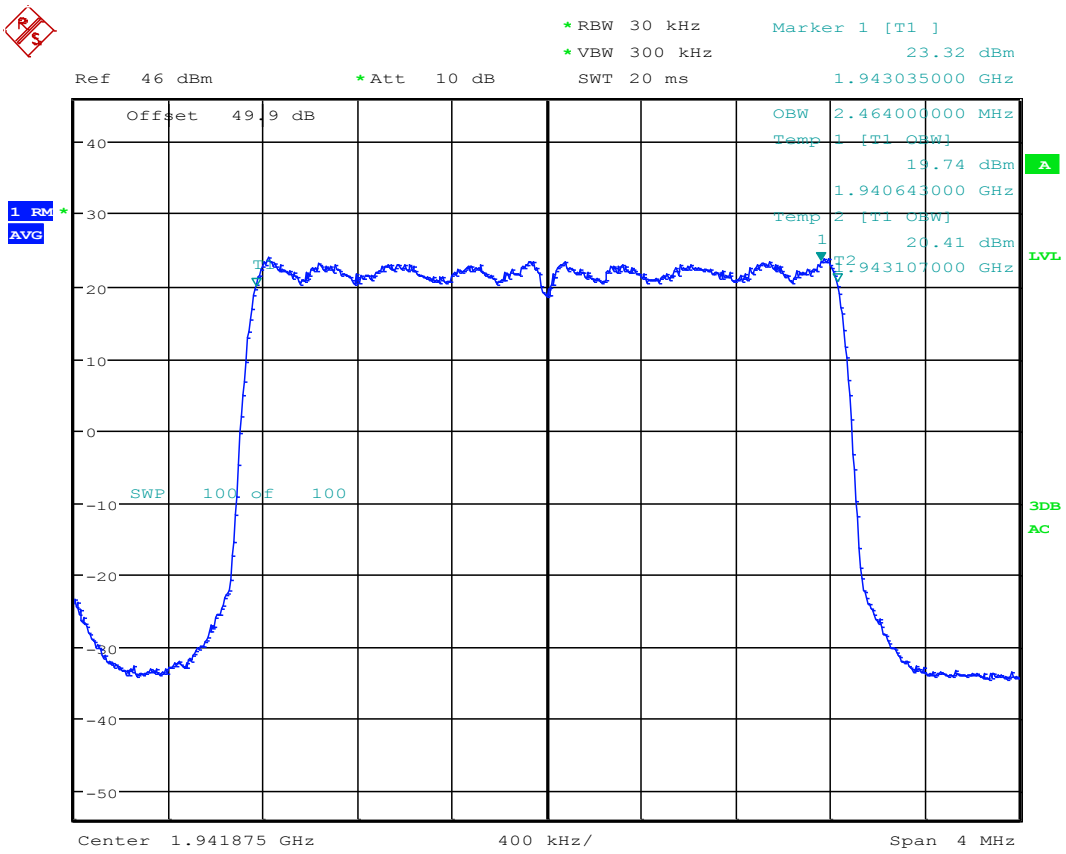

99% Bandwidth; Test Eng:JY; 65MHz LTE CDMA RRH

LTE-1935(QPSK/16QAM),1992.5(64QAM);CDMA-1941.25,1942.5;10W/C

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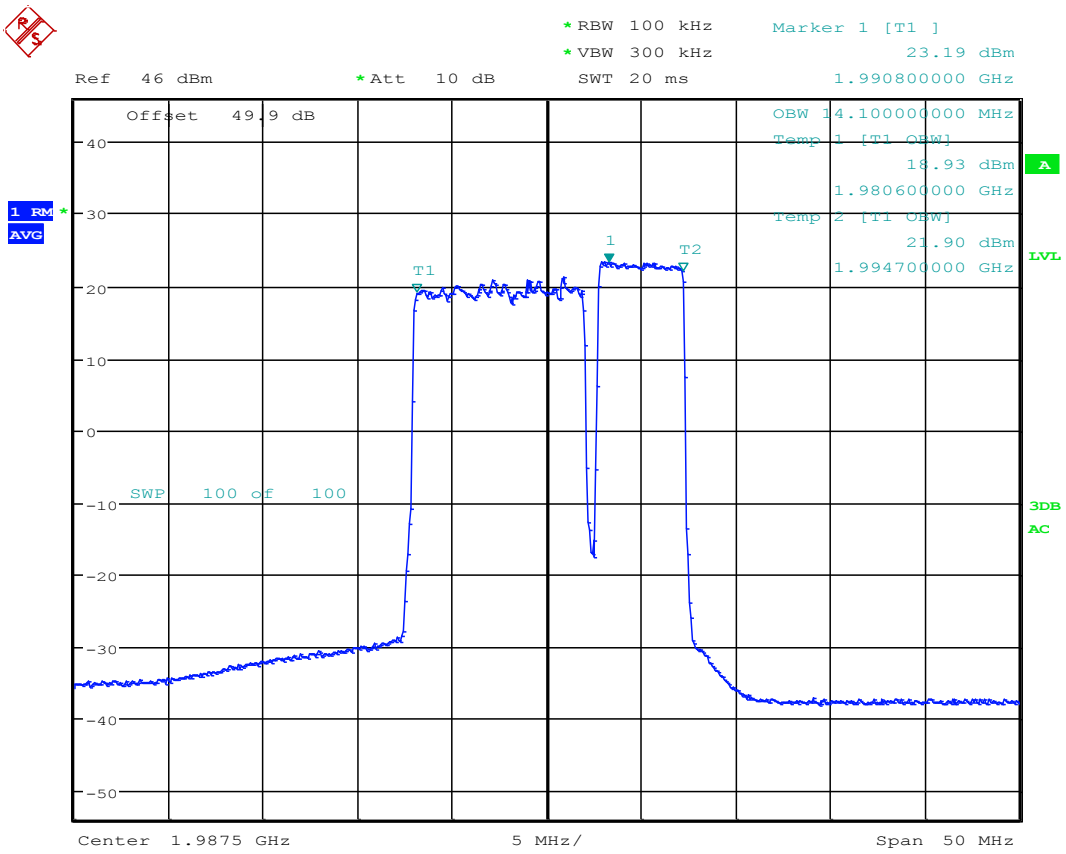

99% Bandwidth; Test Eng:JY; 65MHz LTE CDMA RRH

LTE-1985(QPSK/16QAM),1992.5(64QAM);CDMA-1941.25,1942.5M;10W/

C

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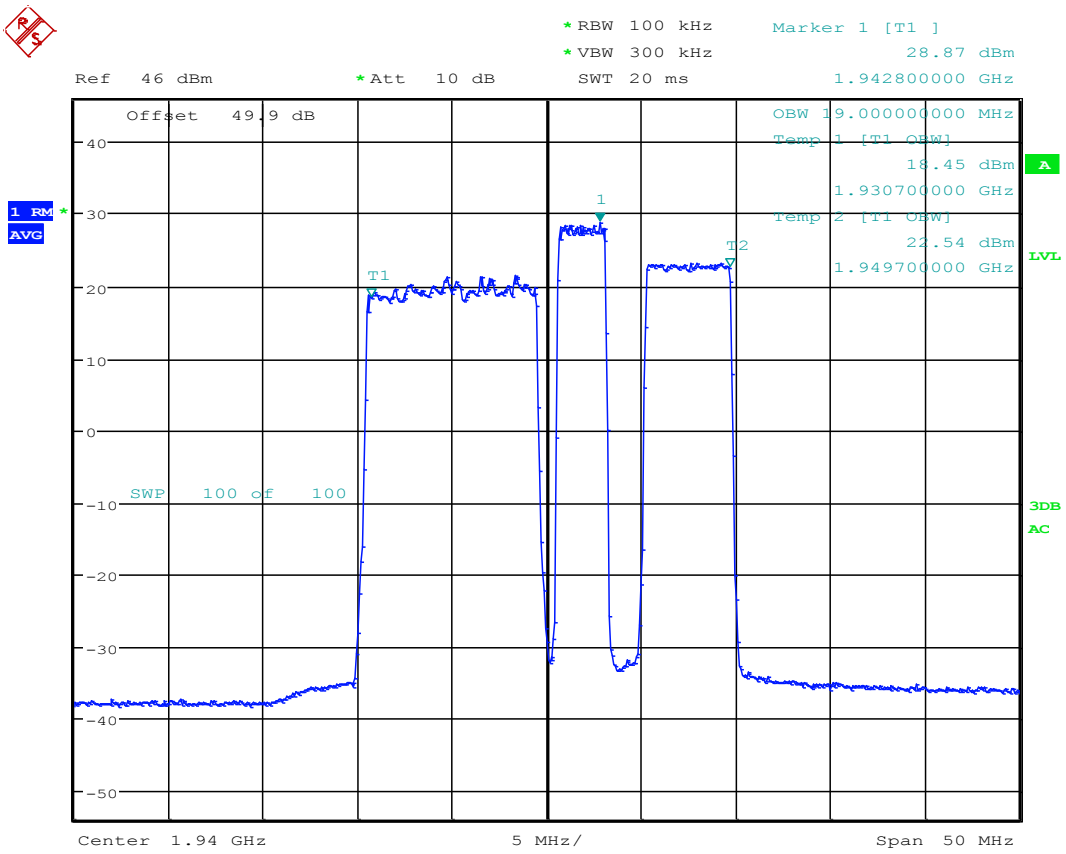

99% Bandwidth; Test Eng:JY; 65MHz LTE CDMA RRH

LTE-1935(QPSK/16QAM),1947.5(64QAM);CDMA-1941.25,1942.5;10W/C

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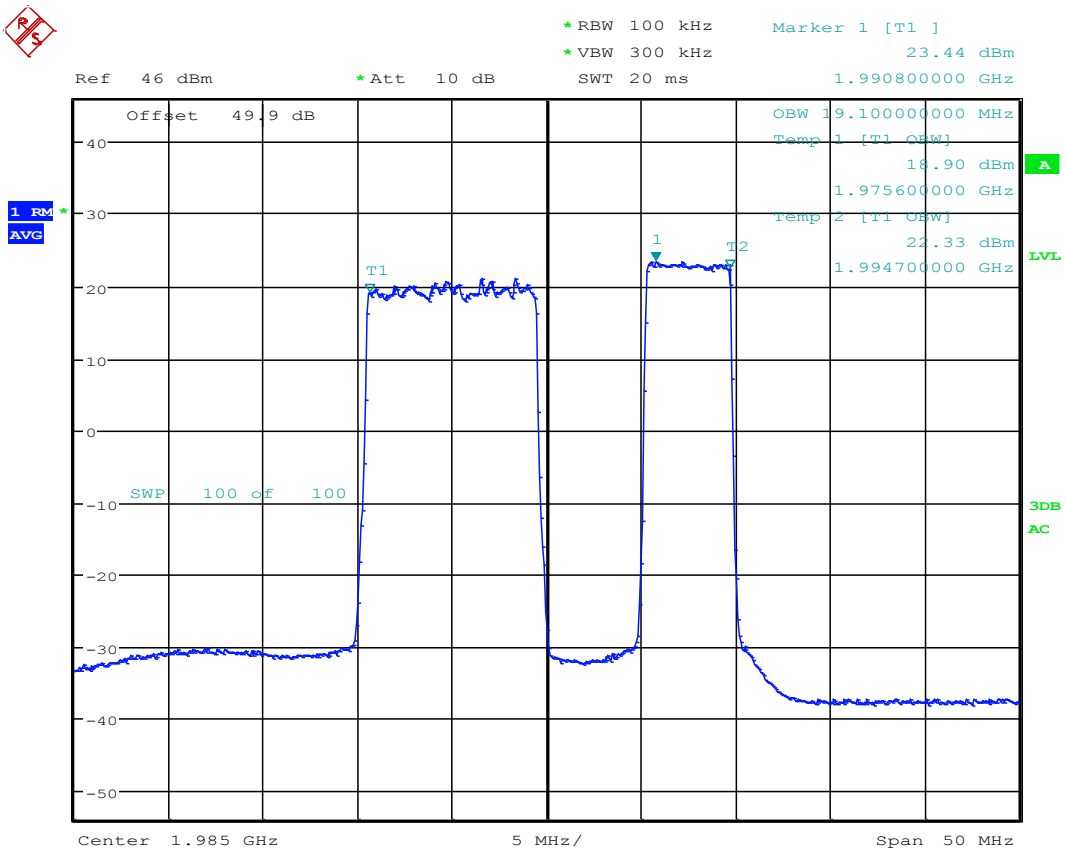
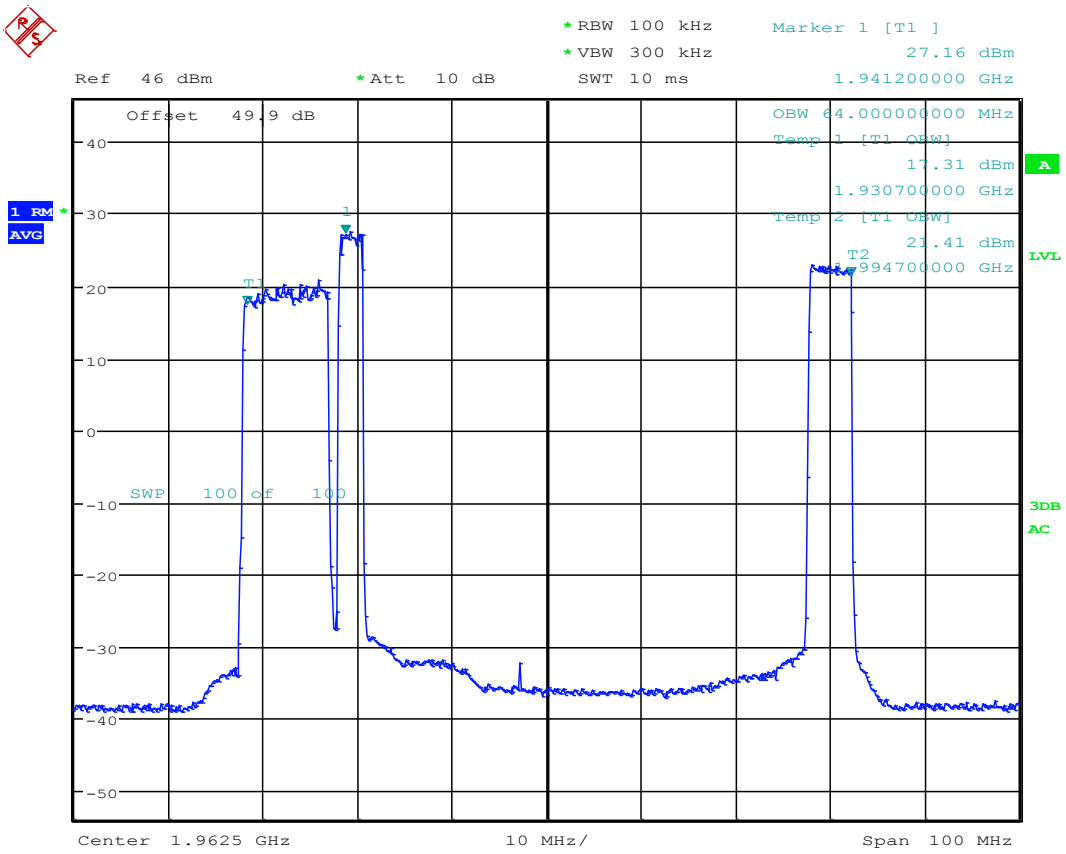


99% Bandwidth; Test Eng:JY; 65MHz LTE CDMA RRH

LTE-1980(QPSK/16QAM),1992.5(64QAM);CDMA-1941.25,1942.5;10W/C

Date: 17.AUG.2016 13:49:18

FCC ID-AS5BBTRX-05



Occupied Bandwidth; Test Eng:JY; 65MHz LTE CDMA RRH

LTE-1935(QPSK/16QAM),1992.5(64QAM);CDMA-1941.25,1942.5;10W/C

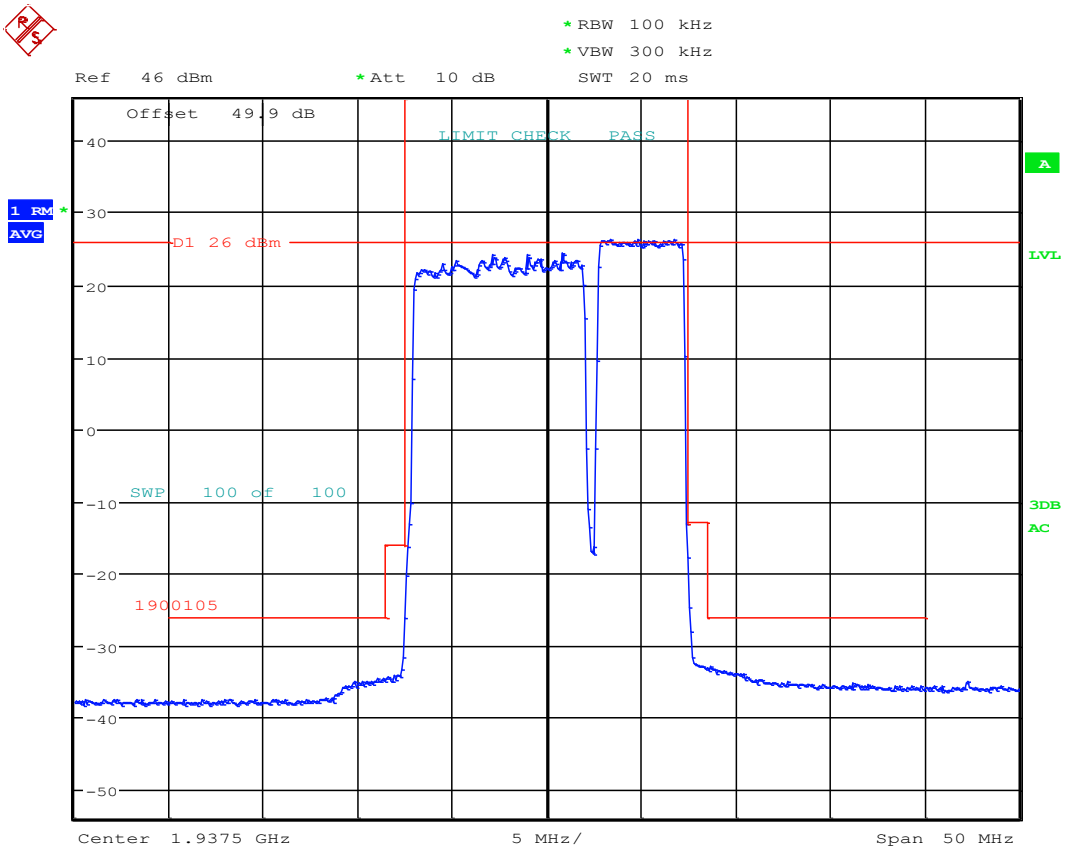
Date: 17.AUG.2016 14:44:13

FCC ID-AS5BBTRX-05

FIGURE 4.3.2 OCCUPIED BANDWIDTH PLOTS

LTE ONLY & LTE/CDMA

LTE ONLY

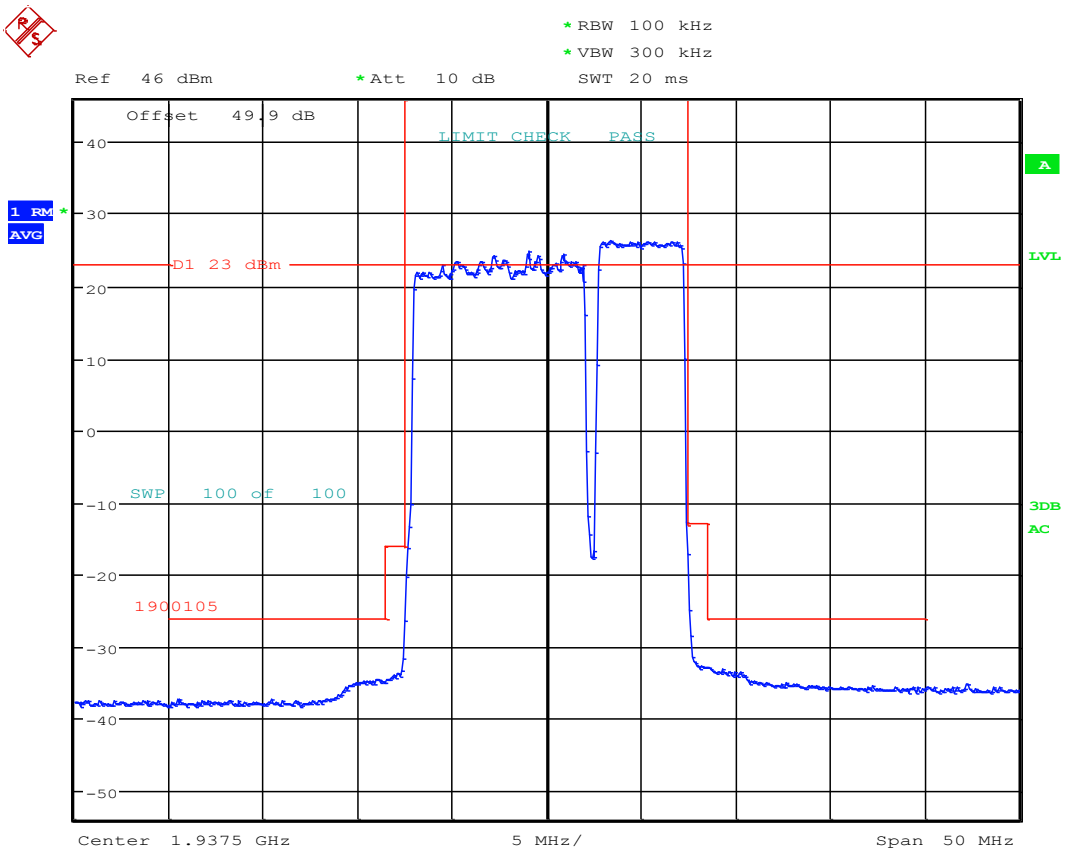


Occupied Bandwidth; Test Eng:JY; 65MHz LTE CDMA RRH

LTE-1935(QPSK/16QAM),1942.5(64QAM);10W/C

Date: 17.AUG.2016 18:30:18

FCC ID-AS5BBTRX-05
PWR: 20 Watts/Carrier



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LTE-1935(QPSK/16QAM),1942.5(64QAM);10W/C

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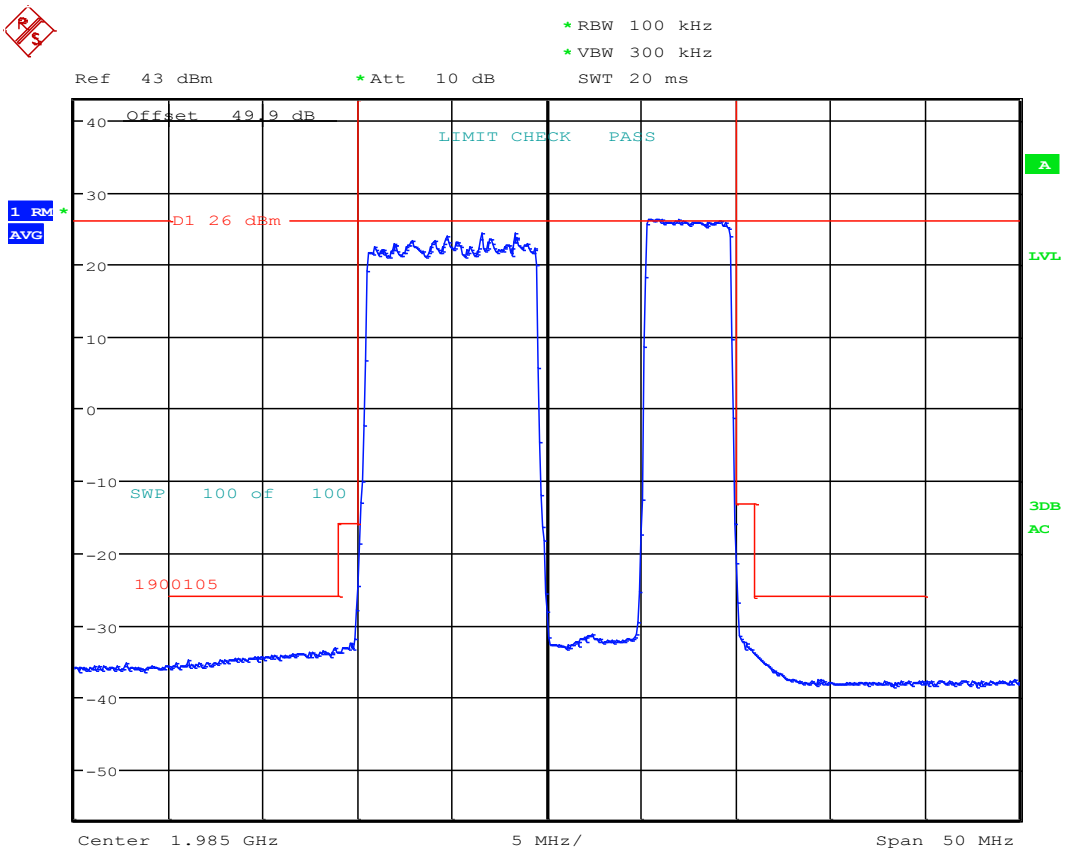

Occupied Bandwidth; Test Eng:JY; 65MHz LTE CDMA RRH

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Date: 17.AUG.2016 16:48:59

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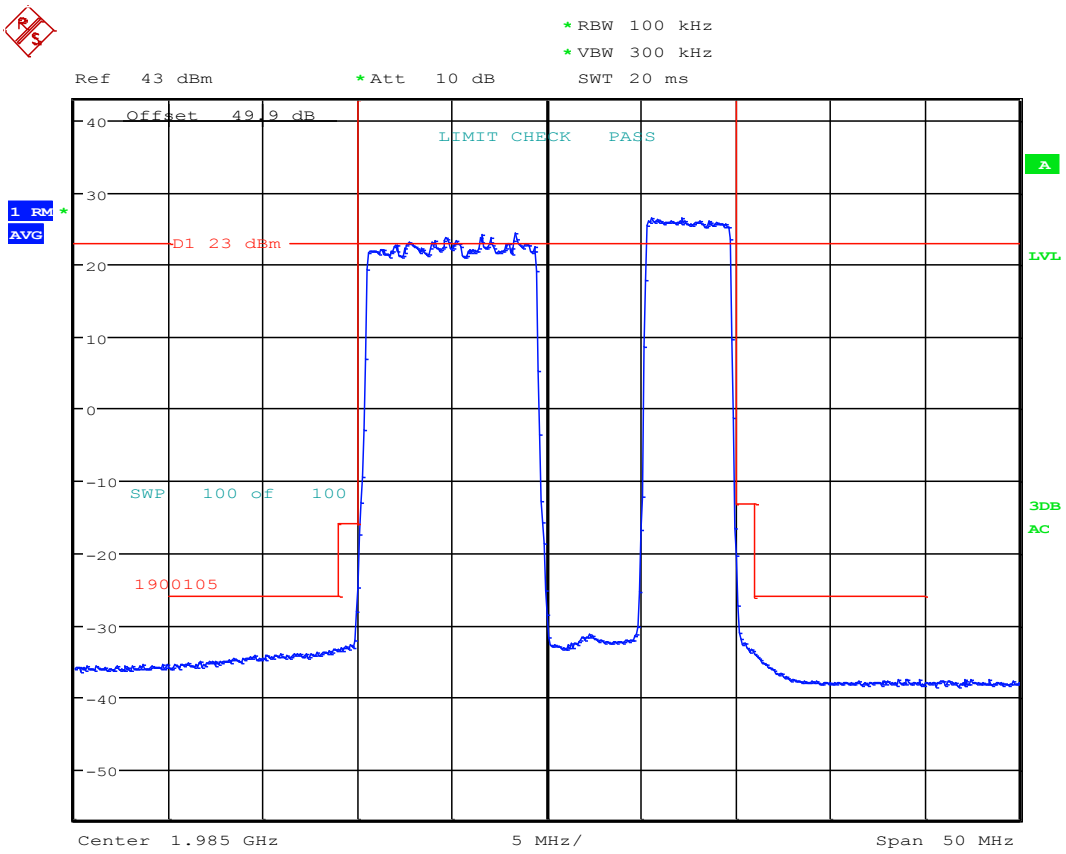

Occupied Bandwidth; Test Eng:JY; 65MHz LTE CDMA RRH

LTE-1980(QPSK/16QAM),1992.5(64QAM);10W/C

Date: 17.AUG.2016 16:49:12

FCC ID-AS5BBTRX-05
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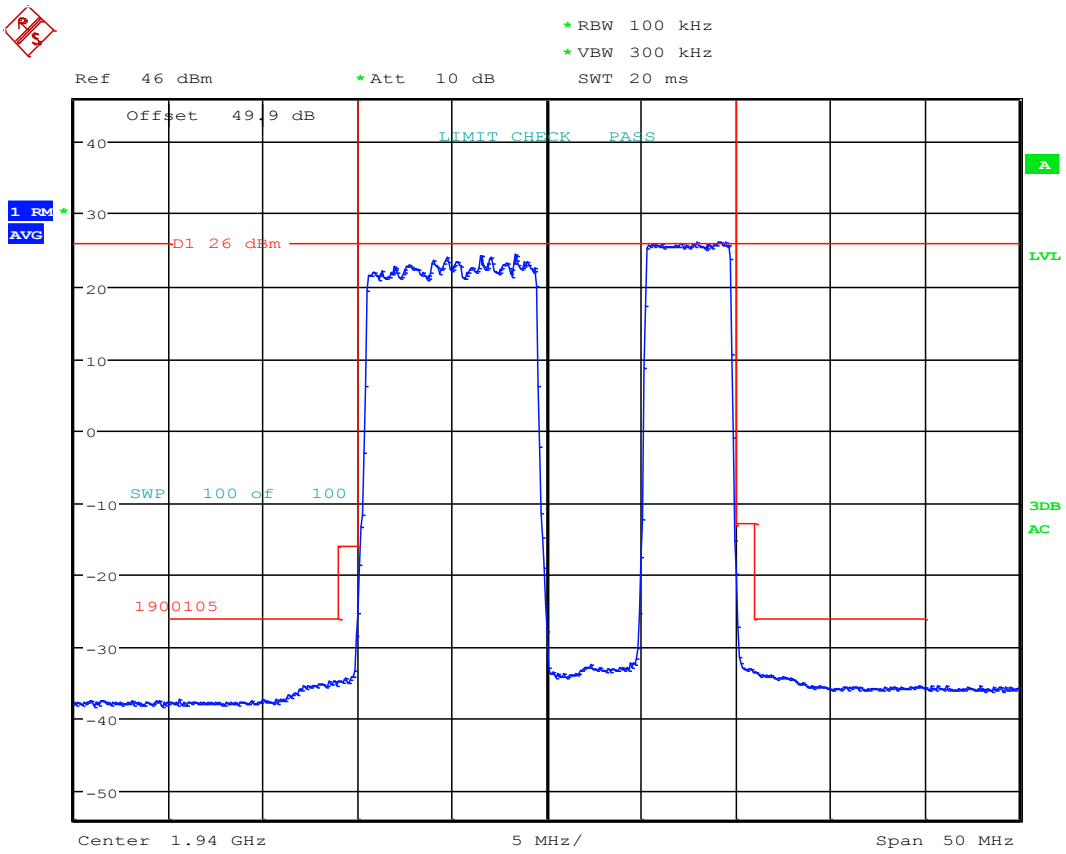

Occupied Bandwidth; Test Eng:JY; 65MHz LTE CDMA RRH

LTE-1935(QPSK/16QAM),1947.5(64QAM);10W/C

Date: 17.AUG.2016 17:55:42

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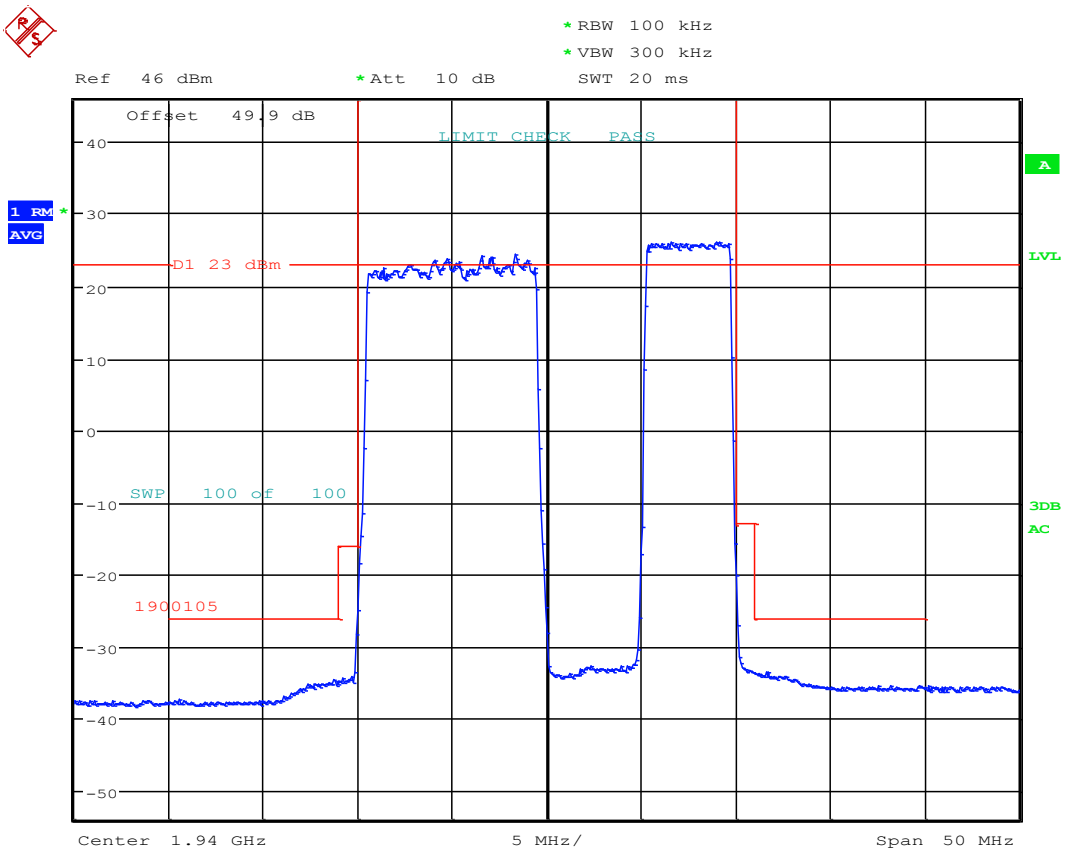

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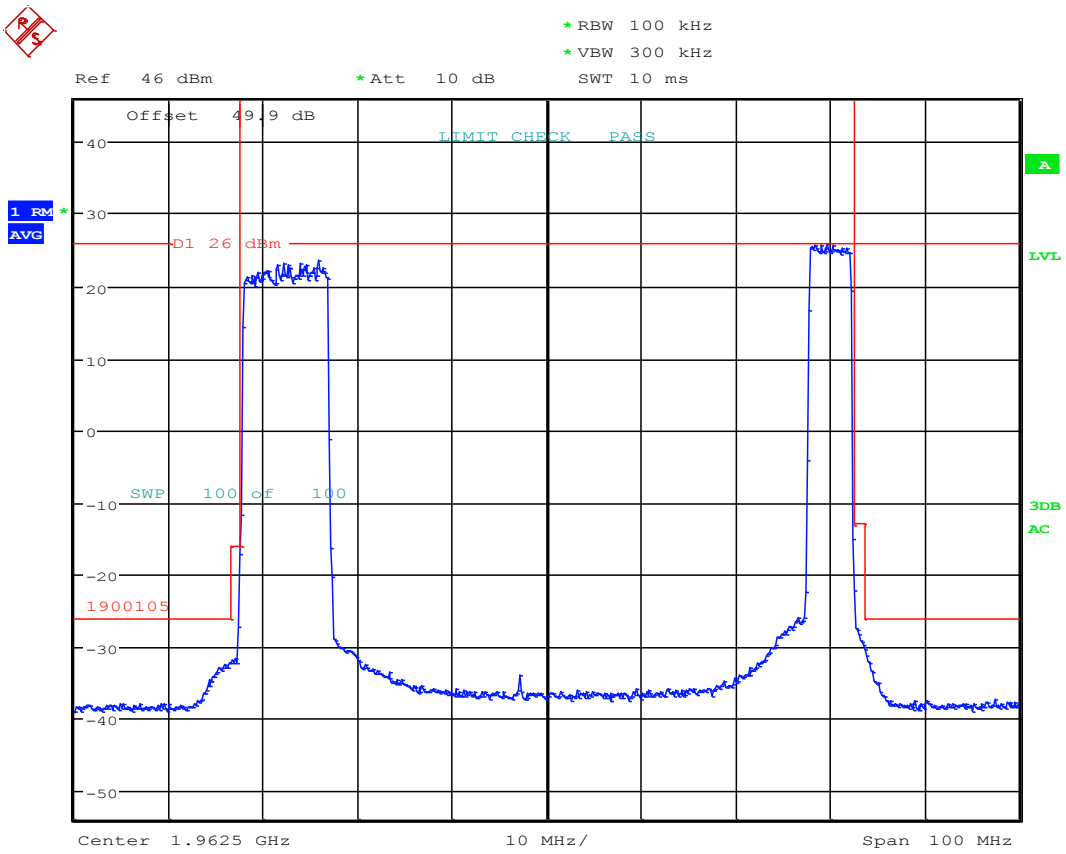

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LTE-1935(QPSK/16QAM),1992.5(64QAM);10W/C

Date: 17.AUG.2016 18:54:20

FCC ID-AS5BBTRX-05
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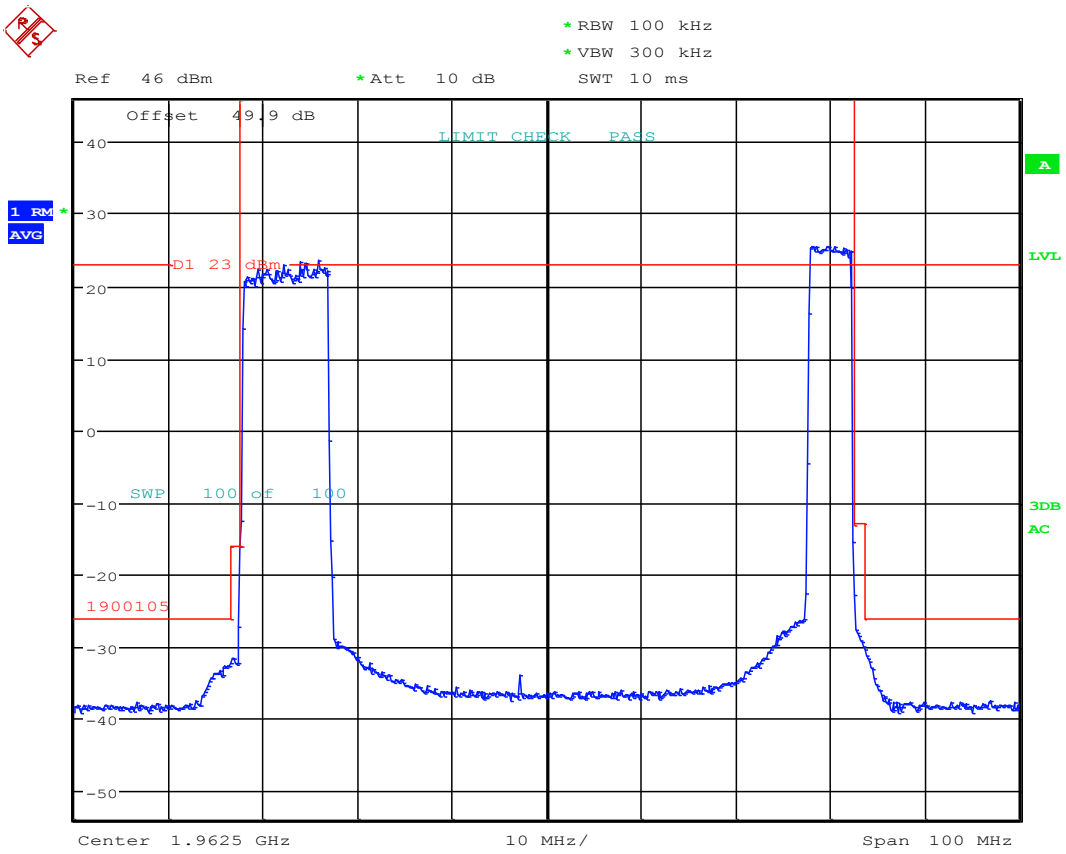

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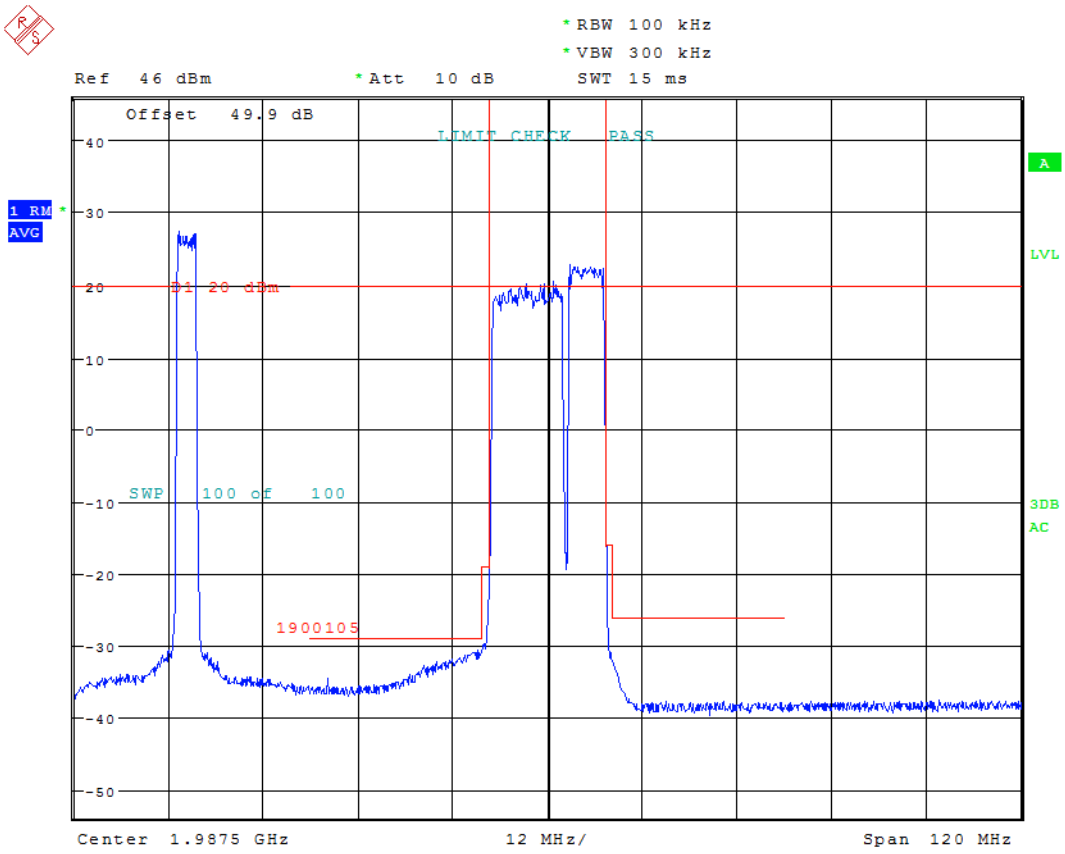
LTE-1935(QPSK/16QAM),1992.5(64QAM);10W/C

Date: 17.AUG.2016 18:54:07

FCC ID-AS5BBTRX-05
PWR: 20 Watts/Carrier

LTE &CDMA

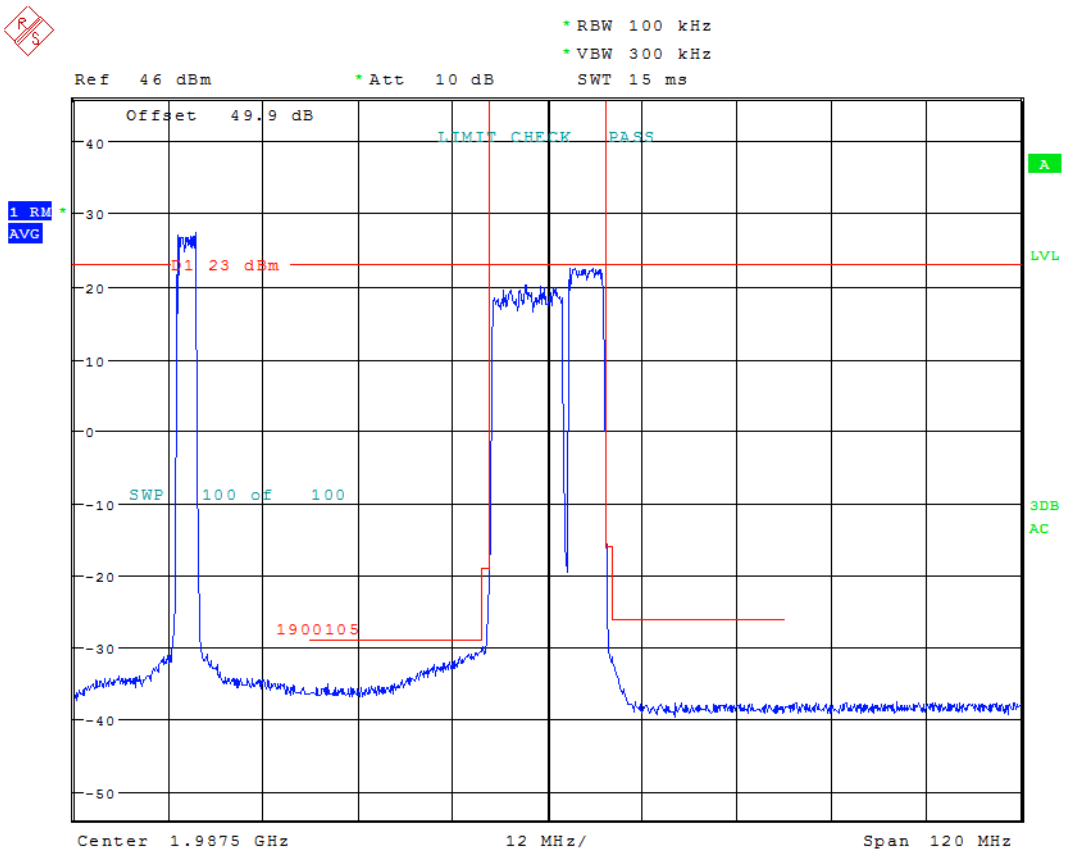


Occupied Bandwidth; Test Eng:JY; 65MHz LTE CDMA RRH

LTE-1985(QPSK/16QAM),1992.5(64QAM);CDMA-1941.25,1942.5;10W/C

Date: 9.SEP.2016 16:53:27

FCC ID-AS5BBTRX-05



Occupied Bandwidth; Test Eng:JY; 65MHz LTE CDMA RRH

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Date: 9.SEP.2016 16:53:06

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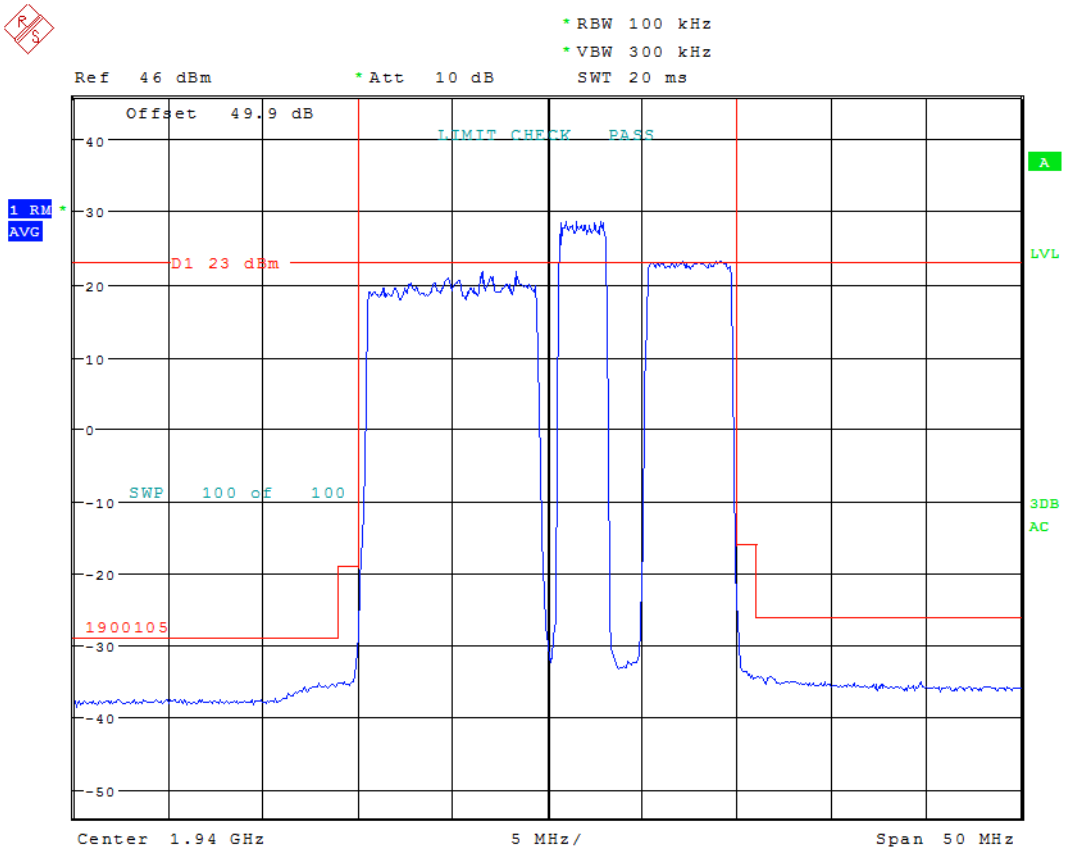
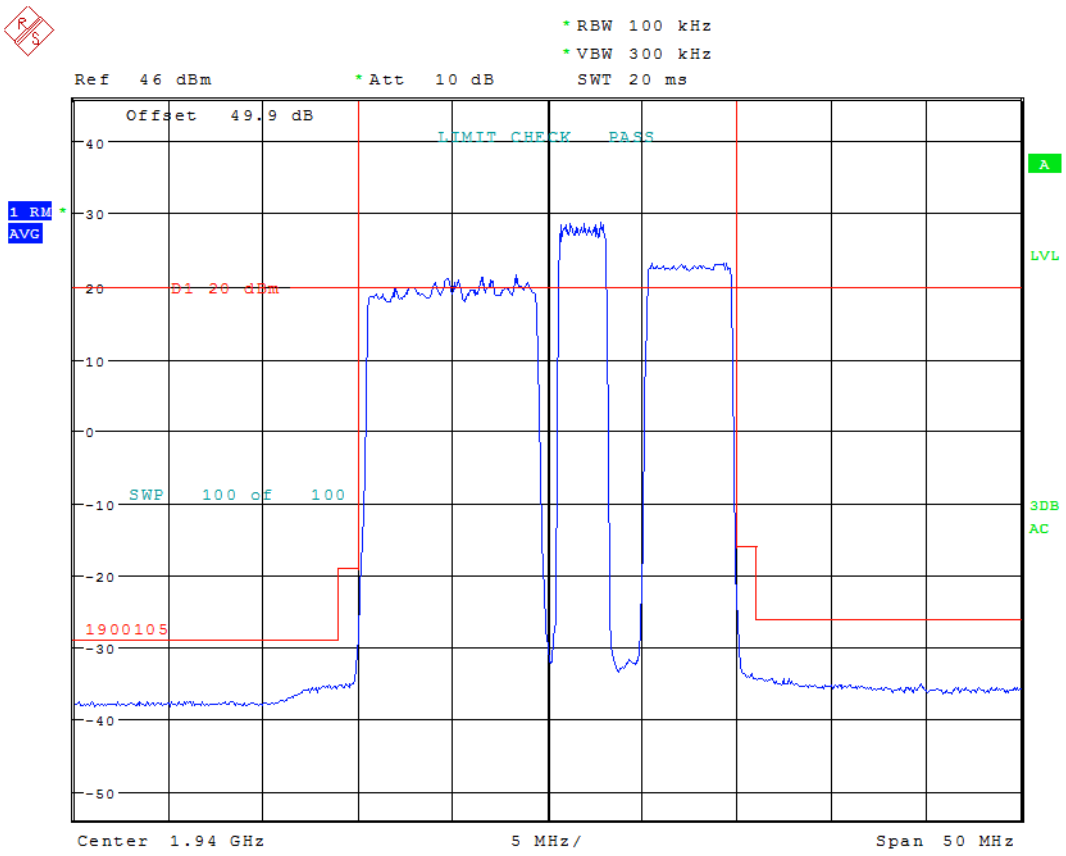


Occupied Bandwidth; Test Eng:JY; 65MHz LTE CDMA RRH

LTE-1935(QPSK/16QAM),1947.5(64QAM);CDMA-1941.25,1942.5;10W/C

Date: 9.SEP.2016 14:33:42

FCC ID-AS5BBTRX-05

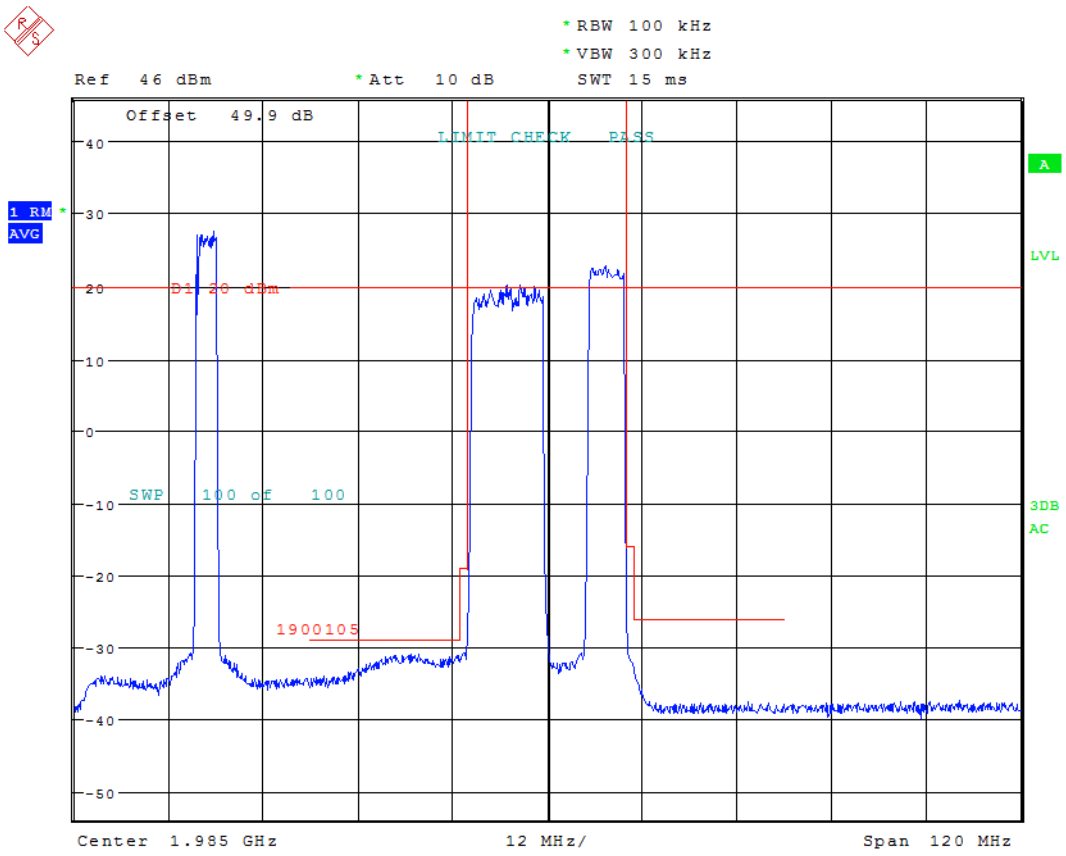


Occupied Bandwidth; Test Eng:JY; 65MHz LTE CDMA RRH

LTE-1935(QPSK/16QAM),1947.5(64QAM);CDMA-1941.25,1942.5;10W/C

Date: 9.SEP.2016 14:33:28

FCC ID-AS5BBTRX-05



Occupied Bandwidth; Test Eng:JY; 65MHz LTE CDMA RRH

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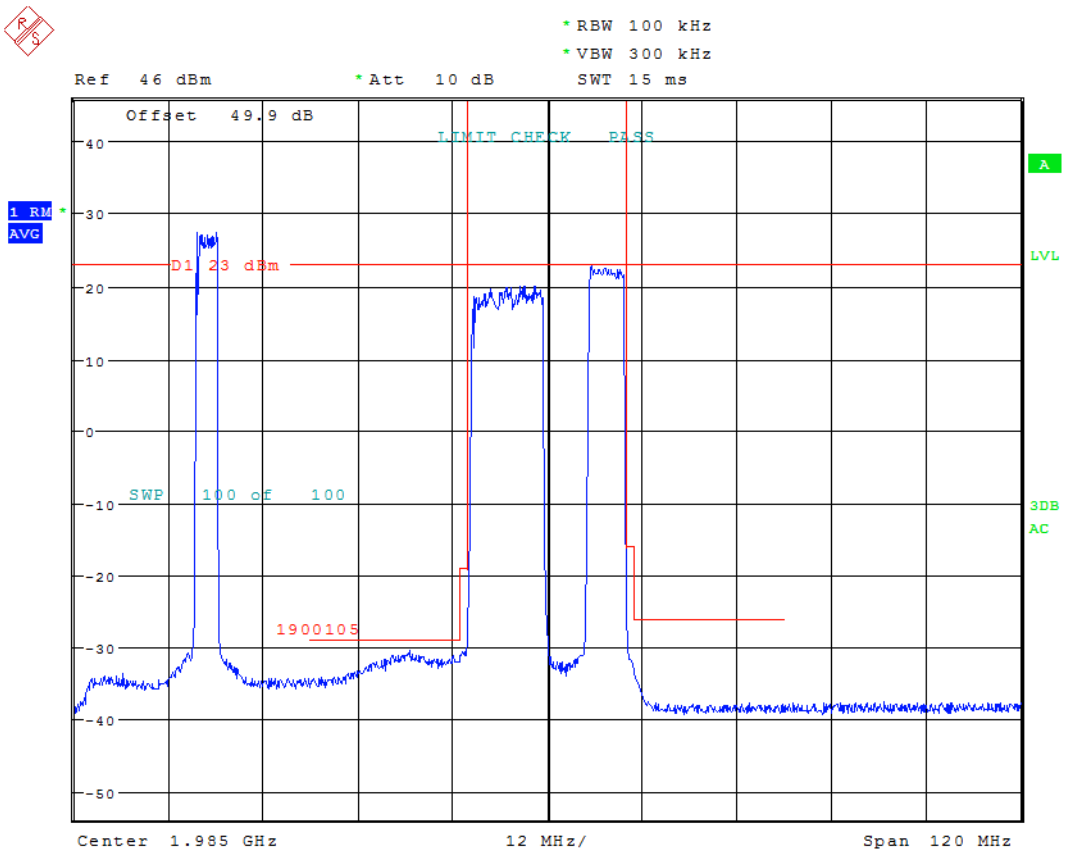

Occupied Bandwidth; Test Eng:JY; 65MHz LTE CDMA RRH

LTE-1980(QPSK/16QAM),1992.5(64QAM);CDMA-1941.25,1942.5;10W/C

Date: 9.SEP.2016 16:11:57

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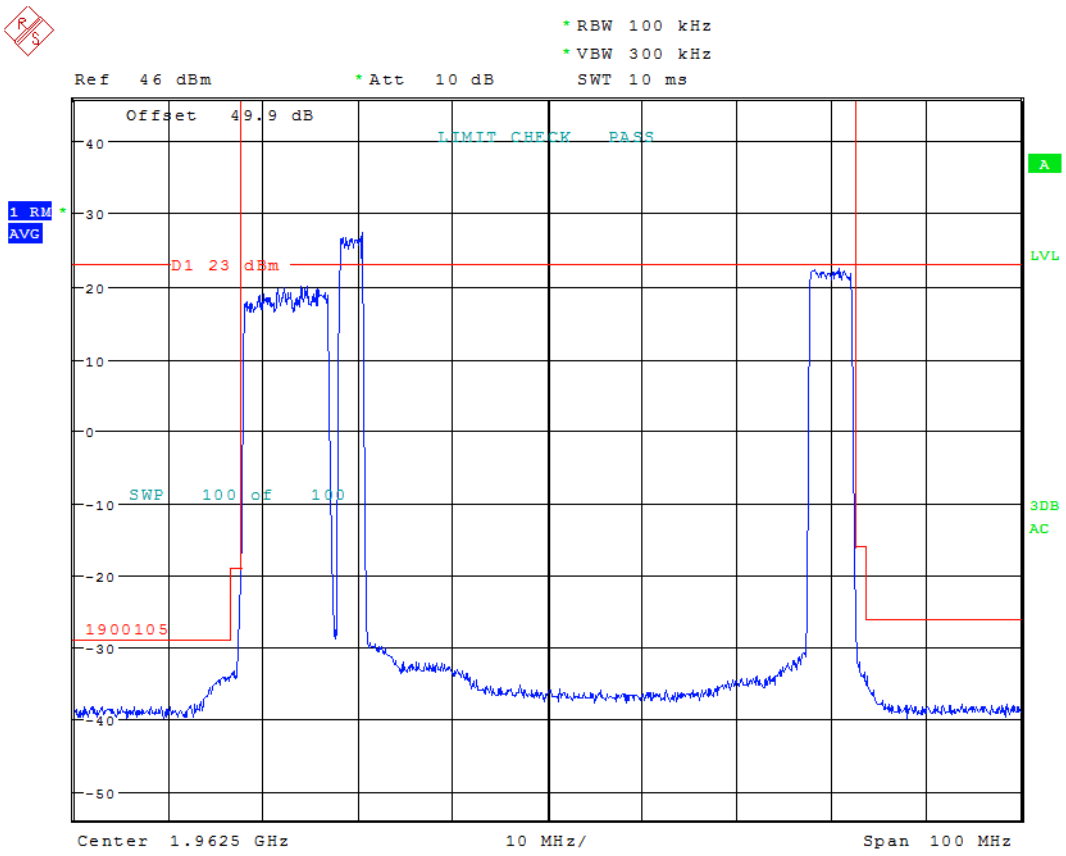
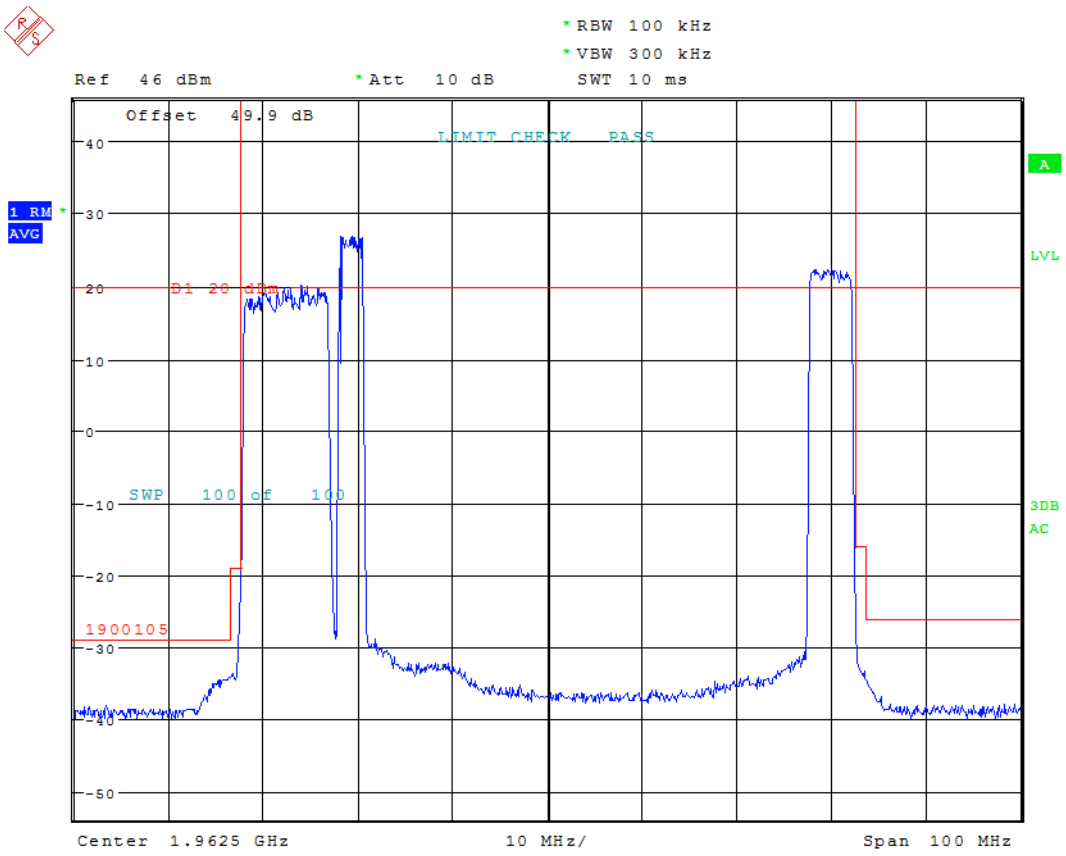


Occupied Bandwidth; Test Eng:JY; 65MHz LTE CDMA RRH

LTE-1935(QPSK/16QAM),1992.5(64QAM);CDMA-1941.25,1942.5;10W/C

Date: 9.SEP.2016 15:34:25

FCC ID-AS5BBTRX-05



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LTE-1935(QPSK/16QAM),1992.5(64QAM);CDMA-1941.25,1942.5;10W/C

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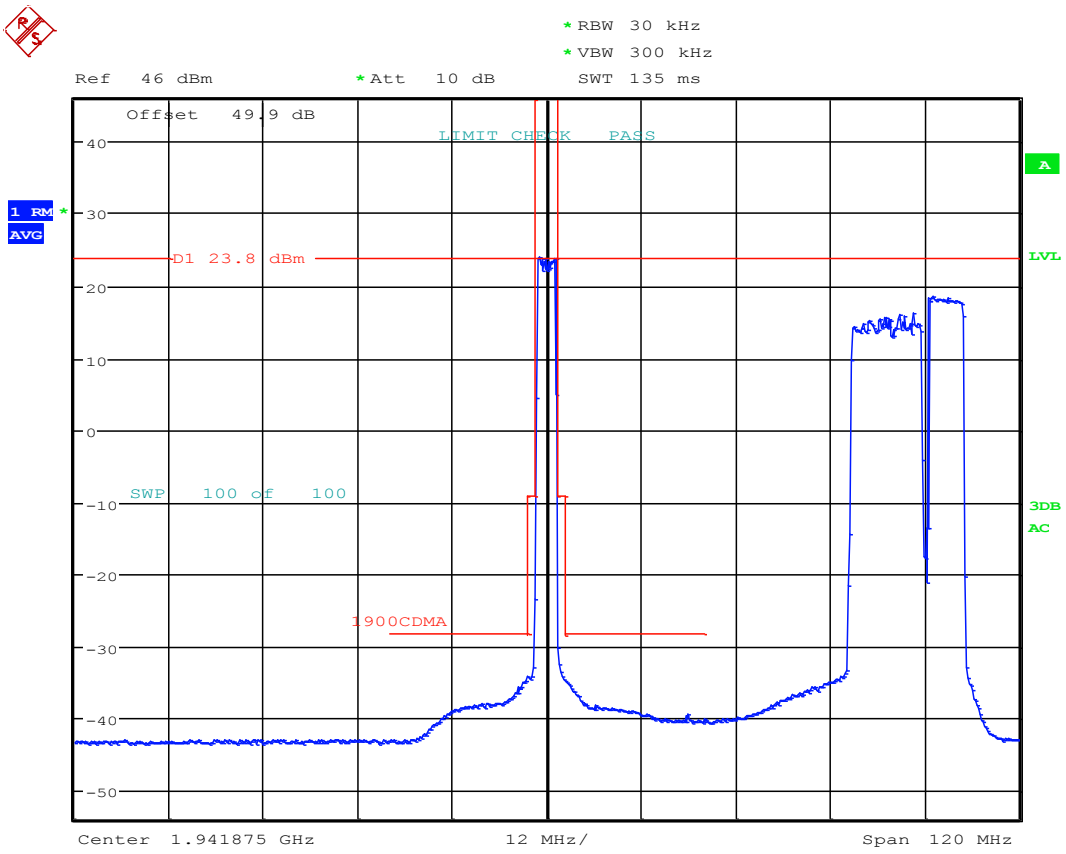

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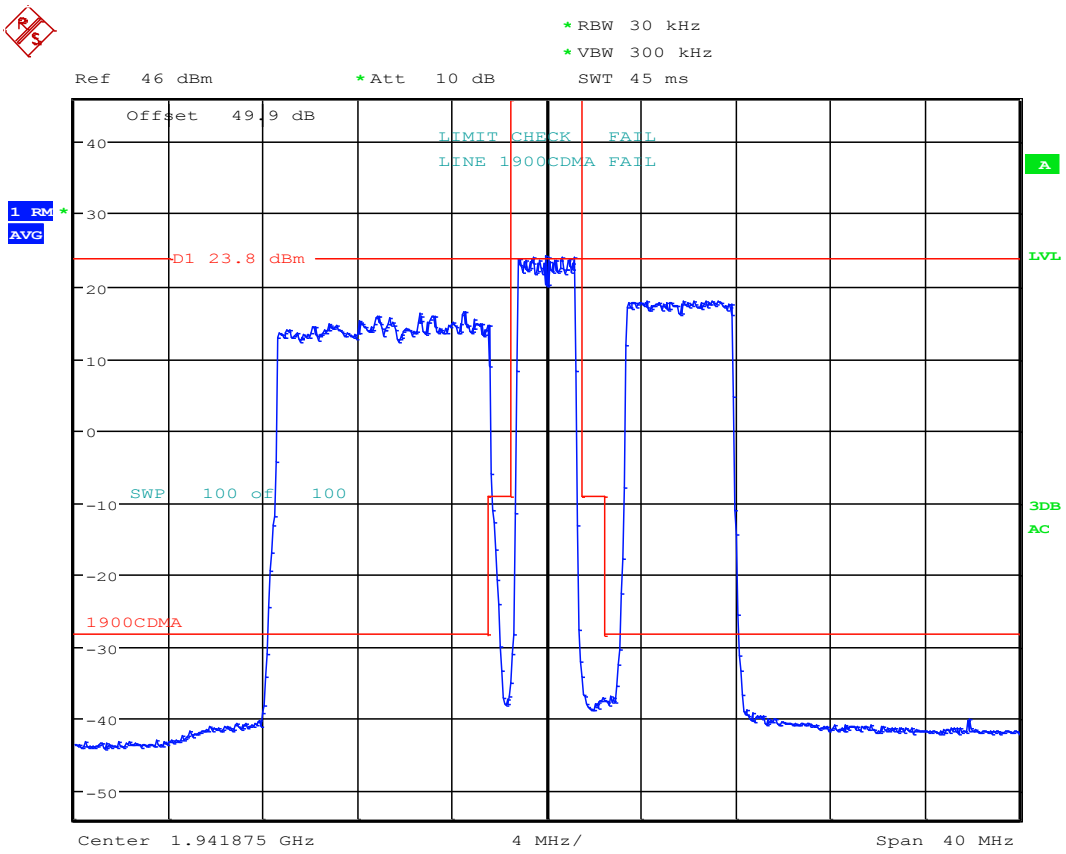
Date: 30.AUG.2016 17:20:04

FCC ID-AS5BBTRX-05



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Date: 31.AUG.2016 16:45:14

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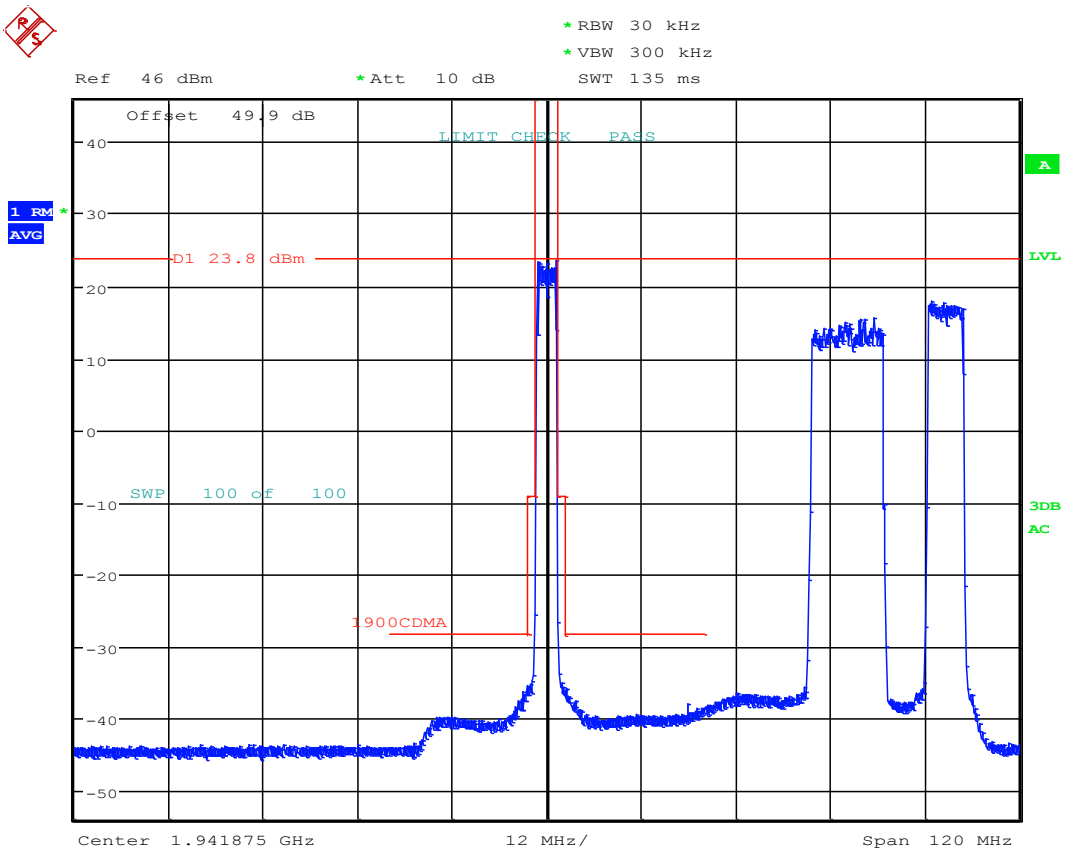
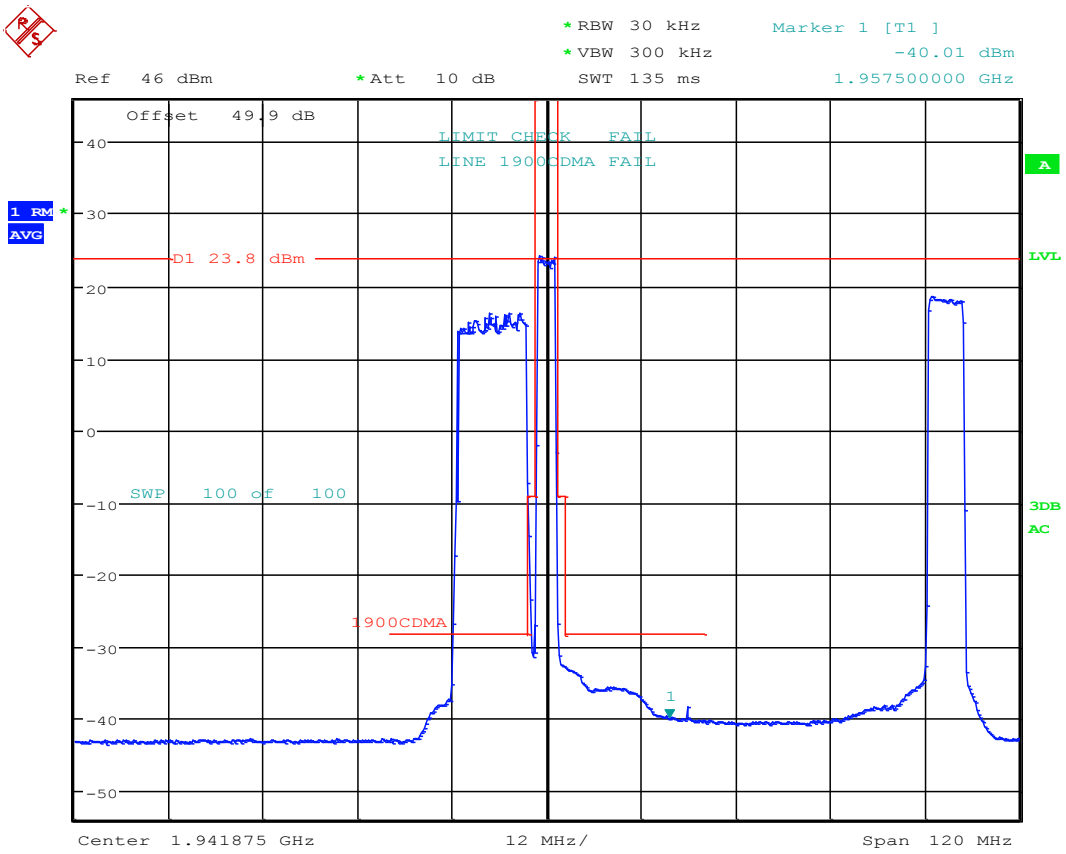


Occupied Bandwidth; Test Eng:JY; 65MHz LTE CDMA RRH

LTE-1980(QPSK/16QAM),1992.5(64QAM);CDMA-1941.25,1942.5;10W/C

Date: 29.AUG.2016 17:53:12

FCC ID-AS5BBTRX-05



Occupied Bandwidth; Test Eng:JY; 65MHz LTE CDMA RRH

LTE-1935(QPSK/16QAM),1992.5(64QAM);CDMA-1941.25,1942.5;10W/C

Date: 18.AUG.2016 17:34:41

FCC ID-AS5BBTRX-05

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.

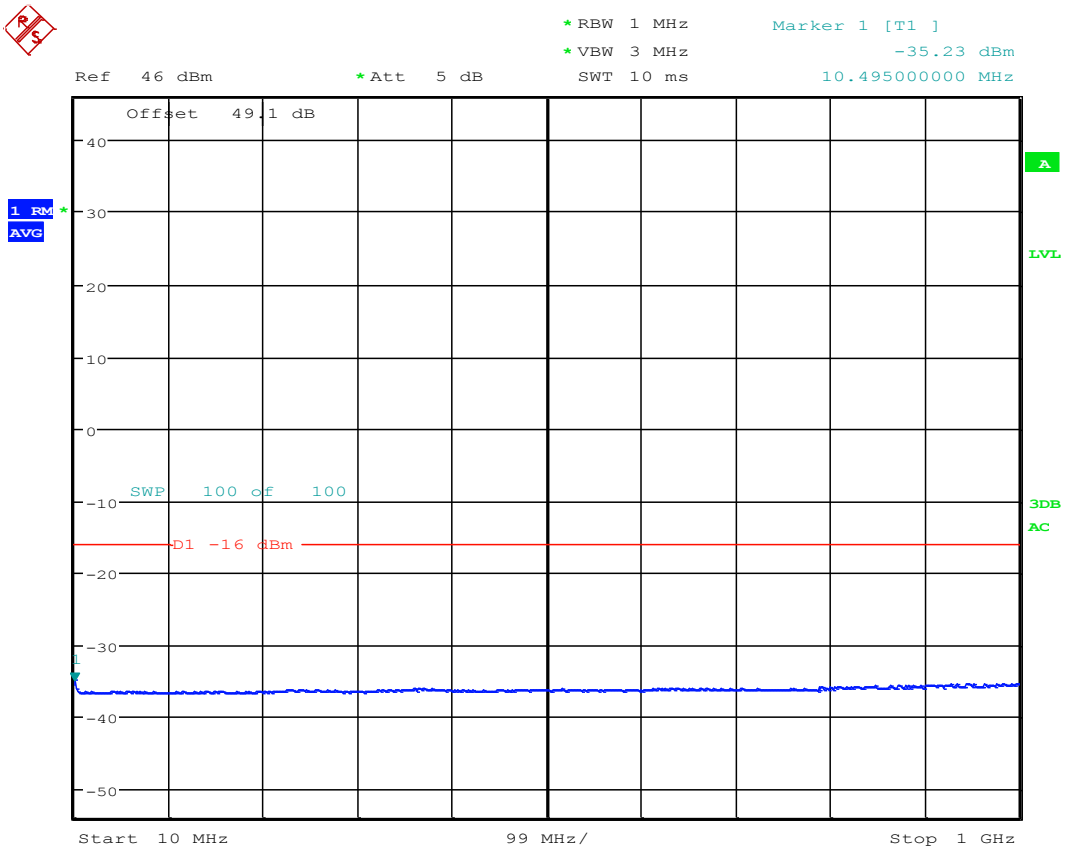
The measurement met the requirements of ANSI C63.26 paragraphs 5.2.4.4.1 and 5.7 which requires that the number of points in the sweep be > 2 × Span/RBW.

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.

Note: The limit line in the following plots should be -19dBm for 4x4 MIMO which is 3dB below the red line displayed.

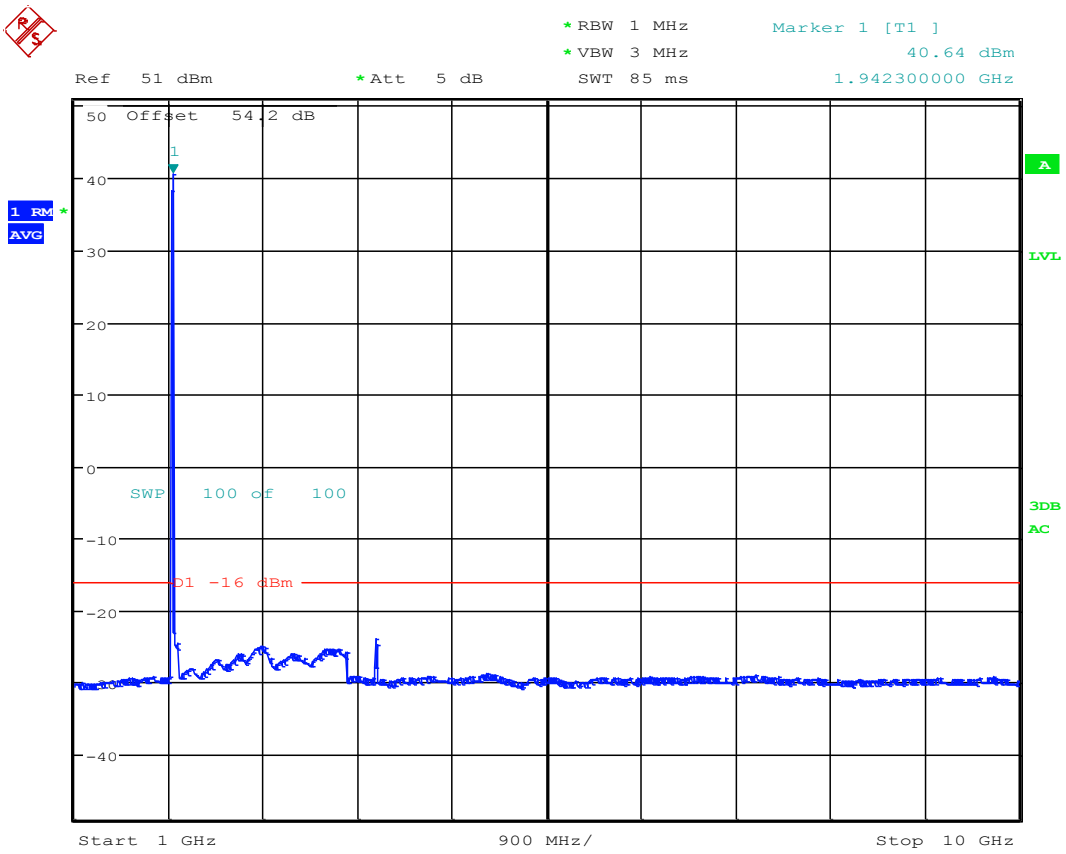


TX Spurious; Test Eng:JY; 65MHz LTE CDMA RRH

LTE-1935(QPSK/16QAM),1942.5(64QAM);10W/C

Date: 17.AUG.2016 18:31:53

FCC ID-AS5BBTRX-05

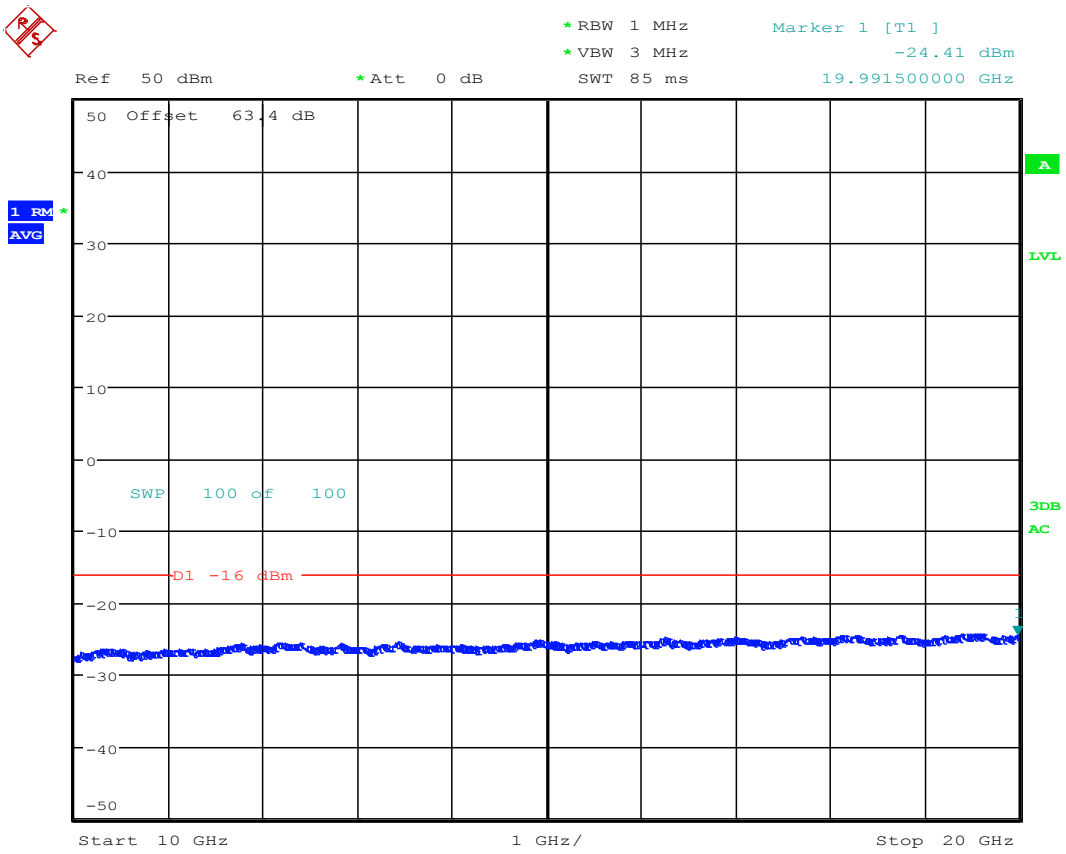


TX Spurious; Test Eng:JY; 65MHz LTE CDMA RRH

LTE-1935(QPSK/16QAM),1942.5(64QAM);10W/C

Date: 17.AUG.2016 18:33:01

FCC ID-AS5BBTRX-05



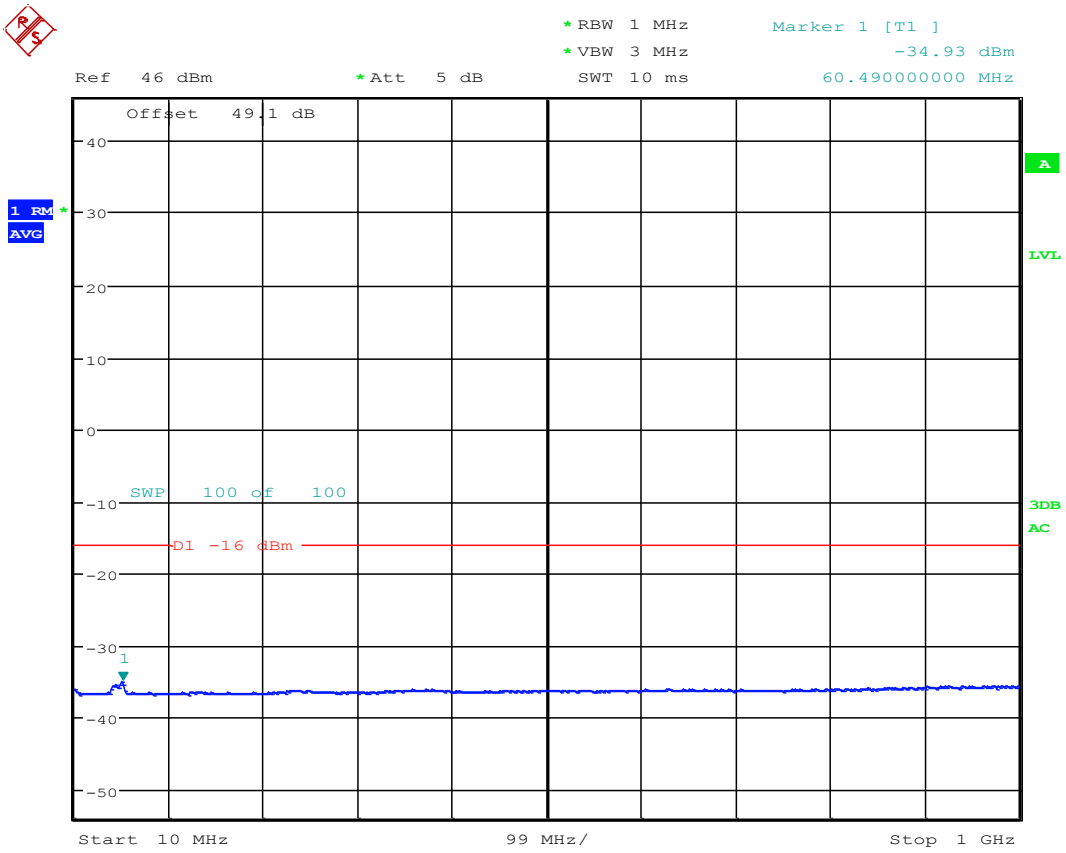
TX Spurious; Test Eng:JY; 65MHz LTE CDMA RRH

LTE-1935(QPSK/16QAM),1942.5(64QAM);10W/C

Date: 17.AUG.2016 18:34:01

FCC ID-AS5BBTRX-05

LTE/CDMA

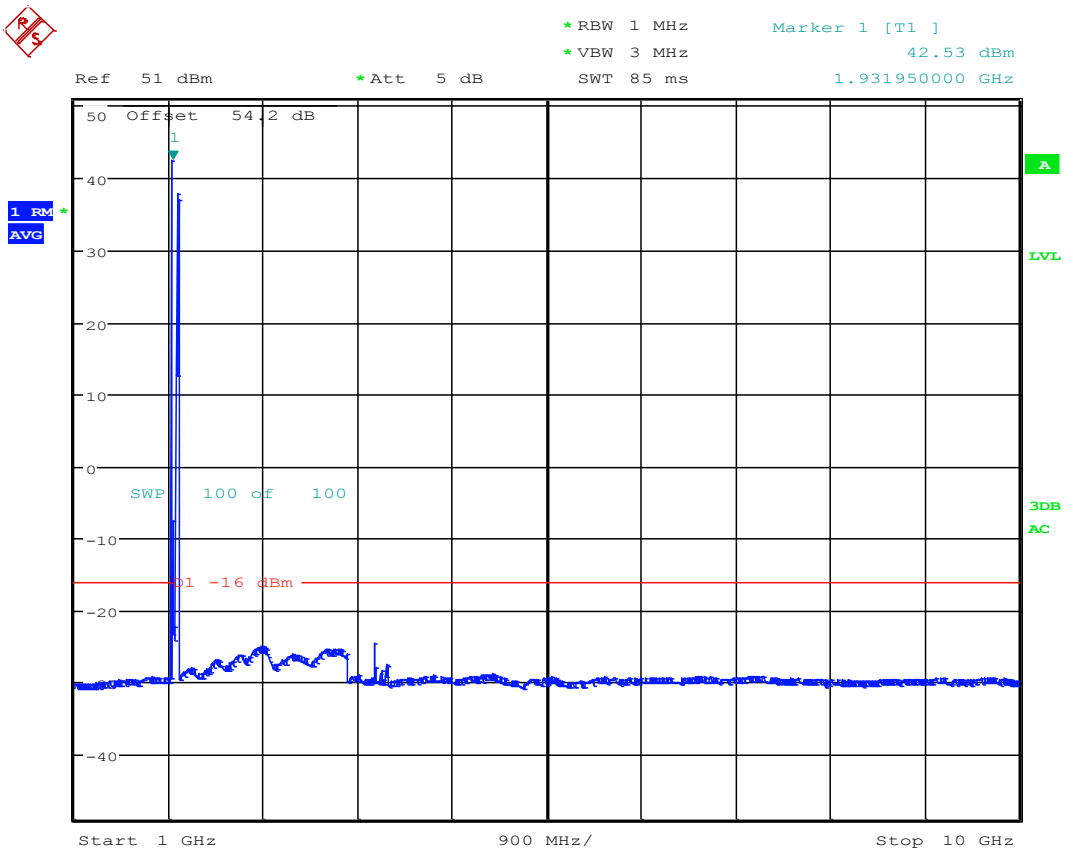


TX Spurious; Test Eng:JY; 65MHz LTE CDMA RRH

LTE-1985(QPSK/16QAM),1992.5(64QAM);CDMA-1931.25,1932.5;10W/C

Date: 10.AUG.2016 17:30:46

FCC ID-AS5BBTRX-05

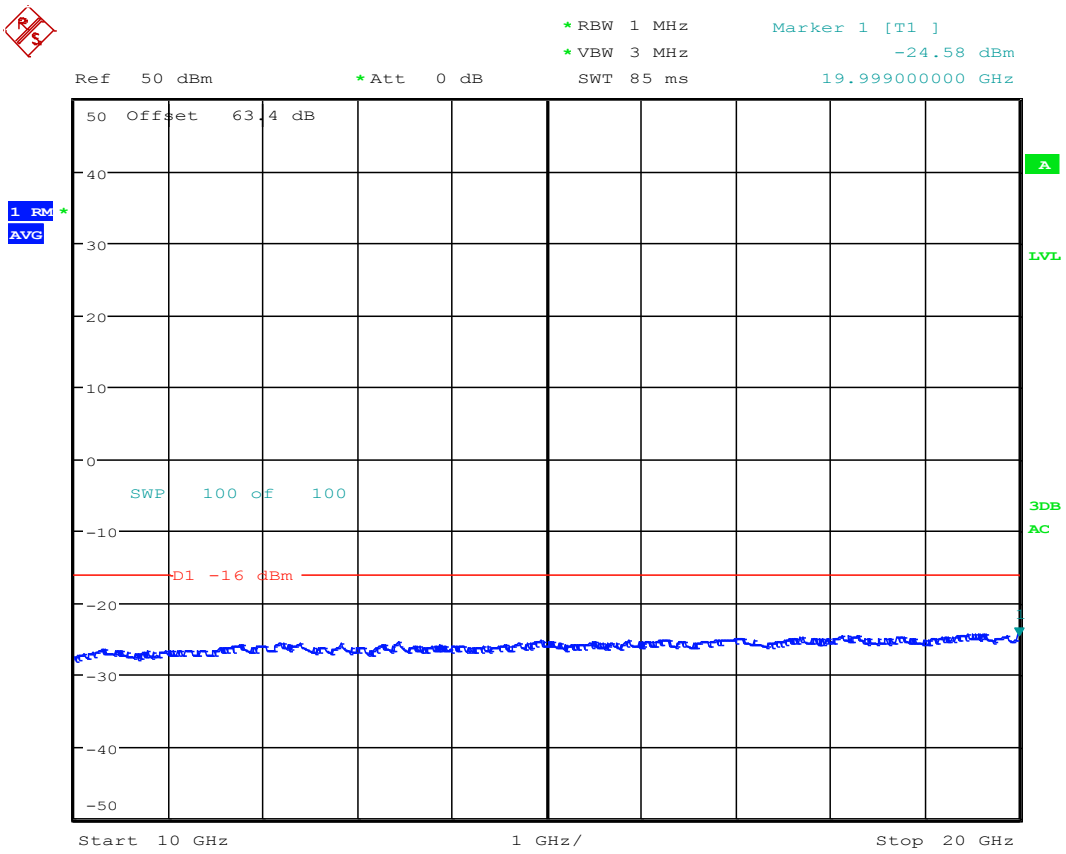


TX Spurious; Test Eng:JY; 65MHz LTE CDMA RRH

LTE-1985(QPSK/16QAM),1992.5(64QAM);CDMA-1931.25,1932.5;10W/C

Date: 10.AUG.2016 17:30:19

FCC ID-AS5BBTRX-05



TX Spurious; Test Eng:JY; 65MHz LTE CDMA RRH

LTE-1985(QPSK/16QAM),1992.5(64QAM);CDMA-1931.25,1932.5;10W/C

Date: 10.AUG.2016 17:29:00

FCC ID-AS5BBTRX-05

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: 515091) and IC (Filing Number: 6933F-5) registered three meter semi-anechoic chamber AR-5 which is maintained by Alcatel-Lucent in Murray Hill, New Jersey.

The CDMA-LTE PCS RRH 4x45W B25 (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 4x MIMO 5 MHz LTE carrier in A Block at 1932.5 MHz and 1990 MHz in Blocks C2 +G with the maximum mean power of 20W (43dBm) 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	1932.5 MHz	1990 MHz	43.0	10 + 5	QPSK & 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 = 40 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 PCS LTE RRH 4x45W B25 / FCC ID: AS5BBTRX-05, 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

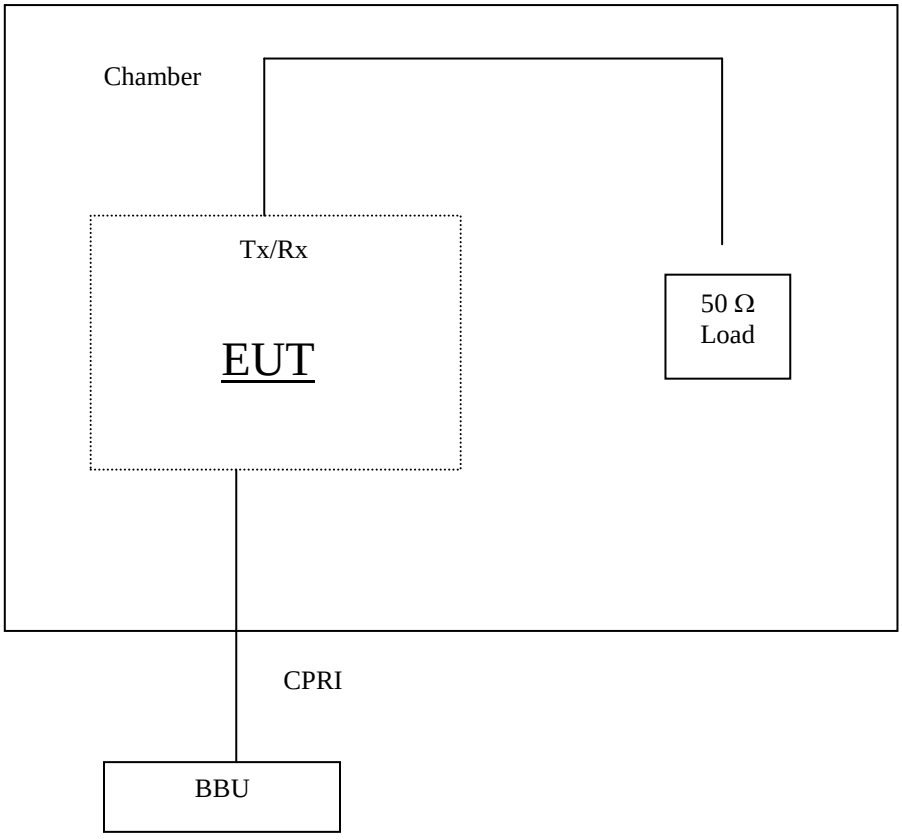
$$E(\text{dB}\mu\text{V/m}) = V_{meas}(\text{dB}\mu\text{V}) + \text{Cable Loss (dB)} + \text{Antenna Factor (dBi/m)}.$$

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:

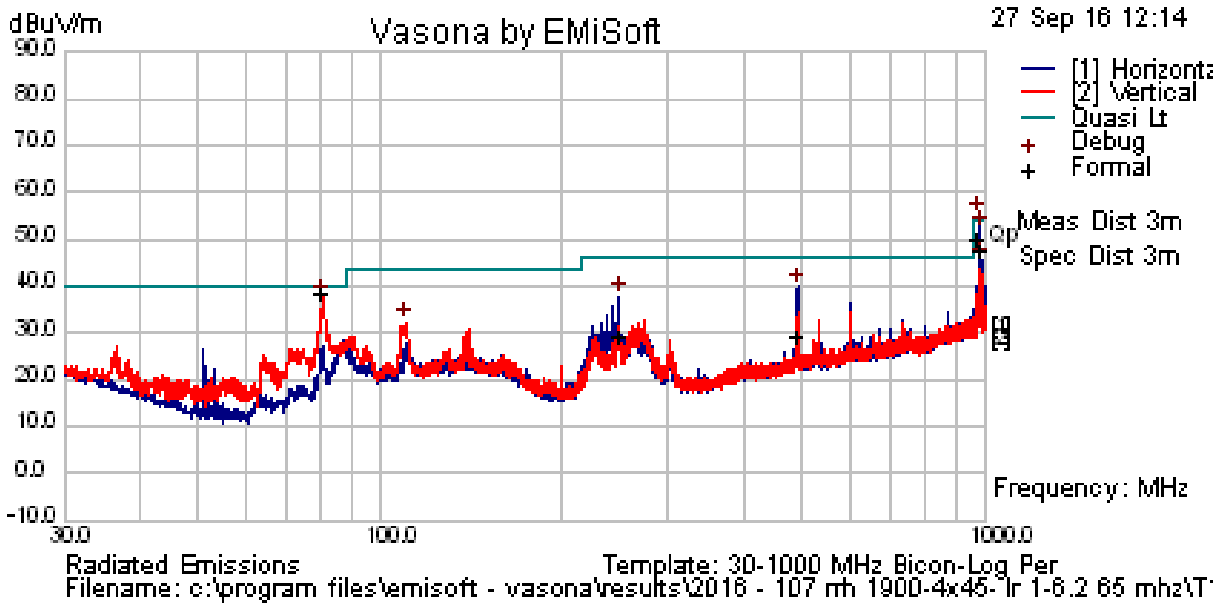
Over the frequency spectrum investigated no reportable radiated spurious emissions were detected. The measurement results of the EUT, subject of this application, demonstrate the full compliance with the Rules of the Commission.

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



Radiated Emissions Data

T2_RE 30 MHz – 1 GHz_FCC B



Results Title:	30-1000 MHz Bicon-Log Per
File Name:	c:\program files\emisoft - vasona\results\2016 - 107 rrh 1900-4x45- lr 1-6.2 65 mhz\T2_RE 30MHz-1GHz_FCC B.emi
Test Laboratory:	AR4-MH, 25C, 33% RH
Test Engineer:	JY
Test Software:	Vasona by EMISoft, version 2.161
Equipment:	Nokia
EUT Details:	RRH 1900-4X45, LR 16.2 65 MHz
Configuration:	2 LTE Carriers each at 20W (43dbm) 1932.5MHz QPSK 5MHz BW and 1990MHz 64QAM 10MHz BW, Qty2 ALM, Qty1 ASIG cables with shields grounded, All covers installed and hatches closed. FCC Part 15B Radiated Emissions 30MHz - 1GHz , Class B, Rcvr E692, Ant E758, 6db pad E1130, preamp E494, RBW 120kHz, VBW 300kHz
Date:	2016-09-27 12:14:26

FORMAL DATA

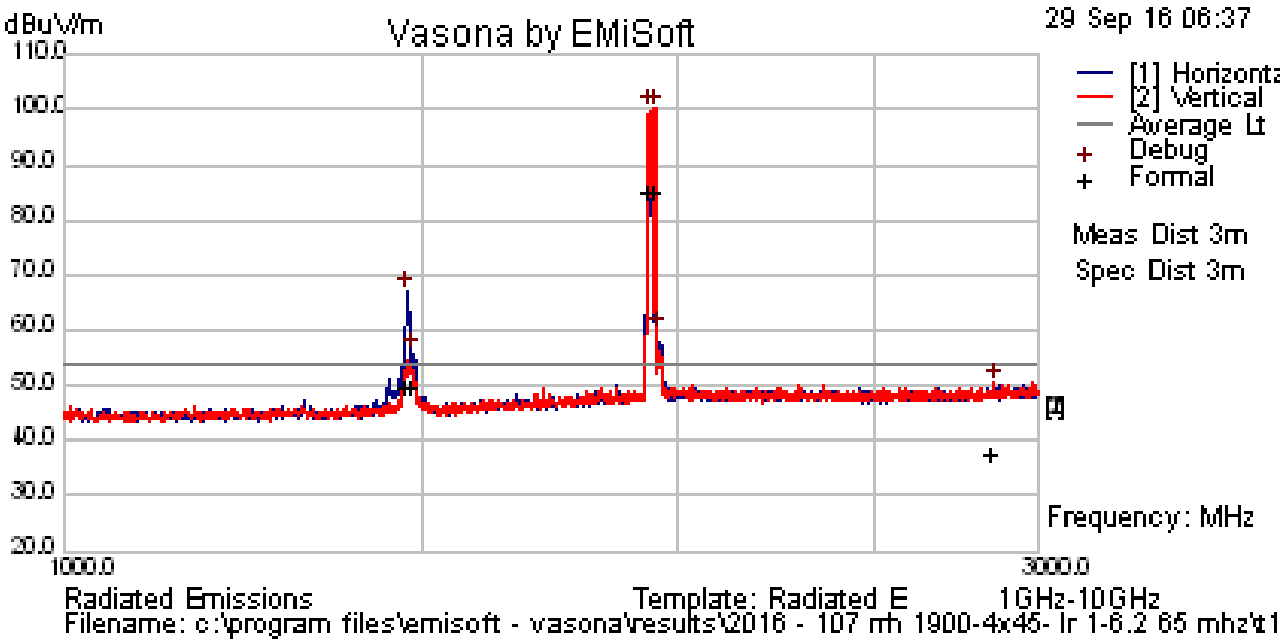
Freq. (MHz)	Raw (dBuV)	Cable (dB)	Factor (dB)	Level (dBuV/m)	Emission Type	Pol (H/V)	Ht (cm)	Az (deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail	Comments
80.23	52.49	6.63	-23.5	35.59	Quasi Max	V	187	190	40	-4.41	Pass	
983.042	45.76	8.76	-7.38	47.14	Quasi Max	H	116	360	54	-6.86	Pass	
984.962	43.41	8.77	-7.34	44.84	Quasi Max	H	128	0	54	-9.16	Pass	
986.883	42.95	8.77	-7.3	44.42	Quasi Max	H	107	10	54	-9.58	Pass	
248.66	34.53	7.26	-15.4	26.36	Quasi Max	H	132	8	46	-19.64	Pass	
491.559	32.61	7.83	-14.1	26.36	Quasi Max	H	114	139	46	-19.64	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
983.04	53.75	8.76	-7.38	55.13	Preview	H	105	225	54	1.13	Fail	
984.96	50.72	8.77	-7.34	52.15	Preview	H	105	225	54	-1.85	Pass	
80.28	54.37	6.63	-23.5	37.47	Preview	V	105	180	40	-2.53	Pass	
491.52	46.14	7.83	-14.1	39.88	Preview	H	105	180	46	-6.12	Pass	
248.76	45.76	7.26	-15.4	37.61	Preview	H	105	315	46	-8.39	Pass	
986.88	43.89	8.77	-7.3	45.36	Preview	H	105	0	54	-8.64	Pass	
110.04	41.76	6.81	-16.3	32.32	Preview	V	105	225	43.5	-11.18	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.

T1b_RE 1GHz - 3GHz_FCC B



Results Title: Radiated E 1GHz-10GHz
File Name: c:\program files\emisoft - vasona\results\2016 - 107 rrh 1900-4x45- lr 1-6.2 65 mhz\t1b_re 1ghz-3ghz_fcc b.emi
Test Laboratory: AR4-MH, 25C, 33% RH
Test Engineer: JY
Test Software: Vasona by EMISoft, version 2.161
Equipment: Nokia
EUT Details: RRH 1900-4X45, LR 16.2 65 MHz
Configuration: 2 LTE Carriers each at 20W (43dbm) 1932.5MHz QPSK 5MHz BW and 1990MHz 64QAM 10MHz BW, Qty2 ALM, Qty1 ASIG cables with shields grounded, All covers installed and hatches closed. FCC Part 15B Radiated Emissions 1GHz - 3GHz , Class B, Rcvr E907, Ant E057, 6db pad E1130, preamp E376, RBW 1MHz, VBW 3MHz
Date: 2016-09-29 06:37:33

FORMAL DATA

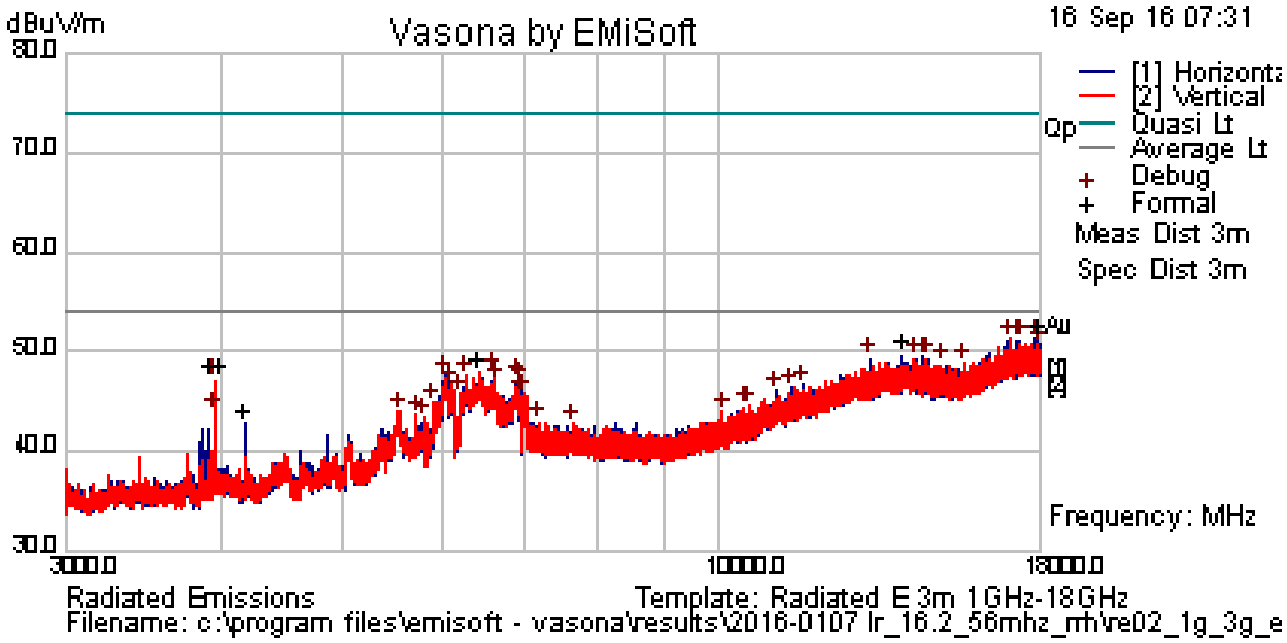
Freq. (MHz)	Raw (dBuV)	Cable (dB)	Factor (dB)	Level (dBuV/m)	Emission Type	Pol (H/V)	Ht (cm)	Az (deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail	Comments
1934.78	80.47	8.59	-6.61	82.44	AvgMax	V	103	254	54	28.44	Fail	
1948.32	80.36	8.6	-6.54	82.43	AvgMax	H	126	228	54	28.43	Fail	
1947.48	80.35	8.6	-6.54	82.41	AvgMax	V	103	235	54	28.41	Fail	
1472.5	48.73	8.16	-9.6	47.29	AvgMax	H	179	73	54	-6.71	Pass	
1482.22	48.41	8.17	-9.56	47.02	AvgMax	H	104	51	54	-6.98	Pass	
2852.9	31.32	8.72	-4.95	35.09	AvgMax	V	316	351	54	-18.91	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
1946.81	98.1	8.6	-6.54	100.15	Preview	V	105	286	54	46.15	Fail	
1937.17	97.91	8.59	-6.6	99.9	Preview	V	105	176	54	45.9	Fail	
1474.21	68.44	8.16	-9.59	67.01	Preview	H	105	352	54	13.01	Fail	
1954.05	57.82	8.61	-6.5	59.92	Preview	H	105	308	54	5.92	Fail	
1483.86	57.21	8.17	-9.56	55.83	Preview	H	105	352	54	1.83	Fail	
2854.88	46.7	8.72	-4.95	50.47	Preview	V	105	88	54	-3.53	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 3 GHz – 18 GHz_FCC B



Results Title:	Radiated E 3m 1GHz-18GHz
File Name:	c:\program files\emisoft - vasona\results\2016-0107 lr_16.2_56mhz_rrh\re02_3g_18g_esu1g_pre.emi
Test Laboratory:	GPCL AR6-MH 23C, 53%RH,
Test Engineer:	NPA/JY
Test Software:	Vasona by EMISoft, version 2.161
Equipment:	Alcatel-Lucent / NOKIA
EUT Details:	2016-0107, PRI04553, RRH 1900-4X45, LR 16.2 65 MHz, 109787622/016/917149, 13W352P10189, (178049), Port1=2=3=4, Qty 2 LTE Carriers each at 20W (43dbm) 1932.5MHz QPSK 5MHz BW and 1990MHz 64QAM 10MHz BW, Qty2 ALM, Qty1 ASIG cables with shields grounded, All covers installed and hatches closed.
Configuration:	FCC Part 15B Radiated Emissions 3GHz - 18GHz , Class B, Rcvr ESI40 E567, Ant E1073, HPF E1116, preamp E123, RBW 100kHz, VBW 300kHz for Debug scan, RBW 1MHz, VBW 1MHz for Formal scan, No Tilt
Date:	2016-09-16 08:22:22

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
3925.56	37.73	4.34	-0.2	41.87	Peak	V	100	180	74	-32.13	Pass	
3925.56	33.44	4.34	-0.2	37.58	Avg	V	100	180	54	-16.42	Pass	
3978.23	42.79	4.47	-0.13	47.13	Peak	V	205	169	74	-26.87	Pass	
3978.23	38.03	4.47	-0.13	42.37	Avg	V	205	169	54	-11.63	Pass	
4175.78	30.14	4.68	0.01	34.83	Avg	H	374	172	54	-19.17	Pass	
4175.78	31.88	4.68	0.01	36.57	Peak	H	374	172	74	-37.43	Pass	
6419.59	32.71	6.31	1.86	40.88	Avg	H	146	193	54	-13.12	Pass	Noise Floor
6419.59	37.73	6.31	1.86	45.9	Peak	H	146	193	74	-28.1	Pass	Noise Floor

13969.2	32.73	7.05	7.74	47.53	Peak	H	132	333	74	-26.47	Pass	Noise Floor
13969.2	28.06	7.05	7.74	42.86	Avg	H	132	333	54	-11.14	Pass	Noise Floor
17975.2	28.05	8.62	9.4	46.07	Avg	H	301	266	54	-7.93	Pass	Noise Floor
17975.2	32.01	8.62	9.4	50.03	Peak	H	301	266	74	-23.97	Pass	Noise Floor

PREVIEW DATA

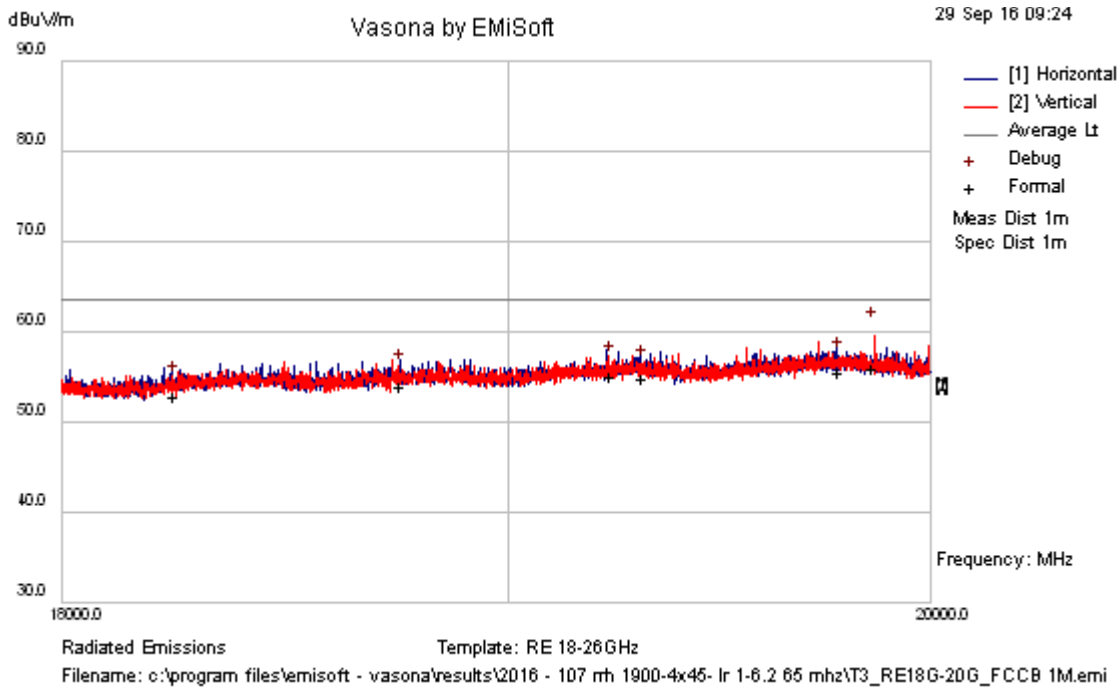
Freq. (MHz)	Raw (dBuV)	Cable (dB)	Factor (dB)	Level (dBuV/m)	Emission Type	Pol (H/V)	Ht (cm)	Az (deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail	Comments
17975.2	33.3	8.62	9.4	51.32	Preview	H	390	110	54	-2.68	Pass	
17850.9	33.28	8.69	9.33	51.29	Preview	H	390	110	54	-2.71	Pass	
17036.4	33.71	8.21	9.29	51.22	Preview	V	390	330	54	-2.78	Pass	
17280.6	33.41	8.52	9.19	51.12	Preview	H	390	308	54	-2.88	Pass	
17378.3	33.3	8.64	9.15	51.09	Preview	H	202	22	54	-2.91	Pass	
17918	33.06	8.65	9.37	51.08	Preview	H	202	264	54	-2.92	Pass	
17988.3	32.57	8.61	9.41	50.59	Preview	H	302	352	54	-3.41	Pass	
13969.2	34.82	7.05	7.74	49.62	Preview	H	390	44	54	-4.38	Pass	
14540	34.71	6.89	7.82	49.43	Preview	H	202	110	54	-4.57	Pass	
14314.4	34.52	6.92	7.83	49.27	Preview	H	202	176	54	-4.73	Pass	
13202.4	35.17	7.29	6.79	49.25	Preview	H	302	352	54	-4.75	Pass	
14635.7	34.52	6.97	7.75	49.24	Preview	H	202	176	54	-4.76	Pass	
15655.8	33.89	7.33	7.64	48.87	Preview	H	390	44	54	-5.13	Pass	
15023.3	33.99	7.25	7.46	48.69	Preview	V	290	22	54	-5.31	Pass	
6419.59	39.79	6.31	1.86	47.96	Preview	H	202	286	54	-6.04	Pass	
6595.7	39.59	6.43	1.9	47.93	Preview	V	190	0	54	-6.07	Pass	
6030.09	40.15	5.74	1.68	47.57	Preview	H	390	176	54	-6.43	Pass	
6274.33	39.63	6.1	1.8	47.52	Preview	V	190	0	54	-6.48	Pass	
6884.93	38.9	6.36	1.92	47.17	Preview	H	202	110	54	-6.83	Pass	
3946.32	42.95	4.4	-0.17	47.17	Preview	V	102	352	54	-6.83	Pass	
6619.48	38.54	6.43	1.9	46.87	Preview	H	302	22	54	-7.13	Pass	
6940.85	38.57	6.34	1.92	46.83	Preview	H	302	22	54	-7.17	Pass	
11651.5	34.43	7.08	5.17	46.68	Preview	H	302	198	54	-7.32	Pass	
6100.14	39.11	5.84	1.72	46.67	Preview	V	102	242	54	-7.33	Pass	
11397.6	34.41	7.12	4.88	46.4	Preview	H	102	22	54	-7.6	Pass	
11076.2	34.41	7.01	4.57	45.99	Preview	H	102	22	54	-8.01	Pass	
6920.92	37.49	6.35	1.92	45.76	Preview	V	290	66	54	-8.24	Pass	
6973.63	37.5	6.33	1.92	45.76	Preview	V	190	308	54	-8.24	Pass	
6212.62	37.81	6.01	1.77	45.58	Preview	V	190	308	54	-8.42	Pass	
5891.25	37.81	5.51	1.5	44.82	Preview	V	190	308	54	-9.18	Pass	
10522.8	34.43	6.38	3.73	44.54	Preview	V	190	352	54	-9.46	Pass	
10458.6	34.44	6.36	3.6	44.4	Preview	V	190	330	54	-9.6	Pass	
3950.82	39.72	4.41	-0.17	43.96	Preview	V	102	352	54	-10.04	Pass	
5538.39	38.11	4.91	0.93	43.95	Preview	V	102	44	54	-10.05	Pass	
10057.5	34.69	6.43	2.7	43.82	Preview	V	290	176	54	-10.18	Pass	
5719.64	37.21	5.22	1.23	43.66	Preview	V	102	0	54	-10.34	Pass	
5812.2	36.55	5.38	1.38	43.3	Preview	V	102	198	54	-10.7	Pass	
7175.45	34.75	6.22	1.89	42.85	Preview	V	190	330	54	-11.15	Pass	
7625.37	34.82	6.01	1.82	42.64	Preview	V	102	330	54	-11.36	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
4175.78	37.94	4.68	0.01	42.63	Preview	H	102	198	54	-11.37	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 18 GHz – 20 GHz FCC Class B limits



Results Title:	RE 18-26GHz
File Name:	c:\program files\emisoft - vasona\results\2016 - 107 rrh 1900-4x45- lr 1-6.2 65 mhz\T3_RE18G-20G_FCCB 1M.emi
Test Laboratory:	AR4-MH, 25C, 33% RH
Test Engineer:	JY
Test Software:	Vasona by EMI Soft, version 2.161
Equipment:	Nokia
EUT Details:	RRH 1900-4X45, LR 16.2 65 MHz
Configuration:	2 LTE Carriers each at 20W (43dbm) 1932.5MHz QPSK 5MHz BW and 1990MHz 64QAM 10MHz BW, Qty2 ALM, Qty1 ASIG cables with shields grounded, All covers installed and hatches closed. FCC Part 15B Radiated Emissions 18GHz - 20GHz , Class B, Rcvr E907, Ant E513, preamp E376, RBW 1MHz, VBW 3MHz
Date:	2016-09-29 09:24:20

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**
19865.2	30.14	7.33	15.72	53.19	AvgMax	V	192	34	63.5	-10.31	Pass	
19783.1	29.7	7.31	15.73	52.75	AvgMax	H	103	45	63.5	-10.75	Pass	
19240.4	29.55	7.18	15.59	52.32	AvgMax	H	105	245	63.5	-11.18	Pass	
19316.6	29.24	7.19	15.65	52.09	AvgMax	V	143	166	63.5	-11.41	Pass	
18757	29.08	7.05	15.12	51.25	AvgMax	H	189	207	63.5	-12.25	Pass	
18249.2	28.59	6.9	14.58	50.07	AvgMax	V	181	47	63.5	-13.43	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**
19865.2	36.49	7.33	15.72	59.53	Preview	V	105	176	63.5	-3.97	Pass	
19783.1	33.33	7.31	15.73	56.37	Debug	H	103	352	63.5	-7.13	Pass	
19240.4	33.15	7.18	15.59	55.92	Debug	H	103	352	63.5	-7.58	Pass	
19316.6	32.63	7.19	15.65	55.47	Debug	V	103	352	63.5	-8.03	Pass	
18757	32.83	7.05	15.12	55	Debug	H	103	352	63.5	-8.5	Pass	
18249.2	32.12	6.9	14.58	53.6	Debug	V	103	352	63.5	-9.9	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
E758	A.H. Systems Inc.	Bilogical Antenna	25 - 2000 MHz	SAS-521-2	458	2015-04-13	2017-04-13	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
E057	EMCO	Horn Antenna	Double Ridged Horn 1-18 GHz	3115	9006-3460	2015-02-10	2017-02-10	Requires Calibration	Active
E376	Hewlett Packard	Pre-Amplifier	Preamplifier 1-26.5 GHz	8449B	3008A01270	2015-12-07	2016-12-07	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
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