

TEST REPORT





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1. Report No : DRTFCC2011-0332
2. Customer
 - Name : LG Electronics USA
 - Address : 111 Sylvan Avenue North Building, Englewood Cliffs, New Jersey, United States 07632
3. Use of Report : FCC Original Grant
4. Product Name / Model Name : Telematics / TL21BNN2
FCC ID : BEJTL21BNN
5. FCC Regulation(s): Part 22, 24, 27
Test Method Used : KDB971168 D01v03, ANSI/TIA-603-E-2016, ANSI C63.26-2015
6. Date of Test : 2020.09.09 ~ 2020.10.20
7. Location of Test : Permanent Testing Lab On Site Testing
8. Testing Environment : Refer to appended test report.
9. Test Result : Refer to the attached test result.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

Affirmation	Tested by	Reviewed by
	Name : JaeHyeok Bañg 	Name : JaeJin Lee  (Signature)

2020 . 11 . 05 .

DT&C Co., Ltd.

Unconnected with KS Q ISO / IEC 17025 and KOLAS accreditation.

If this report is required to confirmation of authenticity, please contact to report@dtnc.net

Test Report Version

Test Report No.	Date	Description	Revised by	Reviewed by
DRTFCC2011-0332	Nov. 05, 2020	Initial issue	JaeHyeok Bang	JaeJin Lee

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1. GENERAL INFORMATION

Applicant Name(FCC) : LG Electronics USA
Address(FCC) : 111 Sylvan Avenue North Building, Englewood Cliffs, New Jersey, United States
 07632
FCC Classification : PCS Licensed Transmitter (PCB)
FCC ID : BEJTL21BNN
Product Name : Telematics
Model Name : TL21BNN2
Add Model Name : TL21BNN1
Serial Number : Identical prototype
Supplying power : DC 12 V
Antenna Type : External antenna

Mode	TX Frequency (MHz)	Emission Designator	Modulation	ERP		EIRP	
				Max power (dBm)	Max power (W)	Max power (dBm)	Max power (W)
LTE Band 12	704 ~ 711	8M94G7D	QPSK	16.64	0.046	-	-
LTE Band 12	704 ~ 711	8M92W7D	16QAM	15.01	0.032	-	-
LTE Band 12	701.5 ~ 713.5	4M47G7D	QPSK	17.96	0.063	-	-
LTE Band 12	701.5 ~ 713.5	4M48W7D	16QAM	16.86	0.049	-	-
LTE Band 12	700.5 ~ 714.5	2M69G7D	QPSK	18.07	0.064	-	-
LTE Band 12	700.5 ~ 714.5	2M69W7D	16QAM	17.02	0.050	-	-
LTE Band 12	699.7 ~ 715.3	1M08G7D	QPSK	17.64	0.058	-	-
LTE Band 12	699.7 ~ 715.3	1M08W7D	16QAM	16.71	0.047	-	-
LTE Band 26	831.5 ~ 841.5	13M4G7D	QPSK	22.13	0.163	-	-
LTE Band 26	831.5 ~ 841.5	13M4W7D	16QAM	20.96	0.125	-	-
LTE Band 26(5)	829 ~ 844	8M93G7D	QPSK	21.84	0.153	-	-
LTE Band 26(5)	829 ~ 844	8M92W7D	16QAM	20.41	0.110	-	-
LTE Band 26(5)	826.5 ~ 846.5	4M48G7D	QPSK	21.55	0.143	-	-
LTE Band 26(5)	826.5 ~ 846.5	4M48W7D	16QAM	20.31	0.107	-	-
LTE Band 26(5)	825.5 ~ 847.5	2M69G7D	QPSK	21.37	0.137	-	-
LTE Band 26(5)	825.5 ~ 847.5	2M69W7D	16QAM	20.07	0.102	-	-
LTE Band 26(5)	824.7 ~ 848.3	1M08G7D	QPSK	21.79	0.151	-	-
LTE Band 26(5)	824.7 ~ 848.3	1M09W7D	16QAM	20.47	0.111	-	-

Mode	TX Frequency (MHz)	Emission Designator	Modulation	EIRP	
				Max power(dBm)	Max power(W)
LTE Band 4	1 720 ~ 1 745	17M9G7D	QPSK	24.73	0.297
LTE Band 4	1 720 ~ 1 745	17M8W7D	16QAM	23.59	0.229
LTE Band 4	1 717.5 ~ 1 747.5	13M4G7D	QPSK	24.86	0.306
LTE Band 4	1 717.5 ~ 1 747.5	13M4W7D	16QAM	23.45	0.221
LTE Band 4	1 715 ~ 1 750	8M95G7D	QPSK	24.89	0.308
LTE Band 4	1 715 ~ 1 750	8M93W7D	16QAM	23.63	0.231
LTE Band 4	1 712.5 ~ 1 752.5	4M47G7D	QPSK	25.02	0.318
LTE Band 4	1 712.5 ~ 1 752.5	4M49W7D	16QAM	23.73	0.236
LTE Band 4	1 711.5 ~ 1 753.5	2M69G7D	QPSK	24.87	0.307
LTE Band 4	1 711.5 ~ 1 753.5	2M69W7D	16QAM	23.69	0.234
LTE Band 4	1 710.7 ~ 1 754.3	1M08G7D	QPSK	25.02	0.318
LTE Band 4	1 710.7 ~ 1 754.3	1M08W7D	16QAM	23.70	0.234
LTE Band 2	1 860 ~ 1 900	17M8G7D	QPSK	24.54	0.284
LTE Band 2	1 860 ~ 1 900	17M9W7D	16QAM	23.62	0.230
LTE Band 2	1 857.5 ~ 1 902.5	13M4G7D	QPSK	23.91	0.246
LTE Band 2	1 857.5 ~ 1 902.5	13M4W7D	16QAM	22.95	0.197
LTE Band 2	1 855 ~ 1 905	8M96G7D	QPSK	24.40	0.275
LTE Band 2	1 855 ~ 1 905	8M96W7D	16QAM	23.02	0.200
LTE Band 2	1 852.5 ~ 1 907.5	4M49G7D	QPSK	25.23	0.333
LTE Band 2	1 852.5 ~ 1 907.5	4M48W7D	16QAM	24.18	0.262
LTE Band 2	1 851.5 ~ 1 908.5	2M69G7D	QPSK	25.74	0.375
LTE Band 2	1 851.5 ~ 1 908.5	2M69W7D	16QAM	24.63	0.290
LTE Band 2	1 850.7 ~ 1 909.3	1M08G7D	QPSK	24.27	0.267
LTE Band 2	1 850.7 ~ 1 909.3	1M08W7D	16QAM	23.00	0.200

2. INTRODUCTION

2.1. EUT DESCRIPTION

This ETU contains the following capabilities:
850/1700/1900 WCDMA/HSUPA, Multi-band LTE.

2.2. TESTING ENVIRONMENT

Ambient Condition	
▪ Temperature	+20 °C ~ +25 °C
▪ Relative Humidity	35 % ~ 45 %

2.3. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

2.4. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with requirements of ANSI C 63.4-2014. All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95 % level of confidence.

Parameter	Measurement uncertainty
Radiated Disturbance (Below 1 GHz)	4.9 dB (The confidence level is about 95 %, $k = 2$)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.1 dB (The confidence level is about 95 %, $k = 2$)
Radiated Disturbance (Above 18 GHz)	5.3 dB (The confidence level is about 95 %, $k = 2$)

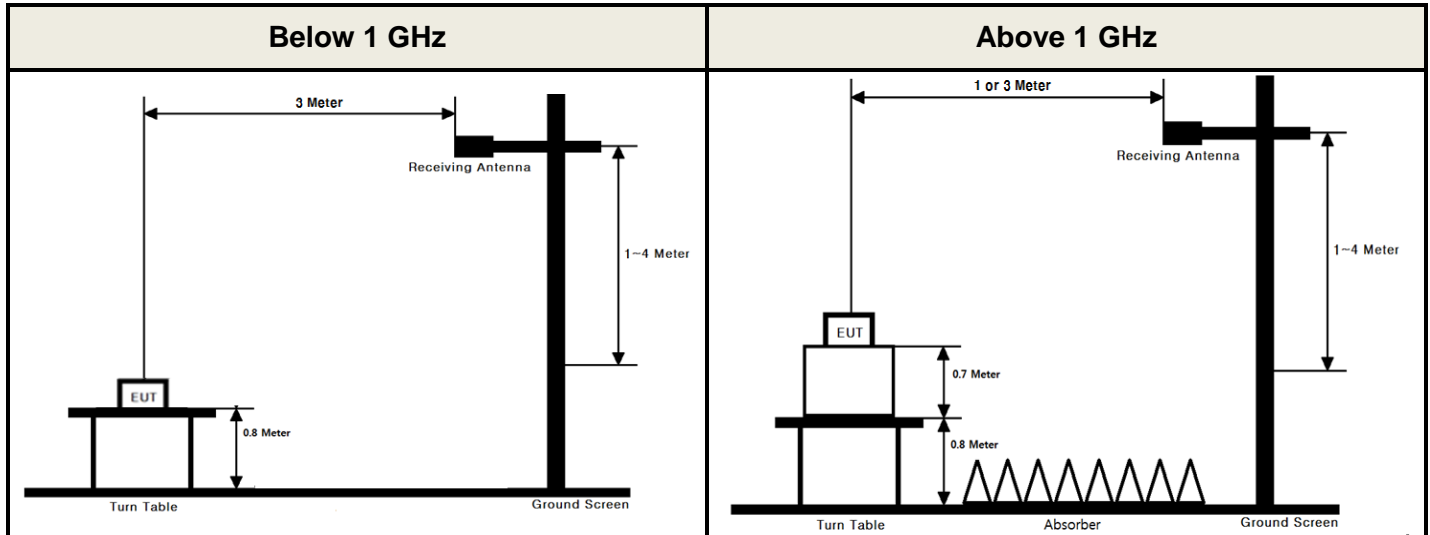
2.5. TEST FACILITY

DT&C Co., Ltd.	
The 3 m test site and conducted measurement facility used to collect the radiated data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042. The test site complies with the requirements of § 2.948 according to ANSI C63.4-2014.	
- FCC & IC MRA Designation No. : KR0034 - ISED #: 5740A	
www.dtnc.net	
Telephone	: + 82-31-321-2664
FAX	: + 82-31-321-1664

3. DESCRIPTION OF TESTS

3.1 ERP & EIRP (Effective Radiated Power & Equivalent Isotropic Radiated Power)

Test Set-up



These measurements were performed at 3 m test site. The equipment under test is placed on a non-conductive table 0.8 meter or 1.5 meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna. For measurements above 1 GHz absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1 GHz, the absorbers are removed.

Test Procedure

- ANSI/TIA-603-E-2016 - Section 2.2.17
- KDB971168 D01v03 - Section 5.2.2
- ANSI C63.26-2015 – Section 5.2.4.4.1

Test setting

1. Set span to 2 x to 3 x the OBW.
2. Set RBW = 1 % to 5 % of the OBW.
3. Set VBW \geq 3 x RBW.
4. Set number of points in sweep \geq 2 x span / RBW.
5. Sweep time:
 - 1) Set = auto-couple, or
 - 2) Set \geq [10 x (number of points in sweep) x (transmission period)] for single sweep (automation-compatible) measurement. Transmission period is the on and off time of the transmitter.
6. Detector = power averaging (rms).
7. If the EUT can be configured to transmit continuously, then set the trigger to free run.
8. If the EUT cannot be configured to transmit continuously, then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep. Verify that the sweep time is less than or equal to the transmission burst duration. Time gating can also be used under similar constraints (i.e., configured such that measurement data is collected only during active full-power transmissions).
9. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over multiple symbols, it can be necessary to increase the number of traces to be averaged above 100 or, if using a manually configured sweep time, increase the sweep time.

10. Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band or channel power measurement function, with the band/channel limits set equal to the OBW band edges. If the instrument does not have a band or channel power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

The receiver antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer.

A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminal of the substitute antenna is measured.

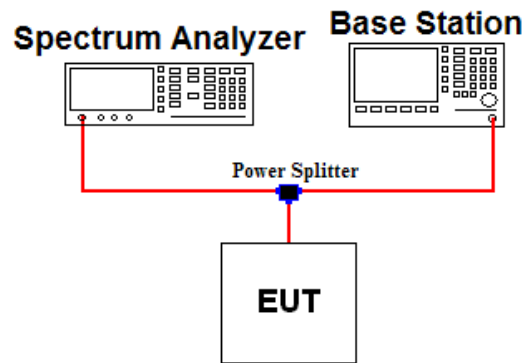
The ERP/EIRP is calculated using the following formula:

ERP/EIRP = The conducted power at the substitute antenna's terminal [dBm] + Substitute Antenna gain [dBd for ERP , dBi for EIRP]

For readings above 1 GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn antenna and an isotropic antenna are taken into consideration.

3.2 PEAK TO AVERAGE RATIO

Test set-up



Test Procedure

- KDB971168 D01v03 - Section 5.7.2
- ANSI C63.26-2015 – Section 5.2.3.4

A peak to average ratio measurement is performed at the conducted port of the EUT.

The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The present of time the signal spends at or above the level defines the probability for that particular power level.

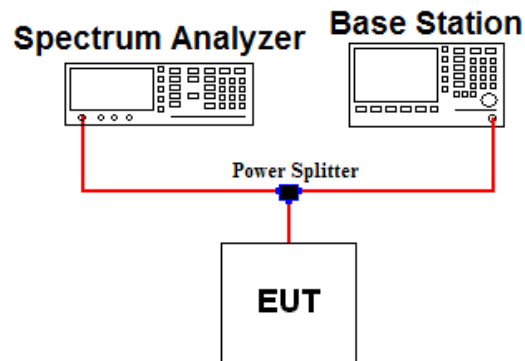
Test setting

The spectrum Analyzer's CCDF measurement function is enabled.

1. Set resolution/measurement bandwidth \geq OBW or specified reference bandwidth.
2. Set the number of counts to a value that stabilizes the measured CCDF curve.
3. Set the measurement interval as follows:
 - 1) For continuous transmissions, set to the greater of $[10 \times (\text{number of points in sweep}) \times (\text{transmission symbol period})]$ or 1 ms.
 - 2) For burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize. Set the measurement interval to a time that is less than or equal to the burst duration.
 - 3) If there are several carriers in a single antenna port, the peak power shall be determined for each individual carrier (by disabling the other carriers while measuring the required carrier) and the total peak power calculated from the sum of the individual carrier peak powers.
4. Record the maximum PAPR level associated with a probability of 0.1 %.
5. The peak power level is calculated from the sum of the PAPR value from step d) to the measured average power.

3.3 OCCUPIED BANDWIDTH.

Test set-up



Test Procedure

- KDB971168 D01v03 - Section 4.3
- ANSI C63.26-2015 – Section 5.4.4

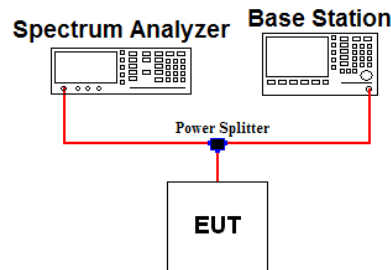
The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power of a given emission.

Test setting

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99 % occupied bandwidth and the 26 dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. $RBW = 1\% \sim 5\%$ of the expected OBW & $VBW \geq 3 \times RBW$
3. Detector = Peak
4. Trance mode = Max hold
5. Sweep = Auto couple
6. The trace was allowed to stabilize
7. If necessary, step 2 ~ 6 were repeated after changing the RBW such that it would be within 1 % ~ 5 % of the 99 % occupied bandwidth observed in step 6.

3.4 BAND EDGE EMISSIONS AT ANTENNA TERMINAL

Test set-up



Test Procedure

- KDB971168 D01v03 - Section 6
- ANSI C63.26-2015 – Section 5.7

All out of band emissions are measured by means of a calibrated spectrum analyzer. The EUT was setup to maximum output power at its lowest and highest channel with all bandwidths, modulations and RB configurations.

The power of any spurious emission shall be attenuated below the transmitter power (P) by at least $43 + 10 \log(P)$ dB.

Test setting

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW $\geq 1\%$ of the emission bandwidth
4. VBW $\geq 3 \times$ RBW
5. Detector = RMS & Trace mode = Max hold
6. Sweep time = Auto couple or 1 s for band edge
7. Number of sweep point $\geq 2 \times$ span / RBW
8. The trace was allowed to stabilize

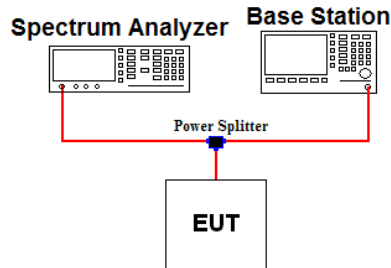
Note 1: Per Part 22.917(b)(1) / 24.238(b) / 27.53(h) in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions limit.

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 emission are attenuated at least 26 dB below the transmitter power.

Note 2: Per Part 27(g) for operations in the 600 MHz band and the 698-746 MHz band, compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

3.5 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL

Test set-up



Test Procedure

- KDB971168 D01v03 - Section 6
- ANSI C63.26-2015 – Section 5.7

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The EUT was setup to maximum output power at its low, middle, high channel with all bandwidths, modulations and RB configurations. The spectrum is scanned from 9 kHz up to a frequency including its 10th harmonic.

The power of any spurious emission shall be attenuated below the transmitter power (P) by at least $43 + 10 \log(P)$ dB.

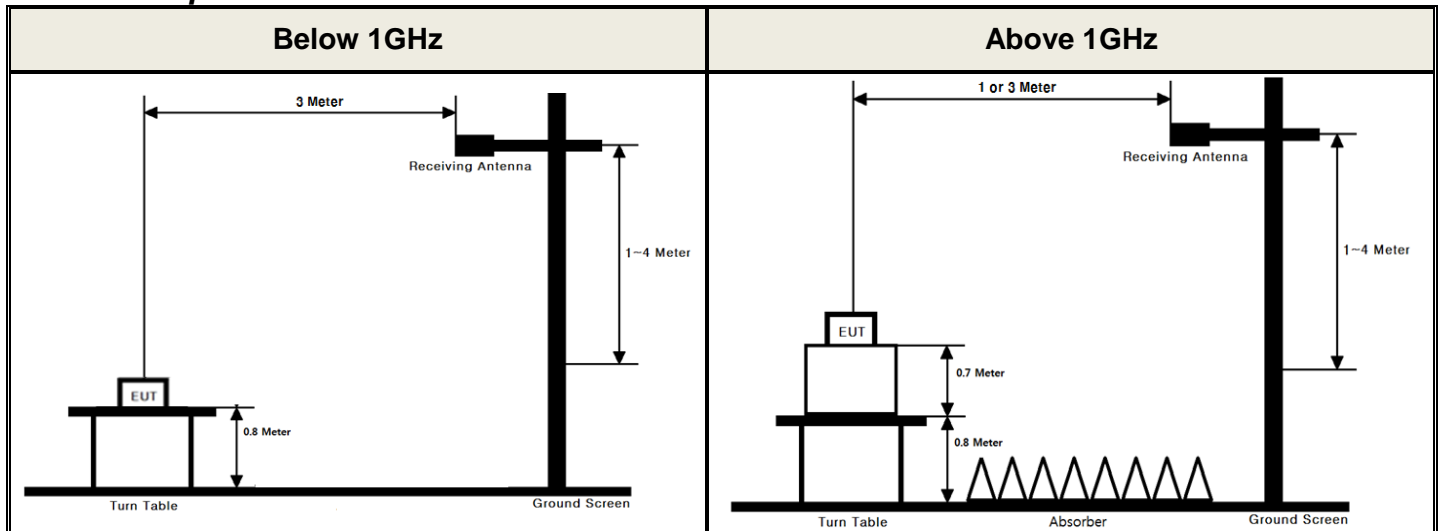
Test setting

1. RBW = 100 kHz (Below 1 GHz) or 1 MHz (Above 1 GHz) & VBW $\geq 3 \times$ RBW (Refer to Note 1)
2. Detector = RMS & Trace mode = Max hold
3. Sweep time = Auto couple
4. Number of sweep point $\geq 2 \times$ span / RBW
5. The trace was allowed to stabilize

Note 1: Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1MHz or greater for frequencies greater than 1GHz.

3.6 UNDESIRABLE EMISSIONS

Test Set-up



These measurements were performed at 3 test site. The equipment under test is placed on a non-conductive table 1.5 meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna. For measurements above 1 GHz absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1 GHz, the absorbers are removed.

Test Procedure

- ANSI/TIA-603-E-2016 - Section 2.2.12
- KDB971168 D01v03 - Section 5.8
- ANSI C63.26-2015 – Section 5.5

Test setting

1. RBW = 100 kHz for below 1 GHz and 1 MHz for above 1 GHz / VBW \geq 3 X RBW
2. Detector = RMS & Trace mode = Max hold
3. Sweep time = Auto couple
4. Number of sweep point \geq 2 X span / RBW
5. The trace was allowed to stabilize

The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer.

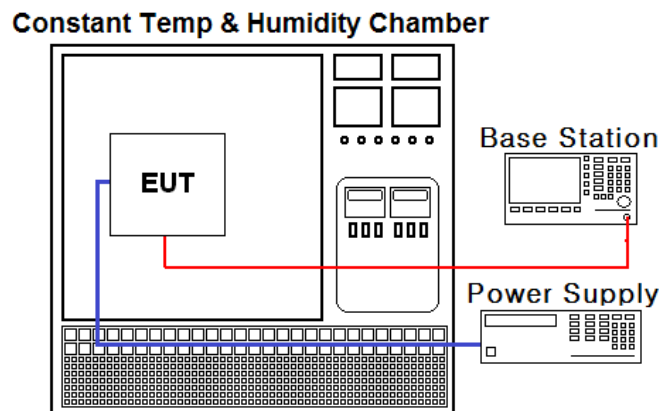
For radiated power measurements below 1 GHz, a half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading.

For radiated power measurements above 1 GHz, a Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading. The difference between the gain of the horn and an isotropic antenna are taken into consideration.

This measurement was performed with the EUT oriented in 3 orthogonal axis.

3.7 FREQUENCY STABILITY

Test Set-up



Test Procedure

- ANSI/TIA-603-E-2016
- KDB971168 D01v03 - Section 9

The frequency stability of the transmitter is measured by:

a.) **Temperature:**

The temperature is varied from -30 °C to +50 °C using an environmental chamber.

b.) **Primary Supply Voltage:**

The primary supply voltage is varied from 85 % to 115 % of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

Specification:

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block for Part 24, 27. The frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ (± 2.5 ppm) of the center frequency for Part 22.

Time Period and Procedure:

1. The carrier frequency of the transmitter is measured at room temperature.
(20 °C to provide a reference)
2. The equipment is turned on in a "standby" condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10 °C intervals ranging from -30 °C to +50 °C.
A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

4. LIST OF TEST EQUIPMENT

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal. Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	20/06/24	21/06/24	MY50200834
Spectrum Analyzer	Agilent Technologies	N9020A	19/12/16	20/12/16	MY50410357
Spectrum Analyzer	Agilent Technologies	N9020A	20/06/24	21/06/24	US47360812
DC power supply	Agilent Technologies	66332A	20/06/24	21/06/24	MY43000211
Multimeter	FLUKE	17B+	19/12/16	20/12/16	36390701WS
Power Splitter	Anritsu	K241B	19/12/16	20/12/16	016681
Temp & Humi	SJ Science	SJ-TH-S50	20/06/23	21/06/23	U5542113
Radio Communication Analyzer	Anritsu	MT8820C	20/06/24	21/06/24	6201127429
Thermohygrometer	BODYCOM	BJ5478	19/12/18	20/12/18	120612-2
Thermohygrometer	BODYCOM	BJ5478	19/12/18	20/12/18	120612-1
Signal Generator	Rohde Schwarz	SMBV100A	19/12/16	20/12/16	255571
Signal Generator	ANRITSU	MG3695C	19/12/16	20/12/16	173501
Loop Antenna	ETS-Lindgren	6502	19/09/18	21/09/18	00226186
Bilog Antenna	Schwarzbeck	VULB 9160	19/04/23	21/04/23	9160-3362
Dipole Antenna	A.H.Systems Inc.	FCC-4	19/03/26	21/03/26	710A
Dipole Antenna	Schwarzbeck	UHA9105	20/04/10	22/04/10	2262
HORN ANT	ETS	3117	20/04/24	21/04/24	00140394
HORN ANT	ETS	3117	20/03/26	21/03/26	00152145
HORN ANT	A.H.Systems	SAS-574	20/06/24	21/06/24	154
HORN ANT	A.H.Systems	SAS-574	20/06/24	21/06/24	155
Amplifier	EMPOWER	BBS3Q7ELU	20/06/24	21/06/24	1020
PreAmplifier	H.P	8447D	19/12/16	20/12/16	2944A07774
PreAmplifier	Agilent	8449B	20/06/24	21/06/24	3008A02108
High-pass filter	Wainwright	WHKX12-935-1000-15000-40SS	20/06/24	21/06/24	7
High-pass filter	Wainwright	WHKX12-2580-3000-18000-80SS	20/06/24	21/06/24	3
High-pass filter	Wainwright	WHNX8.5/26.5G-6SS	20/06/24	21/06/24	1
Cable	DTNC	Cable	20/01/13	21/01/13	M-01
Cable	DTNC	Cable	20/01/13	21/01/13	M-02
Cable	Junkosha	MWX315	20/01/13	21/01/13	M-05
Cable	Junkosha	MWX221	20/01/13	21/01/13	M-06
Cable	Radiall	Cable	20/01/16	21/01/16	RF-65
Cable	Radiall	Cable	20/01/16	21/01/16	RF-84

Note1: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2017.

Note2: The cable is not a regular calibration item, so it has been calibrated by DT & C itself.

5. SUMMARY OF TEST RESULTS

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Status <small>Note 1</small>
2.1046	Conducted Output Power	N/A	Conducted	C
2.1049	Occupied Bandwidth	N/A		C
24.232(d) 27.50(d.5)	Peak to Average Ratio	< 13 dB		C
2.1051 22.917(a) 24.238(a) 27.53(g) 27.53(h)	Band Edge / Conducted Spurious Emissions	> 43 + 10log ₁₀ (P) dB at Band edge and for all out-of-band emissions		C
2.1055 22.355 24.235 27.54	Frequency Stability	< 2.5 ppm (Part 22) or Fundamental emissions must stay within Authorized frequency block (Part 24, 27)		C
27.50(c.10)	Radiated Output Power (B12)	< 3 Watts max. ERP	Radiated	C
22.913(a.5)	Radiated Output Power (B26, B5)	< 7 Watts max. ERP		C
27.50(d.4)	Radiated Output Power (B4)	< 1 Watts max. EIRP		C
24.232(c) 27.50(h.2)	Radiated Output Power (B2)	< 2 Watts max. EIRP		C
2.1053 22.917(a) 24.238(a) 27.53(g) 27.53(h)	Undesirable Emissions	> 43 + 10log ₁₀ (P) dB for all out-of-band emissions		C
Note 1: C =Comply NC =Not Comply NT =Not Tested NA =Not Applicable Note 2: This device supports the antenna switch system that allows for radiated transmission from one of two antennas. Two antennas cannot transmit simultaneously. Note 3: The antenna port-conducted test items were performed at the highest conducted power RF path.(Main path – Antenna 1)				

6. SAMPLE CALCULATION

A. Emission Designator

LTE Band 12(QPSK)

Emission Designator = **8M94G7D**
LTE OBW = 8.935 MHz
G = Phase Modulation
7 = Quantized/Digital Info
D = Data Transmission

LTE Band 26(5)(QPSK)

Emission Designator = **13M4G7D**
LTE OBW = 13.381 MHz
G = Phase Modulation
7 = Quantized/Digital Info
D = Data Transmission

LTE Band 4(QPSK)

Emission Designator = **17M9G7D**
LTE OBW = 17.886 MHz
G = Phase Modulation
7 = Quantized/Digital Info
D = Data Transmission

LTE Band 2(QPSK)

Emission Designator = **17M8G7D**
LTE OBW = 17.826 MHz
G = Phase Modulation
7 = Quantized/Digital Info
D = Data Transmission

LTE Band 12(16QAM)

Emission Designator = **8M92W7D**
LTE OBW = 8.916 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
D = Data Transmission

LTE Band 26(5)(16QAM)

Emission Designator = **13M4W7D**
LTE OBW = 13.381 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
D = Data Transmission

LTE Band 4(16QAM)

Emission Designator = **17M8W7D**
LTE OBW = 17.784 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
D = Data Transmission

LTE Band 2(16QAM)

Emission Designator = **17M9W7D**
LTE OBW = 17.854 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
D = Data Transmission

B. For substitution method

- 1) The EUT was placed on a turntable with 0.8 meter height for frequency below 1GHz and 1.5 meter height for frequency above 1 GHz respectively above ground.
- 2) The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
- 3) During the test, the turn table is rotated until the maximum signal is found.
- 4) Record the field strength meter's level. (ex. Spectrum reading level is -8.5 dBm)
- 5) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
- 6) Increase the signal generator output till the field strength meter's level is equal to the item (4).
(ex. Signal generator level is -18.04 dBm)
- 7) The gain of the cable and amplifier between the signal generator and terminals of substituted antenna is 46.92 dB at test frequency.
- 8) Record the level at substituted antenna terminal. (ex. 28.88dBm)
- 9) The result is calculated as below;

$$\text{EIRP(dBm)} = \text{LEVLE@ANTENNA TERMINAL} + \text{TX Antenna Gain (dBi)}$$

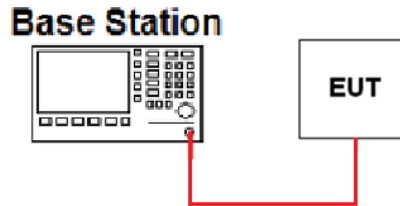
$$\text{ERP(dBm)} = \text{LEVLE@ANTENNA TERMINAL} + \text{TX Antenna Gain (dBd)}$$

$$\text{Where, TX Antenna Gain (dBd)} = \text{TX Antenna Gain (dBi)} - 2.15 \text{ dB}$$

7. TEST DATA

7.1 CONDUCTED OUTPUT POWER

A base station simulator was used to establish communication with the EUT. The base station simulator parameters were set to produce the maximum power from the EUT. This device was tested under all configurations and the highest power is reported. Conducted Output Powers of EUT are reported below.



Note 1: The conducted output power was measured using the base station simulator.

• Band 12 <Test case: ANT 1>

Conducted Power [dBm]									
RB Alloc			1 RB			MID RB			FULL RB
B.W(MHz)	Freq.(MHz)	Modulation	LOW	MID	HIGH	LOW	MID	HIGH	
10	704	QPSK	23.29	23.44	23.26	22.13	22.29	22.41	22.23
		16QAM	22.20	22.23	22.10	21.18	21.24	21.38	21.27
	711	QPSK	23.27	23.44	23.26	22.22	22.29	22.27	22.21
		16QAM	22.18	22.31	22.25	21.25	21.29	21.31	21.26
5	701.5	QPSK	23.06	23.20	23.10	22.28	22.17	22.21	22.16
		16QAM	22.07	22.11	21.98	21.37	21.36	21.26	21.17
	707.5	QPSK	23.09	23.49	23.09	22.35	22.37	22.25	22.26
		16QAM	22.02	22.19	21.90	21.39	21.40	21.28	21.24
	713.5	QPSK	23.21	23.31	23.28	22.17	22.24	22.17	22.19
		16QAM	21.90	22.16	22.08	21.16	21.30	21.20	21.22
3	700.5	QPSK	23.16	23.43	23.26	22.32	22.37	22.21	22.20
		16QAM	22.12	22.24	22.15	21.30	21.29	21.22	21.19
	707.5	QPSK	23.25	23.22	23.13	22.36	22.33	22.37	22.36
		16QAM	22.06	22.23	22.09	21.32	21.24	21.35	21.30
	714.5	QPSK	23.18	23.40	23.29	22.32	22.30	22.32	22.27
		16QAM	22.12	22.19	22.31	21.25	21.29	21.25	21.24
1.4	699.7	QPSK	23.14	23.42	23.26	23.21	23.38	23.32	22.33
		16QAM	22.06	22.24	22.20	22.31	22.40	22.32	21.31
	707.5	QPSK	23.32	23.48	23.31	23.31	23.36	23.33	22.33
		16QAM	22.18	22.32	22.14	22.42	22.40	22.38	21.20
	715.3	QPSK	23.17	23.45	23.32	23.24	23.28	23.24	22.25
		16QAM	22.09	22.40	22.27	22.32	22.29	22.24	21.13

Band 12 <Test case: ANT 2>

Conducted Power [dBm]									
RB Alloc			1 RB			MID RB			FULL RB
B.W(MHz)	Freq.(MHz)	Modulation	LOW	MID	HIGH	LOW	MID	HIGH	
10	704	QPSK	22.88	22.98	22.88	21.71	21.87	21.94	21.88
		16QAM	21.74	21.81	21.79	20.73	20.81	20.89	20.80
	711	QPSK	22.96	22.89	22.87	21.86	21.91	21.93	21.84
		16QAM	21.77	21.81	21.80	20.83	20.85	20.81	20.84
5	701.5	QPSK	22.74	22.77	22.76	21.91	21.79	21.81	21.77
		16QAM	21.59	21.72	21.58	20.83	20.82	20.87	20.83
	707.5	QPSK	22.76	22.88	22.68	21.95	21.96	21.87	21.83
		16QAM	21.61	21.79	21.59	21.01	21.05	20.96	20.79
	713.5	QPSK	22.74	22.82	22.75	21.81	21.86	21.84	21.77
		16QAM	21.70	21.61	21.77	20.86	20.84	20.87	20.80
3	700.5	QPSK	22.75	22.84	22.78	21.92	21.91	21.82	21.83
		16QAM	21.69	21.82	21.64	20.92	20.93	20.77	20.80
	707.5	QPSK	22.79	22.95	22.82	21.97	21.99	21.96	21.93
		16QAM	21.57	21.72	21.74	20.93	20.91	20.91	20.89
	714.5	QPSK	22.88	22.86	22.91	21.88	21.88	21.92	21.90
		16QAM	21.75	21.77	21.92	20.80	20.86	20.89	20.82
1.4	699.7	QPSK	22.73	23.00	22.89	22.75	22.88	22.86	21.88
		16QAM	21.69	22.00	21.73	21.85	22.02	21.96	20.91
	707.5	QPSK	22.89	23.00	22.93	22.85	22.93	22.91	21.94
		16QAM	21.81	22.09	21.85	21.99	22.03	22.02	20.85
	715.3	QPSK	22.82	22.95	22.81	22.79	22.88	22.81	21.89
		16QAM	21.81	21.94	21.86	21.89	21.94	21.85	20.74

Band 26 <Test case: ANT 1>

Conducted Power [dBm]									
RB Alloc			1 RB			MID RB			FULL RB
B.W(MHz)	Freq.(MHz)	Modulation	LOW	MID	HIGH	LOW	MID	HIGH	
15	831.5	QPSK	22.39	22.40	22.47	21.32	21.40	21.35	21.39
		16QAM	21.18	21.43	21.28	20.43	20.47	20.42	20.46
	841.5	QPSK	22.42	22.44	22.49	21.34	21.34	21.39	21.31
		16QAM	21.45	21.37	21.30	20.37	20.41	20.45	20.39

Band 26 <Test case: ANT 2>

Conducted Power [dBm]									
RB Alloc			1 RB			MID RB			FULL RB
B.W(MHz)	Freq.(MHz)	Modulation	LOW	MID	HIGH	LOW	MID	HIGH	
15	831.5	QPSK	21.88	22.10	21.93	20.84	20.90	20.86	20.83
		16QAM	20.69	20.80	20.74	20.04	19.98	19.92	19.94
	841.5	QPSK	21.95	21.99	22.08	20.84	20.84	20.89	20.74
		16QAM	20.68	20.86	20.95	19.86	19.86	19.93	19.84

▪ Band 26(5) <Test case: ANT 1>

Conducted Power [dBm]									
RB Alloc			1 RB			MID RB			FULL RB
B.W(MHz)	Freq.(MHz)	Modulation	LOW	MID	HIGH	LOW	MID	HIGH	
10	829	QPSK	22.39	22.51	22.61	21.41	21.35	21.34	21.40
		16QAM	21.22	21.61	21.47	20.45	20.45	20.43	20.48
	836.5	QPSK	22.61	22.43	22.55	21.38	21.32	21.32	21.31
		16QAM	21.47	21.45	21.56	20.41	20.42	20.39	20.39
	844	QPSK	22.46	22.52	22.48	21.39	21.41	21.33	21.38
		16QAM	21.27	21.45	21.30	20.45	20.45	20.47	20.46
5	826.5	QPSK	22.23	22.43	22.38	21.32	21.37	21.36	21.35
		16QAM	21.15	21.32	21.40	20.42	20.49	20.45	20.43
	836.5	QPSK	22.36	22.38	22.30	21.30	21.35	21.30	21.28
		16QAM	21.24	21.38	21.22	20.51	20.45	20.44	20.37
	846.5	QPSK	22.34	22.40	22.34	21.32	21.31	21.29	21.31
		16QAM	21.15	21.19	21.16	20.35	20.53	20.40	20.41
3	825.5	QPSK	22.37	22.53	22.44	21.30	21.37	21.37	21.37
		16QAM	21.31	21.28	21.45	20.40	20.50	20.43	20.42
	836.5	QPSK	22.42	22.35	22.37	21.33	21.34	21.33	21.35
		16QAM	21.43	21.40	21.39	20.41	20.34	20.39	20.40
	847.5	QPSK	22.42	22.42	22.42	21.33	21.35	21.32	21.31
		16QAM	21.15	21.18	21.25	20.41	20.45	20.45	20.43
1.4	824.7	QPSK	22.38	22.44	22.35	22.32	22.48	22.44	21.28
		16QAM	21.36	21.38	21.30	21.38	21.44	21.49	20.37
	836.5	QPSK	22.39	22.47	22.34	22.35	22.42	22.37	21.29
		16QAM	21.33	21.49	21.28	21.34	21.32	21.38	20.34
	848.3	QPSK	22.37	22.51	22.39	22.39	22.44	22.40	21.30
		16QAM	21.26	21.39	21.20	21.40	21.44	21.38	20.41

▪ Band 26(5) <Test case: ANT 2>

Conducted Power [dBm]									
RB Alloc			1 RB			MID RB			FULL RB
B.W(MHz)	Freq.(MHz)	Modulation	LOW	MID	HIGH	LOW	MID	HIGH	
10	829	QPSK	21.95	22.18	22.12	20.82	20.92	20.86	20.87
		16QAM	20.69	20.91	20.81	19.94	20.06	19.99	19.90
	836.5	QPSK	22.09	21.92	22.09	20.88	20.84	20.84	20.85
		16QAM	20.89	20.93	20.96	19.92	19.94	19.96	19.88
	844	QPSK	21.97	22.01	22.05	20.88	20.87	20.87	20.88
		16QAM	20.82	20.93	20.92	19.99	19.97	19.94	20.00
5	826.5	QPSK	21.74	22.02	21.96	20.82	20.88	20.91	20.82
		16QAM	20.78	20.77	20.77	19.93	20.02	20.03	19.94
	836.5	QPSK	21.78	21.86	21.83	20.88	20.80	20.79	20.83
		16QAM	20.83	20.87	20.63	20.09	19.96	20.00	19.84
	846.5	QPSK	21.87	21.91	21.86	20.82	20.82	20.79	20.84
		16QAM	20.76	20.87	20.63	19.99	19.96	20.17	19.92
3	825.5	QPSK	21.83	21.99	21.91	20.81	20.89	20.84	20.84
		16QAM	20.78	20.91	20.93	19.89	20.01	20.00	19.92
	836.5	QPSK	21.94	21.83	21.86	20.79	20.80	20.83	20.82
		16QAM	20.92	20.82	20.81	19.97	19.89	19.85	19.87
	847.5	QPSK	21.88	21.92	21.96	20.84	20.83	20.85	20.86
		16QAM	20.84	20.83	20.75	19.94	19.90	19.93	19.93
1.4	824.7	QPSK	21.75	21.97	21.86	21.74	21.93	21.93	20.75
		16QAM	20.78	20.96	20.70	20.88	20.91	20.84	19.88
	836.5	QPSK	21.88	21.92	21.86	21.83	21.93	21.87	20.78
		16QAM	20.77	20.97	20.77	20.92	20.94	20.99	19.89
	848.3	QPSK	21.87	22.02	21.91	21.89	21.93	21.90	20.80
		16QAM	20.72	20.98	20.71	20.87	20.95	20.86	19.88

• Band 4 <Test case: ANT 1>

Conducted Power [dBm]									
RB Alloc			1 RB			MID RB			FULL RB
B.W(MHz)	Freq.(MHz)	Modulation	LOW	MID	HIGH	LOW	MID	HIGH	
20	1 720	QPSK	23.50	24.04	23.65	22.60	22.63	22.59	22.63
		16QAM	22.37	22.68	22.34	21.56	21.52	21.52	21.52
	1 732.5	QPSK	23.78	23.87	23.48	22.66	22.64	22.49	22.62
		16QAM	22.57	22.63	22.25	21.57	21.56	21.49	21.57
	1 745	QPSK	24.02	23.83	23.76	22.68	22.48	22.46	22.50
		16QAM	22.83	22.56	22.65	21.67	21.42	21.51	21.55
15	1 717.5	QPSK	23.66	23.73	23.58	22.58	22.57	22.57	22.57
		16QAM	22.36	22.41	22.48	21.51	21.50	21.53	21.54
	1 732.5	QPSK	23.71	23.64	23.56	22.64	22.68	22.63	22.60
		16QAM	22.42	22.38	22.49	21.61	21.58	21.58	21.58
	1 747.5	QPSK	23.68	23.72	23.83	22.43	22.53	22.63	22.53
		16QAM	22.44	22.42	22.69	21.43	21.54	21.63	21.52
10	1 715	QPSK	23.48	23.79	23.64	22.56	22.54	22.52	22.51
		16QAM	22.21	22.56	22.38	21.50	21.53	21.51	21.50
	1 732.5	QPSK	23.73	23.70	23.53	22.66	22.59	22.62	22.60
		16QAM	22.46	22.63	22.42	21.58	21.57	21.55	21.54
	1 750	QPSK	23.76	23.83	23.97	22.57	22.58	22.68	22.55
		16QAM	22.45	22.58	22.81	21.56	21.61	21.68	21.57
5	1 712.5	QPSK	23.41	23.52	23.44	22.52	22.53	22.46	22.46
		16QAM	22.12	22.31	22.34	21.53	21.53	21.62	21.44
	1 732.5	QPSK	23.57	23.51	23.44	22.65	22.68	22.48	22.66
		16QAM	22.44	22.33	22.22	21.61	21.55	21.54	21.59
	1 752.5	QPSK	23.55	23.72	23.86	22.70	22.65	22.73	22.70
		16QAM	22.29	22.56	22.57	21.63	21.75	21.80	21.65
3	1 711.5	QPSK	23.45	23.50	23.46	22.45	22.51	22.51	22.46
		16QAM	22.23	22.24	22.31	21.37	21.43	21.43	21.44
	1 732.5	QPSK	23.65	23.60	23.56	22.67	22.61	22.49	22.59
		16QAM	22.47	22.22	22.43	21.65	21.61	21.47	21.59
	1 753.5	QPSK	23.61	23.65	23.74	22.66	22.67	22.69	22.63
		16QAM	22.38	22.45	22.78	21.63	21.56	21.62	21.60
1.4	1 710.7	QPSK	23.42	23.53	23.43	23.44	23.50	23.37	22.44
		16QAM	22.12	22.35	22.11	22.41	22.41	22.36	21.32
	1 732.5	QPSK	23.57	23.61	23.53	23.60	23.64	23.53	22.60
		16QAM	22.59	22.49	22.35	22.66	22.71	22.52	21.56
	1 754.3	QPSK	23.73	23.85	23.72	23.66	23.74	23.74	22.71
		16QAM	22.44	22.67	22.47	22.65	22.87	22.74	21.68

Band 4 <Test case: ANT 2>

Conducted Power [dBm]									
RB Alloc			1 RB			MID RB			FULL RB
B.W(MHz)	Freq.(MHz)	Modulation	LOW	MID	HIGH	LOW	MID	HIGH	
20	1 720	QPSK	23.06	23.50	23.16	22.19	22.21	22.18	22.19
		16QAM	22.09	22.36	22.15	21.26	21.25	21.24	21.16
	1 732.5	QPSK	23.34	23.29	22.88	22.23	22.12	21.94	22.13
		16QAM	22.25	22.13	21.81	21.13	21.11	21.03	21.12
	1 745	QPSK	23.46	23.30	23.23	22.12	21.91	21.87	21.90
		16QAM	22.36	22.10	22.18	21.14	20.94	20.97	21.02
15	1 717.5	QPSK	23.14	23.27	23.18	22.18	22.19	22.12	22.18
		16QAM	22.02	22.06	22.00	21.11	21.10	21.12	21.12
	1 732.5	QPSK	23.28	23.19	23.08	22.17	22.13	22.14	22.12
		16QAM	22.04	21.95	21.84	21.08	21.09	21.04	21.08
	1 747.5	QPSK	23.11	23.16	23.21	21.90	21.97	22.04	21.95
		16QAM	21.94	21.84	22.01	20.89	20.99	21.02	20.96
10	1 715	QPSK	23.10	23.41	23.25	22.13	22.16	22.16	22.15
		16QAM	21.96	22.10	22.01	21.07	21.13	21.09	21.09
	1 732.5	QPSK	23.15	23.23	23.21	22.13	22.12	22.10	22.11
		16QAM	21.95	22.04	21.87	21.10	21.08	21.05	21.07
	1 750	QPSK	23.21	23.44	23.27	21.98	21.94	22.01	21.93
		16QAM	21.95	21.96	22.20	21.02	20.98	21.03	20.93
5	1 712.5	QPSK	23.07	23.08	23.04	22.10	22.12	22.01	22.06
		16QAM	21.79	22.09	21.97	21.16	21.18	21.21	21.18
	1 732.5	QPSK	23.12	23.10	22.98	22.13	22.10	22.02	22.09
		16QAM	21.82	21.92	21.65	21.08	21.21	21.12	21.08
	1 752.5	QPSK	22.92	23.15	23.23	22.08	22.10	22.15	22.10
		16QAM	21.86	21.87	22.15	21.11	21.08	21.26	21.02
3	1 711.5	QPSK	23.08	23.03	23.10	22.01	22.16	22.12	22.11
		16QAM	21.92	22.23	22.20	21.07	21.18	21.14	21.18
	1 732.5	QPSK	23.10	23.08	22.95	22.19	22.19	22.04	22.08
		16QAM	22.07	21.93	21.98	21.17	21.17	21.07	21.17
	1 753.5	QPSK	22.93	23.11	23.18	22.03	22.07	22.02	22.01
		16QAM	21.84	21.84	22.14	21.09	21.06	21.04	21.06
1.4	1 710.7	QPSK	23.00	23.05	23.02	22.99	23.01	22.89	21.98
		16QAM	21.95	22.21	21.83	22.07	22.14	22.09	21.01
	1 732.5	QPSK	23.02	23.13	22.93	23.08	23.12	23.05	22.08
		16QAM	22.02	22.00	21.99	22.27	22.23	22.11	21.15
	1 754.3	QPSK	22.92	23.24	23.22	23.03	23.17	23.12	22.05
		16QAM	22.04	22.30	22.03	22.14	22.25	22.21	21.18

• Band 2 <Test case: ANT 1>

Conducted Power [dBm]									
RB Alloc			1 RB			MID RB			FULL RB
B.W(MHz)	Freq.(MHz)	Modulation	LOW	MID	HIGH	LOW	MID	HIGH	
20	1 860	QPSK	23.68	23.84	23.70	22.60	22.62	22.68	22.68
		16QAM	22.63	22.61	22.62	21.66	21.68	21.68	21.66
	1 880	QPSK	23.79	24.30	23.78	22.75	22.79	22.81	22.79
		16QAM	22.66	22.83	22.77	21.81	21.85	21.85	21.84
	1 900	QPSK	23.96	24.48	24.06	22.96	22.88	22.99	22.94
		16QAM	22.83	23.16	22.81	21.94	21.93	21.93	21.96
15	1 857.5	QPSK	23.54	23.61	23.64	22.55	22.45	22.61	22.57
		16QAM	22.66	22.54	22.66	21.62	21.55	21.67	21.65
	1 880	QPSK	23.83	23.86	23.84	22.79	22.82	22.86	22.82
		16QAM	22.94	22.77	22.83	21.78	21.82	21.88	21.80
	1 902.5	QPSK	23.98	23.96	23.82	22.91	22.87	22.95	22.94
		16QAM	22.89	22.83	22.87	21.97	21.96	21.94	21.93
10	1 855	QPSK	23.52	23.80	23.42	22.47	22.38	22.43	22.46
		16QAM	22.60	22.56	22.52	21.59	21.54	21.51	21.60
	1 880	QPSK	23.66	24.02	23.76	22.65	22.75	22.75	22.70
		16QAM	22.78	22.84	22.85	21.82	21.81	21.81	21.84
	1 905	QPSK	24.07	23.90	23.88	22.83	22.82	22.72	22.86
		16QAM	22.97	23.00	22.88	21.92	21.98	21.87	21.97
5	1 852.5	QPSK	23.42	23.61	23.52	22.45	22.50	22.50	22.45
		16QAM	22.39	22.53	22.36	21.68	21.57	21.53	21.57
	1 880	QPSK	23.60	23.72	23.65	22.73	22.74	22.67	22.71
		16QAM	22.65	22.83	22.66	21.79	21.92	21.78	21.81
	1 907.5	QPSK	23.71	23.75	24.02	22.67	22.72	22.71	22.66
		16QAM	22.92	22.74	22.70	21.88	21.85	21.92	21.80
3	1 851.5	QPSK	23.47	23.43	23.37	22.48	22.49	22.49	22.44
		16QAM	22.54	22.42	22.48	21.57	21.60	21.53	21.57
	1 880	QPSK	23.69	23.66	23.65	22.74	22.76	22.73	22.72
		16QAM	22.75	22.69	22.72	21.87	21.81	21.85	21.81
	1 908.5	QPSK	23.84	23.85	23.79	22.78	22.78	22.77	22.72
		16QAM	22.73	22.72	22.80	21.85	21.85	21.89	21.84
1.4	1 850.7	QPSK	23.23	23.43	23.51	23.38	23.40	23.39	22.42
		16QAM	22.53	22.59	22.31	22.58	22.63	22.59	21.51
	1 880	QPSK	23.65	23.70	23.68	23.65	23.66	23.72	22.66
		16QAM	22.72	22.92	22.72	22.87	22.88	22.84	21.82
	1 909.3	QPSK	23.71	23.87	23.85	23.70	23.77	23.73	22.73
		16QAM	22.73	22.88	22.77	22.99	23.00	22.97	21.81

• Band 2 <Test case: ANT 2>

Conducted Power [dBm]									
RB Alloc			1 RB			MID RB			FULL RB
B.W(MHz)	Freq.(MHz)	Modulation	LOW	MID	HIGH	LOW	MID	HIGH	
20	1 860	QPSK	22.98	23.18	23.09	22.01	21.97	22.00	22.01
		16QAM	22.04	22.08	22.05	21.00	21.06	21.02	20.99
	1 880	QPSK	23.13	23.63	23.10	22.07	22.08	22.08	22.14
		16QAM	22.00	22.25	22.12	21.13	21.15	21.12	21.18
	1 900	QPSK	23.27	23.84	23.21	22.25	22.27	22.17	22.28
		16QAM	22.14	22.42	22.25	21.23	21.24	21.25	21.25
15	1 857.5	QPSK	23.08	22.99	23.04	22.02	21.90	22.01	22.02
		16QAM	21.87	21.70	21.98	20.96	20.91	20.96	20.97
	1 880	QPSK	23.24	23.20	23.08	22.12	22.05	22.09	22.08
		16QAM	22.01	22.01	22.08	21.14	21.11	21.14	21.13
	1 902.5	QPSK	23.28	23.21	23.13	22.21	22.20	22.19	22.20
		16QAM	22.10	22.13	22.01	21.23	21.24	21.21	21.25
10	1 855	QPSK	23.11	23.11	23.04	22.08	22.01	21.93	22.03
		16QAM	22.01	21.92	21.86	21.00	20.87	20.90	20.99
	1 880	QPSK	23.35	23.31	23.41	22.23	22.28	22.28	22.26
		16QAM	22.20	22.32	22.22	21.14	21.17	21.15	21.16
	1 905	QPSK	23.50	23.80	23.29	22.36	22.33	22.22	22.30
		16QAM	22.26	22.32	22.15	21.25	21.31	21.18	21.25
5	1 852.5	QPSK	22.87	23.17	22.92	22.01	22.06	22.05	22.02
		16QAM	21.80	21.83	21.67	20.99	20.96	21.06	20.90
	1 880	QPSK	23.08	23.23	23.14	22.26	22.26	22.24	22.24
		16QAM	22.02	22.06	21.94	21.11	21.11	21.10	21.10
	1 907.5	QPSK	23.24	23.29	23.16	22.20	22.18	22.19	22.25
		16QAM	22.09	22.15	21.96	21.24	21.09	21.18	21.14
3	1 851.5	QPSK	22.97	23.00	23.11	22.07	22.05	22.08	21.98
		16QAM	21.92	21.73	21.98	20.93	20.89	20.94	20.88
	1 880	QPSK	23.23	23.23	23.16	22.31	22.28	22.23	22.17
		16QAM	22.02	21.96	22.01	21.08	21.12	21.14	21.11
	1 908.5	QPSK	23.23	23.19	23.23	22.25	22.23	22.32	22.23
		16QAM	22.04	21.99	22.18	21.15	21.11	21.18	21.16
1.4	1 850.7	QPSK	22.82	23.03	22.98	22.93	22.98	22.93	21.94
		16QAM	21.91	21.90	21.77	21.93	21.99	21.95	20.90
	1 880	QPSK	23.13	23.21	23.19	23.20	23.18	23.15	22.19
		16QAM	21.95	22.11	22.02	22.16	22.13	22.15	21.05
	1 909.3	QPSK	23.08	23.09	23.21	23.17	23.25	23.27	22.24
		16QAM	21.98	22.28	22.09	22.16	22.29	22.18	21.06

7.2 OCCUPIED BANDWIDTH

- Plots of the EUT's Occupied Bandwidth are shown in Clause 8.1

7.3 PEAK TO AVERAGE RATIO

- Plots of the EUT's Peak- to- Average Ratio are shown in Clause 8.2

7.4 BAND EDGE EMISSIONS (Conducted)

- Plots of the EUT's Band Edge Emissions are shown in Clause 8.3

7.5 SPURIOUS AND HARMONICS EMISSIONS (Conducted)

- Plots of the EUT's Spurious Emissions are shown in Clause 8.4

7.6 ERP & EIRP

- Test Notes

- 1) This device was tested under all bandwidths, modulations and RB configurations and the worst case data are reported in the below table.

7.6.1 LTE Band 12

<Test case: ANT 1>

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBd)	ERP (dBm)	ERP (W)
10	704	QPSK	1/25	H	17.29	-0.65	16.64	0.046
		16QAM	1/25	H	15.66	-0.65	15.01	0.032
	711	QPSK	1/25	H	16.33	-0.63	15.70	0.037
		16QAM	1/25	H	15.01	-0.63	14.38	0.027
5	701.5	QPSK	1/12	H	18.36	-0.66	17.70	0.059
		16QAM	1/12	H	17.32	-0.66	16.66	0.046
	707.5	QPSK	1/12	H	18.60	-0.64	17.96	0.063
		16QAM	1/12	H	17.50	-0.64	16.86	0.049
	713.5	QPSK	1/12	H	18.47	-0.62	17.85	0.061
		16QAM	1/12	H	17.14	-0.62	16.52	0.045
3	700.5	QPSK	1/7	H	18.11	-0.66	17.45	0.056
		16QAM	1/7	H	16.85	-0.66	16.19	0.042
	707.5	QPSK	1/7	H	18.71	-0.64	18.07	0.064
		16QAM	1/7	H	17.66	-0.64	17.02	0.050
	714.5	QPSK	1/7	H	18.52	-0.62	17.90	0.062
		16QAM	1/7	H	17.39	-0.62	16.77	0.048
1.4	699.7	QPSK	1/2	H	18.30	-0.66	17.64	0.058
		16QAM	1/2	H	17.15	-0.66	16.49	0.045
	707.5	QPSK	1/2	H	18.23	-0.64	17.59	0.057
		16QAM	1/2	H	17.35	-0.64	16.71	0.047
	715.3	QPSK	1/2	H	17.79	-0.62	17.17	0.052
		16QAM	1/2	H	16.70	-0.62	16.08	0.041

<Test case: ANT 2>

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBd)	ERP (dBm)	ERP (W)
10	704	QPSK	1/25	H	16.46	-0.65	15.81	0.038
		16QAM	1/25	H	15.10	-0.65	14.45	0.028
	711	QPSK	1/25	H	16.67	-0.63	16.04	0.040
		16QAM	1/25	H	15.41	-0.63	14.78	0.030
5	701.5	QPSK	1/12	H	16.24	-0.66	15.58	0.036
		16QAM	1/12	H	14.85	-0.66	14.19	0.026
	707.5	QPSK	1/12	H	16.91	-0.64	16.27	0.042
		16QAM	1/12	H	15.30	-0.64	14.66	0.029
	713.5	QPSK	1/12	H	16.80	-0.62	16.18	0.041
		16QAM	1/12	H	15.88	-0.62	15.26	0.034
3	700.5	QPSK	1/14	H	15.80	-0.66	15.14	0.033
		16QAM	1/14	H	14.56	-0.66	13.90	0.025
	707.5	QPSK	1/14	H	16.81	-0.64	16.17	0.041
		16QAM	1/14	H	15.82	-0.64	15.18	0.033
	714.5	QPSK	1/14	H	17.13	-0.62	16.51	0.045
		16QAM	1/14	H	15.77	-0.62	15.15	0.033
1.4	699.7	QPSK	1/2	H	15.63	-0.66	14.97	0.031
		16QAM	1/2	H	14.45	-0.66	13.79	0.024
	707.5	QPSK	1/2	H	16.74	-0.64	16.10	0.041
		16QAM	1/2	H	15.38	-0.64	14.74	0.030
	715.3	QPSK	1/2	H	16.96	-0.62	16.34	0.043
		16QAM	1/2	H	15.88	-0.62	15.26	0.034

7.6.2 LTE Band 26
<Test case: ANT 1>

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBd)	ERP (dBm)	ERP (W)
15	831.5	QPSK	1/0	H	22.82	-0.69	22.13	0.163
		16QAM	1/0	H	21.65	-0.69	20.96	0.125
	841.5	QPSK	1/0	H	21.81	-0.79	21.02	0.126
		16QAM	1/0	H	20.35	-0.79	19.56	0.090

<Test case: ANT 2>

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBd)	ERP (dBm)	ERP (W)
15	831.5	QPSK	1/0	H	22.21	-0.69	21.52	0.142
		16QAM	1/0	H	20.95	-0.69	20.26	0.106
	841.5	QPSK	1/0	H	21.37	-0.79	20.58	0.114
		16QAM	1/0	H	20.14	-0.79	19.35	0.086

7.6.3 LTE Band 26(5)

<Test case: ANT 1>

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBd)	ERP (dBm)	ERP (W)
10	829	QPSK	1/0	H	22.51	-0.67	21.84	0.153
		16QAM	1/0	H	21.08	-0.67	20.41	0.110
	836.5	QPSK	1/0	H	21.73	-0.74	20.99	0.126
		16QAM	1/0	H	20.19	-0.74	19.45	0.088
	844	QPSK	1/0	H	21.83	-0.81	21.02	0.126
		16QAM	1/0	H	20.54	-0.81	19.73	0.094
5	826.5	QPSK	1/0	H	22.20	-0.65	21.55	0.143
		16QAM	1/0	H	20.96	-0.65	20.31	0.107
	836.5	QPSK	1/0	H	21.18	-0.74	20.44	0.111
		16QAM	1/0	H	19.83	-0.74	19.09	0.081
	846.5	QPSK	1/0	H	21.53	-0.83	20.70	0.117
		16QAM	1/0	H	20.14	-0.83	19.31	0.085
3	825.5	QPSK	1/0	H	21.89	-0.64	21.25	0.133
		16QAM	1/0	H	20.71	-0.64	20.07	0.102
	836.5	QPSK	1/0	H	21.31	-0.74	20.57	0.114
		16QAM	1/0	H	20.23	-0.74	19.49	0.089
	847.5	QPSK	1/0	H	22.21	-0.84	21.37	0.137
		16QAM	1/0	H	20.76	-0.84	19.92	0.098
1.4	824.7	QPSK	1/0	H	22.42	-0.63	21.79	0.151
		16QAM	1/0	H	21.10	-0.63	20.47	0.111
	836.5	QPSK	1/0	H	21.06	-0.74	20.32	0.108
		16QAM	1/0	H	19.94	-0.74	19.20	0.083
	848.3	QPSK	1/0	H	22.33	-0.85	21.48	0.141
		16QAM	1/0	H	21.05	-0.85	20.20	0.105

<Test case: ANT 2>

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBd)	ERP (dBm)	ERP (W)
10	829	QPSK	1/0	H	22.03	-0.67	21.36	0.137
		16QAM	1/0	H	20.67	-0.67	20.00	0.100
	836.5	QPSK	1/0	H	21.57	-0.74	20.83	0.121
		16QAM	1/0	H	20.29	-0.74	19.55	0.090
	844	QPSK	1/0	H	21.14	-0.81	20.33	0.108
		16QAM	1/0	H	19.96	-0.81	19.15	0.082
5	826.5	QPSK	1/0	H	21.71	-0.65	21.06	0.128
		16QAM	1/0	H	20.34	-0.65	19.69	0.093
	836.5	QPSK	1/0	H	21.37	-0.74	20.63	0.116
		16QAM	1/0	H	20.09	-0.74	19.35	0.086
	846.5	QPSK	1/0	H	21.49	-0.83	20.66	0.116
		16QAM	1/0	H	20.26	-0.83	19.43	0.088
3	825.5	QPSK	1/0	H	21.66	-0.64	21.02	0.126
		16QAM	1/0	H	20.44	-0.64	19.80	0.095
	836.5	QPSK	1/0	H	21.24	-0.74	20.50	0.112
		16QAM	1/0	H	19.96	-0.74	19.22	0.084
	847.5	QPSK	1/0	H	21.62	-0.84	20.78	0.120
		16QAM	1/0	H	20.42	-0.84	19.58	0.091
1.4	824.7	QPSK	1/0	H	21.39	-0.63	20.76	0.119
		16QAM	1/0	H	20.10	-0.63	19.47	0.089
	836.5	QPSK	1/0	H	21.13	-0.74	20.39	0.109
		16QAM	1/0	H	19.73	-0.74	18.99	0.079
	848.3	QPSK	1/0	H	21.82	-0.85	20.97	0.125
		16QAM	1/0	H	20.65	-0.85	19.80	0.095

7.6.4 LTE Band 4
<Test case: ANT 1>

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBi)	EIRP (dBm)	EIRP (W)
20	1 720	QPSK	1/0	V	17.31	5.28	22.59	0.182
		16QAM	1/0	V	15.76	5.28	21.04	0.127
	1 732.5	QPSK	1/0	V	18.07	5.33	23.40	0.219
		16QAM	1/0	V	15.65	5.33	20.98	0.125
	1 745	QPSK	1/0	V	17.64	5.38	23.02	0.200
		16QAM	1/0	V	16.24	5.38	21.62	0.145
15	1 717.5	QPSK	1/0	V	17.13	5.27	22.40	0.174
		16QAM	1/0	V	15.85	5.27	21.12	0.129
	1 732.5	QPSK	1/0	V	16.26	5.33	21.59	0.144
		16QAM	1/0	V	15.16	5.33	20.49	0.112
	1 747.5	QPSK	1/0	V	17.24	5.39	22.63	0.183
		16QAM	1/0	V	15.93	5.39	21.32	0.136
10	1 715	QPSK	1/0	V	16.63	5.26	21.89	0.155
		16QAM	1/0	V	15.21	5.26	20.47	0.111
	1 732.5	QPSK	1/0	V	16.47	5.33	21.80	0.151
		16QAM	1/0	V	14.90	5.33	20.23	0.105
	1 750	QPSK	1/0	V	18.93	5.40	24.33	0.271
		16QAM	1/0	V	17.43	5.40	22.83	0.192
5	1 712.5	QPSK	1/0	V	16.34	5.25	21.59	0.144
		16QAM	1/0	V	15.05	5.25	20.30	0.107
	1 732.5	QPSK	1/0	V	16.49	5.33	21.82	0.152
		16QAM	1/0	V	15.22	5.33	20.55	0.114
	1 752.5	QPSK	1/0	V	17.30	5.38	22.68	0.185
		16QAM	1/0	V	16.16	5.38	21.54	0.143
3	1 711.5	QPSK	1/0	V	16.30	5.25	21.55	0.143
		16QAM	1/0	V	15.00	5.25	20.25	0.106
	1 732.5	QPSK	1/0	V	15.23	5.33	20.56	0.114
		16QAM	1/0	V	13.97	5.33	19.30	0.085
	1 753.5	QPSK	1/0	V	17.52	5.37	22.89	0.195
		16QAM	1/0	V	16.33	5.37	21.70	0.148
1.4	1 710.7	QPSK	1/0	V	16.08	5.24	21.32	0.136
		16QAM	1/0	V	14.87	5.24	20.11	0.103
	1 732.5	QPSK	1/0	V	16.09	5.33	21.42	0.139
		16QAM	1/0	V	14.82	5.33	20.15	0.104
	1 754.3	QPSK	1/0	V	17.24	5.36	22.60	0.182
		16QAM	1/0	V	16.05	5.36	21.41	0.138

<Test case: ANT 2>

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBi)	EIRP (dBm)	EIRP (W)
20	1 720	QPSK	1/50	V	16.89	5.28	22.17	0.165
		16QAM	1/50	V	15.70	5.28	20.98	0.125
	1 732.5	QPSK	1/50	V	17.93	5.33	23.26	0.212
		16QAM	1/50	V	16.62	5.33	21.95	0.157
	1 745	QPSK	1/50	V	19.35	5.38	24.73	0.297
		16QAM	1/50	V	18.21	5.38	23.59	0.229
15	1 717.5	QPSK	1/36	V	17.38	5.27	22.65	0.184
		16QAM	1/36	V	15.99	5.27	21.26	0.134
	1 732.5	QPSK	1/36	V	17.60	5.33	22.93	0.196
		16QAM	1/36	V	16.29	5.33	21.62	0.145
	1 747.5	QPSK	1/36	V	19.47	5.39	24.86	0.306
		16QAM	1/36	V	18.06	5.39	23.45	0.221
10	1 715	QPSK	1/25	V	17.30	5.26	22.56	0.180
		16QAM	1/25	V	15.90	5.26	21.16	0.131
	1 732.5	QPSK	1/25	V	17.73	5.33	23.06	0.202
		16QAM	1/25	V	16.71	5.33	22.04	0.160
	1 750	QPSK	1/25	V	19.49	5.40	24.89	0.308
		16QAM	1/25	V	18.23	5.40	23.63	0.231
5	1 712.5	QPSK	1/12	V	17.25	5.25	22.50	0.178
		16QAM	1/12	V	16.14	5.25	21.39	0.138
	1 732.5	QPSK	1/12	V	17.63	5.33	22.96	0.198
		16QAM	1/12	V	16.49	5.33	21.82	0.152
	1 752.5	QPSK	1/12	V	19.64	5.38	25.02	0.318
		16QAM	1/12	V	18.35	5.38	23.73	0.236
3	1 711.5	QPSK	1/7	V	17.19	5.25	22.44	0.175
		16QAM	1/7	V	15.70	5.25	20.95	0.124
	1 732.5	QPSK	1/7	V	17.79	5.33	23.12	0.205
		16QAM	1/7	V	16.67	5.33	22.00	0.158
	1 753.5	QPSK	1/7	V	19.50	5.37	24.87	0.307
		16QAM	1/7	V	18.32	5.37	23.69	0.234
1.4	1 710.7	QPSK	1/2	V	17.02	5.24	22.26	0.168
		16QAM	1/2	V	15.52	5.24	20.76	0.119
	1 732.5	QPSK	1/2	V	17.65	5.33	22.98	0.199
		16QAM	1/2	V	16.57	5.33	21.90	0.155
	1 754.3	QPSK	1/2	V	19.66	5.36	25.02	0.318
		16QAM	1/2	V	18.34	5.36	23.70	0.234

7.6.5 LTE Band 2
<Test case: ANT 1>

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBi)	EIRP (dBm)	EIRP (W)
20	1 860	QPSK	1/0	V	17.23	4.80	22.03	0.160
		16QAM	1/0	V	16.46	4.80	21.26	0.134
	1 880	QPSK	1/0	V	19.94	4.60	24.54	0.284
		16QAM	1/0	V	19.02	4.60	23.62	0.230
	1 900	QPSK	1/0	V	19.91	4.40	24.31	0.270
		16QAM	1/0	V	18.72	4.40	23.12	0.205
15	1 857.5	QPSK	1/0	V	17.06	4.83	21.89	0.155
		16QAM	1/0	V	15.72	4.83	20.55	0.114
	1 880	QPSK	1/0	V	19.31	4.60	23.91	0.246
		16QAM	1/0	V	18.35	4.60	22.95	0.197
	1 900.5	QPSK	1/0	V	19.43	4.41	23.84	0.242
		16QAM	1/0	V	18.07	4.41	22.48	0.177
10	1 855	QPSK	1/0	V	16.96	4.85	21.81	0.152
		16QAM	1/0	V	15.43	4.85	20.28	0.107
	1 880	QPSK	1/0	V	19.18	4.60	23.78	0.239
		16QAM	1/0	V	18.04	4.60	22.64	0.184
	1 905	QPSK	1/0	V	19.98	4.42	24.40	0.275
		16QAM	1/0	V	18.60	4.42	23.02	0.200
5	1 852.5	QPSK	1/0	V	15.13	4.88	20.01	0.100
		16QAM	1/0	V	14.12	4.88	19.00	0.079
	1 880	QPSK	1/0	V	19.16	4.60	23.76	0.238
		16QAM	1/0	V	18.10	4.60	22.70	0.186
	1 907.5	QPSK	1/0	V	20.80	4.43	25.23	0.333
		16QAM	1/0	V	19.75	4.43	24.18	0.262
3	1 851.5	QPSK	1/0	V	16.79	4.89	21.68	0.147
		16QAM	1/0	V	15.44	4.89	20.33	0.108
	1 880	QPSK	1/0	V	18.90	4.60	23.50	0.224
		16QAM	1/0	V	17.87	4.60	22.47	0.177
	1 908.5	QPSK	1/0	V	21.31	4.43	25.74	0.375
		16QAM	1/0	V	20.20	4.43	24.63	0.290
1.4	1 850.7	QPSK	1/0	V	16.71	4.89	21.60	0.145
		16QAM	1/0	V	15.72	4.89	20.61	0.115
	1 880	QPSK	1/0	V	15.72	4.60	20.32	0.108
		16QAM	1/0	V	14.66	4.60	19.26	0.084
	1 909.3	QPSK	1/0	V	19.83	4.44	24.27	0.267
		16QAM	1/0	V	18.56	4.44	23.00	0.200

<Test case: ANT 2>

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBi)	EIRP (dBm)	EIRP (W)
20	1 860	QPSK	1/50	V	17.29	4.80	22.09	0.162
		16QAM	1/50	V	16.58	4.80	21.38	0.137
	1 880	QPSK	1/50	V	18.49	4.60	23.09	0.204
		16QAM	1/50	V	17.12	4.60	21.72	0.149
	1 900	QPSK	1/50	V	18.05	4.40	22.45	0.176
		16QAM	1/50	V	16.54	4.40	20.94	0.124
15	1 857.5	QPSK	1/74	V	17.07	4.83	21.90	0.155
		16QAM	1/74	V	15.63	4.83	20.46	0.111
	1 880	QPSK	1/50	V	18.25	4.60	22.85	0.193
		16QAM	1/50	V	17.03	4.60	21.63	0.146
	1 900.5	QPSK	1/74	V	18.35	4.41	22.76	0.189
		16QAM	1/74	V	17.27	4.41	21.68	0.147
10	1 855	QPSK	1/25	V	16.86	4.85	21.71	0.148
		16QAM	1/25	V	15.42	4.85	20.27	0.106
	1 880	QPSK	1/25	V	18.41	4.60	23.01	0.200
		16QAM	1/25	V	17.11	4.60	21.71	0.148
	1 905	QPSK	1/25	V	18.37	4.42	22.79	0.190
		16QAM	1/25	V	17.32	4.42	21.74	0.149
5	1 852.5	QPSK	1/12	V	16.74	4.88	21.62	0.145
		16QAM	1/12	V	15.22	4.88	20.10	0.102
	1 880	QPSK	1/12	V	18.19	4.60	22.79	0.190
		16QAM	1/12	V	17.06	4.60	21.66	0.147
	1 907.5	QPSK	1/12	V	19.47	4.43	23.90	0.245
		16QAM	1/12	V	17.99	4.43	22.42	0.175
3	1 851.5	QPSK	1/7	V	17.08	4.89	21.97	0.157
		16QAM	1/7	V	15.66	4.89	20.55	0.114
	1 880	QPSK	1/7	V	17.87	4.60	22.47	0.177
		16QAM	1/7	V	16.78	4.60	21.38	0.137
	1 908.5	QPSK	1/7	V	19.36	4.43	23.79	0.239
		16QAM	1/7	V	18.13	4.43	22.56	0.180
1.4	1 850.7	QPSK	1/2	V	16.82	4.89	21.71	0.148
		16QAM	1/2	V	15.41	4.89	20.30	0.107
	1 880	QPSK	1/2	V	17.99	4.60	22.59	0.182
		16QAM	1/2	V	16.91	4.60	21.51	0.142
	1 909.3	QPSK	1/2	V	19.19	4.44	23.63	0.231
		16QAM	1/2	V	18.01	4.44	22.45	0.176

7.7 UNDESIRABLE EMISSIONS (Radiated)

- Test Notes

- 1) This device was tested under all bandwidths, modulations and RB configurations and the worst case data are reported.
- 2) The frequency spectrum is examined from 9 kHz to the 10th harmonic of the fundamental frequency of the transmitter.
No other spurious and harmonic emissions were reported greater than listed emissions.
- 3) Limit Calculation for Band 2/4/12/26/5 = $43 + 10 \log_{10}(P[\text{Watts}])$

7.7.1 LTE Band 12

<Test case: ANT 1>

B.W (MHz)	Test Freq. (MHz)	RB Size/Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBd)	Result		Limit (dBc)
								(dBm)	(dBc)	
10	704	1/25	QPSK	1 408.22	V	-51.88	2.48	-49.40	66.04	29.64
			16QAM	1 408.04	V	-52.13	2.48	-49.65	64.66	28.01
	711	1/25	QPSK	1 422.16	V	-55.81	2.54	-53.27	68.97	28.70
			16QAM	1 422.18	V	-56.64	2.54	-54.10	68.48	27.38
3	707.5	1/7	QPSK	1 414.92	V	-52.52	2.51	-50.01	68.08	31.07
			16QAM	1 414.99	V	-53.43	2.51	-50.92	67.94	30.02

<Test case: ANT 2>

B.W (MHz)	Test Freq. (MHz)	RB Size/Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBd)	Result		Limit (dBc)
								(dBm)	(dBc)	
10	704	1/25	QPSK	1 408.21	V	-51.98	2.48	-49.50	65.31	28.81
			16QAM	1 408.13	V	-52.75	2.48	-50.27	64.72	27.45
	711	1/25	QPSK	1 422.18	V	-54.88	2.54	-52.34	68.38	29.04
			16QAM	1 422.18	V	-55.75	2.54	-53.21	67.99	27.78
3	714.5	1/7	QPSK	1 428.90	V	-54.63	2.57	-52.06	68.57	29.51
			16QAM	1 428.96	V	-55.58	2.57	-53.01	68.16	28.15

7.7.2 LTE Band 26
<Test case: ANT 1>

B.W (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBd)	Result		Limit (dBc)
								(dBm)	(dBc)	
15	831.5	1/0	QPSK	1 648.56	V	-67.67	4.16	-63.51	85.64	35.13
				2 474.47	V	-60.98	3.60	-57.38	79.51	
			16QAM	1 650.11	V	-67.73	4.15	-63.58	84.54	33.96
				2 474.41	V	-61.83	3.60	-58.23	79.19	
	841.5	1/0	QPSK	1 669.57	V	-65.02	3.72	-61.30	82.32	34.02
				2 504.79	V	-62.79	3.77	-59.02	80.04	
16QAM			1 669.78	V	-66.38	3.71	-62.67	82.23	32.56	
			2 504.04	V	-63.11	3.77	-59.34	78.90		

<Test case: ANT 2>

B.W (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBd)	Result		Limit (dBc)
								(dBm)	(dBc)	
15	831.5	1/0	QPSK	1 658.35	V	-66.76	3.97	-62.79	84.31	34.52
				2 474.44	V	-59.99	3.60	-56.39	77.91	
			16QAM	1 658.68	V	-66.85	3.96	-62.89	83.15	33.26
				2 474.53	V	-60.49	3.60	-56.89	77.15	
	841.5	1/0	QPSK	1 669.73	V	-63.55	3.72	-59.83	80.41	33.58
				2 504.27	V	-63.11	3.77	-59.34	79.92	
16QAM			1 669.76	V	-65.17	3.72	-61.45	80.80	32.35	
			2 504.46	V	-63.02	3.77	-59.25	78.60		

7.7.3 LTE Band 4
<Test case: ANT 1>

B.W (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBi)	Result		Limit (dBc)
								(dBm)	(dBc)	
20	1 720	1/0	QPSK	3 422.30	V	-63.10	7.74	-55.36	77.95	35.59
				8 555.34	V	-59.98	13.20	-46.78	69.37	
			16QAM	3 422.22	V	-63.67	7.74	-55.93	76.97	34.04
				8 555.63	V	-60.24	13.20	-47.04	68.08	
	1 732.5	1/0	QPSK	3 447.05	V	-63.16	7.79	-55.37	78.77	36.40
				8 617.93	V	-59.53	13.20	-46.33	69.73	
			16QAM	3 447.16	V	-64.20	7.79	-56.41	77.39	33.98
				8 617.68	V	-60.08	13.20	-46.88	67.86	
	1 745	1/0	QPSK	3 472.12	V	-64.21	7.84	-56.37	79.39	36.02
				8 680.42	V	-59.46	13.20	-46.26	69.28	
			16QAM	3 472.14	V	-64.65	7.84	-56.81	78.43	34.62
				8 680.66	V	-60.03	13.20	-46.83	68.45	

<Test case: ANT 2>

B.W (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBi)	Result		Limit (dBc)
								(dBm)	(dBc)	
20	1 720	1/50	QPSK	3 440.14	V	-62.98	7.78	-55.20	77.37	35.17
				8 600.61	H	-59.79	13.20	-46.59	68.76	
			16QAM	3 440.26	V	-63.75	7.78	-55.97	76.95	33.98
				8 601.22	H	-60.33	13.20	-47.13	68.11	
	1 732.5	1/50	QPSK	3 465.08	V	-61.62	7.83	-53.79	77.05	36.26
				8 663.18	H	-59.15	13.20	-45.95	69.21	
			16QAM	3 465.18	V	-63.74	7.83	-55.91	77.86	34.95
				8 663.20	H	-59.67	13.20	-46.47	68.42	
	1 745	1/50	QPSK	3 490.42	V	-63.89	7.88	-56.01	80.74	37.73
				8 725.69	H	-59.95	13.30	-46.65	71.38	
			16QAM	3 490.04	V	-64.20	7.88	-56.32	79.91	36.59
				8 725.48	H	-59.87	13.30	-46.57	70.16	
5	1 752.5	1/12	QPSK	3 505.09	V	-64.33	7.92	-56.41	81.43	38.02
				8 762.25	H	-60.03	13.35	-46.68	71.70	
			16QAM	3 504.83	V	-64.53	7.92	-56.61	80.34	36.73
				8 762.51	H	-60.01	13.35	-46.66	70.39	

7.7.4 LTE Band 2
<Test case: ANT 1>

B.W (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBi)	Result		Limit (dBc)
								(dBm)	(dBc)	
20	1 860	1/0	QPSK	3 702.04	V	-63.83	8.30	-55.53	77.56	35.03
				5 553.35	V	-58.88	10.52	-48.36	70.39	
			16QAM	3 701.99	V	-64.14	8.30	-55.84	77.10	34.26
				5 553.18	V	-60.56	10.52	-50.04	71.30	
	1 880	1/0	QPSK	3 742.23	V	-64.34	8.38	-55.96	80.50	37.54
				5 613.16	V	-58.11	10.77	-47.34	71.88	
			16QAM	3 742.22	V	-64.48	8.38	-56.10	79.72	36.62
				5 613.35	V	-59.78	10.77	-49.01	72.63	
	1 900	1/0	QPSK	3 782.16	V	-63.22	8.46	-54.76	79.07	37.31
				5 673.16	V	-60.43	10.65	-49.78	74.09	
			16QAM	3 782.27	V	-63.80	8.46	-55.34	78.46	36.12
				5 673.52	V	-61.36	10.65	-50.71	73.83	
3	1 908.5	1/0	QPSK	3 814.45	V	-63.35	8.50	-54.85	80.59	38.74
				5 721.65	V	-60.78	10.60	-50.18	75.92	
			16QAM	3 814.36	V	-63.68	8.50	-55.18	79.81	37.63
				5 721.55	V	-61.60	10.60	-51.00	75.63	

<Test case: ANT 2>

B.W (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBi)	Result		Limit (dBc)
								(dBm)	(dBc)	
20	1 860	1/0	QPSK	3 721.40	V	-64.84	8.34	-56.50	78.59	35.09
				5 580.17	H	-62.33	10.68	-51.65	73.74	
				7 441.32	V	-60.61	12.00	-48.61	70.70	
			16QAM	3 718.81	V	-64.66	8.34	-56.32	77.70	34.38
				5 580.34	H	-62.55	10.68	-51.87	73.25	
				7 439.51	V	-60.99	12.00	-48.99	70.37	
	1 880	1/0	QPSK	3 760.32	V	-63.95	8.42	-55.53	78.62	36.09
				5 640.22	H	-62.58	10.72	-51.86	74.95	
				7 520.46	V	-60.59	12.14	-48.45	71.54	
			16QAM	3 760.20	V	-64.56	8.42	-56.14	77.86	34.72
				5 640.55	H	-63.16	10.72	-52.44	74.16	
				7 520.54	V	-60.93	12.14	-48.79	70.51	
	1 900	1/0	QPSK	3 880.11	V	-63.78	8.56	-55.22	77.67	35.45
				5 700.31	H	-61.82	10.60	-51.22	73.67	
				7 600.35	V	-60.52	12.20	-48.32	70.77	
			16QAM	3 880.23	V	-63.84	8.56	-55.28	76.22	33.94
5 700.11				H	-62.69	10.60	-52.09	73.03		
7 600.60				V	-60.38	12.20	-48.18	69.12		
5	1 907.5	1/12	QPSK	3 815.06	V	-63.74	8.50	-55.24	79.14	36.90
				5 722.46	H	-61.89	10.60	-51.29	75.19	
				7 628.09	V	-60.87	12.20	-48.67	72.57	
			16QAM	3 815.12	V	-64.13	8.50	-55.63	78.05	35.42
				5 722.39	H	-62.42	10.60	-51.82	74.24	
				7 632.32	V	-60.86	12.20	-48.66	71.08	

7.8 FREQUENCY STABILITY

- Test Notes

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

7.8.1 LTE Band 12

OPERATING FREQUENCY : 707.5 MHz
 REFERENCE VOLTAGE : 12 VDC
 LIMIT : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

VOLTAGE (%)	POWER (V DC)	TEMP (°C)	FREQUENCY (Hz)	FREQ.Dev (Hz)	Deviation	
					(ppm)	(%)
100 %	12.0	+20(Ref)	707,500,001	+1	+0.001 4	+0.000 000 141
100 %		-30	707,500,003	+3	+0.004 2	+0.000 000 424
100 %		-20	707,500,002	+2	+0.002 8	+0.000 000 283
100 %		-10	707,500,002	+2	+0.002 8	+0.000 000 283
100 %		0	707,500,003	+3	+0.004 2	+0.000 000 424
100 %		+10	707,500,002	+2	+0.002 8	+0.000 000 283
100 %		+20	707,500,001	+1	+0.001 4	+0.000 000 141
100 %		+30	707,500,001	+1	+0.001 4	+0.000 000 141
100 %		+40	707,500,003	+3	+0.004 2	+0.000 000 424
100 %		+50	707,500,002	+2	+0.002 8	+0.000 000 283
115 %		13.8	+20	707,500,004	+4	+0.005 7
85 %	10.2	+20	707,500,001	+1	+0.001 4	+0.000 000 141

7.8.2 LTE Band 26(5)

OPERATING FREQUENCY : 836.5 MHz
 REFERENCE VOLTAGE : 12 VDC
 DEVIATION LIMIT : ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (V DC)	TEMP (°C)	FREQUENCY (Hz)	FREQ.Dev (Hz)	Deviation	
					(ppm)	(%)
100 %	12.0	+20(Ref)	836,500,001	+1	+0.001 2	+0.000 000 120
100 %		-30	836,500,003	+3	+0.003 6	+0.000 000 359
100 %		-20	836,500,002	+2	+0.002 4	+0.000 000 239
100 %		-10	836,500,001	+1	+0.001 2	+0.000 000 120
100 %		0	836,500,001	+1	+0.001 2	+0.000 000 120
100 %		+10	836,500,002	+2	+0.002 4	+0.000 000 239
100 %		+20	836,500,001	+1	+0.001 2	+0.000 000 120
100 %		+30	836,500,001	+1	+0.001 2	+0.000 000 120
100 %		+40	836,500,003	+3	+0.003 6	+0.000 000 359
100 %		+50	836,500,002	+2	+0.002 4	+0.000 000 239
115 %	13.8	+20	836,500,004	+4	+0.004 8	+0.000 000 478
85 %	10.2	+20	836,500,001	+1	+0.001 2	+0.000 000 120

7.8.3 LTE Band 4

OPERATING FREQUENCY : 1 732.5 MHz
 REFERENCE VOLTAGE : 12 VDC
 LIMIT : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

VOLTAGE (%)	POWER (V DC)	TEMP (°C)	FREQUENCY (Hz)	FREQ.Dev (Hz)	Deviation		
					(ppm)	(%)	
100 %	12.0	+20(Ref)	1,732,500,003	+3	+0.001 7	+0.000 000 173	
100 %		-30	1,732,500,002	+2	+0.001 2	+0.000 000 115	
100 %		-20	1,732,500,003	+3	+0.001 7	+0.000 000 173	
100 %		-10	1,732,500,004	+4	+0.002 3	+0.000 000 231	
100 %		0	1,732,500,003	+3	+0.001 7	+0.000 000 173	
100 %		+10	1,732,500,001	+1	+0.000 6	+0.000 000 058	
100 %		+20	1,732,500,003	+3	+0.001 7	+0.000 000 173	
100 %		+30	1,732,500,001	+1	+0.000 6	+0.000 000 058	
100 %		+40	1,732,500,002	+2	+0.001 2	+0.000 000 115	
100 %		+50	1,732,500,002	+2	+0.001 2	+0.000 000 115	
115 %		13.8	+20	1,732,500,003	+3	+0.001 7	+0.000 000 173
85 %		10.2	+20	1,732,500,001	+1	+0.000 6	+0.000 000 058

7.8.4 LTE Band 2

OPERATING FREQUENCY : 1 880 MHz
 REFERENCE VOLTAGE : 12 VDC
 LIMIT : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

VOLTAGE (%)	POWER (V DC)	TEMP (°C)	FREQUENCY (Hz)	FREQ.Dev (Hz)	Deviation	
					(ppm)	(%)
100 %	12.0	+20(Ref)	1,880,000,002	+2	+0.001 1	+0.000 000 106
100 %		-30	1,880,000,003	+3	+0.001 6	+0.000 000 160
100 %		-20	1,880,000,002	+2	+0.001 1	+0.000 000 106
100 %		-10	1,880,000,001	+1	+0.000 5	+0.000 000 053
100 %		0	1,880,000,002	+2	+0.001 1	+0.000 000 106
100 %		+10	1,880,000,003	+3	+0.001 6	+0.000 000 160
100 %		+20	1,880,000,002	+2	+0.001 1	+0.000 000 106
100 %		+30	1,880,000,001	+1	+0.000 5	+0.000 000 053
100 %		+40	1,880,000,001	+1	+0.000 5	+0.000 000 053
100 %		+50	1,880,000,002	+2	+0.001 1	+0.000 000 106
115 %		13.8	+20	1,880,000,003	+3	+0.001 6
85 %	10.2	+20	1,880,000,001	+1	+0.000 5	+0.000 000 053

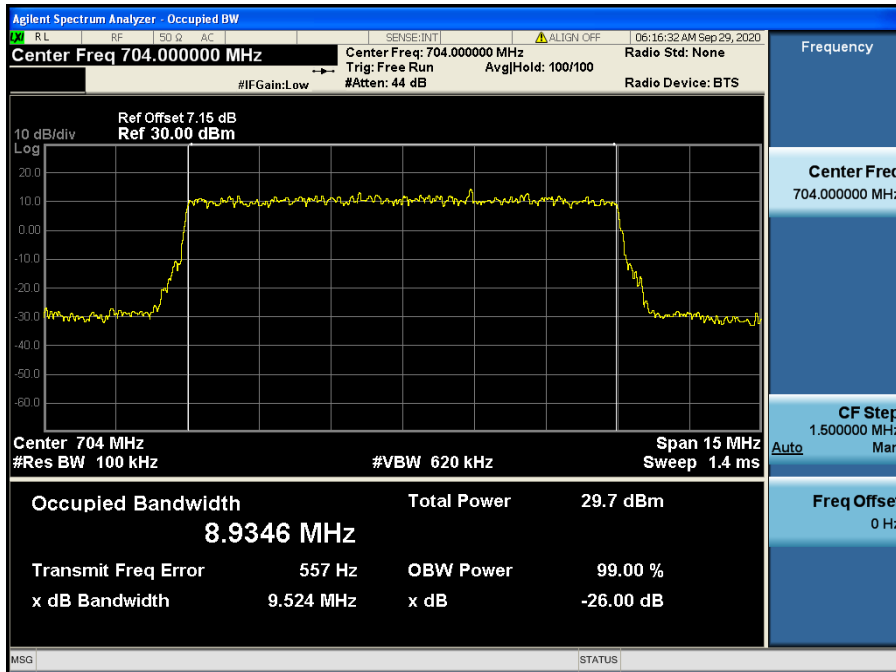
8. TEST PLOTS

- Test Notes:

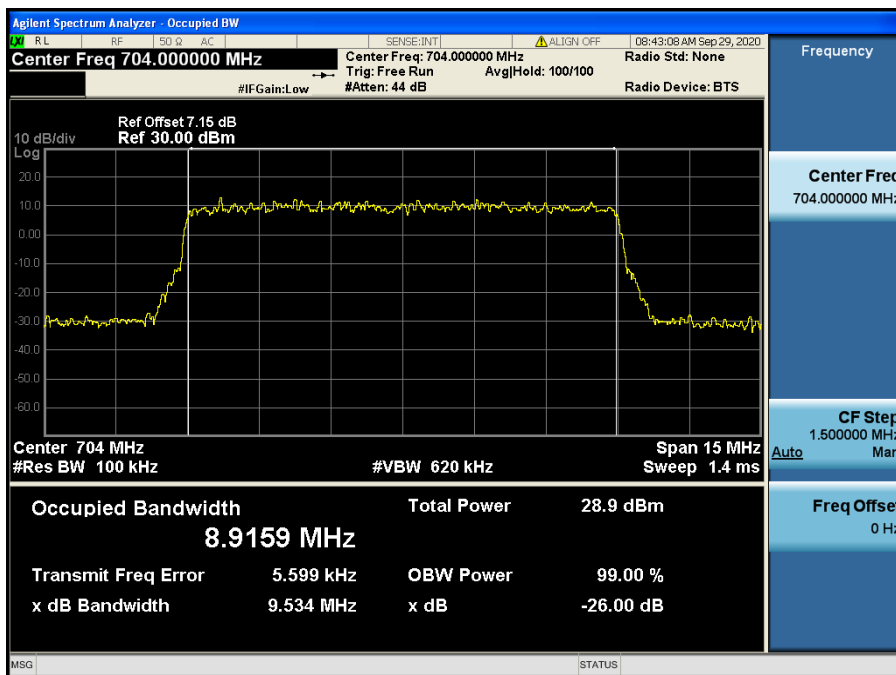
All bandwidths, RB configurations, and modulations were investigated. The worst case test results are reported.

8.1 OCCUPIED BANDWIDTH

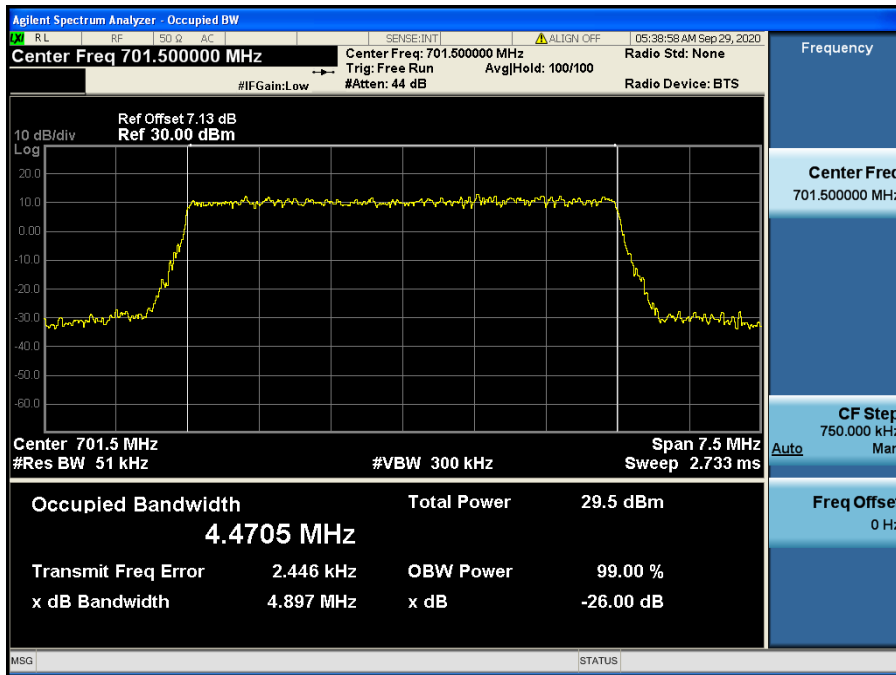
8.1.1 LTE Band 12



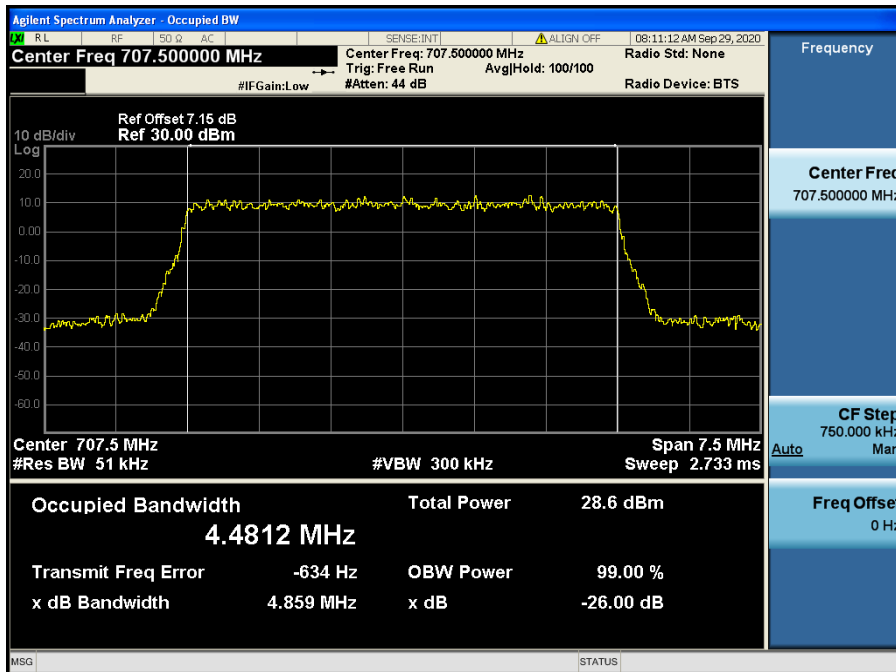
LTE Band 12 / 10 MHz / QPSK - RB Size 50



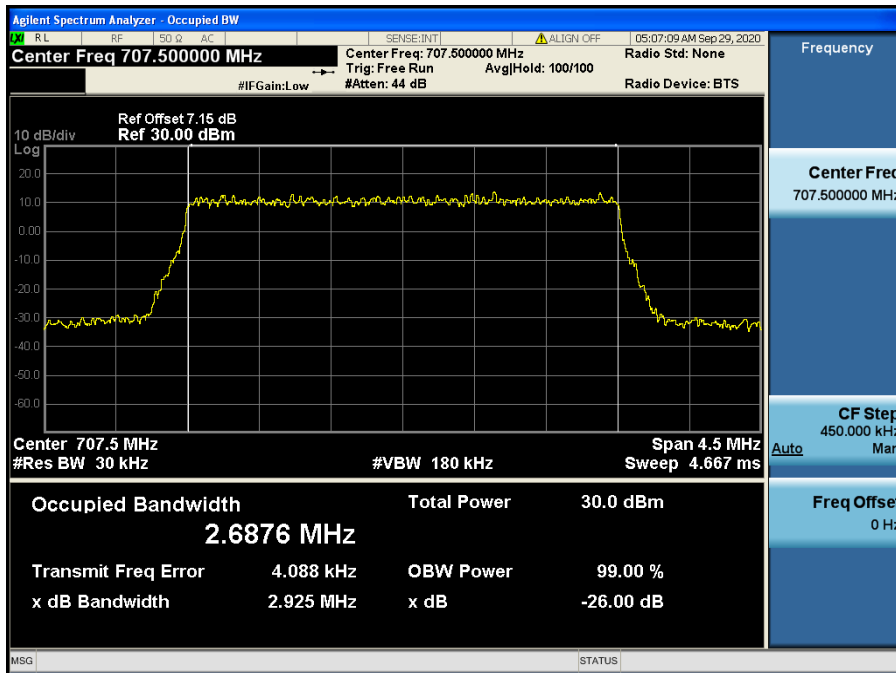
LTE Band 12 / 10 MHz / 16QAM - RB Size 50



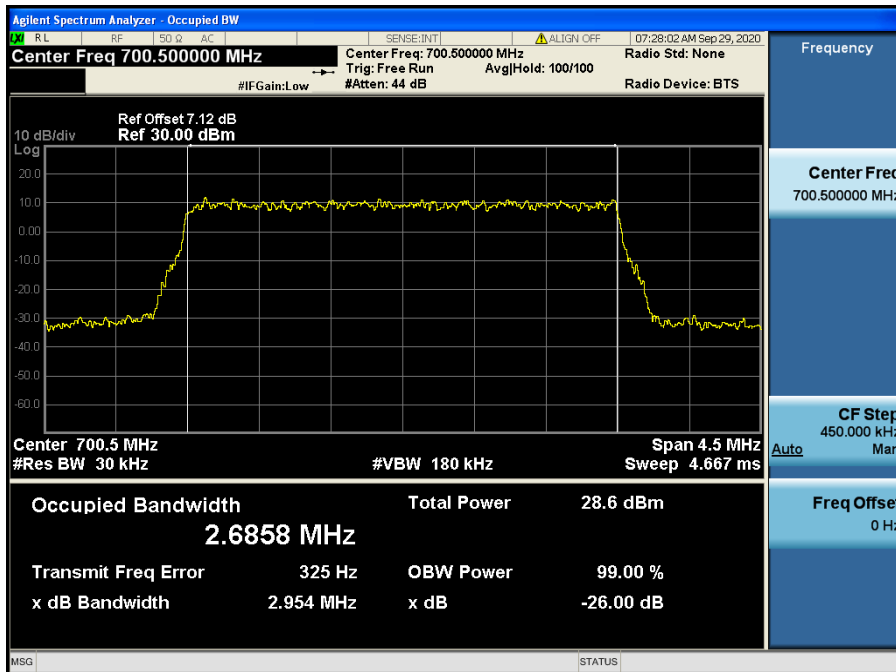
LTE Band 12 / 5 MHz / QPSK - RB Size 25



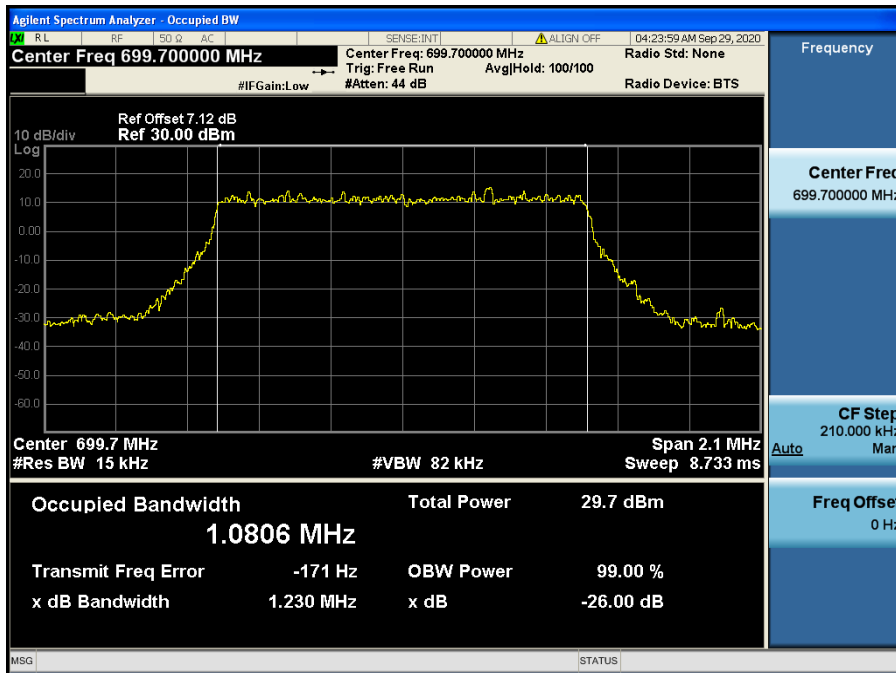
LTE Band 12 / 5 MHz / 16QAM - RB Size 25



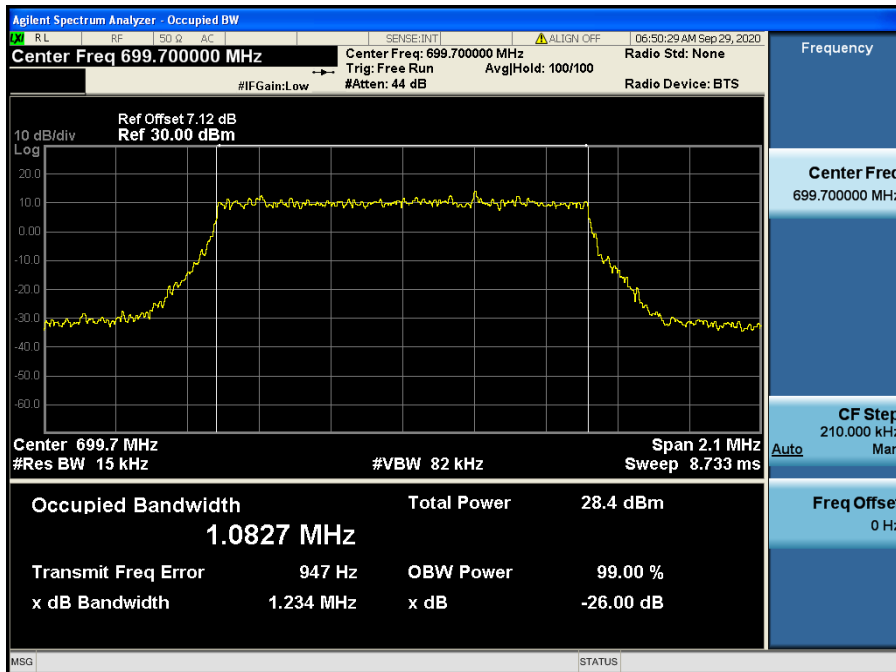
LTE Band 12 / 3 MHz / QPSK - RB Size 15



LTE Band 12 / 3 MHz / 16QAM - RB Size 15

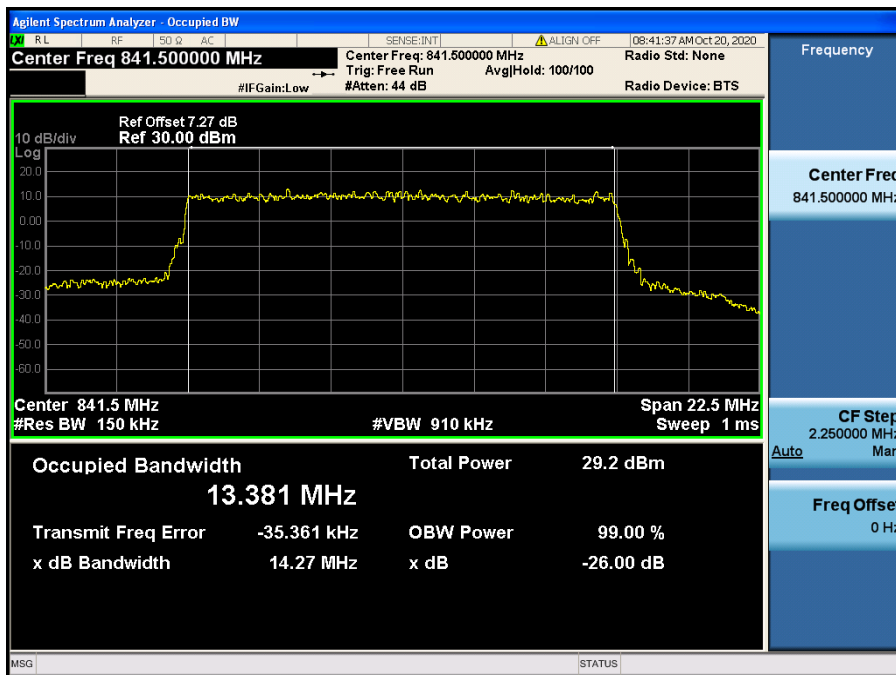


LTE Band 12 / 1.4 MHz / QPSK - RB Size 6

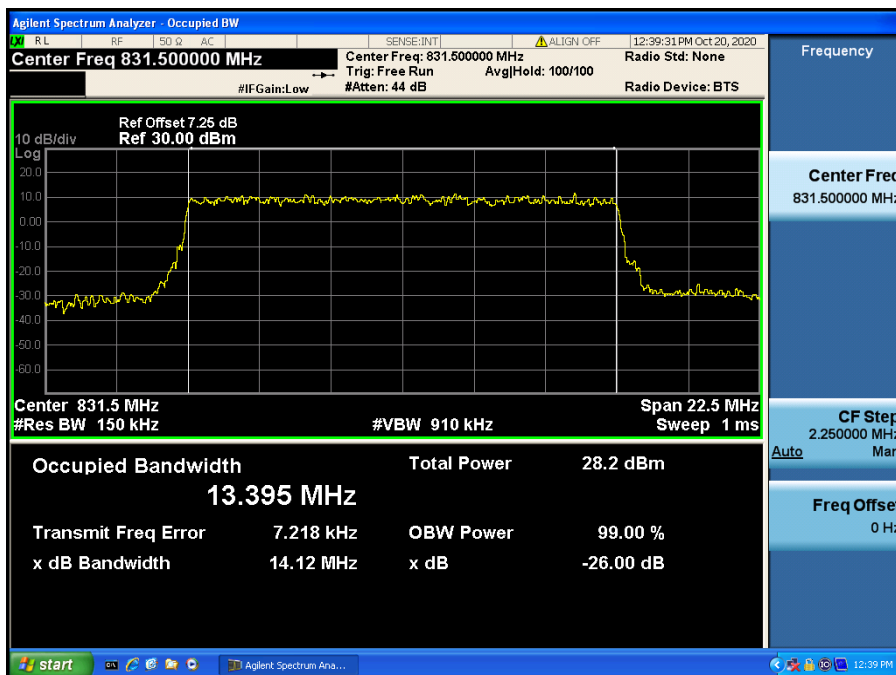


LTE Band 12 / 1.4 MHz / 16QAM - RB Size 6

8.1.2 LTE Band 26

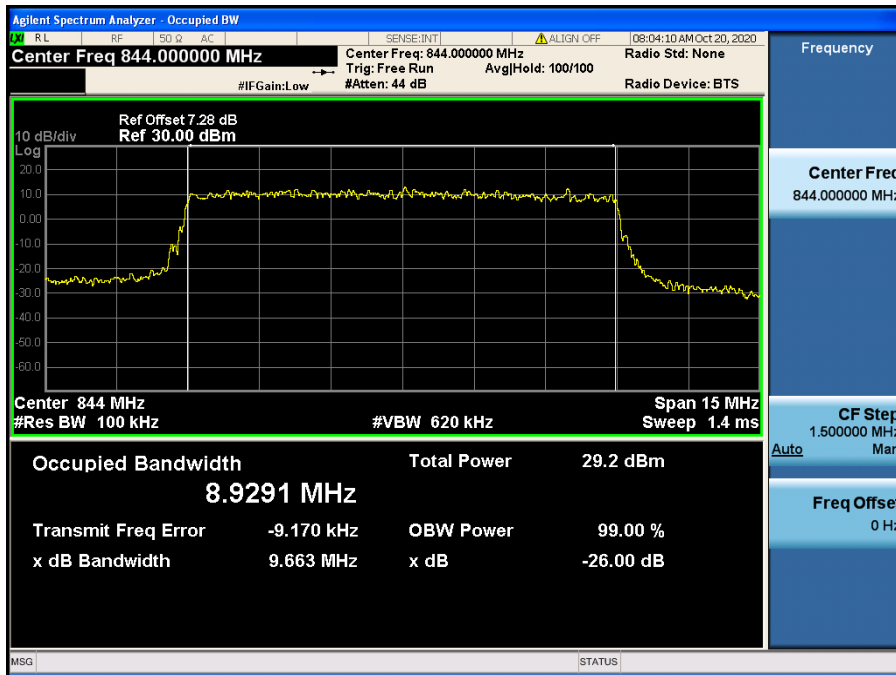


LTE Band 26 / 15 MHz / QPSK - RB Size 75

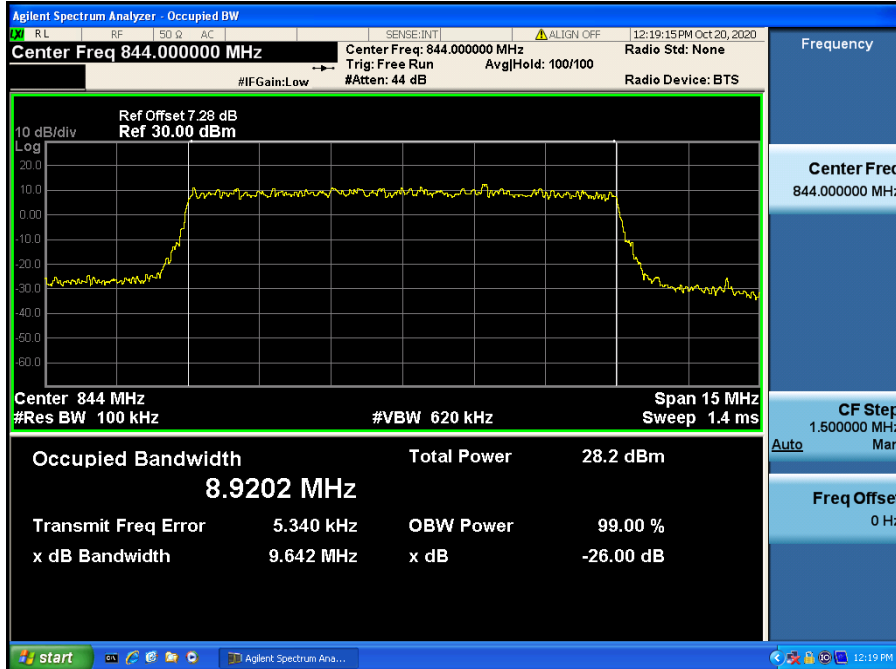


LTE Band 26 / 15 MHz / 16QAM - RB Size 75

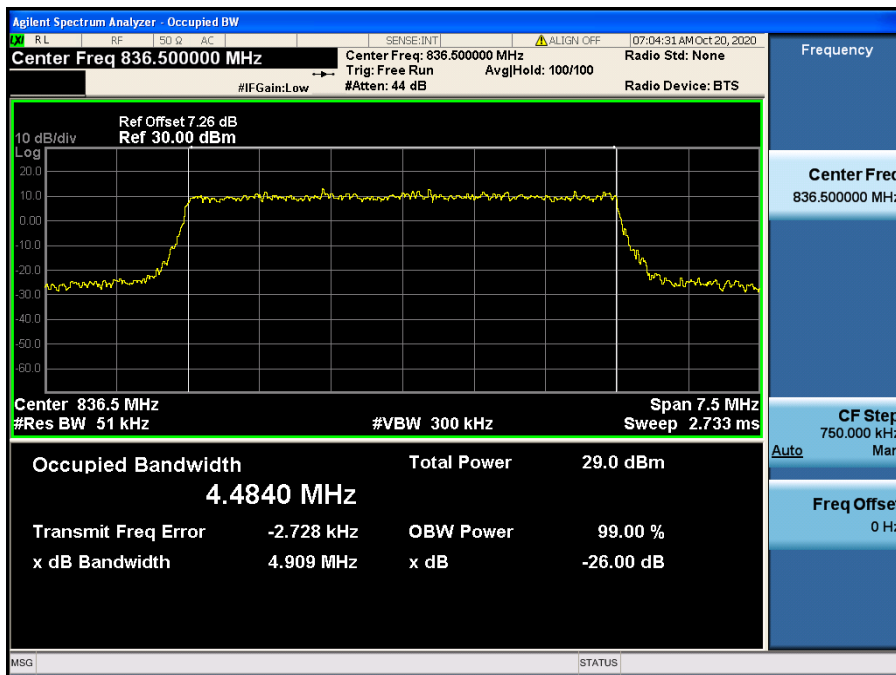
8.1.3 LTE Band 26(5)



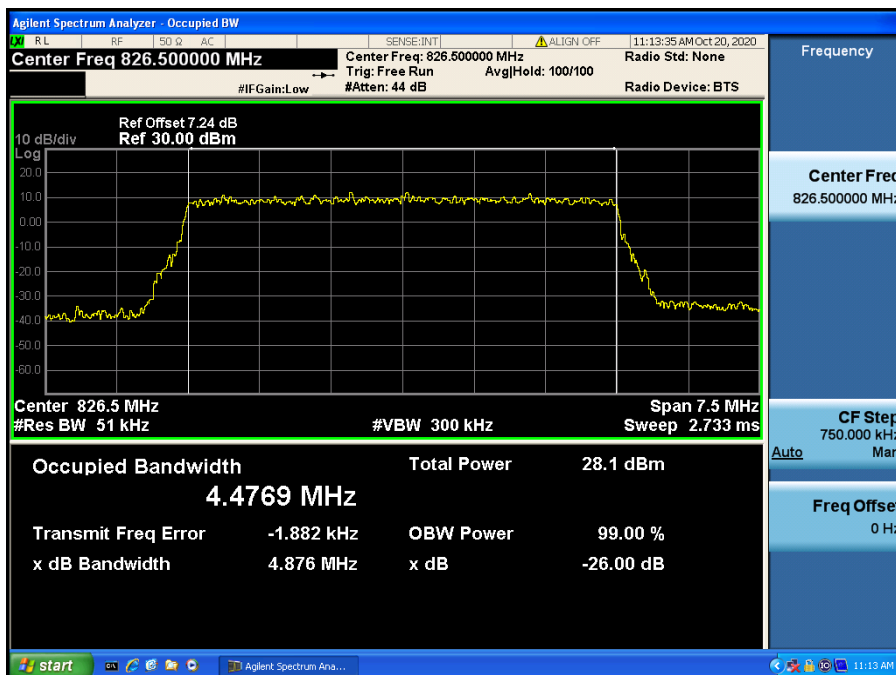
LTE Band 26 / 10 MHz / QPSK - RB Size 50



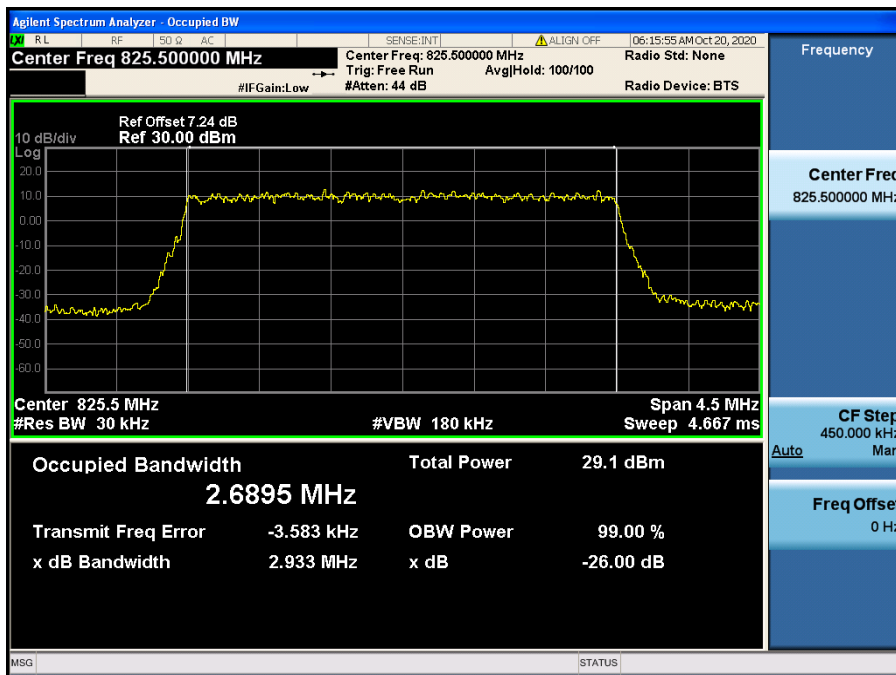
LTE Band 26 / 10 MHz / 16QAM - RB Size 50



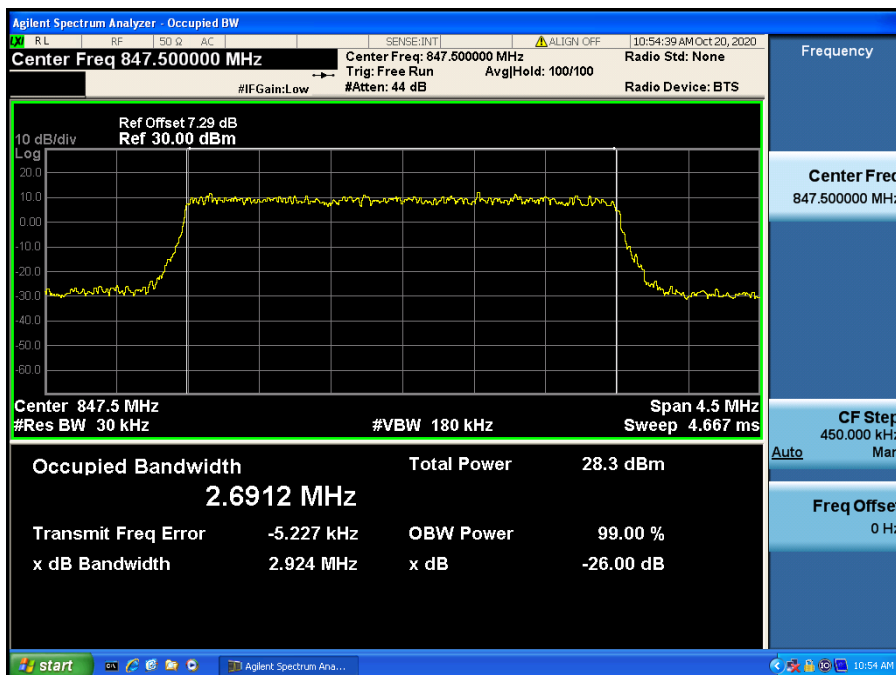
LTE Band 26 / 5 MHz / QPSK - RB Size 25



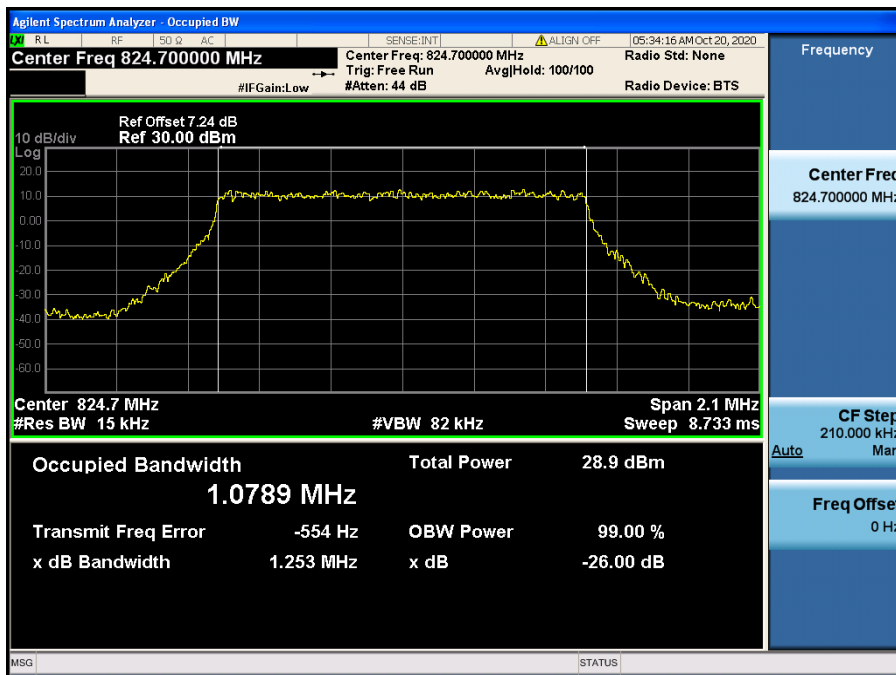
LTE Band 26 / 5 MHz / 16QAM - RB Size 25



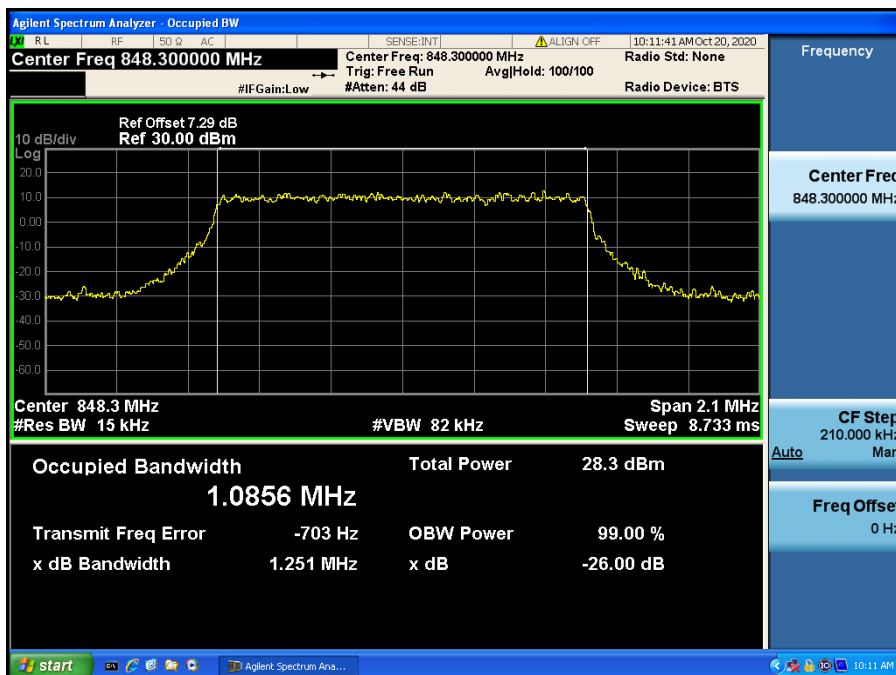
LTE Band 26 / 3 MHz / QPSK - RB Size 15



LTE Band 26 / 3 MHz / 16QAM - RB Size 15

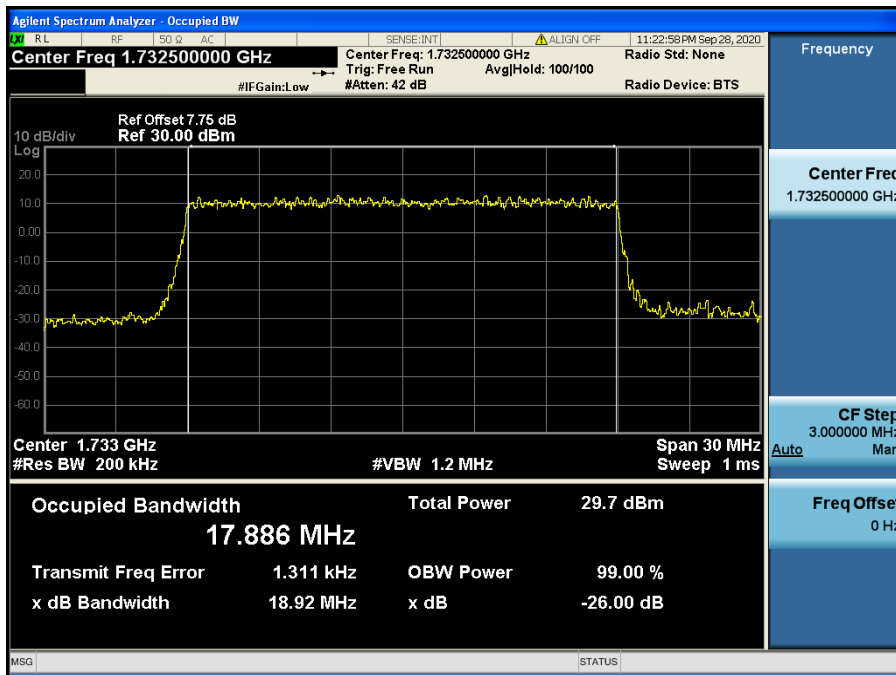


LTE Band 26 / 1.4 MHz / QPSK - RB Size 6

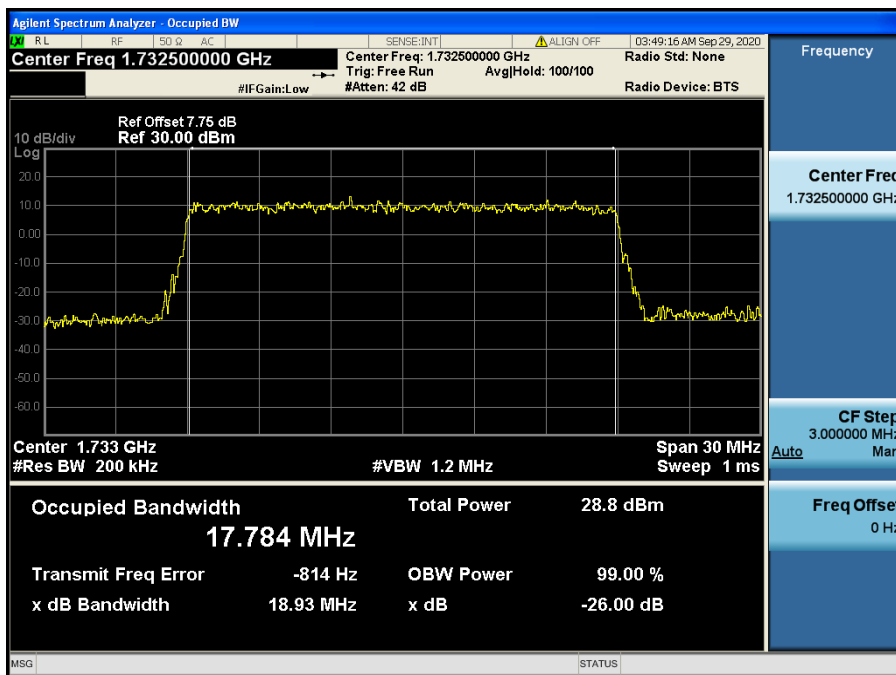


LTE Band 26 / 1.4 MHz / 16QAM - RB Size 6

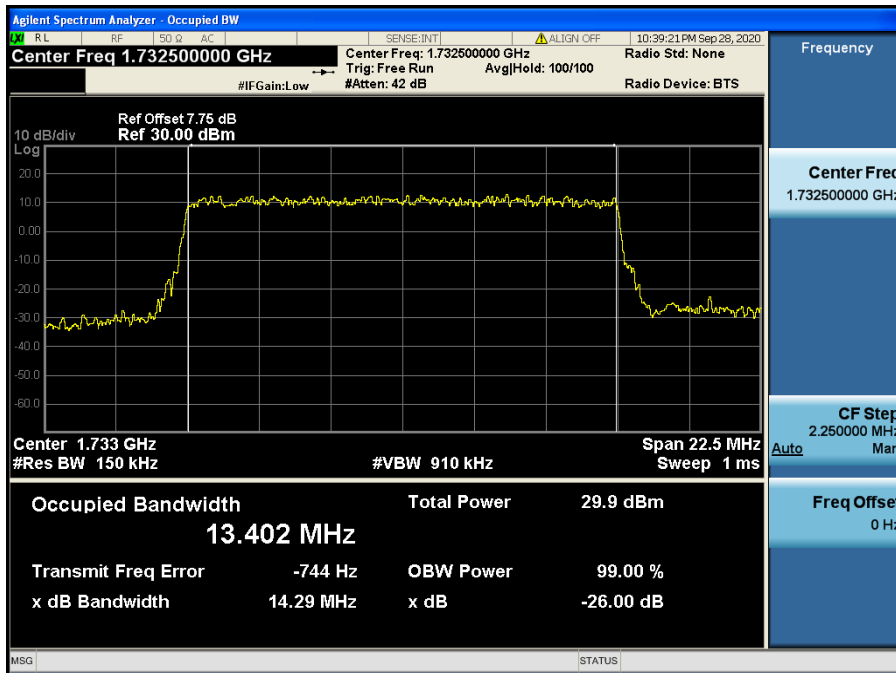
8.1.4 LTE Band 4



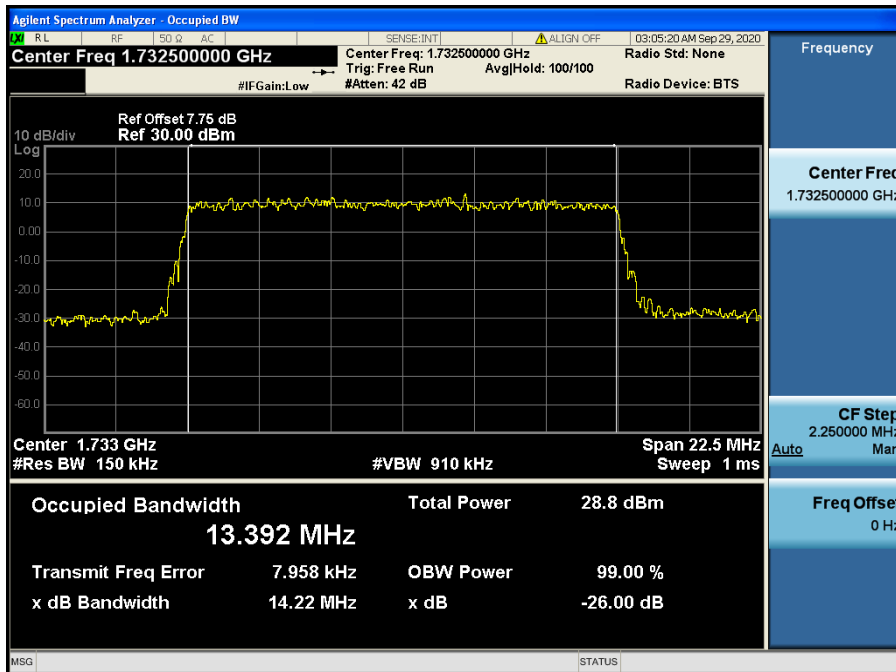
LTE Band 4 / 20 MHz / QPSK - RB Size 100



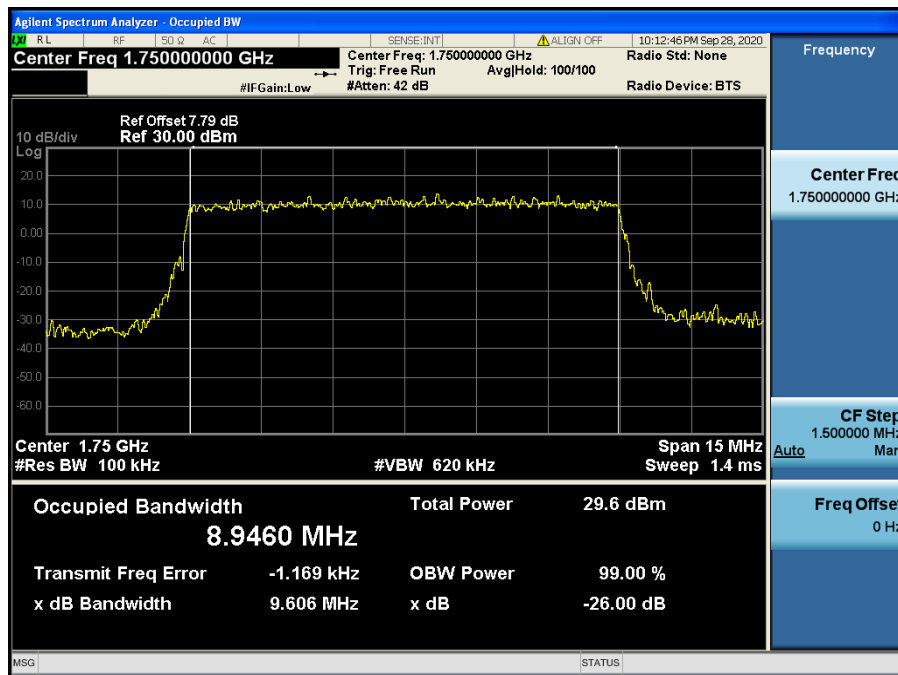
LTE Band 4 / 20 MHz / 16QAM - RB Size 100



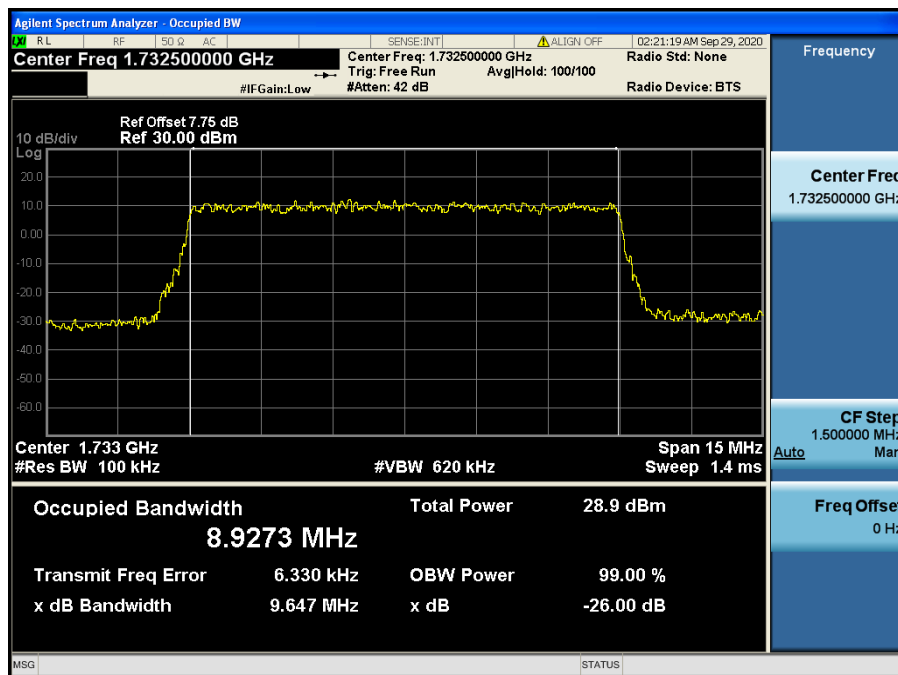
LTE Band 4 / 15 MHz / QPSK - RB Size 75



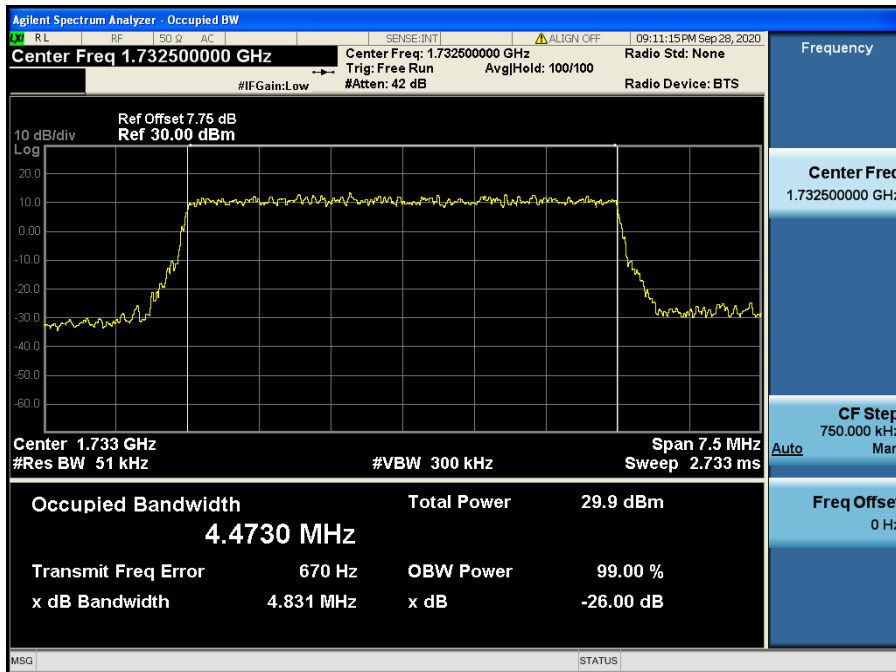
LTE Band 4 / 15 MHz / 16QAM - RB Size 75



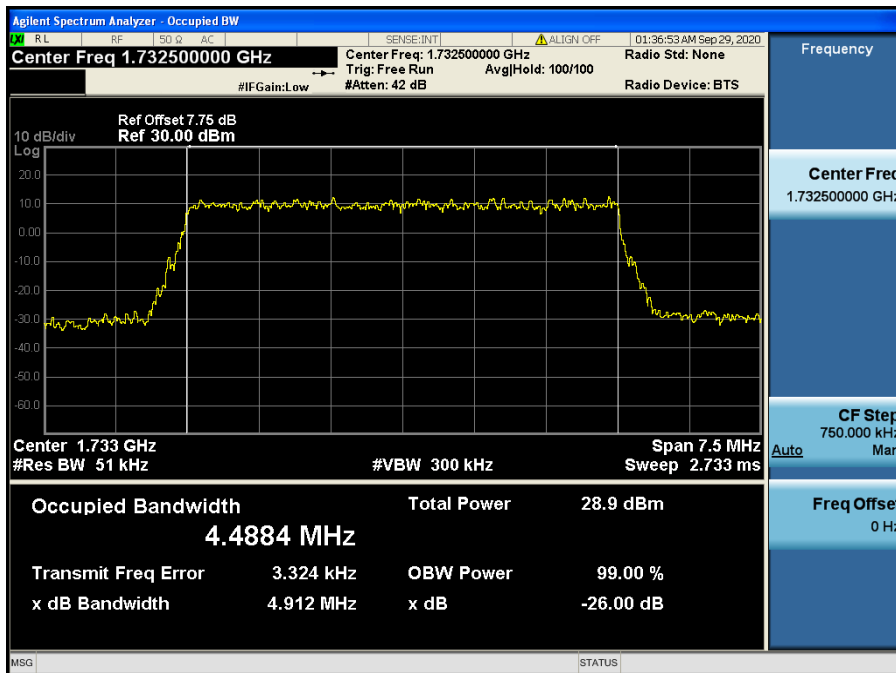
LTE Band 4 / 10 MHz / QPSK - RB Size 50



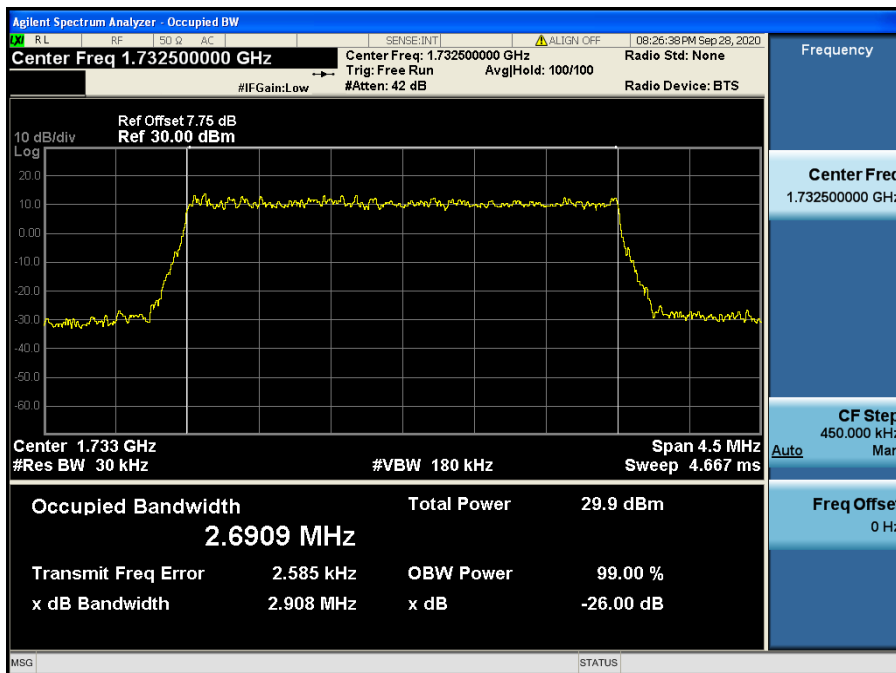
LTE Band 4 / 10 MHz / 16QAM - RB Size 50



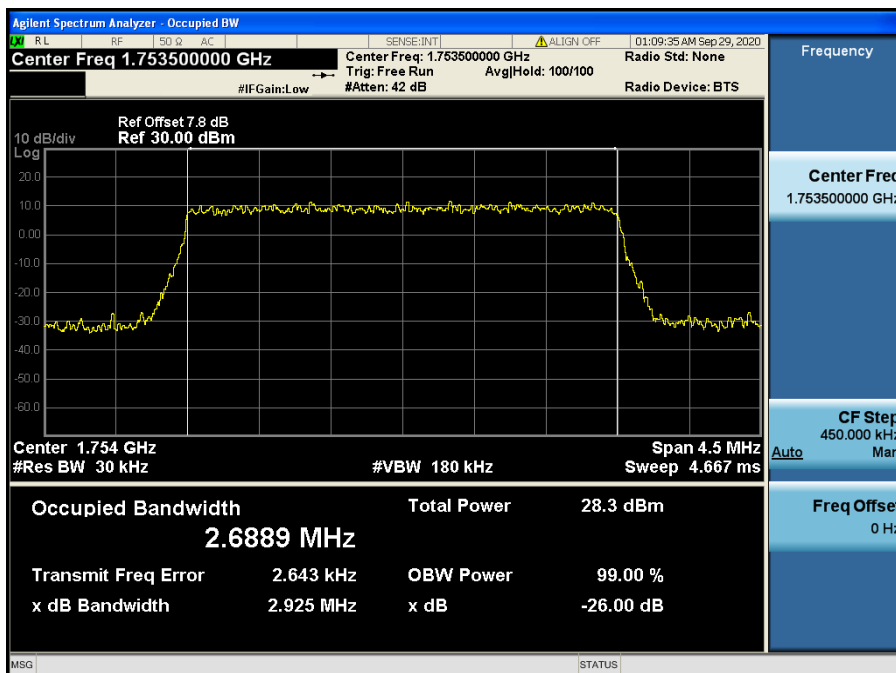
LTE Band 4 / 5 MHz / QPSK - RB Size 25



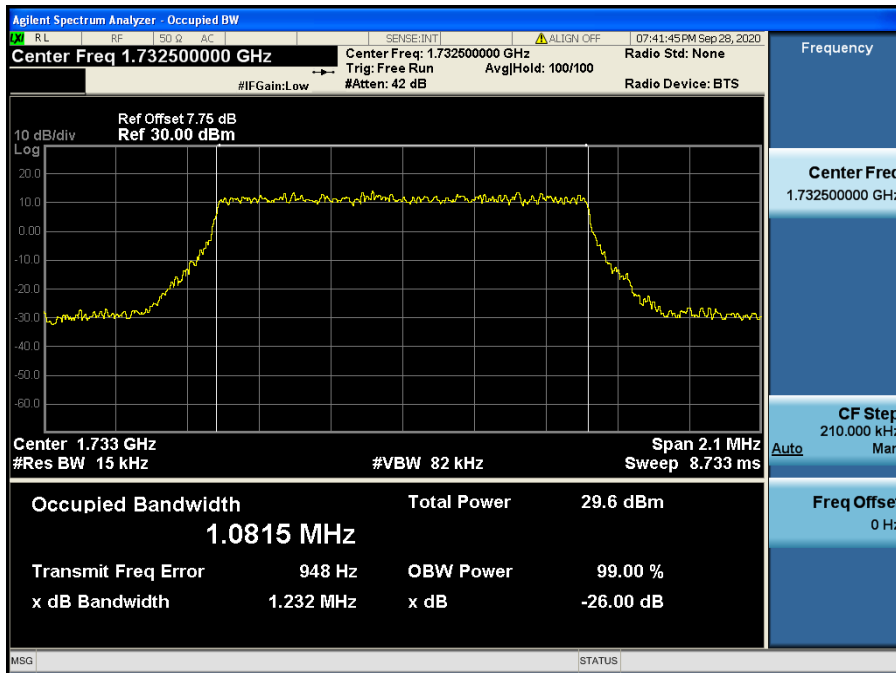
LTE Band 4 / 5 MHz / 16QAM - RB Size 25



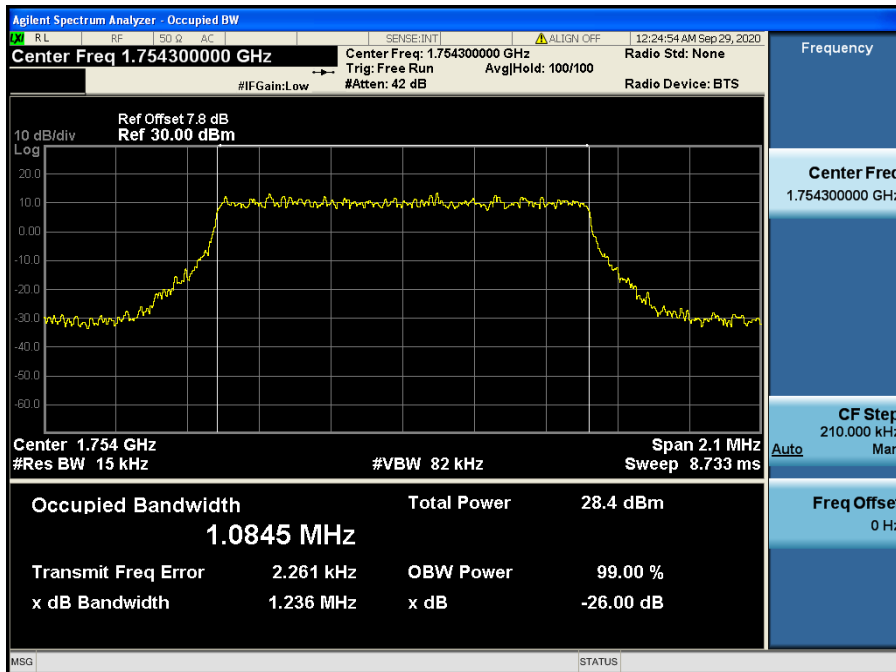
LTE Band 4 / 3 MHz / QPSK - RB Size 15



LTE Band 4 / 3 MHz / 16QAM - RB Size 15



LTE Band 4 / 1.4 MHz / QPSK - RB Size 6



LTE Band 4 / 1.4 MHz / 16QAM - RB Size 6