

TEST REPORT



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1. Report No : DRTFCC2302-0012

2. Customer

- Name (FCC) : LG Electronics USA / Name (IC) : LG ELECTRONICS INC.
- Address (FCC) : 111 Sylvan Avenue North Building Englewood Cliffs New Jersey United States 07632
Address (IC) : 222, LG-ro, Jinwi-myeon Pyeongtaek-si, Gyeonggi-do 451-713 Korea (Republic Of)

3. Use of Report : FCC & IC Certification

4. Product Name / Model Name : NAD module / TM15FNNATY0

FCC ID : BEJTM15FNNATY0

IC : 2703H-TM15FNNATY0

5. FCC Regulation(s): Part 22, 24, 27, 90

IC Standard(s): RSS-Gen Issue 5, 130 Issue 2, 132 Issue 4, 133 Issue 6, 139 Issue 4, 140 Issue 1

Test Method Used : KDB971168 D01v03, ANSI/TIA-603-E-2016, ANSI C63.26-2015

6. Date of Test : 2022.12.26 ~ 2023.02.23

7. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing

8. Testing Environment : See 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.

This test report is not related to KOLAS accreditation.

Affirmation	Tested by	Technical Manager
	Name : JaeHyeok Bang (Signature)	Name : JaeJin Lee (Signature)

2023 . 02 . 24 .

Dt&C Co., Ltd.

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
DRTFCC2302-0012	Feb. 24, 2023	Initial issue	JaeHyeok Bang	JaeJin Lee

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1. GENERAL INFORMATION

Equipment Class	PCS Licensed Transmitter (PCB)
Product Name	NAD module
Model Name	TM15FNNATY0
Add Model Name	-
PMN(Product Marketing Name)	TM15FNNATY0
FVIN(Firmware Version Identification Number)	5G.NAD.06a
EUT Serial Number	No specified
Supplying power	DC 3.90 V
Antenna Information	Antenna Type: PIFA Antenna Gain(including path loss between conducted test feeding point and antenna feeding point) ANT1: -1.15 dBi (Band 12), -1.91 dBi (Band 14), -1.82 dBi (Band 5), 0.18 dBi (Band 66, 4), 1.88 dBi (Band 2) ANT2: -1.43 dBi (Band 12), -0.54 dBi (Band 14), -0.01 dBi (Band 5), -0.55 dBi (Band 66, 4), 0.17 dBi (Band 2)

Mode	TX Frequency (MHz)	Emission Designator	Modulation	Conducted Output Power		ERP	
				Max power (dBm)	Max power (W)	Max power (dBm)	Max power (W)
LTE Band 12	704 ~ 711	8M96G7D	QPSK	23.50	0.224	20.73	0.118
LTE Band 12	704 ~ 711	8M95W7D	16QAM	22.50	0.178	19.95	0.099
LTE Band 12	704 ~ 711	8M94W7D	64QAM	21.30	0.135	19.01	0.080
LTE Band 12	701.5 ~ 713.5	4M49G7D	QPSK	23.59	0.229	21.60	0.145
LTE Band 12	701.5 ~ 713.5	4M48W7D	16QAM	22.76	0.189	20.80	0.120
LTE Band 12	701.5 ~ 713.5	4M48W7D	64QAM	21.45	0.140	19.93	0.098
LTE Band 12	700.5 ~ 714.5	2M69G7D	QPSK	23.56	0.227	21.49	0.141
LTE Band 12	700.5 ~ 714.5	2M68W7D	16QAM	22.75	0.188	21.23	0.133
LTE Band 12	700.5 ~ 714.5	2M69W7D	64QAM	21.37	0.137	19.75	0.094
LTE Band 12	699.7 ~ 715.3	1M08G7D	QPSK	23.38	0.218	20.86	0.122
LTE Band 12	699.7 ~ 715.3	1M08W7D	16QAM	22.74	0.188	20.25	0.106
LTE Band 12	699.7 ~ 715.3	1M08W7D	64QAM	21.30	0.135	19.28	0.085
LTE Band 14	793 ~ 793	8M95G7D	QPSK	24.23	0.265	21.90	0.155
LTE Band 14	793 ~ 793	8M95W7D	16QAM	23.58	0.228	21.37	0.137
LTE Band 14	793 ~ 793	8M94W7D	64QAM	22.45	0.176	20.11	0.103
LTE Band 14	790.5 ~ 795.5	4M47G7D	QPSK	24.16	0.261	21.89	0.155
LTE Band 14	790.5 ~ 795.5	4M48W7D	16QAM	23.51	0.224	21.18	0.131
LTE Band 14	790.5 ~ 795.5	4M48W7D	64QAM	22.45	0.176	20.09	0.102
LTE Band 5	829 ~ 844	8M93G7D	QPSK	23.35	0.216	21.17	0.131
LTE Band 5	829 ~ 844	8M93W7D	16QAM	22.63	0.183	20.37	0.109
LTE Band 5	829 ~ 844	8M93W7D	64QAM	21.61	0.145	19.70	0.093
LTE Band 5	826.5 ~ 846.5	4M48G7D	QPSK	23.23	0.210	21.41	0.138
LTE Band 5	826.5 ~ 846.5	4M48W7D	16QAM	22.74	0.188	20.59	0.115
LTE Band 5	826.5 ~ 846.5	4M47W7D	64QAM	21.73	0.149	19.79	0.095
LTE Band 5	825.5 ~ 847.5	2M69G7D	QPSK	23.13	0.206	21.39	0.138
LTE Band 5	825.5 ~ 847.5	2M69W7D	16QAM	22.75	0.188	20.55	0.114
LTE Band 5	825.5 ~ 847.5	2M69W7D	64QAM	21.73	0.149	19.82	0.096
LTE Band 5	824.7 ~ 848.3	1M08G7D	QPSK	23.07	0.203	21.08	0.128
LTE Band 5	824.7 ~ 848.3	1M09W7D	16QAM	22.77	0.189	20.32	0.108
LTE Band 5	824.7 ~ 848.3	1M08W7D	64QAM	21.61	0.145	19.34	0.086
LTE Band 5(10+10)	829 ~ 844	18M6G7D	QPSK	23.58	0.228	21.57	0.144
LTE Band 5(10+10)	829 ~ 844	18M6W7D	16QAM	22.53	0.179	20.88	0.122
LTE Band 5(10+10)	829 ~ 844	18M6W7D	64QAM	21.27	0.134	18.89	0.077

Mode	TX Frequency (MHz)	Emission Designator	Modulation	Conducted Output Power		EIRP	
				Max power (dBm)	Max power (W)	Max power (dBm)	Max power (W)
LTE Band 66(4)	1 720 ~ 1 770	17M9G7D	QPSK	23.63	0.231	27.70	0.589
LTE Band 66(4)	1 720 ~ 1 770	17M9W7D	16QAM	23.10	0.204	27.23	0.528
LTE Band 66(4)	1 720 ~ 1 770	17M9W7D	64QAM	22.19	0.166	25.77	0.378
LTE Band 66(4)	1 717.5 ~ 1 772.5	13M4G7D	QPSK	23.61	0.230	27.32	0.540
LTE Band 66(4)	1 717.5 ~ 1 772.5	13M4W7D	16QAM	23.04	0.201	26.85	0.484
LTE Band 66(4)	1 717.5 ~ 1 772.5	13M4W7D	64QAM	21.96	0.157	25.68	0.370
LTE Band 66(4)	1 715 ~ 1 775	8M95G7D	QPSK	23.56	0.227	27.13	0.516
LTE Band 66(4)	1 715 ~ 1 775	8M94W7D	16QAM	22.99	0.199	26.73	0.471
LTE Band 66(4)	1 715 ~ 1 775	8M94W7D	64QAM	21.91	0.155	25.64	0.366
LTE Band 66(4)	1 712.5 ~ 1 777.5	4M49G7D	QPSK	23.52	0.225	27.22	0.527
LTE Band 66(4)	1 712.5 ~ 1 777.5	4M48W7D	16QAM	22.98	0.199	26.62	0.459
LTE Band 66(4)	1 712.5 ~ 1 777.5	4M47W7D	64QAM	21.99	0.158	25.47	0.352
LTE Band 66(4)	1 711.5 ~ 1 778.5	2M69G7D	QPSK	23.88	0.244	27.08	0.511
LTE Band 66(4)	1 711.5 ~ 1 778.5	2M69W7D	16QAM	23.02	0.200	26.64	0.461
LTE Band 66(4)	1 711.5 ~ 1 778.5	2M69W7D	64QAM	21.97	0.157	25.19	0.330
LTE Band 66(4)	1 710.7 ~ 1 779.3	1M08G7D	QPSK	23.86	0.243	26.79	0.478
LTE Band 66(4)	1 710.7 ~ 1 779.3	1M09W7D	16QAM	22.86	0.193	26.27	0.424
LTE Band 66(4)	1 710.7 ~ 1 779.3	1M08W7D	64QAM	21.89	0.155	25.02	0.318
LTE Band 2	1 860 ~ 1 900	17M9G7D	QPSK	23.73	0.236	27.89	0.615
LTE Band 2	1 860 ~ 1 900	17M9W7D	16QAM	23.49	0.223	27.36	0.545
LTE Band 2	1 860 ~ 1 900	17M8W7D	64QAM	22.46	0.176	26.97	0.498
LTE Band 2	1 857.5 ~ 1 902.5	13M4G7D	QPSK	23.73	0.236	27.91	0.618
LTE Band 2	1 857.5 ~ 1 902.5	13M4W7D	16QAM	23.54	0.226	27.04	0.506
LTE Band 2	1 857.5 ~ 1 902.5	13M4W7D	64QAM	22.47	0.177	27.08	0.511
LTE Band 2	1 855 ~ 1 905	8M95G7D	QPSK	23.70	0.234	27.78	0.600
LTE Band 2	1 855 ~ 1 905	8M94W7D	16QAM	23.46	0.222	27.39	0.548
LTE Band 2	1 855 ~ 1 905	8M95W7D	64QAM	22.43	0.175	26.93	0.493
LTE Band 2	1 852.5 ~ 1 907.5	4M47G7D	QPSK	23.70	0.234	27.84	0.608
LTE Band 2	1 852.5 ~ 1 907.5	4M49W7D	16QAM	23.49	0.223	27.33	0.541
LTE Band 2	1 852.5 ~ 1 907.5	4M47W7D	64QAM	22.47	0.177	26.91	0.491
LTE Band 2	1 851.5 ~ 1 908.5	2M68G7D	QPSK	23.68	0.233	26.91	0.491
LTE Band 2	1 851.5 ~ 1 908.5	2M68W7D	16QAM	23.48	0.223	26.56	0.453
LTE Band 2	1 851.5 ~ 1 908.5	2M69W7D	64QAM	22.45	0.176	25.13	0.326
LTE Band 2	1 850.7 ~ 1 909.3	1M08G7D	QPSK	23.61	0.230	26.80	0.479
LTE Band 2	1 850.7 ~ 1 909.3	1M08W7D	16QAM	23.37	0.217	26.10	0.407
LTE Band 2	1 850.7 ~ 1 909.3	1M08W7D	64QAM	22.41	0.174	24.73	0.297

2. INTRODUCTION

2.1. EUT DESCRIPTION

This device supports the following capabilities:

Multi-Band LTE, LTE up-link carrier aggregation and 5G NR(FR1)

5G NR supports SCS 15 kHz for FDD Band and SCS 30 kHz for TDD Band.

2.2. TESTING ENVIRONMENT

Ambient Condition	
▪ Temperature	+21 °C ~ +24 °C
▪ Relative Humidity	42 % ~ 46 %

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)	4.8 dB (The confidence level is about 95 %, $k = 2$)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.0 dB (The confidence level is about 95 %, $k = 2$)
Radiated Disturbance (Above 18 GHz)	5.2 dB (The confidence level is about 95 %, $k = 2$)

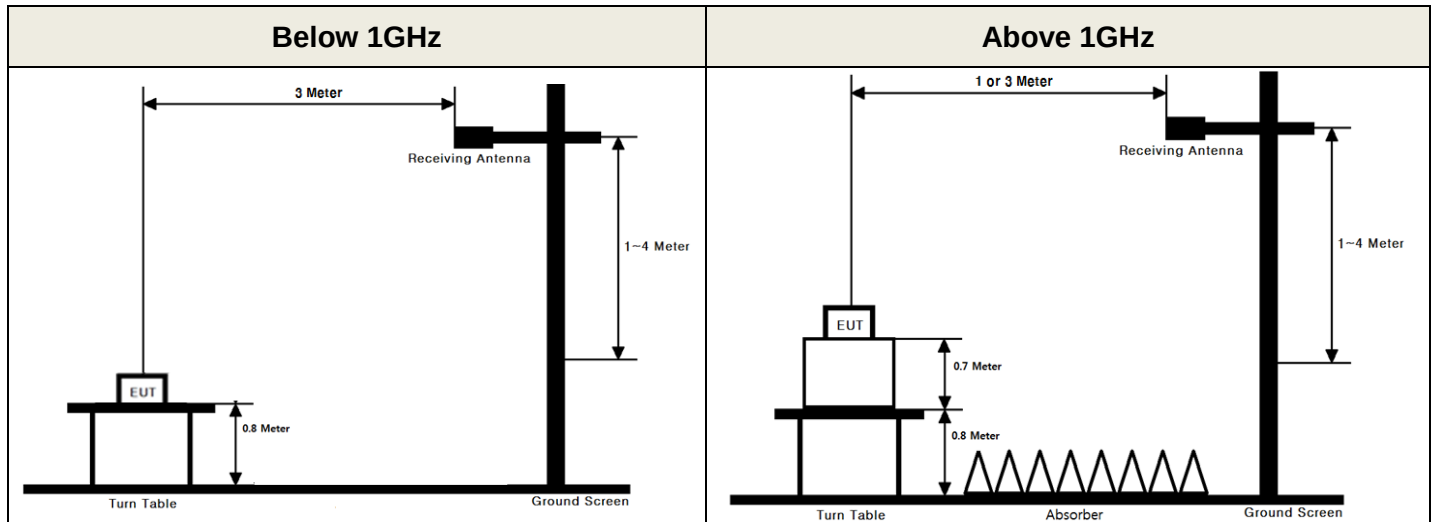
2.5. TEST FACILITY

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 Part 2.948 according to ANSI C63.4-2014.		
- FCC & IC MRA Designation No. : KR0034		
- ISED#: 5740A		
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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 or 1.5-meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna. For measurements above 1GHz 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 $\geq$ $[10 \times (\text{number of points in sweep}) \times (\text{transmission period})]$ 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.

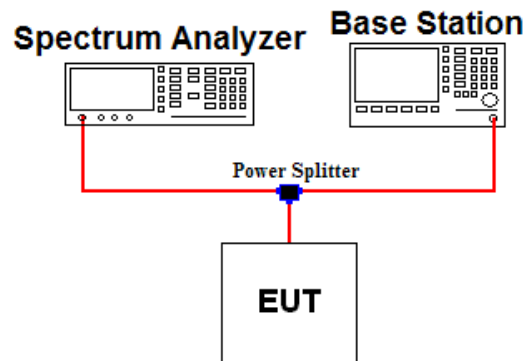
The ERP/EIRP is calculated using the following formula:

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.

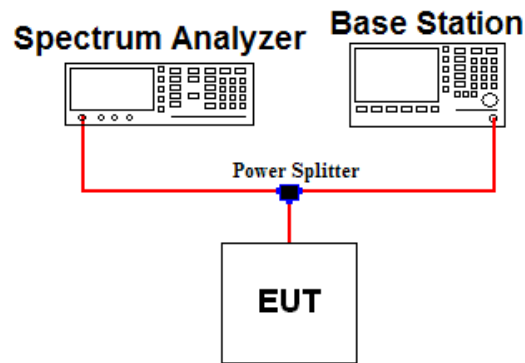
Test setting

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

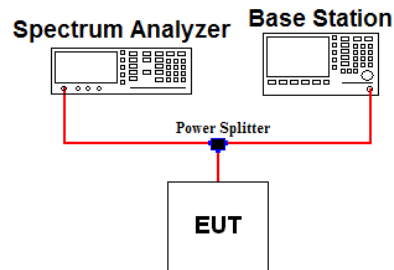
The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power of a given emission.

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 27.53(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.

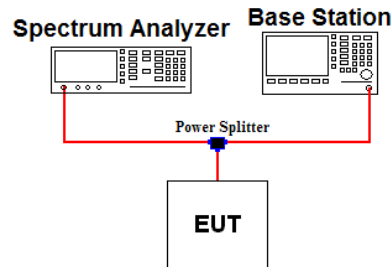
Note 3: Per Part 90.543(e) for operations in the 758-768 MHz and the 788-798 MHz bands, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

- (1) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than $76 + 10 \log(P)$ dB in a 6.25 kHz band segment, for base and fixed stations.
- (2) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than $65 + 10 \log(P)$ dB in a 6.25 kHz band segment, for mobile and portable stations.
- (3) On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, by at least $43 + 10 \log(P)$ dB.
- (4) Compliance with the provisions of paragraphs (e)(1) and (2) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.
- (5) Compliance with the provisions of paragraph (e)(3) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of 30 kHz may be employed.

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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.

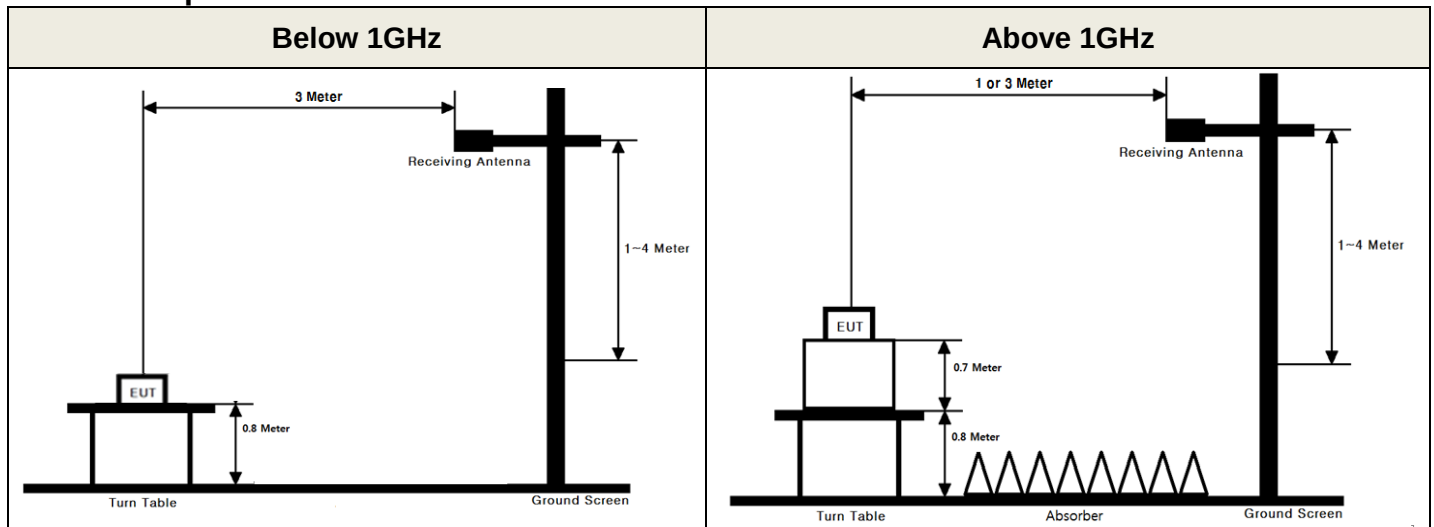
Test setting

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 1 MHz 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 0.8 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 2.2.12
- KDB971168 D01v03 - Section 6
- ANSI C63.26-2015 – Section 5.5

Test setting

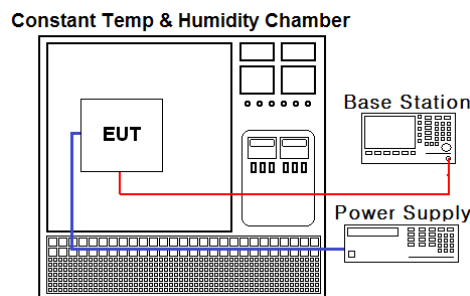
1. RBW = 100 kHz for below 1 GHz and 1 MHz for above 1 GHz / VBW $\geq 3 \times$ RBW
2. Detector = RMS & Trace mode = Max hold
3. Sweep time = Auto couple
4. Number of sweep point $\geq 2 \times$ span / RBW
5. The trace was allowed to stabilize

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:

Part 24.235, Part 27.54, RSS-130[4.5], RSS-132[5.4], RSS-139[5.4], RSS-140[4.2]: The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Part 22.355: The frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ (± 2.5 ppm) of the center frequency.

RSS-133[4.5]: The carrier frequency shall not depart from the reference frequency, in excess of ± 2.5 ppm for mobile stations and ± 1.0 ppm for base stations.

Part 90.539(e): The frequency stability of mobile, portable and control transmitters operating in the wideband segment must be 1.25 parts per million or better when AFC is locked to a base station, and 5 parts per million or better when AFC is not locked.

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	22/12/16	23/12/16	MY50410163
Spectrum Analyzer	Agilent Technologies	N9020A	22/06/24	23/06/24	US47360812
DC power supply	Agilent Technologies	66332A	22/06/24	23/06/24	US37474125
DC power supply	DIGITAL	DPR-303D	22/06/24	23/06/24	2090097
Multimeter	FLUKE	17B+	22/12/16	23/12/16	36390701WS
Power Splitter	Anritsu	K241B	22/06/24	23/06/24	020611
Temp & Humi	SJ Science	SJ-TH-S50	22/03/08	23/03/08	U5542113
Radio Communication Analyzer	Anritsu	MT8820C	22/06/24	23/06/24	6200951873
Radio Communication Analyzer	KEYSIGHT	E7515B	22/06/24	23/06/24	MY60192461
Radio Communication Analyzer	KEYSIGHT	E7515B	22/12/16	23/12/16	MY58300723
Thermohygrometer	BODYCOM	BJ5478	22/12/16	23/12/16	120612-1
Thermohygrometer	BODYCOM	BJ5478	22/12/16	23/12/16	120612-2
Signal Generator	Rohde Schwarz	SMBV100A	22/12/16	23/12/16	255571
Signal Generator	ANRITSU	MG3695C	22/12/16	23/12/16	173501
Loop Antenna	ETS-Lindgren	6502	22/12/16	24/12/16	00226186
Bilog Antenna	Schwarzbeck	VULB 9160	22/12/16	23/12/16	3362
Dipole Antenna	Schwarzbeck	UHA9105	22/12/16	23/12/16	2262
HORN ANT	ETS	3117	22/12/16	23/12/16	00140394
HORN ANT	A.H.Systems	SAS-574	22/06/24	23/06/24	155
PreAmplifier	H.P	8447D	22/12/16	23/12/16	2944A07774
PreAmplifier	Agilent	8449B	22/06/24	23/06/24	3008A02108
PreAmplifier	A.H.Systems Inc.	PAM-1840VH	22/06/24	23/06/24	163
Band Reject Fliter	Wainwright	WTRCTV5-1710-2000-20-60-40SSM	22/06/24	23/06/24	1
High-pass filter	Wainwright	WHKX12-935-1000-15000-40SS	22/06/24	23/06/24	7
High-pass filter	Wainwright	WHKX10-2838-3300-18000-60SS	22/06/24	23/06/24	2
High-pass filter	Wainwright	WHKX6-6320-8000-26500-40CC	22/06/24	23/06/24	2
Cable	HUBER+SUHNER	SUCOFLEX100	23/01/04	24/01/04	M-1
Cable	HUBER+SUHNER	SUCOFLEX100	23/01/04	24/01/04	M-2
Cable	Junkosah	MWX241/B	23/01/04	24/01/04	M-3
Cable	Junkosah	MWX221	23/01/04	24/01/04	M-4
Cable	Junkosah	MWX221	23/01/04	24/01/04	M-5
Cable	DTNC	Cable	23/01/04	24/01/04	M-6
Cable	JUNFLON	J12J101757-00	23/01/04	24/01/04	M-7
Cable	HUBER+SUHNER	SUCOFLEX104	23/01/04	24/01/04	M-8
Cable	HUBER+SUHNER	SUCOFLEX106	23/01/04	24/01/04	M-9
Cable	Junkosah	MWX342	23/01/04	24/01/04	RFC-72
Cable	DTNC	Cable	23/01/04	24/01/04	RFC-102

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)	RSS Section(s)	Test Description	Test Limit	Test Condition	Status Note 1
2.1046	-	Conducted Output Power	N/A	Conducted	C
2.1049	RSS-Gen[6.7]	Occupied Bandwidth	N/A		C
24.232(d) 27.50(d.5)	RSS-130 [4.6] RSS-132 [5.3] RSS-133 [6.4] RSS-139 [5.5] RSS-140 [4.3]	Peak to Average Ratio	< 13 dB		C
2.1051 22.917(a) 24.238(a) 27.53(g) 27.53(h)	RSS-130 [4.7] RSS-132 [5.5] RSS-133 [6.5] RSS-139 [5.6]	Band Edge / Conducted Spurious Emissions	> 43 + 10log ₁₀ (P) dB at Band edge and for all out-of-band emissions		C
90.543(e)	RSS-140 [4.4]	Band Edge / Conducted Spurious Emissions	FCC - For any frequency between 769-775MHz and 799-805MHz:; IC - For any frequency between 769-775MHz and 799-806MHz: > 65 + 10 log (P) dB in a 6.25 kHz FCC - For any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz:; IC - For any frequency between 775-788 MHz, above 806 MHz, and below 758 MHz: > 43 + 10 log (P) dB.		C
2.1055 22.355 24.235 27.54 90.539(e)	RSS-130 [4.5] RSS-132 [5.3] RSS-133 [6.3] RSS-139 [5.4] RSS-140 [4.2]	Frequency Stability	Refer to section 3.7 of this report.		C
27.50(c.9) 90.542(a.6)	RSS-130 [4.6] RSS-140 [4.3]	Radiated Output Power (B12, 14)	For mobile equipment: < 30 Watts max. ERP	Radiated	C Note2
22.913(a.5)	RSS-132 [5.4]	Radiated Output Power (B5)	For mobile equipment: < 7 Watts max. ERP		C Note2
27.50(d.4)	RSS-139 [5.5]	Radiated Output Power (B66, 4)	For mobile equipment: < 1 Watts max. EIRP		C Note2
24.232(c)	RSS-133 [6.4]	Radiated Output Power (B2)	For mobile equipment: < 2 Watts max. EIRP		C Note2
2.1053 22.917(a) 24.238(a) 27.53(g) 27.53(h) 90.543(e)	RSS-130 [4.7] RSS-132 [5.5] RSS-133 [6.5] RSS-139 [5.6] RSS-140 [4.4]	Undesirable Emissions	> 43 + 10log ₁₀ (P) dB for all out-of-band emissions		C Note2
90.543(f)	RSS-140[4.4]	Undesirable Emissions in 1559 ~ 1610 MHz	< -70 dBW/MHz (for wideband signals) < -80 dBW (for discrete emissions of less than 700 Hz bandwidth)		C Note2
Note 1: C=Comply NC=Not Comply NT=Not Tested NA=Not Applicable					
Note 2: This test item was performed in three orthogonal EUT positions and the worst case data was reported. This device has the antenna switch that allows for radiated transmission from one of two antennas for the LTE FDD Band. Radiated emissions were performed on both antenna and the worst case data was reported.					

6. SAMPLE CALCULATION

A. Emission Designator

LTE Band 12(QPSK)

Emission Designator = **8M96G7D**

LTE OBW = 8.964 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data Transmission

LTE Band 12(16QAM)

Emission Designator = **8M95W7D**

LTE OBW = 8.951 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Data Transmission

LTE Band 12(64QAM)

Emission Designator = **8M94G7D**

LTE OBW = 8.943 MHz

G = Phase Modulation

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

- Test Notes

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

▪ Band 12

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	23.50	23.37	23.26	22.55	22.50	22.40	22.51
		16QAM	22.50	22.33	22.28	21.20	21.19	21.04	21.14
		64QAM	21.30	21.21	21.20	20.11	20.11	20.02	20.09
	711	QPSK	23.32	23.07	22.92	22.26	22.13	22.10	22.14
		16QAM	22.37	22.04	21.93	20.88	20.79	20.72	20.77
		64QAM	21.18	21.03	20.95	19.89	19.81	19.76	19.80
5	701.5	QPSK	23.59	23.55	23.45	22.60	22.59	22.53	22.59
		16QAM	22.76	22.75	22.62	21.48	21.47	21.37	21.42
		64QAM	21.37	21.45	21.33	20.15	20.16	20.14	20.13
	707.5	QPSK	23.34	23.29	23.17	22.39	22.35	22.32	22.35
		16QAM	22.50	22.45	22.36	21.20	21.94	21.82	20.98
		64QAM	21.32	21.20	21.22	19.98	19.99	19.94	19.96
	713.5	QPSK	23.04	23.05	22.98	22.15	22.13	22.06	22.11
		16QAM	22.01	22.06	21.93	20.76	20.73	20.70	20.75
		64QAM	20.92	21.05	20.95	19.81	19.81	19.71	19.75
3	700.5	QPSK	23.56	23.55	23.45	22.58	22.56	22.52	22.59
		16QAM	22.75	22.75	22.64	21.44	21.47	21.42	21.43
		64QAM	21.35	21.37	21.33	20.16	20.16	20.11	20.17
	707.5	QPSK	23.32	23.29	23.23	22.28	22.34	22.31	22.34
		16QAM	22.48	22.51	22.43	21.20	21.18	21.18	21.15
		64QAM	21.12	21.30	21.13	19.97	20.00	19.99	19.95
	714.5	QPSK	23.01	23.01	22.93	22.04	22.04	21.99	21.99
		16QAM	22.15	22.15	22.06	20.89	20.87	20.86	20.79
		64QAM	21.07	20.83	20.85	19.72	19.77	19.70	19.69
1.4	699.7	QPSK	23.26	23.38	23.29	23.35	23.35	23.31	22.36
		16QAM	22.66	22.74	22.62	22.44	22.47	22.42	21.48
		64QAM	21.22	21.30	21.21	21.22	21.22	21.14	20.09
	707.5	QPSK	23.03	23.10	23.01	23.02	23.08	23.03	22.07
		16QAM	22.36	22.43	22.33	22.13	22.17	22.13	21.20
		64QAM	20.95	21.04	20.79	20.86	20.91	20.86	19.80
	715.3	QPSK	22.66	22.75	22.66	22.65	22.75	22.68	21.80
		16QAM	21.99	22.12	22.00	21.71	21.81	21.70	20.83
		64QAM	20.49	20.53	20.49	20.38	20.41	20.37	19.33

▪ Band 14

Conducted Power [dBm]									
RB Alloc			1 RB			MID RB			FULL RB
B.W(MHz)	Freq.(MHz)	Modulation	LOW	MID	HIGH	LOW	MID	HIGH	
10	793	QPSK	24.23	24.11	24.06	23.18	23.15	23.16	23.15
		16QAM	23.58	23.51	23.40	22.22	22.16	22.15	22.16
		64QAM	22.45	22.24	22.34	21.03	20.96	21.19	21.19
5	790.5	QPSK	24.14	24.16	24.07	23.32	23.30	23.24	23.27
		16QAM	23.51	23.47	23.47	22.32	22.31	22.24	22.27
		64QAM	22.45	22.03	21.79	21.35	21.01	20.68	21.04
	795.5	QPSK	24.05	24.14	24.03	23.12	23.11	23.11	23.11
		16QAM	23.40	23.47	23.33	22.15	22.15	22.15	22.10
		64QAM	22.31	22.44	22.31	21.15	21.22	21.20	21.11

▪ Band 5

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	23.35	23.28	23.23	22.40	22.47	22.44	22.45
		16QAM	22.63	22.58	22.52	21.26	21.35	21.30	21.37
		64QAM	21.57	21.61	21.54	20.33	20.41	20.37	20.36
	836.5	QPSK	23.32	23.31	23.14	22.39	22.44	22.34	22.34
		16QAM	22.58	22.56	22.36	21.28	21.33	21.17	21.21
		64QAM	21.57	21.58	21.46	20.35	20.36	20.32	20.26
	844	QPSK	23.24	23.11	22.97	22.30	22.23	22.17	22.22
		16QAM	22.48	22.39	22.19	21.17	21.06	21.02	21.11
		64QAM	21.45	21.44	21.23	20.19	20.13	20.12	20.12
5	826.5	QPSK	23.23	23.15	23.10	22.26	22.23	22.18	22.22
		16QAM	22.74	22.69	22.63	21.38	21.39	21.34	21.35
		64QAM	21.73	21.57	21.47	20.42	20.40	20.34	20.37
	836.5	QPSK	23.17	23.15	23.05	22.20	22.19	22.13	22.19
		16QAM	22.69	22.68	22.53	21.35	21.38	21.31	21.37
		64QAM	21.60	21.58	21.51	20.38	20.37	20.29	20.30
	846.5	QPSK	22.97	22.91	22.78	21.99	21.99	21.90	21.93
		16QAM	22.47	22.45	22.25	21.16	21.16	21.06	21.06
		64QAM	21.50	21.42	21.28	20.17	20.17	20.01	20.03
3	825.5	QPSK	23.12	23.13	23.01	22.17	22.14	22.13	22.13
		16QAM	22.75	22.75	22.68	21.49	21.48	21.41	21.40
		64QAM	21.71	21.73	21.57	20.43	20.41	20.33	20.39
	836.5	QPSK	23.06	23.07	22.96	22.12	22.14	22.10	22.09
		16QAM	22.63	22.74	22.57	21.36	21.34	21.39	21.31
		64QAM	21.67	21.63	21.42	20.32	20.40	20.38	20.34
	847.5	QPSK	22.82	22.79	22.63	21.84	21.83	21.77	21.82
		16QAM	22.45	22.38	22.22	21.11	21.07	20.99	21.03
		64QAM	21.46	21.28	21.15	20.15	20.11	20.07	20.06
1.4	824.7	QPSK	23.03	23.07	22.98	23.04	23.05	22.99	22.08
		16QAM	22.70	22.77	22.72	22.50	22.56	22.48	21.41
		64QAM	21.53	21.59	21.46	21.38	21.45	21.38	20.33
	836.5	QPSK	22.93	23.02	22.94	22.99	23.00	22.97	22.04
		16QAM	22.64	22.68	22.60	22.44	22.47	22.40	21.36
		64QAM	21.51	21.61	21.42	21.37	21.40	21.32	20.29
	848.3	QPSK	22.67	22.70	22.57	22.62	22.64	22.58	21.70
		16QAM	22.30	22.36	22.27	22.12	22.15	22.08	21.05
		64QAM	21.01	20.19	20.13	20.09	20.12	20.01	20.02

▪ Intra Band ULCA(5B)

Conducted Power [dBm]						
B.W(MHz) (PCC + SCC)	PCC		SCC		Modulation	Result
	Freq.(MHz)	RB Size/ Offset	Freq.(MHz)	RB Size/ Offset		
10+10	831.6	50/0	841.5	50/0	QPSK	22.15
					16QAM	21.13
					64QAM	20.59
	831.6	1/49	841.5	1/0	QPSK	23.58
					16QAM	22.53
					64QAM	21.27

▪ Band 66(4)

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	23.38	23.36	23.41	22.41	22.48	22.48	22.52
		16QAM	22.86	22.77	22.94	21.45	21.62	21.53	21.54
		64QAM	21.78	21.77	21.95	20.53	20.61	20.62	20.62
	1 745	QPSK	23.63	23.46	23.34	22.56	22.57	22.50	22.57
		16QAM	23.10	22.91	22.78	21.63	21.68	21.57	21.63
		64QAM	22.19	22.06	21.97	20.89	20.92	20.82	20.90
	1 770	QPSK	23.52	23.40	23.36	22.48	22.55	22.50	22.54
		16QAM	22.86	22.81	22.90	21.55	21.60	21.56	21.60
		64QAM	22.08	21.94	21.95	20.80	20.87	20.82	20.87
15	1 717.5	QPSK	23.37	23.40	23.41	22.38	22.50	22.51	22.49
		16QAM	22.81	22.77	22.76	21.43	21.57	21.55	21.57
		64QAM	21.70	21.76	21.90	20.49	20.62	20.59	20.61
	1 745	QPSK	23.61	23.51	23.38	22.60	22.67	22.56	22.62
		16QAM	23.04	23.02	22.87	21.64	21.70	21.59	21.63
		64QAM	21.96	21.93	21.81	20.70	20.73	20.66	20.68
	1 772.5	QPSK	23.57	23.51	23.52	22.55	22.55	22.57	22.54
		16QAM	22.97	22.85	22.87	21.58	21.57	21.61	21.54
		64QAM	21.86	21.77	21.87	20.63	20.61	20.67	20.60
10	1 715	QPSK	23.28	23.29	23.32	22.35	22.43	22.38	22.39
		16QAM	22.74	22.79	22.81	21.41	21.52	21.47	21.49
		64QAM	21.58	21.70	21.73	20.42	20.52	20.49	20.50
	1 745	QPSK	23.56	23.50	23.34	22.53	22.54	22.51	22.56
		16QAM	22.99	22.84	22.89	21.64	21.67	21.63	21.63
		64QAM	21.91	21.86	21.74	20.64	20.68	20.62	20.64
	1 775	QPSK	23.46	23.42	23.43	22.46	22.56	22.50	22.55
		16QAM	22.95	22.94	22.82	21.58	21.67	21.65	21.63
		64QAM	21.74	21.88	21.84	20.60	20.68	20.66	20.64
5	1 712.5	QPSK	23.18	23.30	23.25	22.35	22.35	22.36	22.37
		16QAM	22.70	22.79	22.74	21.50	21.53	21.48	21.45
		64QAM	21.70	21.73	21.67	20.48	20.50	20.50	20.46
	1 745	QPSK	23.43	23.51	23.38	22.52	22.58	22.56	22.51
		16QAM	22.93	22.98	22.86	21.65	21.69	21.61	21.66
		64QAM	21.87	21.92	21.92	20.67	20.72	20.65	20.63
	1 777.5	QPSK	23.38	23.52	23.45	22.48	22.52	22.54	22.52
		16QAM	22.92	22.92	22.89	21.65	21.69	21.68	21.63
		64QAM	21.83	21.99	21.87	20.65	20.66	20.69	20.62
3	1 711.5	QPSK	23.65	23.67	23.50	22.69	22.77	22.69	22.69
		16QAM	22.64	22.85	22.71	21.46	21.48	21.49	21.42
		64QAM	21.64	21.74	21.64	20.55	20.52	20.54	20.49
	1 745	QPSK	23.79	23.88	23.74	22.74	22.95	22.78	22.80
		16QAM	22.84	23.02	22.92	21.65	21.69	21.67	21.62
		64QAM	21.82	21.95	21.78	20.65	20.69	20.60	20.64
	1 778.5	QPSK	23.72	23.85	23.71	22.81	22.78	22.80	22.72
		16QAM	22.84	23.02	23.00	21.63	21.69	21.72	21.61
		64QAM	21.85	21.95	21.97	20.67	20.66	20.69	20.63

Conducted Power [dBm]									
RB Alloc			1 RB			MID RB			FULL RB
B.W(MHz)	Freq.(MHz)	Modulation	LOW	MID	HIGH	LOW	MID	HIGH	
1.4	1 710.7	QPSK	23.61	23.66	23.61	23.62	23.69	23.65	22.74
		16QAM	22.58	22.62	22.60	22.41	22.51	22.48	21.38
		64QAM	21.54	21.59	21.58	21.44	21.49	21.49	20.45
	1 745	QPSK	23.74	23.79	23.71	23.78	23.80	23.79	21.86
		16QAM	22.82	22.85	22.74	22.61	22.65	22.65	20.56
		64QAM	21.81	21.87	21.80	21.61	21.68	21.69	20.65
	1 779.3	QPSK	23.84	23.86	23.83	23.85	23.90	23.86	22.95
		16QAM	22.81	22.86	22.83	22.68	22.70	22.63	21.62
		64QAM	21.89	21.85	21.77	21.68	21.76	21.66	20.73

▪ Band 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	23.73	23.60	23.54	22.76	22.77	22.73	22.75
		16QAM	23.47	23.39	23.39	22.13	22.14	22.14	22.13
		64QAM	22.45	22.28	22.44	21.17	21.16	21.16	21.15
	1 880	QPSK	23.69	23.68	23.62	22.72	22.76	22.79	22.74
		16QAM	23.49	23.41	23.33	22.10	22.11	22.13	22.07
		64QAM	22.46	22.38	22.41	21.14	21.15	21.16	21.10
	1 900	QPSK	23.71	23.57	23.56	22.64	22.71	22.69	22.71
		16QAM	23.36	23.34	23.30	21.95	22.01	21.99	21.98
		64QAM	22.26	21.83	22.18	20.97	20.84	20.94	20.95
15	1 857.5	QPSK	23.73	23.64	23.62	22.77	22.75	22.74	22.76
		16QAM	23.50	23.47	23.46	22.16	22.18	22.15	22.14
		64QAM	22.44	22.41	22.36	21.15	21.19	21.15	21.13
	1 880	QPSK	23.68	23.68	23.65	22.72	22.74	22.80	22.76
		16QAM	23.54	23.52	23.41	22.13	22.11	22.17	22.08
		64QAM	22.47	22.35	22.32	21.11	21.14	21.17	21.11
	1 902.5	QPSK	23.58	23.60	23.53	22.62	22.62	22.69	22.60
		16QAM	23.26	23.27	23.24	21.89	21.94	22.00	21.90
		64QAM	22.23	21.82	22.27	20.87	20.77	21.02	20.84
10	1 855	QPSK	23.70	23.66	23.63	22.75	22.78	22.74	22.75
		16QAM	23.42	23.43	23.33	22.12	22.13	22.12	22.09
		64QAM	22.43	22.36	22.36	21.13	21.14	21.16	21.15
	1 880	QPSK	23.65	23.64	23.65	22.69	22.72	22.79	22.71
		16QAM	23.39	23.43	23.46	22.08	22.11	22.14	22.03
		64QAM	22.32	22.34	22.29	21.09	21.10	21.15	21.09
	1 905	QPSK	23.49	23.48	23.50	22.53	22.64	22.67	22.64
		16QAM	23.24	23.17	23.24	21.82	21.97	21.99	21.93
		64QAM	21.92	22.14	22.14	20.76	21.00	20.97	20.94
5	1 852.5	QPSK	23.61	23.66	23.63	22.71	22.77	22.73	22.73
		16QAM	23.40	23.43	23.42	22.08	22.11	22.13	22.09
		64QAM	22.39	22.41	22.31	21.13	21.17	21.17	21.10
	1 880	QPSK	23.57	23.70	23.69	22.68	22.69	22.77	22.71
		16QAM	23.36	23.49	23.46	22.08	22.09	22.16	22.08
		64QAM	22.25	22.47	22.37	21.09	21.17	21.17	21.09
	1 907.5	QPSK	23.43	23.53	23.51	22.49	22.65	22.58	22.55
		16QAM	23.09	23.26	23.24	21.86	21.94	21.97	21.84
		64QAM	22.04	22.34	22.18	20.88	21.03	20.97	20.91
3	1 851.5	QPSK	23.62	23.67	23.64	22.71	22.74	22.73	22.72
		16QAM	23.33	23.48	23.37	22.10	22.14	22.13	22.07
		64QAM	22.30	22.40	22.36	21.11	21.19	21.16	21.14
	1 880	QPSK	23.53	23.68	23.62	22.65	22.75	22.73	22.67
		16QAM	23.34	23.47	23.39	22.10	22.16	22.14	22.10
		64QAM	22.32	22.45	22.37	21.14	21.21	21.20	21.12
	1 908.5	QPSK	23.44	23.54	23.48	22.56	22.61	22.59	22.57
		16QAM	23.12	23.34	23.26	21.91	21.95	21.96	21.87
		64QAM	22.18	22.17	22.22	21.00	21.04	20.98	20.99

Conducted Power [dBm]									
RB Alloc			1 RB			MID RB			FULL RB
B.W(MHz)	Freq.(MHz)	Modulation	LOW	MID	HIGH	LOW	MID	HIGH	
1.4	1 850.7	QPSK	23.54	23.61	23.56	23.59	23.62	23.60	22.69
		16QAM	23.28	23.37	23.31	23.09	23.13	23.11	22.03
		64QAM	22.19	22.35	22.23	22.16	22.21	22.16	21.11
	1 880	QPSK	23.48	23.57	23.51	23.54	23.59	23.52	22.63
		16QAM	23.34	23.35	23.35	23.13	23.17	23.09	22.05
		64QAM	22.22	22.41	22.26	22.21	22.23	22.18	21.13
	1 909.3	QPSK	23.33	23.40	23.33	23.35	23.40	23.39	22.46
		16QAM	23.05	23.12	23.16	22.86	22.96	22.93	21.84
		64QAM	22.06	22.20	22.19	21.98	22.06	22.00	20.89

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

- 2) This is 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	1/49	H	21.34	-0.71	20.63	0.116
		16QAM	1/49	H	20.66	-0.71	19.95	0.099
		64QAM	1/49	H	19.51	-0.71	18.80	0.076
	711	QPSK	1/25	H	21.43	-0.70	20.73	0.118
		16QAM	1/25	H	20.63	-0.70	19.93	0.098
		64QAM	1/25	H	19.71	-0.70	19.01	0.080
5	701.5	QPSK	1/12	H	21.08	-0.72	20.36	0.109
		16QAM	1/12	H	20.44	-0.72	19.72	0.094
		64QAM	1/12	H	18.89	-0.72	18.17	0.066
	707.5	QPSK	1/12	H	21.35	-0.70	20.65	0.116
		16QAM	1/12	H	20.62	-0.70	19.92	0.098
		64QAM	1/12	H	19.46	-0.70	18.76	0.075
	713.5	QPSK	1/12	H	22.29	-0.69	21.60	0.145
		16QAM	1/12	H	21.49	-0.69	20.80	0.120
		64QAM	1/12	H	20.62	-0.69	19.93	0.098
3	700.5	QPSK	1/14	H	20.81	-0.72	20.09	0.102
		16QAM	1/14	H	20.19	-0.72	19.47	0.089
		64QAM	1/14	H	18.70	-0.72	17.98	0.063
	707.5	QPSK	1/0	H	21.31	-0.70	20.61	0.115
		16QAM	1/0	H	20.84	-0.70	20.14	0.103
		64QAM	1/0	H	19.64	-0.70	18.94	0.078
	714.5	QPSK	1/0	H	22.18	-0.69	21.49	0.141
		16QAM	1/0	H	21.92	-0.69	21.23	0.133
		64QAM	1/0	H	20.44	-0.69	19.75	0.094
1.4	699.7	QPSK	1/5	H	20.54	-0.72	19.82	0.096
		16QAM	1/5	H	20.27	-0.72	19.55	0.090
		64QAM	1/5	H	18.72	-0.72	18.00	0.063
	707.5	QPSK	1/5	H	21.50	-0.70	20.80	0.120
		16QAM	1/5	H	20.87	-0.70	20.17	0.104
		64QAM	1/5	H	19.77	-0.70	19.07	0.081
	715.3	QPSK	1/5	H	21.55	-0.69	20.86	0.122
		16QAM	1/5	H	20.94	-0.69	20.25	0.106
		64QAM	1/5	H	19.97	-0.69	19.28	0.085

<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)
5	713.5	QPSK	1/12	H	22.18	-0.69	21.49	0.141
		16QAM	1/12	H	21.40	-0.69	20.71	0.118
		64QAM	1/12	H	20.62	-0.69	19.93	0.098

7.6.2 LTE Band 14

<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	793	QPSK	1/0	H	22.42	-0.52	21.90	0.155
		16QAM	1/0	H	21.89	-0.52	21.37	0.137
		64QAM	1/0	H	20.63	-0.52	20.11	0.103
5	790.5	QPSK	1/0	H	22.28	-0.52	21.76	0.150
		16QAM	1/0	H	21.63	-0.52	21.11	0.129
		64QAM	1/0	H	20.60	-0.52	20.08	0.102
	795.5	QPSK	1/24	H	22.40	-0.51	21.89	0.155
		16QAM	1/24	H	21.69	-0.51	21.18	0.131
		64QAM	1/24	H	20.60	-0.51	20.09	0.102

<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	793	QPSK	1/0	H	22.09	-0.52	21.57	0.144
		16QAM	1/0	H	21.47	-0.52	20.95	0.124
		64QAM	1/0	H	20.34	-0.52	19.82	0.096

7.6.3. LTE Band 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	21.79	-0.62	21.17	0.131
		16QAM	1/0	H	20.99	-0.62	20.37	0.109
		64QAM	1/0	H	20.17	-0.62	19.55	0.090
	836.5	QPSK	1/0	H	21.67	-0.65	21.02	0.126
		16QAM	1/0	H	20.97	-0.65	20.32	0.108
		64QAM	1/0	H	20.35	-0.65	19.70	0.093
	844	QPSK	1/0	H	21.67	-0.68	20.99	0.126
		16QAM	1/0	H	20.89	-0.68	20.21	0.105
		64QAM	1/0	H	19.93	-0.68	19.25	0.084
5	826.5	QPSK	1/12	H	21.66	-0.61	21.05	0.127
		16QAM	1/12	H	20.84	-0.61	20.23	0.105
		64QAM	1/12	H	19.97	-0.61	19.36	0.086
	836.5	QPSK	1/0	H	22.06	-0.65	21.41	0.138
		16QAM	1/0	H	21.24	-0.65	20.59	0.115
		64QAM	1/0	H	20.44	-0.65	19.79	0.095
	846.5	QPSK	1/0	H	21.35	-0.69	20.66	0.116
		16QAM	1/0	H	20.64	-0.69	19.95	0.099
		64QAM	1/0	H	19.66	-0.69	18.97	0.079
3	825.5	QPSK	1/0	H	21.79	-0.60	21.19	0.132
		16QAM	1/0	H	20.94	-0.60	20.34	0.108
		64QAM	1/0	H	20.21	-0.60	19.61	0.091
	836.5	QPSK	1/0	H	22.04	-0.65	21.39	0.138
		16QAM	1/0	H	21.20	-0.65	20.55	0.114
		64QAM	1/0	H	20.47	-0.65	19.82	0.096
	847.5	QPSK	1/0	H	20.86	-0.69	20.17	0.104
		16QAM	1/0	H	20.28	-0.69	19.59	0.091
		64QAM	1/0	H	19.49	-0.69	18.80	0.076
1.4	824.7	QPSK	1/5	H	21.68	-0.60	21.08	0.128
		16QAM	1/5	H	20.81	-0.60	20.21	0.105
		64QAM	1/5	H	19.83	-0.60	19.23	0.084
	836.5	QPSK	1/2	H	21.46	-0.65	20.81	0.121
		16QAM	1/2	H	20.97	-0.65	20.32	0.108
		64QAM	1/2	H	19.99	-0.65	19.34	0.086
	848.3	QPSK	1/0	H	20.51	-0.70	19.81	0.096
		16QAM	1/0	H	19.73	-0.70	19.03	0.080
		64QAM	1/0	H	18.14	-0.70	17.44	0.055

▪ Intra Band ULCA(5B)

Band	B.W(MHz) (PCC + SCC)	PCC		SCC		Test Mode	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBd)	ERP (dBm)	ERP (W)
		Freq. (MHz)	RB Size/ Offset	Freq. (MHz)	RB Size/ Offset						
5	10+10	831.6	50/0	841.5	50/0	QPSK	H	20.57	-0.65	19.92	0.098
						16QAM	H	19.60	-0.65	18.95	0.079
						64QAM	H	19.54	-0.65	18.89	0.077
		831.6	1/49	841.5	1/0	QPSK	H	22.22	-0.65	21.57	0.144
						16QAM	H	21.53	-0.65	20.88	0.122
						64QAM	H	19.41	-0.65	18.76	0.075

<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)
5	826.5	QPSK	1/12	H	20.93	-0.61	20.32	0.108
		16QAM	1/12	H	20.25	-0.61	19.64	0.092
		64QAM	1/12	H	19.59	-0.61	18.98	0.079
	836.5	QPSK	1/0	H	20.34	-0.65	19.69	0.093
		16QAM	1/0	H	19.08	-0.65	18.43	0.070
		64QAM	1/0	H	18.36	-0.65	17.71	0.059
	846.5	QPSK	1/0	H	19.30	-0.69	18.61	0.073
		16QAM	1/0	H	18.59	-0.69	17.90	0.062
		64QAM	1/0	H	17.79	-0.69	17.10	0.051

7.6.4. LTE Band 66(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	H	21.87	5.83	27.70	0.589
		16QAM	1/0	H	21.40	5.83	27.23	0.528
		64QAM	1/0	H	19.94	5.83	25.77	0.378
	1 745	QPSK	1/0	H	21.29	5.56	26.85	0.484
		16QAM	1/0	H	21.06	5.56	26.62	0.459
		64QAM	1/0	H	19.88	5.56	25.44	0.350
	1 770	QPSK	1/0	H	21.43	5.27	26.70	0.468
		16QAM	1/0	H	21.30	5.27	26.57	0.454
		64QAM	1/0	H	19.95	5.27	25.22	0.333
15	1 717.5	QPSK	1/0	H	21.46	5.86	27.32	0.540
		16QAM	1/0	H	20.99	5.86	26.85	0.484
		64QAM	1/0	H	19.82	5.86	25.68	0.370
	1 745	QPSK	1/36	H	21.29	5.56	26.85	0.484
		16QAM	1/36	H	20.81	5.56	26.37	0.434
		64QAM	1/36	H	19.74	5.56	25.30	0.339
	1 772.5	QPSK	1/0	H	21.44	5.24	26.68	0.466
		16QAM	1/0	H	21.14	5.24	26.38	0.435
		64QAM	1/0	H	19.79	5.24	25.03	0.318
10	1 715	QPSK	1/0	H	21.24	5.89	27.13	0.516
		16QAM	1/0	H	20.84	5.89	26.73	0.471
		64QAM	1/0	H	19.75	5.89	25.64	0.366
	1 745	QPSK	1/49	H	21.49	5.56	27.05	0.507
		16QAM	1/49	H	20.71	5.56	26.27	0.424
		64QAM	1/49	H	20.03	5.56	25.59	0.362
	1 775	QPSK	1/0	H	21.30	5.21	26.51	0.448
		16QAM	1/0	H	20.28	5.21	25.49	0.354
		64QAM	1/0	H	19.32	5.21	24.53	0.284
5	1 712.5	QPSK	1/0	H	21.18	5.91	27.09	0.512
		16QAM	1/0	H	20.71	5.91	26.62	0.459
		64QAM	1/0	H	19.56	5.91	25.47	0.352
	1 745	QPSK	1/24	H	21.66	5.56	27.22	0.527
		16QAM	1/24	H	20.88	5.56	26.44	0.441
		64QAM	1/24	H	19.70	5.56	25.26	0.336
	1 777.5	QPSK	1/24	H	21.68	5.18	26.86	0.485
		16QAM	1/24	H	21.16	5.18	26.34	0.431
		64QAM	1/24	H	19.84	5.18	25.02	0.318

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)
3	1 711.5	QPSK	1/14	H	21.06	5.92	26.98	0.499
		16QAM	1/14	H	20.42	5.92	26.34	0.431
		64QAM	1/14	H	19.24	5.92	25.16	0.328
	1 745	QPSK	1/7	H	21.52	5.56	27.08	0.511
		16QAM	1/7	H	21.08	5.56	26.64	0.461
		64QAM	1/7	H	19.63	5.56	25.19	0.330
	1 778.5	QPSK	1/14	H	21.74	5.17	26.91	0.491
		16QAM	1/14	H	21.30	5.17	26.47	0.444
		64QAM	1/14	H	19.85	5.17	25.02	0.318
1.4	1 710.7	QPSK	1/2	H	20.50	5.93	26.43	0.440
		16QAM	1/2	H	19.88	5.93	25.81	0.381
		64QAM	1/2	H	18.98	5.93	24.91	0.310
	1 745	QPSK	1/2	H	21.19	5.56	26.75	0.473
		16QAM	1/2	H	20.71	5.56	26.27	0.424
		64QAM	1/2	H	19.46	5.56	25.02	0.318
	1 779.3	QPSK	1/0	H	21.63	5.16	26.79	0.478
		16QAM	1/0	H	21.07	5.16	26.23	0.420
		64QAM	1/0	H	19.80	5.16	24.96	0.313

<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	1/0	H	21.18	5.83	27.01	0.502
		16QAM	1/0	H	20.54	5.83	26.37	0.434
		64QAM	1/0	H	19.55	5.83	25.38	0.345

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	1/50	V	23.20	4.69	27.89	0.615
		16QAM	1/50	V	22.67	4.69	27.36	0.545
		64QAM	1/50	V	22.28	4.69	26.97	0.498
	1 880	QPSK	1/0	V	21.36	4.56	25.92	0.391
		16QAM	1/0	V	20.92	4.56	25.48	0.353
		64QAM	1/0	V	20.61	4.56	25.17	0.329
	1 900	QPSK	1/50	V	20.70	4.42	25.12	0.325
		16QAM	1/50	V	20.39	4.42	24.81	0.303
		64QAM	1/50	V	19.86	4.42	24.28	0.268
15	1 857.5	QPSK	1/36	V	23.20	4.71	27.91	0.618
		16QAM	1/36	V	22.33	4.71	27.04	0.506
		64QAM	1/36	V	22.37	4.71	27.08	0.511
	1 880	QPSK	1/0	V	21.51	4.56	26.07	0.405
		16QAM	1/0	V	20.72	4.56	25.28	0.337
		64QAM	1/0	V	20.55	4.56	25.11	0.324
	1 902.5	QPSK	1/36	V	21.16	4.43	25.59	0.362
		16QAM	1/36	V	20.78	4.43	25.21	0.332
		64QAM	1/36	V	20.29	4.43	24.72	0.296
10	1 855	QPSK	1/49	V	23.05	4.73	27.78	0.600
		16QAM	1/49	V	22.66	4.73	27.39	0.548
		64QAM	1/49	V	22.20	4.73	26.93	0.493
	1 880	QPSK	1/0	V	21.20	4.56	25.76	0.377
		16QAM	1/0	V	20.46	4.56	25.02	0.318
		64QAM	1/0	V	20.23	4.56	24.79	0.301
	1 905	QPSK	1/0	V	21.42	4.43	25.85	0.385
		16QAM	1/0	V	20.48	4.43	24.91	0.310
		64QAM	1/0	V	20.23	4.43	24.66	0.292
5	1 852.5	QPSK	1/24	V	23.10	4.74	27.84	0.608
		16QAM	1/24	V	22.59	4.74	27.33	0.541
		64QAM	1/24	V	22.17	4.74	26.91	0.491
	1 880	QPSK	1/0	V	20.91	4.56	25.47	0.352
		16QAM	1/0	V	20.57	4.56	25.13	0.326
		64QAM	1/0	V	20.01	4.56	24.57	0.286
	1 907.5	QPSK	1/0	V	21.41	4.44	25.85	0.385
		16QAM	1/0	V	20.78	4.44	25.22	0.333
		64QAM	1/0	V	20.51	4.44	24.95	0.313

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)
3	1 851.5	QPSK	1/14	V	22.16	4.75	26.91	0.491
		16QAM	1/14	V	21.81	4.75	26.56	0.453
		64QAM	1/14	V	20.38	4.75	25.13	0.326
	1 880	QPSK	1/0	V	20.55	4.56	25.11	0.324
		16QAM	1/0	V	19.86	4.56	24.42	0.277
		64QAM	1/0	V	18.62	4.56	23.18	0.208
	1 908.5	QPSK	1/0	V	21.07	4.44	25.51	0.356
		16QAM	1/0	V	20.41	4.44	24.85	0.305
		64QAM	1/0	V	19.36	4.44	23.80	0.240
1.4	1 850.7	QPSK	1/0	V	22.04	4.76	26.80	0.479
		16QAM	1/0	V	21.34	4.76	26.10	0.407
		64QAM	1/0	V	19.97	4.76	24.73	0.297
	1 880	QPSK	1/2	V	20.41	4.56	24.97	0.314
		16QAM	1/2	V	19.98	4.56	24.54	0.284
		64QAM	1/2	V	18.79	4.56	23.35	0.216
	1 909.3	QPSK	1/2	V	20.86	4.45	25.31	0.340
		16QAM	1/2	V	20.28	4.45	24.73	0.297
		64QAM	1/2	V	19.12	4.45	23.57	0.228

<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)
15	1 857.5	QPSK	1/36	Z	22.86	4.71	27.57	0.571
		16QAM	1/36	Z	22.35	4.71	27.06	0.508
		64QAM	1/36	Z	21.46	4.71	26.17	0.414

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 for Band 2/66(4)/12/14/5 = -13dBm
Limit for 1 559 MHz ~ 1 610 MHz in Band 14 = -40 dBm/MHz
(equivalent isotropically radiated power for wideband signals)

7.7.1. LTE Band 12

<Test case: ANT 1>

Channel Bandwidth (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBd)	Result (dBm)	Limit (dBm)	Margin (dB)
10	704	1/49	QPSK	1 416.83	H	-42.85	3.07	-39.78	-13.00	29.78
				2 125.34	H	-63.37	2.90	-60.47	-13.00	47.47
				4 250.72	H	-54.15	7.18	-46.97	-13.00	33.97
			16QAM	1 416.77	H	-43.04	3.06	-39.98	-13.00	26.98
				2 125.32	H	-64.09	2.90	-61.19	-13.00	48.19
				4 250.37	H	-55.99	7.18	-48.81	-13.00	35.81
			64QAM	1 416.92	H	-43.93	3.07	-40.86	-13.00	27.86
				2 125.20	H	-64.68	2.90	-61.78	-13.00	48.78
				4 250.26	H	-61.97	7.18	-54.79	-13.00	41.79
	711	1/25	QPSK	1 422.17	H	42.68	3.12	-39.56	-13.00	26.56
				2 133.40	H	-63.85	2.90	-60.95	-13.00	47.95
				4 266.58	H	-56.55	7.15	-49.40	-13.00	36.40
			16QAM	1 422.28	H	-43.22	3.12	-40.10	-13.00	27.10
				2 133.31	H	-64.18	2.90	-61.28	-13.00	48.28
				4 266.57	H	-57.26	7.15	-50.11	-13.00	37.11
			64QAM	1 422.26	H	-44.13	3.12	-41.01	-13.00	28.01
				2 133.20	H	-65.42	2.90	-62.52	-13.00	49.52
				4 266.51	H	-59.48	7.15	-52.33	-13.00	39.33
5	713.5	1/12	QPSK	1 426.93	H	-44.21	3.31	-40.90	-13.00	27.90
				2 140.43	H	-63.79	3.32	-60.47	-13.00	47.47
				4 281.27	H	-58.62	7.78	-50.84	-13.00	37.84
			16QAM	1 426.93	H	-45.40	3.31	42.09	-13.00	29.09
				2 140.62	H	-63.84	3.32	-60.52	-13.00	47.52
				4 281.03	H	-58.67	7.78	-50.89	-13.00	37.89
			64QAM	1 426.93	H	-45.99	3.31	-42.68	-13.00	29.68
				2 140.75	H	-65.09	3.32	-61.77	-13.00	48.77
				4 280.89	H	-59.93	7.78	-52.15	-13.00	39.15

<Test case: ANT 2>

Channel Bandwidth (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBd)	Result (dBm)	Limit (dBm)	Margin (dB)
5	713.5	1/12	QPSK	1 426.94	H	-44.39	3.31	-41.08	-13.00	28.08
				2 144.74	H	-64.95	3.32	-61.63	-13.00	48.63
				4 281.03	H	-58.77	7.78	-50.99	-13.00	37.99
			16QAM	1 426.94	H	-45.08	3.31	-41.77	-13.00	28.77
				2 145.33	H	-65.02	3.32	-61.70	-13.00	48.70
				4 281.09	H	-59.01	7.78	-51.23	-13.00	38.23
			64QAM	1 427.00	H	-46.11	3.31	-42.80	-13.00	29.80
				2 143.58	H	-65.00	3.32	-61.68	-13.00	48.68
				4 280.97	H	-61.12	7.78	-53.34	-13.00	40.34

7.7.2 LTE Band 14

<Test case: ANT 1>

Channel Bandwidth (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBd)	Result (dBm)	Limit (dBm)	Margin (dB)
10	793	1/0	QPSK	2 365.87	V	-58.31	3.69	-54.62	-13.00	41.62
				3 942.86	H	-55.76	6.67	-49.09	-13.00	36.09
			16QAM	2 365.74	V	-58.67	3.69	-54.98	-13.00	41.98
				3 943.20	H	-56.49	6.67	-49.82	-13.00	36.82
			64QAM	2 365.84	V	-59.90	3.69	-56.21	-13.00	43.21
				3 942.87	H	-57.14	6.67	-50.47	-13.00	37.47

UNDESIRABLE EMISSIONS IN 1559~1610MHz (LTE Band 14)

Channel Bandwidth (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBi)	Result (dBm)	Limit (dBm)	Margin (dB)
10	793	1/0	QPSK	1 577.02	H	-47.30	5.93	-41.37	-40.00	1.37
			16QAM	1 577.13	H	-48.17	5.93	-42.24	-40.00	2.24
			64QAM	1 577.26	H	-48.95	5.93	-43.02	-40.00	3.02

<Test case: ANT 2>

Channel Bandwidth (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBd)	Result (dBm)	Limit (dBm)	Margin (dB)
10	793	1/0	QPSK	2 365.51	V	-61.02	3.69	-57.33	-13.00	44.33
				3 943.02	H	-56.85	6.67	-50.18	-13.00	37.18
			16QAM	2 365.69	V	-61.09	3.69	-57.40	-13.00	44.40
				3 943.13	H	-57.65	6.67	-50.98	-13.00	37.98
			64QAM	2 365.65	V	-62.47	3.69	-58.78	-13.00	45.78
				3 943.02	H	-58.76	6.67	-52.09	-13.00	39.09

UNDESIRABLE EMISSIONS IN 1559~1610MHz (LTE Band 14)

Channel Bandwidth (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBi)	Result (dBm)	Limit (dBm)	Margin (dB)
10	793	1/0	QPSK	1577.29	H	-49.11	5.93	-43.18	-40.00	3.18
			16QAM	1577.25	H	-50.13	5.93	-44.20	-40.00	4.20
			64QAM	1577.26	H	-50.94	5.93	-45.01	-40.00	5.01

7.7.3 LTE Band 5

<Test case: ANT 1>

Channel Bandwidth (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBd)	Result (dBm)	Limit (dBm)	Margin (dB)
10	829	1/0	QPSK	1 649.30	H	-58.54	4.04	-54.50	-13.00	41.50
				2 473.93	H	-60.59	3.69	-56.90	-13.00	43.90
				4 123.15	V	-56.44	7.00	-49.44	-13.00	36.44
			16QAM	1 649.22	H	-58.93	4.04	-54.89	-13.00	41.89
				2 473.99	H	-60.82	3.69	-57.13	-13.00	44.13
				4 122.77	V	-57.76	7.00	-50.76	-13.00	37.76
			64QAM	1 649.19	H	-59.43	4.04	-55.39	-13.00	42.39
				2 473.66	H	-62.05	3.69	-58.36	-13.00	45.36
				4 123.04	V	-58.65	7.00	-51.65	-13.00	38.65
	836.5	1/0	QPSK	1 664.14	H	-56.78	4.00	-52.78	-13.00	39.78
				2 496.30	H	-63.10	3.53	-59.57	-13.00	46.57
				4 158.10	V	-57.81	7.06	-50.75	-13.00	37.75
			16QAM	1 664.24	H	-57.56	4.00	-53.56	-13.00	40.56
				2 496.37	H	-63.33	3.53	-59.80	-13.00	46.80
				4 157.82	V	-58.80	7.06	-51.74	-13.00	38.74
			64QAM	1 663.98	H	-58.83	4.00	-54.83	-13.00	41.83
				2 496.72	H	-64.01	3.52	-60.49	-13.00	47.49
				4 157.97	V	-60.02	7.06	-52.96	-13.00	39.96
	844	1/0	QPSK	1 679.17	H	-58.07	3.96	-54.11	-13.00	41.11
				2 518.78	H	-59.34	3.65	-55.69	-13.00	42.69
				4 197.99	V	-58.36	7.13	-51.23	-13.00	38.23
			16QAM	1 679.31	H	-58.43	3.96	-54.47	-13.00	41.47
				2 518.67	H	-59.97	3.65	-56.32	-13.00	43.32
				4 197.73	V	-57.84	7.13	-50.71	-13.00	37.71
			64QAM	1 679.20	H	-60.03	3.96	-56.07	-13.00	43.07
				2 518.65	H	-60.83	3.65	-57.18	-13.00	44.18
				4 198.24	V	-58.82	7.13	-51.69	-13.00	38.69

Channel Bandwidth (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBd)	Result (dBm)	Limit (dBm)	Margin (dB)
5	826.5	1/12	QPSK	1 657.24	H	-55.55	4.53	-51.02	-13.00	38.02
				2 486.13	H	-61.50	4.14	-57.36	-13.00	44.36
				4 143.33	V	-61.65	7.72	-53.93	-13.00	40.93
			16QAM	1 657.24	H	-56.03	4.53	-51.50	-13.00	38.50
				2 485.99	H	-62.27	4.14	-58.13	-13.00	45.13
				4 143.36	V	-62.37	7.72	-54.65	-13.00	41.65
			64QAM	1 657.24	H	-57.13	4.53	-52.60	-13.00	39.60
				2 485.98	H	-63.26	4.14	-59.12	-13.00	46.12
				4 143.22	V	-63.81	7.72	-56.09	-13.00	43.09
	836.5	1/0	QPSK	1 668.65	H	-55.27	4.54	-50.73	-13.00	37.73
				2 502.97	H	-61.98	4.13	-57.85	-13.00	44.85
				4 171.76	V	-56.85	7.73	-49.12	-13.00	36.12
			16QAM	1 668.65	H	-56.07	4.54	-51.53	-13.00	38.53
				2 503.22	H	-62.48	4.13	-58.35	-13.00	45.35
				4 171.60	V	-56.17	7.73	-48.44	-13.00	35.44
			64QAM	1 668.65	H	-56.71	4.54	-52.17	-13.00	39.17
				2 503.00	H	-63.21	4.13	-59.08	-13.00	46.08
				4 171.62	V	-57.69	7.73	-49.96	-13.00	36.96
	846.5	1/0	QPSK	1 688.55	H	-54.58	4.57	-50.01	-13.00	37.01
				2 533.14	H	-61.70	4.18	-57.52	-13.00	44.52
				4 221.79	V	-56.94	7.78	-49.16	-13.00	36.16
			16QAM	1 688.55	H	-56.29	4.57	-51.72	-13.00	38.72
				2 533.03	H	-62.12	4.18	-57.94	-13.00	44.94
				4 221.78	V	-57.18	7.78	-49.40	-13.00	36.40
			64QAM	1 688.55	H	-57.34	4.57	-52.77	-13.00	39.77
				2 532.99	H	-63.04	4.18	-58.86	-13.00	45.86
				4 221.82	V	-57.97	7.78	-50.19	-13.00	37.19

<Test case: ANT 2>

Channel Bandwidth (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBd)	Result (dBm)	Limit (dBm)	Margin (dB)
5	826.5	1/12	QPSK	1 657.15	H	-54.39	4.53	-49.86	-13.00	36.86
				2 486.10	H	-60.85	4.14	-56.71	-13.00	43.71
				4 143.34	V	-62.42	7.72	-54.70	-13.00	41.70
			16QAM	1 657.34	H	-54.67	4.53	-50.14	-13.00	37.14
				2 486.14	H	-61.26	4.14	-57.12	-13.00	44.12
				4 143.34	V	-63.66	7.72	-55.94	-13.00	42.94
			64QAM	1 657.44	H	-56.08	4.53	-51.55	-13.00	38.55
				2 485.89	H	-61.83	4.14	-57.69	-13.00	44.69
				4 143.34	V	-64.48	7.72	-56.76	-13.00	43.76
	836.5	1/0	QPSK	1 668.68	H	-57.24	4.54	-52.70	-13.00	39.70
				2 503.05	H	-61.83	4.13	-57.70	-13.00	44.70
				4 171.71	V	-56.03	7.73	-48.30	-13.00	35.30
			16QAM	1 688.71	H	-57.94	4.57	-53.37	-13.00	40.37
				2 503.11	H	-62.70	4.13	-58.57	-13.00	45.57
				4 171.67	V	-56.30	7.73	-48.57	-13.00	35.57
			64QAM	1 668.60	H	-59.40	4.54	-54.86	-13.00	41.86
				2 503.11	H	-64.10	4.13	-59.97	-13.00	46.97
				4 171.47	V	-57.64	7.73	-49.91	-13.00	36.91
	846.5	1/0	QPSK	1 688.59	H	-57.48	4.57	-52.91	-13.00	39.91
				2 532.87	H	-61.34	4.18	-57.16	-13.00	44.16
				4 221.98	V	-57.98	7.78	-50.20	-13.00	37.20
			16QAM	1 688.49	H	-57.90	4.57	-53.33	-13.00	40.33
				2 533.15	H	-61.75	4.18	-57.57	-13.00	44.57
				4 221.98	V	-59.60	7.78	-51.82	-13.00	38.82
			64QAM	1 688.57	H	-59.80	4.57	-55.23	-13.00	42.23
				2 533.13	H	-63.08	4.18	-58.90	-13.00	45.90
				4 221.98	V	-59.84	7.78	-52.06	-13.00	39.06

7.7.4. LTE Band 66(4)

<Test case: ANT 1>

Channel Bandwidth (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBi)	Result (dBm)	Limit (dBm)	Margin (dB)
20	1 720.0	1/0	QPSK	3 422.33	H	-64.33	7.99	-56.34	-13.00	43.34
				5 133.20	H	-65.38	9.87	-55.51	-13.00	42.51
				6 844.31	V	-65.35	11.21	-54.14	-13.00	41.14
			16QAM	3 422.40	H	-63.96	7.99	-55.97	-13.00	42.97
				5 133.07	H	-65.18	9.87	-55.31	-13.00	42.31
				6 844.18	V	-66.11	11.21	-54.90	-13.00	41.90
			64QAM	3 422.49	H	-64.80	7.99	-56.81	-13.00	43.81
				5 133.38	H	-65.85	9.87	-55.98	-13.00	42.98
				6 844.42	V	-66.16	11.21	-54.95	-13.00	41.95
	1 745	1/0	QPSK	3 472.31	H	-63.89	8.14	-55.75	-13.00	42.75
				5 208.24	H	-66.62	9.92	-56.70	-13.00	43.70
				6 944.31	V	-64.87	11.33	-53.54	-13.00	40.54
			16QAM	3 472.24	H	-64.60	8.14	-56.46	-13.00	43.46
				5 208.18	H	-66.08	9.92	-56.16	-13.00	43.16
				6 944.46	V	-65.21	11.33	-53.88	-13.00	40.88
			64QAM	3 472.33	H	-64.92	8.14	-56.78	-13.00	43.78
				5 208.47	H	-65.90	9.92	-55.98	-13.00	42.98
				6 944.43	V	-65.58	11.33	-54.25	-13.00	41.25
	1 770	1/0	QPSK	3 522.05	H	-61.86	8.24	-53.62	-13.00	40.62
				5 283.02	H	-65.74	9.96	-55.78	-13.00	42.78
				7 043.93	V	-64.88	11.47	-53.41	-13.00	40.41
			16QAM	3 521.93	H	-61.83	8.24	-53.59	-13.00	40.59
				5 283.11	H	-65.89	9.96	-55.93	-13.00	42.93
				7 043.98	V	-64.93	11.47	-53.46	-13.00	40.46
			64QAM	3 522.06	H	-62.45	8.24	-54.21	-13.00	41.21
				5 283.34	H	-66.29	9.96	-56.33	-13.00	43.33
				7 043.83	V	-65.02	11.47	-53.55	-13.00	40.55

<Test case: ANT 2>

Channel Bandwidth (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBi)	Result (dBm)	Limit (dBm)	Margin (dB)
20	1 720.0	1/0	QPSK	3 422.19	H	-63.30	7.99	-55.31	-13.00	42.31
				5 133.18	H	-65.85	9.87	-55.98	-13.00	42.98
				6 844.42	V	-64.89	11.21	-53.68	-13.00	40.68
			16QAM	3 422.19	H	-63.41	7.99	-55.42	-13.00	42.42
				5 133.56	H	-65.95	9.87	-56.08	-13.00	43.08
				6 844.38	V	-65.03	11.21	-53.82	-13.00	40.82
			64QAM	3 422.19	H	-63.69	7.99	-55.70	-13.00	42.70
				5 133.10	H	-66.53	9.87	-56.66	-13.00	43.66
				6 844.39	V	-65.66	11.21	-54.45	-13.00	41.45

7.7.5. LTE Band 2

<Test case: ANT 1>

Channel Bandwidth (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBi)	Result (dBm)	Limit (dBm)	Margin (dB)
20	1 860	1/50	QPSK	3 720.13	H	-50.05	8.22	-41.83	-13.00	28.83
				5 580.33	H	-64.36	10.19	-54.17	-13.00	41.17
				7 440.28	V	-66.05	11.93	-54.12	-13.00	41.12
			16QAM	3 720.14	H	-50.72	8.22	-42.50	-13.00	29.49
				5 580.30	H	-64.75	10.19	-54.56	-13.00	41.56
				7 441.01	V	-66.08	11.93	-54.15	-13.00	41.15
			64QAM	3 720.42	H	-51.81	8.22	-43.59	-13.00	30.59
				5 580.09	H	-65.14	10.19	-54.95	-13.00	41.95
				7 440.70	V	-66.02	11.93	-54.09	-13.00	41.09
	1 880	1/0	QPSK	3 742.24	H	-55.72	8.24	-47.48	-13.00	34.48
				5 613.21	H	-62.14	10.21	-51.93	-13.00	38.92
				7 484.63	V	-65.55	11.97	-53.58	-13.00	40.58
			16QAM	3 742.26	H	-56.12	8.24	-47.88	-13.00	34.88
				5 613.31	H	-62.93	10.21	-52.72	-13.00	39.72
				7 484.81	V	-65.61	11.97	-53.64	-13.00	40.64
			64QAM	3 742.23	H	-56.61	8.24	-48.37	-13.00	35.37
				5 613.33	H	-63.81	10.21	-53.60	-13.00	40.60
				7 484.47	V	-65.77	11.97	-53.80	-13.00	40.80
	1 900	1/50	QPSK	3 800.08	H	-50.72	8.37	-42.35	-13.00	29.35
				5 700.31	H	-63.63	10.34	-53.29	-13.00	40.29
				7 600.54	V	-65.69	12.08	-53.61	-13.00	40.61
			16QAM	3 800.21	H	-50.99	8.37	-42.62	-13.00	29.62
				5 700.43	H	-63.91	10.34	-53.57	-13.00	40.57
				7 599.85	V	-65.63	12.08	-53.55	-13.00	40.55
			64QAM	3 800.09	H	-52.54	8.37	-44.17	-13.00	31.17
				5 700.30	H	-64.39	10.34	-54.05	-13.00	41.05
				7 611.17	V	-65.87	12.09	-53.78	-13.00	40.78
15	1 857.5	1/36	QPSK	3 714.59	H	-49.27	8.22	-41.05	-13.00	28.05
				5 572.00	H	-64.61	10.18	-54.43	-13.00	41.43
				7 429.02	V	-65.69	11.93	-53.76	-13.00	40.76
			16QAM	3 714.58	H	-49.90	8.22	-41.68	-13.00	28.68
				5 571.98	H	-64.78	10.18	-54.59	-13.00	41.59
				7 429.28	V	-65.81	11.93	-53.88	-13.00	40.88
			64QAM	3 714.58	H	-50.48	8.22	-42.26	-13.00	29.26
				5 572.16	H	-65.31	10.18	-55.13	-13.00	42.13
				7 429.46	V	-66.19	11.93	-54.26	-13.00	41.26

<Test case: ANT 2>

Channel Bandwidth (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBi)	Result (dBm)	Limit (dBm)	Margin (dB)
15	1 857.5	1/36	QPSK	3 714.62	H	-50.21	8.22	-41.99	-13.00	28.99
				5 571.85	H	-64.21	10.18	-54.03	-13.00	41.03
				7 429.87	V	-66.00	11.93	-54.07	-13.00	41.07
			16QAM	3 714.62	H	-51.10	8.22	-42.88	-13.00	29.88
				5 571.85	H	-64.52	10.18	-54.34	-13.00	41.34
				7 429.87	V	-66.54	11.93	-54.61	-13.00	41.61
			64QAM	3 714.62	H	-52.38	8.22	-44.16	-13.00	31.16
				5 571.85	H	-65.10	10.18	-54.92	-13.00	41.92
				7 429.87	V	-67.52	11.93	-55.59	-13.00	42.59

Intra Band ULCA(5B)

Band	Channel Bandwidth (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBd)	Substitute Antenna Gain(dBi)	Result (dBm)	Limit (dBm)	Margin (dB)
5	10+10	831.6, 841.5	1/49, 1/0	QPSK	1 671.87	H	-54.71	3.98	-	-50.73	-13.00	-37.73
					2 509.09	H	-59.79	3.57	-	-56.22	-13.00	-43.22
					4 181.17	V	-58.25	7.10	-	-51.15	-13.00	-38.15

Inter Band CA(PCC: 2A, SCC: 5A)

Band	Channel Bandwidth (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBd)	Substitute Antenna Gain(dBi)	Result (dBm)	Limit (dBm)	Margin (dB)
2	15	1 857.5	1/36	QPSK	3 714.65	H	-51.41	-	8.22	-43.19	-13.00	30.19
					5 571.94	H	-62.63	-	10.18	-52.45	-13.00	39.45
					7 429.16	V	-66.18	-	11.93	-54.25	-13.00	41.25
5	5	836.5	1/0	QPSK	1 668.65	H	-57.10	4.54	-	-52.56	-13.00	39.56
					2 503.25	H	-64.24	4.13	-	-60.11	-13.00	47.11
					4 171.63	V	-65.14	7.73	-	-57.41	-13.00	44.41

Inter Band CA(PCC: 2A, SCC: 12A)

Band	Channel Bandwidth (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBd)	Substitute Antenna Gain(dBi)	Result (dBm)	Limit (dBm)	Margin (dB)
2	15	1 857.5	1/36	QPSK	3 714.75	H	-50.85	-	8.22	-42.63	-13.00	29.63
					5 572.04	H	-62.83	-	10.18	-52.65	-13.00	39.65
					7 429.35	V	-65.89	-	11.93	-53.96	-13.00	40.96
12	5	713.5	1/12	QPSK	1 427.02	H	-54.54	3.31	-	-51.23	-13.00	38.23
					2 140.89	H	-66.53	3.32	-	-63.21	-13.00	50.21
					4 285.72	H	-67.79	7.77	-	-60.02	-13.00	47.02

Inter Band CA(PCC: 2A, SCC: 14A)

Band	Channel Bandwidth (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBd)	Substitute Antenna Gain(dBi)	Result (dBm)	Limit (dBm)	Margin (dB)
2	15	1 857.5	1/36	QPSK	3 714.62	H	-51.13	-	8.22	-42.91	-13.00	29.91
					5572.09	H	-63.81	-	10.18	-53.63	-13.00	40.63
					7 429.77	V	-66.70	-	11.93	-54.77	-13.00	41.77
14	10	793	1/0	QPSK	1 577.26	H	-54.98	-	5.93	-49.05	-40.00	9.05
					2 365.69	V	-65.47	3.69	-	-61.78	-13.00	48.78
					3 943.15	H	-65.78	6.67	-	-59.11	-13.00	46.11

Inter Band CA(PCC: 5A, SCC: 66A)

Band	Channel Bandwidth (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBd)	Substitute Antenna Gain(dBi)	Result (dBm)	Limit (dBm)	Margin (dB)
5	5	836.5	1/0	QPSK	1 668.69	H	-52.64	4.54	-	-48.10	-13.00	35.10
					2 503.01	H	-62.22	4.13	-	-58.09	-13.00	45.09
					4 171.65	V	-57.21	7.73	-	-49.48	-13.00	36.48
66	20	1 720	1/0	QPSK	3 422.10	H	-65.49	-	7.99	-57.50	-13.00	44.50
					5 133.35	H	-67.69	-	9.87	-57.82	-13.00	44.82
					6 844.62	H	-67.38	-	11.21	-56.17	-13.00	43.17

Inter Band CA(PCC: 12A, SCC: 66A)

Band	Channel Bandwidth (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBd)	Substitute Antenna Gain(dBi)	Result (dBm)	Limit (dBm)	Margin (dB)
12	5	713.5	1/12	QPSK	1 426.91	H	-42.78	3.31	-	-39.47	-13.00	26.47
					2 140.34	H	-64.16	3.32	-	-60.84	-13.00	47.84
					4 280.84	H	-61.69	7.78	-	-53.91	-13.00	40.91
66	20	1 720	1/0	QPSK	3 421.81	H	-65.49	-	7.99	-57.50	-13.00	44.50
					5 133.19	H	-67.73	-	9.87	-57.86	-13.00	44.86
					6 845.92	V	-67.52	-	11.21	-56.31	-13.00	43.31

Inter Band CA(PCC: 14A, SCC: 66A)

Band	Channel Bandwidth (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBd)	Substitute Antenna Gain(dBi)	Result (dBm)	Limit (dBm)	Margin (dB)
14	5	793	1/0	QPSK	1 577.21	H	-50.84	-	5.93	-44.91	-40.00	4.91
					2 365.66	V	-62.11	4.18	-	-57.93	-13.00	44.93
					3 942.92	H	-58.27	7.21	-	-51.06	-13.00	38.06
66	20	1 720	1/0	QPSK	3 422.14	H	-65.84	-	7.99	-57.85	-13.00	44.85
					5 133.49	H	-67.43	-	9.87	-57.56	-13.00	44.56
					6 843.07	V	-67.66	-	11.21	-56.45	-13.00	43.45

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 : 3.90 VDC

LIMIT(FCC&IC) : 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 %	3.90	+20(Ref)	707,499,997	-3	-0.0042	-0.000000424
100 %		-30	707,500,008	8	0.0113	0.000001131
100 %		-20	707,500,016	16	0.0226	0.000002261
100 %		-10	707,499,998	-2	-0.0028	-0.000000283
100 %		0	707,500,006	6	0.0085	0.000000848
100 %		+10	707,499,989	-11	-0.0155	-0.000001555
100 %		+20	707,499,997	-3	-0.0042	-0.000000424
100 %		+30	707,500,006	6	0.0085	0.000000848
100 %		+40	707,500,013	13	0.0184	0.000001837
100 %		+50	707,499,995	-5	-0.0071	-0.000000707
115 %	4.49	+20	707,500,012	12	0.0170	0.000001696
85 %	3.32	+20	707,499,997	-3	-0.0042	-0.000000424

7.8.2 LTE Band 14

OPERATING FREQUENCY : 793 MHz
 REFERENCE VOLTAGE : 3.90 VDC
 LIMIT(FCC) : $\pm 0.000125\%$ or 1.25 ppm
 LIMIT(IC) : 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 %	3.90	+20(Ref)	793,000,012	12	0.0151	0.000001513
100 %		-30	792,999,999	-1	-0.0013	-0.000000126
100 %		-20	793,000,006	6	0.0076	0.000000757
100 %		-10	793,000,011	11	0.0139	0.000001387
100 %		0	793,000,007	7	0.0088	0.000000883
100 %		+10	792,999,985	-15	-0.0189	-0.000001892
100 %		+20	793,000,012	12	0.0151	0.000001513
100 %		+30	793,000,002	2	0.0025	0.000000252
100 %		+40	793,000,009	9	0.0113	0.000001135
100 %		+50	792,999,994	-6	-0.0076	-0.000000757
115 %	4.49	+20	793,000,015	15	0.0189	0.000001892
85 %	3.32	+20	792,999,998	-2	-0.0025	-0.000000252

7.8.3. LTE Band 5

OPERATING FREQUENCY : 836.5 MHz
 REFERENCE VOLTAGE : 3.90 VDC
 LIMIT(FCC) : $\pm 0.00025\%$ or 2.5 ppm
 LIMIT(IC) : 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 %	3.90	+20(Ref)	836,500,001	1	0.0012	0.000000120
100 %		-30	836,499,994	-6	-0.0072	-0.000000717
100 %		-20	836,499,985	-15	-0.0179	-0.000001793
100 %		-10	836,500,002	2	0.0024	0.000000239
100 %		0	836,500,009	9	0.0108	0.000001076
100 %		+10	836,499,988	-12	-0.0143	-0.000001435
100 %		+20	836,500,001	1	0.0012	0.000000120
100 %		+30	836,500,006	6	0.0072	0.000000717
100 %		+40	836,499,995	-5	-0.0060	-0.000000598
100 %		+50	836,500,012	12	0.0143	0.000001435
115 %	4.49	+20	836,499,999	-1	-0.0012	-0.000000120
85 %	3.32	+20	836,500,013	13	0.0155	0.000001554

7.8.4. LTE Band 66(4)

OPERATING FREQUENCY : 1 745 MHz

REFERENCE VOLTAGE : 3.90 VDC

LIMIT(FCC&IC) : 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 %	3.90	+20(Ref)	1,745,000,002	2	0.0011	0.000000115
100 %		-30	1,744,999,997	-3	-0.0017	-0.000000172
100 %		-20	1,744,999,989	-11	-0.0063	-0.000000630
100 %		-10	1,745,000,002	2	0.0011	0.000000115
100 %		0	1,745,000,009	9	0.0052	0.000000516
100 %		+10	1,744,999,999	-1	-0.0006	-0.000000057
100 %		+20	1,745,000,002	2	0.0011	0.000000115
100 %		+30	1,745,000,006	6	0.0034	0.000000344
100 %		+40	1,744,999,984	-16	-0.0092	-0.000000917
100 %		+50	1,745,000,006	6	0.0034	0.000000344
115 %	4.49	+20	1,745,000,007	7	0.0040	0.000000401
85 %	3.32	+20	1,744,999,997	-3	-0.0017	-0.000000172

7.8.5. LTE Band 2

OPERATING FREQUENCY : 1 880 MHz
 REFERENCE VOLTAGE : 3.90 VDC
 LIMIT(FCC) : The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.
 LIMIT(IC) : $\pm 0.000\ 25\ %$ or 2.5 ppm

VOLTAGE (%)	POWER (V DC)	TEMP (°C)	FREQUENCY (Hz)	FREQ.Dev (Hz)	Deviation	
					(ppm)	(%)
100 %	3.90	+20(Ref)	1,880,000,011	11	0.0059	0.000000585
100 %		-30	1,879,999,999	-1	-0.0005	-0.000000053
100 %		-20	1,880,000,007	7	0.0037	0.000000372
100 %		-10	1,880,000,002	2	0.0011	0.000000106
100 %		0	1,879,999,984	-16	-0.0085	-0.000000851
100 %		+10	1,880,000,002	2	0.0011	0.000000106
100 %		+20	1,880,000,011	11	0.0059	0.000000585
100 %		+30	1,880,000,005	5	0.0027	0.000000266
100 %		+40	1,879,999,993	-7	-0.0037	-0.000000372
100 %		+50	1,880,000,008	8	0.0043	0.000000426
115 %	4.49	+20	1,879,999,995	-5	-0.0027	-0.000000266
BATT.ENDPOINT	3.32	+20	1,880,000,007	7	0.0037	0.000000372

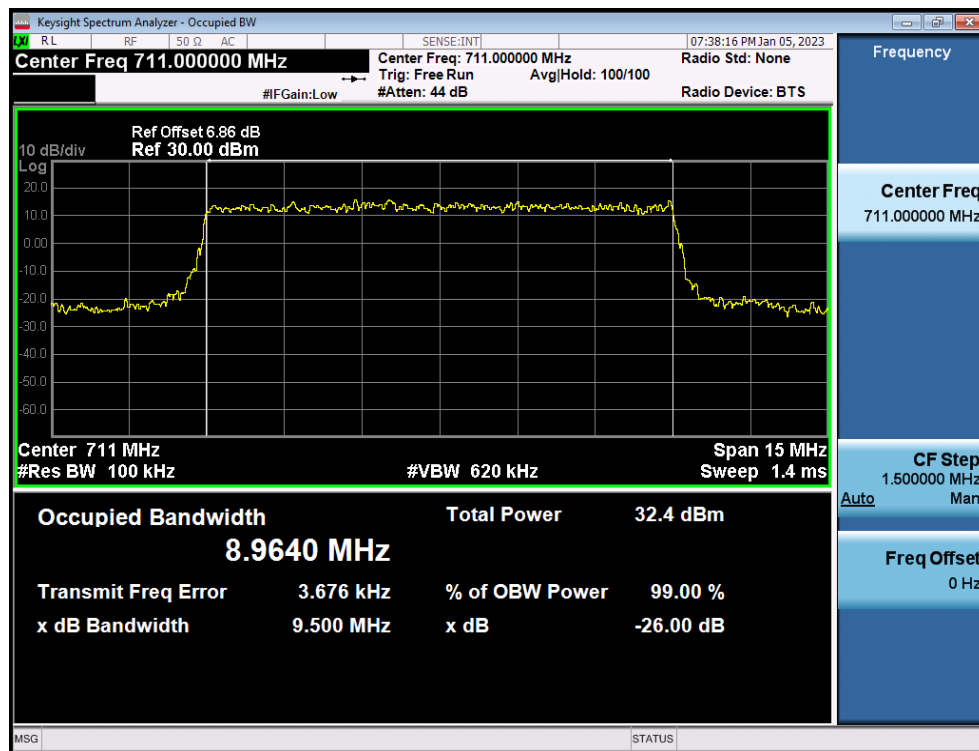
8. TEST PLOTS

- Test Notes:

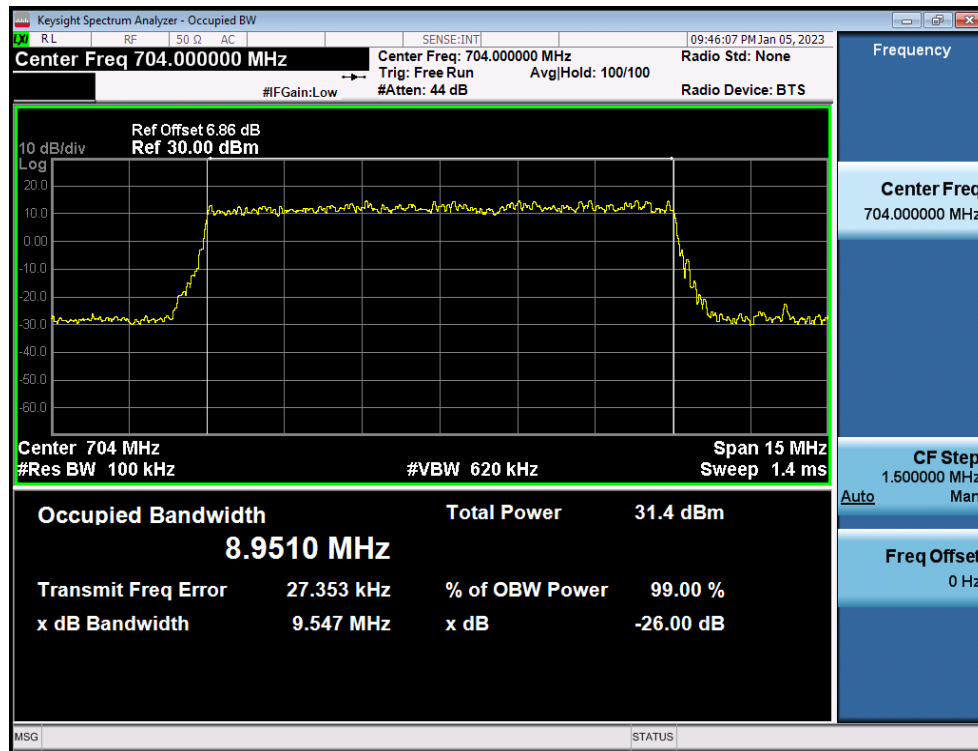
All bandwidths, RB configurations, and modulations were investigated.
The worst case test results are reported.

8.1. OCCUPIED BANDWIDTH

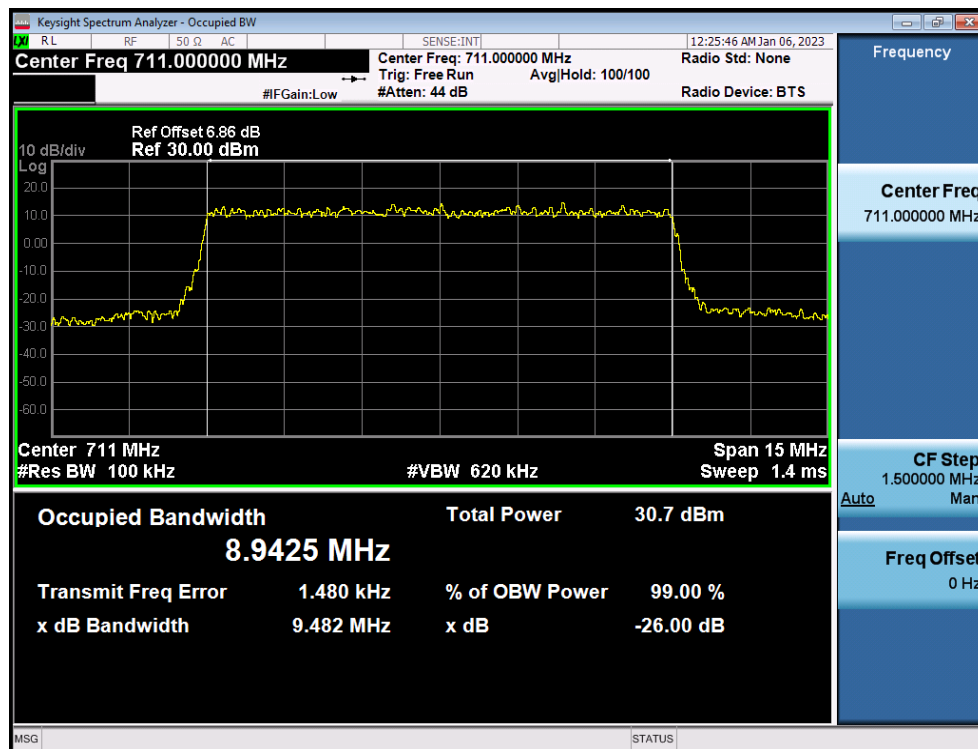
8.1.1. LTE Band 12



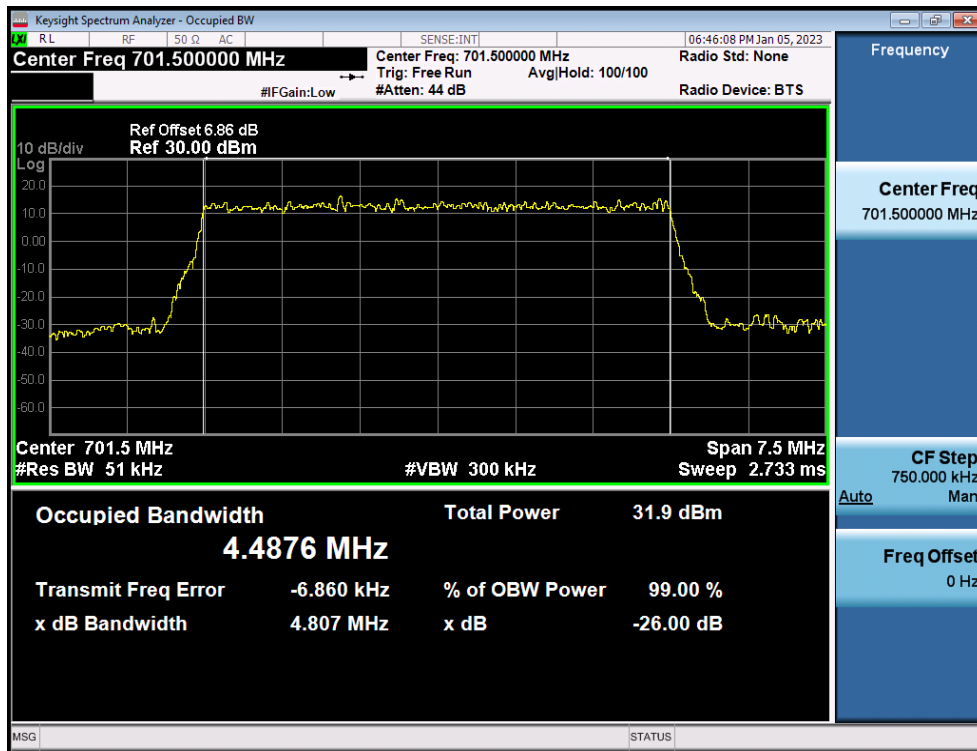
LTE Band 12 / 10MHz / QPSK - RB Size 50



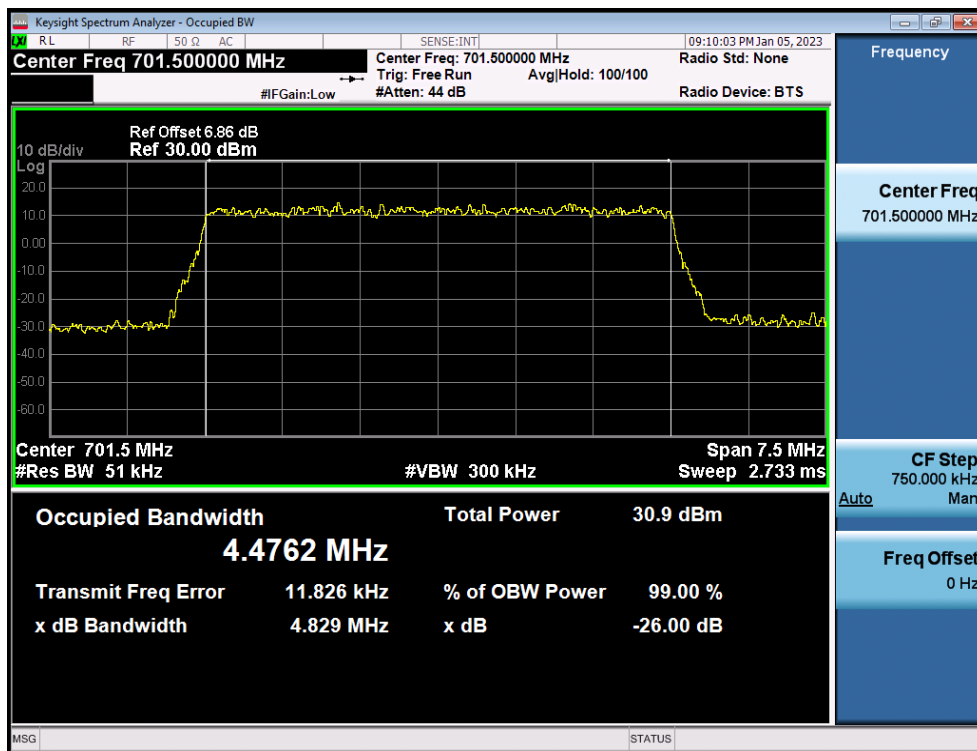
LTE Band 12 / 10MHz / 16QAM - RB Size 50



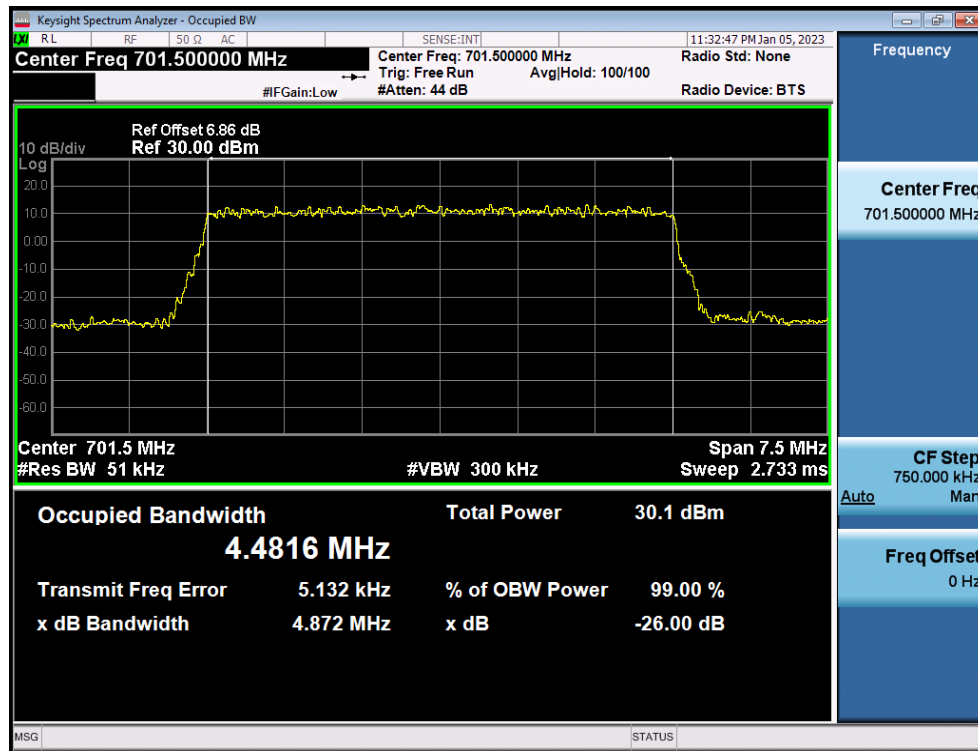
LTE Band 12 / 10MHz / 64QAM - RB Size 50



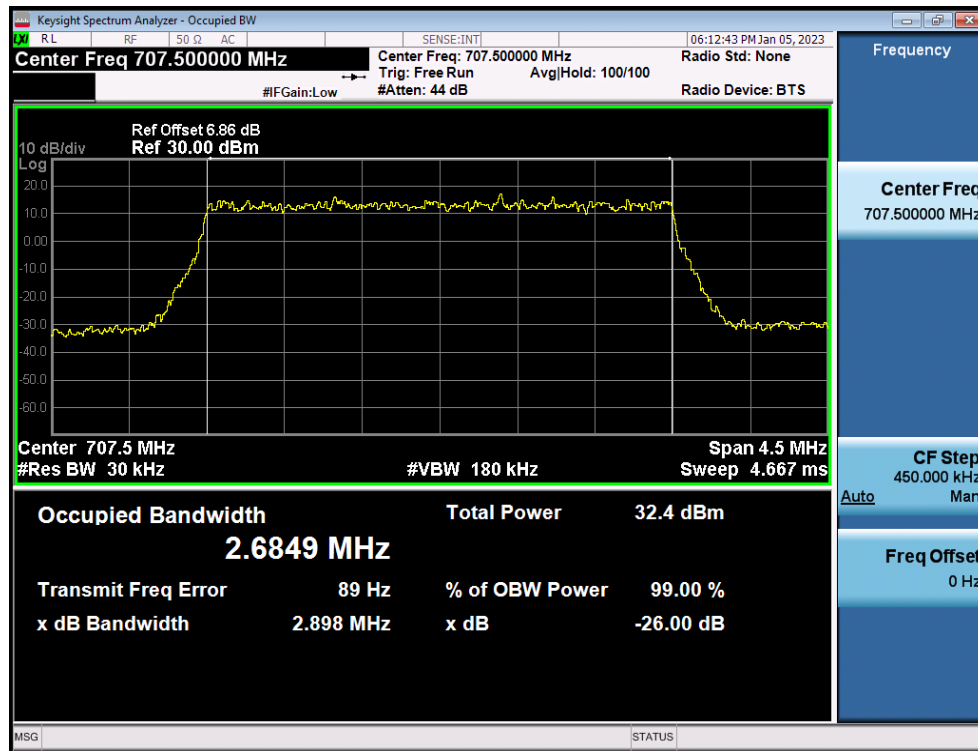
LTE Band 12 / 5MHz / QPSK - RB Size 25



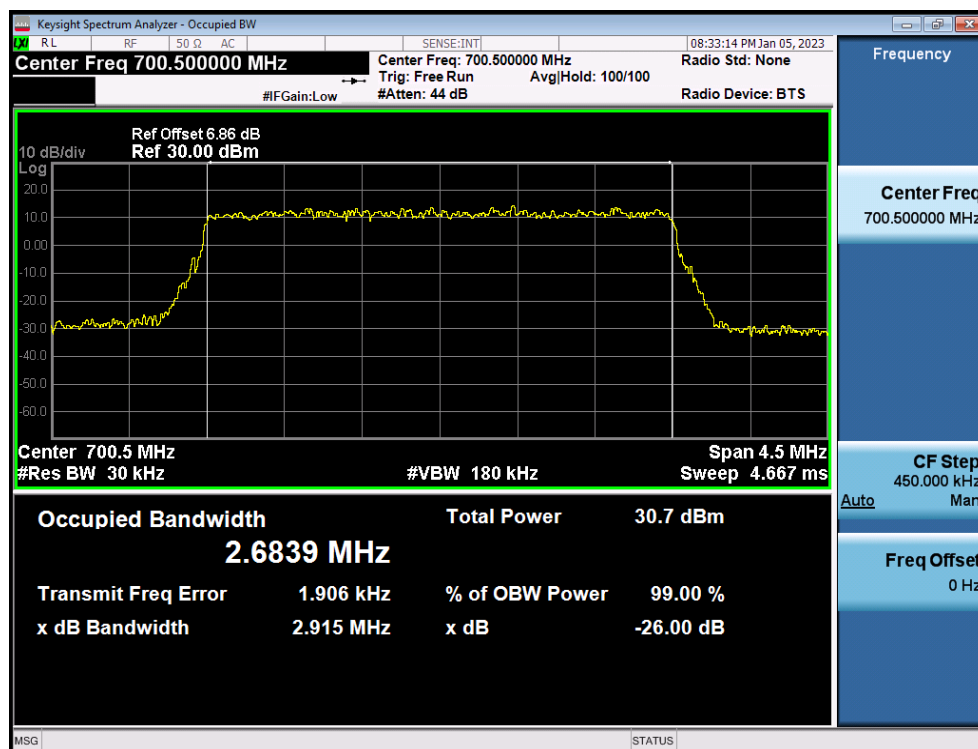
LTE Band 12 / 5MHz / 16QAM - RB Size 25



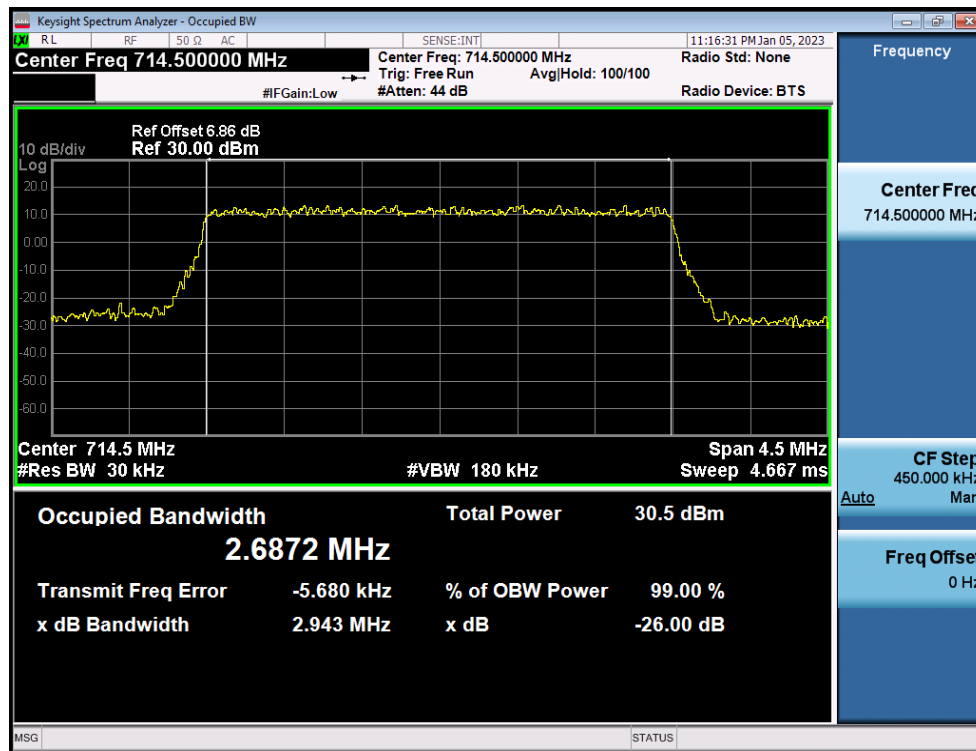
LTE Band 12 / 5MHz / 64QAM - RB Size 25



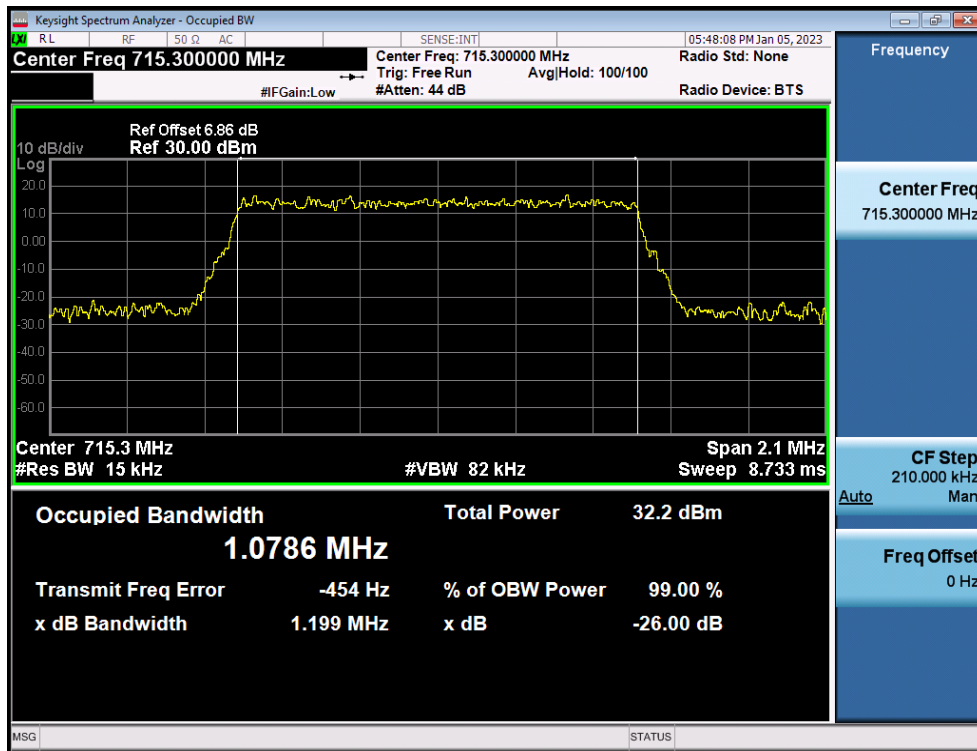
LTE Band 12 / 3MHz / QPSK - RB Size 15



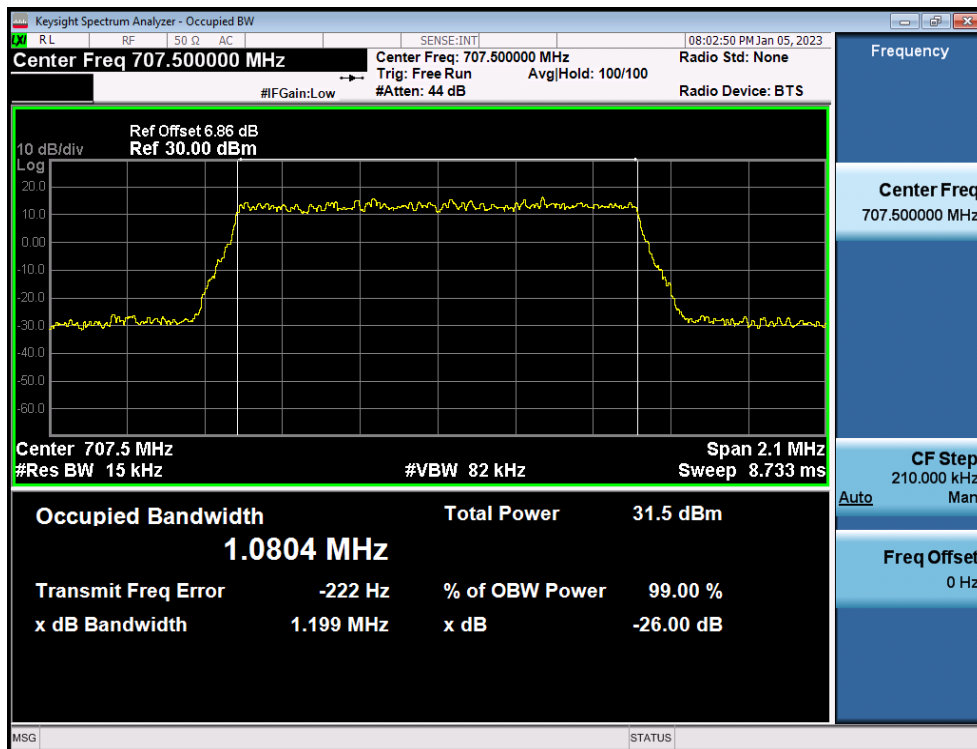
LTE Band 12 / 3MHz / 16QAM - RB Size 15



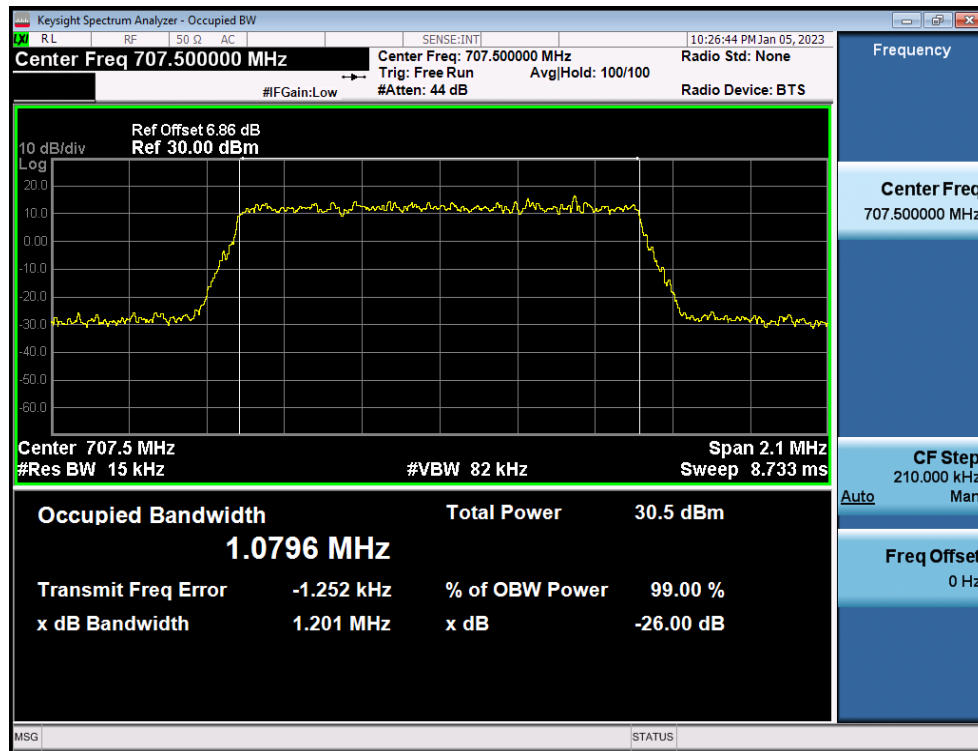
LTE Band 12 / 3MHz / 64QAM - RB Size 15



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

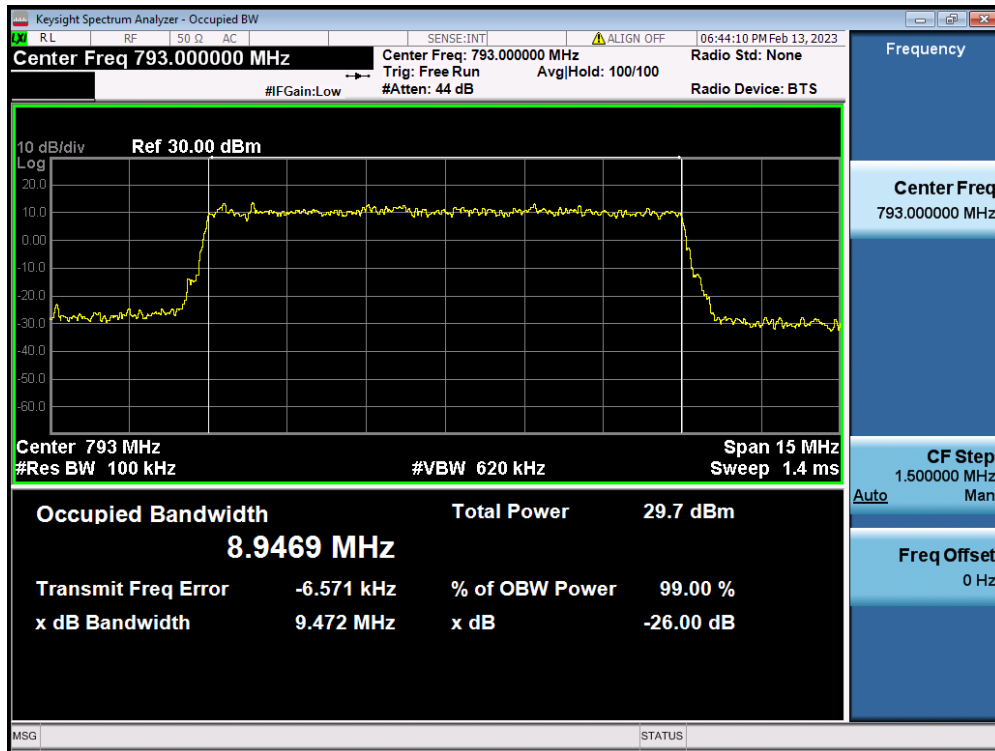


LTE Band 12 / 1.4MHz / 16QAM - RB Size 6

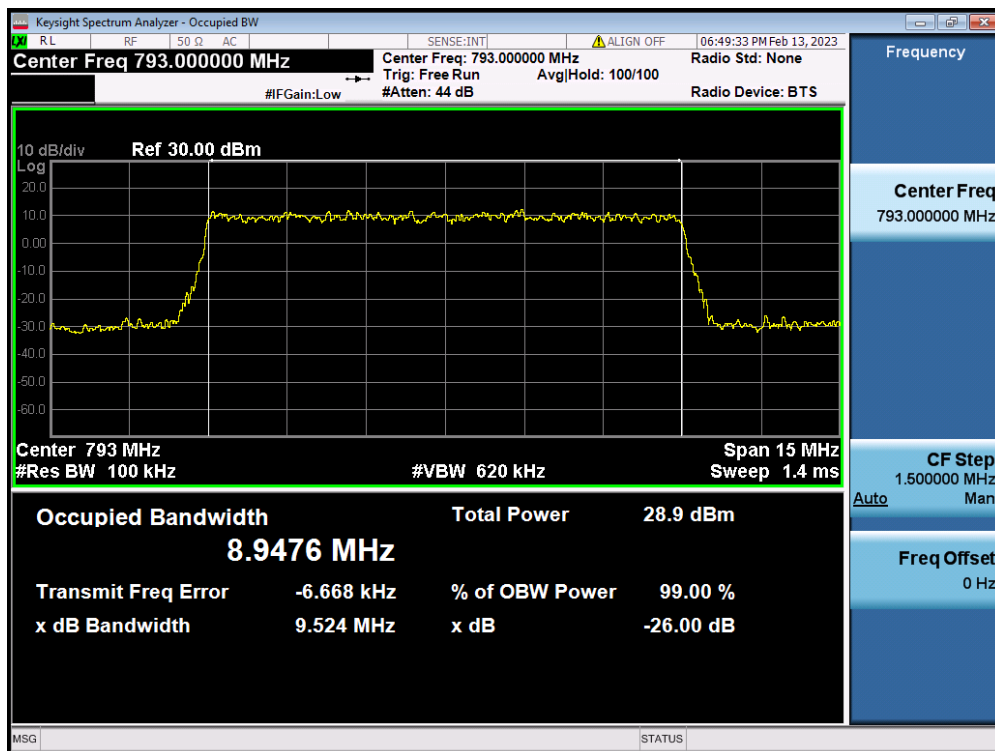


LTE Band 12 / 1.4MHz / 64QAM - RB Size 6

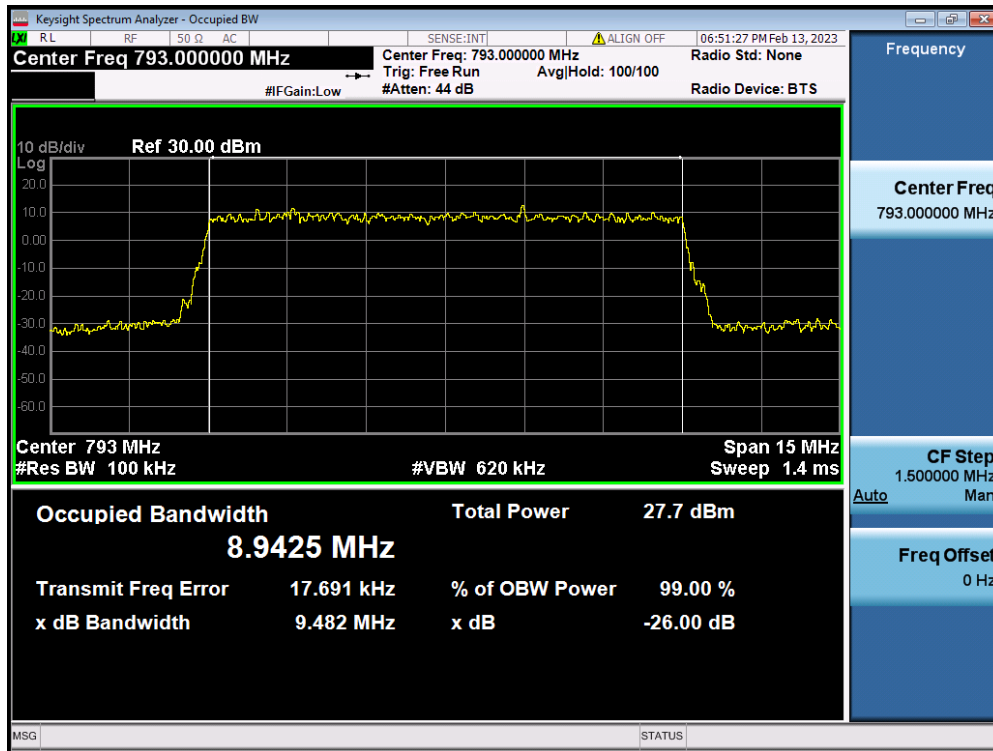
8.1.2. LTE Band 14



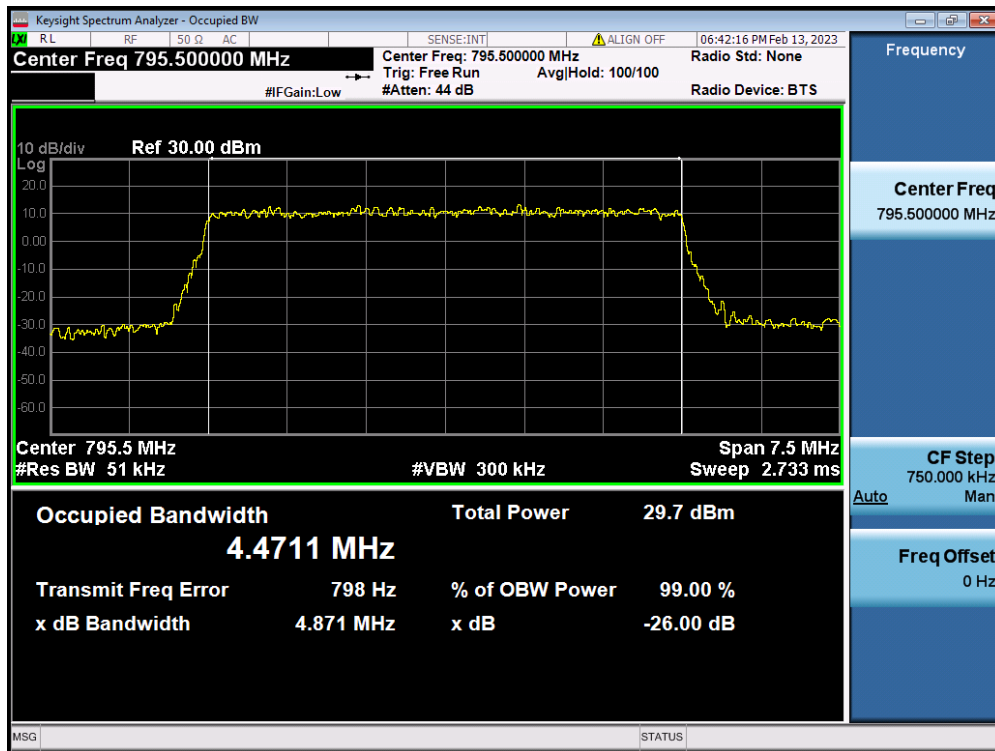
LTE Band 14 / 10MHz / QPSK - RB Size 50



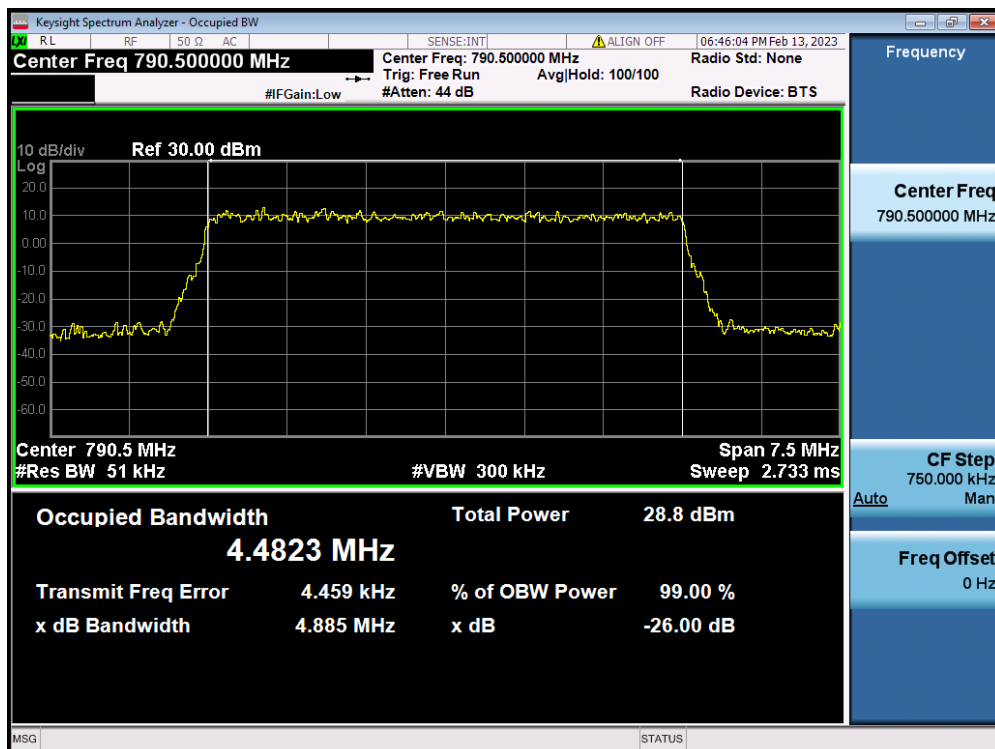
LTE Band 14 / 10MHz / 16QAM - RB Size 50



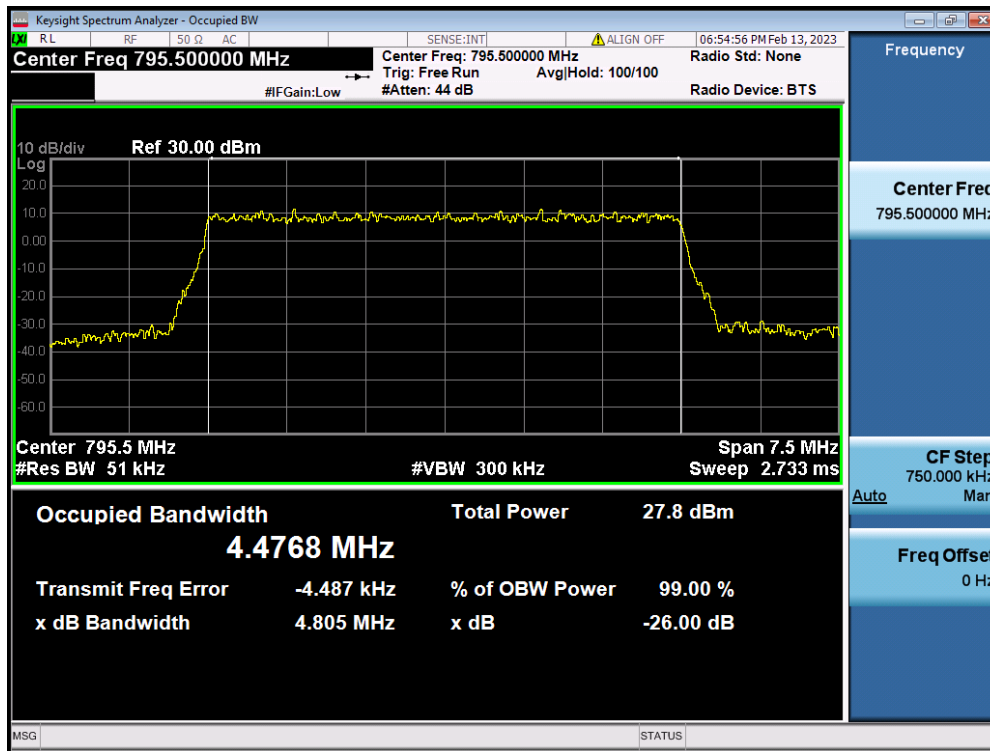
LTE Band 14 / 10MHz / 64QAM - RB Size 50



LTE Band 14 / 5MHz / QPSK - RB Size 25

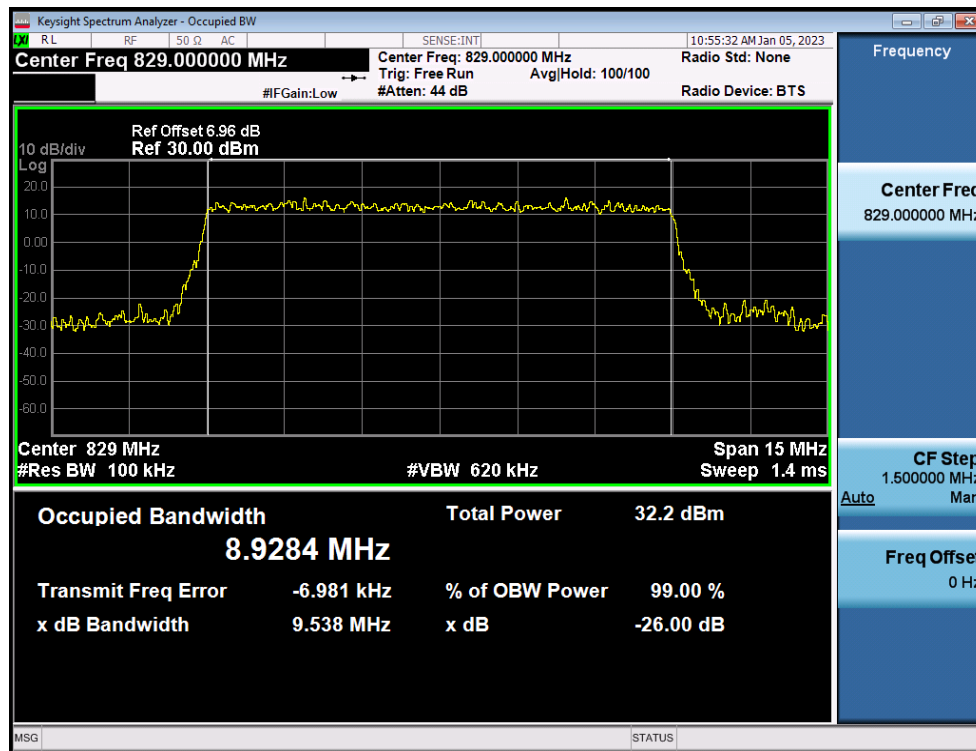


LTE Band 14 / 5MHz / 16QAM - RB Size 25

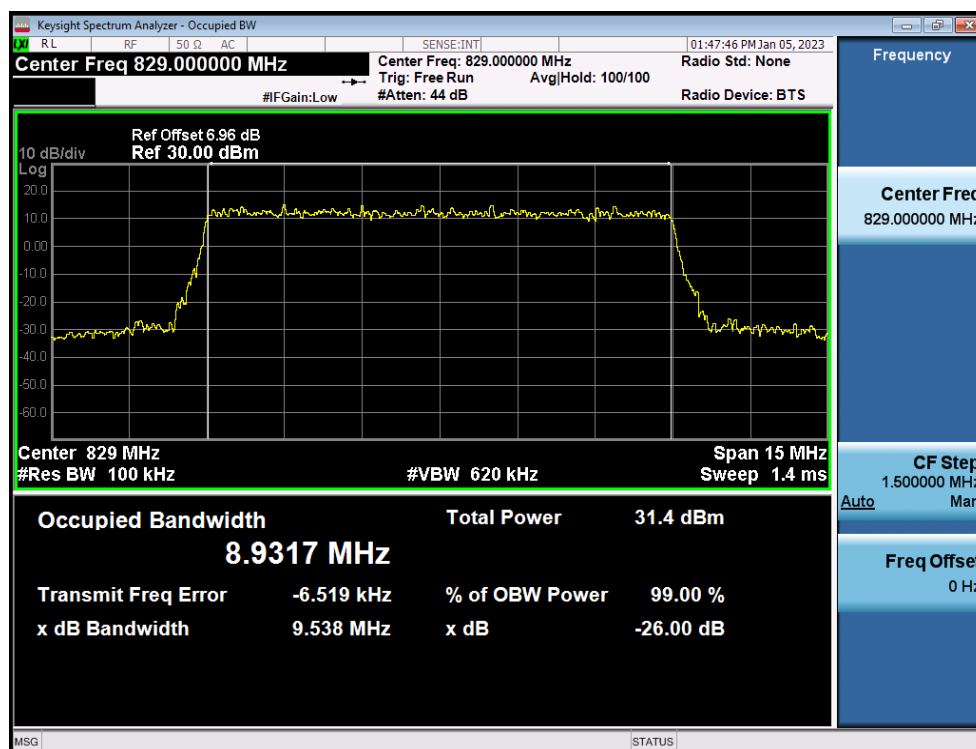


LTE Band 14 / 5MHz / 64QAM - RB Size 25

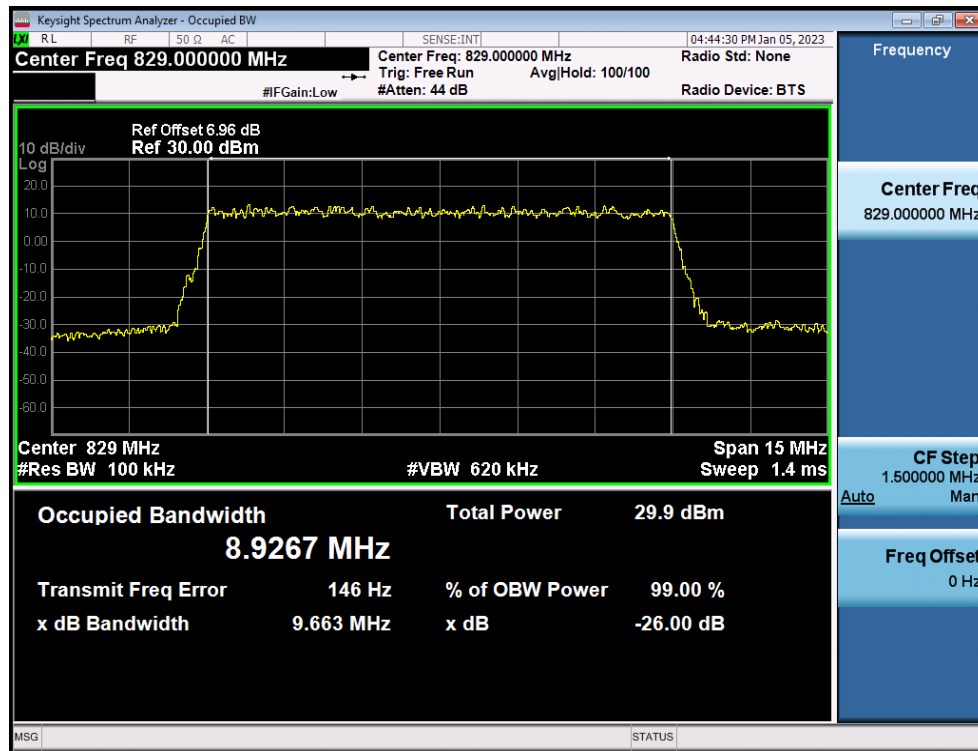
8.1.3. LTE Band 5



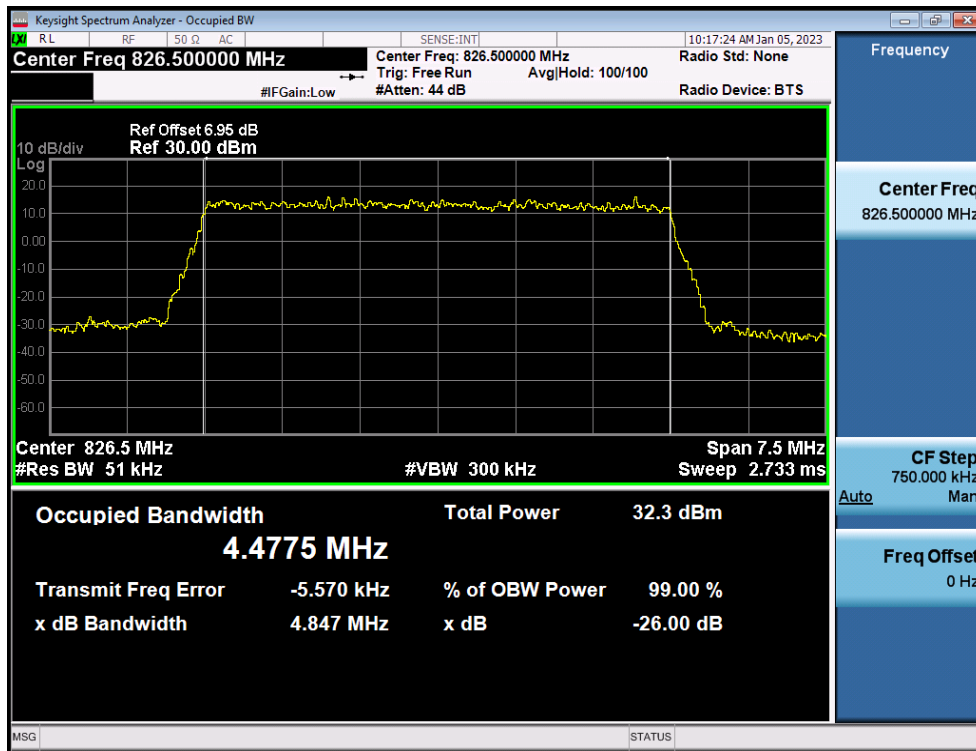
LTE Band 5 / 10MHz / QPSK - RB Size 50



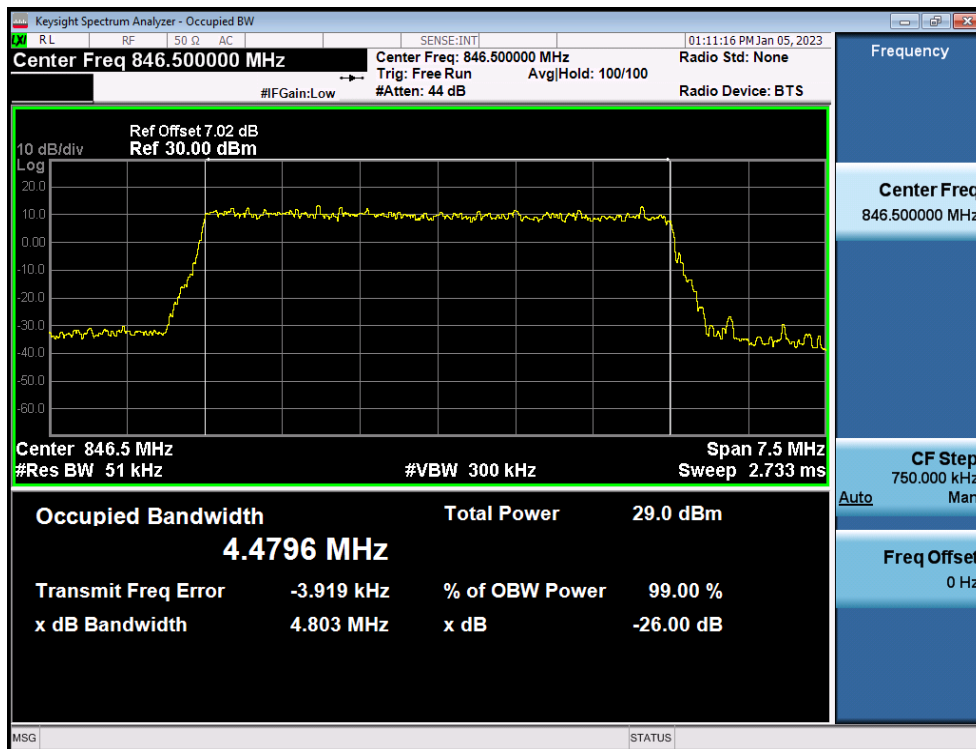
LTE Band 5 / 10MHz / 16QAM - RB Size 50



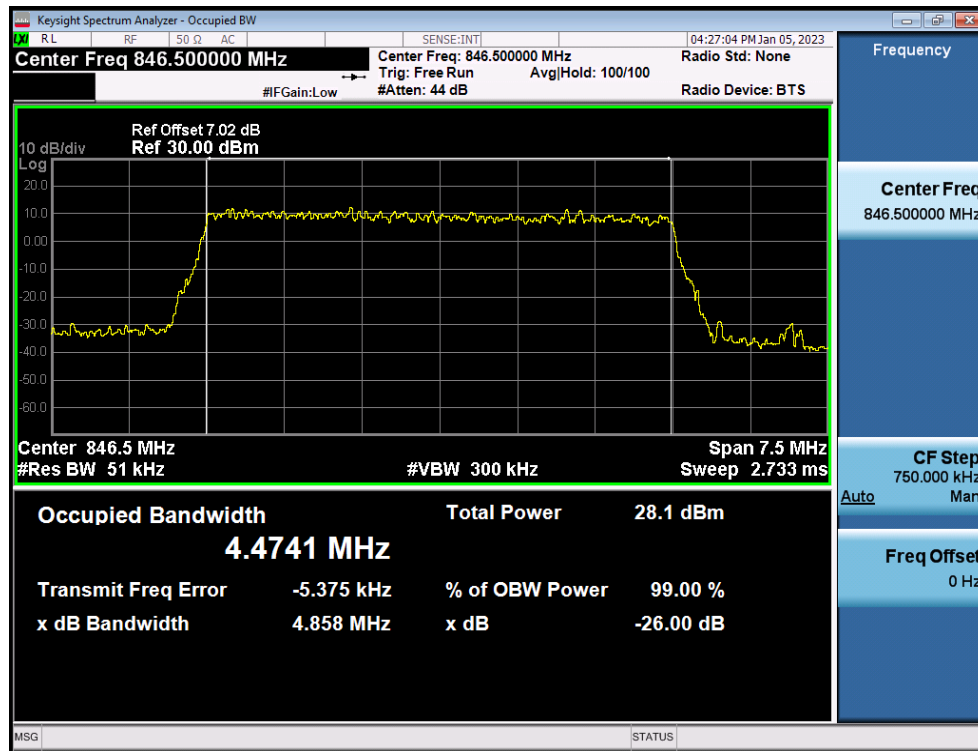
LTE Band 5 / 10MHz / 64QAM - RB Size 50



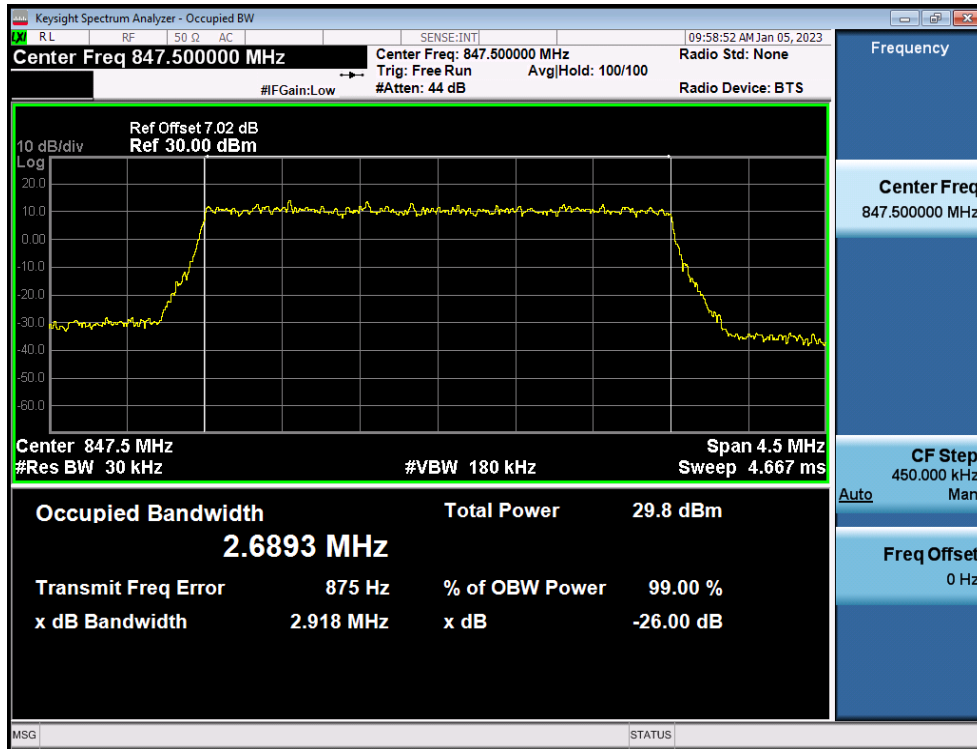
LTE Band 5 / 5MHz / QPSK - RB Size 25



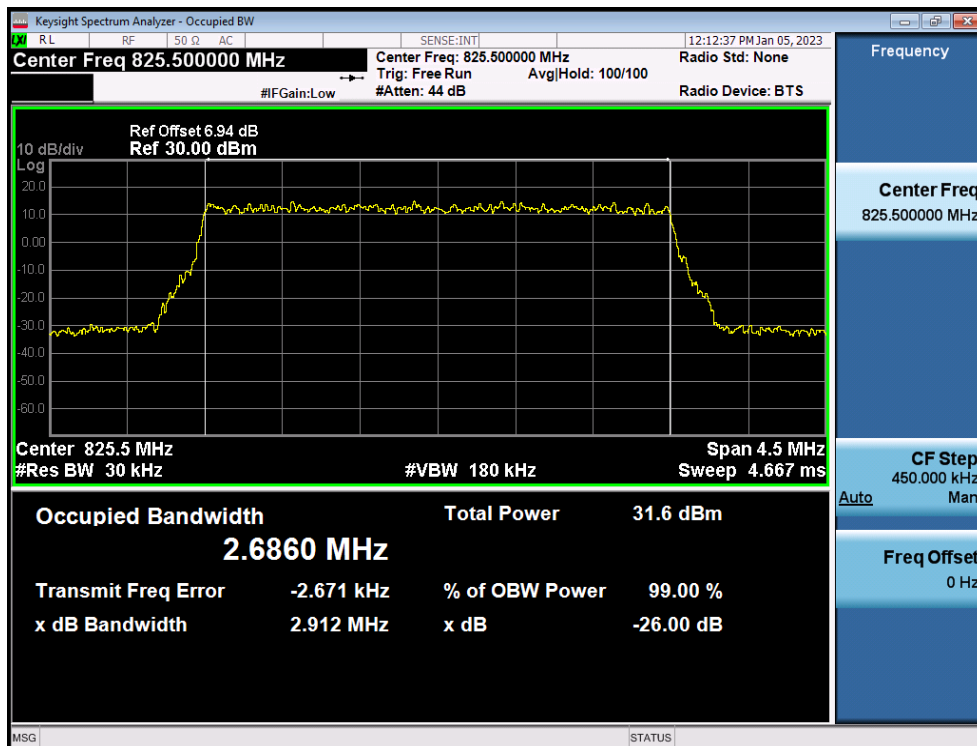
LTE Band 5 / 5MHz / 16QAM - RB Size 25



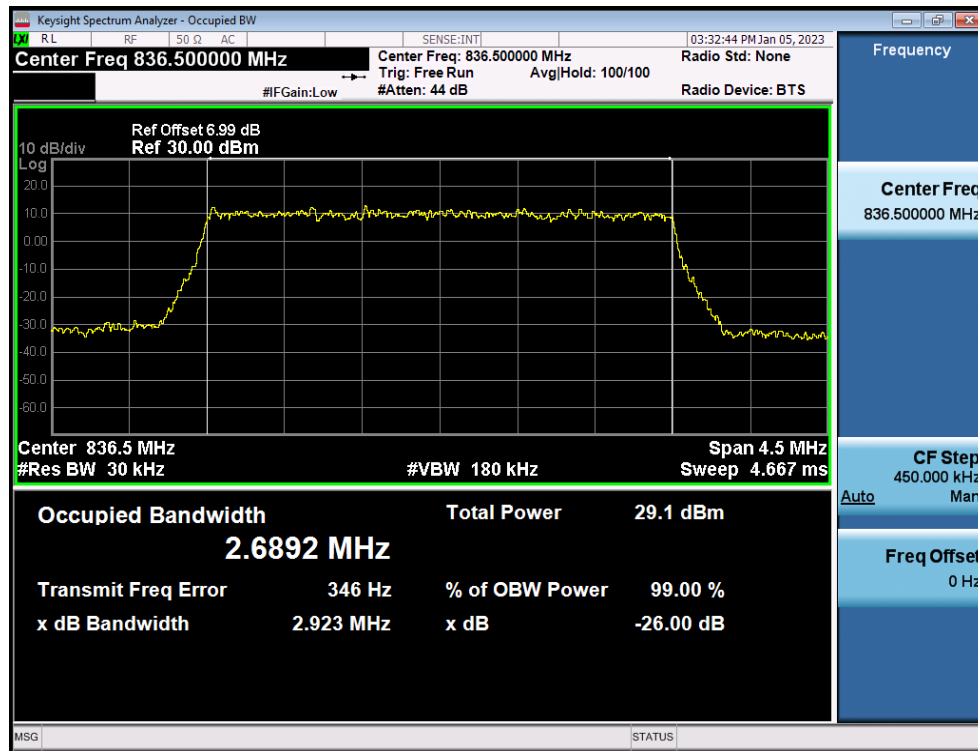
LTE Band 5 / 5MHz / 64QAM - RB Size 25



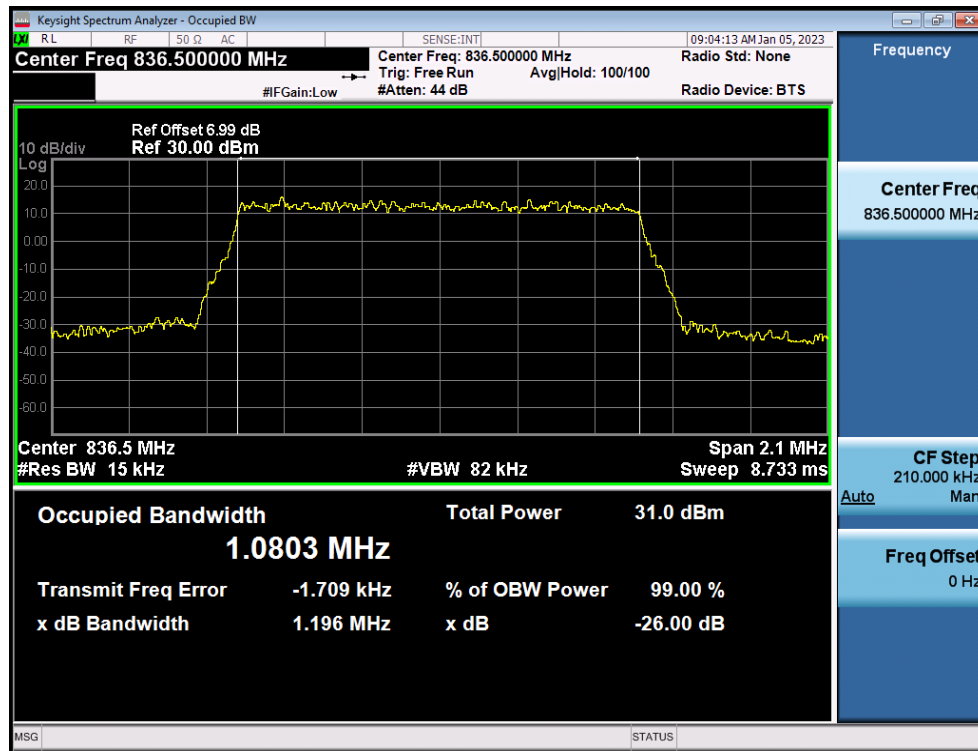
LTE Band 5 / 3MHz / QPSK - RB Size 15



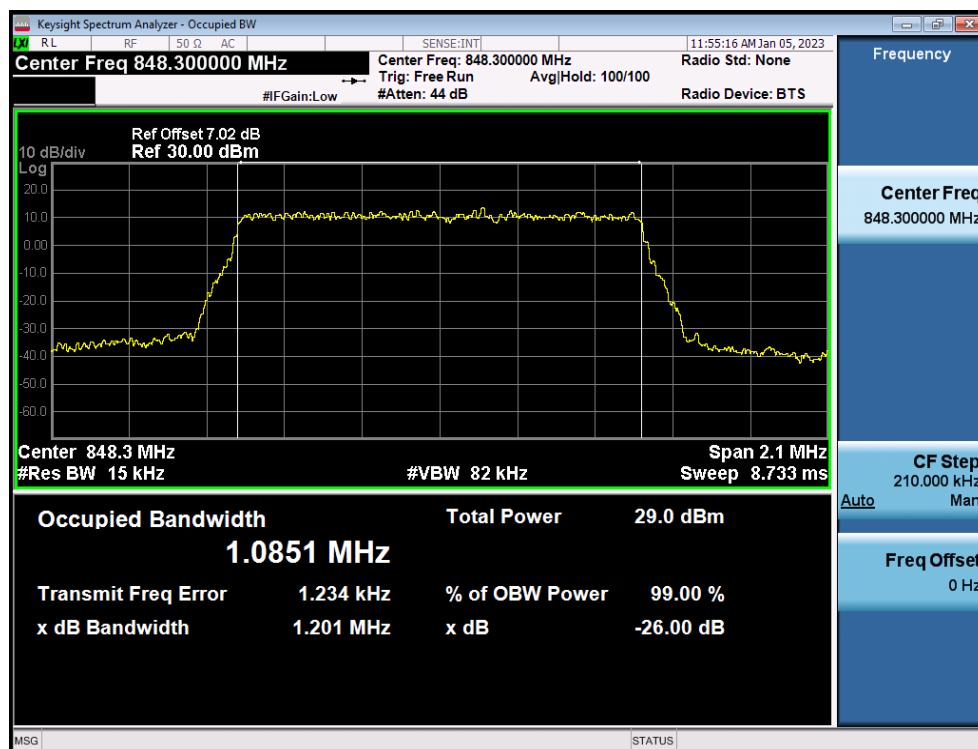
LTE Band 5 / 3MHz / 16QAM - RB Size 15



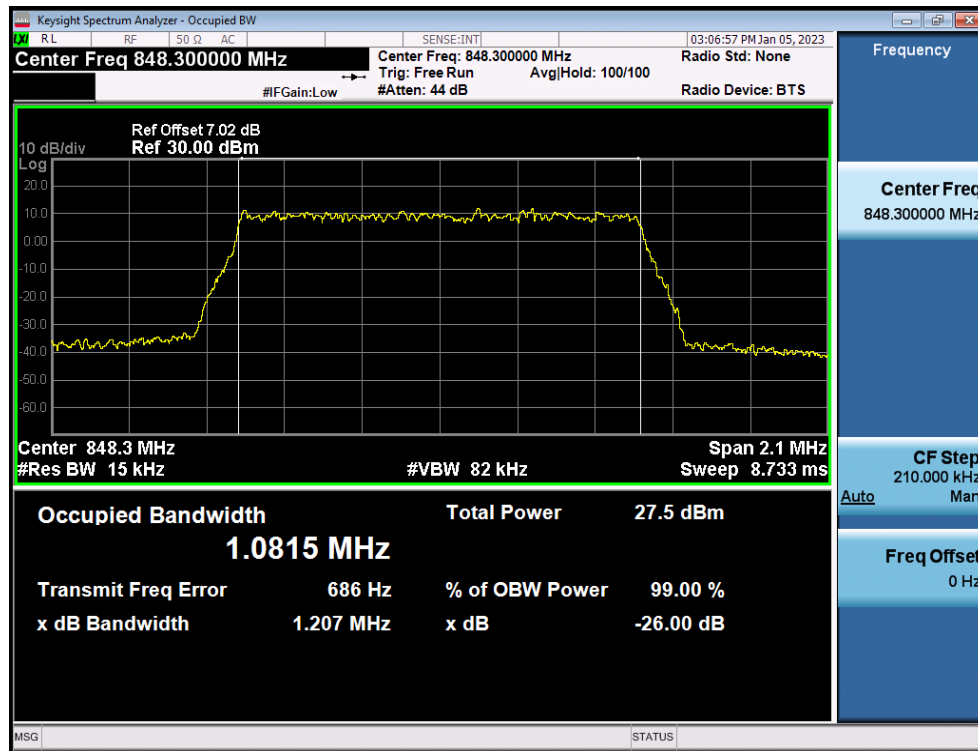
LTE Band 5 / 3MHz / 64QAM - RB Size 15



LTE Band 5 / 1.4MHz / QPSK - RB Size 6

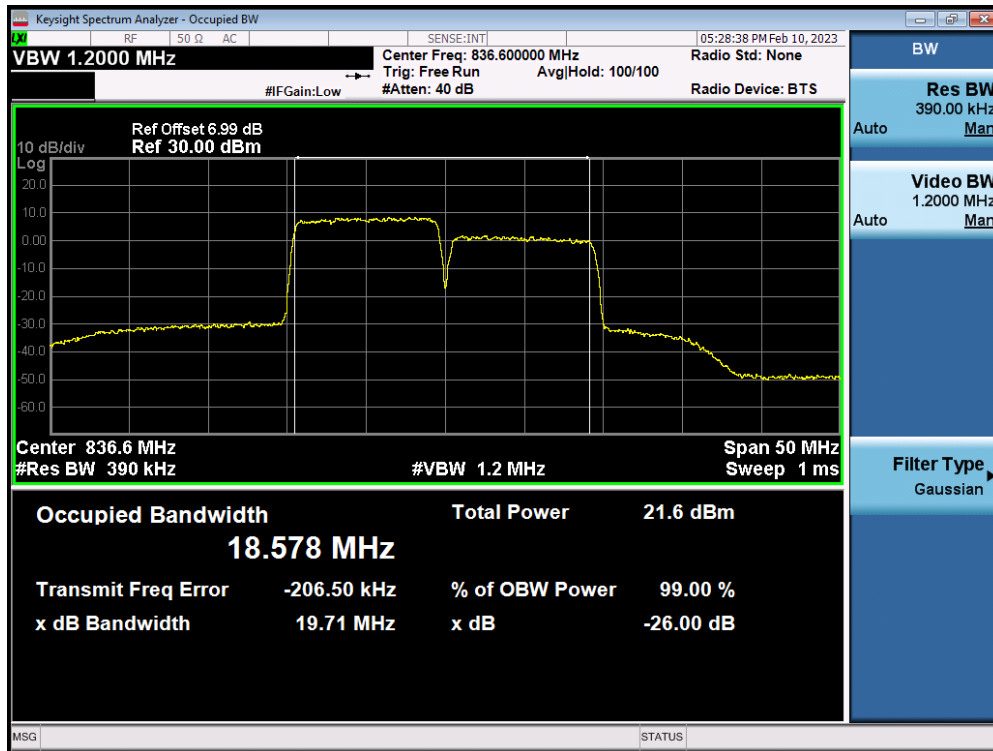


LTE Band 5 / 1.4MHz / 16QAM - RB Size 6

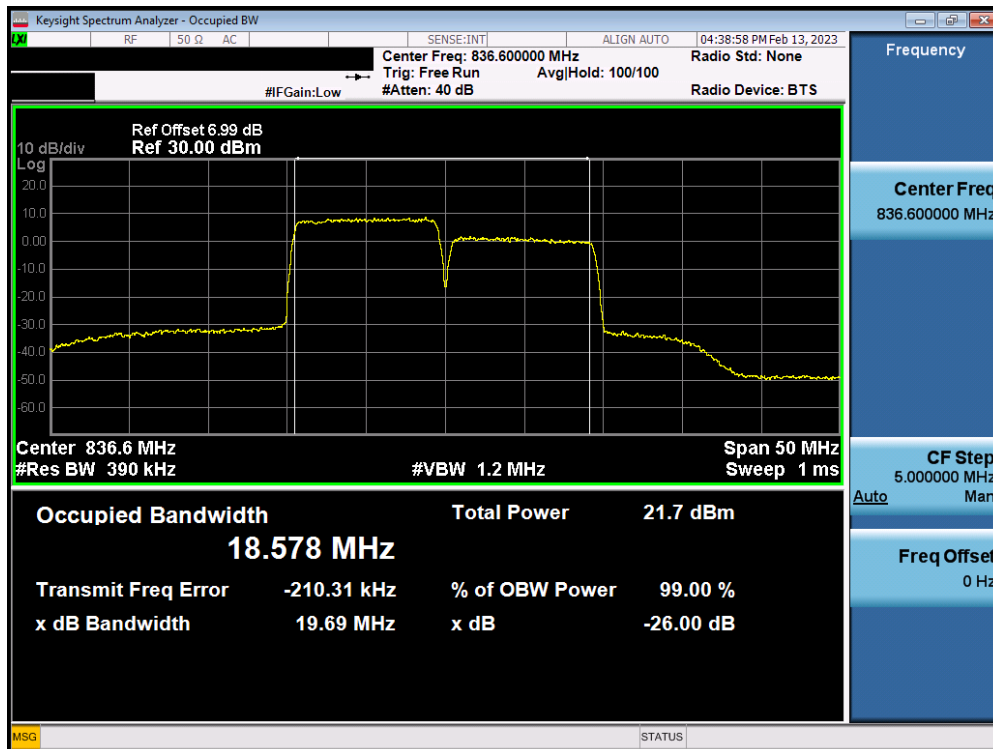


LTE Band 5 / 1.4MHz / 64QAM - RB Size 6

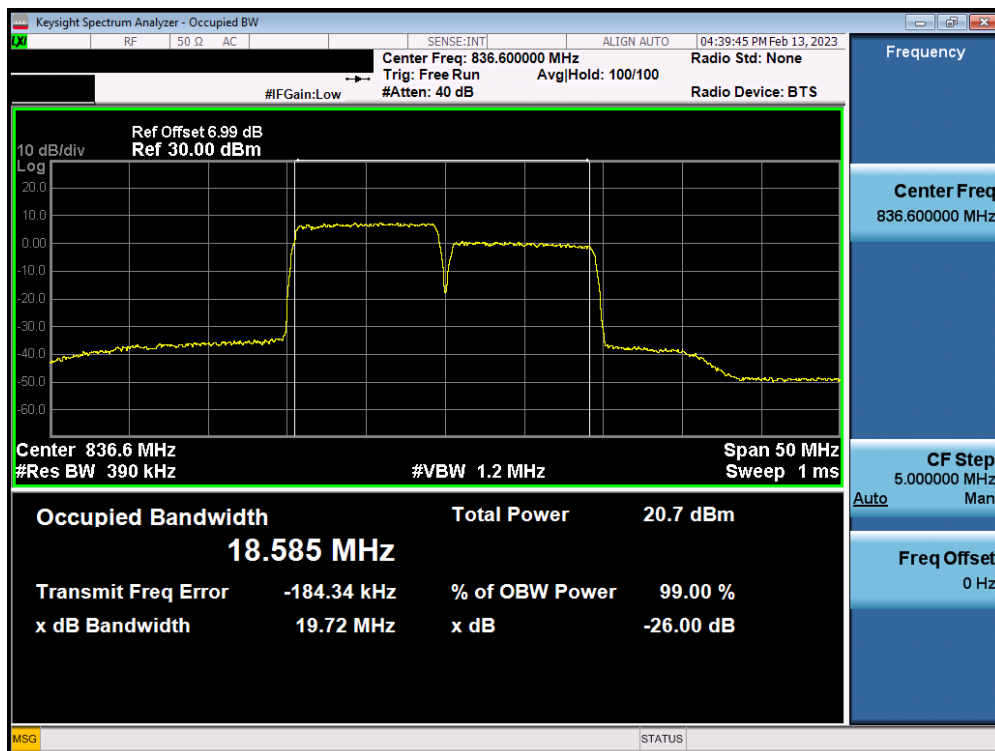
Intra Band CA(5B)



ULCA LTE Band 5 / 10+10MHz / QPSK – PCC 50/0, SCC 50/0

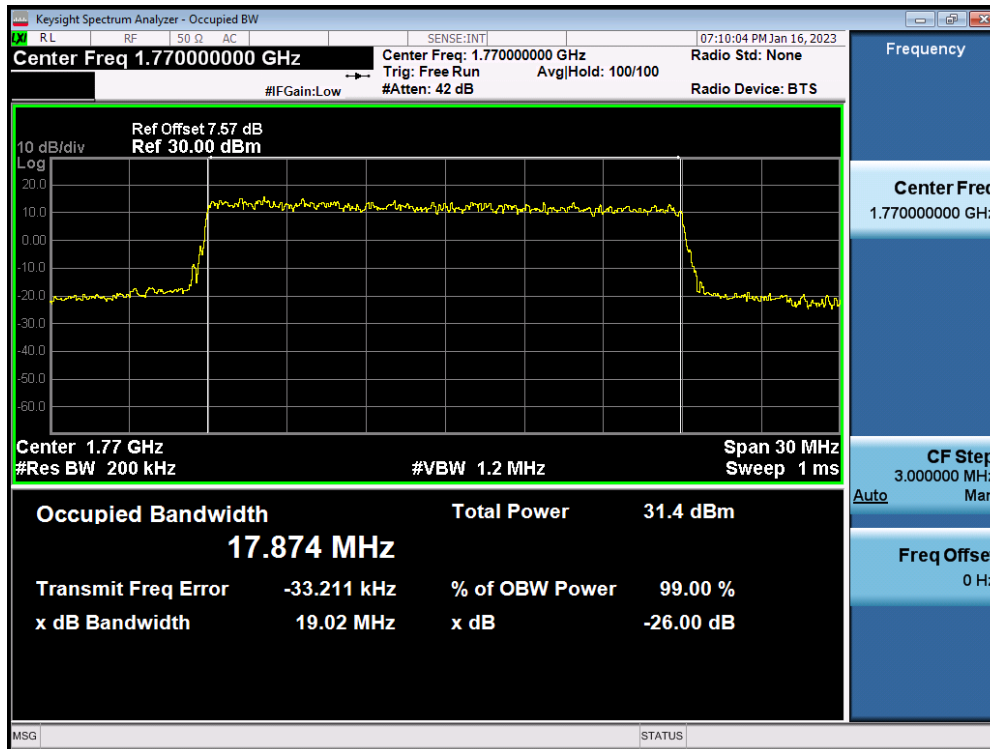


ULCA LTE Band 5 / 10+10MHz / 16QAM - PCC 50/0, SCC 50/0

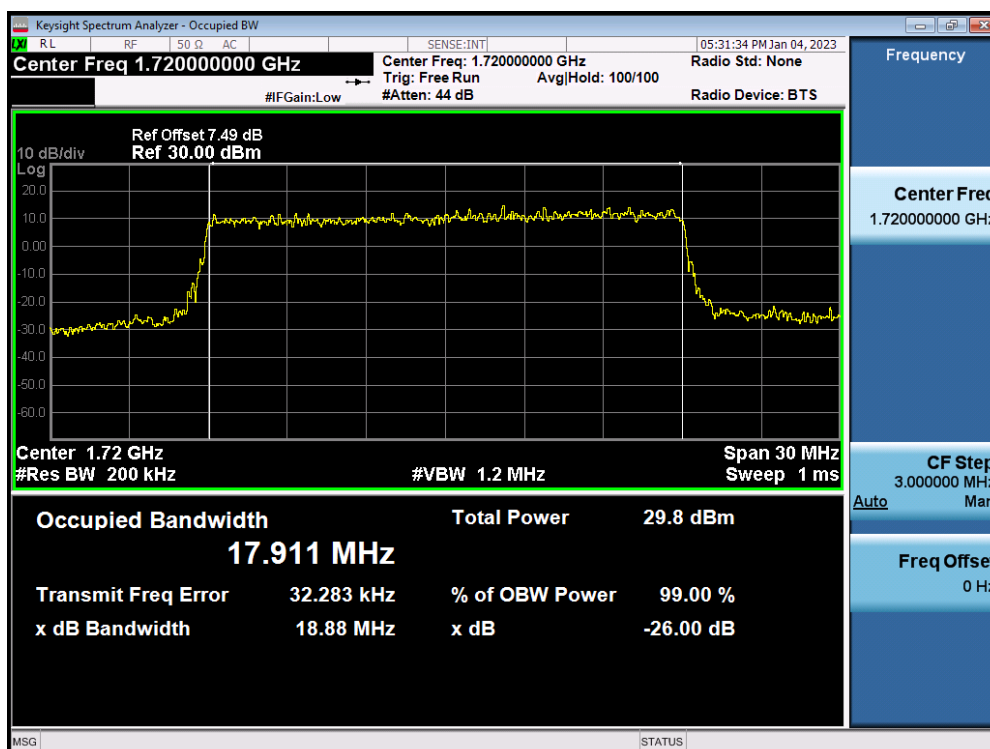


ULCA LTE Band 5 / 10+10MHz / 64QAM - PCC 50/0, SCC 50/0

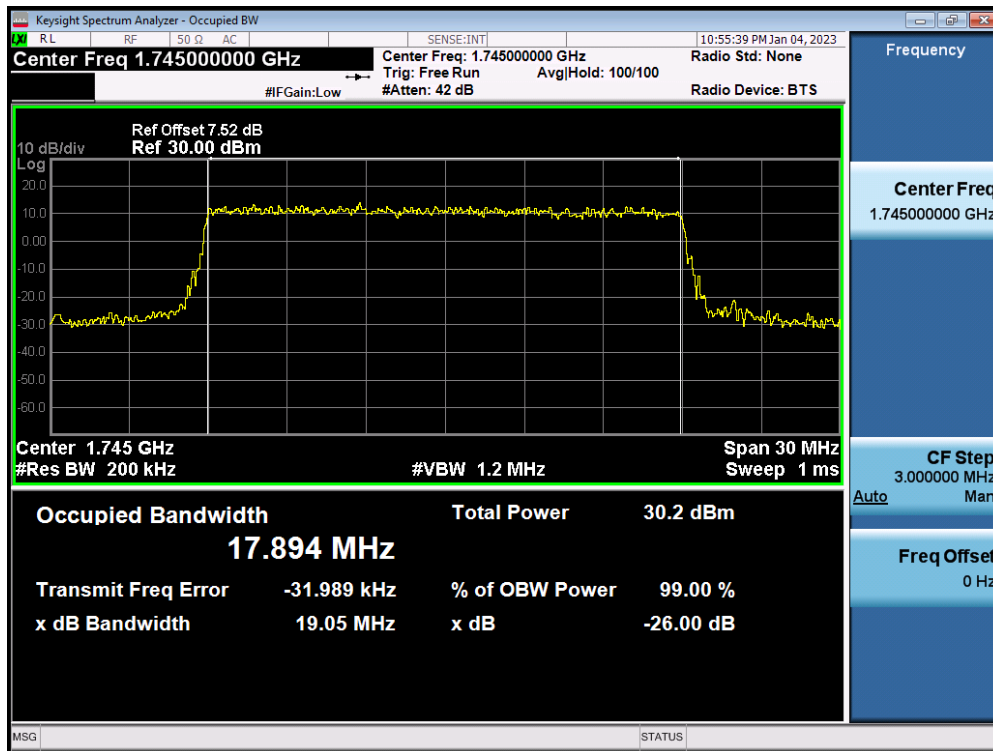
8.1.4. LTE Band 66(4)



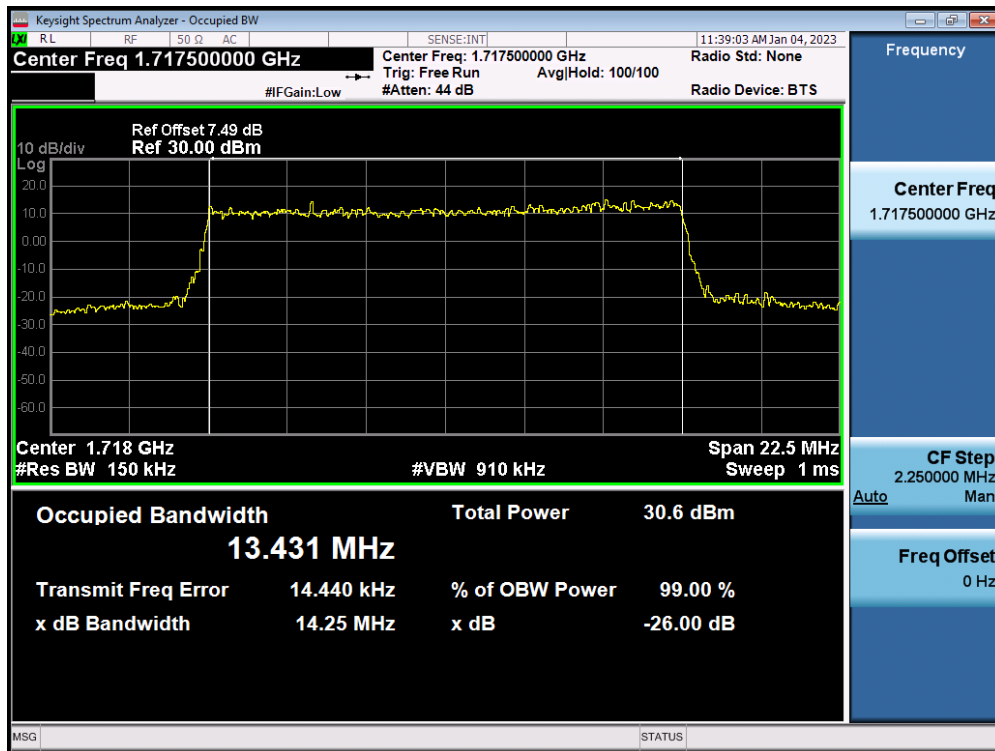
LTE Band 66(4) / 20MHz / QPSK - RB Size 100



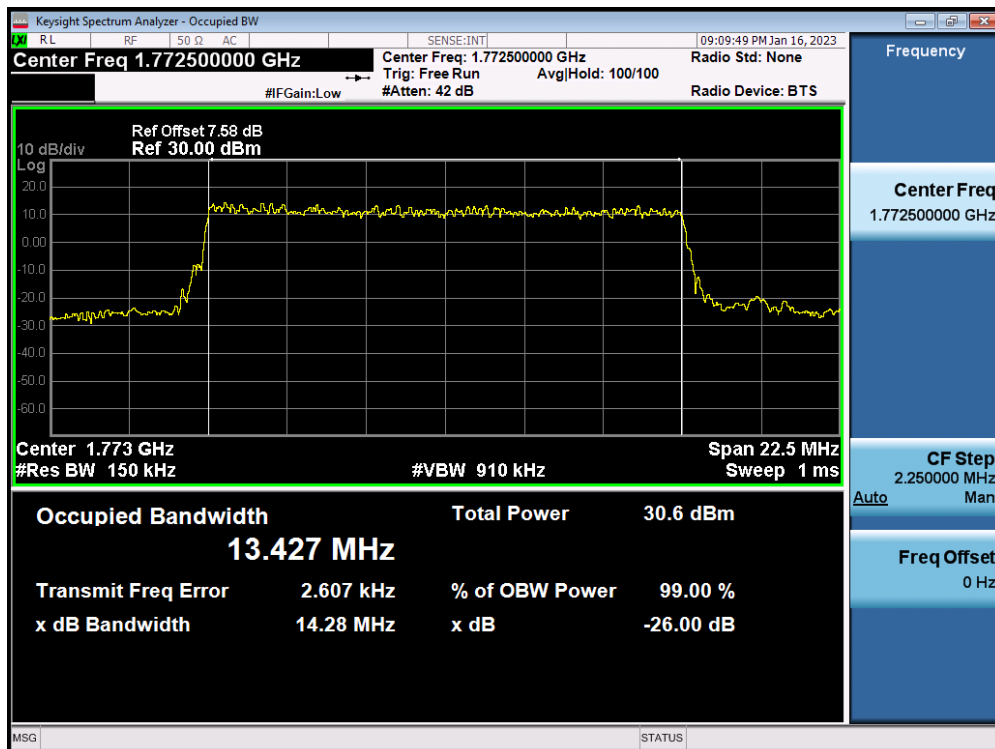
LTE Band 66(4) / 20MHz / 16QAM - RB Size 100



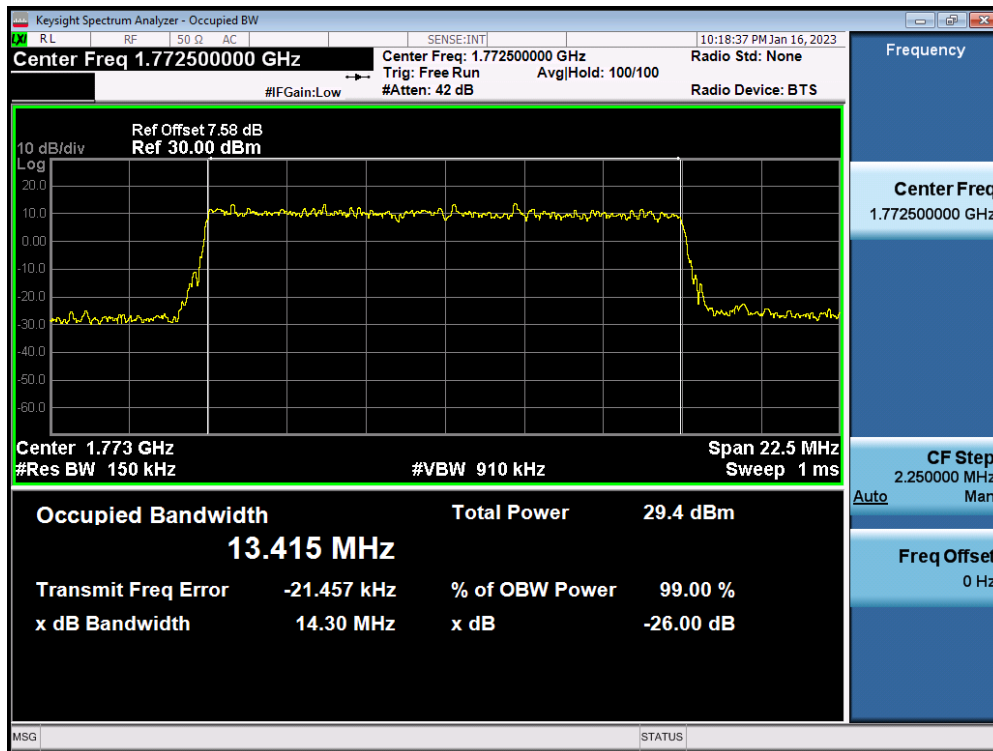
LTE Band 66(4) / 20MHz / 64QAM - RB Size 100



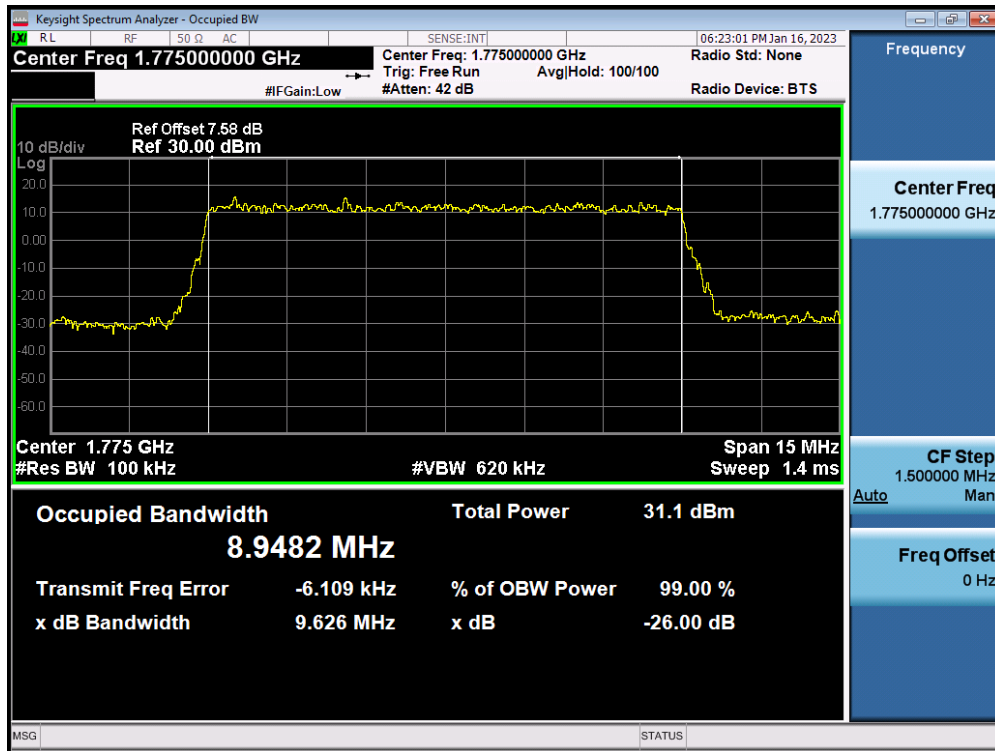
LTE Band 66(4) / 15MHz / QPSK - RB Size 75



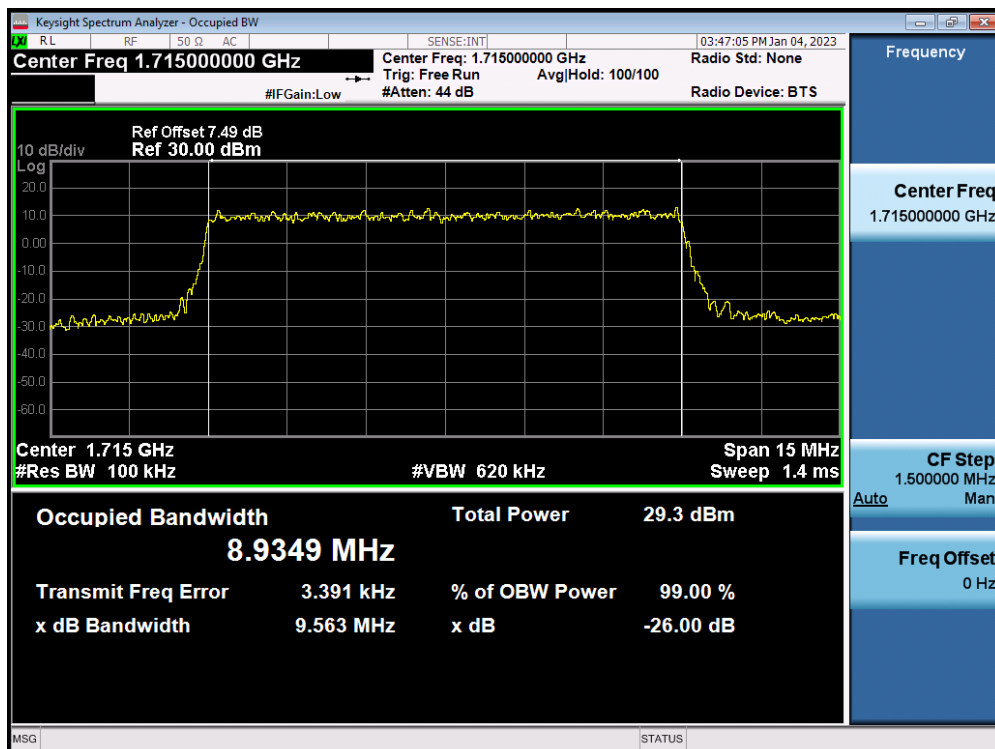
LTE Band 66(4) / 15MHz / 16QAM - RB Size 75



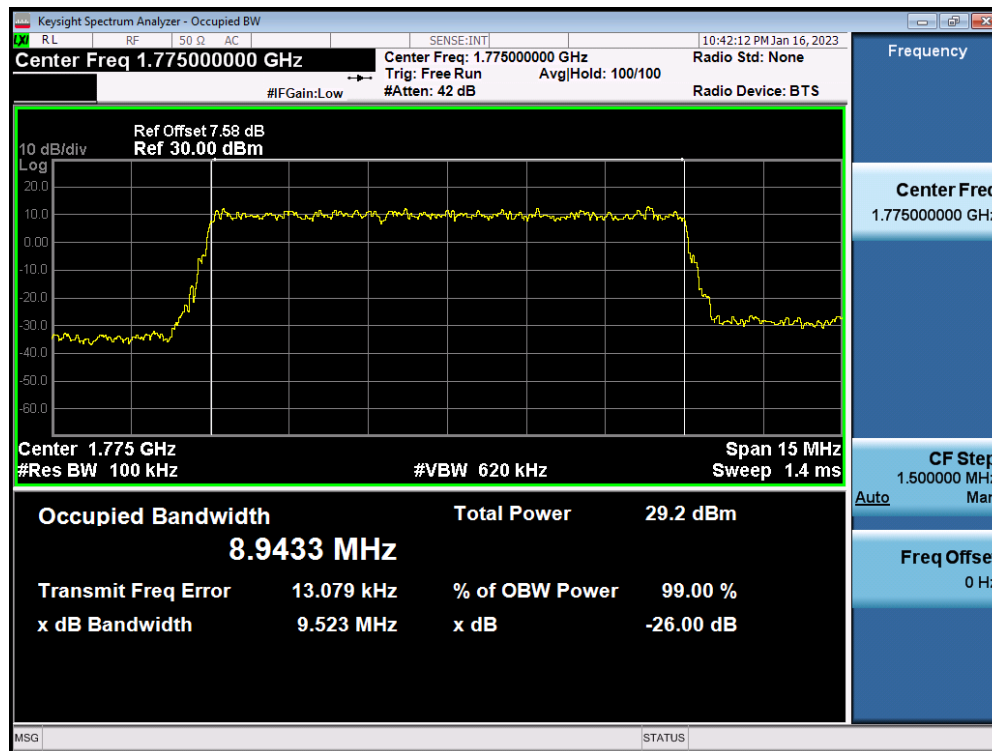
LTE Band 66(4) / 15MHz / 64QAM - RB Size 75



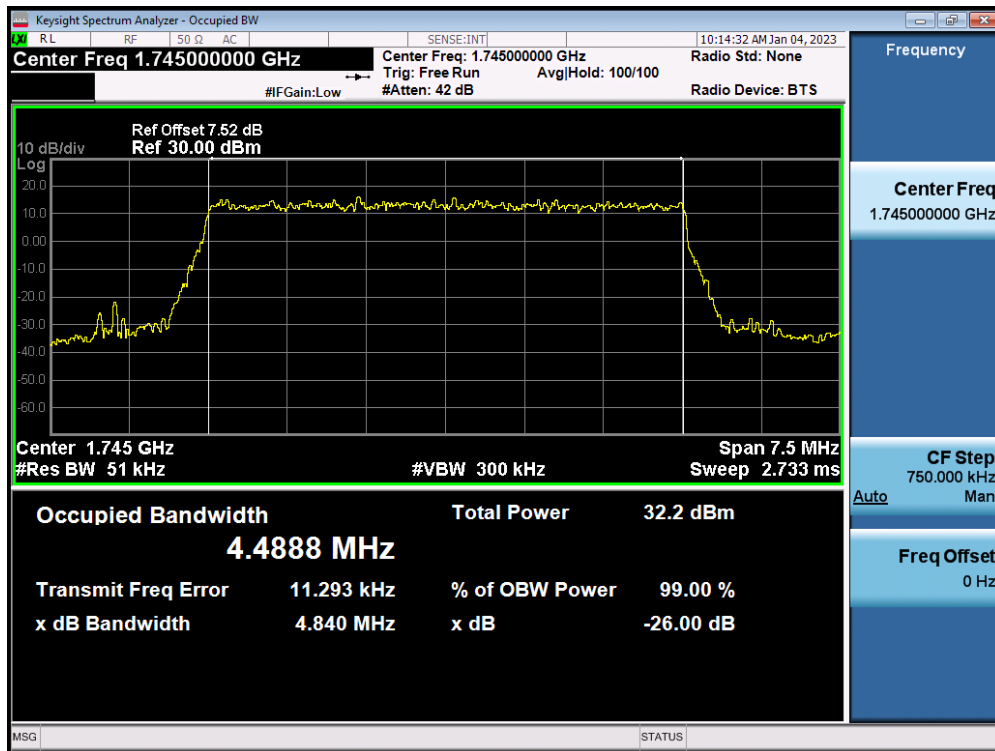
LTE Band 66(4) / 10MHz / QPSK - RB Size 50



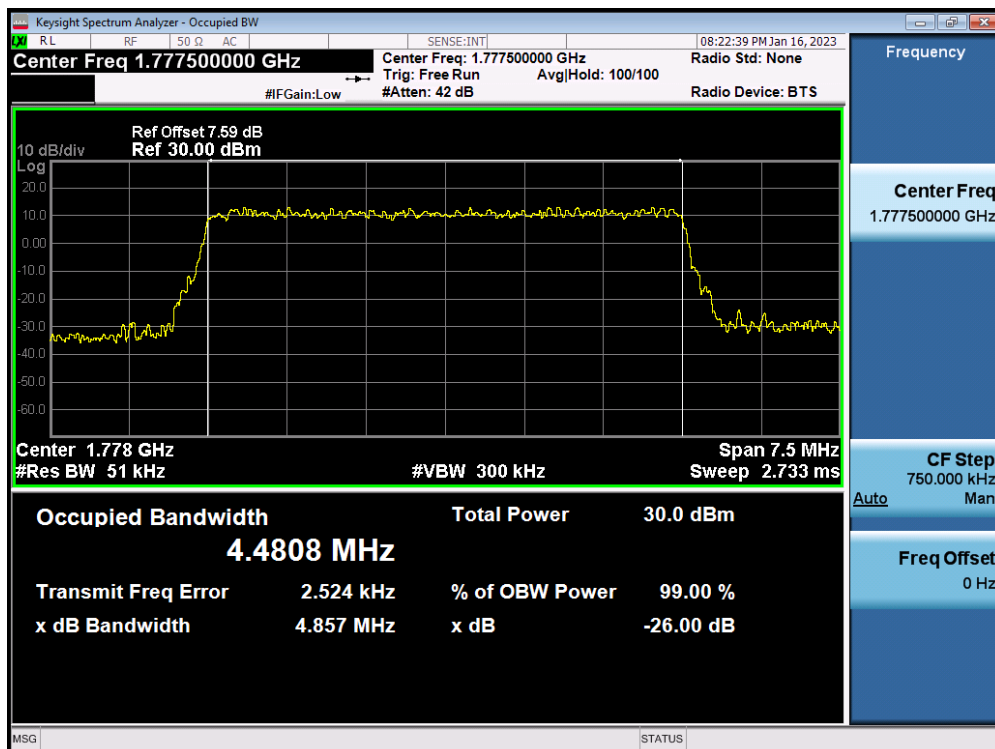
LTE Band 66(4) / 10MHz / 16QAM - RB Size 50



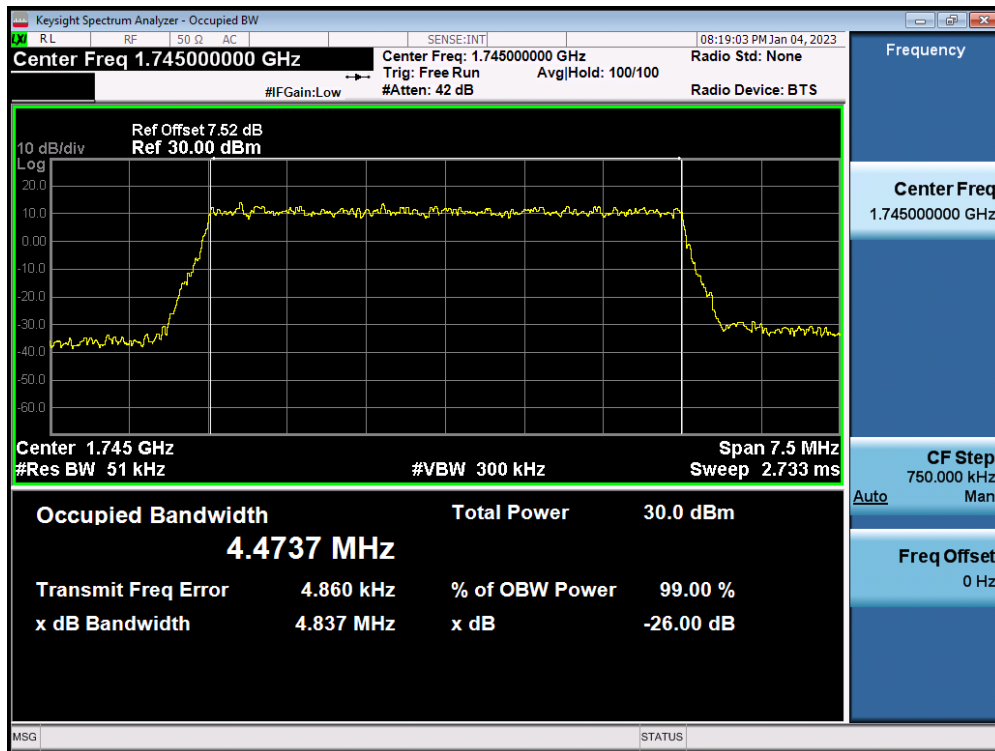
LTE Band 66(4) / 10MHz / 64QAM - RB Size 50



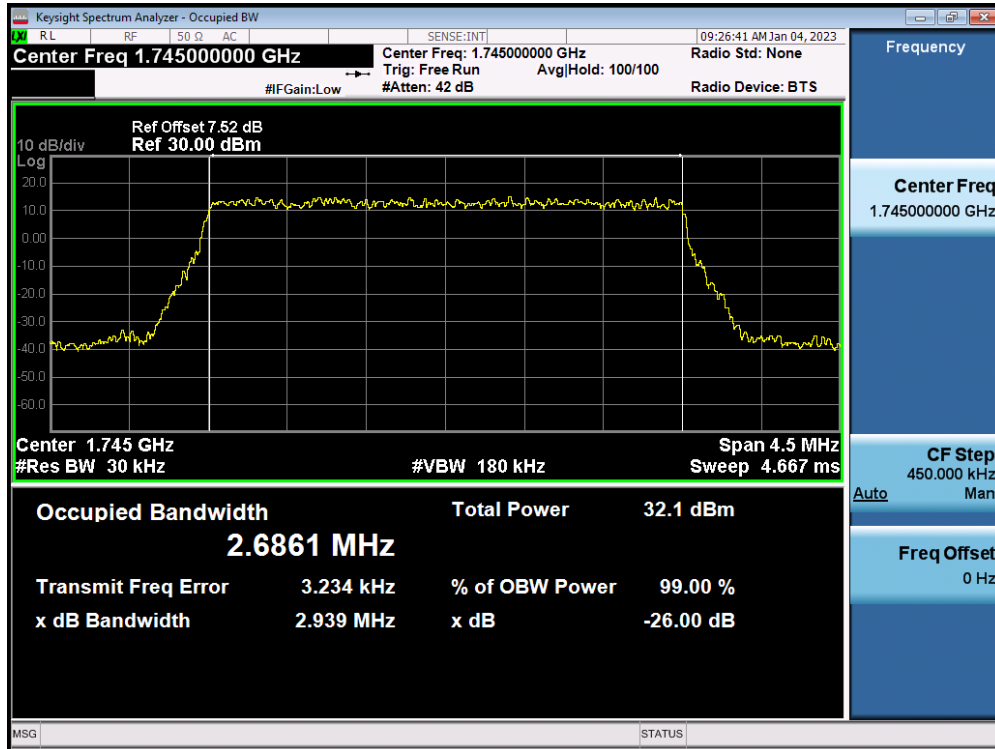
LTE Band 66(4) / 5MHz / QPSK - RB Size 25



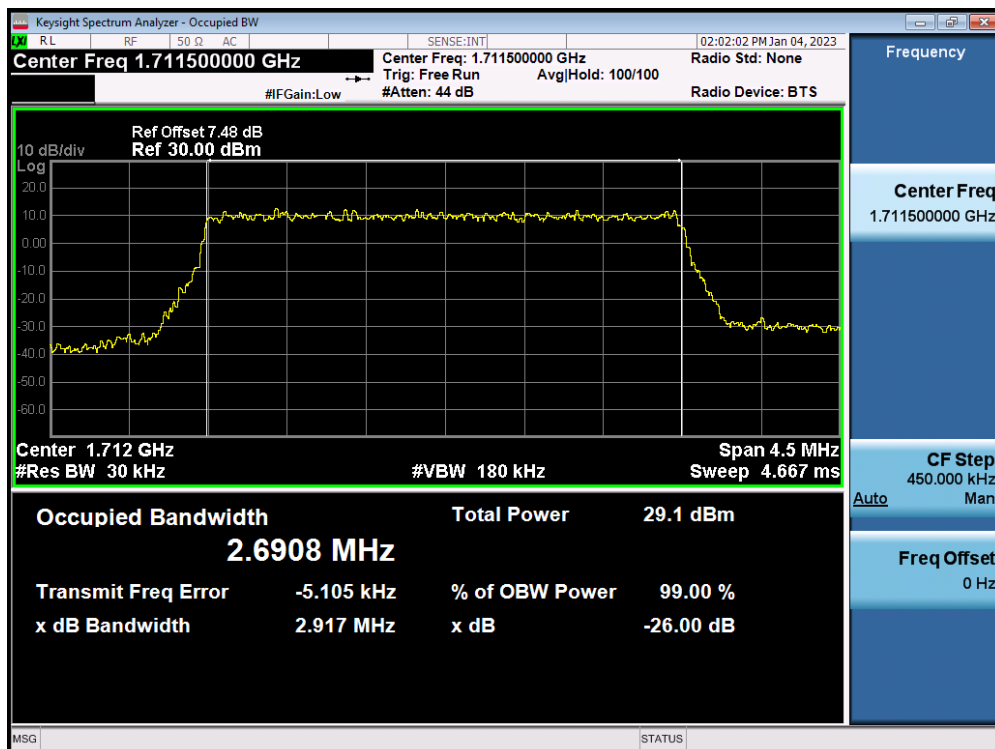
LTE Band 66(4) / 5MHz / 16QAM - RB Size 25



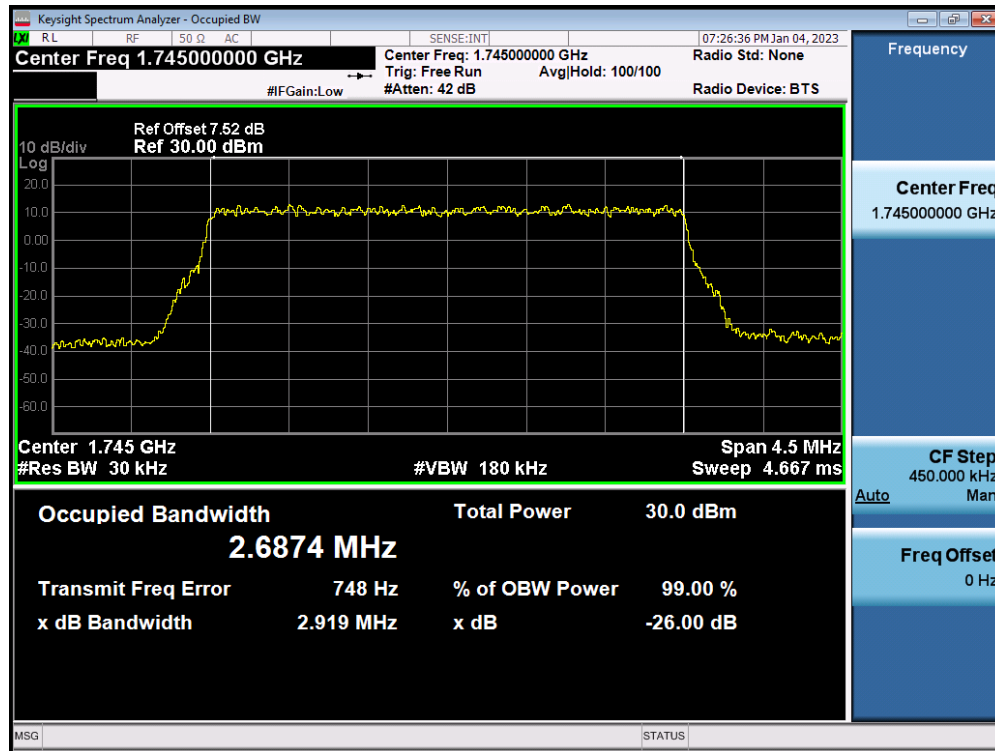
LTE Band 66(4) / 5MHz / 64QAM - RB Size 25



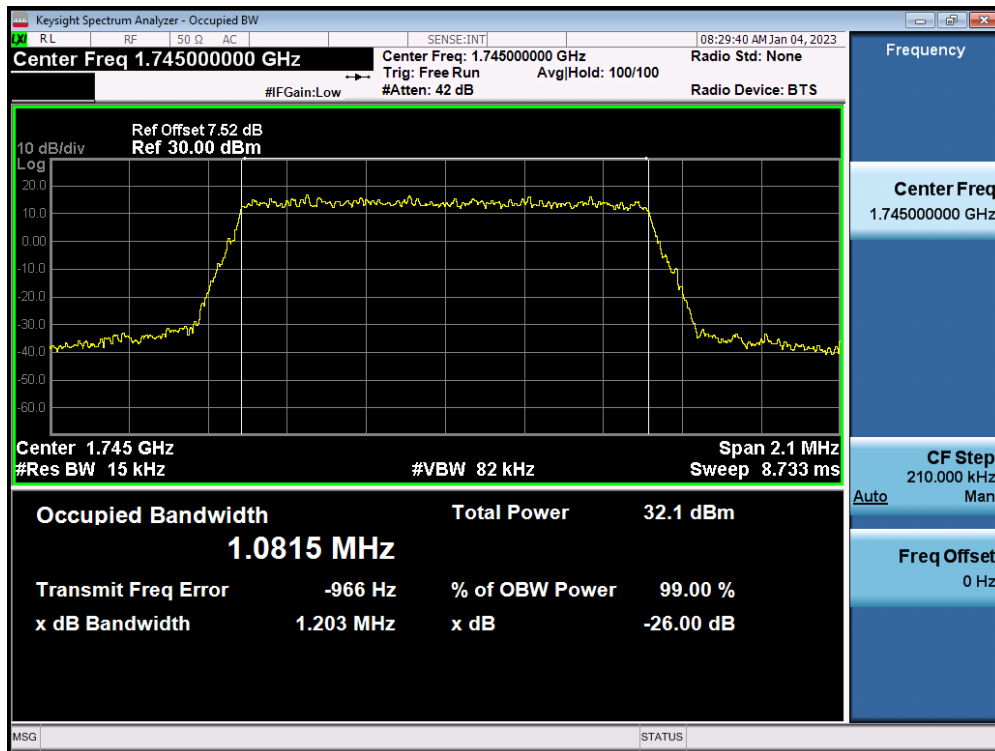
LTE Band 66(4) / 3MHz / QPSK - RB Size 15



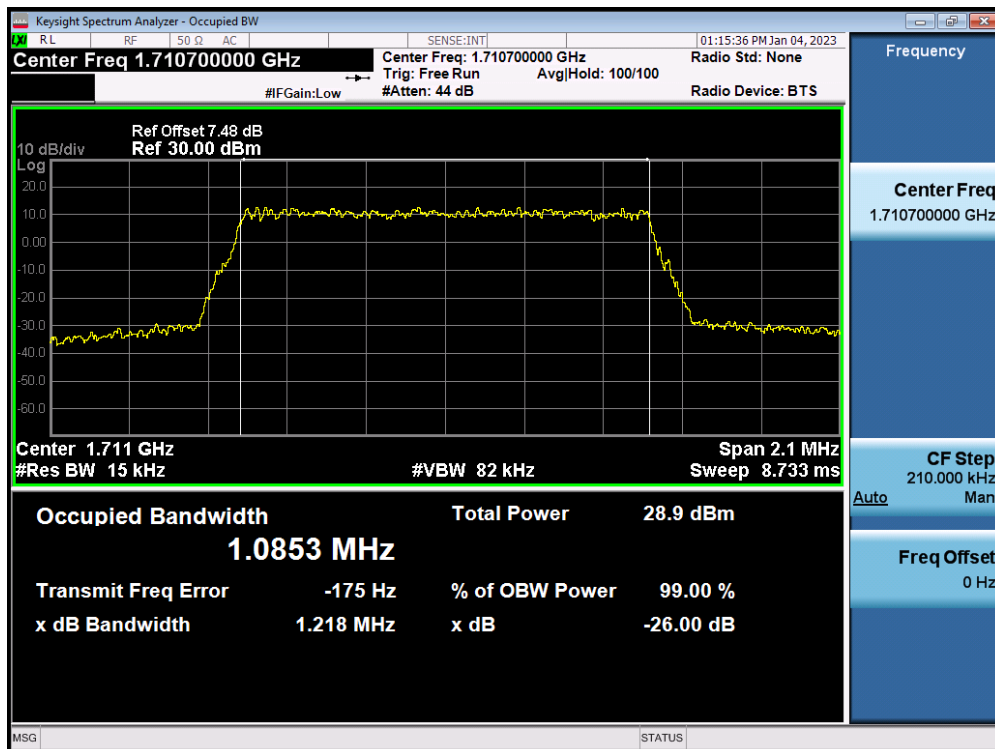
LTE Band 66(4) / 3MHz / 16QAM - RB Size 15



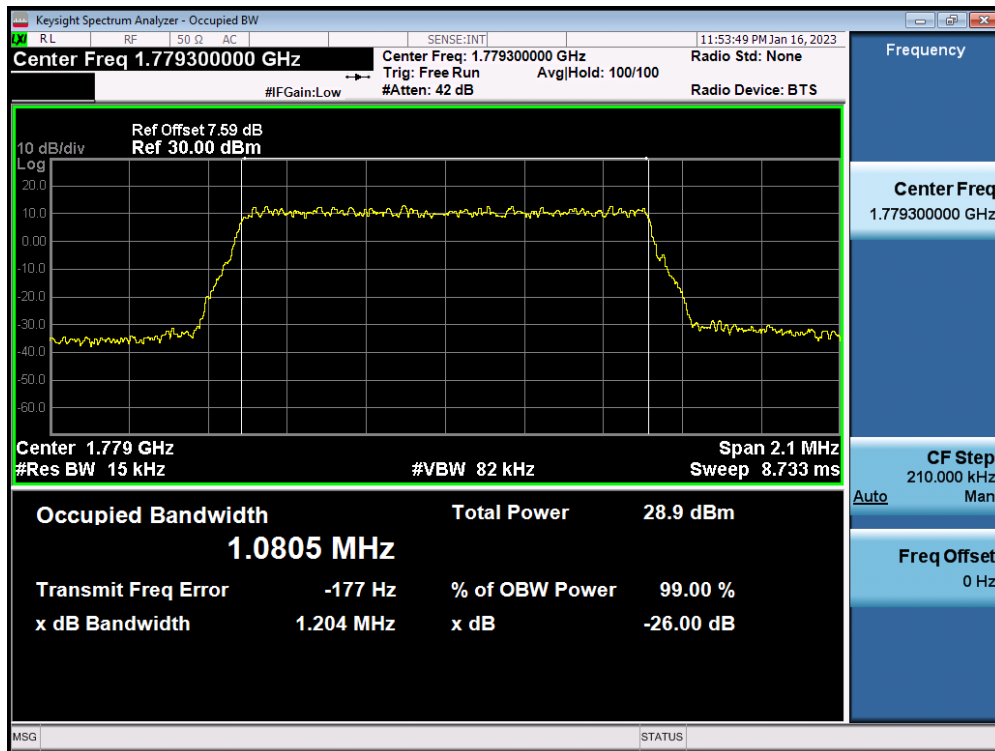
LTE Band 66(4) / 3MHz / 64QAM - RB Size 15



LTE Band 66(4) / 1.4MHz / QPSK - RB Size 6

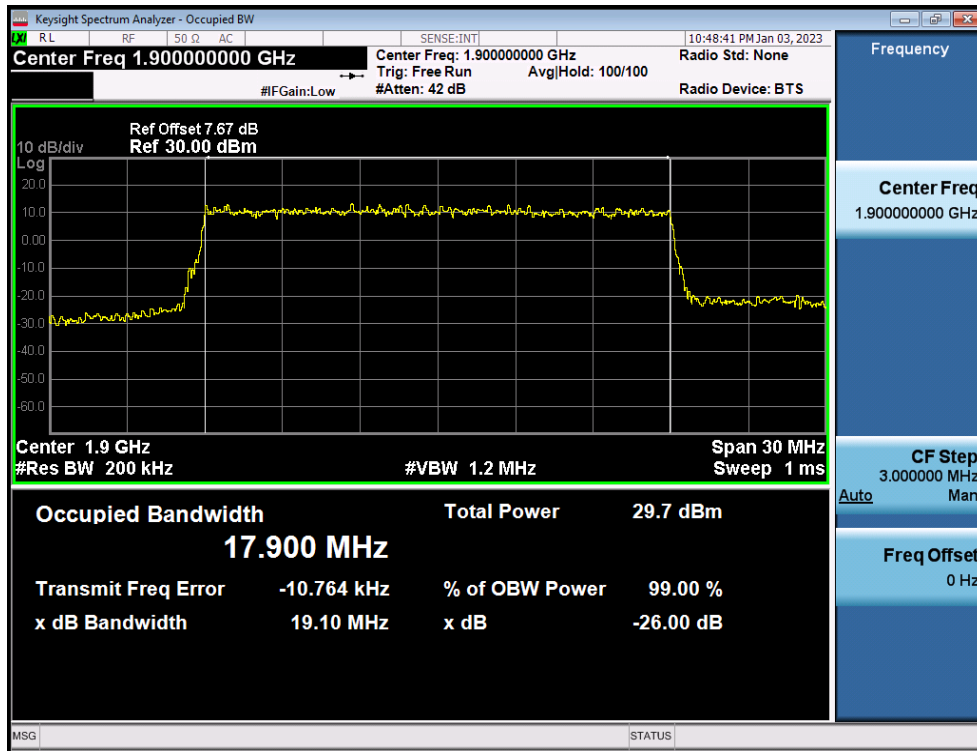


LTE Band 66(4) / 1.4MHz / 16QAM - RB Size 6

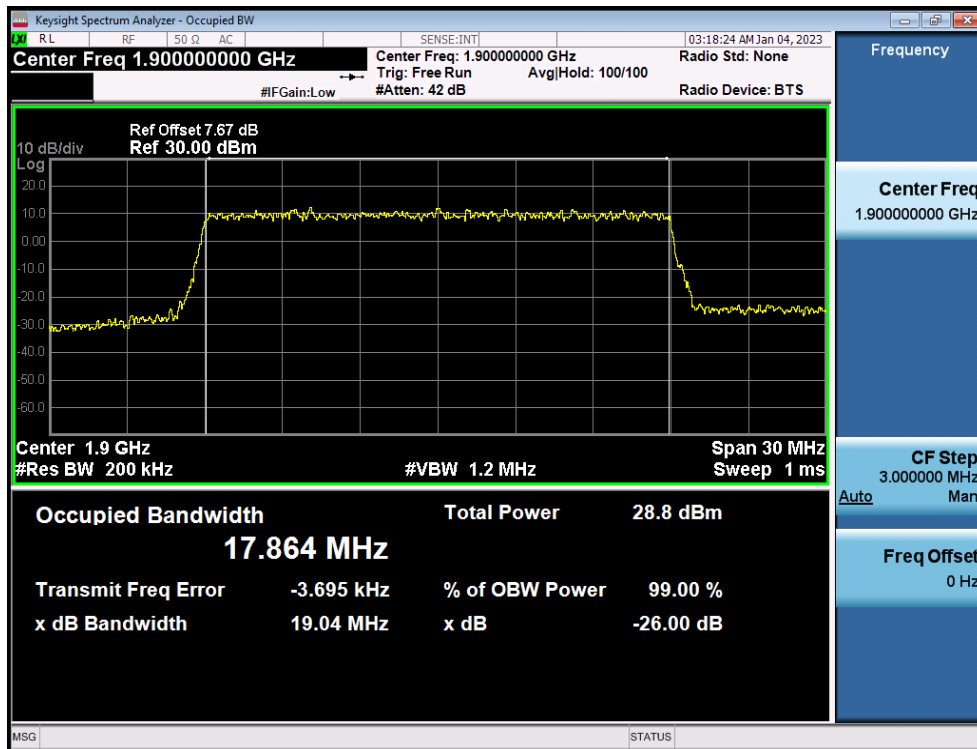


LTE Band 66(4) / 1.4MHz / 64QAM - RB Size 6

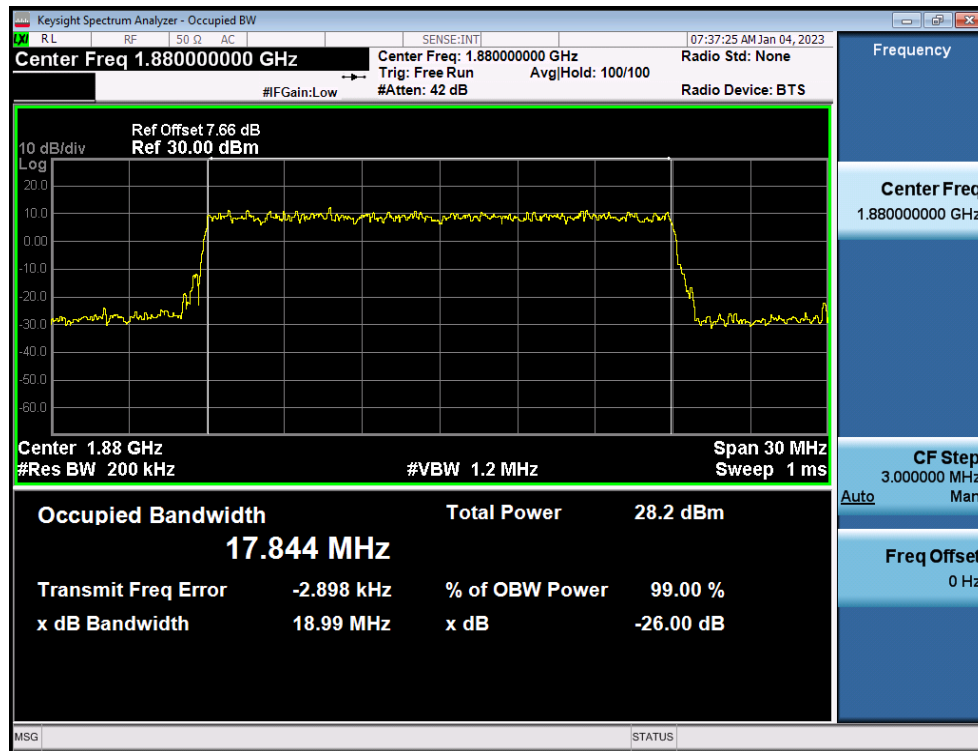
8.1.5. LTE Band 2



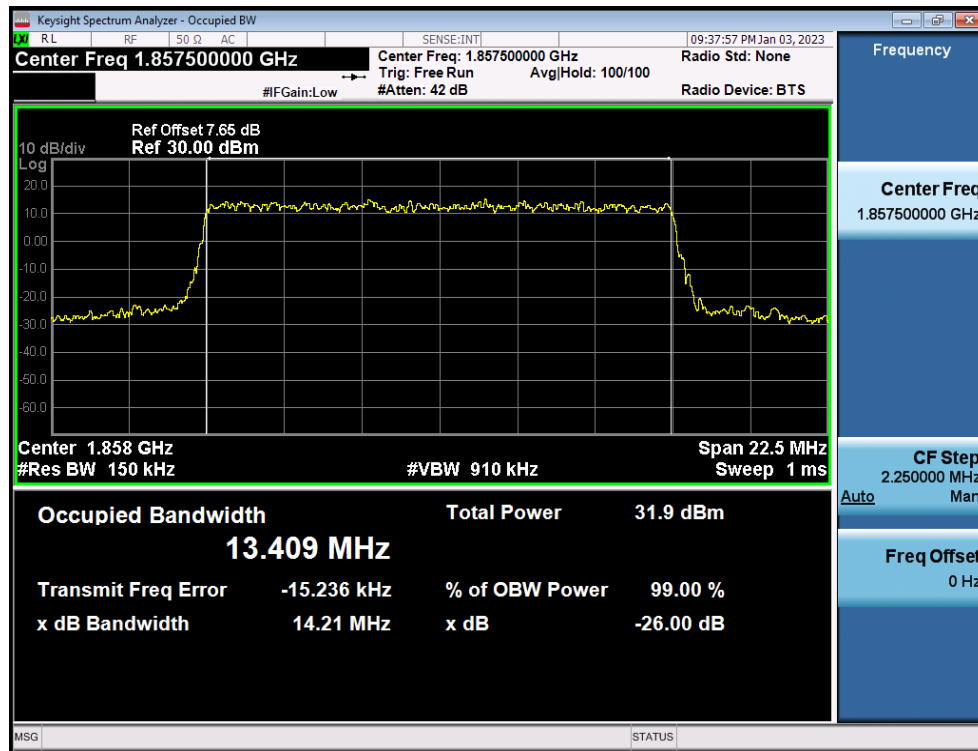
LTE Band 2 / 20MHz / QPSK - RB Size 100



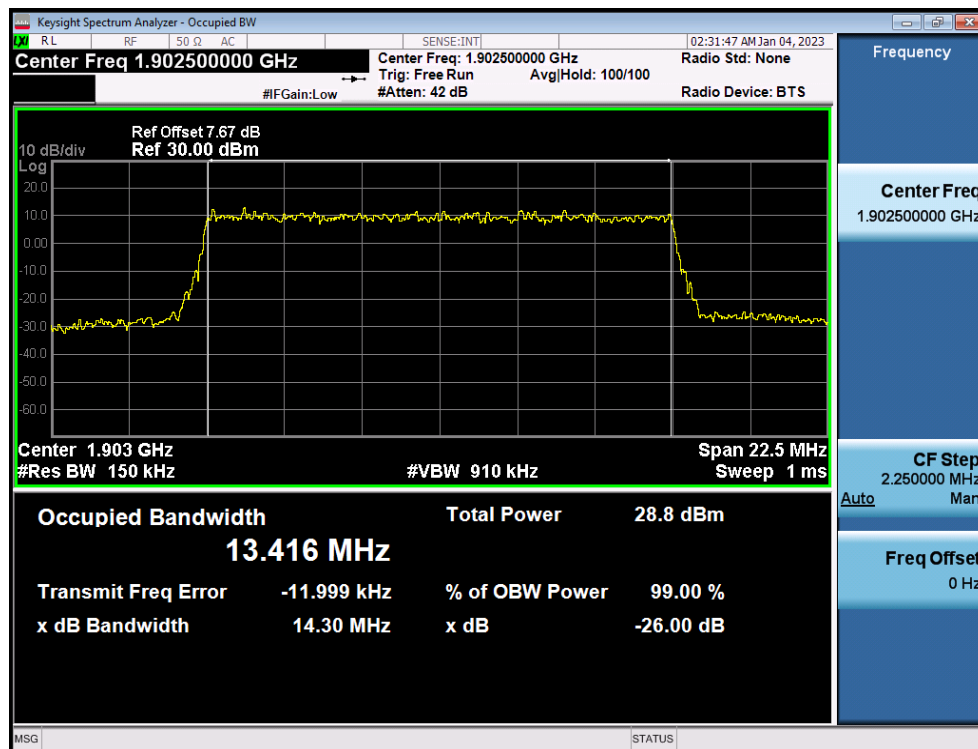
LTE Band 2 / 20MHz / 16QAM - RB Size 100



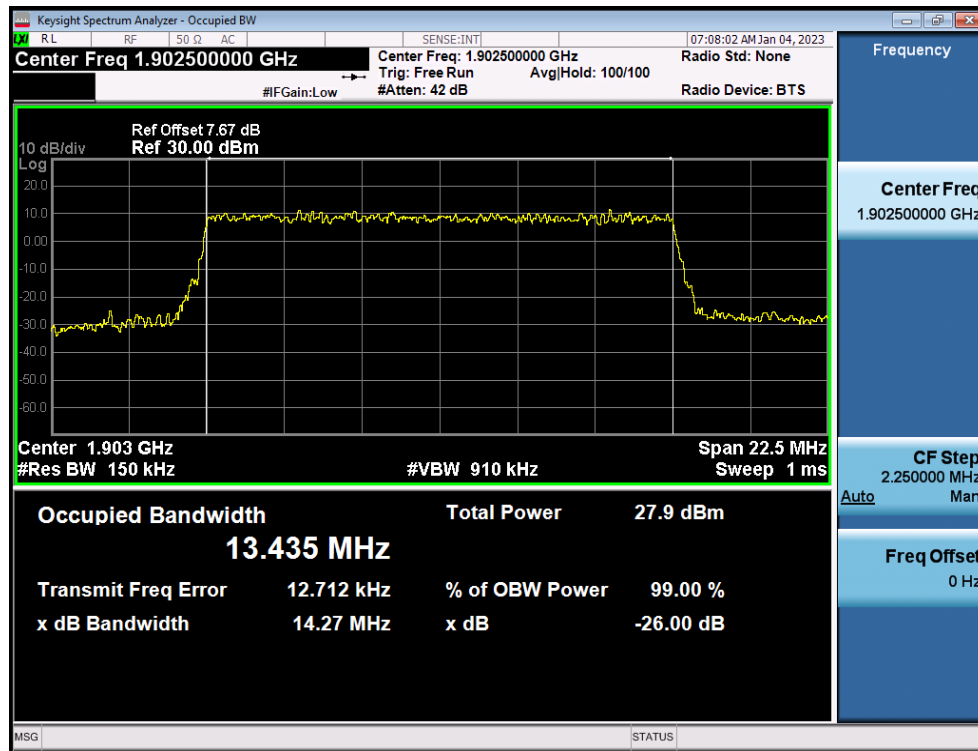
LTE Band 2 / 20MHz / 64QAM - RB Size 100



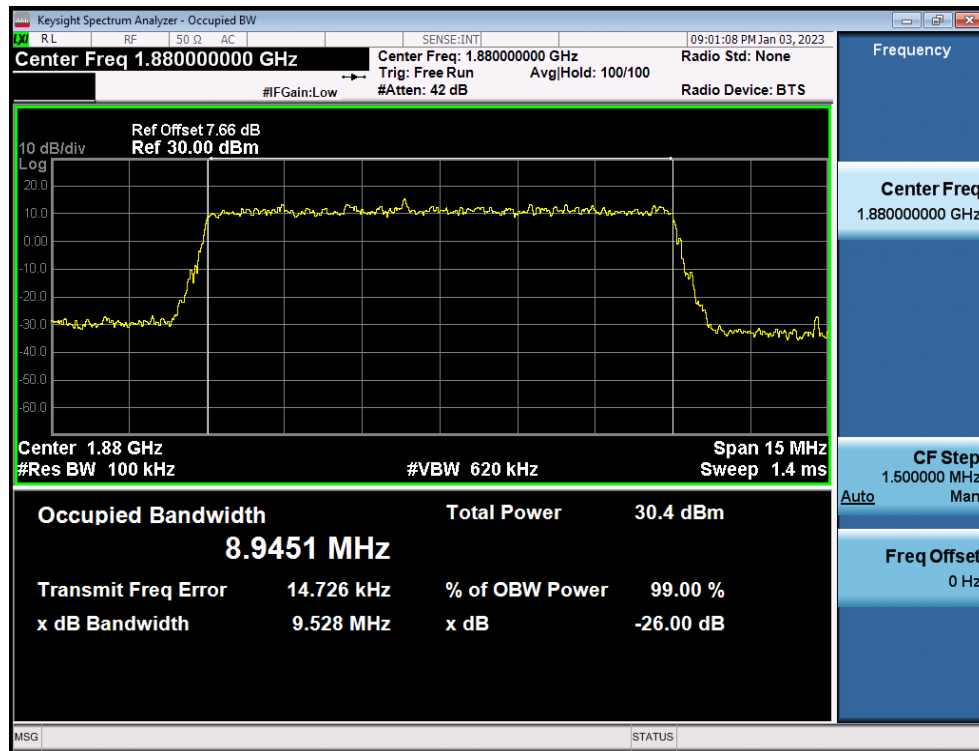
LTE Band 2 / 15MHz / QPSK - RB Size 75



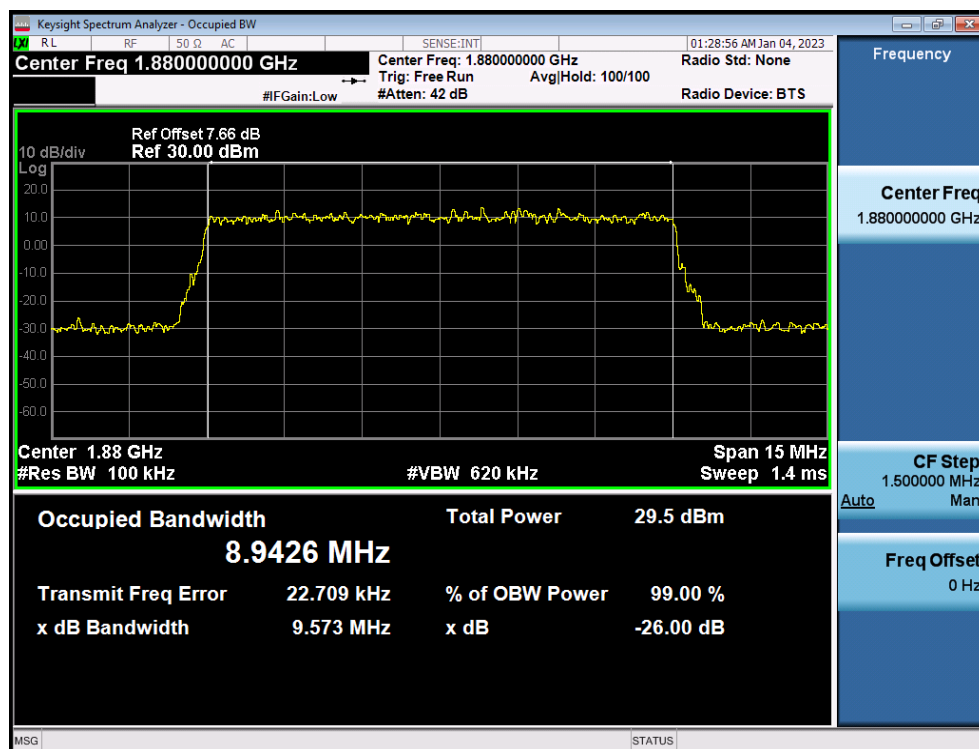
LTE Band 2 / 15MHz / 16QAM - RB Size 75



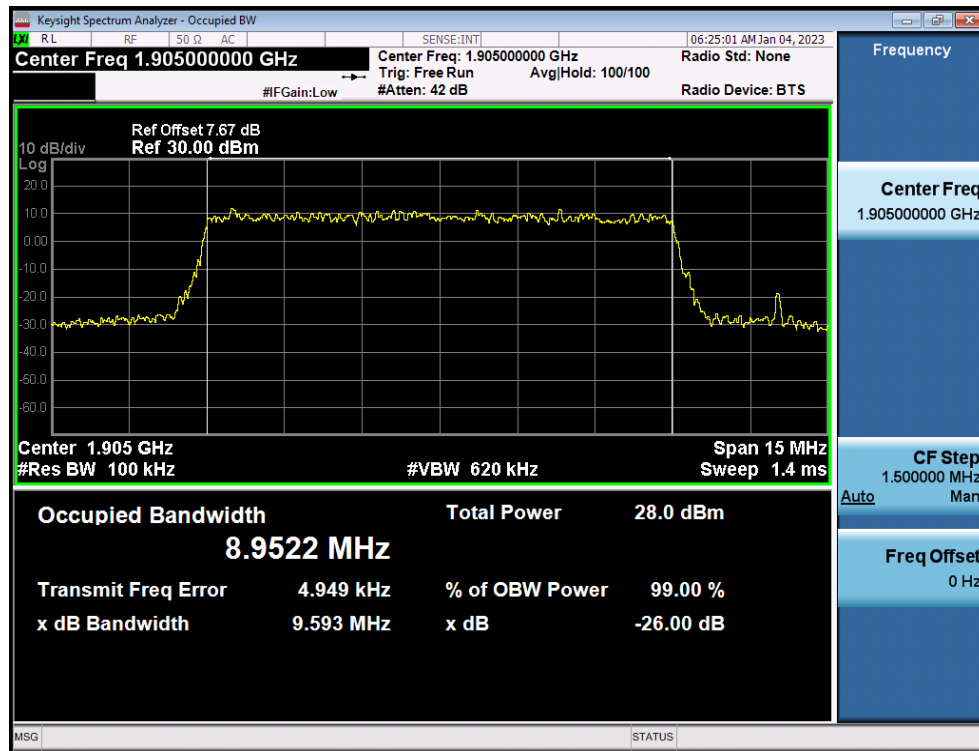
LTE Band 2 / 15MHz / 64QAM - RB Size 75



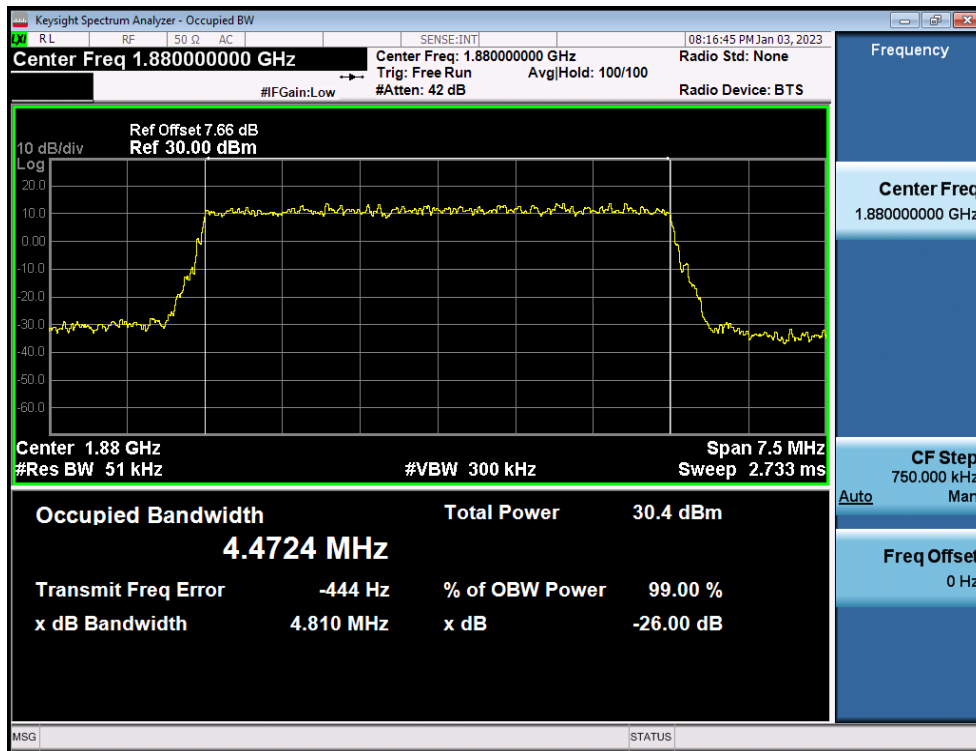
LTE Band 2 / 10MHz / QPSK - RB Size 50



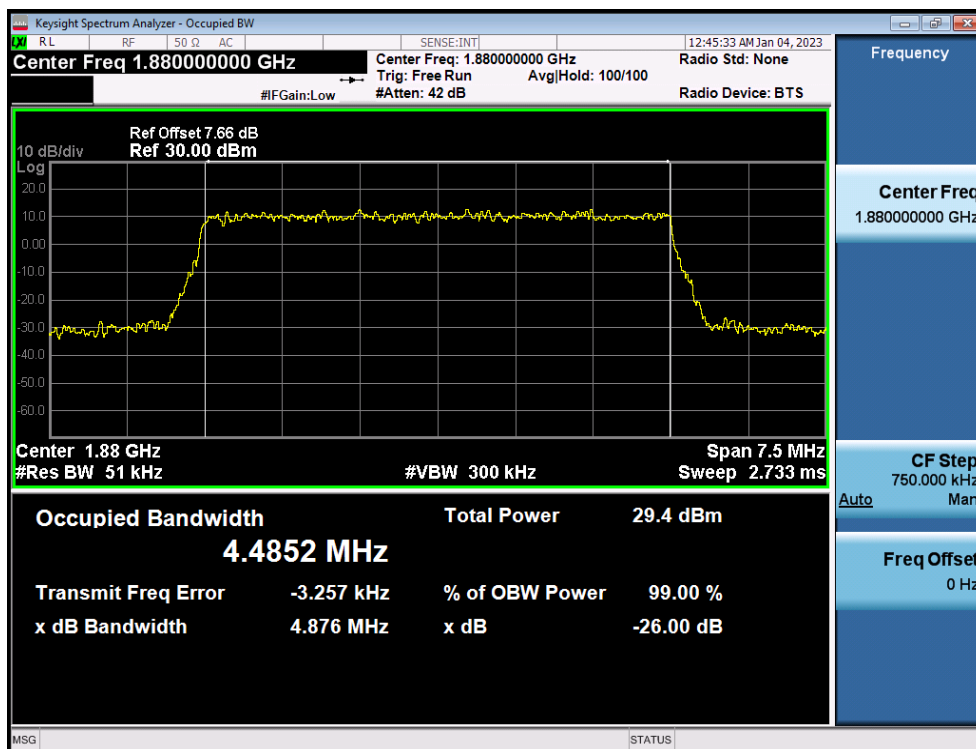
LTE Band 2 / 10MHz / 16QAM - RB Size 50



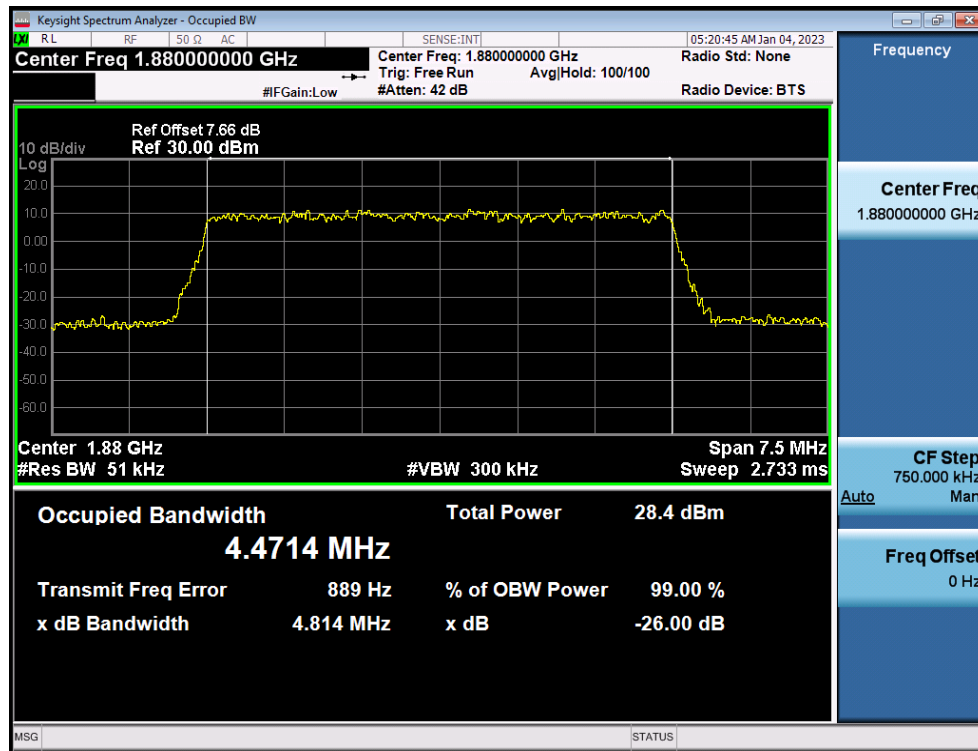
LTE Band 2 / 10MHz / 64QAM - RB Size 50



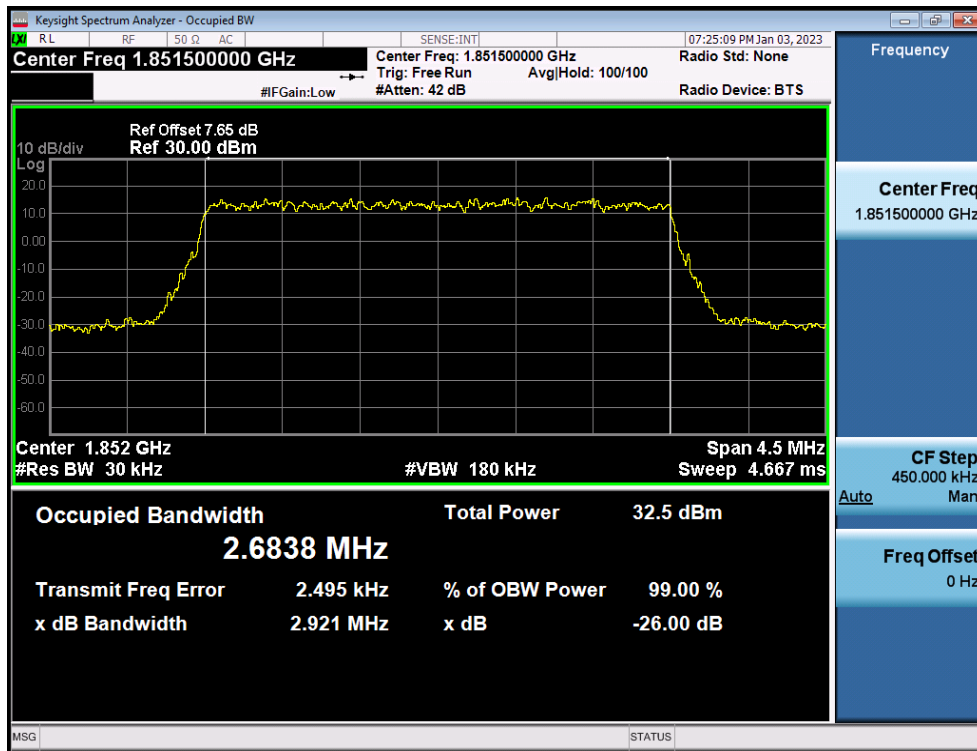
LTE Band 2 / 5MHz / QPSK - RB Size 25



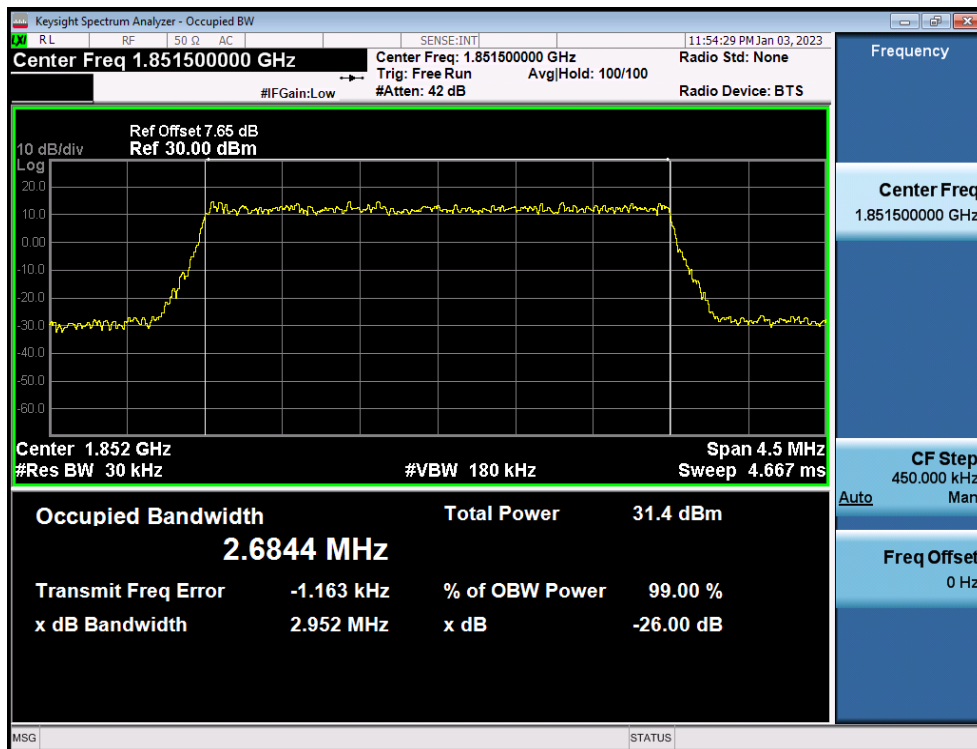
LTE Band 2 / 5MHz / 16QAM - RB Size 25



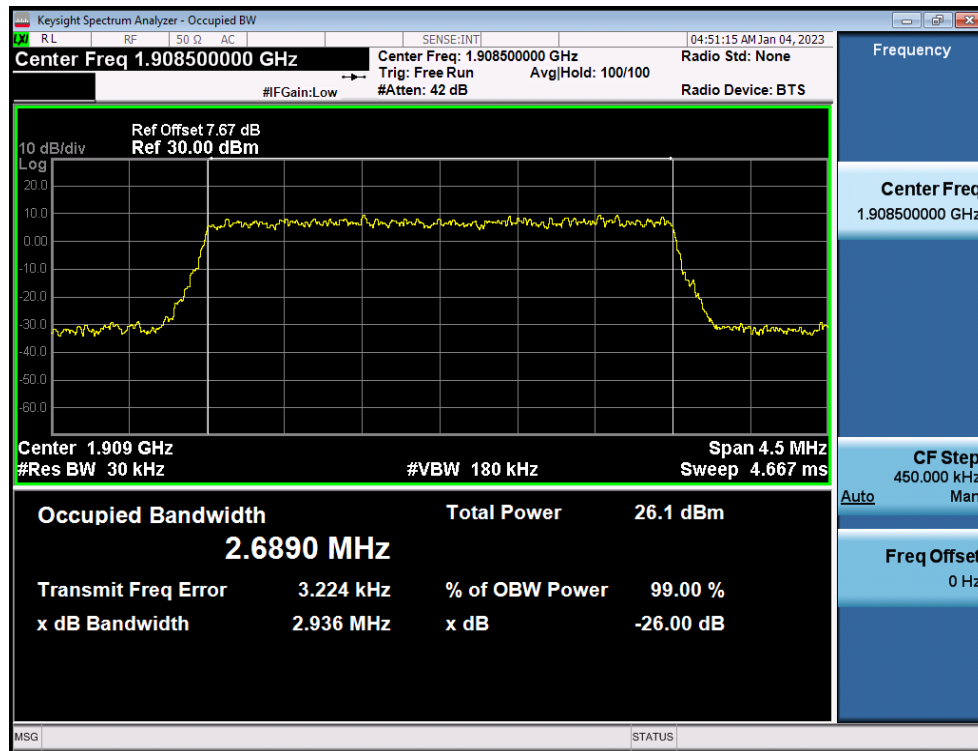
LTE Band 2 / 5MHz / 64QAM - RB Size 25



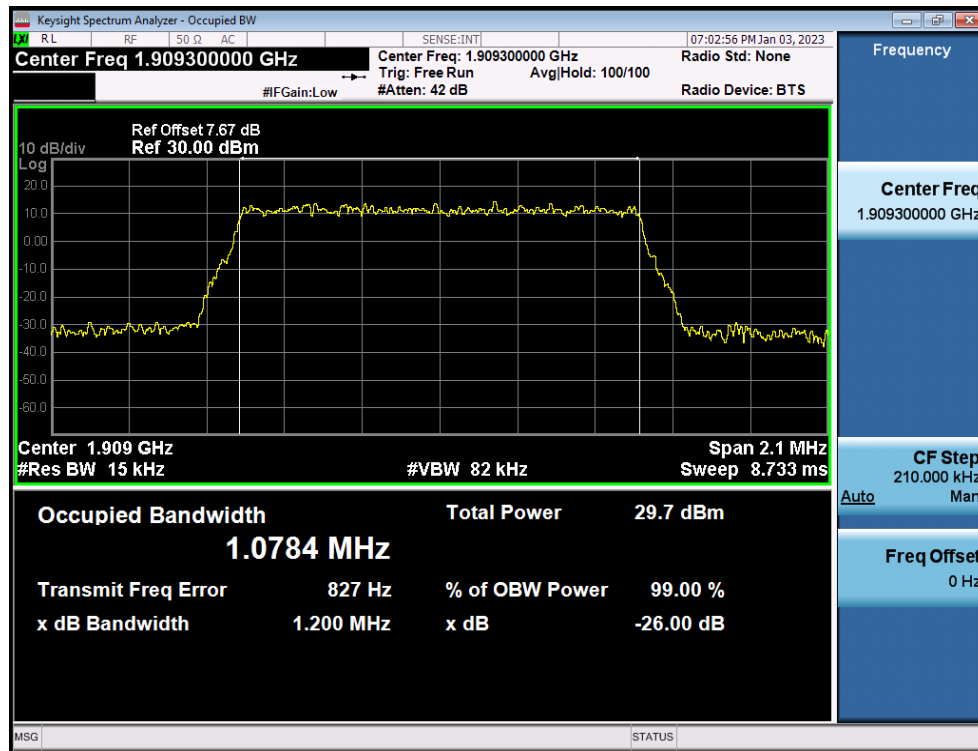
LTE Band 2 / 3MHz / QPSK - RB Size 15



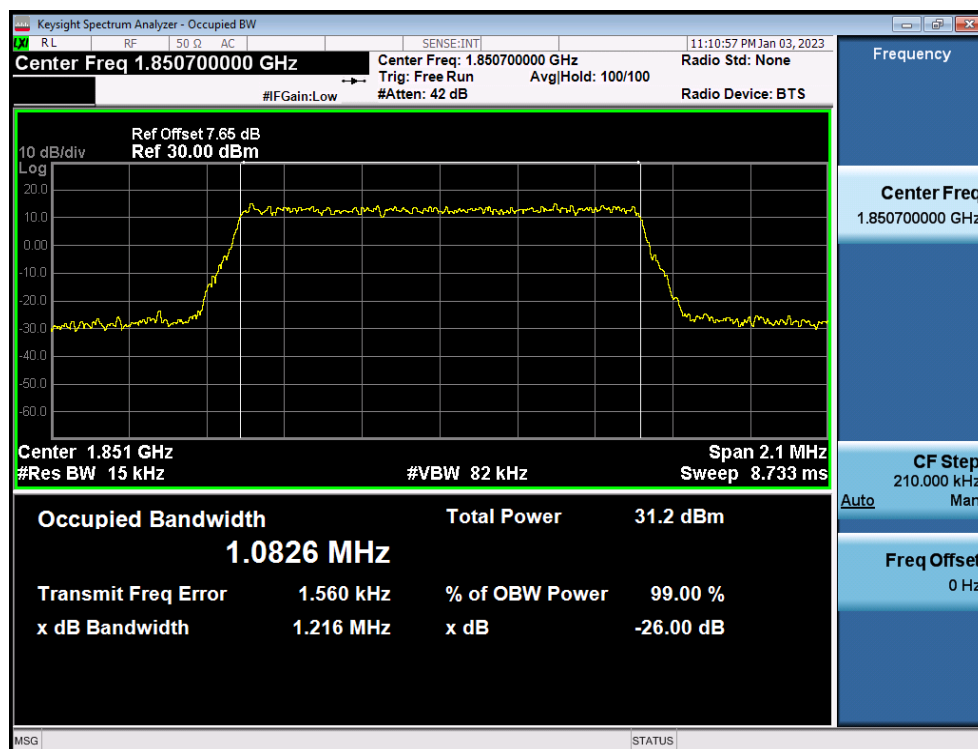
LTE Band 2 / 3MHz / 16QAM - RB Size 15



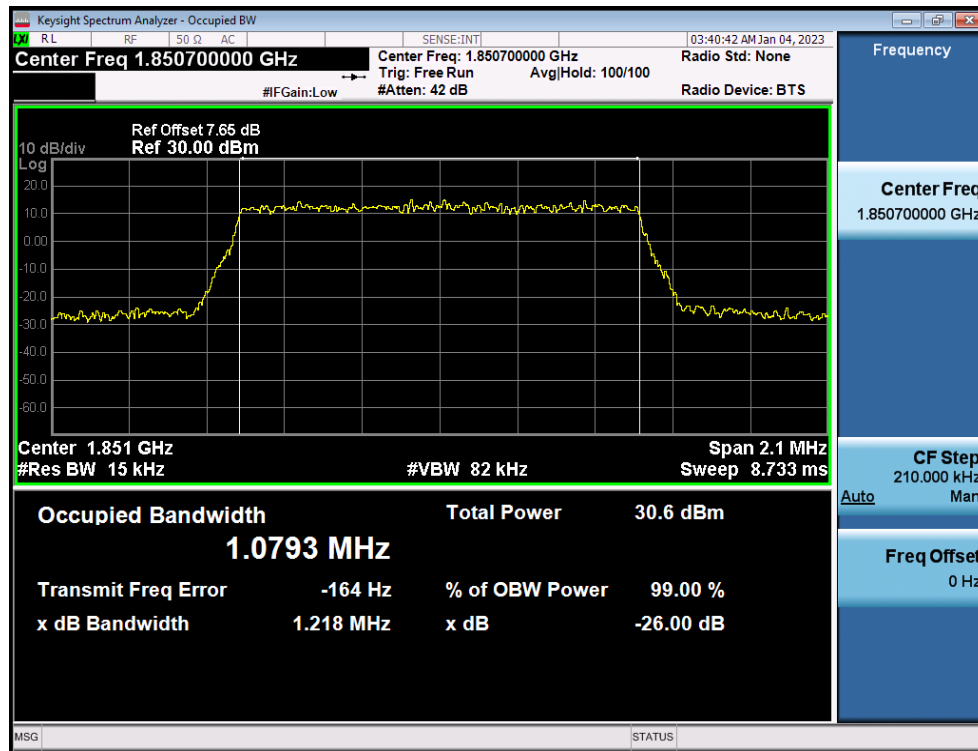
LTE Band 2 / 3MHz / 64QAM - RB Size 15



LTE Band 2 / 1.4MHz / QPSK - RB Size 6



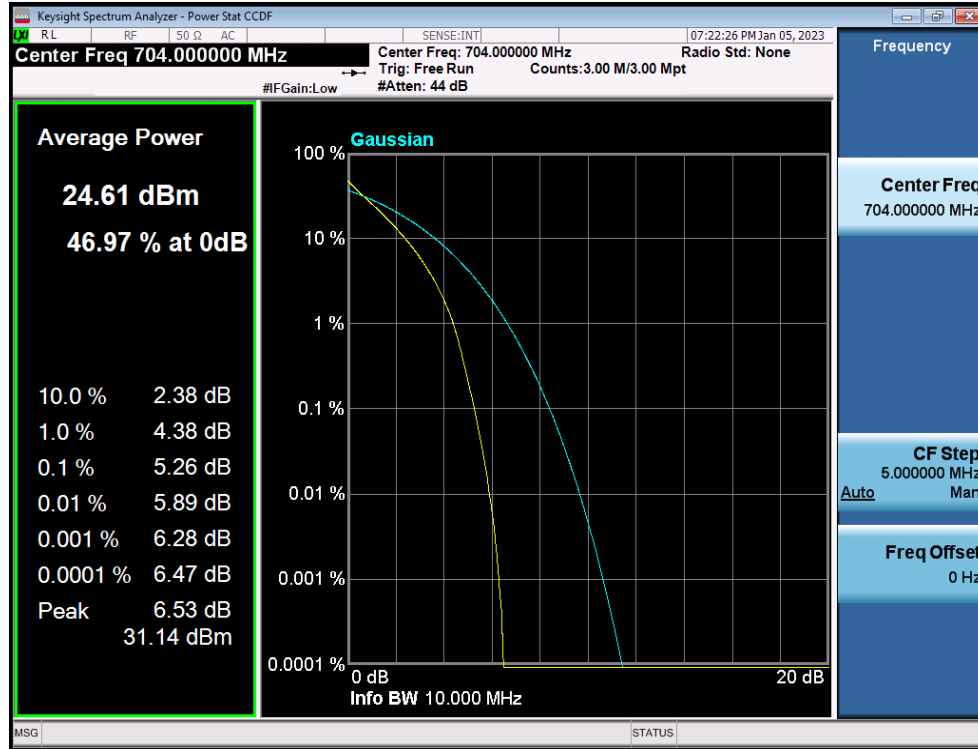
LTE Band 2 / 1.4MHz / 16QAM - RB Size 6



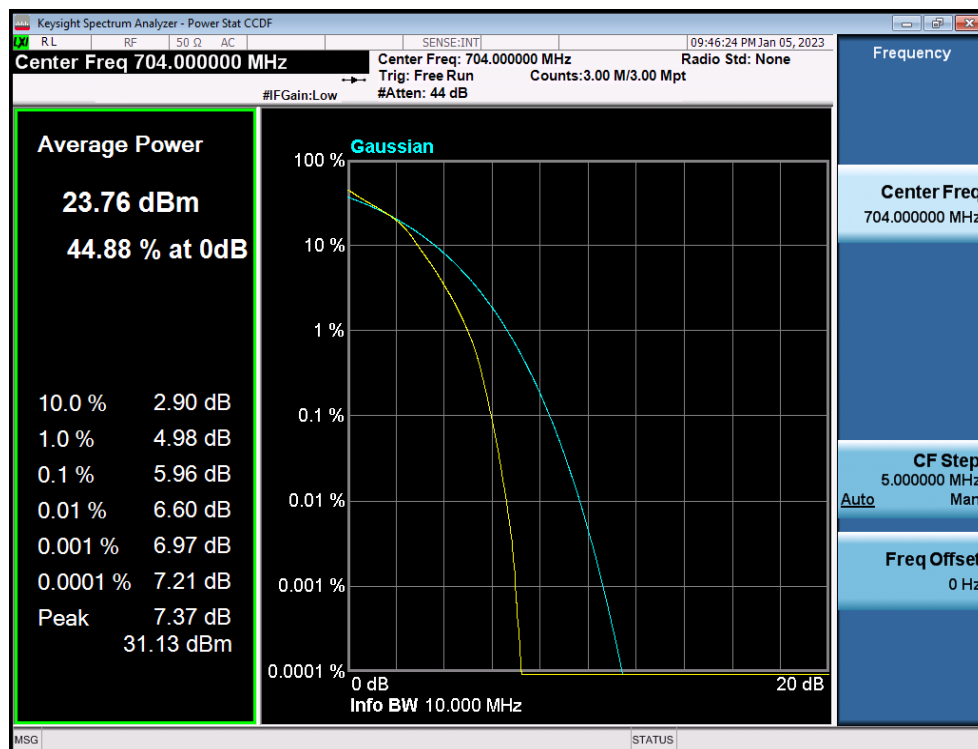
LTE Band 2 / 1.4MHz / 64QAM - RB Size 6

8.2. PEAK TO AVERAGE RATIO

8.2.1. LTE Band 12



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



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