

# TEST REPORT

## CERTIFICATE OF CONFORMITY

**Standard:** 47 CFR FCC Part 24  
47 CFR FCC Part 27  
47 CFR FCC Part 2

**Report No.:** RFBEDV-WTW-P23090682-6

**FCC ID:** VKF-MASIFDM1

**Product:** Masimo Freedom Watch

**Brand:** Masimo 

**Model No.:** Freedom Watch

**Received Date:** 2023/9/28

**Test Date:** 2023/11/15 ~ 2023/12/19

**Issued Date:** 2024/1/25

**Applicant:** Masimo Corporation

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**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
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**FCC Registration /** 788550 / TW0003

**Designation Number (1):**

**FCC Registration /** 427177 / TW0011

**Designation Number (2):**

**Approved by:** \_\_\_\_\_

*Jeremy Lin*

**Date:** \_\_\_\_\_

2024/1/25

Jeremy Lin / Project Engineer

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Prepared by : Celine Chou / Senior Specialist

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## Release Control Record

Issue No.	Description	Date Issued
RFBEDV-WTW-P23090682-6	Original release.	2024/1/25

## 1 Certificate

**Product:** Masimo Freedom Watch

**Brand:** Masimo 

**Test Model:** Freedom Watch

**Sample Status:** Engineering sample

**Applicant:** Masimo Corporation

**Test Date:** 2023/11/15 ~ 2023/12/19

**Standard:** 47 CFR FCC Part 24

47 CFR FCC Part 27

47 CFR FCC Part 2

**Measurement procedure:** ANSI/TIA/EIA-603-E 2016

ANSI C63.26-2015

KDB 971168 D01 Power Meas License Digital Systems v03r01

KDB 971168 D02 Misc Rev Approv License Devices v02r02

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

## 2 Summary of Test Results

Standard / Clause	Test Item	Result	Remark
Part 2.1046 Part 24.232 (c) Part 27.50(d) Part 27.50(c) Part 27.50(b)	Effective Radiated Power and Equivalent Isotropically Radiated Power	Pass	Meet the requirement of limit.
Part 2.1047	Modulation Characteristics	Pass	Meet the requirement of limit.
Part 24.232 (d) Part 27.50(d)	Peak to Average Ratio	Pass	Meet the requirement of limit.
Part 2.1049	Bandwidth	Pass	Meet the requirement of limit.
Part 2.1051 Part 24.238 Part 27.53(h) Part 27.53(g) Part 27.53(c)(f)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
Part 2.1053 Part 24.238 Part 27.53(h) Part 27.53(g) Part 27.53(c)(f)	Radiated Spurious Emissions below 1GHz	Pass	Minimum passing margin is -31.15 dB at 33.65 MHz
Part 2.1053 Part 24.238 Part 27.53(h) Part 27.53(g) Part 27.53(c)(f)	Radiated Spurious Emissions above 1GHz	Pass	Minimum passing margin is -1.75 dB at 1564.00 MHz
Part 2.1055 Part 24.235 Part 27.54	Frequency Stability	Pass	Meet the requirement of limit.

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

### 2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Parameter	Specification	Uncertainty (±)
Radiated Spurious Emissions below 1GHz	9 kHz ~ 30 MHz	2.44 dB
	30 MHz ~ 1 GHz	2.02 dB
Radiated Spurious Emissions above 1GHz	1 GHz ~ 18 GHz	1.01 dB
	18 GHz ~ 40 GHz	1.15 dB


The other instruments specified are routine verified to remain within the calibrated levels, no measurement uncertainty is required to be calculated.

### 2.2 Supplementary Information

There is not any deviation from the test standards for the test method, and no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

Product	Masimo Freedom Watch
Brand	Masimo 
Test Model	Freedom Watch
Status of EUT	Engineering sample
Power Supply Rating	3.87 Vdc from Battery 5 Vdc from Wireless Charger

Note:

#### 1. EUT Overview

Mode	Bandwidth	TX Frequency Range (MHz)	Modulation	Max. ERP (W)	Max. ERP (dBm)	Emission Designator
LTE Band 12	1.4 MHz	699.7 ~ 715.3	QPSK	0.007	8.37	1M09G7D
			16QAM	0.005	7.38	1M09D7W
			64QAM	0.004	6.31	1M09D7W
	3 MHz	700.5 ~ 714.5	QPSK	0.007	8.34	2M69G7D
			16QAM	0.005	7.32	2M70D7W
			64QAM	0.004	6.23	2M70D7W
	5 MHz	701.5 ~ 713.5	QPSK	0.007	8.45	4M49G7D
			16QAM	0.006	7.41	4M49D7W
			64QAM	0.004	6.31	4M49D7W
	10 MHz	704 ~ 711	QPSK	0.007	8.50	8M99G7D
			16QAM	0.006	7.44	9M00D7W
			64QAM	0.004	6.37	9M00D7W
LTE Band 13	5 MHz	779.5 ~ 784.5	QPSK	0.007	8.14	4M50G7D
			16QAM	0.005	7.12	4M49D7W
			64QAM	0.004	6.12	4M49D7W
	10 MHz	782	QPSK	0.007	8.17	8M92G7D
			16QAM	0.005	7.16	8M91D7W
			64QAM	0.004	6.12	8M90D7W
LTE Band 17	5 MHz	706.5 ~ 713.5	QPSK	0.007	8.49	4M49G7D
			16QAM	0.006	7.46	4M49D7W
			64QAM	0.004	6.43	4M50D7W
	10 MHz	709 ~ 711	QPSK	0.007	8.51	8M95G7D
			16QAM	0.006	7.49	8M95D7W
			64QAM	0.004	6.49	8M95D7W



Mode	Bandwidth	TX Frequency Range (MHz)	Modulation	Max. EIRP (W)	Max. EIRP (dBm)	Emission Designator
LTE Band 2	1.4 MHz	1850.7 ~ 1909.3	QPSK	0.041	16.08	1M10G7D
			16QAM	0.032	15.07	1M09D7W
			64QAM	0.026	14.09	1M09D7W
	3 MHz	1851.5 ~ 1908.5	QPSK	0.040	16.00	2M70G7D
			16QAM	0.032	15.03	2M70D7W
			64QAM	0.025	14.05	2M70D7W
	5 MHz	1852.5 ~ 1907.5	QPSK	0.040	16.03	4M49G7D
			16QAM	0.032	15.10	4M49D7W
			64QAM	0.025	14.06	4M50D7W
	10 MHz	1855 ~ 1905	QPSK	0.040	16.00	8M98G7D
			16QAM	0.032	15.10	8M96D7W
			64QAM	0.026	14.07	8M96D7W
	15 MHz	1857.5 ~ 1902.5	QPSK	0.040	16.05	13M4G7D
			16QAM	0.032	15.11	13M4D7W
			64QAM	0.026	14.09	13M4D7W
	20 MHz	1860 ~ 1900	QPSK	0.041	16.13	17M9G7D
			16QAM	0.033	15.16	17M9D7W
			64QAM	0.026	14.15	17M9D7W
LTE Band 4	1.4 MHz	1710.7 ~ 1754.3	QPSK	0.053	17.25	1M09G7D
			16QAM	0.042	16.24	1M09D7W
			64QAM	0.034	15.27	1M09D7W
	3 MHz	1711.5 ~ 1753.5	QPSK	0.053	17.28	2M70G7D
			16QAM	0.042	16.21	2M70D7W
			64QAM	0.033	15.21	2M70D7W
	5 MHz	1712.5 ~ 1752.5	QPSK	0.053	17.25	4M49G7D
			16QAM	0.042	16.22	4M49D7W
			64QAM	0.033	15.21	4M49D7W
	10 MHz	1715 ~ 1750	QPSK	0.053	17.27	8M96G7D
			16QAM	0.041	16.18	8M96D7W
			64QAM	0.033	15.20	8M96D7W
	15 MHz	1717.5 ~ 1747.5	QPSK	0.054	17.30	13M4G7D
			16QAM	0.042	16.25	13M4D7W
			64QAM	0.033	15.23	13M4D7W
	20 MHz	1720 ~ 1745	QPSK	0.054	17.36	17M9G7D
			16QAM	0.043	16.29	17M9D7W
			64QAM	0.034	15.26	17M9D7W

Mode	Bandwidth	TX Frequency Range (MHz)	Modulation	Max. EIRP (W)	Max. EIRP (dBm)	Emission Designator
LTE Band 66	1.4 MHz	1710.7 ~ 1779.3	QPSK	0.047	16.74	1M09G7D
			16QAM	0.037	15.71	1M09D7W
			64QAM	0.030	14.78	1M09D7W
	3 MHz	1711.5 ~ 1778.5	QPSK	0.048	16.77	2M70G7D
			16QAM	0.037	15.74	2M70D7W
			64QAM	0.030	14.76	2M70D7W
	5 MHz	1712.5 ~ 1777.5	QPSK	0.047	16.76	4M49G7D
			16QAM	0.038	15.75	4M49D7W
			64QAM	0.030	14.74	4M49D7W
	10 MHz	1715 ~ 1775	QPSK	0.047	16.74	8M96G7D
			16QAM	0.037	15.71	8M95D7W
			64QAM	0.030	14.76	8M96D7W
	15 MHz	1717.5 ~ 1772.5	QPSK	0.048	16.77	13M4G7D
			16QAM	0.037	15.67	13M4D7W
			64QAM	0.030	14.76	13M4D7W
20 MHz	1720 ~ 1770	QPSK	0.048	16.81	17M9G7D	
		16QAM	0.037	15.72	17M9D7W	
		64QAM	0.030	14.76	17M9D7W	

2. The EUT uses following accessories.

Battery		
Brand	Model	Specification
EVE	EVE443423QH	Power Rating: 3.87 Vdc, 430 mAh, 1.66 Wh
Wireless Charger		
Brand	Model	Specification
Masimo	Masimo Wireless Charger	Power Rating: 5.0 Vdc, 1.5 A

3. Simultaneously transmission condition.

Condition	Technology			
1	WWAN	WLAN 2.4G	-	NFC
2	WWAN	WLAN 5G	BT	NFC

Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.

4. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

### 3.2 Antenna Description of EUT

1. The antenna information is listed as below.

Antenna Type	PIFA	
Connector Type	Spring	
Band	Freq. Range (MHz)	Gain (dBi)
LTE B2	1850 ~ 1910	-6.3
LTE B4	1710 ~ 1755	-5.6
LTE B12	698 ~ 716	-11.8
LTE B13	777 ~ 787	-12.1
LTE B17	704 ~ 716	-11.8
LTE B66	1710 ~ 1780	-5.6

\* The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

### 3.3 Test Mode Applicability and Tested Channel Detail

Pre-Scan:	1. EUT can be used in the following ways: X/ Y/ Z. Pre-scan in these ways and find the worst case as a representative test condition.
Worst Case:	1. X/ Y/ Z Worst Condition: X axis. 2. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

#### For LTE Band 2

Test Item	Tested Channel	Channel Bandwidth	Modulation	Mode
EIRP	18607 (1850.70 MHz) 18900 (1880.00 MHz) 19193 (1909.30 MHz)	1.4 MHz	QPSK / 16QAM / 64QAM	1 RB Half RB Full RB
	18615 (1851.50 MHz) 18900 (1880.00 MHz) 19185 (1908.50 MHz)	3 MHz	QPSK / 16QAM / 64QAM	1 RB Half RB Full RB
	18625 (1852.50 MHz) 18900 (1880.00 MHz) 19175 (1907.50 MHz)	5 MHz	QPSK / 16QAM / 64QAM	1 RB Half RB Full RB
	18650 (1855.00 MHz) 18900 (1880.00 MHz) 19150 (1905.00 MHz)	10 MHz	QPSK / 16QAM / 64QAM	1 RB Half RB Full RB
	18675 (1857.50 MHz) 18900 (1880.00 MHz) 19125 (1902.50 MHz)	15 MHz	QPSK / 16QAM / 64QAM	1 RB Half RB Full RB
	18700 (1860.00 MHz) 18900 (1880.00 MHz) 19100 (1900.00 MHz)	20 MHz	QPSK / 16QAM / 64QAM	1 RB Half RB Full RB
	Modulation Characteristics	18900 (1880.00 MHz)	20 MHz	QPSK / 16QAM / 64QAM
Occupied Bandwidth	18607 (1850.70 MHz) 18900 (1880.00 MHz) 19193 (1909.30 MHz)	1.4 MHz	QPSK / 16QAM / 64QAM	Full RB
	18615 (1851.50 MHz) 18900 (1880.00 MHz) 19185 (1908.50 MHz)	3 MHz	QPSK / 16QAM / 64QAM	Full RB
	18625 (1852.50 MHz) 18900 (1880.00 MHz) 19175 (1907.50 MHz)	5 MHz	QPSK / 16QAM / 64QAM	Full RB
	18650 (1855.00 MHz) 18900 (1880.00 MHz) 19150 (1905.00 MHz)	10 MHz	QPSK / 16QAM / 64QAM	Full RB
	18675 (1857.50 MHz) 18900 (1880.00 MHz) 19125 (1902.50 MHz)	15 MHz	QPSK / 16QAM / 64QAM	Full RB
	18700 (1860.00 MHz) 18900 (1880.00 MHz) 19100 (1900.00 MHz)	20 MHz	QPSK / 16QAM / 64QAM	Full RB

Test Item	Tested Channel	Channel Bandwidth	Modulation	Mode
Peak to Average Ratio	18607 (1850.70 MHz) 18900 (1880.00 MHz) 19193 (1909.30 MHz)	1.4 MHz	QPSK / 16QAM / 64QAM	1 RB
	18615 (1851.50 MHz) 18900 (1880.00 MHz) 19185 (1908.50 MHz)	3 MHz	QPSK / 16QAM / 64QAM	1 RB
	18625 (1852.50 MHz) 18900 (1880.00 MHz) 19175 (1907.50 MHz)	5 MHz	QPSK / 16QAM / 64QAM	1 RB
	18650 (1855.00 MHz) 18900 (1880.00 MHz) 19150 (1905.00 MHz)	10 MHz	QPSK / 16QAM / 64QAM	1 RB
	18675 (1857.50 MHz) 18900 (1880.00 MHz) 19125 (1902.50 MHz)	15 MHz	QPSK / 16QAM / 64QAM	1 RB
	18700 (1860.00 MHz) 18900 (1880.00 MHz) 19100 (1900.00 MHz)	20 MHz	QPSK / 16QAM / 64QAM	1 RB
	Conducted Emission	18607 (1850.70 MHz) 18900 (1880.00 MHz) 19193 (1909.30 MHz)	1.4 MHz	QPSK
18615 (1851.50 MHz) 18900 (1880.00 MHz) 19185 (1908.50 MHz)		3 MHz	QPSK	1 RB Full RB
18625 (1852.50 MHz) 18900 (1880.00 MHz) 19175 (1907.50 MHz)		5 MHz	QPSK	1 RB Full RB
18650 (1855.00 MHz) 18900 (1880.00 MHz) 19150 (1905.00 MHz)		10 MHz	QPSK	1 RB Full RB
18675 (1857.50 MHz) 18900 (1880.00 MHz) 19125 (1902.50 MHz)		15 MHz	QPSK	1 RB Full RB
18700 (1860.00 MHz) 18900 (1880.00 MHz) 19100 (1900.00 MHz)		20 MHz	QPSK	1 RB Full RB

Test Item	Tested Channel	Channel Bandwidth	Modulation	Mode
Radiated Spurious Emissions below 1GHz	18900 (1880.00 MHz)	20 MHz	QPSK	1 RB
Radiated Spurious Emissions above 1GHz	18607 (1850.70 MHz) 18900 (1880.00 MHz) 19193 (1909.30 MHz)	1.4 MHz	QPSK	1 RB
	18625 (1852.50 MHz) 18900 (1880.00 MHz) 19175 (1907.50 MHz)	5 MHz	QPSK	1 RB
	18700 (1860.00 MHz) 18900 (1880.00 MHz) 19100 (1900.00 MHz)	20 MHz	QPSK	1 RB
	18607 (1850.70 MHz) 19193 (1909.30 MHz)	1.4 MHz	QPSK	Full RB
	18615 (1851.50 MHz) 19185 (1908.50 MHz)	3 MHz	QPSK	Full RB
	18625 (1852.50 MHz) 19175 (1907.50 MHz)	5 MHz	QPSK	Full RB
Frequency Stability	18650 (1855.00 MHz) 19150 (1905.00 MHz)	10 MHz	QPSK	Full RB
	18675 (1857.50 MHz) 19125 (1902.50 MHz)	15 MHz	QPSK	Full RB
	18700 (1860.00 MHz) 19100 (1900.00 MHz)	20 MHz	QPSK	Full RB

**For LTE Band 4**

Test Item	Tested Channel	Channel Bandwidth	Modulation	Mode
EIRP	19957 (1710.70 MHz) 20175 (1732.50 MHz) 20393 (1754.30 MHz)	1.4 MHz	QPSK / 16QAM / 64QAM	1 RB Half RB Full RB
	19965 (1711.50 MHz) 20175 (1732.50 MHz) 20385 (1753.50 MHz)	3 MHz	QPSK / 16QAM / 64QAM	1 RB Half RB Full RB
	19975 (1712.50 MHz) 20175 (1732.50 MHz) 20375 (1752.50 MHz)	5 MHz	QPSK / 16QAM / 64QAM	1 RB Half RB Full RB
	20000 (1715.00 MHz) 20175 (1732.50 MHz) 20350 (1750.00 MHz)	10 MHz	QPSK / 16QAM / 64QAM	1 RB Half RB Full RB
	20025 (1717.50 MHz) 20175 (1732.50 MHz) 20325 (1747.50 MHz)	15 MHz	QPSK / 16QAM / 64QAM	1 RB Half RB Full RB
	20050 (1720.00 MHz) 20175 (1732.50 MHz) 20300 (1745.00 MHz)	20 MHz	QPSK / 16QAM / 64QAM	1 RB Half RB Full RB
Modulation Characteristics	20175 (1732.50 MHz)	20 MHz	QPSK / 16QAM / 64QAM	Full RB
Occupied Bandwidth	19957 (1710.70 MHz) 20175 (1732.50 MHz) 20393 (1754.30 MHz)	1.4 MHz	QPSK / 16QAM / 64QAM	Full RB
	19965 (1711.50 MHz) 20175 (1732.50 MHz) 20385 (1753.50 MHz)	3 MHz	QPSK / 16QAM / 64QAM	Full RB
	19975 (1712.50 MHz) 20175 (1732.50 MHz) 20375 (1752.50 MHz)	5 MHz	QPSK / 16QAM / 64QAM	Full RB
	20000 (1715.00 MHz) 20175 (1732.50 MHz) 20350 (1750.00 MHz)	10 MHz	QPSK / 16QAM / 64QAM	Full RB
	20025 (1717.50 MHz) 20175 (1732.50 MHz) 20325 (1747.50 MHz)	15 MHz	QPSK / 16QAM / 64QAM	Full RB
	20050 (1720.00 MHz) 20175 (1732.50 MHz) 20300 (1745.00 MHz)	20 MHz	QPSK / 16QAM / 64QAM	Full RB

Test Item	Tested Channel	Channel Bandwidth	Modulation	Mode
Peak to Average Ratio	19957 (1710.70 MHz) 20175 (1732.50 MHz) 20393 (1754.30 MHz)	1.4 MHz	QPSK / 16QAM / 64QAM	1 RB
	19965 (1711.50 MHz) 20175 (1732.50 MHz) 20385 (1753.50 MHz)	3 MHz	QPSK / 16QAM / 64QAM	1 RB
	19975 (1712.50 MHz) 20175 (1732.50 MHz) 20375 (1752.50 MHz)	5 MHz	QPSK / 16QAM / 64QAM	1 RB
	20000 (1715.00 MHz) 20175 (1732.50 MHz) 20350 (1750.00 MHz)	10 MHz	QPSK / 16QAM / 64QAM	1 RB
	20025 (1717.50 MHz) 20175 (1732.50 MHz) 20325 (1747.50 MHz)	15 MHz	QPSK / 16QAM / 64QAM	1 RB
	20050 (1720.00 MHz) 20175 (1732.50 MHz) 20300 (1745.00 MHz)	20 MHz	QPSK / 16QAM / 64QAM	1 RB
	Conducted Emission	19957 (1710.70 MHz) 20175 (1732.50 MHz) 20393 (1754.30 MHz)	1.4 MHz	QPSK
19965 (1711.50 MHz) 20175 (1732.50 MHz) 20385 (1753.50 MHz)		3 MHz	QPSK	1 RB Full RB
19975 (1712.50 MHz) 20175 (1732.50 MHz) 20375 (1752.50 MHz)		5 MHz	QPSK	1 RB Full RB
20000 (1715.00 MHz) 20175 (1732.50 MHz) 20350 (1750.00 MHz)		10 MHz	QPSK	1 RB Full RB
20025 (1717.50 MHz) 20175 (1732.50 MHz) 20325 (1747.50 MHz)		15 MHz	QPSK	1 RB Full RB
20050 (1720.00 MHz) 20175 (1732.50 MHz) 20300 (1745.00 MHz)		20 MHz	QPSK	1 RB Full RB



Test Item	Tested Channel	Channel Bandwidth	Modulation	Mode
Radiated Spurious Emissions below 1GHz	20175 (1732.50 MHz)	20 MHz	QPSK	1 RB
Radiated Spurious Emissions above 1GHz	19957 (1710.70 MHz) 20175 (1732.50 MHz) 20393 (1754.30 MHz)	1.4 MHz	QPSK	1 RB
	19975 (1712.50 MHz) 20175 (1732.50 MHz) 20375 (1752.50 MHz)	5 MHz	QPSK	1 RB
	20050 (1720.00 MHz) 20175 (1732.50 MHz) 20300 (1745.00 MHz)	20 MHz	QPSK	1 RB
	19957 (1710.70 MHz) 20393 (1754.30 MHz)	1.4 MHz	QPSK	Full RB
	19965 (1711.50 MHz) 20385 (1753.50 MHz)	3 MHz	QPSK	Full RB
	19975 (1712.50 MHz) 20375 (1752.50 MHz)	5 MHz	QPSK	Full RB
Frequency Stability	20000 (1715.00 MHz) 20350 (1750.00 MHz)	10 MHz	QPSK	Full RB
	20025 (1717.50 MHz) 20325 (1747.50 MHz)	15 MHz	QPSK	Full RB
	20050 (1720.00 MHz) 20300 (1745.00 MHz)	20 MHz	QPSK	Full RB

## For LTE Band 12

Test Item	Tested Channel	Channel Bandwidth	Modulation	Mode
ERP	23017 (699.70 MHz) 23095 (707.50 MHz) 23173 (715.30 MHz)	1.4 MHz	QPSK / 16QAM / 64QAM	1 RB Half RB Full RB
	23025 (700.50 MHz) 23095 (707.50 MHz) 23165 (714.50 MHz)	3 MHz	QPSK / 16QAM / 64QAM	1 RB Half RB Full RB
	23035 (701.50 MHz) 23095 (707.50 MHz) 23155 (713.50 MHz)	5 MHz	QPSK / 16QAM / 64QAM	1 RB Half RB Full RB
	23060 (704.00 MHz) 23095 (707.50 MHz) 23130 (711.00 MHz)	10 MHz	QPSK / 16QAM / 64QAM	1 RB Half RB Full RB
Modulation Characteristics	23095 (707.50 MHz)	10 MHz	QPSK / 16QAM / 64QAM	Full RB
Occupied Bandwidth	23017 (699.70 MHz) 23095 (707.50 MHz) 23173 (715.30 MHz)	1.4 MHz	QPSK / 16QAM / 64QAM	Full RB
	23025 (700.50 MHz) 23095 (707.50 MHz) 23165 (714.50 MHz)	3 MHz	QPSK / 16QAM / 64QAM	Full RB
	23035 (701.50 MHz) 23095 (707.50 MHz) 23155 (713.50 MHz)	5 MHz	QPSK / 16QAM / 64QAM	Full RB
	23060 (704.00 MHz) 23095 (707.50 MHz) 23130 (711.00 MHz)	10 MHz	QPSK / 16QAM / 64QAM	Full RB
Peak to Average Ratio	23017 (699.70 MHz) 23095 (707.50 MHz) 23173 (715.30 MHz)	1.4 MHz	QPSK / 16QAM / 64QAM	1 RB
	23025 (700.50 MHz) 23095 (707.50 MHz) 23165 (714.50 MHz)	3 MHz	QPSK / 16QAM / 64QAM	1 RB
	23035 (701.50 MHz) 23095 (707.50 MHz) 23155 (713.50 MHz)	5 MHz	QPSK / 16QAM / 64QAM	1 RB
	23060 (704.00 MHz) 23095 (707.50 MHz) 23130 (711.00 MHz)	10 MHz	QPSK / 16QAM / 64QAM	1 RB

Test Item	Tested Channel	Channel Bandwidth	Modulation	Mode
Conducted Emission	23017 (699.70 MHz) 23095 (707.50 MHz) 23173 (715.30 MHz)	1.4 MHz	QPSK	1 RB Full RB
	23025 (700.50 MHz) 23095 (707.50 MHz) 23165 (714.50 MHz)	3 MHz	QPSK	1 RB Full RB
	23035 (701.50 MHz) 23095 (707.50 MHz) 23155 (713.50 MHz)	5 MHz	QPSK	1 RB Full RB
	23060 (704.00 MHz) 23095 (707.50 MHz) 23130 (711.00 MHz)	10 MHz	QPSK	1 RB Full RB
Radiated Spurious Emissions below 1GHz	23095 (707.50 MHz)	10 MHz	QPSK	1 RB
Radiated Spurious Emissions above 1GHz	23017 (699.70 MHz) 23095 (707.50 MHz) 23173 (715.30 MHz)	1.4 MHz	QPSK	1 RB
	23035 (701.50 MHz) 23095 (707.50 MHz) 23155 (713.50 MHz)	5 MHz	QPSK	1 RB
	23060 (704.00 MHz) 23095 (707.50 MHz) 23130 (711.00 MHz)	10 MHz	QPSK	1 RB
Frequency Stability	23017 (699.70 MHz) 23173 (715.30 MHz)	1.4 MHz	QPSK	Full RB
	23025 (700.50 MHz) 23165 (714.50 MHz)	3 MHz	QPSK	Full RB
	23035 (701.50 MHz) 23155 (713.50 MHz)	5 MHz	QPSK	Full RB
	23060 (704.00 MHz) 23130 (711.00 MHz)	10 MHz	QPSK	Full RB

**For LTE Band 13**

Test Item	Tested Channel	Channel Bandwidth	Modulation	Mode
ERP	23205 (779.50 MHz) 23230 (782.00 MHz) 23255 (784.50 MHz)	5 MHz	QPSK / 16QAM / 64QAM	1 RB Half RB Full RB
	23230 (782.00 MHz)	10 MHz	QPSK / 16QAM / 64QAM	1 RB Half RB Full RB
Modulation Characteristics	23230 (782.00 MHz)	10 MHz	QPSK / 16QAM / 64QAM	Full RB
Occupied Bandwidth	23205 (779.50 MHz) 23230 (782.00 MHz) 23255 (784.50 MHz)	5 MHz	QPSK / 16QAM / 64QAM	Full RB
	23230 (782.00 MHz)	10 MHz	QPSK / 16QAM / 64QAM	Full RB
Peak to Average Ratio	23205 (779.50 MHz) 23230 (782.00 MHz) 23255 (784.50 MHz)	5 MHz	QPSK / 16QAM / 64QAM	1 RB
	23230 (782.00 MHz)	10 MHz	QPSK / 16QAM / 64QAM	1 RB
Conducted Emission	23205 (779.50 MHz) 23230 (782.00 MHz) 23255 (784.50 MHz)	5 MHz	QPSK	1 RB Full RB
	23230 (782.00 MHz)	10 MHz	QPSK	1 RB Full RB
Radiated Spurious Emissions below 1GHz	23230 (782.00 MHz)	10 MHz	QPSK	1 RB
Radiated Spurious Emissions above 1GHz	23205 (779.50 MHz) 23230 (782.00 MHz) 23255 (784.50 MHz)	5 MHz	QPSK	1 RB
	23230 (782.00 MHz)	10 MHz	QPSK	1 RB
Frequency Stability	23205 (779.50 MHz) 23255 (784.50 MHz)	5 MHz	QPSK	Full RB
	23230 (782.00 MHz)	10 MHz	QPSK	Full RB

**For LTE Band 17**

Test Item	Tested Channel	Channel Bandwidth	Modulation	Mode
ERP	23755 (706.50 MHz) 23790 (710.00 MHz) 23825 (713.50 MHz)	5 MHz	QPSK / 16QAM / 64QAM	1 RB Half RB Full RB
	23780 (709.00 MHz) 23790 (710.00 MHz) 23800 (711.00 MHz)	10 MHz	QPSK / 16QAM / 64QAM	1 RB Half RB Full RB
Modulation Characteristics	23790 (710.00 MHz)	10 MHz	QPSK / 16QAM / 64QAM	Full RB
Occupied Bandwidth	23755 (706.50 MHz) 23790 (710.00 MHz) 23825 (713.50 MHz)	5 MHz	QPSK / 16QAM / 64QAM	Full RB
	23780 (709.00 MHz) 23790 (710.00 MHz) 23800 (711.00 MHz)	10 MHz	QPSK / 16QAM / 64QAM	Full RB
Peak to Average Ratio	23755 (706.50 MHz) 23790 (710.00 MHz) 23825 (713.50 MHz)	5 MHz	QPSK / 16QAM / 64QAM	1 RB
	23780 (709.00 MHz) 23790 (710.00 MHz) 23800 (711.00 MHz)	10 MHz	QPSK / 16QAM / 64QAM	1 RB
Conducted Emission	23755 (706.50 MHz) 23790 (710.00 MHz) 23825 (713.50 MHz)	5 MHz	QPSK	1 RB Full RB
	23780 (709.00 MHz) 23790 (710.00 MHz) 23800 (711.00 MHz)	10 MHz	QPSK	1 RB Full RB
Radiated Spurious Emissions below 1GHz	23800 (711.00 MHz)	10 MHz	QPSK	1 RB
Radiated Spurious Emissions above 1GHz	23755 (706.50 MHz) 23790 (710.00 MHz) 23825 (713.50 MHz)	5 MHz	QPSK	1 RB
	23780 (709.00 MHz) 23790 (710.00 MHz) 23800 (711.00 MHz)	10 MHz	QPSK	1 RB
Frequency Stability	23755 (706.50 MHz) 23825 (713.50 MHz)	5 MHz	QPSK	Full RB
	23780 (709.00 MHz) 23800 (711.00 MHz)	10 MHz	QPSK	Full RB

For LTE Band 66

Test Item	Tested Channel	Channel Bandwidth	Modulation	Mode
EIRP	131979 (1710.70 MHz) 132322 (1745.00 MHz) 132665 (1779.30 MHz)	1.4 MHz	QPSK / 16QAM / 64QAM	1 RB Half RB Full RB
	131987 (1711.50 MHz) 132322 (1745.00 MHz) 132657 (1778.50 MHz)	3 MHz	QPSK / 16QAM / 64QAM	1 RB Half RB Full RB
	131997 (1712.50 MHz) 132322 (1745.00 MHz) 132647 (1777.50 MHz)	5 MHz	QPSK / 16QAM / 64QAM	1 RB Half RB Full RB
	132022 (1715.00 MHz) 132322 (1745.00 MHz) 132622 (1775.00 MHz)	10 MHz	QPSK / 16QAM / 64QAM	1 RB Half RB Full RB
	132047 (1717.50 MHz) 132322 (1745.00 MHz) 132597 (1772.50 MHz)	15 MHz	QPSK / 16QAM / 64QAM	1 RB Half RB Full RB
	132072 (1720.00 MHz) 132322 (1745.00 MHz) 132572 (1770.00 MHz)	20 MHz	QPSK / 16QAM / 64QAM	1 RB Half RB Full RB
	Modulation Characteristics	132322 (1745.00 MHz)	20 MHz	QPSK / 16QAM / 64QAM
Occupied Bandwidth	131979 (1710.70 MHz) 132322 (1745.00 MHz) 132665 (1779.30 MHz)	1.4 MHz	QPSK / 16QAM / 64QAM	Full RB
	131987 (1711.50 MHz) 132322 (1745.00 MHz) 132657 (1778.50 MHz)	3 MHz	QPSK / 16QAM / 64QAM	Full RB
	131997 (1712.50 MHz) 132322 (1745.00 MHz) 132647 (1777.50 MHz)	5 MHz	QPSK / 16QAM / 64QAM	Full RB
	132022 (1715.00 MHz) 132322 (1745.00 MHz) 132622 (1775.00 MHz)	10 MHz	QPSK / 16QAM / 64QAM	Full RB
	132047 (1717.50 MHz) 132322 (1745.00 MHz) 132597 (1772.50 MHz)	15 MHz	QPSK / 16QAM / 64QAM	Full RB
	132072 (1720.00 MHz) 132322 (1745.00 MHz) 132572 (1770.00 MHz)	20 MHz	QPSK / 16QAM / 64QAM	Full RB

Test Item	Tested Channel	Channel Bandwidth	Modulation	Mode
Peak to Average Ratio	131979 (1710.70 MHz) 132322 (1745.00 MHz) 132665 (1779.30 MHz)	1.4 MHz	QPSK / 16QAM / 64QAM	1 RB
	131987 (1711.50 MHz) 132322 (1745.00 MHz) 132657 (1778.50 MHz)	3 MHz	QPSK / 16QAM / 64QAM	1 RB
	131997 (1712.50 MHz) 132322 (1745.00 MHz) 132647 (1777.50 MHz)	5 MHz	QPSK / 16QAM / 64QAM	1 RB
	132022 (1715.00 MHz) 132322 (1745.00 MHz) 132622 (1775.00 MHz)	10 MHz	QPSK / 16QAM / 64QAM	1 RB
	132047 (1717.50 MHz) 132322 (1745.00 MHz) 132597 (1772.50 MHz)	15 MHz	QPSK / 16QAM / 64QAM	1 RB
	132072 (1720.00 MHz) 132322 (1745.00 MHz) 132572 (1770.00 MHz)	20 MHz	QPSK / 16QAM / 64QAM	1 RB
	Conducted Emission	131979 (1710.70 MHz) 132322 (1745.00 MHz) 132665 (1779.30 MHz)	1.4 MHz	QPSK
131987 (1711.50 MHz) 132322 (1745.00 MHz) 132657 (1778.50 MHz)		3 MHz	QPSK	1 RB Full RB
131997 (1712.50 MHz) 132322 (1745.00 MHz) 132647 (1777.50 MHz)		5 MHz	QPSK	1 RB Full RB
132022 (1715.00 MHz) 132322 (1745.00 MHz) 132622 (1775.00 MHz)		10 MHz	QPSK	1 RB Full RB
132047 (1717.50 MHz) 132322 (1745.00 MHz) 132597 (1772.50 MHz)		15 MHz	QPSK	1 RB Full RB
132072 (1720.00 MHz) 132322 (1745.00 MHz) 132572 (1770.00 MHz)		20 MHz	QPSK	1 RB Full RB

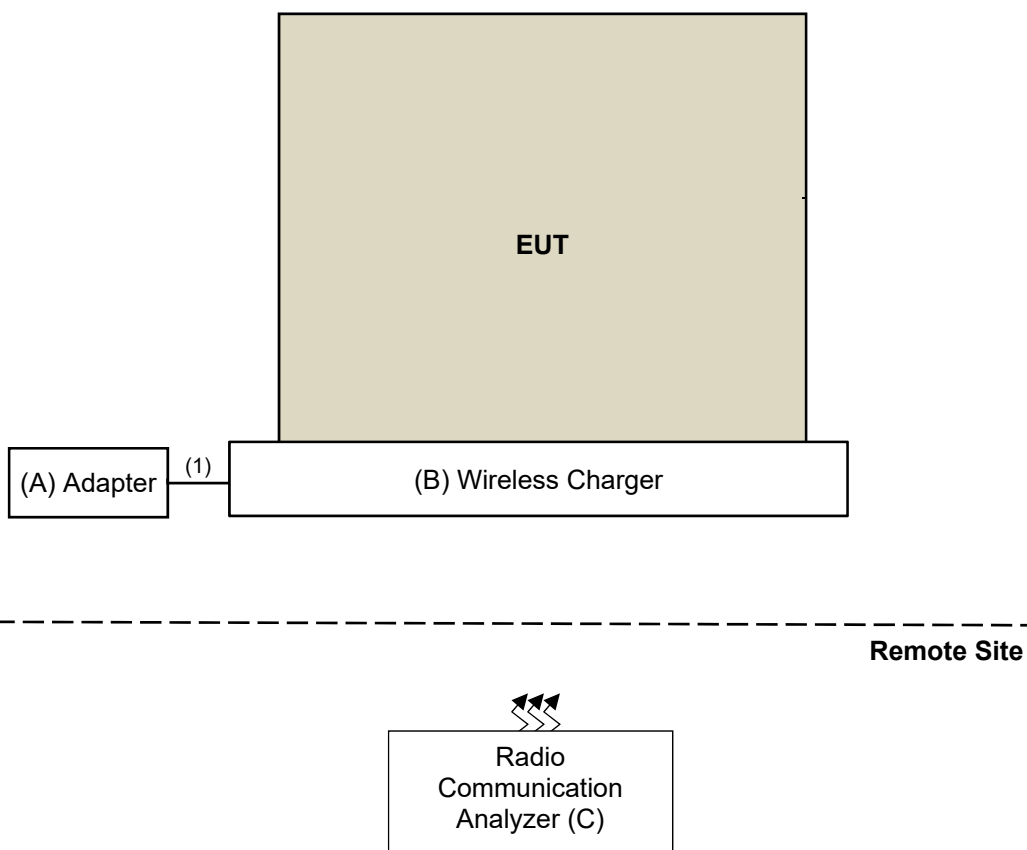
Test Item	Tested Channel	Channel Bandwidth	Modulation	Mode
Radiated Spurious Emissions below 1GHz	132322 (1745.00 MHz)	20 MHz	QPSK	1 RB
Radiated Spurious Emissions above 1GHz	131979 (1710.70 MHz) 132322 (1745.00 MHz) 132665 (1779.30 MHz)	1.4 MHz	QPSK	1 RB
	131997 (1712.50 MHz) 132322 (1745.00 MHz) 132647 (1777.50 MHz)	5 MHz	QPSK	1 RB
	132072 (1720.00 MHz) 132322 (1745.00 MHz) 132572 (1770.00 MHz)	20 MHz	QPSK	1 RB
	131979 (1710.70 MHz) 132665 (1779.30 MHz)	1.4 MHz	QPSK	Full RB
	131987 (1711.50 MHz) 132657 (1778.50 MHz)	3 MHz	QPSK	Full RB
	131997 (1712.50 MHz) 132647 (1777.50 MHz)	5 MHz	QPSK	Full RB
Frequency Stability	132022 (1715.00 MHz) 132622 (1775.00 MHz)	10 MHz	QPSK	Full RB
	132047 (1717.50 MHz) 132597 (1772.50 MHz)	15 MHz	QPSK	Full RB
	132072 (1720.00 MHz) 132572 (1770.00 MHz)	20 MHz	QPSK	Full RB



### 3.4 Test Program Used and Operation Descriptions

There is no need to controlling software during the test, and the EUT can be paired with the Radio Communication Analyzer to test the connection when it is powered on.

### 3.5 Connection Diagram of EUT and Peripheral Devices



### 3.6 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Adapter	Masimo	NY-PW101-05002400	N/A	N/A	Supplied by applicant
B	Wireless Charger	Masimo	N/A	N/A	N/A	Supplied by applicant
C	Radio Communication Analyzer	Anritsu	MT8821C	6201462755	N/A	Provided by Lab

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	USB Cable	1	1	No	0	Supplied by applicant Attached on Wireless Charger

## 4 Test Instruments

The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.1 Effective Radiated Power and Equivalent Isotropically Radiated Power

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
PXA Signal Analyzer Keysight	N9030B	MY57140488	2023/3/6	2024/3/5
Radio Communication Analyzer Anritsu	MT8821C	6201462755	2023/3/3	2024/3/2
		6261806803	2023/2/18	2024/2/17
Software BV	ADT_RF Test Software V7.6.5.4	N/A	N/A	N/A

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2023/11/15 ~ 2023/12/15

### 4.2 Modulation Characteristics

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
PXA Signal Analyzer Keysight	N9030B	MY57140488	2023/3/6	2024/3/5
Radio Communication Analyzer Anritsu	MT8821C	6201462755	2023/3/3	2024/3/2
		6272278312	2023/7/6	2024/7/5
Software BV	ADT_RF Test Software V7.6.5.4	N/A	N/A	N/A

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2023/11/15 ~ 2023/12/15

### 4.3 Peak to Average Ratio

Refer to section 4.2 to get information of the instruments.

### 4.4 Bandwidth

Refer to section 4.2 to get information of the instruments.

### 4.5 Conducted Spurious Emissions

Refer to section 4.2 to get information of the instruments.

#### 4.6 Radiated Spurious Emissions below 1GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower Max-Full	UNAT_5+	PAD-CH6-01	N/A	N/A
Antenna Tower Controller Max-Full	MF-7802	N/A	N/A	N/A
Bi_Log Antenna Schwarzbeck	VULB 9168	9168-616	2023/10/18	2024/10/17
Loop Antenna Electro-Metrics	EM-6879	269	2023/9/23	2024/9/22
Loop Antenna TESEQ	HLA 6121	45745	2023/8/8	2024/8/7
MXE EMI Receiver Agilent	N9038A	MY52260177	2023/9/15	2024/9/14
Preamplifier Agilent	310N	187226	2023/6/13	2024/6/12
Preamplifier EMCI	EMC001340	980201	2023/9/27	2024/9/26
RF Coaxial Cable EMCI	5D-NM-BM	140903+140902	2023/1/7	2024/1/6
RF Coaxial Cable ETS-Lindgren	EMC104-SM-SM-10000	Cable-CH1-01(RFC-SMS-100-SMS-120+RFC-SMS-100-SMS-4)	2023/6/13	2024/6/12
	RFC-SMS-100-SMS-24-IN	Cable-CH1-02(RFC-SMS-100-SMS-24)	2023/6/13	2024/6/12
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Turn Table Max-Full	TT-1510	N/A	N/A	N/A
Turn Table Controller Max-Full	MF-7802	N/A	N/A	N/A

Notes:

1. The test was performed in XD - 966 chamber 6.
2. Tested Date: 2023/12/19

#### 4.7 Radiated Spurious Emissions above 1GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower Max-Full	UNAT_5+	PAD-CH6-01	N/A	N/A
Antenna Tower Controller Max-Full	MF-7802	N/A	N/A	N/A
Boresight antenna tower fixture BV	BAF-02	8	N/A	N/A
Horn Antenna ETS-Lindgren	3117	00143293	2023/11/12	2024/11/11
Horn Antenna Schwarzbeck	BBHA 9170	BBHA9170241	2023/10/16	2024/10/15
MXE EMI Receiver Agilent	N9038A	MY52260177	2023/9/15	2024/9/14
Preamplifier Agilent	83017A	MY39501373	2023/6/13	2024/6/12
Preamplifier EMCI	EMC 184045	980116	2023/9/27	2024/9/26
RF Coaxial Cable ETS-Lindgren	EMC104-SM-SM-10000	Cable-CH1-01(RFC-SMS-100-SMS-120+RFC-SMS-100-SMS-4)	2023/6/13	2024/6/12
	RFC-SMS-100-SMS-24-IN	Cable-CH1-02(RFC-SMS-100-SMS-24)	2023/6/13	2024/6/12
RF Coaxial Cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/4)	2023/1/7	2024/1/6
RF Coaxial Cable HUBER+SUHNER&EMCI	SUCOFLEX 104& EMC104-SM-SM8000	CABLE-CH9-02 (248780+171006)	2023/1/7	2024/1/6
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Turn Table Max-Full	TT-1510	N/A	N/A	N/A
Turn Table Controller Max-Full	MF-7802	N/A	N/A	N/A

Notes:

1. The test was performed in XD - 966 chamber 6.
2. Tested Date: 2023/11/25 ~ 2023/11/26

#### 4.8 Frequency Stability

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
3-channel DC power supply JIN YIH Technology	ODP3033	ODP30332128138	N/A	N/A
Digital Multimeter Fluke	87-III	70360742	2023/7/6	2024/7/5
Signal and spectrum analyzer R&S	FSV3044	101105	2023/2/22	2024/2/21
Software BV	ADT_RF Test Software V6.6.5.4	N/A	N/A	N/A
Temperature & Humidity Chamber TERCHY	HRM-120RF	931022	2022/12/27	2023/12/26
Radio Communication Analyzer Anritsu	MT8821C	6201462755	2023/3/3	2024/3/2

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2023/11/15 ~ 2023/12/15

## 5 Limits of Test Items

### 5.1 Effective Radiated Power and Equivalent Isotropically Radiated Power

#### For LTE Band 2:

Mobile and portable stations are limited to 2 watts EIRP.

#### For LTE Band 4, LTE Band 66:

Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.

#### For LTE Band 12, LTE Band 17:

Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

#### For LTE Band 13:

Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.

### 5.2 Modulation Characteristics

A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

### 5.3 Peak to Average Ratio

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB.

### 5.4 Bandwidth

According to FCC 47 CFR part 2.1049, 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% of the total mean power radiated by a given emission.

## 5.5 Conducted Spurious Emissions

### For LTE Band 2:

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB. The emission limit equal to  $-13$  dBm.

### For LTE Band 4:

According to FCC 47 CFR part 27.53(h), for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log(P)$  dB. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

### For LTE Band 12, LTE Band 17:

According to FCC 47 CFR part 27.53(g), for operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a 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, by at least  $43 + 10 \log(P)$  dB. 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.

### For LTE Band 13:

According to FCC 47 CFR part 27.53(c)(2), for on any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least  $43 + 10 \log(P)$  dB. 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.

According to FCC 47 CFR part 27.53(c)(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than  $65 + 10 \log(P)$  dB in a 6.25 kHz band segment, for mobile and portable stations.

For operations in the 775-788 MHz, emissions in the band 1559-1610 MHz shall be limited to  $-70$  dBW/MHz (EIRP). The limit of emissions is equal to  $-40$  dBm.

### For LTE Band 66:

According to FCC 47 CFR part 27.53(h), for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log(P)$  dB. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

## 5.6 Radiated Spurious Emissions below 1GHz

### For LTE Band 2:

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB. The emission limit equal to  $-13$  dBm.

### For LTE Band 4:

According to FCC 47 CFR part 27.53(h), for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log(P)$  dB. The limit of emission is equal to  $-13$  dBm.

### For LTE Band 12, LTE Band 17:

According to FCC 47 CFR part 27.53(g), for operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a 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, by at least  $43 + 10 \log(P)$  dB. The limit of emissions is equal to  $-13$  dBm.

### For LTE Band 13:

According to FCC 47 CFR part 27.53(c)(2), for on any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least  $43 + 10 \log(P)$  dB. The limit of emissions is equal to  $-13$  dBm.

For operations in the 775-788 MHz, emissions in the band 1559-1610 MHz shall be limited to  $-70$  dBW/MHz (EIRP). The limit of emissions is equal to  $-40$  dBm.

### For LTE Band 66:

According to FCC 47 CFR part 27.53(h), for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log(P)$  dB. The limit of emission is equal to  $-13$  dBm.

## 5.7 Radiated Spurious Emissions above 1GHz

### For LTE Band 2:

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB. The emission limit equal to  $-13$  dBm.

### For LTE Band 4:

According to FCC 47 CFR part 27.53(h), for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log(P)$  dB. The limit of emission is equal to  $-13$  dBm.

### For LTE Band 12, LTE Band 17:

According to FCC 47 CFR part 27.53(g), for operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a 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, by at least  $43 + 10 \log(P)$  dB. The limit of emissions is equal to  $-13$  dBm.

### For LTE Band 13:

According to FCC 47 CFR part 27.53(c)(2), for on any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least  $43 + 10 \log(P)$  dB. The limit of emissions is equal to  $-13$  dBm.

For operations in the 775-788 MHz, emissions in the band 1559-1610 MHz shall be limited to  $-70$  dBW/MHz (EIRP). The limit of emissions is equal to  $-40$  dBm.

### For LTE Band 66:

According to FCC 47 CFR part 27.53(h), for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log(P)$  dB. The limit of emission is equal to  $-13$  dBm.



## 5.8 Frequency Stability

**For LTE Band 2, LTE Band 4, LTE Band 12, LTE Band 13, LTE Band 17, LTE Band 66:**

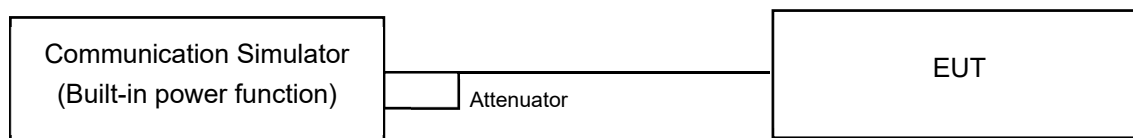
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation (authorized frequency block).

## 6 Test Arrangements

### 6.1 Effective Radiated Power and Equivalent Isotropically Radiated Power

#### 6.1.1 Test Setup

##### Conducted Power Measurement:



#### 6.1.2 Test Procedure

##### Conducted Power Measurement:

The EUT is configured by emulator to set data modulation and maximum power using WWAN technology. The average (rms) power measurement was performed on emulator and power value was measured from power function on emulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

##### Maximum EIRP / ERP

The relevant equation for determining the maximum ERP or EIRP from the measured RF output power is given in Equation as follows:

$$\text{EIRP} = P_{\text{Meas}} + G_{\text{T}}$$

$$\text{ERP} = P_{\text{Meas}} + G_{\text{T}} - 2.15$$

where

ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively

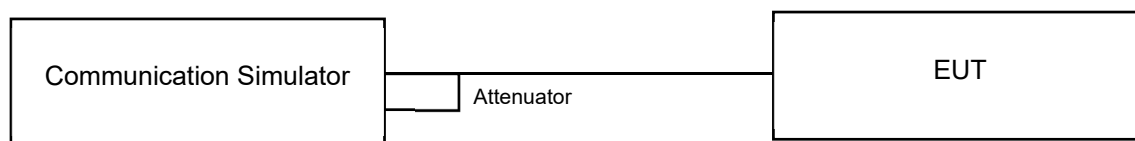
(expressed in the same units as  $P_{\text{Meas}}$ , e.g., dBm or dBW)

$P_{\text{Meas}}$  measured transmitter output power or PSD, in dBm or dBW

$G_{\text{T}}$  gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)

## 6.2 Modulation Characteristics

### 6.2.1 Test Setup

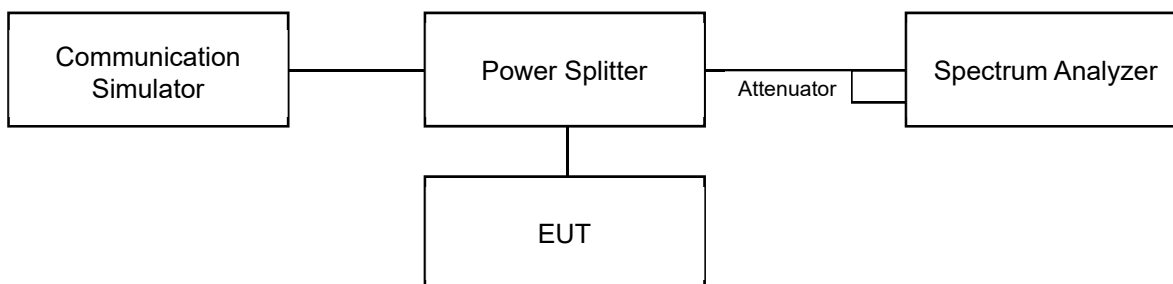


### 6.2.2 Test Procedure

Connect the EUT to Communication Simulator via the antenna connector, the frequency band is set as EUT supported Modulation and Channels, the EUT output is matched with 50 ohm load, the waveform quality and constellation of the EUT was tested.

## 6.3 Peak to Average Ratio

### 6.3.1 Test Setup

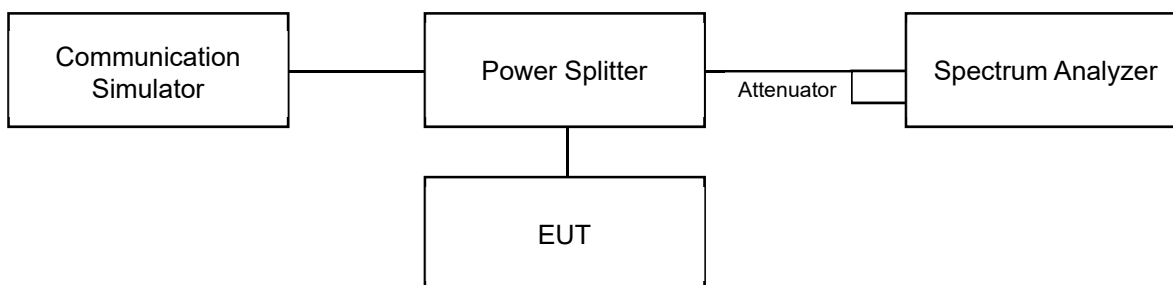


### 6.3.2 Test Procedure

- Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth;
- Set the number of counts to a value that stabilizes the measured CCDF curve;
- Record the maximum PAPR level associated with a probability of 0.1%.

## 6.4 Bandwidth

### 6.4.1 Test Setup



### 6.4.2 Test Procedure

For the 26 dBc bandwidth measurement method, please refer to section 5.4.3 of ANSI C63.26.

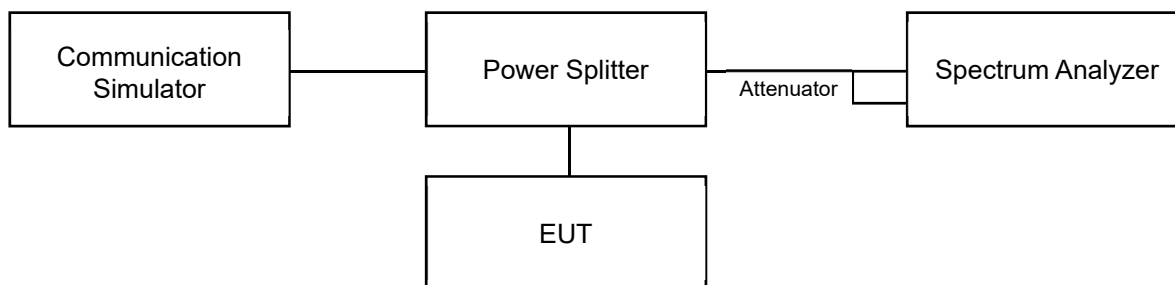
- a. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.
- b. The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set  $\geq 3 \times$  RBW.
- c. Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
- d. The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target “-X dB” requirement, i.e., if the requirement calls for measuring the -26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.
- e. Set spectrum analyzer detection mode to peak, and the trace mode to max hold.
- f. Determine the following reference values: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
- g. Determine the “-X dB amplitude” as equal to (Reference Value - X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.
- h. Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “-X dB amplitude” determined in step f). If a marker is below this “-X dB amplitude” value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers.
- i. The OBW shall be reported by providing plot(s) of the measuring instrument display, to include markers depicting the relevant frequency and amplitude information (e.g., marker table). The frequency and amplitude axis and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

For the occupied bandwidth measurement method, please refer to section 5.4.4 of ANSI C63.26.

- a. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.
- b. The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set  $\geq 3 \times$  RBW.
- c. Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
- d. The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target “-X dB” requirement, i.e., if the requirement calls for measuring the -26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.
- e. Set spectrum analyzer detection mode to peak, and the trace mode to max hold.
- f. Determine the reference value by either of the following:
  - g. 1) Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
  - h. 2) Set the EUT to transmit an unmodulated carrier. Set the spectrum analyzer marker to the level of the carrier.
- i. Determine the “-X dB amplitude” as equal to (Reference Value - X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.
- j. If the reference value was determined using an unmodulated carrier, turn the EUT modulation on, then either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise the trace from step f) shall be used for step i).
- k. Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “-X dB amplitude” determined in step f). If a marker is below this “-X dB amplitude” value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers. The spectral envelope can cross the “-X dB amplitude” at multiple points. The lowest or highest frequency shall be selected as the frequencies that are the farthest away from the center frequency at which the spectral envelope crosses the “-X dB amplitude.”
- l. The OBW shall be reported by providing plot(s) of the measuring instrument display, to include markers depicting the relevant frequency and amplitude information (e.g., marker table). The frequency and amplitude axis and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

## 6.5 Conducted Spurious Emissions

### 6.5.1 Test Setup



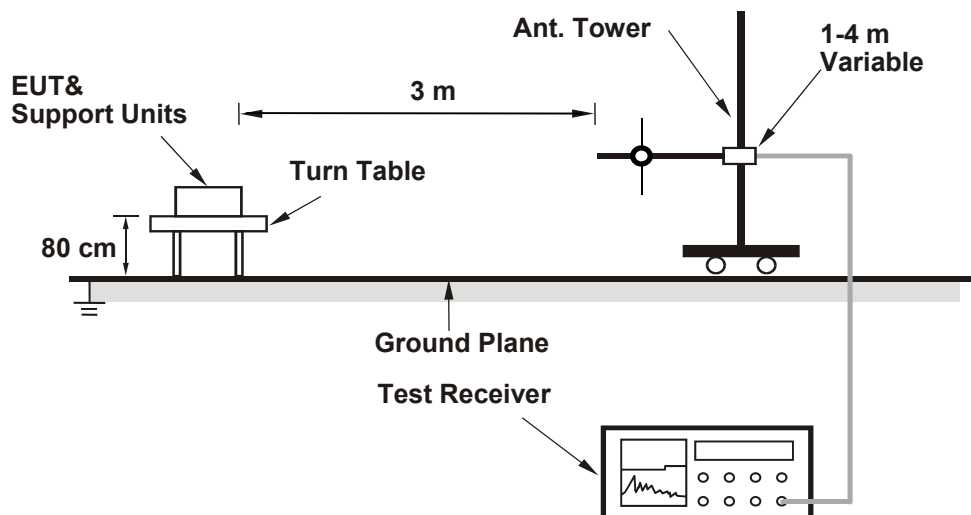
### 6.5.2 Test Procedure

- Measurement refer to ANSI C63.26 section 5.7.
- All measurements were done at 3 channels: low, middle and high operational frequency range.
- Measuring frequency range is from 9 kHz up to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. 20 dB attenuation pad is connected with spectrum.
- The fundamental frequency above 1 GHz, the spectrum set RBW = 1 MHz, VBW = 3 MHz, Detector = Average.
- The fundamental frequency below 1 GHz, the spectrum set RBW  $\geq$  100 kHz, VBW  $\geq$  3 x RBW, Detector = Average.
- Measuring frequency band edge, narrow RBW (no less than 1% of the OBW) is used for conducted emission measurement.

## 6.6 Radiated Spurious Emissions below 1GHz

### 6.6.1 Test Setup

#### For radiated emission 30 MHz to 1 GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

### 6.6.2 Test Procedure

The EUT is configured by emulator to set data modulation and maximum power using WWAN technology.

- In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) height of turn table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- Perform a field strength measurement and record the worse read value, is the field strength value via a spectrum reading obtained corrected for antenna factor, cable loss and pre-amplifier factor and then mathematically convert the measured field strength level to EIRP/ERP level.
- Following ANSI C63.26 section 5.5 and 5.2.7
- $EIRP \text{ (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20\log(D) - 104.8$ ; where D is the measurement distance (in the far field region) in m.
- $ERP \text{ (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20\log(D) - 104.8 - 2.15$ ; where D is the measurement distance (in the far field region) in m.

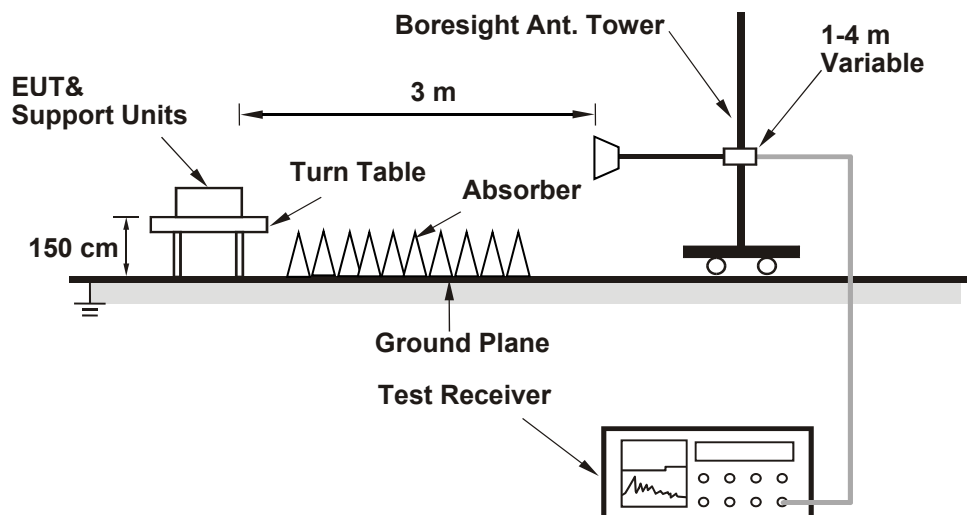
#### Note:

- The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz. Set detector = average.
- The emission levels were against the limit of frequency range 9 kHz ~ 30 MHz:  
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

## 6.7 Radiated Spurious Emissions above 1GHz

### 6.7.1 Test Setup

#### For radiated emission above 1 GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

### 6.7.2 Test Procedure

The EUT is configured by emulator to set data modulation and maximum power using WWAN technology.

- In the semi-anechoic chamber, EUT placed on the 1.5 m height of turn table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- Perform a field strength measurement and record the worse read value, is the field strength value via a spectrum reading obtained corrected for antenna factor, cable loss and pre-amplifier factor and then mathematically convert the measured field strength level to EIRP/ERP level.
- Following ANSI C63.26 section 5.5 and 5.2.7
- $EIRP (dBm) = E (dB\mu V/m) + 20\log(D) - 104.8$ ; where D is the measurement distance (in the far field region) in m.
- $ERP (dBm) = E (dB\mu V/m) + 20\log(D) - 104.8 - 2.15$ ; where D is the measurement distance (in the far field region) in m.

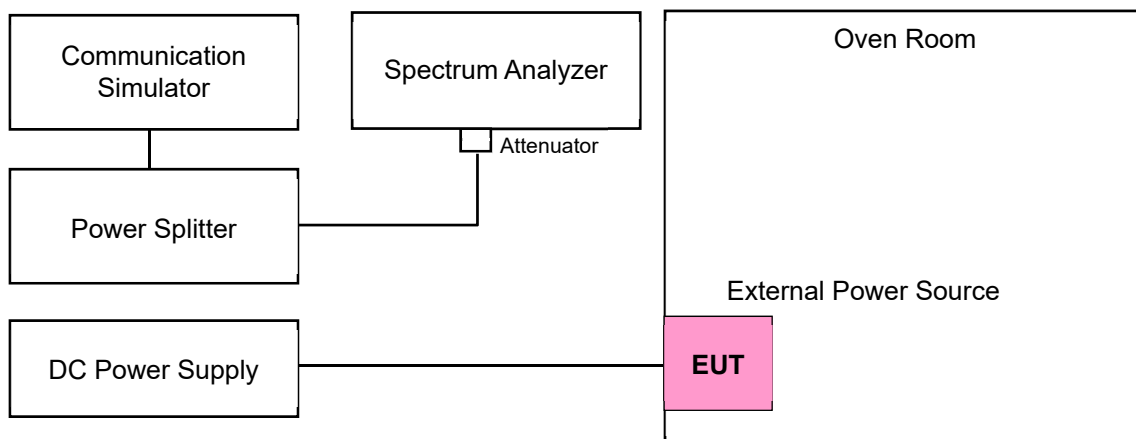
#### Note:

- The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz. Set detector = average.



## 6.8 Frequency Stability

### 6.8.1 Test Setup



### 6.8.2 Test Procedure

The EUT is configured by emulator to set data modulation and maximum power using WWAN technology.

- a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- b. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the  $\pm 0.5^{\circ}\text{C}$  during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

Note: The frequency error was recorded frequency error from the communication simulator.

## 7 Test Results of Test Item

### 7.1 Effective Radiated Power and Equivalent Isotropically Radiated Power

Input Power:	3.87 Vdc	Environmental Conditions:	22°C, 68% RH	Tested By:	Willy Cheng
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#### 7.1.1 LTE Band 2

##### LTE Band 2, Channel Bandwidth: 1.4 MHz

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 18607	CH 18900	CH 19193
			1850.7 MHz	1880 MHz	1909.3 MHz
QPSK	1	0	22.31	22.38	22.23
	1	2	22.25	22.31	22.28
	1	5	22.20	22.36	22.19
	3	0	22.32	22.23	22.25
	3	1	22.28	22.30	22.21
	3	3	22.27	22.27	22.22
	6	0	21.23	21.24	21.15
16QAM	1	0	21.22	21.27	21.36
	1	2	21.37	21.32	21.35
	1	5	21.22	21.22	21.23
	3	0	21.16	21.36	21.29
	3	1	21.23	21.34	21.12
	3	3	21.25	21.24	21.24
	6	0	20.27	20.37	20.23
64QAM	1	0	20.23	20.32	20.31
	1	2	20.23	20.21	20.19
	1	5	20.26	20.23	20.19
	3	0	20.25	20.36	20.14
	3	1	20.20	20.39	20.29
	3	3	20.13	20.27	20.06
	6	0	19.28	19.28	19.27

Maximum Output Power			
Modulation	Cond. Power (dBm)	EIRP (dBm)	EIRP Limit (dBm)
QPSK	22.38	16.08	33
16QAM	21.37	15.07	33
64QAM	20.39	14.09	33

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

**LTE Band 2, Channel Bandwidth: 3 MHz**

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 18615	CH 18900	CH 19185
			1851.5 MHz	1880 MHz	1908.5 MHz
QPSK	1	0	22.26	22.30	22.22
	1	7	22.15	22.29	22.28
	1	14	22.19	22.28	22.23
	8	0	21.37	21.36	21.32
	8	3	21.18	21.28	21.36
	8	7	21.32	21.25	21.22
	15	0	21.23	21.37	21.27
16QAM	1	0	21.30	21.27	21.22
	1	7	21.28	21.20	21.33
	1	14	21.26	21.33	21.30
	8	0	20.16	20.33	20.28
	8	3	20.31	20.37	20.23
	8	7	20.25	20.29	20.12
	15	0	20.24	20.28	20.17
64QAM	1	0	20.25	20.35	20.29
	1	7	20.31	20.19	20.17
	1	14	20.15	20.16	20.34
	8	0	19.29	19.33	19.21
	8	3	19.24	19.28	19.30
	8	7	19.09	19.25	19.06
	15	0	19.27	19.25	19.23

Maximum Output Power			
Modulation	Cond. Power (dBm)	EIRP (dBm)	EIRP Limit (dBm)
QPSK	22.30	16.00	33
16QAM	21.33	15.03	33
64QAM	20.35	14.05	33

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

**LTE Band 2, Channel Bandwidth: 5 MHz**

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 18625	CH 18900	CH 19175
			1852.5 MHz	1880 MHz	1907.5 MHz
QPSK	1	0	22.28	22.29	22.22
	1	12	22.13	22.33	22.22
	1	24	22.26	22.33	21.94
	12	0	21.38	21.36	21.29
	12	6	21.18	21.26	21.17
	12	13	21.21	21.24	21.11
	25	0	21.19	21.29	21.03
16QAM	1	0	21.28	21.24	21.35
	1	12	21.36	21.24	21.40
	1	24	21.21	21.28	21.22
	12	0	20.29	20.41	20.31
	12	6	20.24	20.29	20.09
	12	13	20.24	20.23	20.17
	25	0	20.28	20.33	20.21
64QAM	1	0	20.35	20.31	20.36
	1	12	20.22	20.22	20.31
	1	24	20.18	20.28	20.28
	12	0	19.21	19.27	19.21
	12	6	19.31	19.34	19.34
	12	13	19.14	19.21	19.1
	25	0	19.28	19.22	19.27

Maximum Output Power			
Modulation	Cond. Power (dBm)	EIRP (dBm)	EIRP Limit (dBm)
QPSK	22.33	16.03	33
16QAM	21.40	15.10	33
64QAM	20.36	14.06	33

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

**LTE Band 2, Channel Bandwidth: 10 MHz**

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 18650	CH 18900	CH 19150
			1855 MHz	1880 MHz	1905 MHz
QPSK	1	0	22.28	22.30	22.23
	1	24	22.18	22.19	22.28
	1	49	22.26	22.22	22.09
	25	0	21.41	21.29	21.33
	25	12	21.25	21.20	21.26
	25	25	21.24	21.17	21.22
	50	0	21.20	21.37	21.15
16QAM	1	0	21.33	21.32	21.32
	1	24	21.23	21.27	21.40
	1	49	21.20	21.20	21.20
	25	0	20.24	20.33	20.32
	25	12	20.21	20.26	20.23
	25	25	20.20	20.21	20.13
	50	0	20.20	20.36	20.16
64QAM	1	0	20.37	20.36	20.33
	1	24	20.18	20.27	20.18
	1	49	20.27	20.18	20.26
	25	0	19.32	19.34	19.25
	25	12	19.28	19.32	19.25
	25	25	19.16	19.30	19.21
	50	0	19.18	19.18	19.32

Maximum Output Power			
Modulation	Cond. Power (dBm)	EIRP (dBm)	EIRP Limit (dBm)
QPSK	22.30	16.00	33
16QAM	21.40	15.10	33
64QAM	20.37	14.07	33

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

**LTE Band 2, Channel Bandwidth: 15 MHz**

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 18675	CH 18900	CH 19125
			1857.5 MHz	1880 MHz	1902.5 MHz
QPSK	1	0	22.33	22.35	22.26
	1	37	22.27	22.33	22.29
	1	74	22.28	22.34	22.23
	36	0	21.45	21.38	21.38
	36	19	21.32	21.35	21.36
	36	39	21.33	21.27	21.31
	75	0	21.29	21.39	21.29
16QAM	1	0	21.34	21.36	21.37
	1	37	21.37	21.33	21.41
	1	74	21.31	21.35	21.31
	36	0	20.31	20.44	20.37
	36	19	20.36	20.40	20.24
	36	39	20.33	20.30	20.27
	75	0	20.34	20.39	20.25
64QAM	1	0	20.38	20.36	20.39
	1	37	20.31	20.34	20.32
	1	74	20.28	20.29	20.34
	36	0	19.36	19.38	19.29
	36	19	19.35	19.40	19.35
	36	39	19.18	19.32	19.21
	75	0	19.29	19.33	19.35

Maximum Output Power			
Modulation	Cond. Power (dBm)	EIRP (dBm)	EIRP Limit (dBm)
QPSK	22.35	16.05	33
16QAM	21.41	15.11	33
64QAM	20.39	14.09	33

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

**LTE Band 2, Channel Bandwidth: 20 MHz**

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 18700	CH 18900	CH 19100
			1860 MHz	1880 MHz	1900 MHz
QPSK	1	0	22.37	22.43	22.32
	1	50	22.32	22.41	22.39
	1	99	22.31	22.37	22.32
	50	0	21.47	21.48	21.43
	50	25	21.42	21.42	21.40
	50	50	21.36	21.37	21.31
	100	0	21.32	21.41	21.38
16QAM	1	0	21.41	21.46	21.38
	1	50	21.41	21.43	21.42
	1	99	21.37	21.39	21.31
	50	0	20.37	20.47	20.43
	50	25	20.40	20.44	20.34
	50	50	20.37	20.37	20.34
	100	0	20.34	20.39	20.34
64QAM	1	0	20.40	20.45	20.40
	1	50	20.40	20.41	20.35
	1	99	20.34	20.34	20.34
	50	0	19.45	19.46	19.37
	50	25	19.37	19.42	19.37
	50	50	19.24	19.33	19.31
	100	0	19.34	19.37	19.35

Maximum Output Power			
Modulation	Cond. Power (dBm)	EIRP (dBm)	EIRP Limit (dBm)
QPSK	22.43	16.13	33
16QAM	21.46	15.16	33
64QAM	20.45	14.15	33

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

7.1.2 LTE Band 4

**LTE Band 4, Channel Bandwidth: 1.4 MHz**

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 19957	CH 20175	CH 20393
			1710.7 MHz	1732.5 MHz	1754.3 MHz
QPSK	1	0	22.70	22.85	22.81
	1	2	22.79	22.79	22.76
	1	5	22.68	22.83	22.69
	3	0	22.64	22.81	22.83
	3	1	22.56	22.82	22.72
	3	3	22.73	22.79	22.55
	6	0	21.60	21.67	21.65
16QAM	1	0	21.73	21.77	21.80
	1	2	21.63	21.84	21.74
	1	5	21.55	21.77	21.71
	3	0	21.83	21.82	21.73
	3	1	21.79	21.69	21.67
	3	3	21.68	21.71	21.52
	6	0	20.64	20.74	20.70
64QAM	1	0	20.63	20.72	20.74
	1	2	20.64	20.64	20.71
	1	5	20.64	20.73	20.67
	3	0	20.70	20.70	20.87
	3	1	20.60	20.75	20.57
	3	3	20.62	20.69	20.56
	6	0	19.74	19.60	19.64

Maximum Output Power			
Modulation	Cond. Power (dBm)	EIRP (dBm)	EIRP Limit (dBm)
QPSK	22.85	17.25	30
16QAM	21.84	16.24	30
64QAM	20.87	15.27	30

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)



**LTE Band 4, Channel Bandwidth: 3 MHz**

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 19965	CH 20175	CH 20385
			1711.5 MHz	1732.5 MHz	1753.5 MHz
QPSK	1	0	22.68	22.88	22.86
	1	7	22.74	22.76	22.62
	1	14	22.55	22.71	22.59
	8	0	21.71	21.82	21.84
	8	3	21.68	21.70	21.60
	8	7	21.65	21.73	21.57
	15	0	21.70	21.73	21.63
16QAM	1	0	21.71	21.69	21.81
	1	7	21.61	21.76	21.72
	1	14	21.57	21.78	21.72
	8	0	20.78	20.88	20.75
	8	3	20.78	20.69	20.62
	8	7	20.66	20.63	20.59
	15	0	20.64	20.69	20.70
64QAM	1	0	20.70	20.75	20.81
	1	7	20.64	20.75	20.71
	1	14	20.66	20.67	20.66
	8	0	19.79	19.77	19.78
	8	3	19.73	19.69	19.70
	8	7	19.49	19.58	19.66
	15	0	19.72	19.64	19.52

Maximum Output Power			
Modulation	Cond. Power (dBm)	EIRP (dBm)	EIRP Limit (dBm)
QPSK	22.88	17.28	30
16QAM	21.81	16.21	30
64QAM	20.81	15.21	30

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

**LTE Band 4, Channel Bandwidth: 5 MHz**

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 19975	CH 20175	CH 20375
			1712.5 MHz	1732.5 MHz	1752.5 MHz
QPSK	1	0	22.65	22.85	22.84
	1	12	22.72	22.83	22.69
	1	24	22.56	22.73	22.53
	12	0	21.79	21.83	21.63
	12	6	21.68	21.80	21.54
	12	13	21.65	21.69	21.52
	25	0	21.71	21.61	21.66
16QAM	1	0	21.74	21.68	21.82
	1	12	21.63	21.78	21.67
	1	24	21.65	21.79	21.60
	12	0	20.74	20.80	20.75
	12	6	20.64	20.78	20.59
	12	13	20.62	20.62	20.67
	25	0	20.72	20.73	20.66
64QAM	1	0	20.65	20.81	20.79
	1	12	20.57	20.75	20.76
	1	24	20.67	20.74	20.59
	12	0	19.85	19.78	19.78
	12	6	19.70	19.76	19.66
	12	13	19.63	19.70	19.63
	25	0	19.69	19.68	19.54

Maximum Output Power			
Modulation	Cond. Power (dBm)	EIRP (dBm)	EIRP Limit (dBm)
QPSK	22.85	17.25	30
16QAM	21.82	16.22	30
64QAM	20.81	15.21	30

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

**LTE Band 4, Channel Bandwidth: 10 MHz**

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 20000	CH 20175	CH 20350
			1715 MHz	1732.5 MHz	1750 MHz
QPSK	1	0	22.64	22.87	22.84
	1	24	22.76	22.73	22.77
	1	49	22.65	22.73	22.59
	25	0	21.78	21.81	21.74
	25	12	21.58	21.69	21.60
	25	25	21.63	21.67	21.62
	50	0	21.69	21.71	21.70
16QAM	1	0	21.78	21.73	21.72
	1	24	21.59	21.76	21.65
	1	49	21.68	21.70	21.66
	25	0	20.83	20.75	20.72
	25	12	20.67	20.72	20.62
	25	25	20.66	20.66	20.65
	50	0	20.72	20.71	20.66
64QAM	1	0	20.66	20.75	20.80
	1	24	20.61	20.64	20.78
	1	49	20.61	20.78	20.72
	25	0	19.76	19.66	19.74
	25	12	19.67	19.65	19.69
	25	25	19.59	19.67	19.65
	50	0	19.67	19.62	19.61

Maximum Output Power			
Modulation	Cond. Power (dBm)	EIRP (dBm)	EIRP Limit (dBm)
QPSK	22.87	17.27	30
16QAM	21.78	16.18	30
64QAM	20.80	15.20	30

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

**LTE Band 4, Channel Bandwidth: 15 MHz**

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 20025	CH 20175	CH 20325
			1717.5 MHz	1732.5 MHz	1747.5 MHz
QPSK	1	0	22.74	22.90	22.89
	1	37	22.80	22.85	22.77
	1	74	22.68	22.83	22.70
	36	0	21.79	21.92	21.84
	36	19	21.71	21.83	21.74
	36	39	21.76	21.82	21.66
	75	0	21.72	21.76	21.74
16QAM	1	0	21.80	21.82	21.82
	1	37	21.73	21.85	21.75
	1	74	21.70	21.81	21.73
	36	0	20.84	20.89	20.75
	36	19	20.79	20.79	20.71
	36	39	20.73	20.76	20.67
	75	0	20.77	20.75	20.75
64QAM	1	0	20.74	20.83	20.81
	1	37	20.72	20.78	20.80
	1	74	20.72	20.81	20.73
	36	0	19.85	19.79	19.87
	36	19	19.74	19.80	19.70
	36	39	19.64	19.71	19.71
	75	0	19.75	19.75	19.67

Maximum Output Power			
Modulation	Cond. Power (dBm)	EIRP (dBm)	EIRP Limit (dBm)
QPSK	22.90	17.30	30
16QAM	21.85	16.25	30
64QAM	20.83	15.23	30

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

**LTE Band 4, Channel Bandwidth: 20 MHz**

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 20050	CH 20175	CH 20300
			1720 MHz	1732.5 MHz	1745 MHz
QPSK	1	0	22.83	22.96	22.91
	1	50	22.82	22.87	22.84
	1	99	22.78	22.84	22.76
	50	0	21.87	21.92	21.84
	50	25	21.77	21.86	21.77
	50	50	21.77	21.82	21.74
	100	0	21.78	21.84	21.80
16QAM	1	0	21.87	21.89	21.86
	1	50	21.79	21.85	21.75
	1	99	21.78	21.81	21.73
	50	0	20.85	20.89	20.81
	50	25	20.79	20.84	20.77
	50	50	20.74	20.79	20.75
	100	0	20.79	20.82	20.77
64QAM	1	0	20.82	20.86	20.83
	1	50	20.82	20.84	20.81
	1	99	20.72	20.81	20.76
	50	0	19.85	19.88	19.88
	50	25	19.84	19.85	19.80
	50	50	19.71	19.76	19.72
	100	0	19.77	19.82	19.77

Maximum Output Power			
Modulation	Cond. Power (dBm)	EIRP (dBm)	EIRP Limit (dBm)
QPSK	22.96	17.36	30
16QAM	21.89	16.29	30
64QAM	20.86	15.26	30

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

### 7.1.3 LTE Band 12

#### LTE Band 12, Channel Bandwidth: 1.4 MHz

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 23017	CH 23095	CH 23173
			699.7 MHz	707.5 MHz	715.3 MHz
QPSK	1	0	22.31	22.32	22.26
	1	2	22.11	22.22	22.12
	1	5	22.16	22.21	22.21
	3	0	22.18	22.30	22.25
	3	1	22.17	22.29	22.23
	3	3	22.18	22.15	22.13
	6	0	21.22	21.17	21.22
16QAM	1	0	21.26	21.24	21.11
	1	2	21.27	21.25	21.23
	1	5	21.04	21.22	21.00
	3	0	21.18	21.33	21.24
	3	1	21.24	21.27	21.10
	3	3	21.12	21.15	21.23
	6	0	20.18	20.24	20.23
64QAM	1	0	20.25	20.18	20.10
	1	2	20.09	20.18	20.11
	1	5	20.11	20.23	20.05
	3	0	20.11	20.22	20.09
	3	1	20.24	20.26	20.17
	3	3	20.21	20.17	20.11
	6	0	19.10	19.07	18.98

Maximum Output Power			
Modulation	Cond. Power (dBm)	ERP (dBm)	ERP Limit (dBm)
QPSK	22.32	8.37	44.77
16QAM	21.33	7.38	44.77
64QAM	20.26	6.31	44.77

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

ERP (dBm) = EIRP (dBm) - 2.15

**LTE Band 12, Channel Bandwidth: 3 MHz**

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 23025	CH 23095	CH 23165
			700.5 MHz	707.5 MHz	714.5 MHz
QPSK	1	0	22.28	22.29	22.24
	1	7	22.08	22.28	22.16
	1	14	22.19	22.27	22.21
	8	0	21.22	21.25	21.33
	8	3	21.36	21.26	21.12
	8	7	21.15	21.21	21.13
	15	0	21.09	21.21	21.12
16QAM	1	0	21.15	21.27	21.25
	1	7	21.25	21.18	21.21
	1	14	21.09	21.25	21.01
	8	0	20.13	20.32	20.21
	8	3	20.20	20.20	20.22
	8	7	20.21	20.21	20.24
	15	0	20.09	20.29	20.23
64QAM	1	0	20.13	20.11	20.06
	1	7	20.17	20.13	20.09
	1	14	20.13	20.18	20.11
	8	0	19.17	19.35	19.18
	8	3	19.19	19.25	19.20
	8	7	19.15	19.02	18.99
	15	0	19.09	19.16	18.99

Maximum Output Power			
Modulation	Cond. Power (dBm)	ERP (dBm)	ERP Limit (dBm)
QPSK	22.29	8.34	44.77
16QAM	21.27	7.32	44.77
64QAM	20.18	6.23	44.77

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

ERP (dBm) = EIRP (dBm) - 2.15

**LTE Band 12, Channel Bandwidth: 5 MHz**

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 23035	CH 23095	CH 23155
			701.5 MHz	707.5 MHz	713.5 MHz
QPSK	1	0	22.37	22.40	22.31
	1	12	22.22	22.36	22.26
	1	24	22.23	22.30	22.29
	12	0	21.27	21.32	21.38
	12	6	21.36	21.31	21.25
	12	13	21.30	21.27	21.16
	25	0	21.22	21.32	21.23
16QAM	1	0	21.30	21.36	21.25
	1	12	21.30	21.29	21.32
	1	24	21.18	21.28	21.14
	12	0	20.26	20.36	20.27
	12	6	20.30	20.32	20.25
	12	13	20.21	20.26	20.27
	25	0	20.21	20.30	20.27
64QAM	1	0	20.26	20.25	20.21
	1	12	20.18	20.19	20.20
	1	24	20.22	20.24	20.18
	12	0	19.25	19.35	19.22
	12	6	19.26	19.33	19.22
	12	13	19.24	19.17	19.13
	25	0	19.21	19.21	19.11

Maximum Output Power			
Modulation	Cond. Power (dBm)	ERP (dBm)	ERP Limit (dBm)
QPSK	22.40	8.45	44.77
16QAM	21.36	7.41	44.77
64QAM	20.26	6.31	44.77

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

ERP (dBm) = EIRP (dBm) - 2.15



**LTE Band 12, Channel Bandwidth: 10 MHz**

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 23060	CH 23095	CH 23130
			704 MHz	707.5 MHz	711 MHz
QPSK	1	0	22.41	22.45	22.38
	1	24	22.28	22.36	22.28
	1	49	22.25	22.32	22.32
	25	0	21.34	21.41	21.40
	25	12	21.37	21.37	21.31
	25	25	21.31	21.33	21.24
	50	0	21.26	21.35	21.27
16QAM	1	0	21.34	21.39	21.32
	1	24	21.31	21.37	21.36
	1	49	21.28	21.33	21.23
	25	0	20.32	20.39	20.30
	25	12	20.31	20.36	20.27
	25	25	20.26	20.34	20.30
	50	0	20.31	20.36	20.35
64QAM	1	0	20.29	20.32	20.30
	1	24	20.24	20.29	20.29
	1	49	20.29	20.31	20.27
	25	0	19.32	19.36	19.26
	25	12	19.33	19.34	19.28
	25	25	19.26	19.27	19.17
	50	0	19.21	19.29	19.19

Maximum Output Power			
Modulation	Cond. Power (dBm)	ERP (dBm)	ERP Limit (dBm)
QPSK	22.45	8.50	44.77
16QAM	21.39	7.44	44.77
64QAM	20.32	6.37	44.77

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

ERP (dBm) = EIRP (dBm) - 2.15

### 7.1.4 LTE Band 13

#### LTE Band 13, Channel Bandwidth: 5 MHz

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 23205	CH 23230	CH 23255
			779.5 MHz	782 MHz	784.5 MHz
QPSK	1	0	22.36	22.39	22.32
	1	12	22.28	22.36	22.30
	1	24	22.28	22.33	22.28
	12	0	21.35	21.41	21.39
	12	6	21.35	21.36	21.36
	12	13	21.26	21.31	21.30
	25	0	21.27	21.33	21.27
16QAM	1	0	21.27	21.37	21.31
	1	12	21.29	21.32	21.31
	1	24	21.29	21.29	21.24
	12	0	20.34	20.42	20.40
	12	6	20.29	20.37	20.33
	12	13	20.25	20.33	20.31
	25	0	20.29	20.36	20.27
64QAM	1	0	20.32	20.37	20.31
	1	12	20.27	20.33	20.24
	1	24	20.21	20.31	20.29
	12	0	19.40	19.42	19.41
	12	6	19.27	19.37	19.37
	12	13	19.26	19.32	19.22
	25	0	19.33	19.35	19.29

Maximum Output Power			
Modulation	Cond. Power (dBm)	ERP (dBm)	ERP Limit (dBm)
QPSK	22.39	8.14	44.77
16QAM	21.37	7.12	44.77
64QAM	20.37	6.12	44.77

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

ERP (dBm) = EIRP (dBm) - 2.15

**LTE Band 13, Channel Bandwidth: 10 MHz**

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)
			CH 23230
			782 MHz
QPSK	1	0	22.42
	1	24	22.39
	1	49	22.35
	25	0	21.43
	25	12	21.41
	25	25	21.36
	50	0	21.39
16QAM	1	0	21.41
	1	24	21.37
	1	49	21.33
	25	0	20.39
	25	12	20.36
	25	25	20.29
	50	0	20.33
64QAM	1	0	20.37
	1	24	20.33
	1	49	20.31
	25	0	19.44
	25	12	19.41
	25	25	19.34
	50	0	19.37

Maximum Output Power			
Modulation	Cond. Power (dBm)	ERP (dBm)	ERP Limit (dBm)
QPSK	22.42	8.17	44.77
16QAM	21.41	7.16	44.77
64QAM	20.37	6.12	44.77

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

ERP (dBm) = EIRP (dBm) - 2.15

## 7.1.5 LTE Band 17

**LTE Band 17, Channel Bandwidth: 5 MHz**

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 23755	CH 23790	CH 23825
			706.5 MHz	710 MHz	713.5 MHz
QPSK	1	0	22.40	22.44	22.29
	1	12	22.33	22.36	22.42
	1	24	22.23	22.31	22.30
	12	0	21.42	21.37	21.38
	12	6	21.30	21.39	21.33
	12	13	21.30	21.32	21.26
	25	0	21.37	21.34	21.33
16QAM	1	0	21.41	21.35	21.36
	1	12	21.33	21.41	21.32
	1	24	21.29	21.29	21.31
	12	0	20.32	20.45	20.37
	12	6	20.24	20.40	20.34
	12	13	20.21	20.26	20.19
	25	0	20.25	20.29	20.25
64QAM	1	0	20.29	20.38	20.31
	1	12	20.32	20.34	20.31
	1	24	20.16	20.33	20.29
	12	0	19.33	19.40	19.31
	12	6	19.22	19.27	19.18
	12	13	19.20	19.26	19.21
	25	0	19.25	19.26	19.19

Maximum Output Power			
Modulation	Cond. Power (dBm)	ERP (dBm)	ERP Limit (dBm)
QPSK	22.44	8.49	44.77
16QAM	21.41	7.46	44.77
64QAM	20.38	6.43	44.77

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

ERP (dBm) = EIRP (dBm) - 2.15

**LTE Band 17, Channel Bandwidth: 10 MHz**

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 23780	CH 23790	CH 23800
			709 MHz	710 MHz	711 MHz
QPSK	1	0	22.42	22.46	22.38
	1	24	22.39	22.42	22.42
	1	49	22.30	22.38	22.30
	25	0	21.45	21.47	21.39
	25	12	21.40	21.43	21.38
	25	25	21.31	21.38	21.35
	50	0	21.38	21.41	21.41
16QAM	1	0	21.43	21.44	21.39
	1	24	21.36	21.41	21.41
	1	49	21.36	21.36	21.33
	25	0	20.37	20.45	20.37
	25	12	20.33	20.41	20.38
	25	25	20.30	20.36	20.26
	50	0	20.34	20.39	20.30
64QAM	1	0	20.38	20.44	20.38
	1	24	20.39	20.41	20.36
	1	49	20.26	20.36	20.32
	25	0	19.34	19.41	19.33
	25	12	19.30	19.35	19.27
	25	25	19.26	19.31	19.30
	50	0	19.28	19.33	19.24

Maximum Output Power			
Modulation	Cond. Power (dBm)	ERP (dBm)	ERP Limit (dBm)
QPSK	22.46	8.51	44.77
16QAM	21.44	7.49	44.77
64QAM	20.44	6.49	44.77

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

ERP (dBm) = EIRP (dBm) - 2.15

## 7.1.6 LTE Band 66

**LTE Band 66, Channel Bandwidth: 1.4 MHz**

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 131979	CH 132322	CH 132665
			1710.7 MHz	1745 MHz	1779.3 MHz
QPSK	1	0	22.33	22.34	22.30
	1	2	22.28	22.33	22.30
	1	5	22.18	22.32	22.19
	3	0	21.24	21.31	21.27
	3	1	21.28	21.34	21.32
	3	3	21.12	21.31	21.11
	6	0	21.25	21.24	21.13
16QAM	1	0	21.26	21.31	21.26
	1	2	21.29	21.25	21.25
	1	5	21.14	21.19	21.16
	3	0	20.37	20.32	20.40
	3	1	20.28	20.29	20.26
	3	3	20.21	20.32	20.24
	6	0	20.29	20.34	20.23
64QAM	1	0	20.31	20.38	20.25
	1	2	20.34	20.35	20.28
	1	5	20.22	20.27	20.15
	3	0	19.29	19.35	19.25
	3	1	19.21	19.28	19.17
	3	3	19.16	19.18	19.14
	6	0	19.17	19.25	19.19

Maximum Output Power			
Modulation	Cond. Power (dBm)	EIRP (dBm)	EIRP Limit (dBm)
QPSK	22.34	16.74	30
16QAM	21.31	15.71	30
64QAM	20.38	14.78	30

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

**LTE Band 66, Channel Bandwidth: 3 MHz**

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 131987	CH 132322	CH 132657
			1711.5 MHz	1745 MHz	1778.5 MHz
QPSK	1	0	22.31	22.37	22.33
	1	7	22.29	22.36	22.28
	1	14	22.23	22.30	22.17
	8	0	21.24	21.32	21.34
	8	3	21.20	21.30	21.29
	8	7	21.18	21.25	21.19
	15	0	21.27	21.30	21.16
16QAM	1	0	21.25	21.27	21.34
	1	7	21.23	21.31	21.24
	1	14	21.19	21.25	21.22
	8	0	20.30	20.36	20.34
	8	3	20.27	20.36	20.28
	8	7	20.19	20.26	20.18
	15	0	20.31	20.27	20.21
64QAM	1	0	20.29	20.29	20.30
	1	7	20.27	20.31	20.36
	1	14	20.24	20.22	20.21
	8	0	19.26	19.37	19.28
	8	3	19.22	19.32	19.12
	8	7	19.18	19.24	19.13
	15	0	19.15	19.22	19.24

Maximum Output Power			
Modulation	Cond. Power (dBm)	EIRP (dBm)	EIRP Limit (dBm)
QPSK	22.37	16.77	30
16QAM	21.34	15.74	30
64QAM	20.36	14.76	30

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

**LTE Band 66, Channel Bandwidth: 5 MHz**

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 131997	CH 132322	CH 132647
			1712.5 MHz	1745 MHz	1777.5 MHz
QPSK	1	0	22.31	22.36	22.33
	1	12	22.25	22.30	22.26
	1	24	22.17	22.32	22.23
	12	0	21.25	21.38	21.32
	12	6	21.19	21.26	21.33
	12	13	21.14	21.23	21.18
	25	0	21.25	21.24	21.20
16QAM	1	0	21.29	21.30	21.35
	1	12	21.20	21.27	21.27
	1	24	21.19	21.28	21.14
	12	0	20.33	20.42	20.37
	12	6	20.29	20.30	20.30
	12	13	20.24	20.24	20.14
	25	0	20.30	20.30	20.24
64QAM	1	0	20.32	20.31	20.25
	1	12	20.34	20.33	20.32
	1	24	20.25	20.24	20.21
	12	0	19.29	19.27	19.24
	12	6	19.15	19.31	19.15
	12	13	19.20	19.23	19.11
	25	0	19.18	19.24	19.22

Maximum Output Power			
Modulation	Cond. Power (dBm)	EIRP (dBm)	EIRP Limit (dBm)
QPSK	22.36	16.76	30
16QAM	21.35	15.75	30
64QAM	20.34	14.74	30

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)



**LTE Band 66, Channel Bandwidth: 10 MHz**

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 132022	CH 132322	CH 132622
			1715 MHz	1745 MHz	1775 MHz
QPSK	1	0	22.32	22.34	22.30
	1	24	22.21	22.29	22.27
	1	49	22.20	22.25	22.22
	25	0	21.26	21.38	21.28
	25	12	21.24	21.25	21.33
	25	25	21.12	21.21	21.20
	50	0	21.31	21.27	21.15
16QAM	1	0	21.24	21.30	21.27
	1	24	21.23	21.31	21.26
	1	49	21.14	21.27	21.21
	25	0	20.29	20.38	20.37
	25	12	20.26	20.27	20.34
	25	25	20.19	20.25	20.19
	50	0	20.30	20.27	20.24
64QAM	1	0	20.32	20.33	20.32
	1	24	20.35	20.36	20.27
	1	49	20.25	20.31	20.15
	25	0	19.27	19.28	19.24
	25	12	19.18	19.26	19.12
	25	25	19.15	19.17	19.07
	50	0	19.21	19.22	19.24

Maximum Output Power			
Modulation	Cond. Power (dBm)	EIRP (dBm)	EIRP Limit (dBm)
QPSK	22.34	16.74	30
16QAM	21.31	15.71	30
64QAM	20.36	14.76	30

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

**LTE Band 66, Channel Bandwidth: 15 MHz**

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 132047	CH 132322	CH 132597
			1717.5 MHz	1745 MHz	1772.5 MHz
QPSK	1	0	22.35	22.37	22.35
	1	37	22.26	22.29	22.31
	1	74	22.19	22.27	22.15
	36	0	21.24	21.32	21.29
	36	19	21.19	21.33	21.28
	36	39	21.20	21.28	21.18
	75	0	21.23	21.30	21.17
16QAM	1	0	21.27	21.26	21.27
	1	37	21.27	21.24	21.26
	1	74	21.13	21.25	21.23
	36	0	20.39	20.38	20.35
	36	19	20.25	20.28	20.32
	36	39	20.20	20.26	20.21
	75	0	20.28	20.35	20.22
64QAM	1	0	20.30	20.35	20.32
	1	37	20.28	20.30	20.36
	1	74	20.29	20.25	20.24
	36	0	19.33	19.35	19.21
	36	19	19.17	19.28	19.13
	36	39	19.15	19.19	19.09
	75	0	19.18	19.21	19.25

Maximum Output Power			
Modulation	Cond. Power (dBm)	EIRP (dBm)	EIRP Limit (dBm)
QPSK	22.37	16.77	30
16QAM	21.27	15.67	30
64QAM	20.36	14.76	30

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

**LTE Band 66, Channel Bandwidth: 20 MHz**

Modulation	RB Size	RB Offset	Measurement Conducted Power (dBm)		
			CH 132072	CH 132322	CH 132572
			1720 MHz	1745 MHz	1770 MHz
QPSK	1	0	22.35	22.41	22.34
	1	50	22.27	22.31	22.31
	1	99	22.23	22.35	22.24
	50	0	21.23	21.34	21.32
	50	25	21.29	21.28	21.33
	50	50	21.20	21.29	21.16
	100	0	21.33	21.26	21.13
16QAM	1	0	21.22	21.30	21.32
	1	50	21.27	21.31	21.25
	1	99	21.17	21.19	21.23
	50	0	20.38	20.39	20.30
	50	25	20.30	20.32	20.26
	50	50	20.20	20.27	20.20
	100	0	20.31	20.34	20.21
64QAM	1	0	20.27	20.33	20.32
	1	50	20.33	20.32	20.36
	1	99	20.26	20.22	20.22
	50	0	19.27	19.30	19.25
	50	25	19.16	19.28	19.15
	50	50	19.22	19.27	19.07
	100	0	19.16	19.22	19.17

Maximum Output Power			
Modulation	Cond. Power (dBm)	EIRP (dBm)	EIRP Limit (dBm)
QPSK	22.41	16.81	30
16QAM	21.32	15.72	30
64QAM	20.36	14.76	30

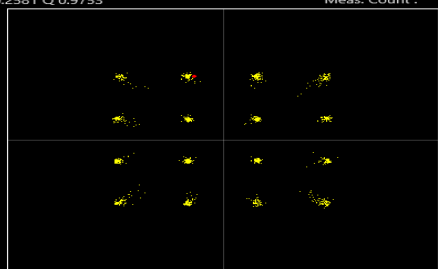
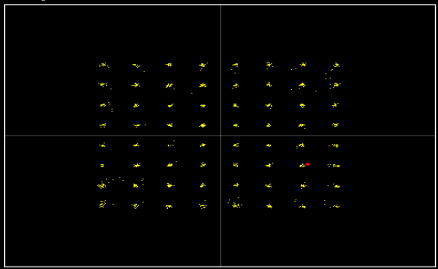
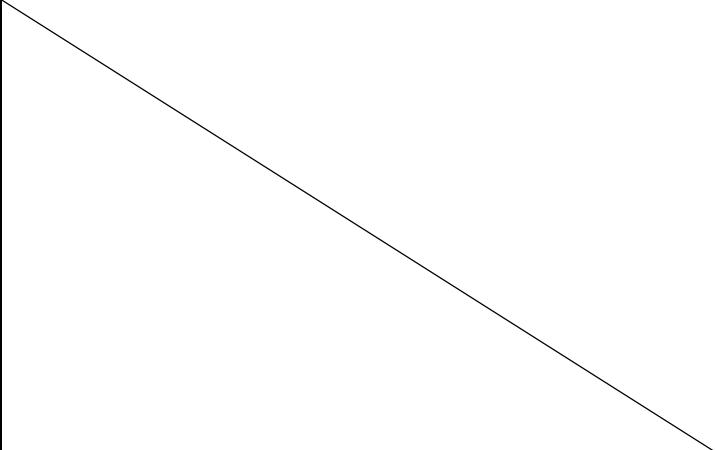
Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

## 7.2 Modulation Characteristics

Input Power:	3.87 Vdc	Environmental Conditions:	23°C, 68% RH	Tested By:	Noah Chang
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### 7.2.1 LTE Band 2

#### LTE Band 2, Channel Bandwidth: 20 MHz

<p>Fundamental &gt; Constellation</p> <p>0 Symbol I 0.6771 Q -0.6751 Meas. Count : 1/ 1</p>  <table border="1"> <thead> <tr> <th></th> <th>Avg.</th> <th>Max.</th> <th>Min.</th> </tr> </thead> <tbody> <tr> <td>EVM</td> <td>5.34</td> <td>5.34</td> <td>5.34 %(rms)</td> </tr> <tr> <td>Peak Vector Error</td> <td>33.37</td> <td>33.37</td> <td>33.37 %</td> </tr> <tr> <td>Carrier Leakage</td> <td>-42.40</td> <td>-42.40</td> <td>-42.40 dBc</td> </tr> <tr> <td>IQ Imbalance</td> <td>99.52</td> <td>99.52</td> <td>99.52 %(I/Q)</td> </tr> </tbody> </table>		Avg.	Max.	Min.	EVM	5.34	5.34	5.34 %(rms)	Peak Vector Error	33.37	33.37	33.37 %	Carrier Leakage	-42.40	-42.40	-42.40 dBc	IQ Imbalance	99.52	99.52	99.52 %(I/Q)	<p>Fundamental &gt; Constellation</p> <p>0 Symbol I -0.2581 Q 0.9753 Meas. Count : 1/ 1</p>  <table border="1"> <thead> <tr> <th></th> <th>Avg.</th> <th>Max.</th> <th>Min.</th> </tr> </thead> <tbody> <tr> <td>EVM</td> <td>5.69</td> <td>5.69</td> <td>5.69 %(rms)</td> </tr> <tr> <td>Peak Vector Error</td> <td>37.23</td> <td>37.23</td> <td>37.23 %</td> </tr> <tr> <td>Carrier Leakage</td> <td>-45.72</td> <td>-45.72</td> <td>-45.72 dBc</td> </tr> <tr> <td>IQ Imbalance</td> <td>99.61</td> <td>99.61</td> <td>99.61 %(I/Q)</td> </tr> </tbody> </table>		Avg.	Max.	Min.	EVM	5.69	5.69	5.69 %(rms)	Peak Vector Error	37.23	37.23	37.23 %	Carrier Leakage	-45.72	-45.72	-45.72 dBc	IQ Imbalance	99.61	99.61	99.61 %(I/Q)
	Avg.	Max.	Min.																																						
EVM	5.34	5.34	5.34 %(rms)																																						
Peak Vector Error	33.37	33.37	33.37 %																																						
Carrier Leakage	-42.40	-42.40	-42.40 dBc																																						
IQ Imbalance	99.52	99.52	99.52 %(I/Q)																																						
	Avg.	Max.	Min.																																						
EVM	5.69	5.69	5.69 %(rms)																																						
Peak Vector Error	37.23	37.23	37.23 %																																						
Carrier Leakage	-45.72	-45.72	-45.72 dBc																																						
IQ Imbalance	99.61	99.61	99.61 %(I/Q)																																						
QPSK CH 18900 (1880 MHz)	16QAM CH 18900 (1880 MHz)																																								
<p>Fundamental &gt; Constellation</p> <p>0 Symbol I 0.8142 Q -0.4458 Meas. Count : 1/ 1</p>  <table border="1"> <thead> <tr> <th></th> <th>Avg.</th> <th>Max.</th> <th>Min.</th> <th>Limit</th> </tr> </thead> <tbody> <tr> <td>EVM</td> <td>2.94</td> <td>2.94</td> <td>2.94 %(rms)</td> <td>≤ 8.0 %(rms)</td> </tr> <tr> <td>Peak Vector Error</td> <td>19.68</td> <td>19.68</td> <td>19.68 %</td> <td></td> </tr> <tr> <td>Carrier Leakage</td> <td>-38.38</td> <td>-38.38</td> <td>-38.38 dBc</td> <td></td> </tr> <tr> <td>IQ Imbalance</td> <td>99.45</td> <td>99.45</td> <td>99.45 %(I/Q)</td> <td></td> </tr> </tbody> </table>		Avg.	Max.	Min.	Limit	EVM	2.94	2.94	2.94 %(rms)	≤ 8.0 %(rms)	Peak Vector Error	19.68	19.68	19.68 %		Carrier Leakage	-38.38	-38.38	-38.38 dBc		IQ Imbalance	99.45	99.45	99.45 %(I/Q)																	
	Avg.	Max.	Min.	Limit																																					
EVM	2.94	2.94	2.94 %(rms)	≤ 8.0 %(rms)																																					
Peak Vector Error	19.68	19.68	19.68 %																																						
Carrier Leakage	-38.38	-38.38	-38.38 dBc																																						
IQ Imbalance	99.45	99.45	99.45 %(I/Q)																																						
64QAM CH 18900 (1880 MHz)																																									

7.2.2 LTE Band 4

LTE Band 4, Channel Bandwidth: 20 MHz



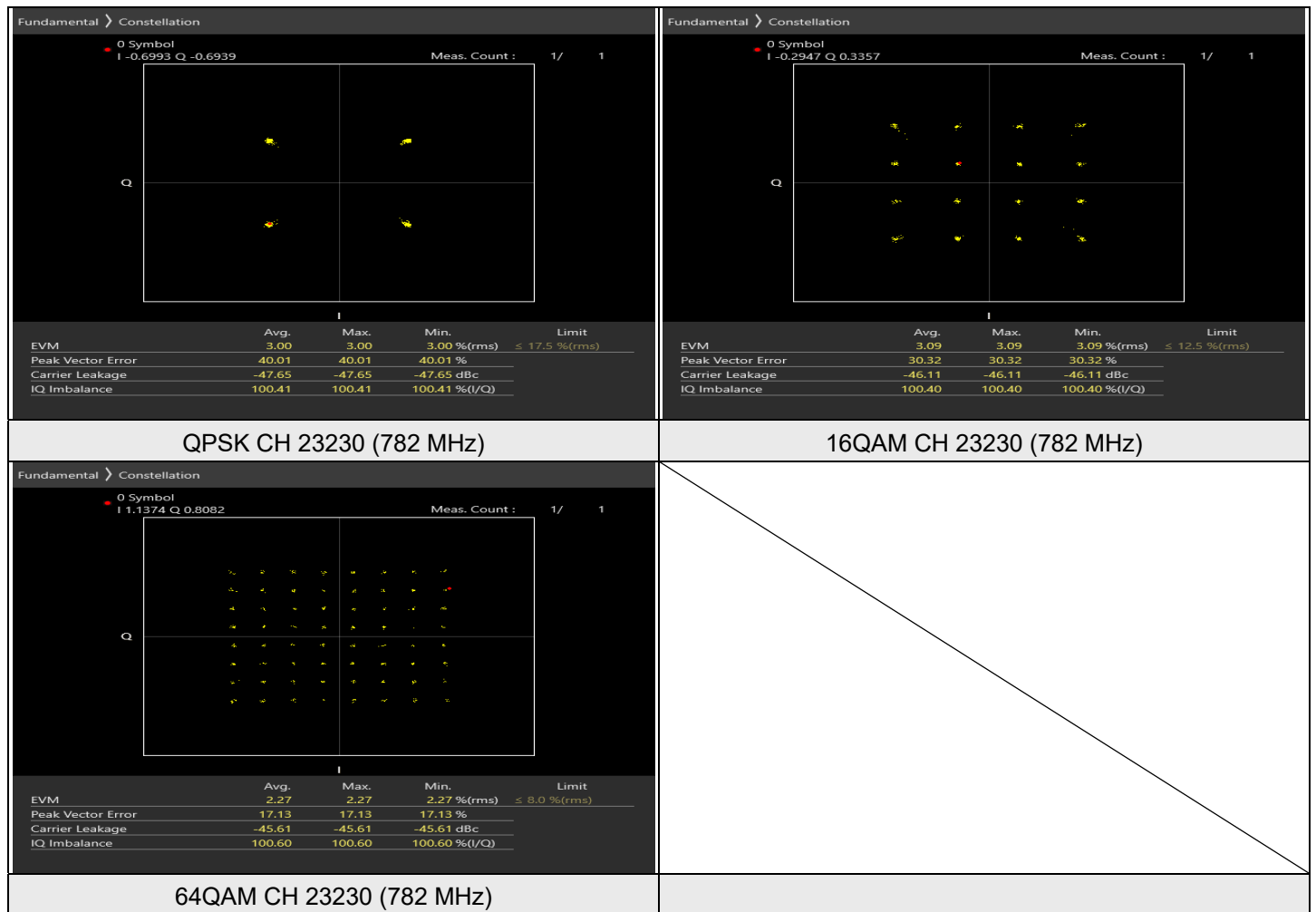
### 7.2.3 LTE Band 12

#### LTE Band 12, Channel Bandwidth: 10 MHz



7.2.4 LTE Band 13

LTE Band 13, Channel Bandwidth: 10 MHz



## 7.2.5 LTE Band 17

### LTE Band 17, Channel Bandwidth: 10 MHz





7.2.6 LTE Band 66

LTE Band 66, Channel Bandwidth: 20 MHz



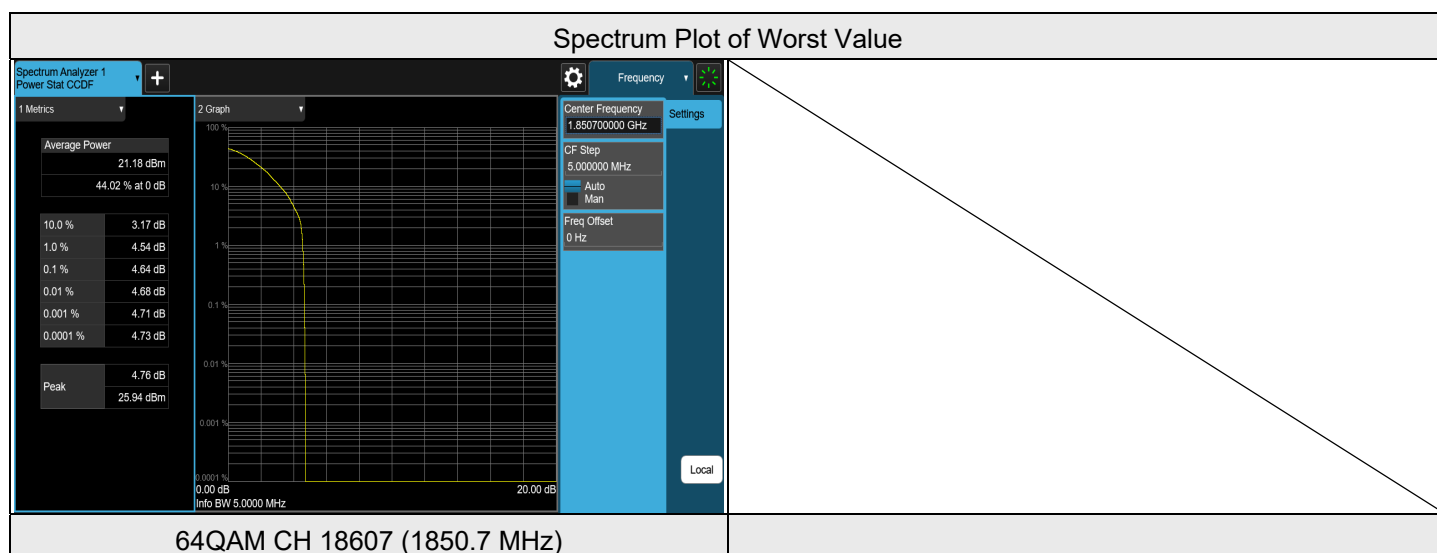
### 7.3 Peak to Average Ratio

Input Power:	3.87 Vdc	Environmental Conditions:	23°C, 68% RH	Tested By:	Noah Chang
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#### 7.3.1 LTE Band 2

#### LTE Band 2, Channel Bandwidth: 1.4 MHz

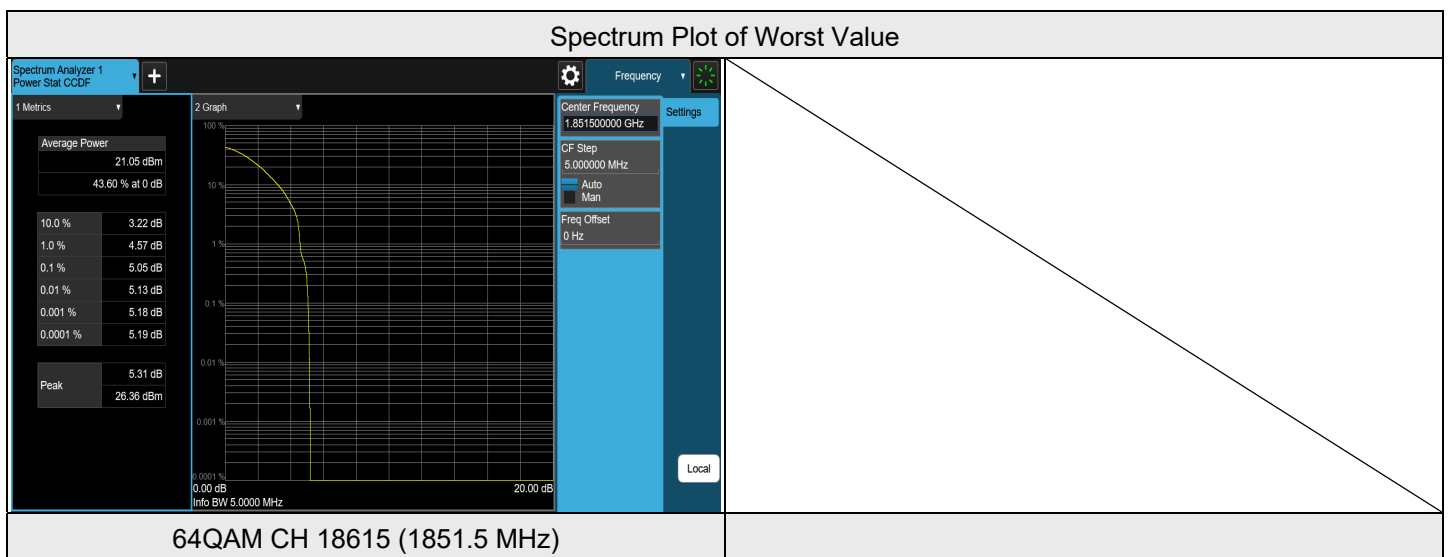
Modulation	Channel	Frequency (MHz)	Measurement Value(dB)	Limit (dB)	Result
QPSK	18607	1850.7	2.71	13	PASS
QPSK	18900	1880	1.87	13	PASS
QPSK	19193	1909.3	2.36	13	PASS
16QAM	18607	1850.7	3.69	13	PASS
16QAM	18900	1880	2.68	13	PASS
16QAM	19193	1909.3	3.33	13	PASS
64QAM	18607	1850.7	4.64	13	PASS
64QAM	18900	1880	3.52	13	PASS
64QAM	19193	1909.3	3.84	13	PASS





### LTE Band 2, Channel Bandwidth: 3 MHz

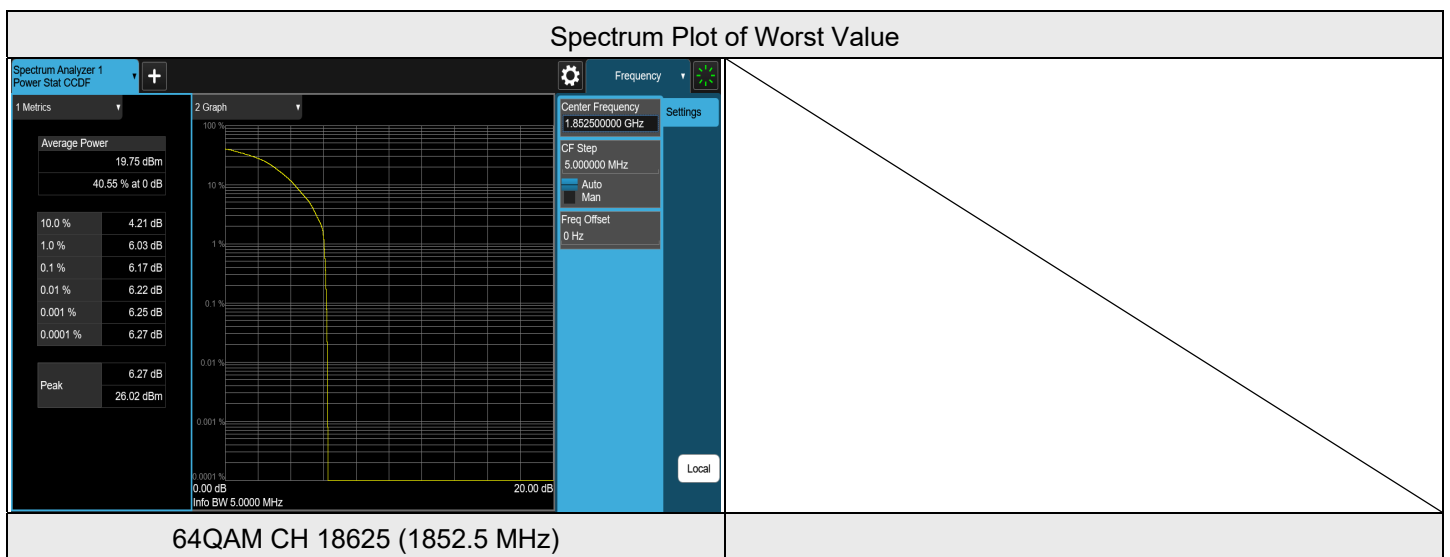
Modulation	Channel	Frequency (MHz)	Measurement Value(dB)	Limit (dB)	Result
QPSK	18615	1851.5	2.98	13	PASS
QPSK	18900	1880	1.73	13	PASS
QPSK	19185	1908.5	1.91	13	PASS
16QAM	18615	1851.5	3.76	13	PASS
16QAM	18900	1880	2.67	13	PASS
16QAM	19185	1908.5	2.85	13	PASS
64QAM	18615	1851.5	5.05	13	PASS
64QAM	18900	1880	3.58	13	PASS
64QAM	19185	1908.5	3.69	13	PASS





LTE Band 2, Channel Bandwidth: 5 MHz

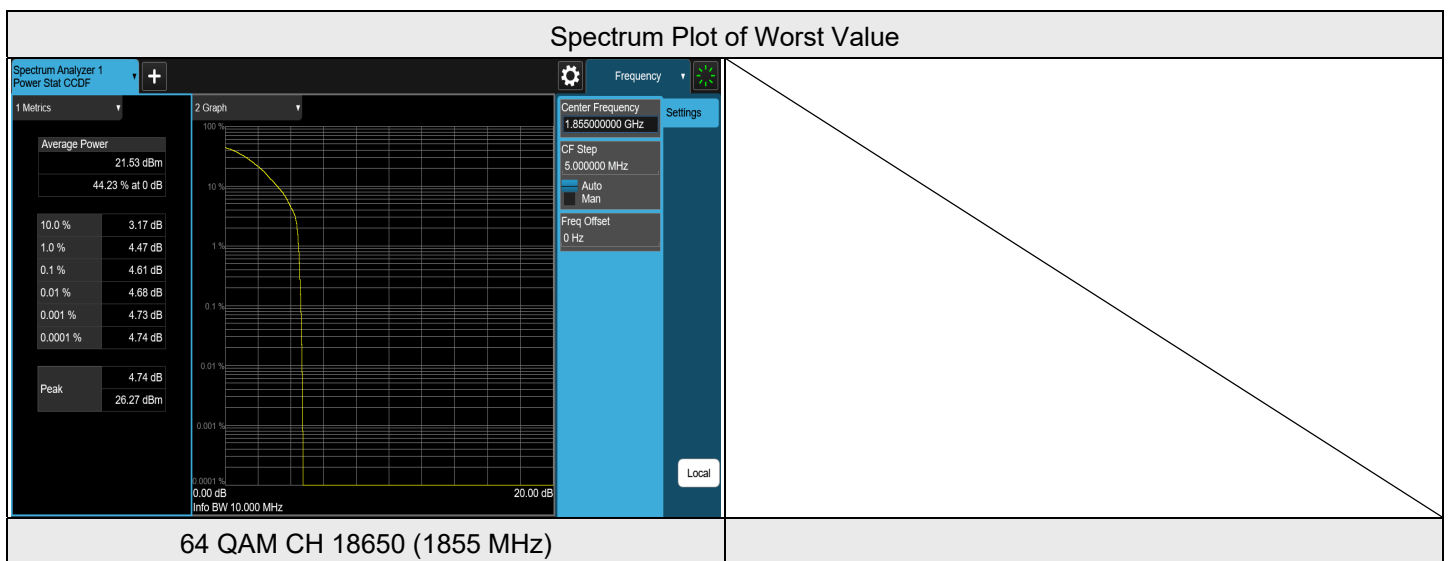
Modulation	Channel	Frequency (MHz)	Measurement Value(dB)	Limit (dB)	Result
QPSK	18625	1852.5	2.86	13	PASS
QPSK	18900	1880	1.97	13	PASS
QPSK	19175	1907.5	2.08	13	PASS
16QAM	18625	1852.5	3.70	13	PASS
16QAM	18900	1880	2.91	13	PASS
16QAM	19175	1907.5	2.87	13	PASS
64QAM	18625	1852.5	6.17	13	PASS
64QAM	18900	1880	3.69	13	PASS
64QAM	19175	1907.5	3.78	13	PASS





LTE Band 2, Channel Bandwidth: 10 MHz

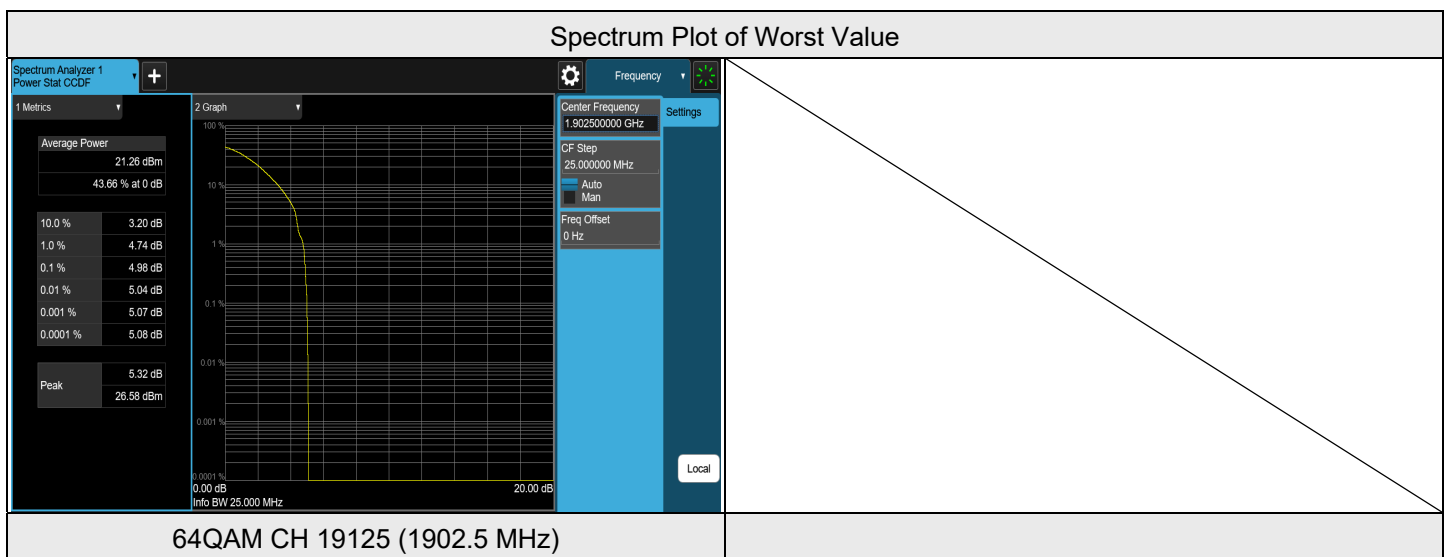
Modulation	Channel	Frequency (MHz)	Measurement Value(dB)	Limit (dB)	Result
QPSK	18650	1855	2.87	13	PASS
QPSK	18900	1880	2.05	13	PASS
QPSK	19150	1905	2.52	13	PASS
16QAM	18650	1855	3.69	13	PASS
16QAM	18900	1880	2.91	13	PASS
16QAM	19150	1905	3.41	13	PASS
64QAM	18650	1855	4.61	13	PASS
64QAM	18900	1880	3.76	13	PASS
64QAM	19150	1905	4.30	13	PASS





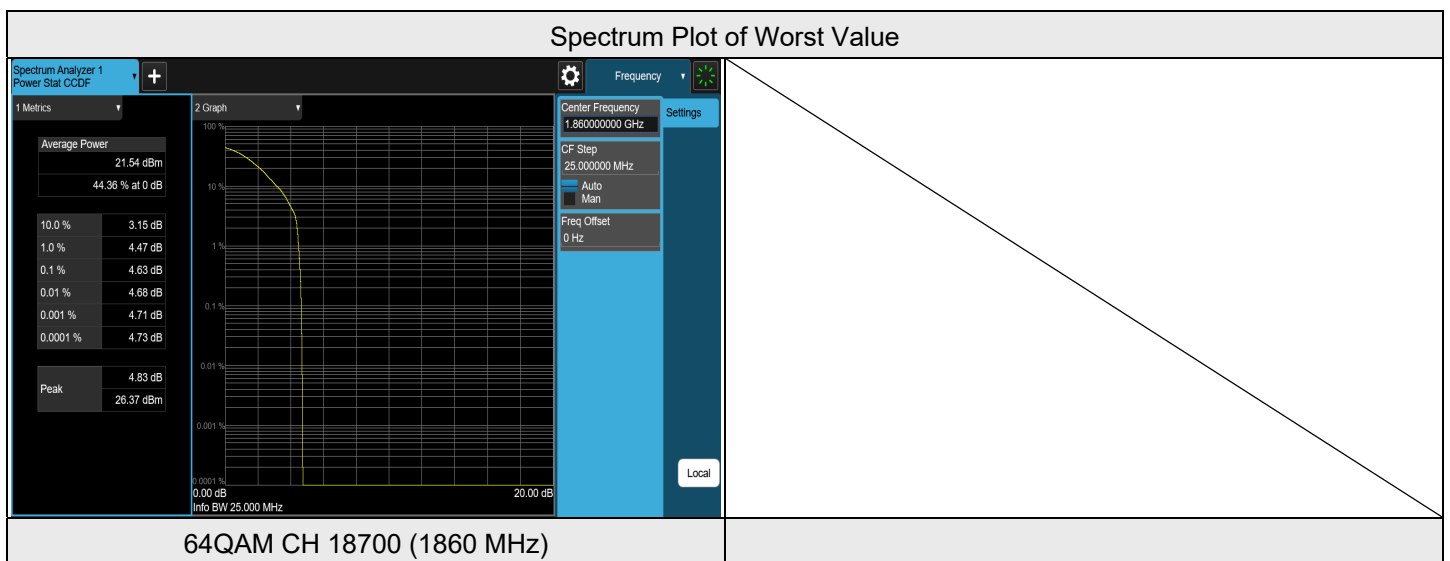
LTE Band 2, Channel Bandwidth: 15 MHz

Modulation	Channel	Frequency (MHz)	Measurement Value(dB)	Limit (dB)	Result
QPSK	18675	1857.5	2.90	13	PASS
QPSK	18900	1880	2.29	13	PASS
QPSK	19125	1902.5	2.87	13	PASS
16QAM	18675	1857.5	4.06	13	PASS
16QAM	18900	1880	2.94	13	PASS
16QAM	19125	1902.5	4.07	13	PASS
64QAM	18675	1857.5	4.89	13	PASS
64QAM	18900	1880	3.99	13	PASS
64QAM	19125	1902.5	4.98	13	PASS



**LTE Band 2, Channel Bandwidth: 20 MHz**

Modulation	Channel	Frequency (MHz)	Measurement Value(dB)	Limit (dB)	Result
QPSK	18700	1860	3.15	13	PASS
QPSK	18900	1880	2.42	13	PASS
QPSK	19100	1900	3.08	13	PASS
16QAM	18700	1860	4.06	13	PASS
16QAM	18900	1880	3.18	13	PASS
16QAM	19100	1900	3.59	13	PASS
64QAM	18700	1860	4.63	13	PASS
64QAM	18900	1880	4.33	13	PASS
64QAM	19100	1900	4.53	13	PASS

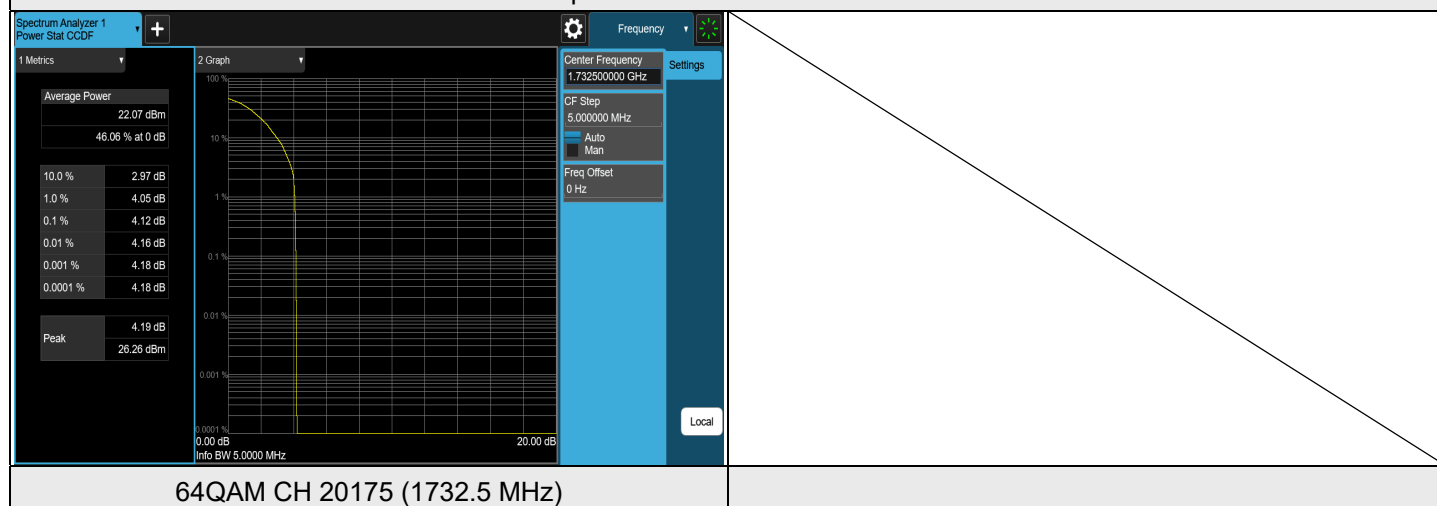


7.3.2 LTE Band 4

LTE Band 4, Channel Bandwidth: 1.4 MHz

Modulation	Channel	Frequency (MHz)	Measurement Value(dB)	Limit (dB)	Result
QPSK	19957	1710.7	2.18	13	PASS
QPSK	20175	1732.5	2.60	13	PASS
QPSK	20393	1754.3	2.19	13	PASS
16QAM	19957	1710.7	3.13	13	PASS
16QAM	20175	1732.5	3.27	13	PASS
16QAM	20393	1754.3	2.99	13	PASS
64QAM	19957	1710.7	3.76	13	PASS
64QAM	20175	1732.5	4.12	13	PASS
64QAM	20393	1754.3	3.77	13	PASS

Spectrum Plot of Worst Value

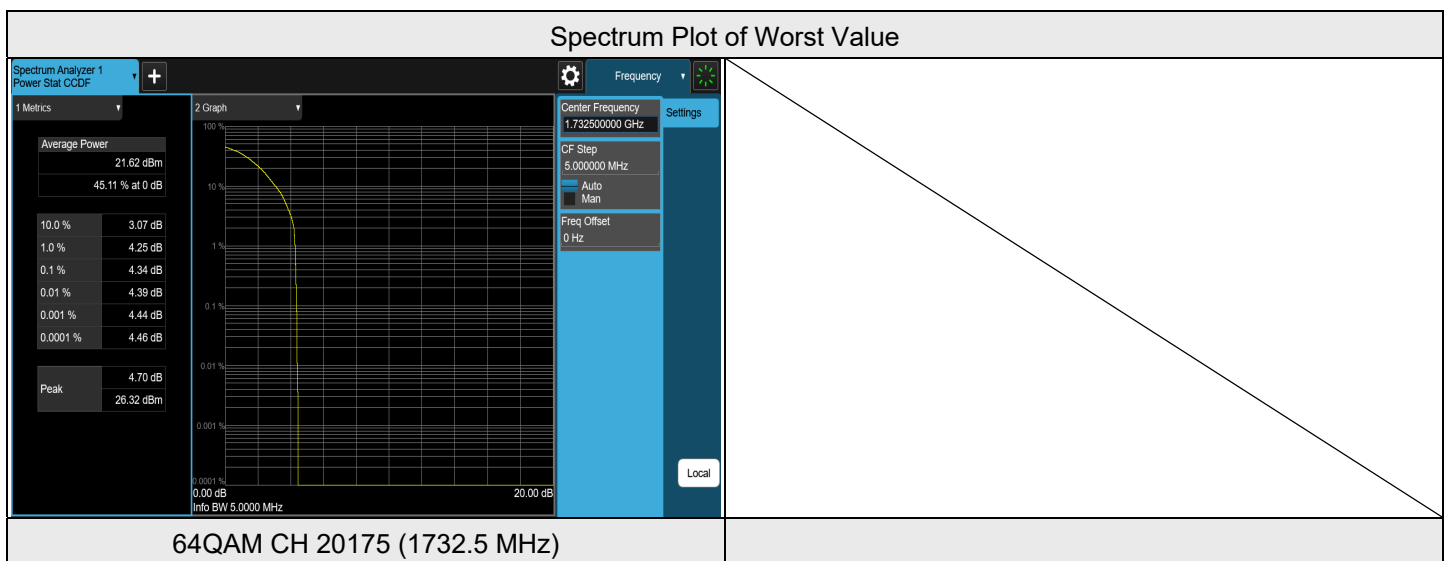






LTE Band 4, Channel Bandwidth: 3 MHz

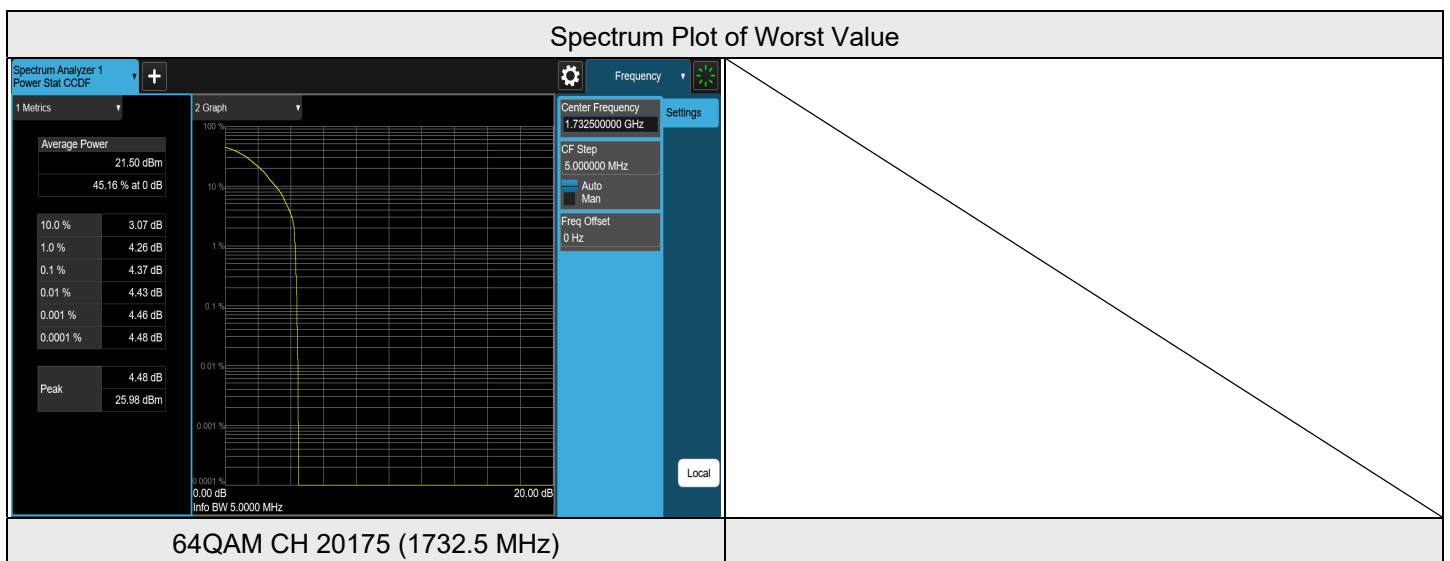
Modulation	Channel	Frequency (MHz)	Measurement Value(dB)	Limit (dB)	Result
QPSK	19965	1711.5	2.38	13	PASS
QPSK	20175	1732.5	2.49	13	PASS
QPSK	20385	1753.5	2.13	13	PASS
16QAM	19965	1711.5	3.15	13	PASS
16QAM	20175	1732.5	3.39	13	PASS
16QAM	20385	1753.5	3.21	13	PASS
64QAM	19965	1711.5	3.92	13	PASS
64QAM	20175	1732.5	4.34	13	PASS
64QAM	20385	1753.5	4.03	13	PASS





LTE Band 4, Channel Bandwidth: 5 MHz

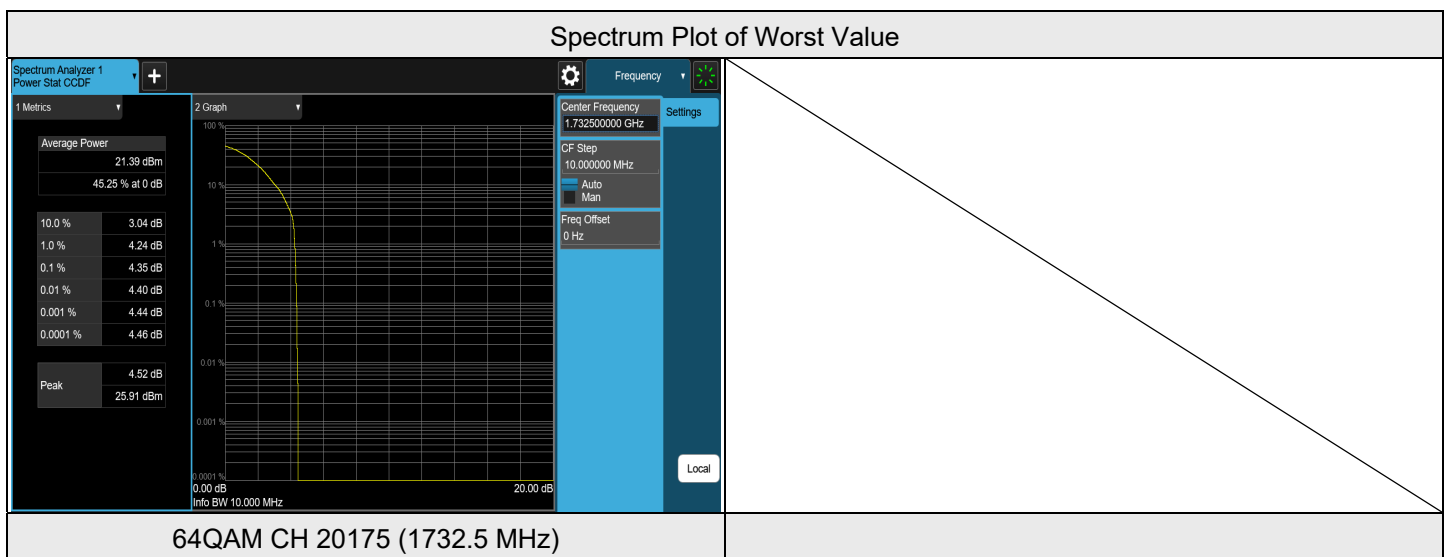
Modulation	Channel	Frequency (MHz)	Measurement Value(dB)	Limit (dB)	Result
QPSK	19975	1712.5	2.20	13	PASS
QPSK	20175	1732.5	2.50	13	PASS
QPSK	20375	1752.5	2.25	13	PASS
16QAM	19975	1712.5	3.19	13	PASS
16QAM	20175	1732.5	3.42	13	PASS
16QAM	20375	1752.5	3.10	13	PASS
64QAM	19975	1712.5	4.15	13	PASS
64QAM	20175	1732.5	4.37	13	PASS
64QAM	20375	1752.5	4.05	13	PASS





LTE Band 4, Channel Bandwidth: 10 MHz

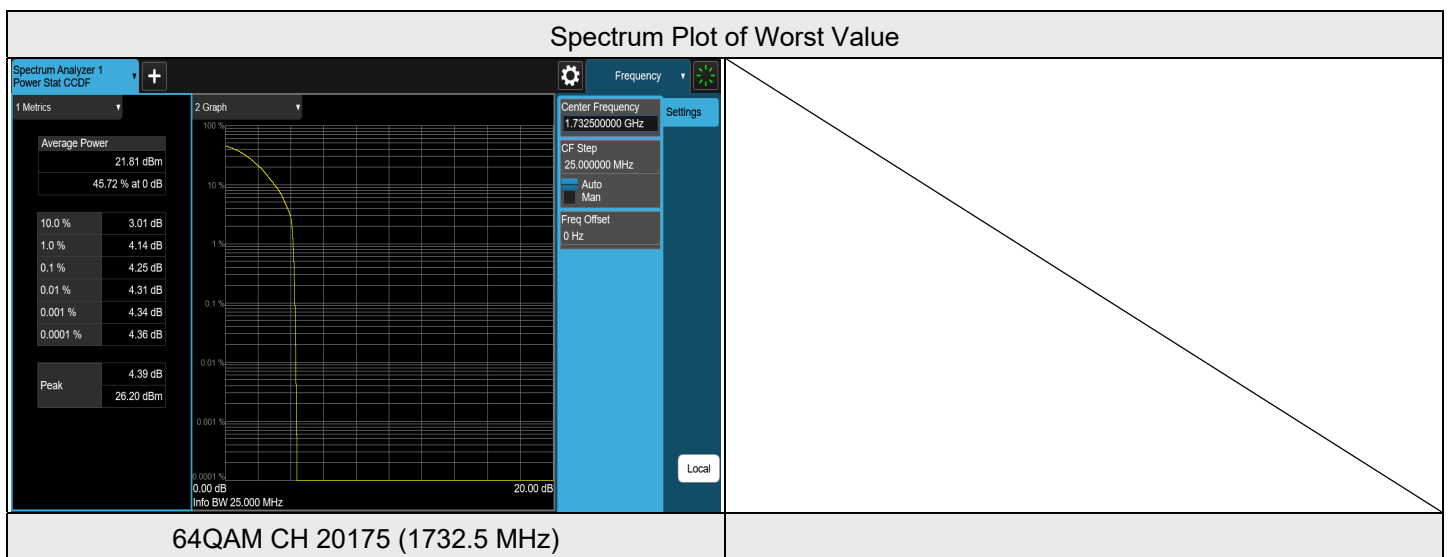
Modulation	Channel	Frequency (MHz)	Measurement Value(dB)	Limit (dB)	Result
QPSK	20000	1715	2.32	13	PASS
QPSK	20175	1732.5	2.55	13	PASS
QPSK	20350	1750	2.27	13	PASS
16QAM	20000	1715	3.25	13	PASS
16QAM	20175	1732.5	3.49	13	PASS
16QAM	20350	1750	3.16	13	PASS
64QAM	20000	1715	4.08	13	PASS
64QAM	20175	1732.5	4.35	13	PASS
64QAM	20350	1750	4.04	13	PASS





LTE Band 4, Channel Bandwidth: 15 MHz

Modulation	Channel	Frequency (MHz)	Measurement Value(dB)	Limit (dB)	Result
QPSK	20025	1717.5	2.22	13	PASS
QPSK	20175	1732.5	2.59	13	PASS
QPSK	20325	1747.5	2.20	13	PASS
16QAM	20025	1717.5	3.27	13	PASS
16QAM	20175	1732.5	3.34	13	PASS
16QAM	20325	1747.5	3.26	13	PASS
64QAM	20025	1717.5	3.85	13	PASS
64QAM	20175	1732.5	4.25	13	PASS
64QAM	20325	1747.5	4.05	13	PASS

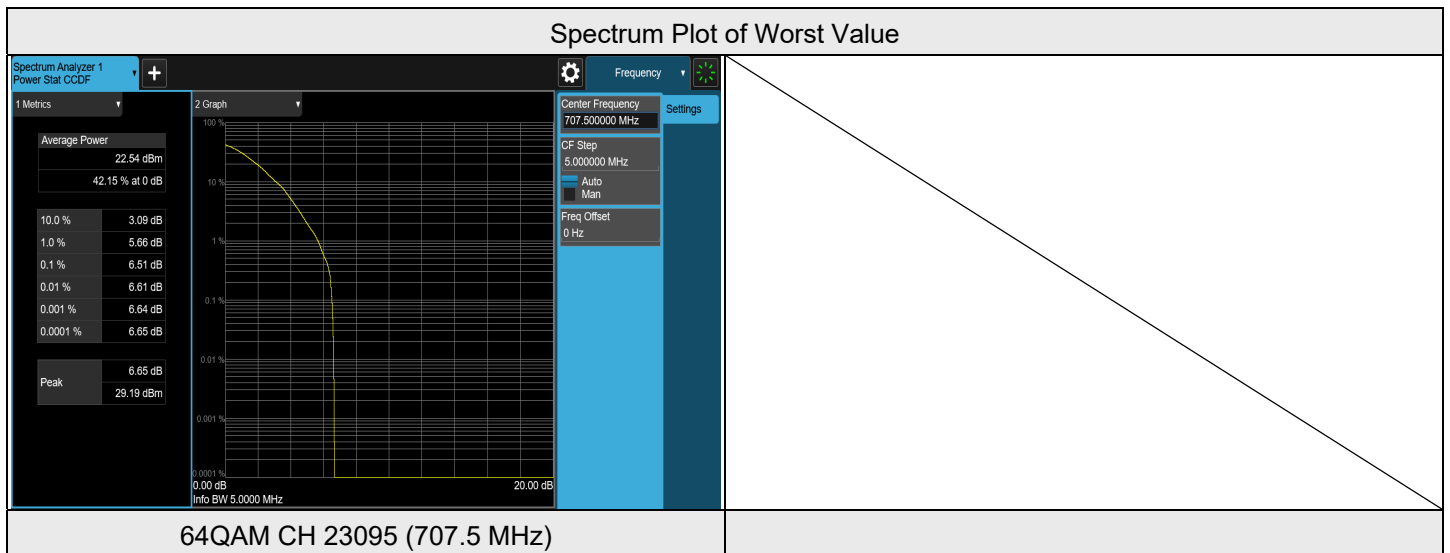




7.3.3 LTE Band 12

LTE Band 12, Channel Bandwidth: 1.4 MHz

Modulation	Channel	Frequency (MHz)	Measurement Value(dB)	Limit (dB)	Result
QPSK	23017	699.7	4.23	13	PASS
QPSK	23095	707.5	4.68	13	PASS
QPSK	23173	715.3	4.40	13	PASS
16QAM	23017	699.7	5.27	13	PASS
16QAM	23095	707.5	5.50	13	PASS
16QAM	23173	715.3	5.32	13	PASS
64QAM	23017	699.7	6.08	13	PASS
64QAM	23095	707.5	6.51	13	PASS
64QAM	23173	715.3	6.16	13	PASS

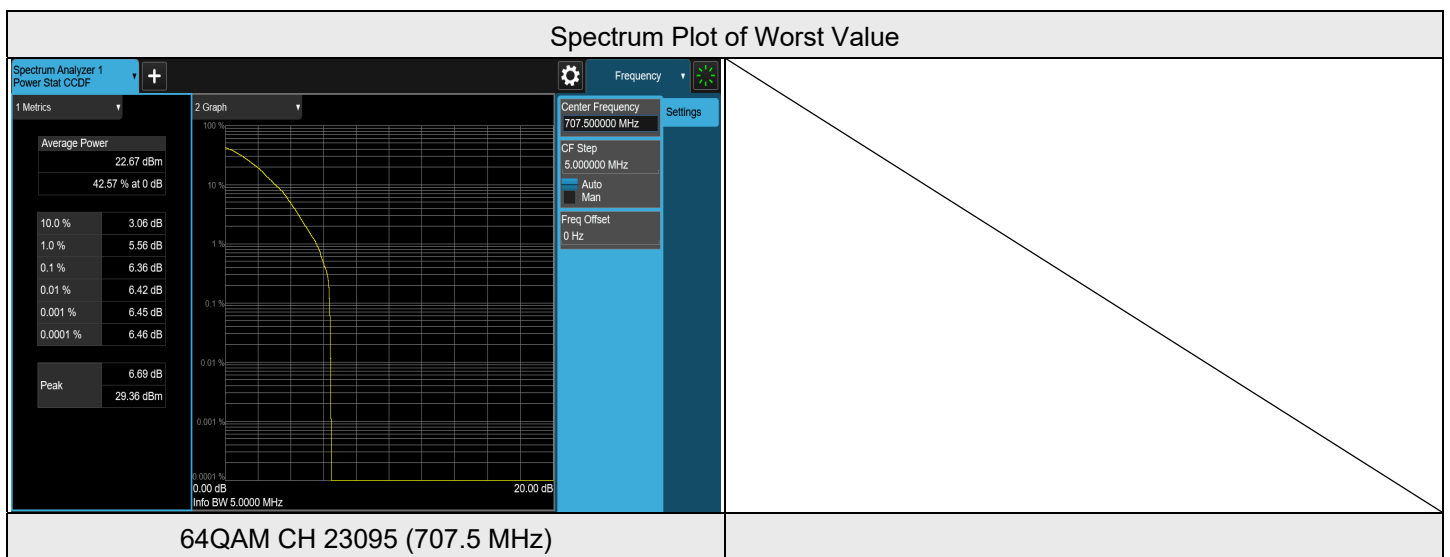






LTE Band 12, Channel Bandwidth: 5 MHz

Modulation	Channel	Frequency (MHz)	Measurement Value(dB)	Limit (dB)	Result
QPSK	23035	701.5	4.11	13	PASS
QPSK	23095	707.5	4.60	13	PASS
QPSK	23155	713.5	4.15	13	PASS
16QAM	23035	701.5	5.29	13	PASS
16QAM	23095	707.5	5.45	13	PASS
16QAM	23155	713.5	5.14	13	PASS
64QAM	23035	701.5	6.13	13	PASS
64QAM	23095	707.5	6.36	13	PASS
64QAM	23155	713.5	5.96	13	PASS

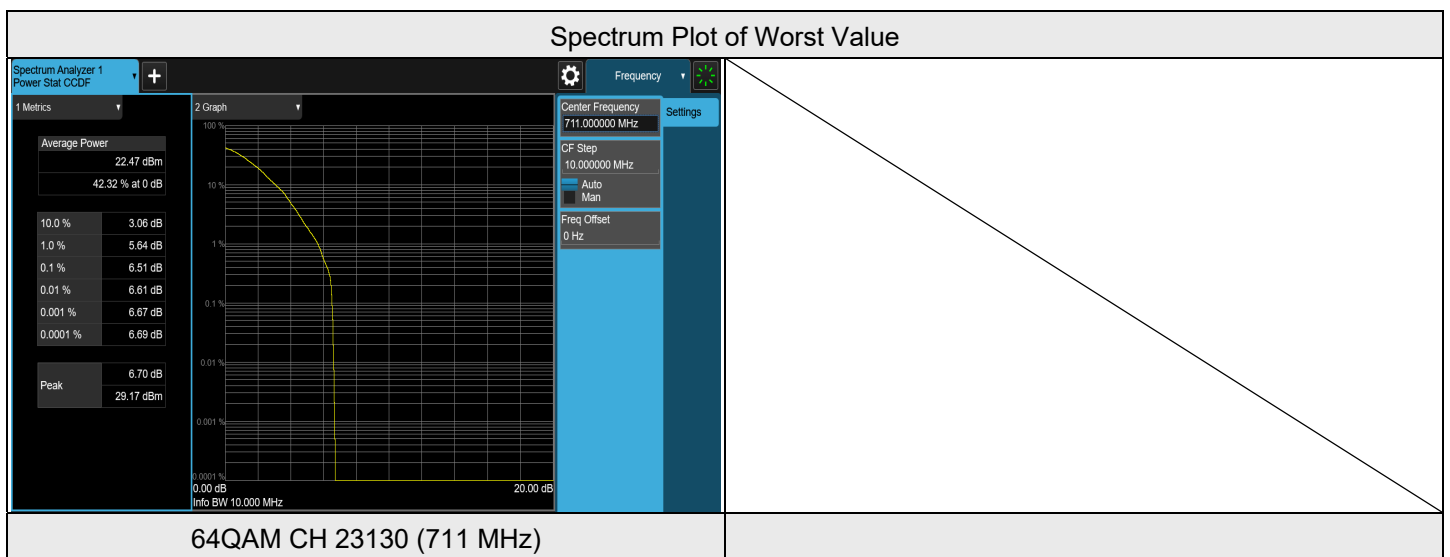






LTE Band 12, Channel Bandwidth: 10 MHz

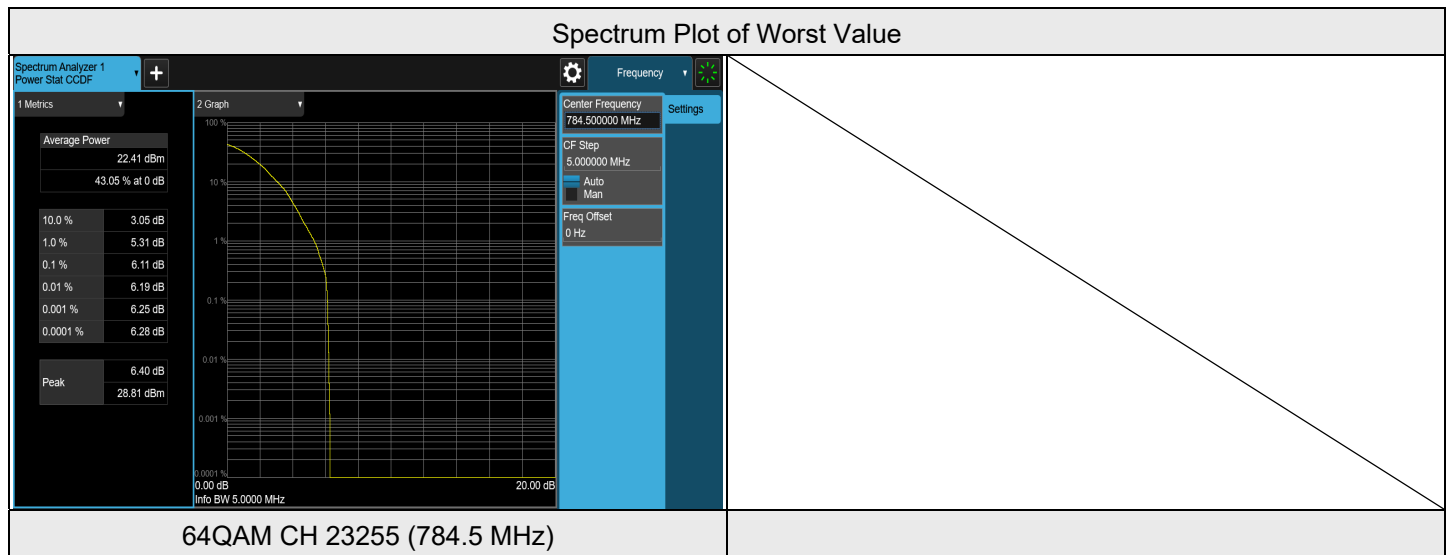
Modulation	Channel	Frequency (MHz)	Measurement Value(dB)	Limit (dB)	Result
QPSK	23060	704	4.13	13	PASS
QPSK	23095	707.5	4.20	13	PASS
QPSK	23130	711	4.61	13	PASS
16QAM	23060	704	5.02	13	PASS
16QAM	23095	707.5	5.18	13	PASS
16QAM	23130	711	5.62	13	PASS
64QAM	23060	704	6.11	13	PASS
64QAM	23095	707.5	6.16	13	PASS
64QAM	23130	711	6.51	13	PASS



7.3.4 LTE Band 13

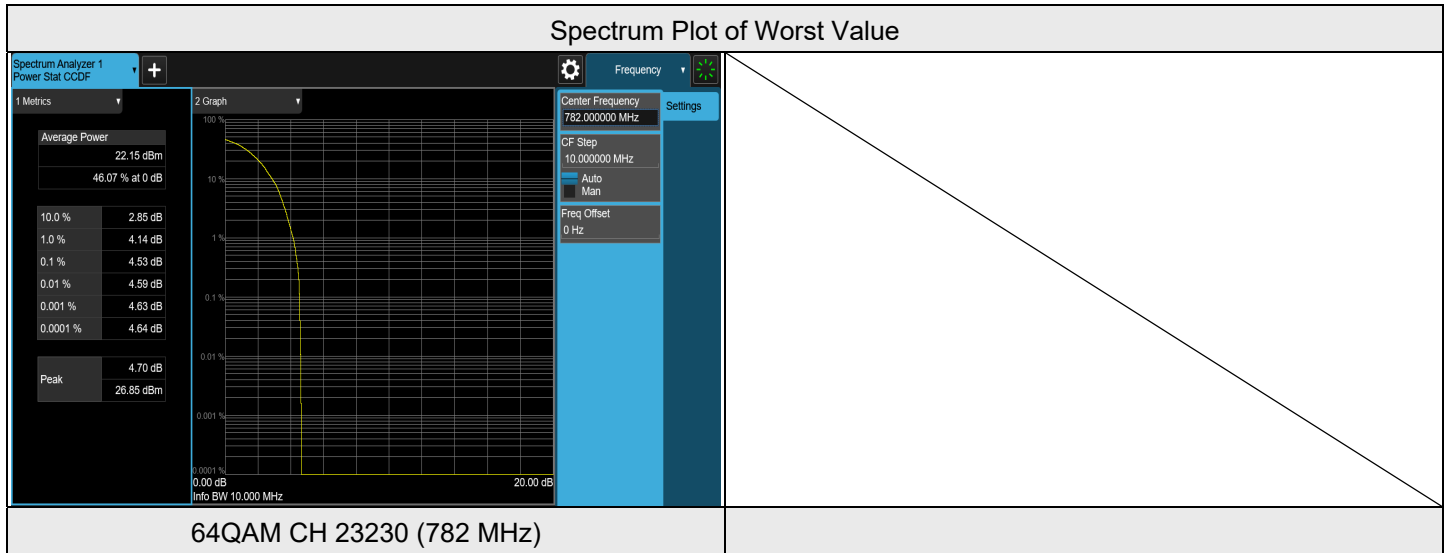
LTE Band 13, Channel Bandwidth: 5 MHz

Modulation	Channel	Frequency (MHz)	Measurement Value(dB)	Limit (dB)	Result
QPSK	23205	779.5	2.78	13	PASS
QPSK	23230	782	3.87	13	PASS
QPSK	23255	784.5	4.18	13	PASS
16QAM	23205	779.5	3.87	13	PASS
16QAM	23230	782	4.83	13	PASS
16QAM	23255	784.5	5.20	13	PASS
64QAM	23205	779.5	4.77	13	PASS
64QAM	23230	782	5.73	13	PASS
64QAM	23255	784.5	6.11	13	PASS



**LTE Band 13, Channel Bandwidth: 10 MHz**

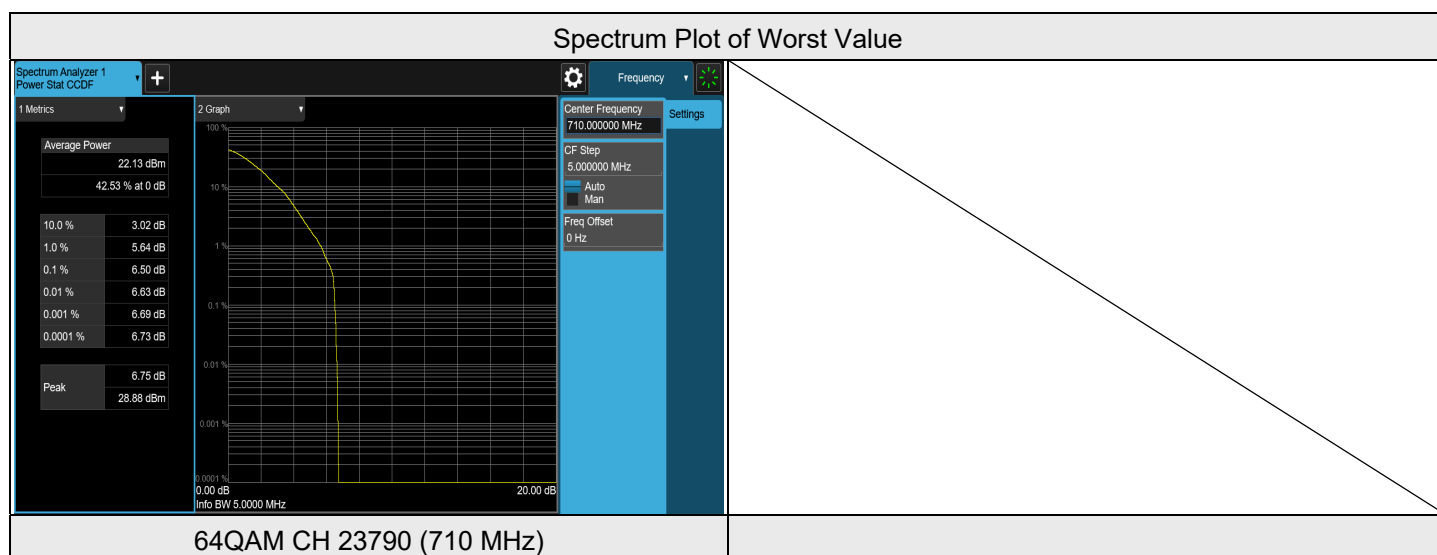
Modulation	Channel	Frequency (MHz)	Measurement Value(dB)	Limit (dB)	Result
QPSK	23230	782	2.48	13	PASS
16QAM	23230	782	3.63	13	PASS
64QAM	23230	782	4.53	13	PASS



7.3.5 LTE Band 17

LTE Band 17, Channel Bandwidth: 5 MHz

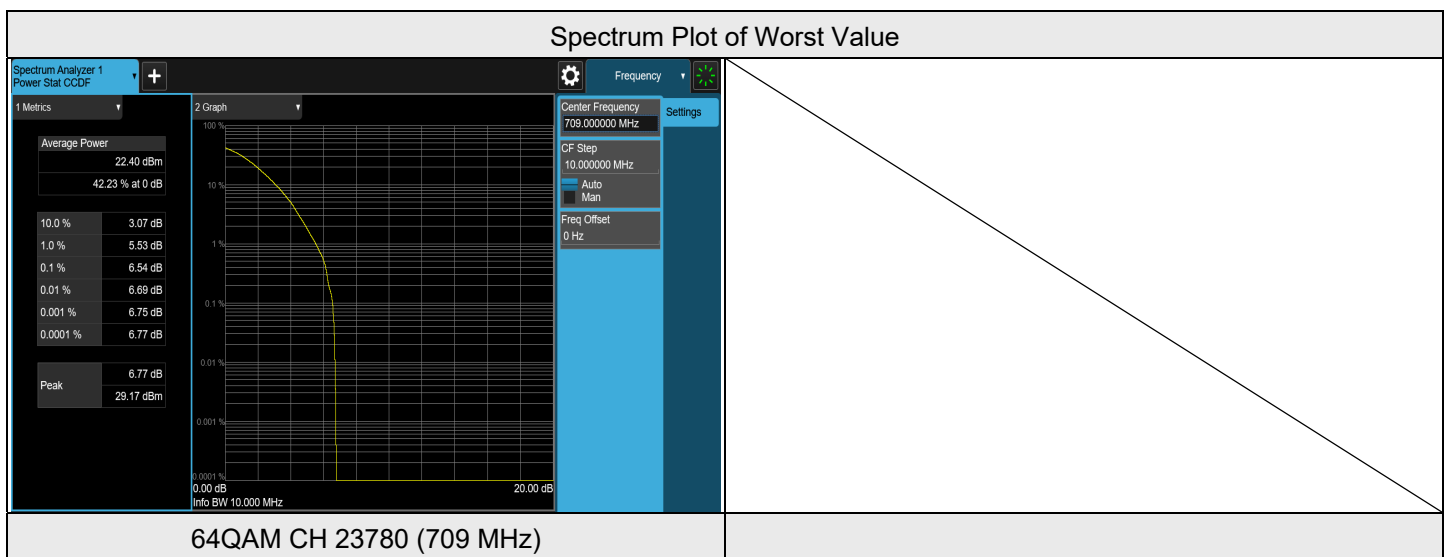
Modulation	Channel	Frequency (MHz)	Measurement Value(dB)	Limit (dB)	Result
QPSK	23755	706.5	4.62	13	PASS
QPSK	23790	710	4.66	13	PASS
QPSK	23825	713.5	4.26	13	PASS
16QAM	23755	706.5	5.49	13	PASS
16QAM	23790	710	5.46	13	PASS
16QAM	23825	713.5	5.05	13	PASS
64QAM	23755	706.5	6.43	13	PASS
64QAM	23790	710	6.50	13	PASS
64QAM	23825	713.5	6.08	13	PASS





LTE Band 17, Channel Bandwidth: 10 MHz

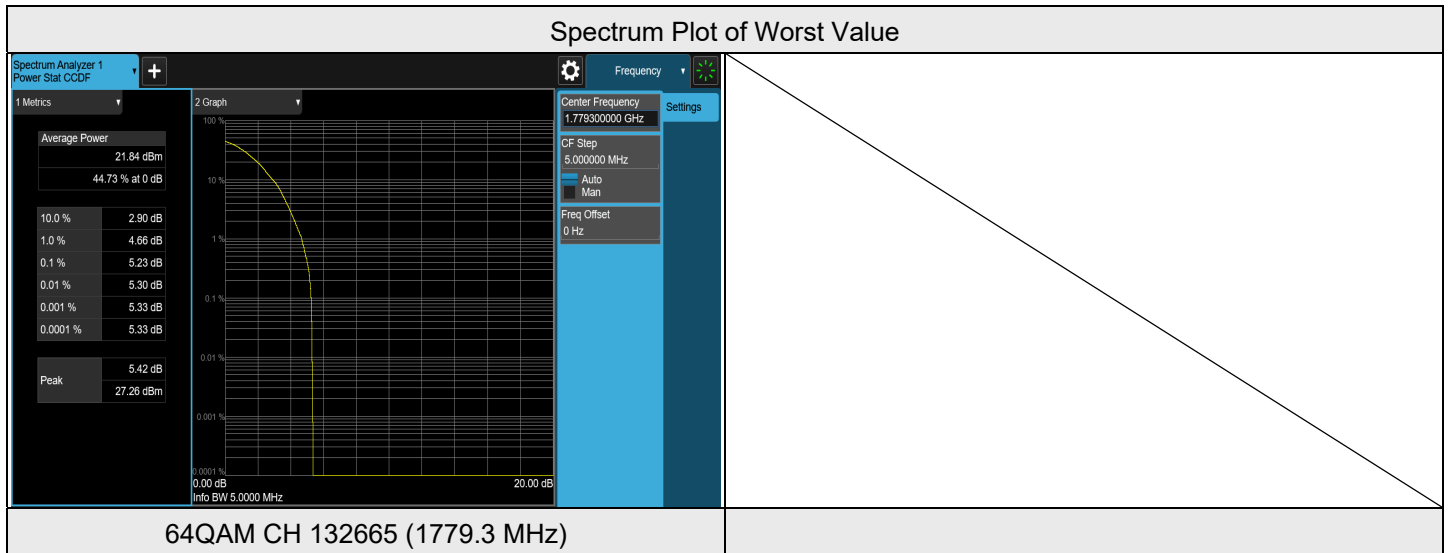
Modulation	Channel	Frequency (MHz)	Measurement Value(dB)	Limit (dB)	Result
QPSK	23780	709	4.37	13	PASS
QPSK	23790	710	4.60	13	PASS
QPSK	23800	711	4.62	13	PASS
16QAM	23780	709	5.53	13	PASS
16QAM	23790	710	5.54	13	PASS
16QAM	23800	711	5.72	13	PASS
64QAM	23780	709	6.54	13	PASS
64QAM	23790	710	6.41	13	PASS
64QAM	23800	711	6.47	13	PASS



7.3.6 LTE Band 66

LTE Band 66, Channel Bandwidth: 1.4 MHz

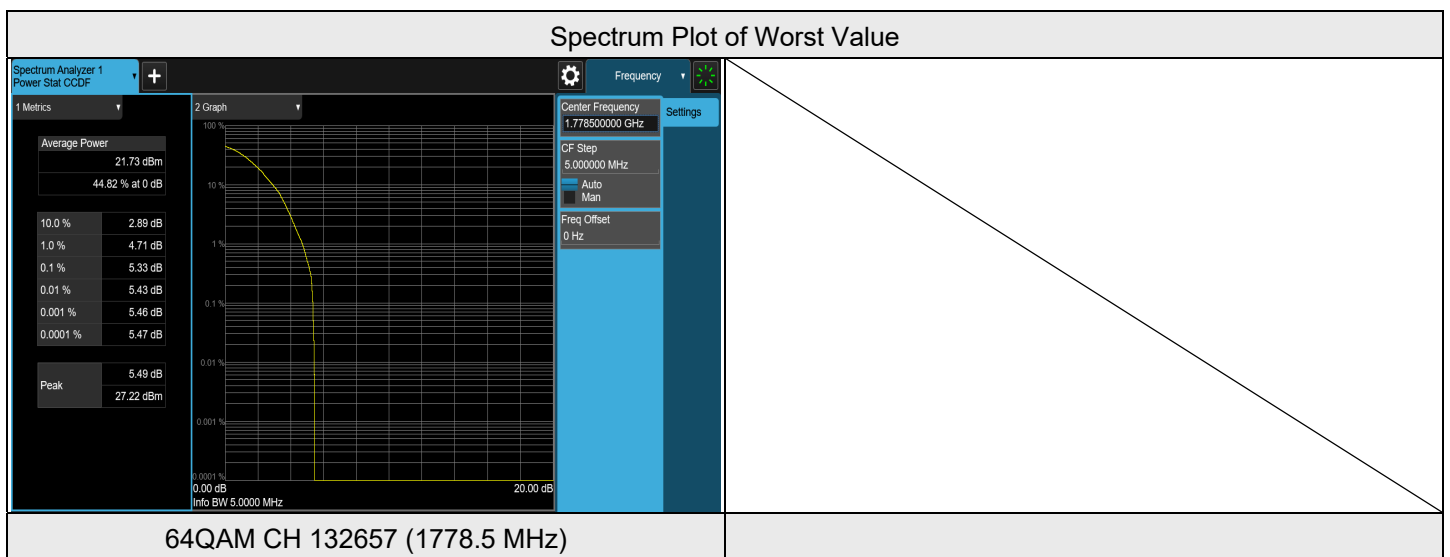
Modulation	Channel	Frequency (MHz)	Measurement Value(dB)	Limit (dB)	Result
QPSK	131979	1710.7	3.02	13	PASS
QPSK	132322	1745	3.20	13	PASS
QPSK	132665	1779.3	3.63	13	PASS
16QAM	131979	1710.7	4.00	13	PASS
16QAM	132322	1745	4.28	13	PASS
16QAM	132665	1779.3	4.37	13	PASS
64QAM	131979	1710.7	4.92	13	PASS
64QAM	132322	1745	5.01	13	PASS
64QAM	132665	1779.3	5.23	13	PASS





LTE Band 66, Channel Bandwidth: 3 MHz

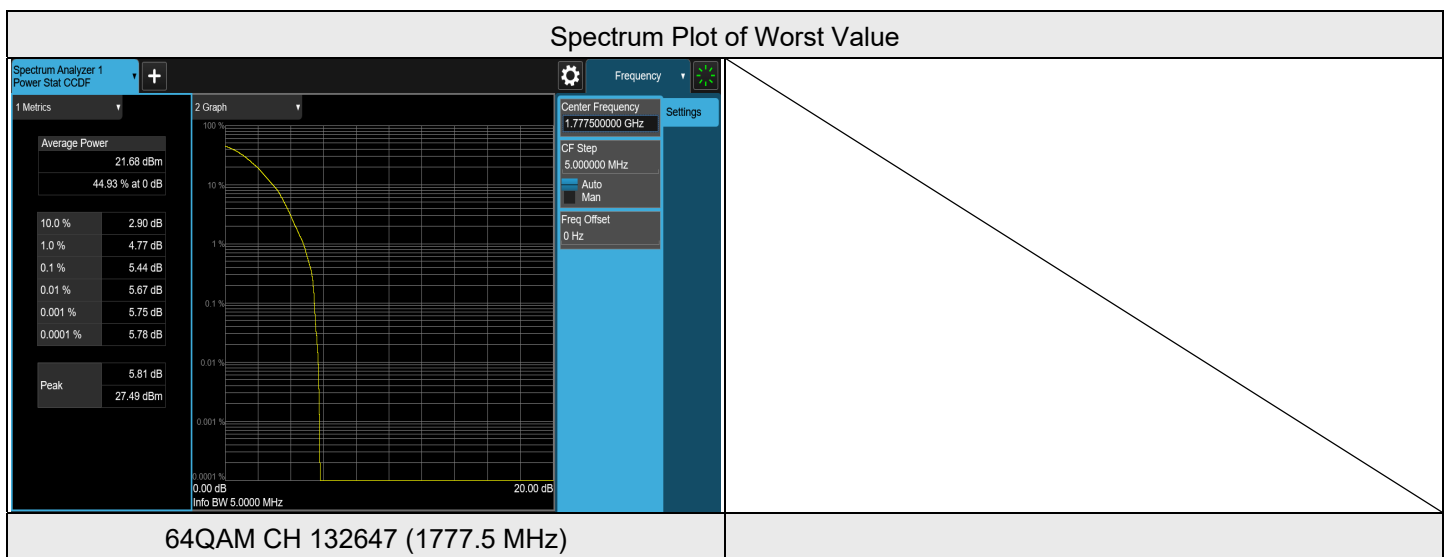
Modulation	Channel	Frequency (MHz)	Measurement Value(dB)	Limit (dB)	Result
QPSK	131987	1711.5	2.99	13	PASS
QPSK	132322	1745	3.15	13	PASS
QPSK	132657	1778.5	3.36	13	PASS
16QAM	131987	1711.5	4.07	13	PASS
16QAM	132322	1745	4.32	13	PASS
16QAM	132657	1778.5	4.35	13	PASS
64QAM	131987	1711.5	4.84	13	PASS
64QAM	132322	1745	4.95	13	PASS
64QAM	132657	1778.5	5.33	13	PASS





LTE Band 66, Channel Bandwidth: 5 MHz

Modulation	Channel	Frequency (MHz)	Measurement Value(dB)	Limit (dB)	Result
QPSK	131997	1712.5	3.02	13	PASS
QPSK	132322	1745	3.24	13	PASS
QPSK	132647	1777.5	3.52	13	PASS
16QAM	131997	1712.5	4.06	13	PASS
16QAM	132322	1745	4.25	13	PASS
16QAM	132647	1777.5	4.58	13	PASS
64QAM	131997	1712.5	5.03	13	PASS
64QAM	132322	1745	5.08	13	PASS
64QAM	132647	1777.5	5.44	13	PASS

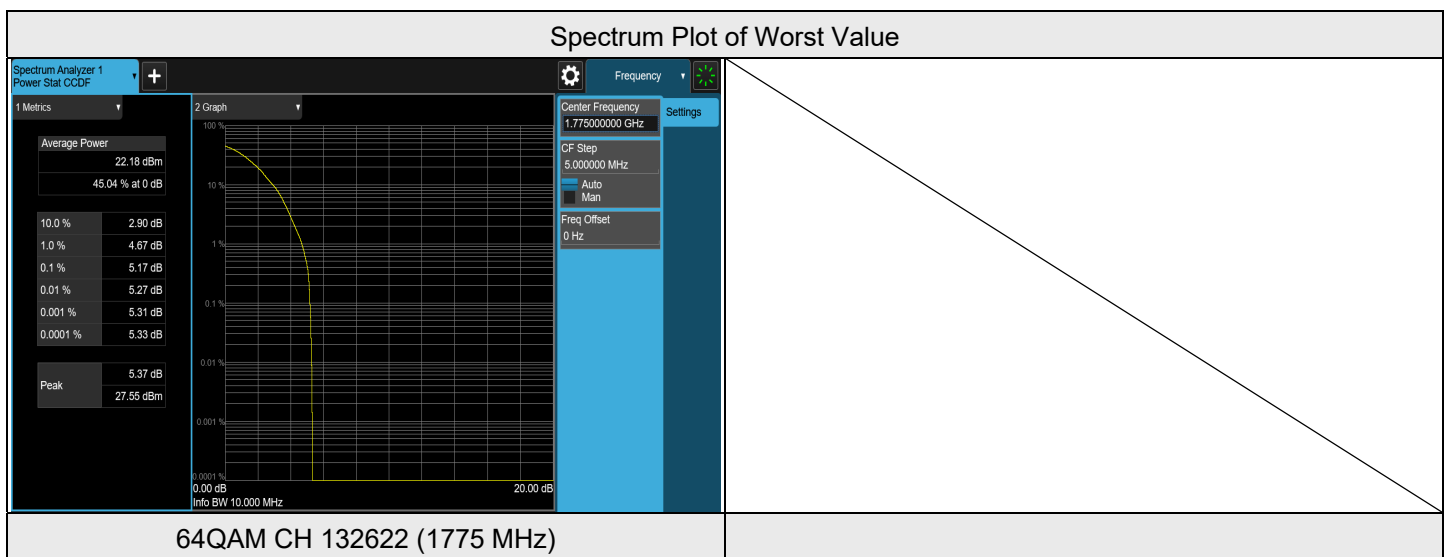






LTE Band 66, Channel Bandwidth: 10 MHz

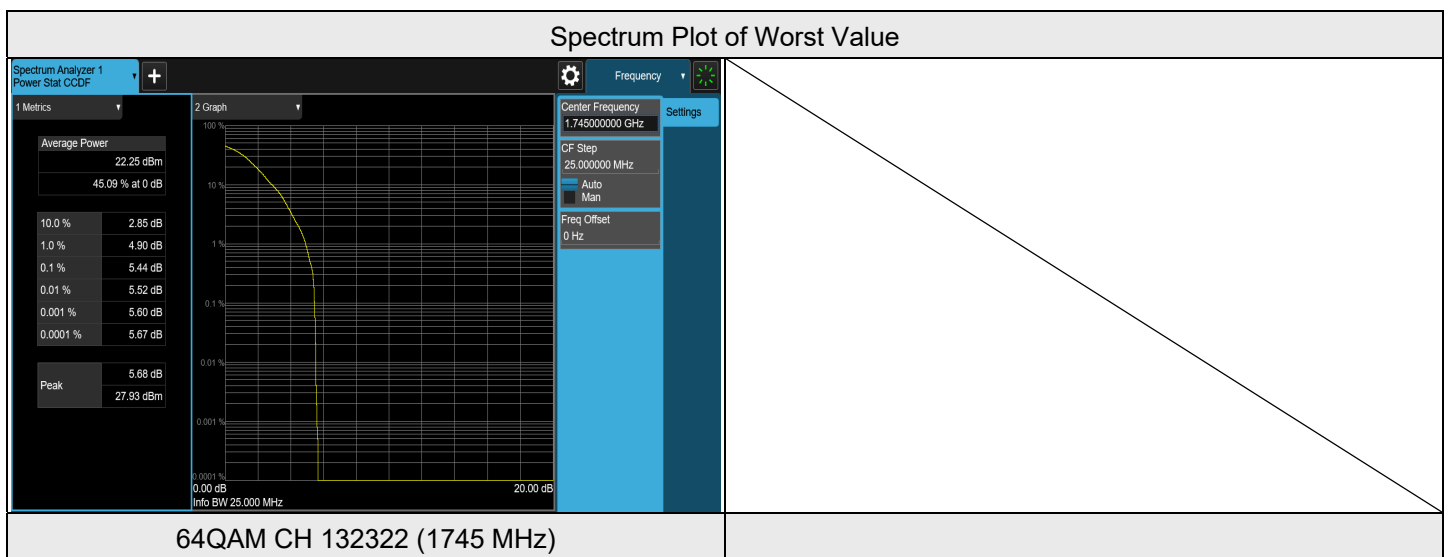
Modulation	Channel	Frequency (MHz)	Measurement Value(dB)	Limit (dB)	Result
QPSK	132022	1715	3.04	13	PASS
QPSK	132322	1745	3.22	13	PASS
QPSK	132622	1775	3.37	13	PASS
16QAM	132022	1715	3.99	13	PASS
16QAM	132322	1745	4.03	13	PASS
16QAM	132622	1775	4.43	13	PASS
64QAM	132022	1715	4.75	13	PASS
64QAM	132322	1745	5.09	13	PASS
64QAM	132622	1775	5.17	13	PASS





LTE Band 66, Channel Bandwidth: 15 MHz

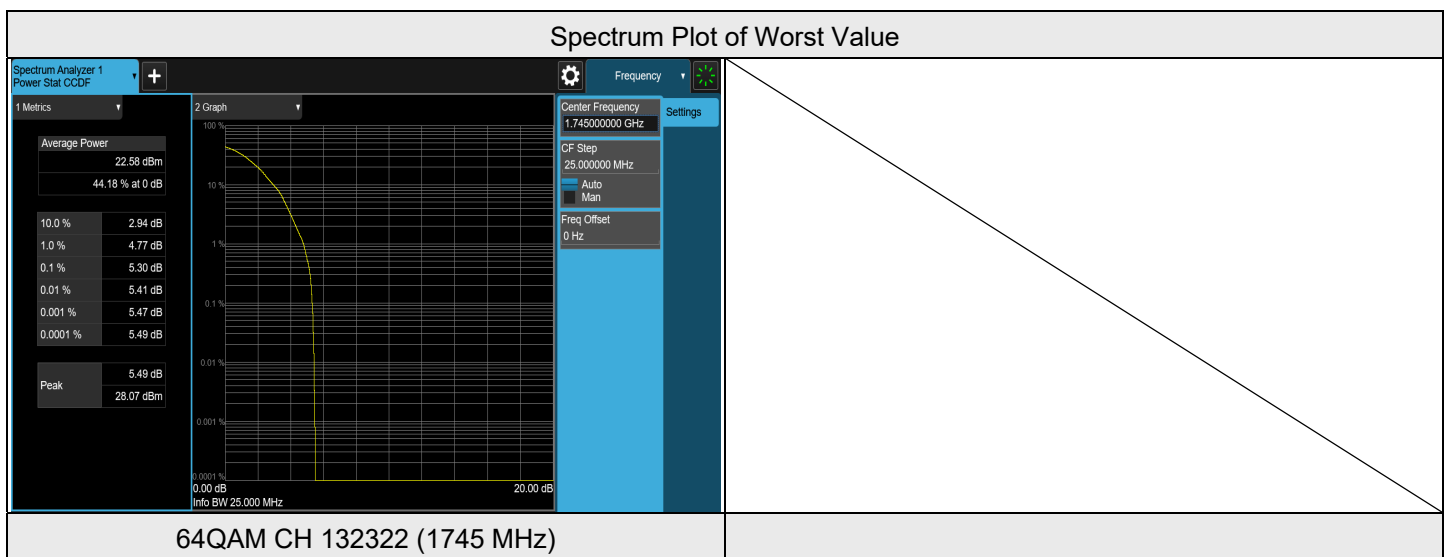
Modulation	Channel	Frequency (MHz)	Measurement Value(dB)	Limit (dB)	Result
QPSK	132047	1717.5	3.08	13	PASS
QPSK	132322	1745	3.40	13	PASS
QPSK	132597	1772.5	3.23	13	PASS
16QAM	132047	1717.5	4.08	13	PASS
16QAM	132322	1745	4.44	13	PASS
16QAM	132597	1772.5	4.32	13	PASS
64QAM	132047	1717.5	4.77	13	PASS
64QAM	132322	1745	5.44	13	PASS
64QAM	132597	1772.5	5.00	13	PASS





LTE Band 66, Channel Bandwidth: 20 MHz

Modulation	Channel	Frequency (MHz)	Measurement Value(dB)	Limit (dB)	Result
QPSK	132072	1720	3.00	13	PASS
QPSK	132322	1745	3.43	13	PASS
QPSK	132572	1770	3.14	13	PASS
16QAM	132072	1720	4.14	13	PASS
16QAM	132322	1745	4.42	13	PASS
16QAM	132572	1770	4.07	13	PASS
64QAM	132072	1720	4.87	13	PASS
64QAM	132322	1745	5.30	13	PASS
64QAM	132572	1770	4.94	13	PASS



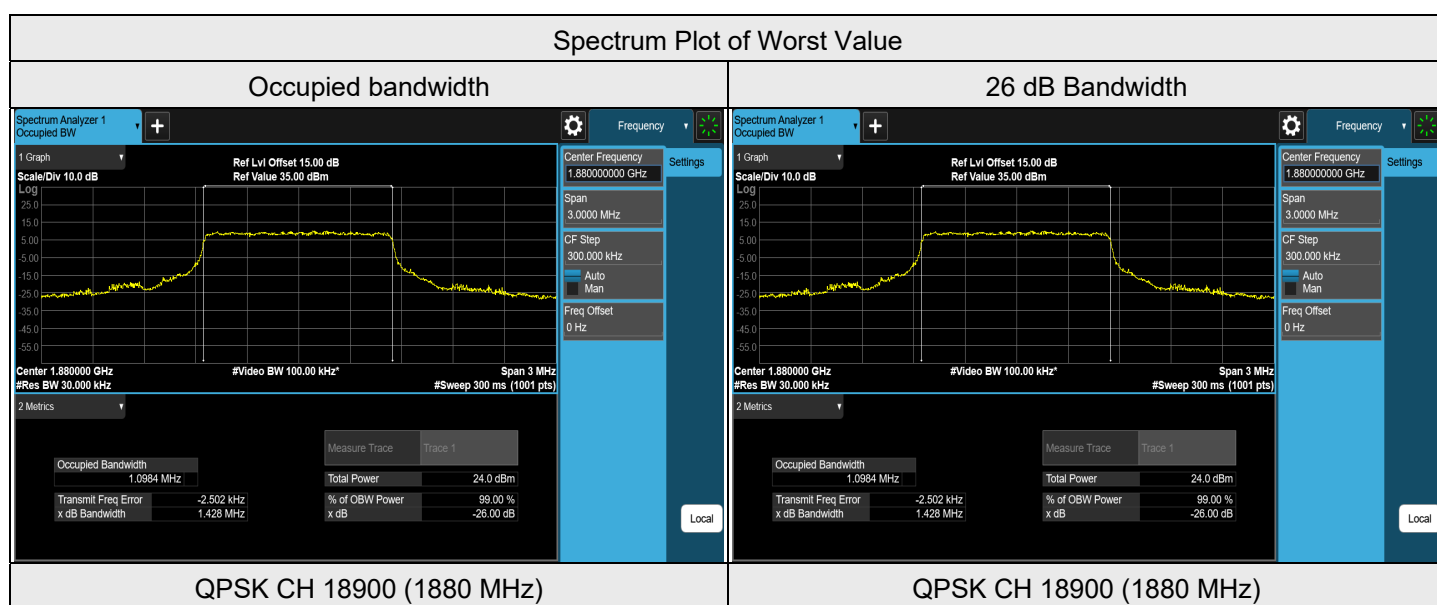
## 7.4 Bandwidth

Input Power:	3.87 Vdc	Environmental Conditions:	23°C, 68% RH	Tested By:	Noah Chang Chang
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### 7.4.1 LTE Band 2

#### LTE Band 2, Channel Bandwidth: 1.4 MHz

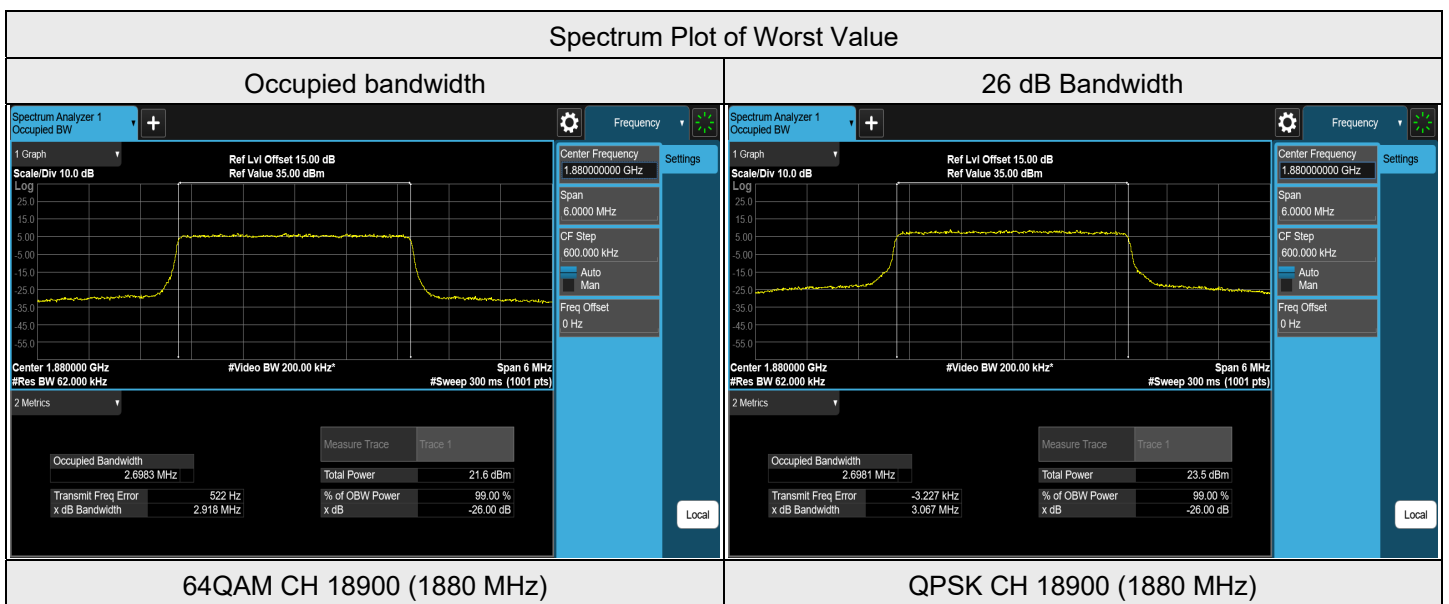
Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	18607	1850.7	1.0889	1.278
QPSK	18900	1880	1.0984	1.428
QPSK	19193	1909.3	1.0954	1.319
16QAM	18607	1850.7	1.0895	1.274
16QAM	18900	1880	1.0926	1.337
16QAM	19193	1909.3	1.0888	1.270
64QAM	18607	1850.7	1.0892	1.259
64QAM	18900	1880	1.0902	1.267
64QAM	19193	1909.3	1.0892	1.268





LTE Band 2, Channel Bandwidth: 3 MHz

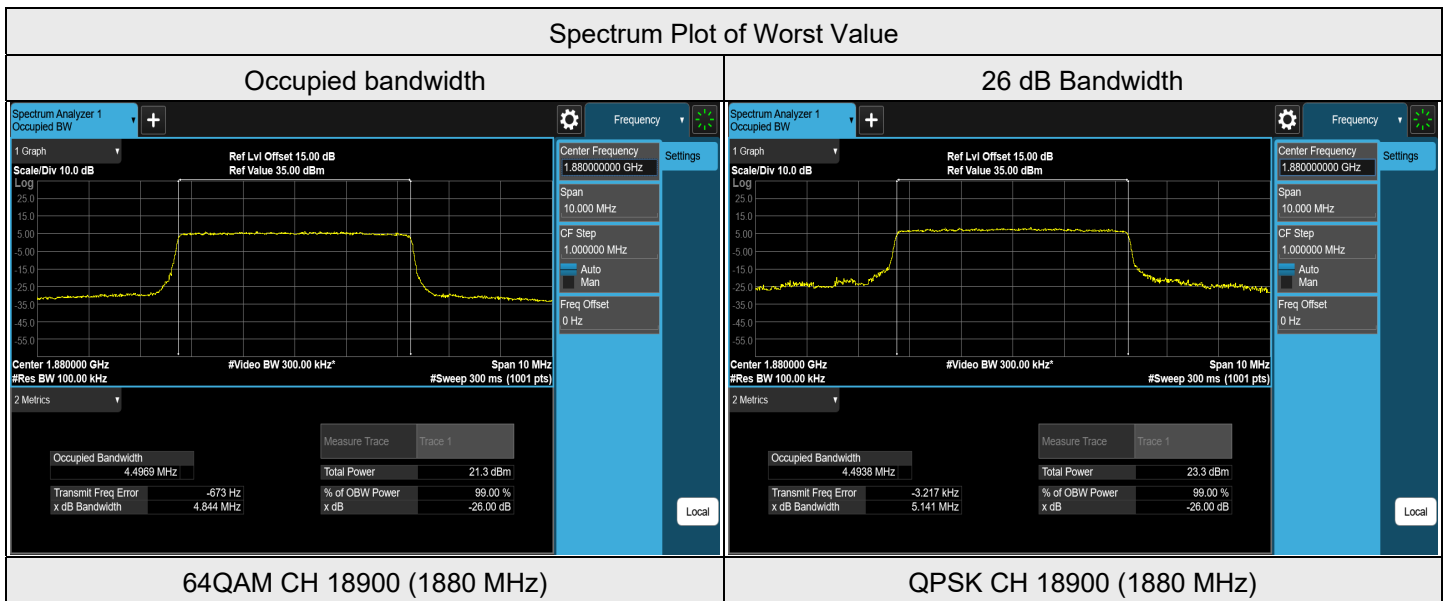
Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	18615	1851.5	2.6915	2.909
QPSK	18900	1880	2.6981	3.067
QPSK	19185	1908.5	2.6960	3.031
16QAM	18615	1851.5	2.6932	2.937
16QAM	18900	1880	2.6936	2.971
16QAM	19185	1908.5	2.6966	2.979
64QAM	18615	1851.5	2.6981	2.907
64QAM	18900	1880	2.6983	2.918
64QAM	19185	1908.5	2.6957	2.917





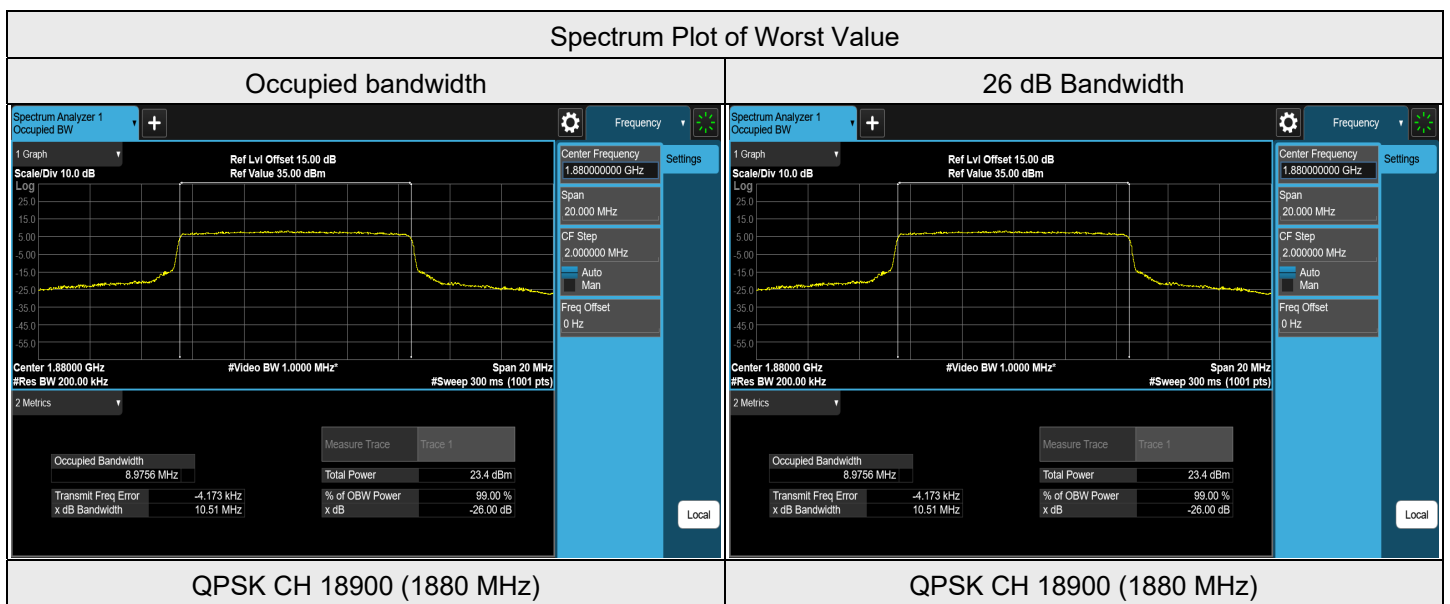
LTE Band 2, Channel Bandwidth: 5 MHz

Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	18625	1852.5	4.4903	4.858
QPSK	18900	1880	4.4938	5.141
QPSK	19175	1907.5	4.4933	5.031
16QAM	18625	1852.5	4.4861	4.836
16QAM	18900	1880	4.4868	4.943
16QAM	19175	1907.5	4.4854	4.867
64QAM	18625	1852.5	4.4903	4.814
64QAM	18900	1880	4.4969	4.844
64QAM	19175	1907.5	4.4920	4.848



**LTE Band 2, Channel Bandwidth: 10 MHz**

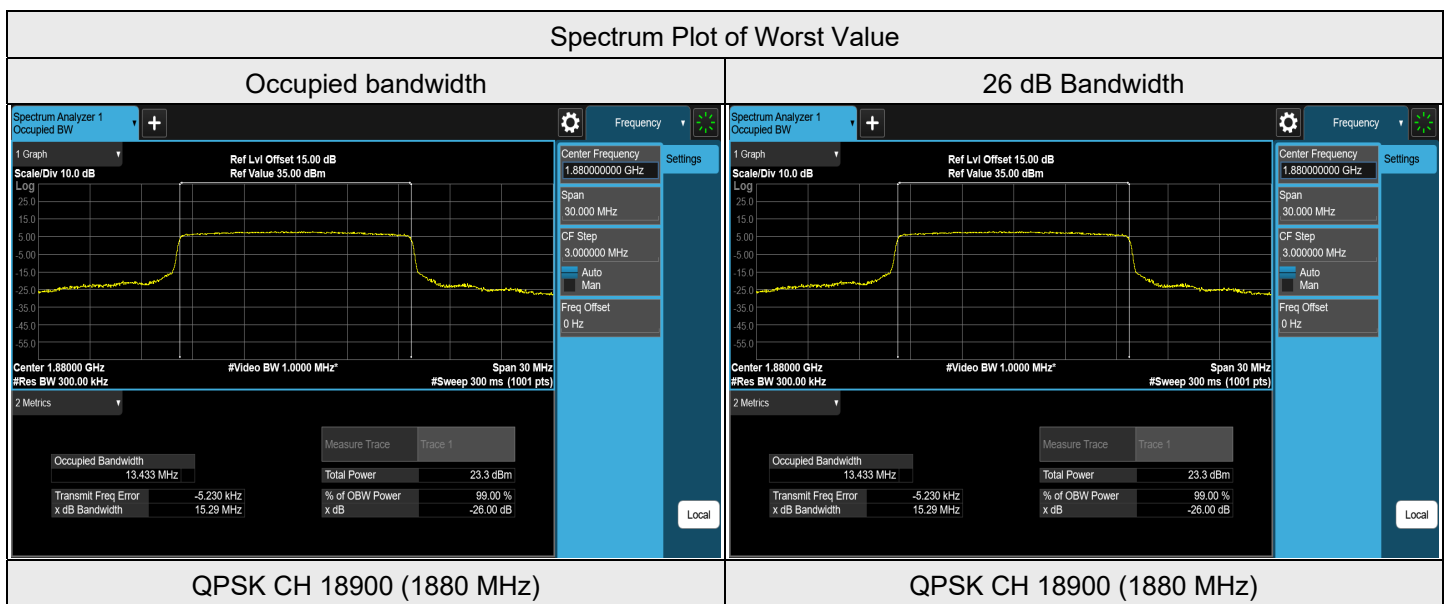
Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	18650	1855	8.9527	9.612
QPSK	18900	1880	8.9756	10.510
QPSK	19150	1905	8.9626	10.262
16QAM	18650	1855	8.9457	9.547
16QAM	18900	1880	8.9544	9.791
16QAM	19150	1905	8.9597	9.629
64QAM	18650	1855	8.9649	9.537
64QAM	18900	1880	8.9555	9.560
64QAM	19150	1905	8.9524	9.533





LTE Band 2, Channel Bandwidth: 15 MHz

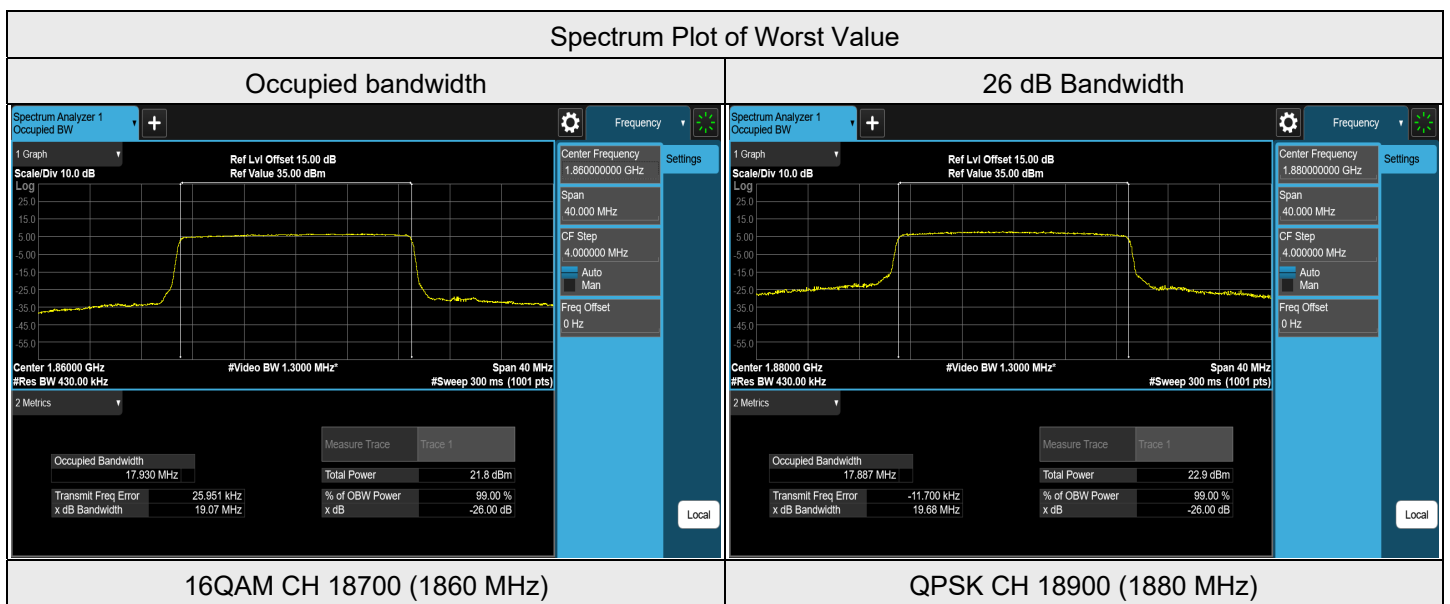
Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	18675	1857.5	13.4159	14.265
QPSK	18900	1880	13.4326	15.293
QPSK	19125	1902.5	13.3959	14.369
16QAM	18675	1857.5	13.4159	14.255
16QAM	18900	1880	13.4177	14.592
16QAM	19125	1902.5	13.3913	14.249
64QAM	18675	1857.5	13.4135	14.224
64QAM	18900	1880	13.3932	14.243
64QAM	19125	1902.5	13.3852	14.229





**LTE Band 2, Channel Bandwidth: 20 MHz**

Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	18700	1860	17.9053	19.127
QPSK	18900	1880	17.8868	19.685
QPSK	19100	1900	17.8615	19.113
16QAM	18700	1860	17.9298	19.067
16QAM	18900	1880	17.8844	19.080
16QAM	19100	1900	17.8871	19.024
64QAM	18700	1860	17.9237	19.038
64QAM	18900	1880	17.8796	19.020
64QAM	19100	1900	17.8871	19.010

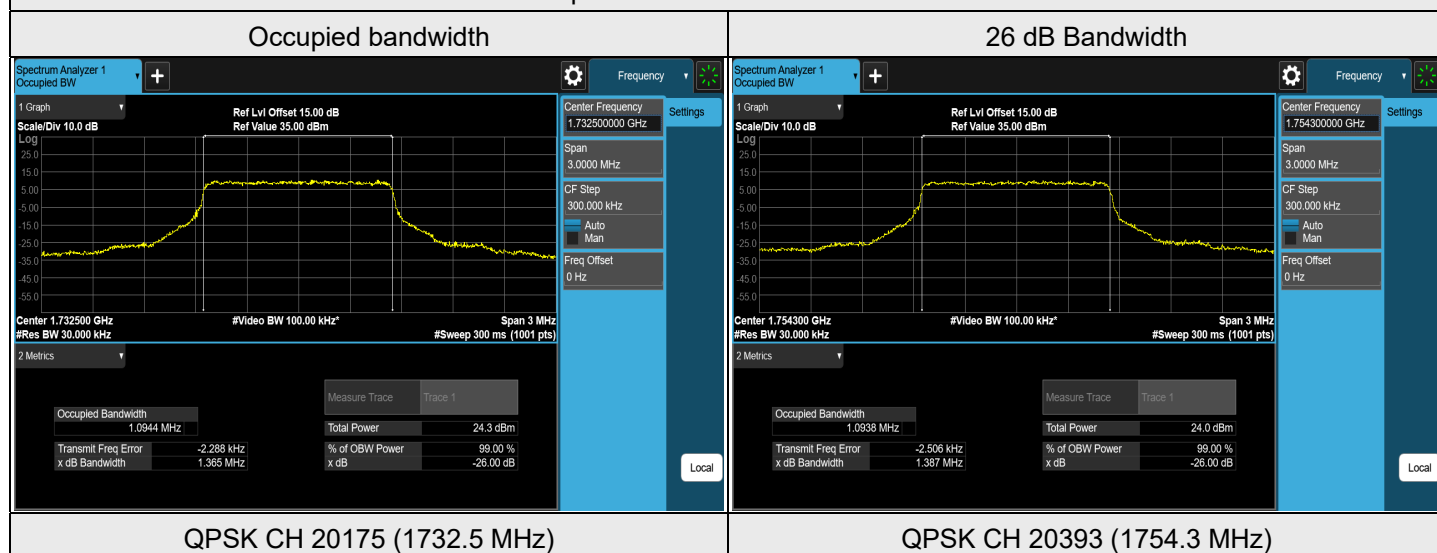


## 7.4.2 LTE Band 4

### LTE Band 4, Channel Bandwidth: 1.4 MHz

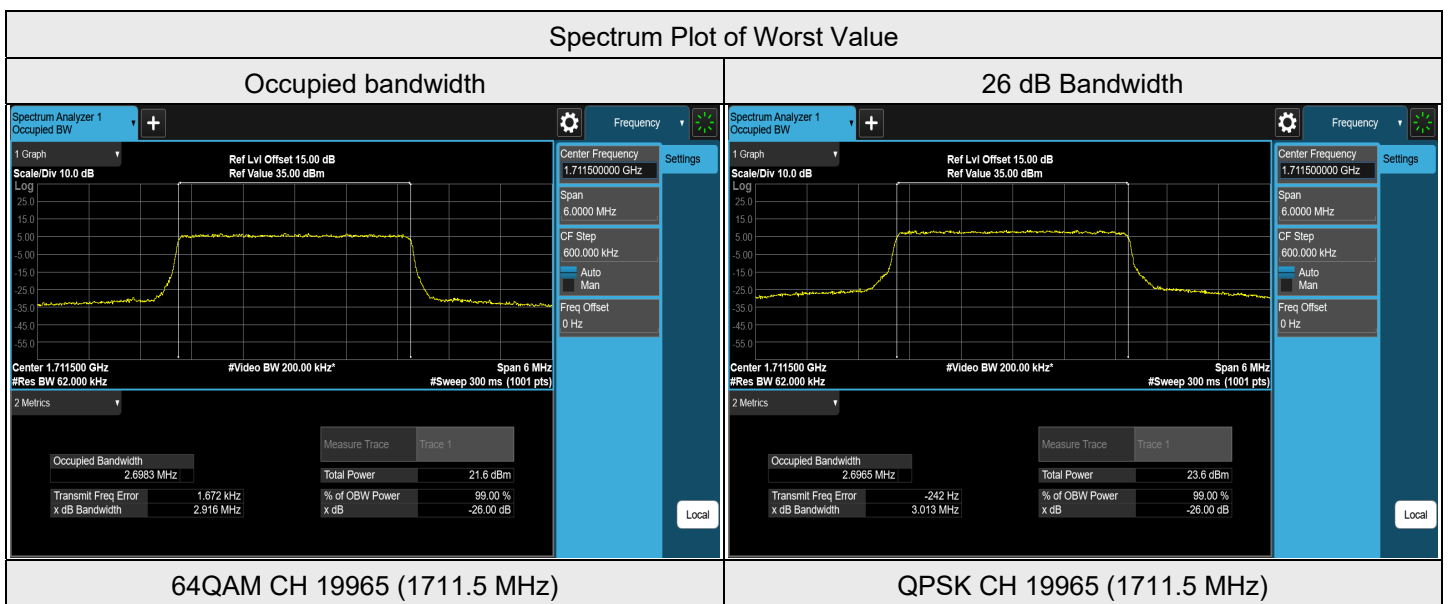
Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	19957	1710.7	1.0929	1.371
QPSK	20175	1732.5	1.0944	1.365
QPSK	20393	1754.3	1.0938	1.387
16QAM	19957	1710.7	1.0900	1.288
16QAM	20175	1732.5	1.0916	1.306
16QAM	20393	1754.3	1.0932	1.315
64QAM	19957	1710.7	1.0900	1.262
64QAM	20175	1732.5	1.0889	1.263
64QAM	20393	1754.3	1.0905	1.267

Spectrum Plot of Worst Value



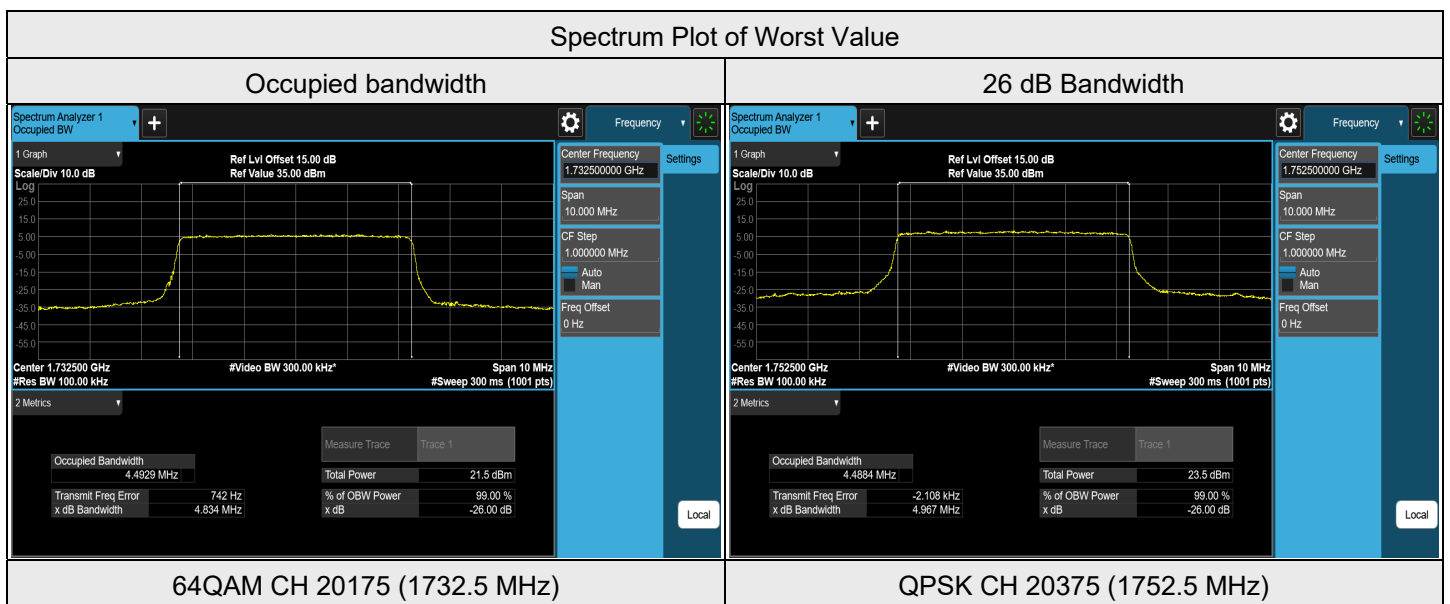
**LTE Band 4, Channel Bandwidth: 3 MHz**

Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	19965	1711.5	2.6965	3.013
QPSK	20175	1732.5	2.6958	2.973
QPSK	20385	1753.5	2.6954	3.008
16QAM	19965	1711.5	2.6953	2.969
16QAM	20175	1732.5	2.6931	2.945
16QAM	20385	1753.5	2.6928	2.955
64QAM	19965	1711.5	2.6983	2.916
64QAM	20175	1732.5	2.6937	2.898
64QAM	20385	1753.5	2.6981	2.903



**LTE Band 4, Channel Bandwidth: 5 MHz**

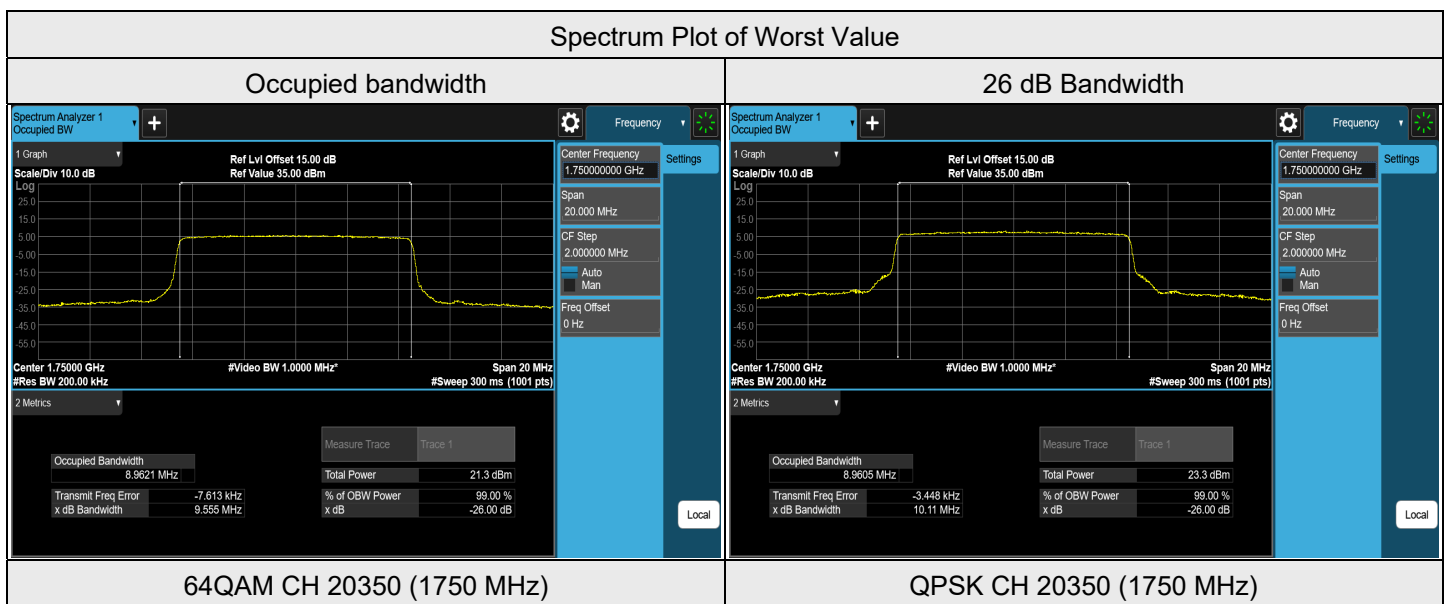
Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	19975	1712.5	4.4923	4.927
QPSK	20175	1732.5	4.4901	4.847
QPSK	20375	1752.5	4.4884	4.967
16QAM	19975	1712.5	4.4855	4.896
16QAM	20175	1732.5	4.4828	4.836
16QAM	20375	1752.5	4.4864	4.917
64QAM	19975	1712.5	4.4921	4.854
64QAM	20175	1732.5	4.4929	4.834
64QAM	20375	1752.5	4.4921	4.852





LTE Band 4, Channel Bandwidth: 10 MHz

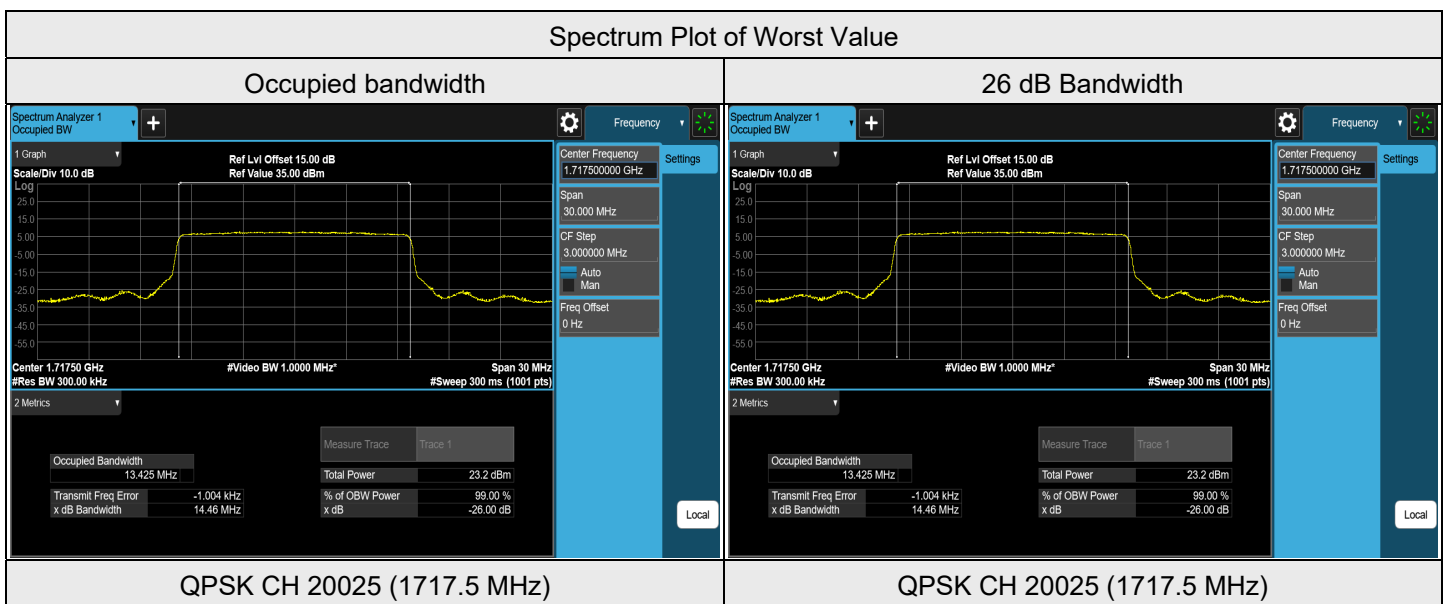
Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	20000	1715	8.9602	9.950
QPSK	20175	1732.5	8.9548	9.759
QPSK	20350	1750	8.9605	10.111
16QAM	20000	1715	8.9603	9.630
16QAM	20175	1732.5	8.9543	9.577
16QAM	20350	1750	8.9597	9.650
64QAM	20000	1715	8.9598	9.542
64QAM	20175	1732.5	8.9573	9.536
64QAM	20350	1750	8.9621	9.555





LTE Band 4, Channel Bandwidth: 15 MHz

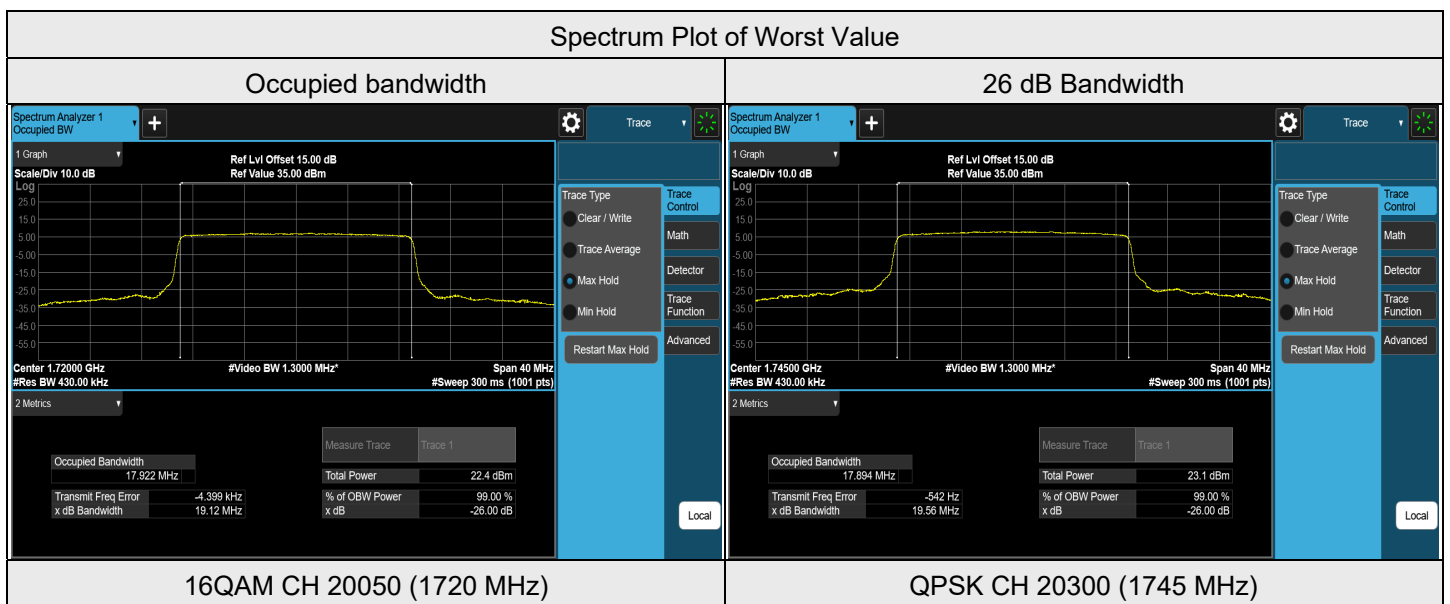
Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	20025	1717.5	13.4247	14.455
QPSK	20175	1732.5	13.4094	14.299
QPSK	20325	1747.5	13.4091	14.420
16QAM	20025	1717.5	13.4188	14.266
16QAM	20175	1732.5	13.4008	14.235
16QAM	20325	1747.5	13.4039	14.275
64QAM	20025	1717.5	13.4084	14.252
64QAM	20175	1732.5	13.4026	14.240
64QAM	20325	1747.5	13.3957	14.242





LTE Band 4, Channel Bandwidth: 20 MHz

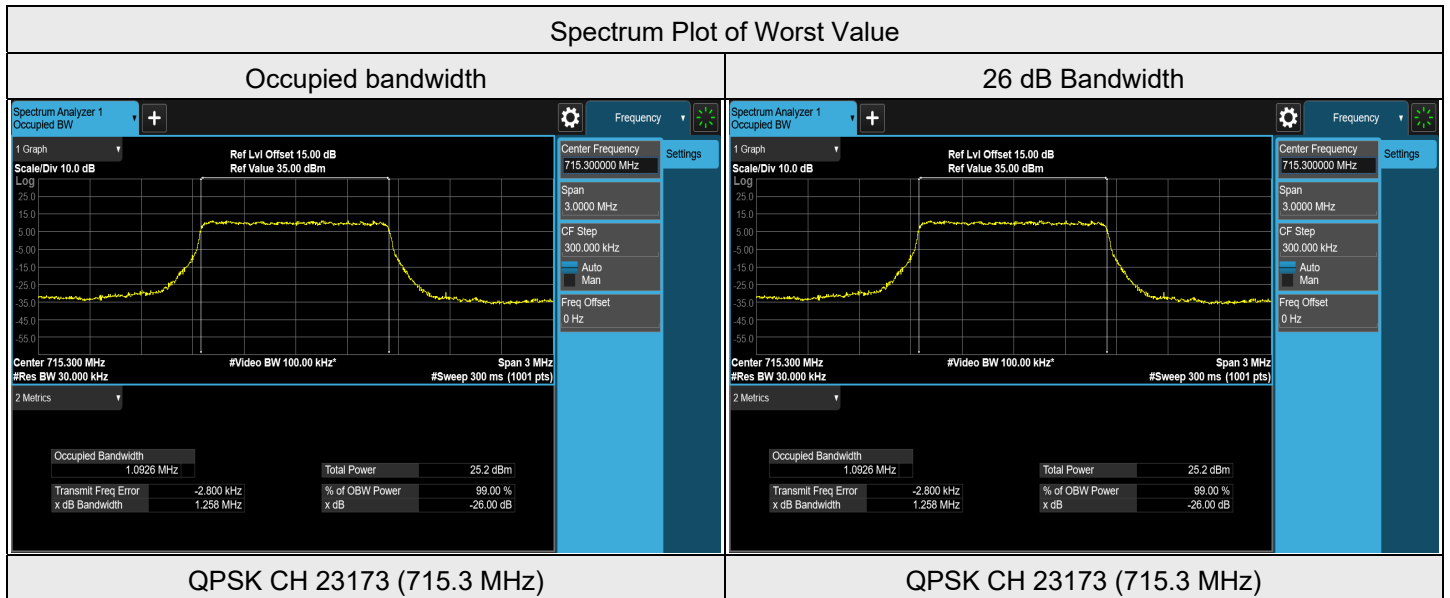
Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	20050	1720	17.8820	19.300
QPSK	20175	1732.5	17.8884	19.304
QPSK	20300	1745	17.8938	19.556
16QAM	20050	1720	17.9216	19.118
16QAM	20175	1732.5	17.9081	19.067
16QAM	20300	1745	17.8906	19.113
64QAM	20050	1720	17.9092	19.039
64QAM	20175	1732.5	17.8943	19.026
64QAM	20300	1745	17.8823	19.017



7.4.3 LTE Band 12

LTE Band 12, Channel Bandwidth: 1.4 MHz

Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	23017	699.7	1.0879	1.253
QPSK	23095	707.5	1.0907	1.254
QPSK	23173	715.3	1.0926	1.258
16QAM	23017	699.7	1.0891	1.243
16QAM	23095	707.5	1.0888	1.250
16QAM	23173	715.3	1.0901	1.248
64QAM	23017	699.7	1.0884	1.251
64QAM	23095	707.5	1.0887	1.250
64QAM	23173	715.3	1.0887	1.251

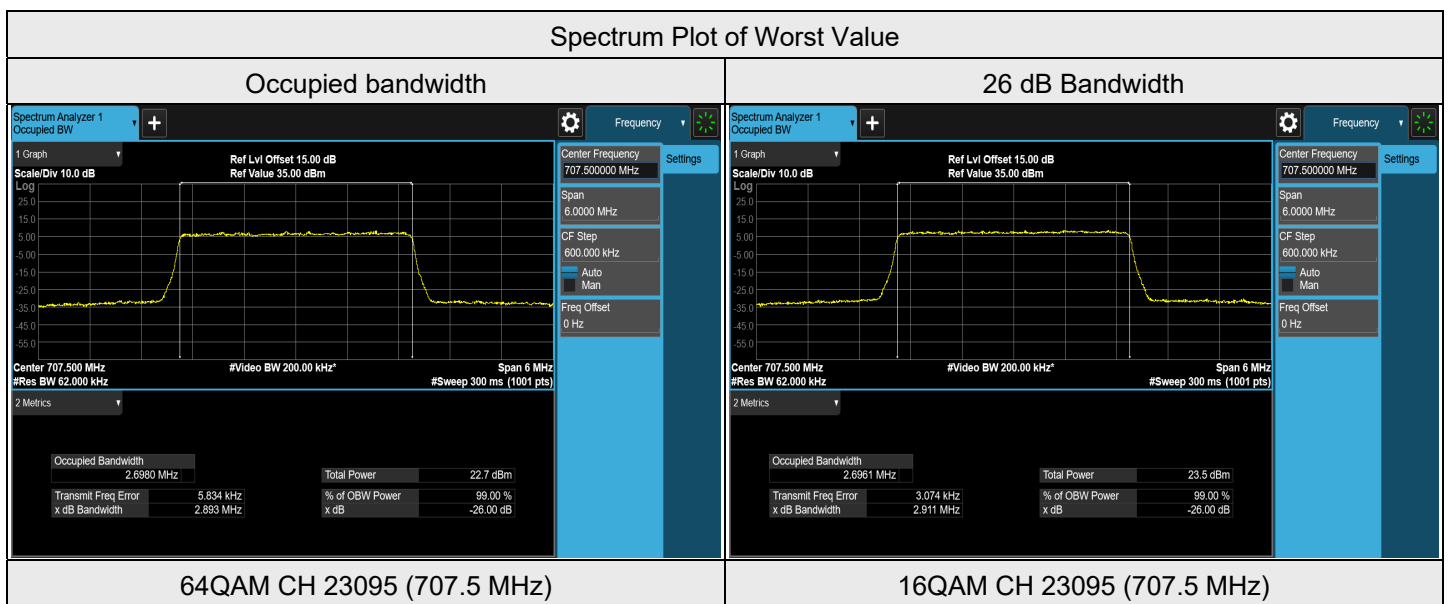






LTE Band 12, Channel Bandwidth: 3 MHz

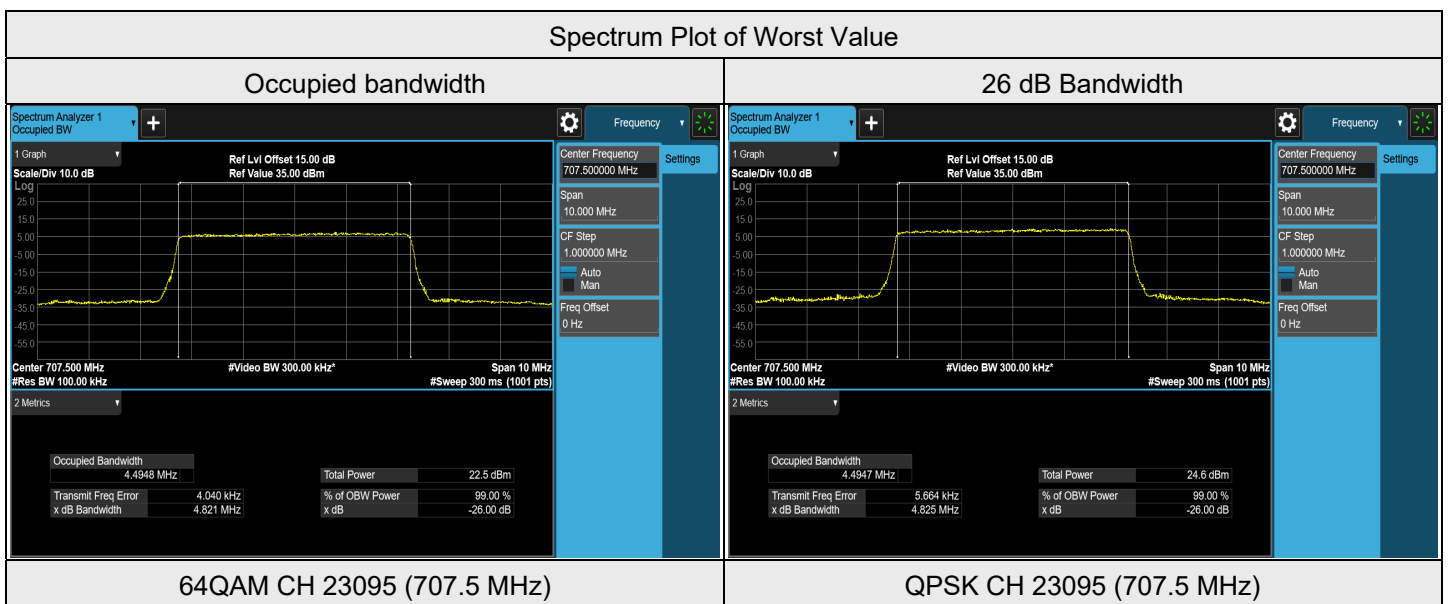
Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	23025	700.5	2.6881	2.889
QPSK	23095	707.5	2.6948	2.895
QPSK	23165	714.5	2.6943	2.894
16QAM	23025	700.5	2.6859	2.906
16QAM	23095	707.5	2.6961	2.911
16QAM	23165	714.5	2.6948	2.898
64QAM	23025	700.5	2.6877	2.889
64QAM	23095	707.5	2.6980	2.893
64QAM	23165	714.5	2.6929	2.894





LTE Band 12, Channel Bandwidth: 5 MHz

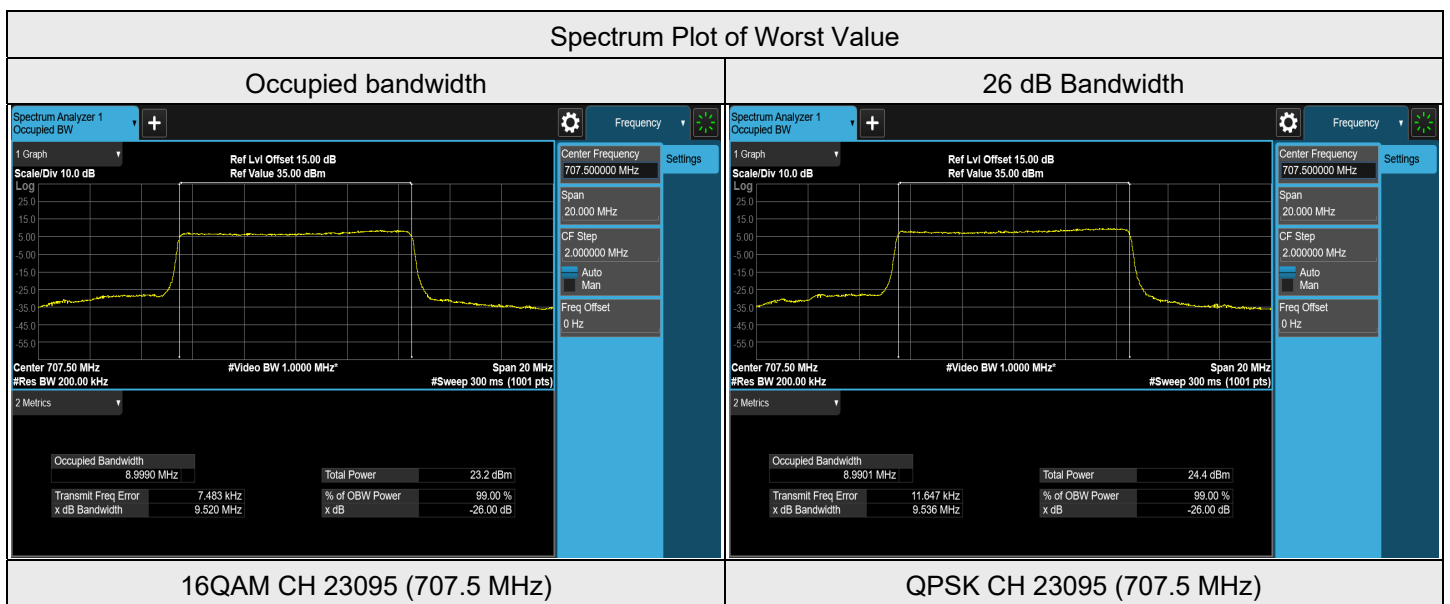
Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	23035	701.5	4.4660	4.791
QPSK	23095	707.5	4.4947	4.825
QPSK	23155	713.5	4.4744	4.798
16QAM	23035	701.5	4.4644	4.764
16QAM	23095	707.5	4.4905	4.804
16QAM	23155	713.5	4.4708	4.776
64QAM	23035	701.5	4.4673	4.781
64QAM	23095	707.5	4.4948	4.821
64QAM	23155	713.5	4.4765	4.798





LTE Band 12, Channel Bandwidth: 10 MHz

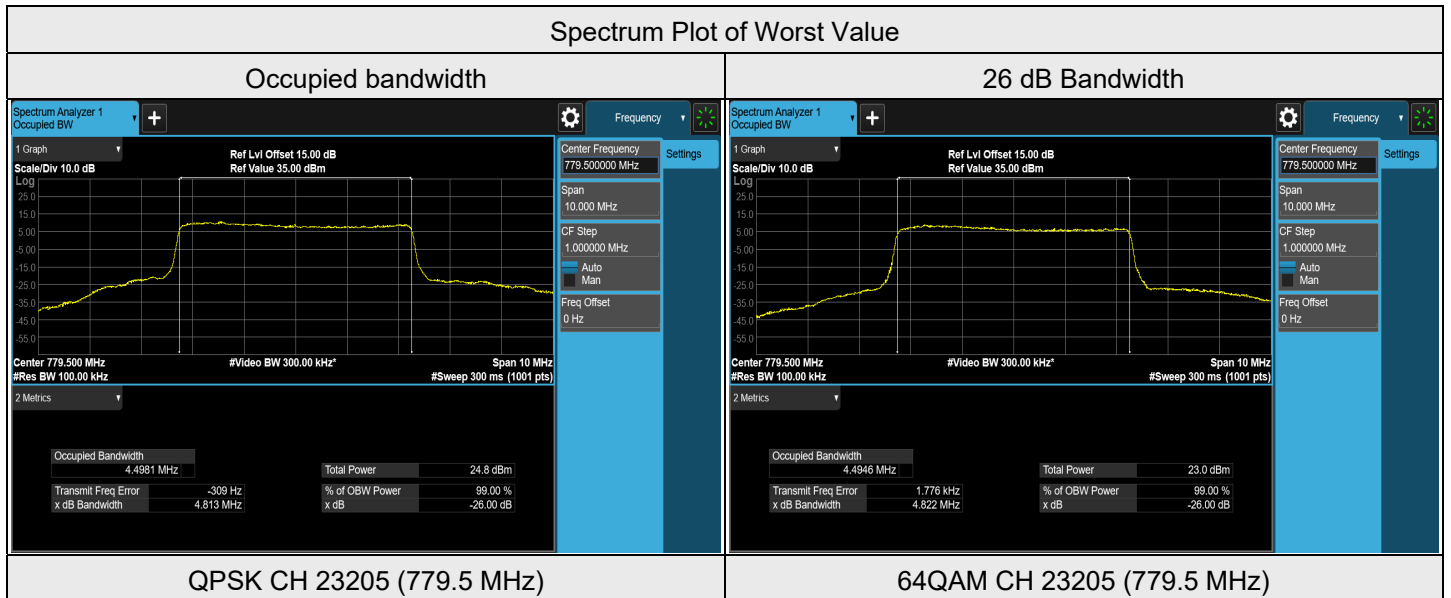
Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	23060	704	8.9526	9.493
QPSK	23095	707.5	8.9901	9.536
QPSK	23130	711	8.8971	9.457
16QAM	23060	704	8.9495	9.480
16QAM	23095	707.5	8.9990	9.520
16QAM	23130	711	8.9023	9.460
64QAM	23060	704	8.9472	9.487
64QAM	23095	707.5	8.9986	9.526
64QAM	23130	711	8.9033	9.463



7.4.4 LTE Band 13

LTE Band 13, Channel Bandwidth: 5 MHz

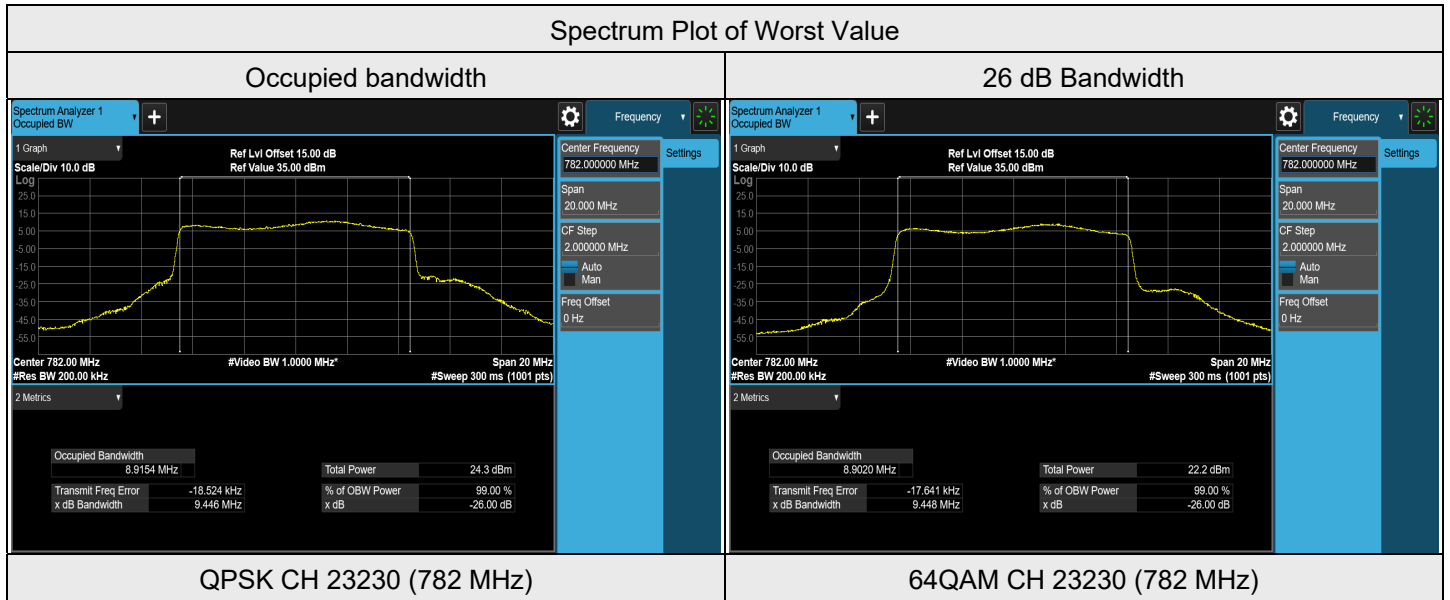
Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	23205	779.5	4.4981	4.813
QPSK	23230	782	4.4714	4.773
QPSK	23255	784.5	4.4614	4.770
16QAM	23205	779.5	4.4886	4.791
16QAM	23230	782	4.4660	4.761
16QAM	23255	784.5	4.4605	4.750
64QAM	23205	779.5	4.4946	4.822
64QAM	23230	782	4.4743	4.765
64QAM	23255	784.5	4.4627	4.789





LTE Band 13, Channel Bandwidth: 10 MHz

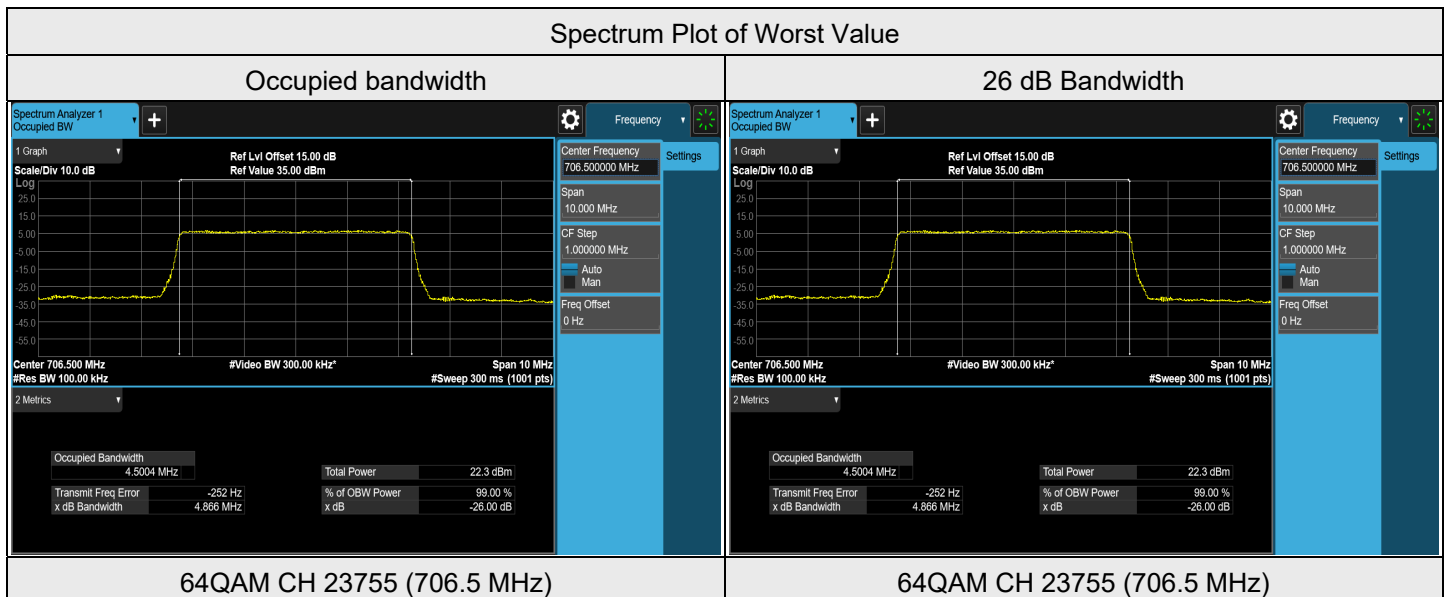
Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	23230	782	8.9154	9.446
16QAM	23230	782	8.9081	9.447
64QAM	23230	782	8.9020	9.448



### 7.4.5 LTE Band 17

#### LTE Band 17, Channel Bandwidth: 5 MHz

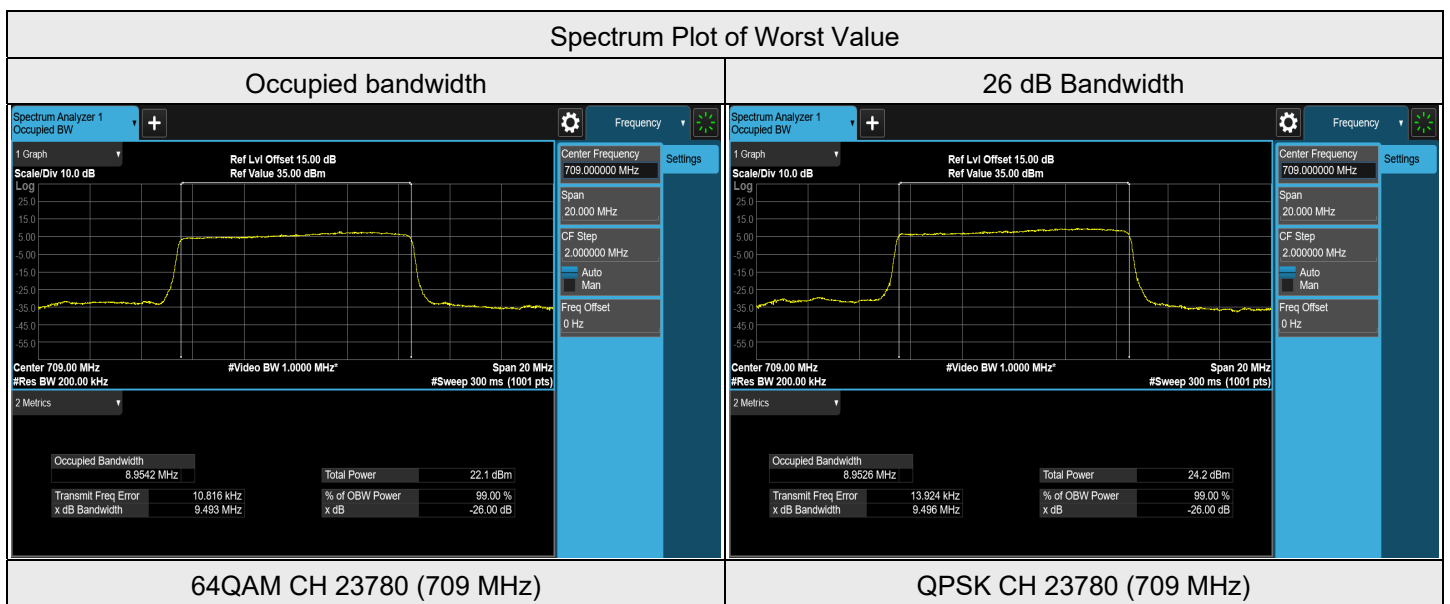
Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	23755	706.5	4.4915	4.824
QPSK	23790	710	4.4804	4.807
QPSK	23825	713.5	4.4756	4.790
16QAM	23755	706.5	4.4913	4.824
16QAM	23790	710	4.4788	4.791
16QAM	23825	713.5	4.4719	4.774
64QAM	23755	706.5	4.5004	4.866
64QAM	23790	710	4.4863	4.802
64QAM	23825	713.5	4.4739	4.811





LTE Band 17, Channel Bandwidth: 10 MHz

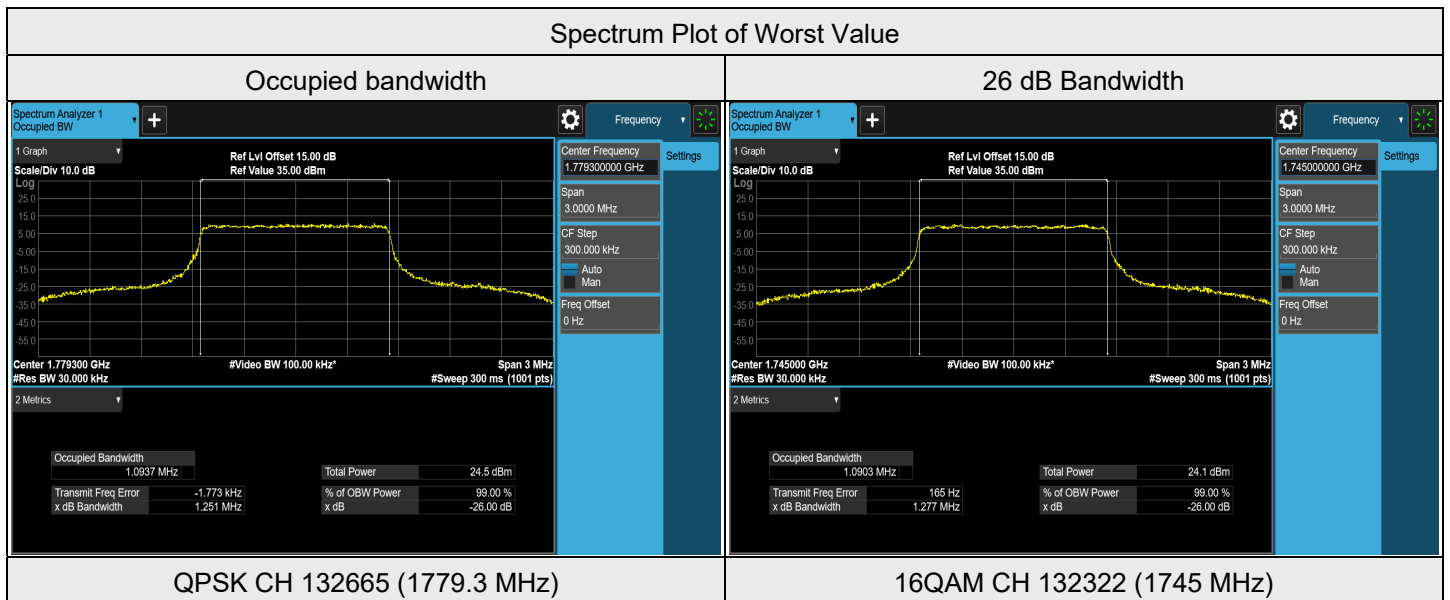
Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	23780	709	8.9526	9.496
QPSK	23790	710	8.9144	9.452
QPSK	23800	711	8.8992	9.441
16QAM	23780	709	8.9488	9.492
16QAM	23790	710	8.9207	9.478
16QAM	23800	711	8.8949	9.459
64QAM	23780	709	8.9542	9.493
64QAM	23790	710	8.9176	9.467
64QAM	23800	711	8.8995	9.457



7.4.6 LTE Band 66

LTE Band 66, Channel Bandwidth: 1.4 MHz

Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	131979	1710.7	1.0902	1.266
QPSK	132322	1745	1.0927	1.271
QPSK	132665	1779.3	1.0937	1.251
16QAM	131979	1710.7	1.0904	1.267
16QAM	132322	1745	1.0903	1.277
16QAM	132665	1779.3	1.0921	1.261
64QAM	131979	1710.7	1.0890	1.258
64QAM	132322	1745	1.0885	1.265
64QAM	132665	1779.3	1.0897	1.265

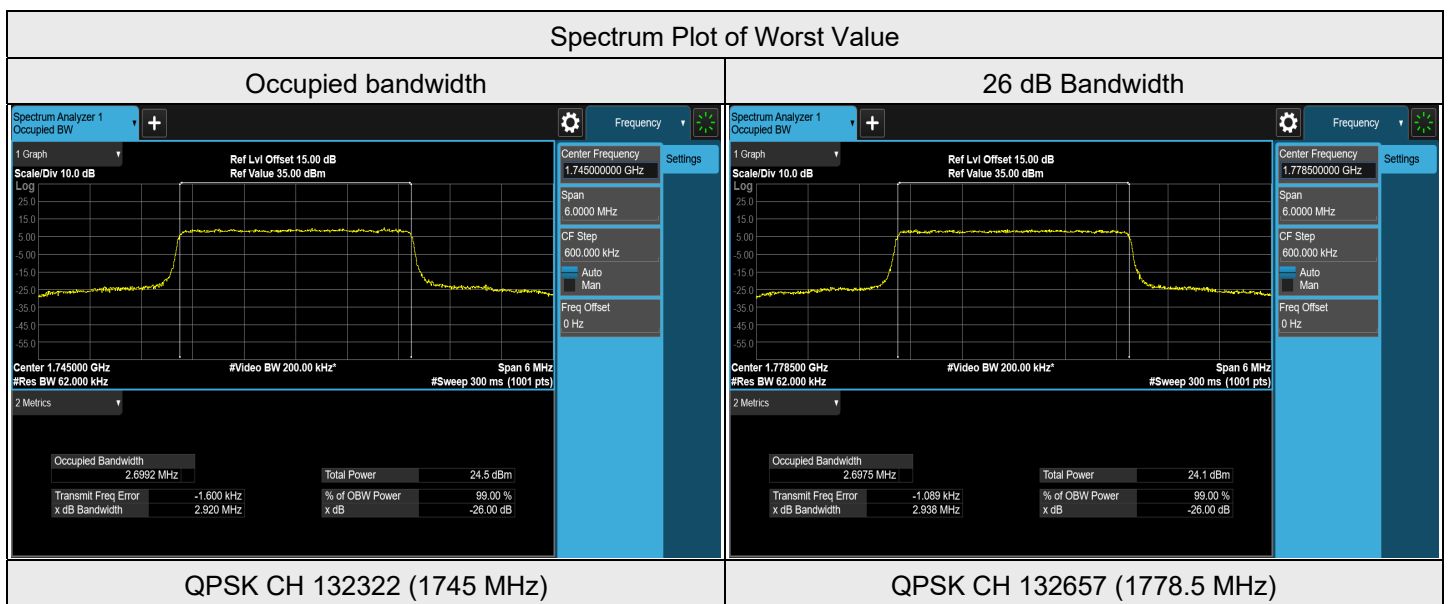






LTE Band 66, Channel Bandwidth: 3 MHz

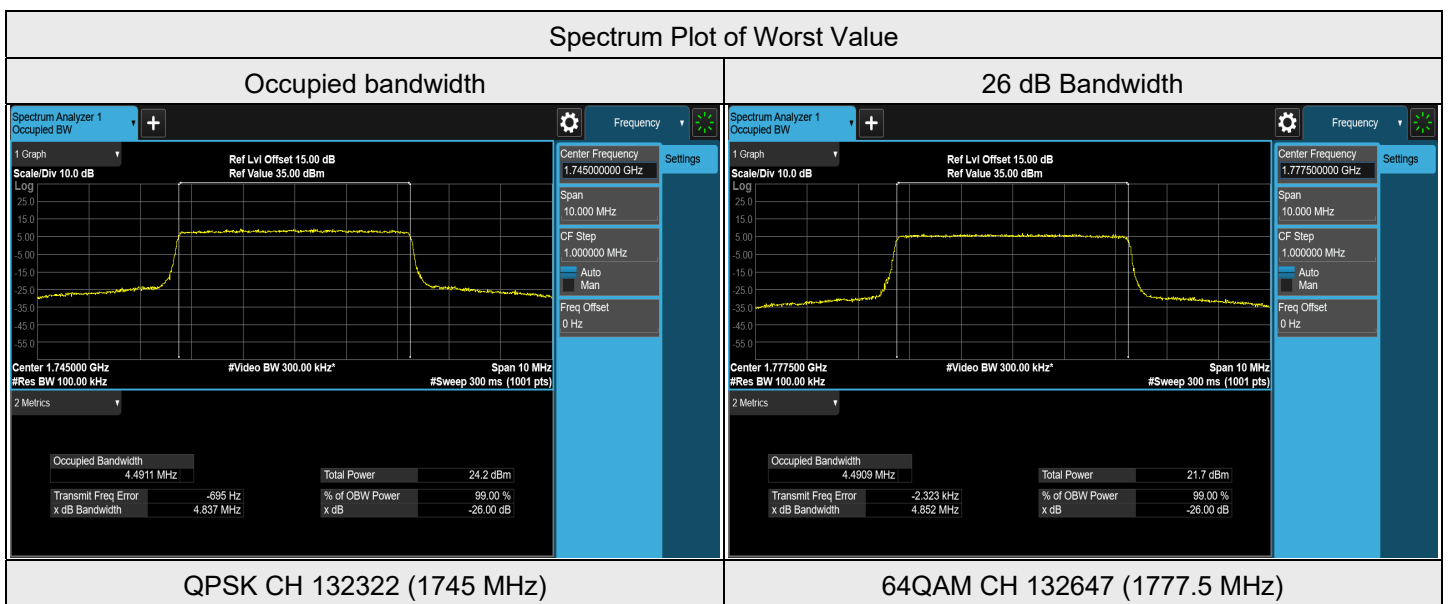
Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	131987	1711.5	2.6969	2.930
QPSK	132322	1745	2.6992	2.920
QPSK	132657	1778.5	2.6975	2.938
16QAM	131987	1711.5	2.6949	2.928
16QAM	132322	1745	2.6942	2.918
16QAM	132657	1778.5	2.6968	2.926
64QAM	131987	1711.5	2.6949	2.895
64QAM	132322	1745	2.6945	2.903
64QAM	132657	1778.5	2.6963	2.907





LTE Band 66, Channel Bandwidth: 5 MHz

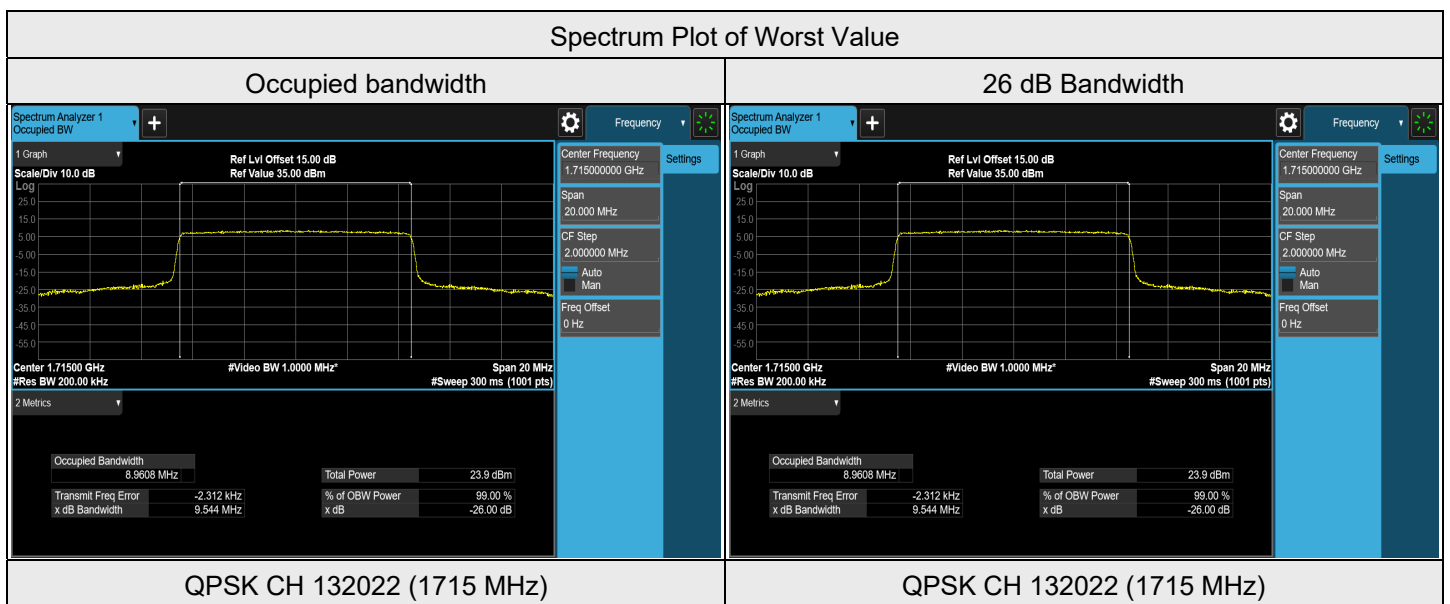
Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	131997	1712.5	4.4910	4.848
QPSK	132322	1745	4.4911	4.837
QPSK	132647	1777.5	4.4895	4.844
16QAM	131997	1712.5	4.4877	4.840
16QAM	132322	1745	4.4857	4.792
16QAM	132647	1777.5	4.4798	4.790
64QAM	131997	1712.5	4.4898	4.829
64QAM	132322	1745	4.4910	4.817
64QAM	132647	1777.5	4.4909	4.852





LTE Band 66, Channel Bandwidth: 10 MHz

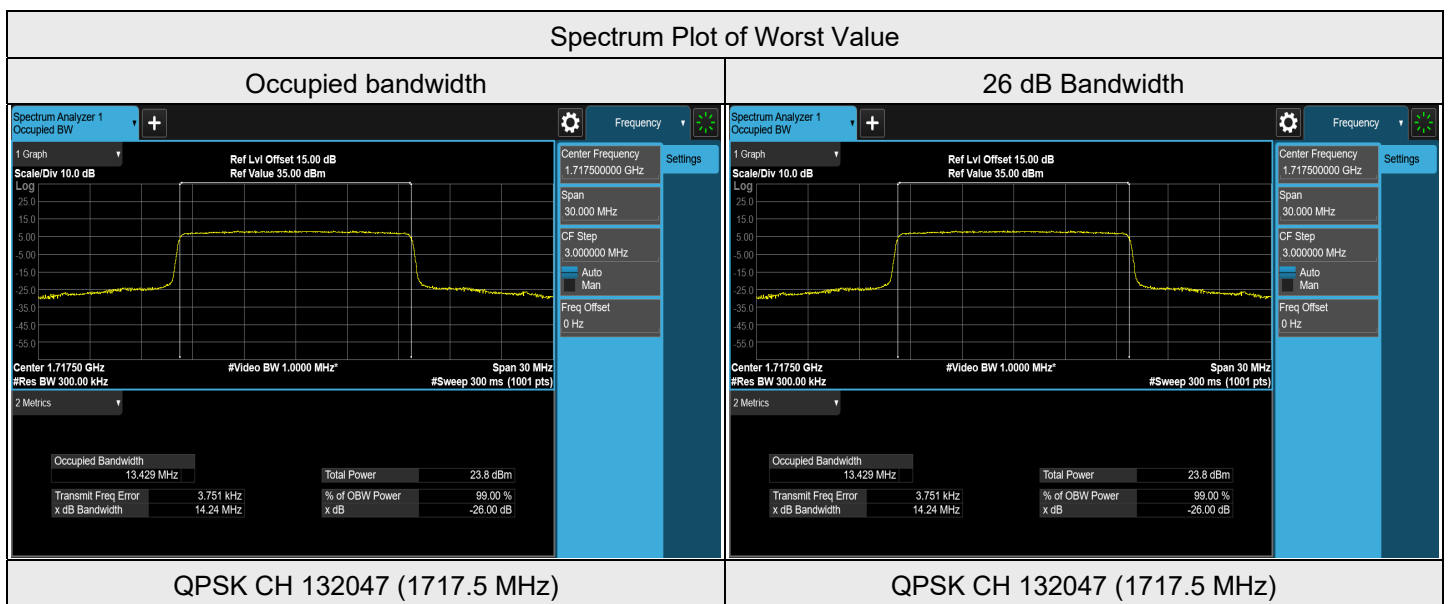
Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	132022	1715	8.9608	9.544
QPSK	132322	1745	8.9543	9.540
QPSK	132622	1775	8.9558	9.519
16QAM	132022	1715	8.9518	9.510
16QAM	132322	1745	8.9416	9.507
16QAM	132622	1775	8.9241	9.472
64QAM	132022	1715	8.9608	9.530
64QAM	132322	1745	8.9511	9.516
64QAM	132622	1775	8.9594	9.513





LTE Band 66, Channel Bandwidth: 15 MHz

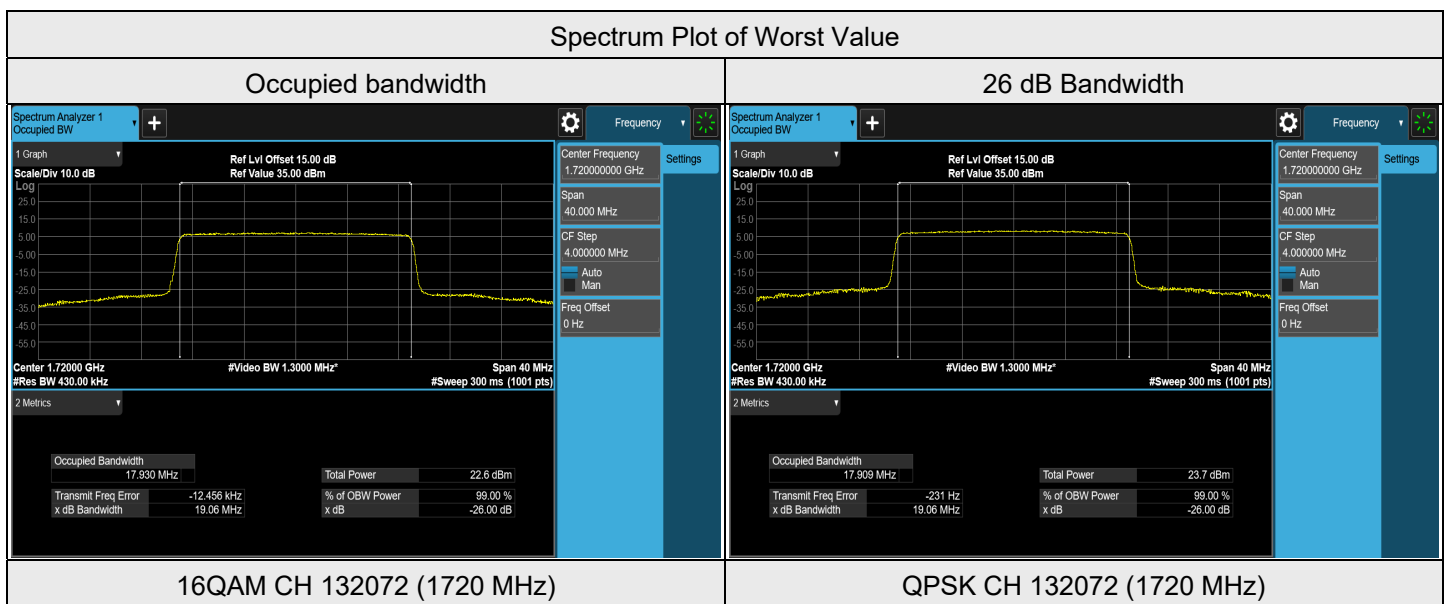
Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	132047	1717.5	13.4287	14.240
QPSK	132322	1745	13.4053	14.227
QPSK	132597	1772.5	13.4114	14.224
16QAM	132047	1717.5	13.4092	14.222
16QAM	132322	1745	13.4002	14.223
16QAM	132597	1772.5	13.4029	14.222
64QAM	132047	1717.5	13.4056	14.214
64QAM	132322	1745	13.3963	14.218
64QAM	132597	1772.5	13.4033	14.219





LTE Band 66, Channel Bandwidth: 20 MHz

Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	132072	1720	17.9091	19.056
QPSK	132322	1745	17.8852	19.032
QPSK	132572	1770	17.8943	19.041
16QAM	132072	1720	17.9297	19.055
16QAM	132322	1745	17.8909	19.004
16QAM	132572	1770	17.8931	18.991
64QAM	132072	1720	17.9111	19.009
64QAM	132322	1745	17.8843	18.983
64QAM	132572	1770	17.8940	19.000





### 7.5 Conducted Spurious Emissions

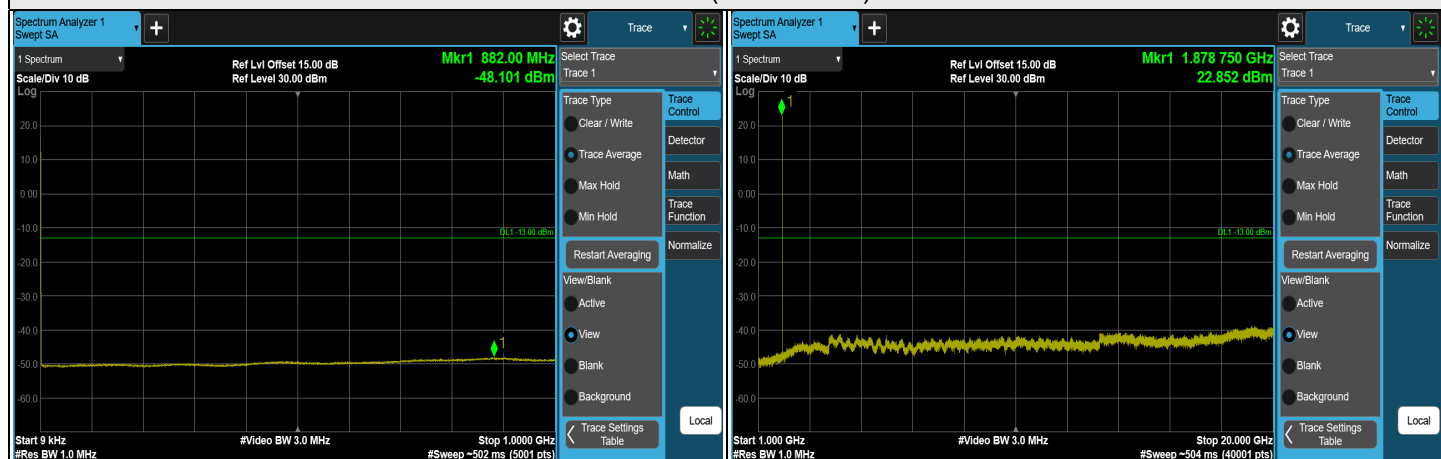
Input Power:	3.87 Vdc	Environmental Conditions:	23°C, 68% RH	Tested By:	Noah Chang
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#### 7.5.1 LTE Band 2

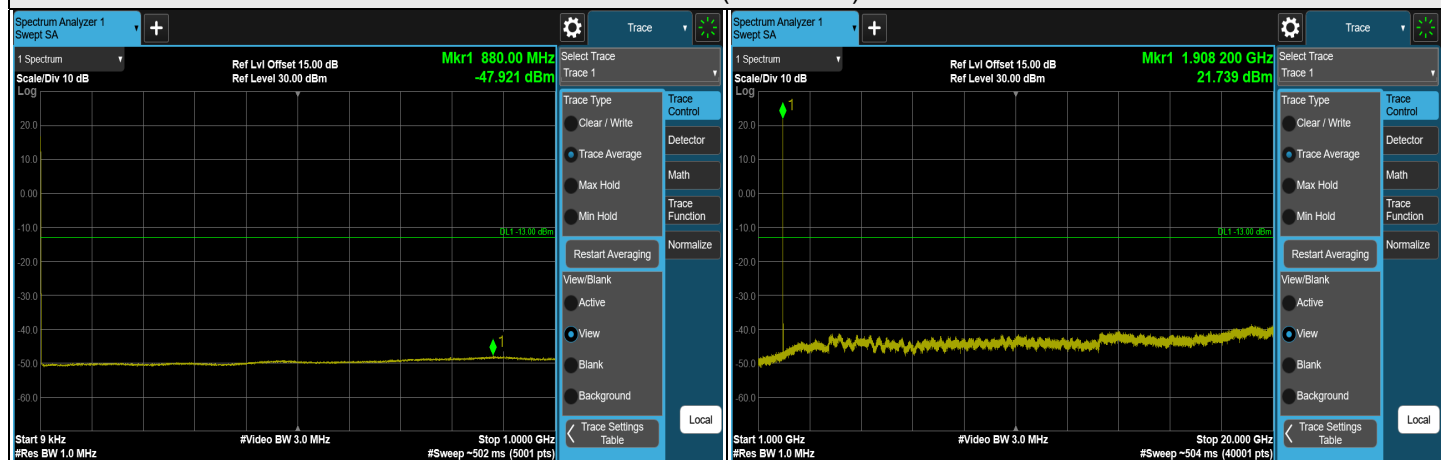
#### LTE Band 2, Channel Bandwidth: 1.4 MHz



CH 18607 (1850.7 MHz)



CH 18900 (1880 MHz)

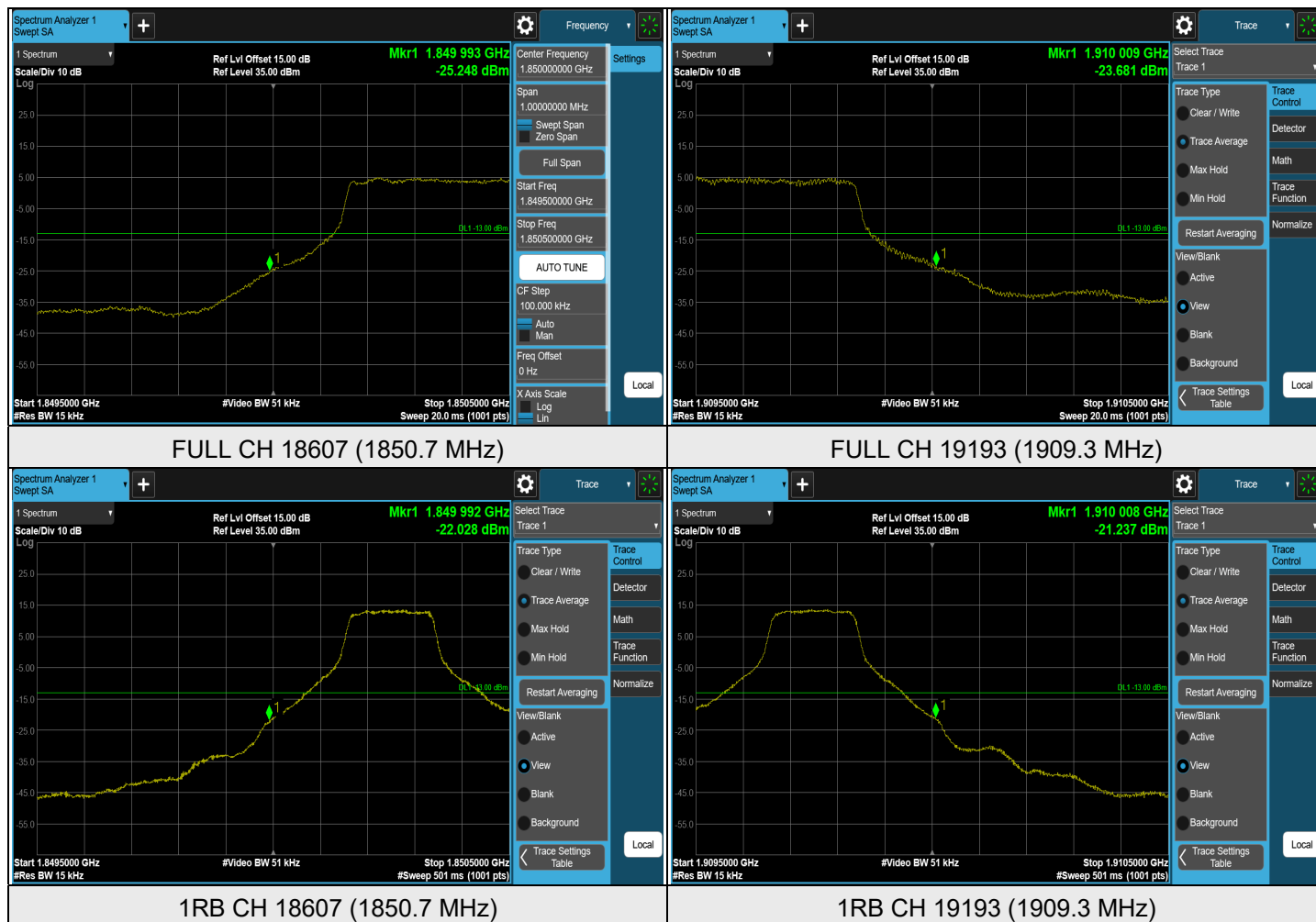


CH 19193 (1909.3 MHz)

Note: The signal at 9 kHz is IF signal from spectrum analyzer.

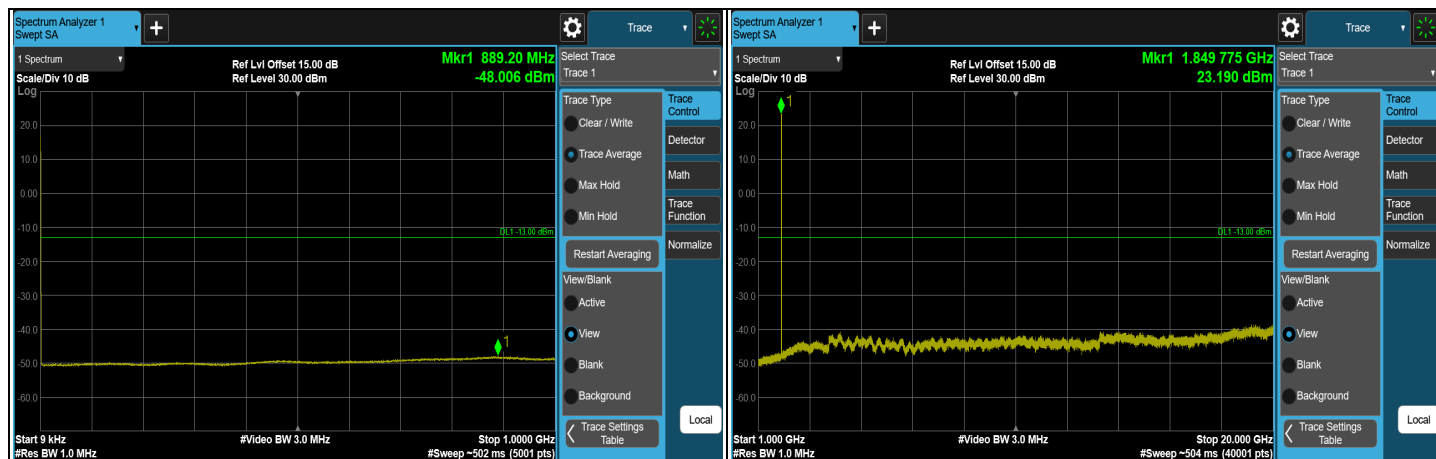


### LTE Band 2, Channel Bandwidth: 1.4 MHz

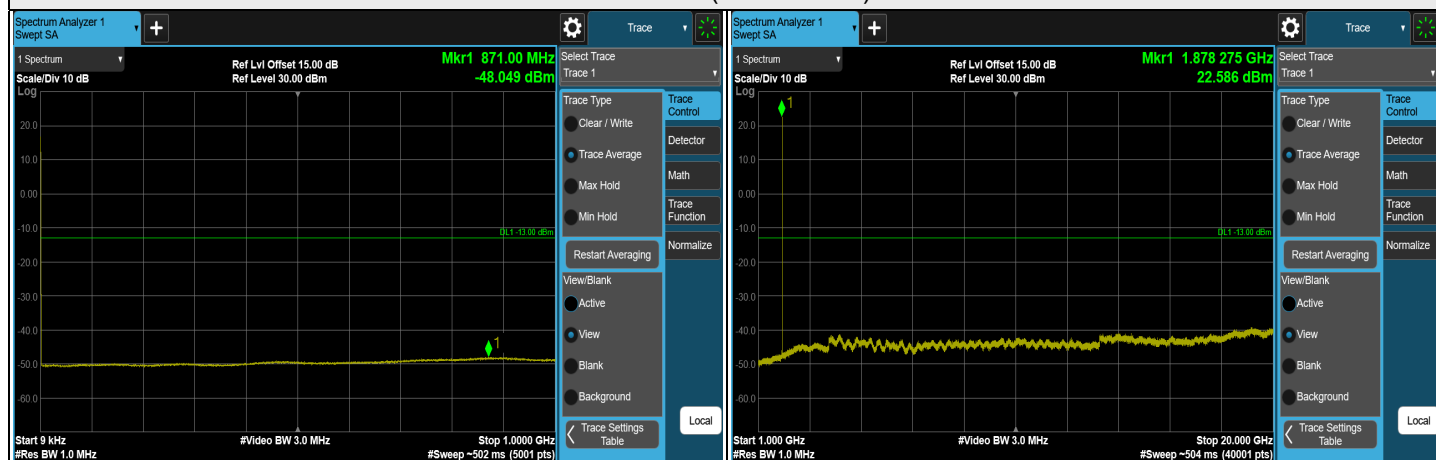




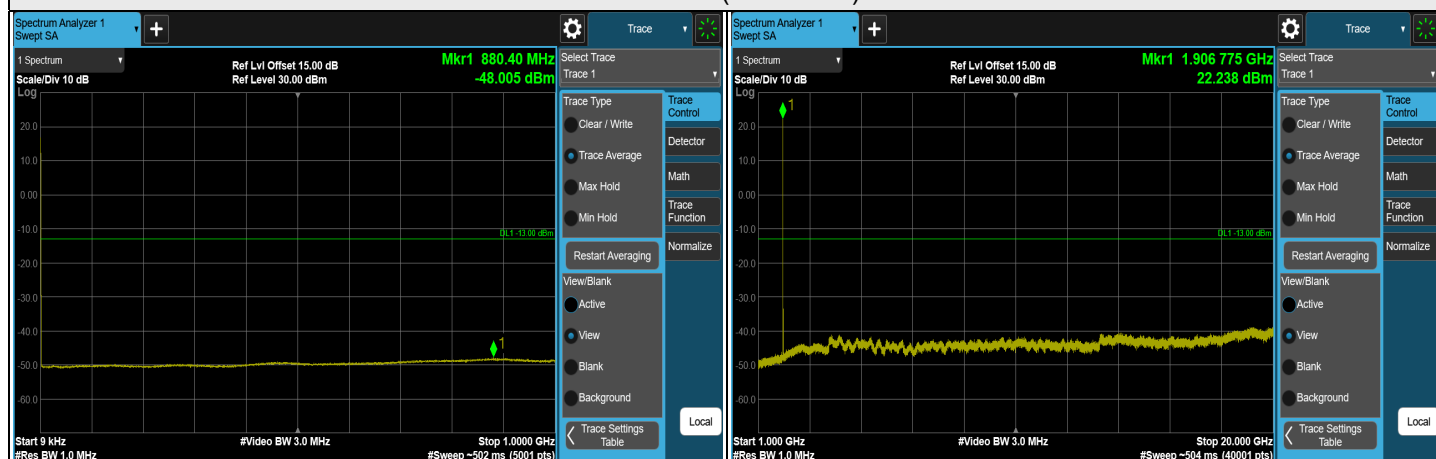
### LTE Band 2, Channel Bandwidth: 3 MHz



### CH 18615 (1851.5 MHz)



### CH 18900 (1880 MHz)



### CH 19185 (1908.5 MHz)

Note: The signal at 9 kHz is IF signal from spectrum analyzer.