

## FCC Test Report

### (PART 27)

**Report No.:** RF190628C20-2

**FCC ID:** ZMOL850GL

**Test Model:** Lenovo Yoga C640-13IML LTE

**Series Model:** 81XL

(refer to item 3.1 for more details)

**Received Date:** Jun. 28, 2019

**Test Date:** Jul. 08 ~ Jul. 17, 2019

**Issued Date:** Aug. 01, 2019

**Applicant:** Lenovo (Shanghai) Electronics Technology Co., Ltd.

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Pilot Free Trade Zone

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

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( R.O.C )

**Test Location:** No. 19, Hwa Ya 2nd Rd, Wen Hwa Vil, Kwei Shan Dist., Taoyuan City  
33383, Taiwan (R.O.C)

**FCC Registration /  
Designation Number:** 788550 / TW0003



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### Release Control Record

Issue No.	Description	Date Issued
RF190628C20-2	Original Release	Aug. 01, 2019

## 1 Certificate of Conformity

**Product:** Notebook Computer

**Brand:** Lenovo

**Test Model:** Lenovo Yoga C640-13IML LTE

**Series Model:** 81XL  
(refer to item 3.1 for more details)


**Sample Status:** Engineering Sample


**Applicant:** Lenovo (Shanghai) Electronics Technology Co., Ltd.

**Test Date:** Jul. 08 ~ Jul. 17, 2019

**Standards:** FCC Part 27, Subpart C, H, F, L

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.

**Prepared by :**  , **Date:** Aug. 01, 2019  
Ivonne Wu / Supervisor

**Approved by :**  , **Date:** Aug. 01, 2019  
Dylan Chiou / Project Engineer

## 2 Summary of Test Results

Applied Standard: FCC Part 27 & Part 2 (WCDMA)			
FCC Clause	Test Item	Result	Remarks
2.1046 27.50(d)(4)	Equivalent Isotropic Radiated Power	Pass	Meet the requirement of limit.
2.1047	Modulation Characteristics	Pass	Meet the requirement.
2.1055 27.54	Frequency Stability	Pass	Meet the requirement of limit.
2.1049	Occupied Bandwidth	Pass	Meet the requirement of limit.
27.50(d)(5)	Peak to Average Ratio	Pass	Meet the requirement of limit.
27.53(h)	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 27.53(h)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 27.53(h)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -26.33 dB at 5137.20 MHz.

Applied Standard: FCC Part 27 & Part 2 (LTE 4)			
FCC Clause	Test Item	Result	Remarks
2.1046 27.50(d)(4)	Maximum Peak Output Power	Pass	Meet the requirement of limit.
2.1047	Modulation Characteristics	Pass	Meet the requirement.
2.1055 27.54	Frequency Stability	Pass	Meet the requirement of limit.
2.1049	Occupied Bandwidth	Pass	Meet the requirement of limit.
27.50(d)(5)	Peak to Average Ratio	Pass	Meet the requirement of limit.
27.53(h)	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 27.53(h)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 27.53(h)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -19.78 dB at 7010.00 MHz.

Applied Standard: FCC Part 27 & Part 2 (LTE 12)			
FCC Clause	Test Item	Result	Remarks
2.1046 27.50(c)(10)	Maximum Peak Output Power	Pass	Meet the requirement of limit.
2.1047	Modulation Characteristics	Pass	Meet the requirement.
2.1055 27.54	Frequency Stability	Pass	Meet the requirement of limit.
2.1049	Occupied Bandwidth	Pass	Meet the requirement of limit.
---	Peak to Average Ratio	Pass	Meet the requirement of limit.
27.53(g)	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 27.53(g)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 27.53(g)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -36.25 dB at 43.58 MHz.

Applied Standard: FCC Part 27 & Part 2 (LTE 13)			
FCC Clause	Test Item	Result	Remarks
2.1046 27.50(b)(10)	Maximum Peak Output Power	Pass	Meet the requirement of limit.
2.1047	Modulation Characteristics	Pass	Meet the requirement.
2.1055 27.54	Frequency Stability	Pass	Meet the requirement of limit.
2.1049	Occupied Bandwidth	Pass	Meet the requirement of limit.
---	Peak to Average Ratio	Pass	Meet the requirement of limit.
27.53(c)(2)(4)	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 27.53(c)(2)&(f)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 27.53(c)(2)&(f)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -15.27 dB at 1564.00 MHz.

Applied Standard: FCC Part 27 & Part 2 (LTE 17)			
FCC Clause	Test Item	Result	Remarks
2.1046 27.50(c)(10)	Maximum Peak Output Power	Pass	Meet the requirement of limit.
2.1047	Modulation Characteristics	Pass	Meet the requirement.
2.1055 27.54	Frequency Stability	Pass	Meet the requirement of limit.
2.1049	Occupied Bandwidth	Pass	Meet the requirement of limit.
---	Peak to Average Ratio	Pass	Meet the requirement of limit.
27.53(g)	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 27.53(g)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 27.53(g)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -35.65 dB at 43.58 MHz.

Applied Standard: FCC Part 27 & Part 2 (LTE 66)			
FCC Clause	Test Item	Result	Remarks
2.1046 27.50(d)(4)	Maximum Peak Output Power	Pass	Meet the requirement of limit.
2.1047	Modulation Characteristics	Pass	Meet the requirement.
2.1055 27.54	Frequency Stability	Pass	Meet the requirement of limit.
2.1049	Occupied Bandwidth	Pass	Meet the requirement of limit.
27.50(d)(5)	Peak to Average Ratio	Pass	Meet the requirement of limit.
27.53(h)	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 27.53(h)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 27.53(h)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -15.55 dB at 10320.00 MHz.

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:

Measurement	Frequency	Expanded Uncertainty (k=2) ( $\pm$ )
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.04 dB
	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

## 2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY51210203	Mar. 18, 2019	Mar. 17, 2020
Spectrum Analyzer Agilent	N9010A	MY52220314	Dec. 13, 2018	Dec. 12, 2019
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Apr. 15, 2019	Apr. 14, 2020
Spectrum Analyzer ROHDE & SCHWARZ	FSW26	102023	Oct. 11, 2018	Oct. 10, 2019
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-969	Nov. 25, 2018	Nov. 24, 2019
BILOG Antenna SCHWARZBECK	VULB 9168	9168-472	Nov. 23, 2018	Nov. 22, 2019
BILOG Antenna SCHWARZBECK	VULB 9168	9168-153	Nov. 23, 2018	Nov. 22, 2019
Double Ridge Guide Horn Antenna EMCO	3115	5619	Nov. 25, 2018	Nov. 24, 2019
Fixed Attenuator WOKEN	MDCS18N-10	MDCS18N-10-01	Apr. 15, 2019	Apr. 14, 2020
MXG Vector signal generator Agilent	N5182B	MY53050430	Nov. 19, 2018	Nov. 18, 2019
Preamplifier EMCI	EMC 012645	980115	Oct. 12, 2018	Oct. 11, 2019
Preamplifier EMCI	EMC 330H	980112	Oct. 12, 2018	Oct. 11, 2019
RF Coaxial Cable HUBER+SUHNNER	EMC104-SM-SM-800 0&3000	140811+170717	Oct. 12, 2018	Oct. 11, 2019
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM-1 000(140807)	Oct. 12, 2018	Oct. 11, 2019
RF Coaxial Cable WOKEN	8D-FB	Cable-Ch10-01	Oct. 12, 2018	Oct. 11, 2019
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	NA	NA	NA
Radio Communication Analyzer Anritsu	MT8821C	6201462755	Jan. 16, 2019	Jan. 15, 2020
Radio Communication Analyzer Anritsu	MT8820C	6201300640	Aug. 16, 2017	Aug. 15, 2019
Temperature & Humidity Chamber	GTH-120-40-CP-AR	MAA1306-019	Sep. 05, 2018	Sep. 04, 2019
DC Power Supply Topward	33010D	807748	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 / 24 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Chamber 10.

### 3 General Information

#### 3.1 General Description of EUT

<b>Product</b>	Notebook Computer	
<b>Brand</b>	Lenovo	
<b>Test Model</b>	Lenovo Yoga C640-13IML LTE	
<b>Series Model</b>	81XL	
<b>Status of EUT</b>	Engineering Sample	
<b>Power Supply Rating</b>	12 Vdc (Adapter)	
<b>Modulation Type</b>	WCDMA	QPSK
	LTE	QPSK, 16QAM
<b>Frequency Range</b>	WCDMA	1712.4 ~ 1752.6 MHz
	LTE Band 4 (Channel Bandwidth: 1.4 MHz)	1710.7 ~ 1754.3 MHz
	LTE Band 4 (Channel Bandwidth: 3 MHz)	1711.5 ~ 1753.5 MHz
	LTE Band 4 (Channel Bandwidth: 5 MHz)	1712.5 ~ 1752.5 MHz
	LTE Band 4 (Channel Bandwidth: 10 MHz)	1715.0 ~ 1750.0 MHz
	LTE Band 4 (Channel Bandwidth: 15 MHz)	1717.5 ~ 1747.5 MHz
	LTE Band 4 (Channel Bandwidth: 20 MHz)	1720.0 ~ 1745.0 MHz
	LTE Band 12 (Channel Bandwidth: 1.4 MHz)	699.7 ~ 715.3 MHz
	LTE Band 12 (Channel Bandwidth: 3 MHz)	700.5 ~ 714.5 MHz
	LTE Band 12 (Channel Bandwidth: 5 MHz)	701.5 ~ 713.5 MHz
	LTE Band 12 (Channel Bandwidth: 10 MHz)	704.0 ~ 711.0 MHz
	LTE Band 13 (Channel Bandwidth: 5 MHz)	779.5 ~ 784.5 MHz
	LTE Band 13 (Channel Bandwidth: 10 MHz)	782.0 MHz
	LTE Band 17 (Channel Bandwidth: 5 MHz)	706.5 ~ 713.5 MHz
	LTE Band 17 (Channel Bandwidth: 10 MHz)	709.0 ~ 711.0 MHz
	LTE Band 66 (Channel Bandwidth: 1.4 MHz)	1710.7 ~ 1779.3 MHz
	LTE Band 66 (Channel Bandwidth: 3 MHz)	1711.5 ~ 1778.5 MHz
	LTE Band 66 (Channel Bandwidth: 5 MHz)	1712.5 ~ 1777.5 MHz
	LTE Band 66 (Channel Bandwidth: 10 MHz)	1715.0 ~ 1775.0 MHz
	LTE Band 66 (Channel Bandwidth: 15 MHz)	1717.5 ~ 1772.5 MHz
	LTE Band 66 (Channel Bandwidth: 20 MHz)	1720.0 ~ 1770.0 MHz

<b>Emission Designator</b>	WCDMA	4M08F9W
	LTE Band 4 (Channel Bandwidth: 1.4 MHz)	1M09D7W
	LTE Band 4 (Channel Bandwidth: 3 MHz)	2M71D7W
	LTE Band 4 (Channel Bandwidth: 5 MHz)	4M50G7D
	LTE Band 4 (Channel Bandwidth: 10 MHz)	8M99G7D
	LTE Band 4 (Channel Bandwidth: 15 MHz)	13M5G7D
	LTE Band 4 (Channel Bandwidth: 20 MHz)	18M0G7D
	LTE Band 12 (Channel Bandwidth: 1.4 MHz)	1M09G7D
	LTE Band 12 (Channel Bandwidth: 3 MHz)	2M71G7D
	LTE Band 12 (Channel Bandwidth: 5 MHz)	4M50G7D
	LTE Band 12 (Channel Bandwidth: 10 MHz)	9M01G7D
	LTE Band 13 (Channel Bandwidth: 5 MHz)	4M50G7D
	LTE Band 13 (Channel Bandwidth: 10 MHz)	8M95G7D
	LTE Band 17 (Channel Bandwidth: 5 MHz)	4M50D7W
	LTE Band 17 (Channel Bandwidth: 10 MHz)	9M01G7D
	LTE Band 66 (Channel Bandwidth: 1.4 MHz)	1M10D7W
	LTE Band 66 (Channel Bandwidth: 3 MHz)	2M70G7D
	LTE Band 66 (Channel Bandwidth: 5 MHz)	4M50D7W
	LTE Band 66 (Channel Bandwidth: 10 MHz)	8M99G7D
	LTE Band 66 (Channel Bandwidth: 15 MHz)	13M5G7D
	LTE Band 66 (Channel Bandwidth: 20 MHz)	18M0D7W
<b>Max. ERP Power</b>	LTE Band 12 (Channel Bandwidth: 1.4 MHz)	67.14 mW
	LTE Band 12 (Channel Bandwidth: 3 MHz)	70.63 mW
	LTE Band 12 (Channel Bandwidth: 5 MHz)	74.82 mW
	LTE Band 12 (Channel Bandwidth: 10 MHz)	78.89 mW
	LTE Band 13 (Channel Bandwidth: 5 MHz)	72.61 mW
	LTE Band 13 (Channel Bandwidth: 10 MHz)	73.79 mW
	LTE Band 17 (Channel Bandwidth: 5 MHz)	72.78 mW
	LTE Band 17 (Channel Bandwidth: 10 MHz)	76.91 mW
<b>Max. EIRP Power</b>	WCDMA	250.03 mW
	LTE Band 4 (Channel Bandwidth: 1.4 MHz)	159.59 mW
	LTE Band 4 (Channel Bandwidth: 3 MHz)	172.98 mW
	LTE Band 4 (Channel Bandwidth: 5 MHz)	181.13 mW
	LTE Band 4 (Channel Bandwidth: 10 MHz)	192.31 mW
	LTE Band 4 (Channel Bandwidth: 15 MHz)	201.37 mW
	LTE Band 4 (Channel Bandwidth: 20 MHz)	214.78 mW
	LTE Band 66 (Channel Bandwidth: 1.4 MHz)	151.36 mW
	LTE Band 66 (Channel Bandwidth: 3 MHz)	154.53 mW
	LTE Band 66 (Channel Bandwidth: 5 MHz)	155.96 mW
	LTE Band 66 (Channel Bandwidth: 10 MHz)	158.12 mW
	LTE Band 66 (Channel Bandwidth: 15 MHz)	161.06 mW
	LTE Band 66 (Channel Bandwidth: 20 MHz)	162.93 mW

<b>Antenna Type</b>	PIFA Antenna	
<b>Antenna Gain</b>	WCDMA	NB Mode: 1.5 dBi (Main) / 1.07 dBi (Aux.) Tablet Mode: -2.33 dBi (Main) / -4.6 dBi (Aux.)
	LTE Band 4	NB Mode: 1.5 dBi (Main) / 1.07 dBi (Aux.) Tablet Mode: -2.33 dBi (Main) / -4.6 dBi (Aux.)
	LTE Band 12	NB Mode: -1.09 dBi (Main) / -2.64 dBi (Aux.) Tablet Mode: -6.64 dBi (Main) / -6.02 dBi (Aux.)
	LTE Band 13	NB Mode: -1.85 dBi (Main) / -1.63 dBi (Aux.) Tablet Mode: -6.42 dBi (Main) / -5.82 dBi (Aux.)
	LTE Band 17	NB Mode: -1.08 dBi (Main) / -2.64 dBi (Aux.) Tablet Mode: -7 dBi (Main) / -6.02 dBi (Aux.)
	LTE Band 66	NB Mode: 1.89 dBi (Main) / 1.07 dBi (Aux.) Tablet Mode: -2.16 dBi (Main) / -4.6 dBi (Aux.)
<b>Accessory Device</b>	Refer to Note as below	
<b>Data Cable Supplied</b>	Refer to Note as below	

Note:

1. The WWAN module (Brand: Fibocom, Model: L850-GL) was installed in the EUT.
2. All models are listed as below.

Brand	Model	Difference
Lenovo	Lenovo Yoga C640-13IML LTE (Main test)	All models are electrically identical, different model names are for marketing purpose.
	81XL (Series model)	

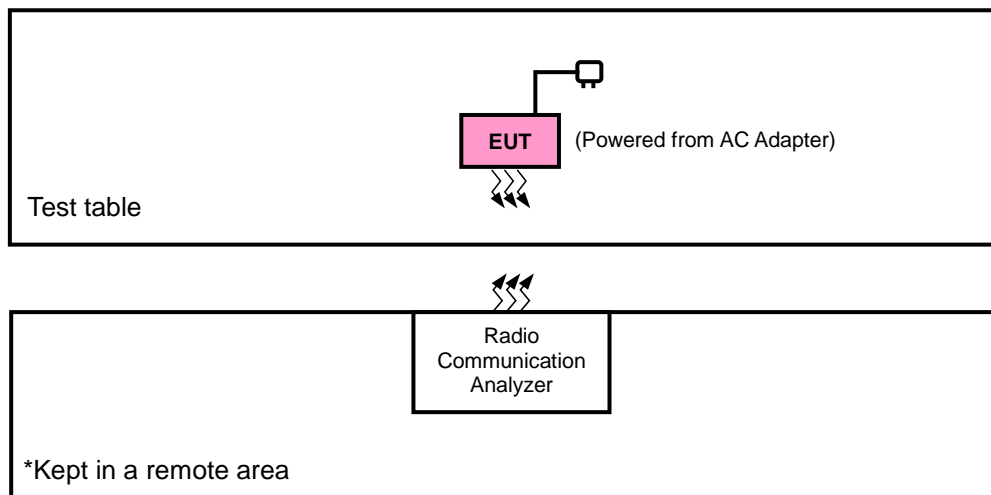
3. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter	Lenovo	PA-1450-55LL	I/P: 100-240 Vac, 50/60 Hz, 1.7 A O/P: 12 Vdc, 2 A

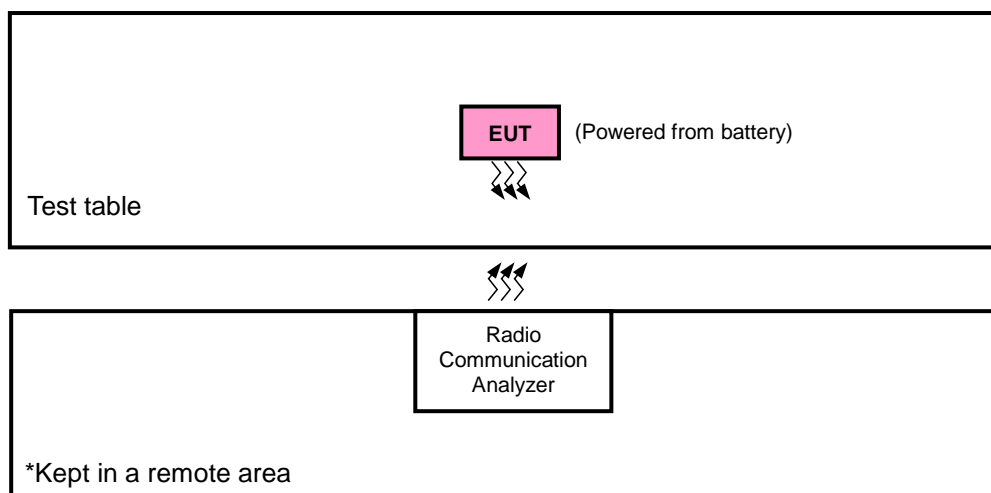
4. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

### 3.2 Configuration of System under Test

#### <Radiated Emission Test>



#### <E.R.P. / E.I.R.P. Test>



#### 3.2.1 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.

### 3.3 Test Mode Applicability and Tested Channel Detail

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis, and antenna ports

The worst case was found when positioned as the table below. Following channel(s) was (were) selected for the final test as listed below:

Band	ERP / EIRP	Radiated Emission
WCDMA	NB Mode	Y-axis
LTE Band 4	NB Mode	Z-axis
LTE Band 12	NB Mode	Z-axis
LTE Band 13	NB Mode	NB Mode
LTE Band 17	NB Mode	Z-axis
LTE Band 66	NB Mode	Z-axis

#### WCDMA

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	EIRP	1312 to 1513	1312, 1413, 1513	WCDMA
-	Modulation Characteristics	1312 to 1513	1413	WCDMA
-	Frequency Stability	1312 to 1513	1312, 1513	WCDMA
-	Occupied Bandwidth	1312 to 1513	1312, 1413, 1513	WCDMA
-	Band Edge	1312 to 1513	1312, 1513	WCDMA
-	Peak to Average Ratio	1312 to 1513	1312, 1413, 1513	WCDMA
-	Conducted Emission	1312 to 1513	1312, 1413, 1513	WCDMA
-	Radiated Emission	1312 to 1513	1312, 1413, 1513	WCDMA



## LTE Band 4

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	EIRP	19957 to 20393	19957, 20175, 20393	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		19965 to 20385	19965, 20175, 20385	3 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		19975 to 20375	19975, 20175, 20375	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20000 to 20350	20000, 20175, 20350	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20025 to 20325	20025, 20175, 20325	15 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20050 to 20300	20050, 20175, 20300	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	Modulation Characteristics	20050 to 20300	20175	20 MHz	QPSK, 16QAM	100 RB / 0 RB Offset
-	Frequency Stability	19957 to 20393	19957, 20393	1.4 MHz	QPSK	1 RB / 0 RB Offset
		19965 to 20385	19965, 20385	3 MHz	QPSK	1 RB / 0 RB Offset
		19975 to 20375	19975, 20375	5 MHz	QPSK	1 RB / 0 RB Offset
		20000 to 20350	20000, 20350	10 MHz	QPSK	1 RB / 0 RB Offset
		20025 to 20325	20025, 20325	15 MHz	QPSK	1 RB / 0 RB Offset
		20050 to 20300	20050, 20300	20 MHz	QPSK	1 RB / 0 RB Offset
-	Occupied Bandwidth	19957 to 20393	19957, 20175, 20393	1.4 MHz	QPSK, 16QAM	6 RB / 0 RB Offset
		19965 to 20385	19965, 20175, 20385	3 MHz	QPSK, 16QAM	15 RB / 0 RB Offset
		19975 to 20375	19975, 20175, 20375	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		20000 to 20350	20000, 20175, 20350	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset
		20025 to 20325	20025, 20175, 20325	15 MHz	QPSK, 16QAM	75 RB / 0 RB Offset
		20050 to 20300	20050, 20175, 20300	20 MHz	QPSK, 16QAM	100 RB / 0 RB Offset
-	Peak to Average Ratio	19957 to 20393	19957, 20175, 20393	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		19965 to 20385	19965, 20175, 20385	3 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		19975 to 20375	19975, 20175, 20375	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20000 to 20350	20000, 20175, 20350	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20025 to 20325	20025, 20175, 20325	15 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20050 to 20300	20050, 20175, 20300	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	Band Edge	19957 to 20393	19957	1.4 MHz	QPSK	1 RB / 0 RB Offset
			20393	1.4 MHz	QPSK	6 RB / 0 RB Offset
		19965 to 20385	19965	3 MHz	QPSK	1 RB / 5 RB Offset
			20385	3 MHz	QPSK	6 RB / 0 RB Offset
		19975 to 20375	19975	5 MHz	QPSK	1 RB / 0 RB Offset
			20375	5 MHz	QPSK	15 RB / 0 RB Offset
		20000 to 20350	20000	10 MHz	QPSK	1 RB / 14 RB Offset
			20350	10 MHz	QPSK	15 RB / 0 RB Offset
		20025 to 20325	20025	15 MHz	QPSK	1 RB / 0 RB Offset
			20325	15 MHz	QPSK	25 RB / 0 RB Offset
		20050 to 20300	20050	20 MHz	QPSK	1 RB / 24 RB Offset
			20300	20 MHz	QPSK	25 RB / 0 RB Offset
	Conducted Emission	19957 to 20393	19957, 20175, 20393	1.4 MHz	QPSK	1 RB / 0 RB Offset
		19965 to 20385	19965, 20175, 20385	3 MHz	QPSK	6 RB / 0 RB Offset
		19975 to 20375	19975, 20175, 20375	5 MHz	QPSK	1 RB / 5 RB Offset
		20000 to 20350	20000, 20175, 20350	10 MHz	QPSK	6 RB / 0 RB Offset
		20025 to 20325	20025, 20175, 20325	15 MHz	QPSK	1 RB / 0 RB Offset
		20050 to 20300	20050, 20175, 20300	20 MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission	19957 to 20393	19957, 20175, 20393	1.4 MHz	QPSK	1 RB / 0 RB Offset
		19975 to 20375	19975, 20175, 20375	5 MHz	QPSK	1 RB / 0 RB Offset
		20050 to 20300	20050, 20175, 20300	20 MHz	QPSK	1 RB / 0 RB Offset

**Note:**

1. This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.
2. For radiated emission, according to 3GPP 36.521 Section 6.6.3.1.4, choose the lowest, 5 MHz & highest channel bandwidth for final test.

## LTE Band 12

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	ERP	23017 to 23173	23017, 23095, 23173	1.4 MHz	QPSK, 16QAM	1 RB / 5 RB Offset
		23025 to 23165	23025, 23095, 23165	3 MHz	QPSK, 16QAM	1 RB / 7 RB Offset
		23035 to 23155	23035, 23095, 23155	5 MHz	QPSK, 16QAM	1 RB / 24 RB Offset
		23060 to 23130	23060, 23095, 23130	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	Modulation Characteristics	23060 to 23130	23095	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset
-	Frequency Stability	23017 to 23173	23017, 23173	1.4 MHz	QPSK	1 RB / 0 RB Offset
		23025 to 23165	23025, 23165	3 MHz	QPSK	1 RB / 0 RB Offset
		23035 to 23155	23035, 23155	5 MHz	QPSK	1 RB / 0 RB Offset
		23060 to 23130	23060, 23130	10 MHz	QPSK	1 RB / 0 RB Offset
-	Occupied Bandwidth	23017 to 23173	23017, 23095, 23173	1.4 MHz	QPSK, 16QAM	6 RB / 0 RB Offset
		23025 to 23165	23025, 23095, 23165	3 MHz	QPSK, 16QAM	15 RB / 0 RB Offset
		23035 to 23155	23035, 23095, 23155	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		23060 to 23130	23060, 23095, 23130	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset
-	Peak to Average Ratio	23017 to 23173	23017, 23095, 23173	1.4 MHz	QPSK, 16QAM	1 RB / 5 RB Offset
		23025 to 23165	23025, 23095, 23165	3 MHz	QPSK, 16QAM	1 RB / 7 RB Offset
		23035 to 23155	23035, 23095, 23155	5 MHz	QPSK, 16QAM	1 RB / 24 RB Offset
		23060 to 23130	23060, 23095, 23130	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	Band Edge	23017 to 23173	23017	1.4 MHz	QPSK	1 RB / 0 RB Offset
			23173	1.4 MHz	QPSK	6 RB / 0 RB Offset
		23025 to 23165	23025	3 MHz	QPSK	1 RB / 0 RB Offset
			23165	3 MHz	QPSK	15 RB / 0 RB Offset
		23035 to 23155	23035	5 MHz	QPSK	1 RB / 14 RB Offset
			23155	5 MHz	QPSK	15 RB / 0 RB Offset
		23060 to 23130	23060	10 MHz	QPSK	1 RB / 0 RB Offset
			23130	10 MHz	QPSK	50 RB / 0 RB Offset
		23017 to 23173	23017, 23095, 23173	1.4 MHz	QPSK	1 RB / 5 RB Offset
			23025, 23095, 23165	3 MHz	QPSK	1 RB / 7 RB Offset
		23035 to 23155	23035, 23095, 23155	5 MHz	QPSK	1 RB / 24 RB Offset
			23060, 23095, 23130	10 MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission	23017 to 23173	23017, 23095, 23173	1.4 MHz	QPSK	1 RB / 5 RB Offset
		23035 to 23155	23035, 23095, 23155	5 MHz	QPSK	1 RB / 7 RB Offset
		23060 to 23130	23060, 23095, 23130	10 MHz	QPSK	1 RB / 0 RB Offset

### Note:

1. This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.
2. For radiated emission, according to 3GPP 36.521 Section 6.6.3.1.4, choose the lowest, 5 MHz & highest channel bandwidth for final test.

## LTE Band 13

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	ERP	23205 to 23255	23205, 23230, 23255	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		23230	23230	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	Modulation Characteristics	23230	23230	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset
-	Frequency Stability	23205 to 23255	23205, 23255	5 MHz	QPSK	1 RB / 0 RB Offset
		23230	23230	10 MHz	QPSK	1 RB / 0 RB Offset
-	Occupied Bandwidth	23205 to 23255	23205, 23230, 23255	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		23230	23230	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset
-	Peak to Average Ratio	23205 to 23255	23205, 23230, 23255	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		23230	23230	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	Band Edge	23205 to 23255	23205	5 MHz	QPSK	1 RB / 0 RB Offset
						25 RB / 0 RB Offset
		23230	23255	5 MHz	QPSK	1 RB / 24 RB Offset
						25 RB / 0 RB Offset
		23230	23230	10 MHz	QPSK	1 RB / 0 RB Offset
						50 RB / 0 RB Offset
-	Conducted Emission	23205 to 23255	23205, 23230, 23255	5 MHz	QPSK	1 RB / 0 RB Offset
		23230	23230	10 MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission	23205 to 23255	23205, 23230, 23255	5 MHz	QPSK	1 RB / 0 RB Offset
		23230	23230	10 MHz	QPSK	1 RB / 0 RB Offset

### Note:

1. This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.
2. For radiated emission, according to 3GPP 36.521 Section 6.6.3.1.4, choose the lowest, 5 MHz & highest channel bandwidth for final test.

## LTE Band 17

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	ERP	23755 to 23825	23755, 23790, 23825	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		23780 to 23800	23780, 23790, 23800	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	Modulation Characteristics	23780 to 23800	23790	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset
-	Frequency Stability	23755 to 23825	23755, 23825	5 MHz	QPSK	1 RB / 0 RB Offset
		23780 to 23800	23780, 23800	10 MHz	QPSK	1 RB / 0 RB Offset
-	Occupied Bandwidth	23755 to 23825	23755, 23790, 23825	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		23780 to 23800	23780, 23790, 23800	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset
-	Peak to Average Ratio	23755 to 23825	23755, 23790, 23825	5 MHz	QPSK, 16QAM	1 RB / 12 RB Offset
		23780 to 23800	23780, 23790, 23800	10 MHz	QPSK, 16QAM	1 RB / 24 RB Offset
-	Band Edge	23755 to 23825	23755	5 MHz	QPSK	1 RB / 0 RB Offset
						25 RB / 0 RB Offset
		23780 to 23800	23825	5 MHz	QPSK	1 RB / 24 RB Offset
						25 RB / 0 RB Offset
			23780	10 MHz	QPSK	1 RB / 0 RB Offset
						50 RB / 0 RB Offset
-	Conducted Emission	23755 to 23825	23755, 23790, 23825	5 MHz	QPSK	1 RB / 0 RB Offset
		23780 to 23800	23780, 23790, 23800	10 MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission	23755 to 23825	23755, 23790, 23825	5 MHz	QPSK	1 RB / 0 RB Offset
		23780 to 23800	23780, 23790, 23800	10 MHz	QPSK	1 RB / 0 RB Offset

### Note:

1. This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.
2. For radiated emission, according to 3GPP 36.521 Section 6.6.3.1.4, choose the lowest, 5 MHz & highest channel bandwidth for final test.

## LTE Band 66

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	EIRP	131979 to 132665	131979, 132322, 132665	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		131987 to 132657	131987, 132322, 132657	3 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		131997 to 132647	131997, 132322, 132647	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		132022 to 132622	132022, 132322, 132622	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		132047 to 132597	132047, 132322, 132597	15 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		132072 to 132572	132072, 132322, 132572	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	Modulation Characteristics	132072 to 132572	132322	20 MHz	QPSK, 16QAM	100 RB / 0 RB Offset
-	Frequency Stability	131979 to 132665	131979, 132665	1.4 MHz	QPSK	1 RB / 0 RB Offset
		131987 to 132657	131987, 132657	3 MHz	QPSK	1 RB / 0 RB Offset
		131997 to 132647	131997, 132647	5 MHz	QPSK	1 RB / 0 RB Offset
		132022 to 132622	132022, 132622	10 MHz	QPSK	1 RB / 0 RB Offset
		132047 to 132597	132047, 132597	15 MHz	QPSK	1 RB / 0 RB Offset
		132072 to 132572	132072, 132572	20 MHz	QPSK	1 RB / 0 RB Offset
-	Occupied Bandwidth	131979 to 132665	131979, 132322, 132665	1.4 MHz	QPSK, 16QAM	6 RB / 0 RB Offset
		131987 to 132657	131987, 132322, 132657	3 MHz	QPSK, 16QAM	15 RB / 0 RB Offset
		131997 to 132647	131997, 132322, 132647	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		132022 to 132622	132022, 132322, 132622	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset
		132047 to 132597	132047, 132322, 132597	15 MHz	QPSK, 16QAM	75 RB / 0 RB Offset
		132072 to 132572	132072, 132322, 132572	20 MHz	QPSK, 16QAM	100 RB / 0 RB Offset
-	Peak to Average Ratio	131979 to 132665	131979, 132322, 132665	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		131987 to 132657	131987, 132322, 132657	3 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		131997 to 132647	131997, 132322, 132647	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		132022 to 132622	132022, 132322, 132622	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		132047 to 132597	132047, 132322, 132597	15 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		132072 to 132572	132072, 132322, 132572	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	Band Edge	131979 to 132665	131979	1.4 MHz	QPSK	1 RB / 0 RB Offset
						6 RB / 0 RB Offset
			132665	1.4 MHz	QPSK	1 RB / 5 RB Offset
						6 RB / 0 RB Offset
		131987 to 132657	131987	3 MHz	QPSK	1 RB / 0 RB Offset
						15 RB / 0 RB Offset
			132657	3 MHz	QPSK	1 RB / 14 RB Offset
						15 RB / 0 RB Offset
		131997 to 132647	131997	5 MHz	QPSK	1 RB / 0 RB Offset
						25 RB / 0 RB Offset
			132647	5 MHz	QPSK	1 RB / 24 RB Offset
						25 RB / 0 RB Offset
		132022 to 132622	132022	10 MHz	QPSK	1 RB / 0 RB Offset
						50 RB / 0 RB Offset
			132622	10 MHz	QPSK	1 RB / 49 RB Offset
						50 RB / 0 RB Offset
		132047 to 132597	132047	15 MHz	QPSK	1 RB / 0 RB Offset
						75 RB / 0 RB Offset
			132597	15 MHz	QPSK	1 RB / 74 RB Offset
						75 RB / 0 RB Offset
		132072 to 132572	132072	20 MHz	QPSK	1 RB / 0 RB Offset
						100 RB / 0 RB Offset
			132572	20 MHz	QPSK	1 RB / 99 RB Offset
						100 RB / 0 RB Offset

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	Conducted Emission	131979 to 132665	131979, 132322, 132665	1.4 MHz	QPSK	1 RB / 0 RB Offset
		131987 to 132657	131987, 132322, 132657	3 MHz	QPSK	1 RB / 0 RB Offset
		131997 to 132647	131997, 132322, 132647	5 MHz	QPSK	1 RB / 0 RB Offset
		132022 to 132622	132022, 132322, 132622	10 MHz	QPSK	1 RB / 0 RB Offset
		132047 to 132597	132047, 132322, 132597	15 MHz	QPSK	1 RB / 0 RB Offset
		132072 to 132572	132072, 132322, 132572	20 MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission	131979 to 132665	131979, 132322, 132665	1.4 MHz	QPSK	1 RB / 0 RB Offset
		131997 to 132647	131997, 132322, 132647	5 MHz	QPSK	1 RB / 0 RB Offset
		132072 to 132572	132072, 132322, 132572	20 MHz	QPSK	1 RB / 0 RB Offset

**Note:**

1. This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.
2. For radiated emission, according to 3GPP 36.521 Section 6.6.3.1.4, choose the lowest, 5 MHz & highest channel bandwidth for final test.

**Test Condition:**

Test Item	Environmental Conditions	Input Power	Tested By
ERP / EIRP	25 deg. C, 65 % RH	120 Vac, 60 Hz	Thomas Wei
Modulation Characteristics	25 deg. C, 65 % RH	120 Vac, 60 Hz	Gavin Wu
Frequency Stability	25 deg. C, 65 % RH	120 Vac, 60 Hz	Gavin Wu
Occupied Bandwidth	25 deg. C, 65 % RH	120 Vac, 60 Hz	Gavin Wu
Band Edge	25 deg. C, 65 % RH	120 Vac, 60 Hz	Gavin Wu
Peak to Average Ratio	25 deg. C, 65 % RH	120 Vac, 60 Hz	Gavin Wu
Conducted Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Gavin Wu
Radiated Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Thomas Wei / Tim Chen / Getaz Yang

### **3.4 EUT Operating Conditions**

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency

### **3.5 General Description of Applied Standards**

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC 47 CFR Part 2**

**FCC 47 CFR Part 27**

**KDB 971168 D01 Power Meas License Digital Systems v03r01**

**ANSI/TIA/EIA-603-E 2016**

**ANSI 63.26-2015**

**Note:** All test items have been performed and recorded as per the above standards.



## 4 Test Types and Results

### 4.1 Output Power Measurement

#### 4.1.1 Limits of Output Power Measurement

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.

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

Portable stations (hand-held device) operating 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.

#### 4.1.2 Test Procedures

##### **EIRP / ERP Measurement:**

- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 5 MHz for WCDMA and 10 MHz for LTE mode.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 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.
- c. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a tx cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value” of step b. Record the power level of S.G.
- d.  $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$ . E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole,  $E.R.P \text{ power} = E.I.R.P \text{ power} - 2.15 \text{ dB}$ .

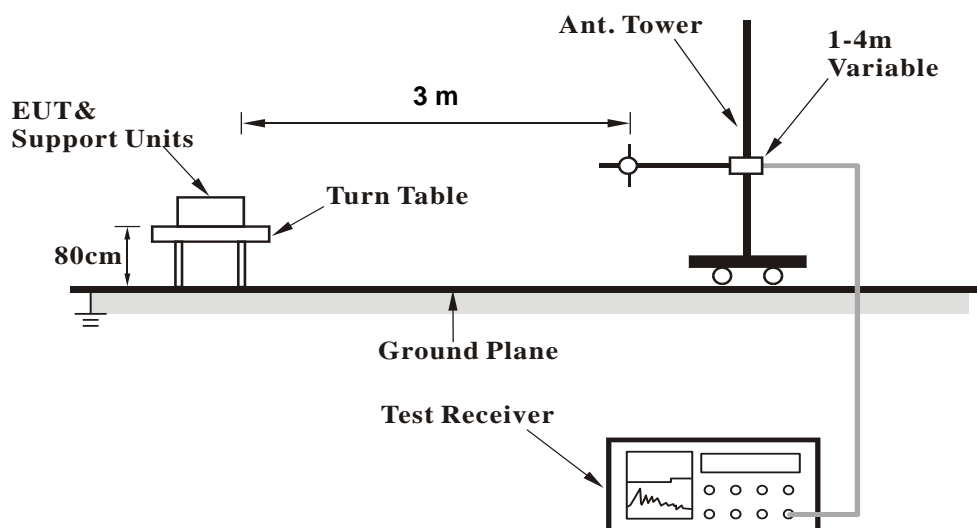
##### **Conducted Power Measurement:**

- a. The EUT was set up for the maximum power with WCDMA and LTE link data modulation and link up with simulator.
- b. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

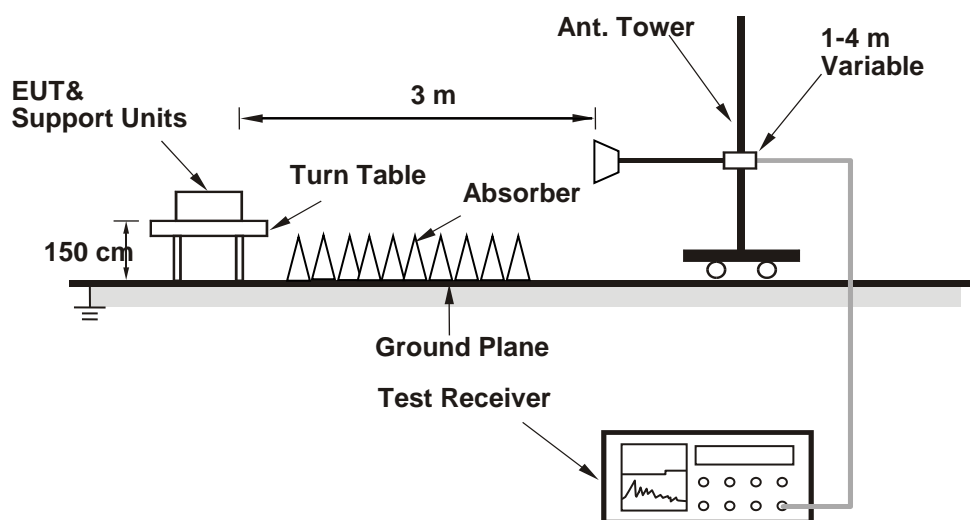
#### 4.1.3 Test Setup

##### EIRP / ERP Measurement:

<Radiated Emission below or equal 1 GHz>

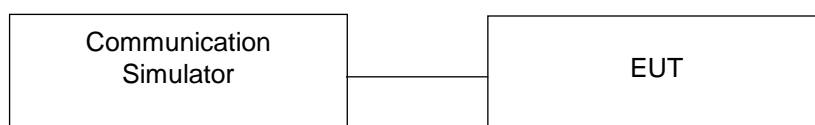


<Radiated Emission above 1 GHz>



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

##### Conducted Power Measurement:



#### 4.1.4 Test Results

##### Conducted Output Power (dBm)

Band	WCDMA IV		
Channel	1312	1413	1513
Frequency (MHz)	1712.4	1732.6	1752.6
RMC 12.2K	23.68	23.69	23.75
HSDPA Subtest-1	23.35	23.36	23.42
HSDPA Subtest-2	22.37	22.38	22.44
HSDPA Subtest-3	22.01	22.02	22.08
HSDPA Subtest-4	21.74	21.75	21.81
DC-HSDPA Subtest-1	23.32	23.33	23.39
DC-HSDPA Subtest-2	22.34	22.35	22.41
DC-HSDPA Subtest-3	21.98	21.99	22.05
DC-HSDPA Subtest-4	21.71	21.72	21.78
HSUPA Subtest-1	22.44	22.45	22.51
HSUPA Subtest-2	20.25	20.26	20.32
HSUPA Subtest-3	21.01	21.02	21.08
HSUPA Subtest-4	20.40	20.41	20.47
HSUPA Subtest-5	22.61	22.62	22.68

LTE Band 4															
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		20050	20175	20300				Channel		20025	20175	20325	
		Frequency (MHz)		1720.0	1732.5	1745.0				Frequency (MHz)		1717.5	1732.5	1747.5	
20M	QPSK	1	0	23.14	23.15	23.09	0	15M	QPSK	1	0	23.09	23.13	23.05	0
		1	50	22.84	22.85	22.79	0			1	37	22.75	22.79	22.72	0
		1	99	22.82	22.83	22.77	0			1	74	22.80	22.80	22.70	0
		50	0	21.97	21.98	21.92	1			36	0	21.90	21.94	21.88	1
		50	25	21.87	21.88	21.82	1			36	19	21.77	21.84	21.72	1
		50	50	21.84	21.85	21.79	1			36	39	21.78	21.78	21.69	1
		100	0	21.96	21.97	21.91	1			75	0	21.87	21.94	21.89	1
	16QAM	1	0	22.28	22.29	22.23	1		16QAM	1	0	22.24	22.19	22.23	1
		1	50	22.02	22.03	21.97	1			1	37	21.93	22.02	21.94	1
		1	99	22.04	22.05	21.99	1			1	74	21.94	21.98	21.99	1
		50	0	21.00	21.01	20.95	2			36	0	21.00	20.99	20.92	2
		50	25	20.88	20.89	20.83	2			36	19	20.83	20.86	20.74	2
50	50	20.91	20.92	20.86	2	36	39	20.91	20.89	20.77	2				
100	0	20.99	21.00	20.94	2	75	0	20.91	20.94	20.91	2				
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		20000	20175	20350				Channel		19975	20175	20375	
		Frequency (MHz)		1715.0	1732.5	1750.0				Frequency (MHz)		1712.5	1732.5	1752.5	
10M	QPSK	1	0	22.97	22.94	22.99	0	5M	QPSK	1	0	22.98	22.98	22.89	0
		1	24	22.76	22.70	22.60	0			1	12	22.68	22.64	22.58	0
		1	49	22.69	22.64	22.60	0			1	24	22.71	22.76	22.66	0
		25	0	21.94	21.95	21.87	1			12	0	21.82	21.88	21.74	1
		25	12	21.84	21.85	21.74	1			12	6	21.65	21.72	21.63	1
		25	25	21.71	21.72	21.63	1			12	13	21.84	21.76	21.61	1
		50	0	21.75	21.89	21.80	1			25	0	21.77	21.86	21.75	1
	16QAM	1	0	22.05	22.17	22.21	1		16QAM	1	0	22.07	22.23	22.10	1
		1	24	21.84	21.90	21.74	1			1	12	21.86	21.97	21.90	1
		1	49	21.94	21.88	21.95	1			1	24	21.92	21.95	21.82	1
		25	0	20.84	20.90	20.70	2			12	0	20.98	20.79	20.85	2
		25	12	20.77	20.74	20.73	2			12	6	20.74	20.70	20.66	2
25	25	20.77	20.81	20.66	2	12	13	20.74	20.76	20.71	2				
50	0	20.81	20.88	20.89	2	25	0	20.89	20.93	20.90	2				
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		19965	20175	20385				Channel		19957	20175	20393	
		Frequency (MHz)		1711.5	1732.5	1753.5				Frequency (MHz)		1710.7	1732.5	1754.3	
3M	QPSK	1	0	22.99	23.01	22.87	0	1.4M	QPSK	1	0	23.00	23.07	22.89	0
		1	7	22.72	22.81	22.63	0			1	2	22.65	22.67	22.73	0
		1	14	22.61	22.78	22.61	0			1	5	22.68	22.77	22.63	0
		8	0	21.88	21.79	21.71	1			3	0	22.78	22.89	22.79	0
		8	3	21.68	21.78	21.66	1			3	1	22.81	22.77	22.65	0
		8	7	21.75	21.78	21.59	1			3	3	22.78	22.72	22.65	0
		15	0	21.84	21.96	21.80	1			6	0	21.85	21.95	21.75	1
	16QAM	1	0	22.24	22.20	22.01	1		16QAM	1	0	22.24	22.15	22.13	1
		1	7	21.97	21.93	21.79	1			1	2	21.91	21.91	21.92	1
		1	14	21.90	21.86	21.92	1			1	5	21.88	21.82	21.94	1
		8	0	20.90	20.92	20.85	2			3	0	21.91	21.77	21.71	1
		8	3	20.77	20.79	20.65	2			3	1	21.75	21.81	21.79	1
8	7	20.78	20.80	20.64	2	3	3	21.73	21.77	21.67	1				
15	0	20.82	20.75	20.79	2	6	0	20.84	20.80	20.86	2				

LTE Band 12															
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		23060	23095	23130				Channel		23035	23095	23155	
		Frequency (MHz)		704.0	707.5	711.0				Frequency (MHz)		701.5	707.5	713.5	
10M	QPSK	1	0	22.56	22.61	22.58	0	5M	QPSK	1	0	22.56	22.52	22.57	0
		1	24	22.51	22.52	22.53	0			1	12	22.51	22.56	22.53	0
		1	49	22.53	22.58	22.55	0			1	24	22.53	22.59	22.58	0
		25	0	21.60	21.65	21.62	1			12	0	21.55	21.64	21.57	1
		25	12	21.54	21.59	21.56	1			12	6	21.53	21.54	21.56	1
		25	25	21.58	21.63	21.60	1			12	13	21.61	21.54	21.52	1
		50	0	21.63	21.68	21.65	1			25	0	21.57	21.58	21.65	1
	16QAM	1	0	21.61	21.72	21.65	1		16QAM	1	0	21.54	21.70	21.65	1
		1	24	21.58	21.60	21.60	1			1	12	21.54	21.51	21.55	1
		1	49	21.58	21.62	21.62	1			1	24	21.58	21.59	21.52	1
		25	0	20.69	20.68	20.66	2			12	0	20.64	20.61	20.66	2
		25	12	20.62	20.70	20.59	2			12	6	20.52	20.69	20.53	2
		25	25	20.67	20.71	20.63	2			12	13	20.60	20.67	20.53	2
		50	0	20.66	20.77	20.75	2			25	0	20.57	20.76	20.70	2
3M	QPSK	1	0	22.54	22.56	22.54	0	1.4M	QPSK	1	0	22.51	22.55	22.52	0
		1	7	22.51	22.58	22.55	0			1	2	22.53	22.51	22.59	0
		1	14	22.54	22.57	22.56	0			1	5	22.60	22.56	22.53	0
		8	0	21.67	21.66	21.58	1			3	0	22.57	22.58	22.52	0
		8	3	21.53	21.57	22.54	1			3	1	22.58	22.51	22.57	0
		8	7	22.53	21.54	21.51	1			3	3	22.53	22.54	22.52	0
		15	0	21.58	21.68	21.59	1			6	0	21.76	21.76	21.81	1
	16QAM	1	0	21.57	21.69	21.64	1		16QAM	1	0	21.70	21.91	21.92	1
		1	7	21.51	21.57	21.59	1			1	2	21.72	21.74	21.80	1
		1	14	21.56	21.61	21.59	1			1	5	21.82	21.82	21.67	1
		8	0	20.57	20.66	20.61	2			3	0	21.91	21.78	21.94	1
		8	3	20.52	20.70	20.59	2			3	1	21.81	21.79	21.76	1
		8	7	20.52	20.67	20.62	2			3	3	21.88	21.87	21.71	1
		15	0	20.51	20.60	20.69	2			6	0	20.55	20.59	20.56	2

LTE Band 13															
BW	MCS Index	RB Size	RB Offset		Mid		3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel			23230					Channel		23205	23230	23225	
		Frequency (MHz)			782.0					Frequency (MHz)		779.5	782.0	784.5	
10M	QPSK	1	0		23.15		0	5M	QPSK	1	0	22.98	23.12	22.99	0
		1	24		23.02		0			1	12	22.91	23.01	22.89	0
		1	49		23.12		0			1	24	22.96	23.08	22.92	0
		25	0		22.19		1			12	0	22.09	22.16	22.03	1
		25	12		22.12		1			12	6	21.96	22.05	21.95	1
		25	25		22.15		1			12	13	22.06	22.10	22.01	1
		50	0		22.23		1			25	0	22.21	22.27	22.17	1
	16QAM	1	0		22.01		1		16QAM	1	0	22.02	22.19	22.03	1
		1	24		21.88		1			1	12	21.97	22.12	21.94	1
		1	49		22.20		1			1	24	22.04	22.10	22.02	1
		25	0		21.13		2			12	0	21.17	21.22	21.07	2
		25	12		21.10		2			12	6	21.02	21.07	21.06	2
		25	25		21.10		2			12	13	21.08	21.13	21.10	2
		50	0		21.22		2			25	0	21.30	21.30	21.24	2

LTE Band 17															
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		23780	23790	23800				Channel		23755	23790	23825	
		Frequency (MHz)		709.0	710.0	711.0				Frequency (MHz)		706.5	710.0	713.5	
10M	QPSK	1	0	22.62	22.59	22.54	0	5M	QPSK	1	0	22.61	22.51	22.53	0
		1	24	22.60	22.57	22.52	0			1	12	22.55	22.53	22.51	0
		1	49	22.58	22.55	22.51	0			1	24	22.51	22.55	22.52	0
		25	0	21.78	21.75	21.70	1			12	0	21.69	21.66	21.67	1
		25	12	21.75	21.72	21.67	1			12	6	21.65	21.65	21.63	1
		25	25	21.72	21.69	21.64	1			12	13	21.66	21.59	21.64	1
		50	0	21.80	21.77	21.72	1			25	0	21.71	21.76	21.64	1
	16QAM	1	0	21.71	21.69	21.55	1		16QAM	1	0	21.62	21.69	21.52	1
		1	24	21.63	21.63	21.54	1			1	12	21.57	21.56	21.53	1
		1	49	21.63	21.59	21.58	1			1	24	21.60	21.52	21.56	1
		25	0	20.88	20.76	20.73	2			12	0	20.83	20.71	20.64	2
		25	12	20.78	20.73	20.68	2			12	6	20.69	20.66	20.60	2
		25	25	20.78	20.71	20.70	2			12	13	20.78	20.62	20.66	2
		50	0	20.83	20.83	20.79	2			25	0	20.77	20.81	20.75	2

LTE Band 66															
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		132072	132322	132572				Channel		132047	132322	132597	
		Frequency (MHz)		1720.0	1745.0	1770.0				Frequency (MHz)		1717.5	1745.0	1772.5	
20M	QPSK	1	0	22.98	22.93	22.92	0	15M	QPSK	1	0	22.97	22.87	22.91	0
		1	50	22.78	22.73	22.72	0			1	37	22.78	22.69	22.69	0
		1	99	22.77	22.72	22.71	0			1	74	22.73	22.65	22.67	0
		50	0	21.87	21.82	21.81	1			36	0	21.79	21.74	21.72	1
		50	25	21.86	21.81	21.80	1			36	19	21.78	21.76	21.79	1
		50	50	21.80	21.75	21.74	1			36	39	21.72	21.66	21.70	1
		100	0	21.90	21.85	21.84	1			75	0	21.85	21.83	21.84	1
	16QAM	1	0	22.06	22.04	22.03	1		16QAM	1	0	21.98	21.99	21.96	1
		1	50	21.82	21.82	21.73	1			1	37	21.79	21.82	21.66	1
		1	99	21.83	21.80	21.80	1			1	74	21.80	21.73	21.79	1
		50	0	20.89	20.93	20.82	2			36	0	20.87	20.91	20.80	2
		50	25	20.93	20.88	20.87	2			36	19	20.92	20.86	20.86	2
		50	50	20.82	20.84	20.76	2			36	39	20.76	20.82	20.69	2
		100	0	21.00	20.86	20.88	2			75	0	20.95	20.77	20.81	2

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		132022	132322	132622				Channel		131997	132322	132647	
		Frequency (MHz)		1715.0	1745.0	1775.0				Frequency (MHz)		1712.5	1745.0	1777.5	
10M	QPSK	1	0	22.82	22.86	22.71	0	5M	QPSK	1	0	22.91	22.80	22.87	0
		1	24	22.56	22.64	22.53	0			1	12	22.55	22.68	22.55	0
		1	49	22.65	22.59	22.54	0			1	24	22.69	22.62	22.52	0
		25	0	21.73	21.78	21.66	1			12	0	21.74	21.69	21.69	1
		25	12	21.71	21.75	21.62	1			12	6	21.83	21.69	21.65	1
		25	25	21.65	21.65	21.64	1			12	13	21.75	21.51	21.59	1
		50	0	21.80	21.78	21.74	1			25	0	21.73	21.79	21.56	1
	16QAM	1	0	21.92	22.00	21.94	1		16QAM	1	0	21.88	21.96	21.92	1
		1	24	21.69	21.73	21.60	1			1	12	21.68	21.72	21.63	1
		1	49	21.70	21.68	21.72	1			1	24	21.69	21.61	21.61	1
		25	0	20.66	20.83	20.80	2			12	0	20.79	20.87	20.66	2
		25	12	20.80	20.76	20.85	2			12	6	20.87	20.79	20.73	2
		25	25	20.67	20.75	20.62	2			12	13	20.73	20.75	20.55	2
		50	0	20.77	20.67	20.81	2			25	0	20.93	20.66	20.85	2

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		131987	132322	132657				Channel		131979	132322	132665	
		Frequency (MHz)		1711.5	1745.5	1778.5				Frequency (MHz)		1710.7	1745.0	1779.3	
3M	QPSK	1	0	22.88	22.82	22.82	0	1.4M	QPSK	1	0	22.87	22.84	22.83	0
		1	7	22.72	22.62	22.52	0			1	2	22.71	22.58	22.57	0
		1	14	22.57	22.54	22.63	0			1	5	22.65	22.66	22.62	0
		8	0	21.73	21.74	21.81	1			3	0	22.79	22.73	22.66	0
		8	3	21.81	21.76	21.64	1			3	1	22.69	22.71	22.63	0
		8	7	21.61	21.69	21.61	1			3	3	22.57	22.73	22.64	0
		15	0	21.77	21.74	21.72	1			6	0	21.85	21.69	21.73	1
	16QAM	1	0	21.95	21.80	22.00	1		16QAM	1	0	21.96	21.86	21.91	1
		1	7	21.76	21.61	21.51	1			1	2	21.67	21.61	21.54	1
		1	14	21.61	21.62	21.68	1			1	5	21.59	21.62	21.64	1
		8	0	20.70	20.87	20.65	2			3	0	21.81	21.84	21.76	1
		8	3	20.86	20.77	20.76	2			3	1	21.85	21.65	21.77	1
		8	7	20.72	20.72	20.64	2			3	3	21.71	21.75	21.63	1
		15	0	20.83	20.66	20.70	2			6	0	20.91	20.83	20.79	2

# ERP Power (dBm)

LTE Band 12							
Channel Bandwidth: 1.4 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)
NB	23017	699.7	-10.16	30.36	18.05	63.83	H
	23095	707.5	-9.75	30.17	18.27	67.14	
	23173	715.3	-10.09	30.17	17.93	62.09	
	23017	699.7	-15.77	32.03	14.11	25.76	V
	23095	707.5	-15.58	31.98	14.25	26.61	
	23173	715.3	-16.09	32.06	13.82	24.10	
Channel Bandwidth: 1.4 MHz / 16QAM							
NB	23017	699.7	-11.33	30.36	16.88	48.75	H
	23095	707.5	-10.95	30.17	17.07	50.93	
	23173	715.3	-11.37	30.17	16.65	46.24	
	23017	699.7	-16.86	32.03	13.02	20.04	V
	23095	707.5	-16.50	31.98	13.33	21.53	
	23173	715.3	-17.05	32.06	12.86	19.32	

Note: ERP (dBm) = Reading (dBm) + Correction Factor (dB) – 2.15

LTE Band 12							
Channel Bandwidth: 3 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)
NB	23025	700.5	-9.71	30.17	18.31	67.76	H
	23095	707.5	-9.53	30.17	18.49	70.63	
	23165	714.5	-9.87	30.18	18.16	65.46	
	23025	700.5	-15.43	31.96	14.38	27.42	V
	23095	707.5	-15.29	31.98	14.54	28.44	
	23165	714.5	-15.73	32.03	14.15	26.00	
Channel Bandwidth: 3 MHz / 16QAM							
NB	23025	700.5	-10.92	30.17	17.10	51.29	H
	23095	707.5	-10.71	30.17	17.31	53.83	
	23165	714.5	-11.06	30.18	16.97	49.77	
	23025	700.5	-16.53	31.96	13.28	21.28	V
	23095	707.5	-16.19	31.98	13.64	23.12	
	23165	714.5	-16.73	32.03	13.15	20.65	

Note: ERP (dBm) = Reading (dBm) + Correction Factor (dB) – 2.15

LTE Band 12							
Channel Bandwidth: 5 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)
NB	23035	701.5	-9.39	30.17	18.63	72.95	H
	23095	707.5	-9.28	30.17	18.74	74.82	
	23155	713.5	-9.59	30.18	18.44	69.82	
	23035	701.5	-15.10	31.96	14.71	29.58	V
	23095	707.5	-14.95	31.98	14.88	30.76	
	23155	713.5	-15.38	32.03	14.50	28.18	
Channel Bandwidth: 5 MHz / 16QAM							
NB	23035	701.5	-10.62	30.17	17.40	54.95	H
	23095	707.5	-10.48	30.17	17.54	56.75	
	23155	713.5	-10.77	30.18	17.26	53.21	
	23035	701.5	-16.23	31.96	13.58	22.80	V
	23095	707.5	-15.94	31.98	13.89	24.49	
	23155	713.5	-16.41	32.03	13.47	22.23	

Note: ERP (dBm) = Reading (dBm) + Correction Factor (dB) – 2.15

LTE Band 12							
Channel Bandwidth: 10 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)
NB	23060	704.0	-9.18	30.17	18.84	76.56	H
	23095	707.5	-9.05	30.17	18.97	78.89	
	23130	711.0	-9.28	30.18	18.75	74.99	
	23060	704.0	-14.90	31.96	14.91	30.97	V
	23095	707.5	-14.75	31.98	15.08	32.21	
	23130	711.0	-15.06	32.03	14.82	30.34	
Channel Bandwidth: 10 MHz / 16QAM							
NB	23060	704.0	-10.29	30.17	17.73	59.29	H
	23095	707.5	-10.16	30.17	17.86	61.09	
	23130	711.0	-10.49	30.18	17.54	56.75	
	23060	704.0	-15.97	31.96	13.84	24.21	V
	23095	707.5	-15.74	31.98	14.09	25.64	
	23130	711.0	-16.11	32.03	13.77	23.82	

Note: ERP (dBm) = Reading (dBm) + Correction Factor (dB) – 2.15



LTE Band 13							
Channel Bandwidth: 5 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)
NB	23205	779.5	-11.51	32.24	18.58	72.11	H
	23230	782.0	-11.41	32.17	18.61	72.61	
	23255	784.5	-11.45	32.11	18.51	70.96	
	23205	779.5	-16.47	32.43	13.81	24.04	V
	23230	782.0	-16.39	32.42	13.88	24.43	
	23255	784.5	-16.56	32.46	13.75	23.71	
Channel Bandwidth: 5 MHz / 16QAM							
NB	23205	779.5	-12.31	32.24	17.78	59.98	H
	23230	782.0	-12.20	32.17	17.82	60.53	
	23255	784.5	-12.26	32.11	17.70	58.88	
	23205	779.5	-17.39	32.43	12.89	19.45	V
	23230	782.0	-17.33	32.42	12.94	19.68	
	23255	784.5	-17.47	32.46	12.84	19.23	

Note: ERP (dBm) = Reading (dBm) + Correction Factor (dB) – 2.15

LTE Band 13							
Channel Bandwidth: 10 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)
NB	23230	782.0	-11.34	32.17	18.68	73.79	H
	23230	782.0	-16.34	32.42	13.93	24.72	V
Channel Bandwidth: 10 MHz / 16QAM							
NB	23230	782.0	-12.15	32.17	17.87	61.24	H
	23230	782.0	-17.29	32.42	12.98	19.86	V

Note: ERP (dBm) = Reading (dBm) + Correction Factor (dB) – 2.15

LTE Band 17							
Channel Bandwidth: 5 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)
NB	23755	706.5	-9.76	30.36	18.45	69.98	H
	23790	710.0	-9.40	30.17	18.62	72.78	
	23825	713.5	-9.64	30.17	18.38	68.87	
	23755	706.5	-15.77	32.03	14.11	25.76	V
	23790	710.0	-15.58	31.98	14.25	26.61	
	23825	713.5	-15.92	32.06	13.99	25.06	
Channel Bandwidth: 5 MHz / 16QAM							
NB	23755	706.5	-10.90	30.36	17.31	53.83	H
	23790	710.0	-10.48	30.17	17.54	56.75	
	23825	713.5	-10.76	30.17	17.26	53.21	
	23755	706.5	-16.61	32.03	13.27	21.23	V
	23790	710.0	-16.45	31.98	13.38	21.78	
	23825	713.5	-16.78	32.06	13.13	20.56	

Note: ERP (dBm) = Reading (dBm) + Correction Factor (dB) – 2.15

LTE Band 17							
Channel Bandwidth: 10 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)
NB	23780	709.0	-9.30	30.17	18.72	74.47	H
	23790	710.0	-9.16	30.17	18.86	76.91	
	23800	711.0	-9.39	30.18	18.64	73.11	
	23780	709.0	-15.35	31.96	14.46	27.93	V
	23790	710.0	-15.24	31.98	14.59	28.77	
	23800	711.0	-15.55	32.03	14.33	27.10	
Channel Bandwidth: 10 MHz / 16QAM							
NB	23780	709.0	-10.41	30.17	17.61	57.68	H
	23790	710.0	-10.15	30.17	17.87	61.24	
	23800	711.0	-10.52	30.18	17.51	56.36	
	23780	709.0	-16.27	31.96	13.54	22.59	V
	23790	710.0	-16.21	31.98	13.62	23.01	
	23800	711.0	-16.49	32.03	13.39	21.83	

Note: ERP (dBm) = Reading (dBm) + Correction Factor (dB) – 2.15

### EIRP Power (dBm)

WCDMA							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
NB	1312	1712.4	-12.45	36.29	23.84	242.10	H
	1413	1732.6	-12.71	36.69	23.98	250.03	
	1513	1752.6	-13.25	36.98	23.73	236.05	
	1312	1712.4	-18.46	37.11	18.65	73.28	V
	1413	1732.6	-18.83	37.60	18.77	75.34	
	1513	1752.6	-19.12	37.65	18.53	71.29	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

LTE Band 4							
Channel Bandwidth: 1.4 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
NB	19957	1710.7	-14.64	36.45	21.81	151.71	H
	20175	1732.5	-14.77	36.80	22.03	159.59	
	20393	1754.3	-15.32	36.94	21.62	145.21	
	19957	1710.7	-20.78	37.28	16.50	44.67	V
	20175	1732.5	-20.89	37.63	16.74	47.21	
	20393	1754.3	-21.20	37.64	16.44	44.06	
Channel Bandwidth: 1.4 MHz / 16QAM							
NB	19957	1710.7	-15.62	36.45	20.83	121.06	H
	20175	1732.5	-15.71	36.80	21.09	128.53	
	20393	1754.3	-16.32	36.94	20.62	115.35	
	19957	1710.7	-21.78	37.28	15.50	35.48	V
	20175	1732.5	-21.93	37.63	15.70	37.15	
	20393	1754.3	-22.35	37.64	15.29	33.81	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

LTE Band 4							
Channel Bandwidth: 3 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
NB	19965	1711.5	-14.29	36.45	22.16	164.44	H
	20175	1732.5	-14.42	36.80	22.38	172.98	
	20385	1753.5	-15.04	36.94	21.90	154.88	
	19965	1711.5	-20.51	37.28	16.77	47.53	V
	20175	1732.5	-20.66	37.63	16.97	49.77	
	20385	1753.5	-20.99	37.64	16.65	46.24	
Channel Bandwidth: 3 MHz / 16QAM							
NB	19965	1711.5	-15.37	36.45	21.08	128.23	H
	20175	1732.5	-15.50	36.80	21.30	134.90	
	20385	1753.5	-16.10	36.94	20.84	121.34	
	19965	1711.5	-21.51	37.28	15.77	37.76	V
	20175	1732.5	-21.67	37.63	15.96	39.45	
	20385	1753.5	-22.11	37.64	15.53	35.73	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

LTE Band 4							
Channel Bandwidth: 5 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
NB	19975	1712.5	-13.98	36.45	22.47	176.60	H
	20175	1732.5	-14.22	36.80	22.58	181.13	
	20375	1752.5	-14.75	36.94	22.19	165.58	
	19975	1712.5	-20.30	37.28	16.98	49.89	V
	20175	1732.5	-20.44	37.63	17.19	52.36	
	20375	1752.5	-20.77	37.64	16.87	48.64	
Channel Bandwidth: 5 MHz / 16QAM							
NB	19975	1712.5	-15.08	36.45	21.37	137.09	H
	20175	1732.5	-15.17	36.80	21.63	145.55	
	20375	1752.5	-15.80	36.94	21.14	130.02	
	19975	1712.5	-21.26	37.28	16.02	39.99	V
	20175	1732.5	-21.43	37.63	16.20	41.69	
	20375	1752.5	-21.80	37.64	15.84	38.37	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

LTE Band 4							
Channel Bandwidth: 10 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
NB	20000	1715.0	-13.91	36.64	22.73	187.50	H
	20175	1732.5	-13.96	36.80	22.84	192.31	
	20350	1750.0	-14.32	36.80	22.48	177.01	
	20000	1715.0	-20.15	37.44	17.29	53.58	V
	20175	1732.5	-20.16	37.63	17.47	55.85	
	20350	1750.0	-20.47	37.64	17.17	52.12	
Channel Bandwidth: 10 MHz / 16QAM							
NB	20000	1715.0	-14.96	36.64	21.68	147.23	H
	20175	1732.5	-14.87	36.80	21.93	155.96	
	20350	1750.0	-15.34	36.80	21.46	139.96	
	20000	1715.0	-21.09	37.44	16.35	43.15	V
	20175	1732.5	-21.15	37.63	16.48	44.46	
	20350	1750.0	-21.57	37.64	16.07	40.46	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

LTE Band 4							
Channel Bandwidth: 15 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
NB	20025	1717.5	-13.52	36.45	22.93	196.34	H
	20175	1732.5	-13.76	36.80	23.04	201.37	
	20325	1747.5	-14.22	36.94	22.72	187.07	
	20025	1717.5	-19.65	37.28	17.63	57.94	V
	20175	1732.5	-19.85	37.63	17.78	59.98	
	20325	1747.5	-20.14	37.64	17.50	56.23	
Channel Bandwidth: 15 MHz / 16QAM							
NB	20025	1717.5	-14.54	36.45	21.91	155.24	H
	20175	1732.5	-14.65	36.80	22.15	164.06	
	20325	1747.5	-15.16	36.94	21.78	150.66	
	20025	1717.5	-20.68	37.28	16.60	45.71	V
	20175	1732.5	-20.89	37.63	16.74	47.21	
	20325	1747.5	-21.37	37.64	16.27	42.36	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

LTE Band 4							
Channel Bandwidth: 20 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
NB	20050	1720.0	-13.28	36.45	23.17	207.49	H
	20175	1732.5	-13.48	36.80	23.32	214.78	
	20300	1745.0	-13.90	36.94	23.04	201.37	
	20050	1720.0	-19.38	37.28	17.90	61.66	V
	20175	1732.5	-19.58	37.63	18.05	63.83	
	20300	1745.0	-19.83	37.64	17.81	60.39	
Channel Bandwidth: 20 MHz / 16QAM							
NB	20050	1720.0	-14.23	36.45	22.22	166.72	H
	20175	1732.5	-14.41	36.80	22.39	173.38	
	20300	1745.0	-14.96	36.94	21.98	157.76	
	20050	1720.0	-20.40	37.28	16.88	48.75	V
	20175	1732.5	-20.67	37.63	16.96	49.66	
	20300	1745.0	-21.07	37.64	16.57	45.39	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

LTE Band 66							
Channel Bandwidth: 1.4 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
NB	131979	1710.7	-14.69	36.45	21.76	149.97	H
	132322	1745.0	-15.00	36.80	21.80	151.36	
	132665	1779.3	-15.23	36.94	21.71	148.25	
	131979	1710.7	-20.75	37.28	16.53	44.98	V
	132322	1745.0	-21.04	37.63	16.59	45.60	
	132665	1779.3	-21.16	37.64	16.48	44.46	
Channel Bandwidth: 1.4 MHz / 16QAM							
NB	131979	1710.7	-15.91	36.45	20.54	113.24	H
	132322	1745.0	-16.22	36.80	20.58	114.29	
	132665	1779.3	-16.48	36.94	20.46	111.17	
	131979	1710.7	-21.91	37.28	15.37	34.43	V
	132322	1745.0	-22.22	37.63	15.41	34.75	
	132665	1779.3	-22.34	37.64	15.30	33.88	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

LTE Band 66							
Channel Bandwidth: 3 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
NB	131987	1711.5	-14.62	36.45	21.83	152.41	H
	132322	1745.0	-14.91	36.80	21.89	154.53	
	132657	1778.5	-15.15	36.94	21.79	151.01	
	131987	1711.5	-20.43	37.28	16.85	48.42	V
	132322	1745.0	-20.72	37.63	16.91	49.09	
	132657	1778.5	-20.86	37.64	16.78	47.64	
Channel Bandwidth: 3 MHz / 16QAM							
NB	131987	1711.5	-15.80	36.45	20.65	116.14	H
	132322	1745.0	-16.09	36.80	20.71	117.76	
	132657	1778.5	-16.35	36.94	20.59	114.55	
	131987	1711.5	-21.52	37.28	15.76	37.67	V
	132322	1745.0	-21.81	37.63	15.82	38.19	
	132657	1778.5	-21.93	37.64	15.71	37.24	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

LTE Band 66							
Channel Bandwidth: 5 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
NB	131997	1712.5	-14.57	36.45	21.88	154.17	H
	132322	1745.0	-14.87	36.80	21.93	155.96	
	132647	1777.5	-15.12	36.94	21.82	152.05	
	131997	1712.5	-20.16	37.28	17.12	51.52	V
	132322	1745.0	-20.45	37.63	17.18	52.24	
	132647	1777.5	-20.56	37.64	17.08	51.05	
Channel Bandwidth: 5 MHz / 16QAM							
NB	131997	1712.5	-15.70	36.45	20.75	118.85	H
	132322	1745.0	-16.00	36.80	20.80	120.23	
	132647	1777.5	-16.25	36.94	20.69	117.22	
	131997	1712.5	-21.20	37.28	16.08	40.55	V
	132322	1745.0	-21.48	37.63	16.15	41.21	
	132647	1777.5	-21.66	37.64	15.98	39.63	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

LTE Band 66							
Channel Bandwidth: 10 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
NB	132022	1715.0	-14.71	36.64	21.93	155.96	H
	132322	1745.0	-14.81	36.80	21.99	158.12	
	132622	1775.0	-14.91	36.80	21.89	154.53	
	132022	1715.0	-20.05	37.44	17.39	54.83	V
	132322	1745.0	-20.19	37.63	17.44	55.46	
	132622	1775.0	-20.30	37.64	17.34	54.20	
Channel Bandwidth: 10 MHz / 16QAM							
NB	132022	1715.0	-15.83	36.64	20.81	120.50	H
	132322	1745.0	-15.90	36.80	20.90	123.03	
	132622	1775.0	-16.07	36.80	20.73	118.30	
	132022	1715.0	-21.07	37.44	16.37	43.35	V
	132322	1745.0	-21.20	37.63	16.43	43.95	
	132622	1775.0	-21.34	37.64	16.30	42.66	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

LTE Band 66							
Channel Bandwidth: 15 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
NB	132047	1717.5	-14.43	36.45	22.02	159.22	H
	132322	1745.0	-14.73	36.80	22.07	161.06	
	132597	1772.5	-14.97	36.94	21.97	157.40	
	132047	1717.5	-19.67	37.28	17.61	57.68	V
	132322	1745.0	-19.95	37.63	17.68	58.61	
	132597	1772.5	-20.07	37.64	17.57	57.15	
Channel Bandwidth: 15 MHz / 16QAM							
NB	132047	1717.5	-15.51	36.45	20.94	124.17	H
	132322	1745.0	-15.77	36.80	21.03	126.77	
	132597	1772.5	-16.06	36.94	20.88	122.46	
	132047	1717.5	-20.63	37.28	16.65	46.24	V
	132322	1745.0	-20.93	37.63	16.70	46.77	
	132597	1772.5	-21.06	37.64	16.58	45.50	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)



LTE Band 66							
Channel Bandwidth: 20 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
NB	132072	1720.0	-14.37	36.45	22.08	161.44	H
	132322	1745.0	-14.68	36.80	22.12	162.93	
	132572	1770.0	-14.91	36.94	22.03	159.59	
	132072	1720.0	-19.40	37.28	17.88	61.38	V
	132322	1745.0	-19.68	37.63	17.95	62.37	
	132572	1770.0	-19.83	37.64	17.81	60.39	
Channel Bandwidth: 20 MHz / 16QAM							
NB	132072	1720.0	-15.36	36.45	21.09	128.53	H
	132322	1745.0	-15.64	36.80	21.16	130.62	
	132572	1770.0	-15.94	36.94	21.00	125.89	
	132072	1720.0	-20.36	37.28	16.92	49.20	V
	132322	1745.0	-20.64	37.63	16.99	50.00	
	132572	1770.0	-20.81	37.64	16.83	48.19	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

## 4.2 Modulation Characteristics Measurement

### 4.2.1 Limits of Modulation Characteristics

N/A

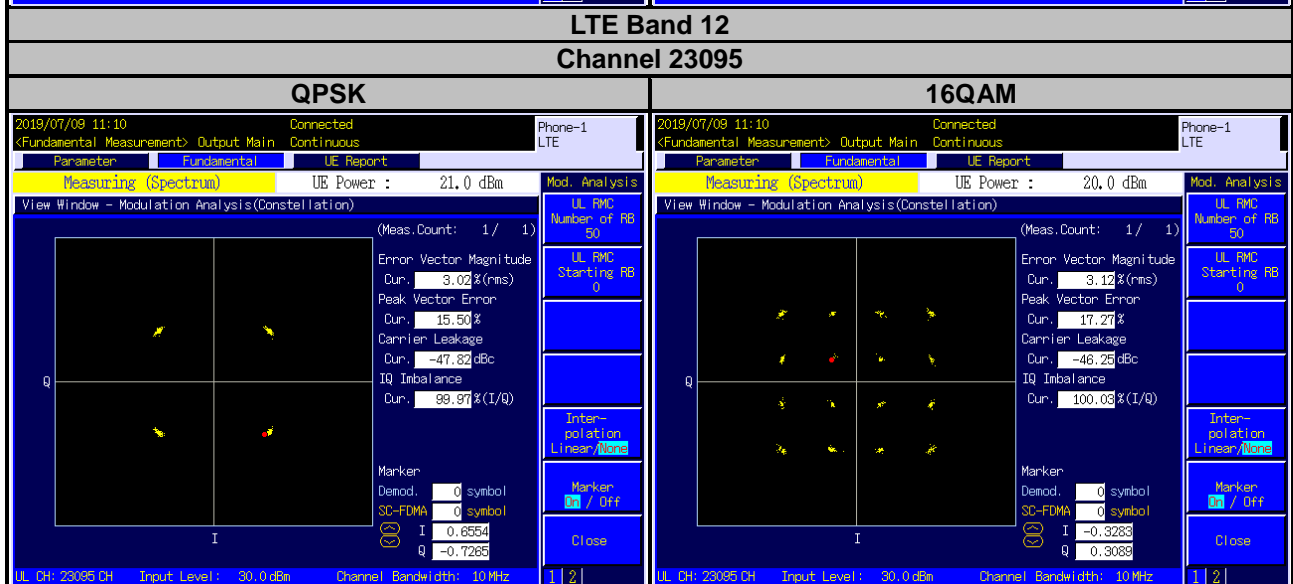
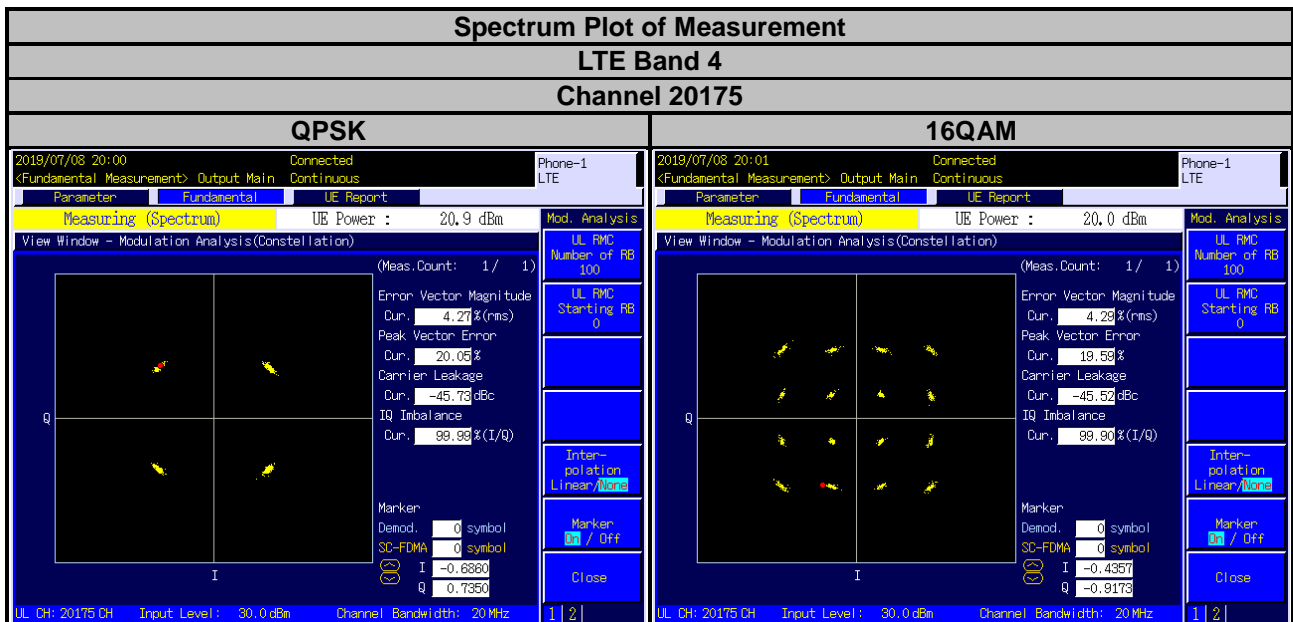
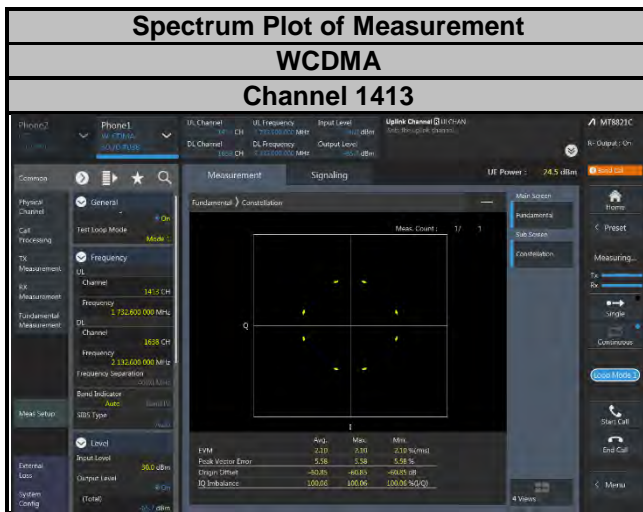
### 4.2.2 Test Setup



### 4.2.3 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.

#### 4.2.4 Test Results

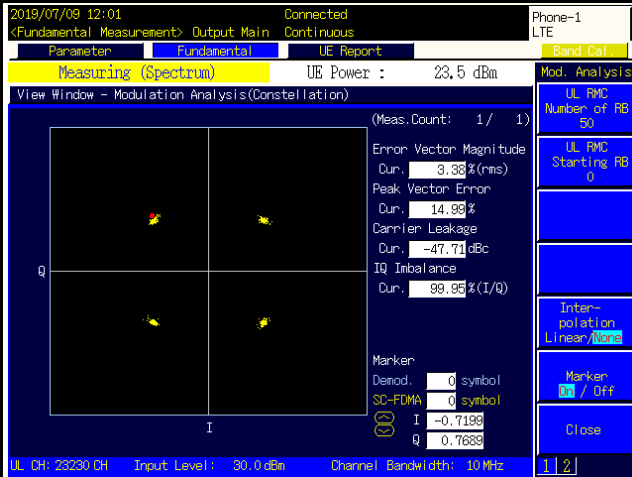


## Spectrum Plot of Measurement

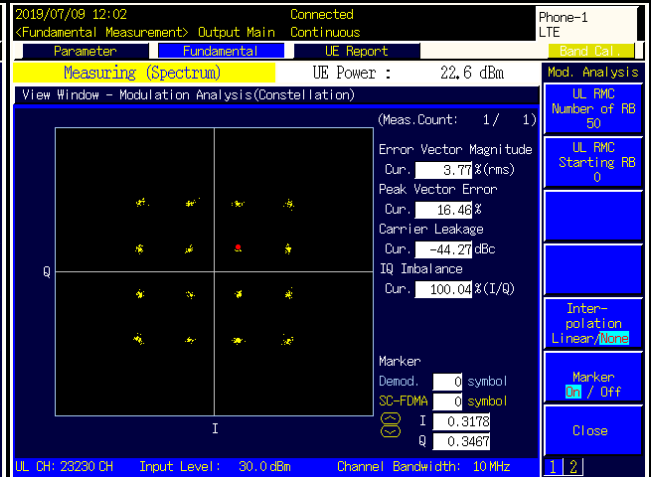
### LTE Band 13

### Channel 23230

#### QPSK



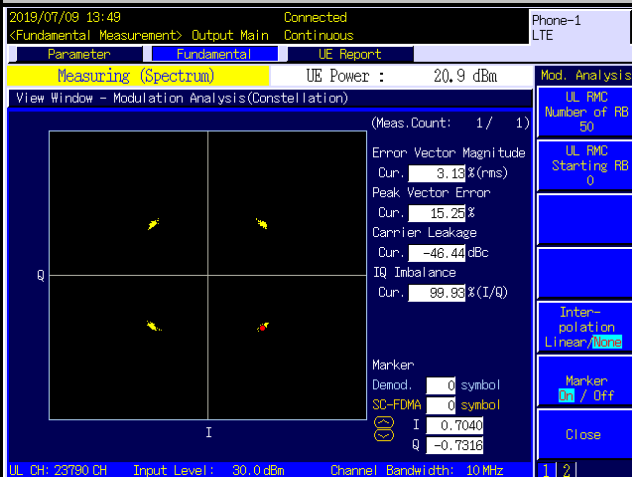
#### 16QAM



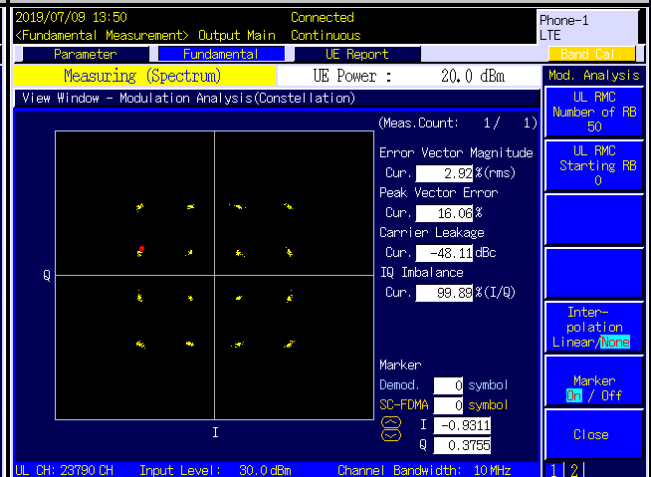
### LTE Band 17

### Channel 23790

#### QPSK



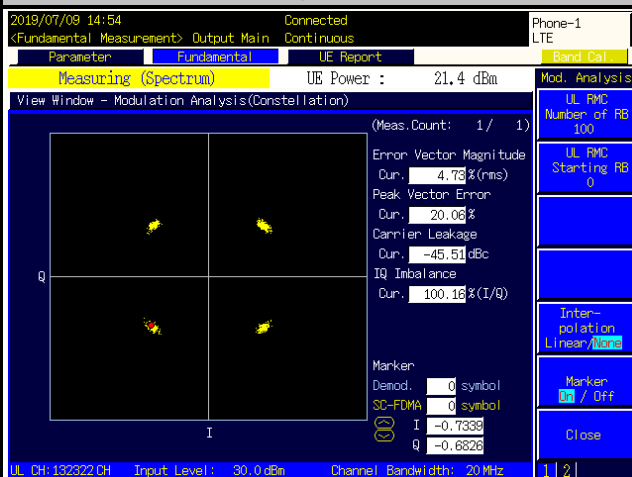
#### 16QAM



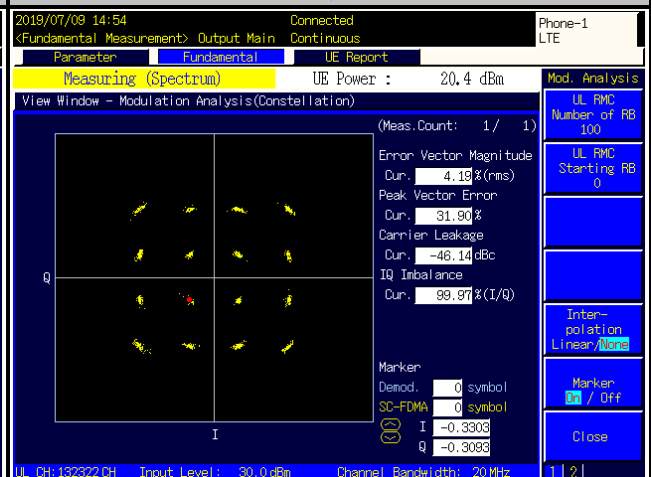
### LTE Band 66

### Channel 132322

#### QPSK



#### 16QAM



### 4.3 Frequency Stability Measurement

#### 4.3.1 Limits of Frequency Stability Measurement

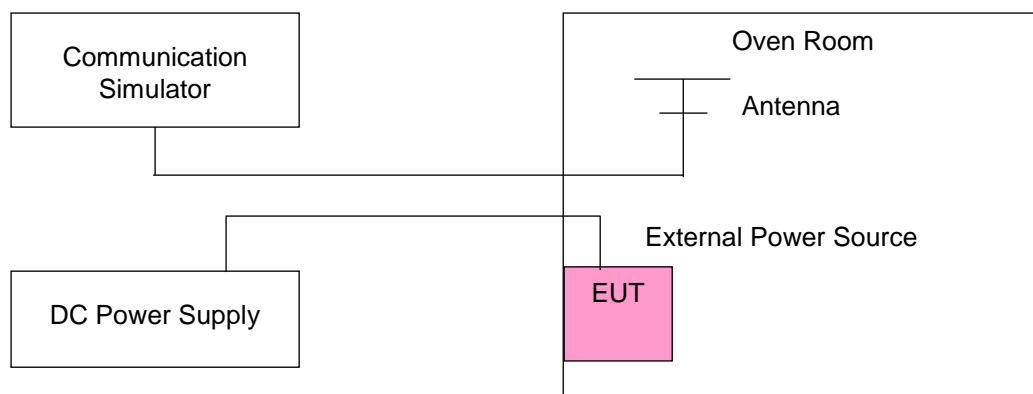
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

#### 4.3.2 Test Procedure

- 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.
- EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
- 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.

#### 4.3.3 Test Setup



#### 4.3.4 Test Results

##### Frequency Error vs. Voltage

Voltage (Volts)	WCDMA			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	1712.400003	0.001	1752.600002	0.001
102	1712.400002	0.001	1752.600002	0.001
138	1712.400003	0.002	1752.600003	0.002

**Note:** The applicant defined the normal working voltage of the battery is from 102 Vac to 138 Vac.

##### Frequency Error vs. Temperature

Temp. (°C)	WCDMA			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1712.400001	0.001	1752.600002	0.001
-20	1712.400001	0.001	1752.600003	0.002
-10	1712.400002	0.001	1752.600002	0.001
0	1712.400003	0.002	1752.600004	0.002
10	1712.400001	0.001	1752.600003	0.002
20	1712.399998	-0.001	1752.599998	-0.001
30	1712.399997	-0.002	1752.599996	-0.002
40	1712.399996	-0.002	1752.599999	-0.001
50	1712.399999	-0.001	1752.599997	-0.002

#### Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 4			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	1710.700003	0.002	1754.300002	0.001
102	1710.700003	0.002	1754.300002	0.001
138	1710.700002	0.001	1754.300001	0.001

**Note:** The applicant defined the normal working voltage of the battery is from 102 Vac to 138 Vac.

#### Frequency Error vs. Temperature

Temp. (°C)	LTE Band 4			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1710.700004	0.002	1754.300001	0.001
-20	1710.700002	0.001	1754.300004	0.002
-10	1710.700004	0.002	1754.300002	0.001
0	1710.700002	0.001	1754.300003	0.002
10	1710.700003	0.002	1754.300004	0.002
20	1710.699998	-0.001	1754.299997	-0.002
30	1710.699998	-0.001	1754.299998	-0.001
40	1710.699999	-0.001	1754.299998	-0.001
50	1710.699997	-0.002	1754.299999	-0.001

#### Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 4			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	1710.700002	0.001	1754.300002	0.001
102	1710.700003	0.002	1754.300003	0.002
138	1710.700003	0.002	1754.300001	0.001

**Note:** The applicant defined the normal working voltage of the battery is from 102 Vac to 138 Vac.

#### Frequency Error vs. Temperature

Temp. (°C)	LTE Band 4			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1710.700002	0.001	1754.300004	0.002
-20	1710.700003	0.001	1754.300002	0.001
-10	1710.700003	0.002	1754.300003	0.002
0	1710.700004	0.002	1754.300002	0.001
10	1710.700003	0.002	1754.300003	0.002
20	1710.699996	-0.002	1754.299998	-0.001
30	1710.699999	-0.001	1754.299997	-0.002
40	1710.699997	-0.002	1754.299997	-0.002
50	1710.699997	-0.002	1754.299997	-0.002



#### Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 4			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	1710.700004	0.002	1754.300002	0.001
102	1710.700002	0.001	1754.300002	0.001
138	1710.700003	0.002	1754.300003	0.002

**Note:** The applicant defined the normal working voltage of the battery is from 102 Vac to 138 Vac.

#### Frequency Error vs. Temperature

Temp. (°C)	LTE Band 4			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1710.700001	0.001	1754.300002	0.001
-20	1710.700002	0.001	1754.300001	0.001
-10	1710.700004	0.002	1754.300003	0.001
0	1710.700004	0.002	1754.300003	0.002
10	1710.700002	0.001	1754.300001	0.001
20	1710.699997	-0.002	1754.299996	-0.002
30	1710.699996	-0.002	1754.299999	-0.001
40	1710.699998	-0.001	1754.299998	-0.001
50	1710.699999	-0.001	1754.299999	-0.001

### Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 4			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	1710.700003	0.002	1754.300002	0.001
102	1710.700003	0.002	1754.300004	0.002
138	1710.700002	0.001	1754.300003	0.001

**Note:** The applicant defined the normal working voltage of the battery is from 102 Vac to 138 Vac.

### Frequency Error vs. Temperature

Temp. (°C)	LTE Band 4			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1710.700001	0.001	1754.300002	0.001
-20	1710.700003	0.002	1754.300004	0.002
-10	1710.700003	0.002	1754.300003	0.002
0	1710.700003	0.002	1754.300002	0.001
10	1710.700002	0.001	1754.300004	0.002
20	1710.699997	-0.002	1754.299998	-0.001
30	1710.699999	-0.001	1754.299999	-0.001
40	1710.699999	-0.001	1754.299997	-0.002
50	1710.699996	-0.002	1754.299997	-0.002

#### Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 4			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	1710.700003	0.002	1754.300004	0.002
102	1710.700004	0.002	1754.300004	0.002
138	1710.700004	0.002	1754.300004	0.002

**Note:** The applicant defined the normal working voltage of the battery is from 102 Vac to 138 Vac.

#### Frequency Error vs. Temperature

Temp. (°C)	LTE Band 4			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1710.700002	0.001	1754.300003	0.001
-20	1710.700003	0.002	1754.300004	0.002
-10	1710.700003	0.002	1754.300003	0.001
0	1710.700002	0.001	1754.300002	0.001
10	1710.700003	0.001	1754.300004	0.002
20	1710.699998	-0.001	1754.299998	-0.001
30	1710.699999	-0.001	1754.299998	-0.001
40	1710.699997	-0.002	1754.299997	-0.002
50	1710.699997	-0.002	1754.299998	-0.001

### Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 4			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	1710.700001	0.001	1754.300001	0.001
102	1710.700002	0.001	1754.300003	0.001
138	1710.700001	0.001	1754.300001	0.001

**Note:** The applicant defined the normal working voltage of the battery is from 102 Vac to 138 Vac.

### Frequency Error vs. Temperature

Temp. (°C)	LTE Band 4			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1710.700004	0.002	1754.300003	0.002
-20	1710.700003	0.002	1754.300002	0.001
-10	1710.700002	0.001	1754.300003	0.002
0	1710.700002	0.001	1754.300002	0.001
10	1710.700001	0.001	1754.300002	0.001
20	1710.699996	-0.002	1754.299998	-0.001
30	1710.699997	-0.002	1754.299996	-0.002
40	1710.699997	-0.002	1754.299998	-0.001
50	1710.699999	-0.001	1754.299997	-0.002

### Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 12			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	699.700003	0.004	715.300003	0.005
102	699.700003	0.004	715.300004	0.006
138	699.700003	0.004	715.300004	0.005

**Note:** The applicant defined the normal working voltage of the battery is from 102 Vac to 138 Vac.

### Frequency Error vs. Temperature

Temp. (°C)	LTE Band 12			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	699.700003	0.004	715.300003	0.004
-20	699.700003	0.004	715.300002	0.003
-10	699.700004	0.005	715.300003	0.004
0	699.700002	0.003	715.300001	0.001
10	699.700004	0.005	715.300001	0.002
20	699.699997	-0.004	715.299999	-0.001
30	699.699999	-0.002	715.299997	-0.004
40	699.699996	-0.005	715.299999	-0.002
50	699.699998	-0.003	715.299997	-0.004

#### Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 12			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	699.700004	0.005	715.300003	0.004
102	699.700003	0.004	715.300002	0.003
138	699.700001	0.001	715.300001	0.001

**Note:** The applicant defined the normal working voltage of the battery is from 102 Vac to 138 Vac.

#### Frequency Error vs. Temperature

Temp. (°C)	LTE Band 12			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	699.700002	0.003	715.300002	0.003
-20	699.700004	0.005	715.300001	0.002
-10	699.700003	0.004	715.300003	0.004
0	699.700004	0.006	715.300002	0.003
10	699.700002	0.003	715.300003	0.005
20	699.699999	-0.002	715.299997	-0.004
30	699.699998	-0.003	715.299996	-0.005
40	699.699998	-0.002	715.299997	-0.005
50	699.699997	-0.005	715.299997	-0.004

### Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 12			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	699.700002	0.003	715.300003	0.004
102	699.700002	0.003	715.300001	0.001
138	699.700001	0.002	715.300004	0.005

**Note:** The applicant defined the normal working voltage of the battery is from 102 Vac to 138 Vac.

### Frequency Error vs. Temperature

Temp. (°C)	LTE Band 12			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	699.700003	0.004	715.300003	0.005
-20	699.700002	0.003	715.300002	0.003
-10	699.700002	0.003	715.300003	0.004
0	699.700001	0.001	715.300001	0.001
10	699.700002	0.003	715.300002	0.002
20	699.699997	-0.004	715.299997	-0.005
30	699.699996	-0.005	715.299997	-0.004
40	699.699996	-0.005	715.299998	-0.003
50	699.699999	-0.002	715.299996	-0.005

### Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 12			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	699.700003	0.004	715.300003	0.005
102	699.700001	0.002	715.300002	0.003
138	699.700002	0.003	715.300002	0.002

**Note:** The applicant defined the normal working voltage of the battery is from 102 Vac to 138 Vac.

### Frequency Error vs. Temperature

Temp. (°C)	LTE Band 12			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	699.700002	0.002	715.300001	0.002
-20	699.700002	0.003	715.300004	0.005
-10	699.700002	0.003	715.300003	0.004
0	699.700004	0.005	715.300004	0.006
10	699.700002	0.003	715.300003	0.005
20	699.699999	-0.002	715.299997	-0.005
30	699.699999	-0.002	715.299997	-0.004
40	699.699997	-0.005	715.299998	-0.002
50	699.699999	-0.002	715.299998	-0.002



### Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 13			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	779.500003	0.004	784.500004	0.005
102	779.500004	0.005	784.500003	0.003
138	779.500002	0.002	784.500004	0.005

**Note:** The applicant defined the normal working voltage of the battery is from 102 Vac to 138 Vac.

### Frequency Error vs. Temperature

Temp. (°C)	LTE Band 13			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	779.500004	0.005	784.500003	0.004
-20	779.500003	0.004	784.500004	0.005
-10	779.500002	0.003	784.500004	0.005
0	779.500003	0.003	784.500003	0.004
10	779.500001	0.002	784.500004	0.005
20	779.499999	-0.002	784.499999	-0.001
30	779.499998	-0.002	784.499999	-0.001
40	779.499998	-0.002	784.499998	-0.002
50	779.499998	-0.002	784.499998	-0.002

### Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 13	
	Channel Bandwidth: 10 MHz	
	Frequency (MHz)	Frequency Error (ppm)
120	779.500003	0.004
102	779.500003	0.004
138	779.500002	0.003

**Note:** The applicant defined the normal working voltage of the battery is from 102 Vac to 138 Vac.

### Frequency Error vs. Temperature

Temp. (°C)	LTE Band 13	
	Channel Bandwidth: 10 MHz	
	Frequency (MHz)	Frequency Error (ppm)
-30	779.500002	0.003
-20	779.500002	0.003
-10	779.500004	0.005
0	779.500003	0.003
10	779.500003	0.004
20	779.499998	-0.003
30	779.499998	-0.002
40	779.499998	-0.003
50	779.499996	-0.005

### Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 17			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	706.500001	0.002	713.500002	0.002
102	706.500002	0.002	713.500002	0.002
138	706.500003	0.004	713.500003	0.005

**Note:** The applicant defined the normal working voltage of the battery is from 102 Vac to 138 Vac.

### Frequency Error vs. Temperature

Temp. (°C)	LTE Band 17			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	706.500003	0.004	713.500003	0.004
-20	706.500003	0.004	713.500003	0.004
-10	706.500002	0.003	713.500002	0.003
0	706.500004	0.006	713.500004	0.005
10	706.500002	0.003	713.500004	0.005
20	706.499997	-0.005	713.499996	-0.005
30	706.499998	-0.003	713.499997	-0.004
40	706.499996	-0.006	713.499997	-0.004
50	706.499997	-0.004	713.499998	-0.003

#### Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 17			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	706.500002	0.002	713.500002	0.002
102	706.500004	0.005	713.500003	0.005
138	706.500004	0.006	713.500004	0.005

**Note:** The applicant defined the normal working voltage of the battery is from 102 Vac to 138 Vac.

#### Frequency Error vs. Temperature

Temp. (°C)	LTE Band 17			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	706.500002	0.003	713.500001	0.002
-20	706.500002	0.003	713.500003	0.004
-10	706.500004	0.005	713.500002	0.003
0	706.500003	0.004	713.500004	0.005
10	706.500004	0.006	713.500001	0.002
20	706.499996	-0.005	713.499999	-0.002
30	706.499997	-0.004	713.499999	-0.002
40	706.499997	-0.005	713.499997	-0.004
50	706.499998	-0.004	713.499999	-0.001

### Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 66			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	1710.700003	0.002	1779.300001	0.001
102	1710.700004	0.002	1779.300003	0.002
138	1710.700002	0.001	1779.300001	0.001

**Note:** The applicant defined the normal working voltage of the battery is from 102 Vac to 138 Vac.

### Frequency Error vs. Temperature

Temp. (°C)	LTE Band 66			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1710.700003	0.002	1779.300003	0.002
-20	1710.700002	0.001	1779.300001	0.001
-10	1710.700002	0.001	1779.300003	0.001
0	1710.700004	0.002	1779.300002	0.001
10	1710.700004	0.002	1779.300002	0.001
20	1710.699998	-0.001	1779.299997	-0.001
30	1710.699997	-0.002	1779.299997	-0.002
40	1710.699998	-0.001	1779.299997	-0.002
50	1710.699998	-0.001	1779.299998	-0.001

### Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 66			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	1710.700003	0.002	1779.300002	0.001
102	1710.700002	0.001	1779.300004	0.002
138	1710.700003	0.001	1779.300002	0.001

**Note:** The applicant defined the normal working voltage of the battery is from 102 Vac to 138 Vac.

### Frequency Error vs. Temperature

Temp. (°C)	LTE Band 66			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1710.700004	0.002	1779.300003	0.002
-20	1710.700004	0.002	1779.300003	0.002
-10	1710.700004	0.002	1779.300002	0.001
0	1710.700003	0.001	1779.300001	0.001
10	1710.700001	0.001	1779.300003	0.002
20	1710.699999	-0.001	1779.299996	-0.002
30	1710.699997	-0.002	1779.299996	-0.002
40	1710.699998	-0.001	1779.299996	-0.002
50	1710.699996	-0.002	1779.299997	-0.002

### Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 66			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	1710.700001	0.001	1779.300003	0.002
102	1710.700003	0.002	1779.300002	0.001
138	1710.700003	0.002	1779.300003	0.002

**Note:** The applicant defined the normal working voltage of the battery is from 102 Vac to 138 Vac.

### Frequency Error vs. Temperature

Temp. (°C)	LTE Band 66			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1710.700002	0.001	1779.300003	0.001
-20	1710.700004	0.002	1779.300003	0.002
-10	1710.700003	0.002	1779.300003	0.002
0	1710.700002	0.001	1779.300003	0.001
10	1710.700003	0.002	1779.300001	0.001
20	1710.699996	-0.002	1779.299998	-0.001
30	1710.699997	-0.002	1779.299998	-0.001
40	1710.699999	-0.001	1779.299996	-0.002
50	1710.699999	-0.001	1779.299997	-0.002

#### Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 66			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	1710.700002	0.001	1779.300002	0.001
102	1710.700002	0.001	1779.300001	0.001
138	1710.700002	0.001	1779.300002	0.001

**Note:** The applicant defined the normal working voltage of the battery is from 102 Vac to 138 Vac.

#### Frequency Error vs. Temperature

Temp. (°C)	LTE Band 66			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1710.700001	0.001	1779.300003	0.002
-20	1710.700001	0.001	1779.300002	0.001
-10	1710.700004	0.002	1779.300002	0.001
0	1710.700003	0.002	1779.300002	0.001
10	1710.700003	0.002	1779.300003	0.002
20	1710.699998	-0.001	1779.299998	-0.001
30	1710.699999	-0.001	1779.299999	-0.001
40	1710.699997	-0.002	1779.299998	-0.001
50	1710.699997	-0.002	1779.299999	-0.001



### Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 66			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	1710.700002	0.001	1779.300004	0.002
102	1710.700003	0.002	1779.300001	0.001
138	1710.700003	0.002	1779.300002	0.001

**Note:** The applicant defined the normal working voltage of the battery is from 102 Vac to 138 Vac.

### Frequency Error vs. Temperature

Temp. (°C)	LTE Band 66			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1710.700003	0.001	1779.300002	0.001
-20	1710.700001	0.001	1779.300002	0.001
-10	1710.700003	0.002	1779.300001	0.001
0	1710.700004	0.002	1779.300002	0.001
10	1710.700003	0.002	1779.300001	0.001
20	1710.699999	-0.001	1779.299997	-0.002
30	1710.699996	-0.002	1779.299998	-0.001
40	1710.699996	-0.002	1779.299998	-0.001
50	1710.699999	-0.001	1779.299998	-0.001

### Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 66			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	1710.700002	0.001	1779.300004	0.002
102	1710.700003	0.002	1779.300001	0.001
138	1710.700003	0.002	1779.300003	0.002

**Note:** The applicant defined the normal working voltage of the battery is from 102 Vac to 138 Vac.

### Frequency Error vs. Temperature

Temp. (°C)	LTE Band 66			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1710.700002	0.001	1779.300003	0.002
-20	1710.700002	0.001	1779.300004	0.002
-10	1710.700004	0.002	1779.300001	0.001
0	1710.700003	0.002	1779.300003	0.002
10	1710.700001	0.001	1779.300001	0.001
20	1710.699996	-0.002	1779.299996	-0.002
30	1710.699998	-0.001	1779.299999	-0.001
40	1710.699997	-0.002	1779.299998	-0.001
50	1710.699998	-0.001	1779.299996	-0.002

#### 4.4 Occupied Bandwidth Measurement

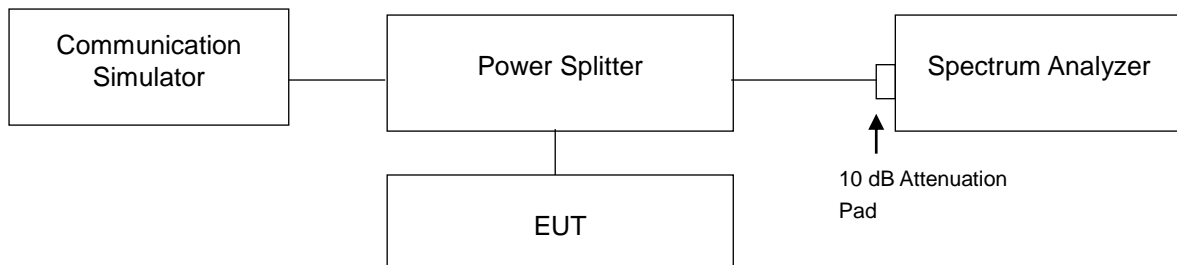
##### 4.4.1 Limits of Occupied Bandwidth Measurement

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

##### 4.4.2 Test Procedure

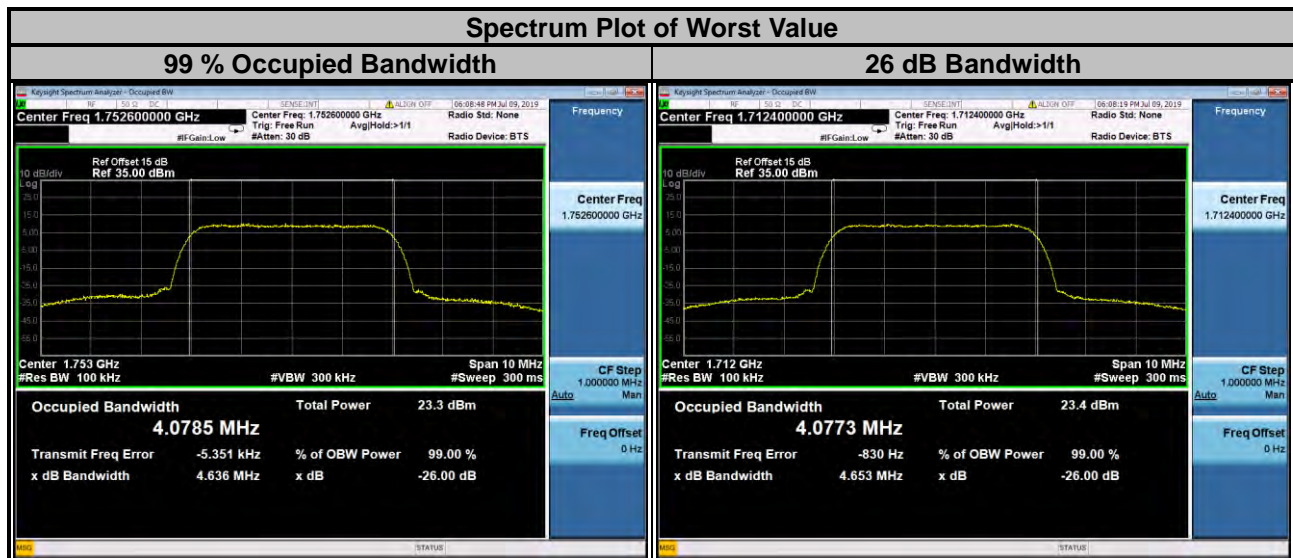
- The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

##### 4.4.3 Test Setup



#### 4.4.4 Test Result

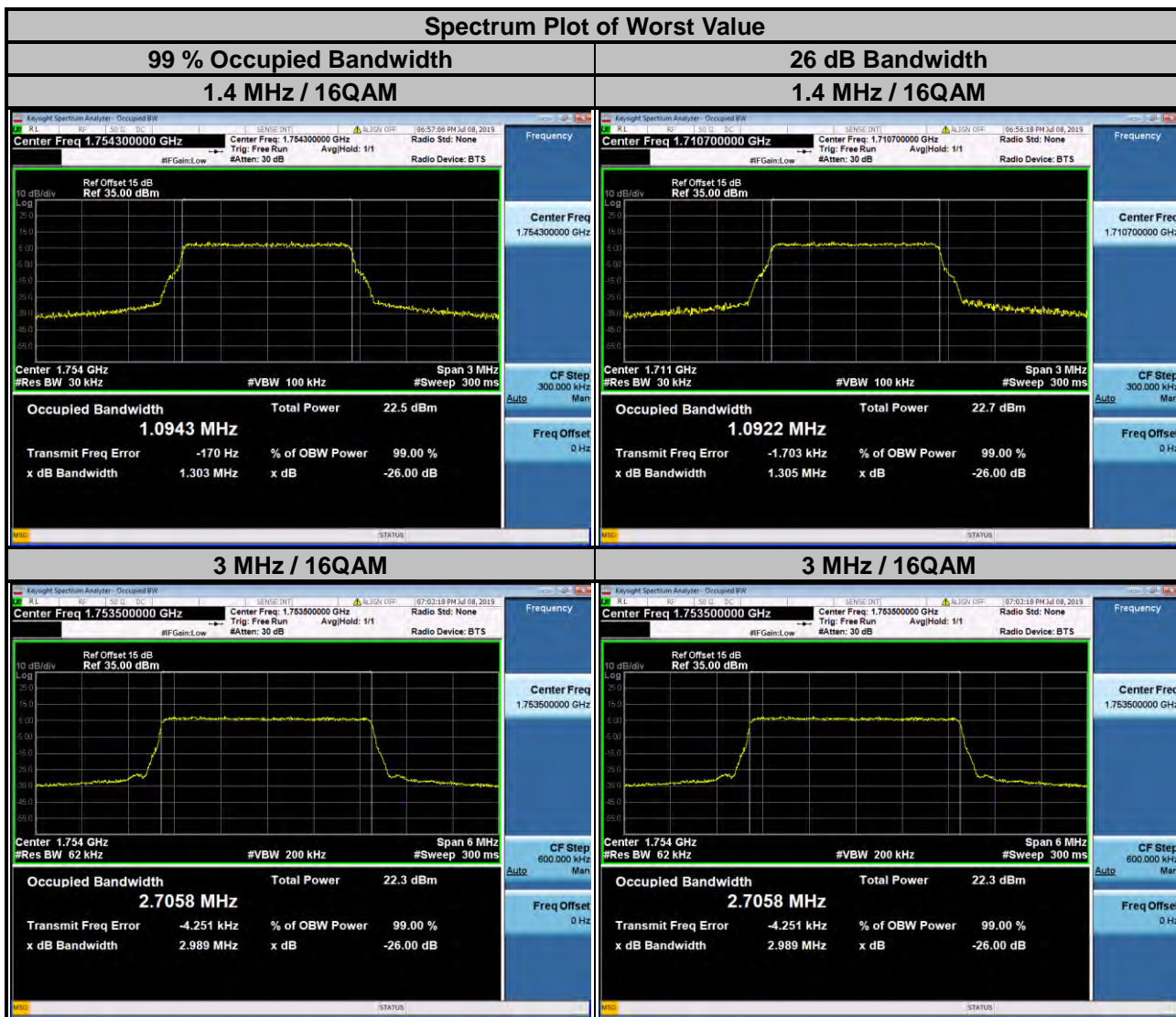
WCDMA			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
1312	1712.4	4.0773	4.653
1413	1732.6	4.0767	4.623
1513	1752.6	4.0785	4.636



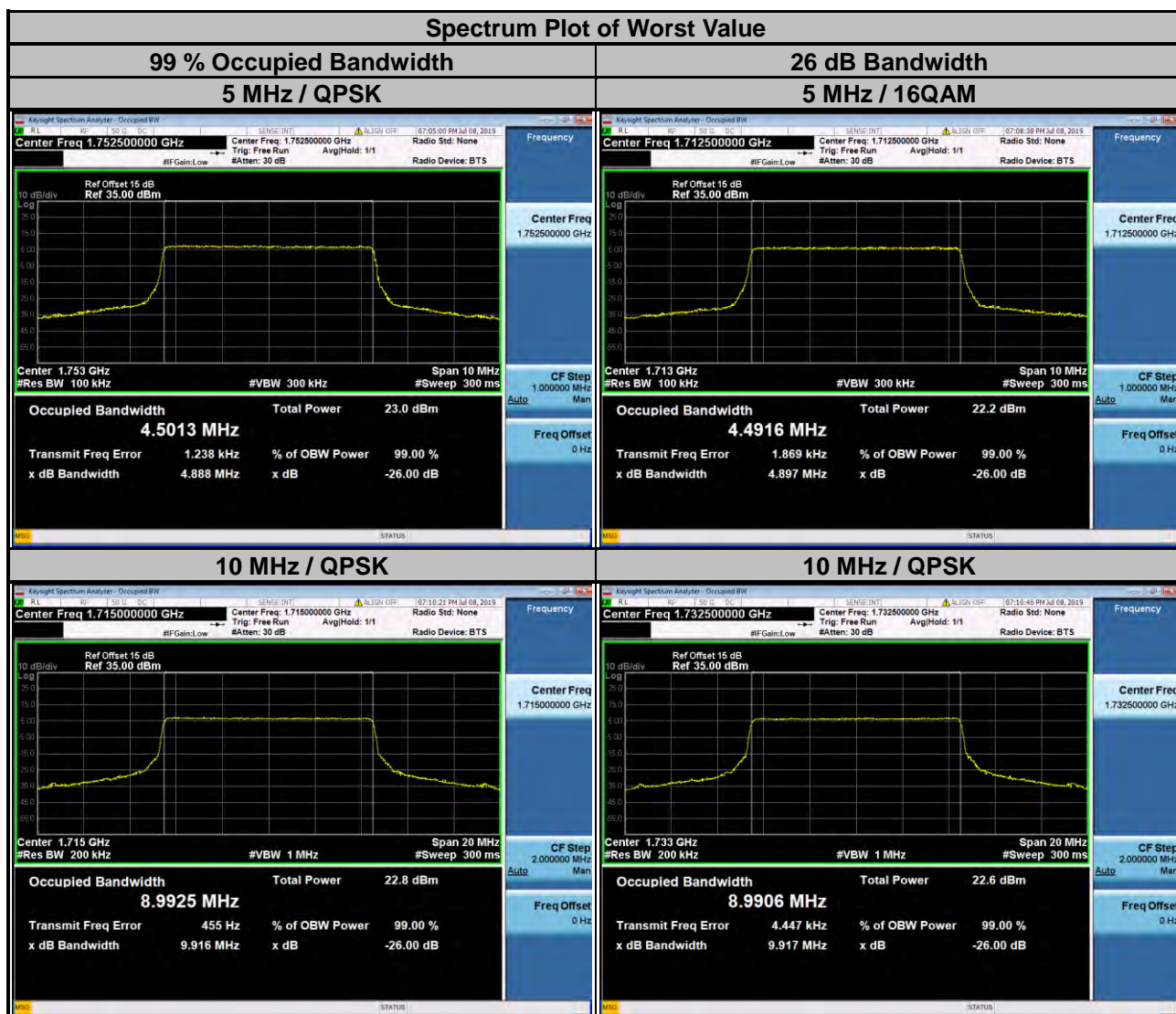
LTE Band 4					
Channel Bandwidth: 1.4 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
19957	1710.7	1.0903	1.0922	1.305	1.305
20175	1732.5	1.0903	1.0926	1.304	1.304
20393	1754.3	1.0911	1.0943	1.302	1.303

Channel Bandwidth: 3 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
19965	1711.5	2.7011	2.7041	2.976	2.984
20175	1732.5	2.7004	2.6992	2.975	2.971
20385	1753.5	2.7033	2.7058	2.986	2.989

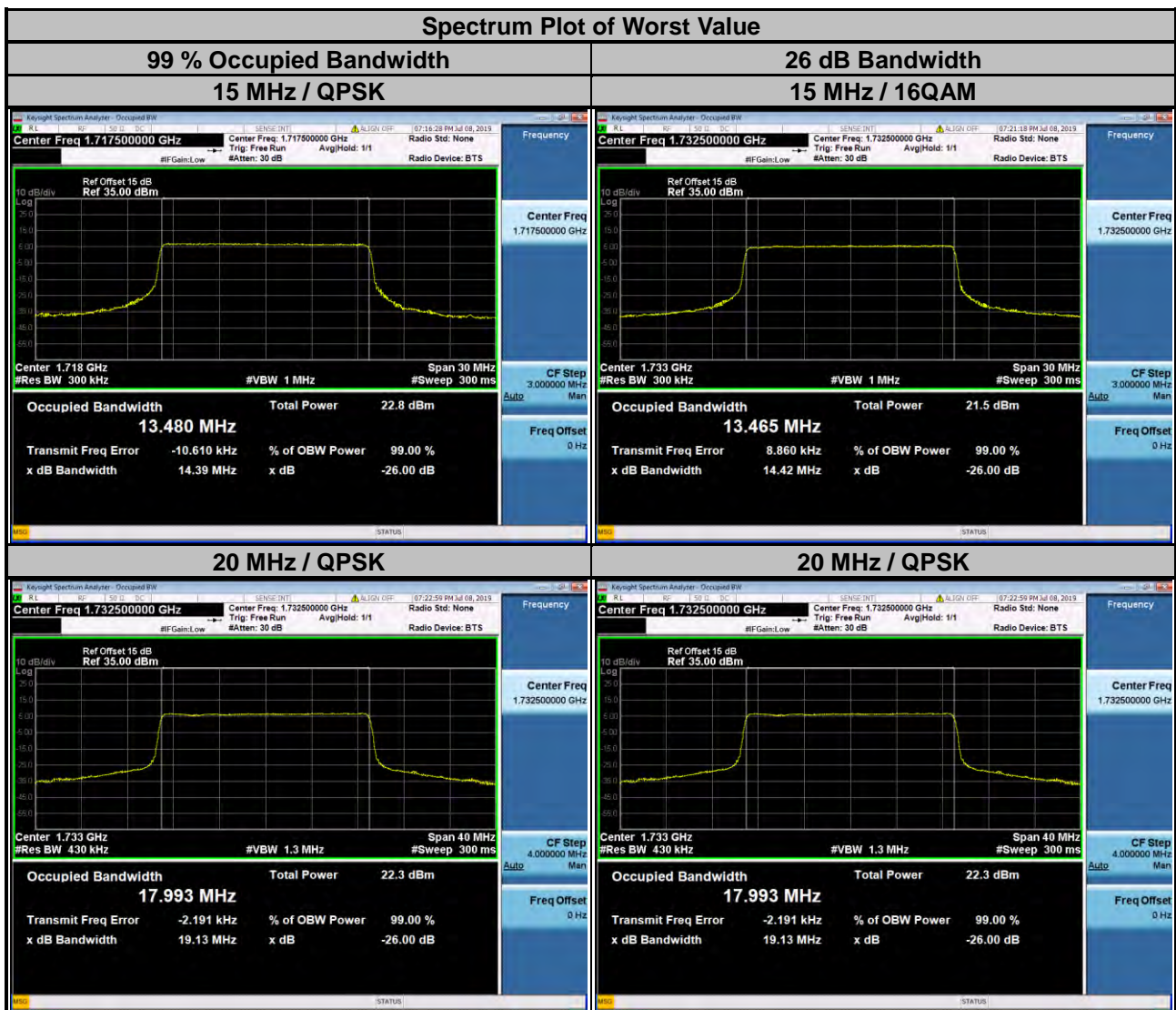


LTE Band 4					
Channel Bandwidth: 5 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
19975	1712.5	4.4994	4.4916	4.876	4.897
20175	1732.5	4.5009	4.4925	4.879	4.889
20375	1752.5	4.5013	4.4932	4.888	4.875
Channel Bandwidth: 10 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
20000	1715.0	8.9925	8.9876	9.916	9.900
20175	1732.5	8.9906	8.9889	9.917	9.904
20350	1750.0	8.9890	8.9865	9.876	9.885





LTE Band 4					
Channel Bandwidth: 15 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
20025	1717.5	13.480	13.462	14.39	14.35
20175	1732.5	13.464	13.465	14.36	14.42
20325	1747.5	13.473	13.456	14.39	14.34
Channel Bandwidth: 20 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
20050	1720.0	17.976	17.968	19.10	19.08
20175	1732.5	17.993	17.983	19.13	19.12
20300	1745.0	17.961	17.958	19.10	19.10

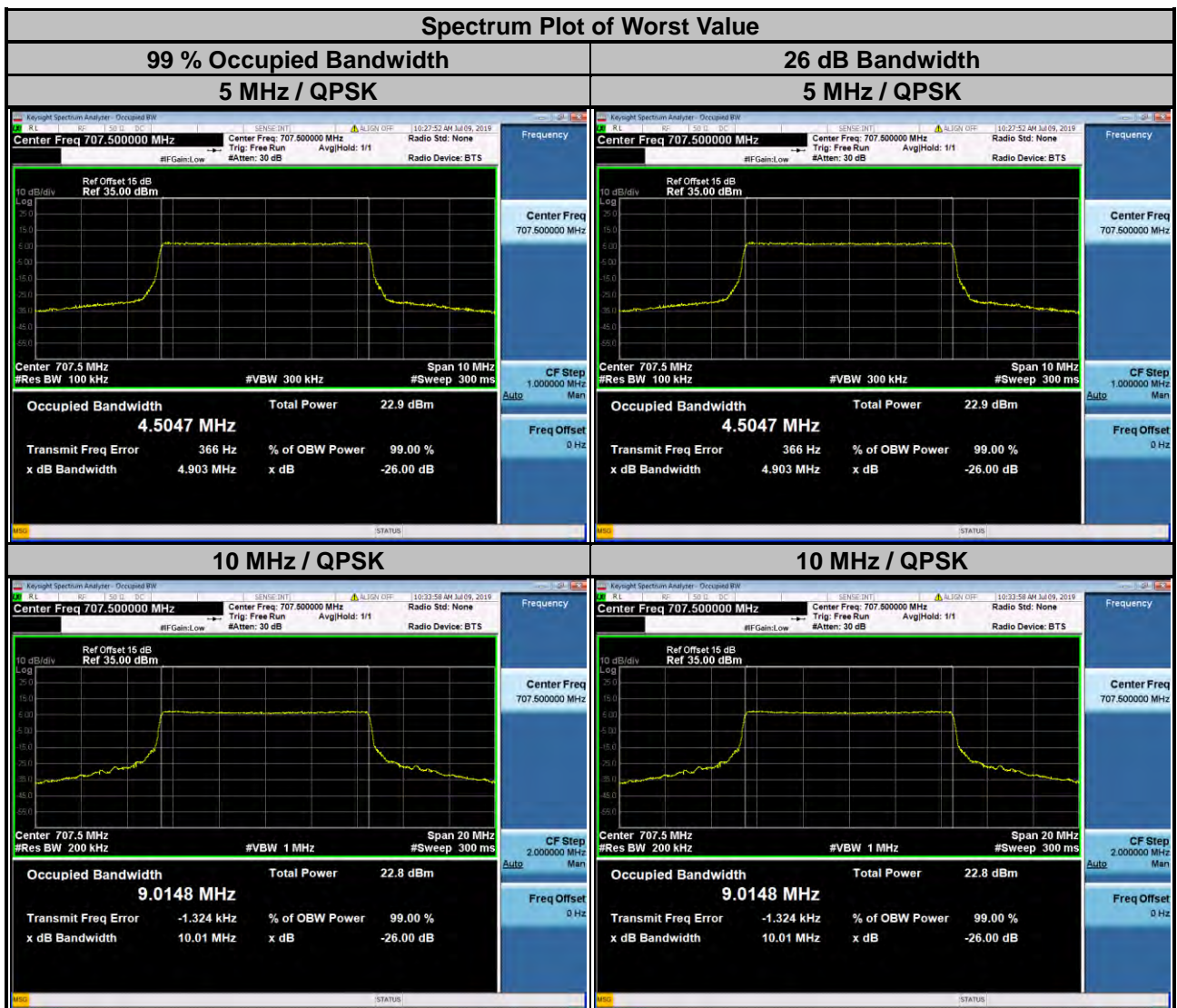


LTE Band 12					
Channel Bandwidth: 1.4 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
23017	699.7	1.0930	1.0899	1.301	1.298
23095	707.5	1.0912	1.0929	1.305	1.294
23173	715.3	1.0934	1.0926	1.301	1.302
Channel Bandwidth: 3 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
23025	700.5	2.7025	2.7034	2.989	3.001
23095	707.5	2.7094	2.7032	3.007	2.988
23165	714.5	2.7029	2.7011	2.989	2.972

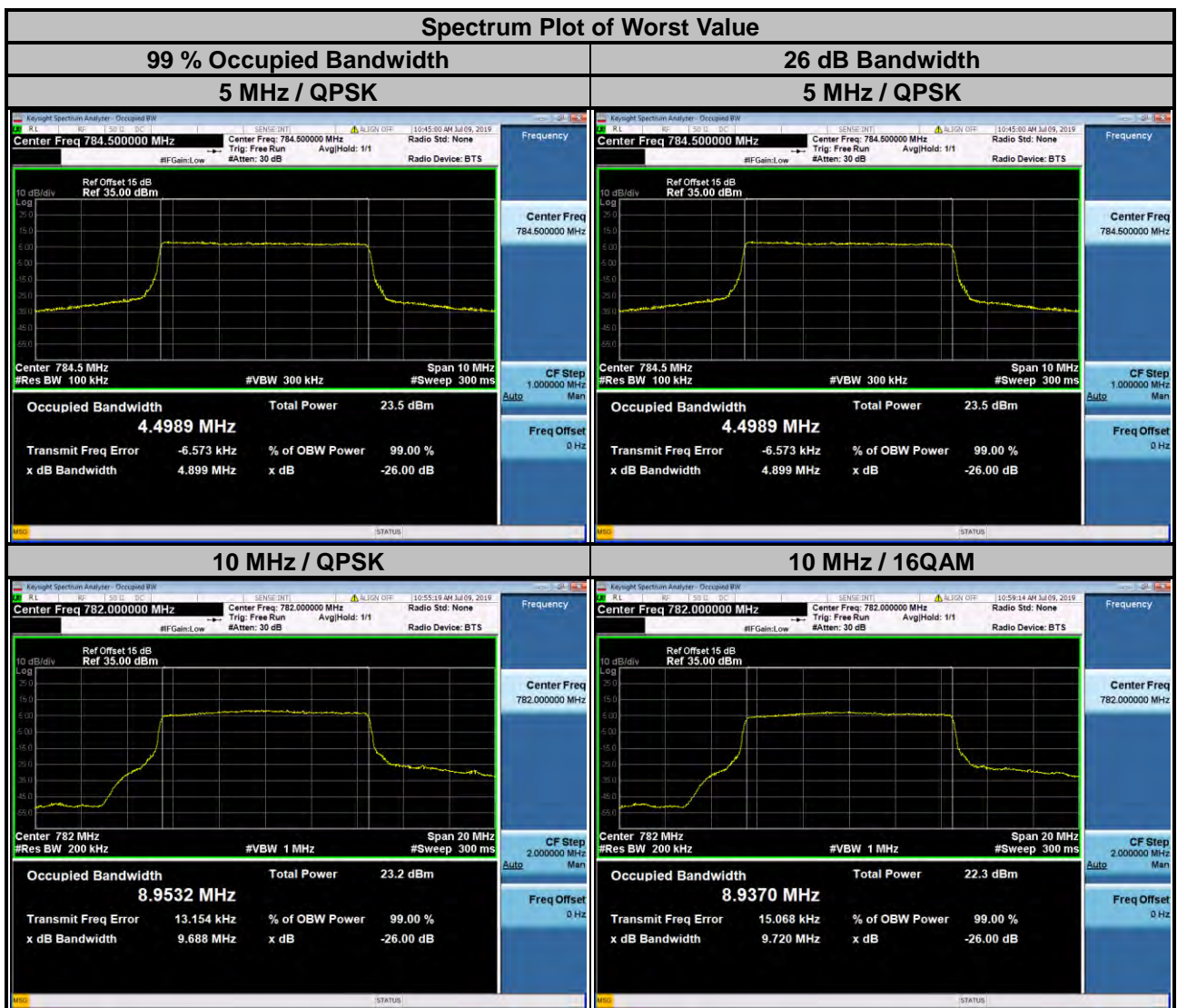




LTE Band 12					
Channel Bandwidth: 5 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
23035	701.5	4.4868	4.4813	4.853	4.865
23095	707.5	4.5047	4.4979	4.903	4.880
23155	713.5	4.4940	4.4850	4.849	4.842
Channel Bandwidth: 10 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
23060	704.0	8.9726	8.9656	9.795	9.769
23095	707.5	9.0148	8.9967	10.012	9.945
23130	711.0	8.9810	8.9765	9.830	9.775



LTE Band 13					
Channel Bandwidth: 5 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
23205	779.5	4.4918	4.4919	4.826	4.862
23230	782.0	4.4868	4.4841	4.858	4.855
23255	784.5	4.4989	4.4966	4.899	4.877
Channel Bandwidth: 10 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
23230	782.0	8.9532	8.9370	9.688	9.720



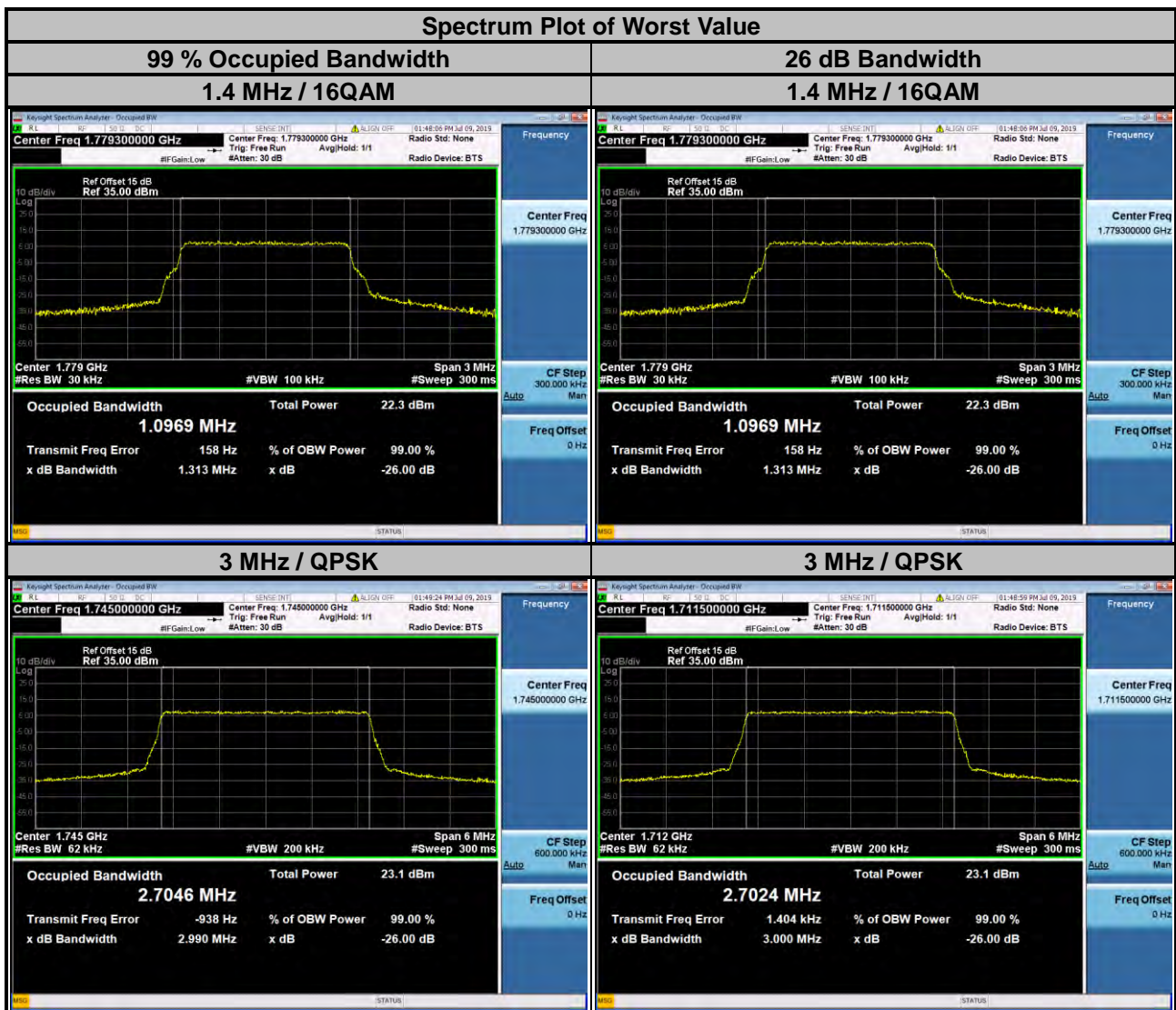
LTE Band 17					
Channel Bandwidth: 5 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
23755	706.5	4.4973	4.4913	4.870	4.882
23790	710.0	4.4955	4.5017	4.820	4.897
23825	713.5	4.4863	4.4841	4.815	4.836
Channel Bandwidth: 10 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
23780	709.0	9.0105	9.0036	9.891	9.967
23790	710.0	8.9939	8.9903	9.923	9.947
23800	711.0	8.9802	8.9817	9.837	9.918



LTE Band 66					
Channel Bandwidth: 1.4 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
131979	1710.7	1.0920	1.0923	1.299	1.303
132322	1745.0	1.0928	1.0920	1.298	1.307
132665	1779.3	1.0911	1.0969	1.306	1.313

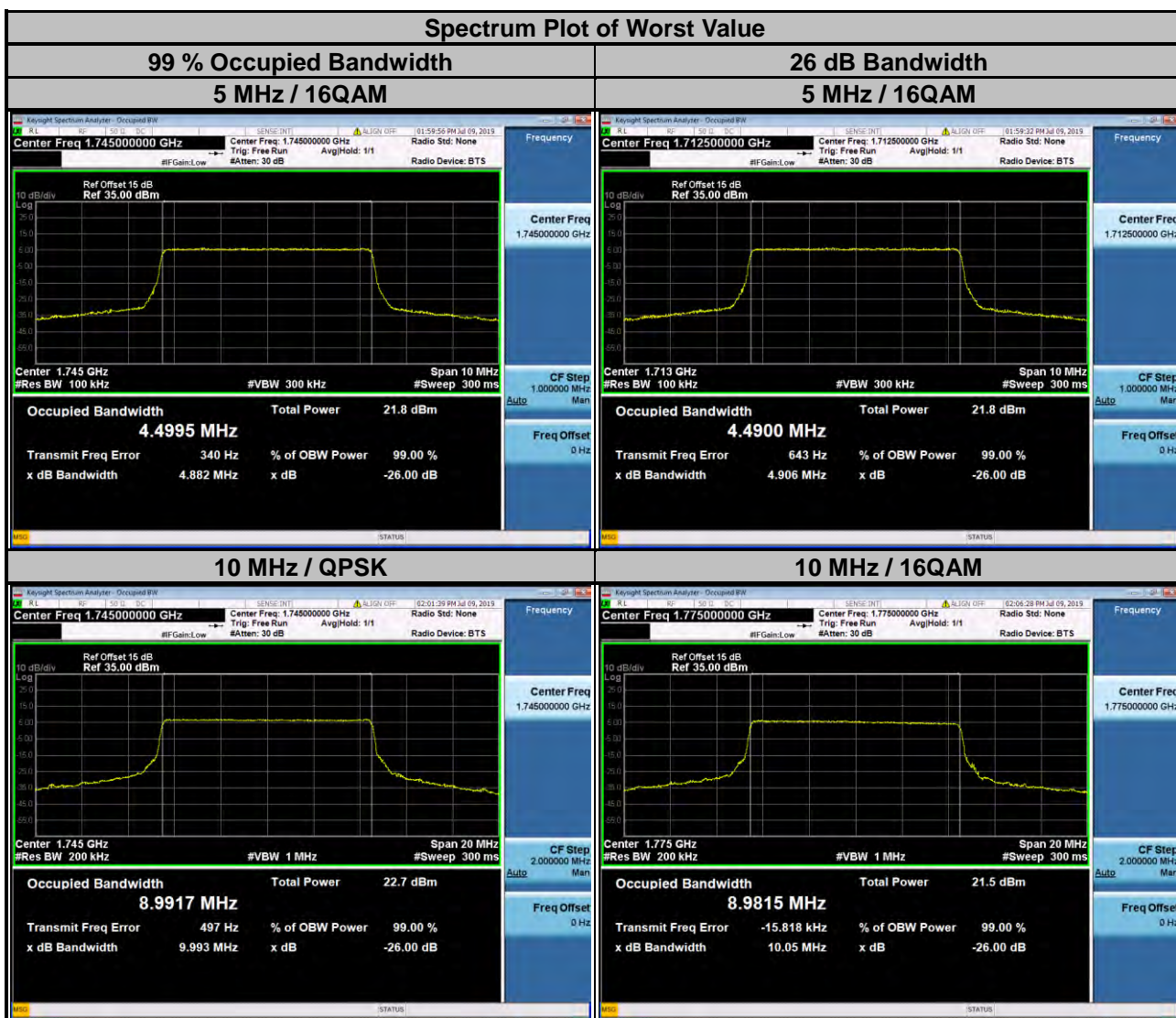
  

Channel Bandwidth: 3 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
131987	1711.5	2.7024	2.7014	3.000	2.999
132322	1745.0	2.7046	2.7045	2.990	2.976
132657	1778.5	2.7045	2.7018	2.978	2.978





LTE Band 66					
Channel Bandwidth: 5 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
131997	1712.5	4.4931	4.4900	4.849	4.906
132322	1745.0	4.4965	4.4995	4.835	4.882
132647	1777.5	4.4964	4.4964	4.860	4.879
Channel Bandwidth: 10 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
132022	1715.0	8.9912	8.9897	9.978	9.971
132322	1745.0	8.9917	8.9844	9.993	10.010
132622	1775.0	8.9829	8.9815	9.881	10.050



LTE Band 66					
Channel Bandwidth: 15 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
132047	1717.5	13.472	13.463	14.33	14.41
132322	1745.0	13.462	13.459	14.32	14.36
132597	1772.5	13.445	13.433	14.31	14.29
Channel Bandwidth: 20 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
132072	1720.0	17.954	17.961	19.09	19.08
132322	1745.0	17.950	17.949	19.08	19.10
132572	1770.0	17.931	17.930	19.08	19.09



## 4.5 Band Edge Measurement

### 4.5.1 Limits of Band Edge Measurement

For operations in the 698-787 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.

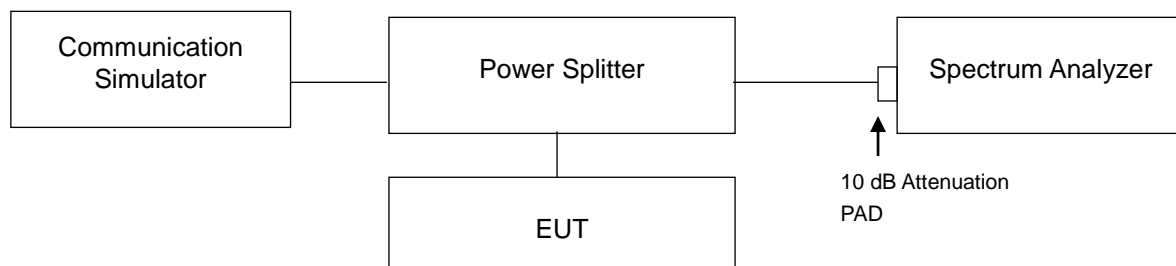
However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

For operations in the 746-758 MHz band and the 776-788 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.

On all frequencies between 763-775 MHz and 793-805 MHz, by a factor no less than  $65 + 10 \log (P)$  dB in a 6.25 kHz band segment, for mobile and portable stations.

For operations in the 1710–1755 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB.

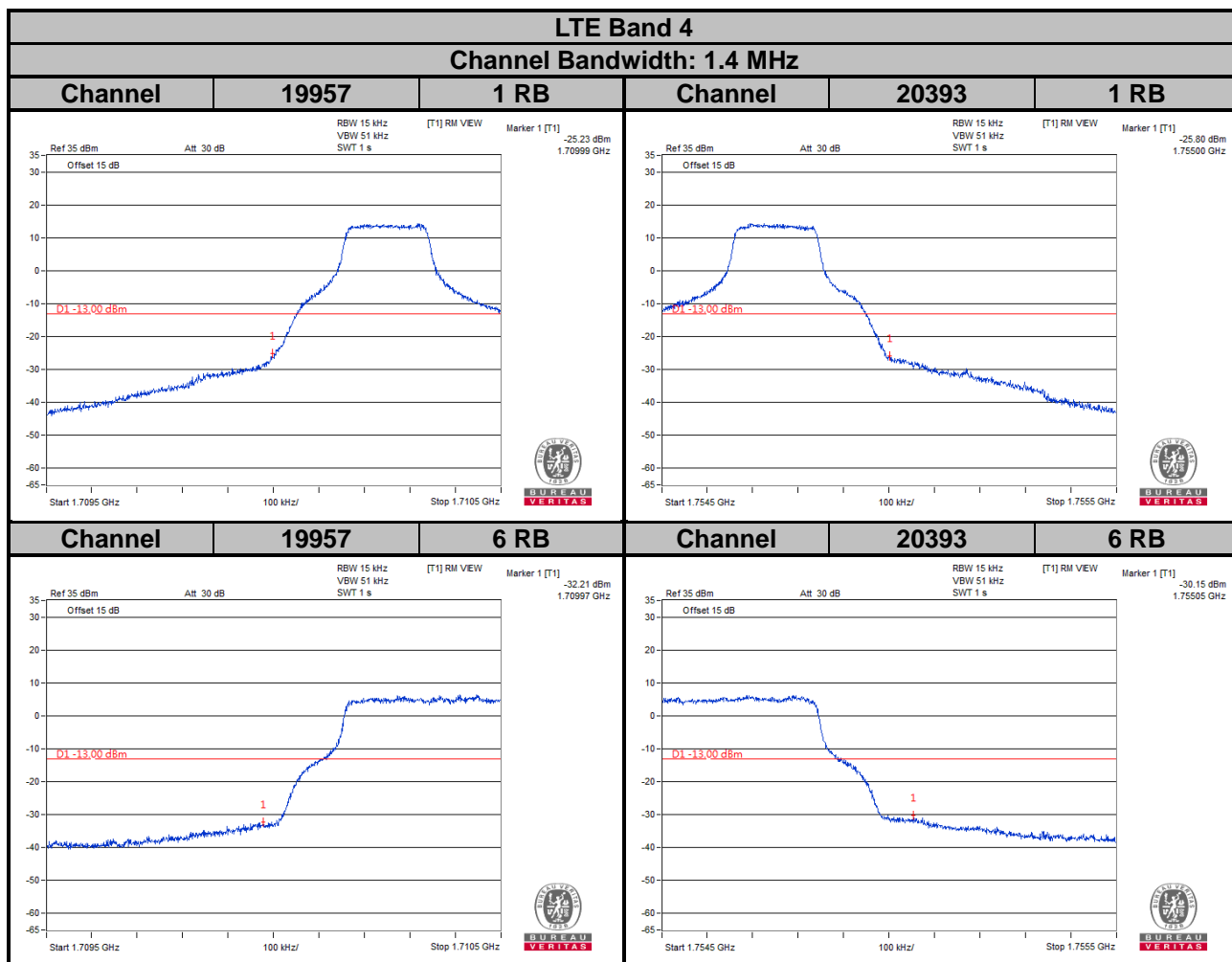
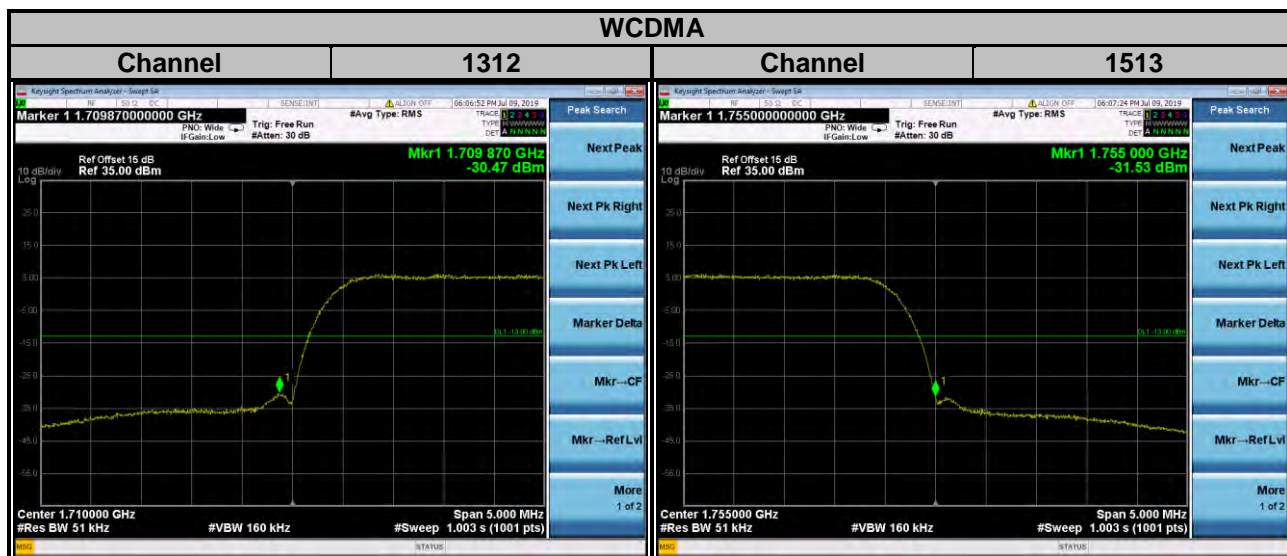
### 4.5.2 Test Setup



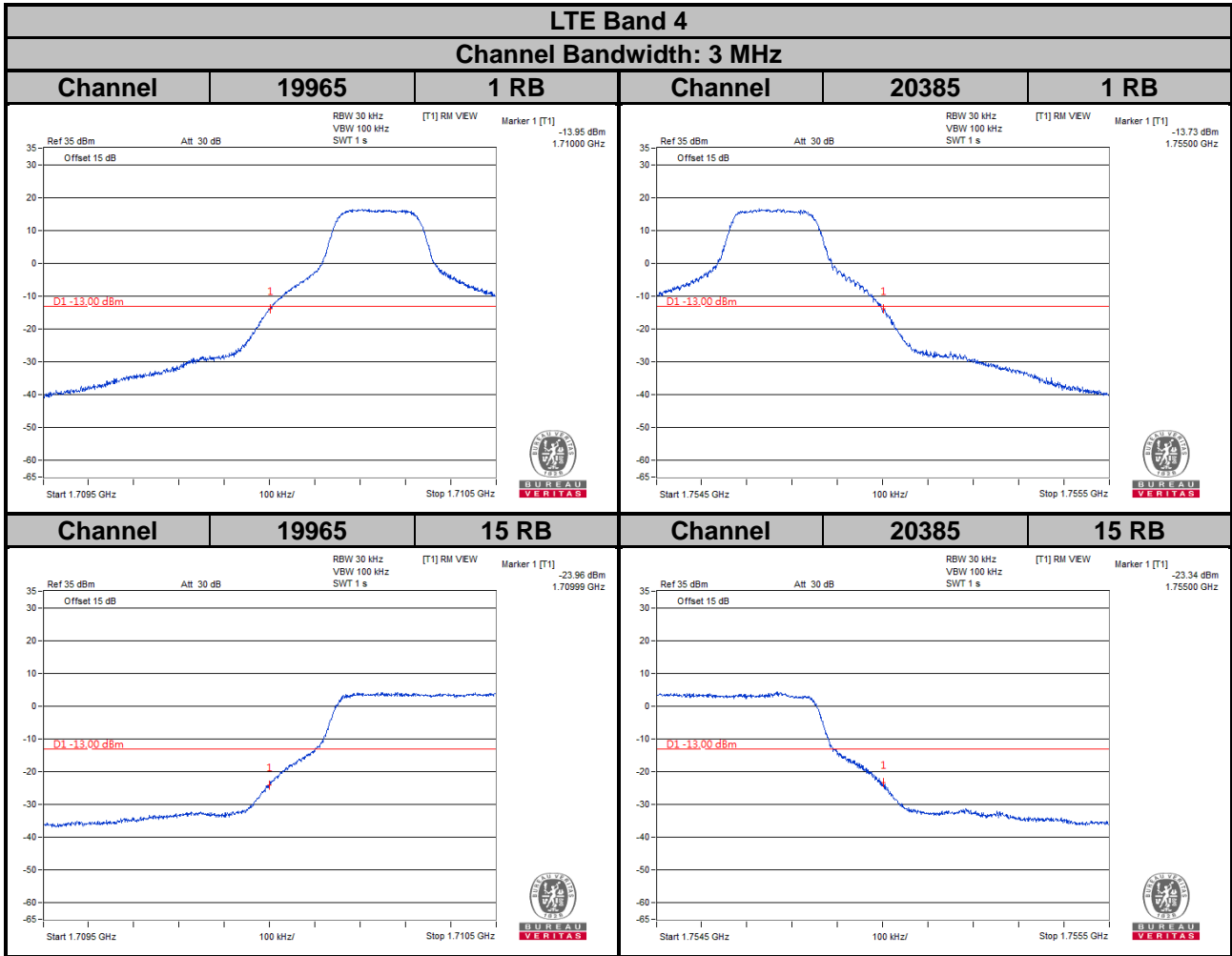
### 4.5.3 Test Procedures

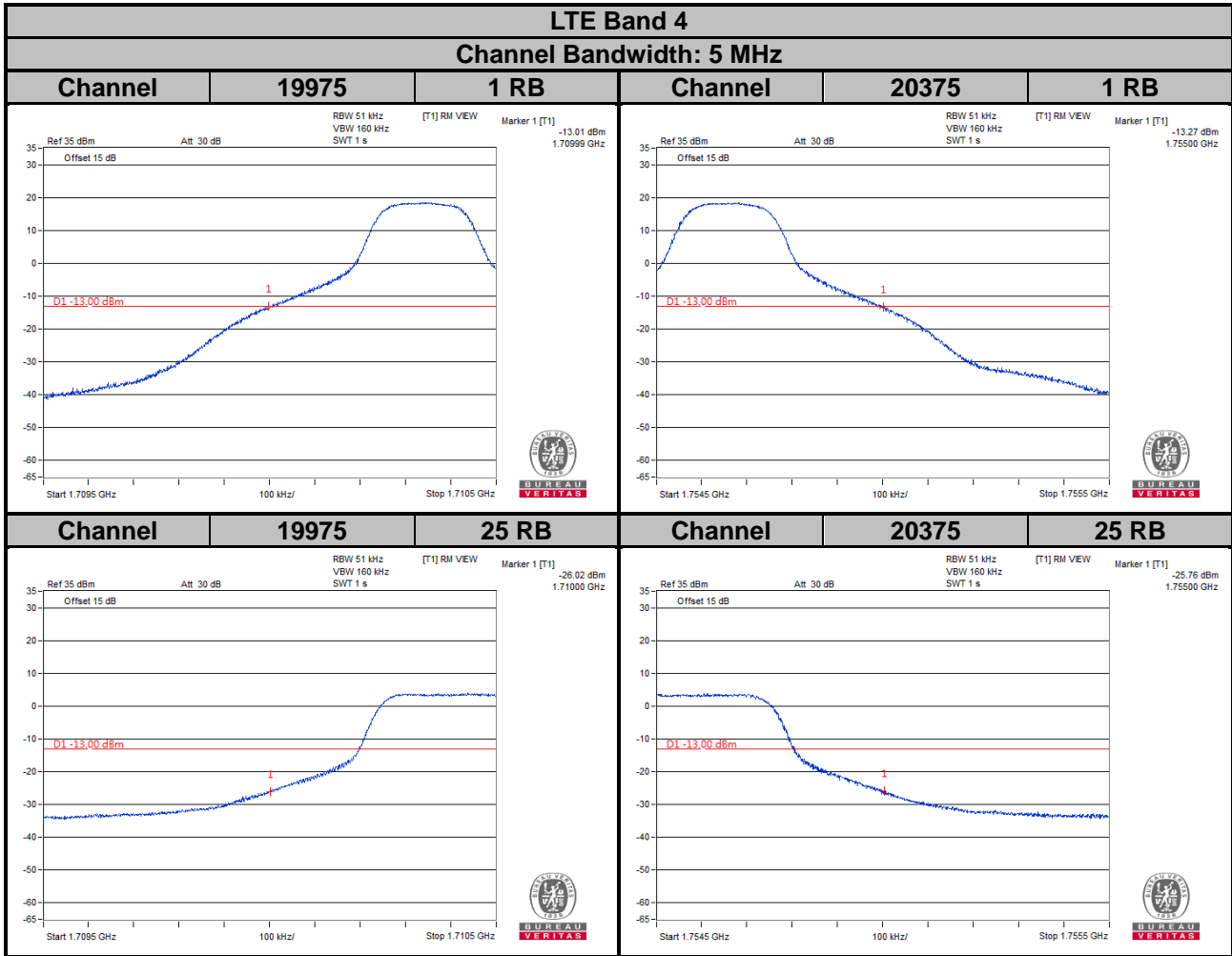
- All measurements were done at low and high operational frequency range.
- The center frequency of spectrum is the band edge frequency and span is 5 MHz. RB of the spectrum is 51 kHz and VB of the spectrum is 160 kHz (WCDMA).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 15 kHz or 30 kHz and VB of the spectrum is 51 kHz or 100 kHz (LTE Bandwidth 1.4 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 30 kHz and VB of the spectrum is 100 kHz (LTE Bandwidth 3 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 51 kHz and VB of the spectrum is 160 kHz (LTE Bandwidth 5 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 100 kHz and VB of the spectrum is 300 kHz (LTE Bandwidth 10 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 150 kHz and VB of the spectrum is 470 kHz (LTE Bandwidth 15 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 200 kHz and VB of the spectrum is 1 MHz (LTE Bandwidth 20 MHz).
- Record the max. trace plot into the test report.

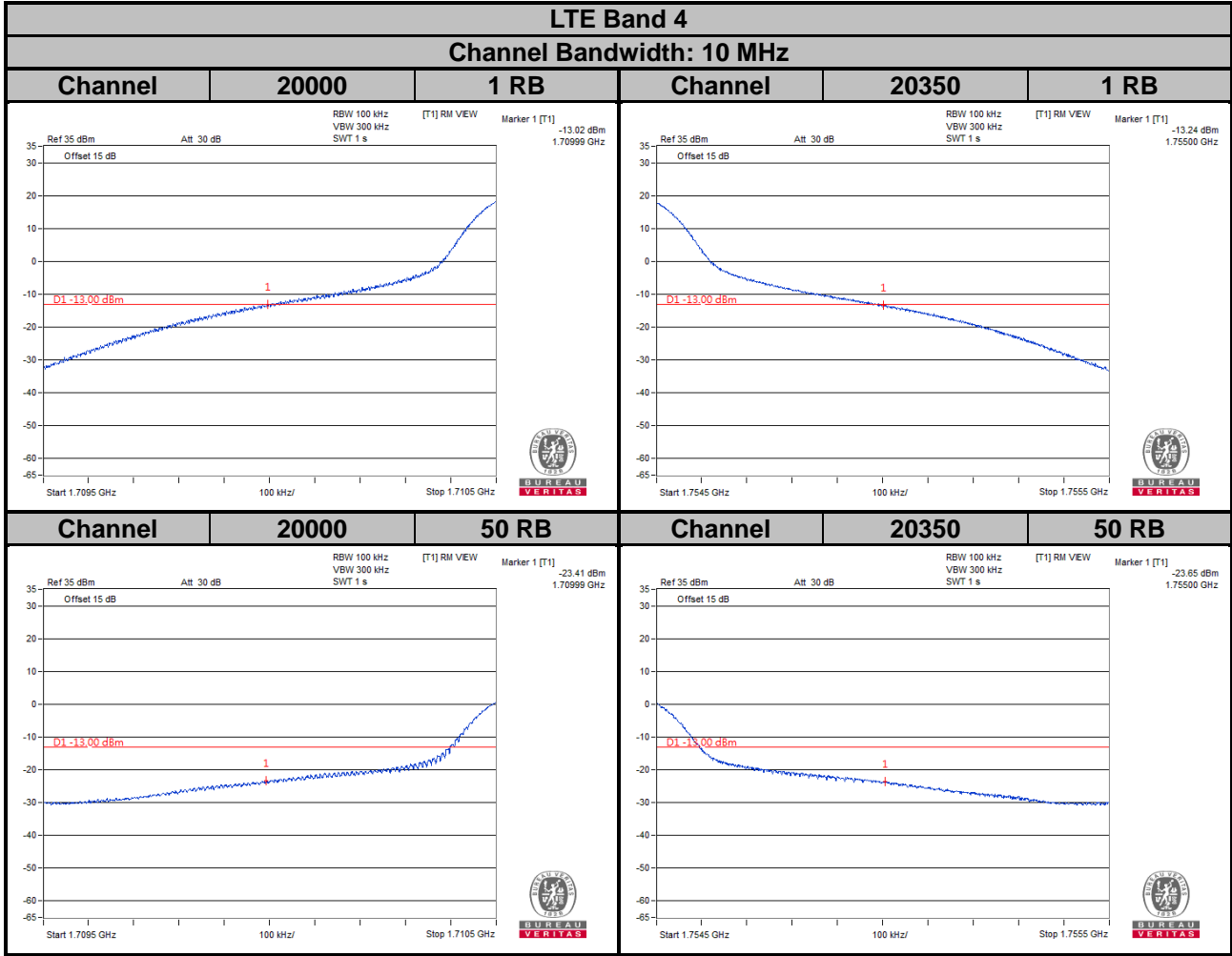
#### 4.5.4 Test Results

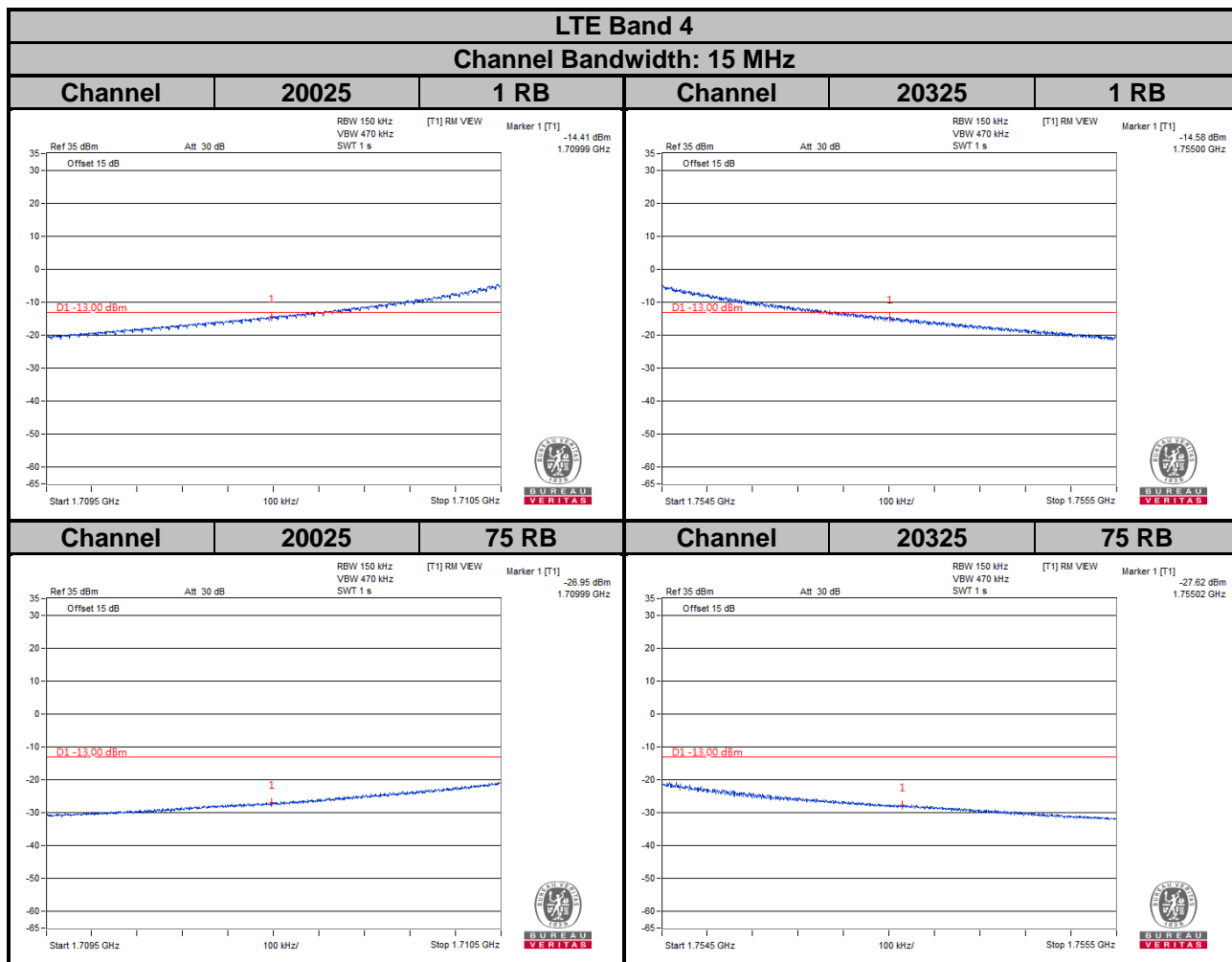


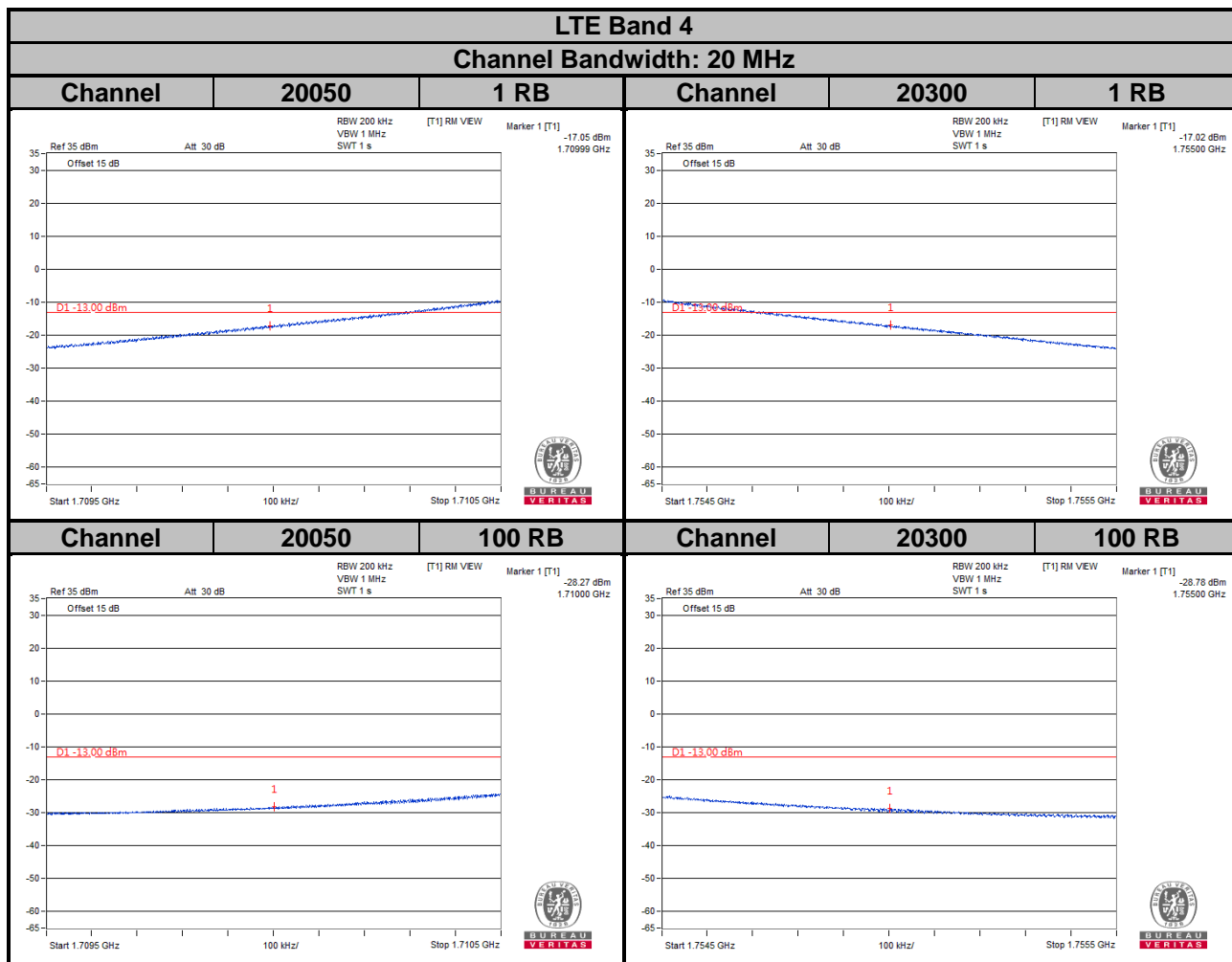






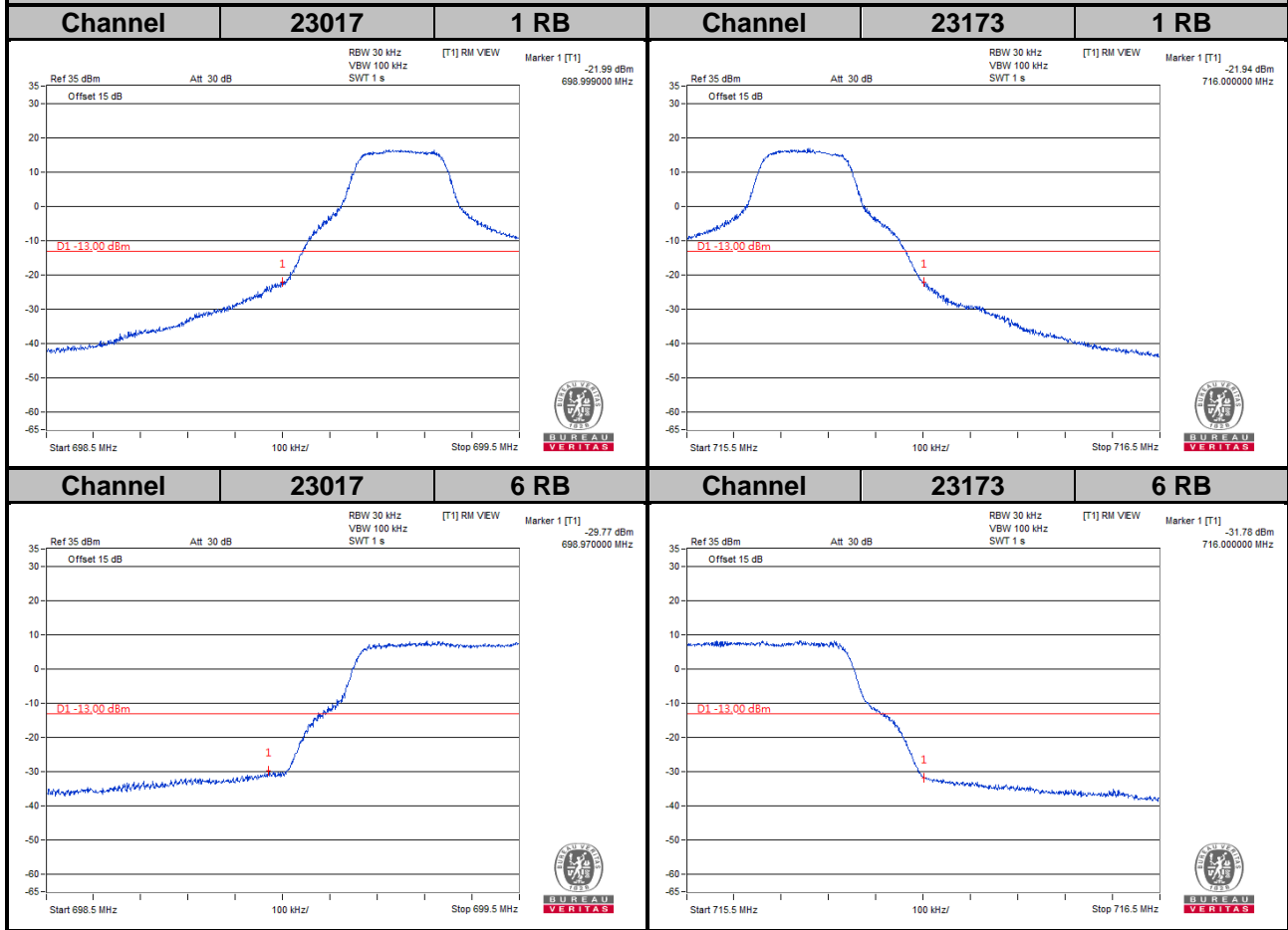


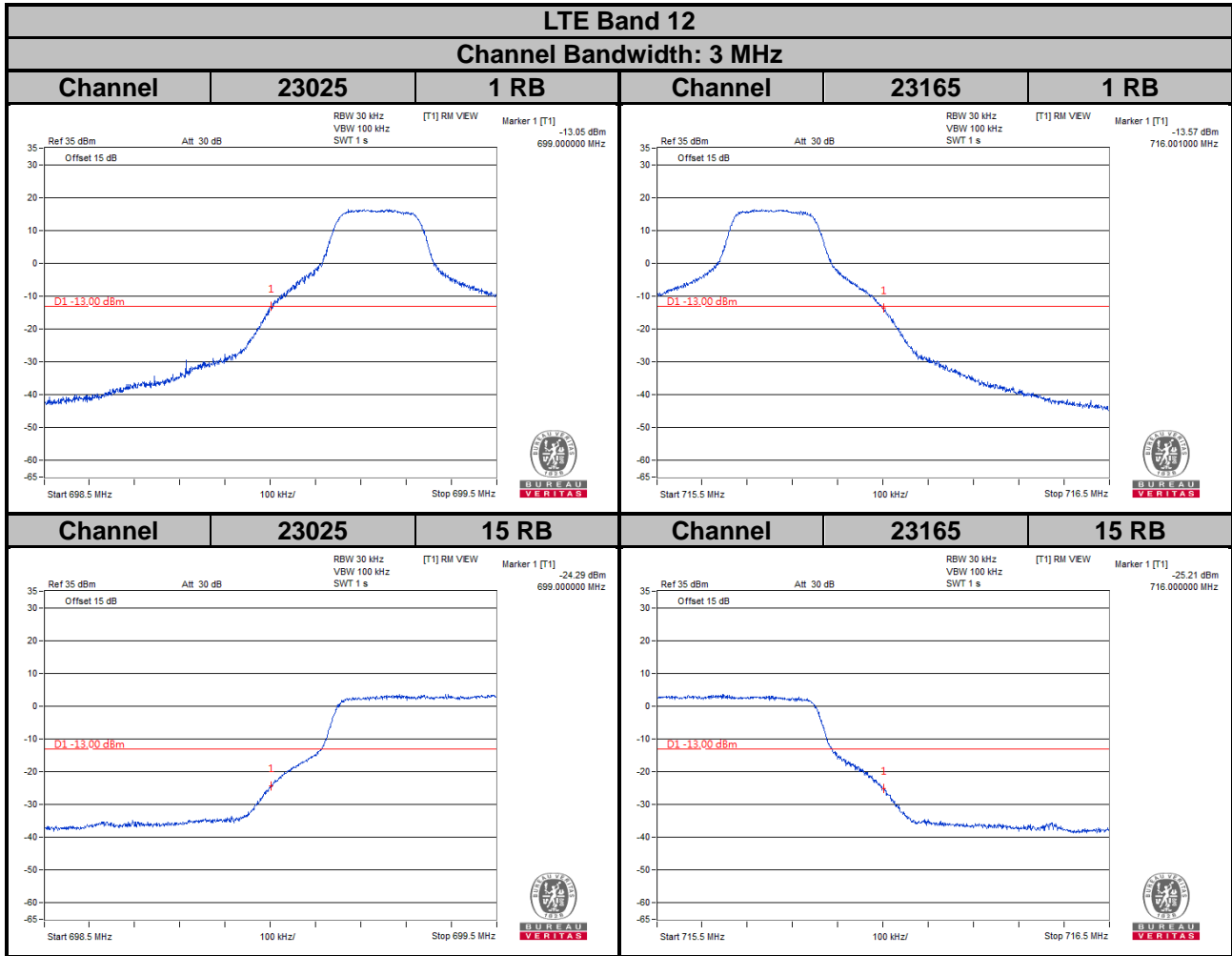


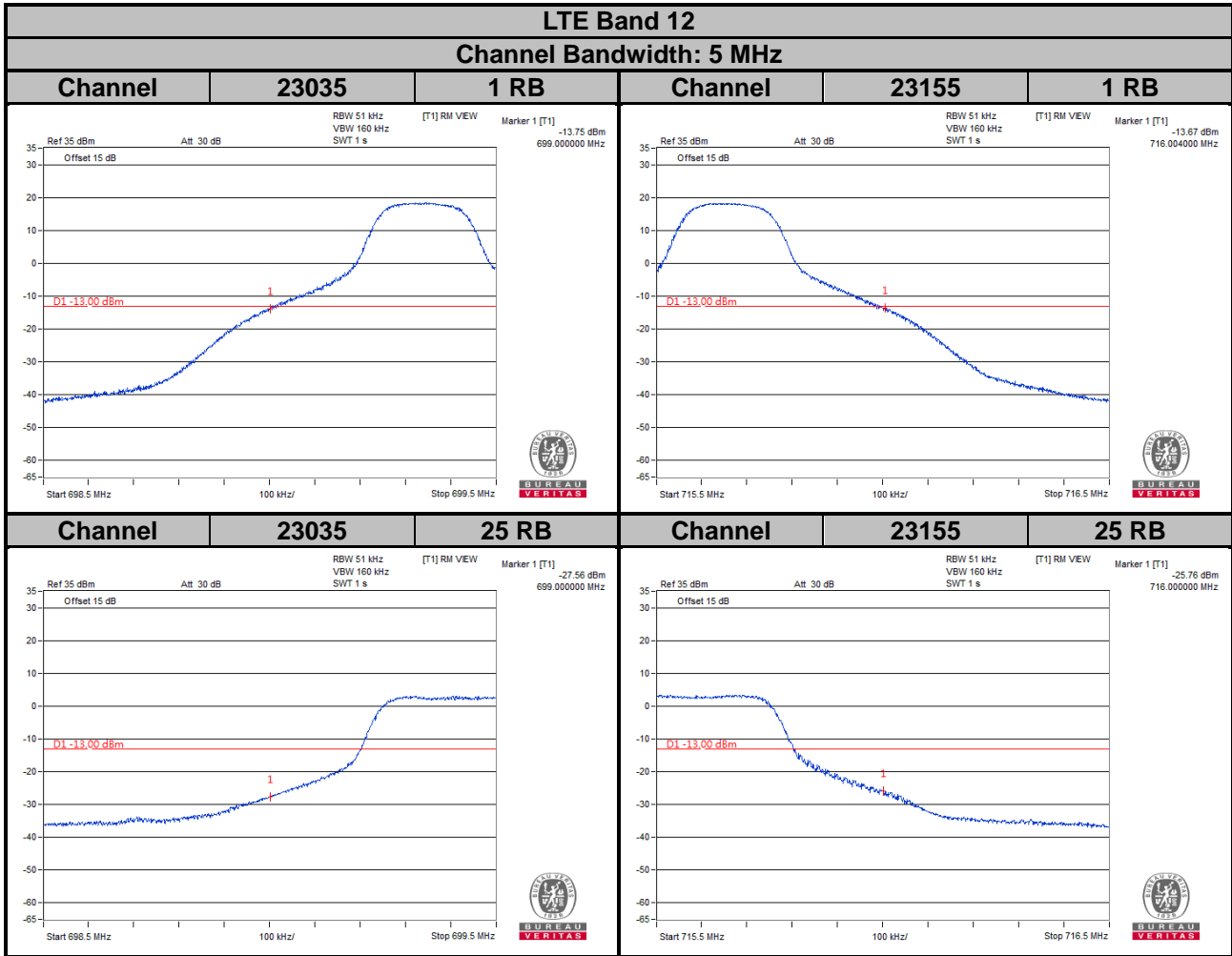


## LTE Band 12

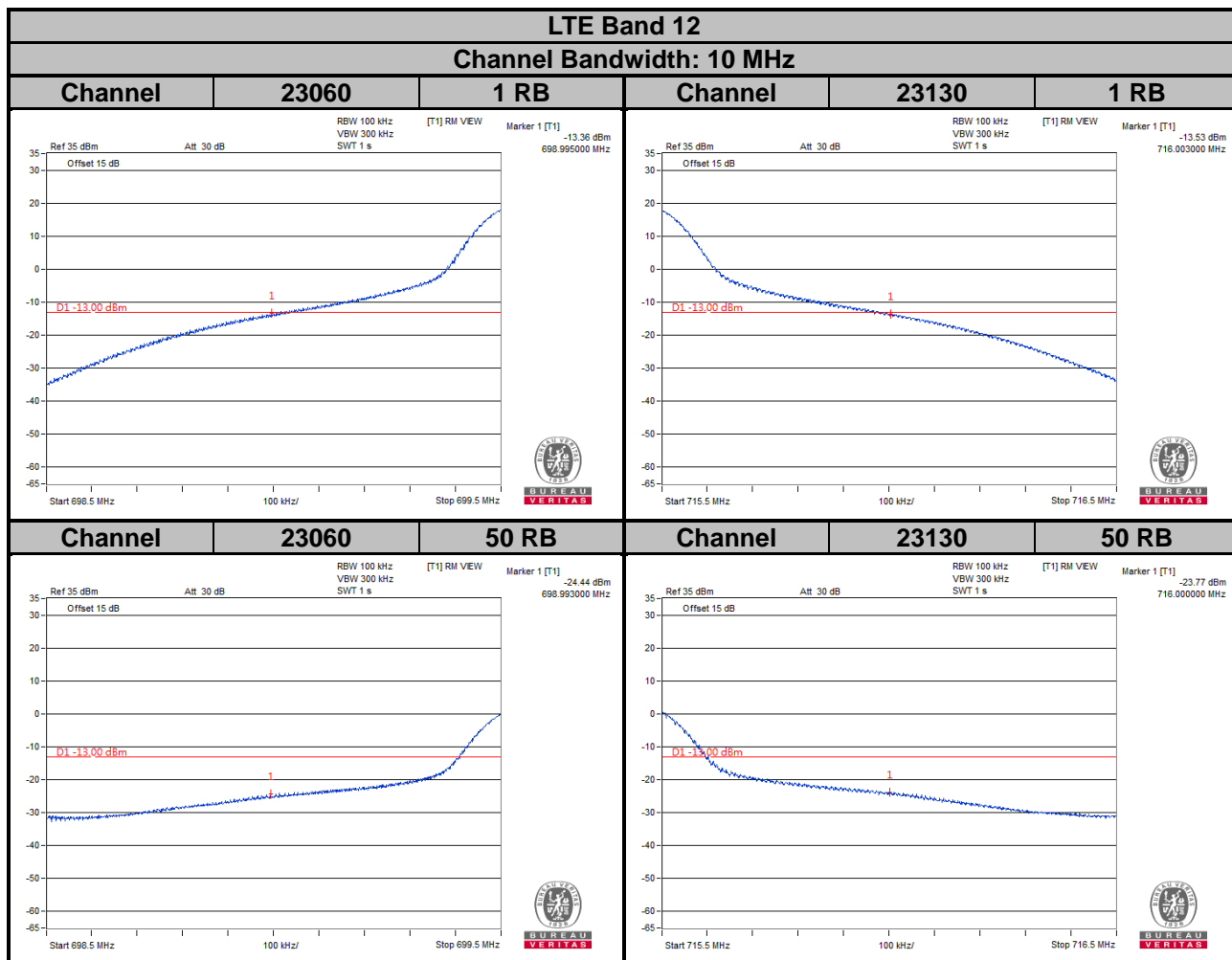
Channel Bandwidth: 1.4 MHz

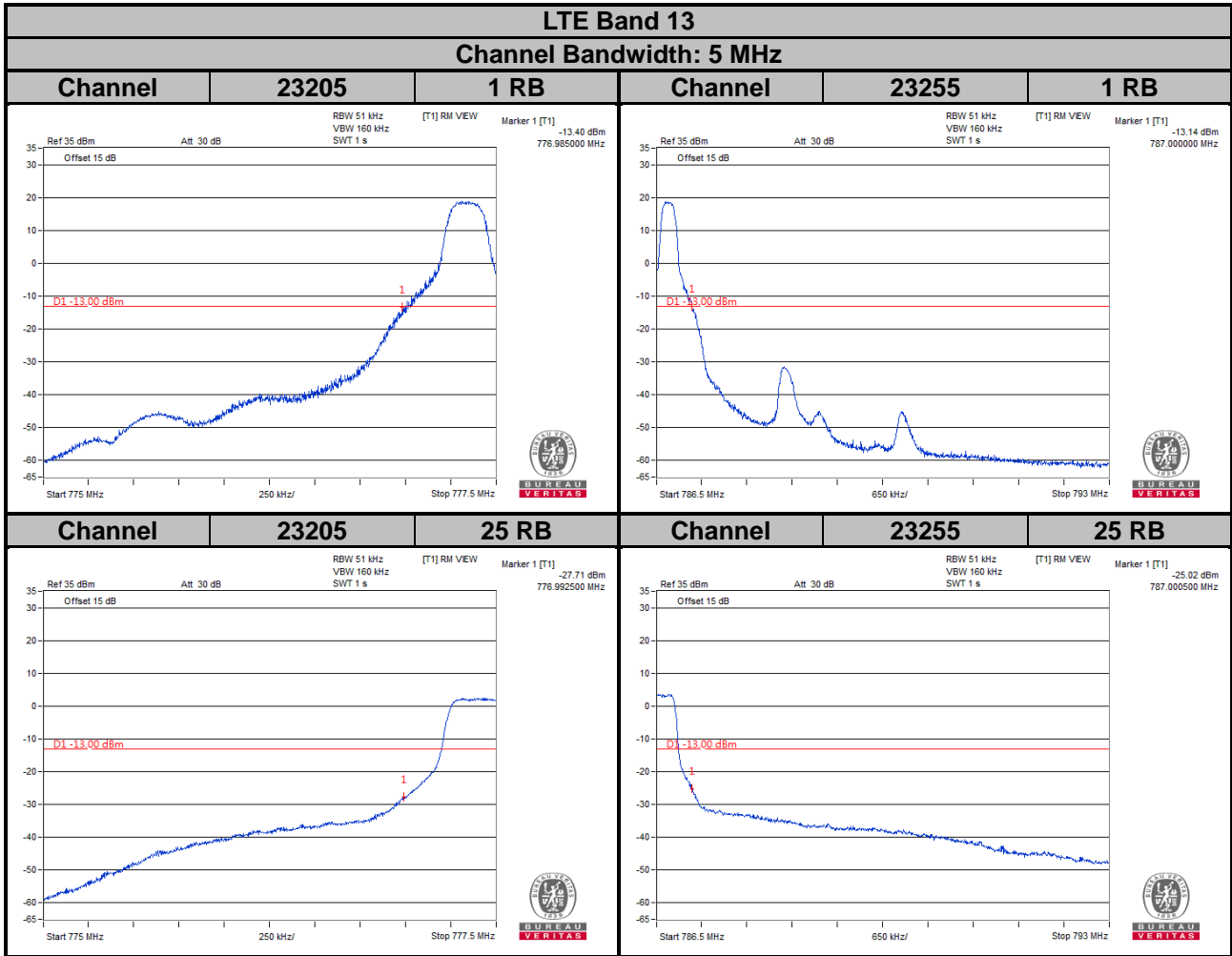






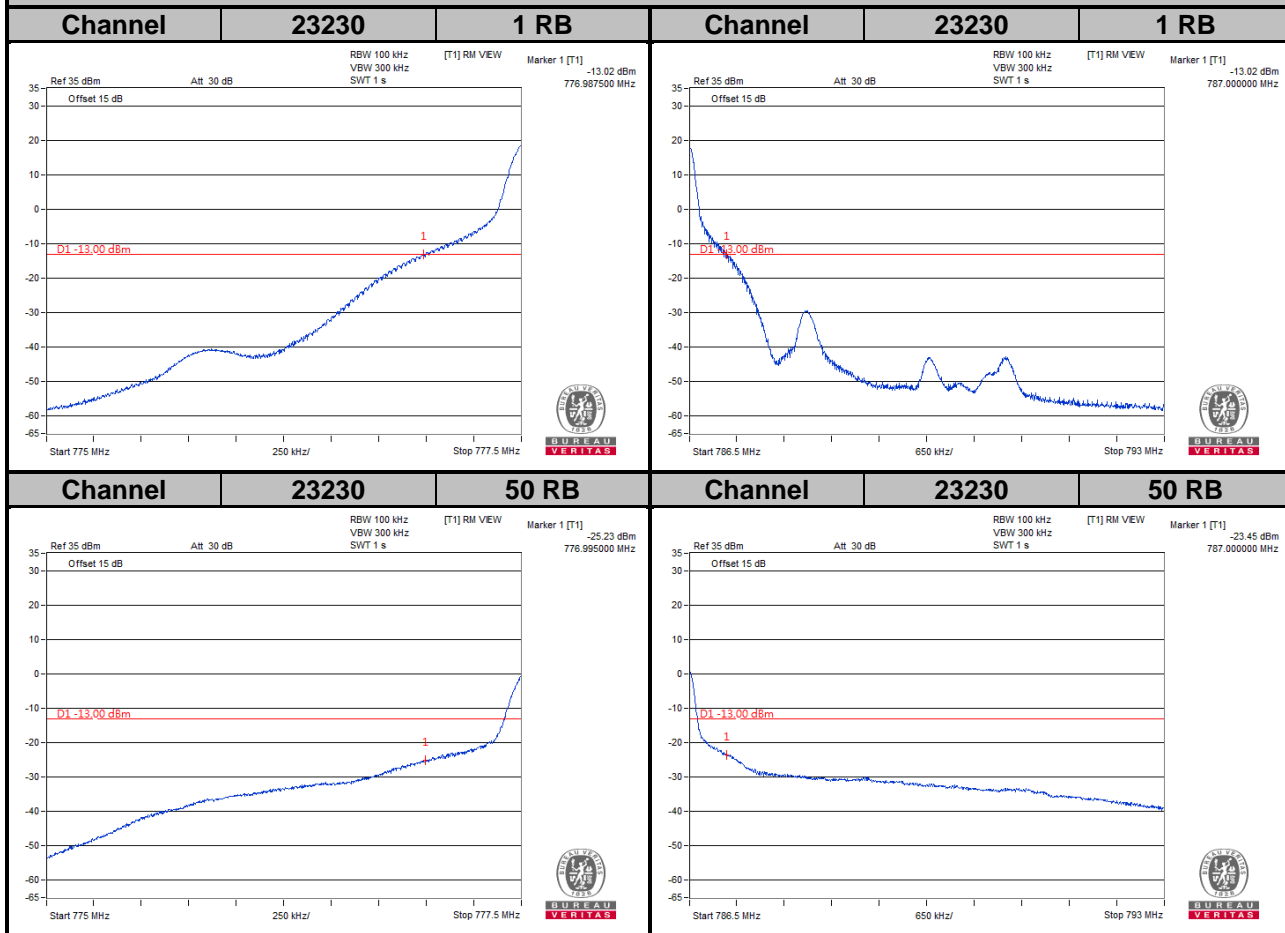


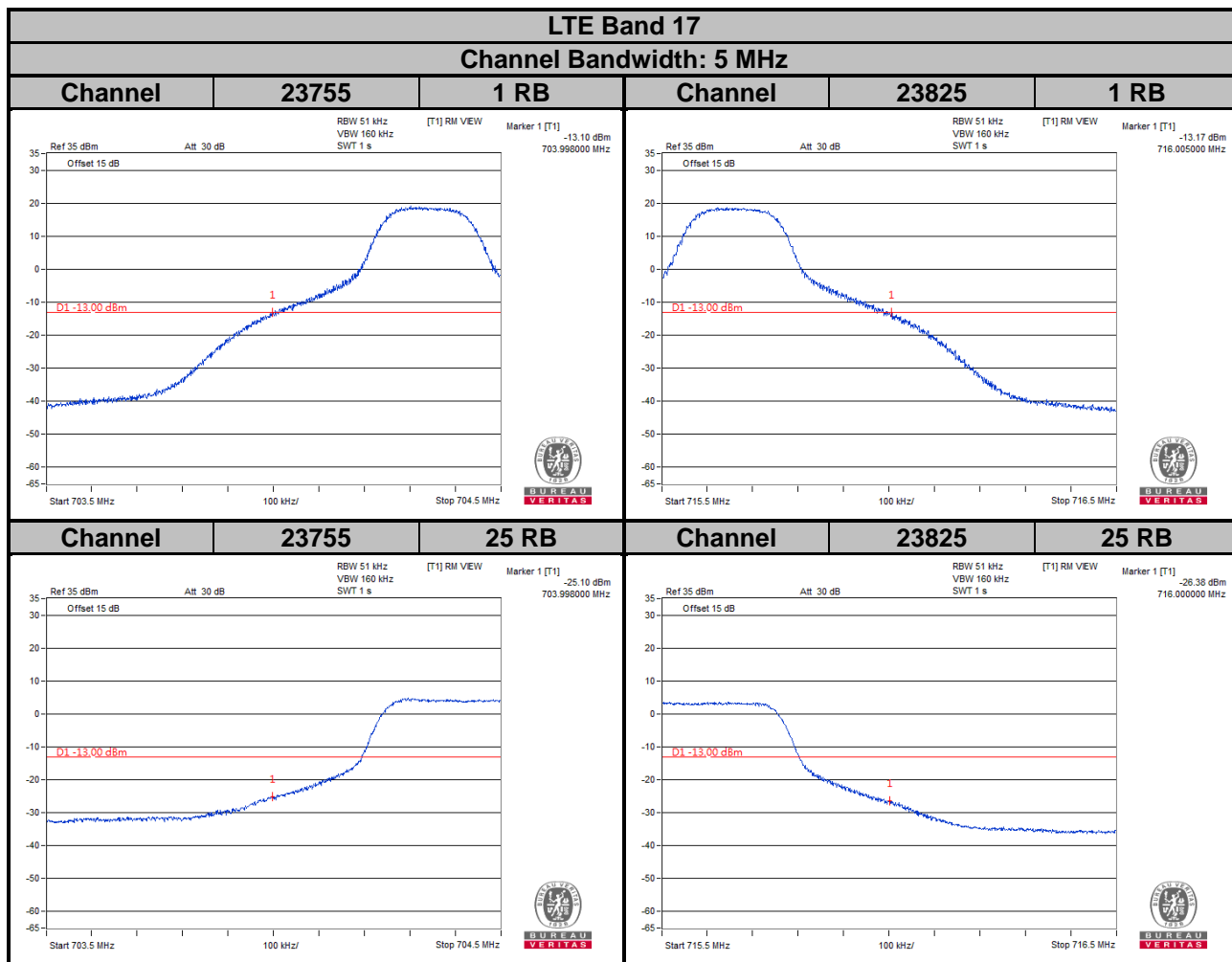


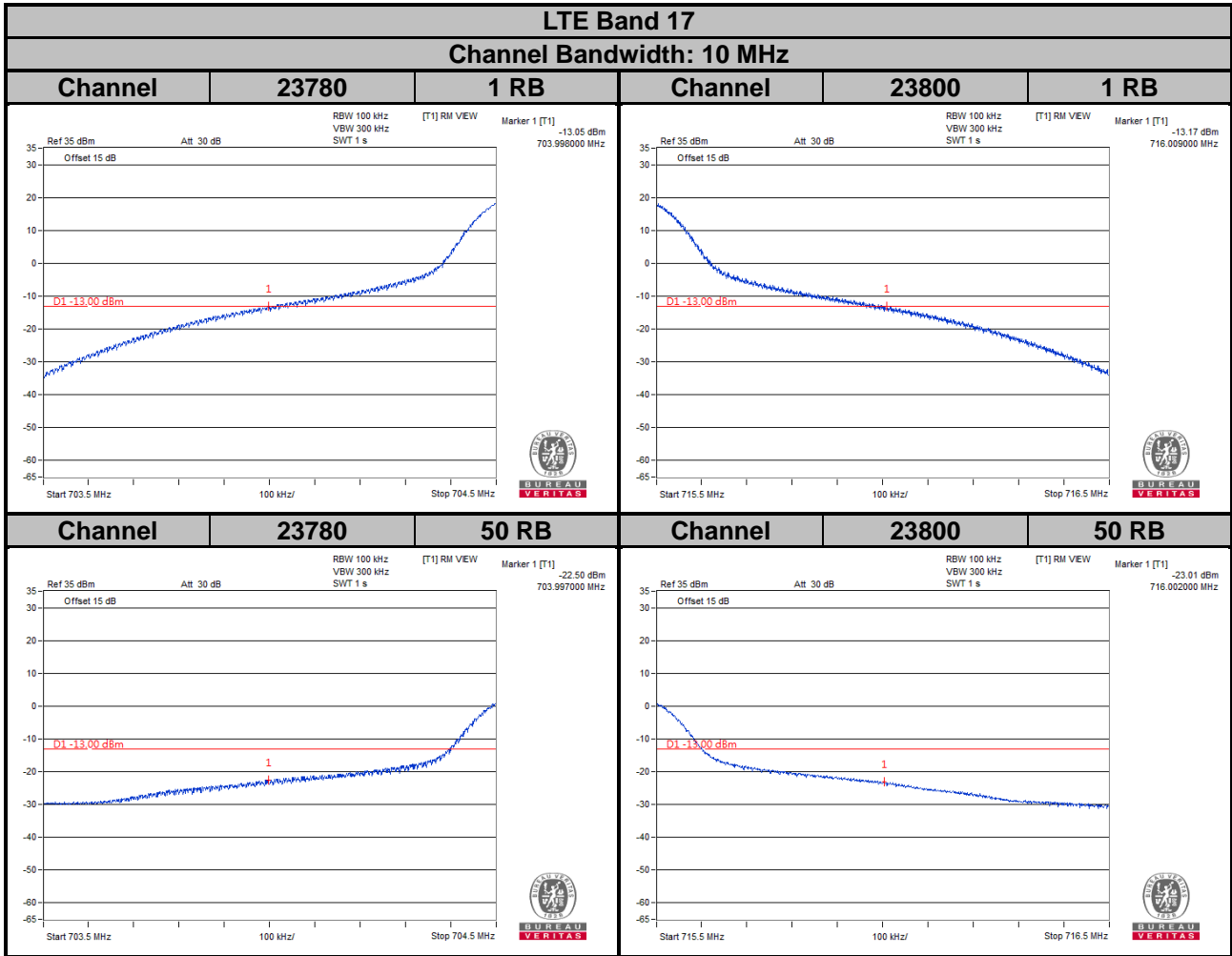


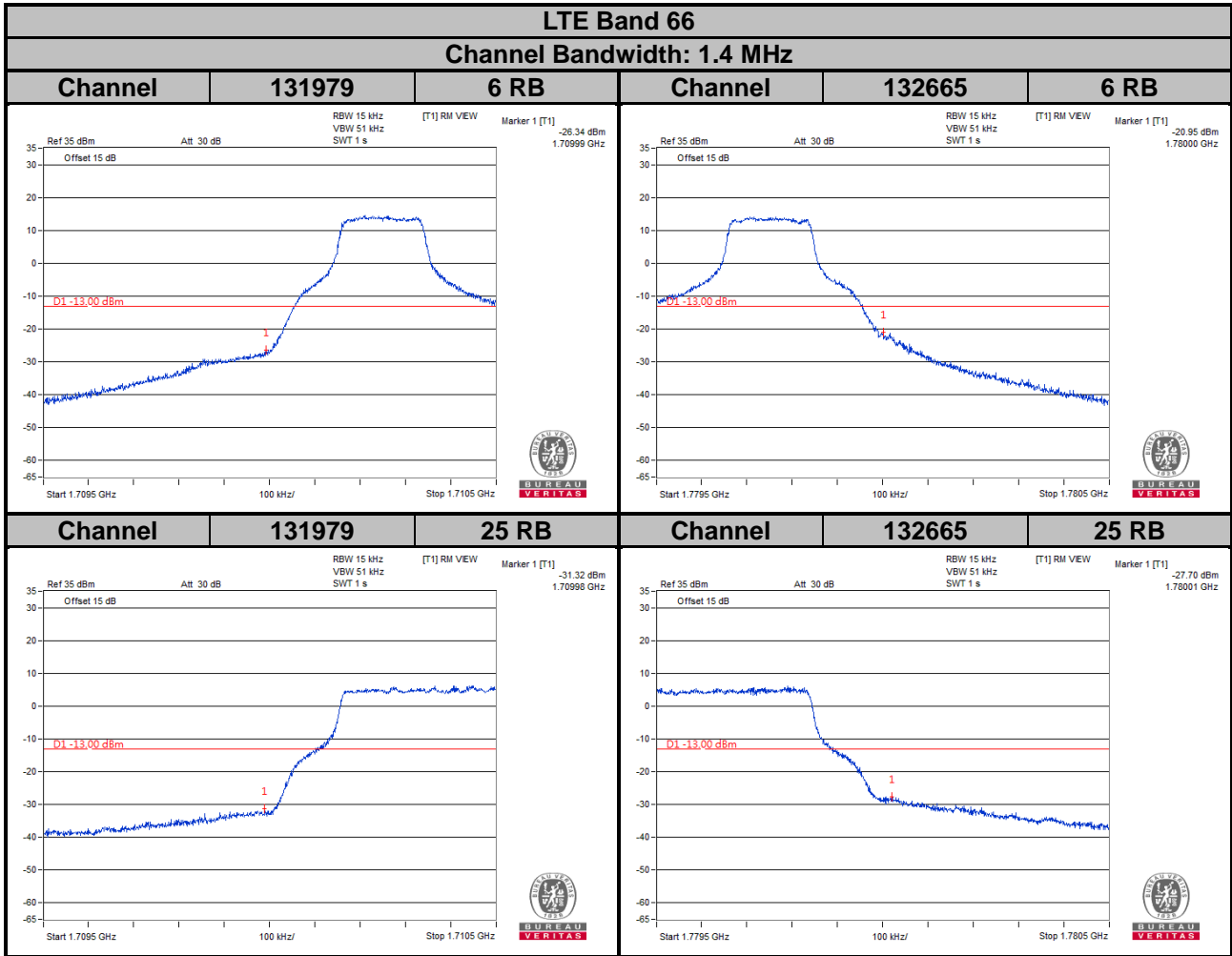
# LTE Band 13

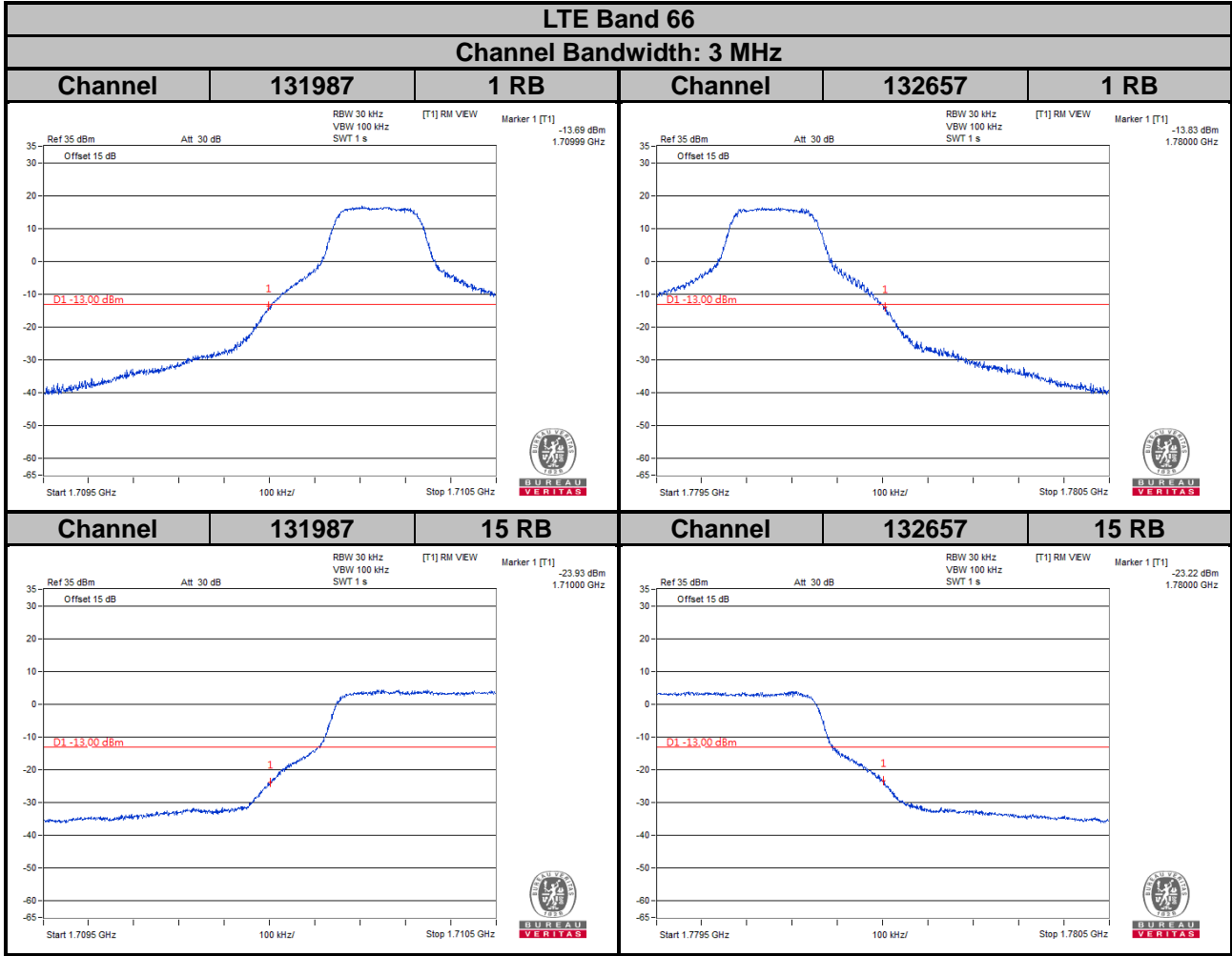
Channel Bandwidth: 10 MHz

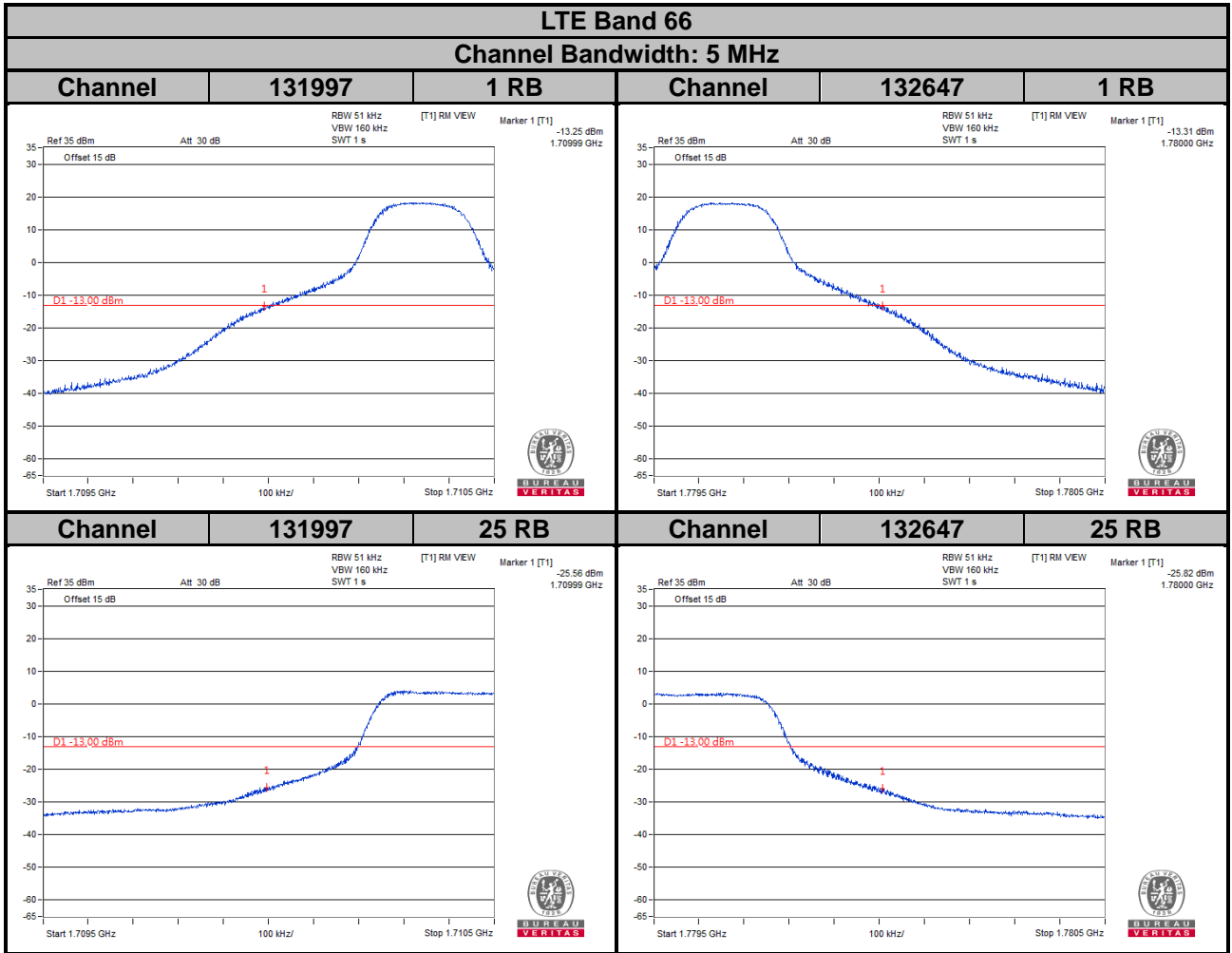




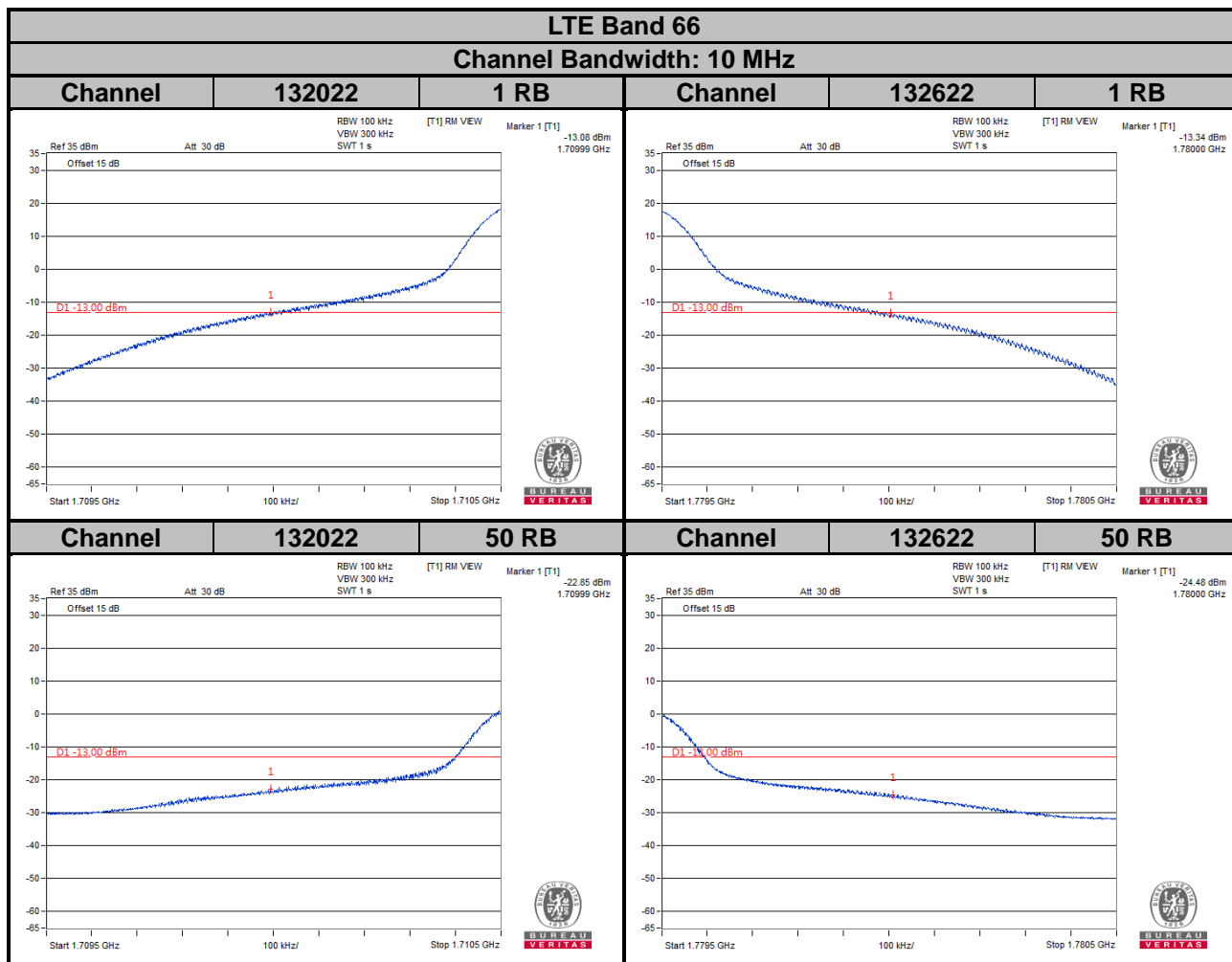


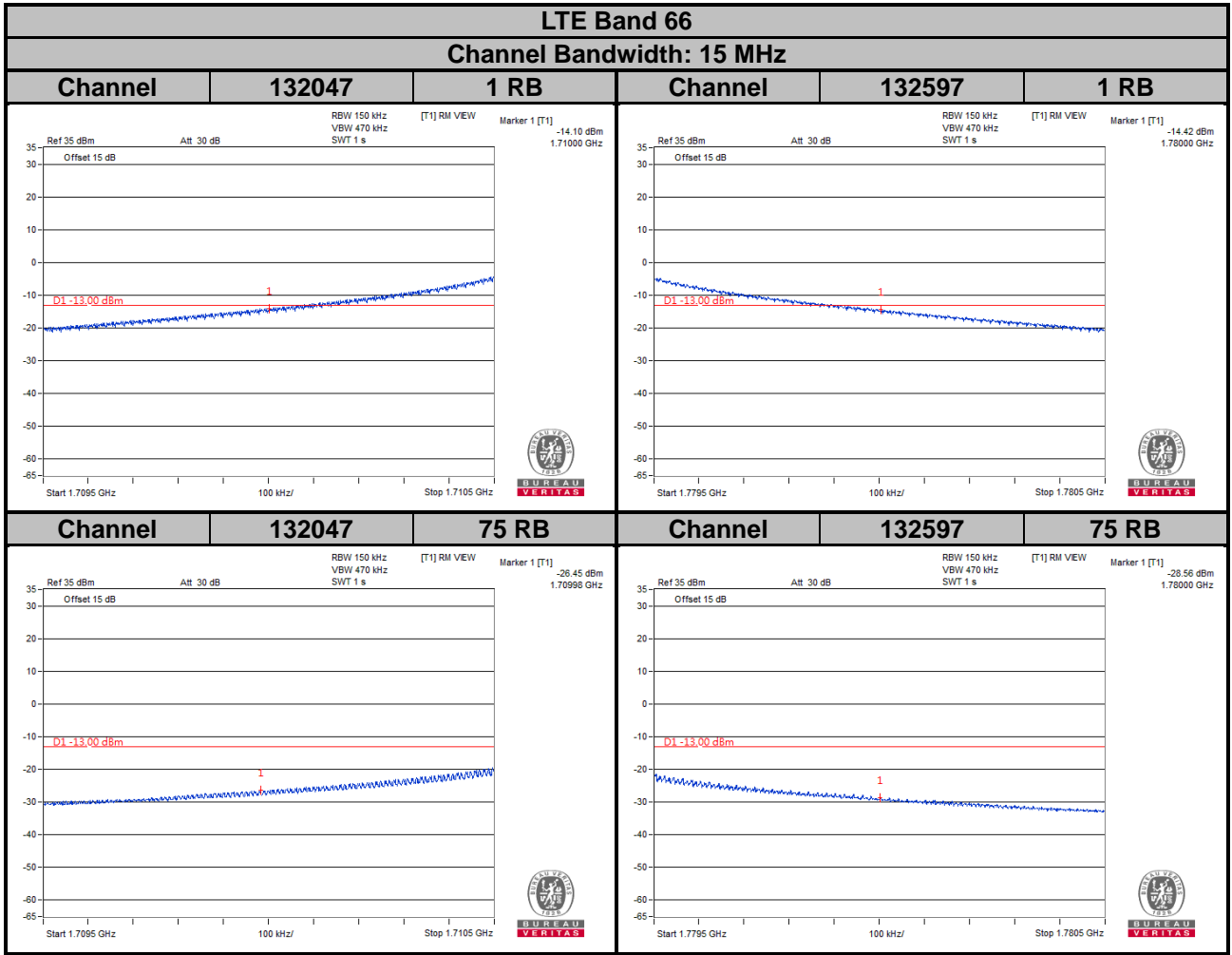


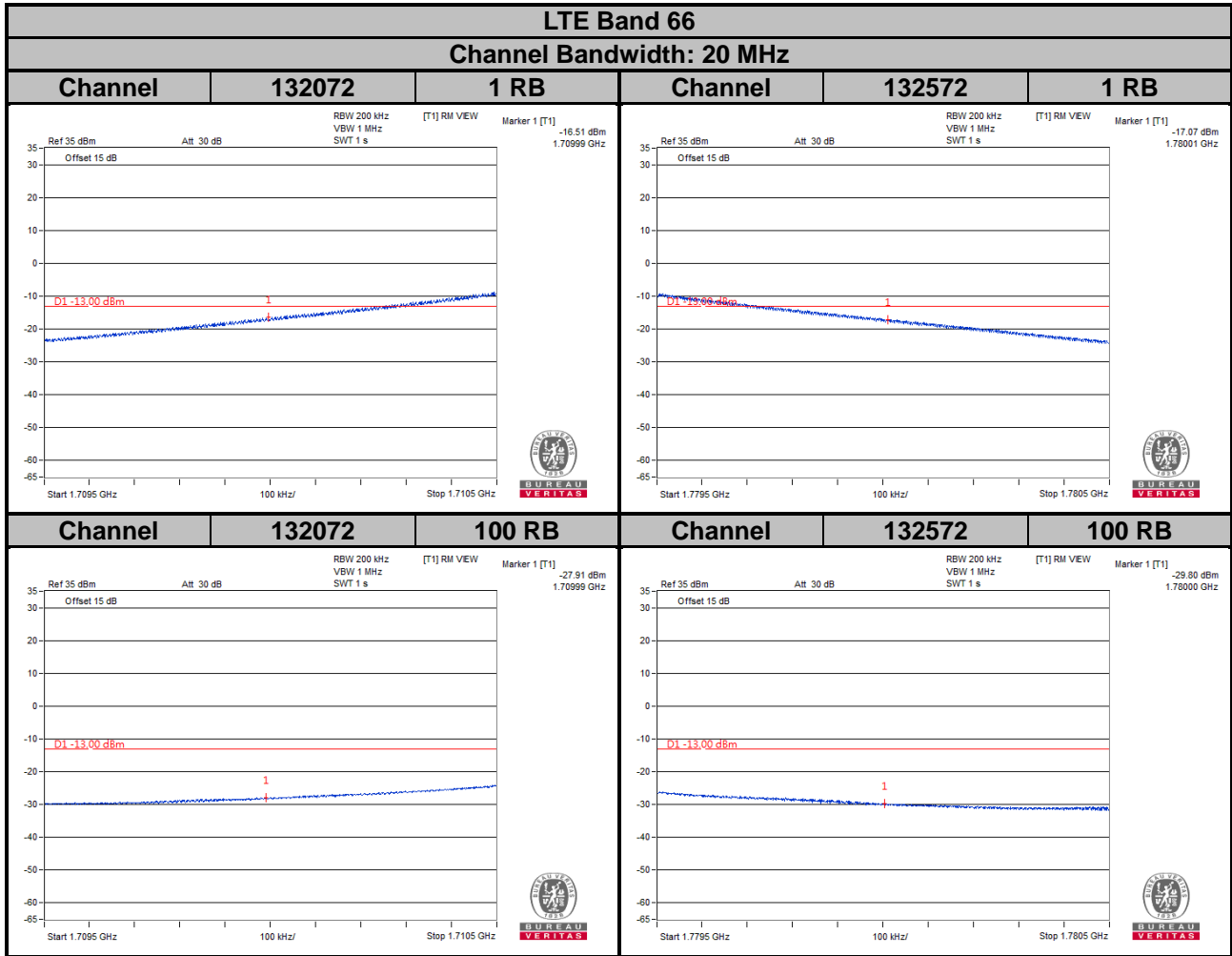




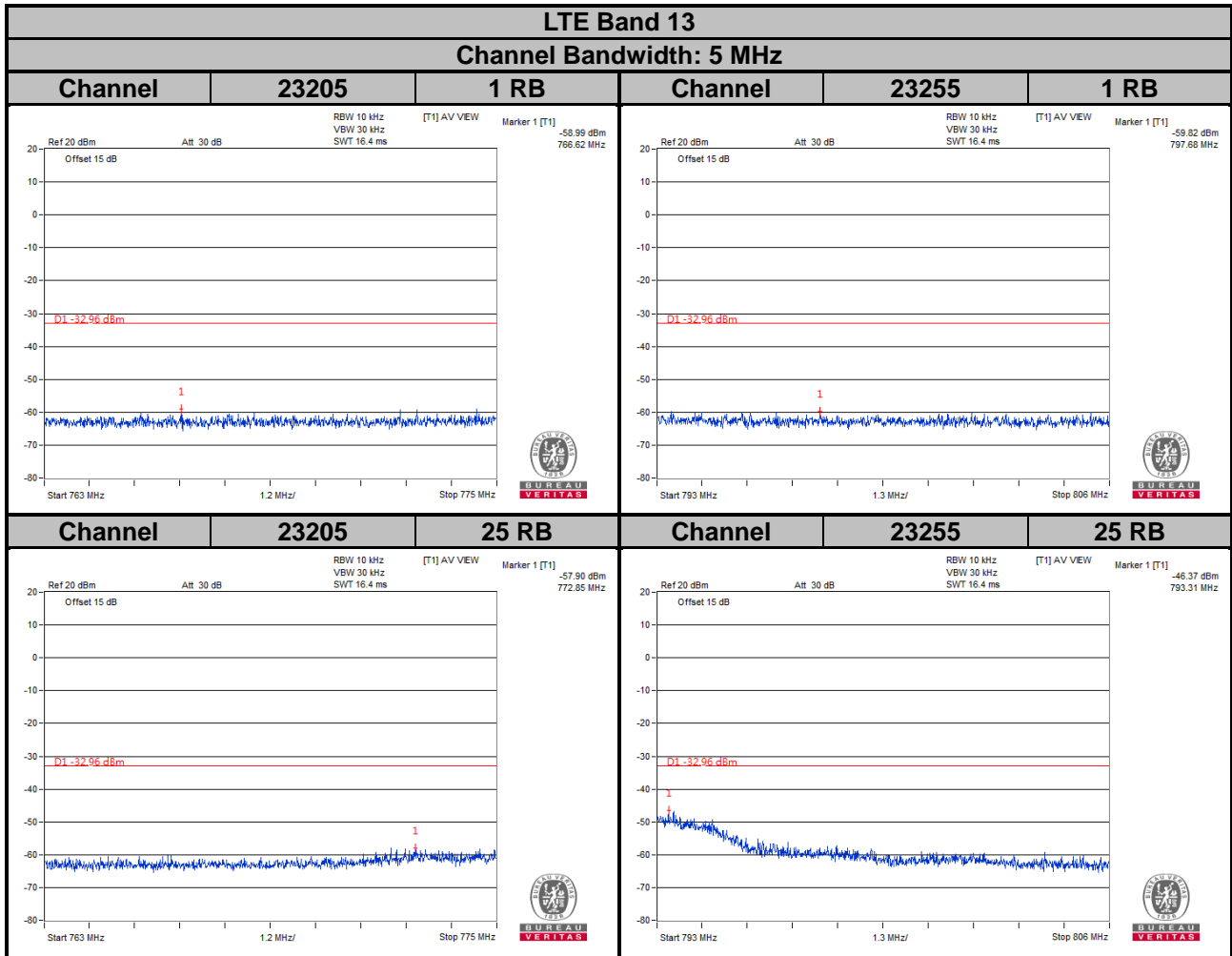








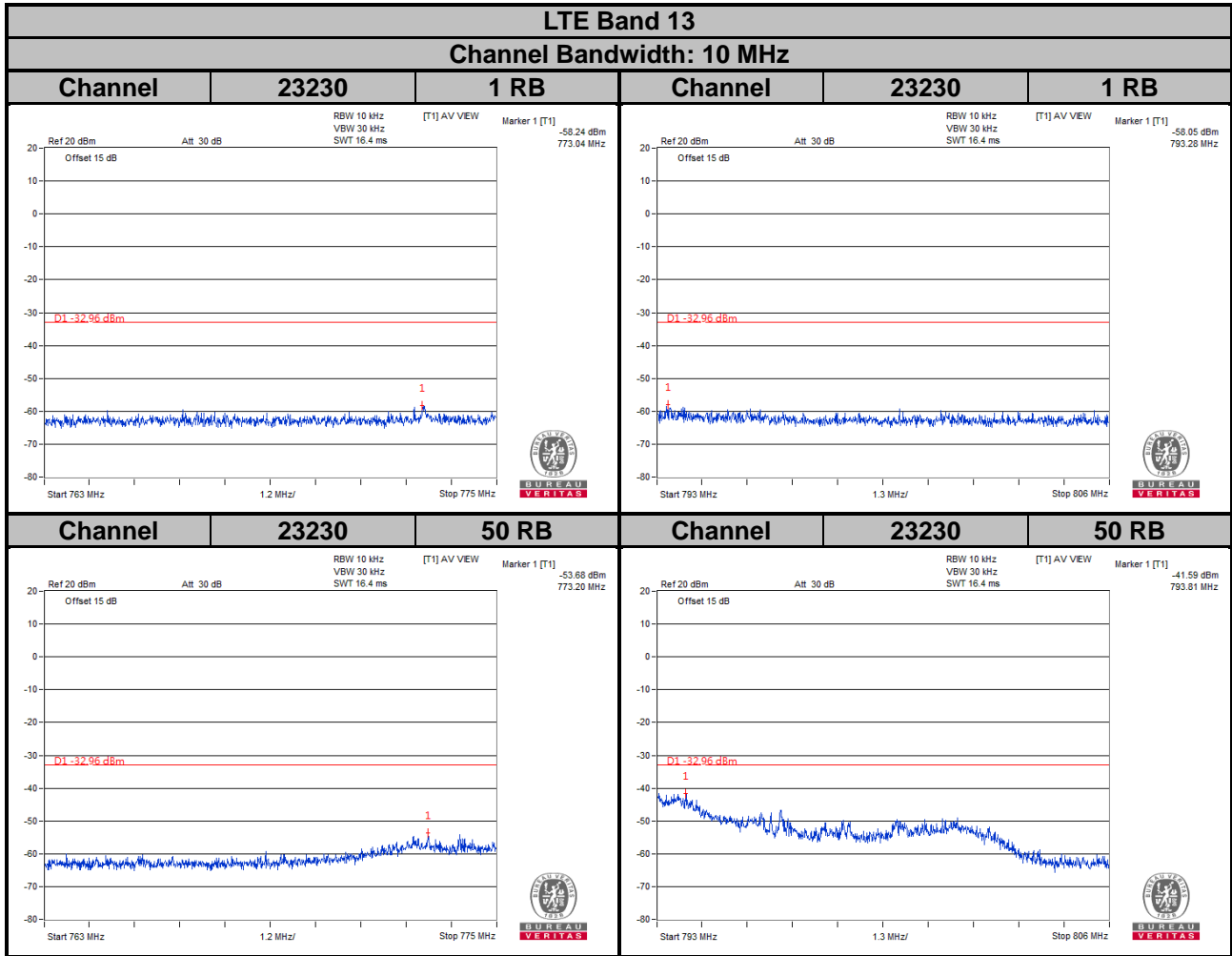
## Emission Mask



For the 763 - 775 MHz and 793 - 805 MHz band, the FCC limit is  $65 + 10\log(P[\text{watt}])$  in a 6.25 kHz bandwidth. Since it was not possible to set the resolution bandwidth to 6.25 kHz with the available equipment, a bandwidth of 10 kHz was used instead to show compliance. By using a 10 kHz bandwidth on the spectrum analyzer.

$$10\log(10\text{kHz}/6.25\text{kHz}) = 2.04 \text{ dB}$$

$$\text{Limit line} = -35 \text{ dBm} + 2.04 \text{ dB} = -32.96 \text{ dBm}$$



For the 763 - 775 MHz and 793 - 805 MHz band, the FCC limit is  $65 + 10\log(P[\text{watt}])$  in a 6.25 kHz bandwidth. Since it was not possible to set the resolution bandwidth to 6.25 kHz with the available equipment, a bandwidth of 10 kHz was used instead to show compliance. By using a 10 kHz bandwidth on the spectrum analyzer.

$$10\log(10\text{kHz}/6.25\text{kHz}) = 2.04 \text{ dB}$$

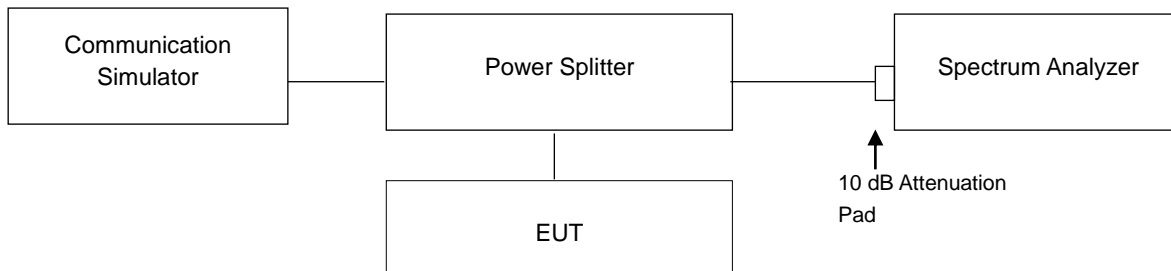
$$\text{Limit line} = -35 \text{ dBm} + 2.04 \text{ dB} = -32.96 \text{ dBm}$$

## 4.6 Peak to Average Ratio

### 4.6.1 Limits of Peak to Average Ratio Measurement

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.

### 4.6.2 Test Setup

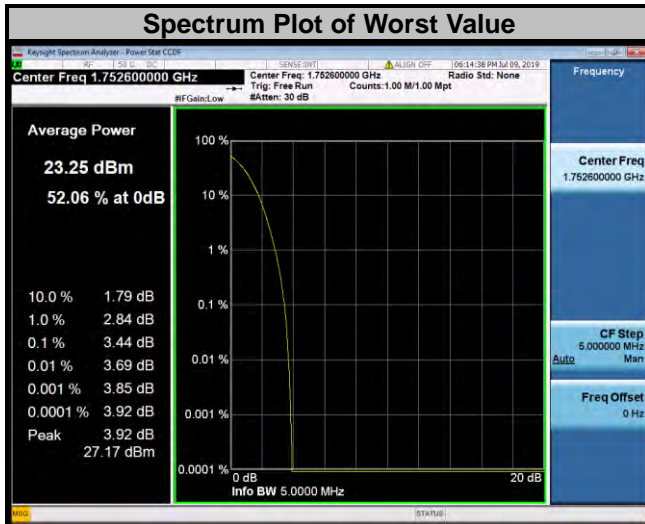


### 4.6.3 Test Procedures

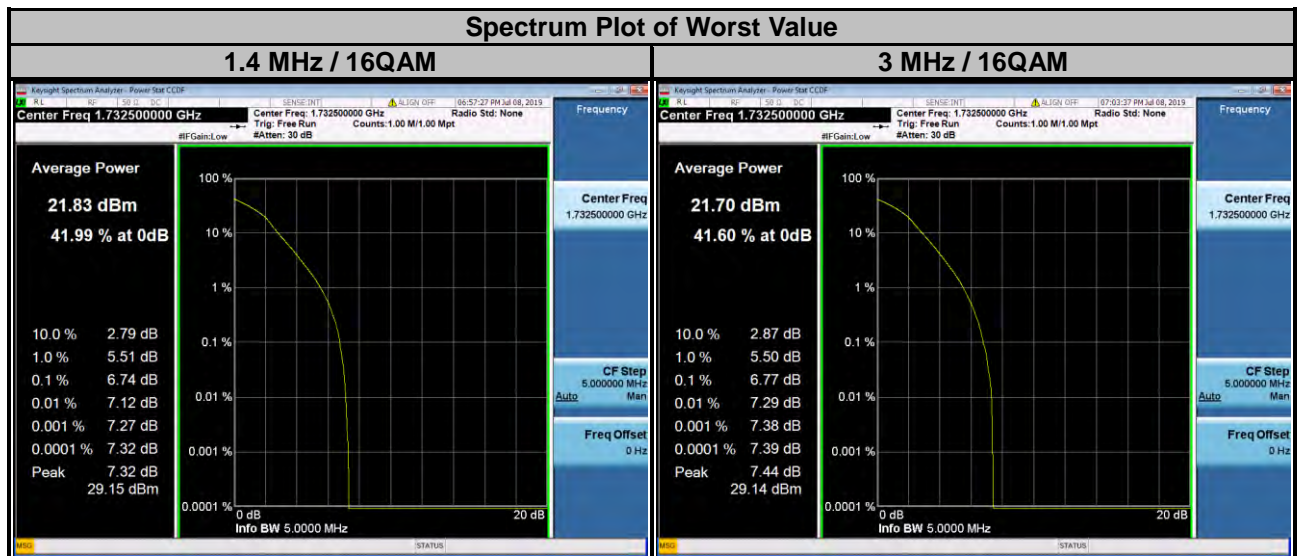
1. Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1 %.

#### 4.6.4 Test Results

WCDMA		
Channel	Frequency (MHz)	Peak to Average Ratio (dB)
1312	1712.4	3.41
1413	1732.6	3.43
1513	1752.6	3.44

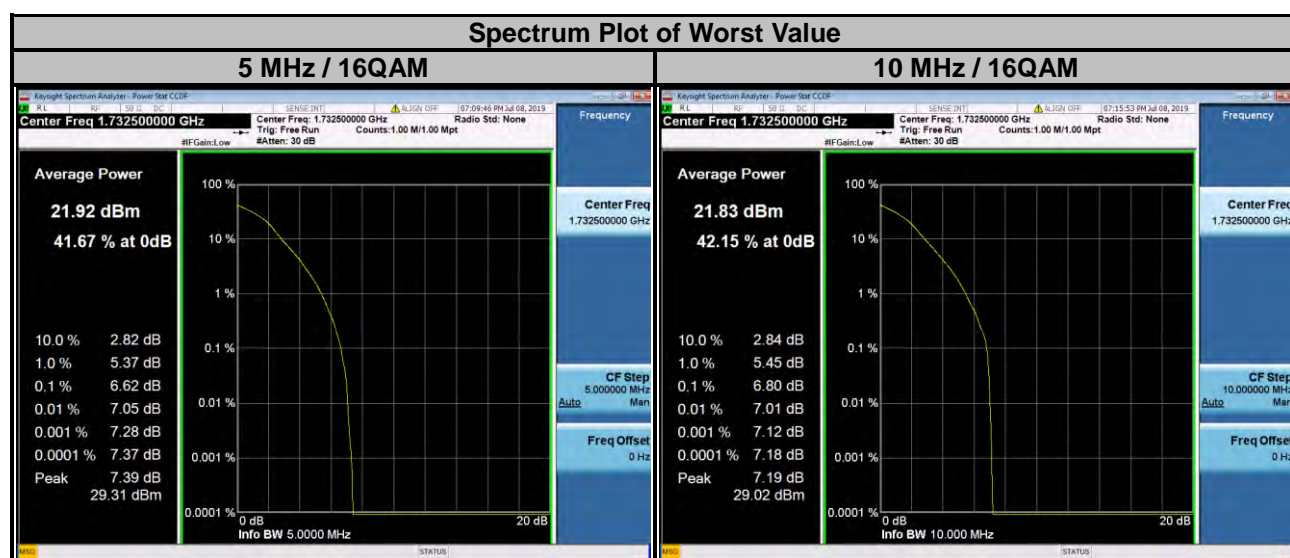


LTE Band 4							
Channel Bandwidth: 1.4 MHz				Channel Bandwidth: 3 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
19957	1710.7	5.82	6.43	19965	1711.5	5.87	6.53
20175	1732.5	5.80	6.74	20175	1732.5	5.88	6.77
20393	1754.3	5.86	6.50	20385	1753.5	5.91	6.62

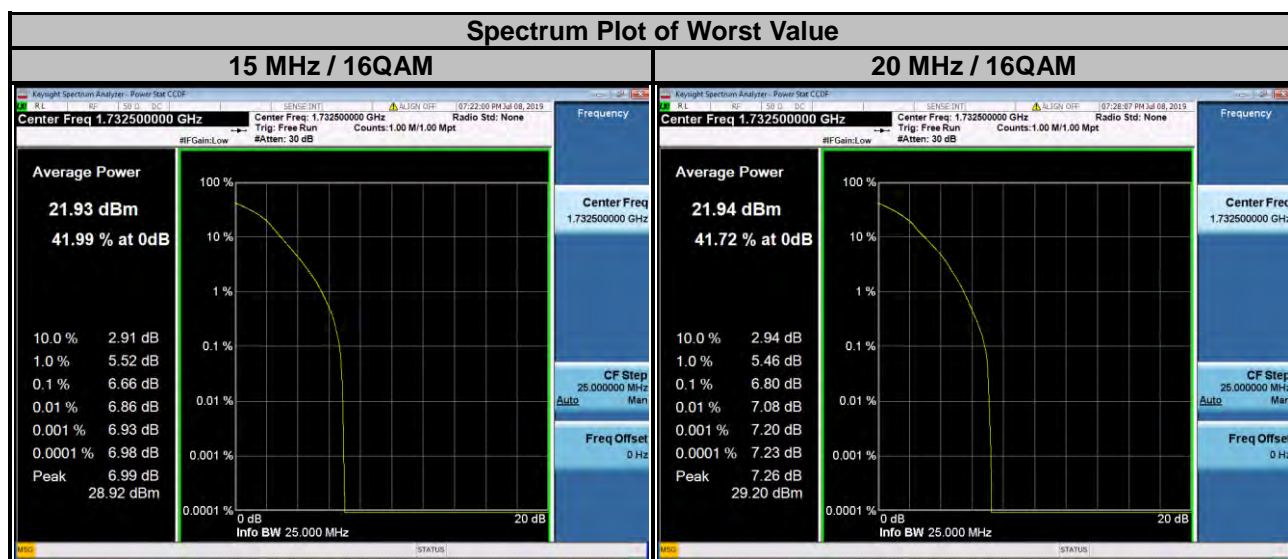




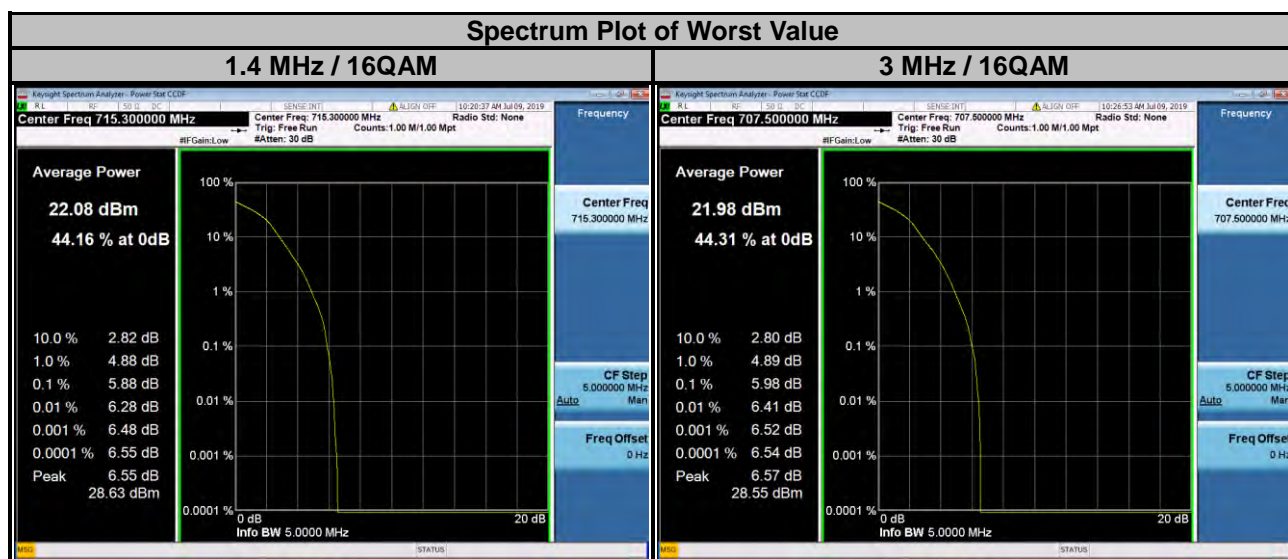
LTE Band 4							
Channel Bandwidth: 5 MHz				Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
19975	1712.5	5.92	6.38	20000	1715.0	5.97	6.45
20175	1732.5	5.91	6.62	20175	1732.5	5.87	6.80
20375	1752.5	5.95	6.48	20350	1750.0	6.01	6.64



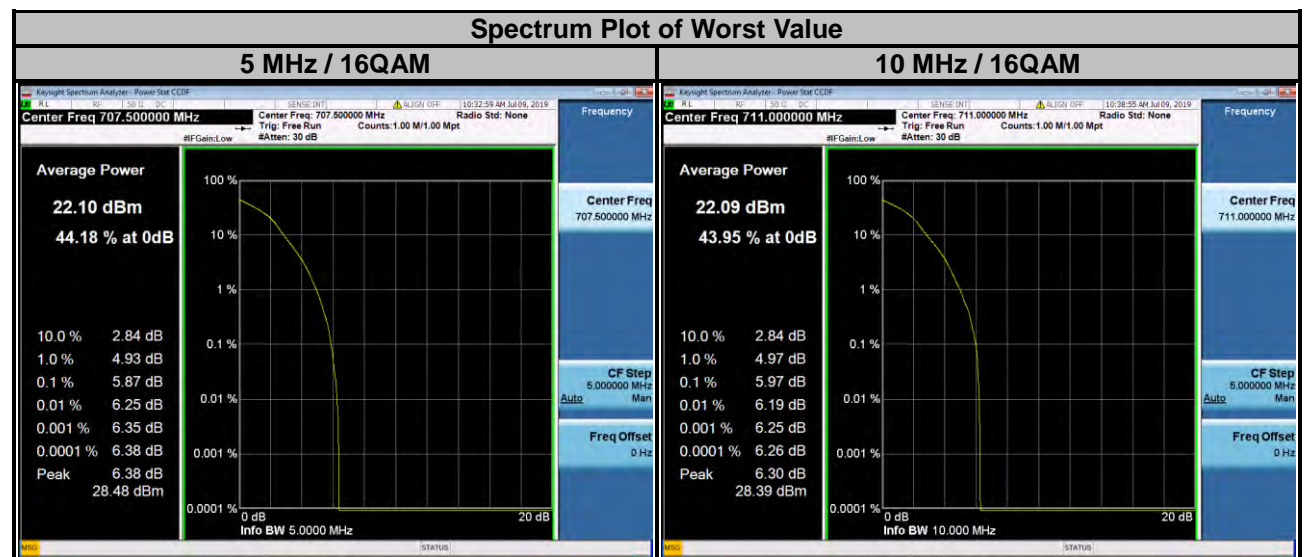
LTE Band 4							
Channel Bandwidth: 15 MHz				Channel Bandwidth: 20 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
20025	1717.5	5.88	6.64	20050	1720.0	6.01	6.46
20175	1732.5	5.89	6.66	20175	1732.5	5.89	6.80
20325	1747.5	6.21	6.66	20300	1745.0	6.19	6.61



LTE Band 12							
Channel Bandwidth: 1.4 MHz				Channel Bandwidth: 3 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
23017	699.7	4.85	5.49	23025	700.5	4.80	5.80
23095	707.5	4.97	5.85	23095	707.5	5.03	5.98
23173	715.3	5.01	5.88	23165	714.5	5.13	5.93



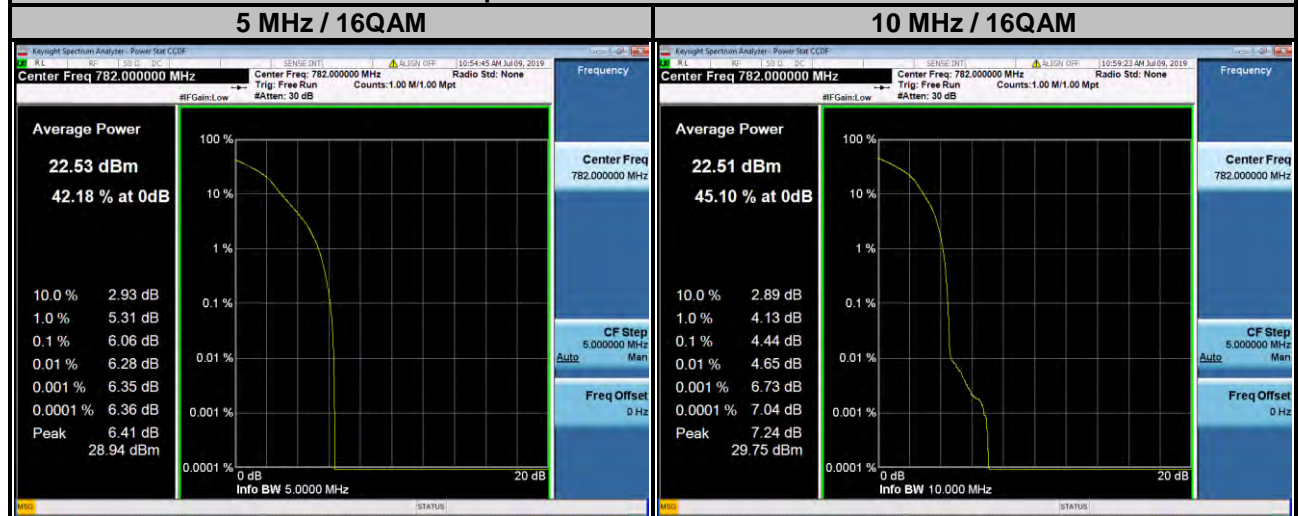
LTE Band 12							
Channel Bandwidth: 5 MHz				Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
23035	701.5	4.80	5.54	23060	704.0	4.82	5.53
23095	707.5	5.09	5.87	23095	707.5	5.12	5.88
23155	713.5	5.01	5.71	23130	711.0	5.07	5.97



### LTE Band 13

Channel Bandwidth: 5 MHz				Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
23205	779.5	3.67	4.23	23230	782.0	3.77	4.44
23230	782.0	5.39	6.06				
23255	784.5	5.09	5.45				

### Spectrum Plot of Worst Value

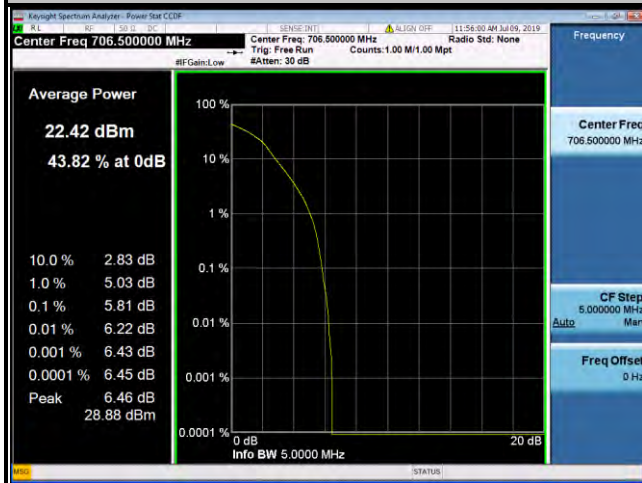


### LTE Band 17

Channel Bandwidth: 5 MHz				Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
23755	706.5	5.01	5.81	23780	709.0	5.06	5.78
23790	710.0	4.89	5.70	23790	710.0	4.98	5.76
23825	713.5	4.92	5.66	23800	711.0	4.99	5.95

### Spectrum Plot of Worst Value

#### 5 MHz / 16QAM



#### 10 MHz / 16QAM

