

## FCC Test Report

### (PART 27)

**Report No.:** RF171130C26-2

**FCC ID:** HD5-660W

**Test Model:** SOM660W

**Received Date:** Nov. 30, 2017

**Test Date:** Dec. 27, 2017 ~ Jan. 18, 2018

**Issued Date:** Jan. 26, 2018

**Applicant:** Honeywell International Inc.

**Address:** 9680 Old Bailes Road, Fort Mill, SC 29707 USA

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

**Lab Address:** No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan  
( R.O.C )

**Test Location (1):** No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan  
Hsien 333, Taiwan, R.O.C.

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



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### Release Control Record

Issue No.	Description	Date Issued
RF171130C26-2	Original Release	Jan. 26, 2018

## 1 Certificate of Conformity

**Product:** HSOM660

**Brand:** Honeywell

**Test Model:** SOM660W

**Sample Status:** Engineering Sample


**Applicant:** Honeywell International Inc.

**Test Date:** Dec. 27, 2017 ~ Jan. 18, 2018

**Standards:** FCC Part 27, Subpart C, 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: Jan. 26, 2018  
Vera Huang / Specialist

Approved by :  , Date: Jan. 26, 2018  
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.
2.1055 27.54	Frequency Stability	Pass	Meet the requirement of limit.
2.1049 27.53(h)	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 -33.28 dB at 42.42 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.
2.1055 27.54	Frequency Stability	Pass	Meet the requirement of limit.
2.1049 27.53(h)	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 -30.35 dB at 42.61 MHz.

**Applied Standard: FCC Part 27 & Part 2 (LTE 12)**

<b>FCC Clause</b>	<b>Test Item</b>	<b>Result</b>	<b>Remarks</b>
2.1046 27.50(c)(10)	Maximum Peak Output Power	Pass	Meet the requirement of limit.
2.1055 27.54	Frequency Stability	Pass	Meet the requirement of limit.
2.1049 27.53(g)	Occupied Bandwidth	Pass	Meet the requirement of limit.
27.50(d)(5)	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 -30.96 dB at 42.61 MHz.

**Applied Standard: FCC Part 27 & Part 2 (LTE 13)**

<b>FCC Clause</b>	<b>Test Item</b>	<b>Result</b>	<b>Remarks</b>
2.1046 27.50(b)(10)	Maximum Peak Output Power	Pass	Meet the requirement of limit.
2.1055 27.54	Frequency Stability	Pass	Meet the requirement of limit.
2.1049 27.53(g)	Occupied Bandwidth	Pass	Meet the requirement of limit.
27.50(d)(5)	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)(f)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -20.75 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.
2.1055 27.54	Frequency Stability	Pass	Meet the requirement of limit.
2.1049 27.53(g)	Occupied Bandwidth	Pass	Meet the requirement of limit.
27.50(d)(5)	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 -31.27 dB at 41.64 MHz.

## 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) (±)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.44 dB
Radiated Emissions up to 1 GHz	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	Feb. 17, 2017	Feb. 16, 2018
Spectrum Analyzer Agilent	N9010A	MY52220314	Nov. 24, 2017	Nov. 23, 2018
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	100115	Nov. 23, 2017	Nov. 22, 2018
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Dec. 06, 2017	Dec. 05, 2018
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-969	Dec. 12, 2017	Dec. 11, 2018
Double Ridge Guide Horn Antenna EMCO	3115	5619	Nov. 30, 2017	Nov. 29, 2018
BILOG Antenna SCHWARZBECK	VULB 9168	9168-153	Dec. 06, 2017	Dec. 05, 2018
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Dec. 01, 2017	Nov. 30, 2018
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(R FC-SMS-100-SM S-120+RFC-SMS -100-SMS-400)	Jun. 23, 2017	Jun. 22, 2018
MXG Vector signal generator Agilent	N5182B	MY53050430	Oct. 24, 2017	Oct. 23, 2018
Loop Antenna	EM-6879	269	Aug. 11, 2017	Aug. 10, 2018
Preamplifier EMCI	EMC001340	980201	Nov. 01, 2017	Oct. 30, 2018
Bluetooth Tester	CBT	100946	Jul. 29, 2016	Jul. 28, 2018
Preamplifier EMCI	EMC 012645	980115	Oct. 20, 2017	Oct. 19, 2018
Preamplifier EMCI	EMC 184045	980116	Oct. 20, 2017	Oct. 19, 2018
Preamplifier EMCI	EMC 330H	980112	Oct. 13, 2017	Oct. 12, 2018
Power Meter Anritsu	ML2495A	1012010	Aug. 15, 2017	Aug. 14, 2018
Power Sensor Anritsu	MA2411B	1315050	Aug. 15, 2017	Aug. 14, 2018
RF Coaxial Cable HUBER+SUHNNER	EMC104-SM-SM-8 000&3000	140811+170717	Oct. 20, 2017	Oct. 19, 2018



Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM-1000(140807)	Oct. 20, 2017	Oct. 19, 2018
RF Coaxial Cable Worken	8D-FB	Cable-Ch10-01	Oct. 20, 2017	Oct. 19, 2018
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

- 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. The horn antenna and preamplifier (model: EMC 184045) are used only for the measurement of emission frequency above 1 GHz if tested.
4. The IC Site Registration No. is IC7450F-10.

### 3 General Information

#### 3.1 General Description of EUT

<b>Product</b>	HSOM660	
<b>Brand</b>	Honeywell	
<b>Test Model</b>	SOM660W	
<b>Status of EUT</b>	Engineering Sample	
<b>HW Version</b>	V2.0	
<b>HW P/N</b>	22	
<b>SW Version</b>	HON.01.004	
<b>SW P/N</b>	351D	
<b>Power Supply Rating</b>	3.85 Vdc (battery)	
<b>Modulation Type</b>	WCDMA	QPSK
	LTE	QPSK, 16QAM, 64QAM
<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
	<b>Emission Designator</b>	WCDMA
LTE Band 4 (Channel Bandwidth: 1.4 MHz)		1M09W7D
LTE Band 4 (Channel Bandwidth: 3 MHz)		2M71W7D
LTE Band 4 (Channel Bandwidth: 5 MHz)		4M50W7D
LTE Band 4 (Channel Bandwidth: 10 MHz)		8M99G7D
LTE Band 4 (Channel Bandwidth: 15 MHz)		13M5G7D
LTE Band 4 (Channel Bandwidth: 20 MHz)		18M0W7D
LTE Band 12 (Channel Bandwidth: 1.4 MHz)		1M09W7D
LTE Band 12 (Channel Bandwidth: 3 MHz)		2M70G7D
LTE Band 12 (Channel Bandwidth: 5 MHz)		4M51W7D
LTE Band 12 (Channel Bandwidth: 10 MHz)		9M00W7D
LTE Band 13 (Channel Bandwidth: 5 MHz)		4M50W7D
LTE Band 13 (Channel Bandwidth: 10 MHz)		8M95W7D
LTE Band 17 (Channel Bandwidth: 5 MHz)		4M51W7D
LTE Band 17 (Channel Bandwidth: 10 MHz)	9M01W7D	

<b>Max. ERP Power</b>	LTE Band 12 (Channel Bandwidth: 1.4 MHz)	105.68 mW
	LTE Band 12 (Channel Bandwidth: 3 MHz)	128.23 mW
	LTE Band 12 (Channel Bandwidth: 5 MHz)	132.13 mW
	LTE Band 12 (Channel Bandwidth: 10 MHz)	136.77 mW
	LTE Band 13 (Channel Bandwidth: 5 MHz)	112.46 mW
	LTE Band 13 (Channel Bandwidth: 10 MHz)	106.91 mW
	LTE Band 17 (Channel Bandwidth: 5 MHz)	113.76 mW
	LTE Band 17 (Channel Bandwidth: 10 MHz)	115.35 mW
<b>Max. EIRP Power</b>	WCDMA	609.54 mW
	LTE Band 4 (Channel Bandwidth: 1.4 MHz)	283.86 mW
	LTE Band 4 (Channel Bandwidth: 3 MHz)	289.80 mW
	LTE Band 4 (Channel Bandwidth: 5 MHz)	299.99 mW
	LTE Band 4 (Channel Bandwidth: 10 MHz)	363.66 mW
	LTE Band 4 (Channel Bandwidth: 15 MHz)	387.35 mW
	LTE Band 4 (Channel Bandwidth: 20 MHz)	392.74 mW
<b>Antenna Type</b>	PIFA Antenna	
<b>Accessory Device</b>	Refer to Note as below	
<b>Data Cable Supplied</b>	N/A	

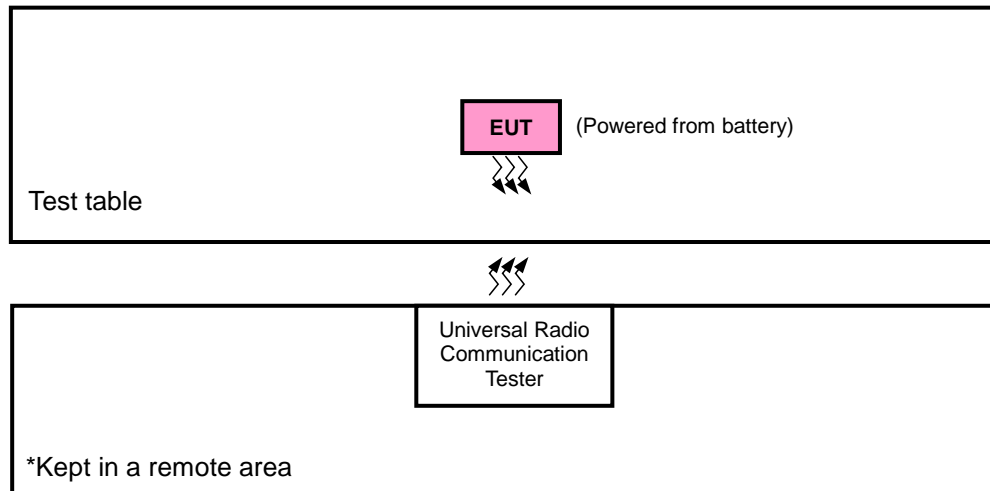
Note:

- The EUT has been tested with following support unit.

Product	Brand	Model	Description
Battery	Inventus Power Inc.	CW-BAT	3.85 Vdc, 5800 mAh

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

### 3.2 Configuration of System under 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	Y-plane	Z-axis
LTE Band 4	X-plane	X-axis
LTE Band 12	X-plane	Z-axis
LTE Band 13	X-plane	Z-axis
LTE Band 17	X-plane	Z-axis

#### WCDMA

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	EIRP	1312 to 1513	1312, 1413, 1513	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, 64QAM	1 RB / 0 RB Offset
		19965 to 20385	19965, 20175, 20385	3 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		19975 to 20375	19975, 20175, 20375	5 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		20000 to 20350	20000, 20175, 20350	10 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		20025 to 20325	20025, 20175, 20325	15 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		20050 to 20300	20050, 20175, 20300	20 MHz	QPSK, 16QAM, 64QAM	1 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, 64QAM	6 RB / 0 RB Offset
		19965 to 20385	19965, 20175, 20385	3 MHz	QPSK, 16QAM, 64QAM	15 RB / 0 RB Offset
		19975 to 20375	19975, 20175, 20375	5 MHz	QPSK, 16QAM, 64QAM	25 RB / 0 RB Offset
		20000 to 20350	20000, 20175, 20350	10 MHz	QPSK, 16QAM, 64QAM	50 RB / 0 RB Offset
		20025 to 20325	20025, 20175, 20325	15 MHz	QPSK, 16QAM, 64QAM	75 RB / 0 RB Offset
		20050 to 20300	20050, 20175, 20300	20 MHz	QPSK, 16QAM, 64QAM	100 RB / 0 RB Offset
-	Peak to Average Ratio	19957 to 20393	19957, 20175, 20393	1.4 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		19965 to 20385	19965, 20175, 20385	3 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		19975 to 20375	19975, 20175, 20375	5 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		20000 to 20350	20000, 20175, 20350	10 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		20025 to 20325	20025, 20175, 20325	15 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		20050 to 20300	20050, 20175, 20300	20 MHz	QPSK, 16QAM, 64QAM	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 6 RB / 0 RB Offset		
			20393	1.4 MHz	QPSK	1 RB / 5 RB Offset 6 RB / 0 RB Offset		
		19965 to 20385	19965	3 MHz	QPSK	1 RB / 0 RB Offset 15 RB / 0 RB Offset		
			20385	3 MHz	QPSK	1 RB / 14 RB Offset 15 RB / 0 RB Offset		
		19975 to 20375	19975	5 MHz	QPSK	1 RB / 0 RB Offset 25 RB / 0 RB Offset		
			20375	5 MHz	QPSK	1 RB / 24 RB Offset 25 RB / 0 RB Offset		
		20000 to 20350	20000	10 MHz	QPSK	1 RB / 0 RB Offset 50 RB / 0 RB Offset		
			20350	10 MHz	QPSK	1 RB / 49 RB Offset 50 RB / 0 RB Offset		
		20025 to 20325	20025	15 MHz	QPSK	1 RB / 0 RB Offset 75 RB / 0 RB Offset		
			20325	15 MHz	QPSK	1 RB / 74 RB Offset 75 RB / 0 RB Offset		
		20050 to 20300	20050	20 MHz	QPSK	1 RB / 0 RB Offset 100 RB / 0 RB Offset		
			20300	20 MHz	QPSK	1 RB / 99 RB Offset 100 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	1 RB / 0 RB Offset
				19975 to 20375	19975, 20175, 20375	5 MHz	QPSK	1 RB / 0 RB Offset
				20000 to 20350	20000, 20175, 20350	10 MHz	QPSK	1 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	20050 to 20300	20050, 20175, 20300	20 MHz	QPSK	1 RB / 0 RB Offset		

**Note:** This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

### 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, 64QAM	1 RB / 0 RB Offset		
		23025 to 23165	23025, 23095, 23165	3 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset		
		23035 to 23155	23035, 23095, 23155	5 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset		
		23060 to 23130	23060, 23095, 23130	10 MHz	QPSK, 16QAM, 64QAM	1 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, 64QAM	6 RB / 0 RB Offset		
		23025 to 23165	23025, 23095, 23165	3 MHz	QPSK, 16QAM, 64QAM	15 RB / 0 RB Offset		
		23035 to 23155	23035, 23095, 23155	5 MHz	QPSK, 16QAM, 64QAM	25 RB / 0 RB Offset		
		23060 to 23130	23060, 23095, 23130	10 MHz	QPSK, 16QAM, 64QAM	50 RB / 0 RB Offset		
-	Peak to Average Ratio	23017 to 23173	23017, 23095, 23173	1.4 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset		
		23025 to 23165	23025, 23095, 23165	3 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset		
		23035 to 23155	23035, 23095, 23155	5 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset		
		23060 to 23130	23060, 23095, 23130	10 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset		
-	Band Edge	23017 to 23173	23017	1.4 MHz	QPSK	1 RB / 0 RB Offset 6 RB / 0 RB Offset		
			23173	1.4 MHz	QPSK	1 RB / 5 RB Offset 6 RB / 0 RB Offset		
		23025 to 23165	23025	3 MHz	QPSK	1 RB / 0 RB Offset 15 RB / 0 RB Offset		
			23165	3 MHz	QPSK	1 RB / 14 RB Offset 15 RB / 0 RB Offset		
		23035 to 23155	23035	5 MHz	QPSK	1 RB / 0 RB Offset 25 RB / 0 RB Offset		
			23155	5 MHz	QPSK	1 RB / 24 RB Offset 25 RB / 0 RB Offset		
		23060 to 23130	23060	10 MHz	QPSK	1 RB / 0 RB Offset 50 RB / 0 RB Offset		
			23130	10 MHz	QPSK	1 RB / 49 RB Offset 50 RB / 0 RB Offset		
		-	Conducted Emission	23017 to 23173	23017, 23095, 23173	1.4 MHz	QPSK	1 RB / 0 RB Offset
				23025 to 23165	23025, 23095, 23165	3 MHz	QPSK	1 RB / 0 RB Offset
				23035 to 23155	23035, 23095, 23155	5 MHz	QPSK	1 RB / 0 RB Offset
				23060 to 23130	23060, 23095, 23130	10 MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission	23060 to 23130	23060, 23095, 23130	10 MHz	QPSK	1 RB / 0 RB Offset		

**Note:** This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.



### 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, 64QAM	1 RB / 0 RB Offset
		23230	23230	10 MHz	QPSK, 16QAM, 64QAM	1 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, 64QAM	25 RB / 0 RB Offset
		23230	23230	10 MHz	QPSK, 16QAM, 64QAM	50 RB / 0 RB Offset
-	Peak to Average Ratio	23205 to 23255	23205, 23230, 23255	5 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		23230	23230	10 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
-	Band Edge	23205 to 23255	23205	5 MHz	QPSK	1 RB / 0 RB Offset
			23255	5 MHz	QPSK	25 RB / 0 RB Offset
		23230	23230	10 MHz	QPSK	1 RB / 24 RB Offset
			23230	10 MHz	QPSK	25 RB / 0 RB Offset
			23230	10 MHz	QPSK	1 RB / 0 RB Offset
			23230	10 MHz	QPSK	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	23230	23230	10 MHz	QPSK	1 RB / 0 RB Offset
						1 RB / 0 RB Offset

**Note:** This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

### 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, 64QAM	1 RB / 0 RB Offset
		23780 to 23800	23780, 23790, 23800	10 MHz	QPSK, 16QAM, 64QAM	1 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, 64QAM	25 RB / 0 RB Offset
		23780 to 23800	23780, 23790, 23800	10 MHz	QPSK, 16QAM, 64QAM	50 RB / 0 RB Offset
-	Peak to Average Ratio	23755 to 23825	23755, 23790, 23825	5 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		23780 to 23800	23780, 23790, 23800	10 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
-	Band Edge	23755 to 23825	23755	5 MHz	QPSK	1 RB / 0 RB Offset
			23825	5 MHz	QPSK	25 RB / 0 RB Offset
		23780 to 23800	23780	10 MHz	QPSK	1 RB / 24 RB Offset
			23800	10 MHz	QPSK	25 RB / 0 RB Offset
						1 RB / 0 RB Offset
						50 RB / 0 RB Offset
-	Conducted Emission	23755 to 23825	23755, 23790, 23825	5 MHz	QPSK	1 RB / 49 RB Offset
		23780 to 23800	23780, 23790, 23800	10 MHz	QPSK	50 RB / 0 RB Offset
-	Radiated Emission	23780 to 23800	23780, 23790, 23800	10 MHz	QPSK	1 RB / 0 RB Offset

**Note:** This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

#### Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
ERP / EIRP	25 deg. C, 65 % RH	3.85 Vdc	Jisyong Wang
Frequency Stability	25 deg. C, 65 % RH	3.85 Vdc	Wayne Lin
Occupied Bandwidth	25 deg. C, 65 % RH	3.85 Vdc	Wayne Lin
Band Edge	25 deg. C, 65 % RH	3.85 Vdc	Wayne Lin
Peak to Average Ratio	25 deg. C, 65 % RH	3.85 Vdc	Wayne Lin
Conducted Emission	25 deg. C, 65 % RH	3.85 Vdc	Wayne Lin
Radiated Emission	25 deg. C, 65 % RH	3.85 Vdc	Jisyong Wang

### **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 v02r02**

**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 are limited to 1 watt EIRP.

Portable stations (hand-held devices) operating in the 704-716 MHz 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,  $E.R.P \text{ power} = E.I.P.R \text{ power} - 2.15 \text{ dBi}$ .

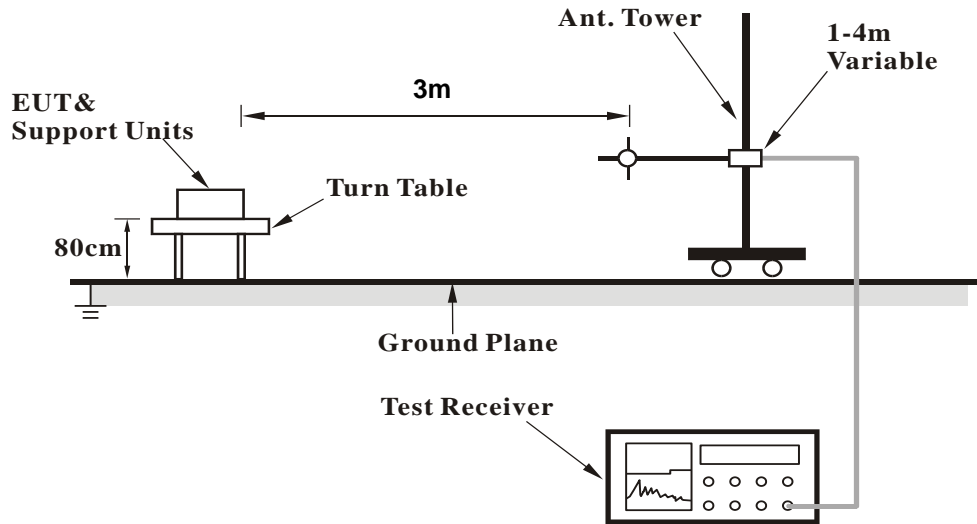
##### **Conducted Power Measurement:**

- a. The EUT was set up for the maximum power with 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.

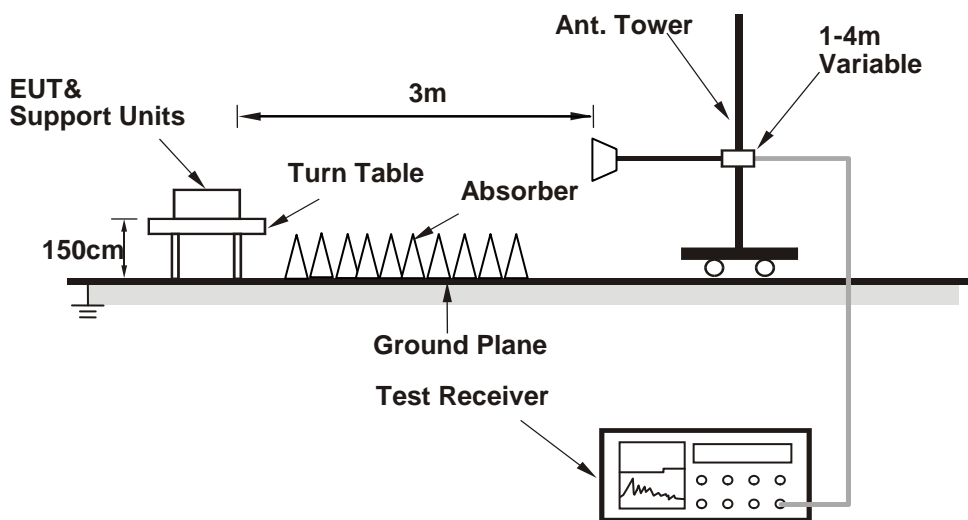
4.1.3 Test Setup

**EIRP / ERP Measurement:**

**<Radiated Emission below or equal 1 GHz>**

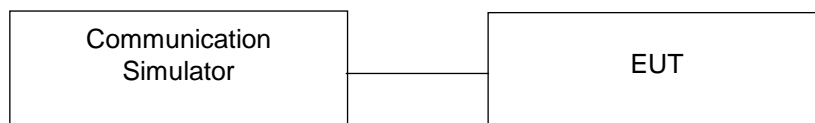


**<Radiated Emission above 1 GHz>**



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		
	1312	1413	1513
Channel	1712.4	1732.6	1752.6
Frequency (MHz)	1712.4	1732.6	1752.6
RMC 12.2K	24.51	24.65	24.69
HSDPA Subtest-1	23.51	23.65	23.69
HSDPA Subtest-2	23.50	23.64	23.68
HSDPA Subtest-3	23.03	23.17	23.21
HSDPA Subtest-4	23.01	23.15	23.19
HSUPA Subtest-1	23.50	23.64	23.68
HSUPA Subtest-2	21.50	21.64	21.68
HSUPA Subtest-3	22.49	22.63	22.67
HSUPA Subtest-4	21.49	21.63	21.67
HSUPA Subtest-5	23.56	23.70	23.74

**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	24.52	24.56	24.59	0	15M	QPSK	1	0	24.41	24.45	24.48	0				
		1	50	24.36	24.40	24.43	0			1	37	24.25	24.29	24.32	0				
		1	99	24.34	24.38	24.41	0			1	74	24.23	24.27	24.30	0				
		50	0	23.52	23.56	23.59	1			36	0	23.41	23.45	23.48	1				
		50	25	23.47	23.51	23.54	1			36	19	23.36	23.40	23.43	1				
		50	50	23.38	23.42	23.45	1			36	39	23.27	23.31	23.34	1				
	100	0	23.42	23.46	23.49	1	75		0	23.31	23.35	23.38	1						
	16QAM	1	0	23.50	23.54	23.57	1		16QAM	1	0	23.39	23.43	23.46	1				
		1	50	23.34	23.38	23.41	1			1	37	23.23	23.27	23.30	1				
		1	99	23.32	23.36	23.39	1			1	74	23.21	23.25	23.28	1				
		50	0	22.50	22.54	22.57	2			36	0	22.39	22.43	22.46	2				
		50	25	22.45	22.49	22.52	2			36	19	22.34	22.38	22.41	2				
		50	50	22.36	22.40	22.43	2			36	39	22.25	22.29	22.32	2				
	100	0	22.40	22.44	22.47	2	75		0	22.29	22.33	22.36	2						
	64QAM	1	0	22.41	22.45	22.48	2		64QAM	1	0	22.30	22.34	22.37	2				
		1	50	22.25	22.29	22.32	2			1	37	22.14	22.18	22.21	2				
		1	99	22.23	22.27	22.30	2			1	74	22.12	22.16	22.19	2				
		50	0	21.41	21.45	21.48	3			36	0	21.30	21.34	21.37	3				
		50	25	21.36	21.40	21.43	3			36	19	21.25	21.29	21.32	3				
		50	50	21.27	21.31	21.34	3			36	39	21.16	21.20	21.23	3				
	100	0	21.31	21.35	21.38	3	75		0	21.20	21.24	21.27	3						
	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	24.33	24.37	24.40	0	5M	QPSK	1	0	24.27	24.31	24.34	0				
		1	24	24.17	24.21	24.24	0			1	12	24.11	24.15	24.18	0				
		1	49	24.15	24.19	24.22	0			1	24	24.09	24.13	24.16	0				
		25	0	23.33	23.37	23.40	1			12	0	23.27	23.31	23.34	1				
		25	12	23.28	23.32	23.35	1			12	6	23.22	23.26	23.29	1				
		25	25	23.19	23.23	23.26	1			12	13	23.13	23.17	23.20	1				
	50	0	23.23	23.27	23.30	1	25		0	23.17	23.21	23.24	1						
	16QAM	1	0	23.31	23.35	23.38	1		16QAM	1	0	23.25	23.29	23.32	1				
		1	24	23.15	23.19	23.22	1			1	12	23.09	23.13	23.16	1				
		1	49	23.13	23.17	23.20	1			1	24	23.07	23.11	23.14	1				
		25	0	22.31	22.35	22.38	2			12	0	22.25	22.29	22.32	2				
		25	12	22.26	22.30	22.33	2			12	6	22.20	22.24	22.27	2				
		25	25	22.17	22.21	22.24	2			12	13	22.11	22.15	22.18	2				
	50	0	22.21	22.25	22.28	2	25		0	22.15	22.19	22.22	2						
	64QAM	1	0	22.22	22.26	22.29	2		64QAM	1	0	22.16	22.20	22.23	2				
		1	24	22.06	22.10	22.13	2			1	12	22.00	22.04	22.07	2				
		1	49	22.04	22.08	22.11	2			1	24	21.98	22.02	22.05	2				
		25	0	21.22	21.26	21.29	3			12	0	21.16	21.20	21.23	3				
		25	12	21.17	21.21	21.24	3			12	6	21.11	21.15	21.18	3				
		25	25	21.08	21.12	21.15	3			12	13	21.02	21.06	21.09	3				
	50	0	21.12	21.16	21.19	3	25		0	21.06	21.10	21.13	3						
	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	24.16	24.20	24.23	0	1.4M	QPSK	1	0	24.06	24.10	24.13	0				
		1	7	24.00	24.04	24.07	0			1	2	23.90	23.94	23.97	0				
		1	14	23.98	24.02	24.05	0			1	5	23.88	23.92	23.95	0				
		8	0	23.16	23.20	23.23	1			3	0	23.76	23.80	23.83	0				
		8	3	23.11	23.15	23.18	1			3	1	23.71	23.75	23.78	0				
		8	7	23.02	23.06	23.09	1			3	3	23.62	23.66	23.69	0				
	15	0	23.06	23.10	23.13	1	6		0	22.96	23.00	23.03	1						
	16QAM	1	0	23.14	23.18	23.21	1		16QAM	1	0	23.04	23.08	23.11	1				
		1	7	22.98	23.02	23.05	1			1	2	22.88	22.92	22.95	1				
		1	14	22.96	23.00	23.03	1			1	5	22.86	22.90	22.93	1				
		8	0	22.14	22.18	22.21	2			3	0	22.74	22.78	22.81	1				
		8	3	22.09	22.13	22.16	2			3	1	22.69	22.73	22.76	1				
		8	7	22.00	22.04	22.07	2			3	3	22.60	22.64	22.67	1				
	15	0	22.04	22.08	22.11	2	6		0	21.94	21.98	22.01	2						
	64QAM	1	0	22.05	22.09	22.12	2		64QAM	1	0	21.95	21.99	22.02	2				
		1	7	21.89	21.93	21.96	2			1	2	21.79	21.83	21.86	2				
		1	14	21.87	21.91	21.94	2			1	5	21.77	21.81	21.84	2				
		8	0	21.05	21.09	21.12	3			3	0	21.65	21.69	21.72	2				
		8	3	21.00	21.04	21.07	3			3	1	21.60	21.64	21.67	2				
		8	7	20.91	20.95	20.98	3			3	3	21.51	21.55	21.58	2				
	15	0	20.95	20.99	21.02	3	6		0	20.85	20.89	20.92	3						

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)		
				23060	23095	23130						23035	23095	23155			
				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	23.97	23.96	24.05	0	5M	QPSK	1	0	23.88	23.87	23.96	0		
		1	24	24.08	24.07	24.16	0			1	12	23.99	23.98	24.07	0		
		1	49	24.04	24.03	24.12	0			1	24	23.95	23.94	24.03	0		
		25	0	23.10	23.09	23.18	1			12	0	23.01	23.00	23.09	1		
		25	12	23.20	23.19	23.28	1			12	6	23.11	23.10	23.19	1		
		25	25	23.15	23.14	23.23	1			12	13	23.06	23.05	23.14	1		
	16QAM	50	0	23.17	23.16	23.25	1		25	0	23.08	23.07	23.16	1			
		1	0	22.95	22.94	23.03	1		16QAM	1	0	22.86	22.85	22.94	1		
		1	24	23.06	23.05	23.14	1			1	12	22.97	22.96	23.05	1		
		1	49	23.02	23.01	23.10	1			1	24	22.93	22.92	23.01	1		
		25	0	22.08	22.07	22.16	2			12	0	21.99	21.98	22.07	2		
		25	12	22.18	22.17	22.26	2			12	6	22.09	22.08	22.17	2		
	25	25	22.13	22.12	22.21	2	12			13	22.04	22.03	22.12	2			
	64QAM	50	0	22.15	22.14	22.23	2		25	0	22.06	22.05	22.14	2			
		1	0	21.89	21.88	21.97	2		64QAM	1	0	21.80	21.79	21.88	2		
		1	24	22.00	21.99	22.08	2			1	12	21.91	21.90	21.99	2		
		1	49	21.96	21.95	22.04	2			1	24	21.87	21.86	21.95	2		
		25	0	21.02	21.01	21.10	3			12	0	20.93	20.92	21.01	3		
		25	12	21.12	21.11	21.20	3			12	6	21.03	21.02	21.11	3		
	25	25	21.07	21.06	21.15	3	12			13	20.98	20.97	21.06	3			
	50	0	21.09	21.08	21.17	3	25		0	21.00	20.99	21.08	3				
	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)
					23025	23095	23165							23017	23095	23173	
					Channel	700.5	707.5							714.5	Channel	699.7	
		Frequency (MHz)		700.5	707.5	714.5			Frequency (MHz)		699.7	707.5	715.3				
3M	QPSK	1	0	23.74	23.73	23.82	0	1.4M	QPSK	1	0	23.59	23.58	23.67	0		
		1	7	23.85	23.84	23.93	0			1	2	23.70	23.69	23.78	0		
		1	14	23.81	23.80	23.89	0			1	5	23.66	23.65	23.74	0		
		8	0	22.87	22.86	22.95	1			3	0	23.52	23.51	23.60	0		
		8	3	22.97	22.96	23.05	1			3	1	23.62	23.61	23.70	0		
		8	7	22.92	22.91	23.00	1			3	3	23.57	23.56	23.65	0		
	16QAM	15	0	22.94	22.93	23.02	1		6	0	22.79	22.78	22.87	1			
		1	0	22.72	22.71	22.80	1		16QAM	1	0	22.57	22.56	22.65	1		
		1	7	22.83	22.82	22.91	1			1	2	22.68	22.67	22.76	1		
		1	14	22.79	22.78	22.87	1			1	5	22.64	22.63	22.72	1		
		8	0	21.85	21.84	21.93	2			3	0	22.50	22.49	22.58	1		
		8	3	21.95	21.94	22.03	2			3	1	22.60	22.59	22.68	1		
	8	7	21.90	21.89	21.98	2	3			3	22.55	22.54	22.63	1			
	64QAM	15	0	21.92	21.91	22.00	2		6	0	21.77	21.76	21.85	2			
		1	0	21.66	21.65	21.74	2		64QAM	1	0	21.51	21.50	21.59	2		
		1	7	21.77	21.76	21.85	2			1	2	21.62	21.61	21.70	2		
		1	14	21.73	21.72	21.81	2			1	5	21.58	21.57	21.66	2		
		8	0	20.79	20.78	20.87	3			3	0	21.44	21.43	21.52	2		
		8	3	20.89	20.88	20.97	3			3	1	21.54	21.53	21.62	2		
	8	7	20.84	20.83	20.92	3	3			3	21.49	21.48	21.57	2			
	15	0	20.86	20.85	20.94	3	6		0	20.71	20.70	20.79	3				



LTE Band 13															
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)
		Frequency (MHz)	782.0	779.5	782.0	784.5									
10M	QPSK	1	0		23.91		0	5M	QPSK	1	0	23.94	23.90	23.78	0
		1	24		23.81		0			1	12	23.83	23.79	23.67	0
		1	49		23.55		0			1	24	23.71	23.67	23.55	0
		25	0		22.95		1			12	0	22.88	22.84	22.72	1
		25	12		22.87		1			12	6	22.91	22.87	22.75	1
		25	25		22.73		1			12	13	22.78	22.74	22.62	1
	16QAM	50	0		22.83		1		25	0	22.87	22.83	22.71	1	
		1	0		22.89		1		16QAM	1	0	22.92	22.88	22.76	1
		1	24		22.79		1			1	12	22.81	22.77	22.65	1
		1	49		22.53		1			1	24	22.69	22.65	22.53	1
		25	0		21.93		2			12	0	21.86	21.82	21.70	2
		25	12		21.85		2			12	6	21.89	21.85	21.73	2
	25	25		21.71		2	12			13	21.76	21.72	21.60	2	
	64QAM	50	0		21.81		2		25	0	21.85	21.81	21.69	2	
		1	0		21.84		2		64QAM	1	0	21.86	21.82	21.70	2
		1	24		21.74		2			1	12	21.75	21.71	21.59	2
		1	49		21.48		2			1	24	21.63	21.59	21.47	2
		25	0		20.88		3			12	0	20.80	20.76	20.64	3
		25	12		20.80		3			12	6	20.83	20.79	20.67	3
		25	25		20.66		3			12	13	20.70	20.66	20.54	3
		50	0		20.76		3			25	0	20.79	20.75	20.63	3

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)
		Frequency (MHz)	709.0	710.0	711.0	706.5	710.0			713.5					
10M	QPSK	1	0	23.96	23.98	24.05	0	5M	QPSK	1	0	23.88	23.90	23.97	0
		1	24	24.04	24.06	24.13	0			1	12	23.96	23.98	24.05	0
		1	49	23.97	23.99	24.06	0			1	24	23.89	23.91	23.98	0
		25	0	23.13	23.15	23.22	1			12	0	23.05	23.07	23.14	1
		25	12	23.15	23.17	23.24	1			12	6	23.07	23.09	23.16	1
		25	25	23.02	23.04	23.11	1			12	13	22.94	22.96	23.03	1
	16QAM	50	0	23.09	23.11	23.18	1		25	0	23.01	23.03	23.10	1	
		1	0	22.94	22.96	23.03	1		16QAM	1	0	22.86	22.88	22.95	1
		1	24	23.02	23.04	23.11	1			1	12	22.94	22.96	23.03	1
		1	49	22.95	22.97	23.04	1			1	24	22.87	22.89	22.96	1
		25	0	22.11	22.13	22.20	2			12	0	22.03	22.05	22.12	2
		25	12	22.13	22.15	22.22	2			12	6	22.05	22.07	22.14	2
	25	25	22.00	22.02	22.09	2	12			13	21.92	21.94	22.01	2	
	64QAM	50	0	22.07	22.09	22.16	2		25	0	21.99	22.01	22.08	2	
		1	0	21.87	21.89	21.96	2		64QAM	1	0	21.79	21.81	21.88	2
		1	24	21.95	21.97	22.04	2			1	12	21.87	21.89	21.96	2
		1	49	21.88	21.90	21.97	2			1	24	21.80	21.82	21.89	2
		25	0	21.04	21.06	21.13	3			12	0	20.96	20.98	21.05	3
		25	12	21.06	21.08	21.15	3			12	6	20.98	21.00	21.07	3
		25	25	20.93	20.95	21.02	3			12	13	20.85	20.87	20.94	3
		50	0	21.00	21.02	21.09	3			25	0	20.92	20.94	21.01	3

**ERP Power (dBm)**

<b>LTE Band 12</b>							
<b>Channel Bandwidth: 1.4 MHz / QPSK</b>							
<b>Plane</b>	<b>Channel</b>	<b>Frequency (MHz)</b>	<b>LVL (dBm)</b>	<b>Correction Factor (dB)</b>	<b>ERP (dBm)</b>	<b>ERP (mW)</b>	<b>Polarization (H/V)</b>
X	23017	699.7	-7.97	30.36	20.24	105.68	H
	23095	707.5	-7.99	30.17	20.03	100.69	
	23173	715.3	-8.30	30.17	19.72	93.76	
	23017	699.7	-13.59	32.03	16.29	42.56	V
	23095	707.5	-13.93	31.98	15.90	38.90	
	23173	715.3	-14.16	32.06	15.75	37.58	
<b>Channel Bandwidth: 1.4 MHz / 16QAM</b>							
X	23017	699.7	-9.02	30.36	19.19	82.99	H
	23095	707.5	-9.08	30.17	18.94	78.34	
	23173	715.3	-9.31	30.17	18.71	74.30	
	23017	699.7	-14.67	32.03	15.21	33.19	V
	23095	707.5	-15.00	31.98	14.83	30.41	
	23173	715.3	-15.22	32.06	14.69	29.44	
<b>Channel Bandwidth: 1.4 MHz / 64QAM</b>							
X	23017	699.7	-10.10	30.36	18.11	64.71	H
	23095	707.5	-10.16	30.17	17.86	61.09	
	23173	715.3	-10.34	30.17	17.68	58.61	
	23017	699.7	-15.68	32.03	14.20	26.30	V
	23095	707.5	-16.03	31.98	13.80	23.99	
	23173	715.3	-16.25	32.06	13.66	23.23	

LTE Band 12							
Channel Bandwidth: 3 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)
X	23025	700.5	-6.94	30.17	21.08	128.23	H
	23095	707.5	-7.18	30.17	20.84	121.34	
	23165	714.5	-7.39	30.18	20.64	115.88	
	23025	700.5	-12.85	31.96	16.96	49.66	V
	23095	707.5	-12.98	31.98	16.85	48.42	
	23165	714.5	-13.44	32.03	16.44	44.06	
Channel Bandwidth: 3 MHz / 16QAM							
X	23025	700.5	-8.02	30.17	20.00	100.00	H
	23095	707.5	-8.19	30.17	19.83	96.16	
	23165	714.5	-8.42	30.18	19.61	91.41	
	23025	700.5	-13.91	31.96	15.90	38.90	V
	23095	707.5	-14.01	31.98	15.82	38.19	
	23165	714.5	-14.49	32.03	15.39	34.59	
Channel Bandwidth: 3 MHz / 64QAM							
X	23025	700.5	-9.10	30.17	18.92	77.98	H
	23095	707.5	-9.22	30.17	18.80	75.86	
	23165	714.5	-9.51	30.18	18.52	71.12	
	23025	700.5	-14.92	31.96	14.89	30.83	V
	23095	707.5	-15.02	31.98	14.81	30.27	
	23165	714.5	-15.58	32.03	14.30	26.92	

LTE Band 12							
Channel Bandwidth: 5 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)
X	23035	701.5	-6.81	30.17	21.21	132.13	H
	23095	707.5	-7.01	30.17	21.01	126.18	
	23155	713.5	-7.35	30.18	20.68	116.95	
	23035	701.5	-12.57	31.96	17.24	52.97	V
	23095	707.5	-12.82	31.98	17.01	50.23	
	23155	713.5	-13.17	32.03	16.71	46.88	
Channel Bandwidth: 5 MHz / 16QAM							
X	23035	701.5	-7.86	30.17	20.16	103.75	H
	23095	707.5	-8.09	30.17	19.93	98.40	
	23155	713.5	-8.36	30.18	19.67	92.68	
	23035	701.5	-13.58	31.96	16.23	41.98	V
	23095	707.5	-13.88	31.98	15.95	39.36	
	23155	713.5	-14.23	32.03	15.65	36.73	
Channel Bandwidth: 5 MHz / 64QAM							
X	23035	701.5	-8.87	30.17	19.15	82.22	H
	23095	707.5	-9.15	30.17	18.87	77.09	
	23155	713.5	-9.42	30.18	18.61	72.61	
	23035	701.5	-14.59	31.96	15.22	33.27	V
	23095	707.5	-14.92	31.98	14.91	30.97	
	23155	713.5	-15.30	32.03	14.58	28.71	

LTE Band 12							
Channel Bandwidth: 10 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)
X	23060	704.0	-6.66	30.17	21.36	136.77	H
	23095	707.5	-6.86	30.17	21.16	130.62	
	23130	711.0	-7.19	30.18	20.84	121.34	
	23060	704.0	-12.47	31.96	17.34	54.20	V
	23095	707.5	-12.74	31.98	17.09	51.17	
	23130	711.0	-13.03	32.03	16.85	48.42	
Channel Bandwidth: 10 MHz / 16QAM							
X	23060	704.0	-7.75	30.17	20.27	106.41	H
	23095	707.5	-7.87	30.17	20.15	103.51	
	23130	711.0	-8.22	30.18	19.81	95.72	
	23060	704.0	-13.50	31.96	16.31	42.76	V
	23095	707.5	-13.78	31.98	16.05	40.27	
	23130	711.0	-14.09	32.03	15.79	37.93	
Channel Bandwidth: 10 MHz / 64QAM							
X	23060	704.0	-8.80	30.17	19.22	83.56	H
	23095	707.5	-8.94	30.17	19.08	80.91	
	23130	711.0	-9.31	30.18	18.72	74.47	
	23060	704.0	-14.58	31.96	15.23	33.34	V
	23095	707.5	-14.80	31.98	15.03	31.84	
	23130	711.0	-15.16	32.03	14.72	29.65	

LTE Band 13							
Channel Bandwidth: 5 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)
X	23205	779.5	-9.58	32.24	20.51	112.46	H
	23230	782.0	-9.86	32.17	20.16	103.75	
	23255	784.5	-10.02	32.11	19.94	98.63	
	23205	779.5	-12.85	32.43	17.43	55.34	V
	23230	782.0	-13.09	32.42	17.18	52.24	
	23255	784.5	-13.53	32.46	16.78	47.64	
Channel Bandwidth: 5 MHz / 16QAM							
X	23205	779.5	-10.62	32.24	19.47	88.51	H
	23230	782.0	-10.87	32.17	19.15	82.22	
	23255	784.5	-11.10	32.11	18.86	76.91	
	23205	779.5	-13.88	32.43	16.40	43.65	V
	23230	782.0	-14.17	32.42	16.10	40.74	
	23255	784.5	-14.59	32.46	15.72	37.33	
Channel Bandwidth: 5 MHz / 64QAM							
X	23205	779.5	-11.67	32.24	18.42	69.50	H
	23230	782.0	-11.94	32.17	18.08	64.27	
	23255	784.5	-12.14	32.11	17.82	60.53	
	23205	779.5	-14.94	32.43	15.34	34.20	V
	23230	782.0	-15.24	32.42	15.03	31.84	
	23255	784.5	-15.66	32.46	14.65	29.17	

**LTE Band 13**

**Channel Bandwidth: 10 MHz / QPSK**

Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)
X	23230	782.0	-9.73	32.17	20.29	106.91	H
	23230	782.0	-13.00	32.42	17.27	53.33	V

**Channel Bandwidth: 10 MHz / 16QAM**

X	23230	782.0	-10.80	32.17	19.22	83.56	H
	23230	782.0	-14.07	32.42	16.20	41.69	V

**Channel Bandwidth: 10 MHz / 64QAM**

X	23230	782.0	-11.89	32.17	18.13	65.01	H
	23230	782.0	-15.08	32.42	15.19	33.04	V

LTE Band 17							
Channel Bandwidth: 5 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)
X	23755	706.5	-7.65	30.36	20.56	113.76	H
	23790	710.0	-7.84	30.17	20.18	104.23	
	23825	713.5	-8.03	30.17	19.99	99.77	
	23755	706.5	-12.17	32.03	17.71	59.02	V
	23790	710.0	-12.44	31.98	17.39	54.83	
	23825	713.5	-12.83	32.06	17.08	51.05	
Channel Bandwidth: 5 MHz / 16QAM							
X	23755	706.5	-8.71	30.36	19.50	89.13	H
	23790	710.0	-8.85	30.17	19.17	82.60	
	23825	713.5	-9.12	30.17	18.90	77.62	
	23755	706.5	-13.26	32.03	16.62	45.92	V
	23790	710.0	-13.52	31.98	16.31	42.76	
	23825	713.5	-13.86	32.06	16.05	40.27	
Channel Bandwidth: 5 MHz / 64QAM							
X	23755	706.5	-9.80	30.36	18.41	69.34	H
	23790	710.0	-9.92	30.17	18.10	64.57	
	23825	713.5	-10.21	30.17	17.81	60.39	
	23755	706.5	-14.32	32.03	15.56	35.97	V
	23790	710.0	-14.59	31.98	15.24	33.42	
	23825	713.5	-14.92	32.06	14.99	31.55	



LTE Band 17							
Channel Bandwidth: 10 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)
X	23780	709.0	-7.40	30.17	20.62	115.35	H
	23790	710.0	-7.68	30.17	20.34	108.14	
	23800	711.0	-7.93	30.18	20.10	102.33	
	23780	709.0	-11.96	31.96	17.85	60.95	V
	23790	710.0	-12.28	31.98	17.55	56.89	
	23800	711.0	-12.65	32.03	17.23	52.84	
Channel Bandwidth: 10 MHz / 16QAM							
X	23780	709.0	-8.42	30.17	19.60	91.20	H
	23790	710.0	-8.70	30.17	19.32	85.51	
	23800	711.0	-8.95	30.18	19.08	80.91	
	23780	709.0	-12.98	31.96	16.83	48.19	V
	23790	710.0	-13.34	31.98	16.49	44.57	
	23800	711.0	-13.74	32.03	16.14	41.11	
Channel Bandwidth: 10 MHz / 64QAM							
X	23780	709.0	-9.47	30.17	18.55	71.61	H
	23790	710.0	-9.74	30.17	18.28	67.30	
	23800	711.0	-9.99	30.18	18.04	63.68	
	23780	709.0	-14.02	31.96	15.79	37.93	V
	23790	710.0	-14.40	31.98	15.43	34.91	
	23800	711.0	-14.78	32.03	15.10	32.36	

**EIRP Power (dBm)**

WCDMA							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Y	1312	1712.4	-8.77	36.29	27.52	565.07	H
	1413	1732.6	-9.05	36.69	27.64	580.23	
	1513	1752.6	-9.13	36.98	27.85	609.54	
	1312	1712.4	-16.45	37.11	20.66	116.41	V
	1413	1732.6	-16.70	37.60	20.90	123.03	
	1513	1752.6	-16.44	37.65	21.21	132.13	

LTE Band 4							
Channel Bandwidth: 1.4 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	19957	1710.7	-12.41	36.45	24.05	253.80	H
	20175	1732.5	-12.54	36.80	24.26	266.62	
	20393	1754.3	-12.41	36.94	24.53	283.86	
	19957	1710.7	-17.50	37.28	19.78	95.06	V
	20175	1732.5	-17.58	37.63	20.05	101.16	
	20393	1754.3	-17.55	37.64	20.09	102.09	
Channel Bandwidth: 1.4 MHz / 16QAM							
X	19957	1710.7	-13.46	36.45	23.00	199.30	H
	20175	1732.5	-13.58	36.80	23.22	209.85	
	20393	1754.3	-13.49	36.94	23.45	221.36	
	19957	1710.7	-18.59	37.28	18.69	73.96	V
	20175	1732.5	-18.59	37.63	19.04	80.17	
	20393	1754.3	-18.64	37.64	19.00	79.43	
Channel Bandwidth: 1.4 MHz / 64QAM							
X	19957	1710.7	-14.47	36.45	21.99	157.94	H
	20175	1732.5	-14.59	36.80	22.21	166.30	
	20393	1754.3	-14.55	36.94	22.39	173.42	
	19957	1710.7	-19.62	37.28	17.66	58.34	V
	20175	1732.5	-19.61	37.63	18.02	63.39	
	20393	1754.3	-19.65	37.64	17.99	62.95	

LTE Band 4							
Channel Bandwidth: 3 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	19965	1711.5	-12.34	36.45	24.12	257.93	H
	20175	1732.5	-12.46	36.80	24.34	271.58	
	20385	1753.5	-12.32	36.94	24.62	289.80	
	19965	1711.5	-17.38	37.28	19.90	97.72	V
	20175	1732.5	-17.44	37.63	20.19	104.47	
	20385	1753.5	-17.36	37.64	20.28	106.66	
Channel Bandwidth: 3 MHz / 16QAM							
X	19965	1711.5	-13.42	36.45	23.04	201.14	H
	20175	1732.5	-13.52	36.80	23.28	212.76	
	20385	1753.5	-13.33	36.94	23.61	229.67	
	19965	1711.5	-18.43	37.28	18.85	76.74	V
	20175	1732.5	-18.53	37.63	19.10	81.28	
	20385	1753.5	-18.38	37.64	19.26	84.33	
Channel Bandwidth: 3 MHz / 64QAM							
X	19965	1711.5	-14.49	36.45	21.97	157.22	H
	20175	1732.5	-14.53	36.80	22.27	168.62	
	20385	1753.5	-14.42	36.94	22.52	178.69	
	19965	1711.5	-19.50	37.28	17.78	59.98	V
	20175	1732.5	-19.59	37.63	18.04	63.68	
	20385	1753.5	-19.45	37.64	18.19	65.92	

LTE Band 4							
Channel Bandwidth: 5 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	19975	1712.5	-12.15	36.45	24.31	269.46	H
	20175	1732.5	-12.23	36.80	24.57	286.35	
	20375	1752.5	-12.17	36.94	24.77	299.99	
	19975	1712.5	-17.21	37.28	20.07	101.62	V
	20175	1732.5	-17.23	37.63	20.40	109.65	
	20375	1752.5	-17.18	37.64	20.46	111.17	
Channel Bandwidth: 5 MHz / 16QAM							
X	19975	1712.5	-13.24	36.45	23.22	209.65	H
	20175	1732.5	-13.31	36.80	23.49	223.31	
	20375	1752.5	-13.19	36.94	23.75	237.19	
	19975	1712.5	-18.29	37.28	18.99	79.25	V
	20175	1732.5	-18.32	37.63	19.31	85.31	
	20375	1752.5	-18.20	37.64	19.44	87.90	
Channel Bandwidth: 5 MHz / 64QAM							
X	19975	1712.5	-14.33	36.45	22.13	163.12	H
	20175	1732.5	-14.39	36.80	22.41	174.14	
	20375	1752.5	-14.20	36.94	22.74	187.97	
	19975	1712.5	-19.35	37.28	17.93	62.09	V
	20175	1732.5	-19.41	37.63	18.22	66.37	
	20375	1752.5	-19.22	37.64	18.42	69.50	

LTE Band 4							
Channel Bandwidth: 10 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	20000	1715.0	-11.51	36.64	25.13	325.84	H
	20175	1732.5	-11.45	36.80	25.35	342.69	
	20350	1750.0	-11.19	36.80	25.61	363.66	
	20000	1715.0	-16.53	37.44	20.91	123.31	V
	20175	1732.5	-16.48	37.63	21.15	130.29	
	20350	1750.0	-16.50	37.64	21.14	130.02	
Channel Bandwidth: 10 MHz / 16QAM							
X	20000	1715.0	-12.55	36.64	24.09	256.45	H
	20175	1732.5	-12.49	36.80	24.31	269.71	
	20350	1750.0	-12.23	36.80	24.57	286.22	
	20000	1715.0	-17.62	37.44	19.82	95.94	V
	20175	1732.5	-17.53	37.63	20.10	102.31	
	20350	1750.0	-17.52	37.64	20.12	102.80	
Channel Bandwidth: 10 MHz / 64QAM							
X	20000	1715.0	-13.58	36.64	23.06	202.30	H
	20175	1732.5	-13.52	36.80	23.28	212.76	
	20350	1750.0	-13.32	36.80	23.48	222.69	
	20000	1715.0	-18.70	37.44	18.74	74.82	V
	20175	1732.5	-18.55	37.63	19.08	80.89	
	20350	1750.0	-18.56	37.64	19.08	80.91	

LTE Band 4							
Channel Bandwidth: 15 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	20025	1717.5	-11.13	36.45	25.33	340.80	H
	20175	1732.5	-11.28	36.80	25.52	356.37	
	20325	1747.5	-11.06	36.94	25.88	387.35	
	20025	1717.5	-16.24	37.28	21.04	127.06	V
	20175	1732.5	-16.29	37.63	21.34	136.14	
	20325	1747.5	-16.23	37.64	21.41	138.36	
Channel Bandwidth: 15 MHz / 16QAM							
X	20025	1717.5	-12.18	36.45	24.28	267.61	H
	20175	1732.5	-12.33	36.80	24.47	279.83	
	20325	1747.5	-12.13	36.94	24.81	302.76	
	20025	1717.5	-17.26	37.28	20.02	100.46	V
	20175	1732.5	-17.30	37.63	20.33	107.89	
	20325	1747.5	-17.24	37.64	20.40	109.65	
Channel Bandwidth: 15 MHz / 64QAM							
X	20025	1717.5	-13.23	36.45	23.23	210.14	H
	20175	1732.5	-13.42	36.80	23.38	217.72	
	20325	1747.5	-13.19	36.94	23.75	237.19	
	20025	1717.5	-18.29	37.28	18.99	79.25	V
	20175	1732.5	-18.31	37.63	19.32	85.51	
	20325	1747.5	-18.25	37.64	19.39	86.90	

LTE Band 4							
Channel Bandwidth: 20 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	20050	1720.0	-11.02	36.45	25.44	349.54	H
	20175	1732.5	-11.11	36.80	25.69	370.60	
	20300	1745.0	-11.00	36.94	25.94	392.74	
	20050	1720.0	-16.14	37.28	21.14	130.02	V
	20175	1732.5	-16.13	37.63	21.50	141.25	
	20300	1745.0	-16.09	37.64	21.55	142.89	
Channel Bandwidth: 20 MHz / 16QAM							
X	20050	1720.0	-12.08	36.45	24.38	273.84	H
	20175	1732.5	-12.14	36.80	24.66	292.35	
	20300	1745.0	-12.04	36.94	24.90	309.10	
	20050	1720.0	-17.16	37.28	20.12	102.80	V
	20175	1732.5	-17.15	37.63	20.48	111.69	
	20300	1745.0	-17.18	37.64	20.46	111.17	
Channel Bandwidth: 20 MHz / 64QAM							
X	20050	1720.0	-13.14	36.45	23.32	214.54	H
	20175	1732.5	-13.22	36.80	23.58	227.98	
	20300	1745.0	-13.10	36.94	23.84	242.16	
	20050	1720.0	-18.23	37.28	19.05	80.35	V
	20175	1732.5	-18.16	37.63	19.47	88.51	
	20300	1745.0	-18.20	37.64	19.44	87.90	

## 4.2 Frequency Stability Measurement

### 4.2.1 Limits of Frequency Stability Measurement

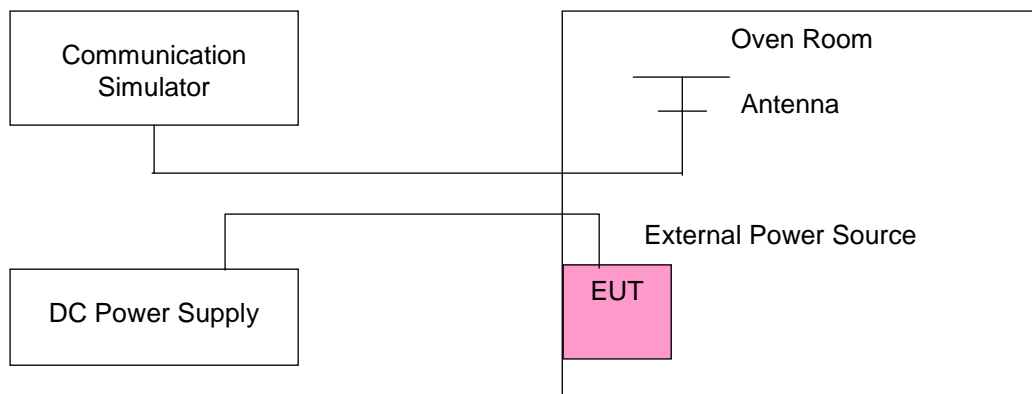
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

### 4.2.2 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  $\pm 0.5$  °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.

### 4.2.3 Test Setup





#### 4.2.4 Test Results

##### Frequency Error vs. Voltage

Voltage (Volts)	WCDMA				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	1712.400003	0.002	1752.600002	0.001	2.5
2.8	1712.400001	0.001	1752.600004	0.002	2.5
4.38	1712.400002	0.001	1752.600001	0.001	2.5

**Note:** The applicant defined the normal working voltage of the battery is from 2.8 Vdc to 4.38 Vdc.

##### Frequency Error vs. Temperature

Temp. (°C)	WCDMA				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1712.400001	0.001	1752.600003	0.002	2.5
-20	1712.400002	0.001	1752.600002	0.001	2.5
-10	1712.400002	0.001	1752.600002	0.001	2.5
0	1712.400003	0.001	1752.600003	0.002	2.5
10	1712.400003	0.002	1752.600001	0.001	2.5
20	1712.399998	-0.001	1752.599997	-0.002	2.5
30	1712.399998	-0.001	1752.599997	-0.002	2.5
40	1712.399998	-0.001	1752.599998	-0.001	2.5
50	1712.399997	-0.002	1752.599997	-0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 4				Limit (ppm)
	Channel Bandwidth: 1.4 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	1710.700004	0.002	1754.300004	0.002	2.5
2.8	1710.700001	0.001	1754.300004	0.002	2.5
4.38	1710.700003	0.002	1754.300003	0.001	2.5

**Note:** The applicant defined the normal working voltage of the battery is from 2.8 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 4				Limit (ppm)
	Channel Bandwidth: 1.4 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1710.700004	0.002	1754.300002	0.001	2.5
-20	1710.700004	0.002	1754.300003	0.002	2.5
-10	1710.700001	0.001	1754.300001	0.001	2.5
0	1710.700003	0.002	1754.300002	0.001	2.5
10	1710.700003	0.002	1754.300004	0.002	2.5
20	1710.699998	-0.001	1754.299998	-0.001	2.5
30	1710.699999	-0.001	1754.299997	-0.002	2.5
40	1710.699998	-0.001	1754.299997	-0.002	2.5
50	1710.699997	-0.002	1754.299998	-0.001	2.5

## Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 4				Limit (ppm)
	Channel Bandwidth: 3 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	1711.500002	0.001	1753.500002	0.001	2.5
2.8	1711.500003	0.002	1753.500002	0.001	2.5
4.38	1711.500003	0.002	1753.500003	0.002	2.5

**Note:** The applicant defined the normal working voltage of the battery is from 2.8 Vdc to 4.38 Vdc.

## Frequency Error vs. Temperature

Temp. (°C)	LTE Band 4				Limit (ppm)
	Channel Bandwidth: 3 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1711.500003	0.002	1753.500003	0.002	2.5
-20	1711.500002	0.001	1753.500003	0.002	2.5
-10	1711.500002	0.001	1753.500002	0.001	2.5
0	1711.500004	0.002	1753.500001	0.001	2.5
10	1711.500003	0.002	1753.500002	0.001	2.5
20	1711.499996	-0.002	1753.499997	-0.002	2.5
30	1711.499997	-0.002	1753.499999	-0.001	2.5
40	1711.499997	-0.002	1753.499998	-0.001	2.5
50	1711.499998	-0.001	1753.499996	-0.002	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 4				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	1712.500003	0.002	1752.500003	0.002	2.5
2.8	1712.500004	0.002	1752.500003	0.002	2.5
4.38	1712.500004	0.002	1752.500001	0.001	2.5

**Note:** The applicant defined the normal working voltage of the battery is from 2.8 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 4				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1712.500002	0.001	1752.500002	0.001	2.5
-20	1712.500003	0.001	1752.500002	0.001	2.5
-10	1712.500003	0.002	1752.500004	0.002	2.5
0	1712.500001	0.001	1752.500003	0.002	2.5
10	1712.500003	0.002	1752.500002	0.001	2.5
20	1712.499998	-0.001	1752.499999	-0.001	2.5
30	1712.499999	-0.001	1752.499997	-0.002	2.5
40	1712.499999	-0.001	1752.499999	-0.001	2.5
50	1712.499997	-0.002	1752.499997	-0.002	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 4				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	1715.000002	0.001	1750.000003	0.002	2.5
2.8	1715.000004	0.002	1750.000002	0.001	2.5
4.38	1715.000002	0.001	1750.000004	0.002	2.5

**Note:** The applicant defined the normal working voltage of the battery is from 2.8 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 4				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1715.000001	0.001	1750.000003	0.002	2.5
-20	1715.000003	0.002	1750.000004	0.002	2.5
-10	1715.000002	0.001	1750.000002	0.001	2.5
0	1715.000002	0.001	1750.000003	0.002	2.5
10	1715.000002	0.001	1750.000002	0.001	2.5
20	1714.999997	-0.002	1749.999999	-0.001	2.5
30	1714.999998	-0.001	1749.999998	-0.001	2.5
40	1714.999998	-0.001	1749.999999	-0.001	2.5
50	1714.999996	-0.002	1749.999997	-0.002	2.5

## Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 4				Limit (ppm)
	Channel Bandwidth: 15 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	1717.500002	0.001	1747.500003	0.002	2.5
2.8	1717.500001	0.001	1747.500003	0.002	2.5
4.38	1717.500002	0.001	1747.500001	0.001	2.5

**Note:** The applicant defined the normal working voltage of the battery is from 2.8 Vdc to 4.38 Vdc.

## Frequency Error vs. Temperature

Temp. (°C)	LTE Band 4				Limit (ppm)
	Channel Bandwidth: 15 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1717.500004	0.002	1747.500002	0.001	2.5
-20	1717.500002	0.001	1747.500001	0.001	2.5
-10	1717.500002	0.001	1747.500002	0.001	2.5
0	1717.500002	0.001	1747.500001	0.001	2.5
10	1717.500002	0.001	1747.500002	0.001	2.5
20	1717.499998	-0.001	1747.499996	-0.002	2.5
30	1717.499996	-0.002	1747.499996	-0.002	2.5
40	1717.499997	-0.002	1747.499998	-0.001	2.5
50	1717.499998	-0.001	1747.499996	-0.002	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 4				Limit (ppm)
	Channel Bandwidth: 20 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	1720.000002	0.001	1745.000002	0.001	2.5
2.8	1720.000003	0.002	1745.000003	0.002	2.5
4.38	1720.000003	0.002	1745.000003	0.002	2.5

**Note:** The applicant defined the normal working voltage of the battery is from 2.8 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 4				Limit (ppm)
	Channel Bandwidth: 20 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1720.000002	0.001	1745.000004	0.002	2.5
-20	1720.000004	0.002	1745.000001	0.001	2.5
-10	1720.000002	0.001	1745.000002	0.001	2.5
0	1720.000001	0.001	1745.000002	0.001	2.5
10	1720.000004	0.002	1745.000001	0.001	2.5
20	1719.999999	-0.001	1744.999998	-0.001	2.5
30	1719.999998	-0.001	1744.999998	-0.001	2.5
40	1719.999999	-0.001	1744.999999	-0.001	2.5
50	1719.999999	-0.001	1744.999996	-0.002	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 12				Limit (ppm)
	Channel Bandwidth: 1.4 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	699.700002	0.003	715.300002	0.002	2.5
2.8	699.700002	0.002	715.300003	0.004	2.5
4.38	699.700002	0.002	715.300003	0.004	2.5

**Note:** The applicant defined the normal working voltage of the battery is from 2.8 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 12				Limit (ppm)
	Channel Bandwidth: 1.4 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	699.700002	0.002	715.300004	0.005	2.5
-20	699.700003	0.004	715.300003	0.004	2.5
-10	699.700003	0.004	715.300003	0.004	2.5
0	699.700004	0.005	715.300003	0.005	2.5
10	699.700001	0.002	715.300002	0.003	2.5
20	699.699996	-0.006	715.299997	-0.004	2.5
30	699.699998	-0.003	715.299998	-0.003	2.5
40	699.699998	-0.003	715.299996	-0.005	2.5
50	699.699999	-0.002	715.299998	-0.003	2.5



Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 12				Limit (ppm)
	Channel Bandwidth: 3 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	700.500001	0.002	714.500003	0.004	2.5
2.8	700.500003	0.005	714.500002	0.002	2.5
4.38	700.500003	0.004	714.500003	0.004	2.5

**Note:** The applicant defined the normal working voltage of the battery is from 2.8 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 12				Limit (ppm)
	Channel Bandwidth: 3 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	700.500003	0.005	714.500002	0.002	2.5
-20	700.500003	0.004	714.500002	0.003	2.5
-10	700.500003	0.004	714.500002	0.003	2.5
0	700.500004	0.005	714.500002	0.003	2.5
10	700.500001	0.002	714.500003	0.004	2.5
20	700.499997	-0.005	714.499999	-0.001	2.5
30	700.499996	-0.006	714.499999	-0.001	2.5
40	700.499998	-0.002	714.499997	-0.004	2.5
50	700.499999	-0.002	714.499998	-0.003	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 12				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	701.500002	0.003	713.500002	0.003	2.5
2.8	701.500002	0.002	713.500004	0.005	2.5
4.38	701.500003	0.005	713.500003	0.004	2.5

**Note:** The applicant defined the normal working voltage of the battery is from 2.8 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 12				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	701.500003	0.004	713.500001	0.001	2.5
-20	701.500003	0.004	713.500002	0.003	2.5
-10	701.500003	0.005	713.500001	0.002	2.5
0	701.500004	0.005	713.500001	0.002	2.5
10	701.500002	0.003	713.500004	0.005	2.5
20	701.499999	-0.002	713.499999	-0.002	2.5
30	701.499998	-0.003	713.499999	-0.002	2.5
40	701.499998	-0.003	713.499998	-0.003	2.5
50	701.499999	-0.002	713.499997	-0.004	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 12				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	704.000003	0.005	711.000003	0.004	2.5
2.8	704.000002	0.003	711.000002	0.002	2.5
4.38	704.000001	0.002	711.000003	0.005	2.5

**Note:** The applicant defined the normal working voltage of the battery is from 2.8 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 12				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	704.000004	0.006	711.000004	0.006	2.5
-20	704.000003	0.004	711.000002	0.002	2.5
-10	704.000001	0.002	711.000001	0.002	2.5
0	704.000003	0.004	711.000003	0.005	2.5
10	704.000003	0.004	711.000002	0.002	2.5
20	703.999998	-0.003	710.999998	-0.003	2.5
30	703.999998	-0.003	710.999998	-0.002	2.5
40	703.999998	-0.003	710.999997	-0.004	2.5
50	703.999997	-0.004	710.999998	-0.003	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 13				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	779.500004	0.004	784.500002	0.002	2.5
2.8	779.500001	0.002	784.500002	0.003	2.5
4.38	779.500002	0.003	784.500001	0.002	2.5

**Note:** The applicant defined the normal working voltage of the battery is from 2.8 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 13				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	779.500002	0.003	784.500004	0.005	2.5
-20	779.500003	0.004	784.500002	0.002	2.5
-10	779.500002	0.002	784.500002	0.003	2.5
0	779.500004	0.004	784.500004	0.005	2.5
10	779.500004	0.005	784.500003	0.004	2.5
20	779.499998	-0.003	784.499998	-0.003	2.5
30	779.499998	-0.003	784.499996	-0.005	2.5
40	779.499997	-0.004	784.499997	-0.004	2.5
50	779.499999	-0.001	784.499998	-0.002	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 13		Limit (ppm)
	Channel Bandwidth: 10 MHz		
	Frequency (MHz)	Frequency Error (ppm)	
3.85	782.000002	0.003	2.5
2.8	782.000003	0.004	2.5
4.38	782.000004	0.005	2.5

**Note:** The applicant defined the normal working voltage of the battery is from 2.8 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 13		Limit (ppm)
	Channel Bandwidth: 10 MHz		
	Frequency (MHz)	Frequency Error (ppm)	
-30	782.000003	0.004	2.5
-20	782.000004	0.004	2.5
-10	782.000003	0.004	2.5
0	782.000003	0.004	2.5
10	782.000003	0.004	2.5
20	781.999996	-0.005	2.5
30	781.999998	-0.003	2.5
40	781.999999	-0.001	2.5
50	781.999998	-0.003	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 17				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	706.500004	0.006	713.500002	0.002	2.5
2.8	706.500004	0.006	713.500002	0.003	2.5
4.38	706.500001	0.001	713.500001	0.002	2.5

**Note:** The applicant defined the normal working voltage of the battery is from 2.8 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 17				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	706.500004	0.006	713.500001	0.001	2.5
-20	706.500001	0.002	713.500002	0.003	2.5
-10	706.500003	0.004	713.500001	0.001	2.5
0	706.500003	0.004	713.500001	0.002	2.5
10	706.500002	0.003	713.500001	0.001	2.5
20	706.499997	-0.004	713.499997	-0.004	2.5
30	706.499996	-0.005	713.499999	-0.002	2.5
40	706.499997	-0.004	713.499998	-0.003	2.5
50	706.499997	-0.004	713.499996	-0.005	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 17				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	709.000004	0.005	711.000003	0.004	2.5
2.8	709.000002	0.003	711.000004	0.005	2.5
4.38	709.000001	0.002	711.000003	0.004	2.5

**Note:** The applicant defined the normal working voltage of the battery is from 2.8 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 17				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	709.000004	0.005	711.000003	0.004	2.5
-20	709.000004	0.005	711.000004	0.005	2.5
-10	709.000002	0.003	711.000002	0.003	2.5
0	709.000003	0.005	711.000002	0.003	2.5
10	709.000004	0.005	711.000003	0.005	2.5
20	708.999997	-0.004	710.999997	-0.004	2.5
30	708.999999	-0.002	710.999998	-0.003	2.5
40	708.999999	-0.002	710.999998	-0.003	2.5
50	708.999998	-0.003	710.999997	-0.005	2.5

### 4.3 Occupied Bandwidth Measurement

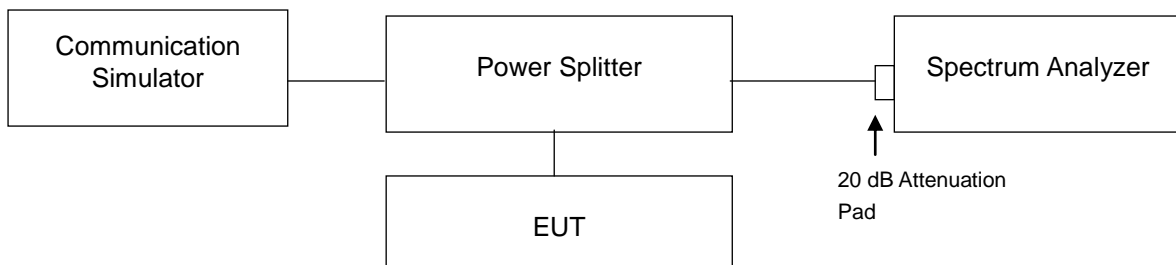
#### 4.3.1 Limits of Occupied Bandwidth Measurement

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.

#### 4.3.2 Test Procedure

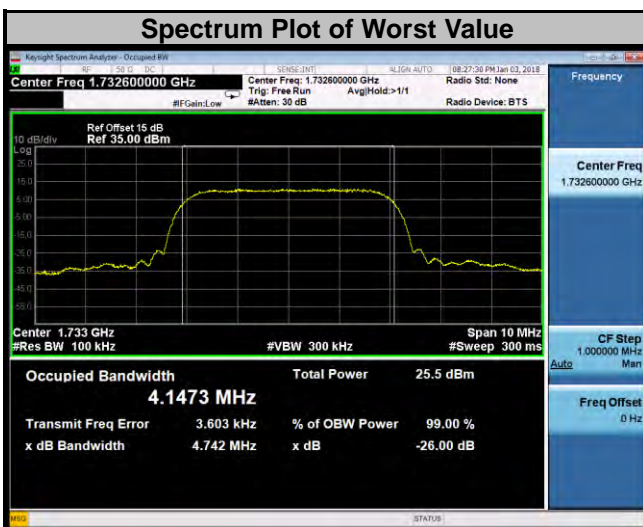
- The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

#### 4.3.3 Test Setup



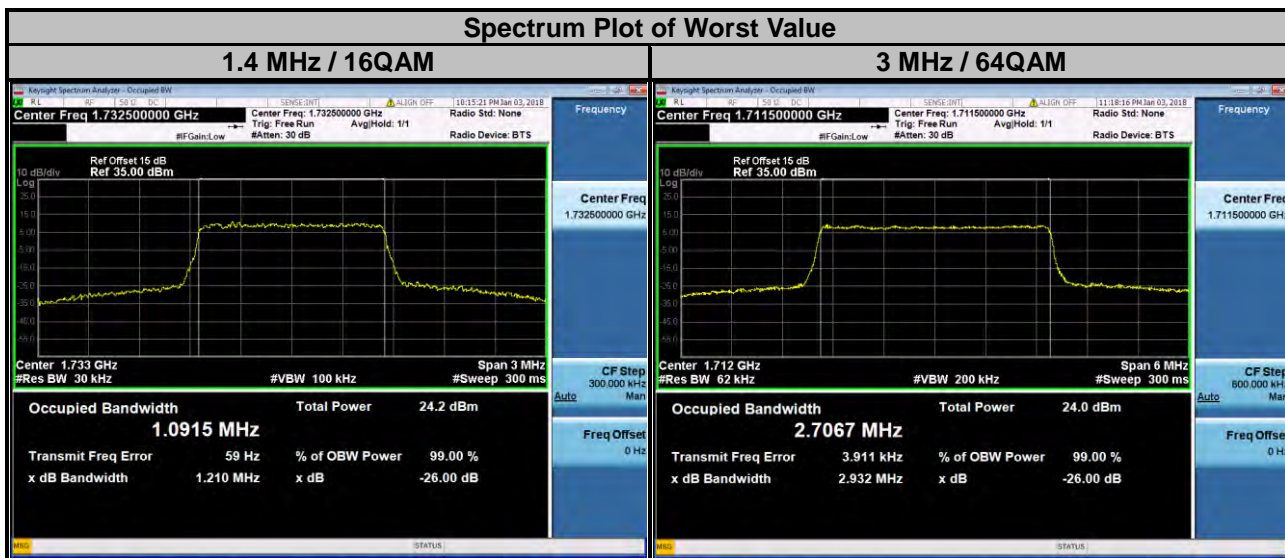
#### 4.3.4 Test Result

WCDMA		
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)
1312	1712.4	4.1428
1413	1732.6	4.1473
1513	1752.6	4.1461





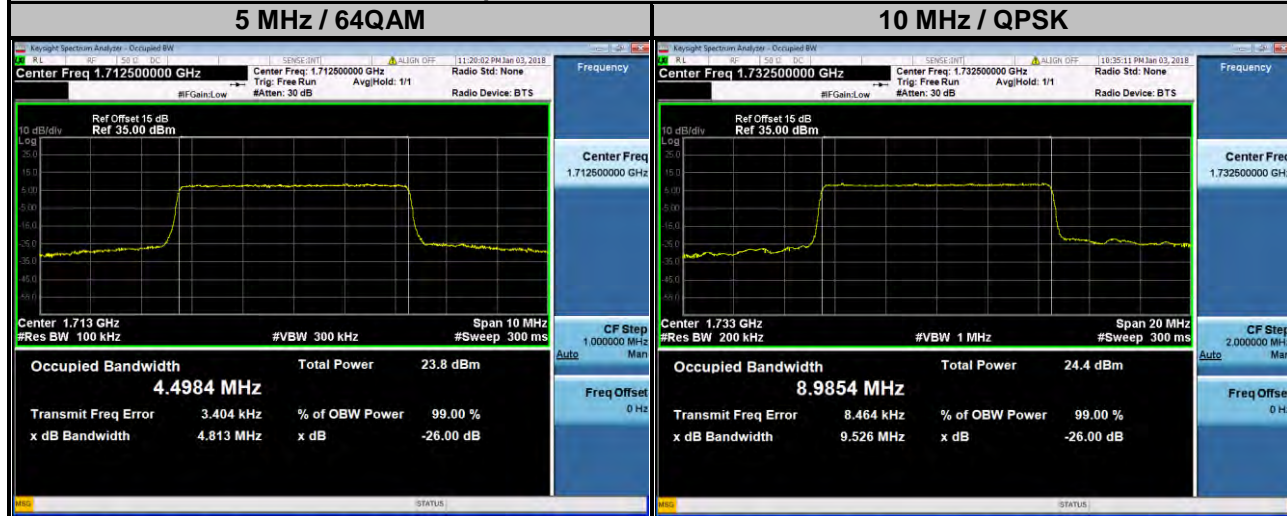
LTE Band 4									
Channel Bandwidth: 1.4 MHz					Channel Bandwidth: 3 MHz				
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
19957	1710.7	1.0886	1.0894	1.0871	19965	1711.5	2.7035	2.7009	2.7067
20175	1732.5	1.0858	1.0915	1.0871	20175	1732.5	2.7019	2.6973	2.7058
20393	1754.3	1.0873	1.0896	1.0864	20385	1753.5	2.7013	2.6976	2.7067



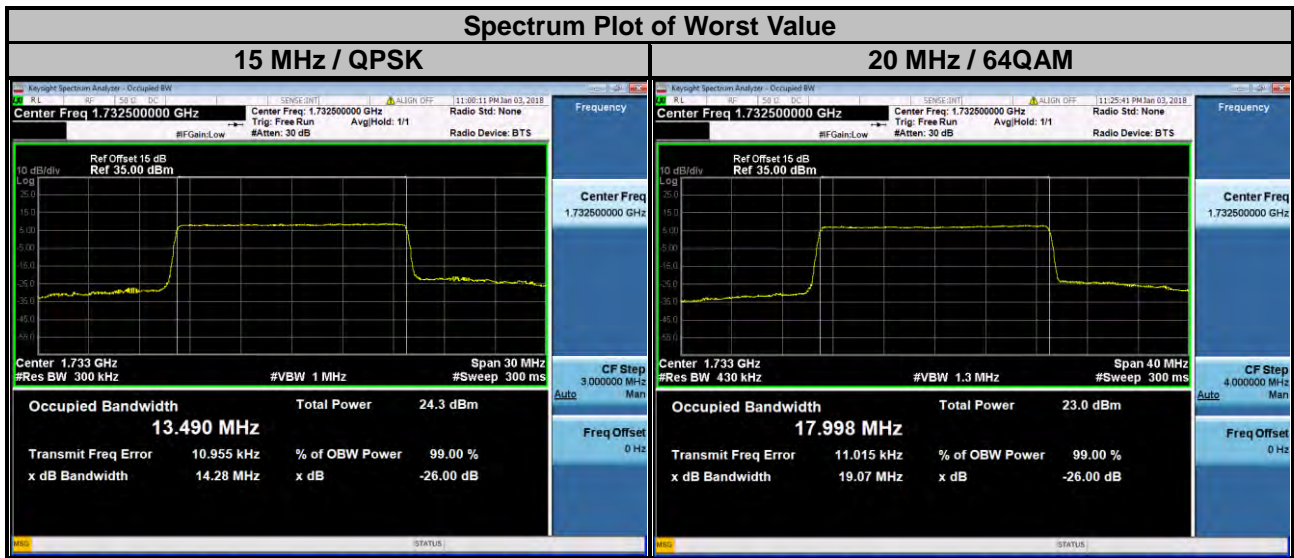
### LTE Band 4

Channel Bandwidth: 5 MHz					Channel Bandwidth: 10 MHz				
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
19975	1712.5	4.4931	4.4959	4.4984	20000	1715.0	8.9633	8.9587	8.9593
20175	1732.5	4.4960	4.4974	4.4957	20175	1732.5	8.9854	8.9815	8.9791
20375	1752.5	4.4932	4.4957	4.4942	20350	1750.0	8.9689	8.9697	8.9654

### Spectrum Plot of Worst Value



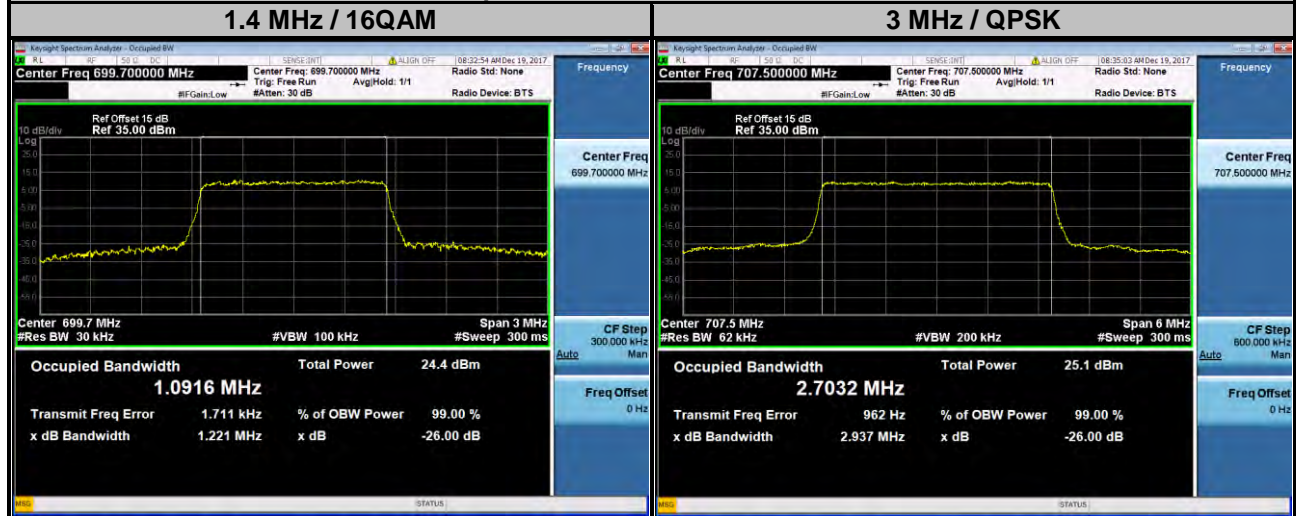
LTE Band 4									
Channel Bandwidth: 15 MHz					Channel Bandwidth: 20 MHz				
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
20025	1717.5	13.424	13.410	13.404	20050	1720.0	17.879	17.903	17.899
20175	1732.5	13.490	13.467	13.467	20175	1732.5	17.990	17.996	17.998
20325	1747.5	13.429	13.415	13.413	20300	1745.0	17.865	17.876	17.877



### LTE Band 12

Channel Bandwidth: 1.4 MHz					Channel Bandwidth: 3 MHz				
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
23017	699.7	1.0878	1.0916	1.0873	23025	700.5	2.6999	2.6953	2.6951
23095	707.5	1.0873	1.0895	1.0881	23095	707.5	2.7032	2.6997	2.6986
23173	715.3	1.0875	1.0889	1.0869	23165	714.5	2.6984	2.6932	2.6942

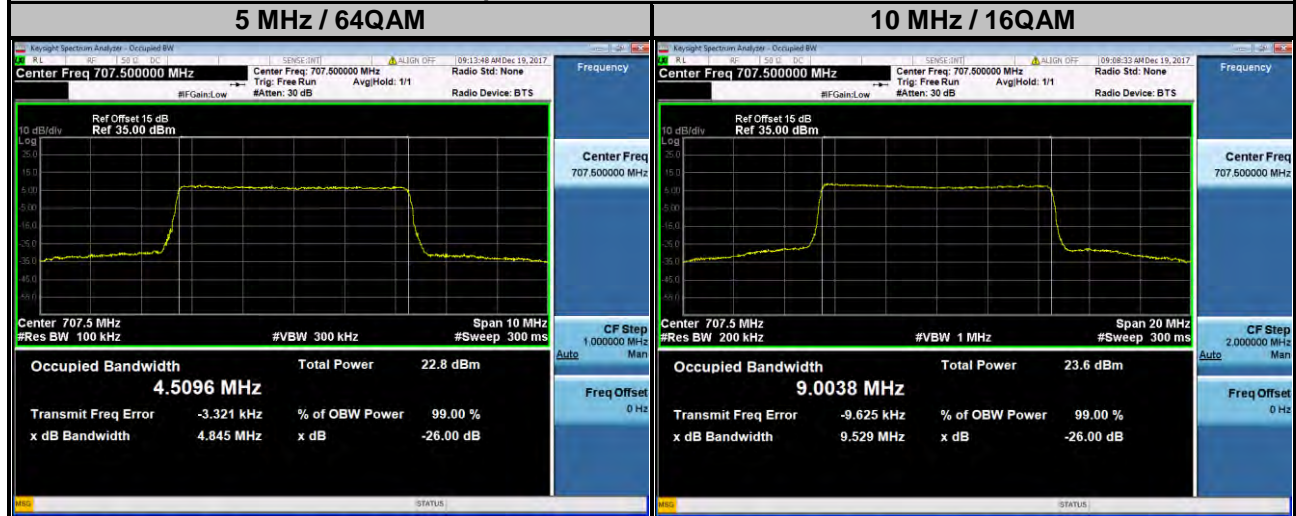
### Spectrum Plot of Worst Value



### LTE Band 12

Channel Bandwidth: 5 MHz					Channel Bandwidth: 10 MHz				
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
23035	701.5	4.4805	4.4808	4.4882	23060	704.0	8.9303	8.9297	8.9345
23095	707.5	4.4981	4.5009	4.5096	23095	707.5	9.0010	9.0038	9.0024
23155	713.5	4.4801	4.4832	4.4916	23130	711.0	8.9673	8.9708	8.9733

### Spectrum Plot of Worst Value

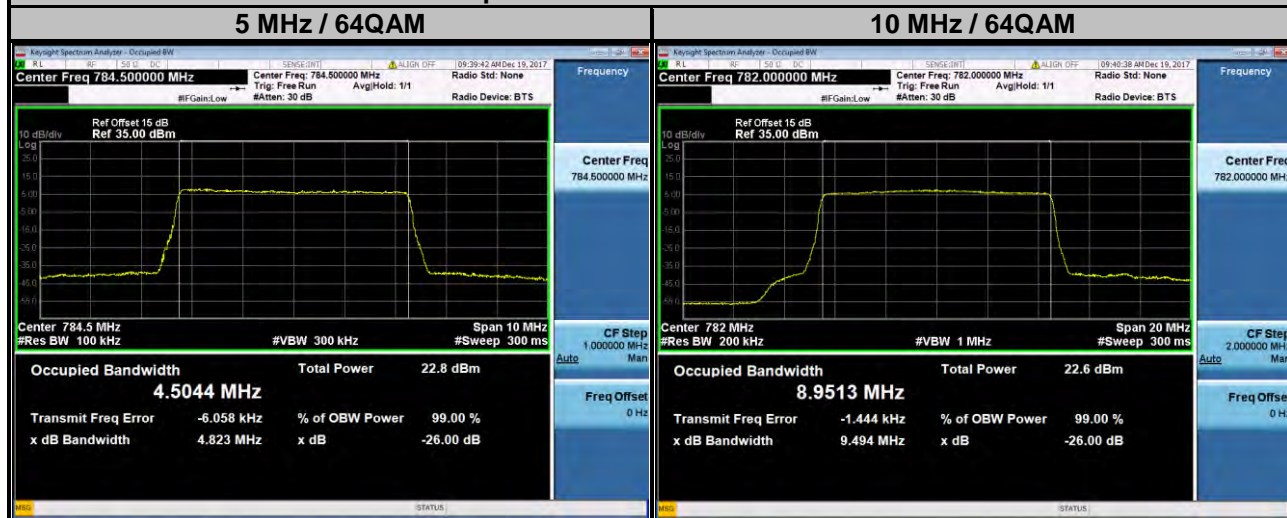




### LTE Band 13

Channel Bandwidth: 5 MHz					Channel Bandwidth: 10 MHz				
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
23205	779.5	4.4927	4.4926	4.5004	23230	782.0	8.9452	8.9490	8.9513
23230	782.0	4.4826	4.4843	4.4938					
23255	784.5	4.4956	4.4978	4.5044					

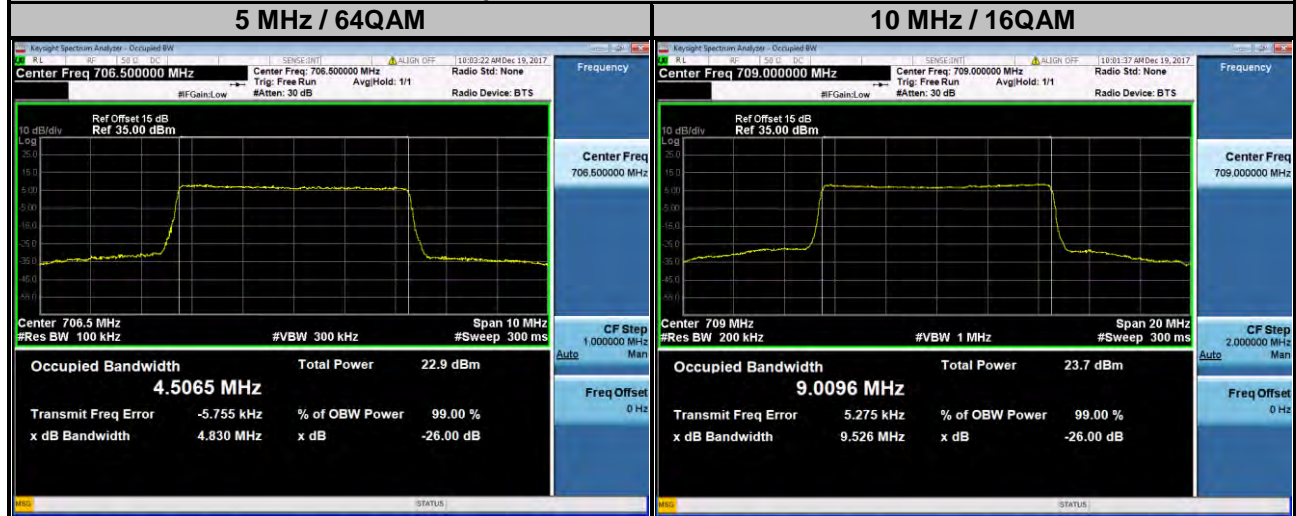
### Spectrum Plot of Worst Value



### LTE Band 17

Channel Bandwidth: 5 MHz					Channel Bandwidth: 10 MHz				
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
23755	706.5	4.4979	4.4984	4.5065	23780	709.0	8.9995	9.0096	9.0092
23790	710.0	4.4974	4.4984	4.5061	23790	710.0	8.9893	8.9979	8.9962
23825	713.5	4.4817	4.4861	4.4935	23800	711.0	8.9687	8.9726	8.9750

### Spectrum Plot of Worst Value



## 4.4 Band Edge Measurement

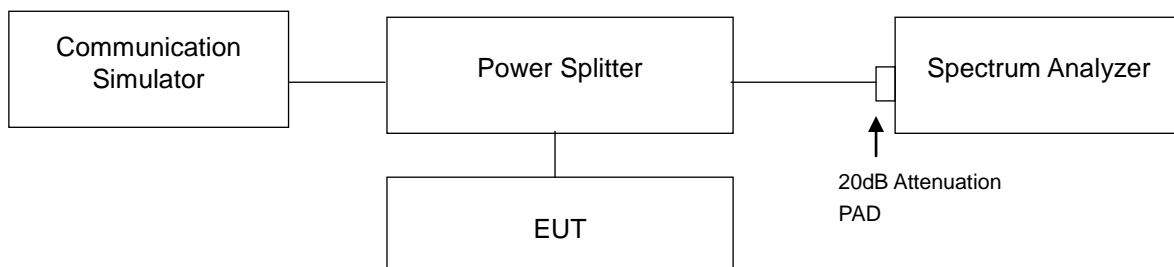
### 4.4.1 Limits of Band Edge Measurement

For operations in the 704-716 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 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  $43 + 10 \log_{10}(P)$  dB.

### 4.4.2 Test Setup

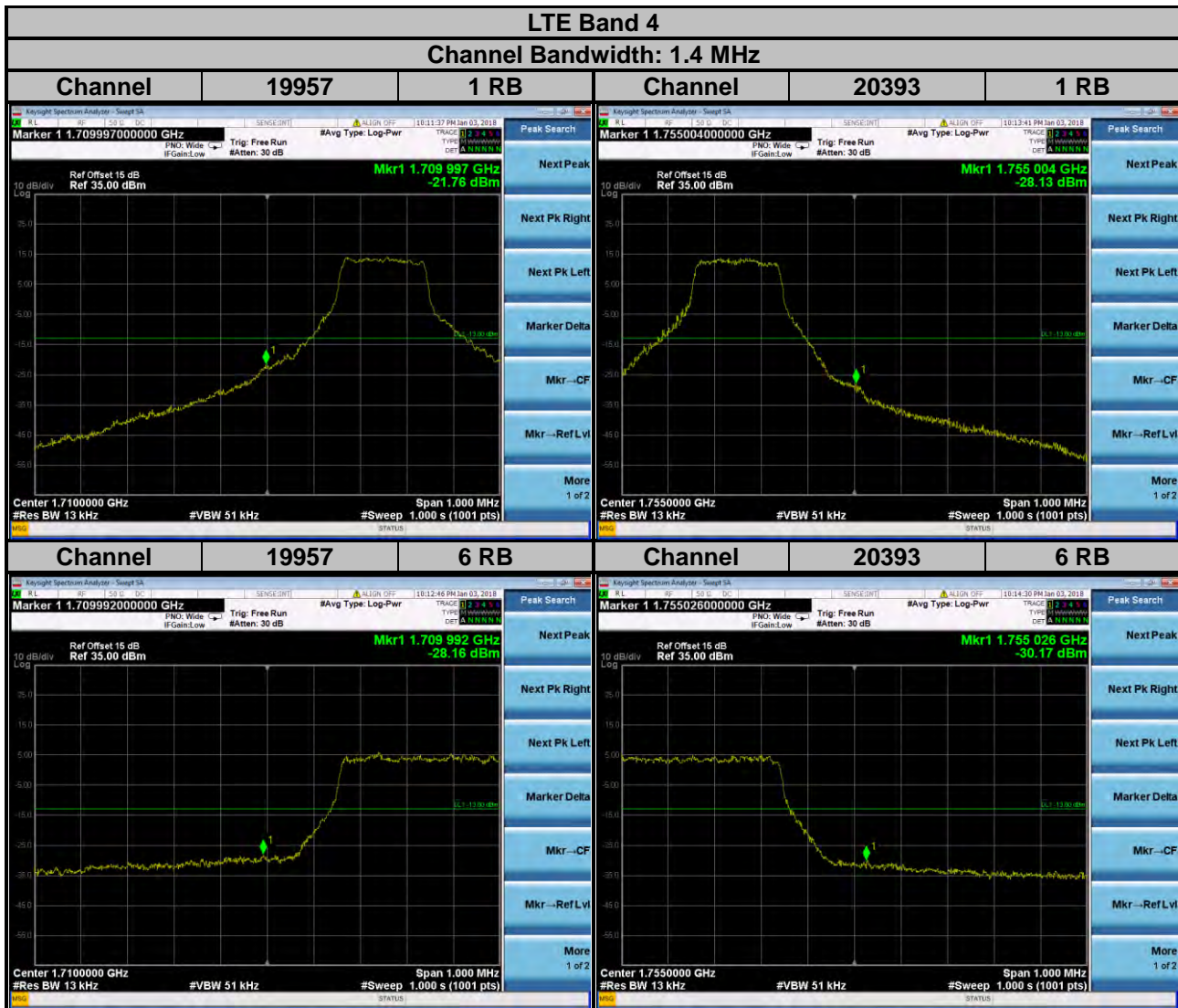
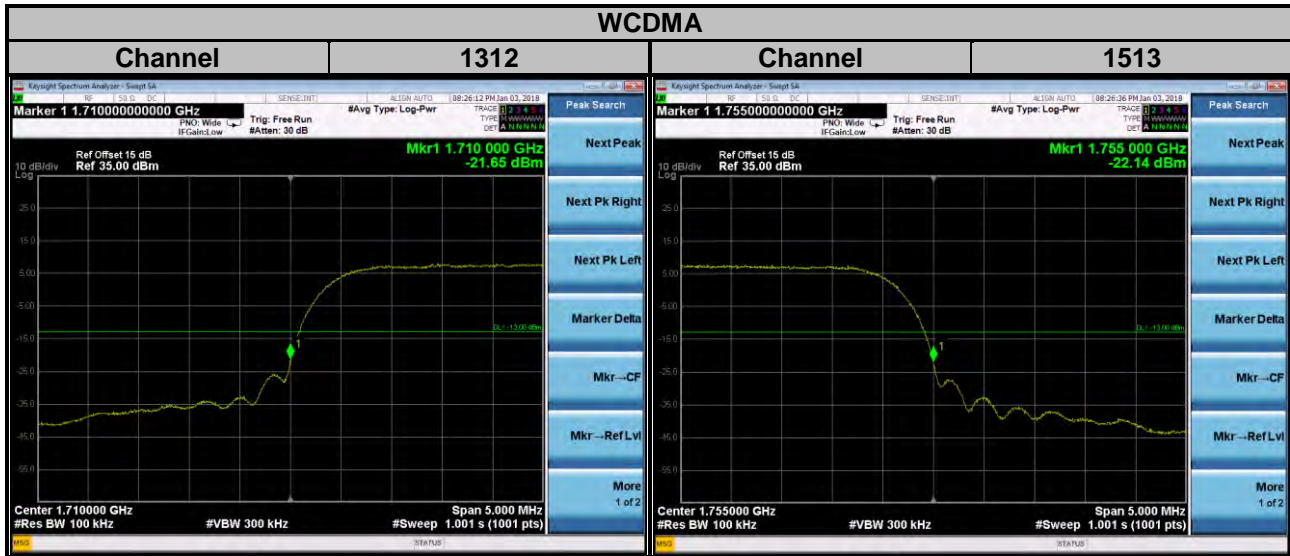


### 4.4.3 Test Procedures

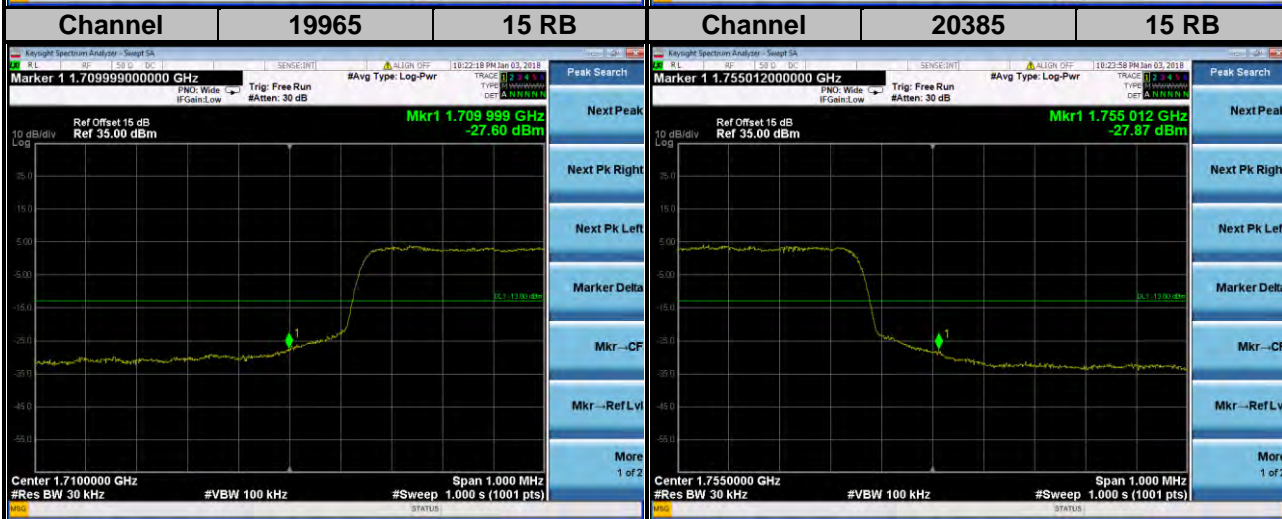
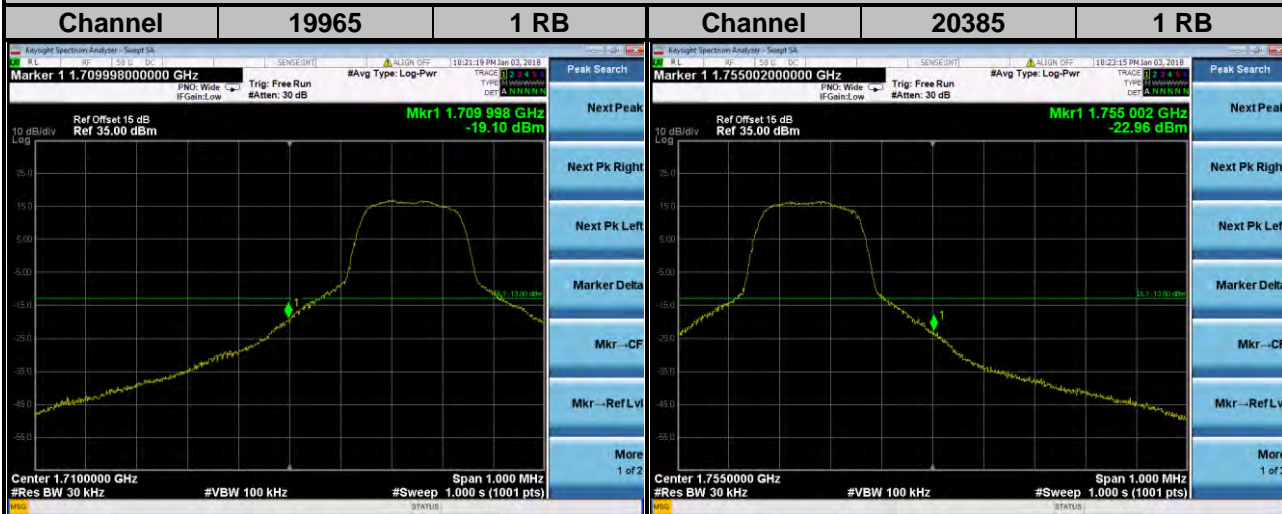
- a. All measurements were done at low and high operational frequency range.
- b. The center frequency of spectrum is the band edge frequency and span is 5 MHz. RB of the spectrum is 100 kHz and VB of the spectrum is 300 kHz (WCDMA).
- c. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 13 kHz and VB of the spectrum is 51 kHz (LTE Bandwidth 1.4 MHz).
- d. 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).
- e. 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 5 MHz/10 MHz).
- f. 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).
- g. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 180 kHz and VB of the spectrum is 560 kHz (LTE Bandwidth 20 MHz).
- h. Record the max. trace plot into the test report.

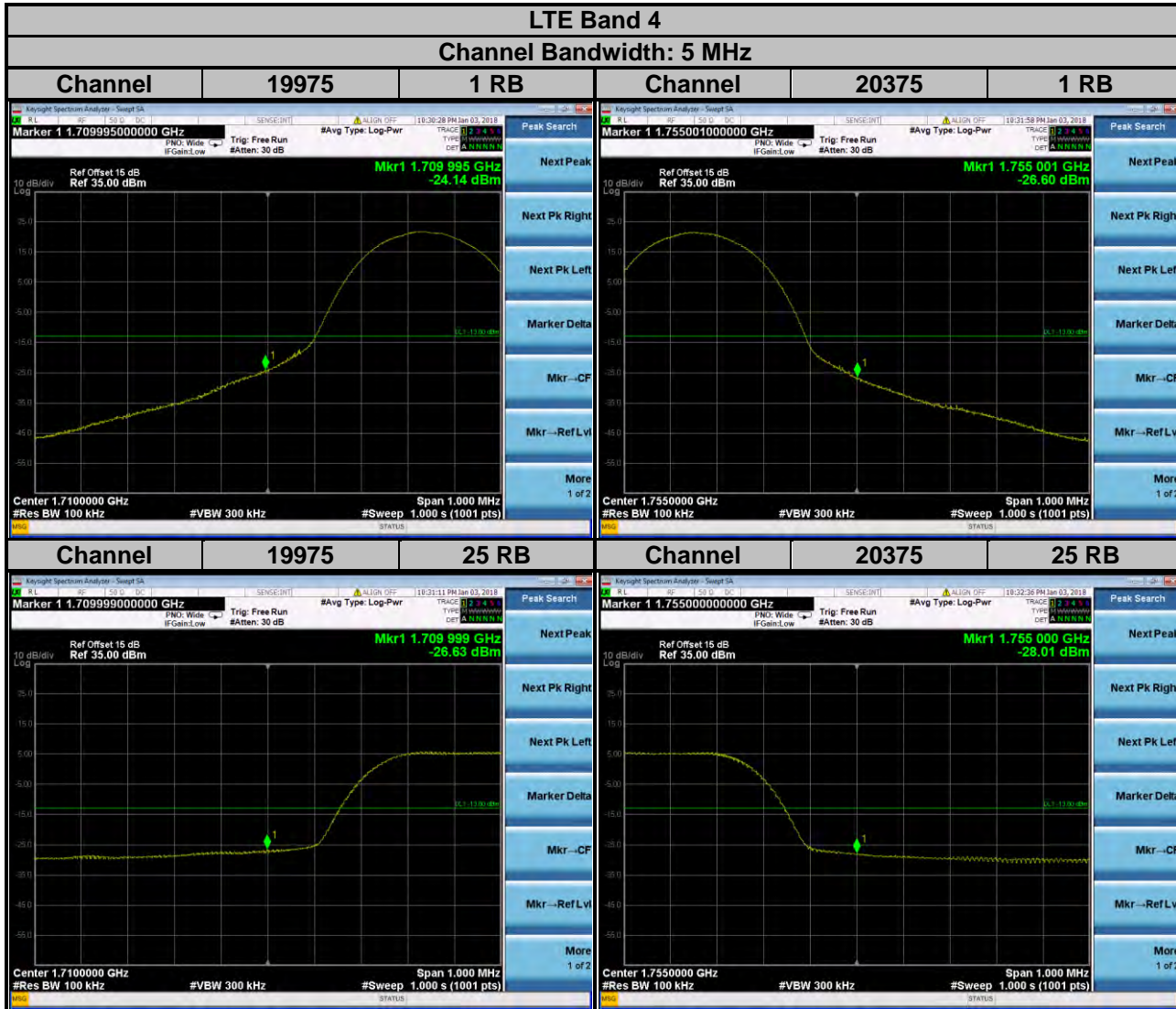


### 4.4.4 Test Results

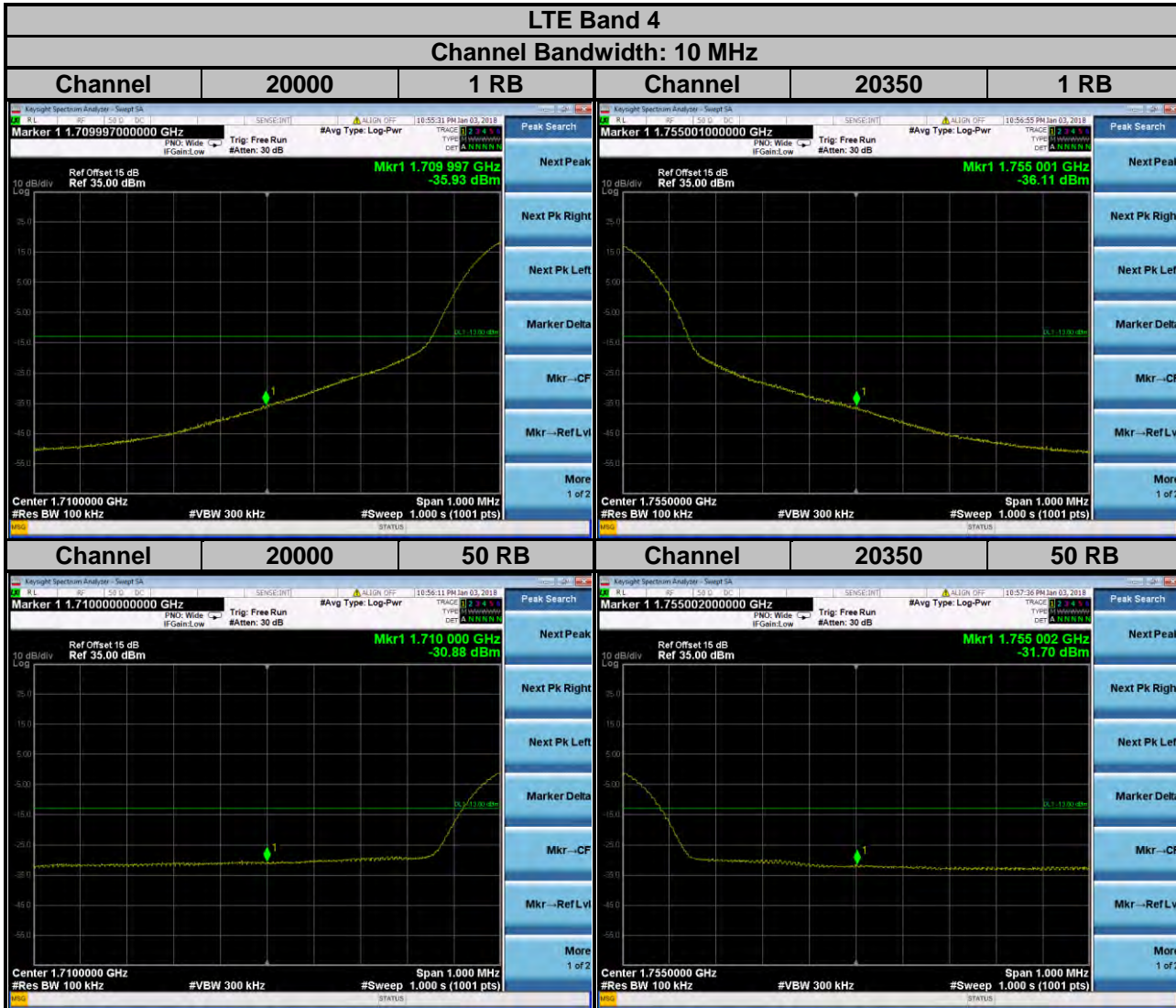


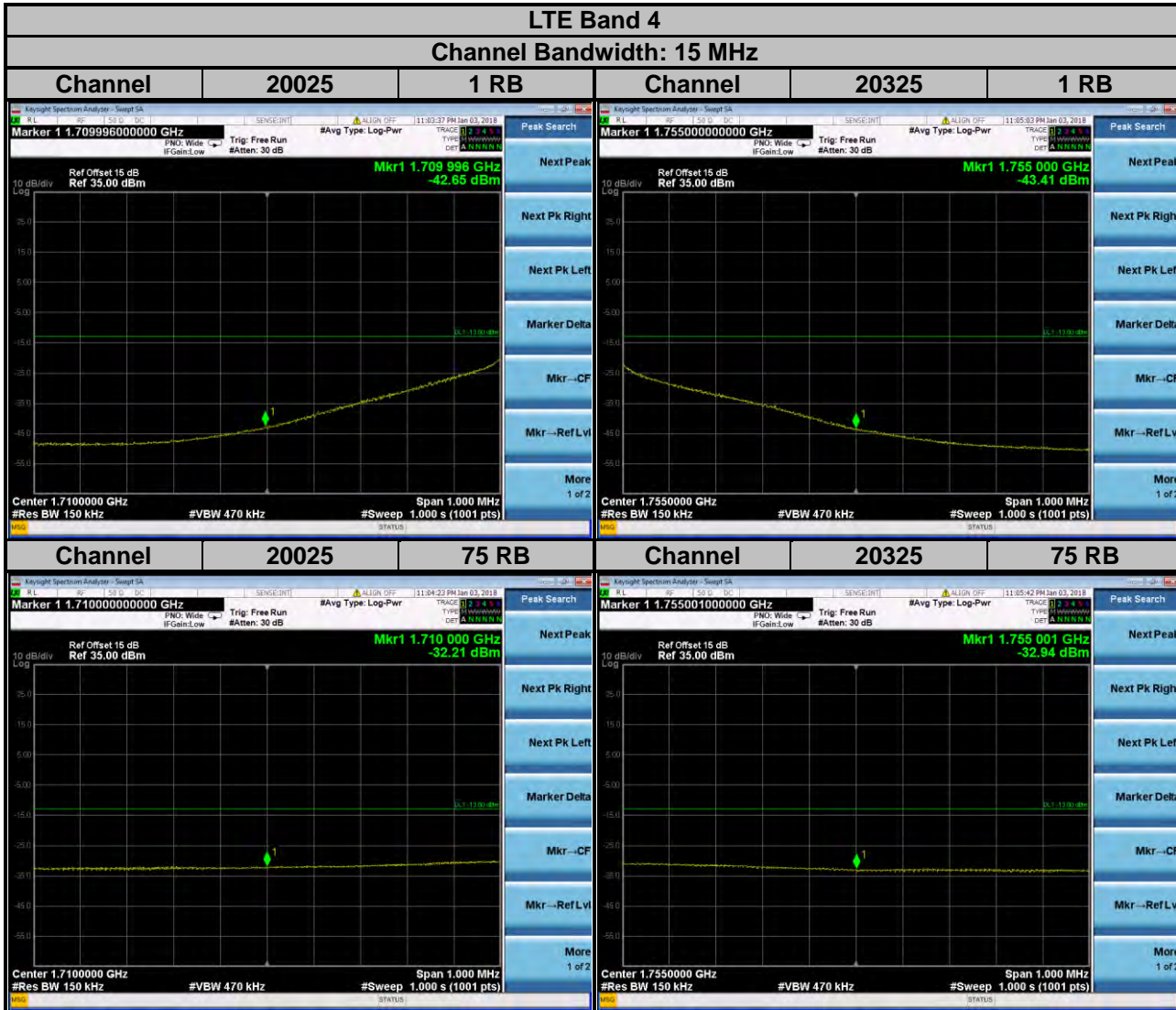
**LTE Band 4**  
**Channel Bandwidth: 3 MHz**

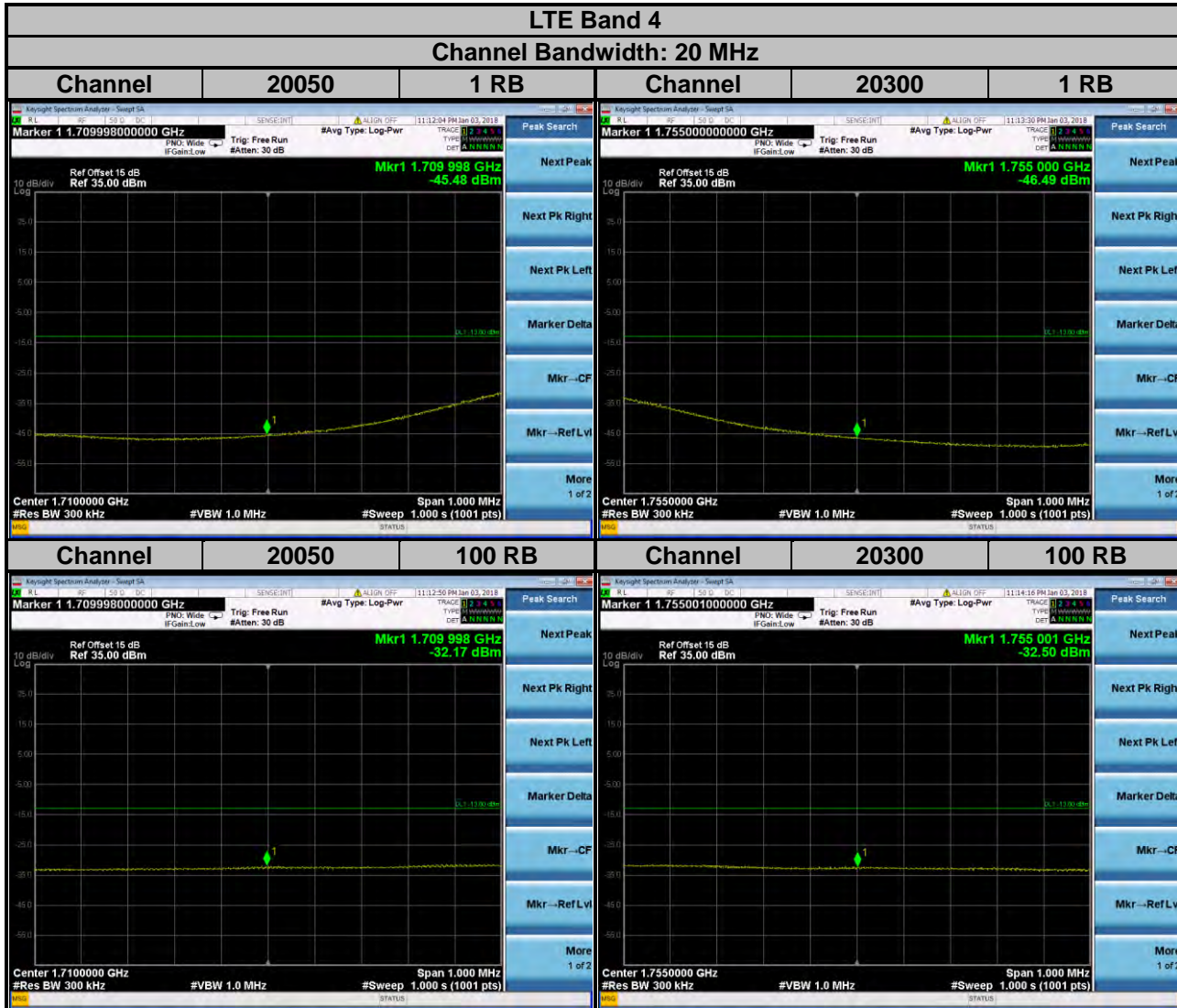






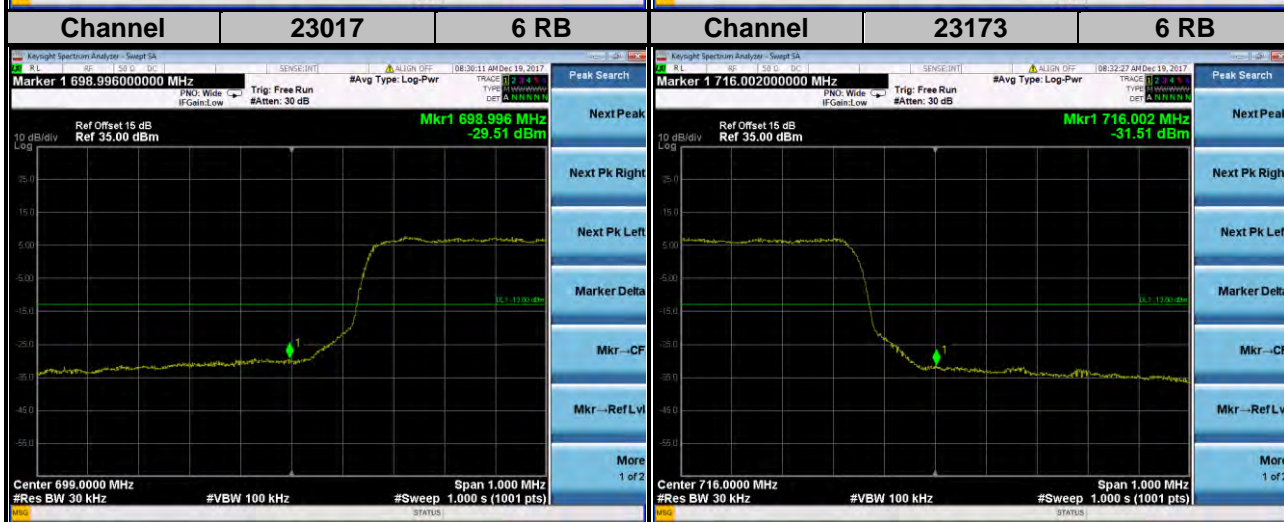
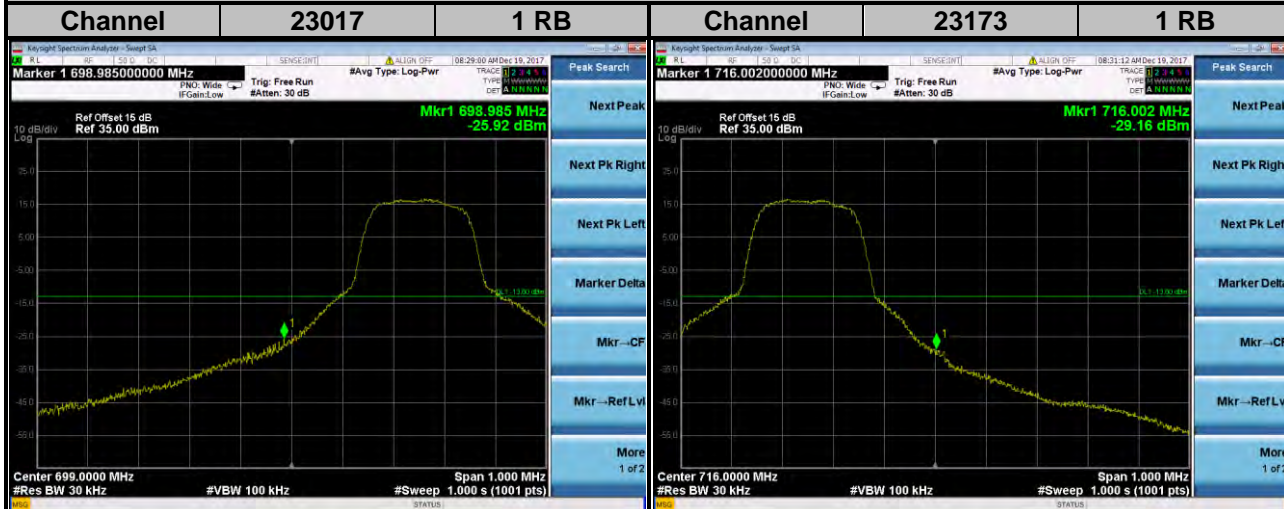


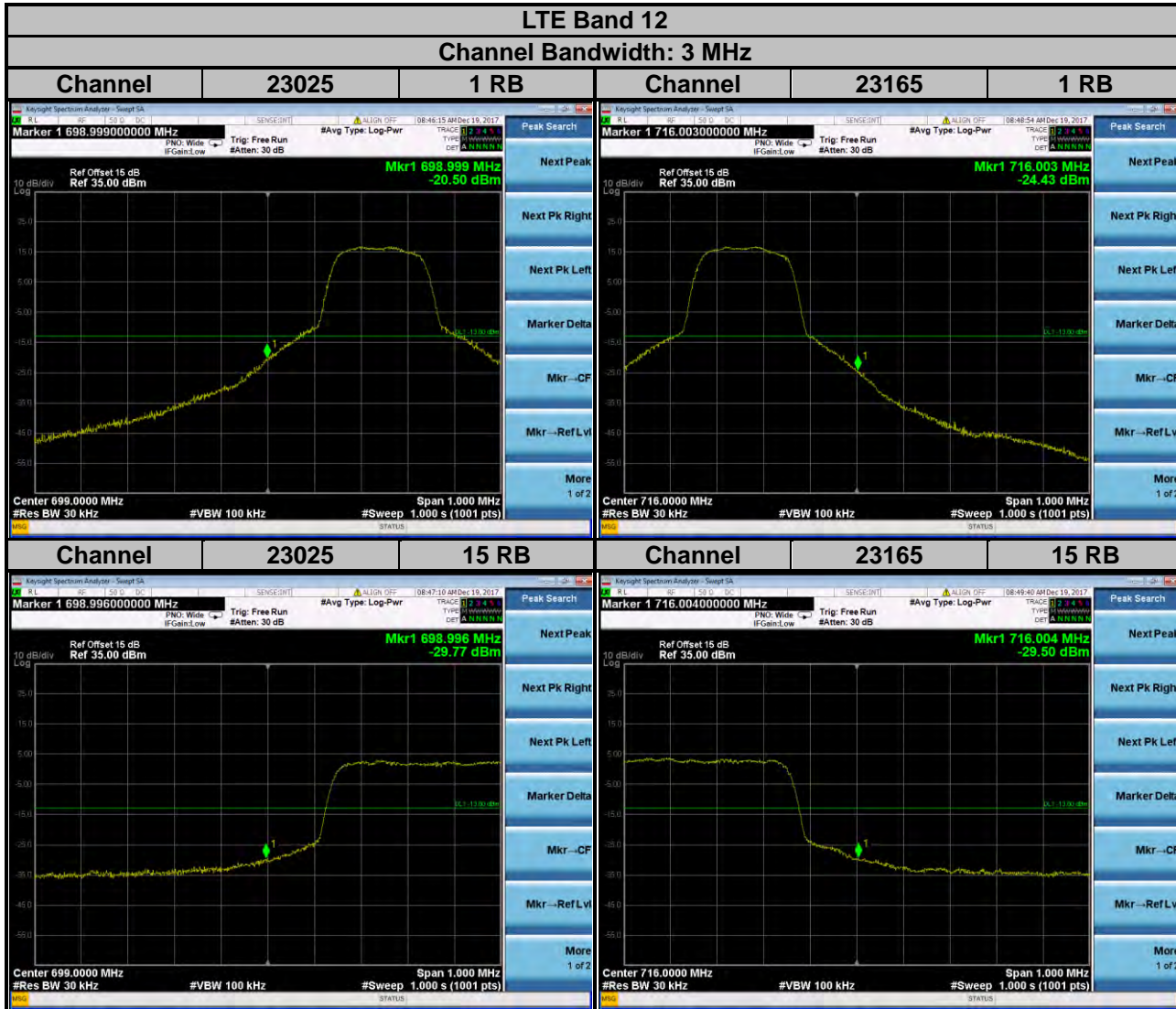






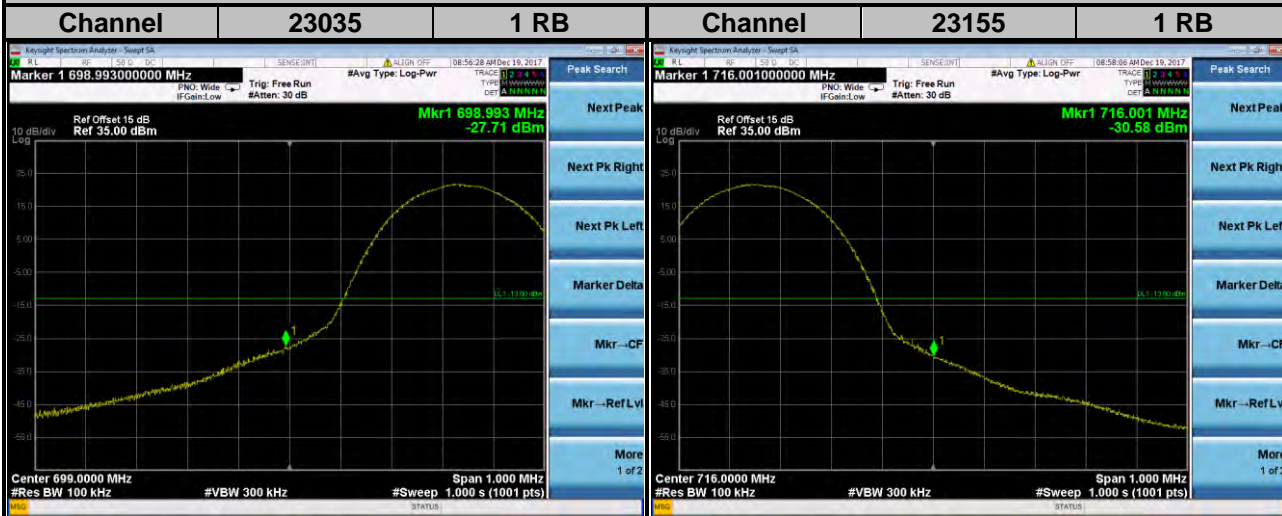
**LTE Band 12**  
**Channel Bandwidth: 1.4 MHz**



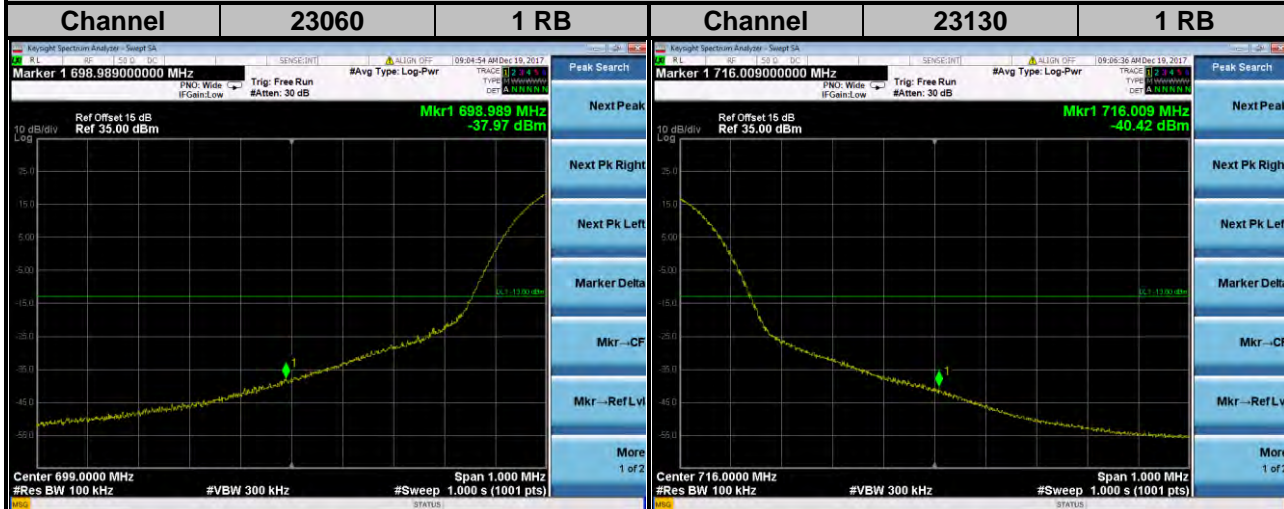


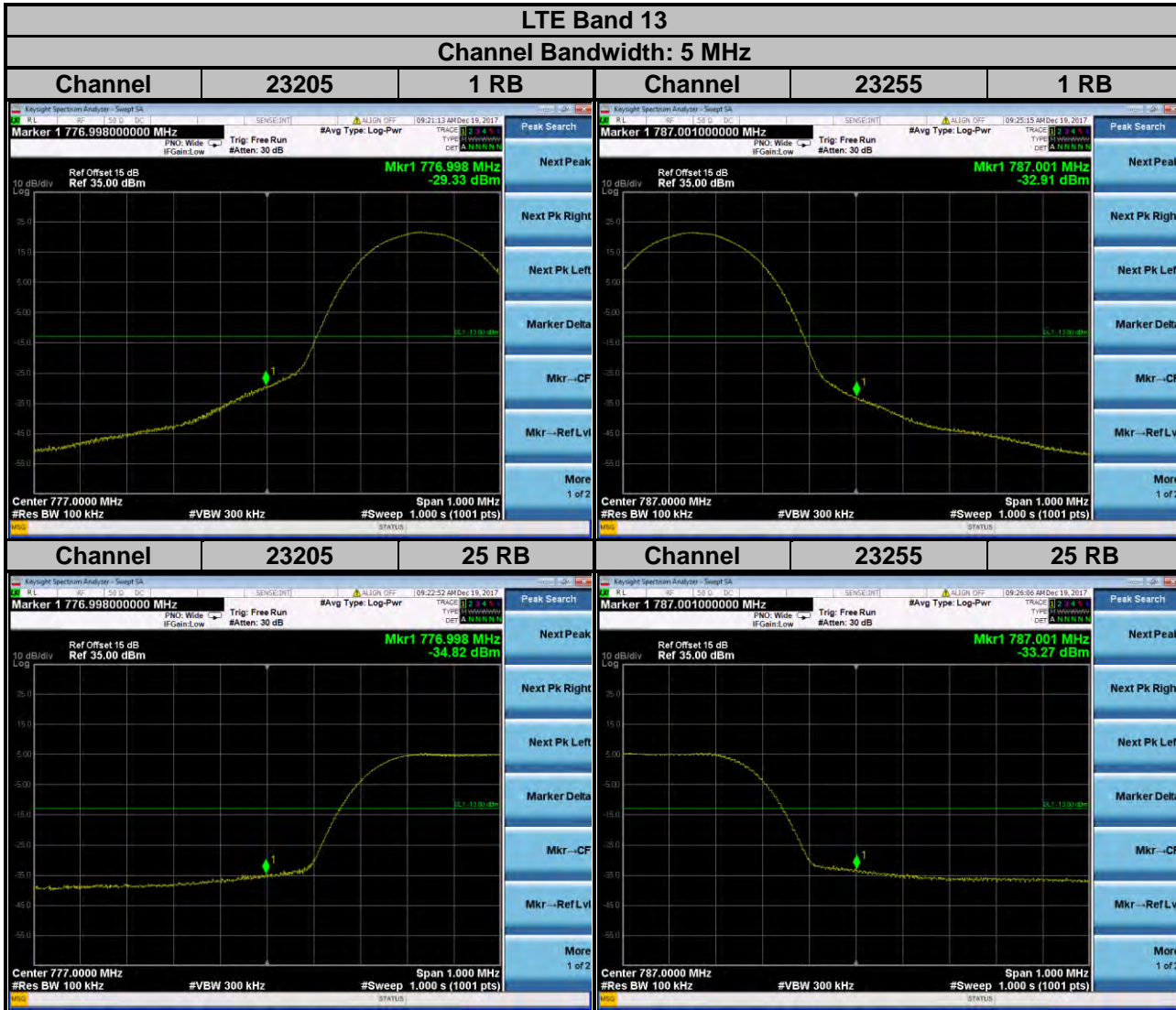


**LTE Band 12**  
**Channel Bandwidth: 5 MHz**

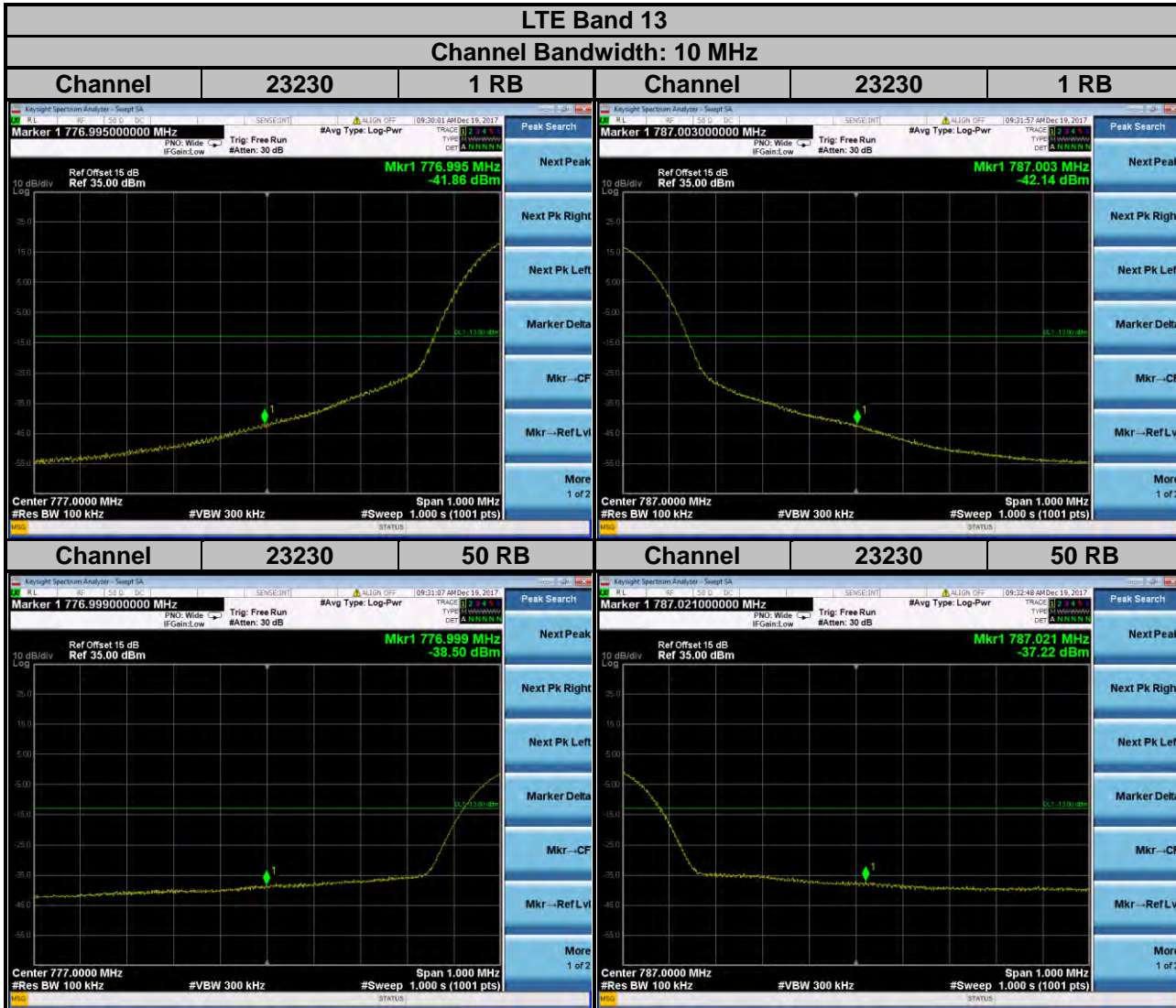


**LTE Band 12**  
**Channel Bandwidth: 10 MHz**

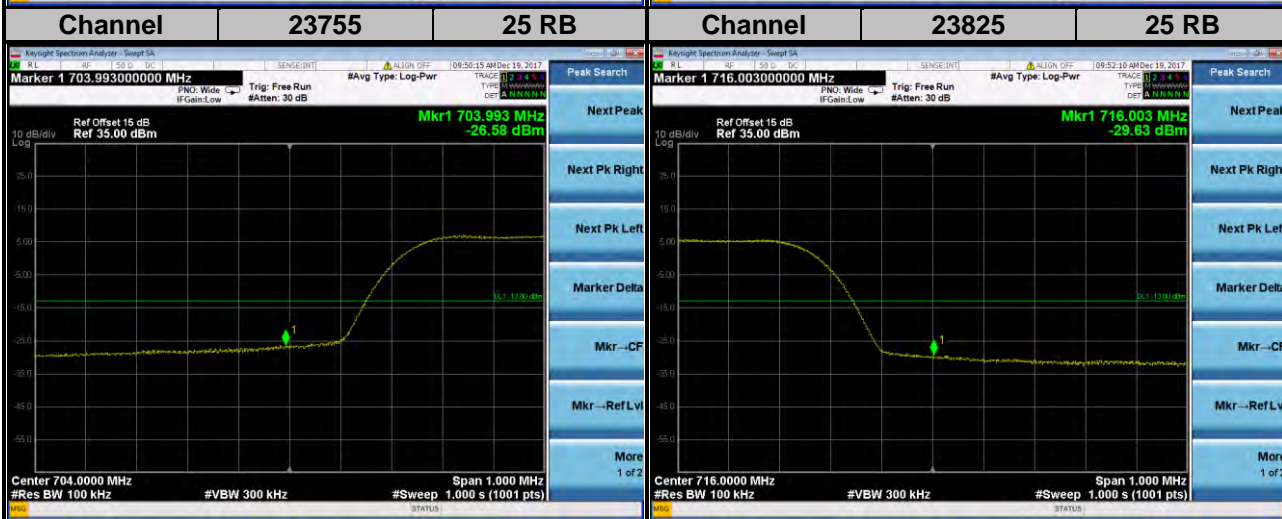
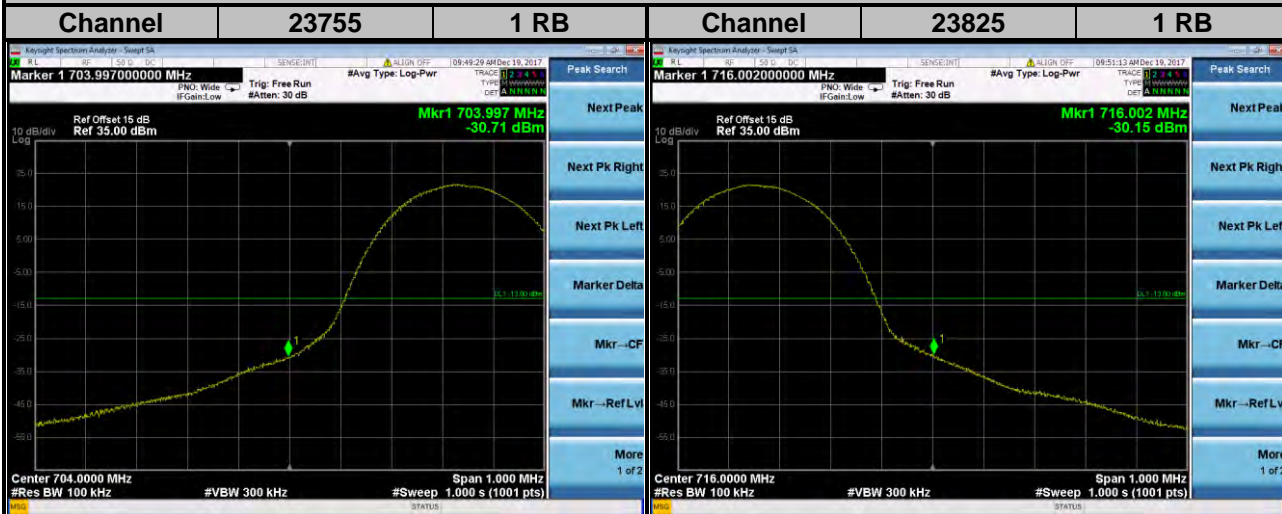


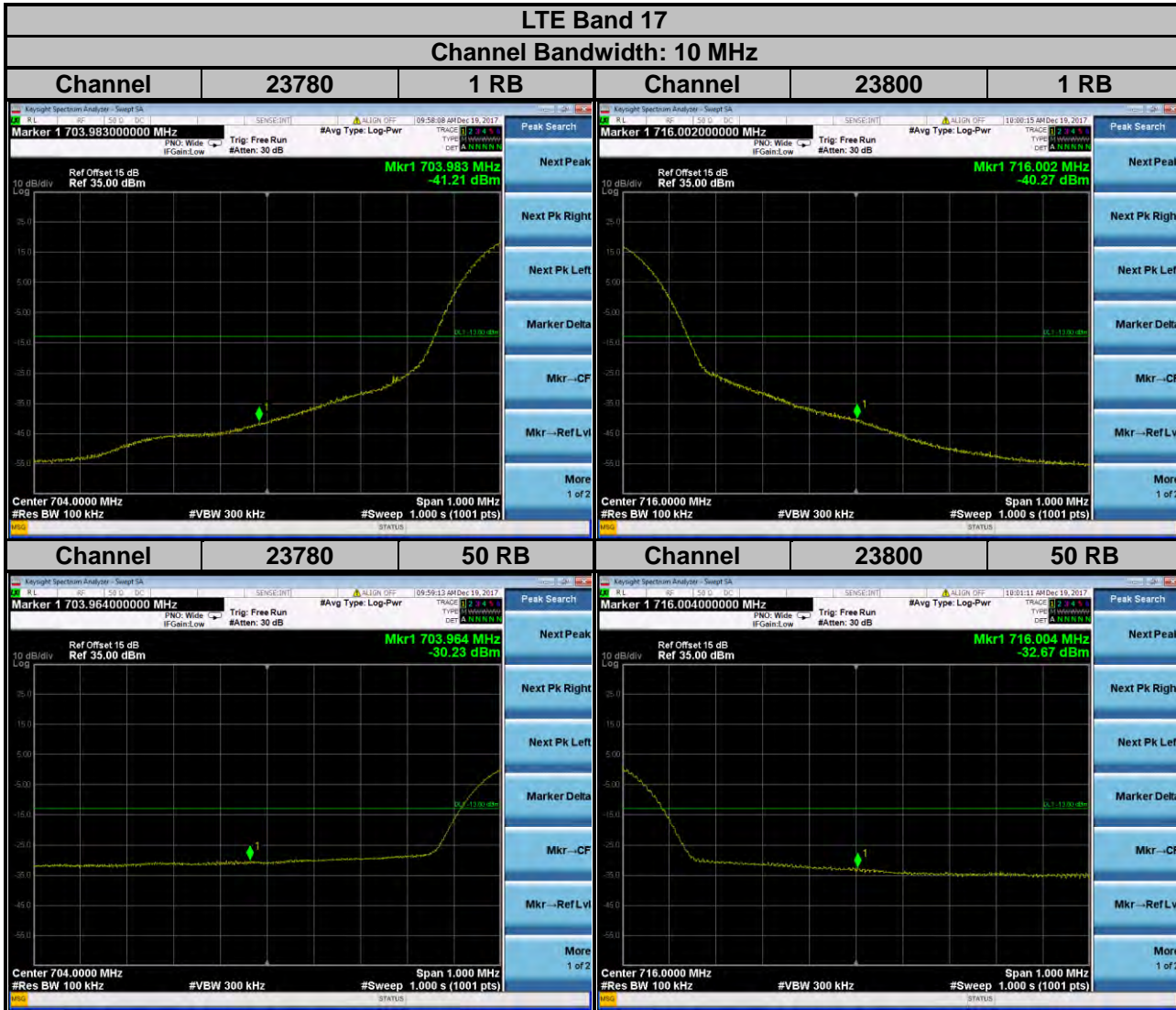






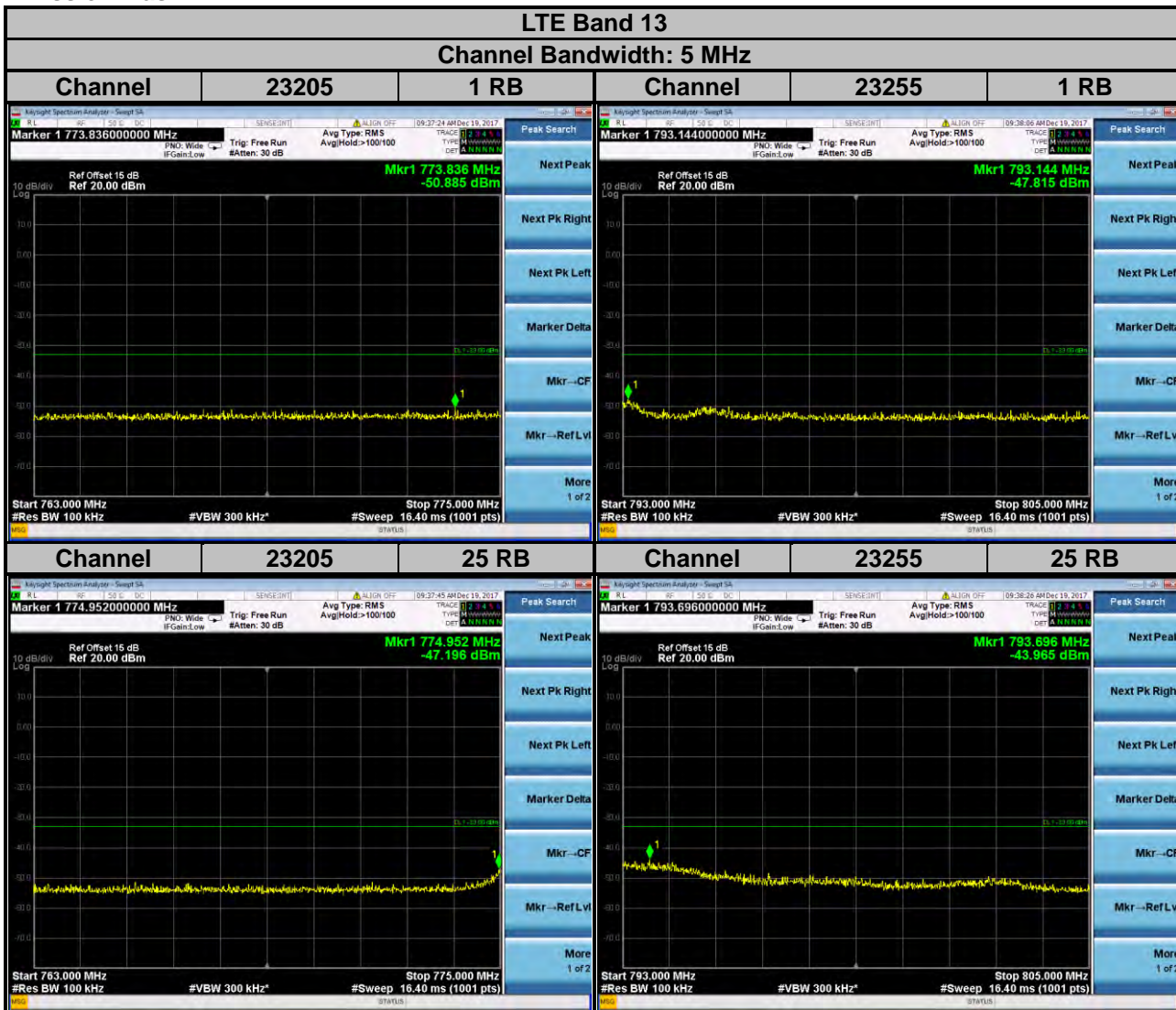
**LTE Band 17**  
**Channel Bandwidth: 5 MHz**







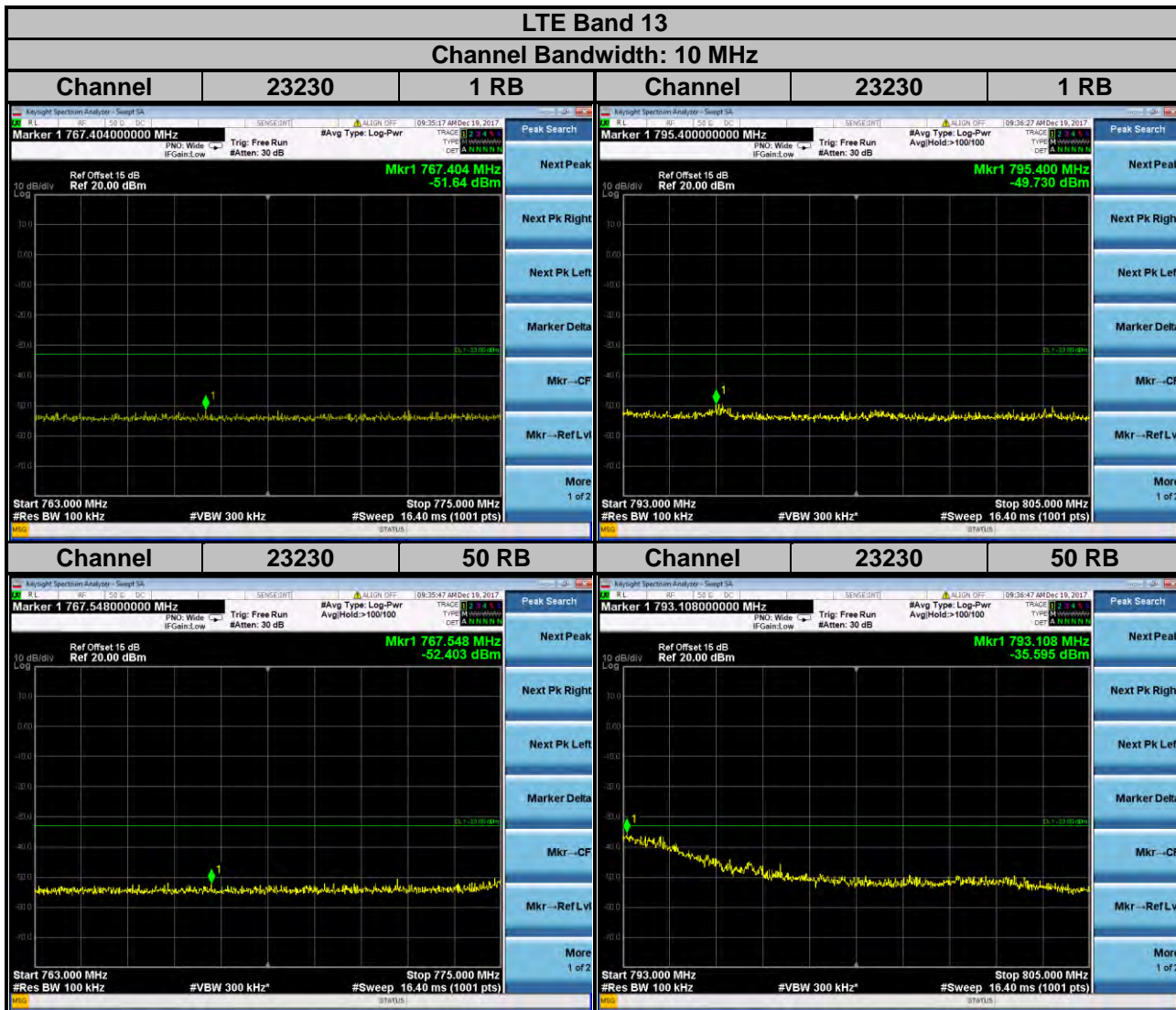
### Emission Mask



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.

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

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

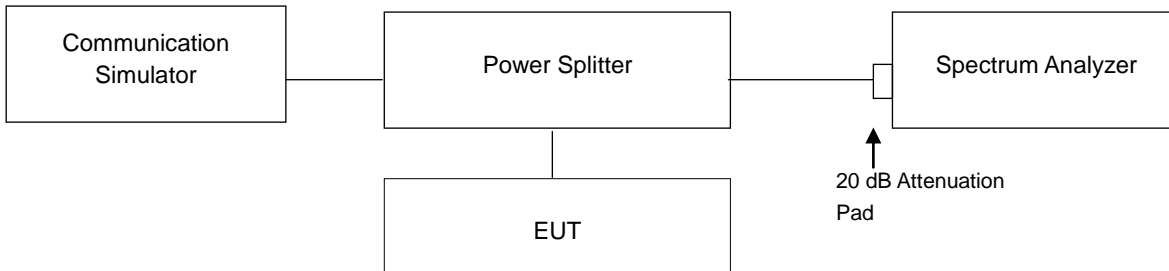


## 4.5 Peak to Average Ratio

### 4.5.1 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.

### 4.5.2 Test Setup

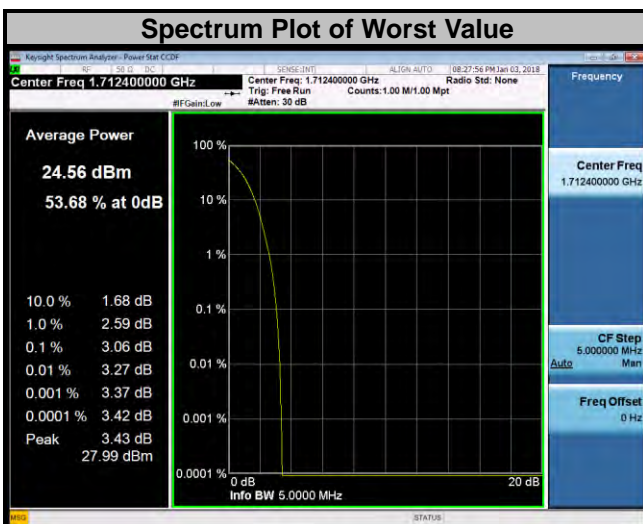


### 4.5.3 Test Procedures

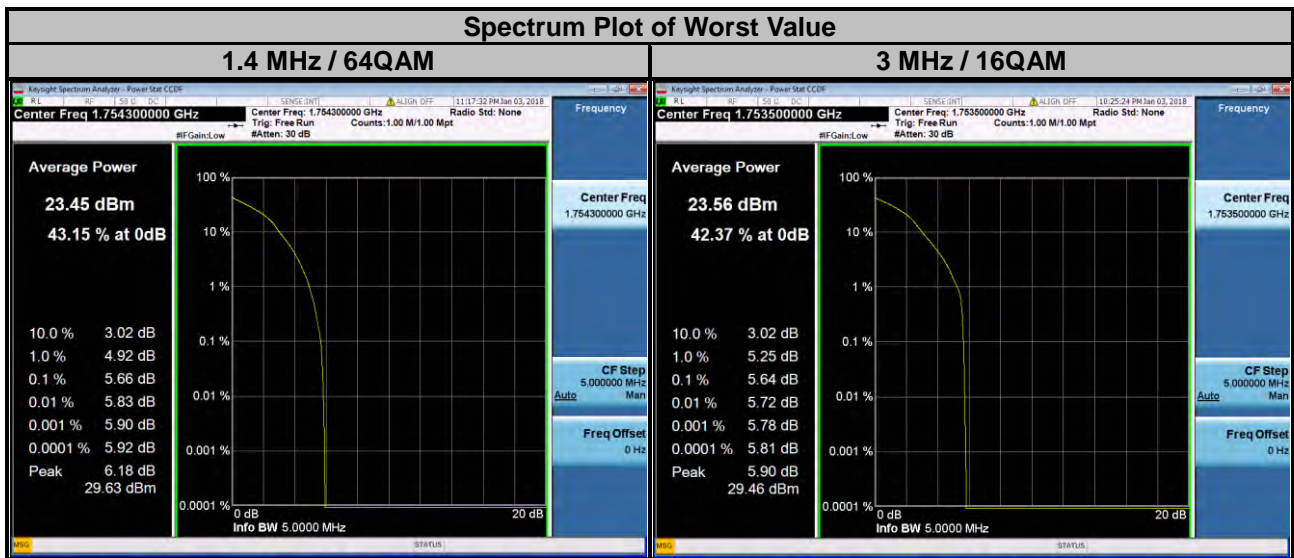
1. Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1 %.

### 4.5.4 Test Results

WCDMA		
Channel	Frequency (MHz)	Peak to Average Ratio (dB)
1312	1712.4	3.06
1413	1732.6	2.97
1513	1752.6	2.98



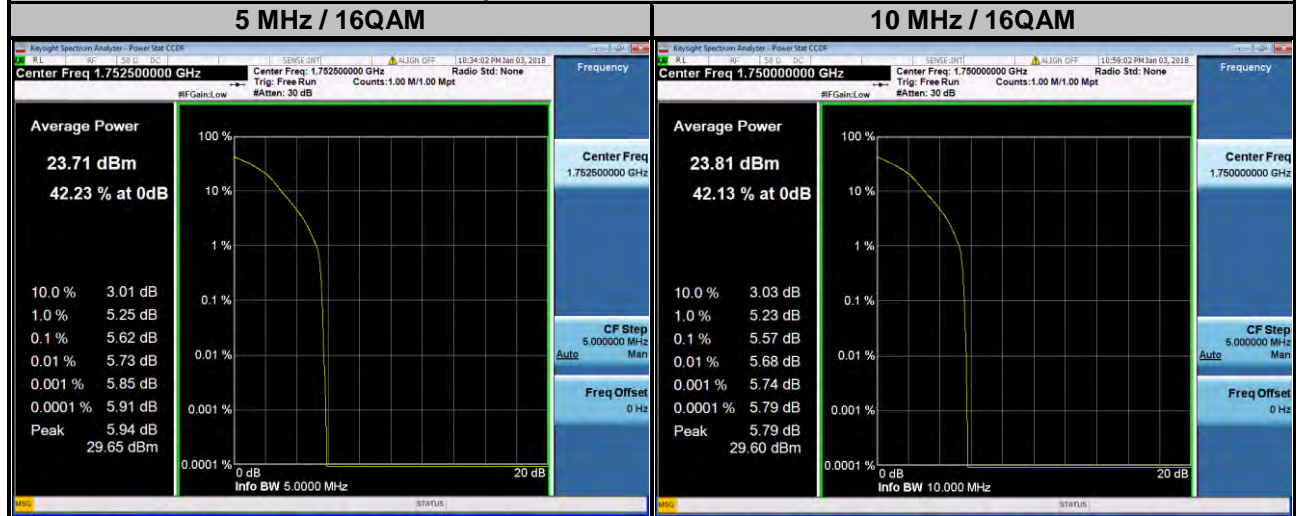
LTE Band 4									
Channel Bandwidth: 1.4 MHz					Channel Bandwidth: 3 MHz				
Channel	Frequency (MHz)	Peak to Average Ratio (dB)			Channel	Frequency (MHz)	Peak to Average Ratio (dB)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
19957	1710.7	4.23	5.05	5.00	19965	1711.5	4.19	4.95	4.92
20175	1732.5	4.68	5.41	5.49	20175	1732.5	4.60	5.45	5.38
20393	1754.3	4.87	5.65	5.66	20385	1753.5	4.85	5.64	5.58



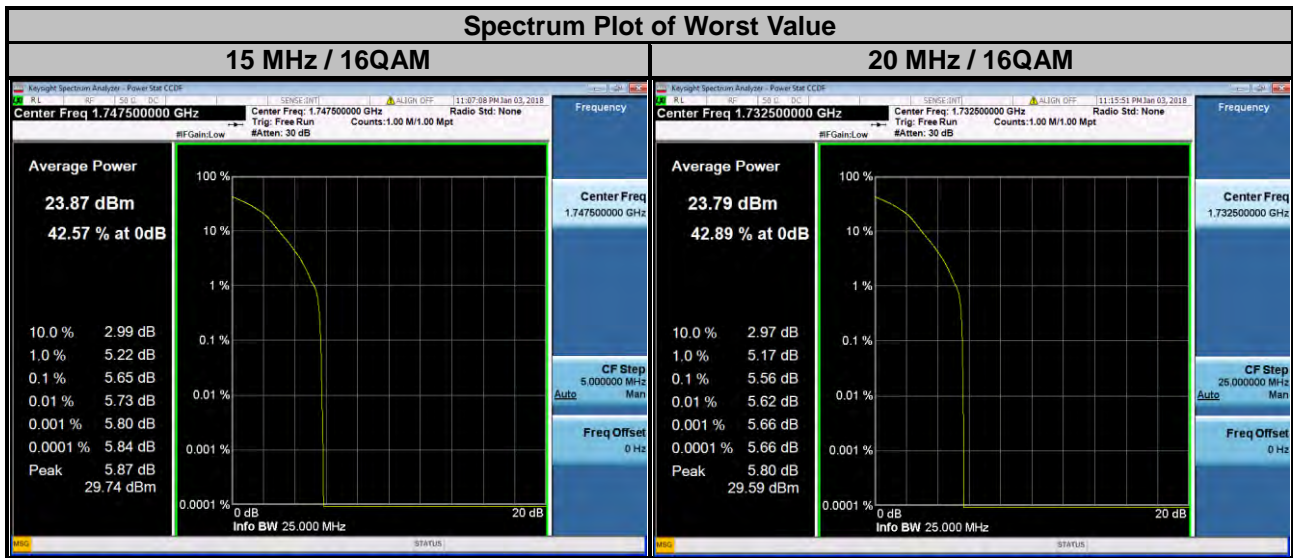
### LTE Band 4

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	64QAM			QPSK	16QAM	64QAM
19975	1712.5	4.19	4.98	4.86	20000	1715.0	4.10	4.93	4.86
20175	1732.5	4.58	5.38	5.28	20175	1732.5	4.60	5.41	5.33
20375	1752.5	4.85	5.62	5.58	20350	1750.0	4.81	5.57	5.51

### Spectrum Plot of Worst Value



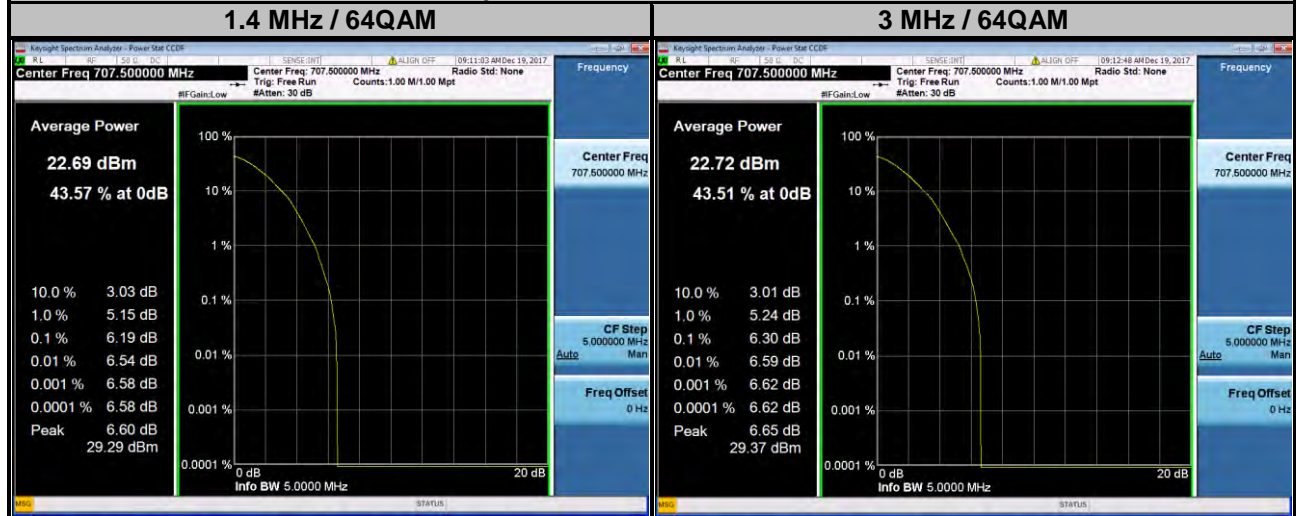
LTE Band 4									
Channel Bandwidth: 15 MHz					Channel Bandwidth: 20 MHz				
Channel	Frequency (MHz)	Peak to Average Ratio (dB)			Channel	Frequency (MHz)	Peak to Average Ratio (dB)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
20025	1717.5	4.05	4.86	4.76	20050	1720.0	4.04	4.82	4.66
20175	1732.5	4.68	5.45	5.36	20175	1732.5	4.75	5.56	5.47
20325	1747.5	4.87	5.65	5.55	20300	1745.0	4.69	5.46	5.44



### 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	64QAM			QPSK	16QAM	64QAM
23017	699.7	3.50	4.31	5.02	23025	700.5	3.29	4.19	4.95
23095	707.5	4.81	5.45	6.19	23095	707.5	4.70	5.44	6.30
23173	715.3	3.74	4.58	5.35	23165	714.5	3.40	4.19	5.04

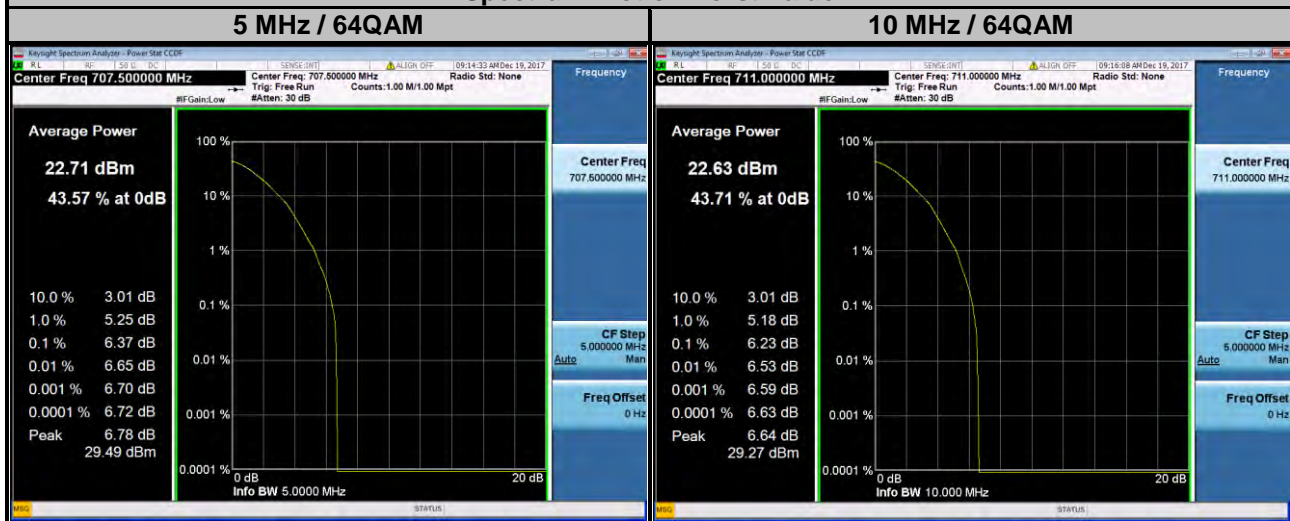
### Spectrum Plot of Worst Value



### 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	64QAM			QPSK	16QAM	64QAM
23035	701.5	3.37	4.20	5.06	23060	704.0	3.26	4.07	4.93
23095	707.5	4.77	5.57	6.37	23095	707.5	4.05	4.86	5.69
23155	713.5	3.69	4.48	5.38	23130	711.0	4.61	5.41	6.23

### Spectrum Plot of Worst Value

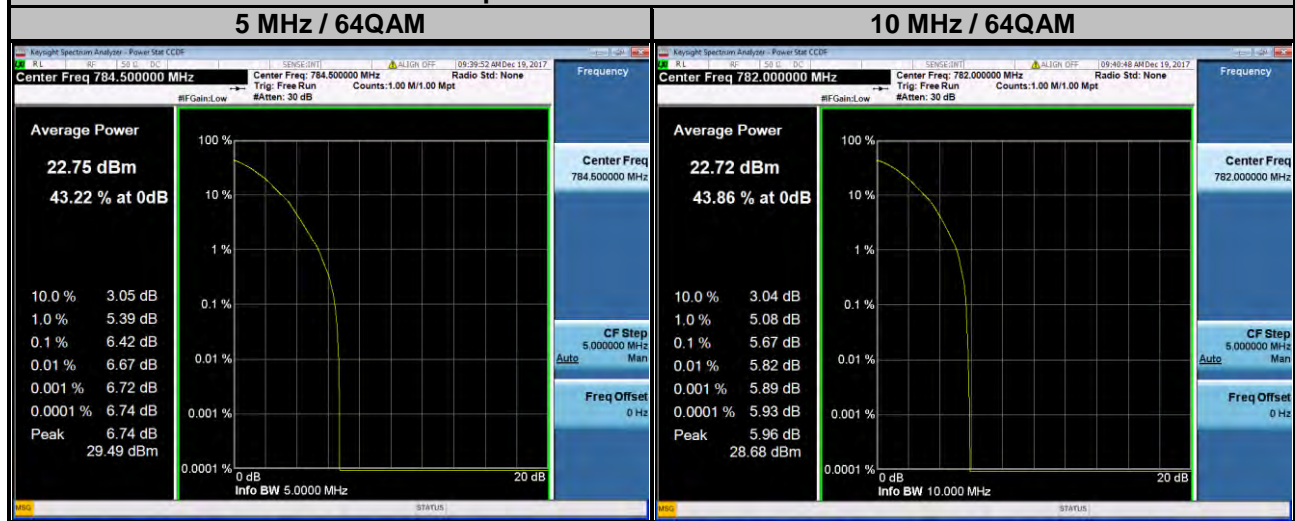




### LTE Band 13

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	64QAM			QPSK	16QAM	64QAM
23205	779.5	3.89	4.65	5.43	23230	782.0	4.10	4.85	5.67
23230	782.0	4.58	5.36	6.18					
23255	784.5	4.81	5.58	6.42					

### 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	64QAM			QPSK	16QAM	64QAM
23755	706.5	4.46	5.23	6.06	23780	709.0	4.54	5.30	6.13
23790	710.0	4.51	5.35	6.20	23790	710.0	4.75	5.52	6.33
23825	713.5	3.66	4.58	5.45	23800	711.0	4.65	5.45	6.29

### Spectrum Plot of Worst Value

