Annex A – Test Report for TA-1085 (Dual SIM)

FCC Test Report

(PART 27)

Report No.:	RF180626C09-2
FCC ID:	2AJOTTA-1085
Test Model:	TA-1085
Received Date:	Jun. 26, 2018
Test Date:	Jul. 05, 2018 ~ Jul. 20, 2018
Issued Date:	Jul. 31, 2018
Applicant:	HMD Global Oy
Address:	Karaportti 2, 02610 Espoo, Finland
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 Vil, Kwei Shan Dist., Taoyuan City 33383, Taiwan (R.O.C)
Test Location (2):	No.215, Sec. 3, Beixin Rd., Xindian Dist., New Taipei City 231, Taiwan, R.O.C
FCC Registration / Designation Number:	427177 / TW0011

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Table of Contents

Release Control Record **4**

1 Certificate of Conformity **5**

2 Summary of Test Results **6**

2.1 Measurement Uncertainty 9
2.2 Test Site and Instruments 10

3 General Information **11**

3.1 General Description of EUT 11
3.2 Configuration of System under Test 14
3.2.1 Description of Support Units 14
3.3 Test Mode Applicability and Tested Channel Detail 15
3.4 EUT Operating Conditions 23
3.5 General Description of Applied Standards 23

4 Test Types and Results **24**

4.1 Output Power Measurement 24
4.1.1 Limits of Output Power Measurement 24
4.1.2 Test Procedures 24
4.1.3 Test Setup 25
4.1.4 Test Results 26
4.2 Modulation Characteristics Measurement 43
4.2.1 Limits of Modulation Characteristics 43
4.2.2 Test Setup 43
4.2.3 Test Procedure 43
4.2.4 Test Results 44
4.3 Frequency Stability Measurement 46
4.3.1 Limits of Frequency Stability Measurement 46
4.3.2 Test Procedure 46
4.3.3 Test Setup 46
4.3.4 Test Results 47
4.4 Occupied Bandwidth Measurement 68
4.4.1 Limits of Occupied Bandwidth Measurement 68
4.4.2 Test Procedure 68
4.4.3 Test Setup 68
4.4.4 Test Result 69
4.5 Band Edge Measurement 80
4.5.1 Limits of Band Edge Measurement 80
4.5.2 Test Setup 80
4.5.3 Test Procedures 80
4.5.4 Test Results 81
4.6 Peak to Average Ratio 103
4.6.1 Limits of Peak to Average Ratio Measurement 103
4.6.2 Test Setup 103
4.6.3 Test Procedures 103
4.6.4 Test Results 104
4.7 Conducted Spurious Emissions 115
4.7.1 Limits of Conducted Spurious Emissions Measurement 115
4.7.2 Test Setup 115
4.7.3 Test Procedure 115
4.7.4 Test Results 116
4.8 Radiated Emission Measurement 163
4.8.1 Limits of Radiated Emission Measurement 163
4.8.2 Test Procedure 163
4.8.3 Deviation from Test Standard 163
4.8.4 Test Setup 164

4.8.5 Test Results 165
5 Pictures of Test Arrangements 259
Appendix – Information on the Testing Laboratories 260

Release Control Record

Issue No.	Description	Date Issued
RF180626C09-2	Original Release	Jul. 31, 2018

1 Certificate of Conformity

Product: Smart Phone

Brand: NOKIA

Test Model: TA-1085

Sample Status: Engineering Sample

Applicant: HMD Global Oy

Test Date: Jul. 05, 2018 ~ Jul. 20, 2018

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:** Jul. 31, 2018

Ivonne Wu / Supervisor

Approved by : _____ , **Date:** Jul. 31, 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 -36.95 dB at 3465.20 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.
2.1055 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 -26.06 dB at 5196.00 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 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 -14.11 dB at 2133.00 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 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 -11.47 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 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 -15.11 dB at 2130.00 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 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 -27.11 dB at 5235.00 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	Expended Uncertainty (k=2) (±)
Radiated Emissions up to 1 GHz	30 MHz ~ 200 MHz	2.0153 dB
	200 MHz ~ 1000 MHz	2.0224 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	1.0121 dB
	18 GHz ~ 40 GHz	1.1508 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent Technologies	N9010A	MY52220314	Nov. 24, 2017	Nov. 23, 2018
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Jan. 11, 2018	Jan. 10, 2019
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 9120D	9120D-969	Dec. 12, 2017	Dec. 11, 2018
Fixed Attenuator Woken	00801A1GGAM02Y	NA	May 17, 2018	May 16, 2019
MXG Vector signal generator Agilent	N5182B	MY53050430	Oct. 24, 2017	Oct. 23, 2018
Preamplifier Agilent	310N	187226	Jun. 19, 2018	Jun. 18, 2019
Preamplifier Agilent	83017A	MY39501357	Jun. 19, 2018	Jun. 18, 2019
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(RFC-SMS-100-SMS-120+RFC-SMS-100-SMS-400)	Jun. 19, 2018	Jun. 18, 2019
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(RFC-SMS-100-SMS-24)	Jun. 19, 2018	Jun. 18, 2019
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Software BV ADT	E3 8.130425b	NA	NA	NA
Antenna Tower MF	NA	NA	NA	NA
Turn Table MF	NA	NA	NA	NA
Antenna Tower &Turn Table Controller MF	MF-7802	NA	NA	NA
Radio Communication Analyzer Anritsu	MT8820C	6201010284	Dec. 28, 2017	Dec. 27, 2018
Temperature & Humidity Chamber	GTH-120-40-CP-AR	MAA1306-019	Sep. 08, 2017	Sep. 07, 2018
DC Power Supply Topward	33010D	807748	Oct. 25, 2016	Oct. 24, 2018
Digital Multimeter Fluke	87-III	70360742	Jun. 29, 2018	Jun. 28, 2019

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 HsinTien Chamber 1.
3. The horn antenna and preamplifier (model: 83017A) are used only for the measurement of emission frequency above 1 GHz if tested.
4. The IC Site Registration No. is IC7450I-1.

3 General Information

3.1 General Description of EUT

Product	Smart Phone	
Brand	NOKIA	
Test Model	TA-1085	
Status of EUT	Engineering Sample	
Power Supply Rating	5.0 Vdc or 9 Vdc or 12 Vdc (adapter) 5.0 Vdc (host equipment) 3.85 Vdc (Li-ion battery)	
Modulation Type	WCDMA	QPSK
	LTE	QPSK, 16QAM
Frequency Range	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

Emission Designator	WCDMA	4M15F9W
	LTE Band 4 (Channel Bandwidth: 1.4 MHz)	1M09W7D
	LTE Band 4 (Channel Bandwidth: 3 MHz)	2M70G7D
	LTE Band 4 (Channel Bandwidth: 5 MHz)	4M50W7D
	LTE Band 4 (Channel Bandwidth: 10 MHz)	8M98W7D
	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)	4M49W7D
	LTE Band 12 (Channel Bandwidth: 10 MHz)	8M99W7D
	LTE Band 13 (Channel Bandwidth: 5 MHz)	4M49W7D
	LTE Band 13 (Channel Bandwidth: 10 MHz)	8M94W7D
	LTE Band 17 (Channel Bandwidth: 5 MHz)	4M50W7D
	LTE Band 17 (Channel Bandwidth: 10 MHz)	9M00W7D
	LTE Band 66 (Channel Bandwidth: 1.4 MHz)	1M09W7D
	LTE Band 66 (Channel Bandwidth: 3 MHz)	2M70G7D
	LTE Band 66 (Channel Bandwidth: 5 MHz)	4M50W7D
	LTE Band 66 (Channel Bandwidth: 10 MHz)	8M98W7D
	LTE Band 66 (Channel Bandwidth: 15 MHz)	13M5G7D
	LTE Band 66 (Channel Bandwidth: 20 MHz)	18M0W7D
Max. ERP Power	LTE Band 12 (Channel Bandwidth: 1.4 MHz)	63.55 mW
	LTE Band 12 (Channel Bandwidth: 3 MHz)	64.14 mW
	LTE Band 12 (Channel Bandwidth: 5 MHz)	64.58 mW
	LTE Band 12 (Channel Bandwidth: 10 MHz)	64.83 mW
	LTE Band 13 (Channel Bandwidth: 5 MHz)	45.40 mW
	LTE Band 13 (Channel Bandwidth: 10 MHz)	46.10 mW
	LTE Band 17 (Channel Bandwidth: 5 MHz)	64.06 mW
	LTE Band 17 (Channel Bandwidth: 10 MHz)	64.55 mW
Max. EIRP Power	WCDMA	255.86 mW
	LTE Band 4 (Channel Bandwidth: 1.4 MHz)	250.03 mW
	LTE Band 4 (Channel Bandwidth: 3 MHz)	251.77 mW
	LTE Band 4 (Channel Bandwidth: 5 MHz)	253.51 mW
	LTE Band 4 (Channel Bandwidth: 10 MHz)	255.27 mW
	LTE Band 4 (Channel Bandwidth: 15 MHz)	257.04 mW
	LTE Band 4 (Channel Bandwidth: 20 MHz)	258.23 mW
	LTE Band 66 (Channel Bandwidth: 1.4 MHz)	278.80 mW
	LTE Band 66 (Channel Bandwidth: 3 MHz)	280.09 mW
	LTE Band 66 (Channel Bandwidth: 5 MHz)	281.38 mW
	LTE Band 66 (Channel Bandwidth: 10 MHz)	283.79 mW
	LTE Band 66 (Channel Bandwidth: 15 MHz)	285.96 mW
	LTE Band 66 (Channel Bandwidth: 20 MHz)	287.94 mW

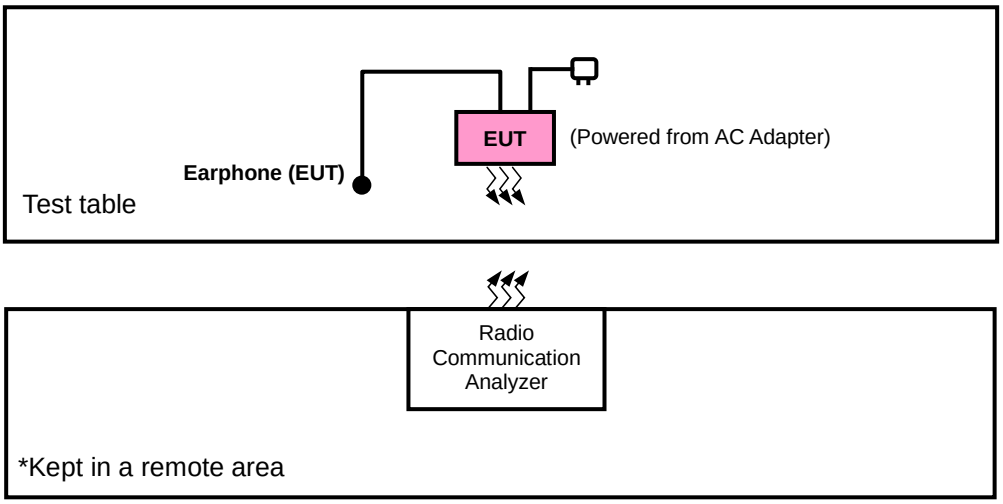
Antenna Type	PIFA Antenna	
Antenna Gain	WCDMA	0.72 dBi
	LTE Band 4	0.72 dBi
	LTE Band 12	-3.14 dBi
	LTE Band 13	-3.91 dBi
	LTE Band 17	-3.14 dBi
	LTE Band 66	0.72 dBi
Accessory Device	Refer to Note as below	
Data Cable Supplied	Refer to Note as below	

Note:

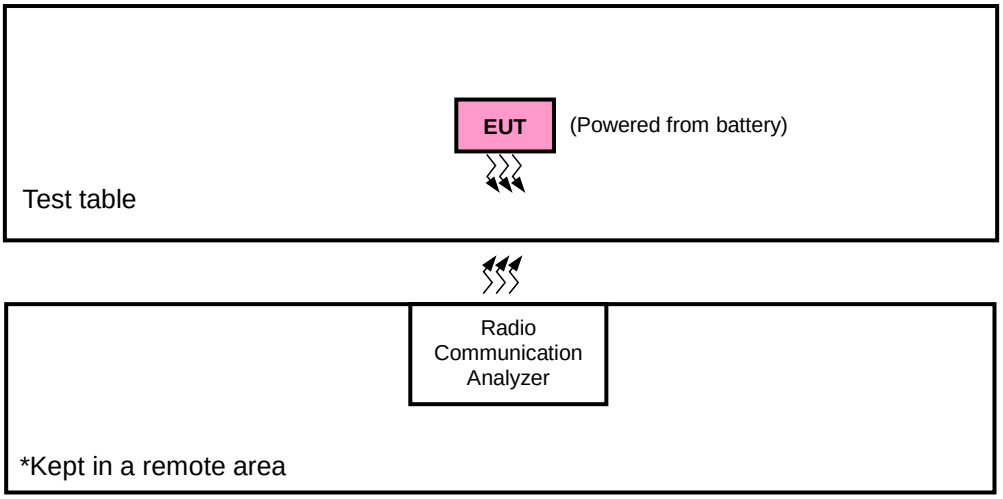
1. There’re 2 configurations for the EUT listed as below.
   Main Sample: EUT + Battery 1
   2nd Sample: EUT + Battery 2
   ✧ Only the worst test data was presented in the report.
2. The EUT’s accessories list refers to Ext. Pho.
3. The above EUT information is declared by manufacturer and for more detailed 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:

EUT Configure Mode	Description
A	Main Sample
B	2nd Sample

SIM	Band	ERP / EIRP	Radiated Emission
1	**WCDMA**	Z-plane	Y-axis
	LTE Band 4	X-plane	X-axis
	LTE Band 12	Z-plane	Y-axis
	LTE Band 13	Z-plane	X-axis
	LTE Band 17	Z-plane	X-axis
	LTE Band 66	X-plane	X-axis

WCDMA

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
A, B	EIRP	1312 to 1513	1312, 1413, 1513	WCDMA
A	Modulation Characteristics	1312 to 1513	1413	WCDMA
A	Frequency Stability	1312 to 1513	1312, 1513	WCDMA
A	Occupied Bandwidth	1312 to 1513	1312, 1413, 1513	WCDMA
A	Band Edge	1312 to 1513	1312, 1513	WCDMA
A	Peak to Average Ratio	1312 to 1513	1312, 1413, 1513	WCDMA
A	Conducted Emission	1312 to 1513	1312, 1413, 1513	WCDMA
A, B	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
A	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
B		20050 to 20300	20050, 20175, 20300	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
A	Modulation Characteristics	20050 to 20300	20175	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
A	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
A	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
A	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
A	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
A	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
A	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
B		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
A	ERP	23017 to 23173	23017, 23095, 23173	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		23025 to 23165	23025, 23095, 23165	3 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		23035 to 23155	23035, 23095, 23155	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		23060 to 23130	23060, 23095, 23130	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
A	Modulation Characteristics	23060 to 23130	23095	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
A	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
A	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
A	Peak to Average Ratio	23017 to 23173	23017, 23095, 23173	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		23025 to 23165	23025, 23095, 23165	3 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		23035 to 23155	23035, 23095, 23155	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		23060 to 23130	23060, 23095, 23130	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
A	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
A	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
A	Radiated Emission	23017 to 23173	23017, 23095, 23173	1.4 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

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
A	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
B		23230	23230	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
A	Modulation Characteristics	23230	23230	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
A	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
A	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
A	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
A	Band Edge	23205 to 23255	23205	5 MHz	QPSK	1 RB / 0 RB Offset
						25 RB / 0 RB Offset
			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
			23230	10 MHz	QPSK	1 RB / 49 RB Offset
						50 RB / 0 RB Offset
A	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
A	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
B		23230	23230	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 17

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
A	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
A	Modulation Characteristics	23780 to 23800	23790	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
A	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
A	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
A	Peak to Average Ratio	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
A	Band Edge	23755 to 23825	23755	5 MHz	QPSK	1 RB / 0 RB Offset
						25 RB / 0 RB Offset
			23825	5 MHz	QPSK	1 RB / 24 RB Offset
						25 RB / 0 RB Offset
		23780 to 23800	23780	10 MHz	QPSK	1 RB / 0 RB Offset
						50 RB / 0 RB Offset
			23800	10 MHz	QPSK	1 RB / 49 RB Offset
						50 RB / 0 RB Offset
A	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
A	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: This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

LTE Band 66

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
A	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
A	Modulation Characteristics	132072 to 132572	132322	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
A	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
A	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
A	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

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
A	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
A	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
A	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

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
ERP / EIRP	25 deg. C, 65 % RH	3.85 Vdc	Charles Hsiao
Modulation Characteristics	25 deg. C, 65 % RH	3.85 Vdc	Wayne Lin
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	120 Vac, 60 Hz	Charles Hsiao / Karl Lee

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 are limited to 1 watt EIRP.

Portable stations (hand-held devices) operating in the 698-787 MHz band are limited to 3 watts ERP

4.1.2 Test Procedures

EIRP / ERP Measurement:

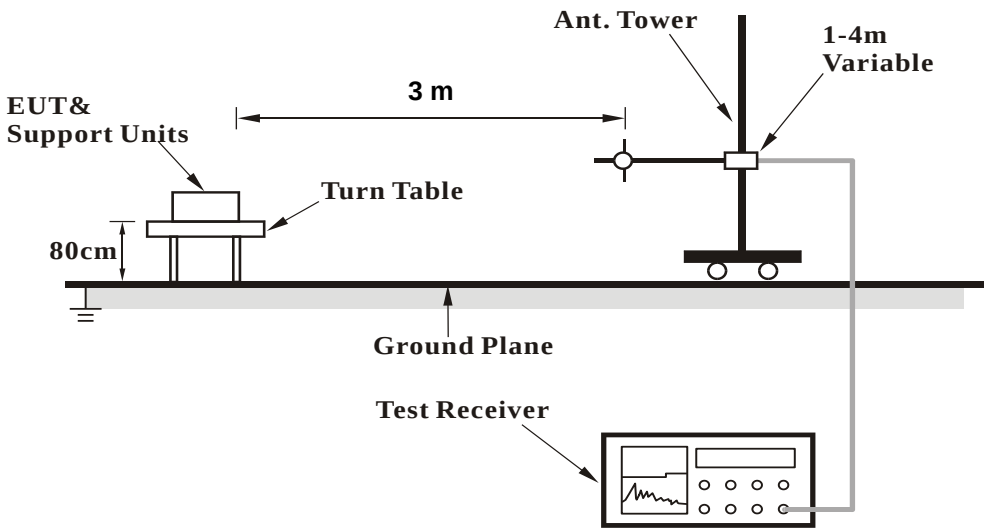
a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 5 MHz for WCDMA and 10 MHz for LTE mode.
b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) height 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 = Output power level of S.G – TX cable loss + 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 power = E.I.R.P power - 2.15 dB.

Conducted Power Measurement:

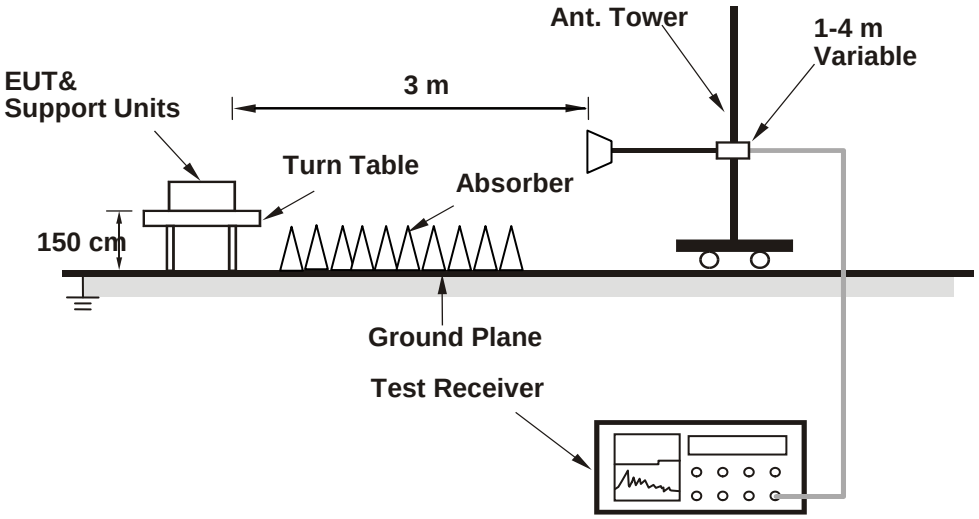
a. The EUT was set up for the maximum power with WCDMA & LTE link data modulation and link up with simulator.
b. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

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	23.34	23.47	23.45
HSDPA Subtest-1	22.44	22.57	22.55
HSDPA Subtest-2	22.39	22.52	22.50
HSDPA Subtest-3	21.93	22.06	22.04
HSDPA Subtest-4	21.92	22.05	22.03
DC-HSDPA Subtest-1	22.36	22.49	22.47
DC-HSDPA Subtest-2	22.31	22.44	22.42
DC-HSDPA Subtest-3	21.85	21.98	21.96
DC-HSDPA Subtest-4	21.84	21.97	21.95
HSUPA Subtest-1	22.42	22.55	22.53
HSUPA Subtest-2	20.44	20.57	20.55
HSUPA Subtest-3	21.44	21.57	21.55
HSUPA Subtest-4	20.40	20.53	20.51
HSUPA Subtest-5	22.48	22.61	22.59

LTE Band 4

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		20050	20175	20300	
		Frequency (MHz)		1720.0	1732.5	1745.0	
20M	QPSK	1	0	23.36	23.45	23.53	0
		1	50	23.33	23.42	23.50	0
		1	99	23.30	23.39	23.47	0
		50	0	22.47	22.56	22.64	1
		50	25	22.46	22.55	22.63	1
		50	50	22.39	22.48	22.56	1
		100	0	22.42	22.51	22.59	1
	16QAM	1	0	22.31	22.40	22.48	1
		1	50	22.28	22.37	22.45	1
		1	99	22.25	22.34	22.42	1
		50	0	21.42	21.51	21.59	2
		50	25	21.41	21.50	21.58	2
		50	50	21.34	21.43	21.51	2
		100	0	21.37	21.46	21.54	2

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		20025	20175	20325	
		Frequency (MHz)		1717.5	1732.5	1747.5	
15M	QPSK	1	0	23.27	23.36	23.44	0
		1	37	23.24	23.33	23.41	0
		1	74	23.21	23.30	23.38	0
		36	0	22.38	22.47	22.55	1
		36	19	22.37	22.46	22.54	1
		36	39	22.30	22.39	22.47	1
		75	0	22.33	22.42	22.50	1
	16QAM	1	0	22.22	22.31	22.39	1
		1	37	22.19	22.28	22.36	1
		1	74	22.16	22.25	22.33	1
		36	0	21.33	21.42	21.50	2
		36	19	21.32	21.41	21.49	2
		36	39	21.25	21.34	21.42	2
		75	0	21.28	21.37	21.45	2

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		20000	20175	20350	
		Frequency (MHz)		1715.0	1732.5	1750.0	
10M	QPSK	1	0	23.13	23.22	23.30	0
		1	24	23.10	23.19	23.27	0
		1	49	23.07	23.16	23.24	0
		25	0	22.24	22.33	22.41	1
		25	12	22.23	22.32	22.40	1
		25	25	22.16	22.25	22.33	1
		50	0	22.19	22.28	22.36	1
	16QAM	1	0	22.08	22.17	22.25	1
		1	24	22.05	22.14	22.22	1
		1	49	22.02	22.11	22.19	1
		25	0	21.19	21.28	21.36	2
		25	12	21.18	21.27	21.35	2
		25	25	21.11	21.20	21.28	2
		50	0	21.14	21.23	21.31	2

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		19975	20175	20375	
		Frequency (MHz)		1712.5	1732.5	1752.5	
5M	QPSK	1	0	22.98	23.07	23.15	0
		1	12	22.95	23.04	23.12	0
		1	24	22.92	23.01	23.09	0
		12	0	22.09	22.18	22.26	1
		12	6	22.08	22.17	22.25	1
		12	13	22.01	22.10	22.18	1
		25	0	22.04	22.13	22.21	1
	16QAM	1	0	21.93	22.02	22.10	1
		1	12	21.90	21.99	22.07	1
		1	24	21.87	21.96	22.04	1
		12	0	21.04	21.13	21.21	2
		12	6	21.03	21.12	21.20	2
		12	13	20.96	21.05	21.13	2
		25	0	20.99	21.08	21.16	2

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		19965	20175	20385	
		Frequency (MHz)		1711.5	1732.5	1753.5	
3M	QPSK	1	0	22.90	22.99	23.07	0
		1	7	22.87	22.96	23.04	0
		1	14	22.84	22.93	23.01	0
		8	0	22.01	22.10	22.18	1
		8	3	22.00	22.09	22.17	1
		8	7	21.93	22.02	22.10	1
		15	0	21.96	22.05	22.13	1
	16QAM	1	0	21.85	21.94	22.02	1
		1	7	21.82	21.91	21.99	1
		1	14	21.79	21.88	21.96	1
		8	0	20.96	21.05	21.13	2
		8	3	20.95	21.04	21.12	2
		8	7	20.88	20.97	21.05	2
		15	0	20.91	21.00	21.08	2

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		19957	20175	20393	
		Frequency (MHz)		1710.7	1732.5	1754.3	
1.4M	QPSK	1	0	22.79	22.88	22.96	0
		1	2	22.76	22.85	22.93	0
		1	5	22.73	22.82	22.90	0
		3	0	22.71	22.80	22.88	0
		3	1	22.70	22.79	22.87	0
		3	3	22.63	22.72	22.80	0
		6	0	21.85	21.94	22.02	1
	16QAM	1	0	21.74	21.83	21.91	1
		1	2	21.71	21.80	21.88	1
		1	5	21.68	21.77	21.85	1
		3	0	21.65	21.74	21.82	1
		3	1	21.64	21.73	21.81	1
		3	3	21.57	21.66	21.74	1
		6	0	20.80	20.89	20.97	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	23.21	23.28	23.33	0	5M	QPSK	1	0	23.12	23.19	23.24	0
		1	24	23.17	23.24	23.29	0			1	12	23.08	23.15	23.20	0
		1	49	23.14	23.21	23.26	0			1	24	23.05	23.12	23.17	0
		25	0	22.29	22.36	22.41	1			12	0	22.20	22.27	22.32	1
		25	12	22.27	22.34	22.39	1			12	6	22.18	22.25	22.30	1
		25	25	22.24	22.31	22.36	1			12	13	22.15	22.22	22.27	1
		50	0	22.25	22.32	22.37	1			25	0	22.16	22.23	22.28	1
	16QAM	1	0	22.19	22.26	22.31	1		16QAM	1	0	22.10	22.17	22.22	1
		1	24	22.15	22.22	22.27	1			1	12	22.06	22.13	22.18	1
		1	49	22.12	22.19	22.24	1			1	24	22.03	22.10	22.15	1
		25	0	21.27	21.34	21.39	2			12	0	21.18	21.25	21.30	2
		25	12	21.25	21.32	21.37	2			12	6	21.16	21.23	21.28	2
		25	25	21.22	21.29	21.34	2			12	13	21.13	21.20	21.25	2
		50	0	21.23	21.30	21.35	2			25	0	21.14	21.21	21.26	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		23025	23095	23165				Channel		23017	23095	23173	
		Frequency (MHz)		700.5	707.5	714.5				Frequency (MHz)		699.7	707.5	715.3	
3M	QPSK	1	0	23.00	23.07	23.12	0	1.4M	QPSK	1	0	22.91	22.98	23.03	0
		1	7	22.96	23.03	23.08	0			1	2	22.87	22.94	22.99	0
		1	14	22.93	23.00	23.05	0			1	5	22.84	22.91	22.96	0
		8	0	22.08	22.15	22.20	1			3	0	22.81	22.88	22.93	0
		8	3	22.06	22.13	22.18	1			3	1	22.79	22.86	22.91	0
		8	7	22.03	22.10	22.15	1			3	3	22.76	22.83	22.88	0
		15	0	22.04	22.11	22.16	1			6	0	21.95	22.02	22.07	1
	16QAM	1	0	21.98	22.05	22.10	1		16QAM	1	0	21.89	21.96	22.01	1
		1	7	21.94	22.01	22.06	1			1	2	21.85	21.92	21.97	1
		1	14	21.91	21.98	22.03	1			1	5	21.82	21.89	21.94	1
		8	0	21.06	21.13	21.18	2			3	0	21.79	21.86	21.91	1
		8	3	21.04	21.11	21.16	2			3	1	21.77	21.84	21.89	1
		8	7	21.01	21.08	21.13	2			3	3	21.74	21.81	21.86	1
		15	0	21.02	21.09	21.14	2			6	0	20.93	21.00	21.05	2

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)
		Channel			23230					Channel		23205	23230	23225	
		Frequency (MHz)			782.0					Frequency (MHz)		779.5	782.0	784.5	
10M	QPSK	1	0		22.88		0	5M	QPSK	1	0	22.71	22.75	22.67	0
		1	24		22.86		0			1	12	22.69	22.73	22.65	0
		1	49		22.81		0			1	24	22.64	22.68	22.60	0
		25	0		21.91		1			12	0	21.74	21.78	21.70	1
		25	12		21.89		1			12	6	21.72	21.76	21.68	1
		25	25		21.86		1			12	13	21.69	21.73	21.65	1
		50	0		21.85		1			25	0	21.68	21.72	21.64	1
	16QAM	1	0		21.83		1		16QAM	1	0	21.66	21.70	21.62	1
		1	24		21.81		1			1	12	21.64	21.68	21.60	1
		1	49		21.76		1			1	24	21.59	21.63	21.55	1
		25	0		20.86		2			12	0	20.69	20.73	20.65	2
		25	12		20.84		2			12	6	20.67	20.71	20.63	2
		25	25		20.81		2			12	13	20.64	20.68	20.60	2
		50	0		20.80		2			25	0	20.63	20.67	20.59	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	23.33	23.28	23.22	0	5M	QPSK	1	0	23.20	23.15	23.09	0
		1	24	23.28	23.23	23.17	0			1	12	23.15	23.10	23.04	0
		1	49	23.24	23.19	23.13	0			1	24	23.11	23.06	23.00	0
		25	0	22.31	22.26	22.20	1			12	0	22.18	22.13	22.07	1
		25	12	22.30	22.25	22.19	1			12	6	22.17	22.12	22.06	1
		25	25	22.28	22.23	22.17	1			12	13	22.15	22.10	22.04	1
		50	0	22.27	22.22	22.16	1			25	0	22.14	22.09	22.03	1
	16QAM	1	0	22.30	22.25	22.19	1		16QAM	1	0	22.17	22.12	22.06	1
		1	24	22.25	22.20	22.14	1			1	12	22.12	22.07	22.01	1
		1	49	22.21	22.16	22.10	1			1	24	22.08	22.03	21.97	1
		25	0	21.28	21.23	21.17	2			12	0	21.15	21.10	21.04	2
		25	12	21.27	21.22	21.16	2			12	6	21.14	21.09	21.03	2
		25	25	21.25	21.20	21.14	2			12	13	21.12	21.07	21.01	2
		50	0	21.24	21.19	21.13	2			25	0	21.11	21.06	21.00	2

LTE Band 66

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		132072	132322	132572	
		Frequency (MHz)		1720.0	1745.0	1770.0	
20M	QPSK	1	0	23.59	23.68	23.57	0
		1	50	23.47	23.56	23.45	0
		1	99	23.30	23.39	23.28	0
		50	0	22.49	22.58	22.47	1
		50	25	22.38	22.47	22.36	1
		50	50	22.32	22.41	22.30	1
		100	0	22.34	22.43	22.32	1
	16QAM	1	0	22.54	22.63	22.52	1
		1	50	22.42	22.51	22.40	1
		1	99	22.25	22.34	22.23	1
		50	0	21.44	21.53	21.42	2
		50	25	21.33	21.42	21.31	2
		50	50	21.27	21.36	21.25	2
		100	0	21.29	21.38	21.27	2

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		132047	132322	132597	
		Frequency (MHz)		1717.5	1745.0	1772.5	
15M	QPSK	1	0	23.48	23.57	23.46	0
		1	37	23.36	23.45	23.34	0
		1	74	23.19	23.28	23.17	0
		36	0	22.38	22.47	22.36	1
		36	19	22.27	22.36	22.25	1
		36	39	22.21	22.30	22.19	1
		75	0	22.23	22.32	22.21	1
	16QAM	1	0	22.43	22.52	22.41	1
		1	37	22.31	22.40	22.29	1
		1	74	22.14	22.23	22.12	1
		36	0	21.33	21.42	21.31	2
		36	19	21.22	21.31	21.20	2
		36	39	21.16	21.25	21.14	2
		75	0	21.18	21.27	21.16	2

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		132022	132322	132622	
		Frequency (MHz)		1715.0	1745.0	1775.0	
10M	QPSK	1	0	23.40	23.49	23.38	0
		1	24	23.28	23.37	23.26	0
		1	49	23.11	23.20	23.09	0
		25	0	22.30	22.39	22.28	1
		25	12	22.19	22.28	22.17	1
		25	25	22.13	22.22	22.11	1
		50	0	22.15	22.24	22.13	1
	16QAM	1	0	22.35	22.44	22.33	1
		1	24	22.23	22.32	22.21	1
		1	49	22.06	22.15	22.04	1
		25	0	21.25	21.34	21.23	2
		25	12	21.14	21.23	21.12	2
		25	25	21.08	21.17	21.06	2
		50	0	21.10	21.19	21.08	2

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		131997	132322	132647	
		Frequency (MHz)		1712.5	1745.0	1777.5	
5M	QPSK	1	0	23.28	23.37	23.26	0
		1	12	23.16	23.25	23.14	0
		1	24	22.99	23.08	22.97	0
		12	0	22.18	22.27	22.16	1
		12	6	22.07	22.16	22.05	1
		12	13	22.01	22.10	21.99	1
		25	0	22.03	22.12	22.01	1
	16QAM	1	0	22.23	22.32	22.21	1
		1	12	22.11	22.20	22.09	1
		1	24	21.94	22.03	21.92	1
		12	0	21.13	21.22	21.11	2
		12	6	21.02	21.11	21.00	2
		12	13	20.96	21.05	20.94	2
		25	0	20.98	21.07	20.96	2

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		131987	132322	132657	
		Frequency (MHz)		1711.5	1745.5	1778.5	
3M	QPSK	1	0	23.13	23.22	23.11	0
		1	7	23.01	23.10	22.99	0
		1	14	22.84	22.93	22.82	0
		8	0	22.03	22.12	22.01	1
		8	3	21.92	22.01	21.90	1
		8	7	21.86	21.95	21.84	1
		15	0	21.88	21.97	21.86	1
	16QAM	1	0	22.08	22.17	22.06	1
		1	7	21.96	22.05	21.94	1
		1	14	21.79	21.88	21.77	1
		8	0	20.98	21.07	20.96	2
		8	3	20.87	20.96	20.85	2
		8	7	20.81	20.90	20.79	2
		15	0	20.83	20.92	20.81	2

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		131979	132322	132665	
		Frequency (MHz)		1710.7	1745.0	1779.3	
1.4M	QPSK	1	0	23.04	23.13	23.02	0
		1	2	22.92	23.01	22.90	0
		1	5	22.75	22.84	22.73	0
		3	0	22.80	22.89	22.78	0
		3	1	22.69	22.78	22.67	0
		3	3	22.63	22.72	22.61	0
		6	0	21.79	21.88	21.77	1
	16QAM	1	0	21.99	22.08	21.97	1
		1	2	21.87	21.96	21.85	1
		1	5	21.70	21.79	21.68	1
		3	0	21.75	21.84	21.73	1
		3	1	21.64	21.73	21.62	1
		3	3	21.58	21.67	21.56	1
		6	0	20.74	20.83	20.72	2

ERP Power (dBm)
Mode A

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)**
Z	23017	699.7	-12.58	32.719	17.99	62.94	H
	23095	707.5	-12.63	32.736	17.96	62.46	
	23173	715.3	-12.41	32.591	18.03	63.55	
	23017	699.7	-15.53	32.69	15.01	31.70	V
	23095	707.5	-15.67	32.81	14.99	31.55	
	23173	715.3	-15.57	32.74	15.02	31.77	
Channel Bandwidth: 1.4 MHz / 16QAM							
Z	23017	699.7	-13.59	32.719	16.98	49.88	H
	23095	707.5	-13.64	32.736	16.95	49.50	
	23173	715.3	-13.41	32.591	17.03	50.48	
	23017	699.7	-16.54	32.69	14.00	25.12	V
	23095	707.5	-16.67	32.81	13.99	25.06	
	23173	715.3	-16.58	32.74	14.01	25.18	

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)**
Z	23025	700.5	-12.54	32.719	18.03	63.52	H
	23095	707.5	-12.59	32.736	18.00	63.04	
	23165	714.5	-12.37	32.591	18.07	64.14	
	23025	700.5	-15.50	32.69	15.04	31.92	V
	23095	707.5	-15.64	32.81	15.02	31.77	
	23165	714.5	-15.53	32.74	15.06	32.06	
Channel Bandwidth: 3 MHz / 16QAM							
Z	23025	700.5	-13.55	32.719	17.02	50.34	H
	23095	707.5	-13.60	32.736	16.99	49.96	
	23165	714.5	-13.38	32.591	17.06	50.83	
	23025	700.5	-16.52	32.69	14.02	25.23	V
	23095	707.5	-16.65	32.81	14.01	25.18	
	23165	714.5	-16.53	32.74	14.06	25.47	

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)
Z	23035	701.5	-12.51	32.719	18.06	63.96	H
	23095	707.5	-12.56	32.736	18.03	63.47	
	23155	713.5	-12.34	32.591	18.10	64.58	
	23035	701.5	-15.46	32.69	15.08	32.21	V
	23095	707.5	-15.61	32.81	15.05	31.99	
	23155	713.5	-15.50	32.74	15.09	32.28	
Channel Bandwidth: 5 MHz / 16QAM							
Z	23035	701.5	-13.52	32.719	17.05	50.69	H
	23095	707.5	-13.56	32.736	17.03	50.42	
	23155	713.5	-13.34	32.591	17.10	51.30	
	23035	701.5	-16.47	32.69	14.07	25.53	V
	23095	707.5	-16.62	32.81	14.04	25.35	
	23155	713.5	-16.51	32.74	14.08	25.59	

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)
Z	23060	704.0	-12.48	32.727	18.10	64.52	H
	23095	707.5	-12.52	32.739	18.07	64.11	
	23130	711.0	-12.46	32.728	18.12	64.83	
	23060	704.0	-15.49	32.75	15.11	32.43	V
	23095	707.5	-15.58	32.81	15.08	32.21	
	23130	711.0	-15.56	32.84	15.13	32.58	
Channel Bandwidth: 10 MHz / 16QAM							
Z	23060	704.0	-12.49	32.727	18.09	64.37	H
	23095	707.5	-13.53	32.739	17.06	50.80	
	23130	711.0	-13.47	32.728	17.11	51.38	
	23060	704.0	-16.49	32.75	14.11	25.76	V
	23095	707.5	-16.58	32.81	14.08	25.59	
	23130	711.0	-16.57	32.84	14.12	25.82	

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)**
Z	23205	779.5	-14.05	32.771	16.57	45.40	H
	23230	782.0	-14.11	32.741	16.48	44.47	
	23255	784.5	-14.20	32.854	16.50	44.71	
	23205	779.5	-16.85	32.5	13.50	22.39	V
	23230	782.0	-16.84	32.52	13.53	22.54	
	23255	784.5	-16.92	32.62	13.55	22.65	
Channel Bandwidth: 5 MHz / 16QAM							
Z	23205	779.5	-15.06	32.771	15.56	35.98	H
	23230	782.0	-15.12	32.741	15.47	35.25	
	23255	784.5	-15.22	32.854	15.48	35.35	
	23205	779.5	-17.86	32.5	12.49	17.74	V
	23230	782.0	-17.85	32.52	12.52	17.86	
	23255	784.5	-17.94	32.62	12.53	17.91	

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)**
Z	23230	782.0	-13.95	32.737	16.64	46.10	H
	23230	782.0	-16.79	32.52	13.58	22.80	V
Channel Bandwidth: 10 MHz / 16QAM							
Z	23230	782.0	-14.96	32.737	15.63	36.53	H
	23230	782.0	-17.81	32.52	12.56	18.03	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)
Z	23755	706.5	-12.53	32.719	18.04	63.66	H
	23790	710.0	-12.52	32.736	18.07	64.06	
	23825	713.5	-12.44	32.591	18.00	63.11	
	23755	706.5	-15.50	32.69	15.04	31.92	V
	23790	710.0	-15.58	32.81	15.08	32.21	
	23825	713.5	-15.58	32.74	15.01	31.70	
Channel Bandwidth: 5 MHz / 16QAM							
Z	23755	706.5	-13.54	32.719	17.03	50.45	H
	23790	710.0	-13.53	32.736	17.06	50.77	
	23825	713.5	-13.44	32.591	17.00	50.13	
	23755	706.5	-16.50	32.69	14.04	25.35	V
	23790	710.0	-16.59	32.81	14.07	25.53	
	23825	713.5	-16.58	32.74	14.01	25.18	

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)
Z	23780	709.0	-12.50	32.727	18.08	64.22	H
	23790	710.0	-12.49	32.739	18.10	64.55	
	23800	711.0	-12.56	32.728	18.02	63.36	
	23780	709.0	-15.53	32.75	15.07	32.14	V
	23790	710.0	-15.54	32.81	15.12	32.51	
	23800	711.0	-15.64	32.84	15.05	31.99	
Channel Bandwidth: 10 MHz / 16QAM							
Z	23780	709.0	-13.51	32.727	17.07	50.90	H
	23790	710.0	-13.49	32.739	17.10	51.27	
	23800	711.0	-13.56	32.728	17.02	50.33	
	23780	709.0	-16.54	32.75	14.06	25.47	V
	23790	710.0	-16.55	32.81	14.11	25.76	
	23800	711.0	-16.64	32.84	14.05	25.41	

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

Mode B

LTE Band 13							
Channel Bandwidth: 10 MHz / QPSK							
Plane	**Channel**	**Frequency (MHz)**	**Reading (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (mW)**	**Polarization (H/V)**
Z	23230	782.0	-14.75	32.737	15.84	38.34	H
	23230	782.0	-17.56	32.52	12.81	19.10	V
Channel Bandwidth: 10 MHz / 16QAM							
Z	23230	782.0	-15.96	32.737	14.63	29.02	H
	23230	782.0	-18.74	32.52	11.63	14.55	V

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

EIRP Power (dBm)

Mode A

WCDMA							
Plane	**Channel**	**Frequency (MHz)**	**Reading (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (mW)**	**Polarization (H/V)**
Z	1312	1712.4	-18.44	42.49	24.05	253.80	H
	1413	1732.6	-18.26	42.33	24.07	255.09	
	1513	1752.6	-18.02	42.10	24.08	255.86	
	1312	1712.4	-23.96	42.99	19.03	79.98	V
	1413	1732.6	-23.68	42.74	19.06	80.54	
	1513	1752.6	-23.11	42.21	19.10	81.28	

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)**
X	19957	1710.7	-18.61	42.49	23.88	244.06	H
	20175	1732.5	-18.40	42.33	23.93	247.00	
	20393	1754.3	-18.12	42.10	23.98	250.03	
	19957	1710.7	-24.11	42.99	18.88	77.27	V
	20175	1732.5	-23.80	42.74	18.94	78.34	
	20393	1754.3	-23.22	42.21	18.99	79.25	
Channel Bandwidth: 1.4 MHz / 16QAM							
X	19957	1710.7	-19.62	42.49	22.87	193.42	H
	20175	1732.5	-19.40	42.33	22.93	196.20	
	20393	1754.3	-19.12	42.10	22.98	198.61	
	19957	1710.7	-25.12	42.99	17.87	61.24	V
	20175	1732.5	-24.81	42.74	17.93	62.09	
	20393	1754.3	-24.23	42.21	17.98	62.81	

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)
X	19965	1711.5	-18.57	42.49	23.92	246.32	H
	20175	1732.5	-18.37	42.33	23.96	248.71	
	20385	1753.5	-18.09	42.10	24.01	251.77	
	19965	1711.5	-24.07	42.99	18.92	77.98	V
	20175	1732.5	-23.79	42.74	18.95	78.52	
	20385	1753.5	-23.19	42.21	19.02	79.80	
Channel Bandwidth: 3 MHz / 16QAM							
X	19965	1711.5	-19.59	42.49	22.90	194.76	H
	20175	1732.5	-19.38	42.33	22.95	197.11	
	20385	1753.5	-19.11	42.10	22.99	199.07	
	19965	1711.5	-25.08	42.99	17.91	61.80	V
	20175	1732.5	-24.78	42.74	17.96	62.52	
	20385	1753.5	-24.21	42.21	18.00	63.10	

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)
X	19975	1712.5	-18.55	42.49	23.94	247.46	H
	20175	1732.5	-18.34	42.33	23.99	250.44	
	20375	1752.5	-18.06	42.10	24.04	253.51	
	19975	1712.5	-24.04	42.99	18.95	78.52	V
	20175	1732.5	-23.77	42.74	18.97	78.89	
	20375	1752.5	-23.16	42.21	19.05	80.35	
Channel Bandwidth: 5 MHz / 16QAM							
X	19975	1712.5	-19.56	42.49	22.93	196.11	H
	20175	1732.5	-19.36	42.33	22.97	198.02	
	20375	1752.5	-19.07	42.10	23.03	200.91	
	19975	1712.5	-25.05	42.99	17.94	62.23	V
	20175	1732.5	-24.78	42.74	17.96	62.52	
	20375	1752.5	-24.16	42.21	18.05	63.83	

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)
X	20000	1715.0	-18.52	42.49	23.97	249.17	H
	20175	1732.5	-18.32	42.33	24.01	251.59	
	20350	1750.0	-18.03	42.10	24.07	255.27	
	20000	1715.0	-24.01	42.99	18.98	79.07	V
	20175	1732.5	-23.73	42.74	19.01	79.62	
	20350	1750.0	-23.12	42.21	19.09	81.10	
Channel Bandwidth: 10 MHz / 16QAM							
X	20000	1715.0	-19.53	42.49	22.96	197.47	H
	20175	1732.5	-19.33	42.33	23.00	199.39	
	20350	1750.0	-19.04	42.10	23.06	202.30	
	20000	1715.0	-25.01	42.99	17.98	62.81	V
	20175	1732.5	-24.73	42.74	18.01	63.24	
	20350	1750.0	-24.13	42.21	18.08	64.27	

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)
X	20025	1717.5	-18.50	42.49	23.99	250.32	H
	20175	1732.5	-18.29	42.33	24.04	253.34	
	20325	1747.5	-18.00	42.10	24.10	257.04	
	20025	1717.5	-23.98	42.99	19.01	79.62	V
	20175	1732.5	-23.71	42.74	19.03	79.98	
	20325	1747.5	-23.09	42.21	19.12	81.66	
Channel Bandwidth: 15 MHz / 16QAM							
X	20025	1717.5	-19.50	42.49	22.99	198.84	H
	20175	1732.5	-19.29	42.33	23.04	201.23	
	20325	1747.5	-19.01	42.10	23.09	203.70	
	20025	1717.5	-24.99	42.99	18.00	63.10	V
	20175	1732.5	-24.72	42.74	18.02	63.39	
	20325	1747.5	-24.10	42.21	18.11	64.71	

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)
X	20050	1720.0	-18.47	42.49	24.02	252.06	H
	20175	1732.5	-18.27	42.33	24.06	254.51	
	20300	1745.0	-17.98	42.10	24.12	258.23	
	20050	1720.0	-23.96	42.99	19.03	79.98	V
	20175	1732.5	-23.68	42.74	19.06	80.54	
	20300	1745.0	-23.06	42.21	19.15	82.22	
Channel Bandwidth: 20 MHz / 16QAM							
X	20050	1720.0	-19.48	42.49	23.01	199.76	H
	20175	1732.5	-19.27	42.33	23.06	202.16	
	20300	1745.0	-18.99	42.10	23.11	204.64	
	20050	1720.0	-24.96	42.99	18.03	63.53	V
	20175	1732.5	-24.69	42.74	18.05	63.83	
	20300	1745.0	-24.07	42.21	18.14	65.16	

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)
X	131979	1710.7	-12.06	36.45	24.39	274.79	H
	132322	1745.0	-12.38	36.80	24.42	276.63	
	132665	1779.3	-12.49	36.94	24.45	278.80	
	131979	1710.7	-17.94	37.28	19.34	85.84	V
	132322	1745.0	-18.23	37.63	19.40	87.10	
	132665	1779.3	-18.18	37.64	19.46	88.31	
Channel Bandwidth: 1.4 MHz / 16QAM							
X	131979	1710.7	-13.08	36.45	23.37	217.27	H
	132322	1745.0	-13.39	36.80	23.41	219.23	
	132665	1779.3	-13.50	36.94	23.44	220.95	
	131979	1710.7	-18.96	37.28	18.32	67.87	V
	132322	1745.0	-19.25	37.63	18.38	68.87	
	132665	1779.3	-19.20	37.64	18.44	69.82	

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)
X	131987	1711.5	-12.05	36.45	24.40	275.42	H
	132322	1745.0	-12.36	36.80	24.44	277.91	
	132657	1778.5	-12.47	36.94	24.47	280.09	
	131987	1711.5	-17.89	37.28	19.39	86.84	V
	132322	1745.0	-18.20	37.63	19.43	87.70	
	132657	1778.5	-18.16	37.64	19.48	88.72	
Channel Bandwidth: 3 MHz / 16QAM							
X	131987	1711.5	-13.06	36.45	23.39	218.27	H
	132322	1745.0	-13.37	36.80	23.43	220.24	
	132657	1778.5	-13.48	36.94	23.46	221.97	
	131987	1711.5	-18.91	37.28	18.37	68.66	V
	132322	1745.0	-19.21	37.63	18.42	69.50	
	132657	1778.5	-19.17	37.64	18.47	70.31	

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)
X	131997	1712.5	-12.01	36.45	24.44	277.97	H
	132322	1745.0	-12.34	36.80	24.46	279.19	
	132647	1777.5	-12.45	36.94	24.49	281.38	
	131997	1712.5	-17.85	37.28	19.43	87.64	V
	132322	1745.0	-18.16	37.63	19.47	88.51	
	132647	1777.5	-18.14	37.64	19.50	89.13	
Channel Bandwidth: 5 MHz / 16QAM							
X	131997	1712.5	-13.02	36.45	23.43	220.29	H
	132322	1745.0	-13.35	36.80	23.45	221.26	
	132647	1777.5	-13.45	36.94	23.49	223.51	
	131997	1712.5	-18.86	37.28	18.42	69.45	V
	132322	1745.0	-19.17	37.63	18.46	70.15	
	132647	1777.5	-19.15	37.64	18.49	70.63	

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)
X	132022	1715.0	-12.16	36.64	24.48	280.54	H
	132322	1745.0	-12.30	36.80	24.50	281.51	
	132622	1775.0	-12.27	36.80	24.53	283.79	
	132022	1715.0	-17.97	37.44	19.47	88.49	V
	132322	1745.0	-18.13	37.63	19.50	89.10	
	132622	1775.0	-18.12	37.64	19.52	89.43	
Channel Bandwidth: 10 MHz / 16QAM							
X	132022	1715.0	-13.17	36.64	23.47	222.33	H
	132322	1745.0	-13.30	36.80	23.50	223.61	
	132622	1775.0	-13.28	36.80	23.52	224.91	
	132022	1715.0	-18.98	37.44	18.46	70.13	V
	132322	1745.0	-19.14	37.63	18.49	70.62	
	132622	1775.0	-19.13	37.64	18.51	70.88	

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)
X	132047	1717.5	-11.95	36.45	24.50	281.84	H
	132322	1745.0	-12.27	36.80	24.53	283.73	
	132597	1772.5	-12.38	36.94	24.56	285.96	
	132047	1717.5	-17.78	37.28	19.50	89.06	V
	132322	1745.0	-18.10	37.63	19.53	89.74	
	132597	1772.5	-18.09	37.64	19.55	90.16	
Channel Bandwidth: 15 MHz / 16QAM							
X	132047	1717.5	-12.95	36.45	23.50	223.87	H
	132322	1745.0	-13.28	36.80	23.52	224.85	
	132597	1772.5	-13.39	36.94	23.55	226.62	
	132047	1717.5	-18.78	37.28	18.50	70.75	V
	132322	1745.0	-19.11	37.63	18.52	71.12	
	132597	1772.5	-19.10	37.64	18.54	71.45	

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)
X	132072	1720.0	-11.91	36.45	24.54	284.45	H
	132322	1745.0	-12.23	36.80	24.57	286.35	
	132572	1770.0	-12.35	36.94	24.59	287.94	
	132072	1720.0	-17.74	37.28	19.54	89.89	V
	132322	1745.0	-18.07	37.63	19.56	90.36	
	132572	1770.0	-18.05	37.64	19.59	90.99	
Channel Bandwidth: 20 MHz / 16QAM							
X	132072	1720.0	-12.92	36.45	23.53	225.42	H
	132322	1745.0	-13.23	36.80	23.57	227.46	
	132572	1770.0	-13.36	36.94	23.58	228.19	
	132072	1720.0	-18.75	37.28	18.53	71.24	V
	132322	1745.0	-19.08	37.63	18.55	71.61	
	132572	1770.0	-19.05	37.64	18.59	72.28	

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

Mode B

WCDMA							
Plane	**Channel**	**Frequency (MHz)**	**Reading (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (mW)**	**Polarization (H/V)**
Z	1312	1712.4	-19.41	42.49	23.08	203.00	H
	1413	1732.6	-18.89	42.33	23.44	220.65	
	1513	1752.6	-18.89	42.10	23.21	209.41	
	1312	1712.4	-24.12	42.99	18.87	77.09	V
	1413	1732.6	-23.88	42.74	18.86	76.91	
	1513	1752.6	-24.01	42.21	18.20	66.07	

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)**
X	20050	1720.0	-18.99	42.49	23.50	223.61	H
	20175	1732.5	-18.86	42.33	23.47	222.18	
	20300	1745.0	-18.56	42.10	23.54	225.94	
	20050	1720.0	-24.21	42.99	18.78	75.51	V
	20175	1732.5	-24.10	42.74	18.64	73.11	
	20300	1745.0	-24.22	42.21	18.00	63.02	
Channel Bandwidth: 20 MHz / 16QAM							
X	20050	1720.0	-19.88	42.49	22.61	182.18	H
	20175	1732.5	-19.95	42.33	22.38	172.86	
	20300	1745.0	-19.21	42.10	22.89	194.54	
	20050	1720.0	-25.62	42.99	17.37	54.58	V
	20175	1732.5	-25.41	42.74	17.33	54.08	
	20300	1745.0	-25.01	42.21	17.20	52.48	

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

4.2 Modulation Characteristics Measurement

4.2.1 Limits of Modulation Characteristics

N/A

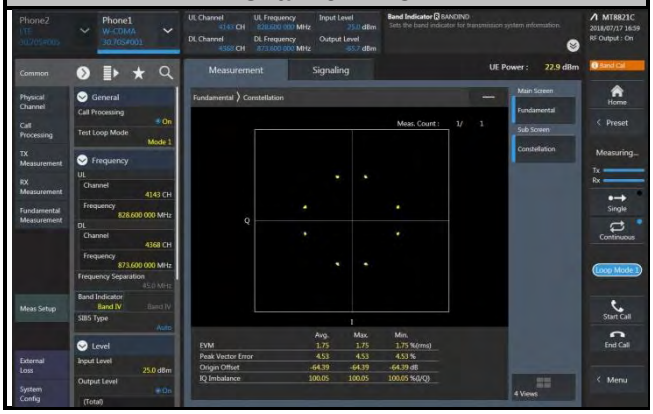
4.2.2 Test Setup

4.2.3 Test Procedure

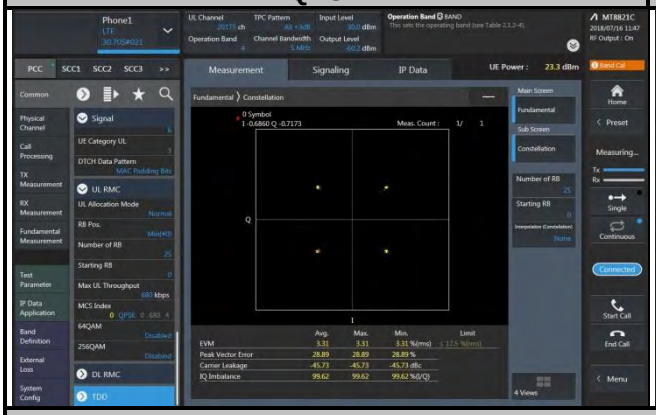
Connect the EUT to Communication Simulator via the antenna connector. The frequency band is set as EUT supported Modulation and Channels, the EUT output is matched with 50 ohm load, the waveform quality and constellation of the EUT was tested.

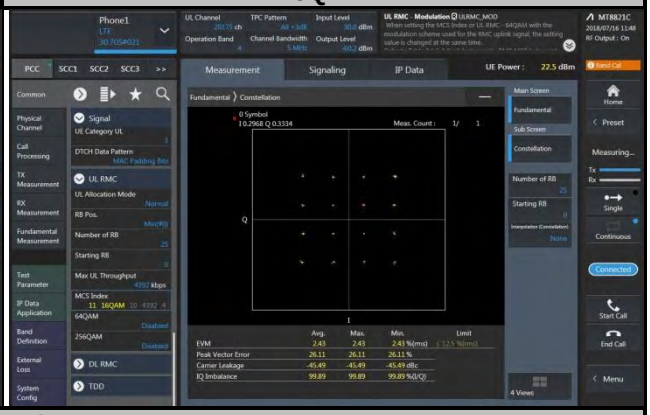
4.2.4 Test Results

Spectrum Plot of Measurement
WCDMA
Channel 1413

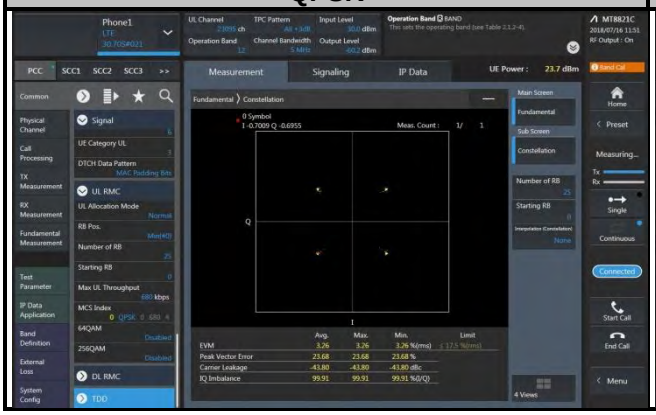


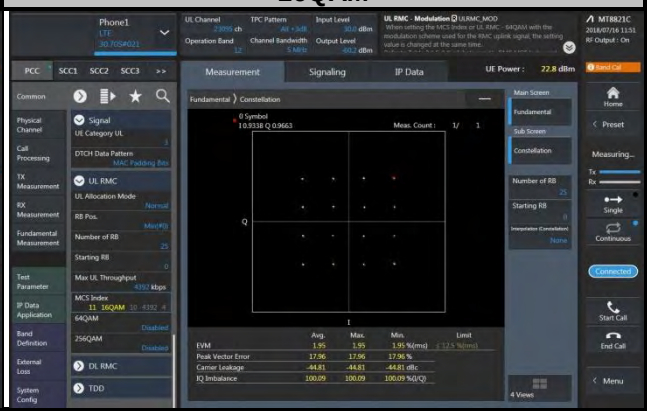
Spectrum Plot of Measurement	
LTE Band 4	
Channel 20175	
QPSK	16QAM





LTE Band 12	
Channel 23095	
QPSK	16QAM



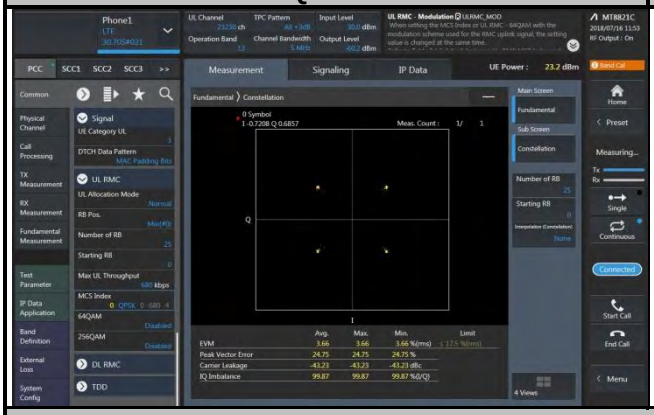


Spectrum Plot of Measurement

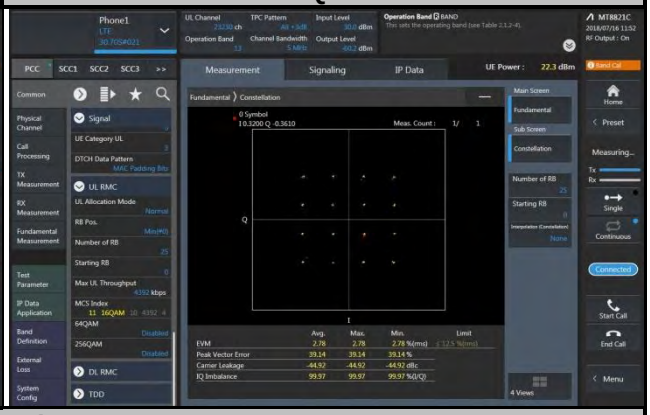
LTE Band 13

Channel 23230

QPSK



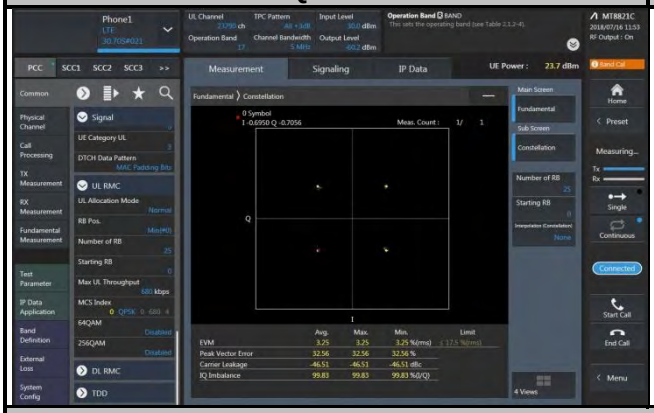
16QAM



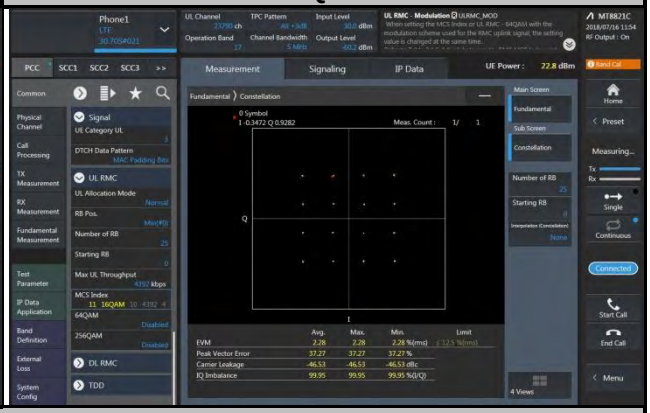
LTE Band 17

Channel 23790

QPSK



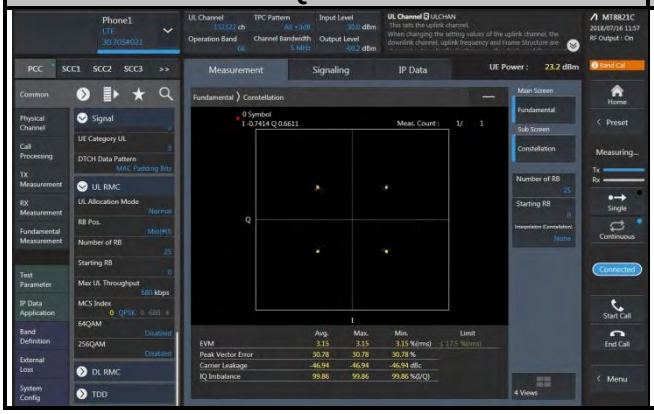
16QAM



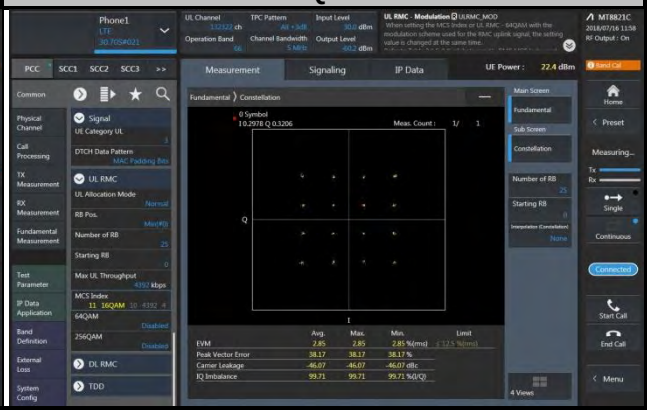
LTE Band 66

Channel 132322

QPSK



16QAM



4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stability Measurement

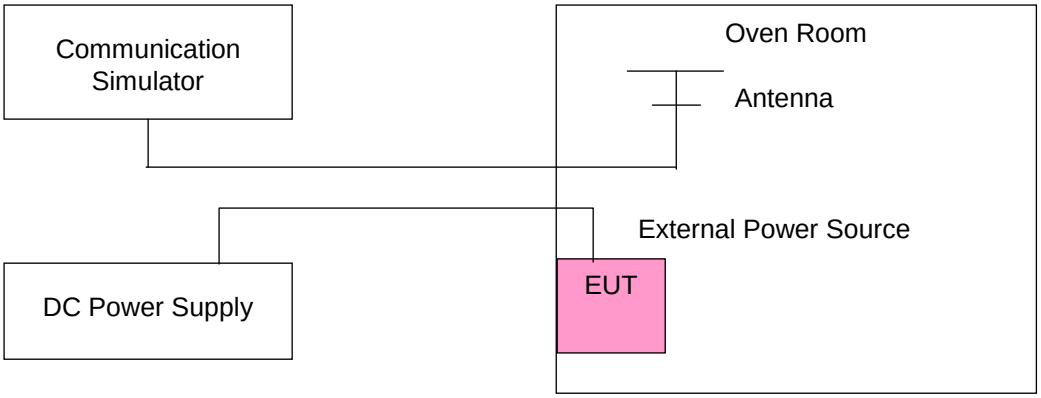
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

4.3.2 Test Procedure

a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
b. 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.
c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5 ℃ 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				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	1712.400003	0.002	1752.600004	0.002	2.5
3.27	1712.400004	0.002	1752.600002	0.001	2.5
4.42	1712.400001	0.001	1752.600003	0.002	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	WCDMA				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1712.400003	0.002	1752.600003	0.002	2.5
-20	1712.400004	0.002	1752.600003	0.002	2.5
-10	1712.400003	0.002	1752.600001	0.001	2.5
0	1712.400002	0.001	1752.600004	0.002	2.5
10	1712.400003	0.002	1752.600002	0.001	2.5
20	1712.399999	-0.001	1752.599998	-0.001	2.5
30	1712.399998	-0.001	1752.599998	-0.001	2.5
40	1712.399998	-0.001	1752.599998	-0.001	2.5
50	1712.399998	-0.001	1752.599997	-0.002	2.5
55	1712.399997	-0.002	1752.599997	-0.002	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	1754.300002	0.001	2.5
3.27	1710.700003	0.002	1754.300004	0.002	2.5
4.42	1710.700002	0.001	1754.300001	0.001	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	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	1710.700001	0.001	1754.300003	0.002	2.5
-20	1710.700003	0.001	1754.300004	0.002	2.5
-10	1710.700002	0.001	1754.300003	0.002	2.5
0	1710.700004	0.002	1754.300003	0.002	2.5
10	1710.700004	0.002	1754.300003	0.001	2.5
20	1710.699997	-0.002	1754.299997	-0.002	2.5
30	1710.699999	-0.001	1754.299997	-0.002	2.5
40	1710.699997	-0.002	1754.299998	-0.001	2.5
50	1710.699997	-0.002	1754.299997	-0.002	2.5
55	1710.699999	-0.001	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	1711.500003	0.002	1753.500004	0.002	2.5
3.27	1711.500004	0.002	1753.500001	0.001	2.5
4.42	1711.500003	0.001	1753.500004	0.002	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	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	1711.500001	0.001	1753.500002	0.001	2.5
-10	1711.500001	0.001	1753.500002	0.001	2.5
0	1711.500001	0.001	1753.500002	0.001	2.5
10	1711.500002	0.001	1753.500004	0.002	2.5
20	1711.499997	-0.002	1753.499998	-0.001	2.5
30	1711.499996	-0.002	1753.499998	-0.001	2.5
40	1711.499999	-0.001	1753.499998	-0.001	2.5
50	1711.499999	-0.001	1753.499997	-0.002	2.5
55	1711.499996	-0.002	1753.499998	-0.001	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	1752.500002	0.001	2.5
3.27	1712.500002	0.001	1752.500003	0.002	2.5
4.42	1712.500002	0.001	1752.500002	0.001	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	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	1712.500002	0.001	1752.500001	0.001	2.5
-10	1712.500001	0.001	1752.500001	0.001	2.5
0	1712.500004	0.002	1752.500003	0.002	2.5
10	1712.500002	0.001	1752.500002	0.001	2.5
20	1712.499998	-0.001	1752.499998	-0.001	2.5
30	1712.499998	-0.001	1752.499997	-0.002	2.5
40	1712.499996	-0.002	1752.499998	-0.001	2.5
50	1712.499998	-0.001	1752.499998	-0.001	2.5
55	1712.499997	-0.002	1752.499998	-0.001	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	1715.000004	0.002	1750.000002	0.001	2.5
3.27	1715.000004	0.002	1750.000001	0.001	2.5
4.42	1715.000003	0.002	1750.000003	0.002	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	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	1750.000004	0.002	2.5
-20	1715.000003	0.002	1750.000002	0.001	2.5
-10	1715.000001	0.001	1750.000003	0.001	2.5
0	1715.000004	0.002	1750.000003	0.002	2.5
10	1715.000002	0.001	1750.000004	0.002	2.5
20	1714.999998	-0.001	1749.999997	-0.002	2.5
30	1714.999996	-0.002	1749.999998	-0.001	2.5
40	1714.999997	-0.002	1749.999996	-0.002	2.5
50	1714.999997	-0.002	1749.999996	-0.002	2.5
55	1714.999998	-0.001	1749.999998	-0.001	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	1747.500002	0.001	2.5
3.27	1717.500002	0.001	1747.500003	0.002	2.5
4.42	1717.500001	0.001	1747.500003	0.002	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 4				Limit (ppm)
	Channel Bandwidth: 15 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1717.500001	0.001	1747.500004	0.002	2.5
-20	1717.500004	0.002	1747.500001	0.001	2.5
-10	1717.500002	0.001	1747.500001	0.001	2.5
0	1717.500004	0.002	1747.500002	0.001	2.5
10	1717.500002	0.001	1747.500002	0.001	2.5
20	1717.499997	-0.002	1747.499999	-0.001	2.5
30	1717.499997	-0.002	1747.499998	-0.001	2.5
40	1717.499997	-0.002	1747.499998	-0.001	2.5
50	1717.499997	-0.002	1747.499997	-0.001	2.5
55	1717.499997	-0.002	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	1720.000003	0.002	1745.000004	0.002	2.5
3.27	1720.000001	0.001	1745.000003	0.002	2.5
4.42	1720.000003	0.001	1745.000003	0.002	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	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	1720.000001	0.001	1745.000004	0.002	2.5
-10	1720.000003	0.002	1745.000004	0.002	2.5
0	1720.000003	0.002	1745.000003	0.001	2.5
10	1720.000003	0.002	1745.000002	0.001	2.5
20	1719.999998	-0.001	1744.999997	-0.002	2.5
30	1719.999998	-0.001	1744.999996	-0.002	2.5
40	1719.999997	-0.002	1744.999997	-0.002	2.5
50	1719.999999	-0.001	1744.999999	-0.001	2.5
55	1719.999997	-0.002	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	0.002	715.300003	0.004	2.5
3.27	699.700004	0.005	715.300003	0.004	2.5
4.42	699.700004	0.005	715.300003	0.004	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	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	699.700004	0.005	715.300004	0.005	2.5
-20	699.700004	0.005	715.300001	0.002	2.5
-10	699.700002	0.003	715.300002	0.003	2.5
0	699.700002	0.003	715.300003	0.003	2.5
10	699.700002	0.003	715.300003	0.005	2.5
20	699.699996	-0.006	715.299998	-0.002	2.5
30	699.699997	-0.005	715.299999	-0.002	2.5
40	699.699998	-0.003	715.299999	-0.002	2.5
50	699.699998	-0.003	715.299998	-0.003	2.5
55	699.699998	-0.003	715.299998	-0.002	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	700.500002	0.002	714.500003	0.004	2.5
3.27	700.500001	0.002	714.500003	0.005	2.5
4.42	700.500002	0.002	714.500003	0.003	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	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	714.500001	0.002	2.5
-20	700.500004	0.006	714.500002	0.003	2.5
-10	700.500002	0.003	714.500001	0.002	2.5
0	700.500002	0.003	714.500003	0.004	2.5
10	700.500002	0.002	714.500002	0.003	2.5
20	700.499997	-0.004	714.499998	-0.002	2.5
30	700.499996	-0.005	714.499998	-0.003	2.5
40	700.499996	-0.006	714.499996	-0.005	2.5
50	700.499997	-0.004	714.499997	-0.004	2.5
55	700.499999	-0.002	714.499996	-0.005	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	701.500001	0.001	713.500001	0.002	2.5
3.27	701.500003	0.004	713.500002	0.003	2.5
4.42	701.500003	0.004	713.500004	0.005	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 12				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	701.500002	0.003	713.500004	0.005	2.5
-20	701.500003	0.004	713.500003	0.005	2.5
-10	701.500002	0.002	713.500002	0.003	2.5
0	701.500004	0.005	713.500004	0.005	2.5
10	701.500002	0.003	713.500003	0.004	2.5
20	701.499997	-0.004	713.499999	-0.002	2.5
30	701.499998	-0.003	713.499998	-0.003	2.5
40	701.499999	-0.001	713.499999	-0.002	2.5
50	701.499996	-0.005	713.499999	-0.002	2.5
55	701.499998	-0.002	713.499996	-0.005	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	704.000002	0.003	711.000001	0.002	2.5
3.27	704.000002	0.003	711.000001	0.002	2.5
4.42	704.000001	0.002	711.000004	0.006	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 12				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	704.000003	0.004	711.000001	0.002	2.5
-20	704.000004	0.006	711.000004	0.005	2.5
-10	704.000003	0.004	711.000003	0.004	2.5
0	704.000003	0.005	711.000004	0.006	2.5
10	704.000003	0.005	711.000003	0.005	2.5
20	703.999998	-0.002	710.999997	-0.005	2.5
30	703.999998	-0.003	710.999998	-0.004	2.5
40	703.999996	-0.005	710.999999	-0.002	2.5
50	703.999997	-0.004	710.999997	-0.005	2.5
55	703.999999	-0.002	710.999997	-0.004	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	779.500003	0.004	784.500004	0.004	2.5
3.27	779.500004	0.005	784.500004	0.005	2.5
4.42	779.500002	0.003	784.500002	0.003	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 13				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	779.500003	0.004	784.500004	0.004	2.5
-20	779.500003	0.003	784.500004	0.005	2.5
-10	779.500003	0.004	784.500004	0.005	2.5
0	779.500001	0.001	784.500003	0.004	2.5
10	779.500002	0.002	784.500004	0.005	2.5
20	779.499999	-0.001	784.499996	-0.005	2.5
30	779.499997	-0.003	784.499997	-0.004	2.5
40	779.499996	-0.005	784.499997	-0.004	2.5
50	779.499999	-0.001	784.499996	-0.005	2.5
55	779.499999	-0.002	784.499999	-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	0.002	2.5
3.27	782.000002	0.002	2.5
4.42	782.000004	0.005	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 13		Limit (ppm)
	Channel Bandwidth: 10 MHz		
	Frequency (MHz)	Frequency Error (ppm)	
-30	782.000002	0.002	2.5
-20	782.000002	0.003	2.5
-10	782.000002	0.003	2.5
0	782.000004	0.005	2.5
10	782.000001	0.002	2.5
20	781.999998	-0.002	2.5
30	781.999999	-0.002	2.5
40	781.999998	-0.003	2.5
50	781.999996	-0.005	2.5
55	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	706.500001	0.001	713.500003	0.004	2.5
3.27	706.500002	0.003	713.500004	0.006	2.5
4.42	706.500003	0.004	713.500003	0.005	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 17				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	706.500001	0.002	713.500003	0.005	2.5
-20	706.500004	0.005	713.500004	0.005	2.5
-10	706.500003	0.004	713.500004	0.005	2.5
0	706.500002	0.003	713.500004	0.005	2.5
10	706.500003	0.004	713.500004	0.005	2.5
20	706.499998	-0.002	713.499999	-0.001	2.5
30	706.499997	-0.004	713.499998	-0.004	2.5
40	706.499998	-0.003	713.499999	-0.001	2.5
50	706.499998	-0.003	713.499998	-0.003	2.5
55	706.499999	-0.002	713.499997	-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	709.000003	0.005	711.000004	0.005	2.5
3.27	709.000002	0.002	711.000004	0.006	2.5
4.42	709.000004	0.005	711.000003	0.004	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 17				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	709.000003	0.004	711.000002	0.002	2.5
-20	709.000003	0.004	711.000003	0.004	2.5
-10	709.000002	0.002	711.000003	0.004	2.5
0	709.000001	0.002	711.000002	0.003	2.5
10	709.000001	0.002	711.000003	0.004	2.5
20	708.999998	-0.003	710.999997	-0.004	2.5
30	708.999999	-0.002	710.999998	-0.003	2.5
40	708.999998	-0.003	710.999997	-0.005	2.5
50	708.999997	-0.004	710.999999	-0.002	2.5
55	708.999996	-0.006	710.999998	-0.003	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 66				Limit (ppm)
	Channel Bandwidth: 1.4 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	1710.700001	0.001	1779.300003	0.002	2.5
3.27	1710.700003	0.002	1779.300003	0.002	2.5
4.42	1710.700002	0.001	1779.300002	0.001	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 66				Limit (ppm)
	Channel Bandwidth: 1.4 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1710.700001	0.001	1779.300004	0.002	2.5
-20	1710.700004	0.002	1779.300003	0.001	2.5
-10	1710.700003	0.002	1779.300003	0.002	2.5
0	1710.700003	0.002	1779.300002	0.001	2.5
10	1710.700002	0.001	1779.300003	0.002	2.5
20	1710.699997	-0.002	1779.299996	-0.002	2.5
30	1710.699999	-0.001	1779.299998	-0.001	2.5
40	1710.699998	-0.001	1779.299999	-0.001	2.5
50	1710.699998	-0.001	1779.299997	-0.002	2.5
55	1710.699996	-0.002	1779.299999	-0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 66				Limit (ppm)
	Channel Bandwidth: 3 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	1711.500003	0.002	1778.500001	0.001	2.5
3.27	1711.500001	0.001	1778.500003	0.002	2.5
4.42	1711.500003	0.002	1778.500002	0.001	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 66				Limit (ppm)
	Channel Bandwidth: 3 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1711.500002	0.001	1778.500002	0.001	2.5
-20	1711.500003	0.002	1778.500003	0.002	2.5
-10	1711.500001	0.001	1778.500004	0.002	2.5
0	1711.500003	0.002	1778.500003	0.002	2.5
10	1711.500001	0.001	1778.500003	0.002	2.5
20	1711.499996	-0.002	1778.499999	-0.001	2.5
30	1711.499998	-0.001	1778.499997	-0.002	2.5
40	1711.499998	-0.001	1778.499998	-0.001	2.5
50	1711.499997	-0.002	1778.499998	-0.001	2.5
55	1711.499998	-0.001	1778.499997	-0.002	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 66				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	1712.500004	0.002	1777.500001	0.001	2.5
3.27	1712.500001	0.001	1777.500002	0.001	2.5
4.42	1712.500001	0.001	1777.500002	0.001	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 66				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1712.500004	0.002	1777.500002	0.001	2.5
-20	1712.500001	0.001	1777.500003	0.001	2.5
-10	1712.500001	0.001	1777.500002	0.001	2.5
0	1712.500003	0.002	1777.500004	0.002	2.5
10	1712.500002	0.001	1777.500003	0.002	2.5
20	1712.499996	-0.002	1777.499997	-0.002	2.5
30	1712.499998	-0.001	1777.499998	-0.001	2.5
40	1712.499998	-0.001	1777.499998	-0.001	2.5
50	1712.499999	-0.001	1777.499999	-0.001	2.5
55	1712.499997	-0.002	1777.499999	-0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 66				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	1775.000003	0.002	2.5
3.27	1715.000002	0.001	1775.000003	0.002	2.5
4.42	1715.000002	0.001	1775.000003	0.002	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 66				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1715.000002	0.001	1775.000002	0.001	2.5
-20	1715.000004	0.002	1775.000001	0.001	2.5
-10	1715.000001	0.001	1775.000002	0.001	2.5
0	1715.000003	0.002	1775.000003	0.002	2.5
10	1715.000004	0.002	1775.000003	0.001	2.5
20	1714.999999	-0.001	1774.999998	-0.001	2.5
30	1714.999997	-0.002	1774.999997	-0.002	2.5
40	1714.999998	-0.001	1774.999998	-0.001	2.5
50	1714.999999	-0.001	1774.999998	-0.001	2.5
55	1714.999997	-0.002	1774.999998	-0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 66				Limit (ppm)
	Channel Bandwidth: 15 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	1717.500004	0.002	1772.500003	0.002	2.5
3.27	1717.500003	0.002	1772.500003	0.001	2.5
4.42	1717.500002	0.001	1772.500003	0.001	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 66				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	1772.500002	0.001	2.5
-20	1717.500003	0.002	1772.500002	0.001	2.5
-10	1717.500003	0.002	1772.500002	0.001	2.5
0	1717.500001	0.001	1772.500003	0.002	2.5
10	1717.500002	0.001	1772.500002	0.001	2.5
20	1717.499998	-0.001	1772.499997	-0.002	2.5
30	1717.499998	-0.001	1772.499997	-0.002	2.5
40	1717.499998	-0.001	1772.499998	-0.001	2.5
50	1717.499999	-0.001	1772.499996	-0.002	2.5
55	1717.499996	-0.002	1772.499999	-0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 66				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	1770.000004	0.002	2.5
3.27	1720.000002	0.001	1770.000001	0.001	2.5
4.42	1720.000003	0.002	1770.000001	0.001	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 66				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	1770.000002	0.001	2.5
-20	1720.000001	0.001	1770.000001	0.001	2.5
-10	1720.000001	0.001	1770.000003	0.001	2.5
0	1720.000002	0.001	1770.000003	0.002	2.5
10	1720.000003	0.002	1770.000003	0.002	2.5
20	1719.999998	-0.001	1769.999996	-0.002	2.5
30	1719.999998	-0.001	1769.999997	-0.002	2.5
40	1719.999999	-0.001	1769.999998	-0.001	2.5
50	1719.999998	-0.001	1769.999998	-0.001	2.5
55	1719.999996	-0.002	1769.999998	-0.001	2.5

4.4 Occupied Bandwidth Measurement

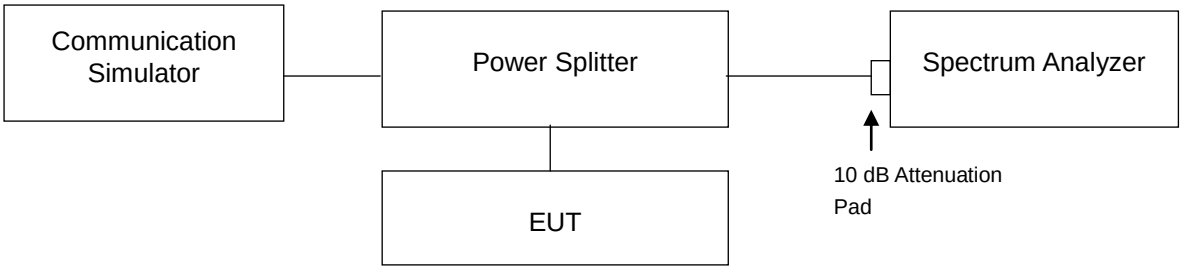
4.4.1 Limits of Occupied Bandwidth Measurement

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

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

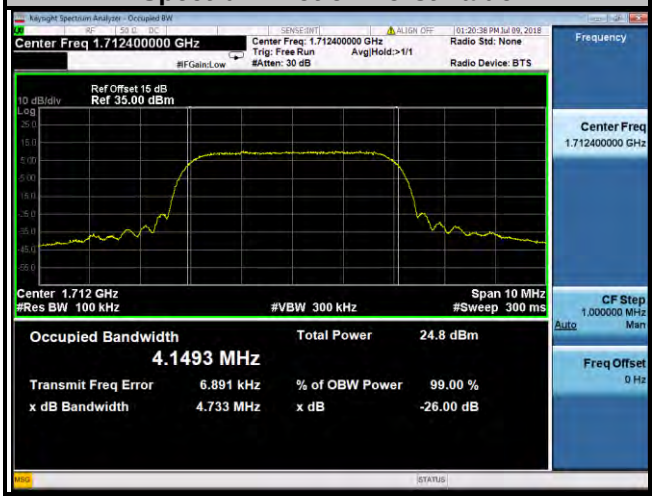
4.4.3 Test Setup



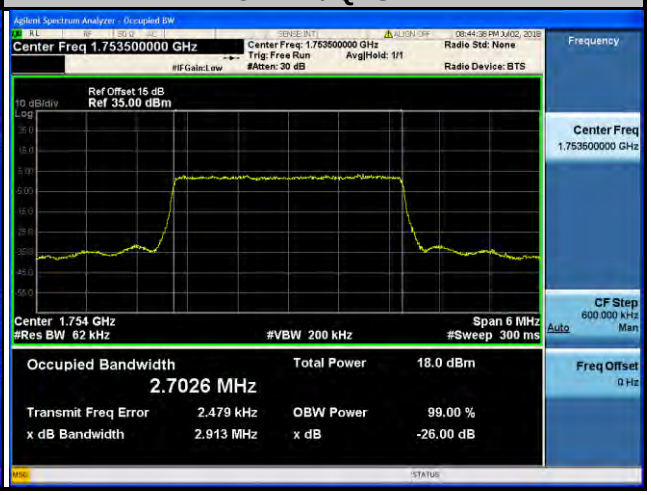
4.4.4 Test Result

WCDMA		
Channel	**Frequency (MHz)**	**99 % Occupied Bandwidth (MHz)**
1312	1712.4	4.1493
1413	1732.6	4.1486
1513	1752.6	4.1412

Spectrum Plot of Worst Value



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			QPSK	16QAM
19957	1710.7	1.0862	1.0892	19965	1711.5	2.6999	2.6971
20175	1732.5	1.0866	1.0896	20175	1732.5	2.7004	2.6993
20393	1754.3	1.0878	1.0883	20385	1753.5	2.7026	2.6978

Spectrum Plot of Worst Value	
1.4 MHz / 16QAM	3 MHz / QPSK
	

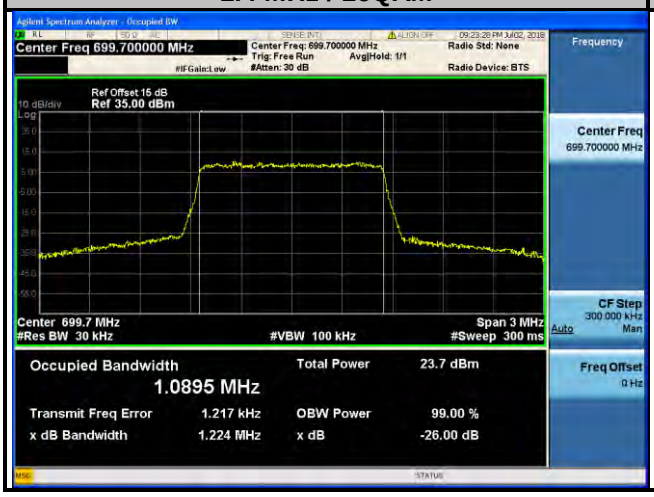
LTE Band 4							
Channel Bandwidth: 5 MHz				Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
19975	1712.5	4.4922	4.4943	20000	1715.0	8.9649	8.9714
20175	1732.5	4.4954	4.4967	20175	1732.5	8.9683	8.9724
20375	1752.5	4.4936	4.4970	20350	1750.0	8.9720	8.9767

Spectrum Plot of Worst Value	
5 MHz / 16QAM	10 MHz / 16QAM

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			QPSK	16QAM
20025	1717.5	13.437	13.428	20050	1720.0	17.871	17.894
20175	1732.5	13.451	13.442	20175	1732.5	17.915	17.940
20325	1747.5	13.466	13.451	20300	1745.0	17.945	17.970

Spectrum Plot of Worst Value	
15 MHz / QPSK	20 MHz / 16QAM

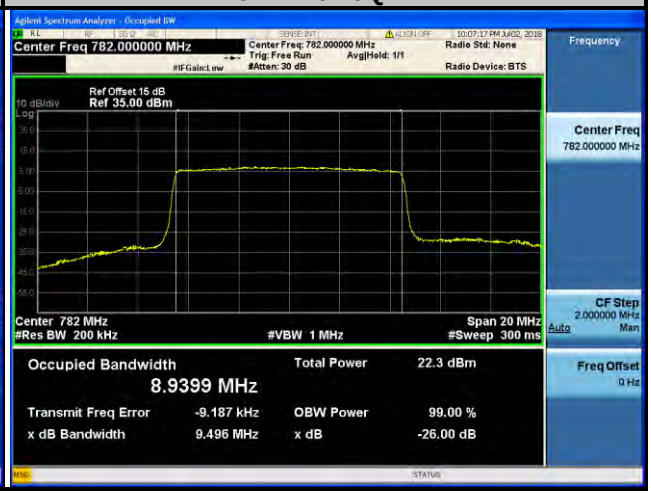
LTE Band 12							
Channel Bandwidth: 1.4 MHz				Channel Bandwidth: 3 MHz			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
23017	699.7	1.0871	1.0895	23025	700.5	2.7002	2.6964
23095	707.5	1.0854	1.0888	23095	707.5	2.7014	2.6973
23173	715.3	1.0863	1.0867	23165	714.5	2.6981	2.6918

Spectrum Plot of Worst Value	
1.4 MHz / 16QAM	3 MHz / QPSK
	

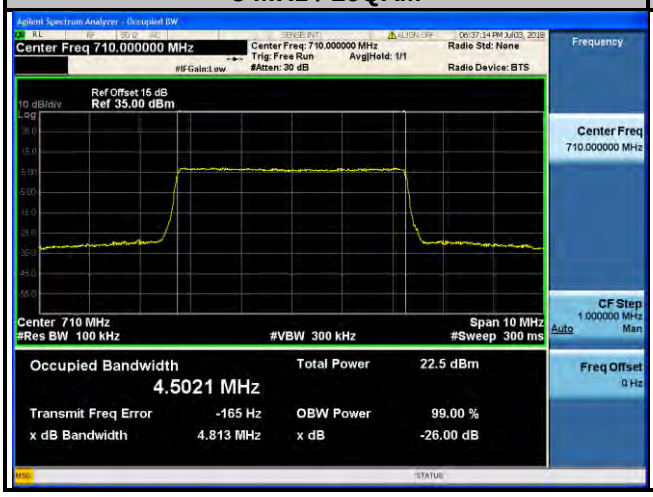
LTE Band 12							
Channel Bandwidth: 5 MHz				Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
23035	701.5	4.4874	4.4912	23060	704.0	8.9329	8.9374
23095	707.5	4.4938	4.4960	23095	707.5	8.9668	8.9678
23155	713.5	4.4849	4.4878	23130	711.0	8.9806	8.9858

Spectrum Plot of Worst Value	
5 MHz / 16QAM	10 MHz / 16QAM

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			QPSK	16QAM
23205	779.5	4.4927	4.4923	23230	782.0	8.9342	8.9399
23230	782.0	4.4842	4.4867				
23255	784.5	4.4938	4.4942				

Spectrum Plot of Worst Value	
5 MHz / 16QAM	10 MHz / 16QAM
	

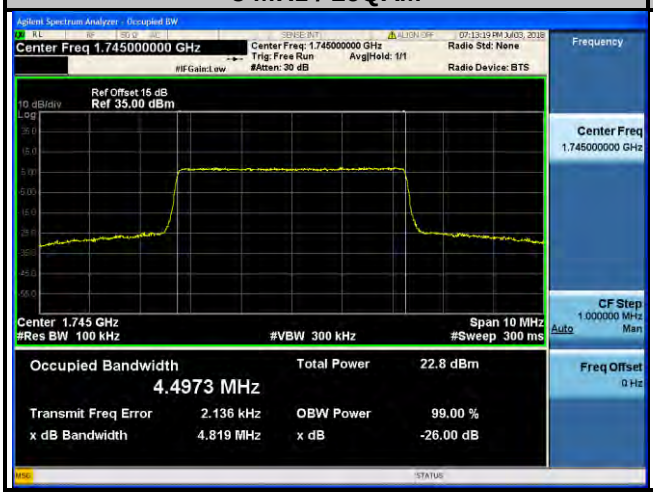
LTE Band 17							
Channel Bandwidth: 5 MHz				Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
23755	706.5	4.4905	4.4913	23780	709.0	8.9917	8.9948
23790	710.0	4.4977	4.5021	23790	710.0	8.9939	8.9959
23825	713.5	4.4846	4.4858	23800	711.0	8.9816	8.9864

Spectrum Plot of Worst Value	
5 MHz / 16QAM	10 MHz / 16QAM
	

LTE Band 66							
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			QPSK	16QAM
131979	1710.7	1.0866	1.0881	131987	1711.5	2.6986	2.6976
132322	1745.0	1.0869	1.0890	132322	1745.0	2.7010	2.6997
132665	1779.3	1.0870	1.0883	132657	1778.5	2.7001	2.6976

Spectrum Plot of Worst Value	
1.4 MHz / 16QAM	3 MHz / QPSK

LTE Band 66							
Channel Bandwidth: 5 MHz				Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
131997	1712.5	4.4937	4.4926	132022	1715.0	8.9637	8.9667
132322	1745.0	4.4968	4.4973	132322	1745.0	8.9770	8.9827
132647	1777.5	4.4923	4.4947	132622	1775.0	8.9650	8.9704

Spectrum Plot of Worst Value	
5 MHz / 16QAM	10 MHz / 16QAM
	

LTE Band 66							
Channel Bandwidth: 15 MHz				Channel Bandwidth: 20 MHz			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
132047	1717.5	13.436	13.427	132072	1720.0	17.881	17.903
132322	1745.0	13.470	13.457	132322	1745.0	17.948	17.967
132597	1772.5	13.455	13.440	132572	1770.0	17.903	17.929

Spectrum Plot of Worst Value	
15 MHz / QPSK	20 MHz / 16QAM

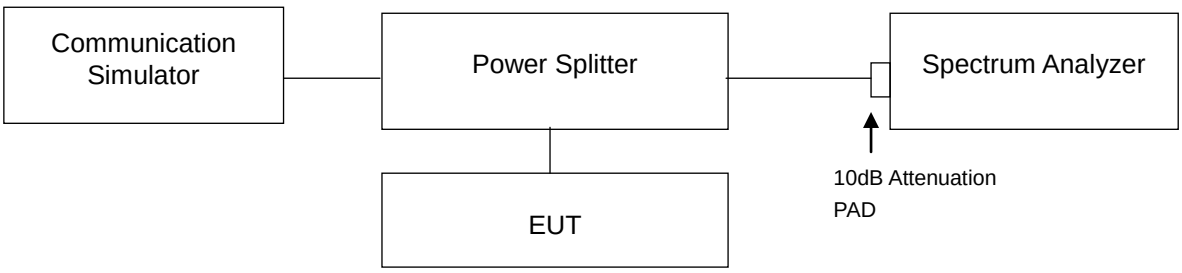
4.5 Band Edge Measurement

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 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



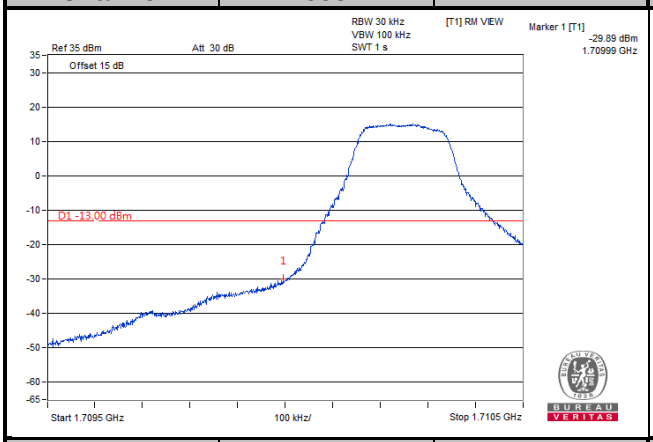
4.5.3 Test Procedures

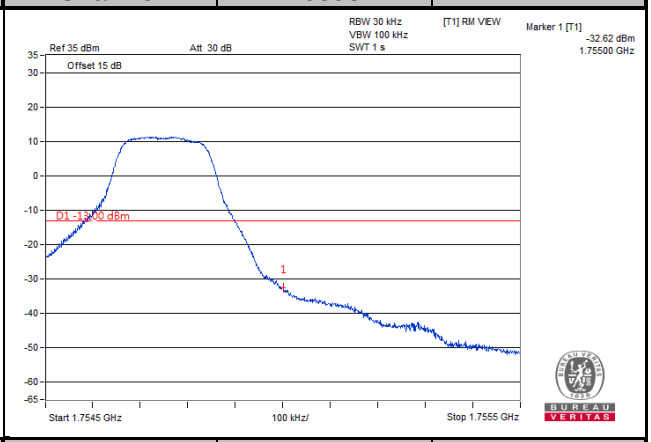
a. All measurements were done at low and high operational frequency range.
b. The center frequency of spectrum is the band edge frequency and span is 5 MHz. RB of the spectrum is 100 kHz and VB of the spectrum is 300 kHz (WCDMA).
c. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 30 kHz and VB of the spectrum is 100 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 62 kHz and VB of the spectrum is 200 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).
f. 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 10 MHz).
g. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 300 kHz and VB of the spectrum is 1 MHz (LTE Bandwidth 15 MHz).
h. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 300 kHz and VB of the spectrum is 1 MHz (LTE Bandwidth 20 MHz).
i. Record the max. trace plot into the test report.

4.5.4 Test Results

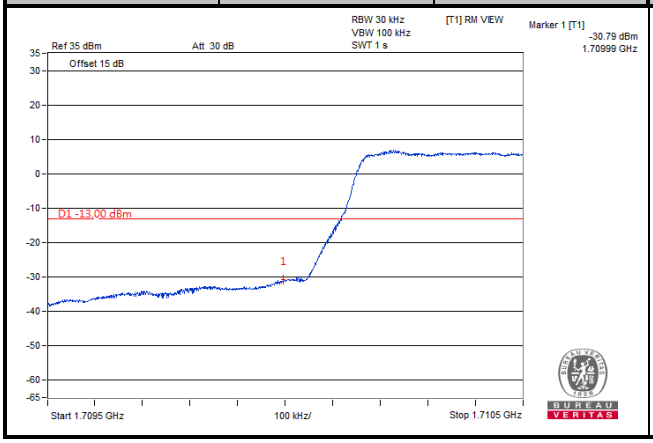
WCDMA			
Channel	1312	Channel	1513

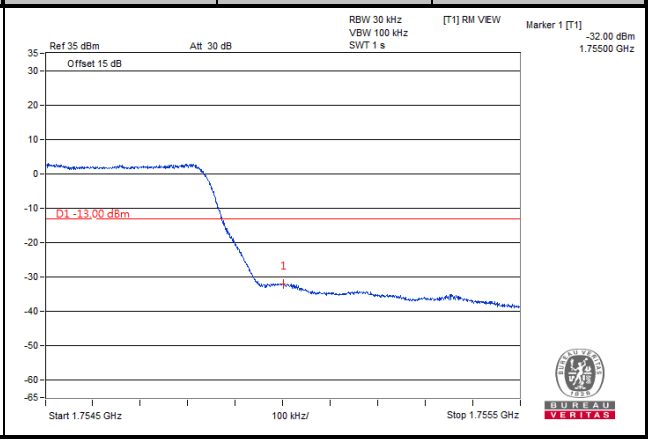
LTE Band 4					
Channel Bandwidth: 1.4 MHz					
Channel	19957	1 RB	Channel	20393	1 RB

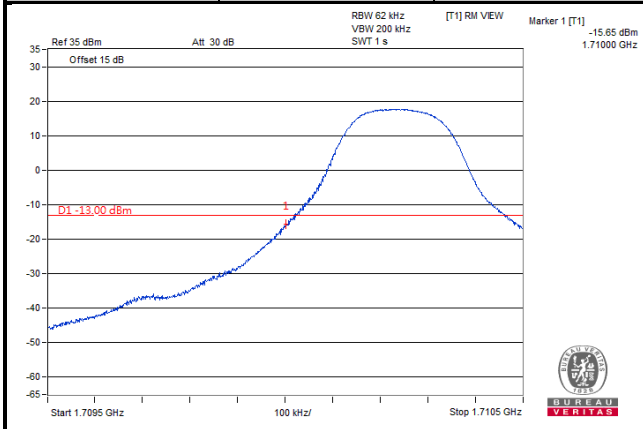
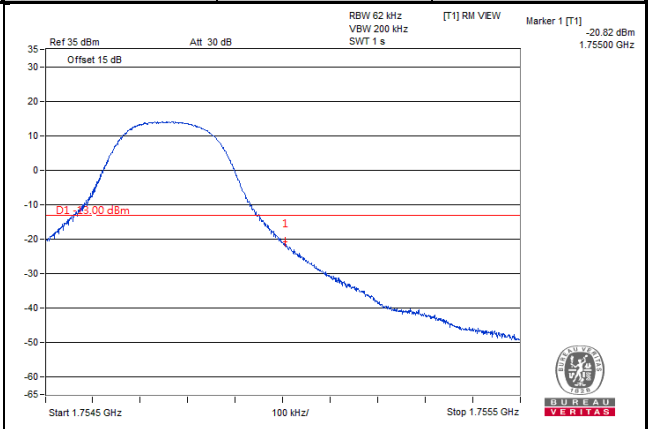
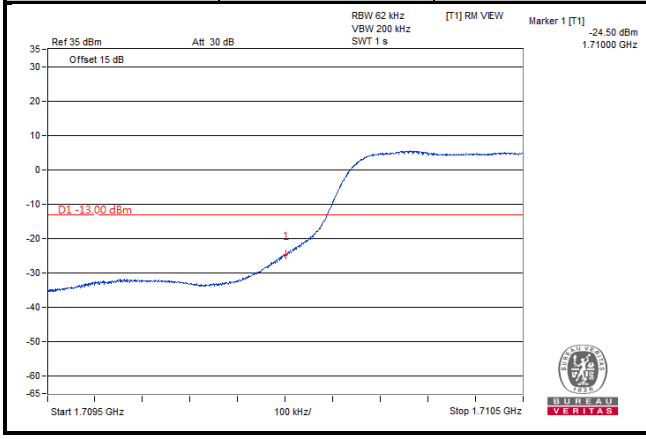
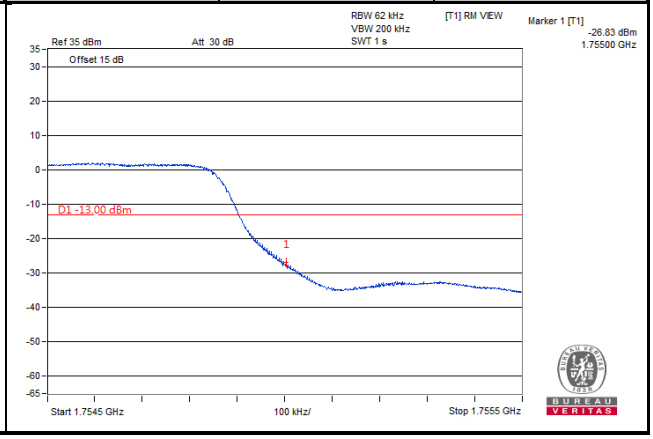


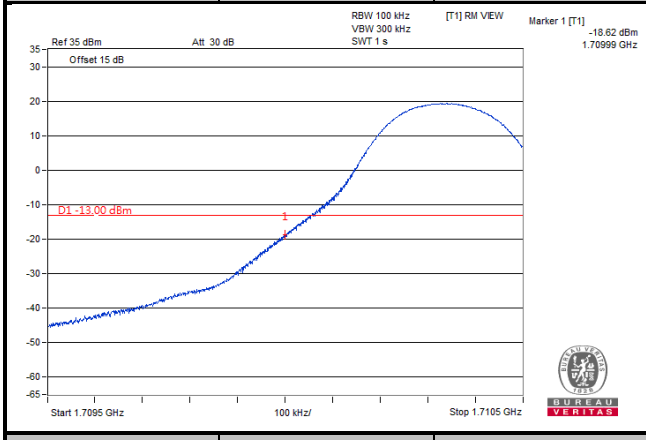
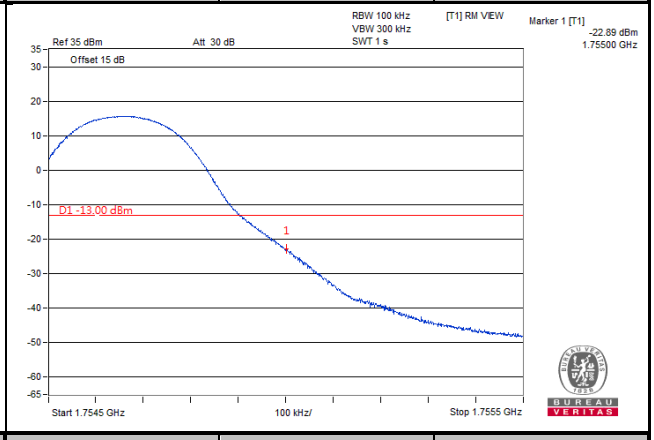
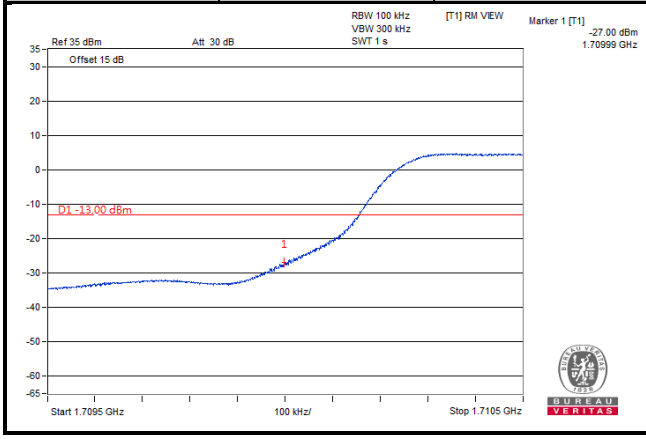
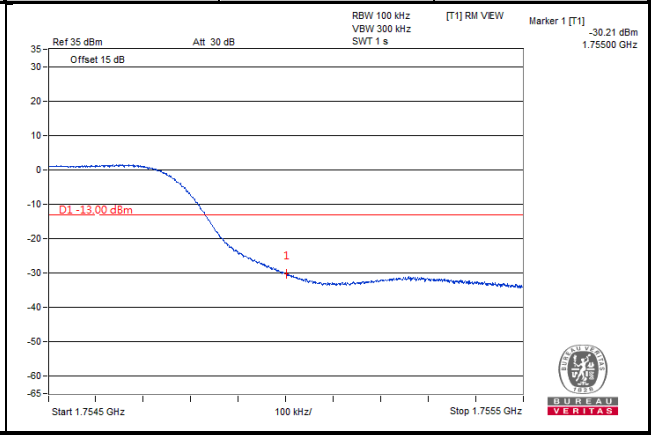


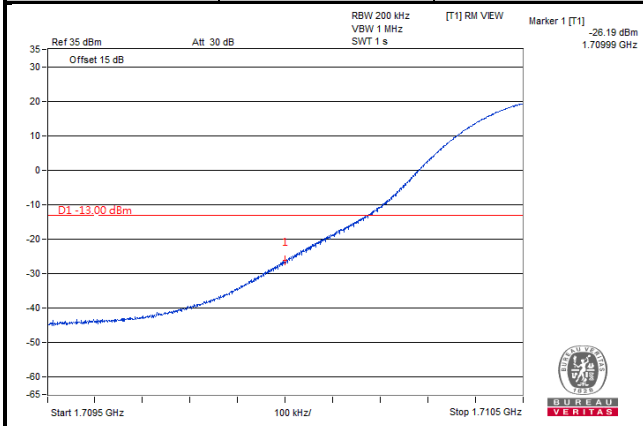
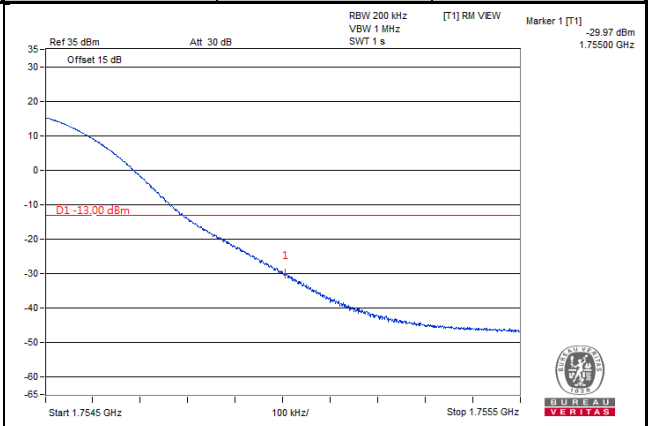
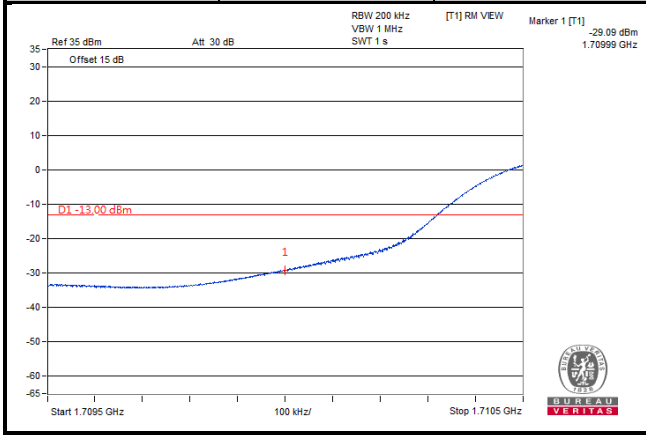
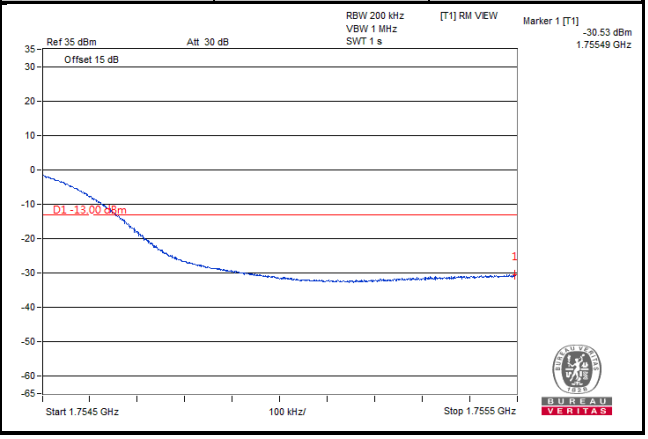
Channel	19957	6 RB	Channel	20393	6 RB

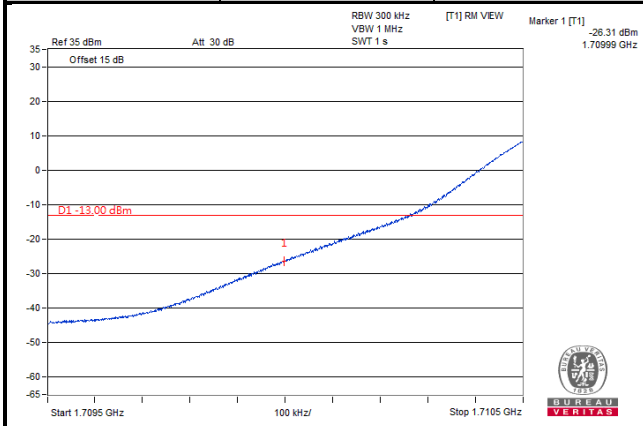
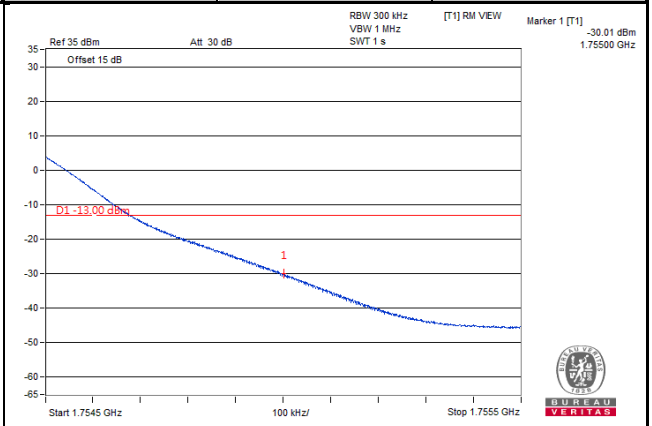
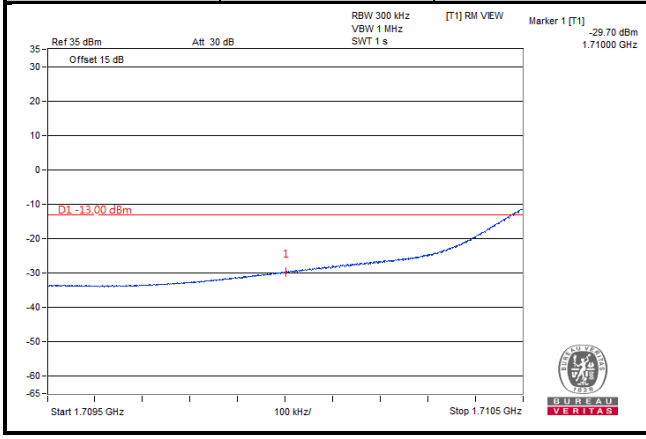
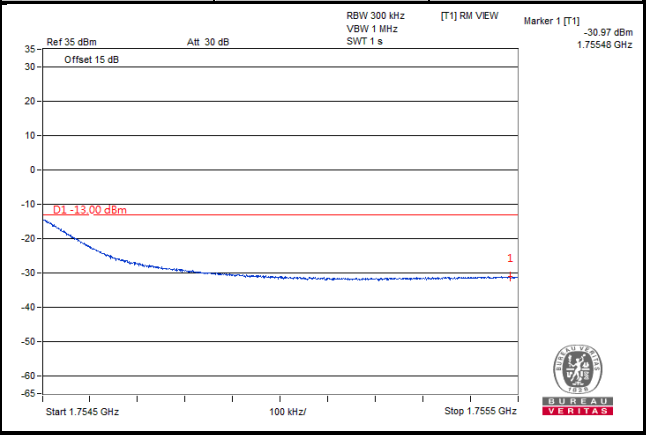


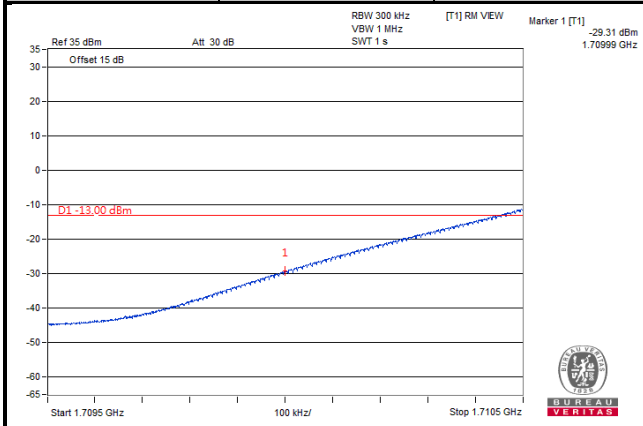
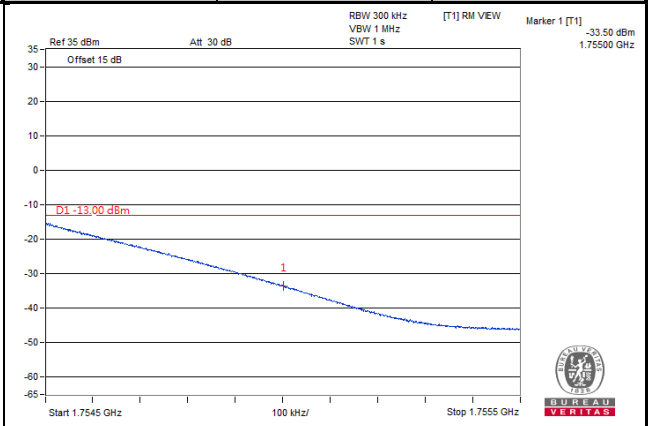
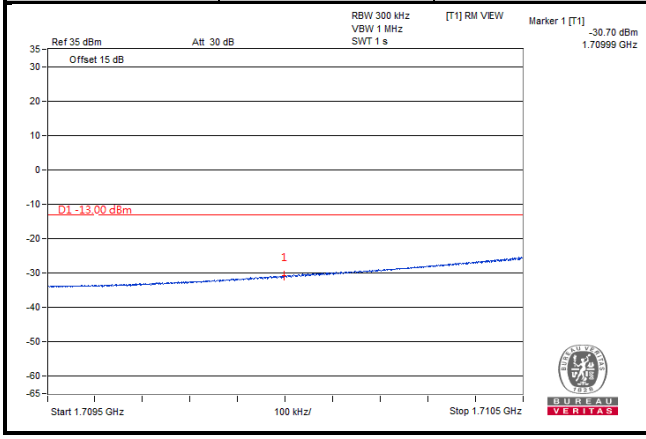
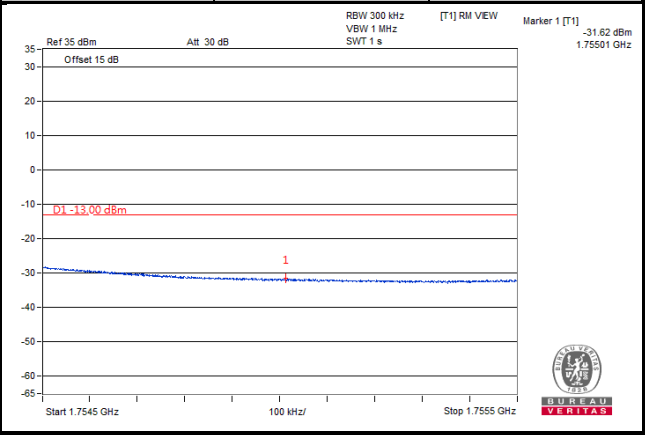


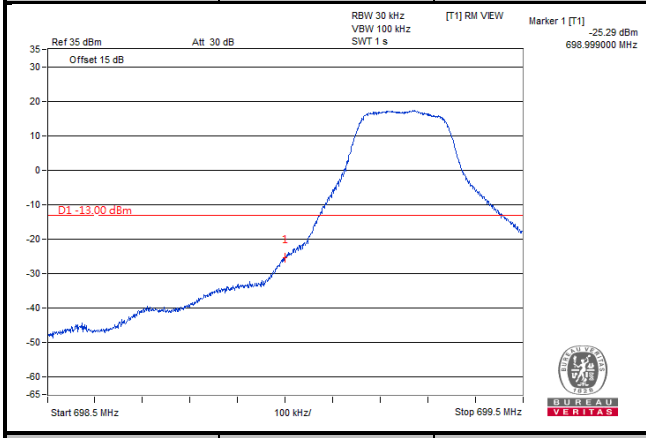
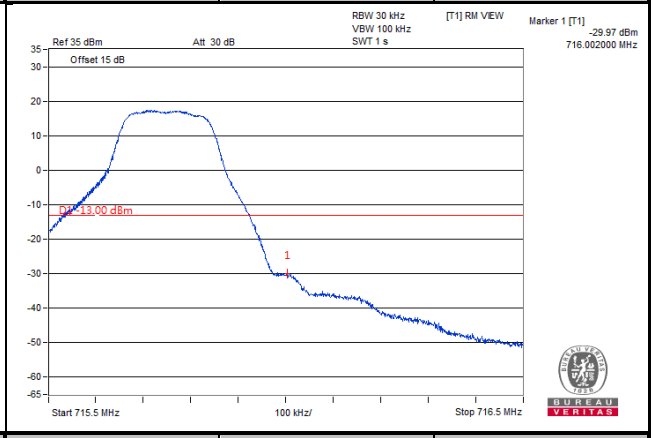
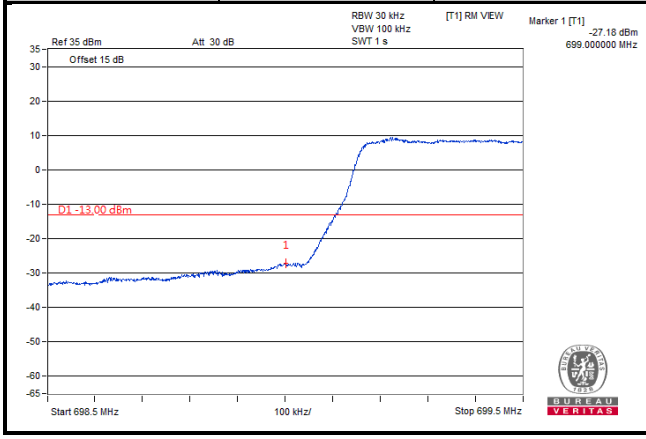
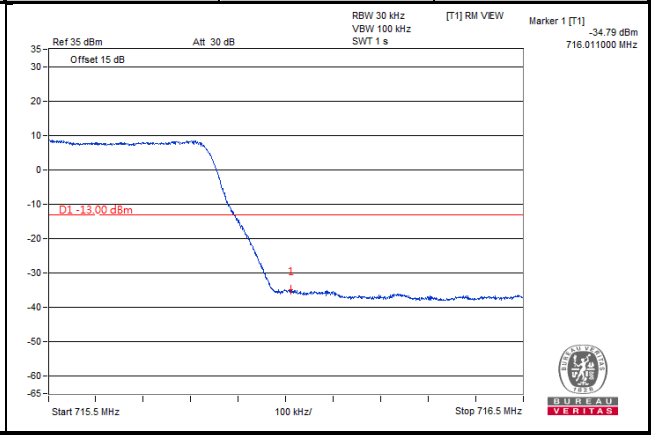
LTE Band 4					
Channel Bandwidth: 3 MHz					
Channel	19965	1 RB	Channel	20385	1 RB
				
Channel	19965	15 RB	Channel	20385	15 RB
				

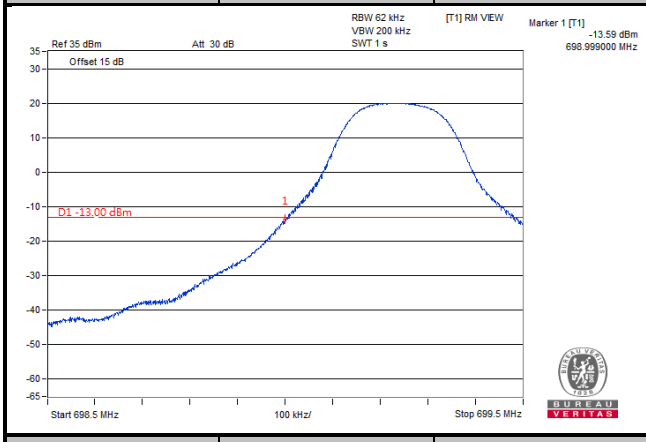
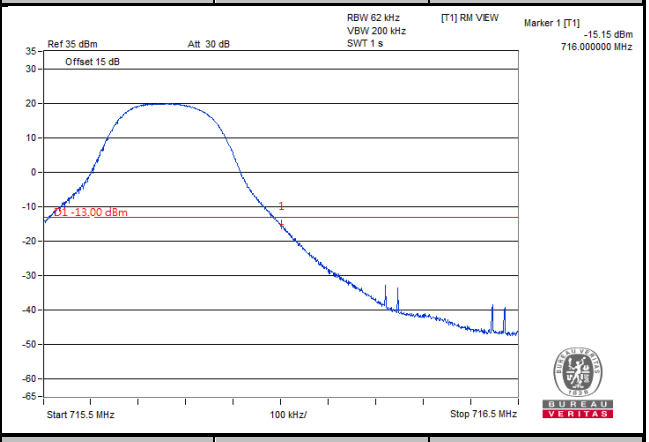
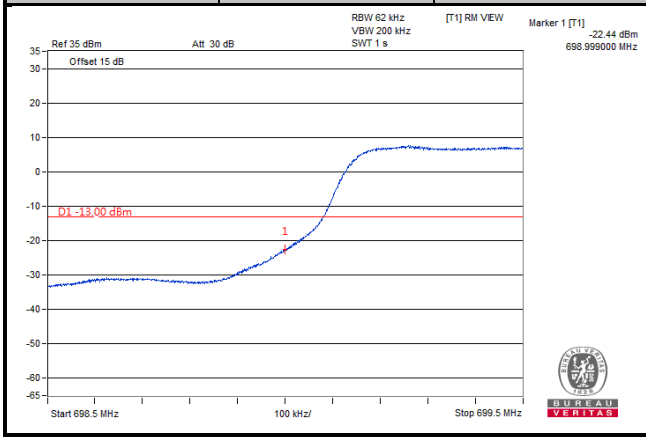
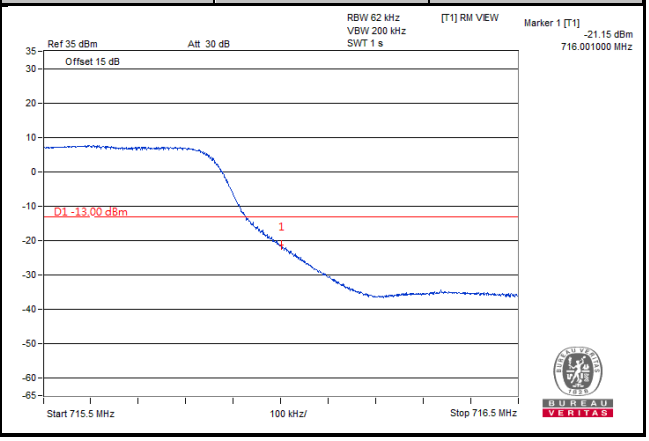
LTE Band 4					
Channel Bandwidth: 5 MHz					
Channel	19975	1 RB	Channel	20375	1 RB
					
Channel	19975	25 RB	Channel	20375	25 RB
					

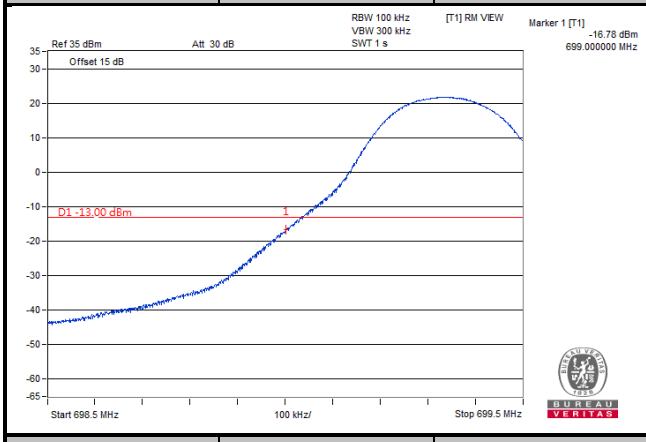
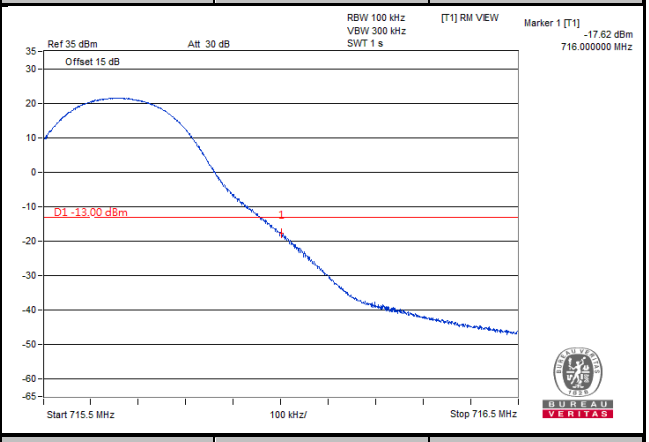
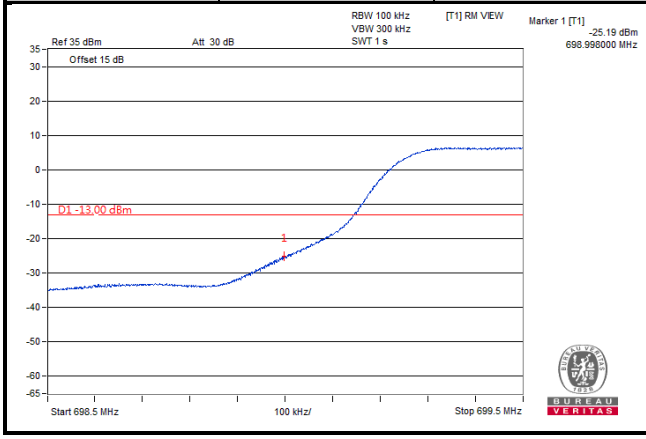
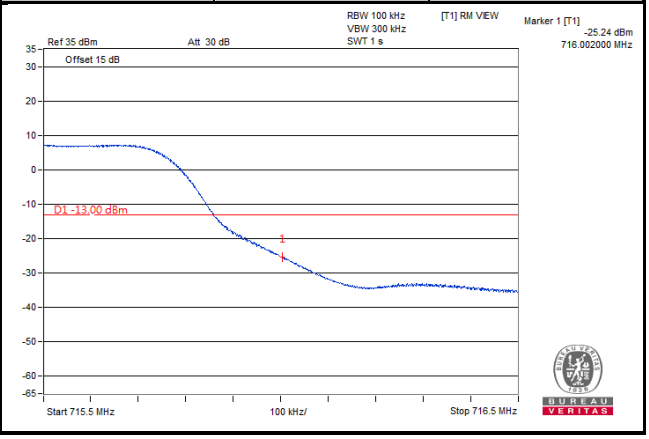
LTE Band 4					
Channel Bandwidth: 10 MHz					
Channel	20000	1 RB	Channel	20350	1 RB
					
Channel	20000	50 RB	Channel	20350	50 RB
					

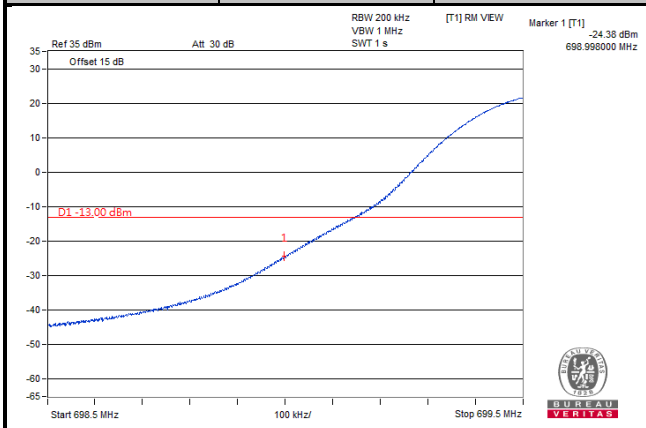
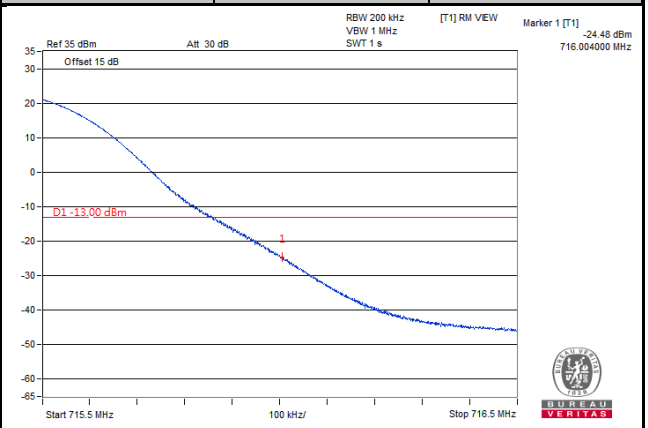
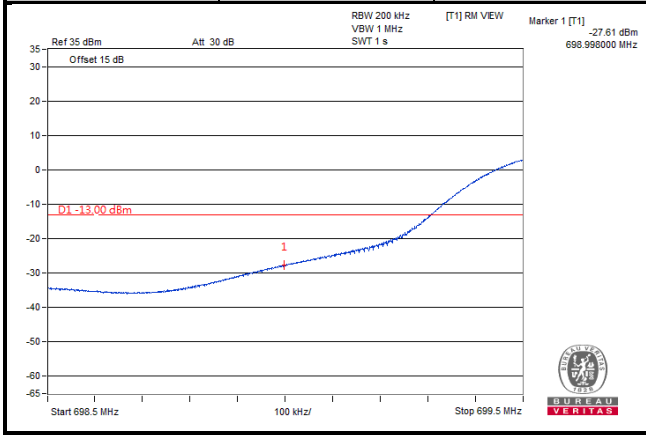
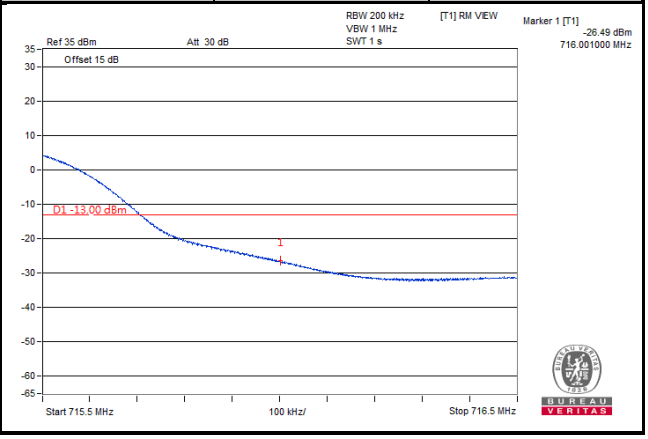
LTE Band 4					
Channel Bandwidth: 15 MHz					
Channel	20025	1 RB	Channel	20325	1 RB
					
Channel	20025	75 RB	Channel	20325	75 RB
					

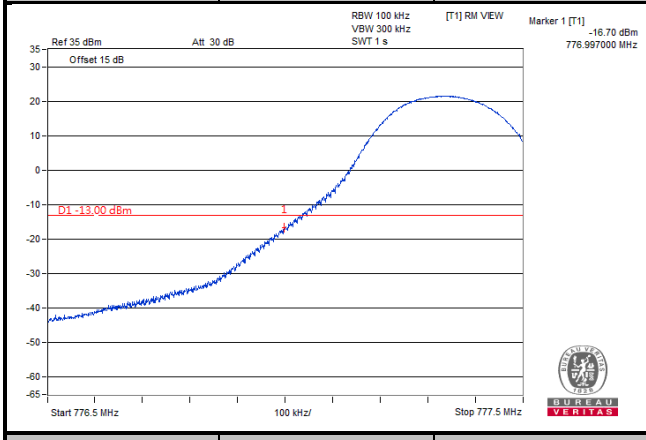
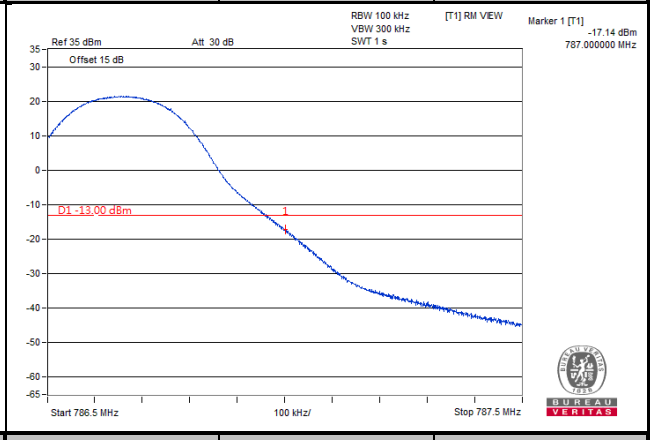
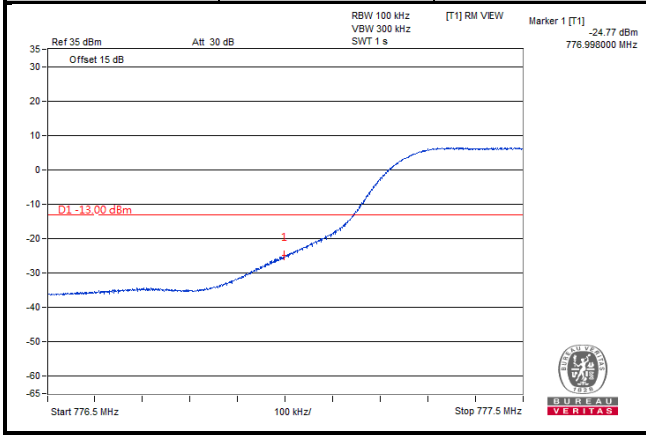
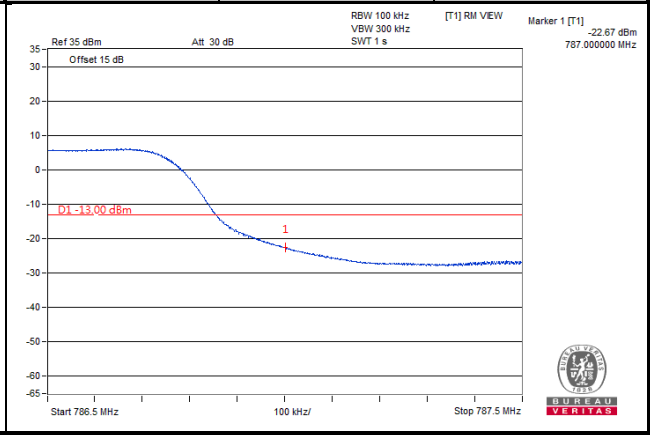
LTE Band 4					
Channel Bandwidth: 20 MHz					
Channel	20050	1 RB	Channel	20300	1 RB
					
Channel	20050	100 RB	Channel	20300	100 RB
					

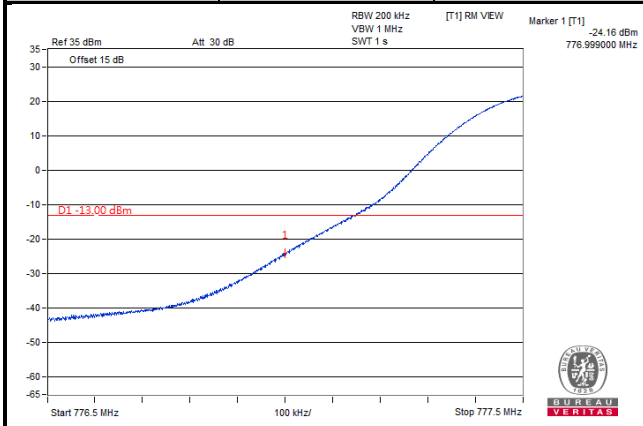
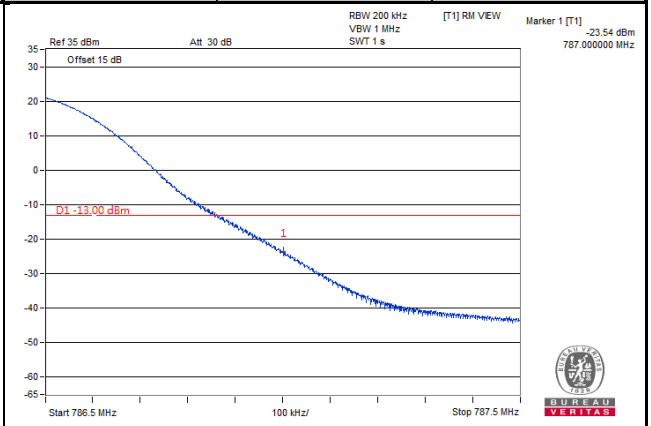
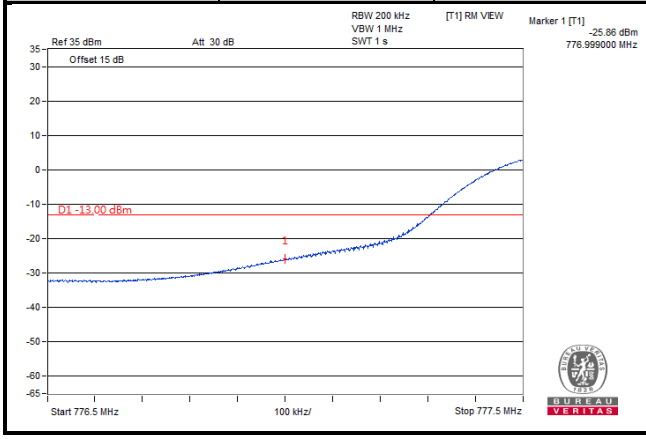
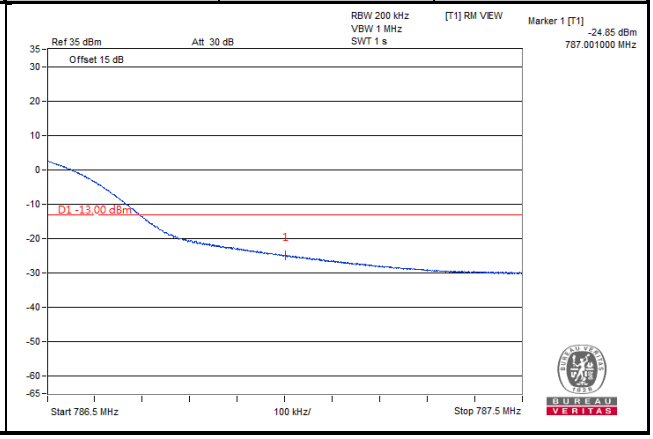
LTE Band 12					
Channel Bandwidth: 1.4 MHz					
Channel	23017	1 RB	Channel	23173	1 RB
					
Channel	23017	6 RB	Channel	23173	6 RB
					

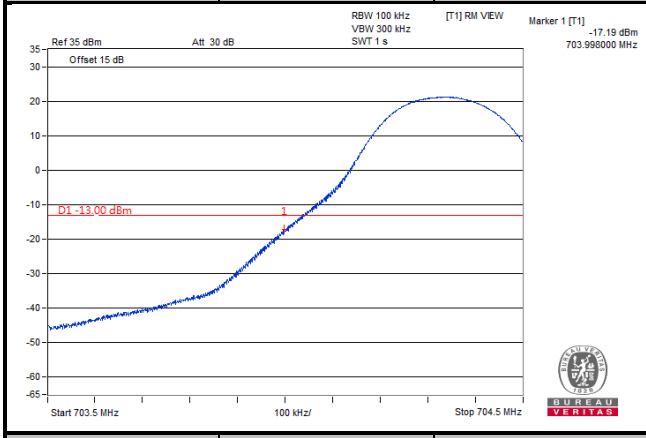
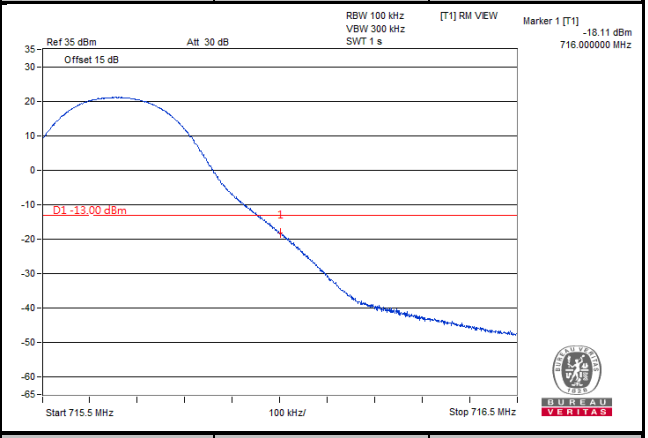
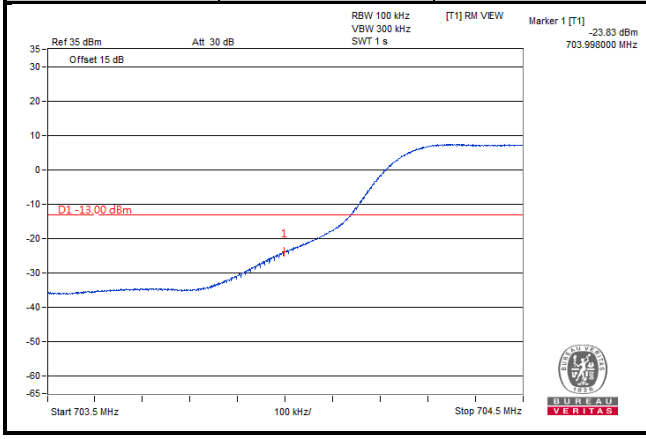
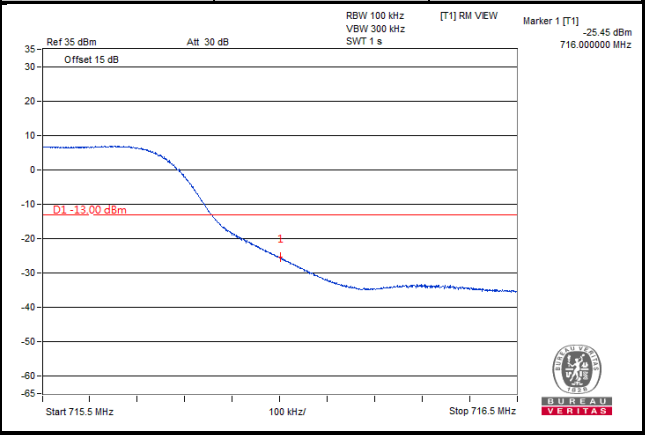
LTE Band 12					
Channel Bandwidth: 3 MHz					
Channel	23025	1 RB	Channel	23165	1 RB
					
Channel	23025	15 RB	Channel	23165	15 RB
					

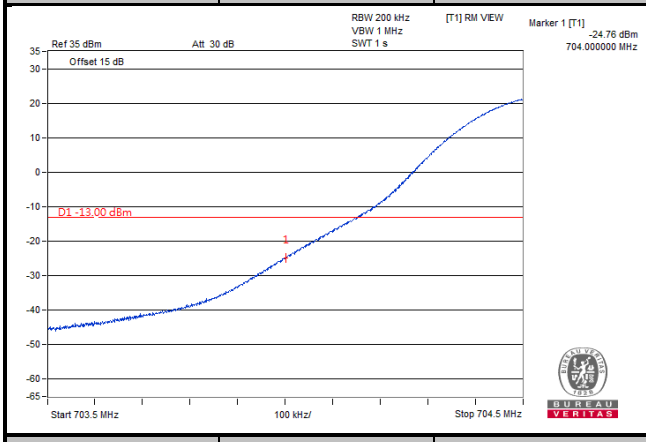
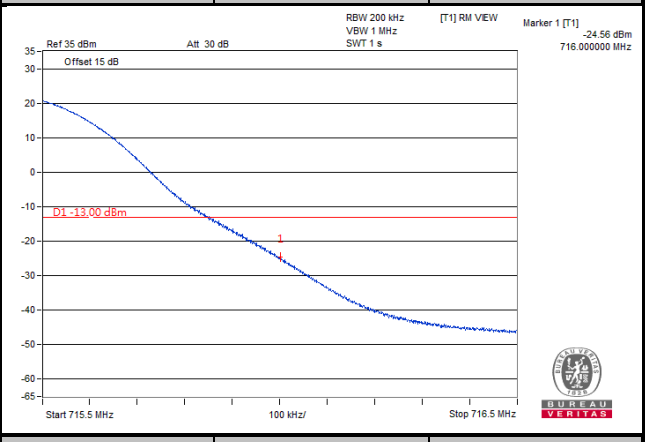
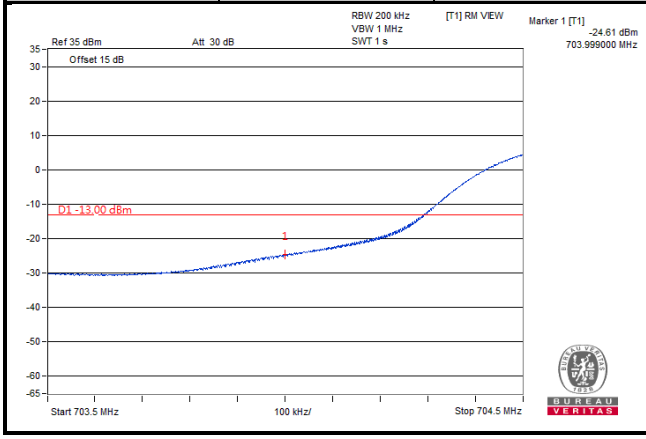
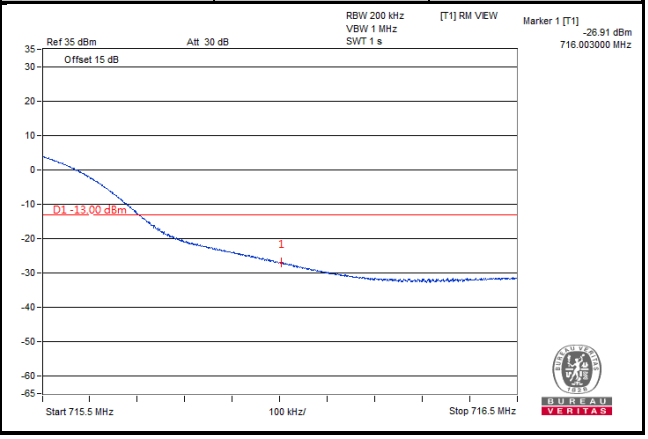
LTE Band 12					
Channel Bandwidth: 5 MHz					
Channel	23035	1 RB	Channel	23155	1 RB
					
Channel	23035	25 RB	Channel	23155	25 RB
					

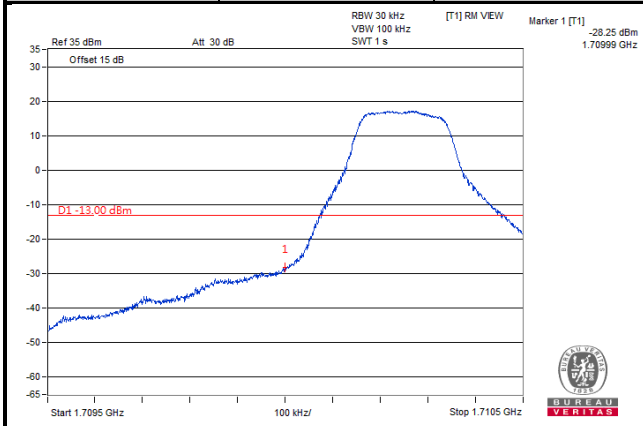
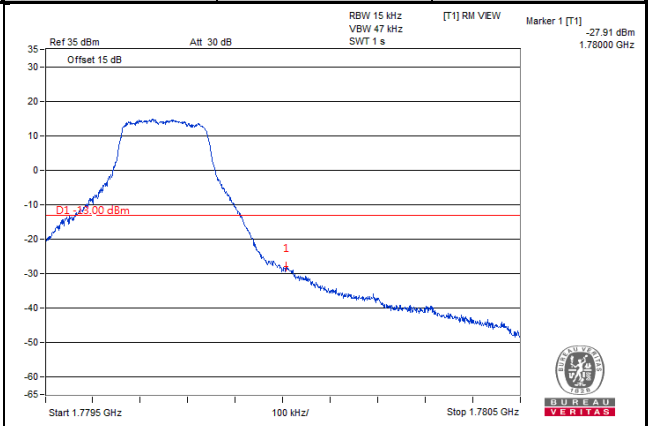
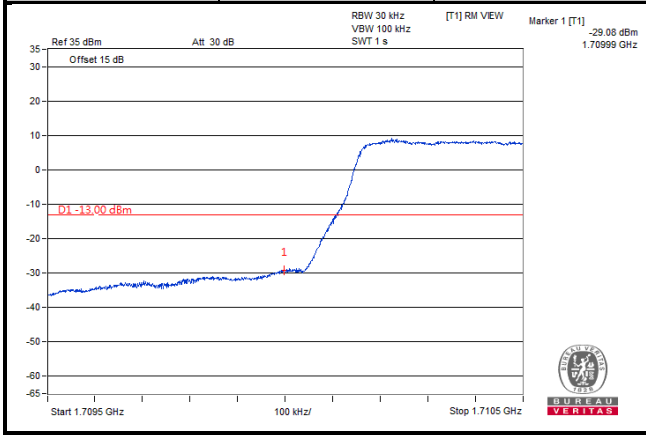
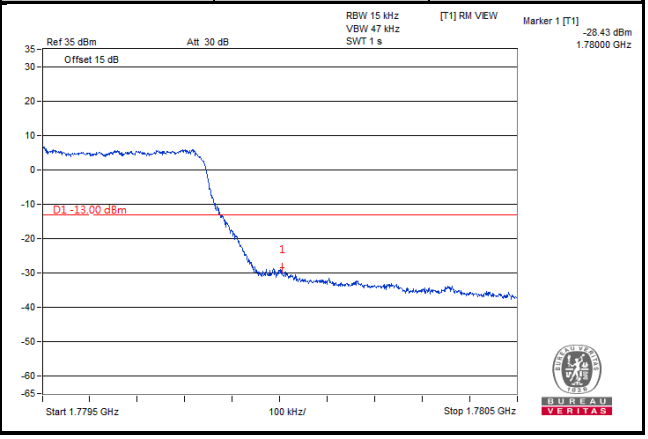
LTE Band 12					
Channel Bandwidth: 10 MHz					
Channel	23060	1 RB	Channel	23130	1 RB
					
Channel	23060	50 RB	Channel	23130	50 RB
					

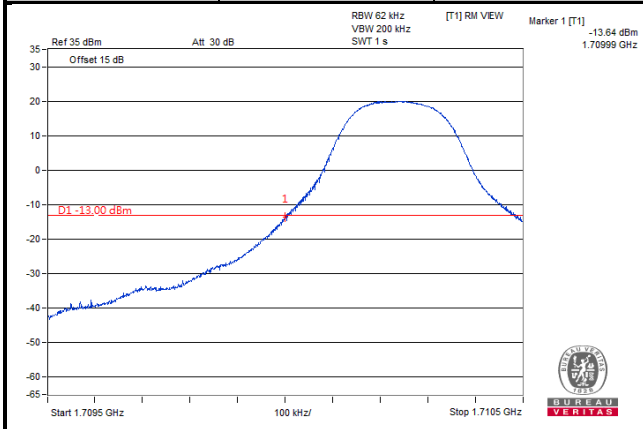
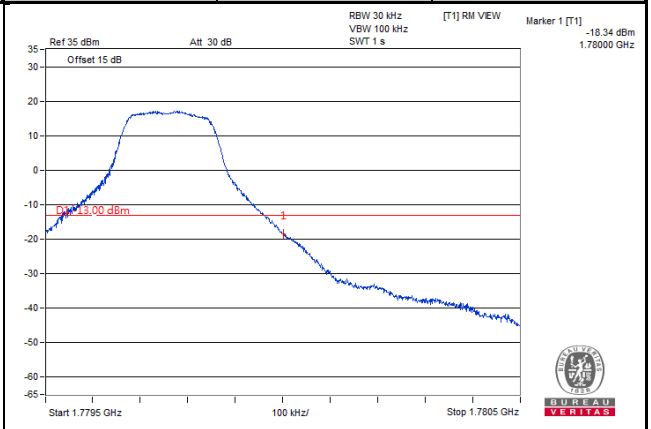
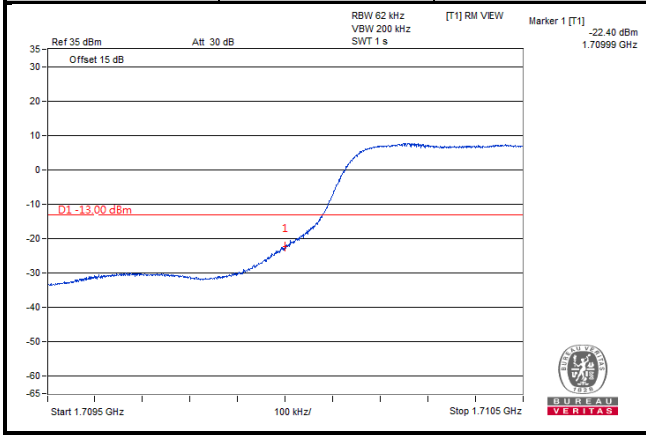
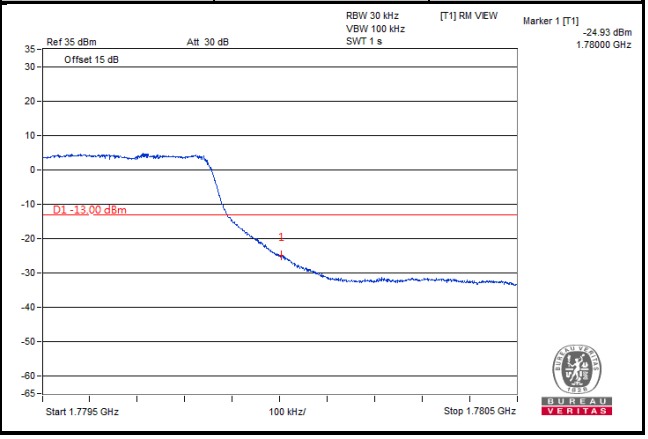
LTE Band 13					
Channel Bandwidth: 5 MHz					
Channel	23205	1 RB	Channel	23255	1 RB
					
Channel	23205	25 RB	Channel	23255	25 RB
					

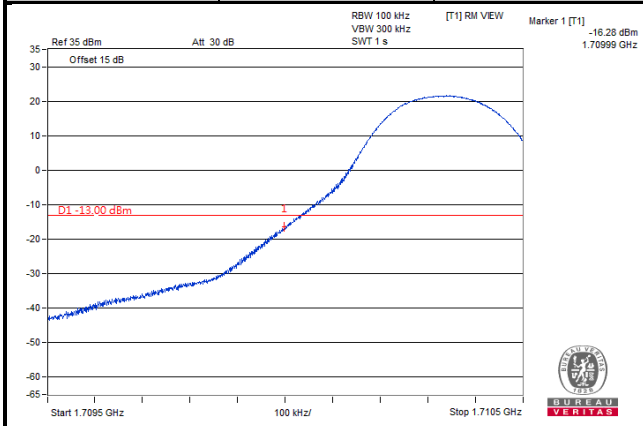
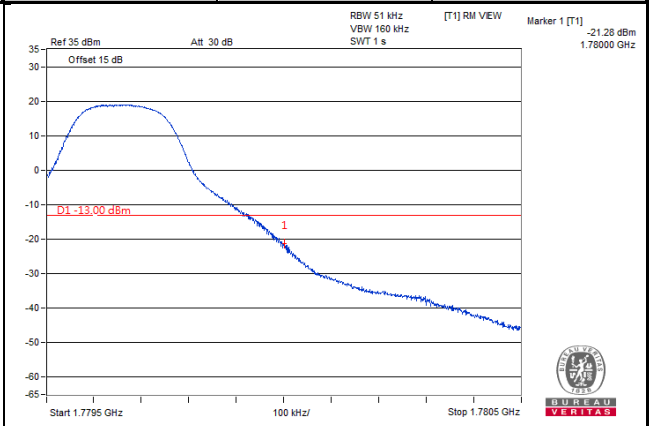
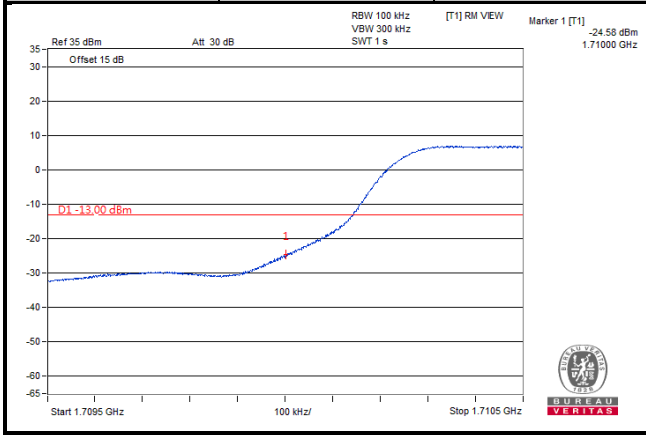
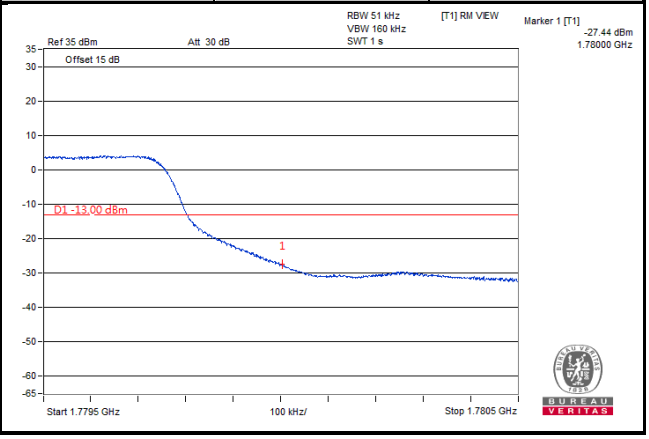
LTE Band 13					
Channel Bandwidth: 10 MHz					
Channel	23230	1 RB	Channel	23230	1 RB
					
Channel	23230	50 RB	Channel	23230	50 RB
					

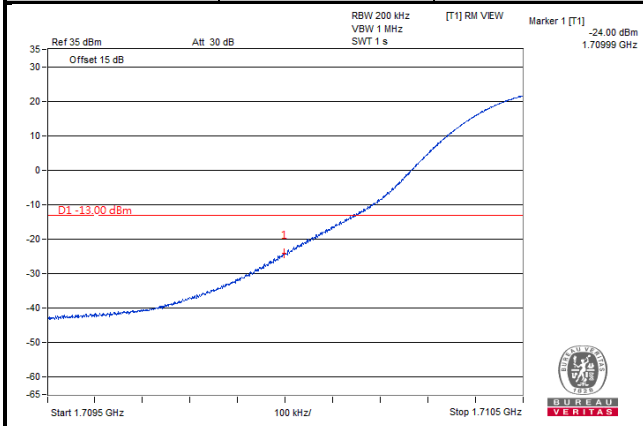
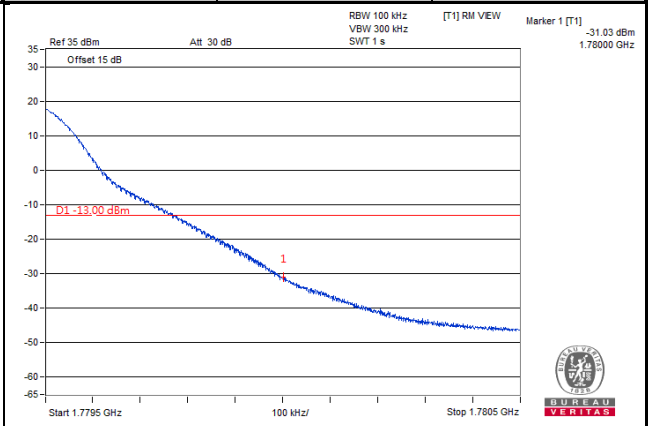
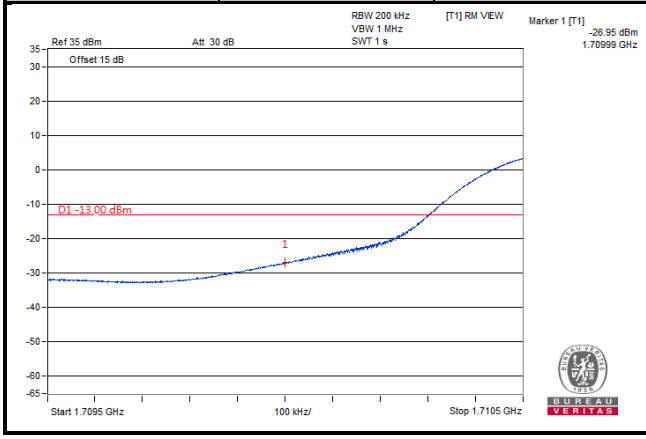
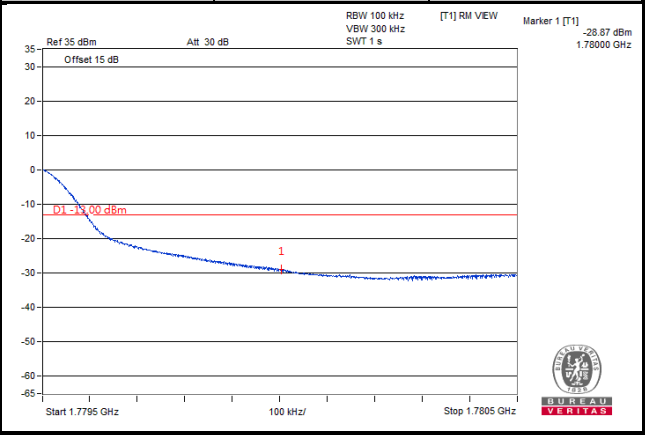
LTE Band 17					
Channel Bandwidth: 5 MHz					
Channel	23755	1 RB	Channel	23825	1 RB
					
Channel	23755	25 RB	Channel	23825	25 RB
					

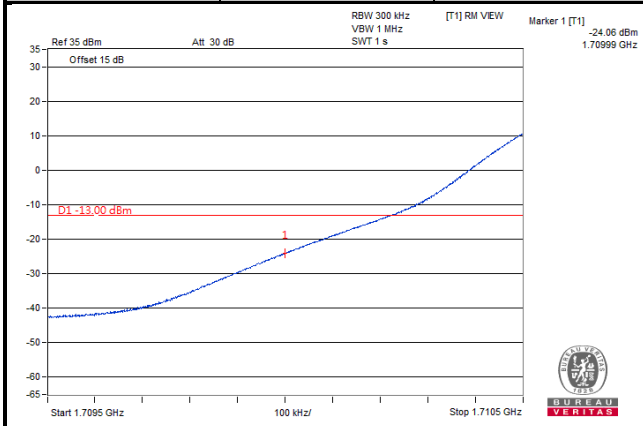
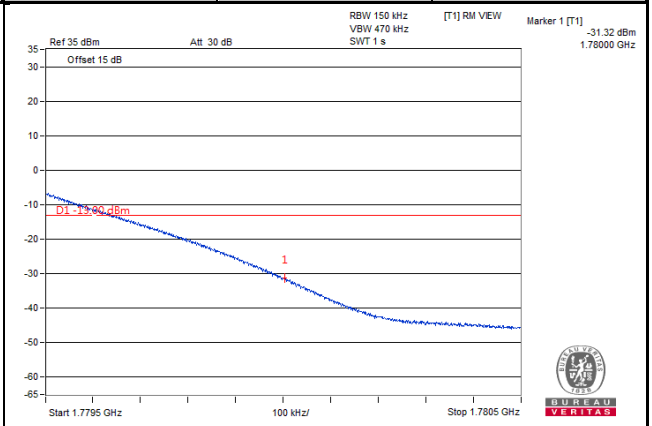
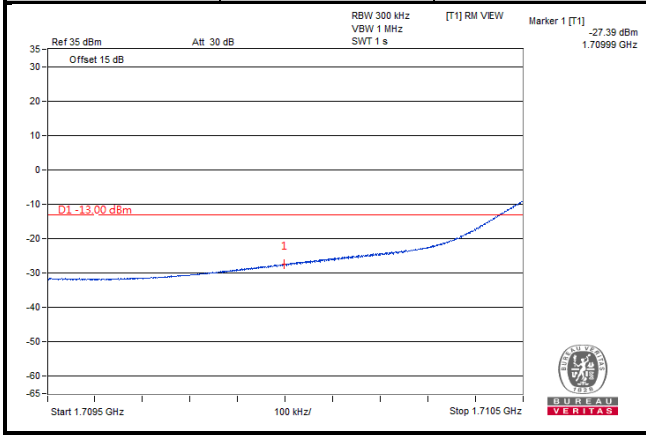
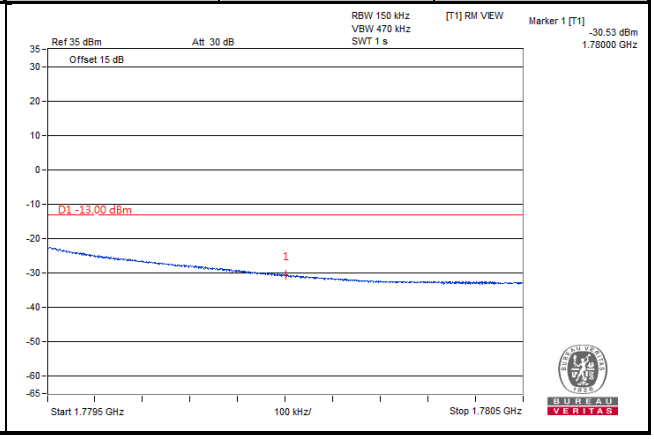
LTE Band 17					
Channel Bandwidth: 10 MHz					
Channel	23780	1 RB	Channel	23800	1 RB
					
Channel	23780	50 RB	Channel	23800	50 RB
					

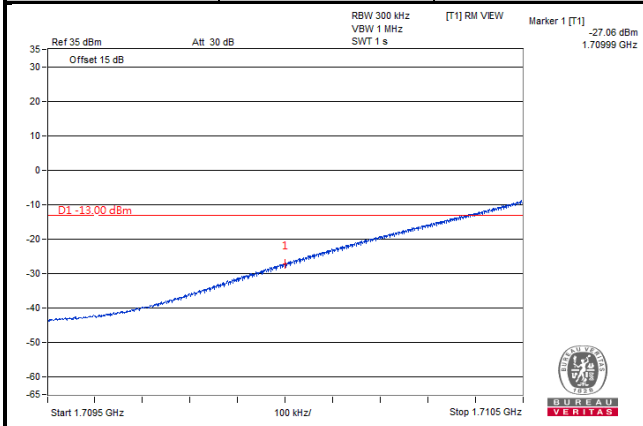
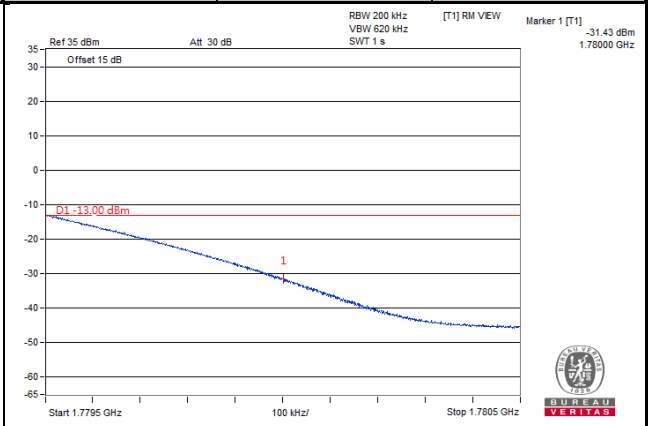
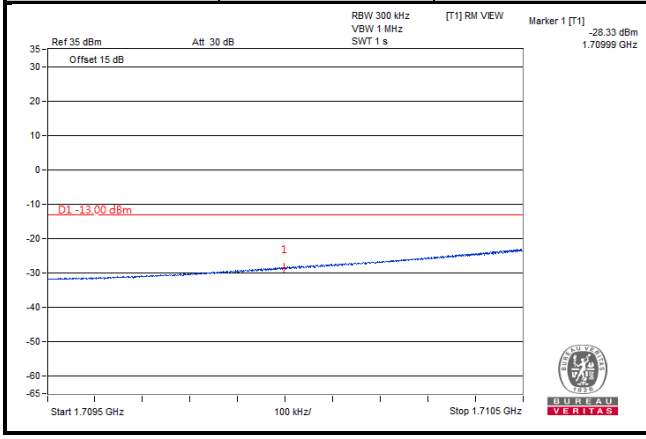
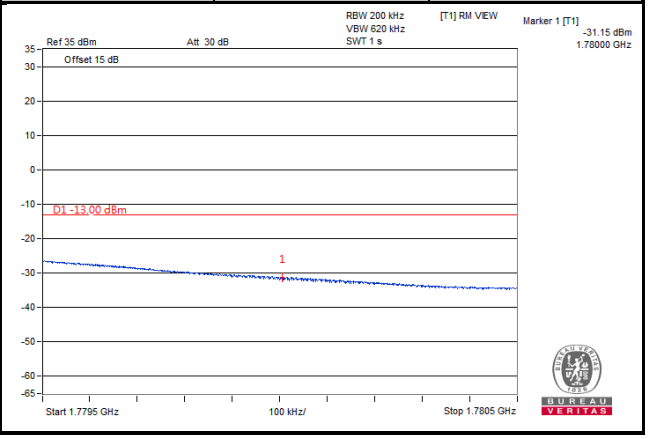
LTE Band 66					
Channel Bandwidth: 1.4 MHz					
Channel	131979	6 RB	Channel	131979	6 RB
					
Channel	131979	25 RB	Channel	131979	25 RB
					

LTE Band 66					
Channel Bandwidth: 3 MHz					
Channel	131987	1 RB	Channel	132657	1 RB
					
Channel	131987	15 RB	Channel	132657	15 RB
					

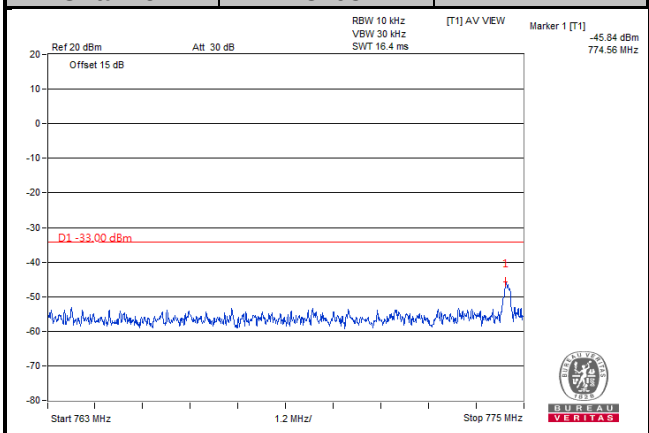
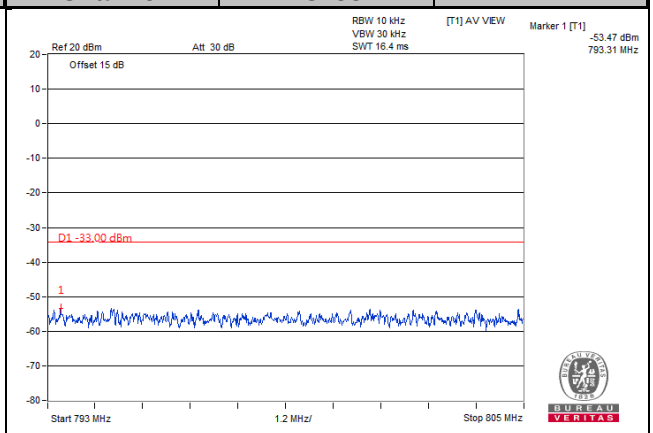
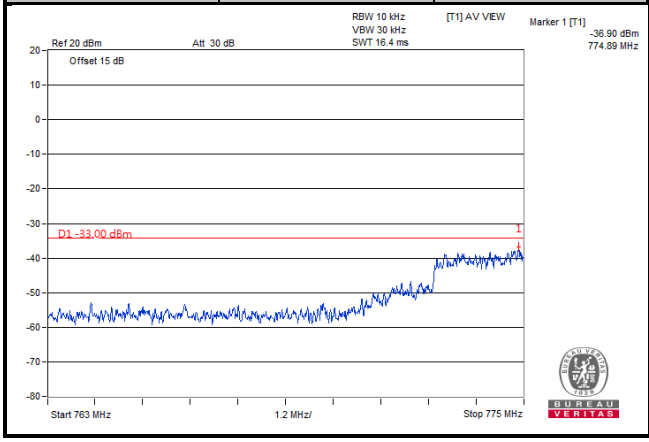
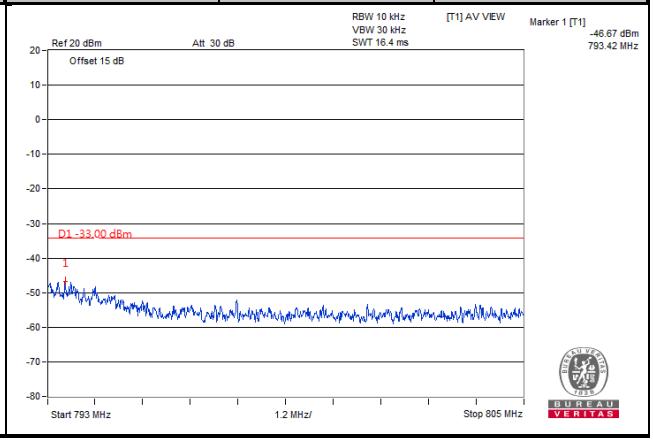
LTE Band 66					
Channel Bandwidth: 5 MHz					
Channel	131997	1 RB	Channel	132647	1 RB
					
Channel	131997	25 RB	Channel	132647	25 RB
					

LTE Band 66					
Channel Bandwidth: 10 MHz					
Channel	132022	1 RB	Channel	132622	1 RB
					
Channel	132022	50 RB	Channel	132622	50 RB
					

LTE Band 66					
Channel Bandwidth: 15 MHz					
Channel	132047	1 RB	Channel	132597	1 RB
				
Channel	132047	75 RB	Channel	132597	75 RB
				

LTE Band 66					
Channel Bandwidth: 20 MHz					
Channel	132072	1 RB	Channel	132572	1 RB
					
Channel	132072	100 RB	Channel	132572	100 RB
					

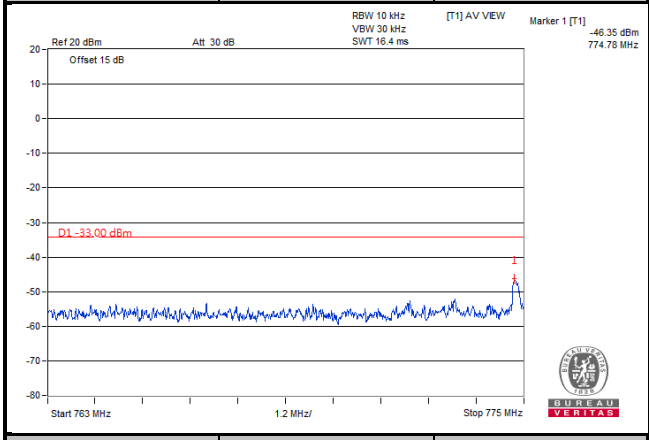
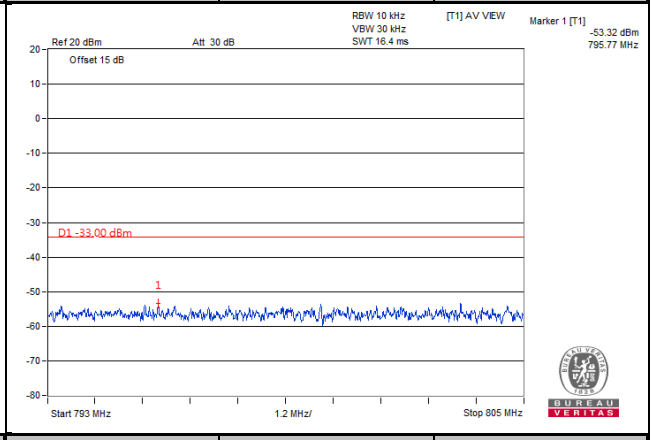
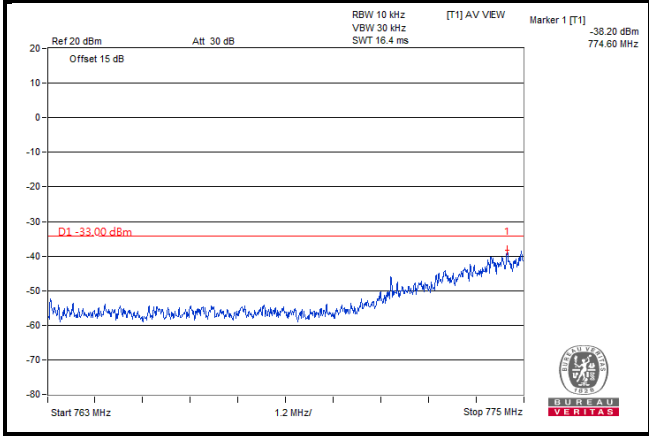
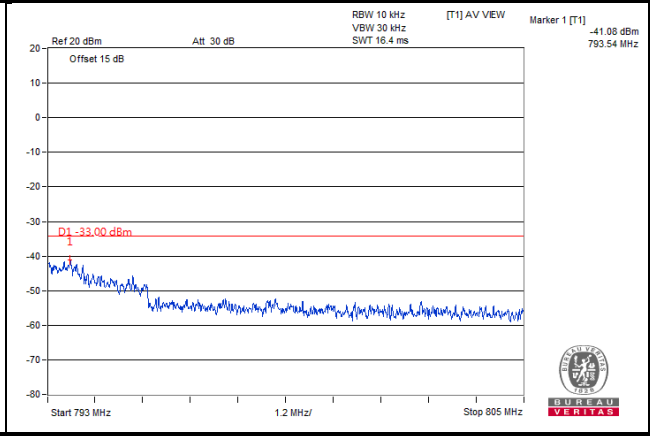
Emission Mask

LTE Band 13					
Channel Bandwidth: 5 MHz					
Channel	23205	1 RB	Channel	23255	1 RB
					
Channel	23205	25 RB	Channel	23255	25 RB
					

For the 763 - 775 MHz and 793 - 805 MHz band, the FCC limit is 65+10log(P[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.

10log(10kHz/6.25kHz) = 2.04 dB

Limit line = -35 dBm + 2.04 dB = -32.96 dBm

LTE Band 13					
Channel Bandwidth: 10 MHz					
Channel	23230	1 RB	Channel	23230	1 RB
					
Channel	23230	50 RB	Channel	23230	50 RB
					

For the 763 - 775 MHz and 793 - 805 MHz band, the FCC limit is 65+10log(P[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.

10log(10kHz/6.25kHz) = 2.04 dB

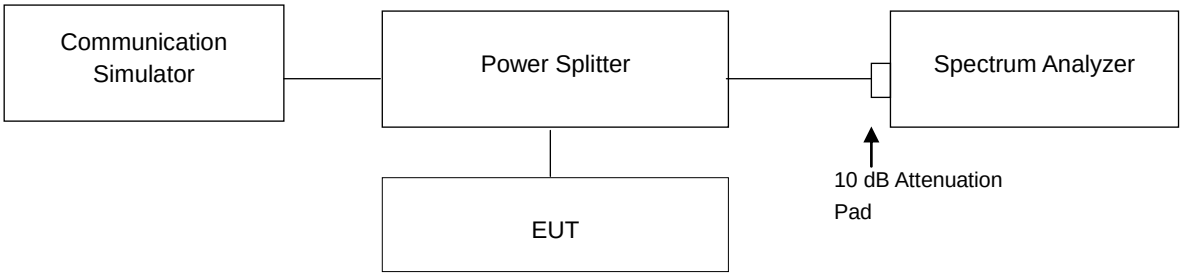
Limit line = -35 dBm + 2.04 dB =-32.96 dBm

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



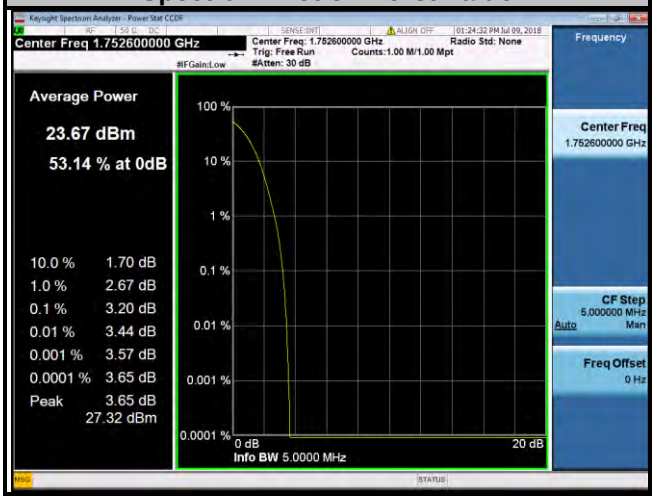
4.6.3 Test Procedures

1. Set resolution/measurement bandwidth ≥ 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 %.

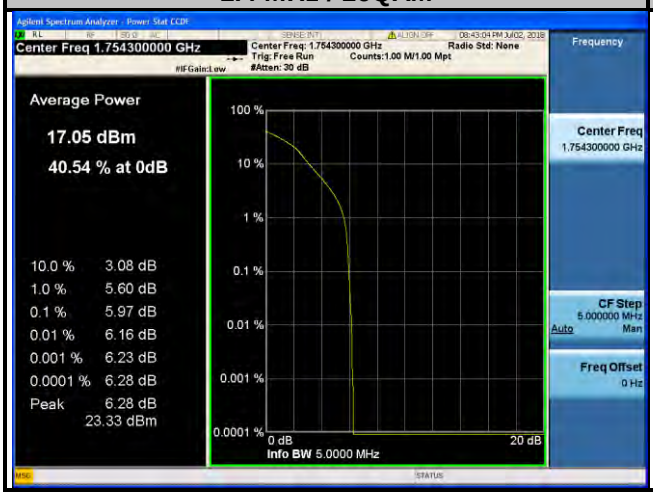
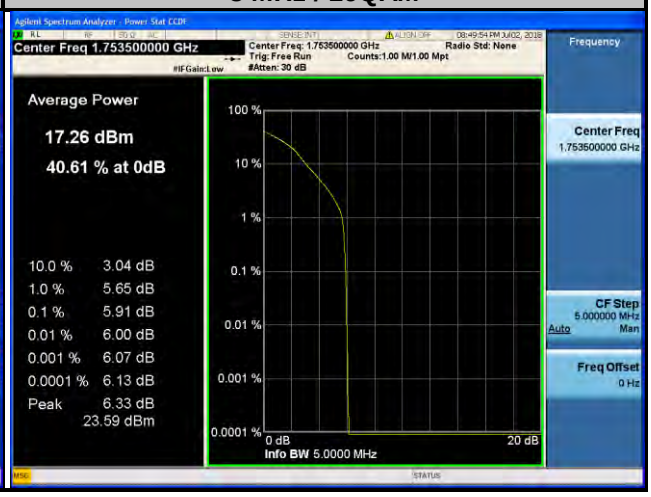
4.6.4 Test Results

WCDMA		
Channel	**Frequency (MHz)**	**Peak to Average Ratio (dB)**
1312	1712.4	3.05
1413	1732.6	3.15
1513	1752.6	3.20

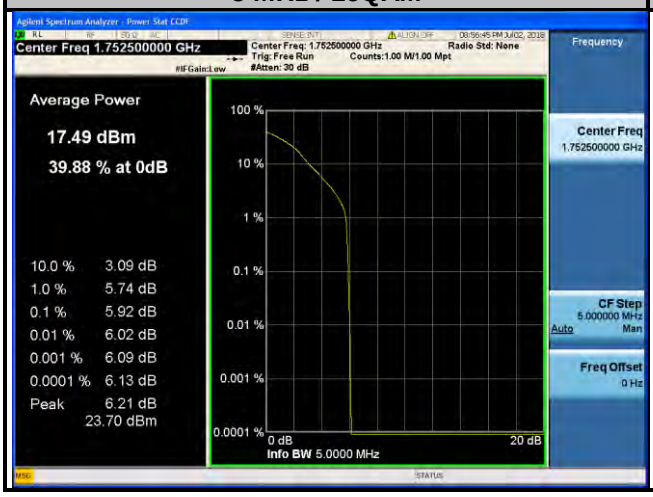
Spectrum Plot of Worst Value



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	3.93	5.44	19965	1711.5	3.72	5.31
20175	1732.5	4.13	5.78	20175	1732.5	3.87	5.61
20393	1754.3	4.25	5.97	20385	1753.5	4.09	5.91

Spectrum Plot of Worst Value	
1.4 MHz / 16QAM	3 MHz / 16QAM
	

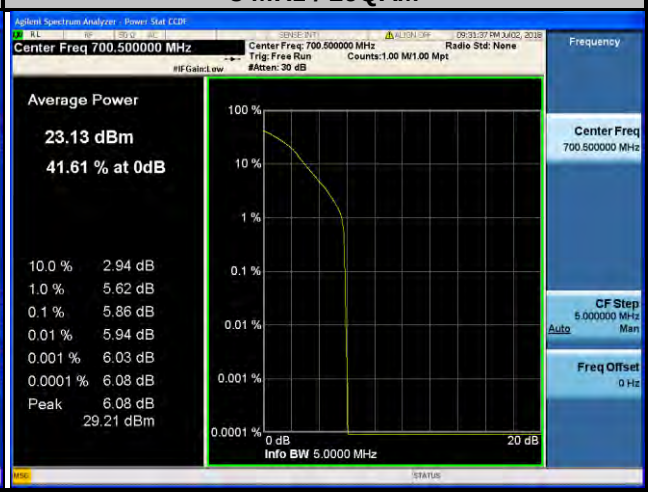
LTE Band 4							
Channel Bandwidth: 5 MHz				Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
19975	1712.5	3.69	5.33	20000	1715.0	3.66	5.31
20175	1732.5	3.85	5.52	20175	1732.5	3.64	5.28
20375	1752.5	4.12	5.92	20350	1750.0	4.07	6.04

Spectrum Plot of Worst Value	
5 MHz / 16QAM	10 MHz / 16QAM
	

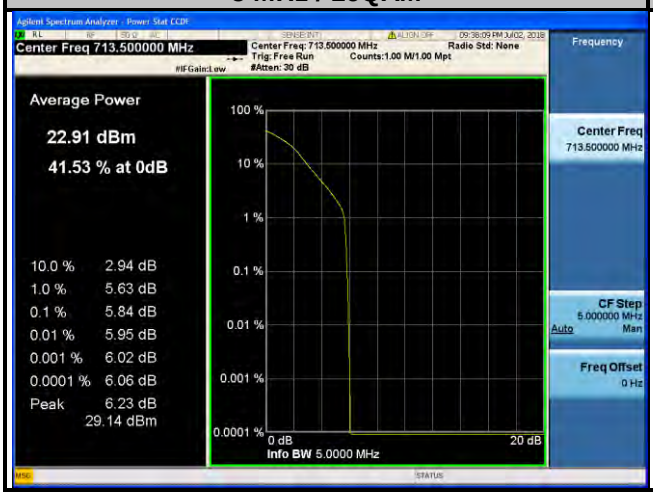
LTE Band 4							
Channel Bandwidth: 15 MHz				Channel Bandwidth: 20 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
20025	1717.5	3.61	5.20	20050	1720.0	3.60	5.27
20175	1732.5	3.54	5.24	20175	1732.5	3.52	5.16
20325	1747.5	4.07	5.90	20300	1745.0	3.90	5.77

Spectrum Plot of Worst Value	
15 MHz / 16QAM	20 MHz / 16QAM

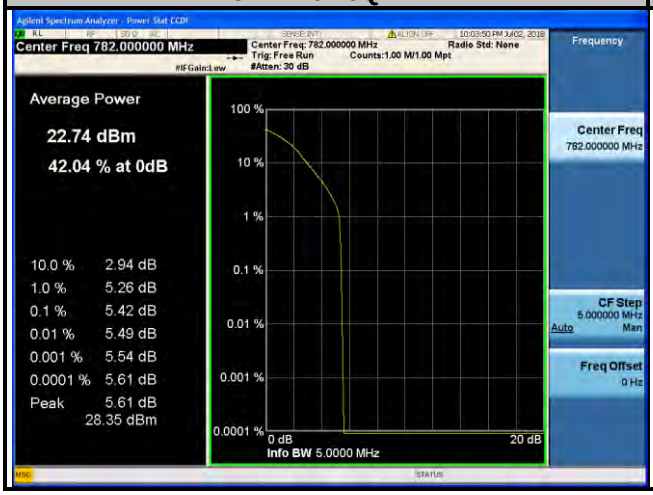
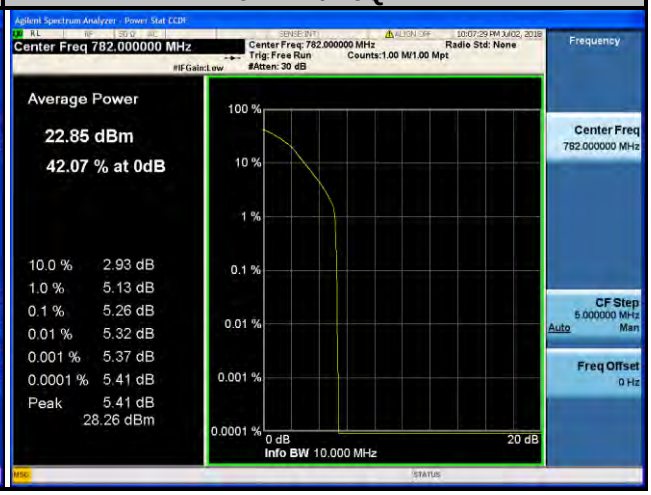
LTE Band 12							
Channel Bandwidth: 1.4 MHz				Channel Bandwidth: 3 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
23017	699.7	4.08	6.06	23025	700.5	3.83	5.86
23095	707.5	4.01	5.80	23095	707.5	3.71	5.45
23173	715.3	3.95	5.70	23165	714.5	3.80	5.57

Spectrum Plot of Worst Value	
1.4 MHz / 16QAM	3 MHz / 16QAM
	

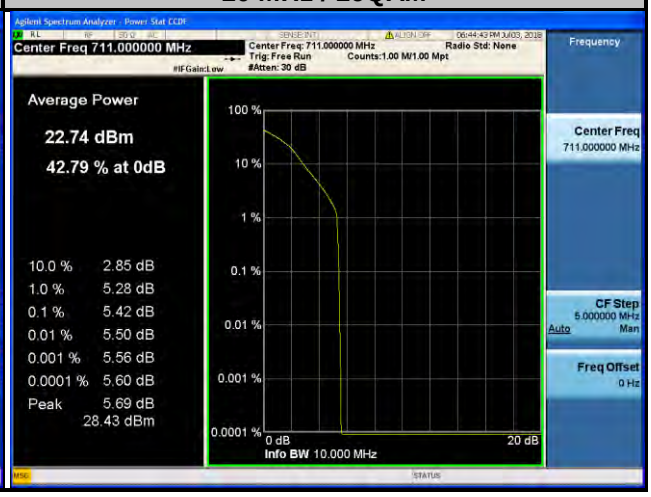
LTE Band 12							
Channel Bandwidth: 5 MHz				Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
23035	701.5	3.84	5.81	23060	704.0	3.75	5.71
23095	707.5	3.66	5.34	23095	707.5	3.57	5.36
23155	713.5	3.87	5.84	23130	711.0	3.62	5.43

Spectrum Plot of Worst Value	
5 MHz / 16QAM	10 MHz / 16QAM
	

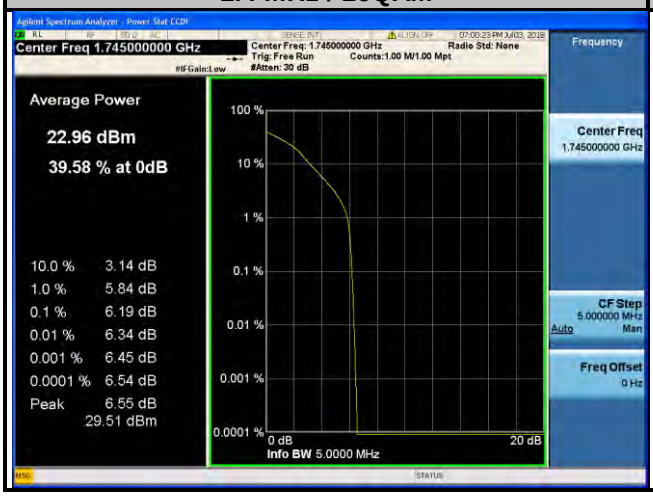
LTE Band 13							
Channel Bandwidth: 5 MHz				Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
23205	779.5	3.65	5.26	23230	782.0	3.62	5.26
23230	782.0	3.75	5.42				
23255	784.5	3.27	4.65				

Spectrum Plot of Worst Value	
5 MHz / 16QAM	10 MHz / 16QAM
	

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	3.59	5.32	23780	709.0	3.53	5.27
23790	710.0	3.79	5.69	23790	710.0	3.57	5.29
23825	713.5	3.85	5.80	23800	711.0	3.62	5.42

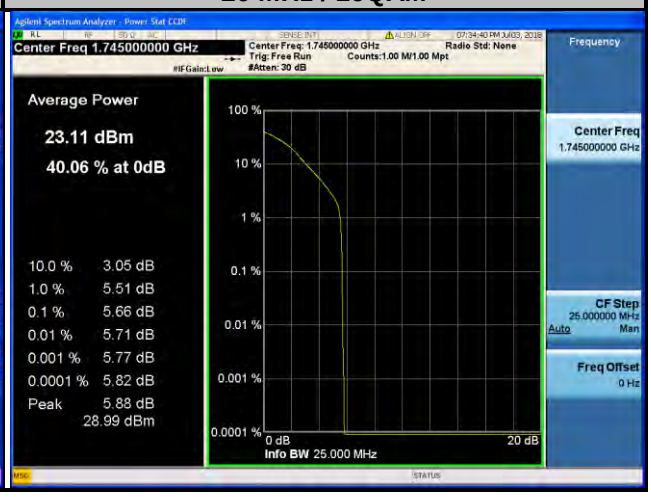
Spectrum Plot of Worst Value	
5 MHz / 16QAM	10 MHz / 16QAM
	

LTE Band 66							
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
131979	1710.7	3.90	5.39	131987	1711.5	3.71	5.28
132322	1745.0	4.44	6.19	132322	1745.0	4.25	6.03
132665	1779.3	3.76	5.12	132657	1778.5	3.67	5.16

Spectrum Plot of Worst Value	
1.4 MHz / 16QAM	3 MHz / 16QAM
	

LTE Band 66							
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
131997	1712.5	3.68	5.25	132022	1715.0	3.63	5.19
132322	1745.0	4.21	5.99	132322	1745.0	4.12	5.84
132647	1777.5	3.70	5.20	132622	1775.0	3.63	5.28

Spectrum Plot of Worst Value	
5 MHz / 16QAM	10 MHz / 16QAM

LTE Band 66							
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
132047	1717.5	3.61	5.15	132072	1720.0	3.61	5.23
132322	1745.0	4.01	5.74	132322	1745.0	3.96	5.66
132597	1772.5	3.65	5.23	132572	1770.0	3.73	5.35

Spectrum Plot of Worst Value	
15 MHz / 16QAM	20 MHz / 16QAM