

FCC Test Report

(PART 24)

Report No.: RF181205C03-1

FCC ID: B32V400M4GWW

Test Model: V400m Plus 4G WW

Received Date: Dec. 05, 2018

Test Date: Dec. 22, 2018 ~ Jan. 04, 2019

Issued Date: Jan. 14, 2019

Applicant: Verifone, Inc.

Address: 1400 West Stanford Ranch Road Suite 200 Rocklin CA 95765 USA

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

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

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

FCC Registration /
Designation Number: 788550 / TW0003



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Release Control Record

Issue No.	Description	Date Issued
RF181205C03-1	Original Release	Jan. 14, 2019

1 Certificate of Conformity

Product: Point of Sale Terminal

Brand: Verifone

Test Model: V400m Plus 4G WW

Sample Status: Identical Prototype

Applicant: Verifone, Inc.

Test Date: Dec. 22, 2018 ~ Jan. 04, 2019

Standards: FCC Part 24, Subpart E

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 : Flora Huang, **Date:** Jan. 14, 2019
Flora Huang / Specialist

Approved by : Dylan Chiou, **Date:** Jan. 14, 2019
Dylan Chiou / Project Engineer

2 Summary of Test Results

Applied Standard: FCC Part 24 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 24.232	Effective Isotropic Radiated Power	Pass	Meet the requirement of limit.
2.1047	Modulation Characteristics	Pass	Meet the requirement.
2.1046 24.232(d)	Peak to Average Ratio	Pass	Meet the requirement of limit.
2.1055 24.235	Frequency Stability	Pass	Meet the requirement of limit.
2.1049 24.238(b)	Occupied Bandwidth	Pass	Meet the requirement of limit.
24.238(a)	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 24.238	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 24.238	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -22.20 dB at 30.00 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	Expanded Uncertainty (k=2) ($\pm$)
Radiated Emissions up to 1 GHz	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY51210203	Mar. 16, 2018	Mar. 15, 2019
Spectrum Analyzer Agilent	N9010A	MY52220314	Dec. 13, 2018	Dec. 12, 2019
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Jan. 11, 2018	Jan. 10, 2019
HORN Antenna SCHWARZBECK	BBHA 9170	148	Nov. 25, 2018	Nov. 24, 2019
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-969	Nov. 25, 2018	Nov. 24, 2019
BILOG Antenna SCHWARZBECK	VULB 9168	9168-472	Nov. 23, 2018	Nov. 22, 2019
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 16, 2018	Apr. 15, 2019
MXG Vector signal generator Agilent	N5182B	MY53050430	Nov. 19, 2018	Nov. 18, 2019
Preamplifier EMCI	EMC 330H	980112	Oct. 12, 2018	Oct. 11, 2019
Preamplifier EMCI	EMC 012645	980115	Oct. 12, 2018	Oct. 11, 2019
Power Meter Anritsu	ML2495A	1012010	Sep. 05, 2018	Sep. 04, 2019
Power Sensor Anritsu	MA2411B	1315050	Sep. 04, 2018	Sep. 03, 2019
RF Coaxial Cable HUBER+SUHNNER	EMC104-SM-SM- 8000&3000	140811+170717	Oct. 12, 2018	Oct. 11, 2019
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM- 1000(140807)	Oct. 12, 2018	Oct. 11, 2019
RF Coaxial Cable WOKEN	8D-FB	Cable-Ch10-01	Oct. 12, 2018	Oct. 11, 2019
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	NA	NA	NA
Communications Tester- Wireless Agilent	8960 Series 10	MY53201073	Jun. 28, 2017	Jun. 27, 2019

Radio Communication Analyzer Anritsu	MT8820C	6201300640	Aug. 16, 2017	Aug. 15, 2019
Temperature & Humidity Chamber	GTH-120-40-CP-AR	MAA1306-019	Sep. 05, 2018	Sep. 04, 2019

- Note:
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The calibration interval of the loop antenna is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
 3. The test was performed in HwaYa Chamber 10.
 4. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
 5. The FCC Site Registration No. is 690701.
 6. The IC Site Registration No. is 7450F-10.

3 General Information

3.1 General Description of EUT

Product	Point of Sale Terminal	
Brand	Verifone	
Test Model	V400m Plus 4G WW	
Status of EUT	Identical Prototype	
Power Supply Rating	5.0 Vdc (Adapter) 3.85 Vdc (Li-ion battery)	
Modulation Type	GSM/GPRS	GMSK
	EDGE	GMSK, 8PSK
	WCDMA	QPSK
	LTE	QPSK, 16QAM
Frequency Range	GSM/GPRS/EDGE	1850.2 ~ 1909.8 MHz
	WCDMA	1852.4 ~ 1907.6 MHz
	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	1850.7 ~ 1909.3 MHz
	LTE Band 2 (Channel Bandwidth: 3 MHz)	1851.5 ~ 1908.5 MHz
	LTE Band 2 (Channel Bandwidth: 5 MHz)	1852.5 ~ 1907.5 MHz
	LTE Band 2 (Channel Bandwidth: 10 MHz)	1855.0 ~ 1905.0 MHz
	LTE Band 2 (Channel Bandwidth: 15 MHz)	1857.5 ~ 1902.5 MHz
	LTE Band 2 (Channel Bandwidth: 20 MHz)	1860.0 ~ 1900.0 MHz
Max. EIRP Power	GSM/GPRS	1686.55 mW
	EDGE	626.61 mW
	WCDMA	328.10 mW
	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	269.15 mW
	LTE Band 2 (Channel Bandwidth: 3 MHz)	284.45 mW
	LTE Band 2 (Channel Bandwidth: 5 MHz)	301.30 mW
	LTE Band 2 (Channel Bandwidth: 10 MHz)	322.11 mW
	LTE Band 2 (Channel Bandwidth: 15 MHz)	340.41 mW
	LTE Band 2 (Channel Bandwidth: 20 MHz)	360.58 mW
Emission Designator	GSM/GPRS	246KGXW
	EDGE	247KG7W
	WCDMA	4M10F9W
	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	1M09G7D
	LTE Band 2 (Channel Bandwidth: 3 MHz)	2M71G7D
	LTE Band 2 (Channel Bandwidth: 5 MHz)	4M49W7D
	LTE Band 2 (Channel Bandwidth: 10 MHz)	8M97W7D
	LTE Band 2 (Channel Bandwidth: 15 MHz)	13M5G7D
	LTE Band 2 (Channel Bandwidth: 20 MHz)	18M0W7D
Antenna Type	Fixed Internal Antenna	
Antenna Gain	2.9 dBi	
Accessory Device	Refer to Note as below	
Data Cable Supplied	Refer to Note as below	

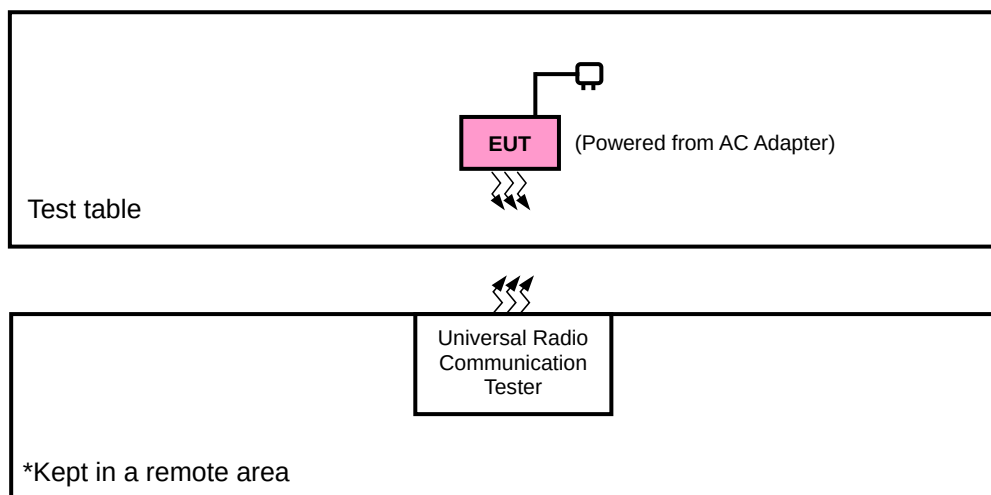
Note:

1. The EUT contains following accessory devices.

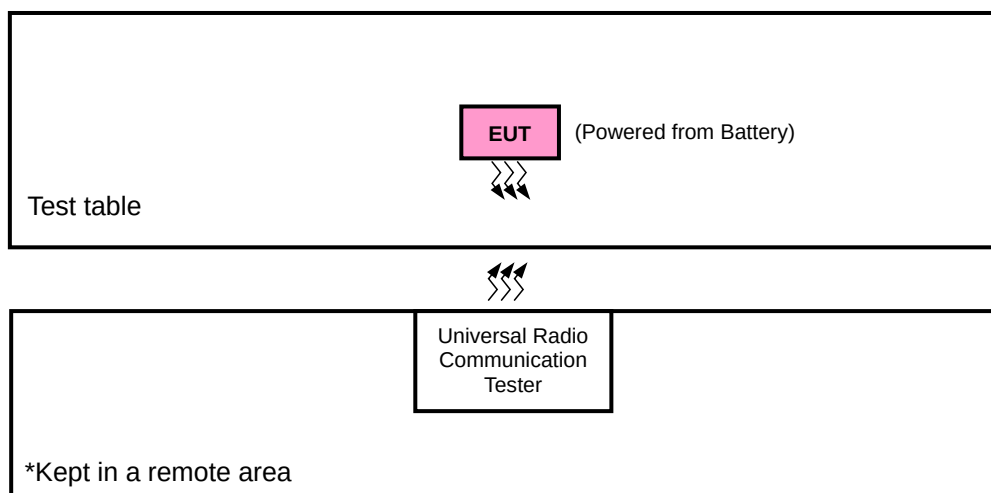
Product	Brand	Model	Description
Adapter 1	Verifone	AM11A-050A	I/P: 100-240 Vac, 50/60 Hz, 500 mA O/P: 5 Vdc, 2.2 A 1.75m non-shielded cable w/o core Manufacturer: Phihong
Adapter 2	Verifone	VF0402	I/P: 100-240 Vac, 50/60 Hz, 500 mA O/P: 5 Vdc, 2.2 A 1.75m non-shielded cable w/o core Manufacturer: Salcomp
Battery 1	Verifone	BPK475-001	3.85 Vdc, 2890 mAh
Battery 2	Verifone	BPK475-001	3.85 Vdc, 2900 mAh

2. 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



<E.R.P. Test>



3.2.1 Description of Support Units

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

3.3 Test Mode Applicability and Tested Channel Detail

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

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

Band	EIRP	Radiated Emission
GSM	Y-plane	Y-axis
EDGE	Y-plane	Y-axis
WCDMA	Y-plane	Y-axis
LTE Band 2	Y-plane	Z-axis

GSM

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	EIRP	512 to 810	512, 661, 810	GSM, EDGE
-	Modulation Characteristics	512 to 810	661	GSM, EDGE
-	Frequency Stability	512 to 810	512, 810	GSM, EDGE
-	Occupied Bandwidth	512 to 810	512, 661, 810	GSM, EDGE
-	Band Edge	512 to 810	512, 810	GSM, EDGE
-	Peak to Average Ratio	512 to 810	512, 661, 810	GSM, EDGE
-	Conducted Emission	512 to 810	512, 661, 810	GSM, EDGE
-	Radiated Emission	512 to 810	512, 661, 810	GSM, EDGE

WCDMA

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	EIRP	9262 to 9538	9262, 9400, 9538	WCDMA
-	Modulation Characteristics	9262 to 9538	9400	WCDMA
-	Frequency Stability	9262 to 9538	9262, 9538	WCDMA
-	Occupied Bandwidth	9262 to 9538	9262, 9400, 9538	WCDMA
-	Band Edge	9262 to 9538	9262, 9538	WCDMA
-	Peak to Average Ratio	9262 to 9538	9262, 9400, 9538	WCDMA
-	Conducted Emission	9262 to 9538	9262, 9400, 9538	WCDMA
-	Radiated Emission	9262 to 9538	9262, 9400, 9538	WCDMA

LTE Band 2

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	EIRP	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	Modulation Characteristics	18700 to 19100	18900	20 MHz	QPSK, 16QAM	100 RB / 0 RB Offset
-	Frequency Stability	18607 to 19193	18607, 19193	1.4 MHz	QPSK	1 RB / 0 RB Offset
		18615 to 19185	18615, 19185	3 MHz	QPSK	1 RB / 0 RB Offset
		18625 to 19175	18625, 19175	5 MHz	QPSK	1 RB / 0 RB Offset
		18650 to 19150	18650, 19150	10 MHz	QPSK	1 RB / 0 RB Offset
		18675 to 19125	18675, 19125	15 MHz	QPSK	1 RB / 0 RB Offset
		18700 to 19100	18700, 19100	20 MHz	QPSK	1 RB / 0 RB Offset
-	Occupied Bandwidth	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK, 16QAM	6 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM	15 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK, 16QAM	75 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK, 16QAM	100 RB / 0 RB Offset
-	Peak to Average Ratio	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	Band Edge	18607 to 19193	18607	1.4 MHz	QPSK	1 RB / 0 RB Offset
			19193	1.4 MHz	QPSK	6 RB / 0 RB Offset
		18615 to 19185	18615	3 MHz	QPSK	1 RB / 5 RB Offset
			19185	3 MHz	QPSK	6 RB / 0 RB Offset
		18625 to 19175	18625	5 MHz	QPSK	1 RB / 0 RB Offset
			19175	5 MHz	QPSK	15 RB / 0 RB Offset
		18650 to 19150	18650	10 MHz	QPSK	1 RB / 14 RB Offset
			19150	10 MHz	QPSK	15 RB / 0 RB Offset
		18675 to 19125	18675	15 MHz	QPSK	1 RB / 0 RB Offset
			19125	15 MHz	QPSK	25 RB / 0 RB Offset
		18700 to 19100	18700	20 MHz	QPSK	1 RB / 24 RB Offset
			19100	20 MHz	QPSK	25 RB / 0 RB Offset
		18607 to 19193	18607	1.4 MHz	QPSK	1 RB / 0 RB Offset
			19193	1.4 MHz	QPSK	50 RB / 0 RB Offset
		18615 to 19185	18615	3 MHz	QPSK	1 RB / 49 RB Offset
			19185	3 MHz	QPSK	50 RB / 0 RB Offset
		18625 to 19175	18625	5 MHz	QPSK	1 RB / 0 RB Offset
			19175	5 MHz	QPSK	75 RB / 0 RB Offset
		18650 to 19150	18650	10 MHz	QPSK	1 RB / 74 RB Offset
			19150	10 MHz	QPSK	75 RB / 0 RB Offset
		18675 to 19125	18675	15 MHz	QPSK	1 RB / 0 RB Offset
			19125	15 MHz	QPSK	100 RB / 0 RB Offset
		18700 to 19100	18700	20 MHz	QPSK	1 RB / 99 RB Offset
			19100	20 MHz	QPSK	100 RB / 0 RB Offset
-	Conducted	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK	1 RB / 0 RB Offset

	Emission	18615 to 19185	18615, 18900, 19185	3 MHz	QPSK	1 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK	1 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK	1 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK	1 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK	1 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK	1 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	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.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
EIRP	26 deg. C, 58 % RH	120 Vac, 60 Hz	Jisyong Wang
Modulation Characteristics	26 deg. C, 58 % RH	3.85 Vdc	Getaz Yang
Frequency Stability	26 deg. C, 58 % RH	3.85 Vdc	Getaz Yang
Occupied Bandwidth	26 deg. C, 58 % RH	3.85 Vdc	Getaz Yang
Band Edge	26 deg. C, 58 % RH	3.85 Vdc	Getaz Yang
Peak to Average Ratio	26 deg. C, 58 % RH	3.85 Vdc	Getaz Yang
Conducted Emission	26 deg. C, 58 % RH	3.85 Vdc	Getaz Yang
Radiated Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Jisyong Wang

3.4 EUT Operating Conditions

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

3.5 General Description of Applied Standards

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

FCC 47 CFR Part 2

FCC 47 CFR Part 24

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

Mobile / Portable station are limited to 2 watts e.i.r.p.

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 1 MHz for GSM, GPRS & EDGE, 5 MHz for WCDMA and 10 MHz for LTE mode.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- c. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a tx cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step b. Record the power level of S.G.
- d. $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, $E.R.P \text{ power} = E.I.R.P \text{ power} - 2.15 \text{ dB}$.

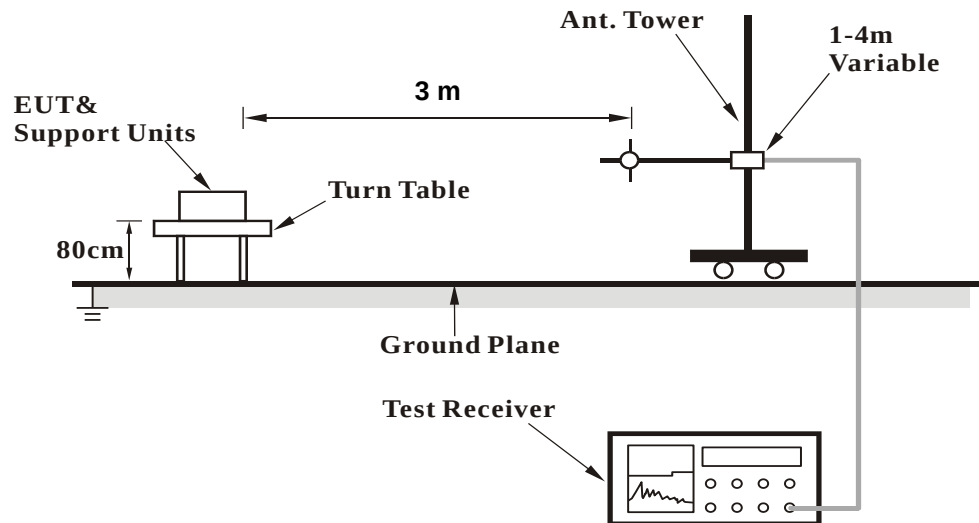
Conducted Power Measurement:

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

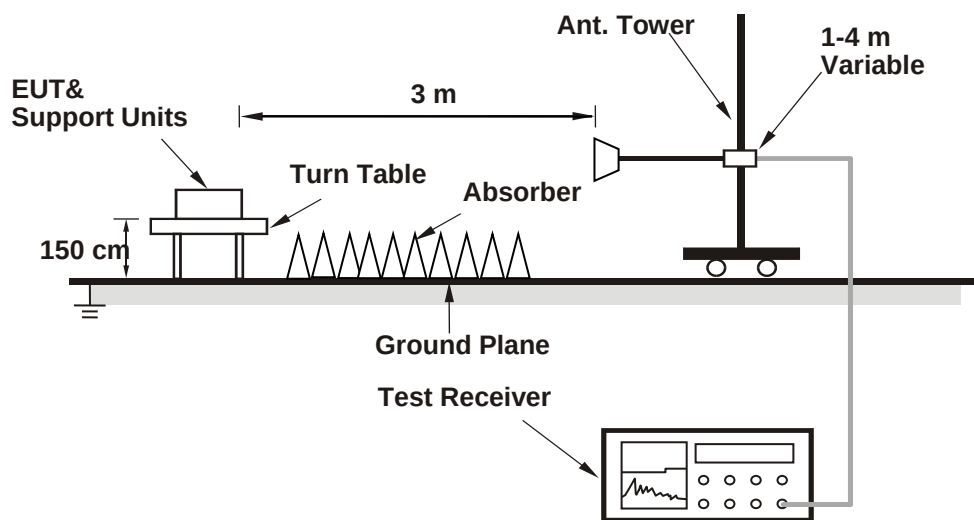
4.1.3 Test Setup

EIRP / ERP Measurement:

<Radiated Emission below or equal 1 GHz>

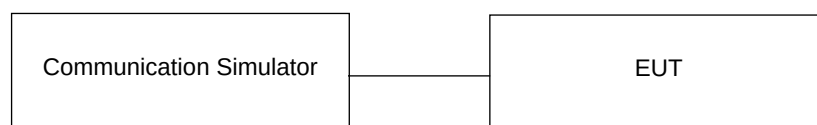


<Radiated Emission above 1 GHz>



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	GSM1900		
Channel	512	661	810
Frequency (MHz)	1850.2	1880.0	1909.8
GPRS (GMSK, 1Tx-slot)	29.63	29.55	30.13
GPRS (GMSK, 2Tx-slot)	26.69	26.61	27.19
GPRS (GMSK, 3Tx-slot)	24.89	24.81	25.39
GPRS (GMSK, 4Tx-slot)	23.67	23.59	24.17
EDGE (8PSK, 1Tx-slot)	25.31	25.23	25.81
EDGE (8PSK, 2Tx-slot)	22.94	22.86	23.44
EDGE (8PSK, 3Tx-slot)	21.00	20.92	21.50
EDGE (8PSK, 4Tx-slot)	19.80	19.72	20.30

Band	WCDMA II		
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880.0	1907.6
RMC 12.2K	22.71	22.61	22.88
HSDPA Subtest-1	22.59	22.49	22.76
HSDPA Subtest-2	21.71	21.61	21.88
HSDPA Subtest-3	21.21	21.11	21.38
HSDPA Subtest-4	20.98	20.88	21.15
HSUPA Subtest-1	21.19	21.09	21.36
HSUPA Subtest-2	19.39	19.29	19.56
HSUPA Subtest-3	20.48	20.38	20.65
HSUPA Subtest-4	19.66	19.56	19.83
HSUPA Subtest-5	21.61	21.51	21.78

LTE Band 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		18700	18900	19100				Channel		18675	18900	19125	
		Frequency (MHz)		1860.0	1880.0	1900.0				Frequency (MHz)		1857.5	1880.0	1902.5	
20M	QPSK	1	0	22.89	22.95	22.78	0	15M	QPSK	1	0	22.83	22.93	22.74	0
		1	50	22.37	22.43	22.26	0			1	37	22.29	22.34	22.24	0
		1	99	22.09	22.15	21.98	0			1	74	21.99	22.14	21.89	0
		50	0	21.86	21.92	21.75	1			36	0	21.78	21.87	21.73	1
		50	25	21.52	21.58	21.41	1			36	19	21.44	21.54	21.38	1
		50	50	21.50	21.56	21.39	1			36	39	21.40	21.48	21.38	1
		100	0	21.77	21.83	21.66	1			75	0	21.73	21.82	21.60	1
	16QAM	1	0	21.86	21.92	21.75	1		16QAM	1	0	21.77	21.90	21.71	1
		1	50	21.34	21.40	21.23	1			1	37	21.30	21.39	21.22	1
		1	99	21.06	21.12	20.95	1			1	74	21.06	21.10	20.92	1
		50	0	20.83	20.89	20.72	2			36	0	20.73	20.84	20.67	2
		50	25	20.49	20.55	20.38	2			36	19	20.41	20.45	20.33	2
50		50	20.47	20.53	20.36	2	36	39		20.41	20.46	20.34	2		
	100	0	20.74	20.80	20.63	2		75	0	20.69	20.80	20.62	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		18650	18900	19150				Channel		18625	18900	19175	
		Frequency (MHz)		1855.0	1880.0	1905.0				Frequency (MHz)		1852.5	1880.0	1907.5	
10M	QPSK	1	0	22.82	22.79	22.67	0	5M	QPSK	1	0	22.64	22.79	22.55	0
		1	24	22.30	22.37	22.19	0			1	12	22.33	22.30	22.08	0
		1	49	21.92	22.07	21.82	0			1	24	21.92	21.94	21.69	0
		25	0	21.78	21.78	21.59	1			12	0	21.73	21.80	21.51	1
		25	12	21.45	21.36	21.26	1			12	6	21.43	21.41	21.28	1
		25	25	21.48	21.35	21.14	1			12	13	21.44	21.41	21.31	1
		50	0	21.67	21.73	21.50	1			25	0	21.67	21.70	21.58	1
	16QAM	1	0	21.75	21.84	21.75	1		16QAM	1	0	21.86	21.67	21.70	1
		1	24	21.22	21.22	21.08	1			1	12	21.29	21.31	21.08	1
		1	49	20.97	20.93	20.86	1			1	24	20.96	20.93	20.83	1
		25	0	20.70	20.80	20.58	2			12	0	20.64	20.73	20.61	2
		25	12	20.35	20.52	20.31	2			12	6	20.45	20.46	20.25	2
25		25	20.27	20.46	20.11	2	12	13		20.34	20.45	20.26	2		
	50	0	20.64	20.62	20.43	2		25	0	20.60	20.63	20.48	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		18615	18900	19185				Channel		18607	18900	19193	
		Frequency (MHz)		1851.5	1880.0	1908.5				Frequency (MHz)		1850.7	1880.0	1909.3	
3M	QPSK	1	0	22.77	22.78	22.63	0	1.4M	QPSK	1	0	22.73	22.82	22.77	0
		1	7	22.30	22.28	22.09	0			1	2	22.21	22.28	22.10	0
		1	14	21.98	21.97	21.82	0			1	5	21.90	21.96	21.87	0
		8	0	21.78	21.82	21.64	1			3	0	22.79	22.76	22.70	0
		8	3	21.38	21.55	21.26	1			3	1	22.37	22.51	22.29	0
		8	7	21.33	21.41	21.32	1			3	3	22.45	22.39	22.24	0
		15	0	21.54	21.67	21.55	1			6	0	21.65	21.63	21.43	1
	16QAM	1	0	21.62	21.79	21.56	1		16QAM	1	0	21.66	21.84	21.58	1
		1	7	21.18	21.22	21.18	1			1	2	21.24	21.35	21.14	1
		1	14	20.81	21.01	20.84	1			1	5	20.96	20.96	20.81	1
		8	0	20.72	20.81	20.64	2			3	0	21.65	21.77	21.57	1
		8	3	20.37	20.51	20.20	2			3	1	21.44	21.39	21.23	1
8		7	20.39	20.36	20.26	2	3	3		21.31	21.39	21.24	1		
	15	0	20.72	20.58	20.57	2		6	0	20.57	20.69	20.45	2		

EIRP Power (dBm)

GSM							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Y	512	1850.2	-4.80	36.57	31.77	1503.14	H
	661	1880.0	-5.53	37.22	31.69	1475.71	
	810	1909.8	-4.91	37.18	32.27	1686.55	
	512	1850.2	-10.49	37.65	27.16	520.00	V
	661	1880.0	-10.74	37.58	26.84	483.06	
	810	1909.8	-9.63	37.48	27.85	609.54	

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

EDGE							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Y	512	1850.2	-9.10	36.57	27.47	558.47	H
	661	1880.0	-9.83	37.22	27.39	548.28	
	810	1909.8	-9.21	37.18	27.97	626.61	
	512	1850.2	-15.16	37.65	22.49	177.42	V
	661	1880.0	-15.59	37.58	21.99	158.12	
	810	1909.8	-14.63	37.48	22.85	192.75	

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

WCDMA							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Y	9262	1852.4	-11.58	36.57	24.99	315.50	H
	9400	1880.0	-12.33	37.22	24.89	308.32	
	9538	1907.6	-12.02	37.18	25.16	328.10	
	9262	1852.4	-17.80	37.65	19.85	96.61	V
	9400	1880.0	-17.87	37.58	19.71	93.54	
	9538	1907.6	-17.43	37.48	20.05	101.16	

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

LTE Band 2							
Channel Bandwidth: 1.4 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Y	18607	1850.7	-12.33	36.57	24.24	265.46	H
	18900	1880.0	-12.92	37.22	24.30	269.15	
	19193	1909.3	-13.05	37.18	24.13	258.82	
	18607	1850.7	-19.03	37.65	18.62	72.78	V
	18900	1880.0	-18.80	37.58	18.78	75.51	
	19193	1909.3	-19.07	37.48	18.41	69.34	
Channel Bandwidth: 1.4 MHz / 16QAM							
Y	18607	1850.7	-13.36	36.57	23.21	209.41	H
	18900	1880.0	-13.95	37.22	23.27	212.32	
	19193	1909.3	-14.08	37.18	23.10	204.17	
	18607	1850.7	-20.06	37.65	17.59	57.41	V
	18900	1880.0	-19.83	37.58	17.75	59.57	
	19193	1909.3	-20.10	37.48	17.38	54.70	

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

LTE Band 2							
Channel Bandwidth: 3 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Y	18615	1851.5	-12.09	36.57	24.48	280.54	H
	18900	1880.0	-12.68	37.22	24.54	284.45	
	19185	1908.5	-12.81	37.18	24.37	273.53	
	18615	1851.5	-18.79	37.65	18.86	76.91	V
	18900	1880.0	-18.56	37.58	19.02	79.80	
	19185	1908.5	-18.83	37.48	18.65	73.28	
Channel Bandwidth: 3 MHz / 16QAM							
Y	18615	1851.5	-13.12	36.57	23.45	221.31	H
	18900	1880.0	-13.71	37.22	23.51	224.39	
	19185	1908.5	-13.84	37.18	23.34	215.77	
	18615	1851.5	-19.82	37.65	17.83	60.67	V
	18900	1880.0	-19.59	37.58	17.99	62.95	
	19185	1908.5	-19.86	37.48	17.62	57.81	

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

LTE Band 2							
Channel Bandwidth: 5 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Y	18625	1852.5	-11.84	36.57	24.73	297.17	H
	18900	1880.0	-12.43	37.22	24.79	301.30	
	19175	1907.5	-12.56	37.18	24.62	289.73	
	18625	1852.5	-18.54	37.65	19.11	81.47	V
	18900	1880.0	-18.31	37.58	19.27	84.53	
	19175	1907.5	-18.58	37.48	18.90	77.62	
Channel Bandwidth: 5 MHz / 16QAM							
Y	18625	1852.5	-12.86	36.57	23.71	234.96	H
	18900	1880.0	-13.45	37.22	23.77	238.23	
	19175	1907.5	-13.58	37.18	23.60	229.09	
	18625	1852.5	-19.56	37.65	18.09	64.42	V
	18900	1880.0	-19.33	37.58	18.25	66.83	
	19175	1907.5	-19.60	37.48	17.88	61.38	

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

LTE Band 2							
Channel Bandwidth: 10 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Y	18650	1855.0	-11.55	36.57	25.02	317.69	H
	18900	1880.0	-12.14	37.22	25.08	322.11	
	19150	1905.0	-12.27	37.18	24.91	309.74	
	18650	1855.0	-18.25	37.65	19.40	87.10	V
	18900	1880.0	-18.02	37.58	19.56	90.36	
	19150	1905.0	-18.29	37.48	19.19	82.99	
Channel Bandwidth: 10 MHz / 16QAM							
Y	18650	1855.0	-12.59	36.57	23.98	250.03	H
	18900	1880.0	-13.18	37.22	24.04	253.51	
	19150	1905.0	-13.31	37.18	23.87	243.78	
	18650	1855.0	-19.29	37.65	18.36	68.55	V
	18900	1880.0	-19.06	37.58	18.52	71.12	
	19150	1905.0	-19.33	37.48	18.15	65.31	

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

LTE Band 2							
Channel Bandwidth: 15 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Y	18675	1857.5	-11.31	36.57	25.26	335.74	H
	18900	1880.0	-11.90	37.22	25.32	340.41	
	19125	1902.5	-12.03	37.18	25.15	327.34	
	18675	1857.5	-18.01	37.65	19.64	92.04	V
	18900	1880.0	-17.78	37.58	19.80	95.50	
	19125	1902.5	-18.05	37.48	19.43	87.70	
Channel Bandwidth: 15 MHz / 16QAM							
Y	18675	1857.5	-12.33	36.57	24.24	265.46	H
	18900	1880.0	-12.92	37.22	24.30	269.15	
	19125	1902.5	-13.05	37.18	24.13	258.82	
	18675	1857.5	-19.03	37.65	18.62	72.78	V
	18900	1880.0	-18.80	37.58	18.78	75.51	
	19125	1902.5	-19.07	37.48	18.41	69.34	

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

LTE Band 2							
Channel Bandwidth: 20 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Y	18700	1860.0	-11.06	36.57	25.51	355.63	H
	18900	1880.0	-11.65	37.22	25.57	360.58	
	19100	1900.0	-11.78	37.18	25.40	346.74	
	18700	1860.0	-17.76	37.65	19.89	97.50	V
	18900	1880.0	-17.53	37.58	20.05	101.16	
	19100	1900.0	-17.80	37.48	19.68	92.90	
Channel Bandwidth: 20 MHz / 16QAM							
Y	18700	1860.0	-12.08	36.57	24.49	281.19	H
	18900	1880.0	-12.67	37.22	24.55	285.10	
	19100	1900.0	-12.80	37.18	24.38	274.16	
	18700	1860.0	-18.78	37.65	18.87	77.09	V
	18900	1880.0	-18.55	37.58	19.03	79.98	
	19100	1900.0	-18.82	37.48	18.66	73.45	

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

4.2 Modulation Characteristics Measurement

4.2.1 Limits of Modulation Characteristics

N/A

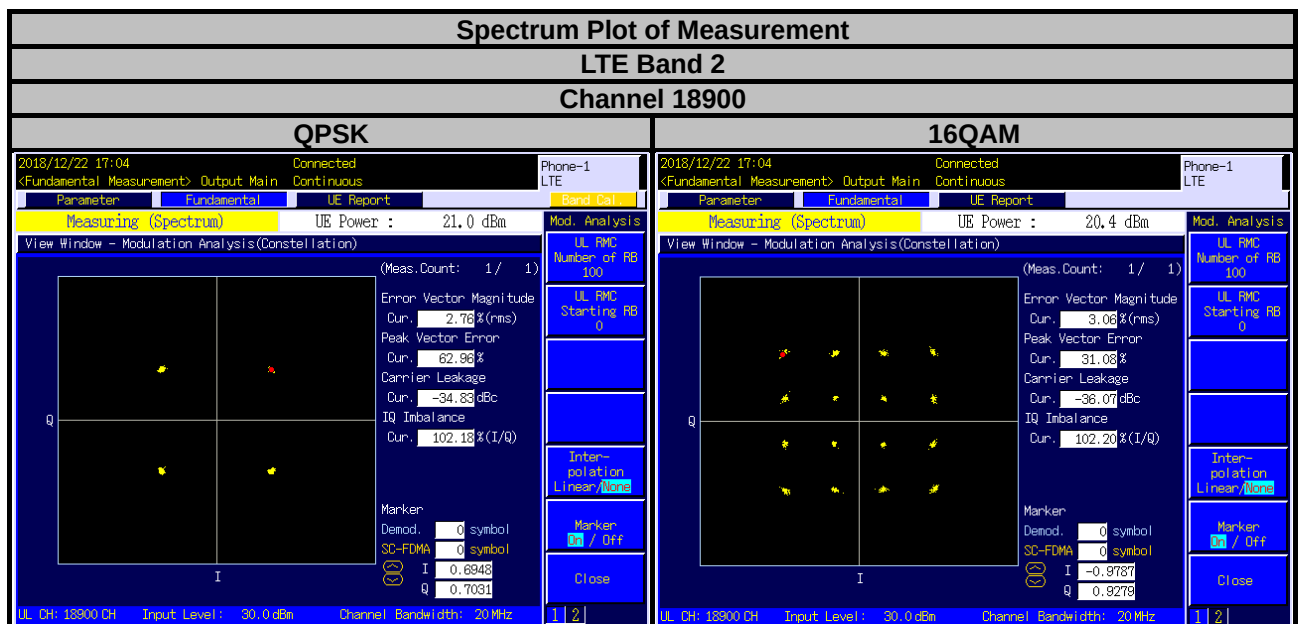
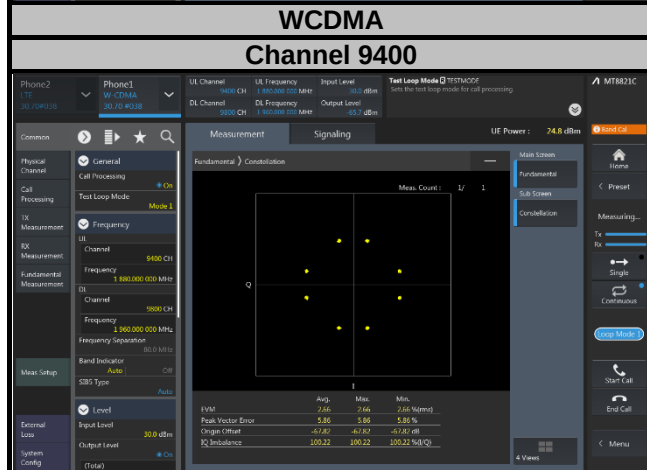
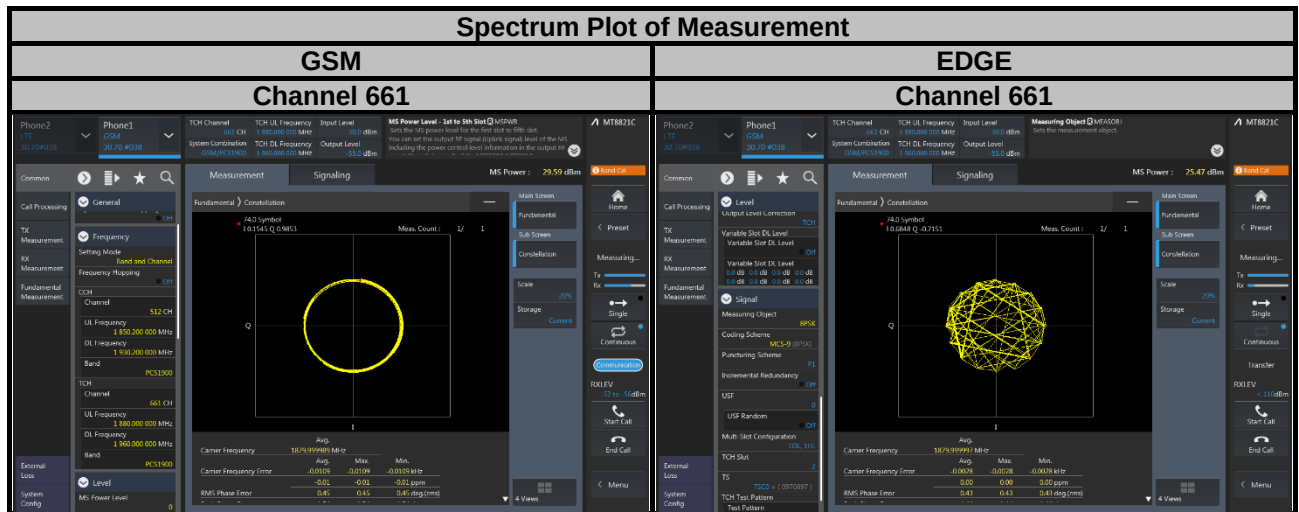
4.2.2 Test Setup



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



4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stability Measurement

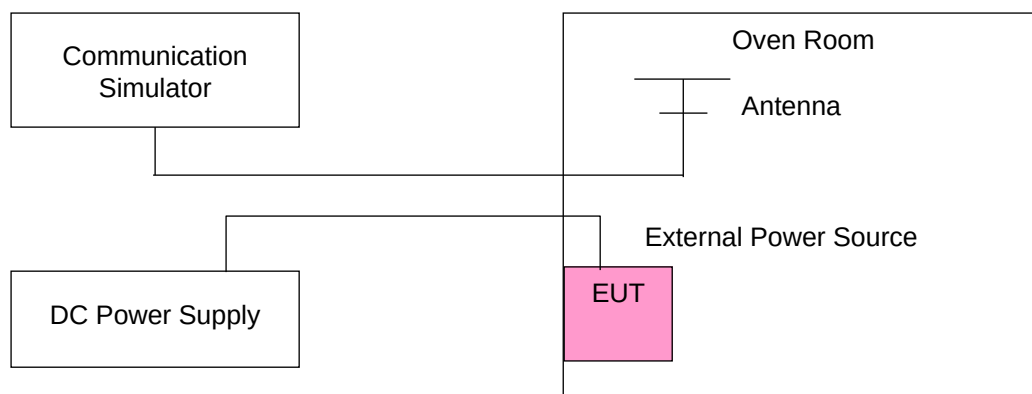
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

4.3.2 Test Procedure

- Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
- The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ± 0.5 °C during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

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

4.3.3 Test Setup



4.3.4 Test Results

Frequency Error vs. Voltage

Voltage (Volts)	GSM			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.85	1850.200002	0.001	1909.800003	0.002
3.27	1850.200002	0.001	1909.800003	0.002
4.23	1850.200003	0.001	1909.800002	0.001

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.23 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	GSM			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1850.200003	0.002	1909.800004	0.002
-20	1850.200001	0.001	1909.800001	0.001
-10	1850.200003	0.001	1909.800004	0.002
0	1850.200003	0.001	1909.800002	0.001
10	1850.200004	0.002	1909.800004	0.002
20	1850.199996	-0.002	1909.799997	-0.001
30	1850.199998	-0.001	1909.799997	-0.002
40	1850.199998	-0.001	1909.799996	-0.002
50	1850.199996	-0.002	1909.799997	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	EDGE			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.85	1850.200001	0.001	1909.800004	0.002
3.27	1850.200001	0.001	1909.800003	0.002
4.23	1850.200001	0.001	1909.800002	0.001

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.23 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	EDGE			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1850.200003	0.002	1909.800001	0.001
-20	1850.200003	0.002	1909.800003	0.002
-10	1850.200003	0.001	1909.800004	0.002
0	1850.200002	0.001	1909.800001	0.001
10	1850.200004	0.002	1909.800002	0.001
20	1850.199997	-0.002	1909.799997	-0.002
30	1850.199999	-0.001	1909.799996	-0.002
40	1850.199997	-0.002	1909.799999	-0.001
50	1850.199998	-0.001	1909.799996	-0.002

Frequency Error vs. Voltage

Voltage (Volts)	WCDMA			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.85	1852.400001	0.001	1907.600002	0.001
3.27	1852.400004	0.002	1907.600003	0.001
4.23	1852.400002	0.001	1907.600002	0.001

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.23 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	WCDMA			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1852.400001	0.001	1907.600002	0.001
-20	1852.400003	0.002	1907.600001	0.001
-10	1852.400001	0.001	1907.600002	0.001
0	1852.400002	0.001	1907.600003	0.002
10	1852.400002	0.001	1907.600002	0.001
20	1852.399997	-0.002	1907.599998	-0.001
30	1852.399998	-0.001	1907.599996	-0.002
40	1852.399999	-0.001	1907.599998	-0.001
50	1852.399998	-0.001	1907.599999	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.85	1850.700003	0.001	1909.300000	0.001
3.27	1850.700004	0.002	1909.300002	0.001
4.23	1850.700004	0.002	1909.300004	0.002

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.23 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1850.700001	0.001	1909.300003	0.002
-20	1850.700003	0.002	1909.300001	0.001
-10	1850.700003	0.002	1909.300002	0.001
0	1850.700002	0.001	1909.300003	0.002
10	1850.700001	0.001	1909.300002	0.001
20	1850.699999	-0.001	1909.299997	-0.002
30	1850.699999	-0.001	1909.299997	-0.002
40	1850.699997	-0.001	1909.299998	-0.001
50	1850.699998	-0.001	1909.299997	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.85	1851.500002	0.001	1907.500004	0.002
3.27	1851.500002	0.001	1907.500001	0.001
4.23	1851.500004	0.002	1907.500003	0.001

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.23 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1851.500003	0.002	1907.500002	0.001
-20	1851.500003	0.002	1907.500004	0.002
-10	1851.500003	0.001	1907.500003	0.001
0	1851.500003	0.002	1907.500004	0.002
10	1851.500002	0.001	1907.500004	0.002
20	1851.499998	-0.001	1907.499998	-0.001
30	1851.499996	-0.002	1907.499998	-0.001
40	1851.499997	-0.002	1907.499996	-0.002
50	1851.499998	-0.001	1907.499998	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.85	1852.500001	0.001	1907.500000	0.000
3.27	1852.500004	0.002	1907.500000	0.000
4.23	1852.500004	0.002	1907.500000	0.000

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.23 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1852.500003	0.002	1907.500000	0.000
-20	1852.500003	0.002	1907.500000	0.000
-10	1852.500004	0.002	1907.500000	0.000
0	1852.500001	0.001	1907.500000	0.000
10	1852.500002	0.001	1907.500000	0.000
20	1852.499998	-0.001	1907.500000	0.000
30	1852.499996	-0.002	1907.500000	0.000
40	1852.499999	-0.001	1907.500000	0.000
50	1852.499998	-0.001	1907.500000	0.000

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.85	1855.000002	0.001	1905.000001	0.001
3.27	1855.000004	0.002	1905.000002	0.001
4.23	1855.000003	0.002	1905.000001	0.001

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.23 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1855.000001	0.001	1905.000002	0.001
-20	1855.000004	0.002	1905.000002	0.001
-10	1855.000003	0.002	1905.000003	0.001
0	1855.000003	0.002	1905.000004	0.002
10	1855.000003	0.002	1905.000002	0.001
20	1854.999999	-0.001	1904.999999	-0.001
30	1854.999998	-0.001	1904.999998	-0.001
40	1854.999997	-0.002	1904.999998	-0.001
50	1854.999999	-0.001	1904.999998	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.85	1857.500003	0.002	1902.500003	0.001
3.27	1857.500003	0.001	1902.500002	0.001
4.23	1857.500002	0.001	1902.500004	0.002

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.23 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1857.500002	0.001	1902.500004	0.002
-20	1857.500004	0.002	1902.500003	0.002
-10	1857.500003	0.002	1902.500002	0.001
0	1857.500004	0.002	1902.500003	0.002
10	1857.500003	0.002	1902.500004	0.002
20	1857.499996	-0.002	1902.499998	-0.001
30	1857.499998	-0.001	1902.499997	-0.002
40	1857.499997	-0.002	1902.499998	-0.001
50	1857.499996	-0.002	1902.499997	-0.002

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.85	1860.000002	0.001	1900.000003	0.002
3.27	1860.000002	0.001	1900.000004	0.002
4.23	1860.000003	0.001	1900.000003	0.002

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.23 Vdc.

Frequency Error vs. Temperature

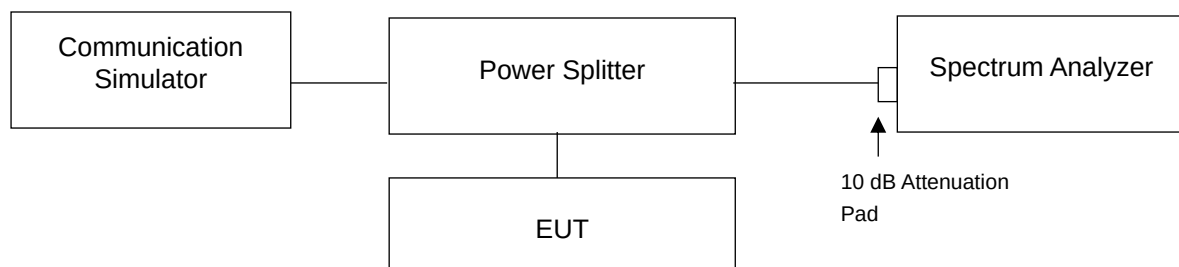
Temp. (°C)	LTE Band 2			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1860.000004	0.002	1900.000003	0.001
-20	1860.000002	0.001	1900.000002	0.001
-10	1860.000002	0.001	1900.000001	0.001
0	1860.000002	0.001	1900.000003	0.002
10	1860.000002	0.001	1900.000003	0.002
20	1859.999999	-0.001	1899.999998	-0.001
30	1859.999996	-0.002	1899.999997	-0.002
40	1859.999999	-0.001	1899.999997	-0.002
50	1859.999997	-0.002	1899.999997	-0.002

4.4 Occupied Bandwidth Measurement

4.4.1 Test Procedure

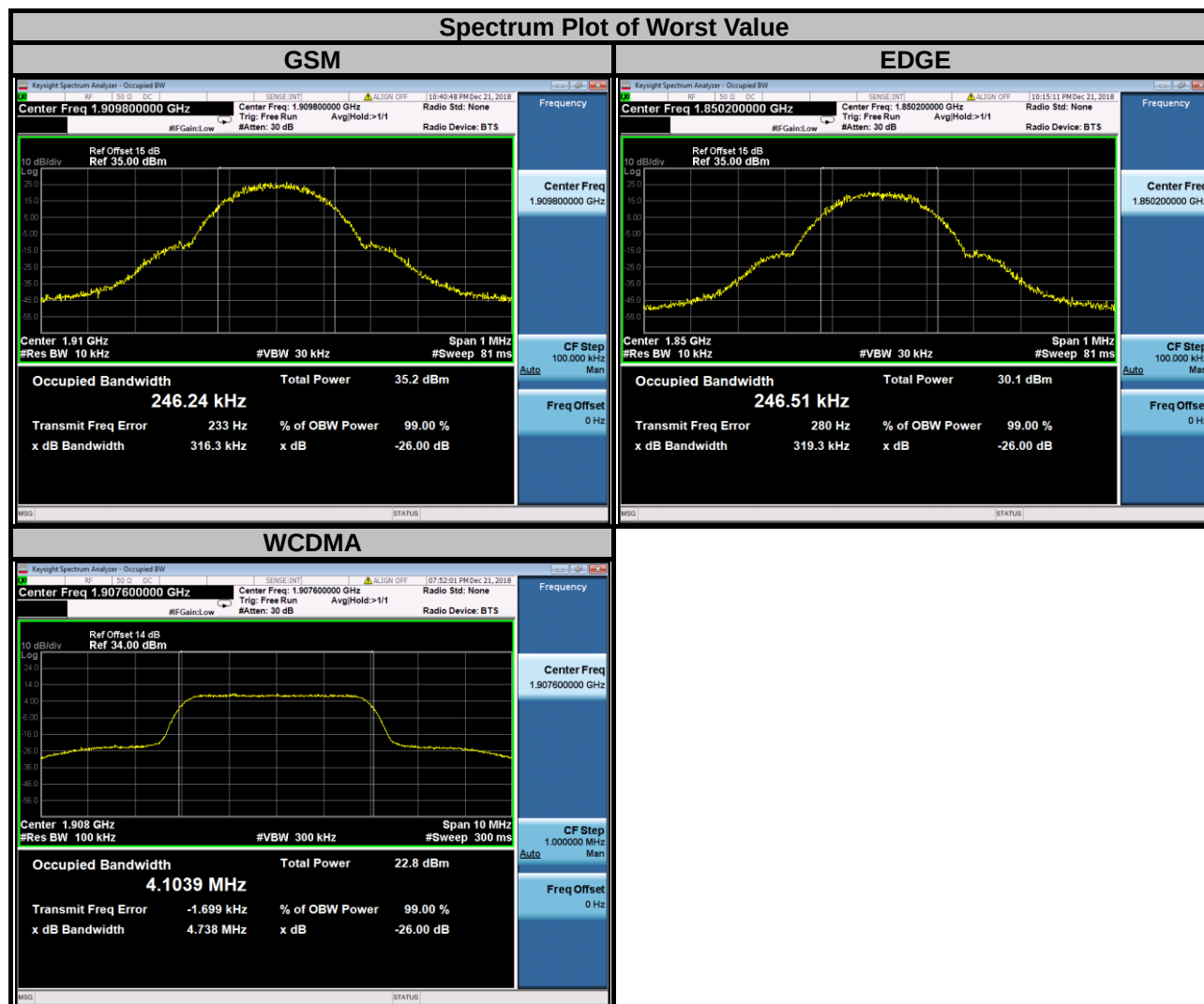
The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

4.4.2 Test Setup

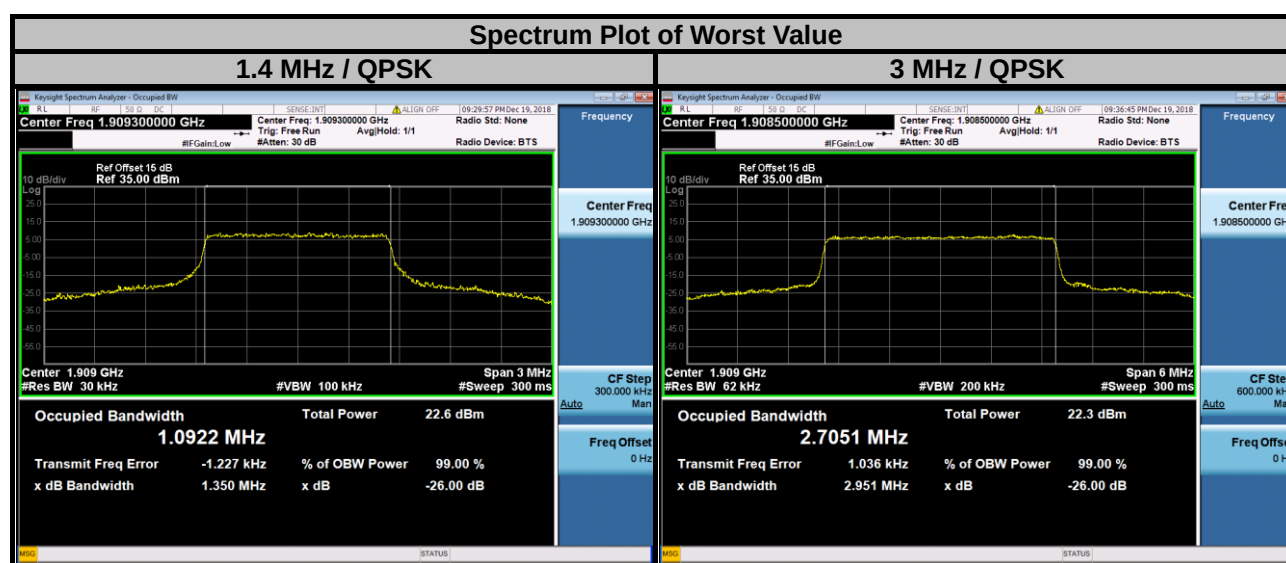


4.4.3 Test Result

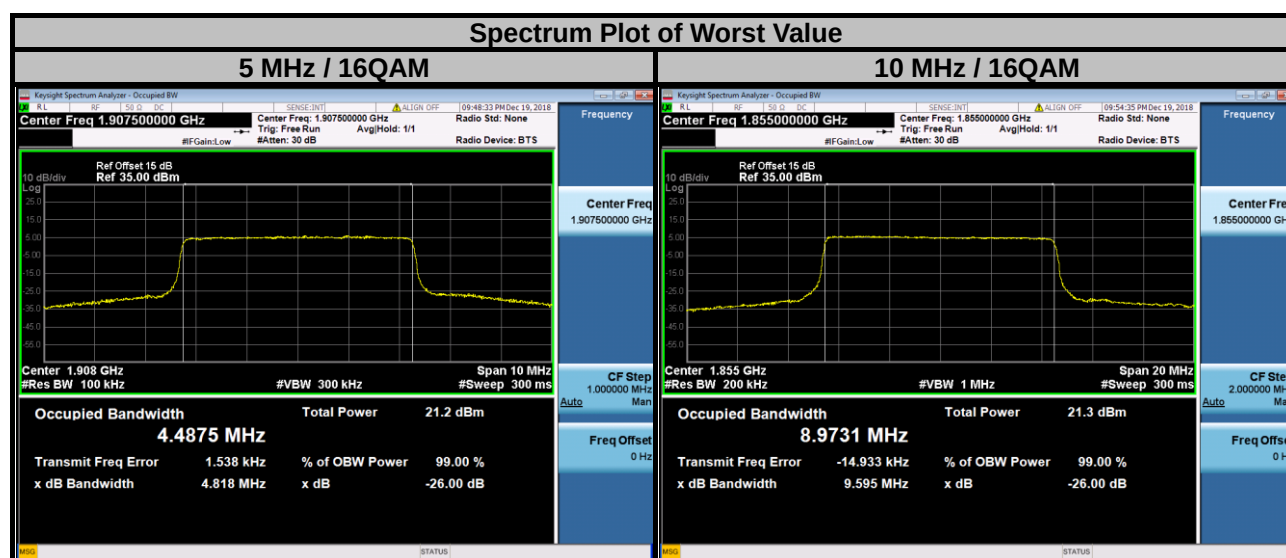
Channel	Frequency (MHz)	99 % Occupied Bandwidth (kHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)
		GSM	EDGE			
512	1850.2	243.13	246.51	9262	1852.4	4.085
661	1880.0	244.92	244.24	9400	1880.0	4.077
810	1909.8	246.24	242.86	9538	1907.6	4.104



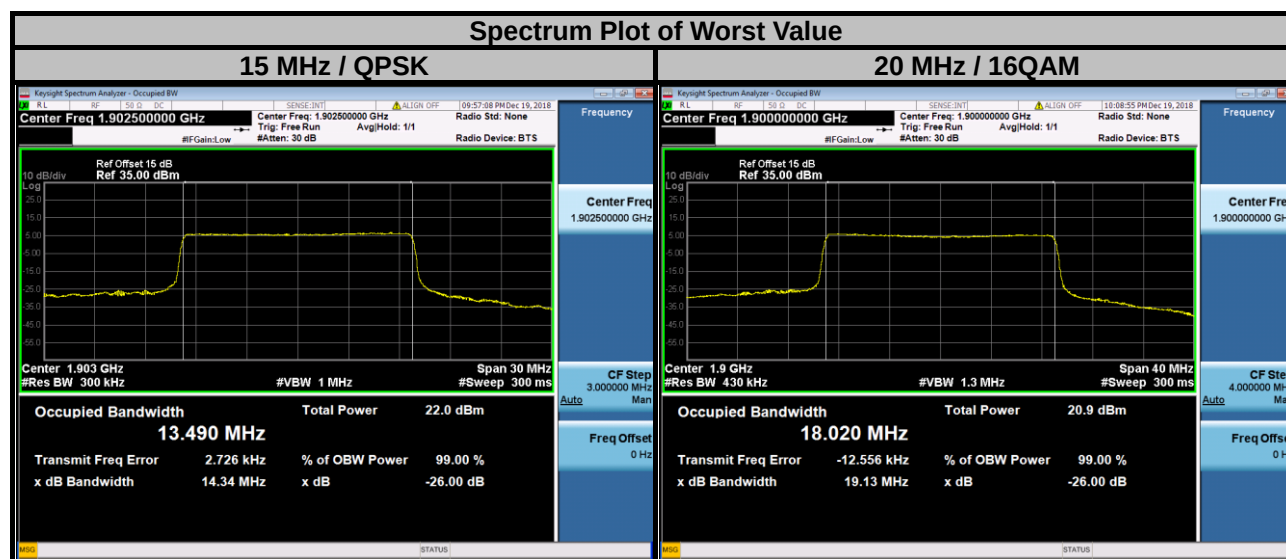
LTE Band 2							
Channel Bandwidth: 1.4 MHz				Channel Bandwidth: 3 MHz			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18607	1850.7	1.0878	1.0909	18615	1851.5	2.7024	2.6960
18900	1880.0	1.0901	1.0919	18900	1880.0	2.7017	2.6958
19193	1909.3	1.0922	1.0911	19185	1908.5	2.7051	2.6988



LTE Band 2							
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
18625	1852.5	4.4836	4.4853	18650	1855.0	8.9708	8.9731
18900	1880.0	4.4835	4.4831	18900	1880.0	8.9630	8.9696
19175	1907.5	4.4835	4.4875	19150	1905.0	8.9679	8.9714



LTE Band 2							
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
18675	1857.5	13.4741	13.4594	18700	1860.0	17.9613	17.9787
18900	1880.0	13.4529	13.4463	18900	1880.0	17.9210	17.9414
19125	1902.5	13.4899	13.4781	19100	1900.0	18.0005	18.0200

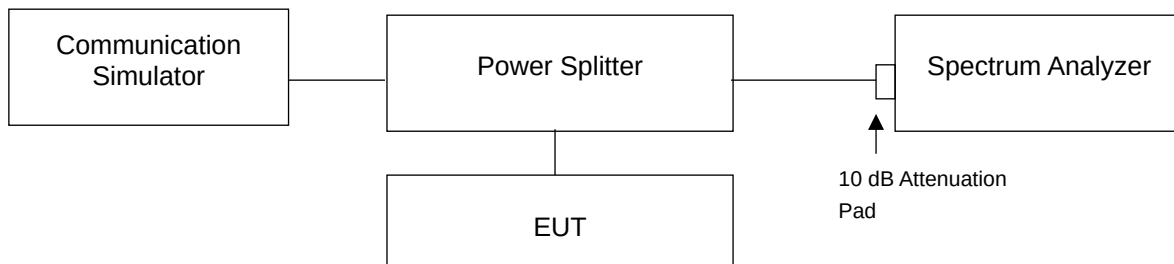


4.5 Band Edge Measurement

4.5.1 Limits of Band Edge Measurement

Power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

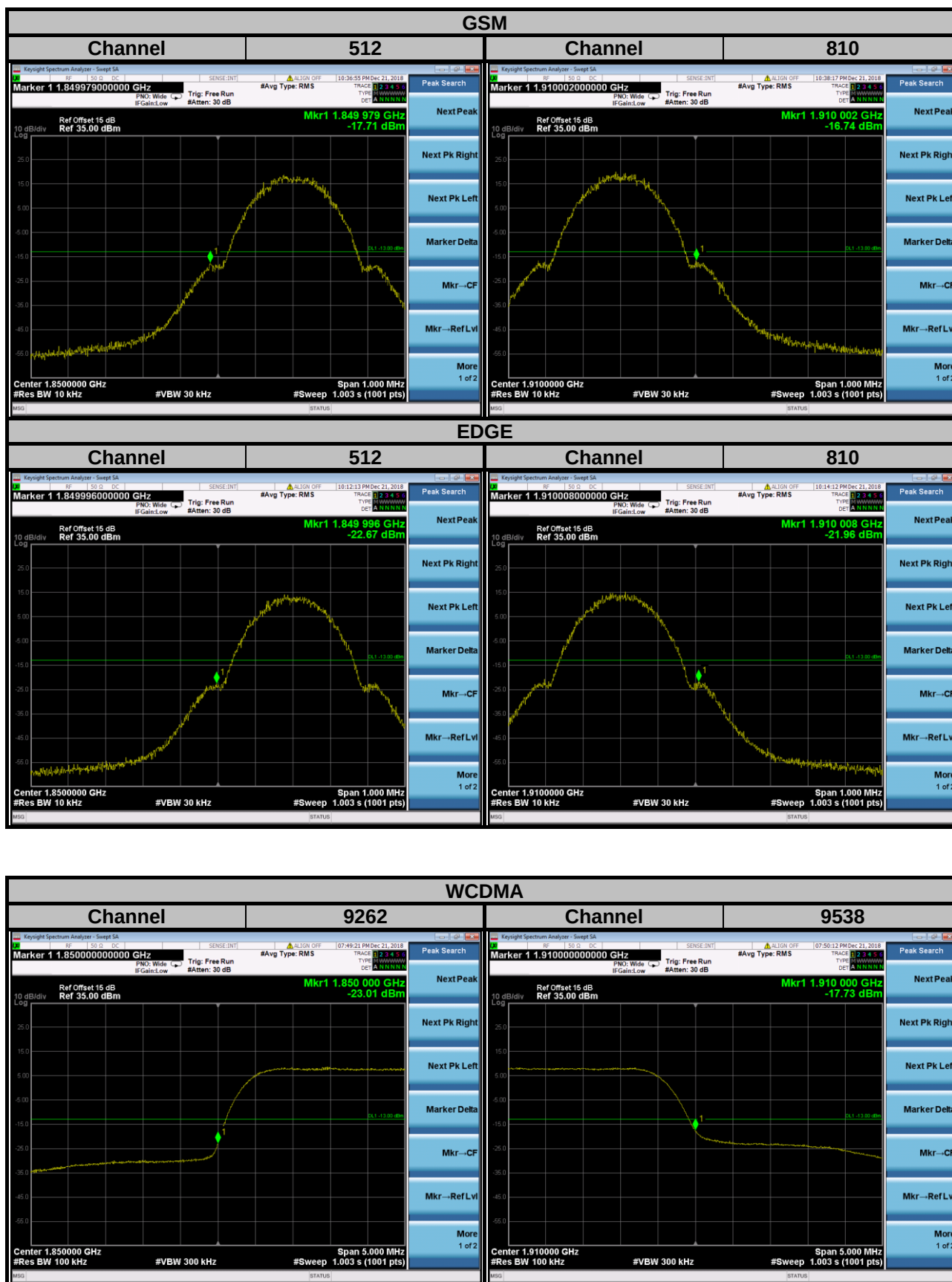
4.5.2 Test Setup

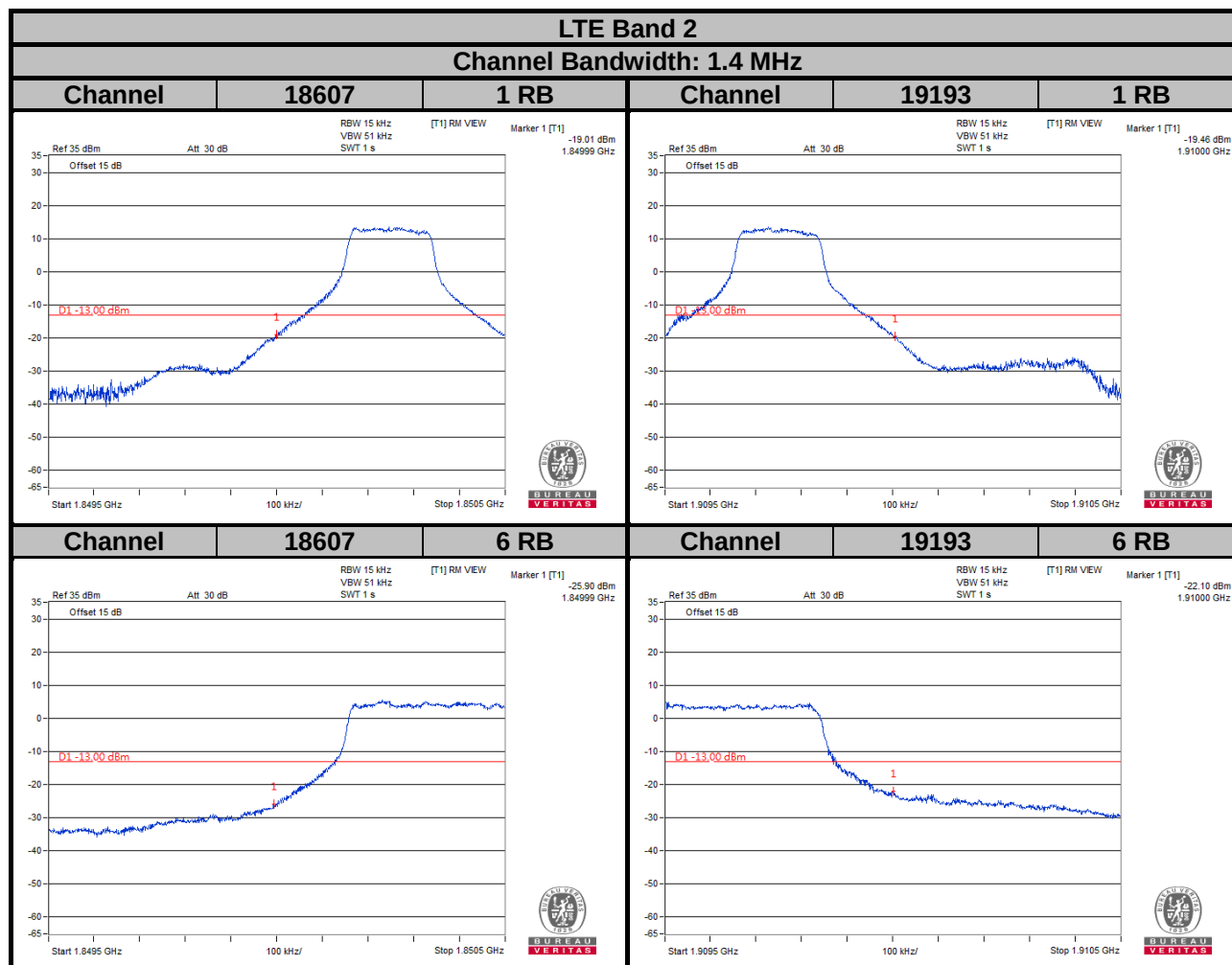


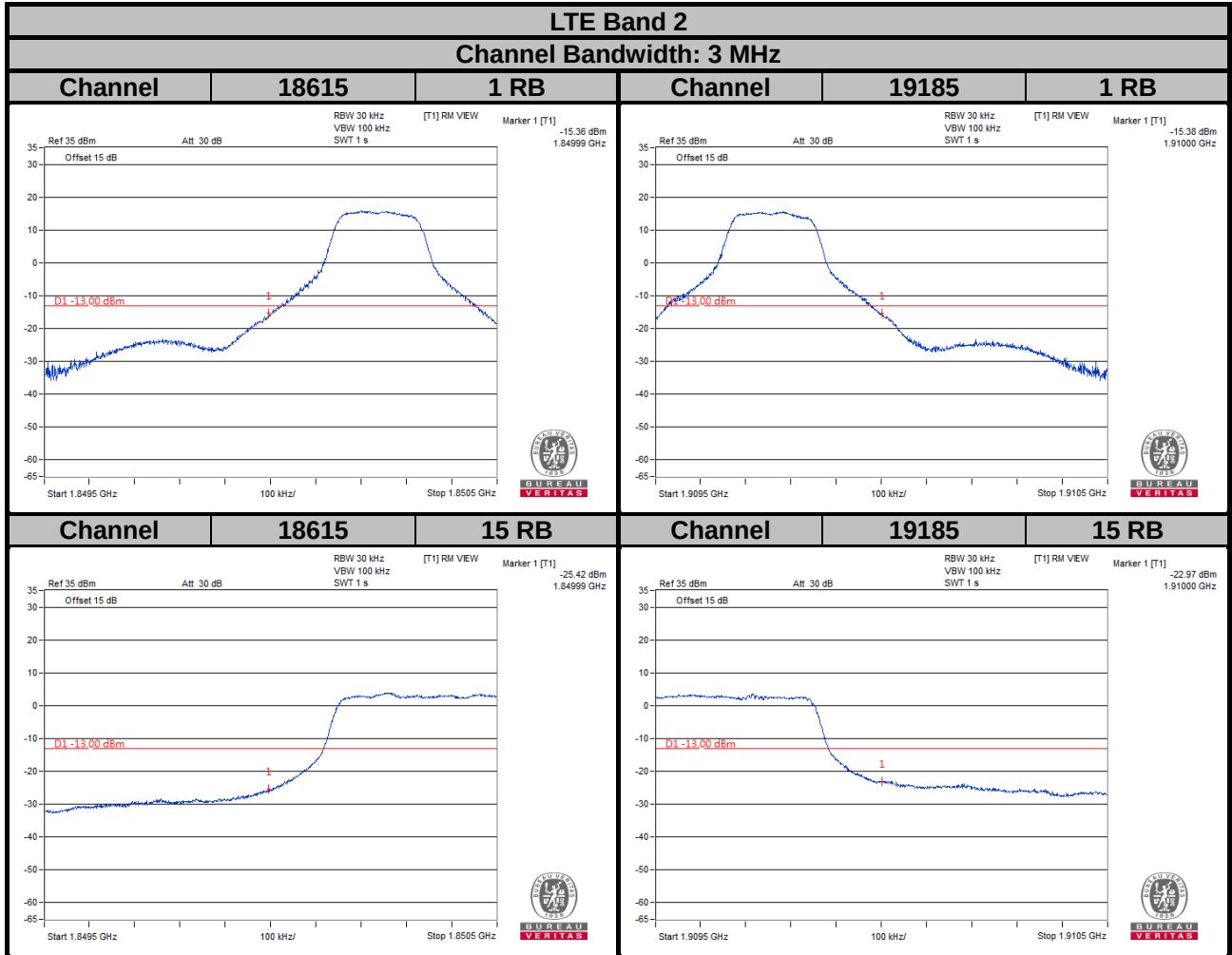
4.5.3 Test Procedures

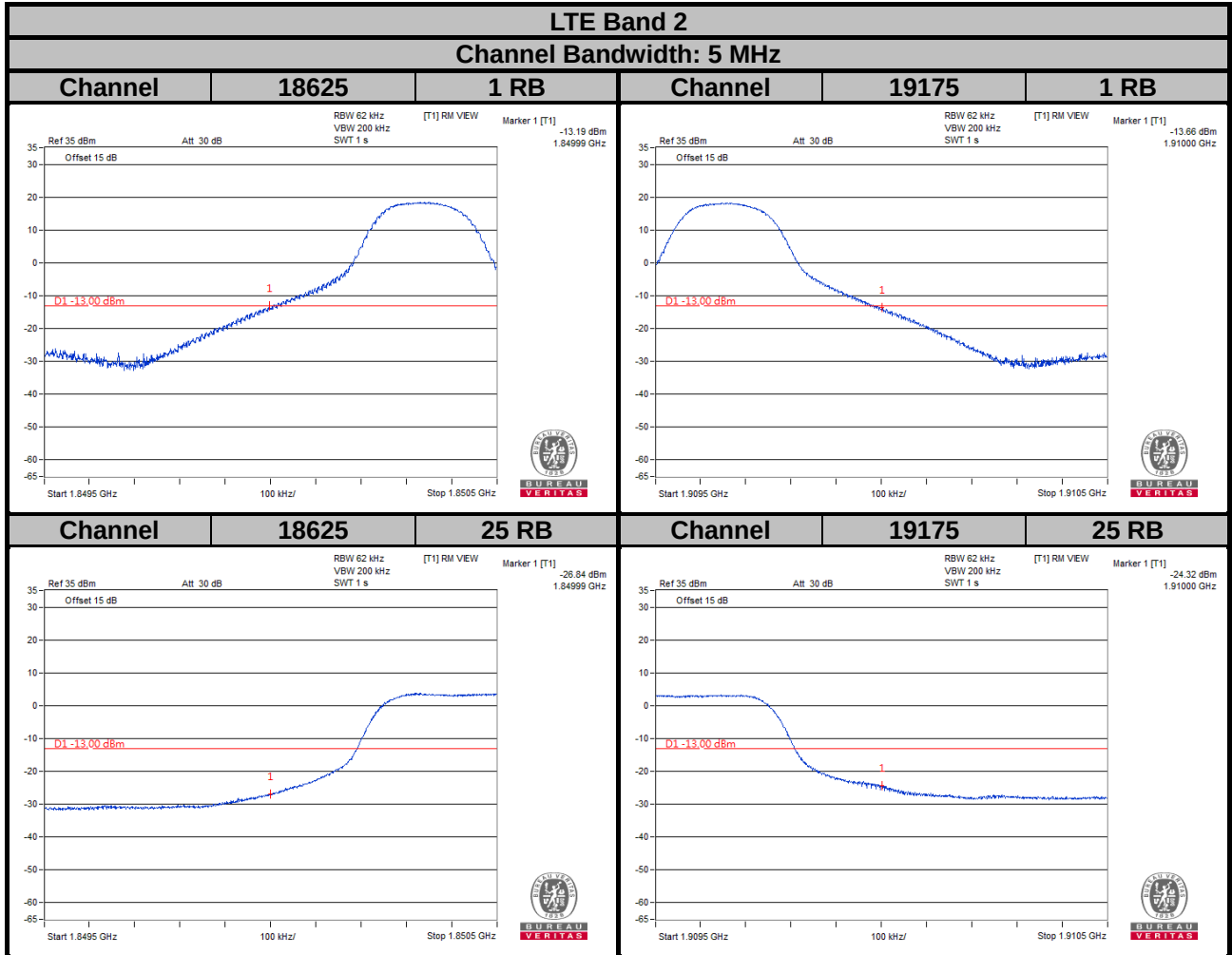
- All measurements were done at low and high operational frequency range.
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 10 kHz and VB of the spectrum is 30 kHz (GSM/GPRS/EDGE).
- The center frequency of spectrum is the band edge frequency and span is 5 MHz. RB of the spectrum is 100 kHz and VB of the spectrum is 300 kHz (WCDMA).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 15 kHz and VB of the spectrum is 51 kHz (LTE Bandwidth 1.4 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 30 kHz and VB of the spectrum is 100 kHz (LTE Bandwidth 3 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 62 kHz and VB of the spectrum is 200 kHz (LTE Bandwidth 5 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 100 kHz and VB of the spectrum is 300 kHz (LTE Bandwidth 10 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 150 kHz and VB of the spectrum is 470 kHz (LTE Bandwidth 15 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 200 kHz and VB of the spectrum is 1 MHz (LTE Bandwidth 20 MHz).
- Record the max trace plot into the test report.

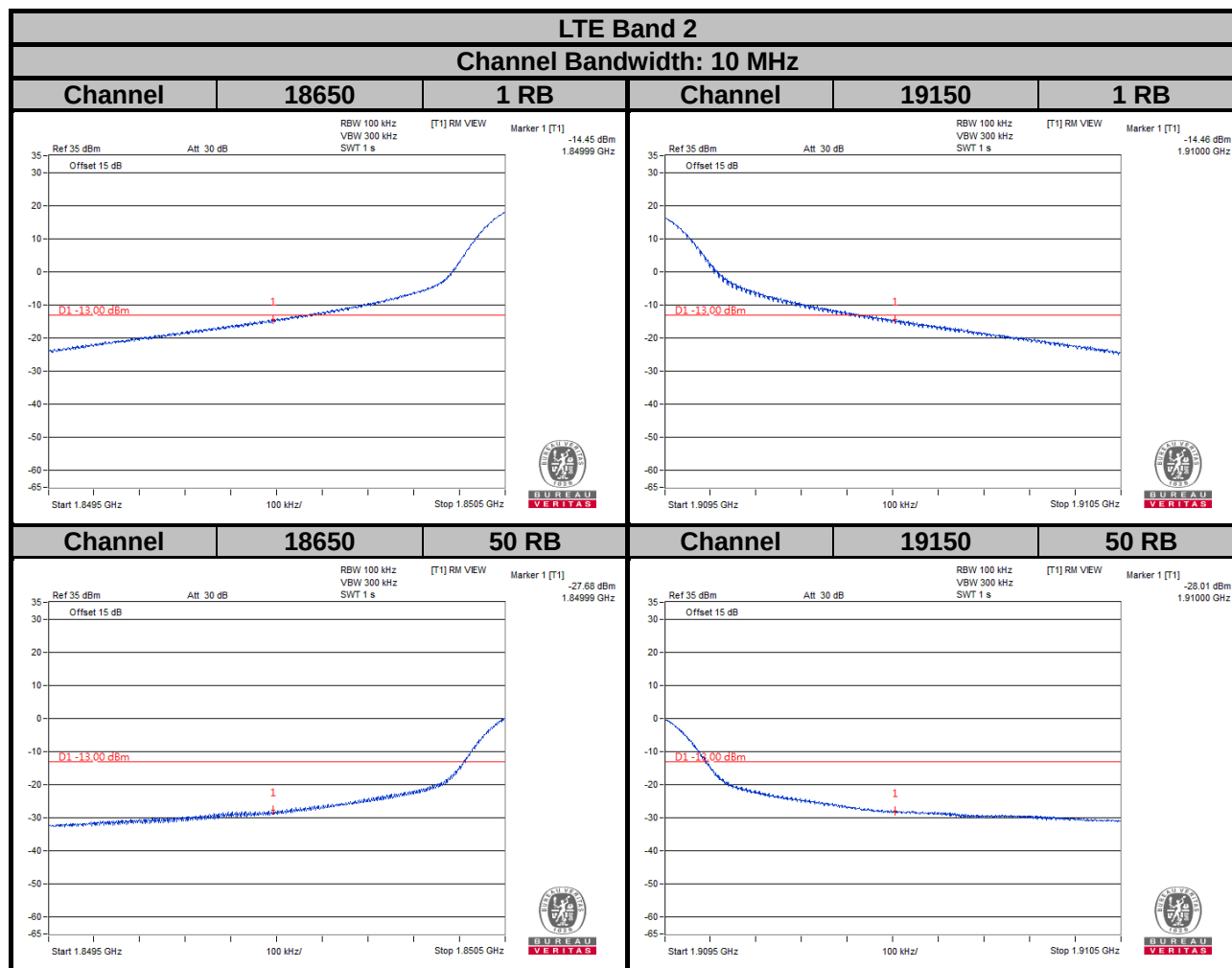
4.5.4 Test Results

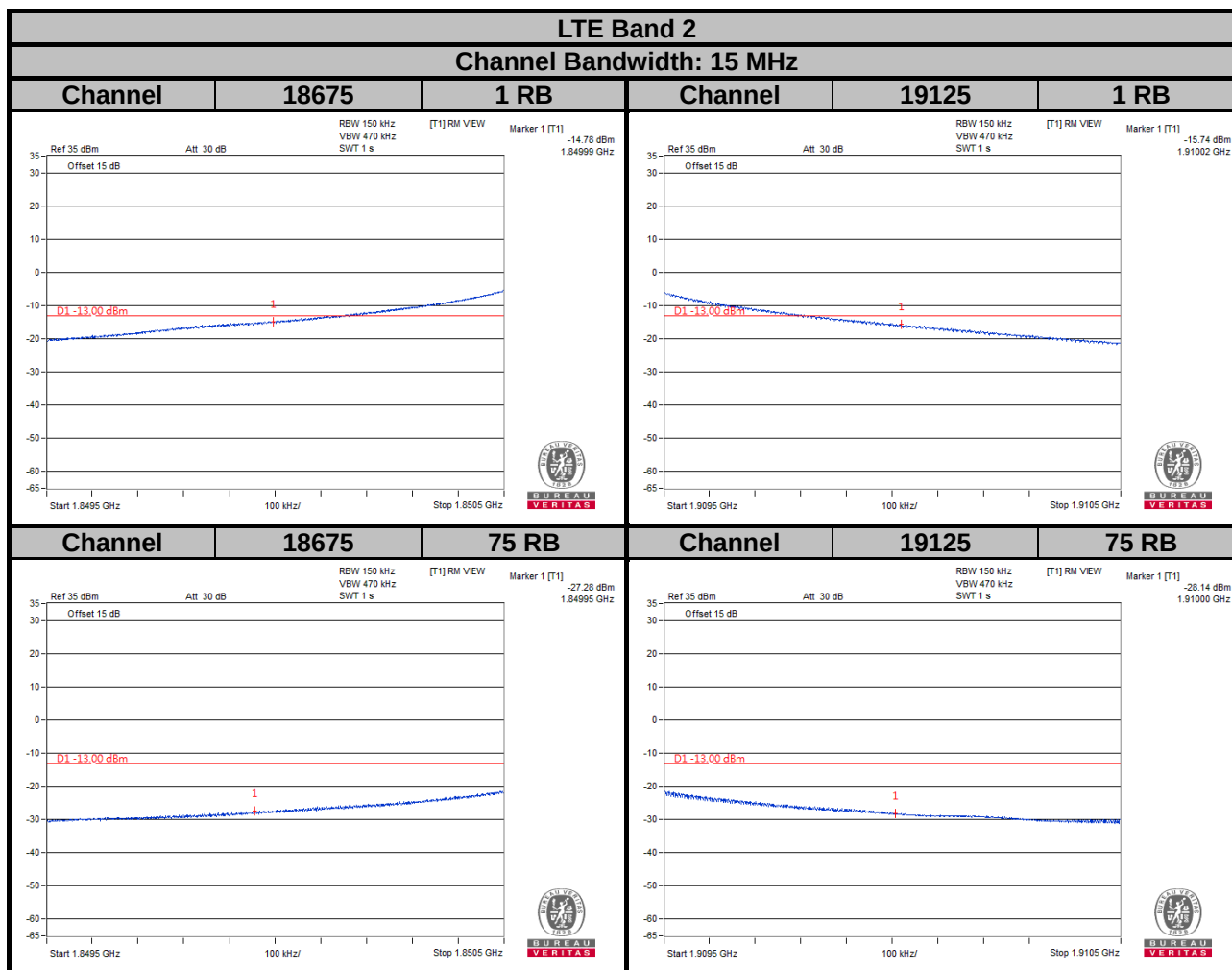


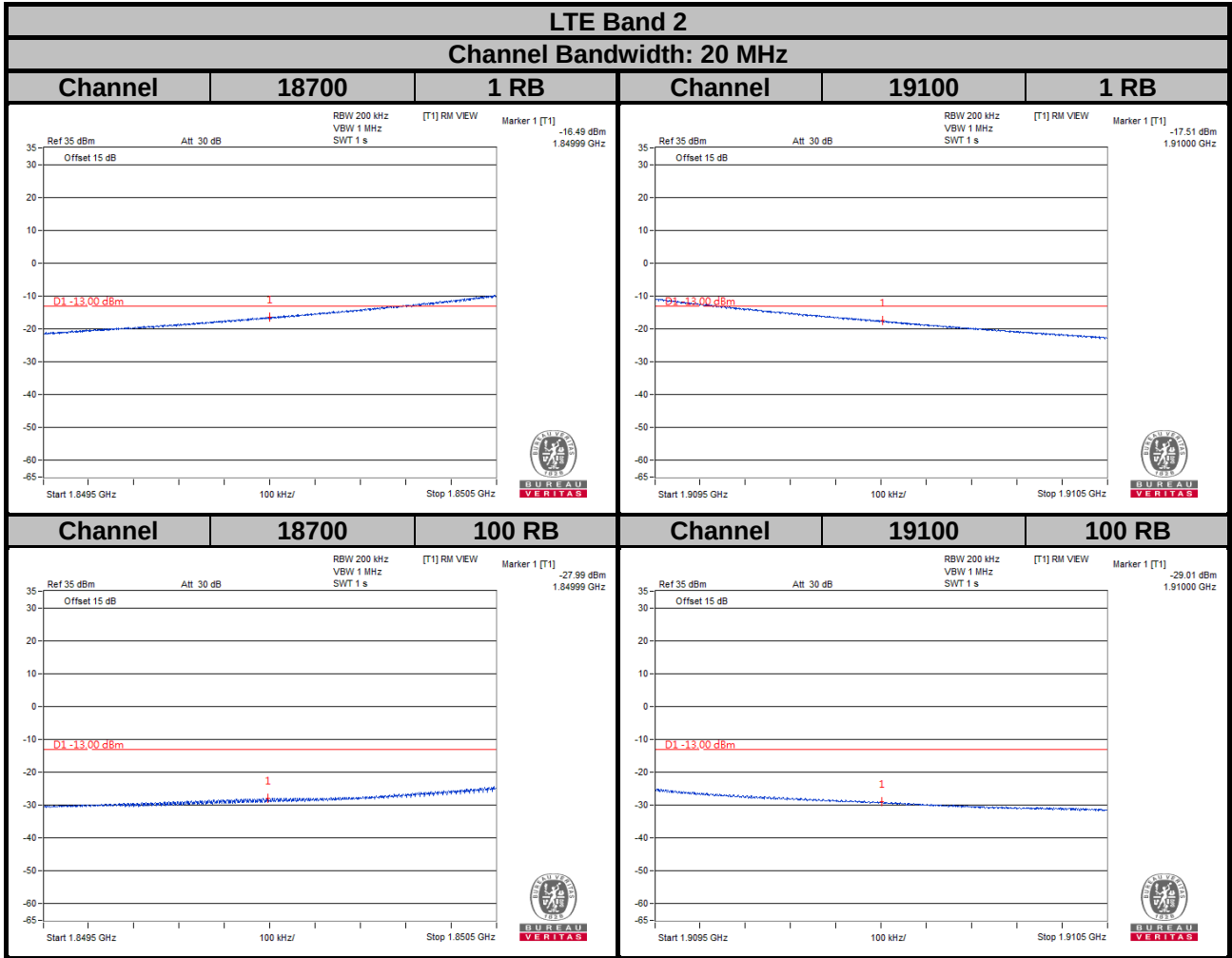










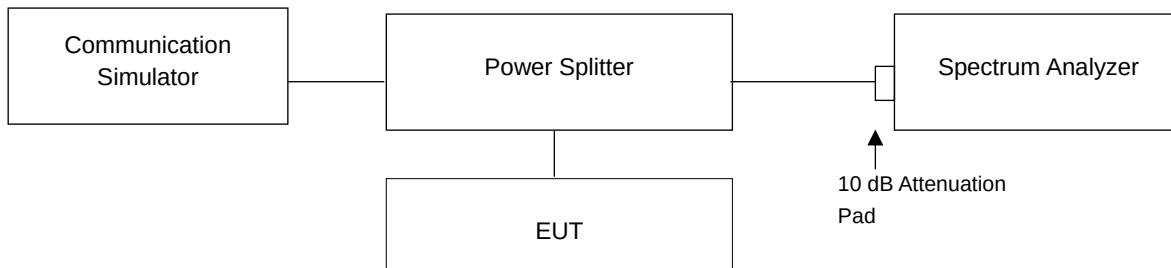


4.6 Peak to Average Ratio

4.6.1 Limits of Peak to Average Ratio Measurement

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

4.6.2 Test Setup



4.6.3 Test Procedures

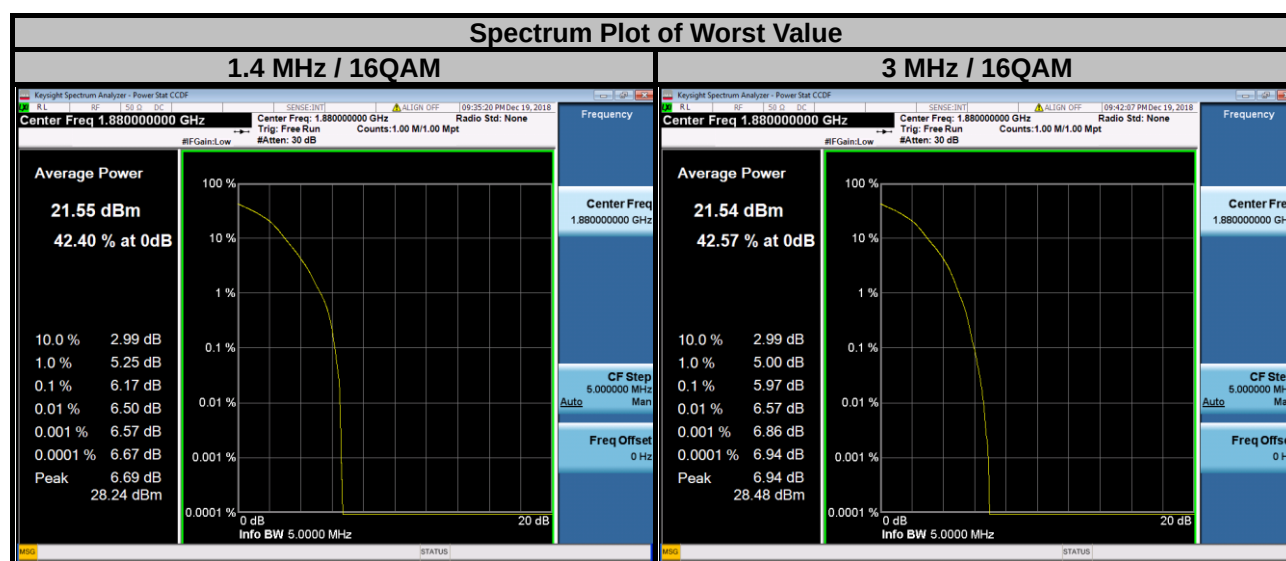
1. Set resolution/measurement bandwidth $\geq$ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1 %.

4.6.4 Test Results

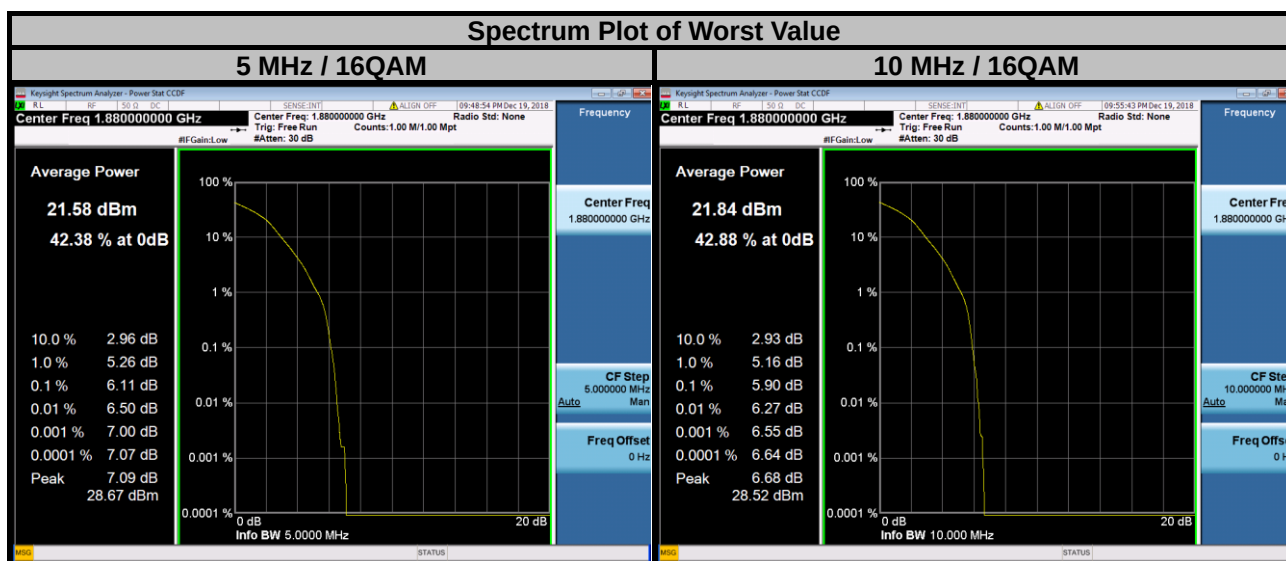
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)
		GSM	EDGE			WCDMA
512	1850.2	0.28	0.26	9262	1852.4	3.07
661	1880.0	0.30	0.31	9400	1880.0	3.30
810	1909.8	0.31	0.32	9538	1907.6	2.74



LTE Band 2							
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
18607	1850.7	4.82	5.66	18615	1851.5	4.71	5.47
18900	1880.0	5.27	6.17	18900	1880.0	5.14	5.97
19193	1909.3	3.75	4.52	19185	1908.5	4.27	5.04



LTE Band 2							
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
18625	1852.5	4.78	5.60	18650	1855.0	4.61	5.28
18900	1880.0	5.28	6.11	18900	1880.0	5.08	5.90
19175	1907.5	4.84	5.62	19150	1905.0	4.84	5.56



LTE Band 2							
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
18675	1857.5	4.35	5.08	18700	1860.0	4.41	5.25
18900	1880.0	4.94	5.73	18900	1880.0	4.85	5.62
19125	1902.5	4.30	5.05	19100	1900.0	4.26	4.94

