FCC Test Report

(PART 24)

Report No.:	RF190516C01-7
FCC ID:	B94HNQ20PK
Test Model:	HSN-Q20C
Received Date:	May 16, 2019
Test Date:	May 25 ~ Jun. 07, 2019
Issued Date:	Jun. 26, 2019
Applicant:	HP Inc.
Address:	3390 East Harmony Road, Fort Collins, Colorado 80528, United States
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

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RF190516C01-7	Original Release	Jun. 26, 2019

1 Certificate of Conformity

Product:	Notebook Computer
Brand:	HP
Test Model:	HSN-Q20C
Sample Status:	Engineering Sample
Applicant:	HP Inc.
Test Date:	May 25 ~ Jun. 07, 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 : Gina Liu , **Date:** Jun. 26, 2019

Gina Liu / Specialist

Approved by : , **Date:** Jun. 26, 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	Occupied Bandwidth	Pass	Meet the requirement of limit.
24.238	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 -29.95 dB at 30.00 MHz.

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

2.1 Measurement Uncertainty

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

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

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY51210203	Mar. 18, 2019	Mar. 17, 2020
Spectrum Analyzer Agilent	N9010A	MY52220314	Dec. 13, 2018	Dec. 12, 2019
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Apr. 15, 2019	Apr. 14, 2020
HORN Antenna SCHWARZBECK	BBHA 9170	148	Nov. 25, 2018	Nov. 24, 2019
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-969	Nov. 25, 2018	Nov. 24, 2019
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Nov. 23, 2018	Nov. 22, 2019
Double Ridge Guide Horn Antenna EMCO	3115	5619	Nov. 25, 2018	Nov. 24, 2019
BILOG Antenna SCHWARZBECK	VULB 9168	9168-153	Nov. 23, 2018	Nov. 22, 2019
Fixed Attenuator WORKEN	MDCS18N-10	MDCS18N-10-01	Apr. 15, 2019	Apr. 14, 2020
MXG Vector signal generator Agilent	N5182B	MY53050430	Nov. 19, 2018	Nov. 18, 2019
Preamplifier EMCI	EMC 012645	980115	Oct. 12, 2018	Oct. 11, 2019
Preamplifier EMCI	EMC 330H	980112	Oct. 12, 2018	Oct. 11, 2019
RF Coaxial Cable HUBER+SUHNNER	EMC104-SM-SM-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
Radio Communication Analyzer Anritsu	MT8821C	6261806803	Jan. 22, 2019	Jan. 21, 2020
Radio Communication Analyzer Anritsu	MT8820C	6201300640	Aug. 16, 2017	Aug. 15, 2019
Temperature & Humidity Chamber	GTH-120-40-CP-AR	MAA1306-019	Sep. 05, 2018	Sep. 04, 2019
DC Power Supply Topward	33010D	807748	NA	NA

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

2. The test was performed in HwaYa Chamber 10.

3 General Information

3.1 General Description of EUT

Product	Notebook Computer	
Brand	HP	
Test Model	HSN-Q20C	
Status of EUT	Engineering Sample	
Power Supply Rating	5 or 9 or 12 or 15 or 20 Vdc (Adapter)	
Modulation Type	WCDMA	QPSK
	LTE	QPSK, 16QAM, 64QAM
Frequency Range	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
	LTE Band 25 (Channel Bandwidth: 1.4 MHz)	1850.7 ~ 1914.3 MHz
	LTE Band 25 (Channel Bandwidth: 3 MHz)	1851.5 ~ 1913.5 MHz
	LTE Band 25 (Channel Bandwidth: 5 MHz)	1852.5 ~ 1912.5 MHz
	LTE Band 25 (Channel Bandwidth: 10 MHz)	1855.0 ~ 1910.0 MHz
	LTE Band 25 (Channel Bandwidth: 15 MHz)	1857.5 ~ 1907.5 MHz
	LTE Band 25 (Channel Bandwidth: 20 MHz)	1860.0 ~ 1905.0 MHz
Max. EIRP Power	WCDMA	44.77 mW
	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	33.57 mW
	LTE Band 2 (Channel Bandwidth: 3 MHz)	35.73 mW
	LTE Band 2 (Channel Bandwidth: 5 MHz)	38.19 mW
	LTE Band 2 (Channel Bandwidth: 10 MHz)	40.09 mW
	LTE Band 2 (Channel Bandwidth: 15 MHz)	42.07 mW
	LTE Band 2 (Channel Bandwidth: 20 MHz)	44.16 mW
	LTE Band 25 (Channel Bandwidth: 1.4 MHz)	34.43 mW
	LTE Band 25 (Channel Bandwidth: 3 MHz)	36.39 mW
	LTE Band 25 (Channel Bandwidth: 5 MHz)	38.37 mW
	LTE Band 25 (Channel Bandwidth: 10 MHz)	40.64 mW
	LTE Band 25 (Channel Bandwidth: 15 MHz)	42.85 mW
	LTE Band 25 (Channel Bandwidth: 20 MHz)	45.19 mW
Emission Designator	WCDMA	4M09F9W
	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	1M09D7W
	LTE Band 2 (Channel Bandwidth: 3 MHz)	2M71G7D
	LTE Band 2 (Channel Bandwidth: 5 MHz)	4M50G7D
	LTE Band 2 (Channel Bandwidth: 10 MHz)	8M99D7W
	LTE Band 2 (Channel Bandwidth: 15 MHz)	13M5G7D
	LTE Band 2 (Channel Bandwidth: 20 MHz)	18M0D7W
	LTE Band 25 (Channel Bandwidth: 1.4 MHz)	1M09D7W
	LTE Band 25 (Channel Bandwidth: 3 MHz)	2M70G7D

	LTE Band 25 (Channel Bandwidth: 5 MHz)	4M50D7W
	LTE Band 25 (Channel Bandwidth: 10 MHz)	9M01D7W
	LTE Band 25 (Channel Bandwidth: 15 MHz)	13M5G7D
	LTE Band 25 (Channel Bandwidth: 20 MHz)	18M0D7W
Antenna Type	Couple Antenna with -6.19 dBi gain	
Accessory Device	Refer to Note as below	
Data Cable Supplied	Refer to Note as below	

Note:

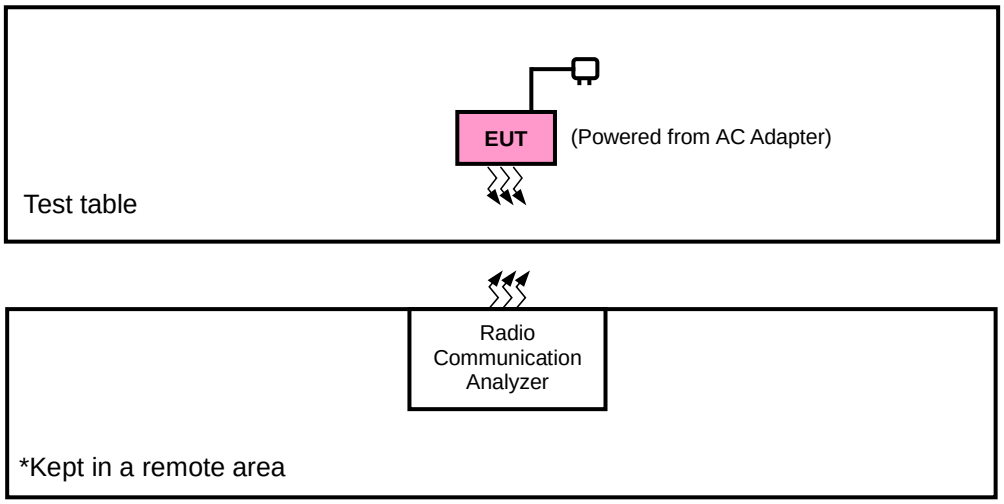
1. The WWAN module (Brand: Fibocom, Model: L860-GL) was installed in the EUT.
2. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter	hp	TPN-TA02	I/P: 100-240 Vac, 50-60 Hz, 1.6 A O/P: 5 Vdc, 3 A or 9 Vdc, 3 A or 12 Vdc, 5 A or 15 Vdc, 4.33 A or 20 Vdc, 3.25 A

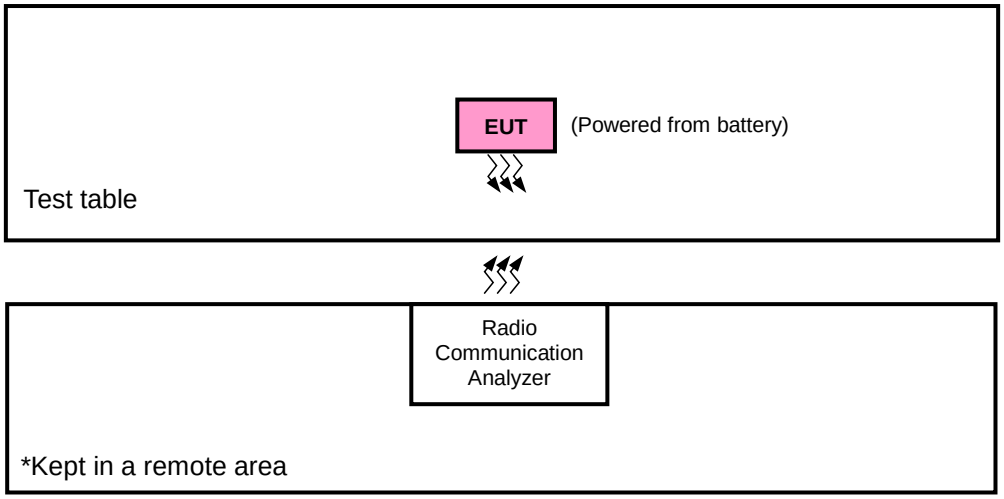
3. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

3.2 Configuration of System under Test

<Radiated Emission Test>



<E.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 NB mode, 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
WCDMA	NB mode	Z-axis
LTE Band 2	NB mode	NB mode
LTE Band 25	NB mode	NB mode

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, 64QAM	1 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM, 64QAM	1 RB / 12 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
-	Modulation Characteristics	18700 to 19100	18900	20 MHz	QPSK, 16QAM, 64QAM	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

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	Occupied Bandwidth	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK, 16QAM, 64QAM	6 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM, 64QAM	15 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM, 64QAM	25 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK, 16QAM, 64QAM	50 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK, 16QAM, 64QAM	75 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK, 16QAM, 64QAM	100 RB / 0 RB Offset
-	Peak to Average Ratio	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM, 64QAM	1 RB / 12 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
-	Band Edge	18607 to 19193	18607	1.4 MHz	QPSK	1 RB / 0 RB Offset
						6 RB / 0 RB Offset
			19193	1.4 MHz	QPSK	1 RB / 5 RB Offset
						6 RB / 0 RB Offset
		18615 to 19185	18615	3 MHz	QPSK	1 RB / 0 RB Offset
						15 RB / 0 RB Offset
			19185	3 MHz	QPSK	1 RB / 14 RB Offset
						15 RB / 0 RB Offset
		18625 to 19175	18625	5 MHz	QPSK	1 RB / 0 RB Offset
						25 RB / 0 RB Offset
			19175	5 MHz	QPSK	1 RB / 24 RB Offset
						25 RB / 0 RB Offset
		18650 to 19150	18650	10 MHz	QPSK	1 RB / 0 RB Offset
						50 RB / 0 RB Offset
			19150	10 MHz	QPSK	1 RB / 49 RB Offset
						50 RB / 0 RB Offset
		18675 to 19125	18675	15 MHz	QPSK	1 RB / 0 RB Offset
						75 RB / 0 RB Offset
			19125	15 MHz	QPSK	1 RB / 74 RB Offset
						75 RB / 0 RB Offset
		18700 to 19100	18700	20 MHz	QPSK	1 RB / 0 RB Offset
						100 RB / 0 RB Offset
			19100	20 MHz	QPSK	1 RB / 99 RB Offset
						100 RB / 0 RB Offset
-	Conducted Emission	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK	1 RB / 0 RB Offset
		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 / 12 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

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	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 / 12 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK	1 RB / 0 RB Offset

Note:

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

LTE Band 25

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	EIRP	26047 to 26683	26047, 26365, 26683	1.4 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		26055 to 26675	26055, 26365, 26675	3 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		26065 to 26665	26065, 26365, 26665	5 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		26090 to 26640	26090, 26365, 26640	10 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		26115 to 26615	26115, 26365, 26615	15 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		26140 to 26590	26140, 26365, 26590	20 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
-	Modulation Characteristics	26090 to 26640	26365	20 MHz	QPSK, 16QAM, 64QAM	100 RB / 0 RB Offset
-	Frequency Stability	26047 to 26683	26047, 26683	1.4 MHz	QPSK	1 RB / 0 RB Offset
		26055 to 26675	26055, 26675	3 MHz	QPSK	1 RB / 0 RB Offset
		26065 to 26665	26065, 26665	5 MHz	QPSK	1 RB / 0 RB Offset
		26090 to 26640	26090, 26640	10 MHz	QPSK	1 RB / 0 RB Offset
		26115 to 26615	26115, 26615	15 MHz	QPSK	1 RB / 0 RB Offset
		26140 to 26590	26140, 26590	20 MHz	QPSK	1 RB / 0 RB Offset
-	Occupied Bandwidth	26047 to 26683	26047, 26365, 26683	1.4 MHz	QPSK, 16QAM, 64QAM	6 RB / 0 RB Offset
		26055 to 26675	26055, 26365, 26675	3 MHz	QPSK, 16QAM, 64QAM	15 RB / 0 RB Offset
		26065 to 26665	26065, 26365, 26665	5 MHz	QPSK, 16QAM, 64QAM	25 RB / 0 RB Offset
		26090 to 26640	26090, 26365, 26640	10 MHz	QPSK, 16QAM, 64QAM	50 RB / 0 RB Offset
		26115 to 26615	26115, 26365, 26615	15 MHz	QPSK, 16QAM, 64QAM	75 RB / 0 RB Offset
		26140 to 26590	26140, 26365, 26590	20 MHz	QPSK, 16QAM, 64QAM	100 RB / 0 RB Offset
-	Peak to Average Ratio	26047 to 26683	26047, 26365, 26683	1.4 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		26055 to 26675	26055, 26365, 26675	3 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		26065 to 26665	26065, 26365, 26665	5 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		26090 to 26640	26090, 26365, 26640	10 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		26115 to 26615	26115, 26365, 26615	15 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		26140 to 26590	26140, 26365, 26590	20 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	Band Edge	26047 to 26683	26047	1.4 MHz	QPSK	1 RB / 0 RB Offset
						6 RB / 0 RB Offset
			26683	1.4 MHz	QPSK	1 RB / 5 RB Offset
						6 RB / 0 RB Offset
		26055 to 26675	26055	3 MHz	QPSK	1 RB / 0 RB Offset
						1 RB / 0 RB Offset
			26675	3 MHz	QPSK	1 RB / 14 RB Offset
						15 RB / 0 RB Offset
		26065 to 26665	26065	5 MHz	QPSK	1 RB / 0 RB Offset
						25 RB / 0 RB Offset
			26665	5 MHz	QPSK	1 RB / 24 RB Offset
						25 RB / 0 RB Offset
		26090 to 26640	26090	10 MHz	QPSK	1 RB / 0 RB Offset
						50 RB / 0 RB Offset
			26640	10 MHz	QPSK	1 RB / 49 RB Offset
						50 RB / 0 RB Offset
		26115 to 26615	26115	15 MHz	QPSK	1 RB / 0 RB Offset
						75 RB / 0 RB Offset
			26615	15 MHz	QPSK	1 RB / 74 RB Offset
						75 RB / 0 RB Offset
		26140 to 26590	26140	20 MHz	QPSK	1 RB / 0 RB Offset
						100 RB / 0 RB Offset
			26590	20 MHz	QPSK	1 RB / 99 RB Offset
						100 RB / 0 RB Offset
-	Conducted Emission	26047 to 26683	26047, 26365, 26683	1.4 MHz	QPSK	1 RB / 0 RB Offset
		26055 to 26675	26055, 26365, 26675	3 MHz	QPSK	1 RB / 0 RB Offset
		26065 to 26665	26065, 26365, 26665	5 MHz	QPSK	1 RB / 0 RB Offset
		26090 to 26640	26090, 26365, 26640	10 MHz	QPSK	1 RB / 0 RB Offset
		26115 to 26615	26115, 26365, 26615	15 MHz	QPSK	1 RB / 0 RB Offset
		26140 to 26590	26140, 26365, 26590	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:

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

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
EIRP	26 deg. C, 58 % RH	120 Vac, 60 Hz	Thomas Wei
Modulation Characteristics	26 deg. C, 58 % RH	120 Vac, 60 Hz	Wayne Lin
Frequency Stability	26 deg. C, 58 % RH	120 Vac, 60 Hz	Wayne Lin
Occupied Bandwidth	26 deg. C, 58 % RH	120 Vac, 60 Hz	Wayne Lin
Band Edge	26 deg. C, 58 % RH	120 Vac, 60 Hz	Wayne Lin
Peak to Average Ratio	26 deg. C, 58 % RH	120 Vac, 60 Hz	Wayne Lin
Conducted Emission	26 deg. C, 58 % RH	120 Vac, 60 Hz	Wayne Lin
Radiated Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Thomas Wei

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
ANSI 63.2 -1996

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 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.

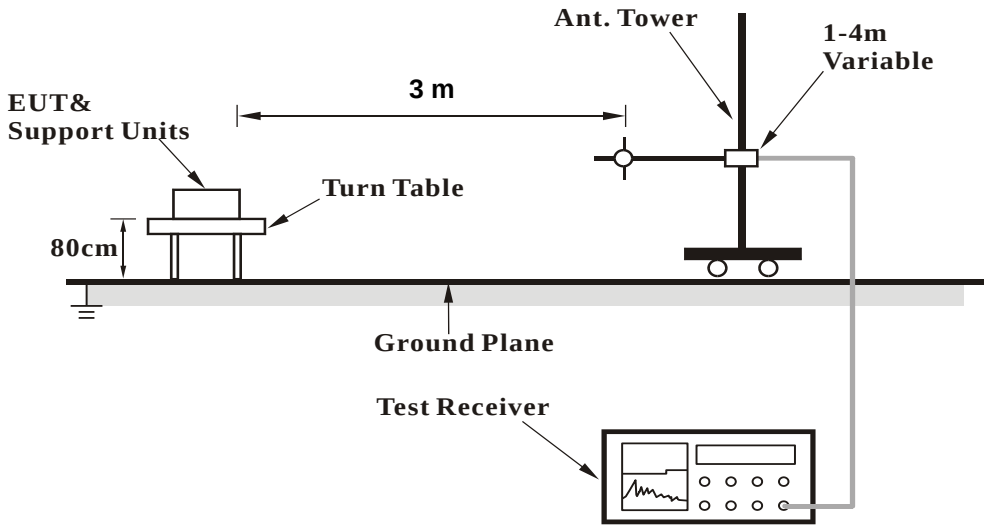
d. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.R.P power - 2.15 dB.

Conducted Power Measurement:

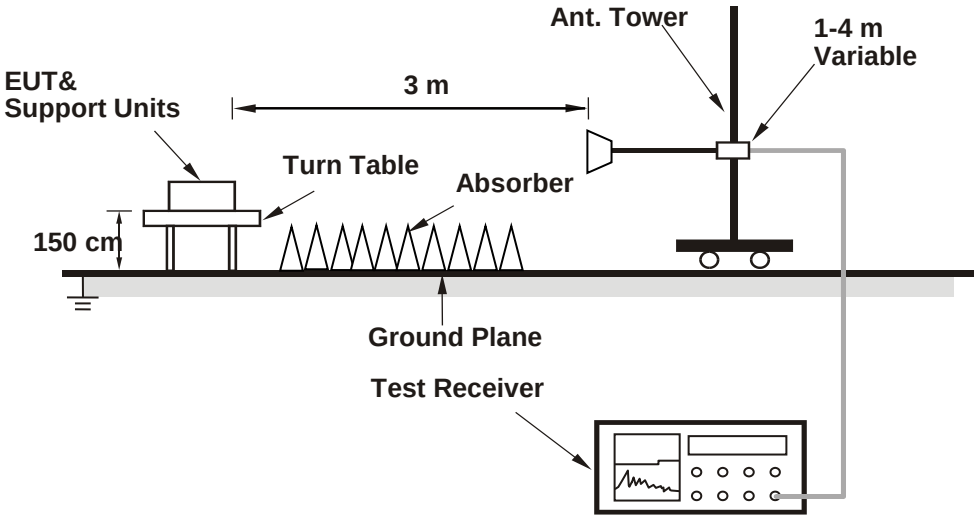
The EUT was set up for the maximum power with GSM, GPRS, EDGE, WCDMA, CDMA, and LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

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	WCDMA II		
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880.0	1907.6
RMC 12.2K	23.44	**23.49**	23.42
HSDPA Subtest-1	23.43	23.48	23.41
HSDPA Subtest-2	23.13	23.18	23.11
HSDPA Subtest-3	22.89	22.94	22.87
HSDPA Subtest-4	22.63	22.68	22.61
DC-HSDPA Subtest-1	23.33	23.38	23.31
DC-HSDPA Subtest-2	23.03	23.08	23.01
DC-HSDPA Subtest-3	22.79	22.84	22.77
DC-HSDPA Subtest-4	22.53	22.58	22.51
HSUPA Subtest-1	23.20	23.25	23.18
HSUPA Subtest-2	21.11	21.16	21.09
HSUPA Subtest-3	22.16	22.21	22.14
HSUPA Subtest-4	21.38	21.43	21.36
HSUPA Subtest-5	23.15	23.20	23.13

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	22.80	**22.92**	22.78	0	15M	QPSK	1	0	22.78	**22.90**	22.77	0
		1	50	22.73	22.81	22.69	0			1	37	22.70	22.74	22.68	0
		1	99	22.75	22.87	22.73	0			1	74	22.74	22.79	22.67	0
		50	0	21.95	22.02	21.91	1			36	0	21.93	21.99	21.86	1
		50	25	21.83	21.90	21.78	1			36	19	21.75	21.87	21.68	1
		50	50	21.79	21.89	21.75	1			36	39	21.72	21.88	21.67	1
		100	0	21.83	21.93	21.80	1			75	0	21.74	21.89	21.79	1
	16QAM	1	0	21.66	21.90	21.70	1		16QAM	1	0	21.60	21.78	21.64	1
		1	50	21.70	21.73	21.66	1			1	37	21.67	21.62	21.51	1
		1	99	21.70	21.87	21.68	1			1	74	21.69	21.77	21.55	1
		50	0	20.93	20.99	20.85	2			36	0	20.77	20.94	20.83	2
		50	25	20.80	20.89	20.74	2			36	19	20.71	20.72	20.69	2
		50	50	20.73	20.82	20.75	2			36	39	20.67	20.84	20.67	2
		100	0	20.83	20.86	20.72	2			75	0	20.71	20.84	20.79	2
	64QAM	1	0	20.70	20.91	20.74	2		64QAM	1	0	20.73	20.81	20.63	2
		1	50	20.70	20.76	20.64	2			1	37	20.56	20.61	20.62	2
		1	99	20.75	20.81	20.66	2			1	74	20.65	20.72	20.64	2
		50	0	19.91	19.99	19.81	3			36	0	19.82	19.88	19.87	3
		50	25	19.76	19.89	19.68	3			36	19	19.67	19.84	19.63	3
		50	50	19.72	19.84	19.73	3			36	39	19.67	19.75	19.67	3
		100	0	19.75	19.90	19.71	3			75	0	19.76	19.84	19.67	3

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		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	22.67	**22.81**	22.74	0	5M	QPSK	1	0	22.70	22.72	22.70	0
		1	24	22.65	22.73	22.54	0			1	12	22.51	**22.73**	22.48	0
		1	49	22.64	22.74	22.60	0			1	24	22.70	22.69	22.52	0
		25	0	21.95	21.89	21.74	1			12	0	21.82	21.90	21.71	1
		25	12	21.66	21.83	21.58	1			12	6	21.83	21.76	21.47	1
		25	25	21.69	21.68	21.64	1			12	13	21.68	21.74	21.58	1
		50	0	21.62	21.84	21.60	1			25	0	21.76	21.72	21.69	1
	16QAM	1	0	21.54	21.81	21.67	1		16QAM	1	0	21.53	21.74	21.58	1
		1	24	21.58	21.54	21.48	1			1	12	21.46	21.53	21.52	1
		1	49	21.61	21.65	21.53	1			1	24	21.47	21.62	21.56	1
		25	0	20.63	20.78	20.66	2			12	0	20.65	20.84	20.72	2
		25	12	20.57	20.70	20.62	2			12	6	20.74	20.73	20.72	2
		25	25	20.46	20.76	20.44	2			12	13	20.60	20.76	20.72	2
		50	0	20.70	20.72	20.76	2			25	0	20.54	20.74	20.66	2
	64QAM	1	0	20.59	20.82	20.45	2		64QAM	1	0	20.79	20.72	20.57	2
		1	24	20.56	20.61	20.48	2			1	12	20.59	20.66	20.42	2
		1	49	20.67	20.77	20.49	2			1	24	20.61	20.80	20.58	2
		25	0	19.65	19.88	19.84	3			12	0	19.67	19.94	19.65	3
		25	12	19.65	19.83	19.65	3			12	6	19.53	19.64	19.49	3
		25	25	19.65	19.78	19.56	3			12	13	19.69	19.58	19.53	3
		50	0	19.69	19.82	19.62	3			25	0	19.61	19.67	19.69	3

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		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	22.64	**22.79**	22.64	0	1.4M	QPSK	1	0	22.57	**22.84**	22.61	0
		1	7	22.66	22.70	22.48	0			1	2	22.62	22.64	22.52	0
		1	14	22.60	22.70	22.56	0			1	5	22.53	22.65	22.65	0
		8	0	21.76	21.81	21.80	1			3	0	22.81	22.79	22.72	0
		8	3	21.65	21.75	21.72	1			3	1	22.69	22.75	22.66	0
		8	7	21.63	21.78	21.60	1			3	3	22.68	22.69	22.59	0
		15	0	21.71	21.80	21.59	1			6	0	21.72	21.88	21.73	1
	16QAM	1	0	21.60	21.89	21.60	1		16QAM	1	0	21.61	21.77	21.67	1
		1	7	21.53	21.62	21.37	1			1	2	21.53	21.61	21.53	1
		1	14	21.54	21.71	21.59	1			1	5	21.68	21.67	21.48	1
		8	0	20.74	20.88	20.79	2			3	0	21.77	21.82	21.73	1
		8	3	20.51	20.74	20.54	2			3	1	21.59	21.81	21.59	1
		8	7	20.53	20.79	20.51	2			3	3	21.66	21.67	21.62	1
		15	0	20.54	20.82	20.55	2			6	0	20.74	20.79	20.72	2
	64QAM	1	0	20.55	20.69	20.56	2		64QAM	1	0	20.74	20.66	20.61	2
		1	7	20.47	20.70	20.53	2			1	2	20.46	20.74	20.49	2
		1	14	20.55	20.71	20.55	2			1	5	20.57	20.73	20.57	2
		8	0	19.77	19.91	19.81	3			3	0	20.86	20.85	20.82	2
		8	3	19.67	19.84	19.61	3			3	1	20.72	20.71	20.63	2
		8	7	19.73	19.78	19.62	3			3	3	20.70	20.74	20.57	2
		15	0	19.66	19.73	19.64	3			6	0	19.74	19.79	19.63	3

LTE Band 25

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		26140	26365	26590				Channel		26115	26365	26615	
		Frequency (MHz)		1860.0	1882.5	1905.0				Frequency (MHz)		1857.5	1882.5	1907.5	
20M	QPSK	1	0	**23.23**	23.21	23.17	0	15M	QPSK	1	0	23.16	**23.19**	23.16	0
		1	50	23.07	23.03	22.95	0			1	37	23.05	23.01	22.85	0
		1	99	23.16	23.12	23.08	0			1	74	23.16	23.09	23.07	0
		50	0	22.18	22.16	22.10	1			36	0	22.13	22.12	22.06	1
		50	25	22.07	22.05	22.01	1			36	19	22.04	22.03	22.01	1
		50	50	22.09	22.02	21.98	1			36	39	22.05	21.96	21.96	1
		100	0	22.08	22.06	22.03	1			75	0	21.98	21.99	21.95	1
	16QAM	1	0	22.13	22.21	22.17	1		16QAM	1	0	22.07	22.18	22.08	1
		1	50	22.00	22.03	21.88	1			1	37	22.01	21.98	21.80	1
		1	99	22.10	22.02	21.99	1			1	74	22.07	21.98	21.95	1
		50	0	21.08	21.14	21.06	2			36	0	20.98	21.05	20.96	2
		50	25	20.97	21.04	20.93	2			36	19	21.00	20.95	20.93	2
		50	50	20.99	20.94	20.94	2			36	39	21.07	20.90	20.81	2
		100	0	20.99	21.06	21.01	2			75	0	21.01	20.90	20.86	2
	64QAM	1	0	21.13	21.14	21.16	2		64QAM	1	0	21.15	21.07	21.10	2
		1	50	20.98	20.98	20.94	2			1	37	21.01	20.85	20.87	2
		1	99	21.09	21.02	20.99	2			1	74	21.10	20.97	21.03	2
		50	0	20.13	20.09	20.05	3			36	0	20.05	20.10	19.98	3
		50	25	20.07	20.02	19.93	3			36	19	19.93	19.97	19.88	3
		50	50	20.06	19.93	19.97	3			36	39	19.97	19.97	19.85	3
		100	0	20.04	20.00	20.00	3			75	0	19.95	19.96	19.94	3

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		26090	26365	26640				Channel		26065	26365	26665	
		Frequency (MHz)		2855.0	1882.5	1910.0				Frequency (MHz)		1852.5	1882.5	1912.5	
10M	QPSK	1	0	**23.19**	23.13	23.14	0	5M	QPSK	1	0	**23.18**	23.01	22.87	0
		1	24	22.85	22.88	22.89	0			1	12	22.97	22.84	22.75	0
		1	49	22.99	22.99	22.97	0			1	24	22.99	22.90	22.99	0
		25	0	21.97	21.99	22.01	1			12	0	22.06	22.10	21.88	1
		25	12	22.01	21.87	21.88	1			12	6	21.86	21.94	21.88	1
		25	25	21.95	21.86	21.89	1			12	13	21.94	21.88	21.70	1
		50	0	22.05	21.95	21.96	1			25	0	22.03	22.00	21.93	1
	16QAM	1	0	22.11	21.94	22.12	1		16QAM	1	0	22.05	22.01	21.94	1
		1	24	21.95	21.78	21.75	1			1	12	21.93	21.75	21.89	1
		1	49	22.04	22.05	21.92	1			1	24	21.98	21.94	21.85	1
		25	0	21.04	21.00	20.86	2			12	0	20.97	21.02	20.96	2
		25	12	20.97	20.84	20.86	2			12	6	20.91	20.79	20.93	2
		25	25	20.87	20.96	20.83	2			12	13	20.80	20.89	20.83	2
		50	0	20.94	20.88	20.76	2			25	0	20.83	20.91	20.97	2
	64QAM	1	0	20.99	21.15	21.09	2		64QAM	1	0	20.99	20.97	21.05	2
		1	24	20.92	20.83	20.76	2			1	12	20.85	20.76	20.78	2
		1	49	20.95	21.05	20.89	2			1	24	20.98	21.00	21.01	2
		25	0	20.01	19.85	19.94	3			12	0	19.90	20.00	19.98	3
		25	12	19.84	19.87	19.71	3			12	6	19.82	19.90	19.83	3
		25	25	19.84	19.83	19.78	3			12	13	19.94	19.78	19.77	3
		50	0	19.90	19.94	19.95	3			25	0	19.90	19.91	19.85	3

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		26055	26365	26675				Channel		26047	26365	26683	
		Frequency (MHz)		1851.5	1882.5	1913.5				Frequency (MHz)		1850.7	1882.5	1914.3	
3M	QPSK	1	0	23.02	**23.14**	23.09	0	1.4M	QPSK	1	0	**23.12**	23.01	22.98	0
		1	7	22.92	22.86	22.85	0			1	2	22.88	23.01	22.77	0
		1	14	23.06	22.91	22.95	0			1	5	23.05	22.88	22.95	0
		8	0	22.09	22.02	22.03	1			3	0	23.18	23.04	22.99	0
		8	3	22.05	21.98	21.88	1			3	1	23.05	22.95	22.84	0
		8	7	21.96	21.91	21.81	1			3	3	23.06	22.81	22.90	0
		15	0	22.03	21.95	21.91	1			6	0	22.04	21.96	21.79	1
	16QAM	1	0	22.05	21.88	21.98	1		16QAM	1	0	22.16	22.03	22.02	1
		1	7	21.99	21.84	21.81	1			1	2	21.87	21.86	21.66	1
		1	14	21.95	21.92	21.94	1			1	5	22.11	21.85	21.84	1
		8	0	20.96	20.96	20.95	2			3	0	22.06	21.89	21.99	1
		8	3	20.80	20.97	20.90	2			3	1	21.90	21.87	21.79	1
		8	7	20.83	20.93	20.82	2			3	3	21.94	21.89	21.71	1
		15	0	20.98	20.93	20.85	2			6	0	20.86	20.89	20.78	2
	64QAM	1	0	20.98	21.04	20.95	2		64QAM	1	0	20.96	21.00	20.96	2
		1	7	20.92	20.81	20.78	2			1	2	20.94	20.77	20.78	2
		1	14	20.92	20.85	20.87	2			1	5	20.98	21.01	20.79	2
		8	0	19.95	19.94	19.89	3			3	0	20.96	21.00	20.96	2
		8	3	20.01	19.86	19.84	3			3	1	20.79	21.00	20.87	2
		8	7	19.90	19.81	19.75	3			3	3	20.98	20.88	20.85	2
		15	0	19.86	19.90	19.96	3			6	0	19.90	19.94	19.85	3

EIRP Power (dBm)

WCDMA							
Plane	**Channel**	**Frequency (MHz)**	**Reading (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (mW)**	**Polarization (H/V)**
NB	9262	1852.4	-27.03	36.57	9.54	8.99	H
	9400	1880.0	-27.33	37.22	9.89	9.75	
	9538	1907.6	-27.42	37.18	9.76	9.46	
	9262	1852.4	-21.31	37.65	16.34	43.05	V
	9400	1880.0	-21.07	37.58	16.51	44.77	
	9538	1907.6	-21.06	37.48	16.42	43.85	

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)**
NB	18607	1850.7	-27.88	36.57	8.69	7.40	H
	18900	1880.0	-28.25	37.22	8.97	7.89	
	19193	1909.3	-28.63	37.18	8.55	7.16	
	18607	1850.7	-22.68	37.65	14.97	31.41	V
	18900	1880.0	-22.32	37.58	15.26	33.57	
	19193	1909.3	-22.72	37.48	14.76	29.92	
Channel Bandwidth: 1.4 MHz / 16QAM							
NB	18607	1850.7	-28.87	36.57	7.70	5.89	H
	18900	1880.0	-29.49	37.22	7.73	5.93	
	19193	1909.3	-29.57	37.18	7.61	5.77	
	18607	1850.7	-23.81	37.65	13.84	24.21	V
	18900	1880.0	-23.66	37.58	13.92	24.66	
	19193	1909.3	-23.72	37.48	13.76	23.77	
Channel Bandwidth: 1.4 MHz / 64QAM							
NB	18607	1850.7	-29.92	36.57	6.65	4.62	H
	18900	1880.0	-30.50	37.22	6.72	4.70	
	19193	1909.3	-30.60	37.18	6.58	4.55	
	18607	1850.7	-24.89	37.65	12.76	18.88	V
	18900	1880.0	-24.61	37.58	12.97	19.82	
	19193	1909.3	-24.73	37.48	12.75	18.84	

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)**
NB	18615	1851.5	-27.54	36.57	9.03	8.00	H
	18900	1880.0	-27.98	37.22	9.24	8.39	
	19185	1908.5	-28.30	37.18	8.88	7.73	
	18615	1851.5	-22.34	37.65	15.31	33.96	V
	18900	1880.0	-22.05	37.58	15.53	35.73	
	19185	1908.5	-22.38	37.48	15.10	32.36	
Channel Bandwidth: 3 MHz / 16QAM							
NB	18615	1851.5	-28.59	36.57	7.98	6.28	H
	18900	1880.0	-29.20	37.22	8.02	6.34	
	19185	1908.5	-29.32	37.18	7.86	6.11	
	18615	1851.5	-23.56	37.65	14.09	25.64	V
	18900	1880.0	-23.40	37.58	14.18	26.18	
	19185	1908.5	-23.42	37.48	14.06	25.47	
Channel Bandwidth: 3 MHz / 64QAM							
NB	18615	1851.5	-29.64	36.57	6.93	4.93	H
	18900	1880.0	-30.18	37.22	7.04	5.06	
	19185	1908.5	-30.37	37.18	6.81	4.80	
	18615	1851.5	-24.69	37.65	12.96	19.77	V
	18900	1880.0	-24.37	37.58	13.21	20.94	
	19185	1908.5	-24.59	37.48	12.89	19.45	

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)**
NB	18625	1852.5	-27.33	36.57	9.24	8.39	H
	18900	1880.0	-27.71	37.22	9.51	8.93	
	19175	1907.5	-27.95	37.18	9.23	8.38	
	18625	1852.5	-22.09	37.65	15.56	35.97	V
	18900	1880.0	-21.76	37.58	15.82	38.19	
	19175	1907.5	-22.07	37.48	15.41	34.75	
Channel Bandwidth: 5 MHz / 16QAM							
NB	18625	1852.5	-28.35	36.57	8.22	6.64	H
	18900	1880.0	-28.92	37.22	8.30	6.76	
	19175	1907.5	-29.04	37.18	8.14	6.52	
	18625	1852.5	-23.29	37.65	14.36	27.29	V
	18900	1880.0	-23.17	37.58	14.41	27.61	
	19175	1907.5	-23.16	37.48	14.32	27.04	
Channel Bandwidth: 5 MHz / 64QAM							
NB	18625	1852.5	-29.38	36.57	7.19	5.24	H
	18900	1880.0	-29.98	37.22	7.24	5.30	
	19175	1907.5	-30.10	37.18	7.08	5.11	
	18625	1852.5	-24.40	37.65	13.25	21.13	V
	18900	1880.0	-24.16	37.58	13.42	21.98	
	19175	1907.5	-24.25	37.48	13.23	21.04	

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)**
NB	18650	1855.0	-27.01	36.57	9.56	9.04	H
	18900	1880.0	-27.44	37.22	9.78	9.51	
	19150	1905.0	-27.69	37.18	9.49	8.89	
	18650	1855.0	-21.82	37.65	15.83	38.28	V
	18900	1880.0	-21.55	37.58	16.03	40.09	
	19150	1905.0	-21.78	37.48	15.70	37.15	
Channel Bandwidth: 10 MHz / 16QAM							
NB	18650	1855.0	-28.14	36.57	8.43	6.97	H
	18900	1880.0	-28.66	37.22	8.56	7.18	
	19150	1905.0	-28.74	37.18	8.44	6.98	
	18650	1855.0	-23.01	37.65	14.64	29.11	V
	18900	1880.0	-22.87	37.58	14.71	29.58	
	19150	1905.0	-22.90	37.48	14.58	28.71	
Channel Bandwidth: 10 MHz / 64QAM							
NB	18650	1855.0	-29.07	36.57	7.50	5.62	H
	18900	1880.0	-29.68	37.22	7.54	5.68	
	19150	1905.0	-29.81	37.18	7.37	5.46	
	18650	1855.0	-24.09	37.65	13.56	22.70	V
	18900	1880.0	-23.96	37.58	13.62	23.01	
	19150	1905.0	-23.96	37.48	13.52	22.49	

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)**
NB	18675	1857.5	-26.73	36.57	9.84	9.64	H
	18900	1880.0	-27.23	37.22	9.99	9.98	
	19125	1902.5	-27.40	37.18	9.78	9.51	
	18675	1857.5	-21.62	37.65	16.03	40.09	V
	18900	1880.0	-21.34	37.58	16.24	42.07	
	19125	1902.5	-21.53	37.48	15.95	39.36	
Channel Bandwidth: 15 MHz / 16QAM							
NB	18675	1857.5	-27.82	36.57	8.75	7.50	H
	18900	1880.0	-28.34	37.22	8.88	7.73	
	19125	1902.5	-28.48	37.18	8.70	7.41	
	18675	1857.5	-22.76	37.65	14.89	30.83	V
	18900	1880.0	-22.60	37.58	14.98	31.48	
	19125	1902.5	-22.62	37.48	14.86	30.62	
Channel Bandwidth: 15 MHz / 64QAM							
NB	18675	1857.5	-28.87	36.57	7.70	5.89	H
	18900	1880.0	-29.43	37.22	7.79	6.01	
	19125	1902.5	-29.58	37.18	7.60	5.75	
	18675	1857.5	-23.83	37.65	13.82	24.10	V
	18900	1880.0	-23.70	37.58	13.88	24.43	
	19125	1902.5	-23.73	37.48	13.75	23.71	

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)**
NB	18700	1860.0	-26.45	36.57	10.12	10.28	H
	18900	1880.0	-26.99	37.22	10.23	10.54	
	19100	1900.0	-27.12	37.18	10.06	10.14	
	18700	1860.0	-21.29	37.65	16.36	43.25	V
	18900	1880.0	-21.13	37.58	16.45	44.16	
	19100	1900.0	-21.19	37.48	16.29	42.56	
Channel Bandwidth: 20 MHz / 16QAM							
NB	18700	1860.0	-27.51	36.57	9.06	8.05	H
	18900	1880.0	-28.11	37.22	9.11	8.15	
	19100	1900.0	-28.23	37.18	8.95	7.85	
	18700	1860.0	-22.44	37.65	15.21	33.19	V
	18900	1880.0	-22.26	37.58	15.32	34.04	
	19100	1900.0	-22.28	37.48	15.20	33.11	
Channel Bandwidth: 20 MHz / 64QAM							
NB	18700	1860.0	-28.53	36.57	8.04	6.37	H
	18900	1880.0	-29.17	37.22	8.05	6.38	
	19100	1900.0	-29.29	37.18	7.89	6.15	
	18700	1860.0	-23.60	37.65	14.05	25.41	V
	18900	1880.0	-23.49	37.58	14.09	25.64	
	19100	1900.0	-23.48	37.48	14.00	25.12	

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

LTE Band 25							
Channel Bandwidth: 1.4 MHz / QPSK							
Plane	**Channel**	**Frequency (MHz)**	**Reading (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (mW)**	**Polarization (H/V)**
NB	26047	1850.7	-27.39	36.57	9.18	8.28	H
	26365	1882.5	-28.07	37.22	9.15	8.22	
	26683	1914.3	-30.35	39.09	8.74	7.48	
	26047	1850.7	-22.28	37.65	15.37	34.43	V
	26365	1882.5	-22.48	37.58	15.10	32.36	
	26683	1914.3	-22.90	37.92	15.02	31.77	
Channel Bandwidth: 1.4 MHz / 16QAM							
NB	26047	1850.7	-28.49	36.57	8.08	6.43	H
	26365	1882.5	-29.37	37.22	7.85	6.10	
	26683	1914.3	-31.40	39.09	7.69	5.87	
	26047	1850.7	-23.34	37.65	14.31	26.98	V
	26365	1882.5	-23.56	37.58	14.02	25.23	
	26683	1914.3	-23.98	37.92	13.94	24.77	
Channel Bandwidth: 1.4 MHz / 64QAM							
NB	26047	1850.7	-29.44	36.57	7.13	5.16	H
	26365	1882.5	-30.34	37.22	6.88	4.88	
	26683	1914.3	-32.52	39.09	6.57	4.54	
	26047	1850.7	-24.45	37.65	13.20	20.89	V
	26365	1882.5	-24.56	37.58	13.02	20.04	
	26683	1914.3	-25.17	37.92	12.75	18.84	

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

LTE Band 25							
Channel Bandwidth: 3 MHz / QPSK							
Plane	**Channel**	**Frequency (MHz)**	**Reading (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (mW)**	**Polarization (H/V)**
NB	26055	1851.5	-27.15	36.57	9.42	8.75	H
	26365	1882.5	-27.83	37.22	9.39	8.69	
	26675	1913.5	-30.04	39.11	9.07	8.07	
	26055	1851.5	-22.04	37.65	15.61	36.39	V
	26365	1882.5	-22.20	37.58	15.38	34.51	
	26675	1913.5	-22.59	37.93	15.34	34.20	
Channel Bandwidth: 3 MHz / 16QAM							
NB	26055	1851.5	-28.18	36.57	8.39	6.90	H
	26365	1882.5	-29.16	37.22	8.06	6.40	
	26675	1913.5	-31.21	39.11	7.90	6.17	
	26055	1851.5	-23.11	37.65	14.54	28.44	V
	26365	1882.5	-23.25	37.58	14.33	27.10	
	26675	1913.5	-23.75	37.93	14.18	26.18	
Channel Bandwidth: 3 MHz / 64QAM							
NB	26055	1851.5	-29.16	36.57	7.41	5.51	H
	26365	1882.5	-30.12	37.22	7.10	5.13	
	26675	1913.5	-32.30	39.11	6.81	4.80	
	26055	1851.5	-24.16	37.65	13.49	22.34	V
	26365	1882.5	-24.33	37.58	13.25	21.13	
	26675	1913.5	-24.87	37.93	13.06	20.23	

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

LTE Band 25							
Channel Bandwidth: 5 MHz / QPSK							
Plane	**Channel**	**Frequency (MHz)**	**Reading (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (mW)**	**Polarization (H/V)**
NB	26065	1852.5	-26.80	36.57	9.77	9.48	H
	26365	1882.5	-27.57	37.22	9.65	9.23	
	26665	1912.5	-28.71	38.11	9.40	8.71	
	26065	1852.5	-21.81	37.65	15.84	38.37	V
	26365	1882.5	-21.94	37.58	15.64	36.64	
	26665	1912.5	-22.37	37.96	15.59	36.22	
Channel Bandwidth: 5 MHz / 16QAM							
NB	26065	1852.5	-27.88	36.57	8.69	7.40	H
	26365	1882.5	-28.95	37.22	8.27	6.71	
	26665	1912.5	-29.92	38.11	8.19	6.59	
	26065	1852.5	-22.82	37.65	14.83	30.41	V
	26365	1882.5	-23.02	37.58	14.56	28.58	
	26665	1912.5	-23.53	37.96	14.43	27.73	
Channel Bandwidth: 5 MHz / 64QAM							
NB	26065	1852.5	-28.96	36.57	7.61	5.77	H
	26365	1882.5	-29.81	37.22	7.41	5.51	
	26665	1912.5	-30.98	38.11	7.13	5.16	
	26065	1852.5	-23.93	37.65	13.72	23.55	V
	26365	1882.5	-24.10	37.58	13.48	22.28	
	26665	1912.5	-24.61	37.96	13.35	21.63	

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

LTE Band 25							
Channel Bandwidth: 10 MHz / QPSK							
Plane	**Channel**	**Frequency (MHz)**	**Reading (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (mW)**	**Polarization (H/V)**
NB	26090	1855.0	-26.54	36.57	10.03	10.07	H
	26365	1882.5	-27.30	37.22	9.92	9.82	
	26640	1910.0	-28.44	38.19	9.75	9.44	
	26090	1855.0	-21.56	37.65	16.09	40.64	V
	26365	1882.5	-21.73	37.58	15.85	38.46	
	26640	1910.0	-22.32	38.15	15.83	38.28	
Channel Bandwidth: 10 MHz / 16QAM							
NB	26090	1855.0	-27.63	36.57	8.94	7.83	H
	26365	1882.5	-28.70	37.22	8.52	7.11	
	26640	1910.0	-29.70	38.19	8.49	7.06	
	26090	1855.0	-22.57	37.65	15.08	32.21	V
	26365	1882.5	-22.77	37.58	14.81	30.27	
	26640	1910.0	-23.40	38.15	14.75	29.85	
Channel Bandwidth: 10 MHz / 64QAM							
NB	26090	1855.0	-28.69	36.57	7.88	6.14	H
	26365	1882.5	-29.60	37.22	7.62	5.78	
	26640	1910.0	-30.74	38.19	7.45	5.56	
	26090	1855.0	-23.69	37.65	13.96	24.89	V
	26365	1882.5	-23.80	37.58	13.78	23.88	
	26640	1910.0	-24.56	38.15	13.59	22.86	

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

LTE Band 25							
Channel Bandwidth: 15 MHz / QPSK							
Plane	**Channel**	**Frequency (MHz)**	**Reading (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (mW)**	**Polarization (H/V)**
NB	26115	1857.5	-26.28	36.57	10.29	10.69	H
	26365	1882.5	-27.09	37.22	10.13	10.30	
	26615	1907.5	-28.28	38.23	9.95	9.89	
	26115	1857.5	-21.33	37.65	16.32	42.85	V
	26365	1882.5	-21.42	37.58	16.16	41.30	
	26615	1907.5	-22.15	38.22	16.07	40.46	
Channel Bandwidth: 15 MHz / 16QAM							
NB	26115	1857.5	-27.36	36.57	9.21	8.34	H
	26365	1882.5	-28.37	37.22	8.85	7.67	
	26615	1907.5	-29.45	38.23	8.78	7.55	
	26115	1857.5	-22.34	37.65	15.31	33.96	V
	26365	1882.5	-22.52	37.58	15.06	32.06	
	26615	1907.5	-23.23	38.22	14.99	31.55	
Channel Bandwidth: 15 MHz / 64QAM							
NB	26115	1857.5	-28.48	36.57	8.09	6.44	H
	26365	1882.5	-29.38	37.22	7.84	6.08	
	26615	1907.5	-30.54	38.23	7.69	5.87	
	26115	1857.5	-23.37	37.65	14.28	26.79	V
	26365	1882.5	-23.53	37.58	14.05	25.41	
	26615	1907.5	-24.39	38.22	13.83	24.15	

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

LTE Band 25							
Channel Bandwidth: 20 MHz / QPSK							
Plane	**Channel**	**Frequency (MHz)**	**Reading (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (mW)**	**Polarization (H/V)**
NB	26140	1860.0	-26.05	36.57	10.52	11.27	H
	26365	1882.5	-26.82	37.22	10.40	10.96	
	26590	1905.0	-28.45	38.72	10.27	10.64	
	26140	1860.0	-21.10	37.65	16.55	45.19	V
	26365	1882.5	-21.11	37.58	16.47	44.36	
	26590	1905.0	-21.23	37.56	16.33	42.95	
Channel Bandwidth: 20 MHz / 16QAM							
NB	26140	1860.0	-27.16	36.57	9.41	8.73	H
	26365	1882.5	-28.04	37.22	9.18	8.28	
	26590	1905.0	-29.68	38.72	9.04	8.02	
	26140	1860.0	-22.03	37.65	15.62	36.48	V
	26365	1882.5	-22.26	37.58	15.32	34.04	
	26590	1905.0	-22.36	37.56	15.20	33.11	
Channel Bandwidth: 20 MHz / 64QAM							
NB	26140	1860.0	-28.20	36.57	8.37	6.87	H
	26365	1882.5	-29.08	37.22	8.14	6.52	
	26590	1905.0	-30.77	38.72	7.95	6.24	
	26140	1860.0	-23.10	37.65	14.55	28.51	V
	26365	1882.5	-23.29	37.58	14.29	26.85	
	26590	1905.0	-23.44	37.56	14.12	25.82	

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

4.2 Modulation Characteristics Measurement

4.2.1 Limits of Modulation Characteristics

N/A

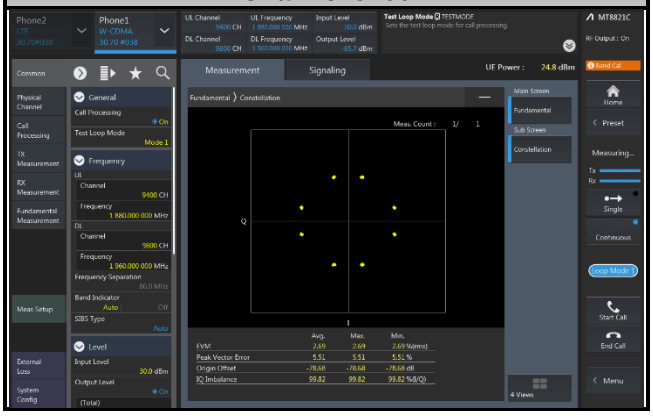
4.2.2 Test Setup

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.

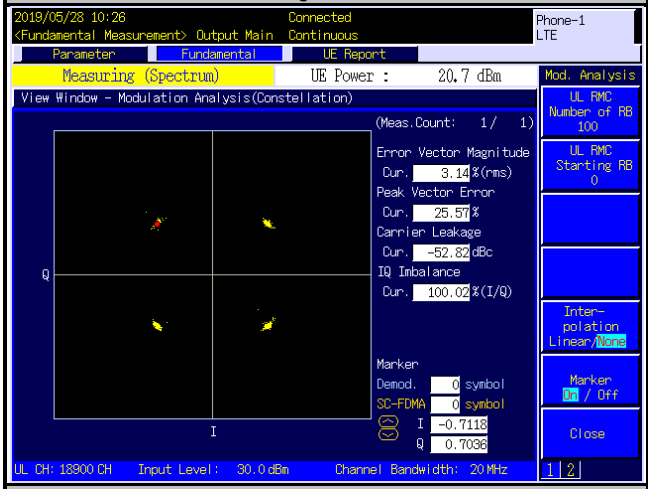
4.2.4 Test Results

Spectrum Plot of Measurement
WCDMA
Channel 9400

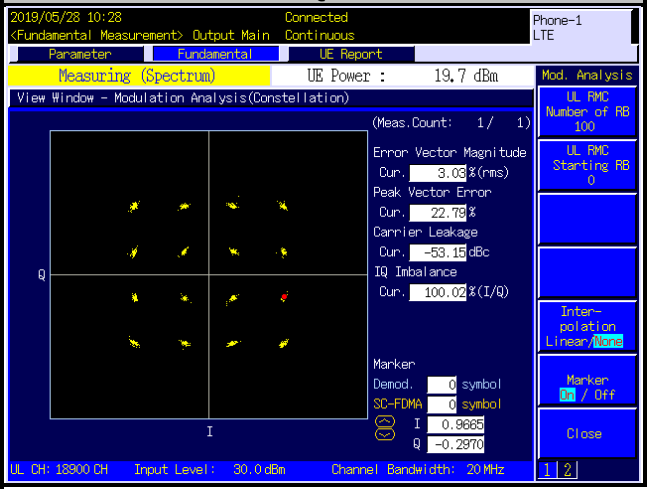


Spectrum Plot of Measurement
LTE Band 2
Channel 18900

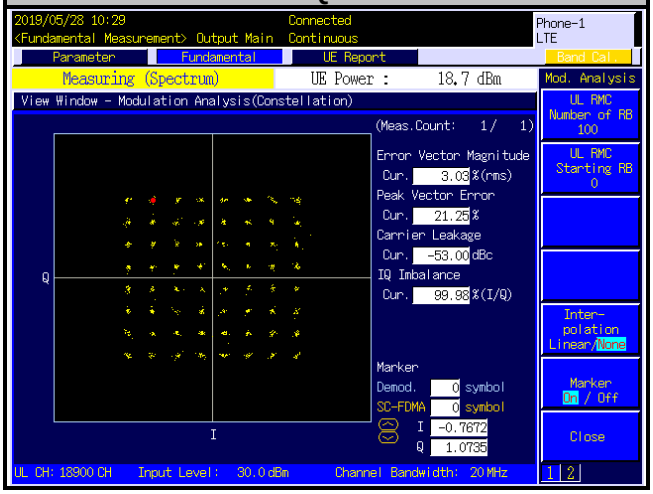
QPSK



16QAM

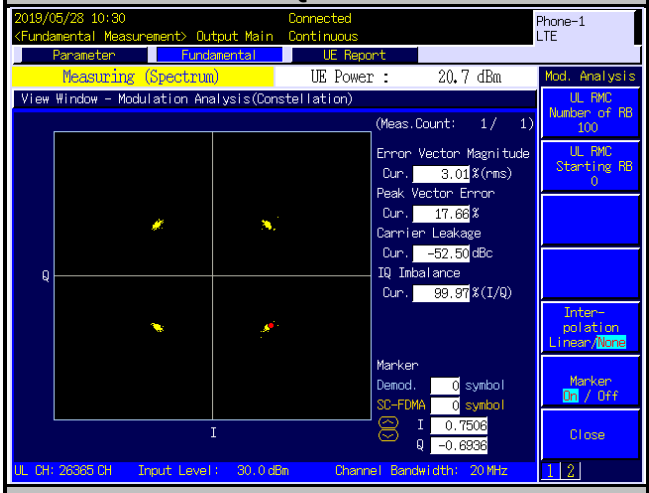


64QAM

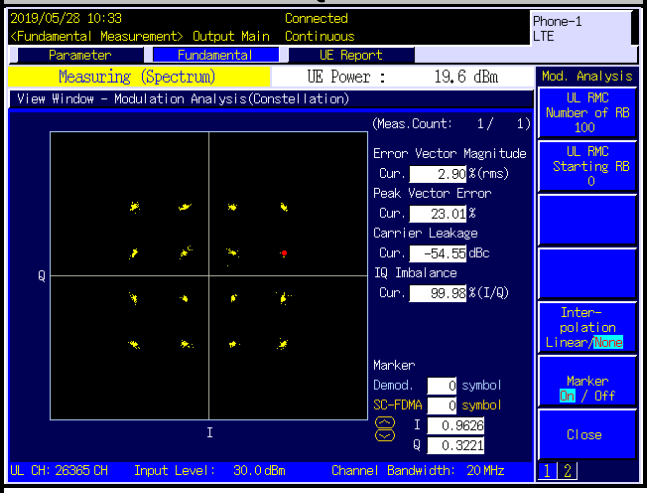


Spectrum Plot of Measurement
LTE Band 25
Channel 26365

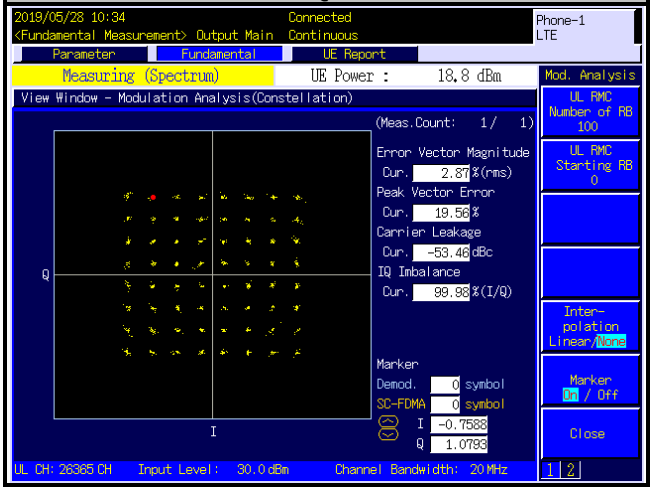
QPSK



16QAM



64QAM



4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stability Measurement

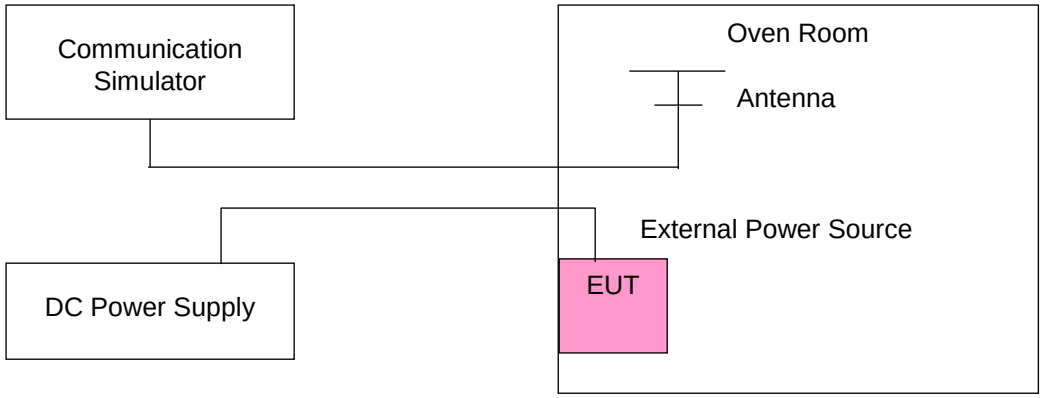
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

4.3.2 Test Procedure

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			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	1852.400004	0.002	1907.600004	0.002
102	1852.400004	0.002	1907.600003	0.002
138	1852.400003	0.002	1907.600003	0.002

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

Frequency Error vs. Temperature

Temp. (℃)	WCDMA			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1852.400002	0.001	1907.600003	0.001
-20	1852.400002	0.001	1907.600002	0.001
-10	1852.400002	0.001	1907.600001	0.001
0	1852.400004	0.002	1907.600002	0.001
10	1852.400001	0.001	1907.600002	0.001
20	1852.399997	-0.002	1907.599996	-0.002
30	1852.399998	-0.001	1907.599998	-0.001
40	1852.399997	-0.002	1907.599998	-0.001
50	1852.399997	-0.002	1907.599998	-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)
120	1850.700002	0.001	1909.300000	0.002
102	1850.700002	0.001	1909.300002	0.001
138	1850.700002	0.001	1909.300001	0.001

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

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 2			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1850.700004	0.002	1909.300002	0.001
-20	1850.700004	0.002	1909.300002	0.001
-10	1850.700004	0.002	1909.300002	0.001
0	1850.700004	0.002	1909.300001	0.001
10	1850.700004	0.002	1909.300003	0.001
20	1850.699996	-0.002	1909.300004	0.002
30	1850.699998	-0.001	1909.299998	-0.001
40	1850.699997	-0.002	1909.299997	-0.002
50	1850.699998	-0.001	1909.299999	-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)
120	1850.700003	0.002	1909.300000	0.001
102	1850.700003	0.002	1909.300003	0.002
138	1850.700003	0.002	1909.300001	0.001

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

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 2			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1850.700003	0.002	1909.300001	0.001
-20	1850.700004	0.002	1909.300003	0.002
-10	1850.700002	0.001	1909.300001	0.001
0	1850.700004	0.002	1909.300002	0.001
10	1850.700004	0.002	1909.300004	0.002
20	1850.699996	-0.002	1909.300003	0.001
30	1850.699998	-0.001	1909.299997	-0.002
40	1850.699998	-0.001	1909.299996	-0.002
50	1850.699997	-0.002	1909.299997	-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)
120	1850.700004	0.002	1909.300000	0.001
102	1850.700001	0.001	1909.300001	0.001
138	1850.700003	0.001	1909.300002	0.001

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

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 2			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1850.700002	0.001	1909.300002	0.001
-20	1850.700001	0.001	1909.300003	0.002
-10	1850.700003	0.002	1909.300002	0.001
0	1850.700003	0.002	1909.300003	0.002
10	1850.700002	0.001	1909.300003	0.001
20	1850.699999	-0.001	1909.300002	0.001
30	1850.699998	-0.001	1909.299997	-0.002
40	1850.699996	-0.002	1909.299996	-0.002
50	1850.699997	-0.002	1909.299998	-0.001

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)
120	1850.700003	0.002	1909.300000	0.002
102	1850.700003	0.002	1909.300001	0.001
138	1850.700003	0.002	1909.300004	0.002

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

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 2			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1850.700004	0.002	1909.300003	0.002
-20	1850.700002	0.001	1909.300003	0.002
-10	1850.700002	0.001	1909.300004	0.002
0	1850.700003	0.001	1909.300003	0.002
10	1850.700002	0.001	1909.300002	0.001
20	1850.699996	-0.002	1909.300001	0.001
30	1850.699996	-0.002	1909.299999	-0.001
40	1850.699996	-0.002	1909.299996	-0.002
50	1850.699997	-0.002	1909.299998	-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)
120	1850.700003	0.002	1909.300000	0.002
102	1850.700003	0.002	1909.300001	0.001
138	1850.700003	0.001	1909.300004	0.002

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

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 2			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1850.700004	0.002	1909.300002	0.001
-20	1850.700003	0.002	1909.300003	0.002
-10	1850.700003	0.001	1909.300001	0.001
0	1850.700004	0.002	1909.300003	0.001
10	1850.700003	0.002	1909.300003	0.001
20	1850.699996	-0.002	1909.300002	0.001
30	1850.699998	-0.001	1909.299996	-0.002
40	1850.699997	-0.002	1909.299998	-0.001
50	1850.699997	-0.002	1909.299997	-0.001

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)
120	1850.700002	0.001	1909.300000	0.001
102	1850.700003	0.002	1909.300002	0.001
138	1850.700004	0.002	1909.300003	0.001

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

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 2			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1850.700002	0.001	1909.300002	0.001
-20	1850.700003	0.002	1909.300003	0.001
-10	1850.700001	0.001	1909.300001	0.001
0	1850.700004	0.002	1909.300002	0.001
10	1850.700003	0.001	1909.300002	0.001
20	1850.699997	-0.002	1909.299998	-0.001
30	1850.699999	-0.001	1909.299998	-0.001
40	1850.699998	-0.001	1909.299998	-0.001
50	1850.699998	-0.001	1909.299998	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 25			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	1850.700003	0.002	1914.300002	0.001
102	1850.700004	0.002	1914.300002	0.001
138	1850.700003	0.002	1914.300004	0.002

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

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 25			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1850.700003	0.001	1914.300002	0.001
-20	1850.700002	0.001	1914.300001	0.001
-10	1850.700001	0.001	1914.300002	0.001
0	1850.700003	0.001	1914.300003	0.001
10	1850.700003	0.002	1914.300002	0.001
20	1850.699996	-0.002	1914.299998	-0.001
30	1850.699996	-0.002	1914.299997	-0.002
40	1850.699999	-0.001	1914.299998	-0.001
50	1850.699997	-0.002	1914.299999	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 25			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	1850.700003	0.002	1914.300002	0.001
102	1850.700003	0.002	1914.300004	0.002
138	1850.700003	0.002	1914.300001	0.001

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

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 25			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1850.700003	0.002	1914.300002	0.001
-20	1850.700003	0.002	1914.300004	0.002
-10	1850.700003	0.002	1914.300004	0.002
0	1850.700003	0.001	1914.300002	0.001
10	1850.700002	0.001	1914.300003	0.002
20	1850.699999	-0.001	1914.299996	-0.002
30	1850.699998	-0.001	1914.299996	-0.002
40	1850.699998	-0.001	1914.299996	-0.002
50	1850.699998	-0.001	1914.299999	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 25			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	1850.700003	0.002	1914.300003	0.002
102	1850.700002	0.001	1914.300002	0.001
138	1850.700002	0.001	1914.300002	0.001

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

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 25			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1850.700004	0.002	1914.300003	0.002
-20	1850.700002	0.001	1914.300003	0.002
-10	1850.700003	0.002	1914.300003	0.001
0	1850.700004	0.002	1914.300004	0.002
10	1850.700001	0.001	1914.300001	0.001
20	1850.699998	-0.001	1914.299998	-0.001
30	1850.699997	-0.002	1914.299998	-0.001
40	1850.699997	-0.002	1914.299998	-0.001
50	1850.699999	-0.001	1914.299997	-0.002

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 25			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	1850.700001	0.001	1914.300001	0.001
102	1850.700004	0.002	1914.300004	0.002
138	1850.700001	0.001	1914.300002	0.001

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

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 25			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1850.700001	0.001	1914.300003	0.001
-20	1850.700001	0.001	1914.300002	0.001
-10	1850.700004	0.002	1914.300001	0.001
0	1850.700002	0.001	1914.300001	0.001
10	1850.700002	0.001	1914.300004	0.002
20	1850.699998	-0.001	1914.299998	-0.001
30	1850.699997	-0.002	1914.299996	-0.002
40	1850.699997	-0.001	1914.299997	-0.002
50	1850.699998	-0.001	1914.299999	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 25			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	1850.700003	0.002	1914.300003	0.002
102	1850.700002	0.001	1914.300001	0.001
138	1850.700003	0.002	1914.300004	0.002

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

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 25			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1850.700002	0.001	1914.300002	0.001
-20	1850.700004	0.002	1914.300004	0.002
-10	1850.700001	0.001	1914.300001	0.001
0	1850.700002	0.001	1914.300003	0.002
10	1850.700002	0.001	1914.300001	0.001
20	1850.699998	-0.001	1914.299999	-0.001
30	1850.699998	-0.001	1914.299997	-0.002
40	1850.699997	-0.001	1914.299999	-0.001
50	1850.699997	-0.002	1914.299997	-0.002

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 25			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	1850.700002	0.001	1914.300002	0.001
102	1850.700003	0.002	1914.300004	0.002
138	1850.700002	0.001	1914.300001	0.001

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

Frequency Error vs. Temperature

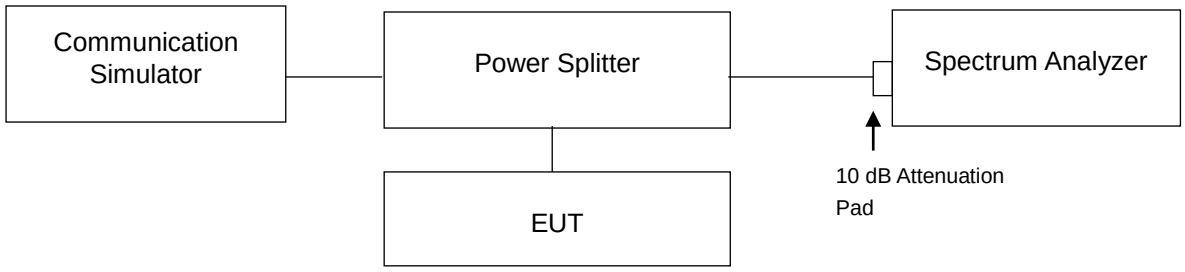
Temp. (℃)	LTE Band 25			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1850.700001	0.001	1914.300002	0.001
-20	1850.700002	0.001	1914.300002	0.001
-10	1850.700002	0.001	1914.300002	0.001
0	1850.700001	0.001	1914.300002	0.001
10	1850.700002	0.001	1914.300003	0.001
20	1850.699997	-0.002	1914.299997	-0.002
30	1850.699996	-0.002	1914.299998	-0.001
40	1850.699997	-0.002	1914.299998	-0.001
50	1850.699998	-0.001	1914.299997	-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.

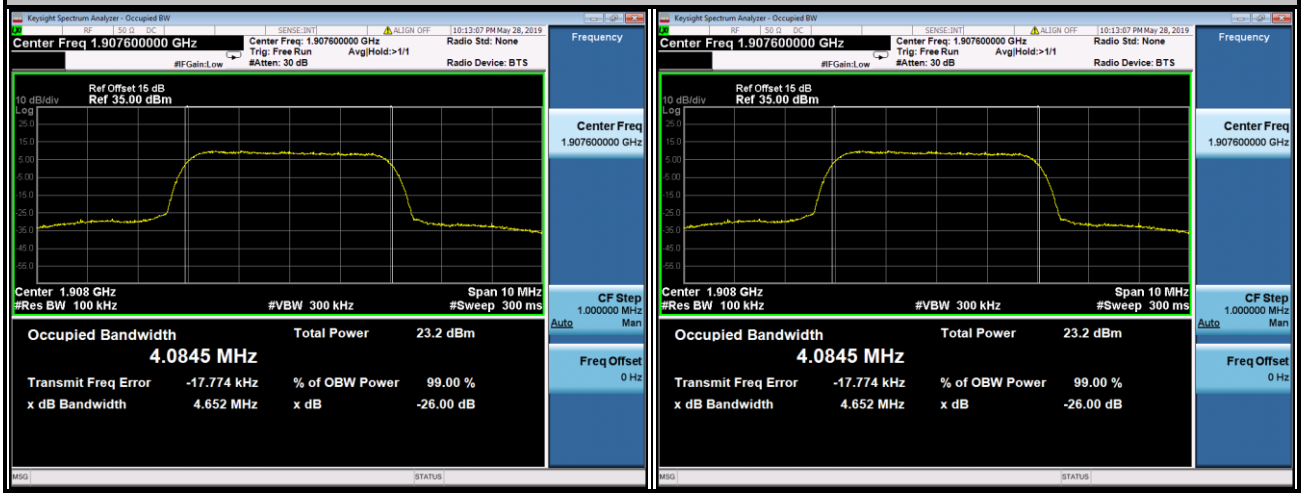
4.4.2 Test Setup



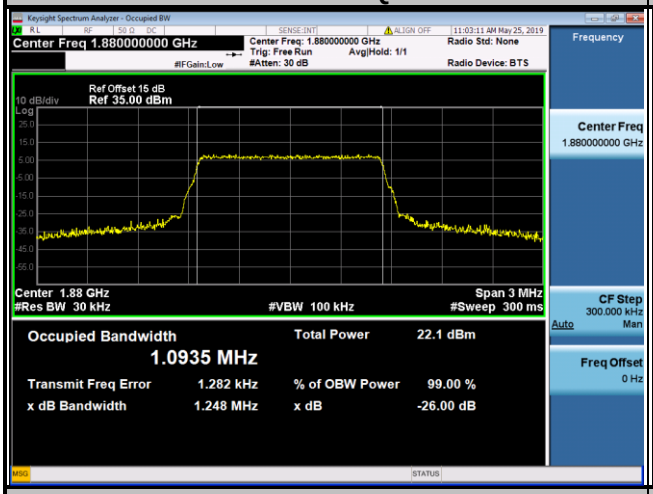
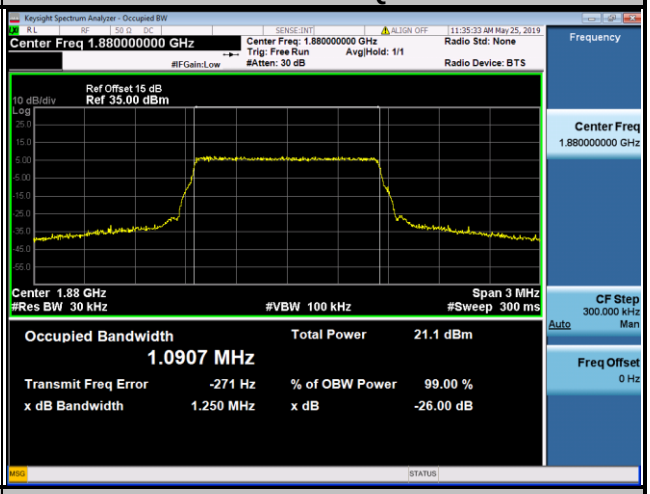
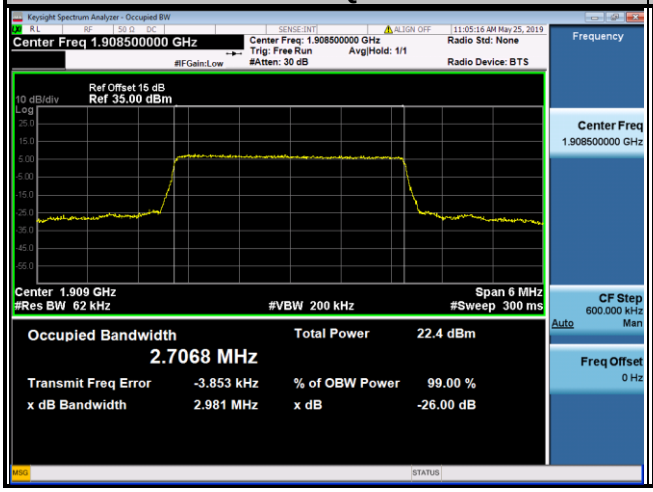
4.4.3 Test Result

WCDMA			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
9262	1852.4	4.080	4.650
9400	1880.0	4.079	4.651
9538	1907.6	4.085	4.652

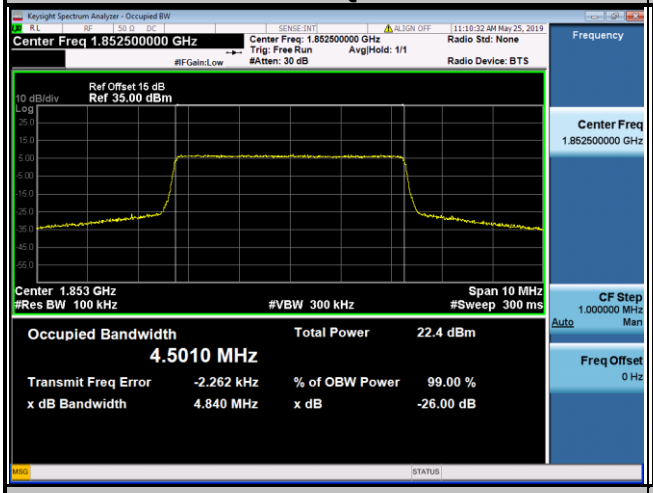
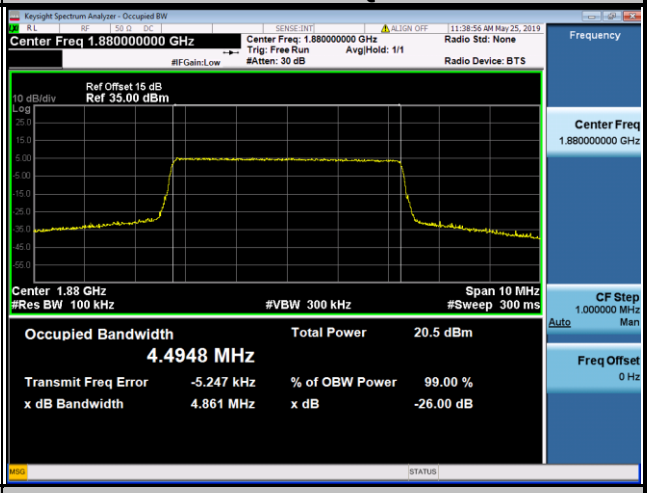
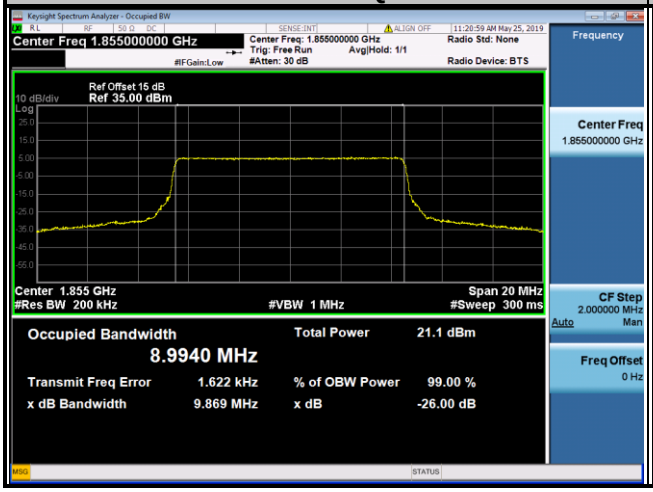
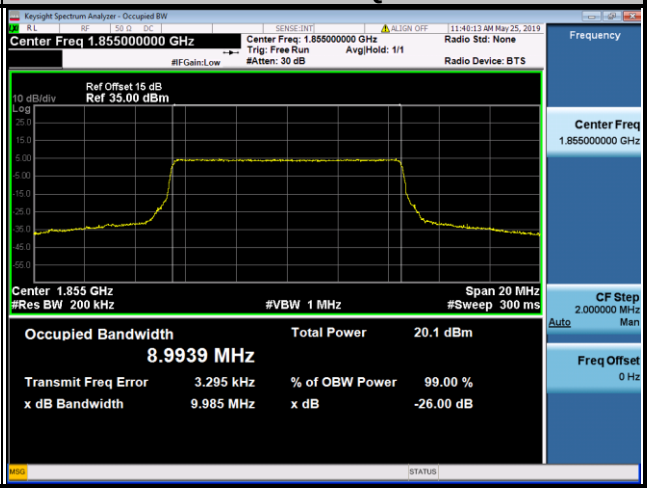
Spectrum Plot of Worst Value	
99 % Occupied Bandwidth	26 dB Bandwidth
WCDMA	



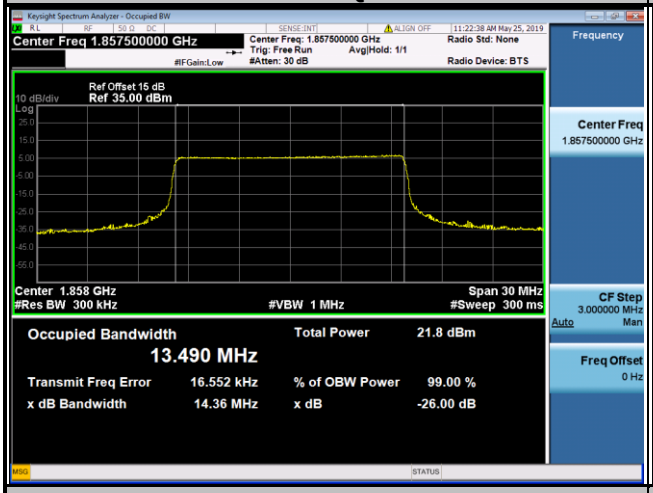
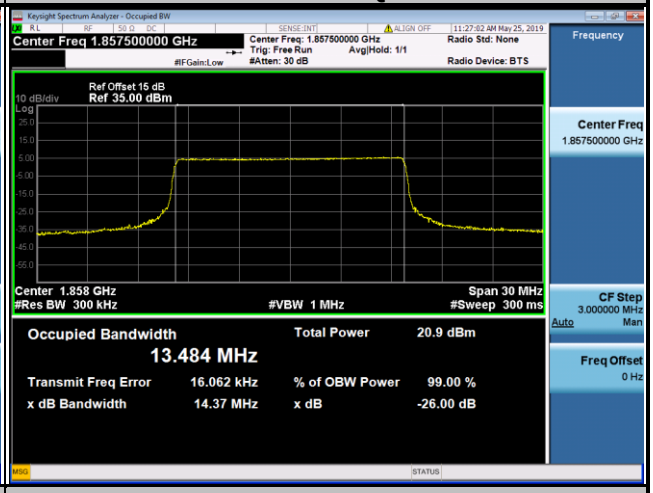
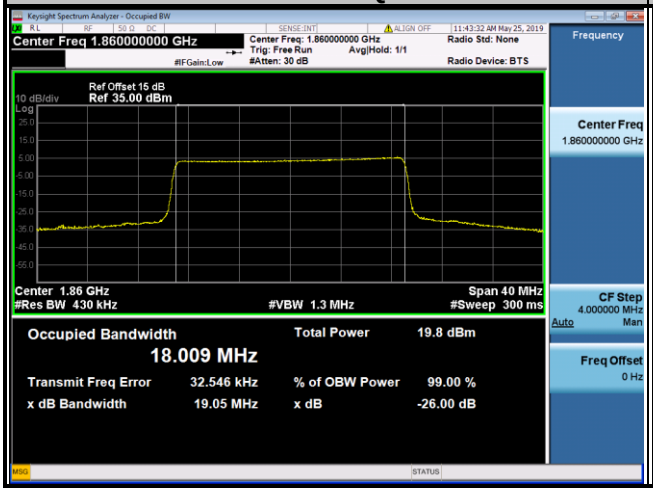
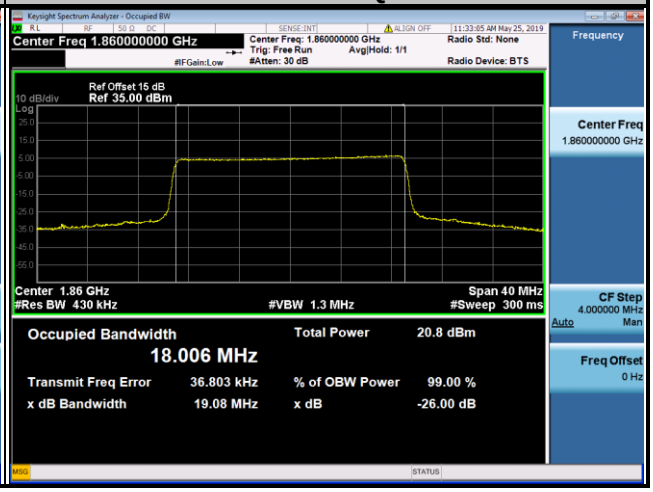
LTE Band 2							
Channel Bandwidth: 1.4 MHz							
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			26 dB Bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
18607	1850.7	1.089	1.091	1.091	1.244	1.245	1.245
18900	1880.0	1.091	1.094	1.091	1.240	1.248	1.250
19193	1909.3	1.093	1.093	1.091	1.247	1.247	1.245
Channel Bandwidth: 3 MHz							
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			26 dB Bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
18615	1851.5	2.704	2.702	2.702	2.961	2.972	2.968
18900	1880.0	2.704	2.704	2.703	2.960	2.972	2.964
19185	1908.5	2.707	2.702	2.702	2.981	2.972	2.959

Spectrum Plot of Worst Value	
99 % Occupied Bandwidth	26 dB Bandwidth
1.4 MHz / 16QAM	1.4 MHz / 64QAM
	
3 MHz / QPSK	3 MHz / QPSK
	

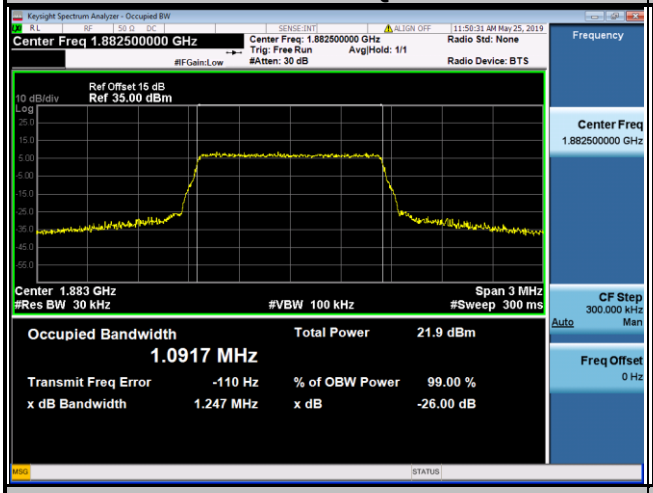
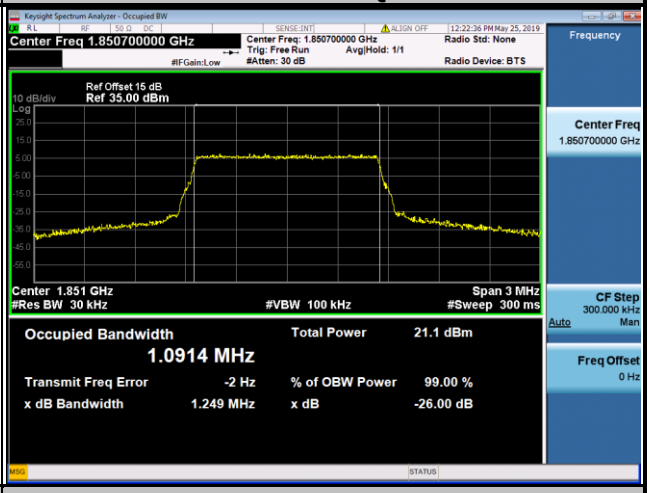
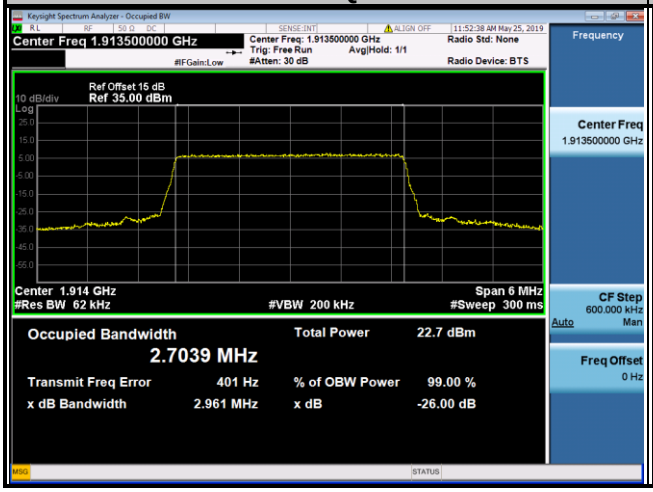
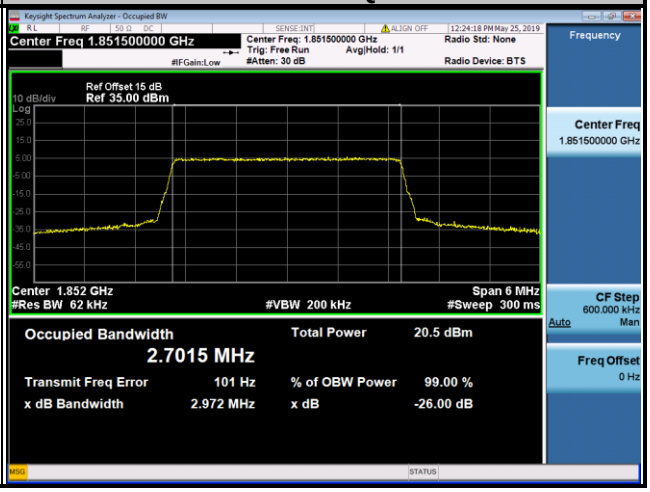
LTE Band 2							
Channel Bandwidth: 5 MHz							
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			26 dB Bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
18625	1852.5	4.501	4.496	4.498	4.840	4.847	4.836
18900	1880.0	4.496	4.493	4.495	4.841	4.819	4.861
19175	1907.5	4.499	4.497	4.496	4.839	4.824	4.823
Channel Bandwidth: 10 MHz							
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			26 dB Bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
18650	1855.0	8.992	8.994	8.994	9.950	9.869	9.985
18900	1880.0	8.980	8.976	8.982	9.763	9.774	9.797
19150	1905.0	8.963	8.959	8.962	9.753	9.791	9.684

Spectrum Plot of Worst Value	
99 % Occupied Bandwidth	26 dB Bandwidth
5 MHz / QPSK	5 MHz / 64QAM
	
10 MHz / 16QAM	10 MHz / 64QAM
	

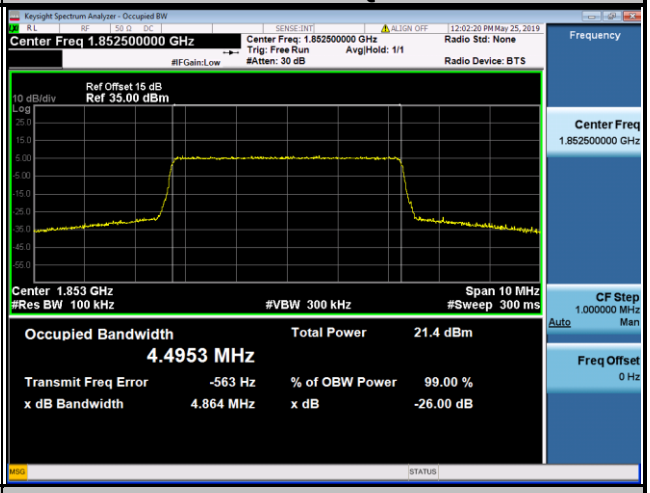
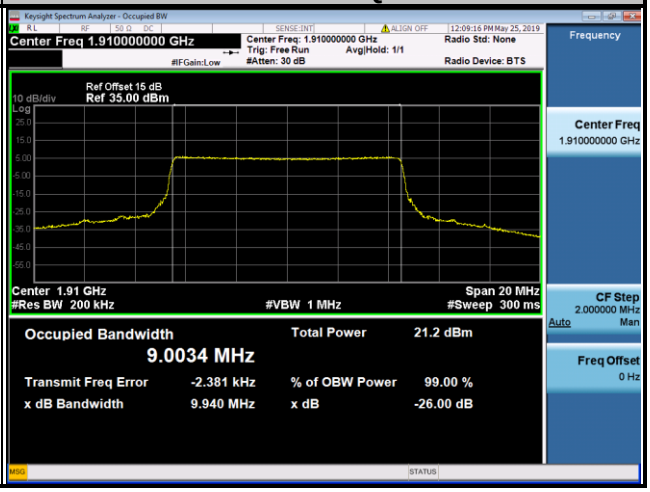
LTE Band 2							
Channel Bandwidth: 15 MHz							
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			26 dB Bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
18675	1857.5	13.490	13.484	13.486	14.360	14.370	14.340
18900	1880.0	13.456	13.447	13.450	14.310	14.280	14.300
19125	1902.5	13.416	13.413	13.415	14.270	14.280	14.280
Channel Bandwidth: 20 MHz							
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			26 dB Bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
18700	1860.0	17.996	18.006	18.009	19.050	19.080	19.050
18900	1880.0	17.941	17.937	17.941	19.040	19.020	19.030
19100	1900.0	17.896	17.905	17.908	19.040	19.020	19.030

Spectrum Plot of Worst Value	
99 % Occupied Bandwidth	26 dB Bandwidth
15 MHz / QPSK	15 MHz / 16QAM
	
20 MHz / 64QAM	20 MHz / 16QAM
	

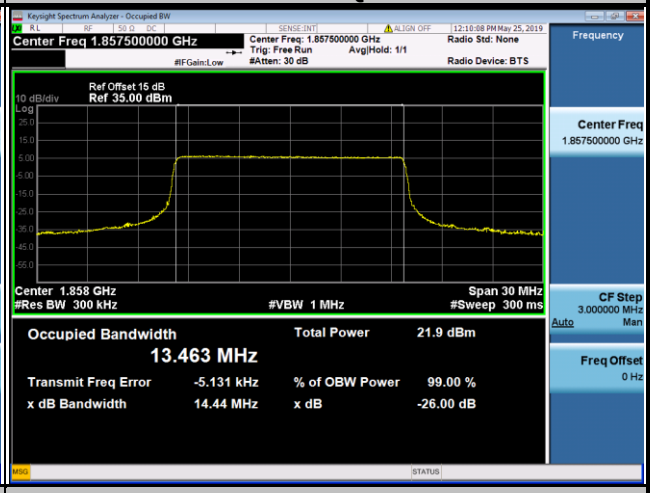
LTE Band 25							
Channel Bandwidth: 1.4 MHz							
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			26 dB Bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
26047	1850.7	1.091	1.091	1.091	1.236	1.247	1.249
26365	1882.5	1.091	1.092	1.092	1.242	1.247	1.244
26683	1914.3	1.091	1.092	1.090	1.243	1.246	1.241
Channel Bandwidth: 3 MHz							
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			26 dB Bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
26055	1851.5	2.703	2.704	2.702	2.966	2.968	2.972
26365	1882.5	2.703	2.699	2.700	2.971	2.960	2.972
26675	1913.5	2.704	2.698	2.702	2.961	2.961	2.970

Spectrum Plot of Worst Value	
99 % Occupied Bandwidth	26 dB Bandwidth
1.4 MHz / 16QAM	1.4 MHz / 64QAM
	
3 MHz / QPSK	3 MHz / 64QAM
	

LTE Band 25							
Channel Bandwidth: 5 MHz							
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			26 dB Bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
26065	1852.5	4.491	4.495	4.496	4.847	4.864	4.850
26365	1882.5	4.497	4.493	4.495	4.828	4.836	4.839
26665	1912.5	4.496	4.497	4.499	4.826	4.846	4.837
Channel Bandwidth: 10 MHz							
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			26 dB Bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
26090	1855.0	8.985	8.980	8.977	9.837	9.822	9.820
26365	1882.5	8.985	8.979	8.977	9.845	9.819	9.811
26640	1910.0	9.009	9.003	9.011	9.869	9.940	9.889

Spectrum Plot of Worst Value	
99 % Occupied Bandwidth	26 dB Bandwidth
5 MHz / 64QAM	5 MHz / 16QAM
	
10 MHz / 64QAM	10 MHz / 16QAM
	

LTE Band 25							
Channel Bandwidth: 15 MHz							
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			26 dB Bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
26115	1857.5	13.463	13.461	13.462	14.440	14.310	14.300
26365	1882.5	13.457	13.452	13.455	14.290	14.290	14.270
26615	1907.5	13.489	13.486	13.479	14.360	14.360	14.310
Channel Bandwidth: 20 MHz							
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			26 dB Bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
26140	1860.0	17.994	17.992	17.996	19.120	19.080	19.080
26365	1882.5	17.954	17.954	17.948	19.050	19.050	19.040
26590	1905.0	17.959	17.962	17.957	19.090	19.080	19.050

Spectrum Plot of Worst Value	
99 % Occupied Bandwidth	26 dB Bandwidth
15 MHz / QPSK	15 MHz / QPSK
	
20 MHz / 64QAM	20 MHz / QPSK