

FCC Test Report

(PART 24)

Report No.: RF170616D05-1

FCC ID: 2AMTS-LEC-2580P

Test Model: LEC-2580P

Series Model: LEC-2580xxxxxxx(where x can be 0-9, A-Z, a-z, any alphanumeric character or blank)

Received Date: Dec. 28, 2016

Test Date: Jan. 10, 2017 ~ Feb. 04, 2017

Issued Date: Jul. 26, 2017

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

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Release Control Record

Issue No.	Description	Date Issued
RF170616D05-1	Original Release	Jul. 26, 2017

1 Certificate of Conformity

Product: Fanless Embedded System

Brand: Lanner

Test Model: LEC-2580P

Series Model: LEC-2580xxxxxx(where x can be 0-9, A-Z, a-z, any alphanumeric character or blank)

Sample Status: Production Unit

Applicant: LEI Technology Canada Ltd.

Test Date: Jan. 10, 2017 ~ Feb. 04, 2017

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 EMC characteristics under the conditions specified in this report.

Prepared by : Evonne Liu , **Date:** Jul. 26, 2017
Evonne Liu / Specialist

Approved by : David Huang , **Date:** Jul. 26, 2017
David Huang / 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.
2.1046 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(b)	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 -25.77 dB at 127.97 MHz.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.44 dB
Radiated Emissions up to 1 GHz	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	ESCS 30	100027	Jun. 06, 2016	Jun. 05, 2017
Spectrum Analyzer Agilent	N9010A	MY52220314	Dec. 16, 2016	Dec. 15, 2017
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 13, 2016	Dec. 12, 2017
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Dec. 26, 2016	Dec. 27, 2017
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-969	Dec. 12, 2016	Dec. 11, 2017
Double Ridge Guide Horn Antenna EMCO	3115	5619	Dec. 27, 2016	Dec. 26, 2017
BILOG Antenna SCHWARZBECK	VULB 9168	9168-153	Dec. 13, 2016	Dec. 12, 2017
Agilent Communications Tester-Wireless	8960 Series 10	MY53201073	Jul. 03, 2015	Jul. 02, 2017
Preamplifier EMCI	EMC 012645	980115	Oct. 21, 2016	Oct. 20, 2017
Preamplifier EMCI	EMC 184045	980116	Oct. 21, 2016	Oct. 20, 2017
Preamplifier EMCI	EMC 330H	980112	Oct. 21, 2016	Oct. 20, 2017
Power Meter Anritsu	ML2495A	1232002	Sep. 08, 2016	Sep. 07, 2017
Power Sensor Anritsu	MA2411B	1207325	Sep. 08, 2016	Sep. 07, 2017
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309219/4 2950114	Oct. 21, 2016	Oct. 20, 2017
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250130/4	Oct. 21, 2016	Oct. 20, 2017
RF Coaxial Cable Worken	8D-FB	Cable-Ch10-01	Oct. 21, 2016	Oct. 20, 2017
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	MT8820C	6201300640	Aug. 10, 2015	Aug. 09, 2017
Temperature & Humidity Chamber	GTH-120-40-CP-A R	MAA1306-019	Sep. 02, 2016	Sep. 01, 2017
DC Power Supply Topward	33010D	807748	Oct. 25, 2016	Oct. 24, 2018
Digital Multimeter Fluke	87-III	70360742	Jul. 01, 2016	Jun. 30, 2017
Signal Generator Agilent	N5182B	MY53050430	Oct. 19, 2016	Oct. 18, 2017

- Note:
1. The calibration interval of the above test instruments is 12 / 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in HwaYa Chamber 10.
 3. The horn antenna and preamplifier (model: EMC 184045) are used only for the measurement of emission frequency above 1 GHz if tested.
 4. The IC Site Registration No. is IC7450F-10.

3 General Information

3.1 General Description of EUT

Product	Fanless Embedded System	
Brand	Lanner	
Test Model	LEC-2580P	
Series Model	LEC-2580xxxxxx(where x can be 0-9, A-Z, a-z, any alphanumeric character or blank)	
Status of EUT	Production Unit	
Power Supply Rating	24.0 Vdc (adapter)	
Modulation Type	GPRS	GMSK
	EDGE	GMSK, 8PSK
	WCDMA	BPSK
	CDMA	QPSK, OQPSK, HPSK
	LTE	QPSK, 16QAM
Frequency Range	GPRS/EDGE	1850.2 ~ 1909.8 MHz
	WCDMA	1852.4 ~ 1907.6 MHz
	CDMA	1851.3 ~ 1908.8 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	GPRS	1390.91 mW
	EDGE	525.17 mW
	WCDMA	220.95 mW
	CDMA	214.93 mW
	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	133.14 mW
	LTE Band 2 (Channel Bandwidth: 3 MHz)	135.93 mW
	LTE Band 2 (Channel Bandwidth: 5 MHz)	137.18 mW
	LTE Band 2 (Channel Bandwidth: 10 MHz)	140.38 mW
	LTE Band 2 (Channel Bandwidth: 15 MHz)	142.33 mW
	LTE Band 2 (Channel Bandwidth: 20 MHz)	144.64 mW
	LTE Band 25 (Channel Bandwidth: 1.4 MHz)	142.00 mW
	LTE Band 25 (Channel Bandwidth: 3 MHz)	144.98 mW
	LTE Band 25 (Channel Bandwidth: 5 MHz)	147.33 mW
	LTE Band 25 (Channel Bandwidth: 10 MHz)	149.04 mW
	LTE Band 25 (Channel Bandwidth: 15 MHz)	151.46 mW

Emission Designator	LTE Band 25 (Channel Bandwidth: 20 MHz)	153.57 mW
	GPRS	245KGXW
	EDGE	249KG7W
	WCDMA	4M19F9W
	CDMA	1M28F9W
	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	1M09W7D
	LTE Band 2 (Channel Bandwidth: 3 MHz)	2M70G7D
	LTE Band 2 (Channel Bandwidth: 5 MHz)	4M49W7D
	LTE Band 2 (Channel Bandwidth: 10 MHz)	9M0W7D
	LTE Band 2 (Channel Bandwidth: 15 MHz)	13M5G7D
	LTE Band 2 (Channel Bandwidth: 20 MHz)	18M0W7D
	LTE Band 25 (Channel Bandwidth: 1.4 MHz)	1M09W7D
	LTE Band 25 (Channel Bandwidth: 3 MHz)	2M70G7D
	LTE Band 25 (Channel Bandwidth: 5 MHz)	4M49W7D
	LTE Band 25 (Channel Bandwidth: 10 MHz)	8M98W7D
	LTE Band 25 (Channel Bandwidth: 15 MHz)	13M5G7D
	LTE Band 25 (Channel Bandwidth: 20 MHz)	18M1W7D
Antenna Type	Fixed Internal Antenna	
Accessory Device	Refer to Note as below	
Data Cable Supplied	Refer to Note as below	

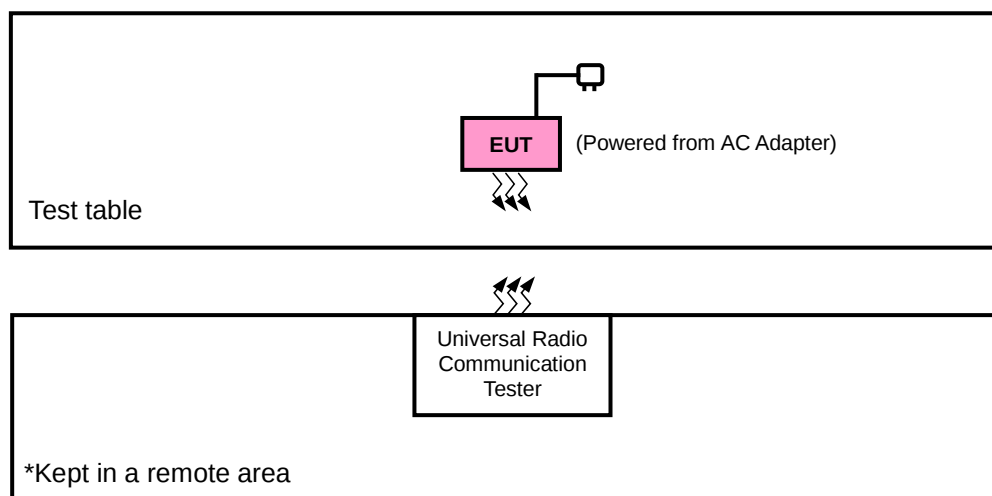
Note:

1. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter	FSP GROUP INC.	FSP120-AAAN2	I/P: 100-240 Vac, 50-60 Hz, 1.8 A O/P: 24 Vdc, 5 A
Battery	Panasonic	CR2032L-JP-W-1A	3 Vdc, 230 mAh
Main Board	Lanner	LEB-2580-V1.0	--
CPU	Intel	i7-6600U	2.6G
Memory	Transcend	TS512MSK64W3N(Samsung)	4G DDR3L 1333MHz
HDD	Intel	SSDSC2BX480G401940783	480G
WWAN Module	Sierra	MC7354	--

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

3.2 Configuration of System under Test



3.2.1 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	Universal Radio Communication Tester	R&S	CMU200	123295	N/A

No.	Signal Cable Description Of The Above Support Units
1.	N/A

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Items 1 acted as communication partners to transfer data.

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
GPRS	Z-plane	Z-axis
EDGE	Z-plane	Z-axis
WCDMA	Z-plane	Z-axis
CDMA	Z-plane	Z-axis
LTE Band 2	Z-plane	Z-axis
LTE Band 25	Z-plane	Z-axis

GSM

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

WCDMA

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	EIRP	9262 to 9538	9262, 9400, 9538	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
-	Conducuted Emission	9262 to 9538	9262, 9400, 9538	WCDMA
-	Radiated Emission	9262 to 9538	9262, 9400, 9538	WCDMA

CDMA

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	ERP	25 to 1175	25, 600, 1175	1xRTT
-	Frequency Stability	25 to 1175	25, 1175	1xRTT
-	Occupied Bandwidth	25 to 1175	25, 600, 1175	1xRTT
-	Band Edge	25 to 1175	25, 600, 1175	1xRTT
-	Peak to Average Ratio	25 to 1175	25, 1175	1xRTT
-	Conducuted Emission	25 to 1175	25, 600, 1175	1xRTT
-	Radiated Emission	25 to 1175	25, 600, 1175	1xRTT

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
-	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
						6 RB / 0 RB Offset
		18615 to 19185	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
		18615 to 19185	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
		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
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 / 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	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.

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	1 RB / 0 RB Offset
		26055 to 26675	26055, 26365, 26675	3 MHz	QPSK / 16QAM	1 RB / 0 RB Offset
		26065 to 26665	26065, 26365, 26665	5 MHz	QPSK / 16QAM	1 RB / 0 RB Offset
		26090 to 26640	26090, 26365, 26640	10 MHz	QPSK / 16QAM	1 RB / 0 RB Offset
		26115 to 26615	26115, 26365, 26615	15 MHz	QPSK / 16QAM	1 RB / 0 RB Offset
		26140 to 26590	26140, 26365, 26590	20 MHz	QPSK / 16QAM	1 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	6 RB / 0 RB Offset
		26055 to 26675	26055, 26365, 26675	3 MHz	QPSK / 16QAM	15 RB / 0 RB Offset
		26065 to 26665	26065, 26365, 26665	5 MHz	QPSK / 16QAM	25 RB / 0 RB Offset
		26090 to 26640	26090, 26365, 26640	10 MHz	QPSK / 16QAM	50 RB / 0 RB Offset
		26115 to 26615	26115, 26365, 26615	15 MHz	QPSK / 16QAM	75 RB / 0 RB Offset
		26140 to 26590	26140, 26365, 26590	20 MHz	QPSK / 16QAM	100 RB / 0 RB Offset
	Peak to Average Ratio	26047 to 26683	26047, 26365, 26683	1.4 MHz	QPSK / 16QAM	1 RB / 0 RB Offset
		26055 to 26675	26055, 26365, 26675	3 MHz	QPSK / 16QAM	1 RB / 7 RB Offset
		26065 to 26665	26065, 26365, 26665	5 MHz	QPSK / 16QAM	1 RB / 12 RB Offset
		26090 to 26640	26090, 26365, 26640	10 MHz	QPSK / 16QAM	1 RB / 24 RB Offset
		26115 to 26615	26115, 26365, 26615	15 MHz	QPSK / 16QAM	75 RB / 0 RB Offset
		26140 to 26590	26140, 26365, 26590	20 MHz	QPSK / 16QAM	100 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
			26683	1.4 MHz	QPSK	6 RB / 0 RB Offset
		26055 to 26675	26055	3 MHz	QPSK	1 RB / 5 RB Offset
			26675	3 MHz	QPSK	6 RB / 0 RB Offset
			26055	3 MHz	QPSK	1 RB / 0 RB Offset
			26675	3 MHz	QPSK	1 RB / 0 RB Offset
		26065 to 26665	26065	5 MHz	QPSK	1 RB / 14 RB Offset
			26665	5 MHz	QPSK	15 RB / 0 RB Offset
			26065	5 MHz	QPSK	1 RB / 0 RB Offset
			26665	5 MHz	QPSK	25 RB / 0 RB Offset
		26090 to 26640	26090	10 MHz	QPSK	1 RB / 24 RB Offset
			26640	10 MHz	QPSK	25 RB / 0 RB Offset
			26090	10 MHz	QPSK	1 RB / 0 RB Offset
			26640	10 MHz	QPSK	50 RB / 0 RB Offset
		26115 to 26615	26115	15 MHz	QPSK	1 RB / 49 RB Offset
			26615	15 MHz	QPSK	50 RB / 0 RB Offset
			26115	15 MHz	QPSK	1 RB / 0 RB Offset
			26615	15 MHz	QPSK	75 RB / 0 RB Offset
		26140 to 26590	26140	20 MHz	QPSK	1 RB / 74 RB Offset
			26590	20 MHz	QPSK	75 RB / 0 RB Offset
			26140	20 MHz	QPSK	1 RB / 0 RB Offset
			26590	20 MHz	QPSK	100 RB / 0 RB Offset
-	Conducted Emission	26047 to 26683	26047, 26365, 26683	1.4 MHz	QPSK	1 RB / 99 RB Offset
		26055 to 26675	26055, 26365, 26675	3 MHz	QPSK	100 RB / 0 RB Offset
		26065 to 26665	26065, 26365, 26665	5 MHz	QPSK	1 RB / 5 RB Offset
		26090 to 26640	26090, 26365, 26640	10 MHz	QPSK	1 RB / 7 RB Offset
		26115 to 26615	26115, 26365, 26615	15 MHz	QPSK	1 RB / 12 RB Offset
		26140 to 26590	26140, 26365, 26590	20 MHz	QPSK	1 RB / 24 RB Offset
-	Radiated Emission	26140 to 26590	26140, 26365, 26590	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	3 Vdc	Toby Tian
Frequency Stability	26 deg. C, 58 % RH	3 Vdc	Taylor Liu
Occupied Bandwidth	26 deg. C, 58 % RH	3 Vdc	Taylor Liu
Band Edge	26 deg. C, 58 % RH	3 Vdc	Taylor Liu
Peak to Average Ratio	26 deg. C, 58 % RH	3 Vdc	Taylor Liu
Conducuted Emission	26 deg. C, 58 % RH	3 Vdc	Taylor Liu
Radiated Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Toby Tian

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 v02r02

ANSI/TIA/EIA-603-D 2010

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:

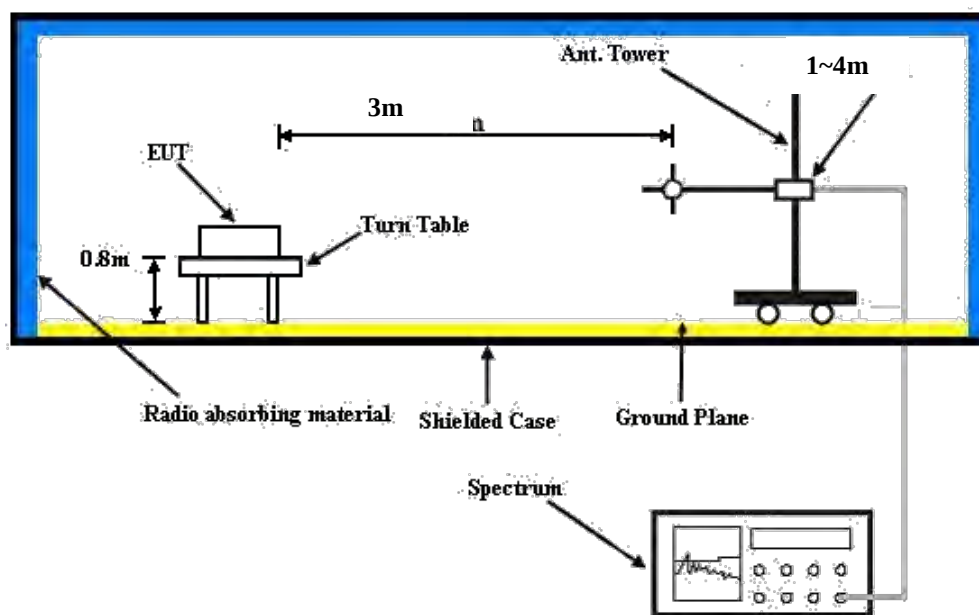
- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 1 MHz for GSM, GPRS & EDGE, 5 MHz for WCDMA and CDMA, and 10 MHz for LTE mode.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m height of 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 1m to 4m 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 from E.I.R.P power by subtracting the gain of dipole, $E.R.P \text{ power} = E.I.P.R \text{ power} - 2.15 \text{ dBi}$.

Conducted Power Measurement:

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:



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)	30.19	30.29	30.21
GPRS (GMSK, 2Tx-slot)	29.51	29.55	29.45
EDGE (8PSK, 1Tx-slot)	25.79	25.91	25.77
EDGE (8PSK, 2Tx-slot)	25.74	25.80	25.71
EDGE (8PSK, 3Tx-slot)	25.55	25.63	25.54
EDGE (8PSK, 4Tx-slot)	24.28	24.30	24.21

Band	WCDMA II		
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880.0	1907.6
RMC 12.2K	22.81	23.05	23.02
HSDPA Subtest-1	21.89	22.05	22.01
HSDPA Subtest-2	21.54	21.67	22.05
HSDPA Subtest-3	21.41	21.64	21.71
HSDPA Subtest-4	21.89	21.62	21.74
HSUPA Subtest-1	20.67	20.93	20.87
HSUPA Subtest-2	18.73	18.99	18.81
HSUPA Subtest-3	19.54	19.10	19.78
HSUPA Subtest-4	18.77	18.89	18.85
HSUPA Subtest-5	20.65	20.91	20.83

Band	CDMA		
Channel	25	600	1175
Frequency (MHz)	1851.25	1880	1908.75
RC1+SO55	22.65	22.67	22.77
RC3+SO55	22.56	22.62	22.52
RC3+SO32 (+F-SCH)	22.47	22.53	22.48
RC3+SO32 (+SCH)	22.41	22.48	22.39
RTAP 153.6	22.38	22.41	22.36
RETAP 4096	22.32	22.38	22.31

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18607	Mid Ch 18900	High Ch 19193		Low Ch 18607	Mid Ch 18900	High Ch 19193	
			1850.7 MHz	1880.0 MHz	1909.3 MHz		1850.7 MHz	1880.0 MHz	1909.3 MHz	
2 / 1.4M	1	0	22.72	23.01	22.96	0	21.65	21.92	21.88	1
	1	2	22.56	22.92	22.83	0	21.59	21.82	21.78	1
	1	5	22.48	22.71	22.59	0	21.33	21.66	21.62	1
	3	0	22.65	22.91	22.95	0	21.64	21.83	21.93	1
	3	1	22.51	22.76	22.75	0	21.39	21.68	21.78	1
	3	3	22.39	22.68	22.62	0	21.30	21.62	21.68	1
	6	0	21.71	21.88	21.91	1	20.52	20.88	20.85	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18615	Mid Ch 18900	High Ch 19185		Low Ch 18615	Mid Ch 18900	High Ch 19185	
			1851.5 MHz	1880.0 MHz	1908.5 MHz		1851.5 MHz	1880.0 MHz	1908.5 MHz	
2 / 3M	1	0	22.74	23.05	23.01	0	21.65	22.04	22.00	1
	1	7	22.59	22.90	22.92	0	21.56	21.94	21.85	1
	1	14	22.38	22.80	22.66	0	21.42	21.83	21.69	1
	8	0	21.87	21.92	21.81	1	20.79	20.77	20.60	2
	8	3	21.78	21.80	21.72	1	20.76	20.81	20.70	2
	8	7	21.52	21.58	21.57	1	20.62	20.56	20.56	2
	15	0	21.64	21.96	21.82	1	20.59	20.90	20.85	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18625	Mid Ch 18900	High Ch 19175		Low Ch 18625	Mid Ch 18900	High Ch 19175	
			1852.5 MHz	1880.0 MHz	1907.5 MHz		1852.5 MHz	1880.0 MHz	1907.5 MHz	
2 / 5M	1	0	22.83	23.14	23.04	0	21.79	22.05	21.99	1
	1	12	22.73	23.03	22.90	0	21.70	21.94	21.81	1
	1	24	22.45	22.87	22.75	0	21.43	21.75	21.81	1
	12	0	21.82	21.87	21.73	1	20.64	20.73	20.53	2
	12	6	21.71	21.75	21.57	1	20.63	20.69	20.48	2
	12	13	21.56	21.65	21.50	1	20.46	20.49	20.40	2
	25	0	21.62	22.07	21.91	1	20.73	20.93	20.87	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18650	Mid Ch 18900	High Ch 19150		Low Ch 18650	Mid Ch 18900	High Ch 19150	
			1855.0 MHz	1880.0 MHz	1905.0 MHz		1855.0 MHz	1880.0 MHz	1905.0 MHz	
2 / 10M	1	0	23.17	23.29	23.11	0	22.16	22.24	22.09	1
	1	24	23.01	23.13	22.99	0	22.02	22.06	21.87	1
	1	49	22.86	22.94	22.87	0	21.84	21.88	21.74	1
	25	0	21.84	21.96	21.85	1	20.78	20.93	20.71	2
	25	12	21.74	21.84	21.74	1	20.66	20.80	20.65	2
	25	25	21.57	21.69	21.55	1	20.61	20.58	20.56	2
	50	0	22.14	22.21	22.09	1	20.89	21.17	20.90	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18675	Mid Ch 18900	High Ch 19125		Low Ch 18675	Mid Ch 18900	High Ch 19125	
			1857.5 MHz	1880.0 MHz	1902.5 MHz		1857.5 MHz	1880.0 MHz	1902.5 MHz	
2 / 15M	1	0	23.13	23.31	23.09	0	22.06	22.28	22.03	1
	1	37	22.99	23.16	22.97	0	22.00	22.13	21.86	1
	1	74	22.88	23.08	22.85	0	21.84	21.96	21.85	1
	36	0	21.73	21.88	21.76	1	20.57	20.82	20.68	2
	36	19	21.62	21.79	21.60	1	20.57	20.70	20.60	2
	36	39	21.38	21.57	21.48	1	20.26	20.61	20.49	2
	75	0	22.10	22.10	22.04	1	21.04	21.22	21.00	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18700	Mid Ch 18900	High Ch 19100		Low Ch 18700	Mid Ch 18900	High Ch 19100	
			1860.0 MHz	1880.0 MHz	1900.0 MHz		1860.0 MHz	1880.0 MHz	1900.0 MHz	
2 / 20M	1	0	23.14	23.32	23.17	0	22.06	22.25	22.09	1
	1	50	22.99	23.19	23.07	0	21.92	22.16	21.99	1
	1	99	22.83	23.04	22.91	0	21.84	21.98	21.80	1
	50	0	21.79	21.93	21.84	1	20.78	20.82	20.81	2
	50	25	21.70	21.84	21.70	1	20.57	20.77	20.69	2
	50	50	21.41	21.68	21.50	1	20.47	20.59	20.55	2
	100	0	22.01	22.21	22.13	1	20.89	21.15	21.01	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 26047	Mid Ch 26365	High Ch 26683		Low Ch 26047	Mid Ch 26365	High Ch 26683	
			1850.7 MHz	1882.5 MHz	1914.3 MHz		1850.7 MHz	1882.5 MHz	1914.3 MHz	
25 / 1.4M	1	0	22.78	22.94	22.85	0	21.75	21.90	21.84	1
	1	2	22.68	22.79	22.70	0	21.58	21.79	21.66	1
	1	5	22.54	22.70	22.54	0	21.46	21.61	21.53	1
	3	0	22.77	22.91	22.83	0	21.68	21.89	21.76	1
	3	1	22.65	22.82	22.69	0	21.58	21.70	21.71	1
	3	3	22.51	22.66	22.48	0	21.42	21.56	21.56	1
	6	0	21.66	21.83	21.83	1	20.53	20.67	20.79	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 26055	Mid Ch 26365	High Ch 26675		Low Ch 26055	Mid Ch 26365	High Ch 26675	
			1851.5 MHz	1882.5 MHz	1913.5 MHz		1851.5 MHz	1882.5 MHz	1913.5 MHz	
25 / 3M	1	0	22.81	23.04	22.94	0	21.73	21.95	21.85	1
	1	7	22.72	22.92	22.79	0	21.61	21.85	21.76	1
	1	14	22.57	22.81	22.64	0	21.46	21.67	21.49	1
	8	0	21.67	21.89	21.83	1	20.61	20.82	20.62	2
	8	3	21.56	21.77	21.73	1	20.45	20.73	20.63	2
	8	7	21.41	21.66	21.47	1	20.25	20.52	20.42	2
	15	0	21.67	21.87	21.87	1	20.58	20.86	20.67	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 26065	Mid Ch 26365	High Ch 26665		Low Ch 26065	Mid Ch 26365	High Ch 26665	
			1852.5 MHz	1882.5 MHz	1912.5 MHz		1852.5 MHz	1882.5 MHz	1912.5 MHz	
25 / 5M	1	0	22.83	23.06	23.01	0	21.77	21.97	21.95	1
	1	12	22.74	22.97	22.91	0	21.65	21.85	21.78	1
	1	24	22.62	22.76	22.63	0	21.53	21.65	21.74	1
	12	0	21.79	22.01	21.94	1	20.76	20.83	20.76	2
	12	6	21.68	21.92	21.79	1	20.60	20.88	20.78	2
	12	13	21.53	21.80	21.56	1	20.43	20.72	20.63	2
	25	0	21.68	21.86	21.91	1	20.65	20.83	20.89	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 26090	Mid Ch 26365	High Ch 26640		Low Ch 26090	Mid Ch 26365	High Ch 26640	
			1855.0 MHz	1882.5 MHz	1910.0 MHz		1855.0 MHz	1882.5 MHz	1910.0 MHz	
25 / 10M	1	0	22.86	23.09	23.02	0	21.81	22.00	21.97	1
	1	24	22.77	22.93	22.87	0	21.69	21.94	21.84	1
	1	49	22.58	22.86	22.72	0	21.55	21.68	21.73	1
	25	0	21.81	21.94	21.96	1	20.67	20.86	20.76	2
	25	12	21.70	21.82	21.86	1	20.69	20.82	20.81	2
	25	25	21.49	21.73	21.69	1	20.51	20.58	20.60	2
	50	0	21.75	22.05	21.95	1	20.60	20.90	20.94	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 26115	Mid Ch 26365	High Ch 26615		Low Ch 26115	Mid Ch 26365	High Ch 26615	
			1857.5 MHz	1882.5 MHz	1907.5 MHz		1857.5 MHz	1882.5 MHz	1907.5 MHz	
25 / 15M	1	0	22.93	23.11	23.04	0	21.89	22.08	21.96	1
	1	37	22.82	22.98	22.91	0	21.79	21.96	21.91	1
	1	74	22.60	22.78	22.77	0	21.65	21.85	21.66	1
	36	0	21.63	21.96	21.75	1	20.61	20.78	20.60	2
	36	19	21.53	21.87	21.60	1	20.47	20.78	20.55	2
	36	39	21.33	21.66	21.53	1	20.29	20.68	20.51	2
	75	0	21.71	21.98	21.97	1	20.70	20.88	20.85	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 26140	Mid Ch 26365	High Ch 26590		Low Ch 26140	Mid Ch 26365	High Ch 26590	
			1860.0 MHz	1882.5 MHz	1905.0 MHz		1860.0 MHz	1882.5 MHz	1905.0 MHz	
25 / 20M	1	0	22.95	23.13	23.10	0	21.92	22.10	22.08	1
	1	50	22.79	23.03	22.96	0	21.79	21.95	21.93	1
	1	99	22.64	22.76	22.73	0	21.55	21.82	21.74	1
	50	0	21.71	21.99	21.77	1	20.51	20.81	20.70	2
	50	25	21.55	21.89	21.61	1	20.58	20.84	20.54	2
	50	50	21.33	21.76	21.45	1	20.33	20.58	20.45	2
	100	0	21.92	22.04	21.88	1	20.71	20.96	21.01	2

EIRP Power (dBm)

GPRS							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	512	1850.2	-15.34	36.57	21.23	132.80	H
	661	1880.0	-15.41	37.22	21.81	151.84	
	810	1909.8	-15.47	37.18	21.71	148.32	
	512	1850.2	-6.55	37.65	31.10	1288.55	V
	661	1880.0	-6.15	37.58	31.43	1390.91	
	810	1909.8	-6.47	37.48	31.01	1261.83	

EDGE							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	512	1850.2	-19.18	36.57	17.39	54.85	H
	661	1880.0	-19.81	37.22	17.41	55.13	
	810	1909.8	-19.96	37.18	17.22	52.75	
	512	1850.2	-10.46	37.65	27.19	523.72	V
	661	1880.0	-10.38	37.58	27.20	525.17	
	810	1909.8	-10.34	37.48	27.14	517.61	

WCDMA							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	9262	1852.4	-24.49	36.57	12.08	16.15	H
	9400	1880.0	-25.08	37.22	12.14	16.38	
	9538	1907.6	-25.08	37.18	12.10	16.23	
	9262	1852.4	-14.28	37.65	23.37	217.32	V
	9400	1880.0	-14.14	37.58	23.44	220.95	
	9538	1907.6	-14.16	37.48	23.32	214.78	

CDMA							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	25	1851.25	-24.48	36.57	12.09	16.19	H
	600	1880.00	-24.69	37.22	12.53	17.92	
	1175	1908.75	-24.96	37.18	12.22	16.68	
	25	1851.25	-14.56	37.65	23.09	203.75	V
	600	1880.00	-14.26	37.58	23.32	214.93	
	1175	1908.75	-14.36	37.48	23.12	205.12	

LTE Band 2							
Channel Bandwidth: 1.4 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	18607	1850.7	-27.65	36.57	8.92	7.80	H
	18900	1880.0	-28.22	37.22	9.00	7.95	
	19193	1909.3	-28.21	37.18	8.97	7.89	
	18607	1850.7	-16.45	37.65	21.20	131.86	V
	18900	1880.0	-16.34	37.58	21.24	133.14	
	19193	1909.3	-16.29	37.48	21.19	131.52	
Channel Bandwidth: 1.4 MHz / 16QAM							
Z	18607	1850.7	-28.52	36.57	8.05	6.39	H
	18900	1880.0	-29.12	37.22	8.10	6.46	
	19193	1909.3	-29.11	37.18	8.07	6.42	
	18607	1850.7	-17.25	37.65	20.40	109.67	V
	18900	1880.0	-17.14	37.58	20.44	110.74	
	19193	1909.3	-17.14	37.48	20.34	108.14	

LTE Band 2							
Channel Bandwidth: 3 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	18615	1851.5	-27.58	36.57	8.99	7.93	H
	18900	1880.0	-28.04	37.22	9.18	8.29	
	19185	1908.5	-28.10	37.18	9.08	8.09	
	18615	1851.5	-16.40	37.65	21.25	133.38	V
	18900	1880.0	-16.25	37.58	21.33	135.93	
	19185	1908.5	-16.20	37.48	21.28	134.28	
Channel Bandwidth: 3 MHz / 16QAM							
Z	18615	1851.5	-28.49	36.57	8.08	6.43	H
	18900	1880.0	-29.10	37.22	8.12	6.49	
	19185	1908.5	-29.07	37.18	8.11	6.47	
	18615	1851.5	-17.20	37.65	20.45	110.94	V
	18900	1880.0	-16.87	37.58	20.71	117.84	
	19185	1908.5	-17.02	37.48	20.46	111.17	

LTE Band 2							
Channel Bandwidth: 5 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	18625	1852.5	-27.41	36.57	9.16	8.25	H
	18900	1880.0	-28.00	37.22	9.22	8.36	
	19175	1907.5	-28.03	37.18	9.15	8.23	
	18625	1852.5	-16.32	37.65	21.33	135.86	V
	18900	1880.0	-16.21	37.58	21.37	137.18	
	19175	1907.5	-16.12	37.48	21.36	136.77	
Channel Bandwidth: 5 MHz / 16QAM							
Z	18625	1852.5	-28.41	36.57	8.16	6.55	H
	18900	1880.0	-29.05	37.22	8.17	6.57	
	19175	1907.5	-29.05	37.18	8.13	6.50	
	18625	1852.5	-17.01	37.65	20.64	115.90	V
	18900	1880.0	-16.81	37.58	20.77	119.48	
	19175	1907.5	-16.94	37.48	20.54	113.24	

LTE Band 2							
Channel Bandwidth: 10 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	18650	1855.0	-27.32	36.57	9.25	8.42	H
	18900	1880.0	-27.93	37.22	9.29	8.50	
	19150	1905.0	-27.95	37.18	9.23	8.38	
	18650	1855.0	-16.24	37.65	21.41	138.39	V
	18900	1880.0	-16.11	37.58	21.47	140.38	
	19150	1905.0	-16.05	37.48	21.43	139.00	
Channel Bandwidth: 10 MHz / 16QAM							
Z	18650	1855.0	-28.32	36.57	8.25	6.69	H
	18900	1880.0	-28.94	37.22	8.28	6.74	
	19150	1905.0	-28.95	37.18	8.23	6.66	
	18650	1855.0	-16.96	37.65	20.69	117.25	V
	18900	1880.0	-16.74	37.58	20.84	121.42	
	19150	1905.0	-16.80	37.48	20.68	116.95	

LTE Band 2							
Channel Bandwidth: 15 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	18675	1857.5	-27.24	36.57	9.33	8.57	H
	18900	1880.0	-27.84	37.22	9.38	8.68	
	19125	1902.5	-27.82	37.18	9.36	8.63	
	18675	1857.5	-16.15	37.65	21.50	141.29	V
	18900	1880.0	-16.05	37.58	21.53	142.33	
	19125	1902.5	-15.99	37.48	21.49	140.93	
Channel Bandwidth: 15 MHz / 16QAM							
Z	18675	1857.5	-28.26	36.57	8.31	6.78	H
	18900	1880.0	-28.87	37.22	8.35	6.85	
	19125	1902.5	-28.89	37.18	8.29	6.75	
	18675	1857.5	-16.86	37.65	20.79	119.98	V
	18900	1880.0	-16.68	37.58	20.90	123.11	
	19125	1902.5	-16.72	37.48	20.76	119.12	

LTE Band 2							
Channel Bandwidth: 20 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	18700	1860.0	-27.12	36.57	9.45	8.81	H
	18900	1880.0	-27.73	37.22	9.49	8.90	
	19100	1900.0	-27.77	37.18	9.41	8.73	
	18700	1860.0	-16.10	37.65	21.55	142.92	V
	18900	1880.0	-15.98	37.58	21.60	144.64	
	19100	1900.0	-15.89	37.48	21.59	144.21	
Channel Bandwidth: 20 MHz / 16QAM							
Z	18700	1860.0	-28.20	36.57	8.37	6.87	H
	18900	1880.0	-28.81	37.22	8.41	6.94	
	19100	1900.0	-28.80	37.18	8.38	6.89	
	18700	1860.0	-16.76	37.65	20.89	122.77	V
	18900	1880.0	-16.60	37.58	20.98	125.40	
	19100	1900.0	-16.65	37.48	20.83	121.06	

LTE Band 25							
Channel Bandwidth: 1.4 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	26047	1850.7	-27.53	36.57	9.04	8.02	H
	26365	1882.5	-28.10	37.22	9.12	8.17	
	26683	1914.3	-30.01	39.09	9.08	8.09	
	26047	1850.7	-16.15	37.65	21.50	141.29	V
	26365	1882.5	-16.06	37.58	21.52	142.00	
	26683	1914.3	-16.45	37.92	21.47	140.28	
Channel Bandwidth: 1.4 MHz / 16QAM							
Z	26047	1850.7	-28.08	36.57	8.49	7.07	H
	26365	1882.5	-28.67	37.22	8.55	7.17	
	26683	1914.3	-30.65	39.09	8.44	6.98	
	26047	1850.7	-17.76	37.65	19.89	97.52	V
	26365	1882.5	-17.65	37.58	19.93	98.47	
	26683	1914.3	-18.01	37.92	19.91	97.95	

LTE Band 25							
Channel Bandwidth: 3 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	26055	1851.5	-27.41	36.57	9.16	8.25	H
	26365	1882.5	-28.00	37.22	9.22	8.36	
	26675	1913.5	-29.94	39.11	9.17	8.26	
	26055	1851.5	-16.08	37.65	21.57	143.58	V
	26365	1882.5	-15.97	37.58	21.61	144.98	
	26675	1913.5	-16.37	37.93	21.56	143.22	
Channel Bandwidth: 3 MHz / 16QAM							
Z	26055	1851.5	-28.01	36.57	8.56	7.18	H
	26365	1882.5	-28.61	37.22	8.61	7.27	
	26675	1913.5	-30.54	39.11	8.57	7.19	
	26055	1851.5	-17.70	37.65	19.95	98.88	V
	26365	1882.5	-17.60	37.58	19.98	99.61	
	26675	1913.5	-17.97	37.93	19.96	99.08	

LTE Band 25							
Channel Bandwidth: 5 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	26065	1852.5	-27.34	36.57	9.23	8.38	H
	26365	1882.5	-27.96	37.22	9.26	8.44	
	26665	1912.5	-29.87	39.11	9.24	8.39	
	26065	1852.5	-16.01	37.65	21.64	145.92	V
	26365	1882.5	-15.90	37.58	21.68	147.33	
	26665	1912.5	-16.31	37.96	21.65	146.22	
Channel Bandwidth: 5 MHz / 16QAM							
Z	26065	1852.5	-27.94	36.57	8.63	7.30	H
	26365	1882.5	-28.57	37.22	8.65	7.33	
	26665	1912.5	-30.47	39.11	8.64	7.31	
	26065	1852.5	-17.64	37.65	20.01	100.25	V
	26365	1882.5	-17.56	37.58	20.02	100.53	
	26665	1912.5	-17.96	37.96	20.00	100.00	

LTE Band 25							
Channel Bandwidth: 10 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	26090	1855.0	-27.22	36.57	9.35	8.61	H
	26365	1882.5	-27.82	37.22	9.40	8.72	
	26640	1910.0	-29.80	39.19	9.39	8.69	
	26090	1855.0	-15.97	37.65	21.68	147.27	V
	26365	1882.5	-15.85	37.58	21.73	149.04	
	26640	1910.0	-16.43	38.15	21.72	148.59	
Channel Bandwidth: 10 MHz / 16QAM							
Z	26090	1855.0	-27.89	36.57	8.68	7.38	H
	26365	1882.5	-28.50	37.22	8.72	7.45	
	26640	1910.0	-30.48	39.19	8.71	7.43	
	26090	1855.0	-17.56	37.65	20.09	102.12	V
	26365	1882.5	-17.46	37.58	20.12	102.87	
	26640	1910.0	-18.07	38.15	20.08	101.86	

LTE Band 25							
Channel Bandwidth: 15 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	26115	1857.5	-27.15	36.57	9.42	8.75	H
	26365	1882.5	-27.74	37.22	9.48	8.88	
	26615	1907.5	-29.76	39.23	9.47	8.85	
	26115	1857.5	-15.89	37.65	21.76	150.00	V
	26365	1882.5	-15.78	37.58	21.80	151.46	
	26615	1907.5	-16.43	38.22	21.79	151.01	
Channel Bandwidth: 15 MHz / 16QAM							
Z	26115	1857.5	-27.81	36.57	8.76	7.52	H
	26365	1882.5	-28.43	37.22	8.79	7.58	
	26615	1907.5	-30.46	39.23	8.77	7.53	
	26115	1857.5	-17.39	37.65	20.26	106.19	V
	26365	1882.5	-17.31	37.58	20.27	106.49	
	26615	1907.5	-17.98	38.22	20.24	105.68	

LTE Band 25							
Channel Bandwidth: 20 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	26140	1860.0	-27.08	36.57	9.49	8.90	H
	26365	1882.5	-27.69	37.22	9.53	8.98	
	26590	1905.0	-29.20	38.72	9.52	8.95	
	26140	1860.0	-15.80	37.65	21.85	153.14	V
	26365	1882.5	-15.72	37.58	21.86	153.57	
	26590	1905.0	-15.74	37.56	21.82	152.05	
Channel Bandwidth: 20 MHz / 16QAM							
Z	26140	1860.0	-27.75	36.57	8.82	7.62	H
	26365	1882.5	-28.39	37.22	8.83	7.65	
	26590	1905.0	-29.94	38.72	8.78	7.55	
	26140	1860.0	-17.35	37.65	20.30	107.18	V
	26365	1882.5	-17.24	37.58	20.34	108.22	
	26590	1905.0	-17.27	37.56	20.29	106.91	

4.2 Frequency Stability Measurement

4.2.1 Limits of Frequency Stability Measurement

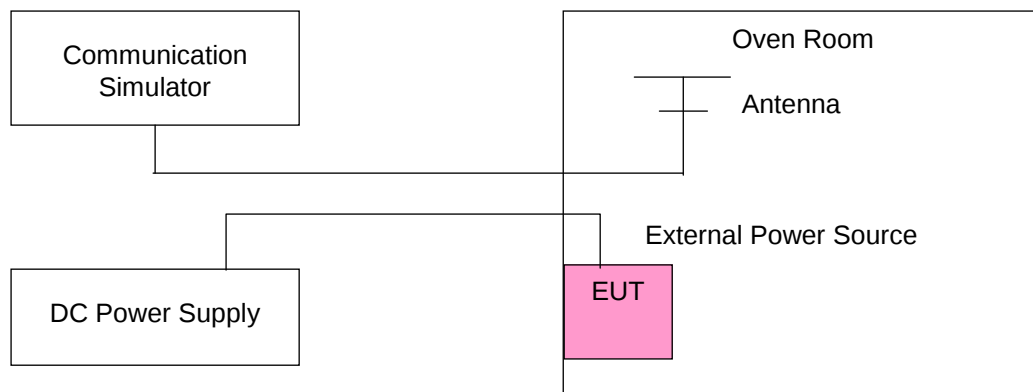
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

4.2.2 Test Procedure

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

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

4.2.3 Test Setup



4.2.4 Test Results

Frequency Error vs. Voltage

Voltage (Volts)	GPRS				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
24	1850.200004	0.002	1909.800004	0.002	2.5
20.4	1850.200003	0.001	1909.800003	0.001	2.5
27.6	1850.200002	0.001	1909.800004	0.002	2.5

Note: The applicant defined the normal working voltage of the battery is from 20.4 Vdc to 27.6 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	GSM				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1850.200004	0.002	1909.799997	-0.002	2.5
-20	1850.200003	0.002	1909.799998	-0.001	2.5
-10	1850.199997	-0.002	1909.799997	-0.002	2.5
0	1850.199997	-0.002	1909.799998	-0.001	2.5
10	1850.199998	-0.001	1909.799997	-0.001	2.5
20	1850.199998	-0.001	1909.800002	0.001	2.5
30	1850.199998	-0.001	1909.800003	0.002	2.5
40	1850.200004	0.002	1909.800002	0.001	2.5
50	1850.200004	0.002	1909.800001	0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	EDGE				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
24	1850.200003	0.002	1909.800004	0.002	2.5
20.4	1850.200002	0.001	1909.800003	0.002	2.5
27.6	1850.200002	0.001	1909.800002	0.001	2.5

Note: The applicant defined the normal working voltage of the battery is from 20.4 Vdc to 27.6 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	EDGE				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1850.200004	0.002	1909.800004	0.002	2.5
-20	1850.199999	-0.001	1909.800002	0.001	2.5
-10	1850.199998	-0.001	1909.800002	0.001	2.5
0	1850.199996	-0.002	1909.799999	-0.001	2.5
10	1850.199998	-0.001	1909.799996	-0.002	2.5
20	1850.199999	-0.001	1909.799999	-0.001	2.5
30	1850.200001	0.001	1909.799997	-0.001	2.5
40	1850.200004	0.002	1909.799999	-0.001	2.5
50	1850.200002	0.001	1909.800002	0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	WCDMA				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
24	1852.400003	0.001	1907.600001	0.001	2.5
20.4	1852.400001	0.001	1907.600004	0.002	2.5
27.6	1852.400002	0.001	1907.600002	0.001	2.5

Note: The applicant defined the normal working voltage of the battery is from 20.4 Vdc to 27.6 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	WCDMA				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1852.399998	-0.001	1907.600004	0.002	2.5
-20	1852.399998	-0.001	1907.600003	0.002	2.5
-10	1852.399997	-0.002	1907.600004	0.002	2.5
0	1852.399996	-0.002	1907.600003	0.002	2.5
10	1852.400002	0.001	1907.600002	0.001	2.5
20	1852.400004	0.002	1907.599999	-0.001	2.5
30	1852.400003	0.001	1907.599998	-0.001	2.5
40	1852.400003	0.002	1907.599997	-0.002	2.5
50	1852.400001	0.001	1907.599998	-0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	CDMA				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
24	1851.250003	0.002	1908.750004	0.002	2.5
20.4	1851.250004	0.002	1908.750002	0.001	2.5
27.6	1851.250004	0.002	1908.750004	0.002	2.5

Note: The applicant defined the normal working voltage of the battery is from 20.4 Vdc to 27.6 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	CDMA				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1851.250001	0.001	1908.750002	0.001	2.5
-20	1851.249998	-0.001	1908.749999	-0.001	2.5
-10	1851.249996	-0.002	1908.749998	-0.001	2.5
0	1851.249998	-0.001	1908.749999	-0.001	2.5
10	1851.249998	-0.001	1908.749998	-0.001	2.5
20	1851.249998	-0.001	1908.749997	-0.002	2.5
30	1851.250002	0.001	1908.750003	0.001	2.5
40	1851.250002	0.001	1908.750004	0.002	2.5
50	1851.250003	0.001	1908.750002	0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 1.4 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
24	1850.700003	0.002	1909.300001	0.001	2.5
20.4	1850.700004	0.002	1909.300002	0.001	2.5
27.6	1850.700002	0.001	1909.300003	0.002	2.5

Note: The applicant defined the normal working voltage of the battery is from 20.4 Vdc to 27.6 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 1.4 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1850.700003	0.001	1909.300002	0.001	2.5
-20	1850.700003	0.002	1909.299999	-0.001	2.5
-10	1850.700003	0.002	1909.299996	-0.002	2.5
0	1850.700002	0.001	1909.299998	-0.001	2.5
10	1850.700003	0.002	1909.299997	-0.001	2.5
20	1850.699997	-0.002	1909.299999	-0.001	2.5
30	1850.699999	-0.001	1909.300002	0.001	2.5
40	1850.699997	-0.002	1909.300004	0.002	2.5
50	1850.699997	-0.002	1909.300003	0.002	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 3 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
24	1851.500002	0.001	1907.500004	0.002	2.5
20.4	1851.500004	0.002	1907.500002	0.001	2.5
27.6	1851.500003	0.001	1907.500003	0.002	2.5

Note: The applicant defined the normal working voltage of the battery is from 20.4 Vdc to 27.6 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 3 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1851.500002	0.001	1907.500004	0.002	2.5
-20	1851.500003	0.002	1907.500002	0.001	2.5
-10	1851.499996	-0.002	1907.500003	0.002	2.5
0	1851.499997	-0.002	1907.499996	-0.002	2.5
10	1851.499996	-0.002	1907.499996	-0.002	2.5
20	1851.499998	-0.001	1907.499997	-0.002	2.5
30	1851.499996	-0.002	1907.499998	-0.001	2.5
40	1851.500002	0.001	1907.499997	-0.002	2.5
50	1851.500003	0.002	1907.500004	0.002	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
24	1852.500002	0.001	1907.500003	0.001	2.5
20.4	1852.500003	0.002	1907.500003	0.001	2.5
27.6	1852.500002	0.001	1907.500001	0.001	2.5

Note: The applicant defined the normal working voltage of the battery is from 20.4 Vdc to 27.6 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1852.499998	-0.001	1907.499999	-0.001	2.5
-20	1852.499996	-0.002	1907.499996	-0.002	2.5
-10	1852.499997	-0.002	1907.499996	-0.002	2.5
0	1852.499997	-0.001	1907.499997	-0.002	2.5
10	1852.499999	-0.001	1907.500003	0.002	2.5
20	1852.500003	0.002	1907.500002	0.001	2.5
30	1852.500002	0.001	1907.500002	0.001	2.5
40	1852.500002	0.001	1907.500003	0.002	2.5
50	1852.500003	0.002	1907.500002	0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
24	1855.000001	0.001	1905.000003	0.002	2.5
20.4	1855.000004	0.002	1905.000003	0.001	2.5
27.6	1855.000004	0.002	1905.000002	0.001	2.5

Note: The applicant defined the normal working voltage of the battery is from 20.4 Vdc to 27.6 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1855.000003	0.002	1904.999997	-0.002	2.5
-20	1855.000001	0.001	1904.999997	-0.001	2.5
-10	1854.999998	-0.001	1904.999999	-0.001	2.5
0	1854.999997	-0.002	1904.999997	-0.001	2.5
10	1854.999997	-0.002	1904.999998	-0.001	2.5
20	1854.999999	-0.001	1905.000003	0.002	2.5
30	1854.999996	-0.002	1905.000001	0.001	2.5
40	1855.000003	0.002	1905.000002	0.001	2.5
50	1855.000001	0.001	1905.000004	0.002	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 15 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
24	1857.500002	0.001	1902.500004	0.002	2.5
20.4	1857.500002	0.001	1902.500002	0.001	2.5
27.6	1857.500002	0.001	1902.500002	0.001	2.5

Note: The applicant defined the normal working voltage of the battery is from 20.4 Vdc to 27.6 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 15 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1857.500004	0.002	1902.500001	0.001	2.5
-20	1857.499996	-0.002	1902.500004	0.002	2.5
-10	1857.499996	-0.002	1902.500003	0.001	2.5
0	1857.499999	-0.001	1902.499998	-0.001	2.5
10	1857.499998	-0.001	1902.499997	-0.002	2.5
20	1857.499998	-0.001	1902.499999	-0.001	2.5
30	1857.500002	0.001	1902.499997	-0.002	2.5
40	1857.500004	0.002	1902.499998	-0.001	2.5
50	1857.500004	0.002	1902.500002	0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 20 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
24	1860.000002	0.001	1900.000003	0.001	2.5
20.4	1860.000002	0.001	1900.000004	0.002	2.5
27.6	1860.000002	0.001	1900.000003	0.002	2.5

Note: The applicant defined the normal working voltage of the battery is from 20.4 Vdc to 27.6 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 20 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1859.999998	-0.001	1900.000004	0.002	2.5
-20	1859.999996	-0.002	1900.000001	0.001	2.5
-10	1859.999997	-0.002	1900.000004	0.002	2.5
0	1859.999997	-0.002	1900.000003	0.001	2.5
10	1860.000004	0.002	1900.000002	0.001	2.5
20	1860.000002	0.001	1899.999996	-0.002	2.5
30	1860.000001	0.001	1899.999996	-0.002	2.5
40	1860.000002	0.001	1899.999997	-0.002	2.5
50	1860.000003	0.002	1899.999997	-0.002	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 25				Limit (ppm)
	Channel Bandwidth: 1.4 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
24	1850.700002	0.001	1914.300001	0.001	2.5
20.4	1850.700004	0.002	1914.300003	0.002	2.5
27.6	1850.700002	0.001	1914.300002	0.001	2.5

Note: The applicant defined the normal working voltage of the battery is from 20.4 Vdc to 27.6 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 25				Limit (ppm)
	Channel Bandwidth: 1.4 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1850.699998	-0.001	1914.300002	0.001	2.5
-20	1850.699996	-0.002	1914.299998	-0.001	2.5
-10	1850.699998	-0.001	1914.299998	-0.001	2.5
0	1850.699998	-0.001	1914.299998	-0.001	2.5
10	1850.699999	-0.001	1914.299997	-0.002	2.5
20	1850.700001	0.001	1914.299996	-0.002	2.5
30	1850.700001	0.001	1914.300004	0.002	2.5
40	1850.700004	0.002	1914.300002	0.001	2.5
50	1850.700003	0.001	1914.300002	0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 25				Limit (ppm)
	Channel Bandwidth: 3 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
24	1851.500003	0.001	1913.500001	0.001	2.5
20.4	1851.500001	0.001	1913.500002	0.001	2.5
27.6	1851.500002	0.001	1913.500004	0.002	2.5

Note: The applicant defined the normal working voltage of the battery is from 20.4 Vdc to 27.6 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 25				Limit (ppm)
	Channel Bandwidth: 3 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1851.500003	0.002	1913.499997	-0.001	2.5
-20	1851.500002	0.001	1913.499997	-0.001	2.5
-10	1851.500002	0.001	1913.499999	-0.001	2.5
0	1851.499996	-0.002	1913.499999	-0.001	2.5
10	1851.499997	-0.002	1913.500002	0.001	2.5
20	1851.499997	-0.002	1913.500002	0.001	2.5
30	1851.499997	-0.002	1913.500002	0.001	2.5
40	1851.499998	-0.001	1913.500002	0.001	2.5
50	1851.500002	0.001	1913.500004	0.002	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 25				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
24	1852.500002	0.001	1912.500003	0.002	2.5
20.4	1852.500003	0.001	1912.500003	0.002	2.5
27.6	1852.500002	0.001	1912.500003	0.001	2.5

Note: The applicant defined the normal working voltage of the battery is from 20.4 Vdc to 27.6 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 25				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1852.500003	0.002	1912.500004	0.002	2.5
-20	1852.500001	0.001	1912.500004	0.002	2.5
-10	1852.500003	0.002	1912.499999	-0.001	2.5
0	1852.500004	0.002	1912.499997	-0.001	2.5
10	1852.500002	0.001	1912.499998	-0.001	2.5
20	1852.499997	-0.001	1912.499997	-0.002	2.5
30	1852.499998	-0.001	1912.499996	-0.002	2.5
40	1852.499996	-0.002	1912.500004	0.002	2.5
50	1852.499997	-0.002	1912.500002	0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 25				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
24	1855.000003	0.002	1910.000003	0.002	2.5
20.4	1855.000003	0.001	1910.000002	0.001	2.5
27.6	1855.000001	0.001	1910.000004	0.002	2.5

Note: The applicant defined the normal working voltage of the battery is from 20.4 Vdc to 27.6 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 25				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1855.000003	0.002	1910.000003	0.002	2.5
-20	1855.000001	0.001	1910.000003	0.001	2.5
-10	1854.999999	-0.001	1910.000004	0.002	2.5
0	1854.999997	-0.002	1909.999999	-0.001	2.5
10	1854.999996	-0.002	1909.999998	-0.001	2.5
20	1854.999998	-0.001	1909.999997	-0.001	2.5
30	1854.999998	-0.001	1909.999998	-0.001	2.5
40	1855.000003	0.002	1909.999999	-0.001	2.5
50	1855.000003	0.002	1910.000003	0.002	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 25				Limit (ppm)
	Channel Bandwidth: 15 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
24	1857.500004	0.002	1907.500004	0.002	2.5
20.4	1857.500004	0.002	1907.500004	0.002	2.5
27.6	1857.500002	0.001	1907.500004	0.002	2.5

Note: The applicant defined the normal working voltage of the battery is from 20.4 Vdc to 27.6 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 25				Limit (ppm)
	Channel Bandwidth: 15 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1857.499997	-0.002	1907.499998	-0.001	2.5
-20	1857.499999	-0.001	1907.499996	-0.002	2.5
-10	1857.499997	-0.001	1907.499999	-0.001	2.5
0	1857.499996	-0.002	1907.499999	-0.001	2.5
10	1857.499998	-0.001	1907.500002	0.001	2.5
20	1857.500003	0.002	1907.500002	0.001	2.5
30	1857.500004	0.002	1907.500002	0.001	2.5
40	1857.500002	0.001	1907.500003	0.002	2.5
50	1857.500002	0.001	1907.500001	0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 25				Limit (ppm)
	Channel Bandwidth: 20 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
24	1860.000001	0.001	1905.000001	0.001	2.5
20.4	1860.000003	0.002	1905.000003	0.002	2.5
27.6	1860.000001	0.001	1905.000001	0.001	2.5

Note: The applicant defined the normal working voltage of the battery is from 20.4 Vdc to 27.6 Vdc.

Frequency Error vs. Temperature

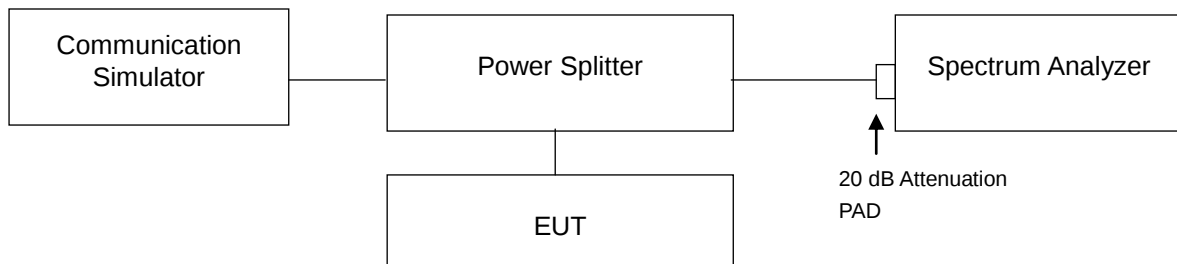
Temp. (°C)	LTE Band 25				Limit (ppm)
	Channel Bandwidth: 20 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1860.000003	0.002	1905.000003	0.002	2.5
-20	1859.999997	-0.001	1905.000001	0.001	2.5
-10	1859.999999	-0.001	1905.000001	0.001	2.5
0	1859.999998	-0.001	1904.999998	-0.001	2.5
10	1859.999997	-0.002	1904.999997	-0.002	2.5
20	1859.999998	-0.001	1904.999999	-0.001	2.5
30	1860.000003	0.002	1904.999997	-0.002	2.5
40	1860.000002	0.001	1904.999996	-0.002	2.5
50	1860.000003	0.002	1905.000004	0.002	2.5

4.3 Occupied Bandwidth Measurement

4.3.1 Test Procedure

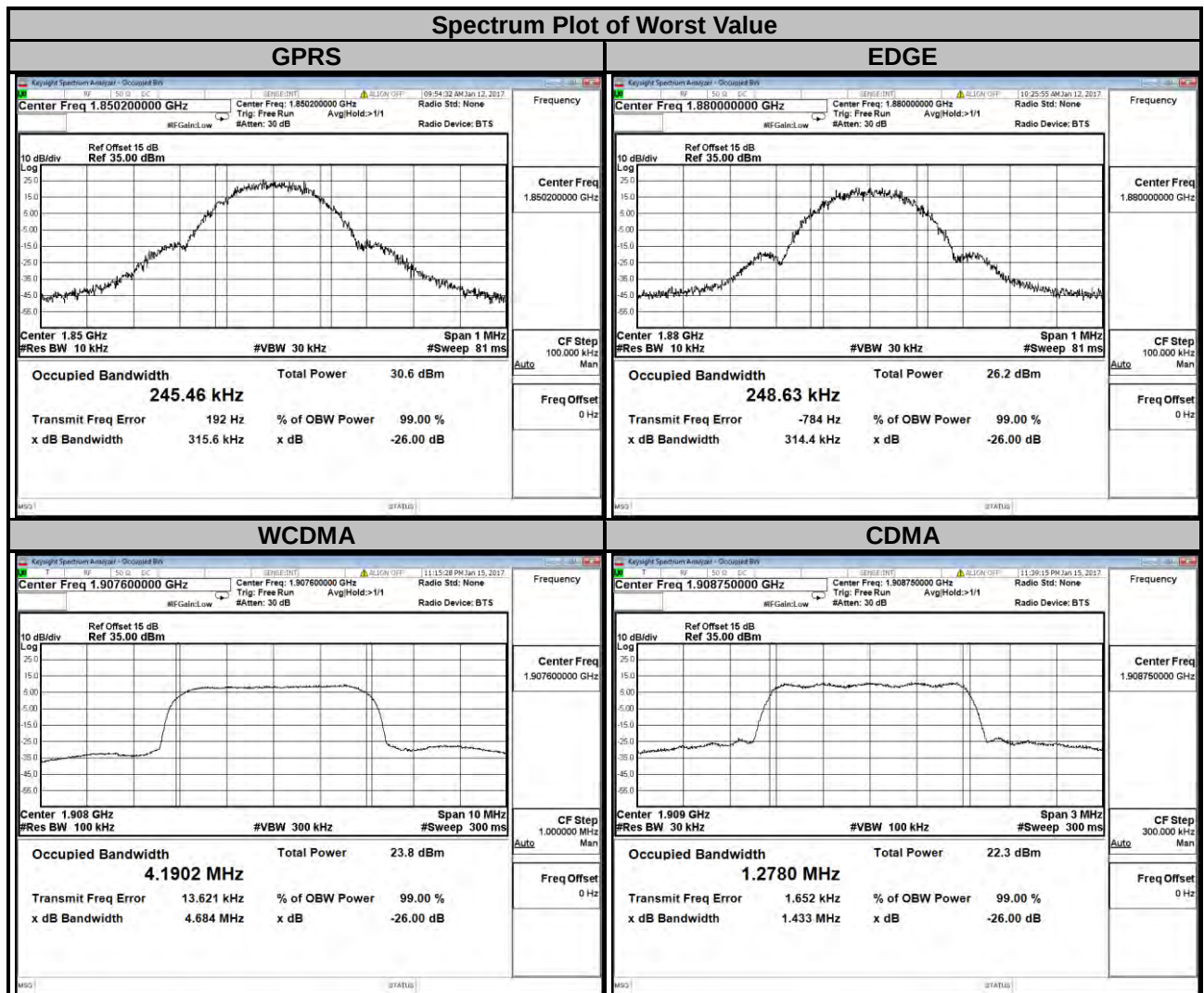
The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function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

4.3.2 Test Setup



4.3.3 Test Result

Channel	Frequency (MHz)	99 % Occupied Bandwidth (kHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)
		GPRS	EDGE			
512	1850.2	245.46	244.77	9262	1852.4	4.1760
661	1880.0	244.07	248.63	9400	1880.0	4.1861
810	1909.8	244.66	243.30	9538	1907.6	4.1902
Channel	Frequency (MHz)	99 % Occupied Bandwidth (kHz)				
		CDMA				
25	1851.25	1.2743				
600	1880.00	1.2771				
1175	1908.75	1.2780				



LTE Band 2

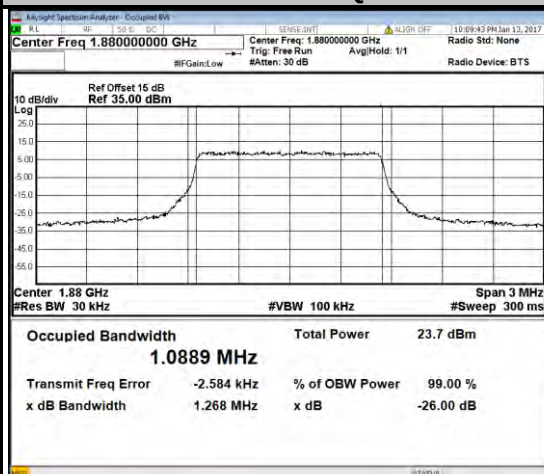
Channel Bandwidth: 1.4 MHz

Channel Bandwidth: 3 MHz

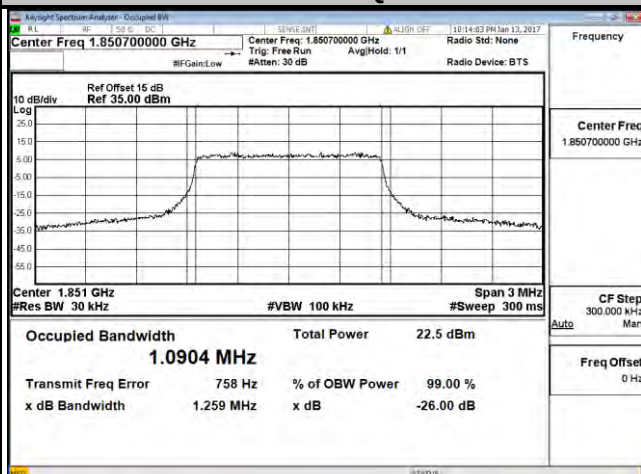
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18607	1850.7	1.0888	1.0904	18615	1851.5	2.6999	2.6970
18900	1880.0	1.0889	1.0855	18900	1880.0	2.7006	2.6951
19193	1909.3	1.0872	1.0904	19185	1908.5	2.7010	2.6968

Spectrum Plot of Worst Value

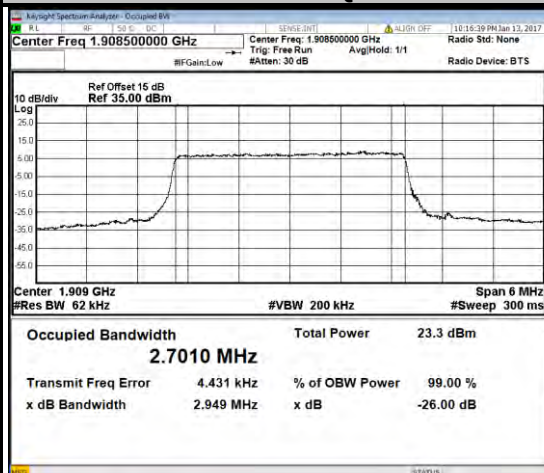
1.4 MHz / QPSK



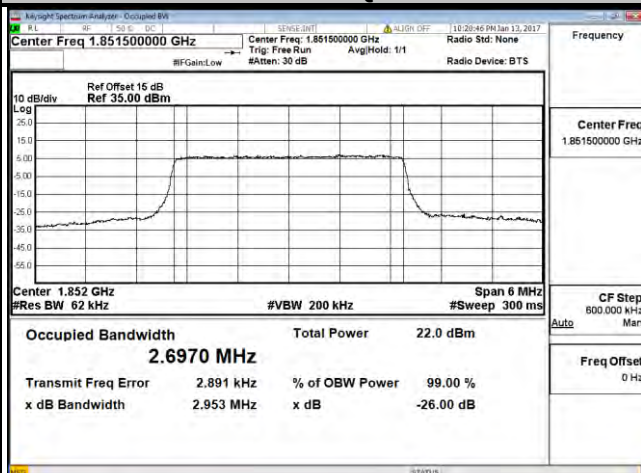
1.4 MHz / 16QAM



3 MHz / QPSK



3 MHz / 16QAM



LTE Band 2

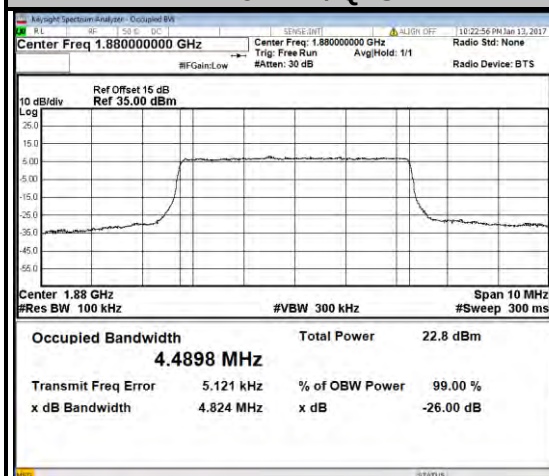
Channel Bandwidth: 5 MHz

Channel Bandwidth: 10 MHz

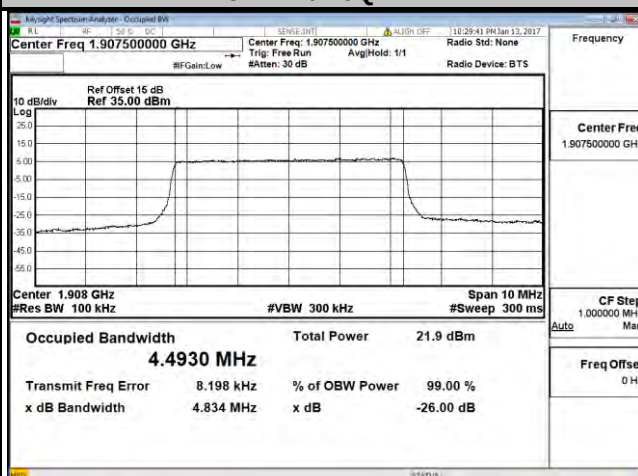
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18625	1852.5	4.4872	4.4885	18650	1855.0	8.9549	8.9586
18900	1880.0	4.4898	4.4896	18900	1880.0	8.9839	8.9938
19175	1907.5	4.4888	4.4930	19150	1905.0	8.9992	9.0072

Spectrum Plot of Worst Value

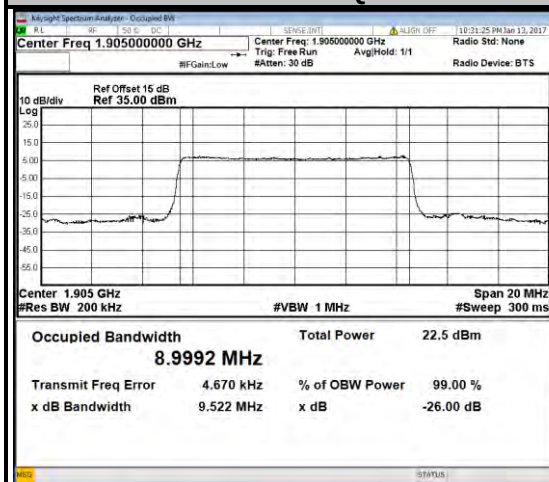
5 MHz / QPSK



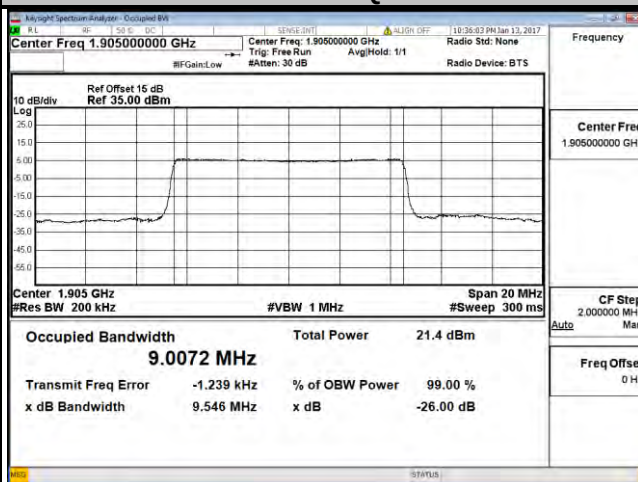
5 MHz / 16QAM



10 MHz / QPSK



10 MHz / 16QAM



LTE Band 2

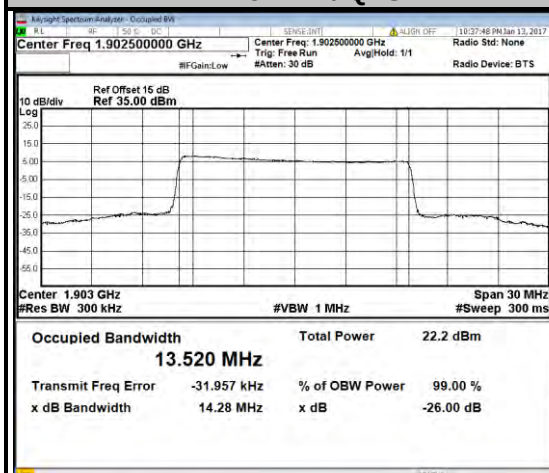
Channel Bandwidth: 15 MHz

Channel Bandwidth: 20 MHz

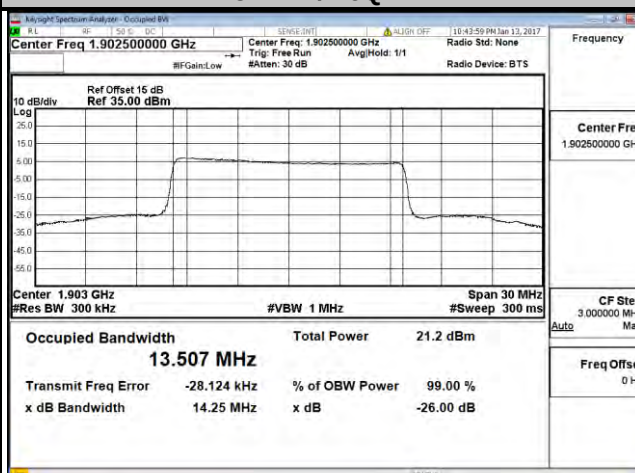
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18675	1857.5	13.3780	13.3760	18700	1860.0	17.7840	17.8150
18900	1880.0	13.4900	13.4870	18900	1880.0	18.0160	18.0460
19125	1902.5	13.5200	13.5070	19100	1900.0	17.9370	17.9650

Spectrum Plot of Worst Value

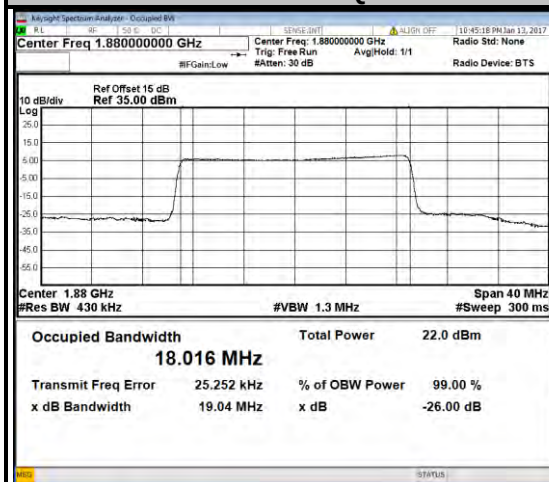
15 MHz / QPSK



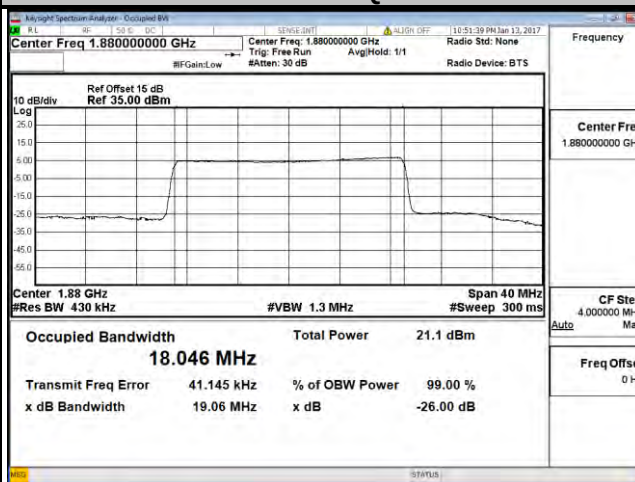
15 MHz / 16QAM



20 MHz / QPSK



20 MHz / 16QAM



LTE Band 25

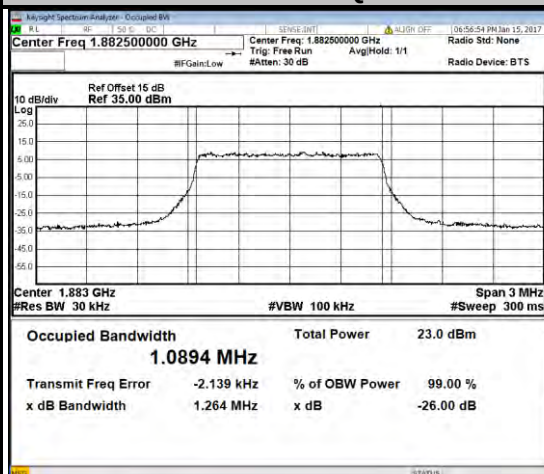
Channel Bandwidth: 1.4 MHz

Channel Bandwidth: 3 MHz

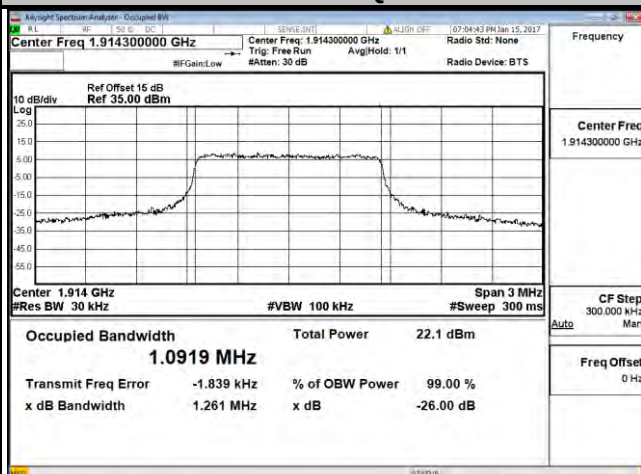
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
26047	1850.7	1.0892	1.0909	26055	1851.5	2.6990	2.6960
26365	1882.5	1.0894	1.0890	26365	1882.5	2.6996	2.6963
26683	1914.3	1.0884	1.0919	26675	1913.5	2.6987	2.6935

Spectrum Plot of Worst Value

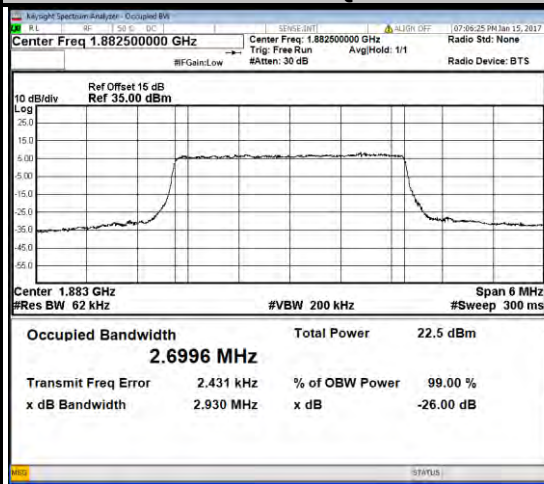
1.4 MHz / QPSK



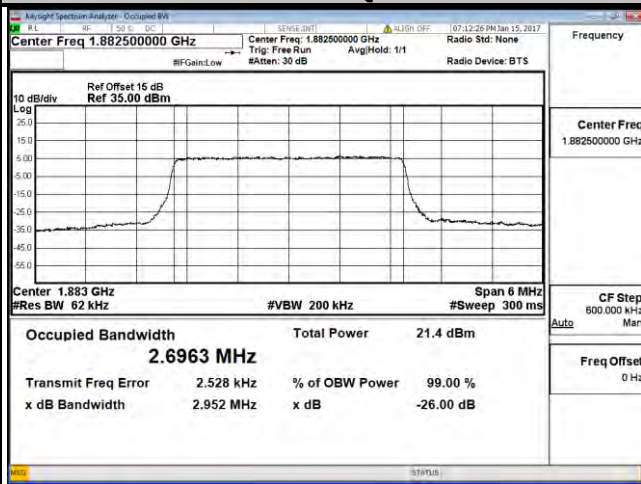
1.4 MHz / 16QAM



3 MHz / QPSK



3 MHz / 16QAM



LTE Band 25

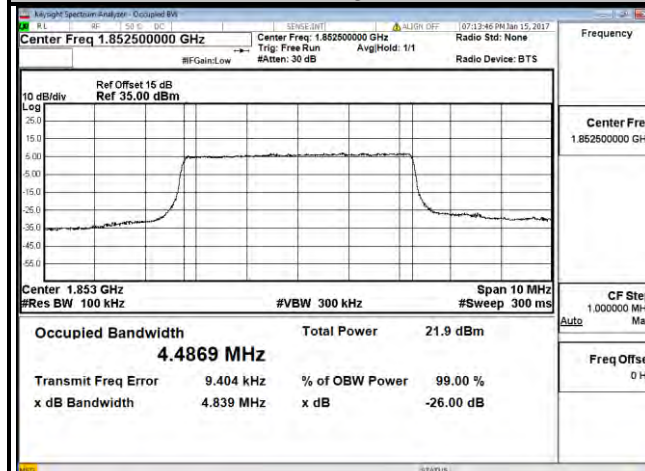
Channel Bandwidth: 5 MHz

Channel Bandwidth: 10 MHz

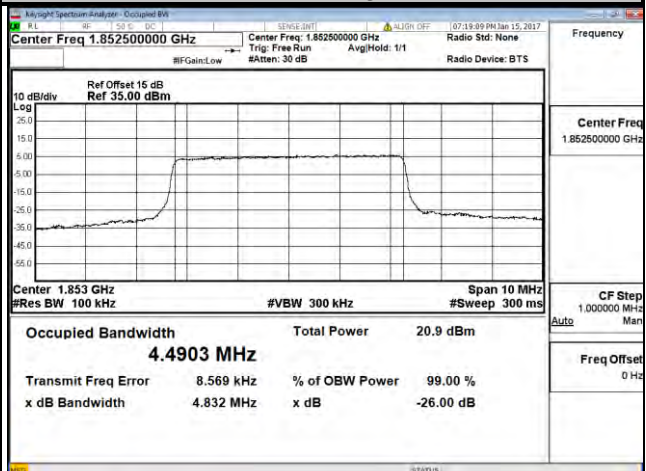
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
26065	1852.5	4.4869	4.4903	26090	1855.0	8.9494	8.9569
26365	1882.5	4.4837	4.4859	26365	1882.5	8.9765	8.9786
26665	1912.5	4.4705	4.4748	26640	1910.0	8.9347	8.9431

Spectrum Plot of Worst Value

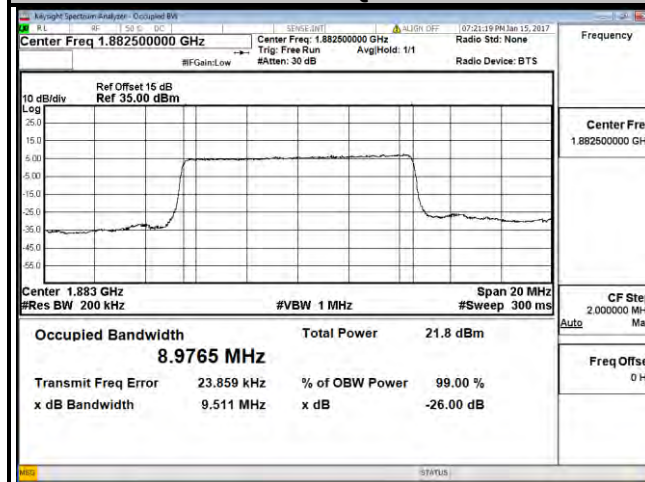
5 MHz / QPSK



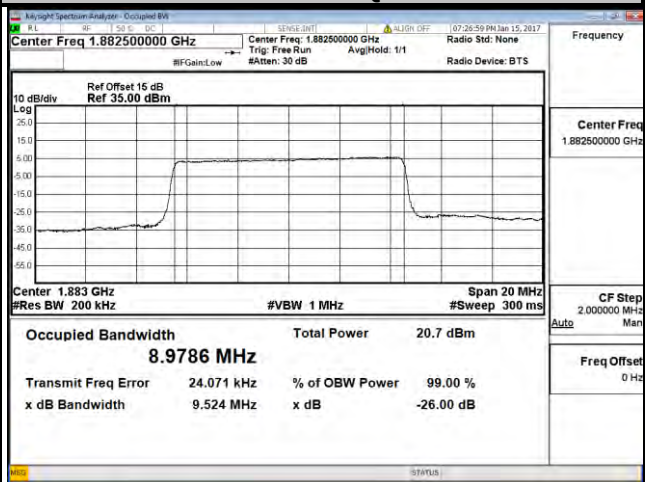
5 MHz / 16QAM



10 MHz / QPSK



10 MHz / 16QAM



LTE BAND 25

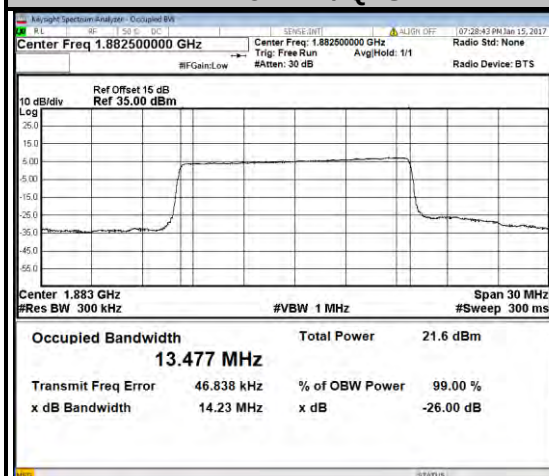
Channel Bandwidth: 15 MHz

Channel Bandwidth: 20 MHz

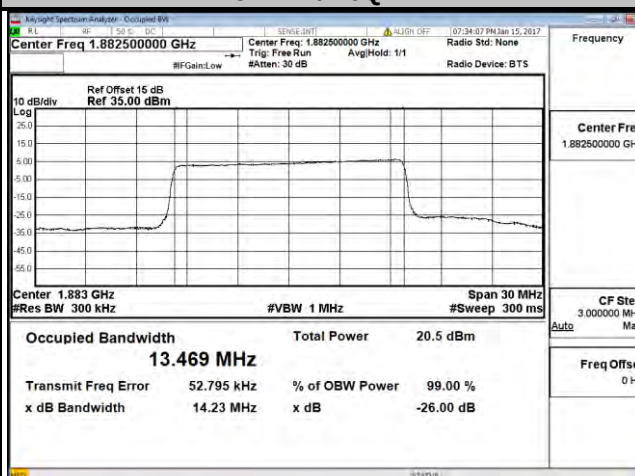
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
26115	1857.5	13.3830	13.3710	26140	1860.0	17.7800	17.8030
26365	1882.5	13.4770	13.4690	26365	1882.5	17.9730	18.0000
26615	1907.5	13.4700	13.4630	26590	1905.0	18.0460	18.0670

Spectrum Plot of Worst Value

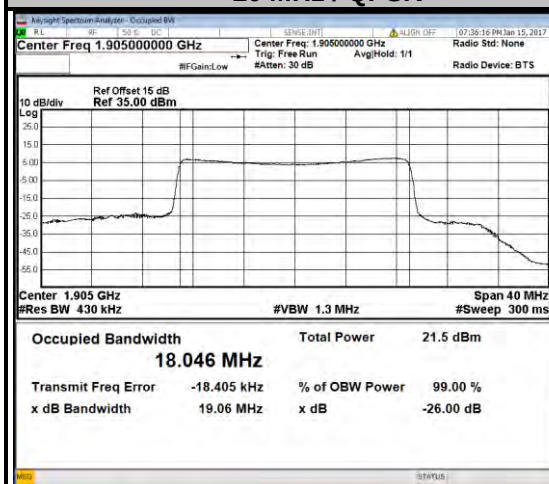
15 MHz / QPSK



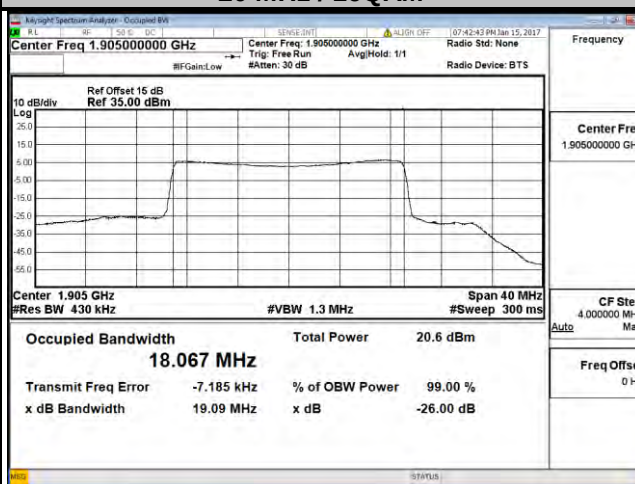
15 MHz / 16QAM



20 MHz / QPSK



20 MHz / 16QAM

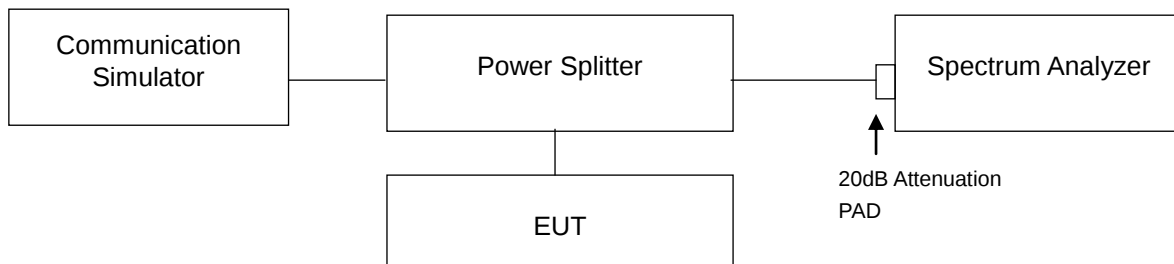


4.4 Band Edge Measurement

4.4.1 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.

4.4.2 Test Setup



4.4.3 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 (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 13 kHz and VB of the spectrum is 51 kHz (CDMA / 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 100 kHz and VB of the spectrum is 300 kHz (LTE Bandwidth 5 MHz/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 180 kHz and VB of the spectrum is 560 kHz (LTE Bandwidth 20 MHz).
- Record the max trace plot into the test report.

4.4.4 Test Results

