



FCC PART 24TEST REPORT
Part 22H Subpart E

**Report Reference No.....:** HK1907111624-3E

FCC ID......ZNFX130IM

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Date of issue.......July. 11,2019

Testing Laboratory Name ...... Shenzhen HUAK Testing Technology Co., Ltd.

Applicant's name LG Electronics USA, Inc.

07632

Test specification .....:

Standard ..... FCC CFR Title 47 Part 2, Part 22H

TRF Originator...... Shenzhen HUAK Testing Technology Co., Ltd.

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Trade Mark ...... LG

Manufacturer..... OPTIEMUS ELECTRONICS LIMITED

Model/Type reference...... LMX130IM

Listed Models ...... /

Modulation Type ...... QPSK, 16QAM

Rating ...... DC 3.85V From Battery

Hardware version ...... V2.0

Software version..... V2.0

Result..... PASS

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### TEST REPORT

Test Report No. :	HK1907111624-3E	July. 11,2019	
	111(1307111024-3L	Date of issue	

Equipment under Test : 4G Mobile phone

Model /Type : LMX130IM

Listed Models : /

**Applicant** : LG Electronics USA, Inc.

Address : 1000 Sylvan Ave. Englewood Cliffs, New Jersey, United

States 07632

Manufacturer : OPTIEMUS ELECTRONICS LIMITED

Address : D-348, Sector 63, Gautam Budh Nagar, Noida, Uttar

Pradesh 201307 India

Test Result:	PASS
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The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.



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# **Revison History**

Revision	Issue Date	Revisions	Revised By
V1.0 2019-07-11		Initial Issue James Zh	





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The tests were performed according to following standards:

The tests were performed according to following standards: <a href="FCC Part 2">FCC Part 2: FREQUENCY ALLOCA-TIONS AND RADIO TREATY MAT-TERS; GENERAL RULES AND REG-ULATIONS</a>

FCC Part 22 Subpart H: PRIVATE LAND MOBILE RADIO SERVICES.

ANSI/TIA-603-E-2016: Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

ANSI C63.26-2015: IEEE/ANSI Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

FCCKDB971168D01 Power Meas License Digital Systems



2.1 General Remarks

Date of receipt of test sample		Jun. 24, 2019
Testing commenced on	:	Jun. 25, 2019
Testing concluded on	:	July. 11,2019

### 2.2 Product Description

Name of EUT	4G Mobile phone
Model/Type reference:	LMX130IM
List Model:	
Power supply:	DC 3.85V From Battery
Adapter Information	Model: UP0920, Input: 100-240V~, 50/60Hz, 0.3A, Output: 5VDC, 2A
Modilation Type	QPSK,16QAM
Antenna Type	Internal Antenna
Operation Frequency Band	LTE BAND 5
Operation frequency	LTE BAND 5: 824~849 MHz
LTE Release	R8
Extreme temp. Tolerance	-30°C to +50°C
Extreme vol. Limits	3.465VDC to 4.235VDC (nominal: 3.85VDC)

### 2.3 Equipment under Test

### Power supply system utilised

Power supply voltage	:	0	120V/ 60 Hz	0	115V/60Hz
		0	12 V DC	0	24 V DC
		•	Other (specified in blank bel	ow	)

DC 3.85V From Battery

### 2.4 Normal Accessory setting

Fully charged battery was used during the test.

### 2.5 EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

- supplied by the manufacturer
- O supplied by the lab

0	Power Cable	Length (m):	1
		Shield :	1
		Detachable :	1
0	Multimeter	Manufacturer:	1
		Model No.:	1

### 2.6 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: ZNFX130IM filing to comply with FCC Part 22H, Rules.





### 2.7 Modifications

No modifications were implemented to meet testing criteria.

## 2.8 GeneralTest Conditions/Configurations

### 2.10.1 TestEnvironment

EnvironmentParameter	SelectedValuesDuringTests			
Relative Humidity	Ambient			
Temperature	TN	Ambient		
	VL	3.465V		
Voltage	VN	3.85V		
_	VH	4.235V		

NOTE:VL=lowerextreme testvoltageVN=nominalvoltage VH=upperextreme testvoltageTN=normaltemperature





### 3 TEST ENVIRONMENT

### 3.1 Address of the test laboratory

Shenzhen HUAK Testing Technology Co., Ltd. Add.:1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, China

#### 3.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

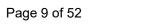
### 3.3 Test Description

### Band 5 (824~849 MHz)

Band 5 (824~849 MHZ)			
Test Item	FCC Rule No.	Requirements	Verdict
Effective(Isotropic) Radiated Output Power	§2.1046, §22.913	FCC: ERP ≤ 7W.	Pass
Modulation Characteristics	§2.1047	Digital modulation	N/A
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Pass
Band Edges Compliance	§2.1051, §22.917	≤-13dBm/1%*EBW, in 1MHz bands immediately outside and adjacent to The frequency block.	Pass
Spurious Emission at Antenna Terminals	§2.1051, §22.917	FCC: ≤ -13dBm/100kHz, from 9kHz to 10th harmonics but outside authorized operating frequency ranges.	Pass
Field Strength of Spurious Radiation	§2.1053, §22.917	FCC: ≤ -13dBm/100kHz.	Pass
Frequency Stability	§2.1055, §22.355	≤ ±2.5ppm.	Pass
Frequency Stability	§2.1055, §22.355	≤ ±2.5ppm. s "not applicable", the "N/T" de notes "not tested".	

#### Remark:

1. The measurement uncertainty is not included in the test result.





3.4 Equipments Used during the Test

					Calibration
Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Due Date
LISN	R&S	ENV216 ENV216	HKE-059	2018/12/27	2019/12/26
LISN			HKE-002	2018/12/27	2019/12/26
Receiver			HKE-010	2018/12/27	2019/12/26
Spectrum analyzer	R&S	FSP40	HKE-025	2018/12/27	2019/12/26
Spectrum analyzer	Agilent	N9020A	HKE-048	2018/12/27	2019/12/26
RF automatic control unit	Tonscend	JS0806-1	HKE-060	2018/12/27	2019/12/26
Loop antenna	Schwarzbeck	FMZB 1519 B	HKE-014	2018/12/27	2019/12/26
Bilog Broadband Antenna	Schwarzbeck	VULB9163	HKE-012	2018/12/27	2019/12/26
Horn antenna	Schwarzbeck	9120D	HKE-013	2018/12/27	2019/12/26
High gain antenna	Schwarzbeck	LB-180400KF	HKE-054	2018/12/27	2019/12/26
Preamplifier	EMCI	EMC051845SE	HKE-015	2018/12/27	2019/12/26
Preamplifier	Agilent	83051A	HKE-016	2018/12/27	2019/12/26
Preamplifier	Schwarzbeck	BBV 9743	HKE-006	2018/12/27	2019/12/26
Temperature and humidity meter	Boyang	HTC-1	HKE-075	2018/12/27	2019/12/26
High-low temperature chamber	Guangke	HT-80L	HKE-118	2018/12/27	2019/12/26
High pass filter unit	Tonscend	JS0806-F	HKE-055	2018/12/27	2019/12/26
RF Cable(below1GHz)	Times	9kHz-1GHz	HKE-117	2018/12/27	2019/12/26
RF Cable(above 1GHz)	Times	1-40G	HKE-034	2018/12/27	2019/12/26
Power meter	Agilent	E4419B	HKE-085	2018/12/27	2019/12/26
Power Sensor	Agilent	E9300A	HKE-086	2018/12/27	2019/12/26
Conducted test software	Tonscend	TS+ Rev 2.5.0.0	HKE-081	N/A	N/A
Radiated test software	Tonscend	TS+ Rev 2.5.0.0	HKE-082	N/A	N/A
RF test software	Tonscend	JS1120-B Version 2.6	HKE-083	N/A	N/A
RF test software	Tonscend	JS1120-4	HKE-113	N/A	N/A
RF test software	Tonscend	JS1120-3	HKE-114	N/A	N/A
RF test software	Tonscend	JS1120-1	HKE-115	N/A	N/A
Wireless Communication Test Set	R&S	CMW500	HKE-026	2018/12/27	2019/12/26
Wireless Communication Test Set	R&S	CMU200	HKE-029	2018/12/27	2019/12/26



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### 4 TEST CONDITIONS AND RESULTS

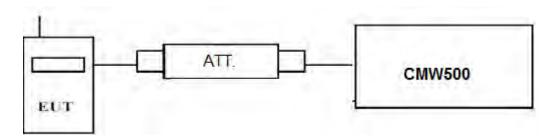
### 4.1 Output Power

### **4.1.1 Coducted Output Power**

#### **TEST APPLICABLE**

During the process of testing, the EUT was controlled via R&S Digital Radio Communication tester (CMW500) to ensure max power transmission and proper modulation. This result contains output power and EIRP measurements for the EUT. In all cases, output power is within the specified limits.

#### **TEST CONFIGURATION**



#### **TEST PROCEDURE**

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

- a) Place the EUT on a bench and set it in transmitting mode.
- b) Connect a low loss RF cable from the antenna port to a CMW500 by an Att.
- c) EUT Communicate with CMW500 then selects a channel for testing.
- d) Add a correction factor to the display CMW500, and then test.

#### **TEST RESULTS**

#### compliance \*

#### Remark:

1. We measured all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 5;

		LTE FDD Band 5		
TX Channel	Frequency	RB Size/Offset	Burst Average	Power [dBm]
Bandwidth	(MHz)	ND Size/Offset	QPSK	16QAM
		1 RB low	24.61	23.56
	824.7	1 RB high	24.72	23.72
	024.7	50% RB mid	24.57	23.57
		100% RB	24.60	24.61
		1 RB low	24.66	23.65
1.4 MHz	836.5	1 RB high	24.84	23.87
1.4 IVITZ	630.3	50% RB mid	24.66	23.69
		100% RB	24.66	24.67
		1 RB low	24.69	23.63
	848.3	1 RB high	24.85	23.76
	040.3	50% RB mid	24.69	23.57
		100% RB	24.76	24.77
		1 RB low	24.57	23.47
	825.5	1 RB high	24.60	23.46
	020.0	50% RB mid	24.61	23.52
3 MHz		100% RB	23.47	23.49
		1 RB low	24.64	23.77
	836.5	1 RB high	24.69	23.71
		50% RB mid	24.67	23.71



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		100% RB	23.78	23.76
		1 RB low	24.75	23.87
	0.47.5	1 RB high	24.77	23.85
	847.5	50% RB mid	24.75	23.84
		100% RB	23.86	23.88
		1 RB low	24.54	23.78
	200 5	1 RB high	24.64	23.69
	826.5	50% RB mid	24.56	23.55
		100% RB	23.56	23.54
		1 RB low	24.71	23.61
5 MH-	020 5	1 RB high	24.86	23.69
5 MHz	836.5	50% RB mid	24.71	23.60
		100% RB	23.72	23.69
		1 RB low	24.64	23.63
	846.5	1 RB high	24.81	23.82
		50% RB mid	24.71	23.68
		100% RB	23.74	23.73
		1 RB low	24.63	23.71
	829.0	1 RB high	24.78	23.78
	629.0	50% RB mid	24.65	23.74
		100% RB	23.68	23.66
		1 RB low	24.80	23.55
10 MHz	836.5	1 RB high	24.70	23.70
IO IVIDZ	030.5	50% RB mid	23.66	23.63
		100% RB	23.67	23.69
		1 RB low	24.67	23.76
	844.0	1 RB high	24.75	23.87
	044.0	50% RB mid	24.68	23.85
		100% RB	23.76	23.75

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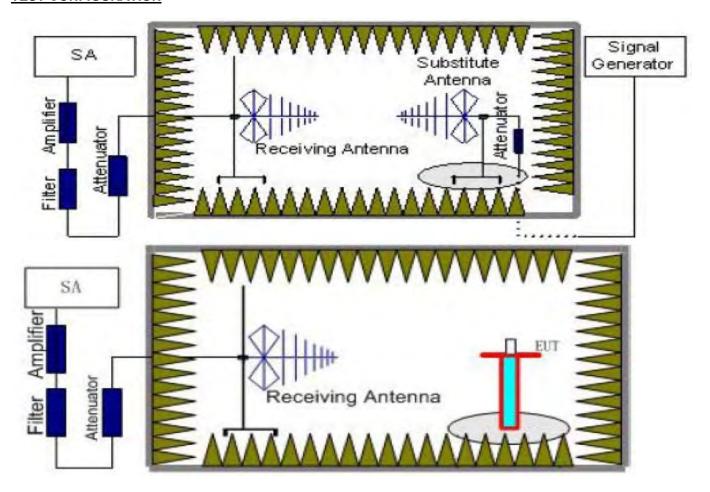
### 4.1.2. Radiated Output Power

#### LIMIT

This is the test for the maximum radiated power from the EUT.

Rule Part 22H.232(b) specifies, "Mobile/portable stations are limited to 7 watts e.i.r.p.

#### **TEST CONFIGURATION**



### **TEST PROCEDURE**

- 1. EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.50m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
- 2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
- 3. The EUT is then put into continuously transmitting mode at its maximum power level during the test.Set Test Receiver or Spectrum RBW=1MHz,VBW=3MHz, And the maximum value of the receiver should be recorded as (P<sub>r</sub>).
- 4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest isconnected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P<sub>Mea</sub>) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (P<sub>r</sub>). The power of signal source (P<sub>Mea</sub>) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

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- 5. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (P<sub>cl</sub>) ,the Substitution Antenna Gain (G<sub>a</sub>) and the Amplifier Gain (P<sub>Ag</sub>) should be recorded after test.
  The measurement results are obtained as described below: Power(EIRP)=P<sub>Mea</sub>- P<sub>Ag</sub> P<sub>cl</sub>+ G<sub>a</sub>. We used SMF100A micowave signal generator which signal level can up to 33dBm,so we not used power Amplifier for substituation test; The measurement results are amend as described below: Power(EIRP)=P<sub>Mea</sub>- P<sub>cl</sub>+ G<sub>a</sub>
- 6. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
- 7. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.

#### **TEST RESULTS**

#### **Radiated Measurement:**

#### Remark:

- 1. We measured all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 5; recorded worst case for each Channel Bandwidth of LTE FDD Band 5.
- 2.  $EIRP=P_{Mea}(dBm)-P_{cl}(dB)+P_{Ag}(dB)+G_a(dBi)$
- 3. We measured both Horizontal and Vertical direction, recorded worst case direction.

#### LTE FDD Band 5 Channel Bandwidth 1.4MHz QPSK

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G₃ Antenna Gain(dB)	Correction (dB)	P <sub>Ag</sub> (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
824.7	-20.71	3.41	10.24	2.15	33.60	19.72	38.45	18.73	V
836.5	-21.67	3.49	10.24	2.15	33.60	18.68	38.45	19.77	V
848.3	-21.32	3.55	10.23	2.15	33.60	18.96	38.45	19.49	V

#### LTE FDD Band 5 Channel Bandwidth 3MHz QPSK

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	Correction (dB)	P <sub>Ag</sub> (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
825.5	-21.23	3.41	10.24	2.15	33.60	19.2	38.45	19.25	V
836.5	-22.13	3.49	10.24	2.15	33.60	18.22	38.45	20.23	V
847.5	-21.09	3.55	10.23	2.15	33.60	19.19	38.45	19.26	V

#### LTE FDD Band 5 Channel Bandwidth 5MHz QPSK

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	Correction (dB)	P <sub>Ag</sub> (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
826.5	-20.95	3.41	10.24	2.15	33.60	19.48	38.45	18.97	V
836.5	-21.62	3.49	10.24	2.15	33.60	18.73	38.45	19.72	V
846.5	-21.22	3.55	10.23	2.15	33.60	19.06	38.45	19.39	V

#### LTE FDD Band 5 Channel Bandwidth 10MHz QPSK

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	Correction (dB)	P <sub>Ag</sub> (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
829.0	-21.19	3.41	10.24	2.15	33.60	19.24	38.45	19.21	V
836.5	-22.06	3.49	10.24	2.15	33.60	18.29	38.45	20.16	V
844.0	-21.42	3.55	10.23	2.15	33.60	18.86	38.45	19.59	V



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### LTE FDD Band 5\_Channel Bandwidth 1.4MHz\_16QAM

			• • • • • • • • • • • • • • • • • • • •						
Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	Correction (dB)	P <sub>Ag</sub> (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
824.7	-20.34	3.41	10.24	2.15	33.6	20.09	38.45	18.36	V
836.5	-21.22	3.49	10.24	2.15	33.6	19.13	38.45	19.32	V
848.3	-21.76	3.55	10.23	2.15	33.6	18.52	38.45	19.93	V

### LTE FDD Band 5\_Channel Bandwidth 3MHz\_16QAM

F	requency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	Correction (dB)	P <sub>Ag</sub> (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
	825.5	-21.34	3.41	10.24	2.15	33.6	19.09	38.45	19.36	V
	836.5	-22.48	3.49	10.24	2.15	33.6	17.87	38.45	20.58	V
	847.5	-20.96	3.55	10.23	2.15	33.6	19.32	38.45	19.13	V

### LTE FDD Band 5\_Channel Bandwidth 5MHz\_16QAM

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	Correction (dB)	P <sub>Ag</sub> (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
826.5	-21.04	3.41	10.24	2.15	33.6	19.39	38.45	19.06	V
836.5	-21.88	3.49	10.24	2.15	33.6	18.47	38.45	19.98	V
846.5	-21.28	3.55	10.23	2.15	33.6	19	38.45	19.45	V

### LTE FDD Band 5\_Channel Bandwidth 10MHz\_16QAM

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	Correction (dB)	P <sub>Ag</sub> (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
829.0	-21.11	3.41	10.24	2.15	33.6	19.32	38.45	19.13	V
836.5	-21.67	3.49	10.24	2.15	33.6	18.68	38.45	19.77	V
844.0	-21.67	3.55	10.23	2.15	33.6	18.61	38.45	19.84	V

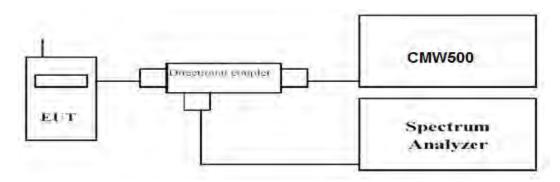


### 4.2 Peak-to-Average Ratio (PAR)

#### LIMIT

The Peak-to-Average Ratio (PAR) of the transmission may not exceed 13 dB.

#### **TEST CONFIGURATION**



#### **TEST PROCEDURE**

- 1. Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF
- 2. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
- 3. Set the number of counts to a value that stabilizes the measured CCDF curve;
- 4. Set the measurement interval as follows:
  - 1). for continuous transmissions, set to 1 ms,
  - 2). for burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.
- 5. Record the maximum PAPR level associated with a probability of 0.1%.

#### **TEST RESULTS**

#### Remark:

We measured all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 5; recorded worst case for each Channel Bandwidth of LTE FDD Band 5.

		LTE FDD Band 5				
TX Channel	Frequency	RB Size/Offset	PAPR(dB)			
Bandwidth	(MHz)	RB 3ize/Offset	QPSK	16QAM		
	824.7		3.40	4.43		
1.4 MHz	836.5	1RB#0	3.02	4.07		
	848.3		3.47	4.37		
	825.5		3.29	4.16		
3 MHz	836.5	1RB#0	2.94	3.88		
	847.5		3.56	4.80		
	826.5		3.44	4.19		
5 MHz	836.5	1RB#0	3.09	3.93		
	846.5		3.85	4.70		
	829.0		3.32	4.30		
10 MHz	836.5	1RB#0	3.23	4.18		
	844.0		3.22	4.18		



LTE FDD Band 5 – 1.4 MHz Channel BandwidthPAPR **QPSK** 16QAM Low Channel enter Freg 824,700000 MHz Center Freq 824.700000 MHz 100 % Gauss 100 % Gaussi Average Power Average Power Center Freq 824.700000 MHz Center Freq 824.700000 MHz 25.26 dBm 24.16 dBm 54.43 % at 0dB 10 % 48.47 % at 0dB 10 % 1 % 1 % 10.0 % 2.21 dB 10.0 % 2.82 dB 0.1 % 0.1 % 1.0 % 3.08 dB CF Step 5.000000 MHz Mar 1.0 % 4.04 dB CF Step 5.000000 MH: 0.1% 3.40 dB 0.1% 4.43 dB 0.01 % 0.01 % 0.01 % 4.52 dB 0.001 % 4.55 dB 0.01 % 3.50 dB 0.001 % 3.53 dB Freq Offs Freq Offse 0.0001 % 3.54 dB 0.0001 % 4.55 dB 0.001 % 0.001 % Peak 4.66 dB 28.82 dBm 3.54 dB 28.80 dBm 0.0001 % 0.0001 % 0 dB Info BW 25.000 MHz 0 dB Info BW 25.000 MHz 1RB#0 1RB#0 Middle Channel SPISE:INT] #136N AUTO 89-59-27 PM Jul 10, 2019
Center Freq: 836,500000 MHz Radio Std: None
Trig: Fre Run Counts: 1.00 M/1.00 Mpt
#Atten: 40 dB enter Freq 836.500000 MHz Center Freq 836.500000 MHz Average Power Average Power 100 % G Center Freq Center Freq 25.25 dBm 24.10 dBm 10 % 10 % 56.52 % at 0dB 49.78 % at 0dB 1 % 10.0 % 2.09 dB 10.0 % 2.72 dB 0.1 % 3.74 dB 10% 2.76 dB 10% CF Ste 5.000000 MH CF Ste 5.000000 MH 0.1% 3.02 dB 0.1% 4.07 dB 0.01 % 0.01 % 4.15 dB 0.001 % 4.18 dB 0.01 % 0.01 % 3.10 dB 0.001 % 3.12 dB Freq Offse Freq Offse 0.0001 % 3.13 dB 0.001 % 0.0001 % 4.19 dB 0.001 % 3.14 dB 4.24 dB Peak Peak 28.39 dBm 28.34 dBm 0.0001 % 0 dB Info BW 25.000 MHz 0.0001 % 0 dB Info BW 25.000 MHz 20 dB 20 dB 1RB#0 1RB#0 High Channel SERSEANT ALLOW AUTO 69:59:55 PM Jul 10, 2019

Center Freq: 848.300000 MHz Radio Std: None
Trig: Free na Counts: 1.00 M/1.00 Mpt
SAtten: 40 dB enter Freq 848.300000 MHz enter Freq 848.300000 MHz Average Power Average Power 100 % Gauss 100 % Ga Center Fred 848.300000 MH: Center Freq 848.300000 MHz 25.31 dBm 24.27 dBm 53.43 % at 0dB 10 % 10 % 48.11 % at 0dB 1 % 1% 10.0 % 2.32 dB 10.0 % 2.81 dB 0.1 % 0.1 % 3.21 dB 1.0 % 4.05 dB CF Step 5.000000 ML 3.47 dB 0.1 % 4.37 dB 0.1% 0.01 % 0.01 % 0.01 % 3.56 dB 0.01 % 4.49 dB 0.001 % 3.60 dB 0.001 % 4.55 dB Freq Offset 0 Hz Freq Offse 0.0001 % 4.56 dB 0.0001 % 3.61 dB 0.001 % 0.001% 3.61 dB 28.92 dBm 4.56 dB 28.83 dBm 0.0001 % 0 dB Info BW 25.000 MHz 0.0001 % 0 dB Info BW 25.000 MHz 1RB#0 1RB#0



LTE FDD Band 5–3MHz Channel BandwidthPAPR **QPSK** 16QAM Low Channel Center Freq 825.500000 MHz Center Freq 825.500000 MHz Average Power Average Power 100 % Gaus Center Freq Center Freq 25.34 dBm 24.45 dBm 48.56 % at 0dB 10 % 54.59 % at 0dB 1 % 10.0 % 2.23 dB 10.0 % 2.66 dB 0.1 % 1.0 % 3.04 dB CF Step 5.000000 MH Ma 1.0 % 3.81 dB CF Ster 5.000000 MH Ma 3.29 dB 0.1% 4.16 dB 0.1% 0.01 % 0.01 % 4.29 dB 0.001 % 4.33 dB 0.01 % 3.41 dB 0.001 % 3.48 dB 0.0001 % 3.50 dB Freq Offs Freq Offse 0.0001 % 4.34 dB 0.001 % 0.001 % Peak 3.51 dB 28.85 dBm Peak 4.40 dB 28.85 dBm 0 dB Info BW 25.000 MHz 0 dB Info BW 25.000 MHz 1RB#0 1RB#0 Middle Channel Center Freq 836.500000 MHz enter Freq 836.500000 MHz Average Power 100 % Gaus Average Power 100 % Center Freq 836.500000 MHz Center Fred 25.38 dBm 24.29 dBm 10 % 56.88 % at 0dB 10 % 50.18 % at 0dB 1% 10.0 % 2.05 dB 10.0 % 2.61 dB 0.1 % 0.1 % CF Step 5.000000 MH Ma 3.62 dB 10% 2.73 dB 1.0 % CF Step 5.000000 MHz 0.1% 2.94 dB 0.1% 3.88 dB 0.01 % 3.02 dB 0.001 % 3.05 dB 0.01 % 0.01 % 4.00 dB 0.001 % 4.04 dB 0.01 % 0.0001 % 3.06 dB 0.0001 % 4.06 dB 0.001 % 0.001 % 4.06 dB 3.07 dB Peak Peak 28.45 dBm 28.35 dBm 0.0001 % 0 dB Info BW 25.000 MHz 0.0001 % 0 dB Info BW 25.000 MHz 20 dB 20 dB 1RB#0 1RB#0 High Channel UN RL RF 50.0 AC CORREC SEMESTON ALIGN AUTO 10:19:55 PM Jul 70, 2019

Center Freq 83.6.500000 MHz Radio Std: None Affect: 40 dB Counts: 1.00 M/1.00 M/pt Auto 10:19:55 PM Jul 70, 2019

ALIGN AUTO 1 enter Freq 847.500000 MHz Average Power Average Power 100 % Gaus 100 % Center Free 847.500000 MH Center Freq 25.33 dBm 23.21 dBm 10 % 10 % 52.85 % at 0dB 46.61 % at 0dB 1 % 1 % 2.37 dB 10.0 % 2.87 dB 10.0 % 0.1 % 0.1 % 3.27 dB 1.0 % 4.23 dB 1.0 % CF Step 5.000000 MH: CF Step 5.000000 MHz 4.80 dB 0.1% 3.56 dB 0.1% 0.01 % 0.01 % 0.01 % 3.71 dB 0.01 % 5.06 dB 0.001 % 3.78 dB 0.001 % 5.17 dB Freq Offs Freq Offset 0 Hz 0.0001 % 3.79 dB 0.0001 % 5.21 dB 0.001 % 0.001 % 3.79 dB 29.12 dBm 5.24 dB 28.45 dBm 0.0001 % 0 dB Info BW 25.000 MHz 0.0001 % O dB Info BW 25.000 MHz 1RB#0 1RB#0



LTE FDD Band 5–5MHz Channel BandwidthPAPR **QPSK** 16QAM Low Channel | SENSE:INT | ALIGN AUTO | 10:39:17 PM Jul 10, 20
| Center Freq: 826.600000 MHz | Radio Std: None | Trig: Free Run | Counts: 1.00 M/1.00 Mpt | Alten: 40 dB enter Freg 826,500000 MHz Center Freq 826.500000 MHz Average Power 100 % Gauss Average Power 100 % Center Freq 826.500000 MHz Center Freq 826.500000 MHz 25.17 dBm 24.36 dBm 53.79 % at 0dB 10 % 48.28 % at 0dB 10 % 1 % 1 % 10.0 % 2.34 dB 10.0 % 2.61 dB 0.1 % 0.1 % 1.0 % 3.15 dB CF Step 5.000000 MH2 1.0 % 3.81 dB CF Step 5.000000 MHz 0.1% 3.44 dB 0.1% 4.19 dB 0.01 % 0.01 % 0.01 % 4.28 dB 0.001 % 4.31 dB 0.01 % 3.59 dB 0.001 % 3.63 dB Freq Offs 0.0001 % 3.64 dB 0.0001 % 4.33 dB 0.001 % 0.001 % Peak 4.37 dB 28.73 dBm 3.69 dB 28.86 dBm 0.0001 % 0.0001 % 0 dB Info BW 25.000 MHz 0 dB Info BW 25.000 MHz 1RB#0 1RB#0 Middle Channel enter Freq 836.500000 MHz Center Freq 836.500000 MHz Average Power Average Power 100 % Center Fred Center Freq 836.500000 MHz 25.25 dBm 24.27 dBm 10 % 10 % 55.53 % at 0dB 49.43 % at 0dB 1 % 10.0 % 2.17 dB 10.0 % 2.63 dB 0.1 % 3 66 dB 10% 2 88 dB 10% CF Step 5.000000 MHz .Man CF Ste 5.000000 MH 0.1% 3.09 dB 0.1% 3.93 dB 0.01 % 0.01 % 0.01 % 3.99 dB 0.001 % 4.01 dB 0.01 % 3.20 dB 0.001 % 3.22 dB Freq Offse 0.0001 % 3.23 dB 0.001 % 0.0001 % 4.02 dB 0.001 % Peak 4.15 day 28.42 dBm 3.31 dB 28.56 dBm 4.15 dB Peak 0.0001 % 0 dB Info BW 25.000 MHz 0.0001 % 0 dB Info BW 25.000 MHz 20 dB 20 dB 1RB#0 1RB#0 High Channel enter Freq 846.500000 MHz nter Freq 846.500000 MHz Average Power Average Power 100 % Gau 100 % Ga Center Fred 846.500000 MHz Center Freq 846.500000 MHz 25.17 dBm 24.19 dBm 50.92 % at 0dB 10 % 46.45 % at 0dB 10 % 1 % 1 % 10.0 % 100% 2.82 dB 2.49 dB 0.1 % 0.1 % 1.0 % 3.49 dB 1.0 % 4.25 dB CF Step 5.000000 MHz 3.85 dB 0.1% 4.70 dB 0.1% 0.01 % 0.01 % 0.01 % 3.99 dB 0.01 % 4 84 dB 0.001 % 4.03 dB 0.001 % 4.89 dB Freq Offs Freq Offset 0.0001 % 4.91 dB 0.0001 % 4.04 dB 0.001 % 0.001 % 4.18 dB 29.35 dBm 4.91 dB 29.10 dBm 0.0001 % 0 dB Info BW 25.000 MHz 0.0001 % 0 dB Info BW 25.000 MHz 1RB#0 1RB#0



LTE FDD Band 5–10MHz Channel BandwidthPAPR **QPSK** 16QAM Low Channel SENSE.INT ALIGN AUTO 10:59:18 PM Jul 10, 2011

Center Free; 282,000000 MHz Radio Std: None

--- Trig: Free Run Counts: 1.00 M/1.00 Mpt

#Atten: 40 dB Center Freg 829.000000 MHz Center Freq 829.000000 MHz Average Power Average Power 100 % Center Freq 25.33 dBm 24.38 dBm 10 % 10 % 54.22 % at 0dB 48.66 % at 0dB 19 10.0 % 2.26 dB 10.0 % 2.69 dB 0.1 % 1.0 % 3.08 dB 1.0 % 3.92 dB CF Step 5,000000 MHz Man CF Step 5.000000 MH Ma 3.32 dB 4.30 dB 0.1% 0.1% 0.01 % 0.01 % 0.01 % 4.40 dB 0.001 % 4.43 dB 0.01 % 3.45 dB 0.001 % 3.51 dB 0.0001 % 3.55 dB Freq Offset Freq Offse 0.0001 % 4.46 dB 0.001 % 0.001 % 3.56 dB 28.89 dBm Peak 4.52 dB 28.90 dBm Peak 20 dB 0 dB Info BW 25.000 MHz 0 dB Info BW 25.000 MHz 1RB#0 1RB#0 Middle Channel Center Freq 836.500000 MHz Center Freq 836.500000 MHz Average Power 100 % Gai Average Power 100 % Gaus Center Freq 836.500000 MHz Center Freq 24.27 dBm 25.33 dBm 10 % 54.96 % at 0dB 10 % 49.32 % at 0dB 1 % 1 % 10.0 % 2.73 dB 10.0 % 2.17 dB 0.1 % 0.1 % 1.0 % 2.98 dB 1.0 % 3.88 dB CF Step 5,000000 MHz CF Step 5.000000 MH 3.23 dB 0.1% 4.18 dB 0.1% Man 0.01 % 0.01 % 4.29 dB 0.001 % 4.32 dB 0.01 % 0.01 % 3.33 dB 0.001 % 3.33 dB 0.001 % 3.38 dB 0.0001 % 3.40 dB 0.0001 % 4.33 dB 0.001 % 0.001 % 4.35 dB 3.47 dB 28.80 dBm Peak Peak 28.62 dBm 0.0001 % 0 dB Info BW 25.000 MHz 0.0001 % 0 dB Info BW 25.000 MHz 20 dB 20 dB 1RB#0 1RB#0 High Channel SPIESTICI 4,168 AITO 1113639 PM Jd 10, 2619
Center Freq: 844,000000 MHz Radio Std: None
Trig: Free Run Counts: 1.00 M/1.00 Mpt
Attent: 40 enter Freq 844.000000 MHz Center Freq 844.000000 MHz Average Power Average Power 100 % Center Freq 844.000000 MHz 25.33 dBm 24.27 dBm 10 % 10 % 54.76 % at 0dB 48.74 % at 0dB 1 % 10.0 % 2.24 dB 10.0 % 2.72 dB CF Step 5.000000 MHz Mar 1.0 % 2.98 dB 1.0 % 3.82 dB 4.18 dB 0.1% 3.22 dB 0.1% 0.01 % 0.01 % 3.34 dB 0.01 % 4.35 dB 0.001 % 3.39 dB 0.001 % 4.39 dB Freq Offs Freq Offse 0.0001 % 3.40 dB 0.0001 % 4.41 dB 3.40 dB 28.73 dBm 4.42 dB 28.69 dBm 0.0001 % 0 dB Info BW 25.000 MHz 0.0001 % 0 dB Info BW 25.000 MHz 1RB#0 1RB#0

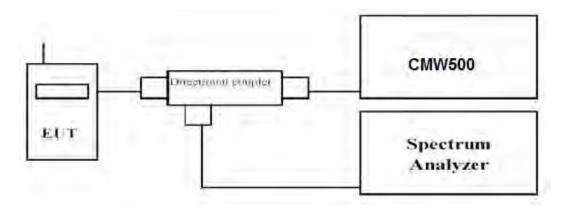


### Occupied Bandwidth and Emission Bandwidth

#### LIMIT

N/A

#### **TEST CONFIGURATION**



#### **TEST PROCEDURE**

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at low, middle and high channel in each band. The -26dBc Emission bandwidth was also measured and recorded. Set RBWwas set to about 1% of emission BW, VBW≥3 times RBW.

-26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth isthe delta frequency between the two points where the display line intersects the signal trace.

#### **TEST RESULTS**

Remark:

We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 5; recorded worst case for each Channel Bandwidth of LTE FDD Band 5.

		LTE FD	D Band 5				
TX Channel	RB Size/Offset	Frequency		Emission Ith (MHz)	99% Occupied bandwidth (MHz)		
Bandwidth		(MHz)	QPSK	16QAM	QPSK	16QAM	
		824.7	1.270	1.273	1.088	1.088	
1.4 MHz	6RB#0	836.5	1.264	1.264	1.090	1.088	
		848.3	1.252	1.248	1.086	1.089	
		825.5	2.865	2.847	2.686	2.694	
3 MHz	15RB#0	836.5	2.868	2.877	2.691	2.693	
		847.5	2.850	2.849	2.693	2.689	
		826.5	4.4984	4.4967	4.498	4.497	
5 MHz	25RB#0	836.5	4.5008	4.5051	4.501	4.505	
		846.5	4.4973	4.5014	4.497	4.501	
		829.0	8.9838	8.9903	8.983	8.990	
10 MHz	50RB#0	836.5	8.9826	8.9880	8.982	8.988	
		844.0	8.9892	8.9764	8.989	8.976	



LTE FDD Band 5 – 1.4 MHz Channel Bandwidth Occupied Bandwidth and Emission Bandwidth **QPSK** Low Channel SENSE::NT] ALIGN AU
Center Freq: 824,700000 MHz
Trig: Free Run Avg|Hold: 30/30
#Atten: 30 dB SENSE:INT ALIGN AU
Center Freq: 824,700000 MHz
Trig: Free Run Avg|Hold: 30/30
#Atten: 30 dB Center Freg 824.700000 MHz Radio Device: BTS Ref 40.00 dBm Center Freq 824.700000 MHz Center Freq CF Step 300,000 kHz Mar Center 824.7 MHz Res BW 30 kHz CF Step 300,000 kHz Mar Span 3 MHz #Sweep 100 ms Span 3 MHz #Sweep 100 ms #VBW 91 kHz #VBW 91 kHz Total Power 26.9 dBm Occupied Bandwidth Total Power 26.0 dBm Occupied Bandwidth 1.0879 MHz 1.0878 MHz Freq Offset 0 Hz Freq Offse -1.537 kHz Transmit Freq Error 16 Hz % of OBW Power 99.00 % Transmit Freq Error % of OBW Power 99.00 % 1.270 MHz x dB -26.00 dB x dB Bandwidth 1.273 MHz x dB -26.00 dB 6RB#0 6RB#0 Middle Channel SENSESINT ALIGN AUT
Center Freq: 836.600000 MHz
Trig: Free Run Avg|Hold: 30/30
#Atten: 30 dB Center Freq: 836.500000 MHz
Trig: Free Run Avg|Hold: 30/30
#Atten: 30 dB Center Freq 836.500000 MHz Ref 40.00 dBm Ref 40.00 dBm Center Freq 836.500000 MHz Center Freq 836.500000 MHz Span 3 MHz #Sweep 100 ms CF Step 300,000 kH CF Step 300,000 kHz #VBW 91 kHz #VBW 91 kHz 27.0 dBm Total Power 25.9 dBm Occupied Bandwidth Occupied Bandwidth 1.0904 MHz 1.0876 MHz Freq Offse -3.579 kHz 1.278 kHz % of OBW Power 99.00 % % of OBW Power 99.00 % Transmit Freq Error Transmit Freq Error 1.264 MHz 1.264 MHz x dB Bandwidth x dB -26.00 dB x dB Bandwidth x dB -26.00 dB 6RB#0 6RB#0 High Channel Center Freq: 848.300000 MHz
Trig: Free Run Avg|Hold: 30/30 #Atten: 30 dB Center Freq: 848,300000 MHz
Trig: Free Run Avg|Hold: 30/30
#Atten: 30 dB enter Freq 848.300000 MHz Center Freq 848.300000 MHz Ref 40.00 dBm Ref 40.00 dBm Center Freq della Maly May CF Step 300,000 kH: Mar enter 848.3 MHz Res BW 30 kHz Span 3 MHz #Sweep 100 ms enter 848.3 MHz Res BW 30 kHz Span 3 MHz #Sweep 100 ms CF Step 300,000 kHz #VBW 91 kHz **#VBW 91 kHz** 27.0 dBm Occupied Bandwidth Total Power Occupied Bandwidth Total Power 26.0 dBm 1.0858 MHz 1.0892 MHz Freq Offse -1.992 kHz Transmit Freq Error -1.043 kHz % of OBW Power 99.00 % Transmit Freq Error % of OBW Power 99.00 % 1.252 MHz -26.00 dB 1.248 MHz -26.00 dB 6RB#0 6RB#0

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LTE FDD Band 5-5MHz Channel Bandwidth Occupied Bandwidth and Emission Bandwidth **QPSK** 16QAM Low Channel SENSE:INT ALIGN AUTO
Center Freq: 826.500000 MHz
Trig: Free Run Avg|Hold: 100/100
#Atten: 30 dB 10:26:07 PM Jul 10, 2 Radio Std: None enter Freq 826.500000 MHz Center Freq 826.500000 MHz Radio Device: BTS Ref 40.00 dBm Ref 40.00 dBm Center Freq CF Step 1.000000 MHz Mar Span 10 MHz #Sweep 100 ms enter 826.5 MHz Res BW 100 kHz **#VBW 300 kHz** enter 826.5 MHz Res BW 100 kHz Span 10 MHz #Sweep 100 ms CF Step 1.000000 MHz **#VBW 300 kHz** 26.7 dBm Total Power Occupied Bandwidth Total Power Occupied Bandwidth 4.4984 MHz Freq Offse 4.4967 MHz Freq Offse 1.855 kHz Transmit Freq Error % of OBW Power 99.00 % Transmit Freq Error -1.240 kHz % of OBW Power 99.00 % 4.802 MHz -26.00 dB 4.833 MHz x dB -26.00 dB 25RB#0 25RB#0 Middle Channel SENSEJINT ALIGN AUTO
Center Freq: 836.500000 MHz
Trig: Free Run Avg|Hold: 100/100
#Atten: 30 dB SENSE:INT] ALIGN AUTO
Center Freq: 836.500000 MHz
Trig: Free Run Avg|Hold: 100/100
#Atten: 30 dB Center Freq 836.500000 MHz Center Freq 836.500000 MHz Ref 40.00 dBm Ref 40.00 dBm Center Freq 836.500000 MHz Center Freq 836.500000 MHz Span 10 MHz #Sweep 100 ms CF Step 1,000000 MHz CF Step 1,000000 MHz #VBW 300 kHz Occupied Bandwidth Occupied Bandwidth 4.5008 MHz 4.5051 MHz Freq Offse 281 Hz 161 Hz % of OBW Power 99.00 % % of OBW Power 99.00 % Transmit Freq Error Transmit Freq Error 4.851 MHz 4.840 MHz x dB Bandwidth x dB -26,00 dB x dB Bandwidth x dB -26,00 dB 25RB#0 25RB#0 High Channel SENSE:INT ALIGN AUTO
Center Freq: 846.500000 MHz
Trig: Free Run Avg|Hold: 100/100
#Atten: 30 dB Center Free: 846.500000 MHz
Trig: Free Run AvgiHold: 100/100
#Atten: 30 dB q 846.500000 MHz Ref 40.00 dBm Ref 40.00 dBm Center Freq Center Freq Span 10 MHz #Sweep 100 ms Center 846.5 MHz Res BW 100 kHz Span 10 MHz #Sweep 100 ms CF Step 1.000000 MH enter 846.5 MHz Res BW 100 kHz CF Step 1.000000 MHz **#VBW 300 kHz #VBW 300 kHz** Total Power 26.7 dBm Total Power 25.7 dBm 4.4973 MHz 4.5014 MHz Transmit Freq Error 1.592 kHz % of OBW Power 99.00 % Transmit Freq Error -2.990 kHz % of OBW Power 99.00 % 4.808 MHz 4.843 MHz -26.00 dB 25RB#0 25RB#0



LTE FDD Band 5-10MHz Channel Bandwidth Occupied Bandwidth and Emission Bandwidth **QPSK** 16QAM Low Channel SENSE:INT] ALIGN AU
Center Freq: 829,000000 MHz
Trig: Free Run Avg|Hold: 30/30
#Atten: 30 dB Center Freq: 829,000000 MHz
Trig: Free Run Avg|Hold: 30/30
#Atten: 30 dB Radio Device: BTS Ref 40.00 dBm Center Freq Center Freq Center 829 MHz Res BW 200 kHz Span 20 MHz #Sweep 100 ms Span 20 MHz #Sweep 100 ms CF Step 2,000000 MHz CF Step 2,000000 MHz #VBW 620 kHz **#VBW** 620 kHz Occupied Bandwidth Total Power 25.4 dBm Occupied Bandwidth Total Power 24.4 dBm 8.9838 MHz 8.9903 MHz Freq Offset Freq Offse -4.801 kHz -7.091 kHz Transmit Freq Error % of OBW Power 99.00 % Transmit Freq Error % of OBW Power 99.00 % 9.524 MHz x dB -26.00 dB x dB Bandwidth 9.509 MHz x dB -26.00 dB 50RB#0 50RB#0 Middle Channel SENSE:INT ALIGN AU
Center Freq: 836.500000 MHz
Trig: Free Run Avg|Hold: 30/30
#Atten: 30 dB SENSE INT ALIGN AU
Center Freq: 836.500000 MHz
Trig: Free Run Avg|Hold: 30/30
#Atten: 30 dB Ref 40.00 dBm Ref 40.00 dBm Center Freq 836.500000 MHz Center Freq 836.500000 MHz Span 20 MHz #Sweep 100 ms CF Step 2.000000 MH CF Step 2,000000 MHz #VBW 620 kHz **#VBW** 620 kHz Total Power 24.4 dBm Occupied Bandwidth Occupied Bandwidth 8.9826 MHz 8.9880 MHz Freq Offse 1.329 kHz 181 Hz % of OBW Power 99.00 % % of OBW Power 99.00 % Transmit Freq Error Transmit Freq Error 9.530 MHz 9.525 MHz x dB Bandwidth x dB -26.00 dB x dB Bandwidth -26.00 dB x dB 50RB#0 50RB#0 High Channel enter Freq 844.000000 MHz Center Freq 844.000000 MHz Center Freq: 844.000000 MHz
Trig: Free Run Avg|Hold: 30/30
#Atten: 30 dB Center Freq: 844.000000 MHz Trig: Free Run Avg|Hold: 30/30 #Atten: 30 dB Ref 40.00 dBm Ref 40.00 dBm Center Freq enter 844 MHz Res BW 200 kHz Span 20 MHz #Sweep 100 ms enter 844 MHz Res BW 200 kHz CF Step 2,000000 MHz CF Step 2,000000 MHz **#VBW 620 kHz #VBW 620 kHz** 25.5 dBm 24.5 dBm Occupied Bandwidth Total Power Occupied Bandwidth Total Power 8.9892 MHz 8.9764 MHz Freq Offse Freq Offse -11.632 kHz Transmit Freq Error -7.856 kHz % of OBW Power 99.00 % Transmit Freq Error % of OBW Power 99.00 % 9.533 MHz -26.00 dB 9.495 MHz -26.00 dB 50RB#0 50RB#0

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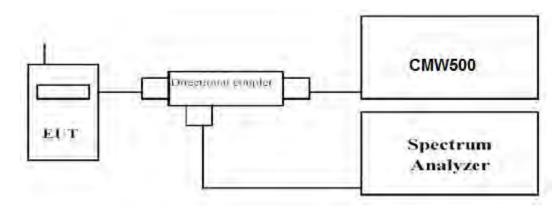


### 4.4 Band Edge compliance

#### LIMIT

Per FCC §24.238 the 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 + 10log(P) dB.

#### **TEST CONFIGURATION**



#### **TEST PROCEDURE**

- 1. The transmitter output port was connected to base station.
- 2. The RF output of EUT was connected to the power meter by RF cable and attenuator, the path loss was compensated to the results for each measurement.
- 3. Set EUT at maximum power through base station.
- 4. Select lowestand highest channels for each band and different modulation.
- 5. Measure Band edge using RMS (Average) detector by spectrum

#### **TEST RESULTS**

#### Remark:

1. We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 5; recorded worst case for each Channel Bandwidth of LTE FDD Band 5.

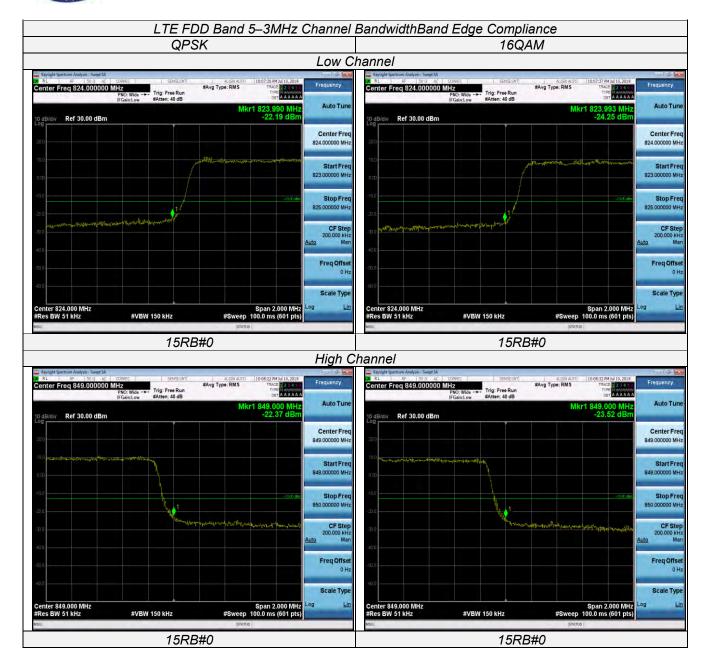
6RB#0



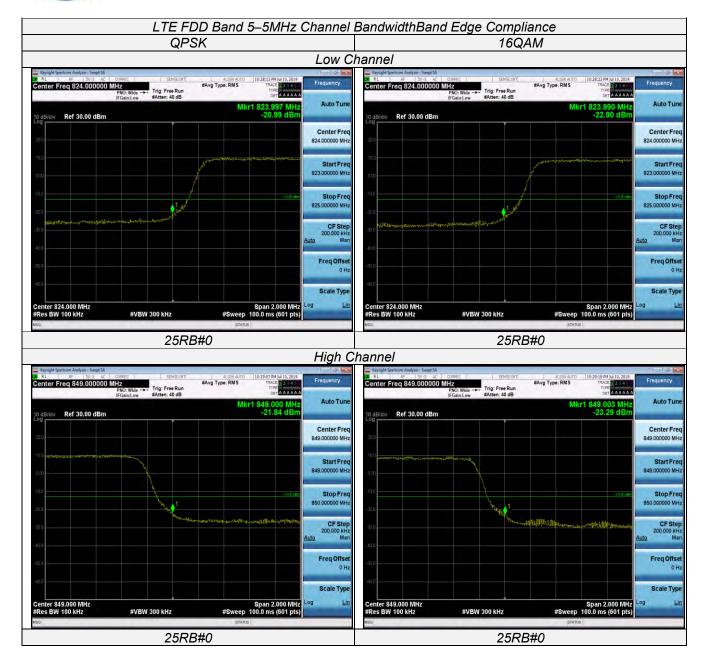
LTE FDD Band 5 – 1.4 MHz Channel BandwidthBand Edge Compliance **QPSK** 16QAM Low Channel #Avg Type: RMS enter Freq 824.000000 MHz Center Freq 824.000000 MHz Auto Tun Ref 30.00 dBm Ref 30.00 dBm Center Free Stop Free 825.000000 MH; Scale Type Span 2.000 MHz #Sweep 100.0 ms (601 pts) Span 2.000 MHz #Sweep 100.0 ms (601 pts) #VBW 91 kHz #VBW 91 kHz 6RB#0 6RB#0 High Channel enter Freq 849.000000 MHz enter Freq 849.000000 MHz 849.000 M -19.35 dE Ref 30.00 dBm Ref 30.00 dBm Center Freq 849.000000 MHz Center Fred 849.000000 MH Stop Free Stop Free Walligham broken by Langer with maken or Marially day the Scale Type Center 849.000 MHz #Res BW 30 kHz #VBW 91 kHz #VBW 91 kHz

6RB#0

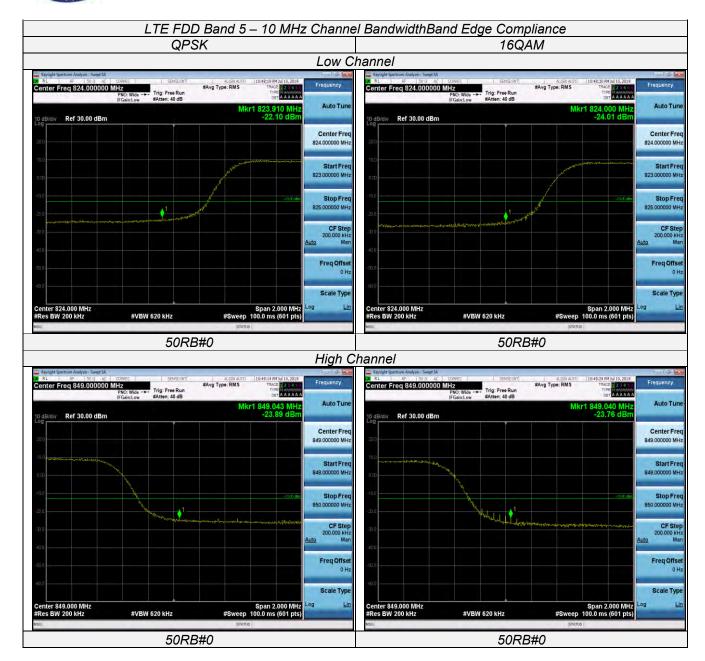
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### 4.5 Spurious Emssion on Antenna Port

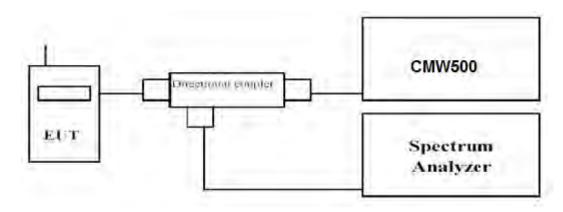
#### LIMIT

Per FCC §24.238, the 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 + 10log(P) dB.

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#### **TEST CONFIGURATION**



#### **TEST PROCEDURE**

The EUT was setup according to EIA/TIA 603D

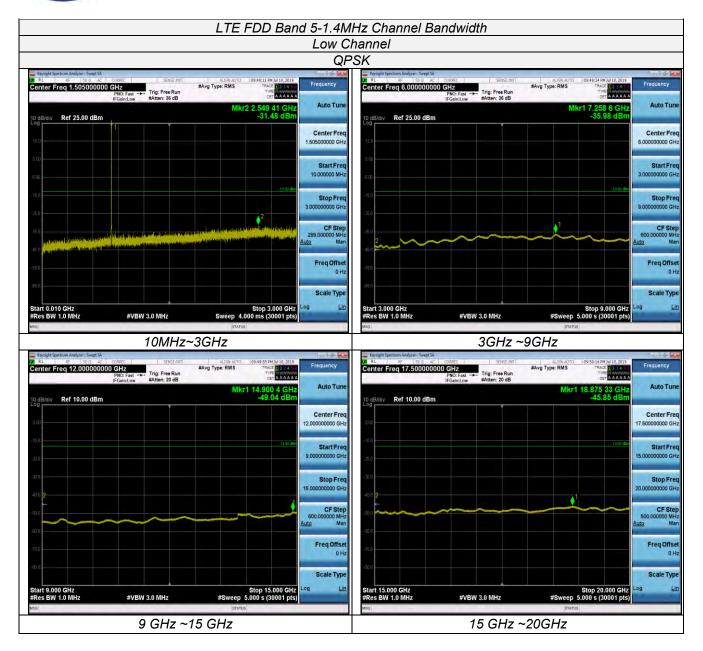
- a. Place the EUT on a bench and set it in transmitting mode.
- b. Connect a low loss RF cable from the antenna port to a spectrum analyzer and CMW500 by a Directional Couple.
- c. EUT Communicate with CMW500, then select a channel for testing.
- d. Add a correction factor to the display of spectrum, and then test.
- e. The resolution bandwidth of the spectrum analyzer was setsufficient scans were taken to show the out of band Emission if any up to10<sup>th</sup> harmonic.
- f. Please refer to following tables for test antenna conducted emissions.

Working Frequency	Sub range (GHz)	RBW	VBW	Sweep time (s)
LTE FDD Band 5	0.01~20	1 MHz	3 MHz	Auto

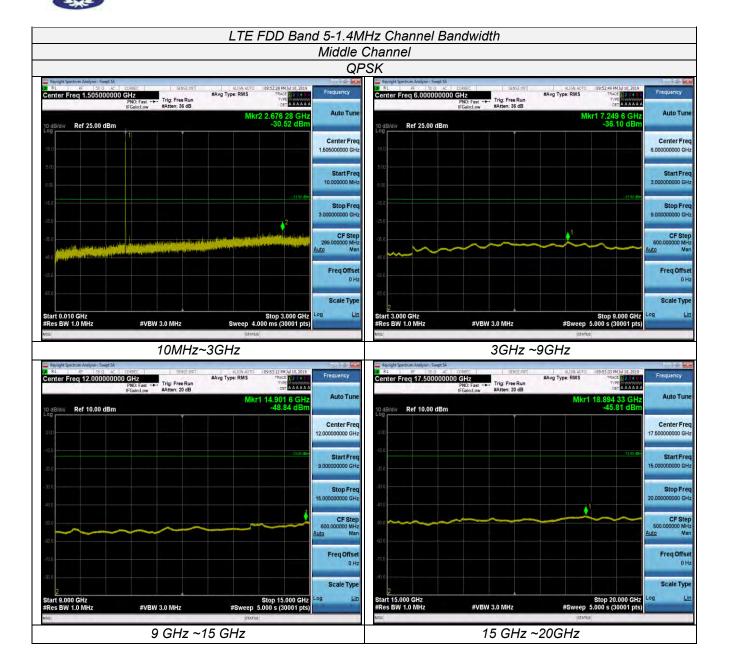
#### **TEST RESULTS**

#### Remark:

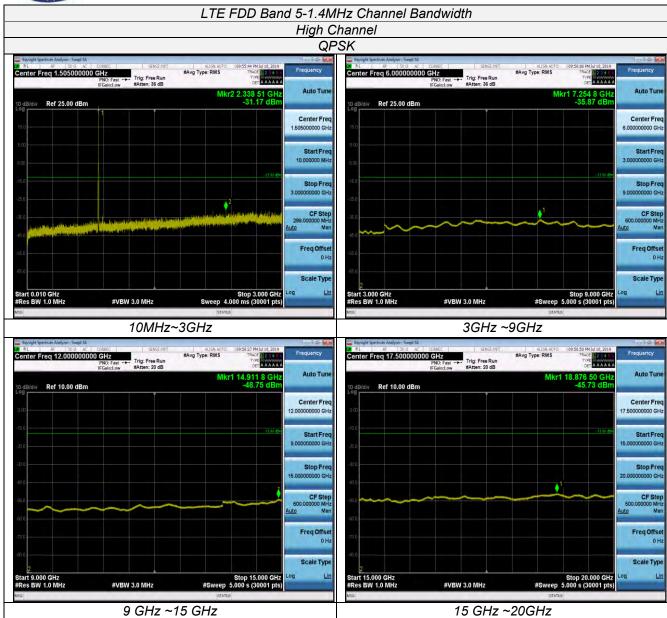
 We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 5; recorded worst case at the QPSK Mode for each Channel Bandwidth of LTE FDD Band 5 Page 31 of 52 Report No.: HK1907111624-3E



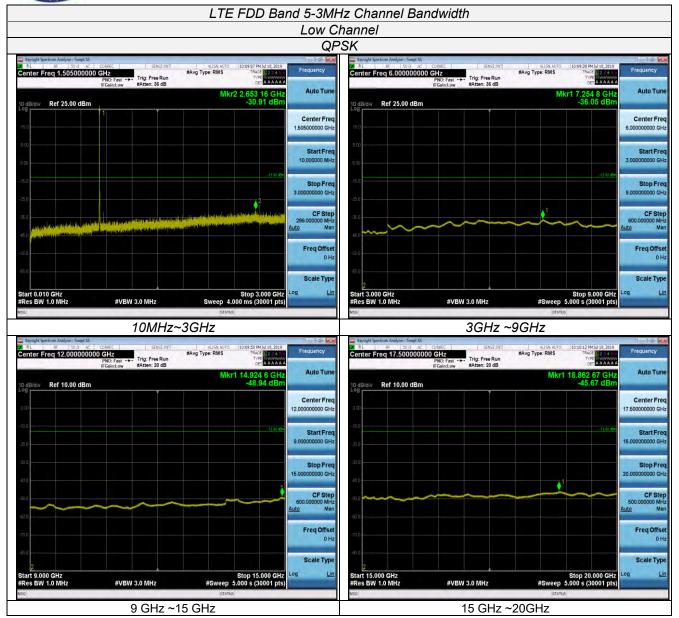
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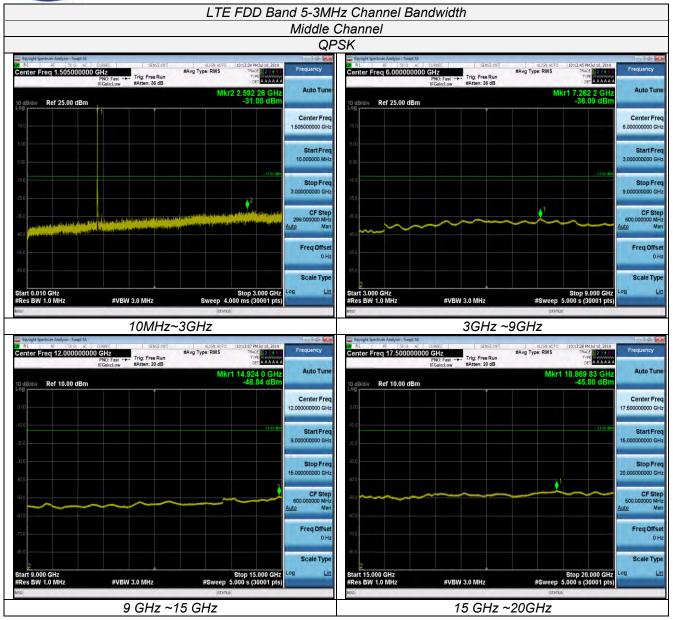
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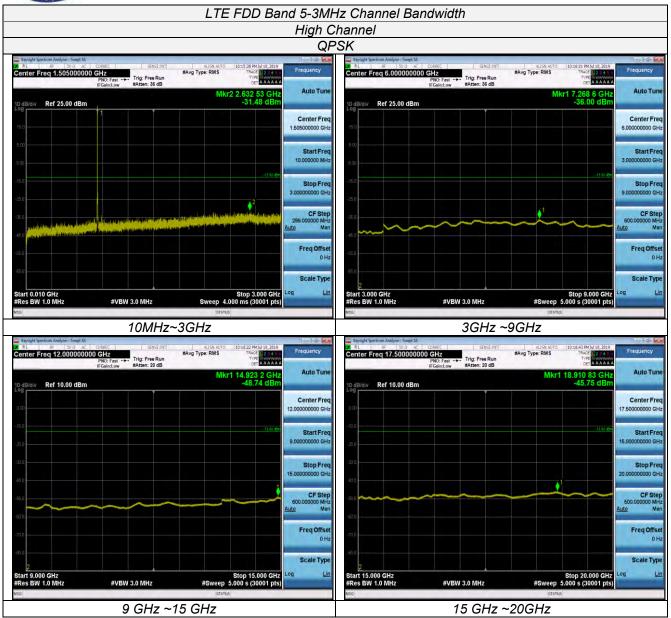
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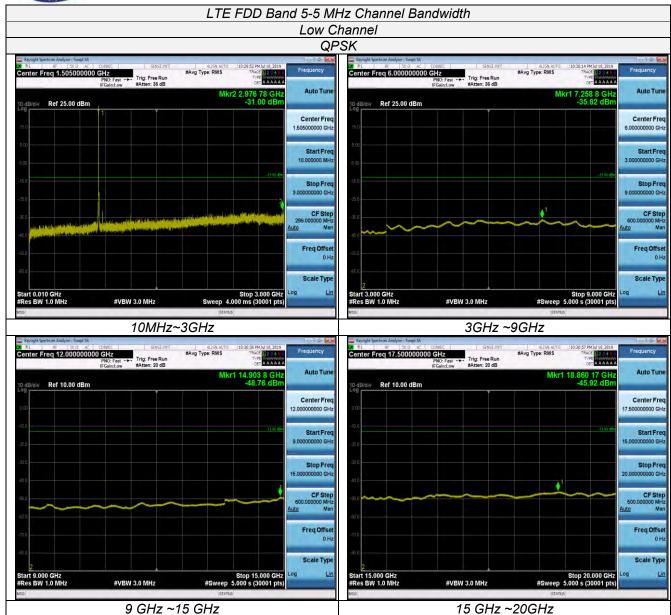
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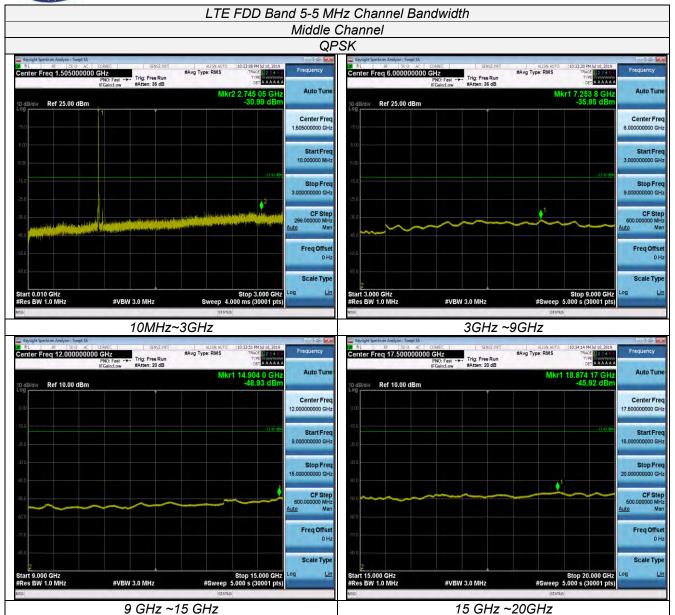
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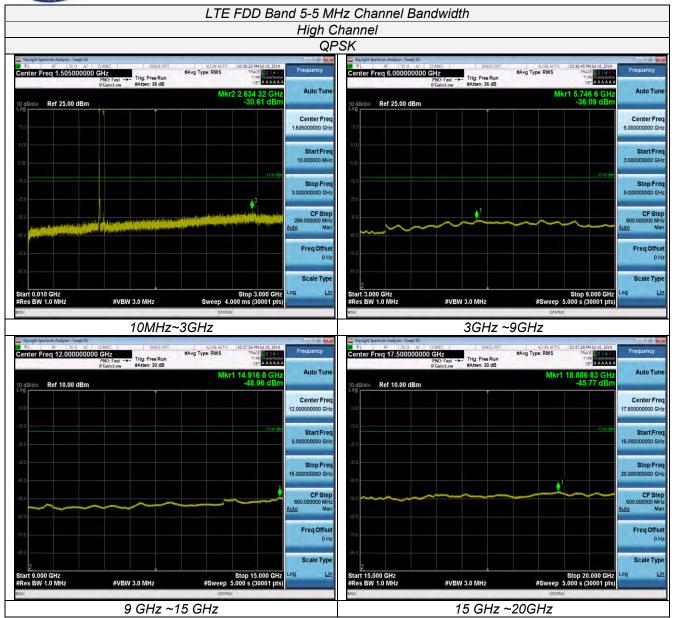
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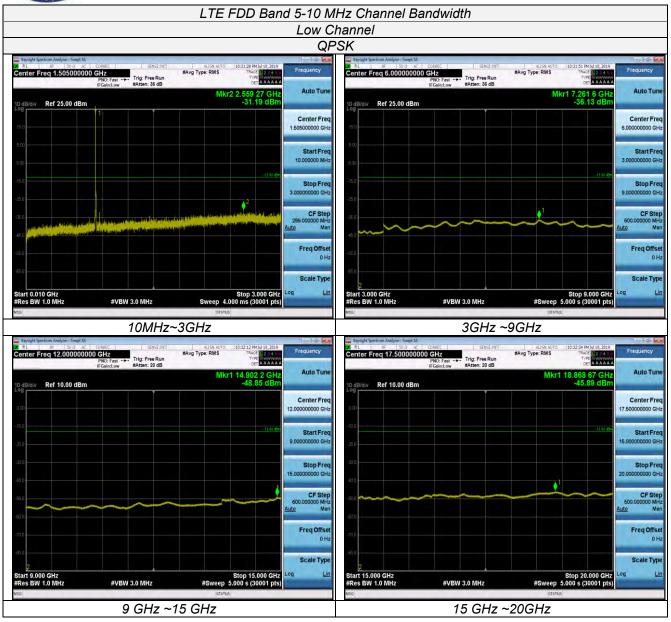
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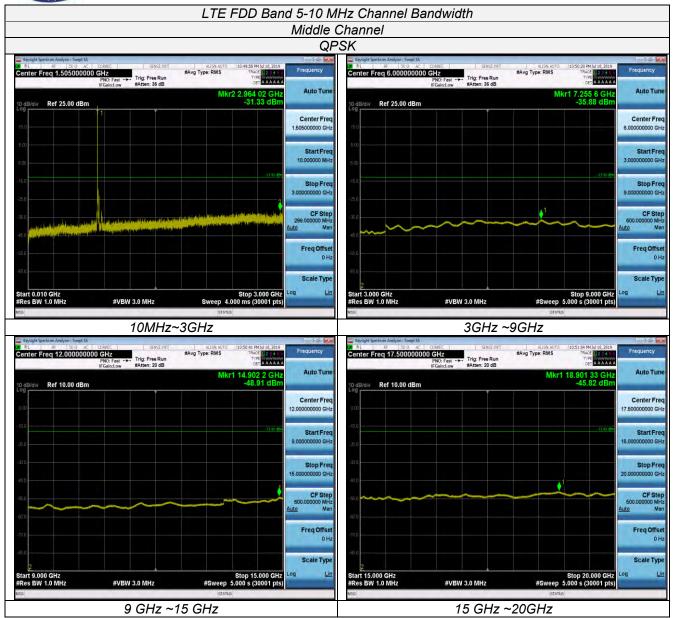
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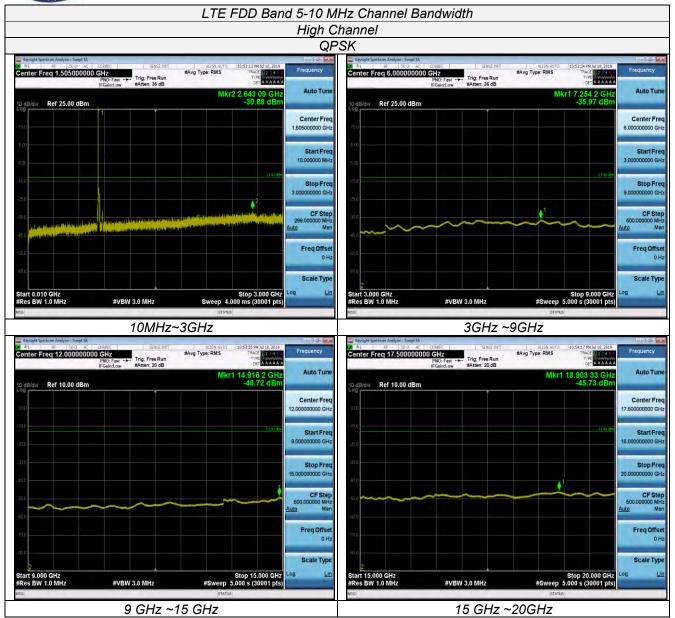
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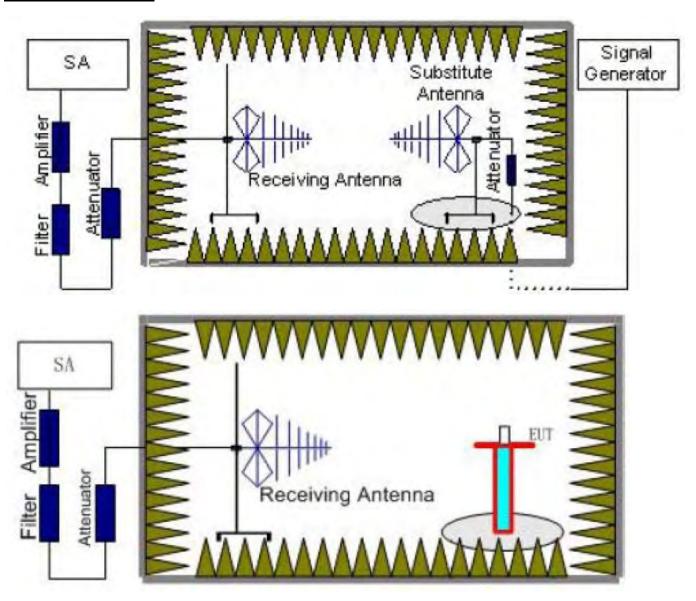


# 4.6 Radiated Spurious Emssion

# **TEST APPLICABLE**

Per FCC §24.238, the 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 + 10log(P) dB.

#### **TEST CONFIGURATION**



# **TEST PROCEDURE**

- 1. EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.50m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
- 2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.

The EUT is then put into continuously transmitting mode at its maximum power level during the test.Set
Test Receiver or Spectrum RBW=1MHz,VBW=3MHz, And the maximum value of the receiver should be
recorded as (P<sub>r</sub>).

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- 4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest isconnected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P<sub>Mea</sub>) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (P<sub>r</sub>). The power of signal source (P<sub>Mea</sub>) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
- 5. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (Pcl), the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.

  The measurement results are obtained as described below:
  - Power(EIRP)=P<sub>Mea</sub>- P<sub>Aq</sub> P<sub>cl</sub>+ G<sub>a</sub>
- 6. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
- 7. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi.
- 8. In order to make sure test results more clearly, we set frequency range and sweep time for difference frequency range as follows table:

Working Frequency	Subrange (GHz)	RBW	VBW	Sweep time (s)
LTE BAND 5	0.03~1	100KHz	300KHz	10
LIE BAND 3	1~20	1 MHz	3 MHz	2

#### **TEST LIMITS**

According to 24.238 specify that the 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. The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

Frequency	Channel	Frequency Range	Verdict
	Low	30MHz -20GHz	PASS
LTE BAND 5	Middle	30MHz -20GHz	PASS
	High	30MHz -20GHz	PASS

# Radiated Measurement:

#### Remark.

- 1. We measured all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE BAND 5; recorded worst case for each Channel Bandwidth of LTE BAND 5.
- 2.  $EIRP=P_{Mea}(dBm)-P_{cl}(dB)+G_a(dBi)$
- 3. Not recorded other points as values lower than limits.
- 4. Margin = Limit EIRP

#### Remark:

- 1. We measured all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 5; recorded worst case for each Channel Bandwidth of LTE FDD Band 5.
- 2.  $EIRP=P_{Mea}(dBm)-P_{cl}(dB)+G_a(dBi)$
- 3. Not recorded other points as values lower than limits.
- 4. Margin = Limit EIRP



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LTE FDD Band 5\_Channel Bandwidth 1.4MHz\_QPSK\_ Low Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1649.4	-30.98	3.00	3.00	9.58	-24.4	-13.00	11.4	Н
2474.1	-37.28	3.03	3.00	10.72	-29.59	-13.00	16.59	Н
1649.4	-30.57	3.00	3.00	9.68	-23.89	-13.00	10.89	V
2474.1	-39.08	3.03	3.00	10.72	-31.39	-13.00	18.39	V

LTE FDD Band 5\_Channel Bandwidth 1.4MHz\_QPSK\_ Middle Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.0	-28.62	3.00	3.00	9.58	-22.04	-13.00	9.04	Н
2509.5	-39.67	3.03	3.00	10.72	-31.98	-13.00	18.98	Н
1673.0	-30.07	3.00	3.00	9.68	-23.39	-13.00	10.39	V
2509.5	-39.11	3.03	3.00	10.72	-31.42	-13.00	18.42	V

LTE FDD Band 5 Channel Bandwidth 1.4MHz QPSK High Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1696.6	-33.05	3.00	3.00	9.58	-26.47	-13.00	13.47	Н
2544.9	-37.68	3.03	3.00	10.72	-29.99	-13.00	16.99	Н
1696.6	-30.95	3.00	3.00	9.68	-24.27	-13.00	11.27	V
2544.9	-35.39	3.03	3.00	10.72	-27.7	-13.00	14.7	V

LTE FDD Band 5\_Channel Bandwidth 3MHz\_QPSK\_ Low Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1651.0	-30.98	3.00	3.00	9.58	-24.4	-13.00	11.4	Н
2476.5	-37.09	3.03	3.00	10.72	-29.4	-13.00	16.4	Н
1651.0	-30.82	3.00	3.00	9.68	-24.14	-13.00	11.14	V
2476.5	-39.01	3.03	3.00	10.72	-31.32	-13.00	18.32	V

LTE FDD Band 5\_Channel Bandwidth 3MHz\_QPSK\_ Middle Channel

	Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
	1673.0	-28.59	3.00	3.00	9.58	-22.01	-13.00	9.01	Н
Ī	2509.5	-39.31	3.03	3.00	10.72	-31.62	-13.00	18.62	Н
	1673.0	-30.12	3.00	3.00	9.68	-23.44	-13.00	10.44	V
Ī	2509.5	-39	3.03	3.00	10.72	-31.31	-13.00	18.31	V

LTE FDD Band 5\_Channel Bandwidth 3MHz\_QPSK\_ High Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1695.0	-33	3.00	3.00	9.58	-26.42	-13.00	13.42	Н
2542.5	-38.27	3.03	3.00	10.72	-30.58	-13.00	17.58	Н
1695.0	-30.77	3.00	3.00	9.68	-24.09	-13.00	11.09	V
2542.5	-35.51	3.03	3.00	10.72	-27.82	-13.00	14.82	V

LTE FDD Band 5 Channel Bandwidth 5MHz QPSK Low Channel

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Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1653.0	-30.98	3.00	3.00	9.58	-24.4	-13.00	11.4	Н
2479.5	-37.27	3.03	3.00	10.72	-29.58	-13.00	16.58	Н
1653.0	-30.87	3.00	3.00	9.68	-24.19	-13.00	11.19	V
2479.5	-39.69	3.03	3.00	10.72	-32	-13.00	19	V



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LTE FDD Band 5\_Channel Bandwidth 5MHz\_QPSK\_ Middle Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.0	-28.91	3.00	3.00	9.58	-22.33	-13.00	9.33	Н
2509.5	-39.29	3.03	3.00	10.72	-31.6	-13.00	18.6	Н
1673.0	-31.03	3.00	3.00	9.68	-24.35	-13.00	11.35	V
2509.5	-38.75	3.03	3.00	10.72	-31.06	-13.00	18.06	V

LTE FDD Band 5\_Channel Bandwidth 5MHz\_QPSK\_ High Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1693.0	-32.99	3.00	3.00	9.58	-26.41	-13.00	13.41	Н
2539.5	-38.12	3.03	3.00	10.72	-30.43	-13.00	17.43	Н
1693.0	-30.11	3.00	3.00	9.68	-23.43	-13.00	10.43	V
2539.5	-35.93	3.03	3.00	10.72	-28.24	-13.00	15.24	V

LTE FDD Band 5 Channel Bandwidth 10MHz QPSK Low Channel

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Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1658.0	-30.98	3.00	3.00	9.58	-24.4	-13.00	11.4	Н
2487.0	-36.79	3.03	3.00	10.72	-29.1	-13.00	16.1	Н
1658.0	-30.17	3.00	3.00	9.68	-23.49	-13.00	10.49	V
2487.0	-39.45	3.03	3.00	10.72	-31.76	-13.00	18.76	V

LTE FDD Band 5\_Channel Bandwidth 10MHz\_QPSK\_ Middle Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.0	-29.11	3.00	3.00	9.58	-22.53	-13.00	9.53	Н
2509.5	-39.37	3.03	3.00	10.72	-31.68	-13.00	18.68	Н
1673.0	-30.71	3.00	3.00	9.68	-24.03	-13.00	11.03	V
2509.5	-38.29	3.03	3.00	10.72	-30.6	-13.00	17.6	V

LTE FDD Band 5\_Channel Bandwidth 10MHz\_QPSK\_ High Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1688.0	-33.17	3.00	3.00	9.58	-26.59	-13.00	13.59	Н
2532.0	-38.09	3.03	3.00	10.72	-30.4	-13.00	17.4	Н
1688.0	-30.36	3.00	3.00	9.68	-23.68	-13.00	10.68	V
2532.0	-35.36	3.03	3.00	10.72	-27.67	-13.00	14.67	V

LTE FDD Band 5\_Channel Bandwidth 1.4MHz\_16QAM \_ Low Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1649.4	-30.98	3.00	3.00	9.58	-24.4	-13.00	11.4	Н
2474.1	-36.31	3.03	3.00	10.72	-28.62	-13.00	15.62	Н
1649.4	-30.37	3.00	3.00	9.68	-23.69	-13.00	10.69	V
2474.1	-39.16	3.03	3.00	10.72	-31.47	-13.00	18.47	V

LTE FDD Band 5 Channel Bandwidth 1.4MHz 16QAM Middle Channel

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Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization				
1673.0	-28.94	3.00	3.00	9.58	-22.36	-13.00	9.36	Н				
2509.5	-39.28	3.03	3.00	10.72	-31.59	-13.00	18.59	Н				
1673.0	-30.3	3.00	3.00	9.68	-23.62	-13.00	10.62	V				
2509.5	-38.97	3.03	3.00	10.72	-31.28	-13.00	18.28	V				



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LTE FDD Band 5\_Channel Bandwidth 1.4MHz\_16QAM \_ High Channel

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Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1696.6	-33.16	3.00	3.00	9.58	-26.58	-13.00	13.58	Н
2544.9	-38.13	3.03	3.00	10.72	-30.44	-13.00	17.44	Н
1696.6	-30.69	3.00	3.00	9.68	-24.01	-13.00	11.01	V
2544.9	-35.7	3.03	3.00	10.72	-28.01	-13.00	15.01	V

LTE FDD Band 5\_Channel Bandwidth 3MHz\_16QAM \_ Low Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1651.0	-30.98	3.00	3.00	9.58	-24.4	-13.00	11.4	Н
2476.5	-36.28	3.03	3.00	10.72	-28.59	-13.00	15.59	Н
1651.0	-30.11	3.00	3.00	9.68	-23.43	-13.00	10.43	V
2476.5	-39.46	3.03	3.00	10.72	-31.77	-13.00	18.77	V

LTE FDD Band 5 Channel Bandwidth 3MHz 16QAM Middle Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.0	-28.57	3.00	3.00	9.58	-21.99	-13.00	8.99	Н
2509.5	-39.35	3.03	3.00	10.72	-31.66	-13.00	18.66	Н
1673.0	-30.54	3.00	3.00	9.68	-23.86	-13.00	10.86	V
2509.5	-38.91	3.03	3.00	10.72	-31.22	-13.00	18.22	V

LTE FDD Band 5\_Channel Bandwidth 3MHz\_16QAM \_ High Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1695.0	-33.01	3.00	3.00	9.58	-26.43	-13.00	13.43	Н
2542.5	-37.67	3.03	3.00	10.72	-29.98	-13.00	16.98	Н
1695.0	-30.98	3.00	3.00	9.68	-24.3	-13.00	11.3	V
2542.5	-35.4	3.03	3.00	10.72	-27.71	-13.00	14.71	V

LTE FDD Band 5\_Channel Bandwidth 5MHz\_16QAM \_ Low Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1653.0	-30.98	3.00	3.00	9.58	-24.4	-13.00	11.4	Н
2479.5	-36.88	3.03	3.00	10.72	-29.19	-13.00	16.19	Н
1653.0	-30.75	3.00	3.00	9.68	-24.07	-13.00	11.07	V
2479.5	-39.34	3.03	3.00	10.72	-31.65	-13.00	18.65	V

LTE FDD Band 5\_Channel Bandwidth 5MHz\_16QAM \_ Middle Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.0	-29.15	3.00	3.00	9.58	-22.57	-13.00	9.57	Н
2509.5	-39.22	3.03	3.00	10.72	-31.53	-13.00	18.53	Н
1673.0	-30.81	3.00	3.00	9.68	-24.13	-13.00	11.13	V
2509.5	-38.99	3.03	3.00	10.72	-31.3	-13.00	18.3	V

LTE FDD Band 5 Channel Bandwidth 5MHz 16QAM High Channel

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Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization				
1693.0	-32.34	3.00	3.00	9.58	-25.76	-13.00	12.76	Н				
2539.5	-37.68	3.03	3.00	10.72	-29.99	-13.00	16.99	Н				
1693.0	-30.51	3.00	3.00	9.68	-23.83	-13.00	10.83	V				
2539.5	-35.54	3.03	3.00	10.72	-27.85	-13.00	14.85	V				



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LTE FDD Band 5\_Channel Bandwidth 10MHz\_16QAM \_ Low Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1658.0	-30.98	3.00	3.00	9.58	-24.4	-13.00	11.4	Н
2487.0	-36.88	3.03	3.00	10.72	-29.19	-13.00	16.19	Н
1658.0	-30.93	3.00	3.00	9.68	-24.25	-13.00	11.25	V
2487.0	-39.15	3.03	3.00	10.72	-31.46	-13.00	18.46	V

LTE FDD Band 5\_Channel Bandwidth 10MHz\_16QAM \_ Middle Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G₂ Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.0	-29.42	3.00	3.00	9.58	-22.84	-13.00	9.84	Н
2509.5	-39.41	3.03	3.00	10.72	-31.72	-13.00	18.72	Н
1673.0	-30.91	3.00	3.00	9.68	-24.23	-13.00	11.23	V
2509.5	-38.29	3.03	3.00	10.72	-30.6	-13.00	17.6	V

LTE FDD Band 5\_Channel Bandwidth 10MHz\_16QAM \_ High Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1688.0	-32.47	3.00	3.00	9.58	-25.89	-13.00	12.89	Н
2532.0	-38.04	3.03	3.00	10.72	-30.35	-13.00	17.35	Н
1688.0	-30.87	3.00	3.00	9.68	-24.19	-13.00	11.19	V
2532.0	-35.32	3.03	3.00	10.72	-27.63	-13.00	14.63	V

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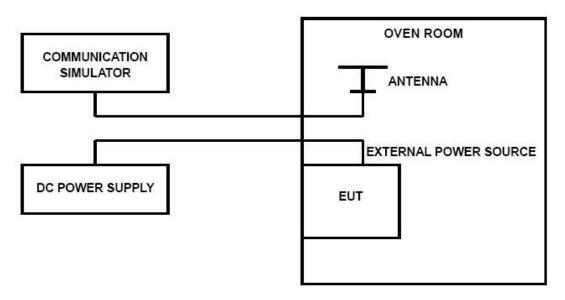


# 4.7 Frequency Stability

### **LIMIT**

According to §24.235, §2.1055 requirement, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation and should not exceed 2.5ppm.

#### **TEST CONFIGURATION**



#### **TEST PROCEDURE**

The EUT was setup according to EIA/TIA 603D

# Frequency Stability Under Temperature Variations:

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a "call mode". This is accomplished with the use of R&S CMW500 DIGITAL RADIO COMMUNICATION TESTER.

- 1. Measure the carrier frequency at room temperature.
- 2. Subject the EUT to overnight soak at -30°C.
- 3. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on middle channel for LTE Band 5, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
- 4. Repeat the above measurements at  $10^{\circ}$ C increments from -30°C to +50°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
- 5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1.5 hours unpowered, to allow any self-heating to stabilize, before continuing.
- 6. Subject the EUT to overnight soak at +50℃.
- 7. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
- 8. Repeat the above measurements at 10  $^{\circ}$ C increments from +50 $^{\circ}$ C to -30 $^{\circ}$ C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements
- 9. At all temperature levels hold the temperature to +/-  $0.5^{\circ}$ C during the measurement procedure.

# Frequency Stability Under Voltage Variations:

Set chamber temperature to  $20^{\circ}$ C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation (±15%) and endpoint, recordthe maximum frequency change.

#### **TEST RESULTS**

Remark:



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1. We testedall RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 5; recorded worst case.

LTE Band 5, 1.4MHz bandwidth , QPSK (worst case of all bandwidths)

LTE FDD Band 5						
DC Power	Temperature (℃)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict	
3.40	20	28	0.0156	2.50	PASS	
3.60	20	35	0.0168	2.50	PASS	
4.20	20	17	0.0089	2.50	PASS	
3.60	-30	26	0.0127	2.50	PASS	
3.60	-20	17	0.0089	2.50	PASS	
3.60	-10	20	0.0109	2.50	PASS	
3.60	0	28	0.0158	2.50	PASS	
3.60	10	21	0.0121	2.50	PASS	
3.60	20	18	0.0099	2.50	PASS	
3.60	30	27	0.0134	2.50	PASS	
3.60	40	19	0.0111	2.50	PASS	
3.60	50	25	0.0138	2.50	PASS	



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LTE Band 5, 1.4MHz bandwidth , 16QAM (worst case of all bandwidths)

LTE FDD Band 5							
DC Power	Temperature (℃)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict		
3.40	20	38	0.0211	2.50	PASS		
3.60	20	47	0.0245	2.50	PASS		
4.20	20	52	0.0268	2.50	PASS		
3.60	-30	61	0.0342	2.50	PASS		
3.60	-20	37	0.0178	2.50	PASS		
3.60	-10	42	0.0232	2.50	PASS		
3.60	0	39	0.0212	2.50	PASS		
3.60	10	25	0.0128	2.50	PASS		
3.60	20	29	0.0145	2.50	PASS		
3.60	30	35	0.0168	2.50	PASS		
3.60	40	27	0.0135	2.50	PASS		
3.60	50	22	0.0171	2.50	PASS		



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# 5 Test Setup Photos of the EUT



