



FCC PART 24TEST REPORT

Part 22H Subpart E

Report Reference No.....: HK1907111626-3E

FCC ID...... ZNFX210LMW

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Date of issue.......July. 12,2019

Testing Laboratory NameShenzhen HUAK Testing Technology Co., Ltd.

Applicant's name LG Electronics USA, Inc.

Address 1000 Sylvan Ave., Englewood Cliffs, New Jersey 07632, United

Test specification:

Standard FCC CFR Title 47 Part 2, Part 22H

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

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Test item description 4G Mobile phone

Trade Mark: LG

Manufacturer OPTIEMUS ELECTRONICS LIMITED

Model/Type reference...... LM-X210LMW

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. :	HK1907111626-3E	July. 12,2019
rest Keport No	11K13071111020-3L	Date of issue

Equipment under Test : 4G Mobile phone

Model /Type : LM-X210LMW

Listed Models : /

Applicant : LG Electronics USA, Inc.

Address : 1000 Sylvan Ave., Englewood Cliffs, New Jersey 07632,

United States

Manufacturer : OPTIEMUS ELECTRONICS LIMITED

Address : D-348, Sector-63, Noida, Uttar Pradesh, Pin Code-

201307

Test Result:	PASS

The test report merely corresponds to the test sample.

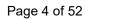
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.



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Revison History

Revision	Issue Date	Revisions	Revised By
V1.0	2019-07-12	Initial Issue	James Zhou





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The tests were performed according to following standards: FCC Part 2: FREQUENCY ALLOCA-TIONS AND RADIO TREATY MAT-TERS; GENERAL RULES AND REG-ULATIONS

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

<u>ANSI/TIA-603-E-2016:</u> 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



SUMMARY

2.1 General Remarks

Date of receipt of test sample	:	Jun. 24, 2019
Testing commenced on	:	Jun. 25, 2019
Testing concluded on	:	July. 12,2019

2.2 Product Description

Name of EUT	4G Mobile phone
Model/Type reference:	LM-X210LMW
List Model:	1
Power supply:	DC 3.85V From Battery
Adapter Information	N/A
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
- - 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: ZNFX210LMW** 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		
Voltage	VL	3.465V		
	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

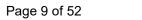
3.3 Test Description

Band 5 (824~849 MHz)

Ballu 5 (624~649 WITIZ)			
Test Item	FCCRuleNo.	Requirements	Verdict
Effective(Isotropic)	§2.1046,	EIRP ≤ 2W	Pass
Radiated Output Power	§2 2.913(a)(2)	LIINF 3 ZVV	F 455
Peak-AverageRatio	§24.232(d)	FCC:Limit≤13dB	Pass
Modulation	§2.1047	Digitalmodulation	Pass
Characteristics	32.1017	Digitalification	1 400
Bandwidth	§2.1049	OBW: Nolimit.	Pass
Dandwidth	92.1049	EBW: Nolimit.	газэ
Pand Edges	SO 1051	≤ -13dBm/1%*EBW,	
Band Edges Compliance	§2.1051,	In1MHz band simmediately outside and adjacent to	Pass
Compliance	§24.238	The frequency block.	
Caurious Emissionet	\$2.4054	≤-13dBm/1MHz,	
Spurious Emissionat AntennaTerminals	§2.1051,	from 9kHz to10th harmonicsbut outside authorized	Pass
Antennarenninais	§24.238	Operating frequency ranges.	
Field Strength of	Clause 7of		
Spurious	KDB971168	≤ -13dBm/1MHz.	Pass
Radiation	D01 v02r02		
	§2.1055,	FCC:with in authorized frequency	
Frequency Stability	§22.355,	block.	Pass
•	§24.235		
NOTE 1:For theverdict,the	"N/A"denotes"not	applicable",the"N/T"denotes "nottested".	

Remark:

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





3.4 Equipments Used during the Test

					0 - 111 11
Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	R&S	ENV216	HKE-059	2018/12/27	2019/12/26
LISN	R&S	ENV216	HKE-002	2018/12/27	2019/12/26
Receiver	R&S	ESCI 7	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



4 TEST CONDITIONS AND RESULTS

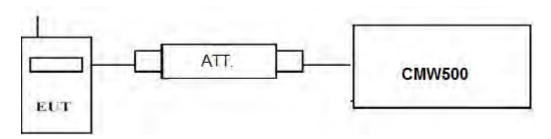
4.1 Output Power

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)	RB Size/Offset	QPSK	16QAM
		1 RB low	23.13	22.69
	824.7	1 RB high	23.05	22.59
	024.7	50% RB mid	23.07	22.41
		100% RB	23.13	23.09
		1 RB low	23.22	22.37
1.4 MHz	836.5	1 RB high	23.23	22.33
1.4 IVITZ	030.3	50% RB mid	23.16	22.25
		100% RB	23.13	23.10
		1 RB low	23.37	22.26
	848.3	1 RB high	23.73	23.31
	040.3	50% RB mid	23.72	23.28
		100% RB	23.20	23.56
		1 RB low	23.26	21.99
	825.5	1 RB high	23.15	21.87
	020.0	50% RB mid	23.31	21.82
3 MHz		100% RB	21.98	21.99
		1 RB low	23.21	22.00
	836.5	1 RB high	23.26	21.98
		50% RB mid	23.23	22.06



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		100% RB	22.00	22.03
		1 RB low	23.38	22.38
	0.47.5	1 RB high	23.66	22.42
	847.5	50% RB mid	22.43	22.43
		100% RB	22.41	22.21
		1 RB low	23.19	22.04
	996 5	1 RB high	23.12	22.13
	826.5	50% RB mid	23.13	22.15
		100% RB	22.16	21.66
		1 RB low	23.02	21.61
5 MI I-	026 5	1 RB high	23.19	21.75
5 MHz	836.5	50% RB mid	22.07	22.08
		100% RB	22.09	22.09
		1 RB low	23.34	22.64
	946 5	1 RB high	23.21	22.80
	846.5	50% RB mid	23.61	22.79
		100% RB	22.58	22.56
		1 RB low	23.03	22.02
	920.0	1 RB high	22.92	21.91
	829.0	50% RB mid	23.17	21.99
		100% RB	22.14	22.10
		1 RB low	23.10	22.59
10 MHz	836.5	1 RB high	23.25	22.51
IU IVITZ	630.5	50% RB mid	23.31	22.78
		100% RB	22.14	22.14
		1 RB low	23.31	22.14
	844.0	1 RB high	23.74	22.21
	044.0	50% RB mid	23.65	22.54
		100% RB	22.28	22.27

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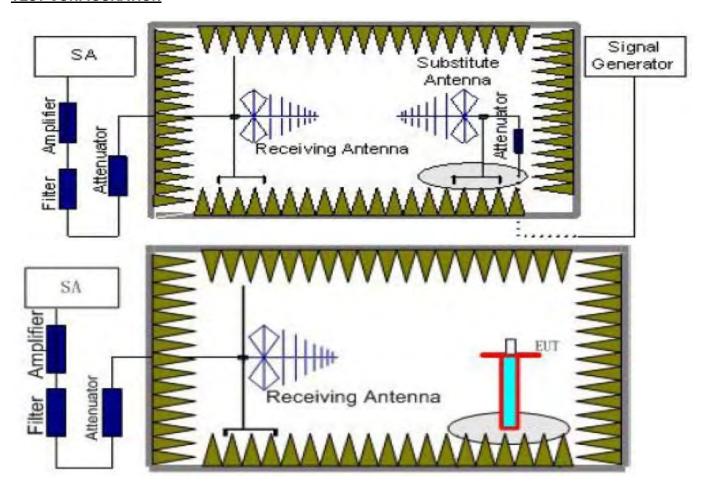
4.1.2. Radiated Output Power

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_r).
- 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_{Mea}) 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_r). The power of signal source (P_{Mea}) 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_{cl}) ,the Substitution Antenna Gain (G_a) and the Amplifier Gain (P_{Ag}) should be recorded after test.
 The measurement results are obtained as described below: Power(EIRP)=P_{Mea}- P_{Ag} P_{cl}+ G_a. 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_{Mea}- P_{cl}+ G_a
- 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 _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Ag} (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
824.7	-20.71	3.41	10.24	33.60	19.72	38.45	18.73	V
836.5	-21.8	3.49	10.24	33.60	18.55	38.45	19.9	V
848.3	-21.17	3.55	10.23	33.60	19.11	38.45	19.34	V

LTE FDD Band 5 Channel Bandwidth 3MHz QPSK

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Ag} (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
825.5	-21.33	3.41	10.24	33.60	19.1	38.45	19.35	V
836.5	-21.69	3.49	10.24	33.60	18.66	38.45	19.79	V
847.5	-21.42	3.55	10.23	33.60	18.86	38.45	19.59	V

LTE FDD Band 5 Channel Bandwidth 5MHz QPSK

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Ag} (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
826.5	-20.96	3.41	10.24	33.60	19.47	38.45	18.98	V
836.5	-21.73	3.49	10.24	33.60	18.62	38.45	19.83	V
846.5	-21.06	3.55	10.23	33.60	19.22	38.45	19.23	V

LTE FDD Band 5 Channel Bandwidth 10MHz QPSK

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Ag} (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
829.0	-20.51	3.41	10.24	33.60	19.92	38.45	18.53	V
836.5	-21.95	3.49	10.24	33.60	18.4	38.45	20.05	V
844.0	-21.56	3.55	10.23	33.60	18.72	38.45	19.73	V



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LTE FDD Band 5_Channel Bandwidth 1.4MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	Correction (dB)	P _{Ag} (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
824.7	-20.11	3.41	10.24	33.6	20.32	18.13	38.45	20.32	V
836.5	-21.14	3.49	10.24	33.6	19.21	19.24	38.45	19.21	V
848.3	-21.96	3.55	10.23	33.6	18.32	20.13	38.45	18.32	V

LTE FDD Band 5_Channel Bandwidth 3MHz_16QAM

	Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	Correction (dB)	P _{Ag} (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
Ī	825.5	-20.89	3.41	10.24	33.6	19.54	18.91	38.45	19.54	V
Ī	836.5	-22.56	3.49	10.24	33.6	17.79	20.66	38.45	17.79	V
Γ	847.5	-21	3.55	10.23	33.6	19.28	19.17	38.45	19.28	V

LTE FDD Band 5_Channel Bandwidth 5MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	Correction (dB)	P _{Ag} (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
826.5	-21.3	3.41	10.24	33.6	19.13	19.32	38.45	19.13	V
836.5	-21.56	3.49	10.24	33.6	18.79	19.66	38.45	18.79	V
846.5	-21.04	3.55	10.23	33.6	19.24	19.21	38.45	19.24	V

LTE FDD Band 5_Channel Bandwidth 10MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	Correction (dB)	P _{Ag} (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
829.0	-20.92	3.41	10.24	33.6	19.51	18.94	38.45	19.51	V
836.5	-21.56	3.49	10.24	33.6	18.79	19.66	38.45	18.79	V
844.0	-21.58	3.55	10.23	33.6	18.7	19.75	38.45	18.7	V

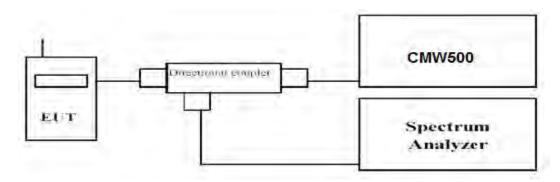


4.2 Peak-to-Average Ratio (PAR)

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:

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.

		LTE FDD Band 5				
TX Channel	Frequency	RB Size/Offset	PAPR(dB)			
Bandwidth	(MHz)	RB Size/Offset	QPSK	16QAM		
	824.7		5.74	6.36		
1.4 MHz	836.5	1RB#0	5.19	5.84		
	848.3		5.17	5.82		
	825.5		5.64	6.69		
3 MHz	836.5	1RB#0	5.07	6.18		
	847.5		5.12	5.86		
	826.5		5.85	6.30		
5 MHz	836.5	1RB#0	5.00	5.82		
	846.5		5.38	5.99		
	829.0		5.53	6.57		
10 MHz	836.5	1RB#0	4.75	5.57		
	844.0		5.49	6.30		



LTE FDD Band 5 – 1.4 MHz Channel BandwidthPAPR **QPSK** 16QAM Low Channel | SENSE::NT| | ALIGN AUTO | 01:20:59 AM Jul 11, 20
| Center Freq: 824,700000 MHz | Radio Std: None | Trig: Free Run | Counts:1,00 M/1,00 Mpt | Atten: 40 dB | SPISE_DIT| | ALIGN AUTO | 01:21:69 AM Jul 11, 26 | Center Freq: 242,700000 MHz | Radio Std: None | Trig. Free Run | Counts:1.00 M/1.00 Mpt | Akten: 40 dB enter Freg 824,700000 MHz enter Freq 824.700000 MHz Average Power Average Power 100 % Gau 100 % Center Freq Center Freq 23.86 dBm 23.13 dBm 10 % 43.62 % at 0dB 10 % 45.74 % at 0dB 1 % 10.0 % 2.54 dB 10.0 % 2.92 dB 0.1 % 1.0 % 4.59 dB 1.0 % 5.20 dB CF Step 5.000000 MHz Man CF Step 5.000000 MHz Man 5.74 dB 0.1% 6.36 dB 0.1% 0.01 % 0.01 % 0.01 % 6.21 dB 0.01 % 6.78 dB 0.001 % 6.90 dB 0.001 % 6.29 dB Freq Offset 0 Hz Freq Offse 0.0001 % 6.30 dB 0.0001 % 6.92 dB 0.001 % 0.001 9 6.31 dB 30.17 dBm Peak 6.98 dB 30.11 dBm 20 dB 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 enter Freq 836.500000 MHz Average Power 100 % Gai Average Power 100 % G Center Freq 836.500000 MHz Center Freq 836.500000 MHz 23.71 dBm 22.95 dBm 10 % 47.03 % at 0dB 10 % 44.55 % at 0dB 1 % 1 % 10.0 % 2.53 dB 10.0 % 2.91 dB 0.1 % 0.1 % 1.0 % 4.45 dB 1.0 % 4.95 dB CF Step 5.000000 MHz CF Step 5.000000 MH 5.19 dB 0.1% 5.84 dB 0.1% 0.01 % 0.01 % 6.13 dB 0.001 % 6.25 dB 0.01 % 0.01 % 5.38 dB 0.001 % 5.61 dB 0.0001 % 5.63 dB 0.0001 % 6.27 dB 0.001 % 0.001 % 5.64 dB 29.35 dBm 6.29 dB 29.24 dBm Peak 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 | SENSE INT | AUGRAPITO | 01:22:15 AM MI1, 2019 | Center Freq: 848,300000 MHz Radio Std: None | Trig: Free Run Counts: 1.00 MM .00 Mpt Center Freq: 848.300000 MHz Radio Std: None
Trig: Free Run Counts:1.00 M/1.00 Mpt enter Freq 848.300000 MHz enter Freq 848.300000 MHz Average Power Average Power 100 % Ga Center Freq 23.84 dBm 22.71 dBm 10 % 47.27 % at 0dB 44.64 % at 0dB 1 % 10.0 % 2.51 dB 10.0 % 2.81 dB 1.0 % 4.43 dB 1.0 % 4.87 dB CF Step 5.000000 MHz Mar CF Step 5,000000 MH 0.1% 5.17 dB 0.1% 5.82 dB 0.01 % 0.01 % 5.43 dB 0.01 % 6.31 dB 0.001 % 6.45 dB 0.001 % 5.51 dB Freq Offse Freq Offset 0 Hz 0.0001 % 5.54 dB 0.0001 % 6.47 dB 0.001 % 0.001 % 5.54 dB 29.38 dBm 6.51 dB 29.22 dBm Peak Peak 0.0001 % 0 dB Info BW 25.000 MHz 0.0001 % 20 dB 20 dB 0 dB Info BW 25.000 MHz 1RB#0 1RB#0



LTE FDD Band 5–3MHz Channel BandwidthPAPR **QPSK** 16QAM Low Channel | SENSE::NT| | ALIGN AUTO | 01:39-45 AM Jul 11, 2. | Center Freq: 825,500000 MHz | Radio Std: None Trig: Free Run | Counts:1.00 M/1.00 Mpt | SAtten: 40 dB | SPISE_DIT| | ALIGN AUTO | 01:39-54 AM Jul 11, 20 | Center Freq: 262,500000 MHz | Radio Std: None | Trig. Free Run | Counts:1.00 M/1,00 Mpt | Akten: 40 dB Center Freg 825.500000 MHz Center Freq 825.500000 MHz Average Power Average Power 100 % Gau 100 % Center Freq Center Freq 23.69 dBm 22.41 dBm 10 % 43.15 % at 0dB 10 % 44.99 % at 0dB 1 % 10.0 % 2.57 dB 10.0 % 2.81 dB 0.1 % 1.0 % 4.57 dB 1.0 % 5.29 dB CF Step 5.000000 MHz Man CF Step 5.000000 MHz Man 5.64 dB 0.1% 6.69 dB 0.1% 0.01 % 0.01 % 0.01 % 6.17 dB 0.01 % 7.23 dB 0.001 % 7.36 dB 0.001 % 6.29 dB Freq Offset 0 Hz Freq Offse 0.0001 % 7.46 dB 0.0001 % 6.32 dB 0.001 % 0.001 9 6.32 dB 30.01 dBm Peak 7.47 dB 29.88 dBm 20 dB 0 dB Info BW 25.000 MHz 0 dB Info BW 25.000 MHz 1RB#0 1RB#0 Middle Channel SENSE INTI

Center Free: 838.500000 MHz

Critic Free: 838.500000 MHz

Radio Std: None

Atten: 40 dB Center Freq 836.500000 MHz enter Freq 836.500000 MHz Average Power 100 % Gai Average Power 100 % Ga Center Freq 836.500000 MHz Center Freq 836.500000 MHz 23.66 dBm 22.31 dBm 10 % 47.66 % at 0dB 10 % 43.67 % at 0dB 1 % 1 % 10.0 % 2.51 dB 10.0 % 2.77 dB 0.1 % 0.1 % 1.0 % 4.20 dB 1.0 % 5.11 dB CF Step 5.000000 MHz CF Step 5.000000 MH 6.18 dB 0.1% 0.1% 0.01 % 0.01 % 6.53 dB 0.001 % 6.62 dB 0.01 % 0.01 % 5.42 dB 0.001 % 5.53 dB 0.0001 % 5.55 dB 0.0001 % 6.66 dB 0.001 % 0.001 % Peak 5.56 dB 29.22 dBm 6.70 dB 29.01 dBm 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 | SENSE INT | 4LIGR AUTO | 161-11:00 AM M.11, 2019 |
| Center Freq: 847,500000 MHz Radio Std: None |
| Trig: Free Run Counts: 1.00 MM .00 Mpt |
| Attent 40 Mm .00 Mpt | Center Freq: 847.500000 MHz Radio Std: None
Trig: Free Run Counts:1.00 M/1.00 Mpt center Freq 847.500000 MHz enter Freq 847.500000 MHz Average Power Average Power 100 % Center Freq 23.86 dBm 22.82 dBm 10 % 46.48 % at 0dB 44.23 % at 0dB 1 % 10.0 % 2.52 dB 10.0 % 2.80 dB 1.0 % 4.41 dB 1.0 % 4.96 dB CF Step 5.000000 MHz Mar CF Step 5,000000 MH 0.1% 5.12 dB 0.1% 5.86 dB 0.01 % 0.01 % 5.52 dB 0.01 % 6.22 dB 0.001 % 6.46 dB 0.001 % 5.65 dB Freq Offse Freq Offset 0 Hz 0.0001 % 5.70 dB 0.0001 % 6.52 dB 0.001 % 0.001 % 6.52 dB 29.34 dBm 5.71 dB 29.57 dBm Peak Peak 0.0001 % 0 dB Info BW 25.000 MHz 0.0001 % 20 dB 20 dB 0 dB Info BW 25.000 MHz 1RB#0 1RB#0



LTE FDD Band 5–5MHz Channel BandwidthPAPR **QPSK** 16QAM Low Channel | SPISE_DIT| | ALIGN AUTO | 01:59:34 AM Jul 11, 26 | Center Freq: 262,500000 MHz | Radio Std: None | Trig. Free Run | Counts:1.00 M/1.00 Mpt | Akten: 40 dB enter Freg 826,500000 MHz Center Freq 826.500000 MHz Average Power Average Power 100 % Gau 100 % Center Freq Center Freq 23.85 dBm 22.41 dBm 44.03 % at 0dB 10 % 43.28 % at 0dB 10 % 1 % 10.0 % 2.65 dB 10.0 % 2.82 dB 0.1 % 1.0 % 4.67 dB 1.0 % 5.25 dB CF Step 5.000000 MHz Man CF Step 5.000000 MHz Man 5.85 dB 0.1% 6.30 dB 0.1% 0.01 % 0.01 % 0.01 % 6.22 dB 0.01 % 7.01 dB 0.001 % 7.25 dB 0.001 % 6.47 dB Freq Offset Freq Offse 0.0001 % 6.58 dB 0.0001 % 7.34 dB 0.001 % 0.001 % 6.58 dB 30.43 dBm Peak 7.37 dB 29.78 dBm 0.0001 % 20 dB 0 dB Info BW 25.000 MHz 0 dB Info BW 25.000 MHz 1RB#0 1RB#0 Middle Channel | SENSE INT| | ALIGN AUTO | 02-00:03 AM Jul 11, 2019
| Center Free: 838.500000 MHz | Radio Std: None | Trig: Free Run | Counts: 1.00 M/1.00 Mpt | Atten: 40 dB enter Freq 836.500000 MHz enter Freq 836.500000 MHz Average Power 100 % Gai Average Power 100 % G Center Freq 836.500000 MHz Center Freq 836.500000 MHz 23.68 dBm 22.67 dBm 10 % 46.53 % at 0dB 10 % 44.51 % at 0dB 1 % 1 % 10.0 % 2.62 dB 10.0 % 2.70 dB 0.1 % 0.1 % 1.0 % 4.33 dB 1.0 % 4.83 dB CF Step 5.000000 MHz CF Step 5.000000 MH 5.00 dB 0.1% 5.82 dB 0.1% 0.01 % 0.01 % 6.03 dB 0.001 % 6.09 dB 0.01 % 5.34 dB 0.01 % 0.001 % 5.40 dB 0.0001 % 5.42 dB 0.0001 % 6.13 dB 0.001 % 0.001 % Peak 5.43 dB 29.11 dBm 6.24 dB 28.91 dBm 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 Center Freq: 846.500000 MHz Radio Std: None
Trig: Free Run Counts:1.00 M/1.00 Mpt enter Freq 846.500000 MHz enter Freq 846.500000 MHz Average Power Average Power 100 % Center Freq 23.85 dBm 22.98 dBm 10 % 44.95 % at 0dB 43.83 % at 0dB 1 % 10.0 % 2.61 dB 10.0 % 2.79 dB 1.0 % 4.47 dB 1.0 % 5.07 dB CF Step 5.000000 MHz Mar CF Step 5,000000 MH 0.1% 5.38 dB 0.1% 5.99 dB 0.01 % 0.01 % 5.92 dB 0.01 % 6.38 dB 0.001 % 6.05 dB 0.001 % 6.54 dB Freq Offse Freq Offset 0 Hz 0.0001 % 6.11 dB 0.0001 % 6.58 dB 0.001 % 0.001 % 6.60 dB 29.58 dBm 6.12 dB 29.97 dBm Peak Peak 0.0001 % 0 dB Info BW 25.000 MHz 0.0001 % 20 dB 20 dB 0 dB Info BW 25.000 MHz 1RB#0 1RB#0



LTE FDD Band 5-10MHz Channel BandwidthPAPR **QPSK** 16QAM Low Channel enter Freg 829,000000 MHz Center Freq 829.000000 MHz Average Power Average Power 100 % Gau 100 % Center Freq Center Freq 23.84 dBm 22.71 dBm 10 % 10 % 44.61 % at 0dB 43.12 % at 0dB 1 % 10.0 % 2.61 dB 10.0 % 2.78 dB 0.1 % 1.0 % 4.58 dB 1.0 % 5.22 dB CF Step 5.000000 MHz Man CF Step 5.000000 MHz Man 5.53 dB 0.1% 6.57 dB 0.1% 0.01 % 0.01 % 0.01 % 5.94 dB 0.01 % 7.10 dB 0.001 % 7.19 dB 0.001 % 6.21 dB Freq Offset 0 Hz Freq Offse 0.0001 % 6.26 dB 0.0001 % 7.22 dB 0.001 % 0.001 9 6.28 dB 30.12 dBm Peak 7.30 dB 30.01 dBm 20 dB 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 enter Freq 836.500000 MHz Average Power 100 % Gai Average Power 100 % G Center Freq 836.500000 MHz Center Freq 836.500000 MHz 23.63 dBm 22.58 dBm 10 % 47.51 % at 0dB 10 % 44.85 % at 0dB 1 % 1 % 10.0 % 2.47 dB 10.0 % 2.77 dB 0.1 % 0.1 % 1.0 % 4.12 dB 1.0 % 4.79 dB CF Step 5.000000 MHz CF Step 5.000000 MH 4.75 dB 0.1% 5.57 dB 0.1% 0.01 % 0.01 % 0.01 % 5.92 dB 0.001 % 6.07 dB 0.01% 5.01 dB 0.001 % 5.01 dB 0.001 % 5.17 dB 0.0001 % 5.22 dB 0.0001 % 6.11 dB 0.001 % 0.001 % Peak 5.23 dB 28.86 dBm 6.13 dB 28.71 dBm 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 Center Freq: 844,000000 MHz Radio Std: None Satters: 40 Counts: 1.00 M/1.00 Mpt enter Freq 844.000000 MHz enter Freq 844.000000 MHz Average Power Average Power 100 % Center Freq 24.00 dBm 23.44 dBm 10 % 46.03 % at 0dB 43.73 % at 0dB 1 % 10.0 % 2.56 dB 10.0 % 2.82 dB 1.0 % 4.52 dB 1.0 % 5.03 dB CF Step 5.000000 MHz Mar CF Step 5,000000 MH 0.1% 5.49 dB 0.1% 6.30 dB 0.01 % 0.01 % 6.07 dB 0.01 % 6.67 dB 0.001 % 6.75 dB 0.001 % 6.23 dB Freq Offse Freq Offset 0 Hz 0.0001 % 6.28 dB 0.0001 % 6.78 dB 0.001 % 0.001 % 6.28 dB 30.28 dBm 6.80 dB 30.24 dBm Peak Peak 0.0001 % 0 dB Info BW 25.000 MHz 0.0001 % 20 dB 20 dB 0 dB Info BW 25.000 MHz 1RB#0 1RB#0

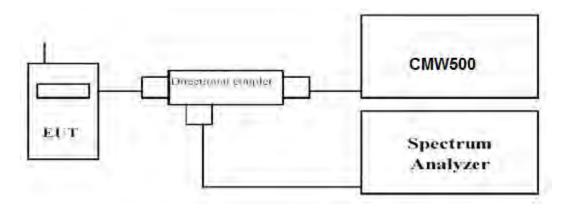


4.3 Occupied Bandwidth and Emission Bandwidth

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:

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.

LTE FDD Band 5								
TX Channel	RB Size/Offset	Frequency (MHz)	-26dBc Emission bandwidth (MHz)		99% Occupied bandwidth (MHz)			
Bandwidth	andwidth		QPSK	16QAM	QPSK	16QAM		
1.4 MHz	6RB#0	824.7	1.241	1.241	1.0890	1.0919		
		836.5	1.242	1.251	1.0882	1.0901		
		848.3	1.248	1.268	1.0951	1.0921		
3 MHz	15RB#0	825.5	2.994	2.998	2.7013	2.6970		
		836.5	2.953	2.978	2.6941	2.6967		
		847.5	2.996	3.024	2.7000	2.7002		
5 MHz	25RB#0	826.5	4.956	4.968	4.5032	4.4990		
		836.5	4.926	4.997	4.4977	4.4936		
		846.5	4.887	4.906	4.5029	4.4990		
10 MHz	50RB#0	829.0	9.559	9.621	8.9796	8.9862		
		836.5	9.530	9.556	8.9715	8.9753		
		844.0	9.591	9.584	9.0004	8.9759		



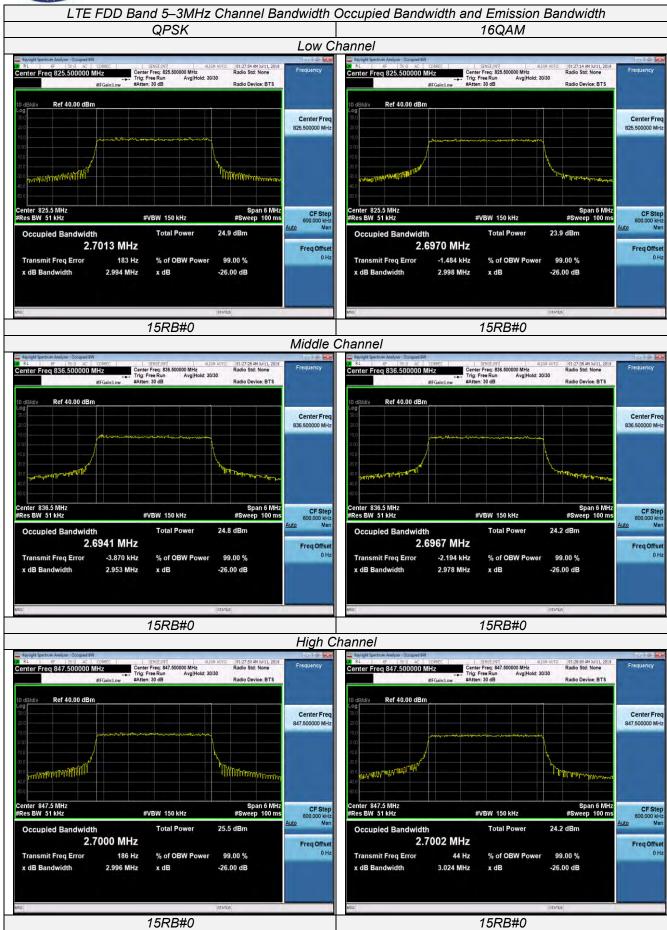
LTE FDD Band 5 - 1.4 MHz Channel Bandwidth Occupied Bandwidth and Emission Bandwidth QPSK 16QAM Low Channel SENSE::NT] ALIGN AU
Center Freq: 824,700000 MHz
Trig: Free Run Avg|Hold: 30/30
#Atten: 30 dB SENSE:INTI ALIGN AU
Center Freq: 824,700000 MHz
Trig: Free Run Avg|Hold: 30/30
#Atten: 30 dB Center Freg 824,700000 MHz 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 Occupied Bandwidth Total Power 25.5 dBm Occupied Bandwidth Total Power 24.4 dBm 1.0890 MHz 1.0919 MHz Freq Offset 0 Hz Freq Offse -934 Hz -1.514 kHz Transmit Freq Error % of OBW Power 99.00 % Transmit Freq Error % of OBW Power 99.00 % 1.241 MHz x dB -26.00 dB x dB Bandwidth 1.241 MHz x dB -26.00 dB 6RB#0 6RB#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 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 kH #VBW 91 kHz #VBW 91 kHz 25.3 dBm 24.8 dBm Occupied Bandwidth Occupied Bandwidth 1.0882 MHz 1.0901 MHz Freq Offse -2.083 kHz % of OBW Power -656 Hz % of OBW Power 99.00 % Transmit Freq Error 99.00 % Transmit Freq Error 1.242 MHz 1.251 MHz x dB Bandwidth x dB -26.00 dB x dB Bandwidth -26.00 dB x dB 6RB#0 6RB#0 High Channel Center Freq 848.300000 MHz enter Freq 848.300000 MHz Center Freq: 848.300000 MHz Trig: Free Run Avg|Hold: 30/30 #Atten: 30 dB Ref 40.00 dBm Ref 40.00 dBm Center Freq 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 CF Step 300,000 kHz #VBW 91 kHz **#VBW 91 kHz** Occupied Bandwidth Total Power 25.9 dBm Occupied Bandwidth Total Power 25.2 dBm 1.0951 MHz 1.0921 MHz Freq Offse Transmit Freq Error -886 Hz % of OBW Power 99.00 % Transmit Freq Error -630 Hz % of OBW Power 99.00 % 1.248 MHz -26.00 dB 1.268 MHz -26.00 dB 6RB#0 6RB#0

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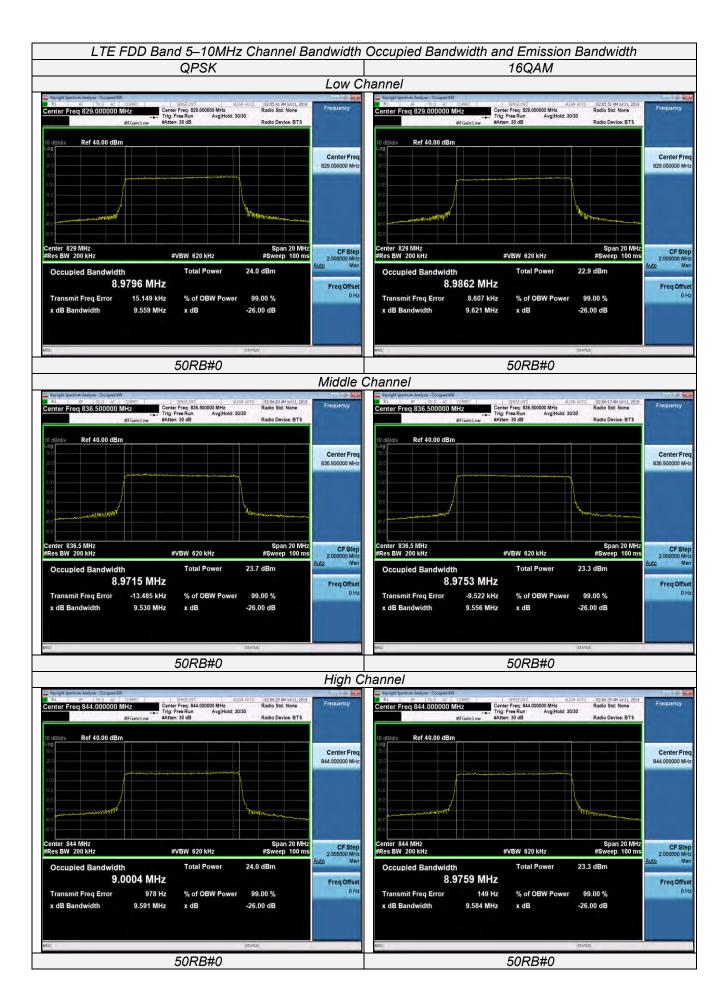




LTE FDD Band 5-5MHz Channel Bandwidth Occupied Bandwidth and Emission Bandwidth QPSK 16QAM Low Channel Center Freq: 826.500000 MHz
Trig: Free Run Avg|Hold: 100/100 SENGE:INT ALIGN AUTO
Center Freq: 826,500000 MHz
Trig: Free Run Avg|Hold: 100/100
#Atten: 30 dB Ref 40.00 dBm Ref 40.00 dBm Center Fred Center Free 826 500000 M Span 10 MHz #Sweep 100 ms CF Ste 1.000000 MH enter 826.5 MHz Res BW 100 kHz **#VBW 300 kHz** CF Step 1.000000 MH #VBW 300 kHz Mai Occupied Bandwidth Total Power 24.4 dBm 4.5032 MHz Freq Offse 4.4990 MHz Freq Offse Transmit Freq Error 626 Hz % of OBW Power 99.00 % % of OBW Power 99.00 % Transmit Freq Error 4.956 MHz -26.00 dB x dB 4.968 MHz x dB -26.00 dB 25RB#0 25RB#0 Middle Channel Center Freq: 836.500000 MHz
Trig: Free Run Avg|Hold: 100/100
#Atten: 30 dB Center Freq: 836.500000 MHz
Trig: Free Run Avg|Hold: 100/100 #Atten: 30 dB Ref 40.00 dBm Center Freq 836.500000 MHz Center Freq 836.500000 MHz The tellette the telle CF Step 1.000000 MHz Mar Span 10 MHz #Sweep 100 ms Span 10 MHz #Sweep 100 ms CF Step 1.000000 MHz #VBW 300 kHz **#VBW 300 kHz** 25.1 dBm Total Power 24.4 dBm **Total Power** Occupied Bandwidth Occupied Bandwidth 4.4977 MHz 4.4936 MHz Freq Offse Freq Offset Transmit Freq Error -2 732 kHz % of OBW Power 99 00 % Transmit Freq Error -6 559 kHz % of OBW Power 99 00 % 4.926 MHz x dB -26,00 dB 4.997 MHz 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 Freq: 846,500000 MHz
Trig: Free Run Avg|Hold: 100/100
#Atten: 30 dB Ref 40.00 dBm Ref 40.00 dBm Center Fred 846.500000 MH: Center Freq 846,500000 MHz Span 10 MHz #Sweep 100 ms CF Step 1.000000 MH Span 10 MHz #Sweep 100 ms enter 846.5 MHz Res BW 100 kHz CF Step 1.000000 ML #VBW 300 kHz #VBW 300 kHz Occupied Bandwidth Occupied Bandwidth 24.7 dBm 4.5029 MHz 4.4990 MHz -4.828 kHz 1.309 kHz Transmit Freq Error % of OBW Power 99.00 % Transmit Freq Error % of OBW Power 99.00 % 4.887 MHz 4.906 MHz x dB -26.00 dB x dB Bandwidth -26.00 dB x dB 25RB#0 25RB#0



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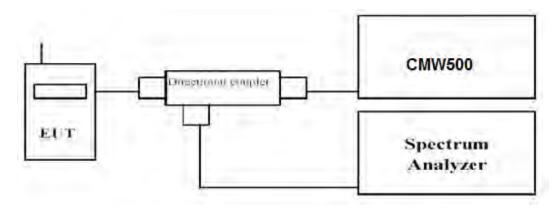


4.4 Band Edge compliance

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 #Avg Type: RMS Center Freq 824.000000 MHz Auto Tun Ref 30.00 dBm Ref 30.00 dBm Center Freq MANAGEMENT BOOK BURNET PROPERTY BURNET CF Step 200,000 kH Mai CF Step 200,000 kH Scale Type Scale Type Span 2.000 MHz #Sweep 100.0 ms (601 pts) enter 824.000 MHz Res BW 30 kHz 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 Ref 30.00 dBm Ref 30.00 dBm Center Freq 849.000000 MHz Center Free 849.000000 MH Mallin Allindell hellenter der der der Allinder Scale Type Center 849.000 MHz #Res BW 30 kHz Center 849.000 MHz Res BW 30 kHz #VBW 91 kHz #VBW 91 kHz

6RB#0

15RB#0



LTE FDD Band 5-3MHz Channel BandwidthBand Edge Compliance QPSK 16QAM Low Channel #Avg Type: RMS #Avg Type: RMS 823.987 MH -16.18 dBr 824.000 MH -17.43 dB Ref 30.00 dBm Center Freq Center Free Stop Fred 825,000000 MH habettististedlijd habeled baked CF Step 200,000 kH; Mar CF Step 200,000 kHz Freq Offse Scale Type Scale Type Span 2.000 MHz #Sweep 100.0 ms (601 pts) Span 2.000 MHz #Sweep 100.0 ms (601 pts) **#VBW 150 kHz #VBW 150 kHz** 15RB#0 15RB#0 High Channel 01:29:29 AM Jul 11, 2017 TRACE 12 3 4 5 0 TYPE TANAMAN DET A A A A A A enter Freq 849.000000 MHz nter Freq 849.000000 MHz 849.003 MI -16.83 dB Ref 30.00 dBm Ref 30.00 dBm Center Fred 849.000000 MH: Center Free 849.000000 MH Scale Type Scale Type Center 849.000 MHz #Res BW 51 kHz enter 849.000 MHz Res BW 51 kHz #VBW 150 kHz #VBW 150 kHz

15RB#0

25RB#0

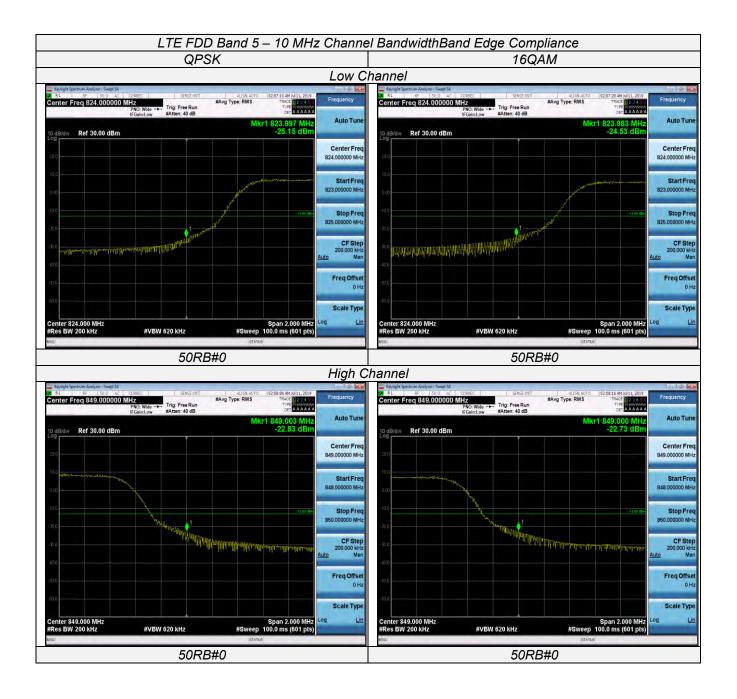


LTE FDD Band 5-5MHz Channel BandwidthBand Edge Compliance QPSK 16QAM Low Channel #Avg Type: RMS #Avg Type: RMS 823.997 MH -20.80 dBr 323.993 MF -18.07 dB Ref 30.00 dBm Center Freq Center Free Stop Fred 825.000000 MH arrhole-Albana Inchisorialis (Alban-dalis Adam balla CF Step 200,000 kH; Mar CF Step 200,000 kHz Freq Offse Scale Type Scale Type Span 2.000 MHz #Sweep 100.0 ms (601 pts) Span 2.000 MHz #Sweep 100.0 ms (601 pts) **#VBW** 300 kHz #VBW 300 kHz 25RB#0 25RB#0 High Channel enter Freq 849.000000 MHz nter Freq 849.000000 MHz TYPE MANAMAN 849.003 MI -19.36 dB 849.000 M -18.07 dE Ref 30.00 dBm Ref 30.00 dBm Center Fred 849.000000 MH: Center Free 849.000000 MH فيارا المساية المتداود متاره البالوب مدينا بالرحمنيد ليداييون Scale Type Scale Type enter 849.000 MHz Res BW 100 kHz Center 849.000 MHz #Res BW 100 kHz #VBW 300 kHz #VBW 300 kHz

25RB#0



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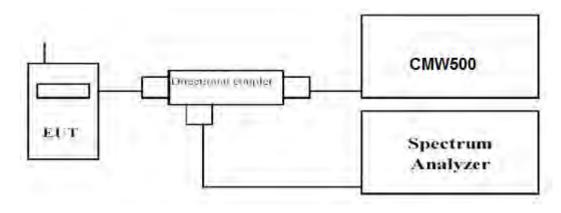


4.5 Spurious Emssion on Antenna Port

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.

TEST CONFIGURATION



TEST PROCEDURE

The EUT was setup according to EIA/TIA 603D

- Place the EUT on a bench and set it in transmitting mode.
- Connect a low loss RF cable from the antenna port to a spectrum analyzer and CMW 500 by a Directional
- 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 to 10th harmonic.
- Please refer to following tables for test antenna conducted emissions.

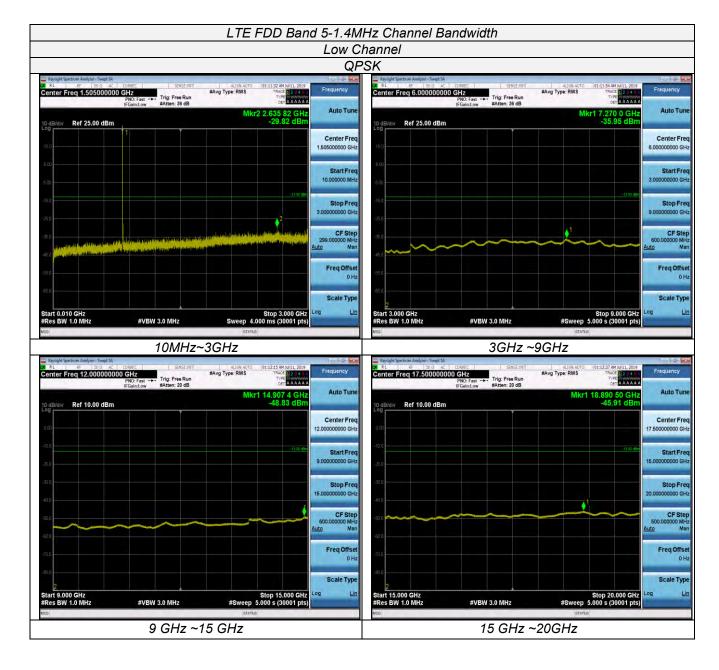
Working Frequency	Sub range (GHz)	RBW	VBW	Sweep time (s)
LTE FDD Band 5	0.01~20	1 MHz	3 MHz	Auto

TEST RESULTS

Remark:

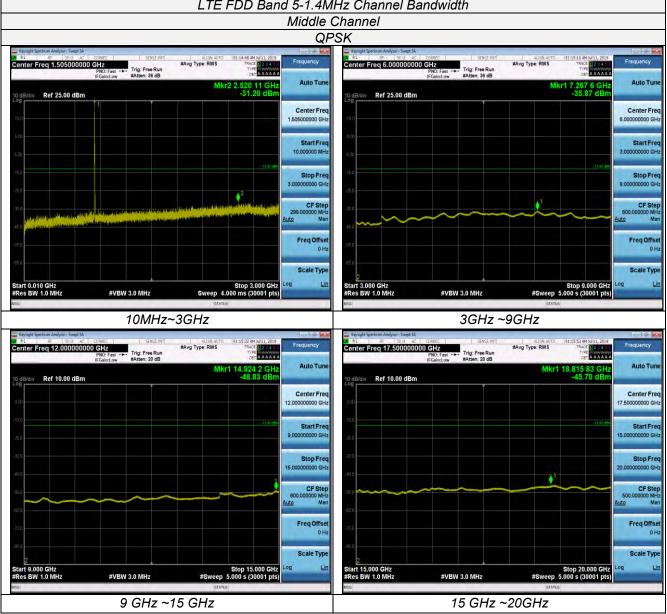
We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 5; recorded worst case at the QPSK Mode for each Channel Bandwidth of LTE FDD Band 5



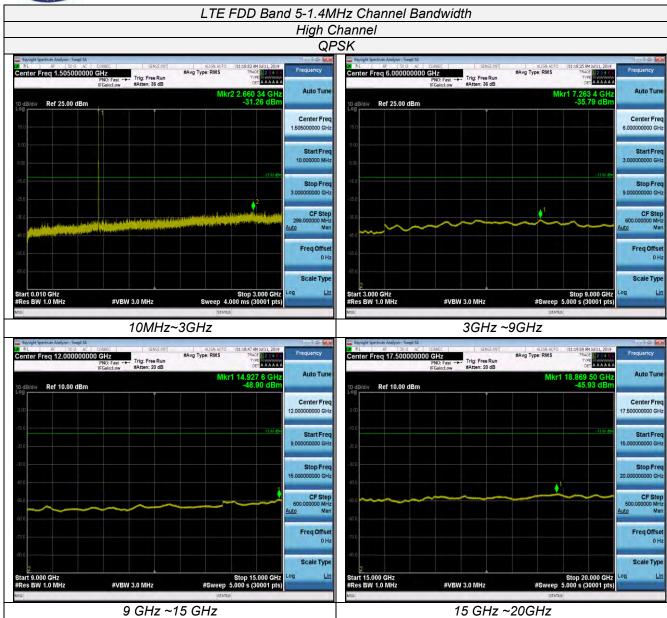




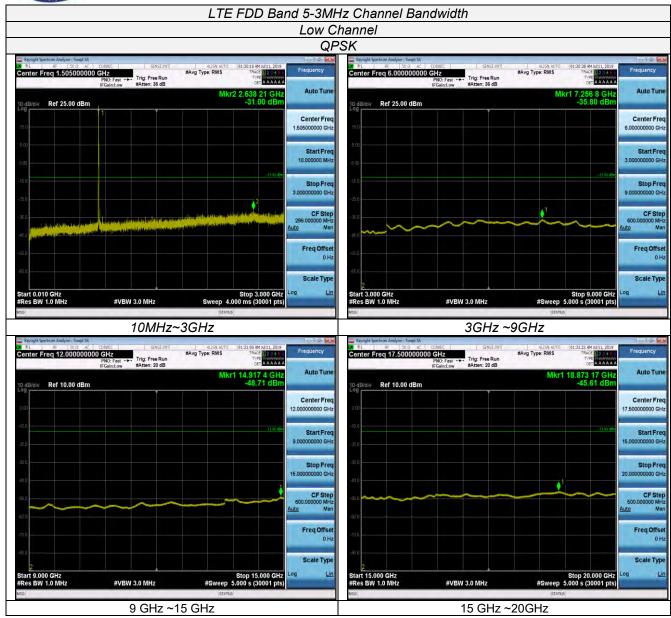
Report No.: HK1907111626-3E LTE FDD Band 5-1.4MHz Channel Bandwidth



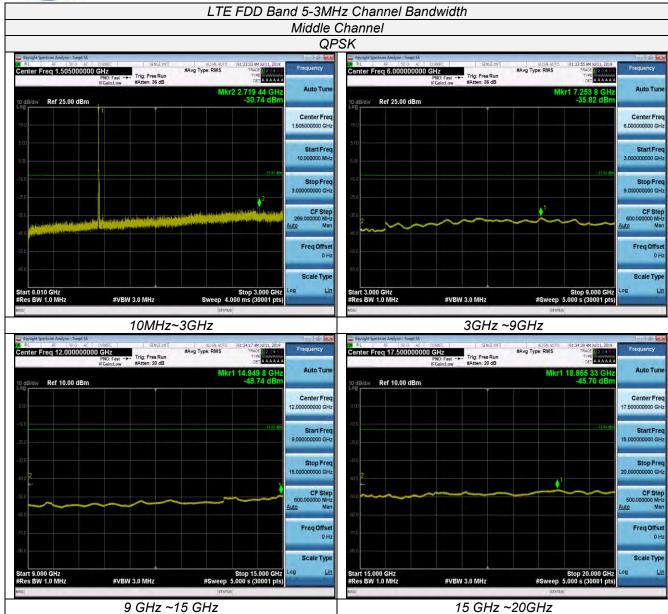
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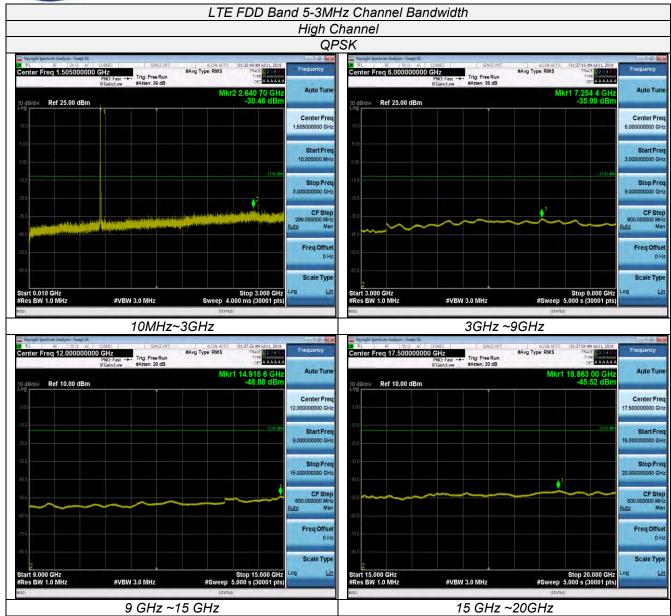
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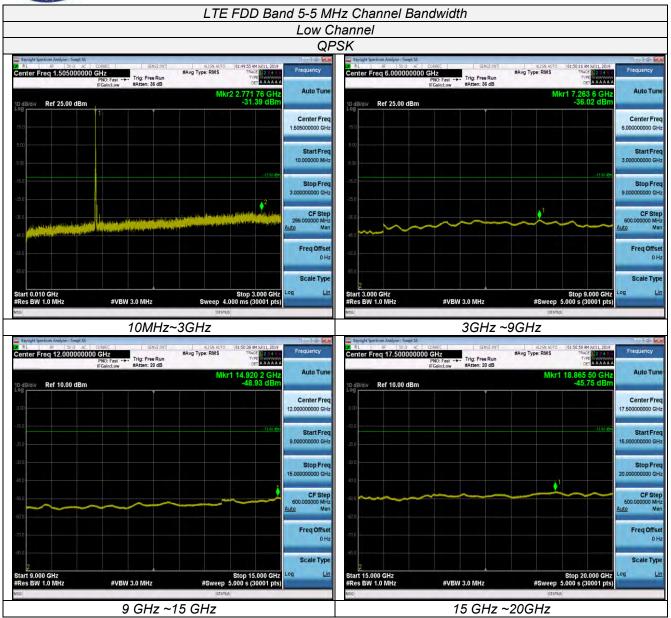
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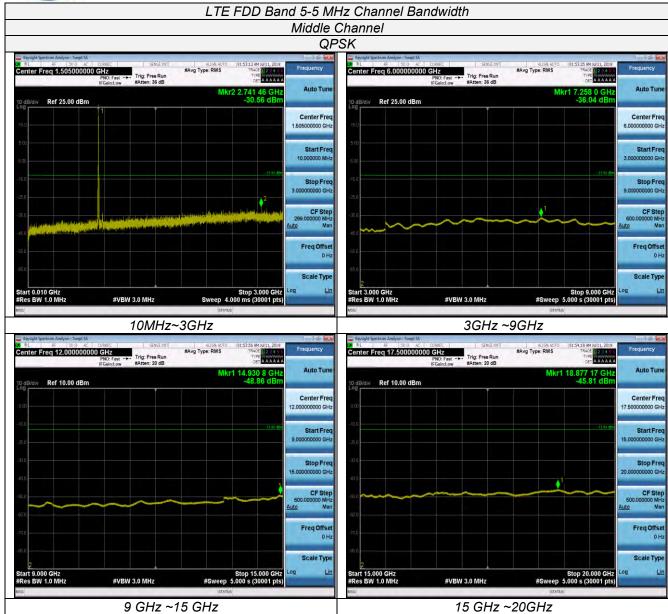
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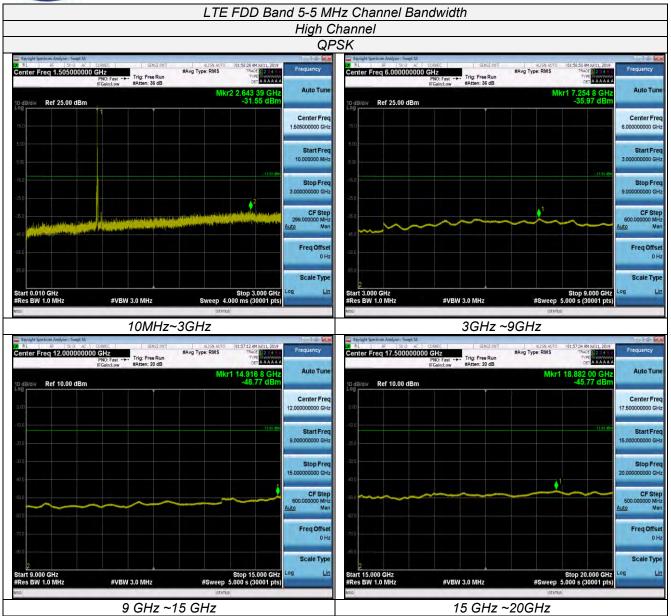
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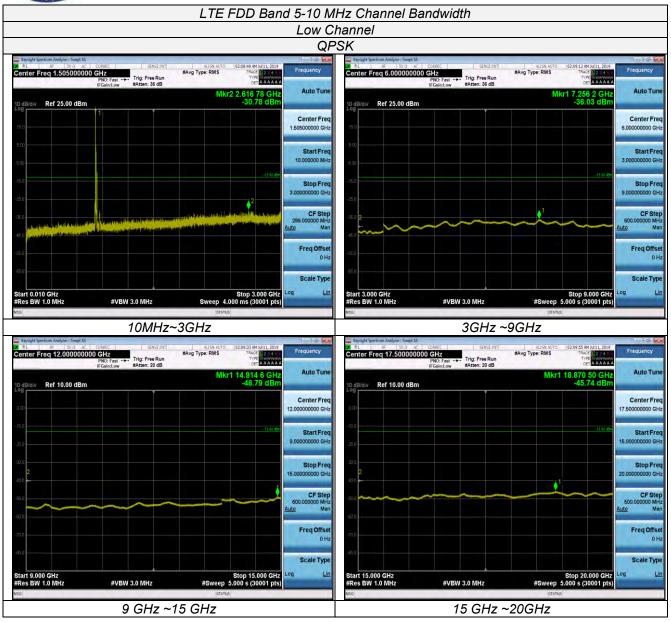
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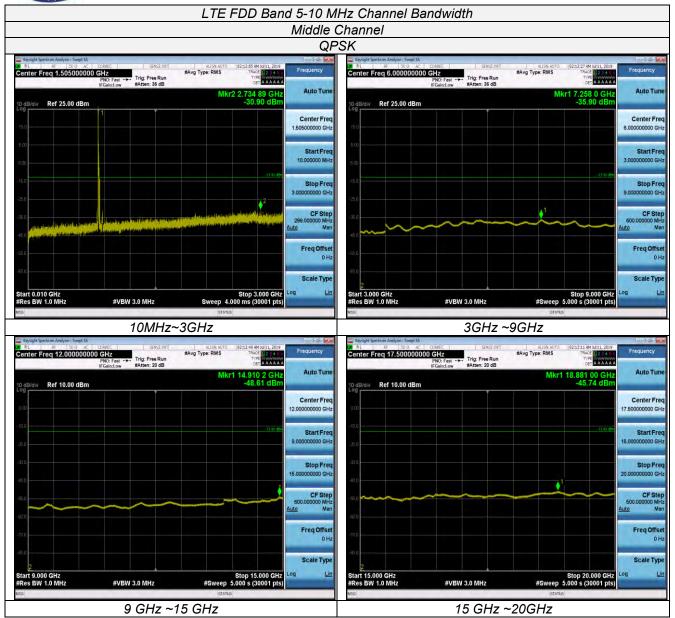
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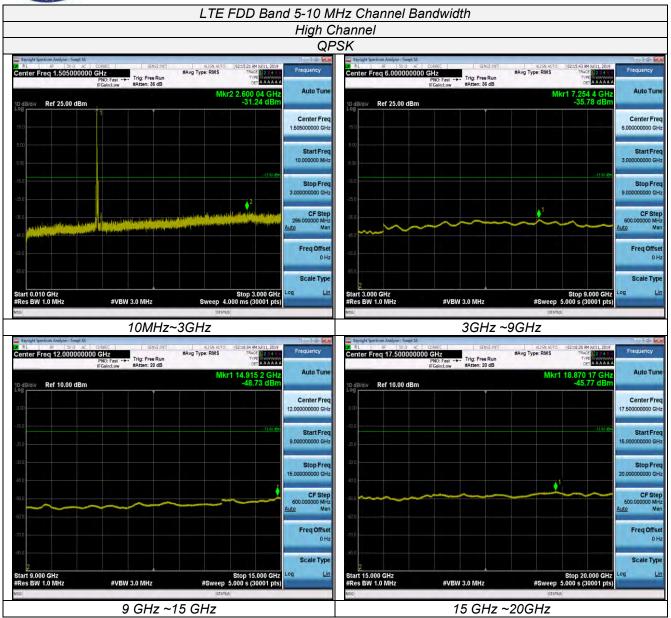
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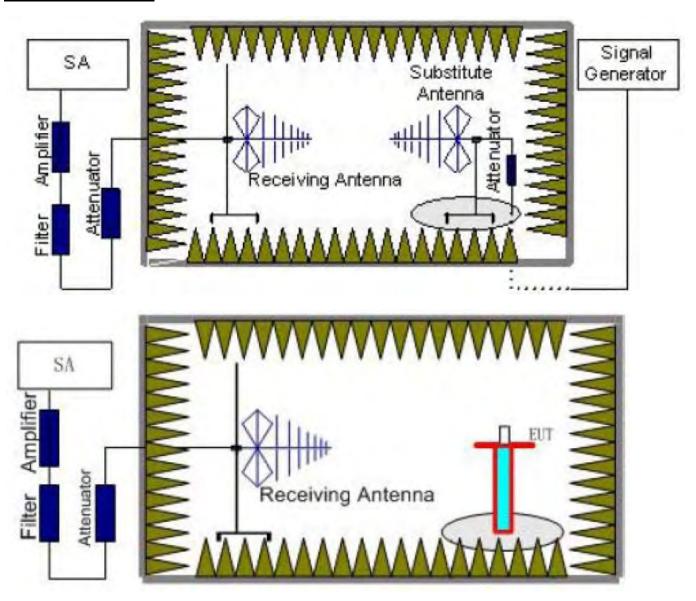


4.6 Radiated Spurious Emssion

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.

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_r).

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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_{Mea}) 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_r). The power of signal source (P_{Mea}) 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 (P_{cl}) ,the Substitution Antenna Gain (G_a) and the Amplifier Gain (P_{Ag}) should be recorded after test.

 The measurement results are obtained as described below:

Power(EIRP)= P_{Mea} - P_{Ag} - P_{cl} + G_a

- 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 _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1649.4	-30.94	3.00	3.00	9.58	-24.36	-13.00	11.36	Н
2474.1	-36.72	3.03	3.00	10.72	-29.03	-13.00	16.03	Н
1649.4	-30.06	3.00	3.00	9.68	-23.38	-13.00	10.38	V
2474.1	-39.93	3.03	3.00	10.72	-32.24	-13.00	19.24	V

LTE FDD Band 5_Channel Bandwidth 1.4MHz_QPSK_ Middle Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.0	-28.14	3.00	3.00	9.58	-21.56	-13.00	8.56	Н
2509.5	-39.53	3.03	3.00	10.72	-31.84	-13.00	18.84	Н
1673.0	-30.65	3.00	3.00	9.68	-23.97	-13.00	10.97	V
2509.5	-38.7	3.03	3.00	10.72	-31.01	-13.00	18.01	V

LTE FDD Band 5 Channel Bandwidth 1.4MHz QPSK High Channel

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Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1696.6	-32.61	3.00	3.00	9.58	-26.03	-13.00	13.03	Н
2544.9	-37.76	3.03	3.00	10.72	-30.07	-13.00	17.07	Н
1696.6	-29.84	3.00	3.00	9.68	-23.16	-13.00	10.16	V
2544.9	-35.99	3.03	3.00	10.72	-28.3	-13.00	15.3	V

LTE FDD Band 5_Channel Bandwidth 3MHz_QPSK_ Low Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1651.0	-30.84	3.00	3.00	9.58	-24.26	-13.00	11.26	Н
2476.5	-36.93	3.03	3.00	10.72	-29.24	-13.00	16.24	Н
1651.0	-30.1	3.00	3.00	9.68	-23.42	-13.00	10.42	V
2476.5	-39.21	3.03	3.00	10.72	-31.52	-13.00	18.52	V

LTE FDD Band 5_Channel Bandwidth 3MHz_QPSK_ Middle Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G₂ Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.0	-28.86	3.00	3.00	9.58	-22.28	-13.00	9.28	Н
2509.5	-38.97	3.03	3.00	10.72	-31.28	-13.00	18.28	Н
1673.0	-31.17	3.00	3.00	9.68	-24.49	-13.00	11.49	V
2509.5	-38.84	3.03	3.00	10.72	-31.15	-13.00	18.15	V

LTE FDD Band 5_Channel Bandwidth 3MHz_QPSK_ High Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a 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	-37.83	3.03	3.00	10.72	-30.14	-13.00	17.14	Н
1695.0	-30.37	3.00	3.00	9.68	-23.69	-13.00	10.69	V
2542.5	-35.56	3.03	3.00	10.72	-27.87	-13.00	14.87	V

LTE FDD Band 5 Channel Bandwidth 5MHz QPSK Low Channel

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Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1653.0	-30.39	3.00	3.00	9.58	-23.81	-13.00	10.81	Н
2479.5	-37.24	3.03	3.00	10.72	-29.55	-13.00	16.55	Н
1653.0	-30.72	3.00	3.00	9.68	-24.04	-13.00	11.04	V
2479.5	-39.19	3.03	3.00	10.72	-31.5	-13.00	18.5	V



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LTE FDD Band 5_Channel Bandwidth 5MHz_QPSK_ Middle Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.0	-28.96	3.00	3.00	9.58	-22.38	-13.00	9.38	Н
2509.5	-39.02	3.03	3.00	10.72	-31.33	-13.00	18.33	Н
1673.0	-30.85	3.00	3.00	9.68	-24.17	-13.00	11.17	V
2509.5	-38.46	3.03	3.00	10.72	-30.77	-13.00	17.77	V

LTE FDD Band 5_Channel Bandwidth 5MHz_QPSK_ High Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1693.0	-32.23	3.00	3.00	9.58	-25.65	-13.00	12.65	Н
2539.5	-37.38	3.03	3.00	10.72	-29.69	-13.00	16.69	Н
1693.0	-30.32	3.00	3.00	9.68	-23.64	-13.00	10.64	V
2539.5	-36.1	3.03	3.00	10.72	-28.41	-13.00	15.41	V

LTE FDD Band 5 Channel Bandwidth 10MHz QPSK Low Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1658.0	-30.5	3.00	3.00	9.58	-23.92	-13.00	10.92	Н
2487.0	-37.26	3.03	3.00	10.72	-29.57	-13.00	16.57	Н
1658.0	-29.8	3.00	3.00	9.68	-23.12	-13.00	10.12	V
2487.0	-39.46	3.03	3.00	10.72	-31.77	-13.00	18.77	V

LTE FDD Band 5_Channel Bandwidth 10MHz_QPSK_ Middle Channel

	Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna	Peak EIRP	Limit (dBm)	Margin (dB)	Polarization
	(1411 12)	(dDill)	(GD)		Gain(dB)	(dBm)	(dDIII)	(GD)	
	1673.0	-28.82	3.00	3.00	9.58	-22.24	-13.00	9.24	Н
	2509.5	-38.96	3.03	3.00	10.72	-31.27	-13.00	18.27	Н
Ī	1673.0	-31	3.00	3.00	9.68	-24.32	-13.00	11.32	V
Ī	2509.5	-38.37	3.03	3.00	10.72	-30.68	-13.00	17.68	V

LTE FDD Band 5_Channel Bandwidth 10MHz_QPSK_ High Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1688.0	-32.21	3.00	3.00	9.58	-25.63	-13.00	12.63	Н
2532.0	-38.18	3.03	3.00	10.72	-30.49	-13.00	17.49	Н
1688.0	-30.7	3.00	3.00	9.68	-24.02	-13.00	11.02	V
2532.0	-35.35	3.03	3.00	10.72	-27.66	-13.00	14.66	V

LTE FDD Band 5_Channel Bandwidth 1.4MHz_16QAM _ Low Channel

	_		_					
Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1649.4	-30.76	3.00	3.00	9.58	-24.18	-13.00	11.18	Н
2474.1	-37.55	3.03	3.00	10.72	-29.86	-13.00	16.86	Н
1649.4	-29.77	3.00	3.00	9.68	-23.09	-13.00	10.09	V
2474.1	-39.45	3.03	3.00	10.72	-31.76	-13.00	18.76	V

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

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Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.0	-28.64	3.00	3.00	9.58	-22.06	-13.00	9.06	Н
2509.5	-39.9	3.03	3.00	10.72	-32.21	-13.00	19.21	Н
1673.0	-30.38	3.00	3.00	9.68	-23.7	-13.00	10.7	V
2509.5	-38.44	3.03	3.00	10.72	-30.75	-13.00	17.75	V



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LTE FDD Band 5_Channel Bandwidth 1.4MHz_16QAM _ High Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1696.6	-32.77	3.00	3.00	9.58	-26.19	-13.00	13.19	Н
2544.9	-37.94	3.03	3.00	10.72	-30.25	-13.00	17.25	Н
1696.6	-30.02	3.00	3.00	9.68	-23.34	-13.00	10.34	V
2544.9	-36.08	3.03	3.00	10.72	-28.39	-13.00	15.39	V

LTE FDD Band 5_Channel Bandwidth 3MHz_16QAM _ Low Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1651.0	-30.42	3.00	3.00	9.58	-23.84	-13.00	10.84	Н
2476.5	-36.95	3.03	3.00	10.72	-29.26	-13.00	16.26	Н
1651.0	-29.81	3.00	3.00	9.68	-23.13	-13.00	10.13	V
2476.5	-39.56	3.03	3.00	10.72	-31.87	-13.00	18.87	V

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

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.0	-28.46	3.00	3.00	9.58	-21.88	-13.00	8.88	Н
2509.5	-39.34	3.03	3.00	10.72	-31.65	-13.00	18.65	Н
1673.0	-30.55	3.00	3.00	9.68	-23.87	-13.00	10.87	V
2509.5	-38.36	3.03	3.00	10.72	-30.67	-13.00	17.67	V

LTE FDD Band 5_Channel Bandwidth 3MHz_16QAM _ High Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1695.0	-32.68	3.00	3.00	9.58	-26.1	-13.00	13.1	Н
2542.5	-38.25	3.03	3.00	10.72	-30.56	-13.00	17.56	Н
1695.0	-29.99	3.00	3.00	9.68	-23.31	-13.00	10.31	V
2542.5	-35.34	3.03	3.00	10.72	-27.65	-13.00	14.65	V

LTE FDD Band 5_Channel Bandwidth 5MHz_16QAM _ Low Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	Ga Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1653.0	-30.08	3.00	3.00	9.58	-23.5	-13.00	10.5	Н
2479.5	-36.59	3.03	3.00	10.72	-28.9	-13.00	15.9	Н
1653.0	-30.28	3.00	3.00	9.68	-23.6	-13.00	10.6	V
2479.5	-39.36	3.03	3.00	10.72	-31.67	-13.00	18.67	V

LTE FDD Band 5_Channel Bandwidth 5MHz_16QAM _ Middle Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.0	-28.31	3.00	3.00	9.58	-21.73	-13.00	8.73	Н
2509.5	-38.99	3.03	3.00	10.72	-31.3	-13.00	18.3	Н
1673.0	-30.89	3.00	3.00	9.68	-24.21	-13.00	11.21	V
2509.5	-38.32	3.03	3.00	10.72	-30.63	-13.00	17.63	V

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

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Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization			
1693.0	-32.49	3.00	3.00	9.58	-25.91	-13.00	12.91	Н			
2539.5	-37.37	3.03	3.00	10.72	-29.68	-13.00	16.68	Н			
1693.0	-30.23	3.00	3.00	9.68	-23.55	-13.00	10.55	V			
2539.5	-35.86	3.03	3.00	10.72	-28.17	-13.00	15.17	V			



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LTE FDD Band 5_Channel Bandwidth 10MHz_16QAM _ Low Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1658.0	-30.45	3.00	3.00	9.58	-23.87	-13.00	10.87	Н
2487.0	-37.27	3.03	3.00	10.72	-29.58	-13.00	16.58	Н
1658.0	-29.9	3.00	3.00	9.68	-23.22	-13.00	10.22	V
2487.0	-39.18	3.03	3.00	10.72	-31.49	-13.00	18.49	V

LTE FDD Band 5_Channel Bandwidth 10MHz_16QAM _ Middle Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.0	-28.4	3.00	3.00	9.58	-21.82	-13.00	8.82	Н
2509.5	-39.62	3.03	3.00	10.72	-31.93	-13.00	18.93	Н
1673.0	-30.65	3.00	3.00	9.68	-23.97	-13.00	10.97	V
2509.5	-38.74	3.03	3.00	10.72	-31.05	-13.00	18.05	V

LTE FDD Band 5_Channel Bandwidth 10MHz_16QAM _ High Channel

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	Diatance	G _a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1688.0	-32.43	3.00	3.00	9.58	-25.85	-13.00	12.85	Н
2532.0	-37.7	3.03	3.00	10.72	-30.01	-13.00	17.01	Н
1688.0	-29.83	3.00	3.00	9.68	-23.15	-13.00	10.15	V
2532.0	-36.23	3.03	3.00	10.72	-28.54	-13.00	15.54	V

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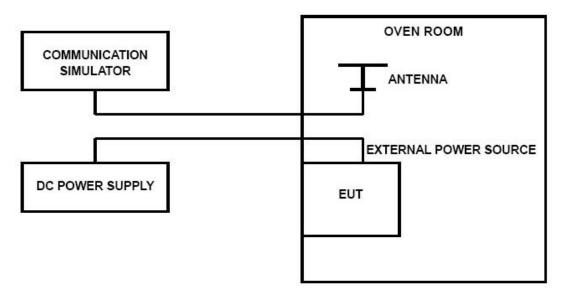


4.7 Frequency Stability

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° C increments from -30° C to $+50^{\circ}$ 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° C during the measurement procedure.

Frequency Stability Under Voltage Variations:

Set chamber temperature to 20° 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 (°C)	Frequency error(Hz)	Frequency error(ppm)	Limit (ppm)	Verdict		
3.40	20	28	0.0156	2.50	PASS		
3.60	20	35	0.0177	2.50	PASS		
4.20	20	17	0.0089	2.50	PASS		
3.60	-30	26	0.0179	2.50	PASS		
3.60	-20	17	0.0095	2.50	PASS		
3.60	-10	20	0.0187	2.50	PASS		
3.60	0	28	0.0190	2.50	PASS		
3.60	10	21	0.0122	2.50	PASS		
3.60	20	18	0.0078	2.50	PASS		
3.60	30	27	0.0135	2.50	PASS		
3.60	40	19	0.0177	2.50	PASS		
3.60	50	25	0.0156	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	0.0236	2.50	PASS		
3.60	20	47	0.0235	2.50	PASS		
4.20	20	52	0.0245	2.50	PASS		
3.60	-30	61	0.0355	2.50	PASS		
3.60	-20	37	0.0149	2.50	PASS		
3.60	-10	42	0.0224	2.50	PASS		
3.60	0	39	0.0212	2.50	PASS		
3.60	10	25	0.0158	2.50	PASS		
3.60	20	29	0.0145	2.50	PASS		
3.60	30	35	0.0175	2.50	PASS		
3.60	40	27	0.0145	2.50	PASS		
3.60	50	22	0.0127	2.50	PASS		



5 Test Setup Photos of the EUT



