



FCC PART 24TEST REPORT

Part 24 Subpart E

Report Reference No...... HK2007171893-1E

FCC ID......2AHH4TL-403

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Applicant's name......Toplovo Industrial Co.,Ltd

Address Building B2b, Yingzhan Industrial Park Kengzi Town, Longgang

District, Shenzhen, China

Test specification:

Standard FCC CFR Title 47 Part 2, Part 24E

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

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Test item description Personal GPS tracker

Trade Mark: N/A

Manufacturer Toplovo Industrial Co.,Ltd

Model/Type reference...... TL-403

Listed Models N/A

Modulation Type QPSK, 16QAM

Rating DC 5V from USB or DC3.7V By Battery

Hardware version: V05 Software version...... V05

Result..... PASS

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TEST REPORT

Test Report No. :	HK2007171893-1E	Jul. 29, 2020
	111(2001111095-1E	Date of issue

Equipment under Test : Personal GPS tracker

Model /Type : TL-403

Listed Models : N/A

Applicant : Toplovo Industrial Co.,Ltd

Address : Building B2b, Yingzhan Industrial Park Kengzi Town,

Longgang District, Shenzhen, China

Manufacturer : Toplovo Industrial Co.,Ltd

Address : Building B2b, Yingzhan Industrial Park Kengzi Town,

Longgang District, Shenzhen, China

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	2020-07-29	Initial Issue	Jasou Zhou





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The tests were performed according to following standards:

FCC Part 24 : PUBLIC MOBILE SERVICES

<u>TIA/EIA 603 D June 2010:</u>Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

47 CFR FCC Part 15 Subpart B: - Unintentional Radiators

FCC Part 2: FREQUENCY ALLOCA-TIONS AND RADIO TREATY MAT-TERS; GENERAL RULES AND REG-ULATIONS

KDB971168 D01:v02r02MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS





2 SUMMARY

2.1 General Remarks

Date of receipt of test sample	:	Jul. 17, 2020
Testing commenced on	:	Jul. 18, 2020
Testing concluded on	1:	Jul. 29, 2020

2.2 Product Description

The **Toplovo Industrial Co.,Ltd**'s Model:MAS-501 or the "EUT" as referred to in this report; more general information as follows,for more details, refer to the user's manual of the EUT.

Name of EUT	Personal GPS tracker
Model/Type reference:	TL-403
List Model:	N/A
Power supply:	DC 5V from USB or DC3.7V By Battery
Modilation Type	QPSK,16QAM
Antenna Type	Internal Antenna
Antenna Gain	1dBi
Operation Frequency Band	LTE Band 2
Operation frequency	LTE Band 2: 1850~1910 MHz(TX), 1930~1990 MHz(TX)
LTE Release	R8
Extreme temp. Tolerance	-30°C to +70°C
Extreme vol. Limits	3.33VDC to 4.07VDC (nominal: 3.7VDC)

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 5V from USB or DC3.7V By Battery

2.4 Short description of the Equipment under Test (EUT)

2.4.1 GeneralDescription

This is a Personal GPS tracker .

For more details, refer to the user's manual of the EUT



2.5 Test frequency list

r		,
TX Channel Bandwidth	Frequency (MHz)	channel
4.4.841.1	1850.7	18607
1.4 MHz	1880.0	18900
	1909.3	19193
	1851.5	18615
3 MHz	1880.0	18900
	1908.5	19185
	1852.5	18625
5 MHz	1880.0	18900
	1907.5	19175
	1855.0	18650
10 MHz	1880.0	18900
	1905.0	19150
	1857.5	18675
15 MHz	1880.0	18900
	1902.5	19125
	1860.0	18700
20 MHz	1880.0	18900
	1900.0	19100

2.6 Normal Accessory setting

Fully charged battery was used during the test.

2.7 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):	/
		Shield :	/
		Detachable :	/
0	Multimeter	Manufacturer:	/
		Model No.:	/

2.8 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: 2AHH4TL-403 filing to comply with FCC Part 24, Rules.

2.9 Modifications

No modifications were implemented to meet testing criteria.

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2.10 GeneralTest Conditions/Configurations

2.10.1 TestEnvironment

EnvironmentParameter	SelectedValuesDuringTests		
Relative Humidity	Amb	pient	
Temperature	TN	Ambient	
	VL	3.33V	
Voltage	VN	3.7V	
	VH	4.07V	

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



TEST ENVIRONMENT

Address of the test laboratory

Shenzhen HUAK Testing Technology Co., Ltd. 1F, Building No. 13A, Zhonghaixin Science and Technology City, No.12,6 Road, Ganli Industrial Park, Buji Street, Longgang District, Shenzhen, Guangdong

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

PCSPand (1950-1015MHz pairodwith 1030-1005MHz)

PCSBand (1850-1915MHz pairedwith 1930-1995MHz)					
Test Item	FCCRuleNo.	Requirements	Verdict		
Effective(Isotropic)Radia tedOutputPower	Part§2.1046, Part§24.232	EIRP ≤ 2W	Pass		
Peak-AverageRatio	Part§2.1046, Part§24.232	FCC:Limit≤13dB	Pass		
Bandwidth	Part§2.1049 RSS-133	OBW: Nolimit. EBW: Nolimit.	Pass		
BandEdgesCompliance	Part§2.1051, Part§24.238	≤ -13dBm/1%*EBW, In1MHzbandsimmediatelyoutsideandadjacentto Thefrequency block.	Pass		
SpuriousEmissionatAnte nnaTerminals	Part§2.1051, Part§24.238	≤-13dBm/1MHz, from9kHzto10thharmonicsbut outsideauthorized Operatingfrequency ranges.	Pass		
Field Strengthof Spurious Radiation	Part§2.1053, Part§24.238	≤ -13dBm/1MHz.	Pass		
Frequency Stability	Part§2.1055, Part§24.235	FCC:withinauthorizedfrequency block.	Pass		
NOTE 1:For theverdict,the	"N/A"denotes"not appl	licable",the"N/T"denotes "nottested".	•		

Remark:

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



3.4 Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	ENV216	R&S	HKE-059	2019/12/26	2020/12/25
LISN	R&S	ENV216	HKE-002	2019/12/26	2020/12/25
Broadband antenna	Schwarzbeck	VULB 9163	HKE-012	2019/12/26	2020/12/25
Receiver	R&S	ESCI 7	HKE-010	2019/12/26	2020/12/25
Spectrum analyzer	Agilent	N9020A	HKE-048	2019/12/26	2020/12/25
RF automatic control unit	Tonscend	JS0806-2	HKE-060	2019/12/26	2020/12/25
Horn antenna	Schwarzbeck	9120D	HKE-013	2019/12/26	2020/12/25
Loop antenna	Schwarzbeck	FMZB 1519 B	HKE-014	2019/12/26	2020/12/25
Preamplifier	EMCI	EMC051845SE	HKE-015	2019/12/26	2020/12/25
Preamplifier	Agilent	83051A	HKE-016	2019/12/26	2020/12/25
Temperature and humidity meter	Boyang	HTC-1	HKE-075	2019/12/26	2020/12/25
High pass filter unit	Tonscend	JS0806-F	HKE-055	2019/12/26	2020/12/25
RF cable	Times	1-40G	HKE-034	2019/12/26	2020/12/25
Power meter	Agilent	E4419B	HKE-085	2019/12/26	2020/12/25
Power Sensor	Agilent	E9300A	HKE-086	2019/12/26	2020/12/25
Wireless Communication Test Set	R&S	CMW500	HKE-026	2019/12/26	2020/12/25
Wireless Communication Test Set	R&S	CMU200	HKE-029	2019/12/26	2020/12/25
High gain antenna	Schwarzbeck	LB-180400KF	HKE-054	2019/12/26	2020/12/25



4 TEST CONDITIONS AND RESULTS

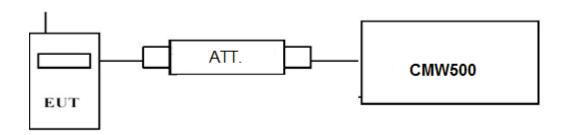
4.1 Output Power

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

Remark:

1. We measured all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 2;

		LTE FDD Band 2		
TX Channel	Frequency	RB Size/Offset	Burst Average	Power [dBm]
Bandwidth	(MHz)	NB Size/Oliset	QPSK	16QAM
		1 RB low	23.42	22.51
	1850.7	1 RB high	23.53	22.60
	1000.7	50% RB mid	23.56	22.46
		100% RB	23.42	22.10
		1 RB low	23.31	22.23
1.4 MHz	1000 0	1 RB high	23.19	22.11
1.4 IVIDZ	1880.0	50% RB mid	22.38	21.41
		100% RB	23.49	22.53
	1909.3	1 RB low	23.54	21.42
		1 RB high	23.71	21.58
		50% RB mid	23.71	21.79
		100% RB	23.65	22.23
		1 RB low	22.88	22.31
	10E1 E	1 RB high	23.01	22.14
	1851.5	50% RB mid	22.94	22.15
2 MH=		100% RB	22.22	21.12
3 MHz		1 RB low	22.14	21.18
	4000 0	1 RB high	22.07	21.20
	1880.0	50% RB mid	22.12	21.18
		100% RB	23.20	22.39



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A SHERE		_		
		1 RB low	23.28	22.45
	1000 5	1 RB high	23.64	22.42
	1908.5	50% RB mid	22.42	21.57
		100% RB	22.55	21.65
		1 RB low	22.98	22.18
		1 RB high	23.27	22.26
	1852.5	50% RB mid	23.18	21.05
		100% RB	22.16	21.16
		1 RB low	22.06	21.08
		1 RB high	22.10	21.17
5 MHz	1880.0	50% RB mid	22.08	22.35
		100% RB	23.32	22.50
-		1 RB low	23.33	22.05
		1 RB high	23.10	21.54
	1907.5	50% RB mid	22.47	21.27
		100% RB	22.55	21.45
		1 RB low	23.98	21.69
		1 RB high	23.81	21.87
	1855.0	50% RB mid	23.99	/ 21.07
		100% RB	22.76	
<u> </u>		1 RB low	22.76	23.43
			22.73	23.43
10 MHz	1880.0	1 RB high 50% RB mid	22.76	
_		100% RB	23.63	/ / / / / / / / / / / / / / / / / / / /
		1 RB low	21.63	22.43
	1905.0	1 RB high	23.27	22.11
		50% RB mid	22.51	/
		100% RB	22.74	/
		1 RB low	23.82	22.94
	1857.5	1 RB high	23.94	23.00
		50% RB mid	23.81	
		100% RB	23.81	/
		1 RB low	23.56	23.03
15 MHz	1880.0	1 RB high	23.78	22.57
		50% RB mid	22.86	
		100% RB	23.97	/
		1 RB low	24.01	22.23
	1902.5	1 RB high	23.49	23.14
	1002.0	50% RB mid	23.59	/
		100% RB	23.99	/
		1 RB low	23.82	23.76
	1860.0	1 RB high	23.31	22.98
	1000.0	50% RB mid	22.89	/
		100% RB	23.18	/
		1 RB low	24.05	22.91
20 MHz	1880.0	1 RB high	22.98	22.91
ZU IVII IZ	1000.0	50% RB mid	23.77	1
		100% RB	22.91	/
	<u> </u>	1 RB low	23.53	22.92
	1000.0	1 RB high	23.30	23.28
	1900.0	50% RB mid	23.05	/
		100% RB	23.32	

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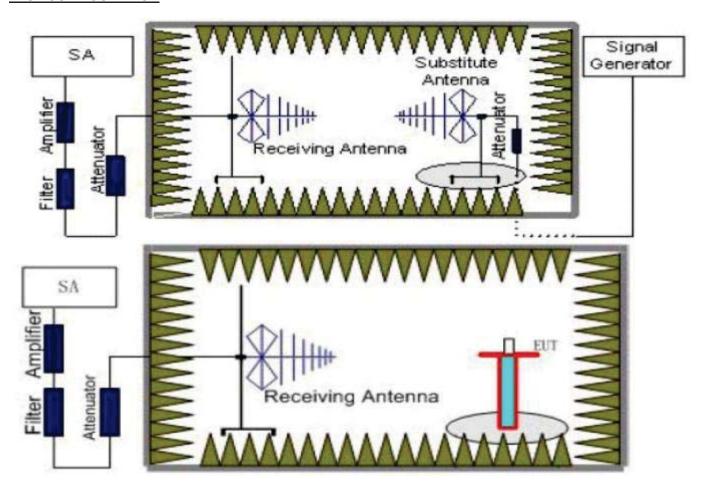


4.1.2. Radiated Output Power

LIMIT

This is the test for the maximum radiated power from the EUT. Rule Part 24.232(b) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p.

TEST CONFIGURATION



TEST PROCEDURE

- 1. EUT was placed on a 1.5 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 1.5m. 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_{Aq}) 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 2; recorded worst case for each Channel Bandwidth of LTE FDD Band 2.
- 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 2_Channel Bandwidth 1.4MHz_QPSK

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1850.7	-14.78	3.41	10.24	33.6	25.65	33.01	7.36	V
1880.0	-15.66	3.49	10.24	33.6	24.69	33.01	8.32	V
1909.3	-15.79	3.55	10.23	33.6	24.49	33.01	8.52	V
1850.7	-14.64	3.41	10.24	33.6	25.79	33.01	7.22	Н
1880.0	-15.92	3.49	10.24	33.6	24.43	33.01	8.58	Н
1909.3	-15.03	3.55	10.23	33.6	25.25	33.01	7.76	Н

LTE FDD Band 2 Channel Bandwidth 3MHz QPSK

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1851.5	-15.01	3.41	10.24	33.6	25.42	33.01	7.59	V
1880.0	-15.97	3.49	10.24	33.6	24.38	33.01	8.63	V
1908.5	-15.78	3.55	10.23	33.6	24.5	33.01	8.51	V
1851.5	-14.2	3.41	10.24	33.6	26.23	33.01	6.78	Н
1880.0	-15.97	3.49	10.24	33.6	24.38	33.01	8.63	Н
1908.5	-15.17	3.55	10.23	33.6	25.11	33.01	7.9	Н

LTE FDD Band 2 Channel Bandwidth 5MHz_QPSK

ETET DD Bana Z_Onanner Banawath Oliniz_QT ON										
Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization		
1852.5	-15.54	3.41	10.24	33.6	24.89	33.01	8.12	V		
1880.0	-15.67	3.49	10.24	33.6	24.68	33.01	8.33	V		
1907.5	-15.86	3.55	10.23	33.6	24.42	33.01	8.59	V		
1852.5	-14.24	3.41	10.24	33.6	26.19	33.01	6.82	Н		
1880.0	-15.63	3.49	10.24	33.6	24.72	33.01	8.29	Н		
1907.5	-15.51	3.55	10.23	33.6	24.77	33.01	8.24	Н		



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LTE FDD Band 2_Channel Bandwidth 10MHz_QPSK

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1855.0	-14.87	3.41	10.24	33.6	25.56	33.01	7.45	V
1880.0	-16.37	3.49	10.24	33.6	23.98	33.01	9.03	V
1905.0	-15.91	3.55	10.23	33.6	24.37	33.01	8.64	V
1855.0	-14.53	3.41	10.24	33.6	25.9	33.01	7.11	Н
1880.0	-15.63	3.49	10.24	33.6	24.72	33.01	8.29	Н
1905.0	-15.78	3.55	10.23	33.6	24.5	33.01	8.51	Н

LTE FDD Band 2_Channel Bandwidth 15MHz_QPSK

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1857.5	-14.86	3.41	10.24	33.6	25.57	33.01	7.44	V
1880.0	-15.52	3.49	10.24	33.6	24.83	33.01	8.18	V
1902.5	-15.8	3.55	10.23	33.6	24.48	33.01	8.53	V
1857.5	-13.77	3.41	10.24	33.6	26.66	33.01	6.35	Н
1880.0	-15.37	3.49	10.24	33.6	24.98	33.01	8.03	Н
1902.5	-15.82	3.55	10.23	33.6	24.46	33.01	8.55	Н

LTE FDD Band 2_Channel Bandwidth 20MHz_QPSK

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1860.0	-15.52	3.41	10.24	33.6	24.91	33.01	8.1	V
1880.0	-15.79	3.49	10.24	33.6	24.56	33.01	8.45	V
1900.0	-15.88	3.55	10.23	33.6	24.4	33.01	8.61	V
1860.0	-13.7	3.41	10.24	33.6	26.73	33.01	6.28	Н
1880.0	-15.64	3.49	10.24	33.6	24.71	33.01	8.3	Н
1900.0	-15.11	3.55	10.23	33.6	25.17	33.01	7.84	Н

LTE FDD Band 2_Channel Bandwidth 1.4MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1850.7	-15.56	3.41	10.24	33.6	24.87	33.01	8.14	V
1880.0	-16.29	3.49	10.24	33.6	24.06	33.01	8.95	V
1909.3	-15.95	3.55	10.23	33.6	24.33	33.01	8.68	V
1850.7	-13.92	3.41	10.24	33.6	26.51	33.01	6.5	Н
1880.0	-15.49	3.49	10.24	33.6	24.86	33.01	8.15	Н
1909.3	-15.72	3.55	10.23	33.6	24.56	33.01	8.45	Н

LTE FDD Band 2_Channel Bandwidth 3MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1851.5	-15.03	3.41	10.24	33.6	25.4	33.01	7.61	V
1880.0	-15.97	3.49	10.24	33.6	24.38	33.01	8.63	V
1908.5	-15.59	3.55	10.23	33.6	24.69	33.01	8.32	V
1851.5	-13.82	3.41	10.24	33.6	26.61	33.01	6.4	Н
1880.0	-16.17	3.49	10.24	33.6	24.18	33.01	8.83	Н
1908.5	-15.45	3.55	10.23	33.6	24.83	33.01	8.18	Н



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LTE FDD Band 2_Channel Bandwidth 5MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1852.5	-15.27	3.41	10.24	33.6	25.16	33.01	7.85	V
1880.0	-16.3	3.49	10.24	33.6	24.05	33.01	8.96	V
1907.5	-16.01	3.55	10.23	33.6	24.27	33.01	8.74	V
1852.5	-14.06	3.41	10.24	33.6	26.37	33.01	6.64	Н
1880.0	-16.2	3.49	10.24	33.6	24.15	33.01	8.86	Н
1907.5	-15.69	3.55	10.23	33.6	24.59	33.01	8.42	Н

LTE FDD Band 2_Channel Bandwidth 10MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1855.0	-15.6	3.41	10.24	33.6	24.83	33.01	8.18	V
1880.0	-16.15	3.49	10.24	33.6	24.2	33.01	8.81	V
1905.0	-15.93	3.55	10.23	33.6	24.35	33.01	8.66	V
1855.0	-14.01	3.41	10.24	33.6	26.42	33.01	6.59	Н
1880.0	-16.27	3.49	10.24	33.6	24.08	33.01	8.93	Н
1905.0	-15.33	3.55	10.23	33.6	24.95	33.01	8.06	Н

LTE FDD Band 2_Channel Bandwidth 15MHz_16QAM

	ETET BB Band E_Gnamer Bandwath Tollin E_Told, iiii							
Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Ag} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1857.5	-15.56	3.41	10.24	33.6	24.87	33.01	8.14	V
1880.0	-15.59	3.49	10.24	33.6	24.76	33.01	8.25	V
1902.5	-16.16	3.55	10.23	33.6	24.12	33.01	8.89	V
1857.5	-13.81	3.41	10.24	33.6	26.62	33.01	6.39	Н
1880.0	-15.46	3.49	10.24	33.6	24.89	33.01	8.12	Н
1902.5	-15.85	3.55	10.23	33.6	24.43	33.01	8.58	Н

LTE FDD Band 2_Channel Bandwidth 20MHz_16QAM

LILIDDD	LTET DD Band Z_Channel Bandwidth Zolvin Z_10QAlvi							
Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Aq} (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1860.0	-15.34	3.41	10.24	33.6	25.09	33.01	7.92	V
1880.0	-16.05	3.49	10.24	33.6	24.3	33.01	8.71	V
1900.0	-16.1	3.55	10.23	33.6	24.18	33.01	8.83	V
1860.0	-13.81	3.41	10.24	33.6	26.62	33.01	6.39	Н
1880.0	-15.48	3.49	10.24	33.6	24.87	33.01	8.14	Н
1900.0	-15.73	3.55	10.23	33.6	24.55	33.01	8.46	Н

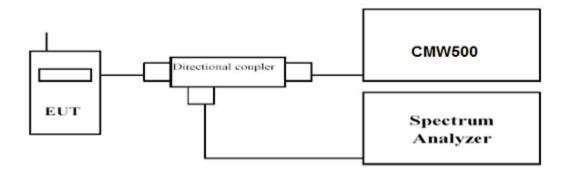


4.2 Peak-to-Average Ratio (PAR)

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 function;
- 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 2; recorded worst case for each Channel Bandwidth of LTE FDD Band 2.

		LTE FDD Band 2				
TX Channel	Frequency	DD Ci-o/Offoot	PAPF	PAPR(dB)		
Bandwidth	(MHz)	RB Size/Offset	QPSK	16QAM		
	1850.7		3.31	4.35		
1.4 MHz	1880.0	1RB#0	3.13	4.25		
	1909.3		3.02	4.03		
	1851.5		2.48	2.92		
3 MHz	1880.0	1RB#0	2.82	3.47		
	1908.5		2.81	3.40		
	1852.5	1RB#0	2.73	3.42		
5 MHz	1880.0		2.88	3.29		
	1907.5		2.73	4.21		
	1855.0		4.17	3.74		
10 MHz	1880.0	1RB#0	4.16	3.59		
	1905.0		3.76	3.52		
	1857.5		4.06	4.91		
15 MHz	1880.0	1RB#0	4.59	5.34		
	1902.5		3.14	4.04		
	1860.0	1RB#0	4.10	4.88		
20 MHz	1880.0		4.15	5.31		
	1900.0		3.47 4.17 4.16 3.76 4.06 4.59 3.14 4.10	3.86		

1RB#0



LTE FDD Band 2 - 1.4 MHz Channel BandwidthPAPR QPSK 16QAM Low Channel Center Freq: 1.850700000 GHz Radio Std: None
Trig: Free Run Counts:1.00 M/1.00 Mpt enter Freq 1.850700000 GHz Center Freq: 1.850700000 GHz Radio Std: None
Trig: Free Run Counts: 1.00 M/1.00 Mpt Center Freq 1.850700000 GHz Average Power Average Power Center Free Center Freq 22.29 dBm 21.23 dBm 52.74 % at 0dB 47.64 % at 0dB 1 % 1 % 10.0 % 2.36 dB 10.0 % 2.96 dB 3.22 dB 4.18 dB 1.0 % 1.0 % 3.31 dB 4.35 dB 0.01 % 0.01 % 0.01 % 3.34 dB 0.01 % 4.39 dB 0.001 % 3.36 dB 0.0001 % 3.38 dB Peak 3.39 dB 25.68 dBm 0.001 % 4.40 dB Freq Offse Freq Offse 0.0001 % 4.41 dB 0.001 % 0.001 5 4.53 dB 25.76 dBm 0.0001 5 1RB#0 1RB#0 Middle Channel Center Freq: 1.880000000 GHz

Trig: Free Run

Counts:1.00 M/1.00 Mpt

Atten: 40 dB Center Freq: 1.880000000 GHz Radio Std: None
Trig: Free Run Counts:1.00 M/1.00 Mpt
Atten: 40 dB enter Freg 1.880000000 GHz enter Freg 1.880000000 GHz Average Power Average Power Center Fre 1.880000000 GH Center Fred 22.87 dBm 21.77 dBm 54.44 % at 0dB 10 % 48.51 % at 0dB 10 % 10.0 % 2.26 dB 10.0 % 2.84 dB 0.1 % 0.1 % 1.0 % 3.05 dB 4.06 dB CF Step 5.000000 MHz CF Ste 4.25 dB 3.13 dB 0.1% 0.1 % 0.01 % 0.01 % 4.28 dB 0.01 % 3.16 dB 0.01 % 0.001 % 3.18 dB 0.001 % 4.30 dB 0.0001 % 3.19 dB 0.0001 % 4.30 dB 0.001 % 0.001% 3.21 dB 26.08 dBm Peak Peak 4.31 dB 26.08 dBm 0.0001 % 0.0001 % 1RB#0 1RB#0 High Channel | SERSE 21 SC 800 CFF | ALSO CFF | 06-58:07 FM 3/21, 2 | Center Freq: 1.809300000 GHz | Radio Std: None | Trig: Free Run | Counts: 1.00 M/1.00 Mpt | SAtten: 40 dB enter Freq 1.909300000 GHz 100 % 100 % Center Free 1.909300000 GH Center Free 1.909300000 GH: 22.27 dBm 21.36 dBm 10 % 10 % 54.85 % at 0dB 48.82 % at 0dB 2.19 dB 2.85 dB 10.0 % 0.1 % 10.0 % 0.1 % 2.93 dB 3.86 dB 1.0 % 1.0 % 3.02 dB 4.03 dB 0.01 % 0.01 % 3.05 dB 0.01 % 4.07 dB 0.001 % 4.09 dB 0.0001 % 4.10 dB 0.001 % 3.08 dB 0.0001 % 3.09 dB Freq Offse Freq Offse 0.001 % 0.001 % 3.09 dB 25.36 dBm 4.12 dB 25.48 dBm 0 dB Info BW 25.000 MHz 0 dB Info BW 25.000 MHz

LTE FDD Band 2–3MHz Channel BandwidthPAPR QPSK 16QAM Low Channel Center Freq: 1.851500000 GHz

Trig: Free Run

Counts: 1.00 M/1.00 Mpt

Readio Std: None | Center Freq: 1.851500000 GHz | Radio Std: None | Trig: Free Run | Counts: 1.00 M/1.00 Mpt Center Freq 1.851500000 GHz Average Power Center Freq 1.851500000 GHz Center Free 22.19 dBm 21.34 dBm 10 % 56.97 % at 0dB 53.08 % at 0dB 1 % 1 % 10.0 % 2.02 dB 2.40 dB 10.0 % 2.42 dB 2.86 dB 1.0 % CF Ster 5.000000 MH Ma 1.0 % 2.48 dB 2.92 dB 0.01 % 0.01 % 0.01 % 2.50 dB 0.001 % 2.52 dB 0.0001 % 2.53 dB 0.01 % 2.95 dB 0.001 % 2.96 dB 0.0001 % 2.98 dB Freq Offse 0 H Freq Offse 0.001 % 2.56 dB 24.75 dBm 0.0001 % 1RB#0 1RB#0 Middle Channel Center Freq: 1.800000000 GHz Radio Std: None Tay: Free Run Counts:1.00 M/1.00 Mpt Akten: 40 dB Center Freq: 1.89000000 GHz Radio Std: None
Trig: Free Run Counts: 1.00 M/1.00 Mpt
SAtten: 10 dB Center Freq 1.880000000 GHz Center Freq 1.880000000 GHz 100 % 100 % Center Fre Center Fred 1.880000000 GHz 22.99 dBm 22.34 dBm 51.21 % at 0dB 55.20 % at 0dB 10 % 10 % 1 % 1 % 2.16 dB 2.64 dB 10.0 % 10.0 % 0.1 % 2.74 dB 3.37 dB 1.0 % 1.0 % 2.82 dB 0.1 % 3.47 dB 0.01 % 0.01 % 0.01 % 2.84 dB 0.001 % 2.86 dB 0.0001 % 2.86 dB 3,50 dB 0.001 % 3.52 dB Freq Offse Freq Offset 0 Hz 0.0001 % 3.53 dB 0.001 % 0.001 % 3.63 dB 25.97 dBm 0 dB 0 dB Info BW 25.000 MHz 0 dB Info BW 25.000 MHz 1RB#0 1RB#0 High Channel Server Brill SCHICE OFF ARADRICOFF 08-15-13FM 321, 2

Center Freq: 1,300500000 GHz Radio Std: None Trig: Free Run Counts:1.00 M/1.00 Mpt #Atten; 40 dB er Freq 1.908500000 GHz Average Power 100 % 100 % Center Freq 22.42 dBm 21.70 dBm 54.95 % at 0dB 51.01 % at 0dB 1 % 1 % 10.0 % 2.19 dB 10.0 % 2.62 dB 2.75 dB 3.32 dB 1.0 % CF Ste 5.000000 MH Ma CF Step 5.000000 MHz Man 0.1 % 2.81 dB 0.1 % 3.40 dB 0.01 % 0.01 % 2.83 dB 3.44 dB 0.01% 0.01 % 0.001 % 2.85 dB 0.001 % 3.46 dB Freq Offse Freq Offset 0 Hz 0.0001 % 2.85 dB 0.0001 % 3.47 dB 2.90 dB 25.32 dBm 3.50 dB 25.20 dBm 0.0001 % 0 dB Info BW 25.000 MHz 0.0001 % 0 dB Info BW 25.000 MHz 1RB#0 1RB#0

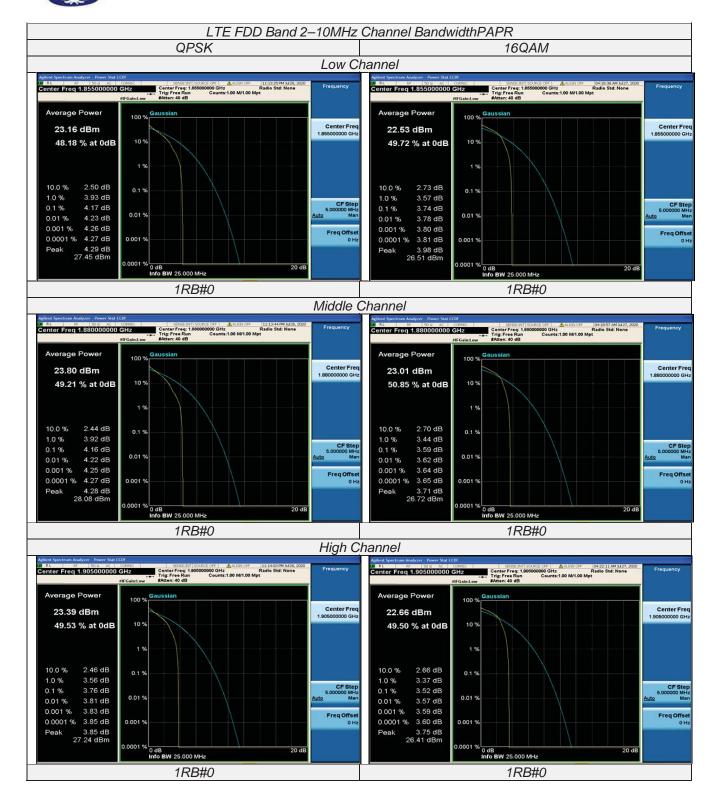
Report No.: HK2007171893-1E

1RB#0



LTE FDD Band 2–5MHz Channel BandwidthPAPR **QPSK** 16QAM Low Channel Center Freq: 1.852500000 GHz Radio Std: None
Trig: Free Run Counts: 1.00 M/1.00 Mpt Center Freq: 1.852500000 GHz Radio Std: None
Trig: Free Run Counts: 1.00 M/1.00 Mpt Center Freq 1.852500000 GHz Average Power Average Power Center Freq 1.852500000 GHz Center Freq 22.40 dBm 21.65 dBm 10 % 54.87 % at 0dB 50.55 % at 0dB 1 % 1 % 10.0 % 2.18 dB 10.0 % 2.67 dB 2.66 dB 3.33 dB 1.0 % 1.0 % 2.73 dB 3.42 dB 0.01 % 0.01 % 0.01 % 2.76 dB 0.001 % 2.78 dB 0.01 % 3.46 dB 0.001 % 3.47 dB Freq Offse Freq Offse 0.0001 % 2.79 dB 0.0001 % 2.79 dB Peak 2.82 dB 25.22 dBm 0.0001 % 3.48 dB 0.001 0.001 5 3.49 dB 25.14 dBm 0.0001 1RB#0 1RB#0 Middle Channel Center Freq: 1.880000000 GHz Radio Std: None
Trig: Free Run Counts:1.00 M/1.00 Mpt
SAtten: 40 dB Center Freq: 1.880000000 GHz Radio Std: None
Trig: Free Run Counts:1.00 M/1.00 Mpt enter Freg 1.880000000 GHz enter Freg 1.880000000 GHz Average Power Average Power Center Free Center Fred 22.77 dBm 22.26 dBm 55.02 % at 0dB 10 % 52.36 % at 0dB 10 % 10.0 % 2.24 dB 10.0 % 2.48 dB 0.1 % 0.1 % 1.0 % 2.84 dB 2.88 dB 1.0 % 3.18 dB 3.29 dB CF Ste 0.1 % 0.1 % 0.01 % 0.01 % 0.01 % 2.89 dB 3.32 dB 0.01 % 0.001 % 2.91 dB 0.0001 % 2.91 dB 0.001 % 3.34 dB 0.0001 % 3.35 dB Peak 3.45 dB 25.71 dBm 0.001 % 0.001 % 3.01 dB 25.78 dBm Peak 0.0001 % 0.0001 % 0 dB Info BW 25.000 MHz 20 dE 1RB#0 1RB#0 High Channel | SERCE PR | SCHICE OFF | A-ALDRI OFF | 10:05:45 PM NJ21, 2 | Center Freq: 1.807500000 GHz | Radio Std: None | Trig: Free Run | Counts: 1.00 M/1.00 Mpt | Std: None | Std: 10:00 Mpt | Std: 10:00 Center Freq: 1.907500000 GHz Radio Std: None
Trig: Free Run Counts: 1.00 M/1.00 Mpt
Satter: 40 dB enter Freq 1.907500000 GHz enter Freq 1.907500000 GHz 100 % 100 % Center Fre 1.907500000 GH 22.53 dBm 21.69 dBm 10 % 10 % 51.13 % at 0dB 47.59 % at 0dB 2.45 dB 10.0 % 2.81 dB 10.0 % 0.1 % 0.1 % 3.37 dB 4.05 dB 1.0 % 1.0 % 3.47 dB 4.21 dB 0.01 % 0.01 % 0.01 % 3.50 dB 0.01 % 4.26 dB 0.001 % 4.29 dB 0.0001 % 4.30 dB 0.001 % 3.52 dB Freq Offse Freq Offset 0.0001 % 3.52 dB 0.001 % 0.001 % 3.52 dB 26.05 dBm 4.64 dB 26.33 dBm 0.0001 % 0 dB Info BW 25.000 MHz 0.0001 9 20 dl 0 dB Info BW 25.000 MHz 20 di

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1RB#0



LTE FDD Band 2- 15 MHz Channel BandwidthPAPR QPSK 16QAM Low Channel Center Freq: 1.867500000 GHz Radio Std: None
Trig: Free Run Counts:1.00 M/1.00 Mpt enter Freq 1.857500000 GHz Center Freq: 1.857500000 GHz Radio Std: None
Trig: Free Run Counts: 1.00 M/1.00 Mpt Center Freq 1.857500000 GHz Average Power Average Power Center Freq 1.857500000 GHz Center Fre 23.20 dBm 22.21 dBm 48.47 % at 0dB 45.81 % at 0dB 1 % 10.0 % 2.45 dB 10.0 % 2.78 dB 3.76 dB 4.56 dB 1.0 % 1.0 % CF Ste 5.000000 M 4.06 dB 4.91 dB 0.01 % 0.01 % 0.01 % 4.12 dB 0.01 % 4.97 dB 0.001 % 4.12 dB 0.0001 % 4.15 dB Peak 4.16 dB 27.36 dBm 0.001 % 5.00 dB Freq Offse Freq Offse 0.0001 % 5.00 dB 0.001 % 0.001 % 5.13 dB 27.34 dBm 1RB#0 1RB#0 Middle Channel enter Freq 1.880000000 GHz Center Freg 1.880000000 GHz Average Power Average Power Center Freq Center Freq 21.96 dBm 22.77 dBm 48.93 % at 0dB 10 % 45.20 % at 0dB 10 % 10.0 % 2.36 dB 10.0 % 2.82 dB 0.1 % 0.1 % 4.05 dB 1.0 % 0.1 % 4.99 dB CF Ste 5.000000 *** CF Step 5.000000 MH: Mar 4.59 dB 5.34 dB 0.1% 0.01 % 0.01 % 4.83 dB 0.01 % 5.40 dB 0.01 % 0.001 % 4.90 dB 0.001 % 5.42 dB 0.0001 % 5.43 dB Peak 5.51 dB 27.47 dBm 0.0001 % 4.93 dB 0.001 % 0.001 % 4.93 dB 27.70 dBm Peak 0.0001 % 1RB#0 1RB#0 High Channel SUSSIBLI SOURCE OFF ALLSH OFF 00-42-49FM 3J27, 22

Center Freq: 1.902800000 GHz

Trig: Free Run

Counts: 1.00 M/1.00 Mpt

Satten: 40 dB Center Freq: 1.902500000 GHz Radio Std: None Fig. Free Run Counts:1.00 MH.00 Mpt Radio Std: None Fig. Free Run Counts:1.00 MH.00 Mpt Center Freq 1.902500000 GHz enter Freq 1.902500000 GHz Average Power 100 % 100 % Center Fre Center Freq 902500000 GHz 23.38 dBm 22.28 dBm 47.90 % at 0dB 52.39 % at 0dB 10 % 2.30 dB 10.0 % 2.75 dB 10.0 % 0.1 % 0.1 % 2.97 dB 3.83 dB 1.0 % 1.0 % 3.14 dB 4.04 dB 0.01 % 0.01 % 0.01 % 3.18 dB 0.01 % 4.09 dB 0.001 % 3.20 dB 0.0001 % 3.21 dB 0.001 % 4.10 dB 0.0001 % 4.10 dB Freq Offse Freq Offset 0.001 % 3.21 dB 26.59 dBm 4.14 dB 26.42 dBm 0.0001 % 0 dB Info BW 25.000 MHz 20 dB 0 dB Info BW 25.000 MHz 1RB#0

1RB#0



LTE FDD Band 2-20MHz Channel BandwidthPAPR QPSK 16QAM Low Channel Center Freq: 1.86000000 GHz Radio Std: None
Trig: Free Run Counts: 1.00 M/1.00 Mpt
#Atten: 40 dB Average Power Average Power Center Freq 1.860000000 GHz Center Freq 1.860000000 GHz 22.82 dBm 22.17 dBm 10 % 49.26 % at 0dB 46.23 % at 0dB 1 % 1 % 10.0 % 2.41 dB 10.0 % 2.76 dB 3.80 dB 4.48 dB 1.0 % 1.0 % 4.10 dB 4.88 dB 0.01 % 0.01 % 0.01 % 4.17 dB 0.01 % 4.97 dB 0.001 % 4.20 dB 0.0001 % 4.21 dB 0.001 % 5.00 dB Freq Offse Freq Offse 0.0001 % 5.01 dB 0.001 % 0.001 5.16 dB 27.33 dBm 1RB#0 1RB#0 Middle Channel Center Freq: 1.880000000 GHz
Trig: Free Run
Editor: O Mpt Mt.00 Mpt
Editor: 40 dB Center Freq: 1,880000000 GHz Radio Std: None
Trig: Free Run Counts: 1.00 M/1.00 Mpt
#Atten: 40 dB enter Freg 1.880000000 GHz enter Freg 1.880000000 GHz Average Power Average Power Center Fre Center Free 23.24 dBm 21.98 dBm 49.07 % at 0dB 10 % 46.18 % at 0dB 10 % 10.0 % 2.41 dB 10.0 % 2.84 dB 0.1 % 0.1 % 3.87 dB 1.0 % 4.82 dB CF Step 5.000000 MH 5.31 dB CF Ste 4.15 dB 0.1 % 0.1% 0.01 % 4.22 dB 0.01 % 0.01 % 5.42 dB 0.01 % 0.001 % 5.45 dB 0.0001 % 4.27 dB 0.001 % 0.0001 % 5.48 dB 5.51 dB 27.49 dBm Peak 4.28 dB 27.52 dBm Peak 0.0001 % 0.0001 % 0 dB Info BW 25.000 MHz 1RB#0 1RB#0 High Channel Center Freq: 1,900000000 GHz Radio Std: None
Trig: Free Run Counts: 1,00 M/1,00 Mpt enter Freq 1.900000000 GHz 100 % 100 % Center Freq 1.900000000 GH 23.05 dBm 22.34 dBm 49.07 % at 0dB 54.62 % at 0dB 10 % 1 % 10.0 % 2.19 dB 2.71 dB 10.0 % 0.1 % 2.78 dB 3.65 dB 1.0 % 1.0 % 2.94 dB 3.86 dB 0.01 % 0.01 % 0.01 % 2.98 dB 0.01 % 3.93 dB 0.001 % 3.01 dB 0.0001 % 3.04 dB 0.001 % 3.96 dB Freq Offse Freq Offset 0.0001 % 3.97 dB 0.001 % 0.001 % 4.15 dB 26.49 dBm 0.0001 % 0 dB Info BW 25.000 MH≥ 0.0001 % 0 dB Info BW 25.000 MHz

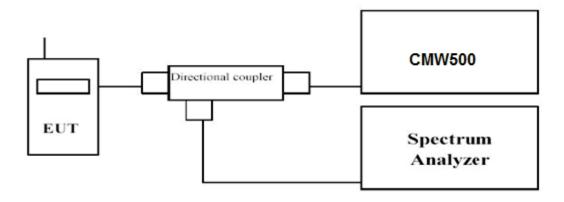


4.3 Occupied Bandwidth and Emission Bandwidth

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:

We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE 1. FDD Band 2; recorded worst case for each Channel Bandwidth of LTE FDD Band 2.

LTE FDD Band 2							
TX Channel Bandwidth	RB Size/Offset	Frequency (MHz)	99% Occupied bandwidth (MHz)	-26dBc Emission bandwidth (MHz)			
			QPSK	QPSK			
		1850.7	1.0908	1.268			
1.4 MHz	6RB#0	1880.0	1.0928	1.254			
		1909.3	1.0926	1.261			
		1851.5	2.6966	2.930			
3 MHz	15RB#0	1880.0	2.7037	2.950			
		1908.5	2.6928	2.939			
		1852.5	4.5082	4.960			
5 MHz	25RB#0	1880.0	4.5587	8.966			
		1907.5	4.5337	7.611			
		1855.0	8.9755	9.568			
10 MHz	50RB#0	1880.0	8.9530	9.578			
		1905.0	8.9644	9.555			
		1857.5	13.448	14.33			
15 MHz	75RB#0	1880.0	13.423	14.30			
		1902.5	13.456	14.40			
		1860.0	17.917	18.95			
20 MHz	100RB#0	1880.0	17.870	18.94			
		1900.0	17.934	19.02			



LTE FDD Band 2							
TX Channel Bandwidth	RB Size/Offset	Frequency (MHz)	99% Occupied bandwidth (MHz)	-26dBc Emission bandwidth (MHz)			
			16QAM	16QAM			
		1850.7	1.0922	1.272			
1.4 MHz	6RB#0	1880.0	1.0900	1.276			
		1909.3	1.0899	1.254			
		1851.5	2.6989	2.905			
3 MHz	15RB#0	1880.0	2.6975	2.912			
		1908.5	2.6951	2.916			
		1852.5	4.5162	4.967			
5 MHz	25RB#0	1880.0	4.5164	4.941			
		1907.5	4.5079	4.910			
		1855.0	2.3344	2.719			
10 MHz	12RB#0	1880.0	2.3287	2.721			
		1905.0	2.3385	2.744			
		1857.5	3.1415	7.171			
15 MHz	16RB#0	1880.0	3.1431	7.160			
		1902.5	3.1402	3.727			
		1860.0	3.5951	4.252			
20 MHz	18RB#0	1880.0	3.5988	4.248			
		1900.0	3.6125	4.322			

6RB#0



LTE FDD Band 2 - 1.4 MHz Channel Bandwidth Occupied Bandwidth and Emission Bandwidth QPSK 16QAM Low Channel Center Freq: 1.850700000 GHz
Trig: Free Run Avg|Hold: 30: Center Freq: 1,850700000 GHz
Trig: Free Run Avg|Hold: 30 Center Freq 1.850700000 GHz Center Free 1.850700000 GHz CF Step 300.000 kHz Man Span 3 MHz #Sweep 100 ms enter 1.851 GHz Res BW 30 kHz Span 3 MH #Sweep 100 m #VBW 91 kHz #VBW 91 kHz Occupied Bandwidth 1.0908 MHz 1.0922 MHz Freq Offse Freq Offse Transmit Freq Error -615 Hz OBW Power -826 Hz 1.268 MHz -26.00 dB x dB Bandwidth 1.272 MHz -26.00 dB 6RB#0 6RB#0 Middle Channel Ref 40.00 dBm Center Free Center Freq enter 1.88 GHz Res BW 30 kHz Span 3 MHz veep 100 ms CF Step 300.000 kHz Man er 1.88 GHz BW 30 kHz #VBW 91 kHz #VBW 91 kHz Occupied Bandwidth 1.0928 MHz Occupied Bandwidth
1.0900 MHz 24.8 dBm Total Power Total Powe 23.8 dBn Freq Offse -2.668 kHz 118 Hz 1.276 MHz 99.00 % -26.00 dB Transmit Freq Error **OBW Power** 99.00 % Transmit Freq Error **OBW Power** 1.254 MHz -26.00 dB x dB 6RB#0 6RB#0 High Channel Center Fred 1.909300000 GH Center Fred 1.909300000 GH: Span 3 MHz eep 100 ms #VBW 91 kHz #VBW 91 kHz 1.0926 MHz 1.0899 MHz Freq Offset -1.005 kHz 1.254 MHz -1.012 kHz Transmit Freq Error Transmit Freq Erro 1.261 MHz x dB -26,00 dB x dB Bandwidth x dB -26.00 dB

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15RB#0



25RB#0



LTE FDD Band 2-5MHz Channel Bandwidth Occupied Bandwidth and Emission Bandwidth **QPSK** 16QAM Low Channel Center Freq: 1.852500000 GHz
Trig: Free Run Avg|Hold: Center Freq: 1.852500000 GHz Center Free Center Freq 1.852500000 GHz Span 10 MH: #Sweep 100 ms enter 1.853 GHz Res BW 100 kHz Span 10 MH: #Sweep 100 m #VBW 300 kHz 23,8 dBn 22.9 dBm Occupied Bandwidth Occupied Bandwidth 4.5162 MHz 4.5082 MHz Freq Offse Freq Offset 0 Hz Transmit Freq Error -5.866 kHz Transmit Freq Error -5.523 kHz OBW Power 99.00 % x dB Bandwidth x dB Bandwidth 4.960 MHz -26.00 dB 4.967 MHz -26.00 dB 25RB#0 25RB#0 Middle Channel Center Freq: 1.88 Trig: Free Run Ref 40.00 dB Ref 40.00 dB Center Free Center Free nter 1.88 GHz Span 10 MHz #Sweep 100 ms CF Step 1.000000 MH: Mar nter 1.88 GHz es BW 100 kHz Span 10 MHz Sweep 100 ms CF Step 1.000000 MHz Mar Total Powe 4.5587 MHz 4.5164 MHz Transmit Freq Error 4.539 kHz **OBW Power** 99.00 % Transmit Freq Error -496 Hz **OBW Power** 99.00 % 8.966 MHz -26.00 dB 25RB#0 25RB#0 High Channel 08:42:29 PM 3.421, Radio Std: None Center Free 1.907500000 GH Center Freq 1.907500000 GHz Span 10 MHz weep 100 ms enter 1.908 GHz Res BW 100 kHz Span 10 MH #Sweep 100 m #VBW 300 kHz #VBW 300 kHz Occupied Bandwidth
4.5079 MHz 23.7 dBm 23 ft dBm 4.5337 MHz Freq Offse Transmit Freq Error x dB Bandwidth -27 Hz 4.910 MHz Transmit Freq Error -26.00 dB 7.611 MHz x dB -26.00 dB x dB

12RB#0



LTE FDD Band 2-10MHz Channel Bandwidth Occupied Bandwidth and Emission Bandwidth **QPSK** 16QAM Low Channel Center Freq: 1.855000000 GHz
Trig: Free Run Avg|Hold: 30 Center Freq: 1.855000000 GHz Trig: Free Run Avg|Hold: 30 Center Fred Center Freq 1.855000000 GHz Span 20 MHz #Sweep 100 ms ter 1.855 GHz s BW 200 kHz Span 20 MHz weep 100 ms #VBW 620 kHz 23.4 dBm Occupied Bandwidth 8.9755 MHz 2.3344 MHz Freq Offse Freq Offse Transmit Freq Error -9.137 kHz Transmit Freq Error x dB Bandwidth 9.568 MHz x dB -26.00 dB x dB Bandwidth 2.719 MHz -26.00 dB 50RB#0 12RB#0 Middle Channel 12:18:47 AM 3J/28, 26 Radio Std: None Center Freq: 1.88 Trig: Free Run Center Freq: 1.88 Trig: Free Run Ref 40.00 dB Ref 40.00 dB Center Free Center Free iter 1.88 GHz s BW 200 kHz er 1.88 GHz BW 200 kHz Span 20 MH: #Sweep 100 m Span 20 MH: weep 100 m CF Ste #VBW 620 kHz 23.2 dBm width 8.9530 MHz Total Power Total Power 2.3287 MHz 4.695 kHz Transmit Freq Error x dB Bandwidth -3.4077 MHz 2.721 MHz 99.00 % -26.00 dB Transmit Freq Error **OBW Power** 99.00 % **OBW Power** 9.578 MHz 50RB#0 12RB#0 High Channel 12:25:11 AM 3./24, Radio Std: None Radio Std: None Ref 40.00 dB Center Fre Center Freq 1.905000000 GHz enter 1.905 GHz Res BW 200 kHz Span 20 MHz #Sweep 100 ms #VBW 620 kHz #VBW 620 kHz 22 7 dBm Occupied Bandwidth 22.8 dBm 8.9644 MHz 2.3385 MHz Freq Offse Freq Offse 358 Hz 9.555 MHz 99.00 % -26.00 dB Transmit Freq Error -3.4077 MHz Transmit Freq Error 99.00 % 2.744 MHz x dB Bandwidth x dB x dB Bandwidth x dB -26.00 dB

16RB#0



LTE FDD Band 2-15MHz Channel Bandwidth Occupied Bandwidth and Emission Bandwidth **QPSK** 16QAM Low Channel 12:20:46 AM Jul 28, Radio Std: None Center Freq: 1.857500000 GHz
Trig: Free Run Avg|Hold: 30 Center Freq: 1.857500000 GHz Center Freq 1.857500000 GHz Center Free 1.857500000 GH: enter 1.858 GHz Res BW 300 kHz enter 1.858 GHz Res BW 300 kHz Span 30 MHz #Sweep 100 ms Span 30 MHz #Sweep 100 ms #VBW 910 kHz #VBW 910 kHz 23.2 dBm Total Powe 23.2 dBm 13.448 MHz 3.1415 MHz Freq Offse Freq Offse Transmit Freq Error x dB Bandwidth Transmit Freq Error -9.814 kHz OBW Power 99.00 % -5.3000 MHz OBW Power 99.00 % 14.33 MHz 7.171 MHz -26.00 dB x dB Bandwidth -26.00 dB 75RB#0 16RB#0 Middle Channel Ref 40.00 dBn Center Fre Center Fred enter 1.88 GHz tes BW 300 kHz Span 30 MHz #Sweep 100 ms er 1.88 GHz BW 300 kH Span 30 MHz weep 100 ms CF Ste 3.000000 Mi CF Ste VBW 910 kHz **#VBW 910 kHz** Occupied Bandwidth 13.423 MHz Total Power 23 6 dBm Occupied Bandwidth 3.1431 MHz Total Powe 23.8 dBr Freq Offse Freq Offse 2.742 kHz 14.30 MHz 99.00 % -26.00 dB 99.00 % -26.00 dB Transmit Freq Error OBW Power Transmit Freq Error -5.2979 MHz OBW Power 7.160 MHz x dB x dB 75RB#0 16RB#0 High Channel Ref 40.00 dB Ref 40.00 dB Center Free 1.902500000 GH Center Freq 1.902500000 GHz Span 30 MHz #Sweep 100 ms Center 1.903 GHz #Res BW 300 kHz enter 1.903 GHz Res BW 300 kHz CF Step 3.000000 MHz Man #VBW 910 kHz #VBW 910 kHz 23.3 dBm Occupied Bandwidth Occupied Bandwidth 13.456 MHz 3.1402 MHz Freq Offse -16.449 kHz -5.3058 MHz 99.00 % Transmit Freq Error **OBW Power** 99.00 % Transmit Freq Error **OBW Power** 14.40 MHz 3.727 MHz

18RB#0



LTE FDD Band 2-20MHz Channel Bandwidth Occupied Bandwidth and Emission Bandwidth **QPSK** 16QAM Low Channel Radio Std: None Center Freq: 1.8 Trig: Free Run Center Freq: 1.860 Trig: Free Run Ref 40.00 dBr Center Free Center Freq 1.860000000 GHz Center 1.86 GHz Res BW 390 kHz Center 1.86 GHz Res BW 390 kHz Span 40 MHz #Sweep 100 ms Span 40 MHz #Sweep 100 ms #VBW 1.2 MHz #VBW 1.2 MH2 23.3 dBm Total Powe 23.0 dBm 3.5951 MHz 17.917 MHz Freq Offse Freq Offse Transmit Freq Error x dB Bandwidth Transmit Freq Error 1.757 kHz -7.3660 MHz OBW Power 99.00 % 4.252 MHz -26.00 dB x dB Bandwidth 18.95 MHz x dB -26,00 dB 100RB#0 18RB#0 Middle Channel Center Freq: 1.88 Trig: Free Run Center Freq: 1.88 Trig: Free Run Ref 40.00 dBn Ref 40.00 dB Center Freq Center Freq enter 1.88 GHz s BW 390 kHz enter 1.88 GHz es BW 390 kHz CF Ste CF Ste Total Powe idth 17.870 MHz Occupied Bandwidth 3.5988 MHz Transmit Freq Error 3.275 kHz **OBW Power** 99.00 % Transmit Freq Error -7.3666 MHz **OBW Power** 99.00 % 18.94 MHz 100RB#0 18RB#0 High Channel 12:23:37 AM 3.128, Radio Std: None Center Free Center Free Center 1.9 GHz Res BW 390 kH Span 40 MH: #Sweep 100 m Center 1.9 GHz Res BW 390 kHz #VBW 1.2 MHz #VBW 1.2 MHz 23.2 dBm Occupied Bandwidth 23 3 dBm 3.6125 MHz 17.934 MHz Freq Offse -7.3753 MHz 4.322 MHz -20.536 kHz 19.02 MHz -26.00 dB x dB Bandwidth -26.00 dB x dB x dB

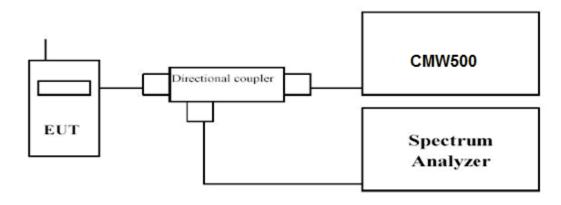


4.4 Band Edge compliance

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

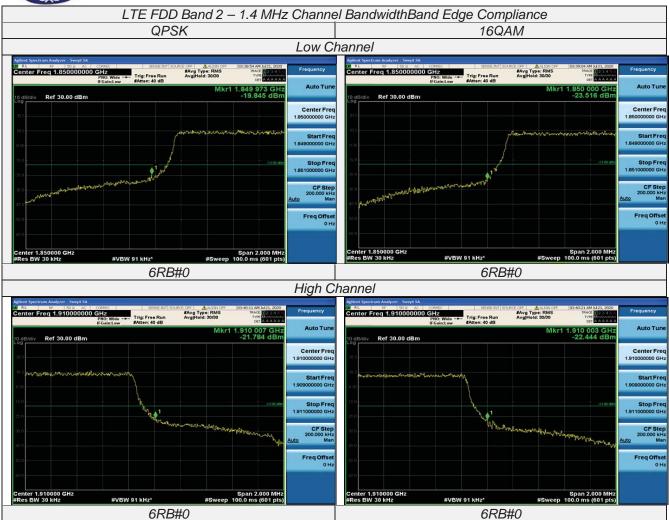
- 1. The transmitter output port was connected to base station.
- 2. The RF output of EUT was connected to the power meter by RF cable and attenuator, the path loss was compensated to the results for each measurement.
- 3. Set EUT at maximum power through base station.
- 4. Select lowestand highest channels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

TEST RESULTS

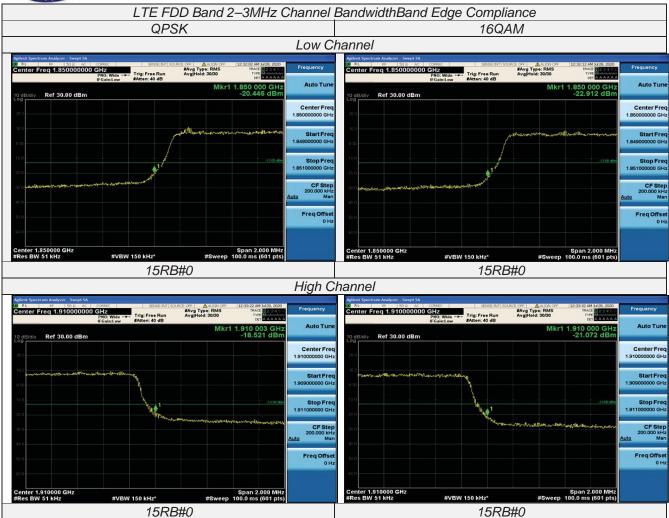
Remark:

1. We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 2; recorded worst case for each Channel Bandwidth of LTE FDD Band 2.

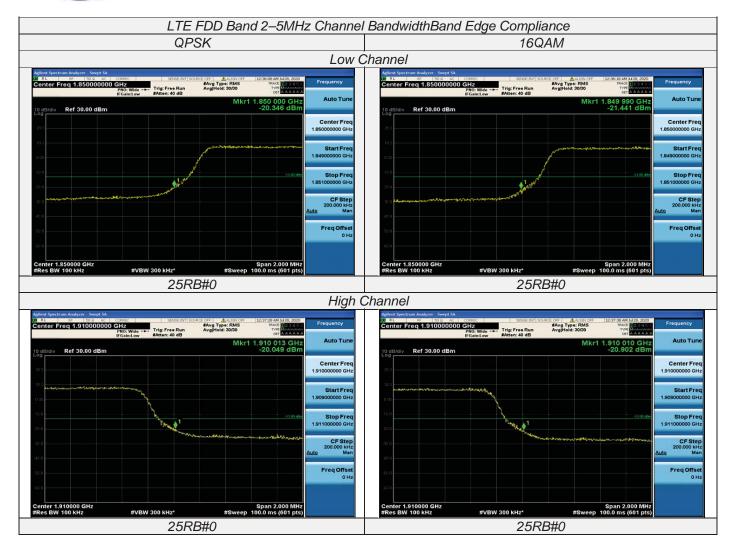
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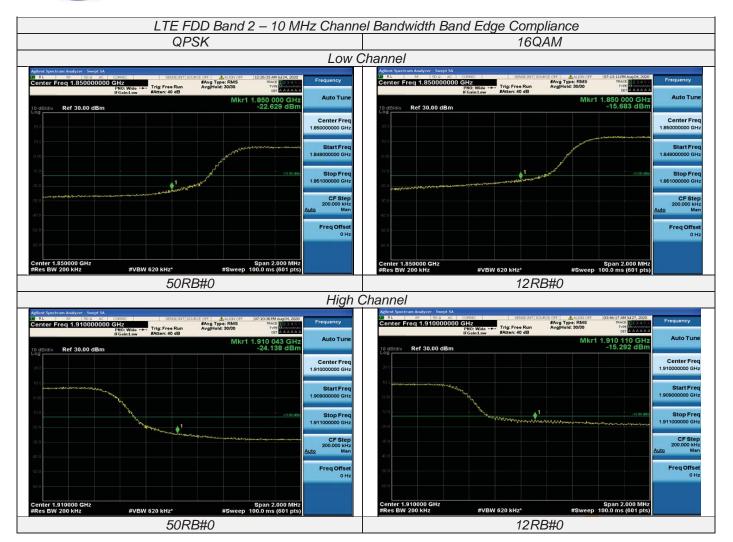
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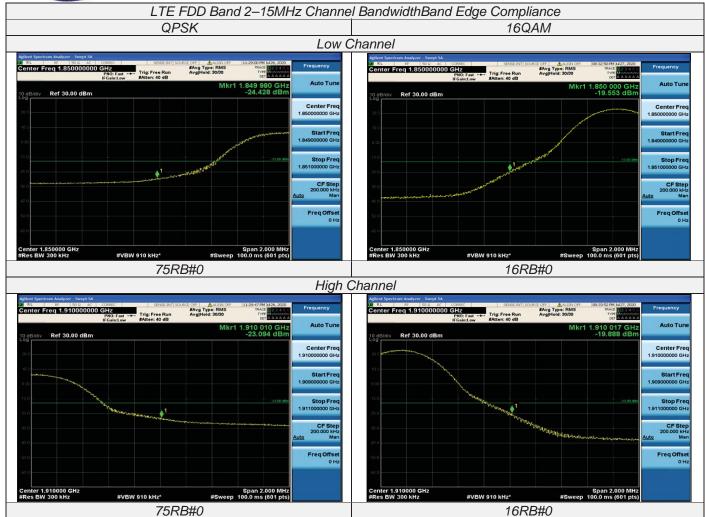
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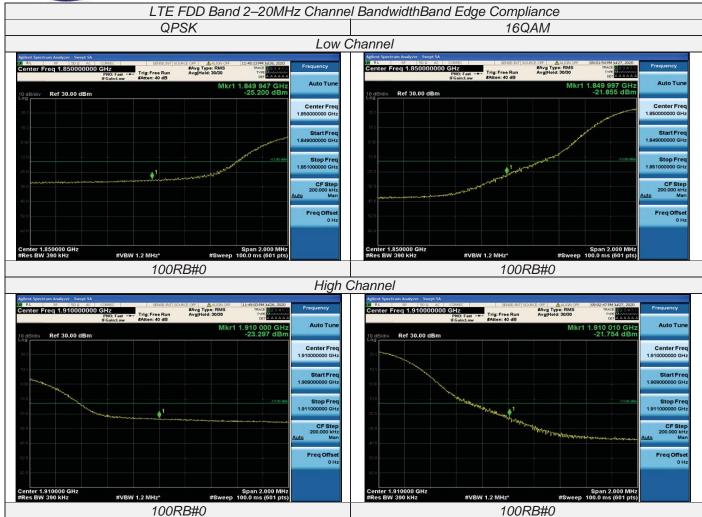
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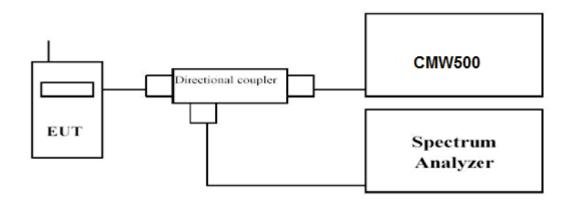
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4.5 Spurious Emssion on Antenna Port

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

- 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 CMW 500 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 to10th 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 2	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 2; recorded worst case at the QPSK Mode for each Channel Bandwidth of LTE FDD Band 2



LTE FDD Band 2-1.4MHz Channel Bandwidth Low Channel QPSK #Avg Type: RMS Avg|Hold: 3/3 Trig: Free Run Trig: Free Run Ref 25.00 dBm Ref 25.00 dBm Center Fre 515.000000 MH Freq Offse Start 1.000 GHz #Res BW 1.0 MH: 30MHz~1GHz 1GHz~5GHz #Avg Type: RMS Avg|Hold: 3/3 #Avg Type: RMS Avg|Held: 3/3 Center Freq 19.250000000 GHz Trig: Free Run Trig: Free Run Ref 10.00 dBm Center Free Start 12.000 GHz #Res BW 1.0 MHz 5GHz~12GHz 12GHz~26.5GHz