Shenzhen CTL Testing Technology Co., Ltd.
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TEST REPORT

FCC Part 27

Report Reference No. .....: **CTL1805236071-WE02**

Compiled by: (position+printed name+signature)	Allen Wang (File administrators)	Allen Wang
Tested by: (position+printed name+signature)	Nice Nong (Test Engineer)	Nice Nong
Approved by: (position+printed name+signature)	Ivan Xie (Manager)	Ivan Xie

Product Name.....: Wireless Infrared Scouting Camera

Model/Type reference .....: Falcon LTE Verizon

List Model(s).....: N/A

Trade Mark.....: 1stcampro

FCC ID.....: **2APYZ-FALCON**

Applicant's name .....: **FirstCam Outdoor Inc.**

Address of applicant .....: 11027 S. Pikes Peak Dr., Unit #106 Parker, CO 80138, USA

Test Firm .....: **Shenzhen CTL Testing Technology Co., Ltd.**

Address of Test Firm .....: Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, China 518055

Test specification.....:

Standard.....: **FCC CFR Title 47 Part 2, Part 27**
EIA/TIA 603-D: 2010
KDB 971168 D01

TRF Originator .....: Shenzhen CTL Testing Technology Co., Ltd.

Master TRF .....: Dated 2011-01

Date of Receipt.....: May 28, 2018

Date of Test Date.....: May 29, 2018 –Jun. 14, 2018

Data of Issue.....: Jun. 15, 2018

Result.....: Pass

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TEST REPORT

Test Report No. :	**CTL1805236071-WE02**	Jun. 15, 2018 Date of issue

Equipment under Test	:	Wireless Infrared Scouting Camera
Model /Type	:	Falcon LTE Verizon
Listed Models	:	N/A
Applicant	:	**FirstCam Outdoor Inc.**
Address	:	11027 S. Pikes Peak Dr., Unit #106 Parker, CO 80138, USA
Manufacturer	:	**UOVision Technology（Shenzhen）Co., Ltd.**
Address	:	5th and 6th Floor the first Building, shunheda Factory,liuxiandong Industrial Zone,xili Street, Nanshan District, Shenzhen, CHN 518055

Test result	**Pass ***

*In the configuration tested, the EUT complied with the standards specified page 5.

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.

** Modified History **

Revisions	Description	Issued Data	Report No.	Remark
Version 1.0	Initial Test Report Release	2018-6-15	CTL1805236071-WF02	Tracy Qi

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Shenzhen CTL Testing Technology Co.,Ltd.

1. SUMMARY

1.1. TEST STANDARDS

The tests were performed according to following standards:

FCC Part 27 : MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES

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

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

KDB971168 D01: v02r02 MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS

ANSI C63.10: 2013: American National Standard for Testing Unlicensed Wireless Devices

ANSI C63.4: 2014: –American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40GHz

Range of 9 kHz to 40GHz

1.2. Test Description

Test Item	Section in CFR 47	Result
RF Output Power	§2.1046, §27.50(d)	Pass
Peak-to-Average Ratio	§2.1046, §27.50(d)	Pass
99% & -26 dB Occupied Bandwidth	§2.1049	Pass
Spurious Emissions at Antenna Terminal	§2.1051, §27.53(h)	Pass
Field Strength of Spurious Radiation	§2.1055, §27.54	Pass
Out of band emission, Band Edge	§2.1051, §27.53(h)	Pass
Frequency stability	§2.1053, §27.53(h)	Pass

1.3. Test Facility

1.3.1 Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.
Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan, Shenzhen 518055 China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 32/EN 55032 requirements.

1.3.2 Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

IC Registration No.: 9618B

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration No.: 9618B on November 13, 2013.

FCC-Registration No.: 399832

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 399832, December 08, 2017.

1.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen CTL Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CTL laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10dB	(1)
Radiated Emission	Above 1GHz	4.32dB	(1)
Conducted Disturbance	0.15~30MHz	3.20dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2. GENERAL INFORMATION

2.1. Environmental conditions

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

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

2.2. General Description of EUT

Product Name:	Wireless Infrared Scouting Camera
Model/Type reference:	Falcon LTE Verizon
Power supply:	DC 6V form battery
LTE	
Operation Band:	FDD-LTE: Band 4/13
Modulation Type:	QPSK, 16QAM
Release Version:	Release 9
Category:	Cat 4
Antenna Type:	External antenna

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

2.3. Description of Test Modes

The EUT has been tested under typical operating condition. The CMW500 used to control the EUT staying in continuous transmitting and receiving mode for testing. Regards to the frequency band operation: the lowest、middle and highest frequency of channel were selected to perform the test, then shown on this report.

2.4. Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date last time	Calibration Date recent	Calibration Due Date
Bilog Antenna	Sunol Sciences Corp.	JB1	A061713	2017/06/02	2018/06/01	2019/05/31
Bilog Antenna	Sunol Sciences Corp.	JB1	A061714	2017/06/02	2018/06/01	2019/05/31
EMI Test Receiver	R&S	ESCI	103710	2017/06/02	2018/06/01	2019/05/31
Spectrum Analyzer	Agilent	E4407B	MY41440676	2017/05/21	2018/05/20	2019/05/19
Spectrum Analyzer	Agilent	N9020	US46220290	2017/01/16	2018/01/17	2019/01/16
Controller	EM Electronics	Controller EM 1000	N/A	2017/05/21	2018/05/20	2019/05/19
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2017/05/19	2018/05/18	2019/05/17
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062014	2017/05/19	2018/05/18	2019/05/17
Active Loop Antenna	SCHWARZBECK	FMZB1519	1519-037	2017/05/19	2018/05/18	2019/05/17
Amplifier	Agilent	8349B	3008A02306	2017/05/19	2018/05/18	2019/05/17
Amplifier	Agilent	8447D	2944A10176	2017/05/19	2018/05/18	2019/05/17
Temperature/Humidity Meter	Gangxing	CTH-608	02	2017/05/20	2018/05/19	2019/05/18

Wideband Radio Communication Tester	R&S	CMW500	101814	2016/11/21	--	2017/11/20
High-Pass Filter	K&L	9SH10-2700/X12 750-O/O	N/A	2017/05/20	2018/05/19	2019/05/18
High-Pass Filter	K&L	41H10-1375/U12 750-O/O	N/A	2017/05/20	2018/05/19	2019/05/18
RF Cable	HUBER+SUHNER	RG214	N/A	2017/06/02	2018/06/01	2019/05/31
Climate Chamber	ESPEC	EL-10KA	A20120523	2017/05/19	2018/05/18	2019/05/17
SIGNAL GENERATOR	Agilent	E4421B	US40051744	2017/05/19	2018/05/18	2019/05/17
Directional Coupler	Agilent	87300B	3116A03638	2017/05/19	2018/05/18	2019/05/17

2.5. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended to comply with of the Part 27 Rules.

2.6. Modifications

No modifications were implemented to meet testing criteria.

Shenzhen CTL Testing Technology Co.,Ltd.

3. TEST CONDITIONS AND RESULTS

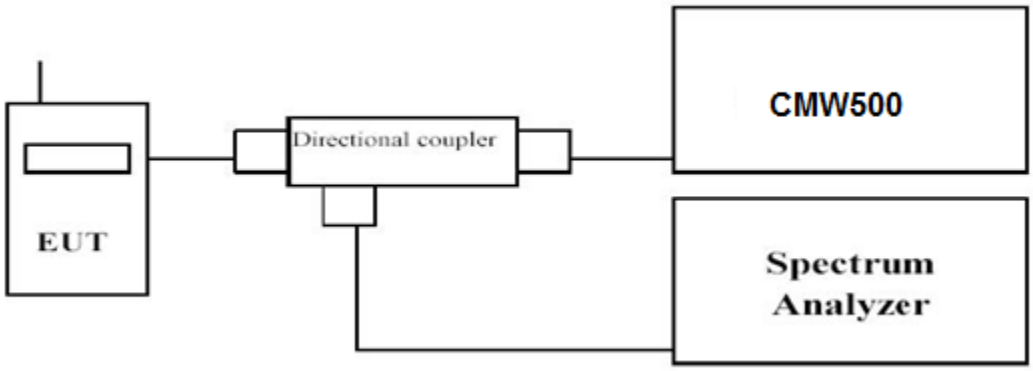
3.1. Output Power

LIMIT

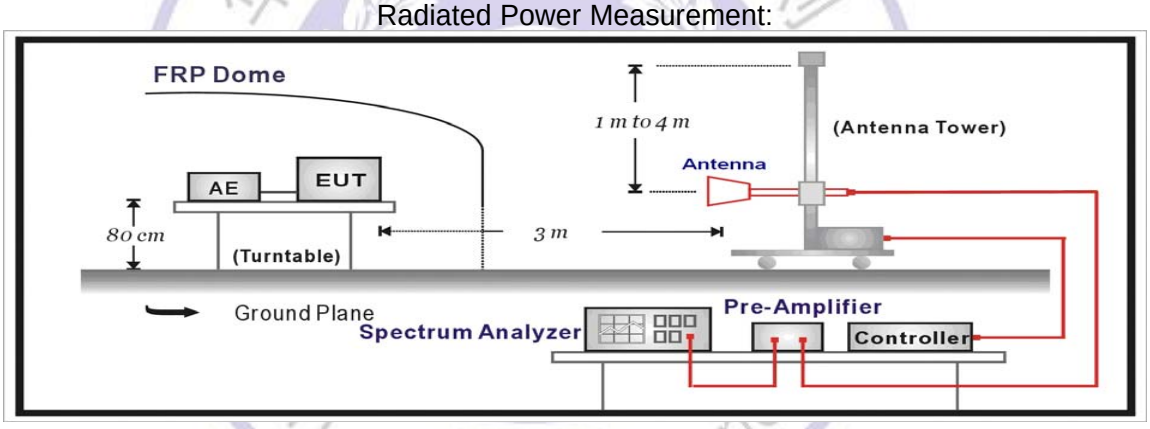
FCC: 3 Watts ERP
IC: 50 Watts e.i.r.p

TEST CONFIGURATION

Conducted Power Measurement



Radiated Power Measurement:



TEST PROCEDURE

The EUT was setup according to EIA/TIA 603D

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 spectrum analyzer and CMW500 by a Directional Couple.
c) EUT Communicate with CMW500, then select a channel for testing.
d) Add a correction factor to the display of spectrum, and then test.

Radiated Power Measurement:

a. The EUT shall be placed at the specified height on a support, and in the position closest to normal use as declared by provider.
b. The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to thefrequency of the transmitter
c. The output of the test antenna shall be connected to the measuring receiver.

d. The transmitter shall be switched on and the measuring receiver shall be tuned to the frequency of the
transmitter under test.
e. The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
f. The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
g. The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
h. The maximum signal level detected by the measuring receiver shall be noted.
i. The transmitter shall be replaced by a substitution antenna.
j. The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
k. The substitution antenna shall be connected to a calibrated signal generator.
l. If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
m. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
n. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
o. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.
p. The measure of the effective radiated power is the larger of the two levels recorded at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.
q. Test site anechoic chamber refer to ANSI C63.4.

TEST RESULTS

Conducted Measurement:

LTE FDD Band 13				
TX Channel Bandwidth	RB Size/Offset	Frequency (MHz)	Average Power [dBm]	
			QPSK	16QAM
5 MHz	1 RB low	779.5	22.54	21.76
		782.0	23.41	22.94
		784.5	22.39	21.55
	1 RB high	779.5	21.88	21.28
		782.0	22.19	21.82
		784.5	23.16	22.42
	50% RB mid	779.5	23.04	22.31
		782.0	22.71	22.32
		784.5	22.46	21.74
	100% RB	779.5	22.96	22.54
		782.0	22.63	21.98
		784.5	22.29	21.86
10 MHz	1 RB low	782 .0	22.78	22.33
	1 RB high	782 .0	23.30	22.82
	50% RB mid	782 .0	21.71	20.99
	100% RB	782 .0	23.30	22.57

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Radiated Measurement:

Remark:

1. *We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 13; recorded worst case for each Channel Bandwidth of LTE FDD Band 13.*
2. *EIRP=P_{Mea}(dBm)-P_{cl}(dB)+P_{Ag}(dB)+G_a(dBi)*
3. *ERP = EIRP – 2.15dBi as EIRP by subtracting the gain of the dipole.*

LTE FDD Band 13_Channel Bandwidth 5MHz_QPSK

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
779.5	-15.84	2.40	8.23	2.15	36.70	24.54	34.77	10.23	V
782.0	-16.82	2.40	8.23	2.15	36.70	23.56	34.77	11.21	V
784.5	-17.09	2.40	8.23	2.15	36.70	23.29	34.77	11.48	V

LTE FDD Band 13_Channel Bandwidth 10MHz_QPSK

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
782.0	-16.49	2.40	8.23	2.15	36.70	23.89	34.77	10.88	V

LTE FDD Band 13_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
779.5	-17.13	2.40	8.23	2.15	36.70	23.25	34.77	11.52	V
782.0	-16.27	2.40	8.23	2.15	36.70	24.11	34.77	10.66	V
784.5	-16.02	2.40	8.23	2.15	36.70	24.36	34.77	10.41	V

LTE FDD Band 13_Channel Bandwidth 10MHz_16QAM

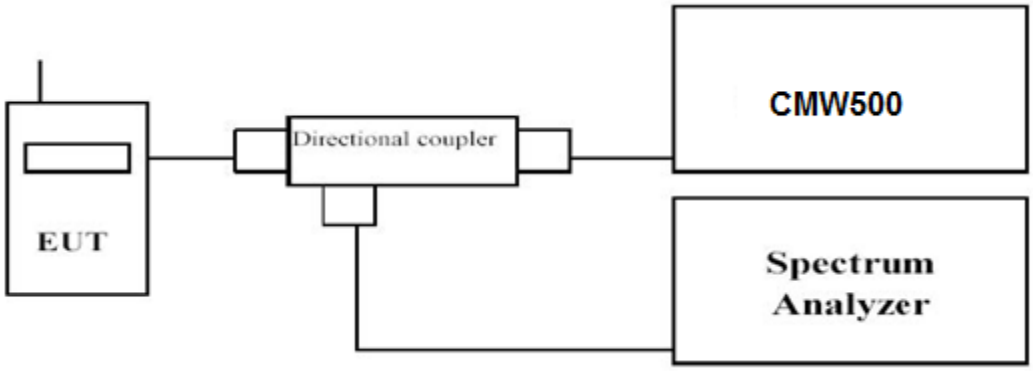
Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	Correction (dB)	P_{Ag} (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
782.0	-16.09	2.40	8.23	2.15	36.70	24.29	34.77	10.48	V

3.2. 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%.

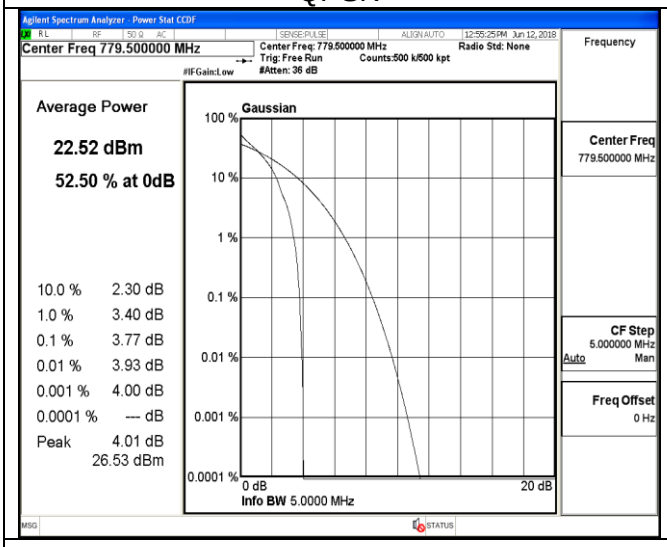
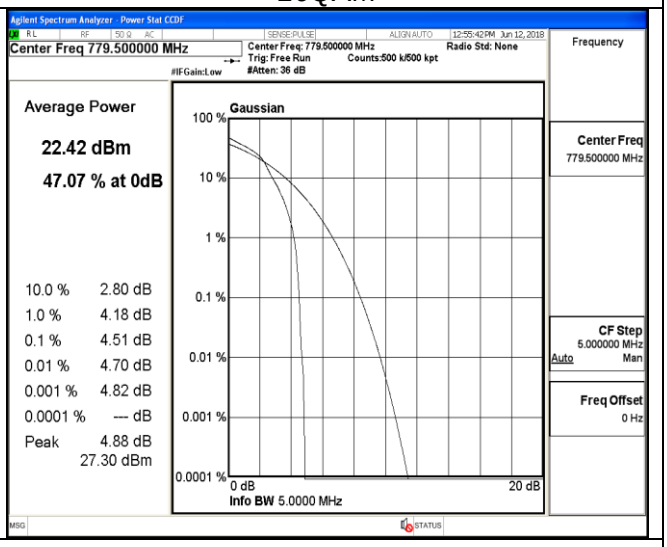
TEST RESULTS

Remark:

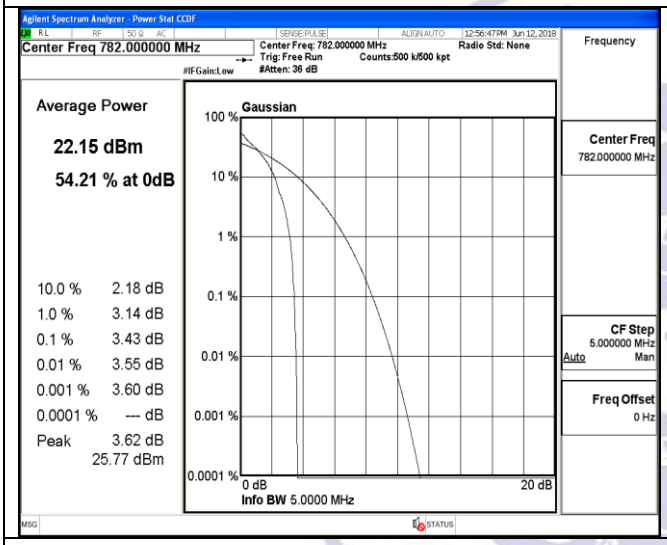
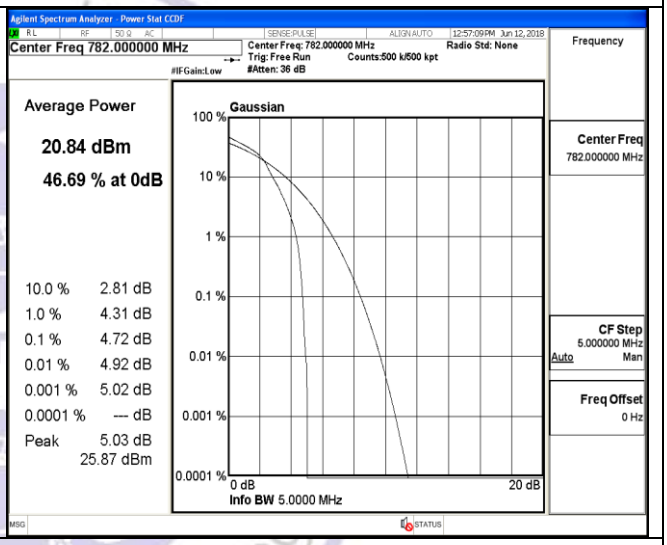
1. *We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 13; recorded worst case for each Channel Bandwidth of LTE FDD Band 13.*

LTE FDD Band 12				
TX Channel Bandwidth	Frequency (MHz)	RB Size/Offset	PAPR (dB)	
			QPSK	16QAM
5 MHz	779.5	*1RB#0*	3.77	4.51
	782.0		3.43	4.72
	784.5		4.24	4.83
10 MHz	782.0	*1RB#0*	3.87	4.62

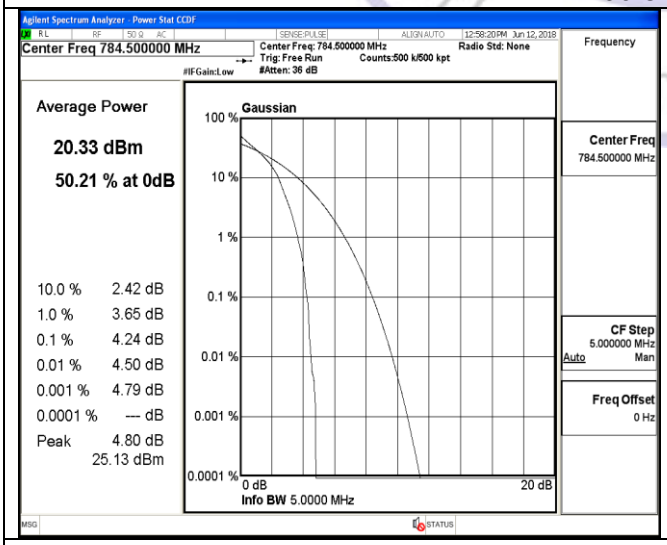
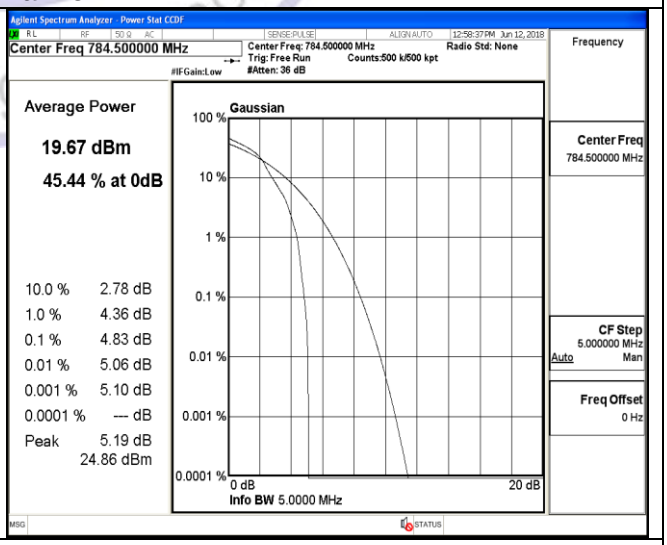
LTE FDD Band 12-5MHz Channel Bandwidth PAPR

QPSK	16QAM
	
1RB#0	1RB#0

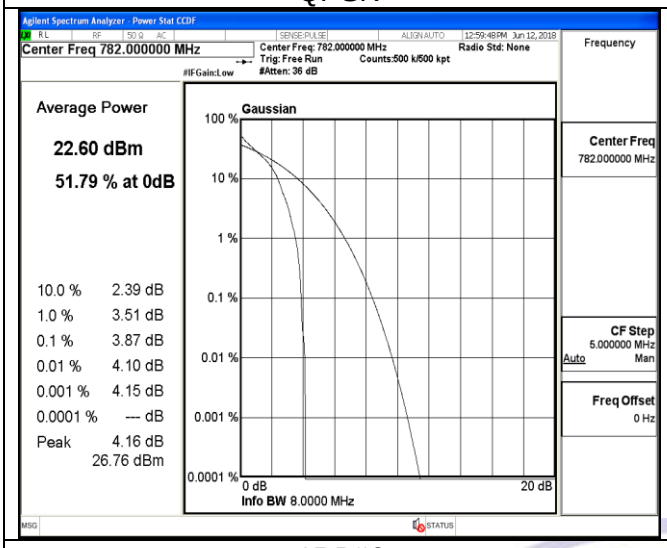
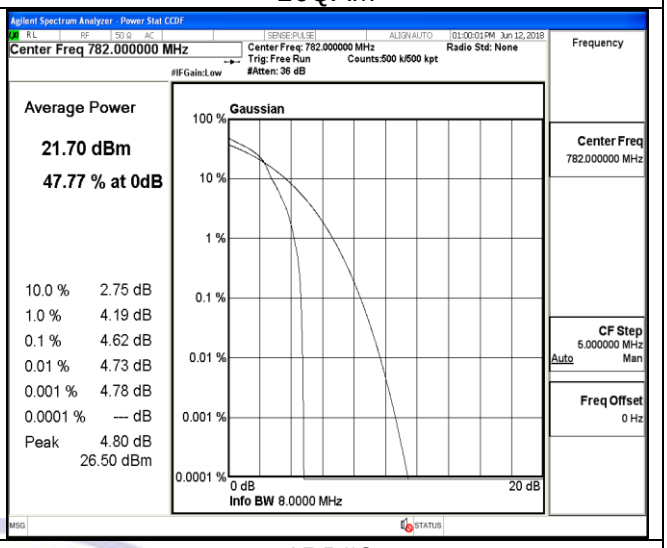
Low Channel

	
1RB#0	1RB#0

Middle Channel

	
1RB#0	1RB#0

High Channel

LTE FDD Band 12-10MHz Channel Bandwidth PAPR	
QPSK	16QAM
	
1RB#0	1RB#0
Low & Middle & High Channel	

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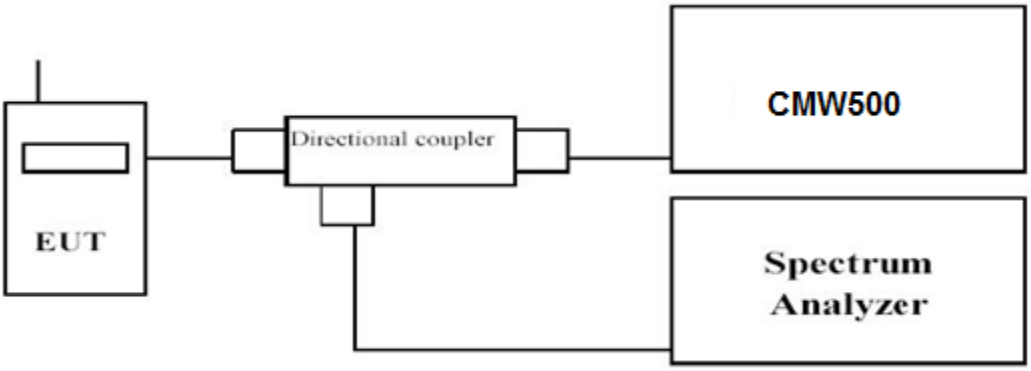
3.3. Occupied Bandwidth and Emission Bandwidth

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 RBW was 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 is the delta frequency between the two points where the display line intersects the signal trace.

TEST RESULTS

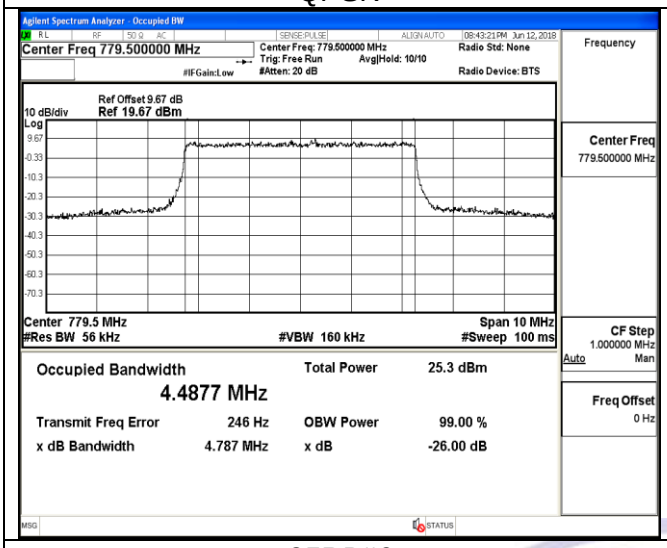
Remark:

1. *We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 13; recorded worst case for each Channel Bandwidth of LTE FDD Band 13.*

LTE FDD Band 13						
TX Channel Bandwidth	RB Size/Offset	Frequency (MHz)	-26dBc Emission bandwidth (MHz)		99% Occupied bandwidth (MHz)	
			QPSK	16QAM	QPSK	16QAM
5 MHz	*25RB#0*	779.5	4.787	4.824	4.4877	4.4827
		782.0	4.822	4.825	4.4795	4.4806
		784.5	4.834	4.811	4.4796	4.4863
10 MHz	*50RB#0*	782.0	9.609	9.597	8.9401	8.9337

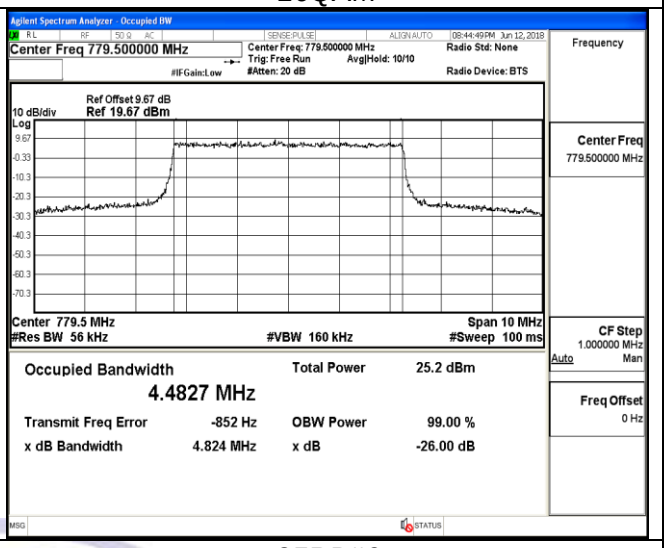
LTE FDD Band 13-5MHz Channel Bandwidth

QPSK



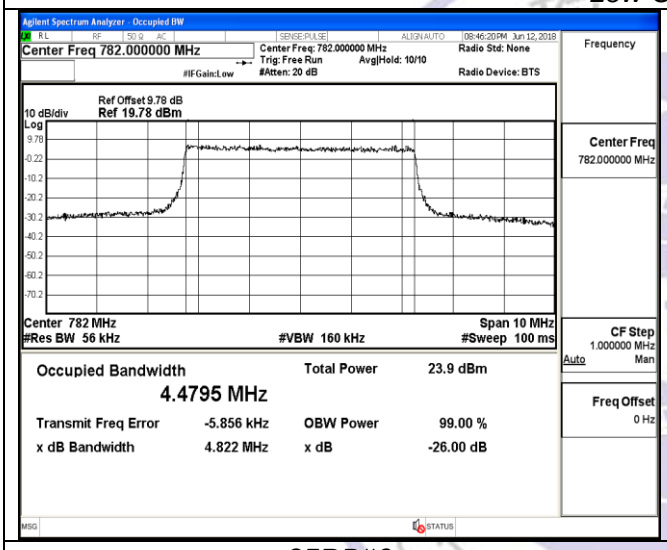
25RB#0

16QAM

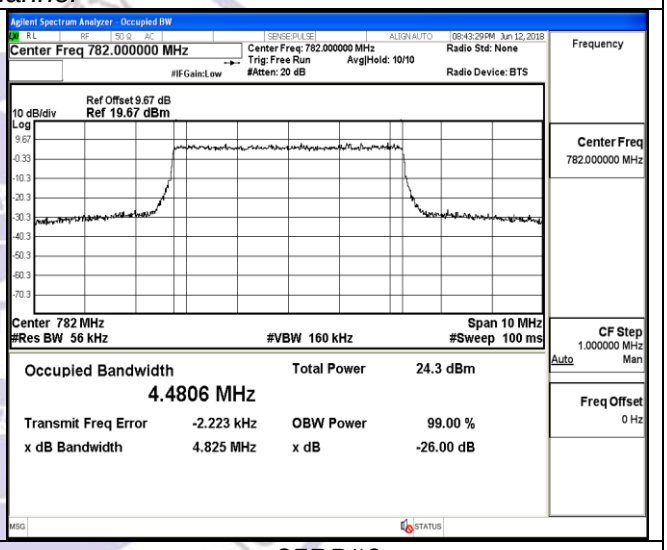


25RB#0

Low Channel

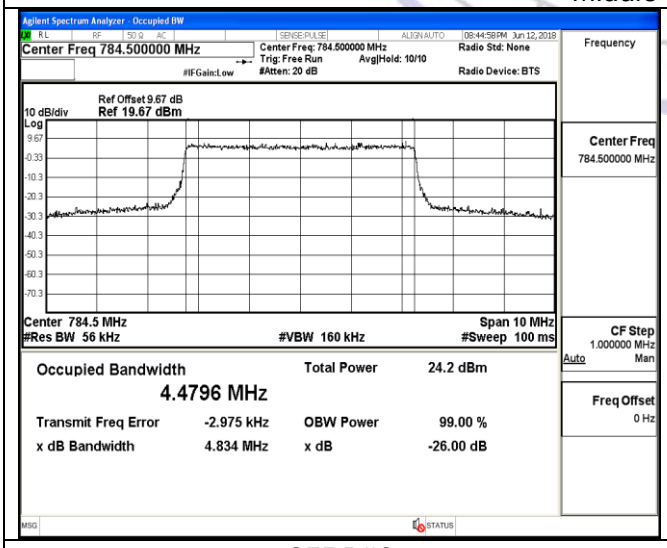


25RB#0

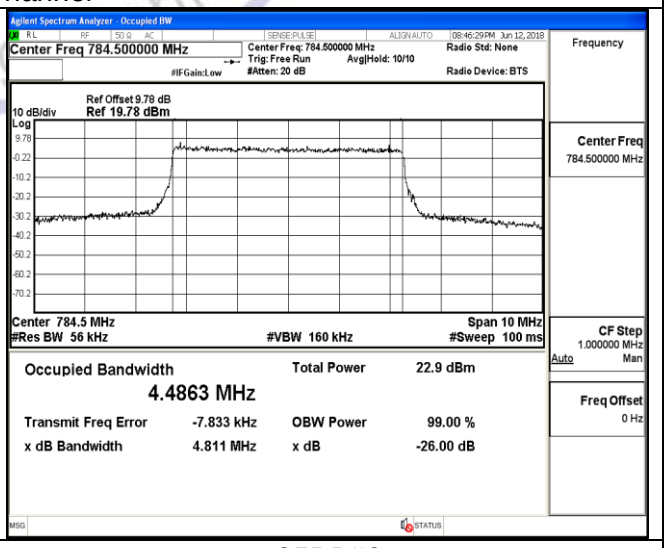


25RB#0

Middle Channel

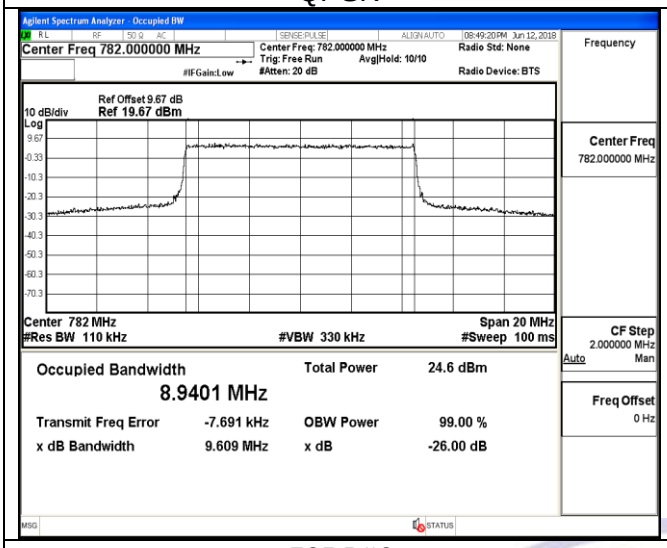
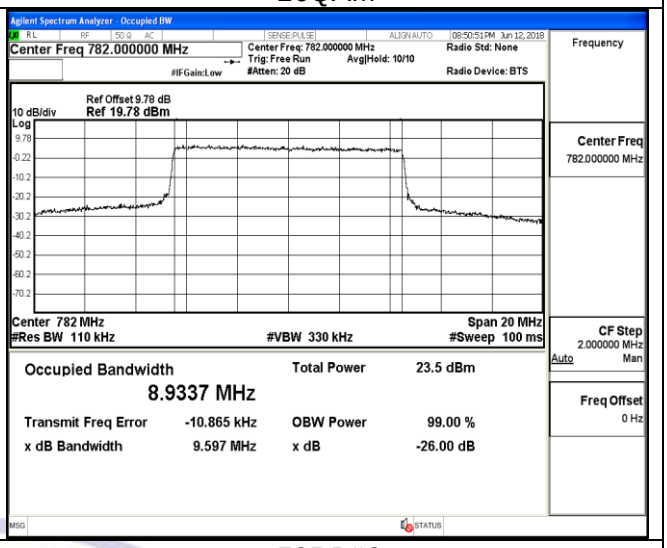


25RB#0



25RB#0

High Channel

LTE FDD Band 13-10MHz Channel Bandwidth	
QPSK	16QAM
	
50RB#0	50RB#0
Low & Middle & High Channel	

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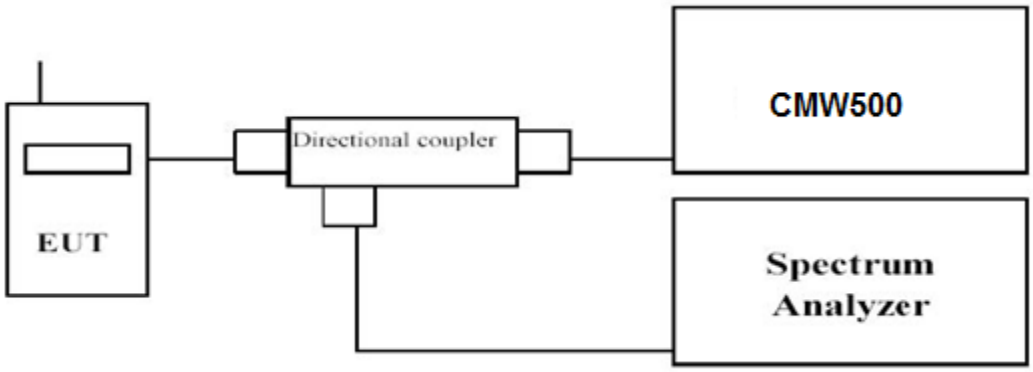
3.4. Band Edge compliance

LIMIT

The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (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 lowest and 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 13; recorded worst case for each Channel Bandwidth of LTE FDD Band 13.*

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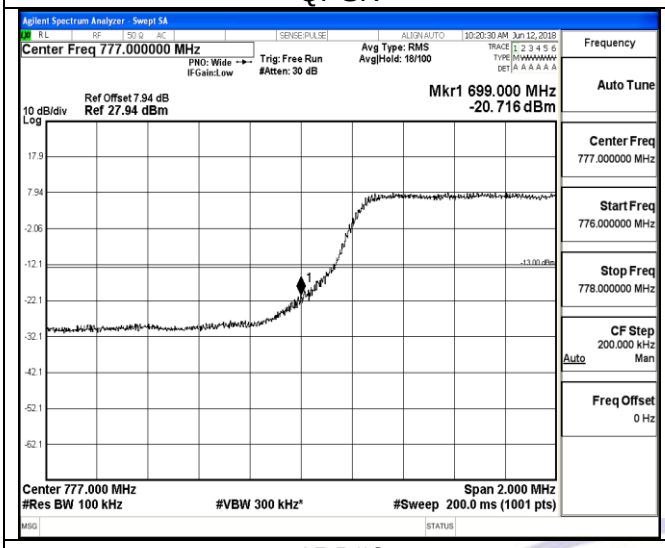
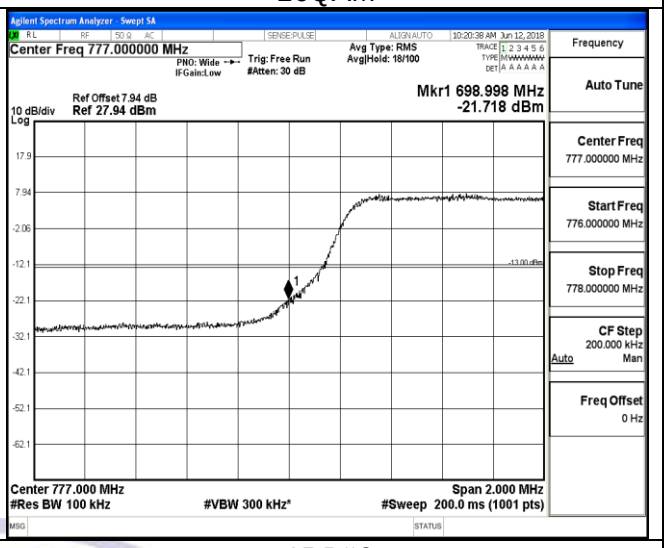
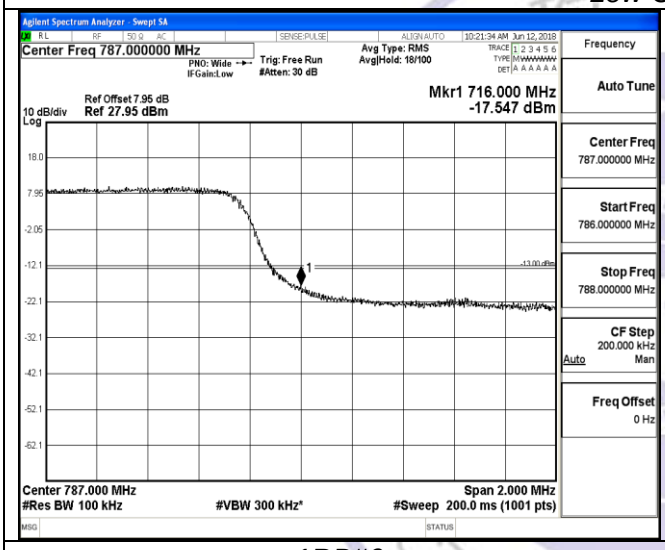
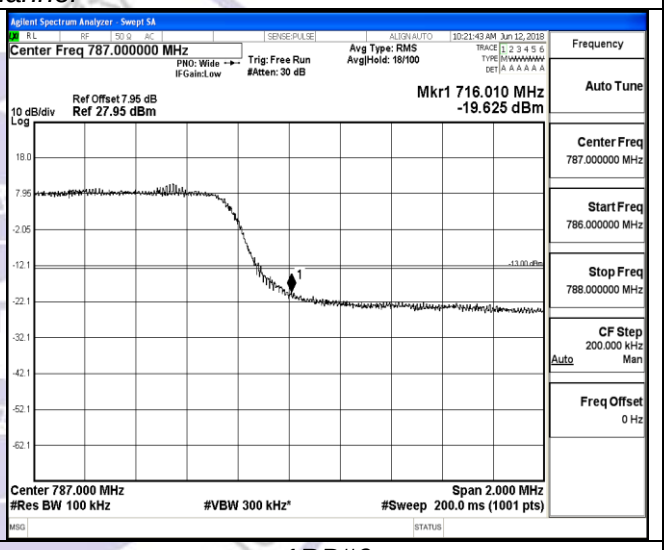
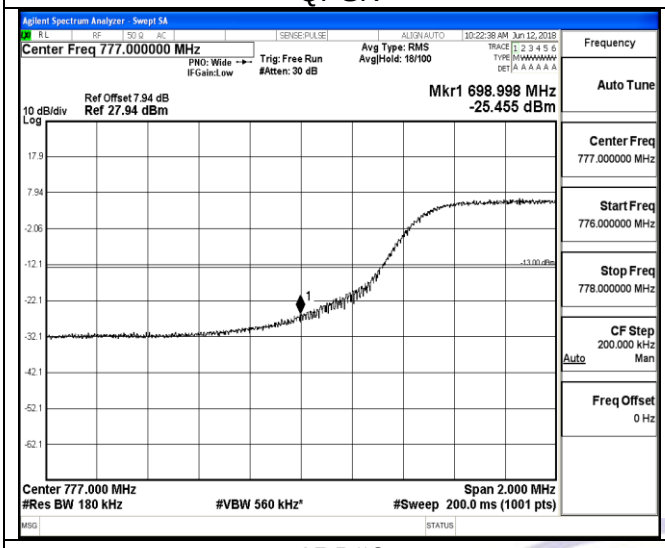
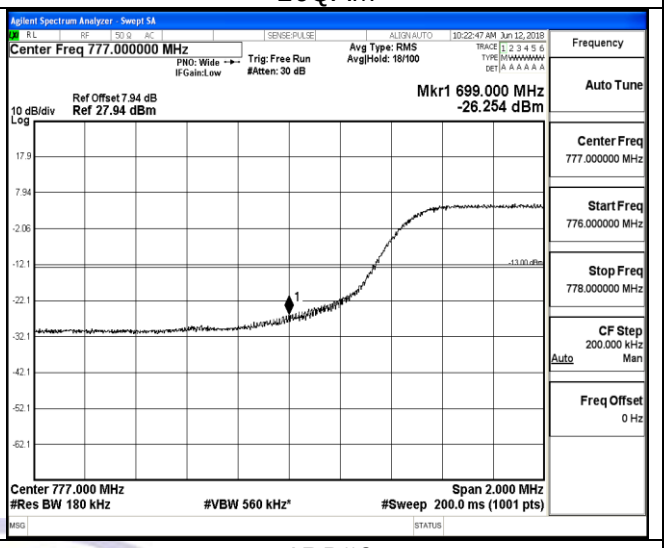
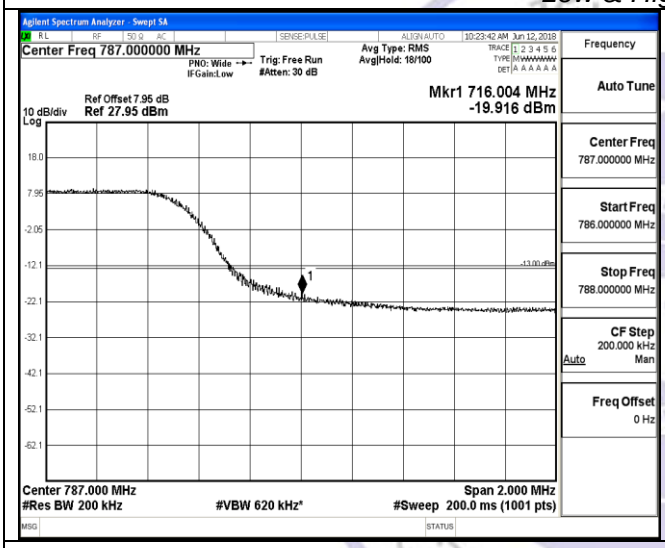
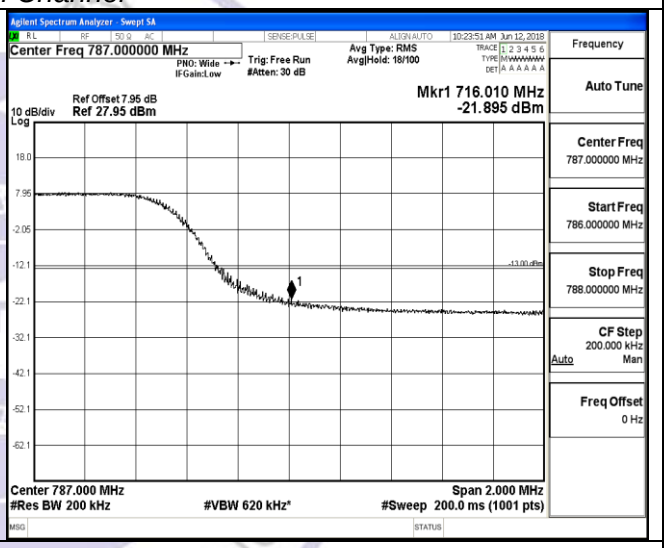
LTE FDD Band 12-5MHz Channel Bandwidth Band Edge Compliance	
QPSK	16QAM
	
1RB#0	1RB#0
Low Channel	
	
1RB#0	1RB#0
High Channel	

LTE FDD Band 12-10MHz Channel Bandwidth Band Edge Compliance	
QPSK	16QAM
	
1RB#0	1RB#0
Low & High Channel	
	
1RB#0	1RB#0
Low & High Channel	

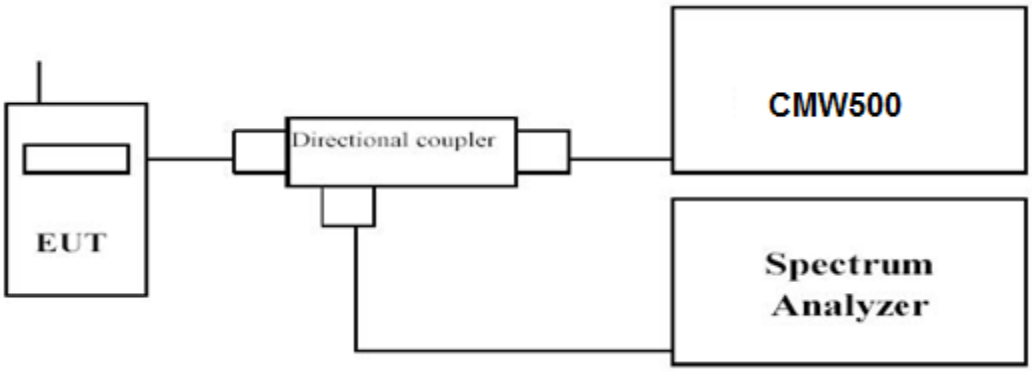
3.5. Spurious Emission

LIMIT

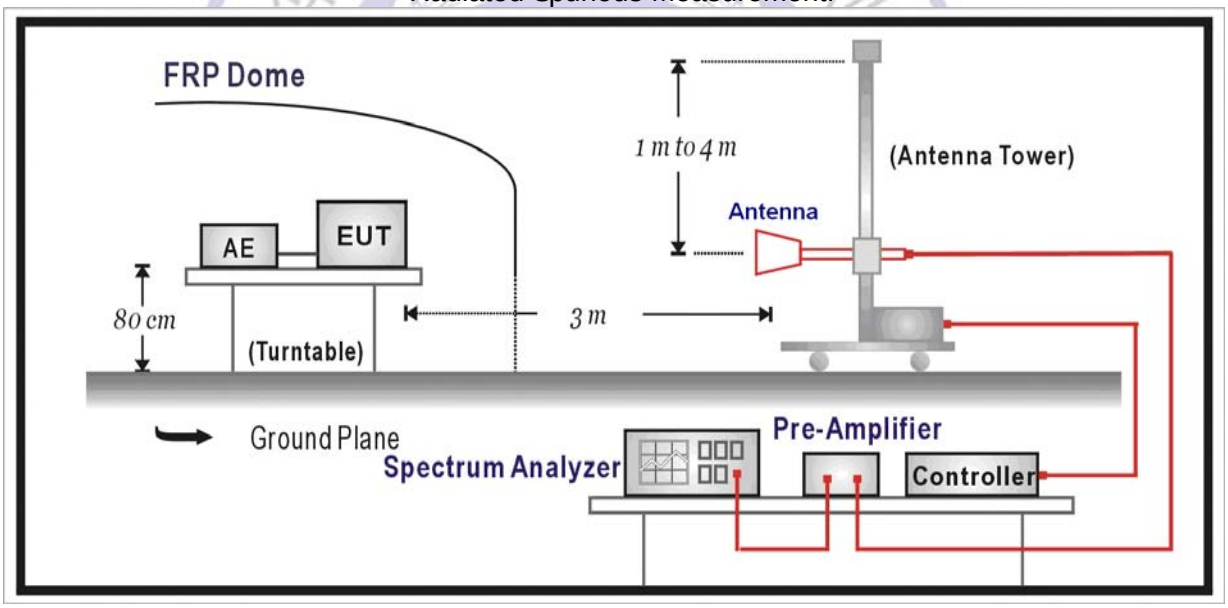
The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB

TEST CONFIGURATION

Conducted Spurious Measurement:

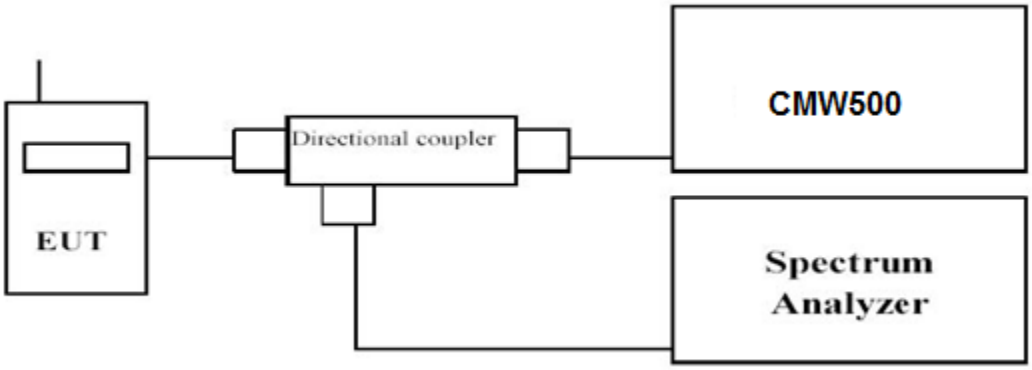


Radiated Spurious Measurement:

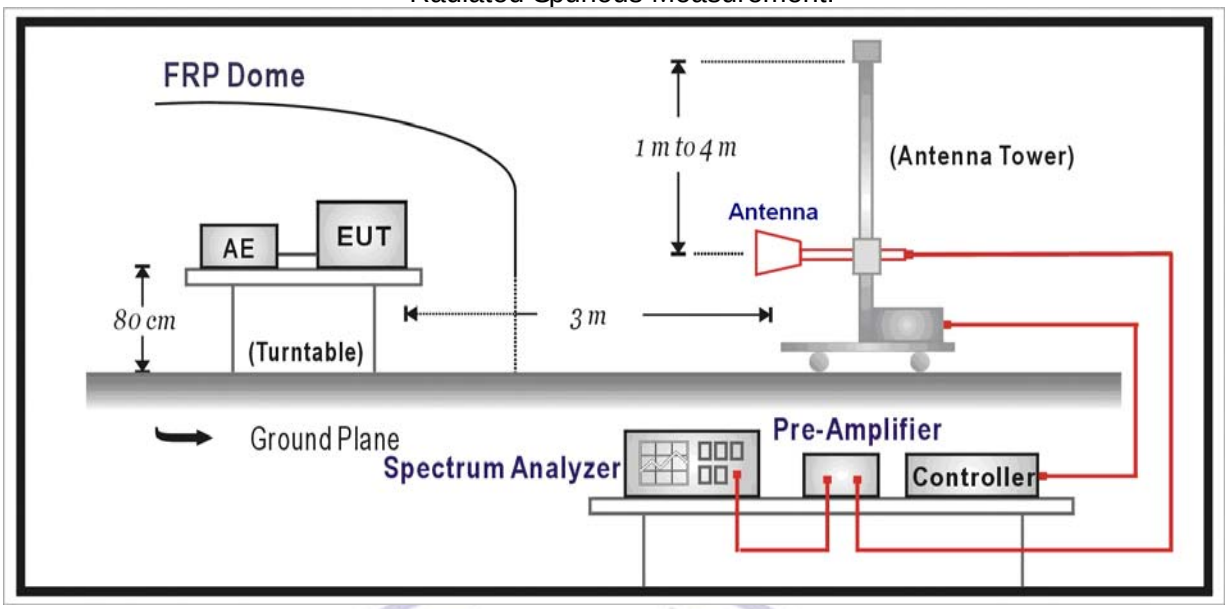


TEST CONFIGURATION

Conducted Spurious Measurement:



Radiated Spurious Measurement:



TEST PROCEDURE

The EUT was setup according to EIA/TIA 603D

Conducted Spurious 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 spectrum analyzer and CMW500 by a Directional Couple.
c. EUT Communicate with CMW500 then selects 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 set sufficient scans were taken to show the out of band Emission if any up to10th harmonic.

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Radiated Spurious Measurement:

a. The EUT shall be placed at the specified height on a support, and in the position closest to normal use as declared by provider.
b. The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter
c. The output of the test antenna shall be connected to the measuring receiver.
d. The transmitter shall be switched on and the measuring receiver shall be tuned to the frequency of the transmitter under test.
e. The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
f. The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
g. The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
h. The maximum signal level detected by the measuring receiver shall be noted.
i. The transmitter shall be replaced by a substitution antenna.
j. The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
k. The substitution antenna shall be connected to a calibrated signal generator.
l. If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
m. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
n. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
o. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.
p. The measure of the effective radiated power is the larger of the two levels recorded at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.
q. The resolution bandwidth of the spectrum analyzer was set at 100 kHz for Part 22 and 1MHz for Part 24. The frequency range was checked up to 10th harmonic.
r. Test site anechoic chamber refer to ANSI C63.

<u>TEST RESULTS</u>

Remark:

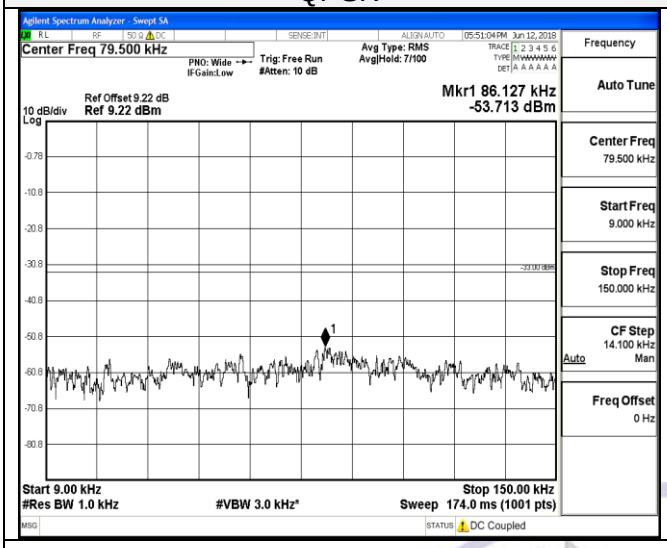
1. *We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 13; recorded worst case for each Channel Bandwidth of LTE FDD Band 13.*

Conducted Measurement:

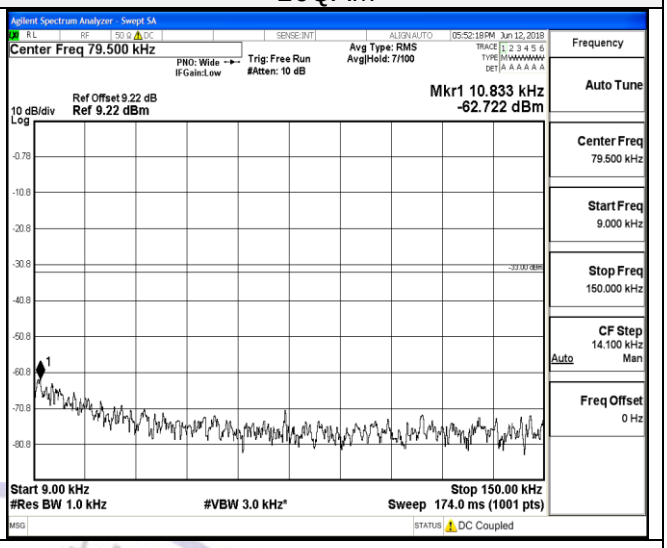
LTE FDD Band 13-5MHz Channel Bandwidth

Low Channel

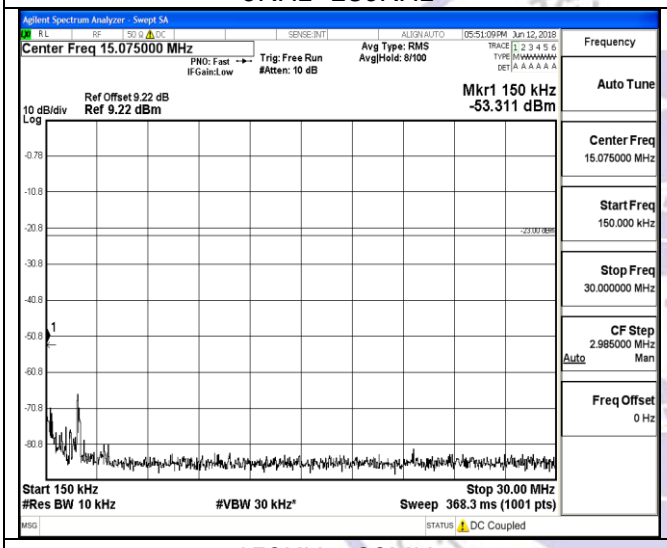
QPSK



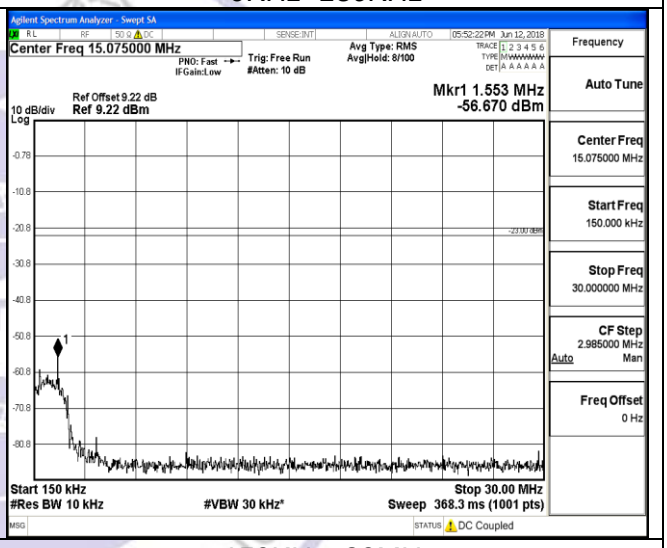
16QAM



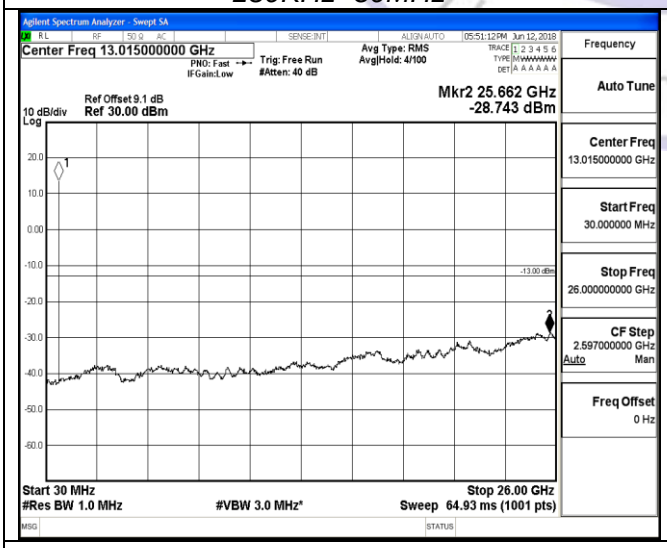
9KHz~150KHz



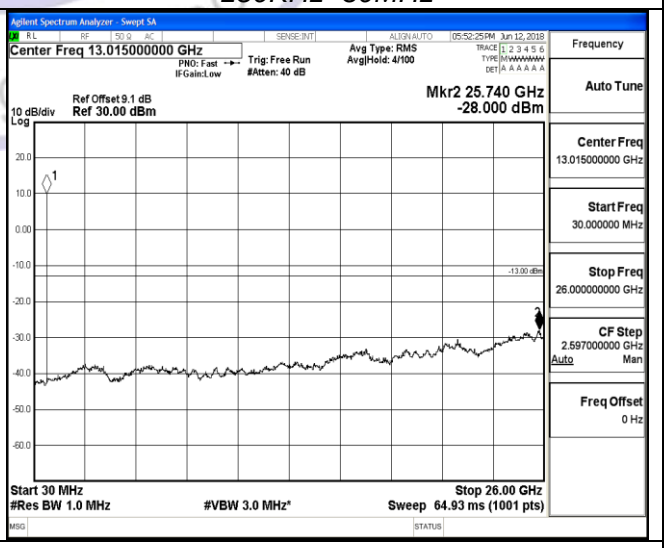
9KHz~150KHz



150KHz~30MHz



150KHz~30MHz

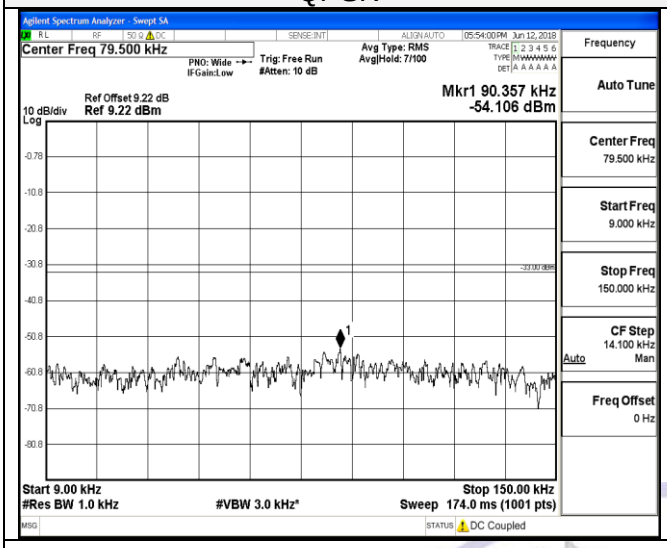
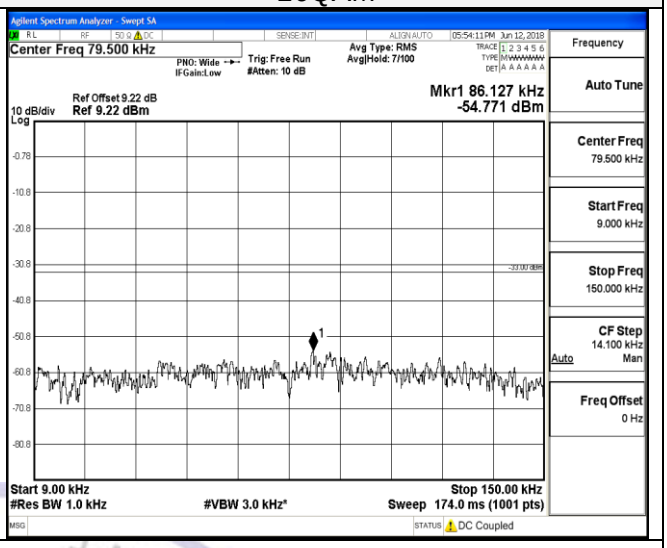
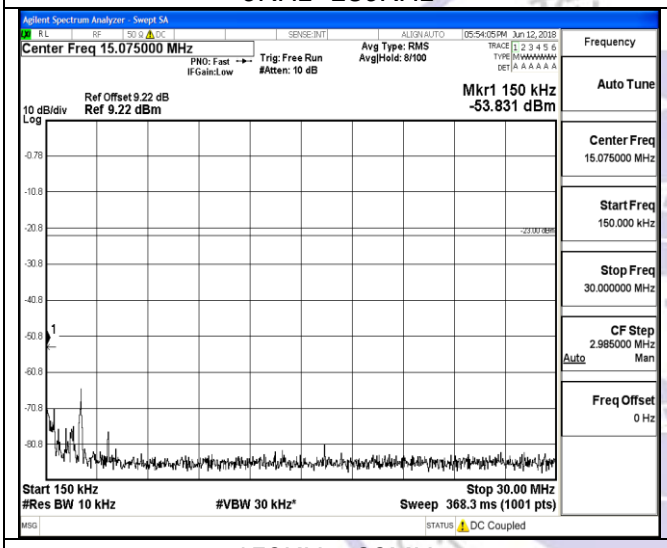
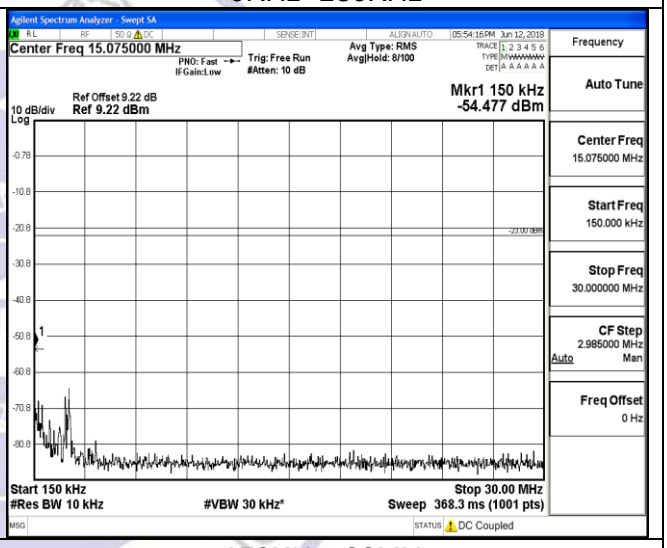
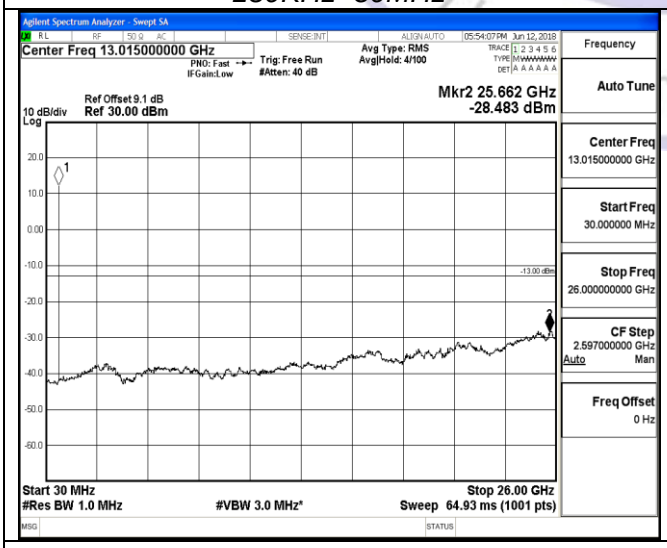
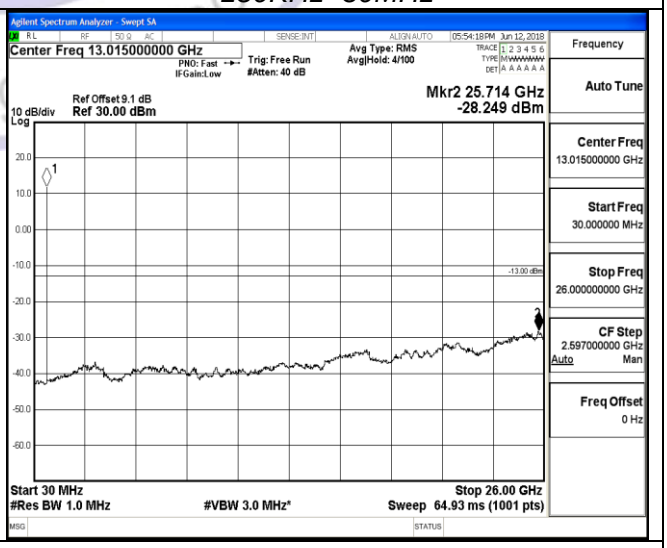


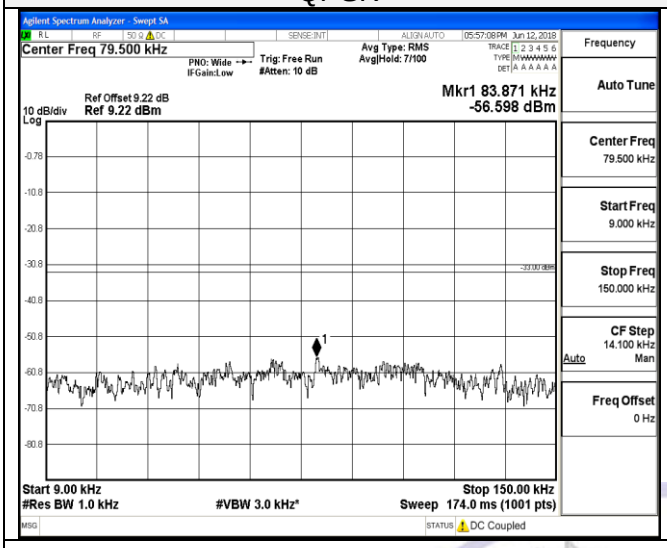
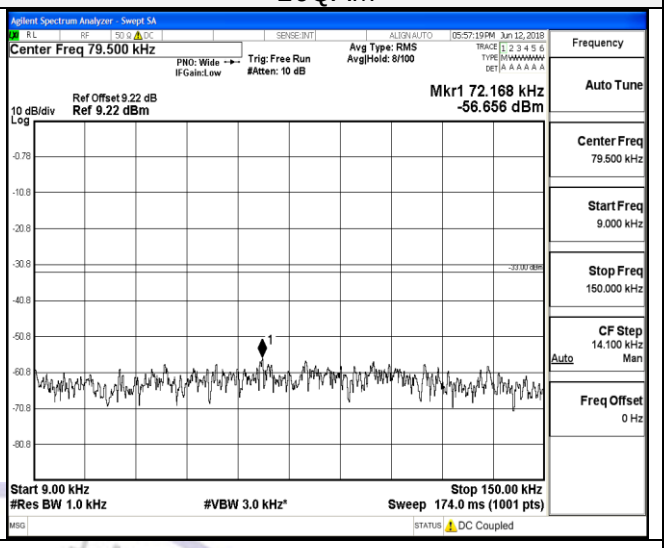
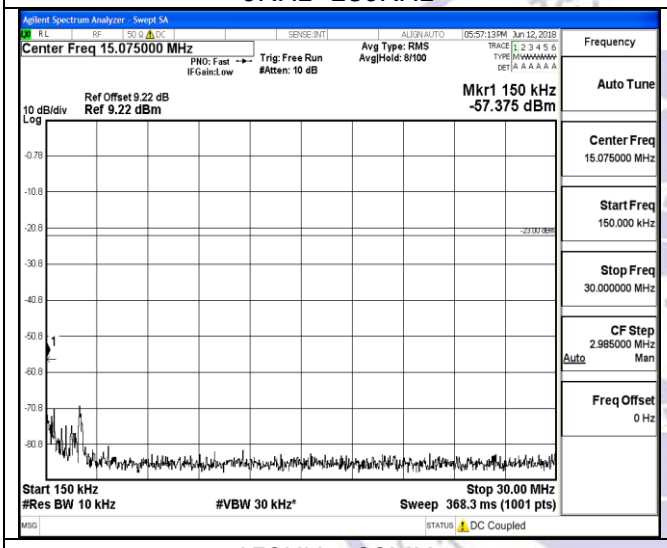
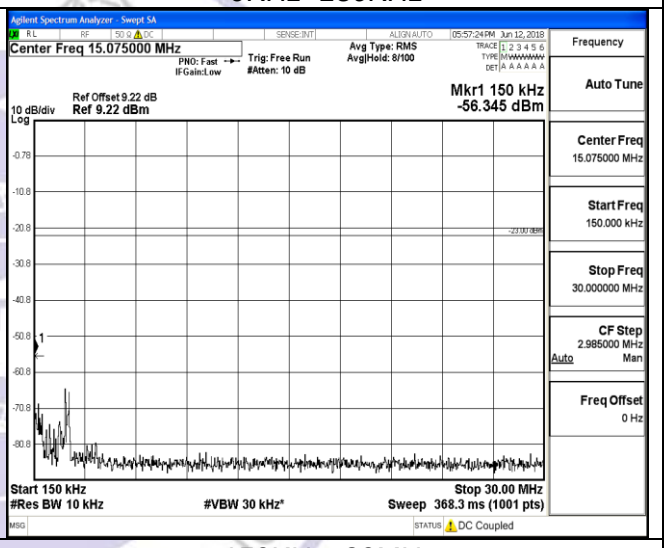
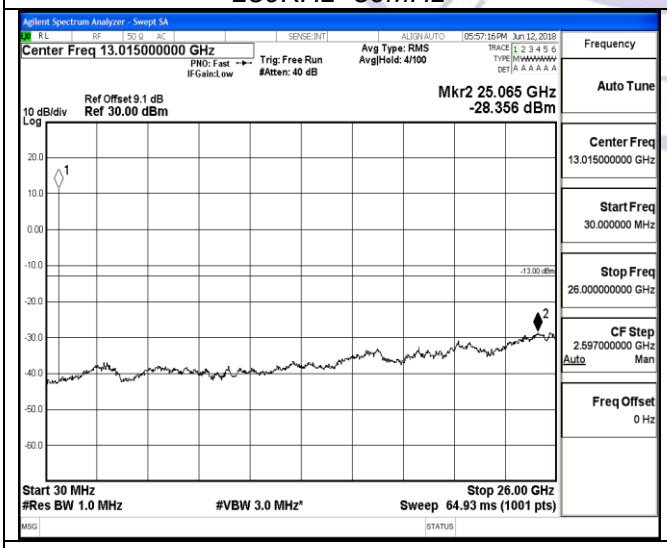
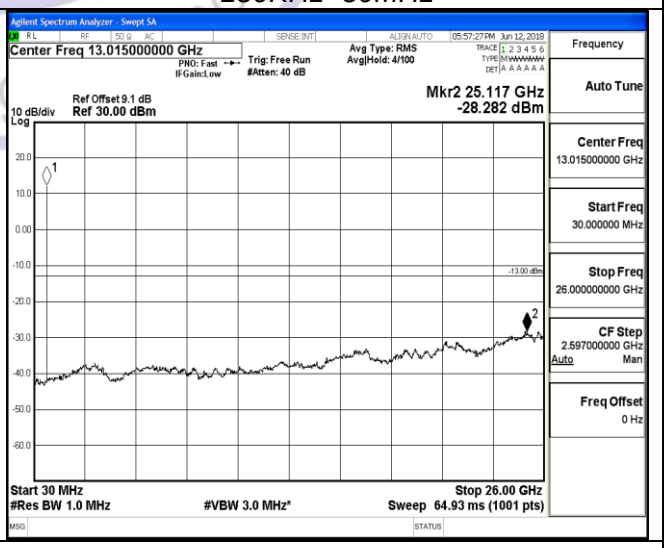
30MHz~26.5GHz

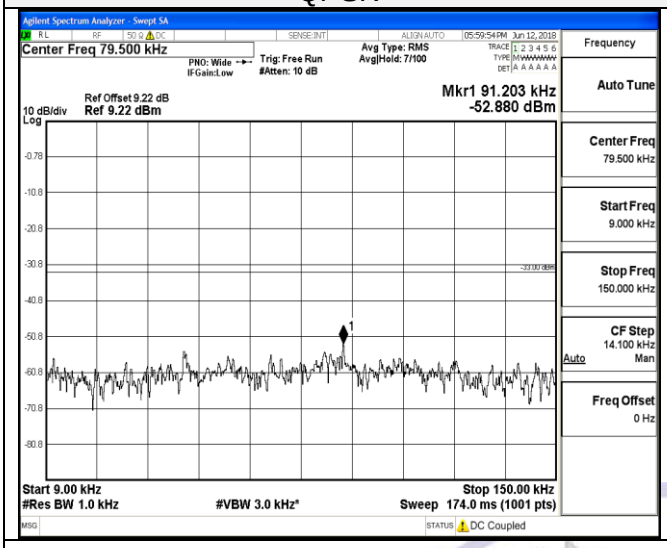
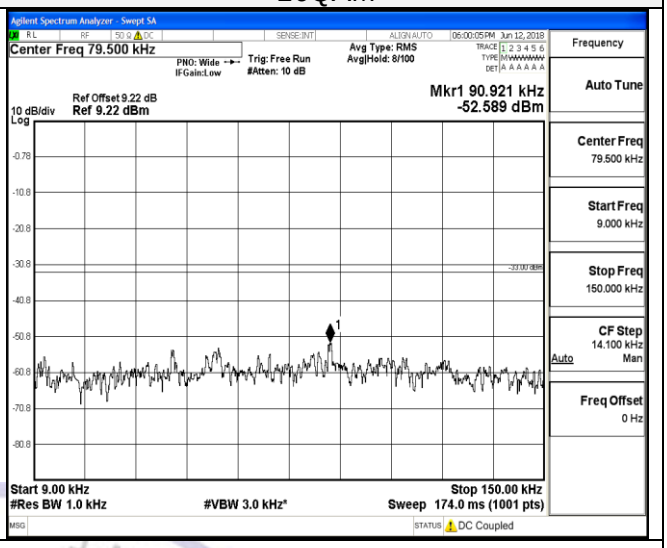
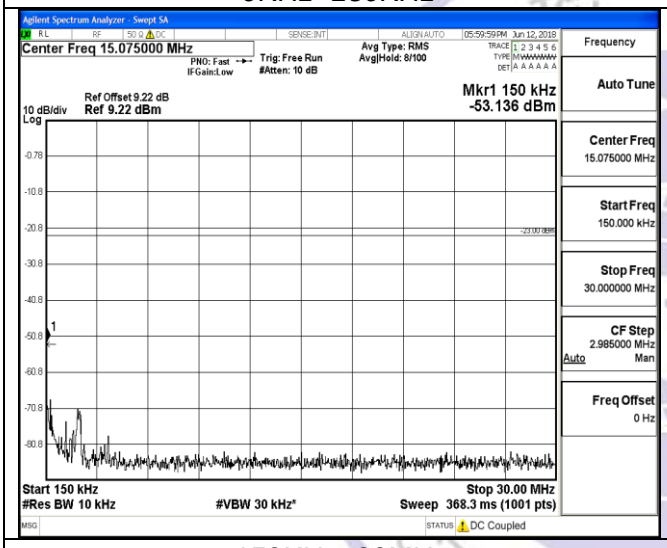
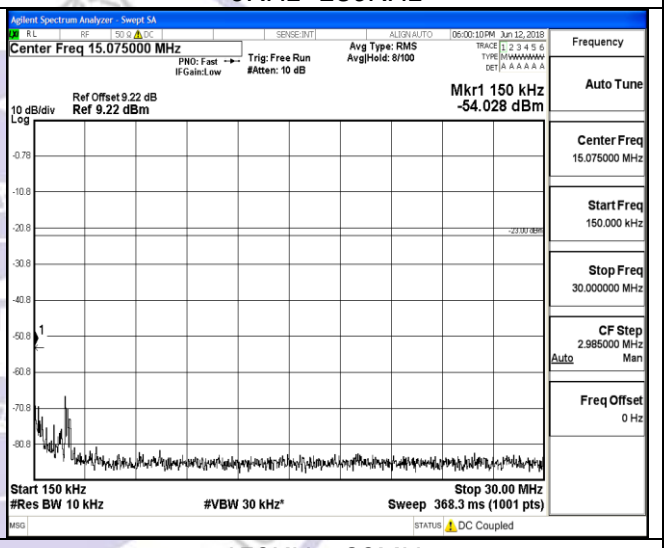
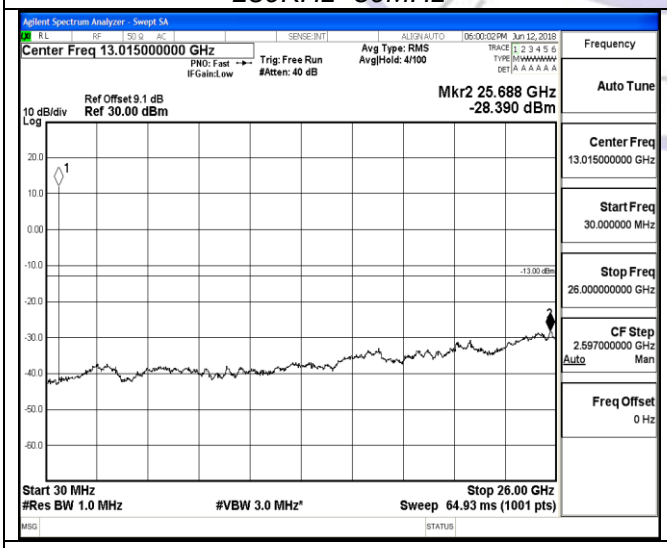
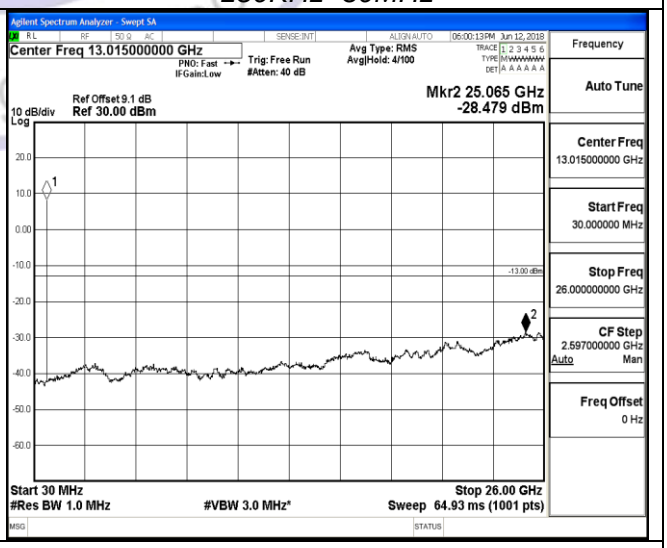
30MHz~26.5GHz

1RB#0

1RB#0

LTE FDD Band 13-5MHz Channel Bandwidth	
Middle Channel	
QPSK	16QAM
	
9KHz~150KHz	9KHz~150KHz
	
150KHz~30MHz	150KHz~30MHz
	
30MHz~26.5GHz	30MHz~26.5GHz
1RB#0	1RB#0

LTE FDD Band 13-5MHz Channel Bandwidth	
High Channel	
QPSK	16QAM
	
9KHz~150KHz	9KHz~150KHz
	
150KHz~30MHz	150KHz~30MHz
	
30MHz~26.5GHz	30MHz~26.5GHz
1RB#0	1RB#0

LTE FDD Band 13-10MHz Channel Bandwidth	
Low & Middle & High Channel	
QPSK	16QAM
	
9KHz~150KHz	9KHz~150KHz
	
150KHz~30MHz	150KHz~30MHz
	
30MHz~26.5GHz	30MHz~26.5GHz
1RB#0	1RB#0

Radiated Measurement:

Remark:
1. *We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 13; recorded worst case for each Channel Bandwidth of LTE FDD Band 13 @ QPSK*
2. *EIRP=P_{Mea}(dBm)-P_{cl}(dB) +G_a(dBi)*
3. *We were not recorded other points as values lower than limits.*
4. *Margin = Limit - EIRP*

LTE FDD Band 13_Channel Bandwidth 5MHz_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
1559.0	-44.63	2.89	3.00	8.64	-25.74	-13.00	12.74	H
2338.5	-47.39	2.97	3.00	9.87	-29.89	-13.00	16.89	H
1559.0	-43.96	2.89	3.00	8.64	-24.02	-13.00	11.02	V
2338.5	-46.98	2.97	3.00	9.87	-27.29	-13.00	14.29	V

LTE FDD Band 13_Channel Bandwidth 5MHz_QPSK_ Middle Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1564.0	-44.63	2.89	3.00	8.64	-26.59	-13.00	13.59	H
2346.0	-47.39	2.97	3.00	9.87	-30.58	-13.00	17.58	H
1564.0	-43.96	2.89	3.00	8.64	-24.12	-13.00	11.12	V
2346.0	-46.98	2.97	3.00	9.87	-27.69	-13.00	14.69	V

LTE FDD Band 13_Channel Bandwidth 5MHz_QPSK_ High Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1569.0	-44.63	2.89	3.00	8.64	-25.44	-13.00	12.44	H
2353.5	-47.39	2.97	3.00	9.87	-30.58	-13.00	17.58	H
1569.0	-43.96	2.89	3.00	8.64	-23.05	-13.00	10.05	V
2353.5	-46.98	2.97	3.00	9.87	-26.22	-13.00	13.22	V

LTE FDD Band 13_Channel Bandwidth 10MHz_QPSK_ Low & Middle & High Channel

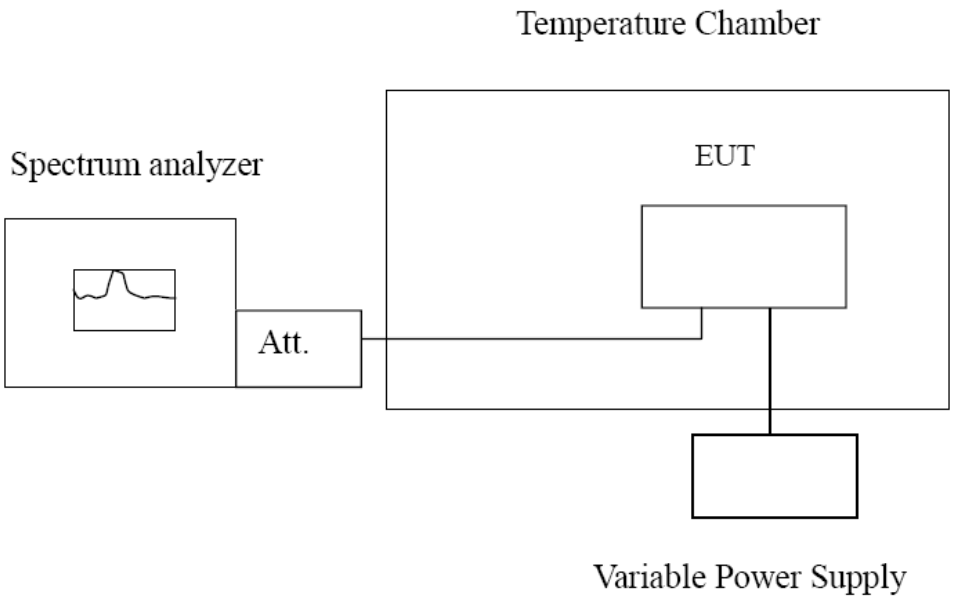
Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1564.0	-44.63	2.89	3.00	8.64	-24.55	-13.00	11.55	H
2346.0	-47.39	2.97	3.00	9.87	-29.74	-13.00	16.74	H
1564.0	-43.96	2.89	3.00	8.64	-23.33	-13.00	10.33	V
2346.0	-46.98	2.97	3.00	9.87	-26.41	-13.00	13.41	V

3.6. Frequency Stability under Temperature & Voltage Variations

LIMIT

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

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℃.
3. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on middle channel for LTE Band 17, 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℃ increments from -30℃ to +50℃. 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 ℃ increments from +50℃ to -30℃. Allow at least 1.5 hours at each temperature, unpowered, before making measurements
9. At all temperature levels hold the temperature to +/- 0.5℃ during the measurement procedure.

Frequency Stability under Voltage Variations:
Set chamber temperature to 20℃. 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, record the maximum frequency change.

TEST RESULTS

Remark:
1. We tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 13; recorded worst case.

LTE Band 13, 5MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)		Limit (ppm)
	QPSK	16QAM	QPSK	16QAM	
6.00	-2.08	9.64	-0.00266	0.01233	2.50
5.10	9.42	-0.75	0.01205	-0.00096	2.50
4.50	-4.84	-3.81	-0.00619	-0.00487	2.50

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)		Limit (ppm)
	QPSK	16QAM	QPSK	16QAM	
-30°	-2.85	3.58	-0.00364	0.00458	2.50
-20°	6.39	3.68	0.00817	0.00471	2.50
-10°	2.89	7.51	0.00370	0.00960	2.50
0°	4.45	-9.55	0.00569	-0.01221	2.50
10°	-4.61	4.69	-0.00590	0.00600	2.50
20°	5.30	9.16	0.00678	0.01171	2.50
30°	-5.01	-3.36	-0.00641	-0.00430	2.50
40°	1.79	0.65	0.00229	0.00083	2.50
50°	4.60	-6.44	0.00588	-0.00824	2.50

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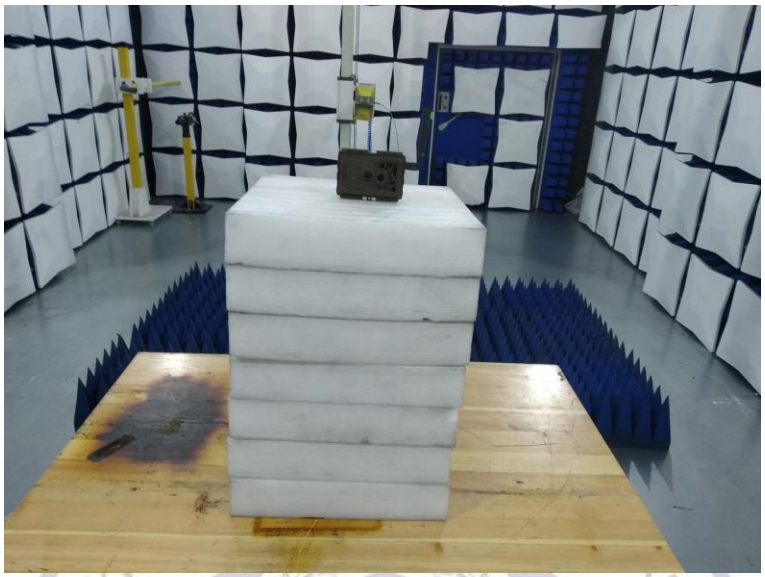
4. Test Setup Photos of the EUT



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5. Photos of the EUT

Reference to the test report No. CTL1805236071-WF01

**********End of Report**********

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