



Shenzhen Global Test Service Co.,Ltd.

No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

FCC TEST REPORT

FCC Part 24E/27

Report Reference No.....: GTS20191217003-1-3

FCC ID..... : W9V-DS735-GP

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Date of issue.....: Mar.05, 2020



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Address.....: No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

Applicant's name: Green Packet Berhad, Taiwan

Address: 2F, NO.23, LANE 583 RUEIGUANG RD, NEIHU DISTRICT, Taipei City, Taiwan

Test specification

Standard: **FCC CFR Title 47 Part 2, Part 24E,Part 27**

Standard: **EIA/TIA 603-D: 2010**

Standard: **KDB 971168 D01**

TRF Originator.....: Shenzhen Global Test Service Co.,Ltd..

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Test item description

Trade Mark: N/A

Manufacturer: Green Packet Berhad, Taiwan

Model/Type reference.....: DS-735

Listed Models: N/A

Modulation Type: QPSK, 16QAM

Rating: DC 12V/1.5A to Adapter

Hardware version: N/A

Software version: N/A

Result.....: **PASS**

TEST REPORT

Test Report No. :	GTS20191217003-1-3	Mar.05, 2020
		Date of issue

Equipment under Test : LTE CPE

Model /Type : DS-735

Listed Models : N/A

Applicant : **Green Packet Berhad, Taiwan**

Address : 2F, NO.23, LANE 583 RUEIGUANG RD, NEIHU DISTRICT, Taipei City, Taiwan

Manufacturer : **Green Packet Berhad, Taiwan**

Address : 2F, NO.23, LANE 583 RUEIGUANG RD, NEIHU DISTRICT, Taipei City, Taiwan

Test result	Pass *
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* In the configuration tested, the EUT complied with the standards specified page 4.

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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1 SUMMARY

1.1 TEST STANDARDS

The tests were performed according to following standards:

[FCC Part 24](#) : PERSONAL COMMUNICATIONS SERVICES

[FCC Part 27](#) : MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES

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

47 CFR FCC Part 15 Subpart B: - Unintentional Radiators

[FCC Part 2](#): FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

[KDB971168 D01: v02r02](#) MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS

[ANSI C63.4:2009](#): Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

1.2 Test Description

Test Item	Section in CFR 47	Result
RF Output Power	Part 2.1046 Part 24.232(c) Part 27.50	Pass
Peak-to-Average Ratio	n/a	Pass
99% & -26 dB Occupied Bandwidth	Part 2.1049	Pass
Spurious Emissions at Antenna Terminal	Part 2.1051 Part 24.238 Part 27.53	Pass
Field Strength of Spurious Radiation	Part 2.1053 Part 24.238 Part 27.53	Pass
Out of band emission, Band Edge	Part 2.1051 Part 22.917(b) Part 24.238 Part 27.53	Pass
Frequency stability	Part 2.1055 Part 24.235 Part 27.54	Pass

1.3 Test Facility

1.3.1 Address of the test laboratory

Shenzhen Global Test Service Co.,Ltd.

No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

1.3.2 Laboratory accreditation

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

CNAS (No. CNAS L8169)

Shenzhen Global Test Service Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2019 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA (Certificate No. 4758.01)

Shenzhen Global Test Service Co., Ltd. has been assessed by the American Association for Laboratory Accreditation (A2LA). Certificate No. 4758.01.

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 Global Test Service 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 **Shenzhen Global Test Service Co.,Ltd.** 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 General Remarks

Date of receipt of test sample	:	Feb.20, 2019
Testing commenced on	:	Feb.20, 2019
Testing concluded on	:	Mar.05, 2020

2.2 Product Description

Product Name	LTE CPE
Trade Mark	N/A
Model/Type reference	DS-735
List Models	N/A
Model Declaration	N/A
Power supply:	DC 12V/1.5A to Adapter
WIFI(2.4G Band)	
Frequency Range	2412MHz ~ 2462MHz
Channel Spacing	5MHz
Channel Number	11 Channel for 20MHz bandwidth(2412~2462MHz) 7 channels for 40MHz bandwidth(2422~2452MHz)
Modulation Type	802.11b: DSSS; 802.11g/n: OFDM
Antenna Description	Two same PCB Antenna, WLAN support MIMO technology ANT0 used for WIFI TX/RX, 1.8dBi(Max.) for 2.4G Band ANT1 used for WIFI TX/RX, 1.8dBi(Max.) for 2.4G Band
WIFI(5.2G Band)	
Frequency Range	5180MHz ~ 5240MHz
Channel Number	4 channels for 20MHz bandwidth(5180-5240MHz) 2 channels for 40MHz bandwidth(5190~5230MHz) 1 channels for 80MHz bandwidth(5210MHz)
Modulation Type	802.11a/n/ac: OFDM
WIFI (5.8G Band)	
Frequency Range	5745MHz ~ 5825MHz
Channel Number	5 channels for 20MHz bandwidth(5745-5825MHz) 2 channels for 40MHz bandwidth(5755~5795MHz) 1 channels for 80MHz bandwidth(5775MHz)
Modulation Type	802.11a/n/ac: OFDM
Antenna Description	Two same PCB Antenna, WLAN support MIMO technology ANT0 used for WIFI TX/RX, 2.5dBi(Max.) for 5G Band ANT1 used for WIFI TX/RX, 2.5dBi(Max.) for 5G Band
LTE	
LTE Operation Frequency Band	LTE Band 2, 4, 66
LTE Release Version	R9
Type Of Modulation	QPSK/16QAM
Antenna Description	PCB Antenna; 3.0dBi (max.) For Band 2;2.5dBi (max.) For Band 4; 2.5dBi (max.) For Band 66;

2.3 Equipment Under Test

Power supply system utilised

Power supply voltage	:	<input type="radio"/> 230V / 50 Hz	<input type="radio"/> 120V / 60Hz
		<input checked="" type="radio"/> 12 V DC	<input type="radio"/> 24 V DC
		<input type="radio"/> Other (specified in blank below)	

DC 12V

2.4 Environmental conditions

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

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

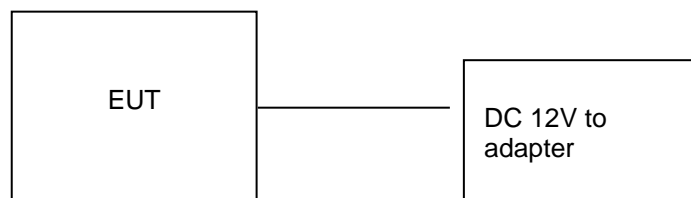
2.5 Description of Test Modes

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.

Note:

1. For the ERP/EIRP and radiated emission test, every axis (X, Y, Z) was verified, and show the worst result on this report.
2. Test method and refer to 3GPP TS136521.

2.6 Block Diagram of Test Setup



2.7 Special Accessories

Manufacturer	Description	Model	Serial Number	Certificate
INDUSTRIAL(SHENZHEN) CO.,LTD.	Adapter	ASSA53A-120150	--	SDOC

2.8 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is filing to comply with of the FCC Part 22,Part 24,Part 27,Part 90 Rules.

2.9 Modifications

No modifications were implemented to meet testing criteria.

2.10 Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	R&S	ENV216	3560.6550.08	2019/09/20	2020/09/19
LISN	R&S	ESH2-Z5	893606/008	2019/09/20	2020/09/19
EMI Test Receiver	R&S	ESPI3	101841-cd	2019/09/20	2020/09/19
EMI Test Receiver	R&S	ESCI7	101102	2019/09/20	2020/09/19
Spectrum Analyzer	Agilent	N9020A	MY48010425	2019/09/20	2020/09/19
Spectrum Analyzer	R&S	FSV40	100019	2019/09/20	2020/09/19
Vector Signal generator	Agilent	N5181A	MY49060502	2019/09/20	2020/09/19
Signal generator	Agilent	E4421B	3610AO1069	2019/09/20	2020/09/19
Climate Chamber	ESPEC	EL-10KA	A20120523	2019/09/20	2020/09/19
Controller	EM Electronics	Controller EM 1000	N/A	N/A	N/A
Horn Antenna	Schwarzbeck	BBHA 9120D	01622	2019/09/23	2020/09/22
Active Loop Antenna	Beijing Da Ze Technology Co.,Ltd.	ZN30900C	15006	2019/10/12	2020/10/11
Bilog Antenna	Schwarzbeck	VULB9163	000976	2019/05/26	2020/05/25
Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2019/09/20	2020/09/19
Amplifier	Schwarzbeck	BBV 9743	#202	2019/09/20	2020/09/19
Amplifier	Schwarzbeck	BBV9179	9719-025	2019/09/20	2020/09/19
Amplifier	EMCI	EMC051845B	980355	2019/09/20	2020/09/19
Temperature/Humidity Meter	Gangxing	CTH-608	02	2019/09/20	2020/09/19
High-Pass Filter	K&L	9SH10-2700/X12750-O/O	KL142031	2019/09/20	2020/09/19
High-Pass Filter	K&L	41H10-1375/U12750-O/O	KL142032	2019/09/20	2020/09/19
RF Cable(below 1GHz)	HUBER+SUHNER	RG214	RE01	2019/09/20	2020/09/19
RF Cable(above 1GHz)	HUBER+SUHNER	RG214	RE02	2019/09/20	2020/09/19
Data acquisition card	Agilent	U2531A	TW53323507	2019/09/20	2020/09/19
Power Sensor	Agilent	U2021XA	MY5365004	2019/09/20	2020/09/19
Test Control Unit	Tonscend	JS0806-1	178060067	2019/06/20	2020/06/19
Automated filter bank	Tonscend	JS0806-F	19F8060177	2019/06/20	2020/06/19
Universal Radio Communication	R&S	CMU200	114353	2019/09/20	2020/09/19
Wireless Communication Tester	R&S	CMW500	125408	2019/09/20	2020/09/19
EMI Test Software	Tonscend	JS1120-1	Ver 2.6.8.0518	/	/
EMI Test Software	Tonscend	JS1120-3	Ver 2.5.77.0418	/	/
EMI Test Software	Tonscend	JS32-CE	Ver 2.5	/	/
EMI Test Software	Tonscend	JS32-RE	Ver 2.5.1.8	/	/

3 TEST CONDITIONS AND RESULTS

3.1 Output Power

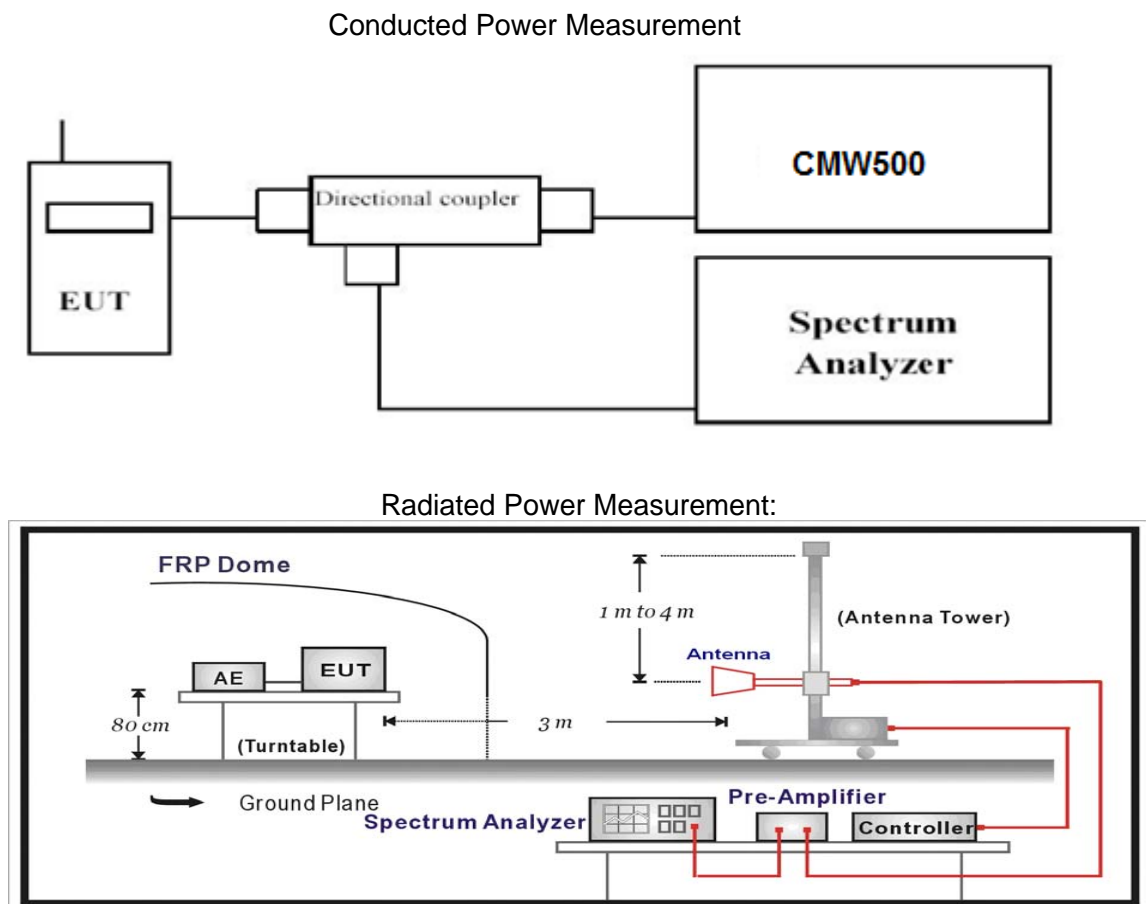
LIMIT

The EIRP of mobile transmitters must not exceed 2 Watts for LTE Band 2.

The EIRP of mobile transmitters must not exceed 1 Watts for LTE Band 4 .

The EIRP of mobile transmitters must not exceed 1 Watts for LTE Band 66 .

TEST CONFIGURATION



TEST PROCEDURE

The EUT was setup according to EIA/TIA 603D

Conducted Power Measurement:

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

Radiated Power Measurement:

- The EUT shall be placed at the specified height on a support, and in the position closest to normal use as declared by provider.
- The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter
- The output of the test antenna shall be connected to the measuring receiver.
- The transmitter shall be switched on and the measuring receiver shall be tuned to the frequency of the transmitter under test.
- 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 C63.26.

TEST RESULTS

Remark:

We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 2, LTE FDD Band 4, LTE FDD Band 66; recorded worst case for each Channel Bandwidth of LTE FDD Band 2, LTE FDD Band 4, LTE FDD Band 66.

Conducted Measurement:

LTE FDD Band 2				
TX Channel Bandwidth	RB Size/Offset	Frequency (MHz)	Average Power [dBm]	
			QPSK	16QAM
1.4 MHz	1 RB low	1850.7	22.37	21.88
		1880	22.68	21.57
		1909.3	22.88	21.38
	1 RB high	1850.7	22.29	21.82
		1880	22.02	21.08
		1909.3	22.92	21.88
	50% RB mid	1850.7	22.43	21.04
		1880	22.92	21.20
		1909.3	22.27	21.66
	100% RB	1850.7	22.35	21.20
		1880	22.96	21.43
		1909.3	22.13	21.11
3 MHz	1 RB low	1851.5	22.29	21.54
		1880	22.90	21.34
		1908.5	22.21	21.50
	1 RB high	1851.5	22.57	21.42
		1880	22.49	21.65
		1908.5	22.92	21.02
	50% RB mid	1851.5	22.04	22.00
		1880	22.36	21.82
		1908.5	22.20	21.12
	100% RB	1851.5	22.29	21.06
		1880	22.15	21.81
		1908.5	22.97	21.07
5 MHz	1 RB low	1852.5	22.21	21.85
		1880	22.65	22.00
		1907.5	22.47	21.85
	1 RB high	1852.5	22.59	21.51
		1880	22.60	21.99
		1907.5	22.37	21.83

	50% RB mid	1852.5	22.51	21.65
		1880	22.88	21.45
		1907.5	22.75	21.15
	100% RB	1852.5	22.44	21.73
		1880	22.65	21.42
		1907.5	22.52	21.50
10 MHz	1 RB low	1855	22.63	21.94
		1880	22.04	21.89
		1905	22.07	21.29
	1 RB high	1855	22.20	21.17
		1880	22.55	21.63
		1905	22.53	21.11
	50% RB mid	1855	22.73	21.29
		1880	22.52	21.87
		1905	22.24	21.63
	100% RB	1855	22.49	21.91
		1880	22.90	21.32
		1905	22.60	21.21
15 MHz	1 RB low	1857.5	22.73	21.90
		1880	22.41	21.13
		1902.5	22.95	21.64
	1 RB high	1857.5	22.70	21.94
		1880	22.47	21.08
		1902.5	22.62	21.97
	50% RB mid	1857.5	22.63	21.95
		1880	22.28	21.06
		1902.5	22.11	21.28
	100% RB	1857.5	22.91	21.70
		1880	22.91	21.37
		1902.5	22.37	21.34
20 MHz	1 RB low	1860	22.23	21.32
		1880	22.45	21.05
		1900	22.71	21.58
	1 RB high	1860	22.78	21.76
		1880	22.42	21.90
		1900	22.18	21.68
	50% RB mid	1860	22.94	21.71
		1880	22.41	21.63
		1900	22.51	21.32
	100% RB	1860	22.80	21.50
		1880	22.22	21.35
		1900	22.75	21.07

LTE FDD Band 4				
TX Channel Bandwidth	RB Size/Offset	Frequency (MHz)	Average Power [dBm]	
			QPSK	16QAM
1.4 MHz	1 RB low	1710.7	23.62	22.42
		1732.5	24.00	22.87
		1754.3	23.05	22.94
	1 RB high	1710.7	23.42	22.44
		1732.5	23.63	22.33
		1754.3	23.30	22.21
	50% RB mid	1710.7	23.41	22.30
		1732.5	23.81	22.77
		1754.3	23.67	22.00
	100% RB	1710.7	23.39	22.21
		1732.5	23.88	22.54
		1754.3	23.42	22.16
3 MHz	1 RB low	1711.5	23.77	22.28
		1732.5	23.64	22.83
		1753.5	23.66	22.67
	1 RB high	1711.5	23.05	22.69
		1732.5	23.75	22.64
		1753.5	23.66	22.56
	50% RB mid	1711.5	23.64	22.44
		1732.5	23.11	22.43
		1753.5	23.08	22.00
	100% RB	1711.5	23.42	22.29
		1732.5	23.42	22.07
		1753.5	23.77	22.91
5 MHz	1 RB low	1712.5	23.58	22.02
		1732.5	23.54	22.97
		1752.5	23.76	22.52
	1 RB high	1712.5	23.48	22.59
		1732.5	23.49	22.50
		1752.5	23.22	22.25
	50% RB mid	1712.5	23.26	22.23
		1732.5	23.76	22.84
		1752.5	23.02	22.98
	100% RB	1712.5	23.36	22.88
		1732.5	23.05	22.26
		1752.5	23.64	22.09
10 MHz	1 RB low	1715	23.74	22.76
		1732.5	23.52	22.92
		1750	23.54	22.15
	1 RB high	1715	23.56	22.06
		1732.5	23.36	22.50
		1750	23.18	22.75
	50% RB mid	1715	23.83	22.67
		1732.5	23.33	22.94
		1750	23.95	22.85
	100% RB	1715	23.71	22.11
		1732.5	23.38	22.80
		1750	23.04	22.63
15 MHz	1 RB low	1707.5	23.89	22.89
		1732.5	23.52	22.82
		1747.5	23.74	22.82
	1 RB high	1707.5	23.05	22.47
		1732.5	23.37	22.93
		1747.5	23.37	22.00
	50% RB mid	1707.5	23.03	22.47
		1732.5	23.46	22.70
		1747.5	23.27	22.22
	100% RB	1707.5	23.27	22.26

20 MHz	1 RB low	1732.5	23.49	22.61
		1747.5	23.86	22.64
	1 RB high	1720	23.94	22.73
		1732.5	23.53	22.14
		1745	23.42	22.21
	50% RB mid	1720	23.04	22.80
		1732.5	23.03	22.33
		1745	23.12	22.75
	100% RB	1720	23.81	22.57
		1732.5	23.78	22.57
		1745	23.83	22.82
			1720	23.17
		1732.5	23.09	22.63
		1745	23.26	22.34

LTE FDD Band 66				
TX Channel Bandwidth	RB Size/Offset	Frequency (MHz)	Average Power [dBm]	
			QPSK	16QAM
1.4 MHz	1 RB low	1710.7	23.75	22.63
		1745.0	23.25	22.05
		1779.3	23.04	22.20
	1 RB high	1710.7	23.44	22.46
		1745.0	23.19	22.73
		1779.3	23.65	22.57
	50% RB mid	1710.7	23.42	22.18
		1745.0	23.39	22.12
		1779.3	23.37	22.26
	100% RB	1710.7	23.17	22.93
		1745.0	23.11	22.78
		1779.3	23.29	22.41
3 MHz	1 RB low	1711.5	23.97	22.41
		1745.0	23.74	22.70
		1778.5	23.32	22.39
	1 RB high	1711.5	23.82	22.07
		1745.0	23.68	22.74
		1778.5	23.32	22.09
	50% RB mid	1711.5	23.01	22.60
		1745.0	23.34	22.93
		1778.5	23.58	22.25
	100% RB	1711.5	23.64	22.67
		1745.0	23.65	22.34
		1778.5	23.84	22.42
5 MHz	1 RB low	1712.5	23.07	22.29
		1745.0	23.92	22.69
		1777.5	23.28	22.30
	1 RB high	1712.5	23.83	22.46
		1745.0	23.47	22.65
		1777.5	23.37	22.99
	50% RB mid	1712.5	23.97	22.09
		1745.0	23.45	22.89
		1777.5	23.99	22.17
	100% RB	1712.5	23.76	22.24
		1745.0	23.70	22.85
		1777.5	23.70	22.92
10 MHz	1 RB low	1715.0	23.62	22.68
		1745.0	23.76	22.48
		1775.0	23.62	22.93
	1 RB high	1715.0	23.95	22.17
		1745.0	23.55	22.66
		1775.0	23.98	22.39

	50% RB mid	1715.0	23.72	22.28
		1745.0	23.83	22.98
		1775.0	23.27	22.50
	100% RB	1715.0	23.52	22.52
		1745.0	23.99	22.07
		1775.0	23.19	22.62
15 MHz	1 RB low	1717.5	23.78	22.43
		1745.0	23.06	22.33
		1772.5	23.21	22.23
	1 RB high	1717.5	23.62	22.84
		1745.0	23.61	22.14
		1772.5	23.77	22.49
	50% RB mid	1717.5	23.54	22.22
		1745.0	23.88	22.65
		1772.5	23.22	22.49
	100% RB	1717.5	23.87	22.21
		1745.0	23.66	22.68
		1772.5	23.20	22.07
20 MHz	1 RB low	1720.0	23.16	22.85
		1745.0	23.74	22.19
		1770.0	23.11	22.40
	1 RB high	1720.0	23.47	22.23
		1745.0	24.00	22.16
		1770.0	23.73	22.33
	50% RB mid	1720.0	23.59	22.44
		1745.0	23.10	22.12
		1770.0	23.02	22.75
	100% RB	1720.0	23.35	22.42
		1745.0	23.41	22.50
		1770.0	23.63	22.46

Radiated Measurement:

Remark:

1. We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 2, LTE FDD Band 4, LTE FDD Band 66; recorded worst case for each Channel Bandwidth of LTE FDD Band 2, LTE FDD Band 4, LTE FDD Band 66.
2. ERP = EIRP – 2.15dBi as EIRP by subtracting the gain of the dipole.

LTE Band 2

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)	
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)				
1880.000	1.4	QPSK	H	85.36	12.60	11.66	2.66	21.60	33.00	11.40	
1880.000			V	85.82	12.81	11.66	2.66	21.81	33.00	11.19	
1880.000	3		H	86.44	12.93	11.66	2.66	21.93	33.00	11.07	
1880.000			V	85.66	12.09	11.66	2.66	21.09	33.00	11.91	
1880.000	5		H	87.63	14.38	11.66	2.66	23.38	33.00	9.62	
1880.000			V	87.00	12.96	11.66	2.66	21.96	33.00	11.04	
1880.000	10		H	86.10	12.31	11.66	2.66	21.31	33.00	11.69	
1880.000			V	84.76	13.60	11.66	2.66	22.60	33.00	10.40	
1880.000	15		H	85.30	13.10	11.66	2.66	22.10	33.00	10.90	
1880.000			V	85.25	13.71	11.66	2.66	22.71	33.00	10.29	
1880.000	20		H	86.52	12.75	11.66	2.66	21.75	33.00	11.25	
1880.000			V	85.88	14.21	11.66	2.66	23.21	33.00	9.79	
1880.000	1.4		16QAM	H	85.77	11.81	11.66	2.66	20.81	33.00	12.19
1880.000				V	85.74	13.10	11.66	2.66	22.10	33.00	10.90
1880.000	3			H	85.94	12.09	11.66	2.66	21.09	33.00	11.91
1880.000				V	86.03	14.13	11.66	2.66	23.13	33.00	9.87
1880.000	5	H		86.73	11.40	11.66	2.66	20.40	33.00	12.60	
1880.000		V		85.62	13.98	11.66	2.66	22.98	33.00	10.02	
1880.000	10	H		87.56	12.07	11.66	2.66	21.07	33.00	11.93	
1880.000		V		85.70	13.13	11.66	2.66	22.13	33.00	10.87	
1880.000	15	H		87.40	12.59	11.66	2.66	21.59	33.00	11.41	
1880.000		V		86.98	13.03	11.66	2.66	22.03	33.00	10.97	
1880.000	20	H		87.03	12.26	11.66	2.66	21.26	33.00	11.74	
1880.000		V		86.65	12.64	11.66	2.66	21.64	33.00	11.36	

LTE Band 4

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)	
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)				
1732.500	1.4	QPSK	H	85.40	13.53	11.66	2.66	22.53	30.00	7.47	
1732.500			V	85.05	12.47	11.66	2.66	21.47	30.00	8.53	
1732.500	3		H	85.50	13.22	11.66	2.66	22.22	30.00	7.78	
1732.500			V	85.27	13.19	11.66	2.66	22.19	30.00	7.81	
1732.500	5		H	87.27	13.82	11.66	2.66	22.82	30.00	7.18	
1732.500			V	85.98	13.37	11.66	2.66	22.37	30.00	7.63	
1732.500	10		H	86.77	13.44	11.66	2.66	22.44	30.00	7.56	
1732.500			V	85.64	12.76	11.66	2.66	21.76	30.00	8.24	
1732.500	15		H	85.42	11.86	11.66	2.66	20.86	30.00	9.14	
1732.500			V	86.90	12.27	11.66	2.66	21.27	30.00	8.73	
1732.500	20		H	85.48	11.46	11.66	2.66	20.46	30.00	9.54	
1732.500			V	87.11	13.97	11.66	2.66	22.97	30.00	7.03	
1732.500	1.4		16QAM	H	86.24	11.96	11.66	2.66	20.96	30.00	9.04
1732.500				V	85.78	12.81	11.66	2.66	21.81	30.00	8.19
1732.500	3			H	86.84	12.37	11.66	2.66	21.37	30.00	8.63
1732.500				V	85.92	12.39	11.66	2.66	21.39	30.00	8.61
1732.500	5	H		86.12	11.81	11.66	2.66	20.81	30.00	9.19	
1732.500		V		86.49	13.56	11.66	2.66	22.56	30.00	7.44	
1732.500	10	H		85.84	11.93	11.66	2.66	20.93	30.00	9.07	
1732.500		V		87.52	13.82	11.66	2.66	22.82	30.00	7.18	
1732.500	15	H		87.11	11.72	11.66	2.66	20.72	30.00	9.28	
1732.500		V		86.76	12.13	11.66	2.66	21.13	30.00	8.87	
1732.500	20	H		85.90	12.92	11.66	2.66	21.92	30.00	8.08	
1732.500		V		87.01	12.54	11.66	2.66	21.54	30.00	8.46	

LTE Band 66

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)	
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)				
1745.000	1.4	QPSK	H	85.67	14.05	11.66	2.66	23.05	30.00	6.95	
1745.000			V	84.23	11.72	11.66	2.66	20.72	30.00	9.28	
1745.000	3		H	86.27	13.17	11.66	2.66	22.17	30.00	7.83	
1745.000			V	84.41	12.01	11.66	2.66	21.01	30.00	8.99	
1745.000	5		H	87.35	12.90	11.66	2.66	21.90	30.00	8.10	
1745.000			V	86.45	12.46	11.66	2.66	21.46	30.00	8.54	
1745.000	10		H	85.49	13.82	11.66	2.66	22.82	30.00	7.18	
1745.000			V	85.96	13.13	11.66	2.66	22.13	30.00	7.87	
1745.000	15		H	85.55	12.51	11.66	2.66	21.51	30.00	8.49	
1745.000			V	85.25	13.82	11.66	2.66	22.82	30.00	7.18	
1745.000	20		H	86.50	12.63	11.66	2.66	21.63	30.00	8.37	
1745.000			V	85.82	12.34	11.66	2.66	21.34	30.00	8.66	
1745.000	1.4		16QAM	H	86.77	12.47	11.66	2.66	21.47	30.00	8.53
1745.000				V	86.66	13.13	11.66	2.66	22.13	30.00	7.87
1745.000	3			H	86.57	12.38	11.66	2.66	21.38	30.00	8.62
1745.000				V	87.34	12.66	11.66	2.66	21.66	30.00	8.34
1745.000	5	H		85.83	12.83	11.66	2.66	21.83	30.00	8.17	
1745.000		V		86.69	12.35	11.66	2.66	21.35	30.00	8.65	
1745.000	10	H		86.06	11.40	11.66	2.66	20.40	30.00	9.60	
1745.000		V		85.69	14.14	11.66	2.66	23.14	30.00	6.86	
1745.000	15	H		86.81	13.60	11.66	2.66	22.60	30.00	7.40	
1745.000		V		87.29	12.50	11.66	2.66	21.50	30.00	8.50	
1745.000	20	H		85.83	13.56	11.66	2.66	22.56	30.00	7.44	
1745.000		V		86.47	11.99	11.66	2.66	20.99	30.00	9.01	

Note:

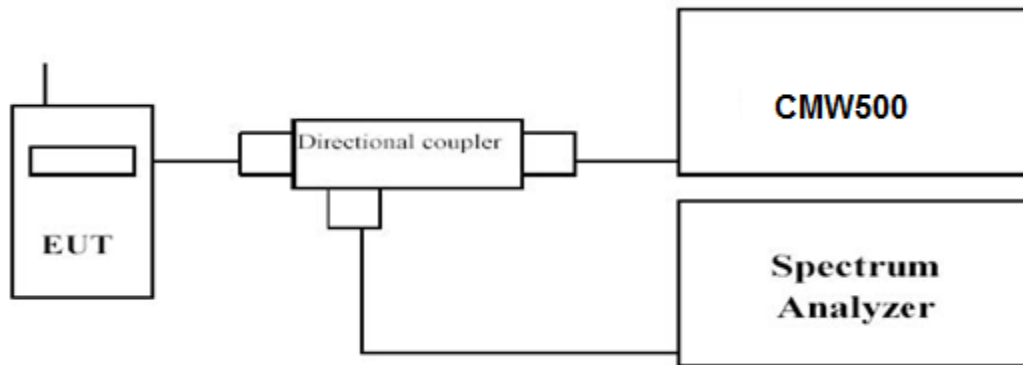
- 1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
- 2) Absolute Level = Substituted Level - Cable loss + Antenna Gain
- 3) Margin = Limit-Absolute Level

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

TEST RESULTS

Remark:

We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 2, LTE FDD Band 4, LTE FDD Band 66; recorded worst case for each Channel Bandwidth of LTE FDD Band 2, LTE FDD Band 4, LTE FDD Band 66.

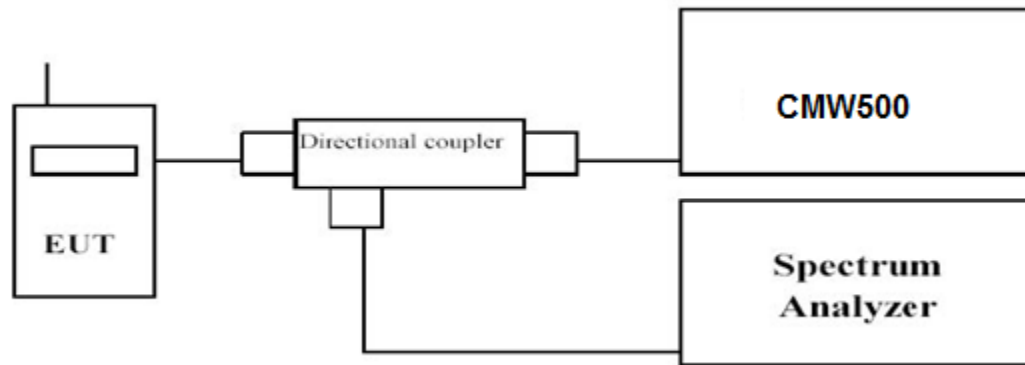
1. For E-UTRA Band 2, please refer to Appendix Band 2: Section A;
2. For E-UTRA Band 4, please refer to Appendix Band 4: Section A;
3. For E-UTRA Band 66, please refer to Appendix Band 66: Section A;

3.3 Occupied Bandwidth and Emission Bandwidth

LIMIT

FCC §2.1049, §24.238, §27.53

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 \geq 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:

We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 2, LTE FDD Band 4, LTE FDD Band 66; recorded worst case for each Channel Bandwidth of LTE FDD Band 2, LTE FDD Band 4, LTE FDD Band 66.

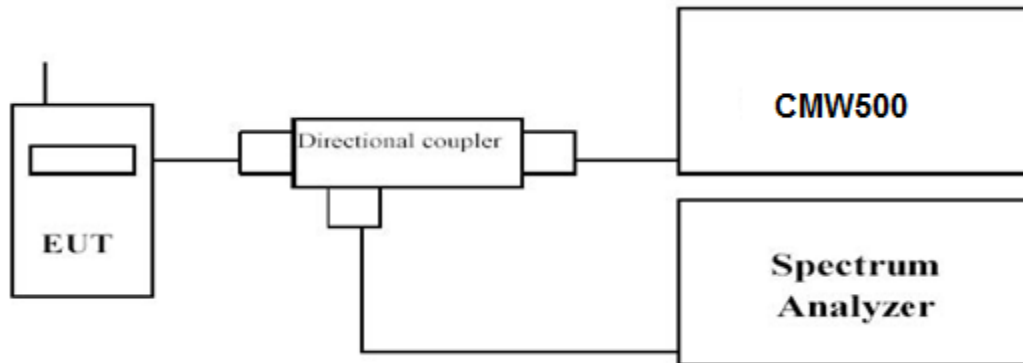
1. *For E-UTRA Band 2, please refer to Appendix Band 2: Section B;*
2. *For E-UTRA Band 4, please refer to Appendix Band 4: Section B;*
3. *For E-UTRA Band 66, please refer to Appendix Band 66: Section B;*

3.4 Band Edge compliance

LIMIT

FCC § 2.1053, § 24.238 and § 27.53.

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:

We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 2, LTE FDD Band 4, LTE FDD Band 66; recorded worst case for each Channel Bandwidth of LTE FDD Band 2, LTE FDD Band 4, LTE FDD Band 66.

1. *For E-UTRA Band 2, please refer to Appendix Band 2: Section C;*
2. *For E-UTRA Band 4, please refer to Appendix Band 4: Section C;*
3. *For E-UTRA Band 66, please refer to Appendix Band 66: Section C;*

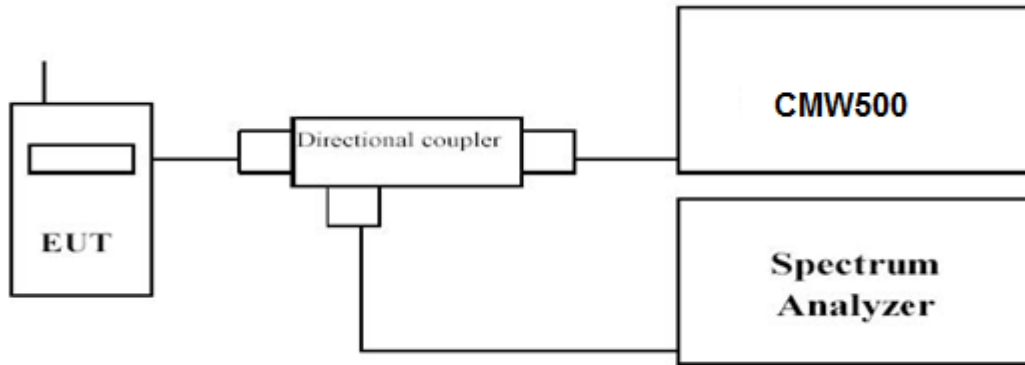
3.5 Spurious Emission

LIMIT

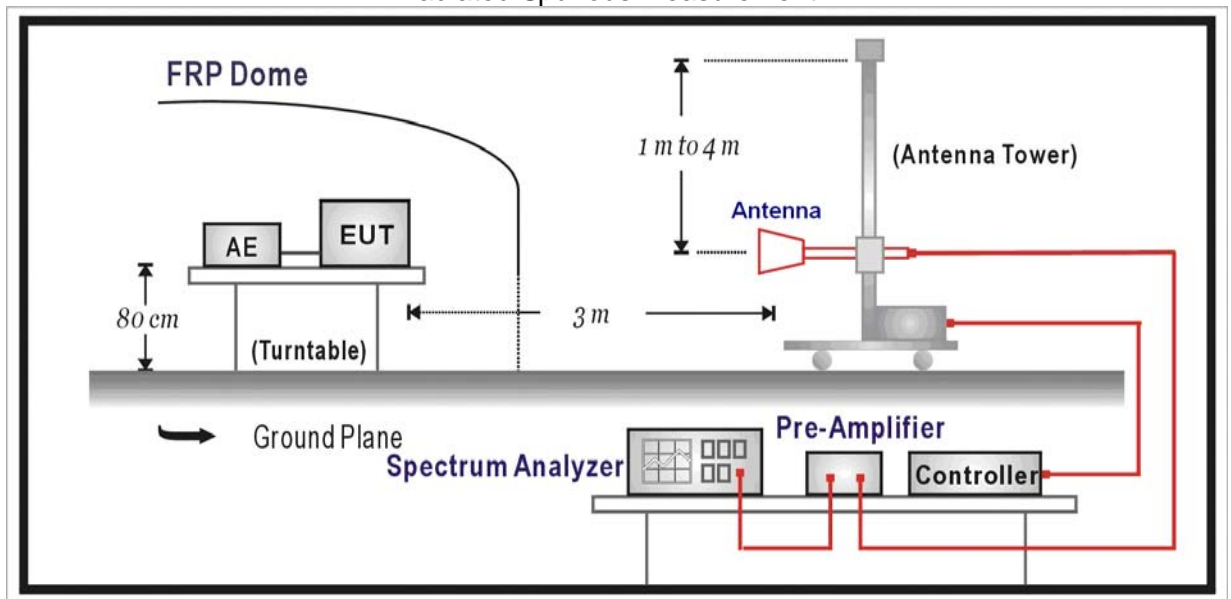
FCC § 2.1053, § 24.238 and § 27.53.

TEST CONFIGURATION

Conducted Spurious Measurement:



Radiated Spurious Measurement:



TEST PROCEDURE

The EUT was setup according to EIA/TIA 603D

Conducted Spurious Measurement:

- 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 CMW500 by a Directional Couple.
- EUT Communicate with CMW500, then select a channel for testing.
- Add a correction factor to the display of spectrum, and then test.
- The resolution bandwidth of the spectrum analyzer was set sufficient 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 2	0.000009~0.000015	1KHz	3KHz	Auto
	0.000015~0.03	10KHz	30KHz	Auto
	0.03~26	1 MHz	3 MHz	Auto
LTE FDD Band 4	0.000009~0.000015	1KHz	3KHz	Auto
	0.000015~0.03	10KHz	30KHz	Auto
	0.03~26	1 MHz	3 MHz	Auto
LTE FDD Band 66	0.000009~0.000015	1KHz	3KHz	Auto
	0.000015~0.03	10KHz	30KHz	Auto
	0.03~26	1 MHz	3 MHz	Auto

Remark:

1. Test results including cable loss;
2. Please refer to following plots;
3. Not recorded test plots from 9 KHz to 30 MHz as emission levels 20dB lower than emission limit;

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.

TEST RESULTS**Conducted Measurement:****Remark:**

We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 2, LTE FDD Band 4, LTE FDD Band 66; recorded worst case for each Channel Bandwidth of LTE FDD Band 2, LTE FDD Band 4, LTE FDD Band 66.

1. For E-UTRA Band 2, please refer to Appendix Band 2: Section D;
2. For E-UTRA Band 4, please refer to Appendix Band 4: Section D;
3. For E-UTRA Band 66, please refer to Appendix Band 66: Section D;

Radiated Measurement:

LTE Band 2 (30MHz-20GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK, Frequency: 1880.000 MHz								
3760.00	H	49.04	59.06	13.76	1.63	46.93	13.00	33.93
3760.00	V	47.66	60.46	13.76	1.63	48.33	13.00	35.33
5640.00	H	54.97	51.31	14.02	1.31	38.60	13.00	25.60
5640.00	V	51.53	53.89	14.02	1.31	41.18	13.00	28.18
272.00	H	41.74	66.25	0.00	0.51	66.76	13.00	53.76
272.00	V	47.14	65.94	0.00	0.51	66.45	13.00	53.45

LTE Band 4 (30MHz-20GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK, Frequency: 1732.500 MHz								
3465.00	H	49.70	60.24	13.76	1.63	48.11	13.00	35.11
3465.00	V	47.29	60.75	13.76	1.63	48.62	13.00	35.62
5197.50	H	55.70	50.05	14.02	1.31	37.34	13.00	24.34
5197.50	V	53.19	53.80	14.02	1.31	41.09	13.00	28.09
357.00	H	41.83	65.95	0.00	0.51	66.46	13.00	53.46
357.00	V	46.75	64.97	0.00	0.51	65.48	13.00	52.48

LTE Band 66 (30MHz-20GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK, Frequency: 1745.00 MHz								
3490.00	H	48.58	60.51	13.76	1.63	48.38	13.00	35.38
3490.00	V	47.55	60.56	13.76	1.63	48.43	13.00	35.43
5235.00	H	55.94	51.28	14.02	1.31	38.57	13.00	25.57
5235.00	V	51.65	53.89	14.02	1.31	41.18	13.00	28.18
413.00	H	42.22	65.75	0.00	0.51	66.26	13.00	53.26
413.00	V	45.49	65.59	0.00	0.51	66.10	13.00	53.10

Note:

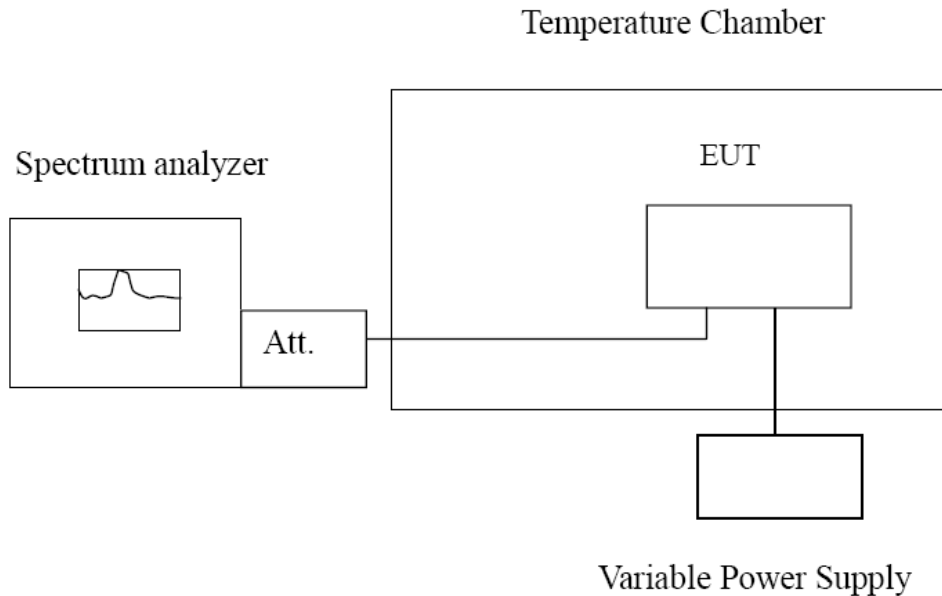
- 1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
- 2) Absolute Level = Substituted Level - Cable loss + Antenna Gain
- 3) Margin = Limit - Absolute Level

3.6 Frequency Stability under Temperature & Voltage Variations

LIMIT

FCC § 2.1055 (a), § 2.1055 (d), §24.235,§27.54.

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 2, 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°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°C.
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 °C increments from +50°C to -30°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 ($\pm 15\%$) and endpoint, record the maximum frequency change.

TEST RESULTS

Remark:

We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 2, LTE FDD Band 4, LTE FDD Band 66; recorded worst case for each Channel Bandwidth of LTE FDD Band 2, LTE FDD Band 4, LTE FDD Band 66.

LTE Band 2:

QPSK, Channel Bandwidth:10MHz Middle Channel, $f_c = 1880$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	VDC	Hz	ppm	
-30	12.0	22	0.012	Pass
-20		16	0.009	
-10		14	0.007	
0		50	0.027	
10		57	0.030	
20		89	0.047	
30		60	0.032	
40		20	0.011	
50		95	0.051	
20	13.2	81	0.043	
20	10.8	61	0.032	

16QAM, Channel Bandwidth:10MHz Middle Channel, $f_c = 1880$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	VDC	Hz	ppm	
-30	12.0	20	0.011	Pass
-20		12	0.006	
-10		31	0.016	
0		22	0.012	
10		73	0.039	
20		83	0.044	
30		77	0.041	
40		18	0.010	
50		97	0.052	
20	13.2	72	0.038	
20	10.8	30	0.016	

LTE Band 4:

QPSK, Channel Bandwidth:10MHz Middle Channel, $f_c = 1732.5$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	VDC	Hz	ppm	
-30	12.0	39	0.022	Pass
-20		27	0.015	
-10		27	0.015	
0		67	0.038	
10		52	0.030	
20		12	0.007	
30		7	0.004	
40		41	0.023	
50		52	0.030	
20		13.2	73	
20	10.8	2	0.001	

16QAM, Channel Bandwidth:10MHz Middle Channel, $f_c = 1732.5$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	VDC	Hz	ppm	
-30	12.0	5	0.003	Pass
-20		84	0.048	
-10		33	0.019	
0		67	0.038	
10		72	0.041	
20		37	0.021	
30		19	0.011	
40		26	0.015	
50		56	0.032	
20		13.2	74	
20	10.8	46	0.026	

LTE Band 66:

QPSK, Channel Bandwidth:10MHz Middle Channel, $f_c = 1745.0$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	VDC	Hz	ppm	
-30	12.0	24	0.014	Pass
-20		48	0.028	
-10		19	0.011	
0		8	0.005	
10		73	0.042	
20		70	0.040	
30		63	0.036	
40		32	0.018	
50		84	0.048	
20		13.2	53	
20	10.8	27	0.015	

16QAM, Channel Bandwidth:10MHz Middle Channel, $f_c = 1745.0$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	VDC	Hz	ppm	
-30	12.0	65	0.037	Pass
-20		23	0.013	
-10		49	0.028	
0		95	0.054	
10		78	0.045	
20		20	0.011	
30		10	0.006	
40		61	0.035	
50		43	0.025	
20		13.2	90	
20	10.8	19	0.011	

4 Test Setup Photos of the EUT



5 External and Internal Photos of the EUT

Reference to the test report No. GTS20191217003-1-1

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