



RF TEST REPORT

Applicant LongSung Technology (Shanghai) Co.,Ltd.

FCC ID XHZU9507A

Product LTE module

Brand longsung

Model U9507A

Report No. RXA1710-0343RF03R1

Issue Date November 27, 2017

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 2 (2017)**/ **FCC CFR47 Part 27C (2017)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Jiangpeng Lan

Performed by: Jiangpeng Lan

Kai Xu

Approved by: Kai Xu

TA Technology (Shanghai) Co., Ltd.

No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China

TEL: +86-021-50791141/2/3

FAX: +86-021-50791141/2/3-8000



Table of Contents

1	Test Laboratory.....	4
1.1	Notes of the Test Report	4
1.2	Test facility	4
1.3	Testing Location	5
2	General Description of Equipment under Test.....	6
3	Applied Standards	8
4	Test Configuration	9
5	Test Information.....	11
5.1	RF Power Output	11
5.2	Effective Isotropic Radiated Power	19
5.3	Occupied Bandwidth	25
5.4	Band Edge Compliance	44
5.5	Peak-to-Average Power Ratio (PAPR).....	72
5.6	Frequency Stability.....	76
5.7	Spurious Emissions at Antenna Terminals	84
5.8	Radiates Spurious Emission	105
6	Main Test Instruments	131
ANNEX A:	EUT Appearance and Test Setup	132
A.1	EUT Appearance.....	132
A.2	Test Setup.....	134



Summary of Measurement Results

Number	Test Case	Clause in FCC rules	Verdict
1	RF power output	2.1046	PASS
2	Effective Isotropic Radiated power	27.50(d)(4)/27.50(b)(10) /27.50(c)(10)/27.50(h)(2)	PASS
3	Occupied Bandwidth	2.1049	PASS
4	Band Edge Compliance	27.53(h)/27.53(g)	PASS
5	Peak-to-Average Power Ratio	27.50(d)/KDB971168 D01(5.7)	PASS
6	Frequency Stability	2.1055 /27.54	PASS
7	Spurious Emissions at Antenna Terminals	2.1051/27.53(h)/27.53(g)	PASS
8	Radiates Spurious Emission	2.1053/27.53(h) /27.53(g)	PASS

Date of Testing: October 25, 2017~ November 27, 2017

Note: PASS: The EUT complies with the essential requirements in the standard.
FAIL: The EUT does not comply with the essential requirements in the standard.



1 Test Laboratory

1.1 Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **TA technology (shanghai) co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein .Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above. This report must not be used by the client to claim product certification, approval, or endorsement by any government agencies.

1.2 Test facility

CNAS (accreditation number: L2264)

TA Technology (Shanghai) Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS).

FCC (Designation number: CN1179, Test Firm Registration Number: 446626)

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

IC (recognition number is 8510A)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Canada to perform electromagnetic emission measurement.

VCCI (recognition number is C-4595, T-2154, R-4113, G-10766)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Japan to perform electromagnetic emission measurement.

A2LA (Certificate Number: 3857.01)

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.



1.3 Testing Location

Company: TA Technology (Shanghai) Co., Ltd.
Address: No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China
City: Shanghai
Post code: 201201
Country: P. R. China
Contact: Xu Kai
Telephone: +86-021-50791141/2/3
Fax: +86-021-50791141/2/3-8000
Website: <http://www.ta-shanghai.com>
E-mail: xukai@ta-shanghai.com



2 General Description of Equipment under Test

Client Information

Applicant	LongSung Technology (Shanghai) Co.,Ltd.
Applicant address	Bldg.5,299 BiSheng Rd,Zhangjiang Hi-Tech Park Pudong, Shanghai,China
Manufacturer	LongSung Technology (Shanghai) Co.,Ltd.
Manufacturer address	Bldg.5,299 BiSheng Rd,Zhangjiang Hi-Tech Park Pudong, Shanghai,China

General information

EUT Description			
Model:	U9507A		
Product IMEI:	865865030001127		
Hardware Version:	A4		
Software Version:	QB40007.1.0_MX11		
Power Supply:	External power supply		
Antenna Type:	The EUT don't have standard Antenna, The Antenna used for testing in this report is the after-market accessory (Dipole Antenna)		
Test Mode(s):	WCDMA Band IV;LTE Band 4/ 12/ 17;		
Test Modulation	(WCDMA)QPSK; (LTE)QPSK 16QAM;		
HSDPA UE Category:	10		
HSUPA UE Category:	6		
DC-HSDPA UE Category	24		
HSPA+ UE Category	14		
LTE Release	10		
Maximum E.I.R.P./ E.R.P.	WCDMA Band IV:	23.51dBm	
	LTE Band 4:	26.98dBm	
	LTE Band 12:	23.12dBm	
	LTE Band 13:	23.64dBm	
	LTE Band 17:	22.98dBm	
Rated Power Supply Voltage:	3.8V		
Extreme Voltage:	Minimum: 3.3V Maximum: 4.2V		
Extreme Temperature:	Lowest: -40°C Highest: +85°C		
Operating Frequency Range(s)	Mode	Tx (MHz)	Rx (MHz)
	WCDMA Band IV	1710 ~ 1755	2110 ~ 2155
	LTE Band 4	1710 ~ 1755	2110 ~ 2155
	LTE Band 7	2500 ~ 2570	2620 ~ 2690



	LTE Band 12	699 ~ 716	729 ~ 746
	LTE Band 13	777 ~ 787	746 ~ 756
	LTE Band 17	704 ~ 716	734 ~ 746

Note: 1. The information of the EUT is declared by the manufacturer.

Accessory equipment	
Evaluation Board	RF Cable
USB Cable	Antenna: Dipole Antenna
Adapter	Power line



3 Applied Standards

According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

Test standards

FCC CFR47 Part 2 (2017)

FCC CFR47 Part 27C (2017)

ANSI/TIA-603-D (2010)

KDB 971168 D01 Power Meas License Digital Systems v03



4 Test Configuration

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes. EUT stand-up position (Z axis), lie-down position (X, Y axis). Receiver antenna polarization (horizontal and vertical), the worst emission was found in position (Z axis, horizontal polarization) and the worst case was recorded.

All mode and data rates and positions and RB size and modulations were investigated.

Subsequently, only the worst case emissions are reported.

The following testing in WCDMA/LTE is set based on the maximum RF Output Power.

The following testing in different Bandwidth is set to detailin the following table:

Test modes are chosen to be reported as the worst case configuration below for WCDMA Band IV:

	Test items	Modes	Modulation
Conducted Test cases	RF power output	WCDMA Band IV	RMC/HSDPA/HSUPA/ DC-HSDPA/HSPA+
	Effective Isotropic Radiated power	WCDMA Band IV	RMC
	Occupied Bandwidth	WCDMA Band IV	RMC
	Band Edge Compliance	WCDMA Band IV	RMC
	Peak-to-Average Power Ratio	WCDMA Band IV	RMC
	Frequency Stability	WCDMA Band IV	RMC
	Spurious Emissions at Antenna Terminals	WCDMA Band IV	RMC
Radiated Test cases	Radiates Spurious Emission	WCDMA Band IV	RMC



Test modes are chosen to be reported as the worst case configuration below for LTE Band

4/12/13/17:

Test items	Modes	Bandwidth (MHz)						Modulation		RB			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	50%	100%	L	M	H
RF power output	LTE 4	O	O	O	O	O	O	O	O	O	O	O	O	O	O
	LTE 12	O	O	O	O	-	-	O	O	O	O	O	O	O	O
	LTE 13	-	-	O	O	-	-	O	O	O	O	O	O	O	O
	LTE 17	-	-	O	O	-	-	O	O	O	O	O	O	O	O
Effective Isotropic Radiated power	LTE 4	O	O	O	O	O	O	O	O	-	-	O	O	O	O
	LTE 12	O	O	O	O	-	-	O	O	-	-	O	O	O	O
	LTE 13	-	-	O	O	-	-	O	O	-	-	O	O	O	O
	LTE 17	-	-	O	O	-	-	O	O	-	-	O	O	O	O
Occupied Bandwidth	LTE 4	O	O	O	O	O	O	O	O	-	-	O	O	O	O
	LTE 12	O	O	O	O	-	-	O	O	-	-	O	O	O	O
	LTE 13	-	-	O	O	-	-	O	O	-	-	O	O	O	O
	LTE 17	-	-	O	O	-	-	O	O	-	-	O	O	O	O
Band Edge Compliance	LTE 4	O	O	O	O	O	O	O	O	O	-	O	O	-	O
	LTE 12	O	O	O	O	-	-	O	O	O	-	O	O	-	O
	LTE 13	-	-	O	O	-	-	O	O	O	-	O	O	-	O
	LTE 17	-	-	O	O	-	-	O	O	O	-	O	O	-	O
Peak-to-Average Power Ratio	LTE 4	O	O	O	O	O	O	O	O	-	-	O	O	O	O
	LTE 12	O	O	O	O	-	-	O	O	-	-	O	O	O	O
	LTE 13	-	-	O	O	-	-	O	O	-	-	O	O	O	O
	LTE 17	-	-	O	O	-	-	O	O	-	-	O	O	O	O
Frequency Stability	LTE 4	O	O	O	O	O	O	O	O	-	-	O	-	O	-
	LTE 12	O	O	O	O	-	-	O	O	-	-	O	-	O	-
	LTE 13	-	-	O	O	-	-	O	O	-	-	O	-	O	-
	LTE 17	-	-	O	O	-	-	O	O	-	-	O	-	O	-
Spurious Emissions at Antenna Terminals	LTE 4	O	O	O	O	O	O	O	O	-	O	-	-	O	O
	LTE 12	O	O	O	O	-	-	O	-	O	-	-	O	O	O
	LTE 13	-	-	O	O	-	-	O	-	O	-	-	O	O	O
	LTE 17	-	-	O	O	-	-	O	-	O	-	-	O	O	O
Radiates Spurious Emission	LTE 4	O	O	O	O	O	O	O	-	O	-	-	O	O	O
	LTE 12	O	O	O	O	-	-	O	-	O	-	-	O	O	O
	LTE 13	-	-	O	O	-	-	O	-	O	-	-	O	O	O
	LTE 17	-	-	O	O	-	-	O	-	O	-	-	O	O	O
Note	1. The mark "O" means that this configuration is chosen for testing. 2. The mark "-" means that this configuration is not testing.														

5 Test Information

5.1 RF Power Output

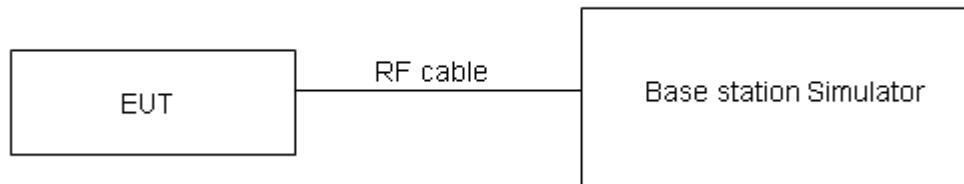
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

During the process of the testing, The EUT is controlled by the Base Station Simulator to ensure max power transmission and proper modulation.

Test Setup



The loss between RF output port of the EUT and the input port of the tester has been taken into consideration.

Limits

No specific RF power output requirements in part 2.1046.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U=0.4$ dB.



Test Results

WCDMA Band IV		AV Conducted Power(dBm)		
		Channel 1312	Channel 1413	Channel 1513
		1712.4 (MHz)	1732.6 (MHz)	1752.6(MHz)
RMC		22.41	22.43	22.28
HSDPA	Sub - Test 1	21.41	21.35	21.23
	Sub - Test 2	21.40	21.34	21.22
	Sub - Test 3	20.84	20.91	20.74
	Sub - Test 4	20.86	20.88	20.72
HSUPA	Sub - Test 1	21.26	21.06	21.07
	Sub - Test 2	20.48	20.46	20.44
	Sub - Test 3	20.89	20.87	20.76
	Sub - Test 4	20.45	20.44	20.41
	Sub - Test 5	21.31	21.33	21.16
DC-HSDPA	Sub - Test 1	21.34	21.37	21.20
	Sub - Test 2	21.36	21.40	21.28
	Sub - Test 3	20.80	20.87	20.70
	Sub - Test 4	20.90	20.92	20.76
HSPA+	16QAM	21.08	20.88	20.89

Note:

- 1) The maximum RF Output Power numbers are marks in bold.
- 2) The following testing in RMC based on the maximum RF Output Power.



LTE Band 4				AV Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				19957/1710.7	20175/1732.5	20393/1754.3
1.4MHz	QPSK	1	0	22.04	21.97	21.99
		1	2	22.25	22.19	21.98
		1	5	22.06	22.09	21.89
		3	0	22.06	22.09	21.98
		3	2	22.04	22.01	21.92
		3	3	22.22	22.06	22.17
		6	0	21.05	21.11	21.04
	16QAM	1	0	21.57	21.26	21.06
		1	2	21.31	21.12	21.15
		1	5	21.35	21.31	21.13
		3	0	21.51	21.31	21.30
		3	2	21.38	21.27	21.11
		3	3	21.35	21.39	21.05
		6	0	20.33	20.05	20.17
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				19965/1711.5	20175/1732.5	20385/1753.5
3MHz	QPSK	1	0	22.20	22.04	21.91
		1	7	22.00	21.91	21.69
		1	14	22.10	22.05	22.10
		8	0	22.04	21.92	22.21
		8	4	21.88	21.96	22.09
		8	7	21.82	22.03	22.13
		15	0	20.99	21.03	20.23
	16QAM	1	0	21.67	21.38	21.73
		1	7	21.19	21.11	21.21
		1	14	21.28	21.31	21.61
		8	0	21.30	21.54	21.52
		8	4	21.36	21.47	21.52
		8	7	21.43	21.44	21.60
		15	0	20.14	20.20	20.24
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				19975/1712.5	20175/1732.5	20375/1752.5
5MHz	QPSK	1	0	22.17	22.02	21.87
		1	13	21.98	21.87	21.66
		1	24	22.07	22.00	22.06
		12	0	22.01	21.87	22.17
		12	6	21.86	21.92	22.04
		12	13	21.80	22.01	22.09
		25	0	20.97	21.02	20.21



			1	0	21.64	21.34	21.70
			1	13	21.16	21.09	21.18
			1	24	21.25	21.29	21.57
			12	0	21.28	21.50	21.49
			12	6	21.33	21.42	21.48
			12	13	21.40	21.39	21.56
			25	0	20.12	20.16	20.19
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			
				20000/1715	20175/1732.5	20350/1750	
10MHz	QPSK	1	0	22.19	22.03	21.90	
		1	25	22.01	21.92	21.70	
		1	49	22.09	22.04	22.09	
		25	0	22.04	21.92	22.21	
		25	13	21.89	21.97	22.08	
		25	25	21.82	22.05	22.14	
		50	0	21.05	21.04	20.25	
	16QAM	1	0	21.66	21.37	21.72	
		1	25	21.19	21.13	21.21	
		1	49	21.28	21.31	21.60	
		25	0	21.31	21.55	21.53	
		25	13	21.35	21.46	21.51	
		25	25	21.43	21.44	21.60	
		50	0	20.15	20.21	20.23	
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			
				20025/1717.5	20175/1732.5	20325/1747.5	
15MHz	QPSK	1	0	22.18	21.99	21.88	
		1	38	21.99	21.91	21.67	
		1	74	22.06	21.99	22.05	
		36	0	22.02	21.88	22.18	
		36	18	21.86	21.92	22.04	
		36	39	21.79	22.02	22.10	
		75	0	21.03	21.00	20.20	
	16QAM	1	0	21.61	21.35	21.70	
		1	38	21.17	21.10	21.19	
		1	74	21.25	21.27	21.57	
		36	0	21.28	21.53	21.50	
		36	18	21.32	21.41	21.47	
		36	39	21.41	21.40	21.57	
		75	0	20.12	20.16	20.19	
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			
				20050/1720	20175/1732.5	20300/1745	
20MHz	QPSK	1	0	22.15	21.95	21.85	
		1	50	21.98	21.87	21.65	



		1	99	22.04	21.98	22.02
		50	0	21.99	21.83	22.14
		50	25	21.84	21.88	22.01
		50	50	21.76	21.97	22.06
		100	0	21.00	20.95	20.16
	16QAM	1	0	21.59	21.31	21.65
		1	50	21.13	21.08	21.15
		1	99	21.23	21.24	21.55
		50	0	21.25	21.49	21.47
		50	25	21.29	21.39	21.44
		50	50	21.38	21.35	21.53
		100	0	20.10	20.12	20.16

LTE Band 12				AV Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				23017/699.7	23095/707.5	23173/715.3
1.4MHz	QPSK	1	0	22.97	23.03	22.89
		1	2	22.99	23.18	23.10
		1	5	23.18	23.20	22.96
		3	0	23.01	23.08	23.01
		3	2	22.97	22.95	23.04
		3	3	23.13	22.98	23.11
		6	0	22.13	22.26	22.05
	16QAM	1	0	22.34	22.76	22.09
		1	2	22.13	22.33	22.23
		1	5	22.48	22.48	22.40
		3	0	22.27	22.16	22.14
		3	2	22.47	22.38	22.54
		3	3	22.62	22.47	22.60
		6	0	21.22	21.25	21.04
3MHz	QPSK	RB size	RB offset	Channel/Frequency (MHz)		
				23025/700.5	23095/707.5	23165/714.5
		1	0	22.86	22.93	23.07
		1	7	22.76	22.25	23.06
		1	14	22.98	23.03	22.94
		8	0	22.84	22.92	22.97
		8	4	22.85	22.97	22.92
	16QAM	8	7	23.00	23.18	22.97
		15	0	22.13	22.16	22.19
		1	0	22.56	22.42	22.88
		1	7	22.28	22.17	22.26



		1	14	22.55	22.54	22.29
		8	0	22.35	22.30	22.93
		8	4	22.36	22.36	22.77
		8	7	22.50	22.43	22.81
		15	0	21.23	21.21	21.29
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				23035/701.5	23095/707.5	23155/713.5
5MHz	QPSK	1	0	22.83	22.91	23.03
		1	13	22.74	22.21	23.03
		1	24	22.95	22.98	22.90
		12	0	22.81	22.87	22.93
		12	6	22.83	22.93	22.87
		12	13	22.98	23.16	22.93
		25	0	22.11	22.15	22.17
	16QAM	1	0	22.53	22.38	22.85
		1	13	22.25	22.15	22.23
		1	24	22.52	22.52	22.25
		12	0	22.33	22.26	22.90
		12	6	22.33	22.31	22.73
		12	13	22.47	22.38	22.77
		25	0	21.21	21.17	21.24
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				23060/704	23095/707.5	23130/711
10MHz	QPSK	1	0	22.81	22.84	23.01
		1	25	22.74	22.21	23.02
		1	49	22.92	22.96	22.86
		25	0	22.79	22.83	22.90
		25	13	22.81	22.89	22.84
		25	25	22.94	23.12	22.90
		50	0	22.14	22.08	22.12
	16QAM	1	0	22.48	22.35	22.80
		1	25	22.22	22.14	22.20
		1	49	22.50	22.47	22.23
		25	0	22.30	22.25	22.88
		25	13	22.29	22.28	22.69
		25	25	22.45	22.34	22.74
		50	0	21.19	21.13	21.21

LTE Band 13				Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				23205/779.5	23230/782	23255/784.5
5MHz	QPSK	1	0	22.59	22.62	22.82
		1	13	21.70	22.78	22.80



		1	24	22.66	22.80	22.68
		12	0	22.78	22.70	22.87
		12	6	22.79	22.68	22.61
		12	13	22.91	22.78	22.64
		25	0	21.71	21.81	21.93
	16QAM	1	0	21.77	21.30	22.40
		1	13	21.70	21.29	22.21
		1	24	21.75	21.36	22.15
		12	0	21.45	21.33	22.25
		12	6	21.64	21.26	22.19
		12	13	21.72	21.34	22.25
		25	0	20.85	20.99	20.97
		RB size	RB offset	Channel/Frequency (MHz)		
				/	23230/782	/
10MHz	QPSK	1	0	/	22.66	/
		1	25	/	22.64	/
		1	49	/	22.79	/
		25	0	/	22.62	/
		25	13	/	22.59	/
		25	25	/	22.86	/
		50	0	/	21.89	/
	16QAM	1	0	/	22.48	/
		1	25	/	22.02	/
		1	49	/	22.55	/
		25	0	/	22.56	/
		25	13	/	22.29	/
		25	25	/	22.16	/
		50	0	/	20.85	/

LTE Band 17				Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				23755/706.5	23790/710	23825/713.5
5MHz	QPSK	1	0	23.06	22.82	22.88
		1	13	22.83	22.98	22.76
		1	24	22.95	22.89	22.83
		12	0	23.03	22.80	22.99
		12	6	22.92	22.89	22.91
		12	13	22.91	22.95	23.00
		25	0	21.86	21.87	21.95
16QAM	16QAM	1	0	21.81	21.47	22.41
		1	13	21.85	21.88	22.34
		1	24	21.96	21.87	22.24
		12	0	21.77	21.94	22.38



		12	6	21.56	21.87	22.18
		12	13	21.75	21.50	22.32
		25	0	20.82	20.90	20.93
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
10MHz	QPSK	1	0	23.07	22.55	22.88
		1	25	23.08	22.44	22.87
		1	49	22.90	22.42	23.07
		25	0	23.22	23.14	23.13
		25	13	23.09	23.09	23.01
		25	25	23.12	23.06	23.05
		50	0	22.04	22.02	22.05
	16QAM	1	0	22.98	22.03	22.36
		1	25	22.67	22.84	22.05
		1	49	22.51	23.14	22.46
		25	0	22.68	22.52	22.42
		25	13	22.49	22.41	22.39
		25	25	22.48	22.48	22.48
		50	0	21.01	20.91	20.95



5.2 Effective Isotropic Radiated Power

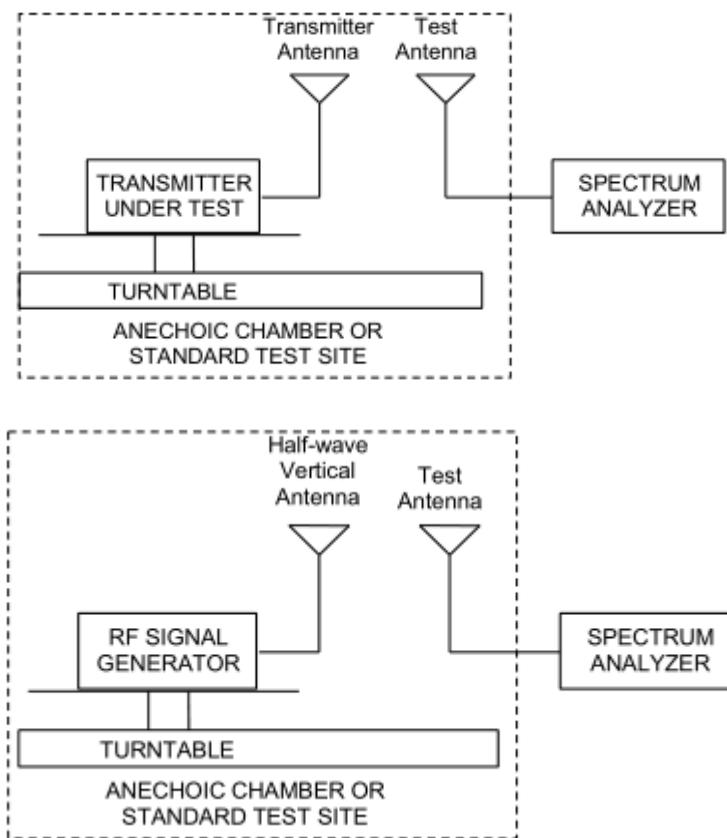
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

1. The testing follows FCC KDB 971168 v02r02 Section 5.8 and ANSI/TIA-603-D-2010.
 - a) Connect the equipment as illustrated. Mount the equipment with the manufacturer specified antenna in a vertical orientation on a manufacturer specified mounting surface located on a non-conducting rotating platform of a RF anechoic chamber (preferred) or a standard radiation site.
 - b) Key the transmitter, then rotate the EUT 360° azimuthally and record spectrum analyzer power level (LVL) measurements at angular increments that are sufficiently small to permit resolution of all peaks. If a standard radiation test site is used, raise and lower the test antenna to obtain a maximum reading at each angular increment. (Note: several batteries may be needed to offset the effect of battery voltage droop, which should not exceed 5% of the manufactured specified battery voltage during transmission).
 - c) Replace the transmitter under test with a vertically polarized half-wave dipole (or an antenna whose gain is known relative to an ideal half-wave dipole). The center of the antenna should be at the same location as the center of the antenna under test.
 - d) Connect the antenna to a signal generator with a known output power and record the path loss (in dB) as LOSS. If a standard radiation test site is used, raise and lower the test antenna to obtain a maximum reading.
$$\text{LOSS} = \text{Generator Output Power (dBm)} - \text{Analyzer reading (dBm)}$$
 - e) Determine the effective radiated output power at each angular position from the readings in steps b) and d) using the following equation:
$$\text{ERP (dBm)} = \text{LVL (dBm)} + \text{LOSS (dB)}$$
 - f) The maximum ERP is the maximum value determined in the preceding step.
 - g) When calculating ERP, in addition to knowing the antenna radiation and matching characteristics, it is necessary to know the loss values of all elements (e.g.transmission line attenuation, mismatches, filters, combiners) interposed between the point where transmitter output power is measured, and the point where power is applied to the antenna. ERP can then be calculated as follows:
$$\text{ERP (dBm)} = \text{Output Power (dBm)} - \text{Losses (dB)} + \text{Antenna Gain (dBd)}$$
where: dBd refers to gain relative to an ideal dipole.
$$\text{EIRP (dBm)} = \text{ERP (dBm)} + 2.15 (\text{dB})$$

Test setup



Note: Area side:2.4mX3.6m

The radiated emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in stand-up position (Z axis) and the worst case was recorded.



Limits

Rule Part 27.50(b) (10) specifies that “Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP”

Rule Part 27.50(c) (10) specifies that “Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP”

Rule Part 27.50(d) (4) specifies that “Fixed, mobile and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP”

Part 27.50(b)(10)Limit (ERP) -LTE 13	$\leq 3 \text{ W}$ (34.77 dBm)
Part 27.50(c)(10)Limit (ERP) -LTE 12/17	$\leq 3 \text{ W}$ (34.77 dBm)
Part 27.50(d)(4)Limit (EIRP) -LTE 4	$\leq 1 \text{ W}$ (30 dBm)

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 1.19 \text{ dB}$



Test Results

The measurement is performed for both of horizontal and vertical antenna Polarization, and only the data of worst mode is recorded in this report.

Mode	Channel	Frequency (MHz)	Polarization	Output Power (dBm)	Losses (dB)	Antenna Gain (dBi)	EIRP (dBm)	Conclusion
WCDMA Band IV	Low	1712.4	Horizontal	-23.81	-45.44	1.82	23.45	Pass
	Mid	1732.6	Horizontal	-23.83	-45.38	1.96	23.51	Pass
	High	1752.6	Horizontal	-23.93	-45.38	1.93	23.38	Pass

LTE Band 4								
Bandwidth	Channel	Frequency (MHz)	Polarization	Output Power (dBm)	Losses (dB)	Antenna Gain (dBi)	EIRP (dBm)	Conclusion
1.4 MHz (QPSK)	Low	1710.7	Horizontal	-29.67	-54.30	1.44	26.06	Pass
	Mid	1732.5	Horizontal	-30.41	-54.32	1.57	25.48	Pass
	High	1754.3	Horizontal	-30.74	-54.10	1.72	25.08	Pass
3 MHz (QPSK)	Low	1711.5	Horizontal	-29.59	-54.35	1.44	26.20	Pass
	Mid	1732.5	Horizontal	-30.33	-54.41	1.57	25.64	Pass
	High	1753.5	Horizontal	-30.82	-54.48	1.72	25.38	Pass
5 MHz (QPSK)	Low	1712.5	Horizontal	-29.74	-54.34	1.44	26.03	Pass
	Mid	1732.5	Horizontal	-30.37	-54.32	1.57	25.52	Pass
	High	1752.5	Horizontal	-30.70	-54.13	1.72	25.14	Pass
10 MHz (QPSK)	Low	1715	Horizontal	-29.62	-54.32	1.44	26.14	Pass
	Mid	1732.5	Horizontal	-30.16	-54.41	1.57	25.82	Pass
	High	1750	Horizontal	-30.16	-54.52	1.66	26.02	Pass
15 MHz (QPSK)	Low	1717.5	Horizontal	-28.85	-54.35	1.49	26.98	Pass
	Mid	1732.5	Horizontal	-29.14	-54.32	1.57	26.74	Pass
	High	1747.5	Horizontal	-29.18	-54.17	1.66	26.65	Pass
20 MHz (QPSK)	Low	1720	Horizontal	-29.03	-54.44	1.49	26.89	Pass
	Mid	1732.5	Horizontal	-29.03	-54.41	1.57	26.95	Pass
	High	1745	Horizontal	-29.66	-54.59	1.63	26.56	Pass
1.4 MHz (16QAM)	Low	1710.7	Horizontal	-29.89	-54.30	1.44	25.85	Pass
	Mid	1732.5	Horizontal	-30.73	-54.32	1.57	25.15	Pass
	High	1754.3	Horizontal	-30.97	-54.10	1.72	24.85	Pass
3 MHz (16QAM)	Low	1711.5	Horizontal	-29.79	-54.35	1.44	26.00	Pass
	Mid	1732.5	Horizontal	-30.43	-54.41	1.57	25.55	Pass
	High	1753.5	Horizontal	-31.05	-54.48	1.72	25.15	Pass
5 MHz (16QAM)	Low	1712.5	Horizontal	-29.93	-54.34	1.44	25.85	Pass
	Mid	1732.5	Horizontal	-30.63	-54.32	1.57	25.25	Pass
	High	1752.5	Horizontal	-30.84	-54.13	1.72	25.00	Pass



10 MHz (16QAM)	Low	1715	Horizontal	-29.77	-54.32	1.44	25.99	Pass
	Mid	1732.5	Horizontal	-30.36	-54.41	1.57	25.62	Pass
	High	1750	Horizontal	-30.30	-54.52	1.66	25.88	Pass
15 MHz (16QAM)	Low	1717.5	Horizontal	-29.08	-54.35	1.49	26.75	Pass
	Mid	1732.5	Horizontal	-29.33	-54.32	1.57	26.55	Pass
	High	1747.5	Horizontal	-29.38	-54.17	1.66	26.45	Pass
20 MHz (16QAM)	Low	1720	Horizontal	-29.27	-54.44	1.49	26.66	Pass
	Mid	1732.5	Horizontal	-29.32	-54.41	1.57	26.66	Pass
	High	1745	Horizontal	-29.83	-54.59	1.63	26.39	Pass

LTE Band 12								
Bandwidth	Channel	Frequency (MHz)	Polarization	Output Power (dBm)	Losses (dB)	Antenna Gain (dBi)	ERP (dBm)	Conclusion
1.4 MHz (QPSK)	Low	699.7	Horizontal	-28.39	-49.12	2.04	22.77	Pass
	Mid	707.5	Horizontal	-28.39	-49.39	2.03	23.04	Pass
	High	715.3	Horizontal	-28.63	-49.76	1.99	23.12	Pass
3 MHz (QPSK)	Low	700.5	Horizontal	-28.30	-48.94	2.04	22.69	Pass
	Mid	707.5	Horizontal	-28.15	-49.12	2.03	23.01	Pass
	High	714.5	Horizontal	-28.44	-49.37	2.00	22.93	Pass
5 MHz (QPSK)	Low	701.5	Horizontal	-28.65	-49.17	2.04	22.57	Pass
	Mid	707.5	Horizontal	-28.62	-49.39	2.03	22.80	Pass
	High	713.5	Horizontal	-28.89	-49.72	2.01	22.84	Pass
10 MHz (QPSK)	Low	704	Horizontal	-28.57	-49.00	2.04	22.48	Pass
	Mid	707.5	Horizontal	-28.21	-49.12	2.03	22.94	Pass
	High	711	Horizontal	-28.56	-49.33	2.02	22.78	Pass
1.4 MHz (16QAM)	Low	699.7	Horizontal	-28.65	-49.12	2.04	22.51	Pass
	Mid	707.5	Horizontal	-28.72	-49.39	2.03	22.71	Pass
	High	715.3	Horizontal	-28.90	-49.76	1.99	22.85	Pass
3 MHz (16QAM)	Low	700.5	Horizontal	-28.47	-48.94	2.04	22.51	Pass
	Mid	707.5	Horizontal	-28.30	-49.12	2.03	22.85	Pass
	High	714.5	Horizontal	-28.70	-49.37	2.00	22.67	Pass
5 MHz (16QAM)	Low	701.5	Horizontal	-28.82	-49.17	2.04	22.40	Pass
	Mid	707.5	Horizontal	-28.92	-49.39	2.03	22.51	Pass
	High	713.5	Horizontal	-29.10	-49.72	2.01	22.62	Pass
10 MHz (16QAM)	Low	704	Horizontal	-28.86	-49.00	2.04	22.18	Pass
	Mid	707.5	Horizontal	-28.42	-49.12	2.03	22.73	Pass
	High	711	Horizontal	-28.83	-49.33	2.02	22.51	Pass



LTE Band 13								
Bandwidth	Channel	Frequency (MHz)	Polarization	Output Power (dBm)	Losses (dB)	Antenna Gain (dBd)	ERP (dBm)	Conclusion
5MHz (QPSK)	Low	779.5	Horizontal	-25.18	-47.01	1.81	23.64	Pass
	Mid	782	Horizontal	-25.35	-47.17	1.81	23.63	Pass
	High	784.5	Horizontal	-25.96	-47.59	1.83	23.47	Pass
10MHz (QPSK)	Mid	782	Horizontal	-24.76	-46.58	1.81	23.63	Pass
5MHz (16QAM)	Low	779.5	Horizontal	-25.52	-47.01	1.81	23.30	Pass
	Mid	782	Horizontal	-25.47	-47.17	1.81	23.51	Pass
	High	784.5	Horizontal	-26.12	-47.59	1.83	23.30	Pass
10MHz (16QAM)	Mid	782	Horizontal	-24.88	-46.58	1.81	23.51	Pass

LTE Band 17								
Bandwidth	Channel	Frequency (MHz)	Polarization	Output Power (dBm)	Losses (dB)	Antenna Gain (dBd)	ERP (dBm)	Conclusion
5MHz (QPSK)	Low	706.5	Horizontal	-26.59	-47.47	1.92	22.80	Pass
	Mid	710	Horizontal	-27.04	-47.75	1.90	22.61	Pass
	High	713.5	Horizontal	-26.98	-47.72	1.91	22.64	Pass
10MHz (QPSK)	Low	709	Horizontal	-26.41	-47.49	1.91	22.98	Pass
	Mid	710	Horizontal	-26.61	-47.49	1.90	22.78	Pass
	High	711	Horizontal	-26.62	-47.48	1.90	22.76	Pass
5MHz (16QAM)	Low	706.5	Horizontal	-26.88	-47.47	1.92	22.51	Pass
	Mid	710	Horizontal	-27.29	-47.75	1.90	22.37	Pass
	High	713.5	Horizontal	-27.27	-47.72	1.91	22.35	Pass
10MHz (16QAM)	Low	709	Horizontal	-26.54	-47.49	1.91	22.85	Pass
	Mid	710	Horizontal	-26.87	-47.49	1.90	22.53	Pass
	High	711	Horizontal	-27.28	-47.48	1.90	22.10	Pass

5.3 Occupied Bandwidth

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The occupied bandwidth is measured using spectrum analyzer.

RBW is set to 51 kHz, VBW is set to 160 kHz for WCDMA Band IV.

RBW is set to 51 kHz, VBW is set to 160 kHz for LTE Band 4/12 (1.4MHz).

RBW is set to 100 kHz, VBW is set to 300 kHz for LTE Band 4/12 (3MHz).

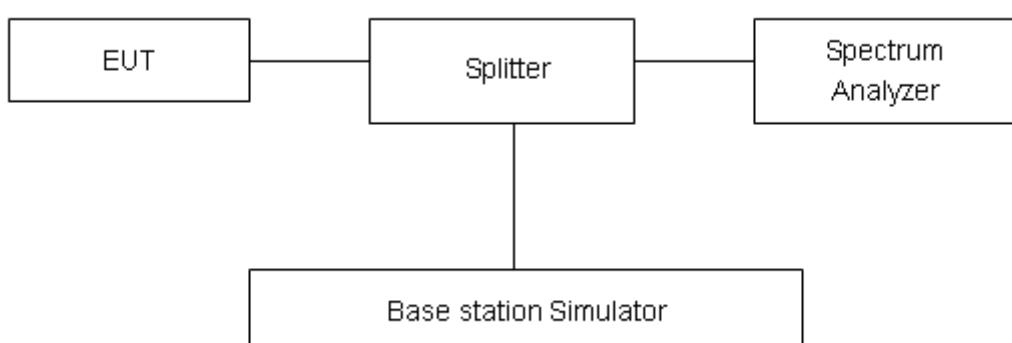
RBW is set to 100 kHz, VBW is set to 300 kHz for LTE Band 4/12/13 (5MHz).

RBW is set to 300 kHz, VBW is set to 1MHz for LTE Band 4/12/13/17 (10MHz).

RBW is set to 300 kHz, VBW is set to 1MHz for LTE Band 4/17 (15MHz/20MHz).

99% power and -26dBc occupied bandwidths are recorded. Spectrum analyzer plots are included on the following pages.

Test Setup



Limits

No specific occupied bandwidth requirements in part 2.1049.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U=624\text{Hz}$.



Test Result

Mode	Channel	Frequency (MHz)	99% Power Bandwidth(MHz)	-26dBc Bandwidth(MHz)
WCDMA Band IV (RMC)	1537	2112.4	4.1396	4.702
	1638	2132.6	4.1462	4.693
	1738	2152.6	4.1399	4.711

LTE Band 4						
RB	Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	99% Power Bandwidth(MHz)	-26dBc Bandwidth(MHz)
100%	QPSK	1.4	19957	1710.7	1.1149	1.339
			20175	1732.5	1.1140	1.301
			20393	1754.3	1.1125	1.323
		3	19965	1711.5	2.7321	2.982
			20175	1732.5	2.7316	2.990
			20385	1753.5	2.7314	2.983
		5	19975	1712.5	4.5042	4.906
			20175	1732.5	4.5018	4.873
			20375	1752.5	4.5022	4.892
		10	20000	1715	9.0463	9.768
			20175	1732.5	9.0526	9.769
			20350	1750	9.0392	9.799
		15	20025	1717.5	13.4460	14.300
			20175	1732.5	13.4680	14.400
			20325	1747.5	13.4420	14.290
		20	20050	1720	17.8670	18.760
			20175	1732.5	17.8940	18.800
			20300	1745	17.8370	18.720
16QAM	1.4	19957	1710.7	1.1127	1.280	
		20175	1732.5	1.1129	1.282	
		20393	1754.3	1.1130	1.281	
	3	19965	1711.5	2.7338	2.994	
		20175	1732.5	2.7320	3.001	
		20385	1753.5	2.7333	2.985	
	5	19975	1712.5	4.5025	4.857	
		20175	1732.5	4.5041	4.871	
		20375	1752.5	4.5041	4.878	
	10	20000	1715	9.0167	9.726	
		20175	1732.5	9.0268	9.720	



			20350	1750	9.0221	9.748	
15		15	20025	1717.5	13.4370	14.270	
			20175	1732.5	13.4600	14.260	
			20325	1747.5	13.4240	14.260	
		20	20050	1720	17.8480	18.770	
100%			20175	1732.5	17.8950	18.790	
			20300	1745	17.8310	18.740	

LTE Band 12						
RB	Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	99% Power Bandwidth(MHz)	-26dBc Bandwidth(MHz)
100%	QPSK	1.4	23017	699.7	1.1122	1.299
			23095	707.5	1.1118	1.301
			23173	715.3	1.1124	1.298
		3	23025	700.5	2.7315	2.996
			23095	707.5	2.7326	2.980
			23165	714.5	2.7329	3.000
		5	23035	701.5	4.4989	4.895
			23095	707.5	4.5015	4.892
			23155	713.5	4.4966	4.887
	16QAM	10	23060	704	9.0546	9.777
			23095	707.5	9.0422	9.766
			23130	711	9.0284	9.771
		1.4	23017	699.7	1.1120	1.272
			23095	707.5	1.1126	1.269
			23173	715.3	1.1133	1.273
		3	23025	700.5	2.7295	3.001
			23095	707.5	2.7270	3.005
			23165	714.5	2.7349	2.991
		5	23035	701.5	4.5004	4.884
			23095	707.5	4.4999	4.865
			23155	713.5	4.5047	4.871
		10	23060	704	9.0328	9.741
			23095	707.5	9.0174	9.746
			23130	711	9.0034	9.725

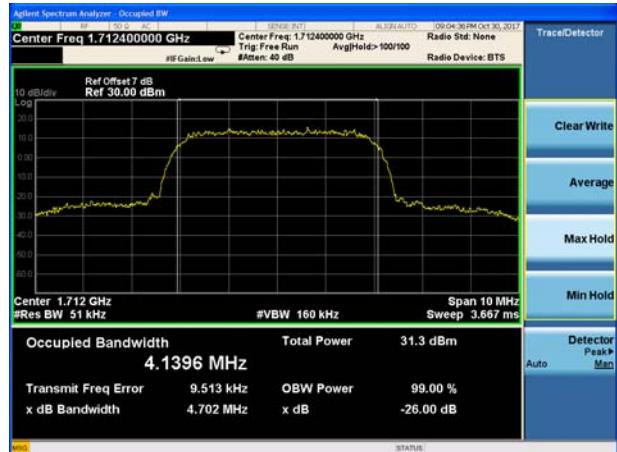


LTE Band 13						
RB	Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	99% Power Bandwidth(MHz)	-26dBc Bandwidth(MHz)
100%	QPSK	5	23205	779.5	4.4953	4.911
			23230	782	4.5005	4.900
			23255	784.5	4.5034	4.848
	16QAM	10	23230	782	9.0424	9.767
			23230	782	4.5046	4.863
			23230	782	4.4998	4.855
	16QAM	5	23205	779.5	4.5063	4.899
			23230	782	9.0243	9.731
			23255	784.5	4.4953	4.911
	16QAM	10	23230	782	4.5005	4.900
			23230	782	4.5034	4.848
			23230	782	9.0424	9.767

LTE Band 17						
RB	Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	99% Power Bandwidth(MHz)	-26dBc Bandwidth(MHz)
100%	QPSK	5	23755	706.5	4.4961	4.890
			23790	710	4.4989	4.870
			23825	713.5	4.5024	4.831
	16QAM	10	23780	709	9.0272	9.771
			23790	710	9.0320	9.767
			23800	711	9.0273	9.768
	16QAM	5	23755	706.5	4.5043	4.871
			23790	710	4.5020	4.836
			23825	713.5	4.5079	4.852
	16QAM	10	23780	709	9.0087	9.726
			23790	710	9.0003	9.709
			23800	711	9.0030	9.715



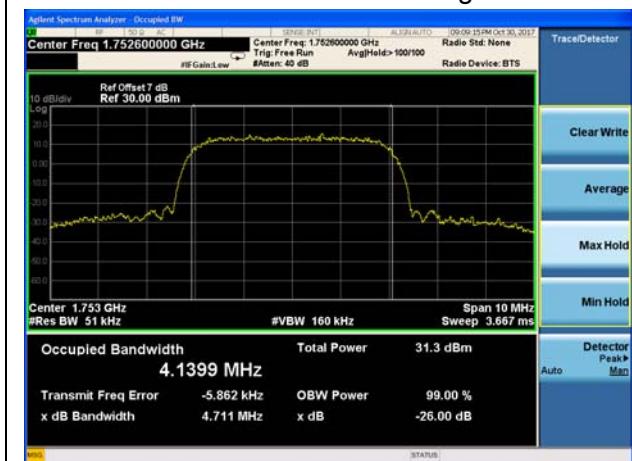
WCDMA Band IV CH-Low



WCDMA Band IV CH Middle

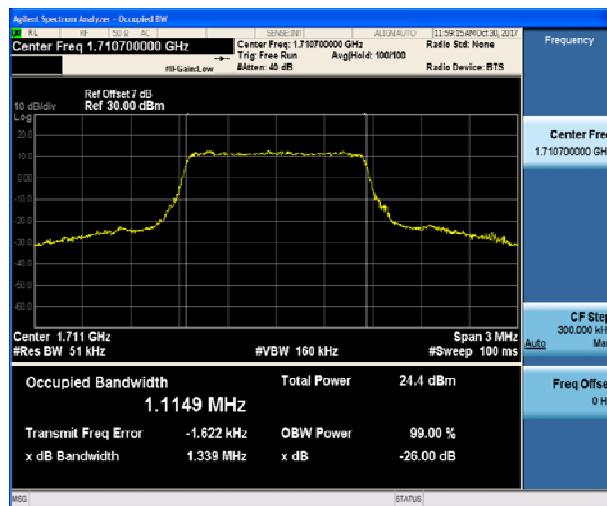


WCDMA Band IV CH High

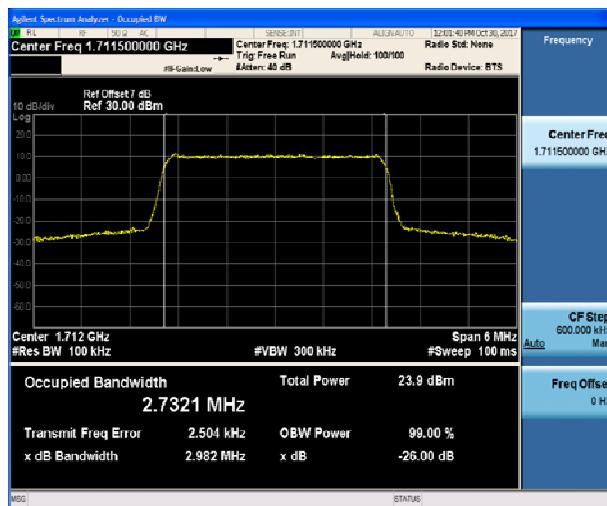




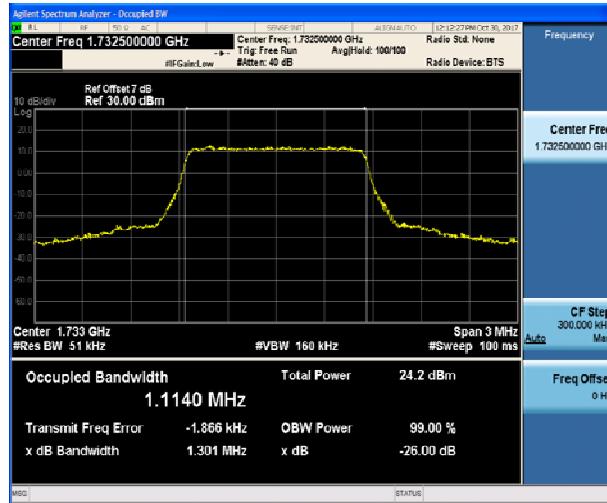
LTE Band 4 QPSK 1.4MHz CH-Low



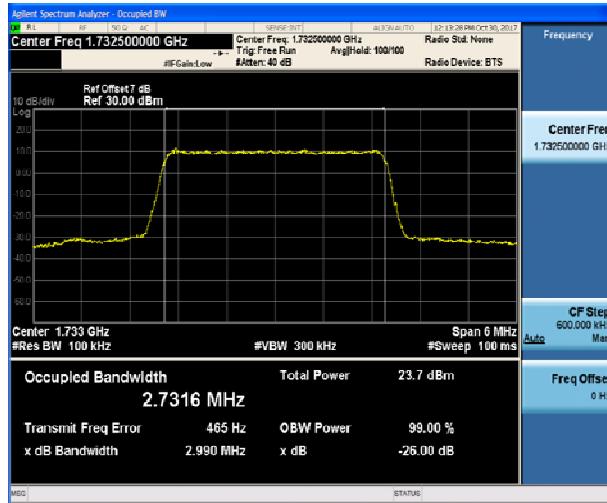
LTE Band 4 QPSK 3MHz CH-Low



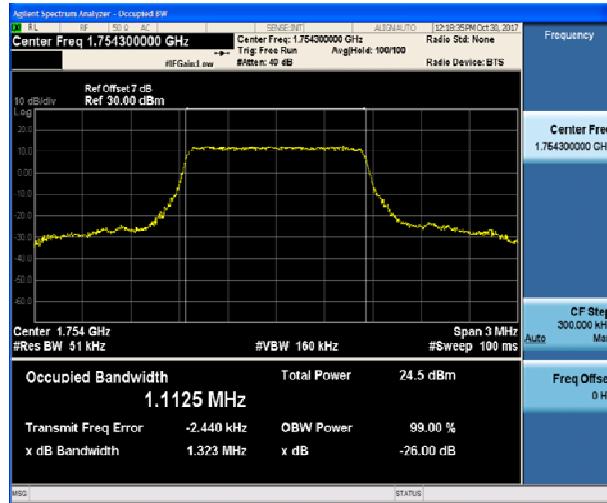
LTE Band 4 QPSK 1.4MHz CH-Middle



LTE Band 4 QPSK 3MHz CH-Middle



LTE Band 4 QPSK 1.4MHz CH-High

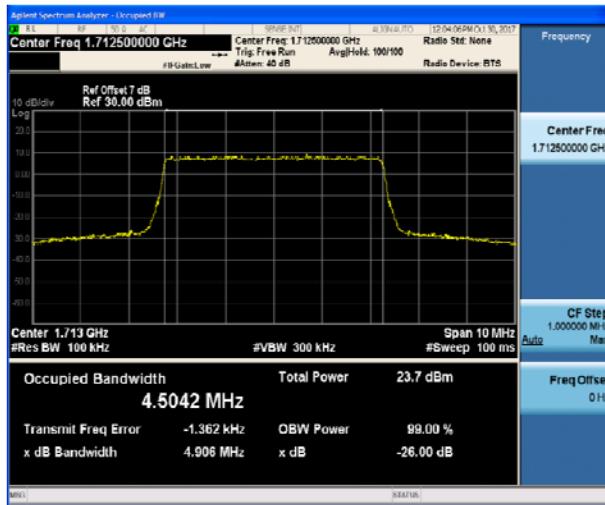


LTE Band 4 QPSK 3MHz CH-High





LTE Band 4 QPSK 5MHz CH-Low



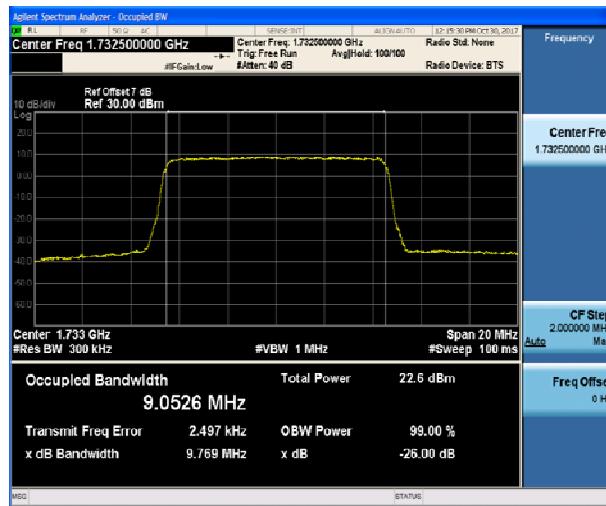
LTE Band 4 QPSK 10MHz CH-Low



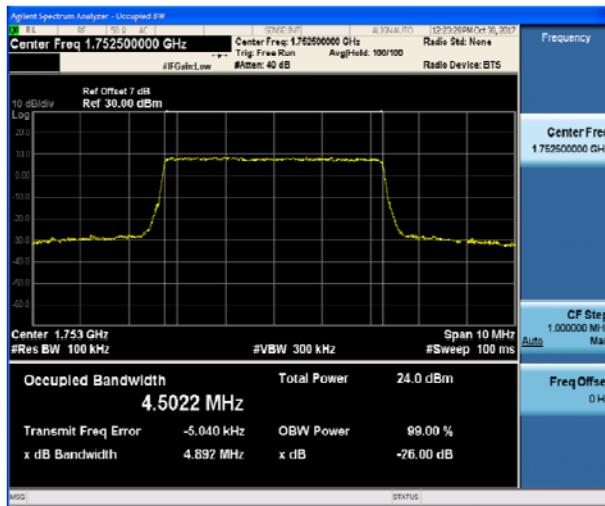
LTE Band 4 QPSK 5MHz CH-Middle



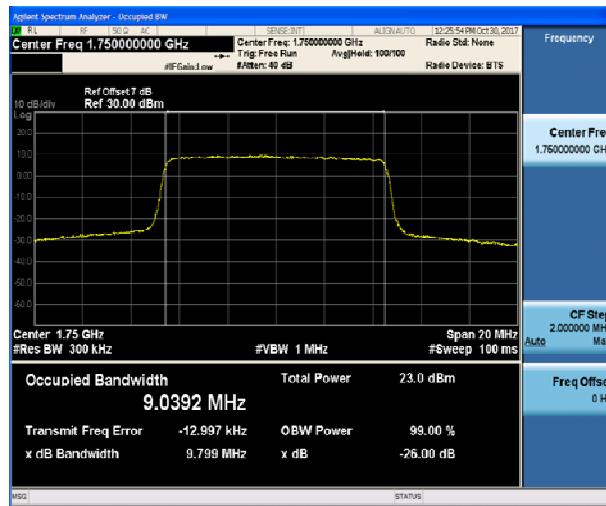
LTE Band 4 QPSK 10MHz CH-Middle



LTE Band 4 QPSK 5MHz CH-High

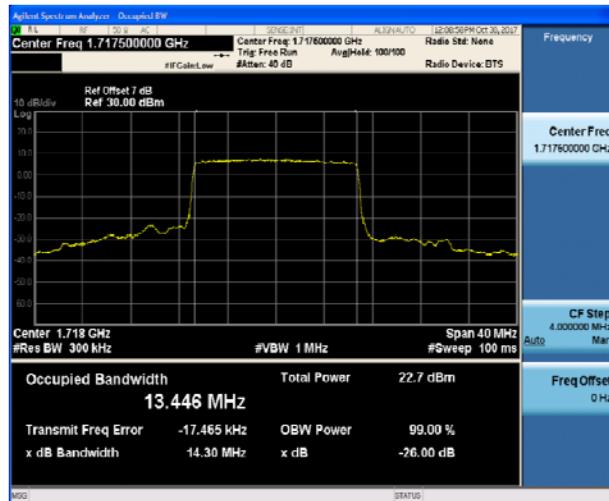


LTE Band 4 QPSK 10MHz CH-High

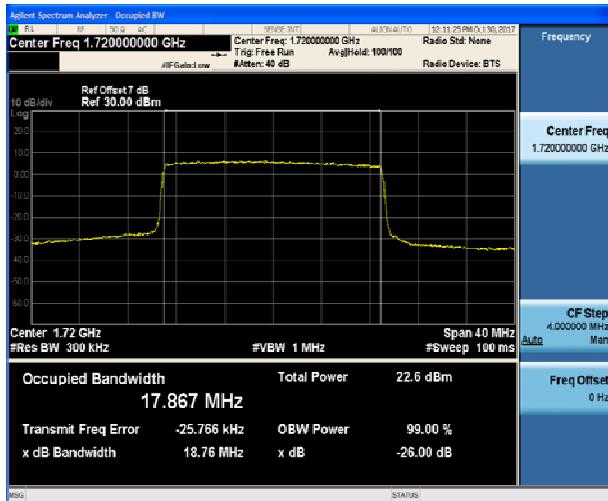




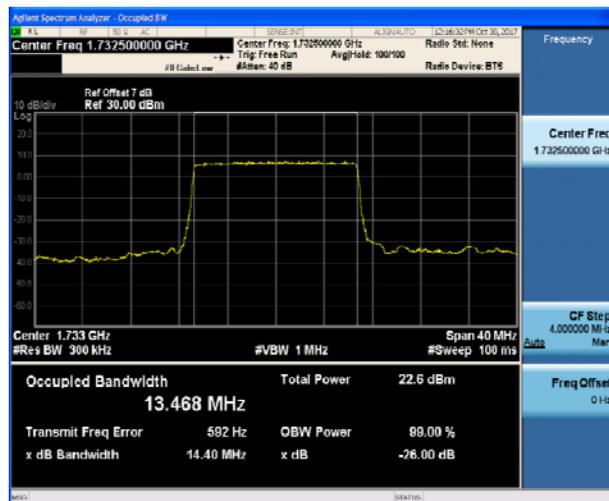
LTE Band 4 QPSK 15MHz CH-Low



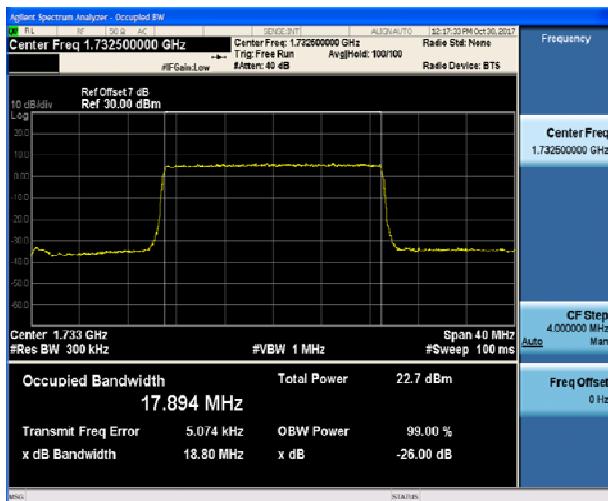
LTE Band 4 QPSK 20MHz CH-Low



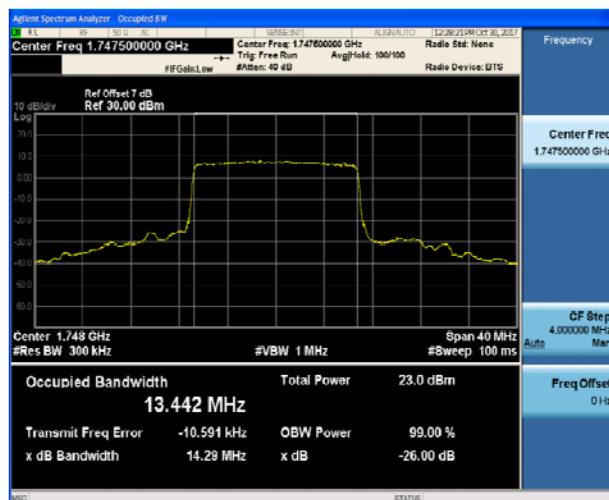
LTE Band 4 QPSK15MHz CH-Middle



LTE Band 4 QPSK 20MHz CH-Middle



LTE Band 4 QPSK 15MHz CH-High



LTE Band 4 QPSK 20MHz CH-High

