FCC CFR47 PART 24 SUBPART E
FCC CFR47 PART 22 SUBPART H
FCC CFR47 PART 27 SUBPART H

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/LTE Phone + Bluetooth, DTS/UNII a/b/g/n & NFC

MODEL NUMBER: SM-C115L

FCC ID: A3LSMC115L

REPORT NUMBER: 14U17495-1, Revision A

ISSUE DATE: May 2, 2014

Prepared for

SAMSUNG ELECTRONICS CO., LTD.
416, MAETAN 3-DONG, YEONGTONG-GU
SUWON-CITY, GYEONGGI-DO 443-742, SOUTH KOREA

Prepared by

UL VERIFICATION SERVICES INC.
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888

Revision History

Rev.	Issue Date	Revisions	Revised By
--	4/22/14	Initial Issue	P. Kim
A	5/2/14	Updated frequency stability table	P. Zhang

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS 5
2. TEST METHODOLOGY 6
3. FACILITIES AND ACCREDITATION 6
4. CALIBRATION AND UNCERTAINTY 6
4.1. MEASURING INSTRUMENT CALIBRATION 6
4.2. SAMPLE CALCULATION 6
4.3. MEASUREMENT UNCERTAINTY 6
5. EQUIPMENT UNDER TEST 7
5.1. DESCRIPTION OF EUT 7
5.2. MAXIMUM OUTPUT POWER 7
5.3. MAXIMUM OUTPUT POWER (LTE) 8
5.4. DESCRIPTION OF AVAILABLE ANTENNAS 10
5.5. DESCRIPTION OF TEST SETUP 11
6. TEST AND MEASUREMENT EQUIPMENT 14
7. Summary Table 15
8. RF POWER OUTPUT VERIFICATION 16
8.1. GSM/GPRS/EDGE 16
8.1.1. GSM OUTPUT POWER RESULT 17
8.2. UMTS REL 99 18
8.2.1. UMTS REL 99 OUTPUT POWER RESULT 18
8.3. UMTS HSDPA 19
8.3.1. UMTS HSDPA OUTPUT POWER RESULT 19
8.3.2. UMTS HSUPA 21
8.3.3. UMTS HSUPA OUTPUT POWER RESULT 22
8.4. LTE OUTPUT VERIFICATION 23
8.4.1. LTE OUTPUT RESULT 23
9. PEAK TO AVERAGE RATIO 26
9.1. CONDUCTED PEAK TO AVERAGE RESULT 26
10. LIMITS AND CONDUCTED RESULTS 34
10.1. OCCUPIED BANDWIDTH 34

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

10.1.1. OCCUPIED BANDWIDTH RESULTS 35
10.1.2. LTE OCCUPIED BANDWIDTH RESULTS 36
10.1.3. OCCUPIED BANDWIDTH PLOTS 38
10.2. BAND EDGE EMISSIONS 52
10.2.1. BAND EDGE PLOTS 53
10.3. OUT OF BAND EMISSIONS 68
10.3.1. OUT OF BAND EMISSIONS RESULT 69
10.3.2. OUT OF BAND EMISSIONS PLOTS 72
10.4. FREQUENCY STABILITY 85
10.4.1. FREQUENCY STABILITY RESULTS 86
11. RADIATED TEST RESULTS 89
11.1. RADIATED POWER (ERP & EIRP) 89
11.1.1. ERP/EIRP Results 89
11.1.2. LTE ERP/EIRP Results 91
11.1.3. ERP/EIRP PLOTS 93
11.2. FIELD STRENGTH OF SPURIOUS RADIATION 110
11.2.1. SPURIOUS RADIATION DATA 111
12. SETUP PHOTOS 128

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: **SAMSUNG ELECTRONICS CO., LTD.**

EUT DESCRIPTION: **GSM/WCDMA/LTE Phone + Bluetooth & DTS/UNII a/b/g/n + NFC**

MODEL: **SM-C115L**

SERIAL NUMBER: **FL-131-A (Radiated& Conducted)**

DATE TESTED: **APRIL 8 – 22, 2014**

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 22H, 24E and 27H	PASS

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For

UL Verification Services Inc. By:

PHILIP KIM

CONSUMER TECHNOLOGY DIVISION
PROGRAM MANAGER
UL Verification Services Inc.

Tested By:

CHARLES VERGONIO

CONSUMER TECHNOLOGY DIVISION
LAB ENGINEER
UL Verification Services Inc.

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with TIA-603-C, FCC CFR 47 Part 22, FCC CFR Part 24, FCC CFR 47 Part 27

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ul.com

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

EIRP = PSA reading with EUT worst orientation (dBm) + Path loss (dB) – cable loss(between the SG and substitution antenna) + Substitution Antenna Factor (dBi)

ERP = PSA reading with EUT worst orientation (dBm) + Path loss (dB) – cable loss(between the SG and substitution antenna)

(Path loss = Signal generator output – PSA reading with substitution antenna)

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 18000 MHz	4.94 dB

Uncertainty figures are valid to a confidence level of 95%.

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE Phone + Bluetooth & DTS/UNII a/b/g/n + NFC.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted and radiated ERP / EIRP output powers as follows:

FCC Part 24						
Band	Frequency Range(MHz)	Modulation Peak	Conducted		Radiated	
			Peak (dBm)	Peak(mW)	Peak (dBm)	Peak(mW)
GSM1900	1850~1910	GMSK	29.6	912		
	1850~1910	GPRS	29.6	912	27.1	512.86

FCC Part 22/24						
Band	Frequency Range(MHz)	Modulation Peak	Conducted		Radiated	
			Avg (dBm)	Avg (mW)	Avg (dBm)	Avg (mW)
Band 5	824~849	REL99	23.0	199.53	19.601	91.22
	824~849	HSDPA	22.5	177.83	19.881	97.3
	824~849	HSUPA	22.5	177.83		
Band 2	1850~1910	REL99	23.0	199.53	23.38	217.77
	1850~1910	HSDPA	22.5	177.83	22.89	194.54
	1850~1910	HSUPA	22.5	177.83		

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

5.3. MAXIMUM OUTPUT POWER (LTE)

The transmitter has a maximum peak conducted and radiated ERP/EIRP output powers as follows:

FCC Part 27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			Peak	Avg (dBm)	Avg(mW)	Avg (dBm)	Avg(mW)
LTE17	704~716	10MHz	QPSK	22.50	177.83	9.101	8.13
	704~716	10MHz	16QAM	21.50	141.25	8.131	6.5

FCC Part 27							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			Peak	Avg (dBm)	Avg(mW)	Avg (dBm)	Avg(mW)
LTE17	704~716	5MHz	QPSK	22.50	177.83	9.561	9.04
	704~716	5MHz	16QAM	21.50	141.25	8.711	7.43

FCC Part 22							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			Peak	Avg (dBm)	Avg(mW)	Avg (dBm)	Avg(mW)
LTE5	824~849	10MHz	QPSK	23.50	223.87	20.701	117.52
	824~849	10MHz	16QAM	22.50	177.83	19.701	93.35

FCC Part 22							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			Peak	Avg (dBm)	Avg(mW)	Avg (dBm)	Avg(mW)
LTE5	824~849	5MHz	QPSK	23.50	223.87	21.001	125.92
	824~849	5MHz	16QAM	22.50	177.83	20.101	102.35

FCC Part 22							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			Peak	Avg (dBm)	Avg(mW)	Avg (dBm)	Avg(mW)
LTE5	824~849	3MHz	QPSK	23.50	223.87	20.501	112.23
	824~849	3MHz	16QAM	22.50	177.83	19.701	93.35

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

FCC Part 22							
Band	Frequency Range(MHz)	BandWidth (MHz)	Modulation	Conducted		Radiated	
			Peak	Avg (dBm)	Avg(mW)	Avg (dBm)	Avg(mW)
LTE5	824~849	1.4MHz	QPSK	23.50	223.87	20.601	114.84
	824~849	1.4MHz	16QAM	22.50	177.83	19.90	97.72

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna for the [List the bands supported] with a maximum peak gain as follow:

Frequency (MHz)	Peak Gain (dBi)
Band 5, 824~849MHz	-2.29
Band 2, 1850~1910MHz	0.77
LTE17, 704~716MHz	-8.54

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	SAMSUNG	EP-TA10EWE	N/A	N/A
Earphone	SAMSUNG	N/A	N/A	N/A

I/O CABLES (CONDUCTED SETUP)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	RF Out	1	Spectrum Analyzer	Shielded	None	NA
2	Antenna Port	1	EUT	Shielded	0.1m	NA
3	RF In/Out	1	Communication Test Set	Shielded	1m	NA

I/O CABLES (RADIATED SETUP)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	USB	1	AC Adapter	Un-shielded	1.2m	No
2	Jack	1	Headset	Shielded	1m	No
3	RF In/out	1	Communication Test Set	Un-shielded	2m	Yes

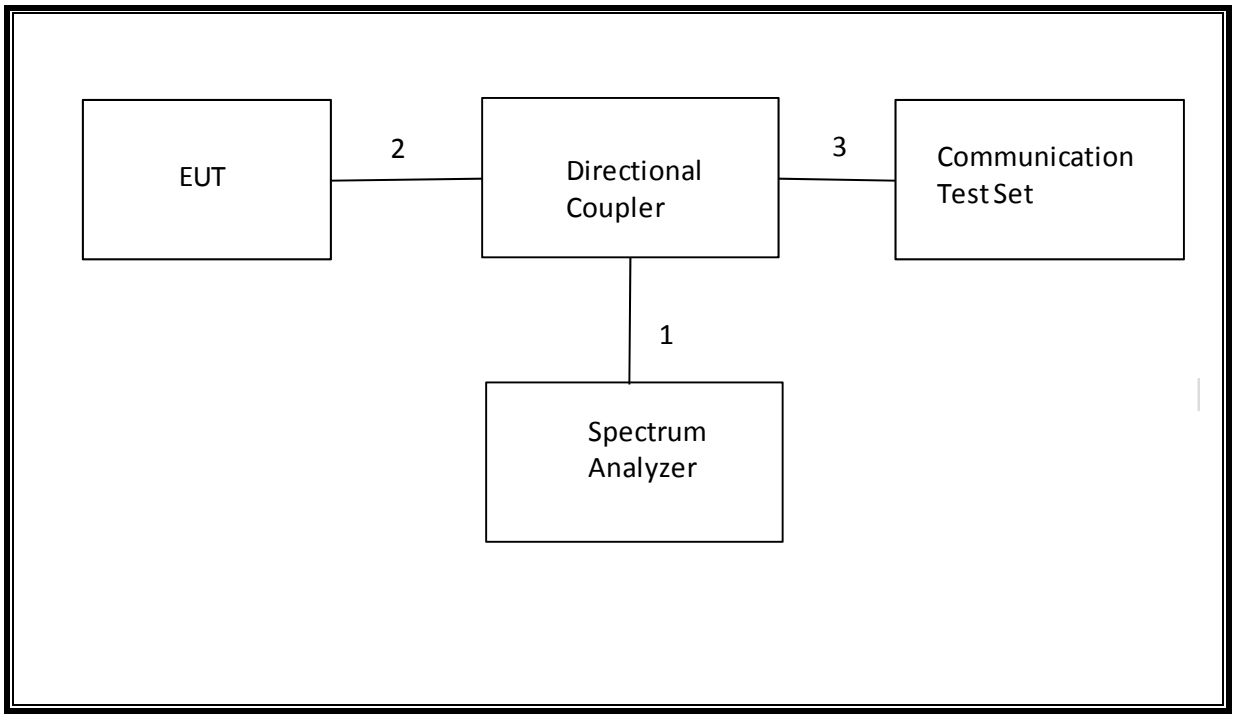
TEST SETUP

The EUT is continuously communicated to the call box during the tests.

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

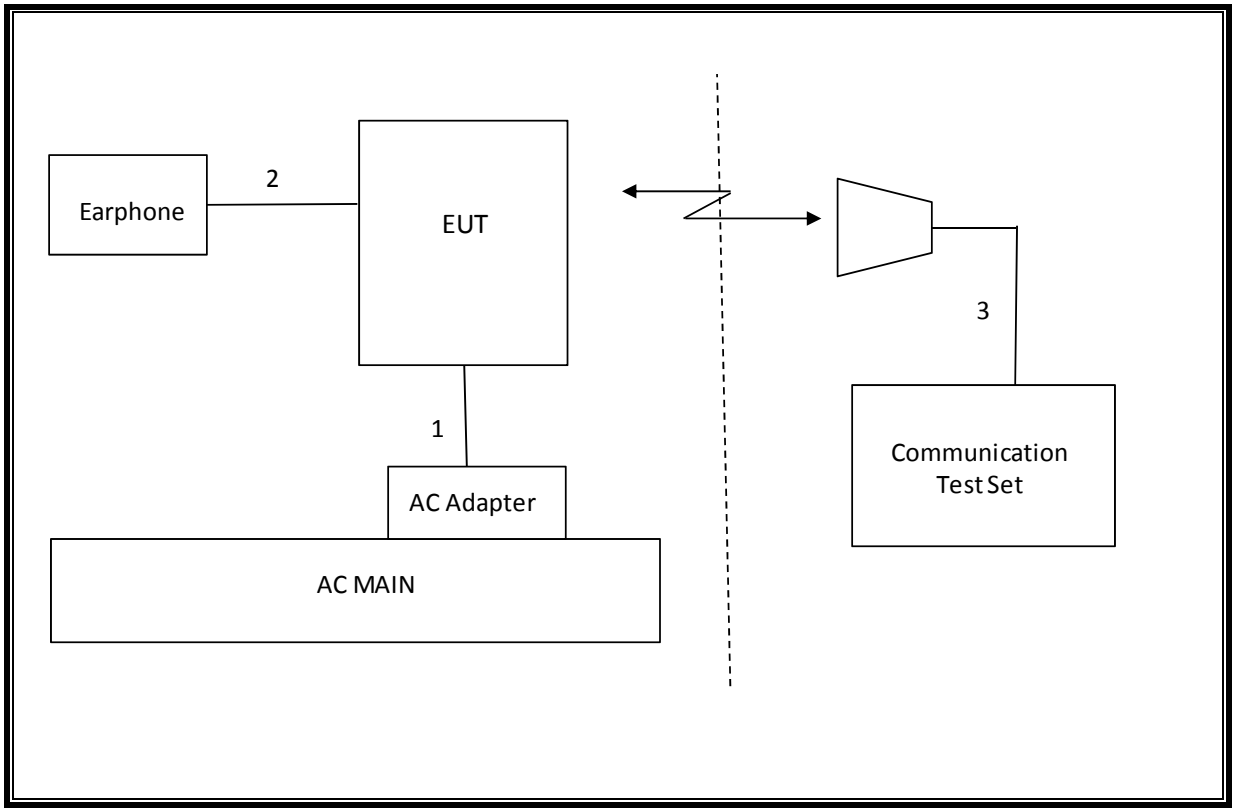
SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Asset	Cal Due
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01179	02/26/15
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	08/14/14
Antenna, Horn, 18 GHz	EMCO	3115	C00783	10/25/14
Antenna, Horn, 18 GHz	EMCO	3115	C00784	09/25/14
Highpass Filter, 2.7 GHz	Micro-Tronics	HPM13194	N02687	CNR
Highpass Filter, 1.5 GHz	Micro-Tronics	HPM13193	N02688	CNR
Temperature / Humidity Chamber	Thermotron	SE 600-10-10	C00930	01/09/15
Communications Test Set	R&S	CMW500	T159	07/02/14
DC power supply, 8 V @ 3 A or 15 V	Agilent / HP	E3610A	None	CNR
Vector signal generator, 6 GHz	Agilent / HP	E4438C	None	07/06/14
Antenna, Tuned Dipole 400~1000	ETS	3121C DB4	C00993	02/14/15
Antenna, Horn, 25.5 GHz	ARA	MWH-1826/B	C00980	11/14/14
Directional Coupler	RF-Lambda	RFDC5M06G15	None	CNR

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

7. Summary Table

FCC Part Section	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Worst Case
2.1049	N/A	Occupied Band width (99%)	N/A	Conducted	Pass	8.943MHz
22.917(a) 24.238(a) 27.53(g)	RSS-132(4.5.1) RSS-133(6.5.1) RSS-130(4.6)	Band Edge / Conducted Spurious Emission	-13dBm		Pass	-14.287dBm
2.1046	N/A	Conducted output power	N/A		Pass	29.6dBm
22.355 24.235 27.54	RSS-132(4.3) RSS-133(6.3) RSS-130(4.2)	Frequency Stability	2.5PPM		Pass	-0.09PPM
22.913(a)(2)	RSS-132(4.4)	Effective Radiated Power	38 dBm	Radiated	Pass	21dBm
27.50(b)(10)	RSS-130(4.4)		34.77 dBm		Pass	
24.232(c)	RSS-133(6.4)	Equivalent Isotropic Radiated Power	33dBm		Pass	27.1dBm
22.917(a) 24.238(a) 27.53(g)	RSS-132(4.5.1) RSS-133(6.5.1) RSS-130(4.6)	Radiated Spurious Emission	-13dBm		Pass	-40.7dBm

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8. RF POWER OUTPUT VERIFICATION

8.1. GSM/GPRS/EDGE

Function: Menu select > GSM Mobile Station > GSM 850/900/1800/1900

Press Connection control to choose the different menus

Press RESET > choose all to reset all settings

Connection Press Signal Off to turn off the signal and change settings

Network Support > GSM+GPRS or GSM+EGPRS

Main Service > Packet Data

Service selection > Test Mode A – Auto Slot Config. off

MS Signal Press Slot Config bottom on the right twice to select and change the number of time slots and power setting

> Slot configuration > Uplink/Gamma

> 33 dBm for GPRS 850/900

> 30 dBm for GPRS1800/1900

BS Signal Enter the same channel number for TCH channel (test channel) and BCCH channel

Frequency Offset > + 0 Hz

Mode > BCCH and TCH

BCCH Level > -85 dBm (May need to adjust if link is not stable)

BCCH Channel > choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]

Channel Type > Off

P0> 4 dB

Slot Config > Unchanged (if already set under MS Signal)

TCH > choose desired test channel

Hopping > Off

Main Timeslot > 3 (Default)

Network Coding Scheme > CS4 (GPRS) and MCS5 ~ MCS9 (EGPRS)

Bit Stream > 2E9-1PSR Bit Pattern

AF/RF Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input

Connection Press Signal On to turn on the signal and change settings

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.1.1. GSM OUTPUT POWER RESULT

Band	Mode	Ch.	f(MHz)	1 time slot	2 time slot
				Peak (dBm)	Peak (dBm)
GSM1900	GMSK	512	1850.2	29.5	
		661	1880	29.5	
		810	1909.8	29.6	
	GPRS	512	1850.2	29.5	26.3
		661	1880	29.5	26.1
		810	1909.8	29.6	26.5

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.2. UMTS REL 99

TEST PROCEDURE

The following summary of these settings are illustrated below:

	Mode	Rel99
	Subtest	-
WCDMA General Settings	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	HSDPA FRC	Not Applicable
	HSUPA Test	Not Applicable
	Power Control Algorithm	Algorithm2
	βc	Not Applicable
	βd	Not Applicable
	βec	Not Applicable
	βc/βd	8/15
	βhs	Not Applicable
	βed	Not Applicable

8.2.1. UMTS REL 99 OUTPUT POWER RESULT

Band	Mode	Ch.	f(MHz)	Conducted Power (dBm) Avg (dBm)
Band 5	REL99	4132	826.4	22.9
		4183	836.6	23.0
		4233	846.6	23.0
Band 2	REL99	9262	1852.4	23.0
		9400	1880	22.9
		9538	1907.6	23.0

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.3. UMTS HSDPA

The following 4 Sub-tests were completed according to Release 5 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

	Mode	Rel5 HSDPA			
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm 2			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR (dB)	0	0	0.5	0.5
HSDPA Specific Settings	D_{ACK}	8			
	D_{NAK}	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	Ahs =βhs/βc	30/15			

8.3.1. UMTS HSDPA OUTPUT POWER RESULT

Band	Mode	Subset	Ch.	f(MHz)	Conducted Power (dBm) Avg (dBm)
Band 5	HSDPA	1	4132	826.4	22.5
			4183	836.6	22.5
			4233	846.6	22.5
		2	4132	826.4	22.5
			4183	836.6	22.5
			4233	846.6	22.5
		3	4132	826.4	22.5
			4183	836.6	22.5
			4233	846.6	22.5
		4	4132	826.4	21.9
			4183	836.6	22.2
			4233	846.6	21.8
Band 2	HSDPA	1	9262	1852.4	22.5

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

			9400	1880	22.5
			9538	1907.6	22.5
		2	9262	1852.4	22.5
			9400	1880	22.5
			9538	1907.6	22.5
		3	9262	1852.4	22.0
			9400	1880	22.2
			9538	1907.6	22.2
		4	9262	1852.4	21.2
			9400	1880	20.8
			9538	1907.6	20.7

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.3.2. UMTS HSUPA

TEST PROCEDURE

The following summary of these settings are illustrated below: (ETSI TS 134.121-1 Table C.11.1)

	Mode	Rel6 HSUPA	Rel6 HSUPA	Rel6 HSUPA	Rel6 HSUPA	Rel6 HSUPA
	Subtest	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	P-CPICH (dB)	-10				
	P-CCPCH (dB)	-12				
	SCH (dB)	-12				
	PICH(dB)	-15				
	DPCH (dB)	-9				
	HS-SCCH_1 (dB)	-8				
	HS-PDSCH (dB)	-3				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	Bc	11/15	6/15	15/15	2/15	15/15
	Bd	15/15	15/15	9/15	15/15	15/15
	Bec	209/225	12/15	30/15	2/15	5/15
	βc/βd	11/15	6/15	15/9	2/15	15/15
	Bhs	22/15	12/15	30/15	4/15	30/15
	βed (note1)	1309/225	94/75	47/15 47/15	56/75	134/15
	MPR	0	2	1	2	0
HSDPA Specific Settings	DACK	8				
	DNAK	8				
	DCQI	8				
	Ack-Nack repetition factor	3				
	CQI Feedback (Table 5.2B.4)	4ms				
	CQI Repetition Factor (Table 5.2B.4)	2				
	Ahs = βhs/βc	30/15				
HSUPA Specific Settings	D E-DPCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	21
	Reference E-TFCIs	5	5	2	5	5
	ETFCI (from 34.121 Table C.11.1.3)	75	67	92	71	81
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E_TFCIs	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27		E-TFCI 11 E-TFCI PO 4 E-TFCI 92 E-TFCI PO 18	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27	

Note1: βed cannot be set directly, it is set by Absolute Grant Value.

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.3.3. UMTS HSUPA OUTPUT POWER RESULT

Band	Mode	Subset	Ch.	f(MHz)	Conducted Power (dBm) Avg (dBm)
Band 5	HSUPA	1	4132	826.4	22.1
			4183	836.6	22.3
			4233	846.6	22.3
		2	4132	826.4	20.5
			4183	836.6	20.5
			4233	846.6	20.5
		3	4132	826.4	21.2
			4183	836.6	21.3
			4233	846.6	21.3
		4	4132	826.4	20.1
			4183	836.6	20.1
			4233	846.6	20.2
		5	4132	826.4	22.5
			4183	836.6	22.5
			4233	846.6	22.5
Band 2	HSUPA	1	9262	1852.4	21.6
			9400	1880	21.5
			9538	1907.6	21.7
		2	9262	1852.4	19.5
			9400	1880	19.6
			9538	1907.6	19.8
		3	9262	1852.4	20.7
			9400	1880	20.6
			9538	1907.6	20.8
		4	9262	1852.4	19.7
			9400	1880	19.5
			9538	1907.6	19.7
		5	9262	1852.4	22.5
			9400	1880	22.4
			9538	1907.6	22.5

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

8.4. LTE OUTPUT VERIFICATION

8.4.1. LTE OUTPUT RESULT

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						20450	20525	20600
						829 MHz	836.5 MHz	844 MHz
LTE Band 5	10	QPSK	1	0	0	23.50	23.50	23.50
			1	25	0	23.40	23.50	23.50
			1	49	0	23.30	23.50	23.00
			25	0	1	21.90	22.10	22.10
			25	12	1	21.90	22.10	22.10
			25	25	1	21.90	22.10	22.00
			50	0	1	22.00	22.20	22.00
		16QAM	1	0	1	22.40	22.50	22.40
			1	25	1	22.50	22.50	22.50
			1	49	1	22.20	22.50	21.90
			25	0	2	21.10	21.10	21.10
			25	12	2	20.90	21.10	21.10
			25	25	2	21.00	21.10	20.90
			50	0	2	21.00	21.10	21.00
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						20425	20525	20625
						826.5 MHz	836.5 MHz	846.5 MHz
LTE Band 5	5	QPSK	1	0	0	23.40	23.50	23.50
			1	12	0	23.40	23.30	23.50
			1	24	0	23.50	23.30	23.20
			12	0	1	22.20	22.30	22.40
			12	7	1	22.10	22.10	22.20
			12	13	1	22.00	22.20	22.10
			25	0	1	22.00	22.20	22.30
		16QAM	1	0	1	22.50	22.50	22.50
			1	12	1	22.50	22.50	22.50
			1	24	1	22.50	22.50	22.50
			12	0	2	21.00	21.20	21.40
			12	7	2	21.10	21.10	21.20
			12	13	2	21.00	21.00	21.10
			25	0	2	20.90	21.20	21.30
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						20415	20525	20635
						825.5 MHz	836.5 MHz	847.5 MHz
LTE	3	QPSK	1	0	0	23.50	23.40	23.50

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band 5			1	8	0	23.50	23.40	23.50
			1	14	0	23.50	23.30	23.50
			8	0	1	22.40	22.50	22.50
			8	4	1	22.20	22.40	22.50
			8	7	1	22.30	22.30	22.40
			15	0	1	22.30	22.30	22.40
		16QAM	1	0	1	22.50	22.50	22.50
			1	8	1	22.50	22.50	22.50
			1	14	1	22.50	22.50	22.50
			8	0	2	21.20	21.50	21.40
			8	4	2	21.20	21.40	21.40
			8	7	2	21.20	21.40	21.30
			15	0	2	21.10	21.40	21.50
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						20407	20525	20643
						824.7 MHz	836.5 MHz	848.3 MHz
LTE Band 5	1.4	QPSK	1	0	0	23.50	23.50	23.50
			1	3	0	23.50	23.50	23.50
			1	5	0	23.50	23.40	23.50
			3	0	0	23.40	23.50	23.50
			3	1	0	23.40	23.50	23.50
			3	3	0	23.40	23.50	23.50
			6	0	1	22.30	22.50	22.50
		16QAM	1	0	1	22.30	22.50	22.50
			1	3	1	22.50	22.50	22.50
			1	5	1	22.50	22.50	22.50
			3	0	1	22.50	22.50	22.50
			3	1	1	22.50	22.40	22.50
			3	3	1	22.40	22.40	22.50
			6	0	2	21.10	21.20	21.40

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm) 23790 710 MHz
LTE Band 17	10	QPSK	1	0	0	22.50
			1	25	0	22.50
			1	49	0	22.50
			25	0	1	21.50
			25	12	1	21.50
			25	25	1	21.50
			50	0	1	21.50
		16QAM	1	0	1	21.50
			1	25	1	21.50
			1	49	1	21.50
			25	0	2	20.50
			25	12	2	20.50
			25	25	2	20.50
			50	0	2	20.50

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm) 23790 710 MHz
LTE Band 17	5	QPSK	1	0	0	22.50
			1	12	0	22.50
			1	24	0	22.50
			12	0	1	21.50
			12	7	1	21.50
			12	13	1	21.50
			25	0	1	21.50
		16QAM	1	0	1	21.50
			1	12	1	21.50
			1	24	1	21.50
			12	0	2	20.50
			12	7	2	20.50
			12	13	2	20.50
			25	0	2	20.50

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

9. PEAK TO AVERAGE RATIO

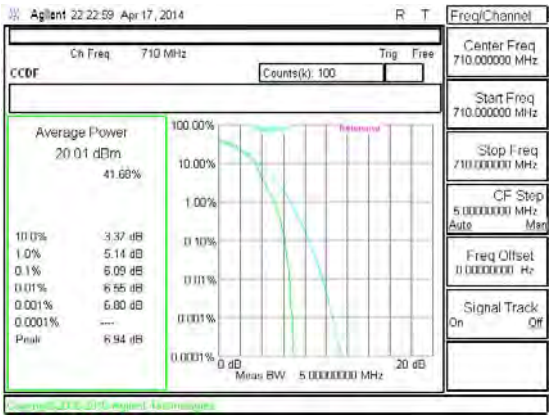
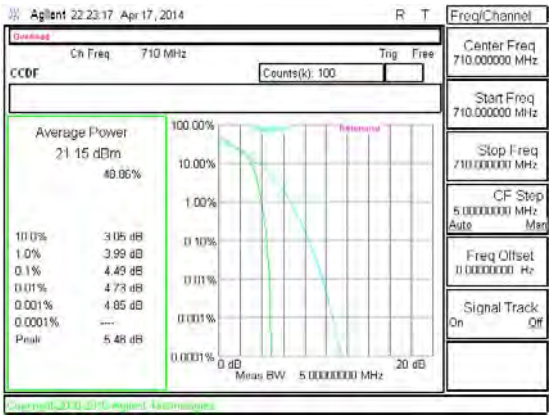
Test Procedure

Per KDB 971168 D01 Power Meas License Digital Systems v02r01

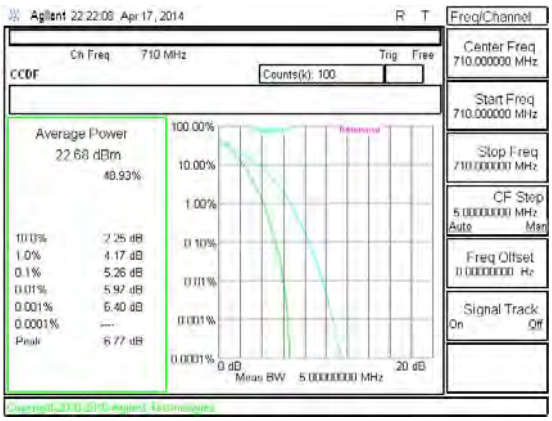
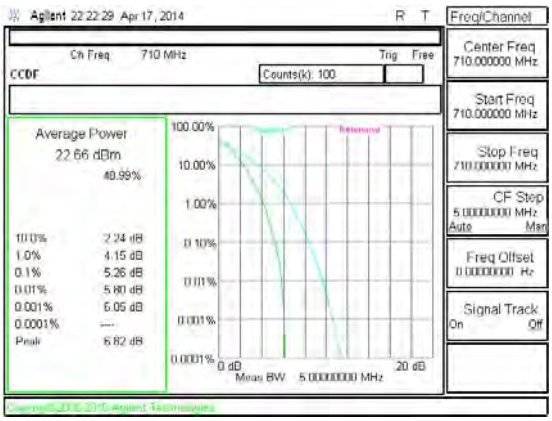
Test Spec

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

9.1. CONDUCTED PEAK TO AVERAGE RESULT

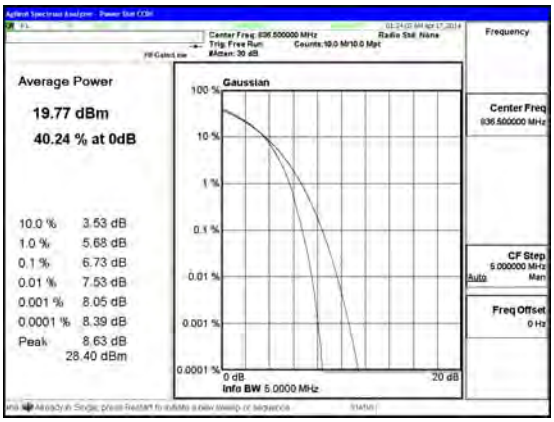
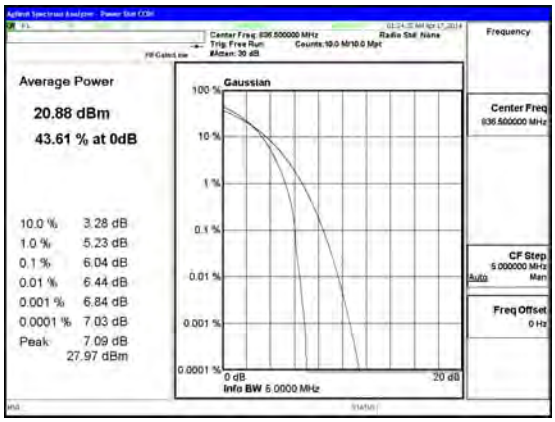
Band LTE17 10MHz	 Band LTE17 10MHz 16QAM Mid channel	 Band LTE17 10MHz QPSK Mid channel

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE17 5MHz	 Band LTE17 5MHz 16QAM Mid channel	 Band LTE17 5MHz QPSK Mid channel

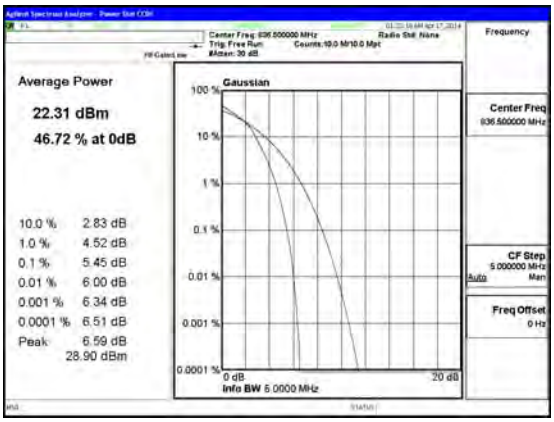
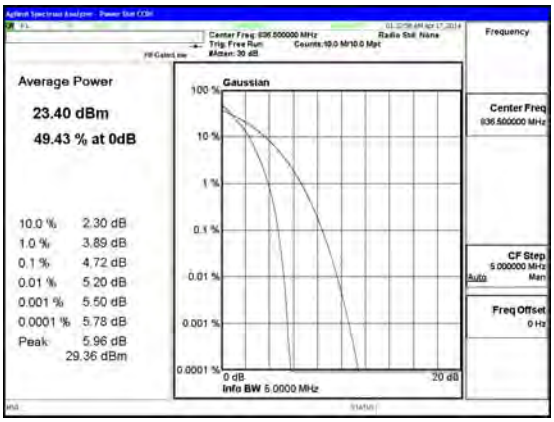
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE5 10MHz	 Band LTE5 10MHz 16QAM Mid channel	 Band LTE5 10MHz QPSK Mid channel

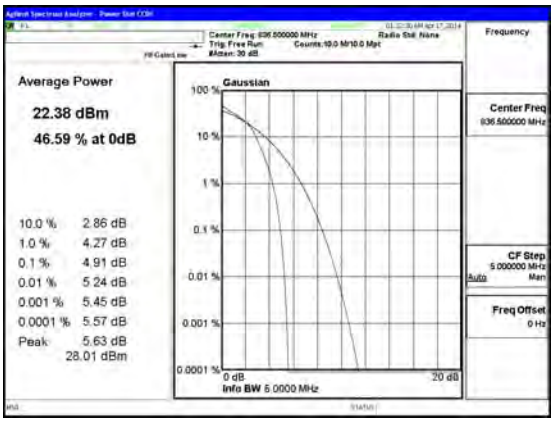
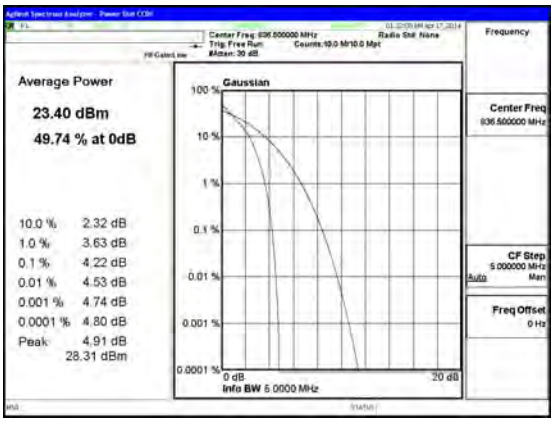
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE5 5MHz	 Band LTE5 5MHz 16QAM Mid channel	 Band LTE5 5MHz QPSK Mid channel

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE5 3MHz	 Band LTE5 3MHz 16QAM Mid channel	 Band LTE5 3MHz QPSK Mid channel

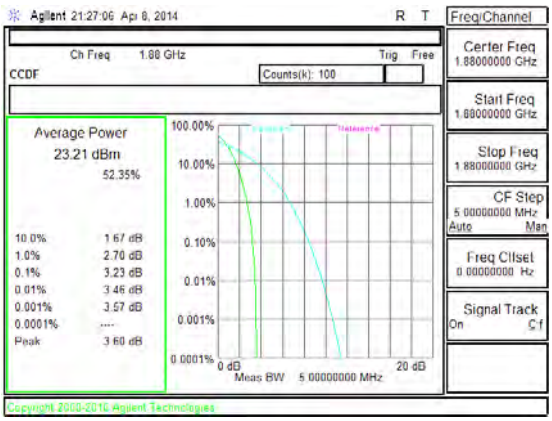
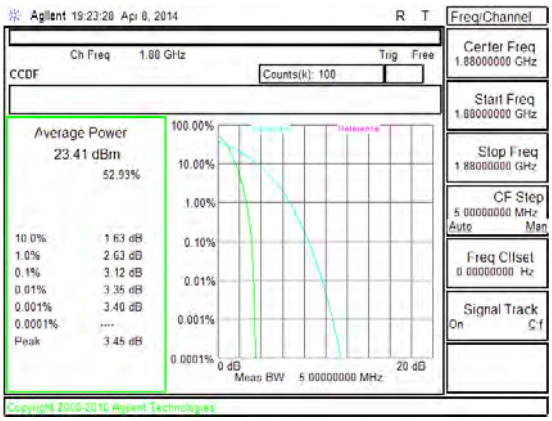
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE5 1.4MHz	 Band LTE5 1.4MHz 16QAM Mid channel	 Band LTE5 1.4MHz QPSK Mid channel

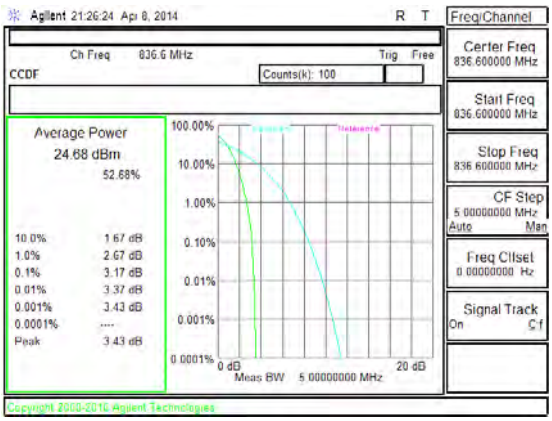
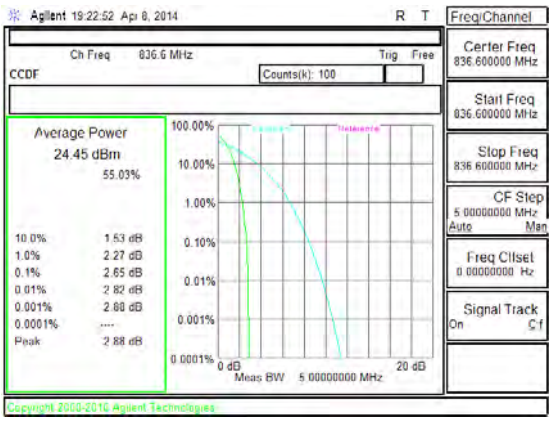
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band Band 2	 Band WCDMA B2 HSDPA	 Band WCDMA B2 REL99

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band Band 5	 Band WCDMA B5 HSDPA	 Band WCDMA B5 REL99

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

10. LIMITS AND CONDUCTED RESULTS

10.1. OCCUPIED BANDWIDTH

RULE PART(S)

FCC: §2.1049
IC: RSS-132, 4.5; RSS-133, 6.5

LIMITS

For reporting purposes only

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 the low, middle and high channel in each band. The -26dB bandwidth was also measured and recorded.

(KDB 971168 D01 Power Meas License Digital Systems v02r01 - 06/07/2013)

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

10.1.1. OCCUPIED BANDWIDTH RESULTS

Band	Mode	Channel	f (MHz)	99% BW (KHz)	-26dB BW (KHz)
GSM1900	GPRS	512	1850.2	256	334
		661	1880	247	328
		810	1909.8	252	326
Band 5	REL99	4132	826.4	4180	4719
		4183	836.6	4140	4746
		4233	846.6	4173	4721
	HSDPA	4132	826.4	4175	4676
		4183	836.6	4182	4706
		4233	846.6	4117	4681
Band 2	REL99	9262	1852.4	4169	4730
		9400	1880	4122	4711
		9538	1907.6	4185	4708
	HSDPA	9262	1852.4	4146	4690
		9400	1880	4155	4698
		9538	1907.6	4158	4700

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

10.1.2. LTE OCCUPIED BANDWIDTH RESULTS

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE17	10	QPSK	50/0	709	8.918	9.566
			50/0	710	8.877	9.606
			50/0	711	8.895	9.562
		16QAM	50/0	709	8.907	9.564
			50/0	710	8.887	9.556
			50/0	711	8.896	9.550

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE17	5	QPSK	25/0	706.5	4.471	4.810
			25/0	710	4.460	4.836
			25/0	713.5	4.455	4.798
		16QAM	25/0	706.5	4.466	4.835
			25/0	710	4.470	4.837
			25/0	713.5	4.466	4.838

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE5	10	QPSK	50/0	829	8.941	9.514
			50/0	836.5	8.926	9.511
			50/0	844	8.943	9.573
		16QAM	50/0	829	8.932	9.553
			50/0	836.5	8.933	9.550
			50/0	844	8.935	9.481

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE5	5	QPSK	25/0	826.5	4.460	4.807
			25/0	836.5	4.459	4.802
			25/0	846.5	4.460	4.817
		16QAM	25/0	826.5	4.471	4.814
			25/0	836.5	4.462	4.843

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

			25/0	846.5	4.472	4.849

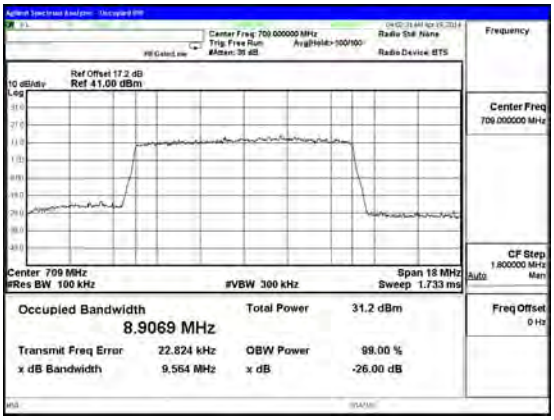
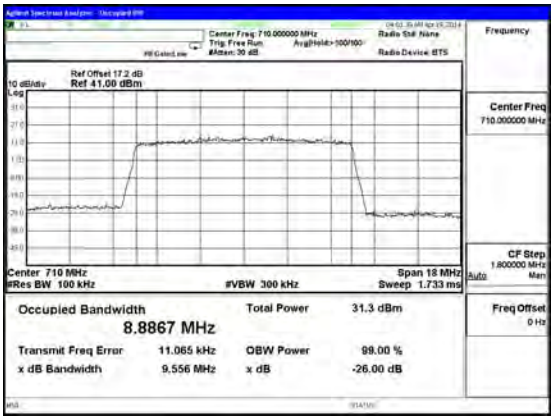
Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE5	3	QPSK	15/0	825.5	2.624	2.857
			15/0	836.5	2.654	2.872
			15/0	847.5	2.650	2.831
		16QAM	15/0	825.5	2.677	2.952
			15/0	836.5	2.684	3.021
			15/0	847.5	2.683	2.954

Band	BW(MHz)	Mode	RB/RB Size	f (MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE5	1.4	QPSK	6/0	824.7	1.084	1.289
			6/0	836.5	1.079	1.284
			6/0	848.3	1.082	1.304
		16QAM	6/0	824.7	1.077	1.294
			6/0	836.5	1.085	1.313
			6/0	848.3	1.086	1.328

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

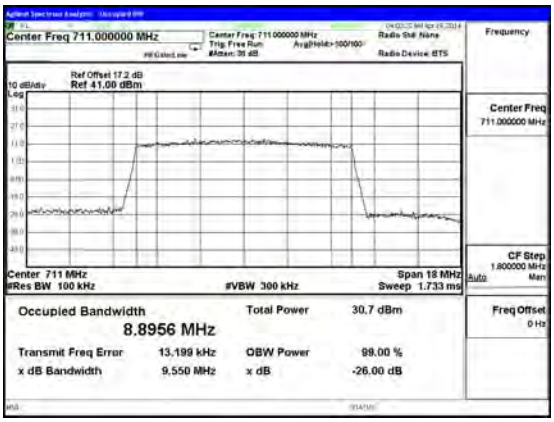
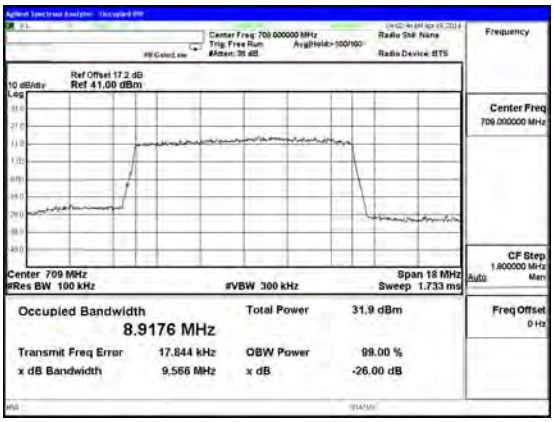
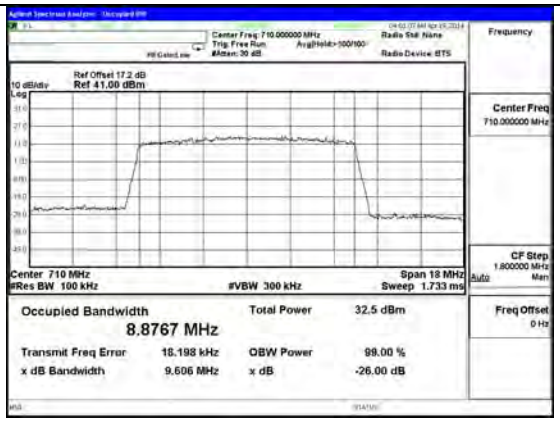
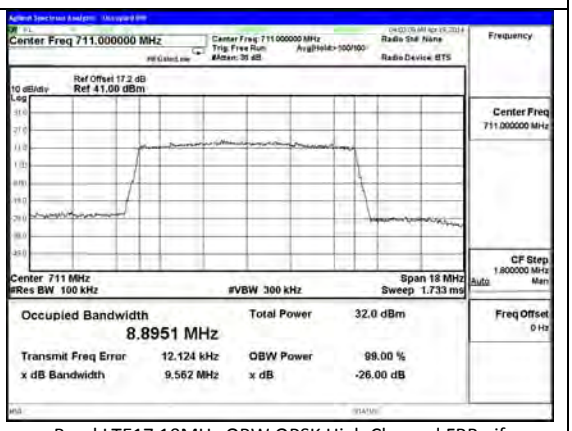
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

10.1.3. OCCUPIED BANDWIDTH PLOTS

Band LTE17 10MHz 16QAM	 Band LTE17 10MHz OBW 16QAM Low Channel FRB.gif	 Band LTE17 10MHz OBW 16QAM Mid Channel FRB.gif

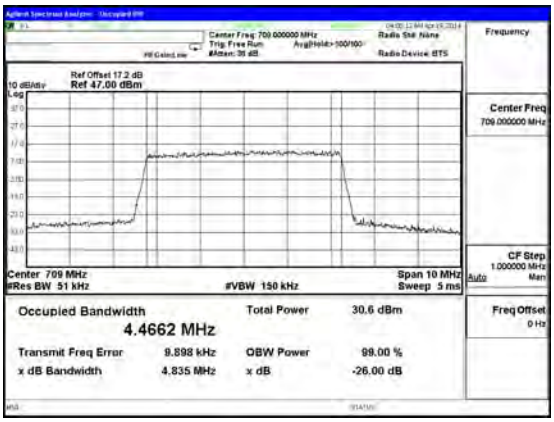
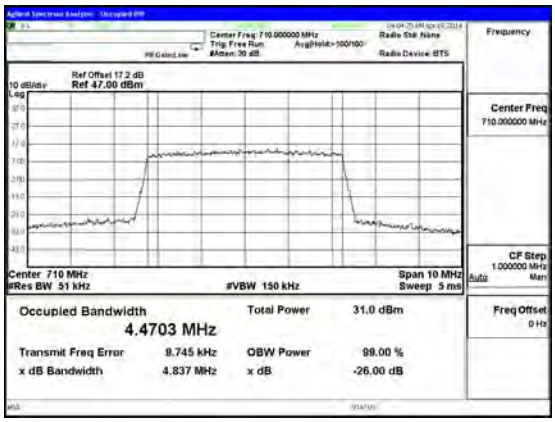
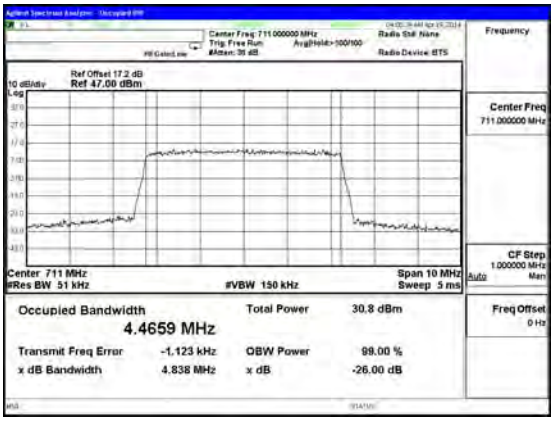
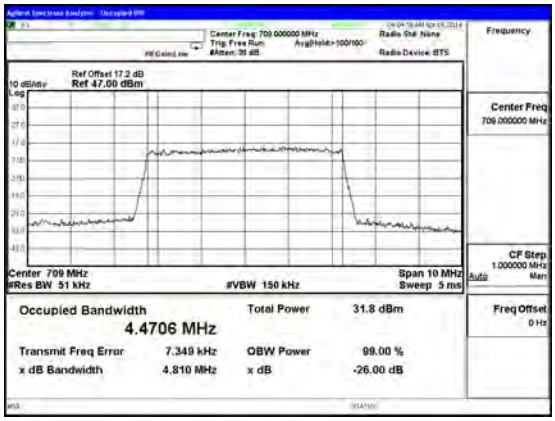
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE17 10MHz 16QAM	 Band LTE17 10MHz OBW 16QAM High Channel FRB.gif	 Band LTE17 10MHz OBW QPSK Low Channel FRB.gif
Band LTE17 10MHz QPSK	 Band LTE17 10MHz OBW QPSK Mid Channel FRB.gif	 Band LTE17 10MHz OBW QPSK High Channel FRB.gif

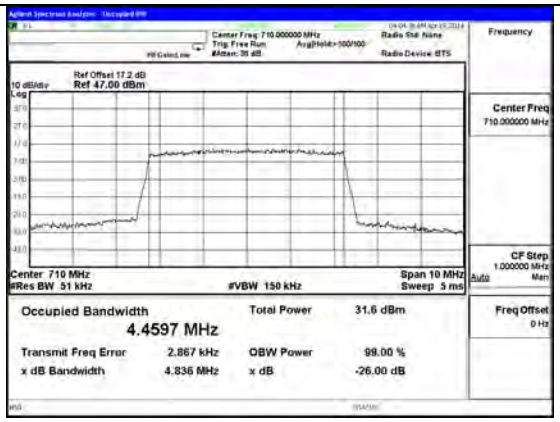
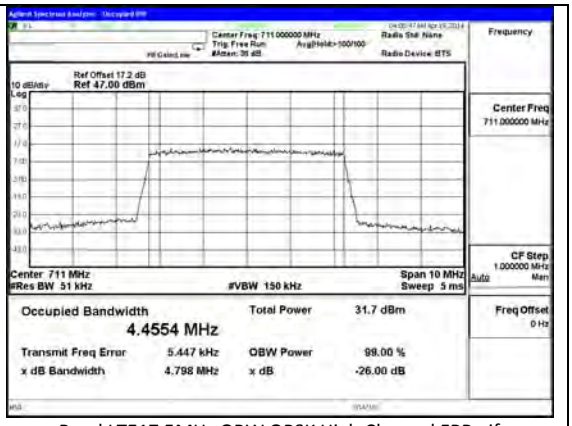
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

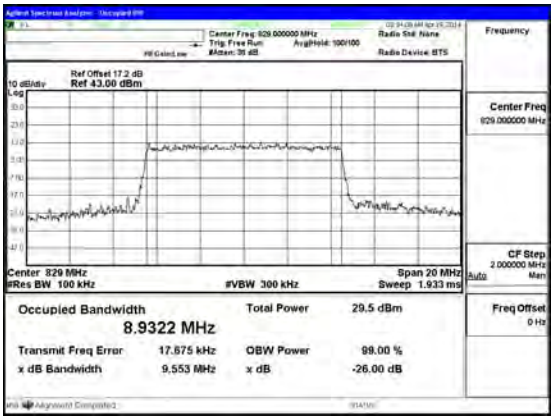
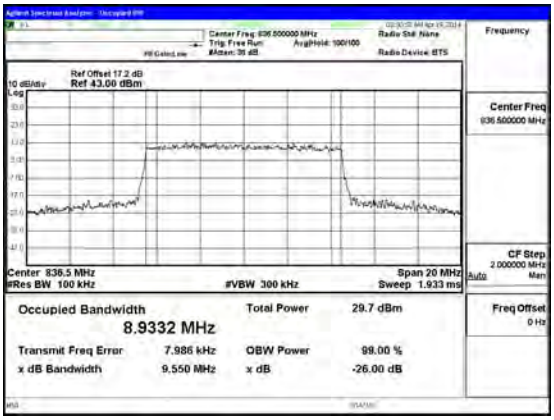
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE17 5MHz 16QAM	 Band LTE17 5MHz OBW 16QAM Low Channel FRB.gif	 Band LTE17 5MHz OBW 16QAM Mid Channel FRB.gif
Band LTE17 5MHz 16QAM	 Band LTE17 5MHz OBW 16QAM High Channel FRB.gif	 Band LTE17 5MHz OBW QPSK Low Channel FRB.gif

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

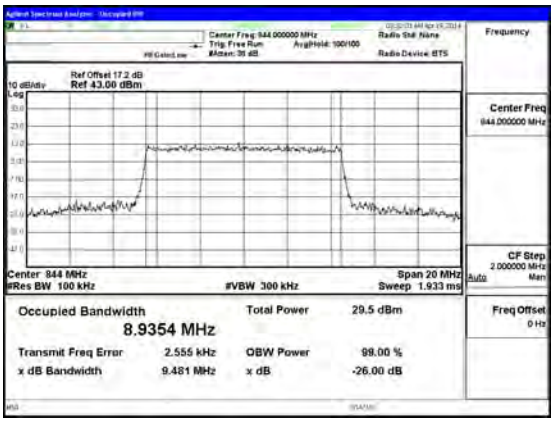
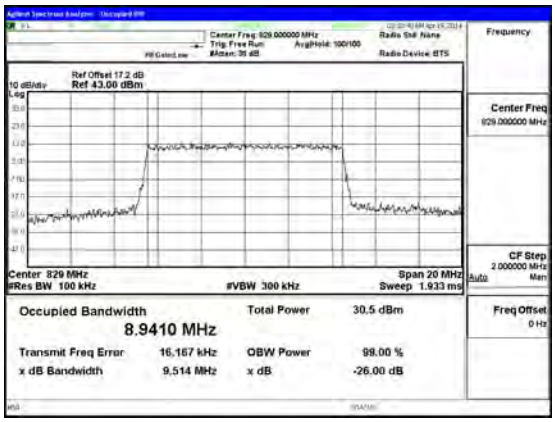
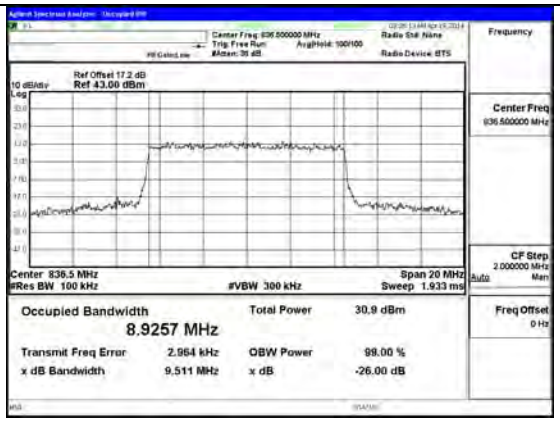
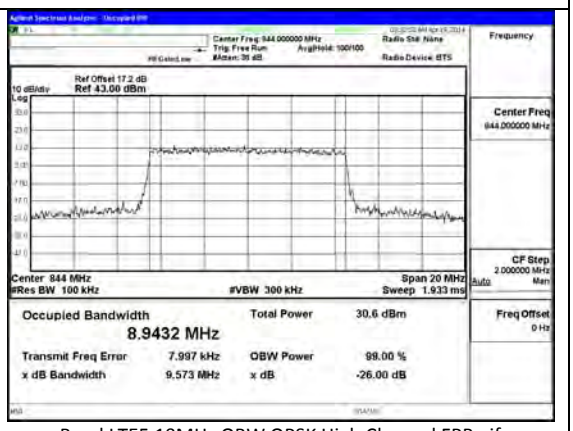
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE17 5MHz QPSK	 Band LTE17 5MHz OBW QPSK Mid Channel FRB.gif	 Band LTE17 5MHz OBW QPSK High Channel FRB.gif

Band LTE5 10MHz 16QAM	 Band LTE5 10MHz OBW 16QAM Low Channel FRB.gif	 Band LTE5 10MHz OBW 16QAM Mid Channel FRB.gif

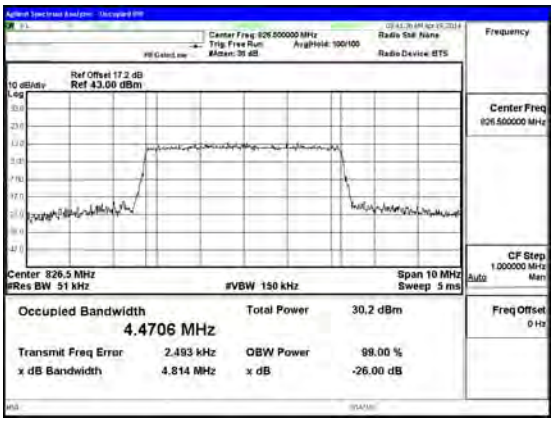
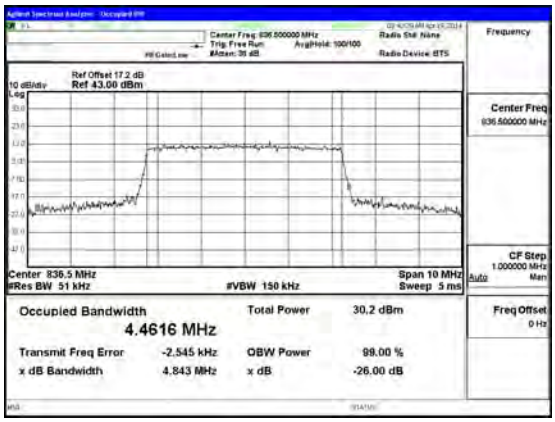
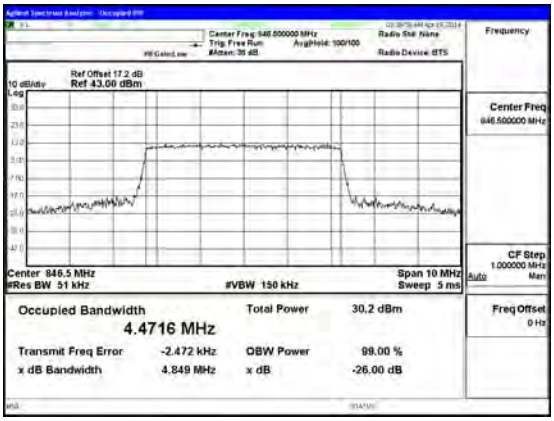
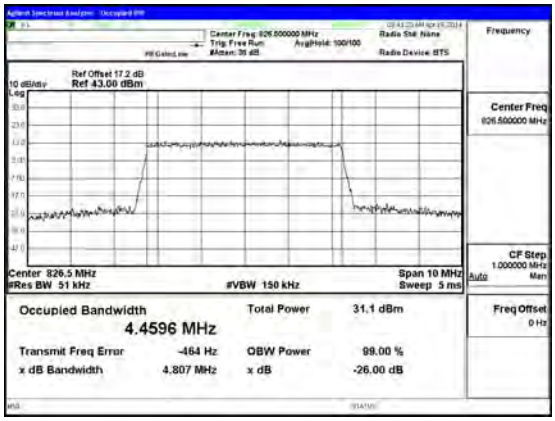
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE5 10MHz 16QAM	 Band LTE5 10MHz OBW 16QAM High Channel FRB.gif	 Band LTE5 10MHz OBW QPSK Low Channel FRB.gif
Band LTE5 10MHz QPSK	 Band LTE5 10MHz OBW QPSK Mid Channel FRB.gif	 Band LTE5 10MHz OBW QPSK High Channel FRB.gif

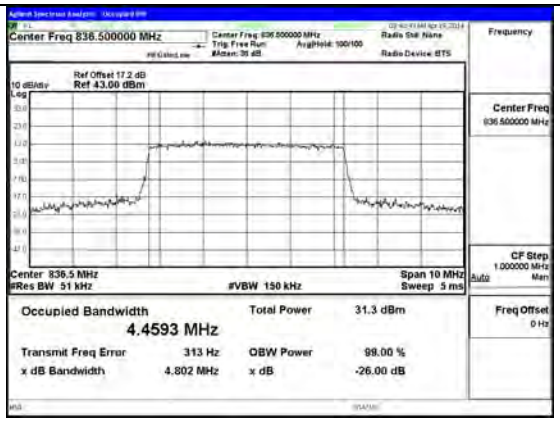
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

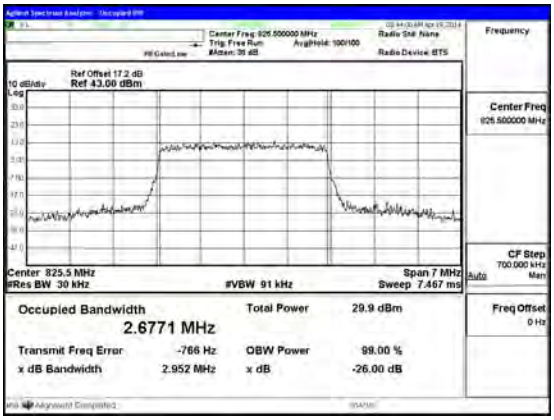
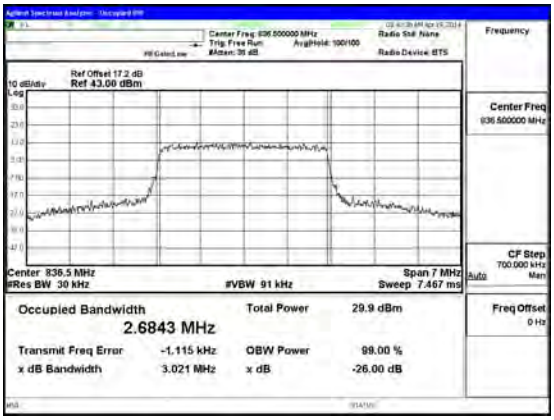
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE5 5MHz 16QAM	 Band LTE5 5MHz OBW 16QAM Low Channel FRB.gif	 Band LTE5 5MHz OBW 16QAM Mid Channel FRB.gif
Band LTE5 5MHz 16QAM	 Band LTE5 5MHz OBW 16QAM High Channel FRB.gif	 Band LTE5 5MHz OBW QPSK Low Channel FRB.gif

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

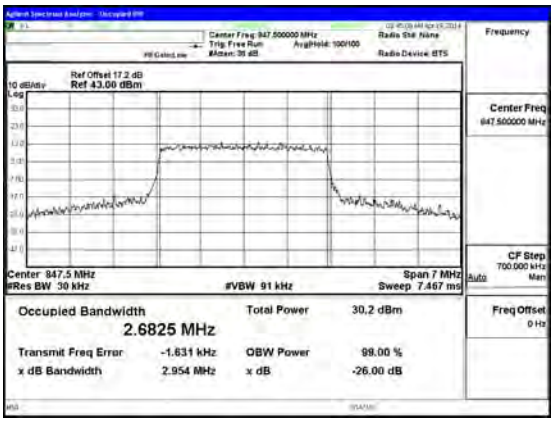
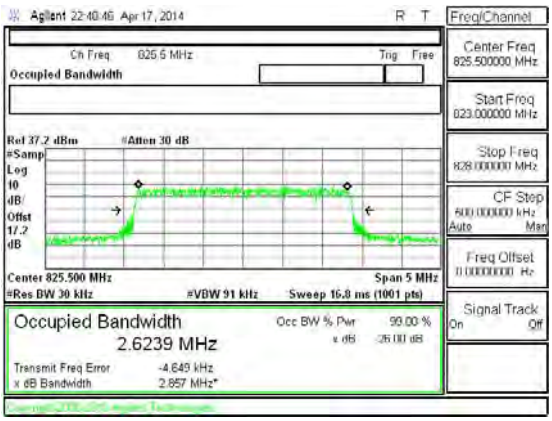
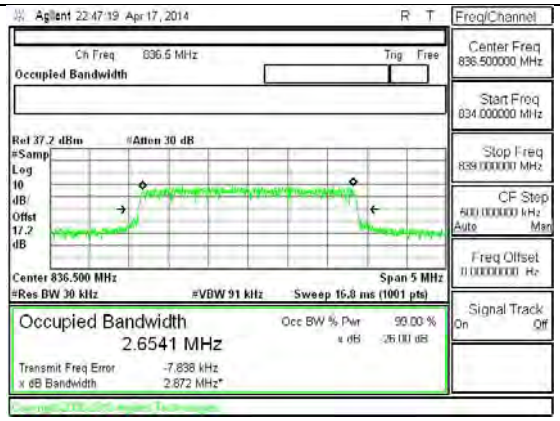
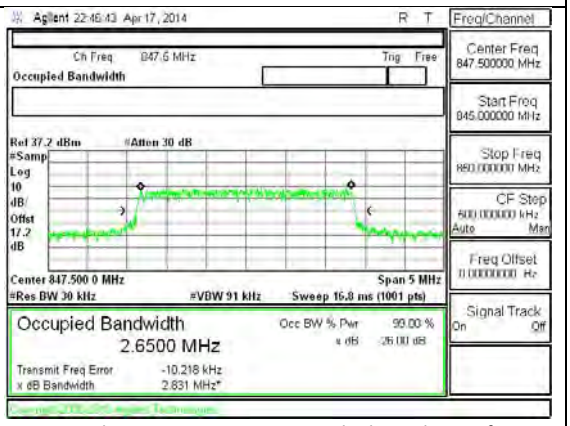
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE5 5MHz QPSK	 Band LTE5 5MHz OBW QPSK Mid Channel FRB.gif	 Band LTE5 5MHz OBW QPSK High Channel FRB.gif

Band LTE5 3MHz 16QAM	 Band LTE5 3MHz OBW 16QAM Low Channel FRB.gif	 Band LTE5 3MHz OBW 16QAM Mid Channel FRB.gif

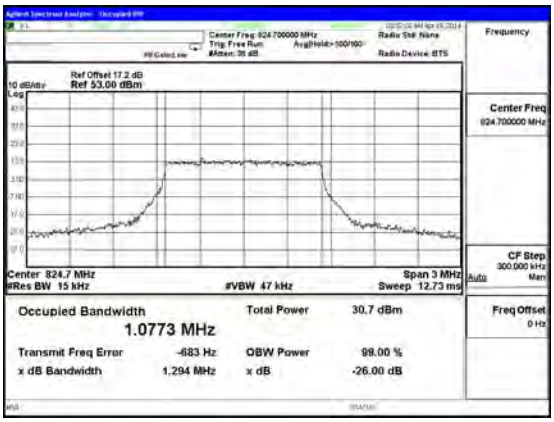
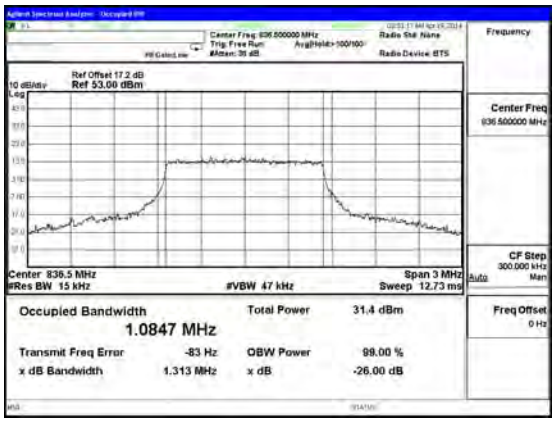
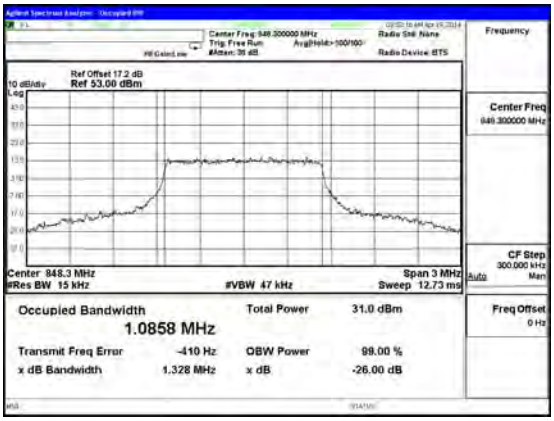
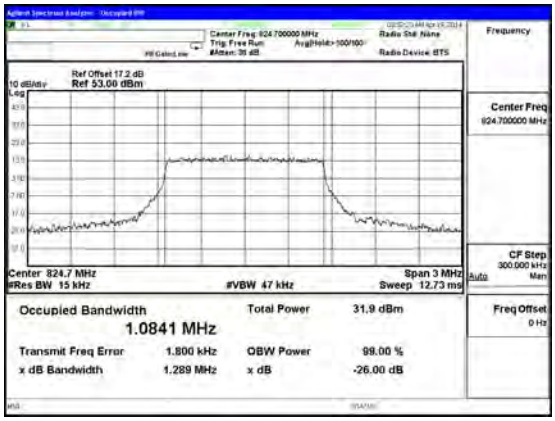
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE5 3MHz 16QAM	 Band LTE5 3MHz OBW 16QAM High Channel FRB.gif	 Band LTE5 3MHz OBW QPSK Low Channel FRB.gif
Band LTE5 3MHz QPSK	 Band LTE5 3MHz OBW QPSK Mid Channel FRB.gif	 Band LTE5 3MHz OBW QPSK High Channel FRB.gif

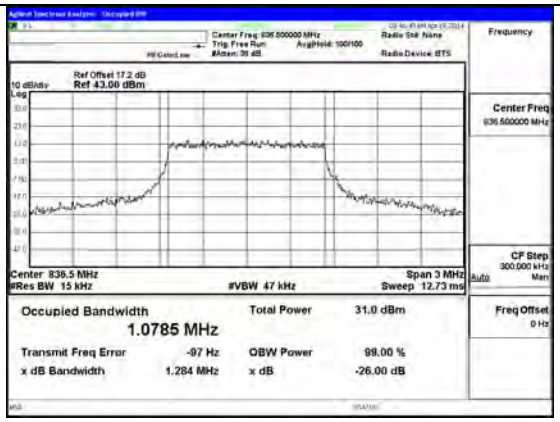
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

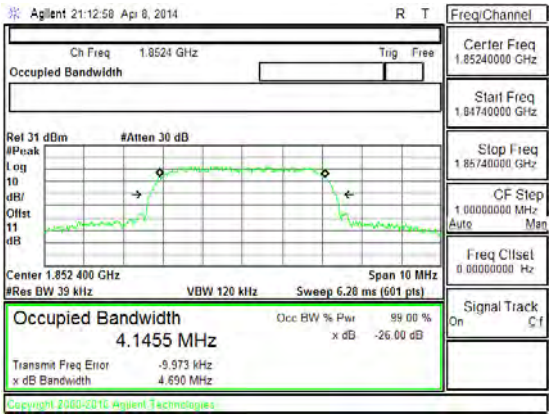
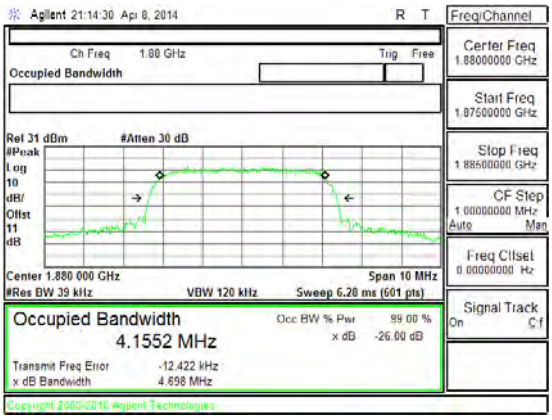
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE5 1.4MHz 16QAM	 Band LTE5 1.4MHz OBW 16QAM Low Channel FRB.gif	 Band LTE5 1.4MHz OBW 16QAM Mid Channel FRB.gif
Band LTE5 1.4MHz 16QAM	 Band LTE5 1.4MHz OBW 16QAM High Channel FRB.gif	 Band LTE5 1.4MHz OBW QPSK Low Channel FRB.gif

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

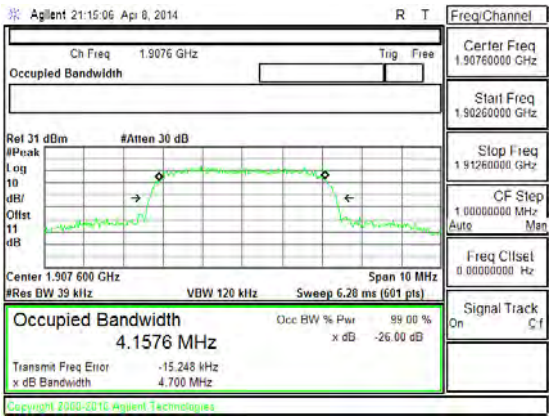
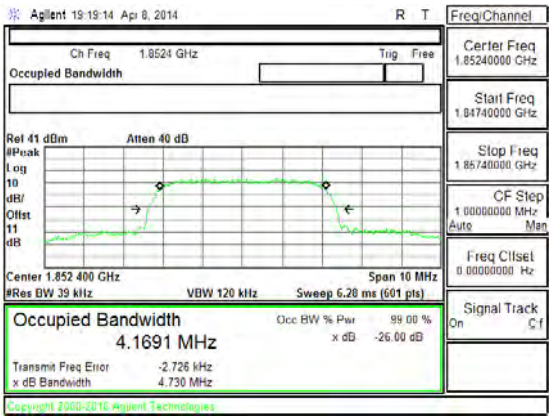
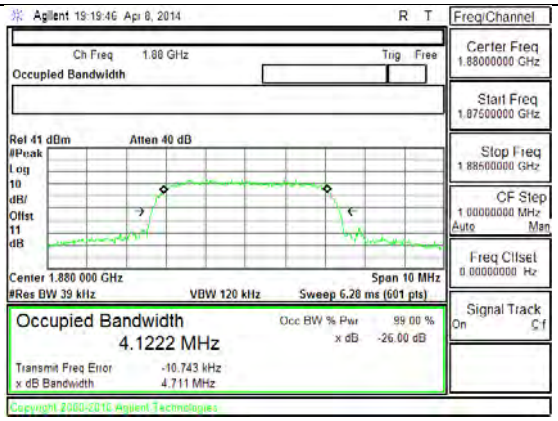
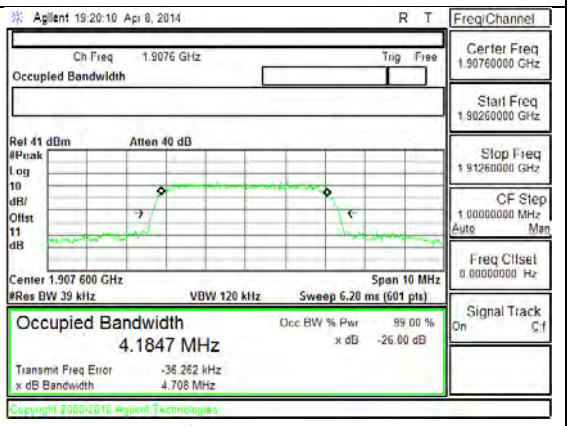
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE5 1.4MHz QPSK	 Band LTE5 1.4MHz OBW QPSK Mid Channel FRB.gif	 Band LTE5 1.4MHz OBW QPSK High Channel FRB.gif

Band Band 2 HSDPA	 Band WCDMA B2 HSDPA OBW	 Band WCDMA B2 HSDPA OBW

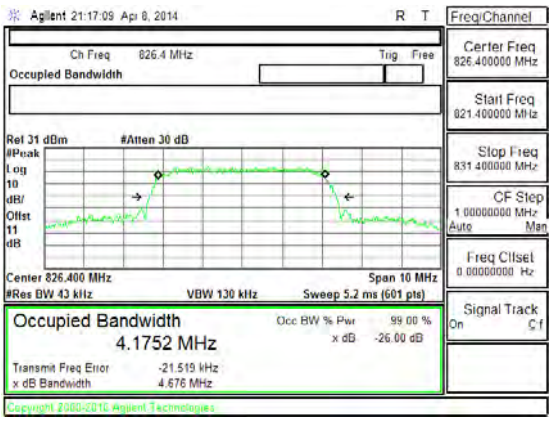
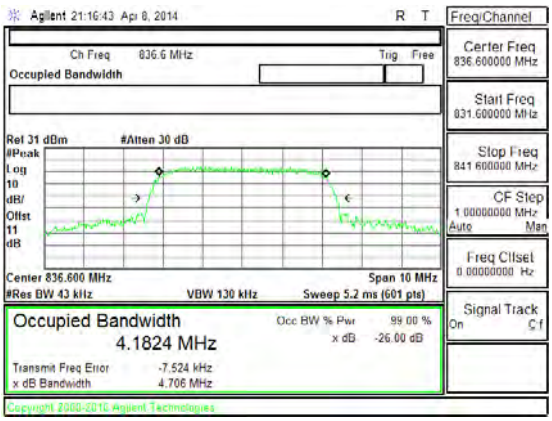
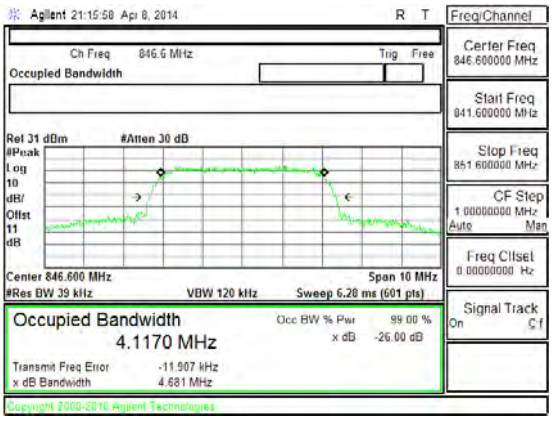
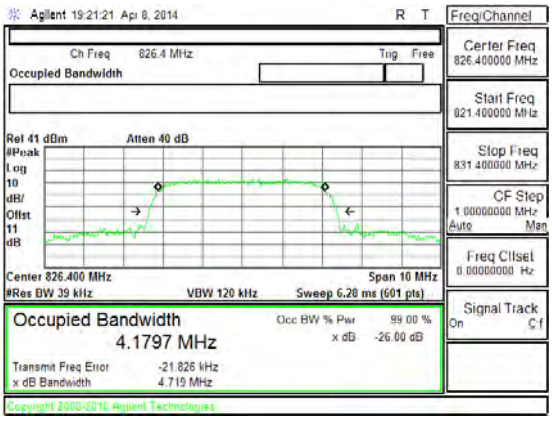
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

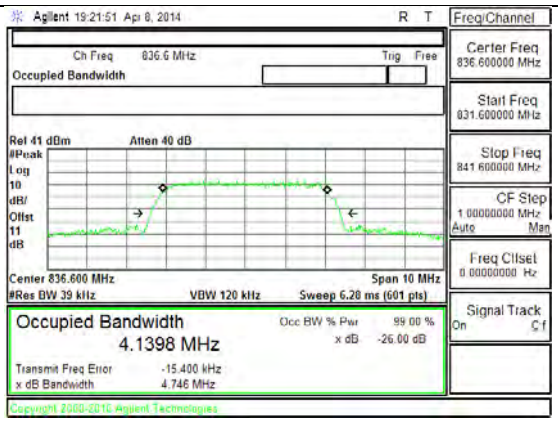
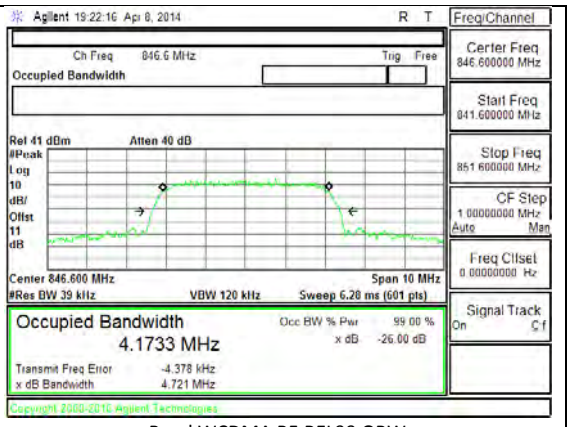
Band Band 2 HSDPA	 Band WCDMA B2 HSDPA OBW	 Band WCDMA B2 REL99 OBW
Band Band 2 REL99	 Band WCDMA B2 REL99 OBW	 Band WCDMA B2 REL99 OBW

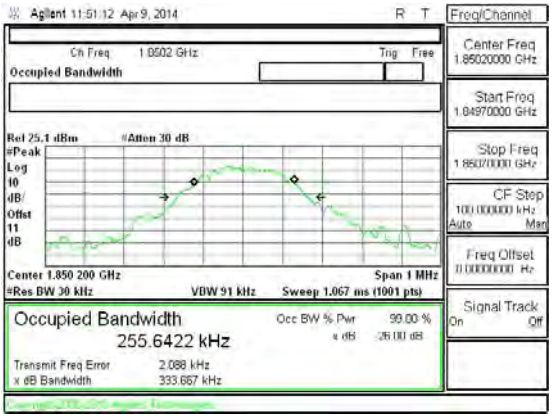
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band Band 5 HSDPA	 Band WCDMA B5 HSDPA OBW	 Band WCDMA B5 HSDPA OBW
Band Band 5 HSDPA	 Band WCDMA B5 HSDPA OBW	 Band WCDMA B5 REL99 OBW

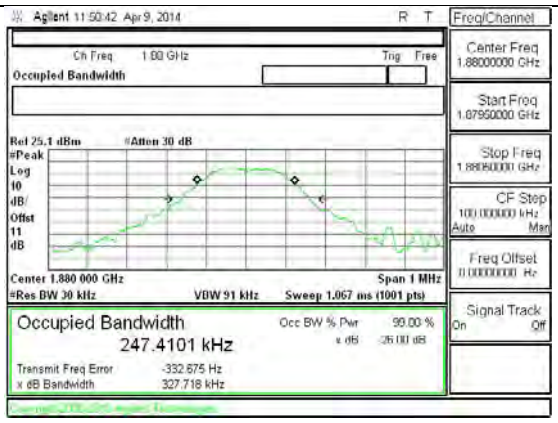
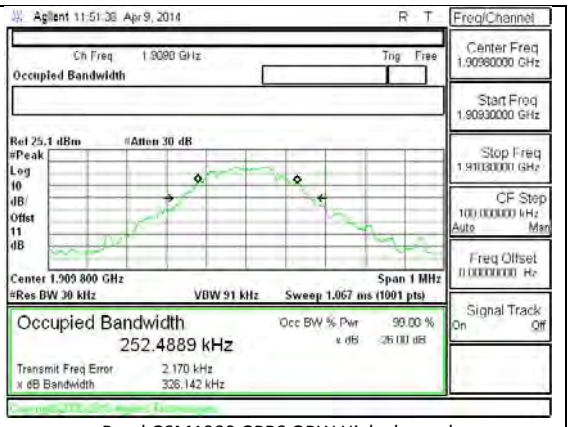
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band Band 5 REL99	 Band WCDMA B5 REL99 OBW	 Band WCDMA B5 REL99 OBW

Band GSM1900		 Band GSM1900 GPRS OBW Low channel

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band GSM1900 GPRS	 Band GSM1900 GPRS OBW Mid channel	 Band GSM1900 GPRS OBW High channel

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

10.2. BAND EDGE EMISSIONS

RULE PART(S)

FCC: §22.359, §24.238

LIMITS

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

TEST PROCEDURE

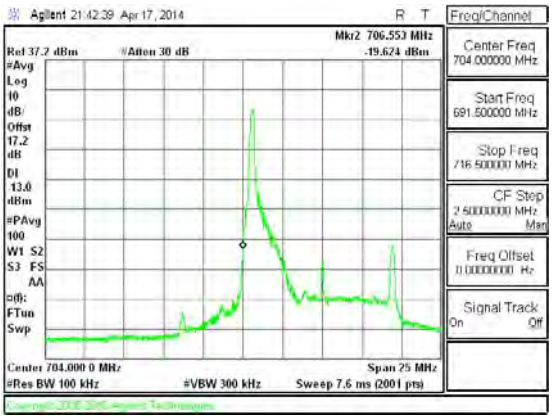
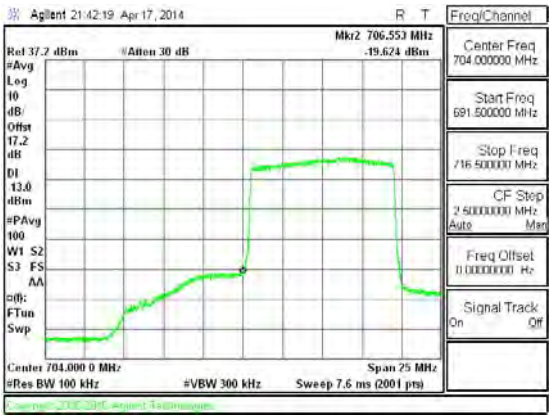
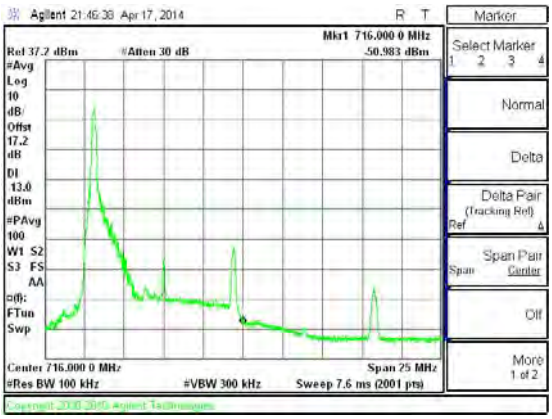
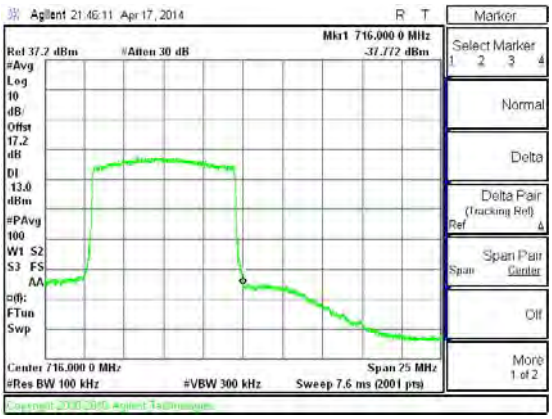
Per KDB 971168 D01 Power Meas License Digital Systems v02r01
The transmitter output was connected to an Agilent 8960 or a CMW500 Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

RESULTS

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

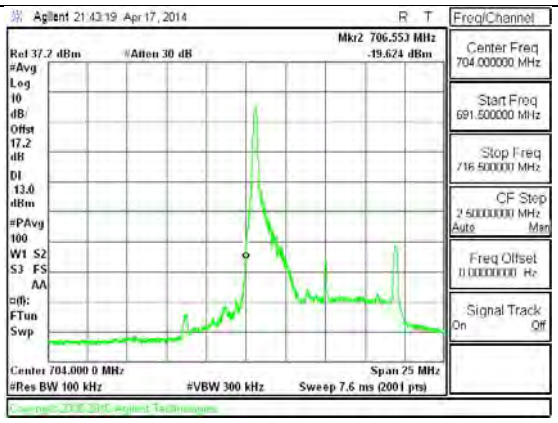
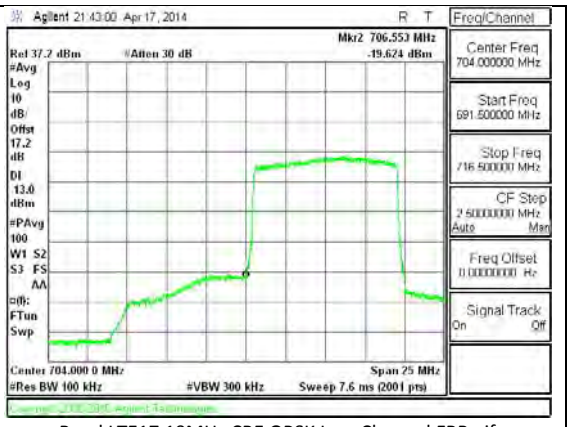
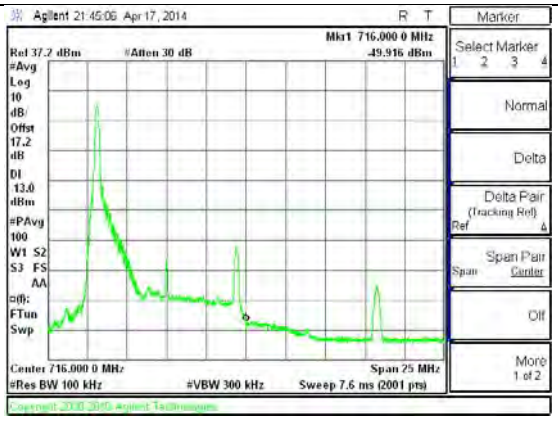
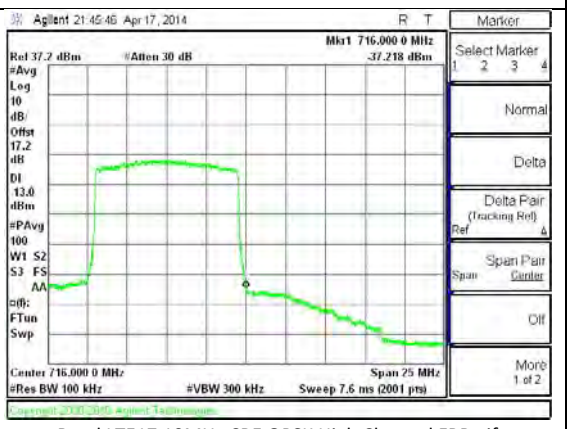
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

10.2.1. BAND EDGE PLOTS

Band LTE17 10MHz 16QAM	 Band LTE17 10MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE17 10MHz CBE 16QAM Low Channel FRB.gif
Band LTE17 10MHz 16QAM	 Band LTE17 10MHz CBE 16QAM High Channel 1RB.gif	 Band LTE17 10MHz CBE 16QAM High Channel FRB.gif

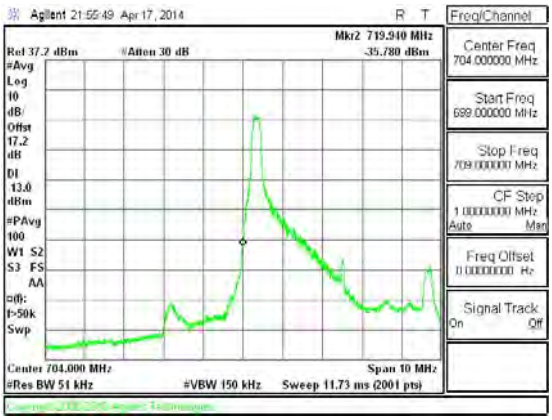
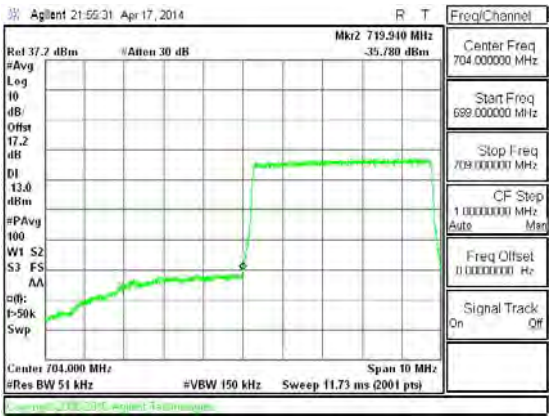
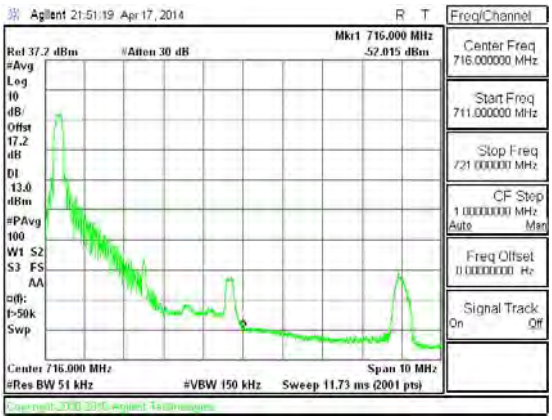
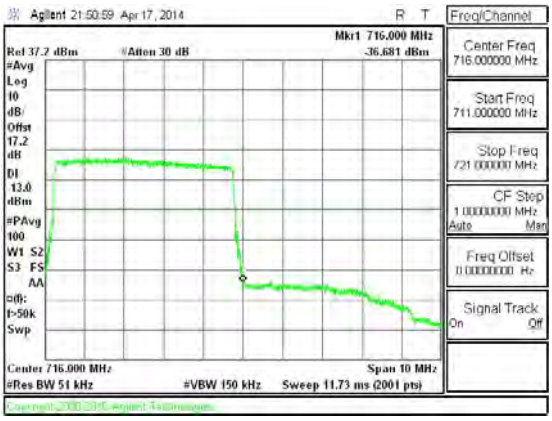
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE17 10MHz QPSK	 Band LTE17 10MHz CBE QPSK Low Channel 1RB.gif	 Band LTE17 10MHz CBE QPSK Low Channel FRB.gif
Band LTE17 10MHz QPSK	 Band LTE17 10MHz CBE QPSK High Channel 1RB.gif	 Band LTE17 10MHz CBE QPSK High Channel FRB.gif

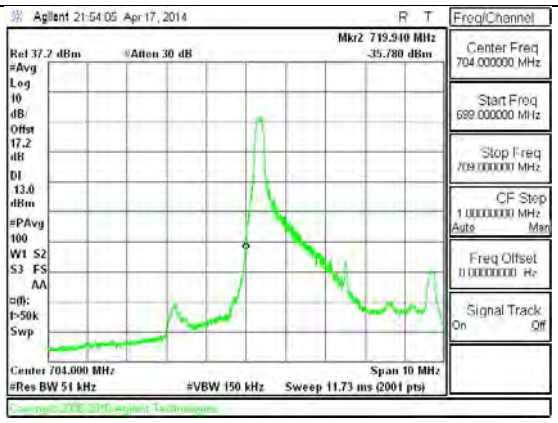
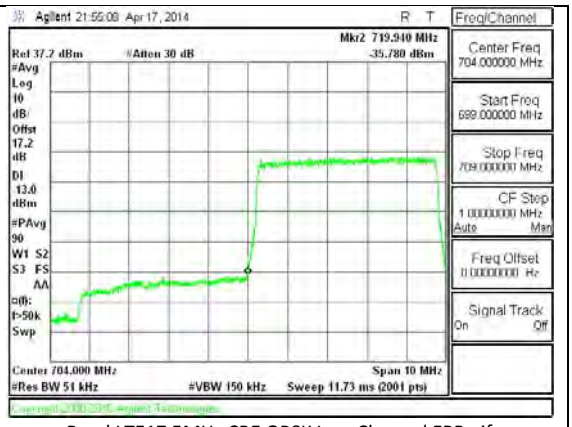
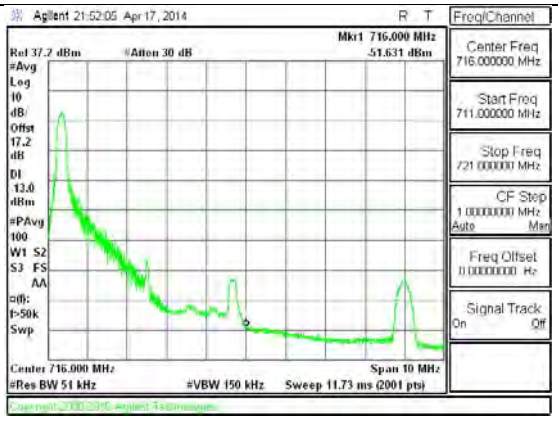
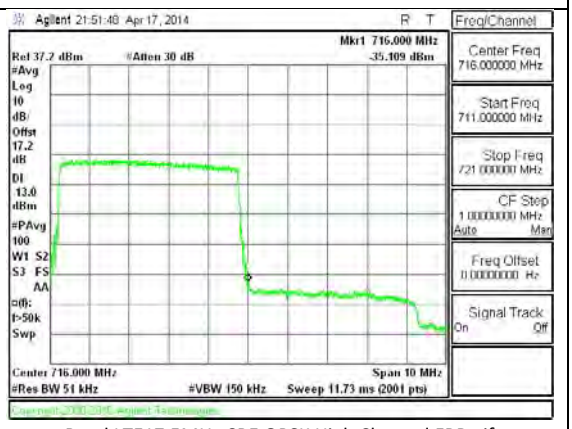
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE17 5MHz 16QAM	 Band LTE17 5MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE17 5MHz CBE 16QAM Low Channel FRB.gif
Band LTE17 5MHz 16QAM	 Band LTE17 5MHz CBE 16QAM High Channel 1RB.gif	 Band LTE17 5MHz CBE 16QAM High Channel FRB.gif

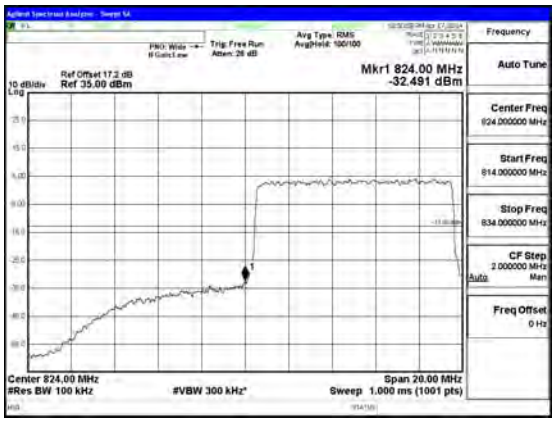
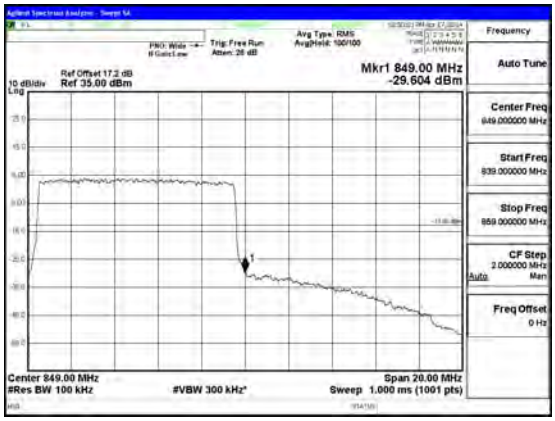
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE17 5MHz QPSK	 Band LTE17 5MHz CBE QPSK Low Channel 1RB.gif	 Band LTE17 5MHz CBE QPSK Low Channel FRB.gif
Band LTE17 5MHz QPSK	 Band LTE17 5MHz CBE QPSK High Channel 1RB.gif	 Band LTE17 5MHz CBE QPSK High Channel FRB.gif

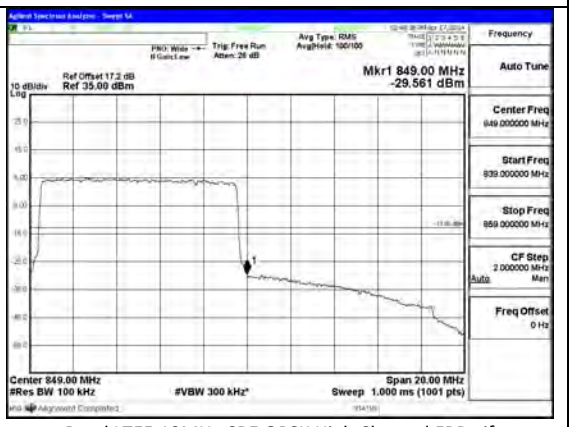
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE5 10MHz 16QAM	 Band LTE5 10MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE5 10MHz CBE 16QAM Low Channel FRB.gif
Band LTE5 10MHz 16QAM	 Band LTE5 10MHz CBE 16QAM High Channel 1RB.gif	 Band LTE5 10MHz CBE 16QAM High Channel FRB.gif

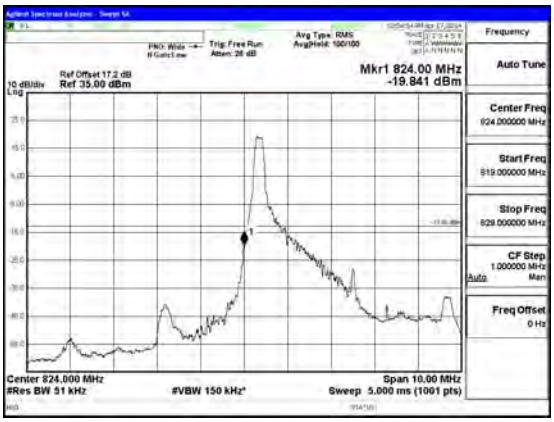
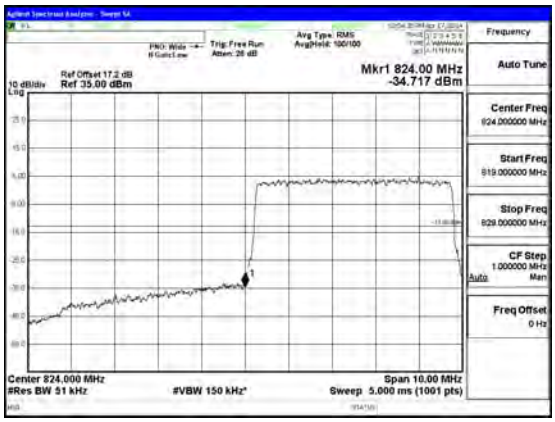
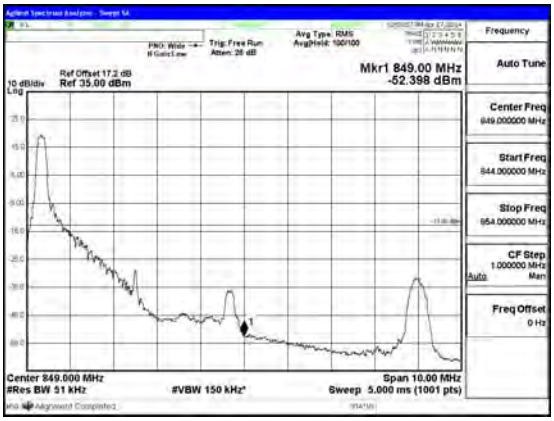
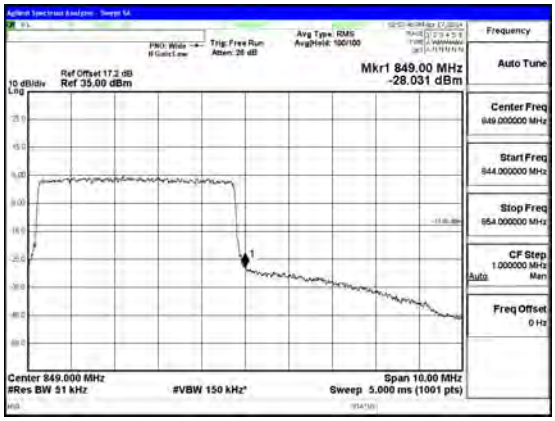
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE5 10MHz QPSK	 Band LTE5 10MHz CBE QPSK Low Channel 1RB.gif	 Band LTE5 10MHz CBE QPSK Low Channel FRB.gif
Band LTE5 10MHz QPSK	 Band LTE5 10MHz CBE QPSK High Channel 1RB.gif	 Band LTE5 10MHz CBE QPSK High Channel FRB.gif

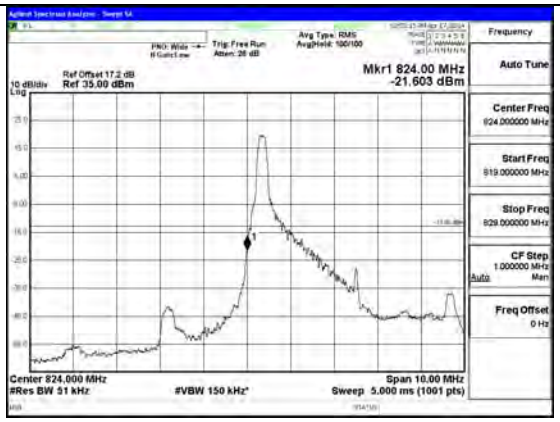
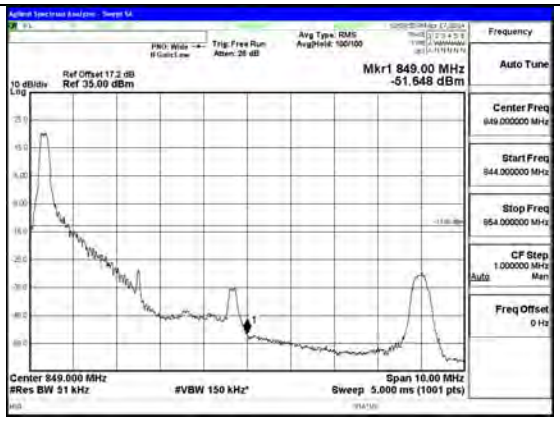
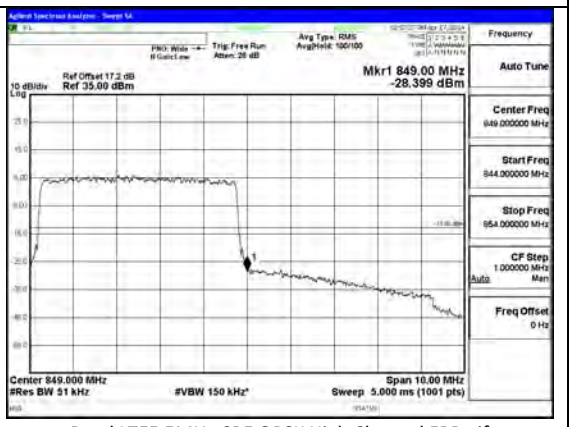
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE5 5MHz 16QAM	 Band LTE5 5MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE5 5MHz CBE 16QAM Low Channel FRB.gif
Band LTE5 5MHz 16QAM	 Band LTE5 5MHz CBE 16QAM High Channel 1RB.gif	 Band LTE5 5MHz CBE 16QAM High Channel FRB.gif

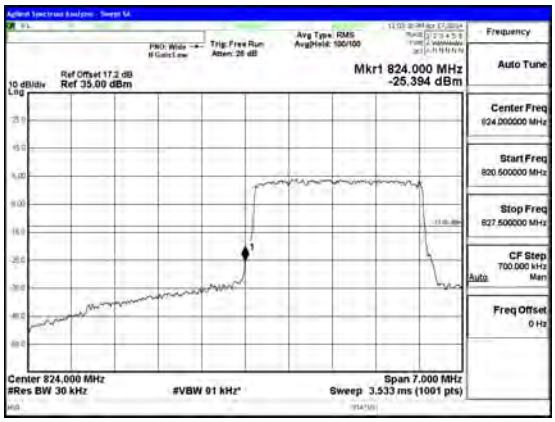
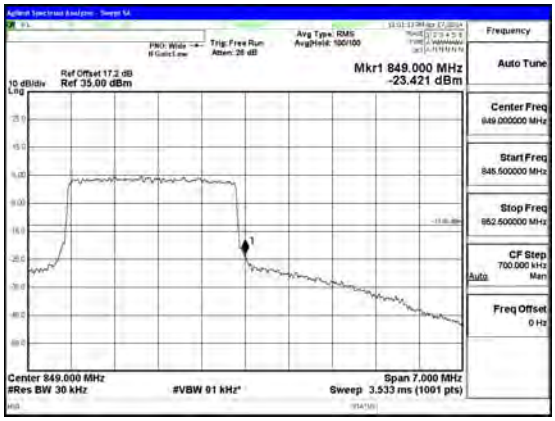
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE5 5MHz QPSK	 Band LTE5 5MHz CBE QPSK Low Channel 1RB.gif	 Band LTE5 5MHz CBE QPSK Low Channel FRB.gif
Band LTE5 5MHz QPSK	 Band LTE5 5MHz CBE QPSK High Channel 1RB.gif	 Band LTE5 5MHz CBE QPSK High Channel FRB.gif

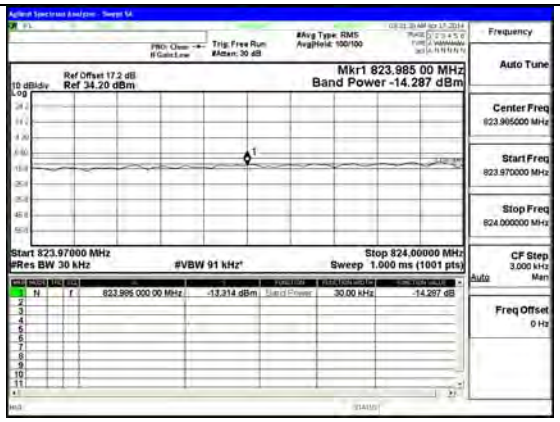
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE5 3MHz 16QAM	 Band LTE5 3MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE5 3MHz CBE 16QAM Low Channel FRB.gif
Band LTE5 3MHz 16QAM	 Band LTE5 3MHz CBE 16QAM High Channel 1RB.gif	 Band LTE5 3MHz CBE 16QAM High Channel FRB.gif

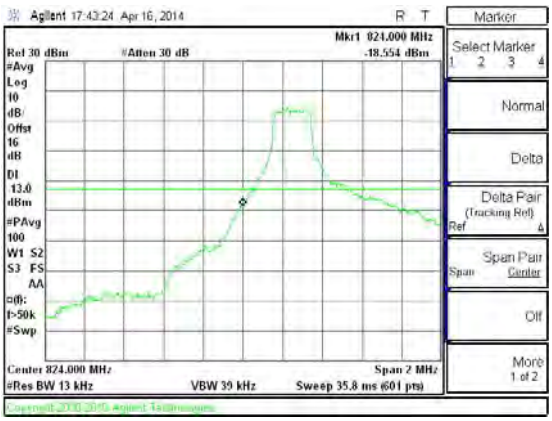
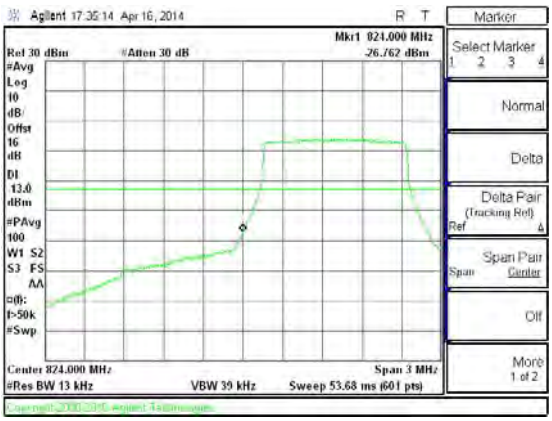
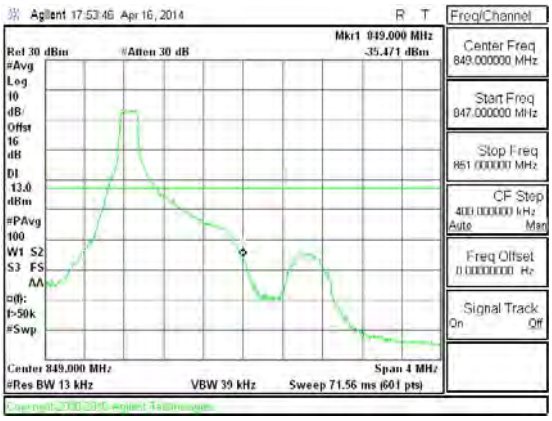
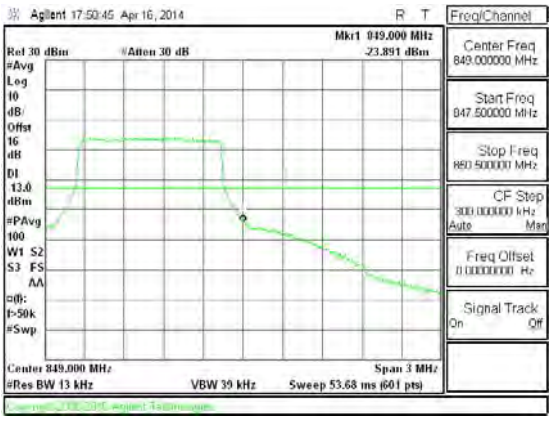
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE5 3MHz QPSK	 Band LTE5 3MHz CBE QPSK Low Channel 1RB.gif	 Band LTE5 3MHz CBE QPSK Low Channel FRB.gif
Band LTE5 3MHz QPSK	 Band LTE5 3MHz CBE QPSK High Channel 1RB.gif	 Band LTE5 3MHz CBE QPSK High Channel FRB.gif

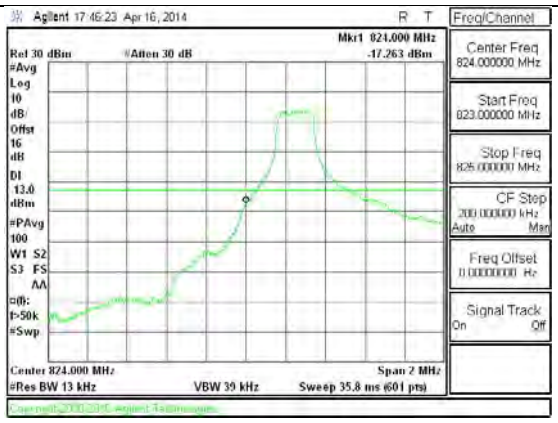
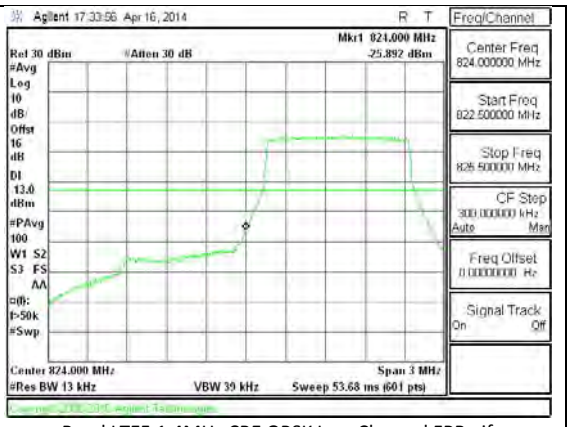
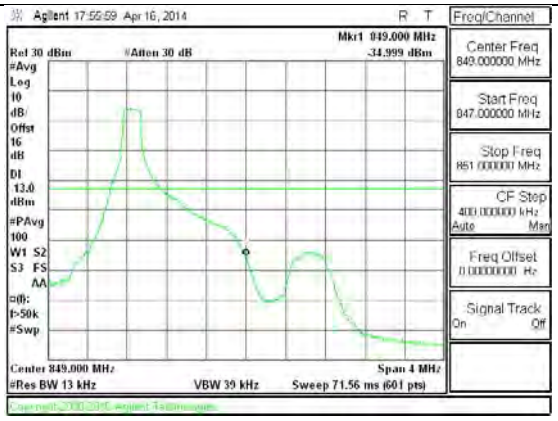
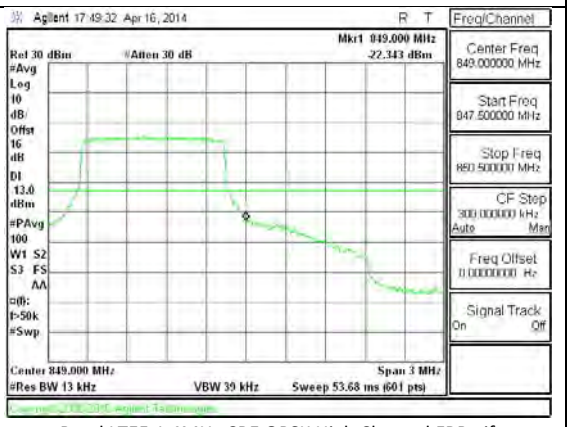
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE5 1.4MHz 16QAM	 Band LTE5 1.4MHz CBE 16QAM Low Channel 1RB.gif	 Band LTE5 1.4MHz CBE 16QAM Low Channel FRB.gif
Band LTE5 1.4MHz 16QAM	 Band LTE5 1.4MHz CBE 16QAM High Channel 1RB.gif	 Band LTE5 1.4MHz CBE 16QAM High Channel FRB.gif

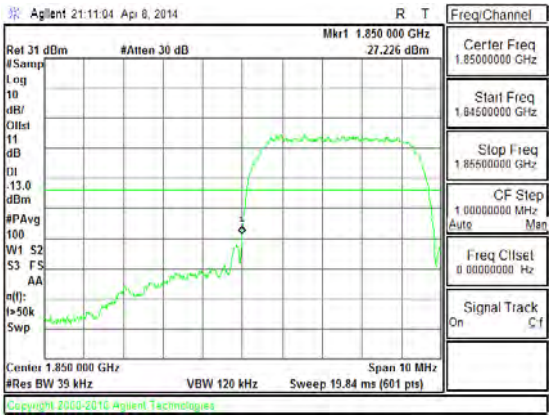
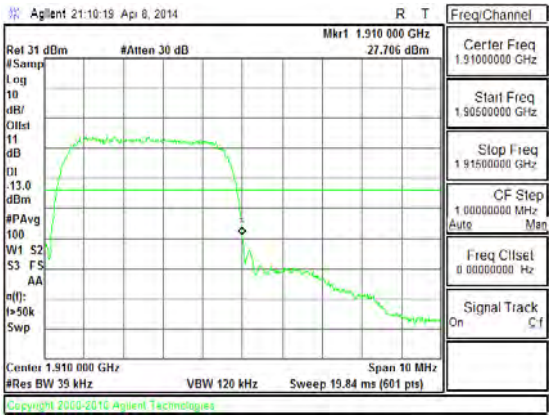
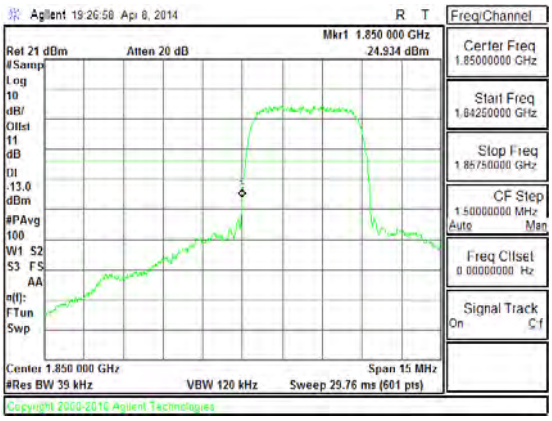
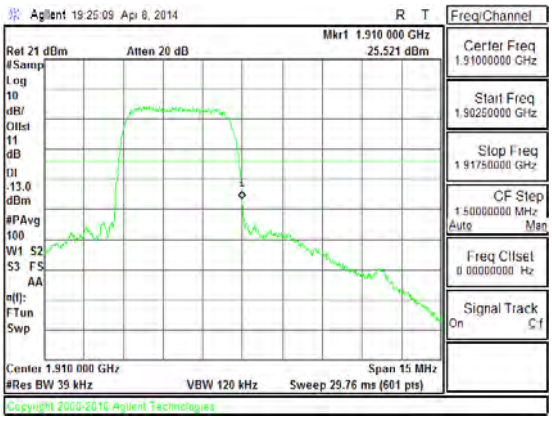
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

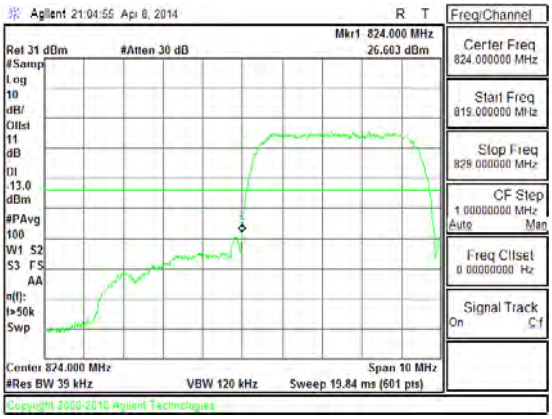
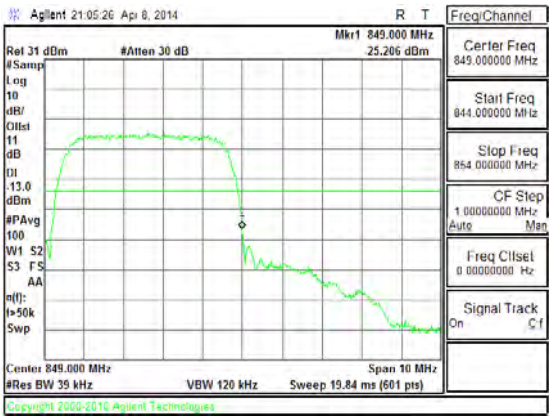
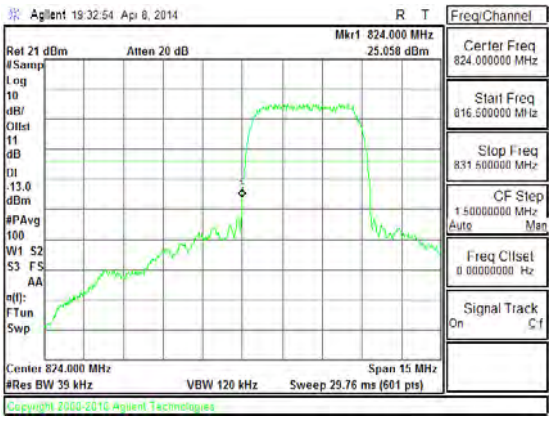
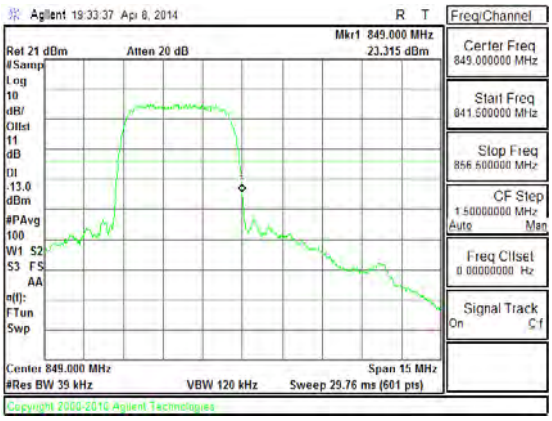
Band LTE5 1.4MHz QPSK	 Band LTE5 1.4MHz CBE QPSK Low Channel 1RB.gif	 Band LTE5 1.4MHz CBE QPSK Low Channel FRB.gif
Band LTE5 1.4MHz QPSK	 Band LTE5 1.4MHz CBE QPSK High Channel 1RB.gif	 Band LTE5 1.4MHz CBE QPSK High Channel FRB.gif

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

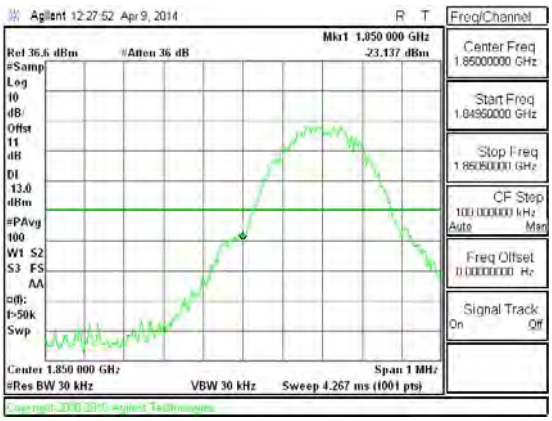
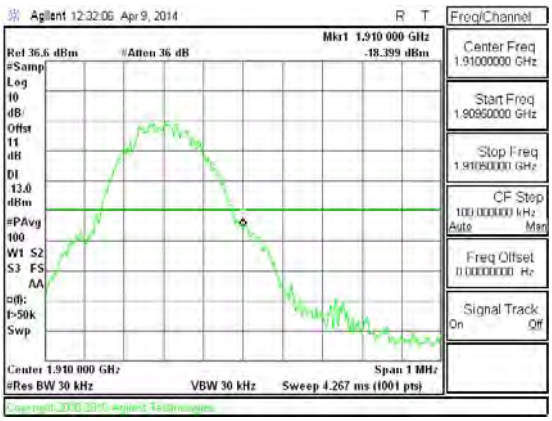
Band Band 2 HSDPA	 Band WCDMA B2 HSDPA CBE	 Band WCDMA B2 HSDPA CBE
Band Band 2 REL99	 Band WCDMA B2 REL99 CBE	 Band WCDMA B2 REL99 CBE

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band Band 5 HSDPA	 Band WCDMA B5 HSDPA CBE	 Band WCDMA B5 HSDPA CBE
Band Band 5 REL99	 Band WCDMA B5 REL99 CBE	 Band WCDMA B5 REL99 CBE

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band GSM1900 GPRS	 Band GSM1900 GPRS CBE Low channel	 Band GSM1900 GPRS CBE High channel

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

10.3. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051, §22.901, §22.917, §24.238 and §27

LIMITS

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v02r01

The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

RESULTS

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

10.3.1. OUT OF BAND EMISSIONS RESULT

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE17	10	QPSK	709	-25.52	-13	-12.52
			710	-26.49	-13	-13.49
			711	-26.19	-13	-13.19
		16QAM	709	-27.19	-13	-14.19
			710	-24.78	-13	-11.78
			711	-25.16	-13	-12.16

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE17	5	QPSK	706.5	-25.26	-13	-12.26
			710	-24.95	-13	-11.95
			713.5	-23.77	-13	-10.77
		16QAM	706.5	-24.71	-13	-11.71
			710	-25.71	-13	-12.71
			713.5	-27.39	-13	-14.39

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE5	10	QPSK	829	-25.22	-13	-12.22
			836.5	-23.57	-13	-10.57
			844	-25.59	-13	-12.59
		16QAM	829	-25.75	-13	-12.75
			836.5	-26.02	-13	-13.02
			844	-24.88	-13	-11.88

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE5	5	QPSK	826.5	-26.96	-13	-13.96
			836.5	-25.79	-13	-12.79
			846.5	-25.46	-13	-12.46
		16QAM	826.5	-25.53	-13	-12.53
			836.5	-25.5	-13	-12.5

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

			846.5	-26.31	-13	-13.31

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE5	3	QPSK	825.5	-26.33	-13	-13.33
			836.5	-23.8	-13	-10.8
			847.5	-24.98	-13	-11.98
		16QAM	825.5	-24.49	-13	-11.49
			836.5	-25.67	-13	-12.67
			847.5	-25.82	-13	-12.82

Band	BW (MHz)	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
LTE5	1.4	QPSK	824.7	-38.55	-13	-25.55
			836.5	-38.64	-13	-25.64
			848.3	-38.51	-13	-25.51
		16QAM	824.7	-38.28	-13	-25.28
			836.5	-38.49	-13	-25.49
			848.3	-41.01	-13	-28.01

Band	Mode	f (MHz)	Spur (dBm)	Spec (dBm)	Delta (dB)
GSM1900	GPRS	1850.2	-24.23	-13	-11.23
		1880	-24.92	-13	-11.92
		1909.8	-25.42	-13	-12.42
Band 2	REL99	1852.4	-40.08	-13	-27.08
		1880	-36.64	-13	-23.64
		1907.6	-34.26	-13	-21.26
	HSDPA	1852.4	-41.68	-13	-28.68
		1880	-42.23	-13	-29.23
		1907.6	-33.91	-13	-20.91
Band 5	REL99	826.6	-44.74	-13	-31.74
		836.6	-42.71	-13	-29.71
		846.4	-38.97	-13	-25.97
	HSDPA	826.6	-40.74	-13	-27.74

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

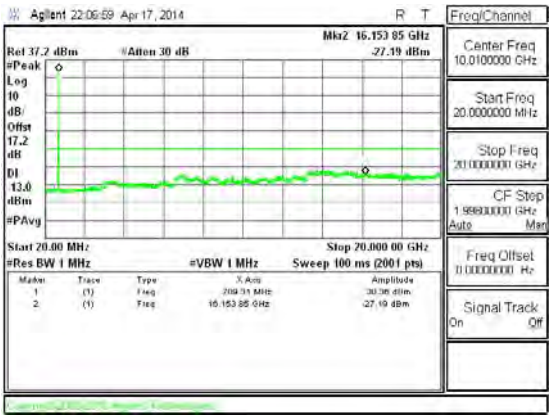
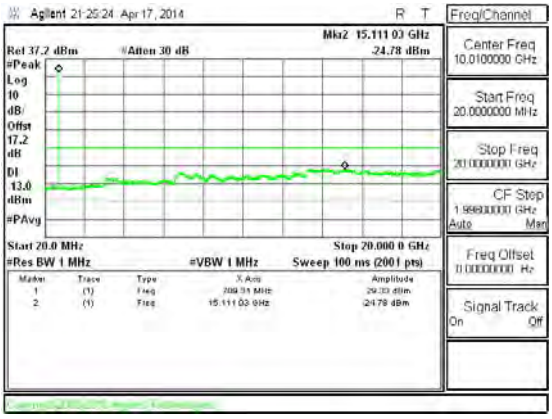
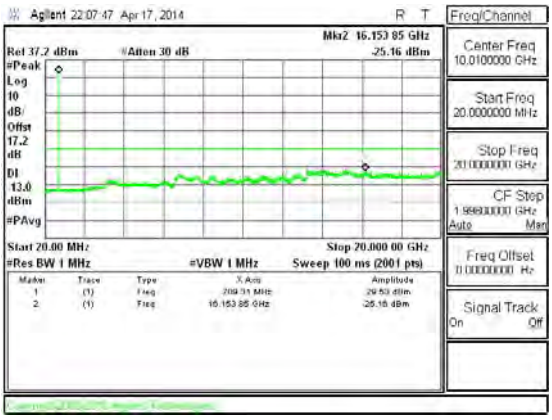
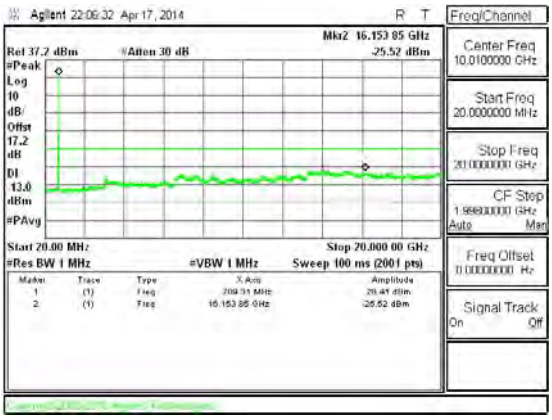
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

		836.6	-42.57	-13	-29.57
		846.4	-42.21	-13	-29.21

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

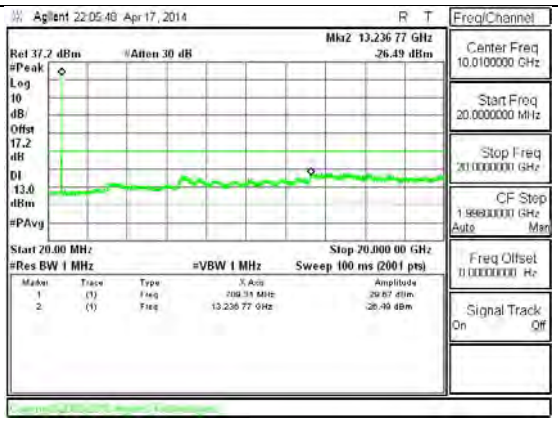
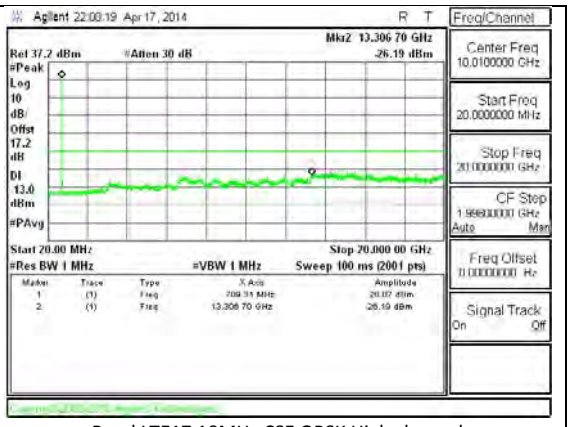
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

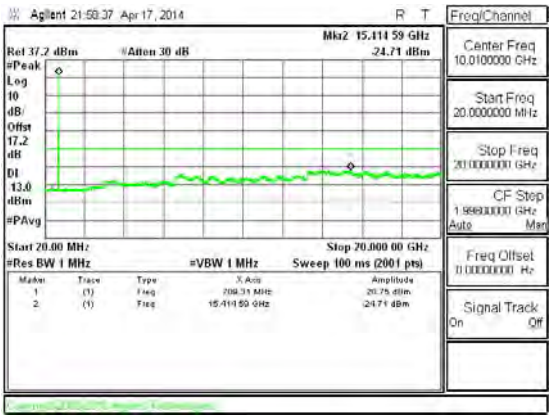
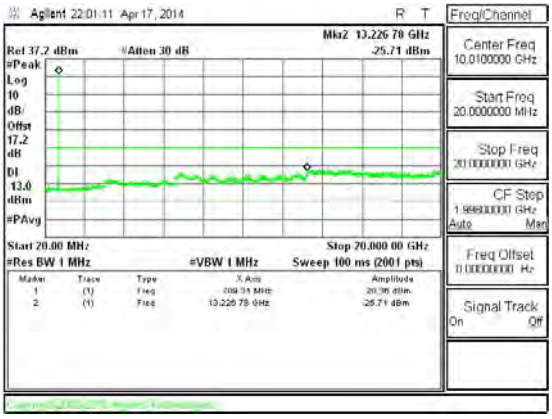
10.3.2. OUT OF BAND EMISSIONS PLOTS

Band LTE17 10MHz 16QAM	 Band LTE17 10MHz CSE 16QAM Low channel	 Band LTE17 10MHz CSE 16QAM Mid channel
Band LTE17 10MHz 16QAM	 Band LTE17 10MHz CSE 16QAM High channel	 Band LTE17 10MHz CSE QPSK Low channel

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

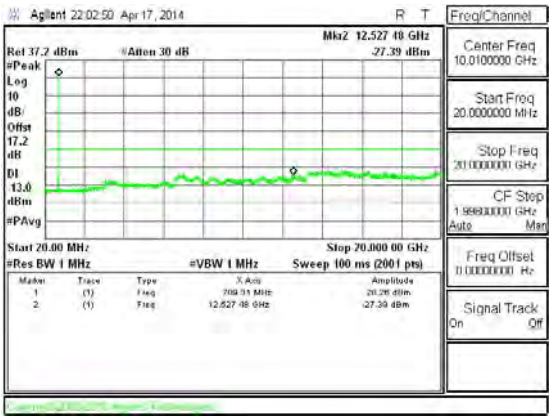
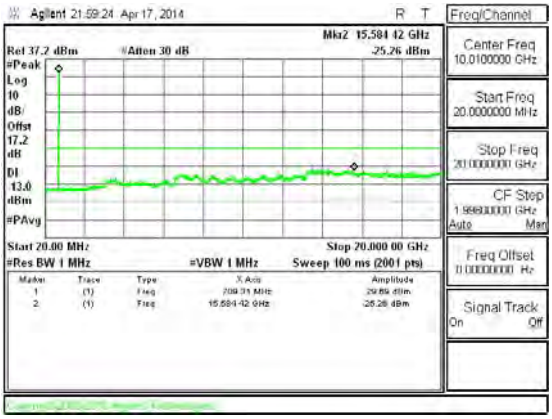
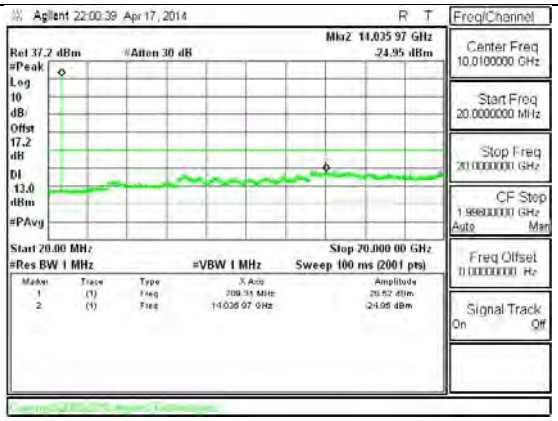
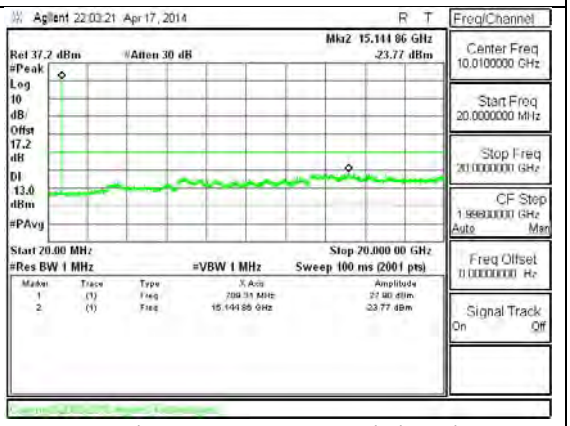
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE17 10MHz QPSK	 Band LTE17 10MHz CSE QPSK Mid channel	 Band LTE17 10MHz CSE QPSK High channel

Band LTE17 5MHz 16QAM	 Band LTE17 5MHz CSE 16QAM Low channel	 Band LTE17 5MHz CSE 16QAM Mid channel

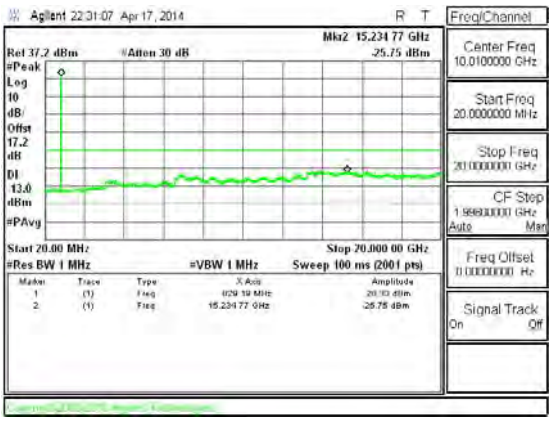
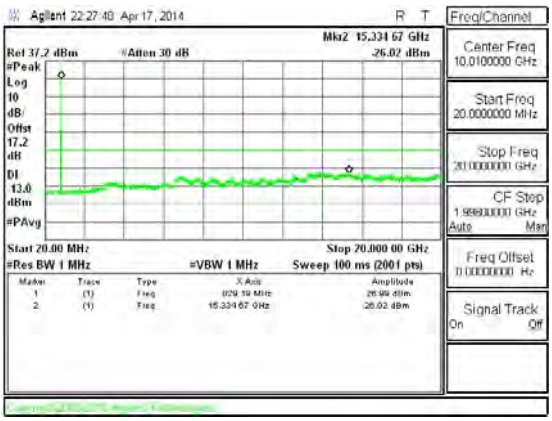
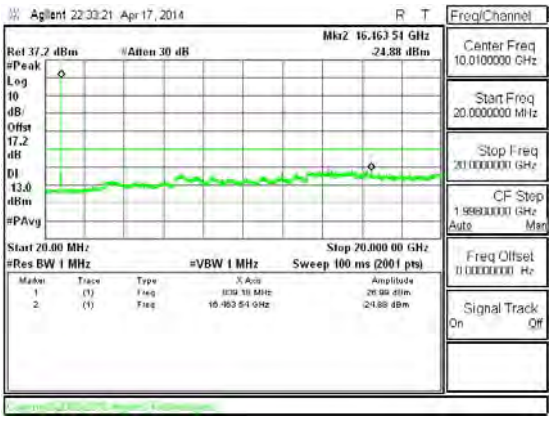
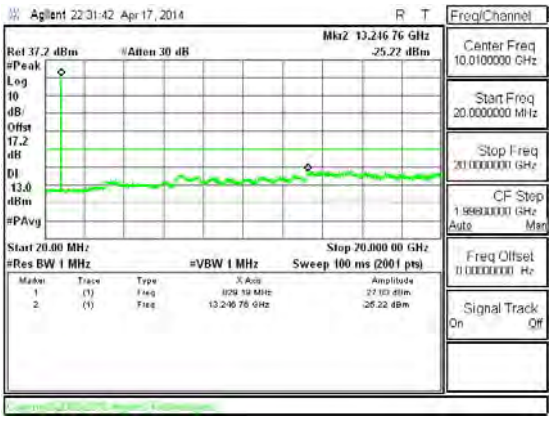
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE17 5MHz 16QAM	 Band LTE17 5MHz CSE 16QAM High channel	 Band LTE17 5MHz CSE QPSK Low channel
Band LTE17 5MHz QPSK	 Band LTE17 5MHz CSE QPSK Mid channel	 Band LTE17 5MHz CSE QPSK High channel

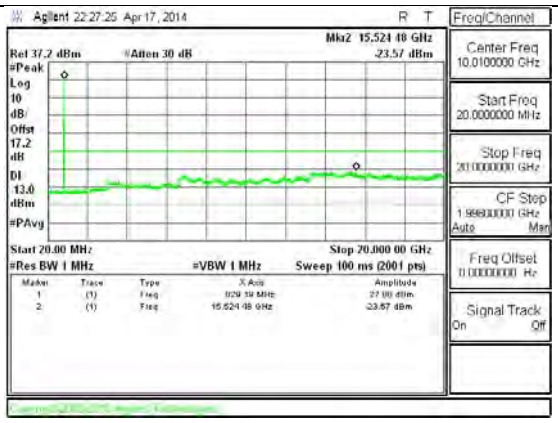
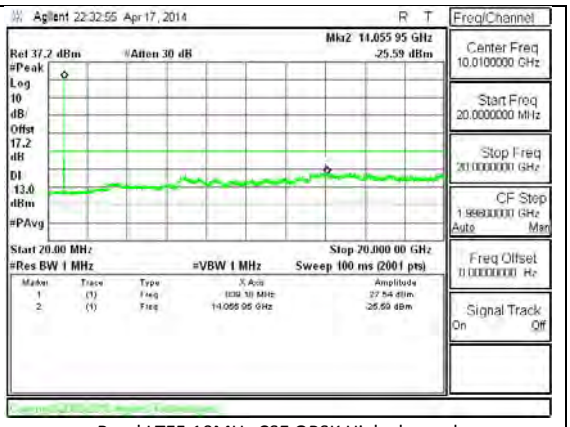
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

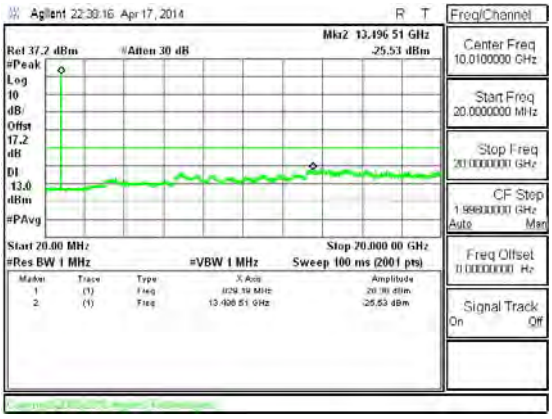
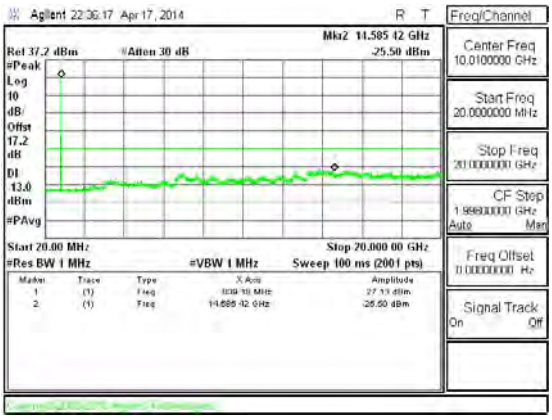
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE5 10MHz 16QAM	 Band LTE5 10MHz CSE 16QAM Low channel	 Band LTE5 10MHz CSE 16QAM Mid channel
Band LTE5 10MHz 16QAM	 Band LTE5 10MHz CSE 16QAM High channel	 Band LTE5 10MHz CSE QPSK Low channel

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

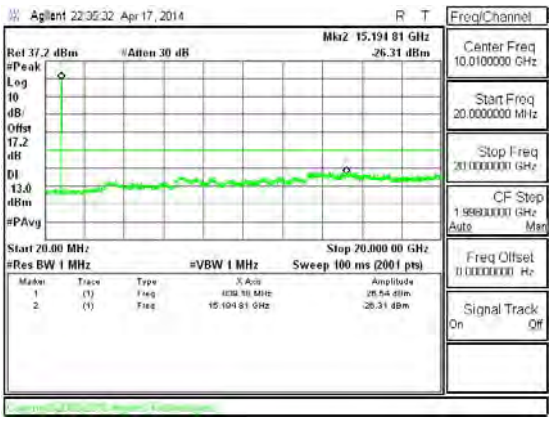
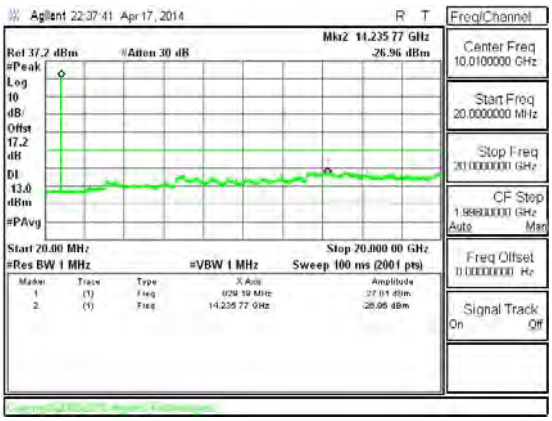
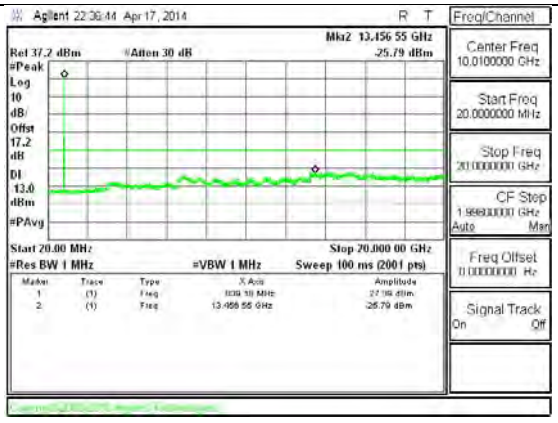
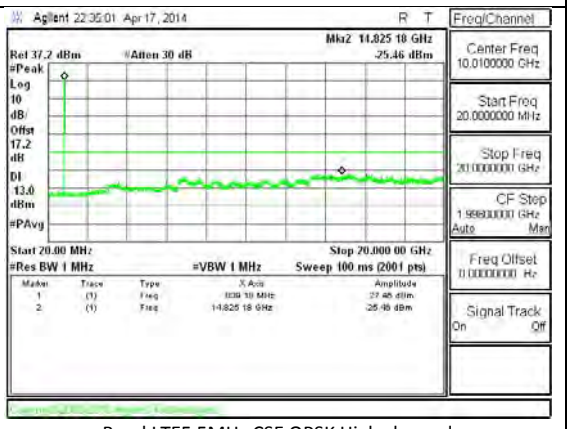
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE5 10MHz QPSK	 Band LTE5 10MHz CSE QPSK Mid channel	 Band LTE5 10MHz CSE QPSK High channel

Band LTE5 5MHz 16QAM	 Band LTE5 5MHz CSE 16QAM Low channel	 Band LTE5 5MHz CSE 16QAM Mid channel

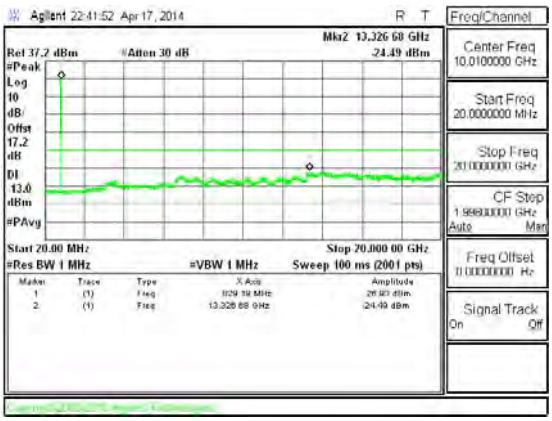
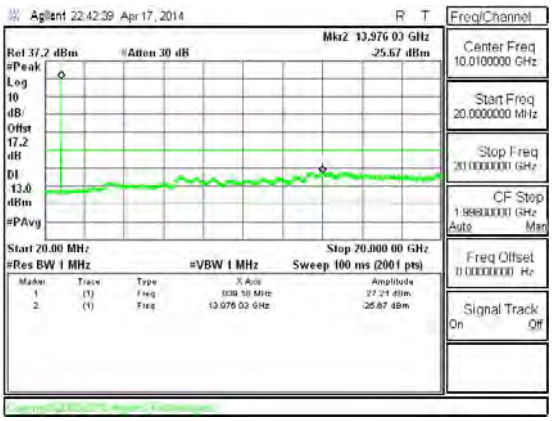
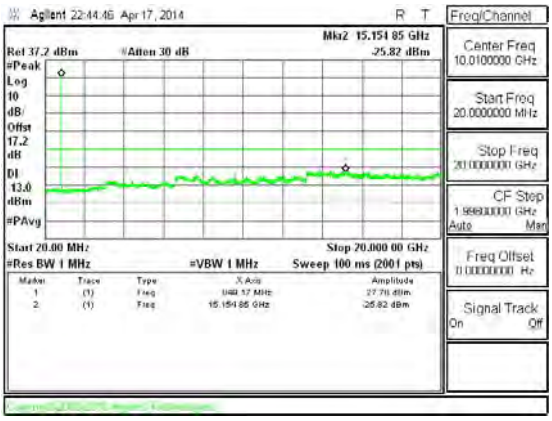
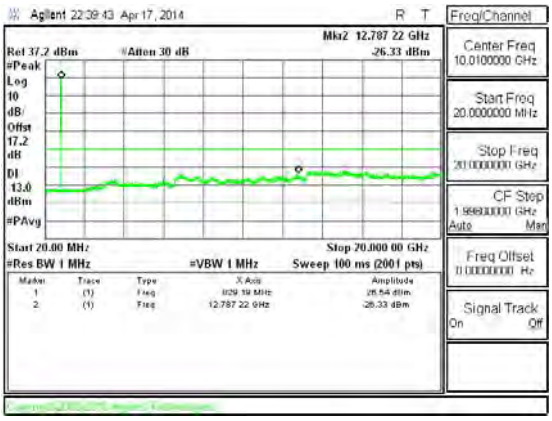
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE5 5MHz 16QAM	 Band LTE5 5MHz CSE 16QAM High channel	 Band LTE5 5MHz CSE QPSK Low channel
Band LTE5 5MHz QPSK	 Band LTE5 5MHz CSE QPSK Mid channel	 Band LTE5 5MHz CSE QPSK High channel

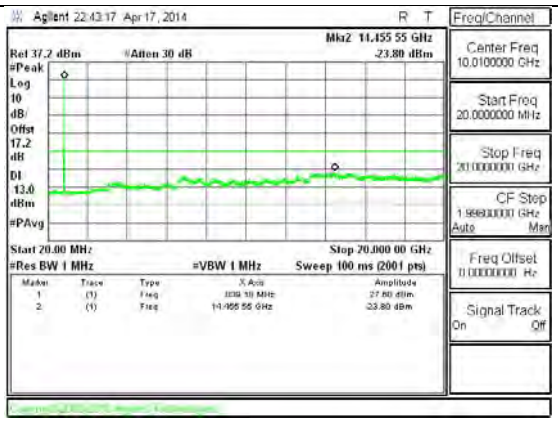
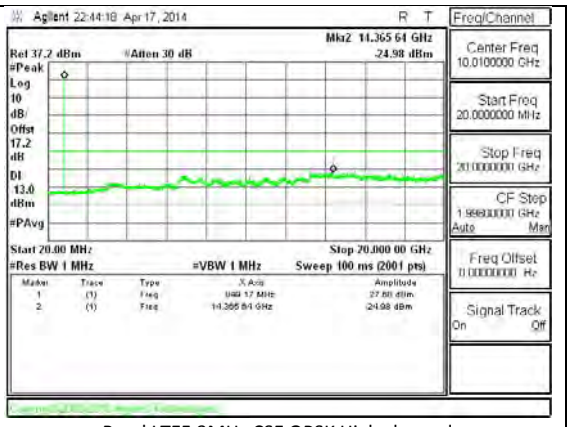
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

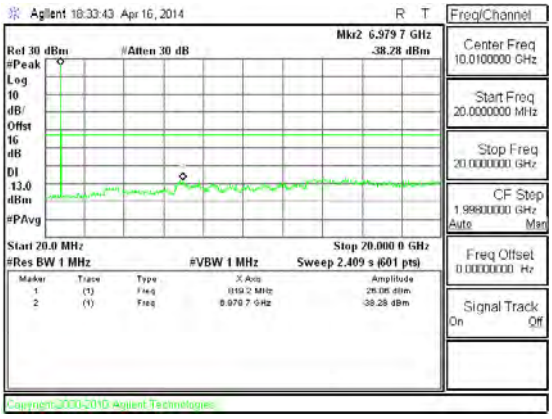
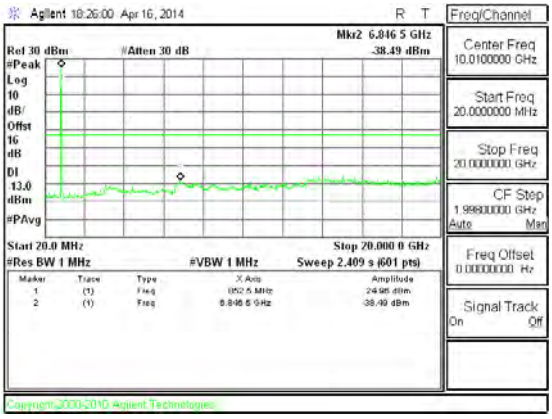
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE5 3MHz 16QAM	 Band LTE5 3MHz CSE 16QAM Low channel	 Band LTE5 3MHz CSE 16QAM Mid channel
Band LTE5 3MHz 16QAM	 Band LTE5 3MHz CSE 16QAM High channel	 Band LTE5 3MHz CSE QPSK Low channel

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

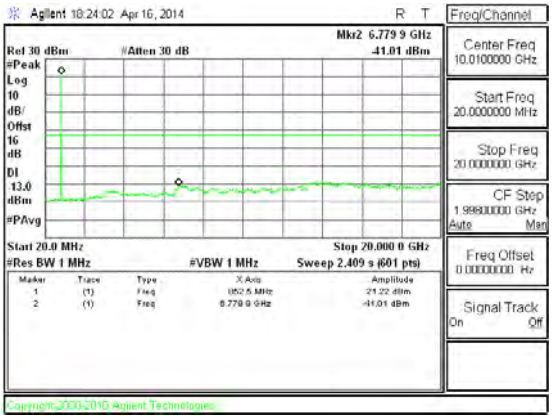
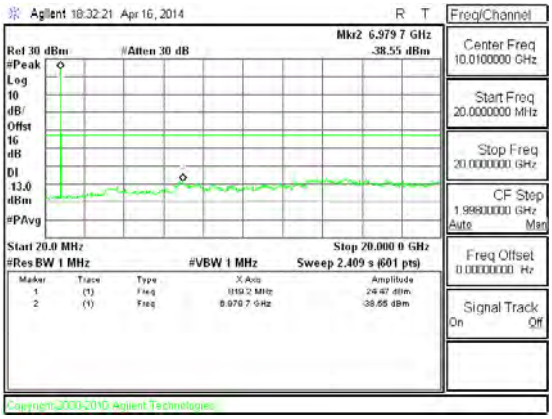
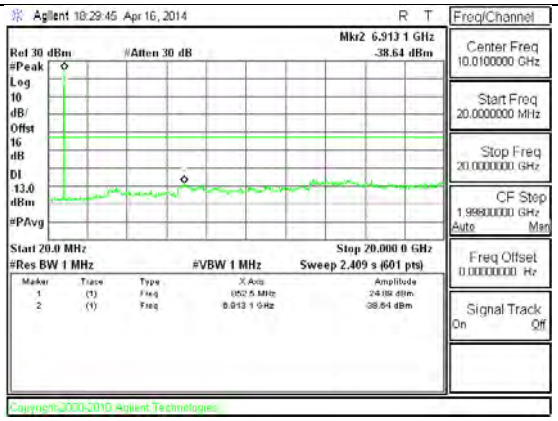
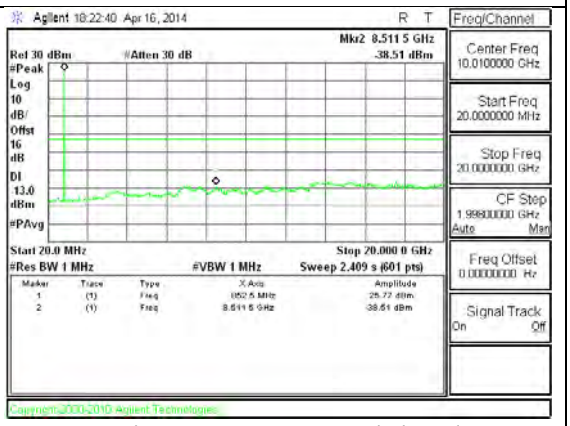
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE5 3MHz QPSK	 Band LTE5 3MHz CSE QPSK Mid channel	 Band LTE5 3MHz CSE QPSK High channel

Band LTE5 1.4MHz 16QAM	 Band LTE5 1.4MHz CSE 16QAM Low channel	 Band LTE5 1.4MHz CSE 16QAM Mid channel

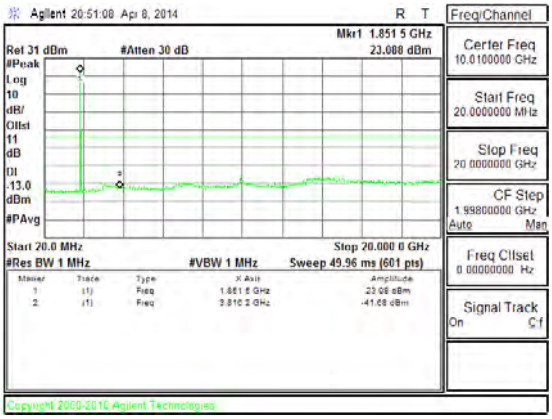
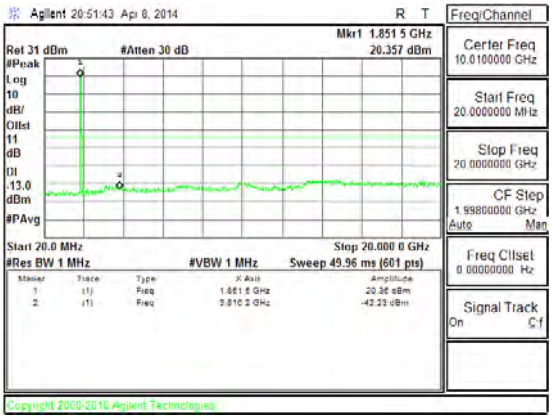
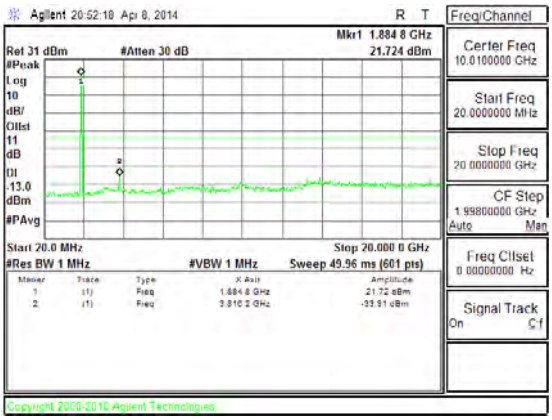
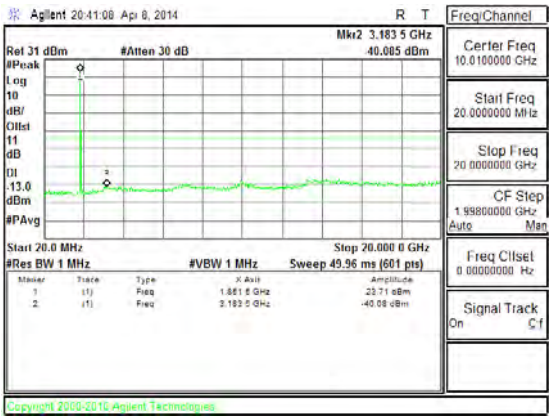
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band LTE5 1.4MHz 16QAM	 Band LTE5 1.4MHz CSE 16QAM High channel	 Band LTE5 1.4MHz CSE QPSK Low channel
Band LTE5 1.4MHz QPSK	 Band LTE5 1.4MHz CSE QPSK Mid channel	 Band LTE5 1.4MHz CSE QPSK High channel

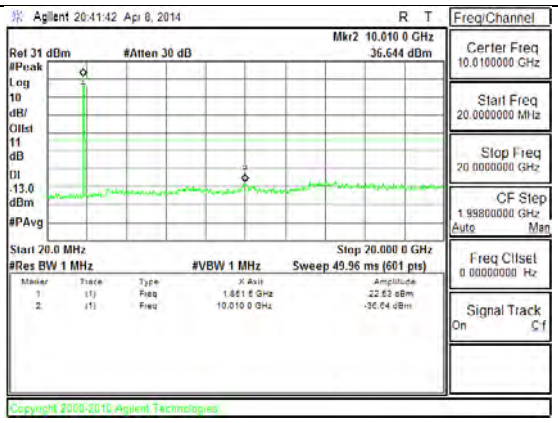
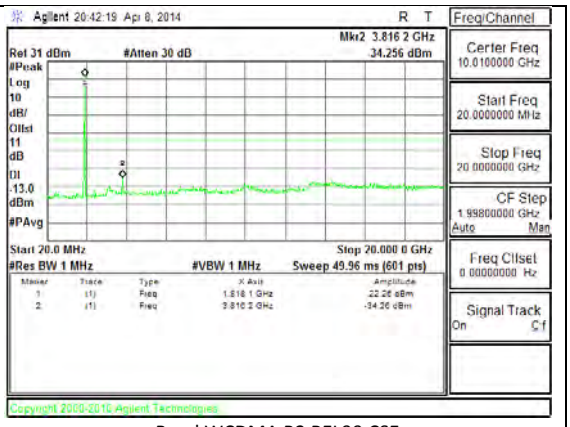
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

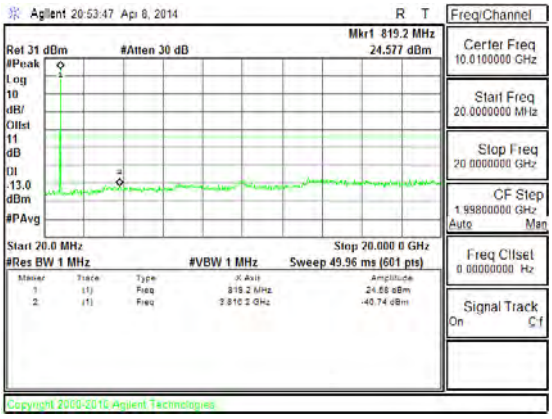
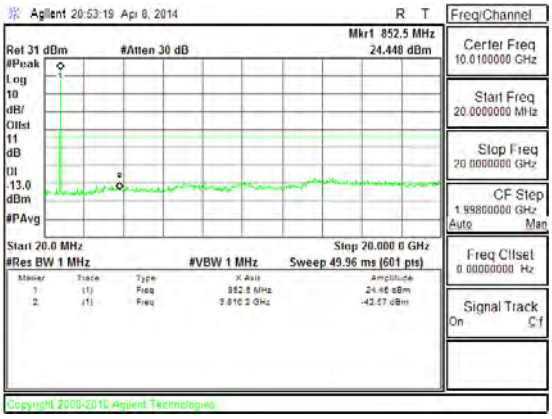
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band Band 2 HSDPA	 Band WCDMA B2 HSDPA CSE	 Band WCDMA B2 HSDPA CSE
Band Band 2 HSDPA	 Band WCDMA B2 HSDPA CSE	 Band WCDMA B2 REL99 CSE

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

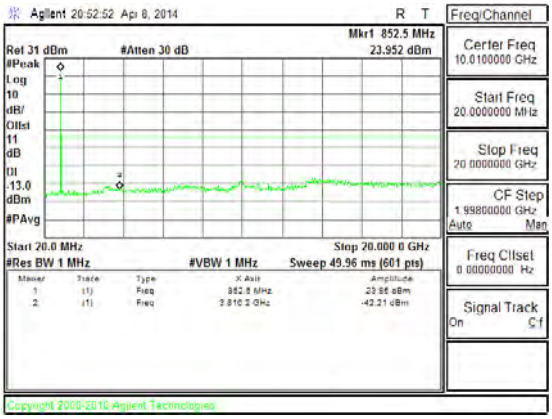
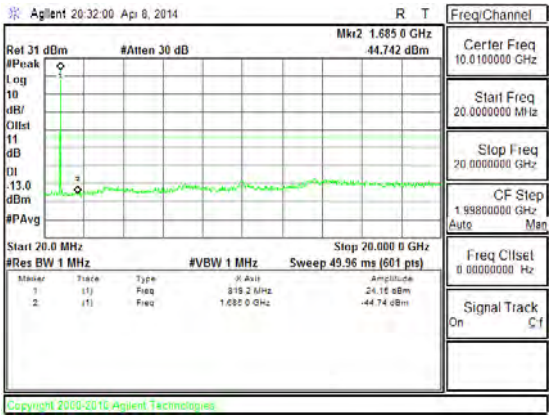
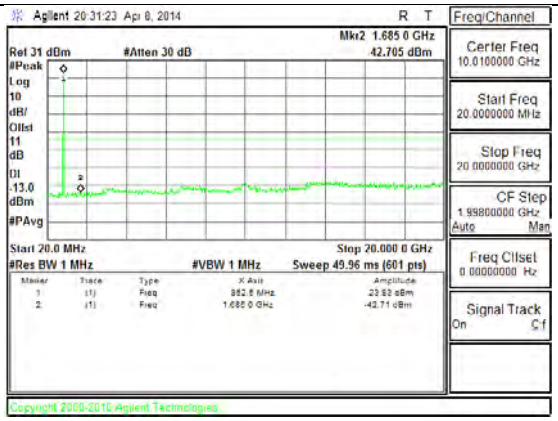
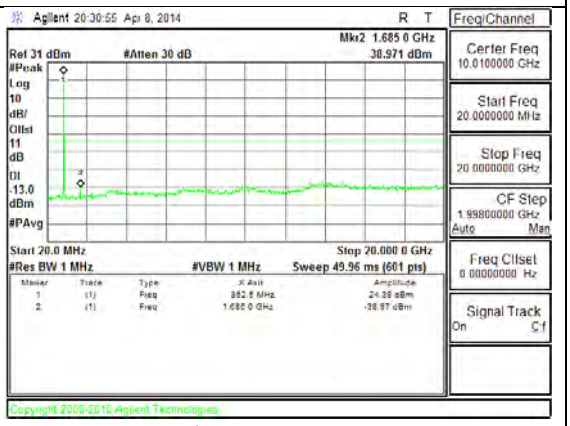
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band Band 2 REL99	 Band WCDMA B2 REL99 CSE	 Band WCDMA B2 REL99 CSE

Band Band 5 HSDPA	 Band WCDMA B5 HSDPA CSE	 Band WCDMA B5 HSDPA CSE

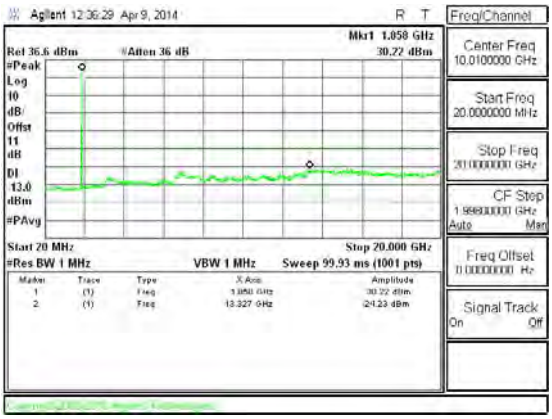
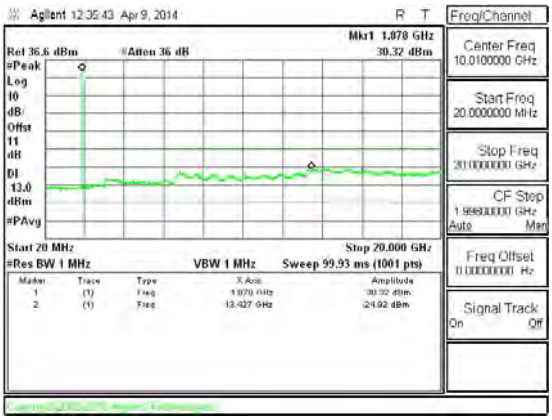
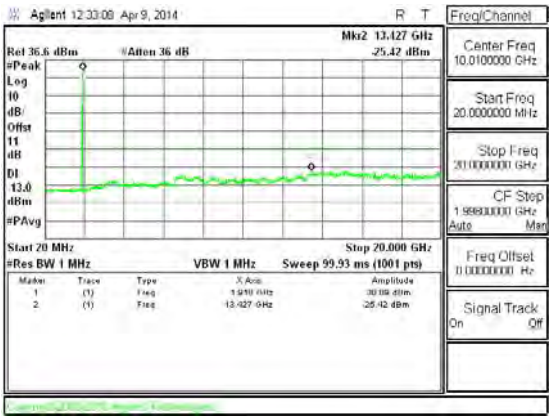
UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band Band 5 HSDPA	 Band WCDMA B5 HSDPA CSE	 Band WCDMA B5 REL99 CSE
Band Band 5 REL99	 Band WCDMA B5 REL99 CSE	 Band WCDMA B5 REL99 CSE

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

		 Band GSM1900 GPRS CSE Low channel
Band GSM1900 GPRS	 Band GSM1900 GPRS CSE Mid channel	 Band GSM1900 GPRS CSE High channel

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

10.4. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §22.355, §24.235, and §27.54

LIMITS

§22.355 - The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations.

§24.235 - The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

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

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v02r01

SOP

Frequency Stability vs Temperature:

The EUT is place inside a temperature chamber. The temperature is set to 20ºC and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50ºC is reached. Reference power supply voltage for these tests is 3.8Vdc.

Frequency Stability vs Voltage:

The peak frequency error is recorded (worst-case). The test voltage ranges from 3.50 to 4.26 VDC.

RESULTS

See the following pages.

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

10.4.1. FREQUENCY STABILITY RESULTS

B5, – MID CHANNEL 4183, Frequency 836.6MHz

Reference Frequency: Band 5 Channel 4183 Freq : 836.6 MHz @ 20ºC Limit: +- 2.5 ppm = 2091.500 Hz				
Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measureed with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	85	836.600006	-0.002	2.5
3.80	60	836.600005	-0.001	2.5
3.80	35	836.600003	0.001	2.5
3.80	***20***	***836.600004***	***0***	***2.5***
3.80	10	836.600002	0.002	2.5
3.80	0	836.600004	0.000	2.5
3.80	-10	836.600005	-0.001	2.5
3.80	-20	836.600005	-0.001	2.5
3.80	-30	836.600006	-0.002	2.5

Reference Frequency: Band 5 Channel 4183 Freq : 836.6 MHz @ 20ºC Limit: +- 2.5 ppm = 2091.500 Hz				
Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measureed with Time Elapse		
			Delta (ppm)	Limit (ppm)
3.80	***20***	***836.600004***	***0.000***	***2.5***
3.3 end volt	20	836.600004	*0.000*	2.5
4.20	20	836.600004	*0.000*	2.5

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

B2, Channel 9400 Freq: 1880MHz– MID CHANNEL

Reference Frequency: Band 2 Channel 9400 Freq: 1880MHz @ 20°C Limit: to stay +- 2.5 ppm = 4700.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measureed with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	85	1880.000008	0.001	2.5
3.80	60	1880.000007	0.002	2.5
3.80	35	1880.000006	0.002	2.5
3.80	***20***	***1880.000010***	***0***	***2.5***
3.80	10	1880.000009	0.001	2.5
3.80	0	1880.00001	0.000	2.5
3.80	-10	1880.000008	0.001	2.5
3.80	-20	1880.000009	0.001	2.5
3.80	-30	1880.000009	0.001	2.5

Reference Frequency: Band 2 Channel 9400 Freq: 1880MHz @ 20°C Limit: to stay +- 2.5 ppm = 4700.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measureed with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.80	***20***	***1880.000010***	***0***	***2.5***
3.3 end volt	20	1880.000008	*0.001*	2.5
4.20	20	1880.000009	*0.001*	2.5

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

LTE17 Channel 23790 Freq: 710 MHz– MID CHANNEL

Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measureed with Time Elapse (MHz)	Delta (ppm)	Limit (ppm)
3.80	85	710.000022	-0.004	2.5
3.80	60	710.000024	-0.007	2.5
3.80	35	710.000016	0.004	2.5
3.80	***20***	***710.000019***	***0***	***2.5***
3.80	10	710.000014	0.007	2.5
3.80	0	710.000008	0.015	2.5
3.80	-10	710.000018	0.001	2.5
3.80	-20	710.000083	-0.090	2.5
3.80	-25	710.000022	-0.004	2.5

Reference Frequency: LTE17 Channel 23790 Freq : 710 MHz @ 20°C Limit: to stay +- 2.5 ppm = 1775.000 Hz				
Power Supply (Vdc)	**Environment Temperature (°C)**	**Frequency Deviation Measureed with Time Elapse (MHz)**	**Delta (ppm)**	**Limit (ppm)**
3.80	***20***	***710.000019***	***0***	***2.5***
3.3 end volt	20	710.000013	*0.008*	2.5
4.20	20	710.000016	0.004	2.5

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

11. RADIATED TEST RESULTS

11.1. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §2.1046, §22.913, §24.232, and § 27.

LIMITS

22.913(a) - The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

24.232(c) - Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13dB.

TEST PROCEDURE

ANSI / TIA / EIA 603C Clause 2.2.17

TEST RESULTS

11.1.1. ERP/EIRP Results

Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
Band 2	REL99	9262	1852.4	23.25	211.35
		9400	1880	23.38	217.77
		9538	1907.6	21.77	150.31
	HSDPA	9262	1852.4	22.23	167.11
		9400	1880	22.89	194.54
		9538	1907.6	21.86	153.46

Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
Band 5	REL99	4132	826.4	18.301	67.62
		4183	836.6	19.151	82.24
		4233	846.6	19.601	91.22
	HSDPA	4132	826.4	18.601	72.46

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

		4183	836.6	19.401	87.12
		4233	846.6	19.881	97.3

Band	Mode	Channel	f(MHz)	ERP / EIRP	
				dBm	mW
GSM1900	GPRS	512	1850.2	25.17	328.85
		661	1880	27.1	512.86
		810	1909.8	27	501.19

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

11.1.2. LTE ERP/EIRP Results

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE17	10	QPSK	1/0	709	8.971	7.89
			1/0	710	9.101	8.13
			1/0	711	9.011	7.96
		16QAM	1/0	709	8.001	6.31
			1/0	710	8.131	6.5
			1/0	711	8.071	6.41

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE17	5	QPSK	1/0	706.5	9.141	8.21
			1/0	710	8.921	7.8
			1/0	713.5	9.561	9.04
		16QAM	1/0	706.5	8.091	6.44
			1/0	710	8.091	6.44
			1/0	713.5	8.711	7.43

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE5	10	QPSK	1/0	829	19.001	79.45
			1/0	836.5	20.701	117.52
			1/0	844	20.101	102.35
		16QAM	1/0	829	18.101	64.58
			1/0	836.5	19.701	93.35
			1/0	844	18.801	75.88

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE5	5	QPSK	1/0	826.5	19.101	81.3

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

			1/0	836.5	21.001	125.92
			1/0	846.5	19.701	93.35
		16QAM	1/0	826.5	17.901	61.67
			1/0	836.5	20.101	102.35
			1/0	846.5	18.601	72.46

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE5	3	QPSK	1/0	825.5	19.001	79.45
			1/0	836.5	20.501	112.23
			1/0	847.5	20.201	104.74
		16QAM	1/0	825.5	17.901	61.67
			1/0	836.5	19.701	93.35
			1/0	847.5	19.401	87.12

Band	BW (MHz)	Mode	RB/RB Size	f (MHz)	ERP / EIRP	
					dBm	mW
LTE5	1.4	QPSK	1/0	824.7	18.50	70.79
			1/0	836.5	20.601	114.84
			1/0	848.3	20.60	114.82
		16QAM	1/0	824.7	17.60	57.54
			1/0	836.5	19.401	87.12
			1/0	848.3	19.90	97.72

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

11.1.3. ERP/EIRP PLOTS

Band

LTE17

10MHz

16QAM

High Frequency Substitution Measurement
UL Verification Services, Inc. Chamber C

Company: Samsung
Project #: 14U17495
Date: 04/21/14
Test Engineer: R. Alegre
Configuration: EUT, X position
Mode: LTE Band 17_10MHz_16QAM

Test Equipment:
Receiving: Sunol T407, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
709.00	5.32	V	0.9	0.0	4.42	34.8	-30.4	
709.00	8.90	H	0.9	0.0	8.00	34.8	-26.8	
Mid Ch								
710.00	5.33	V	0.9	0.0	4.43	34.8	-30.4	
710.00	9.03	H	0.9	0.0	8.13	34.8	-26.7	
High Ch								
711.00	4.98	V	0.9	0.0	4.08	34.8	-30.7	
711.00	8.97	H	0.9	0.0	8.07	34.8	-26.7	

Rev. 3.17.11
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band

LTE17

10MHz

QPSK

High Frequency Substitution Measurement
UL Verification Services, Inc. Chamber C

Company: Samsung
Project #: 14U17495
Date: 04/21/14
Test Engineer: R. Alegre
Configuration: EUT, X position
Mode: LTE Band 17_10MHz_QPSK

Test Equipment:
Receiving: Sunol T407, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
709.00	5.90	V	0.9	0.0	5.00	34.8	-29.8	
709.00	9.87	H	0.9	0.0	8.97	34.8	-25.8	
Mid Ch								
710.00	6.30	V	0.9	0.0	5.40	34.8	-29.4	
710.00	10.00	H	0.9	0.0	9.10	34.8	-25.7	
High Ch								
711.00	5.79	V	0.9	0.0	4.89	34.8	-29.9	
711.00	9.91	H	0.9	0.0	9.01	34.8	-25.8	

Rev. 3.17.11
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band

LTE17

5MHz

16QAM

High Frequency Substitution Measurement
UL Verification Services, Inc. Chamber C

Company: Samsung
Project #: 14U17495
Date: 04/21/14
Test Engineer: R. Alegre
Configuration: EUT, X position
Mode: LTE Band 17_5MHz_16QAM

Test Equipment:
Receiving: Sunol T407, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
706.50	6.15	V	0.9	0.0	5.25	34.8	-29.5	
706.50	8.99	H	0.9	0.0	8.09	34.8	-26.7	
Mid Ch								
710.00	5.41	V	0.9	0.0	4.51	34.8	-30.3	
710.00	8.99	H	0.9	0.0	8.09	34.8	-26.7	
High Ch								
713.50	4.99	V	0.9	0.0	4.09	34.8	-30.7	
713.50	9.61	H	0.9	0.0	8.71	34.8	-26.1	

Rev. 3.17.11
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band

LTE17

5MHz

QPSK

High Frequency Substitution Measurement
UL Verification Services, Inc. Chamber C

Company: Samsung
Project #: 14U17495
Date: 04/21/14
Test Engineer: R. Alegre
Configuration: EUT, X position
Mode: LTE Band 17_5MHz_QPSK

Test Equipment:
Receiving: Sunol T407, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
706.50	6.68	V	0.9	0.0	5.78	34.8	-29.0	
706.50	10.04	H	0.9	0.0	9.14	34.8	-25.7	
Mid Ch								
710.00	6.08	V	0.9	0.0	5.18	34.8	-29.6	
710.00	9.82	H	0.9	0.0	8.92	34.8	-25.9	
High Ch								
713.50	5.88	V	0.9	0.0	4.98	34.8	-29.8	
713.50	10.46	H	0.9	0.0	9.56	34.8	-25.2	

Rev. 3.17.11
Note: For Band 13/17 ERP limit is 34.77dBm; For Band 26 limit is 50dBm

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band

LTE5

10MHz

16QAM

High Frequency Substitution Measurement
Compliance Certification Services Chamber C

Company: Samsung
Project #: 14U17495
Date: 04/17/14
Test Engineer: K.Kedida
Configuration: EUT only
Mode: LTE band 5, 10MHz BW
16QAM, Average, RB1-0

Test Equipment:
Receiving: Sunol T185, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
829.00	11.20	V	0.9	0.0	10.30	38.5	-28.1	
829.00	19.00	H	0.9	0.0	18.10	38.5	-20.3	
Mid Ch								
836.50	12.50	V	0.9	0.0	11.60	38.5	-26.8	
836.50	20.60	H	0.9	0.0	19.70	38.5	-18.7	
High Ch								
844.00	10.80	V	0.9	0.0	9.90	38.5	-28.5	
844.00	19.70	H	0.9	0.0	18.80	38.5	-19.6	

Rev. 3.17.11

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band

LTE5

10MHz

QPSK

High Frequency Substitution Measurement
Compliance Certification Services Chamber C

Company: Samsung
Project #: 14U17495
Date: 04/17/14
Test Engineer: K.Kedida
Configuration: EUT only
Mode: LTE band 5, 10MHz BW
QPSK, Average, RB1-0

Test Equipment:
Receiving: Sunol T185, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
829.00	11.90	V	0.9	0.0	11.00	38.5	-27.4	
829.00	19.90	H	0.9	0.0	19.00	38.5	-19.4	
Mid Ch								
836.50	13.20	V	0.9	0.0	12.30	38.5	-26.1	
836.50	21.60	H	0.9	0.0	20.70	38.5	-17.7	
High Ch								
844.00	11.50	V	0.9	0.0	10.60	38.5	-27.8	
844.00	21.00	H	0.9	0.0	20.10	38.5	-18.3	

Rev. 3.17.11

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band

LTE5

5MHz

16QAM

High Frequency Substitution Measurement
Compliance Certification Services Chamber C

Company: Samsung
Project #: 14U17495
Date: 04/17/14
Test Engineer: K.Kedida
Configuration: EUT only
Mode: LTE band 5, 5MHz BW
16QAM, Average, RB1-0

Test Equipment:
Receiving: Sunol T185, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
826.50	11.20	V	0.9	0.0	10.30	38.5	-28.1	
826.50	18.80	H	0.9	0.0	17.90	38.5	-20.5	
Mid Ch								
836.50	12.10	V	0.9	0.0	11.20	38.5	-27.2	
836.50	21.00	H	0.9	0.0	20.10	38.5	-18.3	
High Ch								
846.50	10.90	V	0.9	0.0	10.00	38.5	-28.4	
846.50	19.50	H	0.9	0.0	18.60	38.5	-19.8	

Rev. 3.17.11

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band

LTE5

5MHz

QPSK

High Frequency Substitution Measurement
Compliance Certification Services Chamber C

Company: Samsung
Project #: 14U17495
Date: 04/17/14
Test Engineer: K.Kedida
Configuration: EUT only
Mode: LTE band 5, 5MHz BW
QPSK, Average, RB1-0

Test Equipment:
Receiving: Sunol T185, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
826.50	12.10	V	0.9	0.0	11.20	38.5	-27.2	
826.50	20.00	H	0.9	0.0	19.10	38.5	-19.3	
Mid Ch								
836.50	13.30	V	0.9	0.0	12.40	38.5	-26.0	
836.50	21.90	H	0.9	0.0	21.00	38.5	-17.4	
High Ch								
846.50	11.70	V	0.9	0.0	10.80	38.5	-27.6	
846.50	20.60	H	0.9	0.0	19.70	38.5	-18.7	

Rev. 3.17.11

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band

LTE5

3MHz

16QAM

High Frequency Substitution Measurement
Compliance Certification Services Chamber C

Company: Samsung
Project #: 14U17414
Date: 04/15/14
Test Engineer: K.Kedida
Configuration: EUT only
Mode: LTE band 5, 3MHz BW
16QAM, Average, RB1-0

Test Equipment:
Receiving: Sunol T185, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
825.50	10.70	V	0.9	0.0	9.80	38.5	-28.6	
825.50	18.80	H	0.9	0.0	17.90	38.5	-20.5	
Mid Ch								
836.50	10.60	V	0.9	0.0	9.70	38.5	-28.7	
836.50	20.60	H	0.9	0.0	19.70	38.5	-18.7	
High Ch								
847.50	10.00	V	0.9	0.0	9.10	38.5	-29.3	
847.50	20.30	H	0.9	0.0	19.40	38.5	-19.0	

Rev. 3.17.11

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band

LTE5

3MHz

QPSK

High Frequency Substitution Measurement
Compliance Certification Services Chamber C

Company: Samsung
Project #: 14U17495
Date: 04/17/14
Test Engineer: K.Kedida
Configuration: EUT only
Mode: LTE band 5, 3MHz BW
QPSK, Average, RB1-0

Test Equipment:
Receiving: Sunol T185, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
825.50	11.60	V	0.9	0.0	10.70	38.5	-27.7	
825.50	19.90	H	0.9	0.0	19.00	38.5	-19.4	
Mid Ch								
836.50	11.70	V	0.9	0.0	10.80	38.5	-27.6	
836.50	21.40	H	0.9	0.0	20.50	38.5	-17.9	
High Ch								
847.50	10.70	V	0.9	0.0	9.80	38.5	-28.6	
847.50	21.10	H	0.9	0.0	20.20	38.5	-18.2	

Rev. 3.17.11

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band

LTE5

1.4MHz

16QAM

High Frequency Substitution Measurement
Compliance Certification Services Chamber C

Company: Samsung
Project #: 14U17495
Date: 04/17/14
Test Engineer: K.Kedida
Configuration: EUT only
Mode: LTE band 5, 1.4MHz BW
16QAM, Average, RB1-0

Test Equipment:
Receiving: Sunol T185, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
824.70	10.70	V	0.9	0.0	9.80	38.5	-28.6	
824.70	18.50	H	0.9	0.0	17.60	38.5	-20.8	
Mid Ch								
836.50	11.70	V	0.9	0.0	10.80	38.5	-27.6	
836.50	20.30	H	0.9	0.0	19.40	38.5	-19.0	
High Ch								
848.30	9.80	V	0.9	0.0	8.90	38.5	-29.5	
848.30	20.80	H	0.9	0.0	19.90	38.5	-18.5	

Rev. 3.17.11

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band

LTE5

1.4MHz

QPSK

High Frequency Substitution Measurement
Compliance Certification Services Chamber C

Company: Samsung
Project #: 14U17495
Date: 04/17/14
Test Engineer: K.Kedida
Configuration: EUT only
Mode: LTE band 5, 1.4MHz BW
QPSK, Average, RB1-0

Test Equipment:
Receiving: Sunol T185, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
824.70	11.50	V	0.9	0.0	10.60	38.5	-27.8	
824.70	19.40	H	0.9	0.0	18.50	38.5	-19.9	
Mid Ch								
836.50	12.60	V	0.9	0.0	11.70	38.5	-26.7	
836.50	21.50	H	0.9	0.0	20.60	38.5	-17.8	
High Ch								
848.30	10.70	V	0.9	0.0	9.80	38.5	-28.6	
848.30	21.50	H	0.9	0.0	20.60	38.5	-17.8	

Rev. 3.17.11

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band

Band 2

HSDPA

High Frequency Fundamental Measurement
Compliance Certification Services Chamber C

Company: Samsung
Project #: 14U17495
Date: 04/14/14
Test Engineer: D. Soper
Configuration: X-position
Mode: HSDPA B2 1900Mhz

Test Equipment:
Receiving: T119, and Chamber C SMA Cables
Substitution: Horn T59 Substitution, 4ft SMA Cable (244639001) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.852	2.1	V	0.85	7.85	9.11	33.0	-23.9	
1.852	15.2	H	0.85	7.85	22.23	33.0	-10.8	
Mid Ch								
1.880	7.7	V	0.85	7.85	14.65	33.0	-18.4	
1.880	15.9	H	0.85	7.85	22.89	33.0	-10.1	
High Ch								
1.908	3.8	V	0.85	7.90	10.88	33.0	-22.1	
1.908	14.8	H	0.85	7.90	21.86	33.0	-11.1	

Rev. 3.17.11

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band

Band 2

REL99

High Frequency Fundamental Measurement
Compliance Certification Services Chamber C

Company: Samsung
Project #: 14U17495
Date: 04/14/14
Test Engineer: D. Soper
Configuration: X-position
Mode: REL99 B2 1900Mhz

Test Equipment:
Receiving: T119, and Chamber C SMA Cables
Substitution: Horn T59 Substitution, 4ft SMA Cable (244639001) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.852	7.1	V	0.85	7.85	14.14	33.0	-18.9	
1.852	16.3	H	0.85	7.85	23.25	33.0	-9.8	
Mid Ch								
1.880	2.8	V	0.85	7.85	9.80	33.0	-23.2	
1.880	16.4	H	0.85	7.85	23.38	33.0	-9.6	
High Ch								
1.908	2.5	V	0.85	7.90	9.50	33.0	-23.5	
1.908	14.7	H	0.85	7.90	21.77	33.0	-11.2	

Rev. 3.17.11

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band

Band 5

HSDPA

High Frequency Substitution Measurement
Compliance Certification Services Chamber C

Company: Samsung
Project #: 14U17495
Date: 04/17/14
Test Engineer: K.Kedida
Configuration: EUT ONLY, X position
Mode: HSDPA 850MHz

Test Equipment:
Receiving: Sunol T185, and 3m Chamber N-type Cable (Setup this one for testing EUT)
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
826.40	11.10	V	0.9	0.0	10.20	38.5	-28.2	
826.40	19.50	H	0.9	0.0	18.60	38.5	-19.8	
Mid Ch								
836.60	11.55	V	0.9	0.0	10.65	38.5	-27.8	
836.60	20.30	H	0.9	0.0	19.40	38.5	-19.0	
High Ch								
846.60	11.46	V	0.9	0.0	10.56	38.5	-27.9	
846.60	20.78	H	0.9	0.0	19.88	38.5	-18.6	

Rev. 3.17.11

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band

Band 5

REL99

High Frequency Substitution Measurement
Compliance Certification Services Chamber C

Company: Samsung
Project #: 14U17495
Date: 04/17/14
Test Engineer: K.Kedida
Configuration: EUT ONLY, X position
Mode: REL99 850MHz

Test Equipment:
Receiving: Sunol T407, and Chamber C SMA Cables
Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 244640 002)

f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low Ch								
826.40	10.70	V	0.9	0.0	9.80	38.5	-28.6	
826.40	19.20	H	0.9	0.0	18.30	38.5	-20.1	
Mid Ch								
836.60	12.10	V	0.9	0.0	11.20	38.5	-27.2	
836.60	20.05	H	0.9	0.0	19.15	38.5	-19.3	
High Ch								
846.60	11.90	V	0.9	0.0	11.00	38.5	-27.4	
846.60	20.50	H	0.9	0.0	19.60	38.5	-18.8	

Rev. 3.17.11

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band

GSM1900

GPRS

High Frequency Fundamental Measurement
Compliance Certification Services Chamber C

Company: Samsung
Project #: 14U17495
Date: 04/21/14
Test Engineer: R. Alegre
Configuration: X-position
Mode: GPRS 1900Mhz

Test Equipment:
Receiving: T119, and Chamber C SMA Cables
Substitution: Horn T59 Substitution, 4ft SMA Cable (244639001) Warehouse

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch								
1.850	6.7	V	0.85	7.85	13.69	33.0	-19.3	
1.850	18.2	H	0.85	7.85	25.17	33.0	-7.8	
Mid Ch								
1.880	7.3	V	0.85	7.85	14.30	33.0	-18.7	
1.880	20.1	H	0.85	7.85	27.10	33.0	-5.9	
High Ch								
1.910	10.6	V	0.85	7.90	17.61	33.0	-15.4	
1.910	20.0	H	0.85	7.90	27.00	33.0	-6.0	

Rev. 3.17.11

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

11.2. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053, §22.917, §24.238, and §27

LIMIT

§22.917 (e) and §24.238 (a): Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB

TEST PROCEDURE

For Cellular equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

For PCS equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

RESULTS

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

11.2.1. SPURIOUS RADIATION DATA

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U17495
Date: 04/21/14
Test Engineer: K.KEDIDA
Configuration: X Position, EUT and AC Adapter
Mode: TX, LTE B17 10MHz 16QAM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber C	T145 8449B	Filter 1	Part 27

Band
LTE17
10MHz
16QAM

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (709MHz)									
1.418	-17.5	V	3.0	33.1	1.0	-49.6	-13.0	-36.6	
2.127	-18.2	V	3.0	31.6	1.0	-48.7	-13.0	-35.7	
2.836	-19.5	V	3.0	31.0	1.0	-49.5	-13.0	-36.5	
1.418	-12.4	H	3.0	33.1	1.0	-44.5	-13.0	-31.5	
2.127	-19.7	H	3.0	31.6	1.0	-50.3	-13.0	-37.3	
2.836	-19.5	H	3.0	31.0	1.0	-49.5	-13.0	-36.5	
Mid Ch, (710MHz)									
1.420	-17.1	V	3.0	33.1	1.0	-49.2	-13.0	-36.2	
2.130	-20.1	V	3.0	31.6	1.0	-50.6	-13.0	-37.6	
2.840	-20.0	V	3.0	31.0	1.0	-50.0	-13.0	-37.0	
1.420	-13.8	H	3.0	33.1	1.0	-45.9	-13.0	-32.9	
2.130	-19.1	H	3.0	31.6	1.0	-49.7	-13.0	-36.7	
2.840	-20.6	H	3.0	31.0	1.0	-50.6	-13.0	-37.6	
High Ch, (711MHz)									
1.422	-14.1	V	3.0	33.1	1.0	-46.2	-13.0	-33.2	
2.133	-19.5	V	3.0	31.6	1.0	-50.1	-13.0	-37.1	
2.844	-19.4	V	3.0	31.0	1.0	-49.4	-13.0	-36.4	
1.422	-18.0	H	3.0	33.1	1.0	-50.1	-13.0	-37.1	
2.133	-20.5	H	3.0	31.6	1.0	-51.1	-13.0	-38.1	
2.844	-19.9	H	3.0	31.0	1.0	-49.9	-13.0	-36.9	

Rev. 03.03.09

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U17495
Date: 04/21/14
Test Engineer: K.KEDIDA
Configuration: X Position, EUT and AC Adapter
Mode: TX, LTE B17 10MHz QPSK

Chamber	Pre-amplifer	Filter	Limit
3m Chamber C	T145 8449B	Filter 1	Part 27

Band: LTE17 10MHz QPSK

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (709MHz)									
1.418	-15.7	V	3.0	33.1	1.0	-47.8	-13.0	-34.8	
2.127	-17.5	V	3.0	31.6	1.0	-48.1	-13.0	-35.1	
2.836	-18.6	V	3.0	31.0	1.0	-48.6	-13.0	-35.6	
1.418	-12.1	H	3.0	33.1	1.0	-44.2	-13.0	-31.2	
2.127	-18.5	H	3.0	31.6	1.0	-49.1	-13.0	-36.1	
2.836	-18.9	H	3.0	31.0	1.0	-48.9	-13.0	-35.9	
Mid Ch, (710MHz)									
1.420	-15.8	V	3.0	33.1	1.0	-47.9	-13.0	-34.9	
2.130	-19.8	V	3.0	31.6	1.0	-50.4	-13.0	-37.4	
2.840	-19.4	V	3.0	31.0	1.0	-49.4	-13.0	-36.4	
1.420	-12.8	H	3.0	33.1	1.0	-44.9	-13.0	-31.9	
2.130	-17.9	H	3.0	31.6	1.0	-48.5	-13.0	-35.5	
2.840	-19.8	H	3.0	31.0	1.0	-49.8	-13.0	-36.8	
High Ch, (711MHz)									
1.422	-12.8	V	3.0	33.1	1.0	-44.9	-13.0	-31.9	
2.133	-18.3	V	3.0	31.6	1.0	-48.9	-13.0	-35.9	
2.844	-17.9	V	3.0	31.0	1.0	-47.9	-13.0	-34.9	
1.422	-16.5	H	3.0	33.1	1.0	-48.6	-13.0	-35.6	
2.133	-19.3	H	3.0	31.6	1.0	-49.9	-13.0	-36.9	
2.844	-18.7	H	3.0	31.0	1.0	-48.7	-13.0	-35.7	

Rev. 03.03.09

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U17495
Date: 04/21/14
Test Engineer: K.KEDIDA
Configuration: X Position, EUT and AC Adapter
Mode: TX, LTE B17 5MHz har 16QAM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber C	T145 8449B	Filter 1	Part 27

Band: LTE17 5MHz 16QAM

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (706.5MHz)									
1.413	-14.8	V	3.0	33.1	1.0	-46.9	-13.0	-33.9	
2.120	-18.8	V	3.0	31.6	1.0	-49.4	-13.0	-36.4	
2.826	-19.6	V	3.0	31.0	1.0	-49.6	-13.0	-36.6	
1.413	-8.6	H	3.0	33.1	1.0	-40.7	-13.0	-27.7	
2.120	-17.4	H	3.0	31.6	1.0	-48.0	-13.0	-35.0	
2.826	-19.2	H	3.0	31.0	1.0	-49.3	-13.0	-36.3	
Mid Ch, (710MHz)									
1.420	-17.9	V	3.0	33.1	1.0	-50.0	-13.0	-37.0	
2.130	-20.6	V	3.0	31.6	1.0	-51.2	-13.0	-38.2	
2.840	-18.9	V	3.0	31.0	1.0	-48.9	-13.0	-35.9	
1.420	-13.1	H	3.0	33.1	1.0	-45.1	-13.0	-32.1	
2.130	-19.2	H	3.0	31.6	1.0	-49.8	-13.0	-36.8	
2.840	-18.8	H	3.0	31.0	1.0	-48.8	-13.0	-35.8	
High Ch, (713.5MHz)									
1.427	-12.3	V	3.0	33.1	1.0	-44.4	-13.0	-31.4	
2.141	-18.8	V	3.0	31.6	1.0	-49.4	-13.0	-36.4	
2.854	-18.8	V	3.0	31.0	1.0	-48.8	-13.0	-35.8	
1.427	-10.5	H	3.0	33.1	1.0	-42.6	-13.0	-29.6	
2.141	-17.9	H	3.0	31.6	1.0	-48.5	-13.0	-35.5	
2.854	-19.6	H	3.0	31.0	1.0	-49.6	-13.0	-36.6	

Rev. 03.03.09

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U17495
Date: 04/21/14
Test Engineer: K.KEDIDA
Configuration: X Position, EUT and AC Adapter
Mode: TX, LTE B17 5MHz har QPSK

Chamber	Pre-amplifer	Filter	Limit
3m Chamber C	T145 8449B	Filter 1	Part 27

Band: LTE17 5MHz QPSK

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (706.5MHz)									
1.413	-14.1	V	3.0	33.1	1.0	-46.1	-13.0	-33.1	
2.120	-18.0	V	3.0	31.6	1.0	-48.6	-13.0	-35.6	
2.826	-18.0	V	3.0	31.0	1.0	-48.1	-13.0	-35.1	
1.413	-8.8	H	3.0	33.1	1.0	-40.9	-13.0	-27.9	
2.120	-16.2	H	3.0	31.6	1.0	-46.8	-13.0	-33.8	
2.826	-19.6	H	3.0	31.0	1.0	-49.6	-13.0	-36.6	
Mid Ch, (710MHz)									
1.420	-16.8	V	3.0	33.1	1.0	-48.9	-13.0	-35.9	
2.130	-19.4	V	3.0	31.6	1.0	-49.9	-13.0	-36.9	
2.840	-18.2	V	3.0	31.0	1.0	-48.2	-13.0	-35.2	
1.420	-12.7	H	3.0	33.1	1.0	-44.8	-13.0	-31.8	
2.130	-18.8	H	3.0	31.6	1.0	-49.4	-13.0	-36.4	
2.840	-19.0	H	3.0	31.0	1.0	-49.1	-13.0	-36.1	
High Ch, (713.5MHz)									
1.427	-11.3	V	3.0	33.1	1.0	-43.4	-13.0	-30.4	
2.141	-17.5	V	3.0	31.6	1.0	-48.1	-13.0	-35.1	
2.854	-18.1	V	3.0	31.0	1.0	-48.1	-13.0	-35.1	
1.427	-9.6	H	3.0	33.1	1.0	-41.7	-13.0	-28.7	
2.141	-17.8	H	3.0	31.6	1.0	-48.3	-13.0	-35.3	
2.854	-17.8	H	3.0	31.0	1.0	-47.8	-13.0	-34.8	

Rev. 03.03.09

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U17495
Date: 04/18/14
Test Engineer: Charles Vergonio
Configuration: X Position, EUT and AC Adapter
Mode: TX, LTE B5 10MHZ 16QAM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T145 8449B	Filter 1	Part 22

Band	f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Low Ch, (829MHz)									
LTE5	1.658	-27.5	V	3.0	32.6	1.0	-59.1	-13.0	-46.1	
	2.487	-26.7	V	3.0	31.4	1.0	-57.1	-13.0	-44.1	
10MHz	3.316	-24.3	V	3.0	30.5	1.0	-53.9	-13.0	-40.9	
	1.658	-28.5	H	3.0	32.6	1.0	-60.2	-13.0	-47.2	
	2.487	-28.6	H	3.0	31.4	1.0	-59.0	-13.0	-46.0	
16QAM	3.316	-24.2	H	3.0	30.5	1.0	-53.7	-13.0	-40.7	
	Mid Ch, (836.5MHz)									
	1.673	-29.1	V	3.0	32.6	1.0	-60.7	-13.0	-47.7	
	2.509	-25.9	V	3.0	31.5	1.0	-56.4	-13.0	-43.4	
	3.346	-23.6	V	3.0	30.5	1.0	-53.1	-13.0	-40.1	
	1.673	-28.3	H	3.0	32.6	1.0	-59.9	-13.0	-46.9	
	2.509	-28.1	H	3.0	31.5	1.0	-58.6	-13.0	-45.6	
	3.346	-24.0	H	3.0	30.5	1.0	-53.5	-13.0	-40.5	
	High Ch, (844MHz)									
	1.688	-28.7	V	3.0	32.6	1.0	-60.3	-13.0	-47.3	
	2.532	-27.1	V	3.0	31.5	1.0	-57.5	-13.0	-44.5	
	3.376	-23.9	V	3.0	30.5	1.0	-53.4	-13.0	-40.4	
	1.688	-30.1	H	3.0	32.6	1.0	-61.7	-13.0	-48.7	
	2.532	-27.7	H	3.0	31.5	1.0	-58.2	-13.0	-45.2	
	3.376	-24.0	H	3.0	30.5	1.0	-53.4	-13.0	-40.4	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U17495
Date: 04/18/14
Test Engineer: Charles Vergonio
Configuration: X Position, EUT and AC Adapter
Mode: TX, LTE B5 10MHZ QPSK

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T145 8449B	Filter 1	Part 22

Band: LTE5 10MHz QPSK

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (829MHz)									
1.658	-27.4	V	3.0	32.6	1.0	-59.1	-13.0	-46.1	
2.487	-26.5	V	3.0	31.4	1.0	-56.9	-13.0	-43.9	
3.316	-24.2	V	3.0	30.5	1.0	-53.7	-13.0	-40.7	
1.658	-28.4	H	3.0	32.6	1.0	-60.1	-13.0	-47.1	
2.487	-28.4	H	3.0	31.4	1.0	-58.8	-13.0	-45.8	
3.316	-24.3	H	3.0	30.5	1.0	-53.8	-13.0	-40.8	
Mid Ch, (836.5MHz)									
1.673	-28.9	V	3.0	32.6	1.0	-60.5	-13.0	-47.5	
2.509	-26.0	V	3.0	31.5	1.0	-56.5	-13.0	-43.5	
3.346	-23.9	V	3.0	30.5	1.0	-53.4	-13.0	-40.4	
1.673	-28.3	H	3.0	32.6	1.0	-59.9	-13.0	-46.9	
2.509	-28.0	H	3.0	31.5	1.0	-58.5	-13.0	-45.5	
3.346	-24.1	H	3.0	30.5	1.0	-53.6	-13.0	-40.6	
High Ch, (844MHz)									
1.688	-28.5	V	3.0	32.6	1.0	-60.1	-13.0	-47.1	
2.532	-26.5	V	3.0	31.5	1.0	-57.0	-13.0	-44.0	
3.376	-23.3	V	3.0	30.5	1.0	-52.8	-13.0	-39.8	
1.688	-29.5	H	3.0	32.6	1.0	-61.1	-13.0	-48.1	
2.532	-28.1	H	3.0	31.5	1.0	-58.6	-13.0	-45.6	
3.376	-23.5	H	3.0	30.5	1.0	-53.0	-13.0	-40.0	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U17495
Date: 04/18/14
Test Engineer: Charles Vergonio
Configuration: X Position, EUT and AC Adapter
Mode: TX, LTE B5 5MHZ 16QAM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T145 8449B	Filter 1	Part 22

Band: LTE5 5MHz 16QAM

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (826.5MHz)									
1.653	-27.7	V	3.0	32.7	1.0	-59.4	-13.0	-46.4	
2.479	-26.5	V	3.0	31.4	1.0	-56.9	-13.0	-43.9	
3.306	-24.3	V	3.0	30.5	1.0	-53.9	-13.0	-40.9	
1.653	-29.9	H	3.0	32.7	1.0	-61.6	-13.0	-48.6	
2.479	-27.8	H	3.0	31.4	1.0	-58.2	-13.0	-45.2	
3.306	-24.7	H	3.0	30.5	1.0	-54.3	-13.0	-41.3	
Mid Ch, (836.5MHz)									
1.673	-27.8	V	3.0	32.6	1.0	-59.4	-13.0	-46.4	
2.509	-27.0	V	3.0	31.5	1.0	-57.5	-13.0	-44.5	
3.346	-24.4	V	3.0	30.5	1.0	-53.9	-13.0	-40.9	
1.673	-29.1	H	3.0	32.6	1.0	-60.7	-13.0	-47.7	
2.509	-27.8	H	3.0	31.5	1.0	-58.3	-13.0	-45.3	
3.346	-24.7	H	3.0	30.5	1.0	-54.2	-13.0	-41.2	
High Ch, (846.5MHz)									
1.693	-29.3	V	3.0	32.6	1.0	-60.8	-13.0	-47.8	
2.539	-27.0	V	3.0	31.4	1.0	-57.5	-13.0	-44.5	
3.386	-22.9	V	3.0	30.5	1.0	-52.4	-13.0	-39.4	
1.693	-29.9	H	3.0	32.6	1.0	-61.5	-13.0	-48.5	
2.539	-28.1	H	3.0	31.4	1.0	-58.5	-13.0	-45.5	
3.386	-24.5	H	3.0	30.5	1.0	-54.0	-13.0	-41.0	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U17495
Date: 04/18/14
Test Engineer: Charles Vergonio
Configuration: X Position, EUT and AC Adapter
Mode: TX, LTE B5 5MHZ QPSK

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T145 8449B	Filter 1	Part 22

Band: LTE5 5MHz QPSK

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (826.5MHz)									
1.653	-26.9	V	3.0	32.7	1.0	-58.5	-13.0	-45.5	
2.479	-26.7	V	3.0	31.4	1.0	-57.1	-13.0	-44.1	
3.306	-24.3	V	3.0	30.5	1.0	-53.8	-13.0	-40.8	
1.653	-29.3	H	3.0	32.7	1.0	-60.9	-13.0	-47.9	
2.479	-27.8	H	3.0	31.4	1.0	-58.2	-13.0	-45.2	
3.306	-24.5	H	3.0	30.5	1.0	-54.0	-13.0	-41.0	
Mid Ch, (836.5MHz)									
1.673	-28.1	V	3.0	32.6	1.0	-59.7	-13.0	-46.7	
2.509	-26.9	V	3.0	31.5	1.0	-57.4	-13.0	-44.4	
3.346	-24.0	V	3.0	30.5	1.0	-53.5	-13.0	-40.5	
1.673	-29.6	H	3.0	32.6	1.0	-61.2	-13.0	-48.2	
2.509	-27.8	H	3.0	31.5	1.0	-58.3	-13.0	-45.3	
3.346	-24.7	H	3.0	30.5	1.0	-54.2	-13.0	-41.2	
High Ch, (846.5MHz)									
1.693	-29.1	V	3.0	32.6	1.0	-60.6	-13.0	-47.6	
2.539	-26.6	V	3.0	31.4	1.0	-57.1	-13.0	-44.1	
3.386	-23.8	V	3.0	30.5	1.0	-53.2	-13.0	-40.2	
1.693	-29.6	H	3.0	32.6	1.0	-61.1	-13.0	-48.1	
2.539	-27.3	H	3.0	31.4	1.0	-57.7	-13.0	-44.7	
3.386	-23.7	H	3.0	30.5	1.0	-53.2	-13.0	-40.2	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U17495
Date: 04/18/14
Test Engineer: Charles Vergonio
Configuration: X Position, EUT and AC Adapter
Mode: TX, LTE B5 3MHZ 16QAM

Chamber	Pre-amplifer	Filter	Limit
5m Chamber	T145 8449B	Filter 1	Part 22

Band: LTE5 3MHz 16QAM

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (825.5MHz)									
1.651	-29.6	V	3.0	32.7	1.0	-61.3	-13.0	-48.3	
2.477	-26.6	V	3.0	31.4	1.0	-57.0	-13.0	-44.0	
3.302	-23.2	V	3.0	30.5	1.0	-52.8	-13.0	-39.8	
1.651	-30.1	H	3.0	32.7	1.0	-61.8	-13.0	-48.8	
2.477	-29.5	H	3.0	31.4	1.0	-59.9	-13.0	-46.9	
3.302	-24.0	H	3.0	30.5	1.0	-53.6	-13.0	-40.6	
Mid Ch, (836.5MHz)									
1.673	-30.3	V	3.0	32.6	1.0	-61.9	-13.0	-48.9	
2.509	-26.3	V	3.0	31.5	1.0	-56.8	-13.0	-43.8	
3.346	-22.9	V	3.0	30.5	1.0	-52.4	-13.0	-39.4	
1.673	-29.4	H	3.0	32.6	1.0	-61.0	-13.0	-48.0	
2.509	-28.0	H	3.0	31.5	1.0	-58.5	-13.0	-45.5	
3.346	-24.4	H	3.0	30.5	1.0	-53.9	-13.0	-40.9	
High Ch, (847.5MHz)									
1.695	-29.4	V	3.0	32.6	1.0	-61.0	-13.0	-48.0	
2.542	-26.0	V	3.0	31.4	1.0	-56.4	-13.0	-43.4	
3.390	-23.8	V	3.0	30.5	1.0	-53.3	-13.0	-40.3	
1.695	-29.4	H	3.0	32.6	1.0	-61.0	-13.0	-48.0	
2.542	-28.4	H	3.0	31.4	1.0	-58.8	-13.0	-45.8	
3.390	-23.4	H	3.0	30.5	1.0	-52.9	-13.0	-39.9	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U17495
Date: 04/18/14
Test Engineer: Charles Vergonio
Configuration: X Position, EUT and AC Adapter
Mode: TX, LTE B5 3MHZ QPSK

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T145 8449B	Filter 1	Part 22

Band	f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Low Ch, (825.5MHz)									
LTE5	1.651	-29.4	V	3.0	32.7	1.0	-61.1	-13.0	-48.1	
	2.477	-26.8	V	3.0	31.4	1.0	-57.1	-13.0	-44.1	
3MHz	3.302	-24.4	V	3.0	30.5	1.0	-53.9	-13.0	-40.9	
	1.651	-30.3	H	3.0	32.7	1.0	-61.9	-13.0	-48.9	
	2.477	-28.1	H	3.0	31.4	1.0	-58.5	-13.0	-45.5	
QPSK	3.302	-24.2	H	3.0	30.5	1.0	-53.8	-13.0	-40.8	
	Mid Ch, (836.5MHz)									
	1.673	-30.1	V	3.0	32.6	1.0	-61.7	-13.0	-48.7	
	2.509	-25.7	V	3.0	31.5	1.0	-56.2	-13.0	-43.2	
	3.346	-24.0	V	3.0	30.5	1.0	-53.5	-13.0	-40.5	
	1.673	-29.8	H	3.0	32.6	1.0	-61.4	-13.0	-48.4	
	2.509	-28.0	H	3.0	31.5	1.0	-58.5	-13.0	-45.5	
	3.346	-23.6	H	3.0	30.5	1.0	-53.1	-13.0	-40.1	
	High Ch, (847.5MHz)									
	1.695	-29.3	V	3.0	32.6	1.0	-60.8	-13.0	-47.8	
	2.542	-26.2	V	3.0	31.4	1.0	-56.6	-13.0	-43.6	
	3.390	-24.2	V	3.0	30.5	1.0	-53.6	-13.0	-40.6	
	1.695	-29.8	H	3.0	32.6	1.0	-61.3	-13.0	-48.3	
	2.542	-27.8	H	3.0	31.4	1.0	-58.2	-13.0	-45.2	
	3.390	-24.3	H	3.0	30.5	1.0	-53.7	-13.0	-40.7	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U17495
Date: 04/18/14
Test Engineer: Charles Vergonio
Configuration: X Position, EUT and AC Adapter
Mode: TX, LTE B5 1.4MHZ 16QAM

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T145 8449B	Filter 1	Part 22

Band: LTE5 1.4MHz 16QAM

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (824.7MHz)									
1.649	-29.5	V	3.0	32.7	1.0	-61.2	-13.0	-48.2	
2.474	-26.4	V	3.0	31.4	1.0	-56.8	-13.0	-43.8	
3.298	-24.2	V	3.0	30.5	1.0	-53.7	-13.0	-40.7	
1.649	-30.2	H	3.0	32.7	1.0	-61.9	-13.0	-48.9	
2.474	-28.1	H	3.0	31.4	1.0	-58.5	-13.0	-45.5	
3.298	-24.8	H	3.0	30.5	1.0	-54.3	-13.0	-41.3	
Mid Ch, (836.5MHz)									
1.673	-29.6	V	3.0	32.6	1.0	-61.2	-13.0	-48.2	
2.509	-26.8	V	3.0	31.5	1.0	-57.3	-13.0	-44.3	
3.346	-24.5	V	3.0	30.5	1.0	-54.0	-13.0	-41.0	
1.673	-30.4	H	3.0	32.6	1.0	-62.0	-13.0	-49.0	
2.509	-27.9	H	3.0	31.5	1.0	-58.4	-13.0	-45.4	
3.346	-24.4	H	3.0	30.5	1.0	-53.9	-13.0	-40.9	
High Ch, (848.3MHz)									
1.696	-30.8	V	3.0	32.6	1.0	-62.4	-13.0	-49.4	
2.544	-27.8	V	3.0	31.4	1.0	-58.2	-13.0	-45.2	
3.393	-22.9	V	3.0	30.5	1.0	-52.4	-13.0	-39.4	
1.696	-30.0	H	3.0	32.6	1.0	-61.6	-13.0	-48.6	
2.544	-27.8	H	3.0	31.4	1.0	-58.2	-13.0	-45.2	
3.393	-24.8	H	3.0	30.5	1.0	-54.3	-13.0	-41.3	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U17495
Date: 04/18/14
Test Engineer: Charles Vergonio
Configuration: X Position, EUT and AC Adapter
Mode: TX, LTE B5 1.4MHZ QPSK

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T145 8449B	Filter 1	Part 22

Band	f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Low Ch, (824.7MHz)									
LTE5	1.649	-29.3	V	3.0	32.7	1.0	-61.0	-13.0	-48.0	
	2.474	-26.6	V	3.0	31.4	1.0	-57.0	-13.0	-44.0	
1.4MHz	3.298	-24.2	V	3.0	30.5	1.0	-53.8	-13.0	-40.8	
	1.649	-30.0	H	3.0	32.7	1.0	-61.7	-13.0	-48.7	
	2.474	-28.3	H	3.0	31.4	1.0	-58.7	-13.0	-45.7	
QPSK	3.298	-24.7	H	3.0	30.5	1.0	-54.3	-13.0	-41.3	
	Mid Ch, (836.5MHz)									
	1.673	-29.7	V	3.0	32.6	1.0	-61.4	-13.0	-48.4	
	2.509	-26.4	V	3.0	31.5	1.0	-56.9	-13.0	-43.9	
	3.346	-24.4	V	3.0	30.5	1.0	-53.9	-13.0	-40.9	
	1.673	-30.2	H	3.0	32.6	1.0	-61.8	-13.0	-48.8	
	2.509	-27.8	H	3.0	31.5	1.0	-58.3	-13.0	-45.3	
	3.346	-24.5	H	3.0	30.5	1.0	-54.0	-13.0	-41.0	
	High Ch, (848.3MHz)									
	1.696	-30.6	V	3.0	32.6	1.0	-62.1	-13.0	-49.1	
	2.544	-27.3	V	3.0	31.4	1.0	-57.7	-13.0	-44.7	
	3.393	-22.7	V	3.0	30.5	1.0	-52.1	-13.0	-39.1	
	1.696	-30.8	H	3.0	32.6	1.0	-62.3	-13.0	-49.3	
	2.544	-28.5	H	3.0	31.4	1.0	-59.0	-13.0	-46.0	
	3.393	-24.5	H	3.0	30.5	1.0	-54.0	-13.0	-41.0	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U17495
Date: 04/18/14
Test Engineer: Charles Vergonio
Configuration: X Position, EUT and AC Adapter
Mode: WCDMA_HSDPA 1900

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T343 8449B	Filter 1	Part 24

Band

Band 2

HSDPA

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1852.4MHz									
3.705	-20.6	V	3.0	35.4	1.0	-55.0	-13.0	-42.0	
5.557	-18.0	V	3.0	34.7	1.0	-51.7	-13.0	-38.7	
7.409	-15.3	V	3.0	34.9	1.0	-49.2	-13.0	-36.2	
3.705	-19.2	H	3.0	35.4	1.0	-53.6	-13.0	-40.6	
5.557	-18.0	H	3.0	34.7	1.0	-51.7	-13.0	-38.7	
7.409	-13.6	H	3.0	34.9	1.0	-47.5	-13.0	-34.5	
Mid Ch, 1880.0MHz									
3.760	-21.6	V	3.0	35.3	1.0	-56.0	-13.0	-43.0	
5.640	-17.5	V	3.0	34.7	1.0	-51.3	-13.0	-38.3	
7.520	-13.1	V	3.0	34.9	1.0	-47.1	-13.0	-34.1	
3.760	-21.4	H	3.0	35.3	1.0	-55.7	-13.0	-42.7	
5.640	-17.4	H	3.0	34.7	1.0	-51.1	-13.0	-38.1	
7.520	-13.8	H	3.0	34.9	1.0	-47.8	-13.0	-34.8	
High Ch, 1907.6 MHz									
3.820	-20.3	V	3.0	35.3	1.0	-54.5	-13.0	-41.5	
5.723	-17.3	V	3.0	34.7	1.0	-51.1	-13.0	-38.1	
7.630	-14.1	V	3.0	34.9	1.0	-48.1	-13.0	-35.1	
3.820	-20.8	H	3.0	35.3	1.0	-55.1	-13.0	-42.1	
5.723	-18.1	H	3.0	34.7	1.0	-51.8	-13.0	-38.8	
7.630	-12.7	H	3.0	34.9	1.0	-46.7	-13.0	-33.7	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U17495
Date: 04/18/14
Test Engineer: Charles Vergonio
Configuration: X Position, EUT and AC Adapter
Mode: WCDMA_Rel 1900

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T343 8449B	Filter 1	Part 24

Band	f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
	Low Ch, 1852.4MHz									
Band 2	3.705	-20.3	V	3.0	35.4	1.0	-54.7	-13.0	-41.7	
	5.557	-17.7	V	3.0	34.7	1.0	-51.4	-13.0	-38.4	
	7.409	-14.2	V	3.0	34.9	1.0	-48.1	-13.0	-35.1	
REL99	3.705	-20.6	H	3.0	35.4	1.0	-55.0	-13.0	-42.0	
	5.557	-18.9	H	3.0	34.7	1.0	-52.6	-13.0	-39.6	
	7.409	-13.7	H	3.0	34.9	1.0	-47.6	-13.0	-34.6	
	Mid Ch, 1880.0MHz									
	3.760	-19.4	V	3.0	35.3	1.0	-53.8	-13.0	-40.8	
	5.640	-19.2	V	3.0	34.7	1.0	-53.0	-13.0	-40.0	
	7.520	-14.9	V	3.0	34.9	1.0	-48.9	-13.0	-35.9	
	3.760	-22.0	H	3.0	35.3	1.0	-56.4	-13.0	-43.4	
	5.640	-18.9	H	3.0	34.7	1.0	-52.7	-13.0	-39.7	
	7.520	-13.0	H	3.0	34.9	1.0	-46.9	-13.0	-33.9	
	High Ch, 1907.6 MHz									
	3.820	-17.8	V	3.0	35.3	1.0	-52.1	-13.0	-39.1	
	5.723	-18.4	V	3.0	34.7	1.0	-52.1	-13.0	-39.1	
	7.630	-14.5	V	3.0	34.9	1.0	-48.4	-13.0	-35.4	
	3.820	-20.7	H	3.0	35.3	1.0	-55.0	-13.0	-42.0	
	5.723	-17.2	H	3.0	34.7	1.0	-50.9	-13.0	-37.9	
	7.630	-13.1	H	3.0	34.9	1.0	-47.1	-13.0	-34.1	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band

Band 5

HSDPA

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company:	Samsung
Project #:	14U17495
Date:	04/18/14
Test Engineer:	Charles Vergonio
Configuration:	X Position, EUT and AC Adapter
Mode:	WCDMA_HSDPA_ 850

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T34 8449B	Filter 1	Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 826.6MHz									
1.653	-28.1	V	3.0	37.4	1.0	-64.5	-13.0	-51.5	
2.480	-24.8	V	3.0	36.4	1.0	-60.2	-13.0	-47.2	
3.306	-22.7	V	3.0	35.8	1.0	-57.5	-13.0	-44.5	
1.653	-28.5	H	3.0	37.4	1.0	-64.8	-13.0	-51.8	
2.480	-24.9	H	3.0	36.4	1.0	-60.3	-13.0	-47.3	
3.306	-23.0	H	3.0	35.8	1.0	-57.8	-13.0	-44.8	
Mid Ch, 836.6MHz									
1.673	-26.7	V	3.0	37.3	1.0	-63.1	-13.0	-50.1	
2.510	-24.8	V	3.0	36.4	1.0	-60.1	-13.0	-47.1	
3.346	-22.1	V	3.0	35.8	1.0	-56.8	-13.0	-43.8	
1.673	-28.4	H	3.0	37.3	1.0	-64.7	-13.0	-51.7	
2.510	-26.0	H	3.0	36.4	1.0	-61.3	-13.0	-48.3	
3.346	-22.2	H	3.0	35.8	1.0	-57.0	-13.0	-44.0	
High Ch, 846.4MHz									
1.693	-27.8	V	3.0	37.3	1.0	-64.2	-13.0	-51.2	
2.539	-24.4	V	3.0	36.3	1.0	-59.7	-13.0	-46.7	
3.386	-22.6	V	3.0	35.7	1.0	-57.3	-13.0	-44.3	
1.693	-27.7	H	3.0	37.3	1.0	-64.0	-13.0	-51.0	
2.539	-26.0	H	3.0	36.3	1.0	-61.3	-13.0	-48.3	
3.386	-22.7	H	3.0	35.7	1.0	-57.5	-13.0	-44.5	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Band

Band 5

REL99

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U17495
Date: 04/18/14
Test Engineer: Charles Vergonio
Configuration: X Position, EUT and AC Adapter
Mode: WCDMA_REL 99_ 850

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T34 8449B	Filter 1	Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 826.6MHz									
1.653	-27.5	V	3.0	37.4	1.0	-63.9	-13.0	-50.9	
2.480	-24.5	V	3.0	36.4	1.0	-59.9	-13.0	-46.9	
3.306	-22.7	V	3.0	35.8	1.0	-57.4	-13.0	-44.4	
1.653	-28.0	H	3.0	37.4	1.0	-64.4	-13.0	-51.4	
2.480	-25.6	H	3.0	36.4	1.0	-61.0	-13.0	-48.0	
3.306	-22.9	H	3.0	35.8	1.0	-57.7	-13.0	-44.7	
Mid Ch, 836.6MHz									
1.673	-27.5	V	3.0	37.3	1.0	-63.8	-13.0	-50.8	
2.510	-24.1	V	3.0	36.4	1.0	-59.4	-13.0	-46.4	
3.346	-21.9	V	3.0	35.8	1.0	-56.7	-13.0	-43.7	
1.673	-27.9	H	3.0	37.3	1.0	-64.3	-13.0	-51.3	
2.510	-26.6	H	3.0	36.4	1.0	-61.9	-13.0	-48.9	
3.346	-22.8	H	3.0	35.8	1.0	-57.5	-13.0	-44.5	
High Ch, 846.4MHz									
1.693	-27.2	V	3.0	37.3	1.0	-63.5	-13.0	-50.5	
2.539	-23.5	V	3.0	36.3	1.0	-58.9	-13.0	-45.9	
3.386	-22.2	V	3.0	35.7	1.0	-57.0	-13.0	-44.0	
1.693	-27.9	H	3.0	37.3	1.0	-64.2	-13.0	-51.2	
2.539	-25.4	H	3.0	36.3	1.0	-60.7	-13.0	-47.7	
3.386	-23.1	H	3.0	35.7	1.0	-57.8	-13.0	-44.8	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company: Samsung
Project #: 14U17495
Date: 04/18/14
Test Engineer: Charles Vergonio
Configuration: X Position, EUT and AC Adapter
Mode: GPRS 1900

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T343 8449B	Filter 1	Part 24

Band

GSM1900

GPRS

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 1850.2MHz									
3.700	-21.6	V	3.0	35.4	1.0	-56.0	-13.0	-43.0	
5.551	-18.3	V	3.0	34.7	1.0	-52.0	-13.0	-39.0	
7.401	-11.3	V	3.0	34.9	1.0	-45.2	-13.0	-32.2	
3.700	-21.5	H	3.0	35.4	1.0	-55.9	-13.0	-42.9	
5.551	-17.8	H	3.0	34.7	1.0	-51.5	-13.0	-38.5	
7.401	-10.7	H	3.0	34.9	1.0	-44.6	-13.0	-31.6	
Mid Ch, 1880.0MHz									
3.760	-20.7	V	3.0	35.3	1.0	-55.0	-13.0	-42.0	
5.640	-18.2	V	3.0	34.7	1.0	-51.9	-13.0	-38.9	
7.520	-10.9	V	3.0	34.9	1.0	-44.9	-13.0	-31.9	
3.760	-21.5	H	3.0	35.3	1.0	-55.9	-13.0	-42.9	
5.640	-17.5	H	3.0	34.7	1.0	-51.2	-13.0	-38.2	
7.520	-10.5	H	3.0	34.9	1.0	-44.4	-13.0	-31.4	
High Ch, 1909.8 MHz									
3.820	-20.8	V	3.0	35.3	1.0	-55.1	-13.0	-42.1	
5.729	-18.4	V	3.0	34.7	1.0	-52.1	-13.0	-39.1	
7.639	-11.3	V	3.0	35.0	1.0	-45.3	-13.0	-32.3	
3.820	-21.7	H	3.0	35.3	1.0	-56.0	-13.0	-43.0	
5.729	-16.9	H	3.0	34.7	1.0	-50.7	-13.0	-37.7	
7.639	-10.8	H	3.0	35.0	1.0	-44.7	-13.0	-31.7	

Rev. 03.03.09
Note: No other emissions were detected above the system noise floor.

UL VERIFICATION SERVICES INC. FORM NO: FCC_24_22_27_90
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.