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

# CERTIFICATION TEST REPORT

**FOR**

**GSM/WCDMA/LTE PHONE + BLUETOOTH, WLAN 2.4GHZ B/G/N & ANT+**

**MODEL NUMBER: SM-G7200**

**FCC ID: A3LSMG7200**

**REPORT NUMBER: 14I19245-E1**

**ISSUE DATE: OCTOBER 31, 2014**

*Prepared for*

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NVLAP LAB CODE 200065-0

# Revision History

| Rev. | Issue Date | Revisions | Revised By |
|---|---|---|---|
| -- | 10/31/14 | Initial Issue | P. Zhang |



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# 1. ATTESTATION OF TEST RESULTS

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

**EUT DESCRIPTION:** **GSM/WCDMA/LTE Phone + Bluetooth, WLAN 2.4 GHz b/g/n & ANT+**

**MODEL:** **SM-G7200**

**SERIAL NUMBER:** **1984966 (RADIATED); 1984965 (CONDUCTED)**

**DATE TESTED:** **OCTOBER 27-31, 2014**

| APPLICABLE STANDARDS | |
|---|---|
| **STANDARD** | **TEST RESULTS** |
| FCC PART 22H, 24E and 27M | 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.

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# 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 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

| 47173 Benicia Street | 47266 Benicia Street |
|---|---|
| ☐ Chamber A | ☐ Chamber D |
| ☒ Chamber B | ☐ Chamber E |
| ☒ Chamber C | ☐ Chamber F |

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://ts.nist.gov/standards/scopes/2000650.htm.

# 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)




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## 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 27000 MHz | 4.94 dB |

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



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# 5. EQUIPMENT UNDER TEST

## 5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE Phone + Bluetooth, WLAN 2.4 GHz b/g/n & ANT+

## 5.2. MAXIMUM OUTPUT POWER

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

| FCC Part 22/24/27 | | | | | | |
|---|---|---|---|---|---|---|
| Band | Frequency Range(MHz) | Modulation | Conducted | | Radiated | |
| | | | AVG (dBm) | AVG (mW) | AVG (dBm) | AVG (mW) |
| GSM850 | 824~849 | GMSK | 33.0 | 1995.26 | | |
| | 824~849 | GPRS | 33.0 | 1995.26 | 25.72 | 373.00 |
| | 824~849 | EGPRS | 27.3 | 537.03 | 22.18 | 165.00 |
| GSM1900 | 1850~1910 | GMSK | 30.5 | 1122.02 | | |
| | 1850~1910 | GPRS | 30.5 | 1122.02 | 26.90 | 490.00 |
| | 1850~1910 | EGPRS | 25.6 | 363.08 | 24.57 | 286.00 |
| Band 5 | 824~849 | REL99 | 23.4 | 218.78 | 17.91 | 62.00 |
| | 824~849 | HSDPA | 23.4 | 218.78 | 17.37 | 55.00 |
| | 824~849 | HSUPA | 22.3 | 169.82 | | |
| Band 2 | 1850~1910 | REL99 | 22.3 | 169.82 | 20.70 | 117.00 |
| | 1850~1910 | HSDPA | 22.3 | 169.82 | 19.73 | 94.00 |
| | 1850~1910 | HSUPA | 20.7 | 117.49 | | |




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## 5.3. MAXIMUM OUTPUT POWER (LTE)

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

| FCC Part 22/24/27 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Band | Frequency Range(MHz) | BandWidth (MHz) | Modulation | Conducted | | Radiated | |
| | | | mW | dBm | mW | dBm | mW |
| LTE41 | 2555~2635 | 20MHz | QPSK | 22.2 | 165.96 | 20.63 | 116.00 |
| | | 20MHz | 16QAM | 21.3 | 134.90 | 19.81 | 96.00 |

| FCC Part 22/2 4/27 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Band | Frequency Range(MHz) | BandWidth (MHz) | Modulation | Conducted | | Radiated | |
| | | | mW | dBm | mW | dBm | mW |
| LTE41 | 2555~2635 | 15MHz | QPSK | 22.2 | 165.96 | 20.72 | 118.00 |
| | | 15MHz | 16QAM | 21.3 | 134.90 | 19.71 | 94.00 |

| FCC Part 22/24/27 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Band | Frequency Range(MHz) | BandWidth (MHz) | Modulation | Conducted | | Radiated | |
| | | | mW | dBm | mW | dBm | mW |
| LTE41 | 2555~2635 | 10MHz | QPSK | 22.2 | 165.96 | 20.62 | 115.00 |
| | | 10MHz | 16QAM | 21.3 | 134.90 | 19.74 | 94.00 |

| FCC Part 22/24/27 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Band | Frequency Range(MHz) | BandWidth (MHz) | Modulation | Conducted | | Radiated | |
| | | | mW | dBm | mW | dBm | mW |
| LTE41 | 2555~2635 | 5MHz | QPSK | 22.2 | 165.96 | 20.70 | 117.00 |
| | | 5MHz | 16QAM | 21.3 | 134.90 | 19.85 | 97.00 |



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## 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 | -3.63 |
| Band 2, 1850~1910MHz | 1.83 |
| LTE41, 2496~2690MHz | 1.28 |




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## 5.5. DESCRIPTION OF TEST SETUP

**SUPPORT EQUIPMENT**

| Support Equipment List | | | | |
|---|---|---|---|---|
| Description | Manufacturer | Model | Serial Number | FCC ID |
| AC Adapter | SAMSUNG | GH44-02657A | 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.




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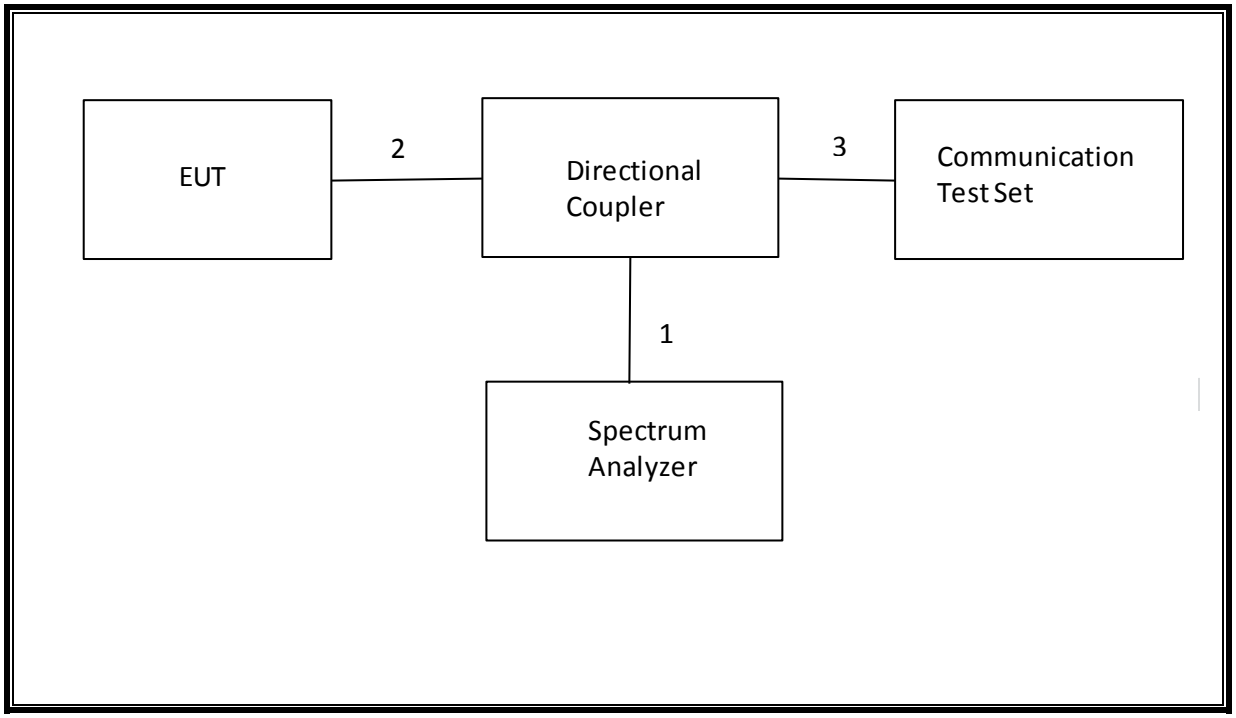
**SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)**







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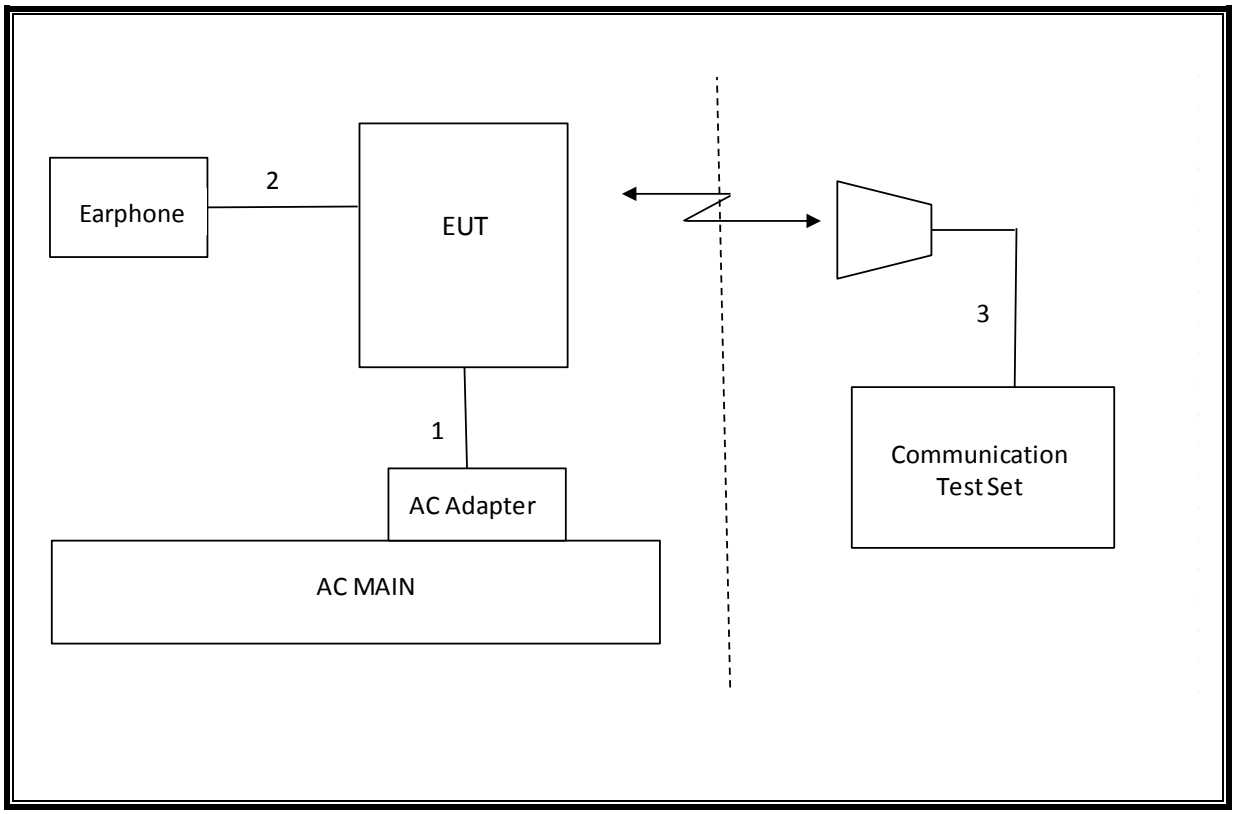
**SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)**







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# 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 | 08/14/15 |
| Antenna, Horn, 18 GHz | EMCO | 3115 | C00783 | 10/25/15 |
| Antenna, Horn, 18 GHz | EMCO | 3115 | C00784 | 10/25/15 |
| 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 | 07/02/15 |
| DC power supply, 8 V @ 3 A or 15 V | Agilent / HP | E3610A | None | CNR |
| Vector signal generator, 6 GHz | Agilent / HP | E4438C | None | 07/06/15 |
| Antenna, Tuned Dipole 400~1000 | ETS | 3121C DB4 | C00993 | 02/14/15 |
| Directional Coupler | Pasternack | PE2213-10 | None | CNR |
| Antenna, Horn, 26.5 GHz | ARA | MWH-1826/B | C00589 | 12/17/14 |



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# 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 | 17.88MHz |
| 22.917(a)<br>24.238(a) | RSS-132(4.5.1)<br>RSS-133(6.5.1) | Band Edge / Conducted Spurious Emission | -13dBm | | Pass | -25.28dBm |
| 27.53(m) | RSS-199(4.5) | | -25dBm | | Pass | -28.91dBm |
| 2.1046 | N/A | Conducted output power | N/A | | Pass | 33.2dBm |
| 27.53(m) | RSS-199(4.5) | Emission Mask | | | Pass | |
| 22.355<br>24.235<br>27.54 | RSS-132(4.3)<br>RSS-133(6.3)<br>RSS-199(6.3) | Frequency Stability | 2.5PPM | | Pass | 0.011PPM |
| 22.913(a)(2) | RSS-132(4.4) | Effective Radiated Power | 38 dBm | Radiated | Pass | 25.72dBm |
| 24.232(c )<br>27.50(h)(2) | RSS-133(6.4)<br>RSS-199(4.4) | Equivalent Isotropic Radiated Power | 33dBm | | Pass | 26.90dBm |
| 22.917(a)<br>24.238(a) | RSS-132(4.5.1)<br>RSS-133(6.5.1) | Radiated Spurious Emission | -13dBm | | Pass | -39.9dBm |
| 27.53(m) | RSS-199(4.5) | | -25dBm | | Pass | -30.1dBm |



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# 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



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### 8.1.1. GSM OUTPUT POWER RESULT

| Band | Mode | Coding Scheme | Time Slots | Ch No. | Freq. (MHz) | Burst Pwr (dBm) | Frame Pwr (dBm) |
|---|---|---|---|---|---|---|---|
| 850 | GSM (Voice) | CS1 | 1 | 128 | 824.2 | 33.0 | 23.9 |
| | | | | 190 | 836.6 | 33.0 | 24.0 |
| | | | | 251 | 848.8 | 33.0 | 24.0 |
| | GPRS (GMSK) | CS1 | 1 | 128 | 824.2 | 33.0 | 23.9 |
| | | | | 190 | 836.6 | 33.0 | 24.0 |
| | | | | 251 | 848.8 | 33.0 | 24.0 |
| | | | 2 | 128 | 824.2 | 29.9 | 23.9 |
| | | | | 190 | 836.6 | 29.9 | 23.9 |
| | | | | 251 | 848.8 | 29.8 | 23.8 |
| | | | 3 | 128 | 824.2 | 27.4 | 23.1 |
| | | | | 190 | 836.6 | 27.4 | 23.1 |
| | | | | 251 | 848.8 | 27.3 | 23.0 |
| | | | 4 | 128 | 824.2 | 25.9 | 22.9 |
| | | | | 190 | 836.6 | 25.9 | 22.9 |
| | | | | 251 | 848.8 | 25.8 | 22.8 |
| | EGPRS (8PSK) | MCS5 | 1 | 128 | 824.2 | 27.3 | 18.3 |
| | | | | 190 | 836.6 | 27.3 | 18.3 |
| | | | | 251 | 848.8 | 27.3 | 18.3 |
| | | | 2 | 128 | 824.2 | 24.8 | 18.8 |
| | | | | 190 | 836.6 | 24.8 | 18.8 |
| | | | | 251 | 848.8 | 24.8 | 18.8 |
| | | | 3 | 128 | 824.2 | 22.2 | 17.9 |
| | | | | 190 | 836.6 | 22.2 | 17.9 |
| | | | | 251 | 848.8 | 22.2 | 17.9 |
| | | | 4 | 128 | 824.2 | 22.1 | 19.1 |
| | | | | 190 | 836.6 | 22.1 | 19.1 |
| | | | | 251 | 848.8 | 22.0 | 19.0 |



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| Band | Mode | Coding Scheme | Time Slots | Ch No. | Freq. (MHz) | Burst Pwr (dBm) | Frame Pwr (dBm) |
|---|---|---|---|---|---|---|---|
| 1900 | GSM (Voice) | CS1 | 1 | 512 | 1850.2 | 30.5 | 21.5 |
| | | | | 661 | 1880.0 | 30.5 | 21.5 |
| | | | | 810 | 1909.8 | 30.4 | 21.4 |
| | GPRS (GMSK) | CS1 | 1 | 512 | 1850.2 | 30.5 | 21.5 |
| | | | | 661 | 1880.0 | 30.5 | 21.5 |
| | | | | 810 | 1909.8 | 30.4 | 21.4 |
| | | | 2 | 512 | 1850.2 | 27.4 | 21.4 |
| | | | | 661 | 1880.0 | 27.4 | 21.4 |
| | | | | 810 | 1909.8 | 27.3 | 21.3 |
| | | | 3 | 512 | 1850.2 | 25.7 | 21.4 |
| | | | | 661 | 1880.0 | 25.7 | 21.4 |
| | | | | 810 | 1909.8 | 25.6 | 21.3 |
| | | | 4 | 512 | 1850.2 | 24.2 | 21.2 |
| | | | | 661 | 1880.0 | 24.1 | 21.1 |
| | | | | 810 | 1909.8 | 24.1 | 21.1 |
| | EGPRS (8PSK) | MCS5 | 1 | 512 | 1850.2 | 25.6 | 16.6 |
| | | | | 661 | 1880.0 | 25.6 | 16.6 |
| | | | | 810 | 1909.8 | 25.6 | 16.6 |
| | | | 2 | 512 | 1850.2 | 24.4 | 18.4 |
| | | | | 661 | 1880.0 | 24.4 | 18.4 |
| | | | | 810 | 1909.8 | 24.3 | 18.3 |
| | | | 3 | 512 | 1850.2 | 21.7 | 17.4 |
| | | | | 661 | 1880.0 | 21.7 | 17.4 |
| | | | | 810 | 1909.8 | 21.6 | 17.3 |
| | | | 4 | 512 | 1850.2 | 21.7 | 18.7 |
| | | | | 661 | 1880.0 | 21.7 | 18.7 |
| | | | | 810 | 1909.8 | 21.6 | 18.6 |




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## 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 | UL Ch No. | Freq. (MHz) | Avg Pwr (dBm) |
|---|---|---|---|---|
| W-CDMA Band V | Rel 99 (RMC, 12.2 kbps) | 4132 | 826.4 | 23.4 |
| | | 4183 | 836.6 | 23.4 |
| | | 4233 | 846.6 | 23.2 |
| W-CDMA Band II | Rel 99 (RMC, 12.2 kbps) | 9262 | 1852.4 | 22.3 |
| | | 9400 | 1880.0 | 22.3 |
| | | 9538 | 1907.6 | 22.3 |




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## 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 | | | |




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### 8.3.1. UMTS HSDPA OUTPUT POWER RESULT

| Band | Mode | UL Ch No. | Freq. (MHz) | Avg Pwr (dBm) |
|---|---|---|---|---|
| W-CDMA Band V | Subtest 1 | 4132 | 826.4 | 23.4 |
| | | 4183 | 836.6 | 23.3 |
| | | 4233 | 846.6 | 23.2 |
| | Subtest 2 | 4132 | 826.4 | 23.2 |
| | | 4183 | 836.6 | 23.3 |
| | | 4233 | 846.6 | 23.2 |
| | Subtest 3 | 4132 | 826.4 | 23.3 |
| | | 4183 | 836.6 | 23.3 |
| | | 4233 | 846.6 | 23.2 |
| | Subtest 4 | 4132 | 826.4 | 23.2 |
| | | 4183 | 836.6 | 23.4 |
| | | 4233 | 846.6 | 23.2 |
| W-CDMA Band II | Subtest 1 | 9262 | 1852.4 | 22.3 |
| | | 9400 | 1880.0 | 22.2 |
| | | 9538 | 1907.6 | 21.2 |
| | Subtest 2 | 9262 | 1852.4 | 22.3 |
| | | 9400 | 1880.0 | 22.2 |
| | | 9538 | 1907.6 | 22.2 |
| | Subtest 3 | 9262 | 1852.4 | 22.3 |
| | | 9400 | 1880.0 | 22.3 |
| | | 9538 | 1907.6 | 22.3 |
| | Subtest 4 | 9262 | 1852.4 | 22.3 |
| | | 9400 | 1880.0 | 22.2 |
| | | 9538 | 1907.6 | 22.3 |



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## 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<br>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<br>E-TFCI PO 4<br>E-TFCI 67<br>E-TFCI PO 18<br>E-TFCI 71<br>E-TFCI PO 23<br>E-TFCI 75<br>E-TFCI PO 26<br>E-TFCI 81<br>E-TFCI PO 27 | | E-TFCI 11<br>E-TFCI PO 4<br>E-TFCI 92<br>E-TFCI PO 18 | E-TFCI 11<br>E-TFCI PO 4<br>E-TFCI 67<br>E-TFCI PO 18<br>E-TFCI 71<br>E-TFCI PO 23<br>E-TFCI 75<br>E-TFCI PO 26<br>E-TFCI 81<br>E-TFCI PO 27 | |

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



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### 8.3.3. UMTS HSUPA OUTPUT POWER RESULT

| Band | Mode | UL Ch No. | Freq. (MHz) | Avg Pwr (dBm) |
|---|---|---|---|---|
| W-CDMA Band V | Subtest 1 | 4132 | 826.4 | 22.2 |
| | | 4183 | 836.6 | 21.8 |
| | | 4233 | 846.6 | 22.1 |
| | Subtest 2 | 4132 | 826.4 | 21.0 |
| | | 4183 | 836.6 | 21.0 |
| | | 4233 | 846.6 | 21.0 |
| | Subtest 3 | 4132 | 826.4 | 21.1 |
| | | 4183 | 836.6 | 21.3 |
| | | 4233 | 846.6 | 21.2 |
| | Subtest 4 | 4132 | 826.4 | 21.0 |
| | | 4183 | 836.6 | 21.1 |
| | | 4233 | 846.6 | 21.0 |
| | Subtest 5 | 4132 | 826.4 | 22.2 |
| | | 4183 | 836.6 | 22.3 |
| | | 4233 | 846.6 | 22.1 |
| W-CDMA Band II | Subtest 1 | 9262 | 1852.4 | 20.7 |
| | | 9400 | 1880.0 | 20.7 |
| | | 9538 | 1907.6 | 20.6 |
| | Subtest 2 | 9262 | 1852.4 | 20.5 |
| | | 9400 | 1880.0 | 20.6 |
| | | 9538 | 1907.6 | 20.5 |
| | Subtest 3 | 9262 | 1852.4 | 20.5 |
| | | 9400 | 1880.0 | 20.6 |
| | | 9538 | 1907.6 | 20.5 |
| | Subtest 4 | 9262 | 1852.4 | 20.5 |
| | | 9400 | 1880.0 | 20.6 |
| | | 9538 | 1907.6 | 20.5 |
| | Subtest 5 | 9262 | 1852.4 | 20.5 |
| | | 9400 | 1880.0 | 20.6 |
| | | 9538 | 1907.6 | 20.6 |



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**DC-HSDPA**

The following tests were completed according to procedures in section 7.3.13 of 3GPP TS34.108 v9.5.0. A summary of these settings are illustrated below:

Downlink Physical Channels are set as per 3GPP TS34.121-1 v9.0.0 E.5.0

**Table E.5.0: Levels for HSDPA connection setup**

| Parameter During Connection setup | Unit | Value |
|---|---|---|
| P-CPICH_Ec/Ior | dB | -10 |
| P-CCPCH and SCH_Ec/Ior | dB | -12 |
| PICH _Ec/Ior | dB | -15 |
| HS-PDSCH | dB | off |
| HS-SCCH_1 | dB | off |
| DPCH_Ec/Ior | dB | -5 |
| OCNS_Ec/Ior | dB | -3.1 |

Call is set up as per 3GPP TS34.108 v9.5.0 sub clause 7.3.13

The configurations of the fixed reference channels for HSDPA RF tests are described in 3GPP TS 34.121, annex C for FDD and 3GPP TS 34.122.




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**Table C.8.1.12: Fixed Reference Channel H-Set 12**

| Parameter | Unit | Value |
|---|---|---|
| Nominal Avg. Inf. Bit Rate | kbps | 60 |
| Inter-TTI Distance | TTI's | 1 |
| Number of HARQ Processes | Processes | 6 |
| Information Bit Payload ( $N_{INF}$ ) | Bits | 120 |
| Number Code Blocks | Blocks | 1 |
| Binary Channel Bits Per TTI | Bits | 960 |
| Total Available SML's in UE | SML's | 19200 |
| Number of SML's per HARQ Proc. | SML's | 3200 |
| Coding Rate | | 0.15 |
| Number of Physical Channel Codes | Codes | 1 |
| Modulation | | QPSK |
| Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table.<br>Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used. | | |

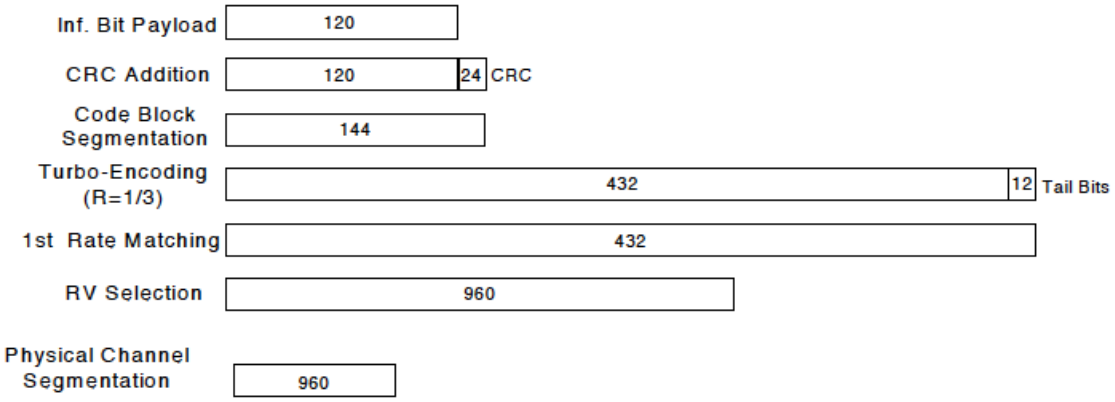


**Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)**




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The following 4 Sub-tests for HSDPA were completed according to Release 8 procedures in section 5.2 of 3GPP TS34.121. A summary of subtest settings are illustrated below:

| | Mode | HSDPA | HSDPA | HSDPA | HSDPA |
|---|---|---|---|---|---|
| | Subtest | 1 | 2 | 3 | 4 |
| WCDMA General Settings | Loopback Mode | Test Mode 1 | | | |
| | Rel99 RMC | 12.2kbps RMC | | | |
| | HSDPA FRC | H-Set 1 | | | |
| | Power Control Algorithm | Algorithm2 | | | |
| | βc | 2/15 | 11/15 | 15/15 | 15/15 |
| | βd | 15/15 | 15/15 | 8/15 | 4/15 |
| | βd (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 | DACK | 8 | | | |
| | DNAK | 8 | | | |
| | DCQI | 8 | | | |
| | Ack-Nack Repetition factor | 3 | | | |
| | CQI Feedback | 4ms | | | |
| | CQI Repetition Factor | 2 | | | |
| | Ahs = βhs/ βc | 30/15 | | | |

Up commands are set continuously to set the UE to Max power.

For the E-MPR setting, the table below was used referencing from 3GPP TS34.121-1 version 11.1.1 Release 11 specification.

**Table 5.2B.5: Maximum Output Powers with HS-DPCCH and E-DCH for test**

| Sub-test in table C.11.1.3 | Power Class 3 | | Power Class 4 | |
|---|---|---|---|---|
| | Power (dBm) | Tol (dB) | Power (dBm) | Tol (dB) |
| 1 | +24 | +1.7/-6.7 | +21 | +2.7/-5.7 |
| 2 | +22 | +3.7/-5.2 | +19 | +4.7/-4.2 |
| 3 | +23 | +2.7/-5.2 | +20 | +3.7/-4.2 |
| 4 | +22 | +3.7/-5.2 | +19 | +4.7/-4.2 |
| 5 | +24 | +1.7/-3.7 | +21 | +2.7/-2.7 |




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**Measured Results**

| Band | Mode | UL Ch No. | Freq. (MHz) | Avg Pwr (dBm) |
|---|---|---|---|---|
| W-CDMA Band V | Subtest 1 | 4132 | 826.4 | 23.3 |
| | | 4183 | 836.6 | 23.3 |
| | | 4233 | 846.6 | 23.2 |
| | Subtest 2 | 4132 | 826.4 | 23.1 |
| | | 4183 | 836.6 | 23.1 |
| | | 4233 | 846.6 | 23.0 |
| | Subtest 3 | 4132 | 826.4 | 23.3 |
| | | 4183 | 836.6 | 23.2 |
| | | 4233 | 846.6 | 23.2 |
| | Subtest 4 | 4132 | 826.4 | 23.2 |
| | | 4183 | 836.6 | 23.3 |
| | | 4233 | 846.6 | 23.2 |
| W-CDMA Band II | Subtest 1 | 9262 | 1852.4 | 21.4 |
| | | 9400 | 1880.0 | 21.4 |
| | | 9538 | 1907.6 | 21.2 |
| | Subtest 2 | 9262 | 1852.4 | 21.5 |
| | | 9400 | 1880.0 | 21.5 |
| | | 9538 | 1907.6 | 21.4 |
| | Subtest 3 | 9262 | 1852.4 | 21.4 |
| | | 9400 | 1880.0 | 21.4 |
| | | 9538 | 1907.6 | 21.4 |
| | Subtest 4 | 9262 | 1852.4 | 21.4 |
| | | 9400 | 1880.0 | 21.3 |
| | | 9538 | 1907.6 | 21.4 |



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# 8.4. LTE OUTPUT VERIFICATION

## 8.4.1. LTE OUTPUT RESULT

| Band | BW (MHz) | Mode | RB Allocation | RB offset | Target MPR | Meas. MPR | Avg Pwr (dBm) | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 2565 MHz | 2595 MHz | 2625 MHz |
| LTE Band 41 | 20 | QPSK | 1 | 0 | 0 | 0 | 21.9 | 22.2 | 21.6 |
| | | | 1 | 50 | 0 | 0 | 22.1 | 22.1 | 22.1 |
| | | | 1 | 99 | 0 | 0 | 22.2 | 22.2 | 22.2 |
| | | | 50 | 0 | 1 | 1 | 21.0 | 21.3 | 21.2 |
| | | | 50 | 25 | 1 | 1 | 21.1 | 21.1 | 21.1 |
| | | | 50 | 50 | 1 | 1 | 21.2 | 21.2 | 21.1 |
| | | | 100 | 0 | 1 | 1 | 21.0 | 21.1 | 21.0 |
| | | 16QAM | 1 | 0 | 1 | 1 | 21.3 | 21.3 | 21.3 |
| | | | 1 | 50 | 1 | 1 | 21.2 | 21.3 | 21.2 |
| | | | 1 | 99 | 1 | 1 | 21.2 | 21.3 | 21.2 |
| | | | 50 | 0 | 2 | 2 | 20.2 | 20.3 | 20.1 |
| | | | 50 | 25 | 2 | 2 | 20.2 | 20.2 | 20.3 |
| | | | 50 | 50 | 2 | 2 | 20.2 | 20.2 | 20.1 |
| | | | 100 | 0 | 2 | 2 | 20.2 | 20.2 | 20.2 |
| Band | BW (MHz) | Mode | RB Allocation | RB offset | Target MPR | Meas. MPR | Avg Pwr (dBm) | | |
| | | | | | | | 2562.5 MHz | 2595 MHz | 2627.5 MHz |
| LTE Band 41 | 15 | QPSK | 1 | 0 | 0 | 0 | 21.8 | 22.2 | 21.6 |
| | | | 1 | 36 | 0 | 0 | 22.1 | 22.1 | 22.1 |
| | | | 1 | 74 | 0 | 0 | 22.2 | 22.2 | 22.1 |
| | | | 36 | 0 | 1 | 1 | 21.0 | 21.3 | 21.2 |
| | | | 36 | 18 | 1 | 1 | 21.1 | 21.1 | 21.1 |
| | | | 36 | 37 | 1 | 1 | 21.2 | 21.2 | 21.1 |
| | | | 75 | 0 | 1 | 1 | 21.0 | 21.1 | 21.0 |
| | | 16QAM | 1 | 0 | 1 | 1 | 21.2 | 21.3 | 21.3 |
| | | | 1 | 36 | 1 | 1 | 21.2 | 21.3 | 21.2 |
| | | | 1 | 74 | 1 | 1 | 21.2 | 21.2 | 21.2 |
| | | | 36 | 0 | 2 | 2 | 20.2 | 20.2 | 20.1 |
| | | | 36 | 18 | 2 | 2 | 20.2 | 20.2 | 20.2 |
| | | | 36 | 37 | 2 | 2 | 20.2 | 20.2 | 20.0 |
| | | | 75 | 0 | 2 | 2 | 20.2 | 20.2 | 20.1 |




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| Band | BW (MHz) | Mode | RB Allocation | RB offset | Target MPR | Meas. MPR | Avg Pwr (dBm) | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 2560 MHz | 2595 MHz | 2630 MHz |
| LTE Band 41 | 10 | QPSK | 1 | 0 | 0 | 0 | 21.8 | 22.2 | 21.6 |
| | | | 1 | 25 | 0 | 0 | 22.1 | 22.1 | 22.1 |
| | | | 1 | 49 | 0 | 0 | 22.2 | 22.2 | 22.1 |
| | | | 25 | 0 | 1 | 1 | 21.0 | 21.3 | 21.2 |
| | | | 25 | 12 | 1 | 1 | 21.1 | 21.1 | 21.1 |
| | | | 25 | 25 | 1 | 1 | 21.2 | 21.2 | 21.1 |
| | | | 50 | 0 | 1 | 1 | 21.0 | 21.1 | 21.0 |
| | | 16QAM | 1 | 0 | 1 | 1 | 21.2 | 21.3 | 21.3 |
| | | | 1 | 25 | 1 | 1 | 21.2 | 21.3 | 21.2 |
| | | | 1 | 49 | 1 | 1 | 21.2 | 21.2 | 21.2 |
| | | | 25 | 0 | 2 | 2 | 20.2 | 20.2 | 20.1 |
| | | | 25 | 12 | 2 | 2 | 20.2 | 20.2 | 20.2 |
| | | | 25 | 25 | 2 | 2 | 20.2 | 20.2 | 20.0 |
| | | | 50 | 0 | 2 | 2 | 20.2 | 20.2 | 20.1 |
| Band | BW (MHz) | Mode | RB Allocation | RB offset | Target MPR | Meas. MPR | Avg Pwr (dBm) | | |
| | | | | | | | 2557.5 MHz | 2595 MHz | 2632.5 MHz |
| LTE Band 41 | 5 | QPSK | 1 | 0 | 0 | 0 | 21.8 | 22.2 | 21.6 |
| | | | 1 | 12 | 0 | 0 | 22.1 | 22.1 | 22.1 |
| | | | 1 | 24 | 0 | 0 | 22.2 | 22.2 | 22.1 |
| | | | 12 | 0 | 1 | 1 | 21.0 | 21.3 | 21.2 |
| | | | 12 | 7 | 1 | 1 | 21.1 | 21.1 | 21.1 |
| | | | 12 | 13 | 1 | 1 | 21.2 | 21.2 | 21.1 |
| | | | 25 | 0 | 1 | 1 | 21.0 | 21.1 | 21.0 |
| | | 16QAM | 1 | 0 | 1 | 1 | 21.2 | 21.3 | 21.3 |
| | | | 1 | 12 | 1 | 1 | 21.2 | 21.3 | 21.2 |
| | | | 1 | 24 | 1 | 1 | 21.2 | 21.2 | 21.2 |
| | | | 12 | 0 | 2 | 2 | 20.2 | 20.2 | 20.1 |
| | | | 12 | 7 | 2 | 2 | 20.2 | 20.2 | 20.2 |
| | | | 12 | 13 | 2 | 2 | 20.2 | 20.2 | 20.0 |
| | | | 25 | 0 | 2 | 2 | 20.2 | 20.2 | 20.1 |




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# 9. PEAK TO AVERAGE RATIO

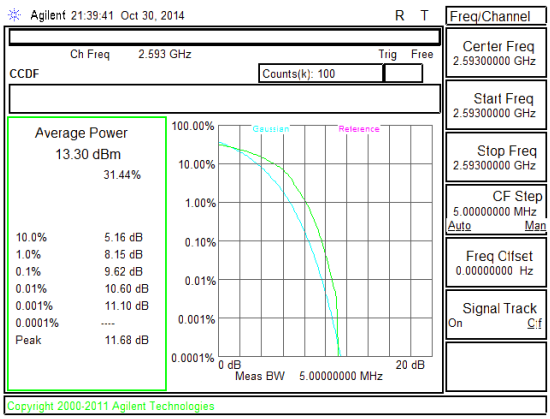
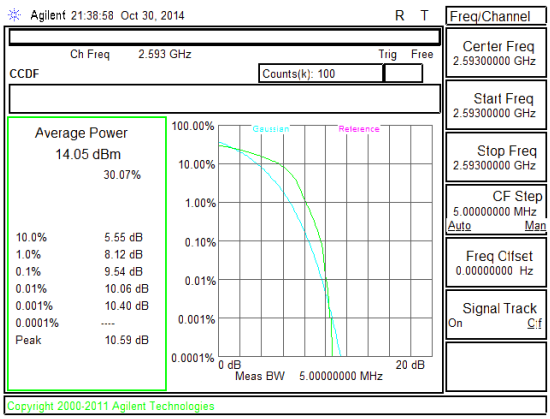
**Test Procedure**

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 | | |
|---|---|---|
| LTE41<br>20MHz<br>16QAM |  <br>Band LTE41 20MHz 16QAM Mid channel |  <br>Band LTE41 20MHz QPSK Mid channel |

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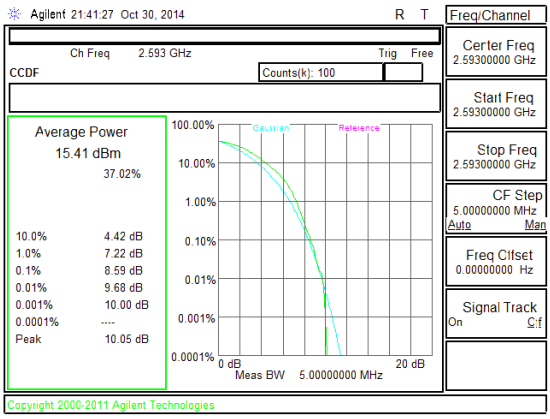
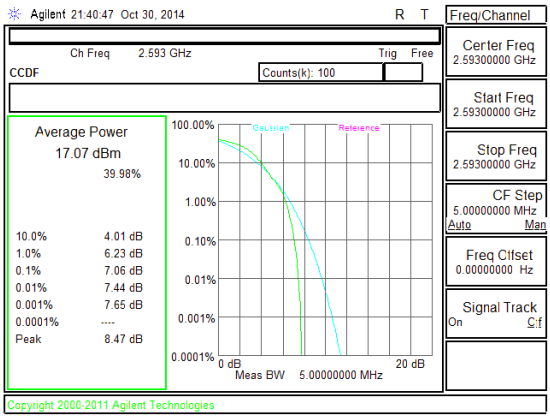
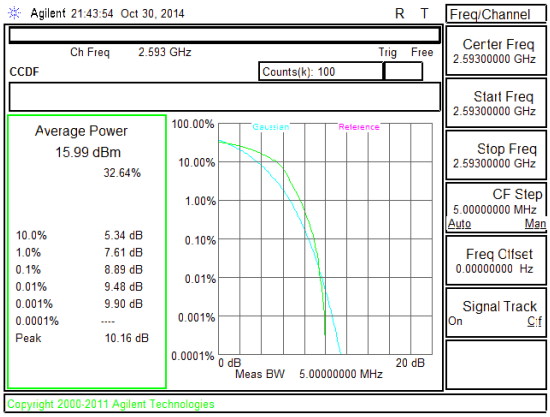
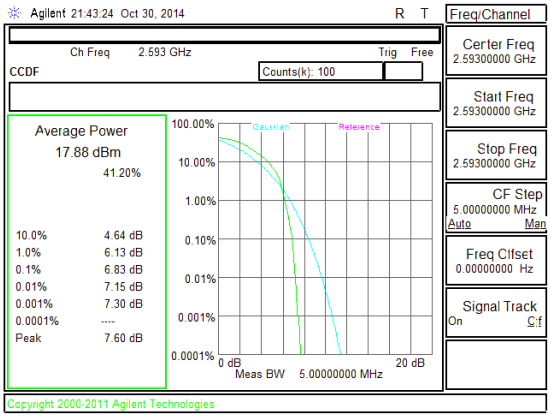
| | | |
|---|---|---|
| Band<br>LTE41<br>15MHz<br>16QAM |  <br>Band LTE41 15MHz 16QAM Mid channel |  <br>Band LTE41 15MHz QPSK Mid channel |

| | | |
|---|---|---|
| Band<br>LTE41<br>10MHz<br>16QAM |  <br>Band LTE41 10MHz 16QAM Mid channel |  <br>Band LTE41 10MHz QPSK Mid channel |

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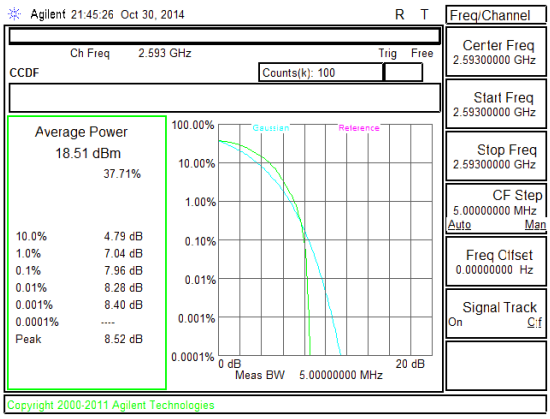
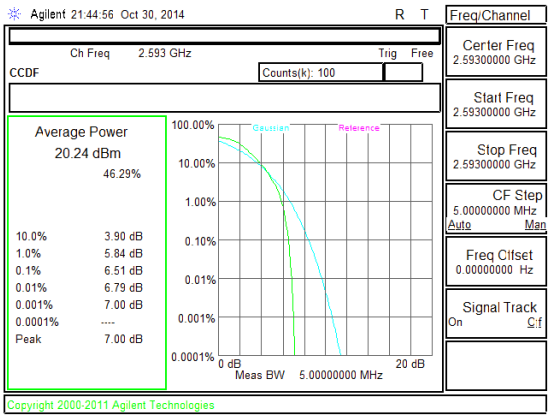
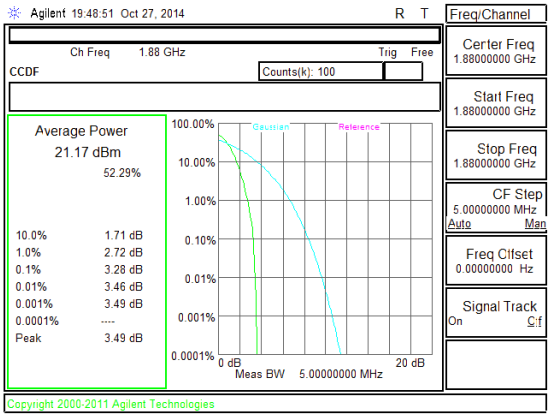
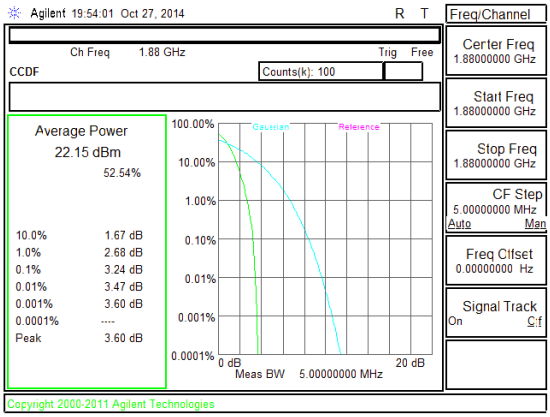
| | | |
|---|---|---|
| Band<br>LTE41<br>5MHz<br>16QAM |  <br>Band LTE41 5MHz 16QAM Mid channel |  <br>Band LTE41 5MHz QPSK Mid channel |

| | | |
|---|---|---|
| Band<br>Band 2<br>HSDPA |  <br>Band WCDMA B2 HSDPA |  <br>Band WCDMA B2 REL99 |

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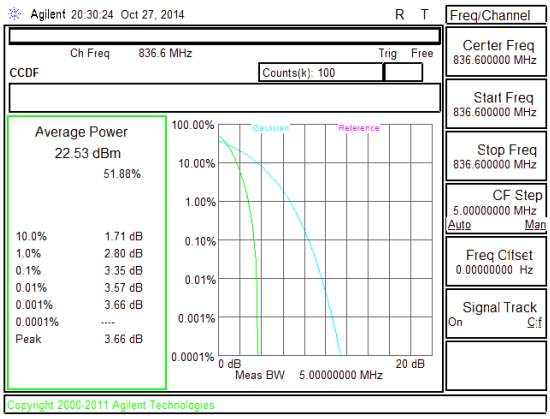
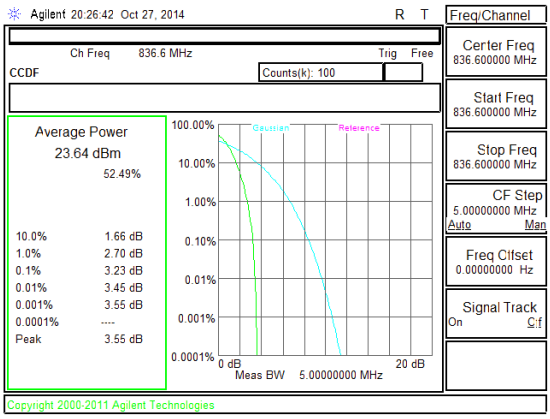
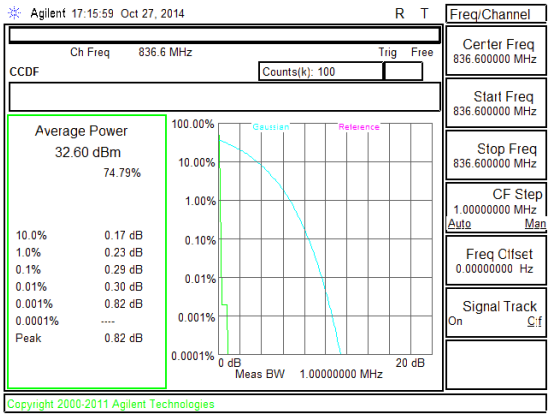
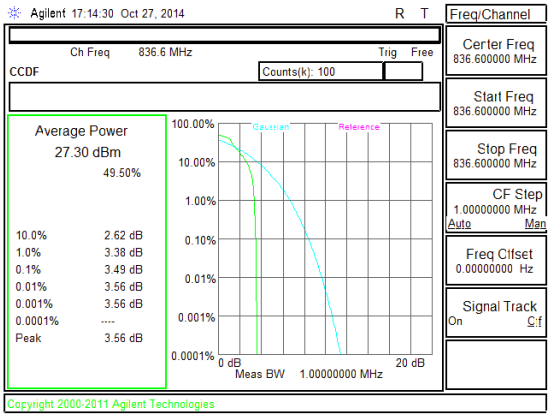
| | | |
|---|---|---|
| Band<br><br>Band 5<br><br>HSDPA |  <br><br>Band WCDMA B5 HSDPA |  <br><br>Band WCDMA B5 REL99 |

| | | |
|---|---|---|
| Band<br><br>GSM<br>850 |  <br><br>GPRS |  <br><br>EGPRS |

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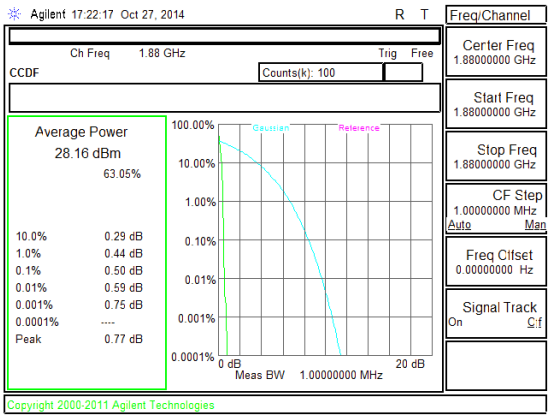
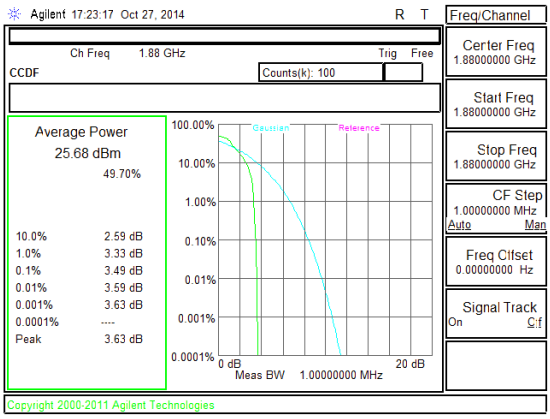
| | | |
|---|---|---|
| Band<br><br>GSM<br>1900 |  <br><br>GPRS |  <br><br>EGPRS |

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# 10. LIMITS AND CONDUCTED RESULTS

## 10.1. OCCUPIED BANDWIDTH

**RULE PART(S)**

FCC: §2.1049

**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)




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### 10.1.1. OCCUPIED BANDWIDTH RESULTS

| Band | Mode | Channel | f (MHz) | 99% BW (KHz) | -26dB BW (KHz) |
|---|---|---|---|---|---|
| GSM850 | GPRS | 128 | 824.2 | 241.2 | 323.3 |
| | | 190 | 836.6 | 244.8 | 311.5 |
| | | 251 | 848.8 | 243.3 | 322.6 |
| | EGPRS | 128 | 824.2 | 244.3 | 306.2 |
| | | 190 | 836.6 | 246.6 | 302.2 |
| | | 251 | 848.8 | 247.8 | 311.8 |
| GSM1900 | GPRS | 512 | 1850.2 | 245.6 | 318.6 |
| | | 661 | 1880 | 247 | 316.1 |
| | | 810 | 1909.8 | 245.9 | 324.3 |
| | EGPRS | 512 | 1850.2 | 251.3 | 319.4 |
| | | 661 | 1880 | 249.8 | 326.6 |
| | | 810 | 1909.8 | 248.8 | 315.1 |
| Band 5 | REL99 | 4132 | 826.4 | 4158 | 4646 |
| | | 4183 | 836.6 | 4151 | 4638 |
| | | 4233 | 846.6 | 4144 | 4650 |
| | HSDPA | 4132 | 826.4 | 4159 | 4627 |
| | | 4183 | 836.6 | 4140 | 4629 |
| | | 4233 | 846.6 | 4142 | 4626 |
| Band 2 | REL99 | 9262 | 1852.4 | 4155 | 4656 |
| | | 9400 | 1880 | 4164 | 4645 |
| | | 9538 | 1907.6 | 4162 | 4636 |
| | HSDPA | 9262 | 1852.4 | 4156 | 4651 |
| | | 9400 | 1880 | 4164 | 4630 |
| | | 9538 | 1907.6 | 4170 | 4638 |




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### 10.1.2. LTE OCCUPIED BANDWIDTH RESULTS

| Band | BW(MHz) | Mode | RB/RB Size | f (MHz) | 99% BW (MHz) | -26dB BW (MHz) |
|---|---|---|---|---|---|---|
| LTE41 | 20 | QPSK | 100/0 | 2565 | 17.83 | 19.11 |
| | | | 100/0 | 2593 | 17.88 | 19.37 |
| | | | 100/0 | 2625 | 17.85 | 19.2 |
| | | 16QAM | 100/0 | 2565 | 17.85 | 19.32 |
| | | | 100/0 | 2593 | 17.84 | 19.31 |
| | | | 100/0 | 2625 | 17.88 | 19.42 |

| Band | BW(MHz) | Mode | RB/RB Size | f (MHz) | 99% BW (MHz) | -26dB BW (MHz) |
|---|---|---|---|---|---|---|
| LTE41 | 15 | QPSK | 75/0 | 2562.5 | 13.41 | 14.44 |
| | | | 75/0 | 2593 | 13.46 | 14.53 |
| | | | 75/0 | 2627.5 | 13.47 | 14.48 |
| | | 16QAM | 75/0 | 2562.5 | 13.41 | 14.38 |
| | | | 75/0 | 2593 | 13.42 | 14.48 |
| | | | 75/0 | 2627.5 | 13.42 | 14.14 |

| Band | BW(MHz) | Mode | RB/RB Size | f (MHz) | 99% BW (MHz) | -26dB BW (MHz) |
|---|---|---|---|---|---|---|
| LTE41 | 10 | QPSK | 50/0 | 2560 | 8.97 | 9.91 |
| | | | 50/0 | 2593 | 8.97 | 9.74 |
| | | | 50/0 | 2630 | 8.99 | 9.8 |
| | | 16QAM | 50/0 | 2560 | 8.97 | 9.67 |
| | | | 50/0 | 2593 | 8.97 | 9.74 |
| | | | 50/0 | 2630 | 8.97 | 9.88 |
| Band | BW(MHz) | Mode | RB/RB Size | f (MHz) | 99% BW (MHz) | -26dB BW (MHz) |
| LTE41 | 5 | QPSK | 25/0 | 2557.5 | 4.52 | 5.06 |
| | | | 25/0 | 2593 | 4.50 | 5.03 |
| | | | 25/0 | 2632.5 | 4.49 | 4.87 |
| | | 16QAM | 25/0 | 2557.5 | 4.51 | 4.96 |
| | | | 25/0 | 2593 | 4.52 | 4.93 |
| | | | 25/0 | 2632.5 | 4.52 | 4.94 |



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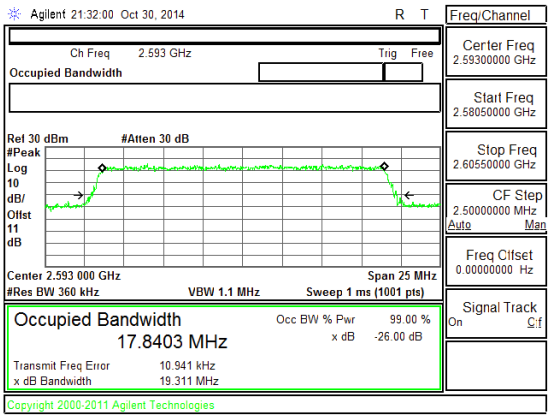
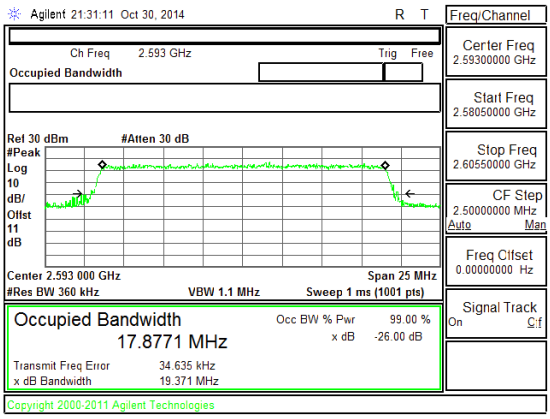
### 10.1.1. OCCUPIED BANDWIDTH PLOTS

| | | |
|---|---|---|
| Band<br>LTE41<br>20MHz |  <br>Band LTE41 20MHz OBW 16QAM Mid Channel FRB.gif |  <br>Band LTE41 20MHz OBW QPSK Mid Channel FRB.gif |

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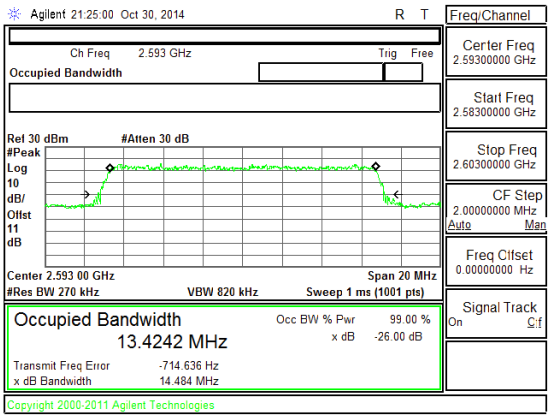
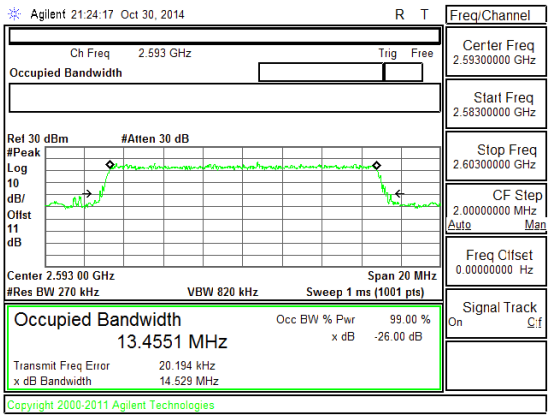
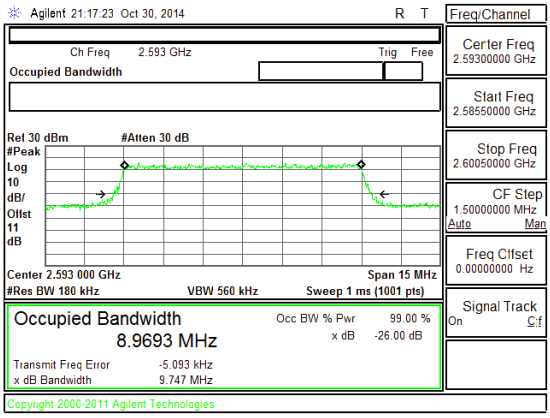
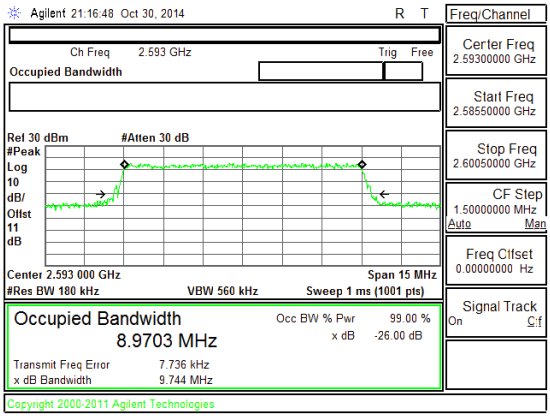
| | | |
|---|---|---|
| Band LTE41 15MHz |  <br>Band LTE41 15MHz OBW 16QAM Mid Channel FRB.gif |  <br>Band LTE41 15MHz OBW QPSK Mid Channel FRB.gif |
| Band LTE41 10MHz |  <br>Band LTE41 10MHz OBW 16QAM Mid Channel FRB.gif |  <br>Band LTE41 10MHz OBW QPSK Mid Channel FRB.gif |

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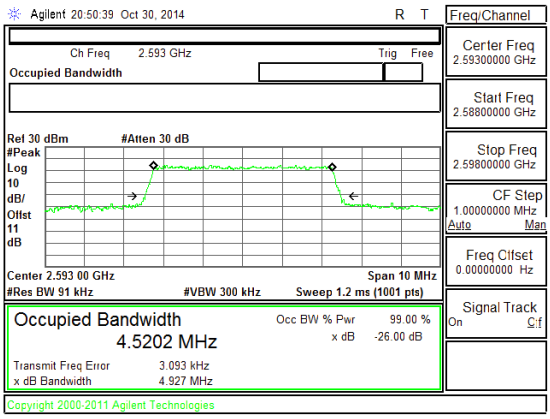
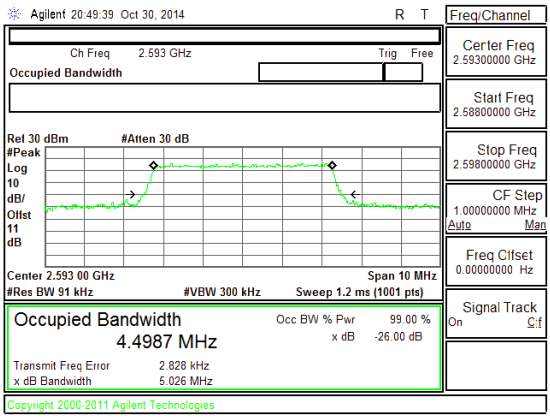
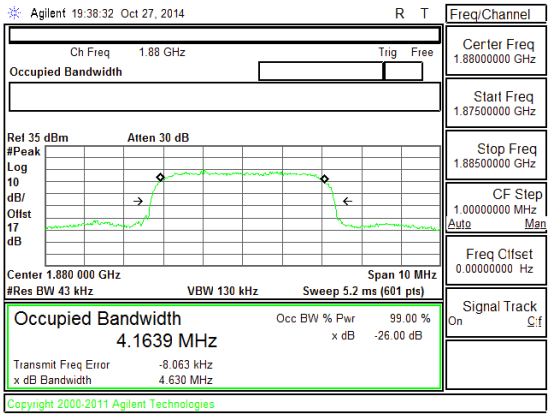
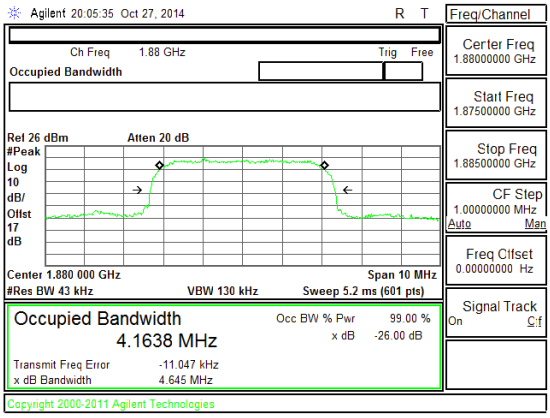
| | | |
|---|---|---|
| Band<br>LTE41<br>5MHz |  <br>Band LTE41 5MHz OBW 16QAM Mid Channel FRB.gif |  <br>Band LTE41 5MHz OBW QPSK Mid Channel FRB.gif |
| Band<br>Band 2 |  <br>Band WCDMA B2 HSDPA OBW |  <br>Band WCDMA B2 REL99 OBW |

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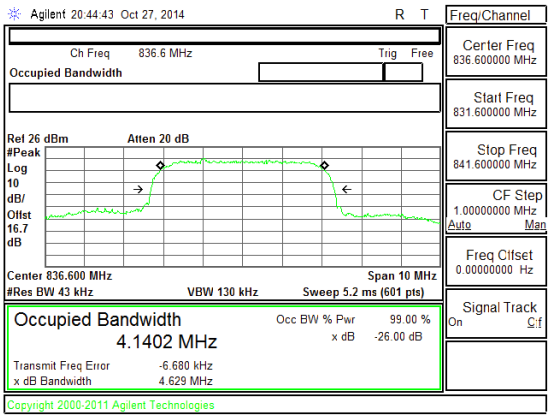
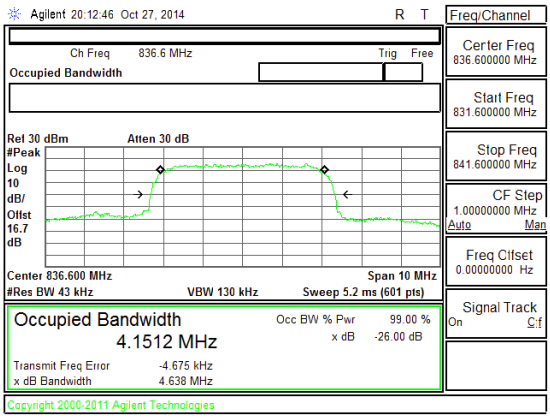
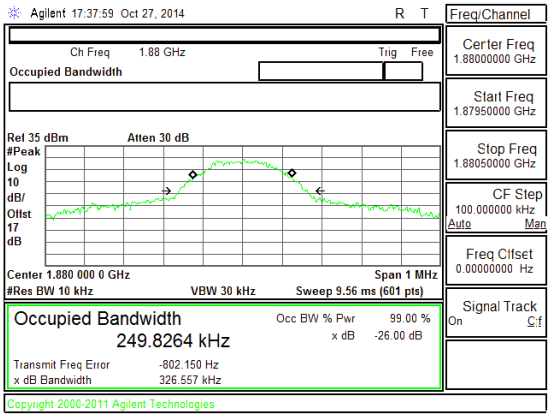
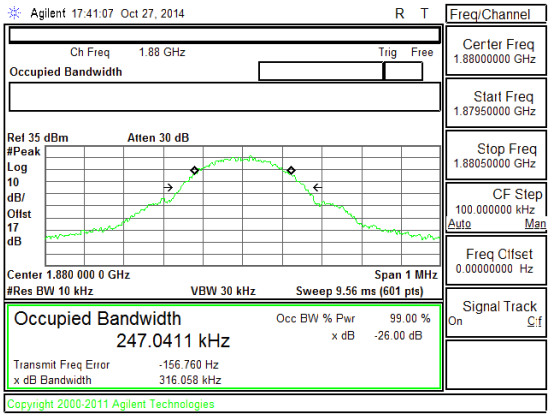
| | | |
|---|---|---|
| Band<br><br>Band 5 |  <br>Band WCDMA B5 HSDPA OBW |  <br>Band WCDMA B5 REL99 OBW |
| Band<br><br>GSM1900 |  <br>Band GSM1900 EGPRS OBW Mid channel |  <br>Band GSM1900 GPRS OBW Mid channel |

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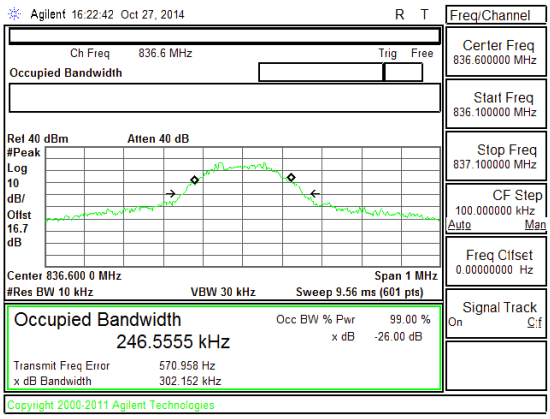
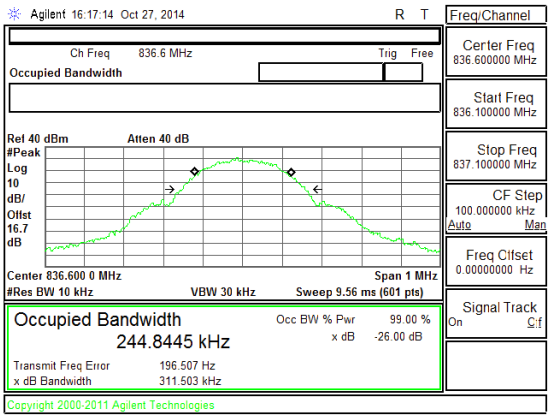
| | | |
|---|---|---|
| Band<br><br>GSM850 |  <br>Band GSM850 EGPRS OBW Mid channel |  <br>Band GSM850 GPRS OBW Mid channel |

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## 10.2. BAND EDGE EMISSIONS

**RULE PART(S)**

FCC: §22.359, §24.238, §27. 53

**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.

Part 27: (m)(4) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

**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**




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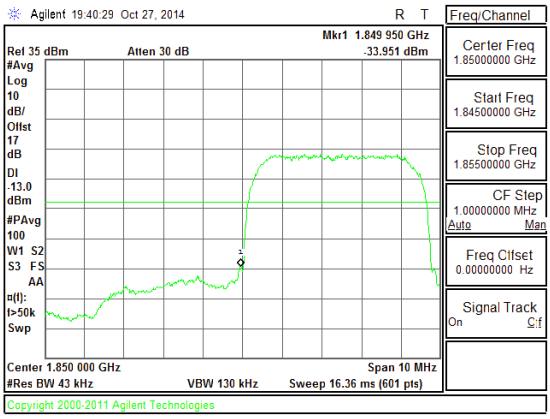
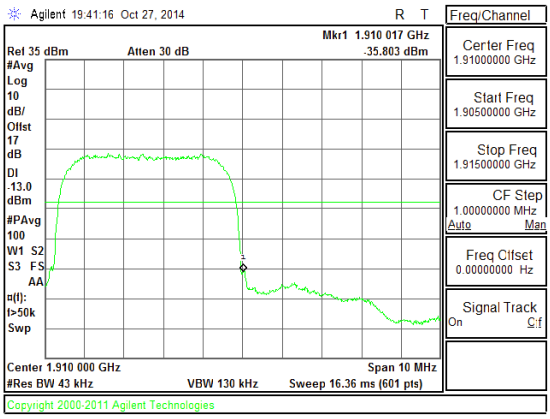
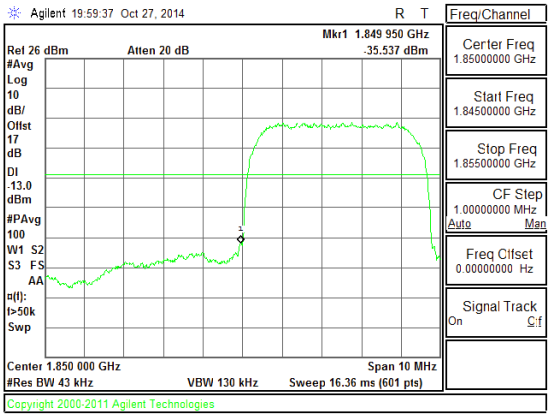
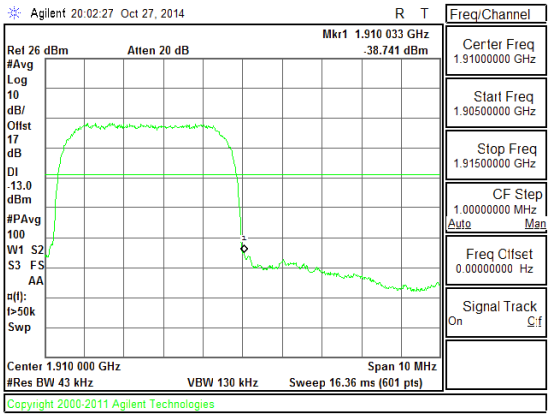
### 10.2.1. BAND EDGE PLOTS

| | | |
|---|---|---|
| Band<br>Band 2<br>HSDPA |  <br>Band WCDMA B2 HSDPA CBE |  <br>Band WCDMA B2 HSDPA CBE |
| Band<br>Band 2<br>REL99 |  <br>Band WCDMA B2 REL99 CBE |  <br>Band WCDMA B2 REL99 CBE |

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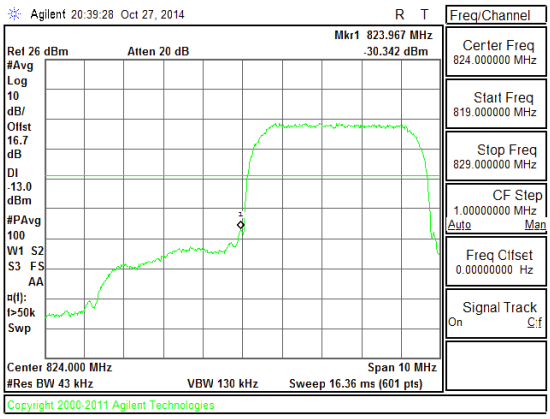
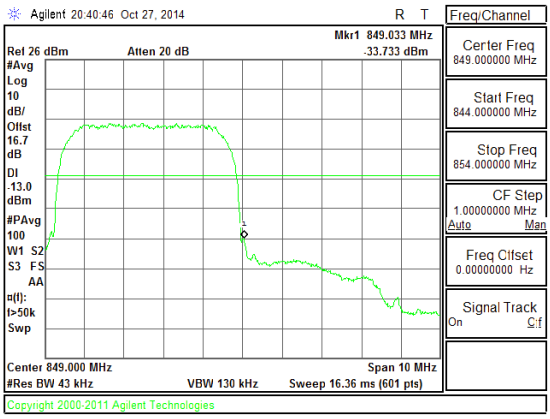
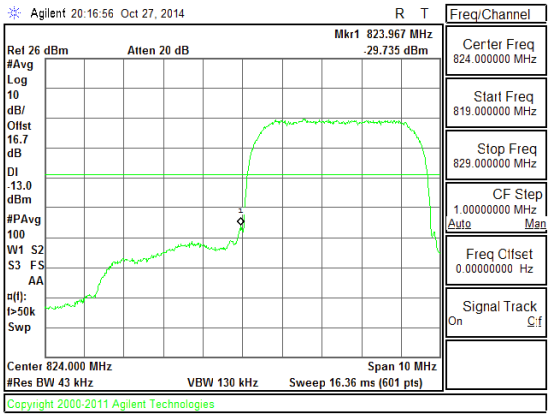
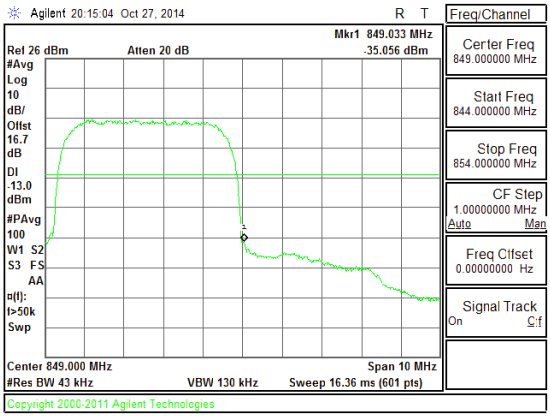
| | | |
|---|---|---|
| Band<br>Band 5<br>HSDPA |  <br>Band WCDMA B5 HSDPA CBE |  <br>Band WCDMA B5 HSDPA CBE |
| Band<br>Band 5<br>REL99 |  <br>Band WCDMA B5 REL99 CBE |  <br>Band WCDMA B5 REL99 CBE |

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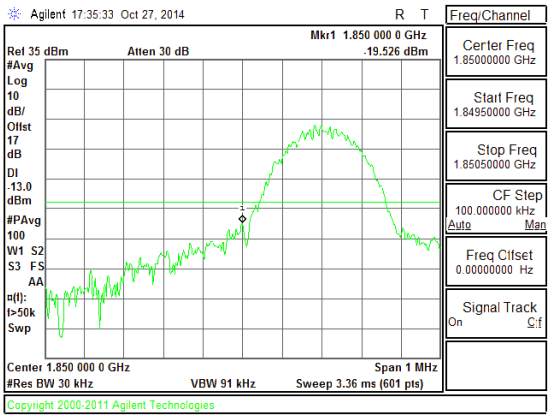
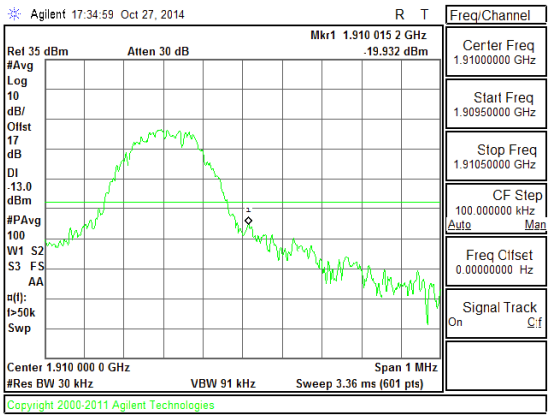
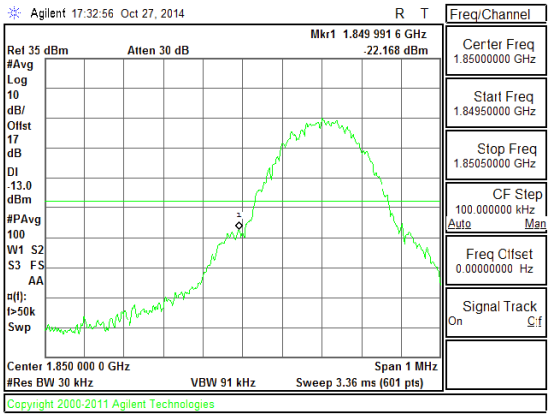
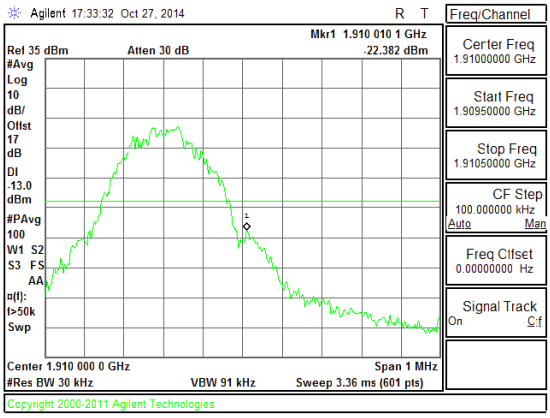
| | | |
|---|---|---|
| Band<br><br>GSM1900<br><br>EGPRS |  <br>Band GSM1900 EGPRS CBE Low channel |  <br>Band GSM1900 EGPRS CBE High channel |
| Band<br><br>GSM1900<br><br>GPRS |  <br>Band GSM1900 GPRS CBE Low channel |  <br>Band GSM1900 GPRS CBE High channel |

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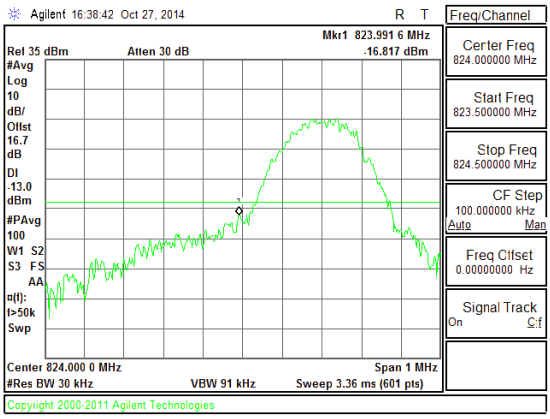
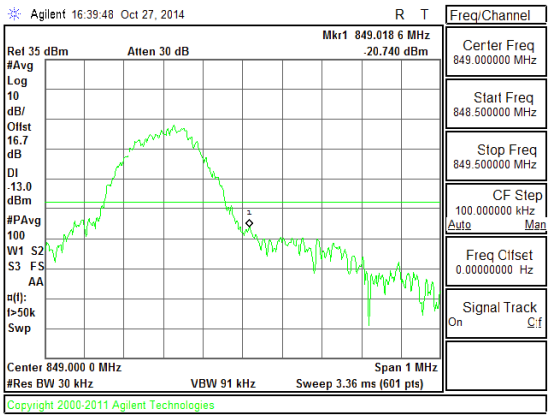
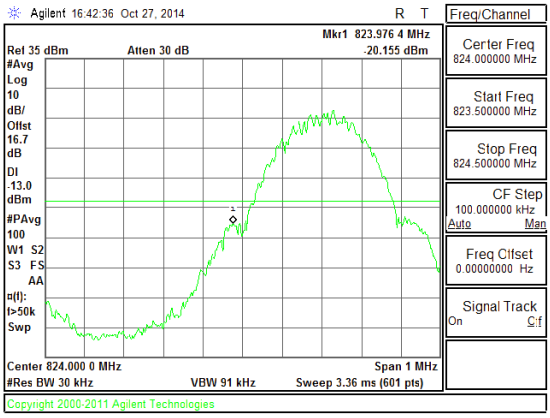
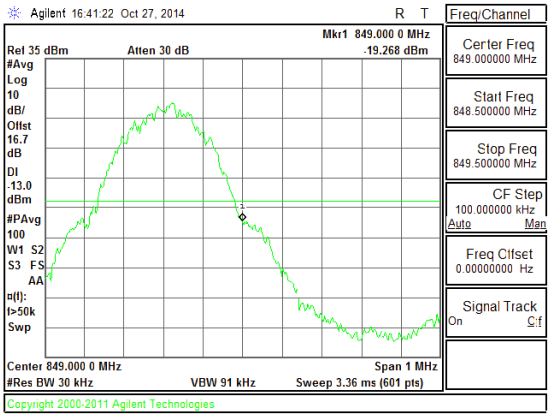
| | | |
|---|---|---|
| Band<br><br>GSM850<br><br>EGPRS |  <br>Band GSM850 EGPRS CBE Low channel |  <br>Band GSM850 EGPRS CBE High channel |
| Band<br><br>GSM850<br><br>GPRS |  <br>Band GSM850 GPRS CBE Low channel |  <br>Band GSM850 GPRS CBE High channel |

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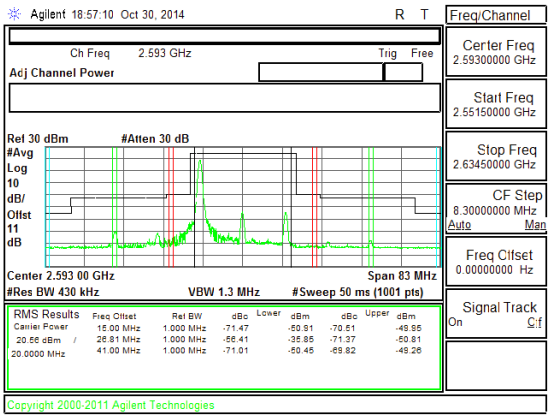
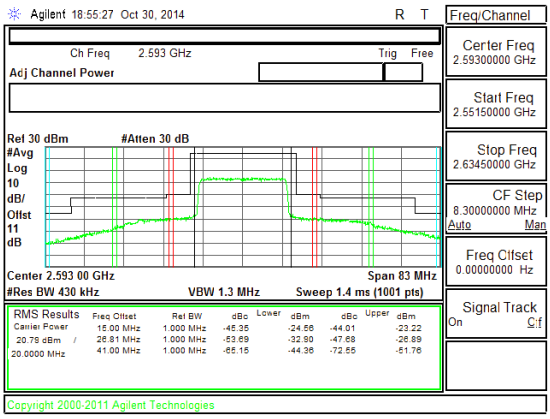
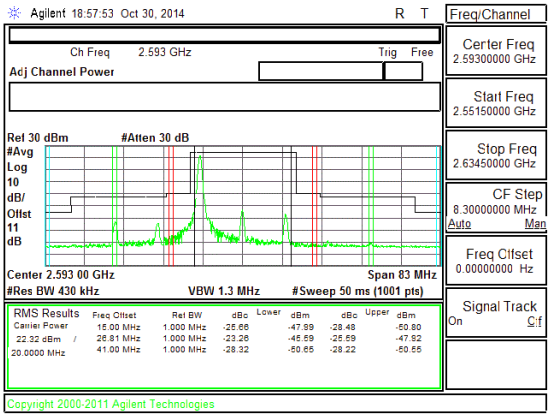
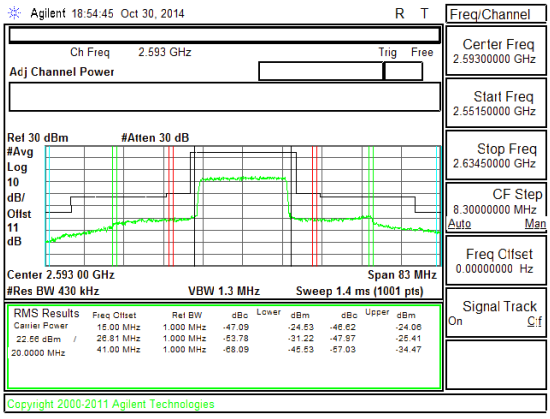
## 10.2.2. EMISSION MASK PLOTS

| | | |
|---|---|---|
| Band LTE41 20MHz 16QAM |  <br>Band LTE41 20MHz EM 16QAM 1RB.gif |  <br>Band LTE41 20MHz EM 16QAM FRB.gif |
| Band LTE41 20MHz QPSK |  <br>Band LTE41 20MHz EM QPSK 1RB.gif |  <br>Band LTE41 20MHz EM QPSK FRB.gif |

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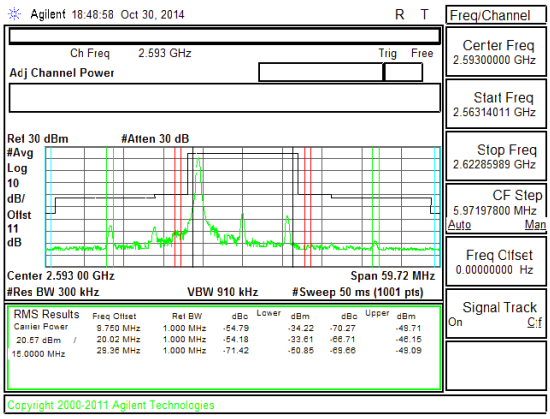
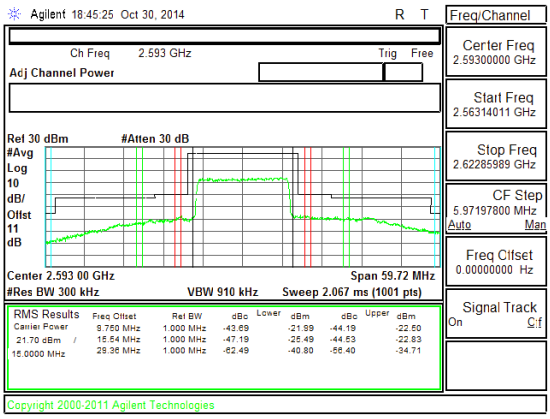
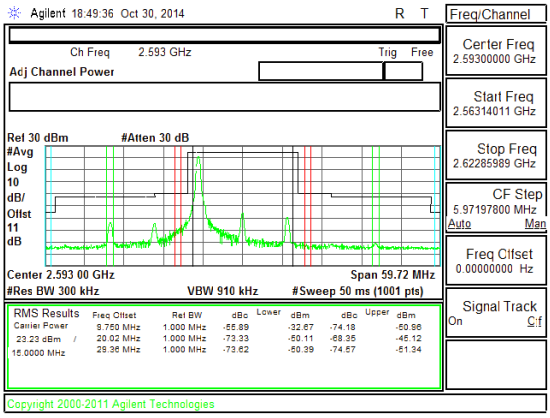
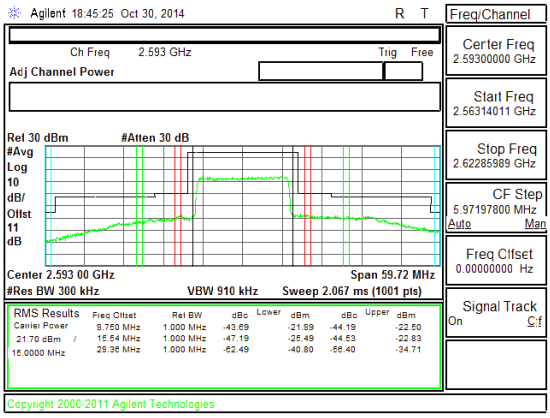
| | | |
|---|---|---|
| Band<br>LTE41<br>15MHz<br>16QAM |  <br>Band LTE41 15MHz EM 16QAM 1RB.gif |  <br>Band LTE41 15MHz EM 16QAM FRB.gif |
| Band<br>LTE41<br>15MHz<br>QPSK |  <br>Band LTE41 15MHz EM QPSK 1RB.gif |  <br>Band LTE41 15MHz EM QPSK FRB.gif |

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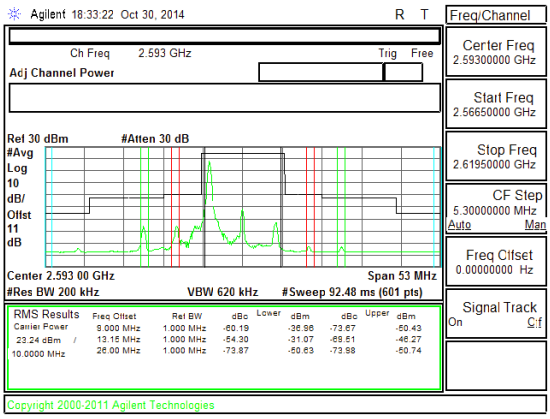
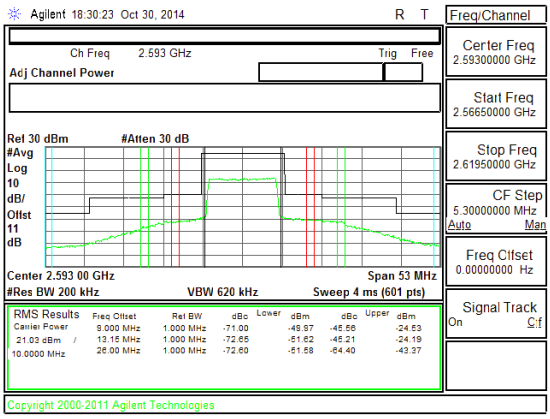
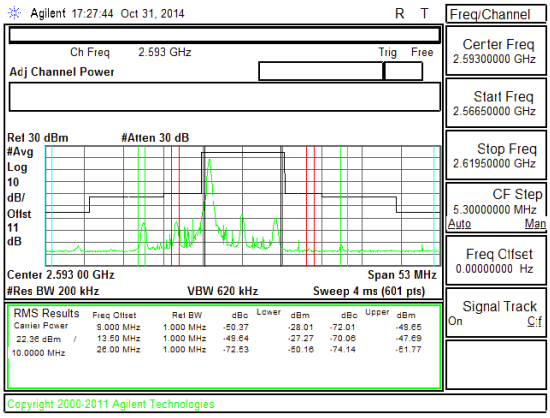
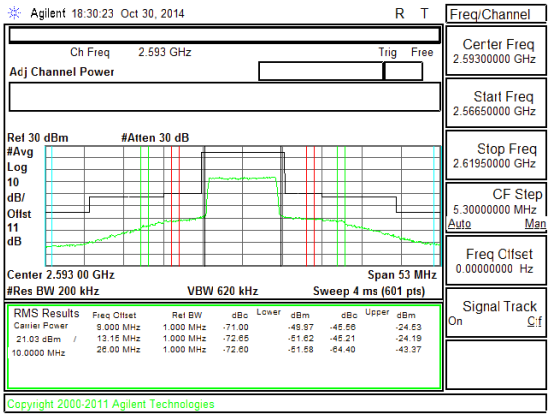
| | | |
|---|---|---|
| Band LTE41 10MHz 16QAM |  <br>Band LTE41 10MHz EM 16QAM 1RB.gif |  <br>Band LTE41 10MHz EM 16QAM FRB.gif |
| Band LTE41 10MHz QPSK |  <br>Band LTE41 10MHz EM QPSK 1RB.gif |  <br>Band LTE41 10MHz EM QPSK FRB.gif |

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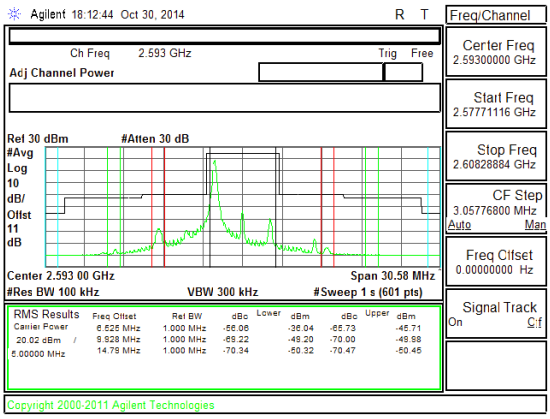
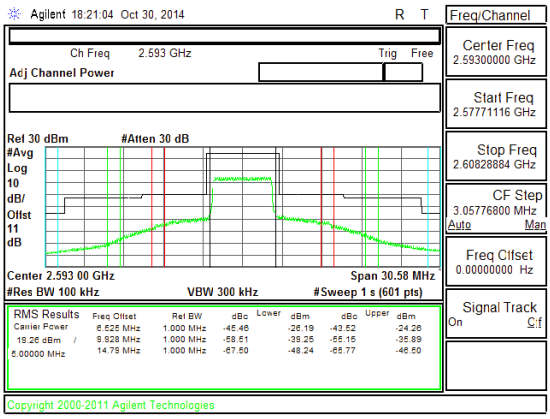
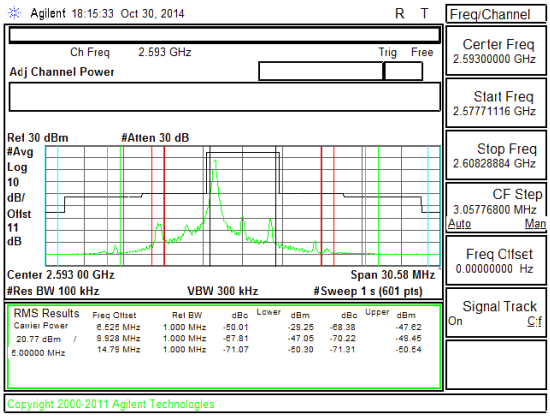
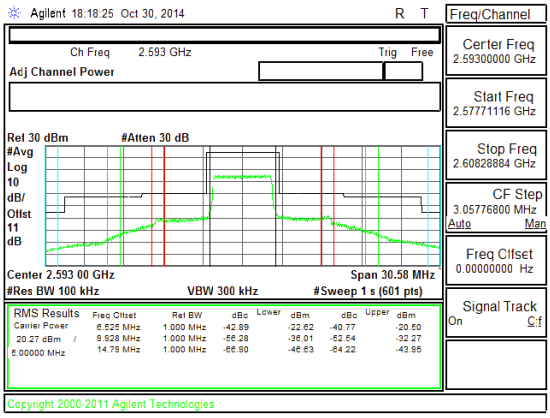
| | | |
|---|---|---|
| Band<br>LTE41<br>5MHz<br>16QAM |  <br>Band LTE41 5MHz EM 16QAM Mid Channel 1RB.gif |  <br>Band LTE41 5MHz EM 16QAM Mid Channel FRB.gif |
| Band<br>LTE41<br>5MHz<br>QPSK |  <br>Band LTE41 5MHz EM QPSK Mid Channel 1RB.gif |  <br>Band LTE41 5MHz EM QPSK Mid Channel FRB.gif |

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## 10.3. OUT OF BAND EMISSIONS

### RULE PART(S)

FCC: §2.1051, §22.901, §22.917, §24.238, §27.53

### 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.

Part 27: (m)(4) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

### 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




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### 10.3.1. OUT OF BAND EMISSIONS RESULT

| Band | BW (MHz) | Mode | f (MHz) | Spur (dBm) | Spec (dBm) | Delta (dB) |
|---|---|---|---|---|---|---|
| LTE41 | 20 | QPSK | 2565 | -29.93 | -25 | -4.93 |
| | | | 2593 | -29.89 | -25 | -4.89 |
| | | | 2625 | -29.55 | -25 | -4.55 |
| | | 16QAM | 2565 | -29.54 | -25 | -4.54 |
| | | | 2593 | -29.85 | -25 | -4.85 |
| | | | 2625 | -29.07 | -25 | -4.07 |

| Band | BW (MHz) | Mode | f (MHz) | Spur (dBm) | Spec (dBm) | Delta (dB) |
|---|---|---|---|---|---|---|
| LTE41 | 15 | QPSK | 2562.5 | -29.54 | -25 | -4.54 |
| | | | 2593 | -29.55 | -25 | -4.55 |
| | | | 2627.5 | -31.07 | -25 | -6.07 |
| | | 16QAM | 2562.5 | -29.43 | -25 | -4.43 |
| | | | 2593 | -29.66 | -25 | -4.66 |
| | | | 2627.5 | -30.19 | -25 | -5.19 |

| Band | BW (MHz) | Mode | f (MHz) | Spur (dBm) | Spec (dBm) | Delta (dB) |
|---|---|---|---|---|---|---|
| LTE41 | 10 | QPSK | 2560 | -29.85 | -25 | -4.85 |
| | | | 2593 | -29.10 | -25 | -4.10 |
| | | | 2630 | -29.98 | -25 | -4.98 |
| | | 16QAM | 2560 | -29.78 | -25 | -4.78 |
| | | | 2593 | -31.89 | -25 | -6.89 |
| | | | 2630 | -30.45 | -25 | -5.45 |

| Band | BW (MHz) | Mode | f (MHz) | Spur (dBm) | Spec (dBm) | Delta (dB) |
|---|---|---|---|---|---|---|
| LTE41 | 5 | QPSK | 2557.5 | -29.60 | -25 | -4.60 |
| | | | 2593 | -28.91 | -25 | -3.91 |
| | | | 2632.5 | -29.85 | -25 | -4.85 |
| | | 16QAM | 2557.5 | -29.52 | -25 | -4.52 |
| | | | 2593 | -30.30 | -25 | -5.3 |
| | | | 2632.5 | -29.51 | -25 | -4.51 |



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| Band | Mode | f (MHz) | Spur (dBm) | Spec (dBm) | Delta (dB) |
|---|---|---|---|---|---|
| GSM850 | GPRS | 824.2 | -27.12 | -13 | -14.12 |
| | | 836.6 | -26.78 | -13 | -13.78 |
| | | 848.8 | -27.39 | -13 | -14.39 |
| | EGPRS | 824.2 | -25.79 | -13 | -12.79 |
| | | 836.6 | -26.58 | -13 | -13.58 |
| | | 848.8 | -27.25 | -13 | -14.25 |
| GSM1900 | GPRS | 1850.2 | -26.55 | -13 | -13.55 |
| | | 1880 | -26.33 | -13 | -13.33 |
| | | 1909.8 | -26.55 | -13 | -13.55 |
| | EGPRS | 1850.2 | -25.28 | -13 | -12.28 |
| | | 1880 | -26.93 | -13 | -13.93 |
| | | 1909.8 | -26.72 | -13 | -13.72 |
| Band 5 | REL99 | 826.4 | -42.81 | -13 | -29.81 |
| | | 836.6 | -43.45 | -13 | -30.45 |
| | | 846.6 | -42.97 | -13 | -29.97 |
| | HSDPA | 826.4 | -36.08 | -13 | -23.08 |
| | | 836.6 | -42.95 | -13 | -29.95 |
| | | 846.6 | -43.34 | -13 | -30.34 |
| Band 2 | REL99 | 1852.4 | -36.10 | -13 | -23.10 |
| | | 1880 | -35.94 | -13 | -22.94 |
| | | 1907.6 | -36.93 | -13 | -23.93 |
| | HSDPA | 1852.4 | -37.22 | -13 | -24.22 |
| | | 1880 | -36.42 | -13 | -23.42 |
| | | 1907.6 | -36.94 | -13 | -23.94 |




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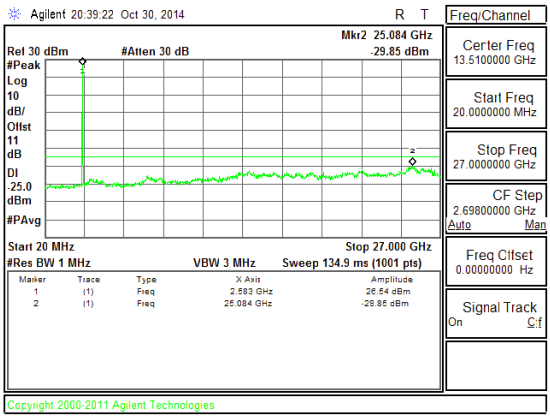
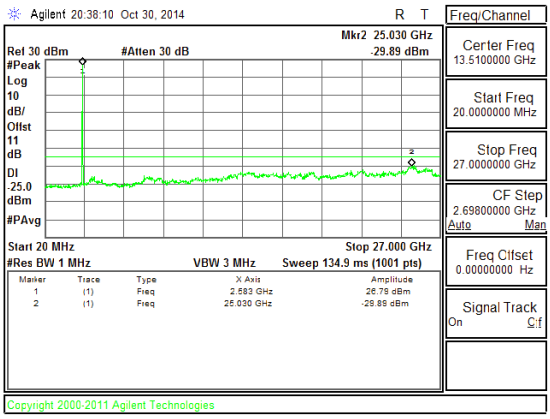
## 10.3.2. OUT OF BAND EMISSIONS PLOTS

Band LTE41 20MHz 16QAM

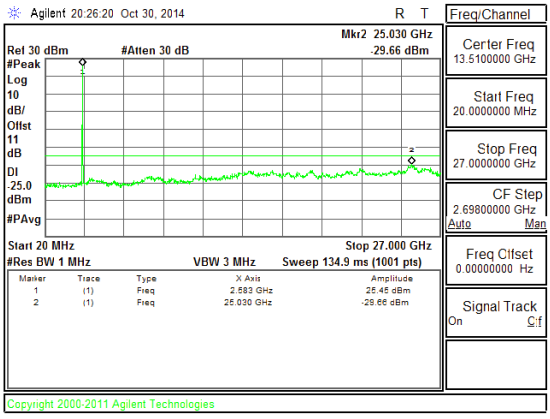



Band LTE41 20MHz CSE 16QAM Mid channel

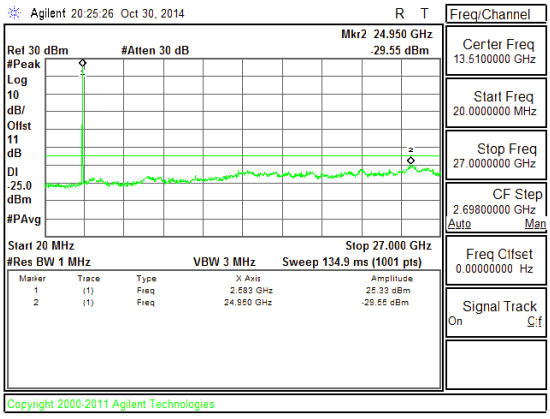



Band LTE41 20MHz CSE QPSK Mid channel

Band LTE41 15MHz 16QAM




Band LTE41 15MHz CSE 16QAM Mid channel




Band LTE41 15MHz CSE QPSK Mid channel



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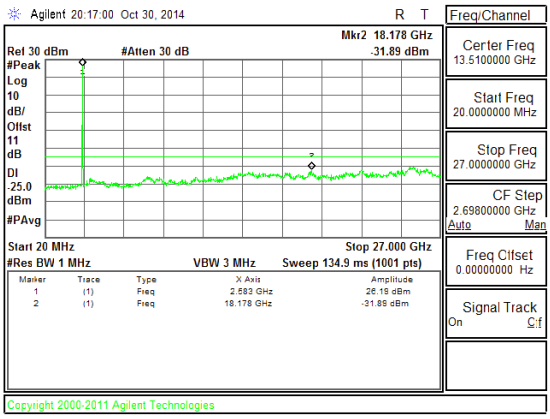
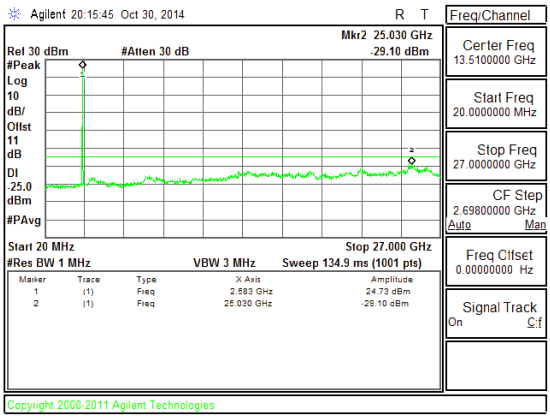
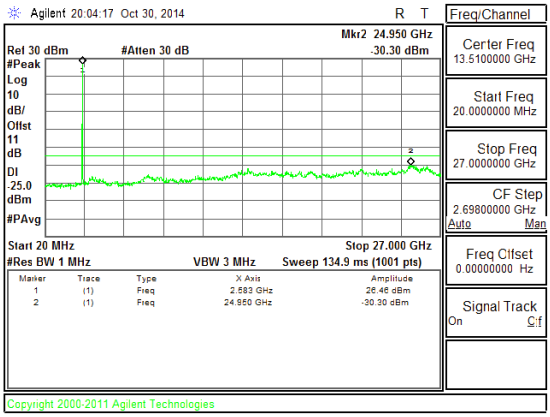
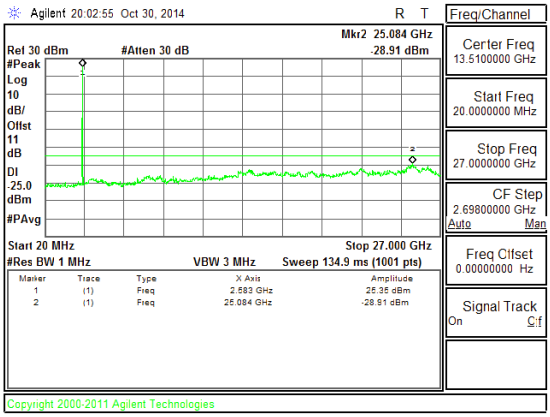
| | | |
|---|---|---|
| Band<br>LTE41<br>10MHz<br>16QAM |  |  |
| | Band LTE41 10MHz CSE 16QAM Mid channel | Band LTE41 10MHz CSE QPSK Mid channel |

| | | |
|---|---|---|
| Band<br>LTE41<br>5MHz<br>16QAM |  |  |
| | Band LTE41 5MHz CSE 16QAM Mid channel | Band LTE41 5MHz CSE QPSK Mid channel |

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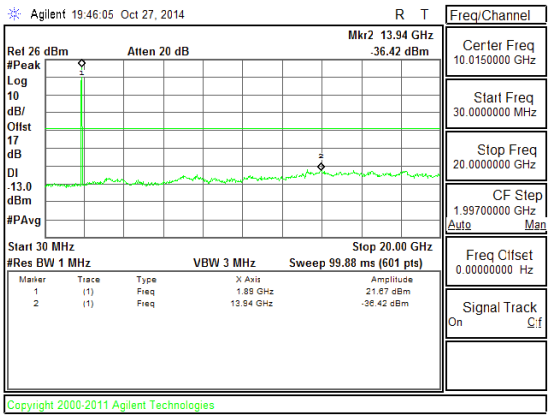
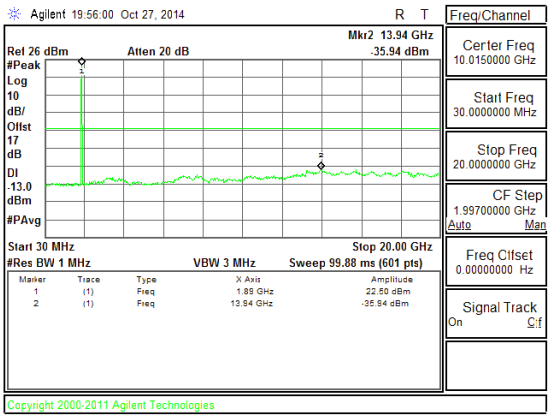
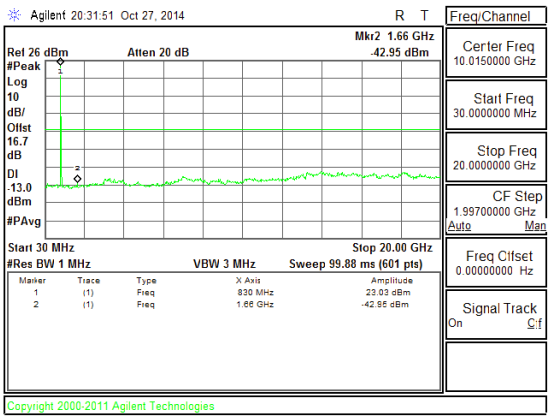
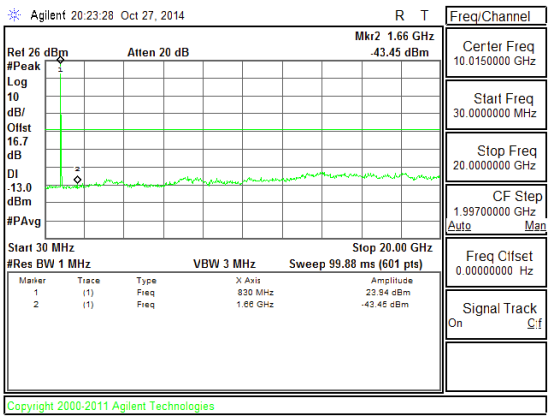
| | | |
|---|---|---|
| Band<br>Band 2<br>HSDPA |  <br>Band WCDMA B2 HSDPA CSE |  <br>Band WCDMA B2 REL99 CSE |

| | | |
|---|---|---|
| Band<br>Band 5<br>HSDPA |  <br>Band WCDMA B5 HSDPA CSE |  <br>Band WCDMA B5 REL99 CSE |

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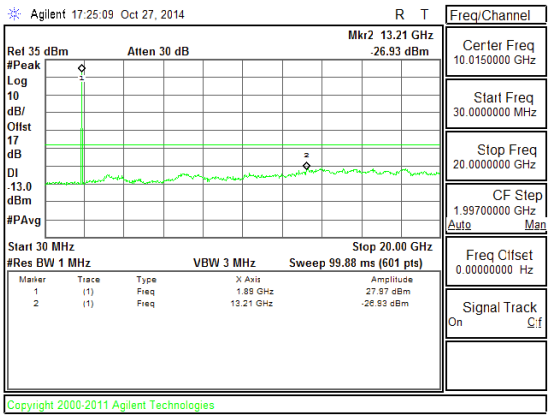
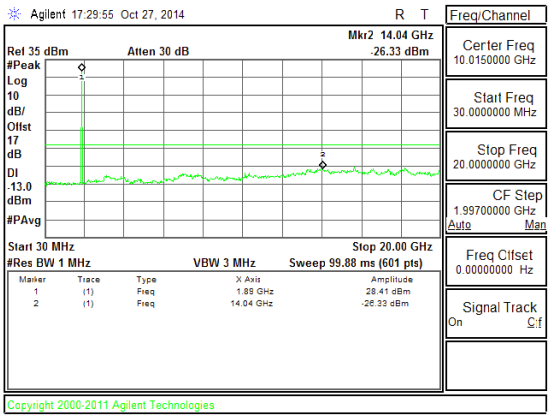
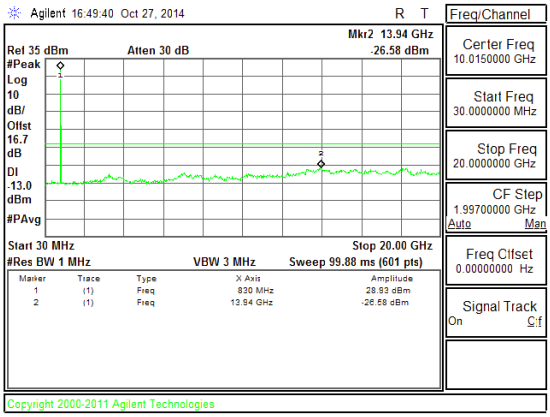
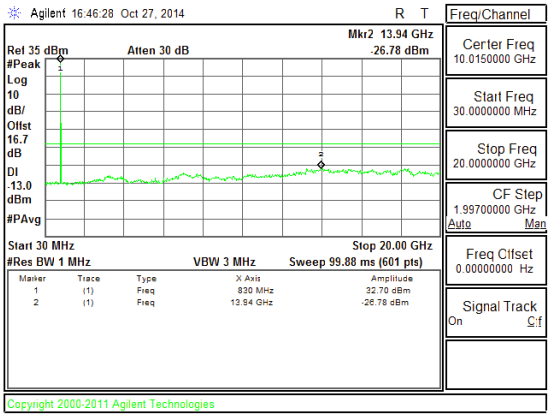
| | | |
|---|---|---|
| Band<br><br>GSM1900<br><br>EGPRS |  <br>Band GSM1900 EGPRS CSE Mid channel |  <br>Band GSM1900 GPRS CSE Mid channel |
| Band<br><br>GSM850<br><br>EGPRS |  <br>Band GSM850 EGPRS CSE Mid channel |  <br>Band GSM850 GPRS CSE Mid channel |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## 10.4. FREQUENCY STABILITY

### RULE PART(S)

FCC: §2.1055, §22.355, §24.235, §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

### RESULTS

See the following pages.



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
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## 10.4.1. FREQUENCY STABILITY RESULTS

**GPRS 1900, Channel 661 Freq: 1880MHz– MID CHANNEL**

| Reference Frequency: PCS Mid Channel | | 1880 | MHz @ 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 | 50 | 1880.000032 | 0.002 | 2.5 |
| 3.80 | 40 | 1880.000016 | 0.011 | 2.5 |
| 3.80 | 30 | 1880.000030 | 0.003 | 2.5 |
| ***3.80*** | ***20*** | 1880.000036 | **0** | ***2.5*** |
| 3.80 | 10 | 1880.000025 | 0.006 | 2.5 |
| 3.80 | 0 | 1880.000032 | 0.002 | 2.5 |
| 3.80 | -10 | 1880.000022 | 0.008 | 2.5 |
| 3.80 | -20 | 1880.000021 | 0.008 | 2.5 |
| 3.80 | -30 | 1880.000033 | 0.002 | 2.5 |

| Reference Frequency: PCS Mid Channel | | 1880 | MHz @ 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*** | ***1880.000036*** | ***0*** | ***2.5*** |
| 4.30 | 20 | 1880.000031 | *0.003* | 2.5 |
| 3.20 | 20 | 1880.000034 | *0.001* | 2.5 |




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**GPRS 850 CELL BAND, – MID CHANNEL190, Frequency 836.6MHz**

| Reference Frequency: Cell Mid Channel 836.6 MHz @ 20ºC<br>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 | 50 | 836.600030 | 0.003 | 2.5 |
| 3.80 | 40 | 836.600032 | 0.000 | 2.5 |
| 3.80 | 30 | 836.600026 | 0.007 | 2.5 |
| 3.80 | ***20*** | 836.600032 | ***0*** | ***2.5*** |
| 3.80 | 10 | 836.600024 | 0.010 | 2.5 |
| 3.80 | 0 | 836.600032 | 0.001 | 2.5 |
| 3.80 | -10 | 836.600033 | -0.001 | 2.5 |
| 3.80 | -20 | 836.600033 | -0.001 | 2.5 |
| 3.80 | -30 | 836.600021 | 0.014 | 2.5 |

| Reference Frequency: Cell Mid Channel 836.6 MHz @ 20ºC<br>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*** | ***836.600032*** | ***0.00000*** | ***2.5*** |
| 4.30 | 20 | 836.600025 | *0.00803* | 2.5 |
| 3.20 | 20 | 836.600027 | *0.00641* | 2.5 |



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
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**LTE41 10MHz, Freq: 2593MHz– MID CHANNEL**

| Reference Frequency: Cellular Mid Channel 2593.000012 MHz @ 20°C<br>Limit: to stay +- 2.5 ppm = 6482.500 Hz | | | | |
|---|---|---|---|---|
| Power Supply (Vdc) | Environment Temperature (°C) | Frequency Deviation Measureed with Time Elapse | | |
| | | (MHz) | Delta (ppm) | Limit (ppm) |
| 3.80 | 50 | 2593.000005 | 0.003 | 2.5 |
| 3.80 | 40 | 2592.999996 | 0.006 | 2.5 |
| 3.80 | 30 | 2592.999995 | 0.007 | 2.5 |
| ***3.80*** | ***20*** | ***2593.000012*** | ***0*** | ***2.5*** |
| 3.80 | 10 | 2593.000007 | 0.002 | 2.5 |
| 3.80 | 0 | 2593.000008 | 0.002 | 2.5 |
| 3.80 | -10 | 2592.999996 | 0.006 | 2.5 |
| 3.80 | -20 | 2592.999991 | 0.008 | 2.5 |
| 3.80 | -30 | 2592.999998 | 0.005 | 2.5 |

| Reference Frequency: Cellular Mid Channel 2593.000012 MHz @ 20°C<br>Limit: to stay +- 2.5 ppm = 6482.500 Hz | | | | |
|---|---|---|---|---|
| Power Supply (Vdc) | Environment Temperature (°C) | Frequency Deviation Measureed with Time Elapse | | |
| | | (MHz) | Delta (ppm) | Limit (ppm) |
| ***3.80*** | ***20*** | ***2593.000012*** | ***0*** | ***2.5*** |
| 4.30 | 20 | 2593.000002 | *0.004* | 2.5 |
| 3.20 | 20 | 2593.000022 | *-0.004* | 2.5 |




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# 11. RADIATED TEST RESULTS

## 11.1. RADIATED POWER (ERP & EIRP)

**RULE PART(S)**

FCC: §2.1046, §22.913, §24.232, §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.

27.50(h) - (2) Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.(LTE B41 & 7)

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; PSA setting reference to 971168 D01 v02r01

For peak power measurement with a PSA:

a) Set the RBW ≥ OBW; b) Set VBW ≥ 3 × RBW; c) Set span ≥ 2 x RBW; d) Sweep time = auto couple; e) Detector = peak; f) Ensure that the number of measurement points ≥ span/RBW; g) Trace mode = max hold;

For average power measurement with a PSA:

a) Set span to at least 1.5 times the OBW; b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz; c) Set VBW ≥ 3 x RBW; d) Set number of points in sweep ≥ 2 × span / RBW; e) Sweep time = auto-couple; f) Detector = RMS (power averaging); g) Use free run trigger If burst duty cycle ≥ 98; h) Use trigger to capture bursts If burst duty cycle < 98; i) Trace average at least 100 traces in power averaging (*i.e.*, RMS) mode. j) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function.

**TEST RESULTS**




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### 11.1.1. ERP/EIRP Results

| Band | Mode | Channel | f(MHz) | ERP / EIRP | |
|---|---|---|---|---|---|
| | | | | dBm | mW |
| Band 2 | REL99 | 9262 | 1852.4 | 20.70 | 117.00 |
| | | 9400 | 1880 | 20.55 | 114.00 |
| | | 9538 | 1907.6 | 19.83 | 96.00 |
| | HSDPA | 9262 | 1852.4 | 19.73 | 94.00 |
| | | 9400 | 1880 | 19.40 | 87.00 |
| | | 9538 | 1907.6 | 18.94 | 78.00 |

| Band | Mode | Channel | f(MHz) | ERP / EIRP | |
|---|---|---|---|---|---|
| | | | | dBm | mW |
| Band 5 | REL99 | 4132 | 826.4 | 17.83 | 61.00 |
| | | 4183 | 836.6 | 17.42 | 55.00 |
| | | 4233 | 846.6 | 17.91 | 62.00 |
| | HSDPA | 4132 | 826.4 | 16.28 | 42.00 |
| | | 4183 | 836.6 | 17.37 | 55.00 |
| | | 4233 | 846.6 | 16.46 | 44.00 |

| Band | Mode | Channel | f(MHz) | ERP / EIRP | |
|---|---|---|---|---|---|
| | | | | dBm | mW |
| GSM1900 | GPRS | 512 | 1850.2 | 25.61 | 364.00 |
| | | 661 | 1880 | 25.92 | 391.00 |
| | | 810 | 1909.8 | 26.90 | 490.00 |
| | EGPRS | 512 | 1850.2 | 22.67 | 185.00 |
| | | 661 | 1880 | 24.09 | 256.00 |
| | | 810 | 1909.8 | 24.57 | 286.00 |

| Band | Mode | Channel | f(MHz) | ERP / EIRP | |
|---|---|---|---|---|---|
| | | | | dBm | mW |
| GSM850 | GPRS | 128 | 824.2 | 25.44 | 350.00 |
| | | 190 | 836.6 | 25.72 | 373.00 |
| | | 251 | 848.8 | 25.42 | 348.00 |
| | EGPRS | 128 | 824.2 | 21.08 | 128.00 |
| | | 190 | 836.6 | 21.30 | 135.00 |
| | | 251 | 848.8 | 22.18 | 165.00 |




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### 11.1.2. LTE ERP/EIRP Results

| Band | BW (MHz) | Mode | RB/RB Size | f (MHz) | ERP / EIRP | |
|---|---|---|---|---|---|---|
| | | | | | dBm | mW |
| LTE41 | 20 | QPSK | 1/0 | 2565 | 20.63 | 116.00 |
| | | | 1/0 | 2593 | 20.51 | 112.00 |
| | | | 1/0 | 2625 | 20.46 | 111.00 |
| | | 16QAM | 1/0 | 2565 | 19.63 | 92.00 |
| | | | 1/0 | 2593 | 19.81 | 96.00 |
| | | | 1/0 | 2625 | 19.80 | 95.00 |

| Band | BW (MHz) | Mode | RB/RB Size | f (MHz) | ERP / EIRP | |
|---|---|---|---|---|---|---|
| | | | | | dBm | mW |
| LTE41 | 15 | QPSK | 1/0 | 2562.5 | 20.72 | 118.00 |
| | | | 1/0 | 2593 | 20.60 | 115.00 |
| | | | 1/0 | 2627.5 | 20.11 | 103.00 |
| | | 16QAM | 1/0 | 2562.5 | 19.60 | 91.00 |
| | | | 1/0 | 2593 | 19.71 | 94.00 |
| | | | 1/0 | 2627.5 | 19.18 | 83.00 |

| Band | BW (MHz) | Mode | RB/RB Size | f (MHz) | ERP / EIRP | |
|---|---|---|---|---|---|---|
| | | | | | dBm | mW |
| LTE41 | 10 | QPSK | 1/0 | 2560 | 20.47 | 111.00 |
| | | | 1/0 | 2593 | 20.62 | 115.00 |
| | | | 1/0 | 2630 | 20.13 | 103.00 |
| | | 16QAM | 1/0 | 2560 | 19.74 | 94.00 |
| | | | 1/0 | 2593 | 19.43 | 88.00 |
| | | | 1/0 | 2630 | 19.22 | 84.00 |

| Band | BW (MHz) | Mode | RB/RB Size | f (MHz) | ERP / EIRP | |
|---|---|---|---|---|---|---|
| | | | | | dBm | mW |
| LTE41 | 5 | QPSK | 1/0 | 2557.5 | 20.51 | 112.00 |
| | | | 1/0 | 2593 | 20.70 | 117.00 |
| | | | 1/0 | 2632.5 | 20.24 | 106.00 |
| | | 16QAM | 1/0 | 2557.5 | 19.85 | 97.00 |
| | | | 1/0 | 2593 | 19.83 | 96.00 |
| | | | 1/0 | 2632.5 | 19.17 | 83.00 |




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### 11.1.3. ERP/EIRP DATA

Band

LTE41

20MHz

16QAM

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

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/29/14
**Test Engineer:** R. Alegre
**Configuration:** X-pos EUT
**Mode:** LTE 41 20M 16QAM

**Test Equipment:**
**Receiving: Horn T119, and Chamber C SMA Cables**
**Substitution: Horn T59 Substitution, 8ft SMA Cable Warehouse**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 2565.00 | 5.81 | V | 0.9 | 9.5 | 14.46 | 33.0 | -18.5 | |
| 2565.00 | 10.98 | H | 0.9 | 9.5 | 19.63 | 33.0 | -13.4 | |
| Mid Ch | | | | | | | | |
| 2593.00 | 5.74 | V | 0.9 | 9.5 | 14.39 | 33.0 | -18.6 | |
| 2593.00 | 11.16 | H | 0.9 | 9.5 | 19.81 | 33.0 | -13.2 | |
| High Ch | | | | | | | | |
| 2625.00 | 5.92 | V | 0.9 | 9.5 | 14.57 | 33.0 | -18.4 | |
| 2625.00 | 11.15 | H | 0.9 | 9.5 | 19.80 | 33.0 | -13.2 | |

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm




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Band

LTE41

20MHz

QPSK

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

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/29/14
**Test Engineer:** R. Alegre
**Configuration:** X-pos EUT
**Mode:** LTE 41 20M QPSK

**Test Equipment:**
**Receiving: Horn T119, and Chamber C SMA Cables**
**Substitution: Horn T59 Substitution, 8ft SMA Cable Warehouse**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 2565.00 | 6.69 | V | 0.9 | 9.5 | 15.34 | 33.0 | -17.7 | |
| 2565.00 | 11.98 | H | 0.9 | 9.5 | 20.63 | 33.0 | -12.4 | |
| Mid Ch | | | | | | | | |
| 2593.00 | 6.87 | V | 0.9 | 9.5 | 15.52 | 33.0 | -17.5 | |
| 2593.00 | 11.86 | H | 0.9 | 9.5 | 20.51 | 33.0 | -12.5 | |
| High Ch | | | | | | | | |
| 2625.00 | 6.56 | V | 0.9 | 9.5 | 15.21 | 33.0 | -17.8 | |
| 2625.00 | 11.81 | H | 0.9 | 9.5 | 20.46 | 33.0 | -12.5 | |

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm




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Band

LTE41

15MHz

16QAM

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

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/29/14
**Test Engineer:** R. Alegre
**Configuration:** X-pos EUT
**Mode:** LTE 41 15M 16QAM

**Test Equipment:**
**Receiving: Horn T119, and Chamber C SMA Cables**
**Substitution: Horn T59 Substitution, 8ft SMA Cable Warehouse**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 2562.50 | 6.14 | V | 0.9 | 9.5 | 14.79 | 33.0 | -18.2 | |
| 2562.50 | 10.95 | H | 0.9 | 9.5 | 19.60 | 33.0 | -13.4 | |
| Mid Ch | | | | | | | | |
| 2593.00 | 6.30 | V | 0.9 | 9.5 | 14.95 | 33.0 | -18.1 | |
| 2593.00 | 11.06 | H | 0.9 | 9.5 | 19.71 | 33.0 | -13.3 | |
| High Ch | | | | | | | | |
| 2627.50 | 5.97 | V | 0.9 | 9.5 | 14.62 | 33.0 | -18.4 | |
| 2627.50 | 10.53 | H | 0.9 | 9.5 | 19.18 | 33.0 | -13.8 | |

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm




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Band

LTE41

15MHz

QPSK

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

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/29/14
**Test Engineer:** R. Alegre
**Configuration:** X-pos EUT
**Mode:** LTE 41 15M QPSK

**Test Equipment:**
**Receiving: Horn T119, and Chamber C SMA Cables**
**Substitution: Horn T59 Substitution, 8ft SMA Cable Warehouse**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 2562.50 | 6.71 | V | 0.9 | 9.5 | 15.36 | 33.0 | -17.6 | |
| 2562.50 | 12.07 | H | 0.9 | 9.5 | 20.72 | 33.0 | -12.3 | |
| Mid Ch | | | | | | | | |
| 2593.00 | 6.96 | V | 0.9 | 9.5 | 15.61 | 33.0 | -17.4 | |
| 2593.00 | 11.95 | H | 0.9 | 9.5 | 20.60 | 33.0 | -12.4 | |
| High Ch | | | | | | | | |
| 2627.50 | 6.49 | V | 0.9 | 9.5 | 15.14 | 33.0 | -17.9 | |
| 2627.50 | 11.46 | H | 0.9 | 9.5 | 20.11 | 33.0 | -12.9 | |

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm




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Band

LTE41

10MHz

16QAM

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

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/29/14
**Test Engineer:** R. Alegre
**Configuration:** X-pos EUT
**Mode:** LTE 41 10M 16QAM

**Test Equipment:**
**Receiving: Horn T119, and Chamber C SMA Cables**
**Substitution: Horn T59 Substitution, 8ft SMA Cable Warehouse**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 2560.00 | 5.85 | V | 0.9 | 9.5 | 14.45 | 33.0 | -18.6 | |
| 2560.00 | 11.14 | H | 0.9 | 9.5 | 19.74 | 33.0 | -13.3 | |
| Mid Ch | | | | | | | | |
| 2593.00 | 6.38 | V | 0.9 | 9.5 | 14.98 | 33.0 | -18.0 | |
| 2593.00 | 10.83 | H | 0.9 | 9.5 | 19.43 | 33.0 | -13.6 | |
| High Ch | | | | | | | | |
| 2630.00 | 5.89 | V | 0.9 | 9.5 | 14.49 | 33.0 | -18.5 | |
| 2630.00 | 10.62 | H | 0.9 | 9.5 | 19.22 | 33.0 | -13.8 | |

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm



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Band

LTE41

10MHz

QPSK

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

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/29/14
**Test Engineer:** R. Alegre
**Configuration:** X-pos EUT
**Mode:** LTE 41 10M QPSK

**Test Equipment:**
**Receiving: Horn T119, and Chamber C SMA Cables**
**Substitution: Horn T59 Substitution, 8ft SMA Cable Warehouse**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 2560.00 | 6.91 | V | 0.9 | 9.5 | 15.51 | 33.0 | -17.5 | |
| 2560.00 | 11.87 | H | 0.9 | 9.5 | 20.47 | 33.0 | -12.5 | |
| Mid Ch | | | | | | | | |
| 2593.00 | 7.05 | V | 0.9 | 9.5 | 15.65 | 33.0 | -17.4 | |
| 2593.00 | 12.02 | H | 0.9 | 9.5 | 20.62 | 33.0 | -12.4 | |
| High Ch | | | | | | | | |
| 2630.00 | 6.46 | V | 0.9 | 9.5 | 15.06 | 33.0 | -17.9 | |
| 2630.00 | 11.53 | H | 0.9 | 9.5 | 20.13 | 33.0 | -12.9 | |

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm




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Band

LTE41

5MHz

16QAM

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

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/29/14
**Test Engineer:** R. Alegre
**Configuration:** X-pos EUT
**Mode:** LTE 41 5M 16QAM

**Test Equipment:**
**Receiving: Horn T119, and Chamber C SMA Cables**
**Substitution: Horn T59 Substitution, 8ft SMA Cable Warehouse**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 2557.50 | 5.78 | V | 0.9 | 9.5 | 14.38 | 33.0 | -18.6 | |
| 2557.50 | 11.25 | H | 0.9 | 9.5 | 19.85 | 33.0 | -13.2 | |
| Mid Ch | | | | | | | | |
| 2593.00 | 6.47 | V | 0.9 | 9.5 | 15.07 | 33.0 | -17.9 | |
| 2593.00 | 11.23 | H | 0.9 | 9.5 | 19.83 | 33.0 | -13.2 | |
| High Ch | | | | | | | | |
| 2632.50 | 5.78 | V | 0.9 | 9.5 | 14.38 | 33.0 | -18.6 | |
| 2632.50 | 10.57 | H | 0.9 | 9.5 | 19.17 | 33.0 | -13.8 | |

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm




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Band

LTE41

5MHz

QPSK

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

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/29/14
**Test Engineer:** R. Alegre
**Configuration:** X-pos EUT
**Mode:** LTE 41 5M QPSK

**Test Equipment:**
**Receiving: Horn T119, and Chamber C SMA Cables**
**Substitution: Horn T59 Substitution, 8ft SMA Cable Warehouse**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 2557.50 | 6.85 | V | 0.9 | 9.5 | 15.45 | 33.0 | -17.6 | |
| 2557.50 | 11.91 | H | 0.9 | 9.5 | 20.51 | 33.0 | -12.5 | |
| Mid Ch | | | | | | | | |
| 2593.00 | 7.27 | V | 0.9 | 9.5 | 15.87 | 33.0 | -17.1 | |
| 2593.00 | 12.10 | H | 0.9 | 9.5 | 20.70 | 33.0 | -12.3 | |
| High Ch | | | | | | | | |
| 2632.50 | 6.56 | V | 0.9 | 9.5 | 15.16 | 33.0 | -17.8 | |
| 2632.50 | 11.64 | H | 0.9 | 9.5 | 20.24 | 33.0 | -12.8 | |

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm




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Band

Band 2

HSDPA

**High Frequency Substitution Measurement**
**UL Verification Services, Inc. Chamber B**

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/27/14
**Test Engineer:** O. Stoelting, D. Sblendorio
**Configuration:** X-pos EUT Only
**Mode:** HDSPA Band 2

**Test Equipment:**
**Receiving: Horn T345, and Chamber B SMA Cables**
**Substitution: Horn T217 Substitution, 8ft SMA Cable Warehouse**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 1852.40 | 9.35 | V | 0.8 | 8.5 | 17.04 | 33.0 | -16.0 | |
| 1852.40 | 12.03 | H | 0.8 | 8.5 | 19.73 | 33.0 | -13.3 | |
| Mid Ch | | | | | | | | |
| 1880.00 | 8.65 | V | 0.8 | 8.4 | 16.28 | 33.0 | -16.7 | |
| 1880.00 | 11.77 | H | 0.8 | 8.4 | 19.40 | 33.0 | -13.6 | |
| High Ch | | | | | | | | |
| 1907.60 | 9.50 | V | 0.8 | 8.3 | 16.99 | 33.0 | -16.0 | |
| 1907.60 | 11.45 | H | 0.8 | 8.3 | 18.94 | 33.0 | -14.1 | |

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm




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Band

Band 2

REL99

**High Frequency Substitution Measurement**
**UL Verification Services, Inc. Chamber B**

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/27/14
**Test Engineer:** O. Stoelting, D. Sblendorio
**Configuration:** X-pos EUT Only
**Mode:** REL99 B2

**Test Equipment:**
**Receiving: Horn T345, and Chamber B SMA Cables**
**Substitution: Horn T217 Substitution, 8ft SMA Cable Warehouse**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 1852.40 | 9.55 | V | 0.8 | 8.5 | 17.24 | 33.0 | -15.8 | |
| 1852.40 | 13.00 | H | 0.8 | 8.5 | 20.70 | 33.0 | -12.3 | |
| Mid Ch | | | | | | | | |
| 1880.00 | 5.90 | V | 0.8 | 8.4 | 13.53 | 33.0 | -19.5 | |
| 1880.00 | 12.92 | H | 0.8 | 8.4 | 20.55 | 33.0 | -12.5 | |
| High Ch | | | | | | | | |
| 1907.60 | 10.10 | V | 0.8 | 8.3 | 17.59 | 33.0 | -15.4 | |
| 1907.60 | 12.34 | H | 0.8 | 8.3 | 19.83 | 33.0 | -13.2 | |

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm




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Band

Band 5

HSDPA

**High Frequency Substitution Measurement**
**UL Verification Services, Inc. Chamber B**

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/27/14
**Test Engineer:** O. Stoelting, D. Sblendorio
**Configuration:** X-pos EUT Only
**Mode:** HSDPA Band 5 HSDPA

**Test Equipment:**
**Receiving: Sunol T243, and Chamber B N-type Cable**
**Substitution: Dipole T273, 8ft SMA Cable 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 | 10.14 | V | 0.9 | 0.0 | 9.25 | 38.5 | -29.3 | |
| 826.40 | 17.18 | H | 0.9 | 0.0 | 16.28 | 38.5 | -22.2 | |
| Mid Ch | | | | | | | | |
| 836.60 | 8.79 | V | 0.9 | 0.0 | 7.89 | 38.5 | -30.6 | |
| 836.60 | 18.27 | H | 0.9 | 0.0 | 17.37 | 38.5 | -21.1 | |
| High Ch | | | | | | | | |
| 846.60 | 8.27 | V | 0.9 | 0.0 | 7.37 | 38.5 | -31.1 | |
| 846.60 | 17.36 | H | 0.9 | 0.0 | 16.46 | 38.5 | -22.0 | |

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




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Band

Band 5

REL99

**High Frequency Substitution Measurement**
**UL Verification Services, Inc. Chamber B**

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/27/14
**Test Engineer:** O. Stoelting, D. Sblendorio
**Configuration:** X-pos EUT Only
**Mode:** WCDMA_Rel99_850

**Test Equipment:**
**Receiving: Sunol T243, and Chamber B N-type Cable**
**Substitution: Dipole T273, 8ft SMA Cable 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 | 10.01 | V | 0.9 | 0.0 | 9.12 | 38.5 | -29.3 | |
| 826.40 | 18.73 | H | 0.9 | 0.0 | 17.83 | 38.5 | -20.6 | |
| Mid Ch | | | | | | | | |
| 836.60 | 8.78 | V | 0.9 | 0.0 | 7.89 | 38.5 | -30.6 | |
| 836.60 | 18.32 | H | 0.9 | 0.0 | 17.42 | 38.5 | -21.0 | |
| High Ch | | | | | | | | |
| 846.60 | 8.06 | V | 0.9 | 0.0 | 7.16 | 38.5 | -31.3 | |
| 846.60 | 18.81 | H | 0.9 | 0.0 | 17.91 | 38.5 | -20.5 | |

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




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Band

GSM 1900

EGPRS

**High Frequency Substitution Measurement**
**UL Verification Services, Inc. Chamber B**

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/27/14
**Test Engineer:** O. Stoelting, D. Sblendorio
**Configuration:** X-pos EUT Only
**Mode:** EGPRS 1880

**Test Equipment:**
**Receiving: Horn T345, and Chamber B SMA Cables**
**Substitution: Horn T217 Substitution, 8ft SMA Cable Warehouse**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 1850.20 | 14.47 | V | 0.8 | 8.5 | 22.16 | 33.0 | -10.8 | |
| 1850.20 | 14.98 | H | 0.8 | 8.5 | 22.67 | 33.0 | -10.3 | |
| Mid Ch | | | | | | | | |
| 1880.00 | 15.51 | V | 0.8 | 8.4 | 23.14 | 33.0 | -9.9 | |
| 1880.00 | 16.47 | H | 0.8 | 8.4 | 24.09 | 33.0 | -8.9 | |
| High Ch | | | | | | | | |
| 1909.80 | 15.87 | V | 0.8 | 8.3 | 23.36 | 33.0 | -9.6 | |
| 1909.80 | 17.08 | H | 0.8 | 8.3 | 24.57 | 33.0 | -8.4 | |

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm




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Band

GSM 1900

GPRS

**High Frequency Substitution Measurement**
**UL Verification Services, Inc. Chamber B**

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/27/14
**Test Engineer:** O. Stoelting, D. Sblendorio
**Configuration:** X-pos EUT Only
**Mode:** GPRS 1880

**Test Equipment:**
**Receiving: Horn T345, and Chamber B SMA Cables**
**Substitution: Horn T217 Substitution, 8ft SMA Cable Warehouse**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 1850.20 | 16.37 | V | 0.8 | 8.5 | 24.07 | 33.0 | -8.9 | |
| 1850.20 | 17.92 | H | 0.8 | 8.5 | 25.61 | 33.0 | -7.4 | |
| Mid Ch | | | | | | | | |
| 1880.00 | 17.37 | V | 0.8 | 8.4 | 24.99 | 33.0 | -8.0 | |
| 1880.00 | 18.29 | H | 0.8 | 8.4 | 25.92 | 33.0 | -7.1 | |
| High Ch | | | | | | | | |
| 1909.80 | 17.59 | V | 0.8 | 8.3 | 25.08 | 33.0 | -7.9 | |
| 1909.80 | 19.41 | H | 0.8 | 8.3 | 26.90 | 33.0 | -6.1 | |

Rev. 3.17.11
Note: For Band 4 EIRP limit is 30dBm




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Band

GSM 850

EGPRS

**High Frequency Substitution Measurement**
**UL Verification Services, Inc. Chamber B**

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/27/14
**Test Engineer:** O. Stoelting, D. Sblendorio
**Configuration:** X-pos EUT Only
**Mode:** EGPRS850

**Test Equipment:**
**Receiving: Sunol T243, and Chamber B N-type Cable**
**Substitution: Dipole T273, 8ft SMA Cable 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 | | | | | | | | |
| 824.20 | 11.56 | V | 0.8 | 0.0 | 10.77 | 38.5 | -27.7 | |
| 824.20 | 21.88 | H | 0.8 | 0.0 | 21.08 | 38.5 | -17.4 | |
| Mid Ch | | | | | | | | |
| 836.60 | 11.05 | V | 0.8 | 0.0 | 10.25 | 38.5 | -28.2 | |
| 836.60 | 22.09 | H | 0.8 | 0.0 | 21.30 | 38.5 | -17.2 | |
| High Ch | | | | | | | | |
| 848.80 | 12.07 | V | 0.8 | 0.0 | 11.27 | 38.5 | -27.2 | |
| 848.80 | 22.98 | H | 0.8 | 0.0 | 22.18 | 38.5 | -16.3 | |

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




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Band

GSM 850

GPRS

**High Frequency Substitution Measurement**
**UL Verification Services, Inc. Chamber B**

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/27/14
**Test Engineer:** O. Stoelting, D. Sblendorio
**Configuration:** X-pos EUT Only
**Mode:** GPRS850

**Test Equipment:**
**Receiving: Sunol T243, and Chamber B N-type Cable**
**Substitution: Dipole T273, 8ft SMA Cable 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 | | | | | | | | |
| 824.20 | 19.70 | V | 0.9 | 0.0 | 18.80 | 38.5 | -19.6 | |
| 824.20 | 26.34 | H | 0.9 | 0.0 | 25.44 | 38.5 | -13.0 | |
| Mid Ch | | | | | | | | |
| 836.60 | 18.65 | V | 0.9 | 0.0 | 17.76 | 38.5 | -20.7 | |
| 836.60 | 26.62 | H | 0.9 | 0.0 | 25.72 | 38.5 | -12.7 | |
| High Ch | | | | | | | | |
| 848.80 | 17.74 | V | 0.9 | 0.0 | 16.84 | 38.5 | -21.6 | |
| 848.80 | 26.32 | H | 0.9 | 0.0 | 25.42 | 38.5 | -13.0 | |

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




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## 11.2. FIELD STRENGTH OF SPURIOUS RADIATION

### RULE PART(S)

FCC: §2.1053, §22.917, §24.238, §27.53

**LIMIT**

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.

Part 27: (m)(4) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees..

### 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**




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## 11.2.1. SPURIOUS RADIATION DATA

**UL Verification Services**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/29/14
**Test Engineer:** O. Stoelting, L. Lara
**Configuration:** X-pos EUT/AC Charger/Headphones
**Mode:** LTE band 41, 20MHz BW 16QAM HARM

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| 5m Chamber A | T145 8449B | Filter 1 | Part 27 |

Band: LTE41, 20MHz, 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, (2565 MHz) | | | | | | | | | |
| 5.130 | -31.9 | V | 3.0 | 28.8 | 1.0 | -59.6 | -25.0 | -34.6 | |
| 7.695 | -28.9 | V | 3.0 | 26.1 | 1.0 | -54.0 | -25.0 | -29.0 | |
| 10.260 | -33.6 | V | 3.0 | 23.0 | 1.0 | -55.6 | -25.0 | -30.6 | |
| 5.130 | -38.8 | H | 3.0 | 28.8 | 1.0 | -66.5 | -25.0 | -41.5 | |
| 7.695 | -25.6 | H | 3.0 | 26.1 | 1.0 | -50.7 | -25.0 | -25.7 | |
| 10.260 | -34.2 | H | 3.0 | 23.0 | 1.0 | -56.3 | -25.0 | -31.3 | |
| Mid Ch, (2593 MHz) | | | | | | | | | |
| 5.186 | -36.0 | V | 3.0 | 28.7 | 1.0 | -63.7 | -25.0 | -38.7 | |
| 7.779 | -26.7 | V | 3.0 | 26.0 | 1.0 | -51.7 | -25.0 | -26.7 | |
| 10.372 | -34.7 | V | 3.0 | 23.0 | 1.0 | -56.7 | -25.0 | -31.7 | |
| 5.186 | -27.0 | H | 3.0 | 28.7 | 1.0 | -54.7 | -25.0 | -29.7 | |
| 7.779 | -25.9 | H | 3.0 | 26.0 | 1.0 | -50.9 | -25.0 | -25.9 | |
| 10.372 | -36.3 | H | 3.0 | 23.0 | 1.0 | -58.3 | -25.0 | -33.3 | |
| High Ch, (2625 MHz) | | | | | | | | | |
| 5.250 | -19.1 | V | 3.0 | 28.7 | 1.0 | -46.7 | -25.0 | -21.7 | |
| 7.875 | -24.4 | V | 3.0 | 25.9 | 1.0 | -49.3 | -25.0 | -24.3 | |
| 10.500 | -30.0 | V | 3.0 | 23.0 | 1.0 | -52.0 | -25.0 | -27.0 | |
| 5.250 | -10.3 | H | 3.0 | 28.7 | 1.0 | -38.0 | -25.0 | -13.0 | |
| 7.875 | -21.3 | H | 3.0 | 25.9 | 1.0 | -46.2 | -25.0 | -21.2 | |
| 10.500 | -34.0 | H | 3.0 | 23.0 | 1.0 | -56.0 | -25.0 | -31.0 | |

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




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**UL Verification Services**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/29/14
**Test Engineer:** O. Stoelting, L. Lara
**Configuration:** X-pos EUT/AC Charger/Headphones
**Mode:** LTE band 41, 20MHz BW QPSK HARM

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| 5m Chamber A | T145 8449B | Filter 1 | Part 27 |

Band
LTE41
20MHz
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, (2565 MHz) | | | | | | | | | |
| 5.130 | -30.5 | V | 3.0 | 28.8 | 1.0 | -58.2 | -25.0 | -33.2 | |
| 7.695 | -29.7 | V | 3.0 | 26.1 | 1.0 | -54.8 | -25.0 | -29.8 | |
| 10.260 | -32.7 | V | 3.0 | 23.0 | 1.0 | -54.7 | -25.0 | -29.7 | |
| 5.130 | -33.5 | H | 3.0 | 28.8 | 1.0 | -61.3 | -25.0 | -36.3 | |
| 7.695 | -21.8 | H | 3.0 | 26.1 | 1.0 | -46.9 | -25.0 | -21.9 | |
| 10.260 | -33.7 | H | 3.0 | 23.0 | 1.0 | -55.7 | -25.0 | -30.7 | |
| | | | | | | | | | |
| Mid Ch, (2593 MHz) | | | | | | | | | |
| 5.186 | -35.5 | V | 3.0 | 28.7 | 1.0 | -63.2 | -25.0 | -38.2 | |
| 7.779 | -26.1 | V | 3.0 | 26.0 | 1.0 | -51.1 | -25.0 | -26.1 | |
| 10.372 | -34.0 | V | 3.0 | 23.0 | 1.0 | -56.0 | -25.0 | -31.0 | |
| 5.186 | -24.8 | H | 3.0 | 28.7 | 1.0 | -52.5 | -25.0 | -27.5 | |
| 7.779 | -24.2 | H | 3.0 | 26.0 | 1.0 | -49.2 | -25.0 | -24.2 | |
| 10.372 | -36.0 | H | 3.0 | 23.0 | 1.0 | -58.0 | -25.0 | -33.0 | |
| | | | | | | | | | |
| High Ch, (2625 MHz) | | | | | | | | | |
| 5.250 | -18.2 | V | 3.0 | 28.7 | 1.0 | -45.8 | -25.0 | -20.8 | |
| 7.875 | -22.5 | V | 3.0 | 25.9 | 1.0 | -47.3 | -25.0 | -22.3 | |
| 10.500 | -29.2 | V | 3.0 | 23.0 | 1.0 | -51.2 | -25.0 | -26.2 | |
| 5.250 | -9.5 | H | 3.0 | 28.7 | 1.0 | -37.2 | -25.0 | -12.2 | |
| 7.875 | -21.8 | H | 3.0 | 25.9 | 1.0 | -46.7 | -25.0 | -21.7 | |
| 10.500 | -33.9 | H | 3.0 | 23.0 | 1.0 | -55.9 | -25.0 | -30.9 | |
| | | | | | | | | | |

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




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**UL Verification Services**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/29/14
**Test Engineer:** O. Stoelting, L. Lara
**Configuration:** X-pos EUT/AC Charger/Headset
**Mode:** TX, LTE band 41, 15MHz, 16QAM

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

Band
LTE41
15MHz
16QAM

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, (2562.5 MHz) | | | | | | | | | |
| 5.125 | -19.4 | V | 3.0 | 28.8 | 1.0 | -47.2 | -25.0 | -22.2 | |
| 7.688 | -14.9 | V | 3.0 | 26.1 | 1.0 | -40.0 | -25.0 | -15.0 | |
| 10.250 | -18.2 | V | 3.0 | 23.0 | 1.0 | -40.3 | -25.0 | -15.3 | |
| 5.125 | -27.5 | H | 3.0 | 28.8 | 1.0 | -55.3 | -25.0 | -30.3 | |
| 7.688 | -11.7 | H | 3.0 | 26.1 | 1.0 | -36.8 | -25.0 | -11.8 | |
| 10.250 | -20.5 | H | 3.0 | 23.0 | 1.0 | -42.5 | -25.0 | -17.5 | |
| | | | | | | | | | |
| Mid Ch, (2593 MHz) | | | | | | | | | |
| 5.186 | -21.9 | V | 3.0 | 28.7 | 1.0 | -49.6 | -25.0 | -24.6 | |
| 7.779 | -12.6 | V | 3.0 | 26.0 | 1.0 | -37.5 | -25.0 | -12.5 | |
| 10.372 | -19.9 | V | 3.0 | 23.0 | 1.0 | -41.9 | -25.0 | -16.9 | |
| 5.186 | -14.8 | H | 3.0 | 28.7 | 1.0 | -42.5 | -25.0 | -17.5 | |
| 7.779 | -9.0 | H | 3.0 | 26.0 | 1.0 | -34.0 | -25.0 | -9.0 | |
| 10.372 | -19.6 | H | 3.0 | 23.0 | 1.0 | -41.6 | -25.0 | -16.6 | |
| | | | | | | | | | |
| High Ch, (2627.5 MHz) | | | | | | | | | |
| 5.255 | -8.6 | V | 3.0 | 28.6 | 1.0 | -36.2 | -25.0 | -11.2 | |
| 7.883 | -13.3 | V | 3.0 | 25.9 | 1.0 | -38.2 | -25.0 | -13.2 | |
| 10.510 | -13.5 | V | 3.0 | 22.9 | 1.0 | -35.4 | -25.0 | -10.4 | |
| 5.255 | -19.9 | H | 3.0 | 28.6 | 1.0 | -47.6 | -25.0 | -22.6 | |
| 7.883 | -13.5 | H | 3.0 | 25.9 | 1.0 | -38.3 | -25.0 | -13.3 | |
| 10.510 | -18.4 | H | 3.0 | 22.9 | 1.0 | -40.3 | -25.0 | -15.3 | |
| | | | | | | | | | |

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




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**UL Verification Services**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/29/14
**Test Engineer:** O. Stoelting, L. Lara
**Configuration:** X-pos EUT/AC Charger/Headset
**Mode:** TX, LTE band 41, 15MHz, QPSK

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

Band
LTE41
15MHz
QPSK

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, (2562.5 MHz) | | | | | | | | | |
| 5.125 | -17.5 | V | 3.0 | 28.8 | 1.0 | -45.3 | -25.0 | -20.3 | |
| 7.688 | -14.2 | V | 3.0 | 26.1 | 1.0 | -39.3 | -25.0 | -14.3 | |
| 10.250 | -18.1 | V | 3.0 | 23.0 | 1.0 | -40.2 | -25.0 | -15.2 | |
| 5.125 | -26.3 | H | 3.0 | 28.8 | 1.0 | -54.1 | -25.0 | -29.1 | |
| 7.688 | -9.8 | H | 3.0 | 26.1 | 1.0 | -35.0 | -25.0 | -10.0 | |
| 10.250 | -20.6 | H | 3.0 | 23.0 | 1.0 | -42.6 | -25.0 | -17.6 | |
| | | | | | | | | | |
| Mid Ch, (2593 MHz) | | | | | | | | | |
| 5.186 | -20.3 | V | 3.0 | 28.7 | 1.0 | -48.0 | -25.0 | -23.0 | |
| 7.779 | -10.8 | V | 3.0 | 26.0 | 1.0 | -35.8 | -25.0 | -10.8 | |
| 10.372 | -18.7 | V | 3.0 | 23.0 | 1.0 | -40.6 | -25.0 | -15.6 | |
| 5.186 | -16.6 | H | 3.0 | 28.7 | 1.0 | -44.3 | -25.0 | -19.3 | |
| 7.779 | -7.8 | H | 3.0 | 26.0 | 1.0 | -32.8 | -25.0 | -7.8 | |
| 10.372 | -19.4 | H | 3.0 | 23.0 | 1.0 | -41.4 | -25.0 | -16.4 | |
| | | | | | | | | | |
| High Ch, (2627.5 MHz) | | | | | | | | | |
| 5.255 | -8.0 | V | 3.0 | 28.6 | 1.0 | -35.6 | -25.0 | -10.6 | |
| 7.883 | -12.6 | V | 3.0 | 25.9 | 1.0 | -37.4 | -25.0 | -12.4 | |
| 10.510 | -13.0 | V | 3.0 | 22.9 | 1.0 | -34.9 | -25.0 | -9.9 | |
| 5.255 | -19.3 | H | 3.0 | 28.6 | 1.0 | -47.0 | -25.0 | -22.0 | |
| 7.883 | -12.3 | H | 3.0 | 25.9 | 1.0 | -37.1 | -25.0 | -12.1 | |
| 10.510 | -18.3 | H | 3.0 | 22.9 | 1.0 | -40.3 | -25.0 | -15.3 | |
| | | | | | | | | | |

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




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**UL Verification Services**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/29/14
**Test Engineer:** O. Stoelting, L. Lara
**Configuration:** X-pos EUT/AC Charger/Headset
**Mode:** TX, LTE band 41, 10MHz, 16QAM

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

Band
LTE41
10MHz
16QAM

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, (2560 MHz) | | | | | | | | | |
| 5.120 | -25.2 | V | 3.0 | 28.8 | 1.0 | -52.9 | -25.0 | -27.9 | |
| 7.680 | -20.9 | V | 3.0 | 26.1 | 1.0 | -46.0 | -25.0 | -21.0 | |
| 10.240 | -10.9 | V | 3.0 | 23.0 | 1.0 | -32.9 | -25.0 | -7.9 | |
| 5.120 | -25.7 | H | 3.0 | 28.8 | 1.0 | -53.4 | -25.0 | -28.4 | |
| 7.680 | -15.6 | H | 3.0 | 26.1 | 1.0 | -40.7 | -25.0 | -15.7 | |
| 10.240 | -18.0 | H | 3.0 | 23.0 | 1.0 | -40.1 | -25.0 | -15.1 | |
| | | | | | | | | | |
| Mid Ch, (2593 MHz) | | | | | | | | | |
| 5.186 | -26.3 | V | 3.0 | 28.7 | 1.0 | -54.1 | -25.0 | -29.1 | |
| 7.779 | -16.9 | V | 3.0 | 26.0 | 1.0 | -41.9 | -25.0 | -16.9 | |
| 10.372 | -19.5 | V | 3.0 | 23.0 | 1.0 | -41.4 | -25.0 | -16.4 | |
| 5.186 | -19.2 | H | 3.0 | 28.7 | 1.0 | -46.9 | -25.0 | -21.9 | |
| 7.779 | -11.5 | H | 3.0 | 26.0 | 1.0 | -36.5 | -25.0 | -11.5 | |
| 10.372 | -20.5 | H | 3.0 | 23.0 | 1.0 | -42.5 | -25.0 | -17.5 | |
| | | | | | | | | | |
| High Ch, (2630 MHz) | | | | | | | | | |
| 5.260 | -3.3 | V | 3.0 | 28.6 | 1.0 | -30.9 | -25.0 | -5.9 | |
| 7.890 | -12.3 | V | 3.0 | 25.8 | 1.0 | -37.1 | -25.0 | -12.1 | |
| 10.520 | -10.0 | V | 3.0 | 22.9 | 1.0 | -32.0 | -25.0 | -7.0 | |
| 5.260 | -20.7 | H | 3.0 | 28.6 | 1.0 | -48.4 | -25.0 | -23.4 | |
| 7.890 | -9.1 | H | 3.0 | 25.8 | 1.0 | -33.9 | -25.0 | -8.9 | |
| 10.520 | -20.7 | H | 3.0 | 22.9 | 1.0 | -42.6 | -25.0 | -17.6 | |
| | | | | | | | | | |

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




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**UL Verification Services**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/29/14
**Test Engineer:** O. Stoelting, L. Lara
**Configuration:** X-pos EUT/AC Charger/Headset
**Mode:** TX, LTE band 41, 10MHz, QPSK

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

Band
LTE41
10MHz
QPSK

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, (2560 MHz) | | | | | | | | | |
| 5.120 | -26.7 | V | 3.0 | 28.8 | 1.0 | -54.5 | -25.0 | -29.5 | |
| 7.680 | -18.5 | V | 3.0 | 26.1 | 1.0 | -43.7 | -25.0 | -18.7 | |
| 10.240 | -8.1 | V | 3.0 | 23.0 | 1.0 | -30.1 | -25.0 | -5.1 | |
| 5.120 | -26.3 | H | 3.0 | 28.8 | 1.0 | -54.1 | -25.0 | -29.1 | |
| 7.680 | -15.1 | H | 3.0 | 26.1 | 1.0 | -40.3 | -25.0 | -15.3 | |
| 10.240 | -17.6 | H | 3.0 | 23.0 | 1.0 | -39.7 | -25.0 | -14.7 | |
| | | | | | | | | | |
| Mid Ch, (2593 MHz) | | | | | | | | | |
| 5.186 | -21.1 | V | 3.0 | 28.7 | 1.0 | -48.8 | -25.0 | -23.8 | |
| 7.779 | -10.7 | V | 3.0 | 26.0 | 1.0 | -35.7 | -25.0 | -10.7 | |
| 10.372 | -20.4 | V | 3.0 | 23.0 | 1.0 | -42.4 | -25.0 | -17.4 | |
| 5.186 | -15.1 | H | 3.0 | 28.7 | 1.0 | -42.8 | -25.0 | -17.8 | |
| 7.779 | -8.0 | H | 3.0 | 26.0 | 1.0 | -32.9 | -25.0 | -7.9 | |
| 10.372 | -20.4 | H | 3.0 | 23.0 | 1.0 | -42.4 | -25.0 | -17.4 | |
| | | | | | | | | | |
| High Ch, (2630 MHz) | | | | | | | | | |
| 5.260 | -2.7 | V | 3.0 | 28.6 | 1.0 | -30.3 | -25.0 | -5.3 | |
| 7.890 | -12.2 | V | 3.0 | 25.8 | 1.0 | -37.1 | -25.0 | -12.1 | |
| 10.520 | -9.7 | V | 3.0 | 22.9 | 1.0 | -31.7 | -25.0 | -6.7 | |
| 5.260 | -20.0 | H | 3.0 | 28.6 | 1.0 | -47.6 | -25.0 | -22.6 | |
| 7.890 | -8.9 | H | 3.0 | 25.8 | 1.0 | -33.7 | -25.0 | -8.7 | |
| 10.520 | -20.8 | H | 3.0 | 22.9 | 1.0 | -42.7 | -25.0 | -17.7 | |
| | | | | | | | | | |

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




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**UL Verification Services**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/29/14
**Test Engineer:** O. Stoelting, L. Lara
**Configuration:** X-pos EUT/AC Charger/Headset
**Mode:** TX, LTE band 41, 5MHz, 16QAM

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

Band
LTE41
5MHz
16QAM

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, (2557.5 MHz) | | | | | | | | | |
| 5.115 | -25.1 | V | 3.0 | 28.8 | 1.0 | -52.8 | -25.0 | -27.8 | |
| 7.673 | -18.7 | V | 3.0 | 26.1 | 1.0 | -43.8 | -25.0 | -18.8 | |
| 10.230 | -9.1 | V | 3.0 | 23.0 | 1.0 | -31.1 | -25.0 | -6.1 | |
| 5.115 | -27.6 | H | 3.0 | 28.8 | 1.0 | -55.3 | -25.0 | -30.3 | |
| 7.673 | -7.0 | H | 3.0 | 26.1 | 1.0 | -32.1 | -25.0 | -7.1 | |
| 10.230 | -13.6 | H | 3.0 | 23.0 | 1.0 | -35.6 | -25.0 | -10.6 | |
| | | | | | | | | | |
| Mid Ch, (2593 MHz) | | | | | | | | | |
| 5.186 | -16.3 | V | 3.0 | 28.7 | 1.0 | -44.0 | -25.0 | -19.0 | |
| 7.779 | -11.9 | V | 3.0 | 26.0 | 1.0 | -36.9 | -25.0 | -11.9 | |
| 10.372 | -17.7 | V | 3.0 | 23.0 | 1.0 | -39.7 | -25.0 | -14.7 | |
| 5.186 | -10.5 | H | 3.0 | 28.7 | 1.0 | -38.2 | -25.0 | -13.2 | |
| 7.779 | -7.2 | H | 3.0 | 26.0 | 1.0 | -32.2 | -25.0 | -7.2 | |
| 10.372 | -11.4 | H | 3.0 | 23.0 | 1.0 | -33.3 | -25.0 | -8.3 | |
| | | | | | | | | | |
| High Ch, (2632.5 MHz) | | | | | | | | | |
| 5.265 | -8.5 | V | 3.0 | 28.6 | 1.0 | -36.1 | -25.0 | -11.1 | |
| 7.898 | -16.0 | V | 3.0 | 25.8 | 1.0 | -40.8 | -25.0 | -15.8 | |
| 10.530 | -14.7 | V | 3.0 | 22.9 | 1.0 | -36.6 | -25.0 | -11.6 | |
| 5.265 | -21.2 | H | 3.0 | 28.6 | 1.0 | -48.9 | -25.0 | -23.9 | |
| 7.898 | -10.2 | H | 3.0 | 25.8 | 1.0 | -35.0 | -25.0 | -10.0 | |
| 10.530 | -20.2 | H | 3.0 | 22.9 | 1.0 | -42.2 | -25.0 | -17.2 | |

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




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**UL Verification Services**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/29/14
**Test Engineer:** O. Stoelting, L. Lara
**Configuration:** X-pos EUT/AC Charger/Headset
**Mode:** TX, LTE band 41, 5MHz, QPSK

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

Band
LTE41
5MHz
QPSK

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, (2557.5 MHz) | | | | | | | | | |
| 5.115 | -25.1 | V | 3.0 | 28.8 | 1.0 | -52.9 | -25.0 | -27.9 | |
| 7.673 | -18.7 | V | 3.0 | 26.1 | 1.0 | -43.9 | -25.0 | -18.9 | |
| 10.230 | -8.9 | V | 3.0 | 23.0 | 1.0 | -31.0 | -25.0 | -6.0 | |
| 5.115 | -27.6 | H | 3.0 | 28.8 | 1.0 | -55.3 | -25.0 | -30.3 | |
| 7.673 | -7.2 | H | 3.0 | 26.1 | 1.0 | -32.3 | -25.0 | -7.3 | |
| 10.230 | -13.8 | H | 3.0 | 23.0 | 1.0 | -35.8 | -25.0 | -10.8 | |
| | | | | | | | | | |
| Mid Ch, (2593 MHz) | | | | | | | | | |
| 5.186 | -17.8 | V | 3.0 | 28.7 | 1.0 | -45.5 | -25.0 | -20.5 | |
| 7.779 | -7.5 | V | 3.0 | 26.0 | 1.0 | -32.4 | -25.0 | -7.4 | |
| 10.372 | -11.8 | V | 3.0 | 23.0 | 1.0 | -33.8 | -25.0 | -8.8 | |
| 5.186 | -14.1 | H | 3.0 | 28.7 | 1.0 | -41.8 | -25.0 | -16.8 | |
| 7.779 | -6.3 | H | 3.0 | 26.0 | 1.0 | -31.3 | -25.0 | -6.3 | |
| 10.372 | -10.9 | H | 3.0 | 23.0 | 1.0 | -32.9 | -25.0 | -7.9 | |
| | | | | | | | | | |
| High Ch, (2632.5 MHz) | | | | | | | | | |
| 5.265 | -7.2 | V | 3.0 | 28.6 | 1.0 | -34.8 | -25.0 | -9.8 | |
| 7.898 | -14.8 | V | 3.0 | 25.8 | 1.0 | -39.6 | -25.0 | -14.6 | |
| 10.530 | -13.4 | V | 3.0 | 22.9 | 1.0 | -35.4 | -25.0 | -10.4 | |
| 5.265 | -20.2 | H | 3.0 | 28.6 | 1.0 | -47.8 | -25.0 | -22.8 | |
| 7.898 | -9.0 | H | 3.0 | 25.8 | 1.0 | -33.8 | -25.0 | -8.8 | |
| 10.530 | -20.1 | H | 3.0 | 22.9 | 1.0 | -42.0 | -25.0 | -17.0 | |
| | | | | | | | | | |

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




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**UL Verification Services**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/28/14
**Test Engineer:** Jude Semana
**Configuration:** EUT w/ AC Charger + HS
**Mode:** HSDPA_B2

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| 3m Chamber | T492 | 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 | -12.0 | V | 3.0 | 35.4 | 1.0 | -46.4 | -13.0 | -33.4 | |
| 5.557 | -10.9 | V | 3.0 | 34.7 | 1.0 | -44.7 | -13.0 | -31.7 | |
| 7.410 | -8.2 | V | 3.0 | 34.9 | 1.0 | -42.1 | -13.0 | -29.1 | |
| 3.705 | -14.6 | H | 3.0 | 35.4 | 1.0 | -49.0 | -13.0 | -36.0 | |
| 5.557 | -9.8 | H | 3.0 | 34.7 | 1.0 | -43.6 | -13.0 | -30.6 | |
| 7.410 | -8.3 | H | 3.0 | 34.9 | 1.0 | -42.2 | -13.0 | -29.2 | |
| Mid Ch, 1880MHz | | | | | | | | | |
| 3.760 | -12.3 | V | 3.0 | 35.3 | 1.0 | -46.6 | -13.0 | -33.6 | |
| 5.640 | -11.2 | V | 3.0 | 34.7 | 1.0 | -44.9 | -13.0 | -31.9 | |
| 7.520 | -8.6 | V | 3.0 | 34.9 | 1.0 | -42.6 | -13.0 | -29.6 | |
| 3.760 | -14.5 | H | 3.0 | 35.3 | 1.0 | -48.8 | -13.0 | -35.8 | |
| 5.640 | -9.7 | H | 3.0 | 34.7 | 1.0 | -43.4 | -13.0 | -30.4 | |
| 7.520 | -6.3 | H | 3.0 | 34.9 | 1.0 | -40.3 | -13.0 | -27.3 | |
| High Ch, 1907.6MHz | | | | | | | | | |
| 3.815 | -11.7 | V | 3.0 | 35.3 | 1.0 | -46.0 | -13.0 | -33.0 | |
| 5.723 | -7.0 | V | 3.0 | 34.7 | 1.0 | -40.8 | -13.0 | -27.8 | |
| 7.630 | -8.6 | V | 3.0 | 34.9 | 1.0 | -42.6 | -13.0 | -29.6 | |
| 3.815 | -14.3 | H | 3.0 | 35.3 | 1.0 | -48.5 | -13.0 | -35.5 | |
| 5.723 | -6.8 | H | 3.0 | 34.7 | 1.0 | -40.5 | -13.0 | -27.5 | |
| 7.630 | -8.6 | H | 3.0 | 34.9 | 1.0 | -42.6 | -13.0 | -29.6 | |

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




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**UL Verification Services, Inc.**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/28/14
**Test Engineer:** Jude Semana
**Configuration:** EUT w/ AC Charger + HS
**Mode:** Rel99_B2

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| 3m Chamber | T34 8449B | Filter 1 | Part 24 |

Band

Band 2

REL99

| 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 | -10.2 | V | 3.0 | 35.4 | 1.0 | -44.6 | -13.0 | -31.6 | |
| 5.557 | -10.5 | V | 3.0 | 34.7 | 1.0 | -44.2 | -13.0 | -31.2 | |
| 7.410 | -7.7 | V | 3.0 | 34.9 | 1.0 | -41.6 | -13.0 | -28.6 | |
| 3.705 | -13.3 | H | 3.0 | 35.4 | 1.0 | -47.7 | -13.0 | -34.7 | |
| 5.557 | -10.7 | H | 3.0 | 34.7 | 1.0 | -44.5 | -13.0 | -31.5 | |
| 7.410 | -6.2 | H | 3.0 | 34.9 | 1.0 | -40.1 | -13.0 | -27.1 | |
| Mid Ch, 1880MHz | | | | | | | | | |
| 3.760 | -11.8 | V | 3.0 | 35.3 | 1.0 | -46.1 | -13.0 | -33.1 | |
| 5.640 | -9.4 | V | 3.0 | 34.7 | 1.0 | -43.1 | -13.0 | -30.1 | |
| 7.520 | -7.7 | V | 3.0 | 34.9 | 1.0 | -41.6 | -13.0 | -28.6 | |
| 3.760 | -14.2 | H | 3.0 | 35.3 | 1.0 | -48.5 | -13.0 | -35.5 | |
| 5.640 | -10.0 | H | 3.0 | 34.7 | 1.0 | -43.8 | -13.0 | -30.8 | |
| 7.520 | -7.9 | H | 3.0 | 34.9 | 1.0 | -41.8 | -13.0 | -28.8 | |
| High Ch, 1907.6MHz | | | | | | | | | |
| 3.815 | -13.0 | V | 3.0 | 35.3 | 1.0 | -47.3 | -13.0 | -34.3 | |
| 5.723 | -9.5 | V | 3.0 | 34.7 | 1.0 | -43.3 | -13.0 | -30.3 | |
| 7.630 | -7.5 | V | 3.0 | 34.9 | 1.0 | -41.5 | -13.0 | -28.5 | |
| 3.815 | -14.0 | H | 3.0 | 35.3 | 1.0 | -48.2 | -13.0 | -35.2 | |
| 5.723 | -8.4 | H | 3.0 | 34.7 | 1.0 | -42.1 | -13.0 | -29.1 | |
| 7.630 | -6.0 | H | 3.0 | 34.9 | 1.0 | -39.9 | -13.0 | -26.9 | |

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




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**UL Verification Services, Inc.**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/28/14
**Test Engineer:** Jude Semana
**Configuration:** EUT w/ AC Charger + HS
**Mode:** HSDPA_B5

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

Band

Band 5

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, 826.4MHz | | | | | | | | | |
| 1.653 | -21.6 | V | 3.0 | 37.4 | 1.0 | -58.0 | -13.0 | -45.0 | |
| 2.479 | -15.5 | V | 3.0 | 36.4 | 1.0 | -50.9 | -13.0 | -37.9 | |
| 3.306 | -17.8 | V | 3.0 | 35.8 | 1.0 | -52.6 | -13.0 | -39.6 | |
| 1.653 | -22.3 | H | 3.0 | 37.4 | 1.0 | -58.7 | -13.0 | -45.7 | |
| 2.479 | -17.5 | H | 3.0 | 36.4 | 1.0 | -52.9 | -13.0 | -39.9 | |
| 3.306 | -17.2 | H | 3.0 | 35.8 | 1.0 | -52.0 | -13.0 | -39.0 | |
| Mid Ch, 836.6MHz | | | | | | | | | |
| 1.673 | -22.7 | V | 3.0 | 37.3 | 1.0 | -59.1 | -13.0 | -46.1 | |
| 2.510 | -16.7 | V | 3.0 | 36.4 | 1.0 | -52.0 | -13.0 | -39.0 | |
| 3.346 | -18.4 | V | 3.0 | 35.8 | 1.0 | -53.2 | -13.0 | -40.2 | |
| 1.673 | -23.5 | H | 3.0 | 37.3 | 1.0 | -59.8 | -13.0 | -46.8 | |
| 2.510 | -19.0 | H | 3.0 | 36.4 | 1.0 | -54.4 | -13.0 | -41.4 | |
| 3.346 | -15.3 | H | 3.0 | 35.8 | 1.0 | -50.1 | -13.0 | -37.1 | |
| High Ch, 846.6MHz | | | | | | | | | |
| 1.693 | -22.7 | V | 3.0 | 37.3 | 1.0 | -59.0 | -13.0 | -46.0 | |
| 2.540 | -15.9 | V | 3.0 | 36.3 | 1.0 | -51.3 | -13.0 | -38.3 | |
| 3.386 | -18.1 | V | 3.0 | 35.7 | 1.0 | -52.8 | -13.0 | -39.8 | |
| 1.693 | -19.6 | H | 3.0 | 37.3 | 1.0 | -55.9 | -13.0 | -42.9 | |
| 2.540 | -13.5 | H | 3.0 | 36.3 | 1.0 | -48.9 | -13.0 | -35.9 | |
| 3.386 | -18.5 | H | 3.0 | 35.7 | 1.0 | -53.2 | -13.0 | -40.2 | |
| | | | | | | | | | |

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




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**UL Verification Services, Inc.**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/28/14
**Test Engineer:** Jude Semana
**Configuration:** EUT w/ AC Charger + HS
**Mode:** REL99_B5

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

Band

Band 5

REL99

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, 826.4MHz | | | | | | | | | |
| 1.653 | -18.0 | V | 3.0 | 37.4 | 1.0 | -54.3 | -13.0 | -41.3 | |
| 2.479 | -18.4 | V | 3.0 | 36.4 | 1.0 | -53.8 | -13.0 | -40.8 | |
| 3.306 | -17.6 | V | 3.0 | 35.8 | 1.0 | -52.4 | -13.0 | -39.4 | |
| 1.653 | -23.4 | H | 3.0 | 37.4 | 1.0 | -59.8 | -13.0 | -46.8 | |
| 2.479 | -22.1 | H | 3.0 | 36.4 | 1.0 | -57.5 | -13.0 | -44.5 | |
| 3.306 | -19.8 | H | 3.0 | 35.8 | 1.0 | -54.6 | -13.0 | -41.6 | |
| Mid Ch, 836.6MHz | | | | | | | | | |
| 1.673 | -25.1 | V | 3.0 | 37.3 | 1.0 | -61.5 | -13.0 | -48.5 | |
| 2.510 | -20.1 | V | 3.0 | 36.4 | 1.0 | -55.5 | -13.0 | -42.5 | |
| 3.346 | -19.1 | V | 3.0 | 35.8 | 1.0 | -53.9 | -13.0 | -40.9 | |
| 1.673 | -26.3 | H | 3.0 | 37.3 | 1.0 | -62.6 | -13.0 | -49.6 | |
| 2.510 | -20.4 | H | 3.0 | 36.4 | 1.0 | -55.8 | -13.0 | -42.8 | |
| 3.346 | -21.9 | H | 3.0 | 35.8 | 1.0 | -56.6 | -13.0 | -43.6 | |
| High Ch, 846.6MHz | | | | | | | | | |
| 1.693 | -20.4 | V | 3.0 | 37.3 | 1.0 | -56.7 | -13.0 | -43.7 | |
| 2.540 | -15.1 | V | 3.0 | 36.3 | 1.0 | -50.5 | -13.0 | -37.5 | |
| 3.386 | -17.2 | V | 3.0 | 35.7 | 1.0 | -51.9 | -13.0 | -38.9 | |
| 1.693 | -23.4 | H | 3.0 | 37.3 | 1.0 | -59.7 | -13.0 | -46.7 | |
| 2.540 | -19.2 | H | 3.0 | 36.3 | 1.0 | -54.5 | -13.0 | -41.5 | |
| 3.386 | -19.0 | H | 3.0 | 35.7 | 1.0 | -53.7 | -13.0 | -40.7 | |

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




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**UL Verification Services, Inc.**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/28/14
**Test Engineer:** Jude Semana
**Configuration:** EUT w/ AC Charger + HS
**Mode:** EGPRS1900

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| 3m Chamber | T34 8449B | Filter 1 | Part 24 |

Band

GSM1900

EGPRS

| 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 | -17.2 | V | 3.0 | 35.4 | 1.0 | -51.6 | -13.0 | -38.6 | |
| 5.551 | -12.4 | V | 3.0 | 34.7 | 1.0 | -46.1 | -13.0 | -33.1 | |
| 7.401 | -6.0 | V | 3.0 | 34.9 | 1.0 | -39.9 | -13.0 | -26.9 | |
| 3.700 | -18.5 | H | 3.0 | 35.4 | 1.0 | -52.9 | -13.0 | -39.9 | |
| 5.551 | -13.9 | H | 3.0 | 34.7 | 1.0 | -47.6 | -13.0 | -34.6 | |
| 7.401 | -10.2 | H | 3.0 | 34.9 | 1.0 | -44.2 | -13.0 | -31.2 | |
| Mid Ch, 1880.0MHz | | | | | | | | | |
| 3.760 | -17.5 | V | 3.0 | 35.3 | 1.0 | -51.8 | -13.0 | -38.8 | |
| 5.640 | -13.9 | V | 3.0 | 34.7 | 1.0 | -47.6 | -13.0 | -34.6 | |
| 7.520 | -11.8 | V | 3.0 | 34.9 | 1.0 | -45.7 | -13.0 | -32.7 | |
| 3.760 | -17.9 | H | 3.0 | 35.3 | 1.0 | -52.3 | -13.0 | -39.3 | |
| 5.640 | -13.6 | H | 3.0 | 34.7 | 1.0 | -47.3 | -13.0 | -34.3 | |
| 7.520 | -11.0 | H | 3.0 | 34.9 | 1.0 | -44.9 | -13.0 | -31.9 | |
| High Ch, 1909.8MHz | | | | | | | | | |
| 3.820 | -17.1 | V | 3.0 | 35.3 | 1.0 | -51.3 | -13.0 | -38.3 | |
| 5.729 | -12.7 | V | 3.0 | 34.7 | 1.0 | -46.5 | -13.0 | -33.5 | |
| 7.639 | -11.5 | V | 3.0 | 35.0 | 1.0 | -45.4 | -13.0 | -32.4 | |
| 3.820 | -17.2 | H | 3.0 | 35.3 | 1.0 | -51.5 | -13.0 | -38.5 | |
| 5.729 | -12.2 | H | 3.0 | 34.7 | 1.0 | -46.0 | -13.0 | -33.0 | |
| 7.639 | -12.9 | H | 3.0 | 35.0 | 1.0 | -46.8 | -13.0 | -33.8 | |

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




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**UL Verification Services, Inc.**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/28/14
**Test Engineer:** Jude Semana
**Configuration:** EUT w/ AC Charger + HS
**Mode:** GPRS1900

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| 3m Chamber | T34 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, 1850.2MHz | | | | | | | | | |
| GSM1900 GPRS | 3.700 | -16.9 | V | 3.0 | 35.4 | 1.0 | -51.3 | -13.0 | -38.3 | |
| | 5.551 | -12.2 | V | 3.0 | 34.7 | 1.0 | -45.9 | -13.0 | -32.9 | |
| | 7.401 | -6.0 | V | 3.0 | 34.9 | 1.0 | -39.9 | -13.0 | -26.9 | |
| | 3.700 | -18.3 | H | 3.0 | 35.4 | 1.0 | -52.7 | -13.0 | -39.7 | |
| | 5.551 | -12.6 | H | 3.0 | 34.7 | 1.0 | -46.4 | -13.0 | -33.4 | |
| | 7.401 | -9.8 | H | 3.0 | 34.9 | 1.0 | -43.7 | -13.0 | -30.7 | |
| | Mid Ch, 1880.0MHz | | | | | | | | | |
| | 3.760 | -17.2 | V | 3.0 | 35.3 | 1.0 | -51.5 | -13.0 | -38.5 | |
| | 5.640 | -13.0 | V | 3.0 | 34.7 | 1.0 | -46.7 | -13.0 | -33.7 | |
| | 7.520 | -11.1 | V | 3.0 | 34.9 | 1.0 | -45.0 | -13.0 | -32.0 | |
| | 3.760 | -16.9 | H | 3.0 | 35.3 | 1.0 | -51.3 | -13.0 | -38.3 | |
| | 5.640 | -12.3 | H | 3.0 | 34.7 | 1.0 | -46.0 | -13.0 | -33.0 | |
| | 7.520 | -11.4 | H | 3.0 | 34.9 | 1.0 | -45.3 | -13.0 | -32.3 | |
| | High Ch, 1909.8MHz | | | | | | | | | |
| | 3.820 | -17.2 | V | 3.0 | 35.3 | 1.0 | -51.4 | -13.0 | -38.4 | |
| | 5.729 | -11.2 | V | 3.0 | 34.7 | 1.0 | -45.0 | -13.0 | -32.0 | |
| | 7.639 | -11.1 | V | 3.0 | 35.0 | 1.0 | -45.1 | -13.0 | -32.1 | |
| | 3.820 | -17.2 | H | 3.0 | 35.3 | 1.0 | -51.5 | -13.0 | -38.5 | |
| | 5.729 | -11.7 | H | 3.0 | 34.7 | 1.0 | -45.4 | -13.0 | -32.4 | |
| | 7.639 | -8.8 | H | 3.0 | 35.0 | 1.0 | -42.7 | -13.0 | -29.7 | |

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




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**UL Verification Services, Inc.**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/28/14
**Test Engineer:** Jude Semana
**Configuration:** EUT w/ AC Charger + HS
**Mode:** EGPRS850 Harm

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

Band

GSM850

EGPRS

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, 824.2MHz | | | | | | | | | |
| 1.648 | -24.3 | V | 3.0 | 37.4 | 1.0 | -60.7 | -13.0 | -47.7 | |
| 2.473 | -19.7 | V | 3.0 | 36.4 | 1.0 | -55.1 | -13.0 | -42.1 | |
| 3.297 | -18.3 | V | 3.0 | 35.8 | 1.0 | -53.1 | -13.0 | -40.1 | |
| 1.648 | -26.6 | H | 3.0 | 37.4 | 1.0 | -63.0 | -13.0 | -50.0 | |
| 2.473 | -21.5 | H | 3.0 | 36.4 | 1.0 | -56.9 | -13.0 | -43.9 | |
| 3.297 | -20.8 | H | 3.0 | 35.8 | 1.0 | -55.6 | -13.0 | -42.6 | |
| Mid Ch, 836.6MHz | | | | | | | | | |
| 1.673 | -26.6 | V | 3.0 | 37.3 | 1.0 | -63.0 | -13.0 | -50.0 | |
| 2.510 | -20.8 | V | 3.0 | 36.4 | 1.0 | -56.2 | -13.0 | -43.2 | |
| 3.346 | -20.2 | V | 3.0 | 35.8 | 1.0 | -55.0 | -13.0 | -42.0 | |
| 1.673 | -25.5 | H | 3.0 | 37.3 | 1.0 | -61.8 | -13.0 | -48.8 | |
| 2.510 | -22.7 | H | 3.0 | 36.4 | 1.0 | -58.1 | -13.0 | -45.1 | |
| 3.346 | -18.5 | H | 3.0 | 35.8 | 1.0 | -53.2 | -13.0 | -40.2 | |
| High Ch, 848.8MHz | | | | | | | | | |
| 1.698 | -25.7 | V | 3.0 | 37.3 | 1.0 | -62.0 | -13.0 | -49.0 | |
| 2.547 | -21.0 | V | 3.0 | 36.3 | 1.0 | -56.4 | -13.0 | -43.4 | |
| 3.395 | -21.0 | V | 3.0 | 35.7 | 1.0 | -55.7 | -13.0 | -42.7 | |
| 1.698 | -26.6 | H | 3.0 | 37.3 | 1.0 | -62.9 | -13.0 | -49.9 | |
| 2.547 | -22.2 | H | 3.0 | 36.3 | 1.0 | -57.5 | -13.0 | -44.5 | |
| 3.395 | -21.4 | H | 3.0 | 35.7 | 1.0 | -56.1 | -13.0 | -43.1 | |

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




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**UL Verification Services, Inc.**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I19245
**Date:** 10/28/14
**Test Engineer:** Jude Semana
**Configuration:** EUT w/ AC Charger + HS
**Mode:** GPRS 850

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

| 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, 824.2MHz | | | | | | | | | |
| GSM850 | 1.648 | -23.9 | V | 3.0 | 37.4 | 1.0 | -60.3 | -13.0 | -47.3 | |
| | 2.473 | -19.7 | V | 3.0 | 36.4 | 1.0 | -55.1 | -13.0 | -42.1 | |
| | 3.297 | -17.9 | V | 3.0 | 35.8 | 1.0 | -52.7 | -13.0 | -39.7 | |
| GPRS | 1.648 | -26.8 | H | 3.0 | 37.4 | 1.0 | -63.2 | -13.0 | -50.2 | |
| | 2.473 | -21.6 | H | 3.0 | 36.4 | 1.0 | -57.0 | -13.0 | -44.0 | |
| | 3.297 | -20.8 | H | 3.0 | 35.8 | 1.0 | -55.6 | -13.0 | -42.6 | |
| | Mid Ch, 836.6MHz | | | | | | | | | |
| | 1.673 | -24.8 | V | 3.0 | 37.3 | 1.0 | -61.1 | -13.0 | -48.1 | |
| | 2.510 | -20.5 | V | 3.0 | 36.4 | 1.0 | -55.8 | -13.0 | -42.8 | |
| | 3.346 | -21.5 | V | 3.0 | 35.8 | 1.0 | -56.2 | -13.0 | -43.2 | |
| | 1.673 | -24.7 | H | 3.0 | 37.3 | 1.0 | -61.1 | -13.0 | -48.1 | |
| | 2.510 | -22.8 | H | 3.0 | 36.4 | 1.0 | -58.2 | -13.0 | -45.2 | |
| | 3.346 | -19.2 | H | 3.0 | 35.8 | 1.0 | -53.9 | -13.0 | -40.9 | |
| | High Ch, 848.8MHz | | | | | | | | | |
| | 1.698 | -25.2 | V | 3.0 | 37.3 | 1.0 | -61.5 | -13.0 | -48.5 | |
| | 2.547 | -20.9 | V | 3.0 | 36.3 | 1.0 | -56.2 | -13.0 | -43.2 | |
| | 3.395 | -21.2 | V | 3.0 | 35.7 | 1.0 | -55.9 | -13.0 | -42.9 | |
| | 1.698 | -25.9 | H | 3.0 | 37.3 | 1.0 | -62.2 | -13.0 | -49.2 | |
| | 2.547 | -23.1 | H | 3.0 | 36.3 | 1.0 | -58.4 | -13.0 | -45.4 | |
| | 3.395 | -22.0 | H | 3.0 | 35.7 | 1.0 | -56.7 | -13.0 | -43.7 | |
| | | | | | | | | | | |

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




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