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

# CERTIFICATION TEST REPORT

**FOR**

**GSM/WCDMA/LTE Phone + Bluetooth & WLAN (2.4GHz), ANT+ and NFC**

**MODEL NUMBER: SM-A300G DS and SM-A300G**

**FCC ID: A3LSMA300G**

**REPORT NUMBER: 14I18889-E1 Revision A**

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# Revision History

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| -- | 9/26/14 | Initial Issue | P. Zhang |
| A | 10/10/14 | Revised FCC IDs<br><br>Removed Declaration Information from Section 7 | 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 DTS b/g/n & ANT+ & NFC**

**MODEL:** **SM-A300G/DS**

**SERIAL NUMBER:** **1961989 (Radiated), 1961987 (Conducted)**

**DATE TESTED:** **September 22- September 25, 2014**

| APPLICABLE STANDARDS | |
|---|---|
| **STANDARD** | **TEST RESULTS** |
| FCC PART 22H, 24E | 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

# 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 1000 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 + WLAN DTS (b,g,n), Bluetooth, ANT+, and NFC.

## 5.2. MAXIMUM OUTPUT POWER

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

| FCC Part 22/24 | | | | | | |
|---|---|---|---|---|---|---|
| Band | Frequency Range(MHz) | Modulation Peak | Conducted | | Radiated | |
| | | | Avg (dBm) | Avg (mW) | Avg (dBm) | Avg (mW) |
| GSM850 | 824~849 | GMSK | 33.5 | 2238.72 | | |
| | 824~849 | GPRS | 33.5 | 2238.72 | 31.03 | 1267.94 |
| | 824~849 | EGPRS | 27.5 | 562.34 | 27.69 | 588.44 |
| GSM1900 | 1850~1910 | GMSK | 30.9 | 1230.27 | | |
| | 1850~1910 | GPRS | 30.9 | 1230.27 | 26.30 | 426.58 |
| | 1850~1910 | EGPRS | 26.5 | 446.68 | 21.97 | 204.6 |

| FCC Part 22/24 | | | | | | |
|---|---|---|---|---|---|---|
| Band | Frequency Range(MHz) | Modulation Peak | Conducted | | Radiated | |
| | | | Avg (dBm) | Avg (mW) | Avg (dBm) | Avg (mW) |
| Band 5 | 824~849 | REL99 | 23.5 | 223.87 | 20.911 | 123.34 |
| | 824~849 | HSDPA | 23.1 | 204.17 | 20.271 | 106.44 |
| | 824~849 | HSUPA | 23.1 | 204.17 | | |
| Band 2 | 1850~1910 | REL99 | 23.5 | 223.87 | 16.91 | 49.09 |
| | 1850~1910 | HSDPA | 22.9 | 194.98 | 16.84 | 48.31 |
| | 1850~1910 | HSUPA | 22.4 | 173.78 | | |




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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 27 (10MHz Bandwidth) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Band | Frequency Range(MHz) | BandWidth (MHz) | Modulation Peak | Conducted | | Radiated | |
| | | | | Avg (dBm) | Avg (mW) | Avg (dBm) | Avg (mW) |
| LTE5 | 824~849 | 10MHz | QPSK | 23.00 | 177.83 | 18.6 | 72.44 |
| | 824~849 | 10MHz | 16QAM | 22.50 | 199.53 | 17.9 | 61.67 |

| FCC Part 27 (5MHz Bandwidth) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Band | Frequency Range(MHz) | BandWidth (MHz) | Modulation Peak | Conducted | | Radiated | |
| | | | | Avg (dBm) | Avg (mW) | Avg (dBm) | Avg (mW) |
| LTE5 | 824~849 | 5MHz | QPSK | 23.4 | 218.78 | 18.93 | 78.18 |
| | 824~849 | 5MHz | 16QAM | 22.3 | 169.82 | 18.12 | 64.88 |

| FCC Part 27 (10MHz Bandwidth) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Band | Frequency Range(MHz) | BandWidth (MHz) | Modulation Peak | Conducted | | Radiated | |
| | | | | Avg (dBm) | Avg (mW) | Avg (dBm) | Avg (mW) |
| LTE5 | 824~849 | 3MHz | QPSK | 23.30 | 213.80 | 19.93 | 98.4 |
| | 824~849 | 3MHz | 16QAM | 21.80 | 151.36 | 18.79 | 75.7 |

| FCC Part 27 (5MHz Bandwidth) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Band | Frequency Range(MHz) | BandWidth (MHz) | Modulation Peak | Conducted | | Radiated | |
| | | | | Avg (dBm) | Avg (mW) | Avg (dBm) | Avg (mW) |
| LTE5 | 824~849 | 1.4MHz | QPSK | 23.20 | 208.93 | 19.13 | 81.87 |
| | 824~849 | 1.4MHz | 16QAM | 22.30 | 169.82 | 18.3 | 67.62 |




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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) |
|---|---|
| GSM850, 824~849MHz | -2.2 |
| GSM1900, 1850~1910MHz | -3.2 |
| Band 5, 824~849MHz | -2.2 |
| Band 2, 1850~1910MHz | -3.2 |
| LTE5, 824~849MHz | -2.2 |




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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 | ETA0U83EWE | N/A | N/A |
| Earphone | Samsung | EHS64AVFWE | 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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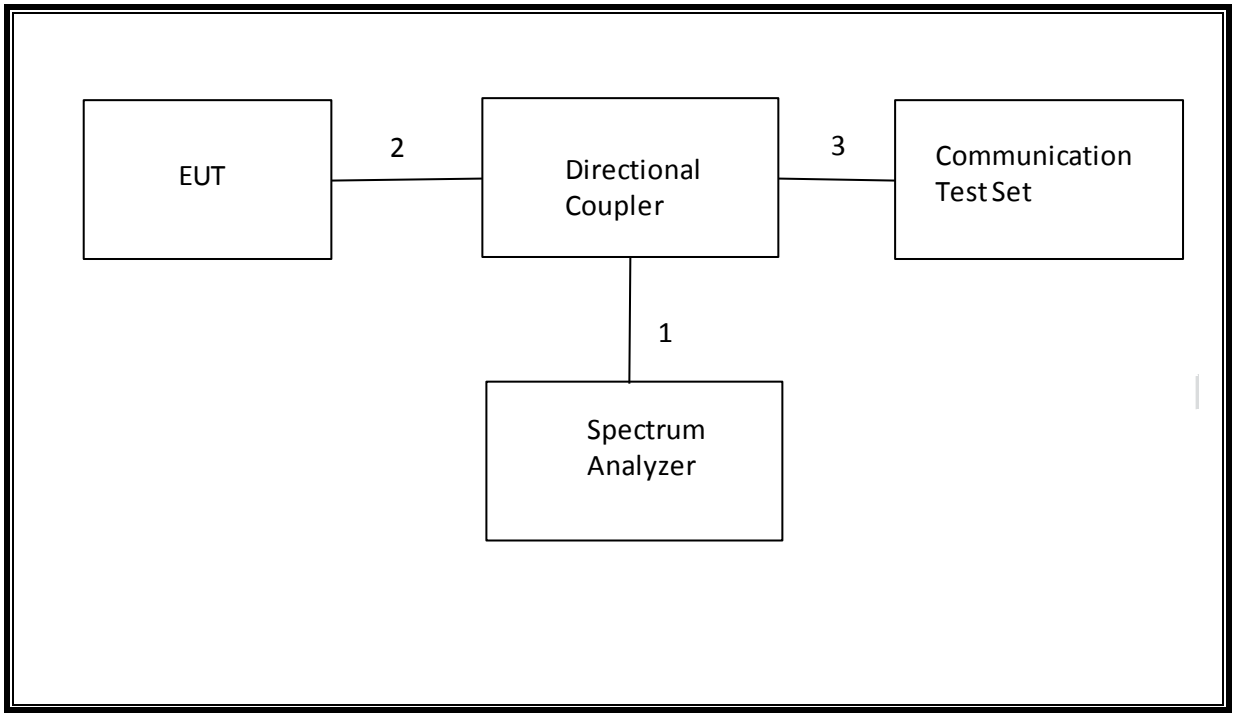
**SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)**







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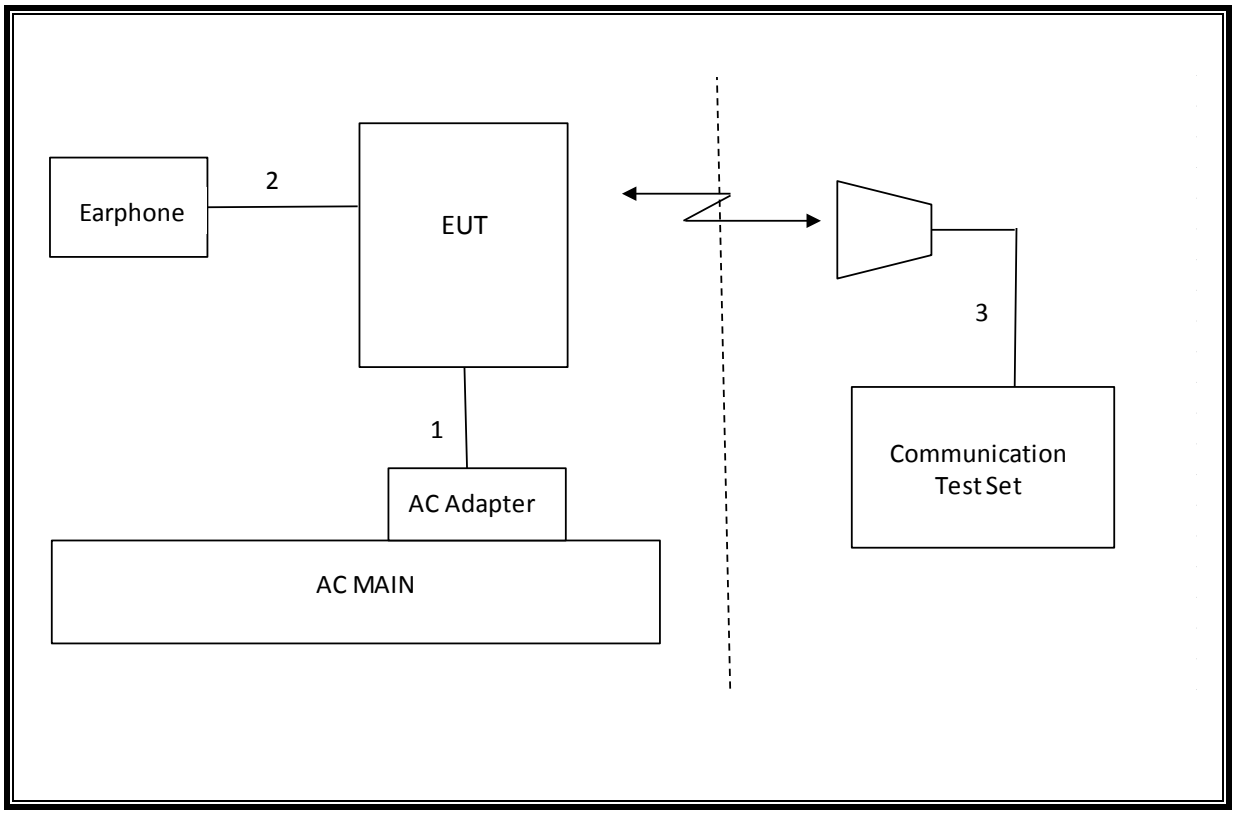
**SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)**







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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 | 10/25/14 |
| Antenna, Horn, 18 GHz | EMCO | 3115 | C00784 | 10/25/14 |
| Highpass Filter, 2.7 GHz | Micro-Tronics | HPM13194 | N02687 | CNR |
| Highpass Filter, 1.5 GHz | Micro-Tronics | HPM13193 | N02688 | CNR |
| Temperature / Humidity Chamber | Thermotron | SE 600-10-10 | C00930 | 01/09/15 |
| Communications Test Set | R&S | CMW500 | T159 | 07/02/15 |
| 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 | RF-Lambda | RFDC5M06G15 | 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 | Worse Case |
|---|---|---|---|---|---|---|
| 2.1049 | N/A | Occupied Band width (99%) | N/A | Conducted | Pass | .242 MHz |
| 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 | -13.22 dBm |
| 2.1046 | N/A | Conducted output power | N/A | | Pass | dBm |
| 22.355<br>24.235 | RSS-132(4.3)<br>RSS-133(6.3) | Frequency Stability | 2.5PPM | | Pass | .007PPM |
| 22.913(a)(2) | RSS-132(4.4) | Effective Radiated Power | 38 dBm | Radiated | Pass | 31.03 dBm |
| 24.232(c ) | RSS-133(6.4) | Equivalent Isotropic Radiated Power | 33dBm | | Pass | 23.98 dBm |
| 22.917(a)<br>24.238(a) | RSS-132(4.5.1)<br>RSS-133(6.5.1) | Radiated Spurious Emission | -13dBm | | Pass | -40.9 dBm |




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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 | Ch. | f(MHz) | 1 time slot | 2 time slot | 3 time slot | 4 time slot |
|---|---|---|---|---|---|---|---|
| | | | | Avg (dBm) | Avg (dBm) | Avg (dBm) | Avg (dBm) |
| GSM850 | GMSK | 128 | 824.2 | 33.5 | | | |
| | | 190 | 836.6 | 33.5 | | | |
| | | 251 | 848.8 | 33.5 | | | |
| | GPRS | 128 | 824.2 | 33.5 | 30.3 | 29.0 | 27.5 |
| | | 190 | 836.6 | 33.5 | 30.6 | 29.0 | 27.8 |
| | | 251 | 848.8 | 33.5 | 30.6 | 29.0 | 28.0 |
| | EGPRS | 128 | 824.2 | 27.5 | 26.0 | 24.2 | 24.0 |
| | | 190 | 836.6 | 27.5 | 26.0 | 24.2 | 24.0 |
| | | 251 | 848.8 | 27.5 | 26.1 | 24.2 | 24.0 |
| GSM1900 | GMSK | 512 | 1850.2 | 30.6 | | | |
| | | 661 | 1880 | 30.9 | | | |
| | | 810 | 1909.8 | 30.9 | | | |
| | GPRS | 512 | 1850.2 | 30.6 | 28.2 | 26.4 | 26.1 |
| | | 661 | 1880 | 30.9 | 28.5 | 26.7 | 26.4 |
| | | 810 | 1909.8 | 30.9 | 28.3 | 26.5 | 26.2 |
| | EGPRS | 512 | 1850.2 | 26.5 | 24.9 | 22.5 | 22.3 |
| | | 661 | 1880 | 26.5 | 25.0 | 22.5 | 22.6 |
| | | 810 | 1909.8 | 26.5 | 25.0 | 22.5 | 22.4 |




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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 | Ch. | f(MHz) | Conducted Power (dBm) |
|---|---|---|---|---|
| | | | | Avg (dBm) |
| Band 5 | REL99 | 4132 | 826.4 | 23.5 |
| | | 4183 | 836.6 | 23.5 |
| | | 4233 | 846.6 | 23.2 |
| Band 2 | REL99 | 9262 | 1852.4 | 23.5 |
| | | 9400 | 1880 | 23.5 |
| | | 9538 | 1907.6 | 23.5 |




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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 | Subset | Ch. | f(MHz) | Conducted Power (dBm) |
|---|---|---|---|---|---|
| | | | | | Avg (dBm) |
| Band 5 | HSDPA | 1 | 4132 | 826.4 | 23.1 |
| | | | 4183 | 836.6 | 23.0 |
| | | | 4233 | 846.6 | 23.0 |
| | | 2 | 4132 | 826.4 | 22.6 |
| | | | 4183 | 836.6 | 22.6 |
| | | | 4233 | 846.6 | 22.5 |
| | | 3 | 4132 | 826.4 | 22.1 |
| | | | 4183 | 836.6 | 22.0 |
| | | | 4233 | 846.6 | 21.9 |
| | | 4 | 4132 | 826.4 | 22.1 |
| | | | 4183 | 836.6 | 22.0 |
| | | | 4233 | 846.6 | 21.9 |
| Band 2 | HSDPA | 1 | 9262 | 1852.4 | 22.9 |
| | | | 9400 | 1880 | 22.9 |
| | | | 9538 | 1907.6 | 23.1 |
| | | 2 | 9262 | 1852.4 | 22.3 |
| | | | 9400 | 1880 | 22.3 |
| | | | 9538 | 1907.6 | 22.5 |
| | | 3 | 9262 | 1852.4 | 21.8 |
| | | | 9400 | 1880 | 21.8 |
| | | | 9538 | 1907.6 | 22.0 |
| | | 4 | 9262 | 1852.4 | 21.8 |
| | | | 9400 | 1880 | 21.8 |
| | | | 9538 | 1907.6 | 22.0 |




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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 | Subset | Ch. | f(MHz) | Conducted Power (dBm) Avg (dBm) |
|---|---|---|---|---|---|
| Band 5 | HSUPA | 1 | 4132 | 826.4 | 23.0 |
| | | | 4183 | 836.6 | 22.9 |
| | | | 4233 | 846.6 | 22.9 |
| | | 2 | 4132 | 826.4 | 21.8 |
| | | | 4183 | 836.6 | 21.6 |
| | | | 4233 | 846.6 | 21.8 |
| | | 3 | 4132 | 826.4 | 21.8 |
| | | | 4183 | 836.6 | 21.8 |
| | | | 4233 | 846.6 | 22.0 |
| | | 4 | 4132 | 826.4 | 22.3 |
| | | | 4183 | 836.6 | 22.2 |
| | | | 4233 | 846.6 | 22.3 |
| | | 5 | 4132 | 826.4 | 22.3 |
| | | | 4183 | 836.6 | 22.3 |
| | | | 4233 | 846.6 | 22.3 |
| Band 2 | HSUPA | 1 | 9262 | 1852.4 | 22.4 |
| | | | 9400 | 1880 | 22.4 |
| | | | 9538 | 1907.6 | 22.9 |
| | | 2 | 9262 | 1852.4 | 21.5 |
| | | | 9400 | 1880 | 21.6 |
| | | | 9538 | 1907.6 | 21.8 |
| | | 3 | 9262 | 1852.4 | 21.5 |
| | | | 9400 | 1880 | 21.5 |
| | | | 9538 | 1907.6 | 21.7 |
| | | 4 | 9262 | 1852.4 | 22.0 |
| | | | 9400 | 1880 | 21.9 |
| | | | 9538 | 1907.6 | 22.2 |
| | | 5 | 9262 | 1852.4 | 22.0 |
| | | | 9400 | 1880 | 22.0 |
| | | | 9538 | 1907.6 | 22.2 |




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### 8.3.4. 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. | | |

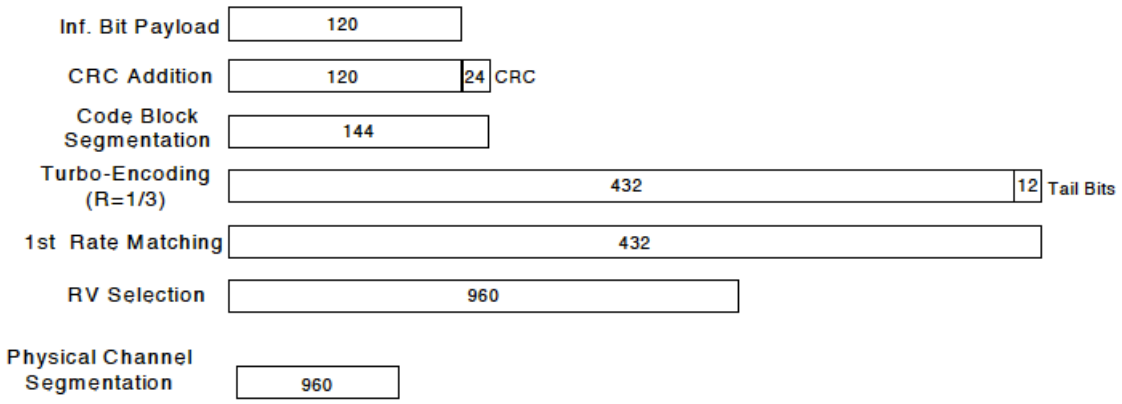


**Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)**

The following 4 Sub-tests for HSDPA were completed according to Release 6 procedures in section 5.2 of 3GPP TS34.121. A summary of subtest settings are illustrated below:

| | Mode | Rel6 HSDPA | Rel6 HSDPA | Rel6 HSDPA | Rel6 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 | Algorithm2 | | | |
| | βc | 2/15 | 12/15 | 15/15 | 15/15 |
| | βd | 15/15 | 15/15 | 8/15 | 4/15 |
| | βd (SF) | 64 | | | |



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| | | | | | |
|---|---|---|---|---|---|
| | βc/βd | 2/15 | 12/15 | 15/8 | 15/4 |
| | βhs | 4/15 | 24/15 | 30/15 | 30/15 |
| | MPR | 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.




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# 8.4. LTE OUTPUT VERIFICATION

## 8.4.1. LTE OUTPUT RESULT

| Band | Frequency | Modulation | BW (MHz) | RB Size | RB Offset | Average Power (dBm) |
|---|---|---|---|---|---|---|
| LTE5 | 829 | QPSK | 10 | 1 | 0 | 23.00 |
| | | | | 1 | 24 | 22.80 |
| | | | | 1 | 49 | 22.50 |
| | | | | 25 | 0 | 22.20 |
| | | | | 25 | 11 | 22.20 |
| | | | | 25 | 24 | 22.20 |
| | | | | 50 | 0 | 22.10 |
| | 829 | 16QAM | | 1 | 0 | 21.60 |
| | | | | 1 | 24 | 21.50 |
| | | | | 1 | 49 | 21.50 |
| | | | | 25 | 0 | 21.30 |
| | | | | 25 | 11 | 21.30 |
| | | | | 25 | 24 | 21.30 |
| | | | | 50 | 0 | 21.20 |
| | 836.5 | QPSK | | 1 | 0 | 23.00 |
| | | | | 1 | 24 | 22.70 |
| | | | | 1 | 49 | 22.60 |
| | | | | 25 | 0 | 22.20 |
| | | | | 25 | 11 | 22.20 |
| | | | | 25 | 24 | 22.20 |
| | | | | 50 | 0 | 22.10 |
| | 836.5 | 16QAM | | 1 | 0 | 22.40 |
| | | | | 1 | 24 | 22.40 |
| | | | | 1 | 49 | 22.50 |
| | | | | 25 | 0 | 21.30 |
| | | | | 25 | 11 | 21.20 |
| | | | | 25 | 24 | 21.20 |
| | | | | 50 | 0 | 21.00 |
| | 844 | QPSK | | 1 | 0 | 22.50 |
| | | | | 1 | 24 | 22.20 |
| | | | | 1 | 49 | 23.00 |
| | | | | 25 | 0 | 22.10 |
| | | | | 25 | 11 | 22.10 |
| | | | | 25 | 24 | 22.00 |
| | | | | 50 | 0 | 22.00 |
| | 844 | 16QAM | | 1 | 0 | 21.80 |
| | | | | 1 | 24 | 21.80 |
| | | | | 1 | 49 | 21.70 |
| | | | | 25 | 0 | 21.20 |
| | | | | 25 | 11 | 21.30 |
| | | | | 25 | 24 | 21.20 |
| | | | | 50 | 0 | 21.00 |



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| Band | Frequency | Modulation | BW (MHz) | RB Size | RB Offset | Average Power |
|---|---|---|---|---|---|---|
| LTE5 | 826.5 | QPSK | 5 | 1 | 0 | 23.40 |
| | | | | 1 | 11 | 23.40 |
| | | | | 1 | 24 | 23.40 |
| | | | | 12 | 0 | 22.20 |
| | | | | 12 | 5 | 22.20 |
| | | | | 12 | 11 | 22.30 |
| | | | | 25 | 0 | 22.20 |
| | 826.5 | 16QAM | | 1 | 0 | 22.20 |
| | | | | 1 | 11 | 22.20 |
| | | | | 1 | 24 | 22.30 |
| | | | | 12 | 0 | 21.20 |
| | | | | 12 | 5 | 21.20 |
| | | | | 12 | 11 | 21.20 |
| | | | | 25 | 0 | 21.20 |
| | 836.5 | QPSK | | 1 | 0 | 23.30 |
| | | | | 1 | 11 | 23.10 |
| | | | | 1 | 24 | 23.20 |
| | | | | 12 | 0 | 22.20 |
| | | | | 12 | 5 | 22.10 |
| | | | | 12 | 11 | 22.20 |
| | | | | 25 | 0 | 21.10 |
| | 836.5 | 16QAM | | 1 | 0 | 21.10 |
| | | | | 1 | 11 | 21.10 |
| | | | | 1 | 24 | 21.10 |
| | | | | 12 | 0 | 21.20 |
| | | | | 12 | 5 | 21.20 |
| | | | | 12 | 11 | 21.20 |
| | | | | 25 | 0 | 21.20 |
| | 846.5 | QPSK | | 1 | 0 | 23.10 |
| | | | | 1 | 11 | 23.20 |
| | | | | 1 | 24 | 23.20 |
| | | | | 12 | 0 | 22.10 |
| | | | | 12 | 5 | 22.10 |
| | | | | 12 | 11 | 22.10 |
| | | | | 25 | 0 | 22.10 |
| | 846.5 | 16QAM | | 1 | 0 | 22.30 |
| | | | | 1 | 11 | 21.10 |
| | | | | 1 | 24 | 21.10 |
| | | | | 12 | 0 | 21.20 |
| | | | | 12 | 5 | 21.10 |
| | | | | 12 | 11 | 21.10 |
| | | | | 25 | 0 | 21.10 |




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| Band | Frequency | Modulation | BW (MHz) | RB Size | RB Offset | Average Power |
|---|---|---|---|---|---|---|
| LTE5 | 825.5 | QPSK | 3 | 1 | 0 | 23.30 |
| | | | | 1 | 7 | 23.10 |
| | | | | 1 | 14 | 23.10 |
| | | | | 7 | 0 | 22.30 |
| | | | | 7 | 2 | 22.20 |
| | | | | 7 | 6 | 22.20 |
| | | | | 15 | 0 | 22.20 |
| | 825.5 | 16QAM | | 1 | 0 | 21.80 |
| | | | | 1 | 7 | 21.80 |
| | | | | 1 | 14 | 21.80 |
| | | | | 7 | 0 | 21.40 |
| | | | | 7 | 2 | 21.30 |
| | | | | 7 | 6 | 21.20 |
| | | | | 15 | 0 | 21.30 |
| | 836.5 | QPSK | | 1 | 0 | 23.00 |
| | | | | 1 | 7 | 23.00 |
| | | | | 1 | 14 | 23.00 |
| | | | | 7 | 0 | 22.20 |
| | | | | 7 | 2 | 22.20 |
| | | | | 7 | 6 | 22.10 |
| | | | | 15 | 0 | 22.10 |
| | 836.5 | 16QAM | | 1 | 0 | 21.80 |
| | | | | 1 | 7 | 21.70 |
| | | | | 1 | 14 | 21.80 |
| | | | | 7 | 0 | 21.22 |
| | | | | 7 | 2 | 21.20 |
| | | | | 7 | 6 | 21.20 |
| | | | | 15 | 0 | 21.20 |
| | 847.5 | QPSK | | 1 | 0 | 23.00 |
| | | | | 1 | 7 | 23.00 |
| | | | | 1 | 14 | 23.00 |
| | | | | 7 | 0 | 22.00 |
| | | | | 7 | 2 | 22.00 |
| | | | | 7 | 6 | 22.10 |
| | | | | 15 | 0 | 22.00 |
| | 847.5 | 16QAM | | 1 | 0 | 21.40 |
| | | | | 1 | 7 | 21.30 |
| | | | | 1 | 14 | 21.30 |
| | | | | 7 | 0 | 21.00 |
| | | | | 7 | 2 | 21.00 |
| | | | | 7 | 6 | 21.00 |
| | | | | 15 | 0 | 21.00 |




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| Band | Frequency (MHz) | Modulation | BW (MHz) | RB Size | RB Offset | Average Power |
|---|---|---|---|---|---|---|
| LTE5 | 824.7 | QPSK | 1.4 | 1 | 0 | 23.20 |
| | | | | 1 | 2 | 23.20 |
| | | | | 1 | 5 | 23.20 |
| | | | | 3 | 0 | 23.20 |
| | | | | 3 | 0 | 23.20 |
| | | | | 3 | 2 | 23.20 |
| | | | | 6 | 0 | 22.30 |
| | 824.7 | 16QAM | | 1 | 0 | 21.40 |
| | | | | 1 | 2 | 22.40 |
| | | | | 1 | 5 | 22.40 |
| | | | | 3 | 0 | 22.30 |
| | | | | 3 | 0 | 22.30 |
| | | | | 3 | 2 | 22.20 |
| | | | | 6 | 0 | 21.10 |
| | 836.5 | QPSK | | 1 | 0 | 23.00 |
| | | | | 1 | 2 | 23.00 |
| | | | | 1 | 5 | 23.00 |
| | | | | 3 | 0 | 23.00 |
| | | | | 3 | 0 | 23.00 |
| | | | | 3 | 2 | 23.00 |
| | | | | 6 | 0 | 22.10 |
| | 836.5 | 16QAM | | 1 | 0 | 21.40 |
| | | | | 1 | 2 | 21.40 |
| | | | | 1 | 5 | 21.40 |
| | | | | 3 | 0 | 22.20 |
| | | | | 3 | 0 | 22.20 |
| | | | | 3 | 2 | 22.20 |
| | | | | 6 | 0 | 21.30 |
| | 848.3 | QPSK | | 1 | 0 | 23.00 |
| | | | | 1 | 2 | 23.00 |
| | | | | 1 | 5 | 23.00 |
| | | | | 3 | 0 | 22.90 |
| | | | | 3 | 0 | 22.90 |
| | | | | 3 | 2 | 22.90 |
| | | | | 6 | 0 | 22.10 |
| | 848.3 | 16QAM | | 1 | 0 | 21.60 |
| | | | | 1 | 2 | 21.50 |
| | | | | 1 | 5 | 21.50 |
| | | | | 3 | 0 | 22.10 |
| | | | | 3 | 0 | 22.10 |
| | | | | 3 | 2 | 22.10 |
| | | | | 6 | 0 | 21.10 |




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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.




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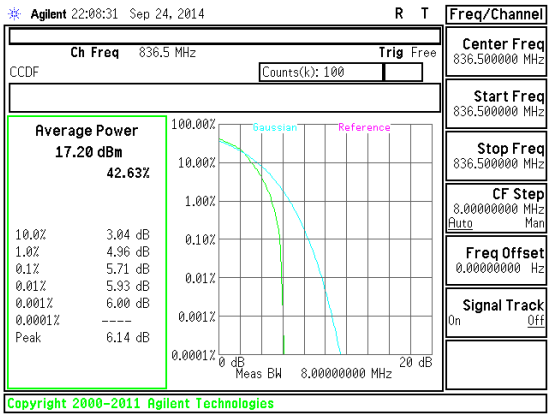
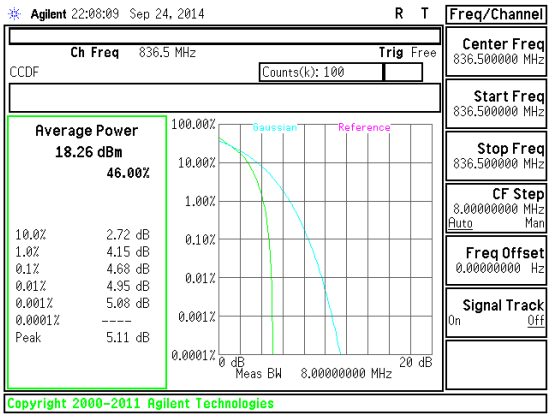
## 9.1. CONDUCTED PEAK TO AVERAGE RESULT

| | | |
|---|---|---|
| Band<br>LTE5<br>10MHz<br>16QAM |  <br>Band LTE5 10MHz 16QAM Mid channel |  <br>Band LTE5 10MHz QPSK Mid channel |

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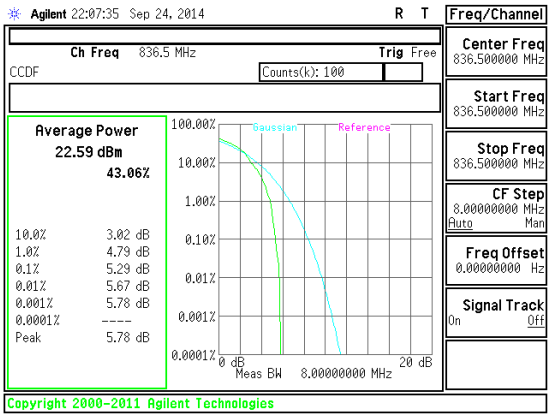
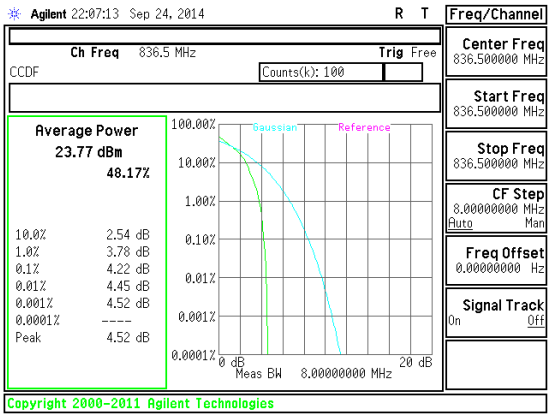
| | | |
|---|---|---|
| Band<br>LTE5<br>5MHz<br>16QAM |  <br>Band LTE5 5MHz 16QAM Mid channel |  <br>Band LTE5 5MHz QPSK Mid channel |

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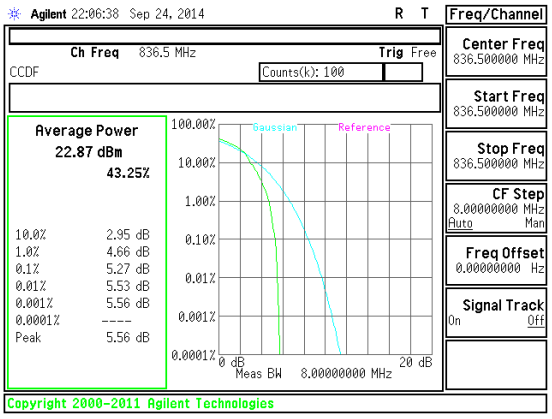
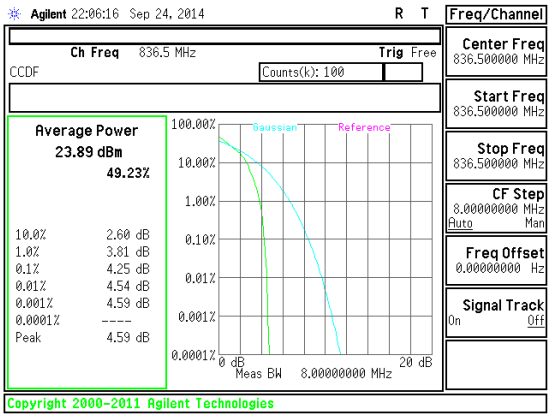
| | | |
|---|---|---|
| Band<br>LTE5<br>3MHz<br>16QAM |  <br>Band LTE5 3MHz 16QAM Mid channel |  <br>Band LTE5 3MHz QPSK Mid channel |

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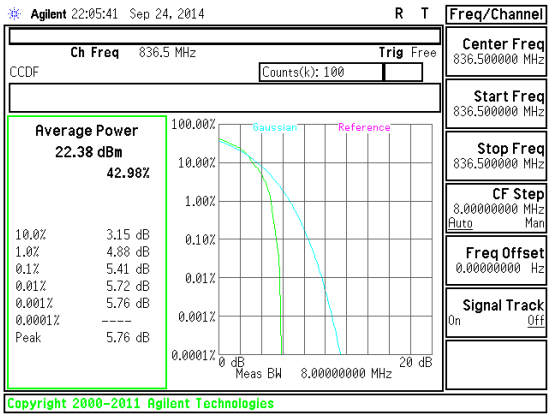
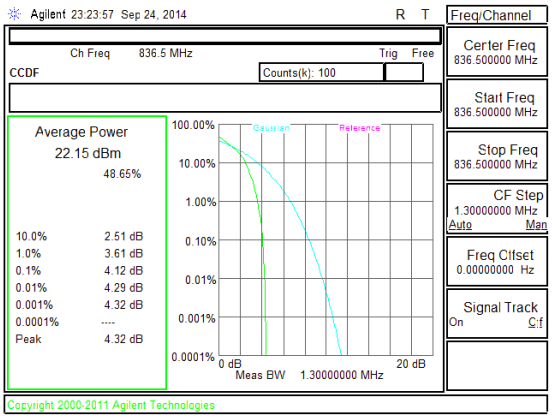
| | | |
|---|---|---|
| Band<br>LTE5<br>1.4MHz<br>16QAM |  <br>Band LTE5 1.4MHz 16QAM Mid channel |  <br>Band LTE5 1.4MHz QPSK Mid channel |

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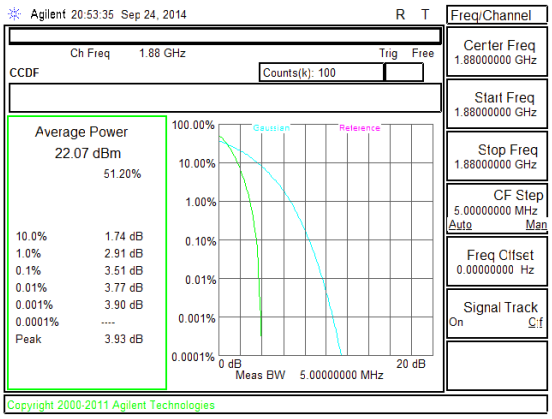
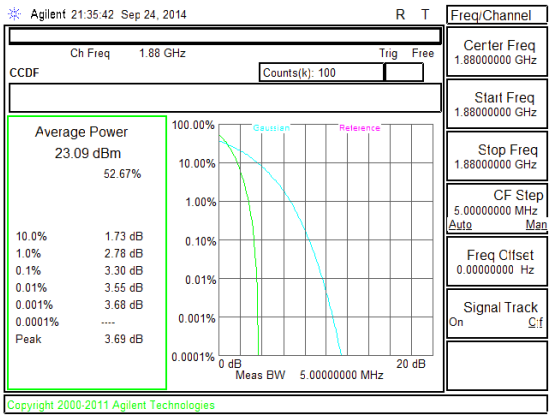
| | | |
|---|---|---|
| Band<br><br>Band 2<br><br>HSDPA |  <br>Band WCDMA B2 HSDPA |  <br>Band WCDMA B2 REL99 |

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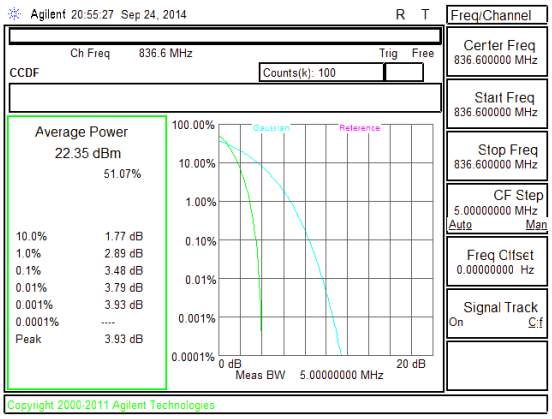
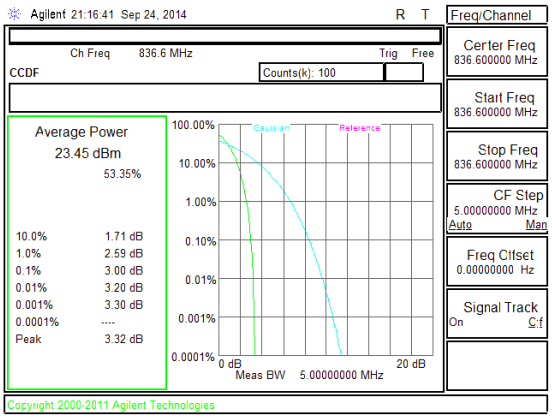
| | | |
|---|---|---|
| Band<br><br>Band 5<br><br>HSDPA |  <br>Band WCDMA B5 HSDPA |  <br>Band WCDMA B5 REL99 |

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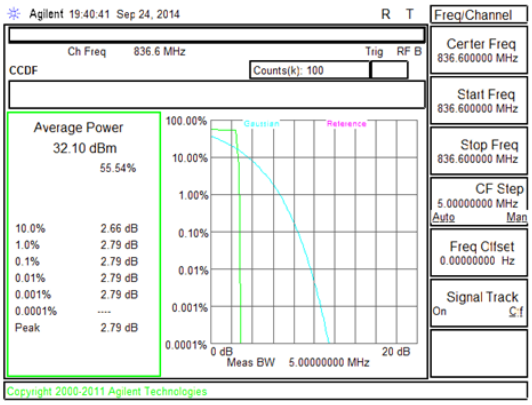
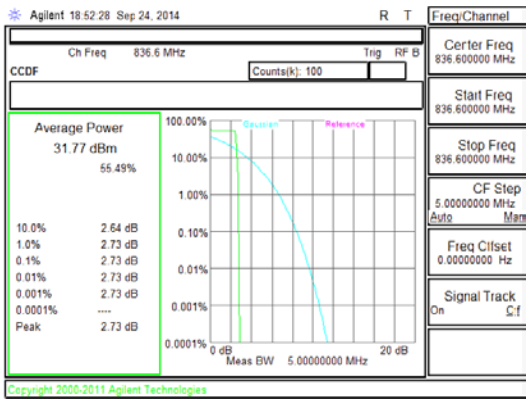
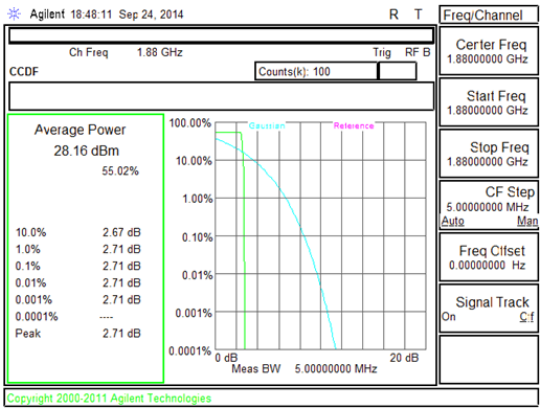
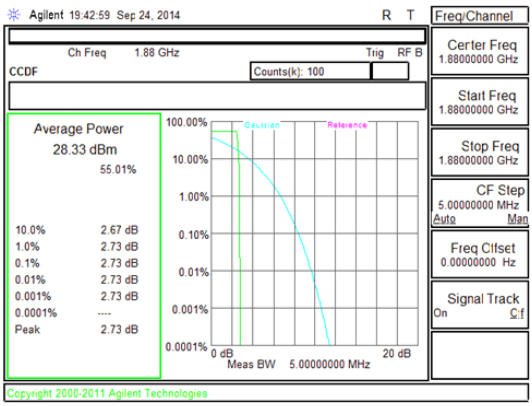
| | | |
|---|---|---|
| GSM 850 |  <br>GSM 850 GPRS |  <br>GSM 850 EGPRS |

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

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# 10. LIMITS AND CONDUCTED RESULTS

## 10.1. OCCUPIED BANDWIDTH

**RULE PART(S)**

FCC: §2.1049

IC: RSS-132, 4.5; RSS-133, 6.5

**LIMITS**

For reporting purposes only

**TEST PROCEDURE**

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The -26dB bandwidth was also measured and recorded.

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




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### 10.1.1. OCCUPIED BANDWIDTH RESULTS

**GSM OCCUPIED BANDWIDTH RESULTS**

| Band | Mode | Channel | f (MHz) | 99% BW (MHz) | -26dB BW (MHz) |
|---|---|---|---|---|---|
| GSM850 | GMSK | 128 | 824.2 | | |
| | | 190 | 836.6 | | |
| | | 251 | 848.8 | | |
| | GPRS | 128 | 824.2 | 0.243 | 0.323 |
| | | 190 | 836.6 | 0.249 | 0.325 |
| | | 251 | 848.8 | 0.245 | 0.314 |
| | EGPRS | 128 | 824.2 | 0.246 | 0.320 |
| | | 190 | 836.6 | 0.245 | 0.320 |
| | | 251 | 848.8 | 0.243 | 0.319 |
| GSM1900 | GMSK | 512 | 1850.2 | | |
| | | 661 | 1880 | | |
| | | 810 | 1909.8 | | |
| | GPRS | 512 | 1850.2 | 0.244 | 0.315 |
| | | 661 | 1880 | 0.243 | 0.315 |
| | | 810 | 1909.8 | 0.251 | 0.321 |
| | EGPRS | 512 | 1850.2 | 0.246 | 0.322 |
| | | 661 | 1880 | 0.242 | 0.320 |
| | | 810 | 1909.8 | 0.244 | 0.322 |




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**WCDMA OCCUPIED BANDWIDTH RESULTS**

| Band | Mode | Channel | f (MHz) | 99% BW (MHz) | -26dB BW (MHz) |
|---|---|---|---|---|---|
| Band 5 | REL99 | 4132 | 826.4 | 4.160 | 4.61 |
| | | 4183 | 836.6 | 4.151 | 4.636 |
| | | 4233 | 846.6 | 4.149 | 4.63 |
| | HSDPA | 4132 | 826.4 | 4.169 | 4.609 |
| | | 4183 | 836.6 | 4.148 | 4.625 |
| | | 4233 | 846.6 | 4.144 | 4.616 |
| | HSUPA | 4132 | 826.4 | | |
| | | 4183 | 836.6 | | |
| | | 4233 | 846.6 | | |
| Band 2 | REL99 | 9262 | 1852.4 | 4.157 | 4.63 |
| | | 9400 | 1880 | 4.136 | 4.669 |
| | | 9538 | 1907.6 | 4.151 | 4.648 |
| | HSDPA | 9262 | 1852.4 | 4.154 | 4.639 |
| | | 9400 | 1880 | 4.158 | 4.618 |
| | | 9538 | 1907.6 | 4.159 | 4.62 |
| | HSUPA | 9262 | 1852.4 | | |
| | | 9400 | 1880 | | |
| | | 9538 | 1907.6 | | |




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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 (KHz) |
|---|---|---|---|---|---|---|
| LTE5 | 10 | QPSK | 50/0 | 829 | 8.943 | 9.714 |
| | | | 50/0 | 836.5 | 8.946 | 9.721 |
| | | | 50/0 | 844 | 8.939 | 9.754 |
| | | 16QAM | 50/0 | 829 | 8.962 | 9.663 |
| | | | 50/0 | 836.5 | 8.922 | 9.720 |
| | | | 50/0 | 844 | 8.934 | 9.709 |

| Band | BW(MHz) | Mode | RB/RB Size | f (MHz) | 99% BW (MHz) | -26dB BW (KHz) |
|---|---|---|---|---|---|---|
| LTE5 | 5 | QPSK | 25/0 | 826.5 | 4.502 | 4.864 |
| | | | 25/0 | 836.5 | 4.485 | 4.897 |
| | | | 25/0 | 846.5 | 4.491 | 4.990 |
| | | 16QAM | 25/0 | 826.5 | 4.493 | 4.935 |
| | | | 25/0 | 836.5 | 4.495 | 4.924 |
| | | | 25/0 | 846.5 | 4.490 | 4.949 |

| Band | BW(MHz) | Mode | RB/RB Size | f (MHz) | 99% BW (MHz) | -26dB BW (KHz) |
|---|---|---|---|---|---|---|
| LTE5 | 3 | QPSK | 15/0 | 825.5 | 2.680 | 2.972 |
| | | | 15/0 | 836.5 | 2.682 | 2.958 |
| | | | 15/0 | 847.5 | 2.677 | 2.950 |
| | | 16QAM | 15/0 | 825.5 | 2.681 | 2.941 |
| | | | 15/0 | 836.5 | 2.695 | 2.976 |
| | | | 15/0 | 847.5 | 2.693 | 2.967 |

| Band | BW(MHz) | Mode | RB/RB Size | f (MHz) | 99% BW (MHz) | -26dB BW (KHz) |
|---|---|---|---|---|---|---|
| LTE5 | 1.4 | QPSK | 6/0 | 824.7 | 1.076 | 1.237 |
| | | | 6/0 | 836.5 | 1.080 | 1.285 |
| | | | 6/0 | 848.3 | 1.080 | 1.271 |
| | | 16QAM | 6/0 | 824.7 | 1.086 | 1.278 |
| | | | 6/0 | 836.5 | 1.087 | 1.267 |
| | | | 6/0 | 848.3 | 1.086 | 1.278 |




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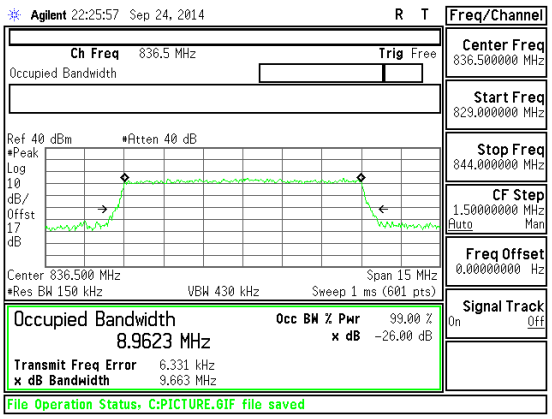
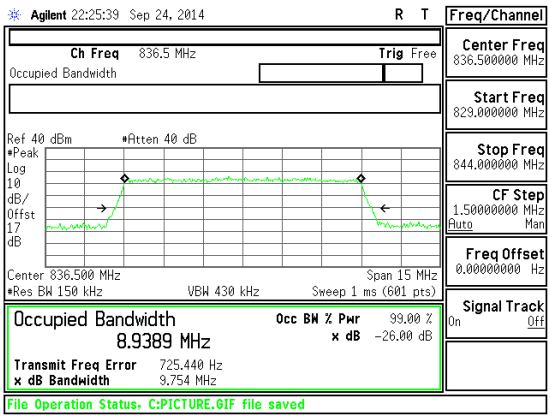
### 10.1.1. OCCUPIED BANDWIDTH PLOTS

| | | |
|---|---|---|
| Band<br>LTE5<br>10MHz<br>16QAM |  <br>Band LTE5 10MHz OBW 16QAM Mid Channel FRB.gif |  <br>Band LTE5 10MHz OBW QPSK Mid Channel FRB.gif |

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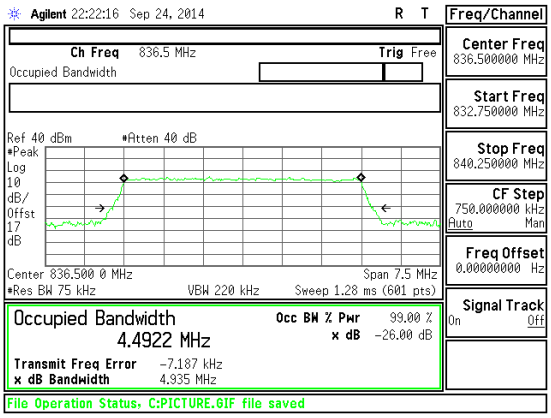
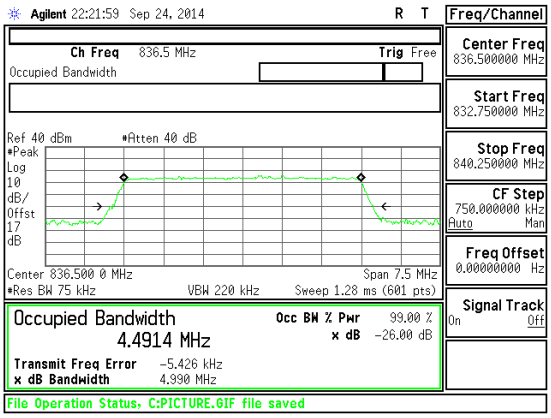
| | | |
|---|---|---|
| Band<br>LTE5<br>5MHz<br>16QAM |  <br>Band LTE5 5MHz OBW 16QAM Mid Channel FRB.gif |  <br>Band LTE5 5MHz OBW QPSK Mid Channel FRB.gif |

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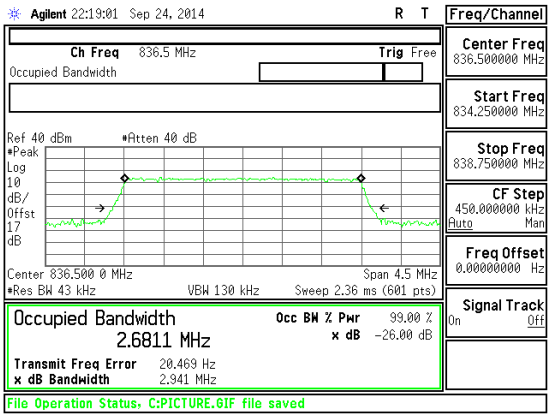
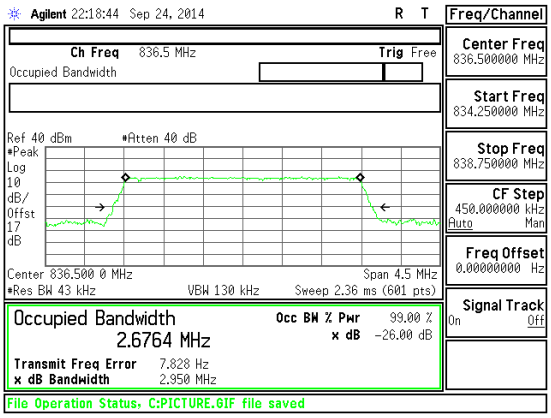
| | | |
|---|---|---|
| Band<br>LTE5<br>3MHz<br>16QAM |  <br>Band LTE5 3MHz OBW 16QAM Mid Channel FRB.gif |  <br>Band LTE5 3MHz OBW QPSK Mid Channel FRB.gif |

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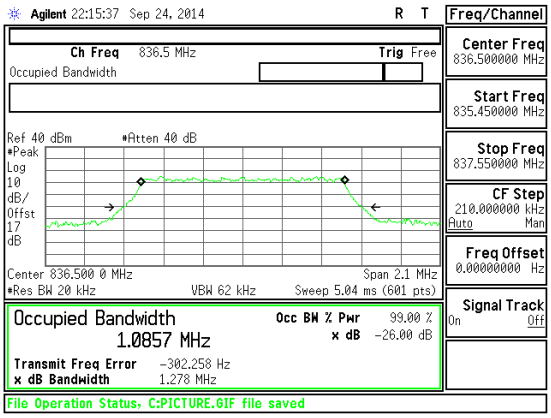
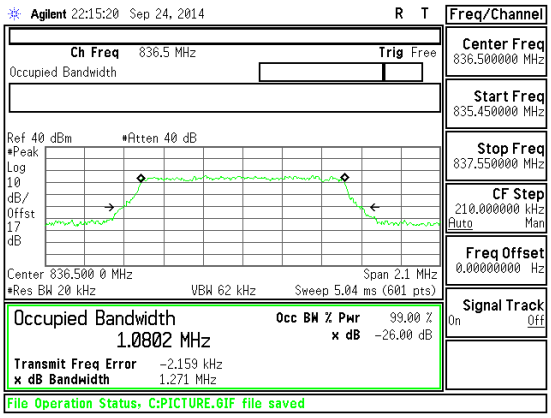
| | | |
|---|---|---|
| Band<br>LTE5<br>1.4MHz<br>16QAM |  <br>Band LTE5 1.4MHz OBW 16QAM Mid Channel FRB.gif |  <br>Band LTE5 1.4MHz OBW QPSK Mid Channel FRB.gif |

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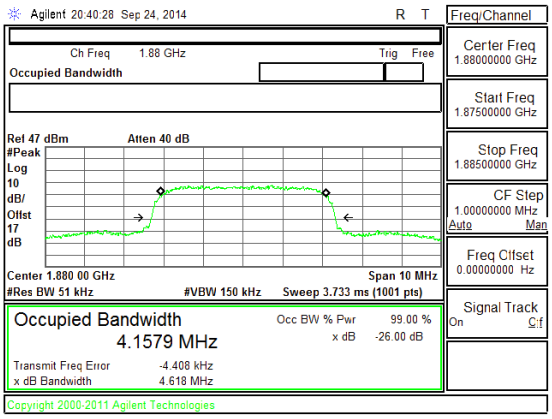
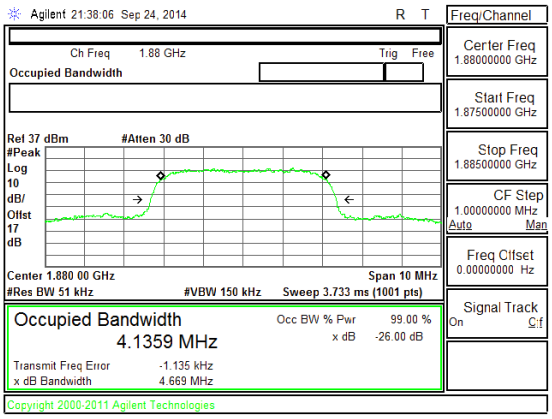
| | | |
|---|---|---|
| Band<br>Band 2<br>HSDPA |  <br>Band WCDMA B2 HSDPA OBW |  <br>Band WCDMA B2 REL99 OBW |

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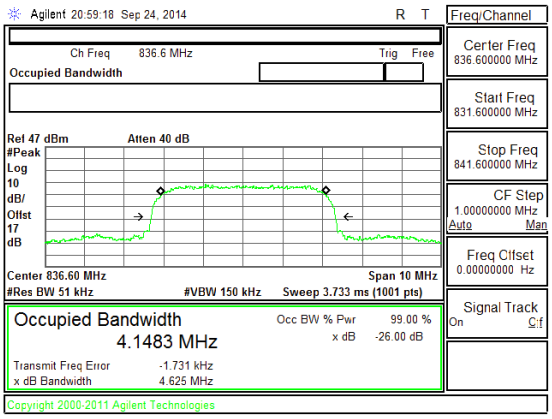
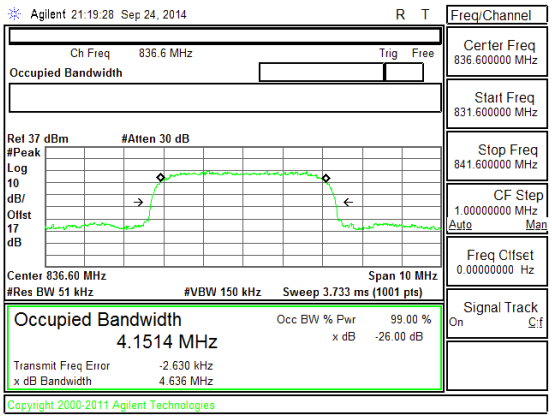
| | | |
|---|---|---|
| Band<br>Band 5<br>HSDPA |  <br>Band WCDMA B5 HSDPA OBW |  <br>Band WCDMA B5 REL99 OBW |

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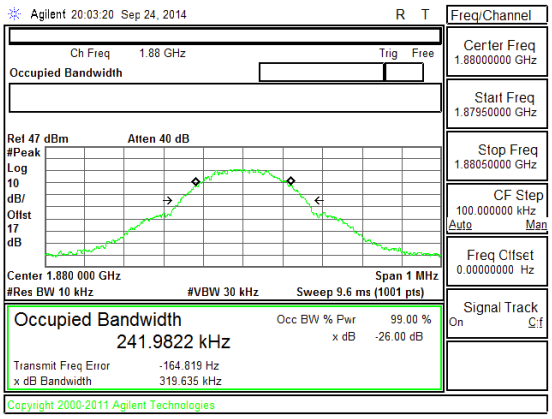
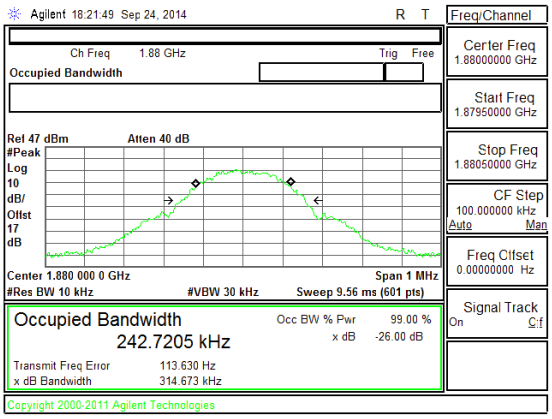
| | | |
|---|---|---|
| Band<br>GSM<br>1900<br>EGPRS |  <br>Band GSM1900 EGPRS OBW Mid channel |  <br>Band GSM1900 GPRS OBW Mid channel |

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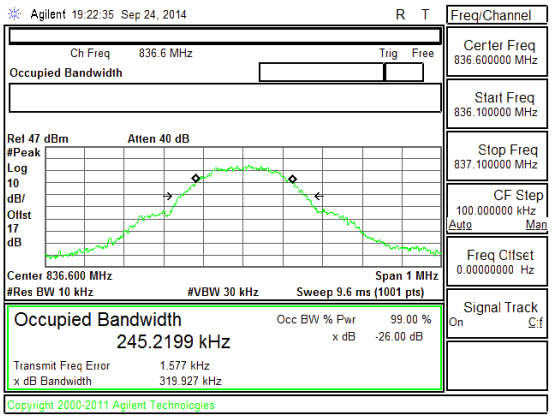
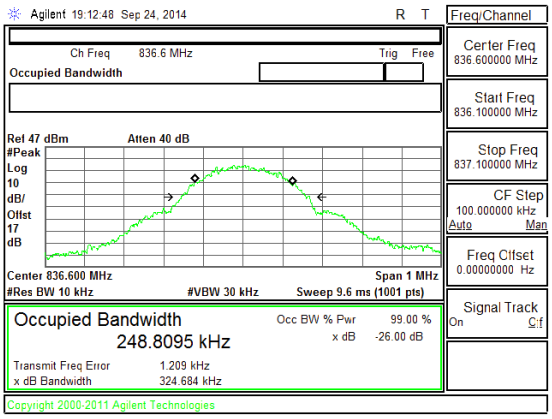
| | | |
|---|---|---|
| Band GSM 850 EGPRS |  <br>Band GSM850 EGPRS OBW Mid channel |  <br>Band GSM850 GPRS OBW Mid channel |

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## 10.2. BAND EDGE EMISSIONS

**RULE PART(S)**

FCC: §22.359, §24.238

**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 station, the attenuation factor shall be not less than 43+10Log(P)dB at the channel edge and (55+10Log(P)dB) at 5.5MHz from the channel edges.

Part 90:
(a)(1)For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log10(f/6.1) decibels or 50 + 10 Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.
(a)(2)For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz. {NOTE: Use 100 kHz reference bandwidth.}

**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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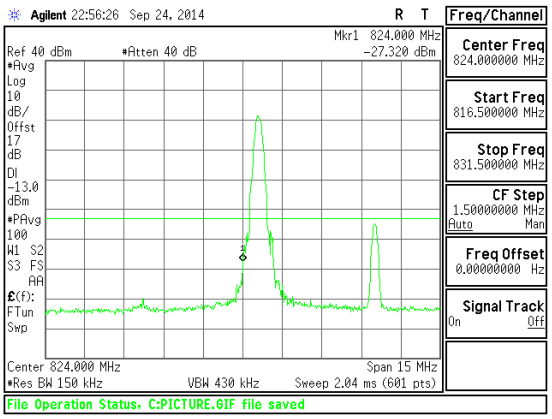
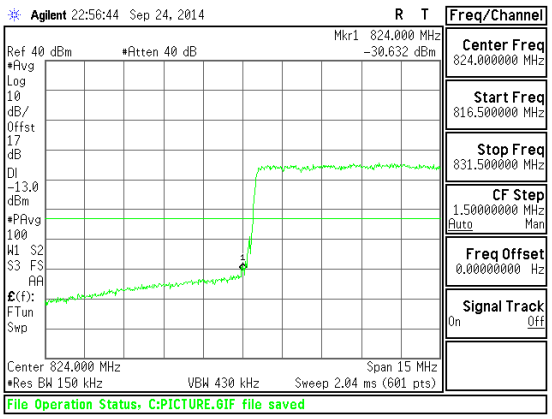
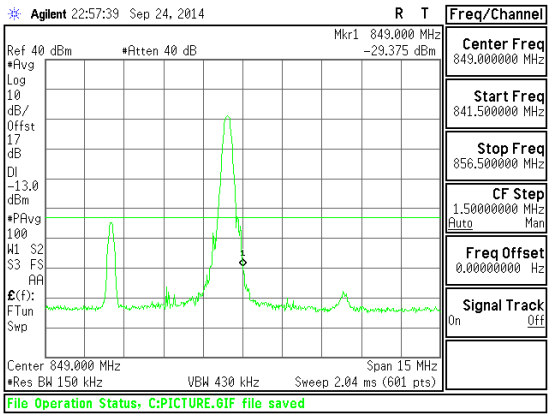
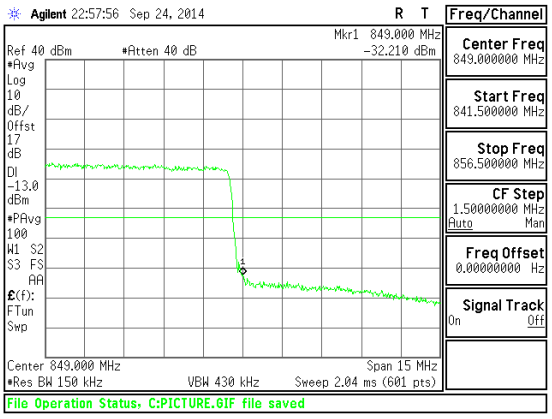
### 10.2.1. BAND EDGE PLOTS

| | | |
|---|---|---|
| Band<br>LTE5<br>10MHz<br>16QAM |  <br>Band LTE5 10MHz CBE 16QAM Low Channel 1RB.gif |  <br>Band LTE5 10MHz CBE 16QAM Low Channel FRB.gif |
| Band<br>LTE5<br>10MHz<br>16QAM |  <br>Band LTE5 10MHz CBE 16QAM High Channel 1RB.gif |  <br>Band LTE5 10MHz CBE 16QAM High Channel FRB.gif |

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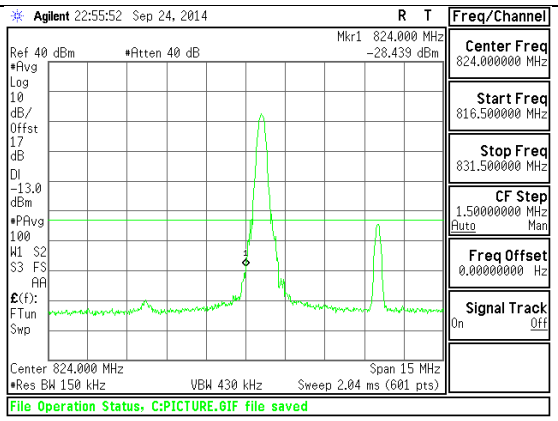
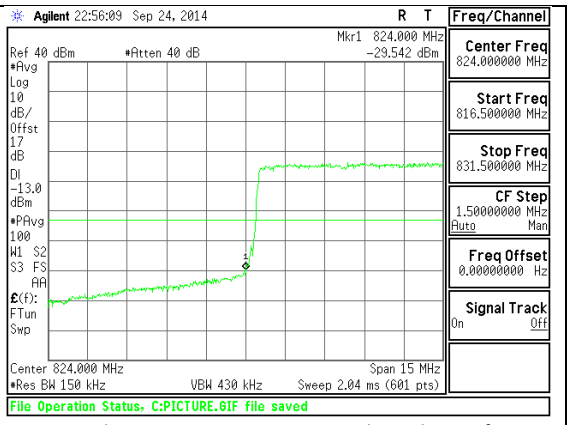
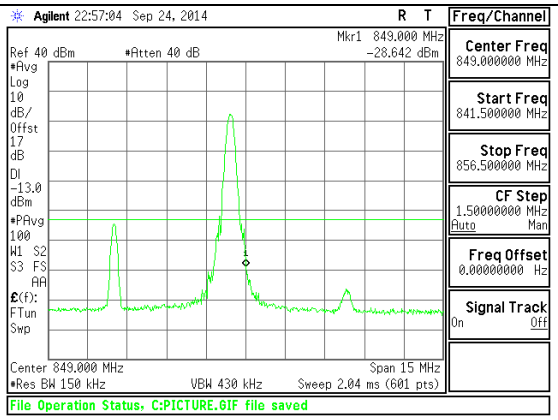
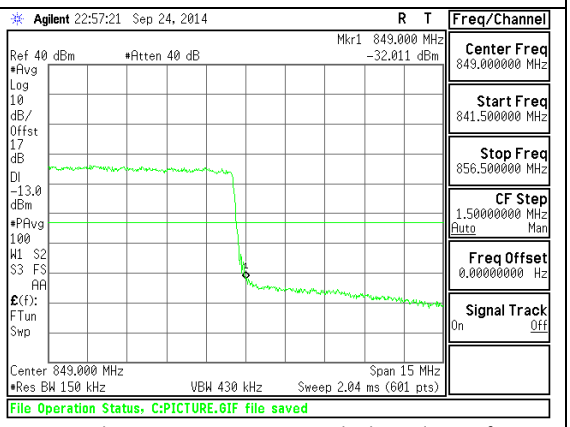
| | | |
|---|---|---|
| Band LTE5 10MHz QPSK |  <br>Band LTE5 10MHz CBE QPSK Low Channel 1RB.gif |  <br>Band LTE5 10MHz CBE QPSK Low Channel FRB.gif |
| Band LTE5 10MHz QPSK |  <br>Band LTE5 10MHz CBE QPSK High Channel 1RB.gif |  <br>Band LTE5 10MHz CBE QPSK High Channel FRB.gif |

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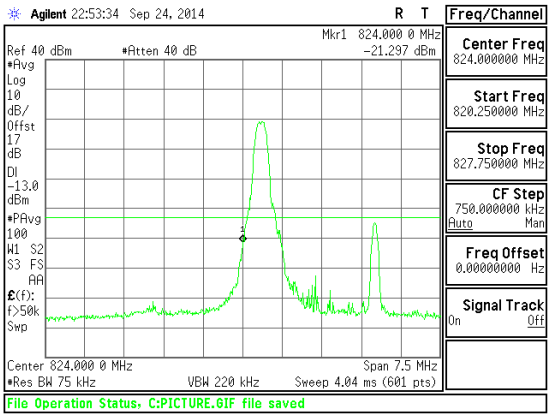
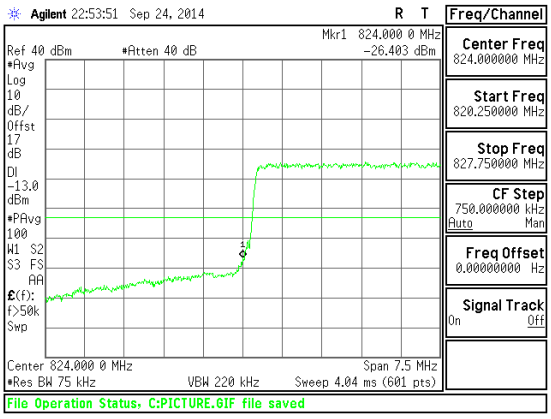
Band LTE5 5MHz 16QAM

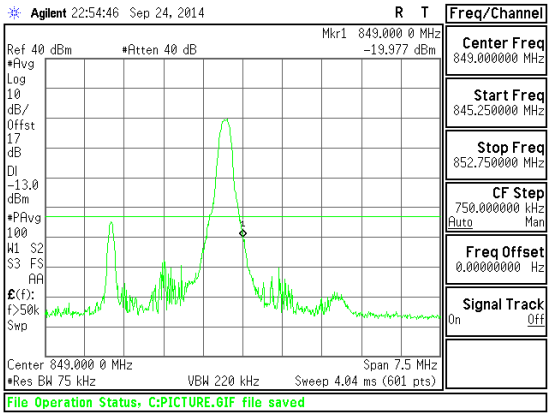



Band LTE5 5MHz CBE 16QAM Low Channel 1RB.gif

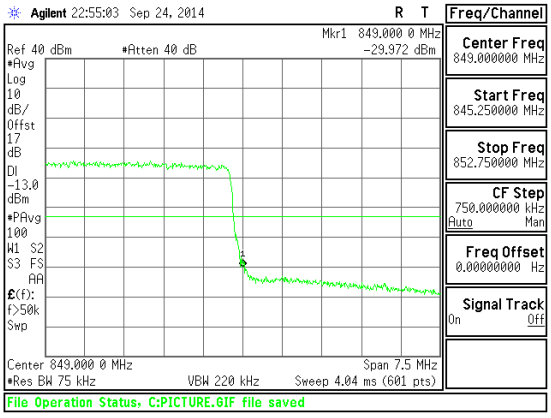



Band LTE5 5MHz CBE 16QAM Low Channel FRB.gif

Band LTE5 5MHz 16QAM




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




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



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
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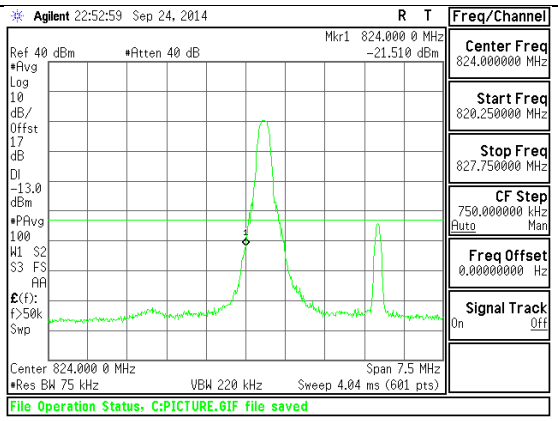
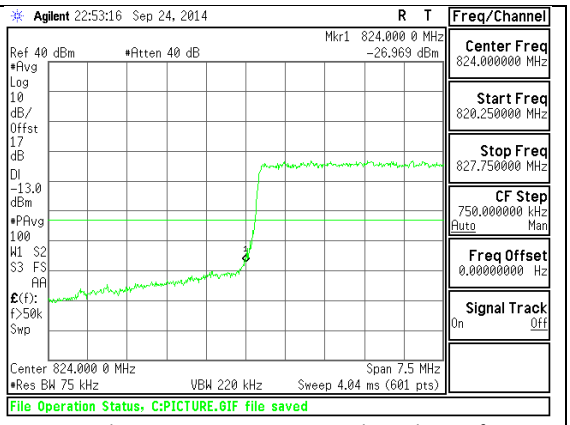
Band LTE5 5MHz QPSK

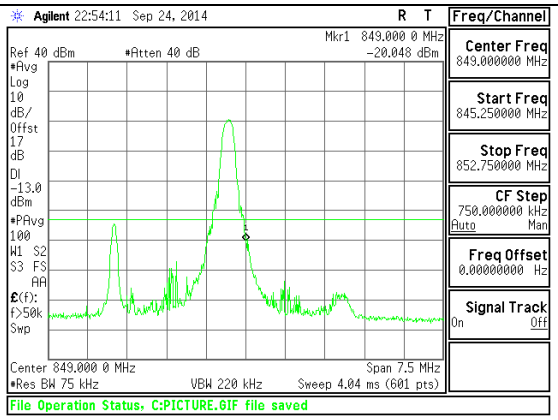



Band LTE5 5MHz CBE QPSK Low Channel 1RB.gif

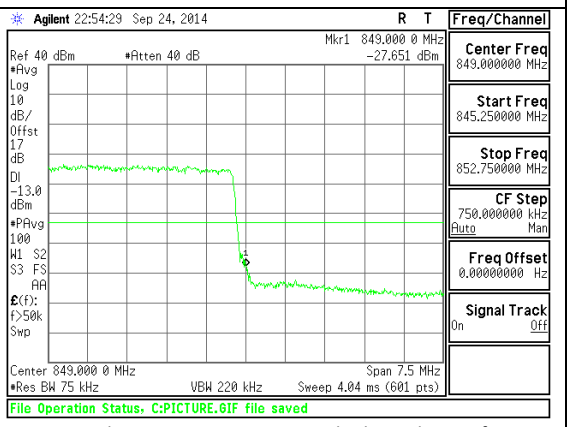



Band LTE5 5MHz CBE QPSK Low Channel FRB.gif

Band LTE5 5MHz QPSK




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




Band LTE5 5MHz CBE QPSK High Channel FRB.gif

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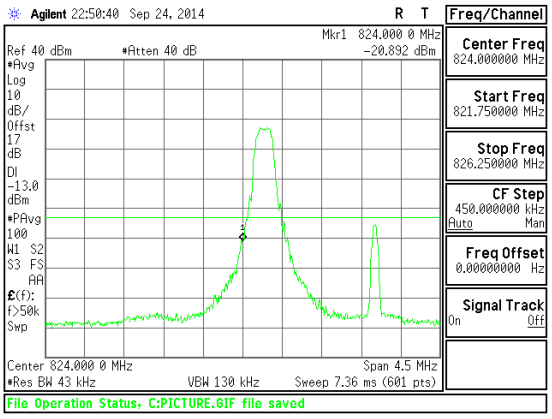
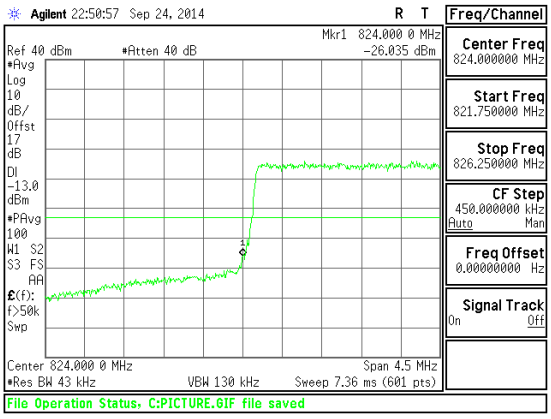
Band LTE5 3MHz 16QAM

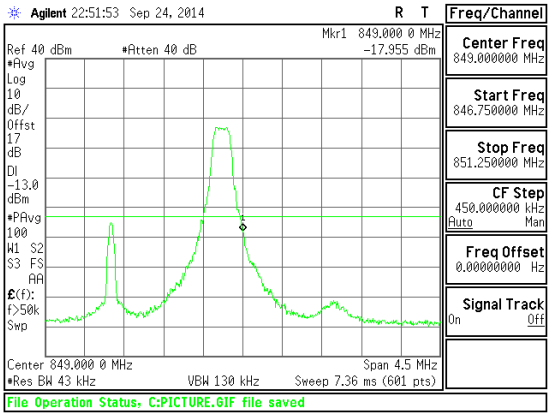



Band LTE5 3MHz CBE 16QAM Low Channel 1RB.gif

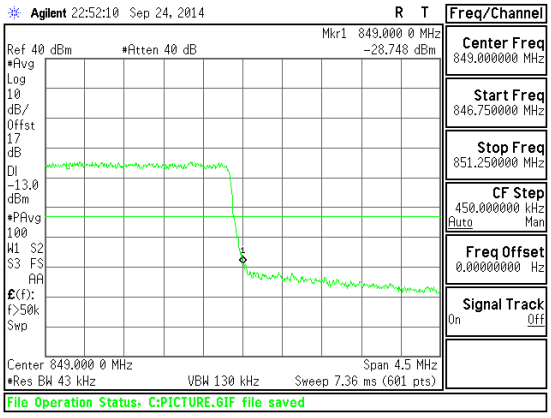



Band LTE5 3MHz CBE 16QAM Low Channel FRB.gif

Band LTE5 3MHz 16QAM




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




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

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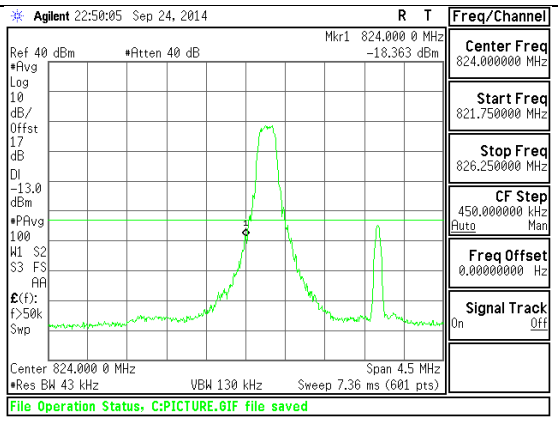
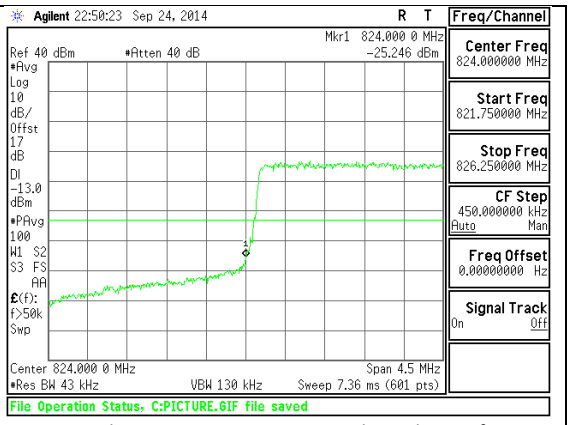
Band LTE5 3MHz QPSK

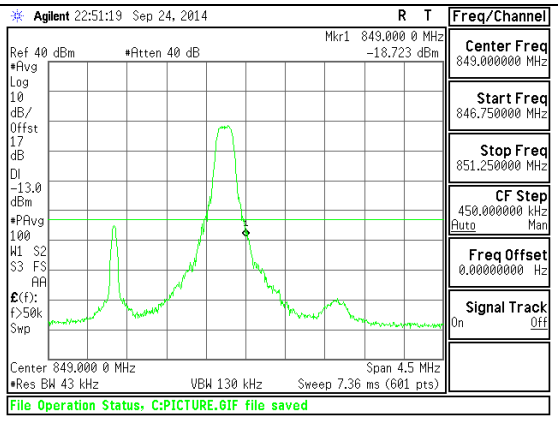



Band LTE5 3MHz CBE QPSK Low Channel 1RB.gif

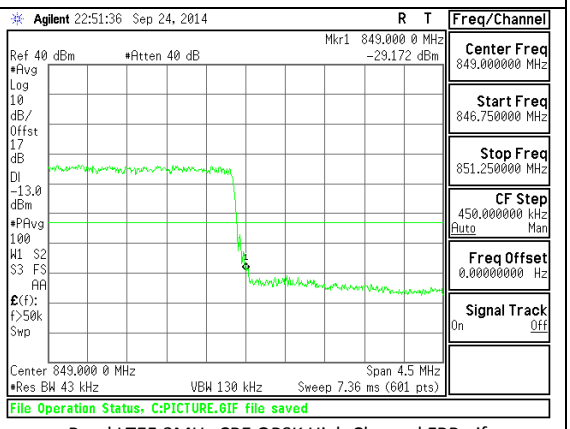



Band LTE5 3MHz CBE QPSK Low Channel FRB.gif

Band LTE5 3MHz QPSK




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




Band LTE5 3MHz CBE QPSK High Channel FRB.gif

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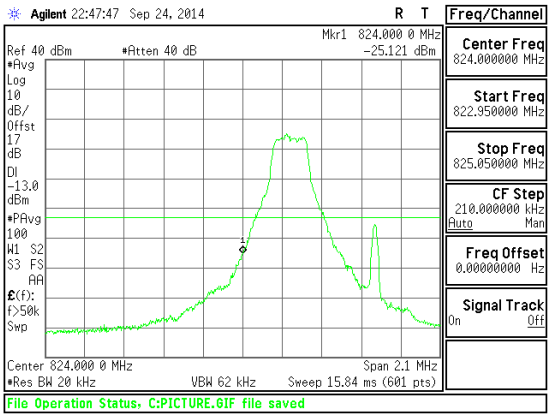
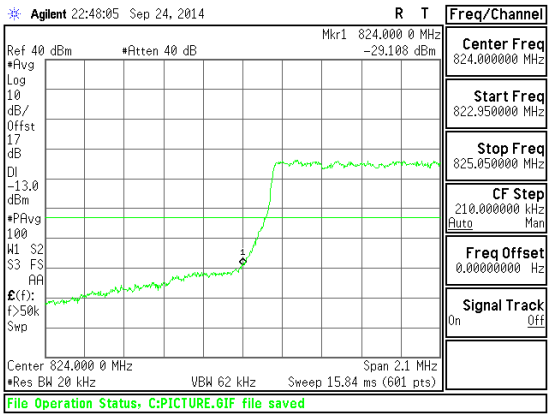
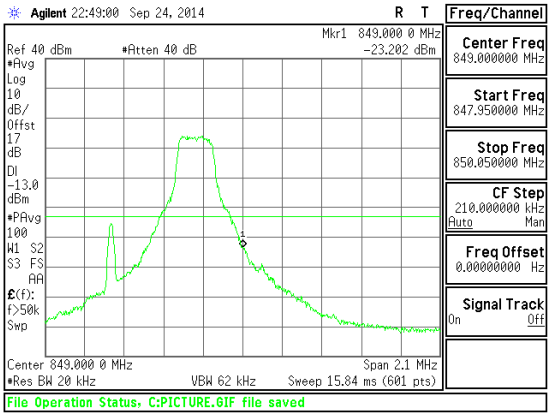
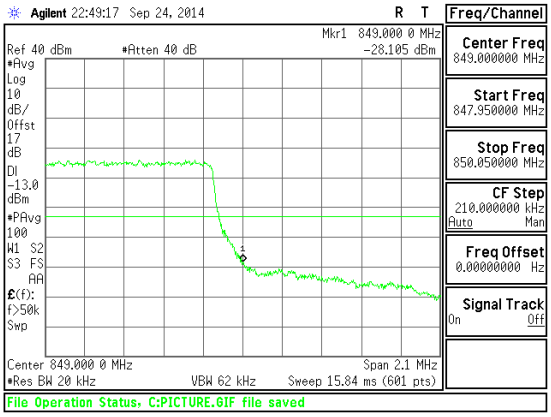
| | | |
|---|---|---|
| Band LTE5 1.4MHz 16QAM |  <br>Band LTE5 1.4MHz CBE 16QAM Low Channel 1RB.gif |  <br>Band LTE5 1.4MHz CBE 16QAM Low Channel FRB.gif |
| Band LTE5 1.4MHz 16QAM |  <br>Band LTE5 1.4MHz CBE 16QAM High Channel 1RB.gif |  <br>Band LTE5 1.4MHz CBE 16QAM High Channel FRB.gif |

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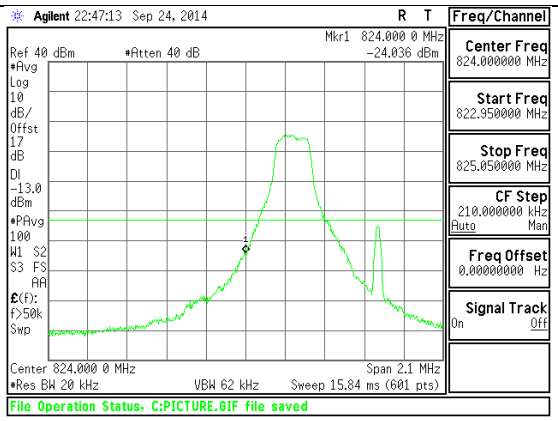
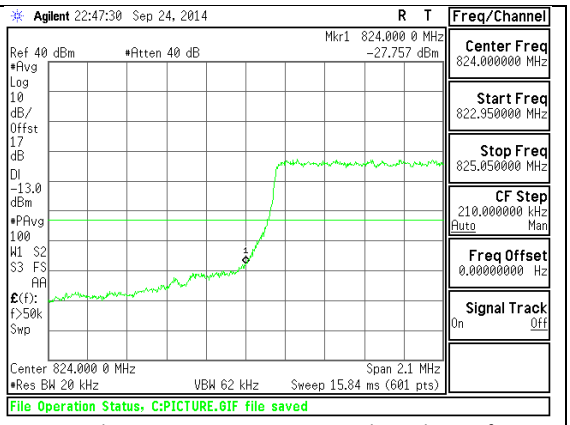
Band LTE5 1.4MHz QPSK

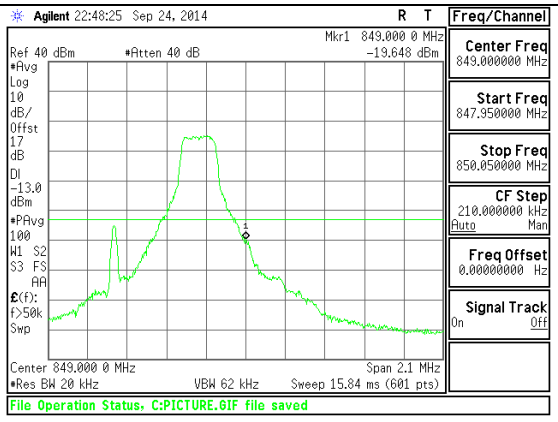



Band LTE5 1.4MHz CBE QPSK Low Channel 1RB.gif

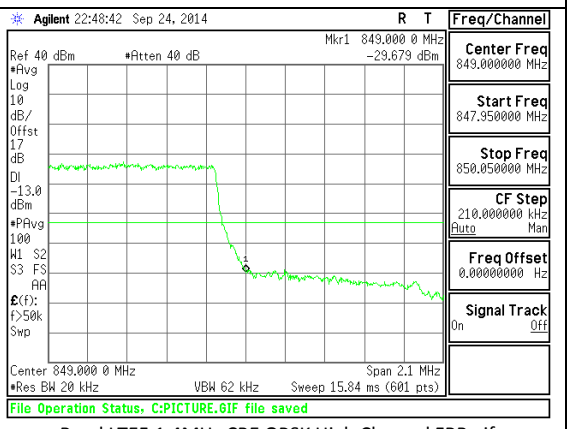



Band LTE5 1.4MHz CBE QPSK Low Channel FRB.gif

Band LTE5 1.4MHz QPSK




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




Band LTE5 1.4MHz CBE QPSK High Channel FRB.gif

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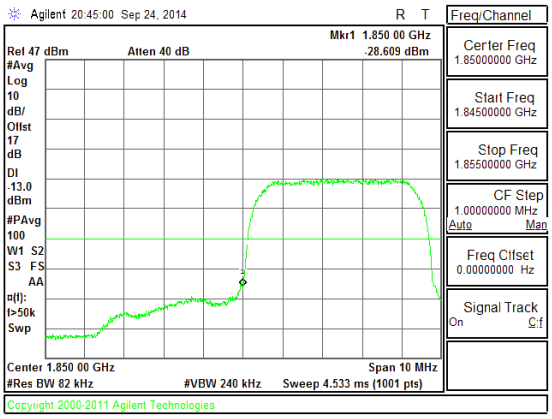
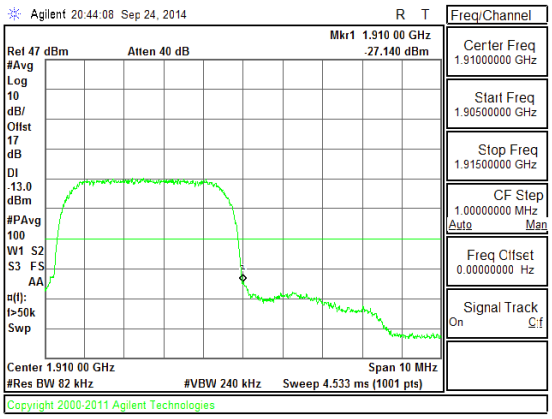
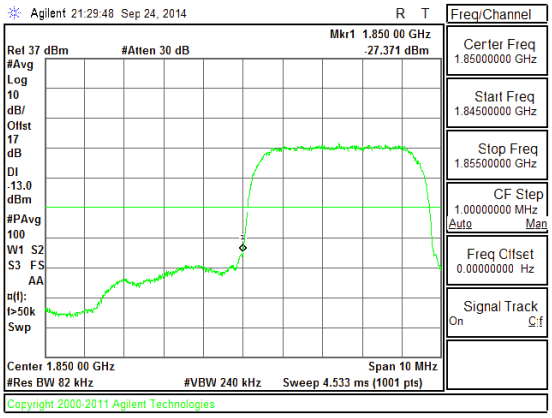
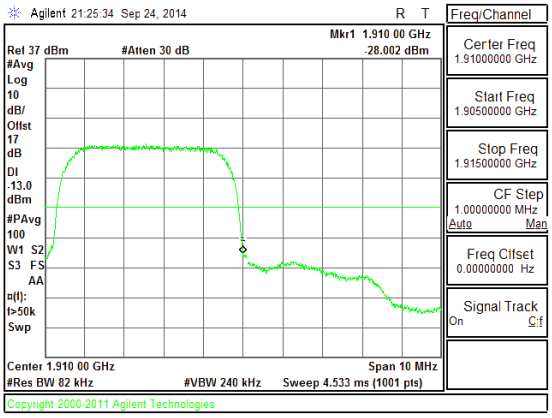
| | | |
|---|---|---|
| Band<br>Band 2<br>HSDPA |  <br>Band WCDMA B2 HSDPA CBE |  <br>Band WCDMA B2 HSDPA CBE |
| Band<br>Band 2<br>REL99 |  <br>Band WCDMA B2 REL99 CBE |  <br>Band WCDMA B2 REL99 CBE |

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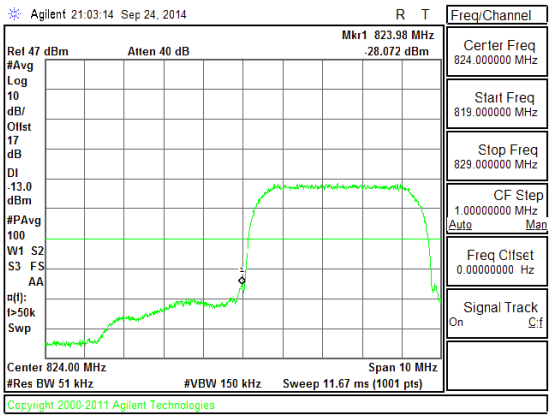
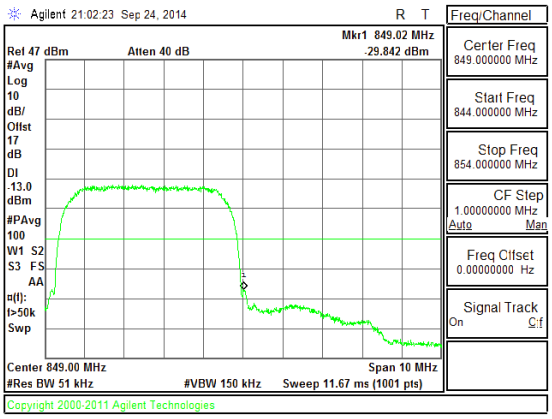
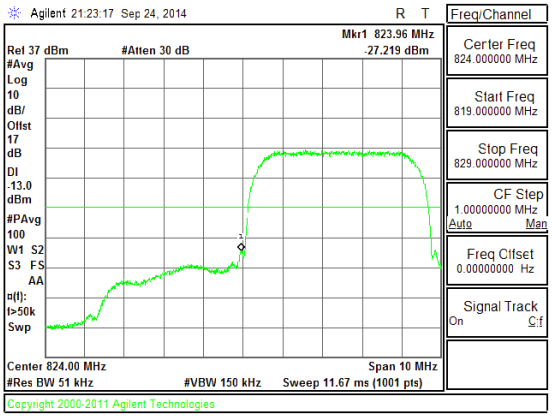
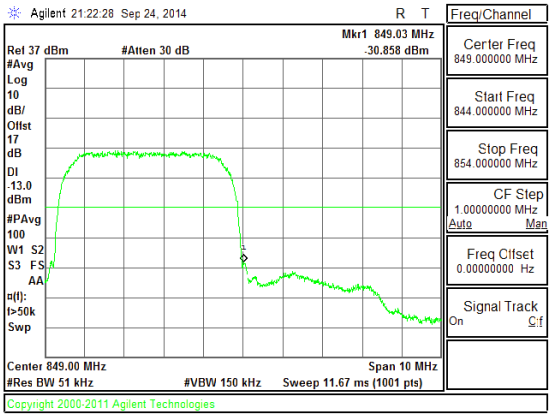
| | | |
|---|---|---|
| Band<br>Band 5<br>HSDPA |  <br>Band WCDMA B5 HSDPA CBE |  <br>Band WCDMA B5 HSDPA CBE |
| Band<br>Band 5<br>REL99 |  <br>Band WCDMA B5 REL99 CBE |  <br>Band WCDMA B5 REL99 CBE |

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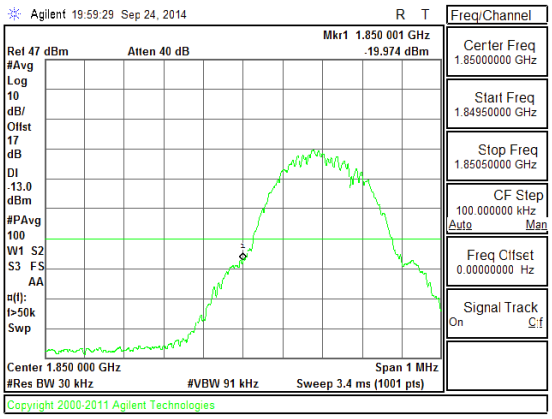
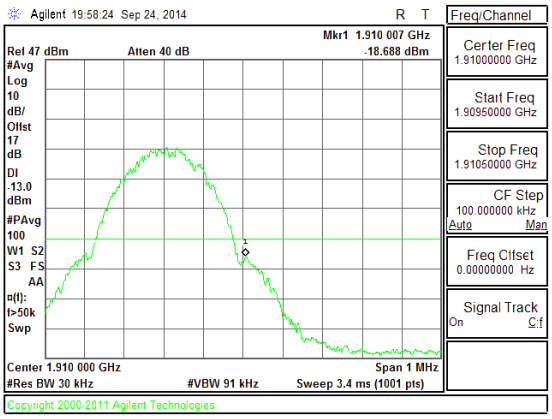
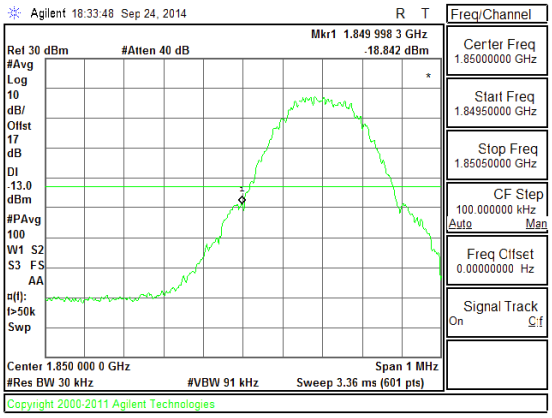
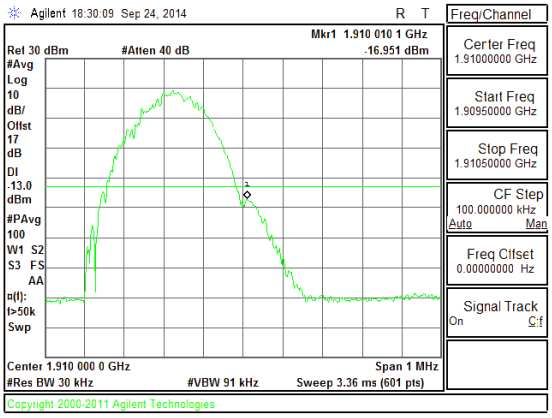
| | | |
|---|---|---|
| Band GSM 1900 EGPRS |  <br>Band GSM1900 EGPRS CBE Low channel |  <br>Band GSM1900 EGPRS CBE High channel |
| Band GSM 1900 GPRS |  <br>Band GSM1900 GPRS CBE Low channel |  <br>Band GSM1900 GPRS CBE High channel |

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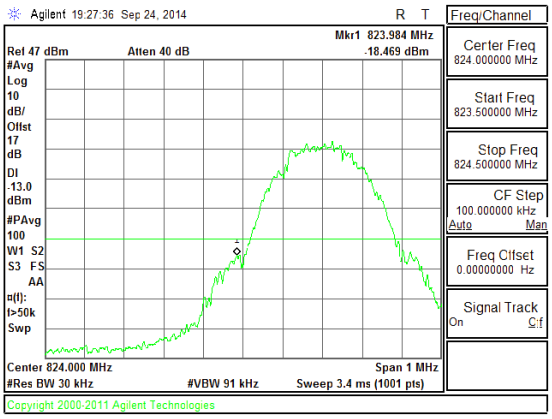
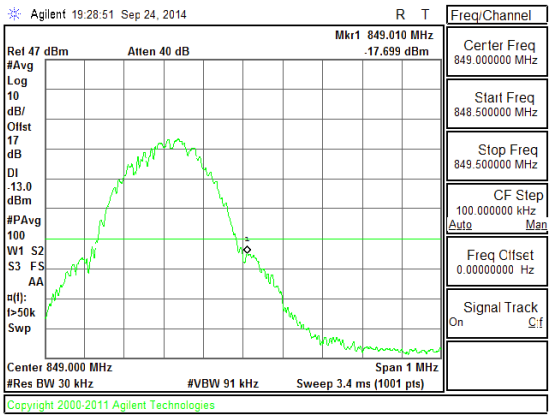
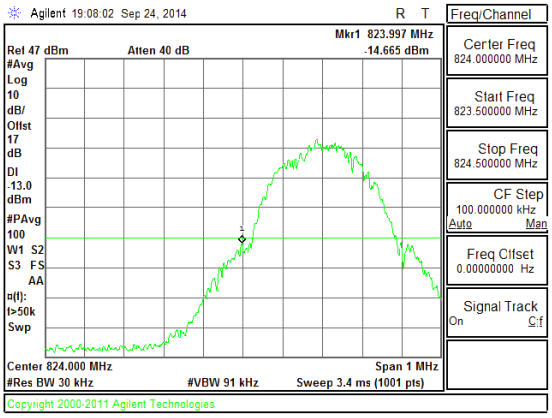
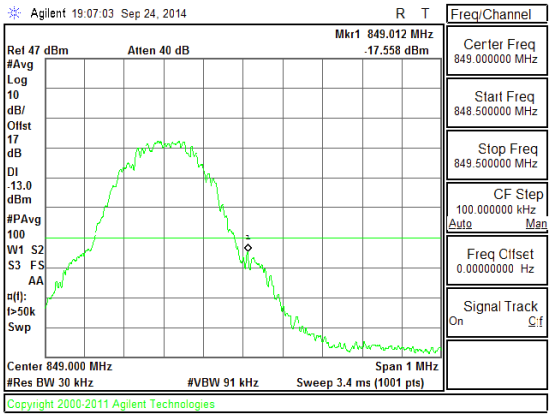
| | | |
|---|---|---|
| Band GSM 850 EGPRS |  <br>Band GSM850 EGPRS CBE Low channel |  <br>Band GSM850 EGPRS CBE High channel |
| Band GSM 850 GPRS |  <br>Band GSM850 GPRS CBE Low channel |  <br>Band GSM850 GPRS CBE High channel |

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## 10.3. OUT OF BAND EMISSIONS

**RULE PART(S)**

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

**LIMITS**

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

Part 27: (m)(4) For mobile station, the attenuation factor shall be not less than 43+10Log(P)dB at the channel edge and (55+10Log(P)dB) at 5.5MHz from the channel edges.

**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) |
|---|---|---|---|---|---|---|
| LTE5 | 10 | QPSK | 829 | -14.41 | -13 | -1.41 |
| | | | 836.5 | -13.76 | -13 | -0.76 |
| | | | 844 | -13.67 | -13 | -1.8 |
| | | 16QAM | 829 | -14.72 | -13 | -1.72 |
| | | | 836.5 | -13.67 | -13 | -1.2 |
| | | | 844 | -13.25 | -13 | -0.25 |

| Band | BW (MHz) | Mode | f (MHz) | Spur (dBm) | Spec (dBm) | Delta (dB) |
|---|---|---|---|---|---|---|
| LTE5 | 5 | QPSK | 826.5 | -13.61 | -13 | -0.61 |
| | | | 836.5 | -14.43 | -13 | -1.43 |
| | | | 846.5 | -13.5 | -13 | -0.5 |
| | | 16QAM | 826.5 | -14.05 | -13 | -1.05 |
| | | | 836.5 | -14.33 | -13 | -1.33 |
| | | | 846.5 | -13.43 | -13 | -0.43 |

| Band | BW (MHz) | Mode | f (MHz) | Spur (dBm) | Spec (dBm) | Delta (dB) |
|---|---|---|---|---|---|---|
| LTE5 | 3 | QPSK | 825.5 | -14.36 | -13 | -1.36 |
| | | | 836.5 | -14.36 | -13 | -1.36 |
| | | | 847.5 | -14.31 | -13 | -1.31 |
| | | 16QAM | 825.5 | -13.75 | -13 | -0.75 |
| | | | 836.5 | -14 | -13 | -1 |
| | | | 847.5 | -13.22 | -13 | -0.22 |

| Band | BW (MHz) | Mode | f (MHz) | Spur (dBm) | Spec (dBm) | Delta (dB) |
|---|---|---|---|---|---|---|
| LTE5 | 1.4 | QPSK | 824.7 | -14.35 | -13 | -1.35 |
| | | | 836.5 | -14.13 | -13 | -1.13 |
| | | | 848.3 | -14.3 | -13 | -1.3 |
| | | 16QAM | 824.7 | -14.32 | -13 | -1.32 |
| | | | 836.5 | -14.33 | -13 | -1.33 |
| | | | 848.3 | -13.46 | -13 | -0.46 |




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| Band | Mode | f (MHz) | Spur (dBm) | Spec (dBm) | Delta (dB) |
|---|---|---|---|---|---|
| GSM850 | GPRS | 824.2 | -26.92 | -13 | -13.92 |
| | | 836.6 | -26.7 | -13 | -13.7 |
| | | 848.8 | -26.91 | -13 | -13.91 |
| | EGPRS | 824.2 | -26.24 | -13 | -13.24 |
| | | 836.6 | -25.92 | -13 | -12.92 |
| | | 848.8 | -25.78 | -13 | -12.78 |
| GSM1900 | GPRS | 1850.2 | -16.51 | -13 | -3.51 |
| | | 1880 | -16.41 | -13 | -3.41 |
| | | 1909.8 | -15.38 | -13 | -2.38 |
| | EGPRS | 1850.2 | -17.02 | -13 | -4.02 |
| | | 1880 | -16.04 | -13 | -3.04 |
| | | 1909.8 | -16.92 | -13 | -3.92 |

| Band | Mode | f (MHz) | Spur (dBm) | Spec (dBm) | Delta (dB) |
|---|---|---|---|---|---|
| Band 5 | REL99 | 826.4 | -26.82 | -13 | -13.82 |
| | | 836.6 | -26.84 | -13 | -13.84 |
| | | 846.6 | -26.4 | -13 | -13.4 |
| | HSDPA | 826.4 | -27.31 | -13 | -14.31 |
| | | 836.6 | -26.92 | -13 | -13.92 |
| | | 846.6 | -27.42 | -13 | -14.42 |
| Band 2 | REL99 | 1852.4 | -26.58 | -13 | -13.58 |
| | | 1880 | -26.49 | -13 | -13.49 |
| | | 1907.6 | -26.67 | -13 | -13.67 |
| | HSDPA | 1852.4 | -16.07 | -13 | -3.07 |
| | | 1880 | -17.18 | -13 | -4.18 |
| | | 1907.6 | -17.36 | -13 | -4.36 |




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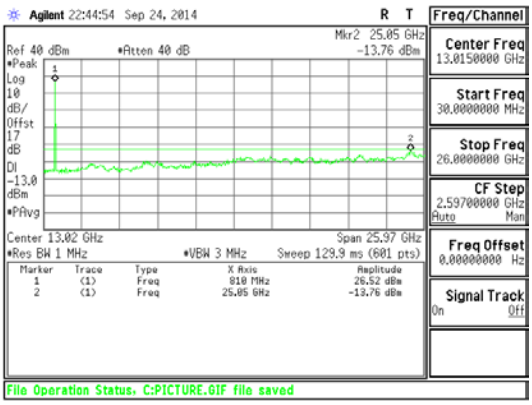
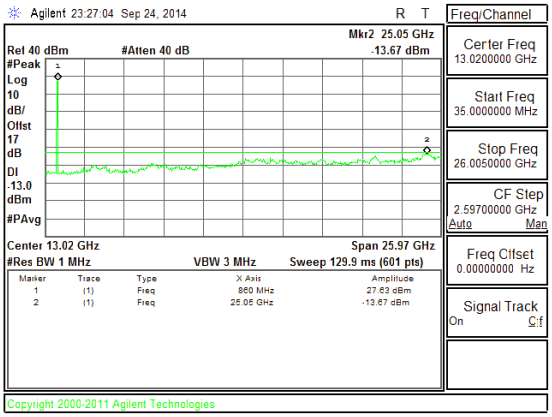
## 10.3.2. OUT OF BAND EMISSIONS PLOTS

| | | |
|---|---|---|
| Band<br>LTE5<br>10MHz<br>16QAM |  <br>Band LTE5 10MHz CSE 16QAM Mid channel |  <br>Band LTE5 10MHz CSE QPSK Mid channel |

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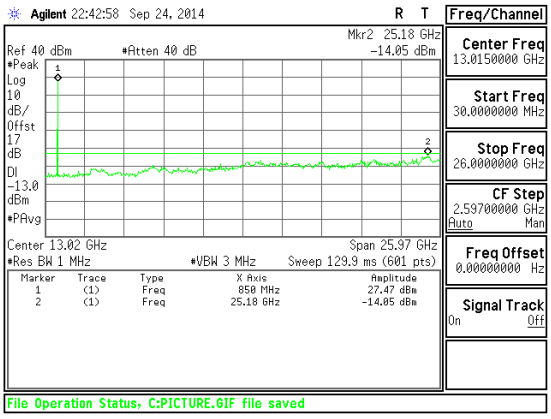
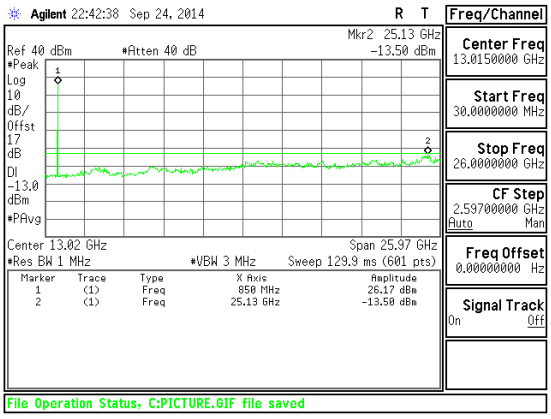
| | | |
|---|---|---|
| Band<br>LTE5<br>5MHz<br>16QAM |  <br>Band LTE5 5MHz CSE 16QAM Mid channel |  <br>Band LTE5 5MHz CSE QPSK Mid channel |

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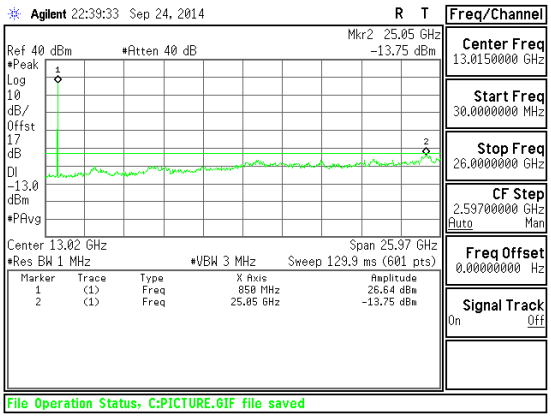
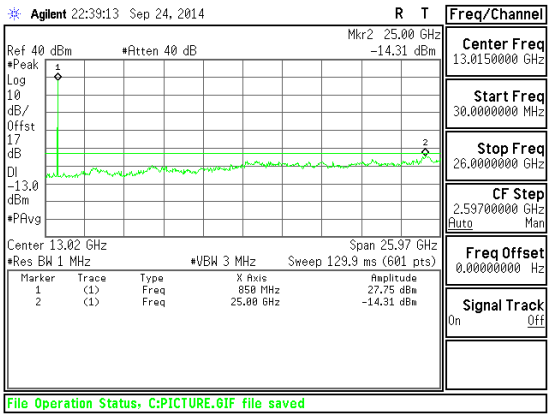
| | | |
|---|---|---|
| Band<br>LTE5<br>3MHz<br>16QAM |  <br>Band LTE5 3MHz CSE 16QAM Mid channel |  <br>Band LTE5 3MHz CSE QPSK Mid channel |

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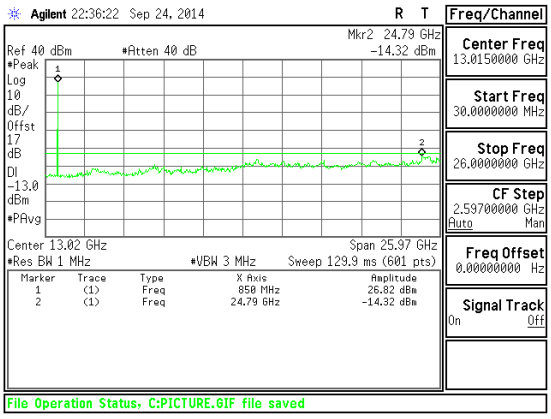
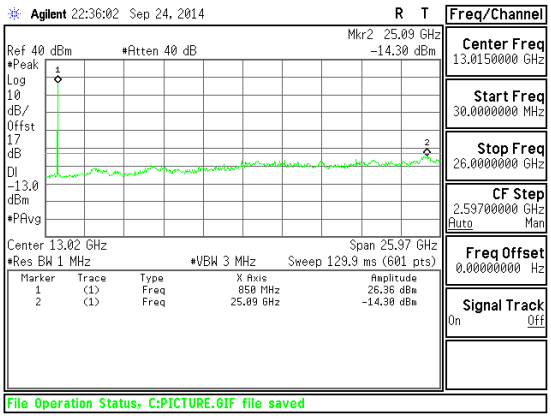
| | | |
|---|---|---|
| Band<br>LTE5<br>1.4MHz<br>16QAM |  <br>Band LTE5 1.4MHz CSE 16QAM Mid channel |  <br>Band LTE5 1.4MHz CSE QPSK Mid channel |

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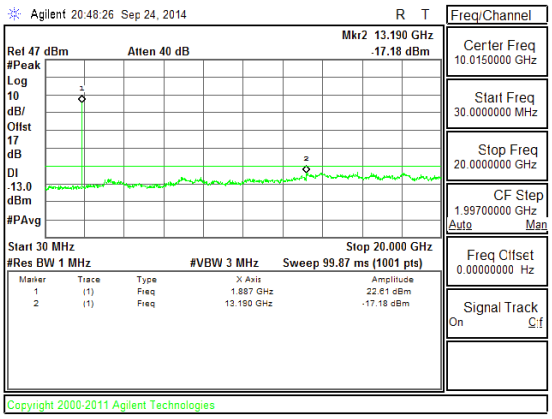
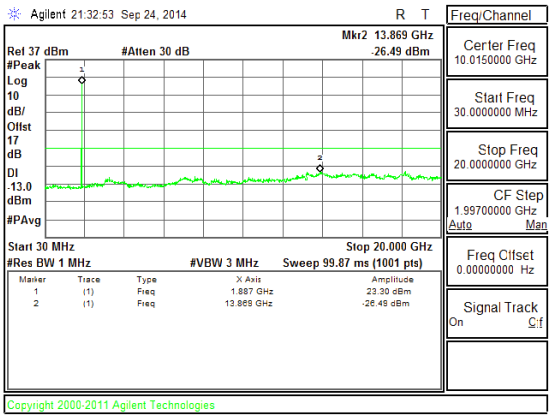
| | | |
|---|---|---|
| Band<br><br>Band 2<br><br>HSDPA |  <br>Band WCDMA B2 HSDPA CSE |  <br>Band WCDMA B2 REL99 CSE |

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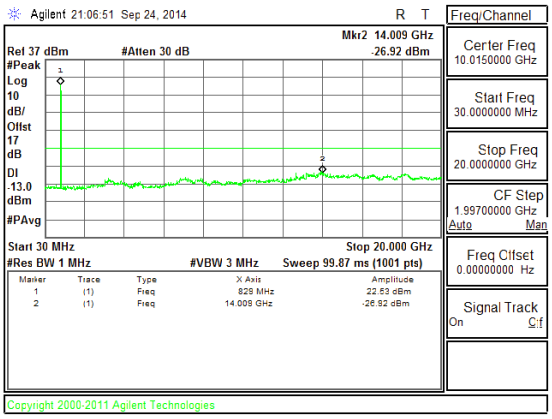
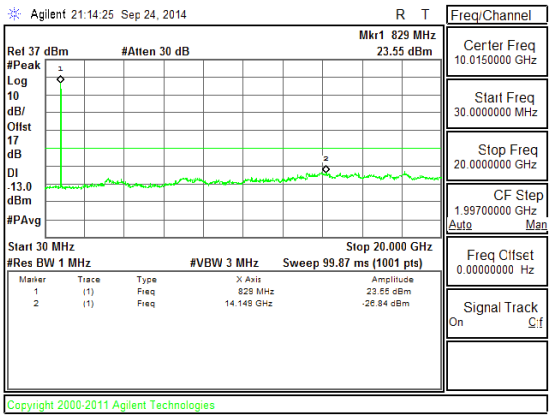
| | | |
|---|---|---|
| Band<br><br>Band 5<br><br>HSDPA |  <br>Band WCDMA B5 HSDPA CSE |  <br>Band WCDMA B5 REL99 CSE |

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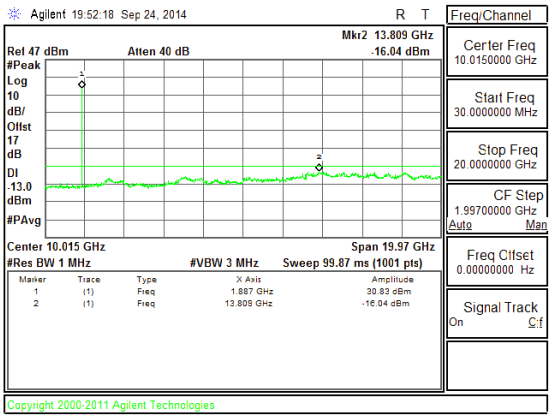
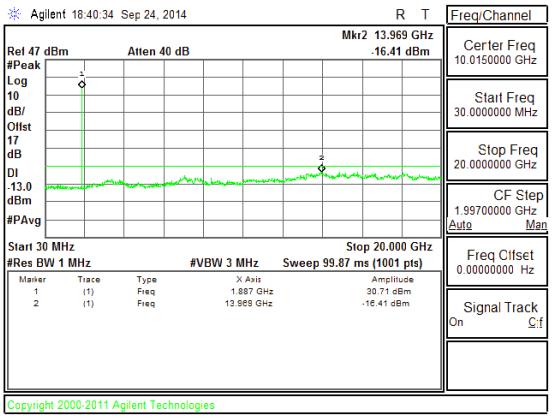
| | | |
|---|---|---|
| Band<br>GSM<br>1900<br>EGPRS |  <br>Band GSM1900 EGPRS CSE Mid channel |  <br>Band GSM1900 GPRS CSE Mid channel |

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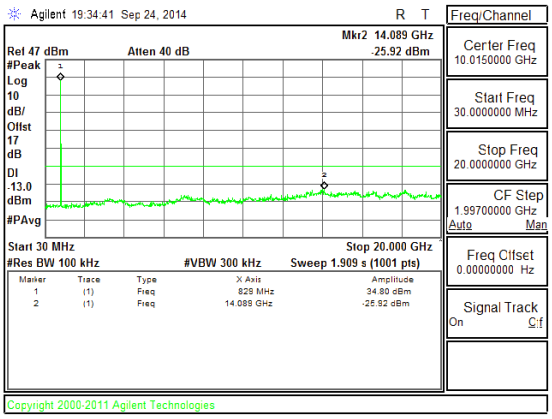
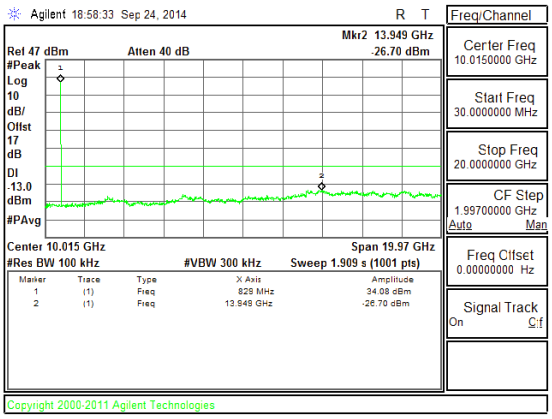
| | | |
|---|---|---|
| Band<br>GSM<br>850<br>EGPRS |  <br>Band GSM850 EGPRS CSE Mid channel |  <br>Band GSM850 GPRS CSE Mid channel |

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## 10.4. FREQUENCY STABILITY

**RULE PART(S)**

FCC: §2.1055, §22.355, §24.235, §27.54 and §90.213

**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.

**TEST PROCEDURE**

Per KDB 971168 D01 Power Meas License Digital Systems v02r01

**MODES TESTED**

**RESULTS**

See the following pages.




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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<br>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 | 1879.999990 | 0.001 | 2.5 |
| 3.80 | 40 | 1879.999989 | 0.001 | 2.5 |
| 3.80 | 30 | 1879.999989 | 0.002 | 2.5 |
| ***3.80*** | ***20*** | **1879.999992** | **0** | ***2.5*** |
| 3.80 | 10 | 1879.999987 | 0.002 | 2.5 |
| 3.80 | 0 | 1879.999992 | 0.000 | 2.5 |
| 3.80 | -10 | 1879.999989 | 0.001 | 2.5 |
| 3.80 | -20 | 1879.999986 | 0.003 | 2.5 |
| 3.80 | -30 | 1879.999993 | -0.001 | 2.5 |

| Reference Frequency: PCS Mid Channel 1880 MHz @ 20°C<br>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*** | ***1879.999992*** | ***0*** | ***2.5*** |
| 4.30 | 20 | 1879.999988 | *0.002* | 2.5 |
| 3.20 | 20 | 1879.999995 | *-0.002* | 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 | 836.599986 | 0.000 | 2.5 |
| 3.80 | 40 | 836.599987 | -0.001 | 2.5 |
| 3.80 | 30 | 836.599987 | -0.001 | 2.5 |
| 3.80 | ***20*** | ***836.599986*** | ***0*** | ***2.5*** |
| 3.80 | 10 | 836.599989 | -0.004 | 2.5 |
| 3.80 | 0 | 836.599987 | -0.001 | 2.5 |
| 3.80 | -10 | 836.599987 | -0.001 | 2.5 |
| 3.80 | -20 | 836.599987 | -0.001 | 2.5 |
| 3.80 | -30 | 836.599985 | 0.001 | 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*** | ***836.599986*** | ***0.00000*** | ***2.5*** |
| 4.30 | 20 | 836.599986 | *0.00000* | 2.5 |
| 3.20 | 20 | 836.599992 | *-0.00717* | 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

**LIMITS**

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

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

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

**TEST PROCEDURE**

ANSI / TIA / EIA 603C Clause 2.2.17; 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.

**MODES TESTED**

**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 | 15.85 | 38.46 |
| | | 9400 | 1880 | 16.91 | 49.09 |
| | | 9538 | 1907.6 | 16.33 | 42.95 |
| | HSDPA | 9262 | 1852.4 | 15.06 | 32.06 |
| | | 9400 | 1880 | 16.84 | 48.31 |
| | | 9538 | 1907.6 | 15.51 | 35.56 |
| | HSUPA | 9262 | 1852.4 | | |
| | | 9400 | 1880 | | |
| | | 9538 | 1907.6 | | |

| Band | Mode | Channel | f(MHz) | ERP / EIRP | |
|---|---|---|---|---|---|
| | | | | dBm | mW |
| Band 5 | REL99 | 4132 | 826.4 | 20.911 | 123.34 |
| | | 4183 | 836.6 | 19.891 | 97.52 |
| | | 4233 | 846.6 | 19.347 | 86.04 |
| | HSDPA | 4132 | 826.4 | 20.271 | 106.44 |
| | | 4183 | 836.6 | 18.891 | 77.46 |
| | | 4233 | 846.6 | 18.547 | 71.56 |
| | HSUPA | 4132 | 826.4 | | |
| | | 4183 | 836.6 | | |
| | | 4233 | 846.6 | | |

| Band | Mode | Channel | f(MHz) | ERP / EIRP | |
|---|---|---|---|---|---|
| | | | | dBm | mW |
| GSM1900 | GMSK | 512 | 1850.2 | | |
| | | 661 | 1880 | | |
| | | 810 | 1909.8 | | |
| | GPRS | 512 | 1850.2 | 22.96 | 197.7 |
| | | 661 | 1880 | 26.30 | 426.58 |
| | | 810 | 1909.8 | 23.11 | 204.6 |
| | EGPRS | 512 | 1850.2 | 21.28 | 134.3 |
| | | 661 | 1880 | 21.97 | 204.6 |
| | | 810 | 1909.8 | 21.78 | 134.3 |



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| Band | Mode | Channel | f(MHz) | ERP / EIRP | |
|---|---|---|---|---|---|
| | | | | dBm | mW |
| GSM850 | GMSK | 128 | 824.2 | | |
| | | 190 | 836.6 | | |
| | | 251 | 848.8 | | |
| | GPRS | 128 | 824.2 | 30.27 | 1064.39 |
| | | 190 | 836.6 | 31.03 | 1267.94 |
| | | 251 | 848.8 | 30.79 | 1201.43 |
| | EGPRS | 128 | 824.2 | 27.30 | 537.16 |
| | | 190 | 836.6 | 27.18 | 522.52 |
| | | 251 | 848.8 | 27.69 | 588.44 |




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### 11.1.2. LTE ERP/EIRP Results

| Band | BW (MHz) | Mode | RB/RB Size | f (MHz) | ERP / EIRP | |
|---|---|---|---|---|---|---|
| | | | | | dBm | mW |
| LTE5 | 10 | QPSK | 1/0 | 829 | 17.50 | 56.25 |
| | | | 1/0 | 836.5 | 18.30 | 67.62 |
| | | | 1/0 | 844 | 18.6 | 72.44 |
| | | 16QAM | 1/0 | 829 | 16.30 | 42.67 |
| | | | 1/0 | 836.5 | 17.50 | 56.25 |
| | | | 1/0 | 844 | 17.90 | 61.67 |

| Band | BW (MHz) | Mode | RB/RB Size | f (MHz) | ERP / EIRP | |
|---|---|---|---|---|---|---|
| | | | | | dBm | mW |
| LTE5 | 5 | QPSK | 1/0 | 826.5 | 18.02 | 63.4 |
| | | | 1/0 | 836.5 | 18.93 | 78.18 |
| | | | 1/0 | 846.5 | 18.55 | 71.63 |
| | | 16QAM | 1/0 | 826.5 | 17.32 | 53.96 |
| | | | 1/0 | 836.5 | 18.12 | 64.88 |
| | | | 1/0 | 846.5 | 17.27 | 53.35 |

| Band | BW (MHz) | Mode | RB/RB Size | f (MHz) | ERP / EIRP | |
|---|---|---|---|---|---|---|
| | | | | | dBm | mW |
| LTE5 | 3 | QPSK | 1/0 | 825.5 | 18.30 | 67.6 |
| | | | 1/0 | 836.5 | 19.15 | 82.2 |
| | | | 1/0 | 847.5 | 19.93 | 98.4 |
| | | 16QAM | 1/0 | 825.5 | 17.38 | 54.71 |
| | | | 1/0 | 836.5 | 18.22 | 66.39 |
| | | | 1/0 | 847.5 | 18.79 | 75.7 |

| Band | BW (MHz) | Mode | RB/RB Size | f (MHz) | ERP / EIRP | |
|---|---|---|---|---|---|---|
| | | | | | dBm | mW |
| LTE5 | 1.4 | QPSK | 1/0 | 824.7 | 18.30 | 67.62 |
| | | | 1/0 | 836.5 | 18.80 | 75.88 |
| | | | 1/0 | 848.3 | 19.13 | 81.87 |
| | | 16QAM | 1/0 | 824.7 | 17.50 | 56.25 |
| | | | 1/0 | 836.5 | 17.67 | 58.49 |
| | | | 1/0 | 848.3 | 18.30 | 67.62 |




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### 11.1.3. ERP/EIRP PLOTS

Band

LTE5

10MHz

16QAM

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

**Company:** Samsung
**Project #:** 14I18889
**Date:** 09/24/14
**Test Engineer:** Dante/Kiya
**Configuration:** X-pos EUT
**Mode:** LTE5 10M 16QAM

**Test Equipment:**
**Receiving: Sunol T243, and 3m Chamber N-type Cable (Setup this one for testing EUT)**
**Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 829.00 | 6.27 | V | 0.9 | 0.0 | 5.37 | 38.5 | -33.1 | |
| 829.00 | 17.20 | H | 0.9 | 0.0 | 16.30 | 38.5 | -22.1 | |
| Mid Ch | | | | | | | | |
| 836.50 | 8.40 | V | 0.9 | 0.0 | 7.50 | 38.5 | -31.0 | |
| 836.50 | 18.40 | H | 0.9 | 0.0 | 17.50 | 38.5 | -20.9 | |
| High Ch | | | | | | | | |
| 844.00 | 5.00 | V | 0.9 | 0.0 | 4.10 | 38.5 | -34.3 | |
| 844.00 | 18.80 | H | 0.9 | 0.0 | 17.90 | 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

LTE5

10MHz

QPSK

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

**Company:** Samsung
**Project #:** 14I18889
**Date:** 09/24/14
**Test Engineer:** Dante/Kiya
**Configuration:** X-pos EUT
**Mode:** LTE5 10M QPSK, Sample 1956394

**Test Equipment:**
**Receiving: Sunol T243, and 3m Chamber N-type Cable (Setup this one for testing EUT)**
**Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 829.00 | 7.47 | V | 0.9 | 0.0 | 6.57 | 38.5 | -31.9 | |
| 829.00 | 18.40 | H | 0.9 | 0.0 | 17.50 | 38.5 | -20.9 | |
| Mid Ch | | | | | | | | |
| 836.50 | 9.00 | V | 0.9 | 0.0 | 8.10 | 38.5 | -30.4 | |
| 836.50 | 19.20 | H | 0.9 | 0.0 | 18.30 | 38.5 | -20.1 | |
| High Ch | | | | | | | | |
| 844.00 | 66.60 | V | 0.9 | 0.0 | 65.70 | 38.5 | 27.3 | |
| 844.00 | 19.50 | H | 0.9 | 0.0 | 18.60 | 38.5 | -19.8 | |

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

LTE5

5MHz

16QAM

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

**Company:** Samsung
**Project #:** 14I18889
**Date:** 09/24/14
**Test Engineer:** J. GOMEZ
**Configuration:** X-pos EUT
**Mode:** LTE5 5MHz 16QAM

**Test Equipment:**
**Receiving: Sunol T243, and 3m Chamber N-type Cable (Setup this one for testing EUT)**
**Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 826.50 | 4.68 | V | 0.9 | 0.0 | 3.78 | 38.5 | -34.7 | |
| 826.50 | 18.22 | H | 0.9 | 0.0 | 17.32 | 38.5 | -21.1 | |
| Mid Ch | | | | | | | | |
| 836.50 | 8.54 | V | 0.9 | 0.0 | 7.64 | 38.5 | -30.8 | |
| 836.50 | 19.02 | H | 0.9 | 0.0 | 18.12 | 38.5 | -20.3 | |
| High Ch | | | | | | | | |
| 846.50 | 7.67 | V | 0.9 | 0.0 | 6.77 | 38.5 | -31.7 | |
| 846.50 | 18.17 | H | 0.9 | 0.0 | 17.27 | 38.5 | -21.2 | |

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

LTE5

5MHz

QPSK

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

**Company:** Samsung
**Project #:** 14I18889
**Date:** 09/24/14
**Test Engineer:** J. GOMEZ
**Configuration:** X-pos EUT
**Mode:** LTE5 5MHz QPSK

**Test Equipment:**
**Receiving: Sunol T243, and 3m Chamber N-type Cable (Setup this one for testing EUT)**
**Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 826.50 | 5.69 | V | 0.9 | 0.0 | 4.79 | 38.5 | -33.7 | |
| 826.50 | 18.92 | H | 0.9 | 0.0 | 18.02 | 38.5 | -20.4 | |
| Mid Ch | | | | | | | | |
| 836.50 | 9.33 | V | 0.9 | 0.0 | 8.43 | 38.5 | -30.0 | |
| 836.50 | 19.83 | H | 0.9 | 0.0 | 18.93 | 38.5 | -19.5 | |
| High Ch | | | | | | | | |
| 846.50 | 8.50 | V | 0.9 | 0.0 | 7.60 | 38.5 | -30.8 | |
| 846.50 | 19.45 | H | 0.9 | 0.0 | 18.55 | 38.5 | -19.9 | |

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

LTE5

3MHz

16QAM

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

**Company:** Samsung
**Project #:** 14I18889
**Date:** 09/24/14
**Test Engineer:** D. Soper
**Configuration:** X-pos EUT
**Mode:** LTE5 3M 16QAM

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

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 825.50 | 4.81 | V | 0.9 | 0.0 | 3.91 | 38.5 | -34.5 | |
| 825.50 | 18.28 | H | 0.9 | 0.0 | 17.38 | 38.5 | -21.1 | |
| Mid Ch | | | | | | | | |
| 836.50 | 8.27 | V | 0.9 | 0.0 | 7.37 | 38.5 | -31.1 | |
| 836.50 | 19.12 | H | 0.9 | 0.0 | 18.22 | 38.5 | -20.2 | |
| High Ch | | | | | | | | |
| 847.50 | 5.31 | V | 0.9 | 0.0 | 4.41 | 38.5 | -34.0 | |
| 847.50 | 19.69 | H | 0.9 | 0.0 | 18.79 | 38.5 | -19.7 | |

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

LTE5

3MHz

QPSK

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

**Company:** Samsung
**Project #:** 14I18889
**Date:** 09/24/14
**Test Engineer:** D. Soper
**Configuration:** X-pos EUT
**Mode:** LTE5 3M QPSK

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

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 826.50 | 5.77 | V | 0.9 | 0.0 | 4.87 | 38.5 | -33.6 | |
| 826.50 | 19.20 | H | 0.9 | 0.0 | 18.30 | 38.5 | -20.1 | |
| Mid Ch | | | | | | | | |
| 836.50 | 8.21 | V | 0.9 | 0.0 | 7.31 | 38.5 | -31.1 | |
| 836.50 | 20.05 | H | 0.9 | 0.0 | 19.15 | 38.5 | -19.3 | |
| High Ch | | | | | | | | |
| 846.50 | 6.35 | V | 0.9 | 0.0 | 5.45 | 38.5 | -33.0 | |
| 846.50 | 20.83 | H | 0.9 | 0.0 | 19.93 | 38.5 | -18.5 | |

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

LTE5

1.4MHz

16QAM

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

**Company:** Samsung
**Project #:** 14I18889
**Date:** 09/24/14
**Test Engineer:** D. Soper
**Configuration:** X-pos EUT
**Mode:** LTE5 1.4MHz QPSK

**Test Equipment:**
**Receiving: Sunol T243, and 3m Chamber N-type Cable (Setup this one for testing EUT)**
**Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 824.70 | 9.65 | V | 0.9 | 0.0 | 8.75 | 38.5 | -29.7 | |
| 824.70 | 18.40 | H | 0.9 | 0.0 | 17.50 | 38.5 | -20.9 | |
| Mid Ch | | | | | | | | |
| 836.50 | 9.32 | V | 0.9 | 0.0 | 8.42 | 38.5 | -30.0 | |
| 836.50 | 18.57 | H | 0.9 | 0.0 | 17.67 | 38.5 | -20.8 | |
| High Ch | | | | | | | | |
| 848.30 | 9.70 | V | 0.9 | 0.0 | 8.80 | 38.5 | -29.6 | |
| 848.30 | 19.20 | H | 0.9 | 0.0 | 18.30 | 38.5 | -20.1 | |

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




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Band

LTE5

1.4MHz

QPSK

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

**Company:** Samsung
**Project #:** 14I18889
**Date:** 09/24/14
**Test Engineer:** D. Soper
**Configuration:** X-pos EUT
**Mode:** LTE5 1.4MHz QPSK

**Test Equipment:**
**Receiving: Sunol T243, and 3m Chamber N-type Cable (Setup this one for testing EUT)**
**Substitution: Dipole S/N: 00022117, 4ft SMA Cable (SN # 245200 001) Warehouse.**

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 824.70 | 10.44 | V | 0.9 | 0.0 | 9.54 | 38.5 | -28.9 | |
| 824.70 | 19.20 | H | 0.9 | 0.0 | 18.30 | 38.5 | -20.1 | |
| Mid Ch | | | | | | | | |
| 836.50 | 10.28 | V | 0.9 | 0.0 | 9.38 | 38.5 | -29.1 | |
| 836.50 | 19.70 | H | 0.9 | 0.0 | 18.80 | 38.5 | -19.6 | |
| High Ch | | | | | | | | |
| 848.30 | 10.38 | V | 0.9 | 0.0 | 9.48 | 38.5 | -29.0 | |
| 848.30 | 20.03 | H | 0.9 | 0.0 | 19.13 | 38.5 | -19.3 | |

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

Band 2

HSDPA

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

**Company:** Samsung
**Project #:** 14I18889
**Date:** 09/24/14
**Test Engineer:** L. Lara
**Configuration:** Y-pos EUT (SN: 1961988)
**Mode:** WCDMA_1900 MHz_HSDPA

**Test Equipment:**
**Receiving: Horn T119, and Chamber C SMA Cables**
**Substitution: Horn T59, 8ft SMA Cable (SN # 245185 003) 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 | 8.05 | V | 0.85 | 7.86 | 15.06 | 33.0 | -17.9 | |
| 1852.40 | 5.42 | H | 0.85 | 7.86 | 12.43 | 33.0 | -20.6 | |
| Mid Ch | | | | | | | | |
| 1880.00 | 9.83 | V | 0.85 | 7.86 | 16.84 | 33.0 | -16.2 | |
| 1880.00 | 1.75 | H | 0.85 | 7.86 | 8.76 | 33.0 | -24.2 | |
| High Ch | | | | | | | | |
| 1907.60 | 8.50 | V | 0.85 | 7.86 | 15.51 | 33.0 | -17.5 | |
| 1907.60 | 5.49 | H | 0.85 | 7.86 | 12.50 | 33.0 | -20.5 | |

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 C**

**Company:** Samsung
**Project #:** 14I18889
**Date:** 9/23/2014 & 09/24/2014
**Test Engineer:** R. Alegre L. Lara
**Configuration:** Y-pos EUT (SN: 1961988)
**Mode:** WCDMA_1900 MHz_Rel 99

**Test Equipment:**
**Receiving: Horn T119, and Chamber C SMA Cables**
**Substitution: Horn T59, 8ft SMA Cable (SN # 245185 003) 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 | 8.84 | V | 0.85 | 7.86 | 15.85 | 33.0 | -17.2 | |
| 1852.40 | 6.45 | H | 0.85 | 7.86 | 13.46 | 33.0 | -19.5 | |
| Mid Ch | | | | | | | | |
| 1880.00 | 9.90 | V | 0.85 | 7.86 | 16.91 | 33.0 | -16.1 | |
| 1880.00 | 6.49 | H | 0.85 | 7.86 | 13.50 | 33.0 | -19.5 | |
| High Ch | | | | | | | | |
| 1907.60 | 9.32 | V | 0.85 | 7.86 | 16.33 | 33.0 | -16.7 | |
| 1907.60 | 6.57 | H | 0.85 | 7.86 | 13.58 | 33.0 | -19.4 | |

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 C**

**Company:** Samsung
**Project #:** 14I18889
**Date:** 09/24/14
**Test Engineer:** L. Lara
**Configuration:** X-pos EUT (SN: 1961988)
**Mode:** WCDMA Band 5 HSDPA

**Test Equipment:**
**Receiving: Sunol T185, and Chamber C N-type Cable**
**Substitution: Dipole T416, 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 | 7.43 | V | 0.9 | 0.0 | 6.53 | 38.5 | -32.0 | |
| 826.40 | 21.17 | H | 0.9 | 0.0 | 20.27 | 38.5 | -18.2 | |
| Mid Ch | | | | | | | | |
| 836.60 | 6.04 | V | 0.9 | 0.0 | 5.14 | 38.5 | -33.3 | |
| 836.60 | 19.79 | H | 0.9 | 0.0 | 18.89 | 38.5 | -19.6 | |
| High Ch | | | | | | | | |
| 846.60 | 7.49 | V | 0.9 | 0.0 | 6.59 | 38.5 | -31.9 | |
| 846.60 | 19.45 | H | 0.9 | 0.0 | 18.55 | 38.5 | -19.9 | |

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 C**

**Company:** Samsung
**Project #:** 14I18889
**Date:** 9/23/2014 & 09/24/2014
**Test Engineer:** R. Alegre & L. Lara
**Configuration:** X-pos EUT (SN: 1961988)
**Mode:** WCDMA Band 5 Rel 99

**Test Equipment:**
**Receiving: Sunol T185, and Chamber C N-type Cable**
**Substitution: Dipole T416, 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 | 8.52 | V | 0.9 | 0.0 | 7.62 | 38.5 | -30.9 | |
| 826.40 | 21.81 | H | 0.9 | 0.0 | 20.91 | 38.5 | -17.6 | |
| Mid Ch | | | | | | | | |
| 836.60 | 5.87 | V | 0.9 | 0.0 | 4.97 | 38.5 | -33.5 | |
| 836.60 | 20.79 | H | 0.9 | 0.0 | 19.89 | 38.5 | -18.6 | |
| High Ch | | | | | | | | |
| 846.60 | 7.68 | V | 0.9 | 0.0 | 6.78 | 38.5 | -31.7 | |
| 846.60 | 20.25 | H | 0.9 | 0.0 | 19.35 | 38.5 | -19.1 | |

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 C**

**Company:** Samsung
**Project #:** 14I18889
**Date:** 09/25/14
**Test Engineer:** L. Lara
**Configuration:** Y-pos EUT (SN: 1961990)
**Mode:** EGPRS 1900

**Test Equipment:**
**Receiving: Horn T119, and Chamber C SMA Cables**
**Substitution: Horn T59 Substitution, 4ft 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 | | | | | | | | |
| 1850.20 | 14.27 | V | 0.85 | 7.86 | 21.28 | 33.0 | -11.7 | |
| 1850.20 | 10.37 | H | 0.85 | 7.86 | 17.38 | 33.0 | -15.6 | |
| Mid | | | | | | | | |
| 1880.00 | 14.96 | V | 0.85 | 7.86 | 21.97 | 33.0 | -11.0 | |
| 1880.00 | 10.05 | H | 0.85 | 7.86 | 17.06 | 33.0 | -15.9 | |
| High | | | | | | | | |
| 1909.80 | 14.77 | V | 0.85 | 7.86 | 21.78 | 33.0 | -11.2 | |
| 1909.80 | 10.88 | H | 0.85 | 7.86 | 17.89 | 33.0 | -15.1 | |

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 #:** 14I18889
**Date:** 09/23/14
**Test Engineer:** R. Alegre
**Configuration:** Y-pos EUT (SN: 19619988)
**Mode:** GPRS 1900

**Test Equipment:**
**Receiving: Horn T345, and Chamber B SMA Cables**
**Substitution: Horn T963 Substitution, 4ft 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 | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| Mid | | | | | | | | |
| 1880.00 | 14.59 | V | 0.85 | 7.90 | 21.64 | 33.0 | -11.4 | |
| 1880.00 | 19.25 | H | 0.85 | 7.90 | 26.30 | 33.0 | -6.7 | |
| High | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

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 C**

**Company:** Samsung
**Project #:** 14I18889
**Date:** 09/24/14
**Test Engineer:** L. Lara
**Configuration:** X-pos EUT (SN: 1961988)
**Mode:** EGPRS850

**Test Equipment:**
**Receiving: Sunol T185, and Chamber C N-type Cable**
**Substitution: Dipole T416, 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 | 15.93 | V | 0.9 | 0.0 | 15.03 | 38.5 | -23.4 | |
| 824.20 | 28.20 | H | 0.9 | 0.0 | 27.30 | 38.5 | -11.1 | |
| Mid Ch | | | | | | | | |
| 836.60 | 15.80 | V | 0.9 | 0.0 | 14.90 | 38.5 | -23.5 | |
| 836.60 | 28.08 | H | 0.9 | 0.0 | 27.18 | 38.5 | -11.3 | |
| High Ch | | | | | | | | |
| 848.80 | 18.11 | V | 0.9 | 0.0 | 17.21 | 38.5 | -21.2 | |
| 848.80 | 28.60 | H | 0.9 | 0.0 | 27.70 | 38.5 | -10.8 | |

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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 C**

**Company:** Samsung
**Project #:** 14I18889
**Date:** 9/23/2014 & 9/24/2014
**Test Engineer:** R. Alegre /L. Lara
**Configuration:** X-pos EUT (SN: 1961988)
**Mode:** GPRS850

**Test Equipment:**
**Receiving: Sunol T185, and Chamber C N-type Cable**
**Substitution: Dipole T416, 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 | 20.48 | V | 0.9 | 0.0 | 19.58 | 38.5 | -18.9 | |
| 824.20 | 31.17 | H | 0.9 | 0.0 | 30.27 | 38.5 | -8.2 | |
| Mid Ch | | | | | | | | |
| 836.60 | 20.12 | V | 0.9 | 0.0 | 19.22 | 38.5 | -19.2 | |
| 836.60 | 31.93 | H | 0.9 | 0.0 | 31.03 | 38.5 | -7.4 | |
| High Ch | | | | | | | | |
| 848.80 | 21.68 | V | 0.9 | 0.0 | 20.78 | 38.5 | -17.7 | |
| 848.80 | 31.70 | H | 0.9 | 0.0 | 30.80 | 38.5 | -7.7 | |

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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

### 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 station, the attenuation factor shall be not less than 43+10Log(P)dB at the channel edge and (55+10Log(P)dB) at 5.5MHz from the channel edges.

### 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 PLOTS

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

**Company:** Samsung
**Project #:** 14I18889
**Date:** 09/25/14
**Test Engineer:** O. Stoelting
**Configuration:** EUT w/ AC Adaptor + HS, X-pos
**Mode:** LTE5 16QAM 10MHz Harm

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| 5m Chamber B | T34 8449B | Filter 1 | Part 22 |

Band
LTE5
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, 829MHz | | | | | | | | | |
| 1.658 | -24.5 | V | 3.0 | 37.4 | 1.0 | -60.9 | -13.0 | -47.9 | |
| 2.487 | -22.4 | V | 3.0 | 36.4 | 1.0 | -57.8 | -13.0 | -44.8 | |
| 3.316 | -9.7 | V | 3.0 | 35.8 | 1.0 | -44.5 | -13.0 | -31.5 | |
| 1.658 | -21.8 | H | 3.0 | 37.4 | 1.0 | -58.2 | -13.0 | -45.2 | |
| 2.487 | -23.6 | H | 3.0 | 36.4 | 1.0 | -59.0 | -13.0 | -46.0 | |
| 3.316 | -18.3 | H | 3.0 | 35.8 | 1.0 | -53.1 | -13.0 | -40.1 | |
| Mid Ch, 836.5MHz | | | | | | | | | |
| 1.673 | -19.0 | V | 3.0 | 37.3 | 1.0 | -55.4 | -13.0 | -42.4 | |
| 2.510 | -21.8 | V | 3.0 | 36.4 | 1.0 | -57.2 | -13.0 | -44.2 | |
| 3.346 | -16.1 | V | 3.0 | 35.8 | 1.0 | -50.9 | -13.0 | -37.9 | |
| 1.673 | -18.1 | H | 3.0 | 37.3 | 1.0 | -54.4 | -13.0 | -41.4 | |
| 2.510 | -24.3 | H | 3.0 | 36.4 | 1.0 | -59.6 | -13.0 | -46.6 | |
| 3.346 | -16.6 | H | 3.0 | 35.8 | 1.0 | -51.3 | -13.0 | -38.3 | |
| High Ch, 844MHz | | | | | | | | | |
| 1.688 | -21.9 | V | 3.0 | 37.3 | 1.0 | -58.3 | -13.0 | -45.3 | |
| 2.532 | -21.0 | V | 3.0 | 36.3 | 1.0 | -56.4 | -13.0 | -43.4 | |
| 3.376 | -12.2 | V | 3.0 | 35.7 | 1.0 | -47.0 | -13.0 | -34.0 | |
| 1.688 | -20.6 | H | 3.0 | 37.3 | 1.0 | -57.0 | -13.0 | -44.0 | |
| 2.532 | -20.0 | H | 3.0 | 36.3 | 1.0 | -55.4 | -13.0 | -42.4 | |
| 3.376 | -20.2 | H | 3.0 | 35.7 | 1.0 | -54.9 | -13.0 | -41.9 | |

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 #:** 14I18889
**Date:** 09/25/14
**Test Engineer:** O. Stoelting
**Configuration:** EUT w/ AC Adaptor + HS, X-pos
**Mode:** LTE5 QPSK 10MHz Harm

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| 5m Chamber B | T34 8449B | Filter 1 | Part 22 |

Band: LTE5 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, 829MHz | | | | | | | | | |
| 1.658 | -24.1 | V | 3.0 | 37.4 | 1.0 | -60.5 | -13.0 | -47.5 | |
| 2.487 | -20.7 | V | 3.0 | 36.4 | 1.0 | -56.1 | -13.0 | -43.1 | |
| 3.316 | -11.2 | V | 3.0 | 35.8 | 1.0 | -46.0 | -13.0 | -33.0 | |
| 1.658 | -22.0 | H | 3.0 | 37.4 | 1.0 | -58.4 | -13.0 | -45.4 | |
| 2.487 | -24.2 | H | 3.0 | 36.4 | 1.0 | -59.5 | -13.0 | -46.5 | |
| 3.316 | -19.1 | H | 3.0 | 35.8 | 1.0 | -53.8 | -13.0 | -40.8 | |
| Mid Ch, 836.5MHz | | | | | | | | | |
| 1.673 | -17.9 | V | 3.0 | 37.3 | 1.0 | -54.3 | -13.0 | -41.3 | |
| 2.510 | -21.7 | V | 3.0 | 36.4 | 1.0 | -57.1 | -13.0 | -44.1 | |
| 3.346 | -16.2 | V | 3.0 | 35.8 | 1.0 | -51.0 | -13.0 | -38.0 | |
| 1.673 | -18.4 | H | 3.0 | 37.3 | 1.0 | -54.7 | -13.0 | -41.7 | |
| 2.510 | -24.2 | H | 3.0 | 36.4 | 1.0 | -59.5 | -13.0 | -46.5 | |
| 3.346 | -17.2 | H | 3.0 | 35.8 | 1.0 | -52.0 | -13.0 | -39.0 | |
| High Ch, 844MHz | | | | | | | | | |
| 1.688 | -20.7 | V | 3.0 | 37.3 | 1.0 | -57.1 | -13.0 | -44.1 | |
| 2.532 | -22.3 | V | 3.0 | 36.3 | 1.0 | -57.6 | -13.0 | -44.6 | |
| 3.376 | -11.8 | V | 3.0 | 35.7 | 1.0 | -46.6 | -13.0 | -33.6 | |
| 1.688 | -20.3 | H | 3.0 | 37.3 | 1.0 | -56.7 | -13.0 | -43.7 | |
| 2.532 | -19.5 | H | 3.0 | 36.3 | 1.0 | -54.9 | -13.0 | -41.9 | |
| 3.376 | -20.1 | H | 3.0 | 35.7 | 1.0 | -54.8 | -13.0 | -41.8 | |

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 #:** 14I18889
**Date:** 09/25/14
**Test Engineer:** O. Stoelting
**Configuration:** EUT w/ AC Adaptor + HS, X-pos
**Mode:** LTE5 16QAM 5MHz Harm

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| 5m Chamber B | T34 8449B | Filter 1 | Part 22 |

Band

LTE5

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, 826.5MHz | | | | | | | | | |
| 1.653 | -20.5 | V | 3.0 | 37.4 | 1.0 | -56.9 | -13.0 | -43.9 | |
| 2.480 | -18.7 | V | 3.0 | 36.4 | 1.0 | -54.0 | -13.0 | -41.0 | |
| 3.306 | -14.7 | V | 3.0 | 35.8 | 1.0 | -49.5 | -13.0 | -36.5 | |
| 1.653 | -18.6 | H | 3.0 | 37.4 | 1.0 | -54.9 | -13.0 | -41.9 | |
| 2.480 | -23.2 | H | 3.0 | 36.4 | 1.0 | -58.6 | -13.0 | -45.6 | |
| 3.306 | -17.2 | H | 3.0 | 35.8 | 1.0 | -52.0 | -13.0 | -39.0 | |
| Mid Ch, 836.5MHz | | | | | | | | | |
| 1.673 | -16.1 | V | 3.0 | 37.3 | 1.0 | -52.4 | -13.0 | -39.4 | |
| 2.510 | -19.5 | V | 3.0 | 36.4 | 1.0 | -54.8 | -13.0 | -41.8 | |
| 3.346 | -17.5 | V | 3.0 | 35.8 | 1.0 | -52.3 | -13.0 | -39.3 | |
| 1.673 | -14.2 | H | 3.0 | 37.3 | 1.0 | -50.6 | -13.0 | -37.6 | |
| 2.510 | -19.8 | H | 3.0 | 36.4 | 1.0 | -55.2 | -13.0 | -42.2 | |
| 3.346 | -18.2 | H | 3.0 | 35.8 | 1.0 | -53.0 | -13.0 | -40.0 | |
| High Ch, 846.5MHz | | | | | | | | | |
| 1.693 | -21.1 | V | 3.0 | 37.3 | 1.0 | -57.4 | -13.0 | -44.4 | |
| 2.540 | -20.8 | V | 3.0 | 36.3 | 1.0 | -56.2 | -13.0 | -43.2 | |
| 3.386 | -19.1 | V | 3.0 | 35.7 | 1.0 | -53.9 | -13.0 | -40.9 | |
| 1.693 | -21.7 | H | 3.0 | 37.3 | 1.0 | -58.0 | -13.0 | -45.0 | |
| 2.540 | -20.7 | H | 3.0 | 36.3 | 1.0 | -56.1 | -13.0 | -43.1 | |
| 3.386 | -16.7 | H | 3.0 | 35.7 | 1.0 | -51.4 | -13.0 | -38.4 | |

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 #:** 14I18889
**Date:** 09/25/14
**Test Engineer:** O. Stoelting
**Configuration:** EUT w/ AC Adaptor + HS, X-pos
**Mode:** LTE5 QPSK 5MHz Harm

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| 5m Chamber B | T34 8449B | Filter 1 | Part 22 |

Band: LTE5 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, 826.5MHz | | | | | | | | | |
| 1.653 | -20.2 | V | 3.0 | 37.4 | 1.0 | -56.6 | -13.0 | -43.6 | |
| 2.480 | -19.0 | V | 3.0 | 36.4 | 1.0 | -54.4 | -13.0 | -41.4 | |
| 3.306 | -14.3 | V | 3.0 | 35.8 | 1.0 | -49.1 | -13.0 | -36.1 | |
| 1.653 | -18.7 | H | 3.0 | 37.4 | 1.0 | -55.1 | -13.0 | -42.1 | |
| 2.480 | -21.8 | H | 3.0 | 36.4 | 1.0 | -57.1 | -13.0 | -44.1 | |
| 3.306 | -17.4 | H | 3.0 | 35.8 | 1.0 | -52.2 | -13.0 | -39.2 | |
| Mid Ch, 836.5MHz | | | | | | | | | |
| 1.673 | -15.8 | V | 3.0 | 37.3 | 1.0 | -52.1 | -13.0 | -39.1 | |
| 2.510 | -21.5 | V | 3.0 | 36.4 | 1.0 | -56.8 | -13.0 | -43.8 | |
| 3.346 | -17.0 | V | 3.0 | 35.8 | 1.0 | -51.8 | -13.0 | -38.8 | |
| 1.673 | -14.3 | H | 3.0 | 37.3 | 1.0 | -50.7 | -13.0 | -37.7 | |
| 2.510 | -19.6 | H | 3.0 | 36.4 | 1.0 | -54.9 | -13.0 | -41.9 | |
| 3.346 | -18.7 | H | 3.0 | 35.8 | 1.0 | -53.4 | -13.0 | -40.4 | |
| High Ch, 846.5MHz | | | | | | | | | |
| 1.693 | -20.8 | V | 3.0 | 37.3 | 1.0 | -57.1 | -13.0 | -44.1 | |
| 2.540 | -22.1 | V | 3.0 | 36.3 | 1.0 | -57.4 | -13.0 | -44.4 | |
| 3.386 | -19.1 | V | 3.0 | 35.7 | 1.0 | -53.8 | -13.0 | -40.8 | |
| 1.693 | -21.8 | H | 3.0 | 37.3 | 1.0 | -58.1 | -13.0 | -45.1 | |
| 2.540 | -20.8 | H | 3.0 | 36.3 | 1.0 | -56.2 | -13.0 | -43.2 | |
| 3.386 | -16.8 | H | 3.0 | 35.7 | 1.0 | -51.5 | -13.0 | -38.5 | |

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 #:** 14I18889
**Date:** 09/25/14
**Test Engineer:** R. Alegre
**Configuration:** EUT w/ AC Adaptor + HS
**Mode:** LTE5 16QAM 3MHz Harm

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

Band
LTE5
3MHz
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, 825.5MHz | | | | | | | | | |
| 1.651 | -27.0 | V | 3.0 | 37.4 | 1.0 | -63.4 | -13.0 | -50.4 | |
| 2.477 | -22.5 | V | 3.0 | 36.4 | 1.0 | -57.9 | -13.0 | -44.9 | |
| 3.302 | -19.8 | V | 3.0 | 35.8 | 1.0 | -54.6 | -13.0 | -41.6 | |
| 1.651 | -27.3 | H | 3.0 | 37.4 | 1.0 | -63.6 | -13.0 | -50.6 | |
| 2.477 | -24.1 | H | 3.0 | 36.4 | 1.0 | -59.5 | -13.0 | -46.5 | |
| 3.302 | -19.8 | H | 3.0 | 35.8 | 1.0 | -54.6 | -13.0 | -41.6 | |
| Mid Ch, 836.5MHz | | | | | | | | | |
| 1.673 | -26.1 | V | 3.0 | 37.3 | 1.0 | -62.4 | -13.0 | -49.4 | |
| 2.510 | -22.5 | V | 3.0 | 36.4 | 1.0 | -57.9 | -13.0 | -44.9 | |
| 3.346 | -19.6 | V | 3.0 | 35.8 | 1.0 | -54.3 | -13.0 | -41.3 | |
| 1.673 | -26.7 | H | 3.0 | 37.3 | 1.0 | -63.0 | -13.0 | -50.0 | |
| 2.510 | -24.2 | H | 3.0 | 36.4 | 1.0 | -59.6 | -13.0 | -46.6 | |
| 3.346 | -19.8 | H | 3.0 | 35.8 | 1.0 | -54.6 | -13.0 | -41.6 | |
| High Ch, 847.5MHz | | | | | | | | | |
| 1.695 | -27.0 | V | 3.0 | 37.3 | 1.0 | -63.3 | -13.0 | -50.3 | |
| 2.543 | -22.0 | V | 3.0 | 36.3 | 1.0 | -57.3 | -13.0 | -44.3 | |
| 3.390 | -20.1 | V | 3.0 | 35.7 | 1.0 | -54.8 | -13.0 | -41.8 | |
| 1.695 | -27.0 | H | 3.0 | 37.3 | 1.0 | -63.3 | -13.0 | -50.3 | |
| 2.543 | -24.0 | H | 3.0 | 36.3 | 1.0 | -59.4 | -13.0 | -46.4 | |
| 3.390 | -20.8 | H | 3.0 | 35.7 | 1.0 | -55.5 | -13.0 | -42.5 | |

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 #:** 14I18889
**Date:** 09/25/14
**Test Engineer:** R. Alegre
**Configuration:** EUT w/ AC Adaptor + HS
**Mode:** LTE5 QPSK 3MHz Harm

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

Band

LTE5

3MHz

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, 825.5MHz | | | | | | | | | |
| 1.651 | -26.5 | V | 3.0 | 37.4 | 1.0 | -62.9 | -13.0 | -49.9 | |
| 2.477 | -22.3 | V | 3.0 | 36.4 | 1.0 | -57.6 | -13.0 | -44.6 | |
| 3.302 | -19.6 | V | 3.0 | 35.8 | 1.0 | -54.4 | -13.0 | -41.4 | |
| 1.651 | -26.7 | H | 3.0 | 37.4 | 1.0 | -63.0 | -13.0 | -50.0 | |
| 2.477 | -23.9 | H | 3.0 | 36.4 | 1.0 | -59.3 | -13.0 | -46.3 | |
| 3.302 | -19.8 | H | 3.0 | 35.8 | 1.0 | -54.6 | -13.0 | -41.6 | |
| Mid Ch, 836.5MHz | | | | | | | | | |
| 1.673 | -26.1 | V | 3.0 | 37.3 | 1.0 | -62.5 | -13.0 | -49.5 | |
| 2.510 | -22.3 | V | 3.0 | 36.4 | 1.0 | -57.7 | -13.0 | -44.7 | |
| 3.346 | -19.6 | V | 3.0 | 35.8 | 1.0 | -54.3 | -13.0 | -41.3 | |
| 1.673 | -26.5 | H | 3.0 | 37.3 | 1.0 | -62.9 | -13.0 | -49.9 | |
| 2.510 | -24.3 | H | 3.0 | 36.4 | 1.0 | -59.6 | -13.0 | -46.6 | |
| 3.346 | -19.5 | H | 3.0 | 35.8 | 1.0 | -54.3 | -13.0 | -41.3 | |
| High Ch, 847.5MHz | | | | | | | | | |
| 1.695 | -26.9 | V | 3.0 | 37.3 | 1.0 | -63.2 | -13.0 | -50.2 | |
| 2.543 | -21.8 | V | 3.0 | 36.3 | 1.0 | -57.1 | -13.0 | -44.1 | |
| 3.390 | -19.5 | V | 3.0 | 35.7 | 1.0 | -54.2 | -13.0 | -41.2 | |
| 1.695 | -27.0 | H | 3.0 | 37.3 | 1.0 | -63.3 | -13.0 | -50.3 | |
| 2.543 | -23.8 | H | 3.0 | 36.3 | 1.0 | -59.2 | -13.0 | -46.2 | |
| 3.390 | -19.7 | H | 3.0 | 35.7 | 1.0 | -54.4 | -13.0 | -41.4 | |

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 #:** 14I18889
**Date:** 09/25/14
**Test Engineer:** R. Alegre
**Configuration:** EUT w/ AC Adaptor + HS
**Mode:** LTE5 1.4MHz 16QAM HARM

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

Band
LTE5
1.4MHz
16QAM

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, 824.7MHz | | | | | | | | | |
| 1.649 | -26.3 | V | 3.0 | 37.4 | 1.0 | -62.7 | -13.0 | -49.7 | |
| 2.474 | -21.6 | V | 3.0 | 36.4 | 1.0 | -57.0 | -13.0 | -44.0 | |
| 3.299 | -16.3 | V | 3.0 | 35.8 | 1.0 | -51.1 | -13.0 | -38.1 | |
| 1.649 | -27.2 | H | 3.0 | 37.4 | 1.0 | -63.6 | -13.0 | -50.6 | |
| 2.474 | -21.2 | H | 3.0 | 36.4 | 1.0 | -56.6 | -13.0 | -43.6 | |
| 3.299 | -20.0 | H | 3.0 | 35.8 | 1.0 | -54.8 | -13.0 | -41.8 | |
| Mid Ch, 836.5MHz | | | | | | | | | |
| 1.673 | -26.4 | V | 3.0 | 37.3 | 1.0 | -62.7 | -13.0 | -49.7 | |
| 2.510 | -20.1 | V | 3.0 | 36.4 | 1.0 | -55.4 | -13.0 | -42.4 | |
| 3.346 | -17.2 | V | 3.0 | 35.8 | 1.0 | -52.0 | -13.0 | -39.0 | |
| 1.673 | -25.3 | H | 3.0 | 37.3 | 1.0 | -61.7 | -13.0 | -48.7 | |
| 2.510 | -23.8 | H | 3.0 | 36.4 | 1.0 | -59.1 | -13.0 | -46.1 | |
| 3.346 | -19.8 | H | 3.0 | 35.8 | 1.0 | -54.6 | -13.0 | -41.6 | |
| High Ch, 848.3MHz | | | | | | | | | |
| 1.697 | -26.9 | V | 3.0 | 37.3 | 1.0 | -63.2 | -13.0 | -50.2 | |
| 2.545 | -21.7 | V | 3.0 | 36.3 | 1.0 | -57.0 | -13.0 | -44.0 | |
| 3.393 | -19.5 | V | 3.0 | 35.7 | 1.0 | -54.2 | -13.0 | -41.2 | |
| 1.697 | -27.0 | H | 3.0 | 37.3 | 1.0 | -63.3 | -13.0 | -50.3 | |
| 2.545 | -24.2 | H | 3.0 | 36.3 | 1.0 | -59.5 | -13.0 | -46.5 | |
| 3.393 | -20.4 | H | 3.0 | 35.7 | 1.0 | -55.1 | -13.0 | -42.1 | |

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 #:** 14I18889
**Date:** 09/25/14
**Test Engineer:** R. Alegre
**Configuration:** EUT w/ AC Adaptor + HS
**Mode:** LTE5 1.4MHz QPSK

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

Band: LTE5 1.4MHz 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, 824.7MHz | | | | | | | | | |
| 1.649 | -26.7 | V | 3.0 | 37.4 | 1.0 | -63.1 | -13.0 | -50.1 | |
| 2.474 | -20.6 | V | 3.0 | 36.4 | 1.0 | -56.0 | -13.0 | -43.0 | |
| 3.299 | -15.8 | V | 3.0 | 35.8 | 1.0 | -50.6 | -13.0 | -37.6 | |
| 1.649 | -16.3 | H | 3.0 | 37.4 | 1.0 | -52.7 | -13.0 | -39.7 | |
| 2.474 | -20.8 | H | 3.0 | 36.4 | 1.0 | -56.2 | -13.0 | -43.2 | |
| 3.299 | -19.6 | H | 3.0 | 35.8 | 1.0 | -54.4 | -13.0 | -41.4 | |
| Mid Ch, 836.5MHz | | | | | | | | | |
| 1.673 | -25.1 | V | 3.0 | 37.3 | 1.0 | -61.4 | -13.0 | -48.4 | |
| 2.510 | -19.6 | V | 3.0 | 36.4 | 1.0 | -55.0 | -13.0 | -42.0 | |
| 3.346 | -16.6 | V | 3.0 | 35.8 | 1.0 | -51.4 | -13.0 | -38.4 | |
| 1.673 | -24.6 | H | 3.0 | 37.3 | 1.0 | -61.0 | -13.0 | -48.0 | |
| 2.510 | -23.9 | H | 3.0 | 36.4 | 1.0 | -59.2 | -13.0 | -46.2 | |
| 3.346 | -19.8 | H | 3.0 | 35.8 | 1.0 | -54.5 | -13.0 | -41.5 | |
| High Ch, 848.3MHz | | | | | | | | | |
| 1.697 | -26.5 | V | 3.0 | 37.3 | 1.0 | -62.8 | -13.0 | -49.8 | |
| 2.545 | -21.5 | V | 3.0 | 36.3 | 1.0 | -56.9 | -13.0 | -43.9 | |
| 3.393 | -18.6 | V | 3.0 | 35.7 | 1.0 | -53.3 | -13.0 | -40.3 | |
| 1.697 | -26.7 | H | 3.0 | 37.3 | 1.0 | -63.0 | -13.0 | -50.0 | |
| 2.545 | -23.9 | H | 3.0 | 36.3 | 1.0 | -59.2 | -13.0 | -46.2 | |
| 3.393 | -20.6 | H | 3.0 | 35.7 | 1.0 | -55.3 | -13.0 | -42.3 | |

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 #:** 14I18889
**Date:** 09/25/14
**Test Engineer:** R. Alegre
**Configuration:** EUT w/ AC Adaptor + HS
**Mode:** HSDPA B2

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

Band

Band 2

HSDPA

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, 1852.4MHz | | | | | | | | | |
| 3.705 | -18.3 | V | 3.0 | 35.4 | 1.0 | -52.7 | -13.0 | -39.7 | |
| 5.557 | -16.4 | V | 3.0 | 34.7 | 1.0 | -50.1 | -13.0 | -37.1 | |
| 7.410 | -10.0 | V | 3.0 | 34.9 | 1.0 | -43.9 | -13.0 | -30.9 | |
| 3.705 | -18.6 | H | 3.0 | 35.4 | 1.0 | -53.0 | -13.0 | -40.0 | |
| 5.557 | -14.9 | H | 3.0 | 34.7 | 1.0 | -48.6 | -13.0 | -35.6 | |
| 7.410 | -11.3 | H | 3.0 | 34.9 | 1.0 | -45.3 | -13.0 | -32.3 | |
| Mid Ch, 1880MHz | | | | | | | | | |
| 3.760 | -19.5 | V | 3.0 | 35.3 | 1.0 | -53.8 | -13.0 | -40.8 | |
| 5.640 | -16.4 | V | 3.0 | 34.7 | 1.0 | -50.2 | -13.0 | -37.2 | |
| 7.520 | -11.3 | V | 3.0 | 34.9 | 1.0 | -45.2 | -13.0 | -32.2 | |
| 3.760 | -19.0 | H | 3.0 | 35.3 | 1.0 | -53.3 | -13.0 | -40.3 | |
| 5.640 | -15.4 | H | 3.0 | 34.7 | 1.0 | -49.1 | -13.0 | -36.1 | |
| 7.520 | -11.4 | H | 3.0 | 34.9 | 1.0 | -45.3 | -13.0 | -32.3 | |
| High Ch, 1907.6MHz | | | | | | | | | |
| 3.815 | -14.8 | V | 3.0 | 35.3 | 1.0 | -49.1 | -13.0 | -36.1 | |
| 5.723 | -13.8 | V | 3.0 | 34.7 | 1.0 | -47.6 | -13.0 | -34.6 | |
| 7.630 | -8.1 | V | 3.0 | 34.9 | 1.0 | -42.1 | -13.0 | -29.1 | |
| 3.815 | -18.0 | H | 3.0 | 35.3 | 1.0 | -52.3 | -13.0 | -39.3 | |
| 5.723 | -14.5 | H | 3.0 | 34.7 | 1.0 | -48.2 | -13.0 | -35.2 | |
| 7.630 | -11.4 | H | 3.0 | 34.9 | 1.0 | -45.3 | -13.0 | -32.3 | |

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 #:** 14I18889
**Date:** 09/24/14
**Test Engineer:** Jude Semana
**Configuration:** EUT w/ AC Adaptor + HS, Y-pos
**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 | -25.0 | V | 3.0 | 35.4 | 1.0 | -59.4 | -13.0 | -46.4 | |
| 5.557 | -22.2 | V | 3.0 | 34.7 | 1.0 | -55.9 | -13.0 | -42.9 | |
| 7.410 | -17.7 | V | 3.0 | 34.9 | 1.0 | -51.6 | -13.0 | -38.6 | |
| 3.705 | -24.9 | H | 3.0 | 35.4 | 1.0 | -59.3 | -13.0 | -46.3 | |
| 5.557 | -21.3 | H | 3.0 | 34.7 | 1.0 | -55.0 | -13.0 | -42.0 | |
| 7.410 | -16.8 | H | 3.0 | 34.9 | 1.0 | -50.8 | -13.0 | -37.8 | |
| Mid Ch, 1880MHz | | | | | | | | | |
| 3.760 | -24.9 | V | 3.0 | 35.3 | 1.0 | -59.2 | -13.0 | -46.2 | |
| 5.640 | -21.9 | V | 3.0 | 34.7 | 1.0 | -55.6 | -13.0 | -42.6 | |
| 7.520 | -20.7 | V | 3.0 | 34.9 | 1.0 | -54.6 | -13.0 | -41.6 | |
| 3.760 | -24.9 | H | 3.0 | 35.3 | 1.0 | -59.3 | -13.0 | -46.3 | |
| 5.640 | -21.7 | H | 3.0 | 34.7 | 1.0 | -55.4 | -13.0 | -42.4 | |
| 7.520 | -19.7 | H | 3.0 | 34.9 | 1.0 | -53.6 | -13.0 | -40.6 | |
| High Ch, 1907.6MHz | | | | | | | | | |
| 3.815 | -24.3 | V | 3.0 | 35.3 | 1.0 | -58.6 | -13.0 | -45.6 | |
| 5.723 | -22.6 | V | 3.0 | 34.7 | 1.0 | -56.3 | -13.0 | -43.3 | |
| 7.630 | -20.3 | V | 3.0 | 34.9 | 1.0 | -54.3 | -13.0 | -41.3 | |
| 3.815 | -24.8 | H | 3.0 | 35.3 | 1.0 | -59.1 | -13.0 | -46.1 | |
| 5.723 | -21.6 | H | 3.0 | 34.7 | 1.0 | -55.4 | -13.0 | -42.4 | |
| 7.630 | -19.7 | H | 3.0 | 34.9 | 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 #:** 14I18889
**Date:** 09/25/14
**Test Engineer:** R. Alegre
**Configuration:** EUT w/ AC Adaptor + HS
**Mode:** HSDPA B2

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

Band

Band 2

HSDPA

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, 1852.4MHz | | | | | | | | | |
| 3.705 | -18.3 | V | 3.0 | 35.4 | 1.0 | -52.7 | -13.0 | -39.7 | |
| 5.557 | -16.4 | V | 3.0 | 34.7 | 1.0 | -50.1 | -13.0 | -37.1 | |
| 7.410 | -10.0 | V | 3.0 | 34.9 | 1.0 | -43.9 | -13.0 | -30.9 | |
| 3.705 | -18.6 | H | 3.0 | 35.4 | 1.0 | -53.0 | -13.0 | -40.0 | |
| 5.557 | -14.9 | H | 3.0 | 34.7 | 1.0 | -48.6 | -13.0 | -35.6 | |
| 7.410 | -11.3 | H | 3.0 | 34.9 | 1.0 | -45.3 | -13.0 | -32.3 | |
| Mid Ch, 1880MHz | | | | | | | | | |
| 3.760 | -19.5 | V | 3.0 | 35.3 | 1.0 | -53.8 | -13.0 | -40.8 | |
| 5.640 | -16.4 | V | 3.0 | 34.7 | 1.0 | -50.2 | -13.0 | -37.2 | |
| 7.520 | -11.3 | V | 3.0 | 34.9 | 1.0 | -45.2 | -13.0 | -32.2 | |
| 3.760 | -19.0 | H | 3.0 | 35.3 | 1.0 | -53.3 | -13.0 | -40.3 | |
| 5.640 | -15.4 | H | 3.0 | 34.7 | 1.0 | -49.1 | -13.0 | -36.1 | |
| 7.520 | -11.4 | H | 3.0 | 34.9 | 1.0 | -45.3 | -13.0 | -32.3 | |
| High Ch, 1907.6MHz | | | | | | | | | |
| 3.815 | -14.8 | V | 3.0 | 35.3 | 1.0 | -49.1 | -13.0 | -36.1 | |
| 5.723 | -13.8 | V | 3.0 | 34.7 | 1.0 | -47.6 | -13.0 | -34.6 | |
| 7.630 | -8.1 | V | 3.0 | 34.9 | 1.0 | -42.1 | -13.0 | -29.1 | |
| 3.815 | -18.0 | H | 3.0 | 35.3 | 1.0 | -52.3 | -13.0 | -39.3 | |
| 5.723 | -14.5 | H | 3.0 | 34.7 | 1.0 | -48.2 | -13.0 | -35.2 | |
| 7.630 | -11.4 | H | 3.0 | 34.9 | 1.0 | -45.3 | -13.0 | -32.3 | |

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 #:** 14I18889
**Date:** 09/25/14
**Test Engineer:** R. Alegre
**Configuration:** EUT w/ AC Adaptor + 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 | -27.7 | V | 3.0 | 37.4 | 1.0 | -64.1 | -13.0 | -51.1 | |
| 2.479 | -22.9 | V | 3.0 | 36.4 | 1.0 | -58.3 | -13.0 | -45.3 | |
| 3.306 | -20.8 | V | 3.0 | 35.8 | 1.0 | -55.6 | -13.0 | -42.6 | |
| 1.653 | -27.2 | H | 3.0 | 37.4 | 1.0 | -63.5 | -13.0 | -50.5 | |
| 2.479 | -24.6 | H | 3.0 | 36.4 | 1.0 | -59.9 | -13.0 | -46.9 | |
| 3.306 | -19.6 | H | 3.0 | 35.8 | 1.0 | -54.4 | -13.0 | -41.4 | |
| Mid Ch, 836.6MHz | | | | | | | | | |
| 1.673 | -27.5 | V | 3.0 | 37.3 | 1.0 | -63.8 | -13.0 | -50.8 | |
| 2.510 | -23.5 | V | 3.0 | 36.4 | 1.0 | -58.9 | -13.0 | -45.9 | |
| 3.346 | -18.9 | V | 3.0 | 35.8 | 1.0 | -53.7 | -13.0 | -40.7 | |
| 1.673 | -27.7 | H | 3.0 | 37.3 | 1.0 | -64.0 | -13.0 | -51.0 | |
| 2.510 | -24.8 | H | 3.0 | 36.4 | 1.0 | -60.1 | -13.0 | -47.1 | |
| 3.346 | -20.5 | H | 3.0 | 35.8 | 1.0 | -55.2 | -13.0 | -42.2 | |
| High Ch, 846.6MHz | | | | | | | | | |
| 1.693 | -27.1 | V | 3.0 | 37.3 | 1.0 | -63.4 | -13.0 | -50.4 | |
| 2.540 | -23.2 | V | 3.0 | 36.3 | 1.0 | -58.6 | -13.0 | -45.6 | |
| 3.386 | -21.2 | V | 3.0 | 35.7 | 1.0 | -55.9 | -13.0 | -42.9 | |
| 1.693 | -27.7 | H | 3.0 | 37.3 | 1.0 | -64.0 | -13.0 | -51.0 | |
| 2.540 | -24.4 | H | 3.0 | 36.3 | 1.0 | -59.8 | -13.0 | -46.8 | |
| 3.386 | -21.5 | H | 3.0 | 35.7 | 1.0 | -56.2 | -13.0 | -43.2 | |

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 #:** 14I18889
**Date:** 09/24/14
**Test Engineer:** Jude Semana
**Configuration:** EUT w/ AC Adaptor + HS, Y-pos
**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 | -30.9 | V | 3.0 | 37.4 | 1.0 | -67.2 | -13.0 | -54.2 | |
| 2.479 | -25.5 | V | 3.0 | 36.4 | 1.0 | -60.9 | -13.0 | -47.9 | |
| 3.306 | -26.3 | V | 3.0 | 35.8 | 1.0 | -61.1 | -13.0 | -48.1 | |
| 1.653 | -31.3 | H | 3.0 | 37.4 | 1.0 | -67.7 | -13.0 | -54.7 | |
| 2.479 | -27.6 | H | 3.0 | 36.4 | 1.0 | -62.9 | -13.0 | -49.9 | |
| 3.306 | -26.5 | H | 3.0 | 35.8 | 1.0 | -61.3 | -13.0 | -48.3 | |
| Mid Ch, 836.6MHz | | | | | | | | | |
| 1.673 | -31.2 | V | 3.0 | 37.3 | 1.0 | -67.6 | -13.0 | -54.6 | |
| 2.510 | -25.8 | V | 3.0 | 36.4 | 1.0 | -61.2 | -13.0 | -48.2 | |
| 3.346 | -25.7 | V | 3.0 | 35.8 | 1.0 | -60.4 | -13.0 | -47.4 | |
| 1.673 | -31.0 | H | 3.0 | 37.3 | 1.0 | -67.3 | -13.0 | -54.3 | |
| 2.510 | -26.9 | H | 3.0 | 36.4 | 1.0 | -62.2 | -13.0 | -49.2 | |
| 3.346 | -25.7 | H | 3.0 | 35.8 | 1.0 | -60.4 | -13.0 | -47.4 | |
| High Ch, 846.6MHz | | | | | | | | | |
| 1.693 | -31.3 | V | 3.0 | 37.3 | 1.0 | -67.6 | -13.0 | -54.6 | |
| 2.540 | -25.4 | V | 3.0 | 36.3 | 1.0 | -60.8 | -13.0 | -47.8 | |
| 3.386 | -25.2 | V | 3.0 | 35.7 | 1.0 | -59.9 | -13.0 | -46.9 | |
| 1.693 | -31.2 | H | 3.0 | 37.3 | 1.0 | -67.5 | -13.0 | -54.5 | |
| 2.540 | -27.3 | H | 3.0 | 36.3 | 1.0 | -62.6 | -13.0 | -49.6 | |
| 3.386 | -25.3 | H | 3.0 | 35.7 | 1.0 | -60.0 | -13.0 | -47.0 | |

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 #:** 14I18889
**Date:** 09/25/14
**Test Engineer:** R. Alegre
**Configuration:** EUT w/ AC Charger + HS
**Mode:** GPRS 1900

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

Band

GSM

1900

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 | -16.9 | V | 3.0 | 35.4 | 1.0 | -51.3 | -13.0 | -38.3 | |
| 5.551 | -14.3 | V | 3.0 | 34.7 | 1.0 | -48.0 | -13.0 | -35.0 | |
| 7.401 | -2.4 | V | 3.0 | 34.9 | 1.0 | -36.3 | -13.0 | -23.3 | |
| 3.700 | -18.5 | H | 3.0 | 35.4 | 1.0 | -52.9 | -13.0 | -39.9 | |
| 5.551 | -15.0 | H | 3.0 | 34.7 | 1.0 | -48.7 | -13.0 | -35.7 | |
| 7.401 | -8.4 | H | 3.0 | 34.9 | 1.0 | -42.3 | -13.0 | -29.3 | |
| Mid Ch, 1880.0MHz | | | | | | | | | |
| 3.760 | -16.8 | V | 3.0 | 35.3 | 1.0 | -51.2 | -13.0 | -38.2 | |
| 5.640 | -13.7 | V | 3.0 | 34.7 | 1.0 | -47.4 | -13.0 | -34.4 | |
| 7.520 | -1.4 | V | 3.0 | 34.9 | 1.0 | -35.3 | -13.0 | -22.3 | |
| 3.760 | -16.0 | H | 3.0 | 35.3 | 1.0 | -50.4 | -13.0 | -37.4 | |
| 5.640 | -13.2 | H | 3.0 | 34.7 | 1.0 | -46.9 | -13.0 | -33.9 | |
| 7.520 | -7.0 | H | 3.0 | 34.9 | 1.0 | -40.9 | -13.0 | -27.9 | |
| High Ch, 1909.8MHz | | | | | | | | | |
| 3.820 | -15.6 | V | 3.0 | 35.3 | 1.0 | -49.9 | -13.0 | -36.9 | |
| 5.729 | -10.8 | V | 3.0 | 34.7 | 1.0 | -44.5 | -13.0 | -31.5 | |
| 7.639 | -8.4 | V | 3.0 | 35.0 | 1.0 | -42.4 | -13.0 | -29.4 | |
| 3.820 | -16.2 | H | 3.0 | 35.3 | 1.0 | -50.5 | -13.0 | -37.5 | |
| 5.729 | -13.1 | H | 3.0 | 34.7 | 1.0 | -46.9 | -13.0 | -33.9 | |
| 7.639 | -8.0 | H | 3.0 | 35.0 | 1.0 | -42.0 | -13.0 | -29.0 | |

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 #:** 14I18889
**Date:** 09/24/14
**Test Engineer:** Jude Semana
**Configuration:** X-Pos EUT w/ AC Charger + HS
**Mode:** GPRS 1900

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

Band: GSM 1900 GPRS

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, 1850.2MHz | | | | | | | | | |
| 3.700 | -24.3 | V | 3.0 | 35.4 | 1.0 | -58.7 | -13.0 | -45.7 | |
| 5.551 | -21.2 | V | 3.0 | 34.7 | 1.0 | -54.9 | -13.0 | -41.9 | |
| 7.401 | -18.3 | V | 3.0 | 34.9 | 1.0 | -52.2 | -13.0 | -39.2 | |
| 3.700 | -25.3 | H | 3.0 | 35.4 | 1.0 | -59.7 | -13.0 | -46.7 | |
| 5.551 | -20.8 | H | 3.0 | 34.7 | 1.0 | -54.5 | -13.0 | -41.5 | |
| 7.401 | -16.5 | H | 3.0 | 34.9 | 1.0 | -50.4 | -13.0 | -37.4 | |
| Mid Ch, 1880.0MHz | | | | | | | | | |
| 3.760 | -25.0 | V | 3.0 | 35.3 | 1.0 | -59.3 | -13.0 | -46.3 | |
| 5.640 | -21.9 | V | 3.0 | 34.7 | 1.0 | -55.6 | -13.0 | -42.6 | |
| 7.520 | -20.9 | V | 3.0 | 34.9 | 1.0 | -54.8 | -13.0 | -41.8 | |
| 3.760 | -24.7 | H | 3.0 | 35.3 | 1.0 | -59.0 | -13.0 | -46.0 | |
| 5.640 | -21.3 | H | 3.0 | 34.7 | 1.0 | -55.0 | -13.0 | -42.0 | |
| 7.520 | -19.5 | H | 3.0 | 34.9 | 1.0 | -53.4 | -13.0 | -40.4 | |
| High Ch, 1909.8MHz | | | | | | | | | |
| 3.820 | -22.7 | V | 3.0 | 35.3 | 1.0 | -57.0 | -13.0 | -44.0 | |
| 5.729 | -21.8 | V | 3.0 | 34.7 | 1.0 | -55.5 | -13.0 | -42.5 | |
| 7.639 | -21.0 | V | 3.0 | 35.0 | 1.0 | -55.0 | -13.0 | -42.0 | |
| 3.820 | -23.3 | H | 3.0 | 35.3 | 1.0 | -57.6 | -13.0 | -44.6 | |
| 5.729 | -21.2 | H | 3.0 | 34.7 | 1.0 | -55.0 | -13.0 | -42.0 | |
| 7.639 | -20.0 | H | 3.0 | 35.0 | 1.0 | -53.9 | -13.0 | -40.9 | |

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 #:** 14I18889
**Date:** 09/25/14
**Test Engineer:** R. Alegre
**Configuration:** EUT w/ AC Adaptor + HS
**Mode:** EGPRS850 Harm

| 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 | | | | | | | | | |
| GSM | 1.648 | -26.7 | V | 3.0 | 37.4 | 1.0 | -63.1 | -13.0 | -50.1 | |
| | 2.473 | -13.6 | V | 3.0 | 36.4 | 1.0 | -49.0 | -13.0 | -36.0 | |
| 850 | 3.297 | -20.8 | V | 3.0 | 35.8 | 1.0 | -55.6 | -13.0 | -42.6 | |
| | 1.648 | -21.0 | H | 3.0 | 37.4 | 1.0 | -57.4 | -13.0 | -44.4 | |
| EGPRS | 2.473 | -14.6 | H | 3.0 | 36.4 | 1.0 | -50.0 | -13.0 | -37.0 | |
| | 3.297 | -20.9 | H | 3.0 | 35.8 | 1.0 | -55.7 | -13.0 | -42.7 | |
| | Mid Ch, 836.6MHz | | | | | | | | | |
| | 1.673 | -27.2 | V | 3.0 | 37.3 | 1.0 | -63.6 | -13.0 | -50.6 | |
| | 2.510 | -22.3 | V | 3.0 | 36.4 | 1.0 | -57.6 | -13.0 | -44.6 | |
| | 3.346 | -21.1 | V | 3.0 | 35.8 | 1.0 | -55.9 | -13.0 | -42.9 | |
| | 1.673 | -26.5 | H | 3.0 | 37.3 | 1.0 | -62.9 | -13.0 | -49.9 | |
| | 2.510 | -22.6 | H | 3.0 | 36.4 | 1.0 | -57.9 | -13.0 | -44.9 | |
| | 3.346 | -19.7 | H | 3.0 | 35.8 | 1.0 | -54.5 | -13.0 | -41.5 | |
| | High Ch, 848.8MHz | | | | | | | | | |
| | 1.698 | -26.0 | V | 3.0 | 37.3 | 1.0 | -62.3 | -13.0 | -49.3 | |
| | 2.547 | -19.6 | V | 3.0 | 36.3 | 1.0 | -55.0 | -13.0 | -42.0 | |
| | 3.395 | -18.6 | V | 3.0 | 35.7 | 1.0 | -53.3 | -13.0 | -40.3 | |
| | 1.698 | -25.8 | H | 3.0 | 37.3 | 1.0 | -62.1 | -13.0 | -49.1 | |
| | 2.547 | -23.0 | H | 3.0 | 36.3 | 1.0 | -58.3 | -13.0 | -45.3 | |
| | 3.395 | -19.7 | H | 3.0 | 35.7 | 1.0 | -54.4 | -13.0 | -41.4 | |

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 #:** 14I18889
**Date:** 09/25/14
**Test Engineer:** R. Alegre
**Configuration:** EUT w/ AC Adaptor + HS
**Mode:** EGPRS850 Harm

| 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 | | | | | | | | | |
| GSM | 1.648 | -26.7 | V | 3.0 | 37.4 | 1.0 | -63.1 | -13.0 | -50.1 | |
| | 2.473 | -13.6 | V | 3.0 | 36.4 | 1.0 | -49.0 | -13.0 | -36.0 | |
| 850 | 3.297 | -20.8 | V | 3.0 | 35.8 | 1.0 | -55.6 | -13.0 | -42.6 | |
| | 1.648 | -21.0 | H | 3.0 | 37.4 | 1.0 | -57.4 | -13.0 | -44.4 | |
| EGPRS | 2.473 | -14.6 | H | 3.0 | 36.4 | 1.0 | -50.0 | -13.0 | -37.0 | |
| | 3.297 | -20.9 | H | 3.0 | 35.8 | 1.0 | -55.7 | -13.0 | -42.7 | |
| | Mid Ch, 836.6MHz | | | | | | | | | |
| | 1.673 | -27.2 | V | 3.0 | 37.3 | 1.0 | -63.6 | -13.0 | -50.6 | |
| | 2.510 | -22.3 | V | 3.0 | 36.4 | 1.0 | -57.6 | -13.0 | -44.6 | |
| | 3.346 | -21.1 | V | 3.0 | 35.8 | 1.0 | -55.9 | -13.0 | -42.9 | |
| | 1.673 | -26.5 | H | 3.0 | 37.3 | 1.0 | -62.9 | -13.0 | -49.9 | |
| | 2.510 | -22.6 | H | 3.0 | 36.4 | 1.0 | -57.9 | -13.0 | -44.9 | |
| | 3.346 | -19.7 | H | 3.0 | 35.8 | 1.0 | -54.5 | -13.0 | -41.5 | |
| | High Ch, 848.8MHz | | | | | | | | | |
| | 1.698 | -26.0 | V | 3.0 | 37.3 | 1.0 | -62.3 | -13.0 | -49.3 | |
| | 2.547 | -19.6 | V | 3.0 | 36.3 | 1.0 | -55.0 | -13.0 | -42.0 | |
| | 3.395 | -18.6 | V | 3.0 | 35.7 | 1.0 | -53.3 | -13.0 | -40.3 | |
| | 1.698 | -25.8 | H | 3.0 | 37.3 | 1.0 | -62.1 | -13.0 | -49.1 | |
| | 2.547 | -23.0 | H | 3.0 | 36.3 | 1.0 | -58.3 | -13.0 | -45.3 | |
| | 3.395 | -19.7 | H | 3.0 | 35.7 | 1.0 | -54.4 | -13.0 | -41.4 | |

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 #:** 14I18889
**Date:** 09/24/14
**Test Engineer:** Jude Semana
**Configuration:** EUT w/ AC Adaptor + HS, X-pos
**Mode:** GPRS850 Harm

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

Band: GSM 850 GPRS

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, 824.2MHz | | | | | | | | | |
| 1.648 | -26.0 | V | 3.0 | 37.4 | 1.0 | -62.4 | -13.0 | -49.4 | |
| 2.473 | -11.9 | V | 3.0 | 36.4 | 1.0 | -47.3 | -13.0 | -34.3 | |
| 3.297 | -20.4 | V | 3.0 | 35.8 | 1.0 | -55.2 | -13.0 | -42.2 | |
| 1.648 | -16.8 | H | 3.0 | 37.4 | 1.0 | -53.1 | -13.0 | -40.1 | |
| 2.473 | -10.6 | H | 3.0 | 36.4 | 1.0 | -46.0 | -13.0 | -33.0 | |
| 3.297 | -21.0 | H | 3.0 | 35.8 | 1.0 | -55.8 | -13.0 | -42.8 | |
| Mid Ch, 836.6MHz | | | | | | | | | |
| 1.673 | -28.4 | V | 3.0 | 37.3 | 1.0 | -64.7 | -13.0 | -51.7 | |
| 2.510 | -22.8 | V | 3.0 | 36.4 | 1.0 | -58.1 | -13.0 | -45.1 | |
| 3.346 | -21.0 | V | 3.0 | 35.8 | 1.0 | -55.8 | -13.0 | -42.8 | |
| 1.673 | -21.1 | H | 3.0 | 37.3 | 1.0 | -57.4 | -13.0 | -44.4 | |
| 2.510 | -18.9 | H | 3.0 | 36.4 | 1.0 | -54.3 | -13.0 | -41.3 | |
| 3.346 | -21.2 | H | 3.0 | 35.8 | 1.0 | -55.9 | -13.0 | -42.9 | |
| High Ch, 848.8MHz | | | | | | | | | |
| 1.698 | -27.4 | V | 3.0 | 37.3 | 1.0 | -63.7 | -13.0 | -50.7 | |
| 2.547 | -23.6 | V | 3.0 | 36.3 | 1.0 | -58.9 | -13.0 | -45.9 | |
| 3.395 | -21.5 | V | 3.0 | 35.7 | 1.0 | -56.2 | -13.0 | -43.2 | |
| 1.698 | -26.8 | H | 3.0 | 37.3 | 1.0 | -63.1 | -13.0 | -50.1 | |
| 2.547 | -25.5 | H | 3.0 | 36.3 | 1.0 | -60.8 | -13.0 | -47.8 | |
| 3.395 | -20.6 | H | 3.0 | 35.7 | 1.0 | -55.3 | -13.0 | -42.3 | |

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 #:** 14I18889
**Date:** 09/24/14
**Test Engineer:** Jude Semana
**Configuration:** EUT w/ AC Adaptor + HS, X-pos
**Mode:** GPRS850 Harm

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

Band: GSM 850 GPRS

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, 824.2MHz | | | | | | | | | |
| 1.648 | -26.0 | V | 3.0 | 37.4 | 1.0 | -62.4 | -13.0 | -49.4 | |
| 2.473 | -11.9 | V | 3.0 | 36.4 | 1.0 | -47.3 | -13.0 | -34.3 | |
| 3.297 | -20.4 | V | 3.0 | 35.8 | 1.0 | -55.2 | -13.0 | -42.2 | |
| 1.648 | -16.8 | H | 3.0 | 37.4 | 1.0 | -53.1 | -13.0 | -40.1 | |
| 2.473 | -10.6 | H | 3.0 | 36.4 | 1.0 | -46.0 | -13.0 | -33.0 | |
| 3.297 | -21.0 | H | 3.0 | 35.8 | 1.0 | -55.8 | -13.0 | -42.8 | |
| Mid Ch, 836.6MHz | | | | | | | | | |
| 1.673 | -28.4 | V | 3.0 | 37.3 | 1.0 | -64.7 | -13.0 | -51.7 | |
| 2.510 | -22.8 | V | 3.0 | 36.4 | 1.0 | -58.1 | -13.0 | -45.1 | |
| 3.346 | -21.0 | V | 3.0 | 35.8 | 1.0 | -55.8 | -13.0 | -42.8 | |
| 1.673 | -21.1 | H | 3.0 | 37.3 | 1.0 | -57.4 | -13.0 | -44.4 | |
| 2.510 | -18.9 | H | 3.0 | 36.4 | 1.0 | -54.3 | -13.0 | -41.3 | |
| 3.346 | -21.2 | H | 3.0 | 35.8 | 1.0 | -55.9 | -13.0 | -42.9 | |
| High Ch, 848.8MHz | | | | | | | | | |
| 1.698 | -27.4 | V | 3.0 | 37.3 | 1.0 | -63.7 | -13.0 | -50.7 | |
| 2.547 | -23.6 | V | 3.0 | 36.3 | 1.0 | -58.9 | -13.0 | -45.9 | |
| 3.395 | -21.5 | V | 3.0 | 35.7 | 1.0 | -56.2 | -13.0 | -43.2 | |
| 1.698 | -26.8 | H | 3.0 | 37.3 | 1.0 | -63.1 | -13.0 | -50.1 | |
| 2.547 | -25.5 | H | 3.0 | 36.3 | 1.0 | -60.8 | -13.0 | -47.8 | |
| 3.395 | -20.6 | H | 3.0 | 35.7 | 1.0 | -55.3 | -13.0 | -42.3 | |

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 #:** 14I18889
**Date:** 09/25/14
**Test Engineer:** R. Alegre
**Configuration:** EUT w/ AC Adaptor + HS
**Mode:** EGPRS850 Harm

| 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 | | | | | | | | | |
| GSM | 1.648 | -26.7 | V | 3.0 | 37.4 | 1.0 | -63.1 | -13.0 | -50.1 | |
| | 2.473 | -13.6 | V | 3.0 | 36.4 | 1.0 | -49.0 | -13.0 | -36.0 | |
| 850 | 3.297 | -20.8 | V | 3.0 | 35.8 | 1.0 | -55.6 | -13.0 | -42.6 | |
| | 1.648 | -21.0 | H | 3.0 | 37.4 | 1.0 | -57.4 | -13.0 | -44.4 | |
| EGPRS | 2.473 | -14.6 | H | 3.0 | 36.4 | 1.0 | -50.0 | -13.0 | -37.0 | |
| | 3.297 | -20.9 | H | 3.0 | 35.8 | 1.0 | -55.7 | -13.0 | -42.7 | |
| | Mid Ch, 836.6MHz | | | | | | | | | |
| | 1.673 | -27.2 | V | 3.0 | 37.3 | 1.0 | -63.6 | -13.0 | -50.6 | |
| | 2.510 | -22.3 | V | 3.0 | 36.4 | 1.0 | -57.6 | -13.0 | -44.6 | |
| | 3.346 | -21.1 | V | 3.0 | 35.8 | 1.0 | -55.9 | -13.0 | -42.9 | |
| | 1.673 | -26.5 | H | 3.0 | 37.3 | 1.0 | -62.9 | -13.0 | -49.9 | |
| | 2.510 | -22.6 | H | 3.0 | 36.4 | 1.0 | -57.9 | -13.0 | -44.9 | |
| | 3.346 | -19.7 | H | 3.0 | 35.8 | 1.0 | -54.5 | -13.0 | -41.5 | |
| | High Ch, 848.8MHz | | | | | | | | | |
| | 1.698 | -26.0 | V | 3.0 | 37.3 | 1.0 | -62.3 | -13.0 | -49.3 | |
| | 2.547 | -19.6 | V | 3.0 | 36.3 | 1.0 | -55.0 | -13.0 | -42.0 | |
| | 3.395 | -18.6 | V | 3.0 | 35.7 | 1.0 | -53.3 | -13.0 | -40.3 | |
| | 1.698 | -25.8 | H | 3.0 | 37.3 | 1.0 | -62.1 | -13.0 | -49.1 | |
| | 2.547 | -23.0 | H | 3.0 | 36.3 | 1.0 | -58.3 | -13.0 | -45.3 | |
| | 3.395 | -19.7 | H | 3.0 | 35.7 | 1.0 | -54.4 | -13.0 | -41.4 | |

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




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