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

# CERTIFICATION TEST REPORT

**For**

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

**MODEL NUMBER: SM-A300F/DS**

**FCC ID: A3LSMA300F**

**REPORT NUMBER: 14I18726-E1**

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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-A300F/DS** |
| **SERIAL NUMBER:** | **1950050 (Radiated), 1951552 (Conducted)** |
| **DATE TESTED:** | **September 2 - September 15, 2014** |

| APPLICABLE STANDARDS | |
|---|---|
| **STANDARD** | **TEST RESULTS** |
| FCC PART 22H and 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 and 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 27000 MHz | 4.94 dB |

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



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# 5. EQUIPMENT UNDER TEST

## 5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE Phone + Bluetooth, WLAN 2.4GHz b/g/n, ANT+ & 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 | 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 | 25.34 | 341.59 |
| | 824~849 | EGPRS | 27.5 | 562.34 | 21.39 | 137.56 |
| GSM1900 | 1850~1910 | GMSK | 30.0 | 1000 | | |
| | 1850~1910 | GPRS | 30.0 | 1000 | 29.39 | 868.96 |
| | 1850~1910 | EGPRS | 26.5 | 446.68 | 25.72 | 373.25 |
| Band 5 | 824~849 | REL99 | 23.5 | 223.87 | 15.81 | 38.11 |
| | 824~849 | HSDPA | 22.5 | 177.83 | 15.51 | 35.56 |
| | 824~849 | HSUPA | 22.5 | 177.83 | | |
| Band 2 | 1850~1910 | REL99 | 23.0 | 199.52 | 22.26 | 168.31 |
| | 1850~1910 | HSDPA | 22.0 | 158.49 | 21.13 | 129.75 |
| | 1850~1910 | HSUPA | 22.0 | 158.49 | | |


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## 5.3. MAXIMUM OUTPUT POWER (LTE)

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

| FCC Part 22/2 4/27 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Band | Frequency Range(MHz) | BandWidth (MHz) | Modulation | Conducted | | Radiated | |
| | | | mW | AVG | mW | AVG | mW |
| LTE5 | 824~849 | 10MHz | QPSK | 23.0 | 199.52 | 15.36 | 34.36 |
| | 824~849 | 10MHz | 16QAM | 21.89 | 154.53 | 14.38 | 27.42 |

| FCC Part 22/2 4/27 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Band | Frequency Range(MHz) | BandWidth (MHz) | Modulation | Conducted | | Radiated | |
| | | | mW | AVG | mW | AVG | mW |
| LTE5 | 824~849 | 5MHz | QPSK | 22.99 | 199.07 | 15.46 | 35.16 |
| | 824~849 | 5MHz | 16QAM | 21.88 | 154.17 | 14.61 | 28.91 |

| FCC Part 22/2 4/27 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Band | Frequency Range(MHz) | BandWidth (MHz) | Modulation | Conducted | | Radiated | |
| | | | mW | AVG | mW | AVG | mW |
| LTE5 | 824~849 | 3MHz | QPSK | 22.98 | 198.61 | 15.84 | 38.37 |
| | 824~849 | 3MHz | 16QAM | 21.87 | 153.81 | 14.69 | 29.43 |

| FCC Part 22/2 4/27 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Band | Frequency Range(MHz) | BandWidth (MHz) | Modulation | Conducted | | Radiated | |
| | | | mW | AVG | mW | AVG | mW |
| LTE5 | 824~849 | 1.4MHz | QPSK | 22.98 | 198.61 | 15.62 | 36.45 |
| | 824~849 | 1.4MHz | 16QAM | 21.87 | 153.81 | 14.64 | 29.09 |



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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 | -2.8 |
| Band 5, 824~849MHz | -2.2 |
| Band 2, 1850~1910MHz | -2.8 |
| 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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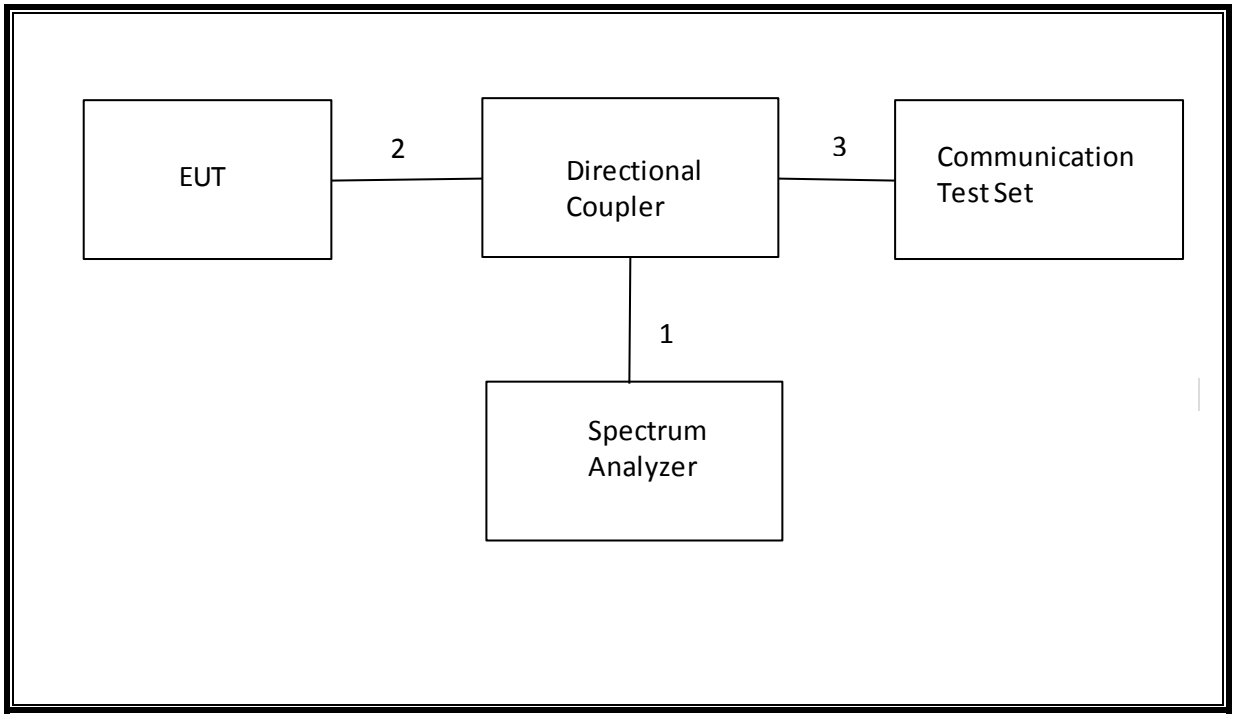
**SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)**



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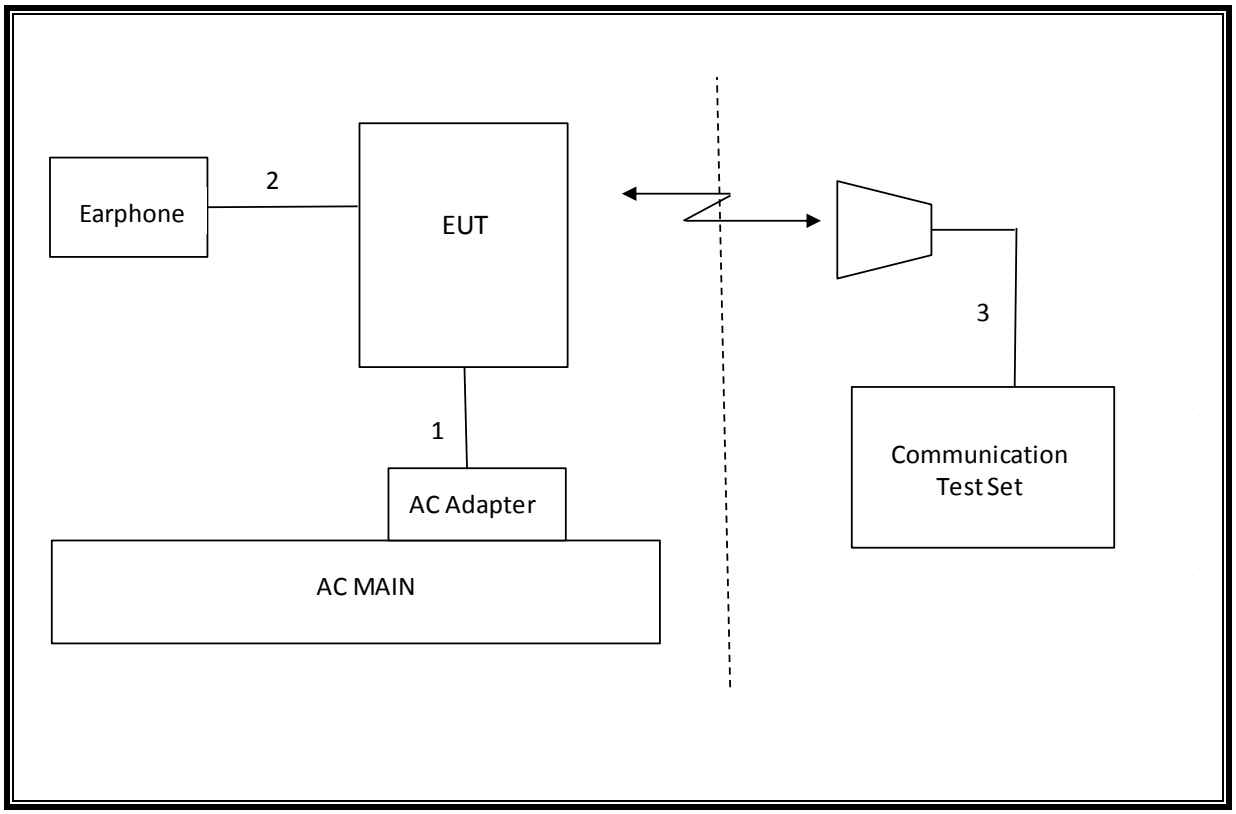
**SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)**



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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 | Worst Case |
|---|---|---|---|---|---|---|
| 2.1049 | N/A | Occupied Band width (99%) | N/A | Conducted | Pass | 8.983MHz |
| 22.917(a)<br>24.238(a)<br>27.53(g)<br>90.691 | RSS-132(4.5.1)<br>RSS-133(6.5.1)<br>RSS-139(6.5.1) | Band Edge / Conducted Spurious Emission | -13dBm | | Pass | -18.62dBm |
| 2.1046 | N/A | Conducted output power | N/A | | Pass | 33.5dBm |
| 22.355<br>24.235<br>27.54<br>90.213 | RSS-132(4.3)<br>RSS-133(6.3)<br>RSS-139(6.3)<br>RSS-199(4.3) | Frequency Stability | 2.5PPM | | Pass | 0.07PPM |
| 22.913(a)(2) | RSS-132(4.4) | Effective Radiated Power | 38 dBm | Radiated | Pass | 25.35dBm |
| 24.232(c )<br>27.50(h)(2) | RSS-133(6.4)<br>RSS-199(4.4) | Equivalent Isotropic Radiated Power | 33dBm | | Pass | 29.39dBm |
| 22.917(a)<br>24.238(a)<br>27.53(g) | RSS-132(4.5.1)<br>RSS-133(6.5.1)<br>RSS-139(6.5.1) | Radiated Spurious Emission | -13dBm | | Pass | -23.7dBm |



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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

| Mode | Coding Scheme | Time Slots | Ch No. | Freq. (MHz) | Burst Pwr (dBm) | Frame Pwr (dBm) |
|---|---|---|---|---|---|---|
| GSM (Voice) | CS1 | 1 | 128 | 824.2 | 33.5 | 24.5 |
| | | | 190 | 836.6 | 33.5 | 24.5 |
| | | | 251 | 848.8 | 33.5 | 24.5 |
| GPRS (GMSK) | CS1 | 1 | 128 | 824.2 | 33.5 | 24.5 |
| | | | 190 | 836.6 | 33.5 | 24.5 |
| | | | 251 | 848.8 | 33.5 | 24.5 |
| | | 2 | 128 | 824.2 | 30.6 | 24.6 |
| | | | 190 | 836.6 | 30.5 | 24.5 |
| | | | 251 | 848.8 | 30.2 | 24.2 |
| | | 3 | 128 | 824.2 | 28.8 | 24.5 |
| | | | 190 | 836.6 | 28.8 | 24.5 |
| | | | 251 | 848.8 | 28.4 | 24.1 |
| | | 4 | 128 | 824.2 | 27.0 | 24.0 |
| | | | 190 | 836.6 | 27.0 | 24.0 |
| | | | 251 | 848.8 | 27.0 | 24.0 |
| EGPRS (8PSK) | MCS5 | 1 | 128 | 824.2 | 27.5 | 18.5 |
| | | | 190 | 836.6 | 27.5 | 18.5 |
| | | | 251 | 848.8 | 27.3 | 18.3 |
| | | 2 | 128 | 824.2 | 26.2 | 20.2 |
| | | | 190 | 836.6 | 26.0 | 20.0 |
| | | | 251 | 848.8 | 25.7 | 19.7 |
| | | 3 | 128 | 824.2 | 24.0 | 19.7 |
| | | | 190 | 836.6 | 24.0 | 19.7 |
| | | | 251 | 848.8 | 24.0 | 19.7 |
| | | 4 | 128 | 824.2 | 23.4 | 20.4 |
| | | | 190 | 836.6 | 23.5 | 20.5 |
| | | | 251 | 848.8 | 23.5 | 20.5 |



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| Mode | Coding Scheme | Time Slots | Ch No. | Freq. (MHz) | Burst Pwr (dBm) | Frame Pwr (dBm) |
|---|---|---|---|---|---|---|
| GSM (Voice) | CS1 | 1 | 512 | 1850.2 | 30.0 | 21.0 |
| | | | 661 | 1880.0 | 30.0 | 21.0 |
| | | | 810 | 1909.8 | 30.0 | 21.0 |
| GPRS (GMSK) | CS1 | 1 | 512 | 1850.2 | 30.0 | 21.0 |
| | | | 661 | 1880.0 | 30.0 | 21.0 |
| | | | 810 | 1909.8 | 30.0 | 21.0 |
| | | 2 | 512 | 1850.2 | 27.9 | 21.9 |
| | | | 661 | 1880.0 | 28.0 | 22.0 |
| | | | 810 | 1909.8 | 28.0 | 22.0 |
| | | 3 | 512 | 1850.2 | 26.0 | 21.7 |
| | | | 661 | 1880.0 | 26.0 | 21.7 |
| | | | 810 | 1909.8 | 26.0 | 21.7 |
| | | 4 | 512 | 1850.2 | 24.5 | 21.5 |
| | | | 661 | 1880.0 | 24.5 | 21.5 |
| | | | 810 | 1909.8 | 24.5 | 21.5 |
| EGPRS (8PSK) | MCS5 | 1 | 512 | 1850.2 | 26.5 | 17.5 |
| | | | 661 | 1880.0 | 26.5 | 17.5 |
| | | | 810 | 1909.8 | 26.4 | 17.4 |
| | | 2 | 512 | 1850.2 | 25.0 | 19.0 |
| | | | 661 | 1880.0 | 25.0 | 19.0 |
| | | | 810 | 1909.8 | 25.0 | 19.0 |
| | | 3 | 512 | 1850.2 | 22.5 | 18.2 |
| | | | 661 | 1880.0 | 22.5 | 18.2 |
| | | | 810 | 1909.8 | 22.5 | 18.2 |
| | | 4 | 512 | 1850.2 | 22.0 | 19.0 |
| | | | 661 | 1880.0 | 22.0 | 19.0 |
| | | | 810 | 1909.8 | 22.0 | 19.0 |



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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 | 23.3 |
| | | 4233 | 846.6 | 23.3 |
| Band 2 | REL99 | 9262 | 1852.4 | 23.0 |
| | | 9400 | 1880 | 23.0 |
| | | 9538 | 1907.6 | 23.0 |



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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 | 22.5 |
| | | | 4183 | 836.6 | 22.3 |
| | | | 4233 | 846.6 | 22.2 |
| | | 2 | 4132 | 826.4 | 22.5 |
| | | | 4183 | 836.6 | 22.3 |
| | | | 4233 | 846.6 | 22.2 |
| | | 3 | 4132 | 826.4 | 22.0 |
| | | | 4183 | 836.6 | 21.8 |
| | | | 4233 | 846.6 | 21.8 |
| | | 4 | 4132 | 826.4 | 21.9 |
| | | | 4183 | 836.6 | 21.9 |
| | | | 4233 | 846.6 | 21.8 |
| Band 2 | HSDPA | 1 | 9262 | 1852.4 | 21.8 |
| | | | 9400 | 1880 | 21.8 |
| | | | 9538 | 1907.6 | 22.0 |
| | | 2 | 9262 | 1852.4 | 21.9 |
| | | | 9400 | 1880 | 22.0 |
| | | | 9538 | 1907.6 | 22.0 |
| | | 3 | 9262 | 1852.4 | 21.8 |
| | | | 9400 | 1880 | 22.0 |
| | | | 9538 | 1907.6 | 22.0 |
| | | 4 | 9262 | 1852.4 | 22.0 |
| | | | 9400 | 1880 | 22.0 |
| | | | 9538 | 1907.6 | 22.0 |



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## 8.4. 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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## 8.4.1. UMTS HSUPA OUTPUT POWER RESULT

| Band | Mode | Subset | Ch. | f(MHz) | Conducted Power (dBm) Avg (dBm) |
|---|---|---|---|---|---|
| Band 5 | HSUPA | 1 | 4132 | 826.4 | 22.7 |
| | | | 4183 | 836.6 | 22.0 |
| | | | 4233 | 846.6 | 21.9 |
| | | 2 | 4132 | 826.4 | 21.3 |
| | | | 4183 | 836.6 | 21.1 |
| | | | 4233 | 846.6 | 21.0 |
| | | 3 | 4132 | 826.4 | 21.0 |
| | | | 4183 | 836.6 | 21.0 |
| | | | 4233 | 846.6 | 21.0 |
| | | 4 | 4132 | 826.4 | 21.5 |
| | | | 4183 | 836.6 | 21.2 |
| | | | 4233 | 846.6 | 21.3 |
| | | 5 | 4132 | 826.4 | 22.5 |
| | | | 4183 | 836.6 | 22.3 |
| | | | 4233 | 846.6 | 22.2 |
| Band 2 | HSUPA | 1 | 9262 | 1852.4 | 22.0 |
| | | | 9400 | 1880 | 22.0 |
| | | | 9538 | 1907.6 | 21.7 |
| | | 2 | 9262 | 1852.4 | 21.0 |
| | | | 9400 | 1880 | 21.2 |
| | | | 9538 | 1907.6 | 20.9 |
| | | 3 | 9262 | 1852.4 | 20.9 |
| | | | 9400 | 1880 | 21.4 |
| | | | 9538 | 1907.6 | 21.1 |
| | | 4 | 9262 | 1852.4 | 21.4 |
| | | | 9400 | 1880 | 21.9 |
| | | | 9538 | 1907.6 | 21.0 |
| | | 5 | 9262 | 1852.4 | 22.0 |
| | | | 9400 | 1880 | 22.0 |
| | | | 9538 | 1907.6 | 22.0 |



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# 8.5. LTE OUTPUT VERIFICATION

## 8.5.1. LTE OUTPUT RESULT

| Band | BW (MHz) | Mode | RB Allocation | RB offset | Target MPR | Avg Pwr (dBm) | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 20450 | 20525 | 20600 |
| | | | | | | 829 MHz | 836.5 MHz | 844 MHz |
| LTE Band 5 | 10 | QPSK | 1 | 0 | 0 | 22.95 | 23.00 | 22.94 |
| | | | 1 | 25 | 0 | 22.94 | 23.00 | 22.92 |
| | | | 1 | 49 | 0 | 22.90 | 22.90 | 22.89 |
| | | | 25 | 0 | 1 | 21.98 | 22.00 | 21.94 |
| | | | 25 | 12 | 1 | 21.94 | 21.98 | 21.93 |
| | | | 25 | 25 | 1 | 21.90 | 21.91 | 21.88 |
| | | | 50 | 0 | 1 | 21.87 | 21.90 | 21.86 |
| | | 16QAM | 1 | 0 | 1 | 21.82 | 21.89 | 21.80 |
| | | | 1 | 25 | 1 | 21.85 | 21.87 | 21.84 |
| | | | 1 | 49 | 1 | 21.68 | 21.71 | 21.66 |
| | | | 25 | 0 | 2 | 20.94 | 21.00 | 20.90 |
| | | | 25 | 12 | 2 | 20.93 | 20.98 | 20.91 |
| | | | 25 | 25 | 2 | 20.90 | 20.98 | 20.89 |
| | | | 50 | 0 | 2 | 20.84 | 20.97 | 20.82 |
| Band | BW (MHz) | Mode | RB Allocation | RB offset | Target MPR | Avg Pwr (dBm) | | |
| | | | | | | 20425 | 20525 | 20625 |
| | | | | | | 826.5 MHz | 836.5 MHz | 846.5 MHz |
| LTE Band 5 | 5 | QPSK | 1 | 0 | 0 | 22.93 | 22.99 | 22.93 |
| | | | 1 | 12 | 0 | 22.92 | 22.97 | 22.91 |
| | | | 1 | 24 | 0 | 22.88 | 22.90 | 22.88 |
| | | | 12 | 0 | 1 | 21.96 | 21.99 | 21.93 |
| | | | 12 | 7 | 1 | 21.92 | 21.97 | 21.92 |
| | | | 12 | 13 | 1 | 21.88 | 21.90 | 21.87 |
| | | | 25 | 0 | 1 | 21.85 | 21.89 | 21.85 |
| | | 16QAM | 1 | 0 | 1 | 21.80 | 21.88 | 21.79 |
| | | | 1 | 12 | 1 | 21.83 | 21.86 | 21.83 |
| | | | 1 | 24 | 1 | 21.66 | 21.70 | 21.65 |
| | | | 12 | 0 | 2 | 20.92 | 20.99 | 20.89 |
| | | | 12 | 7 | 2 | 20.91 | 20.97 | 20.90 |
| | | | 12 | 13 | 2 | 20.88 | 20.97 | 20.88 |
| | | | 25 | 0 | 2 | 20.82 | 20.96 | 20.81 |
| Band | BW (MHz) | Mode | RB Allocation | RB offset | Target MPR | Avg Pwr (dBm) | | |
| | | | | | | 20415 | 20525 | 20635 |
| | | | | | | 825.5 MHz | 836.5 MHz | 847.5 MHz |
| LTE Band 5 | 3 | QPSK | 1 | 0 | 0 | 22.93 | 22.98 | 22.92 |
| | | | 1 | 8 | 0 | 22.92 | 22.96 | 22.90 |
| | | | 1 | 14 | 0 | 22.88 | 22.89 | 22.87 |
| | | | 8 | 0 | 1 | 21.96 | 21.98 | 21.92 |
| | | | 8 | 4 | 1 | 21.92 | 21.96 | 21.91 |
| | | | 8 | 7 | 1 | 21.88 | 21.89 | 21.86 |
| | | | 15 | 0 | 1 | 21.85 | 21.88 | 21.84 |



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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 1 | 0 | 1 | 21.80 | 21.87 | 21.78 |
| | | | 1 | 8 | 1 | 21.83 | 21.85 | 21.82 |
| | | | 1 | 14 | 1 | 21.66 | 21.69 | 21.64 |
| | | 16QAM | 8 | 0 | 2 | 20.92 | 20.98 | 20.88 |
| | | | 8 | 4 | 2 | 20.91 | 20.96 | 20.89 |
| | | | 8 | 7 | 2 | 20.88 | 20.96 | 20.87 |
| | | | 15 | 0 | 2 | 20.82 | 20.95 | 20.80 |
| Band | BW (MHz) | Mode | RB Allocation | RB offset | Target MPR | Avg Pwr (dBm) | | |
| | | | | | | 20407 | 20525 | 20643 |
| | | | | | | 824.7 MHz | 836.5 MHz | 848.3 MHz |
| LTE Band 5 | 1.4 | QPSK | 1 | 0 | 0 | 22.93 | 22.98 | 22.92 |
| | | | 1 | 3 | 0 | 22.92 | 22.96 | 22.90 |
| | | | 1 | 5 | 0 | 22.88 | 22.89 | 22.87 |
| | | | 3 | 0 | 0 | 22.10 | 22.15 | 22.08 |
| | | | 3 | 1 | 0 | 22.08 | 22.10 | 22.07 |
| | | | 3 | 3 | 0 | 22.07 | 22.08 | 22.04 |
| | | | 6 | 0 | 1 | 21.85 | 21.88 | 21.84 |
| | | 16QAM | 1 | 0 | 1 | 21.80 | 21.87 | 21.78 |
| | | | 1 | 3 | 1 | 21.83 | 21.85 | 21.82 |
| | | | 1 | 5 | 1 | 21.66 | 21.69 | 21.64 |
| | | | 3 | 0 | 1 | 21.57 | 21.60 | 21.55 |
| | | | 3 | 1 | 1 | 21.55 | 21.50 | 21.42 |
| | | | 3 | 3 | 1 | 21.40 | 21.40 | 21.39 |
| | | | 6 | 0 | 2 | 20.82 | 20.95 | 20.80 |



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# 9. PEAK TO AVERAGE RATIO

**Test Procedure**

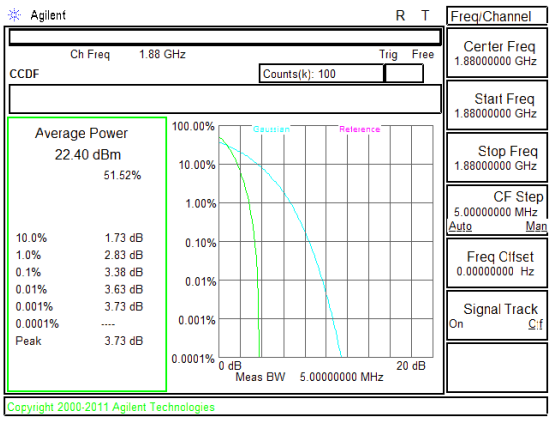
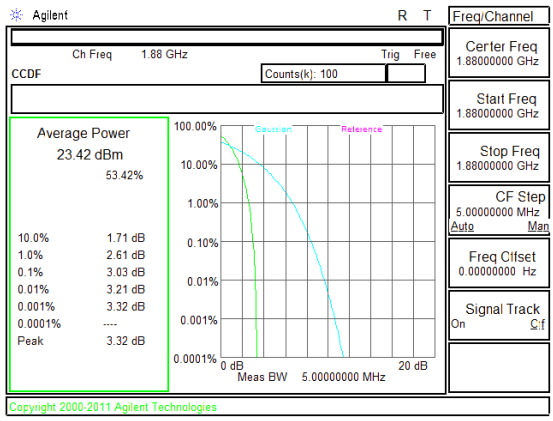
Per KDB 971168 D01 Power Meas License Digital Systems v02r01

**Test Spec**

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

## 9.1. CONDUCTED PEAK TO AVERAGE RESULT

### 9.1.1. WCDMA

| Band | | |
|---|---|---|
| Band 2 |  Band WCDMA B2 HSDPA |  Band WCDMA B2 REL99 |
| HSDPA | | |

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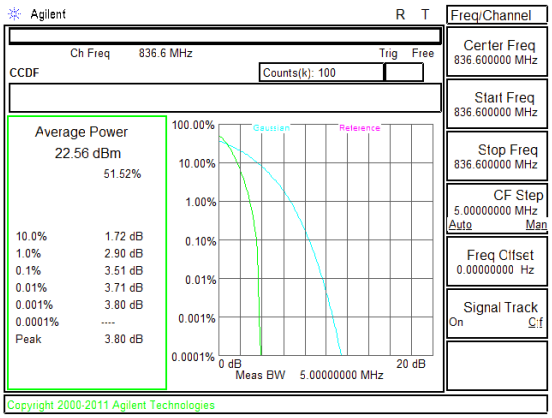
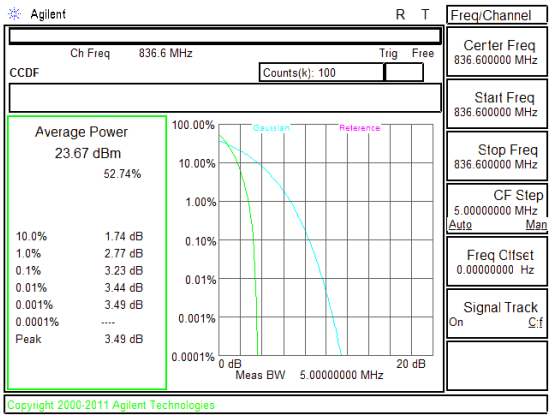
| | | |
|---|---|---|
| Band<br>Band 5<br>HSDPA |  <br>Band WCDMA B5 HSDPA |  <br>Band WCDMA B5 REL99 |

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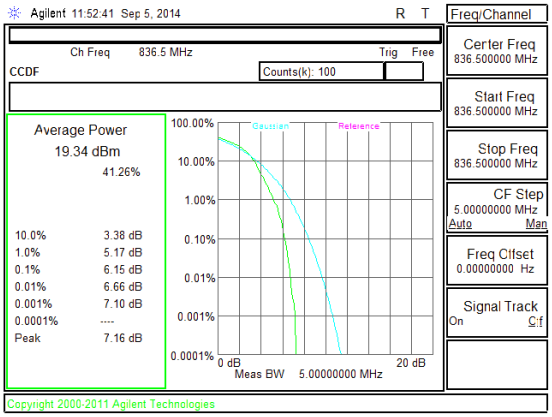
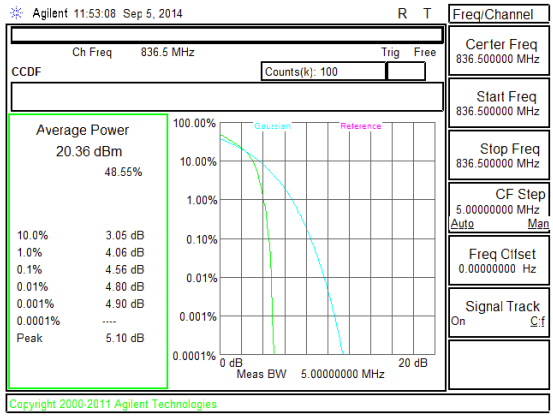
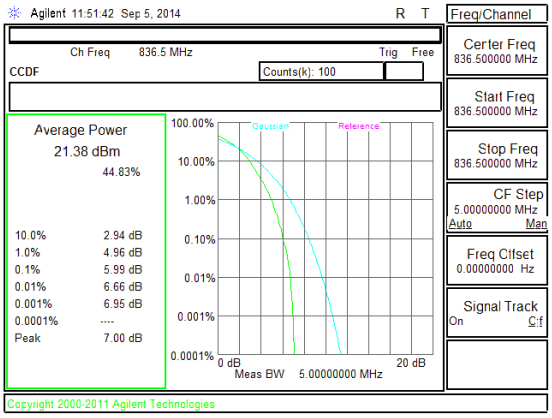
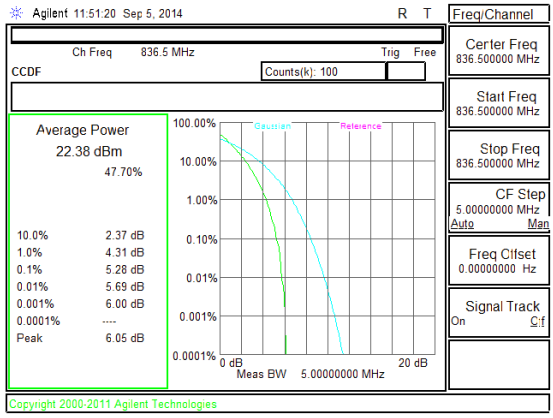
## 9.1.2. LTE Band 5

| | | |
|---|---|---|
| Band<br>LTE5<br>10MHz<br>16QAM |  <br>Band LTE5 10MHz 16QAM Mid channel |  <br>Band LTE5 10MHz QPSK Mid channel |
| 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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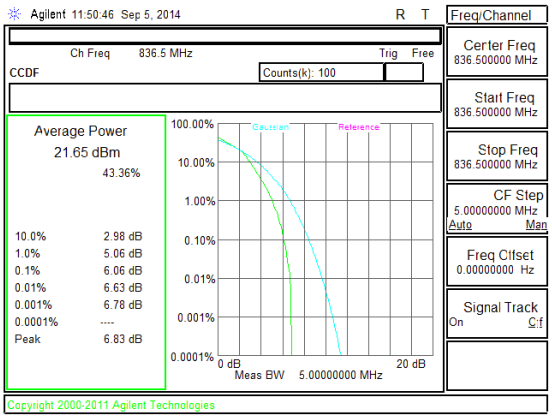
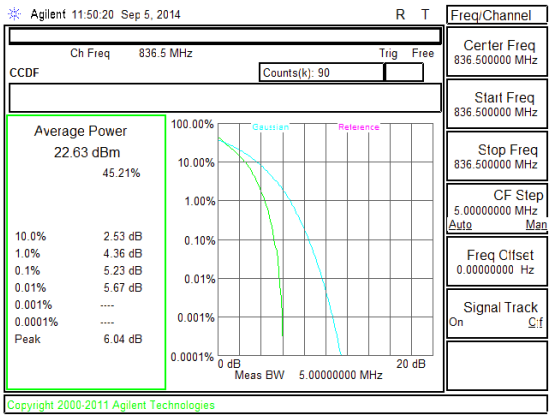
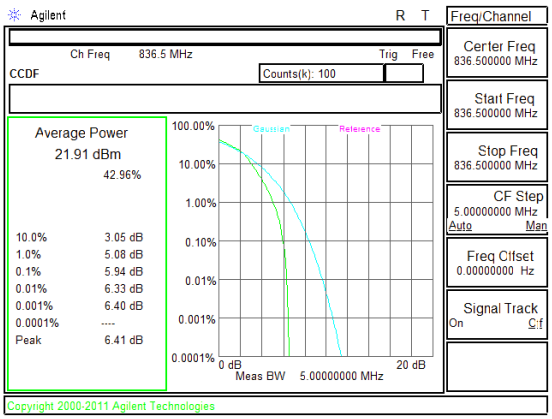
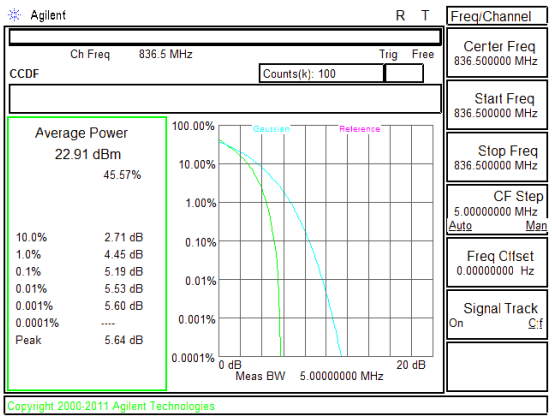
| | | |
|---|---|---|
| Band<br>LTE5<br>3MHz<br>16QAM |  <br>Band LTE5 3MHz 16QAM Mid channel |  <br>Band LTE5 3MHz QPSK Mid channel |

| | | |
|---|---|---|
| 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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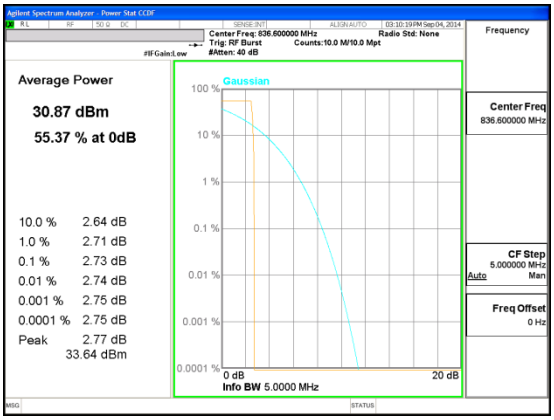
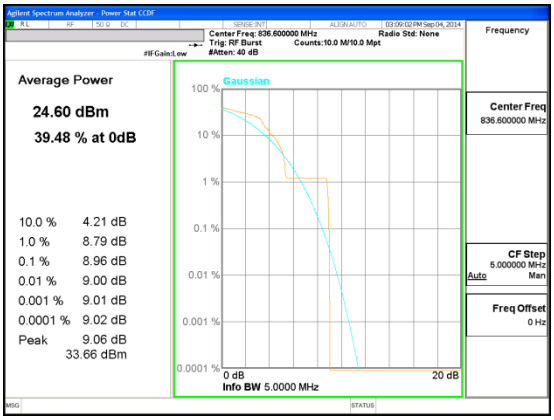
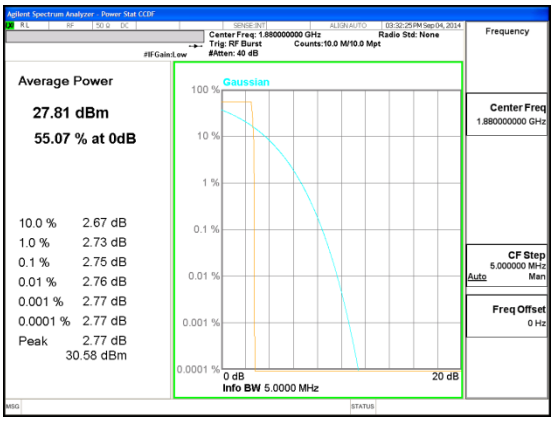
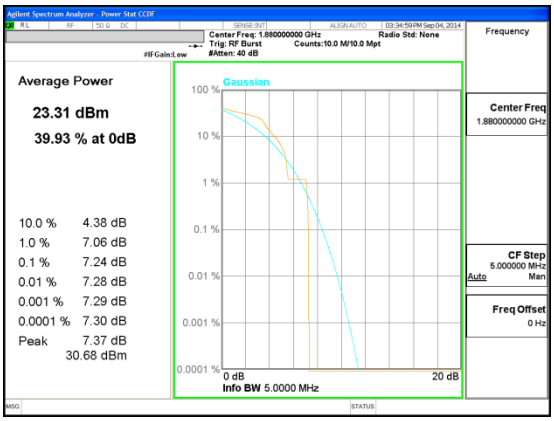
| | | |
|---|---|---|
| Band<br><br>GSM<br>850 |  <br><br>GPRS |  <br><br>EGRPS |
| Band<br><br>GSM<br>1900 |  <br><br>GPRS |  <br><br>EGRPS |



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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)

**SOP**

**Occupied bandwidth – relative measurement procedure (26dB)**

The reference value is the highest level of the spectral envelope of the modulated signal.

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be between two and five times the anticipated OBW.

b) The nominal resolution bandwidth (RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.

c) Set the reference level of the instrument as required to prevent the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.

d) NOTE—*Steps a) through c) may require iteration to adjust within the specified tolerances.*

e) The dynamic range of the spectrum analyzer at the selected RBW shall be at least 10 dB below the target "-*X* dB down" requirement (*i.e.*, if the requirement calls for measuring the –26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference value).

f) Set the detection mode to peak, and the trace mode to max hold.

g) Determine the reference value: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).

h) Determine the "-*X* dB down amplitude" as equal to (Reference Value – *X*). Alternatively, this calculation can be performed by the analyzer by using the marker-delta function.



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i) Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the "–*X* dB down amplitude" determined in step g). If a marker is below this "-*X* dB down amplitude" value it shall be placed as close as possible to this value. The OBW is the positive frequency difference between the two markers.

j) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display. The frequency and amplitude axes and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

**2. Occupied bandwidth – power bandwidth (99%) measurement procedure**

The following procedure shall be used for measuring (99 %) power bandwidth per KDB 971168 D01 Power Meas License Digital Systems v02r01 4

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (*i.e.*, two to five times the OBW).

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.

c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.

d) NOTE—*Steps a) through c) may require iteration to adjust within the specified tolerances.*

e) Set the detection mode to peak, and the trace mode to max hold..

f) Use the 99 % power bandwidth function of the spectrum analyzer (if available) and report the measured bandwidth.

g) If the instrument does not have a 99 % power bandwidth function, the trace data points are to be recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99 % power bandwidth is the difference between these two frequencies.

h) The OBW shall be reported by providing plot(s) of the measuring instrument display. The frequency and amplitude axes and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s). Record the displayed OBW value. MODES TESTED

**MODES TESTED**


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### 10.1.1. OCCUPIED BANDWIDTH RESULTS

| Band | Mode | Channel | f (MHz) | 99% BW (KHz) | -26dB BW (KHz) |
|---|---|---|---|---|---|
| GSM850 | GMSK | 128 | 824.2 | | |
| | | 190 | 836.6 | | |
| | | 251 | 848.8 | | |
| | GPRS | 128 | 824.2 | 242.52 | 321.7 |
| | | 190 | 836.6 | 245.2 | 319.7 |
| | | 251 | 848.8 | 246.27 | 315.9 |
| | EGPRS | 128 | 824.2 | 246.05 | 316.3 |
| | | 190 | 836.6 | 241.85 | 312.9 |
| | | 251 | 848.8 | 240.52 | 311.1 |
| GSM1900 | GMSK | 512 | 1850.2 | | |
| | | 661 | 1880 | | |
| | | 810 | 1909.8 | | |
| | GPRS | 512 | 1850.2 | 246.37 | 330.6 |
| | | 661 | 1880 | 243.69 | 328.4 |
| | | 810 | 1909.8 | 246.3 | 329.6 |
| | EGPRS | 512 | 1850.2 | 249.77 | 330.7 |
| | | 661 | 1880 | 247.8 | 328.6 |
| | | 810 | 1909.8 | 246.82 | 326.9 |



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| Band | Mode | Channel | f (MHz) | 99% BW (MHz) | -26dB BW (MHz) |
|---|---|---|---|---|---|
| Band 5 | REL99 | 4132 | 826.4 | 4.1704 | 4.604 |
| | | 4183 | 836.6 | 4.168 | 4.621 |
| | | 4233 | 846.6 | 4.139 | 4.603 |
| | HSDPA | 4132 | 826.4 | 4.158 | 4.58 |
| | | 4183 | 836.6 | 4.154 | 4.608 |
| | | 4233 | 846.6 | 4.152 | 4.604 |
| | HSUPA | 4132 | 826.4 | | |
| | | 4183 | 836.6 | | |
| | | 4233 | 846.6 | | |
| Band 2 | REL99 | 9262 | 1852.4 | 4.149 | 4.607 |
| | | 9400 | 1880 | 4.158 | 4.625 |
| | | 9538 | 1907.6 | 4.168 | 4.635 |
| | HSDPA | 9262 | 1852.4 | 4.135 | 4.614 |
| | | 9400 | 1880 | 4.163 | 4.609 |
| | | 9538 | 1907.6 | 4.138 | 4.599 |
| | 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 (MHz) |
|---|---|---|---|---|---|---|
| LTE5 | 10 | QPSK | 50/0 | 829 | 8.983 | 9.269 |
| | | | 50/0 | 836.5 | 8.883 | 9.146 |
| | | | 50/0 | 844 | 8.791 | 9.184 |
| | | 16QAM | 50/0 | 829 | 8.898 | 9.161 |
| | | | 50/0 | 836.5 | 8.76 | 9.338 |
| | | | 50/0 | 844 | 8.85 | 9.14 |

| Band | BW(MHz) | Mode | RB/RB Size | f (MHz) | 99% BW (MHz) | -26dB BW (MHz) |
|---|---|---|---|---|---|---|
| LTE5 | 5 | QPSK | 25/0 | 826.5 | 4.446 | 4.723 |
| | | | 25/0 | 836.5 | 4.409 | 4.563 |
| | | | 25/0 | 846.5 | 4.425 | 4.425 |
| | | 16QAM | 25/0 | 826.5 | 4.409 | 4.652 |
| | | | 25/0 | 836.5 | 4.472 | 4.634 |
| | | | 25/0 | 846.5 | 4.425 | 4.571 |

| Band | BW(MHz) | Mode | RB/RB Size | f (MHz) | 99% BW (MHz) | -26dB BW (MHz) |
|---|---|---|---|---|---|---|
| LTE5 | 3 | QPSK | 15/0 | 825.5 | 2.511 | 2.822 |
| | | | 15/0 | 836.5 | 2.656 | 2.834 |
| | | | 15/0 | 847.5 | 2.64 | 2.827 |
| | | 16QAM | 15/0 | 825.5 | 2.633 | 2.826 |
| | | | 15/0 | 836.5 | 2.687 | 2.779 |
| | | | 15/0 | 847.5 | 2.662 | 2.894 |



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| Band | BW(MHz) | Mode | RB/RB Size | f (MHz) | 99% BW (KHz) | -26dB BW (KHz) |
|---|---|---|---|---|---|---|
| LTE5 | 1.4 | QPSK | 6/0 | 824.7 | 1.099 | 1.282 |
| | | | 6/0 | 836.5 | 1.082 | 1.268 |
| | | | 6/0 | 848.3 | 1.081 | 1.244 |
| | | 16QAM | 6/0 | 824.7 | 1.086 | 1.262 |
| | | | 6/0 | 836.5 | 1.081 | 1.261 |
| | | | 6/0 | 848.3 | 1.085 | 1.27 |


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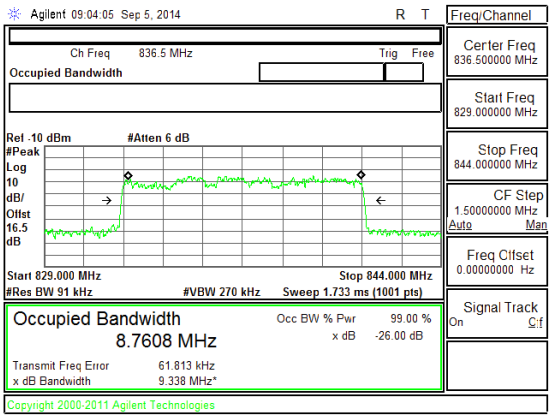
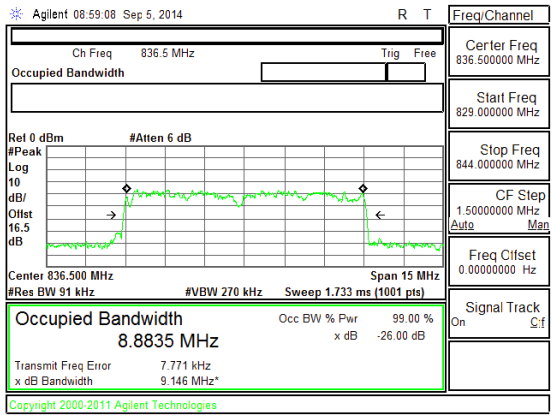
## 10.1.1. OCCUPIED BANDWIDTH PLOTS

**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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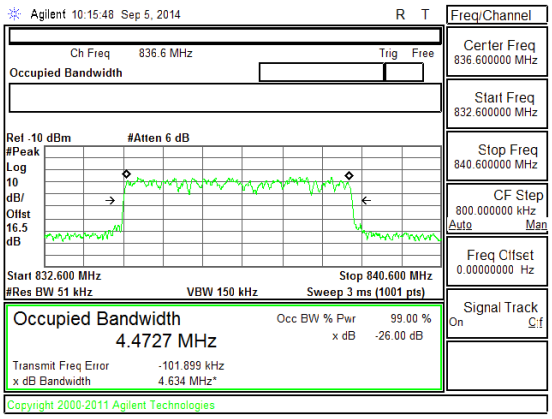
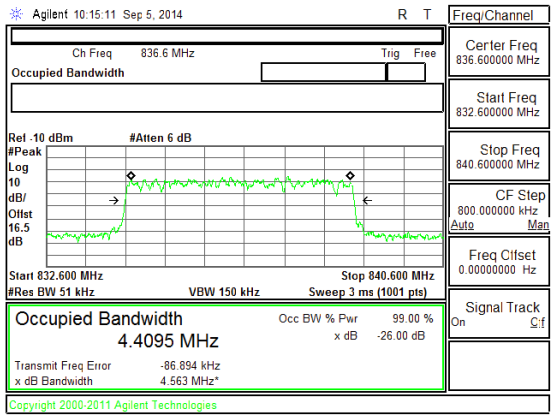
Band LTE5 5MHz

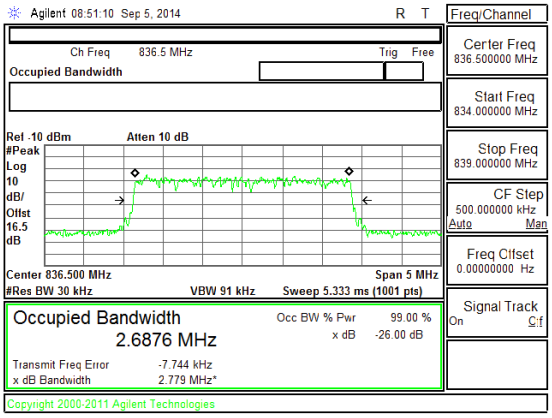



Band LTE5 5MHz OBW 16QAM Mid Channel FRB.gif

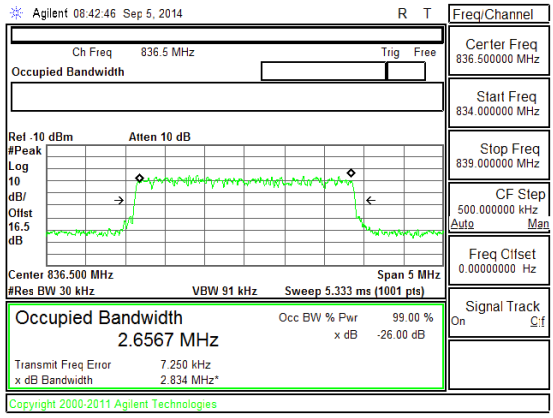



Band LTE5 5MHz OBW QPSK Mid Channel FRB.gif

Band LTE5 3MHz




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




Band LTE5 3MHz OBW QPSK Mid Channel FRB.gif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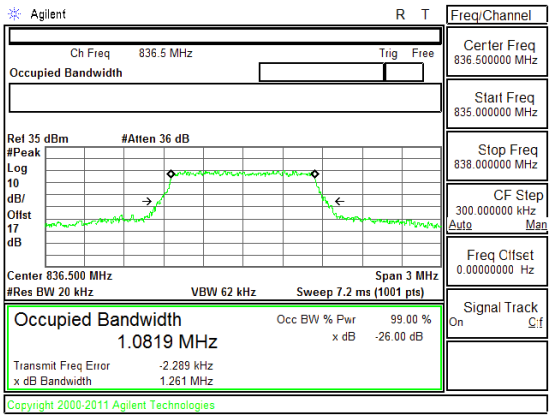
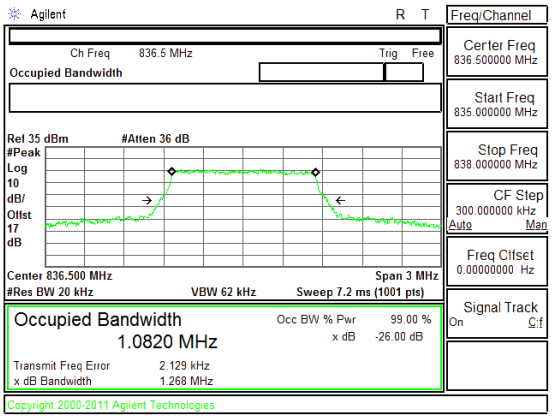
| | | |
|---|---|---|
| Band<br>LTE5<br>1.4MHz |  <br>Band LTE5 1.4MHz OBW 16QAM Mid Channel FRB |  <br>Band LTE5 1.4MHz OBW QPSK Mid Channel FRB |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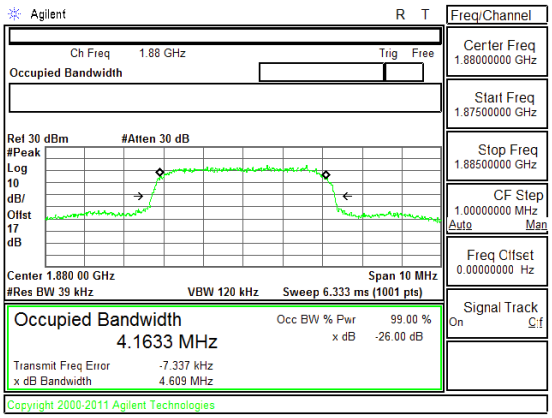
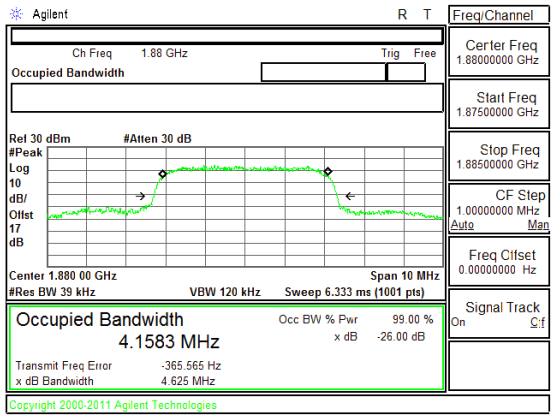
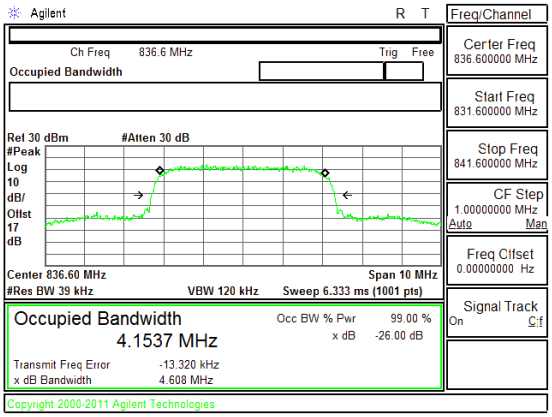
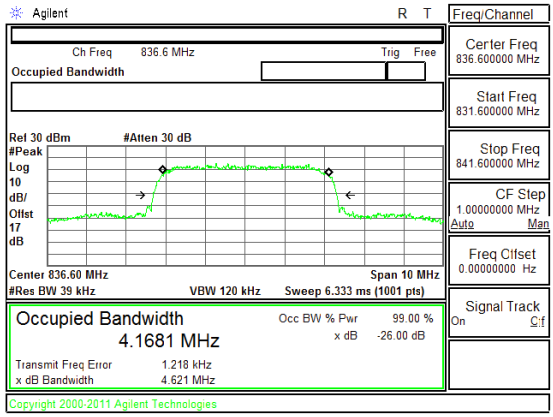
| | | |
|---|---|---|
| Band<br>Band 2<br>HSDPA |  <br>Band WCDMA B2 HSDPA OBW |  <br>Band WCDMA B2 REL99 OBW |
| Band<br>Band 5<br>HSDPA |  <br>Band WCDMA B5 HSDPA OBW |  <br>Band WCDMA B5 REL99 OBW |

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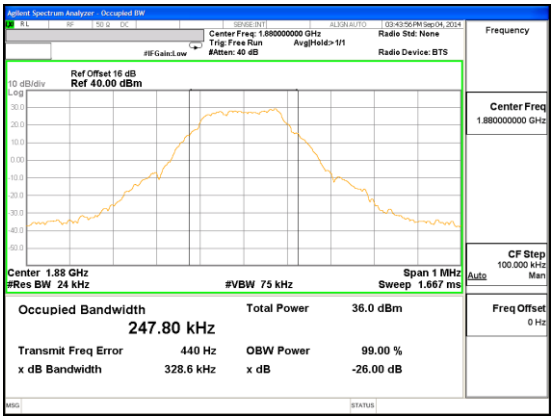
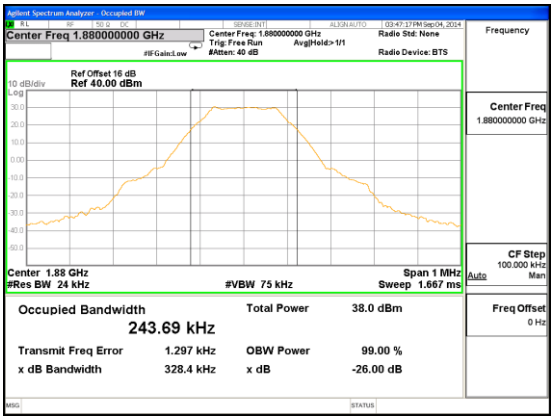
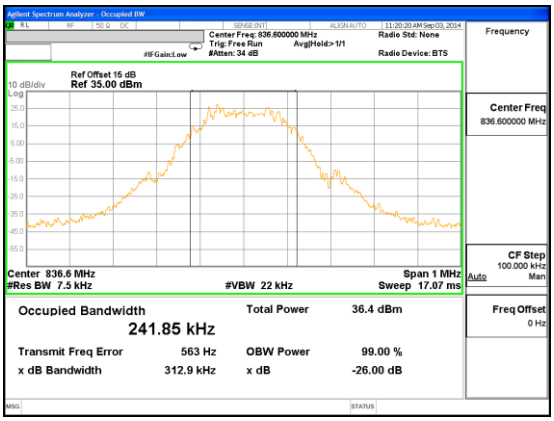
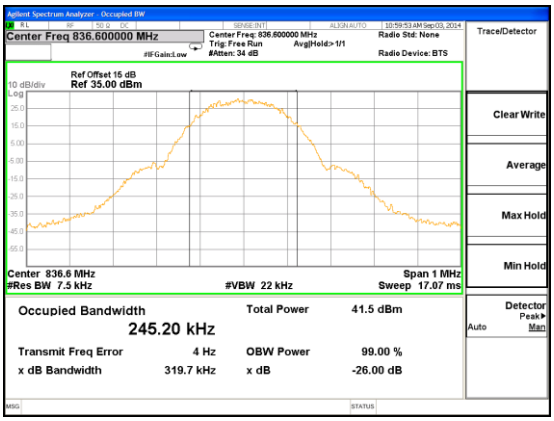
| | | |
|---|---|---|
| Band<br><br>GSM<br>1900<br><br>EGPRS |  <br>Band GSM1900 EGPRS OBW Mid channel |  <br>Band GSM1900 GPRS OBW Mid channel |
| Band<br><br>GSM<br>850<br><br>EGPRS |  <br>Band GSM850 EGPRS OBW Mid channel |  <br>Band GSM850 GPRS OBW Mid channel |

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## 10.2. BAND EDGE EMISSIONS

**RULE PART(S)**

FCC: §22.359, §24.238, §27. 53 and § 90.691

**LIMITS**

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

**TEST PROCEDURE**

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

**MODES TESTED**

GSM, WCDMA, and LTE Band 5

**RESULTS**



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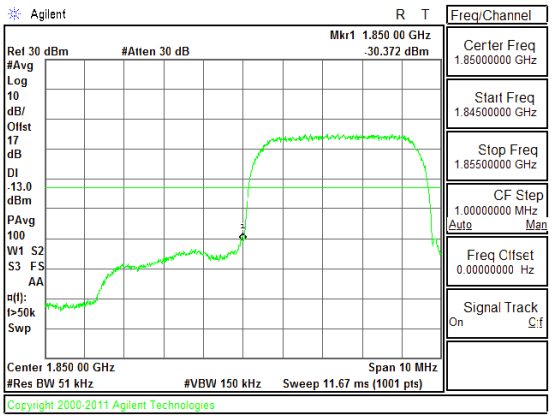
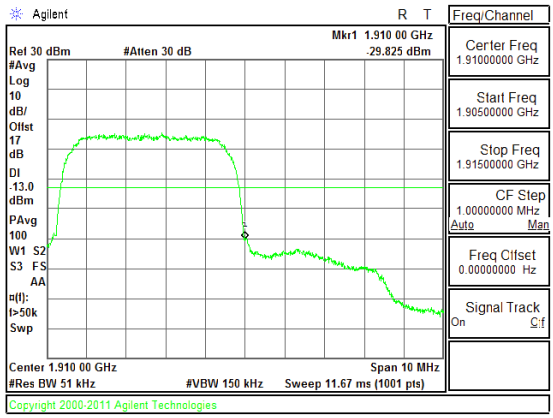
### 10.2.1. BAND EDGE PLOTS

**WCDMA**

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

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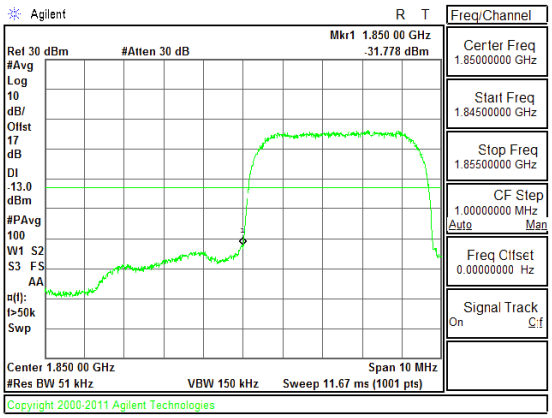
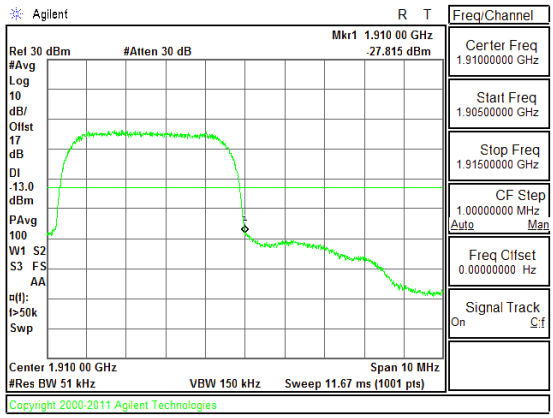
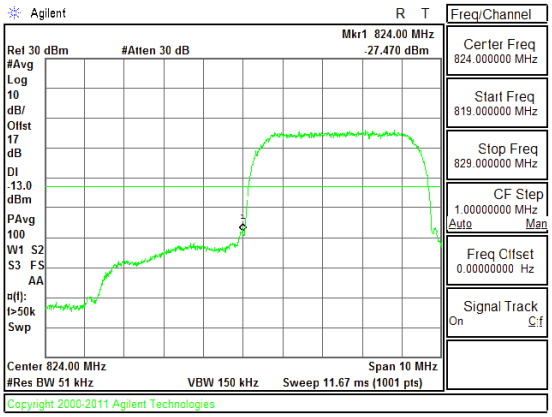
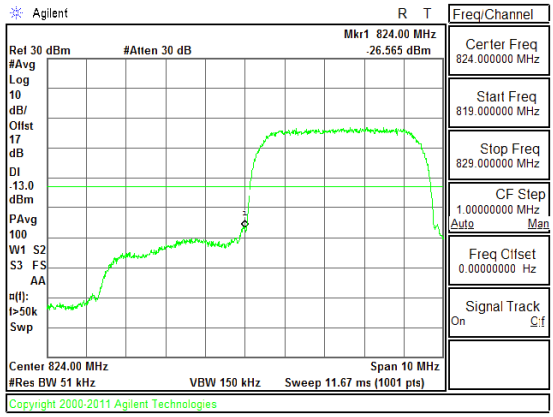
| | | |
|---|---|---|
| Band<br>Band 2<br>REL99 |  <br>Band WCDMA B2 REL99 CBE |  <br>Band WCDMA B2 REL99 CBE |
| Band<br>Band 5 |  <br>Band WCDMA B5 HSDPA CBE |  <br>Band WCDMA B5 REL99 CBE |



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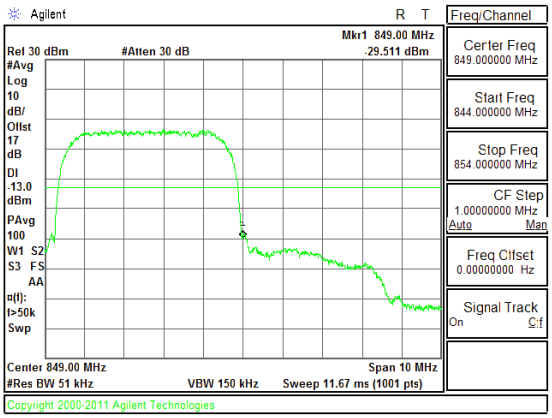
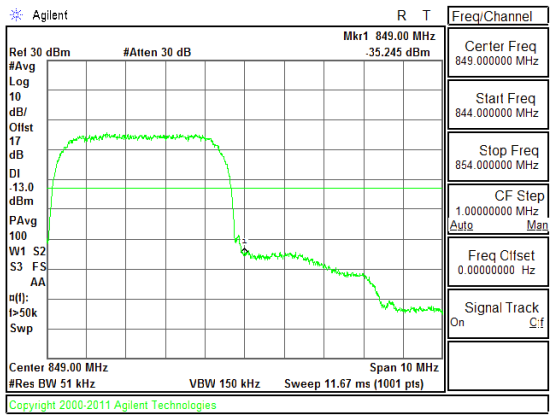
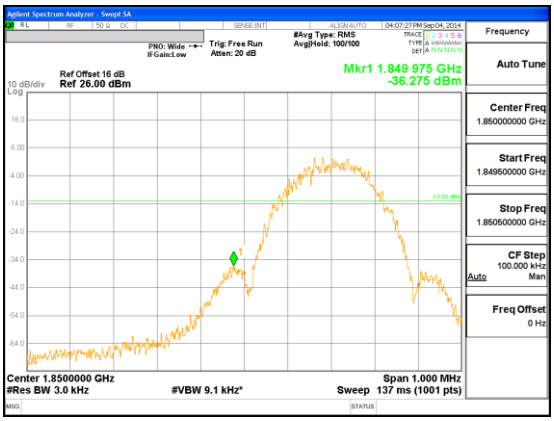
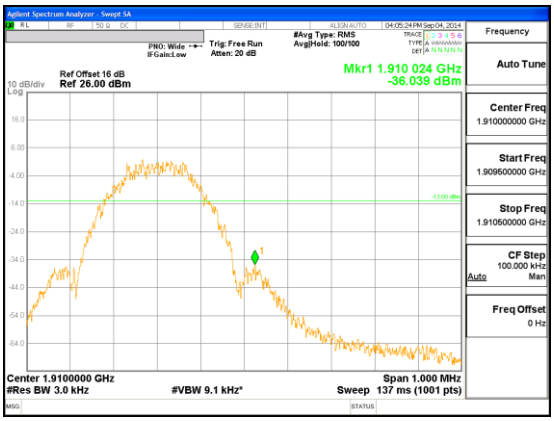
| | | |
|---|---|---|
| Band<br><br>Band 5 |  <br>Band WCDMA B5 REL99 CBE |  <br>Band WCDMA B5 HSDPA CBE |
| Band<br><br>GSM<br>1900<br><br>EGPRS |  <br>Band GSM1900 EGPRS CBE Low channel |  <br>Band GSM1900 EGPRS CBE High channel |

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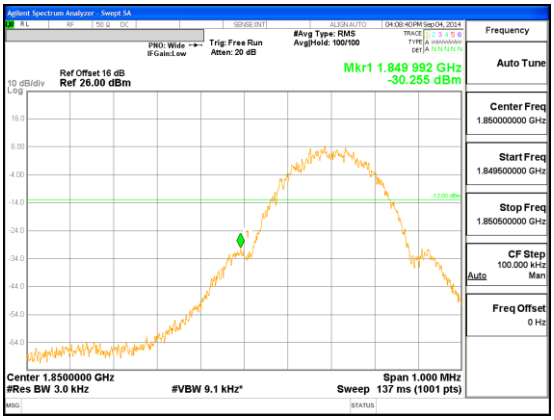
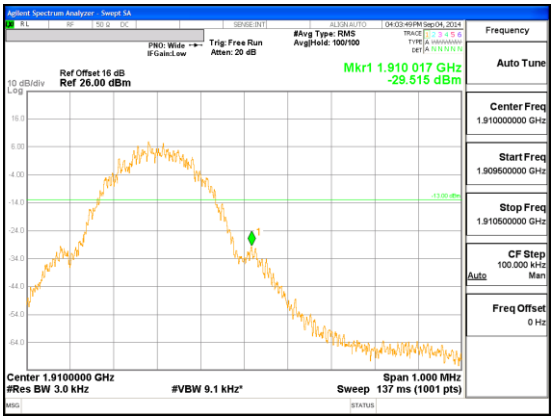
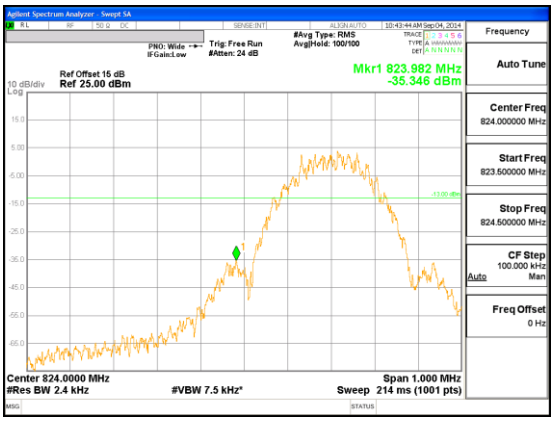
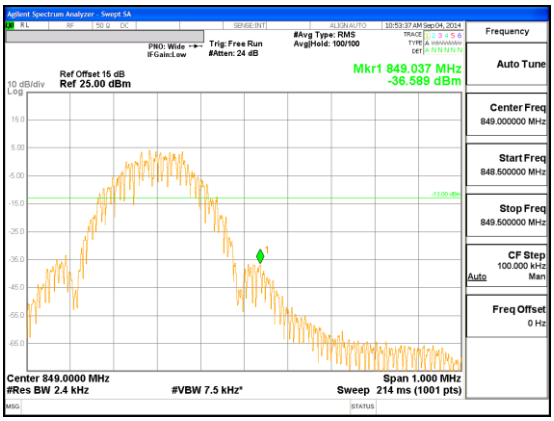
| | | |
|---|---|---|
| Band<br><br>GSM<br>1900<br><br>GPRS |  <br><br>Band GSM1900 GPRS CBE Low channel |  <br><br>Band GSM1900 GPRS CBE High channel |
| Band<br><br>GSM<br>850<br><br>EGPRS |  <br><br>Band GSM850 EGPRS CBE Low channel |  <br><br>Band GSM850 EGPRS CBE High channel |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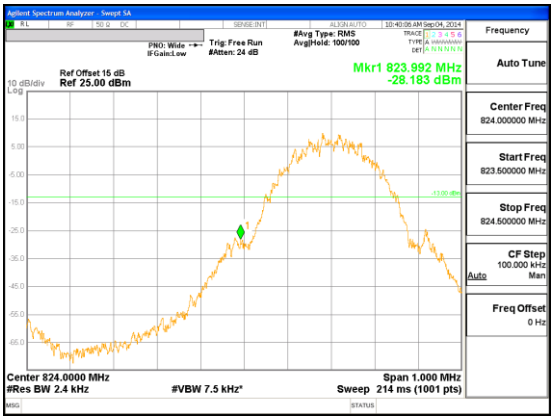
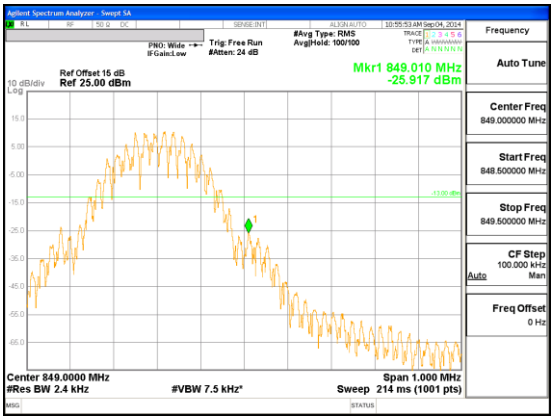
| | | |
|---|---|---|
| Band<br><br>GSM 850<br><br>GPRS |  <br><br>Band GSM850 GPRS CBE Low channel |  <br><br>Band GSM850 GPRS CBE High channel |



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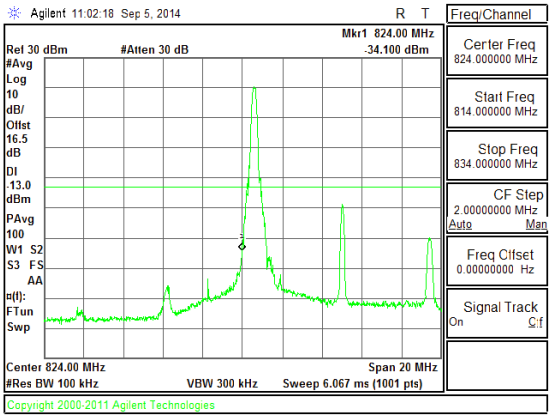
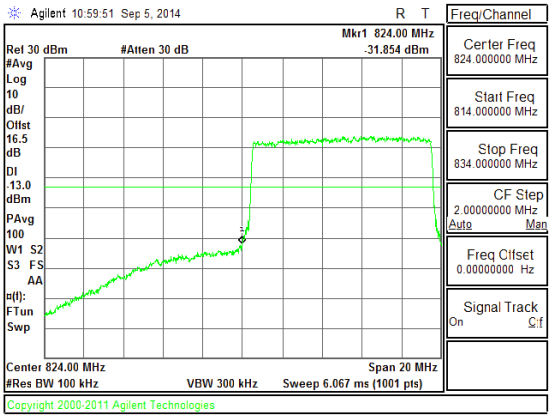
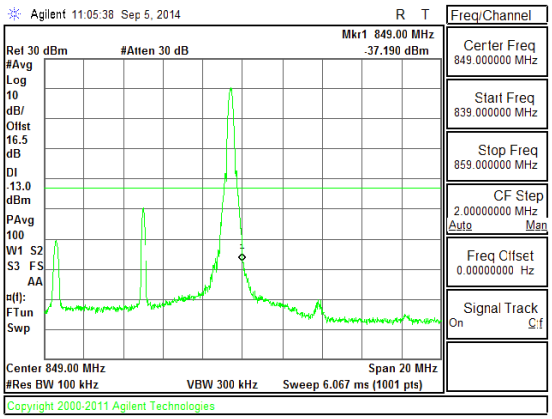
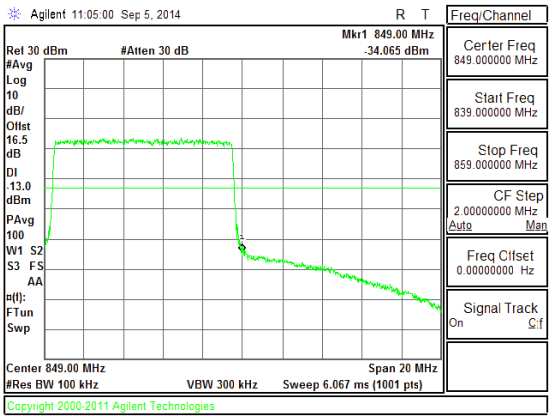
**LTE Band 5**

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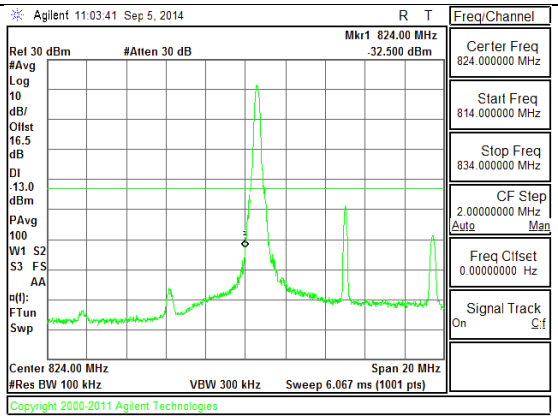
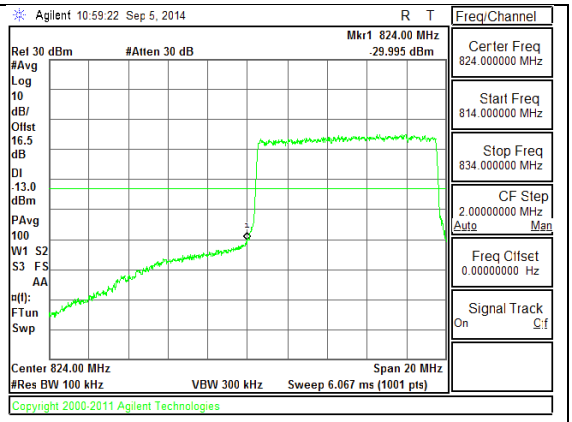
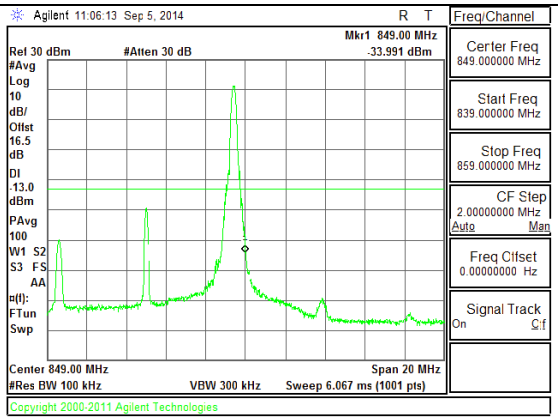
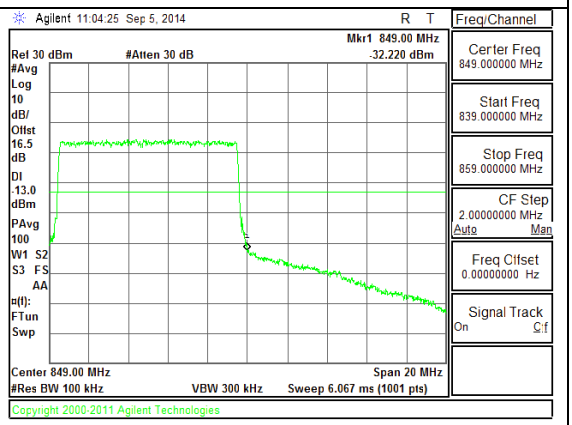
| | | |
|---|---|---|
| Band<br>LTE5<br>10MHz<br>QPSK |  Band LTE5 10MHz CBE QPSK Low Channel 1RB.gif |  Band LTE5 10MHz CBE QPSK Low Channel FRB.gif |
| Band<br>LTE5<br>10MHz<br>QPSK |  Band LTE5 10MHz CBE QPSK High Channel 1RB.gif |  Band LTE5 10MHz CBE QPSK High Channel FRB.gif |



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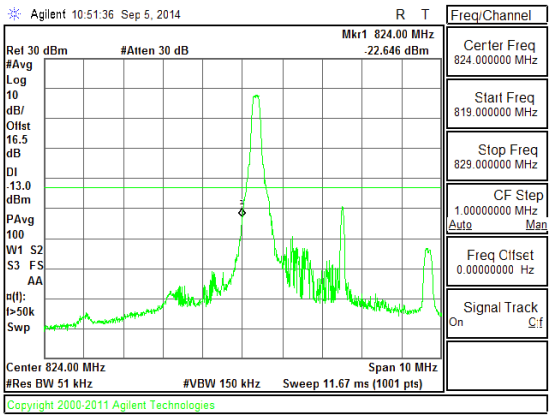
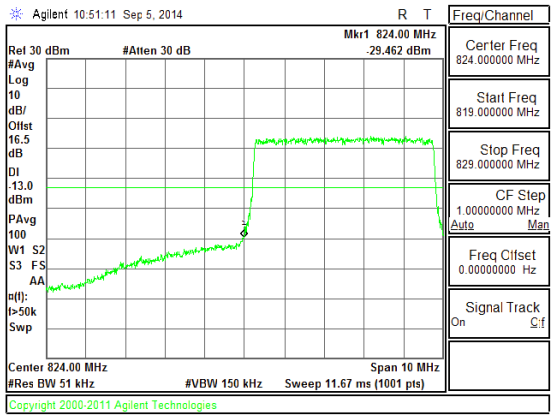
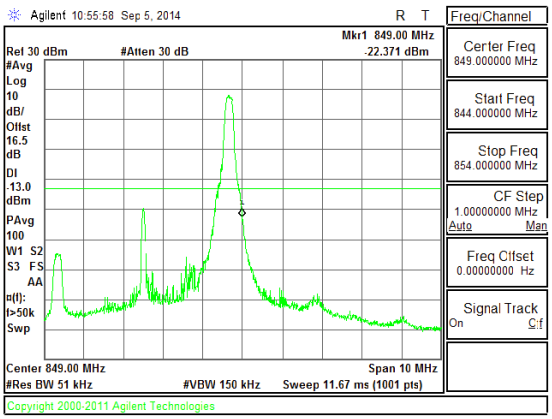
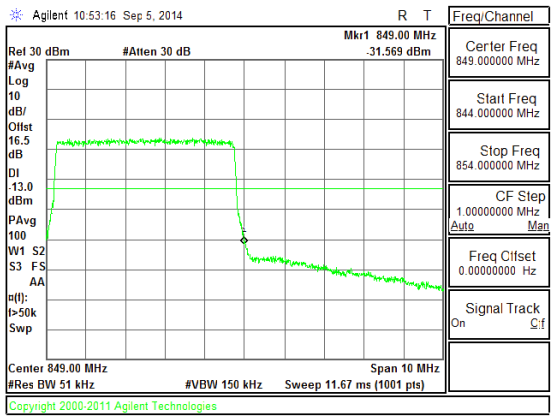
| | | |
|---|---|---|
| Band<br>LTE5<br>5MHz<br>16QAM |  <br>Band LTE5 5MHz CBE 16QAM Low Channel 1RB.gif |  <br>Band LTE5 5MHz CBE 16QAM Low Channel FRB.gif |
| Band<br>LTE5<br>5MHz<br>16QAM |  <br>Band LTE5 5MHz CBE 16QAM High Channel 1RB.gif |  <br>Band LTE5 5MHz CBE 16QAM High Channel FRB.gif |

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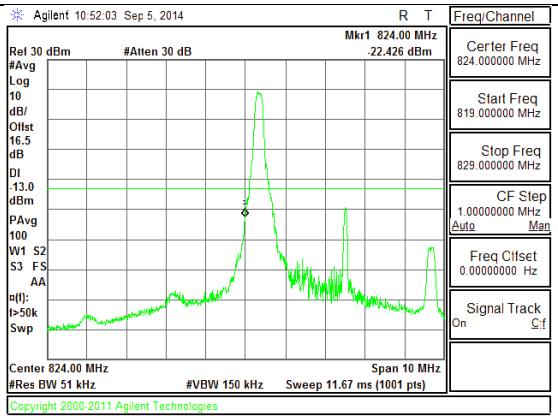
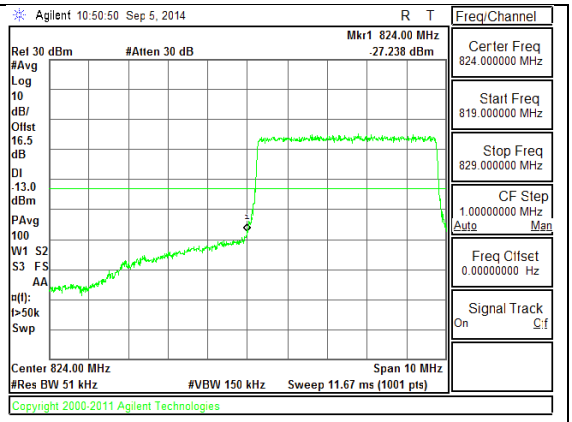
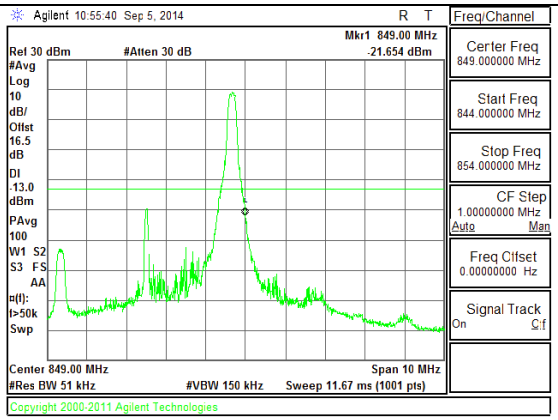
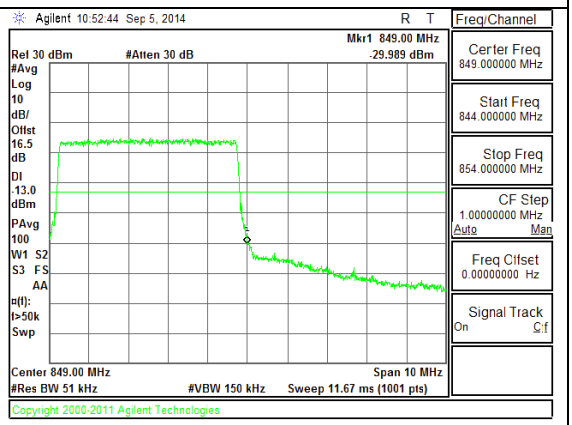
| | | |
|---|---|---|
| Band<br>LTE5<br>5MHz<br>QPSK |  <br>Band LTE5 5MHz CBE QPSK Low Channel 1RB.gif |  <br>Band LTE5 5MHz CBE QPSK Low Channel FRB.gif |
| Band<br>LTE5<br>5MHz<br>QPSK |  <br>Band LTE5 5MHz CBE QPSK High Channel 1RB.gif |  <br>Band LTE5 5MHz CBE QPSK High Channel FRB.gif |

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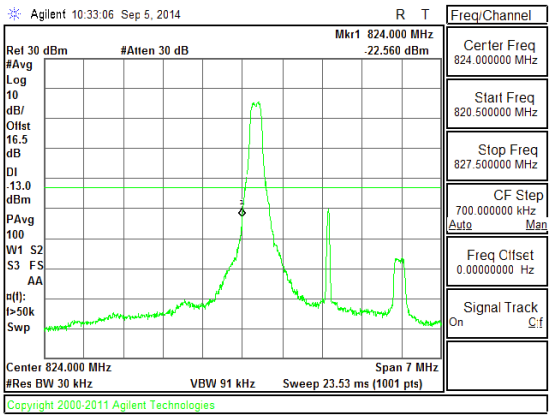
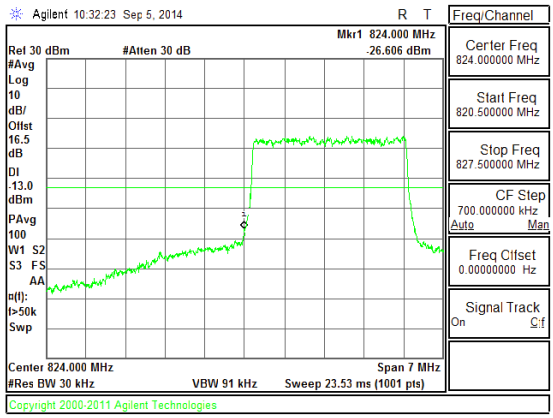
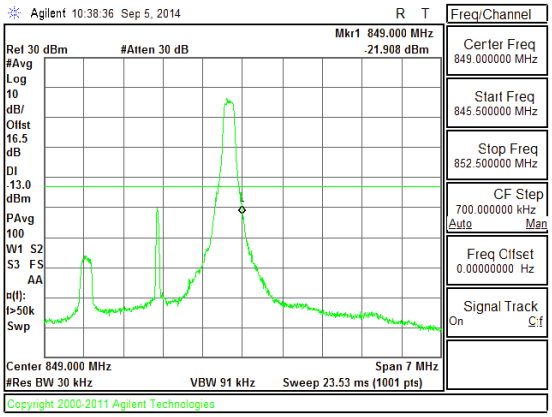
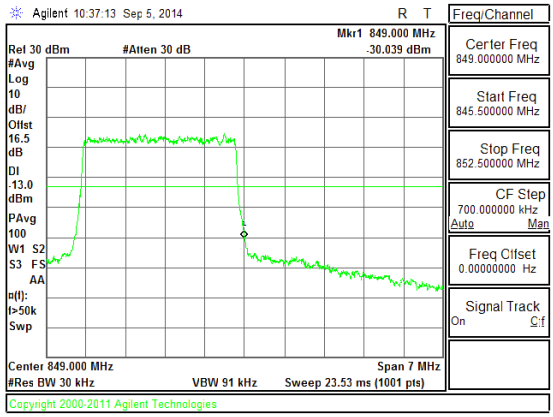
| | | |
|---|---|---|
| Band<br>LTE5<br>3MHz<br>16QAM |  <br>Band LTE5 3MHz CBE 16QAM Low Channel 1RB.gif |  <br>Band LTE5 3MHz CBE 16QAM Low Channel FRB.gif |
| Band<br>LTE5<br>3MHz<br>16QAM |  <br>Band LTE5 3MHz CBE 16QAM High Channel 1RB.gif |  <br>Band LTE5 3MHz CBE 16QAM High Channel FRB.gif |

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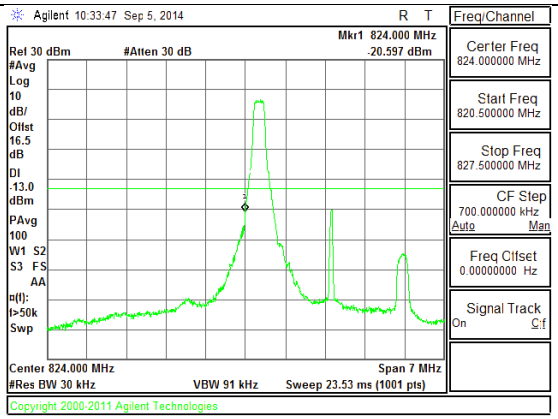
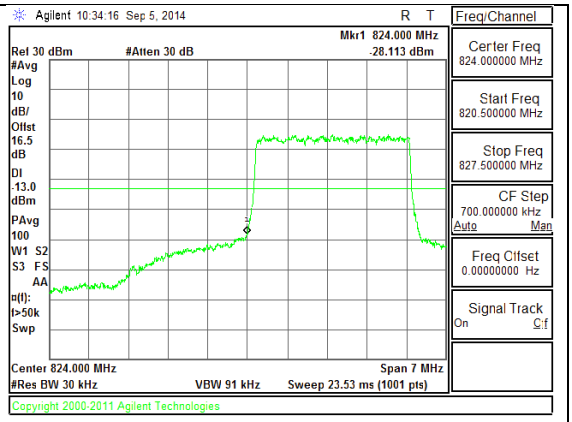
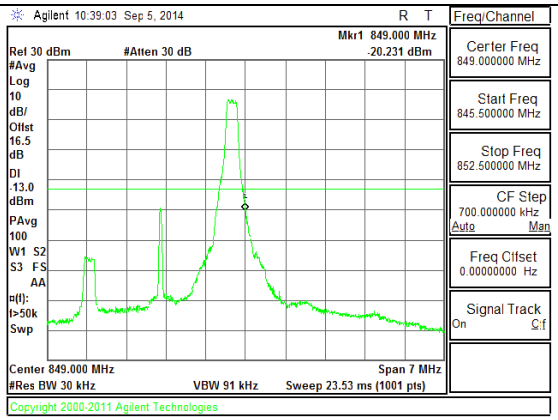
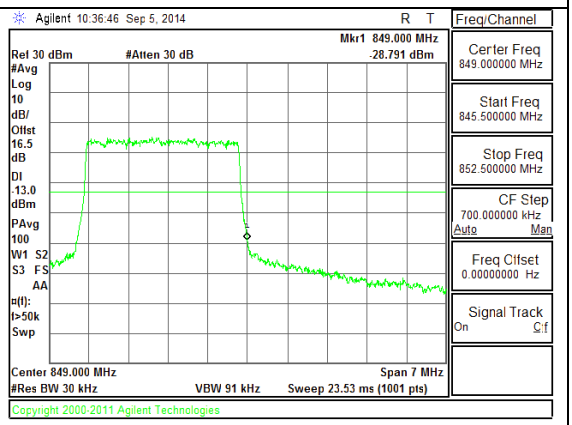
| | | |
|---|---|---|
| Band<br>LTE5<br>3MHz<br>QPSK |  <br>Band LTE5 3MHz CBE QPSK Low Channel 1RB.gif |  <br>Band LTE5 3MHz CBE QPSK Low Channel FRB.gif |
| Band<br>LTE5<br>3MHz<br>QPSK |  <br>Band LTE5 3MHz CBE QPSK High Channel 1RB.gif |  <br>Band LTE5 3MHz CBE QPSK High Channel FRB.gif |

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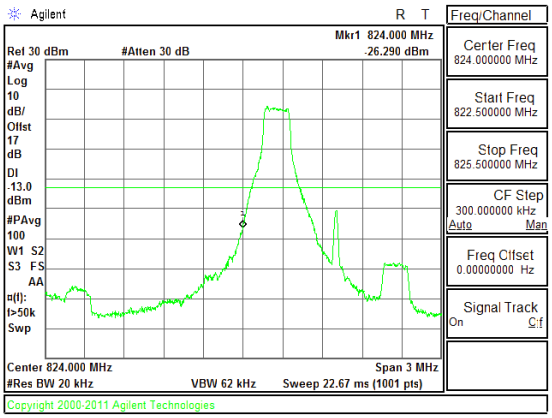
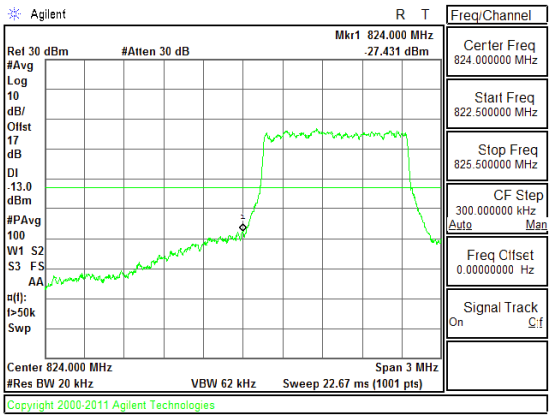
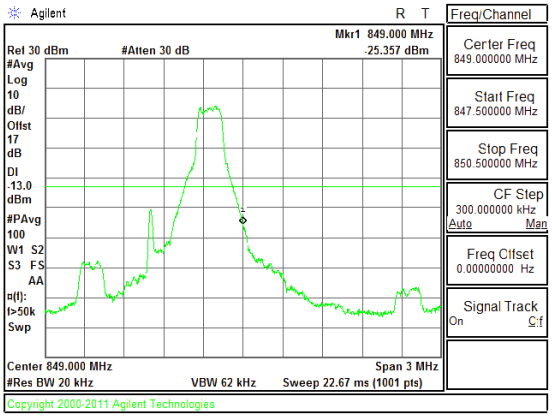
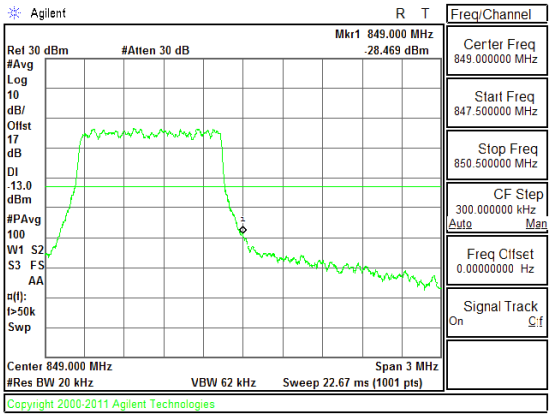
| | | |
|---|---|---|
| Band<br>LTE5<br>1.4MHz<br>16QAM |  <br>Band LTE5 1.4MHz CBE 16QAM Low Channel 1RB.gif |  <br>Band LTE5 1.4MHz CBE 16QAM Low Channel FRB.gif |
| Band<br>LTE5<br>1.4MHz<br>16QAM |  <br>Band LTE5 1.4MHz CBE 16QAM High Channel 1RB.gif |  <br>Band LTE5 1.4MHz CBE 16QAM High Channel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

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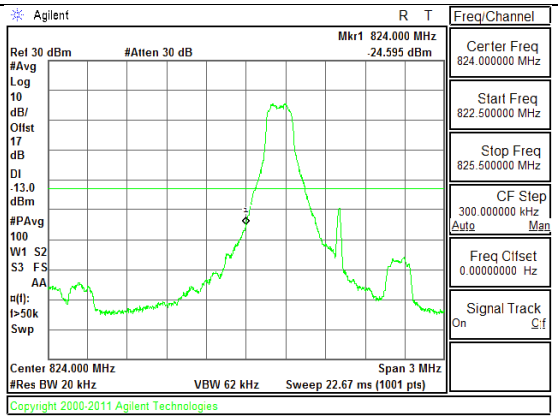
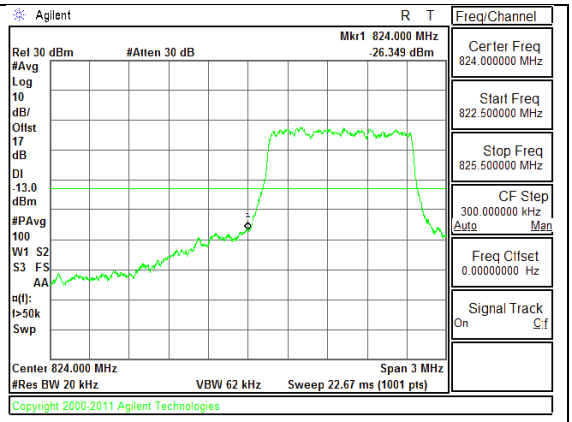
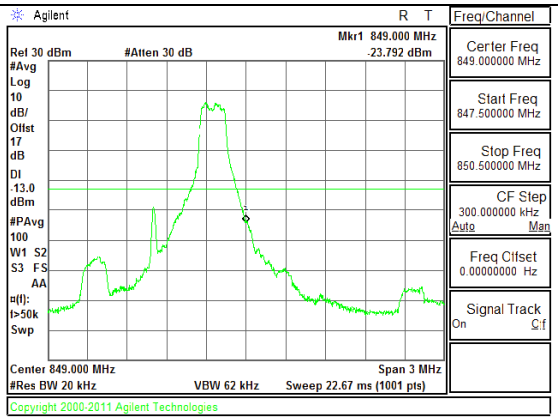
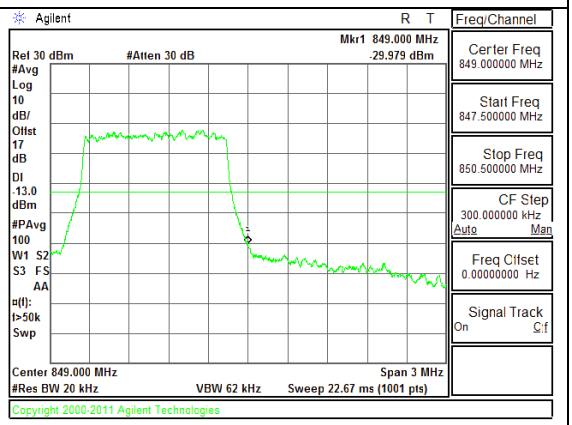
| | | |
|---|---|---|
| Band LTE5 1.4MHz QPSK |  <br>Band LTE5 1.4MHz CBE QPSK Low Channel 1RB.gif |  <br>Band LTE5 1.4MHz CBE QPSK Low Channel FRB.gif |
| Band LTE5 1.4MHz QPSK |  <br>Band LTE5 1.4MHz CBE QPSK High Channel 1RB.gif |  <br>Band LTE5 1.4MHz CBE QPSK High Channel FRB.gif |

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## 10.3. OUT OF BAND EMISSIONS

**RULE PART(S)**

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

**LIMITS**

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

**TEST PROCEDURE**

Per KDB 971168 D01 Power Meas License Digital Systems v02r01

The 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.

**SOP**

For each out of band emissions measurement:

- Set display line at -13 dBm
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.

**MODES TESTED**

GSM, WCDMA, and LTE Band 5

**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 | -28.55 | -13 | -15.55 |
| | | | 836.5 | -27.93 | -13 | -14.93 |
| | | | 844 | -28.69 | -13 | -15.69 |
| | | 16QAM | 829 | -28.62 | -13 | -15.62 |
| | | | 836.5 | -29.97 | -13 | -16.97 |
| | | | 844 | -28.6 | -13 | -15.6 |

| Band | BW (MHz) | Mode | f (MHz) | Spur (dBm) | Spec (dBm) | Delta (dB) |
|---|---|---|---|---|---|---|
| LTE5 | 5 | QPSK | 826.5 | -28.28 | -13 | -15.28 |
| | | | 836.5 | -28.28 | -13 | -15.28 |
| | | | 846.5 | -28.57 | -13 | -15.57 |
| | | 16QAM | 826.5 | -28.83 | -13 | -15.83 |
| | | | 836.5 | -28.78 | -13 | -15.78 |
| | | | 846.5 | -29.62 | -13 | -16.62 |

| Band | BW (MHz) | Mode | f (MHz) | Spur (dBm) | Spec (dBm) | Delta (dB) |
|---|---|---|---|---|---|---|
| LTE5 | 3 | QPSK | 825.5 | -28 | -13 | -15 |
| | | | 836.5 | -28.15 | -13 | -15.15 |
| | | | 847.5 | -28.94 | -13 | -15.94 |
| | | 16QAM | 825.5 | -29.38 | -13 | -16.38 |
| | | | 836.5 | -28.67 | -13 | -15.67 |
| | | | 847.5 | -28.56 | -13 | -15.56 |

| Band | BW (MHz) | Mode | f (MHz) | Spur (dBm) | Spec (dBm) | Delta (dB) |
|---|---|---|---|---|---|---|
| LTE5 | 1.4 | QPSK | 824.7 | -21.19 | -13 | -8.19 |
| | | | 836.5 | -21.82 | -13 | -8.82 |
| | | | 848.3 | -20.7 | -13 | -7.7 |
| | | 16QAM | 824.7 | -20.63 | -13 | -7.63 |
| | | | 836.5 | -20.89 | -13 | -7.89 |
| | | | 848.3 | -20.52 | -13 | -7.52 |


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| Band | Mode | f (MHz) | Spur (dBm) | Spec (dBm) | Delta (dB) |
|---|---|---|---|---|---|
| GSM850 | GMSK | 824.2 | | | |
| | | 836.6 | | | |
| | | 848.8 | | | |
| | GPRS | 824.2 | -29.65 | -13 | -16.65 |
| | | 836.6 | -29.54 | -13 | -16.54 |
| | | 848.8 | -30.15 | -13 | -17.15 |
| | EGPRS | 824.2 | -29.31 | -13 | -16.31 |
| | | 836.6 | -28.68 | -13 | -15.68 |
| | | 848.8 | -28.97 | -13 | -15.97 |
| GSM1900 | GMSK | 1850.2 | | | |
| | | 1880 | | | |
| | | 1909.8 | | | |
| | GPRS | 1850.2 | -19.05 | -13 | -6.05 |
| | | 1880 | -19.96 | -13 | -6.96 |
| | | 1909.8 | -18.62 | -13 | -5.62 |
| | EGPRS | 1850.2 | -19.29 | -13 | -6.29 |
| | | 1880 | -19 | -13 | -6 |
| | | 1909.8 | -19.12 | -13 | -6.12 |



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| Band | Mode | f (MHz) | Spur (dBm) | Spec (dBm) | Delta (dB) |
|---|---|---|---|---|---|
| Band 5 | REL99 | 826.4 | -27.03 | -13 | -14.03 |
| | | 836.6 | -28 | -13 | -15 |
| | | 846.6 | -27.75 | -13 | -14.75 |
| | HSDPA | 826.4 | -27.1 | -13 | -14.1 |
| | | 836.6 | -28.01 | -13 | -15.01 |
| | | 846.6 | -26.95 | -13 | -13.95 |
| Band 2 | REL99 | 1852.4 | -26.11 | -13 | -13.11 |
| | | 1880 | -27.72 | -13 | -14.72 |
| | | 1907.6 | -27 | -13 | -14 |
| | HSDPA | 1852.4 | -27.16 | -13 | -14.16 |
| | | 1880 | -28.19 | -13 | -15.19 |
| | | 1907.6 | -26.78 | -13 | -13.78 |



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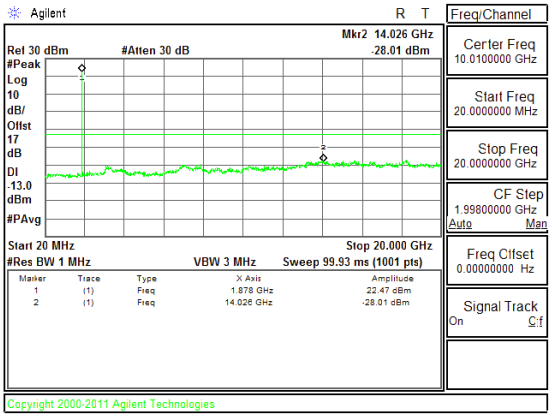
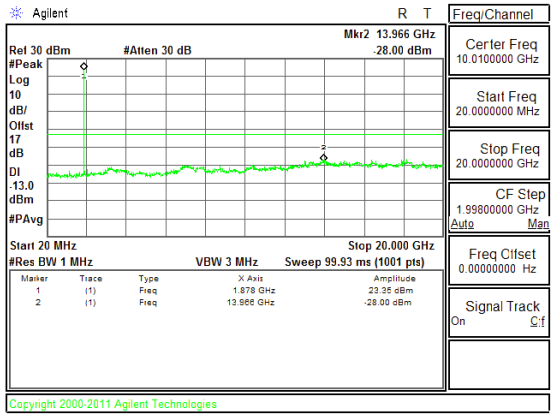
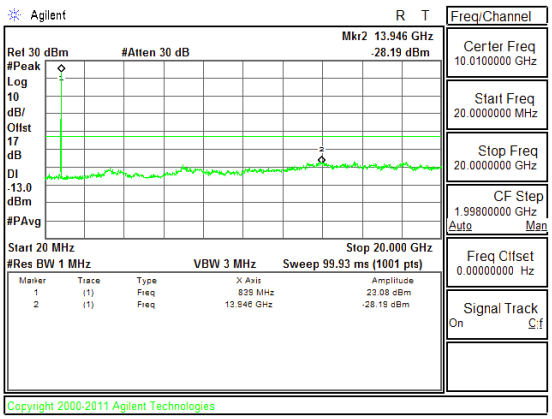
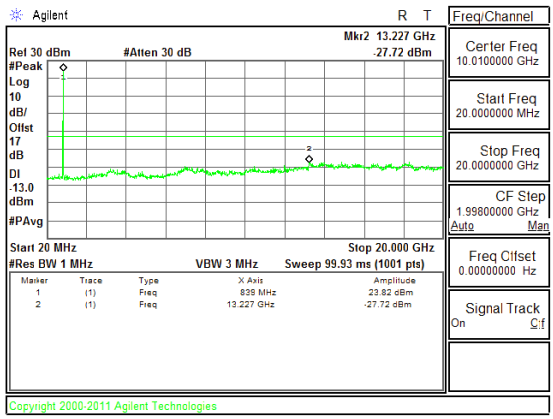
## 10.3.2. OUT OF BAND EMISSIONS PLOTS

**WCDMA**

| | | |
|---|---|---|
| Band<br>Band 2<br>HSDPA |  <br>Band WCDMA B2 HSDPA CSE |  <br>Band WCDMA B2 REL99 CSE |
| Band<br>Band 5<br>HSDPA |  <br>Band WCDMA B5 HSDPA CSE |  <br>Band WCDMA B5 REL99 CSE |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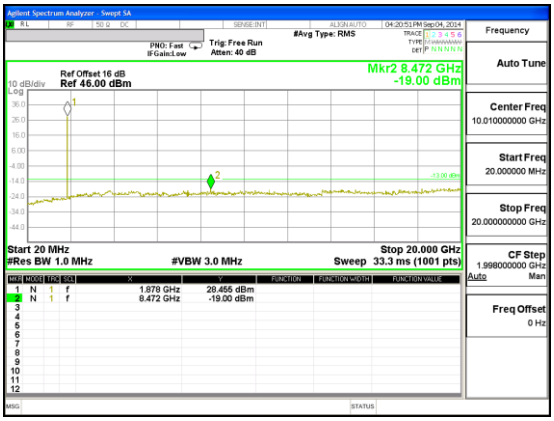
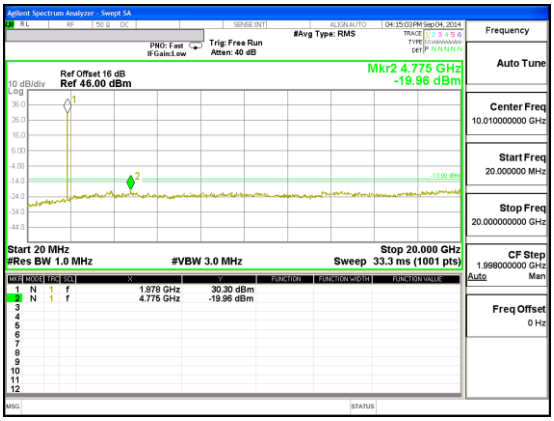
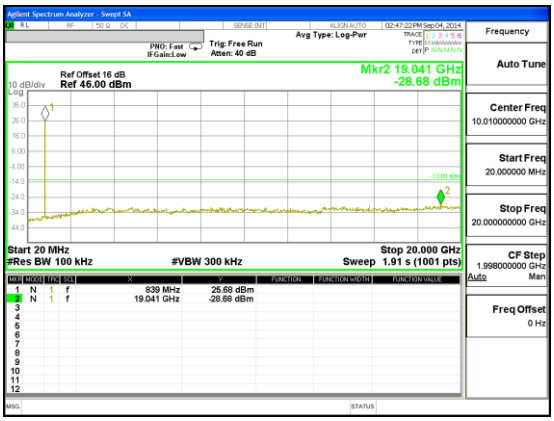
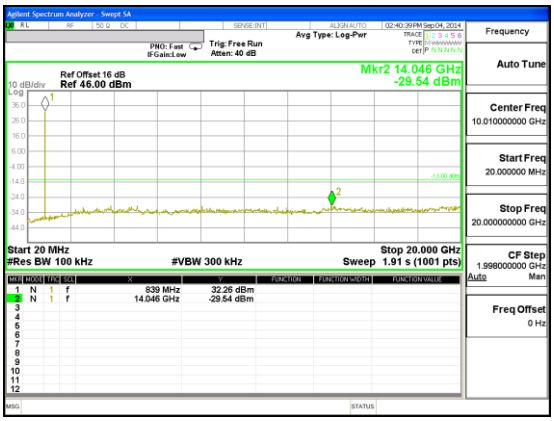
**GSM**

| | | |
|---|---|---|
| Band<br><br>GSM<br>1900<br><br>EGPRS |  <br><br>Band GSM1900 EGPRS CSE Mid channel |  <br><br>Band GSM1900 GPRS CSE Mid channel |
| Band<br><br>GSM<br>850<br><br>EGPRS |  <br><br>Band GSM850 EGPRS CSE Mid channel |  <br><br>Band GSM850 GPRS CSE Mid channel |

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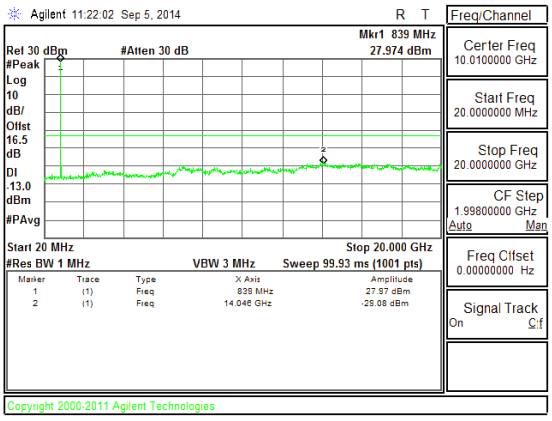
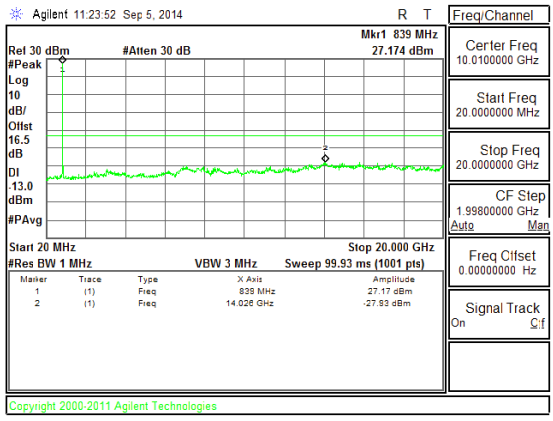
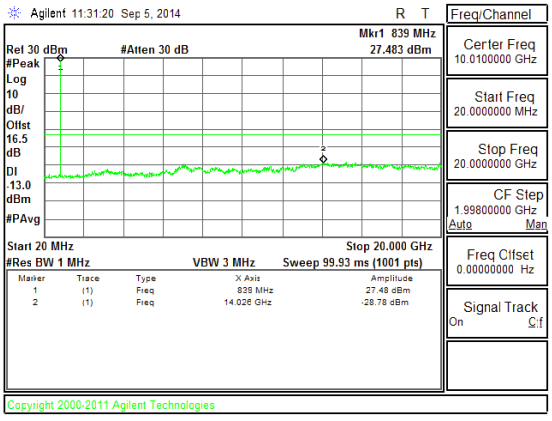
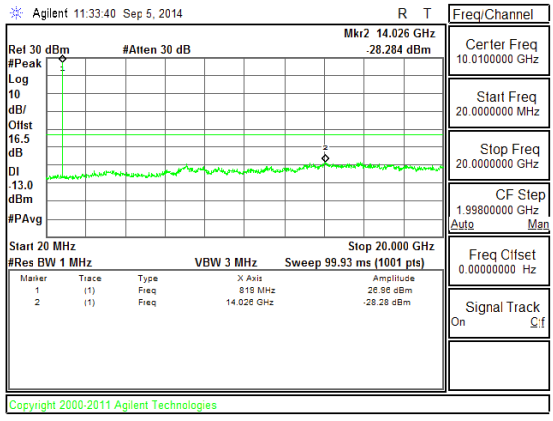
**LTE Band 5**

| | | |
|---|---|---|
| Band LTE5 10MHz 16QAM |  <br>Band LTE5 10MHz CSE 16QAM Mid channel |  <br>Band LTE5 10MHz CSE QPSK Mid channel |
| Band LTE5 5MHz 16QAM |  <br>Band LTE5 5MHz CSE 16QAM Mid channel |  <br>Band LTE5 5MHz CSE QPSK Mid channel |

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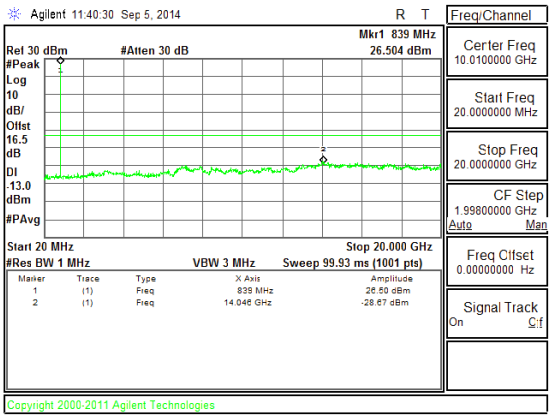
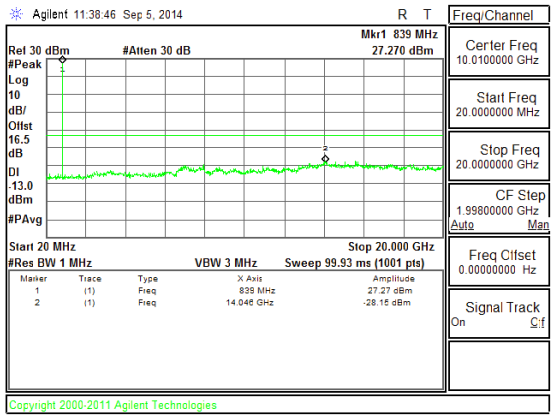
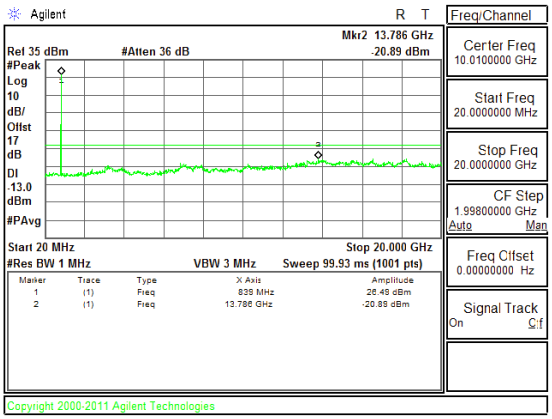
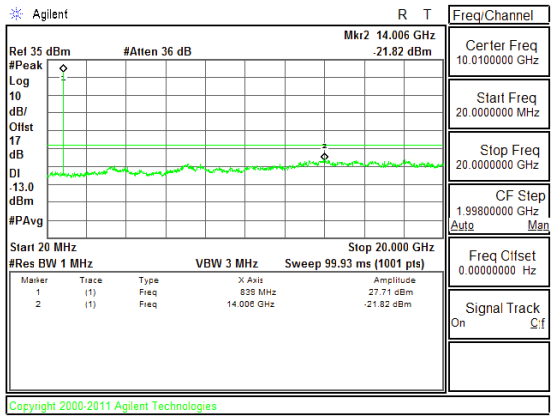
| | | |
|---|---|---|
| Band<br>LTE5<br>3MHz<br>16QAM |  <br>Band LTE5 3MHz CSE 16QAM Mid channel |  <br>Band LTE5 3MHz CSE QPSK Mid channel |
| Band<br>LTE5<br>1.4MHz<br>16QAM |  <br>Band LTE5 1.4MHz CSE 16QAM Mid channel |  <br>Band LTE5 1.4MHz CSE QPSK Mid channel |

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# 10.4. FREQUENCY STABILITY

**RULE PART(S)**

FCC: §2.1055, §22.355, §24.235

**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**

GSM 850 and GSM1900

**RESULTS**

See the following pages.




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## 10.4.1. FREQUENCY STABILITY RESULTS

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

| Reference Frequency: PCS Mid Channel | | 836.6 | MHz @ 20°C | |
|---|---|---|---|---|
| Limit: to stay +- 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 | 836.599992 | 0.022 | 2.5 |
| 3.80 | 40 | 836.600009 | 0.002 | 2.5 |
| 3.80 | 30 | 836.600009 | 0.002 | 2.5 |
| ***3.80*** | ***20*** | **836.600011** | **0** | ***2.5*** |
| 3.80 | 10 | 836.600026 | -0.018 | 2.5 |
| 3.80 | 0 | 836.600009 | 0.002 | 2.5 |
| 3.80 | -10 | 836.599988 | 0.027 | 2.5 |
| 3.80 | -20 | 836.599992 | 0.023 | 2.5 |
| 3.80 | -30 | 836.599978 | 0.040 | 2.5 |

| Reference Frequency: PCS Mid Channel | | 836.6 | MHz @ 20°C | |
|---|---|---|---|---|
| Limit: to stay +- 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*** | ***20*** | ***836.600011*** | ***0*** | ***2.5*** |
| 4.30 | 20 | 836.5999832 | *0.033* | 2.5 |
| 3.20 | 20 | 836.5999745 | *0.043* | 2.5 |



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**GPRS 1900 CELL BAND, MID CHANNEL 661, Frequency 1880 MHz**

| Reference Frequency: PCS Mid Channel | | 1880 | MHz @ 20°C | |
|---|---|---|---|---|
| Limit: to stay +- 2.5 ppm = | | 4700.000 | Hz | |
| Power Supply (Vdc) | Environment Temperature (°C) | Frequency Deviation Measureed with Time Elapse (MHz) | Delta (ppm) | Limit (ppm) |
| 3.80 | 50 | 1879.999985 | 0.047 | 2.5 |
| 3.80 | 40 | 1879.999942 | 0.070 | 2.5 |
| 3.80 | 30 | 1880.000019 | 0.029 | 2.5 |
| ***3.80*** | ***20*** | **1880.000073** | **0** | ***2.5*** |
| 3.80 | 10 | 1880.000020 | 0.028 | 2.5 |
| 3.80 | 0 | 1879.999970 | 0.055 | 2.5 |
| 3.80 | -10 | 1880.000025 | 0.026 | 2.5 |
| 3.80 | -20 | 1879.999960 | 0.060 | 2.5 |
| 3.80 | -30 | 1879.999950 | 0.065 | 2.5 |

| Reference Frequency: PCS Mid Channel | | 1880 | MHz @ 20°C | |
|---|---|---|---|---|
| Limit: to stay +- 2.5 ppm = | | 4700.000 | Hz | |
| Power Supply (Vdc) | Environment Temperature (°C) | Frequency Deviation Measureed with Time Elapse (MHz) | Delta (ppm) | Limit (ppm) |
| ***3.80*** | ***20*** | ***1880.000073*** | ***0*** | ***2.5*** |
| 4.30 | 20 | 1880.000013 | *0.032* | 2.5 |
| 3.20 | 20 | 1880.000019 | *0.029* | 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.

**TEST RESULTS**

### 11.1.1. ERP/EIRP Results




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| Band | Mode | Channel | f(MHz) | ERP / EIRP | |
|---|---|---|---|---|---|
| | | | | dBm | mW |
| Band 2 | REL99 | 9262 | 1852.4 | 20.44 | 110.71 |
| | | 9400 | 1880 | 21.87 | 153.74 |
| | | 9538 | 1907.6 | 22.26 | 168.31 |
| | HSDPA | 9262 | 1852.4 | 19.69 | 93.15 |
| | | 9400 | 1880 | 21.12 | 129.36 |
| | | 9538 | 1907.6 | 21.13 | 129.75 |

| Band | Mode | Channel | f(MHz) | ERP / EIRP | |
|---|---|---|---|---|---|
| | | | | dBm | mW |
| Band 5 | REL99 | 4132 | 826.4 | 13.88 | 24.43 |
| | | 4183 | 836.6 | 14.34 | 27.16 |
| | | 4233 | 846.6 | 15.81 | 38.11 |
| | HSDPA | 4132 | 826.4 | 13.88 | 24.43 |
| | | 4183 | 836.6 | 14.14 | 25.94 |
| | | 4233 | 846.6 | 15.51 | 35.56 |

| Band | Mode | Channel | f(MHz) | ERP / EIRP | |
|---|---|---|---|---|---|
| | | | | dBm | mW |
| GSM1900 | GPRS | 512 | 1850.2 | 27.64 | 580.76 |
| | | 661 | 1880 | 29.39 | 868.96 |
| | | 810 | 1909.8 | 28.56 | 717.79 |
| | EGPRS | 512 | 1850.2 | 24.40 | 275.42 |
| | | 661 | 1880 | 25.72 | 373.25 |
| | | 810 | 1909.8 | 25.15 | 327.34 |

| Band | Mode | Channel | f(MHz) | ERP / EIRP | |
|---|---|---|---|---|---|
| | | | | dBm | mW |
| GSM850 | GPRS | 128 | 824.2 | 25.34 | 341.59 |
| | | 190 | 836.6 | 24.41 | 275.74 |
| | | 251 | 848.8 | 23.51 | 224.23 |
| | EGPRS | 128 | 824.2 | 19.29 | 85 |
| | | 190 | 836.6 | 20.31 | 107.45 |
| | | 251 | 848.8 | 21.39 | 137.56 |



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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 | 13.34 | 21.58 |
| | | | 1/0 | 836.5 | 14.35 | 27.23 |
| | | | 1/0 | 844 | 15.36 | 34.36 |
| | | 16QAM | 1/0 | 829 | 12.57 | 18.08 |
| | | | 1/0 | 836.5 | 13.83 | 24.16 |
| | | | 1/0 | 844 | 14.38 | 27.42 |

| Band | BW (MHz) | Mode | RB/RB Size | f (MHz) | ERP / EIRP | |
|---|---|---|---|---|---|---|
| | | | | | dBm | mW |
| LTE5 | 5 | QPSK | 1/0 | 826.5 | 13.07 | 20.28 |
| | | | 1/0 | 836.5 | 14.02 | 25.24 |
| | | | 1/0 | 846.5 | 15.46 | 35.16 |
| | | 16QAM | 1/0 | 826.5 | 12.03 | 15.96 |
| | | | 1/0 | 836.5 | 12.94 | 19.68 |
| | | | 1/0 | 846.5 | 14.61 | 28.91 |

| Band | BW (MHz) | Mode | RB/RB Size | f (MHz) | ERP / EIRP | |
|---|---|---|---|---|---|---|
| | | | | | dBm | mW |
| LTE5 | 3 | QPSK | 1/0 | 825.5 | 12.74 | 18.79 |
| | | | 1/0 | 836.5 | 14.71 | 29.55 |
| | | | 1/0 | 847.5 | 15.84 | 38.37 |
| | | 16QAM | 1/0 | 825.5 | 11.65 | 14.64 |
| | | | 1/0 | 836.5 | 13.98 | 24.98 |
| | | | 1/0 | 847.5 | 14.69 | 29.43 |



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| Band | BW (MHz) | Mode | RB/RB Size | f (MHz) | ERP / EIRP | |
|---|---|---|---|---|---|---|
| | | | | | dBm | mW |
| LTE5 | 1.4 | QPSK | 1/0 | 824.7 | 13.90 | 24.52 |
| | | | 1/0 | 836.5 | 15.16 | 32.77 |
| | | | 1/0 | 848.3 | 15.62 | 36.45 |
| | | 16QAM | 1/0 | 824.7 | 13.11 | 20.44 |
| | | | 1/0 | 836.5 | 14.08 | 25.56 |
| | | | 1/0 | 848.3 | 14.64 | 29.09 |



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## 11.1.3. ERP/EIRP DATA

**WCDMA**

Band

Band 2

HSDPA

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

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/03/14
**Test Engineer:** R. Alegre
**Configuration:** EUT only
**Mode:** HSDPA B2

**Test Equipment:**
**Receiving: Horn T345, and Chamber B SMA Cables**
**Substitution: Horn T963, 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 | 4.81 | V | 0.85 | 10.41 | 14.37 | 33.0 | -18.6 | |
| 1852.40 | 10.14 | H | 0.85 | 10.41 | 19.69 | 33.0 | -13.3 | |
| Mid Ch | | | | | | | | |
| 1880.00 | 5.01 | V | 0.85 | 10.81 | 14.97 | 33.0 | -18.0 | |
| 1880.00 | 11.16 | H | 0.85 | 10.81 | 21.12 | 33.0 | -11.9 | |
| High Ch | | | | | | | | |
| 1907.60 | 5.85 | V | 0.85 | 11.15 | 16.15 | 33.0 | -16.8 | |
| 1907.60 | 10.83 | H | 0.85 | 11.15 | 21.13 | 33.0 | -11.9 | |

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



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Band

Band 2

REL99

**High Frequency Substitution Measurement**
**Compliance Certification Services Chamber B**

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/03/14
**Test Engineer:** R. Alegre
**Configuration:** EUT only
**Mode:** WCDMA_1900 MHz_Rel 99

**Test Equipment:**
**Receiving: Horn T345, and Chamber B SMA Cables**
**Substitution: Horn T963, 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 | 5.93 | V | 0.85 | 10.41 | 15.49 | 33.0 | -17.5 | |
| 1852.40 | 10.89 | H | 0.85 | 10.41 | 20.44 | 33.0 | -12.6 | |
| Mid Ch | | | | | | | | |
| 1880.00 | 6.14 | V | 0.85 | 10.81 | 16.10 | 33.0 | -16.9 | |
| 1880.00 | 11.91 | H | 0.85 | 10.81 | 21.87 | 33.0 | -11.1 | |
| High Ch | | | | | | | | |
| 1907.60 | 6.82 | V | 0.85 | 11.15 | 17.12 | 33.0 | -15.9 | |
| 1907.60 | 11.96 | H | 0.85 | 11.15 | 22.26 | 33.0 | -10.7 | |

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



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Band

Band 5

HSDPA

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

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/12/14
**Test Engineer:** L. Lara
**Configuration:** X-pos EUT (SN: 1956394)
**Mode:** WCDMA Band 5 HSDPA

**Test Equipment:**
**Receiving: Sunol T243, and 5m Chamber B 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 | 3.60 | V | 0.9 | 0.0 | 2.70 | 38.5 | -35.8 | |
| 826.40 | 14.77 | H | 0.9 | 0.0 | 13.88 | 38.5 | -24.6 | |
| Mid Ch | | | | | | | | |
| 836.60 | 4.93 | V | 0.9 | 0.0 | 4.04 | 38.5 | -34.4 | |
| 836.60 | 15.03 | H | 0.9 | 0.0 | 14.14 | 38.5 | -24.3 | |
| High Ch | | | | | | | | |
| 846.60 | 7.33 | V | 0.9 | 0.0 | 6.43 | 38.5 | -32.0 | |
| 846.60 | 16.41 | H | 0.9 | 0.0 | 15.51 | 38.5 | -22.9 | |

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 B**

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/12/14
**Test Engineer:** L. Lara
**Configuration:** X-pos EUT (SN: 1956394)
**Mode:** WCDMA Band 5 Rel 99

**Test Equipment:**
**Receiving: Sunol T243, and 5m Chamber B 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 | 4.62 | V | 0.9 | 0.0 | 3.72 | 38.5 | -34.7 | |
| 826.40 | 14.77 | H | 0.9 | 0.0 | 13.88 | 38.5 | -24.6 | |
| Mid Ch | | | | | | | | |
| 836.60 | 4.17 | V | 0.9 | 0.0 | 3.28 | 38.5 | -35.2 | |
| 836.60 | 15.23 | H | 0.9 | 0.0 | 14.34 | 38.5 | -24.1 | |
| High Ch | | | | | | | | |
| 846.60 | 7.68 | V | 0.9 | 0.0 | 6.78 | 38.5 | -31.7 | |
| 846.60 | 16.71 | H | 0.9 | 0.0 | 15.81 | 38.5 | -22.6 | |

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



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**GSM**

Band

GSM 1900

EGPRS

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

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/03/14
**Test Engineer:** R. Alegre
**Configuration:** EUT only
**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 | | | | | | | | |
| 1850.20 | 10.18 | V | 0.85 | 10.41 | 19.74 | 33.0 | -13.3 | |
| 1850.20 | 14.85 | H | 0.85 | 10.41 | 24.40 | 33.0 | -8.6 | |
| Mid | | | | | | | | |
| 1880.00 | 10.26 | V | 0.85 | 10.81 | 20.22 | 33.0 | -12.8 | |
| 1880.00 | 15.76 | H | 0.85 | 10.81 | 25.72 | 33.0 | -7.3 | |
| High | | | | | | | | |
| 1909.80 | 10.28 | V | 0.85 | 11.15 | 20.58 | 33.0 | -12.4 | |
| 1909.80 | 14.85 | H | 0.85 | 11.15 | 25.15 | 33.0 | -7.8 | |

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 #:** 14I18726
**Date:** 09/03/14
**Test Engineer:** R. Alegre
**Configuration:** EUT only
**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 | | | | | | | | |
| 1850.20 | 13.79 | V | 0.85 | 10.41 | 23.35 | 33.0 | -9.7 | |
| 1850.20 | 18.09 | H | 0.85 | 10.41 | 27.64 | 33.0 | -5.4 | |
| Mid | | | | | | | | |
| 1880.00 | 14.59 | V | 0.85 | 10.81 | 24.55 | 33.0 | -8.5 | |
| 1880.00 | 19.43 | H | 0.85 | 10.81 | 29.39 | 33.0 | -3.6 | |
| High | | | | | | | | |
| 1909.80 | 13.47 | V | 0.85 | 11.15 | 23.77 | 33.0 | -9.2 | |
| 1909.80 | 18.26 | H | 0.85 | 11.15 | 28.56 | 33.0 | -4.4 | |

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



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Band

GSM 850

EGPRS

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

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/12/14
**Test Engineer:** L. Lara
**Configuration:** X-pos EUT (SN: 1956394)
**Mode:** EGPRS850

**Test Equipment:**
**Receiving: Sunol T243, and 5m Chamber B 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 | 7.55 | V | 0.9 | 0.0 | 6.65 | 38.5 | -31.8 | |
| 824.20 | 20.19 | H | 0.9 | 0.0 | 19.29 | 38.5 | -19.2 | |
| Mid Ch | | | | | | | | |
| 836.60 | 9.50 | V | 0.9 | 0.0 | 8.61 | 38.5 | -29.8 | |
| 836.60 | 21.21 | H | 0.9 | 0.0 | 20.31 | 38.5 | -18.1 | |
| High Ch | | | | | | | | |
| 848.80 | 10.73 | V | 0.9 | 0.0 | 9.83 | 38.5 | -28.6 | |
| 848.80 | 22.28 | H | 0.9 | 0.0 | 21.39 | 38.5 | -17.1 | |

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 850

GPRS

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

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/12/14
**Test Engineer:** L. Lara
**Configuration:** X-pos EUT (SN: 1956394)
**Mode:** GPRS850

**Test Equipment:**
**Receiving: Sunol T243, and 5m Chamber B 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 | 13.05 | V | 0.9 | 0.0 | 12.15 | 38.5 | -26.3 | |
| 824.20 | 26.23 | H | 0.9 | 0.0 | 25.34 | 38.5 | -13.1 | |
| Mid Ch | | | | | | | | |
| 836.60 | 13.03 | V | 0.9 | 0.0 | 12.13 | 38.5 | -26.3 | |
| 836.60 | 25.30 | H | 0.9 | 0.0 | 24.41 | 38.5 | -14.0 | |
| High Ch | | | | | | | | |
| 848.80 | 12.31 | V | 0.9 | 0.0 | 11.41 | 38.5 | -27.0 | |
| 848.80 | 24.41 | H | 0.9 | 0.0 | 23.51 | 38.5 | -14.9 | |

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



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**LTE Band 5**

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

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/12/14
**Test Engineer:** G. Chan
**Configuration:** X-pos EUT
**Mode:** LTE5 10M 16QAM, Sample 1956394

Band
LTE5
10MHz
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 | | | | | | | | |
| 829.00 | 4.48 | V | 0.9 | 0.0 | 3.58 | 38.5 | -34.9 | |
| 829.00 | 13.47 | H | 0.9 | 0.0 | 12.57 | 38.5 | -25.9 | |
| Mid Ch | | | | | | | | |
| 836.50 | 4.33 | V | 0.9 | 0.0 | 3.43 | 38.5 | -35.0 | |
| 836.50 | 14.73 | H | 0.9 | 0.0 | 13.83 | 38.5 | -24.6 | |
| High Ch | | | | | | | | |
| 844.00 | 3.82 | V | 0.9 | 0.0 | 2.92 | 38.5 | -35.5 | |
| 844.00 | 15.28 | H | 0.9 | 0.0 | 14.38 | 38.5 | -24.1 | |

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

LTE5

10MHz

QPSK

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

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/12/14
**Test Engineer:** G. Chan
**Configuration:** X-pos EUT
**Mode:** LTE5 10M QPSK, Sample 1956394

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

| f MHz | SG reading (dBm) | Ant. Pol. (H/V) | Cable Loss (dB) | Antenna Gain (dBd) | ERP (dBm) | Limit (dBm) | Margin (dB) | Notes |
|---|---|---|---|---|---|---|---|---|
| Low Ch | | | | | | | | |
| 829.00 | 5.42 | V | 0.9 | 0.0 | 4.52 | 38.5 | -33.9 | |
| 829.00 | 14.24 | H | 0.9 | 0.0 | 13.34 | 38.5 | -25.1 | |
| Mid Ch | | | | | | | | |
| 836.50 | 5.38 | V | 0.9 | 0.0 | 4.48 | 38.5 | -34.0 | |
| 836.50 | 15.25 | H | 0.9 | 0.0 | 14.35 | 38.5 | -24.1 | |
| High Ch | | | | | | | | |
| 844.00 | 4.93 | V | 0.9 | 0.0 | 4.03 | 38.5 | -34.4 | |
| 844.00 | 16.26 | H | 0.9 | 0.0 | 15.36 | 38.5 | -23.1 | |

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

LTE5

5MHz

16QAM

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

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/12/14
**Test Engineer:** G. Chan
**Configuration:** X-pos EUT
**Mode:** LTE5 5M 16QAM, Sample 1956394

**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 | 4.40 | V | 0.9 | 0.0 | 3.50 | 38.5 | -34.9 | |
| 826.50 | 12.93 | H | 0.9 | 0.0 | 12.03 | 38.5 | -26.4 | |
| Mid Ch | | | | | | | | |
| 836.50 | 3.34 | V | 0.9 | 0.0 | 2.44 | 38.5 | -36.0 | |
| 836.50 | 13.84 | H | 0.9 | 0.0 | 12.94 | 38.5 | -25.5 | |
| High Ch | | | | | | | | |
| 846.50 | 4.82 | V | 0.9 | 0.0 | 3.92 | 38.5 | -34.5 | |
| 846.50 | 15.51 | H | 0.9 | 0.0 | 14.61 | 38.5 | -23.8 | |

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

QPSK

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

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/12/14
**Test Engineer:** G. Chan
**Configuration:** X-pos EUT
**Mode:** LTE5 5M QPSK, Sample 1956394

**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 | 5.29 | V | 0.9 | 0.0 | 4.39 | 38.5 | -34.1 | |
| 826.50 | 13.97 | H | 0.9 | 0.0 | 13.07 | 38.5 | -25.4 | |
| Mid Ch | | | | | | | | |
| 836.50 | 4.40 | V | 0.9 | 0.0 | 3.50 | 38.5 | -34.9 | |
| 836.50 | 14.92 | H | 0.9 | 0.0 | 14.02 | 38.5 | -24.4 | |
| High Ch | | | | | | | | |
| 846.50 | 5.81 | V | 0.9 | 0.0 | 4.91 | 38.5 | -33.5 | |
| 846.50 | 16.36 | H | 0.9 | 0.0 | 15.46 | 38.5 | -23.0 | |

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



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Band

LTE5

3MHz

16QAM

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

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/12/14
**Test Engineer:** G. Chan
**Configuration:** X-pos EUT
**Mode:** LTE5 3M 16QAM, Sample 1956394

**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 | 3.91 | V | 0.9 | 0.0 | 3.01 | 38.5 | -35.4 | |
| 825.50 | 12.55 | H | 0.9 | 0.0 | 11.65 | 38.5 | -26.8 | |
| Mid Ch | | | | | | | | |
| 836.50 | 3.71 | V | 0.9 | 0.0 | 2.81 | 38.5 | -35.6 | |
| 836.50 | 14.88 | H | 0.9 | 0.0 | 13.98 | 38.5 | -24.5 | |
| High Ch | | | | | | | | |
| 847.50 | 4.80 | V | 0.9 | 0.0 | 3.90 | 38.5 | -34.6 | |
| 847.50 | 15.59 | H | 0.9 | 0.0 | 14.69 | 38.5 | -23.8 | |

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

3MHz

QPSK

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

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/12/14
**Test Engineer:** G. Chan
**Configuration:** X-pos EUT
**Mode:** LTE5 3M QPSK, Sample 1956394

**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 | 4.88 | V | 0.9 | 0.0 | 3.98 | 38.5 | -34.5 | |
| 826.50 | 13.64 | H | 0.9 | 0.0 | 12.74 | 38.5 | -25.7 | |
| Mid Ch | | | | | | | | |
| 836.50 | 4.61 | V | 0.9 | 0.0 | 3.71 | 38.5 | -34.7 | |
| 836.50 | 15.61 | H | 0.9 | 0.0 | 14.71 | 38.5 | -23.7 | |
| High Ch | | | | | | | | |
| 846.50 | 5.99 | V | 0.9 | 0.0 | 5.09 | 38.5 | -33.4 | |
| 846.50 | 16.74 | H | 0.9 | 0.0 | 15.84 | 38.5 | -22.6 | |

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 #:** 14I18726
**Date:** 09/12/14
**Test Engineer:** L. Lara
**Configuration:** X-pos EUT (Sample 1956394)
**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 | 1.91 | V | 0.9 | 0.0 | 1.01 | 38.5 | -37.4 | |
| 824.70 | 14.00 | H | 0.9 | 0.0 | 13.11 | 38.5 | -25.3 | |
| Mid Ch | | | | | | | | |
| 836.50 | 3.82 | V | 0.9 | 0.0 | 2.92 | 38.5 | -35.5 | |
| 836.50 | 14.97 | H | 0.9 | 0.0 | 14.08 | 38.5 | -24.4 | |
| High Ch | | | | | | | | |
| 848.30 | 4.53 | V | 0.9 | 0.0 | 3.63 | 38.5 | -34.8 | |
| 848.30 | 15.54 | H | 0.9 | 0.0 | 14.64 | 38.5 | -23.8 | |

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

1.4MHz

QPSK

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

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/12/14
**Test Engineer:** L. Lara
**Configuration:** X-pos EUT (Sample 1956394)
**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 | 2.92 | V | 0.9 | 0.0 | 2.02 | 38.5 | -36.4 | |
| 824.70 | 14.79 | H | 0.9 | 0.0 | 13.90 | 38.5 | -24.6 | |
| Mid Ch | | | | | | | | |
| 836.50 | 5.12 | V | 0.9 | 0.0 | 4.22 | 38.5 | -34.2 | |
| 836.50 | 16.05 | H | 0.9 | 0.0 | 15.16 | 38.5 | -23.3 | |
| High Ch | | | | | | | | |
| 848.30 | 5.73 | V | 0.9 | 0.0 | 4.83 | 38.5 | -33.6 | |
| 848.30 | 16.52 | H | 0.9 | 0.0 | 15.62 | 38.5 | -22.8 | |

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



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## 11.2. FIELD STRENGTH OF SPURIOUS RADIATION

### RULE PART(S)

FCC: §2.1053, §22.917 and §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.

### 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.

#### MODES TESTED

GSM, WCDMA, and LTE Band 5

#### RESULTS




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## 11.2.1. SPURIOUS RADIATION DATA

**WCDMA**

Band

Band 2

HSDPA

**Compliance Certification Services**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/03/14
**Test Engineer:** K.Keidda
**Configuration:** EUT w/ AC charger, headset( Sample 1950050)
**Mode:** HSDPA B2

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| 5m Chamber G | T34 8449B | Filter 1 | Part 24 |

| 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 | -17.4 | V | 3.0 | 35.4 | 1.0 | -51.8 | -13.0 | -38.8 | |
| 5.557 | -14.2 | V | 3.0 | 34.7 | 1.0 | -47.9 | -13.0 | -34.9 | |
| 7.410 | -13.2 | V | 3.0 | 34.9 | 1.0 | -47.1 | -13.0 | -34.1 | |
| 3.705 | -18.1 | H | 3.0 | 35.4 | 1.0 | -52.5 | -13.0 | -39.5 | |
| 5.557 | -14.6 | H | 3.0 | 34.7 | 1.0 | -48.3 | -13.0 | -35.3 | |
| 7.410 | -12.4 | H | 3.0 | 34.9 | 1.0 | -46.3 | -13.0 | -33.3 | |
| Mid Ch, 1880MHz | | | | | | | | | |
| 3.760 | -16.6 | V | 3.0 | 35.3 | 1.0 | -50.9 | -13.0 | -37.9 | |
| 5.640 | -15.2 | V | 3.0 | 34.7 | 1.0 | -48.9 | -13.0 | -35.9 | |
| 7.520 | -13.6 | V | 3.0 | 34.9 | 1.0 | -47.5 | -13.0 | -34.5 | |
| 3.760 | -17.0 | H | 3.0 | 35.3 | 1.0 | -51.3 | -13.0 | -38.3 | |
| 5.640 | -14.4 | H | 3.0 | 34.7 | 1.0 | -48.1 | -13.0 | -35.1 | |
| 7.520 | -12.4 | H | 3.0 | 34.9 | 1.0 | -46.3 | -13.0 | -33.3 | |
| High Ch, 1907.6MHz | | | | | | | | | |
| 3.815 | -17.3 | V | 3.0 | 35.3 | 1.0 | -51.6 | -13.0 | -38.6 | |
| 5.723 | -15.3 | V | 3.0 | 34.7 | 1.0 | -49.1 | -13.0 | -36.1 | |
| 7.630 | -13.7 | V | 3.0 | 34.9 | 1.0 | -47.6 | -13.0 | -34.6 | |
| 3.815 | -16.9 | H | 3.0 | 35.3 | 1.0 | -51.2 | -13.0 | -38.2 | |
| 5.723 | -13.7 | H | 3.0 | 34.7 | 1.0 | -47.4 | -13.0 | -34.4 | |
| 7.630 | -12.2 | H | 3.0 | 34.9 | 1.0 | -46.1 | -13.0 | -33.1 | |
| | | | | | | | | | |

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



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Band

Band 2

REL99

**Compliance Certification Services**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/03/14
**Test Engineer:** K.Keidda
**Configuration:** EUT w/ AC charger, headset( Sample 1950050)
**Mode:** REL99 B2

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| 5m Chamber G | T34 8449B | Filter 1 | Part 24 |

| 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 | -16.2 | V | 3.0 | 35.4 | 1.0 | -50.6 | -13.0 | -37.6 | |
| 5.557 | -14.9 | V | 3.0 | 34.7 | 1.0 | -48.6 | -13.0 | -35.6 | |
| 7.410 | -13.5 | V | 3.0 | 34.9 | 1.0 | -47.4 | -13.0 | -34.4 | |
| 3.705 | -17.8 | H | 3.0 | 35.4 | 1.0 | -52.2 | -13.0 | -39.2 | |
| 5.557 | -14.6 | H | 3.0 | 34.7 | 1.0 | -48.3 | -13.0 | -35.3 | |
| 7.410 | -12.2 | H | 3.0 | 34.9 | 1.0 | -46.1 | -13.0 | -33.1 | |
| Mid Ch, 1880MHz | | | | | | | | | |
| 3.760 | -14.8 | V | 3.0 | 35.3 | 1.0 | -49.1 | -13.0 | -36.1 | |
| 5.640 | -15.0 | V | 3.0 | 34.7 | 1.0 | -48.7 | -13.0 | -35.7 | |
| 7.520 | -13.9 | V | 3.0 | 34.9 | 1.0 | -47.8 | -13.0 | -34.8 | |
| 3.760 | -15.8 | H | 3.0 | 35.3 | 1.0 | -50.2 | -13.0 | -37.2 | |
| 5.640 | -13.9 | H | 3.0 | 34.7 | 1.0 | -47.6 | -13.0 | -34.6 | |
| 7.520 | -11.9 | H | 3.0 | 34.9 | 1.0 | -45.9 | -13.0 | -32.9 | |
| High Ch, 1907.6MHz | | | | | | | | | |
| 3.815 | -16.9 | V | 3.0 | 35.3 | 1.0 | -51.2 | -13.0 | -38.2 | |
| 5.723 | -13.4 | V | 3.0 | 34.7 | 1.0 | -47.1 | -13.0 | -34.1 | |
| 7.630 | -13.3 | V | 3.0 | 34.9 | 1.0 | -47.2 | -13.0 | -34.2 | |
| 3.815 | -16.6 | H | 3.0 | 35.3 | 1.0 | -50.8 | -13.0 | -37.8 | |
| 5.723 | -13.9 | H | 3.0 | 34.7 | 1.0 | -47.6 | -13.0 | -34.6 | |
| 7.630 | -10.8 | H | 3.0 | 34.9 | 1.0 | -44.8 | -13.0 | -31.8 | |
| | | | | | | | | | |

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



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Band

Band 5

HSDPA

**Compliance Certification Services**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/03/14
**Test Engineer:** K.Keidda
**Configuration:** EUT w/ AC charger, headset( Sample 1950050)
**Mode:** HSDPA B5

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

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, 826.4MHz | | | | | | | | | |
| 1.653 | -4.9 | V | 3.0 | 37.4 | 1.0 | -41.3 | -13.0 | -28.3 | |
| 2.479 | -18.8 | V | 3.0 | 36.4 | 1.0 | -54.1 | -13.0 | -41.1 | |
| 3.306 | -19.4 | V | 3.0 | 35.8 | 1.0 | -54.1 | -13.0 | -41.1 | |
| 1.653 | -13.6 | H | 3.0 | 37.4 | 1.0 | -50.0 | -13.0 | -37.0 | |
| 2.479 | -20.8 | H | 3.0 | 36.4 | 1.0 | -56.2 | -13.0 | -43.2 | |
| 3.306 | -18.8 | H | 3.0 | 35.8 | 1.0 | -53.6 | -13.0 | -40.6 | |
| Mid Ch, 836.6MHz | | | | | | | | | |
| 1.673 | -5.7 | V | 3.0 | 37.3 | 1.0 | -42.0 | -13.0 | -29.0 | |
| 2.510 | -19.7 | V | 3.0 | 36.4 | 1.0 | -55.0 | -13.0 | -42.0 | |
| 3.346 | -19.0 | V | 3.0 | 35.8 | 1.0 | -53.7 | -13.0 | -40.7 | |
| 1.673 | -13.0 | H | 3.0 | 37.3 | 1.0 | -49.3 | -13.0 | -36.3 | |
| 2.510 | -22.0 | H | 3.0 | 36.4 | 1.0 | -57.3 | -13.0 | -44.3 | |
| 3.346 | -19.7 | H | 3.0 | 35.8 | 1.0 | -54.4 | -13.0 | -41.4 | |
| High Ch, 846.6MHz | | | | | | | | | |
| 1.693 | -9.5 | V | 3.0 | 37.3 | 1.0 | -45.8 | -13.0 | -32.8 | |
| 2.540 | -21.5 | V | 3.0 | 36.3 | 1.0 | -56.8 | -13.0 | -43.8 | |
| 3.386 | -19.8 | V | 3.0 | 35.7 | 1.0 | -54.5 | -13.0 | -41.5 | |
| 1.693 | -15.8 | H | 3.0 | 37.3 | 1.0 | -52.1 | -13.0 | -39.1 | |
| 2.540 | -24.0 | H | 3.0 | 36.3 | 1.0 | -59.4 | -13.0 | -46.4 | |
| 3.386 | -19.6 | H | 3.0 | 35.7 | 1.0 | -54.3 | -13.0 | -41.3 | |

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



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Band

Band 5

REL99

**Compliance Certification Services**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/03/14
**Test Engineer:** K.Keidda
**Configuration:** EUT w/ AC charger, headset( Sample 1950050)
**Mode:** REL99 B5

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

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, 826.4MHz | | | | | | | | | |
| 1.653 | -4.3 | V | 3.0 | 37.4 | 1.0 | -40.7 | -13.0 | -27.7 | |
| 2.479 | -19.3 | V | 3.0 | 36.4 | 1.0 | -54.7 | -13.0 | -41.7 | |
| 3.306 | -17.9 | V | 3.0 | 35.8 | 1.0 | -52.7 | -13.0 | -39.7 | |
| 1.653 | -13.7 | H | 3.0 | 37.4 | 1.0 | -50.0 | -13.0 | -37.0 | |
| 2.479 | -19.5 | H | 3.0 | 36.4 | 1.0 | -54.9 | -13.0 | -41.9 | |
| 3.306 | -18.5 | H | 3.0 | 35.8 | 1.0 | -53.3 | -13.0 | -40.3 | |
| Mid Ch, 836.6MHz | | | | | | | | | |
| 1.673 | -5.1 | V | 3.0 | 37.3 | 1.0 | -41.4 | -13.0 | -28.4 | |
| 2.510 | -19.1 | V | 3.0 | 36.4 | 1.0 | -54.4 | -13.0 | -41.4 | |
| 3.346 | -18.6 | V | 3.0 | 35.8 | 1.0 | -53.4 | -13.0 | -40.4 | |
| 1.673 | -11.8 | H | 3.0 | 37.3 | 1.0 | -48.2 | -13.0 | -35.2 | |
| 2.510 | -20.9 | H | 3.0 | 36.4 | 1.0 | -56.2 | -13.0 | -43.2 | |
| 3.346 | -18.9 | H | 3.0 | 35.8 | 1.0 | -53.7 | -13.0 | -40.7 | |
| High Ch, 846.6MHz | | | | | | | | | |
| 1.693 | -9.4 | V | 3.0 | 37.3 | 1.0 | -45.7 | -13.0 | -32.7 | |
| 2.540 | -20.3 | V | 3.0 | 36.3 | 1.0 | -55.7 | -13.0 | -42.7 | |
| 3.386 | -19.5 | V | 3.0 | 35.7 | 1.0 | -54.2 | -13.0 | -41.2 | |
| 1.693 | -15.2 | H | 3.0 | 37.3 | 1.0 | -51.5 | -13.0 | -38.5 | |
| 2.540 | -23.3 | H | 3.0 | 36.3 | 1.0 | -58.7 | -13.0 | -45.7 | |
| 3.386 | -19.1 | H | 3.0 | 35.7 | 1.0 | -53.8 | -13.0 | -40.8 | |
| | | | | | | | | | |

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



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**GSM**

**Compliance Certification Services**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/03/14
**Test Engineer:** K.Keidda
**Configuration:** EUT w/ AC charger, headset( Sample 1950050)
**Mode:** EGPRS 1900

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

| Band | f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| | Low Ch, 1850.2Hz | | | | | | | | | |
| GSM 1900 EGPRS | 3.705 | -18.5 | V | 3.0 | 35.4 | 1.0 | -52.9 | -13.0 | -39.9 | |
| | 5.557 | -12.5 | V | 3.0 | 34.7 | 1.0 | -46.2 | -13.0 | -33.2 | |
| | 7.410 | -12.8 | V | 3.0 | 34.9 | 1.0 | -46.7 | -13.0 | -33.7 | |
| | 3.705 | -13.4 | H | 3.0 | 35.4 | 1.0 | -47.8 | -13.0 | -34.8 | |
| | 5.557 | -14.5 | H | 3.0 | 34.7 | 1.0 | -48.2 | -13.0 | -35.2 | |
| | 7.410 | -11.7 | H | 3.0 | 34.9 | 1.0 | -45.6 | -13.0 | -32.6 | |
| | Mid Ch, 1880MHz | | | | | | | | | |
| | 3.760 | -17.6 | V | 3.0 | 35.3 | 1.0 | -52.0 | -13.0 | -39.0 | |
| | 5.640 | -13.2 | V | 3.0 | 34.7 | 1.0 | -46.9 | -13.0 | -33.9 | |
| | 7.520 | -12.8 | V | 3.0 | 34.9 | 1.0 | -46.8 | -13.0 | -33.8 | |
| | 3.760 | -15.1 | H | 3.0 | 35.3 | 1.0 | -49.4 | -13.0 | -36.4 | |
| | 5.640 | -14.0 | H | 3.0 | 34.7 | 1.0 | -47.7 | -13.0 | -34.7 | |
| | 7.520 | -12.0 | H | 3.0 | 34.9 | 1.0 | -46.0 | -13.0 | -33.0 | |
| | High Ch, 1909.8MHz | | | | | | | | | |
| | 3.815 | -16.3 | V | 3.0 | 35.3 | 1.0 | -50.6 | -13.0 | -37.6 | |
| | 5.723 | -13.4 | V | 3.0 | 34.7 | 1.0 | -47.1 | -13.0 | -34.1 | |
| | 7.630 | -10.8 | V | 3.0 | 34.9 | 1.0 | -44.8 | -13.0 | -31.8 | |
| | 3.815 | -16.8 | H | 3.0 | 35.3 | 1.0 | -51.0 | -13.0 | -38.0 | |
| | 5.723 | -13.5 | H | 3.0 | 34.7 | 1.0 | -47.3 | -13.0 | -34.3 | |
| | 7.630 | -11.6 | H | 3.0 | 34.9 | 1.0 | -45.5 | -13.0 | -32.5 | |
| | | | | | | | | | | |

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



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**Compliance Certification Services**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/03/14
**Test Engineer:** K.Keidda
**Configuration:** EUT w/ AC charger, headset( Sample 1950050)
**Mode:** GPRS 1900

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| 5m Chamber B | T34 8449B | Filter 1 | Part 24 |

| Band | f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| | Low Ch, 1850.2MHz | | | | | | | | | |
| GSM 1900 GPRS | 3.705 | -18.2 | V | 3.0 | 35.4 | 1.0 | -52.6 | -13.0 | -39.6 | |
| | 5.557 | -10.5 | V | 3.0 | 34.7 | 1.0 | -44.2 | -13.0 | -31.2 | |
| | 7.410 | -13.2 | V | 3.0 | 34.9 | 1.0 | -47.1 | -13.0 | -34.1 | |
| | 3.705 | -14.6 | H | 3.0 | 35.4 | 1.0 | -49.0 | -13.0 | -36.0 | |
| | 5.557 | -13.6 | H | 3.0 | 34.7 | 1.0 | -47.3 | -13.0 | -34.3 | |
| | 7.410 | -11.8 | H | 3.0 | 34.9 | 1.0 | -45.7 | -13.0 | -32.7 | |
| | Mid Ch, 1880MHz | | | | | | | | | |
| | 3.760 | -17.3 | V | 3.0 | 35.3 | 1.0 | -51.6 | -13.0 | -38.6 | |
| | 5.640 | -12.0 | V | 3.0 | 34.7 | 1.0 | -45.7 | -13.0 | -32.7 | |
| | 7.520 | -13.7 | V | 3.0 | 34.9 | 1.0 | -47.6 | -13.0 | -34.6 | |
| | 3.760 | -11.8 | H | 3.0 | 35.3 | 1.0 | -46.2 | -13.0 | -33.2 | |
| | 5.640 | -11.3 | H | 3.0 | 34.7 | 1.0 | -45.0 | -13.0 | -32.0 | |
| | 7.520 | -10.9 | H | 3.0 | 34.9 | 1.0 | -44.9 | -13.0 | -31.9 | |
| | High Ch, 1909.8MHz | | | | | | | | | |
| | 3.815 | -15.3 | V | 3.0 | 35.3 | 1.0 | -49.6 | -13.0 | -36.6 | |
| | 5.723 | -11.8 | V | 3.0 | 34.7 | 1.0 | -45.5 | -13.0 | -32.5 | |
| | 7.630 | -11.3 | V | 3.0 | 34.9 | 1.0 | -45.2 | -13.0 | -32.2 | |
| | 3.815 | -15.2 | H | 3.0 | 35.3 | 1.0 | -49.5 | -13.0 | -36.5 | |
| | 5.723 | -11.2 | H | 3.0 | 34.7 | 1.0 | -44.9 | -13.0 | -31.9 | |
| | 7.630 | -11.4 | H | 3.0 | 34.9 | 1.0 | -45.4 | -13.0 | -32.4 | |
| | | | | | | | | | | |

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



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**Compliance Certification Services**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/03/14
**Test Engineer:** K.Keidda
**Configuration:** EUT w/ AC charger, headset( Sample 1950050)
**Mode:** EGPRS850

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| 5m Chamber B | T34 8449B | Filter 1 | Part 24 |

Band

GSM 850

EGPRS

| f GHz | SG reading (dBm) | Ant. Pol. (H/V) | Distance (m) | Preamp (dB) | Filter (dB) | EIRP (dBm) | Limit (dBm) | Delta (dB) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Low Ch, 824.2MHz | | | | | | | | | |
| 1.648 | 9.5 | V | 3.0 | 37.4 | 1.0 | -26.9 | -13.0 | -13.9 | |
| 2.473 | -4.5 | V | 3.0 | 36.4 | 1.0 | -39.8 | -13.0 | -26.8 | |
| 3.297 | -14.8 | V | 3.0 | 35.8 | 1.0 | -49.6 | -13.0 | -36.6 | |
| 1.648 | 0.6 | H | 3.0 | 37.4 | 1.0 | -35.8 | -13.0 | -22.8 | |
| 2.473 | -14.5 | H | 3.0 | 36.4 | 1.0 | -49.9 | -13.0 | -36.9 | |
| 3.297 | -17.8 | H | 3.0 | 35.8 | 1.0 | -52.6 | -13.0 | -39.6 | |
| Mid Ch, 836.6MHz | | | | | | | | | |
| 1.673 | 5.6 | V | 3.0 | 37.3 | 1.0 | -30.7 | -13.0 | -17.7 | |
| 2.510 | -8.8 | V | 3.0 | 36.4 | 1.0 | -44.2 | -13.0 | -31.2 | |
| 3.346 | -16.0 | V | 3.0 | 35.8 | 1.0 | -50.7 | -13.0 | -37.7 | |
| 1.673 | 1.5 | H | 3.0 | 37.3 | 1.0 | -34.8 | -13.0 | -21.8 | |
| 2.510 | -15.9 | H | 3.0 | 36.4 | 1.0 | -51.2 | -13.0 | -38.2 | |
| 3.346 | -18.5 | H | 3.0 | 35.8 | 1.0 | -53.2 | -13.0 | -40.2 | |
| High Ch, 848.8MHz | | | | | | | | | |
| 1.698 | 4.4 | V | 3.0 | 37.3 | 1.0 | -31.9 | -13.0 | -18.9 | |
| 2.546 | -17.4 | V | 3.0 | 36.3 | 1.0 | -52.7 | -13.0 | -39.7 | |
| 3.395 | -15.9 | V | 3.0 | 35.7 | 1.0 | -50.6 | -13.0 | -37.6 | |
| 1.698 | -2.3 | H | 3.0 | 37.3 | 1.0 | -38.6 | -13.0 | -25.6 | |
| 2.546 | -17.8 | H | 3.0 | 36.3 | 1.0 | -53.1 | -13.0 | -40.1 | |
| 3.395 | -18.3 | H | 3.0 | 35.7 | 1.0 | -53.0 | -13.0 | -40.0 | |
| | | | | | | | | | |

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



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**Compliance Certification Services**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/03/14
**Test Engineer:** K.Keidda
**Configuration:** EUT w/ AC charger, headset( Sample 1950050)
**Mode:** GPRS850

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| 5m Chamber G | T34 8449B | Filter 1 | Part 24 |

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 | 12.6 | V | 3.0 | 37.4 | 1.0 | -23.7 | -13.0 | -10.7 | |
| 2.473 | -1.2 | V | 3.0 | 36.4 | 1.0 | -36.6 | -13.0 | -23.6 | |
| 3.297 | -10.3 | V | 3.0 | 35.8 | 1.0 | -45.1 | -13.0 | -32.1 | |
| 1.648 | 4.4 | H | 3.0 | 37.4 | 1.0 | -32.0 | -13.0 | -19.0 | |
| 2.473 | -12.4 | H | 3.0 | 36.4 | 1.0 | -47.8 | -13.0 | -34.8 | |
| 3.297 | -15.5 | H | 3.0 | 35.8 | 1.0 | -50.3 | -13.0 | -37.3 | |
| Mid Ch, 836.6MHz | | | | | | | | | |
| 1.673 | 8.5 | V | 3.0 | 37.3 | 1.0 | -27.9 | -13.0 | -14.9 | |
| 2.510 | -4.5 | V | 3.0 | 36.4 | 1.0 | -39.8 | -13.0 | -26.8 | |
| 3.346 | -12.2 | V | 3.0 | 35.8 | 1.0 | -47.0 | -13.0 | -34.0 | |
| 1.673 | 4.6 | H | 3.0 | 37.3 | 1.0 | -31.8 | -13.0 | -18.8 | |
| 2.510 | -12.1 | H | 3.0 | 36.4 | 1.0 | -47.5 | -13.0 | -34.5 | |
| 3.346 | -17.2 | H | 3.0 | 35.8 | 1.0 | -52.0 | -13.0 | -39.0 | |
| High Ch, 848.8MHz | | | | | | | | | |
| 1.698 | 7.6 | V | 3.0 | 37.3 | 1.0 | -28.7 | -13.0 | -15.7 | |
| 2.546 | -5.8 | V | 3.0 | 36.3 | 1.0 | -41.2 | -13.0 | -28.2 | |
| 3.395 | -14.6 | V | 3.0 | 35.7 | 1.0 | -49.3 | -13.0 | -36.3 | |
| 1.698 | 1.3 | H | 3.0 | 37.3 | 1.0 | -35.0 | -13.0 | -22.0 | |
| 2.546 | -13.7 | H | 3.0 | 36.3 | 1.0 | -49.0 | -13.0 | -36.0 | |
| 3.395 | -18.5 | H | 3.0 | 35.7 | 1.0 | -53.2 | -13.0 | -40.2 | |
| | | | | | | | | | |

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



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**LTE Band 5**

**Compliance Certification Services**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/15/14
**Test Engineer:** R. Alegre
**Configuration:** EUT w/ AC Charger + HS
**Mode:** LTE5 16QAM 10MHz Harm

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| 3m Chamber | 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 | -19.5 | V | 3.0 | 37.4 | 1.0 | -55.8 | -13.0 | -42.8 | |
| 2.487 | -14.8 | V | 3.0 | 36.4 | 1.0 | -50.1 | -13.0 | -37.1 | |
| 3.316 | -13.0 | V | 3.0 | 35.8 | 1.0 | -47.7 | -13.0 | -34.7 | |
| 1.658 | -19.6 | H | 3.0 | 37.4 | 1.0 | -55.9 | -13.0 | -42.9 | |
| 2.487 | -16.4 | H | 3.0 | 36.4 | 1.0 | -51.8 | -13.0 | -38.8 | |
| 3.316 | -13.8 | H | 3.0 | 35.8 | 1.0 | -48.6 | -13.0 | -35.6 | |
| Mid Ch, 836.5MHz | | | | | | | | | |
| 1.673 | -18.2 | V | 3.0 | 37.3 | 1.0 | -54.5 | -13.0 | -41.5 | |
| 2.510 | -15.7 | V | 3.0 | 36.4 | 1.0 | -51.1 | -13.0 | -38.1 | |
| 3.346 | -13.0 | V | 3.0 | 35.8 | 1.0 | -47.7 | -13.0 | -34.7 | |
| 1.673 | -18.1 | H | 3.0 | 37.3 | 1.0 | -54.4 | -13.0 | -41.4 | |
| 2.510 | -15.8 | H | 3.0 | 36.4 | 1.0 | -51.2 | -13.0 | -38.2 | |
| 3.346 | -15.5 | H | 3.0 | 35.8 | 1.0 | -50.3 | -13.0 | -37.3 | |
| High Ch, 844MHz | | | | | | | | | |
| 1.688 | -19.0 | V | 3.0 | 37.3 | 1.0 | -55.4 | -13.0 | -42.4 | |
| 2.532 | -15.4 | V | 3.0 | 36.3 | 1.0 | -50.8 | -13.0 | -37.8 | |
| 3.376 | -14.6 | V | 3.0 | 35.7 | 1.0 | -49.3 | -13.0 | -36.3 | |
| 1.688 | -19.9 | H | 3.0 | 37.3 | 1.0 | -56.2 | -13.0 | -43.2 | |
| 2.532 | -17.6 | H | 3.0 | 36.3 | 1.0 | -53.0 | -13.0 | -40.0 | |
| 3.376 | -15.3 | H | 3.0 | 35.7 | 1.0 | -50.0 | -13.0 | -37.0 | |

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



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**Compliance Certification Services**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/15/14
**Test Engineer:** R. Alegre
**Configuration:** EUT w/ AC Charger + HS
**Mode:** LTE5 QPSK 10MHz Harm

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| 3m Chamber | 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 | -18.8 | V | 3.0 | 37.4 | 1.0 | -55.2 | -13.0 | -42.2 | |
| 2.487 | -14.7 | V | 3.0 | 36.4 | 1.0 | -50.0 | -13.0 | -37.0 | |
| 3.316 | -12.5 | V | 3.0 | 35.8 | 1.0 | -47.3 | -13.0 | -34.3 | |
| 1.658 | -19.6 | H | 3.0 | 37.4 | 1.0 | -55.9 | -13.0 | -42.9 | |
| 2.487 | -15.8 | H | 3.0 | 36.4 | 1.0 | -51.1 | -13.0 | -38.1 | |
| 3.316 | -13.1 | H | 3.0 | 35.8 | 1.0 | -47.9 | -13.0 | -34.9 | |
| Mid Ch, 836.5MHz | | | | | | | | | |
| 1.673 | -17.3 | V | 3.0 | 37.3 | 1.0 | -53.6 | -13.0 | -40.6 | |
| 2.510 | -15.5 | V | 3.0 | 36.4 | 1.0 | -50.9 | -13.0 | -37.9 | |
| 3.346 | -12.4 | V | 3.0 | 35.8 | 1.0 | -47.1 | -13.0 | -34.1 | |
| 1.673 | -17.4 | H | 3.0 | 37.3 | 1.0 | -53.7 | -13.0 | -40.7 | |
| 2.510 | -14.3 | H | 3.0 | 36.4 | 1.0 | -49.7 | -13.0 | -36.7 | |
| 3.346 | -15.0 | H | 3.0 | 35.8 | 1.0 | -49.8 | -13.0 | -36.8 | |
| High Ch, 844MHz | | | | | | | | | |
| 1.688 | -18.4 | V | 3.0 | 37.3 | 1.0 | -54.8 | -13.0 | -41.8 | |
| 2.532 | -15.1 | V | 3.0 | 36.3 | 1.0 | -50.4 | -13.0 | -37.4 | |
| 3.376 | -14.5 | V | 3.0 | 35.7 | 1.0 | -49.2 | -13.0 | -36.2 | |
| 1.688 | -19.7 | H | 3.0 | 37.3 | 1.0 | -56.0 | -13.0 | -43.0 | |
| 2.532 | -17.2 | H | 3.0 | 36.3 | 1.0 | -52.5 | -13.0 | -39.5 | |
| 3.376 | -14.7 | H | 3.0 | 35.7 | 1.0 | -49.4 | -13.0 | -36.4 | |
| | | | | | | | | | |

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



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**Compliance Certification Services**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/15/14
**Test Engineer:** R. Alegre
**Configuration:** EUT w/ AC Charger + HS
**Mode:** LTE5 16QAM 5MHz 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, 826.5MHz | | | | | | | | | |
| LTE5 | 1.653 | -18.9 | V | 3.0 | 37.4 | 1.0 | -55.3 | -13.0 | -42.3 | |
| | 2.480 | -15.0 | V | 3.0 | 36.4 | 1.0 | -50.4 | -13.0 | -37.4 | |
| 5MHz | 3.306 | -12.9 | V | 3.0 | 35.8 | 1.0 | -47.6 | -13.0 | -34.6 | |
| | 1.653 | -19.0 | H | 3.0 | 37.4 | 1.0 | -55.4 | -13.0 | -42.4 | |
| | 2.480 | -16.6 | H | 3.0 | 36.4 | 1.0 | -52.0 | -13.0 | -39.0 | |
| 16QAM | 3.306 | -14.4 | H | 3.0 | 35.8 | 1.0 | -49.2 | -13.0 | -36.2 | |
| | Mid Ch, 836.5MHz | | | | | | | | | |
| | 1.673 | -16.5 | V | 3.0 | 37.3 | 1.0 | -52.8 | -13.0 | -39.8 | |
| | 2.510 | -17.4 | V | 3.0 | 36.4 | 1.0 | -52.8 | -13.0 | -39.8 | |
| | 3.346 | -15.6 | V | 3.0 | 35.8 | 1.0 | -50.4 | -13.0 | -37.4 | |
| | 1.673 | -17.3 | H | 3.0 | 37.3 | 1.0 | -53.7 | -13.0 | -40.7 | |
| | 2.510 | -16.2 | H | 3.0 | 36.4 | 1.0 | -51.5 | -13.0 | -38.5 | |
| | 3.346 | -15.8 | H | 3.0 | 35.8 | 1.0 | -50.6 | -13.0 | -37.6 | |
| | High Ch, 846.5MHz | | | | | | | | | |
| | 1.693 | -19.5 | V | 3.0 | 37.3 | 1.0 | -55.8 | -13.0 | -42.8 | |
| | 2.540 | -16.1 | V | 3.0 | 36.3 | 1.0 | -51.4 | -13.0 | -38.4 | |
| | 3.386 | -15.0 | V | 3.0 | 35.7 | 1.0 | -49.8 | -13.0 | -36.8 | |
| | 1.693 | -18.8 | H | 3.0 | 37.3 | 1.0 | -55.1 | -13.0 | -42.1 | |
| | 2.540 | -17.9 | H | 3.0 | 36.3 | 1.0 | -53.2 | -13.0 | -40.2 | |
| | 3.386 | -15.1 | H | 3.0 | 35.7 | 1.0 | -49.9 | -13.0 | -36.9 | |

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



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**Compliance Certification Services**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/15/14
**Test Engineer:** R. Alegre
**Configuration:** EUT w/ AC Charger + HS
**Mode:** LTE5 QPSK 5MHz Harm

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| 3m Chamber | 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 | -18.2 | V | 3.0 | 37.4 | 1.0 | -54.6 | -13.0 | -41.6 | |
| 2.480 | -14.6 | V | 3.0 | 36.4 | 1.0 | -50.0 | -13.0 | -37.0 | |
| 3.306 | -12.7 | V | 3.0 | 35.8 | 1.0 | -47.5 | -13.0 | -34.5 | |
| 1.653 | -18.8 | H | 3.0 | 37.4 | 1.0 | -55.2 | -13.0 | -42.2 | |
| 2.480 | -16.9 | H | 3.0 | 36.4 | 1.0 | -52.3 | -13.0 | -39.3 | |
| 3.306 | -14.3 | H | 3.0 | 35.8 | 1.0 | -49.1 | -13.0 | -36.1 | |
| Mid Ch, 836.5MHz | | | | | | | | | |
| 1.673 | -16.7 | V | 3.0 | 37.3 | 1.0 | -53.1 | -13.0 | -40.1 | |
| 2.510 | -16.4 | V | 3.0 | 36.4 | 1.0 | -51.8 | -13.0 | -38.8 | |
| 3.346 | -12.8 | V | 3.0 | 35.8 | 1.0 | -47.5 | -13.0 | -34.5 | |
| 1.673 | -17.2 | H | 3.0 | 37.3 | 1.0 | -53.6 | -13.0 | -40.6 | |
| 2.510 | -16.1 | H | 3.0 | 36.4 | 1.0 | -51.5 | -13.0 | -38.5 | |
| 3.346 | -15.8 | H | 3.0 | 35.8 | 1.0 | -50.5 | -13.0 | -37.5 | |
| High Ch, 846.5MHz | | | | | | | | | |
| 1.693 | -19.3 | V | 3.0 | 37.3 | 1.0 | -55.6 | -13.0 | -42.6 | |
| 2.540 | -15.7 | V | 3.0 | 36.3 | 1.0 | -51.0 | -13.0 | -38.0 | |
| 3.386 | -14.3 | V | 3.0 | 35.7 | 1.0 | -49.1 | -13.0 | -36.1 | |
| 1.693 | -18.7 | H | 3.0 | 37.3 | 1.0 | -55.0 | -13.0 | -42.0 | |
| 2.540 | -17.5 | H | 3.0 | 36.3 | 1.0 | -52.9 | -13.0 | -39.9 | |
| 3.386 | -14.7 | H | 3.0 | 35.7 | 1.0 | -49.4 | -13.0 | -36.4 | |
| | | | | | | | | | |

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



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**Compliance Certification Services**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/15/14
**Test Engineer:** R. Alegre
**Configuration:** EUT w/ AC Charger + 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 | -18.7 | V | 3.0 | 37.4 | 1.0 | -55.1 | -13.0 | -42.1 | |
| 2.477 | -15.0 | V | 3.0 | 36.4 | 1.0 | -50.4 | -13.0 | -37.4 | |
| 3.302 | -13.1 | V | 3.0 | 35.8 | 1.0 | -47.9 | -13.0 | -34.9 | |
| 1.651 | -19.0 | H | 3.0 | 37.4 | 1.0 | -55.4 | -13.0 | -42.4 | |
| 2.477 | -16.4 | H | 3.0 | 36.4 | 1.0 | -51.8 | -13.0 | -38.8 | |
| 3.302 | -14.7 | H | 3.0 | 35.8 | 1.0 | -49.5 | -13.0 | -36.5 | |
| Mid Ch, 836.5MHz | | | | | | | | | |
| 1.673 | -16.5 | V | 3.0 | 37.3 | 1.0 | -52.8 | -13.0 | -39.8 | |
| 2.510 | -16.5 | V | 3.0 | 36.4 | 1.0 | -51.9 | -13.0 | -38.9 | |
| 3.346 | -13.7 | V | 3.0 | 35.8 | 1.0 | -48.4 | -13.0 | -35.4 | |
| 1.673 | -17.4 | H | 3.0 | 37.3 | 1.0 | -53.8 | -13.0 | -40.8 | |
| 2.510 | -15.2 | H | 3.0 | 36.4 | 1.0 | -50.5 | -13.0 | -37.5 | |
| 3.346 | -15.6 | H | 3.0 | 35.8 | 1.0 | -50.4 | -13.0 | -37.4 | |
| High Ch, 847.5MHz | | | | | | | | | |
| 1.695 | -18.9 | V | 3.0 | 37.3 | 1.0 | -55.2 | -13.0 | -42.2 | |
| 2.543 | -16.3 | V | 3.0 | 36.3 | 1.0 | -51.6 | -13.0 | -38.6 | |
| 3.390 | -15.1 | V | 3.0 | 35.7 | 1.0 | -49.8 | -13.0 | -36.8 | |
| 1.695 | -18.8 | H | 3.0 | 37.3 | 1.0 | -55.1 | -13.0 | -42.1 | |
| 2.543 | -17.2 | H | 3.0 | 36.3 | 1.0 | -52.5 | -13.0 | -39.5 | |
| 3.390 | -15.0 | H | 3.0 | 35.7 | 1.0 | -49.8 | -13.0 | -36.8 | |
| | | | | | | | | | |

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



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**Compliance Certification Services**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/15/14
**Test Engineer:** R. Alegre
**Configuration:** EUT w/ AC Charger + 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 | -18.2 | V | 3.0 | 37.4 | 1.0 | -54.6 | -13.0 | -41.6 | |
| 2.477 | -14.6 | V | 3.0 | 36.4 | 1.0 | -50.0 | -13.0 | -37.0 | |
| 3.302 | -13.0 | V | 3.0 | 35.8 | 1.0 | -47.8 | -13.0 | -34.8 | |
| 1.651 | -18.8 | H | 3.0 | 37.4 | 1.0 | -55.2 | -13.0 | -42.2 | |
| 2.477 | -16.1 | H | 3.0 | 36.4 | 1.0 | -51.5 | -13.0 | -38.5 | |
| 3.302 | -14.1 | H | 3.0 | 35.8 | 1.0 | -48.9 | -13.0 | -35.9 | |
| Mid Ch, 836.5MHz | | | | | | | | | |
| 1.673 | -16.5 | V | 3.0 | 37.3 | 1.0 | -52.9 | -13.0 | -39.9 | |
| 2.510 | -16.3 | V | 3.0 | 36.4 | 1.0 | -51.6 | -13.0 | -38.6 | |
| 3.346 | -12.6 | V | 3.0 | 35.8 | 1.0 | -47.3 | -13.0 | -34.3 | |
| 1.673 | -17.3 | H | 3.0 | 37.3 | 1.0 | -53.7 | -13.0 | -40.7 | |
| 2.510 | -15.4 | H | 3.0 | 36.4 | 1.0 | -50.7 | -13.0 | -37.7 | |
| 3.346 | -14.8 | H | 3.0 | 35.8 | 1.0 | -49.5 | -13.0 | -36.5 | |
| High Ch, 847.5MHz | | | | | | | | | |
| 1.695 | -19.0 | V | 3.0 | 37.3 | 1.0 | -55.3 | -13.0 | -42.3 | |
| 2.543 | -15.3 | V | 3.0 | 36.3 | 1.0 | -50.6 | -13.0 | -37.6 | |
| 3.390 | -14.3 | V | 3.0 | 35.7 | 1.0 | -49.0 | -13.0 | -36.0 | |
| 1.695 | -18.4 | H | 3.0 | 37.3 | 1.0 | -54.7 | -13.0 | -41.7 | |
| 2.543 | -17.5 | H | 3.0 | 36.3 | 1.0 | -52.9 | -13.0 | -39.9 | |
| 3.390 | -14.6 | H | 3.0 | 35.7 | 1.0 | -49.3 | -13.0 | -36.3 | |
| | | | | | | | | | |

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



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**Compliance Certification Services**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/12/14
**Test Engineer:** L. Lara
**Configuration:** X-pos EUT (Sample 1956394)
**Mode:** LTE5 1.4MHz 16QAM HARM

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| 5m Chamber B | 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, 824.7MHz | | | | | | | | | |
| LTE5 | 1.649 | -20.8 | V | 3.0 | 37.4 | 1.0 | -57.2 | -13.0 | -44.2 | |
| | 2.474 | -16.1 | V | 3.0 | 36.4 | 1.0 | -51.5 | -13.0 | -38.5 | |
| 1.4MHz | 3.299 | -11.5 | V | 3.0 | 35.8 | 1.0 | -46.3 | -13.0 | -33.3 | |
| | 1.649 | -17.0 | H | 3.0 | 37.4 | 1.0 | -53.4 | -13.0 | -40.4 | |
| | 2.474 | -17.5 | H | 3.0 | 36.4 | 1.0 | -52.9 | -13.0 | -39.9 | |
| 16QAM | 3.299 | -12.9 | H | 3.0 | 35.8 | 1.0 | -47.7 | -13.0 | -34.7 | |
| | Mid Ch, 836.5MHz | | | | | | | | | |
| | 1.673 | -19.1 | V | 3.0 | 37.3 | 1.0 | -55.4 | -13.0 | -42.4 | |
| | 2.510 | -14.8 | V | 3.0 | 36.4 | 1.0 | -50.2 | -13.0 | -37.2 | |
| | 3.346 | -11.4 | V | 3.0 | 35.8 | 1.0 | -46.1 | -13.0 | -33.1 | |
| | 1.673 | -14.0 | H | 3.0 | 37.3 | 1.0 | -50.4 | -13.0 | -37.4 | |
| | 2.510 | -16.6 | H | 3.0 | 36.4 | 1.0 | -52.0 | -13.0 | -39.0 | |
| | 3.346 | -12.7 | H | 3.0 | 35.8 | 1.0 | -47.5 | -13.0 | -34.5 | |
| | High Ch, 848.3MHz | | | | | | | | | |
| | 1.697 | -21.1 | V | 3.0 | 37.3 | 1.0 | -57.4 | -13.0 | -44.4 | |
| | 2.545 | -15.6 | V | 3.0 | 36.3 | 1.0 | -50.9 | -13.0 | -37.9 | |
| | 3.393 | -11.6 | V | 3.0 | 35.7 | 1.0 | -46.3 | -13.0 | -33.3 | |
| | 1.697 | -18.2 | H | 3.0 | 37.3 | 1.0 | -54.5 | -13.0 | -41.5 | |
| | 2.545 | -17.3 | H | 3.0 | 36.3 | 1.0 | -52.6 | -13.0 | -39.6 | |
| | 3.393 | -13.0 | H | 3.0 | 35.7 | 1.0 | -47.7 | -13.0 | -34.7 | |
| | | | | | | | | | | |

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



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**Compliance Certification Services**
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung
**Project #:** 14I18726
**Date:** 09/12/14
**Test Engineer:** L. Lara
**Configuration:** X-pos EUT (Sample 1956394)
**Mode:** LTE5 1.4MHz QPSK

| Chamber | Pre-amplifer | Filter | Limit |
|---|---|---|---|
| 5m Chamber B | 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 | -19.0 | V | 3.0 | 37.4 | 1.0 | -55.4 | -13.0 | -42.4 | |
| 2.474 | -14.5 | V | 3.0 | 36.4 | 1.0 | -49.9 | -13.0 | -36.9 | |
| 3.299 | -14.1 | V | 3.0 | 35.8 | 1.0 | -48.9 | -13.0 | -35.9 | |
| 1.649 | -15.8 | H | 3.0 | 37.4 | 1.0 | -52.1 | -13.0 | -39.1 | |
| 2.474 | -16.3 | H | 3.0 | 36.4 | 1.0 | -51.7 | -13.0 | -38.7 | |
| 3.299 | -12.4 | H | 3.0 | 35.8 | 1.0 | -47.2 | -13.0 | -34.2 | |
| Mid Ch, 836.5MHz | | | | | | | | | |
| 1.673 | -16.7 | V | 3.0 | 37.3 | 1.0 | -53.1 | -13.0 | -40.1 | |
| 2.510 | -15.4 | V | 3.0 | 36.4 | 1.0 | -50.8 | -13.0 | -37.8 | |
| 3.346 | -12.5 | V | 3.0 | 35.8 | 1.0 | -47.2 | -13.0 | -34.2 | |
| 1.673 | -13.9 | H | 3.0 | 37.3 | 1.0 | -50.3 | -13.0 | -37.3 | |
| 2.510 | -15.6 | H | 3.0 | 36.4 | 1.0 | -51.0 | -13.0 | -38.0 | |
| 3.346 | -12.8 | H | 3.0 | 35.8 | 1.0 | -47.5 | -13.0 | -34.5 | |
| High Ch, 848.3MHz | | | | | | | | | |
| 1.697 | -19.1 | V | 3.0 | 37.3 | 1.0 | -55.4 | -13.0 | -42.4 | |
| 2.545 | -16.2 | V | 3.0 | 36.3 | 1.0 | -51.5 | -13.0 | -38.5 | |
| 3.393 | -12.3 | V | 3.0 | 35.7 | 1.0 | -47.0 | -13.0 | -34.0 | |
| 1.697 | -17.0 | H | 3.0 | 37.3 | 1.0 | -53.3 | -13.0 | -40.3 | |
| 2.545 | -17.7 | H | 3.0 | 36.3 | 1.0 | -53.0 | -13.0 | -40.0 | |
| 3.393 | -14.4 | H | 3.0 | 35.7 | 1.0 | -49.1 | -13.0 | -36.1 | |

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



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