



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

**CERTIFICATION TEST REPORT**

**FOR  
GSM/WCDMA Phone + Bluetooth & WLAN 2.4GHz b/g/n**

**MODEL NUMBER: SM-G130U**

**FCC ID: A3LSMG130U**

**REPORT NUMBER: 14I18156-1**

**ISSUE DATE: JUNE 30, 2014**

*Prepared for*

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

*Prepared by*

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



**NVLAP LAB CODE 200065-0**

**Revision History**

| Issue |         |               |            |
|-------|---------|---------------|------------|
| Rev.  | Date    | Revisions     | Revised By |
| --    | 6/30/14 | Initial issue | P. Zhang   |
|       |         |               |            |
|       |         |               |            |

## TABLE OF CONTENTS

|            |                                             |           |
|------------|---------------------------------------------|-----------|
| <b>1.</b>  | <b>ATTESTATION OF TEST RESULTS .....</b>    | <b>5</b>  |
| <b>2.</b>  | <b>TEST METHODOLOGY .....</b>               | <b>6</b>  |
| <b>3.</b>  | <b>FACILITIES AND ACCREDITATION .....</b>   | <b>6</b>  |
| <b>4.</b>  | <b>CALIBRATION AND UNCERTAINTY .....</b>    | <b>6</b>  |
| 4.1.       | MEASURING INSTRUMENT CALIBRATION .....      | 6         |
| 4.2.       | SAMPLE CALCULATION .....                    | 6         |
| 4.3.       | MEASUREMENT UNCERTAINTY .....               | 7         |
| <b>5.</b>  | <b>EQUIPMENT UNDER TEST .....</b>           | <b>8</b>  |
| 5.1.       | DESCRIPTION OF EUT .....                    | 8         |
| 5.2.       | MAXIMUM OUTPUT POWER.....                   | 8         |
| 5.3.       | DESCRIPTION OF AVAILABLE ANTENNAS .....     | 9         |
| 5.4.       | DESCRIPTION OF TEST SETUP.....              | 10        |
| <b>6.</b>  | <b>TEST AND MEASUREMENT EQUIPMENT .....</b> | <b>13</b> |
| <b>7.</b>  | <b>Summary Table.....</b>                   | <b>14</b> |
| <b>8.</b>  | <b>RF POWER OUTPUT VERIFICATION.....</b>    | <b>15</b> |
| 8.1.       | GSM/GPRS/EDGE .....                         | 15        |
| 8.1.1.     | GSM OUTPUT POWER RESULT.....                | 16        |
| 8.2.       | UMTS REL 99.....                            | 17        |
| 8.2.1.     | UMTS REL 99 OUTPUT POWER RESULT .....       | 17        |
| 8.3.       | UMTS HSDPA .....                            | 18        |
| 8.3.1.     | UMTS HSDPA OUTPUT POWER RESULT.....         | 18        |
| 8.3.2.     | UMTS HSUPA .....                            | 19        |
| 8.3.3.     | UMTS HSUPA OUTPUT POWER RESULT.....         | 20        |
| <b>9.</b>  | <b>PEAK TO AVERAGE RATIO .....</b>          | <b>21</b> |
| 9.1.       | CONDUCTED PEAK TO AVERAGE RESULT.....       | 21        |
| <b>10.</b> | <b>LIMITS AND CONDUCTED RESULTS.....</b>    | <b>22</b> |
| 10.1.      | OCCUPIED BANDWIDTH.....                     | 22        |
| 10.1.1.    | OCCUPIED BANDWIDTH RESULTS.....             | 23        |
| 10.1.2.    | OCCUPIED BANDWIDTH PLOTS .....              | 24        |
| 10.2.      | BAND EDGE EMISSIONS .....                   | 26        |

---

|         |                                                   |    |
|---------|---------------------------------------------------|----|
| 10.2.1. | BAND EDGE PLOTS .....                             | 27 |
| 10.3.   | <i>OUT OF BAND EMISSIONS</i> .....                | 29 |
| 10.3.1. | OUT OF BAND EMISSIONS RESULT .....                | 30 |
| 10.3.2. | OUT OF BAND EMISSIONS PLOTS.....                  | 31 |
| 10.4.   | <i>FREQUENCY STABILITY</i> .....                  | 33 |
| 10.4.1. | FREQUENCY STABILITY RESULTS.....                  | 34 |
| 11.     | <b>RADIATED TEST RESULTS</b> .....                | 35 |
| 11.1.   | <i>RADIATED POWER (ERP &amp; EIRP)</i> .....      | 35 |
| 11.1.1. | ERP/EIRP Results.....                             | 35 |
| 11.1.2. | ERP/EIRP DATA.....                                | 37 |
| 11.2.   | <i>FIELD STRENGTH OF SPURIOUS RADIATION</i> ..... | 41 |
| 11.2.1. | SPURIOUS RADIATION DATA.....                      | 42 |
| 12.     | <b>SETUP PHOTOS</b> .....                         | 46 |

## 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** SAMSUNG ELECTRONICS CO., LTD.  
**EUT DESCRIPTION:** GSM/WCDMA Phone + Bluetooth & WLAN 2.4GHz b/g/n  
**MODEL:** SM-G130U  
**SERIAL NUMBER:** FL-205-A  
**DATE TESTED:** MAY 28 - JUNE 4, 2014

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

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

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

Approved & Released For

UL Verification Services Inc. By:



PENG ZHANG

CONSUMER TECHNOLOGY DIVISION  
PROJECT LEAD  
UL Verification Services Inc.

Tested By:



CHARLES VERGONIO

CONSUMER TECHNOLOGY DIVISION  
LAB ENGINEER  
UL Verification Services Inc.

## 2. TEST METHODOLOGY

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

## 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                          |
|-----------------------------------------------|-----------------------------------------------|
| <input checked="" type="checkbox"/> Chamber A | <input type="checkbox"/> Chamber D            |
| <input type="checkbox"/> Chamber B            | <input checked="" type="checkbox"/> Chamber E |
| <input type="checkbox"/> Chamber C            | <input checked="" type="checkbox"/> 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:

$$\text{EIRP} = \text{PSA reading with EUT worst orientation (dBm)} + \text{Path loss (dB)} - \text{cable loss( between the SG and substitution antenna)} + \text{Substitution Antenna Factor (dBi)}$$

$$\text{ERP} = \text{PSA reading with EUT worst orientation (dBm)} + \text{Path loss (dB)} - \text{cable loss( between the SG and substitution antenna)}$$

$$(\text{Path loss} = \text{Signal generator output} - \text{PSA reading with substitution antenna})$$

### 4.3. MEASUREMENT UNCERTAINTY

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

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

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

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

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

The model FCC ID: A3LSMG130U shares the same enclosure and circuit board as mode FCC ID: A3LSMG130M. The WWAN/WLAN/Bluetooth circuitry and layout, including antenna, are almost identical between the two units. Only different between these two units is A3LSMG130U removed WCDMA B1 duplexer, disabled WCDMA band 5 and add WCDMA Band 8 capability.

After confirming through preliminary radiated emissions that the performance of the A3LSMG130M WWAN data remain representative of this model (FCC ID A3LSMG130U) test data for FCC ID: A3LSMG130M is being submitted for this application.

Radiated emissions were fully re-evaluated against 15B requirements for digital devices and results indicated no significant differences between the two versions.

### 5.2. MAXIMUM OUTPUT POWER

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

| FCC Part 22/2 4 |                      |                    |           |           |            |           |
|-----------------|----------------------|--------------------|-----------|-----------|------------|-----------|
| Band            | Frequency Range(MHz) | Modulation<br>Peak | Conducted |           | Radiated   |           |
|                 |                      |                    | Peak(dBm) | Peak (mW) | Peak (dBm) | Peak (mW) |
| GSM850          | 824~849              | GMSK               | 32.4      | 1737.80   |            |           |
|                 | 824~849              | GPRS               | 32.5      | 1778.28   | 28.47      | 703.07    |
| GSM1900         | 1850~1910            | GMSK               | 29.9      | 977.24    |            |           |
|                 | 1850~1910            | GPRS               | 30.0      | 1000.00   | 30.6415    | 1159.18   |

| FCC Part 22/2 4/27 |                      |                    |           |          |           |          |
|--------------------|----------------------|--------------------|-----------|----------|-----------|----------|
| Band               | Frequency Range(MHz) | Modulation<br>Peak | Conducted |          | Radiated  |          |
|                    |                      |                    | Avg (dBm) | Avg (mW) | Avg (dBm) | Avg (mW) |
| Band 2             | 1850~1910            | REL99              | 23.0      | 199.53   | 22.7125   | 186.75   |
|                    | 1850~1910            | HSDPA              | 22.9      | 194.98   | 21.9248   | 155.77   |
|                    | 1850~1910            | HSUPA              | 22.7      | 186.21   |           |          |

**5.3. DESCRIPTION OF AVAILABLE ANTENNAS**

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

| Frequency (MHz)      | Peak Gain (dBi) |
|----------------------|-----------------|
| Band 5, 824~849MHz   | -2.4            |
| Band 2, 1850~1910MHz | 1.9             |

## 5.4. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

| Support Equipment List |              |            |               |        |
|------------------------|--------------|------------|---------------|--------|
| Description            | Manufacturer | Model      | Serial Number | FCC ID |
| AC Adapter             | Samsung      | ETA-U90CBC | N/A           | N/A    |
| Earphone               | Samsung      | GH59       | N/A           | N/A    |

### I/O CABLES (CONDUCTED SETUP)

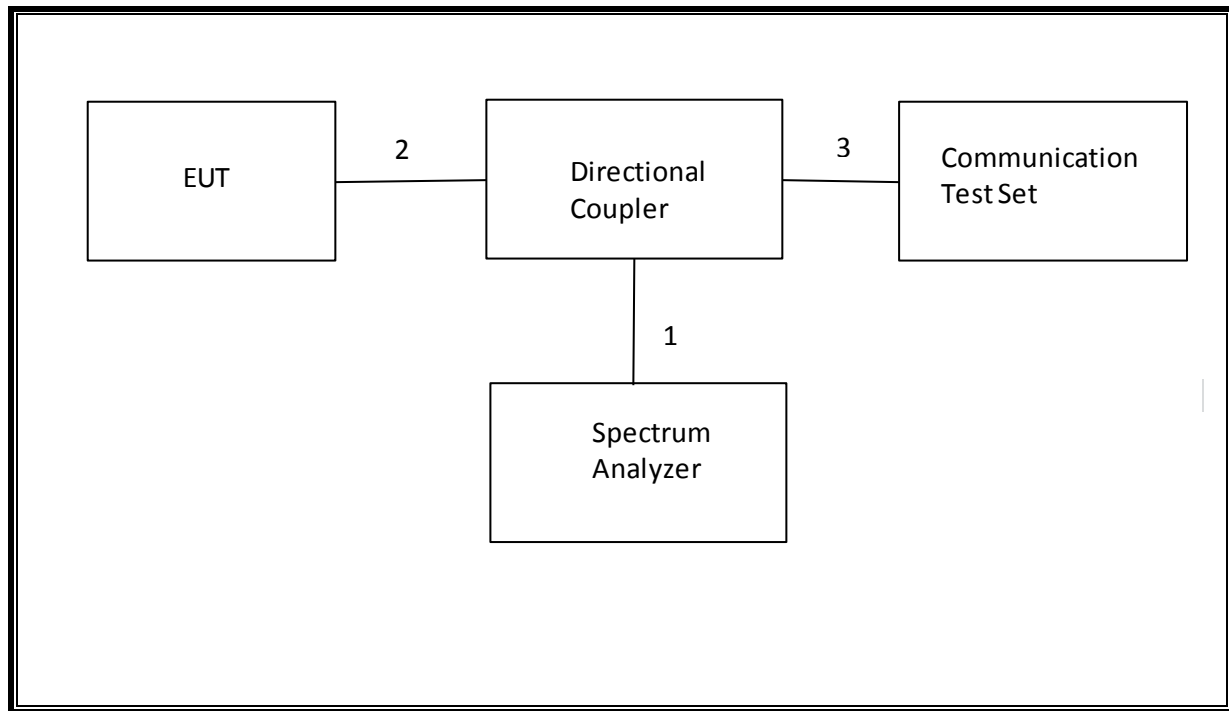
| I/O Cable List |              |                      |                        |            |                  |         |
|----------------|--------------|----------------------|------------------------|------------|------------------|---------|
| Cable No       | Port         | # of identical ports | 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      |

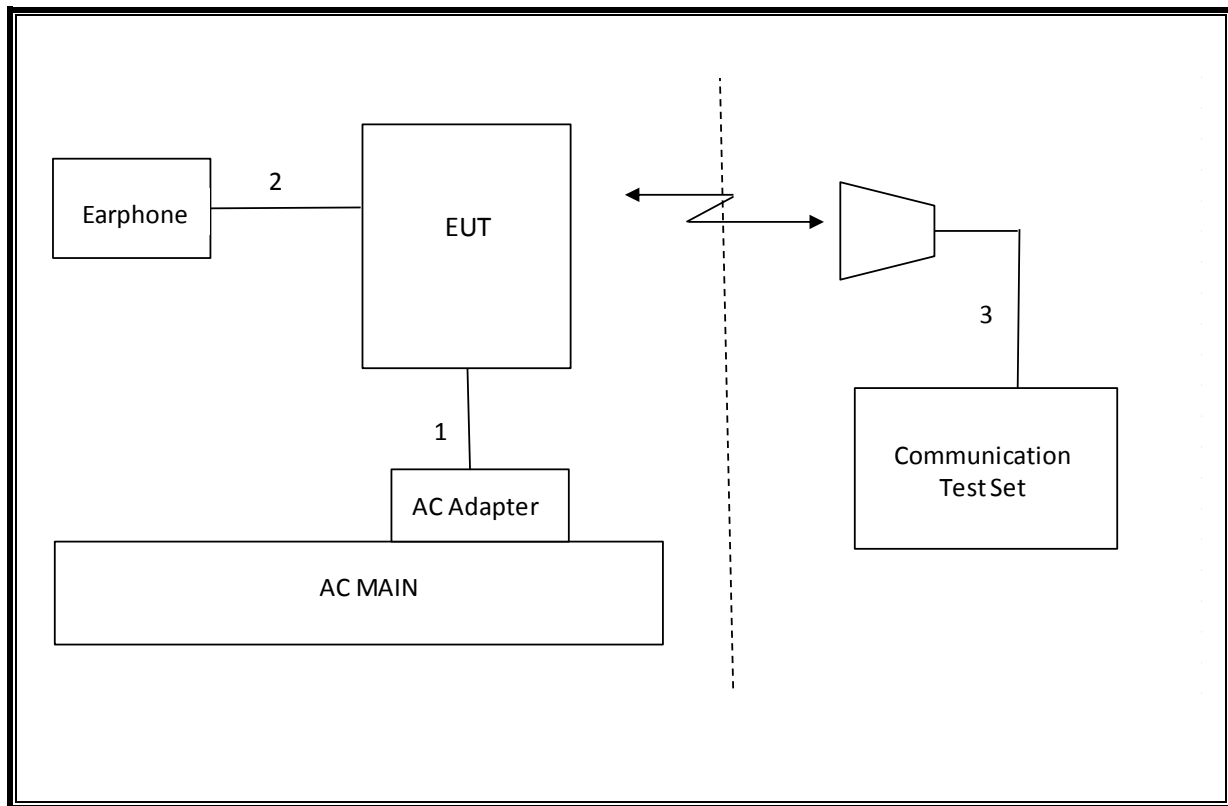
### I/O CABLES (RADIATED SETUP)

| 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.

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

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

## 6. TEST AND MEASUREMENT EQUIPMENT

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

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

## 7. Summary Table

| FCC Part Section       | RSS Section(s)                   | Test Description                        | Test Limit | Test Condition | Test Result | Worst Case |
|------------------------|----------------------------------|-----------------------------------------|------------|----------------|-------------|------------|
| 2.1049                 | RSS Gen                          | Occupied Band width (99%)               | N/A        | Conducted      | Pass        | 4145KHz    |
| 22.917(a)<br>24.238(a) | RSS-132(4.5.1)<br>RSS-133(6.5.1) | Band Edge / Conducted Spurious Emission | -13dBm     |                | Pass        | -17.149dBm |
| 2.1046                 | N/A                              | Conducted output power                  | N/A        |                | Pass        | 32.5dBm    |
| 22.355<br>24.235       | RSS-132(4.3)<br>RSS-133(6.3)     | Frequency Stability                     | 2.5PPM     |                | Pass        | 0.01PPM    |
| 22.913(a)(2)           | RSS-132(4.4)                     | Effective Radiated Power                | 38 dBm     | Radiated       | Pass        | 28.47dBm   |
| 24.232(c )             | RSS-133(6.4)                     | Equivalent Isotropic Radiated Power     | 33dBm      |                | Pass        | 30.64dBm   |
| 22.917(a)<br>24.238(a) | RSS-132(4.5.1)<br>RSS-133(6.5.1) | Radiated Spurious Emission              | -13dBm     |                | Pass        | -35.7dBm   |

## 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

### 8.1.1. GSM OUTPUT POWER RESULT

| Band    | Mode | Ch. | f(MHz) | 1 time slot | 2 time slot | 3 time slot | 4 time slot |
|---------|------|-----|--------|-------------|-------------|-------------|-------------|
|         |      |     |        | Peak (dBm)  | Peak (dBm)  | Peak (dBm)  | Peak (dBm)  |
| GSM850  | GMSK | 128 | 824.2  | 32.3        |             |             |             |
|         |      | 190 | 836.6  | 32.4        |             |             |             |
|         |      | 251 | 848.8  | 32.4        |             |             |             |
|         | GPRS | 128 | 824.2  | 32.4        | 31.0        | 29.3        | 27.4        |
|         |      | 190 | 836.6  | 32.5        | 31.0        | 29.5        | 27.5        |
|         |      | 251 | 848.8  | 32.4        | 31.0        | 29.5        | 27.5        |
| GSM1900 | GMSK | 512 | 1850.2 | 28.7        |             |             |             |
|         |      | 661 | 1880   | 28.1        |             |             |             |
|         |      | 810 | 1909.8 | 27.3        |             |             |             |
|         | GPRS | 512 | 1850.2 | 28.7        | 25.8        | 24.8        | 22.8        |
|         |      | 661 | 1880   | 28.1        | 25.1        | 24.1        | 22.0        |
|         |      | 810 | 1909.8 | 27.3        | 24.4        | 23.3        | 21.2        |

## 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     |
|                        | $\beta_c$               | Not Applicable |
|                        | $\beta_d$               | Not Applicable |
|                        | $\beta_{ec}$            | Not Applicable |
|                        | $\beta_c/\beta_d$       | 8/15           |
|                        | $\beta_{hs}$            | Not Applicable |
|                        | $\beta_{ed}$            | Not Applicable |

### 8.2.1. UMTS REL 99 OUTPUT POWER RESULT

| Band   | Mode  | Ch.  | f(MHz) | Conducted Power<br>(dBm) |
|--------|-------|------|--------|--------------------------|
|        |       |      |        | Avg (dBm)                |
| Band 2 | REL99 | 9262 | 1852.4 | 21.0                     |
|        |       | 9400 | 1880   | 21.4                     |
|        |       | 9538 | 1907.6 | 21.3                     |

### 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  |       |       |       |
|                         | $\beta_c$                            | 2/15         | 12/15 | 15/15 | 15/15 |
|                         | $\beta_d$                            | 15/15        | 15/15 | 8/15  | 4/15  |
|                         | Bd (SF)                              | 64           |       |       |       |
|                         | $\beta_c/\beta_d$                    | 2/15         | 12/15 | 15/8  | 15/4  |
|                         | $\beta_{hs}$                         | 4/15         | 24/15 | 30/15 | 30/15 |
| HSDPA Specific Settings | MPR (dB)                             | 0            | 0     | 0.5   | 0.5   |
|                         | $D_{ACK}$                            | 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            |       |       |       |
|                         | $A_{hs} = \beta_{hs}/\beta_c$        | 30/15        |       |       |       |

#### 8.3.1. UMTS HSDPA OUTPUT POWER RESULT

| Band   | Mode  | Subset | Ch.  | f(MHz) | Conducted Power (dBm) |
|--------|-------|--------|------|--------|-----------------------|
|        |       |        |      |        | Avg (dBm)             |
| Band 2 | HSDPA | 1      | 9262 | 1852.4 | 20.0                  |
|        |       |        | 9400 | 1880   | 20.4                  |
|        |       |        | 9538 | 1907.6 | 20.2                  |
|        |       | 2      | 9262 | 1852.4 | 20.0                  |
|        |       |        | 9400 | 1880   | 20.5                  |
|        |       |        | 9538 | 1907.6 | 20.3                  |
|        |       | 3      | 9262 | 1852.4 | 20.0                  |
|        |       |        | 9400 | 1880   | 20.5                  |
|        |       |        | 9538 | 1907.6 | 20.3                  |
|        |       | 4      | 9262 | 1852.4 | 20.1                  |
|        |       |        | 9400 | 1880   | 20.5                  |
|        |       |        | 9538 | 1907.6 | 20.4                  |

## 8.3.2. UMTS HSUPA

### TEST PROCEDURE

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

|                               | Mode                                 | Rel6 HSUPA                                                                                                                                   | Rel6 HSUPA | Rel6 HSUPA                                            | Rel6 HSUPA | Rel6 HSUPA                                                                                                                                   |
|-------------------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|------------|-------------------------------------------------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------|
|                               | Subtest                              | 1                                                                                                                                            | 2          | 3                                                     | 4          | 5                                                                                                                                            |
| WCDMA<br>General<br>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                                                                                                                                         |
| HSDPA<br>Specific<br>Settings | $\beta_c/\beta_d$                    | 11/15                                                                                                                                        | 6/15       | 15/9                                                  | 2/15       | 15/15                                                                                                                                        |
|                               | Bhs                                  | 22/15                                                                                                                                        | 12/15      | 30/15                                                 | 4/15       | 30/15                                                                                                                                        |
|                               | $\beta_{ed}$ (note1)                 | 1309/225                                                                                                                                     | 94/75      | 47/15                                                 | 56/75      | 134/15                                                                                                                                       |
|                               | MPR                                  | 0                                                                                                                                            | 2          | 1                                                     | 2          | 0                                                                                                                                            |
|                               | DACK                                 | 8                                                                                                                                            |            |                                                       |            |                                                                                                                                              |
|                               | DNAK                                 | 8                                                                                                                                            |            |                                                       |            |                                                                                                                                              |
|                               | DCQI                                 | 8                                                                                                                                            |            |                                                       |            |                                                                                                                                              |
|                               | Ack-Nack repetition factor           | 3                                                                                                                                            |            |                                                       |            |                                                                                                                                              |
| HSUPA<br>Specific<br>Settings | CQI Feedback (Table 5.2B.4)          | 4ms                                                                                                                                          |            |                                                       |            |                                                                                                                                              |
|                               | CQI Repetition Factor (Table 5.2B.4) | 2                                                                                                                                            |            |                                                       |            |                                                                                                                                              |
|                               | $A_{hs} = \beta_{hs}/\beta_c$        | 30/15                                                                                                                                        |            |                                                       |            |                                                                                                                                              |
|                               | 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:  $\beta_{ed}$  cannot be set directly, it is set by Absolute Grant Value.

**8.3.3. UMTS HSUPA OUTPUT POWER RESULT**

| Band   | Mode  | Subset | Ch.  | f(MHz) | Conducted Power<br>(dBm) |
|--------|-------|--------|------|--------|--------------------------|
|        |       |        |      |        | Avg (dBm)                |
| Band 2 | HSUPA | 1      | 9262 | 1852.4 | 19.1                     |
|        |       |        | 9400 | 1880   | 19.4                     |
|        |       |        | 9538 | 1907.6 | 19.0                     |
|        |       | 2      | 9262 | 1852.4 | 19.3                     |
|        |       |        | 9400 | 1880   | 19.8                     |
|        |       |        | 9538 | 1907.6 | 19.3                     |
|        |       | 3      | 9262 | 1852.4 | 19.5                     |
|        |       |        | 9400 | 1880   | 19.9                     |
|        |       |        | 9538 | 1907.6 | 19.4                     |
|        |       | 4      | 9262 | 1852.4 | 20.0                     |
|        |       |        | 9400 | 1880   | 20.5                     |
|        |       |        | 9538 | 1907.6 | 20.0                     |
|        |       | 5      | 9262 | 1852.4 | 19.4                     |
|        |       |        | 9400 | 1880   | 20.0                     |
|        |       |        | 9538 | 1907.6 | 19.7                     |

## 9. PEAK TO AVERAGE RATIO

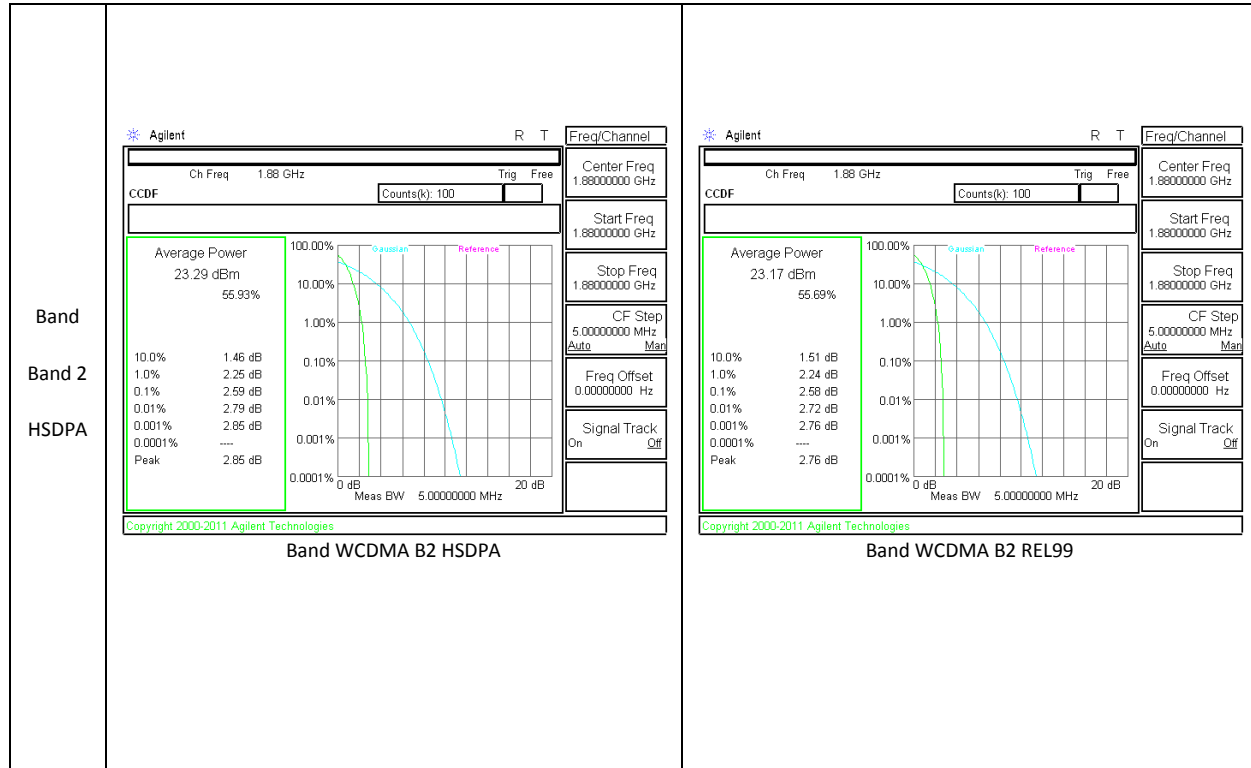
### Test Procedure

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



## 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.

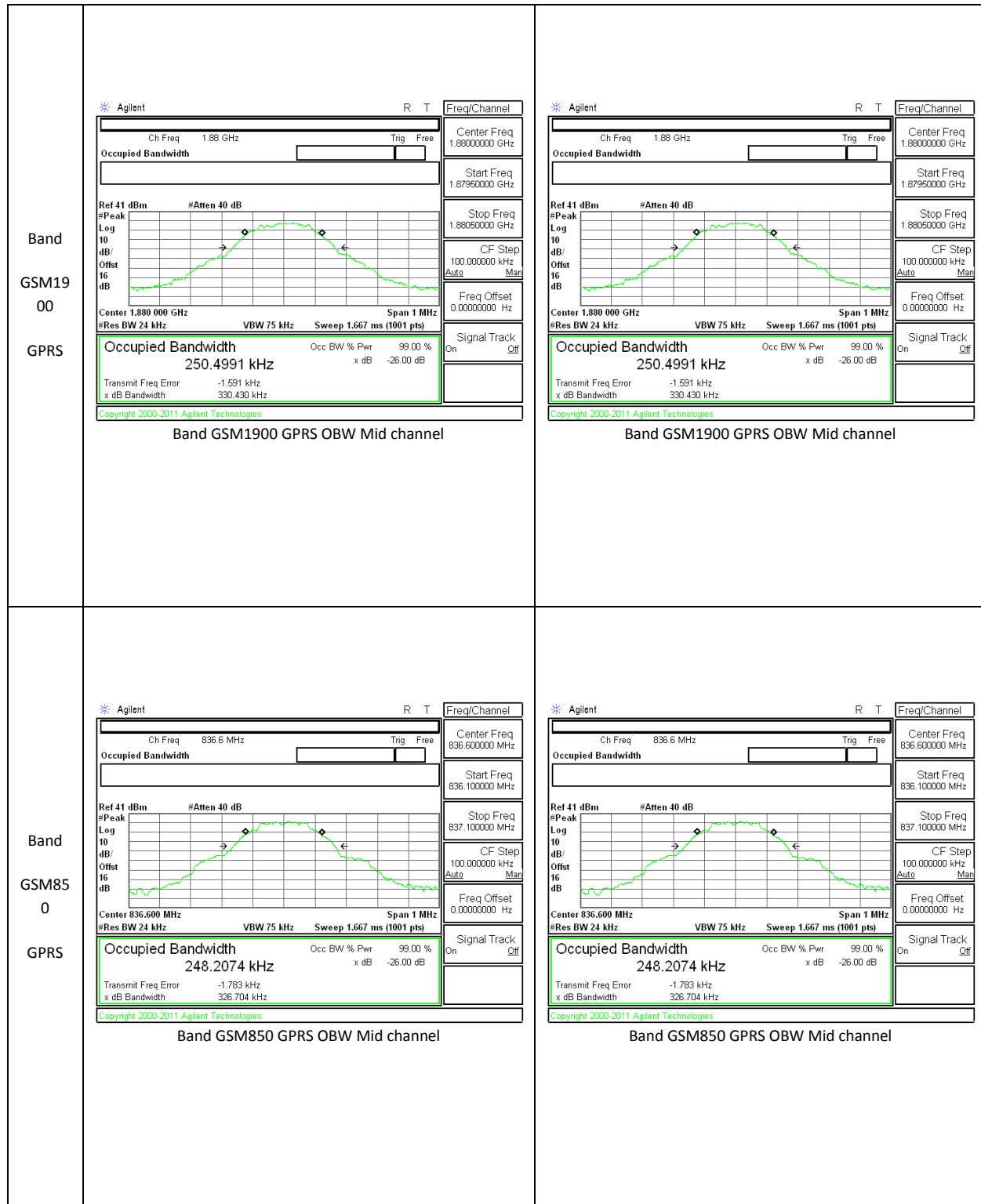
(KDB 971168 D01 Power Meas License Digital Systems v02r01 - 06/07/2013)

**10.1.1. OCCUPIED BANDWIDTH RESULTS**

| Band    | Mode  | Channel | f (MHz) | 99% BW (KHz) | -26dB BW (KHz) |
|---------|-------|---------|---------|--------------|----------------|
| GSM850  | GPRS  | 128     | 824.2   | 250          | 332            |
|         |       | 190     | 836.6   | 248          | 327            |
|         |       | 251     | 848.8   | 246          | 329            |
| GSM1900 | GPRS  | 512     | 1850.2  | 254          | 330            |
|         |       | 661     | 1880    | 250          | 330            |
|         |       | 810     | 1909.8  | 253          | 331            |
| Band 2  | REL99 | 9262    | 1852.4  | 4136         | 4747           |
|         |       | 9400    | 1880    | 4111         | 4700           |
|         |       | 9538    | 1907.6  | 4101         | 4673           |
|         | HSDPA | 9262    | 1852.4  | 4145         | 4707           |
|         |       | 9400    | 1880    | 4088         | 4599           |
|         |       | 9538    | 1907.6  | 4098         | 4701           |

## 10.1.2. OCCUPIED BANDWIDTH PLOTS





## **10.2. BAND EDGE EMISSIONS**

### **RULE PART(S)**

FCC: §22.359, §24.238

### **LIMITS**

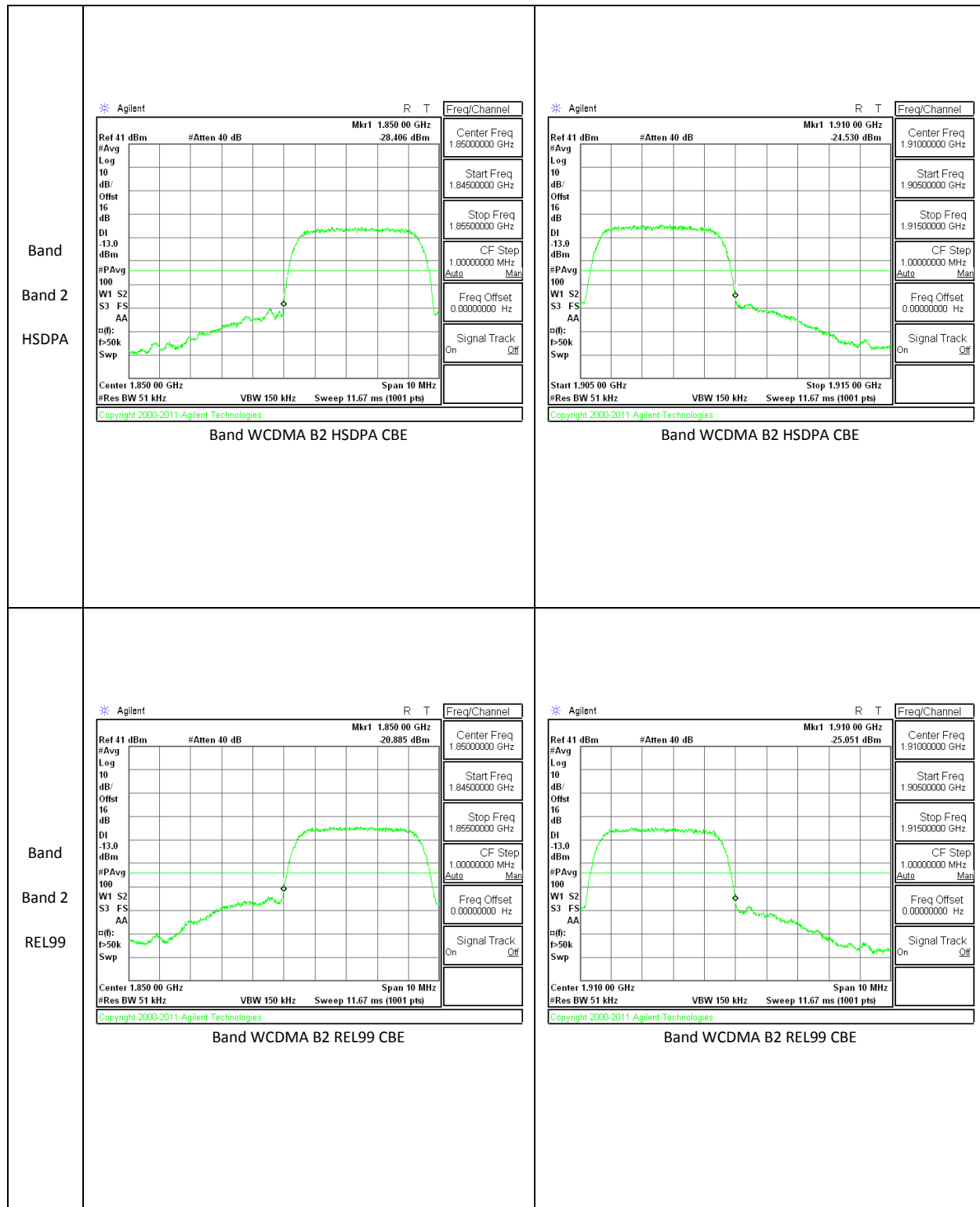
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

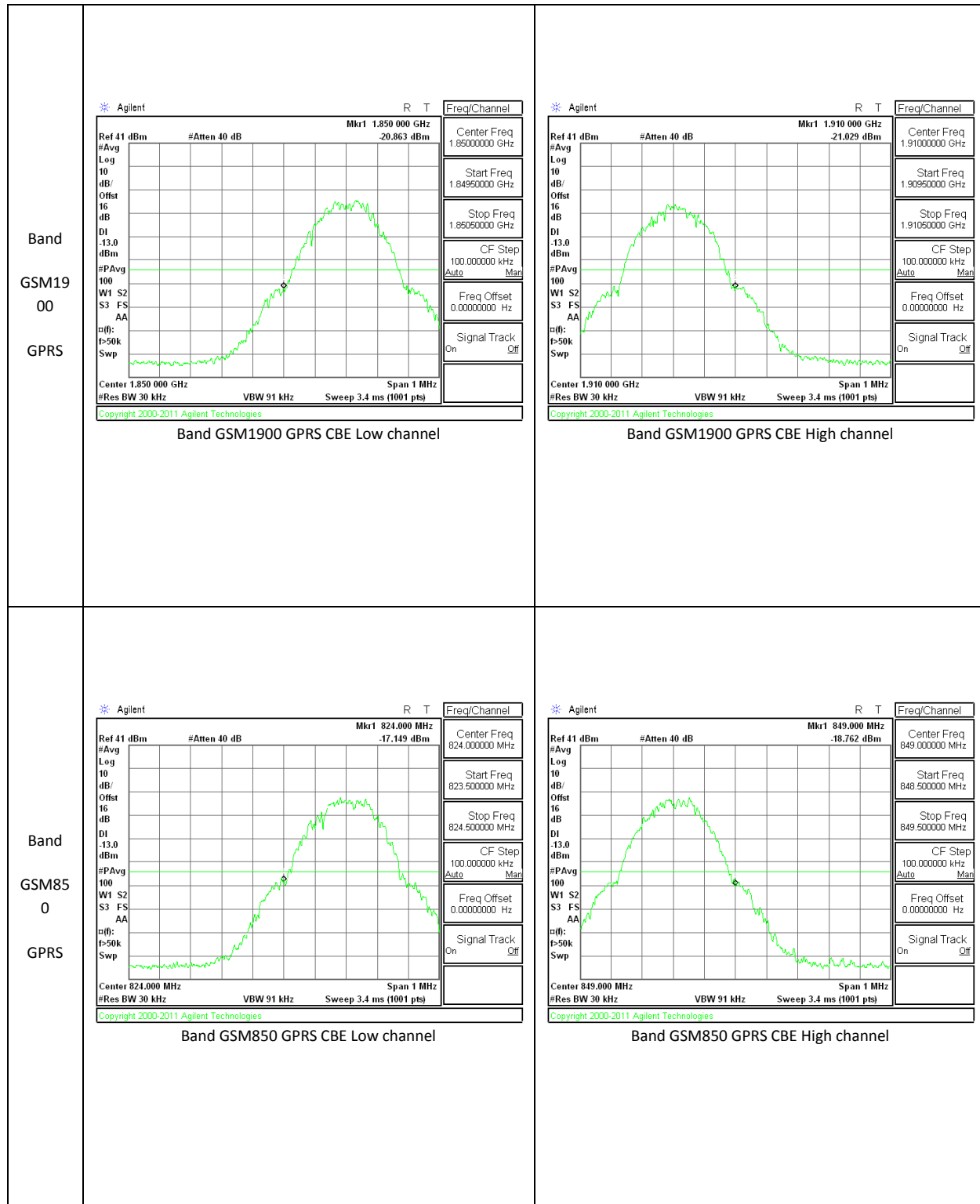
### **TEST PROCEDURE**

Per KDB 971168 D01 Power Meas License Digital Systems v02r01

The transmitter output was connected to an Agilent 8960 or a CMW500 Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

### **RESULTS**

**10.2.1. BAND EDGE PLOTS**



### **10.3. OUT OF BAND EMISSIONS**

#### **RULE PART(S)**

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

#### **LIMITS**

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

#### **TEST PROCEDURE**

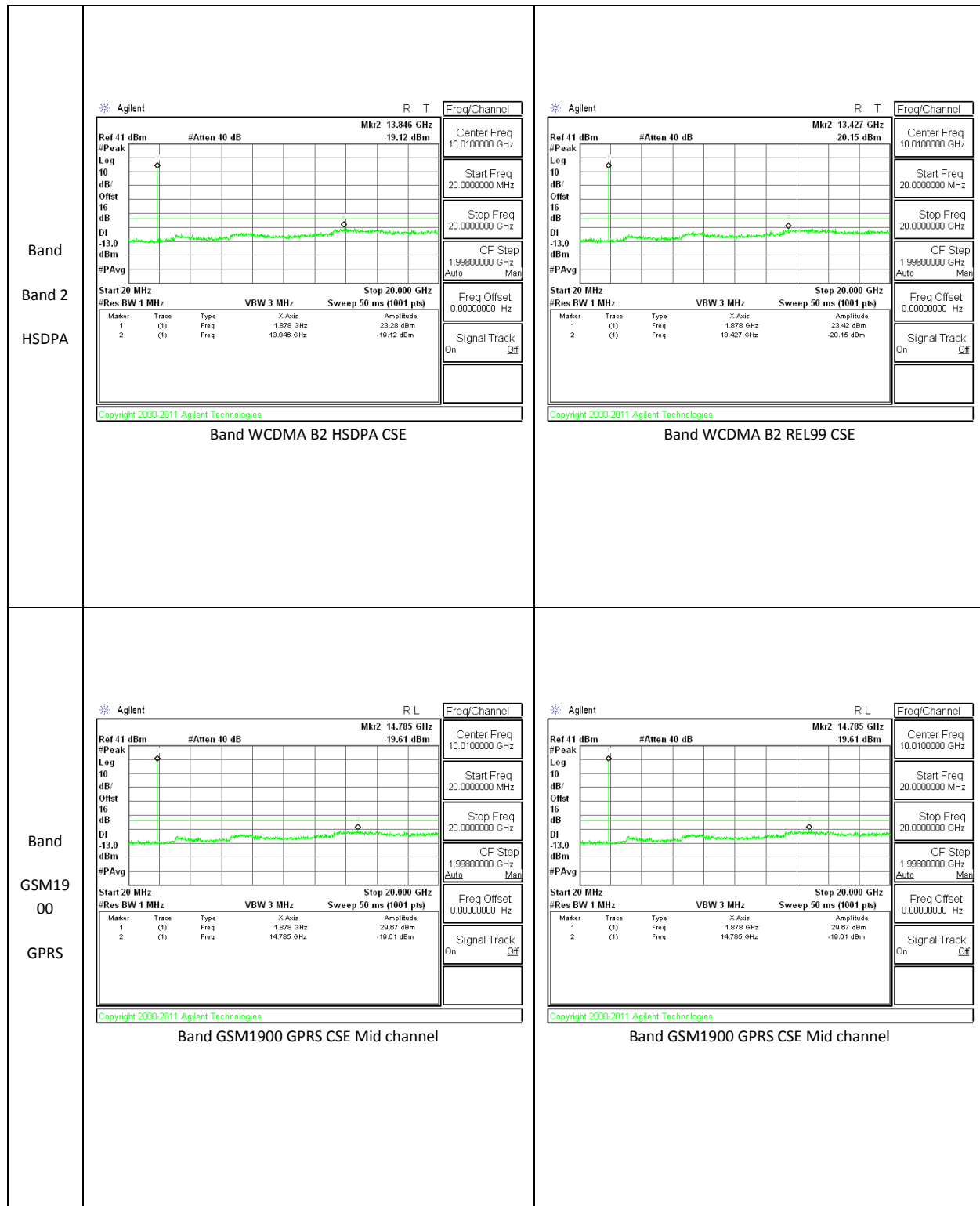
Per KDB 971168 D01 Power Meas License Digital Systems v02r01

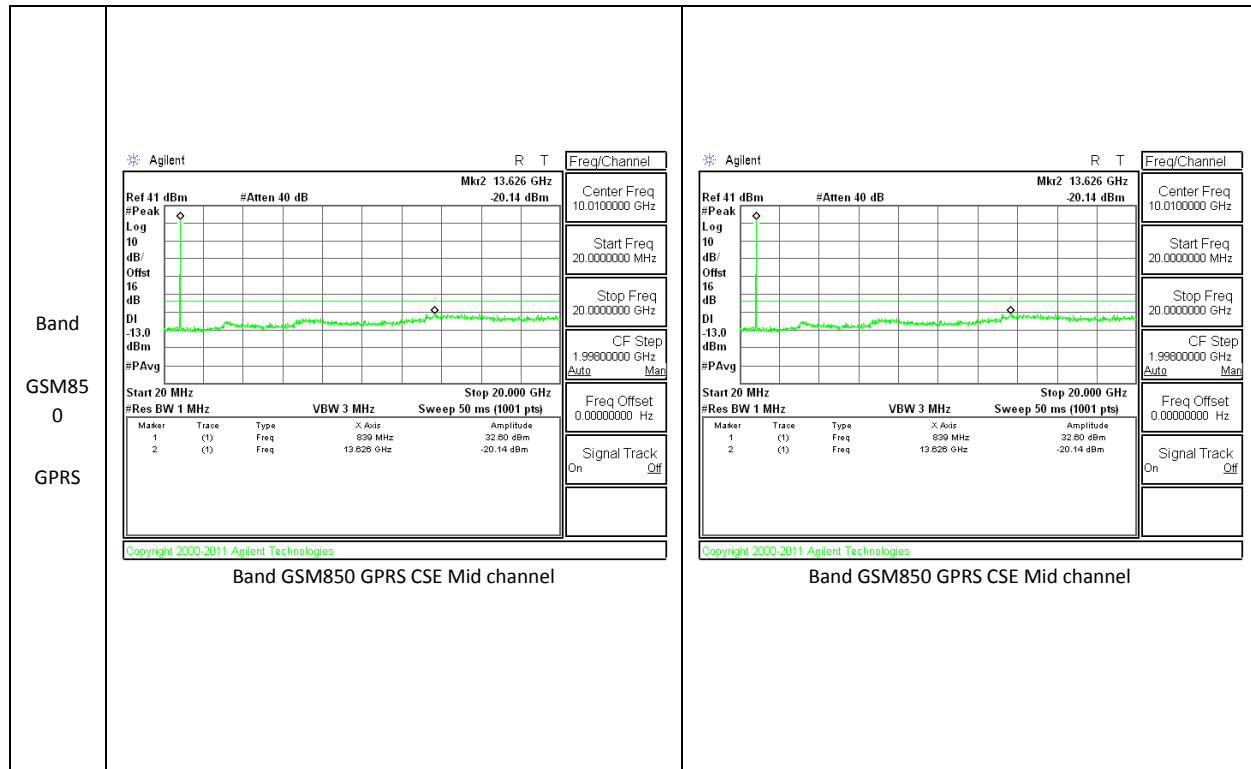
The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case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

#### **RESULTS**

**10.3.1. OUT OF BAND EMISSIONS RESULT**

| Band    | Mode  | f (MHz) | Spur (dBm) | Spec (dBm) | Delta (dB) |
|---------|-------|---------|------------|------------|------------|
| GSM850  | GPRS  | 824.2   | -20.25     | -13        | -7.25      |
|         |       | 836.6   | -20.14     | -13        | -7.14      |
|         |       | 848.8   | -19.4      | -13        | -6.4       |
| GSM1900 | GPRS  | 1850.2  | -19.39     | -13        | -6.39      |
|         |       | 1880    | -19.61     | -13        | -6.61      |
|         |       | 1909.8  | -19.56     | -13        | -6.56      |
| Band 2  | REL99 | 1852.4  | -18.4      | -13        | -5.4       |
|         |       | 1880    | -20.15     | -13        | -7.15      |
|         |       | 1907.6  | -20.18     | -13        | -7.18      |
|         | HSDPA | 1852.4  | -20.24     | -13        | -7.24      |
|         |       | 1880    | -19.12     | -13        | -6.12      |
|         |       | 1907.6  | -19.67     | -13        | -6.67      |

**10.3.2. OUT OF BAND EMISSIONS PLOTS**



## **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  $\pm 2.5$  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

### **RESULTS**

See the following pages.

# 10.4.1. FREQUENCY STABILITY RESULTS

## CELL, GPRS MODULATION – MID CHANNEL

| Reference Frequency: Cellular Mid Channel 836.599989MHz @ 20°C<br>Limit: to stay +/- 2.5 ppm = 2091.500 Hz |                                 |                                               |             |             |
|------------------------------------------------------------------------------------------------------------|---------------------------------|-----------------------------------------------|-------------|-------------|
| Power Supply<br>(Vdc)                                                                                      | Environment<br>Temperature (°C) | Frequency Deviation Measured with Time Elapse |             |             |
|                                                                                                            |                                 | (MHz)                                         | Delta (ppm) | Limit (ppm) |
| 3.80                                                                                                       | 50                              | 836.599985                                    | 0.005       | 2.5         |
| 3.80                                                                                                       | 40                              | 836.599990                                    | -0.001      | 2.5         |
| 3.80                                                                                                       | 30                              | 836.599987                                    | 0.002       | 2.5         |
| <b>3.80</b>                                                                                                | <b>20</b>                       | <b>836.599989</b>                             | <b>0</b>    | <b>2.5</b>  |
| 3.80                                                                                                       | 10                              | 836.599991                                    | -0.002      | 2.5         |
| 3.80                                                                                                       | 0                               | 836.599993                                    | -0.005      | 2.5         |
| 3.80                                                                                                       | -10                             | 836.599996                                    | -0.008      | 2.5         |
| 3.80                                                                                                       | -20                             | 836.599987                                    | 0.002       | 2.5         |
| 3.80                                                                                                       | -30                             | 836.599985                                    | 0.005       | 2.5         |

| Reference Frequency: Cellular Mid Channel 836.599989MHz @ 20°C<br>Limit: to stay +/- 2.5 ppm = 2091.500 Hz |                                 |                                               |             |             |
|------------------------------------------------------------------------------------------------------------|---------------------------------|-----------------------------------------------|-------------|-------------|
| Power Supply<br>(Vdc)                                                                                      | Environment<br>Temperature (°C) | Frequency Deviation Measured with Time Elapse |             |             |
|                                                                                                            |                                 | (MHz)                                         | Delta (ppm) | Limit (ppm) |
| <b>3.80</b>                                                                                                | <b>20</b>                       | <b>836.599989</b>                             | <b>0</b>    | <b>2.5</b>  |
| 4.30                                                                                                       | 20                              | 836.599981                                    | 0.010       | 2.5         |
| 3.30                                                                                                       | 20                              | 836.599993                                    | -0.005      | 2.5         |

## PCS, GPRS MODULATION – MID CHANNEL

| Reference Frequency: PCS Mid Channel 1879.999983MHz @ 20°C<br>Limit: within the authorized block or +/- 2.5 ppm = 4700.000 Hz |                                 |                                               |             |             |
|-------------------------------------------------------------------------------------------------------------------------------|---------------------------------|-----------------------------------------------|-------------|-------------|
| Power Supply<br>(Vdc)                                                                                                         | Environment<br>Temperature (°C) | Frequency Deviation Measured with Time Elapse |             |             |
|                                                                                                                               |                                 | (MHz)                                         | Delta (ppm) | Limit (ppm) |
| 3.80                                                                                                                          | 50                              | 1879.999986                                   | -0.002      | 2.5         |
| 3.80                                                                                                                          | 40                              | 1879.999985                                   | -0.001      | 2.5         |
| 3.80                                                                                                                          | 30                              | 1879.999987                                   | -0.002      | 2.5         |
| <b>3.80</b>                                                                                                                   | <b>20</b>                       | <b>1879.999983</b>                            | <b>0</b>    | <b>2.5</b>  |
| 3.80                                                                                                                          | 10                              | 1879.999989                                   | -0.003      | 2.5         |
| 3.80                                                                                                                          | 0                               | 1879.999982                                   | 0.001       | 2.5         |
| 3.80                                                                                                                          | -10                             | 1879.999989                                   | -0.003      | 2.5         |
| 3.80                                                                                                                          | -20                             | 1879.999981                                   | 0.001       | 2.5         |
| 3.80                                                                                                                          | -30                             | 1879.999975                                   | 0.004       | 2.5         |

| Reference Frequency: PCS Mid Channel 1879.999983 MHz @ 20°C<br>Limit: within the authorized block or +/- 2.5 ppm = 4700.000 Hz |                                 |                                               |                |             |
|--------------------------------------------------------------------------------------------------------------------------------|---------------------------------|-----------------------------------------------|----------------|-------------|
| Power Supply<br>(Vdc)                                                                                                          | Environment<br>Temperature (°C) | Frequency Deviation Measured with Time Elapse |                |             |
|                                                                                                                                |                                 | (MHz)                                         | Delta (ppm)    | Limit (ppm) |
| <b>3.80</b>                                                                                                                    | <b>20</b>                       | <b>1879.999983</b>                            | <b>0.00000</b> | <b>2.5</b>  |
| 4.20                                                                                                                           | 20                              | 1879.999980                                   | 0.00160        | 2.5         |
| 3.30                                                                                                                           | 20                              | 1879.999984                                   | -0.00053       | 2.5         |

## 11. RADIATED TEST RESULTS

### 11.1. RADIATED POWER (ERP & EIRP)

#### RULE PART(S)

FCC: §2.1046, §22.913, §24.2327.

#### LIMITS

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

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

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

#### TEST PROCEDURE

ANSI / TIA / EIA 603C Clause 2.2.17

#### TEST RESULTS

##### 11.1.1. ERP/EIRP Results

| Band   | Mode  | Channel | f(MHz) | ERP / EIRP |        |
|--------|-------|---------|--------|------------|--------|
|        |       |         |        | dBm        | mW     |
| Band 2 | REL99 | 9262    | 1852.4 | 22.7125    | 186.75 |
|        |       | 9400    | 1880   | 21.7228    | 148.69 |
|        |       | 9538    | 1907.6 | 22.3249    | 170.8  |
|        | HSDPA | 9262    | 1852.4 | 21.2285    | 132.69 |
|        |       | 9400    | 1880   | 21.9248    | 155.77 |
|        |       | 9538    | 1907.6 | 21.0789    | 128.2  |

| Band    | Mode | Channel | f(MHz) | ERP / EIRP |         |
|---------|------|---------|--------|------------|---------|
|         |      |         |        | dBm        | mW      |
| GSM1900 | GPRS | 512     | 1850.2 | 30.6415    | 1159.18 |
|         |      | 661     | 1880   | 30.1188    | 1027.73 |
|         |      | 810     | 1909.8 | 30.1739    | 1040.85 |

| Band   | Mode | Channel | f(MHz) | ERP / EIRP |        |
|--------|------|---------|--------|------------|--------|
|        |      |         |        | dBm        | mW     |
| GSM850 | GPRS | 128     | 824.2  | 27.762     | 597.31 |
|        |      | 190     | 836.6  | 28.47      | 703.07 |
|        |      | 251     | 848.8  | 28.394     | 690.88 |

## 11.1.2. ERP/EIRP DATA

|                                      |                                                                                                     |                             |                            |                            |                               |                       |                        |                        |              |
|--------------------------------------|-----------------------------------------------------------------------------------------------------|-----------------------------|----------------------------|----------------------------|-------------------------------|-----------------------|------------------------|------------------------|--------------|
| Band<br><br>Band 2<br><br>HSDPA      | <b>High Frequency Fundamental Measurement</b><br><b>Compliance Certification Services Chamber E</b> |                             |                            |                            |                               |                       |                        |                        |              |
|                                      | <b>Company:</b>                                                                                     |                             | Samsung                    |                            |                               |                       |                        |                        |              |
|                                      | <b>Project #:</b>                                                                                   |                             | 14I17924                   |                            |                               |                       |                        |                        |              |
|                                      | <b>Date:</b>                                                                                        |                             | 06/02/14                   |                            |                               |                       |                        |                        |              |
|                                      | <b>Test Engineer:</b>                                                                               |                             | O. Stoelting               |                            |                               |                       |                        |                        |              |
|                                      | <b>Configuration:</b>                                                                               |                             | EUT ONLY, X Position       |                            |                               |                       |                        |                        |              |
|                                      | <b>Mode:</b>                                                                                        |                             | WCDMA_1900 MHz_HSDPA       |                            |                               |                       |                        |                        |              |
|                                      | <b>Test Equipment:</b>                                                                              |                             |                            |                            |                               |                       |                        |                        |              |
|                                      | Receiving: T346, and Chamber E SMA Cables                                                           |                             |                            |                            |                               |                       |                        |                        |              |
|                                      | Substitution: Horn T59 Substitution, 16ft SMA Cable (247217006) Warehouse                           |                             |                            |                            |                               |                       |                        |                        |              |
|                                      | <b>f<br/>MHz</b>                                                                                    | <b>SG reading<br/>(dBm)</b> | <b>Ant. Pol.<br/>(H/V)</b> | <b>Cable Loss<br/>(dB)</b> | <b>Antenna Gain<br/>(dBi)</b> | <b>EIRP<br/>(dBm)</b> | <b>Limit<br/>(dBm)</b> | <b>Margin<br/>(dB)</b> | <b>Notes</b> |
|                                      | Low Ch                                                                                              |                             |                            |                            |                               |                       |                        |                        |              |
|                                      | 1852.40                                                                                             | 13.37                       | V                          | 0.85                       | 7.89                          | 20.41                 | 33.0                   | -12.6                  |              |
|                                      | 1852.40                                                                                             | 14.19                       | H                          | 0.85                       | 7.89                          | 21.23                 | 33.0                   | -11.8                  |              |
|                                      | Mid Ch                                                                                              |                             |                            |                            |                               |                       |                        |                        |              |
|                                      | 1880.00                                                                                             | 13.33                       | V                          | 0.85                       | 7.87                          | 20.34                 | 33.0                   | -12.7                  |              |
|                                      | 1880.00                                                                                             | 14.91                       | H                          | 0.85                       | 7.87                          | 21.92                 | 33.0                   | -11.1                  |              |
|                                      | High Ch                                                                                             |                             |                            |                            |                               |                       |                        |                        |              |
|                                      | 1907.60                                                                                             | 12.55                       | V                          | 0.85                       | 7.88                          | 19.58                 | 33.0                   | -13.4                  |              |
|                                      | 1907.60                                                                                             | 14.05                       | H                          | 0.85                       | 7.88                          | 21.08                 | 33.0                   | -11.9                  |              |
| Rev. 3.17.11                         |                                                                                                     |                             |                            |                            |                               |                       |                        |                        |              |
| Note: For Band 4 EIRP limit is 30dBm |                                                                                                     |                             |                            |                            |                               |                       |                        |                        |              |

| Band<br><br>Band 2<br><br>REL99 | <div style="text-align: center; border: 1px solid black; margin-bottom: 10px; padding: 5px;"> <b>High Frequency Fundamental Measurement<br/>Compliance Certification Services Chamber A</b> </div> <p> <b>Company:</b> Samsung<br/> <b>Project #:</b> 14I17924<br/> <b>Date:</b> 06/02/14<br/> <b>Test Engineer:</b> O. Stoelting<br/> <b>Configuration:</b> EUT ONLY, X Position<br/> <b>Mode:</b> WCDMA_1900 MHz_Rel 99         </p> <p> <b>Test Equipment:</b><br/> <b>Receiving:</b> T346, and Chamber E SMA Cables<br/> <b>Substitution:</b> Horn T59 Substitution, 16ft SMA Cable (247217006) Warehouse         </p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>f<br/>MHz</th> <th>SG reading<br/>(dBm)</th> <th>Ant. Pol.<br/>(H/V)</th> <th>Cable Loss<br/>(dB)</th> <th>Antenna Gain<br/>(dBi)</th> <th>EIRP<br/>(dBm)</th> <th>Limit<br/>(dBm)</th> <th>Margin<br/>(dB)</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td colspan="9"><b>Low Ch</b></td> </tr> <tr> <td>1852.40</td> <td>14.59</td> <td>V</td> <td>0.85</td> <td>7.89</td> <td>21.63</td> <td>33.0</td> <td>-11.4</td> <td></td> </tr> <tr> <td>1852.40</td> <td>15.67</td> <td>H</td> <td>0.85</td> <td>7.89</td> <td>22.71</td> <td>33.0</td> <td>-10.3</td> <td></td> </tr> <tr> <td colspan="9"><b>Mid Ch</b></td> </tr> <tr> <td>1880.00</td> <td>14.21</td> <td>V</td> <td>0.85</td> <td>7.87</td> <td>21.23</td> <td>33.0</td> <td>-11.8</td> <td></td> </tr> <tr> <td>1880.00</td> <td>14.70</td> <td>H</td> <td>0.85</td> <td>7.87</td> <td>21.72</td> <td>33.0</td> <td>-11.3</td> <td></td> </tr> <tr> <td colspan="9"><b>High Ch</b></td> </tr> <tr> <td>1907.60</td> <td>14.45</td> <td>V</td> <td>0.85</td> <td>7.88</td> <td>21.49</td> <td>33.0</td> <td>-11.5</td> <td></td> </tr> <tr> <td>1907.60</td> <td>15.29</td> <td>H</td> <td>0.85</td> <td>7.88</td> <td>22.32</td> <td>33.0</td> <td>-10.7</td> <td></td> </tr> </tbody> </table> <p>           Rev. 3.17.11<br/>           Note: For Band 4 EIRP limit is 30dBm         </p> | f<br>MHz           | SG reading<br>(dBm) | Ant. Pol.<br>(H/V)    | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm)  | Limit<br>(dBm) | Margin<br>(dB) | Notes | <b>Low Ch</b> |  |  |  |  |  |  |  |  | 1852.40 | 14.59 | V | 0.85 | 7.89 | 21.63 | 33.0 | -11.4 |  | 1852.40 | 15.67 | H | 0.85 | 7.89 | 22.71 | 33.0 | -10.3 |  | <b>Mid Ch</b> |  |  |  |  |  |  |  |  | 1880.00 | 14.21 | V | 0.85 | 7.87 | 21.23 | 33.0 | -11.8 |  | 1880.00 | 14.70 | H | 0.85 | 7.87 | 21.72 | 33.0 | -11.3 |  | <b>High Ch</b> |  |  |  |  |  |  |  |  | 1907.60 | 14.45 | V | 0.85 | 7.88 | 21.49 | 33.0 | -11.5 |  | 1907.60 | 15.29 | H | 0.85 | 7.88 | 22.32 | 33.0 | -10.7 |  |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------------|-----------------------|--------------------|-----------------------|----------------|----------------|----------------|-------|---------------|--|--|--|--|--|--|--|--|---------|-------|---|------|------|-------|------|-------|--|---------|-------|---|------|------|-------|------|-------|--|---------------|--|--|--|--|--|--|--|--|---------|-------|---|------|------|-------|------|-------|--|---------|-------|---|------|------|-------|------|-------|--|----------------|--|--|--|--|--|--|--|--|---------|-------|---|------|------|-------|------|-------|--|---------|-------|---|------|------|-------|------|-------|--|
| f<br>MHz                        | SG reading<br>(dBm)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB)  | Antenna Gain<br>(dBi) | EIRP<br>(dBm)      | Limit<br>(dBm)        | Margin<br>(dB) | Notes          |                |       |               |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |               |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |                |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |
| <b>Low Ch</b>                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |                     |                       |                    |                       |                |                |                |       |               |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |               |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |                |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |
| 1852.40                         | 14.59                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | V                  | 0.85                | 7.89                  | 21.63              | 33.0                  | -11.4          |                |                |       |               |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |               |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |                |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |
| 1852.40                         | 15.67                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | H                  | 0.85                | 7.89                  | 22.71              | 33.0                  | -10.3          |                |                |       |               |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |               |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |                |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |
| <b>Mid Ch</b>                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |                     |                       |                    |                       |                |                |                |       |               |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |               |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |                |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |
| 1880.00                         | 14.21                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | V                  | 0.85                | 7.87                  | 21.23              | 33.0                  | -11.8          |                |                |       |               |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |               |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |                |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |
| 1880.00                         | 14.70                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | H                  | 0.85                | 7.87                  | 21.72              | 33.0                  | -11.3          |                |                |       |               |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |               |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |                |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |
| <b>High Ch</b>                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |                     |                       |                    |                       |                |                |                |       |               |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |               |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |                |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |
| 1907.60                         | 14.45                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | V                  | 0.85                | 7.88                  | 21.49              | 33.0                  | -11.5          |                |                |       |               |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |               |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |                |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |
| 1907.60                         | 15.29                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | H                  | 0.85                | 7.88                  | 22.32              | 33.0                  | -10.7          |                |                |       |               |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |               |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |                |  |  |  |  |  |  |  |  |         |       |   |      |      |       |      |       |  |         |       |   |      |      |       |      |       |  |

Band

GSM19

00

GPRS

High Frequency Fundamental Measurement  
Compliance Certification Services Chamber E

Company: Samsung  
Project #: 14I17924  
Date: 06/02/14  
Test Engineer: O. Stoelting  
Configuration: EUT ONLY, X Position  
Mode: GPRS 1900MHz

Test Equipment:  
Receiving: T346, and Chamber E SMA Cables  
Substitution: Horn T59 Substitution, 16ft SMA Cable (247217006) Warehouse

| f<br>GHz | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Cable Loss<br>(dB) | Antenna Gain<br>(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
|----------|---------------------|--------------------|--------------------|-----------------------|---------------|----------------|---------------|-------|
| Low Ch   |                     |                    |                    |                       |               |                |               |       |
| 1.850    | 22.6                | V                  | 0.85               | 7.89                  | 29.68         | 33.0           | -3.3          |       |
| 1.850    | 23.6                | H                  | 0.85               | 7.89                  | 30.64         | 33.0           | -2.4          |       |
| Mid Ch   |                     |                    |                    |                       |               |                |               |       |
| 1.880    | 22.2                | V                  | 0.85               | 7.87                  | 29.21         | 33.0           | -3.8          |       |
| 1.880    | 23.1                | H                  | 0.85               | 7.87                  | 30.12         | 33.0           | -2.9          |       |
| High Ch  |                     |                    |                    |                       |               |                |               |       |
| 1.910    | 21.5                | V                  | 0.85               | 7.88                  | 28.49         | 33.0           | -4.5          |       |
| 1.910    | 23.1                | H                  | 0.85               | 7.88                  | 30.17         | 33.0           | -2.8          |       |

Rev. 3.17.11

|                                |                                                                                                |                             |                            |                            |                               |                      |                        |                        |              |
|--------------------------------|------------------------------------------------------------------------------------------------|-----------------------------|----------------------------|----------------------------|-------------------------------|----------------------|------------------------|------------------------|--------------|
| Band<br><br>GSM850<br><br>GPRS | <b>High Frequency Substitution Measurement<br/>Compliance Certification Services Chamber D</b> |                             |                            |                            |                               |                      |                        |                        |              |
|                                | <b>Company:</b>                                                                                |                             | Samsung                    |                            |                               |                      |                        |                        |              |
|                                | <b>Project #:</b>                                                                              |                             | 14I17924                   |                            |                               |                      |                        |                        |              |
|                                | <b>Date:</b>                                                                                   |                             | 06/02/14                   |                            |                               |                      |                        |                        |              |
|                                | <b>Test Engineer:</b>                                                                          |                             | O. Stoelting               |                            |                               |                      |                        |                        |              |
|                                | <b>Configuration:</b>                                                                          |                             | EUT ONLY, X Position       |                            |                               |                      |                        |                        |              |
|                                | <b>Mode:</b>                                                                                   |                             | GRPS 850MHz                |                            |                               |                      |                        |                        |              |
|                                | <b>Test Equipment:</b>                                                                         |                             |                            |                            |                               |                      |                        |                        |              |
|                                | Receiving: Horn T59, and Chamber E SMA Cables                                                  |                             |                            |                            |                               |                      |                        |                        |              |
|                                | Substitution: Dipole T416, 22ft SMA Cable                                                      |                             |                            |                            |                               |                      |                        |                        |              |
|                                | <b>f<br/>MHz</b>                                                                               | <b>SG reading<br/>(dBm)</b> | <b>Ant. Pol.<br/>(H/V)</b> | <b>Cable Loss<br/>(dB)</b> | <b>Antenna Gain<br/>(dBd)</b> | <b>ERP<br/>(dBm)</b> | <b>Limit<br/>(dBm)</b> | <b>Margin<br/>(dB)</b> | <b>Notes</b> |
|                                | Low Ch                                                                                         |                             |                            |                            |                               |                      |                        |                        |              |
|                                | 824.20                                                                                         | 20.95                       | V                          | 0.9                        | 0.0                           | 20.05                | 38.5                   | -18.4                  |              |
|                                | 824.20                                                                                         | 28.66                       | H                          | 0.9                        | 0.0                           | 27.76                | 38.5                   | -10.7                  |              |
|                                | Mid Ch                                                                                         |                             |                            |                            |                               |                      |                        |                        |              |
|                                | 836.60                                                                                         | 21.40                       | V                          | 0.9                        | 0.0                           | 20.50                | 38.5                   | -18.0                  |              |
|                                | 836.60                                                                                         | 29.37                       | H                          | 0.9                        | 0.0                           | 28.47                | 38.5                   | -10.0                  |              |
|                                | High Ch                                                                                        |                             |                            |                            |                               |                      |                        |                        |              |
|                                | 848.80                                                                                         | 21.41                       | V                          | 0.9                        | 0.0                           | 20.51                | 38.5                   | -17.9                  |              |
|                                | 848.80                                                                                         | 29.29                       | H                          | 0.9                        | 0.0                           | 28.39                | 38.5                   | -10.1                  |              |
|                                | Rev. 3.17.11                                                                                   |                             |                            |                            |                               |                      |                        |                        |              |

## **11.2. FIELD STRENGTH OF SPURIOUS RADIATION**

### **RULE PART(S)**

FCC: §2.1053, §22.917, §24.238

### **LIMIT**

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

### **TEST PROCEDURE**

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

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

### **RESULTS**

## 11.2.1. SPURIOUS RADIATION DATA

| Compliance Certification Services<br>Above 1GHz High Frequency Substitution Measurement |                     |                               |                 |                |                |               |                |               |       |
|-----------------------------------------------------------------------------------------|---------------------|-------------------------------|-----------------|----------------|----------------|---------------|----------------|---------------|-------|
| <b>Company:</b>                                                                         |                     | Samsung                       |                 |                |                |               |                |               |       |
| <b>Project #:</b>                                                                       |                     | 14I17924                      |                 |                |                |               |                |               |       |
| <b>Date:</b>                                                                            |                     | 06/02/14                      |                 |                |                |               |                |               |       |
| <b>Test Engineer:</b>                                                                   |                     | O. Stoelting                  |                 |                |                |               |                |               |       |
| <b>Configuration:</b>                                                                   |                     | X-pos. EUT w/ ac charger & HS |                 |                |                |               |                |               |       |
| <b>Mode:</b>                                                                            |                     | HSDPA_HARM_ 1900MHz           |                 |                |                |               |                |               |       |
| <b>Chamber</b>                                                                          |                     | <b>Pre-amplifier</b>          |                 | <b>Filter</b>  |                | <b>Limit</b>  |                |               |       |
| 5m Chamber A                                                                            |                     | T34 8449B                     |                 | Filter 1       |                | Part 24       |                |               |       |
| f<br>GHz                                                                                | SG reading<br>(dBm) | Ant. Pol.<br>(H/V)            | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
| <b>Low Ch, 1852.4MHz</b>                                                                |                     |                               |                 |                |                |               |                |               |       |
| 3.705                                                                                   | -20.8               | V                             | 3.0             | 35.4           | 1.0            | -55.2         | -13.0          | -42.2         |       |
| 5.557                                                                                   | -16.3               | V                             | 3.0             | 34.7           | 1.0            | -50.0         | -13.0          | -37.0         |       |
| 7.409                                                                                   | -19.4               | V                             | 3.0             | 34.9           | 1.0            | -53.3         | -13.0          | -40.3         |       |
| 3.705                                                                                   | -23.0               | H                             | 3.0             | 35.4           | 1.0            | -57.4         | -13.0          | -44.4         |       |
| 5.557                                                                                   | -17.2               | H                             | 3.0             | 34.7           | 1.0            | -50.9         | -13.0          | -37.9         |       |
| 7.409                                                                                   | -18.4               | H                             | 3.0             | 34.9           | 1.0            | -52.4         | -13.0          | -39.4         |       |
| <b>Mid Ch, 1880MHz</b>                                                                  |                     |                               |                 |                |                |               |                |               |       |
| 3.760                                                                                   | -20.9               | V                             | 3.0             | 35.3           | 1.0            | -55.2         | -13.0          | -42.2         |       |
| 5.640                                                                                   | -18.7               | V                             | 3.0             | 34.7           | 1.0            | -52.5         | -13.0          | -39.5         |       |
| 7.520                                                                                   | -19.2               | V                             | 3.0             | 34.9           | 1.0            | -53.1         | -13.0          | -40.1         |       |
| 3.760                                                                                   | -21.7               | H                             | 3.0             | 35.3           | 1.0            | -56.1         | -13.0          | -43.1         |       |
| 5.640                                                                                   | -18.0               | H                             | 3.0             | 34.7           | 1.0            | -51.8         | -13.0          | -38.8         |       |
| 7.520                                                                                   | -17.8               | H                             | 3.0             | 34.9           | 1.0            | -51.7         | -13.0          | -38.7         |       |
| <b>High Ch, 1907.6MHz</b>                                                               |                     |                               |                 |                |                |               |                |               |       |
| 3.815                                                                                   | -19.6               | V                             | 3.0             | 35.3           | 1.0            | -53.8         | -13.0          | -40.8         |       |
| 5.723                                                                                   | -11.1               | V                             | 3.0             | 34.7           | 1.0            | -44.8         | -13.0          | -31.8         |       |
| 7.630                                                                                   | -18.7               | V                             | 3.0             | 34.9           | 1.0            | -52.6         | -13.0          | -39.6         |       |
| 3.815                                                                                   | -20.5               | H                             | 3.0             | 35.3           | 1.0            | -54.8         | -13.0          | -41.8         |       |
| 5.723                                                                                   | -15.1               | H                             | 3.0             | 34.7           | 1.0            | -48.8         | -13.0          | -35.8         |       |
| 7.630                                                                                   | -17.1               | H                             | 3.0             | 34.9           | 1.0            | -51.1         | -13.0          | -38.1         |       |
| Rev. 03.03.09                                                                           |                     |                               |                 |                |                |               |                |               |       |

| Compliance Certification Services<br>Above 1GHz High Frequency Substitution Measurement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                               |                    |                 |                |                |               |                |               |       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|--------------------|-----------------|----------------|----------------|---------------|----------------|---------------|-------|
| <b>Company:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Samsung                       |                    |                 |                |                |               |                |               |       |
| <b>Project #:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 14I17924                      |                    |                 |                |                |               |                |               |       |
| <b>Date:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 06/02/14                      |                    |                 |                |                |               |                |               |       |
| <b>Test Engineer:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | O. Stoelting                  |                    |                 |                |                |               |                |               |       |
| <b>Configuration:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | X-pos. EUT w/ ac charger & HS |                    |                 |                |                |               |                |               |       |
| <b>Mode:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Rel 99_HARM_ 1900MHz          |                    |                 |                |                |               |                |               |       |
| <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>Chamber</b><br/>5m Chamber A         </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>Pre-amplifier</b><br/>T34 8449B         </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>Filter</b><br/>Filter 1         </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>Limit</b><br/>Part 24         </div> </div> |                               |                    |                 |                |                |               |                |               |       |
| f<br>GHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | SG reading<br>(dBm)           | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
| <b>Low Ch, 1852.4MHz</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                               |                    |                 |                |                |               |                |               |       |
| 3.705                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -22.0                         | V                  | 3.0             | 35.4           | 1.0            | -56.3         | -13.0          | -43.3         |       |
| 5.557                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -2.0                          | V                  | 3.0             | 34.7           | 1.0            | -35.7         | -13.0          | -22.7         |       |
| 7.409                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -19.5                         | V                  | 3.0             | 34.9           | 1.0            | -53.4         | -13.0          | -40.4         |       |
| 3.705                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -21.1                         | H                  | 3.0             | 35.4           | 1.0            | -55.5         | -13.0          | -42.5         |       |
| 5.557                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -13.5                         | H                  | 3.0             | 34.7           | 1.0            | -47.3         | -13.0          | -34.3         |       |
| 7.409                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -18.2                         | H                  | 3.0             | 34.9           | 1.0            | -52.1         | -13.0          | -39.1         |       |
| <b>Mid Ch, 1880MHz</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                               |                    |                 |                |                |               |                |               |       |
| 3.760                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -22.0                         | V                  | 3.0             | 35.3           | 1.0            | -56.3         | -13.0          | -43.3         |       |
| 5.640                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -12.1                         | V                  | 3.0             | 34.7           | 1.0            | -45.8         | -13.0          | -32.8         |       |
| 7.520                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -19.1                         | V                  | 3.0             | 34.9           | 1.0            | -53.1         | -13.0          | -40.1         |       |
| 3.760                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -14.6                         | H                  | 3.0             | 35.3           | 1.0            | -48.9         | -13.0          | -35.9         |       |
| 5.640                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -6.0                          | H                  | 3.0             | 34.7           | 1.0            | -39.7         | -13.0          | -26.7         |       |
| 7.520                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -17.6                         | H                  | 3.0             | 34.9           | 1.0            | -51.6         | -13.0          | -38.6         |       |
| <b>High Ch, 1907.6MHz</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                               |                    |                 |                |                |               |                |               |       |
| 3.815                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -14.6                         | V                  | 3.0             | 35.3           | 1.0            | -48.9         | -13.0          | -35.9         |       |
| 5.723                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -16.6                         | V                  | 3.0             | 34.7           | 1.0            | -50.3         | -13.0          | -37.3         |       |
| 7.630                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -16.7                         | V                  | 3.0             | 34.9           | 1.0            | -50.6         | -13.0          | -37.6         |       |
| 3.815                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -17.5                         | H                  | 3.0             | 35.3           | 1.0            | -51.8         | -13.0          | -38.8         |       |
| 5.723                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -13.1                         | H                  | 3.0             | 34.7           | 1.0            | -46.8         | -13.0          | -33.8         |       |
| 7.630                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -16.6                         | H                  | 3.0             | 34.9           | 1.0            | -50.5         | -13.0          | -37.5         |       |
| Rev. 03.03.09                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                               |                    |                 |                |                |               |                |               |       |

| Compliance Certification Services<br>Above 1GHz High Frequency Substitution Measurement |                            |                               |                    |                      |                |                |               |                |               |       |
|-----------------------------------------------------------------------------------------|----------------------------|-------------------------------|--------------------|----------------------|----------------|----------------|---------------|----------------|---------------|-------|
| <b>Company:</b>                                                                         |                            | Samsung                       |                    |                      |                |                |               |                |               |       |
| <b>Project #:</b>                                                                       |                            | 14I17924                      |                    |                      |                |                |               |                |               |       |
| <b>Date:</b>                                                                            |                            | 06/02/14                      |                    |                      |                |                |               |                |               |       |
| <b>Test Engineer:</b>                                                                   |                            | O. Stoelting                  |                    |                      |                |                |               |                |               |       |
| <b>Configuration:</b>                                                                   |                            | X-pos. EUT w/ ac charger & HS |                    |                      |                |                |               |                |               |       |
| <b>Mode:</b>                                                                            |                            | GPRS 1900                     |                    |                      |                |                |               |                |               |       |
|                                                                                         |                            | <b>Chamber</b>                |                    | <b>Pre-amplifier</b> |                | <b>Filter</b>  |               | <b>Limit</b>   |               |       |
|                                                                                         |                            | 5m Chamber A                  |                    | T343 8449B           |                | Filter 1       |               | Part 24        |               |       |
| Band                                                                                    | f<br>GHz                   | SG reading<br>(dBm)           | Ant. Pol.<br>(H/V) | Distance<br>(m)      | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
| GSM19<br>00<br><br>GPRS                                                                 | <b>Low Ch, 1850MHz</b>     |                               |                    |                      |                |                |               |                |               |       |
|                                                                                         | 3.700                      | -23.1                         | V                  | 3.0                  | 35.4           | 1.0            | -57.5         | -13.0          | -44.5         |       |
|                                                                                         | 5.550                      | -9.0                          | V                  | 3.0                  | 34.7           | 1.0            | -42.8         | -13.0          | -29.8         |       |
|                                                                                         | 7.400                      | -15.8                         | V                  | 3.0                  | 34.9           | 1.0            | -49.8         | -13.0          | -36.8         |       |
|                                                                                         | 3.700                      | -18.7                         | H                  | 3.0                  | 35.4           | 1.0            | -53.1         | -13.0          | -40.1         |       |
|                                                                                         | 5.550                      | -19.3                         | H                  | 3.0                  | 34.7           | 1.0            | -53.0         | -13.0          | -40.0         |       |
|                                                                                         | 7.400                      | -11.5                         | H                  | 3.0                  | 34.9           | 1.0            | -45.4         | -13.0          | -32.4         |       |
|                                                                                         | <b>Mid Ch, 1880.0MHz</b>   |                               |                    |                      |                |                |               |                |               |       |
|                                                                                         | 3.760                      | -18.3                         | V                  | 3.0                  | 35.3           | 1.0            | -52.6         | -13.0          | -39.6         |       |
|                                                                                         | 5.640                      | -9.8                          | V                  | 3.0                  | 34.7           | 1.0            | -43.5         | -13.0          | -30.5         |       |
|                                                                                         | 7.520                      | -13.0                         | V                  | 3.0                  | 34.9           | 1.0            | -46.9         | -13.0          | -33.9         |       |
|                                                                                         | 3.760                      | -17.2                         | H                  | 3.0                  | 35.3           | 1.0            | -51.5         | -13.0          | -38.5         |       |
|                                                                                         | 5.640                      | -17.1                         | H                  | 3.0                  | 34.7           | 1.0            | -50.8         | -13.0          | -37.8         |       |
|                                                                                         | 7.520                      | -11.2                         | H                  | 3.0                  | 34.9           | 1.0            | -45.2         | -13.0          | -32.2         |       |
|                                                                                         | <b>High Ch, 1909.8 MHz</b> |                               |                    |                      |                |                |               |                |               |       |
|                                                                                         | 3.820                      | -14.9                         | V                  | 3.0                  | 35.3           | 1.0            | -49.1         | -13.0          | -36.1         |       |
|                                                                                         | 5.729                      | -13.0                         | V                  | 3.0                  | 34.7           | 1.0            | -46.8         | -13.0          | -33.8         |       |
|                                                                                         | 7.639                      | -14.4                         | V                  | 3.0                  | 35.0           | 1.0            | -48.3         | -13.0          | -35.3         |       |
| 3.820                                                                                   | -20.7                      | H                             | 3.0                | 35.3                 | 1.0            | -55.0          | -13.0         | -42.0          |               |       |
| 5.729                                                                                   | -17.4                      | H                             | 3.0                | 34.7                 | 1.0            | -51.1          | -13.0         | -38.1          |               |       |
| 7.639                                                                                   | -14.4                      | H                             | 3.0                | 35.0                 | 1.0            | -48.4          | -13.0         | -35.4          |               |       |
| Rev. 03.03.09                                                                           |                            |                               |                    |                      |                |                |               |                |               |       |

| Compliance Certification Services<br>Above 1GHz High Frequency Substitution Measurement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                |                     |                    |                 |                |                |               |                |               |       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|---------------------|--------------------|-----------------|----------------|----------------|---------------|----------------|---------------|-------|
| <b>Company:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Samsung                        |                     |                    |                 |                |                |               |                |               |       |
| <b>Project #:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 14I17924                       |                     |                    |                 |                |                |               |                |               |       |
| <b>Date:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 06/02/14                       |                     |                    |                 |                |                |               |                |               |       |
| <b>Test Engineer:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | K.Kedida                       |                     |                    |                 |                |                |               |                |               |       |
| <b>Configuration:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | X Position EUT, AC Charger, HS |                     |                    |                 |                |                |               |                |               |       |
| <b>Mode:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | GPRS 850                       |                     |                    |                 |                |                |               |                |               |       |
| <div style="display: flex; justify-content: space-around; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px 5px; background-color: #e0f7fa;">Chamber</div> <div style="border: 1px solid black; padding: 2px 5px; background-color: #e0f7fa;">Pre-amplifier</div> <div style="border: 1px solid black; padding: 2px 5px; background-color: #e0f7fa;">Filter</div> <div style="border: 1px solid black; padding: 2px 5px; background-color: #e0f7fa;">Limit</div> </div> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px 5px; background-color: #e0f7fa;">5m Chamber B</div> <div style="border: 1px solid black; padding: 2px 5px; background-color: #e0f7fa;">T34 8449B</div> <div style="border: 1px solid black; padding: 2px 5px; background-color: #e0f7fa;">Filter 1</div> <div style="border: 1px solid black; padding: 2px 5px; background-color: #e0f7fa;">Part 22</div> </div> |                                |                     |                    |                 |                |                |               |                |               |       |
| Band                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | f<br>GHz                       | SG reading<br>(dBm) | Ant. Pol.<br>(H/V) | Distance<br>(m) | Preamp<br>(dB) | Filter<br>(dB) | EIRP<br>(dBm) | Limit<br>(dBm) | Delta<br>(dB) | Notes |
| GSM850<br><br>GPRS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Low Ch, 824.2MHz</b>        |                     |                    |                 |                |                |               |                |               |       |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1.648                          | -8.8                | V                  | 3.0             | 37.4           | 1.0            | -45.2         | -13.0          | -32.2         |       |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2.473                          | -21.9               | V                  | 3.0             | 36.4           | 1.0            | -57.3         | -13.0          | -44.3         |       |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 3.297                          | -20.6               | V                  | 3.0             | 35.8           | 1.0            | -55.4         | -13.0          | -42.4         |       |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1.648                          | -9.6                | H                  | 3.0             | 37.4           | 1.0            | -46.0         | -13.0          | -33.0         |       |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2.473                          | -17.7               | H                  | 3.0             | 36.4           | 1.0            | -53.1         | -13.0          | -40.1         |       |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 3.297                          | -20.3               | H                  | 3.0             | 35.8           | 1.0            | -55.1         | -13.0          | -42.1         |       |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>Mid Ch, 836.6MHz</b>        |                     |                    |                 |                |                |               |                |               |       |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1.673                          | -11.8               | V                  | 3.0             | 37.3           | 1.0            | -48.2         | -13.0          | -35.2         |       |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2.510                          | -22.4               | V                  | 3.0             | 36.4           | 1.0            | -57.8         | -13.0          | -44.8         |       |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 3.346                          | -20.4               | V                  | 3.0             | 35.8           | 1.0            | -55.1         | -13.0          | -42.1         |       |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1.673                          | -13.1               | H                  | 3.0             | 37.3           | 1.0            | -49.5         | -13.0          | -36.5         |       |
| 2.510                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | -14.4                          | H                   | 3.0                | 36.4            | 1.0            | -49.8          | -13.0         | -36.8          |               |       |
| 3.346                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | -20.3                          | H                   | 3.0                | 35.8            | 1.0            | -55.1          | -13.0         | -42.1          |               |       |
| <b>High Ch, 848.8MHz</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                |                     |                    |                 |                |                |               |                |               |       |
| 1.698                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | -8.1                           | V                   | 3.0                | 37.3            | 1.0            | -44.4          | -13.0         | -31.4          |               |       |
| 2.547                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | -19.5                          | V                   | 3.0                | 36.3            | 1.0            | -54.9          | -13.0         | -41.9          |               |       |
| 3.395                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | -19.7                          | V                   | 3.0                | 35.7            | 1.0            | -54.4          | -13.0         | -41.4          |               |       |
| 1.698                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | -5.6                           | H                   | 3.0                | 37.3            | 1.0            | -41.9          | -13.0         | -28.9          |               |       |
| 2.547                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | -16.1                          | H                   | 3.0                | 36.3            | 1.0            | -51.4          | -13.0         | -38.4          |               |       |
| 3.395                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | -19.6                          | H                   | 3.0                | 35.7            | 1.0            | -54.3          | -13.0         | -41.3          |               |       |
| Rev. 03.03.09<br>Note: No other emissions were detected above the system noise floor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                |                     |                    |                 |                |                |               |                |               |       |