



# TEST REPORT

**Test Report No. : UL-RPT-RP10295085JD02A V2.0**

**Manufacturer** : Sony Mobile Communications Inc.

**FCC ID** : PY7PM-0800

**Technology** : GSM850

**Test Standard(s)** : FCC Part 22

1. This test report shall not be reproduced in full or partial, without the written approval of UL VS LTD.
2. The results in this report apply only to the sample(s) tested.
3. The sample tested is in compliance with the above standard(s).
4. The test results in this report are traceable to the national or international standards.
5. Version 2.0 supersedes all previous versions.

**Date of Issue:** 01 August 2014

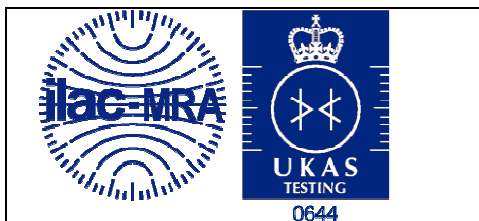
**Checked by:**

Sarah Williams  
Engineer, Radio Laboratory

**Issued by :**

pp

John Newell  
Group Quality Manager  
Basingstoke,  
UL VS LTD



This laboratory is accredited by UKAS.  
The tests reported herein have been  
performed in accordance with its' terms  
of accreditation.

---

## UL VS LTD

Pavilion A, Ashwood Park, Ashwood Way, Basingstoke, Hampshire, RG23 8BG, UK  
Telephone: +44 (0)1256 312000  
Facsimile: +44 (0)1256 312001

This page has been left intentionally blank.

**Table of Contents**

|                                                                    |           |
|--------------------------------------------------------------------|-----------|
| <b>1. Customer Information.....</b>                                | <b>4</b>  |
| <b>2. Summary of Testing.....</b>                                  | <b>5</b>  |
| 2.1. General Information                                           | 5         |
| 2.2. Summary of Test Results                                       | 5         |
| 2.3. Methods and Procedures                                        | 5         |
| 2.4. Deviations from the Test Specification                        | 5         |
| <b>3. Equipment Under Test (EUT) .....</b>                         | <b>6</b>  |
| 3.1. Identification of Equipment Under Test (EUT)                  | 6         |
| 3.2. Description of EUT                                            | 7         |
| 3.3. Modifications Incorporated in the EUT                         | 7         |
| 3.4. Additional Information Related to Testing                     | 8         |
| 3.5. Support Equipment                                             | 8         |
| <b>4. Operation and Monitoring of the EUT during Testing .....</b> | <b>9</b>  |
| 4.1. Operating Modes                                               | 9         |
| 4.2. Configuration and Peripherals                                 | 9         |
| <b>5. Measurements, Examinations and Derived Results.....</b>      | <b>10</b> |
| 5.1. General Comments                                              | 10        |
| 5.2. Test Results                                                  | 11        |
| 5.2.1. Transmitter Output Power (ERP)                              | 11        |
| 5.2.2. Transmitter Frequency Stability (Temperature Variation)     | 13        |
| 5.2.3. Transmitter Frequency Stability (Voltage Variation)         | 15        |
| 5.2.4. Transmitter Occupied Bandwidth                              | 16        |
| 5.2.5. Transmitter Out of Band Radiated Emissions                  | 21        |
| 5.2.6. Transmitter Radiated Emissions at Band Edges                | 24        |
| <b>6. Measurement Uncertainty .....</b>                            | <b>27</b> |
| <b>7. Report Revision History .....</b>                            | <b>28</b> |

**1. Customer Information**

|                      |                                                        |
|----------------------|--------------------------------------------------------|
| <b>Company Name:</b> | Sony Mobile Communications Inc.                        |
| <b>Address:</b>      | Nya Vattentornet Mobilvägen 10<br>Lund 22188<br>Sweden |

## **2. Summary of Testing**

### **2.1. General Information**

|                                 |                                                                                                                    |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------|
| <b>Specification Reference:</b> | 47CFR22                                                                                                            |
| <b>Specification Title:</b>     | Code of Federal Regulations Volume 47 (Telecommunications):<br>Part 22 Subpart H (Public Mobile Services)          |
| <b>Site Registration:</b>       | 209735                                                                                                             |
| <b>Location of Testing:</b>     | UL VS LTD, Unit 3 Horizon, Wade Road, Kingsland Business Park,<br>Basingstoke, Hampshire, RG24 8AH, United Kingdom |
| <b>Test Dates:</b>              | 03 June 2014 to 04 June 2014                                                                                       |

### **2.2. Summary of Test Results**

| <b>FCC Reference<br/>(47CFR)</b>                                                                                                                                                                                             | <b>Measurement</b>                                                     | <b>Result</b>                                                                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Part 22.913(a)(2)                                                                                                                                                                                                            | Transmitter Output Power (ERP)                                         |    |
| Part 2.1055/22.355                                                                                                                                                                                                           | Transmitter Frequency Stability<br>(Temperature and Voltage Variation) |    |
| Part 2.1049                                                                                                                                                                                                                  | Transmitter Occupied Bandwidth                                         |    |
| Part 2.1053/22.917                                                                                                                                                                                                           | Transmitter Out of Band Radiated Emissions                             |  |
| Part 2.1053/22.917                                                                                                                                                                                                           | Transmitter Band Edge Radiated Emissions                               |  |
| <b>Key to Results</b><br> = Complied  = Did not comply |                                                                        |                                                                                       |

### **2.3. Methods and Procedures**

|                   |                                                                              |
|-------------------|------------------------------------------------------------------------------|
| <b>Reference:</b> | ANSI/TIA-603-C-2004                                                          |
| <b>Title:</b>     | Land Mobile Communications Equipment, Measurements and performance Standards |
| <b>Reference:</b> | FCC KDB 971168 D01 v02r01, 7 June 2013                                       |
| <b>Title:</b>     | Measurement Guidance for Certification of Licensed Digital Transmitters      |

### **2.4. Deviations from the Test Specification**

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

### **3. Equipment Under Test (EUT)**

#### **3.1. Identification of Equipment Under Test (EUT)**

|                                   |                                            |
|-----------------------------------|--------------------------------------------|
| <b>Brand Name:</b>                | Sony                                       |
| <b>IMEI:</b>                      | 004402452705555 ( <i>Radiated sample</i> ) |
| <b>Test Sample Serial Number:</b> | CB5A1YYLUK                                 |
| <b>Hardware Version Number:</b>   | A                                          |
| <b>Software Version Number:</b>   | 23.0.A.0.204                               |
| <b>FCC ID:</b>                    | PY7PM-0800                                 |

|                                   |                                                             |
|-----------------------------------|-------------------------------------------------------------|
| <b>Brand Name:</b>                | Sony                                                        |
| <b>IMEI:</b>                      | 004402452706272 ( <i>Conducted sample with RF port #1</i> ) |
| <b>Test Sample Serial Number:</b> | CB5A1Z79SG                                                  |
| <b>Hardware Version Number:</b>   | A                                                           |
| <b>Software Version Number:</b>   | 23.0.A.0.204                                                |
| <b>FCC ID:</b>                    | PY7PM-0800                                                  |

|                                   |                                                             |
|-----------------------------------|-------------------------------------------------------------|
| <b>Brand Name:</b>                | Sony                                                        |
| <b>IMEI:</b>                      | 004402452706264 ( <i>Conducted sample with RF port #2</i> ) |
| <b>Test Sample Serial Number:</b> | CB5A1Z7PAA                                                  |
| <b>Hardware Version Number:</b>   | A                                                           |
| <b>Software Version Number:</b>   | 23.0.A.0.204                                                |
| <b>FCC ID:</b>                    | PY7PM-0800                                                  |

|                              |            |
|------------------------------|------------|
| <b>Brand Name:</b>           | Sony       |
| <b>Description:</b>          | AC Charger |
| <b>Model Name or Number:</b> | EP880      |

|                              |            |
|------------------------------|------------|
| <b>Brand Name:</b>           | Generic    |
| <b>Description:</b>          | MHL Cable  |
| <b>Model Name or Number:</b> | Not marked |

|                              |             |
|------------------------------|-------------|
| <b>Brand Name:</b>           | Sony        |
| <b>Description:</b>          | MHL Adaptor |
| <b>Model Name or Number:</b> | IM750       |

**Identification of Equipment Under Test (EUT) (continued)**

|                       |           |
|-----------------------|-----------|
| Brand Name:           | Sony      |
| Description:          | USB Cable |
| Model Name or Number: | EC803     |

|                       |           |
|-----------------------|-----------|
| Brand Name:           | Sony      |
| Description:          | Deskstand |
| Model Name or Number: | DK43      |

|                       |        |
|-----------------------|--------|
| Brand Name:           | Sony   |
| Description:          | PHF    |
| Model Name or Number: | MH410c |

**3.2. Description of EUT**

The equipment under test (EUT) was a GSM/WCDMA/LTE Phone + Bluetooth, DTS/UNII a/b/g/n/ac + NFC & ANT+.

**3.3. Modifications Incorporated in the EUT**

No modifications were applied to the EUT during testing.

**3.4. Additional Information Related to Testing**

|                              |                |                |                         |
|------------------------------|----------------|----------------|-------------------------|
| Technology Tested:           | GSM850         |                |                         |
| Type of Radio Device:        | Transceiver    |                |                         |
| Mode:                        | GSM/GPRS/EGPRS |                |                         |
| Modulation Type:             | GMSK / 8PSK    |                |                         |
| Channel Spacing:             | 200 kHz        |                |                         |
| Power Supply Requirement(s): | Nominal        | 3.8 V          |                         |
|                              | Minimum        | 3.42 V         |                         |
|                              | Maximum        | 4.18 V         |                         |
| Maximum Output Power (ERP):  | GSM            | 28.45 dBm      |                         |
|                              | GPRS           | 28.45 dBm      |                         |
|                              | EGPRS          | 26.15 dBm      |                         |
| Transmit Frequency Range:    | 824 to 849 MHz |                |                         |
| Transmit Channels Tested:    | Channel ID     | Channel Number | Channel Frequency (MHz) |
|                              | Bottom         | 128            | 824.2                   |
|                              | Middle         | 190            | 836.6                   |
|                              | Top            | 251            | 848.8                   |

**3.5. Support Equipment**

The following support equipment was used to exercise the EUT during testing:

|                              |                    |
|------------------------------|--------------------|
| <b>Description:</b>          | 2 GB Micro SD Card |
| <b>Brand Name:</b>           | SanDisk            |
| <b>Model Name or Number:</b> | Not marked         |

|                              |                                |
|------------------------------|--------------------------------|
| <b>Description:</b>          | 22" High Definition Television |
| <b>Brand Name:</b>           | Logik                          |
| <b>Model Name or Number:</b> | L22FE12A                       |
| <b>Serial Number:</b>        | 1309020661                     |

|                              |                       |
|------------------------------|-----------------------|
| <b>Description:</b>          | Voltage variation jig |
| <b>Brand Name:</b>           | Not marked            |
| <b>Model Name or Number:</b> | Not marked            |
| <b>Serial Number:</b>        | Not marked            |

## **4. Operation and Monitoring of the EUT during Testing**

### **4.1. Operating Modes**

The EUT was tested in the following operating mode(s):

- Constantly transmitting at full power on bottom, middle and top channels as required.
- Occupied bandwidth, ERP/EIRP and band edge tests were performed with the EUT in GSM single timeslot circuit switched and GPRS/EGPRS Multislot Class 33 with the unit transmitting on one timeslot in the uplink. The EUT output power was initially checked when transmitting at maximum power on one, two, three and four timeslots. The highest power was observed when transmitting on one timeslot.
- EGPRS tests were performed with the EUT using MCS5 (8PSK modulation).
- Transmitter radiated spurious emissions were checked in all modes during pre-scans. Circuit switched voice was found to be the worst case and all final measurements were performed with the EUT in this mode.

### **4.2. Configuration and Peripherals**

The EUT was tested in the following configuration(s):

- Connected to a GSM/GPRS/EGPRS system simulator, operating in transceiver mode.
- Transmitter radiated spurious emission tests were performed with the following configurations, employing all available accessories:
  - o Configuration 1 – Handset with the AC charger, USB Cable, MHL cable (terminated in to a television), MHL adaptor and PHF.
  - o Configuration 2 – Handset with the AC charger, USB Cable, Deskstand and PHF.

Pre-scans below 1 GHz were performed in both configurations 1 and 2, with final measurements limited to the configuration which provided worst case results. Pre-scans above 1 GHz were performed in the configuration that employed the most accessories (Configuration 1), with any final measurements being performed in both configurations.

- Testing at temperature and voltage extremes was performed using a voltage variation jig and adaptor supplied by the customer. The adaptor plugs onto the handset in place of the battery connector.
- The voltage variation jig and adaptor were used for conducted measurements set at the nominal voltage.
- The conducted sample with IMEI 004402452706264 was used for frequency stability measurements.
- The conducted sample with IMEI 004402452706272 was used for conducted power and occupied bandwidth measurements.
- The radiated sample with IMEI 004402452705555 was used for all radiated measurements.

## **5. Measurements, Examinations and Derived Results**

### **5.1. General Comments**

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to *Section 6. Measurement Uncertainty* for details.

In accordance with UKAS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

## **5.2. Test Results**

### **5.2.1. Transmitter Output Power (ERP)**

#### **Test Summary:**

|                   |                 |            |              |
|-------------------|-----------------|------------|--------------|
| Test Engineer:    | David Doyle     | Test Date: | 03 June 2014 |
| Test Sample IMEI: | 004402452706272 |            |              |

|                   |                                         |
|-------------------|-----------------------------------------|
| FCC Reference:    | Part 22.913(a)(2)                       |
| Test Method Used: | As detailed in KBD 971168 Section 5.1.1 |

#### **Environmental Conditions:**

|                        |    |
|------------------------|----|
| Temperature (°C):      | 26 |
| Relative Humidity (%): | 39 |

#### **Note(s):**

1. The signal analyser was connected to the RF port on the EUT using suitable attenuation and RF cable. An RF level offset was entered on the signal analyser to compensate for the loss of the attenuator and RF cable.
2. The customer stated a maximum antenna gain of -2.1 dBi. As the limit is an ERP limit, the gain in dBi has been converted to dBd. The dBd was calculated as:

$$-2.1 \text{ dBi} - 2.15 \text{ dB} = -4.25 \text{ dBd}.$$

3. The antenna gain was added to the conducted output power to obtain the ERP.

**Transmitter Output Power (ERP) (continued)****Results: GSM Circuit Switched**

| Channel | Frequency (MHz) | Conducted Output Power (dBm) | Antenna Gain (dBd) | ERP (dBm) | ERP Limit (dBm) | Margin (dB) | Result   |
|---------|-----------------|------------------------------|--------------------|-----------|-----------------|-------------|----------|
| Bottom  | 824.2           | 32.7                         | -4.25              | 28.45     | 38.45           | 10.0        | Complied |
| Middle  | 836.6           | 32.7                         | -4.25              | 28.45     | 38.45           | 10.0        | Complied |
| Top     | 848.8           | 32.6                         | -4.25              | 28.35     | 38.45           | 10.1        | Complied |

**Results: GPRS**

| Channel | Frequency (MHz) | Conducted Output Power (dBm) | Antenna Gain (dBd) | ERP (dBm) | ERP Limit (dBm) | Margin (dB) | Result   |
|---------|-----------------|------------------------------|--------------------|-----------|-----------------|-------------|----------|
| Bottom  | 824.2           | 32.7                         | -4.25              | 28.45     | 38.45           | 10.0        | Complied |
| Middle  | 836.6           | 32.6                         | -4.25              | 28.35     | 38.45           | 10.1        | Complied |
| Top     | 848.8           | 32.6                         | -4.25              | 28.35     | 38.45           | 10.1        | Complied |

**Results: EGPRS / MCS5**

| Channel | Frequency (MHz) | Conducted Output Power (dBm) | Antenna Gain (dBd) | ERP (dBm) | ERP Limit (dBm) | Margin (dB) | Result   |
|---------|-----------------|------------------------------|--------------------|-----------|-----------------|-------------|----------|
| Bottom  | 824.2           | 30.3                         | -4.25              | 26.05     | 38.45           | 12.4        | Complied |
| Middle  | 836.6           | 30.3                         | -4.25              | 26.05     | 38.45           | 12.4        | Complied |
| Top     | 848.8           | 30.4                         | -4.25              | 26.15     | 38.45           | 12.3        | Complied |

**Test Equipment Used:**

| Asset No. | Instrument          | Manufacturer    | Type No.      | Serial No.  | Date Calibration Due  | Cal. Interval (Months) |
|-----------|---------------------|-----------------|---------------|-------------|-----------------------|------------------------|
| M1656     | Thermohygrometer    | JM Handelspunkt | 30.5015.13    | None stated | 14 Mar 2015           | 12                     |
| A2533     | Directional Coupler | Atlan TecRF     | CDC-003060-20 | 14041701717 | Calibrated before use | -                      |
| A2525     | Attenuator          | Atlan TecRF     | AN18W5-10     | 832827#3    | Calibrated before use | -                      |
| L1138     | Signal Analyser     | Rohde & Schwarz | FSV13.6       | 101389      | 17 Apr 2015           | 12                     |
| M1269     | Multimeter          | Fluke           | 179           | 90250210    | 19 May 2015           | 12                     |
| S0523     | DC Power Supply     | TTI             | PL320         | 224235      | Calibrated before use | -                      |

**5.2.2. Transmitter Frequency Stability (Temperature Variation)****Test Summary:**

|                          |                 |                   |              |
|--------------------------|-----------------|-------------------|--------------|
| <b>Test Engineer:</b>    | Keith Tucker    | <b>Test Date:</b> | 04 June 2014 |
| <b>Test Sample IMEI:</b> | 004402452706264 |                   |              |

|                          |                                                                                                         |
|--------------------------|---------------------------------------------------------------------------------------------------------|
| <b>FCC Reference:</b>    | Parts 2.1055 & 22.355                                                                                   |
| <b>Test Method Used:</b> | As detailed in KDB 971168 Section 9.0 referencing ANSI TIA-603-C-2004 Section 2.2.2 and FCC Part 2.1055 |

**Environmental Conditions:**

|                                       |    |
|---------------------------------------|----|
| <b>Ambient Temperature (°C):</b>      | 24 |
| <b>Ambient Relative Humidity (%):</b> | 34 |

**Note(s):**

1. A voltage variation jig was connected to the EUT which was powered via a bench power supply at the nominal voltage of 3.8V.
2. Frequency error was measured using a calibrated Rohde & Schwarz CMW 500 Universal Radio Communications Tester in accordance with current Rohde & Schwarz application notes. The EUT was connected by suitable RF cables to the CMW 500. A bi-directional communications link was established between the EUT and CMW 500. The frequency meter value was recorded.
3. Temperature was monitored throughout the test with a calibrated digital thermometer.

**Results: Middle Channel (836.6 MHz)**

| Temperature (°C) | Measured Frequency (MHz) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) | Margin (ppm) | Result   |
|------------------|--------------------------|----------------------|-----------------------|-------------|--------------|----------|
| -30              | 836.600017               | 17                   | 0.0203                | 2.5         | 2.4797       | Complied |
| -20              | 836.600021               | 21                   | 0.0251                | 2.5         | 2.4749       | Complied |
| -10              | 836.600025               | 25                   | 0.0299                | 2.5         | 2.4701       | Complied |
| 0                | 836.600018               | 18                   | 0.0215                | 2.5         | 2.4785       | Complied |
| 10               | 836.600025               | 25                   | 0.0299                | 2.5         | 2.4701       | Complied |
| 20               | 836.600027               | 27                   | 0.0323                | 2.5         | 2.4677       | Complied |
| 30               | 836.600022               | 22                   | 0.0263                | 2.5         | 2.4737       | Complied |
| 40               | 836.600022               | 22                   | 0.0263                | 2.5         | 2.4737       | Complied |
| 50               | 836.600019               | 19                   | 0.0227                | 2.5         | 2.4773       | Complied |

**Transmitter Frequency Stability (Temperature Variation) (continued)****Test Equipment Used:**

| Asset No. | Instrument                  | Manufacturer    | Type No.       | Serial No.  | Date Calibration Due  | Cal. Interval (Months) |
|-----------|-----------------------------|-----------------|----------------|-------------|-----------------------|------------------------|
| M1659     | Thermohygrometer            | JM Handelspunkt | 30.5015.13     | None stated | 14 Mar 2015           | 12                     |
| M1870     | Wideband Radio Comms Tester | Rohde & Schwarz | CMW500         | 145919      | 05 May 2015           | 12                     |
| E0513     | Environmental Chamber       | TAS             | LT600 Series 3 | 23900506    | Calibrated before use | -                      |
| M1249     | Thermometer                 | Fluke           | 52II           | 88800049    | 02 May 2015           | 12                     |
| S021      | Dual DC power supply        | TTi             | CPX200         | 061034      | Calibrated before use | -                      |
| M1251     | Multimeter                  | Fluke           | 175            | 89170179    | 19 May 2015           | 12                     |

**5.2.3. Transmitter Frequency Stability (Voltage Variation)****Test Summary:**

|                          |                 |                   |              |
|--------------------------|-----------------|-------------------|--------------|
| <b>Test Engineer:</b>    | Keith Tucker    | <b>Test Date:</b> | 04 June 2014 |
| <b>Test Sample IMEI:</b> | 004402452706264 |                   |              |

|                          |                                                                                                         |
|--------------------------|---------------------------------------------------------------------------------------------------------|
| <b>FCC Reference:</b>    | Parts 2.1055 & 22.355                                                                                   |
| <b>Test Method Used:</b> | As detailed in KDB 971168 Section 9.0 referencing ANSI TIA-603-C-2004 Section 2.2.2 and FCC Part 2.1055 |

**Environmental Conditions:**

|                               |    |
|-------------------------------|----|
| <b>Temperature (°C):</b>      | 24 |
| <b>Relative Humidity (%):</b> | 34 |

**Note(s):**

1. A voltage variation jig was connected to the EUT which was powered via a bench power supply.
2. Frequency error was measured using a calibrated Rohde & Schwarz CMW 500 Universal Radio Communications Tester in accordance with current Rohde & Schwarz application notes. The EUT was connected by suitable RF cables to the CMW 500. A bi-directional communications link was established between the EUT and CMW 500. The frequency meter value was recorded.
3. Voltage was monitored throughout the test with a calibrated digital voltmeter.

**Results: Middle Channel (836.6 MHz)**

| Supply Voltage (V) | Measured Frequency (MHz) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) | Margin (ppm) | Result   |
|--------------------|--------------------------|----------------------|-----------------------|-------------|--------------|----------|
| 3.42               | 836.600027               | 27                   | 0.0323                | 2.5         | 2.4677       | Complied |
| 4.18               | 836.600031               | 31                   | 0.0371                | 2.5         | 2.4629       | Complied |

**Test Equipment Used:**

| Asset No. | Instrument                  | Manufacturer    | Type No.   | Serial No.  | Date Calibration Due  | Cal. Interval (Months) |
|-----------|-----------------------------|-----------------|------------|-------------|-----------------------|------------------------|
| M1659     | Thermohygrometer            | JM Handelspunkt | 30.5015.13 | None stated | 14 Mar 2015           | 12                     |
| M1870     | Wideband Radio Comms Tester | Rohde & Schwarz | CMW500     | 145919      | 05 May 2015           | 12                     |
| S021      | Dual DC power supply        | Tti             | CPX200     | 061034      | Calibrated before use | -                      |
| M1251     | Multimeter                  | Fluke           | 175        | 89170179    | 19 May 2015           | 12                     |

**5.2.4. Transmitter Occupied Bandwidth****Test Summary:**

|                   |                 |            |              |
|-------------------|-----------------|------------|--------------|
| Test Engineer:    | David Doyle     | Test Date: | 03 June 2014 |
| Test Sample IMEI: | 004402452706272 |            |              |

|                   |                                       |
|-------------------|---------------------------------------|
| FCC Reference:    | Part 2.1049                           |
| Test Method Used: | As detailed in KBD 971168 Section 4.2 |

**Environmental Conditions:**

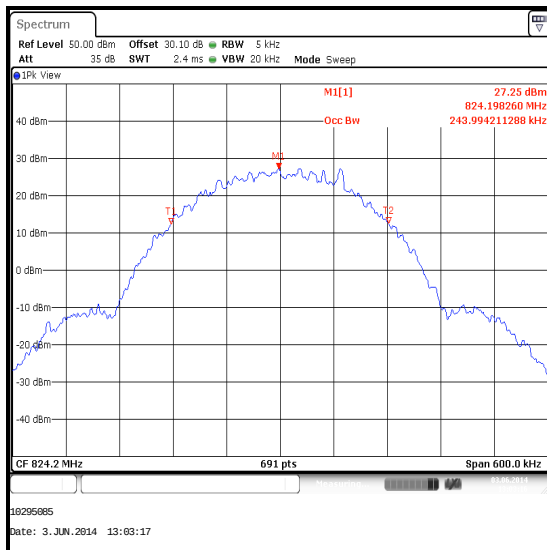
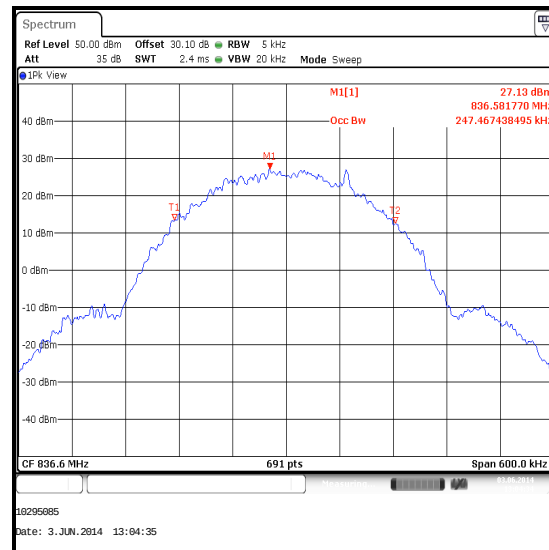
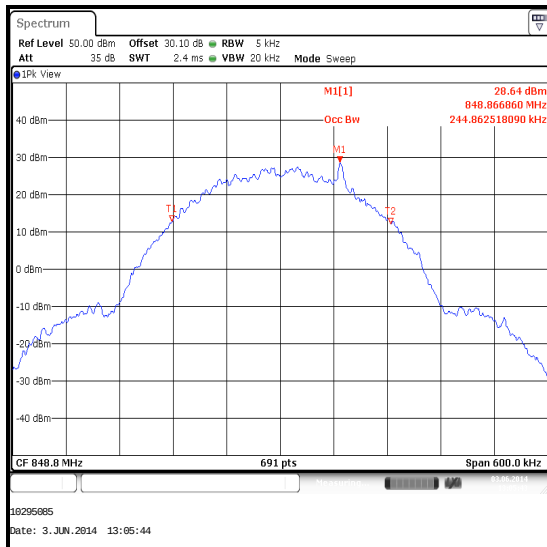
|                        |    |
|------------------------|----|
| Temperature (°C):      | 26 |
| Relative Humidity (%): | 39 |

**Note(s):**

1. The signal analyser was connected to the RF port on the EUT using suitable attenuation and RF cable.

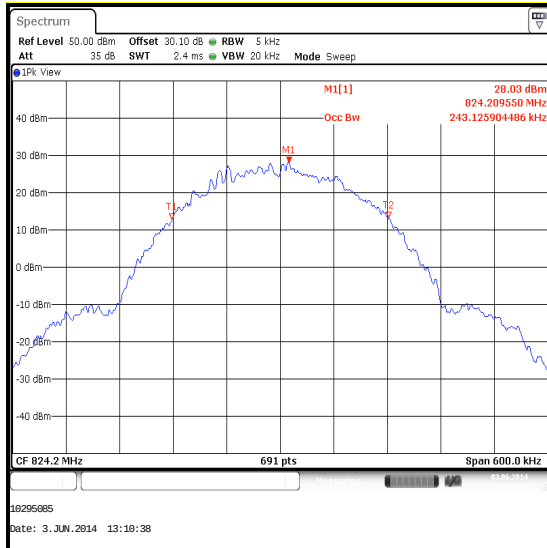
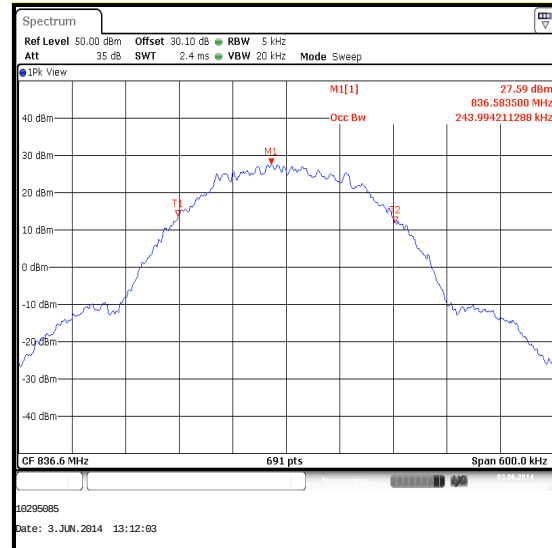
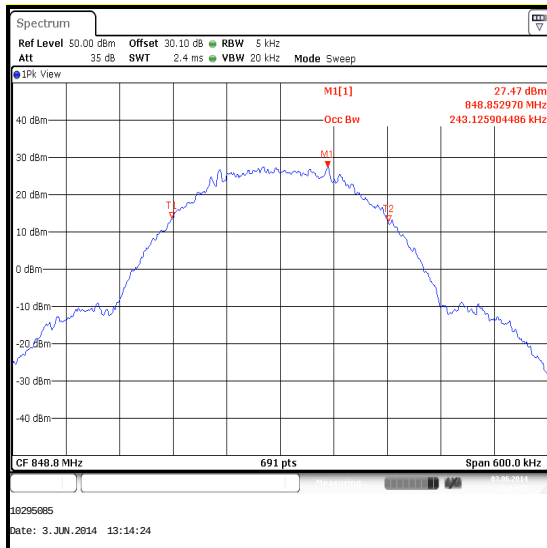
**Transmitter Occupied Bandwidth (continued)****Results: GSM Circuit Switched**

| Channel | Frequency (MHz) | Occupied Bandwidth (kHz) |
|---------|-----------------|--------------------------|
| Bottom  | 824.2           | 243.994                  |
| Middle  | 836.6           | 247.467                  |
| Top     | 848.8           | 244.863                  |

**Bottom Channel****Middle Channel****Top Channel**

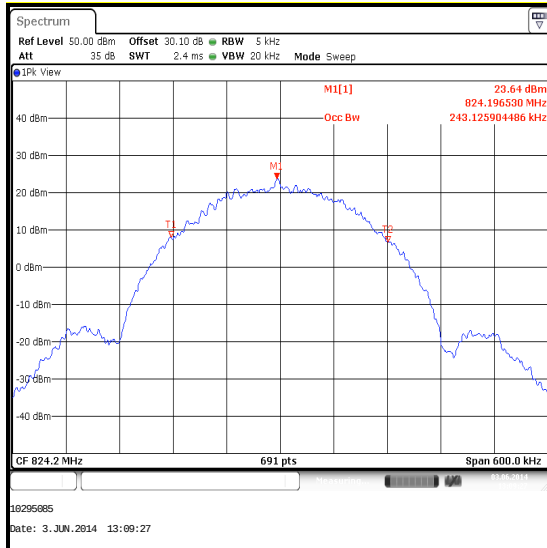
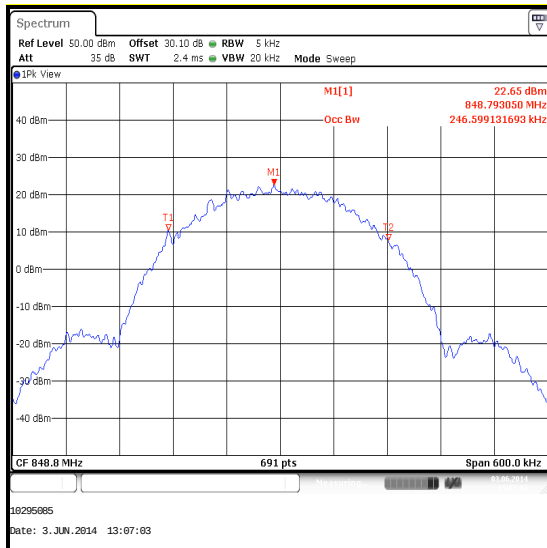
**Transmitter Occupied Bandwidth (continued)****Results: GPRS**

| Channel | Frequency (MHz) | Occupied Bandwidth (kHz) |
|---------|-----------------|--------------------------|
| Bottom  | 824.2           | 243.126                  |
| Middle  | 836.6           | 243.994                  |
| Top     | 848.8           | 243.126                  |

**Bottom Channel****Middle Channel****Top Channel**

**Transmitter Occupied Bandwidth (continued)****Results: EGPRS / MCS5**

| Channel | Frequency (MHz) | Occupied Bandwidth (kHz) |
|---------|-----------------|--------------------------|
| Bottom  | 824.2           | 243.126                  |
| Middle  | 836.6           | 246.599                  |
| Top     | 848.8           | 246.599                  |

**Bottom Channel****Middle Channel****Top Channel**

**Transmitter Occupied Bandwidth (continued)****Test Equipment Used:**

| Asset No. | Instrument          | Manufacturer    | Type No.      | Serial No.  | Date Calibration Due  | Cal. Interval (Months) |
|-----------|---------------------|-----------------|---------------|-------------|-----------------------|------------------------|
| M1656     | Thermohygrometer    | JM Handelspunkt | 30.5015.13    | None stated | 14 Mar 2015           | 12                     |
| A2533     | Directional Coupler | Atlan TecRF     | CDC-003060-20 | 14041701717 | Calibrated before use | -                      |
| A2525     | Attenuator          | Atlan TecRF     | AN18W5-10     | 832827#3    | Calibrated before use | -                      |
| L1138     | Signal Analyser     | Rohde & Schwarz | FSV13.6       | 101389      | 17 Apr 2015           | 12                     |
| M1269     | Multimeter          | Fluke           | 179           | 90250210    | 19 May 2015           | 12                     |
| S0523     | DC Power Supply     | TTI             | PL320         | 224235      | Calibrated before use | -                      |

**5.2.5. Transmitter Out of Band Radiated Emissions****Test Summary:**

|                          |                                 |                   |              |
|--------------------------|---------------------------------|-------------------|--------------|
| <b>Test Engineers:</b>   | Nick Steele &<br>Andrew Edwards | <b>Test Date:</b> | 04 June 2014 |
| <b>Test Sample IMEI:</b> | 004402452705555                 |                   |              |

|                          |                                                                   |
|--------------------------|-------------------------------------------------------------------|
| <b>FCC Reference:</b>    | Parts 2.1053 & 22.917                                             |
| <b>Test Method Used:</b> | As detailed in KDB 971168 Section 6.1 referencing FCC Part 2.1053 |
| <b>Frequency Range:</b>  | 30 MHz to 9 GHz                                                   |
| <b>Configuration:</b>    | GSM Circuit Switched                                              |

**Environmental Conditions:**

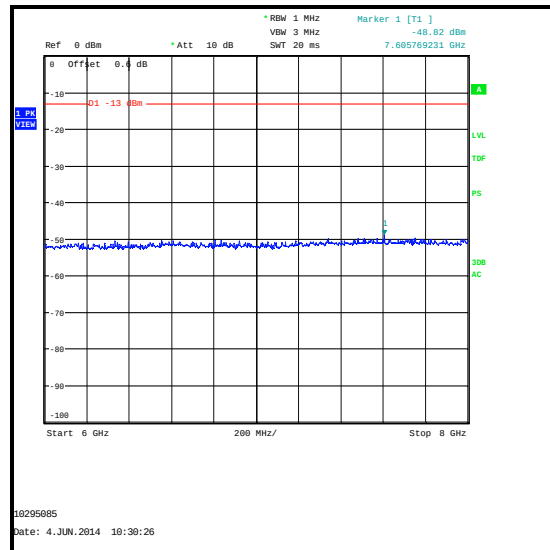
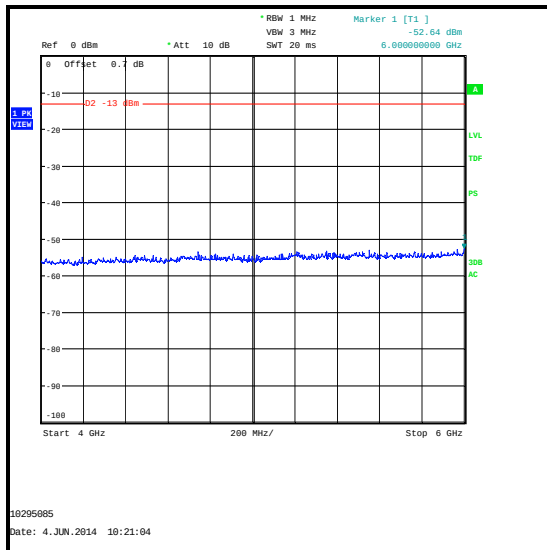
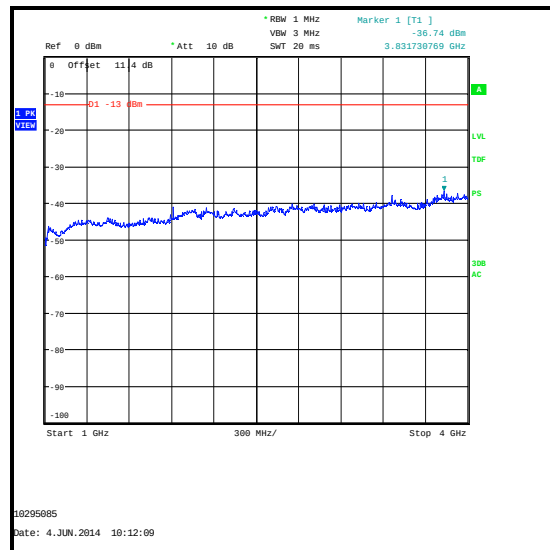
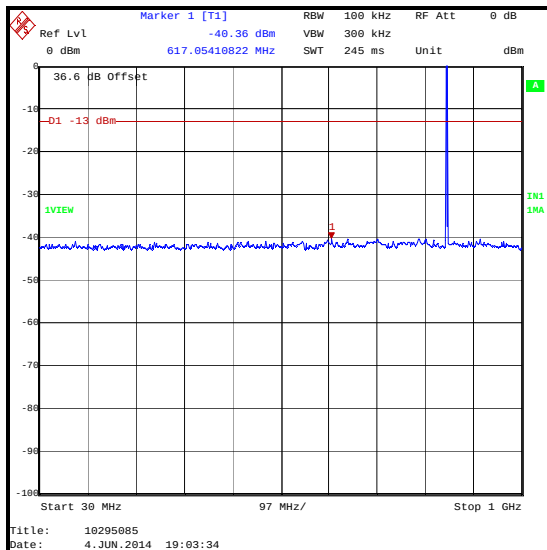
|                               |          |
|-------------------------------|----------|
| <b>Temperature (°C):</b>      | 23 to 24 |
| <b>Relative Humidity (%):</b> | 32 to 46 |

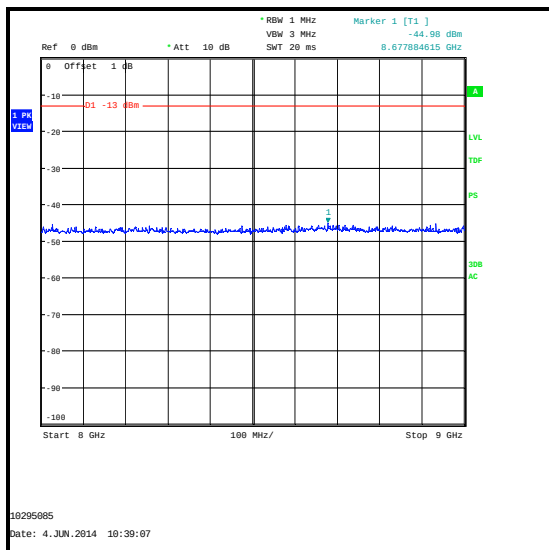
**Note(s):**

1. The uplink traffic channels are shown on the 30 MHz to 1 GHz plot.
2. All emissions shown on the pre-scan plots were investigated. Final measurements were made using appropriate RF filters and attenuators where required. All emissions shown on the pre-scan plots were found to be below the measurement system noise floor or ambient, therefore the highest peak noise floor reading of the measuring receiver was recorded in the table below.
3. Measurements below 1 GHz were performed in a semi-anechoic chamber (Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
4. Pre-scans above 1 GHz were performed in a fully anechoic chamber (Asset Number K0002) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the test chamber floor in the centre of the chamber turntable. All measurement antennas were placed at a fixed height of 1.5 metres above the test chamber floor, in line with the EUT. Final measurements above 1 GHz were performed in a semi-anechoic chamber (Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.

**Results: Top Channel**

| <b>Frequency<br/>(MHz)</b> | <b>Peak Level<br/>(dBm)</b> | <b>Limit<br/>(dBm)</b> | <b>Margin<br/>(dB)</b> | <b>Result</b> |
|----------------------------|-----------------------------|------------------------|------------------------|---------------|
| 3831.731                   | -36.7                       | -13.0                  | 23.7                   | Complied      |

**Transmitter Out of Band Radiated Emissions (continued)**

**Transmitter Out of Band Radiated Emissions (continued)****Test Equipment Used:**

| Asset No. | Instrument       | Manufacturer    | Type No.   | Serial No.  | Date Calibration Due | Cal. Interval (Months) |
|-----------|------------------|-----------------|------------|-------------|----------------------|------------------------|
| A490      | Antenna          | Chase           | CBL6111A   | 1590        | 29 Apr 2015          | 12                     |
| A1834     | Attenuator       | Hewlett Packard | 8491B      | 10444       | 15 Nov 2014          | 12                     |
| K0001     | 5m RSE Chamber   | Rainford EMC    | N/A        | N/A         | 26 Nov 2014          | 12                     |
| G0543     | Amplifier        | Sonoma          | 310N       | 230801      | 19 Aug 2014          | 3                      |
| M1273     | Test Receiver    | Rohde & Schwarz | ESIB 26    | 100275      | 15 Feb 2015          | 12                     |
| M1622     | Thermohygrometer | JM Handelspunkt | 30.5015.06 | None stated | 31 Dec 2014          | 12                     |
| A1393     | Attenuator       | Huber & Suhner  | 6820.17.B  | 757456      | 02 May 2015          | 12                     |
| M1656     | Thermohygrometer | JM Handelspunkt | 30.5015.13 | None stated | 14 Mar 2015          | 12                     |
| K0002     | 3m RSE Chamber   | Rainford EMC    | N/A        | N/A         | 14 Nov 2014          | 12                     |
| M1630     | Test Receiver    | Rohde & Schwarz | ESU40      | 100233      | 13 Mar 2015          | 12                     |
| A1534     | Pre Amplifier    | Hewlett Packard | 8449B      | 3008A00405  | 18 May 2015          | 12                     |
| A1396     | Attenuator       | Huber & Suhner  | 6810.17.B  | 757987      | 02 May 2015          | 12                     |
| A148      | High Pass Filter | AtlanTechRF     | 5H036      | 32218       | 17 May 2015          | 12                     |
| A1818     | Antenna          | EMCO            | 3115       | 00075692    | 14 Nov 2014          | 12                     |
| A253      | Antenna          | Flann Microwave | 12240-20   | 128         | 14 Nov 2014          | 12                     |
| A254      | Antenna          | Flann Microwave | 14240-20   | 139         | 14 Nov 2014          | 12                     |
| A255      | Antenna          | Flann           | 16240-20   | 519         | 14 Nov 2014          | 12                     |

**5.2.6. Transmitter Radiated Emissions at Band Edges****Test Summary:**

|                   |                 |            |              |
|-------------------|-----------------|------------|--------------|
| Test Engineer:    | David Doyle     | Test Date: | 04 June 2014 |
| Test Sample IMEI: | 004402452705555 |            |              |

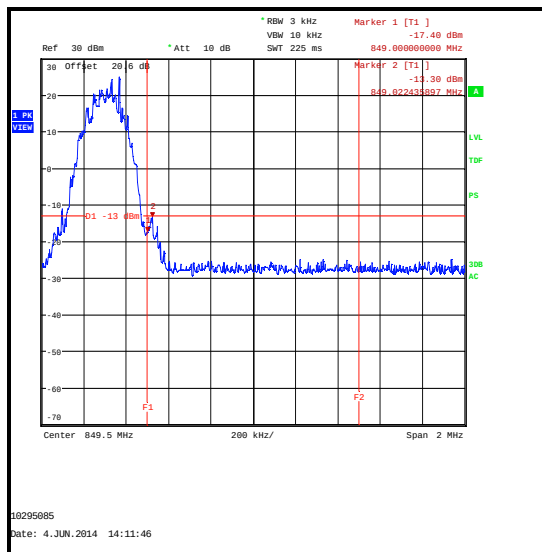
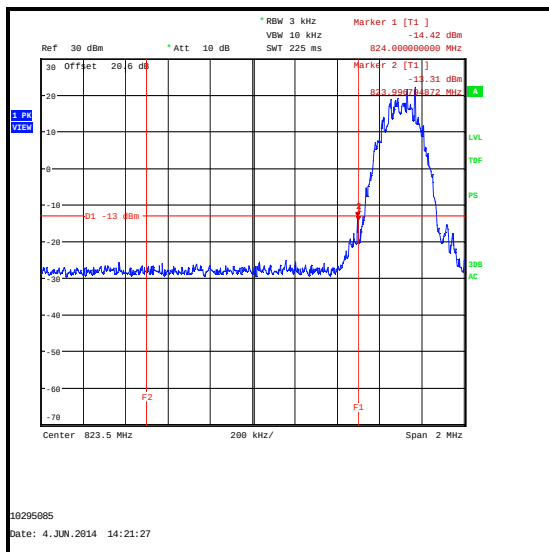
|                   |                                                                   |
|-------------------|-------------------------------------------------------------------|
| FCC Reference:    | Parts 2.1053 & 22.917                                             |
| Test Method Used: | As detailed in KDB 971168 Section 6.1 referencing FCC Part 22.917 |

**Environmental Conditions:**

|                        |    |
|------------------------|----|
| Temperature (°C):      | 23 |
| Relative Humidity (%): | 47 |

**Results: GSM Circuit Switched**

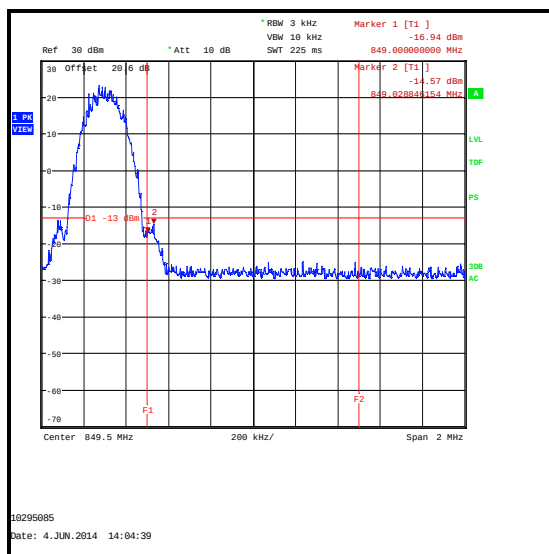
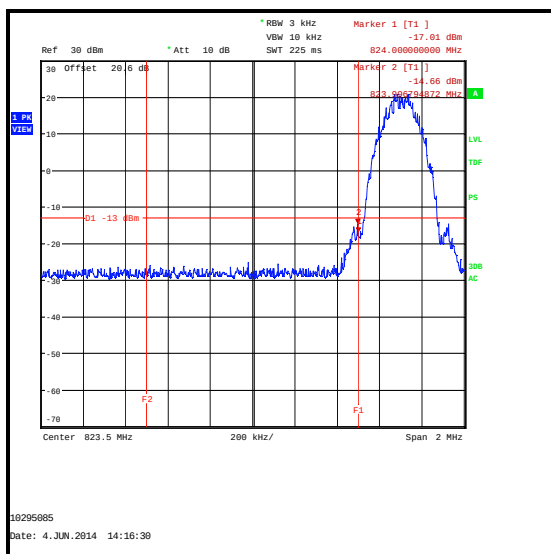
| Frequency (MHz) | Peak Level (dBm) | Limit (dBm) | Margin (dB) | Result   |
|-----------------|------------------|-------------|-------------|----------|
| 823.997         | -13.3            | -13.0       | 0.3         | Complied |
| 824             | -14.4            | -13.0       | 1.4         | Complied |
| 849             | -17.4            | -13.0       | 4.4         | Complied |
| 849.022         | -13.3            | -13.0       | 0.3         | Complied |



### Transmitter Band Edge Radiated Emissions (continued)

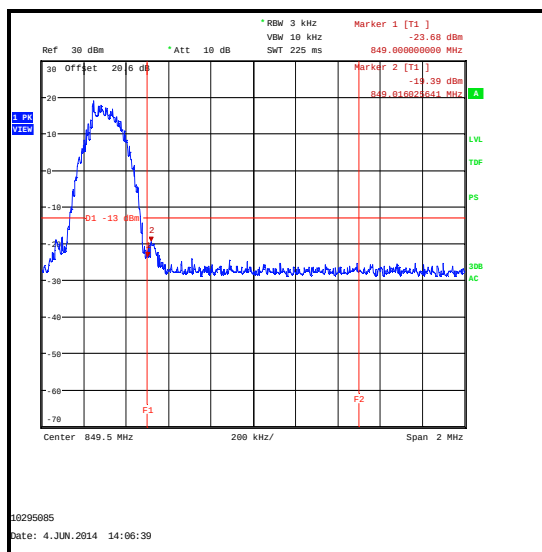
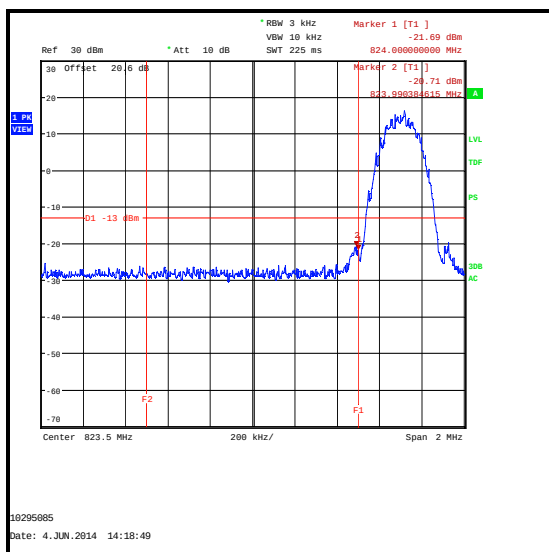
## Results: GPRS

| Frequency (MHz) | Peak Level (dBm) | Limit (dBm) | Margin (dB) | Result   |
|-----------------|------------------|-------------|-------------|----------|
| 823.997         | -14.7            | -13.0       | 1.7         | Complied |
| 824             | -17.0            | -13.0       | 4.0         | Complied |
| 849             | -16.9            | -13.0       | 3.9         | Complied |
| 849.029         | -14.6            | -13.0       | 1.6         | Complied |



**Transmitter Band Edge Radiated Emissions (continued)****Results: EGPRS / MCS5**

| Frequency (MHz) | Peak Level (dBm) | Limit (dBm) | Margin (dB) | Result   |
|-----------------|------------------|-------------|-------------|----------|
| 823.990         | -20.7            | -13.0       | 7.7         | Complied |
| 824             | -21.7            | -13.0       | 8.7         | Complied |
| 849             | -23.7            | -13.0       | 10.7        | Complied |
| 849.016         | -19.4            | -13.0       | 6.4         | Complied |

**Test Equipment Used**

| Asset No. | Instrument       | Manufacturer    | Type No.   | Serial No.  | Date Calibration Due | Cal. Interval (Months) |
|-----------|------------------|-----------------|------------|-------------|----------------------|------------------------|
| M1656     | Thermohygrometer | JM Handelpunkt  | 30.5015.13 | None stated | 14 Mar 2015          | 12                     |
| K0002     | 3m RSE Chamber   | Rainford EMC    | N/A        | N/A         | 14 Nov 2014          | 12                     |
| M1874     | Test Receiver    | Rohde & Schwarz | ESU26      | 100553      | 13 Mar 2015          | 12                     |
| A1393     | Attenuator       | Huber & Suhner  | 6820.17.B  | 757456      | 02 May 2015          | 12                     |
| A288      | Antenna          | Chase           | CBL6111A   | 1589        | 20 Aug 2014          | 12                     |

## **6. Measurement Uncertainty**

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document "approximately" is interpreted as meaning "effectively" or "for most practical purposes".

| Measurement Type            | Range           | Confidence Level (%) | Calculated Uncertainty |
|-----------------------------|-----------------|----------------------|------------------------|
| Conducted Output Power      | 824 to 849 MHz  | 95%                  | ±1.13 dB               |
| Frequency Stability         | 824 to 849 MHz  | 95%                  | ±23 Hz                 |
| Occupied Bandwidth          | 824 to 849 MHz  | 95%                  | ±3.92 %                |
| Radiated Spurious Emissions | 30 MHz to 1 GHz | 95%                  | ±5.65 dB               |
| Radiated Spurious Emissions | 1 GHz to 9 GHz  | 95%                  | ±2.94 dB               |

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

**7. Report Revision History**

| Version Number | Revision Details |        |                        |
|----------------|------------------|--------|------------------------|
|                | Page No(s)       | Clause | Details                |
| 1.0            | -                | -      | Initial Version        |
| 2.0            | -                | -      | EUT Description update |

--- END OF REPORT ---