# TEST REPORT

## Test Report No. : UL-RPT-RP10295140JD04D V2.0

| | | |
|---|---|---|
| **Manufacturer** | : | Sony Mobile Communications Inc. |
| **FCC ID** | : | PY7PM-0804 |
| **Technology** | : | LTE Band 17 |
| **Test Standard(s)** | : | FCC Part 27.53(f) |

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:** 04 August 2014

**Checked by:**

Sarah Williams
Engineer, Radio Laboratory

**Issued by :**

pp
John Newell
Group Quality Manager,
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UL VS LTD

0644

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

**UL VS LTD**

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# 1. Customer Information

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

# 2. Summary of Testing

## 2.1. General Information

| | |
|---|---|
| **Specification Reference:** | 47CFR27 |
| **Specification Title:** | Code of Federal Regulations Volume 47 (Telecommunications):<br>Part 27 Subpart C (Miscellaneous Wireless Communication Services) |
| **Site Registration:** | 209735 |
| **Location of Testing:** | UL VS LTD, Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom |
| **Test Dates:** | 12 July 2014 to 14 July 2014 |

## 2.2. Summary of Test Results

| FCC Reference (47CFR) | Measurement | Result |
|---|---|---|
| 2.1053 / 27.53(f) | Transmitter Radiated Spurious Emissions | ✓ |
| 2.1053 / 27.53(f) | Transmitter Radiated Emissions at Band Edges | ✓ |

Key to Results

✓ **= Complied** ✗ **= Did not comply**

## 2.3. Methods and Procedures

| | |
|---|---|
| **Reference:** | ANSI/TIA-603-C-2004 |
| **Title:** | Land Mobile Communications Equipment, Measurements and performance Standards |
| **Reference:** | FCC KDB 971168 D01 v02r01, 7 June 2013 |
| **Title:** | 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)

| | |
|---|---|
| **Brand Name:** | Sony |
| **IMEI:** | 004402452980612 *(Radiated sample)* |
| **Test Sample Serial Number:** | CB5A1ZQX7W |
| **Hardware Version Number:** | A |
| **Software Version Number:** | 23.0.A.0.283 |
| **FCC ID:** | PY7PM-0804 |

| | |
|---|---|
| **Brand Name:** | Sony |
| **Description:** | AC Charger |
| **Model Name or Number:** | EP880 |

| | |
|---|---|
| **Brand Name:** | Generic |
| **Description:** | MHL Cable |
| **Model Name or Number:** | Not marked |

| | |
|---|---|
| **Brand Name:** | Sony |
| **Description:** | MHL Adaptor |
| **Model Name or Number:** | IM750 |

| | |
|---|---|
| **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

| | | | | |
|---|---|---|---|---|
| **Tested Technology:** | LTE Band 17 | | | |
| **Type of Equipment** | Transceiver | | | |
| **Channel Bandwidth:** | 5 MHz & 10 MHz | | | |
| **Modulation Type:** | QPSK & 16QAM | | | |
| **Duty Cycle:** | 100% | | | |
| **Power Supply Requirement:** | Nominal | 3.8 V | | |
| **Transmit Frequency Range:** | 704 MHz to 716 MHz | | | |
| **Channels Tested:** | **Channel Bandwidth** | | **$N_{ul}$** | **Frequency of Uplink (MHz)** |
| **Bottom Channel** | 5 | | 23755 | 706.5 |
| | 10 | | 23780 | 709.0 |
| **Top Channel** | 5 | | 23825 | 713.5 |
| | 10 | | 23800 | 711.0 |

## 3.5. Support Equipment

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

| | |
|---|---|
| **Description:** | 2 GB Micro SD Card |
| **Brand Name:** | Generic |
| **Model Name or Number:** | Not marked |

| | |
|---|---|
| **Description:** | 22” High Definition Television |
| **Brand Name:** | Logik |
| **Model Name or Number:** | L22FE12A |
| **Serial Number:** | 1309020661 |

# 4. Operation and Monitoring of the EUT during Testing

## 4.1. Operating Modes

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

- Transmit Mode – The EUT was set to transmit with maximum output power using the required channel bandwidth, modulation and resource blocks setting.

## 4.2. Configuration and Peripherals

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

- The EUT was connected to a Rohde and Schwarz CMW500 LTE system simulator, operating in a transceiver mode.
- Transmitter radiated spurious emission tests were performed with the following configurations, employing all available accessories:
    - Configuration 1 – Handset with the AC charger, USB Cable, MHL cable (terminated in to a television), MHL adaptor and PHF.
    - 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
- Transmitter radiated spurious emissions tests were performed with the EUT set to transmit with a 10 MHz channel bandwidth with QPSK modulation applied and 1 resource block with 0 offset. This was found to be the worst case modulation scheme with regards to emissions after preliminary investigations and, as this mode emits the highest transmit output power level, it was deemed to be the worst case.
- Transmitter Radiated Band Edge Emissions was tested on all supported channel bandwidths using QPSK and 16QAM modulations with the maximum resource blocks settings.

# 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* for Measurement Uncertainty 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 Radiated Spurious Emissions

**Test Summary:**

| | | | |
|---|---|---|---|
| **Test Engineers:** | Georgios Vrezas<br>David Doyle | **Test Dates:** | 12 July 2014<br>14 July 2014 |
| **Test Sample IMEI:** | 004402452980612 | | |

| | |
|---|---|
| **FCC Reference:** | Parts 2.1053 & 27.53(f) |
| **Test Method Used:** | As detailed in KDB 971168 Section 6.1 referencing FCC Part 2.1053 |
| **Frequency Range:** | 30 MHz to 8 GHz |
| **Configuration:** | 10 MHz, QPSK, 1RB, 0 Offset |

**Environmental Conditions:**

| | |
|---|---|
| **Temperature (°C):** | 23 to 24 |
| **Relative Humidity (%):** | 31 to 42 |

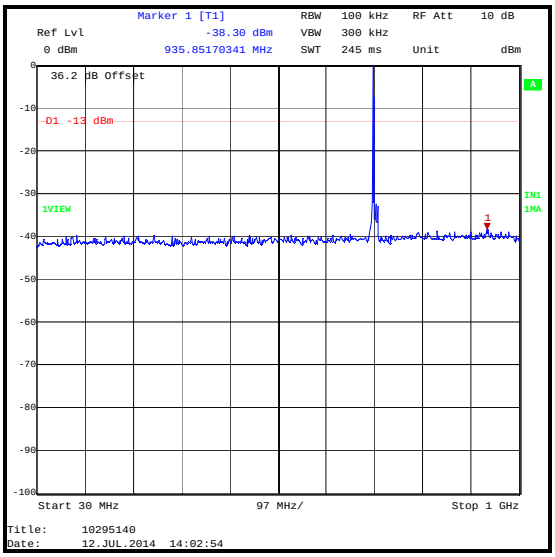
**Note(s):**

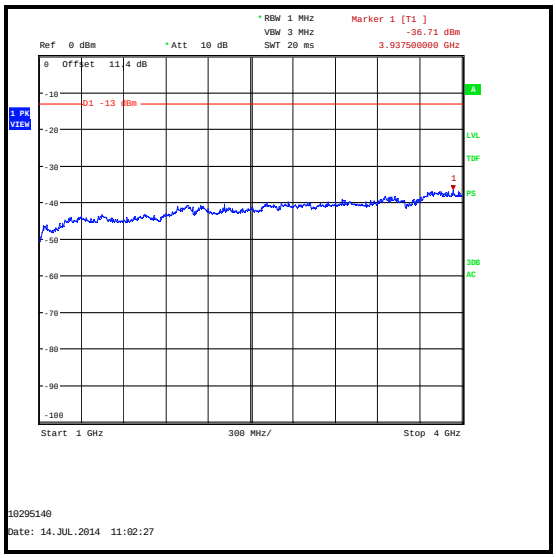
1. The EUT was set to transmit with a 10 MHz channel bandwidth with QPSK modulation applied and 1 resource block with 0 offset, as this was found to be the worst case modulation scheme with regards to emissions after preliminary investigations and, as this mode emits the highest transmit output power level, it was deemed to be the worst case.
2. The emission seen on the 30 MHz to 1 GHz plot at approximately 711 MHz is the EUT carrier.
3. No spurious emissions were detected above the measurement system noise floor therefore the highest peak noise floor reading of the measuring receiver was recorded in the table below.
4. 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.
5. 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.

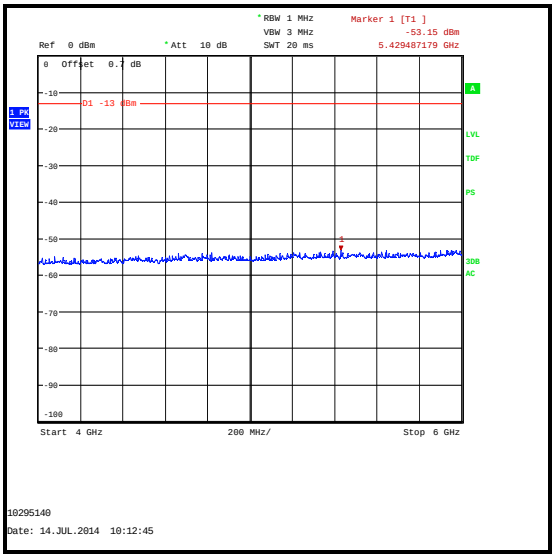
**Results:**

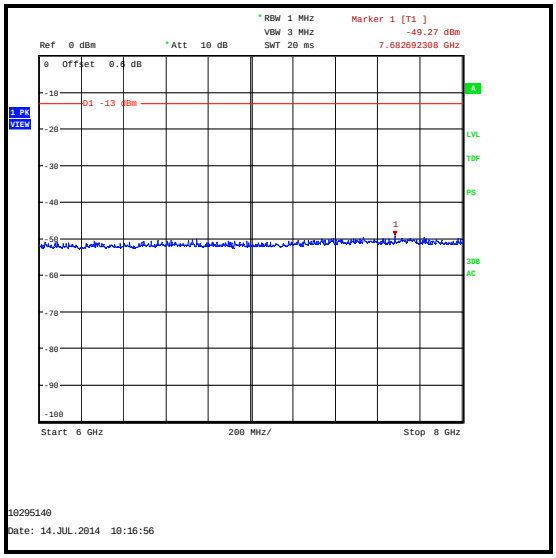
| Frequency (MHz) | Peak Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|
| 3937.500 | -36.7 | -13.0 | 23.7 | Complied |

## Transmitter Radiated Spurious Emissions (continued)



## Transmitter Radiated Spurious 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 |
| A2142 | Attenuator | AtlanTechRF | AN18-20 | 081120-23 | 25 Apr 2015 | 12 |
| K0001 | 5m RSE Chamber | Rainford EMC | N/A | N/A | 26 Nov 2014 | 12 |
| G0543 | Amplifier | Sonoma | 310N | 230801 | 19 Aug 2014 | 3 |
| M1622 | Thermohygrometer | JM Handelspunkt | 30.5015.06 | None stated | 31 Dec 2014 | 12 |
| M1273 | Test Receiver | Rohde & Schwarz | ESIB 26 | 100275 | 15 Feb 2015 | 12 |
| K0002 | 3m RSE Chamber | Rainford EMC | N/A | N/A | 14 Nov 2014 | 12 |
| M1874 | Test Receiver | Rohde & Schwarz | ESU26 | 100553 | 15 May 2015 | 12 |
| A1534 | Pre-Amplifier | Hewlett Packard | 8449B | 3008A00405 | 18 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 | 142240-20 | 139 | 14 Nov 2014 | 12 |
| M1656 | Thermohygrometer | JM Handelspunkt | 30.5015.13 | None stated | 14 Mar 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 |

## 5.2.2. Transmitter Radiated Emissions at Band Edges

### Test Summary:

| | | | |
|---|---|---|---|
| **Test Engineer:** | David Doyle | **Test Date:** | 14 July 2014 |
| **Test Sample IMEI:** | 004402452980612 | | |

| | |
|---|---|
| **FCC Reference:** | Parts 2.1053 & 27.53(f) |
| **Test Method Used:** | As detailed in KDB 971168 Section 6.1 referencing FCC Part 27.53 |

### Environmental Conditions:

| | |
|---|---|
| **Temperature (°C):** | 23 |
| **Relative Humidity (%):** | 42 |

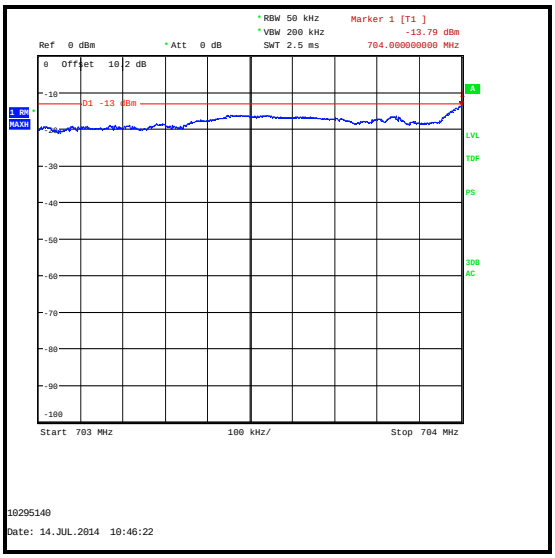
### Note(s):

1. Measurements were performed with the EUT transmitting QPSK and 16QAM modulation schemes, with the maximum resource blocks settings.

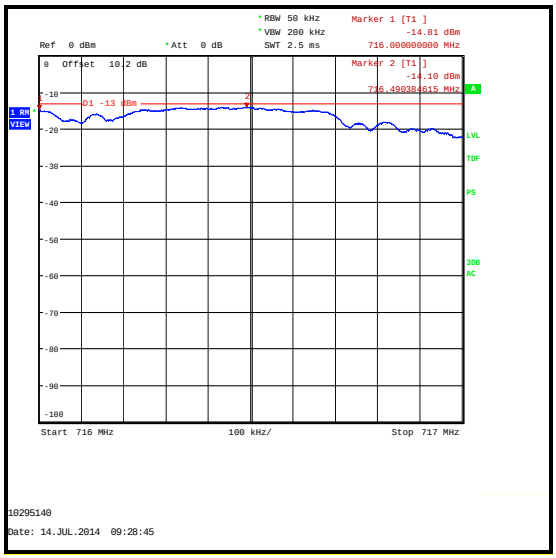
## Transmitter Radiated Emissions at Band Edges (continued)

## Results: 5 MHz Channel Bandwidth / QPSK

| Frequency (MHz) | Resource Block(s) | Resource Block Offset | Emission Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|---|
| 704 | 25 | 0 | -13.8 | -13.0 | 0.8 | Complied |
| 716 | 25 | 0 | -14.8 | -13.0 | 1.8 | Complied |
| 716.490 | 25 | 0 | -14.1 | -13.0 | 1.1 | Complied |




**QPSK / Lower Band Edge**

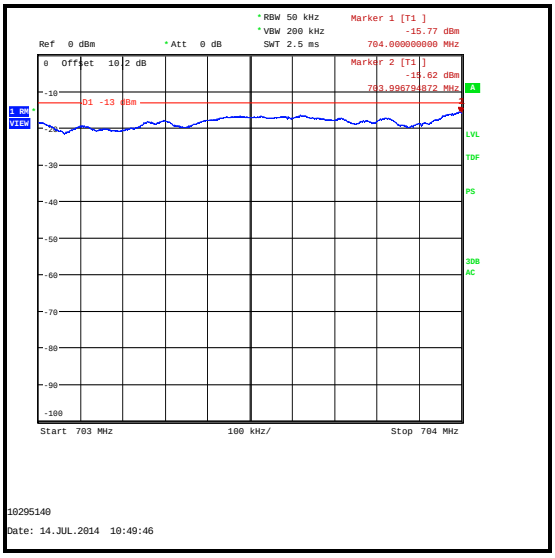



**QPSK / Upper Band Edge**

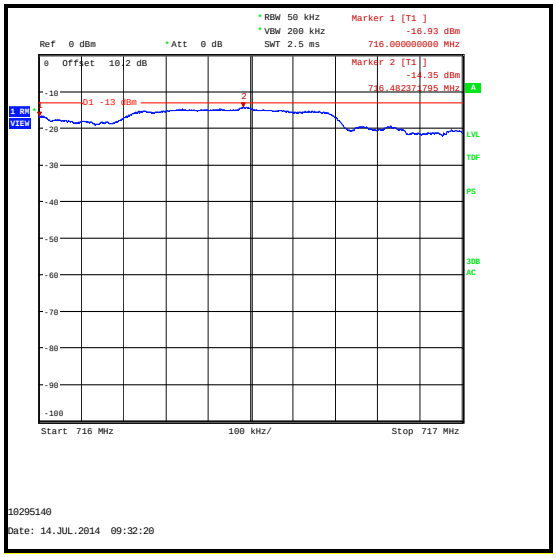
## Transmitter Radiated Emissions at Band Edges (continued)

## Results: 5 MHz Channel Bandwidth / 16QAM

| Frequency (MHz) | Resource Block(s) | Resource Block Offset | Emission Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|---|
| 703.997 | 25 | 0 | -15.6 | -13.0 | 2.6 | Complied |
| 704 | 25 | 0 | -15.8 | -13.0 | 2.8 | Complied |
| 716 | 25 | 0 | -16.9 | -13.0 | 3.9 | Complied |
| 716.482 | 25 | 0 | -14.4 | -13.0 | 1.4 | Complied |




16QAM / Lower Band Edge

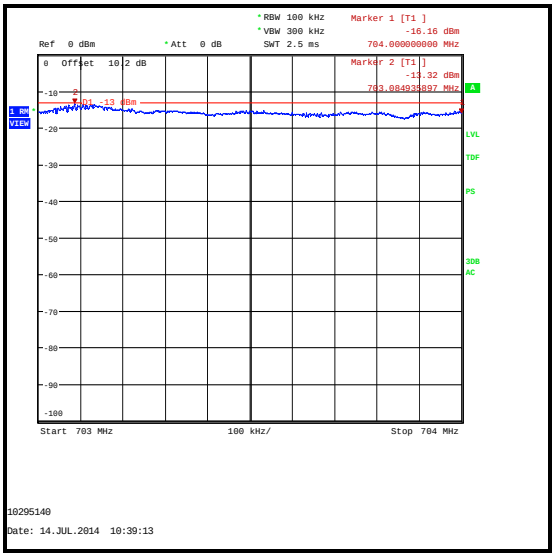



16QAM / Upper Band Edge

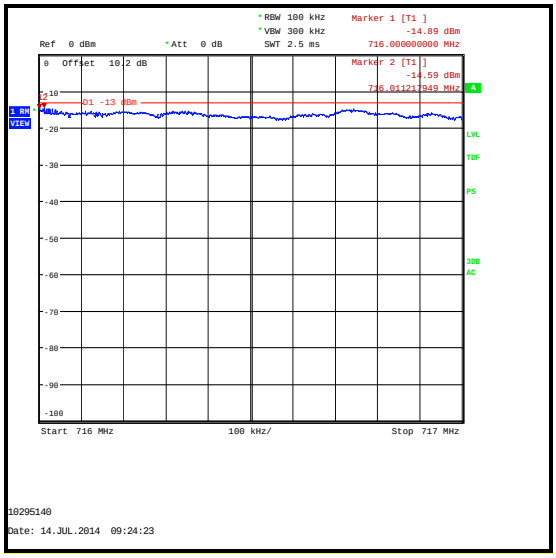
## Transmitter Radiated Emissions at Band Edges (continued)

## Results: 10 MHz Channel Bandwidth / QPSK

| Frequency (MHz) | Resource Block(s) | Resource Block Offset | Emission Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|---|
| 703.085 | 50 | 0 | -13.3 | -13.0 | 0.3 | Complied |
| 704 | 50 | 0 | -16.2 | -13.0 | 3.2 | Complied |
| 716 | 50 | 0 | -14.9 | -13.0 | 1.9 | Complied |
| 716.011 | 50 | 0 | -14.6 | -13.0 | 1.6 | Complied |




**QPSK / Lower Band Edge**

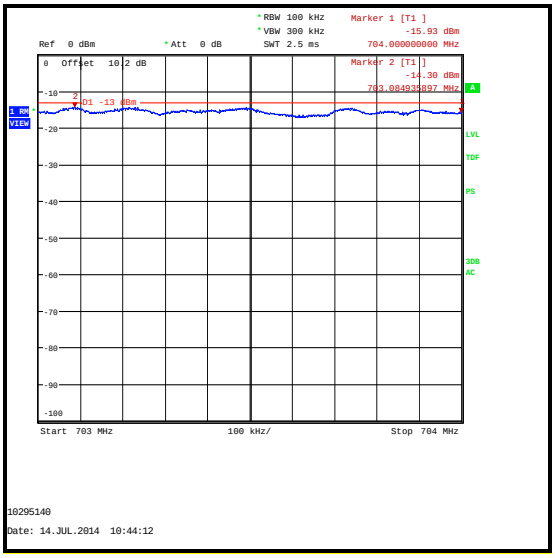



**QPSK / Upper Band Edge**

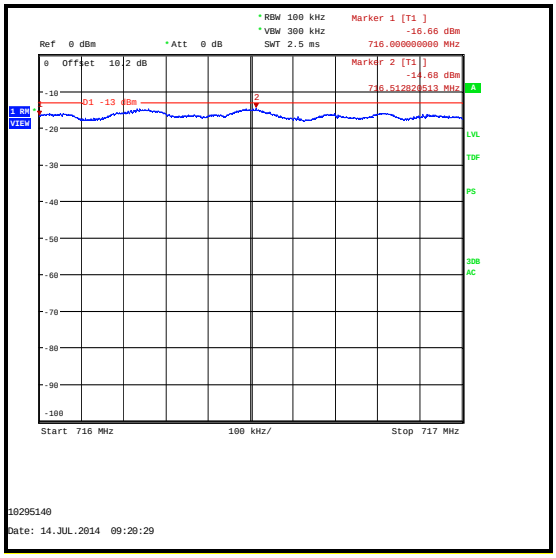
## Transmitter Radiated Emissions at Band Edges (continued)

## Results: 10 MHz Channel Bandwidth / 16QAM

| Frequency (MHz) | Resource Block(s) | Resource Block Offset | Emission Level (dBm) | Limit (dBm) | Margin (dB) | Result |
|---|---|---|---|---|---|---|
| 703.085 | 50 | 0 | -14.3 | -13.0 | 1.3 | Complied |
| 704 | 50 | 0 | -15.9 | -13.0 | 2.9 | Complied |
| 716 | 50 | 0 | -16.7 | -13.0 | 3.7 | Complied |
| 716.513 | 50 | 0 | -14.7 | -13.0 | 1.7 | Complied |




16QAM / Lower Band Edge




16QAM / Upper Band Edge

## 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 |
| K0002 | 3m RSE Chamber | Rainford EMC | N/A | N/A | 14 Nov 2014 | 12 |
| M1874 | Test Receiver | Rohde & Schwarz | ESU26 | 100553 | 15 May 2015 | 12 |
| A288 | Antenna | Chase | CBL6111A | 1589 | 20 Aug 2014 | 12 |
| A1396 | Attenuator | Huber & Suhner | 6810.17.B | 757987 | 02 May 2015 | 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 |
|---|---|---|---|
| Radiated Spurious Emissions | 30 MHz to 1 GHz | 95% | ±5.65 dB |
| Radiated Spurious Emissions | 1 GHz to 8 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 ---