# TEST REPORT
# FROM
# RFI GLOBAL SERVICES LTD

Test of: NTT docomo P-01B

To: FCC Part 15.225: 2008 Subpart C

**Test Report Serial No:**
RFI/RPT1/RP75983JD03A

| | |
|---|---|
| **This Test Report Is Issued Under The Authority Of Brian Watson, Operations Director:** | pp  |
| **Checked By:** | R. Graham |
| **Signature:** |  |
| **Date of Issue:** | 06 October 2009 |

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# 1. Customer Information

| | |
|---|---|
| **Company Name:** | Panasonic Mobile Communications Development of Europe Ltd |
| **Address:** | Panasonic House<br>Willoughby Road<br>Bracknell<br>Berkshire<br>RG12 8FP |

# 2. Summary of Testing

## 2.1. General Information

| | |
|---|---|
| **Specification Reference:** | 47CFR15.225 |
| **Specification Title:** | Code of Federal Regulations Volume 47 (Telecommunications) 2008: Part 15 Subpart C (Radio Frequency Devices) - Section 15.225 |
| **Specification Reference:** | 47CFR15.107 and 47CFR15.109 |
| **Specification Title:** | Code of Federal Regulations Volume 47 (Telecommunications) 2008: Part 15 Subpart B (Radio Frequency Devices) - Sections 15.107 and 15.109 |
| **Site Registration:** | FCC: 209735 |
| **Location of Testing:** | RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH. |
| **Test Dates:** | 21 September 2009 to 29 September 2009 |

## 2.2. Summary of Test Results

| FCC Reference (CFR 47) | Measurement | Port Type | Result |
|---|---|---|---|
| Part 15.107(a) | Receiver / Idle Mode AC Conducted Spurious Emissions | AC Mains | ✓ |
| Part 15.109(a), 15.225(d) | Receiver / Idle Mode Radiated Spurious Emissions | Enclosure | ✓ |
| Part 15.225(a)(b)(c)(d) | Transmitter Fundamental Field Strength | Antenna | ✓ |
| Part 15.209(a) 15.225(d) | Transmitter Radiated Spurious Emissions | Enclosure | ✓ |
| Part 15.209(a) 15.225(c)(d) | Transmitter Band Edge Radiated Emissions | Antenna | ✓ |
| Part 2.1049 | Transmitter 20 dB Bandwidth | Antenna | ✓ |
| Part 15.225(e) | Transmitter Frequency Stability (Temperature & Voltage Variation) | Antenna | ✓ |

**Key to Results**

✓ = Complied ✗ = Did not comply

## 2.3. Methods and Procedures

| | |
|---|---|
| **Reference:** | ANSI C63.4 (2003) |
| **Title:** | American National Standard Methods of Measurement of Electromagnetic Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz. |

## 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:** | NTT docomo |
| **Model Name or Number:** | P-01B |
| **Hardware Version Number:** | Rev C |
| **Software Version Number:** | B-D92WP1-01.03.001<br>D92WP1_Cv18121508 |
| **IMEI Number:** | 353152030012795 |
| **FCC ID:** | UCE209021A |

| | |
|---|---|
| **Description:** | Battery |
| **Brand Name:** | NTT |
| **Model Name or Number:** | P20 |

| | |
|---|---|
| **Description:** | AC charger |
| **Brand Name:** | NTT docomo |
| **Model Name or Number:** | FOMA AC Adapter 01 for Global use / MAS-BH0008-A 002 |

| | |
|---|---|
| **Description:** | DC charger |
| **Brand Name:** | NTT docomo |
| **Model Name or Number:** | FOMA DC Adapter 02 |

| | |
|---|---|
| **Description:** | Charge/USB data cable |
| **Brand Name:** | NTT docomo |
| **Model Name or Number:** | FOMA USB Cable with Charge Function 02 |

| | |
|---|---|
| **Description:** | Micro-SD Memory Card |
| **Brand Name:** | Not stated |
| **Model Name or Number:** | Not stated |

| | |
|---|---|
| **Description:** | Personal Hands-Free |
| **Brand Name:** | NTT docomo |
| **Model Name or Number:** | Stereo Earphone Set 01 |

## 3.2. Description of EUT

The equipment under test was a dual mode UMTS/GSM cellular handset with *Bluetooth* and RFID.

## 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:** | RFID | |
| **Channel Spacing:** | Single channel device | |
| **Transmit Frequency:** | 13.56 MHz | |
| **Receive Frequency:** | 13.56 MHz | |
| **Power Supply Requirement(s):** | Minimum (V) | 3.4 V |
| | Nominal (V) | 3.7 V |
| | Maximum (V) | 4.2 V |
| **Tested Temperature Range (°C):** | Minimum (Temp): | -20 |
| | Maximum (Temp) | +50 |

## 3.5. Support Equipment

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

| | |
|---|---|
| **Description:** | Dummy Battery |
| **Model Name or Number:** | Not stated |
| **Serial Number:** | Not stated |

# 4. Operation and Monitoring of the EUT during Testing

## 4.1. Operating Modes

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

- Receiver/Idle mode.
- Constantly transmitting at full power with a modulated carrier in RFID test mode.

## 4.2. Configuration and Peripherals

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

- The RFID transmitter was enabled by fitting a specially configured test USIM into the EUT and using a test mode accessed through the user interface.
- The Micro SD card was installed during all tests.
- Radiated spurious emissions tests were performed with the Personal Hands-Free connected to the EUT as this was found to be the worst case during pre-scans. All accessories were individually connected and measurements made during pre-scans to determine the worst case combination.
- As the EUT is not capable of transmitting while charging, no AC Mains Conducted Emissions (150 kHz to 30 MHz) test was performed in transmit mode.
- The dummy battery was fitted during frequency measurement tests. This was connected to a bench power supply and the DC voltage level adjusted and monitored accordingly.

# 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.

## 5.2. Test Results

### 5.2.1. Receiver/Idle Mode AC Conducted Spurious Emissions

**Test Summary:**

| | |
|---|---|
| **FCC Part:** | 15.107(a) |
| **Test Method Used:** | As detailed in ANSI C63.4 Section 7 and relevant annexes |

**Environmental Conditions:**

| | |
|---|---|
| **Temperature (°C):** | 26 |
| **Relative Humidity (%):** | 40 |

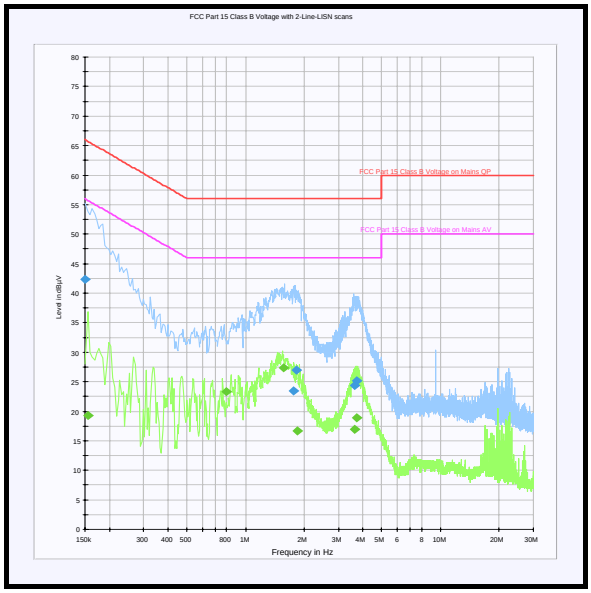
**Results: Quasi Peak Detector Measurements**

| Frequency (MHz) | Line | Quasi Peak Level (dBµV) | Limit (dBµV) | Margin (dB) | Result |
|---|---|---|---|---|---|
| 0.150000 | Neutral | 42.4 | 66.0 | 23.6 | Complied |
| 1.761000 | Live | 23.4 | 56.0 | 32.6 | Complied |
| 1.833000 | Live | 27.0 | 56.0 | 29.0 | Complied |
| 3.619500 | Live | 24.4 | 56.0 | 31.6 | Complied |
| 3.723000 | Live | 25.1 | 56.0 | 30.9 | Complied |

**Results: Average Detector Measurements**

| Frequency (MHz) | Line | Average Level (dBµV) | Limit (dBµV) | Margin (dB) | Result |
|---|---|---|---|---|---|
| 0.154500 | Live | 19.3 | 55.8 | 36.5 | Complied |
| 0.798000 | Live | 23.4 | 46.0 | 22.6 | Complied |
| 1.572000 | Neutral | 27.4 | 46.0 | 18.6 | Complied |
| 1.842000 | Live | 16.7 | 46.0 | 29.3 | Complied |
| 3.637500 | Live | 17.0 | 46.0 | 29.0 | Complied |
| 3.705000 | Live | 18.8 | 46.0 | 27.2 | Complied |

## Receiver/Idle Mode AC Conducted Spurious Emissions (continued)




*Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying tables.*

## 5.2.2. Receiver/Idle Mode Radiated Spurious Emissions

### Test Summary:

| | |
|---|---|
| **FCC Part:** | 15.109(a), 15.225(d) |
| **Test Method Used:** | As detailed in ANSI C63.4 Section 8 and relevant annexes |
| **Frequency Range:** | 9 kHz to 1000 MHz |

### Environmental Conditions:

| | |
|---|---|
| **Temperature (°C):** | 24 |
| **Relative Humidity (%):** | 37 |

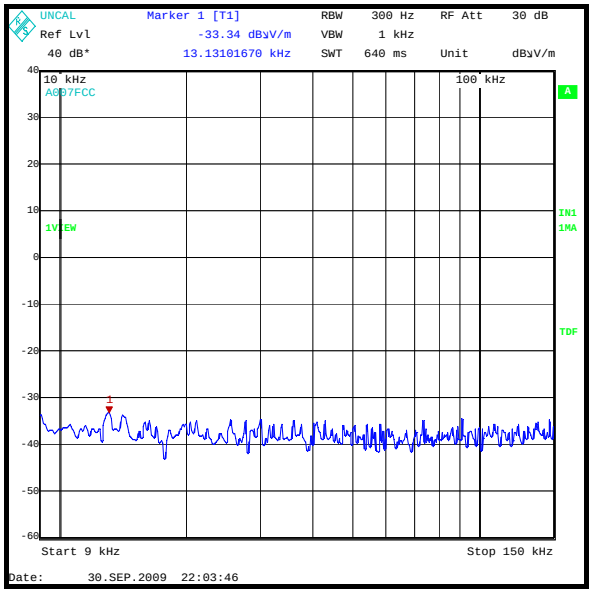
### Results:

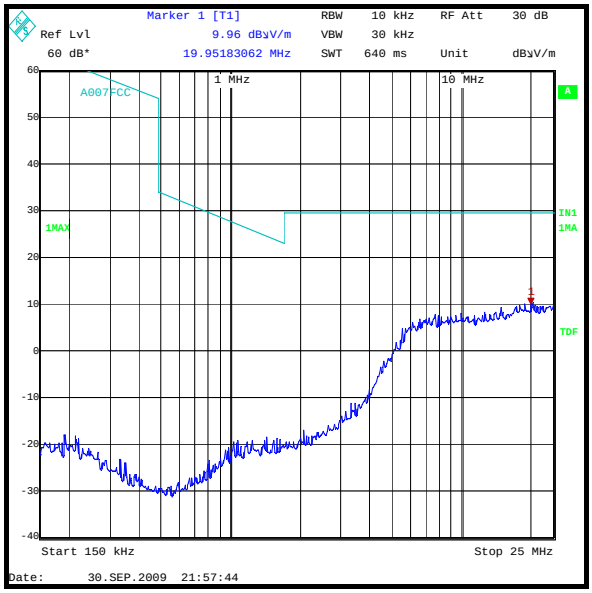
| Frequency (MHz) | Antenna Polarity | Quasi Peak Level (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Result |
|---|---|---|---|---|---|
| 107.588 | Vertical | 26.1 | 43.5 | 17.4 | Complied |
| 963.092 | Vertical | 28.8 | 54.0 | 25.2 | Complied |

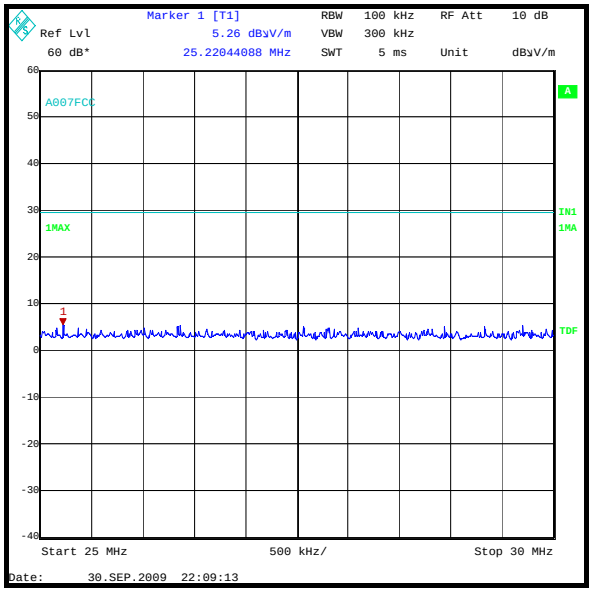
### Note(s):

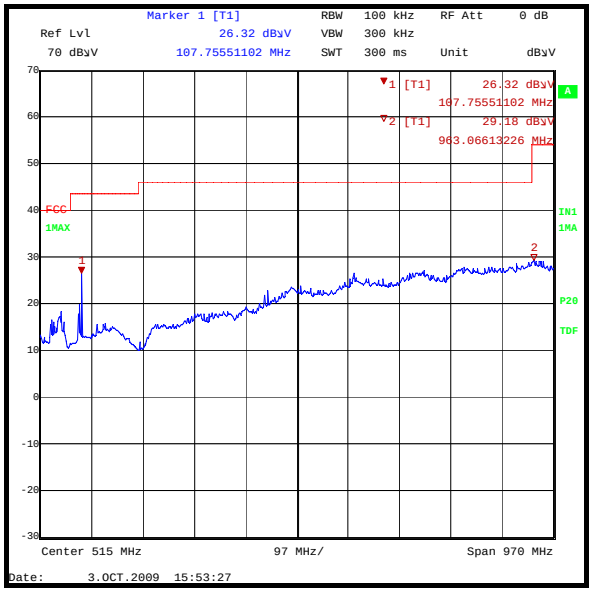
1. Limits below 30 MHz are specified at a test distance of 30 metres, whilst below 0.49 MHz they are specified at a test distance of 300 metres. However, as specified by FCC Section 15.31 (f)(2), measurements may be performed at a closer distance and the measured level corrected to the specified measurement distance by making the measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor.
2. A transducer factor on the measuring instrument was used to extrapolate the results at 3 metres to a distance of 30 metres where required.

## Receiver/Idle Mode Radiated Spurious Emissions (continued)




**30 MHz to 1 GHz**

*Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.*

## 5.2.3. Transmitter Fundamental Field Strength

### Test Summary:

| | |
|---|---|
| **FCC Part:** | 15.225(a)(b)(c)(d) |
| **Test Method Used:** | As detailed in ANSI C63.4 Section 8 and relevant annexes |

### Environmental Conditions:

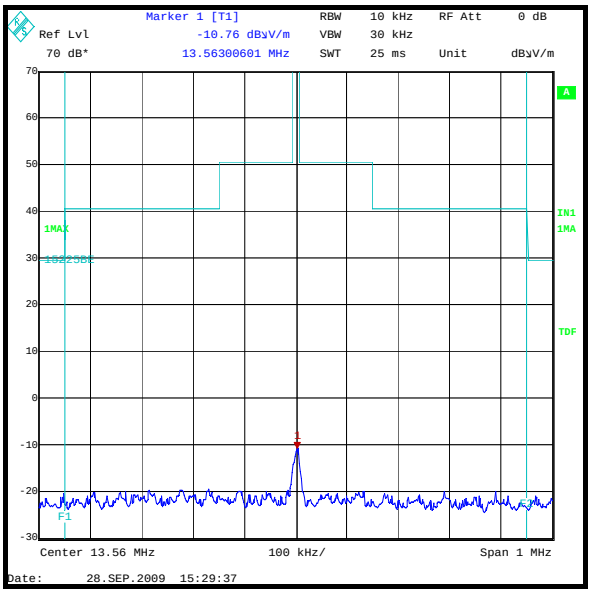
| | |
|---|---|
| **Temperature (°C):** | 25 |
| **Relative Humidity (%):** | 37 |

### Results: Battery Powered Devices

| Frequency (MHz) | Antenna Polarity | Quasi Peak Level (dBµV/m) | Limit at 30 m (dBµV/m) | Margin (dBm) | Result |
|---|---|---|---|---|---|
| 13.56 | 0° to EUT | -10.8 | 84.0 | 94.8 | Complied |

### Note(s):

1. Measurements were performed at 3 metres and results extrapolated to 30 metres.
2. The limit is specified at a test distance of 30 metres. However, as specified by FCC Section 15.31 (f)(2), measurements may be performed at a closer distance and the measured level corrected to the specified measurement distance by making the measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor.



## 5.2.4. Transmitter Radiated Spurious Emissions

### Test Summary:

| | |
|---|---|
| **FCC Part:** | 15.209(a), 15.225(d) |
| **Test Method Used:** | As detailed in ANSI C63.4 Section 8 and relevant annexes |
| **Frequency Range:** | 9 kHz to 1000 MHz |

### Environmental Conditions:

| | |
|---|---|
| **Temperature (°C):** | 23 |
| **Relative Humidity (%):** | 35 |

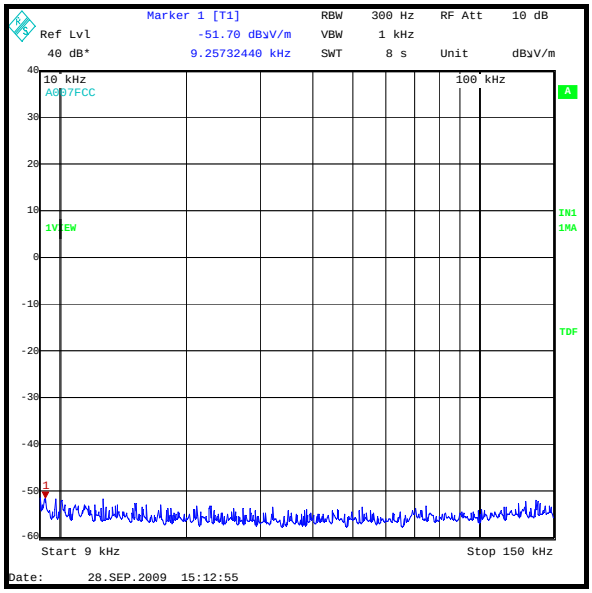
### Results:

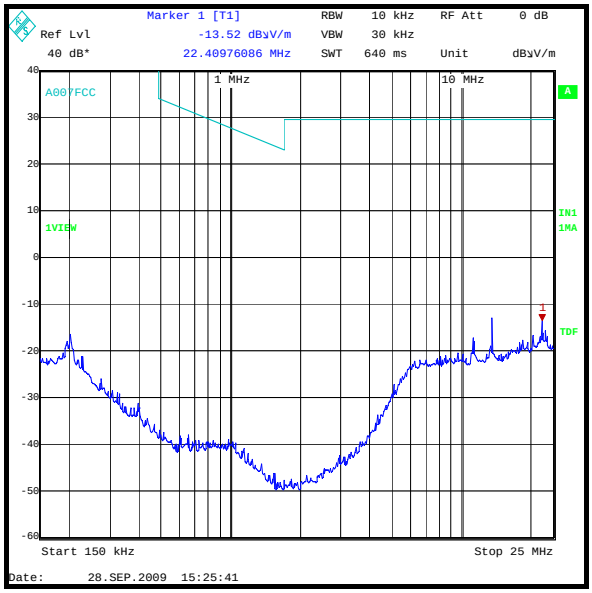
| Frequency (MHz) | Antenna Polarity | Quasi Peak Level (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Result |
|---|---|---|---|---|---|
| 107.588 | Vertical | 26.1 | 43.5 | 17.4 | Complied |

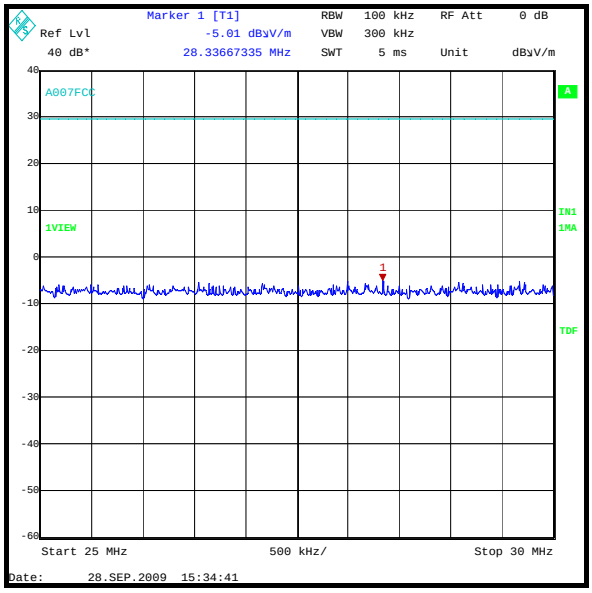
### Note(s):

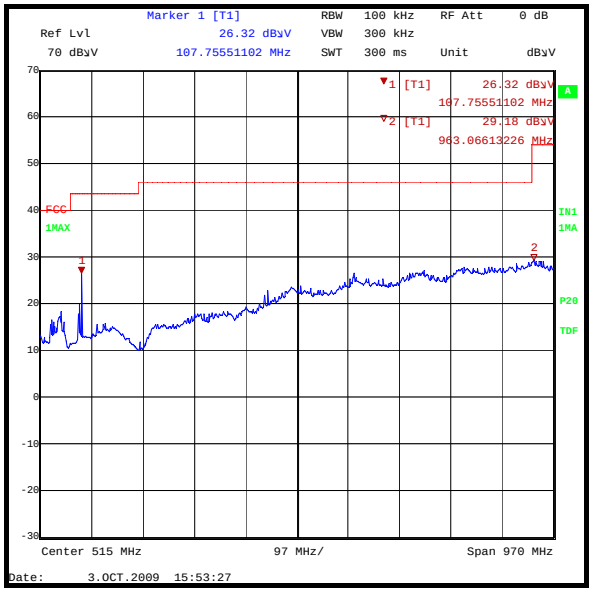
1. Limits below 30 MHz are specified at a test distance of 30 metres, whilst below 0.49 MHz they are specified at a test distance of 300 metres. However, as specified by FCC Section 15.31 (f)(2), measurements may be performed at a closer distance and the measured level corrected to the specified measurement distance by making the measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor.
2. A transducer factor on the measuring instrument was used to extrapolate the results at 3 metres to a distance of 30 metres where required.
3. The emission shown at approximately 13.5 MHz is the fundamental.

## Transmitter Radiated Spurious Emissions (continued)




**30 MHz to 1 GHz**

*Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.*

## 5.2.5. Transmitter Radiated Emissions at Band Edges

### Test Summary:

| | |
|---|---|
| **FCC Part:** | 15.209(a), 15.225(c)(d) |
| **Test Method Used:** | As detailed in ANSI C63.4 Section 8 and relevant annexes |

### Environmental Conditions:

| | |
|---|---|
| **Temperature (°C):** | 24 |
| **Relative Humidity (%):** | 35 |

### Results: Lower Band Edge

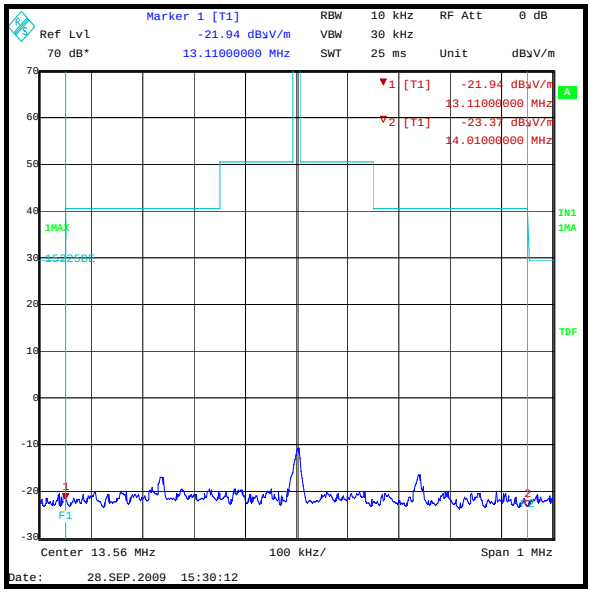
| Frequency (MHz) | Quasi Peak Level (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Result |
|---|---|---|---|---|
| 13.11 | -21.9 | 40.5 | 62.5 | Complied |

### Results: Upper Band Edge

| Frequency (MHz) | Quasi Peak Level (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Result |
|---|---|---|---|---|
| 14.01 | -23.4 | 40.5 | 63.9 | Complied |

### Note(s):

1. Measurements were performed at 3 metres and results extrapolated to 30 metres.
2. A transducer factor on the measuring instrument was used to extrapolate the results at 3 metres to a distance of 30 metres where required.



## 5.2.6. Transmitter 20 dB Bandwidth

### Test Summary:

| | |
|---|---|
| **FCC Part:** | 2.1049 |
| **Test Method Used:** | As detailed in ANSI C63.4 Section 13.1.7 and relevant annexes (see note below) |

### Environmental Conditions:

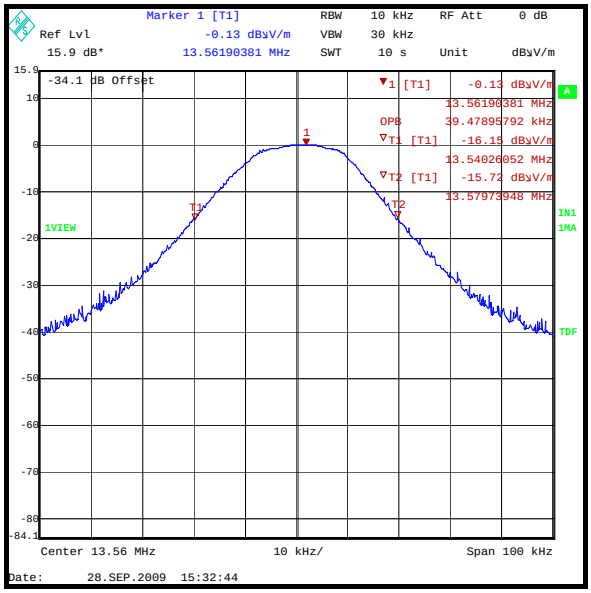
| | |
|---|---|
| **Temperature (°C):** | 24 |
| **Relative Humidity (%):** | 35 |

### Results:

| Transmitter 20 dB Bandwidth (kHz) |
|---|
| 39.479 |

### Note(s):

1. In lieu of the test method detailed in ANSI C63.4 Section 13.1.7 the 20 dB bandwidth was measured using the Occupied Bandwidth function of the spectrum analyser.



## 5.2.7. Transmitter Frequency Stability (Temperature & Voltage Variation)

### Test Summary:

| | |
|---|---|
| **FCC Part:** | 15.225(e) |
| **Test Method Used:** | As detailed in ANSI C63.4 Section 13.1.6 and relevant annexes |

### Environmental Conditions:

| | |
|---|---|
| **Temperature (°C):** | 26 |
| **Relative Humidity (%):** | 34 |

### Results: Maximum frequency error of the EUT with variations in ambient temperature

| Temp (°C) | Nominal Frequency (MHz) | Measured Frequency (MHz) | Frequency Error (Hz) | Frequency Error (%) | Limit (%) | Margin (%) | Result |
|---|---|---|---|---|---|---|---|
| -20 | 13.56 | 13.559991 | 9 | 0.000066 | 0.01 | 0.000934 | Complied |
| 20 | 13.56 | 13.559986 | 14 | 0.000103 | 0.01 | 0.009897 | Complied |
| 50 | 13.56 | 13.559980 | 20 | 0.000147 | 0.01 | 0.009853 | Complied |

### Results: Maximum frequency error of the EUT with variations in nominal operating voltage at an ambient temperature of 20°C

| Supply Voltage (V) | Nominal Frequency (MHz) | Measured Frequency (MHz) | Frequency Error (Hz) | Frequency Error (%) | Limit (%) | Margin (%) | Result |
|---|---|---|---|---|---|---|---|
| 3.4 | 13.56 | 13.559989 | 11 | 0.000081 | 0.01 | 0.009919 | Complied |
| 3.7 | 13.56 | 13.559986 | 14 | 0.000103 | 0.01 | 0.009897 | Complied |
| 4.2 | 13.56 | 13.559990 | 10 | 0.000074 | 0.01 | 0.009926 | Complied |

## 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 |
|---|---|---|---|
| AC Conducted Spurious Emissions | 0.15 MHz to 30 MHz | 95% | ±3.25 dB |
| 20 dB Bandwidth | N/A | 95% | ±0.92 ppm |
| Frequency Stability | N/A | 95% | ±0.92 ppm |
| Radiated Spurious Emissions | 9 kHz to 30 MHz | 95% | ±3.53 dB |
| Radiated Spurious Emissions | 30 MHz to 1000 MHz | 95% | ±2.94 dB |
| Transmitter Fundamental Field Strength | 9 kHz to 30 MHz | 95% | ±3.53 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.

# Appendix 1. Test Equipment Used

| RFI No. | Instrument | Manufacturer | Type No. | Serial No. | Date Last Calibrated | Cal. Interval (Months) |
|---|---|---|---|---|---|---|
| A007 | Antenna | Rohde & Schwarz | HFH2-Z2 | 880 458/020 | 29 Mar 2009 | 12 |
| A1299 | Antenna | Schaffner | CBL6143 | 5094 | 13 Aug 2009 | 12 |
| A1830 | Pulse Limiter | Rhode & Schwarz | ESH3-Z2 | 100668 | 05 Jan 2009 | 12 |
| A649 | LISN | Rohde & Schwarz | ESH3-Z5 | 825562/008 | 19 Mar 2009 | 12 |
| E013 | Environmental Chamber | Sanyo | ATMOS chamber | None | Calibrated before use | - |
| K0001 | 5m SA Chamber | Rainford EMC | N/A | N/A | 04 May 2009 | 12 |
| K0002 | 3m RSE Chamber | Rainford EMC | N/A | N/A | 01 Sep 2009 | 12 |
| M1124 | Spectrum Analyser | Rohde & Schwarz | ESIB26 | 100046K | 09 Mar 2009 | 12 |
| M1263 | Test Receiver | Rohde & Schwarz | ESIB7 | 100265 | 22 Apr 2009 | 12 |
| M1269 | Multimeter | Fluke | 179 | 90250210 | 23 Jun 2009 | 12 |
| M1273 | Test Receiver | Rhode & Schwarz | ESIB 26 | 100275 | 01 Apr 2009 | 12 |
| M1379 | Test Receiver | Rhode & Schwarz | ESIB7 | 100330 | 20 Aug 2009 | 12 |
| S021 | DC Power Supply | Thurlby Thandar Instruments | CPX200 | 061034 | Calibrated before use | - |

**NB** In accordance with UKAS requirements all the measurement equipment is on a calibration schedule.