

## TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: NTT docomo EB-4058

FCC ID: UCE212051A

To: FCC Part 15.225: 2011 Subpart C

**Test Report Serial No.:**  
RFI-RPT-RP87473JD10A

<b>This Test Report Is Issued Under The Authority Of Chris Guy, Head of Global Approvals:</b>	
<b>Checked By:</b>	Sarah Williams
<b>Signature:</b>	
<b>Date of Issue:</b>	27 June 2012

This report is issued in Adobe Acrobat portable document format (PDF). It is only a valid copy of the report if it is being viewed in PDF format with the following security options not allowed: Changing the document, Selecting text and graphics, Adding or changing notes and form fields.

This report may not be reproduced other than in full, except with the prior written approval of RFI Global Services Ltd. The results in this report apply only to the sample(s) tested.

**RFI Global Services Ltd**

Pavilion A, Ashwood Park, Ashwood Way, Basingstoke, Hampshire RG23 8BG

Telephone: +44 (0)1256 312000 Facsimile: +44 (0)1256 312001

Email: [info@rfi-global.com](mailto:info@rfi-global.com) Website: [www.rfi-global.com](http://www.rfi-global.com)

Registered in England and Wales. Company number: 2117901

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 .....	6
2.4. Deviations from the Test Specification .....	6
<b>3. Equipment Under Test (EUT) .....</b>	<b>7</b>
3.1. Identification of Equipment Under Test (EUT) .....	7
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. Receiver/Idle Mode AC Conducted Spurious Emissions .....	11
5.2.2. Receiver/Idle Mode Radiated Spurious Emissions .....	14
5.2.3. Transmitter AC Conducted Spurious Emissions .....	16
5.2.4. Transmitter Fundamental Field Strength .....	19
5.2.5. Transmitter Radiated Spurious Emissions .....	20
5.2.6. Transmitter Band Edge Radiated Emissions .....	23
5.2.7. Transmitter 20 dB Bandwidth .....	24
5.2.8. Transmitter Frequency Stability (Temperature & Voltage Variation) .....	25
<b>6. Measurement Uncertainty .....</b>	<b>26</b>
<b>Appendix 1. Test Equipment Used .....</b>	<b>27</b>

**1. Customer Information**











<b>Company Name:</b>	Panasonic Mobile Communications Development of Europe Ltd.
<b>Address:</b>	Panasonic House Willoughby Road Bracknell Berkshire RG12 8FP United Kingdom

## **2. Summary of Testing**

### **2.1. General Information**

<b>Specification Reference:</b>	47CFR15.225
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications) 2011: Part 15 Subpart C (Radio Frequency Devices) - Section 15.225
<b>Specification Reference:</b>	47CFR15.107 and 47CFR15.109
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications) 2011: Part 15 Subpart B (Radio Frequency Devices) - Sections 15.107 and 15.109
<b>Specification Reference:</b>	47CFR15.209
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications) 2011: Part 15 Subpart C (Intentional Radiators) - Section 15.209
<b>Site Registration:</b>	209735
<b>Location of Testing:</b>	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
<b>Test Dates:</b>	29 May 2012 to 26 June 2012

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

<b>FCC Reference (47CFR)</b>	<b>Measurement</b>	<b>Result</b>
Part 15.107(a)	Receiver/Idle Mode AC Conducted Spurious Emissions	
Part 15.109	Receiver/Idle Mode Radiated Spurious Emissions	
Part 15.207	Transmitter AC Conducted Emissions	
Part 15.225(a)(b)(c)(d)	Transmitter Fundamental Field Strength	
Part 15.209(a), 15.225(d)	Transmitter Radiated Spurious Emissions	
Part 15.209(a), 15.225(c)(d)	Transmitter Band Edge Radiated Emissions	
Part 2.1049	Transmitter 20 dB Bandwidth	
Part 15.225(e)	Transmitter Frequency Stability (Temperature & Voltage Variation)	
<b>Key to Results</b>  = Complied  = Did not comply		

**2.3. Methods and Procedures**

<b>Reference:</b>	ANSI C63.4 (2009)
<b>Title:</b>	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
<b>Reference:</b>	ANSI C63.10 (2009)
<b>Title:</b>	American National Standard for Testing Unlicensed Wireless Devices

**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>	NTT docomo
<b>Model Name or Number:</b>	EB-4058
<b>IMEI:</b>	351807050017170 (Radiated sample #1)
<b>Hardware Version Number:</b>	Rev E
<b>Software Version Number:</b>	ACPU: fujiko-ics-09-0316 CCPU: HY11-N5119_ALL_00.20.31
<b>FCC ID:</b>	UCE212051A

<b>Brand Name:</b>	NTT docomo
<b>Model Name or Number:</b>	EB-4058
<b>IMEI:</b>	351807050017212 (Radiated sample #2)
<b>Hardware Version Number:</b>	Rev E
<b>Software Version Number:</b>	ACPU: fujiko-ics-09-0316 CCPU: HY11-N5119_ALL_00.20.31
<b>FCC ID:</b>	UCE212051A

<b>Brand Name:</b>	NTT docomo
<b>Description:</b>	Battery
<b>Model Name or Number:</b>	Not stated

<b>Brand Name:</b>	NTT docomo
<b>Description:</b>	AC Charger
<b>Model Name or Number:</b>	Type P01

<b>Brand Name:</b>	NTT docomo
<b>Description:</b>	USB Data cable
<b>Model Name or Number:</b>	Type 01

<b>Brand Name:</b>	NTT docomo
<b>Description:</b>	Personal Hands-Free
<b>Model Name or Number:</b>	Type 02

#### **3.2. Description of EUT**

The equipment under test was a Dual Mode UMTS/GSM Mobile Phone with WLAN, *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**

<b>Tested Technology:</b>	RFID	
<b>Category of Equipment:</b>	Transceiver	
<b>Channel Spacing:</b>	Single channel device	
<b>Transmit Frequency Range:</b>	13.56 MHz	
<b>Receive Frequency Range:</b>	13.56 MHz	
<b>Power Supply Requirement:</b>	Nominal	3.8 V
	Minimum	3.23 V
	Maximum	4.37 V
<b>Tested Temperature Range:</b>	Minimum	-20°C
	Maximum	50°C

### **3.5. Support Equipment**

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

<b>Brand Name:</b>	Panasonic
<b>Description:</b>	Laptop PC
<b>Model Name or Number:</b>	CF-74

<b>Brand Name:</b>	Not marked or stated
<b>Description:</b>	2 GB Micro SD Card
<b>Model Name or Number:</b>	Not Stated

<b>Brand Name:</b>	Buffalo
<b>Description:</b>	USB hub
<b>Model Name or Number:</b>	BSH3U01

<b>Brand Name:</b>	Not Stated
<b>Description:</b>	Dummy Battery
<b>Model Name or Number:</b>	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 test mode was enabled by means of bespoke software provided by the client.
- Receiver Idle/standby mode radiated spurious emission tests were performed with the AC Charger and PHF 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.
- Transmitter radiated spurious emission tests were performed with the PHF and USB data cable were connected to the EUT as this was found to be the worst case during pre-scans. The USB cable was terminated into a hub. All appropriate accessories were individually connected and measurements made during pre-scans to determine the worst case combination.
- AC conducted emissions tests were performed with the EUT connected to the AC charger. The AC charger was connected to a 120 VAC 60 Hz single phase supply via a LISN.

## **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 Uncertainties* for details.

## 5.2. Test Results

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

#### Test Summary:

Test Engineer:	Nick Steele	Test Date:	12 June 2012
Test Sample IMEI:	351807050017170		

FCC Reference:	Part 15.107
Test Method Used:	As detailed in ANSI C63.10 Section 6.2 referencing ANSI C63.4

#### Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	39

#### Results: Live / Quasi Peak

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.150	Live	48.2	66.0	17.8	Complied
0.303	Live	38.5	60.2	21.7	Complied
1.167	Live	36.2	56.0	19.8	Complied
1.334	Live	33.8	56.0	22.2	Complied
1.586	Live	35.8	56.0	20.2	Complied
3.489	Live	36.3	56.0	19.7	Complied
3.813	Live	35.5	56.0	20.5	Complied
4.862	Live	33.1	56.0	22.9	Complied

#### Results: Live / Average

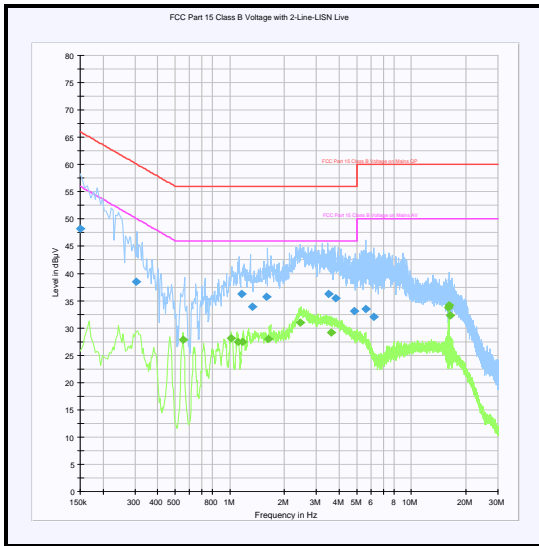
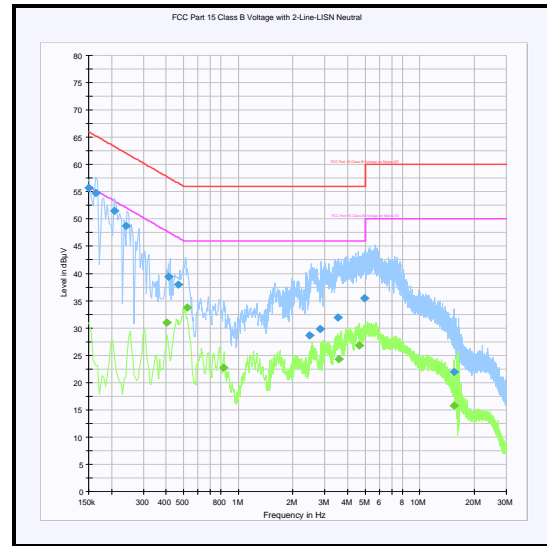
Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.551	Live	27.9	46.0	18.1	Complied
1.014	Live	28.1	46.0	17.9	Complied
1.113	Live	27.5	46.0	18.5	Complied
1.176	Live	27.5	46.0	18.5	Complied
1.631	Live	28.0	46.0	18.0	Complied
2.436	Live	31.0	46.0	15.0	Complied
3.606	Live	29.1	46.0	16.9	Complied
16.026	Live	33.7	50.0	16.3	Complied
16.152	Live	34.2	50.0	15.8	Complied
16.260	Live	32.3	50.0	17.7	Complied

**Receiver/Idle Mode AC Conducted Spurious Emissions (continued)****Results: Neutral / Quasi Peak**

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.150000	Neutral	55.6	66.0	10.4	Complied
0.163500	Neutral	54.7	65.3	10.6	Complied
0.208500	Neutral	51.6	63.3	11.7	Complied
0.240000	Neutral	48.8	62.1	13.3	Complied
0.411000	Neutral	39.4	57.6	18.2	Complied
0.465000	Neutral	37.9	56.6	18.7	Complied
4.969500	Neutral	35.4	56.0	20.6	Complied

**Results: Neutral / Average**

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.402	Neutral	31.0	47.8	16.8	Complied
0.524	Neutral	33.7	46.0	12.3	Complied
0.830	Neutral	22.7	46.0	23.3	Complied
3.579	Neutral	24.3	46.0	21.7	Complied
4.655	Neutral	26.9	46.0	19.1	Complied
15.482	Neutral	15.7	50.0	34.3	Complied

**Receiver/Idle Mode AC Conducted Spurious Emissions (continued)****Live****Neutral**

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

**5.2.2. Receiver/Idle Mode Radiated Spurious Emissions****Test Summary:**

<b>Test Engineers:</b>	Nick Steele & Andrew Edwards	<b>Test Dates:</b>	29 May 2012 & 25 June 2012
<b>Test Sample IMEI:</b>	351807050017170		

<b>FCC Reference:</b>	Part 15.109
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Sections 6.3, 6.4 and 6.5 referencing ANSI C63.4
<b>Frequency Range:</b>	9 kHz to 1000 MHz

**Environmental Conditions:**

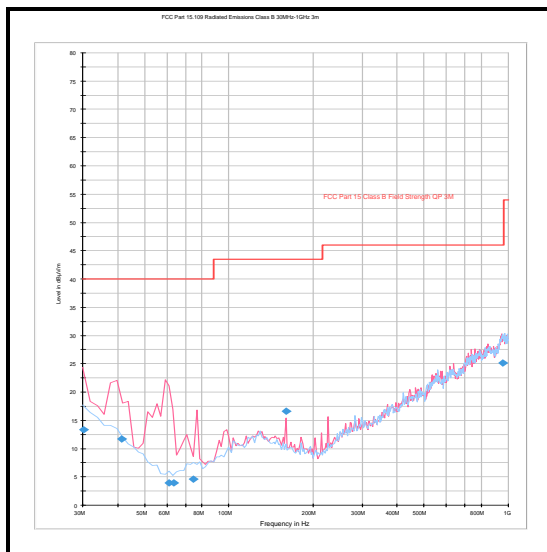
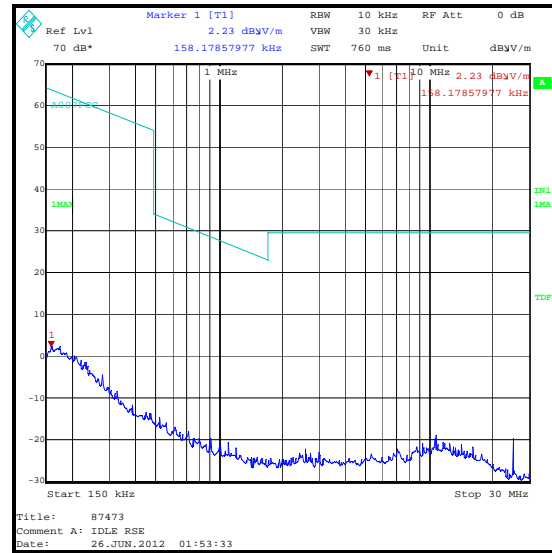
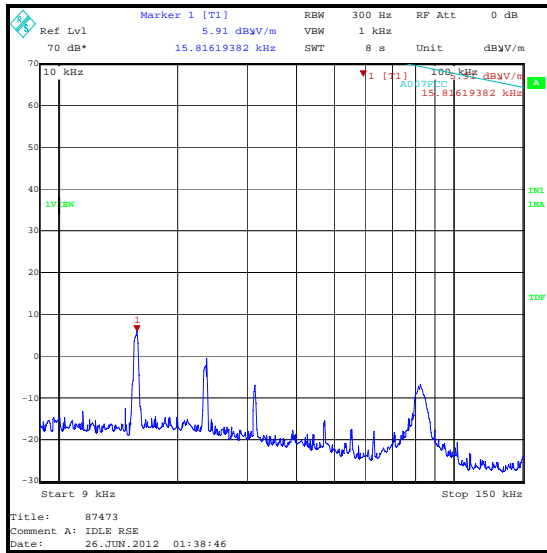
<b>Temperature (°C):</b>	28
<b>Relative Humidity (%):</b>	35

**Results: Quasi Peak**

<b>Frequency (MHz)</b>	<b>Antenna Polarity</b>	<b>Level (dBµV/m)</b>	<b>Limit (dBµV/m)</b>	<b>Margin (dB)</b>	<b>Result</b>
30.284	Vertical	13.3	40.0	26.7	Complied
41.436	Vertical	11.6	40.0	28.4	Complied
63.387	Vertical	4.0	40.0	36.0	Complied
74.600	Vertical	4.6	40.0	35.4	Complied
160.005	Vertical	16.6	43.5	26.9	Complied
954.842	Horizontal	25.2	46.0	20.8	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 using the square of an inverse linear distance extrapolation factor (40dB/decade).
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. A distance extrapolation factor of 40 dB was used.
3. Final measurement values include corrections for antenna factor and cable losses.
4. All emissions on the 9 kHz to 150 kHz plot were investigated and found to be radiating from the test site turntable.
5. All other emissions shown on the pre-scan plots were investigated and found to be >20 dB below the applicable limit or below the measurement system noise floor.
6. Measurements in the range 30 MHz to 1 GHz were performed in a semi-anechoic chamber (RFI 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

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

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

**5.2.3. Transmitter AC Conducted Spurious Emissions****Test Summary:**

<b>Test Engineer:</b>	David Doyle	<b>Test Date:</b>	26 June 2012
<b>Test Sample IMEI:</b>	351807050017212		

<b>FCC Reference:</b>	Part 15.207
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Section 6.2 referencing ANSI C63.4

**Environmental Conditions:**

<b>Temperature (°C):</b>	25
<b>Relative Humidity (%):</b>	39

**Results: Live / Quasi Peak**

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.150000	Live	40.8	66.0	25.2	Complied
1.122000	Live	33.8	56.0	22.2	Complied
2.049000	Live	34.9	56.0	21.1	Complied
2.634000	Live	37.2	56.0	18.8	Complied
3.624000	Live	36.4	56.0	19.6	Complied
4.168500	Live	35.8	56.0	20.2	Complied
4.866000	Live	35.5	56.0	20.5	Complied
4.996500	Live	35.6	56.0	20.4	Complied
5.545500	Live	35.5	60.0	24.5	Complied
13.560000	Live	49.8	60.0	10.2	Complied

**Results: Live / Average**

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
1.108500	Live	25.7	46.0	20.3	Complied
2.139000	Live	27.9	46.0	18.1	Complied
2.458500	Live	30.3	46.0	15.7	Complied
3.777000	Live	29.1	46.0	16.9	Complied
13.560000	Live	48.2	50.0	1.8	Complied
16.066500	Live	32.5	50.0	17.5	Complied
16.152000	Live	33.5	50.0	16.5	Complied
16.237500	Live	31.0	50.0	19.0	Complied

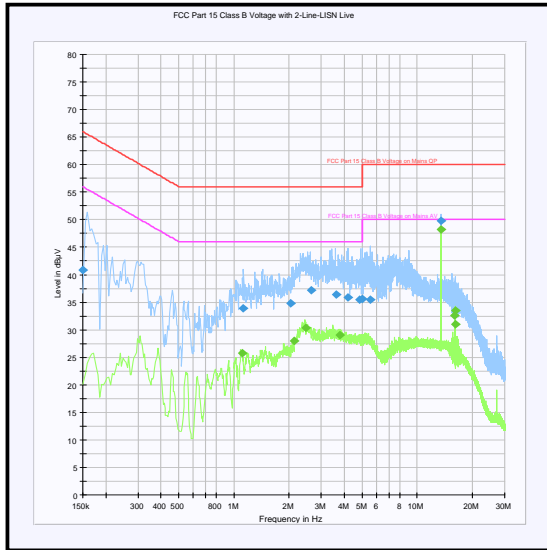
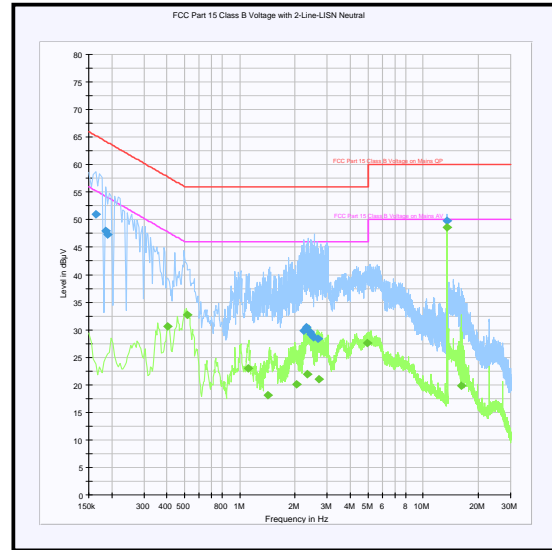


**Transmitter AC Conducted Spurious Emissions (continued)****Results: Neutral / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.163500	Neutral	51.0	65.3	14.3	Complied
0.186000	Neutral	47.9	64.2	16.3	Complied
0.190500	Neutral	47.3	64.0	16.7	Complied
2.229000	Neutral	29.8	56.0	26.2	Complied
2.319000	Neutral	30.4	56.0	25.6	Complied
2.418000	Neutral	29.6	56.0	26.4	Complied
2.454000	Neutral	29.2	56.0	26.8	Complied
2.512500	Neutral	28.6	56.0	27.4	Complied
2.670000	Neutral	28.4	56.0	27.6	Complied
13.560000	Neutral	49.7	60.0	10.3	Complied

**Results: Neutral / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.402000	Neutral	30.6	47.8	17.2	Complied
0.519000	Neutral	32.7	46.0	13.3	Complied
1.108500	Neutral	23.0	46.0	23.0	Complied
1.419000	Neutral	18.1	46.0	27.9	Complied
2.035500	Neutral	20.1	46.0	25.9	Complied
2.332500	Neutral	21.9	46.0	24.1	Complied
2.692500	Neutral	21.1	46.0	24.9	Complied
4.969500	Neutral	27.5	46.0	18.5	Complied
13.560000	Neutral	48.6	50.0	1.4	Complied
16.120500	Neutral	19.8	50.0	30.2	Complied

**Transmitter AC Conducted Spurious Emissions (continued)****Live****Neutral**

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

**5.2.4. Transmitter Fundamental Field Strength****Test Summary:**

Test Engineer:	Andrew Edwards	Test Date:	25 June 2012
Test Sample IMEI:	351807050017212		

FCC Reference:	Part 15.225(a)(b)(c)(d)
Test Method Used:	ANSI C63.10 Section 6.4

**Environmental Conditions:**

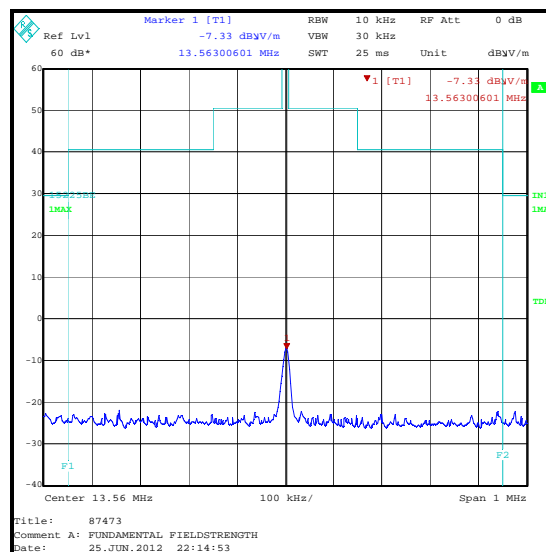
Temperature (°C):	27
Relative Humidity (%):	37

**Results: Quasi Peak**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit at 30 m (dB $\mu$ V/m)	Margin (dB)	Result
13.56	90° to EUT	-7.0	84.0	91.0	Complied

**Note(s):**

1. 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 using the square of an inverse linear distance extrapolation factor (40dB/decade).
2. A transducer factor on the measuring instrument was used to extrapolate the results at 3 metres to a distance of 30 metres. A distance extrapolation factor of 40 dB was used.



**5.2.5. Transmitter Radiated Spurious Emissions****Test Summary:**

<b>Test Engineer:</b>	Andrew Edwards	<b>Test Date:</b>	25 June 2012
<b>Test Sample IMEI:</b>	351807050017212		

<b>FCC Reference:</b>	Part 15.225(d) & 15.209(a)
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Sections 6.3, 6.4 and 6.5 referencing ANSI C63.4
<b>Frequency Range:</b>	9 kHz to 1000 MHz

**Environmental Conditions:**

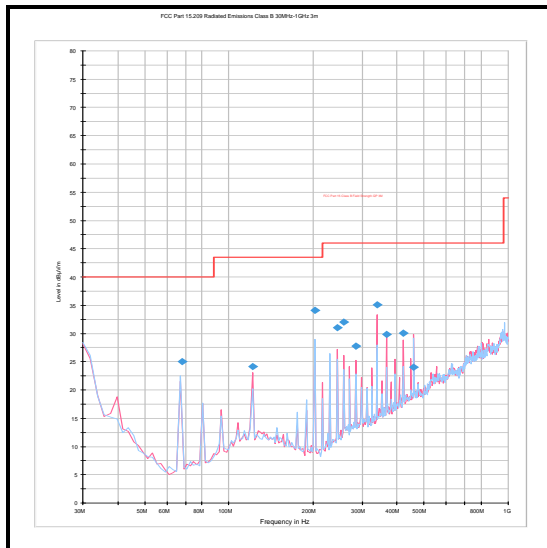
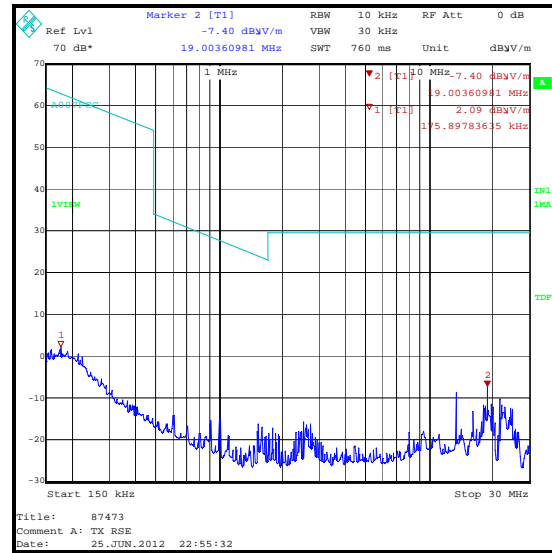
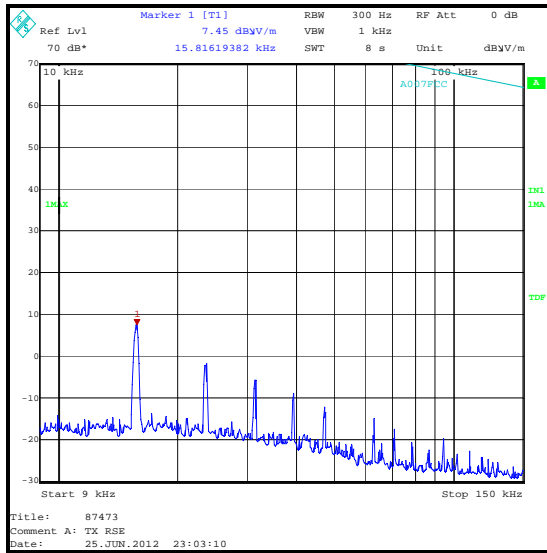
<b>Temperature (°C):</b>	28
<b>Relative Humidity (%):</b>	36

**Results: Quasi Peak**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
67.804	Horizontal	25.1	40.0	14.9	Complied
122.041	Vertical	24.1	43.5	19.4	Complied
203.405	Vertical	34.1	43.5	9.4	Complied
244.083	Vertical	31.1	46.0	14.9	Complied
257.642	Vertical	32.0	46.0	14.0	Complied
284.750	Vertical	27.8	46.0	18.2	Complied
339.006	Vertical	35.1	46.0	10.9	Complied
366.115	Vertical	29.9	46.0	16.1	Complied
420.361	Vertical	30.1	46.0	15.9	Complied
458.834	Vertical	24.0	46.0	22.0	Complied

**Transmitter Radiated Spurious Emissions (continued)****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 using the square of an inverse linear distance extrapolation factor (40dB/decade).
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. A distance extrapolation factor of 40 dB was used.
3. Final measurement values include corrections for antenna factor and cable losses.
4. The emission shown at approximately 13.56 MHz is the fundamental.
5. All emissions on the 9 kHz to 150 kHz plot were investigated and found to be radiating from the test site turntable.
6. All other emissions shown on the pre-scan plots were investigated and found to be >20 dB below the applicable limit or below the measurement system noise floor.
7. Measurements in the range 30 MHz to 1 GHz were performed in a semi-anechoic chamber (RFI 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.

**Transmitter Radiated Spurious Emissions (continued)**

**5.2.6. Transmitter Band Edge Radiated Emissions****Test Summary:**

Test Engineer:	Andrew Edwards	Test Date:	25 June 2012
Test Sample IMEI:	351807050017212		

FCC Reference:	Part 15.225(c)(d) & 15.209(a)
Test Method Used:	As detailed in ANSI C63.10 Section 6.9.2

**Environmental Conditions:**

Temperature (°C):	28
Relative Humidity (%):	36

**Results: Quasi Peak Lower Band Edge**

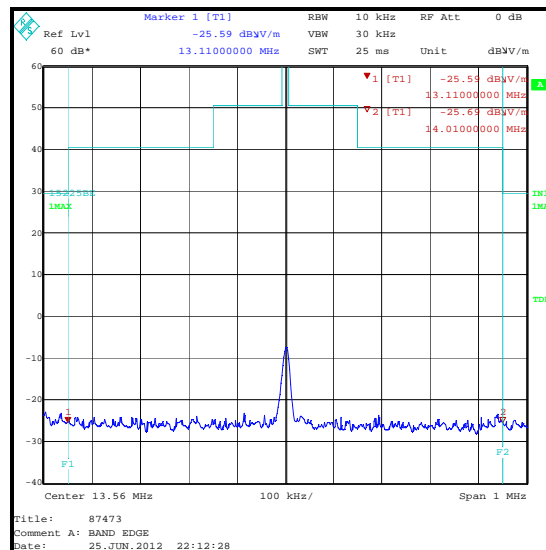
Frequency (MHz)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
13.11	-18.4	29.5	47.9	Complied

**Results: Quasi Peak Upper Band Edge**

Frequency (MHz)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
14.01	-18.0	29.5	47.5	Complied

**Note(s):**

1. A transducer factor on the measuring instrument was used to extrapolate the results at 3 metres to a distance of 30 metres where required.
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. A distance extrapolation factor of 40 dB was used.



**5.2.7. Transmitter 20 dB Bandwidth****Test Summary:**

Test Engineer:	Andrew Edwards	Test Date:	25 June 2012
Test Sample IMEI:	351807050017212		

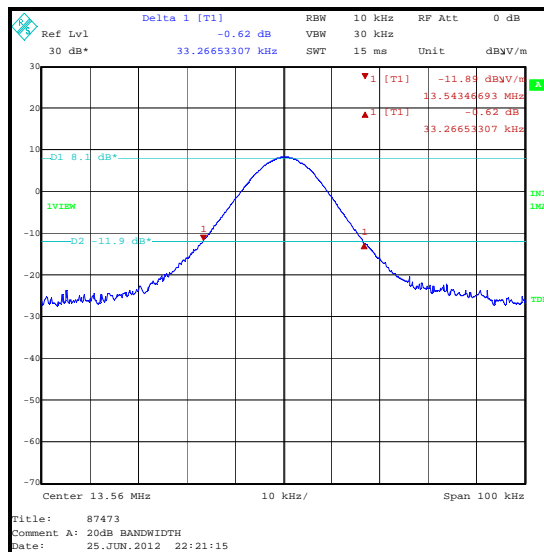
FCC Reference:	Part 2.1049
Test Method Used:	As detailed in ANSI C63.10 Section 6.9.1

**Environmental Conditions:**

Temperature (°C):	28
Relative Humidity (%):	36

**Results:**

<b>20 dB Bandwidth (kHz)</b>
33.267





**5.2.8. Transmitter Frequency Stability (Temperature & Voltage Variation)****Test Summary:**

<b>Test Engineer:</b>	David Doyle	<b>Test Date:</b>	26 June 2012
<b>Test Sample IMEI:</b>	351807050017212		

<b>FCC Reference:</b>	Part 15.225(e)
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Section 6.8.1 and 6.8.2

**Environmental Conditions:**

<b>Ambient Temperature (°C):</b>	25
<b>Ambient Relative Humidity (%):</b>	40

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

Temperature (°C)	Time after Start-up			
	0 minutes	2 minutes	5 minutes	10 minutes
-20	13.560105 MHz	13.560103 MHz	13.560102 MHz	13.560102 MHz
20	13.560025 MHz	13.560017 MHz	13.560015 MHz	13.560011 MHz
50	13.599890 MHz	13.559884 MHz	13.559881 MHz	13.559877 MHz

Frequency with Worst Case Deviation (MHz)	Frequency Error (Hz)	Frequency Error (%)	Limit (%)	Margin (%)	Result
13.559877	123	0.000907	0.01	0.009093	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
3.23	13.56	13.560011	11	0.000081	0.01	0.009919	Complied
3.8	13.56	13.560025	25	0.000184	0.01	0.009816	Complied
4.37	13.56	13.560018	18	0.000133	0.01	0.009867	Complied

**Note(s):**

1. A dummy battery was connected to the EUT. The dummy battery had cables which connected to a DC power supply to vary the voltage.
2. Voltage was monitored throughout the test with a calibrated digital voltmeter.

## **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	13 MHz to 14 MHz	95%	±0.92 ppm
Frequency Stability	13 MHz to 14 MHz	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	13 MHz to 14 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 Calibration Due	Cal. Interval
A1830	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100668	25 Feb 2013	12
A1834	Attenuator	Hewlett Packard	8491B	10444	29 Jan 2013	12
A553	Antenna	Chase	CBL6111A	1593	15 Feb 2013	12
A649	LISN	Rohde & Schwarz	ESH3-Z5	825562/008	19 Apr 2013	12
E0513	Environmental Chamber	TAS	LT600	23900506	Calibrated Before Use	-
G0543	Amplifier	Sonoma	310N	230801	13 Jul 2012	3
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	31 Aug 2012	12
M1068	Thermometer	Iso-Tech	RS55	93102884	02 Apr 2013	12
M1251	DMM	Fluke	175	89170179	29 Jul 2012	12
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016	08 Nov 2012	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	03 Feb 2013	12
M1379	Test Receiver	Rohde & Schwarz	ESIB7	100330	20 Sep 2012	12
M1568	Magnetic Loop	Rohde & Schwarz	HFH2-Z2	879284/2	08 Feb 2013	12
S0537	Dual Power Supply	TTI	EL302D	249928	Calibrated Before Use	-

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