



TEST REPORT

Test Report No. : UL-RPT-RP85051JD01F V2.0

Manufacturer : Panasonic Mobile Communications Development of Europe Ltd.
Model No. : NTT DoCoMo EB-4054
FCC ID : UCE211046A
Technology : RFID – 13.56 MHz
Test Standard(s) : FCC Part 15.225

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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 Test Report Serial Number RFI-RPT-RP85051JD01F. The original test report was issued under the previous company name of RFI Global Services Ltd.

Date of Issue: 17 June 2015

Checked by:

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Senior Engineer, Radio Laboratory

Issued by :

pp

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UL VS LTD



This laboratory is accredited by UKAS.
The tests reported herein have been
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1. Customer Information










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

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR15.225
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) : 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): Part 15 Subpart B (Radio Frequency Devices) - Sections 15.107 and 15.109
Specification Reference:	47CFR15.209
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Section 15.209
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:	17 January 2012 to 26 January 2012

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
Part 15.107(a)	Receiver/Idle Mode AC Conducted Spurious Emissions	
Part 15.109	Receiver/Idle Mode Radiated Spurious 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)	
Key to Results		
 = Complied  = Did not comply		

2.3. Methods and Procedures

Reference:	ANSI C63.4 (2009)
Title:	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
Reference:	ANSI C63.10 (2009)
Title:	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)

Brand Name:	NTT DoCoMo
Model Name or Number:	EB-4054
IMEI:	359569040021561 (<i>Radiated sample #1</i>) 359569040021306 (<i>Radiated sample #2</i>)
Hardware Version Number:	Rev C
Software Version Number:	ACPU: dcm-07-0215 CCPU: R1B_1_EC02_01_DOO
FCC ID:	UCE211046A

Brand Name:	NTT DoCoMo
Description:	AC Charger
Model Name or Number:	P01
Hardware Version Number:	N0JZZY000008

Brand Name:	NTT DoCoMo
Description:	Charge/USB Data cable
Model Name or Number:	Not marked or stated

Brand Name:	NTT DoCoMo
Description:	Personal Hands-Free
Model Name or Number:	Not marked or stated

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

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

3.5. Support Equipment

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

Brand Name:	Panasonic
Description:	Laptop
Model Name or Number:	CF74

Brand Name:	Buffalo
Description:	USB Hub
Model Name or Number:	BSH3U01

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 sample with IMEI 359569040021306 was used for frequency stability measurements.
- The sample with IMEI 359569040021561 was used for all other measurements.
- The RFID transmitter test mode was enabled by means of bespoke software on a laptop PC provided by the Customer.
- Receiver Idle/standby mode radiated spurious emission tests were performed with the AC Charger and Personal Hands-Free connected to the EUT.
- Transmitter radiated spurious emission tests were performed with the Charge/USB Data cable and Personal Hands-Free connected to the EUT. The USB cable was terminated into a USB hub supplied by the client.
- As the EUT is not capable of transmitting while charging, no AC Mains conducted emissions (150 kHz to 30 MHz) tests were performed in transmit mode.

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:	Mark Percival	Test Date:	24 January 2012
Test Sample IMEI:	359569040021561		

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

Environmental Conditions:

Temperature (°C):	20
Relative Humidity (%):	23

Results: Live / Quasi Peak

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.357	Live	43.0	58.8	15.8	Complied
0.645	Live	35.3	56.0	20.7	Complied
0.758	Live	36.5	56.0	19.5	Complied
0.762	Live	39.7	56.0	16.3	Complied
0.762	Live	39.0	56.0	17.0	Complied
0.870	Live	37.2	56.0	18.8	Complied
0.992	Live	40.2	56.0	15.8	Complied
1.005	Live	39.5	56.0	16.5	Complied
1.509	Live	40.6	56.0	15.4	Complied

Results: Live / Average

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.362	Live	35.3	48.7	13.4	Complied
0.735	Live	29.1	46.0	16.9	Complied
1.086	Live	26.6	46.0	19.4	Complied
1.185	Live	31.4	46.0	14.6	Complied
1.388	Live	27.9	46.0	18.1	Complied
1.442	Live	26.3	46.0	19.7	Complied
1.478	Live	28.8	46.0	17.2	Complied
1.559	Live	26.2	46.0	19.8	Complied
1.577	Live	25.6	46.0	20.4	Complied

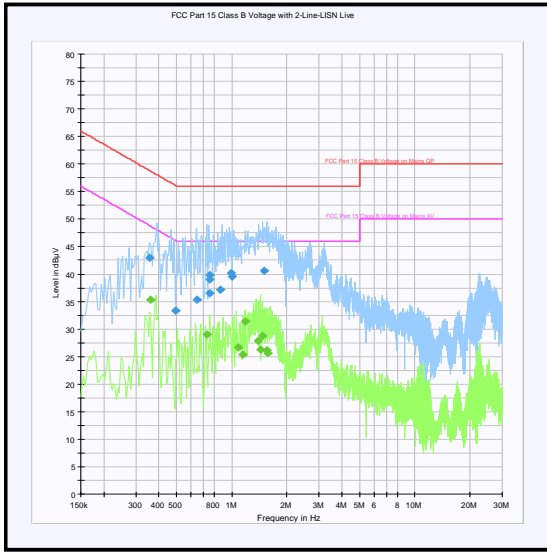
Receiver/Idle Mode AC Conducted Spurious Emissions (continued)**Results: Neutral / Quasi Peak**

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
1.064	Neutral	30.8	56.0	25.2	Complied
1.113	Neutral	31.2	56.0	24.8	Complied
1.208	Neutral	32.4	56.0	23.6	Complied
1.275	Neutral	32.6	56.0	23.4	Complied
1.284	Neutral	31.9	56.0	24.1	Complied
1.410	Neutral	32.2	56.0	23.8	Complied
1.487	Neutral	33.1	56.0	23.0	Complied
1.842	Neutral	32.4	56.0	23.6	Complied
1.860	Neutral	32.7	56.0	23.3	Complied
2.112	Neutral	19.6	56.0	36.4	Complied

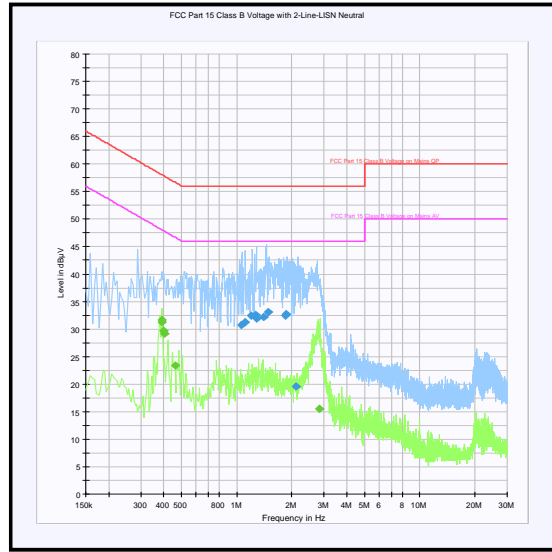
Results: Neutral / Average

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.389	Neutral	31.2	48.1	16.9	Complied
0.389	Neutral	31.7	48.1	16.4	Complied
0.398	Neutral	29.7	47.9	18.2	Complied
0.402	Neutral	29.1	47.8	18.7	Complied
0.461	Neutral	23.4	46.7	23.3	Complied
2.832	Neutral	15.6	46.0	30.4	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:**

Test Engineers:	Andrew Edwards & Patrick Jones	Test Dates:	17 January 2012, 18 January 2012 & 20 January 2012
Test Sample IMEI:	359569040021561		

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

Environmental Conditions:

Temperature (°C):	23 to 26
Relative Humidity (%):	23 to 28

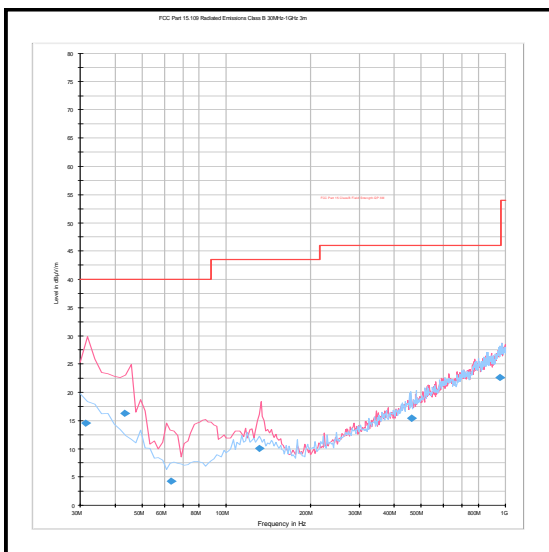
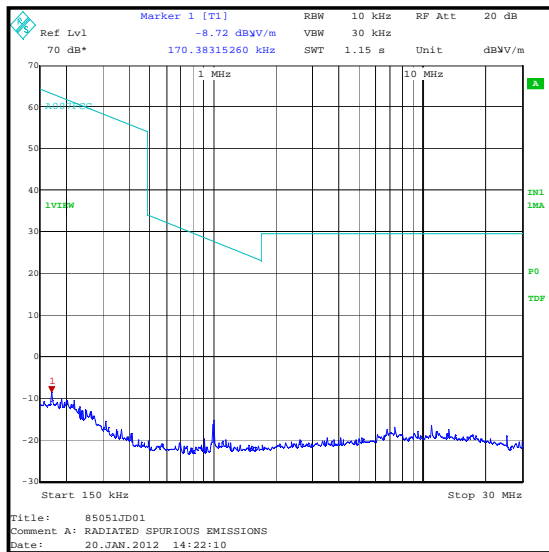
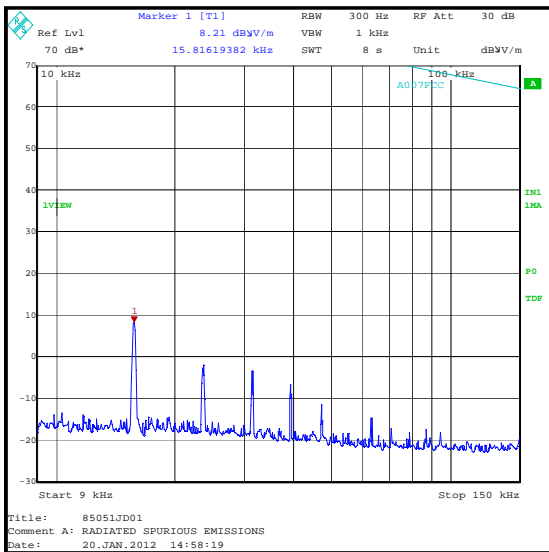
Results: Quasi Peak

Frequency (MHz)	Antenna Polarity	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
31.393	Vertical	14.6	40.0	25.4	Complied
43.238	Vertical	16.3	40.0	23.7	Complied
63.416	Vertical	4.2	40.0	35.8	Complied
131.934	Vertical	10.0	43.5	33.5	Complied
460.556	Horizontal	15.4	46.0	30.6	Complied
957.191	Horizontal	22.6	46.0	23.4	Complied

Note(s):

- 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 (40 dB/decade).
- 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.
- Final measurement values include corrections for antenna factor and cable losses.
- All emissions on the 9 kHz to 150 kHz plot were investigated and found to be radiating from the test site turntable.
- 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.
- 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 Fundamental Field Strength

Test Summary:

Test Engineer:	Patrick Jones	Test Date:	20 January 2012
Test Sample IMEI:	359569040021561		

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

Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	23

Results: Quasi Peak

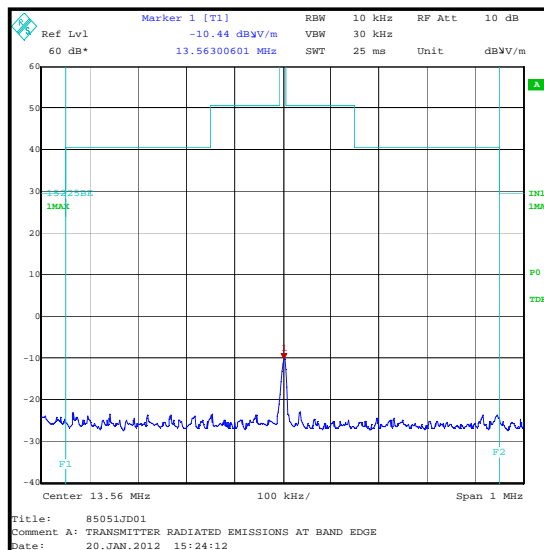
Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit at 30 m (dBµV/m)	Margin (dB)	Result
13.56	90° to EUT	9.0	84.0	75.0	Complied

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.

Note: An additional 20dB has been added to attain the final value shown in the table; this is to account for a transducer factor that was not included during the original measurement.

i.e.: -11 dBuV/m + 20 dB = 9 dBuV/m



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

Test Engineer:	Andrew Edwards & Patrick Jones	Test Date:	18 January 2012 & 20 January 2012
Test Sample IMEI:	359569040021561		

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

Environmental Conditions:

Temperature (°C):	28
Relative Humidity (%):	24

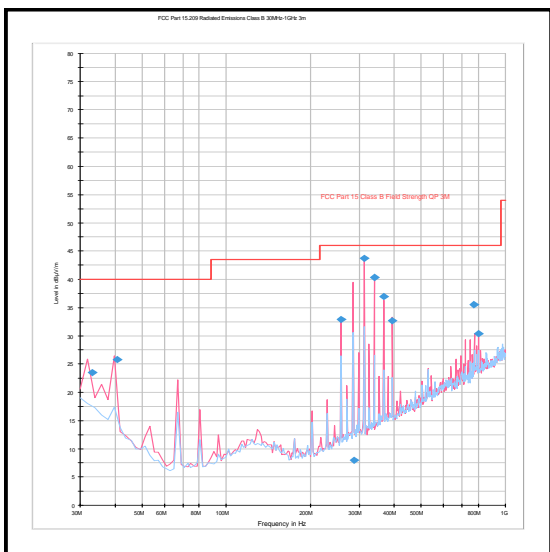
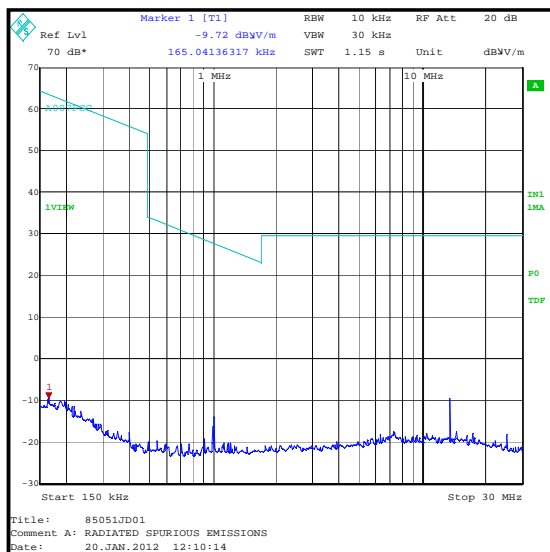
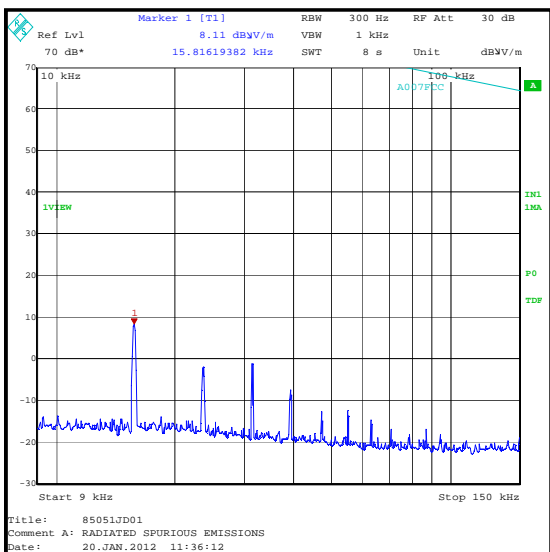
Results: Quasi Peak

Frequency (MHz)	Antenna Polarity	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
33.159	Vertical	23.5	40.0	16.5	Complied
40.686	Vertical	25.8	40.0	14.2	Complied
257.642	Vertical	32.9	46.0	13.1	Complied
284.750	Vertical	39.0	46.0	7.0	Complied
311.869	Vertical	43.7	46.0	2.3	Complied
338.997	Vertical	40.3	46.0	5.7	Complied
366.105	Vertical	36.9	46.0	9.1	Complied
393.233	Vertical	32.6	46.0	13.4	Complied
772.898	Vertical	35.5	46.0	10.5	Complied
800.006	Vertical	30.4	46.0	15.6	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 (40 dB/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)



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

Note: All emissions on the 9 KHz – 30MHz pre-scans are low by a factor of 20 dB, due to the absence of a transducer factor at the time of measurement. An additional 20 dB has subsequently added to any emissions observed during these pre-scan, for comparisons with the limit, when determining the necessity for final measurements.

For final measurements, see accompanying table

5.2.5. Transmitter Band Edge Radiated Emissions

Test Summary:

Test Engineer:	Patrick Jones	Test Date:	20 January 2012
Test Sample IMEI:	359569040021561		

FCC 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):	26
Relative Humidity (%):	23

Results: Quasi Peak Lower Band Edge

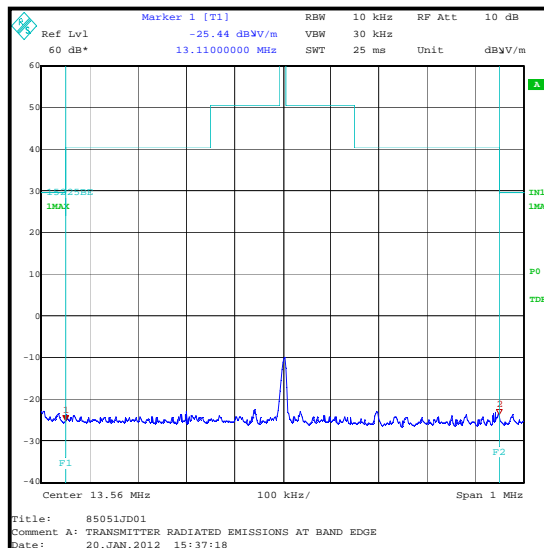
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
13.11	-11.6	29.5	41.1	Complied

Results: Quasi Peak Upper Band Edge

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
14.01	-12.0	29.5	41.5	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. A distance extrapolation factor of 40 dB was used.
2. The band edge emission plot shown below is low by a factor of 20 dB, due to the absence of a transducer factor at the time of measurement. An additional 20 dB has subsequently added to any band edge measurements, for comparisons with the limit, when determining compliance.



5.2.6. Transmitter 20 dB Bandwidth

Test Summary:

Test Engineer:	Patrick Jones	Test Date:	20 January 2012
Test Sample IMEI:	359569040021561		

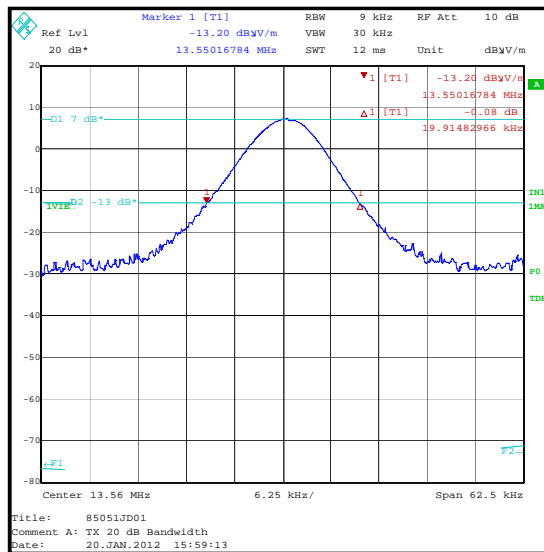
FCC Part:	2.1049
Test Method Used:	As detailed in ANSI C63.10 Section 6.9.1

Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	23

Results:

20 dB Bandwidth (kHz)
19.915



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

Test Engineer:	David Doyle	Test Date:	26 January 2012
Test Sample IMEI:	359569040021306		

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

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	21

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	13.560060 MHz	13.560075	13.560081	13.560083
20	13.560008 MHz	13.559993	13.559986	13.559984
50	13.559947 MHz	13.559952	13.559961	13.559972

Frequency with Worst Case Deviation (MHz)	Frequency Error (Hz)	Frequency Error (%)	Limit (%)	Margin (%)	Result
13.560083	83	0.0006	0.01	0.0094	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	13.559987	13	0.0001	0.01	0.0099	Complied
3.8	13.56	13.559991	9	0.0001	0.01	0.0099	Complied
4.37	13.56	13.559994	6	0.0001	0.01	0.0099	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	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.

7. Report Revision History

Version Number	Revision Details		
	Page No(s)	Clause	Details
1.0	-	-	Initial Version
2.0	15 & 19	-	Corrected previously reported emissions levels by +20 dB

Appendix 1. Test Equipment Used

UL No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (months)
A067	LISN	Rohde & Schwarz	ESH3-Z5	890603/002	02 Jun 2012	12
A1830	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100668	05 Mar 2012	12
A1834	Attenuator	Hewlett Packard	8491B	10444	26 Jul 2012	12
A553	Antenna	Chase	CBL6111A	1593	26 Mar 2012	12
E013	Environmental Chamber	Sanyo	ATMOS chamber	None	Calibrated before use	-
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	29 May 2012	12
M1068	Thermometer	Iso-Tech	RS55	93102884	15 Nov 2012	12
M1263	Test Receiver	Rohde & Schwarz	ESIB7	100265	13 Jul 2012	12
M1269	Multimeter	Fluke	179	90250210	20 Jul 2012	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	04 Feb 2012	12
M1379	Test Receiver	Rohde & Schwarz	ESIB7	100330	20 Sep 2012	12
M1568	Magnetic Loop	Rohde & Schwarz	HFH2-Z2	879284/2	27 Jan 2012	12
S0529	DC Power Supply Unit	ISO-Tech	IPS2302A	504E005G2	Calibrated before use	-

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

--- END OF REPORT ---