



TEST REPORT

Test Report No. : UL-RPT-RP83529JD04B V3.0

Manufacturer : Panasonic Mobile Communications Development of Europe Ltd.
Model No. : NTT DoCoMo P-02D
FCC ID : UCE211042A
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 3.0 supersedes Test Report Serial Number RFI-RPT-RP83529JD04B V2.0. The original test report was issued under the previous company name of RFI Global Services Ltd.

Date of Issue: 17 JUNE 2015

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Senior Engineer, Radio Laboratory

Issued by :

pp

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Quality Manager,
UL VS LTD



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

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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:	01 September 2011 to 16 September 2011

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:	P-02D
IMEI:	357867040012131
Hardware Version Number:	Revision C
Software Version Number:	ACPU: totoro-ginger-dcm-07-0317, CCPU: R1D
FCC ID:	UCE211042A

Brand Name:	NTT DoCoMo
Description:	Battery
Model Name or Number:	P26

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

Brand Name:	NTT DoCoMo
Description:	Desk top Charger
Model Name or Number:	P48

Brand Name:	NTT DoCoMo
Description:	Charge/USB Data cable
Model Name or Number:	P01

Brand Name:	NTT DoCoMo
Description:	Personal Hands-Free
Model Name or Number:	L0ZZ00000027

3.2. Description of EUT

The equipment under test was a dual mode UMTS/GSM cellular handset with BT, WLAN & RFID.

3.3. Modifications Incorporated in the EUT

The Customer stated that the final software version is ACPU: totoro-ginger-dcm-07-0363 CCPU: R1D.

Initial software version ACPU: totoro-ginger-dcm-07-0317 CCPU: R1D was installed in the sample with IMEI 357867040012131. The Customer stated this version was to enable operation of WLAN therefore allowing WLAN test cases to be performed. Otherwise this software is identical to the final software version and has no impact on the test results contained within this test report.

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	3.7 V
	Minimum	3.4 V
	Maximum	4.2 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:	Not Stated
Description:	Micro SD Memory Card
Model Name or Number:	Not Stated

Brand Name:	Not Stated
Description:	Dummy Battery
Model Name or Number:	Not Stated

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

Description:	Laptop PC
Brand Name:	Panasonic
Model Name or Number:	CF-74
Serial Number:	CF-74C3BBDBE

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 Desk top Charger 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 just the micro SD card connected to the EUT as this was found to be the worst case during pre-scans. All appropriate 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 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:	Andrew Edwards	Test Date:	15 September 2011
Test Sample IMEI:	357867040012131		

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

Environmental Conditions:

Temperature (°C):	26
Relative Humidity (%):	22

Results: Live / Quasi Peak

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
1.230000	Live	30.7	56.0	25.3	Complied
1.522500	Live	23.5	56.0	32.5	Complied
1.585500	Live	24.7	56.0	31.3	Complied
1.905000	Live	22.8	56.0	33.2	Complied
1.968000	Live	22.8	56.0	33.2	Complied
1.990500	Live	22.0	56.0	34.0	Complied
2.017500	Live	21.2	56.0	34.8	Complied
2.031000	Live	22.7	56.0	33.3	Complied
2.076000	Live	20.6	56.0	35.4	Complied
2.139000	Live	20.4	56.0	35.6	Complied

Results: Live / Average

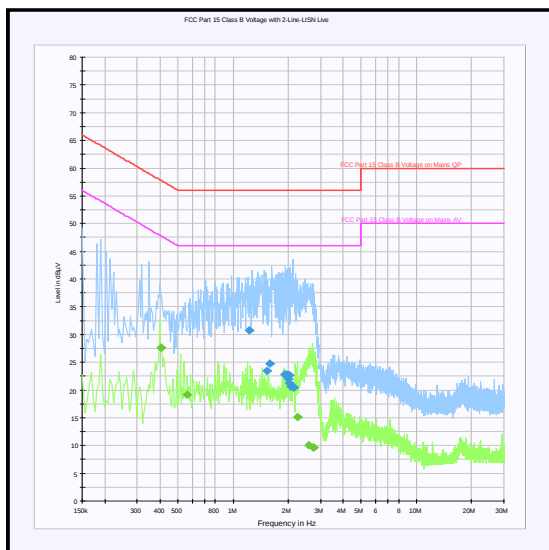
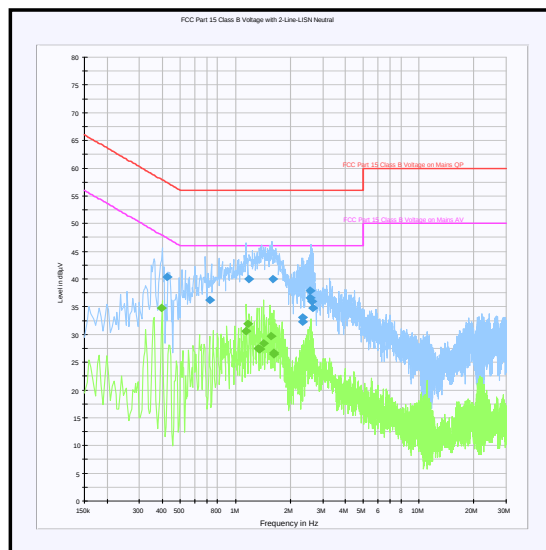
Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.406500	Live	27.6	47.7	20.1	Complied
0.559500	Live	19.2	46.0	26.8	Complied
2.260500	Live	15.1	46.0	30.9	Complied
2.593500	Live	10.0	46.0	36.0	Complied
2.737500	Live	9.6	46.0	36.4	Complied
2.746500	Live	9.6	46.0	36.4	Complied

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

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.424500	Neutral	40.4	57.4	17.0	Complied
0.721500	Neutral	36.3	56.0	19.7	Complied
1.185000	Neutral	39.9	56.0	16.1	Complied
1.594500	Neutral	40.0	56.0	16.0	Complied
2.332500	Neutral	32.3	56.0	23.7	Complied
2.332500	Neutral	33.2	56.0	22.8	Complied
2.553000	Neutral	37.9	56.0	18.1	Complied
2.562000	Neutral	36.7	56.0	19.3	Complied
2.625000	Neutral	36.0	56.0	20.0	Complied
2.643000	Neutral	34.8	56.0	21.2	Complied

Results: Neutral / Average

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.393000	Neutral	34.8	48.0	13.2	Complied
1.144500	Neutral	30.6	46.0	15.4	Complied
1.176000	Neutral	31.9	46.0	14.1	Complied
1.329000	Neutral	27.5	46.0	18.5	Complied
1.342500	Neutral	27.4	46.0	18.6	Complied
1.365000	Neutral	27.3	46.0	18.7	Complied
1.419000	Neutral	28.5	46.0	17.5	Complied
1.572000	Neutral	29.7	46.0	16.3	Complied
1.621500	Neutral	26.4	46.0	19.6	Complied
1.621500	Neutral	26.7	46.0	19.3	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:**

Test Engineer:	Andrew Edwards	Test Date:	06 & 16 September 2011
Test Sample IMEI:	357867040012131		

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:

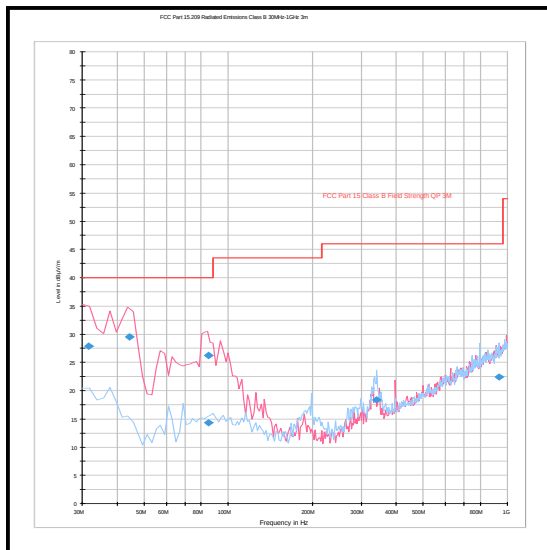
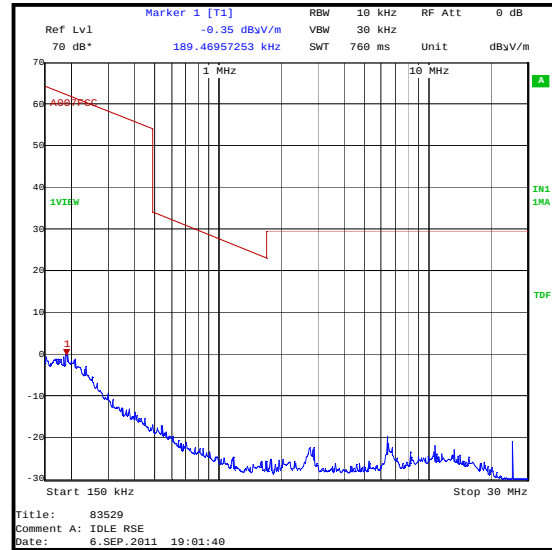
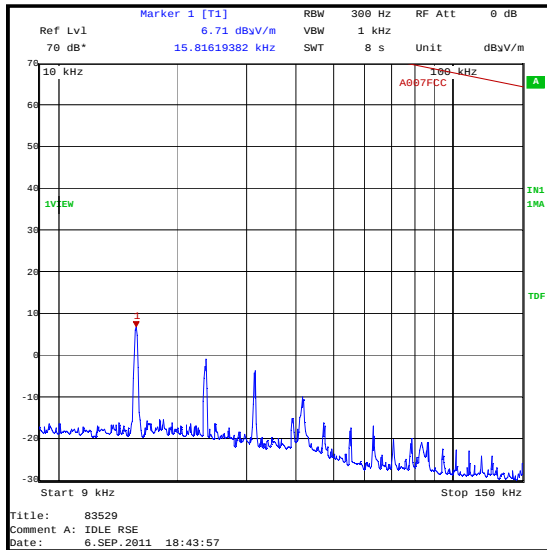
Temperature (°C):	28
Relative Humidity (%):	29

Results: Quasi Peak

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
31.640	Vertical	27.8	40.0	12.2	Complied
44.496	Vertical	29.5	40.0	10.5	Complied
84.886	Vertical	26.2	40.0	13.8	Complied
85.087	Vertical	14.3	40.0	25.7	Complied
340.382	Horizontal	18.3	46.0	27.7	Complied
933.555	Horizontal	22.4	46.0	23.6	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 (40dB/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:	Andrew Edwards	Test Date:	05 September 2011
Test Sample IMEI:	357867040012131		

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

Environmental Conditions:

Temperature (°C):	28
Relative Humidity (%):	33

Results: Quasi Peak

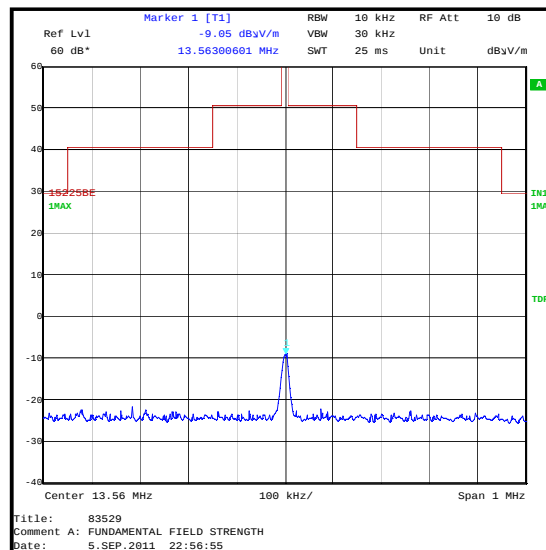
Frequency (MHz)	Antenna Polarity	Level (dBμV/m)	Limit at 30 m (dBμV/m)	Margin (dB)	Result
13.56	90° to EUT	10.7	84.0	73.3	Complied

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.

$$i.e.: -9.3 \text{ dB}\mu\text{V/m} + 20 \text{ dB} = 10.7 \text{ dB}\mu\text{V/m}$$



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

Test Engineer:	Andrew Edwards	Test Date:	05 & 07 September 2011
Test Sample IMEI:	357867040012131		

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:

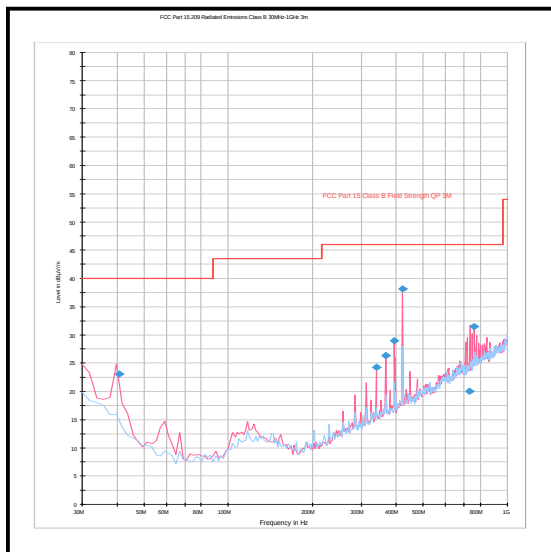
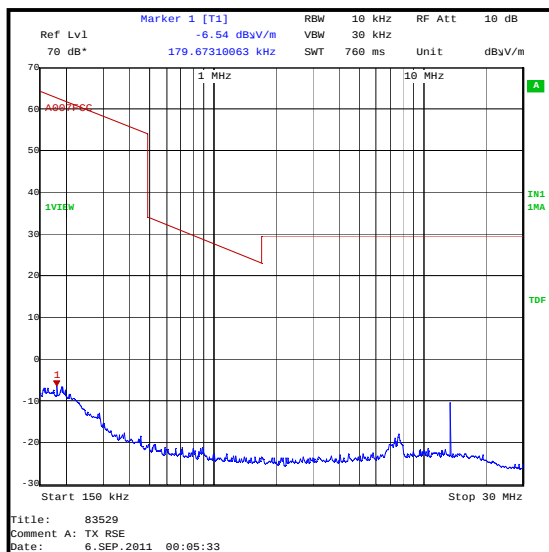
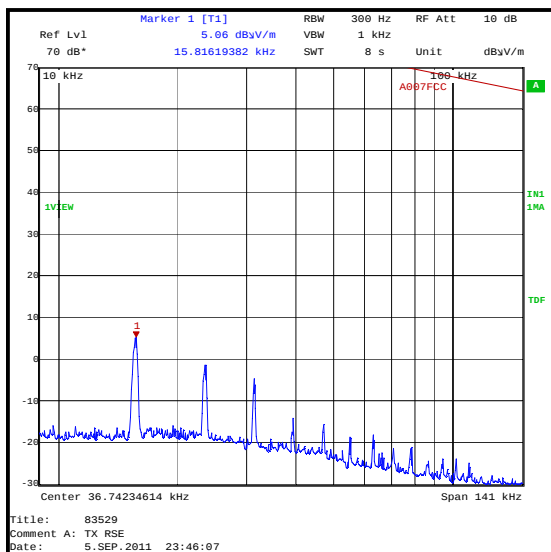
Temperature (°C):	28
Relative Humidity (%):	33

Results: Quasi Peak

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
40.667	Vertical	23.1	40.0	16.9	Complied
339.015	Vertical	24.3	46.0	21.7	Complied
366.134	Vertical	26.3	46.0	19.7	Complied
393.242	Vertical	29.0	46.0	17.0	Complied
420.361	Vertical	38.1	46.0	7.9	Complied
732.240	Vertical	20.0	46.0	26.0	Complied
759.358	Vertical	31.5	46.0	14.5	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 (40dB/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.
- The emission shown at approximately 13.56 MHz is the fundamental.
- 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.

Transmitter Radiated Spurious Emissions (continued)

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

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

Test Engineer:	Andrew Edwards	Test Date:	05 September 2011
Test Sample IMEI:	357867040012131		

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):	28
Relative Humidity (%):	33

Results: Quasi Peak Lower Band Edge

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
13.11	-12.9	29.5	42.4	Complied

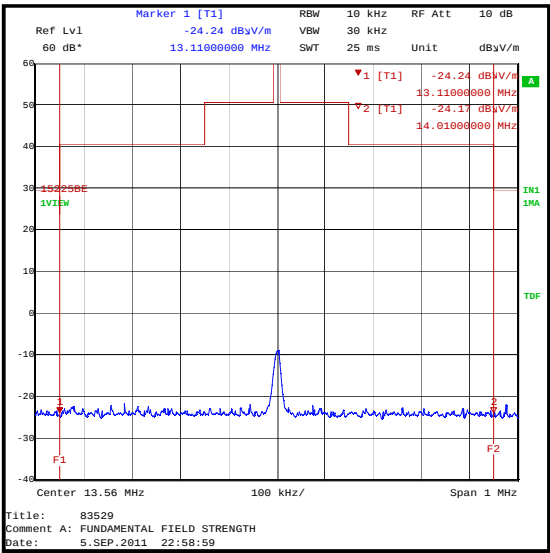
Results: Quasi Peak Upper Band Edge

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
14.01	-13.0	29.5	42.5	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.
3. 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.

Transmitter Band Edge Radiated Emissions (continued)



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

Test Engineer:	Andrew Edwards	Test Date:	05 September 2011
Test Sample IMEI:	357867040012131		

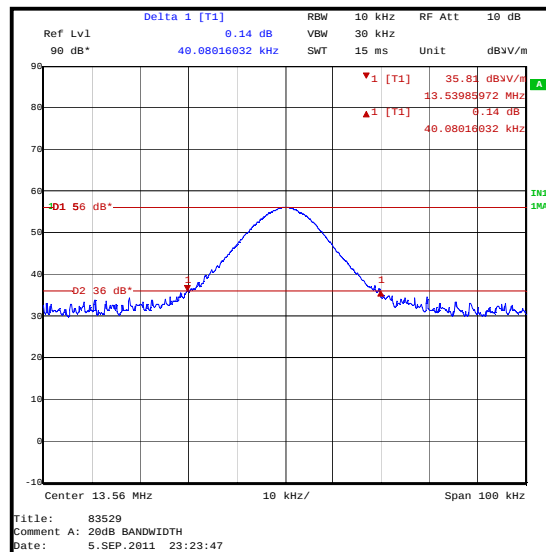
FCC Part:	2.1049
Test Method Used:	As detailed in ANSI C63.10 Section 6.9.1

Environmental Conditions:

Temperature (°C):	28
Relative Humidity (%):	32

Results:

20 dB Bandwidth (kHz)
40.080



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

Test Engineer:	Patrick Jones, Crawford Lindsay & Sarah Williams	Test Date:	15 & 17 September 2011
Test Sample IMEI:	357867040012131		

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

Environmental Conditions:

Ambient Temperature (°C):	20
Ambient Relative Humidity (%):	27

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	13.560103 MHz	13.560102 MHz	13.560101 MHz	13.560099 MHz
20	13.559998 MHz	13.559991 MHz	13.560008 MHz	13.560022 MHz
50	13.559939 MHz	13.559943 MHz	13.559947 MHz	13.559952 MHz

Frequency with Worst Case Deviation (MHz)	Frequency Error (Hz)	Frequency Error (%)	Limit (%)	Margin (%)	Result
13.560103	103	0.00076	0.01	0.00924	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	13.559994	6	0.00004	0.01	0.00996	Complied
3.7	13.56	13.560013	10	0.00010	0.01	0.00990	Complied
4.2	13.56	13.560011	11	0.00008	0.01	0.00992	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
2.0	-	-	Previous Version
3.0	16 & 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)
A007	Antenna	Rohde & Schwarz	HFH2-Z2	880 458/020	02 Apr 2012	12
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	10 Nov 2011	12
M1229	Multimeter	Fluke	179	87640015	21 Jun 2012	12
M1242	Spectrum Analyser	Rohde & Schwarz	FSEM30	845986/022	03 Dec 2011	12
M1263	Test Receiver	Rohde & Schwarz	ESIB7	100265	13 Jul 2012	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	04 Feb 2012	12
S011	DC Power Supply	INSTEK	PR-3010H	9401270	Calibrated before use	-

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

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