



# TEST REPORT

**Test Report No. :** UL-RPT-RP92315JD13A V2.0

**Manufacturer** : Panasonic Mobile Communications Development of Europe Ltd  
**Model No.** : NTT docomo P-03E  
**FCC ID** : UCE313058A  
**Technology** : RFID – 13.56 MHz  
**Test Standard(s)** : FCC Parts 15.107(a), 15.109, 15.207, 15.209(a) & 15.225

1. This test report shall not be reproduced in full or partial, without the written approval of UL VS LTD.
2. The results in this report apply only to the sample(s) tested.
3. The sample tested is in compliance with the above standard(s).
4. The test results in this report are traceable to the national or international standards.
5. Version 2.0 Supersedes all previous versions.

**Date of Issue:** 18 June 2015

**Checked by:**

Ian Watch  
Senior Engineer, Radio Laboratory

**Issued by :**

  
pp

John Newell  
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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## UL VS LTD

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**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) 2012: 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) 2012: Part 15 Subpart B (Radio Frequency Devices) - Sections 15.107 and 15.109
<b>Specification Reference:</b>	47CFR15.207 and 47CFR15.209
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications) 2012: Part 15 Subpart C (Intentional Radiators) - Sections 15.207 and 15.209
<b>Site Registration:</b>	209735
<b>Location of Testing:</b>	UL VS LTD, Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom
<b>Test Dates:</b>	29 March 2013 to 05 April 2013

### 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 (2003)
<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>	P-03E
<b>IMEI:</b>	355335050017210 <i>(Radiated sample #1)</i>
<b>Hardware Version Number:</b>	Rev B
<b>Software Version Number:</b>	ACPU: zoro-jb-10-0371 CCPU: 161022_DCM_00.15
<b>FCC ID:</b>	UCE313058A

<b>Brand Name:</b>	NTT docomo
<b>Model Name or Number:</b>	P-03E
<b>IMEI:</b>	355335050017228 <i>(Radiated sample #2)</i>
<b>Hardware Version Number:</b>	Rev B
<b>Software Version Number:</b>	ACPU: zoro-jb-10-0371 CCPU: 161022_DCM_00.15
<b>FCC ID:</b>	UCE313058A

<b>Brand Name:</b>	NTT docomo
<b>Model Name or Number:</b>	P-03E
<b>IMEI:</b>	355335050017129 <i>(Radiated sample #3 modified with 50 Ohm load for AC conducted emission test only)</i>
<b>Hardware Version Number:</b>	Rev B
<b>Software Version Number:</b>	ACPU: zoro-jb-10-0371 CCPU: 161022_DCM_00.15
<b>FCC ID:</b>	UCE313058A

<b>Brand Name:</b>	NTT docomo
<b>Description:</b>	Battery
<b>Model Name or Number:</b>	P30

<b>Brand Name:</b>	NTT docomo
<b>Description:</b>	AC Charger
<b>Model Name or Number:</b>	AC04

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

**Identification of Equipment Under Test (EUT) (continued)**

<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 Multi-Mode LTE/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>	Not marked or stated	
<b>Description:</b>	2 GB Micro SD Card	
<b>Model Name or Number:</b>	Not marked or stated	

<b>Brand Name:</b>	Not marked or stated	
<b>Description:</b>	Dummy Battery	
<b>Model Name or Number:</b>	Not marked or stated	

<b>Brand Name:</b>	HP mini	
<b>Description:</b>	Laptop PC	
<b>Model Name or Number:</b>	4200sa	
<b>Serial Number:</b>	Test Laptop 1	



## **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 Customer.
- 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 AC Charger and PHF 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.
- Testing at voltage extremes was performed using a dummy battery supplied by the Customer.
- 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.
- The RFID antenna was disconnected and replaced with a 50Ω dummy load in order to comply with the requirements of the AC conducted emissions test in transmit mode. The standard antenna was connected for all other tests.

## **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.

In accordance with UKAS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

## 5.2. Test Results

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

#### Test Summary:

Test Engineer:	Nick Steele	Test Date:	29 March 2013
Test Sample IMEI:	355335050017228		

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

#### Environmental Conditions:

Temperature (°C):	20
Relative Humidity (%):	30

#### Results: Live / Quasi Peak

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.155	Live	51.0	65.8	14.8	Complied
0.231	Live	46.2	62.4	16.2	Complied
0.398	Live	39.5	57.9	18.4	Complied
1.622	Live	39.5	56.0	16.5	Complied
1.856	Live	38.8	56.0	17.2	Complied
1.964	Live	39.7	56.0	16.3	Complied
2.252	Live	37.4	56.0	18.6	Complied

#### Results: Live / Average

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
2.022	Live	28.2	46.0	17.8	Complied
2.594	Live	29.2	46.0	16.8	Complied
15.351	Live	30.0	50.0	20.0	Complied
15.414	Live	30.9	50.0	19.1	Complied
15.747	Live	32.6	50.0	17.4	Complied
15.842	Live	34.8	50.0	15.2	Complied
15.945	Live	30.0	50.0	20.0	Complied

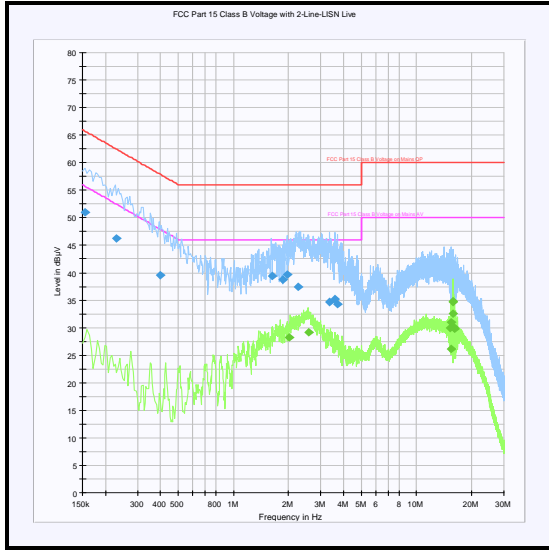
**Receiver/Idle Mode AC Conducted Spurious Emissions (continued)****Results: Neutral / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.155	Neutral	57.3	65.8	8.5	Complied
0.245	Neutral	52.7	61.9	9.2	Complied
0.267	Neutral	51.8	61.2	9.4	Complied
0.285	Neutral	50.8	60.7	9.9	Complied
0.303	Neutral	50.5	60.2	9.7	Complied
0.335	Neutral	48.8	59.3	10.5	Complied
0.344	Neutral	49.1	59.1	10.0	Complied
0.384	Neutral	46.5	58.2	11.7	Complied
0.411	Neutral	44.9	57.6	12.7	Complied
0.443	Neutral	45.5	57.0	11.5	Complied

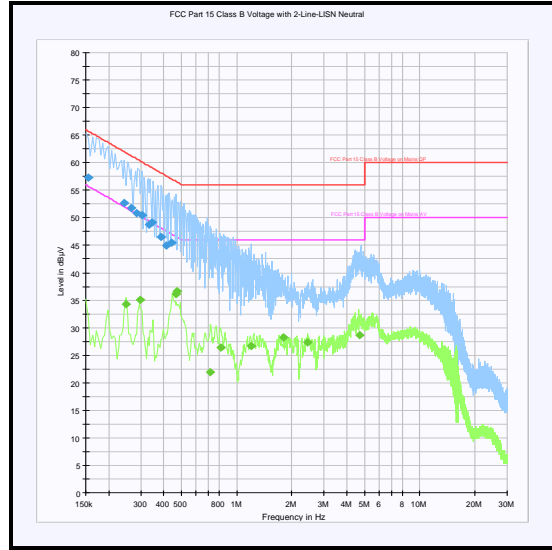
**Results: Neutral / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.249	Neutral	34.3	51.8	17.5	Complied
0.299	Neutral	35.1	50.3	15.2	Complied
0.465	Neutral	36.1	46.6	10.5	Complied
0.474	Neutral	36.6	46.4	9.8	Complied
0.816	Neutral	26.4	46.0	19.6	Complied
1.199	Neutral	26.7	46.0	19.3	Complied
1.806	Neutral	28.3	46.0	17.7	Complied
2.432	Neutral	27.3	46.0	18.7	Complied
4.668	Neutral	28.7	46.0	17.3	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.*

**Test Equipment Used:**

UL No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
A649	LISN	Rohde & Schwarz	ESH3-Z5	825562/008	19 Apr 2013	12
A1830	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100668	19 Feb 2014	12
M1263	Test Receiver	Rohde & Schwarz	ESIB7	100265	09 Aug 2013	12

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

<b>Test Engineer:</b>	Sarah Williams	<b>Test Date:</b>	29 March 2013
<b>Test Sample IMEI:</b>	355335050017236		

<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>	22
<b>Relative Humidity (%):</b>	26

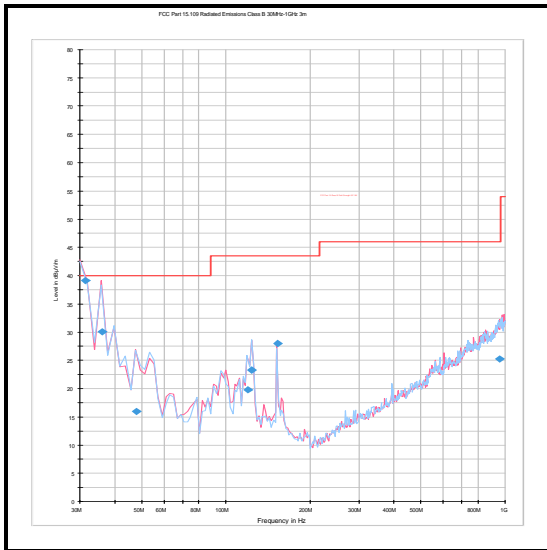
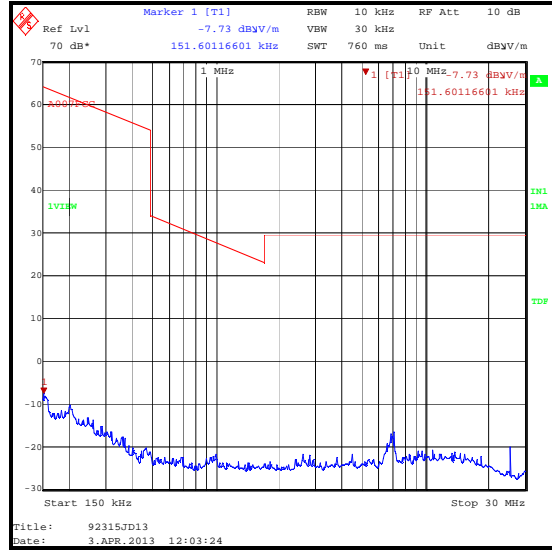
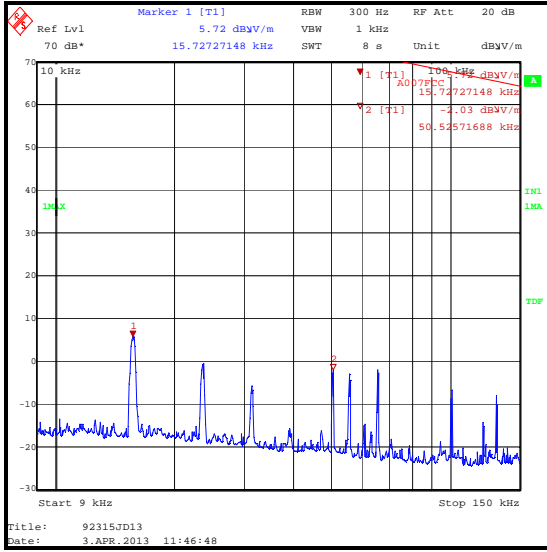
**Note(s):**

- 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.
- 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

**Results: Quasi Peak**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
31.337	Vertical	39.1	40.0	0.9	Complied
36.096	Vertical	30.0	40.0	10.0	Complied
123.571	Horizontal	23.3	43.5	20.2	Complied
153.307	Vertical	28.0	43.5	15.5	Complied
956.200	Vertical	25.3	46.0	20.7	Complied

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



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

**Receiver/Idle Mode Radiated Spurious Emissions (continued)****Test Equipment Used:**

UL No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	24 Oct 2013	12
M1379	Test Receiver	Rohde & Schwarz	ESIB7	100330	15 Oct 2013	12
M1568	Magnetic Loop Antenna	Rohde & Schwarz	HFH2-Z2	879284/2	12 Feb 2014	12
G0543	Pre Amplifier	Sonoma	310N	230801	04 Jul 2013	3
A490	Antenna	Chase	CBL6111A	1590	14 May 2013	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	15 Feb 2014	12
A1834	Attenuator	Hewlett Packard	8491B	10444	27 Jan 2014	12



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

<b>Test Engineer:</b>	Patrick Jones	<b>Test Date:</b>	05 April 2013
<b>Test Sample IMEI:</b>	355335050017210 & 355335050017129 ( <i>modified sample</i> )		

<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>	23
<b>Relative Humidity (%):</b>	30

**Note(s):**

1. The EUT was initially tested with the standard antenna connected. The carrier at 13.56 MHz was found to be non-compliant as it exceeded the test limit. The Customer modified the EUT by disconnecting the standard antenna and fitting a load with the same electrical properties in accordance with ANSI C63.10 Section 6.2.5 and FCC KDB174176. The test was then repeated and the EUT was found to be compliant.
2. The highest emission levels were recorded in the results tables. All other emissions on the pre-scan plots were investigated and found to be >30 dB below the specified limits.

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

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.731	Live	41.9	56.0	14.1	Complied
0.753	Live	38.9	56.0	17.1	Complied
1.212	Live	34.0	56.0	22.0	Complied
1.217	Live	34.6	56.0	21.4	Complied
2.621	Live	35.9	56.0	20.1	Complied
3.422	Live	36.5	56.0	19.5	Complied
4.164	Live	38.8	56.0	17.2	Complied
4.659	Live	38.1	56.0	17.9	Complied

**Results: Live / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.267	Live	36.2	51.2	15.0	Complied
0.420	Live	35.0	47.4	12.4	Complied
0.587	Live	34.2	46.0	11.8	Complied
0.744	Live	34.1	46.0	11.9	Complied
0.753	Live	34.2	46.0	11.8	Complied
1.190	Live	32.0	46.0	14.0	Complied
2.513	Live	30.5	46.0	15.5	Complied
4.817	Live	31.0	46.0	15.0	Complied

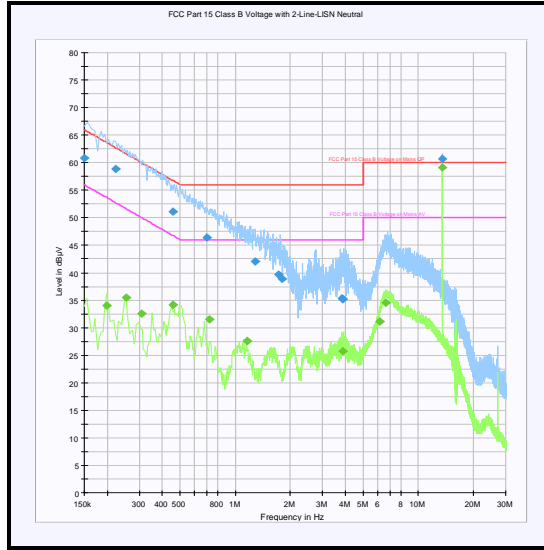
**Transmitter AC Conducted Spurious Emissions (continued)****Results: Neutral / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.150	Neutral	58.0	66.0	8.0	Complied
0.150	Neutral	57.9	66.0	8.1	Complied
0.155	Neutral	57.7	65.8	8.1	Complied
0.173	Neutral	56.9	64.8	7.9	Complied
0.195	Neutral	55.6	63.8	8.2	Complied
0.245	Neutral	53.3	61.9	8.6	Complied
0.353	Neutral	49.2	58.9	9.7	Complied
0.371	Neutral	48.7	58.5	9.8	Complied

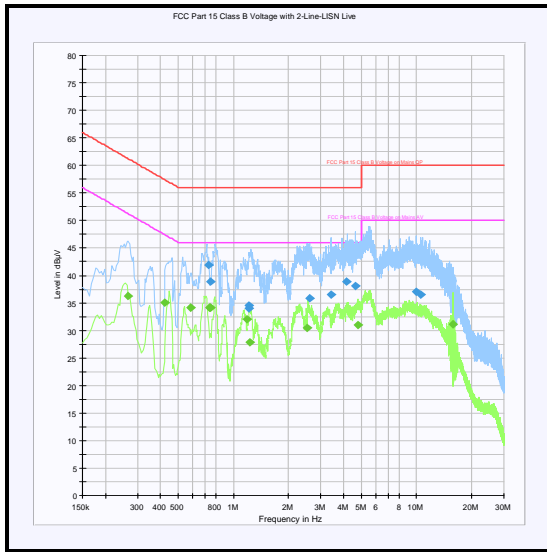
**Results: Neutral / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.150	Neutral	30.7	56.0	25.3	Complied
0.299	Neutral	25.7	50.3	24.6	Complied
0.479	Neutral	24.9	46.4	21.5	Complied
0.713	Neutral	17.7	46.0	28.3	Complied
4.376	Neutral	25.3	46.0	20.7	Complied
5.636	Neutral	27.8	50.0	22.2	Complied
15.734	Neutral	19.6	50.0	30.4	Complied
16.031	Neutral	18.3	50.0	31.7	Complied

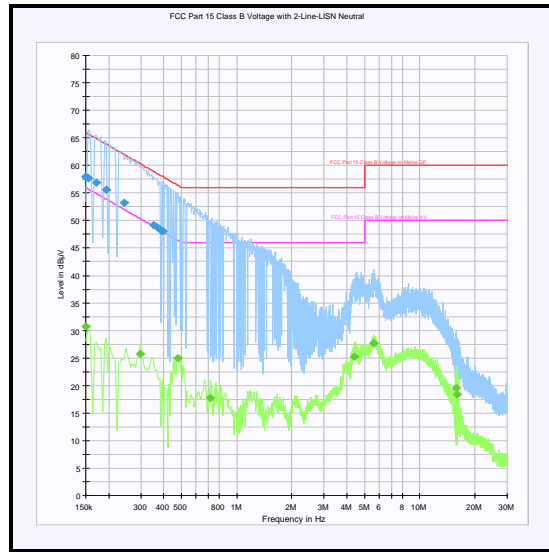
**Transmitter AC Conducted Spurious Emissions (continued)**



**Pre-scan test results prior to modification of the EUT (standard antenna)**



**Live**



**Neutral**

**Test results with modified sample (transmitter terminated into 50Ω load)**

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

**Test Equipment Used:**

ULNo.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1263	Test Receiver	Rohde & Schwarz	ESIB7	100265	09 Aug 2013	12
A1830	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100668	19 Feb 2014	12
A649	Single Phase LISN	Rohde & Schwarz	ESH3-Z5	825562/008	19 Apr 2013	12

**5.2.4. Transmitter Fundamental Field Strength**

**Test Summary:**

<b>Test Engineer:</b>	Patrick Jones	<b>Test Date:</b>	03 April 2013
<b>Test Sample IMEI:</b>	355335050017210		

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

**Environmental Conditions:**

<b>Temperature (°C):</b>	22
<b>Relative Humidity (%):</b>	30

**Note(s):**

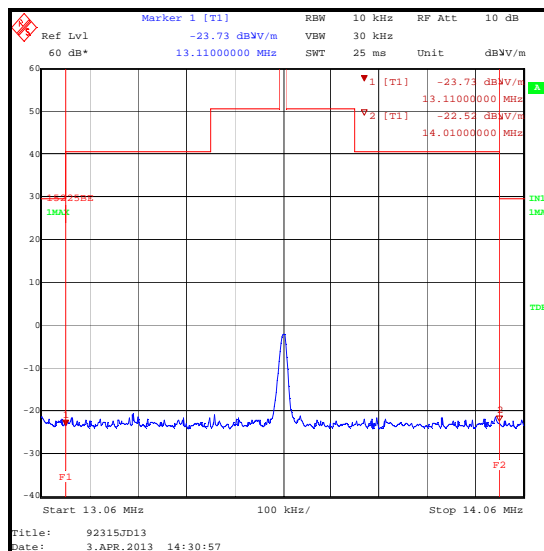
1. The limit is specified at a test distance of 30 metres. However, as specified by FCC Section 15.31 (f)(2), measurements may be performed at a closer distance and the measured level corrected to the specified measurement distance by using the square of an inverse linear distance extrapolation factor (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.
3. Pre-scans were performed with a peak detector. Final measurements were performed with a quasi-peak detector.

*Note: An additional 20 dB 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.: -2.5 dBuV/m + 20 dB = 17.5 dBuV/m*

**Results: Quasi Peak**

Frequency (MHz)	Antenna Polarity	Level (dBμV/m)	Limit at 30 m (dBμV/m)	Margin (dB)	Result
13.56	90° to EUT	17.5	84.0	66.5	Complied



**Transmitter Fundamental Field Strength (continued)****Test Equipment Used:**

<b>UL No.</b>	<b>Instrument</b>	<b>Manufacturer</b>	<b>Type No.</b>	<b>Serial No.</b>	<b>Date Calibration Due</b>	<b>Cal. Interval (Months)</b>
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	24 Oct 2013	12
M1379	Test Receiver	Rohde & Schwarz	ESIB7	100330	15 Oct 2013	12
M1568	Magnetic Loop Antenna	Rohde & Schwarz	HFH2-Z2	879284/2	12 Feb 2014	12

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

<b>Test Engineers:</b>	Patrick Jones & Sandeep Bharat	<b>Test Dates:</b>	03 April 2013 & 04 April 2013
<b>Test Sample IMEI:</b>	355335050017210		

<b>FCC Reference:</b>	Parts 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>	22 to 23
<b>Relative Humidity (%):</b>	28 to 30

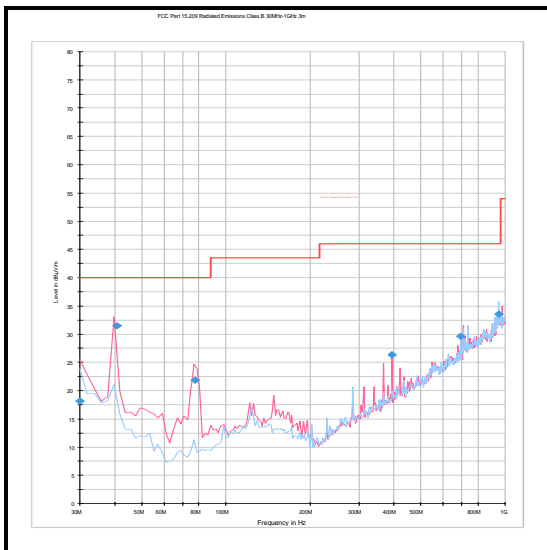
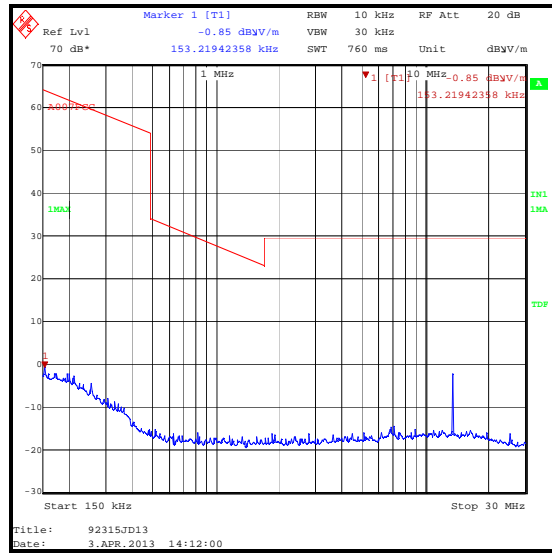
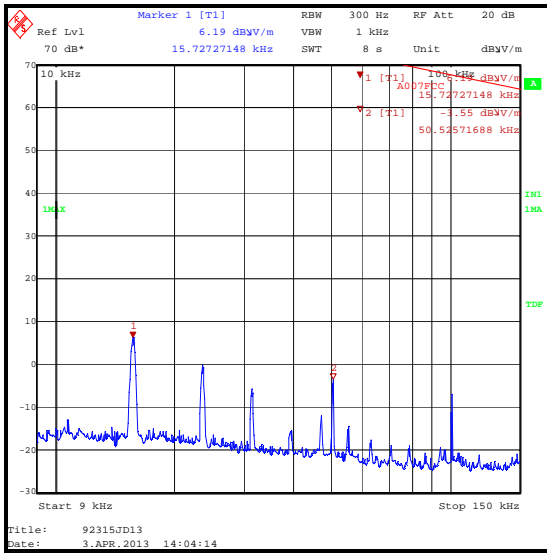
**Note(s):**

- 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.
- 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.

**Results: Quasi Peak**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
30.067	Vertical	18.2	40.0	21.8	Complied
40.686	Vertical	31.5	40.0	8.5	Complied
77.659	Vertical	21.9	40.0	18.1	Complied
393.242	Vertical	26.4	46.0	19.6	Complied
691.582	Horizontal	29.6	46.0	16.4	Complied
949.204	Horizontal	33.5	46.0	12.5	Complied

**Transmitter Radiated Spurious Emissions (continued)**



**Test Equipment Used:**

ULNo.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	24 Oct 2013	12
M1379	Test Receiver	Rohde & Schwarz	ESIB7	100330	15 Oct 2013	12
M1568	Magnetic Loop Antenna	Rohde & Schwarz	HFH2-Z2	879284/2	12 Feb 2014	12
G0543	Pre Amplifier	Sonoma	310N	230801	04 Jul 2013	3
A490	Antenna	Chase	CBL6111A	1590	14 May 2013	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	15 Feb 2014	12
A1834	Attenuator	Hewlett Packard	8491B	10444	27 Jan 2014	12



**5.2.6. Transmitter Band Edge Radiated Emissions**

**Test Summary:**

<b>Test Engineer:</b>	Patrick Jones	<b>Test Date:</b>	03 April 2013
<b>Test Sample IMEI:</b>	355335050017210		

<b>FCC Reference:</b>	Parts 15.225(c)(d) & 15.209(a)
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Section 6.9.2

**Environmental Conditions:**

<b>Temperature (°C):</b>	22
<b>Relative Humidity (%):</b>	30

**Note(s):**

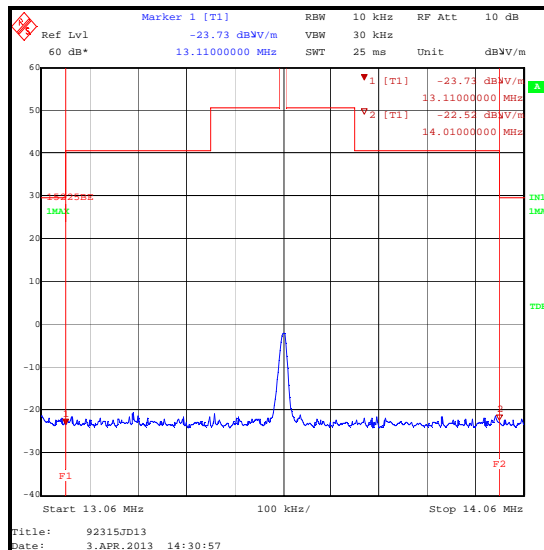
1. A transducer factor on the measuring instrument was used to extrapolate the results at 3 metres to a distance of 30 metres where required. A distance extrapolation factor of 40 dB was used.
2. The band edge emission plot shown below is low by a factor of 20 dB, due to the absence of a transducer factor at the time of measurement. An additional 20 dB was subsequently added to any band edge measurements, for comparisons with the limit, when determining compliance.

**Results: Quasi Peak Lower Band Edge**

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
13.11	-3.7	29.5	33.2	Complied

**Results: Quasi Peak Upper Band Edge**

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
14.01	-2.5	29.5	32.0	Complied



**Transmitter Band Edge Radiated Emissions (continued)****Test Equipment Used:**

<b>UL No.</b>	<b>Instrument</b>	<b>Manufacturer</b>	<b>Type No.</b>	<b>Serial No.</b>	<b>Date Calibration Due</b>	<b>Cal. Interval (Months)</b>
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	24 Oct 2013	12
M1379	Test Receiver	Rohde & Schwarz	ESIB7	100330	15 Oct 2013	12
M1568	Magnetic Loop Antenna	Rohde & Schwarz	HFH2-Z2	879284/2	12 Feb 2014	12

**5.2.7. Transmitter 20 dB Bandwidth**

**Test Summary:**

<b>Test Engineer:</b>	Mark Percival	<b>Test Date:</b>	05 April 2013
<b>Test Sample IMEI:</b>	355335050017210		

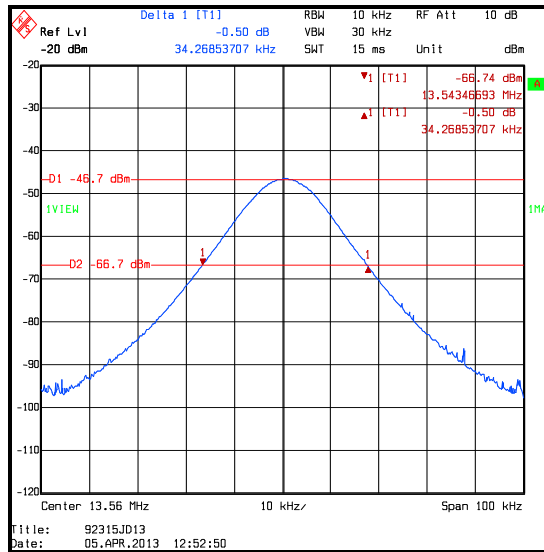
<b>FCC Reference:</b>	Part 2.1049
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Section 6.9.1

**Environmental Conditions:**

<b>Temperature (°C):</b>	25
<b>Relative Humidity (%):</b>	26

**Results:**

<b>20 dB Bandwidth (kHz)</b>
34.269



**Test Equipment Used:**

UL No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M127	Test Receiver	Rohde & Schwarz	FSEB 30	842 659/016	13 Aug 2013	12
M1229	Multimeter	Fluke	179	87640015	18 Jun 2013	12
S0537	DC Power Supply	TTi	EL302D	249928	Calibrated before use	-

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

<b>Test Engineer:</b>	Mark Percival	<b>Test Date:</b>	05 April 2013
<b>Test Sample IMEI:</b>	355335050017210		

<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>	26

**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	13.560226 MHz	13.560225 MHz	13.560226 MHz	13.560224 MHz
20	13.560139 MHz	13.560139 MHz	13.560139 MHz	13.560140 MHz
50	13.560025 MHz	13.560024 MHz	13.560025 MHz	13.560024 MHz

Frequency with Worst Case Deviation (MHz)	Frequency Error (Hz)	Frequency Error (%)	Limit (%)	Margin (%)	Result
13.560226 MHz	226	0.001667	0.01	0.008333	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	13.560129	129	0.000951	0.01	0.009049	Complied
3.8	13.56	13.560140	140	0.001032	0.01	0.008968	Complied
4.37	13.56	13.560139	139	0.001025	0.01	0.008975	Complied

**Transmitter Frequency Stability (Temperature & Voltage Variation)****Test Equipment Used:**

<b>UL No.</b>	<b>Instrument</b>	<b>Manufacturer</b>	<b>Type No.</b>	<b>Serial No.</b>	<b>Date Calibration Due</b>	<b>Cal. Interval (Months)</b>
M127	Test Receiver	Rohde & Schwarz	FSEB 30	842 659/016	13 Aug 2013	12
M1229	Multimeter	Fluke	179	87640015	18 Jun 2013	12
M1642	Thermometer	Fluke	52II	18890119	19 Mar 2014	12
E013	Environmental Chamber	Sanyo	MTH-4200PR	None	Calibrated before use	-
S0537	DC Power Supply	TTi	EL302D	249928	Calibrated before use	-

## **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".

<b>Measurement Type</b>	<b>Range</b>	<b>Confidence Level (%)</b>	<b>Calculated Uncertainty</b>
AC Conducted Spurious Emissions	0.15 MHz to 30 MHz	95%	±4.69 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	21 & 25	-	Corrected previously reported emissions levels by +20 dB

--- END OF REPORT ---