



# TEST REPORT

**Test Report No. : UL-RPT-RP90385JD14A V2.0**

**Manufacturer** : Panasonic Mobile Communications Development of Europe Ltd  
**Model No.** : NTT docomo EB-4063  
**FCC ID** : UCE312057A  
**Technology** : Bluetooth – Low Energy  
**Test Standard(s)** : FCC Parts 15.107(a), 15.109, 15.207, 15.209(a) & 15.247

1. This test report shall not be reproduced in full or partial, without the written approval of RFI Global Services Ltd trading as UL.
2. The results in this report apply only to the sample(s) tested.
3. This 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:** 27 November 2012

**Checked by:**

Sarah Williams  
WiSE Laboratory Engineer

**Issued by :**

pp  
John Newell  
Group Quality Manager, WiSE  
Basingstoke,  
UL Verification Services



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

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**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	8
3.3. Modifications Incorporated in the EUT	8
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	18
5.2.4. Transmitter Minimum 6 dB Bandwidth	21
5.2.5. Transmitter Power Spectral Density	23
5.2.6. Transmitter Maximum Peak Output Power	25
5.2.7. Transmitter Radiated Emissions	27
5.2.8. Transmitter Band Edge Radiated Emissions	32
<b>6. Measurement Uncertainty .....</b>	<b>34</b>
<b>7. Report Revision History .....</b>	<b>35</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>	47CFR15.247
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications) 2012: Part 15 Subpart C (Intentional Radiators) - Section 15.247
<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 (Unintentional Radiators) - 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>	FCC: 209735
<b>Location of Testing:</b>	RFI Global Services Ltd trading as UL, Wade Road, Basingstoke, Hampshire, RG24 8AH.
<b>Test Dates:</b>	11 November 2012 to 17 November 2012

### 2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
Part 15.107(a)	Receiver/Idle Mode AC Conducted Emissions	
Part 15.109	Receiver/Idle Mode Radiated Spurious Emissions	
Part 15.207	Transmitter AC Conducted Emissions	
Part 15.247(a)(2)	Transmitter Minimum 6 dB Bandwidth	
Part 15.247(e)	Transmitter Power Spectral Density	
Part 15.247(b)(3)	Transmitter Maximum Peak Output Power	
Part 15.247(d)/ 15.209(a)	Transmitter Radiated Emissions	
Part 15.247(d)/ 15.209(a)	Transmitter Band Edge Radiated Emissions	
<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
<b>Reference:</b>	KDB 558074 D01 v02 10/04/2012
<b>Title:</b>	Guidance for Performing Compliance Measurements on Digital Transmission System (DTS) devices operating Under 15.247

### **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-4063
<b>IMEI:</b>	353740050011927 ( <i>Radiated sample #1</i> )
<b>Hardware Version Number:</b>	Rev B-2
<b>Software Version Number:</b>	ACPU: rupy-jb-10-0336 CCPU: 101033_DCM_00.12
<b>FCC ID:</b>	UCE312057A

<b>Brand Name:</b>	NTT docomo
<b>Model Name or Number:</b>	EB-4063
<b>IMEI:</b>	353740050010663 ( <i>Conducted RF port sample #1</i> )
<b>Hardware Version Number:</b>	Rev B-2
<b>Software Version Number:</b>	ACPU: rupy-jb-10-0336 CCPU: 101033_DCM_00.12
<b>FCC ID:</b>	UCE312057A

<b>Brand Name:</b>	NTT docomo
<b>Description:</b>	Battery
<b>Model Name or Number:</b>	P29

<b>Brand Name:</b>	NTT docomo
<b>Description:</b>	AC Charger
<b>Model Name or Number:</b>	AC 04

<b>Brand Name:</b>	NTT docomo
<b>Description:</b>	Charge/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 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>Technology Tested:</b>	<i>Bluetooth</i> Low Energy (Digital Transmission System)		
<b>Type of Unit:</b>	Transceiver		
<b>Channel Spacing:</b>	2 MHz		
<b>Modulation:</b>	GFSK		
<b>Data Rate:</b>	1 Mbps		
<b>Power Supply Requirement(s):</b>	Nominal	3.8 V	
<b>Maximum Conducted Output Power:</b>	0.6 dBm		
<b>Antenna Gain:</b>	-2.3 dBi		
<b>Transmit Frequency Range:</b>	2402 MHz to 2480 MHz		
<b>Transmit Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	0	2402
	Middle	19	2440
	Top	39	2480
<b>Receive Frequency Range:</b>	2405 MHz to 2480 MHz		
<b>Receive Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	0	2402
	Top	39	2480

### **3.5. Support Equipment**

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

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

<b>Description:</b>	Not stated
<b>Brand Name:</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):

- Receive/Idle Mode.
- Transmitting at maximum power in Bluetooth mode with modulation, maximum possible data length available, with a pay load set to set Pseudorandom Bit Sequence 9.

### **4.2. Configuration and Peripherals**

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

- Receive/Idle tests: The Bluetooth mode was active but not transmitting.
- Transmit tests: The laptop PC with the Customer's bespoke application was used to place the EUT into Bluetooth test mode.
- Idle mode and transmitter mode radiated spurious emissions tests were performed with the PHF and AC Charger connected to the EUT, as this was found to be the worst case during pre-scans. All accessories were individually connected during pre-scan measurements to determine the worst case combination.
- The EUT conducted sample with IMEI 353740050010663 was used for 6 dB bandwidth, power spectral density and conducted output power tests.
- The radiated sample with IMEI 353740050011927 was used for AC conducted emissions and radiated spurious emissions 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 Uncertainty* 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:**

<b>Test Engineer:</b>	David Doyle	<b>Test Date:</b>	15 November 2012
<b>Test Sample IMEI:</b>	353740050011927		

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

**Environmental Conditions:**

<b>Temperature (°C):</b>	21
<b>Relative Humidity (%):</b>	41

**Results: Live / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.479	Live	42.3	56.4	14.1	Complied
2.558	Live	34.6	56.0	21.4	Complied
4.259	Live	36.0	56.0	20.0	Complied
4.493	Live	37.9	56.0	18.1	Complied
5.325	Live	36.5	60.0	23.5	Complied
5.694	Live	36.2	60.0	23.8	Complied

**Results: Live / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.474	Live	35.9	46.4	10.5	Complied
2.832	Live	33.4	46.0	12.6	Complied
4.335	Live	28.8	46.0	17.2	Complied
4.515	Live	30.6	46.0	15.4	Complied
5.357	Live	29.4	50.0	20.6	Complied
5.681	Live	29.9	50.0	20.1	Complied

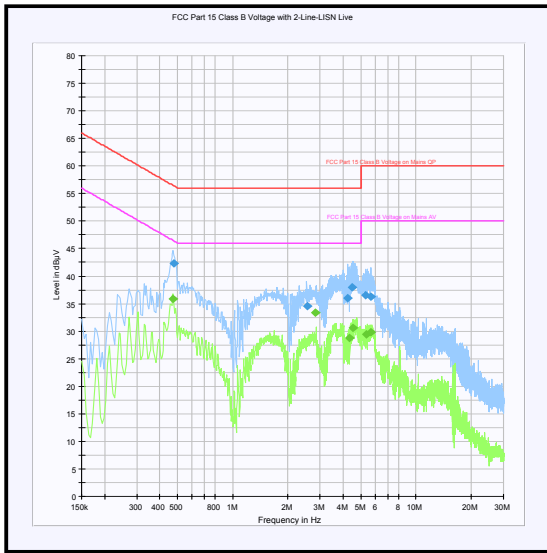
**Receiver/Idle Mode AC Conducted Spurious Emissions (continued)****Results: Neutral / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.209	Neutral	34.6	63.3	28.7	Complied
2.004	Neutral	22.1	56.0	33.9	Complied
2.526	Neutral	23.7	56.0	32.3	Complied
3.539	Neutral	28.8	56.0	27.2	Complied
4.812	Neutral	36.7	56.0	19.3	Complied
5.240	Neutral	36.4	60.0	23.6	Complied
5.645	Neutral	36.2	60.0	23.8	Complied

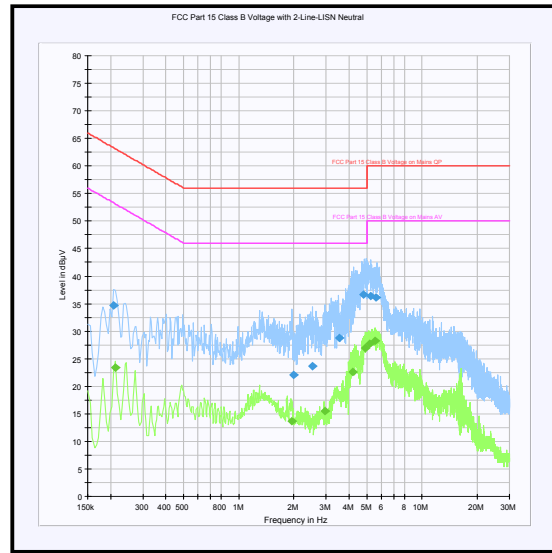
**Results: Neutral / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.213	Neutral	23.4	53.1	29.7	Complied
1.950	Neutral	13.6	46.0	32.4	Complied
2.949	Neutral	15.6	46.0	30.4	Complied
4.205	Neutral	22.6	46.0	23.4	Complied
4.920	Neutral	26.9	46.0	19.1	Complied
5.177	Neutral	27.7	50.0	22.3	Complied
5.573	Neutral	28.3	50.0	21.7	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:**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
A649	LISN	Rohde & Schwarz	ESH3-Z5	825562/008	19 Feb 2013	12
A1830	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100668	25 Feb 2013	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>	Nick Steele	<b>Test Date:</b>	11 November 2012
<b>Test Sample IMEI:</b>	353740050011927		

<b>FCC Reference:</b>	Part 15.109
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Sections 6.3 and 6.5 referencing ANSI C63.4
<b>Frequency Range:</b>	30 MHz to 1000 MHz

**Environmental Conditions:**

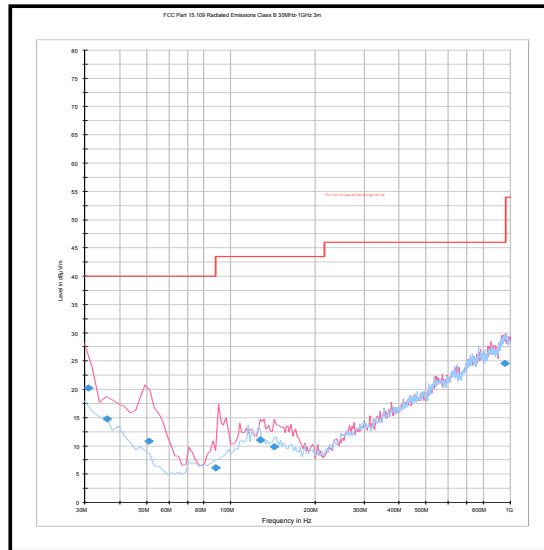
<b>Temperature (°C):</b>	23
<b>Relative Humidity (%):</b>	33

**Note(s):**

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. All other emissions shown on the pre-scan plot were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor.
3. Measurements below 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**

<b>Frequency (MHz)</b>	<b>Antenna Polarity</b>	<b>Level (dB<math>\mu</math>V/m)</b>	<b>Limit (dB<math>\mu</math>V/m)</b>	<b>Margin (dB)</b>	<b>Result</b>
30.986	Vertical	20.2	40.0	19.8	Complied
36.115	Vertical	14.8	40.0	25.2	Complied
50.848	Vertical	10.9	40.0	29.1	Complied
127.430	Vertical	11.1	43.5	32.4	Complied
142.693	Vertical	9.9	43.5	33.6	Complied
956.932	Vertical	24.6	46.0	21.4	Complied

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

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

**Test Equipment Used:**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
A1834	Attenuator	Hewlett Packard	8491B	10444	29 Jan 2013	12
A553	Antenna	Chase	CBL6111A	1593	15 Feb 2013	12
G0543	Amplifier	Sonoma	310N	230801	02 Jan 2013	3
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	24 Oct 2013	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	03 Feb 2013	12

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

<b>Test Engineer:</b>	Nick Steele	<b>Test Date:</b>	13 November 2012
<b>Test Sample IMEI:</b>	353740050011927		

<b>FCC Reference:</b>	Part 15.109
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Sections 6.3 and 6.6 referencing ANSI C63.4
<b>Frequency Range:</b>	1 GHz to 12.5 GHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	23
<b>Relative Humidity (%):</b>	41

**Note(s):**

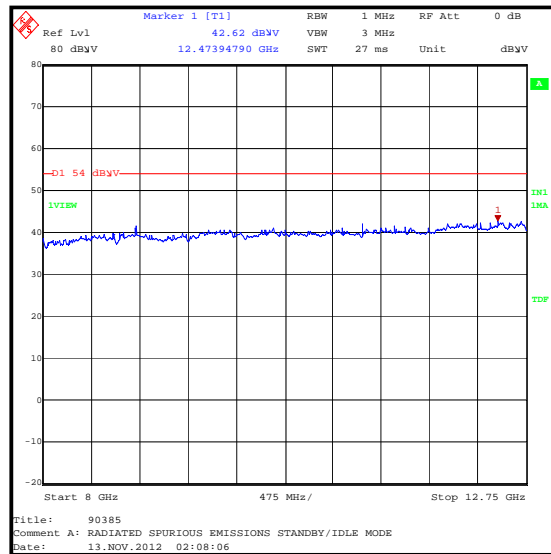
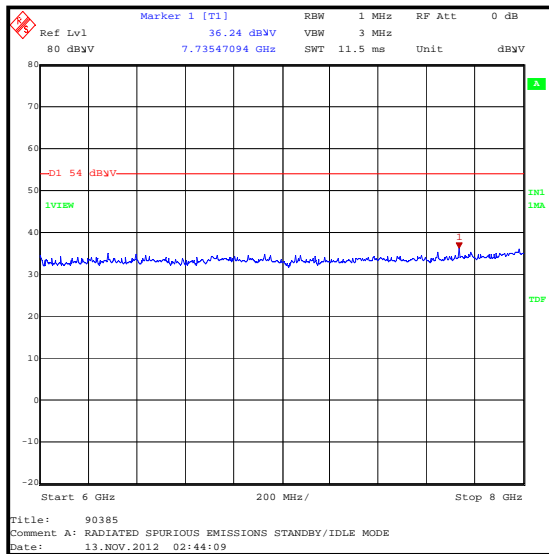
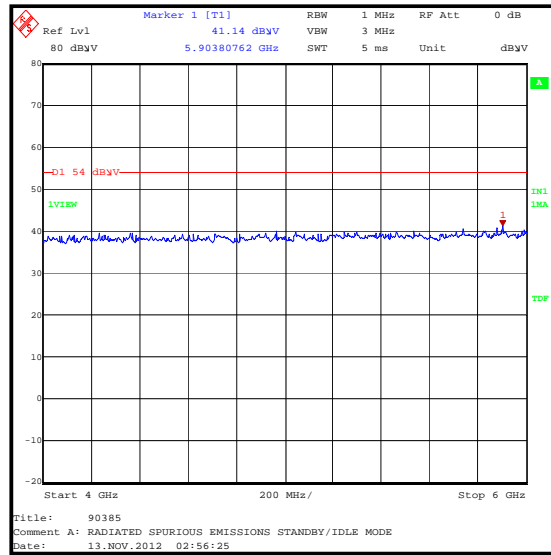
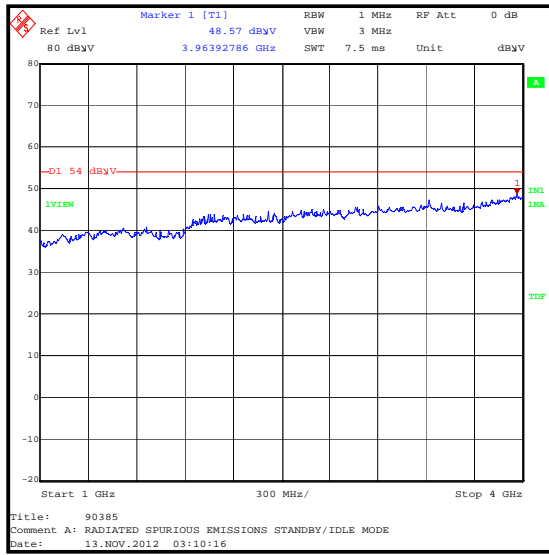
1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. No spurious emissions were detected above the noise floor of the measuring receiver therefore the highest peak noise floor reading of the measuring receiver was recorded as shown in the table below. The peak level was compared to the average limit as opposed to being compared to the peak limit because this is the more onerous limit.
3. Pre-scans above 1 GHz were performed in a fully anechoic chamber (RFI Asset Number K0002) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the test chamber floor in the centre of the chamber turntable. All measurement antennas were placed at a fixed height of 1.5 metres above the test chamber floor, in line with the EUT. Final measurements above 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:**

<b>Frequency (MHz)</b>	<b>Antenna Polarity</b>	<b>Peak Level (dB<math>\mu</math>V/m)</b>	<b>Average Limit (dB<math>\mu</math>V/m)</b>	<b>Margin (dB)</b>	<b>Result</b>
3963.928	Vertical	48.6	54.0	5.4	Complied



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



**Test Equipment Used:**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	04 Nov 2013	12
M1124	Test Receiver	Rohde & Schwarz	ESIB 26	N/A	14 Aug 2013	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	04 Nov 2013	12
A1818	Antenna	EMCO	3115	00075692	04 Nov 2013	12
A253	Antenna	Flann Microwave	12240-20	128	04 Nov 2013	12
A254	Antenna	Flann Microwave	14240-20	139	04 Nov 2013	12
A255	Antenna	Flann Microwave	16240-20	519	04 Nov 2013	12

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

<b>Test Engineer:</b>	David Doyle	<b>Test Date:</b>	15 November 2012
<b>Test Sample IMEI:</b>	353740050011927		

<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>	21
<b>Relative Humidity (%):</b>	41

**Results: Live / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.470	Live	41.1	56.5	15.4	Complied
0.947	Live	28.4	56.0	27.6	Complied
2.607	Live	34.1	56.0	21.9	Complied
3.363	Live	34.4	56.0	21.6	Complied
4.317	Live	36.3	56.0	19.7	Complied
4.443	Live	37.0	56.0	19.0	Complied
5.298	Live	36.5	60.0	23.5	Complied

**Results: Live / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.461	Live	34.2	46.7	12.5	Complied
0.951	Live	20.8	46.0	25.2	Complied
2.589	Live	28.6	46.0	17.4	Complied
3.336	Live	26.9	46.0	19.1	Complied
4.200	Live	28.5	46.0	17.5	Complied
4.677	Live	30.4	46.0	15.6	Complied
5.267	Live	29.3	50.0	20.7	Complied

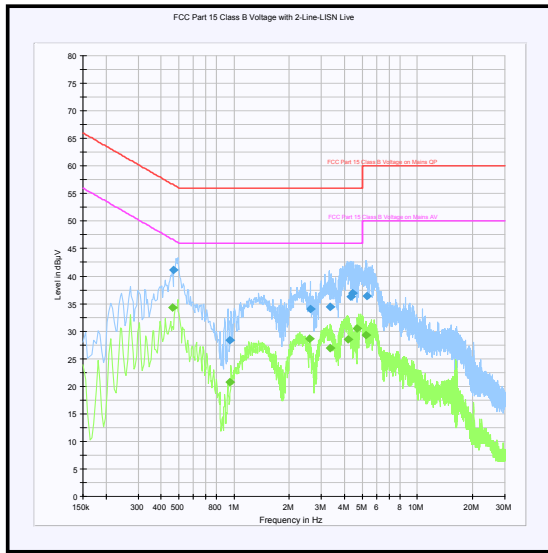
**Transmitter AC Conducted Spurious Emissions (continued)****Results: Neutral / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.456	Neutral	26.5	56.8	30.3	Complied
1.896	Neutral	22.6	56.0	33.4	Complied
3.134	Neutral	24.7	56.0	31.3	Complied
4.317	Neutral	34.5	56.0	21.5	Complied
4.677	Neutral	36.7	56.0	19.3	Complied
5.357	Neutral	36.8	60.0	23.2	Complied

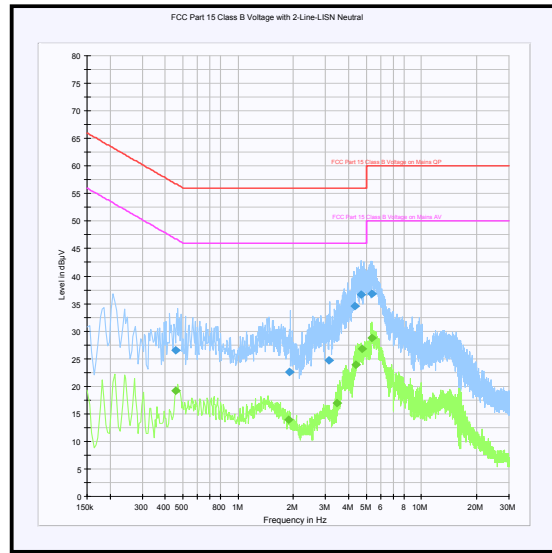
**Results: Neutral / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.456	Neutral	19.1	46.8	27.7	Complied
1.892	Neutral	13.9	46.0	32.1	Complied
3.449	Neutral	17.0	46.0	29.0	Complied
4.389	Neutral	23.9	46.0	22.1	Complied
4.740	Neutral	26.8	46.0	19.2	Complied
5.361	Neutral	28.7	50.0	21.3	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.*

**Test Equipment Used:**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
A649	LISN	Rohde & Schwarz	ESH3-Z5	825562/008	19 Feb 2013	12
A1830	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100668	25 Feb 2013	12
M1263	Test Receiver	Rohde & Schwarz	ESIB7	100265	09 Aug 2013	12

**5.2.4. Transmitter Minimum 6 dB Bandwidth****Test Summary:**

<b>Test Engineer:</b>	Mark Percival	<b>Test Date:</b>	15 November 2012
<b>Test Sample IMEI:</b>	353740050010663		

<b>FCC Reference:</b>	Part 15.247(a)(2)
<b>Test Method Used:</b>	As detailed in FCC KDB 558074 Section 7.1

**Environmental Conditions:**

<b>Temperature (°C):</b>	25
<b>Relative Humidity (%):</b>	33

**Note(s):**

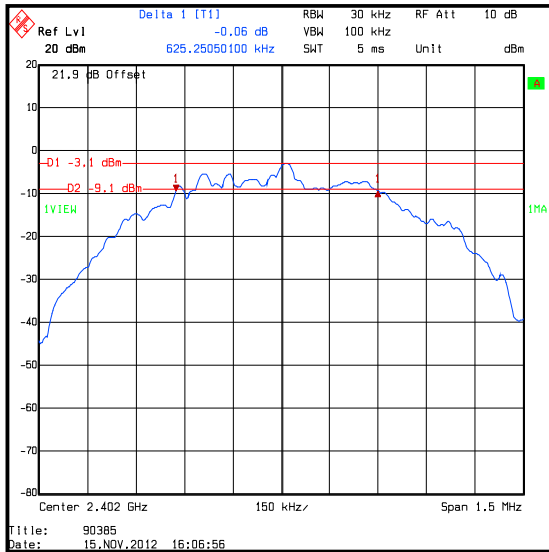
1. Transmitter minimum 6 dB bandwidth tests were performed using a test receiver in accordance with FCC KDB 558074 Section 7.1 Option 1.

**Results:**

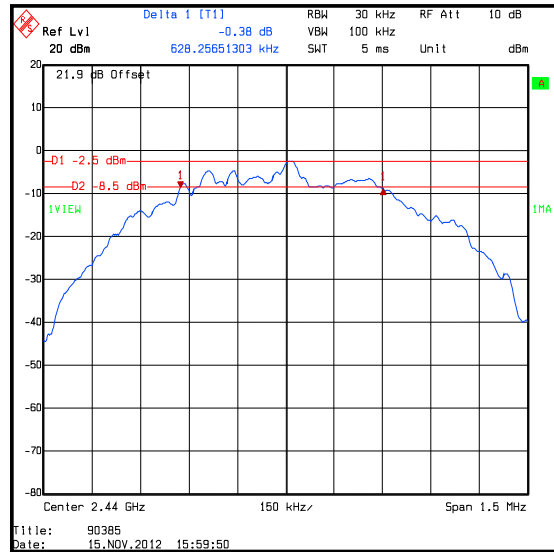
Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	625.251	≥500	125.251	Complied
Middle	628.257	≥500	128.257	Complied
Top	625.251	≥500	125.251	Complied

**Transmitter Minimum 6 dB Bandwidth (continued)**

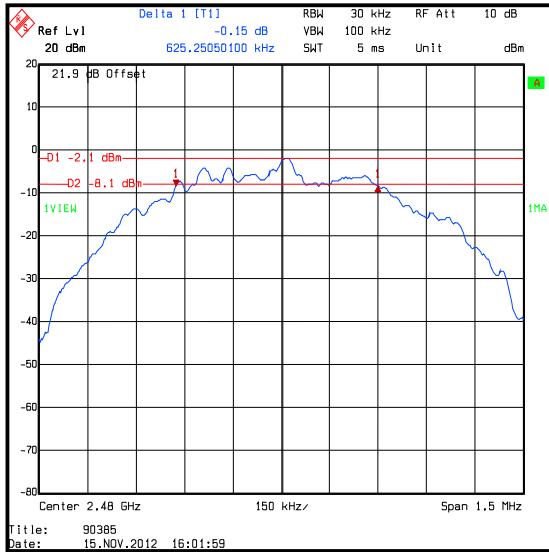
**Results:**



**Bottom Channel**



**Middle Channel**



**Top Channel**

**Test Equipment Used:**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
A2142	Attenuator	AtlanTecRF	AN18-20	081120-23	25 May 2013	12
M1379	Test Receiver	Rohde & Schwarz	ESIB7	100330	15 Oct 2013	12

**5.2.5. Transmitter Power Spectral Density****Test Summary:**

<b>Test Engineer:</b>	Mark Percival	<b>Test Date:</b>	15 November 2012
<b>Test Sample IMEI:</b>	353740050010663		

<b>FCC Reference:</b>	Part 15.247(e)
<b>Test Method Used:</b>	As detailed in FCC KDB 558074 Section 9.1

**Environmental Conditions:**

<b>Temperature (°C):</b>	25
<b>Relative Humidity (%):</b>	33

**Note(s):**

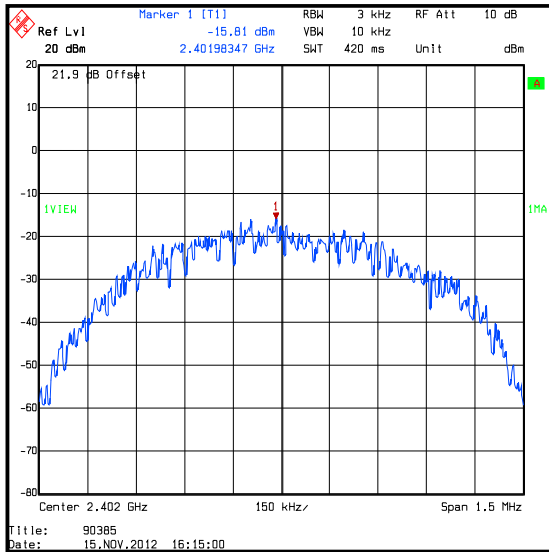
1. Transmitter Power Spectral Density tests in all bands were performed using a spectrum analyser in accordance with FCC KDB 558074 Section 9.1 Option 1.
2. The spectrum analyser was connected to the RF port on the EUT using suitable attenuation and RF cable. An RF level offset of 21.9 dB was entered on the spectrum analyser to compensate for the loss of the attenuator and RF cable.

**Results:**

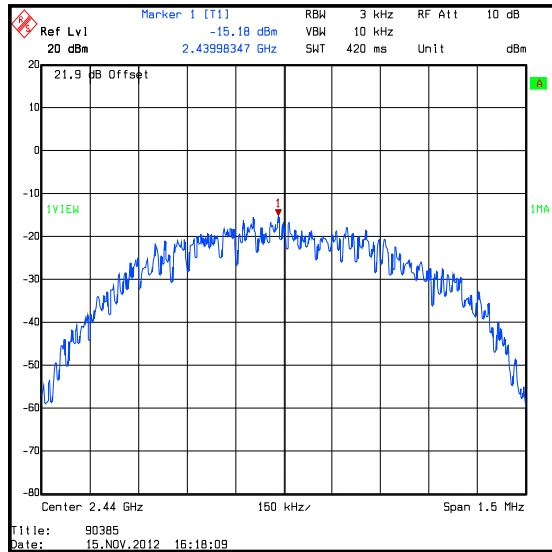
Channel	Output Power (dBm / 3 kHz)	Limit (dBm / 3 kHz)	Margin (dB)	Result
Bottom	-15.8	8.0	23.8	Complied
Middle	-15.2	8.0	23.2	Complied
Top	-14.8	8.0	22.8	Complied

**Transmitter Power Spectral Density (continued)**

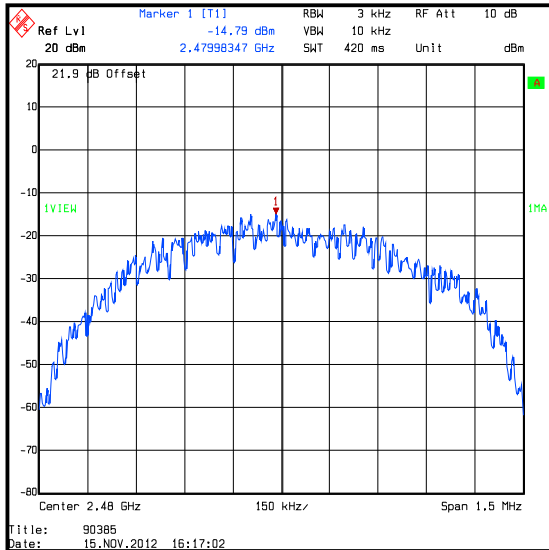
**Results:**



**Bottom Channel**



**Middle Channel**



**Top Channel**

**Test Equipment Used:**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
A2142	Attenuator	AtlanTecRF	AN18-20	081120-23	25 May 2013	12
M1021	Signal Generator	Rohde & Schwarz	SMP02	833286/004	09 Jan 2013	12
M1267	Thermal Power Sensor	Rohde & Schwarz	NRV-Z52	100155	07 Jun 2013	12
M1379	Test Receiver	Rohde & Schwarz	ESIB7	100330	15 Oct 2013	12
M199	Power Meter	Rohde & Schwarz	NRVS	827023/075	07 Jun 2013	12



**5.2.6. Transmitter Maximum Peak Output Power****Test Summary:**

<b>Test Engineer:</b>	Mark Percival	<b>Test Date:</b>	15 November 2012
<b>Test Sample IMEI:</b>	353740050010663		

<b>FCC Reference:</b>	Part 15.247(b)(3)
<b>Test Method Used:</b>	As detailed in FCC KDB 558074 Section 8.1.1

**Environmental Conditions:**

<b>Temperature (°C):</b>	25
<b>Relative Humidity (%):</b>	33

**Note(s):**

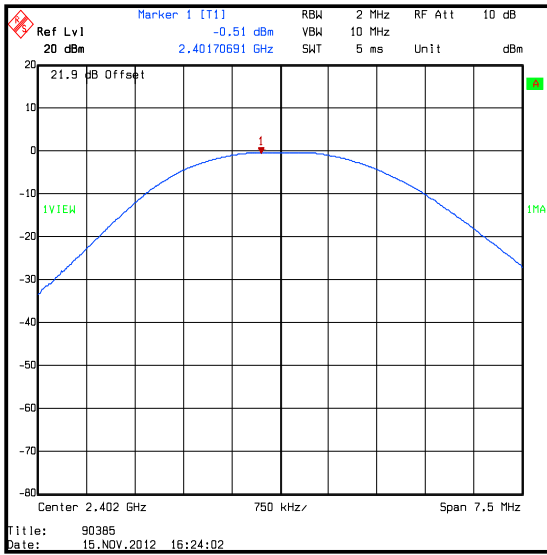
1. Conducted power tests were performed using a spectrum analyser in accordance with FCC KDB 558074 Section 8.1.1 Measurement Procedure Option 1.
2. The spectrum analyser was connected to the RF port on the EUT using suitable attenuation and RF cable. An RF level offset of 21.9 dB was entered on the spectrum analyser to compensate for the loss of the attenuator and RF cable.

**Results:**

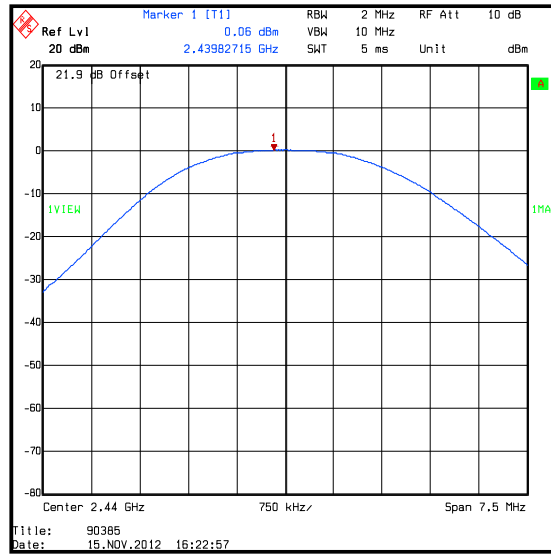
Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	-0.5	30.0	30.5	Complied
Middle	0.1	30.0	29.9	Complied
Top	0.6	30.0	29.4	Complied

Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	-0.5	-2.3	-2.8	36.0	38.8	Complied
Middle	0.1	-2.3	-2.2	36.0	38.2	Complied
Top	0.6	-2.3	-1.7	36.0	37.7	Complied

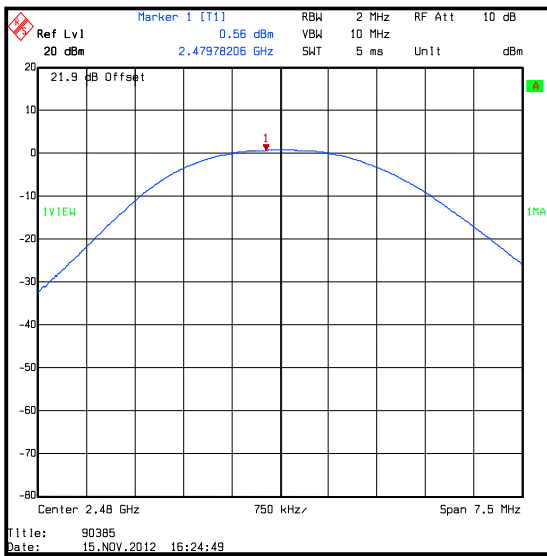
**Transmitter Maximum Peak Output Power (continued)**



**Bottom Channel**



**Middle Channel**



**Top Channel**

**Test Equipment Used:**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
A2142	Attenuator	AtlanTecRF	AN18-20	081120-23	25 May 2013	12
M1021	Signal Generator	Rohde & Schwarz	SMP02	833286/004	09 Jan 2013	12
M1267	Thermal Power Sensor	Rohde & Schwarz	NRV-Z52	100155	07 Jun 2013	12
M1379	Test Receiver	Rohde & Schwarz	ESIB7	100330	15 Oct 2013	12
M199	Power Meter	Rohde & Schwarz	NRVS	827023/075	07 Jun 2013	12

**5.2.7. Transmitter Radiated Emissions****Test Summary:**

<b>Test Engineer:</b>	Nick Steele	<b>Test Date:</b>	17 November 2012
<b>Test Sample IMEI:</b>	353740050011927		

<b>FCC Reference:</b>	Parts 15.247(d) & 15.209(a)
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Sections 6.3 and 6.5 referencing ANSI C63.4
<b>Frequency Range</b>	30 MHz to 1000 MHz

**Environmental Conditions:**

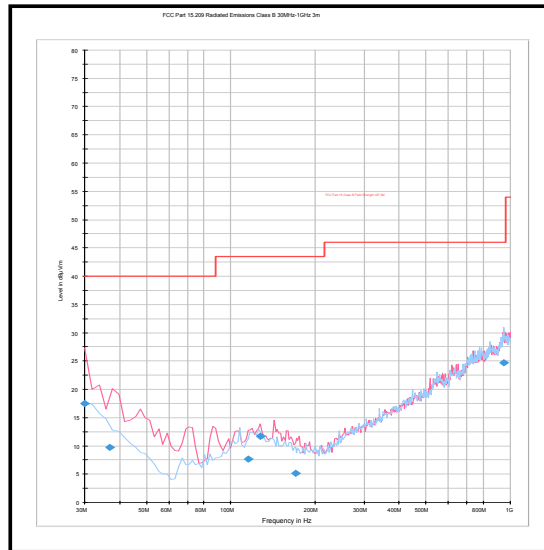
<b>Temperature (°C):</b>	24
<b>Relative Humidity (%):</b>	40

**Note(s):**

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss
2. The preliminary scans showed similar emission levels below 1 GHz, for each channel of operation. Therefore final radiated emissions measurements were performed with the EUT set to the top channel only.
3. All other emissions were at least 20 dB below the appropriate limit or below the noise floor of the measurement system.
4. Measurements below 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: Top Channel**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
115.853	Vertical	7.7	43.5	35.8	Complied
127.719	Vertical	11.7	43.5	31.8	Complied
170.745	Vertical	5.2	43.5	38.3	Complied

**Transmitter Radiated Emissions (continued)**

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

**Test Equipment Used:**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
A1834	Attenuator	Hewlett Packard	8491B	10444	29 Jan 2013	12
A553	Antenna	Chase	CBL6111A	1593	15 Feb 2013	12
G0543	Amplifier	Sonoma	310N	230801	02 Jan 2013	3
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	24 Oct 2013	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	03 Feb 2013	12

**Transmitter Radiated Emissions (continued)****Test Summary:**

<b>Test Engineer:</b>	David Doyle	<b>Test Date:</b>	14 November 2012
<b>Test Sample IMEI:</b>	353740050011927		

<b>FCC Reference:</b>	Parts 15.247(d) & 15.209(a)
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Sections 6.3 and 6.6 referencing ANSI C63.4
<b>Frequency Range</b>	1 GHz to 25 GHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	24
<b>Relative Humidity (%):</b>	42

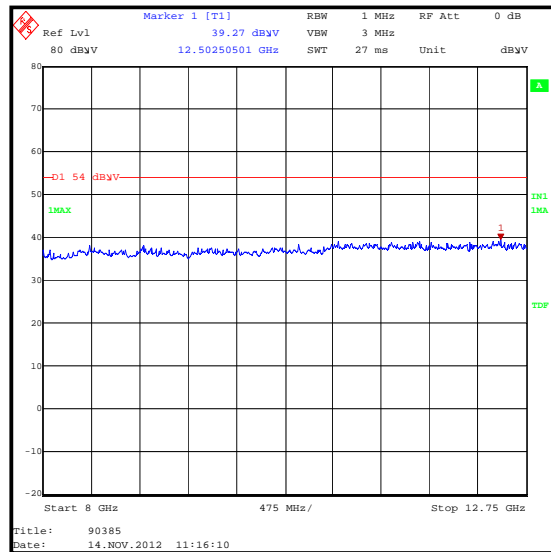
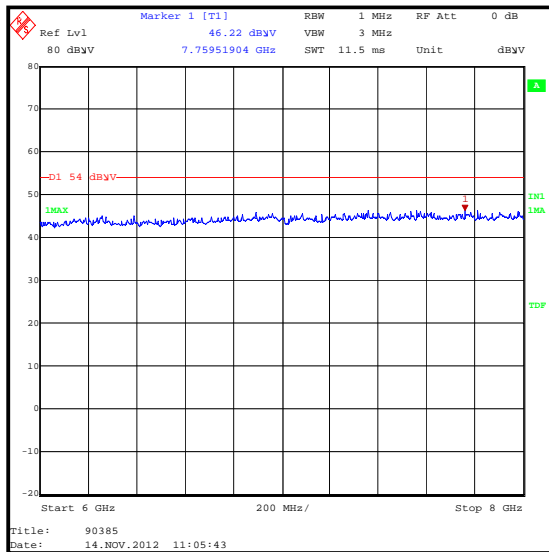
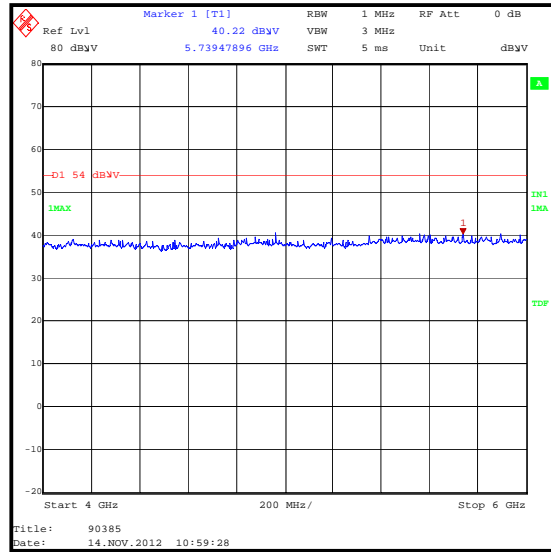
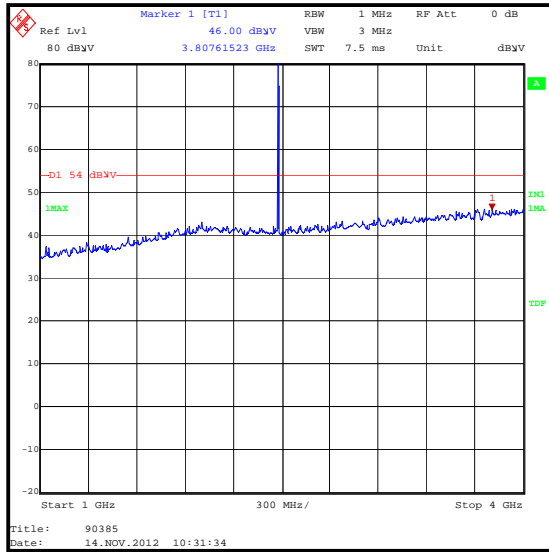
**Note(s):**

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss
2. No spurious emissions were detected above the noise floor of the measuring receiver therefore the highest peak noise floor reading of the measuring receiver was recorded as shown in the table below. The peak level was compared to the average limit as opposed to being compared to the peak limit because this is the more onerous limit.
3. The emission shown on the 1 GHz to 4 GHz plot is the EUT fundamental.
4. Pre-scans above 1 GHz were performed in a fully anechoic chamber (RFI Asset Number K0002) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the test chamber floor in the centre of the chamber turntable. All measurement antennas were placed at a fixed height of 1.5 metres above the test chamber floor, in line with the EUT. Final measurements above 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.

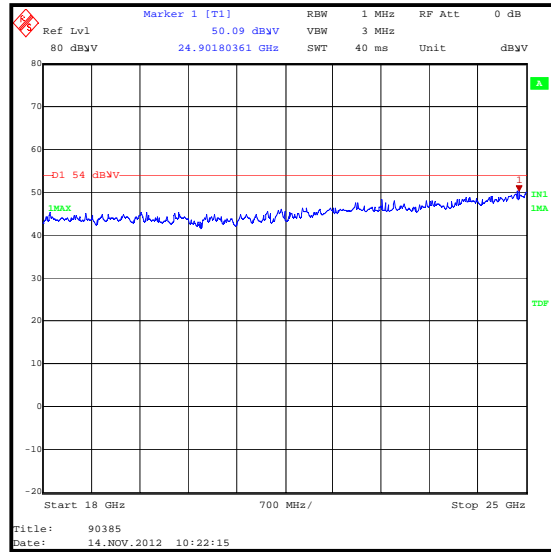
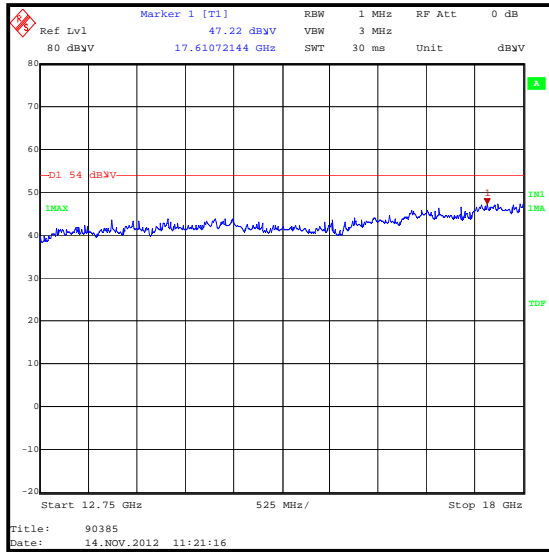
**Results:**

<b>Frequency (MHz)</b>	<b>Antenna Polarity</b>	<b>Level (dB<math>\mu</math>V/m)</b>	<b>Limit (dB<math>\mu</math>V/m)</b>	<b>Margin (dB)</b>	<b>Result</b>
24901.804	Vertical	50.1	54.0	3.9	Complied

### Transmitter Radiated Emissions (continued)



**Transmitter Radiated Emissions (continued)**



**Test Equipment Used:**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
K0002	3m RSE Chamber	Rainford	N/A	N/A	04 Nov 2013	12
A1818	Antenna	EMCO	3115	00075692	04 Nov 2013	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	04 Nov 2013	12
M1124	Test Receiver	Rohde & Schwarz	ESIB 26	100046K	14 Aug 2013	12
A253	Antenna	Flann Microwave	12240-20	128	04 Nov 2013	12
A254	Antenna	Flann Microwave	14240-20	139	04 Nov 2013	12
A255	Antenna	Flann Microwave	16240-20	519	04 Nov 2013	12
A256	Antenna	Flann Microwave	18240-20	400	04 Nov 2013	12
A436	Antenna	Flann Microwave	20240-20	330	04 Nov 2013	12

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

<b>Test Engineer:</b>	David Doyle	<b>Test Date:</b>	14 November 2012
<b>Test Sample IMEI:</b>	353740050011927		

<b>FCC Reference:</b>	Parts 15.247(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>	24
<b>Relative Humidity (%):</b>	41

**Note(s):**

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. \* -20 dBc limit.

**Results: Peak**

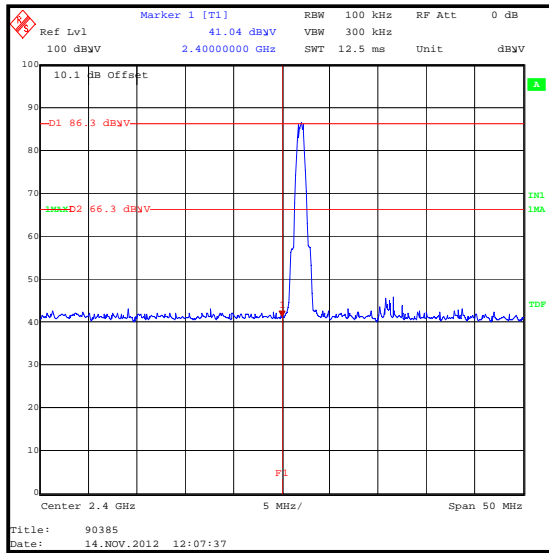
Frequency (MHz)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2400	41.0	66.3*	25.3	Complied
2483.5	51.1	74.0	22.9	Complied

**Results: Average**

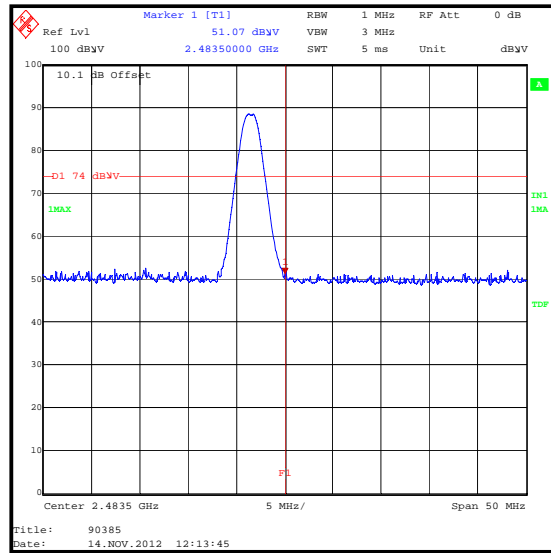
Frequency (MHz)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	38.8	54.0	15.2	Complied



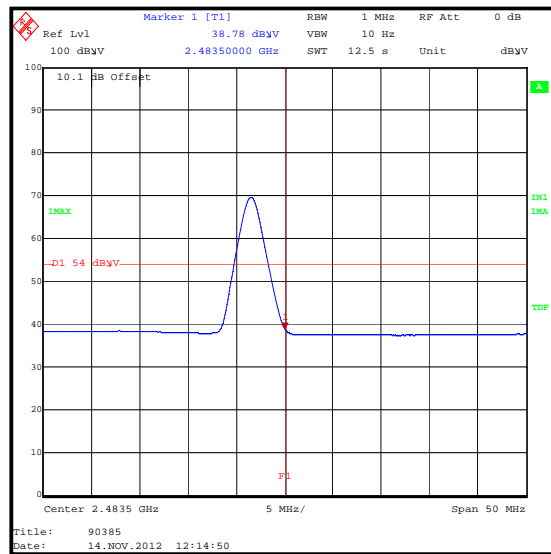
**Transmitter Band Edge Radiated Emissions (continued)**



**Lower Band Edge Peak Measurement**



**Upper Band Edge Peak Measurement**



**Upper Band Edge Average Measurement**

**Test Equipment Used:**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
K0002	3m RSE Chamber	Rainford	N/A	N/A	04 Nov 2013	12
A1818	Antenna	EMCO	3115	00075692	04 Nov 2013	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	04 Nov 2013	12
M1124	Test Receiver	Rohde & Schwarz	ESIB 26	100046K	14 Aug 2013	12
A1396	Attenuator	Huber & Suhner	6810.17.B	757987	06 July 2013	12

## **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%	±3.25 dB
Conducted Maximum Peak Output Power	2.4 GHz to 2.4835 GHz	95%	±0.28 dB
Spectral Power Density	2.4 GHz to 2.4835 GHz	95%	±0.28 dB
Minimum 6 dB Bandwidth	2.4 GHz to 2.4835 GHz	95%	±0.92 ppm
Radiated Spurious Emissions	30 MHz to 25 GHz	95%	±2.94 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**

<b>Version Number</b>	<b>Revision Details</b>		
	<b>Page No(s)</b>	<b>Clause</b>	<b>Details</b>
1.0	-	-	Initial Version
2.0	-	-	Antenna Gain updated as requested by Customer