



# TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: Panasonic EB-3901

FCC ID: UCE211048A

To: FCC Part 15.247: 2011 Subpart C

**Test Report Serial No:**  
RFI-RPT-RP85011JD01F

This Test Report Is Issued Under The Authority  
Of Chris Guy, Head of Global Approvals:

A handwritten signature in black ink that appears to read "I. M. Watch".

Checked By:	Ian Watch
Signature:	A handwritten signature in black ink that appears to read "I. M. Watch".
Date of Issue:	27 January 2012

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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>	47CFR15.247
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications) 2011: 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) 2011: 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) 2011: Part 15 Subpart C (Intentional Radiators) - Sections 15.207 and 15.209
<b>Site Registration:</b>	209735
<b>Location of Testing:</b>	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
<b>Test Dates:</b>	05 January 2012 to 26 January 2012

### 2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
Part 15.107(a)	Receiver/Idle Mode AC Conducted Emissions	✓
Part 15.109	Receiver/Idle Mode Radiated Spurious Emissions	✓
Part 15.207	Transmitter AC Conducted Emissions	✓
Part 15.247(a)(1)	Transmitter 20 dB Bandwidth	✓
Part 15.247(a)(1)	Transmitter Carrier Frequency Separation	✓
Part 15.247(a)(1)(iii)	Transmitter Number of Hopping Frequencies and Average Time of Occupancy	✓
Part 15.247(b)(1)	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

### **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>	Panasonic
<b>Model Name or Number:</b>	EB-3901
<b>IMEI:</b>	004401221200252 (Radiated sample #1) 004401221200260 (Radiated sample #2) 004401221200021 (Conducted RF port sample #1) 004401221200039 (Conducted RF port sample #2)
<b>Hardware Version Number:</b>	Rev C
<b>Software Version Number:</b>	ACPU: eu-07-0181 CCPU: R1B_1_EC02_01_E02
<b>FCC ID:</b>	UCE211048A

<b>Brand Name:</b>	Panasonic
<b>Description:</b>	AC Charger
<b>Model Name or Number:</b>	VSK0775

<b>Brand Name:</b>	Not known
<b>Description:</b>	Charge/USB Data cable
<b>Model Name or Number:</b>	Not known

<b>Brand Name:</b>	Panasonic
<b>Description:</b>	Personal Hands-Free
<b>Model Name or Number:</b>	Not known

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

The equipment under test was a dual mode UMTS/GSM mobile phone with *Bluetooth*, WLAN 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>	<i>Bluetooth</i>				
<b>Power Supply Requirement:</b>	Nominal	3.8 V			
<b>Type of Unit:</b>	Transceiver				
<b>Channel Spacing:</b>	1 MHz				
<b>Mode:</b>	Basic Rate	Enhanced Data Rate			
<b>Modulation:</b>	GFSK	$\pi/4$ -DQPSK	8DQPSK		
<b>Packet Type: (Maximum Payload)</b>	DH5	2DH5	3DH5		
<b>Data Rate (Mbit/s):</b>	1	2	3		
<b>Declared Antenna Gain:</b>	-1.6 dBi				
<b>Maximum Conducted Output Power:</b>	3.3 dBm				
<b>Transmit Frequency Range:</b>	2402 MHz to 2480 MHz				
<b>Transmit Channels Tested:</b>	Channel ID	Channel Number	Channel Frequency (MHz)		
	Bottom	0	2402		
	Middle	39	2441		
	Top	78	2480		
<b>Receive Frequency Range:</b>	2402 MHz to 2480 MHz				
<b>Receive Channels Tested:</b>	Channel ID	Channel Number	Channel Frequency (MHz)		
	Bottom	0	2402		
	Middle	39	2441		
	Top	78	2480		

### **3.5. Support Equipment**

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

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

## **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
- Transmit mode with Basic Rate (DH5 packets) or EDR (2DH5 or 3DH5 packets) as required.

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

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

- For Transmit tests: Standalone, connected via a radio link to a Bluetooth tester in order to place the EUT into Bluetooth test mode. The laptop PC with the Client's bespoke application was used to place the EUT into Bluetooth mode.
- Receive/Idle tests: Standalone, with the Bluetooth mode active but not transmitting.
- Both EDR/Basic rate modes were compared and tests were performed with the mode that presented the worst case result. For output power, bandwidth, band edge and channel separation, all modes were tested.
- Idle and transmitter radiated spurious emissions tests were performed with the AC charger and Personal Hands-Free connected to the EUT.
- The conducted sample with IMEI 004401221200021 was used for EIRP, transmitter frequency separation and number of hopping frequency tests.
- The conducted sample with IMEI 004401221200039 was used for the 20 dB bandwidth test.
- The radiated sample with IMEI 004401221200252 was used for radiated spurious emissions and transmitter band edge tests.
- The radiated sample with IMEI 004401221200260 was used for the AC conducted 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.

## **5.2. Test Results**

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

#### **Test Summary:**

Test Engineer:	Sarah Williams	Test Date:	16 January 2012
Test Sample IMEI:	004401221200260		

FCC 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 (%):	23

#### **Results: Live / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
2.067	Live	34.5	56.0	21.5	Complied
2.792	Live	35.6	56.0	20.4	Complied
3.588	Live	34.5	56.0	21.5	Complied
8.826	Live	37.4	60.0	22.6	Complied
9.119	Live	37.9	60.0	22.1	Complied
9.915	Live	38.1	60.0	21.9	Complied

#### **Results: Live / Average**

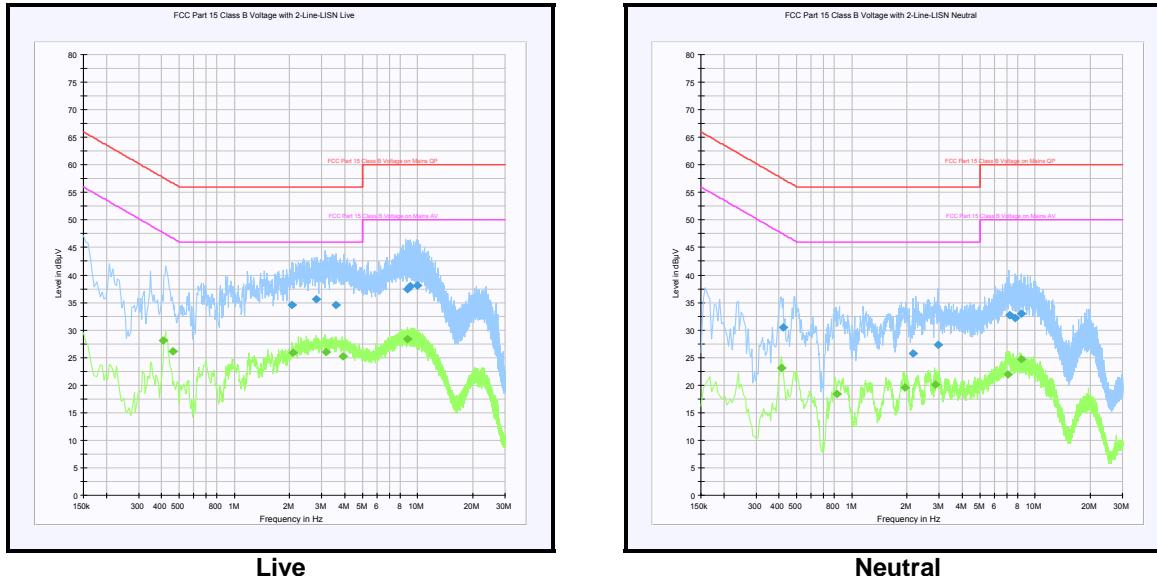
Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.407	Live	28.2	47.7	19.5	Complied
0.461	Live	26.2	46.7	20.5	Complied
2.094	Live	25.9	46.0	20.1	Complied
3.147	Live	25.9	46.0	20.1	Complied
3.921	Live	25.2	46.0	20.8	Complied
8.781	Live	28.4	50.0	21.6	Complied

**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
0.420	Neutral	30.5	57.4	26.9	Complied
2.153	Neutral	25.8	56.0	30.2	Complied
2.945	Neutral	27.4	56.0	28.6	Complied
7.238	Neutral	32.6	60.0	27.4	Complied
7.737	Neutral	32.2	60.0	27.8	Complied
8.453	Neutral	32.9	60.0	27.1	Complied

**Results: Neutral / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.411	Neutral	23.1	47.6	24.5	Complied
0.830	Neutral	18.4	46.0	27.6	Complied
1.950	Neutral	19.6	46.0	26.4	Complied
2.850	Neutral	20.1	46.0	25.9	Complied
7.121	Neutral	21.9	50.0	28.1	Complied
8.376	Neutral	24.7	50.0	25.3	Complied

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

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

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

<b>Test Engineer:</b>	Andrew Edwards	<b>Test Date:</b>	16 January 2012
<b>Test Sample IMEI:</b>	004401221200252		

<b>FCC Part:</b>	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:**

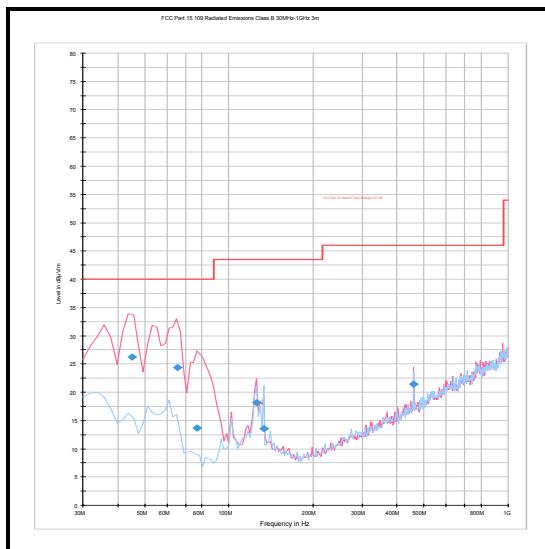
<b>Temperature (°C):</b>	25
<b>Relative Humidity (%):</b>	28

**Results: Quasi Peak**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
44.843	Vertical	26.2	40.0	13.8	Complied
65.523	Vertical	24.4	40.0	15.6	Complied
76.802	Vertical	13.7	40.0	26.3	Complied
125.264	Vertical	18.1	43.5	25.4	Complied
133.223	Horizontal	13.5	43.5	30.0	Complied
458.777	Vertical	21.4	46.0	24.6	Complied

**Note(s):**

1. The final measured value, for the given emission, in the table above 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.

**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.*

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

<b>Test Engineer:</b>	Mark Percival	<b>Test Date:</b>	05 January 2012
<b>Test Sample IMEI:</b>	004401221200252		

<b>FCC Part:</b>	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 12.75 GHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	21
<b>Relative Humidity (%):</b>	35

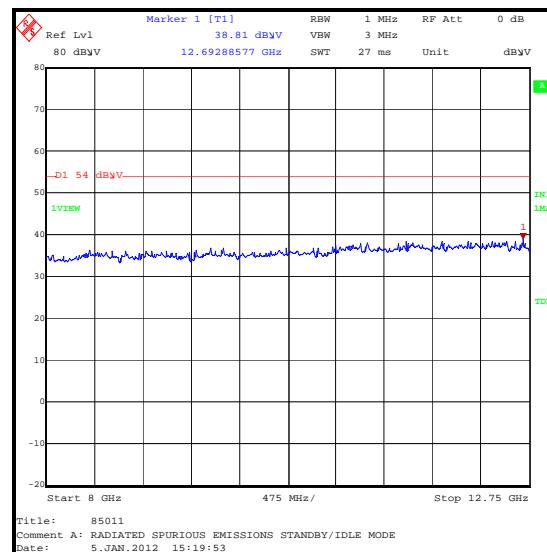
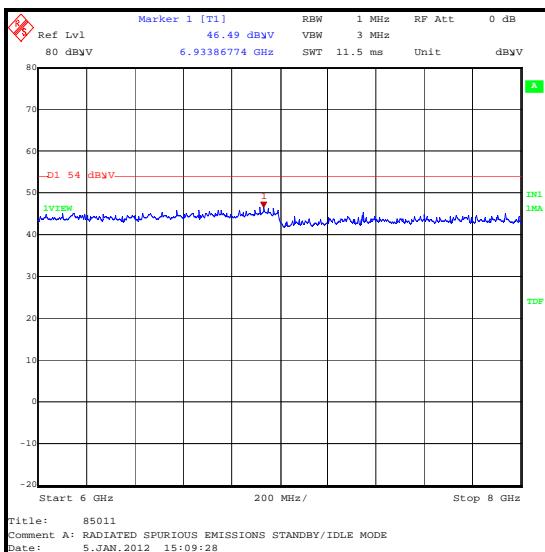
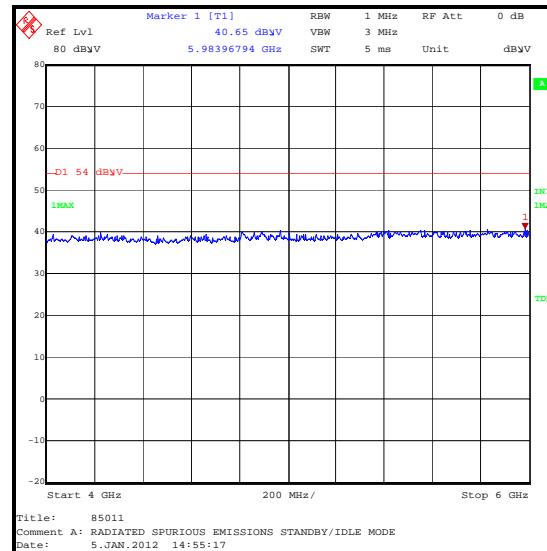
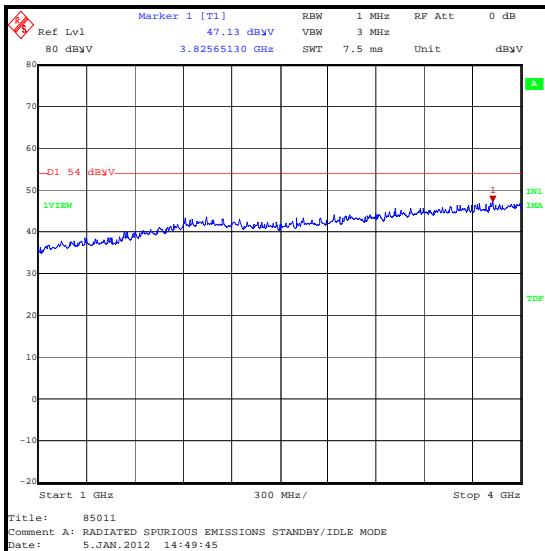
**Results:**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)	Margin (dB)	Result
3825.651	Horizontal	47.1	54.0	6.9	Complied

**Note(s):**

1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss.
2. 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.
3. 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 above. 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.

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



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

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

Test Engineer:	Sarah Williams	Test Date:	16 January 2012
Test Sample IMEI:	004401221200260		

FCC Part:	15.207
Test Method Used:	As detailed in ANSI C63.10 Section 6.2 referencing ANSI C63.4

**Environmental Conditions:**

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

**Results: Live / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
1.482	Live	25.2	56.0	30.8	Complied
3.408	Live	29.3	56.0	26.7	Complied
8.322	Live	33.5	60.0	26.5	Complied
8.376	Live	34.7	60.0	25.3	Complied
8.736	Live	34.8	60.0	25.2	Complied
9.424	Live	35.2	60.0	24.8	Complied

**Results: Live / Average**

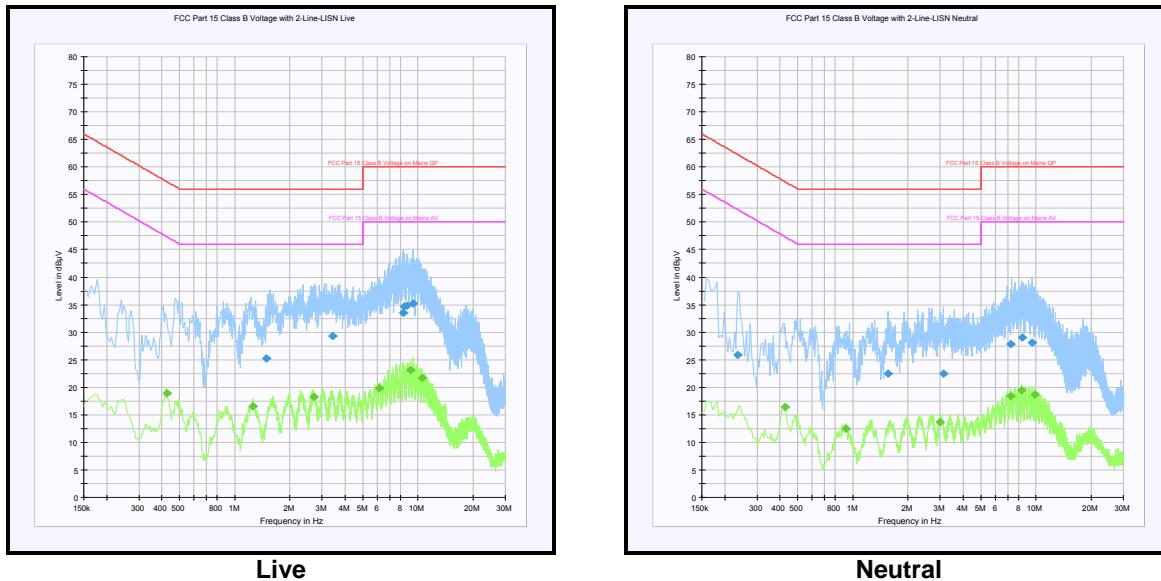
Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.429	Live	18.9	47.3	28.4	Complied
1.257	Live	16.5	46.0	29.5	Complied
2.702	Live	18.3	46.0	27.7	Complied
6.149	Live	19.8	50.0	30.2	Complied
9.105	Live	23.1	50.0	26.9	Complied
10.568	Live	21.7	50.0	28.3	Complied

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

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.236	Neutral	25.8	62.3	36.5	Complied
1.563	Neutral	22.5	56.0	33.5	Complied
3.120	Neutral	22.5	56.0	33.5	Complied
7.310	Neutral	27.9	60.0	32.1	Complied
8.426	Neutral	29.0	60.0	31.0	Complied
9.479	Neutral	28.2	60.0	31.8	Complied

**Results: Neutral / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.429	Neutral	16.4	47.3	30.9	Complied
0.920	Neutral	12.4	46.0	33.6	Complied
2.999	Neutral	13.6	46.0	32.4	Complied
7.265	Neutral	18.3	50.0	31.7	Complied
8.367	Neutral	19.4	50.0	30.6	Complied
9.843	Neutral	18.6	50.0	31.4	Complied

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

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

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

<b>Test Engineers:</b>	Mark Percival & Sarah Williams	<b>Test Dates:</b>	17 January 2012 & 26 January 2012
<b>Test Sample IMEI:</b>	004402112200039		

<b>FCC Part:</b>	15.247(a)(1)
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Section 6.9.1

**Environmental Conditions:**

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

**Results DH5:**

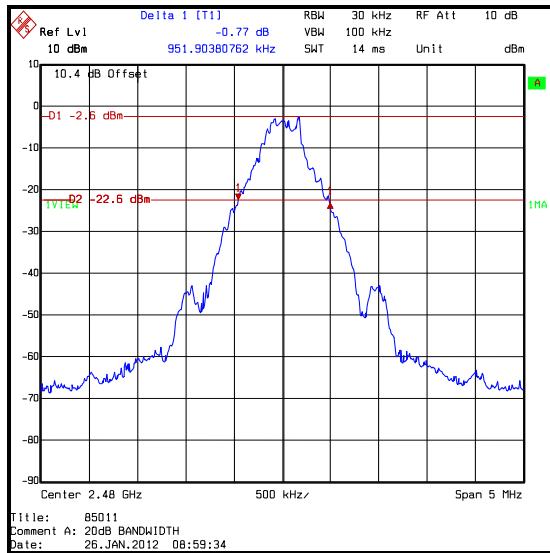
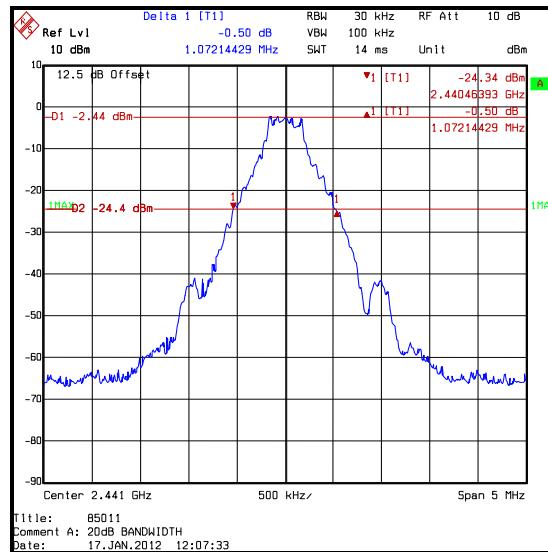
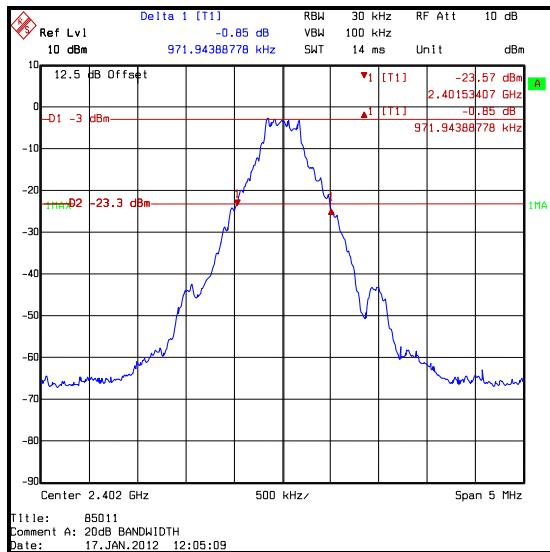
<b>Channel</b>	<b>20 dB Bandwidth (kHz)</b>
Bottom	971.944
Middle	1072.144
Top	951.904

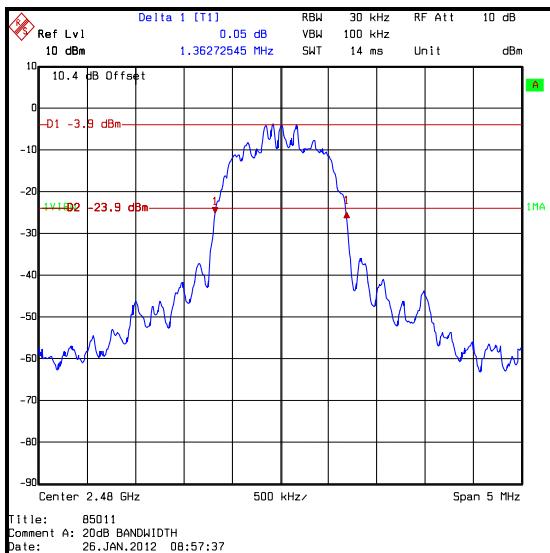
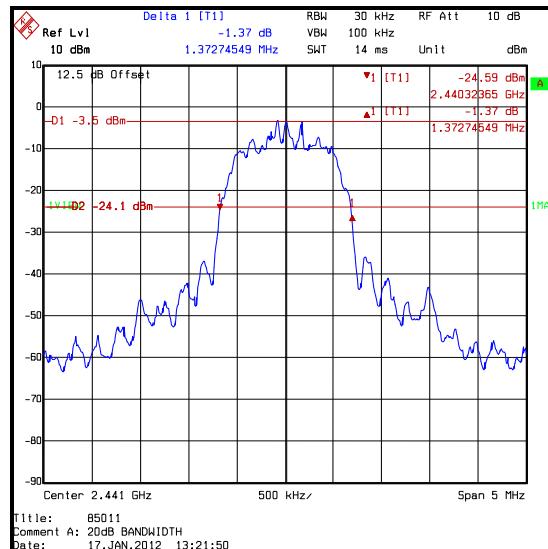
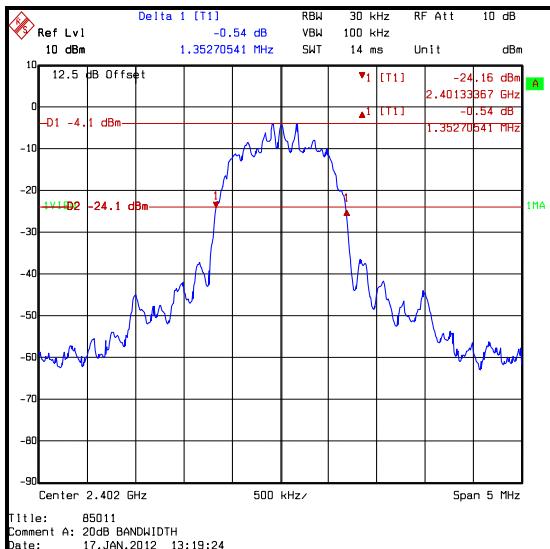
**Results 2DH5:**

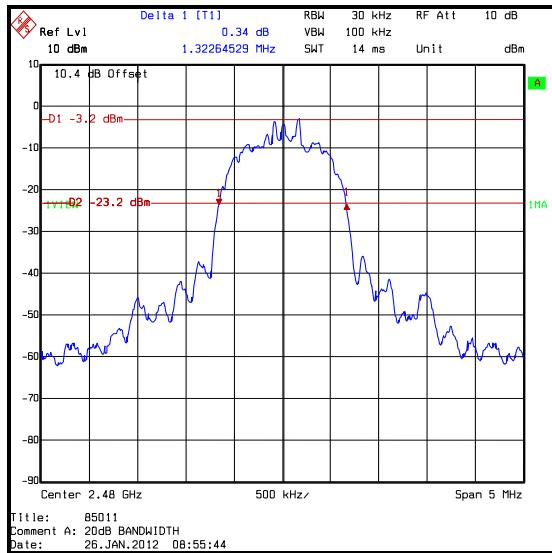
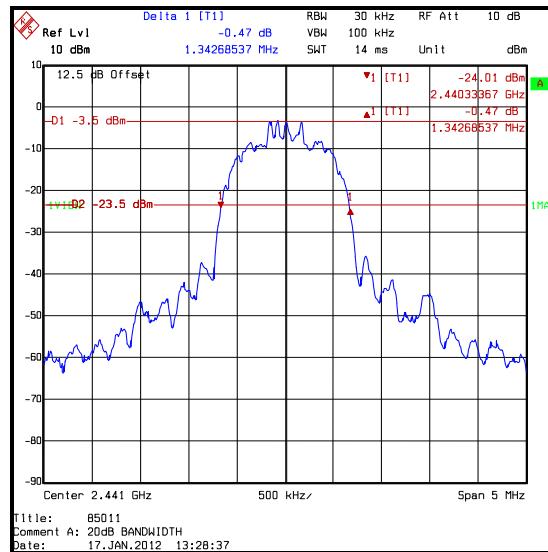
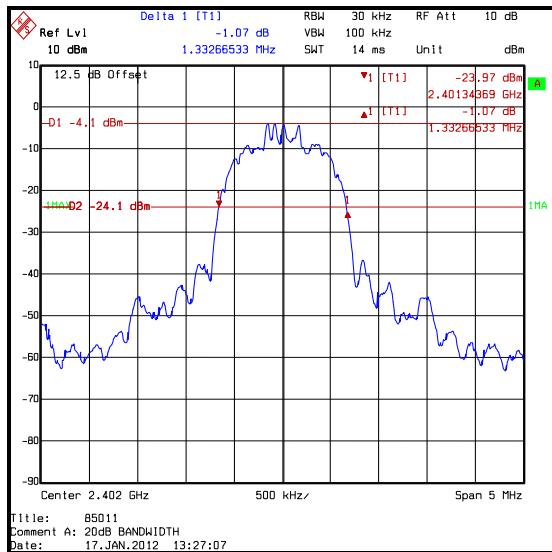
<b>Channel</b>	<b>20 dB Bandwidth (kHz)</b>
Bottom	1352.705
Middle	1372.745
Top	1362.725

**Results 3DH5:**

<b>Channel</b>	<b>20 dB Bandwidth (kHz)</b>
Bottom	1332.665
Middle	1342.685
Top	1322.645

**Transmitter 20 dB Bandwidth (continued)****Results DH5:**

**Transmitter 20 dB Bandwidth (continued)****Results 2DH5:**

**Transmitter 20 dB Bandwidth (continued)****Results 3DH5:**

### 5.2.5. Transmitter Carrier Frequency Separation

#### Test Summary:

Test Engineer:	Mark Percival	Test Date:	20 January 2012
Test Sample IMEI:	004401221200021		

FCC Part:	15.247(a)(1)
Test Method Used:	As detailed in ANSI C63.10 Section 7.7.2

#### Environmental Conditions:

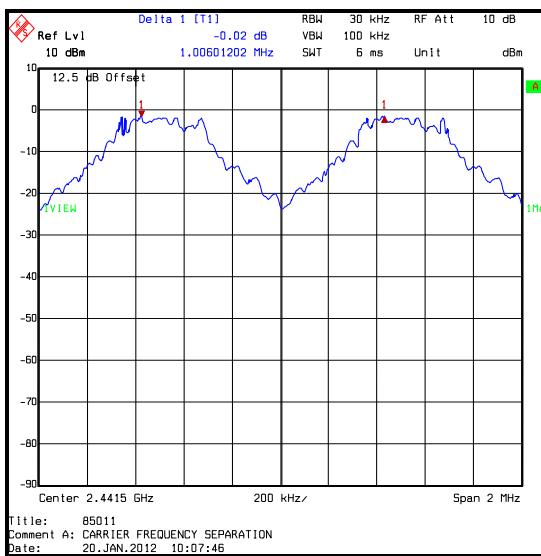
Temperature (°C):	24
Relative Humidity (%):	21

#### Results: DH5

Carrier Frequency Separation (kHz)	Limit ( $\frac{2}{3}$ of 20 dB BW) (kHz)	Margin (kHz)	Result
1006.012	714.763	291.249	Complied

#### Note(s):

1. The 20 dB bandwidth measured for the middle channel operating at 2441 MHz was used to calculate the limit.

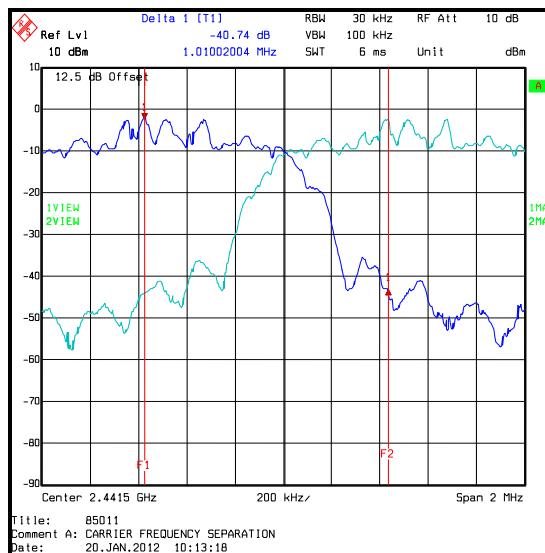


**Transmitter Carrier Frequency Separation (continued)****Results: 2DH5**

Carrier Frequency Separation (kHz)	Limit ( $\frac{2}{3}$ of 20 dB BW) (kHz)	Margin (kHz)	Result
1010.020	915.163	94.857	Complied

**Note(s):**

1. The 20 dB bandwidth measured for the middle channel operating at 2441 MHz was used to calculate the limit.

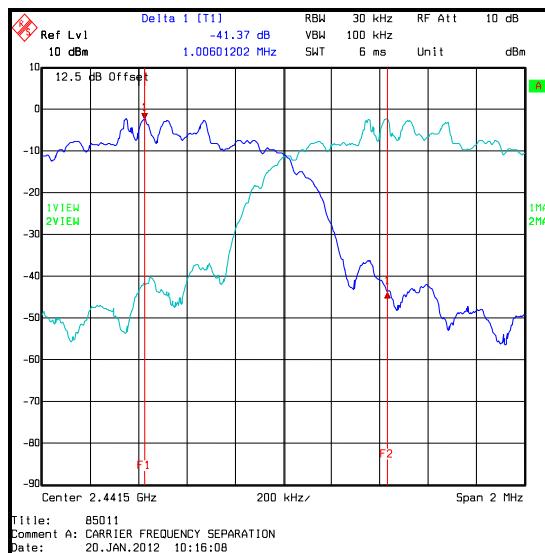


**Transmitter Carrier Frequency Separation (continued)****Results: 3DH5**

Carrier Frequency Separation (kHz)	Limit ( $\frac{2}{3}$ of 20 dB BW) (kHz)	Margin (kHz)	Result
1006.012	895.123	110.889	Complied

**Note(s):**

1. The 20 dB bandwidth measured for the middle channel operating at 2441 MHz was used to calculate the limit.



**5.2.6. Transmitter Number of Hopping Frequencies and Average Time of Occupancy****Test Summary:**

Test Engineer:	Mark Percival	Test Dates:	18 January 2012 & 20 January 2012
Test Sample IMEI:	004401221200021		

FCC Part:	15.247(a)(1)(iii)
Test Method Used:	As detailed in ANSI C63.10 Section 7.7.3 & 7.7.4

**Environmental Conditions:**

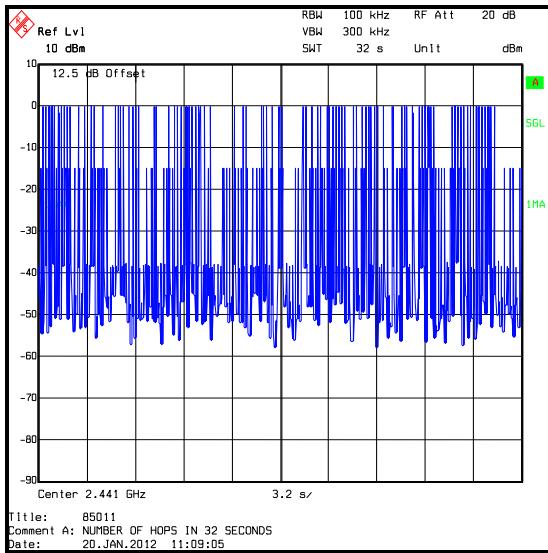
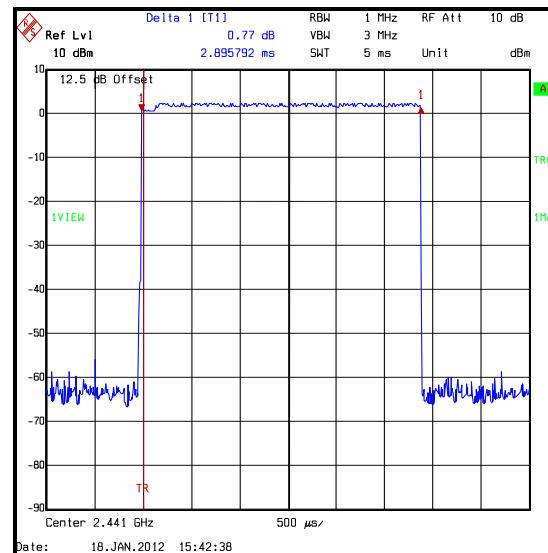
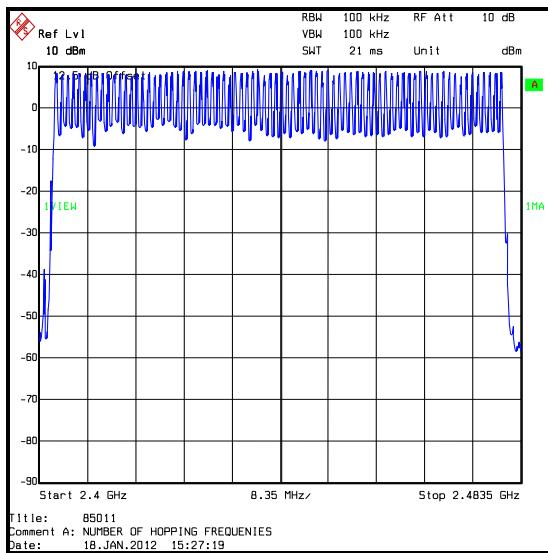
Temperature (°C):	24
Relative Humidity (%):	31

**Results:**

Emission Width (μs)	Number of Hops in 31.6 Seconds	Average Time of Occupancy (s)	Limit (s)	Margin (s)	Result
2895.792	99	0.287	0.4	0.113	Complied

**Note(s):**

1. Tests were performed to identify the average time of occupancy in number of channels (79) x 0.4 seconds. The calculated period is 31.6 seconds.

**Transmitter Number of Hopping Frequencies and Average Time of Occupancy (continued)**

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

<b>Test Engineers:</b>	Mark Percival & Sarah Williams	<b>Test Dates:</b>	18 January 2012 & 26 January 2012
<b>Test Sample IMEI:</b>	004401221200021		

<b>FCC Part:</b>	15.247(b)(1)
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Section 6.10.1

**Environmental Conditions:**

<b>Temperature (°C):</b>	24
<b>Relative Humidity (%):</b>	31

**Results: DH5**

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	0.6	30.0	29.4	Complied
Middle	1.5	30.0	28.5	Complied
Top	-1.0	30.0	31.0	Complied

Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	0.6	-1.6	-1.0	36.0	37.0	Complied
Middle	1.5	-1.6	-0.1	36.0	36.1	Complied
Top	-1.0	-1.6	-2.6	36.0	38.6	Complied

**Results: 2DH5**

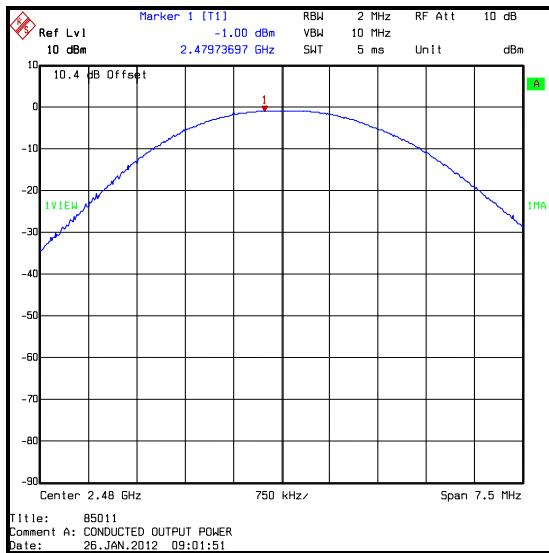
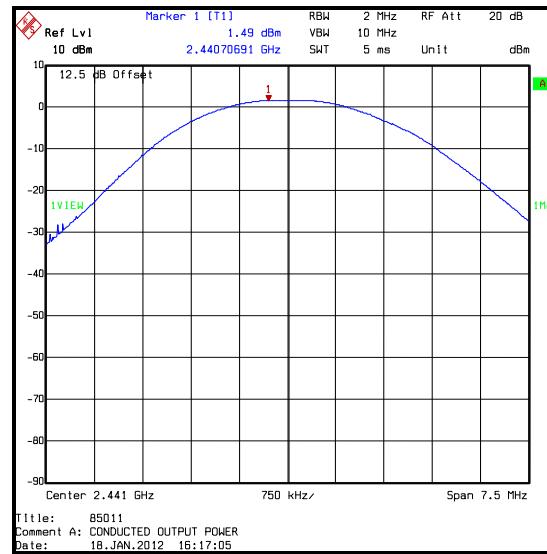
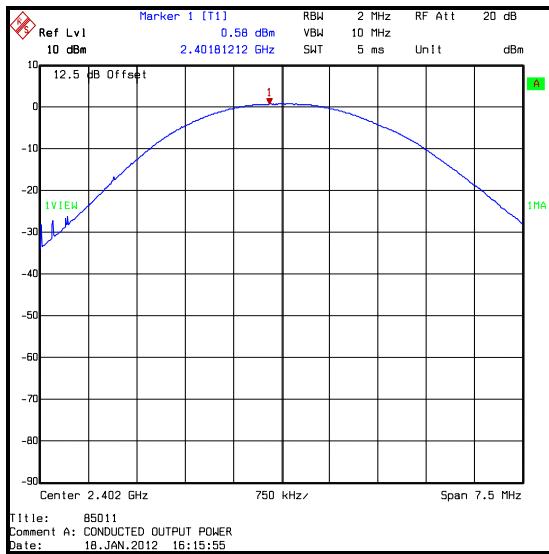
Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	2.1	21.0	18.9	Complied
Middle	2.8	21.0	18.2	Complied
Top	0.6	21.0	20.4	Complied

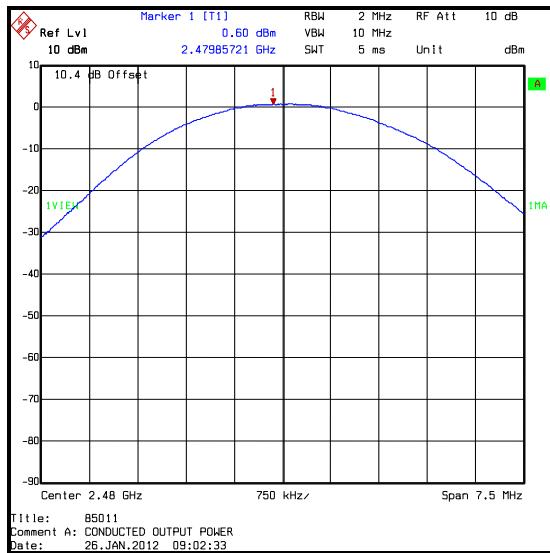
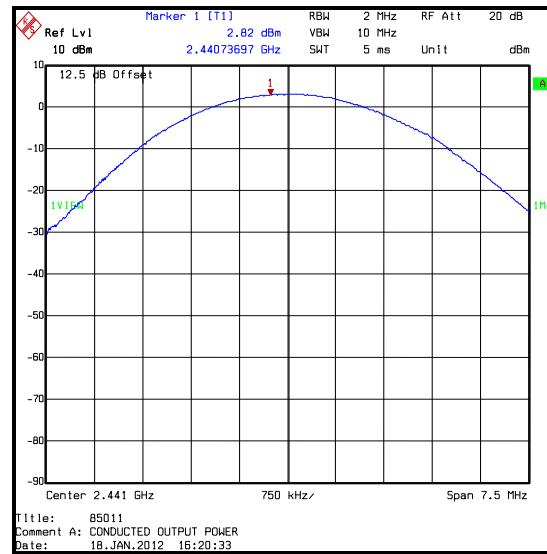
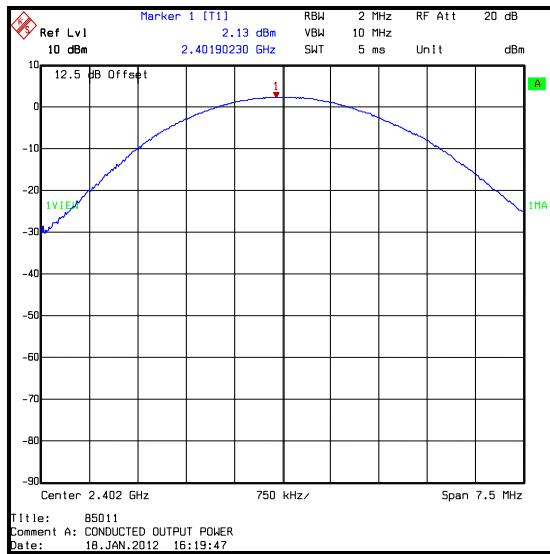
Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	2.1	-1.6	0.5	27.0	26.5	Complied
Middle	2.8	-1.6	1.2	27.0	25.8	Complied
Top	0.6	-1.6	-1.0	27.0	28.0	Complied

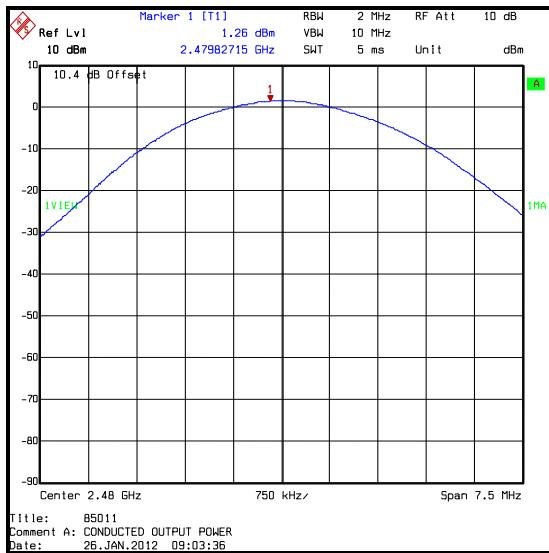
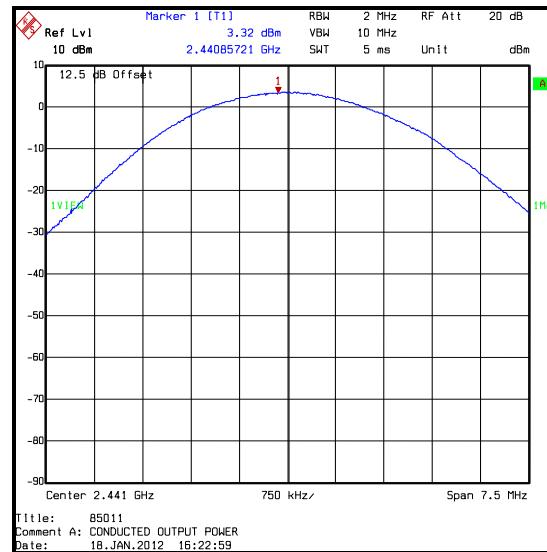
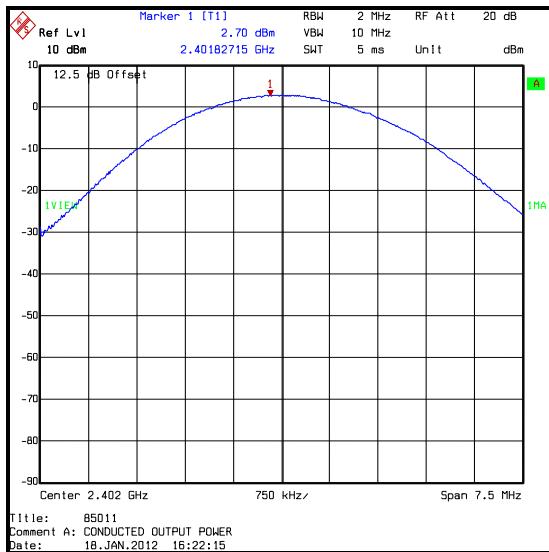
**Transmitter Maximum Peak Output Power (continued)****Results: 3DH5**

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	2.7	21.0	18.3	Complied
Middle	3.3	21.0	17.7	Complied
Top	1.3	21.0	19.7	Complied

Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	2.7	-1.6	1.1	27.0	25.9	Complied
Middle	3.3	-1.6	1.7	27.0	25.3	Complied
Top	1.3	-1.6	-0.3	27.0	27.3	Complied

**Transmitter Maximum Peak Output Power (continued)****Results: Basic Rate DH5**

**Transmitter Maximum Peak Output Power (continued)****Results: 2DH5**

**Transmitter Maximum Peak Output Power (continued)****Results: 3DH5**

### **5.2.8. Transmitter Radiated Emissions**

#### **Test Summary:**

<b>Test Engineer:</b>	Andrew Edwards	<b>Test Date:</b>	16 January 2012
<b>Test Sample IMEI:</b>	004401221200252		

<b>FCC Part:</b>	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:**

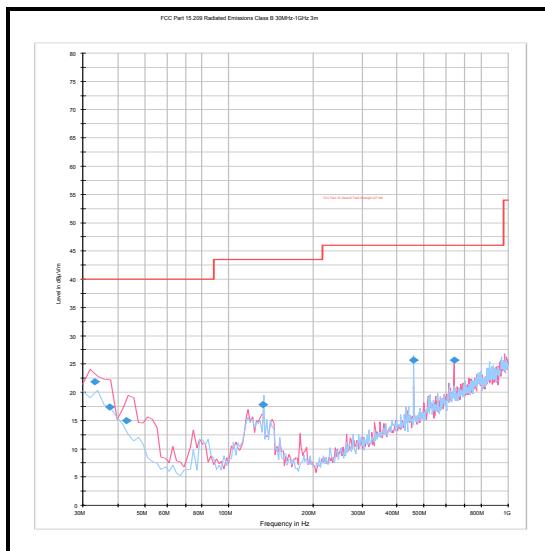
<b>Temperature (°C):</b>	24
<b>Relative Humidity (%):</b>	28

#### **Results: Quasi-Peak 3 DH5**

<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>
33.143	Vertical	21.9	40.0	18.1	Complied
37.347	Vertical	17.4	40.0	22.6	Complied
43.035	Vertical	15.0	40.0	25.0	Complied
132.944	Horizontal	17.9	43.5	25.6	Complied
458.777	Horizontal	25.7	46.0	20.3	Complied
639.231	Vertical	25.6	46.0	20.4	Complied

#### **Note(s):**

1. The final measured value, for the given emission, in the table above 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 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.
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.

**Transmitter Radiated Emissions (continued)**

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

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

<b>Test Engineer:</b>	Mark Percival	<b>Test Date:</b>	16 January 2012
<b>Test Sample IMEI:</b>	004401221200252		

<b>FCC Part:</b>	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>	21
<b>Relative Humidity (%):</b>	22

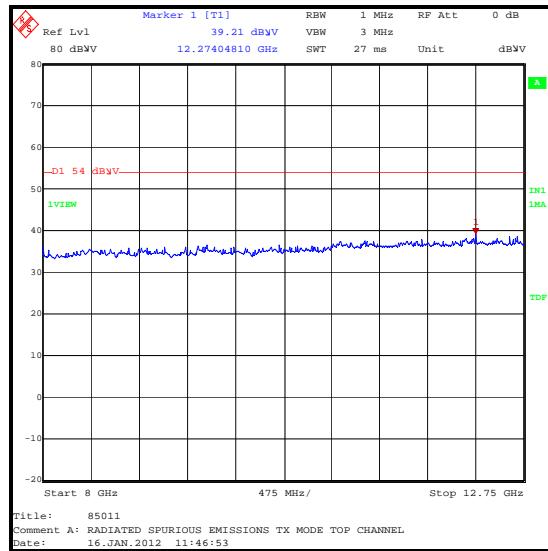
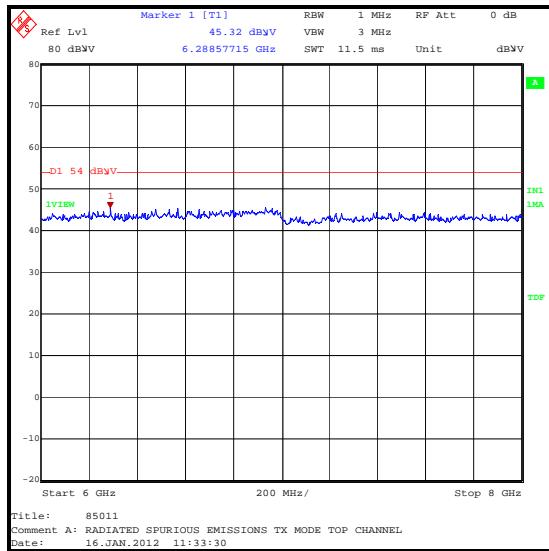
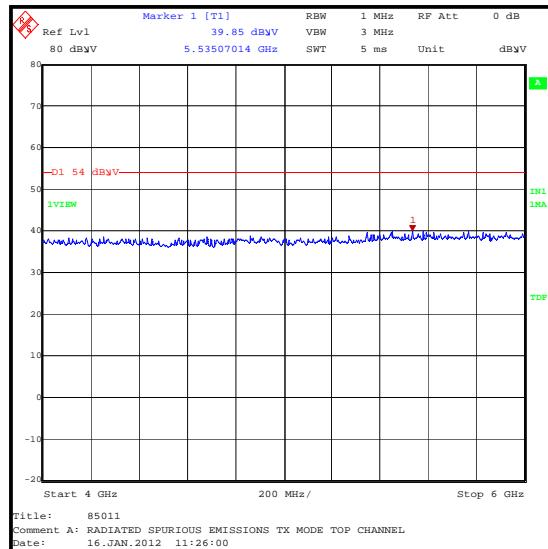
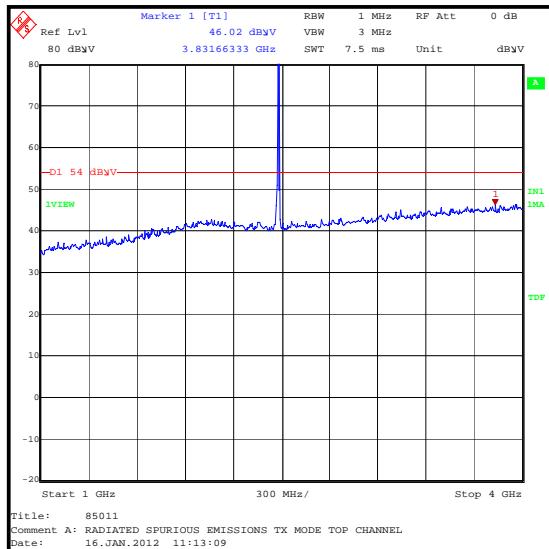
**Results:**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
24705.411	Vertical	47.9	54.0	6.1	Complied

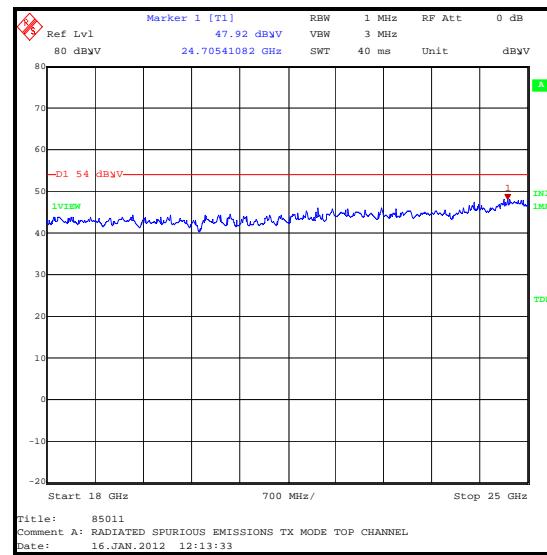
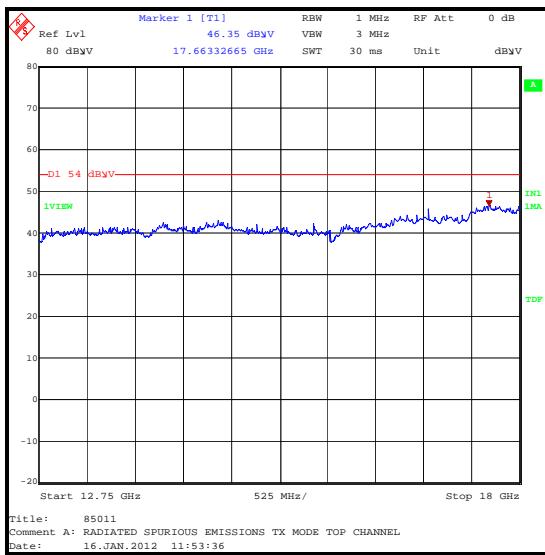
**Note(s):**

1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss
2. The emission shown on the 1 GHz to 4 GHz plot is the EUT fundamental at 2480 MHz
3. 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.
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.

## Transmitter Radiated Emissions (continued)



## Transmitter Radiated Emissions (continued)



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

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

Test Engineer:	Andrew Edwards	Test Dates:	17 January 2012 & 18 January 2012
Test Sample IMEI:	004401221200252		

FCC Part:	15.247(d) & 15.209(a)
Test Method Used:	As detailed in ANSI C63.10 Sections 6.9.2

**Environmental Conditions:**

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

**Results: Static Mode DH5**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2400.0	Vertical	40.2	70.8*	30.6	Complied
2483.5	Vertical	51.6	74.0	22.4	Complied

Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	Vertical	41.1	54.0	12.9	Complied

**Results: Hopping Mode DH5**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2400.0	Vertical	41.2	71.2*	30.0	Complied
2483.5	Vertical	50.7	74.0	23.3	Complied

Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	Vertical	40.0	54.0	14.0	Complied

**Transmitter Band Edge Radiated Emissions (Continued)****Results: Static Mode 2DH5**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2386.874	Vertical	48.3	70.0*	21.7	Complied
2400.0	Vertical	43.3	70.0*	26.7	Complied
2483.5	Vertical	53.0	74.0	21.0	Complied

Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	Vertical	41.4	54.0	12.6	Complied

**Results: Hopping Mode 2DH5**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2385.120	Vertical	47.0	70.1*	23.1	Complied
2400.0	Vertical	40.3	70.1*	29.8	Complied
2483.5	Vertical	50.9	74.0	23.1	Complied

Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	Vertical	38.1	54.0	15.9	Complied

**Transmitter Band Edge Radiated Emissions (continued)****Results: Static Mode 3DH5**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2385.220	Vertical	48.1	70.2*	22.1	Complied
2400.0	Vertical	43.2	70.2*	27.0	Complied
2483.5	Vertical	53.5	74.0	20.5	Complied

Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	Vertical	41.6	54.0	12.4	Complied

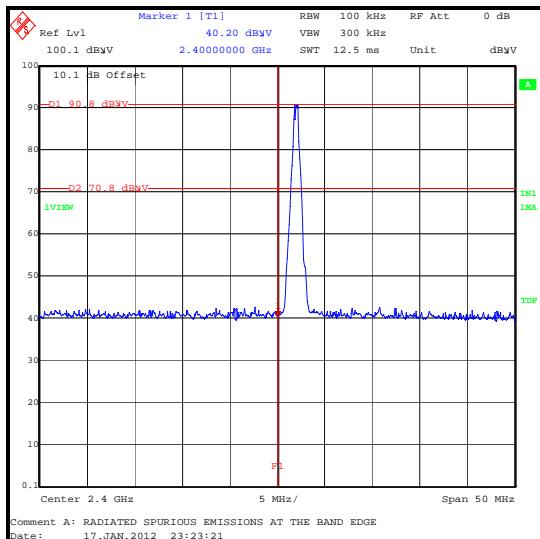
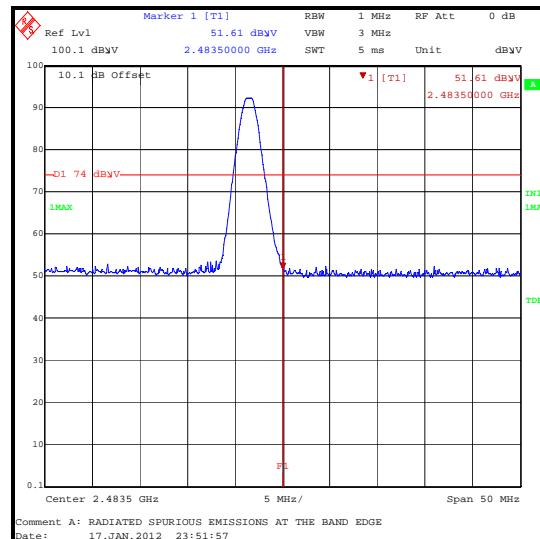
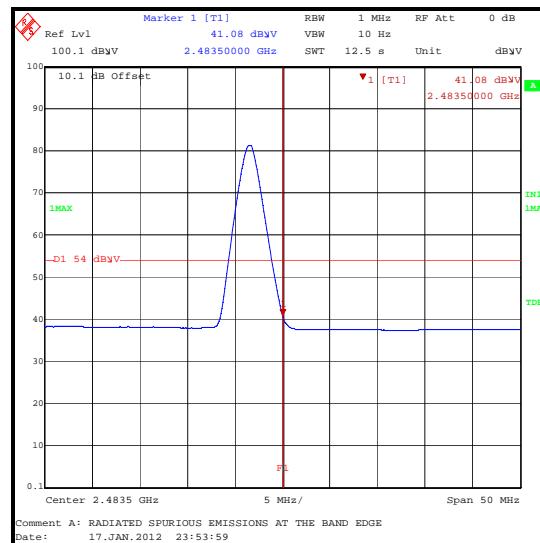
**Results: Hopping Mode 3DH5**

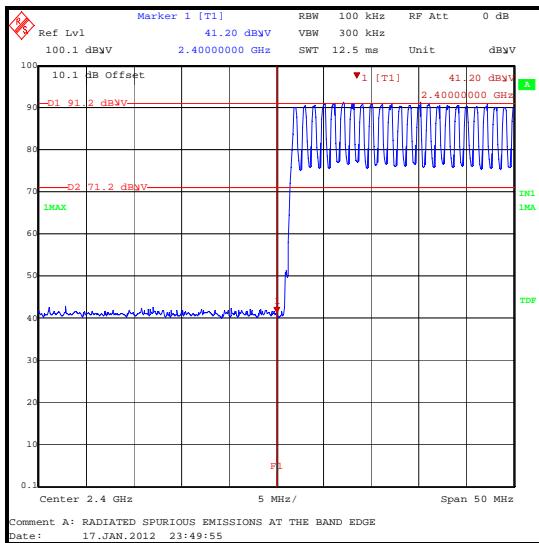
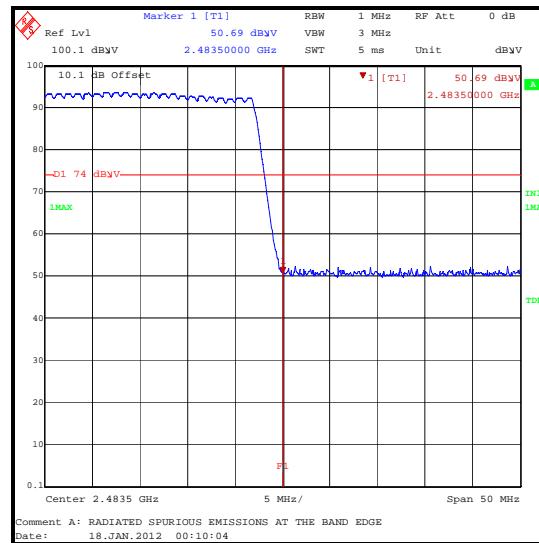
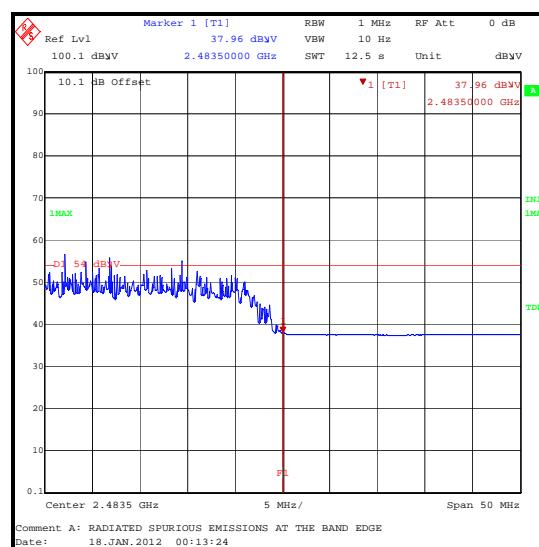
Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2385.220	Vertical	47.4	70.6*	23.2	Complied
2400.0	Vertical	42.0	70.6*	28.6	Complied
2483.5	Vertical	53.0	74.0	21.0	Complied

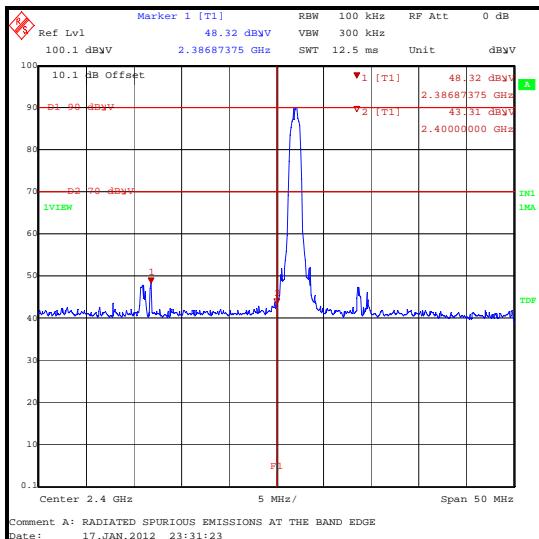
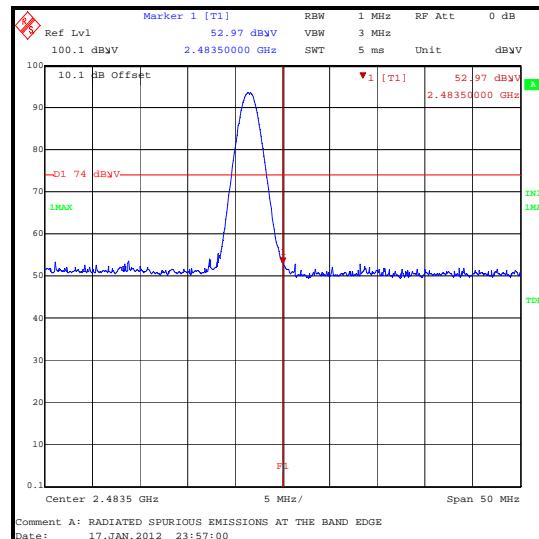
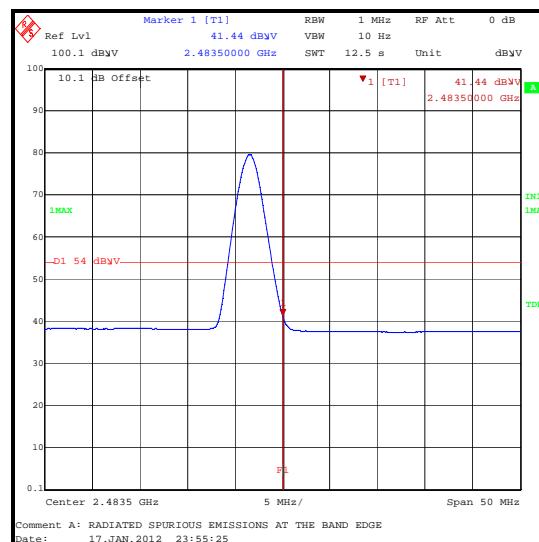
Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	Vertical	38.1	54.0	15.9	Complied

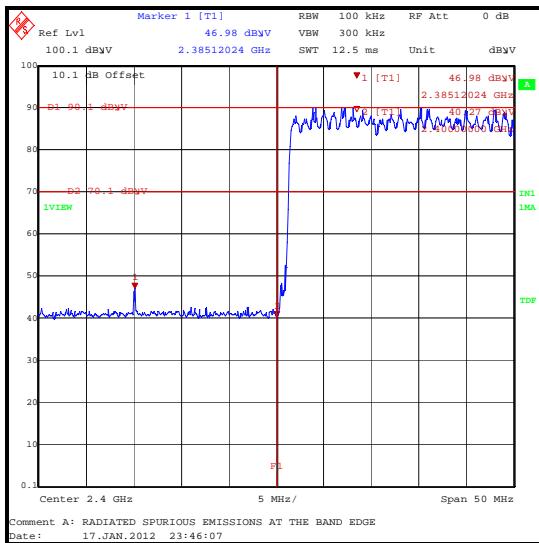
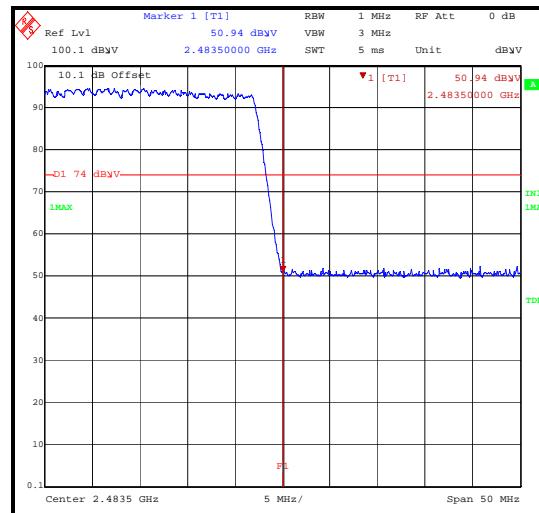
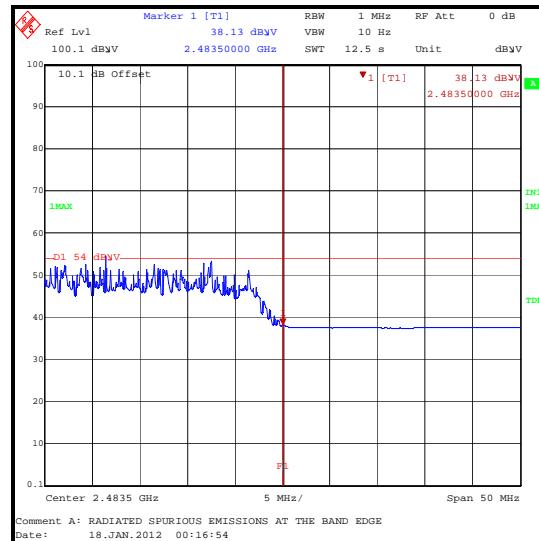
**Note(s):**

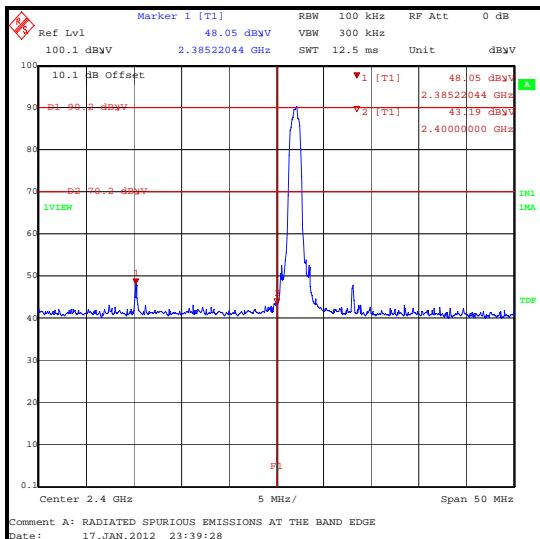
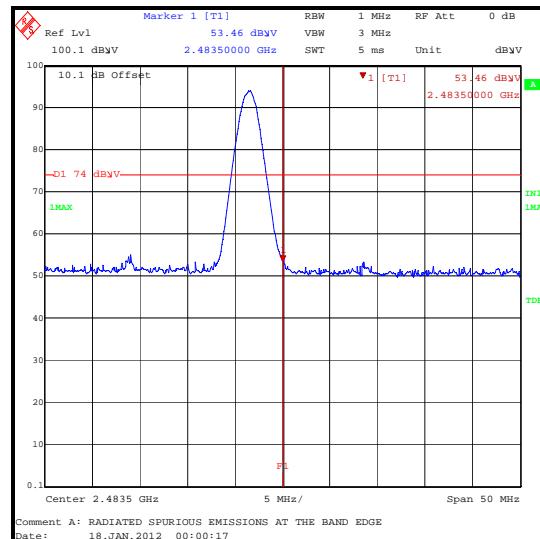
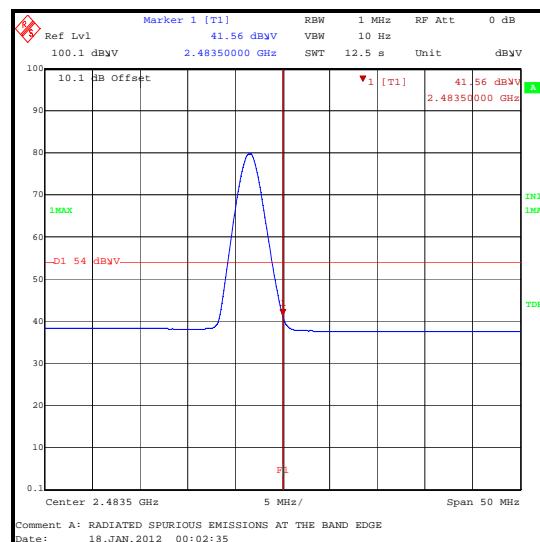
1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss.
2. \* -20 dBc limit

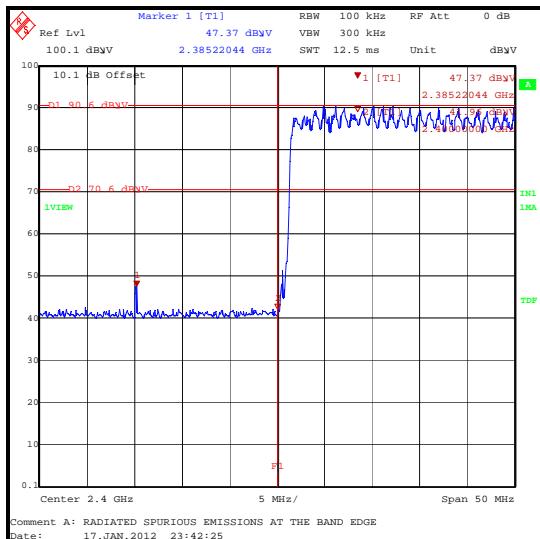
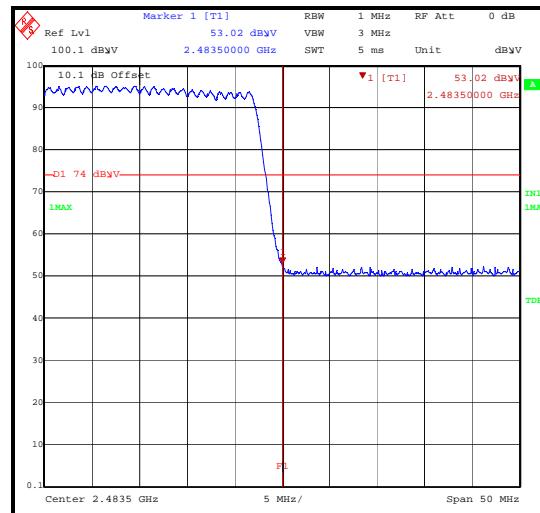
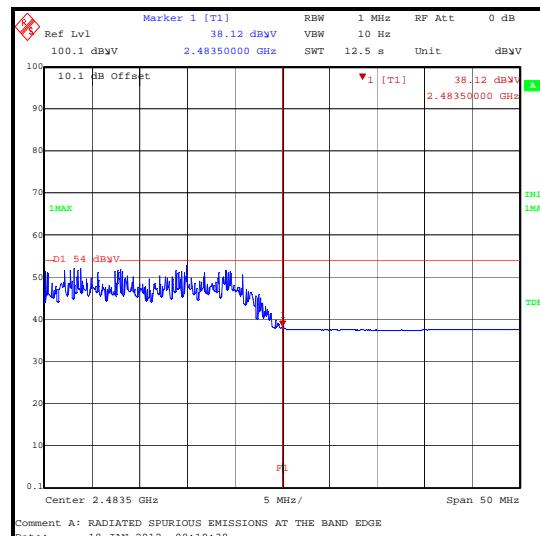
**Transmitter Band Edge Radiated Emissions (continued)****DH5 Static Mode****Lower Band Edge Peak Static****Upper Band Edge Peak Static****Upper Band Edge Average Static**

**Transmitter Band Edge Radiated Emissions (continued)****DH5 Hopping Mode****Lower Band Edge Peak Hopping****Upper Band Edge Peak Hopping****Upper Band Edge Average Hopping**

**Transmitter Band Edge Radiated Emissions (continued)****2DH5 Static Mode****Lower Band Edge Peak Static****Upper Band Edge Peak Static****Upper Band Edge Average Static**

**Transmitter Band Edge Radiated Emissions (continued)****2DH5 Hopping Mode****Lower Band Edge Peak Hopping****Upper Band Edge Peak Hopping****Upper Band Edge Average Hopping**

**Transmitter Band Edge Radiated Emissions (continued)****3DH5 Static Mode****Lower Band Edge Peak Static****Upper Band Edge Peak Static****Upper Band Edge Average Static**

**Transmitter Band Edge Radiated Emissions (continued)****3DH5 Hopping Mode****Lower Band Edge Peak Hopping****Upper Band Edge Peak Hopping****Upper Band Edge Average Hopping**

## **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
Maximum Peak Output Power	2.4 GHz to 2.4835 GHz	95%	±2.94 dB
Carrier Frequency Separation	2.4 GHz to 2.4835 GHz	95%	±0.92 ppm
Average Time of Occupancy	2.4 GHz to 2.4835 GHz	95%	±0.3 ns
20 dB Bandwidth	2.4 GHz to 2.4835 GHz	95%	±0.92 ppm
Radiated Spurious Emissions	30 MHz to 26.5 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.

## Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (months)
A067	LISN	Rohde & Schwarz	ESH3-Z5	890603/002	02 Jun 2012	12
A1396	Attenuator	Huber & Suhner	757987	6810.17.B	08 Jul 2012	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	09 Oct 2012	12
A1818	Antenna	EMCO	3115	00075692	09 Oct 2012	12
A1830	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100668	05 Mar 2012	12
A1834	Attenuator	Hewlett Packard	8491B	10444	26 Jul 2012	12
A2072	Directional Coupler	Narda	4242B	03549	Calibrated before use	-
A253	Antenna	Flann Microwave	12240-20	128	09 Oct 2012	12
A254	Antenna	Flann Microwave	14240-20	139	09 Oct 2012	12
A255	Antenna	Flann Microwave	16240-20	519	09 Oct 2012	12
A256	Antenna	Flann Microwave	18240-20	400	09 Oct 2012	12
A436	Antenna	Flann	20240-20	330	09 Oct 2012	12
A553	Antenna	Chase	CBL6111A	1593	26 Mar 2012	12
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	29 May 2012	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	09 Oct 2012	12
M1124	Spectrum Analyser	Rohde & Schwarz	ESI26	100046K	29 Jun 2012	12
M1242	Spectrum Analyser	Rohde & Schwarz	FSEM30	845986/022	12 Dec 2012	12
M1251	Digital Multimeter	Fluke	175	89170179	29 Jul 2012	12
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016	08 Nov 2012	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	04 Feb 2012	12
M1379	Test Receiver	Rohde & Schwarz	ESIB7	100330	20 Sep 2012	12

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