



# TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: NTT docomo EB-4056

FCC ID: UCE212054A

To: FCC Part 15.247: 2011 Subpart C

**Test Report Serial No.:**  
RFI-RPT-RP87471JD10A

<b>This Test Report Is Issued Under The Authority Of John Newell, Group Quality Manager:</b>	
<b>Checked By:</b>	Ian Watch
<b>Signature:</b>	
<b>Date of Issue:</b>	15 June 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>	FCC: 209735
<b>Location of Testing:</b>	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
<b>Test Dates:</b>	01 May 2012 to 12 June 2012

### **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 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>	NTT docomo
<b>Model Name or Number:</b>	EB-4056
<b>IMEI:</b>	351808050018796 ( <i>Radiated sample #1</i> )
<b>Hardware Version Number:</b>	Rev C
<b>Software Version Number:</b>	ACPU: nemo-ics-09-0433 CCPU: R1C_0_EC10_00_D00
<b>FCC ID:</b>	UCE212054A

<b>Brand Name:</b>	NTT docomo
<b>Model Name or Number:</b>	EB-4056
<b>IMEI:</b>	351808050018796 ( <i>Radiated sample #1</i> )
<b>Hardware Version Number:</b>	Rev C
<b>Software Version Number:</b>	ACPU: nemo-ics-09-0507 CCPU: R1C_0_EC12_00_D00
<b>FCC ID:</b>	UCE212054A

<b>Brand Name:</b>	NTT docomo
<b>Model Name or Number:</b>	EB-4056
<b>IMEI:</b>	351808050018994 ( <i>Conducted RF port sample #1</i> )
<b>Hardware Version Number:</b>	Rev C
<b>Software Version Number:</b>	ACPU: nemo-ics-09-0433 CCPU: R1C_0_EC10_00_D00
<b>FCC ID:</b>	UCE212054A

<b>Brand Name:</b>	NTT docomo
<b>Description:</b>	AC Charger
<b>Model Name or Number:</b>	03

<b>Brand Name:</b>	NTT docomo
<b>Model Name or Number:</b>	Charger Pad Type Number: DE-PAD002AAA
<b>Serial Number:</b>	N/A

<b>Brand Name:</b>	NTT docomo
<b>Model Name or Number:</b>	Charger PSU Type Number: DE-PAA002AAA
<b>Serial Number:</b>	N/A

<b>Brand Name:</b>	NTT docomo
<b>Description:</b>	Charge/USB Data cable
<b>Model Name or Number:</b>	Not marked or stated

<b>Brand Name:</b>	NTT docomo
<b>Description:</b>	Personal Hands-Free
<b>Model Name or Number:</b>	Part Number 549266



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

The equipment under test was a Dual Mode UMTS/GSM Mobile Phone with WLAN, *Bluetooth* and RFID.

### **3.3. Modifications Incorporated in the EUT**

The Customer changed the Software Version on the sample with IMEI 351808050018796 from  
ACPU: nemo-ics-09-0433 CCPU: R1C\_0\_EC10\_00\_D00 to  
ACPU: nemo-ics-09-0507 CCPU: R1C\_0\_EC12\_00\_D00 on 10 May 2012.

The Customer declared that the software update was to fix GPRS/EGPRS connectivity problems only and the software change did not affect any other parameters.

### **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>Maximum Conducted Output Power:</b>	-0.5 dBm		
<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	39	2441
	Top	78	2480
<b>Receive Frequency Range:</b>	2402 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
	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>	CF74

<b>Brand Name:</b>	Not Marked
<b>Description:</b>	Micro SD Memory Card
<b>Model Name or Number:</b>	MMAGR02GUECA

## **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, with the exception of output power, bandwidth, band edge and channel separation, for which all modes were tested.
- Idle mode and transmitter radiated spurious emissions tests were performed with the phone laid on the charge pad, with the PHF and USB cable connected to the EUT as this was found to be the worst case during pre-scans. The USB cable was terminated into a USB hub supplied by the client. All the accessories were individually connected and measurements made during the pre-scans to determine the worst case combination.
- The conducted sample with IMEI 351808050018994 was used for 20 dB bandwidth, carrier frequency separation, average time of occupancy and conducted output power tests.
- The radiated sample with IMEI 351808050018796 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.

## 5.2. Test Results

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

#### Test Summary:

Test Engineer:	Mark Percival	Test Date:	15 May 2012
Test Sample IMEI:	351808050018796		

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

#### Environmental Conditions:

Temperature (°C):	21
Relative Humidity (%):	39

#### Results: Live / Quasi Peak

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.285000	Live	37.2	59.6	22.4	Complied
0.325500	Live	36.3	57.0	20.7	Complied
0.442500	Live	33.2	56.1	22.9	Complied
0.492000	Live	32.9	56.0	23.1	Complied
0.609000	Live	31.2	56.0	24.8	Complied
0.640500	Live	30.4	56.0	25.6	Complied

#### Results: Live / Average

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.348000	Live	25.3	49.0	23.7	Complied
1.702500	Live	23.2	46.0	22.8	Complied

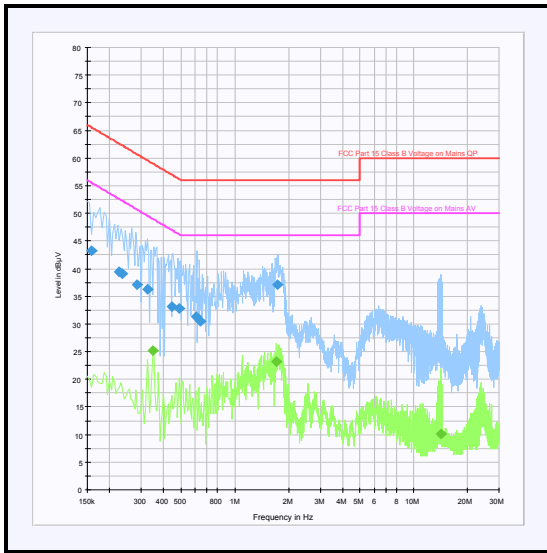
**Receiver/Idle Mode AC Conducted Spurious Emissions (continued)****Results: Neutral / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.676500	Neutral	32.8	56.0	23.2	Complied
0.820500	Neutral	31.5	56.0	24.5	Complied
0.843000	Neutral	31.9	56.0	24.1	Complied
1.095000	Neutral	34.7	56.0	21.3	Complied
1.738500	Neutral	47.1	56.0	8.9	Complied
2.107500	Neutral	34.3	56.0	21.7	Complied

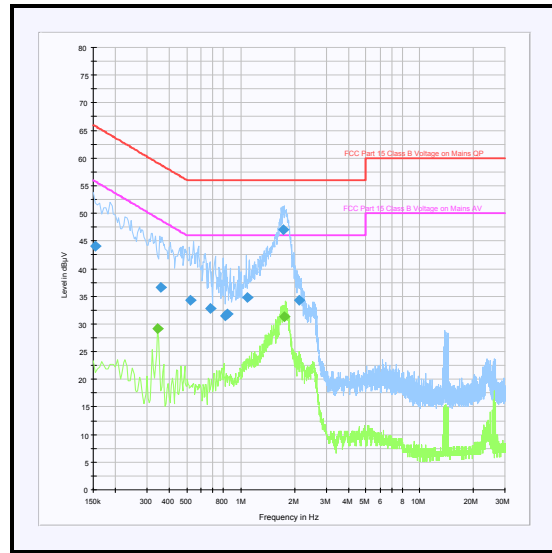
**Results: Neutral / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.343500	Neutral	29.2	49.1	19.9	Complied
1.756500	Neutral	31.3	46.0	14.7	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.*

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

<b>Test Engineer:</b>	Nick Steele	<b>Test Date:</b>	03 May 2012
<b>Test Sample IMEI:</b>	351808050018796		

<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>	24
<b>Relative Humidity (%):</b>	33

**Results: Quasi Peak**

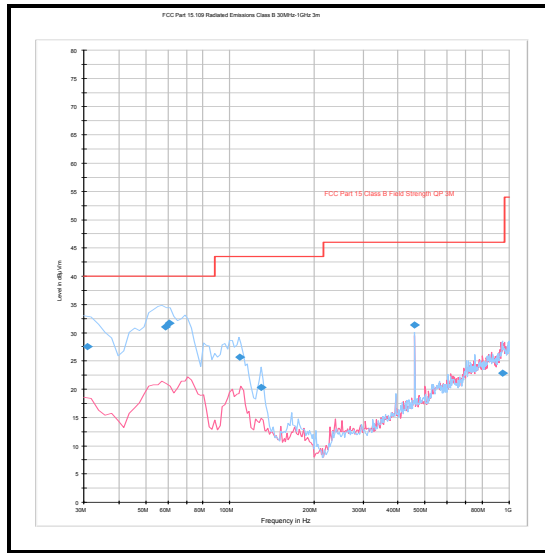
Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
30.909	Horizontal	27.6	40.0	12.4	Complied
58.672	Horizontal	31.1	40.0	8.9	Complied
60.895	Horizontal	31.7	40.0	8.3	Complied
108.424	Horizontal	25.6	43.5	17.9	Complied
129.576	Horizontal	20.4	43.5	23.1	Complied
458.806	Horizontal	31.3	46.0	14.7	Complied
944.903	Horizontal	22.8	46.0	23.2	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>	Nick Steele	<b>Test Date:</b>	01 May 2012
<b>Test Sample IMEI:</b>	351808050018796		

<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>	23
<b>Relative Humidity (%):</b>	25

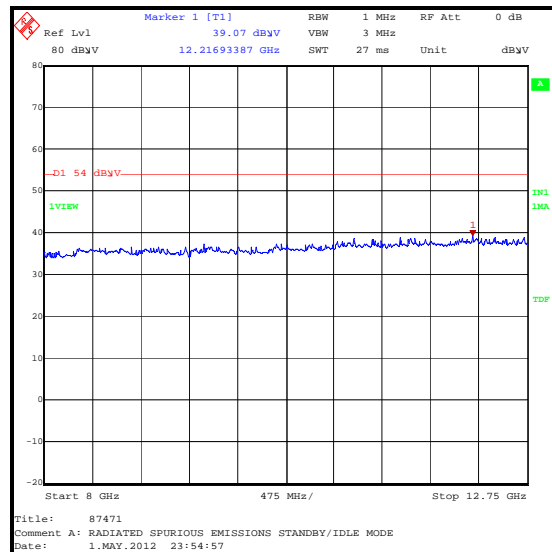
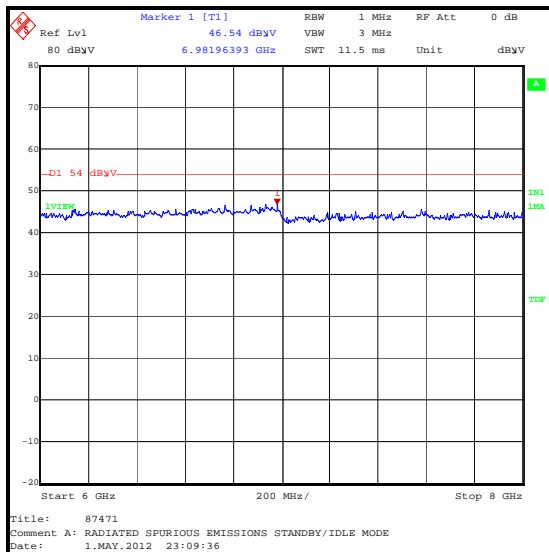
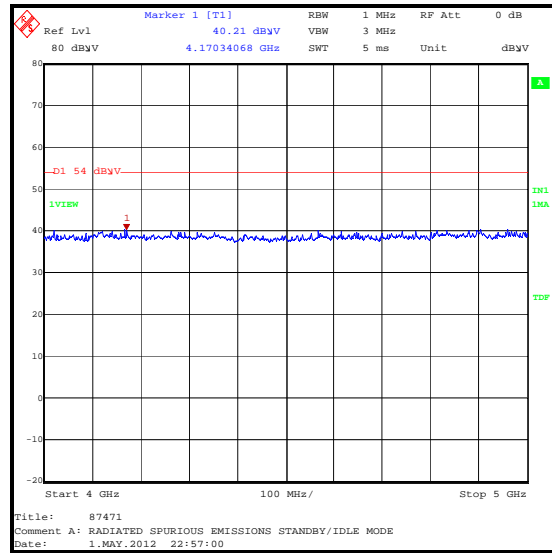
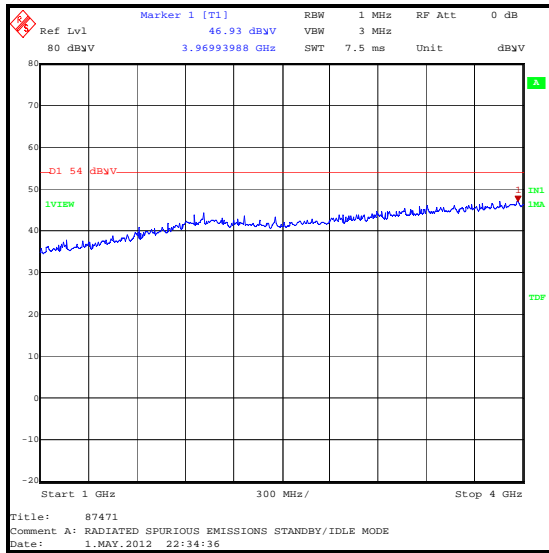
**Results:**

<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>
3969.940	Vertical	46.9	54.0	7.1	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. 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)



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

<b>Test Engineer:</b>	Mark Percival	<b>Test Date:</b>	15 May 2012
<b>Test Sample IMEI:</b>	351808050018796		

<b>FCC Part:</b>	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>	39

**Results: Live / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.339000	Live	28.3	59.2	30.9	Complied
1.108500	Live	30.9	56.0	25.1	Complied
1.747500	Live	33.7	56.0	22.3	Complied
5.671500	Live	29.4	60.0	30.6	Complied
14.379000	Live	14.1	60.0	45.9	Complied
18.640500	Live	20.6	60.0	39.4	Complied

**Results: Live / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.321000	Live	23.2	49.7	26.5	Complied
1.032000	Live	20.9	46.0	25.1	Complied
1.599000	Live	21.2	46.0	24.8	Complied
5.707500	Live	17.1	50.0	32.9	Complied
14.361000	Live	6.3	50.0	43.7	Complied
24.976500	Live	19.8	50.0	30.2	Complied

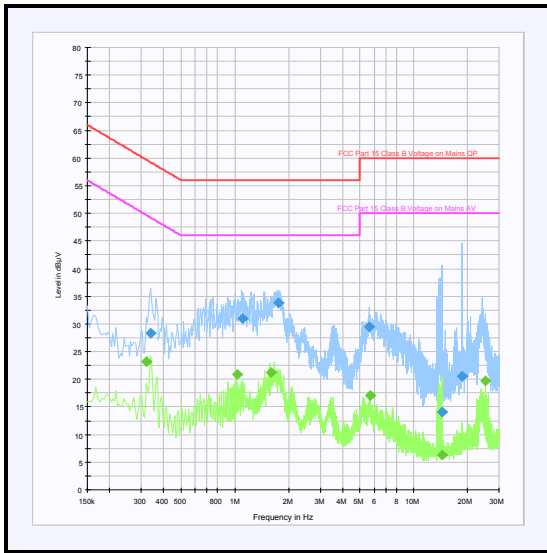
**Transmitter AC Conducted Spurious Emissions (continued)****Results: Neutral / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.150000	Neutral	39.9	66.0	26.1	Complied
0.379500	Neutral	31.2	58.3	27.1	Complied
0.636000	Neutral	29.4	56.0	26.6	Complied
1.284000	Neutral	36.7	56.0	19.3	Complied
1.716000	Neutral	46.1	56.0	9.9	Complied
2.121000	Neutral	35.6	56.0	20.4	Complied

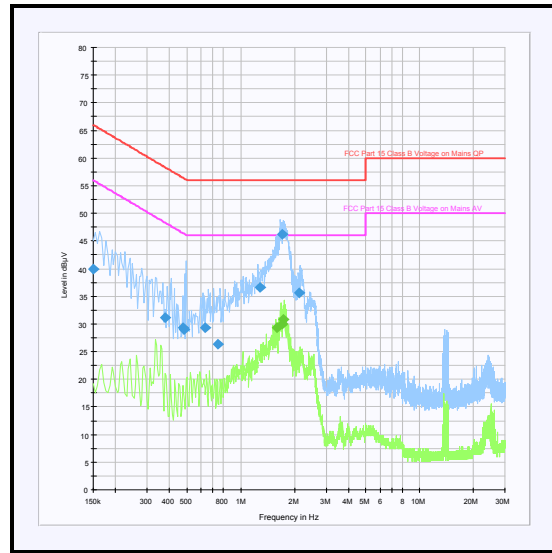
**Results: Neutral / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
1.590000	Neutral	29.4	46.0	16.6	Complied
1.716000	Neutral	30.0	46.0	16.0	Complied
1.720500	Neutral	30.7	46.0	15.3	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.*

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

<b>Test Engineer:</b>	Mark Percival	<b>Test Date:</b>	04 May 2012
<b>Test Sample IMEI:</b>	351808050018994		

<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>	33

**Results DH5:**

Channel	20 dB Bandwidth (kHz)
Bottom	969.551
Middle	977.564
Top	977.564

**Results 2DH5:**

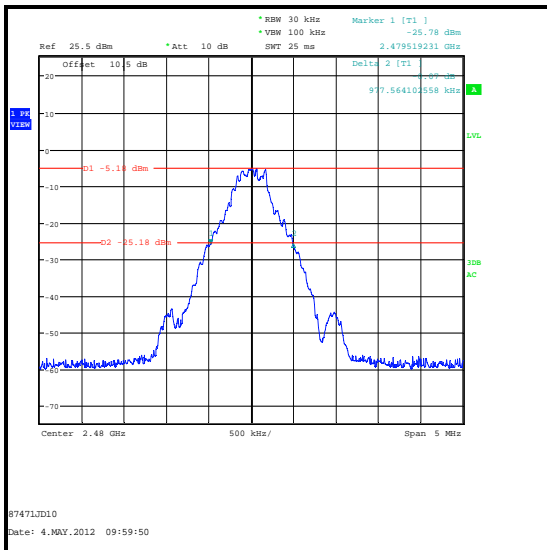
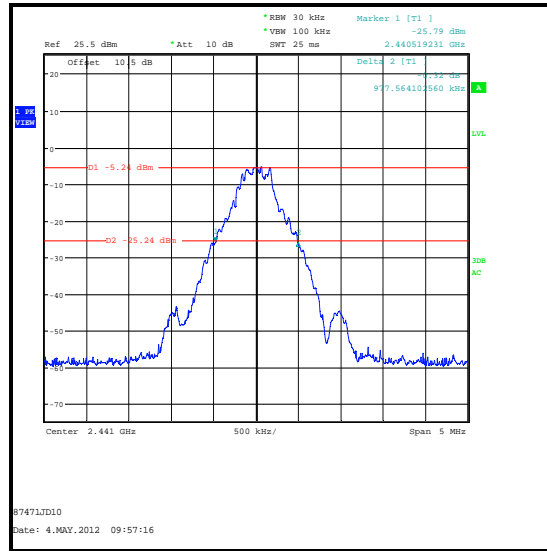
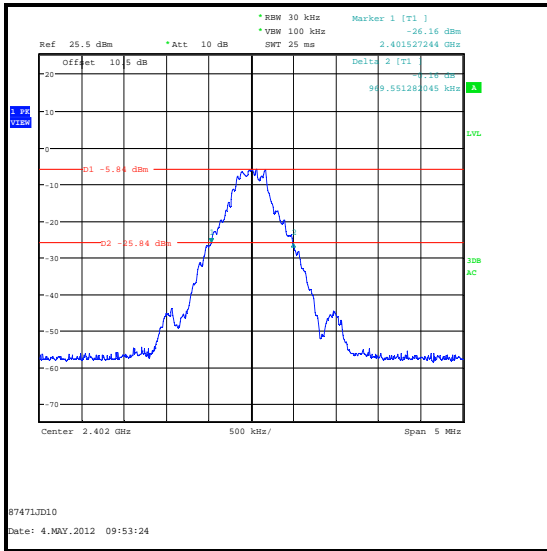
Channel	20 dB Bandwidth (kHz)
Bottom	1362.179
Middle	1362.179
Top	1346.154

**Results 3DH5:**

Channel	20 dB Bandwidth (kHz)
Bottom	1322.115
Middle	1346.154
Top	1346.154

### Transmitter 20 dB Bandwidth (continued)

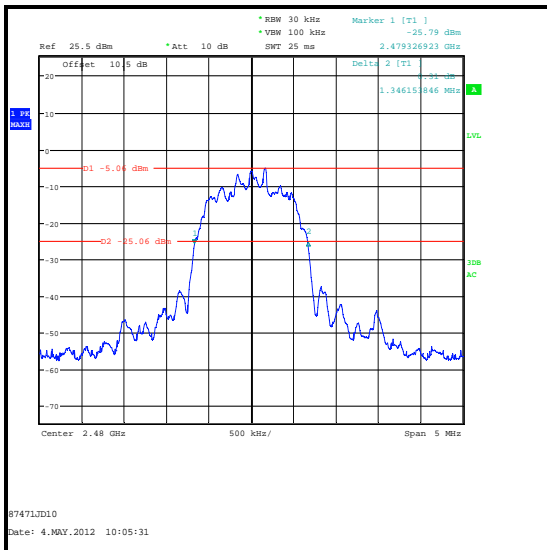
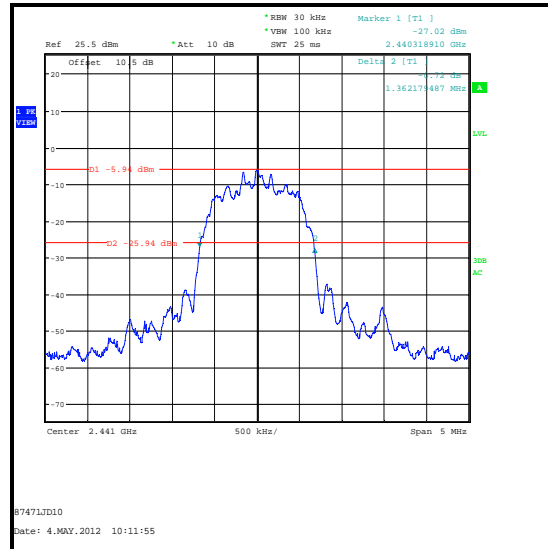
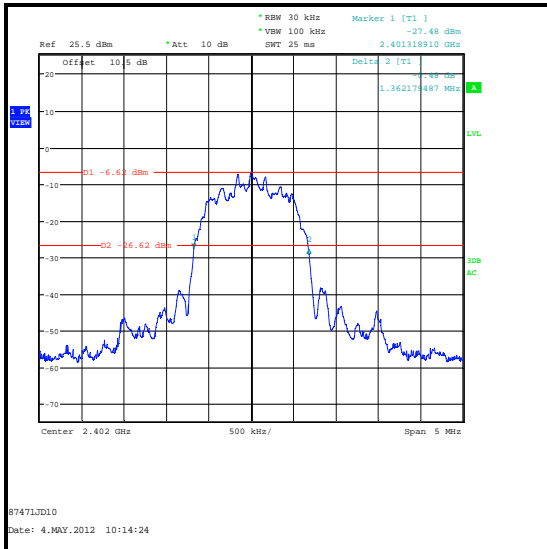
#### Results DH5:





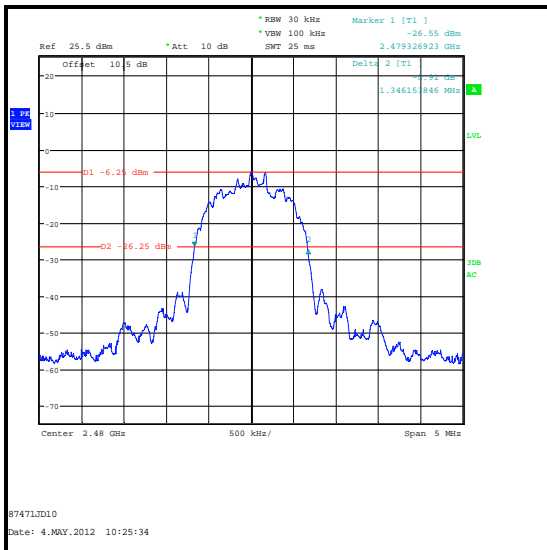
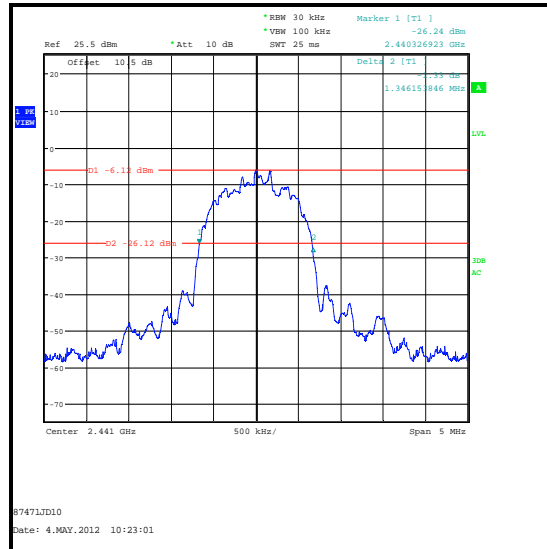
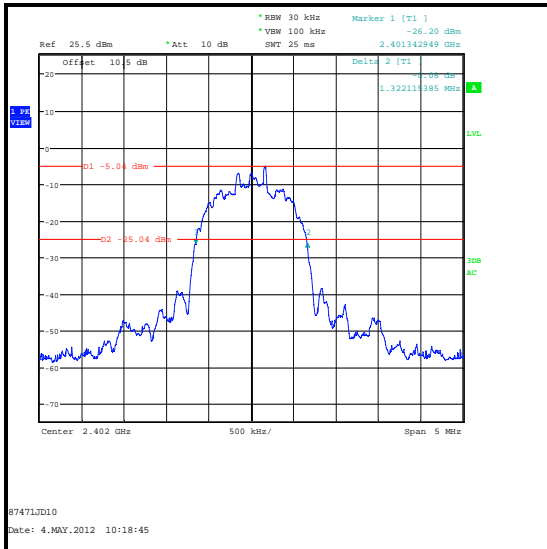
### Transmitter 20 dB Bandwidth (continued)

#### Results 2DH5:



### Transmitter 20 dB Bandwidth (continued)

#### Results 3DH5:



**5.2.5. Transmitter Carrier Frequency Separation**

**Test Summary:**

<b>Test Engineer:</b>	Mark Percival	<b>Test Date:</b>	04 May 2012
<b>Test Sample IMEI:</b>	351808050018994		

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

**Environmental Conditions:**

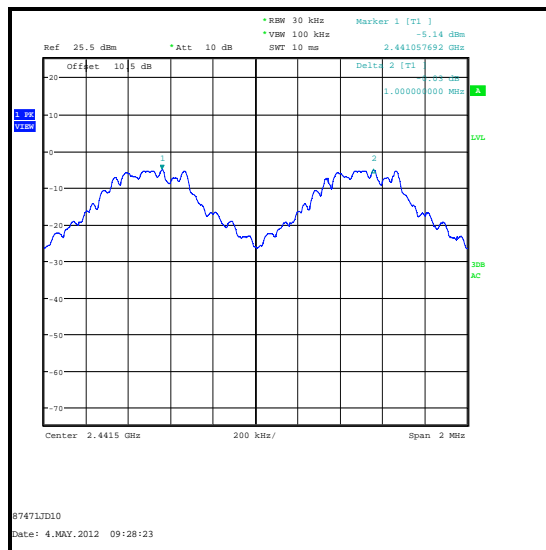
<b>Temperature (°C):</b>	23
<b>Relative Humidity (%):</b>	33

**Results: DH5**

Carrier Frequency Separation (kHz)	Limit (2/3 of 20 dB BW) (kHz)	Margin (kHz)	Result
1000.000	651.709	348.291	Complied

**Note(s):**

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





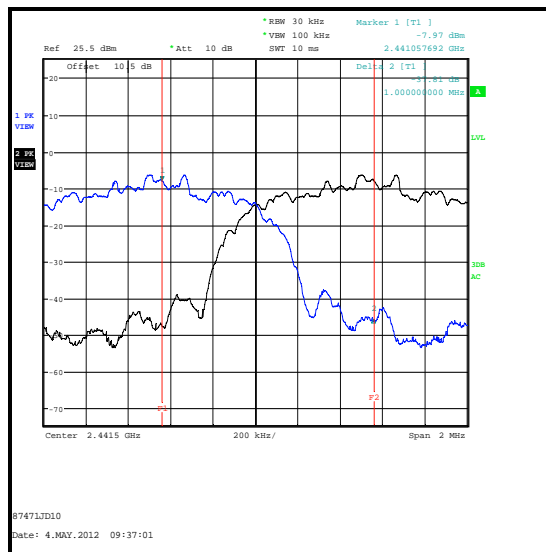
**Transmitter Carrier Frequency Separation (continued)**

**Results: 3DH5**

Carrier Frequency Separation (kHz)	Limit ( $2/3$ of 20 dB BW) (kHz)	Margin (kHz)	Result
1000.000	897.436	102.564	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:**

<b>Test Engineer:</b>	Mark Percival	<b>Test Date:</b>	04 May 2012
<b>Test Sample IMEI:</b>	351808050018994		

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

**Environmental Conditions:**

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

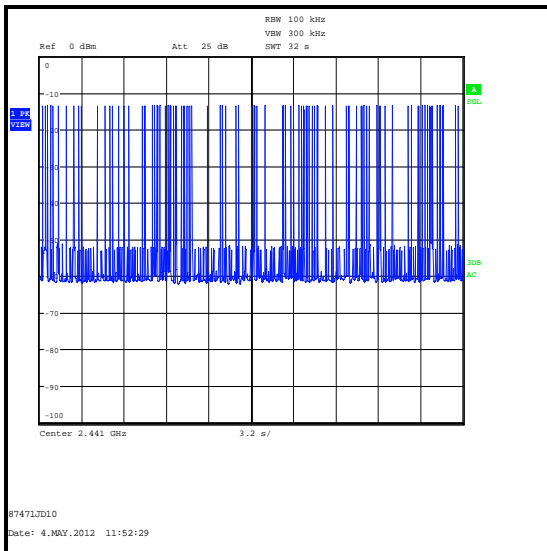
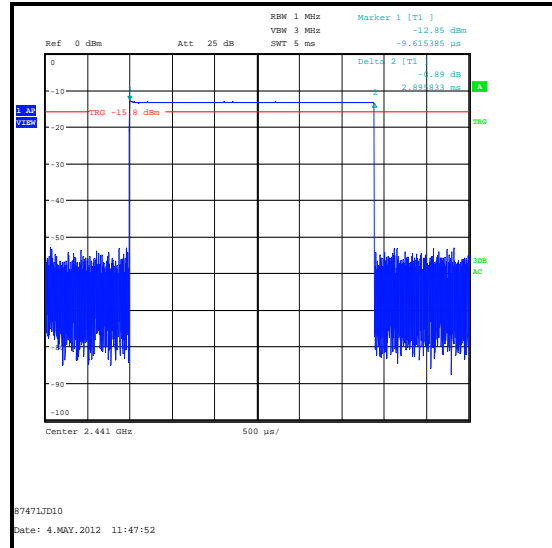
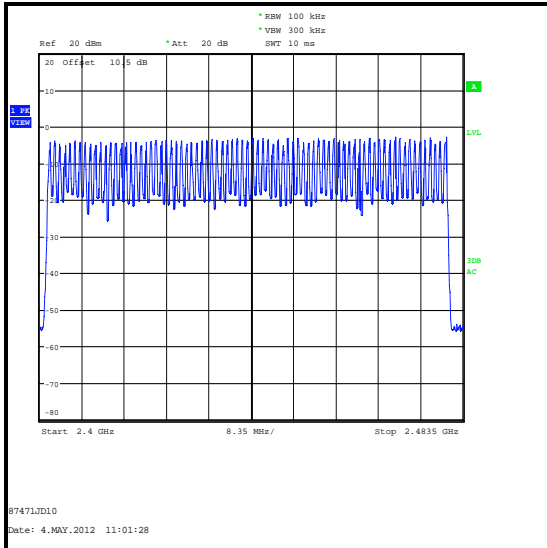
**Results:**

<b>Emission Width (μs)</b>	<b>Number of Hops in 31.6 Seconds</b>	<b>Average Time of Occupancy (s)</b>	<b>Limit (s)</b>	<b>Margin (s)</b>	<b>Result</b>
2895.833	98	0.284	0.4	0.116	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 Engineer:</b>	Mark Percival	<b>Test Date:</b>	04 May 2012
<b>Test Sample IMEI:</b>	351808050018994		

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

**Results: DH5**

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	-2.8	30.0	32.8	Complied
Middle	-2.1	30.0	32.1	Complied
Top	-2.1	30.0	32.1	Complied

Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	-2.8	-3.1	-5.9	36.0	41.9	Complied
Middle	-2.1	-3.1	-5.2	36.0	41.2	Complied
Top	-2.1	-3.1	-5.2	36.0	41.2	Complied

**Results: 2DH5**

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	-1.0	21.0	22.0	Complied
Middle	-1.1	21.0	22.1	Complied
Top	-1.1	21.0	22.1	Complied

Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	-1.0	-3.1	-4.1	27.0	31.1	Complied
Middle	-1.1	-3.1	-4.2	27.0	31.2	Complied
Top	-1.1	-3.1	-4.2	27.0	31.2	Complied



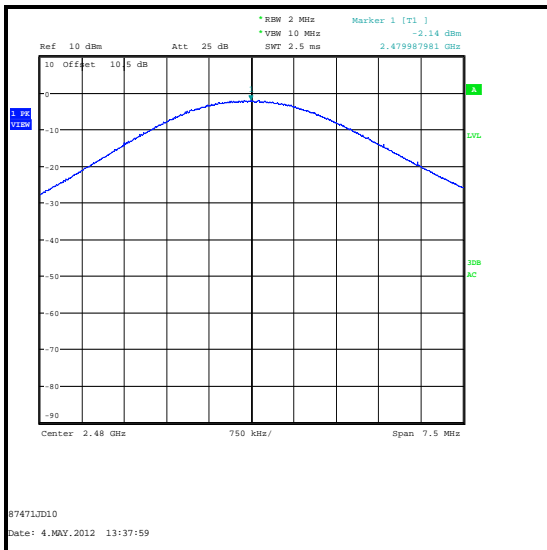
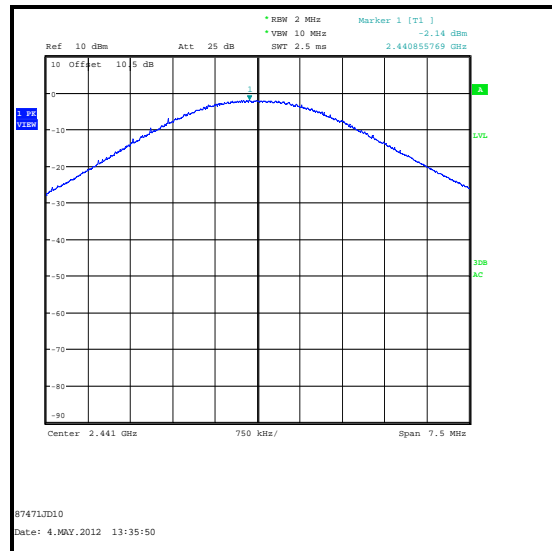
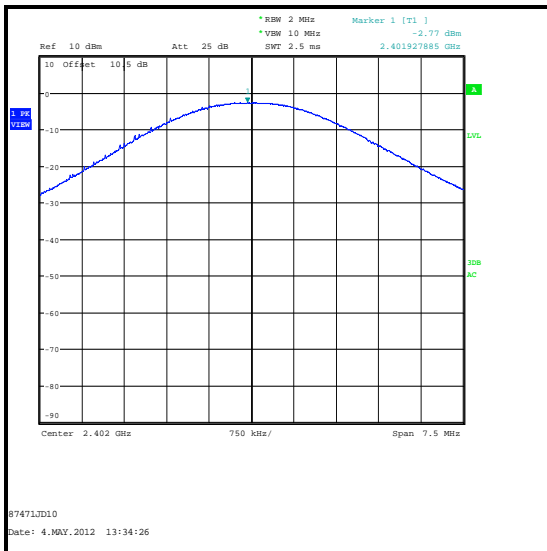
**Transmitter Maximum Peak Output Power (continued)****Results: 3DH5**

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	-1.0	21.0	22.0	Complied
Middle	-0.5	21.0	21.5	Complied
Top	-0.5	21.0	21.5	Complied

Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	-1.0	-3.1	-4.1	27.0	31.1	Complied
Middle	-0.5	-3.1	-3.6	27.0	30.6	Complied
Top	-0.5	-3.1	-3.6	27.0	30.6	Complied

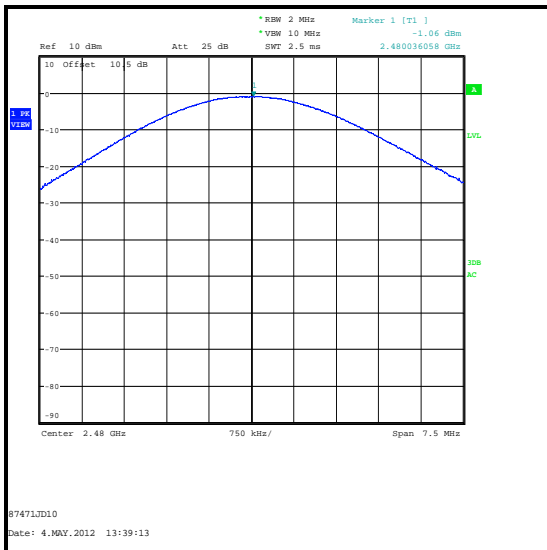
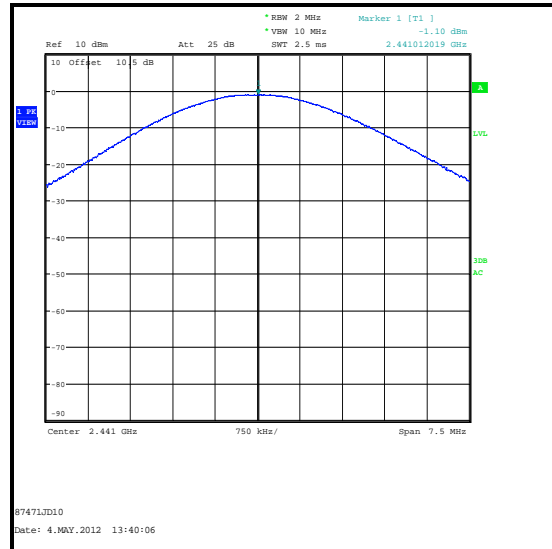
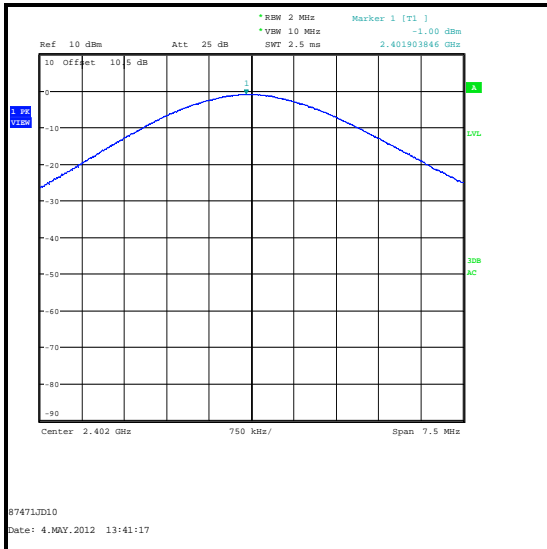
### Transmitter Maximum Peak Output Power (continued)

#### Results: Basic Rate DH5



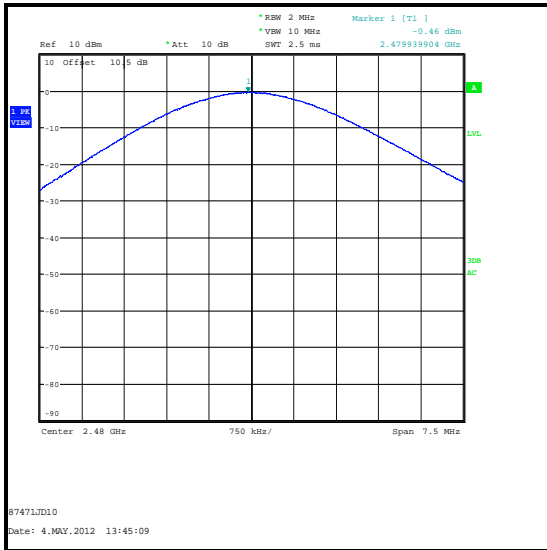
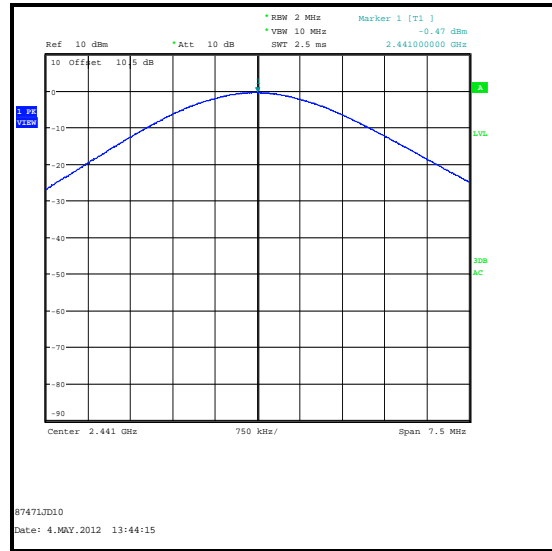
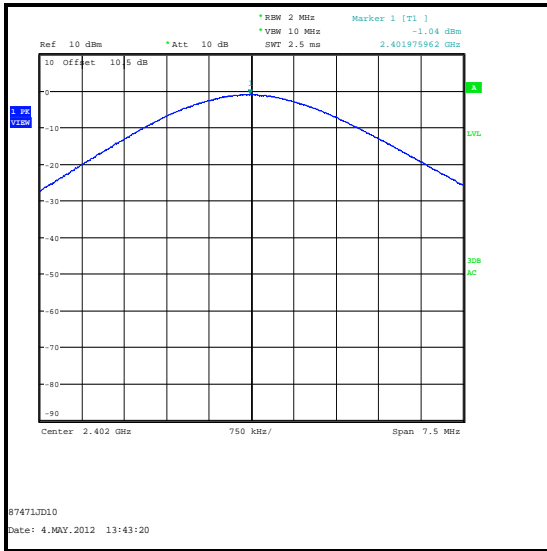
### Transmitter Maximum Peak Output Power (continued)

#### Results: 2DH5



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

**Results: 3DH5**



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

<b>Test Engineer:</b>	Nick Steele	<b>Test Date:</b>	04 May 2012
<b>Test Sample IMEI:</b>	351808050018796		

<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>	33

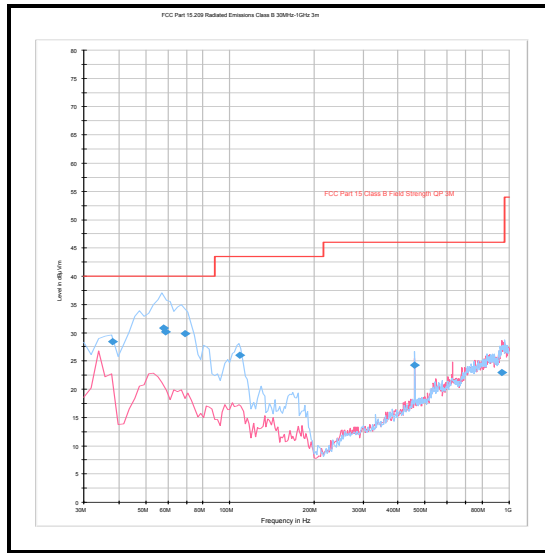
**Results: Quasi-Peak 3DH5**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
37.925	Horizontal	28.4	40.0	11.6	Complied
108.482	Horizontal	26.0	43.5	17.5	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>	Nick Steele	<b>Test Dates:</b>	02 May 2012 & 03 May 2012
<b>Test Sample IMEI:</b>	351808050018796		

<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 26.5 GHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	23
<b>Relative Humidity (%):</b>	25

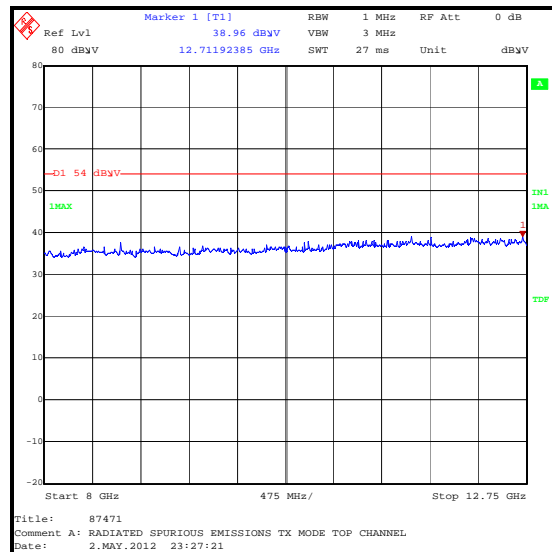
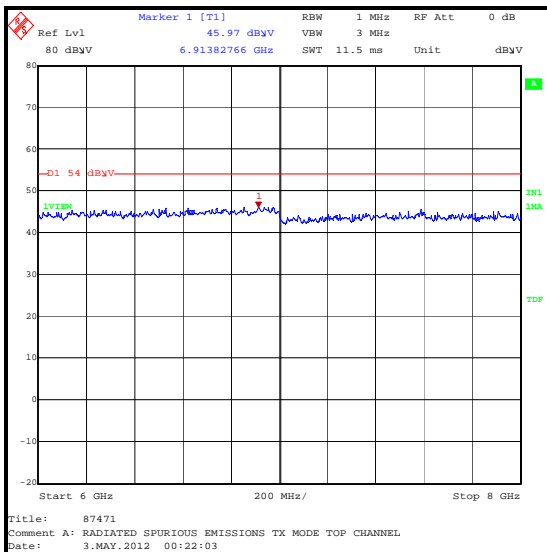
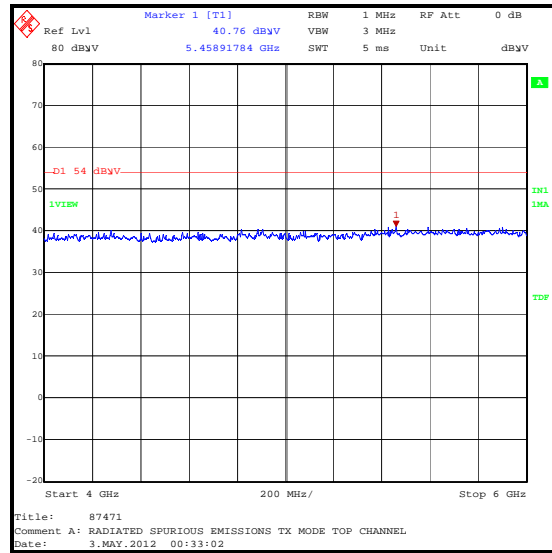
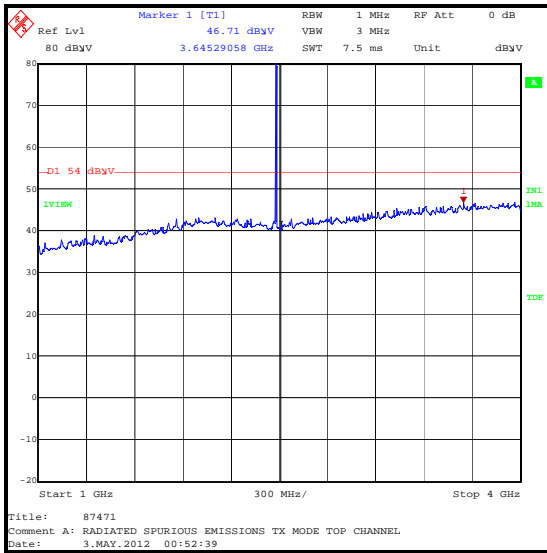
**Results:**

<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>
24621.242	Vertical	49.9	54.0	4.1	Complied

**Note(s):**

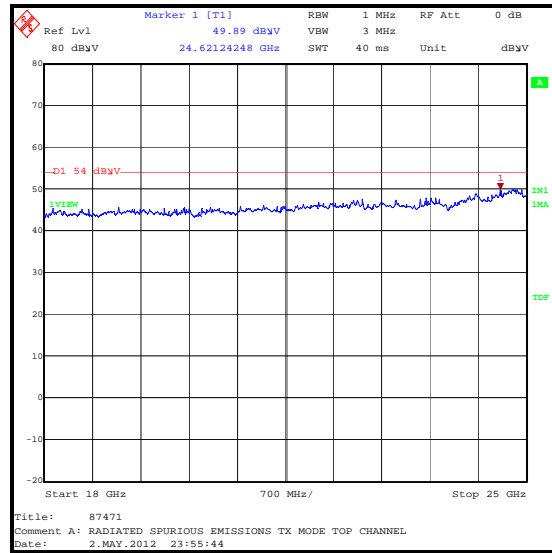
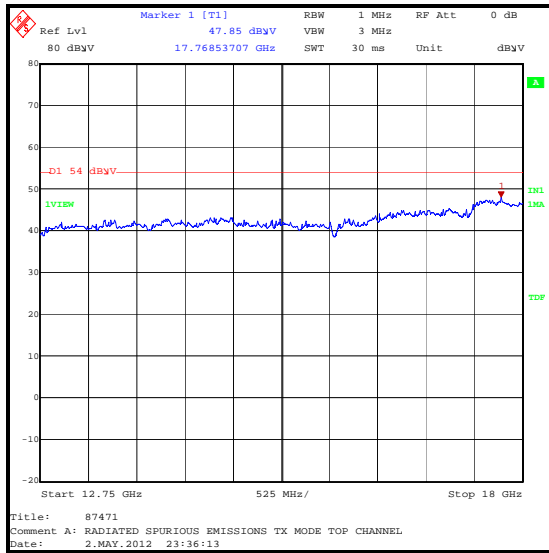
1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss
2. The emission shown on the 1 GHz to 4 GHz plot is the EUT fundamental at 2480 MHz.
3. No spurious emissions were detected above the noise floor of the measuring receiver 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.
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)



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

<b>Test Engineers:</b>	Nick Steele & Andrew Edwards	<b>Test Dates:</b>	03 May 2012 & 12 June 2012
<b>Test Sample IMEI:</b>	351808050018796		

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

**Environmental Conditions:**

<b>Temperature (°C):</b>	22
<b>Relative Humidity (%):</b>	25

**Results: Static Mode DH5**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2400.000	Horizontal	34.9	69.9*	35.0	Complied
2483.500	Horizontal	49.2	74.0	24.8	Complied

Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.500	Horizontal	40.4	54.0	13.6	Complied

**Results: Hopping Mode DH5**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2400.000	Horizontal	33.3	70.6*	37.3	Complied
2483.500	Horizontal	48.8	74.0	25.2	Complied

Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.500	Horizontal	31.2	54.0	22.8	Complied

**Results: Static Mode 2DH5**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2383.617	Horizontal	49.1	54.0	4.9	Complied
2400.000	Horizontal	40.5	69.2*	28.7	Complied
2483.500	Horizontal	51.8	74.0	22.2	Complied

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

Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.500	Horizontal	40.7	54.0	13.3	Complied

**Results: Hopping Mode 2DH5**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2383.617	Horizontal	48.5	54.0	5.5	Complied
2400.000	Horizontal	37.0	69.9*	32.9	Complied
2483.500	Horizontal	51.3	74.0	22.7	Complied

Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.500	Horizontal	31.4	54.0	22.6	Complied

**Results: Static Mode 3DH5**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2384.819	Horizontal	49.4	54.0	4.6	Complied
2400.000	Horizontal	40.1	69.2*	29.1	Complied
2483.500	Horizontal	53.7	74.0	20.3	Complied

Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.500	Horizontal	40.7	54.0	13.3	Complied

**Results: Hopping Mode 3DH5**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2383.317	Horizontal	47.9	54.0	6.1	Complied
2400.000	Horizontal	37.6	69.4*	31.8	Complied
2483.500	Horizontal	52.2	74.0	21.8	Complied

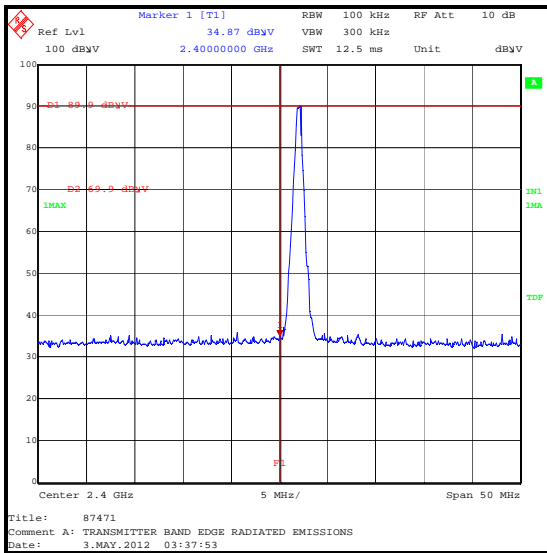
Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.500	Horizontal	31.4	54.0	22.6	Complied

**Transmitter Band Edge Radiated Emissions (continued)****Note(s):**

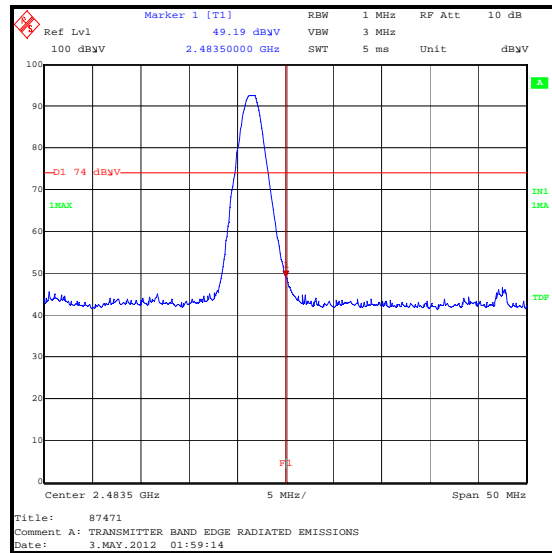
1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss.
2. \* -20 dBc limit
3. The emissions at 2384 MHz were in the restricted bands and was measured using a peak level was compared to the average limit as opposed to being compared to the peak limit because this is the more onerous limit.

### Transmitter Band Edge Radiated Emissions (continued)

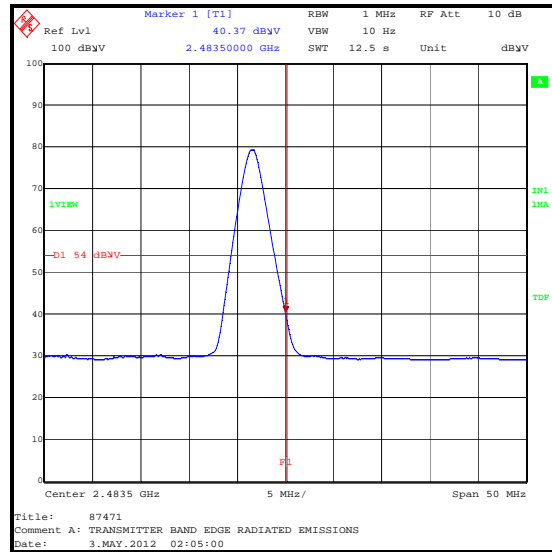
#### DH5 Static Mode



Lower Band Edge Peak Static



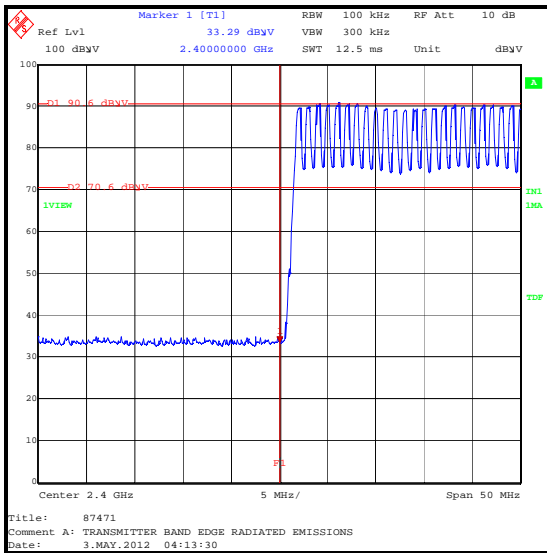
Upper Band Edge Peak Static



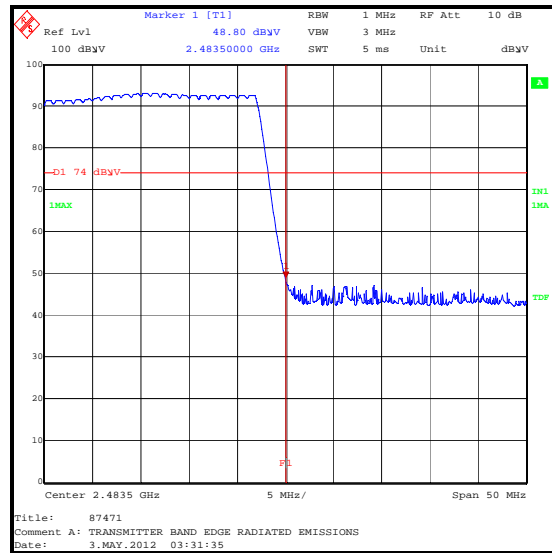
Upper Band Edge Average Static

### Transmitter Band Edge Radiated Emissions (continued)

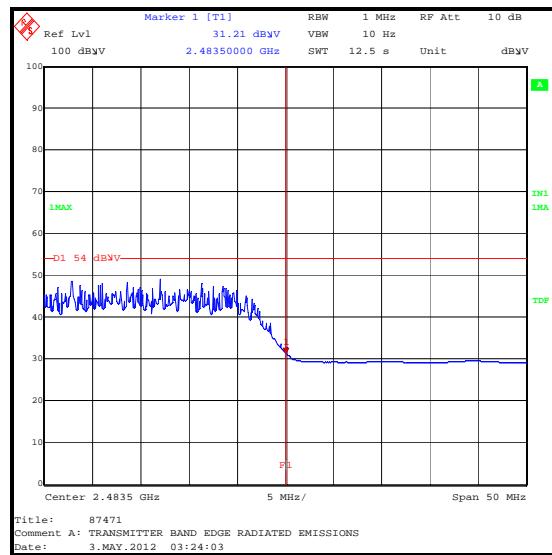
#### DH5 Hopping Mode



Lower Band Edge Peak Hopping



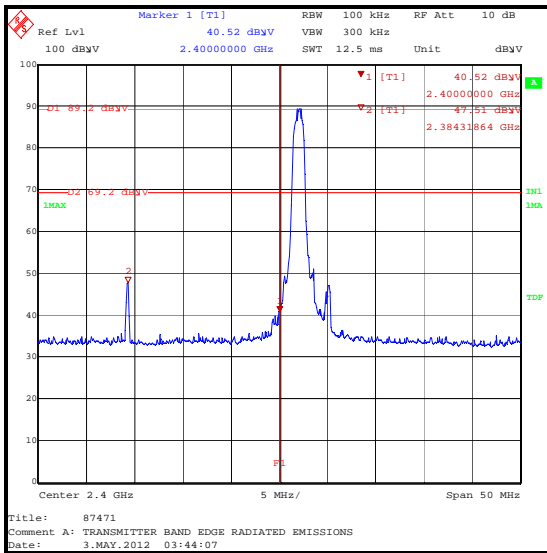
Upper Band Edge Peak Hopping



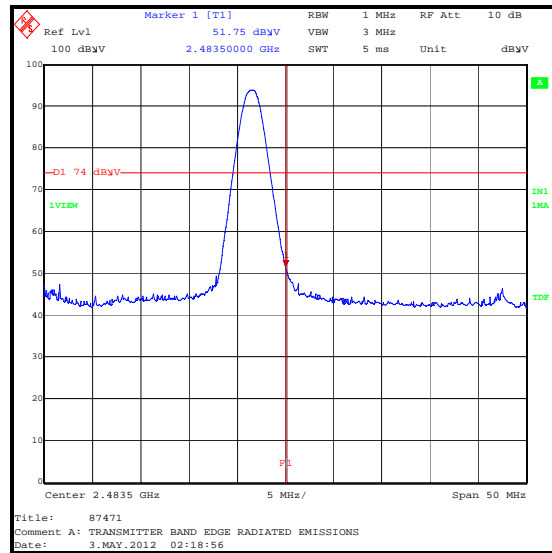
Upper Band Edge Average Hopping

### Transmitter Band Edge Radiated Emissions (continued)

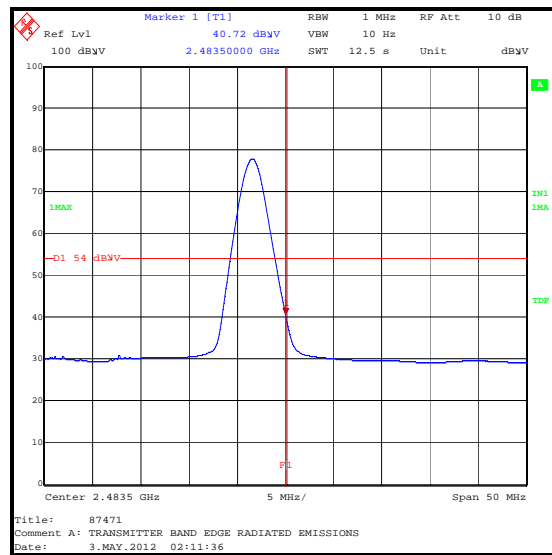
#### 2DH5 Static Mode



Lower Band Edge Peak Static



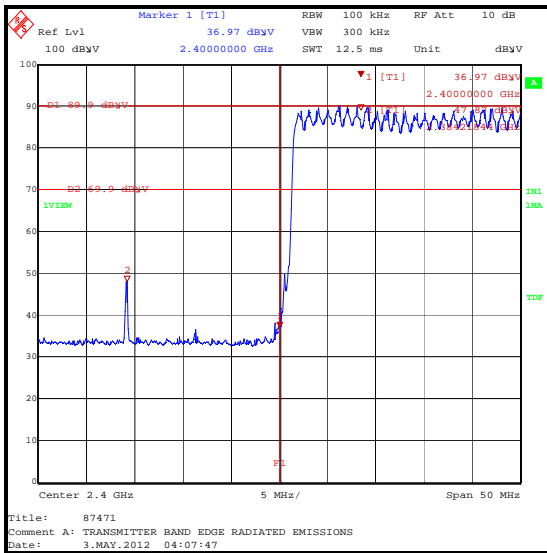
Upper Band Edge Peak Static



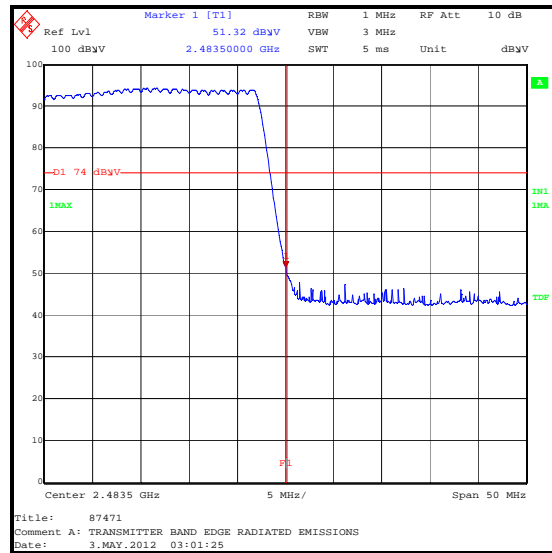
Upper Band Edge Average Static

### Transmitter Band Edge Radiated Emissions (continued)

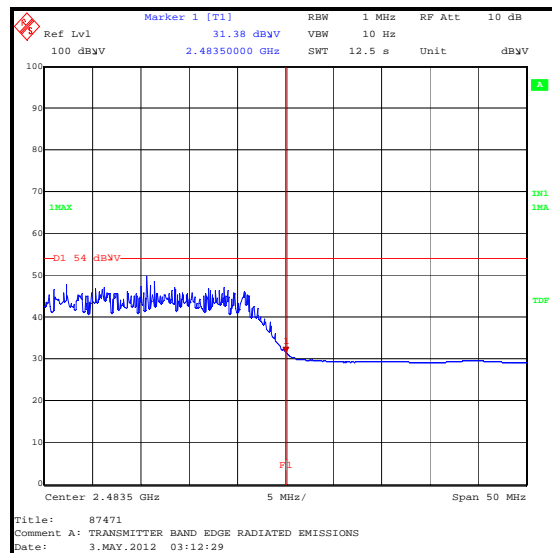
#### 2DH5 Hopping Mode



Lower Band Edge Peak Hopping



Upper Band Edge Peak Hopping



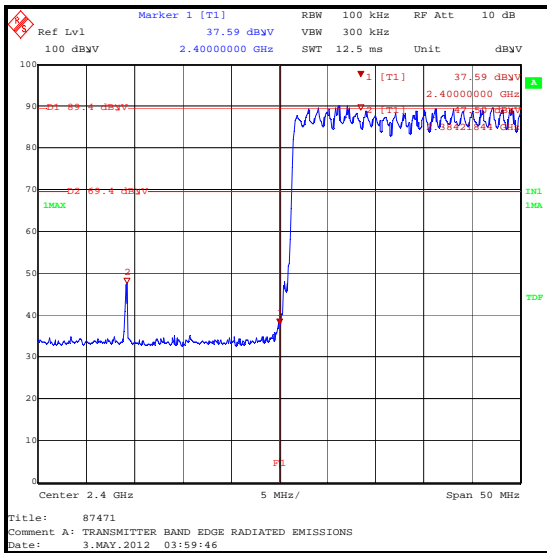
Upper Band Edge Average Hopping



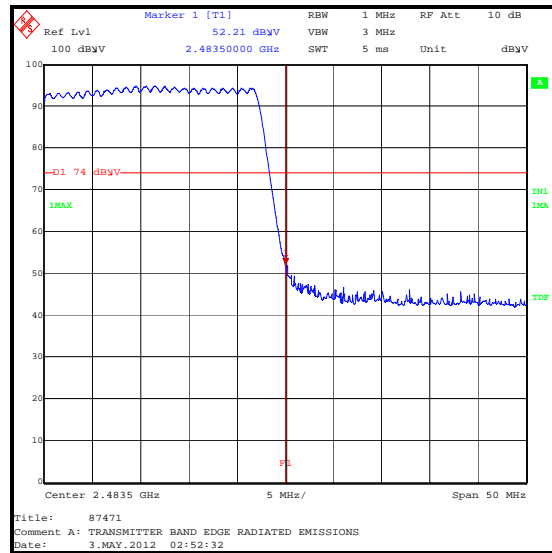


### Transmitter Band Edge Radiated Emissions (continued)

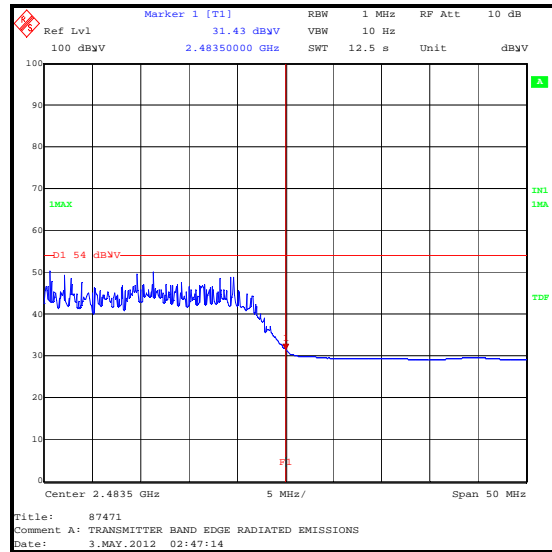
#### 3DH5 Hopping Mode



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".

<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
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**

<b>RFI 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>
A067	LISN	Rohde & Schwarz	ESH3-Z5	890603/002	02 Jun 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	25 Feb 2013	12
A1834	Attenuator	Hewlett Packard	8491B	10444	29 Jan 2013	12
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 Microwave	20240-20	330	09 Oct 2012	12
A553	Antenna	Chase	CBL6111A	1593	15 Feb 2013	12
G0543	Amplifier	Sonoma	310N	230801	13 Jul 2012	3
K0001	5 m RSE Chamber	Rainford EMC	N/A	N/A	29 May 2012	12
K0002	3 m RSE Chamber	Rainford EMC	N/A	N/A	09 Oct 2012	12
M1124	Spectrum Analyser	Rohde & Schwarz	ESI26	100046K	29 Jun 2012	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	03 Feb 2013	12
M1379	Test Receiver	Rohde & Schwarz	ESIB 7	100330	20 Sep 2012	12
M1630	Test Receiver	Rohde & Schwarz	ESU40	100233	06 Feb 2013	12

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