



## TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: Softbank 003P

FCC ID: UCE211041A

To: FCC Part 15.247: 2010 Subpart C

**Test Report Serial No:**  
RFI-RPT-RP81531JD05A

This Test Report Is Issued Under The Authority Of Chris Guy, Head of Global Approvals:		
Checked By:	Ian Watch	
Signature:		
Date of Issue:	20 June 2011	

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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) 2010: 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) 2010: 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) 2010: 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>	25 May 2011 to 13 June 2011

### **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>	Softbank
<b>Model Name or Number:</b>	S11BR1 (003P)
<b>IMEI:</b>	004401221073618 ( <i>Radiated sample #1</i> ) 004401221073642 ( <i>Radiated sample #2</i> ) 004401221073584 ( <i>Conducted RF port sample</i> )
<b>Hardware Version Number:</b>	Rev C
<b>Software Version Number:</b>	003PVA00
<b>FCC ID:</b>	UCE211041A

<b>Brand Name:</b>	Softbank
<b>Description:</b>	Battery
<b>Model Name or Number:</b>	PMBBD1

<b>Brand Name:</b>	Softbank
<b>Description:</b>	AC Charger and USB cable
<b>Model Name or Number:</b>	PMCBD1

<b>Brand Name:</b>	Softbank
<b>Description:</b>	Personal Hands-Free
<b>Model Name or Number:</b>	PMLBD1

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

The equipment under test was a dual mode UMTS/GSM cellular handset with Bluetooth and WLAN.

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

No modifications were applied to the EUT during testing.

**3.4. Additional Information Related to Testing**

Tested Technology:	Bluetooth		
Power Supply Requirement:	Nominal	3.7 V	
Type of Unit:	Transceiver		
Channel Spacing:	1 MHz		
Mode:	Basic Rate	Enhanced Data Rate	
Modulation:	GFSK	π/4-DQPSK	8DQPSK
Packet Type: (Maximum Payload)	DH5	2DH5	3DH5
Data Rate (Mbit/s):	1	2	3
Maximum Peak Output Power:	-1.7 dBm		
Transmit Frequency Range:	2402 MHz to 2480 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	0	2402
	Middle	39	2441
	Top	78	2480
Receive Frequency Range:	2402 MHz to 2480 MHz		
Receive Channels Tested:	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

<b>Brand Name:</b>	Generic
<b>Description:</b>	Micro SD Memory Card
<b>Model Name or Number:</b>	128 MB

<b>Brand Name:</b>	Buffalo
<b>Description:</b>	USB Hub
<b>Model Name or Number:</b>	BSH3U01

## **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 connected to the EUT as this was found to be the worst case during pre-scans. All the accessories were individually connected and measurements made during the pre-scans to determine the worst case combination.
- The EUT conducted sample was used for 20 dB bandwidth, carrier frequency separation, average time of occupancy and maximum output power tests
- The EUT radiated samples were 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:**

<b>Test Engineer:</b>	Andrew Edwards	<b>Test Date:</b>	10 June 2011
<b>Test Sample Serial No:</b>	004401221073618		

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

**Environmental Conditions:**

<b>Temperature (°C):</b>	28
<b>Relative Humidity (%):</b>	31

**Results: Live / Quasi Peak**

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
1.347000	Live	50.5	56.0	5.5	Complied
1.387500	Live	50.5	56.0	5.5	Complied
1.405500	Live	51.1	56.0	4.9	Complied
1.410000	Live	51.7	56.0	4.3	Complied
1.450500	Live	53.5	56.0	2.5	Complied
1.500000	Live	55.7	56.0	0.3	Complied
1.509000	Live	54.7	56.0	1.3	Complied
1.549500	Live	52.6	56.0	3.4	Complied

**Results: Live / Average**

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
1.351500	Live	32.2	46.0	13.8	Complied
1.356000	Live	30.8	46.0	15.2	Complied
1.405500	Live	31.5	46.0	14.5	Complied
1.428000	Live	33.3	46.0	12.7	Complied
1.446000	Live	33.2	46.0	12.8	Complied
1.468500	Live	34.6	46.0	11.4	Complied
1.509000	Live	35.8	46.0	10.2	Complied
1.513500	Live	35.9	46.0	10.1	Complied
1.765500	Live	35.8	46.0	10.2	Complied

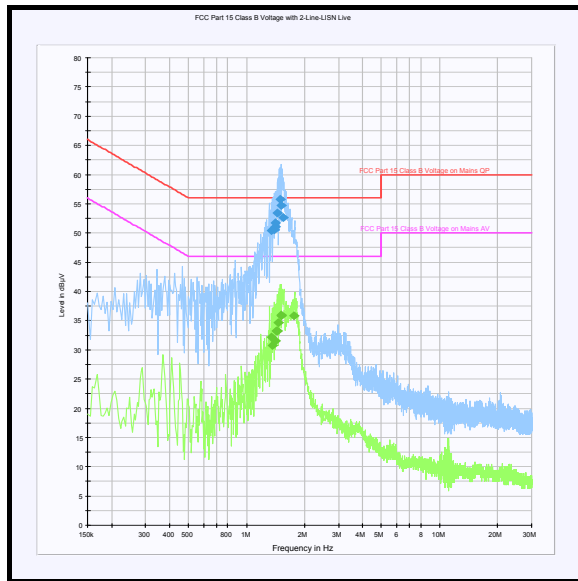
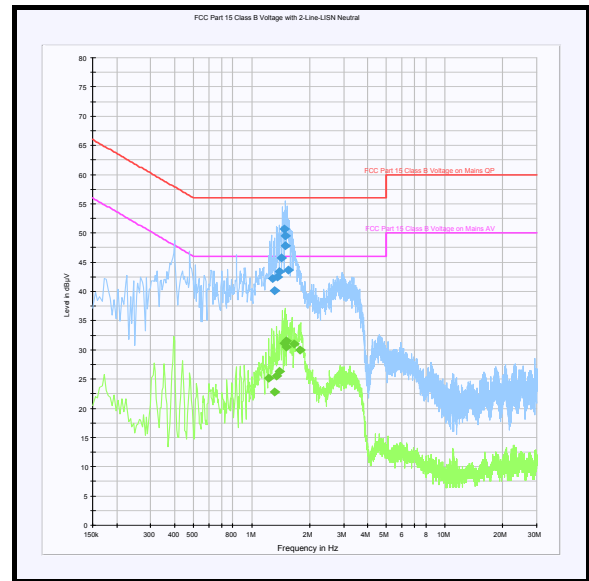
**Receiver/Idle Mode AC Conducted Spurious Emissions (continued)****Results: Neutral / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
1.288500	Neutral	42.3	56.0	13.7	Complied
1.311000	Neutral	40.1	56.0	15.9	Complied
1.360500	Neutral	42.5	56.0	13.5	Complied
1.392000	Neutral	43.5	56.0	12.5	Complied
1.428000	Neutral	45.8	56.0	10.2	Complied
1.482000	Neutral	50.7	56.0	5.3	Complied
1.486500	Neutral	47.8	56.0	8.2	Complied
1.491000	Neutral	49.5	56.0	6.5	Complied
1.549500	Neutral	43.6	56.0	12.4	Complied

**Results: Neutral / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
1.230000	Neutral	25.1	46.0	20.9	Complied
1.311000	Neutral	22.8	46.0	23.2	Complied
1.351500	Neutral	25.6	46.0	20.4	Complied
1.392000	Neutral	26.3	46.0	19.7	Complied
1.477500	Neutral	31.2	46.0	14.8	Complied
1.509000	Neutral	30.5	46.0	15.5	Complied
1.518000	Neutral	31.6	46.0	14.4	Complied
1.653000	Neutral	31.0	46.0	15.0	Complied
1.788000	Neutral	29.9	46.0	16.1	Complied

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

**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>	25 May 2011
<b>Test Sample Serial No:</b>	004401221073618		

<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>	29
<b>Relative Humidity (%):</b>	18

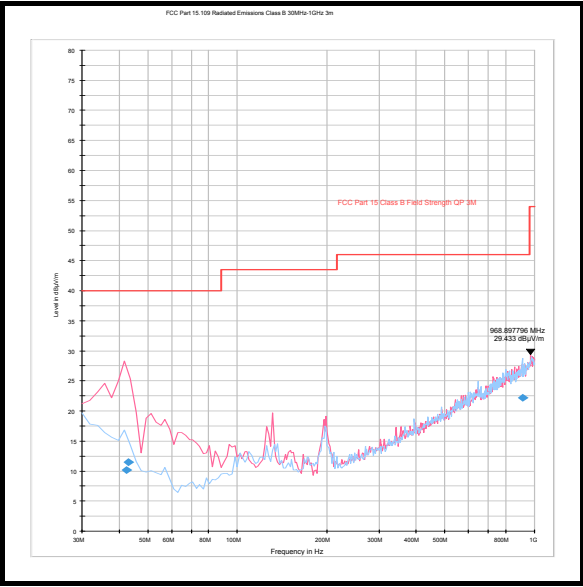
**Results: Quasi Peak**

<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>
911.673	Horizontal	22.2	46.0	23.8	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>	Ian Watch	<b>Test Date:</b>	01 June 2011
<b>Test Sample Serial No:</b>	004401221073618		

<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:**

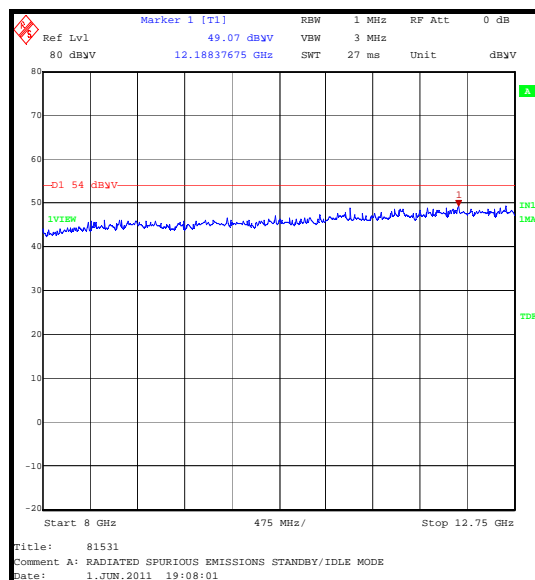
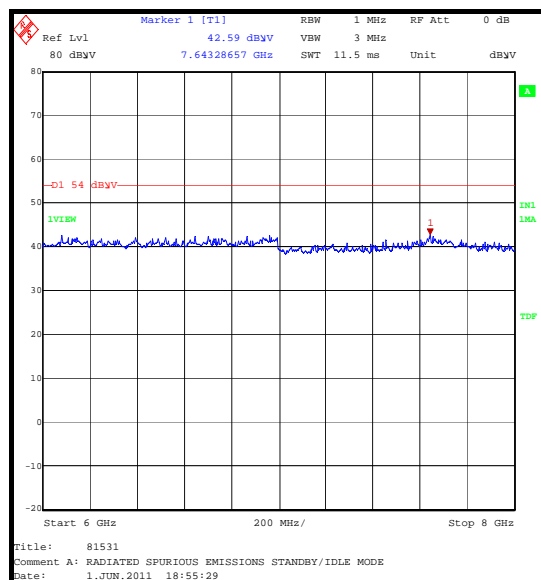
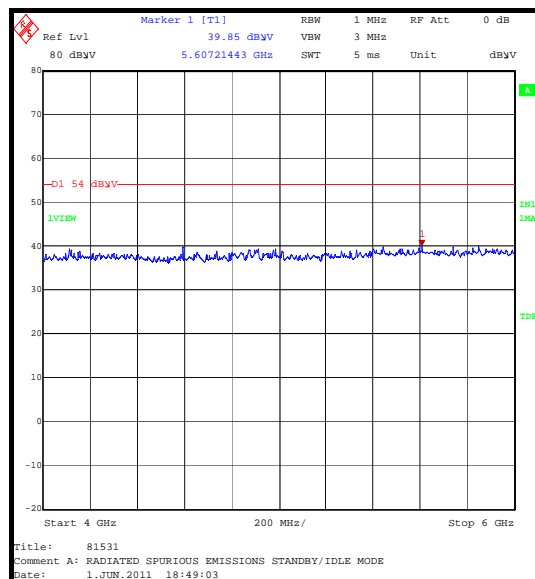
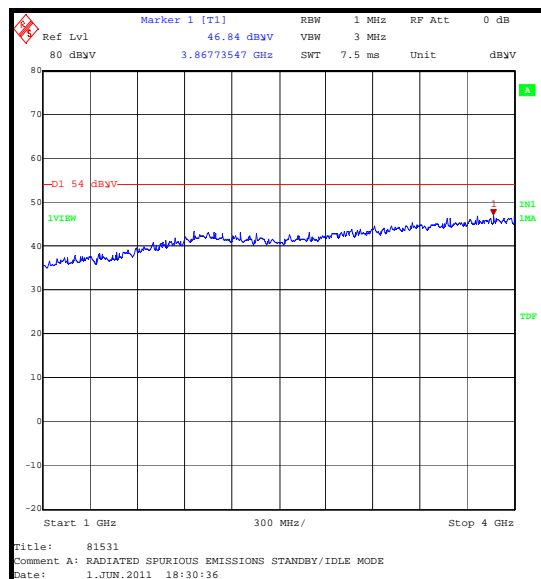
<b>Temperature (°C):</b>	28
<b>Relative Humidity (%):</b>	20

**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>
12188.377	Vertical	49.1	54.0	4.9	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. 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.
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.

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

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

<b>Test Engineer:</b>	Andrew Edwards	<b>Test Date:</b>	10 June 2011
<b>Test Sample Serial No:</b>	004401221073584		

<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>	27
<b>Relative Humidity (%):</b>	30

**Results: Live / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.429000	Live	37.5	57.3	19.8	Complied
0.717000	Live	35.6	56.0	20.4	Complied
0.757500	Live	36.5	56.0	19.5	Complied
0.766500	Live	36.8	56.0	19.2	Complied
0.829500	Live	39.8	56.0	16.2	Complied
1.279500	Live	29.9	56.0	26.1	Complied
1.734000	Live	27.8	56.0	28.2	Complied

**Results: Live / Average**

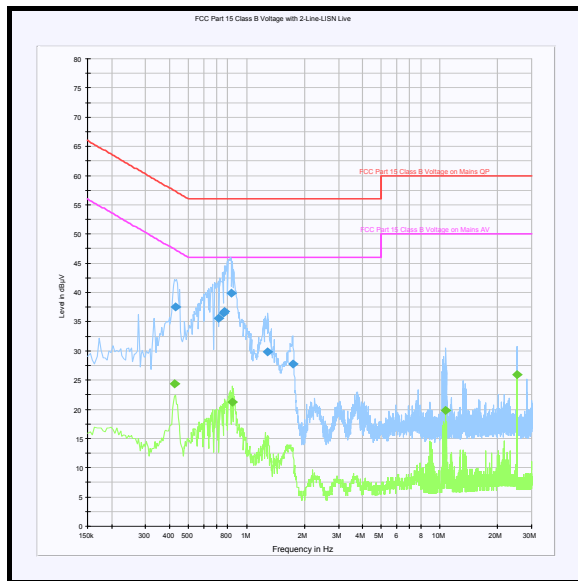
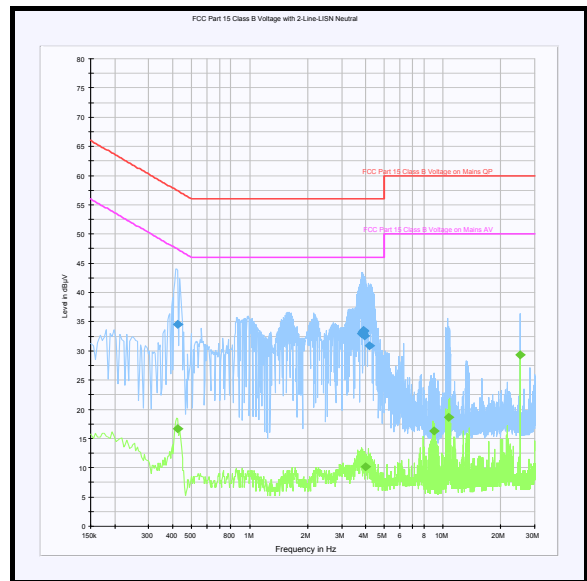
Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.424500	Live	24.4	47.4	23.0	Complied
0.847500	Live	21.3	46.0	24.7	Complied
10.792500	Live	19.8	50.0	30.2	Complied
25.057500	Live	25.9	50.0	24.1	Complied

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

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.424500	Neutral	34.6	57.4	22.8	Complied
3.813000	Neutral	32.9	56.0	23.1	Complied
3.826500	Neutral	33.0	56.0	23.0	Complied
3.858000	Neutral	33.2	56.0	22.8	Complied
3.871500	Neutral	33.4	56.0	22.6	Complied
3.876000	Neutral	33.5	56.0	22.5	Complied
3.948000	Neutral	32.5	56.0	23.5	Complied
4.182000	Neutral	30.9	56.0	25.1	Complied

**Results: Neutral / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.424500	Neutral	16.7	47.4	30.7	Complied
3.979500	Neutral	10.2	46.0	35.8	Complied
9.064500	Neutral	16.3	50.0	33.7	Complied
10.792500	Neutral	18.7	50.0	31.3	Complied
25.057500	Neutral	29.4	50.0	20.6	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>	Andrew Edwards	<b>Test Date:</b>	09 June 2011
<b>Test Sample Serial No:</b>	004401221073584		

<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>	30
<b>Relative Humidity (%):</b>	28

**Results DH5:**

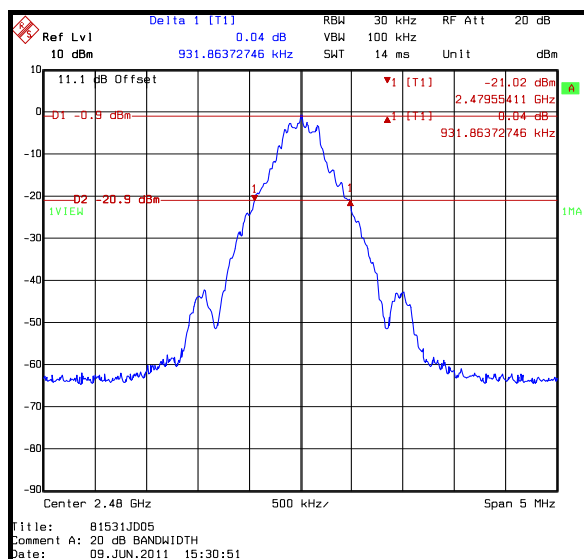
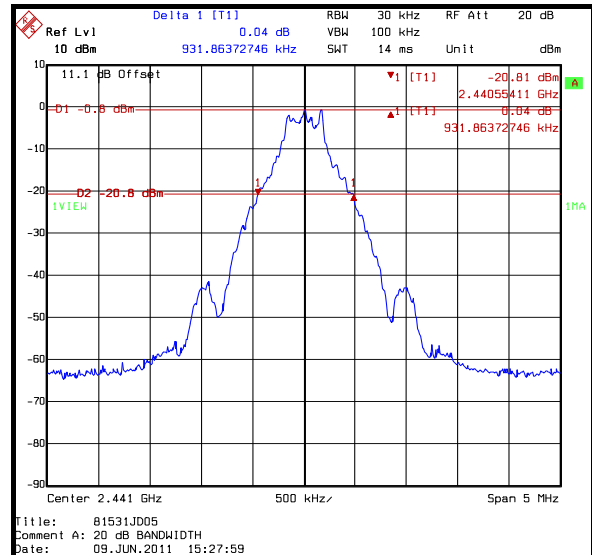
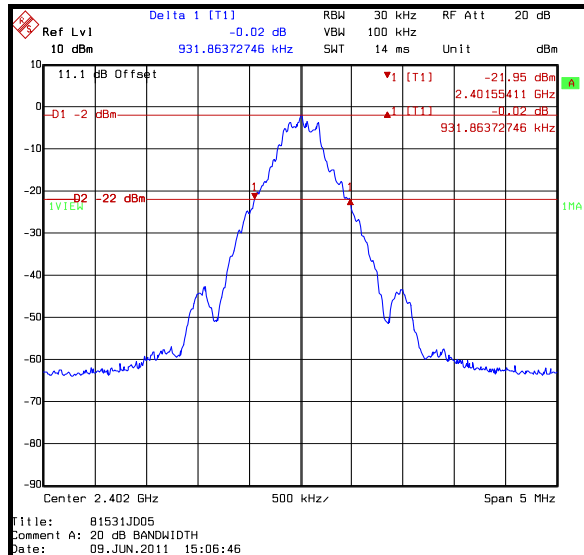
Channel	20 dB Bandwidth (kHz)
Bottom	931.864
Middle	931.864
Top	931.864

**Results 2DH5:**

Channel	20 dB Bandwidth (kHz)
Bottom	1312.623
Middle	1322.645
Top	1312.623

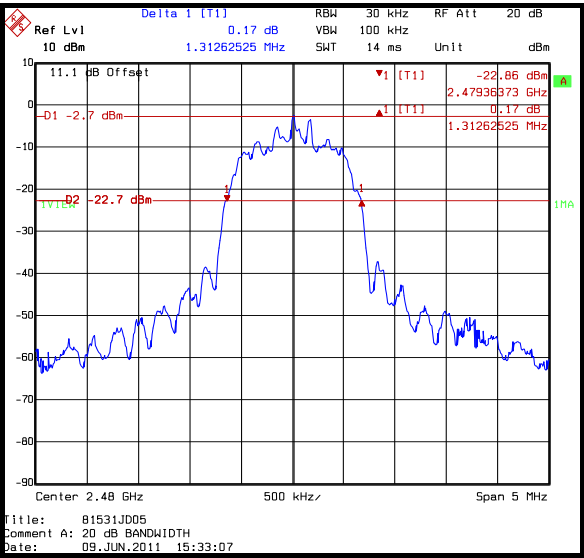
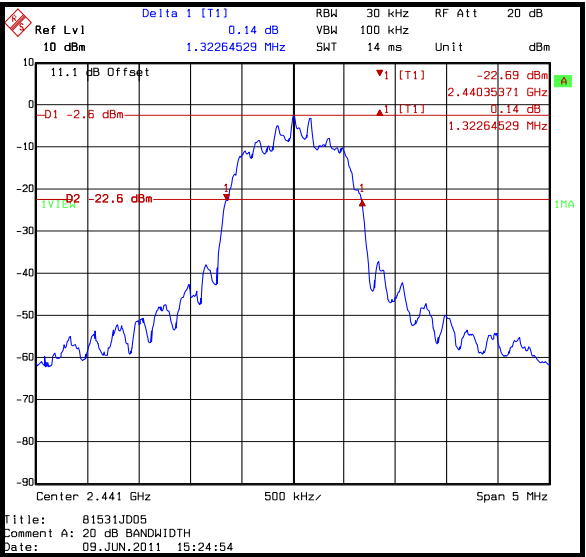
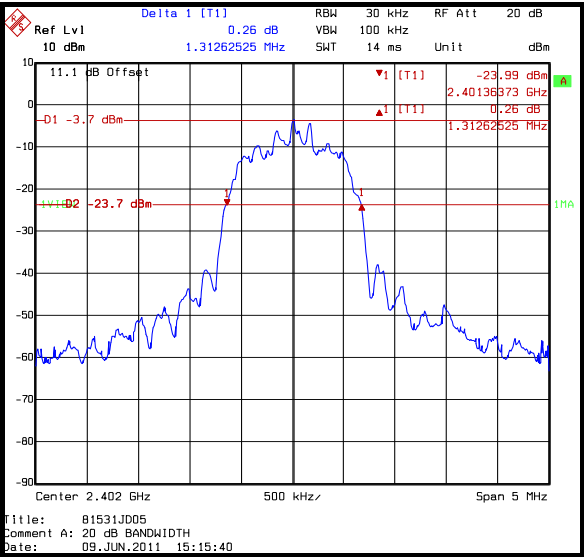
**Results 3DH5:**

Channel	20 dB Bandwidth (kHz)
Bottom	1312.623
Middle	1312.623
Top	1312.623

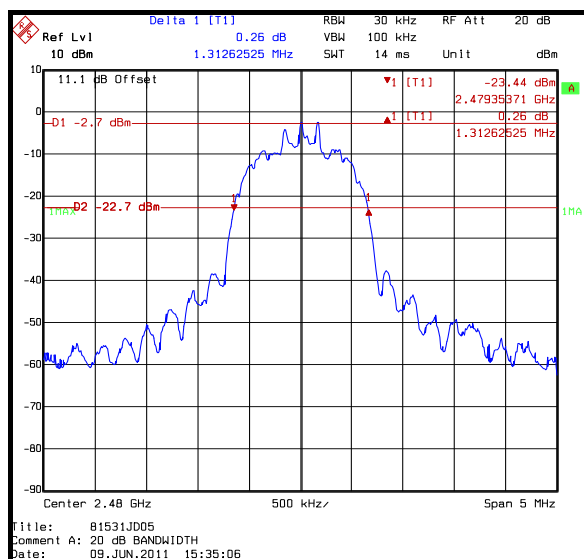
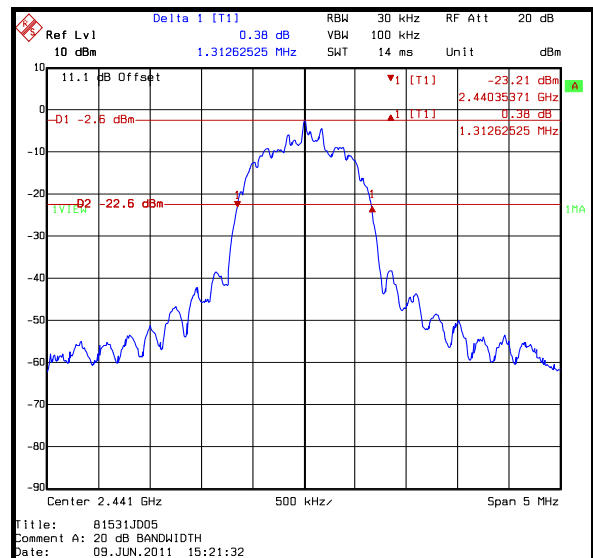
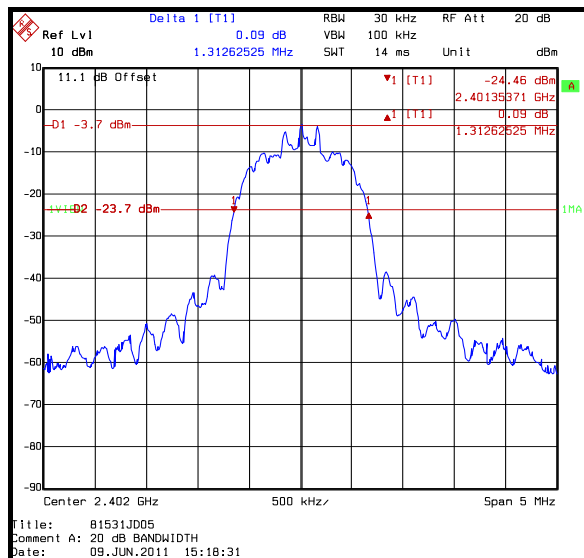
**Transmitter 20 dB Bandwidth (continued)****Results DH5:**

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:	Andrew Edwards	Test Date:	09 June 2011
Test Sample Serial No:	004401221073584		

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

**Environmental Conditions:**

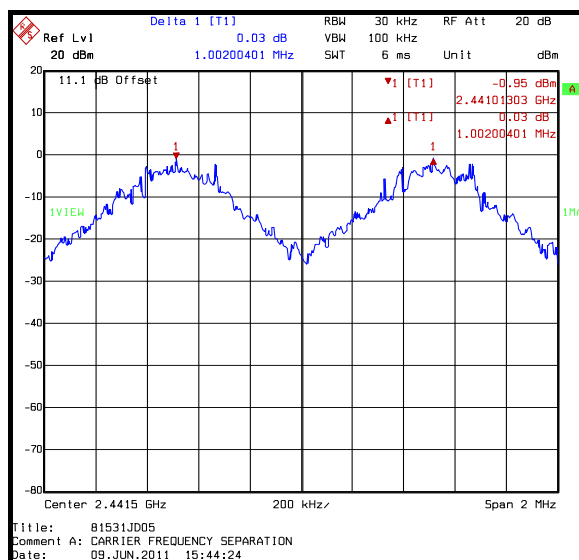
Temperature (°C):	30
Relative Humidity (%):	27

**Results: DH5**

Carrier Frequency Separation (kHz)	Limit ( $2/3$ of 20 dB BW) (kHz)	Margin (kHz)	Result
1002.004	621.243	380.761	Complied

**Note(s):**

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

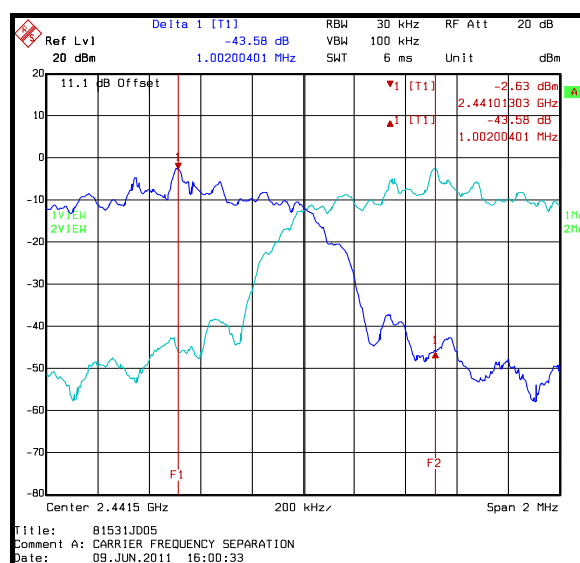


**Transmitter Carrier Frequency Separation (continued)****Results: 2DH5**

Carrier Frequency Separation (kHz)	Limit ( $\frac{2}{3}$ of 20 dB BW) (kHz)	Margin (kHz)	Result
1002.004	881.763	120.241	Complied

**Note(s):**

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

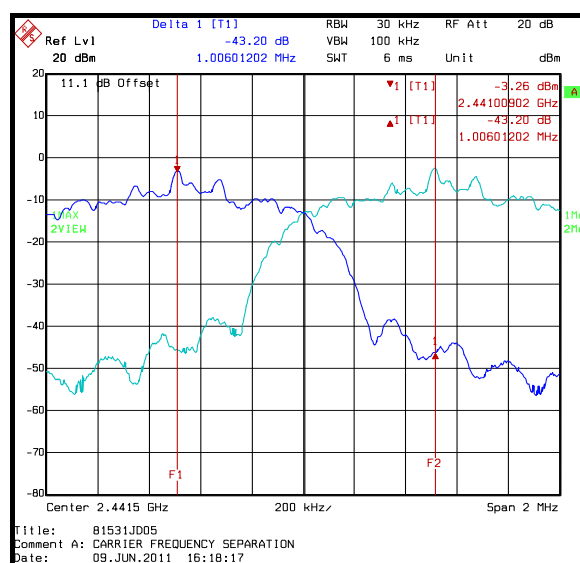


**Transmitter Carrier Frequency Separation (continued)****Results: 3DH5**

Carrier Frequency Separation (kHz)	Limit ( $^{2}/_3$ of 20 dB BW) (kHz)	Margin (kHz)	Result
1005.012	875.082	129.930	Complied

**Note(s):**

- 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:	Andrew Edwards	Test Date:	09 June 2011
Test Sample Serial No:	004401221073584		

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):	29
Relative Humidity (%):	26

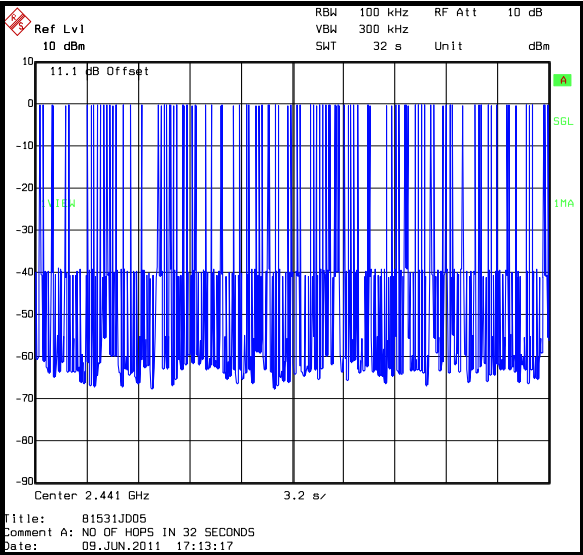
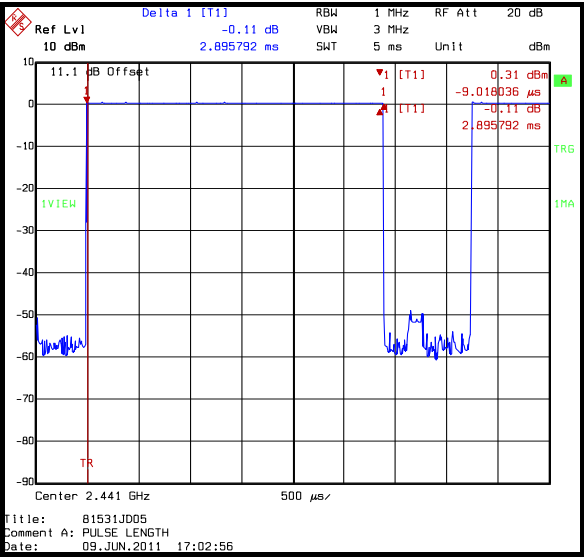
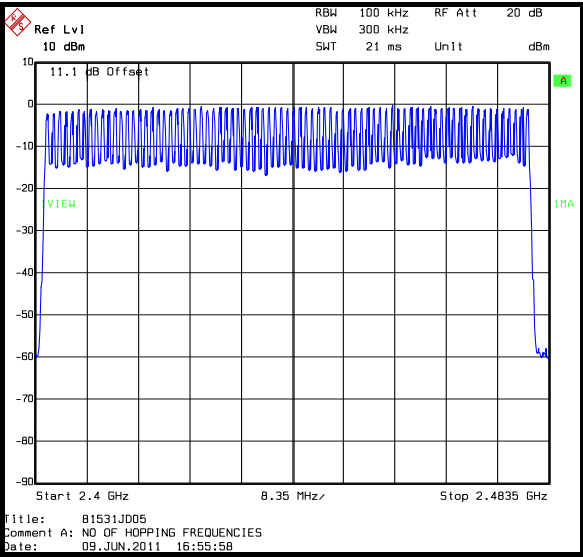
**Results:**

Emission Width (μs)	Number of Hops in 31.6 Seconds	Average Time of Occupancy (s)	Limit (s)	Margin (s)	Result
2895.792	96	0.278	0.4	0.122	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>	Andrew Edwards	<b>Test Date:</b>	09 June 2011
<b>Test Sample Serial No:</b>	004401221073584		

<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>	29
<b>Relative Humidity (%):</b>	27

**Results: DH5**

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	-1.6	30.0	31.6	Complied
Middle	-0.3	30.0	30.3	Complied
Top	-0.5	30.0	30.5	Complied

Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	-1.6	-2.3	-3.9	36.0	39.9	Complied
Middle	-0.3	-2.3	-2.6	36.0	38.6	Complied
Top	-0.5	-2.3	-1.8	36.0	37.8	Complied

**Results: 2DH5**

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	-1.4	21.0	22.4	Complied
Middle	0.1	21.0	20.9	Complied
Top	-0.3	21.0	21.3	Complied

Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	-1.4	-2.3	-3.7	27.0	30.7	Complied
Middle	0.1	-2.3	-2.2	27.0	29.2	Complied
Top	-0.3	-2.3	-2.0	27.0	29.0	Complied

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

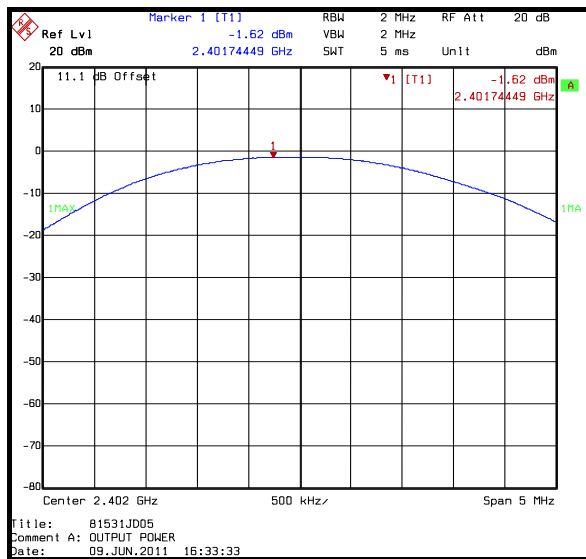
Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	-0.8	21.0	21.8	Complied
Middle	0.6	21.0	20.4	Complied
Top	0.2	21.0	20.8	Complied

Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	-0.8	-2.3	-3.1	27.0	30.1	Complied
Middle	0.6	-2.3	-1.7	27.0	28.7	Complied
Top	0.2	-2.3	-2.1	27.0	29.1	Complied

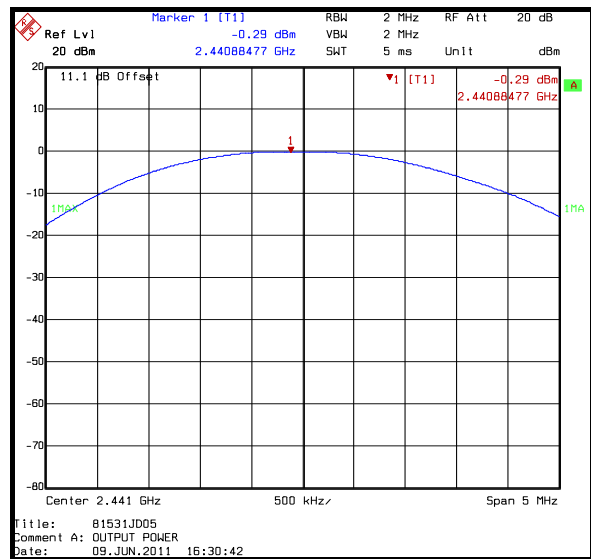


### Transmitter Maximum Peak Output Power (continued)

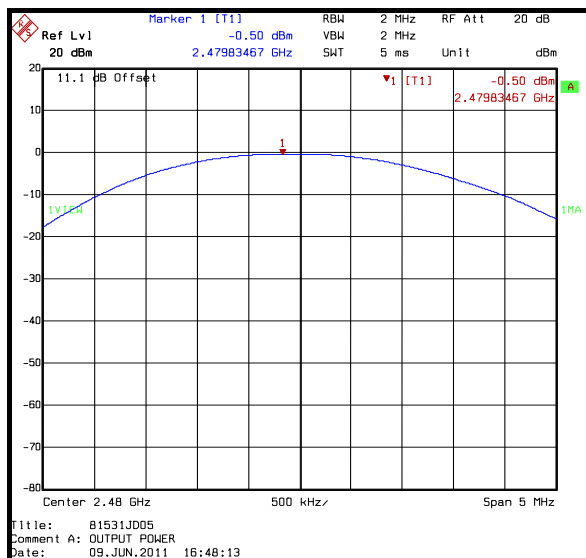
### Results: Basic Rate DH5



### Bottom channel



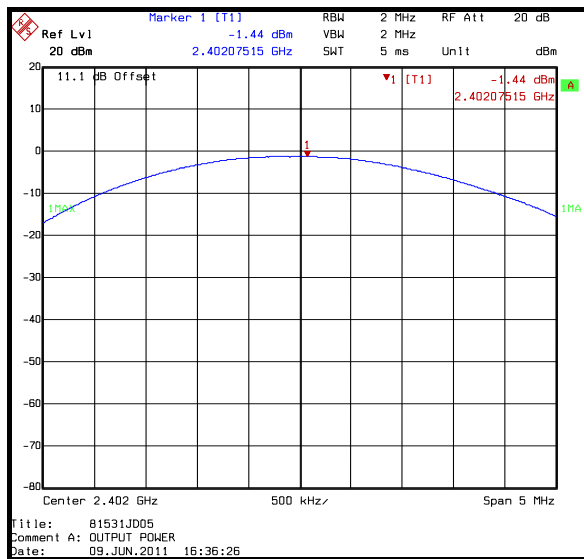
### Middle channel



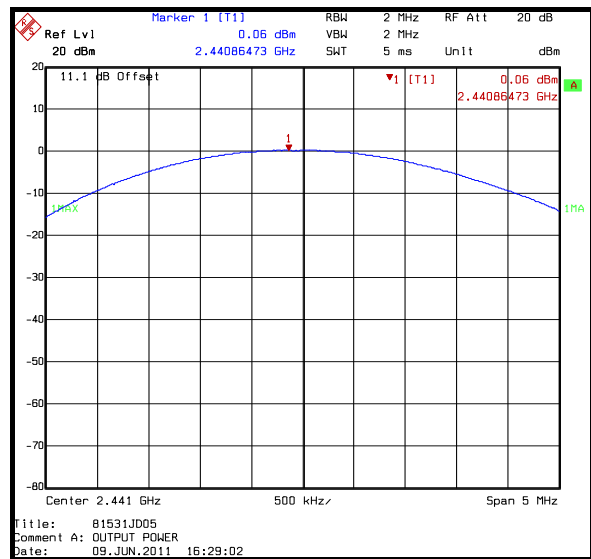
### Top channel

### Transmitter Maximum Peak Output Power (continued)

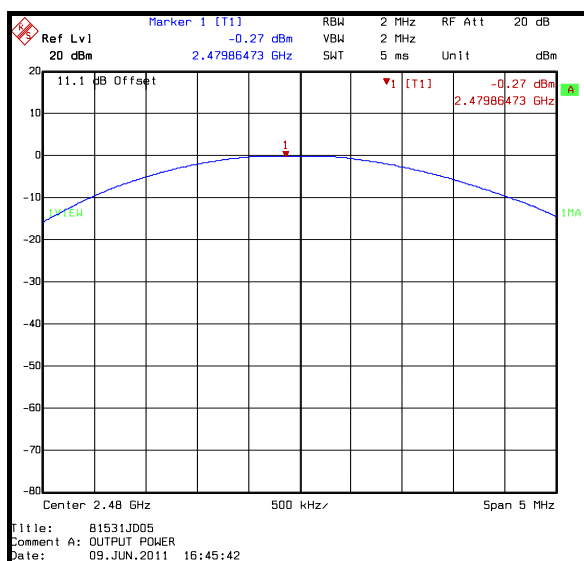
### Results: 2DH5



### Bottom channel



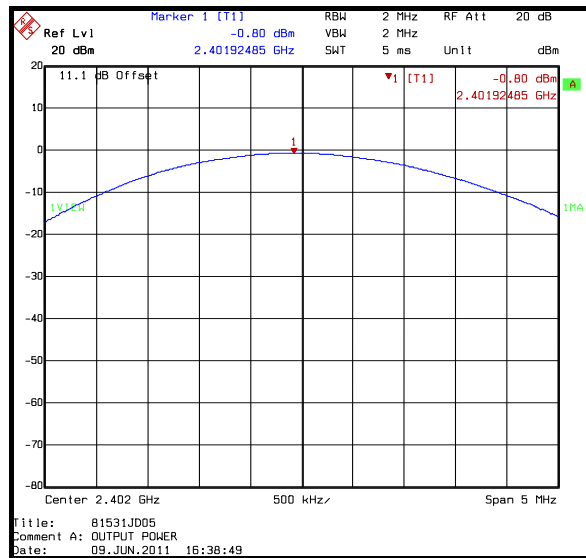
### Middle channel



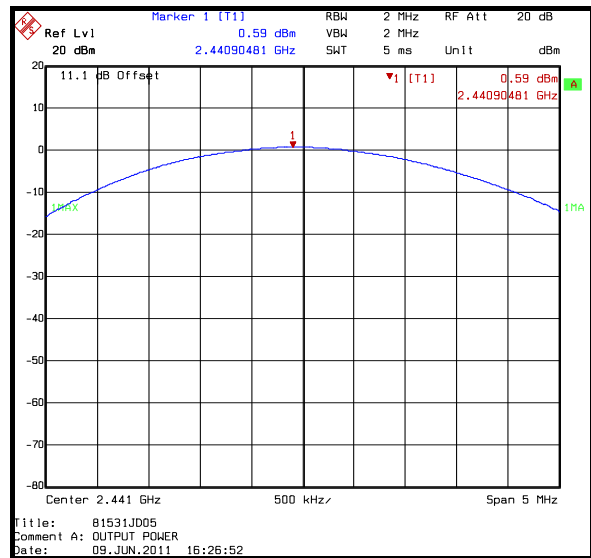
### Top channel

### Transmitter Maximum Peak Output Power (continued)

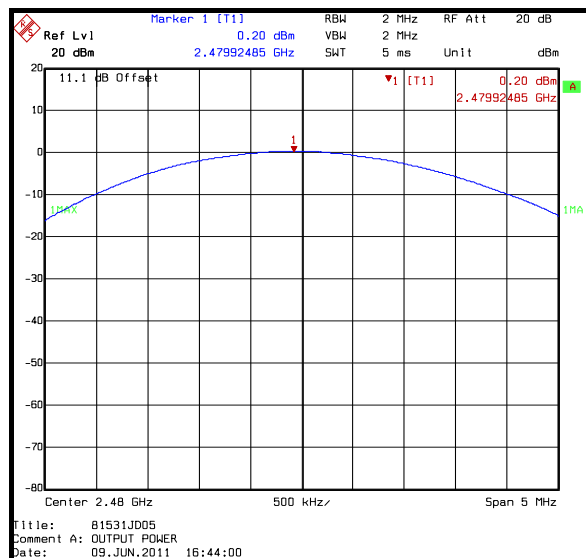
### Results: 3DH5



### Bottom channel



### Middle channel



### Top channel

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

<b>Test Engineer:</b>	Crawford Lindsay	<b>Test Date:</b>	02 June 2011
<b>Test Sample Serial No:</b>	004401221073642		

<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>	28
<b>Relative Humidity (%):</b>	31

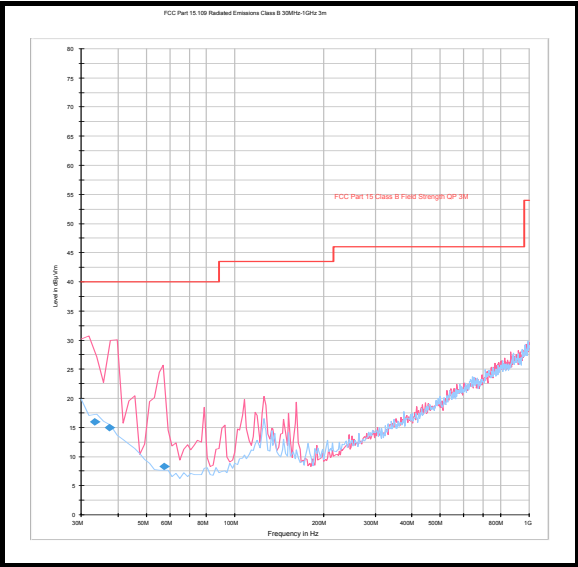
**Results: Quasi-Peak 3DH5**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
33.273	Vertical	16.0	40.0	24.0	Complied
37.521	Vertical	15.0	40.0	25.0	Complied
57.652	Vertical	8.3	40.0	31.7	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>	Andrew Edwards	<b>Test Date:</b>	08 June 2011
<b>Test Sample Serial No:</b>	004401221073642		

<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>	28
<b>Relative Humidity (%):</b>	20

**Results: Peak Bottom Channel 2DH5**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2384.729	Horizontal	58.1	74.0	15.9	Complied

**Results: Average Bottom Channel 2DH5**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2384.729	Vertical	52.4	54.0	1.6	Complied

**Results: Peak Middle Channel 2DH5**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2384.969	Horizontal	59.0	74.0	15.0	Complied

**Results: Average Middle Channel 2DH5**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2384.969	Horizontal	51.7	54.0	2.3	Complied

**Transmitter Radiated Emissions (continued)****Results: Peak Top Channel 2DH5**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2385.636	Horizontal	58.7	74.0	15.3	Complied

**Results: Average Top Channel 2DH5**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2385.636	Horizontal	51.9	54.0	2.1	Complied

**Results: Peak Hopping Mode 2DH5**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2384.449	Horizontal	58.8	74.0	15.2	Complied

**Results: Average Hopping Mode 2DH5**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2384.449	Horizontal	52.4	54.0	1.6	Complied

**Results: Peak Bottom Channel 3DH5**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2344.083	Vertical	58.3	74.0	15.7	Complied

**Results: Average Bottom Channel 3DH5**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2344.083	Horizontal	52.7	54.0	1.3	Complied

**Results: Peak Middle Channel 3DH5**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2384.949	Horizontal	59.2	74.0	14.8	Complied

**Results: Average Middle Channel 3DH5**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2384.949	Horizontal	52.0	54.0	2.0	Complied

**Transmitter Radiated Emissions (continued)****Results: Peak Top Channel 3DH5**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2386.056	Horizontal	58.5	74.0	15.5	Complied

**Results: Average Top Channel 3DH5**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2386.056	Horizontal	51.7	54.0	2.3	Complied

**Results: Peak Hopping Mode 3DH5**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2384.449	Horizontal	58.8	74.0	15.2	Complied

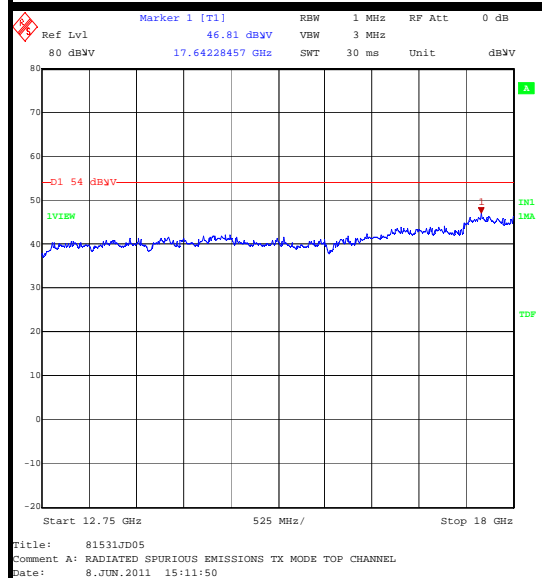
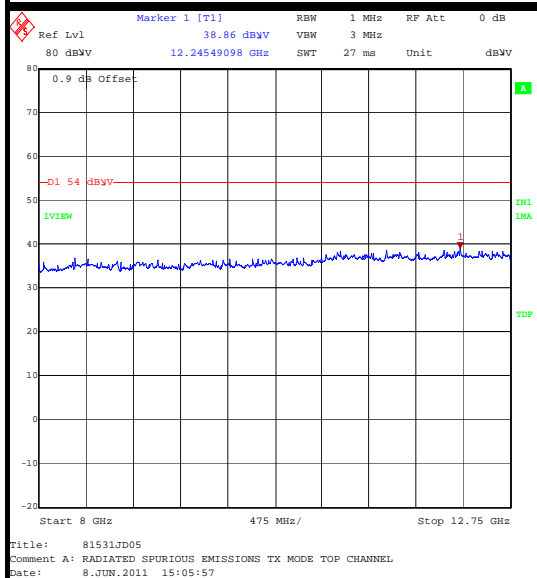
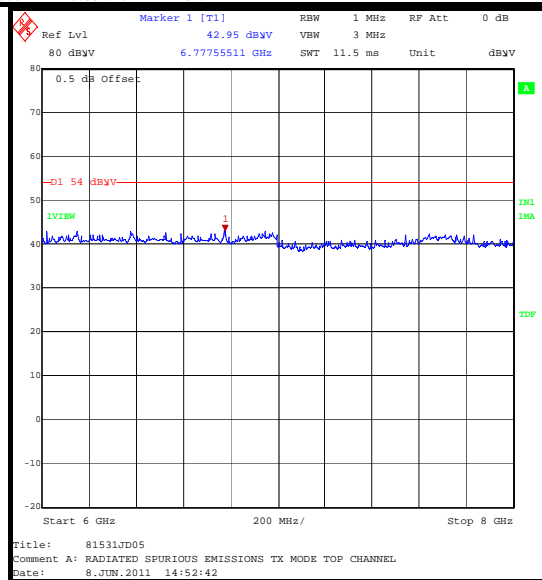
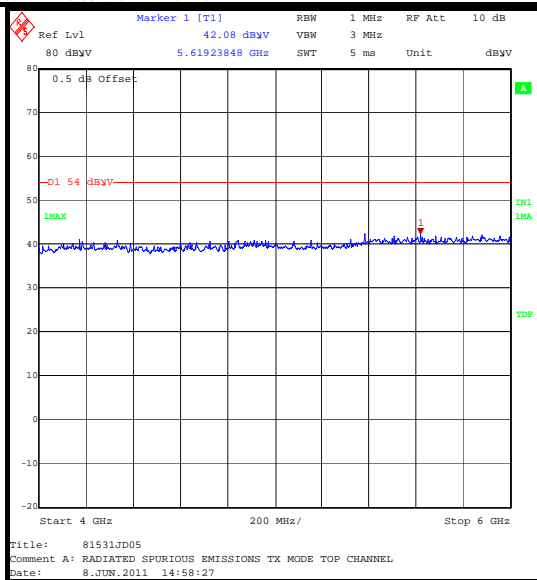
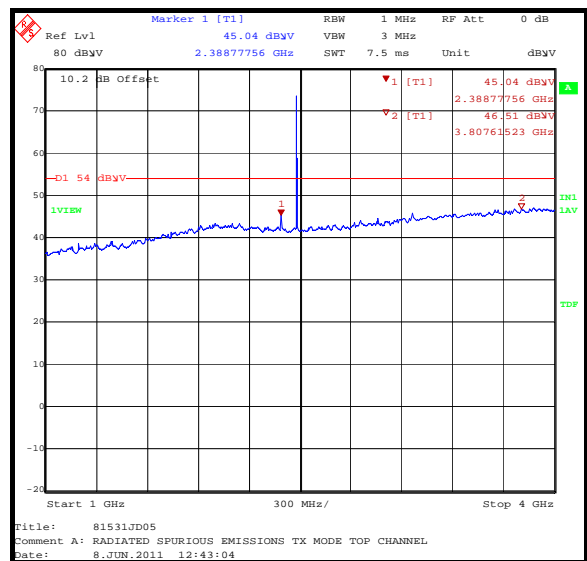
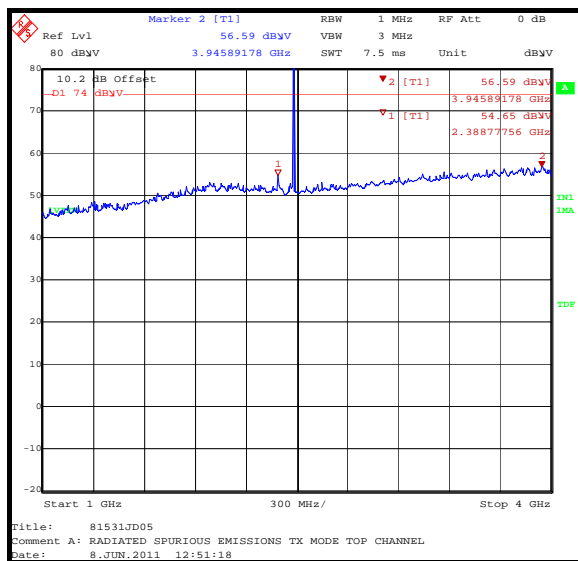
**Results: Average Hopping Mode 3DH5**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2384.449	Horizontal	50.7	54.0	3.3	Complied

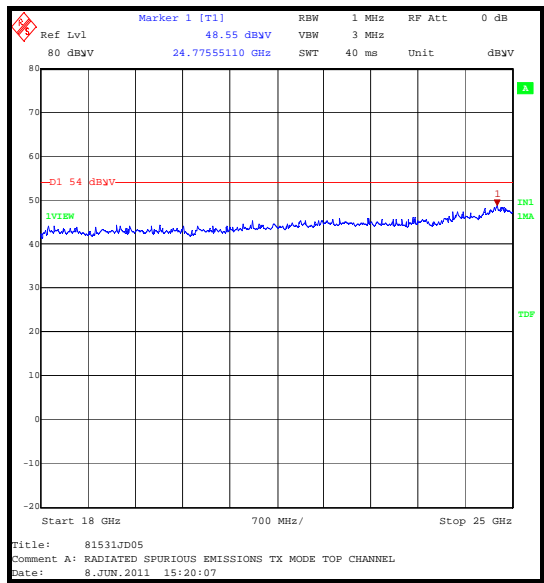
**Note(s):**

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.
5. The Emission at 2388.777 MHz could not be seen for DH5, therefore it was only measured for 2DH5 and 3DH5 on all channels.



**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:**

<b>Test Engineer:</b>	Andrew Edwards	<b>Test Date:</b>	11 June 2011
<b>Test Sample Serial No:</b>	004401221073642		

<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>	27
<b>Relative Humidity (%):</b>	20

**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	42.9	71.9*	29.0	Complied
2483.5	Vertical	52.9	74.0	21.1	Complied

Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	Vertical	40.6	54.0	13.4	Complied

**Results: Hopping Mode DH5**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2394.339	Vertical	46.1	70.7*	24.6	Complied
2400.0	Vertical	42.7	70.7*	28.0	Complied
2483.5	Vertical	51.2	74.0	22.8	Complied

Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	Vertical	38.6	54.0	15.4	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
2384.168	Vertical	51.8	69.6*	18.1	Complied
2400.0	Vertical	44.3	69.6*	25.3	Complied
2483.5	Vertical	52.4	74.0	21.6	Complied

Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	Vertical	40.6	54.0	13.4	Complied

**Results: Hopping Mode 2DH5**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2382.515	Vertical	51.6	69.0*	17.4	Complied
2400.0	Vertical	42.5	69.0*	26.5	Complied
2483.5	Vertical	53.2	74.0	20.8	Complied

Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	Vertical	38.6	54.0	15.4	Complied

**Results: Static Mode 3DH5**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2383.867	Vertical	51.3	69.5*	18.2	Complied
2400.0	Vertical	44.3	69.5*	25.2	Complied
2483.5	Vertical	54.4	74.0	19.6	Complied

Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	Vertical	40.6	54.0	13.4	Complied

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

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2383.056	Vertical	51.0	69.0*	18.0	Complied
2400.0	Vertical	42.7	69.0*	26.3	Complied
2483.5	Vertical	51.3	74.0	22.7	Complied

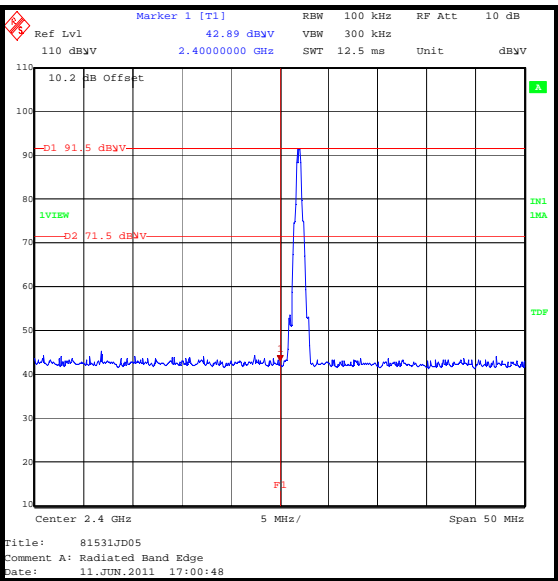
Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	Vertical	38.6	54.0	15.4	Complied

**Note(s):**

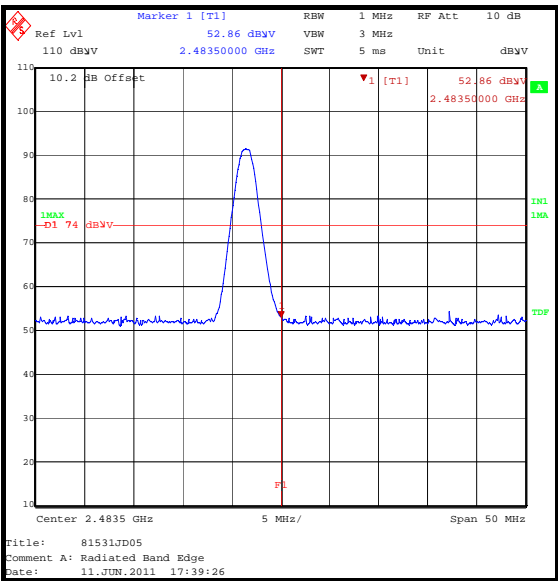
1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss.
2. \* -20 dBc limit

Transmitter Band Edge Radiated Emissions (continued)

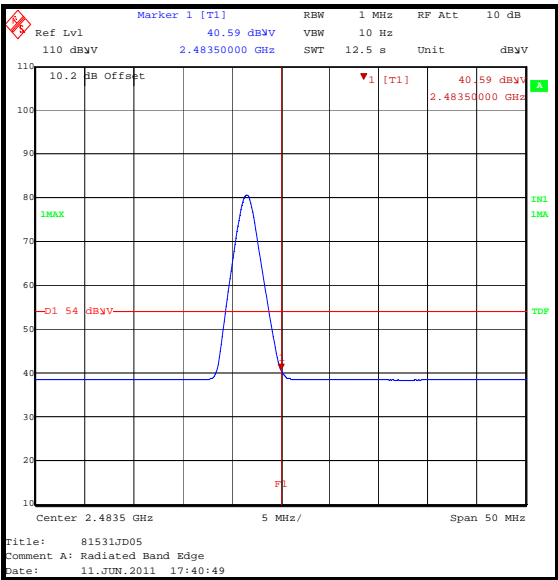
DH5 Static Mode



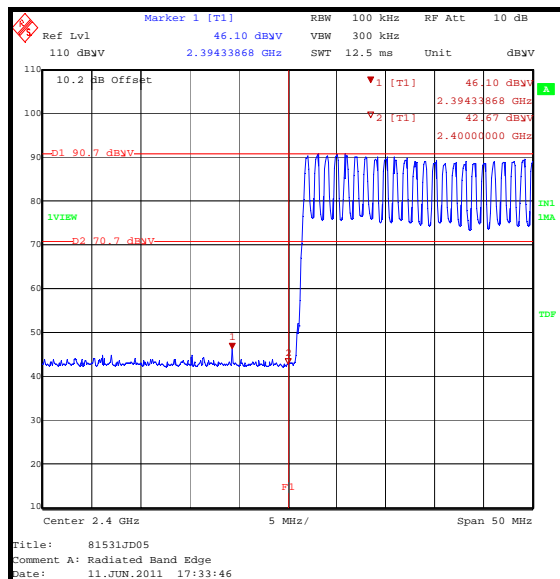
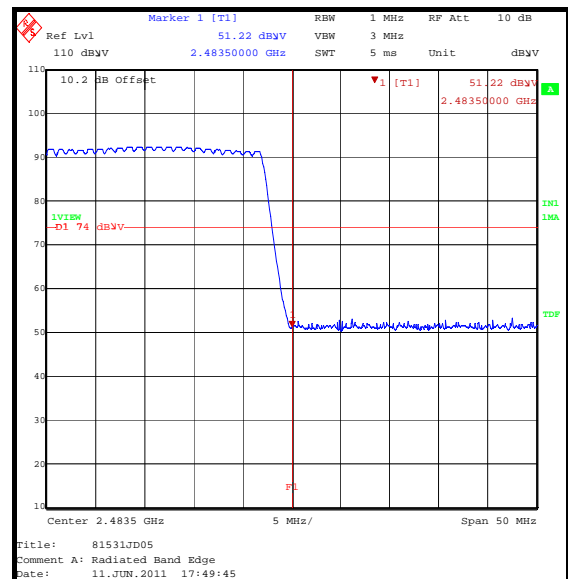
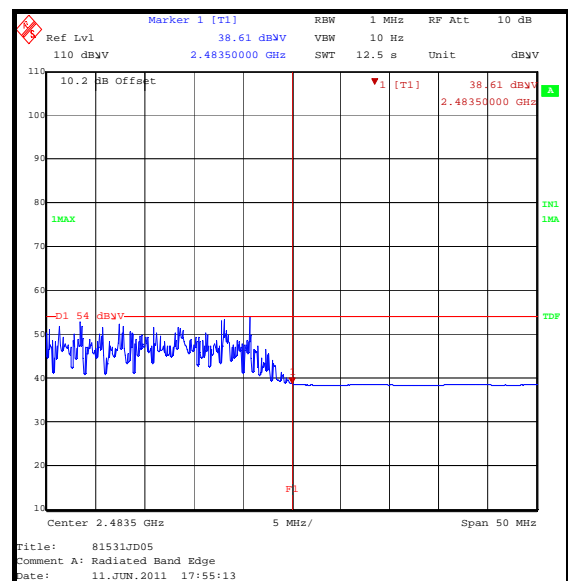
Lower Band Edge Peak Static



Upper Band Edge Peak Static

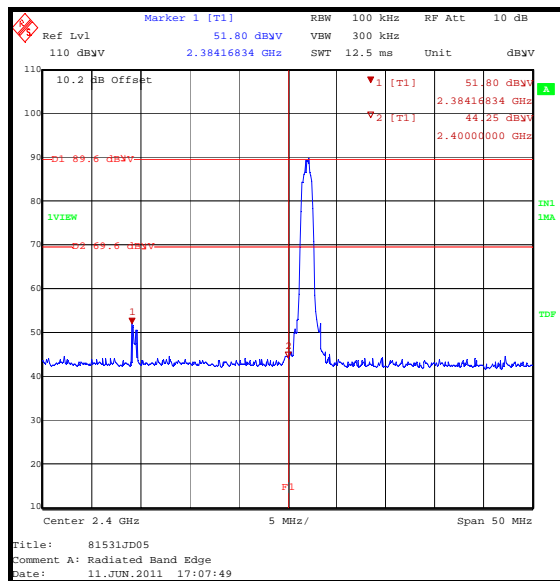


Upper Band Edge Average Static

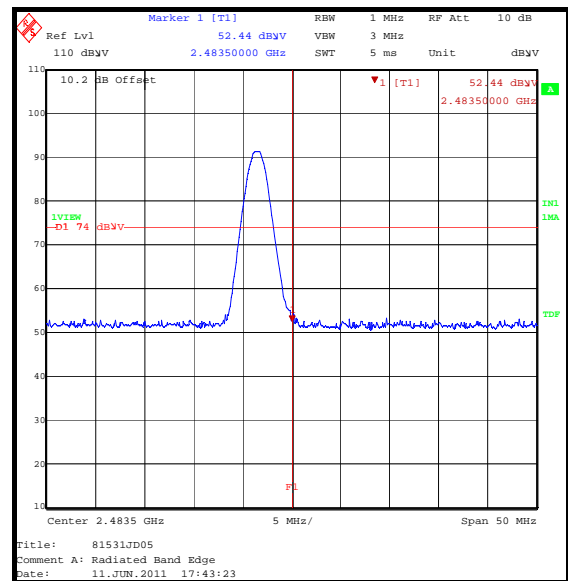
**Transmitter Band Edge Radiated Emissions (continued)****DH5 Hopping Mode****Lower Band Edge Peak Hopping****Upper Band Edge Peak Hopping****Upper Band Edge Average Hopping**

### Transmitter Band Edge Radiated Emissions (continued)

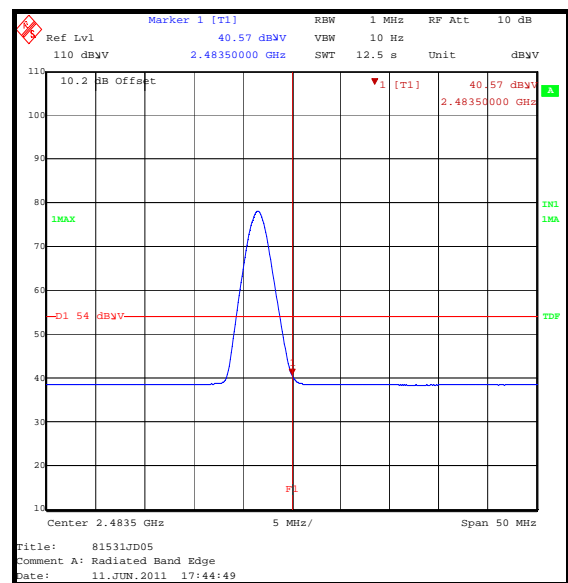
## 2DH5 Static Mode



### Lower Band Edge Peak Static

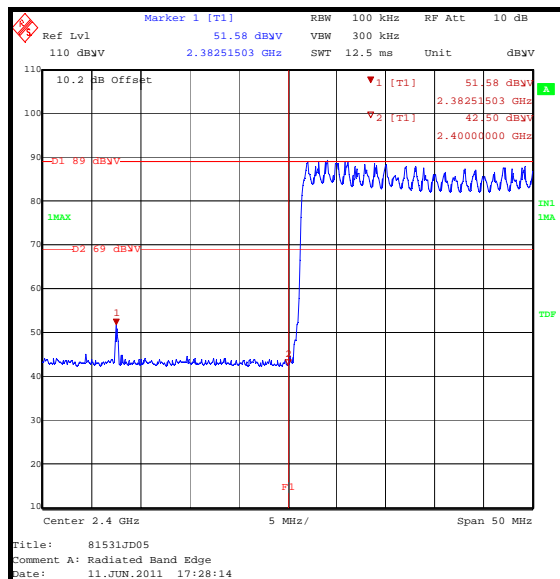
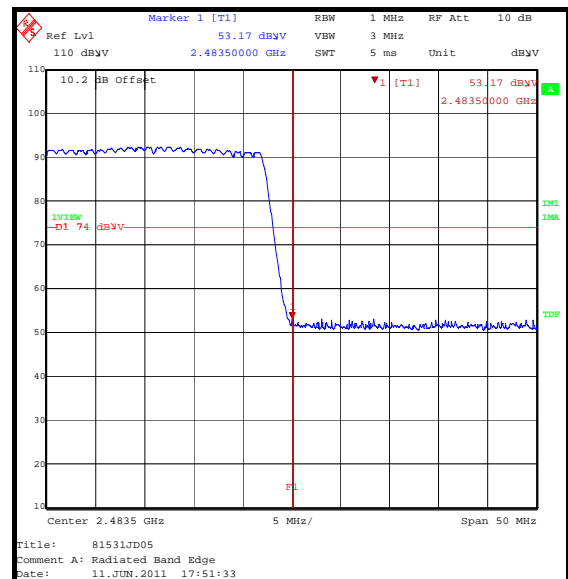
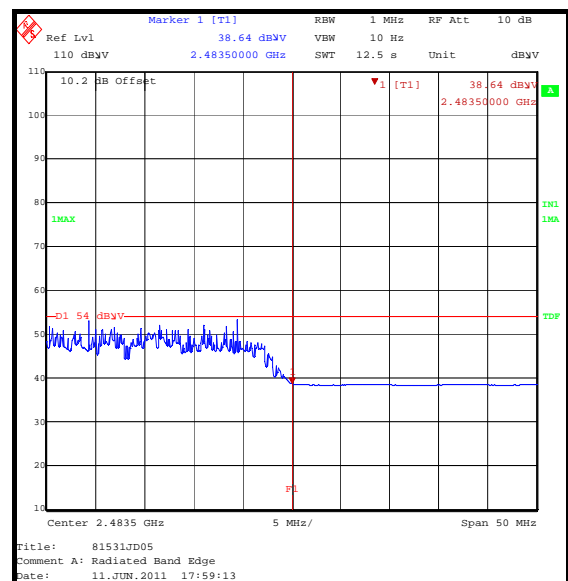


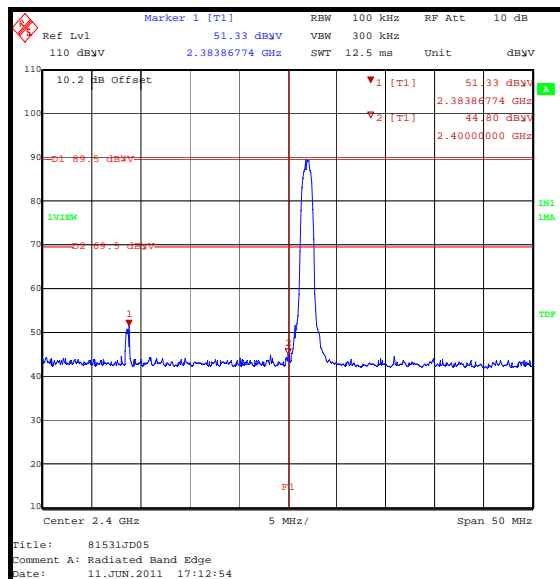
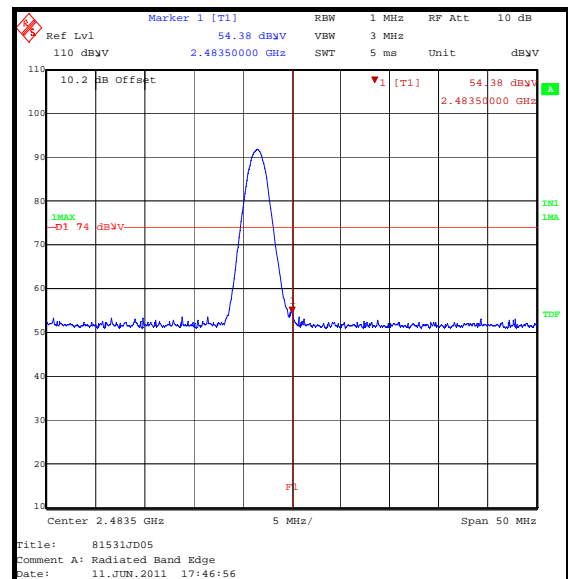
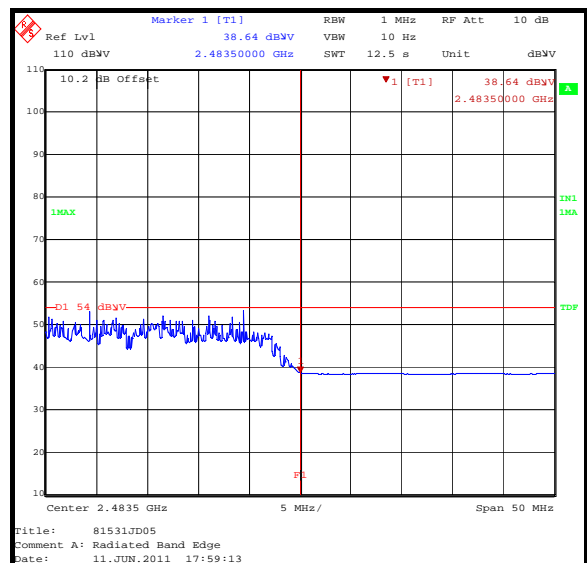
### Upper Band Edge Peak Static



Upper Band Edge Average Static

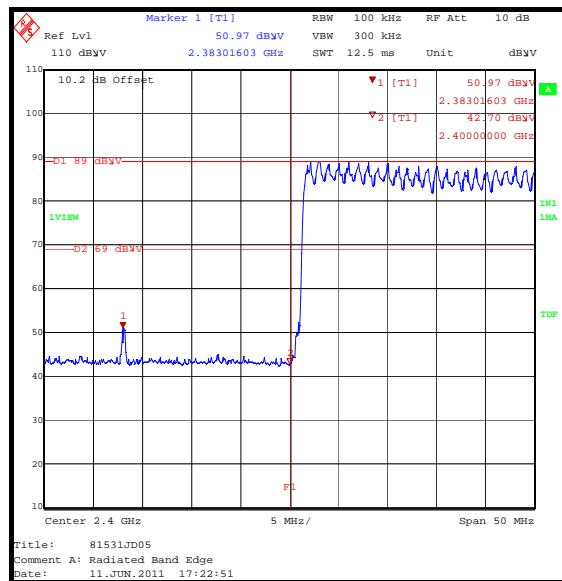


**Transmitter Band Edge Radiated Emissions (continued)****2DH5 Hopping Mode****Lower Band Edge Peak Hopping****Upper Band Edge Peak Hopping****Upper Band Edge Average Hopping**

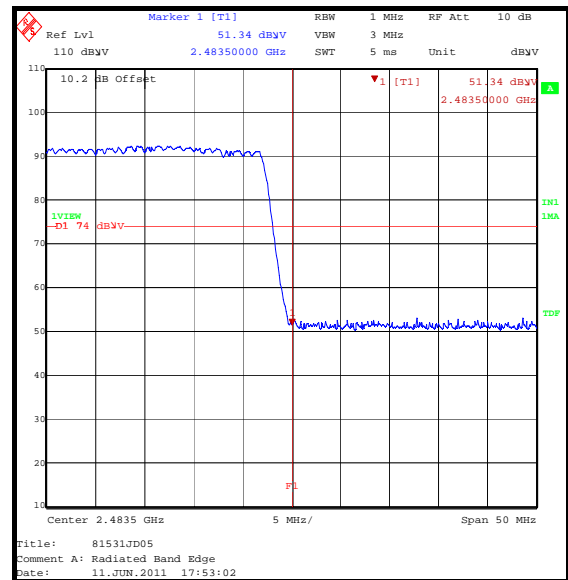
**Transmitter Band Edge Radiated Emissions (continued)****3DH5 Static Mode****Lower Band Edge Peak Static****Upper Band Edge Peak Static****Upper Band Edge Average Static**

### Transmitter Band Edge Radiated Emissions (continued)

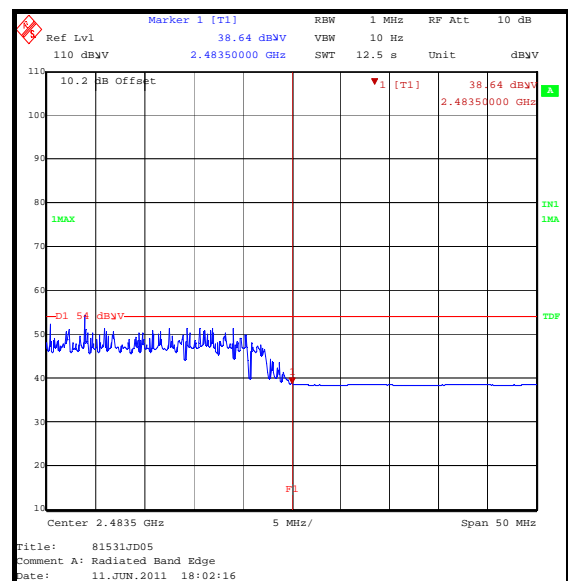
### 3DH5 Hopping Mode



### 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**

<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>
A1396	Attenuator	Huber + Suhner	757987	6810.17.B	06 Jul 2011	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	06 Jul 2011	12
A1818	Antenna	EMCO	3115	00075692	05 Sep 2011	12
A1830	Pulse Limiter	Rhode & Schwarz	ESH3-Z2	100668	05 Mar 2012	12
A1834	Attenuator	Hewlett Packard	8491B	10444	30 Jun 2011	12
A1975	High Pass Filter	AtlanTecRF	AFH-03000	090424010	29 Dec 2011	12
A253	Antenna	Flann Microwave	12240-20	128	05 Sep 2011	12
A254	Antenna	Flann Microwave	14240-20	139	05 Sep 2011	12
A255	Antenna	Flann Microwave	16240-20	519	05 Sep 2011	12
A256	Antenna	Flann Microwave	18240-20	400	05 Sep 2011	12
A436	Antenna	Flann Microwave	20240-20	330	05 Sep 2011	12
A553	Antenna	Chase	CBL6111A	1593	26 Mar 2012	12
A649	LISN	Rohde & Schwarz	ESH3-Z5	825562/008	05 Apr 2012	12
G0543	Amplifier	Sonoma	310N	230801	30 Jun 2011	12
K0001	5m Semi-Anechoic Chamber	Rainford EMC	N/A	N/A	29 May 2012	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	05 Sep 2011	12
L1023	Bluetooth tester	Tescom	TC-3000A	3000A310042	Calibration not required	-
M1124	Test Receiver	Rohde & Schwarz	ESI26	100046K	22 Jun 2011	12
M1263	Test Receiver	Rohde & Schwarz	ESIB7	100265	28 Jun 2011	12
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016	15 Sep 2011	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	04 Feb 2012	12

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