

TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: BT100 Bluetooth Adaptor



FCC ID: YKBBT100001

IC Certification Number: 9095A-BT100001

To: FCC Part 15.247: 2011 Subpart C, RSS-210 Issue 8 December 2010
& RSS-Gen Issue 3 December 2010

Test Report Serial No.:
RFI-RPT-RP79833JD15A V3.0

Version 3.0 Supersedes All Previous Versions

This Test Report Is Issued Under The Authority Of John Newell, Group Quality Manager:	
Checked By:	Ian Watch
Signature:	
Date of Issue:	18 June 2012

The *Bluetooth*[®] word mark and logos are owned by the *Bluetooth* SIG, Inc. and any use of such marks by RFI Global Services Ltd. is under licence. Other trademarks and trade names are those of their respective owners.

This report is issued in Adobe Acrobat portable document format (PDF). It is only a valid copy of the report if it is being viewed in PDF format with the following security options not allowed: Changing the document, Selecting text and graphics, Adding or changing notes and form fields.

This report may not be reproduced other than in full, except with the prior written approval of RFI Global Services Ltd. The results in this report apply only to the sample(s) tested.

This page has been left intentionally blank.

Table of Contents

1. Customer Information	4
2. Summary of Testing	5
2.1. General Information	5
2.2. Summary of Test Results	6
2.3. Methods and Procedures	6
2.4. Deviations from the Test Specification	6
3. Equipment Under Test (EUT)	7
3.1. Identification of Equipment Under Test (EUT)	7
3.2. Description of EUT	7
3.3. Modifications Incorporated in the EUT	7
3.4. Additional Information Related to Testing	8
3.5. Support Equipment	8
4. Operation and Monitoring of the EUT during Testing	9
4.1. Operating Modes	9
4.2. Configuration and Peripherals	9
5. Measurements, Examinations and Derived Results	10
5.1. General Comments	10
5.2. Test Results	11
5.2.1. Receiver/Idle Mode AC Conducted Spurious Emissions	11
5.2.2. Receiver/Idle Mode Radiated Spurious Emissions	14
5.2.3. Transmitter AC Conducted Spurious Emissions	18
5.2.4. Transmitter 20 dB Bandwidth	21
5.2.5. Transmitter Carrier Frequency Separation	25
5.2.6. Transmitter Number of Hopping Frequencies and Average Time of Occupancy	28
5.2.7. Transmitter Maximum Peak Output Power	30
5.2.8. Transmitter Radiated Emissions	35
5.2.9. Transmitter Band Edge Radiated Emissions	41
6. Measurement Uncertainty	49
Appendix 1. Test Equipment Used	50

1. Customer Information












Company Name:	Audio Partnership PLC
Address:	Gallery Court Hankey Place London SE1 4BB United Kingdom

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR15.247
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2011: Part 15 Subpart C (Intentional Radiators) - Section 15.247
Specification Reference:	47CFR15.107 and 47CFR15.109
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2011: Part 15 Subpart B (Unintentional Radiators) - Sections 15.107 and 15.109
Specification Reference:	47CFR15.207 and 47CFR15.209
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2011: Part 15 Subpart C (Intentional Radiators) - Sections 15.207 and 15.209
Specification Reference:	RSS-Gen Issue 3 December 2010
Specification Title:	General Requirements and Information for the Certification of Radio Apparatus
Specification Reference:	RSS-210 Issue 8 December 2010
Specification Title:	Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment.
Site Registration:	FCC: 209735; Industry Canada: 3245B-2
Location of Testing:	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
Test Dates:	22 February 2011 to 15 June 2012

2.2. Summary of Test Results

FCC Reference (47CFR)	IC Reference	Measurement	Result
Part 15.107(a)	RSS-Gen 7.2.4	Receiver/Idle Mode AC Conducted Emissions	
Part 15.109	RSS-Gen 4.10/6.1	Receiver/Idle Mode Radiated Spurious Emissions	
Part 15.207	RSS-Gen 7.2.4	Transmitter AC Conducted Emissions	
Part 15.247(a)(1)	RSS-Gen 4.6.1/4.6.3 RSS-210 A8.1(a)	Transmitter 20 dB Bandwidth	
Part 15.247(a)(1)	RSS-210 A8.1(b)	Transmitter Carrier Frequency Separation	
Part 15.247(a)(1)(iii)	RSS-210 A8.1(d)	Transmitter Number of Hopping Frequencies and Average Time of Occupancy	
Part 15.247(b)(1)	RSS-Gen 4.8 RSS-210 A8.4(2)	Transmitter Maximum Peak Output Power	
Part 15.247(d)/ 15.209(a)	RSS-Gen 4.9 RSS-210 A8.5	Transmitter Radiated Emissions	
Part 15.247(d)/ 15.209(a)	RSS-Gen 4.9 RSS-210 A8.5	Transmitter Band Edge Radiated Emissions	
Key to Results			
 = Complied  = Did not comply			

2.3. Methods and Procedures

Reference:	ANSI C63.4 (2009)
Title:	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
Reference:	ANSI C63.10 (2009)
Title:	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)

Brand Name:	Cambridge Audio
Model Name or Number:	BT100
Serial Number:	#5 – Radiated Sample
Hardware Version Number:	2.0
Software Version Number:	0.9
FCC ID:	YKBBT100001
IC Certification Number:	9095A-BT100001

Brand Name:	Cambridge Audio
Model Name or Number:	BT100
IMEI:	#8 – Conducted Sample
Hardware Version Number:	2.0
Software Version Number:	0.9
FCC ID:	YKBBT100001

Brand Name:	Cambridge Audio
Model Name or Number:	BT100
Serial Number:	C10464K 1011
Hardware Version Number:	2.0
Software Version Number:	0.9
FCC ID:	YKBBT100001

3.2. Description of EUT

The equipment under test was a USB *Bluetooth* Adaptor with an integral PCB antenna.

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:	<i>Bluetooth</i>		
Power Supply Requirement:	Nominal	5.0 VDC via USB interface	
Type of Unit:	Transceiver		
Channel Spacing:	1 MHz		
Mode:	Basic Rate	Enhanced Data Rate	
Declared Antenna Gain:	0 dBi		
Modulation:	GFSK	$\pi/4$ -DQPSK	8DQPSK
Packet Type: (Maximum Payload)	DH5	2DH5	3DH5
Data Rate (Mbit/s):	1	2	3
Maximum Peak Output Power:	7.2 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:

Description:	Test Jig Support Board
Brand Name:	CSR
Model Name or Number:	DEV-PC-1504C 02 06
Serial Number:	153610

Description:	Laptop
Brand Name:	Dell
Model Name or Number:	D610
Serial Number:	RFI Asset Number PC353NT

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

The EUT was tested in the following operating mode(s):

- Transmit Mode – transmitting at high power on the bottom, middle or top channel as required.
- Receive/idle Mode – receiving on the bottom or top channel as required.

4.2. Configuration and Peripherals

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

- Transmit Mode – The EUT was connected to a laptop PC via a test jig, then using software supplied by the Client, placed into transmit mode. Basic Rate (DH5 mode) or Enhanced Data Rate (2-DH5 or 3-DH5) modes were selected as required.
- Receive/Idle Mode – The EUT was connected to a laptop PC via a test jig, then using software supplied by the Client, placed into receive/idle mode.
- The sample marked as #5 was used for radiated emissions tests. The sample marked as #8 was used for 20 dB bandwidth, frequency separation, number of hopping frequencies and average time of occupancy tests. The sample marked #12 was used for maximum peak output power tests.
- The sample with serial number C10464K 1011 was used for AC conducted emissions tests.

5. Measurements, Examinations and Derived Results

5.1. General Comments

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to *Section 6. Measurement Uncertainty* for details.

5.2. Test Results**5.2.1. Receiver/Idle Mode AC Conducted Spurious Emissions**

Test Engineer:	Nick Steele	Test Date:	15 June 2012
Test Sample Serial No.:	C10464K 1011		

FCC Part:	15.107
Test Method Used:	As detailed in ANSI C63.4 Section 7

Environmental Conditions:

Temperature (°C):	21
Relative Humidity (%):	44

Results: Live / Quasi Peak

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.258000	Live	36.0	61.5	25.5	Complied
2.706000	Live	31.2	56.0	24.8	Complied
4.582500	Live	31.7	56.0	24.3	Complied
11.998500	Live	38.6	60.0	21.4	Complied
18.001500	Live	30.9	60.0	29.1	Complied
24.000000	Live	41.1	60.0	18.9	Complied

Results: Live / Average

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.262500	Live	31.6	51.4	19.8	Complied
2.724000	Live	30.5	46.0	15.5	Complied
4.569000	Live	25.8	46.0	20.2	Complied
11.998500	Live	25.6	50.0	24.4	Complied
18.001500	Live	18.6	50.0	31.4	Complied
24.000000	Live	27.5	50.0	22.5	Complied

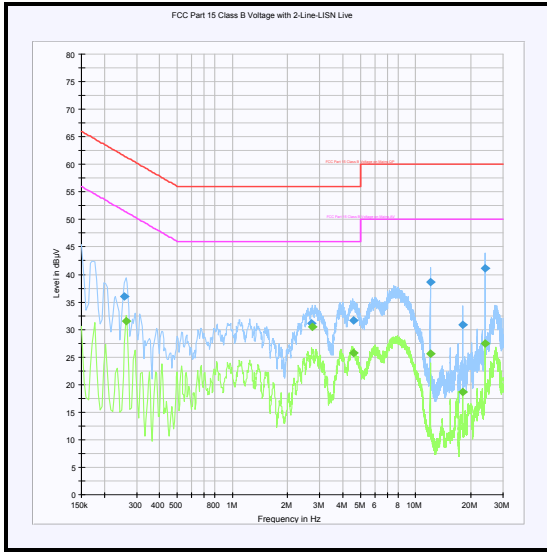
Receiver/Idle Mode AC Conducted Spurious Emissions (continued)**Results: Neutral / Quasi Peak**

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.267000	Neutral	36.2	61.2	25.0	Complied
3.151500	Neutral	31.3	56.0	24.7	Complied
4.650000	Neutral	31.3	56.0	24.7	Complied
11.998500	Neutral	39.0	60.0	21.0	Complied
24.000000	Neutral	41.2	60.0	18.8	Complied
27.339000	Neutral	34.8	60.0	25.2	Complied

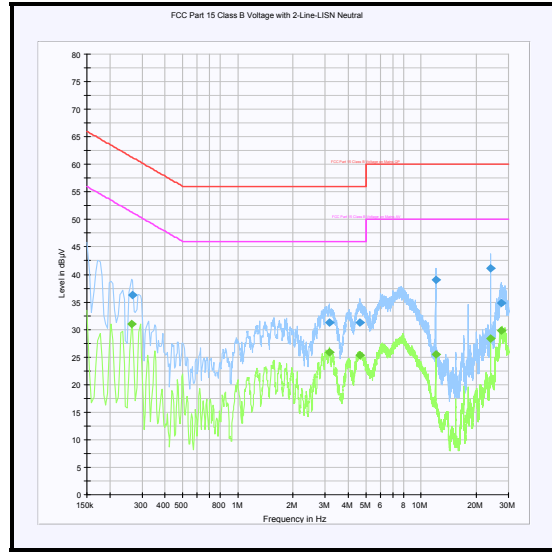
Results: Neutral / Average

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.262500	Neutral	31.0	51.4	20.4	Complied
3.156000	Neutral	25.9	46.0	20.1	Complied
4.641000	Neutral	25.4	46.0	20.6	Complied
11.998500	Neutral	25.6	50.0	24.4	Complied
24.000000	Neutral	28.4	50.0	21.6	Complied
27.564000	Neutral	29.8	50.0	20.2	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:**

Test Engineer:	Nick Steele	Test Date:	22 February 2011
Test Sample Serial No.:	#5		

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

Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	32

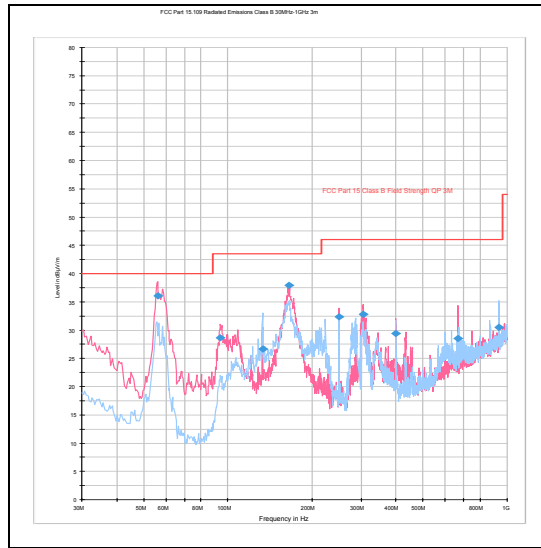
Results: Quasi Peak

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
56.077	Vertical	36.0	40.0	4.0	Complied
93.848	Vertical	28.6	43.5	14.9	Complied
133.439	Horizontal	26.7	43.5	16.8	Complied
165.765	Vertical	37.9	43.5	5.6	Complied
250.004	Horizontal	32.3	46.0	13.7	Complied
305.875	Vertical	32.8	46.0	13.2	Complied
400.544	Vertical	29.5	46.0	16.5	Complied
666.485	Vertical	28.6	46.0	17.4	Complied
932.369	Horizontal	30.5	46.0	15.5	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. 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:**

Test Engineer:	Nick Steele	Test Date:	23 February 2011
Test Sample Serial No:	#5		

FCC Part:	15.109
Test Method Used:	As detailed in ANSI C63.10 Sections 6.3 and 6.6 referencing ANSI C63.4
Frequency Range:	1 GHz to 12.75 GHz

Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	28

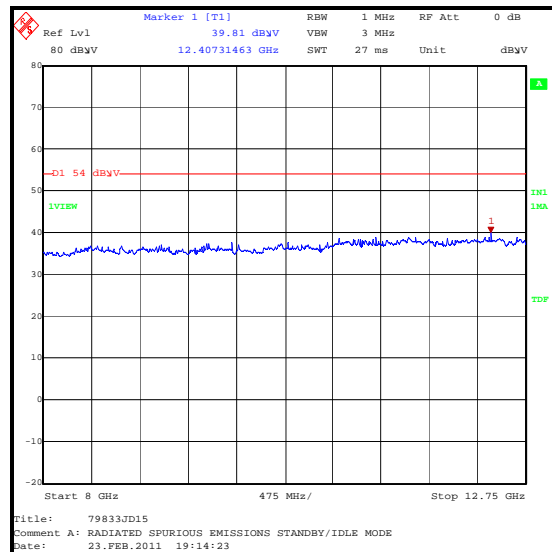
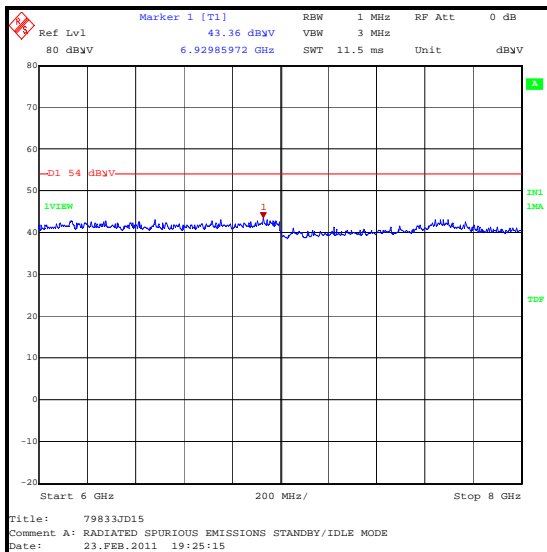
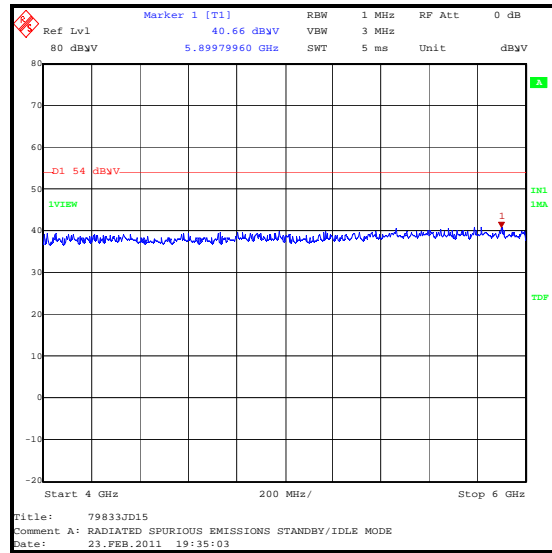
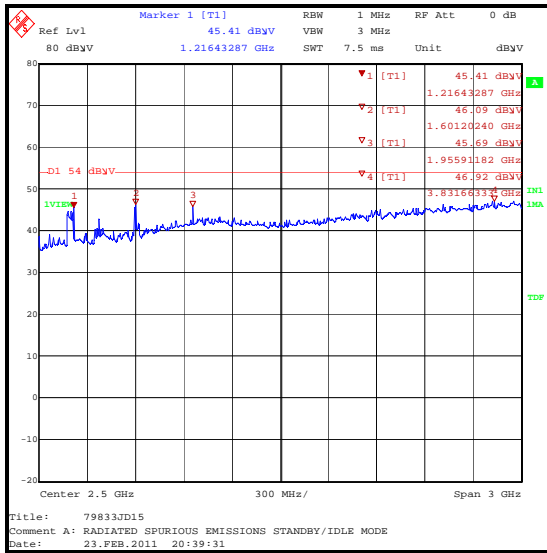
Results:

Frequency (MHz)	Antenna Polarity	Peak Level (dBμV/m)	Average Limit (dBμV/m)	Margin (dB)	Result
3831.663	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. All spurious emissions were investigated and found to be at least 20dB below the relevant specification limit or ambient. Therefore the highest peak noise floor reading of the measuring receiver was recorded 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:**

Test Engineer:	Nick Steele	Test Date:	15 June 2012
Test Sample Serial No.:	C10464K 1011		

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

Environmental Conditions:

Temperature (°C):	21
Relative Humidity (%):	44

Results: Live / Quasi Peak

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.150000	Live	46.1	66.0	19.9	Complied
0.150000	Live	46.0	66.0	20.0	Complied
0.267000	Live	36.3	61.2	24.9	Complied
1.275000	Live	29.2	56.0	26.8	Complied
2.922000	Live	31.3	56.0	24.7	Complied
4.501500	Live	31.6	56.0	24.4	Complied
24.000000	Live	35.6	60.0	24.4	Complied

Results: Live / Average

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.150000	Live	33.6	56.0	22.4	Complied
0.150000	Live	33.6	56.0	22.4	Complied
0.267000	Live	31.3	51.2	19.9	Complied
1.261500	Live	24.4	46.0	21.6	Complied
2.913000	Live	26.2	46.0	19.8	Complied
4.560000	Live	26.6	46.0	19.4	Complied
24.000000	Live	23.7	50.0	26.3	Complied

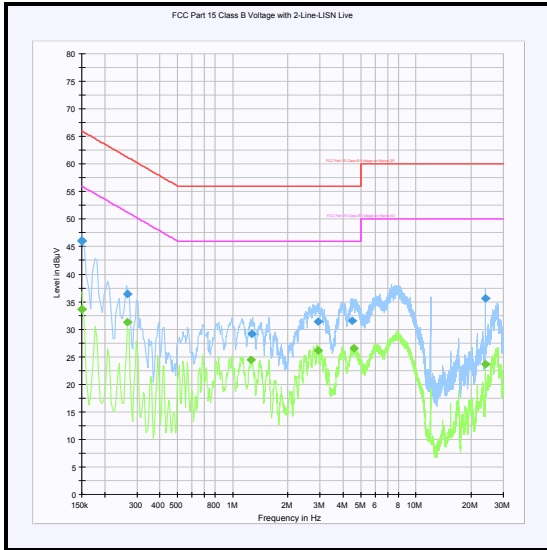
Receiver/Idle Mode AC Conducted Spurious Emissions (continued)**Results: Neutral / Quasi Peak**

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.150000	Neutral	45.4	66.0	20.6	Complied
0.262500	Neutral	35.3	61.4	26.1	Complied
1.581000	Neutral	31.4	56.0	24.6	Complied
3.070500	Neutral	31.9	56.0	24.1	Complied
4.722000	Neutral	31.6	56.0	24.4	Complied
24.000000	Neutral	36.3	60.0	23.7	Complied
27.451500	Neutral	34.7	60.0	25.3	Complied

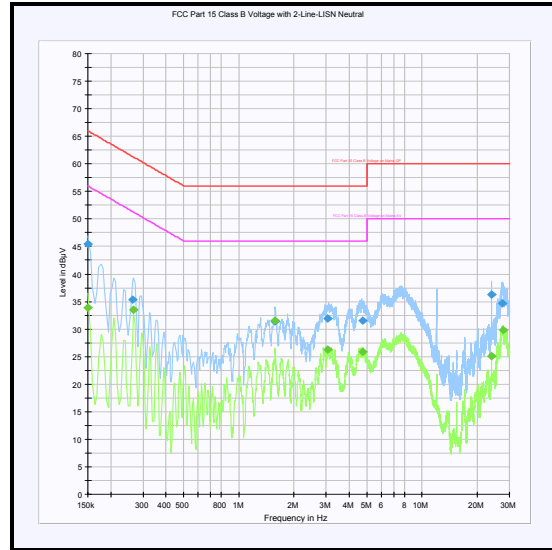
Results: Neutral / Average

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.150000	Neutral	33.9	56.0	22.1	Complied
0.267000	Neutral	33.5	51.2	17.7	Complied
1.581000	Neutral	31.5	46.0	14.5	Complied
3.057000	Neutral	26.3	46.0	19.7	Complied
4.722000	Neutral	25.9	46.0	20.1	Complied
24.000000	Neutral	25.1	50.0	24.9	Complied
27.582000	Neutral	29.9	50.0	20.1	Complied

Transmitter AC Conducted Spurious Emissions (continued)



Live



Neutral

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

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

Test Engineer:	Crawford Lindsay	Test Date:	24 February 2011
Test Sample Serial No:	#8		

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

Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	36

Results DH5:

Channel	20 dB Bandwidth (kHz)
Bottom	931.863
Middle	925.851
Top	925.851

Results 2DH5:

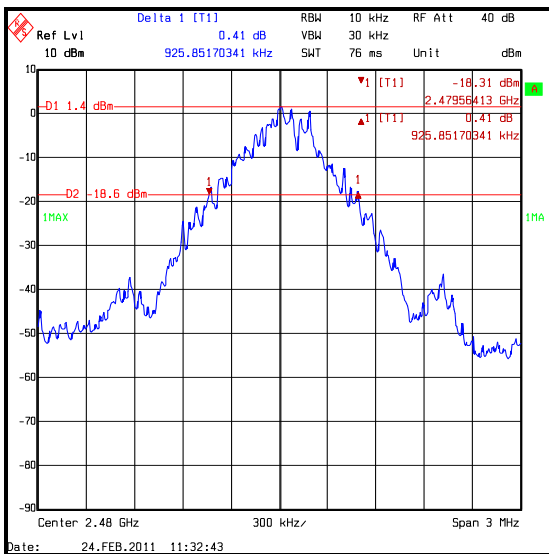
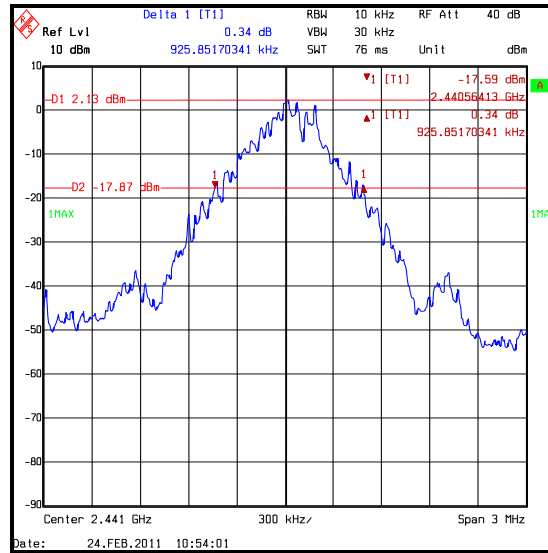
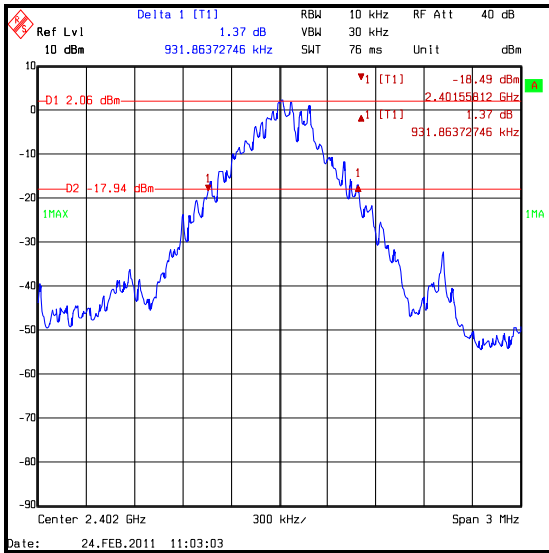
Channel	20 dB Bandwidth (kHz)
Bottom	1262.525
Middle	1256.513
Top	1256.513

Results 3DH5:

Channel	20 dB Bandwidth (kHz)
Bottom	1262.525
Middle	1256.513
Top	1262.525

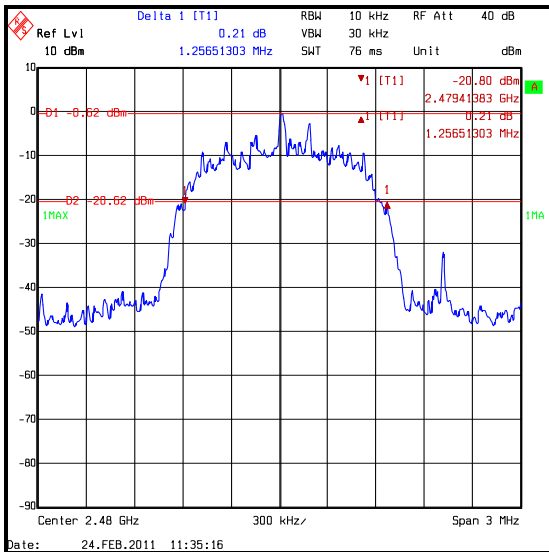
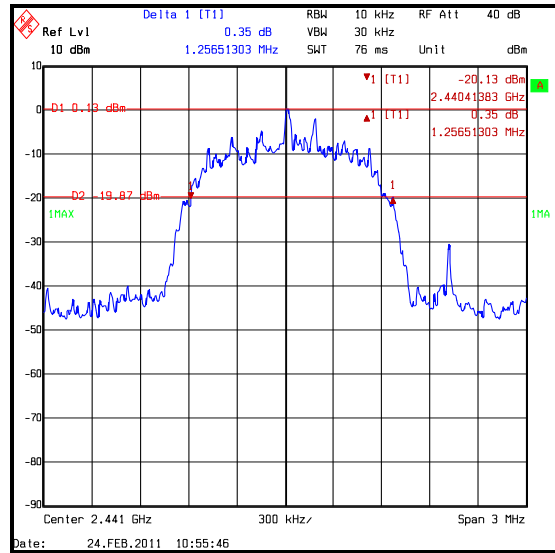
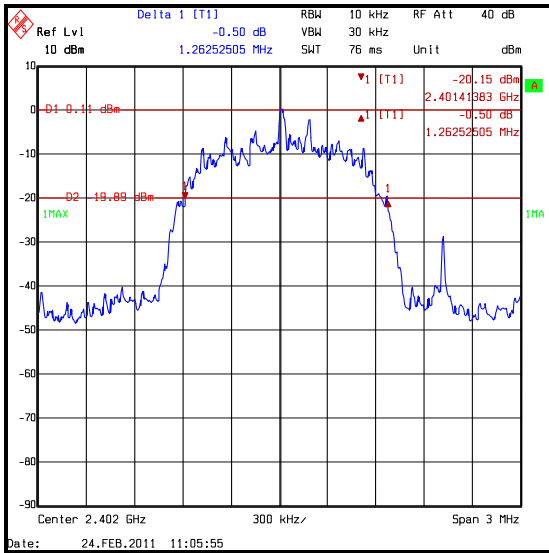
Transmitter 20 dB Bandwidth (continued)

Results DH5:



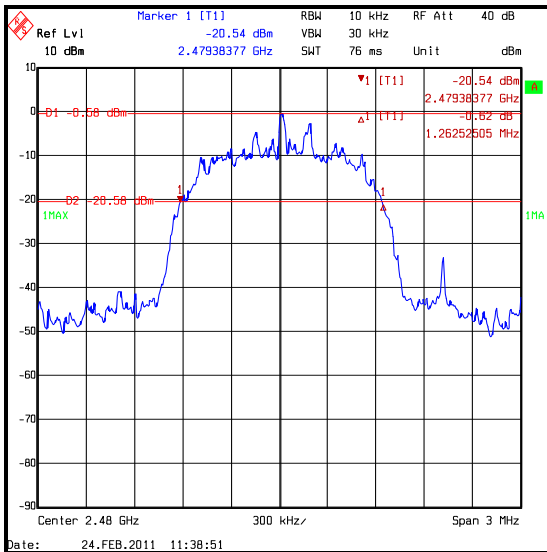
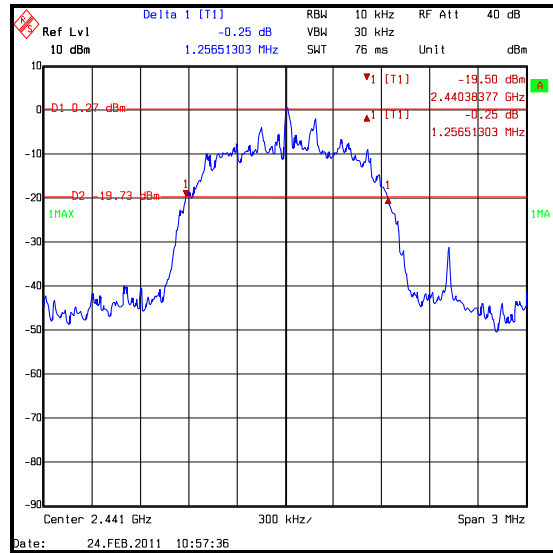
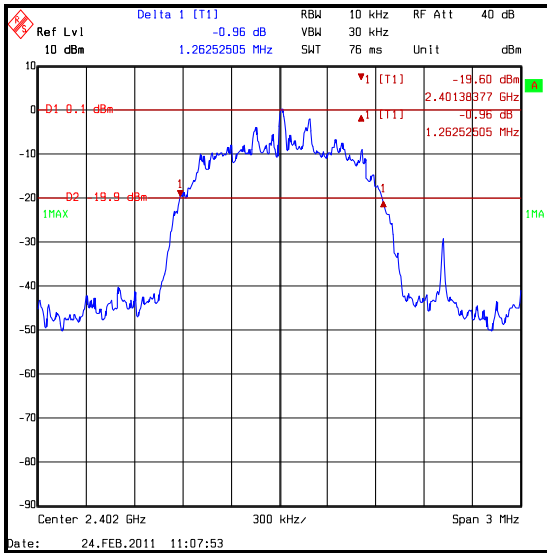
Transmitter 20 dB Bandwidth (continued)

Results 2DH5:



Transmitter 20 dB Bandwidth (continued)

Results 3DH5:



5.2.5. Transmitter Carrier Frequency Separation

Test Summary:

Test Engineer:	Crawford Lindsay & Andrew Edwards	Test Date:	24 February 2011 & 25 February 2011
Test Sample Serial No:	#8		

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

Environmental Conditions:

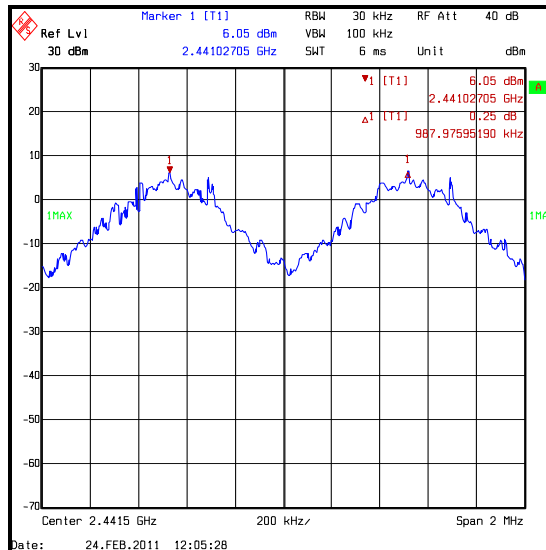
Temperature (°C):	22 to 24
Relative Humidity (%):	34 to 36

Results: DH5

Carrier Frequency Separation (kHz)	Limit ($2/3$ of 20 dB BW) (kHz)	Margin (kHz)	Result
987.976	617.234	370.742	Complied

Note(s):

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



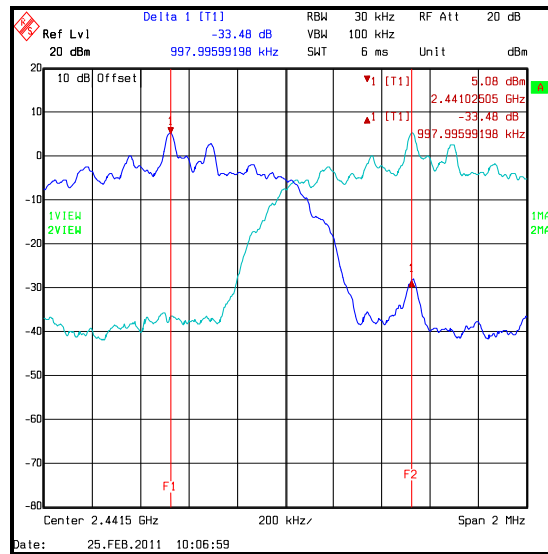
Transmitter Carrier Frequency Separation (continued)

Results: 2DH5

Carrier Frequency Separation (kHz)	Limit ($2/3$ of 20 dB BW) (kHz)	Margin (kHz)	Result
997.996	837.675	160.321	Complied

Note(s):

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



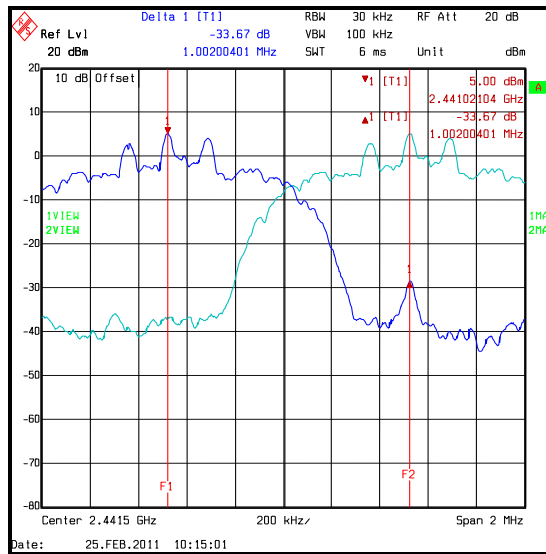
Transmitter Carrier Frequency Separation (continued)

Results: 3DH5

Carrier Frequency Separation (kHz)	Limit ($2/3$ of 20 dB BW) (kHz)	Margin (kHz)	Result
1000.200	837.675	162.525	Complied

Note(s):

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



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

Test Engineer:	Crawford Lindsay	Test Date:	24 February 2011
Test Sample Serial No:	#8		

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

Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	32

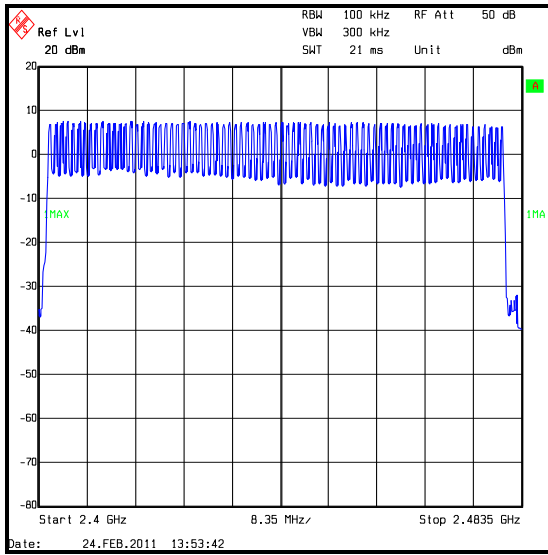
Results:

Emission Width (μs)	Number of Hops in 31.6 Seconds	Average Time of Occupancy (s)	Limit (s)	Margin (s)	Result
2905.812	109	0.322	0.4	0.078	Complied

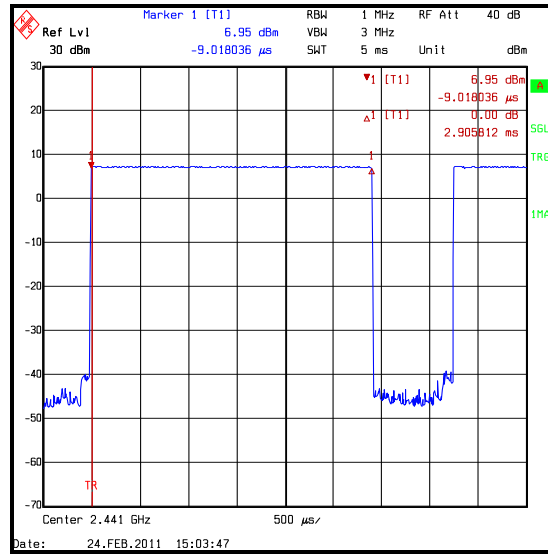
Note(s):

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.

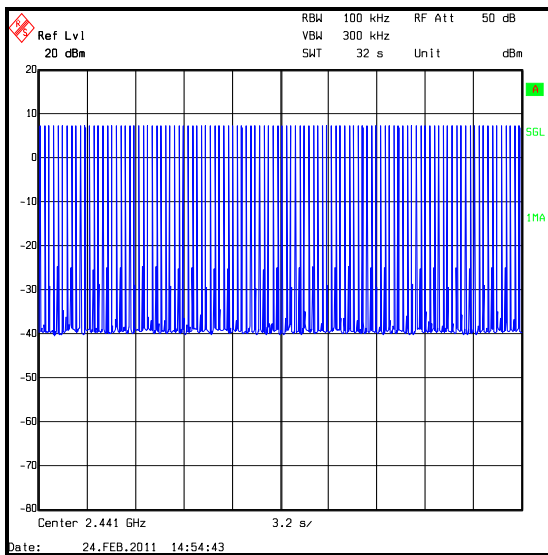
Transmitter Number of Hopping Frequencies and Average Time of Occupancy (continued)



Number of Hopping Frequencies



Pulse Length



Number of Hops in a 32 second period

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

Test Engineer:	Andrew Edwards	Test Date:	09 March 2011
Test Sample Serial No:	# 12		

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

Environmental Conditions:

Temperature (°C):	27
Relative Humidity (%):	33

Results: DH5

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	6.9	30.0	23.1	Complied
Middle	7.2	30.0	22.8	Complied
Top	6.9	30.0	23.1	Complied

Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	6.9	0.0	6.9	36.0	29.1	Complied
Middle	7.2	0.0	7.2	36.0	28.8	Complied
Top	6.9	0.0	6.9	36.0	29.1	Complied

Results: 2DH5

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	5.2	21.0	15.8	Complied
Middle	5.4	21.0	15.6	Complied
Top	5.1	21.0	15.9	Complied

Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	5.2	0.0	5.2	27.0	21.8	Complied
Middle	5.4	0.0	5.4	27.0	21.6	Complied
Top	5.1	0.0	5.1	27.0	21.9	Complied

Results: 3DH5

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	5.5	21.0	15.5	Complied
Middle	5.7	21.0	15.3	Complied
Top	5.4	21.0	15.6	Complied

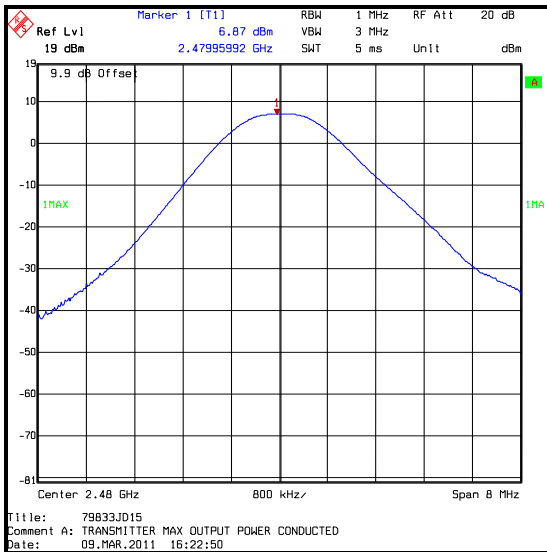
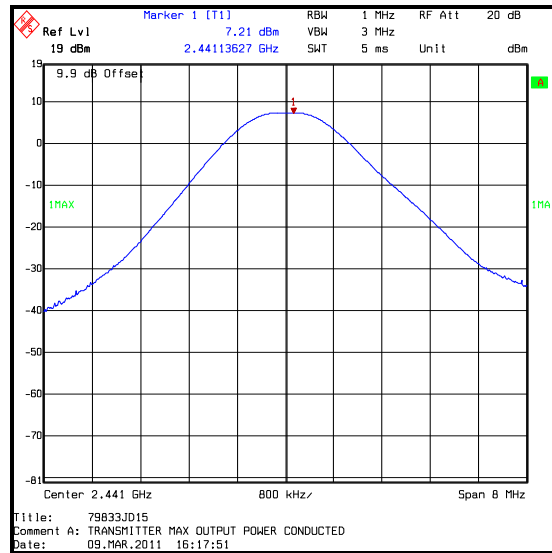
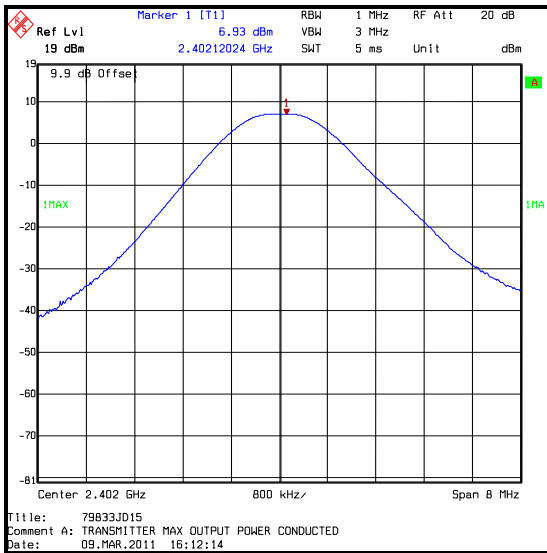
Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	5.5	0.0	5.5	27.0	21.5	Complied
Middle	5.7	0.0	5.7	27.0	21.3	Complied
Top	5.4	0.0	5.4	27.0	21.6	Complied

Note(s):

1. The declared antenna gain was added to the measured conducted peak power to calculate the EIRP.

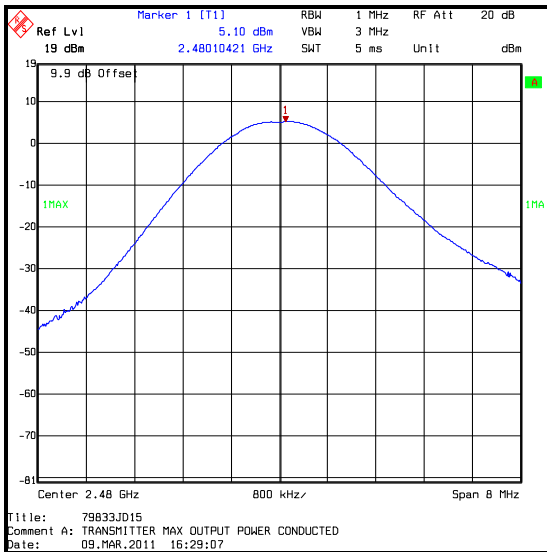
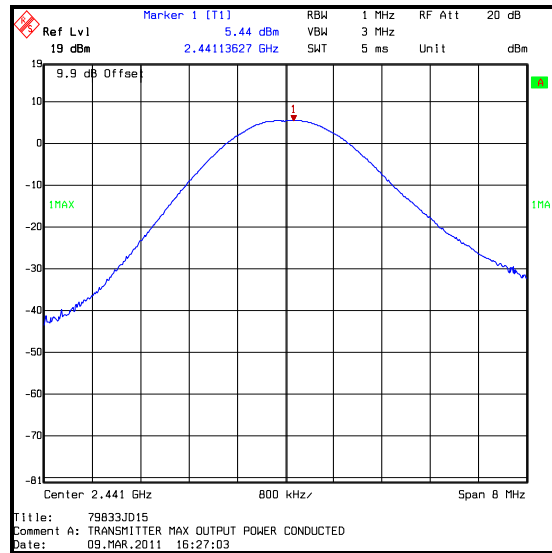
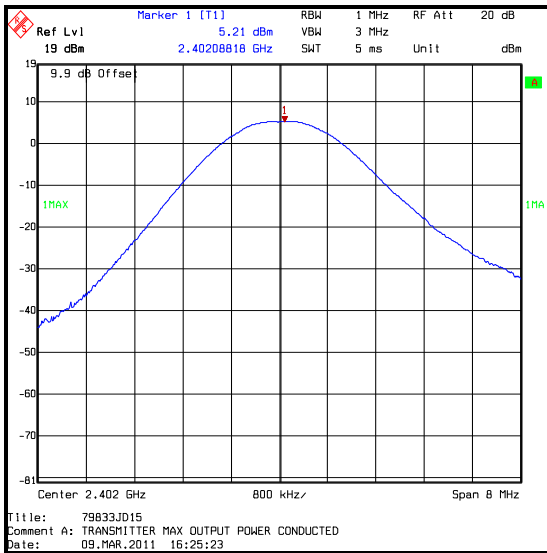
Transmitter Maximum Peak Output Power (continued)

Results: Basic Rate DH5



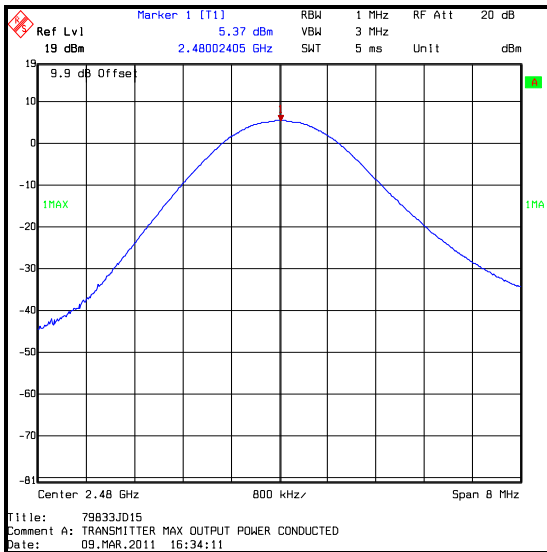
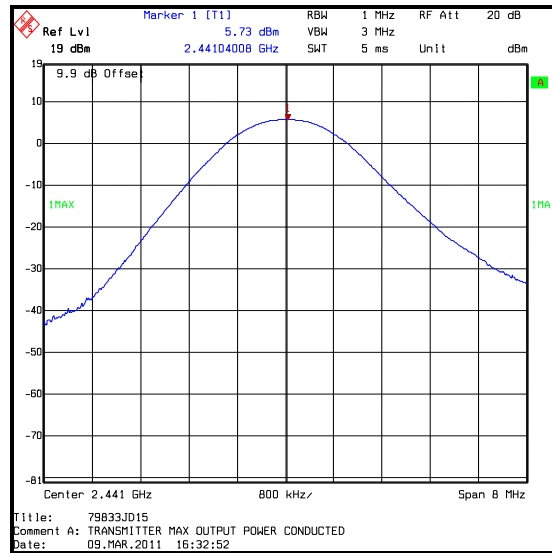
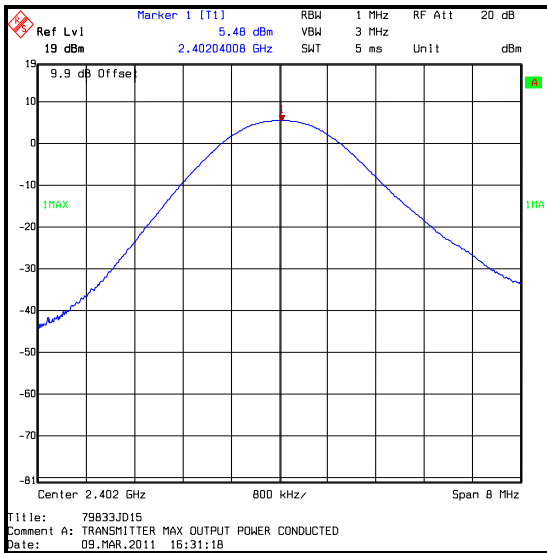
Transmitter Maximum Peak Output Power (continued)

Results: 2DH5



Transmitter Maximum Peak Output Power (continued)

Results: 3DH5



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

Test Engineer:	Nick Steele	Test Date:	22 February 2011
Test Sample Serial No:	#5		

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

Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	32

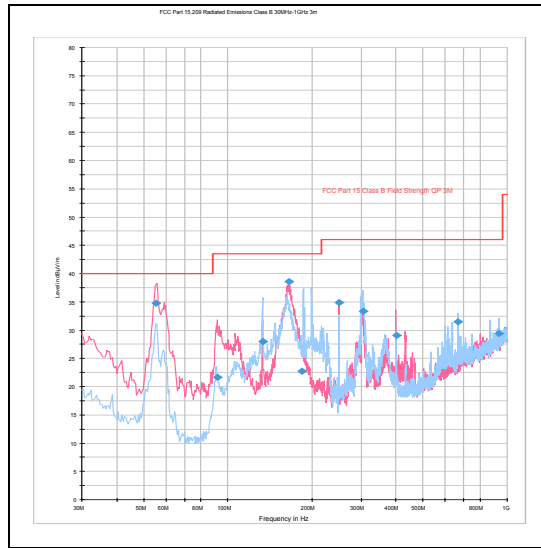
Results: Quasi-Peak DH5

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
55.351	Vertical	34.8	40.0	5.2	Complied
133.154	Horizontal	28.0	43.5	15.5	Complied
165.922	Vertical	38.6	43.5	4.9	Complied
249.992	Vertical	34.9	46.0	11.1	Complied
305.069	Horizontal	33.3	46.0	12.7	Complied
400.578	Vertical	29.1	46.0	16.9	Complied
665.613	Horizontal	31.5	46.0	14.5	Complied
933.797	Vertical	29.4	46.0	16.6	Complied

Note(s):

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

Test Engineer:	Nick Steele	Test Date:	23 February 2011
Test Sample Serial No:	#5		

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

Environmental Conditions:

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

Results: Peak Bottom Channel DH5

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
4804.102	Vertical	61.5	74.0	12.5	Complied

Results: Average Bottom Channel DH5

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
4804.102	Vertical	52.8	54.0	1.2	Complied

Results: Peak Middle Channel DH5

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
4882.342	Vertical	61.9	74.0	12.1	Complied

Results: Average Middle Channel DH5

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
4882.342	Vertical	53.1	54.0	0.9	Complied

Results: Peak Top Channel DH5

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
4960.125	Vertical	61.3	74.0	12.7	Complied

Results: Average Top Channel DH5

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
4960.125	Vertical	50.6	54.0	3.4	Complied

Transmitter Radiated Emissions (continued)**Results: Peak Hopping Mode DH5**

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
4890.311	Vertical	62.5	74.0	11.5	Complied

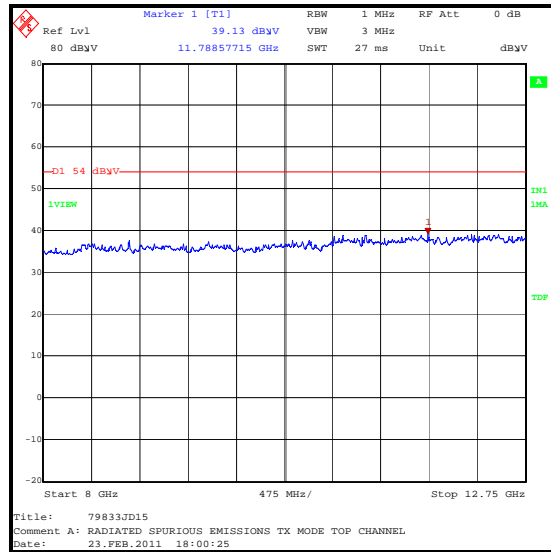
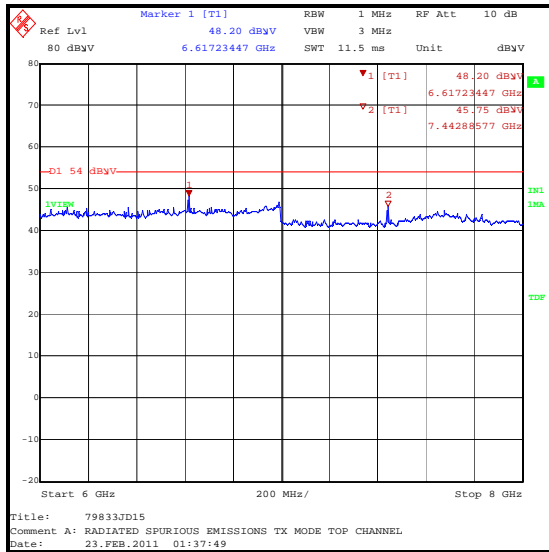
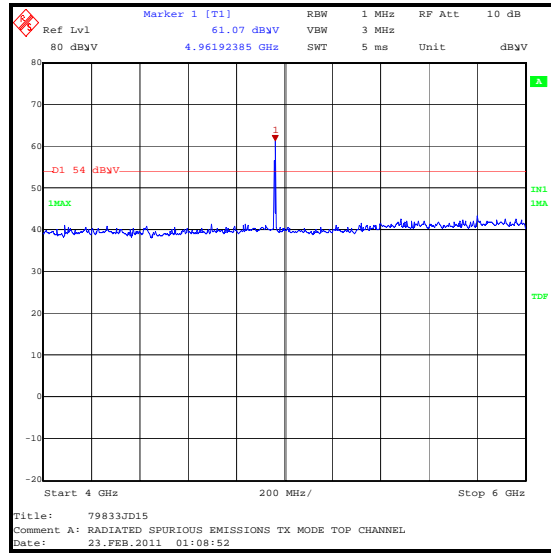
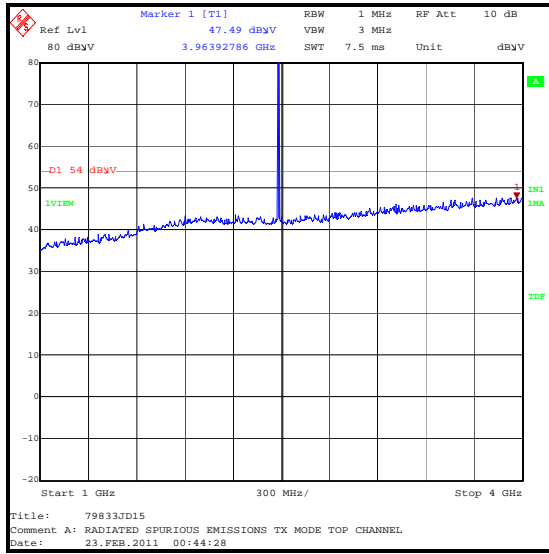
Results: Average Hopping Mode DH5

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
4890.311	Vertical	34.2	54.0	9.8	Complied

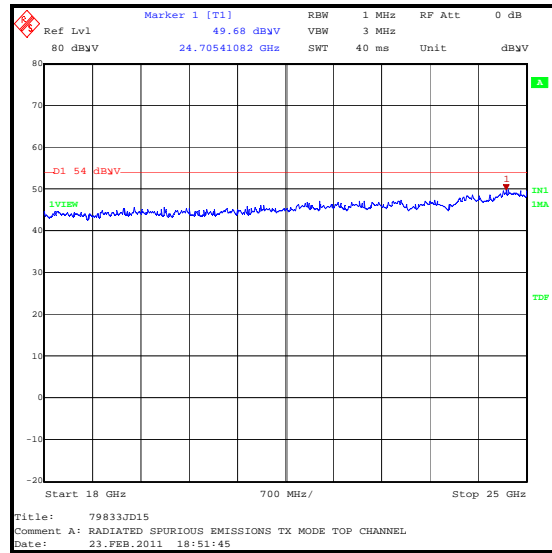
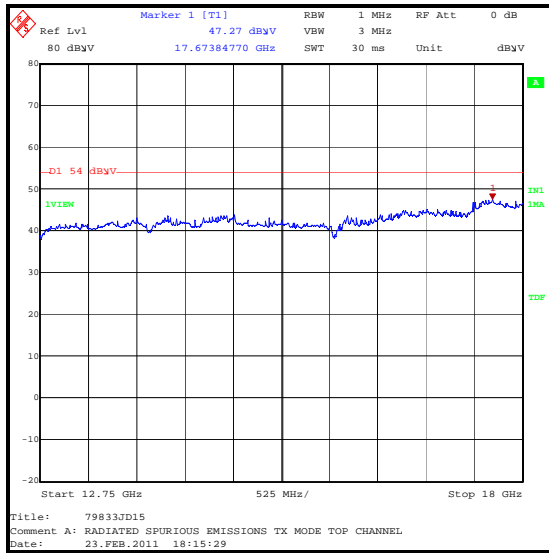
Note(s):

1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss
2. 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. Final measurements were made using appropriate RF attenuators and filters where required.

Transmitter Radiated Emissions (continued)



Transmitter Radiated Emissions (continued)



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

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

Test Engineer:	Nick Steele	Test Date:	23 February 2011 & 24 February 2011
Test Sample Serial No:	#5		

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

Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	27

Results: Static Mode DH5

Frequency (MHz)	Antenna Polarity	Peak Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2400.0	Vertical	59.1	79.0*	19.9	Complied
2483.5	Vertical	61.5	74.0	12.5	Complied

Frequency (MHz)	Antenna Polarity	Average Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2483.5	Vertical	50.0	54.0	4.0	Complied

Results: Hopping Mode DH5

Frequency (MHz)	Antenna Polarity	Peak Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2400.0	Vertical	54.3	79.0*	24.7	Complied
2483.5	Vertical	59.4	74.0	14.6	Complied

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

Results: Static Mode 2DH5

Frequency (MHz)	Antenna Polarity	Peak Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2400.0	Vertical	52.6	77.0*	24.4	Complied
2483.5	Vertical	63.0	74.0	11.0	Complied

Frequency (MHz)	Antenna Polarity	Average Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2483.5	Vertical	49.4	54.0	4.6	Complied

Transmitter Band Edge Radiated Emissions – Continued**Results: Hopping Mode 2DH5**

Frequency (MHz)	Antenna Polarity	Peak Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2400.0	Vertical	49.7	77.0*	27.3	Complied
2483.5	Vertical	61.5	74.0	12.5	Complied

Frequency (MHz)	Antenna Polarity	Average Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2483.5	Vertical	40.9	54.0	13.1	Complied

Results: Static Mode 3DH5

Frequency (MHz)	Antenna Polarity	Peak Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2400.0	Vertical	52.5	77.0*	24.5	Complied
2483.5	Vertical	62.6	74.0	11.4	Complied

Frequency (MHz)	Antenna Polarity	Average Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2483.5	Vertical	49.3	54.0	4.7	Complied

Results: Hopping Mode 3DH5

Frequency (MHz)	Antenna Polarity	Peak Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2400.0	Vertical	50.4	77.0*	26.6	Complied
2483.5	Vertical	62.2	74.0	11.8	Complied

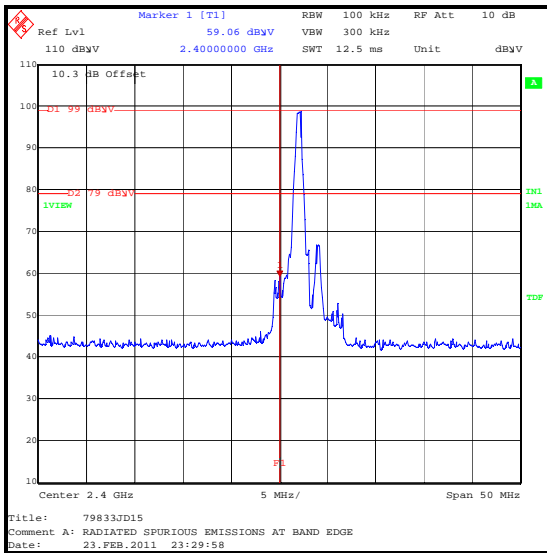
Frequency (MHz)	Antenna Polarity	Average Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2483.5	Vertical	40.9	54.0	13.1	Complied

Note(s):

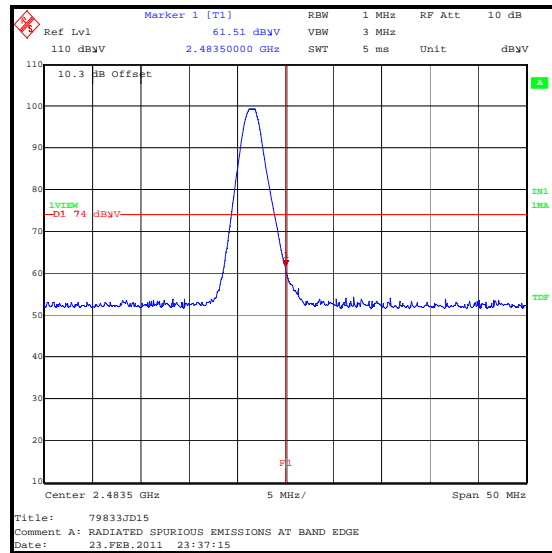
1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss.
2. * -20 dBc limit

Transmitter Band Edge Radiated Emissions (continued)

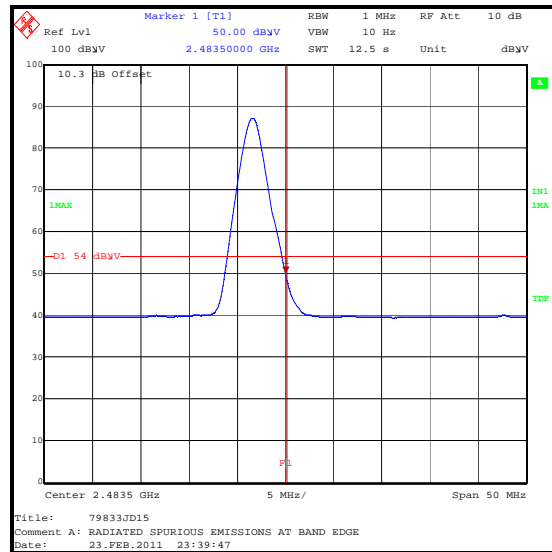
DH5 Static Mode



Lower Band Edge Peak Static



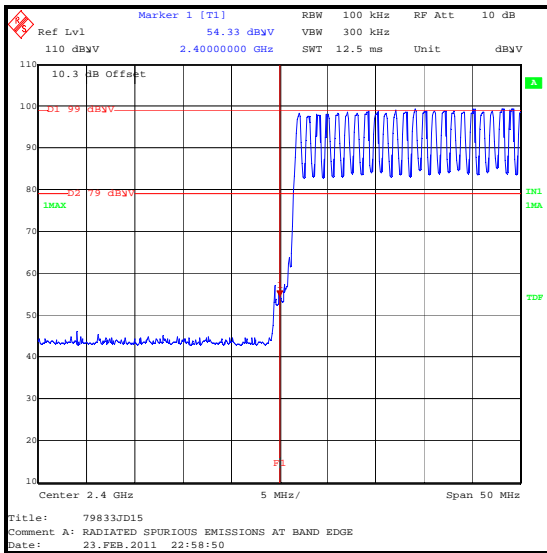
Upper Band Edge Peak Static



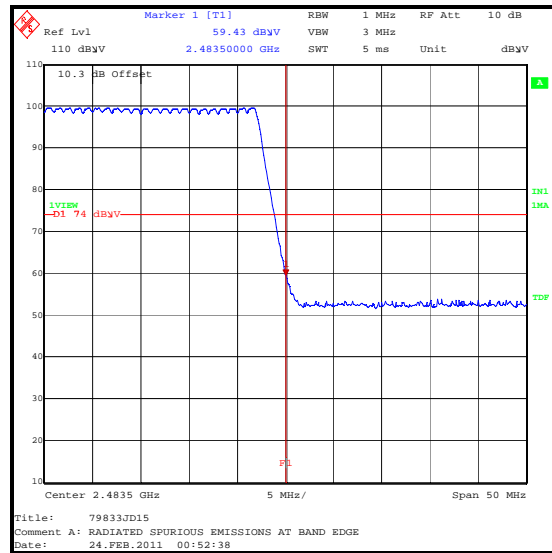
Upper Band Edge Average Static

Transmitter Band Edge Radiated Emissions (continued)

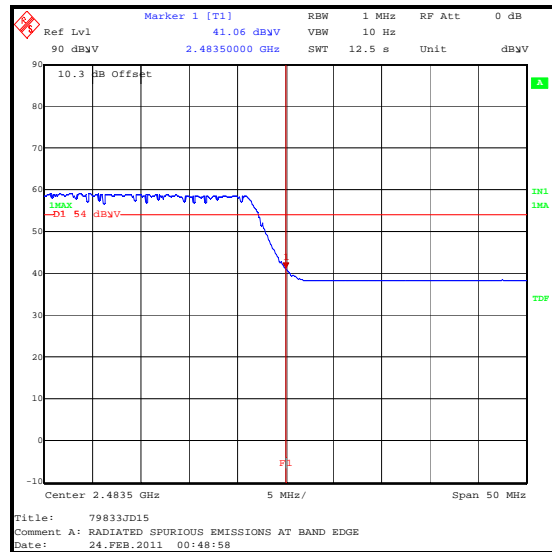
DH5 Hopping Mode



Lower Band Edge Peak Hopping



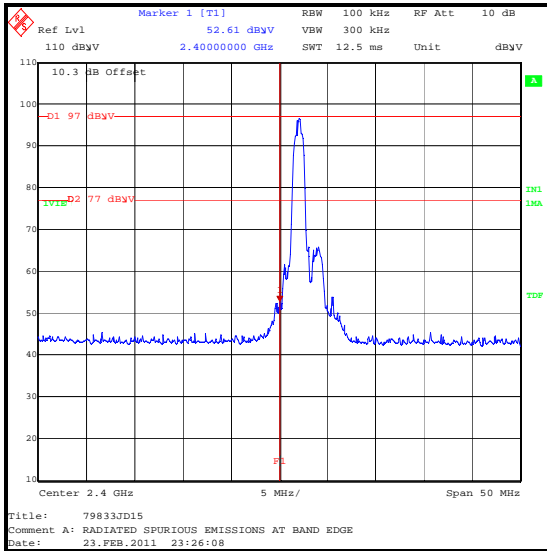
Upper Band Edge Peak Hopping



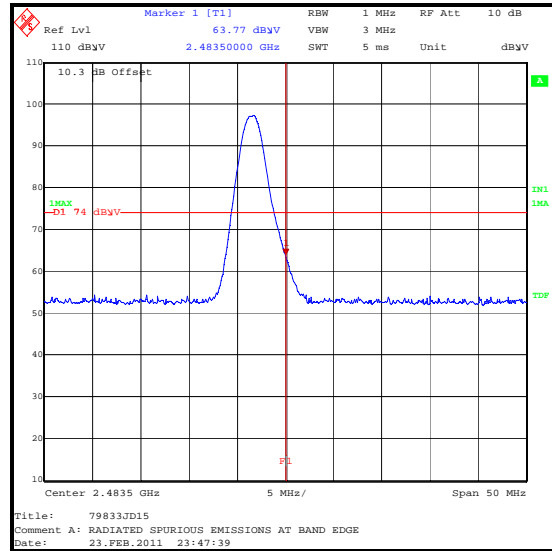
Upper Band Edge Average Hopping

Transmitter Band Edge Radiated Emissions (continued)

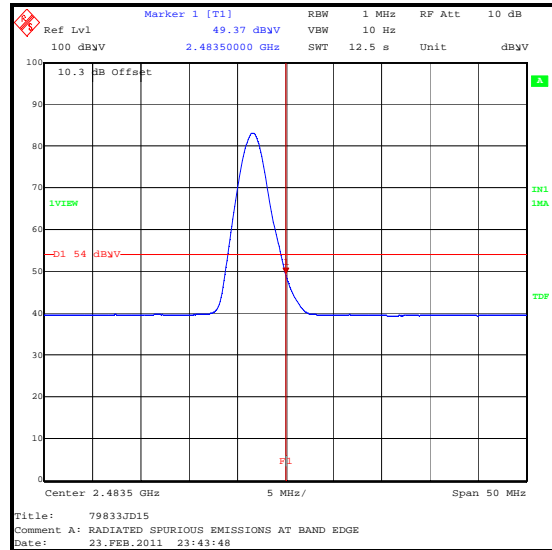
2DH5 Static Mode



Lower Band Edge Peak Static



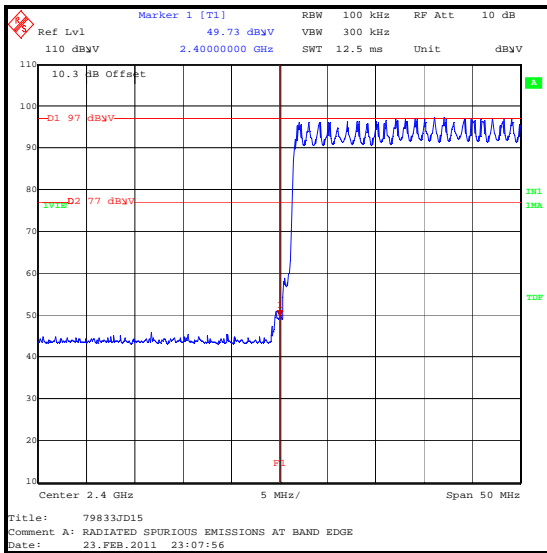
Upper Band Edge Peak Static



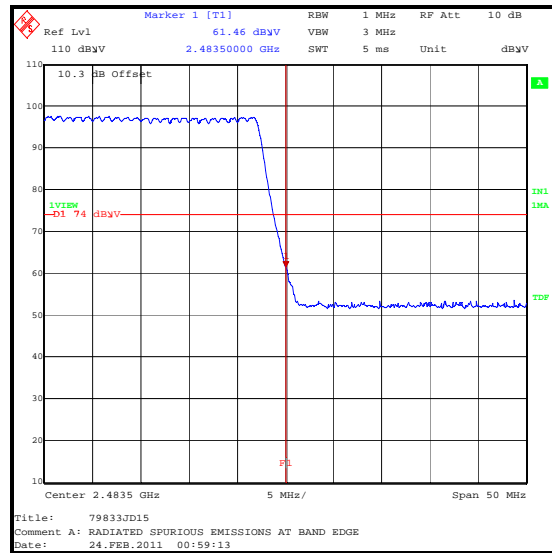
Upper Band Edge Average Static

Transmitter Band Edge Radiated Emissions (continued)

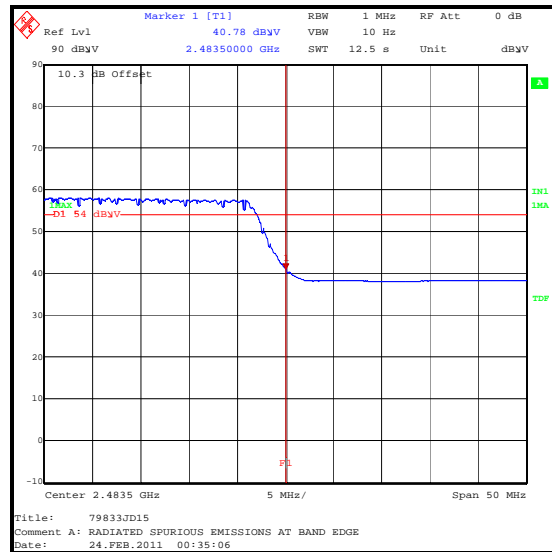
2DH5 Hopping Mode



Lower Band Edge Peak Hopping



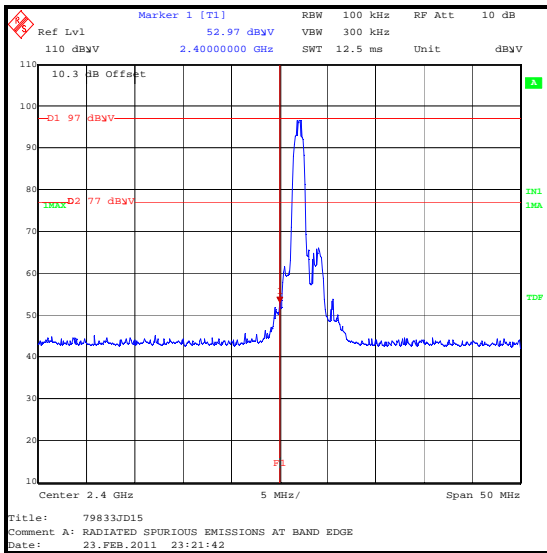
Upper Band Edge Peak Hopping



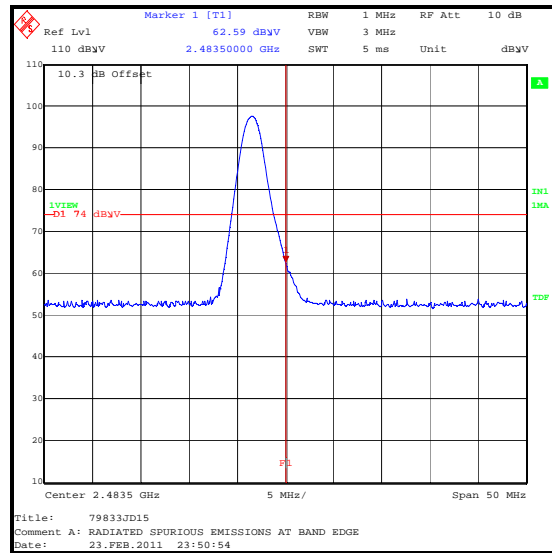
Upper Band Edge Average Hopping

Transmitter Band Edge Radiated Emissions (continued)

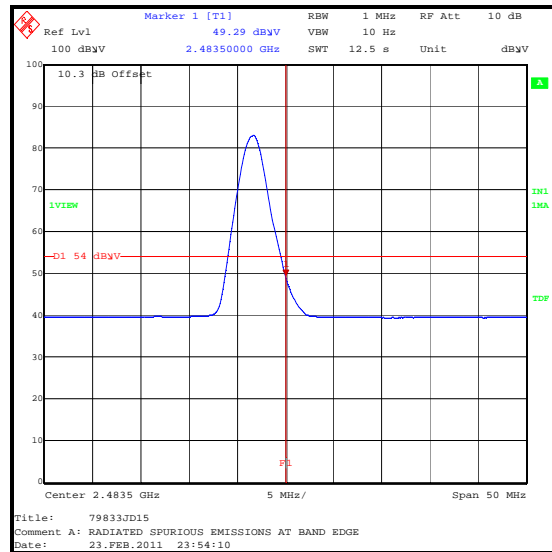
3DH5 Static Mode



Lower Band Edge Peak Static



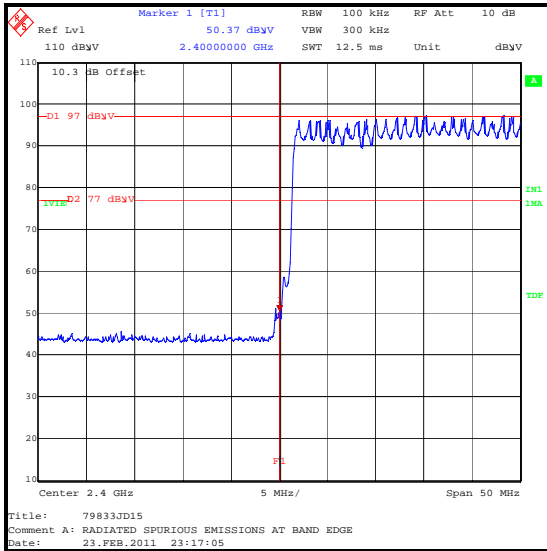
Upper Band Edge Peak Static



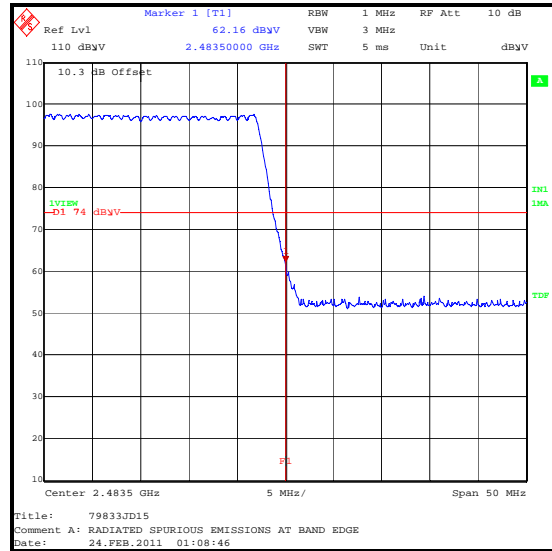
Upper Band Edge Average Static

Transmitter Band Edge Radiated Emissions (continued)

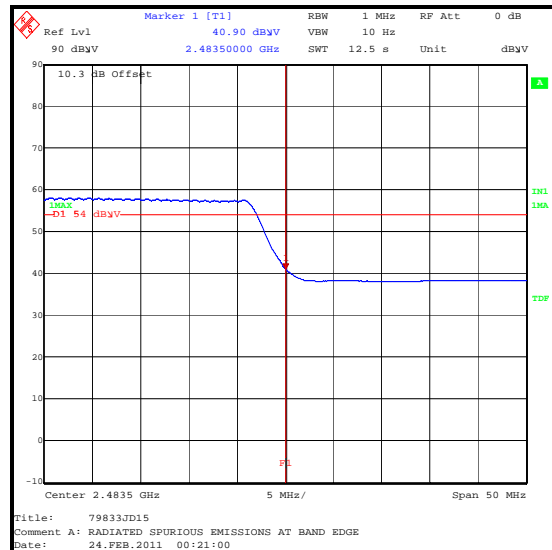
3DH5 Hopping Mode



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
Conducted Maximum Peak Output Power	2.4 GHz to 2.4835 GHz	95%	±0.27 dB
Carrier Frequency Separation	2.4 GHz to 2.4835 GHz	95%	±0.92 ppm
Average Time of Occupancy	2.4 GHz to 2.4835 GHz	95%	±0.3 ns
20 dB Bandwidth	2.4 GHz to 2.4835 GHz	95%	±0.92 ppm
Radiated Spurious Emissions	30 MHz to 26.5 GHz	95%	±2.94 dB

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
A004	LISN	Rohde & Schwarz	ESH3-Z5	890604/027	14 Sep 2012	12
A1396	Attenuator	Huber & Suhner	757987	6810.17.B	06 Jul 2011	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	06 Jun 2011	12
A1818	Antenna	EMCO	3115	00075692	05 Sep 2011	12
A1830	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100668	25 Feb 2013	12
A1975	High Pass Filter	AtlanTecRF	AFH-03000	090424010	29 Dec 2011	12
A1996	Attenuator	Huber & Suhner	6810.17.B	301749	09 Feb 2012	12
A253	Antenna	Flann Microwave	12240-20	128	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
A553	Antenna	Chase	CBL6111A	1593	16 Mar 2011	12
G0543	Amplifier	Sonoma	310N	230801	30 Jun 2011	12
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	25 Apr 2011	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	05 Sep 2011	12
L1001	Test Receiver	Rohde & Schwarz	ESU26	100239	04 Mar 2011	12
M1124	Test Receiver	Rohde & Schwarz	ESI26	100046K	22 Apr 2011	12
M1242	Spectrum Analyser	Rohde & Schwarz	FSEM30	845986/022	06 Dec 2011	12
M1379	Test Receiver	Rohde & Schwarz	ESIB7	100330	20 Sep 2012	12

NB In accordance with UKAS requirements all the measurement equipment is on a calibration schedule. All test equipment was within the current or previous calibration period at the time of test.