TEST REPORT
FROM
RFI GLOBAL SERVICES LTD

Test of: cardo BK-1

FCC ID: Q95ER13

IC Certification Number: 4668A-ER13

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

Test Report Serial No:
RFI-RPT-RP83501JD08A

Version 3.0 supersedes all previous versions

This Test Report Is Issued Under The Authority Of Chris Guy, Head of Global Approvals: 	
Checked By:	Steven White
Signature: 	
Date of Issue:	08 February 2012

RFI Global Services Ltd
Pavilion A, Ashwood Park, Ashwood Way, Basingstoke, Hampshire RG23 8BG
Telephone: +44 (0)1256 312000 Facsimile: +44 (0)1256 312001
Email: info@rfi-global.com Website: www.rfi-global.com

Registered in England and Wales. Company number:2117901

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1. Customer Information

Company Name:	Cardo Systems Inc.
Address:	100 High Tower Blvd. Pittsburgh PA 15205 USA

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:	03 January 2012 to 06 February 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:	cardo
Model Name or Number:	cardo BK-1
Serial Numbers:	J113100120 *(Radiated Sample)* Not marked or stated *(Conducted Sample)*
Hardware Version Number:	1
Software Version Number:	1
FCC ID:	Q95ER13
IC Certification Number:	4668A-ER13

Brand Name:	Ktec
Description:	AC Charger
Model Name or Number:	KSUFBO500100WEU

3.2. Description of EUT

The equipment under test was a Bluetooth stereo headset for bicycle helmets. The EUT comprised of a control unit and a clip on headphone and microphone. The control unit was battery powered and had a USB port for connecting to a laptop for data transfer or charging from an AC charger.

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:	12.7 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:

Description:	Laptop PC running CSR BlueSuite 2.4 (Used for setting DUT in to test modes)
Brand Name:	Dell
Model Name or Number:	D610
Serial Number:	RFI Asset No. PC401NT

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

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

- Transmitter mode with Basic Rate (DH5 packets) or EDR (2DH5 or 3DH5 packets) as required.
- Receive/idle mode.

4.2. Configuration and Peripherals

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

- The EUT was placed into transmitting Basic Rate (DH5 packets), EDR (2DH5 or 3DH5 packets) or receive mode as required using the CSR BlueTest configuration program via the USB port on the control unit.
- For transmitter radiated spurious emissions tests it was necessary to have a support laptop connected to the USB port of the EUT in order to force the device into transmit mode. During normal operation the USB is never connected in transmit mode hence the support laptop was placed below the EUT within a screened box in order to minimise the emissions emanating from the laptop.
- Transmitter testing was performed using BlueTest power settings Ext Power = 0 and Int Power = 15 as requested by the Customer.
- During receiver radiated spurious emissions, the device was configured to charge through the supplied AC charger.
- For AC conducted emissions tests the control unit was connected to the USB port of the charger.

5. Measurements, Examinations and Derived Results

5.1. General Comments

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

5.2. Test Results

5.2.1. Receiver/Idle Mode AC Conducted Spurious Emissions

Test Summary:

Test Engineer:	Mark Percival	**Test Date:**	24 January 2012
Test Sample Serial No:	J113100120		

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

Environmental Conditions:

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

Results: Live / Quasi Peak

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.231	Live	32.4	62.4	30.0	Complied
0.236	Live	32.3	62.3	30.0	Complied
0.285	Live	34.7	60.7	26.0	Complied
0.303	Live	38.4	60.2	21.8	Complied
0.308	Live	37.1	60.0	22.9	Complied

Results: Live / Average

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.218	Live	22.3	52.9	30.6	Complied
0.281	Live	22.8	50.8	28.0	Complied
0.303	Live	27.1	50.2	23.1	Complied

Receiver/Idle Mode AC Conducted Spurious Emissions (continued)

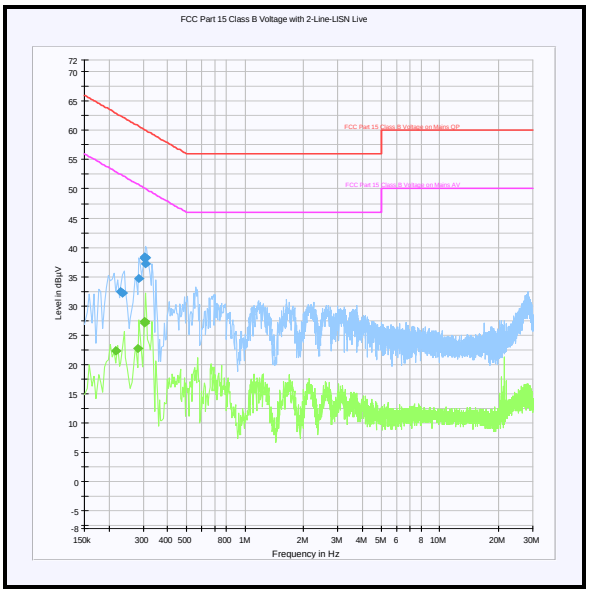
Results: Neutral / Quasi Peak

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.186	Neutral	23.4	64.2	40.8	Complied
0.204	Neutral	27.2	63.4	36.2	Complied
0.218	Neutral	24.1	62.9	38.8	Complied
0.245	Neutral	23.5	61.9	38.4	Complied
0.312	Neutral	28.5	59.9	31.4	Complied

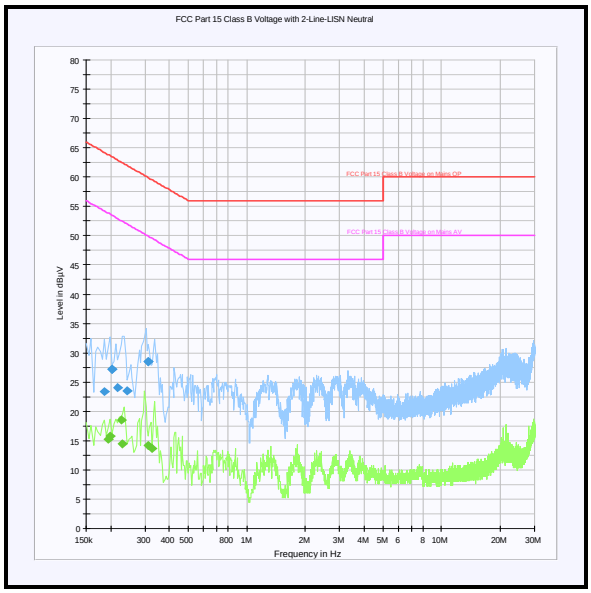
Results: Neutral / Average

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.195	Neutral	15.2	53.8	38.6	Complied
0.200	Neutral	15.7	53.6	37.9	Complied
0.227	Neutral	18.5	52.6	34.1	Complied
0.231	Neutral	14.4	52.4	38.0	Complied
0.312	Neutral	14.2	49.9	35.7	Complied
0.326	Neutral	13.6	49.6	36.0	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:	Mark Percival	**Test Date:**	25 January 2012
Test Sample Serial No:	J113100082		

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):	23
Relative Humidity (%):	29

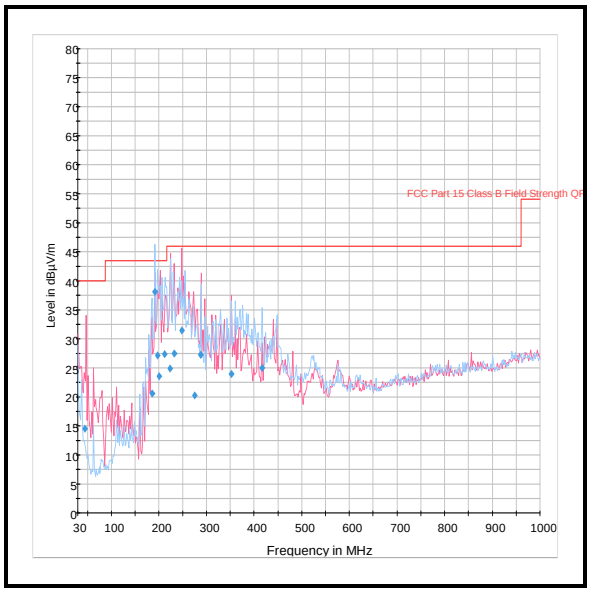
Results: Quasi Peak

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
47.495	Vertical	15.6	40.0	24.4	Complied
185.511	Horizontal	27.9	43.5	15.6	Complied
191.343	Horizontal	36.2	43.5	7.3	Complied
197.174	Horizontal	27.5	43.5	16.0	Complied
203.006	Vertical	26.7	43.5	16.8	Complied
212.725	Horizontal	40.6	43.5	2.9	Complied
224.389	Vertical	39.9	46.0	6.1	Complied
232.164	Vertical	35.4	46.0	10.6	Complied
247.715	Vertical	37.2	46.0	8.8	Complied
272.986	Vertical	29.0	46.0	17.0	Complied
288.537	Vertical	28.1	46.0	17.9	Complied
352.685	Vertical	29.1	46.0	16.9	Complied
416.834	Horizontal	20.2	46.0	25.8	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. 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:	Patrick Jones	**Test Date:**	06 February 2012
Test Sample Serial No:	J113100120		

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):	21
Relative Humidity (%):	25

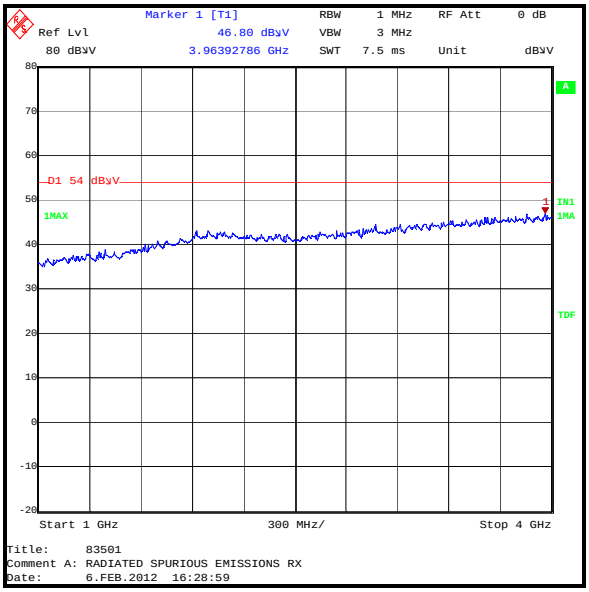
Results:

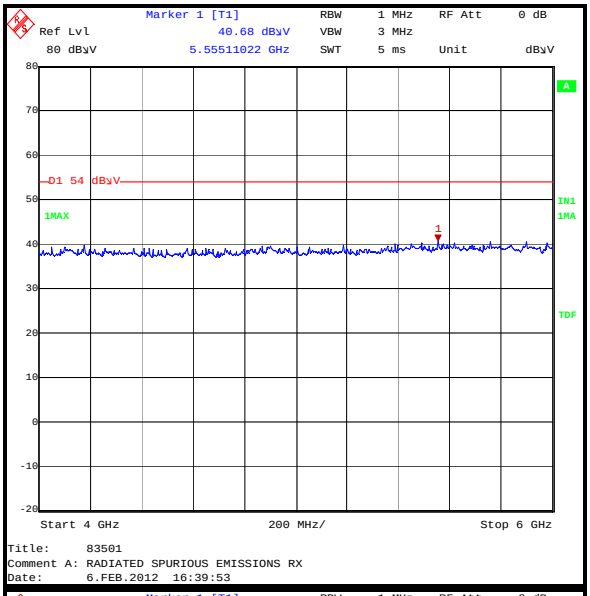
Frequency (MHz)	Antenna Polarity	Peak Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
3963.928	Horizontal	46.8	54.0	7.2	Complied

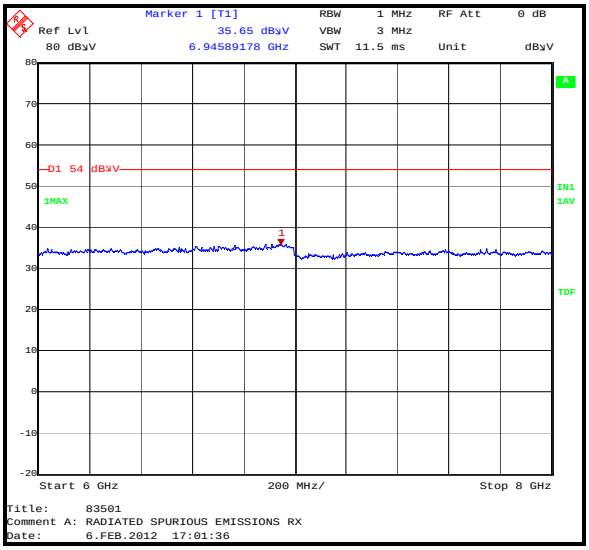
Note(s):

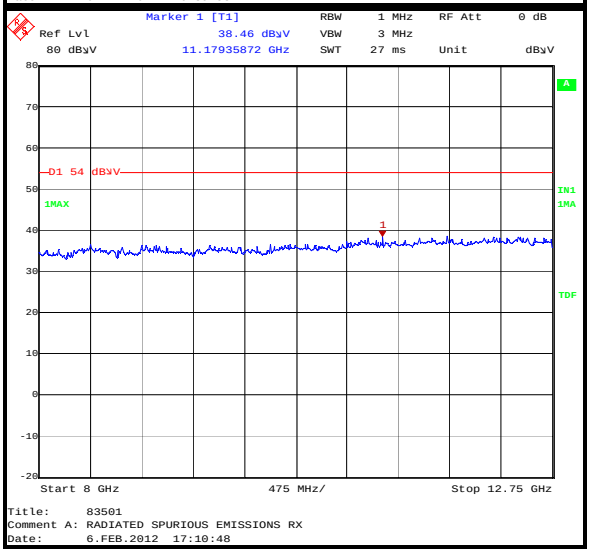
1. The measured final value is of the measurement noise floor and incorporates the calibrated antenna factor and cable loss.
2. No spurious emissions were detected above the noise floor of the measuring receiver therefore the highest peak noise floor reading of the measuring receiver was recorded as 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)









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

5.2.3. Transmitter AC Conducted Spurious Emissions

Test Summary:

Test Engineer:	Mark Percival	**Test Date:**	24 January 2012
Test Sample Serial No:	J113100120		

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

Environmental Conditions:

Temperature (℃):	23
Relative Humidity (%):	28

Results: Live / Quasi Peak

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.155	Live	32.5	65.8	33.3	Complied
0.168	Live	35.9	65.1	29.2	Complied
0.303	Live	34.9	60.2	25.3	Complied
0.308	Live	36.2	60.0	23.8	Complied
0.312	Live	36.5	59.9	23.4	Complied
0.330	Live	36.6	59.5	22.9	Complied

Results: Live / Average

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.168	Live	23.3	55.1	31.8	Complied
0.281	Live	23.8	50.8	27.0	Complied
0.308	Live	27.1	50.0	22.9	Complied
0.335	Live	27.0	49.3	22.3	Complied
0.506	Live	18.5	46.0	27.5	Complied

Transmitter AC Conducted Spurious Emissions (continued)

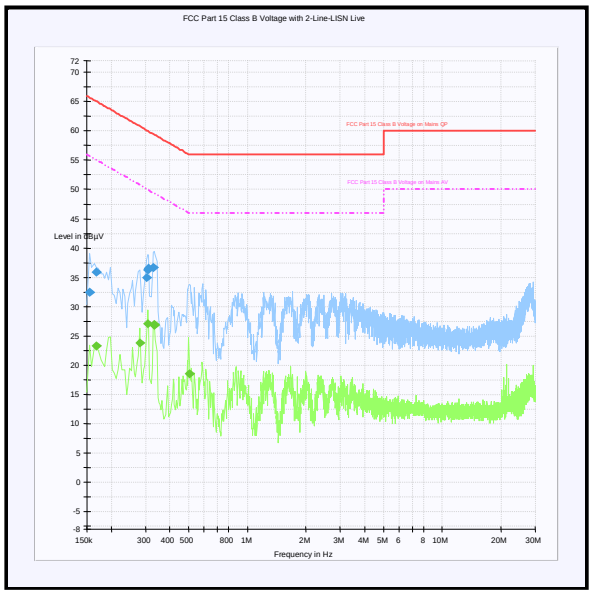
Results: Neutral / Quasi Peak

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.164	Neutral	32.3	65.3	33.0	Complied
0.168	Neutral	32.1	65.1	33.0	Complied
0.173	Neutral	31.7	64.8	33.1	Complied
0.186	Neutral	31.1	64.2	33.1	Complied
0.299	Neutral	31.2	60.3	29.1	Complied
0.312	Neutral	30.9	59.9	29.0	Complied

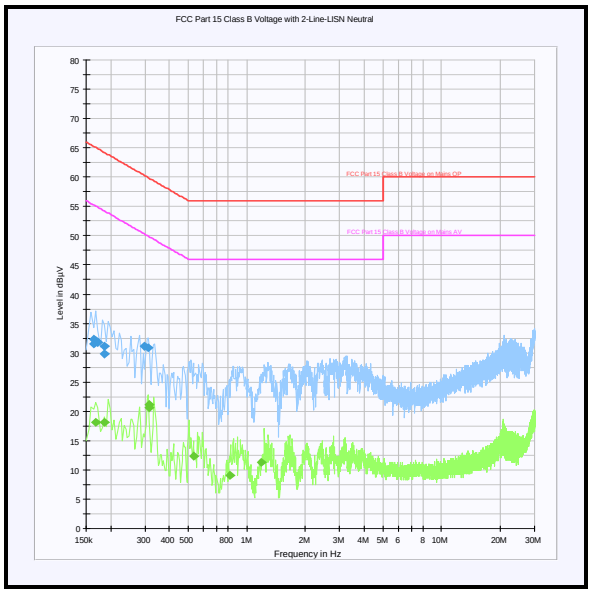
Results: Neutral / Average

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.168	Neutral	18.1	55.1	37.0	Complied
0.186	Neutral	18.1	54.2	36.1	Complied
0.317	Neutral	21.1	49.8	28.7	Complied
0.537	Neutral	12.3	46.0	33.7	Complied
0.821	Neutral	9.1	46.0	36.9	Complied
1.190	Neutral	11.3	46.0	34.7	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:

Test Engineer:	Mark Percival & Sarah Williams	**Test Date:**	03 January 2012
Test Sample Serial No:	Not marked or stated		

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 (%):	35

Results DH5:

Channel	20 dB Bandwidth (kHz)
Bottom	973.948
Middle	1010.020
Top	1022.044

Results 2DH5:

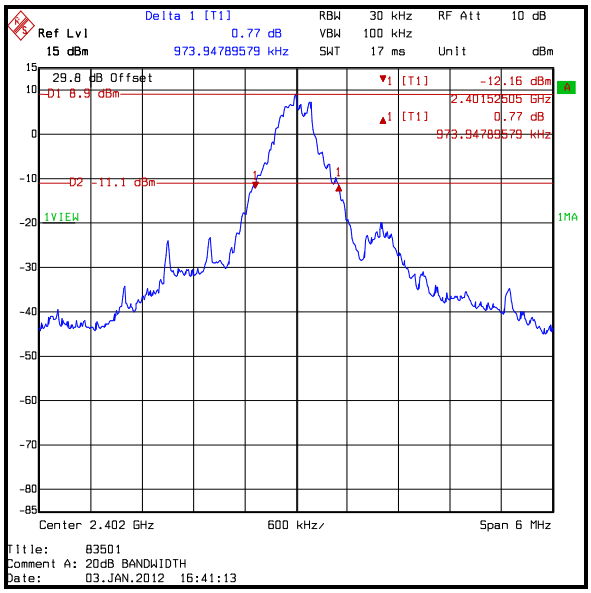
Channel	20 dB Bandwidth (kHz)
Bottom	1358.717
Middle	1358.717
Top	1358.717

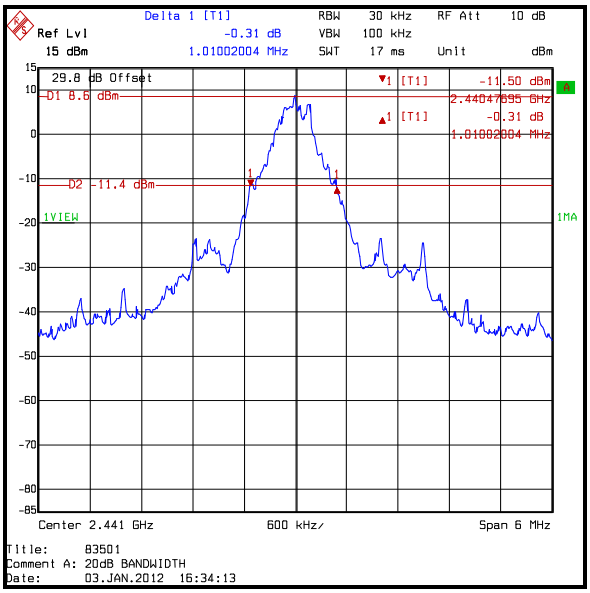
Results 3DH5:

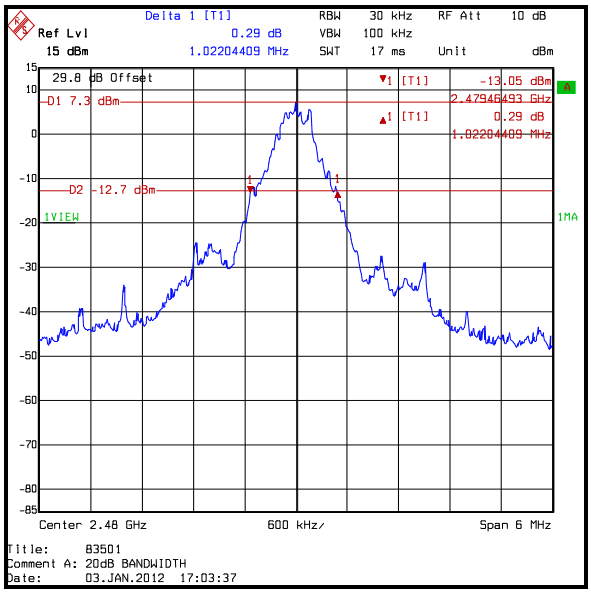
Channel	20 dB Bandwidth (kHz)
Bottom	1334.669
Middle	1346.693
Top	1334.669

Transmitter 20 dB Bandwidth (continued)

Results DH5:

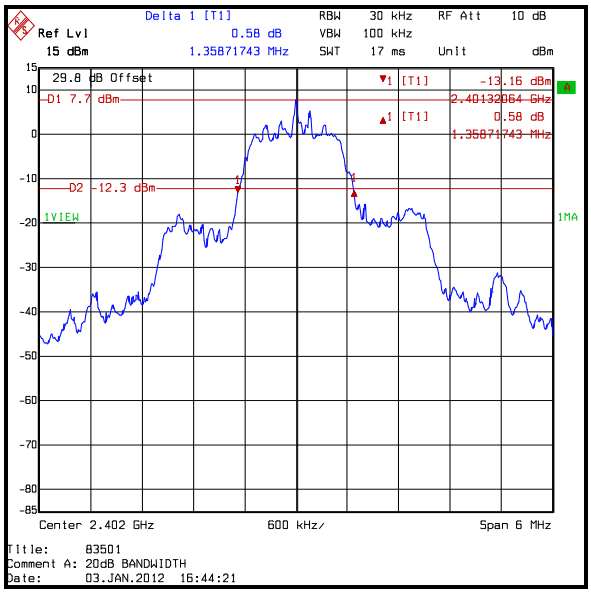


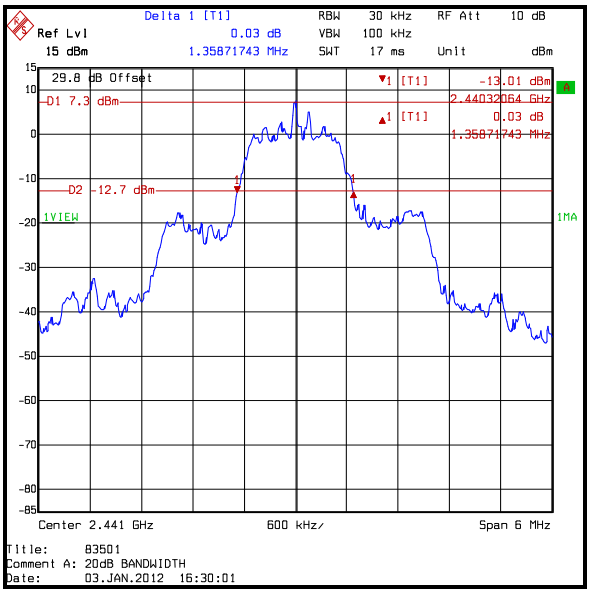


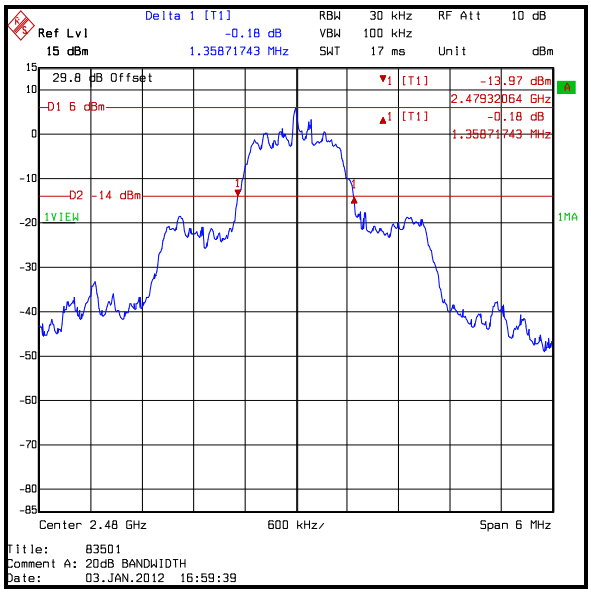


Transmitter 20 dB Bandwidth (continued)

Results 2DH5:

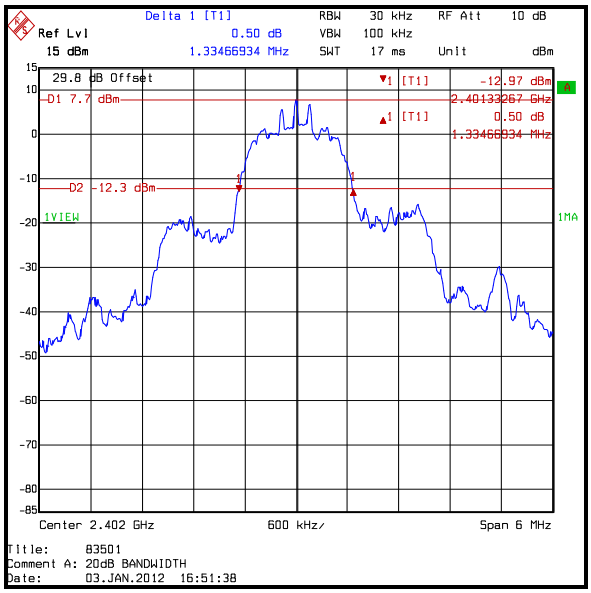


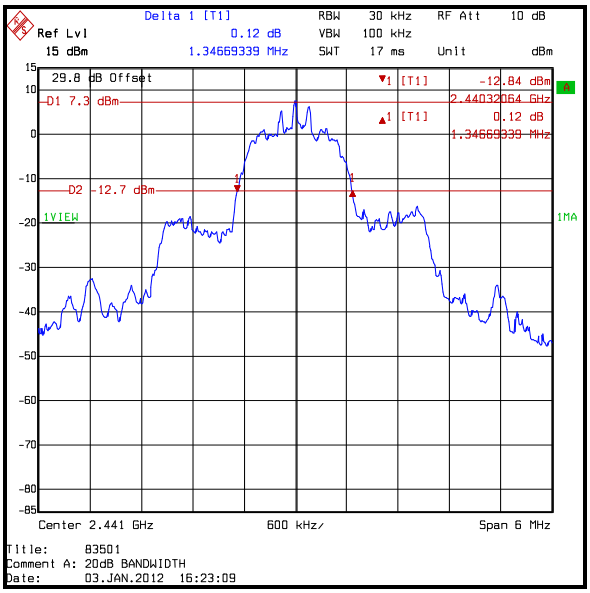


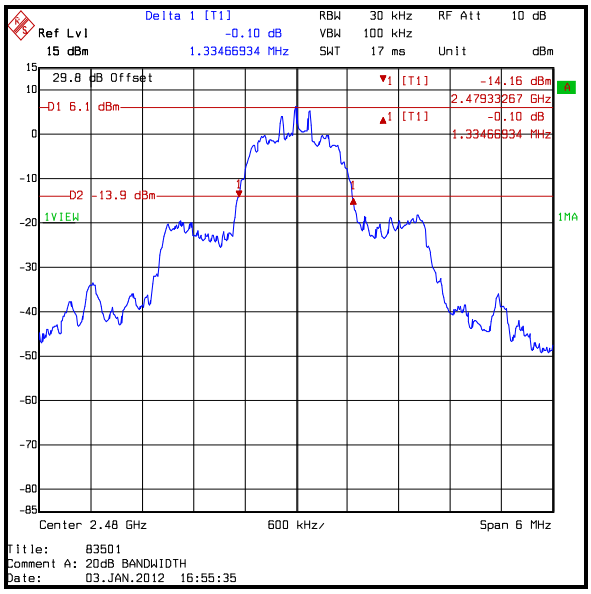


Transmitter 20 dB Bandwidth (continued)

Results 3DH5:







5.2.5. Transmitter Carrier Frequency Separation

Test Summary:

Test Engineer:	Mark Percival & Sarah Williams	**Test Date:**	03 January 2012
Test Sample Serial No:	Not marked or stated		

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

Environmental Conditions:

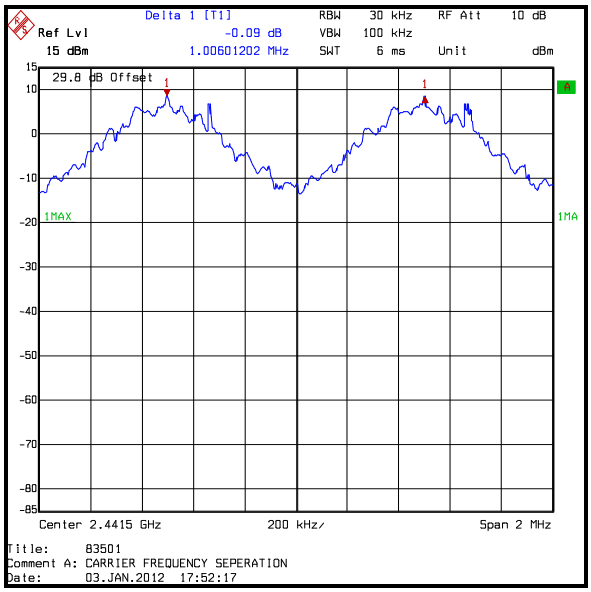
Temperature (°C):	23
Relative Humidity (%):	33

Results: DH5

Carrier Frequency Separation (kHz)	Limit ($^2/_3$ of 20 dB BW) (kHz)	Margin (kHz)	Result
1006.012	673.347	332.665	Complied

Note(s):

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



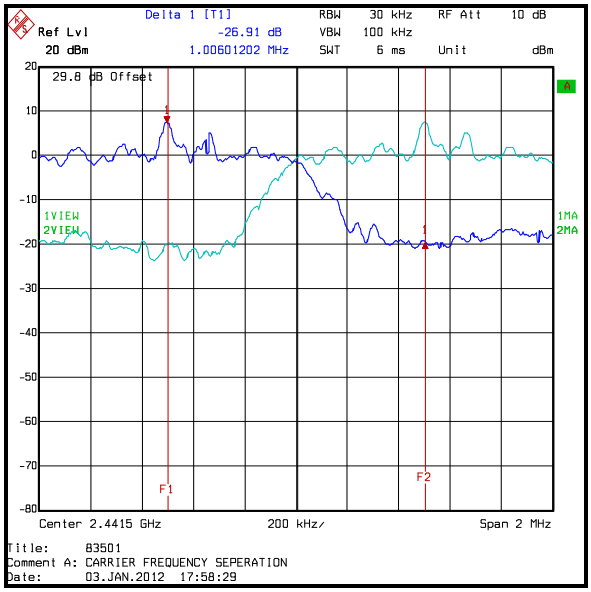
Transmitter Carrier Frequency Separation (continued)

Results: 2DH5

Carrier Frequency Separation (kHz)	Limit ($^2/_3$ of 20 dB BW) (kHz)	Margin (kHz)	Result
1006.012	905.811	100.201	Complied

Note(s):

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



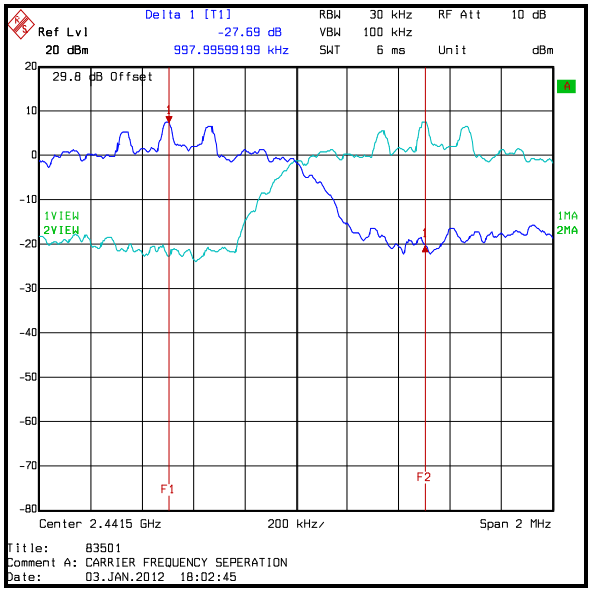
Transmitter Carrier Frequency Separation (continued)

Results: 3DH5

Carrier Frequency Separation (kHz)	Limit ($^2/_3$ of 20 dB BW) (kHz)	Margin (kHz)	Result
997.996	897.795	100.201	Complied

Note(s):

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



5.2.6. Transmitter Number of Hopping Frequencies and Average Time of Occupancy

Test Summary:

Test Engineer:	Mark Percival & Sarah Williams	**Test Date:**	03 January 2012
Test Sample Serial No:	Not marked or stated		

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):	23
Relative Humidity (%):	32

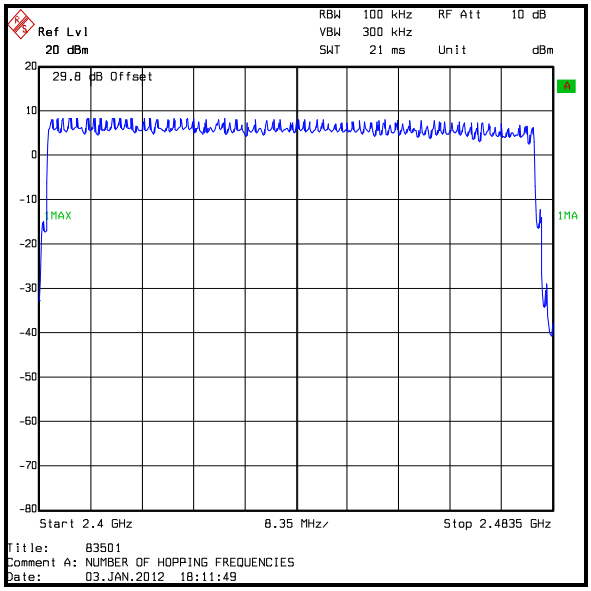
Results:

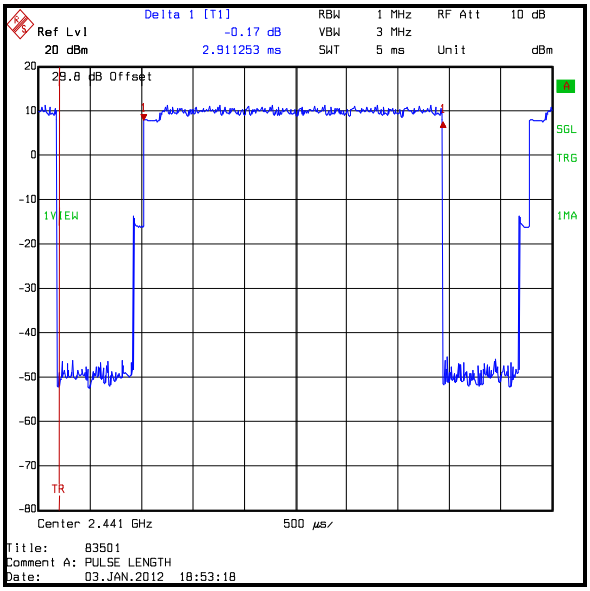
Emission Width (µs)	Number of Hops in 31.6 Seconds	Average Time of Occupancy (s)	Limit (s)	Margin (s)	Result
2911.253	108	0.314	0.4	0.086	Complied

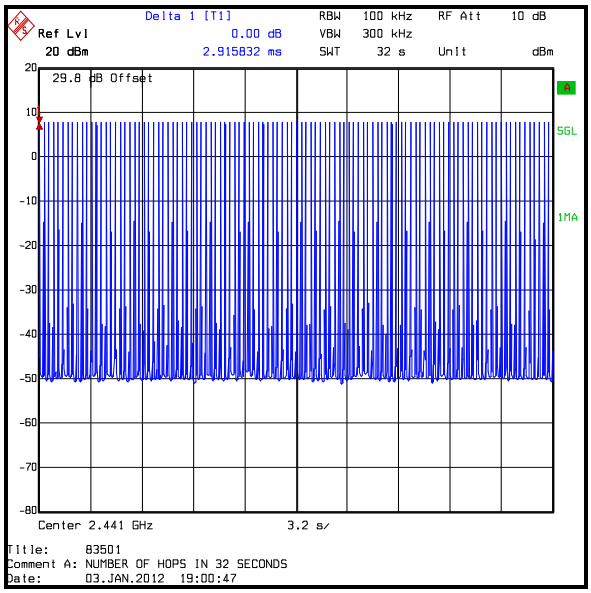
Note(s):

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:

Test Engineer:	Mark Percival & Sarah Williams	**Test Date:**	03 January 2012
Test Sample Serial No:	Not marked or stated		

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

Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	32

Results: DH5

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	10.0	30.0	20.0	Complied
Middle	9.6	30.0	20.4	Complied
Top	8.2	30.0	21.8	Complied

Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	10.0	0	10.0	36.0	26.0	Complied
Middle	9.6	0	9.6	36.0	26.4	Complied
Top	8.2	0	8.2	36.0	27.8	Complied

Results: 2DH5

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	12.0	21.0	9.0	Complied
Middle	11.9	21.0	9.1	Complied
Top	10.4	21.0	10.6	Complied

Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	12.0	0	12.0	27.0	15.0	Complied
Middle	11.9	0	11.9	27.0	15.1	Complied
Top	10.4	0	10.4	27.0	16.6	Complied

Transmitter Maximum Peak Output Power (continued)

Results: 3DH5

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	12.7	21.0	8.3	Complied
Middle	12.3	21.0	8.7	Complied
Top	12.3	21.0	8.7	Complied

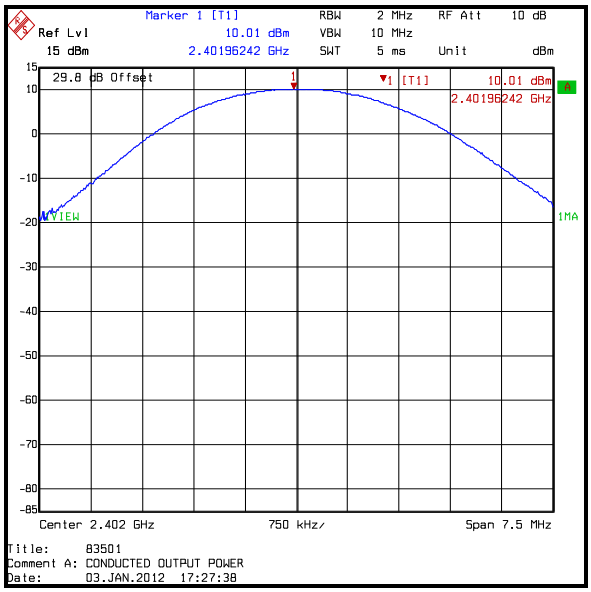
Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	12.7	0	12.7	27.0	14.3	Complied
Middle	12.3	0	12.3	27.0	14.7	Complied
Top	12.3	0	12.3	27.0	14.7	Complied

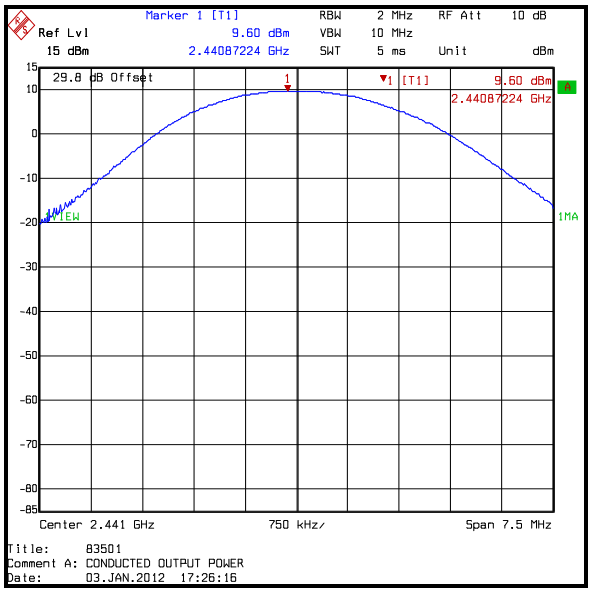
Note(s):

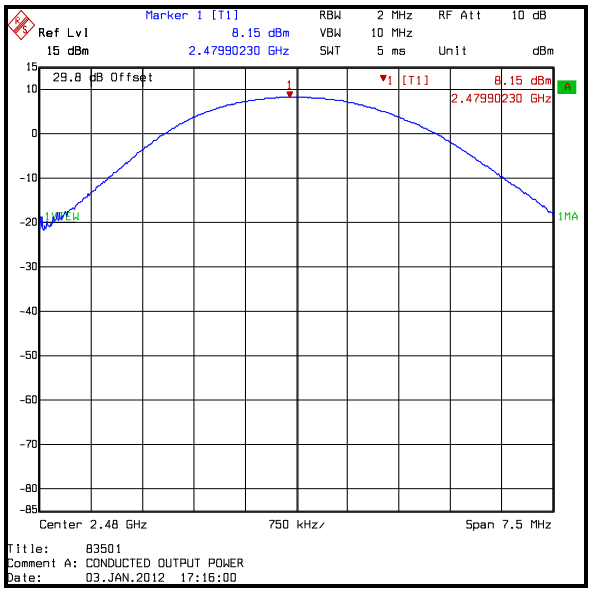
1. The declared antenna gain, has been included in the conducted peak power to obtain the EIRP

Transmitter Maximum Peak Output Power (continued)

Results: Basic Rate DH5

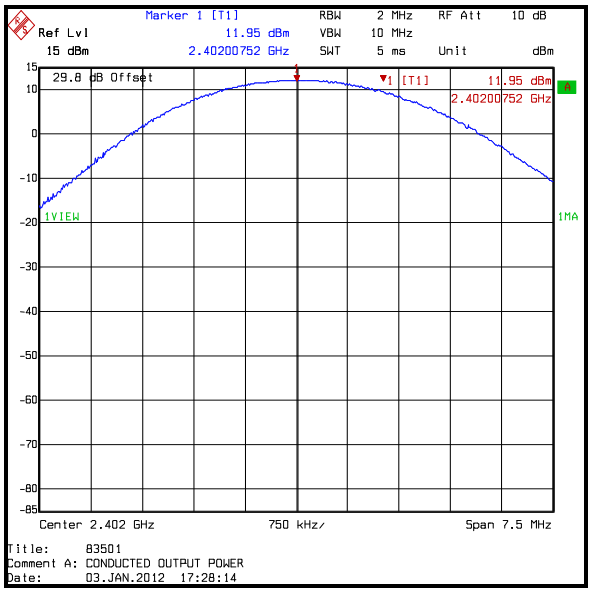


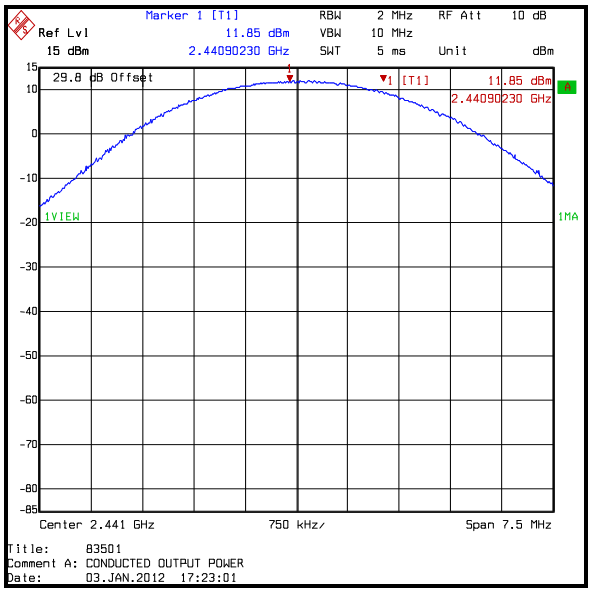


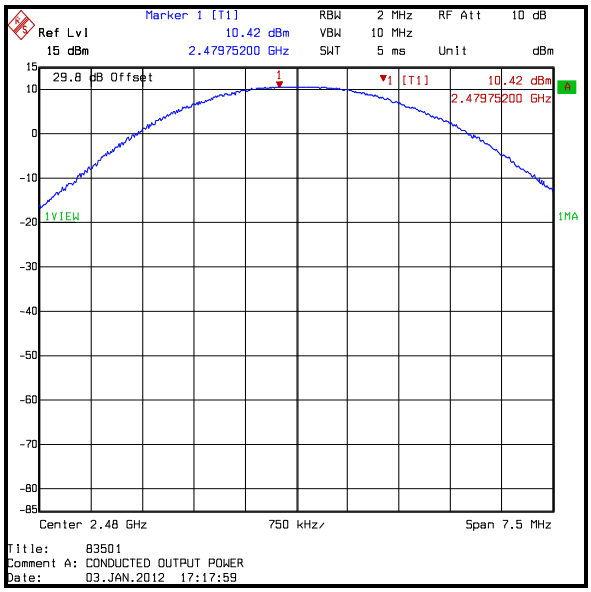


Transmitter Maximum Peak Output Power (continued)

Results: 2DH5

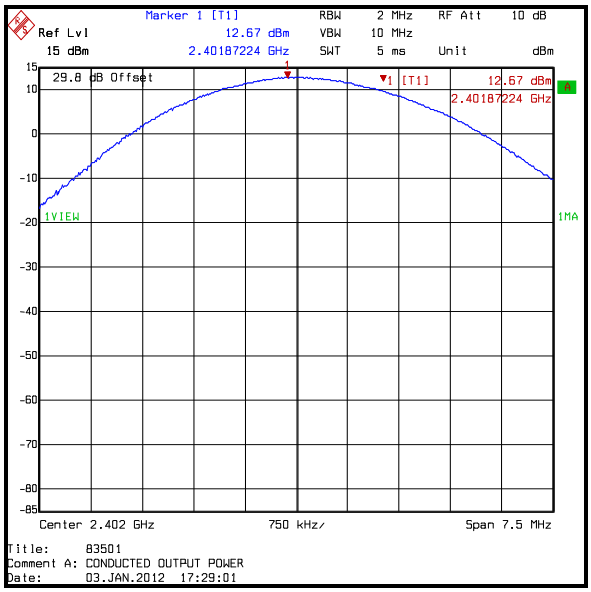


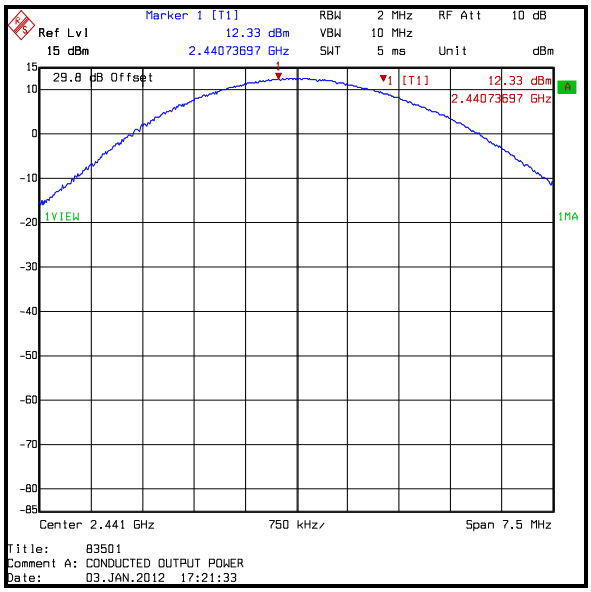


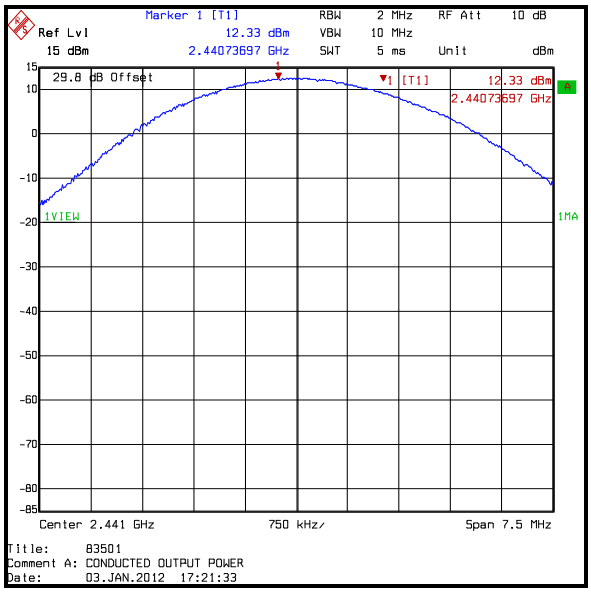


Transmitter Maximum Peak Output Power (continued)

Results: 3DH5







5.2.8. Transmitter Radiated Emissions

Test Summary:

Test Engineer:	Mark Percival & Sarah Williams	**Test Date:**	06 February 2012
Test Sample Serial No:	J113100120		

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):	23
Relative Humidity (%):	30

Results: Quasi-Peak / 3DH5

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
51.965	Vertical	16.8	40.0	23.2	Complied
62.038	Vertical	6.9	40.0	33.1	Complied
124.441	Vertical	7.4	43.5	36.1	Complied
159.972	Horizontal	22.7	43.5	20.8	Complied
192.014	Horizontal	28.7	43.5	14.8	Complied
213.516	Vertical	41.7	43.5	1.8	Complied
223.911	Vertical	40.6	46.0	5.4	Complied
256.015	Horizontal	33.2	46.0	12.8	Complied
287.993	Vertical	41.4	46.0	4.6	Complied
416.002	Horizontal	33.3	46.0	12.7	Complied
540.546	Horizontal	26.2	46.0	19.8	Complied
754.606	Horizontal	24.8	46.0	21.2	Complied

Note(s):

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

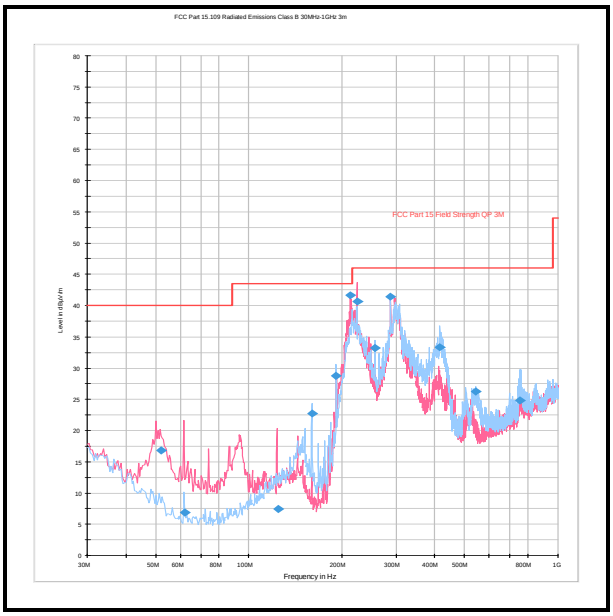


Figure 1

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:**	04 January 2012
Test Sample Serial No:	J113100120		

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 26.5 GHz

Environmental Conditions:

Temperature (°C):	21
Relative Humidity (%):	25

Results: Peak Bottom Channel 3DH5

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
1065.432	Vertical	47.8	74.0	26.2	Complied
1331.972	Horizontal	51.5	74.0	22.5	Complied
1595.794	Vertical	49.9	74.0	24.1	Complied
4803.867	Horizontal	49.7	74.0	24.3	Complied
7205.914	Horizontal	53.7	87.5*	33.8	Complied

Results: Average Bottom Channel 3DH5

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
1065.432	Vertical	32.8	54.0	21.2	Complied
1331.972	Vertical	37.6	54.0	16.4	Complied
1595.794	Horizontal	39.7	54.0	14.3	Complied
4803.867	Horizontal	38.1	54.0	15.9	Complied

Results: Peak Middle Channel 3DH5

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
1064.278	Horizontal	47.7	74.0	26.3	Complied
1332.581	Vertical	51.2	74.0	22.8	Complied
1596.395	Vertical	50.8	74.0	23.2	Complied
4881.945	Horizontal	52.6	74.0	21.4	Complied
7322.726	Horizontal	58.4	74.0	15.6	Complied

Transmitter Radiated Emissions (continued)

Results: Average Middle Channel 3DH5

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
1064.278	Vertical	32.3	54.0	21.7	Complied
1332.581	Vertical	36.6	54.0	17.4	Complied
1596.395	Horizontal	38.1	54.0	15.9	Complied
4881.945	Horizontal	40.2	54.0	13.8	Complied
7322.726	Horizontal	45.4	54.0	8.6	Complied

Results: Peak Top Channel 3DH5

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
1065.987	Vertical	47.1	74.0	26.9	Complied
1330.651	Horizontal	50.0	74.0	24.0	Complied
1595.220	Vertical	50.2	74.0	23.8	Complied
4960.202	Horizontal	54.2	74.0	19.8	Complied
7440.083	Horizontal	52.1	74.0	21.9	Complied

Results: Average Top Channel 3DH5

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
1065.987	Vertical	32.8	54.0	21.2	Complied
1330.651	Horizontal	39.1	54.0	14.9	Complied
1595.220	Vertical	39.1	54.0	14.9	Complied
4960.202	Horizontal	41.6	54.0	12.4	Complied
7440.083	Horizontal	49.7	54.0	4.3	Complied

Results: Peak Hopping Mode 3DH5

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
4892.425	Horizontal	53.5	74.0	20.5	Complied
7413.928	Horizontal	61.1	74.0	12.9	Complied

Results: Average Hopping Mode 3DH5

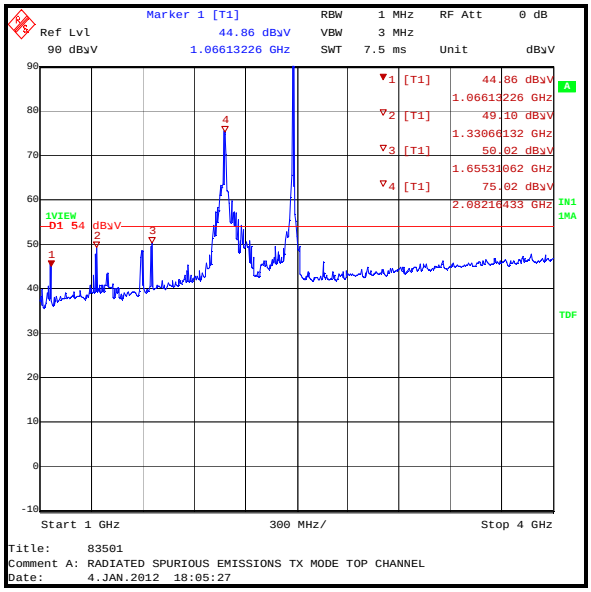
Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
4892.425	Horizontal	29.7	54.0	24.3	Complied
7413.928	Horizontal	34.5	54.0	19.5	Complied

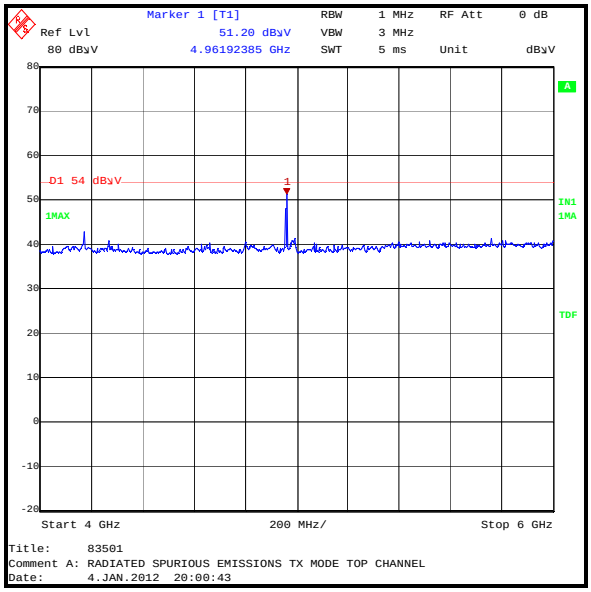
Transmitter Radiated Emissions (continued)

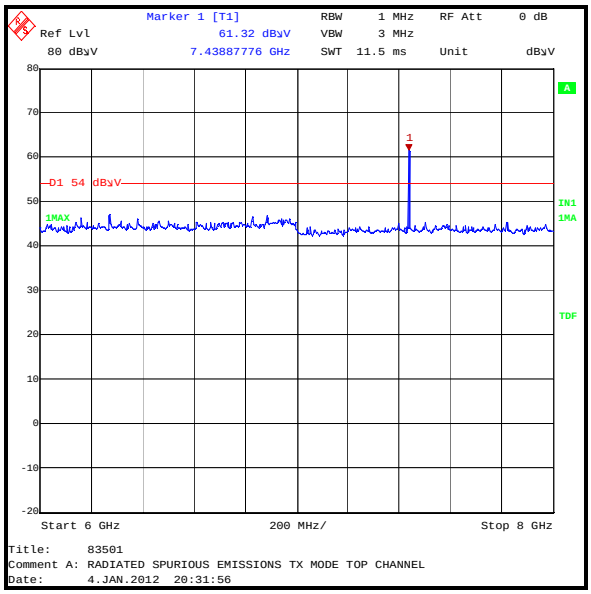
Note(s):

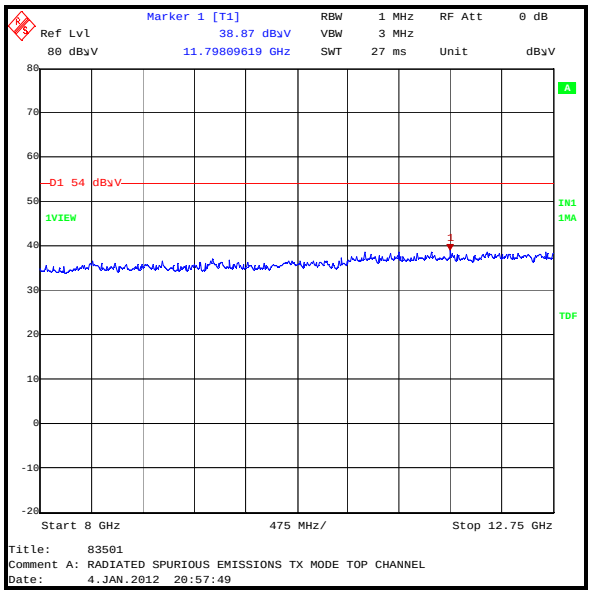
1. Measurements were performed with the EUT transmitting in 3DH5 mode as all modes were previously measured and 3DH5 was found to produce the highest output power.
2. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss.
3. The emission shown on the 1 GHz to 4 GHz plot is the EUT fundamental at 2480 MHz.
4. The emission at 2.082 GHz was measured, as it is in the non-restricted band the -20 dBc limit applied. The emission was found to be >20 dB below the limit and therefore was not recorded.
5. 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.
6. 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.
7. * -20 dBc limit.

Transmitter Radiated Emissions (continued)

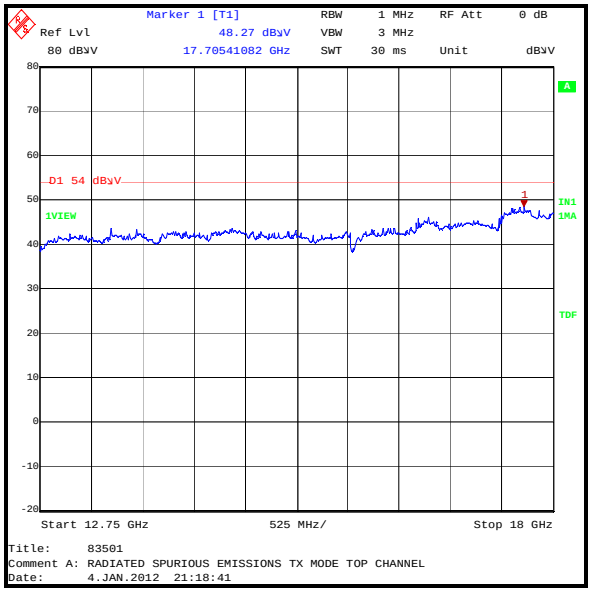


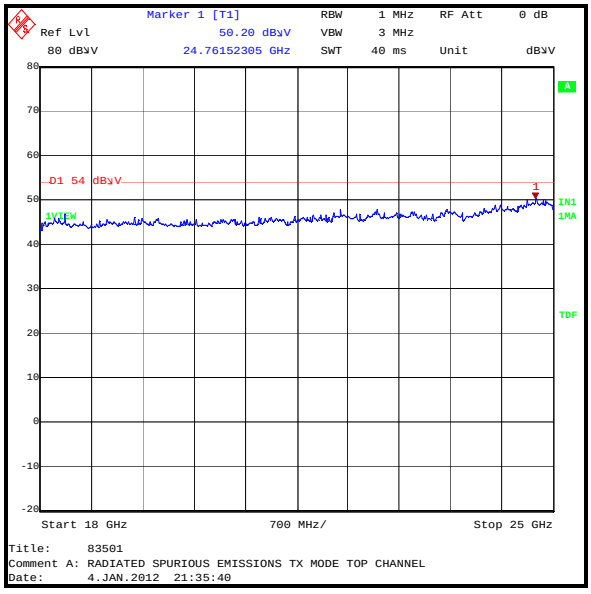






Transmitter Radiated Emissions (continued)





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:**	05 January 2012
Test Sample Serial No:	J113100120		

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

Environmental Conditions:

Temperature (℃):	21
Relative Humidity (%):	25

Results: Static Mode DH5

Frequency (MHz)	Antenna Polarity	Peak Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2400.0	Vertical	65.1	87.5*	22.4	Complied
2483.5	Vertical	70.9	74.0	3.1	Complied

Frequency (MHz)	Antenna Polarity	Average Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2483.5	Vertical	51.4	54.0	2.6	Complied

Results: Hopping Mode DH5

Frequency (MHz)	Antenna Polarity	Peak Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2400.0	Vertical	63.4	87.5*	24.1	Complied
2483.5	Vertical	65.5	74.0	8.5	Complied

Frequency (MHz)	Antenna Polarity	Average Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2483.5	Vertical	42.0	54.0	12.0	Complied

Results: Static Mode 2DH5

Frequency (MHz)	Antenna Polarity	Peak Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2400.0	Vertical	65.0	86.0*	21.0	Complied
2483.5	Vertical	70.5	74.0	3.5	Complied

Frequency (MHz)	Antenna Polarity	Average Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2483.5	Vertical	53.6	54.0	0.4	Complied

Transmitter Band Edge Radiated Emissions (continued)

Results: Hopping Mode 2DH5

Frequency (MHz)	Antenna Polarity	Peak Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2400.0	Vertical	63.6	85.3*	21.7	Complied
2483.5	Vertical	69.3	74.0	4.7	Complied

Frequency (MHz)	Antenna Polarity	Average Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2483.5	Vertical	44.4	54.0	9.6	Complied

Results: Static Mode 3DH5

Frequency (MHz)	Antenna Polarity	Peak Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2400.0	Vertical	66.2	86.2*	20.0	Complied
2483.5	Vertical	72.1	74.0	1.9	Complied

Frequency (MHz)	Antenna Polarity	Average Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2483.5	Vertical	53.9	54.0	0.1	Complied

Results: Hopping Mode 3DH5

Frequency (MHz)	Antenna Polarity	Peak Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2400.0	Vertical	65.9	86.2*	20.3	Complied
2483.5	Vertical	68.6	74.0	5.4	Complied

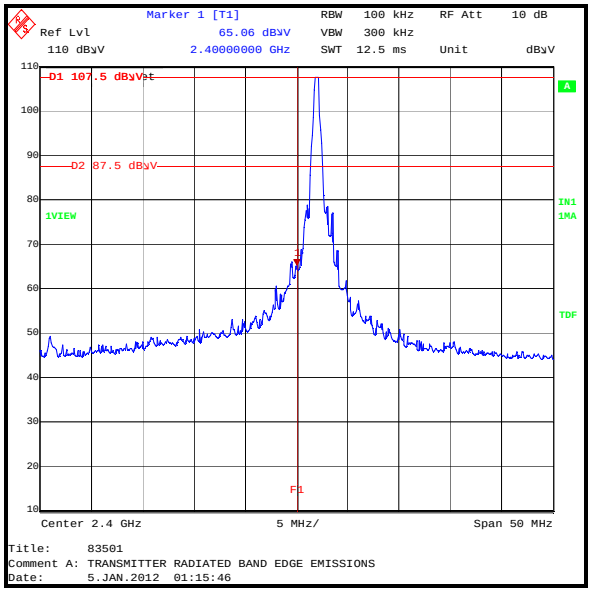
Frequency (MHz)	Antenna Polarity	Average Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2483.5	Vertical	44.3	54.0	9.7	Complied

Note(s):

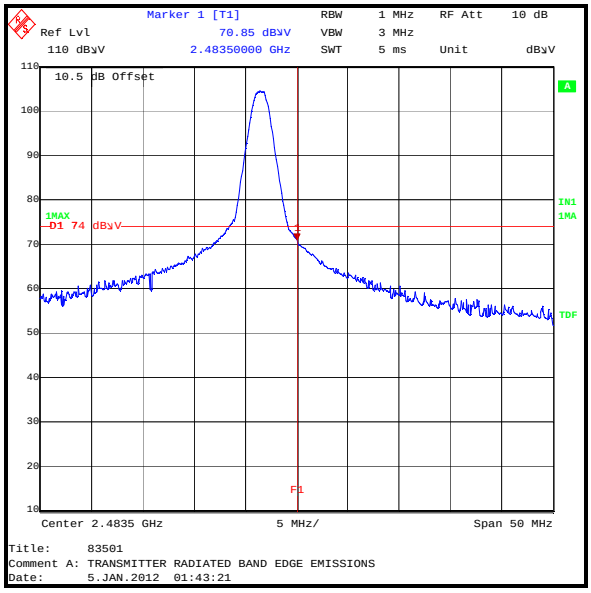
1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss.
2. * -20 dBc limit.

Transmitter Band Edge Radiated Emissions (continued)

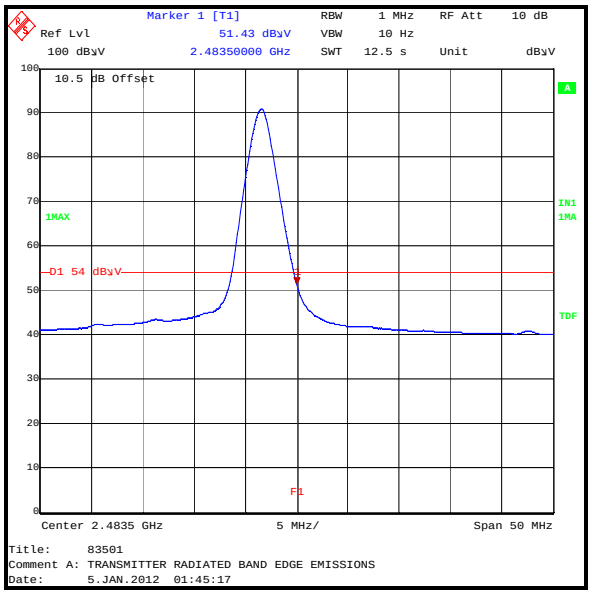
DH5 Static Mode



Lower Band Edge Peak Static



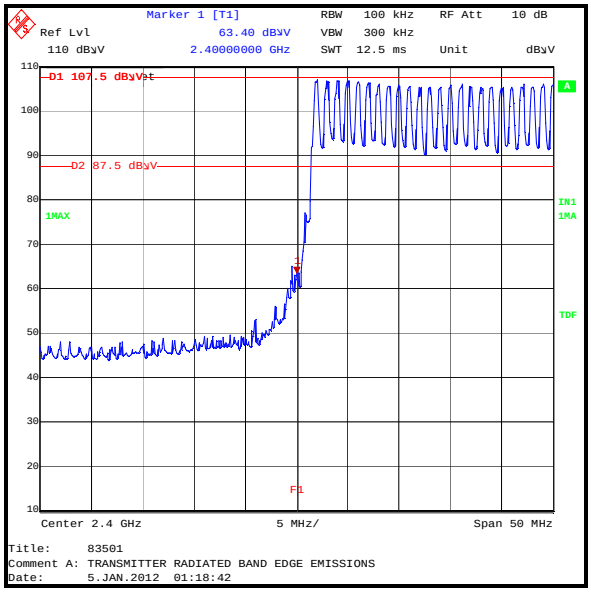
Upper Band Edge Peak Static



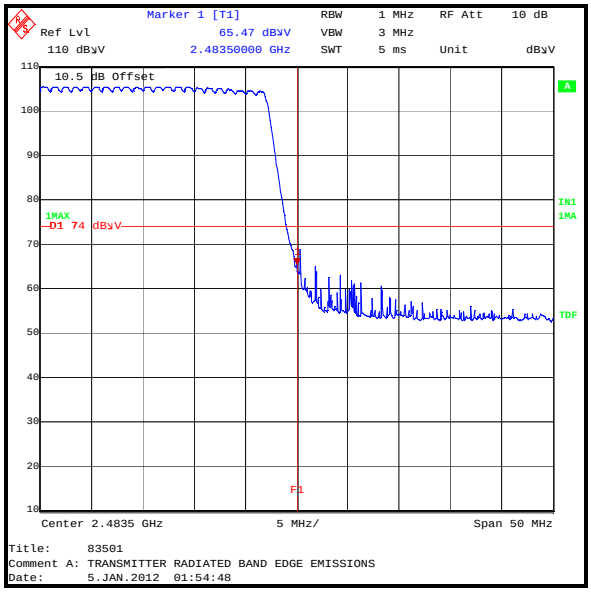
Upper Band Edge Average Static

Transmitter Band Edge Radiated Emissions (continued)

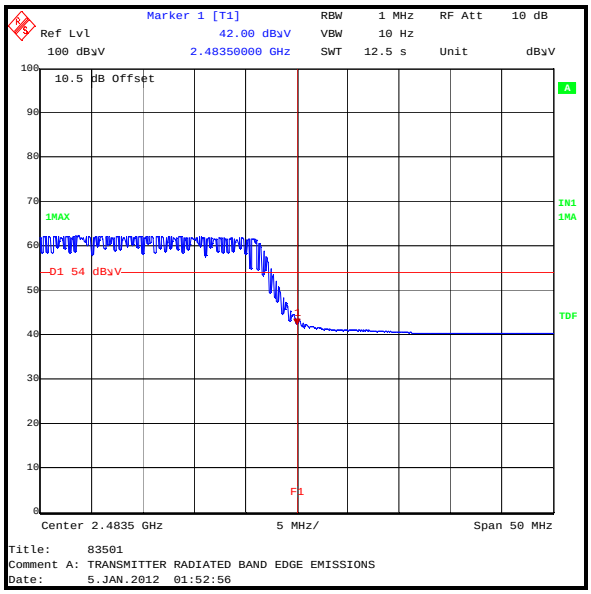
DH5 Hopping Mode



Lower Band Edge Peak Hopping



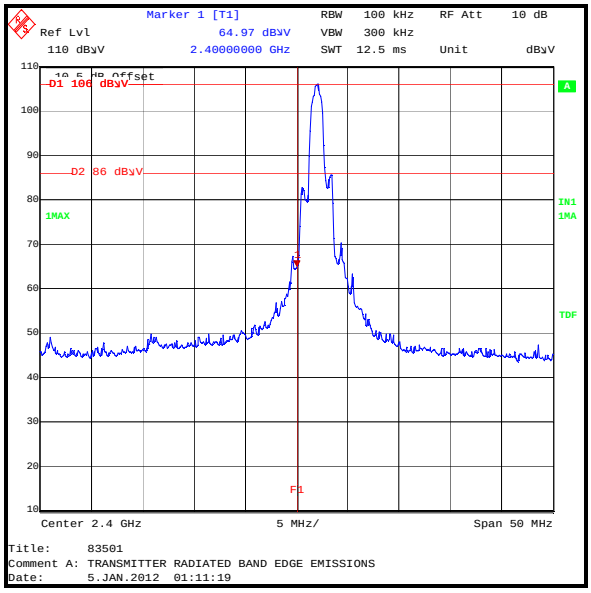
Upper Band Edge Peak Hopping



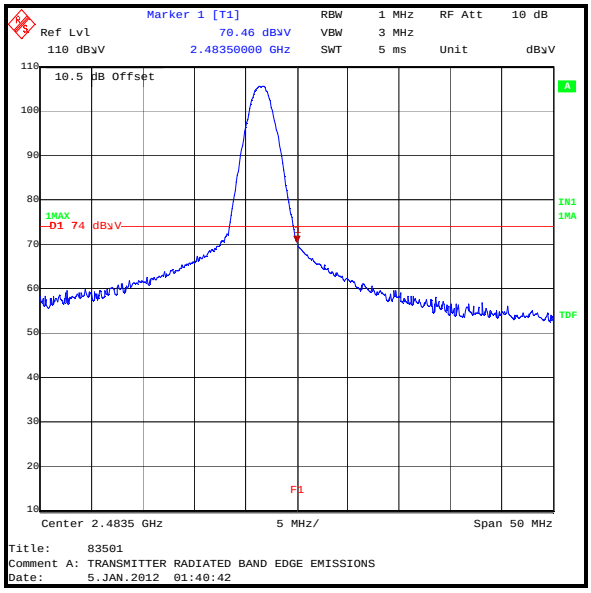
Upper Band Edge Average Hopping

Transmitter Band Edge Radiated Emissions (continued)

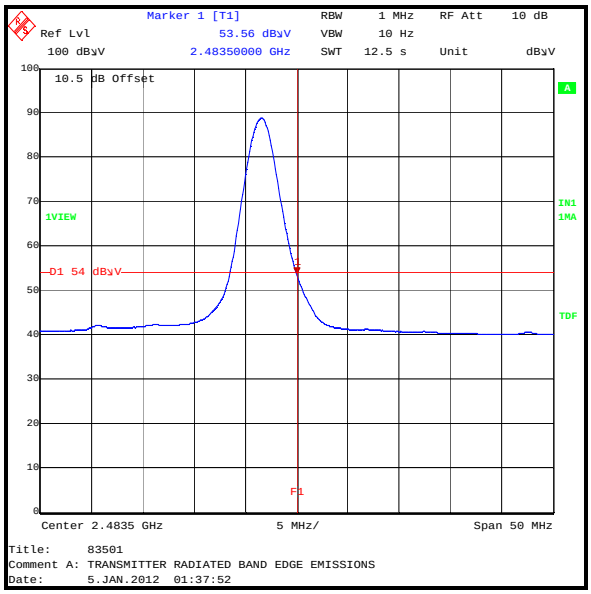
2DH5 Static Mode



Lower Band Edge Peak Static



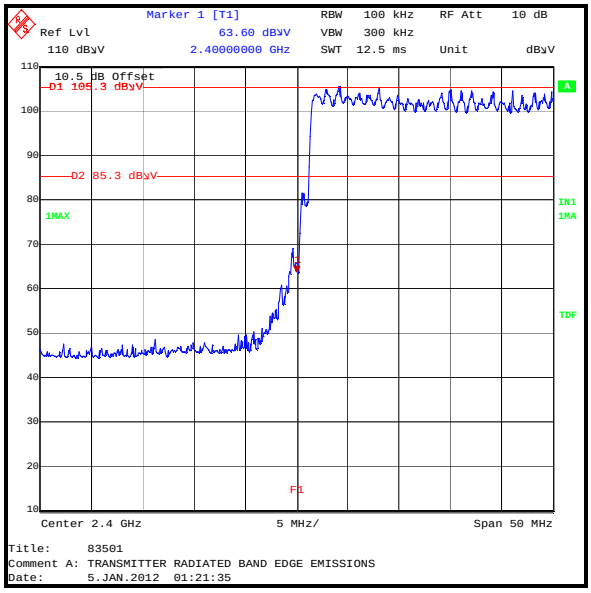
Upper Band Edge Peak Static



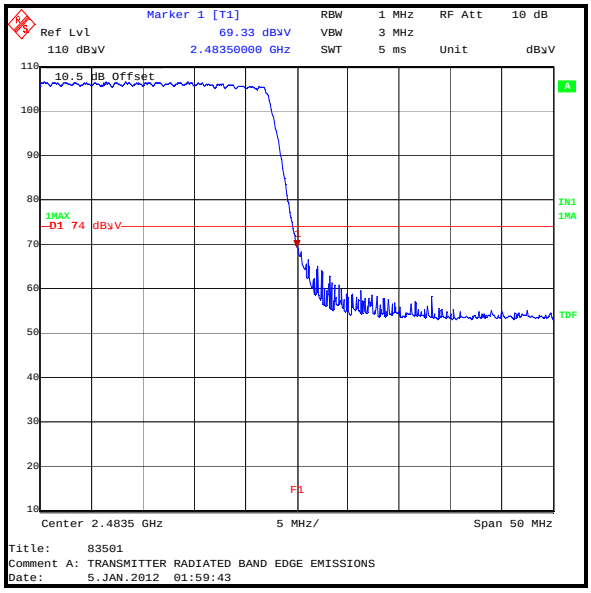
Upper Band Edge Average Static

Transmitter Band Edge Radiated Emissions (continued)

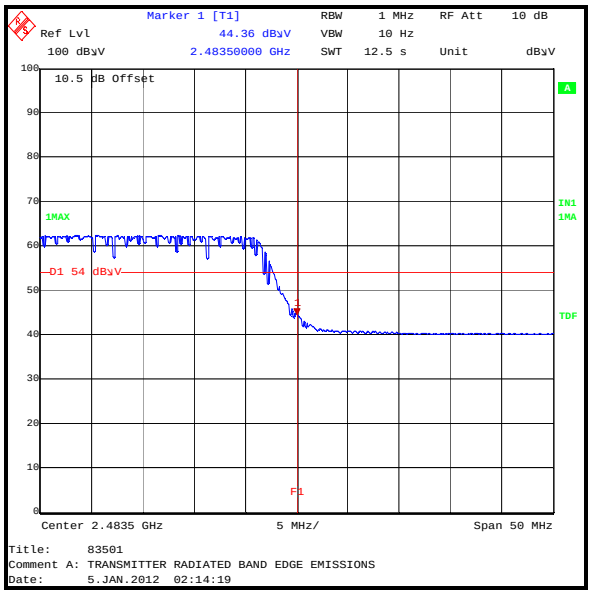
2DH5 Hopping Mode



Lower Band Edge Peak Hopping



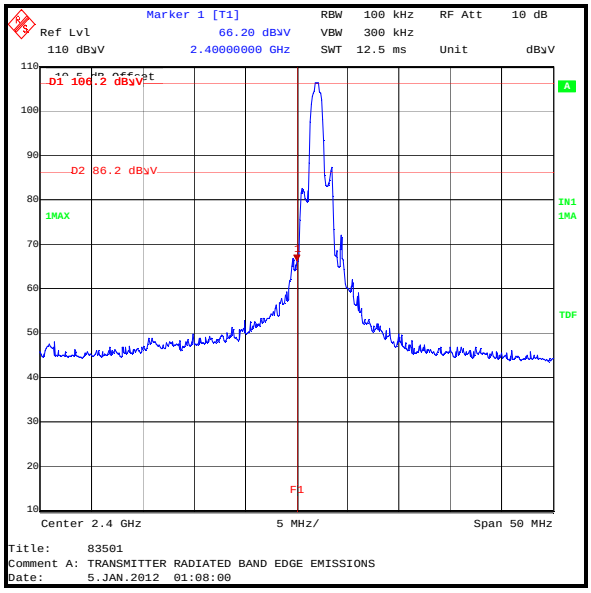
Upper Band Edge Peak Hopping



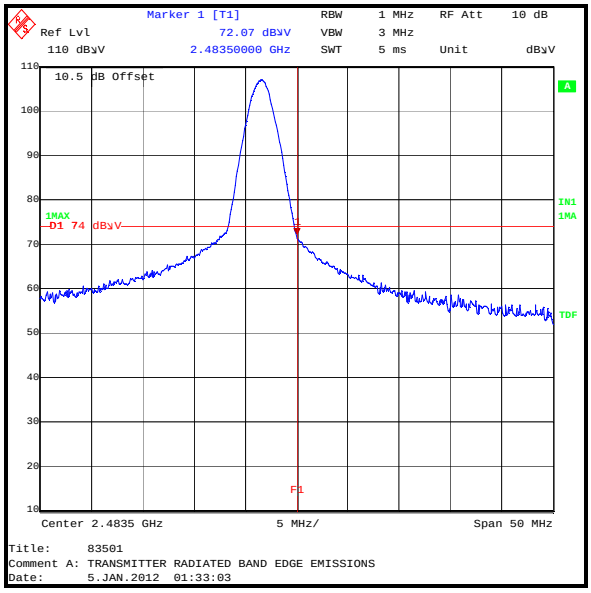
Upper Band Edge Average Hopping

Transmitter Band Edge Radiated Emissions (continued)

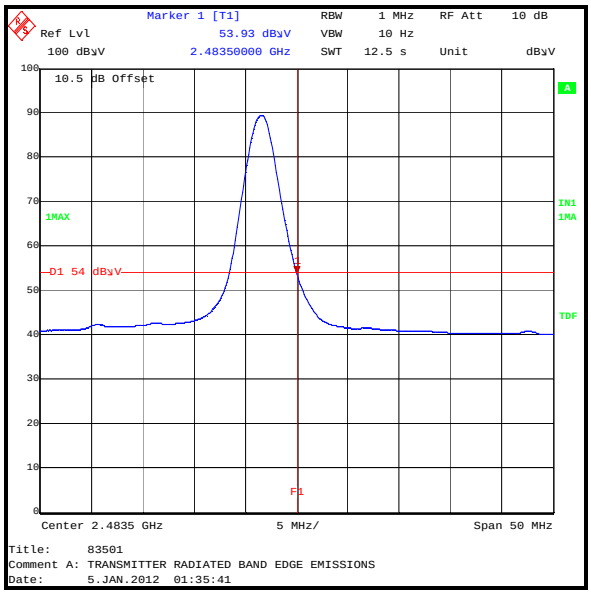
3DH5 Static Mode



Lower Band Edge Peak Static



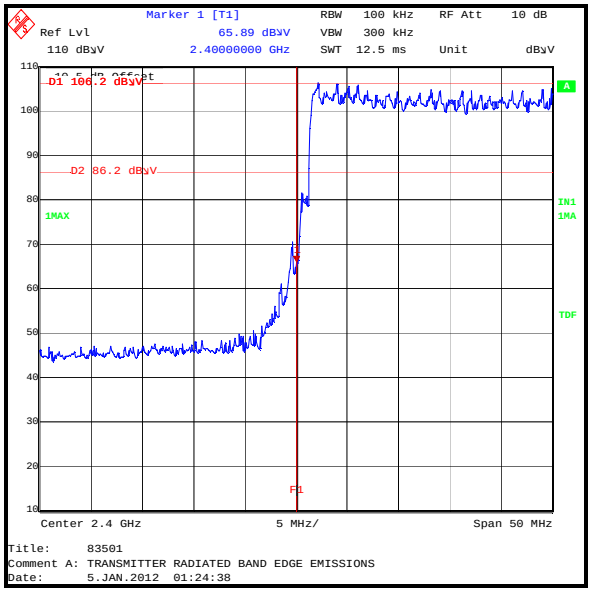
Upper Band Edge Peak Static



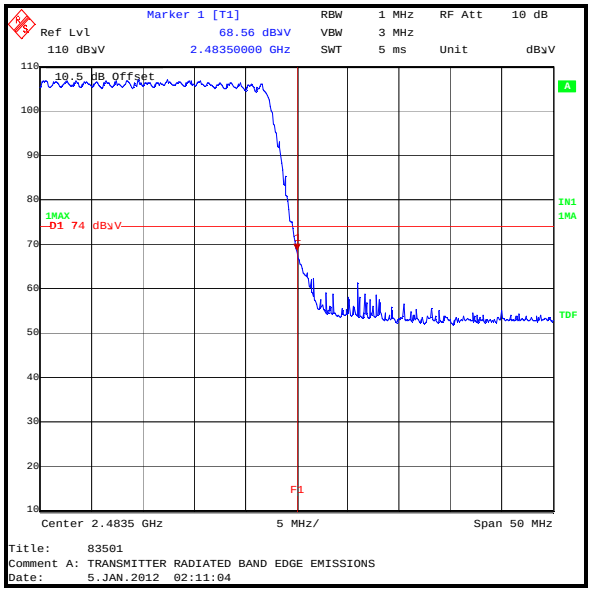
Upper Band Edge Average Static

Transmitter Band Edge Radiated Emissions (continued)

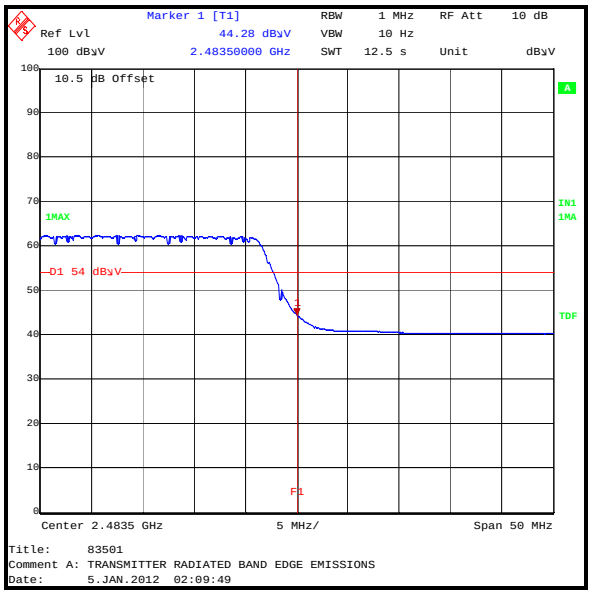
3DH5 Hopping Mode



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)
A067	LISN	Rohde & Schwarz	ESH3-Z5	890603/002	02 Jun 2012	12
A1396	Attenuator	Huber & Suhner	757987	6810.17.B	08 Jul 2012	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	09 Oct 2012	12
A1818	Antenna	EMCO	3115	00075692	09 Oct 2012	12
A1830	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100668	05 Mar 2012	12
A1834	Attenuator	Hewlett Packard	8491B	10444	26 Jul 2012	12
A1975	High Pass Filter	AtlanTecRF	AFH-03000	090424010	28 Feb 2012	12
A2072	RF Coupler	Narda	4242B	03549	Calibrated before use	-
A244	Attenuator	Schaffner	6820-17-B	None	09 Feb 2012	12
A253	Antenna	Flann Microwave	12240-20	128	09 Oct 2012	12
A254	Antenna	Flann Microwave	14240-20	139	09 Oct 2012	12
A255	Antenna	Flann Microwave	16240-20	519	09 Oct 2012	12
A256	Antenna	Flann Microwave	18240-20	400	09 Oct 2012	12
A436	Antenna	Flann	20240-20	330	09 Oct 2012	12
A553	Antenna	Chase	CBL6111A	1593	26 Mar 2012	12
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	29 May 2012	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	09 Oct 2012	12
M1124	Spectrum Analyser	Rohde & Schwarz	ESI26	100046K	29 Jun 2012	12
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016	08 Nov 2012	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	14 Feb 2012	12
M1379	Test Receiver	Rohde & Schwarz	ESIB7	100330	20 Sep 2012	12

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