

TEST REPORT FROM RFI GLOBAL SERVICES LTD



Test of: OPL-9813

FCC ID: Q2Q-OPL9813

To: FCC Part 15.247: 2011 Subpart C

Test Report Serial No.:
RFI-RPT-RP85982JD01A V2.0

Version 2.0 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:	25 July 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.

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

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	5
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	9
4. Operation and Monitoring of the EUT during Testing	10
4.1. Operating Modes	10
4.2. Configuration and Peripherals	10
5. Measurements, Examinations and Derived Results	11
5.1. General Comments	11
5.2. Test Results	12
5.2.1. Receiver/Idle Mode AC Conducted Spurious Emissions	12
5.2.2. Receiver/Idle Mode Radiated Spurious Emissions	15
5.2.3. Transmitter 20 dB Bandwidth	19
5.2.4. Transmitter Carrier Frequency Separation	21
5.2.5. Transmitter Number of Hopping Frequencies and Average Time of Occupancy	22
5.2.6. Transmitter Maximum Peak Output Power	24
5.2.7. Transmitter Radiated Emissions	26
5.2.8. Transmitter Band Edge Radiated Emissions	32
6. Measurement Uncertainty	35
Appendix 1. Test Equipment Used	36

1. Customer Information











Company Name:	Opticon Sensors Europe
Address:	Opaallaan 35 2132 XV Hoofddorp Netherlands

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
Site Registration:	FCC: 209735
Location of Testing:	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
Test Dates:	29 March 2012 to 25 April 2012

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
Part 15.107(a)	Receiver/Idle Mode AC Conducted Emissions	
Part 15.109	Receiver/Idle Mode Radiated Spurious Emissions	
Part 15.247(a)(1)	Transmitter 20 dB Bandwidth	
Part 15.247(a)(1)	Transmitter Carrier Frequency Separation	
Part 15.247(a)(1)(iii)	Transmitter Number of Hopping Frequencies and Average Time of Occupancy	
Part 15.247(b)(1)	Transmitter Maximum Peak Output Power	
Part 15.247(d) & 15.209(a)	Transmitter Radiated Emissions	
Part 15.247(d) & 15.209(a)	Transmitter Band Edge Radiated Emissions	
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:	Opticon
Model Name or Number:	OPL-9813
Serial Number:	ES000001 (<i>Radiated sample #1</i>); ES000002 (<i>Radiated sample #2</i>); ES000003 (<i>Conducted RF port sample</i>)
Hardware Version Number:	OP1110_c
Software Version Number:	XBNV0000
FCC ID:	Q2Q-OPL9813

3.2. Description of EUT

The equipment under test was a Data Collector barcode scanner which supports GPS & *Bluetooth*.

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	3.7 V	
Type of Unit:	Transceiver		
Channel Spacing:	1 MHz		
Mode:	Basic Rate		
Modulation:	GFSK		
Packet Type: (Maximum Payload)	DH5		
Data Rate (Mbit/s):	1		
Maximum Conducted Peak Output Power:	1.3 dBm		
Declared Antenna Gain:	5.0 dBi		
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:

Brand Name:	Techtuit
Description:	AC/DC adapter 6V/2A
Model Name or Number:	SFP0602000P

Brand Name:	Opticon
Description:	Cradle
Model Name or Number:	CRD-9723-RU
Serial Number:	067378; 10935

Brand Name:	Dell
Description:	Laptop
Model Name or Number:	D610
Serial Number:	RFI Asset PC 471NT

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

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

- Receive/Idle Mode
- Transmit mode with Basic Rate (DH5 packets).

4.2. Configuration and Peripherals

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

- For Transmit tests: Standalone, connected via a radio link to a Bluetooth tester in order to place the EUT into Bluetooth test mode. The client supplied instructions for the EUT to scan a barcode which forced the EUT into Bluetooth test mode.
- Receive/Idle tests: Standalone, with the Bluetooth mode active but not transmitting.
- The EUT does not transmit when placed in the charging cradle therefore only idle mode AC conducted emissions were performed with the EUT placed in the cradle
- Idle radiated spurious emissions were performed with the handset situated in the charging cradle as this was deemed to be the worst case. Transmitter radiated spurious emission were performed standalone.
- The EUT conducted sample was used for 20 dB bandwidth, carrier frequency separation, average time of occupancy and conducted output power tests
- All other tests were performed using the radiated sample.
- The client has confirmed that the EUT does not support Enhanced Data Rate modes therefore only Basic Rate tests were performed.

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:	Andrew Edwards	Test Date:	24 April 2012
Test Sample Serial No:	ES000002		

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

Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	27

Results: Live / Quasi Peak

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.163	Live	36.8	65.3	28.5	Complied
0.195	Live	47.2	63.8	16.6	Complied
0.199	Live	46.4	63.6	17.2	Complied
0.199	Live	46.9	63.6	16.7	Complied
0.253	Live	41.9	61.6	19.7	Complied
0.325	Live	40.3	59.6	19.3	Complied
0.447	Live	38.2	56.9	18.7	Complied
0.510	Live	44.5	56.0	11.5	Complied
0.519	Live	44.2	56.0	11.8	Complied
0.523	Live	43.2	56.0	12.8	Complied
0.600	Live	40.6	56.0	15.4	Complied
0.658	Live	40.0	56.0	16.0	Complied

Receiver/Idle Mode AC Conducted Spurious Emissions (continued)**Results: Live / Average**

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.195	Live	23.4	53.8	30.4	Complied
0.195	Live	23.4	53.8	30.4	Complied
0.195	Live	23.4	53.8	30.4	Complied
0.262	Live	24.3	51.4	27.1	Complied
0.262	Live	24.3	51.4	27.1	Complied
0.325	Live	22.2	49.6	27.4	Complied
0.505	Live	22.1	46.0	23.9	Complied
0.514	Live	25.5	46.0	20.5	Complied
0.591	Live	20.9	46.0	25.1	Complied
0.654	Live	19.9	46.0	26.1	Complied

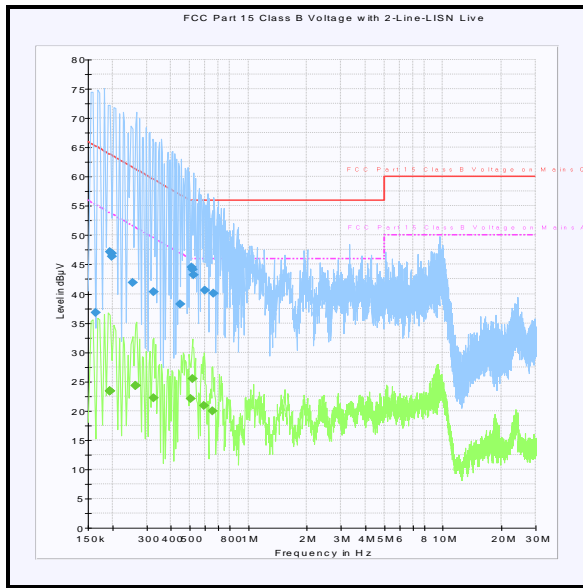
Results: Neutral / Quasi Peak

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.510	Neutral	49.2	56.0	6.8	Complied
0.510	Neutral	49.1	56.0	6.9	Complied
0.591	Neutral	45.5	56.0	10.5	Complied
0.667	Neutral	44.5	56.0	11.5	Complied
1.045	Neutral	42.7	56.0	13.3	Complied
1.608	Neutral	42.1	56.0	13.9	Complied
2.067	Neutral	40.5	56.0	15.5	Complied
2.067	Neutral	40.9	56.0	15.1	Complied
3.381	Neutral	40.9	56.0	15.1	Complied
3.390	Neutral	40.6	56.0	15.4	Complied

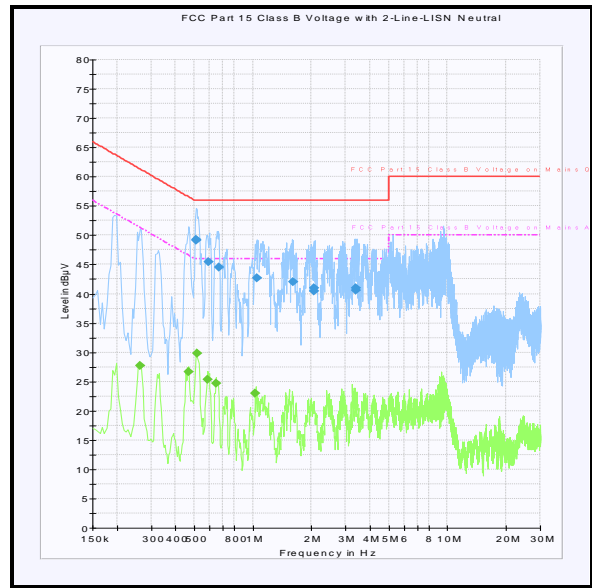
Results: Neutral / Average

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.262	Neutral	27.8	51.4	23.6	Complied
0.465	Neutral	26.7	46.6	19.9	Complied
0.514	Neutral	29.9	46.0	16.1	Complied
0.586	Neutral	25.4	46.0	20.6	Complied
0.649	Neutral	24.7	46.0	21.3	Complied
1.032	Neutral	23.0	46.0	23.0	Complied

Receiver/Idle Mode 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.

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

Test Engineer:	Nick Steele	Test Date:	25 April 2012
Test Sample Serial No:	ES000002		

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 (%):	30

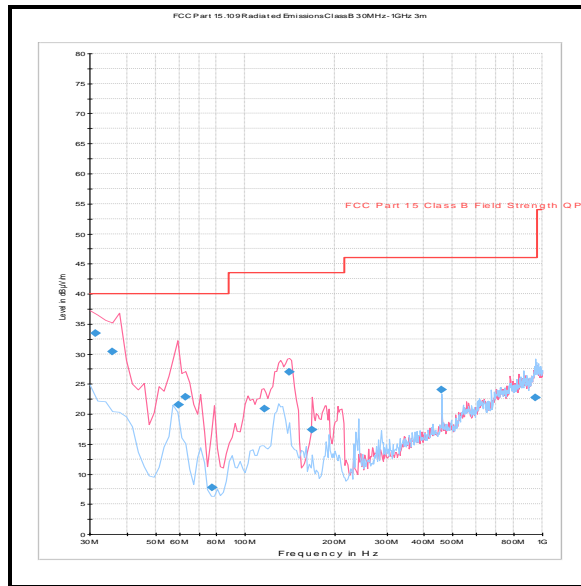
Results: Quasi Peak

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
31.380	Vertical	33.5	40.0	6.6	Complied
35.712	Vertical	30.3	40.0	9.7	Complied
59.606	Vertical	21.5	40.0	18.5	Complied
63.186	Vertical	22.8	40.0	17.2	Complied
141.249	Vertical	27.0	43.5	16.5	Complied
458.825	Horizontal	24.1	46.0	21.9	Complied

Note(s):

1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss.
2. 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:	Andrew Edwards	Test Date:	29 March 2012
Test Sample Serial No:	ES000001		

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):	24
Relative Humidity (%):	20

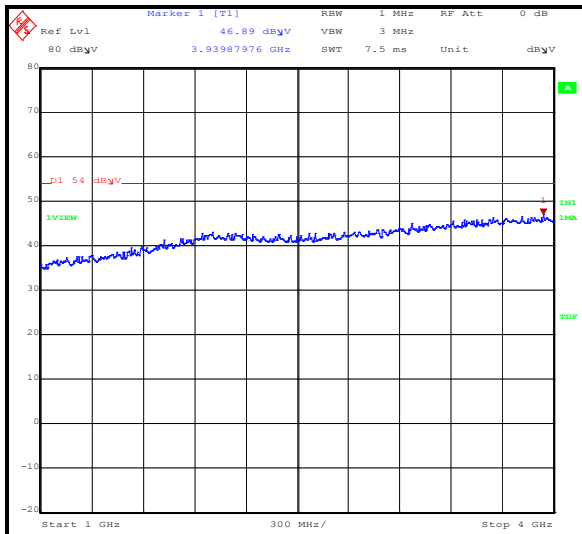
Results:

Frequency (MHz)	Antenna Polarity	Peak Level (dBμV/m)	Average Limit (dBμV/m)	Margin (dB)	Result
3939.880	Vertical	46.9	54.0	7.1	Complied

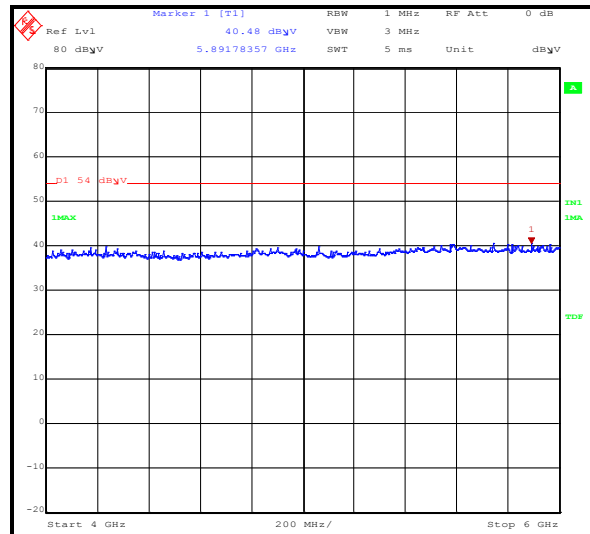
Note(s):

1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss.
2. Pre-scans above 1 GHz were performed in a fully anechoic chamber (RFI Asset Number K0002) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the test chamber floor in the centre of the chamber turntable. All measurement antennas were placed at a fixed height of 1.5 metres above the test chamber floor, in line with the EUT. Final measurements above 1 GHz were performed in a semi-anechoic chamber (RFI Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
3. No spurious emissions were detected above the noise floor of the measuring receiver therefore the highest peak noise floor reading of the measuring receiver was recorded as shown in the table above. The peak level was compared to the average limit as opposed to being compared to the peak limit because this is the more onerous limit.

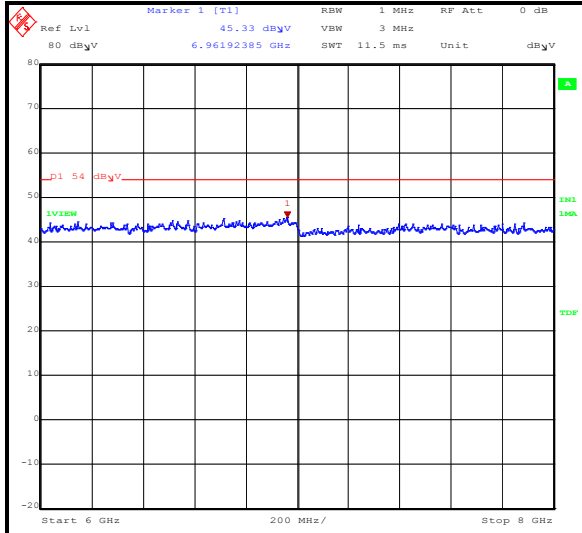
Receiver/Idle Mode Radiated Spurious Emissions (continued)



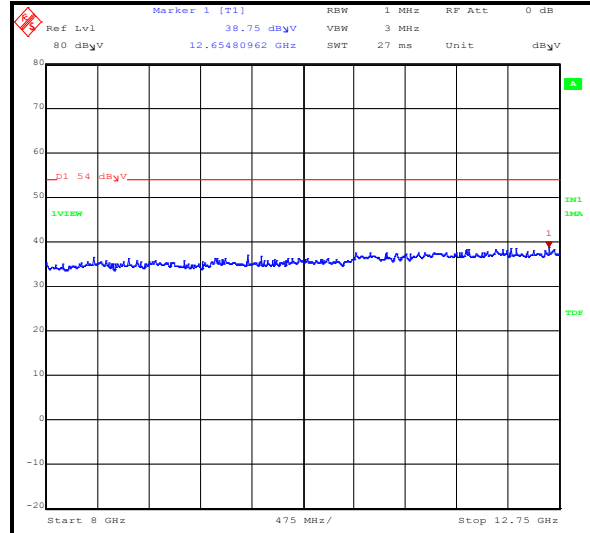
Title: 85982
Comment A: RADIATED SPURIOUS EMISSIONS STANDBY/IDLE MODE
Date: 29.MAR.2012 16:11:14



Title: 85982
Comment A: RADIATED SPURIOUS EMISSIONS STANDBY/IDLE MODE
Date: 29.MAR.2012 16:24:50



Title: 85982
Comment A: RADIATED SPURIOUS EMISSIONS STANDBY/IDLE MODE
Date: 29.MAR.2012 16:38:14



Title: 85982
Comment A: RADIATED SPURIOUS EMISSIONS STANDBY/IDLE MODE
Date: 29.MAR.2012 16:50:02

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

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

Test Engineer:	Andrew Edwards	Test Date:	24 April 2012
Test Sample Serial No:	ES000003		

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

Environmental Conditions:

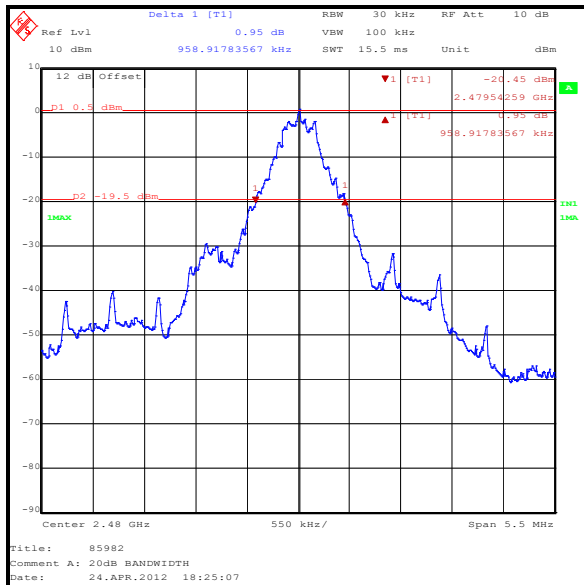
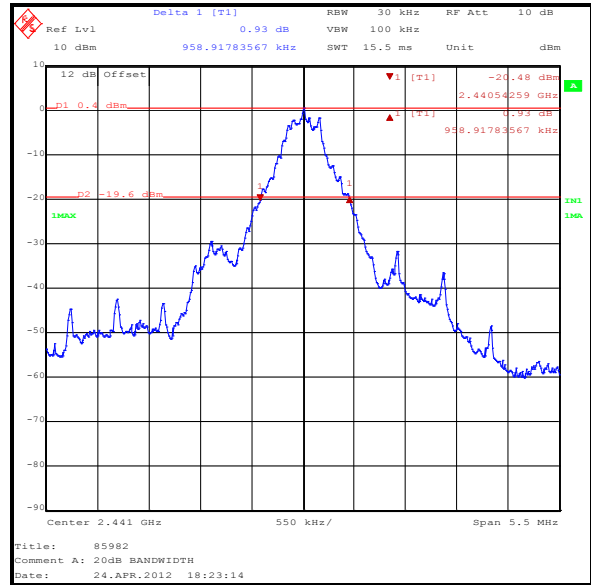
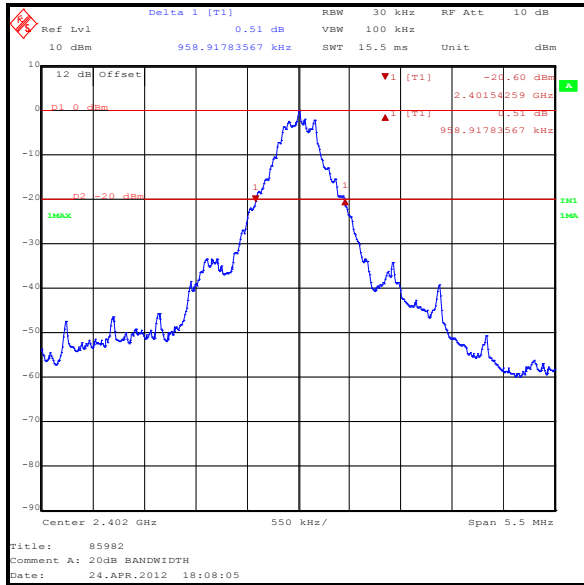
Temperature (°C):	23
Relative Humidity (%):	21

Results DH5:

Channel	20 dB Bandwidth (kHz)
Bottom	958.918
Middle	958.918
Top	958.918

Transmitter 20 dB Bandwidth (continued)

Results DH5:



5.2.4. Transmitter Carrier Frequency Separation

Test Summary:

Test Engineer:	Andrew Edwards	Test Date:	24 April 2012
Test Sample Serial No:	ES000003		

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

Environmental Conditions:

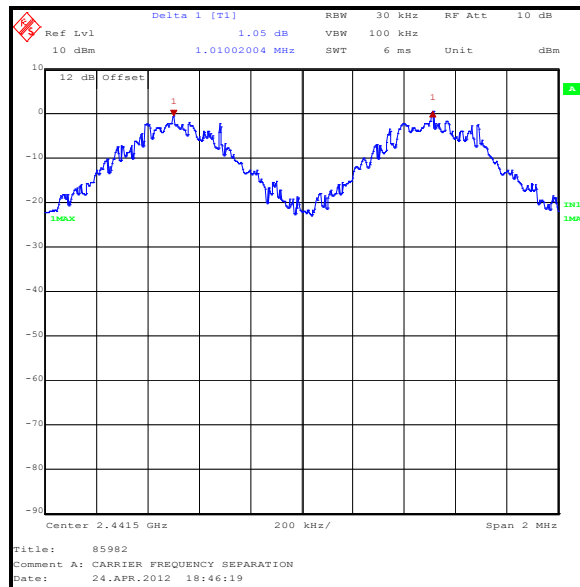
Temperature (°C):	23
Relative Humidity (%):	21

Results: DH5

Carrier Frequency Separation (kHz)	Limit ($2/3$ of 20 dB BW) (kHz)	Margin (kHz)	Result
1010.002	639.279	370.723	Complied

Note(s):

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



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

Test Engineer:	Andrew Edwards	Test Date:	24 April 2012
Test Sample Serial No:	ES000003		

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 (%):	21

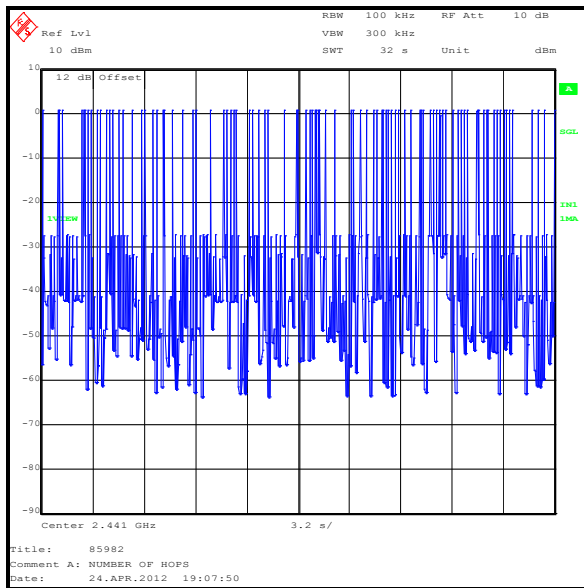
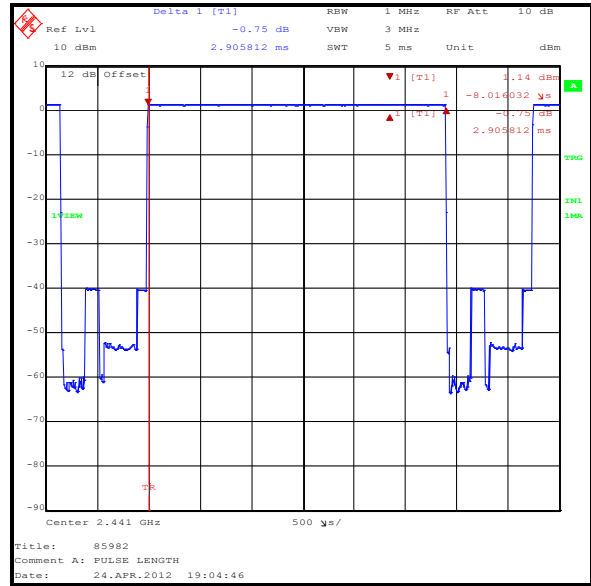
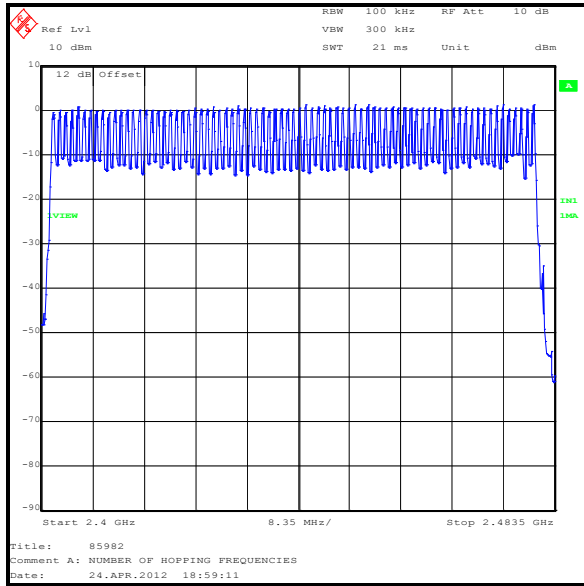
Results:

Emission Width (μs)	Number of Hops in 31.6 Seconds	Average Time of Occupancy (s)	Limit (s)	Margin (s)	Result
2905.812	83	0.2412	0.4	0.1588	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)



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

Test Engineer:	Andrew Edwards	Test Date:	24 April 2012
Test Sample Serial No:	ES000003		

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 (%):	21

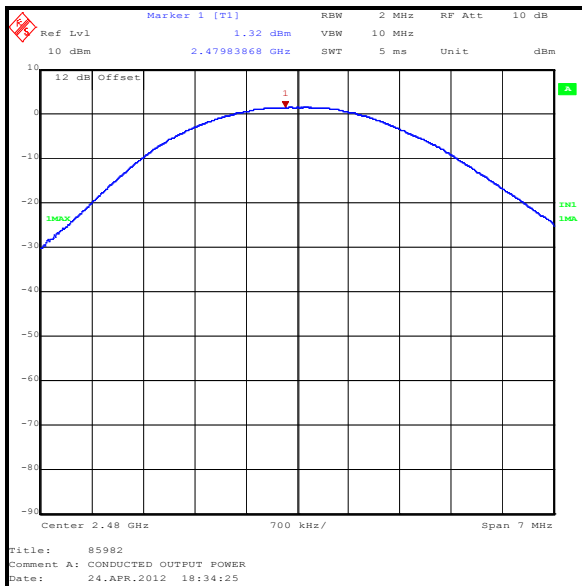
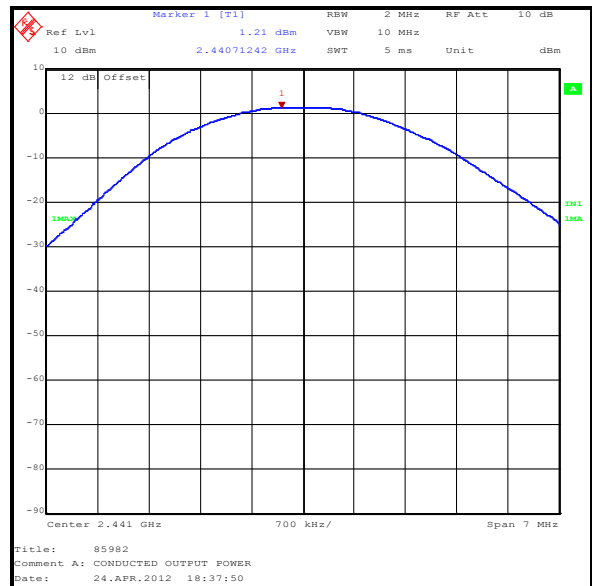
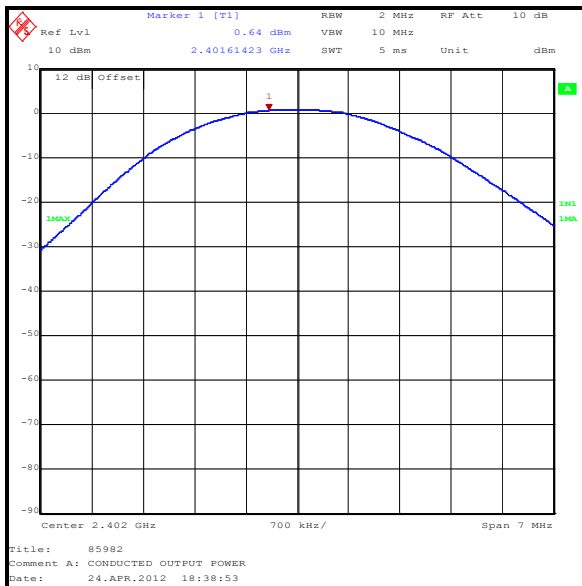
Results: DH5

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	0.6	30.0	29.4	Complied
Middle	1.2	30.0	28.8	Complied
Top	1.3	30.0	28.7	Complied

Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	0.6	5.0	5.6	36.0	30.4	Complied
Middle	1.2	5.0	6.2	36.0	29.8	Complied
Top	1.3	5.0	6.3	36.0	29.7	Complied

Transmitter Maximum Peak Output Power (continued)

Results: Basic Rate DH5



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

Test Engineer:	Nick Steele	Test Date:	25 April 2012
Test Sample Serial No:	ES000002		

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

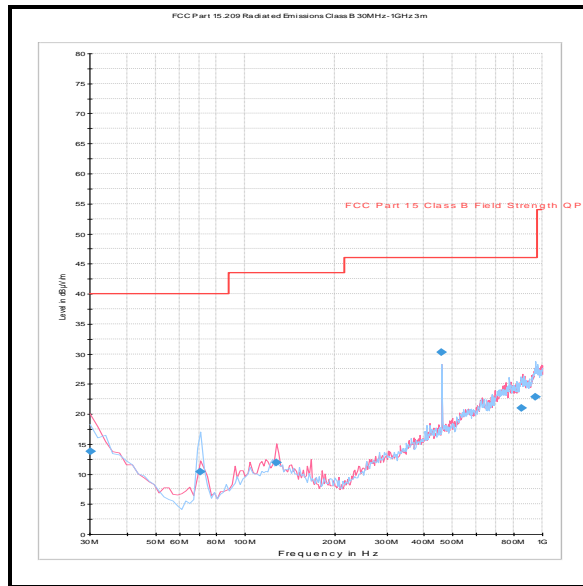
Results: Quasi-Peak DH5

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
30.250	Vertical	13.8	40.0	26.2	Complied
70.490	Horizontal	10.3	40.0	29.7	Complied
127.632	Vertical	12.0	43.5	31.5	Complied
458.806	Horizontal	30.3	46.0	15.7	Complied
853.983	Vertical	21.0	46.0	25.0	Complied
949.704	Horizontal	22.9	46.0	23.1	Complied

Note(s):

1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss
2. The 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:	Andrew Edwards	Test Date:	29 March 2012
Test Sample Serial No:	ES000001		

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):	25
Relative Humidity (%):	20

Results: Peak Bottom Channel DH5

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
4804.133	Horizontal	51.7	74.0	22.3	Complied

Results: Average Bottom Channel DH5

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
4804.133	Horizontal	44.0	54.0	10.0	Complied

Results: Peak Middle Channel DH5

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
4881.614	Horizontal	47.4	74.0	26.6	Complied

Results: Average Middle Channel DH5

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
4881.614	Horizontal	39.6	54.0	14.4	Complied

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

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
4960.266	Horizontal	47.1	74.0	26.9	Complied

Results: Average Top Channel DH5

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
4960.266	Horizontal	38.3	54.0	15.7	Complied

Results: Peak Hopping Mode DH5

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
4808.092	Horizontal	50.8	74.0	23.2	Complied

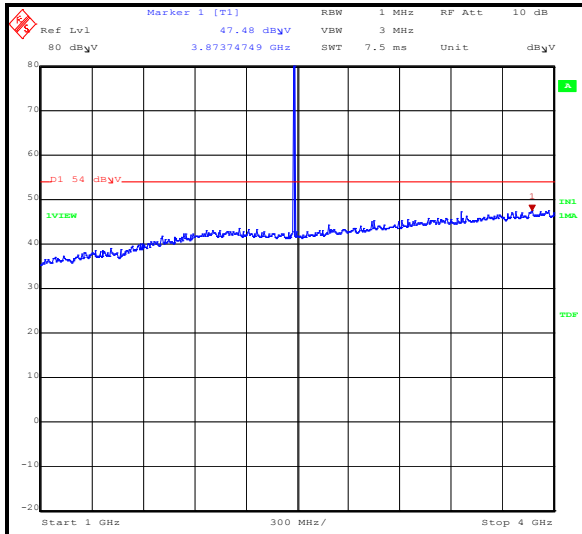
Results: Average Hopping Mode DH5

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
4808.092	Horizontal	31.4	54.0	22.6	Complied

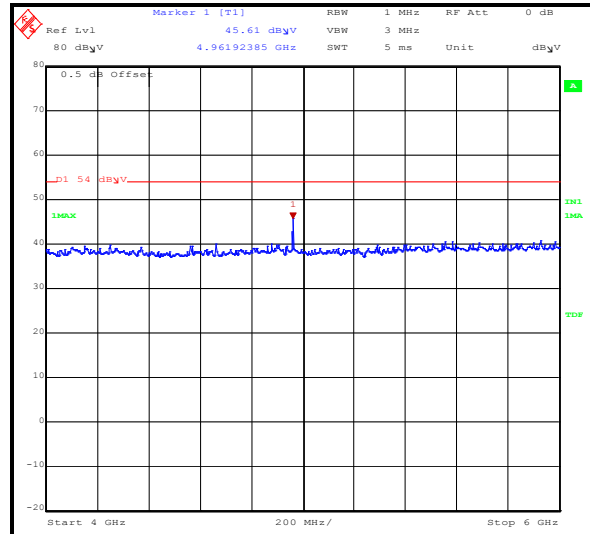
Note(s):

1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss
2. The emission shown on the 1 GHz to 4 GHz plot is the EUT fundamental at 2480 MHz.
3. All other emissions shown on the pre-scan plot were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor.
4. Pre-scans above 1 GHz were performed in a fully anechoic chamber (RFI Asset Number K0002) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the test chamber floor in the centre of the chamber turntable. All measurement antennas were placed at a fixed height of 1.5 metres above the test chamber floor, in line with the EUT. Final measurements above 1 GHz were performed in a semi-anechoic chamber (RFI Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.

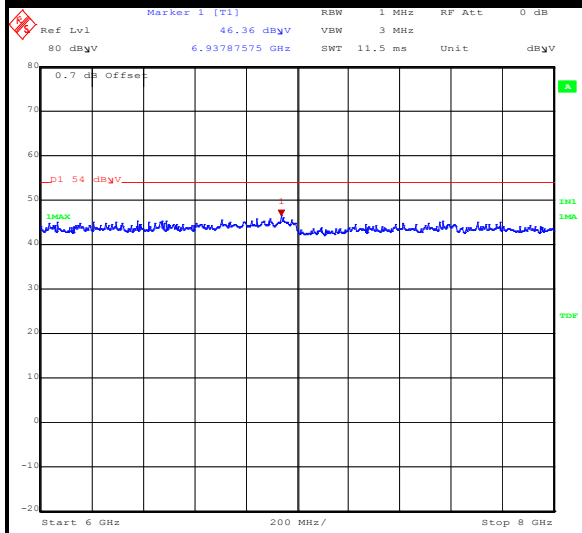
Transmitter Radiated Emissions (continued)



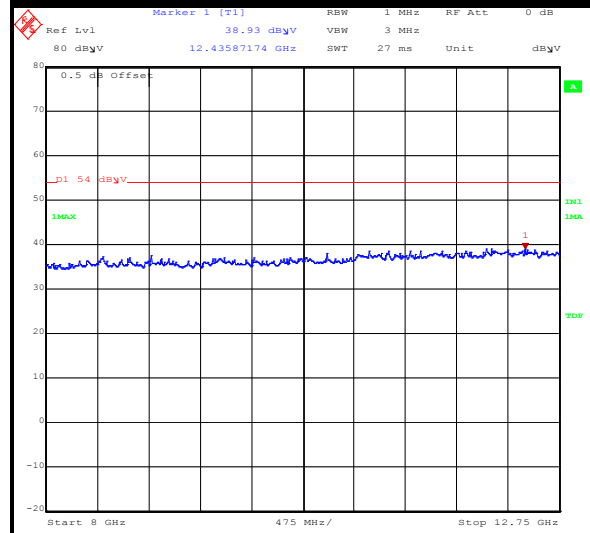
Title: 85982
Comment A: RADIATED SPURIOUS EMISSIONS TX MODE TOP CHANNEL
Date: 29.MAR.2012 18:33:58



Title: 85982
Comment A: RADIATED SPURIOUS EMISSIONS TX MODE TOP CHANNEL
Date: 29.MAR.2012 17:48:42

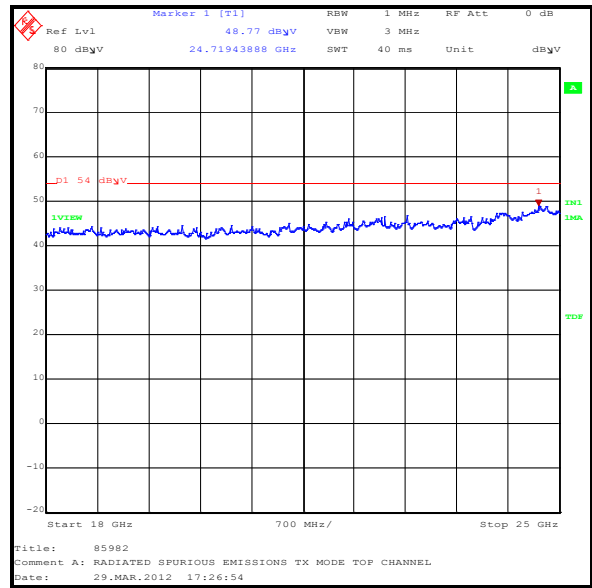
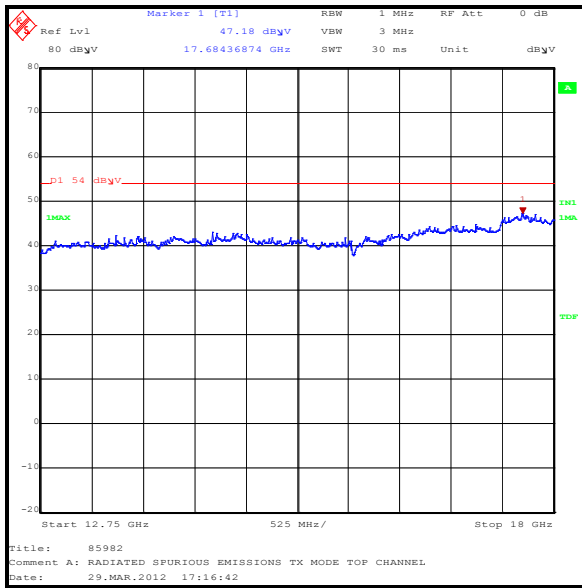


Title: 85982
Comment A: RADIATED SPURIOUS EMISSIONS TX MODE TOP CHANNEL
Date: 29.MAR.2012 17:40:29



Title: 85982
Comment A: RADIATED SPURIOUS EMISSIONS TX MODE TOP CHANNEL
Date: 29.MAR.2012 17:09:40

Transmitter Radiated Emissions (continued)



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

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

Test Engineer:	Andrew Edwards	Test Date:	29 March 2012
Test Sample Serial No:	ES000001		

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):	25
Relative Humidity (%):	20

Results: Static Mode DH5

Frequency (MHz)	Antenna Polarity	Peak Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2399.499	Vertical	42.8	67.4*	24.6	Complied
2400.0	Vertical	41.9	67.4*	25.5	Complied
2483.5	Vertical	47.8	74.0	26.2	Complied

Frequency (MHz)	Antenna Polarity	Average Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2483.5	Vertical	34.5	54.0	19.5	Complied

Results: Hopping Mode DH5

Frequency (MHz)	Antenna Polarity	Peak Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2399.599	Vertical	42.9	68.4*	25.5	Complied
2400.0	Vertical	42.6	68.4*	25.8	Complied
2483.5	Vertical	47.8	74.0	26.2	Complied

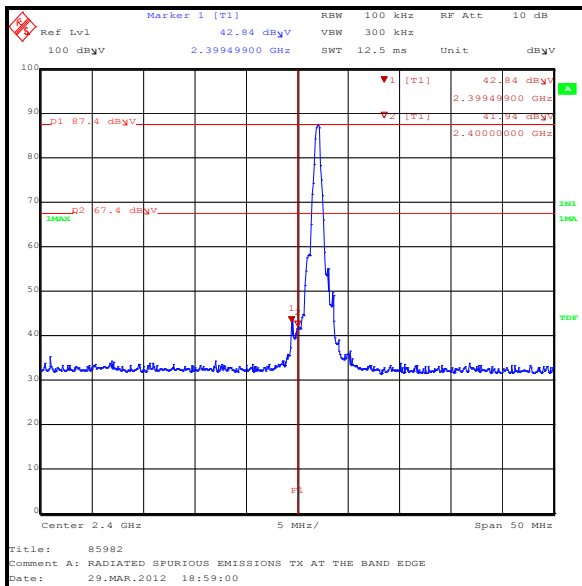
Frequency (MHz)	Antenna Polarity	Average Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2483.5	Vertical	30.0	54.0	24.0	Complied

Note(s):

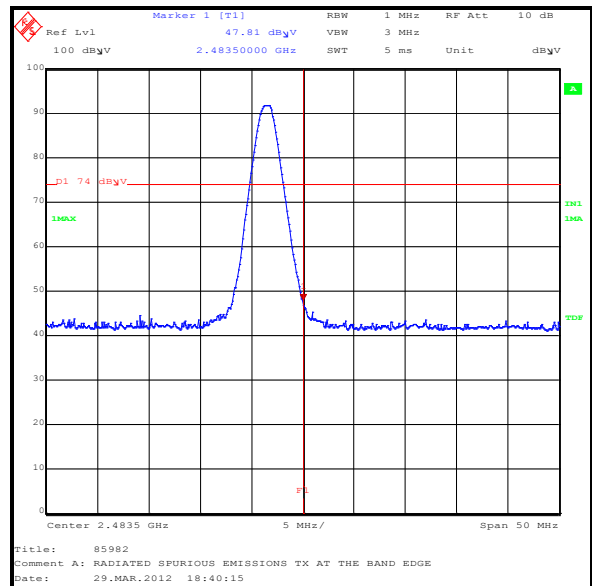
1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss.
2. * -20 dBc limit

Transmitter Band Edge Radiated Emissions (continued)

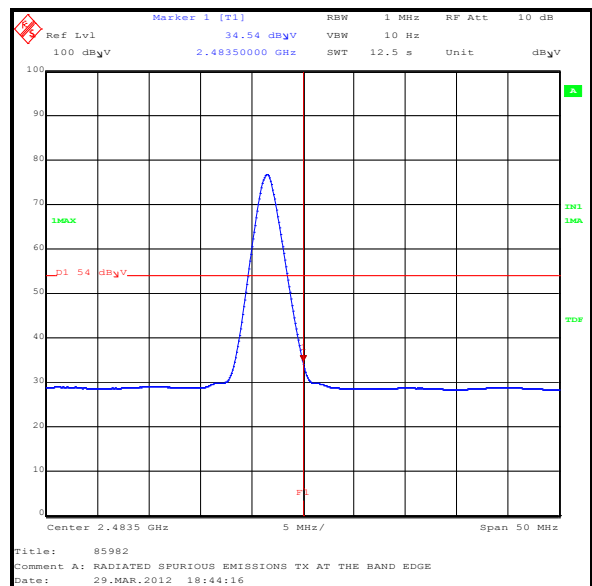
DH5 Static Mode



Lower Band Edge Peak Static



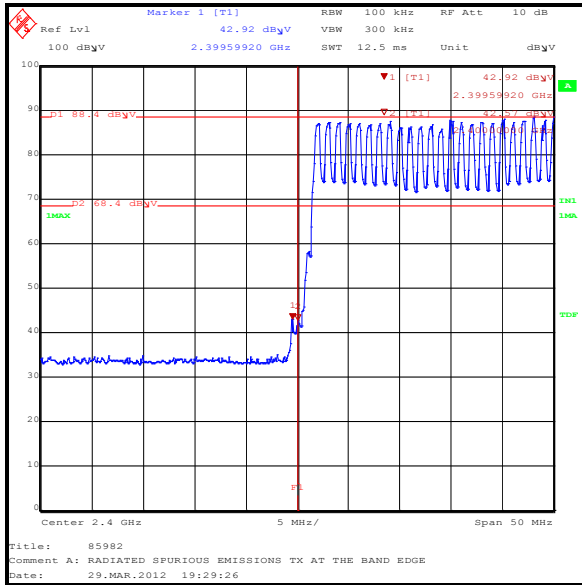
Upper Band Edge Peak Static



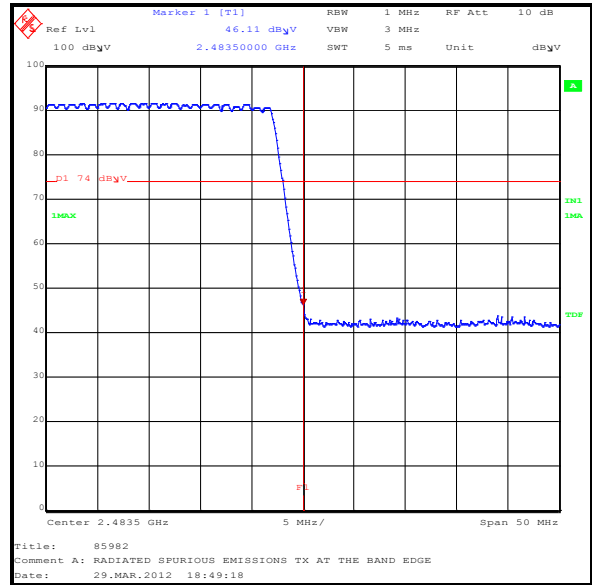
Upper Band Edge Average Static

Transmitter Band Edge Radiated Emissions (continued)

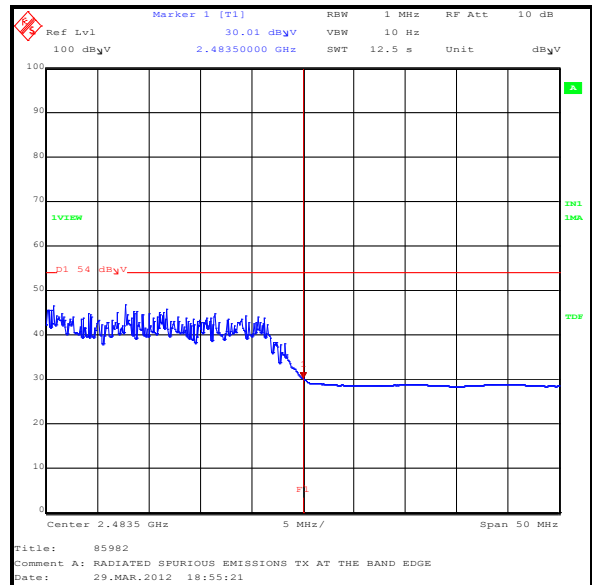
DH5 Hopping Mode



Lower Band Edge Peak Hopping



Upper Band Edge Peak Hopping



Upper Band Edge Average Hopping

6. Measurement Uncertainty

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document "approximately" is interpreted as meaning "effectively" or "for most practical purposes".

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
AC Conducted Spurious Emissions	0.15 MHz to 30 MHz	95%	±3.25 dB
Maximum Peak Output Power	2.4 GHz to 2.4835 GHz	95%	±2.94 dB
Carrier Frequency Separation	2.4 GHz to 2.4835 GHz	95%	±0.92 ppm
Average Time of Occupancy	2.4 GHz to 2.4835 GHz	95%	±0.3 ns
20 dB Bandwidth	2.4 GHz to 2.4835 GHz	95%	±0.92 ppm
Radiated Spurious Emissions	30 MHz to 26.5 GHz	95%	±2.94 dB

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

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (months)
A067	LISN	Rohde & Schwarz	ESH3-Z5	890603/002	02 Jun 2012	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	09 Oct 2012	12
A1818	Antenna	EMCO	3115	00075692	09 Oct 2012	12
A1830	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100668	25 Feb 2013	12
A1834	Attenuator	Hewlett Packard	8491B	10444	29 Jan 2013	12
A1975	High Pass Filter	AtlanTecRF	AFH-03000	090424010	15 Mar 2013	12
A2072	Directional Coupler	Narda	4242B	03549	Calibrated before use	-
A253	Antenna	Flann Microwave	12240-20	128	09 Oct 2012	12
A254	Antenna	Flann Microwave	14240-20	139	09 Oct 2012	12
A255	Antenna	Flann Microwave	16240-20	519	09 Oct 2012	12
A256	Antenna	Flann Microwave	18240-20	400	09 Oct 2012	12
A436	Antenna	Flann	20240-20	330	09 Oct 2012	12
A553	Antenna	Chase	CBL6111A	1593	15 Feb 2013	12
G0543	Amplifier	Sonoma	310N	230801	13 Apr 2013	12
K0001	5m Semi-Anechoic Chamber	Rainford EMC	N/A	N/A	29 May 2012	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	09 Oct 2012	12
M1124	Test Receiver	Rohde & Schwarz	ESI26	100046K	29 Jun 2012	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	03 Feb 2013	12
M1379	Test Receiver	Rohde & Schwarz	ESIB7	100330	20 Sep 2012	12
M1632	Bluetooth tester	Tescom	TC-3000A	3000A310042	Calibration not required	-

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