TEST REPORT
FROM
RFI GLOBAL SERVICES LTD

Test of: DataCollector915

FCC ID: Q8Q-SRDC

To: FCC Part 15.247: 2012 Subpart C

Test Report Serial No.:
RFI-RPT-RP86123JD02A V4.0

Version 4.0 Supersedes All Previous Versions

This Test Report Is Issued Under The Authority Of John Newell, Group Quality Manager: 	
Checked By:	Sarah Williams
Signature: 	
Date of Issue:	08 May 2013

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Table of Contents

1. Customer Information

Company Name:	Kenure Developments Ltd
Address:	Springlakes Deadbrook Lane Aldershot Hampshire GU12 4UH United Kingdom

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR15.247
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2012: 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) 2012: 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) 2012: Part 15 Subpart C (Intentional Radiators) - Sections 15.207 and 15.209
Site Registration:	209735
Location of Testing:	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
Test Dates:	03 September 2012 to 12 September 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 15.207	Transmitter AC Conducted Emissions	✓
Part 15.247(a)(1)(i)	Transmitter 20 dB Bandwidth	✓
Part 15.247(a)(1)	Transmitter Carrier Frequency Separation	✓
Part 15.247(a)(1)(i)	Transmitter Number of Hopping Frequencies and Average Time of Occupancy	✓
Part 15.247(b)(2)	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:	Smart Route DataCollector
Model Name or Number:	DataCollector915
Serial Number:	4
Hardware Version Number:	#B
Software Version Number:	1.00FCC
FCC ID:	Q8Q-SRDC

3.2. Description of EUT

The equipment under test was a 915 MHz Wireless Fixed AMR Reader operating over the 902 MHz to 928 MHz band. The EUT uses a total of 50 channels for communications with a 500 kHz channel spacing.

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:	FHSS		
Power Supply Requirement:	Nominal	12 VDC	
Type of Unit:	Transceiver		
Channel Spacing:	500 kHz		
Modulation:	2-FSK		
Data Rate:	Max 320 kbps, min 100 kbps		
Maximum Conducted Output Power:	28.0 dBm		
Transmit Frequency Range:	902 MHz to 928 MHz		
Transmit Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	1	902.5
	Middle	26	915.0
	Top	50	927.5
Receive Frequency Range:	902 MHz to 928 MHz		
Receive Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	1	902.5
	Middle	26	915.0
	Top	50	927.5

3.5. Support Equipment

The following support equipment was used to exercise the EUT during testing:

Description:	Bench power supply (S0537)
Brand Name:	TTI
Model Name or Number:	EL302D
Serial Number:	249928

Description:	Laptop
Brand Name:	Dell
Model Name or Number:	Inspiron
Serial Number:	Not Marked or Stated

Description:	1 Metre USB lead
Brand Name:	N/A
Model Name or Number:	N/A
Serial Number:	N/A

3.6. Antenna

Type	Stated Gain (dBi)	Manufacturer	Part No.
Dipole (External)	2.2	Antenna Factor	ANT-916-CW-HWR-SMA

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

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

- Transmitter tests were performed with the EUT transmitting at full power on the bottom, middle and top channels or frequency hopping across the band of operation.
- Receiver/idle tests were performed with the EUT in receive mode.

4.2. Configuration and Peripherals

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

- A bench power supply was used to provide power to the EUT for all tests including AC conducted.
- A bespoke application on a laptop PC was used to enable or disable frequency hopping mode as required.
- The PC was disconnected from the EUT once frequency hopping had been enabled or disabled as required for the relevant test.
- An external switch on the EUT was used to select bottom, middle or top channels when in static mode.
- The EUT could be changed between static channels using a 0.15 Metre Cable with a button on the end which was attached by the customer for testing purposes.
- Radiated spurious emissions tests had the antenna connected to the EUT.
- The antenna was removed for all other 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.

In accordance with UKAS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

5.2. Test Results

5.2.1. Receiver/Idle AC Conducted Spurious Emissions

Test Summary:

Test Engineer:	Mark Percival	**Test Date:**	12 September 2012
Test Sample Serial No:	4		

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

Environmental Conditions:

Temperature (°C):	21
Relative Humidity (%):	42

Results: Quasi Peak / Live

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.150	Live	19.3	66.0	46.7	Complied
7.579	Live	11.0	60.0	49.0	Complied
13.798	Live	12.0	60.0	48.0	Complied
14.370	Live	12.0	60.0	48.0	Complied
16.719	Live	10.4	60.0	49.6	Complied
17.232	Live	9.9	60.0	50.1	Complied

Results: Average / Live

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.190	Live	13.6	54.0	40.4	Complied
10.824	Live	5.8	50.0	44.2	Complied
13.569	Live	6.7	50.0	43.3	Complied
13.870	Live	6.0	50.0	44.0	Complied
14.487	Live	9.3	50.0	40.7	Complied
18.303	Live	12.6	50.0	37.4	Complied

Receiver/Idle AC Conducted Spurious Emissions (continued)

Results: Quasi Peak / Neutral

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.181	Neutral	18.8	64.4	45.6	Complied
0.550	Neutral	7.6	56.0	48.4	Complied
13.492	Neutral	11.5	60.0	48.5	Complied
13.915	Neutral	11.1	60.0	48.9	Complied
14.361	Neutral	11.9	60.0	48.1	Complied
17.313	Neutral	10.8	60.0	49.2	Complied

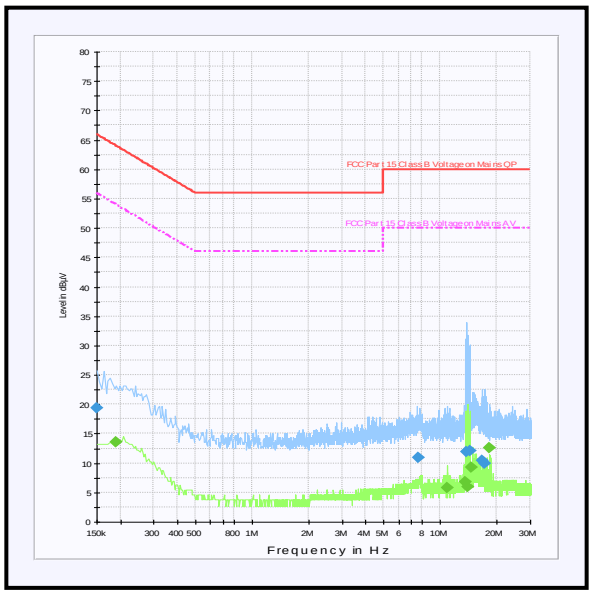
Results: Average / Neutral

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.199	Neutral	13.9	53.6	39.7	Complied
13.474	Neutral	7.9	50.0	42.1	Complied
13.879	Neutral	8.0	50.0	42.0	Complied
15.256	Neutral	8.0	50.0	42.0	Complied
18.244	Neutral	14.8	50.0	35.2	Complied

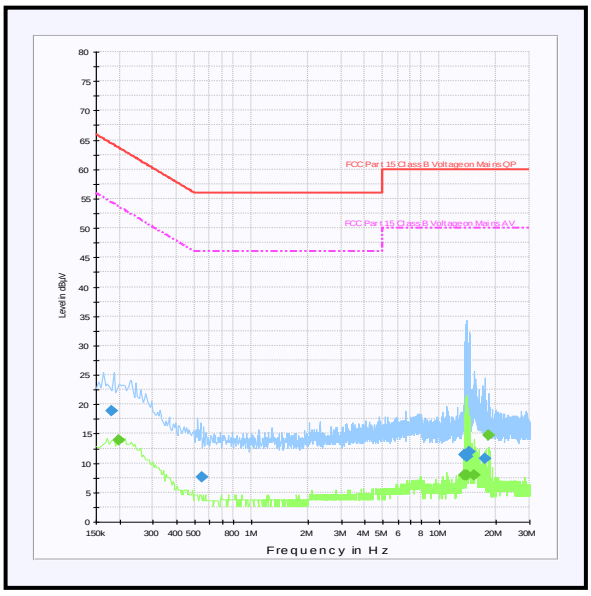
Note(s):

1. A bench power supply was used to provide power to the EUT.

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:	Mark Percival	**Test Date:**	04 September 2012
Test Sample Serial No:	4		

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 (%):	50

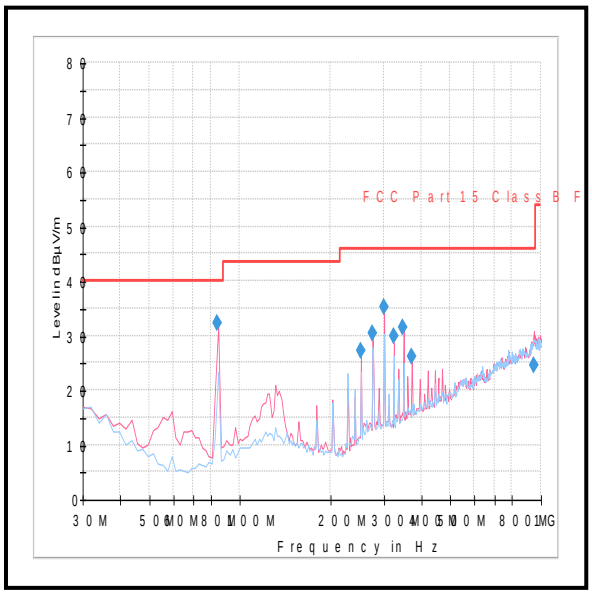
Results: Quasi-Peak

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
83.981	Vertical	32.3	40.0	7.7	Complied
251.992	Vertical	27.3	46.0	18.7	Complied
275.992	Vertical	30.3	46.0	15.7	Complied
299.983	Vertical	35.2	46.0	10.8	Complied
323.983	Vertical	29.8	46.0	16.2	Complied
347.975	Vertical	31.4	46.0	14.6	Complied
371.994	Vertical	26.0	46.0	20.0	Complied
947.182	Vertical	24.5	46.0	21.5	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:	Andrew Edwards	**Test Date:**	06 September 2012
Test Sample Serial No:	4		

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 4.7 GHz

Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	40

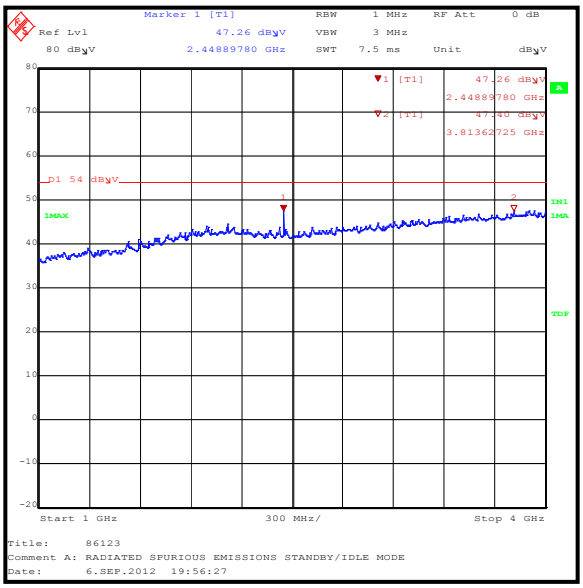
Results: Bottom channel

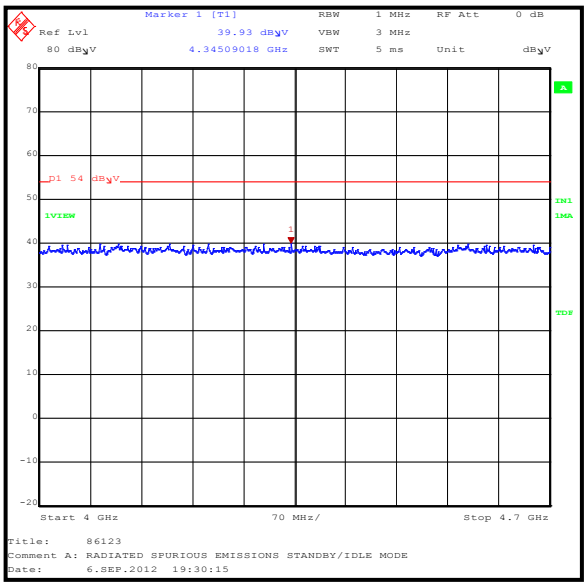
Frequency (MHz)	Antenna Polarity	Peak Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
3813.627	Vertical	47.4	54.0	6.6	Complied

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 at 2.449 GHz was measured and found to be an ambient emission.
3. No spurious emissions were detected above the noise floor of the measuring receiver therefore the highest peak noise floor reading of the measuring receiver was recorded as shown in the table above. The peak level was compared to the average limit as opposed to being compared to the peak limit because this is the more onerous limit.
4. Pre-scans above 1 GHz were performed in a fully anechoic chamber (RFI Asset Number K0002) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the test chamber floor in the centre of the chamber turntable. All measurement antennas were placed at a fixed height of 1.5 metres above the test chamber floor, in line with the EUT. Final measurements above 1 GHz were performed in a semi-anechoic chamber (RFI Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.

Receiver/Idle Mode Radiated Spurious Emissions (continued)





5.2.3. Transmitter AC Conducted Spurious Emissions

Test Summary:

Test Engineer:	Mark Percival	**Test Date:**	12 September 2012
Test Sample Serial No:	4		

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 (%):	42

Results: Quasi Peak / Live

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.154	Live	21.3	65.8	44.5	Complied
0.222	Live	19.5	62.7	43.2	Complied
0.433	Live	10.2	57.2	47.0	Complied
10.828	Live	9.1	60.0	50.9	Complied
13.866	Live	10.3	60.0	49.7	Complied
17.308	Live	12.2	60.0	47.8	Complied
18.303	Live	20.5	60.0	39.5	Complied

Results: Average / Live

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.204	Live	13.9	53.4	39.5	Complied
7.872	Live	11.4	50.0	38.6	Complied
13.951	Live	6.0	50.0	44.0	Complied
14.455	Live	6.0	50.0	44.0	Complied
16.782	Live	9.9	50.0	40.1	Complied
18.244	Live	16.7	50.0	33.3	Complied

Transmitter AC Conducted Spurious Emissions (continued)

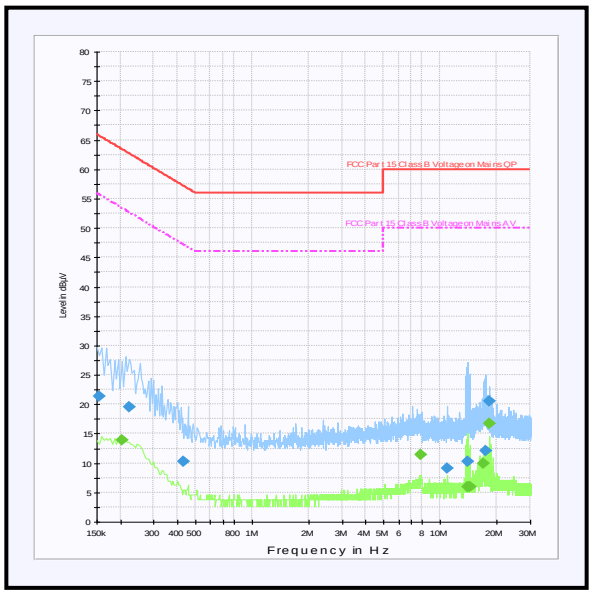
Results: Quasi Peak / Neutral

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.154	Neutral	21.3	65.8	44.5	Complied
0.636	Neutral	7.6	56.0	48.4	Complied
13.569	Neutral	10.6	60.0	49.4	Complied
13.866	Neutral	9.7	60.0	50.3	Complied
14.334	Neutral	14.3	60.0	45.7	Complied
17.340	Neutral	12.0	60.0	48.0	Complied
18.294	Neutral	11.3	60.0	48.8	Complied

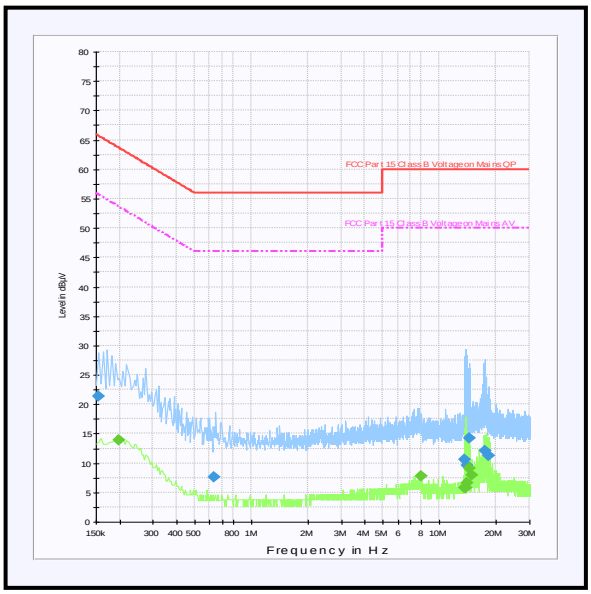
Results: Average / Neutral

Frequency (MHz)	Line	Level (dBµV)	Limit (dBµV)	Margin (dB)	Result
0.199	Neutral	13.9	53.6	39.7	Complied
7.998	Neutral	7.8	50.0	42.2	Complied
13.573	Neutral	5.9	50.0	44.1	Complied
13.731	Neutral	5.9	50.0	44.1	Complied
13.767	Neutral	5.9	50.0	44.1	Complied
13.983	Neutral	6.6	50.0	43.4	Complied
14.334	Neutral	9.2	50.0	40.8	Complied
14.806	Neutral	8.0	50.0	42.0	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:	Mark Percival	**Test Date:**	03 September 2012
Test Sample Serial No:	4		

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

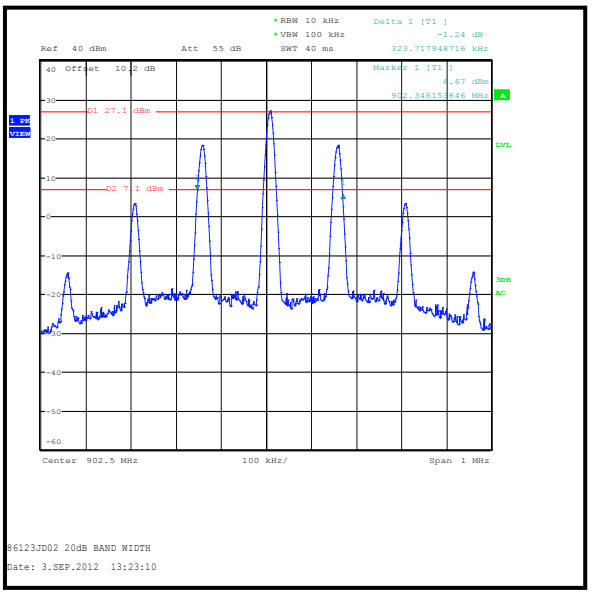
Environmental Conditions:

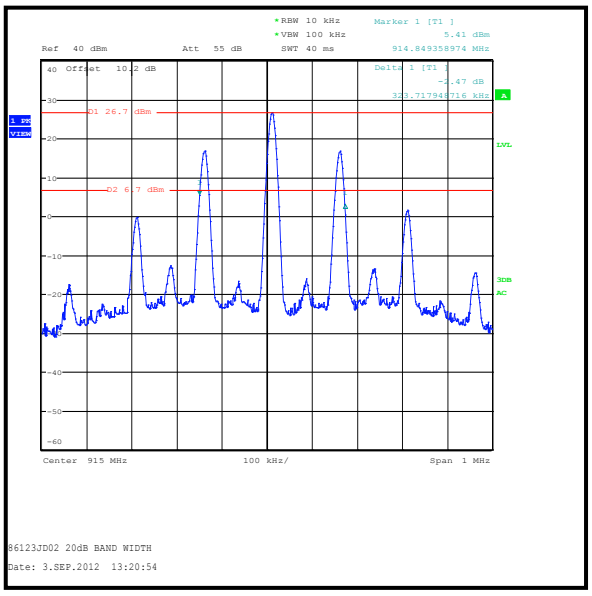
Temperature (°C):	21
Relative Humidity (%):	59

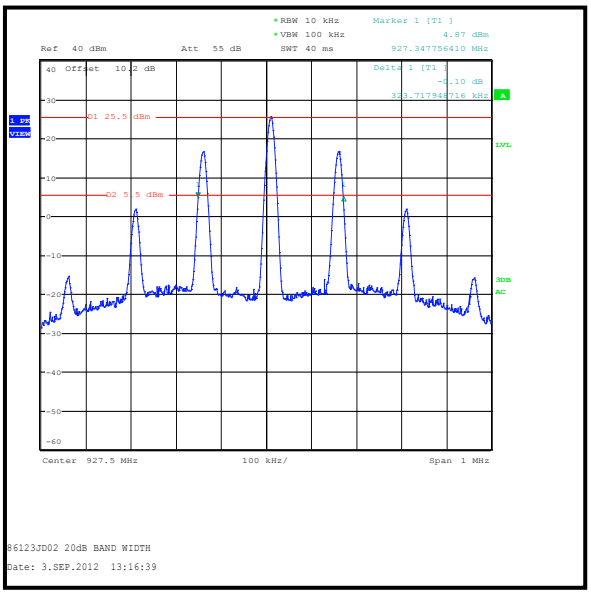
Results:

Channel	20 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	323.718	500	176.282	Complied
Middle	323.718	500	176.282	Complied
Top	323.718	500	176.282	Complied

Transmitter 20 dB Bandwidth (continued)







5.2.5. Transmitter Carrier Frequency Separation

Test Summary:

Test Engineer:	Mark Percival	**Test Date:**	03 September 2012
Test Sample Serial No:	4		

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

Environmental Conditions:

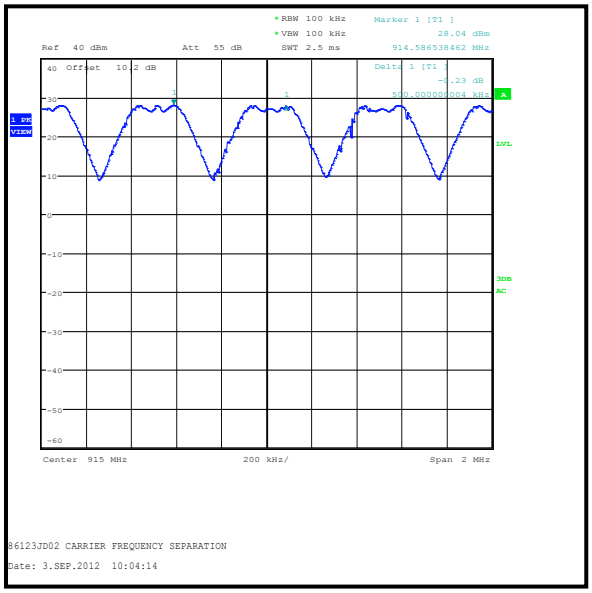
Temperature (°C):	21
Relative Humidity (%):	59

Results:

Carrier Frequency Separation (kHz)	Limit* (kHz)	Margin (kHz)	Result
500.000	323.718	176.282	Complied

Note(s):

1. *Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. The 20 dB bandwidth measured for the middle channel 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	**Test Date:**	03 September 2012
Test Sample Serial No:	4		

FCC Part:	15.247(a)(1)(i)
Test Method Used:	As detailed in ANSI C63.10 Sections 7.7.3 and 7.7.4

Environmental Conditions:

Temperature (°C):	21
Relative Humidity (%):	59

Results: Number of Hopping Frequencies:

Number of Hops	Limit (Hops)	Note	Result
50	≥25	1	Complied

Results: Average Time of Occupancy

Emission Width (ms)	Average Time of Occupancy* (s)	Limit (s)	Margin (s)	Note	Result
6.346	0.050768	0.4	0.349232	1	Complied

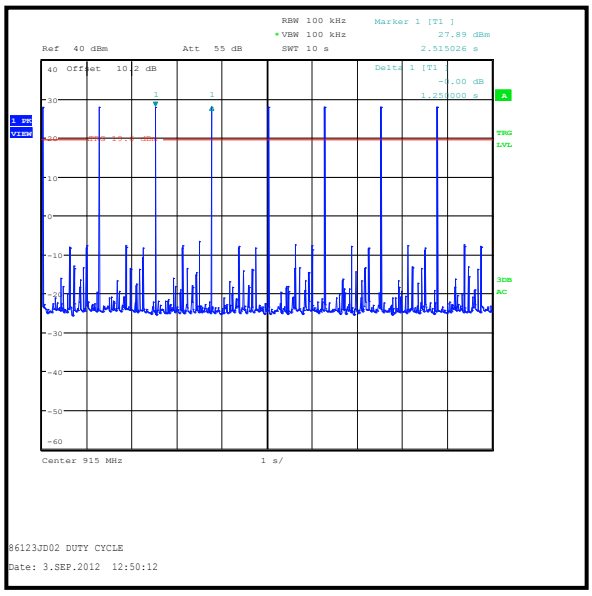
Note(s):

1. For a hopping channel with 20 dB bandwidth equal to, or greater than 250 kHz.

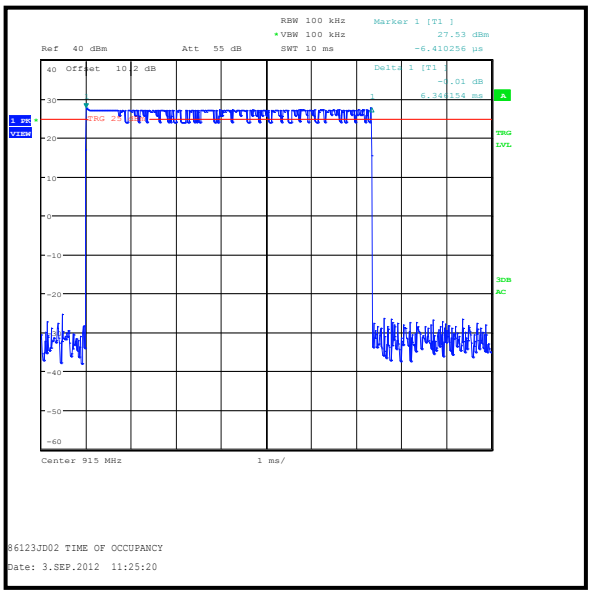
Limit:

If the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.

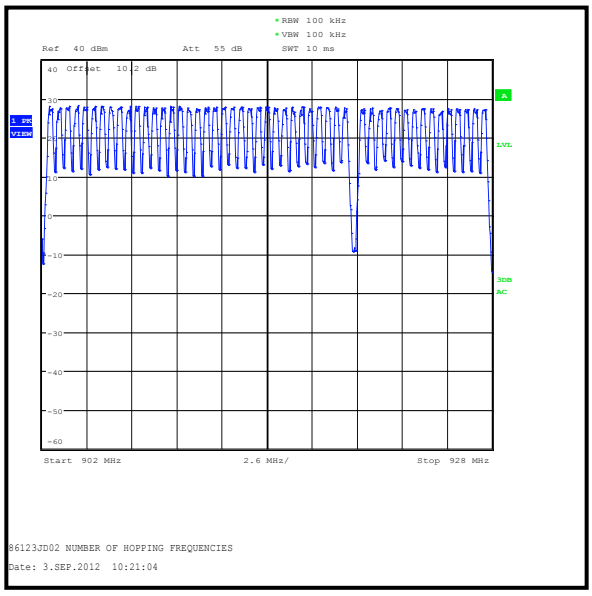
Transmitter Time of Occupancy (continued)



TX on time in 10 second period



TX on period



Number Of Hopping Channels

5.2.7. Transmitter Maximum Peak Output Power

Test Summary:

Test Engineer:	Mark Percival	**Test Date:**	03 September 2012
Test Sample Serial No:	4		

FCC Part:	15.247(b)(2)
Test Method Used:	As detailed in ANSI C63.10 Section 6.10.1 and Sections 6.3 and 6.6 referencing ANSI C63.4 (see note below)

Environmental Conditions:

Temperature (°C):	21
Relative Humidity (%):	59

Results:

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Note	Result
Bottom	28.0	30.0	2.0	1	Complied
Middle	27.5	30.0	2.5	1	Complied
Top	26.4	30.0	3.6	1	Complied

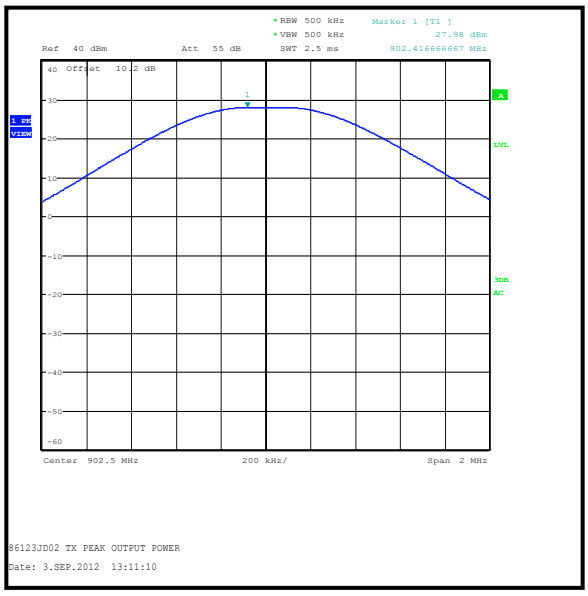
Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Note	Result
Bottom	28.0	2.2	30.2	36.0	5.8	1	Complied
Middle	27.5	2.2	29.7	36.0	6.3	1	Complied
Top	26.4	2.2	28.6	36.0	7.4	1	Complied

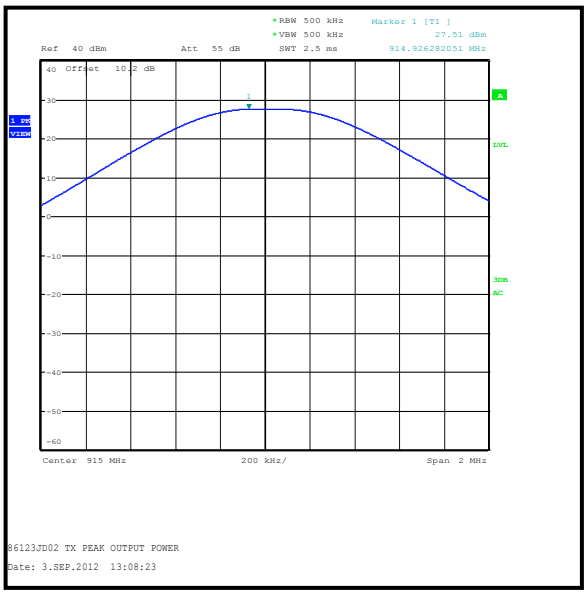
Channel	EIRP (dBm)	EIRP to ERP Conversion Factor	ERP (dBm)	De Facto ERP Limit (dBd)	Margin (dB)	Note	Result
Bottom	30.2	2.15	28.05	33.85	5.8	1	Complied
Middle	29.7	2.15	27.55	33.85	6.3	1	Complied
Top	28.6	2.15	26.45	33.85	7.4	1	Complied

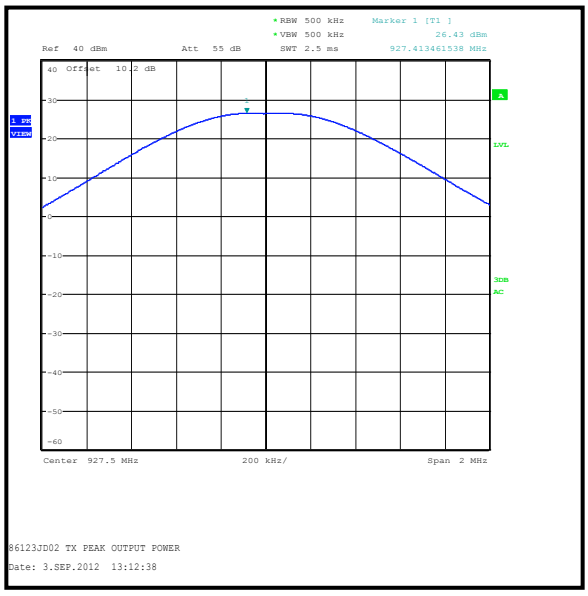
Note(s):

1. For frequency hopping systems employing at least 50 hopping channels.
2. The radiated results are shown as ERP and EIRP for completeness.

Transmitter Maximum Peak Output Power (continued)







5.2.8. Transmitter Radiated Emissions

Test Summary:

Test Engineer:	Mark Percival	**Test Date:**	04 September 2012
Test Sample Serial No:	4		

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 (%):	50

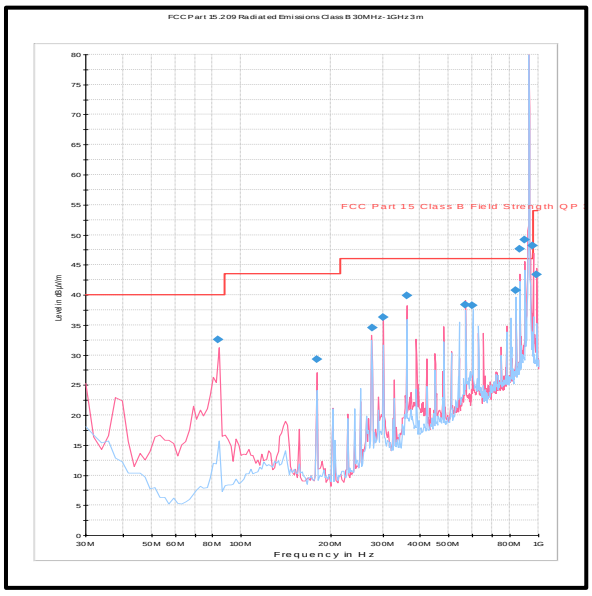
Results: Quasi-Peak

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
275.993	Vertical	34.6	46.0	11.4	Complied
987.475	Vertical	43.4	54.0	10.6	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 at 927.426 MHz shown on the 30 MHz to 1 GHz plot is the EUT fundamental.
3. 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.
4. 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.
5. 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

Test Summary:

Test Engineer:	Mark Percival	**Test Date:**	06 September 2012
Test Sample Serial No:	4		

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 9.30 GHz

Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	24

Results: Peak / Bottom Channel

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2707.517	Vertical	52.6	74.0	21.4	Complied
3610.297	Vertical	53.7	74.0	20.3	Complied
4513.097	Vertical	52.0	74.0	22.0	Complied
8121.743	Vertical	45.6	74.0	28.4	Complied

Results: Average / Bottom Channel

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2707.617	Vertical	28.7	54.0	25.3	Complied
3610.129	Vertical	29.8	54.0	24.2	Complied
4512.517	Vertical	28.1	54.0	25.9	Complied
8122.755	Vertical	21.7	54.0	32.3	Complied

Transmitter Radiated Emissions (continued)

Results: Peak / Middle Channel

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2745.279	Vertical	53.9	74.0	20.1	Complied
3660.344	Horizontal	52.3	74.0	21.7	Complied
4574.571	Vertical	47.1	74.0	26.9	Complied
8234.215	Horizontal	42.3	74.0	31.7	Complied

Results: Average / Middle Channel

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2745.127	Vertical	30.0	54.0	24.0	Complied
3660.920	Vertical	28.4	54.0	25.6	Complied
4575.131	Vertical	23.2	54.0	30.8	Complied
8235.130	Horizontal	18.4	54.0	35.6	Complied

Results: Peak / Top Channel

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2782.596	Vertical	53.5	74.0	20.5	Complied
3709.814	Horizontal	51.0	74.0	23.0	Complied
4638.081	Vertical	44.7	74.0	29.3	Complied
8346.484	Horizontal	42.7	74.0	31.3	Complied

Results: Average / Top Channel

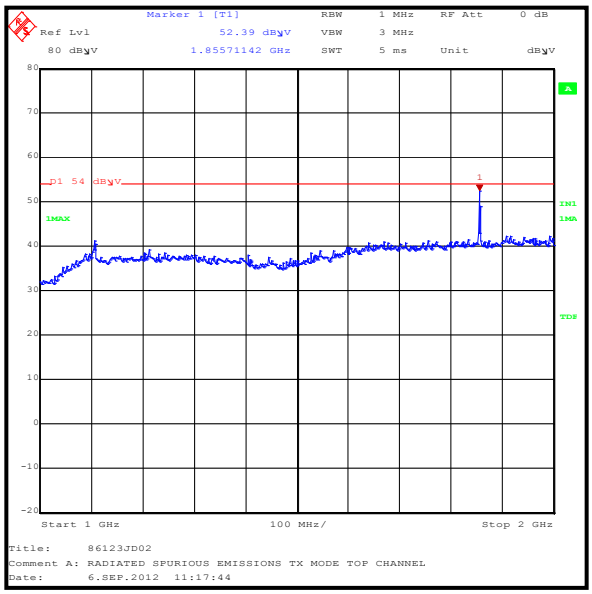
Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
2782.593	Vertical	29.6	54.0	24.4	Complied
3.710.112	Horizontal	27.1	54.0	26.9	Complied
4637.611	Vertical	20.8	54.0	33.2	Complied
8347.472	Horizontal	18.8	54.0	35.2	Complied

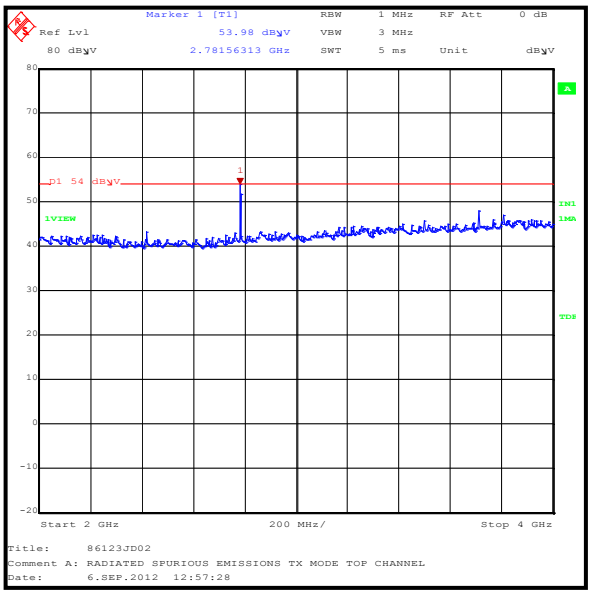
Transmitter Radiated Emissions (continued)

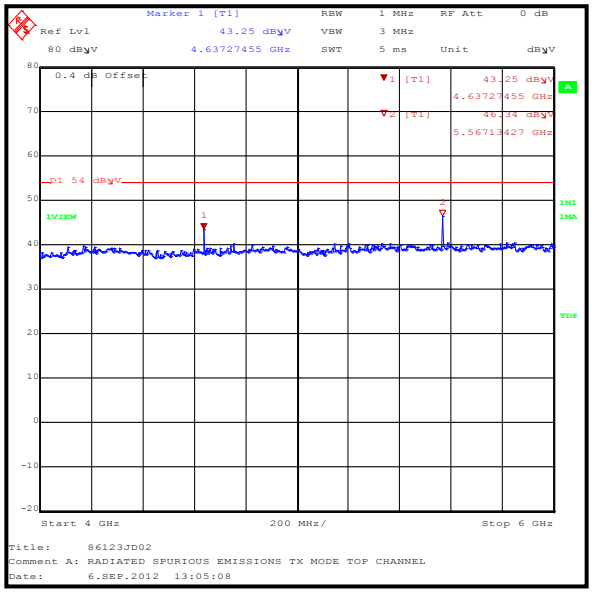
Note(s):

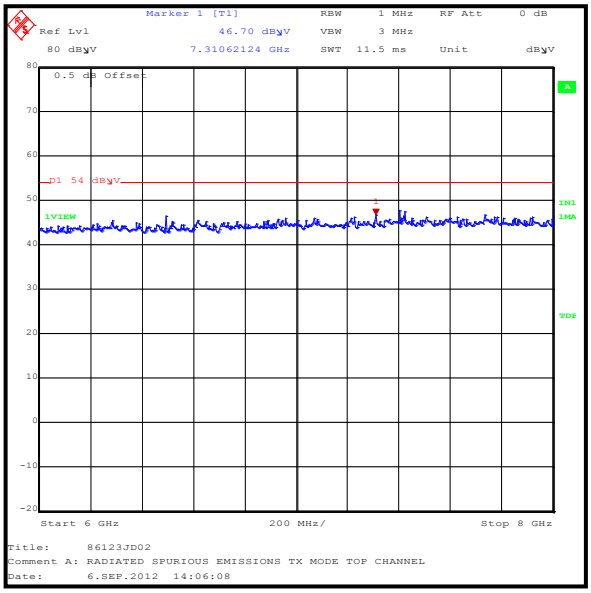
1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss
2. All other emissions shown on the pre-scan plot were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor.
3. 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.
4. Average levels of emissions within the restricted bands were obtained using the test method and procedure stated in ANSI C63.10 Section 7.5. A duty cycle correction factor of -23.9 dB was used.

Transmitter Radiated Emissions (continued)

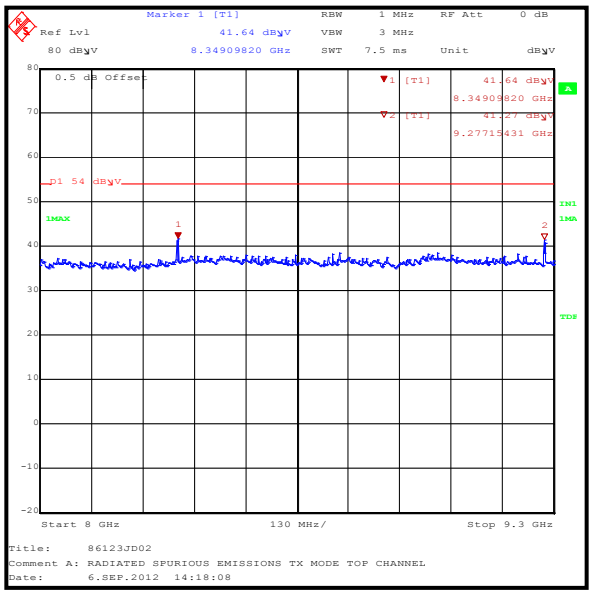








Transmitter Radiated Emissions (continued)



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

5.2.9. Transmitter Duty Cycle

Test Summary:

Test Engineer:	Mark Percival	**Test Date:**	03 September 2012
Test Sample Serial No:	4		

FCC Part:	15.247(d) & 15.209(a)
Test Method Used:	As detailed in ANSI C63.10 Section 7.5

Environmental Conditions:

Temperature (°C):	21
Relative Humidity (%):	59

Results:

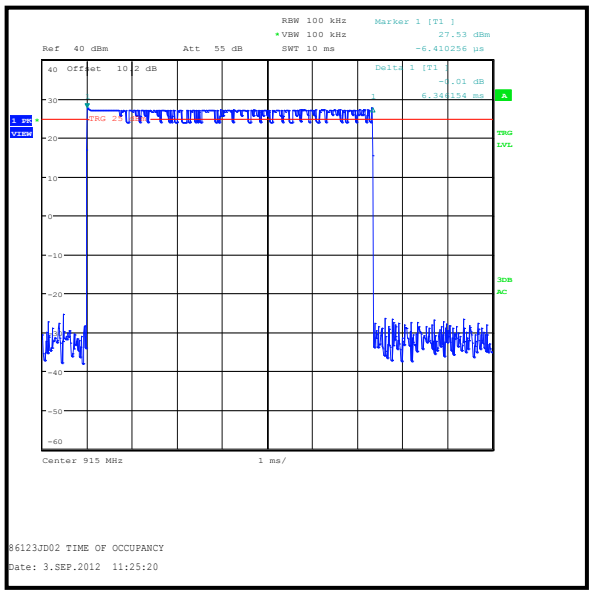
Total Pulse Duration (mS)	Duty Cycle (dB)
6.346154	23.9

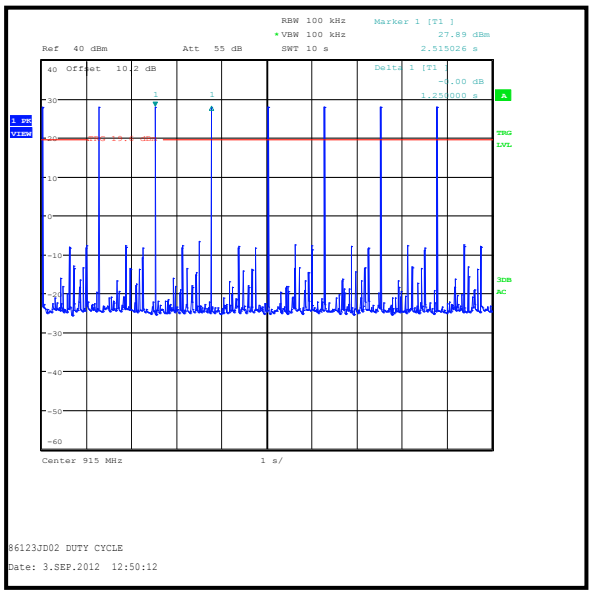
Silent Period (seconds)
1.250

Note(s):

1. In order to assist with the determination of the average level of fundamental and spurious emissions field strength, measurements were made of duty cycle to determine the transmission duration and the silent period time of the transmitter.
2. The EUT transmits a burst of 6.346 milliseconds within one 100 mS period.
3. The calculation for the duty cycle is 20 $\log_{10}$(6.346154/100ms) = -23.9 dB.

Transmitter Duty Cycle (continued)





5.2.10. Transmitter Band Edge Radiated Emissions

Test Summary:

Test Engineer:	Mark Percival	**Test Date:**	06 September 2012
Test Sample Serial No:	4		

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

Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	44

Results: Static Mode

Frequency (MHz)	Peak Level (dBµV/m)	-20 dBc Limit (dBµV/m)	Margin (dB)	Result
902	91.1	101.0	9.9	Complied
928	91.2	100.3	9.1	Complied

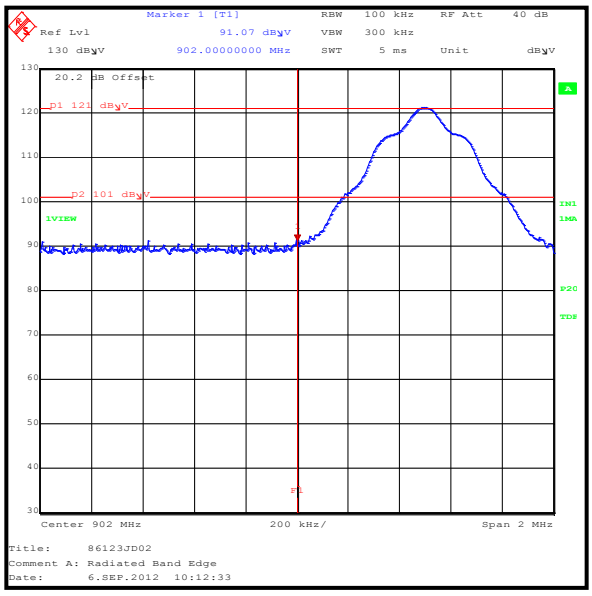
Results: Hopping Mode

Frequency (MHz)	Peak Level (dBµV/m)	-20 dBc Limit (dBµV/m)	Margin (dB)	Result
902	89.2	101.4	12.2	Complied
928	90.7	100.3	9.6	Complied

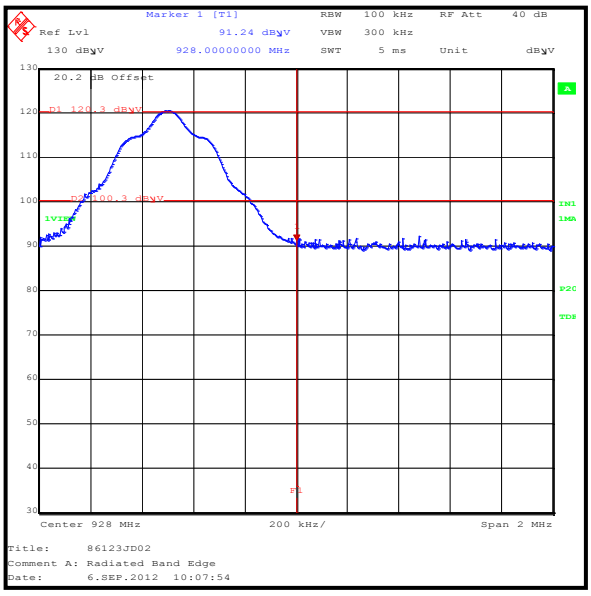
Note(s):

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

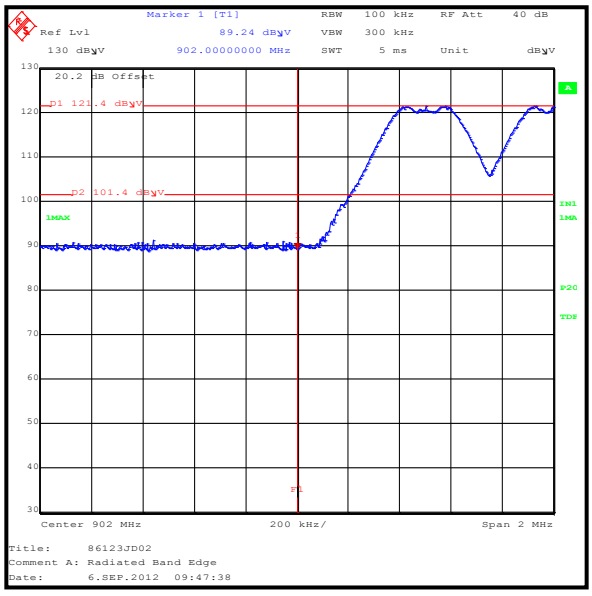
Transmitter Band Edge Radiated Emissions (continued)



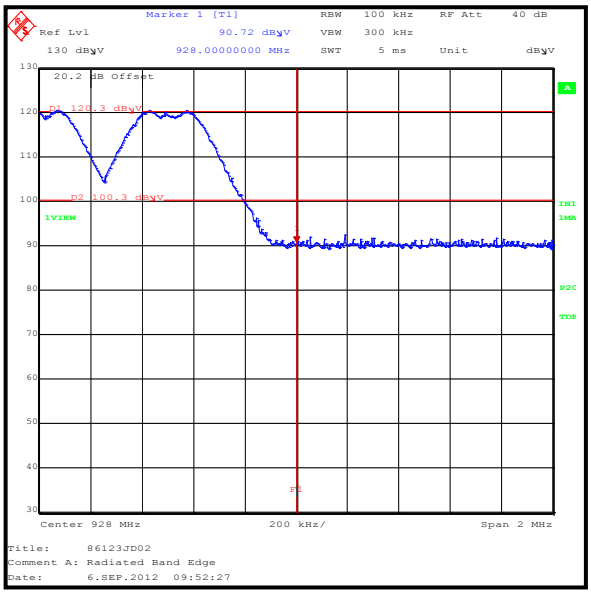
Lower Band Edge / Bottom Channel / Static



Upper Band Edge / Top Channel / Static



Lower Band Edge / Bottom Channel / Hopping



Upper Band Edge / Top Channel / 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
Radiated Maximum Peak Output Power	902 MHz to 928 MHz	95%	±2.94 dB
Carrier Frequency Separation	902 MHz to 928 MHz	95%	±0.92 ppm
Average Time of Occupancy	902 MHz to 928 MHz	95%	±0.3 ns
Duty Cycle	902 MHz to 928 MHz	95%	±0.3 ns
20 dB Bandwidth	902 MHz to 928 MHz	95%	±0.92 ppm
Radiated Spurious Emissions	30 MHz to 10 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)
A057	High Pass Filter	Aerial Facilities Ltd	HP-950-5N	4389B	08 Jul 2013	24
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
A1932	High Pass Filter	Atlan TechRF	AFH-02000	20r-JFBD04-002	15 Mar 2013	12
A228	Power Divider	Suhner Electronics Ltd	4901/01/A	N/A	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
A553	Antenna	Chase	CBL6111A	1593	15 Feb 2013	12
A649	LISN	Rohde & Schwarz	ESH3-Z5	825562/008	19 Feb 2013	12
G0543	Amplifier	Sonoma	310N	230801	15 Oct 2012	3
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	30 Sep 2012	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	09 Oct 2012	12
M1124	Spectrum Analyser	Rohde & Schwarz	ESI26	100046K	14 Aug 2013	12
M1267	Thermal Power Sensor	Rohde & Schwarz	NRV-Z52	100155	07 Jun 2013	12
M1269	Multimeter	Fluke	179	90250210	30 Jul 2013	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	03 Feb 2013	12
M1379	Test Receiver	Rohde & Schwarz	ESIB7	100330	20 Oct 2012	12
M1630	Test Receiver	Rohde & Schwarz	ESU40	100233	13 Jan 2013	12
M199	Power Meter	Rohde & Schwarz	NRVS	827023/075	07 Jun 2013	12
M260	Signal Generator	Rohde & Schwarz	1035.5005.02	829076/008	14 Jun 2013	12
S0537	Dual Power Supply	TTI	EL302D	249928	Calibrated before use	-