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	Test No: <b>T4651</b>	<b>Test Report</b>	Page: 1 of 54



**dB Technology**  
|----- ( Cambridge Ltd. ) -----|

EMC  
Testing

EMC  
Consultancy

EMC  
Training

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## REPORT ON ELECTROMAGNETIC COMPATIBILITY TESTS

Performed at:  
**TWENTY PENCE TEST SITE**

Twenty Pence Road,  
Cottenham,  
Cambridge  
U.K.  
CB24 8PS

on

**Quatro Electronics Ltd**

**WDLM914HP**

dated


**10th December 2013**

### Document History

Issue	Date	Affected page(s)	Description of modifications	Revised by	Approved by
1	12/12/13		Initial release		
2	14/01/14	2	Frequency hopping changed to DSS	DB	PB
3	22/01/14	6,12,14,15,54	Added radiated measurements below 30MHz	DS	DB

Based on report template:  
v090319

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	Report No: <b>R3295</b>	FCC ID: XL8WDLM914HP	
	Issue No: <b>3</b>		
	Test No: <b>T4651</b>	<b>Test Report</b>	Page: 2 of 54

Equipment Under Test (EUT):

WDL914HP

Test Commissioned by:

Quatro Electronics Ltd  
Quatro House  
School Lane  
Lytham  
Lancashire  
FY8 5NL

Representative:

Tim Forrester

Test Started:

10th September 2013

Test Completed:

21st November 2013

Test Engineer:

Dave Smith

Date of Report:

10th December 2013

Written by: Dave Smith

Checked by: Derek Barlow

Signature:

*D. A. Smith*

Signature:

*D. Barlow*

Date: 10th December 2013

Date: 12th December 2013

**dB Technology can only report on the specific unit(s) tested at its site. The responsibility for extrapolating this data to a product line lies solely with the manufacturer.**

## Test Standards Applied


**CFR 47**

*Code of Federal Regulations: Pt 15 Subpart C - Radio Frequency Devices - Intentional Radiators*

**In particular, the rules of part 15.247 for digital spread spectrum (DSS) devices were applied.**

**CFR 47  
Class B**

*Code of Federal Regulations: Pt 15 Subpart B- Radio Frequency Devices - Unintentional Radiators*

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## Emissions Test Results Summary

### CFR 47 - Subpart C

**PASS**

Test	Port	Method	Limit	PASS/FAIL	Notes
Conducted Emissions	ac power	ANSI C63.4:2003	15.207	N/A	#1
Radiated Emissions		ANSI C63.4:2003	15.209	PASS	
Occupied Bandwidth		DA 00-705	15.247 (a)(1)(i)	PASS	
Channel Separation		DA 00-705	15.247 (a)(1)	PASS	
No. of Hopping Channels		DA 00-705	15.247 (a)(1)(i)	PASS	
Time of Occupation		DA 00-705	15.247 (a)(1)(i)	PASS	
Peak Output Power		DA 00-705	15.247 (b)(2)	PASS	
Conducted Spurious	Antenna	DA 00-705	15.247 (d)	PASS	

specs\_fccv100412


### CFR 47 - Subpart B

**PASS**

Test	Port	Method	Limit	PASS/FAIL	Notes
Conducted Emissions	ac power	ANSI C63.4:2003	FCC_B	N/A	#1
Radiated Emissions		ANSI C63.4:2003	FCC_B	PASS	

specs\_fccv100412


#1 Test not applicable because the radio module will only be used in battery powered products.

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## 1 EUT Details

### 1.1 General

The EUT was a radio transceiver module operating in the 902MHz to 928MHz band using frequency hopping.

The module is intended to be used in a range of battery powered alarm systems. The frequency hopping is controlled by the circuitry on the main alarm control board. The system supplied for testing consisted of the radio module connected to a sample alarm control board via a ribbon cable. The alarm control board is normally battery powered, but for the purposes of these tests the battery was replaced with an external bench PSU to allow continuous transmissions to be made without draining the battery.

The unit was supplied with various test modes selected by switches. There were two basic hopping modes.

HOPPING MODE 1: Close to continuous transmission - a pulse train of a duration in the order of 375msec on each channel

HOPPING MODE 2: Short pulse operation - a pulse of a duration in the order of 6.5msec on each channel.

The system was also supplied with test modes so that transmission could be fixed to just one of three frequencies covering the bottom, top and mid point of the used frequency range. These frequencies were:

Low Channel: 909 MHz


Mid Channel: 914.2 MHz

High Channel: 919.6 MHz

Radiated measurements were performed from 20MHz to 10GHz in order to cover the lowest frequency clock of 26MHz and the 10th harmonic of the highest transmit channel.

Details of the EUT and associated peripherals used during the tests are listed below. Figure 1 shows the interconnections between the EUT and peripherals.

Item	Manufacturer	Model	Description	Serial No:	Notes
1	Quatro	WDLM914HP	EUT Module		
2	Quatro	Test Board 914	alarm control board		
3	TTI	TS3022S	Bench PSU		

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## 1.2 Modifications to EUT and Peripherals

Details of any modifications that were required to achieve compliance are listed below. The modification numbers are referred to in the results sections as appropriate.

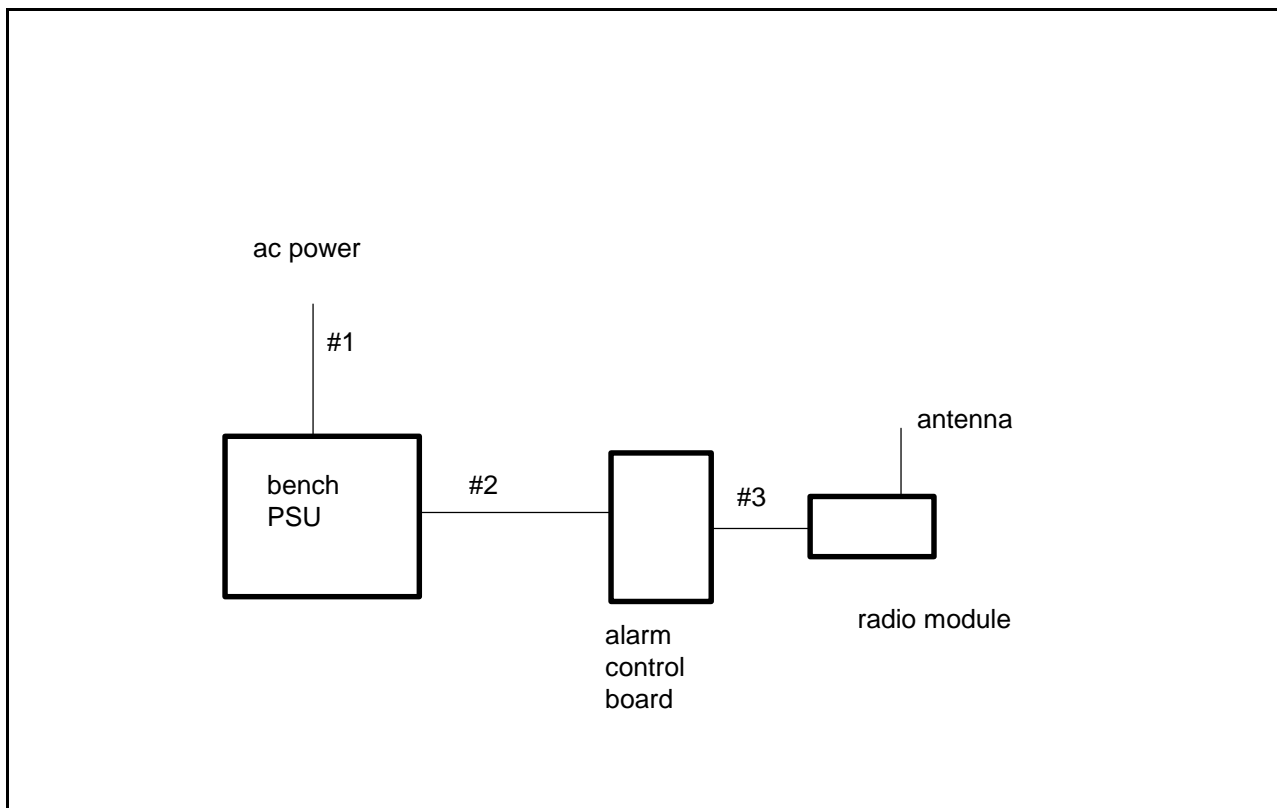
Mod No:	Details	Implemented for
0	Original unmodified unit.	Radiated Emissions
1	Additional switch added to alarm control board to provide additional test mode.	
2	Ferrite and common mode choke added to alarm control board DC power cable. This was to decouple the bench PSU which would not normally be part of the battery powered system.	

## 1.3 EUT Operating Modes

The EUT was tested in the following operating mode or modes. Generally, operating modes are chosen that will exercise the functions of the EUT as fully as possible and in a manner likely to produce maximum emission levels or susceptibility. Individual test result sheets reference the operating mode of the EUT.


Operating Mode	Details
1	Transmit mode. Fixed frequency. Pseudo random data with normal modulation.
2	Transmit mode. Hopping Mode 1. Pseudo random data with normal modulation.
3	Transmit mode. Hopping Mode 2. Pseudo random data with normal modulation.
4	Receive mode. Fixed frequency

**Figure 1 General Arrangement of EUT and Peripherals**



	Description	Type	Length	Notes
#1	Mains	Unscreened	2m	
#2	DC power	Unscreened	0.6m	
#3	Ribbon cable	Unscreened	0.18m	



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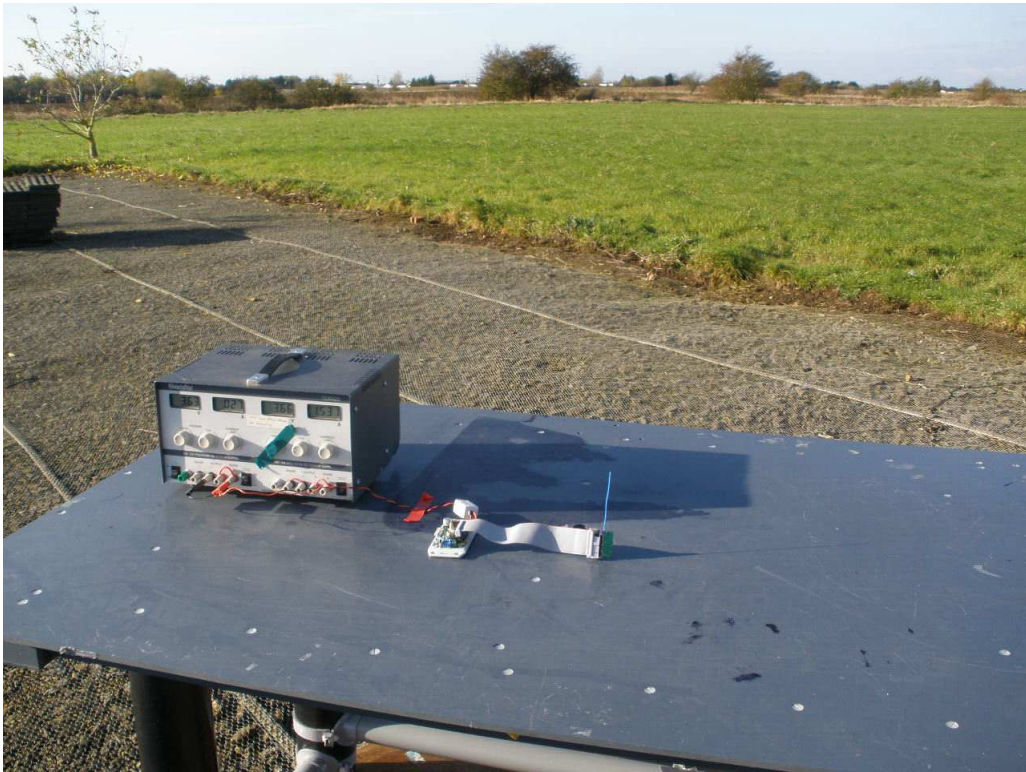
**Photograph 1 Radiated Emissions**



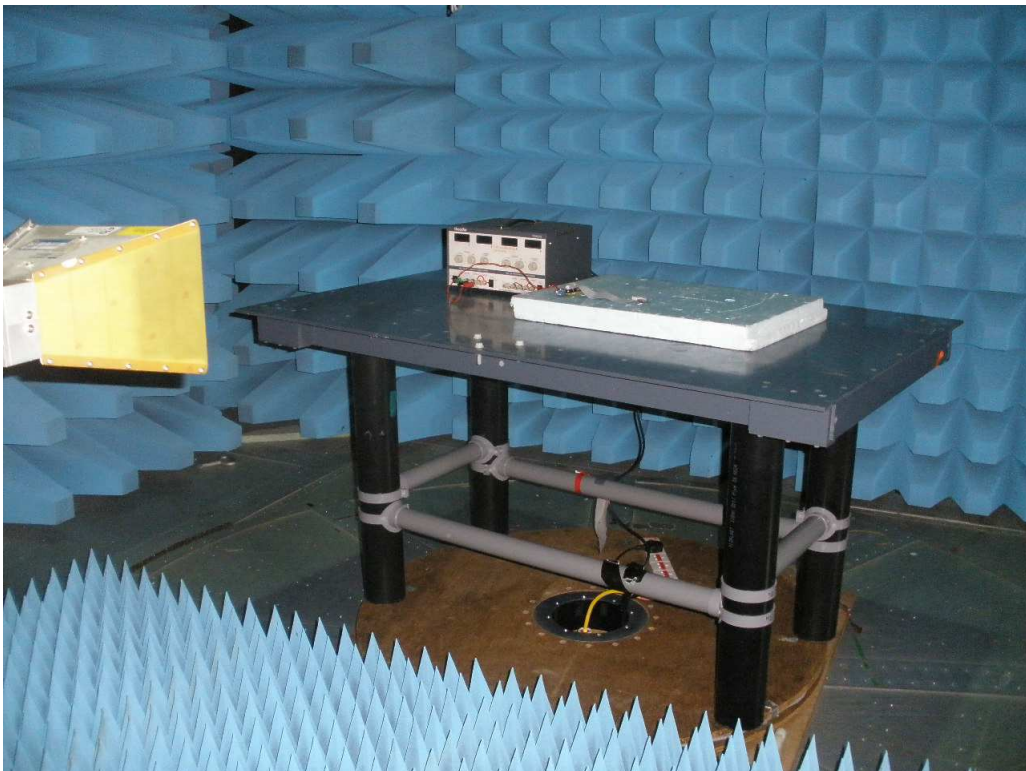
**Photograph 2 Radiated Emissions**



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Test No: <b>T4651</b>	<b>Test Report</b>		Page: 10 of 54




**Photograph 3 Radiated Emissions**



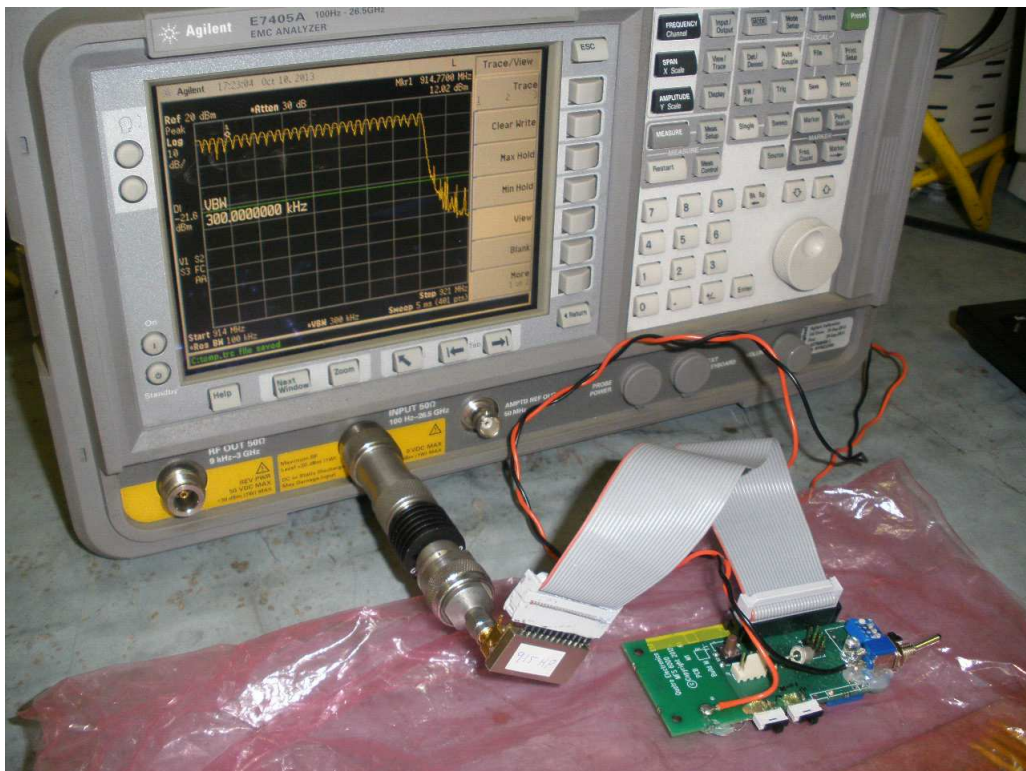
**Photograph 4 Radiated Emissions**




	Report No: <b>R3295</b>	FCC ID: XL8WDLM914HP	
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**Photograph 5 Radiated Emissions**




**Photograph 6 Conducted Antenna**

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	Issue No: <b>3</b>		
	Test No: <b>T4651</b>	<b>Test Report</b>	Page: 12 of 54

## 2 Test Equipment

The test equipment used during the tests was one or more of the items listed below. Individual test result sheets indicate which items were used.

Ref No:	Details	Cal Date	Cal Date	Cal Interval
A12	Chase Bilog CBL6111A	1012	30/01/2013	1 year
A24	Chase X-wing Bilog CBL6144 26MHz-3GHz	27590	28/10/2013	1 year
A8	EMCO 3115 DR Guide	6070	30/01/2013	1 year
A9	EMCO 6502 Loop	2139	10/12/2013	1 year
PRE10	LUCIX 100M-20G pre-amp	10	20/08/2013	1 year
R4	R&S ESVS10	421872	17/12/2012	1 year
R8	Agilent E7405A Spectrum Analyser	MY44212494	24/09/2013	1 year
R9	Agilent E7405A Spectrum Analyser	MY45110758	19/11/2013	1 year
RFF15	Band Pass Filter 1GHz to 2GHz	15	20/08/2013	1 year
RFF16	500MHz to 1GHz Notch Filter	FF204-3	20/08/2013	1 year
RFF17	Low Pass RF Filter 550MHz	17	20/08/2013	1 year
RFF22	High Pass Filter - 1.35GHz (10GHz) MicroTronics HPM13017	33	20/08/2013	1 year

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### 3 Test Methods

#### 3.1 Radiated Emissions

This section describes the general method of performing this test. The specific method used and any deviations from this general method are listed in the appropriate results section.

Initial scans are performed in a semi-anechoic screened room. Scans are performed over the frequency range specified in the test standard with the antenna both horizontally and vertically polarised. During these scans the EUT and peripherals are rotated through 360°. Bench top EUTs are placed on a non-conducting bench at a height of 0.8m above the ground plane. Floor standing EUTs are placed 0.1m above the ground plane. The results of the scans are shown in the plots included at the end of the report.

Significant emissions identified by the scans are measured on an open area test site at the appropriate test distance using the type of detector specified in the standard. Maximised readings are obtained by rotating the EUT through 360° and adjusting the height of the antenna from 1m to 4m. Measurements are made with the antenna both horizontally and vertically polarised and the results tabulated.

Tabulated results show levels based on the following calculation:

Field Strength (dBuV) = receiver reading (dBuV) + CF (dB/m)

CF is the correction factor for the antenna and cable.

For example:


If at 434.478MHz the receiver reading was 58.8dBuV and combined correction factor = 20.4 (dB/m).

Total field strength = 58.8 + 20.4 = 79.2dBuV/m.

#### 3.2 Conducted Antenna Measurements

This section describes the general method of performing this test. The specific method used and any deviations from this general method are listed in the appropriate results section.

The antenna port of the EUT is connected either directly, or using an appropriate attenuator, to the input of a spectrum analyser.

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### 3.3 Radiated Emissions below 30MHz

This section describes the general method of performing this test. The specific method used and any deviations from this general method are listed in the appropriate results section.

Initial scans are performed in a semi-anechoic screened room at a distance of 3m. Scans are performed over the frequency range specified in the test standard with a loop antenna both co-axially and orthogonally orientated with respect to the EUT. During these scans the EUT and peripherals are rotated through 360°. Bench top EUTs are placed on a non-conducting bench at a height of 0.8m above the ground plane. Floor standing EUTs are placed 0.1m above the ground plane. The results of the scans are shown in the plots included at the end of the report.

Significant emissions identified by the scans are measured on an open area test site at the appropriate test distance using a CISPR16 quasi-peak receiver. Maximised readings are obtained by rotating the EUT through 360° with the antenna at a height of 1m. Measurements are made with the antenna both coaxially and orthogonally orientated with respect to the EUT and the results tabulated.


Tabulated results are obtained by adding the raw reading from the receiver (in dBuV) to the appropriate correction factors for the antenna and cables to give a reading in dBuV/m. For example:

Frequency	Receiver reading	Correction Factor	Final level
126kHz	75.8 dBuV	8.0 dB/m	83.8 dBuV/m

Final reading = 75.8 + 8.0 = 83.8 dBuV/m

## 4 Test Results

The following sections contain tabulated test results. Plots of various scans are included at the back of this section.


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#### 4.1 Radiated Emissions Results - Below 30MHz - Transmit Mode

Factor Set 1: A9\_HI\_V\_13A CBL015\_11A --  
Factor Set 2: -- --  
Factor Set 3: -- --  
Test Equipment: R9 A9

##### Radiated Emissions

Company: Quatro Electronics Ltd					Product: WDLM914HP								
Date: 22/01/2014					Test Eng: Dave Smith								
Ports:													
Test: ANSI C63.4:2003					using limits of					15.209			
Ports:													
Test:					using limits of								
Plot	Op Mode	Mod State	Dist m	Fact Set	Freq. MHz	Ant Pol	Rec. Level dBuV	Corr'n Factor dB/m	Corr'n Factor dB	Total Level dBuV/m	Limit FCC_B dBuV/m	Margin FCC_B dB	Notes
33	TMd	2	3	1	26.000	F	21.6	7.3		28.9	69.5	40.6	
33	TMd	2	3	1	26.000	E	21.4	7.3		28.7	69.5	40.9	
Results											Minimum Margin		
											PASS/FAIL		
											40.6 dB		
											PASS		
Notes	Comments and Observations												
	<p>Results of scans shown in plot 33.</p> <p>Measured with 9kHz RBW/ 30kHz VBW peak detector.</p> <p>F = loop antenna face on with EUT. E = loop antenna edge on with EUT.</p> <p>Limits extrapolated to 3m using 40dB/decade.</p> <p>TMd = transmitting on mid channel.</p>												

	Report No: <b>R3295</b> Issue No: <b>3</b>	FCC ID: XL8WDLM914HP	
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## 4.2 Radiated Emissions Results - Below 1GHz - Transmit Mode

Factor Set 1:	A12_FS_13B - - CBL015_11A	1 m cable
Factor Set 2:	- - -	
Factor Set 3:	- - -	
Test Equipment:	R4 A12 A24 R8 RFF16 RFF17	

### Radiated Emissions

Company: Quatro Electronics Ltd					Product: WDLM914HP								
Date: 21/11/2013					Test Eng: Dave Smith								
Ports:													
Test: ANSI C63.4:2003					using limits of				15.209				
Ports:													
Test:					using limits of								
Plot	Op Mode	Mod State	Dist m	Fact Set	Freq. MHz	Ant Pol	Rec. Level dBuV	Corr'n Factor dB/m	Corr'n Factor dB	Total Level dBuV/m	Limit 15.209 dBuV/m	Margin 15.209 dB	Notes
1	THi	2	3	1	30.250	V	7.2	19.9		27.1	40.0	12.9	#1
1	THi	2	3	1	30.250	H	4.5	19.9		24.4	40.0	15.6	
1	THi	2	3	1	33.400	V	7.9	17.6		25.5	40.0	14.5	
1	THi	2	3	1	33.400	H	5.0	17.6		22.6	40.0	17.4	
1	THi	2	3	1	37.300	V	5.7	15.0		20.7	40.0	19.3	
1	THi	2	3	1	37.300	H	6.0	15.0		21.0	40.0	19.0	
1	THi	2	3	1	133.700	V	-3.8	13.0		9.2	43.5	34.3	
1	THi	2	3	1	133.700	H	2.2	13.0		15.2	43.5	28.3	
1	THi	2	3	1	141.100	V	-3.2	12.9		9.7	43.5	33.8	
1	THi	2	3	1	141.100	H	-0.2	12.9		12.7	43.5	30.8	
2	THi	2	3	1	385.900	V	-2.8	19.0		16.2	46.0	29.8	
2	THi	2	3	1	385.900	H	-2.8	19.0		16.2	46.0	29.8	
2	THi	2	3	1	960.000	V	6.6	30.8		37.4	46.0	8.7	
2	THi	2	3	1	960.000	H	-0.9	30.8		29.9	46.0	16.2	
Results											Minimum Margin		
											PASS/FAIL		
											8.7 dB		
											PASS		
Notes		Comments and Observations											
THi		Results of scans are shown in plots 1 and 2. Measurements made with 120kHz QP detector. Maximum reading for unit standing upright and laying flat. Transmitting on high channel. Prescans showed emissions did not differ significantly between the three channels.											
#1		Inlcuding contribution from ambient signal. Limits only actually apply in restricted bands.											
Key:		qp - quasi-peak, av - average, pk - peak											




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### 4.3 Radiated Emissions Results - Below 1GHz - Receive Mode

Factor Set 1:	A12_FS_13B - - CBL015_11A	1 m cable
Factor Set 2:	- - -	
Factor Set 3:	- - -	
Test Equipment:	R4 A12 A24 R8	

#### Radiated Emissions

Company: Quatro Electronics Ltd					Product: WDLM914HP								
Date: 21/11/2013					Test Eng: Dave Smith								
Ports:													
Test: ANSI C63.4:2003					using limits of				FCC B				
Ports:													
Test:					using limits of								
Plot	Op Mode	Mod State	Dist m	Fact Set	Freq. MHz	Ant Pol	Rec. Level dBuV	Corr'n Factor dB/m	Corr'n Factor dB	Total Level dBuV/m	Limit FCC_B dBuV/m	Margin FCC_B dB	Notes
6	RHi	2	3	1	33.770	V	7.0	17.3		24.3	40.0	15.7	
6	RHi	2	3	1	33.770	H	4.5	17.3		21.8	40.0	18.2	
6	RHi	2	3	1	44.500	V	8.1	10.6		18.7	40.0	21.3	
6	RHi	2	3	1	44.500	H	4.9	10.6		15.5	40.0	24.5	
6	RHi	2	3	1	133.700	V	-2.0	13.0		11.0	43.5	32.5	
6	RHi	2	3	1	133.700	H	4.2	13.0		17.2	43.5	26.3	
6	RHi	2	3	1	141.100	V	-3.3	12.9		9.6	43.5	33.9	
6	RHi	2	3	1	141.100	H	4.1	12.9		17.0	43.5	26.5	
6	RHi	2	3	1	408.100	V	-2.8	19.9		17.1	46.0	28.9	
6	RHi	2	3	1	408.100	H	-2.8	19.9		17.1	46.0	28.9	
6	RHi	2	3	1	878.100	V	-2.7	28.7		26.0	46.0	20.0	
6	RHi	2	3	1	878.100	H	-2.7	28.7		26.0	46.0	20.0	
Results											Minimum Margin		
											PASS/FAIL		
											15.7 dB		
											PASS		
Notes		Comments and Observations											
RHi		Results of scans are shown in plot 6. Measurements made with 120kHz QP detector. Maximum reading for unit standing upright and laying flat. Receiving on high channel. Prescans showed emissions did not differ significantly between the three channels.											


	Report No: <b>R3295</b> Issue No: <b>3</b>	FCC ID: XL8WDLM914HP	
	Test No: <b>T4651</b>	<b>Test Report</b>	Page: 18 of 54

#### 4.4 Radiated Emissions Results - Above 1GHz - Vertical

Factor Set 1:	A8_3m_12B PRE10_12A RFF22_12A CBL050_11A	1 m cable
Factor Set 2:	- - - -	
Factor Set 3:	- - - -	
Test Equipment:	R8 A8 PRE10 RFF22 RFF15	

##### Radiated Emissions

Company: Quatro Electronics Ltd					Product: WDLM914HP									
Date: 10/09/2013					Test Eng: Peter Barlow									
Ports:														
Test: ANSI C63.4:2003					using limits of					15.209				
Ports:														
Test:					using limits of									
Plot	Op Mode	Mod State	Dist m	Fact Set	Freq. MHz	Ant Pol	Det. Type	Rec. Level dBuV	Corr'n Factor dB	Total Level dBuV/m	Limit 15.209 dBuV/m	Margin 15.209 dB	Notes	
4	Lo	0	1.5	1	2726.000	V	pk	55.8	-6.9	48.9	80.0	31.1	Upright	
4	Lo	0	1.5	1	2726.000	V	av	53.6	-6.9	46.7	60.0	13.4	Upright	
4	Mid	0	1.5	1	2742.000	V	pk	55.4	-6.9	48.5	80.0	31.5	Upright	
4	Mid	0	1.5	1	2742.000	V	av	53.3	-6.9	46.5	60.0	13.6	Upright	
4	Hi	0	1.5	1	2757.000	V	pk	55.5	-6.8	48.7	80.0	31.3	Upright	
4	Hi	0	1.5	1	2757.000	V	av	53.5	-6.8	46.6	60.0	13.4	Upright	
4	Lo	0	1.5	1	3635.000	V	pk	58.2	-4.1	54.0	80.0	26.0	Flat	
4	Lo	0	1.5	1	3635.000	V	av	56.5	-4.1	52.3	60.0	7.7	Flat	
4	Mid	0	1.5	1	3656.000	V	pk	56.4	-4.0	52.4	80.0	27.6	Flat	
4	Mid	0	1.5	1	3656.000	V	av	54.6	-4.0	50.6	60.0	9.4	Flat	
4	Hi	0	1.5	1	3676.000	V	pk	58.1	-3.8	54.3	80.0	25.8	Flat	
4	Hi	0	1.5	1	3676.000	V	av	56.6	-3.8	52.7	60.0	7.3	Flat	
Results											Minimum Margin		7.3	dB
											PASS/FAIL		PASS	
Notes		Comments and Observations												
Lo Mid Hi		Results of scans are shown in plots 3 to 5 and 7 to 9.												
		The plots showed no significant emissions in receive mode.												
		The highest emissions identified in transmit mode were maximised with a 1MHz RBW peak detector and linear average detector. The results are tabulated above.												
		Transmitting on low channel												
		Transmitting on mid channel												
		Transmitting on high channel												
		Maximised for height and rotation. EUT measured upright and flat with vertical and horizontal measuring antenna. Highest reading recorded above.												


	Report No: <b>R3295</b> Issue No: <b>3</b>	FCC ID: XL8WDLM914HP	
	Test No: <b>T4651</b>	<b>Test Report</b>	Page: 19 of 54

#### 4.5 Radiated Emissions Results - Above 1GHz - Horizontal

Factor Set 1:	A8_3m_12B PRE10_12A RFF22_12A CBL050_11A	1 m cable
Factor Set 2:	- - - -	
Factor Set 3:	- - - -	
Test Equipment:	R8 A8 PRE10 RFF22 RFF15	

##### Radiated Emissions

Company: Quatro Electronics Ltd					Product: WDLM914HP									
Date: 10/09/2013					Test Eng: Peter Barlow									
Ports:														
Test: ANSI C63.4:2003					using limits of 15.209									
Ports:														
Test:					using limits of									
Plot	Op Mode	Mod State	Dist m	Fact Set	Freq. MHz	Ant Pol	Det. Type	Rec. Level dBuV	Corr'n Factor dB	Total Level dBuV/m	Limit 15.209 dBuV/m	Margin 15.209 dB	Notes	
4	Lo	0	1.5	1	2726.000	H	pk	59.0	-6.9	52.1	80.0	27.9	Upright	
4	Lo	0	1.5	1	2726.000	H	av	57.6	-6.9	50.7	60.0	9.3	Upright	
4	Mid	0	1.5	1	2742.000	H	pk	59.1	-6.9	52.2	80.0	27.8	Upright	
4	Mid	0	1.5	1	2742.000	H	av	57.8	-6.9	50.9	60.0	9.1	Upright	
4	Hi	0	1.5	1	2757.000	H	pk	59.5	-6.8	52.7	80.0	27.3	Upright	
4	Hi	0	1.5	1	2757.000	H	av	58.2	-6.8	51.3	60.0	8.7	Upright	
4	Lo	0	1.5	1	3635.000	H	pk	58.1	-4.1	53.9	80.0	26.1	Flat	
4	Lo	0	1.5	1	3635.000	H	av	56.5	-4.1	52.3	60.0	7.7	Flat	
4	Mid	0	1.5	1	3656.000	H	pk	56.4	-4.0	52.4	80.0	27.6	Flat	
4	Mid	0	1.5	1	3656.000	H	av	54.6	-4.0	50.6	60.0	9.4	Flat	
4	Hi	0	1.5	1	3676.000	H	pk	58.1	-3.8	54.3	80.0	25.7	Flat	
4	Hi	0	1.5	1	3676.000	H	av	56.6	-3.8	52.8	60.0	7.2	Flat	
Results											Minimum Margin		7.2	dB
											PASS/FAIL		PASS	
Notes		Comments and Observations												
Lo Mid Hi		Results of scans are shown in plots 3 to 5 and 7 to 9.												
		The plots showed no significant emissions in receive mode.												
		The highest emissions identified in transmit mode were maximised with a 1MHz RBW peak detector and linear average detector. The results are tabulated above.												
		Transmitting on low channel												
		Transmitting on mid channel												
		Transmitting on high channel												
		Maximised for height and rotation. EUT measured upright and flat with vertical and horizontal measuring antenna. Highest reading recorded above.												

	Report No: <b>R3295</b> Issue No: <b>3</b>	FCC ID: XL8WDLM914HP	
	Test No: <b>T4651</b>	<b>Test Report</b>	Page: 20 of 54

## 4.6 Occupied Bandwidth

The spectrum analyser results for occupied bandwidth are shown in plots 10 to 12. The 20dB occupied bandwidth measurements were as follows:

Low channel: 77.5 kHz

Mid Channel: 78 kHz

High Channel: 77.6 kHz

According to 15.247 (a)(1)(i) the bandwidth must not exceed 500kHz and therefore the EUT is compliant.

**PASS**

## 4.7 Carrier Frequency Separation

The spectrum analyser results for channel separation are shown in plot 13. The channel separation was measured as 200kHz.

According to 15.247 (a)(1) the channel separation must exceed the occupied bandwidth (and must not be lower than 25kHz). Since the maximum occupied bandwidth measured was 77.8kHz, and the channel separation was measured at 200kHz, the EUT is compliant.

**PASS**

## 4.8 Number of Hopping Frequencies

The spectrum analyser results for number of hopping frequencies are shown in plots 14 and 15. The number of hopping channels was measured as 54.

According to 15.247 (a)(1)(i), if the occupied bandwidth is less than 250kHz, the number of hopping frequencies must exceed 50. The EUT is compliant.

**PASS**

## 4.9 Time of Occupancy

The spectrum analyser results for time of occupancy are shown in plots 16 to 19.

Plot 16 shows that in HOPPING MODE 1 the dwell time is 374.8 msec.


Plot 17 shows that for HOPPING MODE 2 the dwell time is 6.502msec.

Plot 18 shows that in HOPPING MODE 1 the time between channel repetition is 20.25 seconds.

Plot 19 shows that in HOPPING MODE 2 the time between channel repetition is 20.25 seconds.

According to 15.247 (a)(1)(i), if the occupied bandwidth is less than 250kHz, the average time of occupancy must not be more than 400msec in a 20 second period.

**PASS**

	Report No: <b>R3295</b> Issue No: <b>3</b>	FCC ID: XL8WDLM914HP	
	Test No: <b>T4651</b>	<b>Test Report</b>	Page: 21 of 54

#### 4.10 Peak Output Power

The spectrum analyser results for peak output power are shown in plots 20 to 22. The measured results were as follows:

Low channel: 21.68 dBm

Mid Channel: 22.09 dBm

High Channel: 22.06 dBm

According to 15.247 (b)(2) the limit is 1 watt (30dBm) for systems employing at least 50 hopping channels.

**PASS**

#### 4.11 Conducted Antenna Spurious - Band Edge

The spectrum analyser results for conducted antenna band edge spurious are shown in plots 23 and 24. The measured results are comfortably below the -20dBc limit of 15.247 (d).


(Note: the band edges do not coincide with restricted bands and therefore radiated measurements were not performed at the band edges).

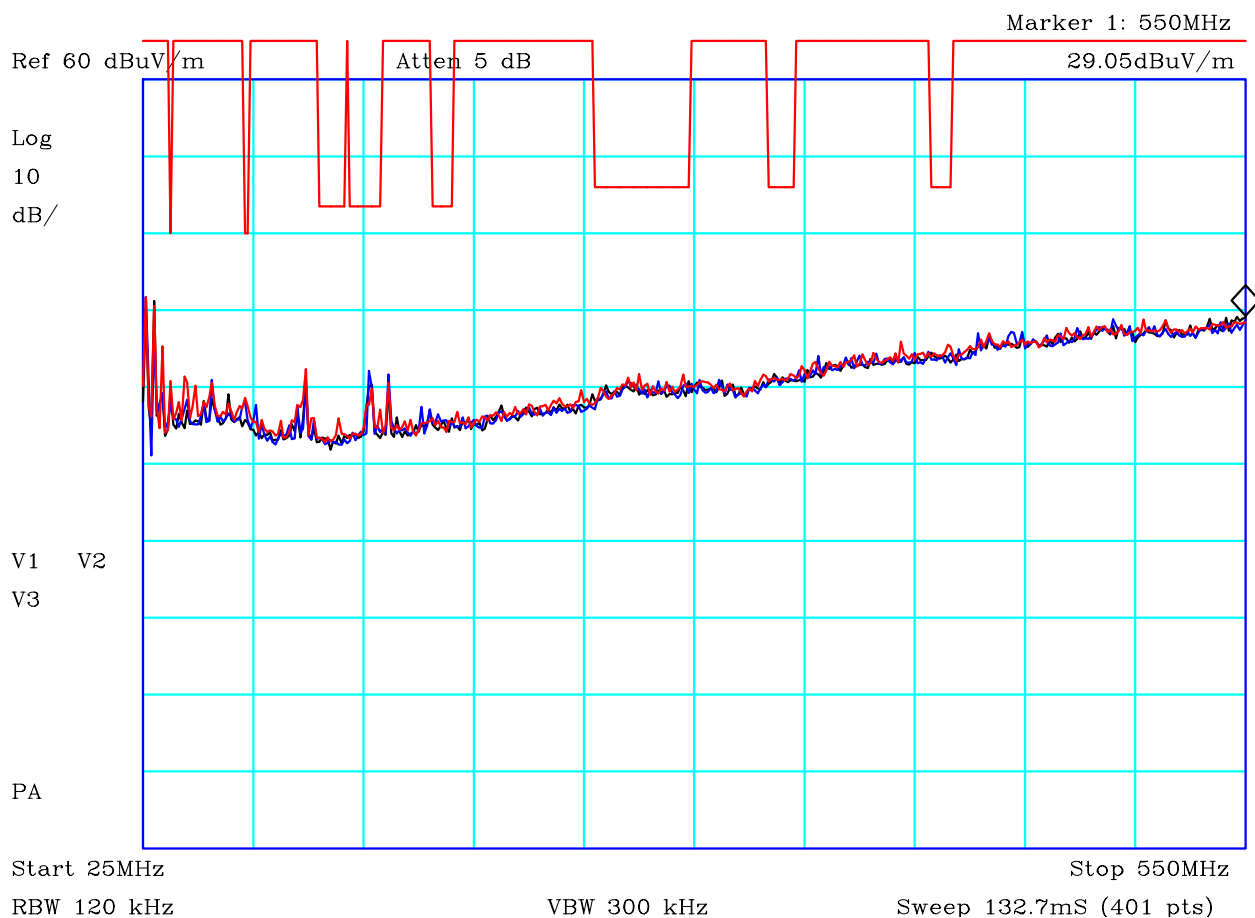
**PASS**

#### 4.12 Conducted Antenna Spurious

The spectrum analyser results for conducted antenna spurious are shown in plots 25 to 32. The measured results are more than 20dB below the -20dBc limit of 15.247 (d).

**PASS**

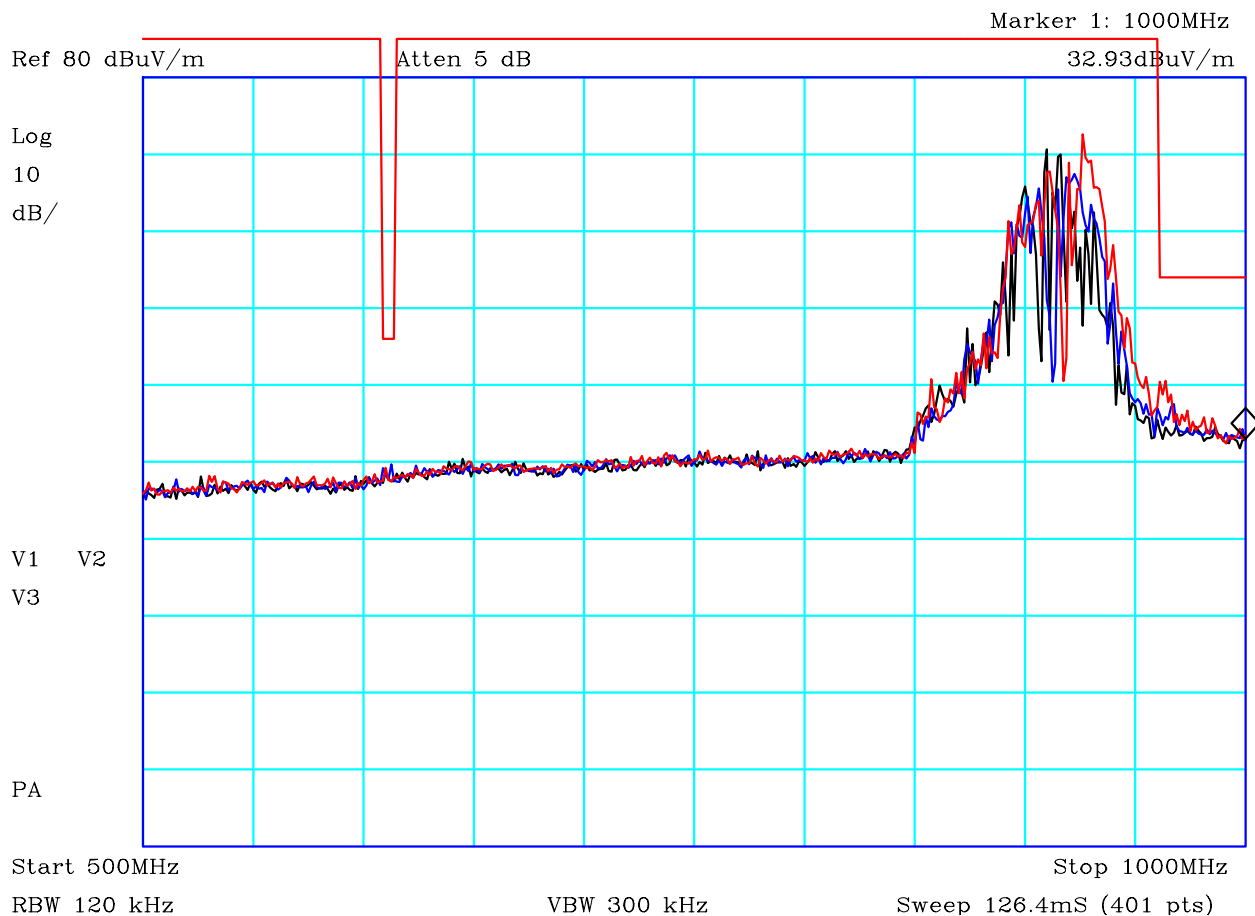
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	Issue No: <b>3</b>		
	Test No: <b>T4651</b>	<b>Test Report</b>	Page: 22 of 54



CF1:A24\_3m\_130215 CF2:CBL059\_CBL018\_CBL065\_CBL060\_100806 CF3:RFF17\_120716

## PLOT 1 Radiated Emissions - Tx - 25MHz to 550MHz


Company:	Quatro	Product:	Frequency Hopping Module
Date:	20/11/2013	Test Eng:	Dave Smith
Method:	ANSI C63.4	Method:	
Limit1:(RED)	FCC Restricted Bands at 3m	Limit2:	
Limit3:		Limit4:	
Black: 909 MHz Carrier. Blue: 914 MHz Carrier. Red: 919 MHz Carrier. Antenna fitted. Upright and on side. Canned modules.			
Facility:	Anech_2	Height	1.1,1.5,1.9m
Distance	3m	Polarisation	V+H
Angle	0-360	File:	H3A20806
		Mode:	1
		Modification State:	2
		Analyser:	R8

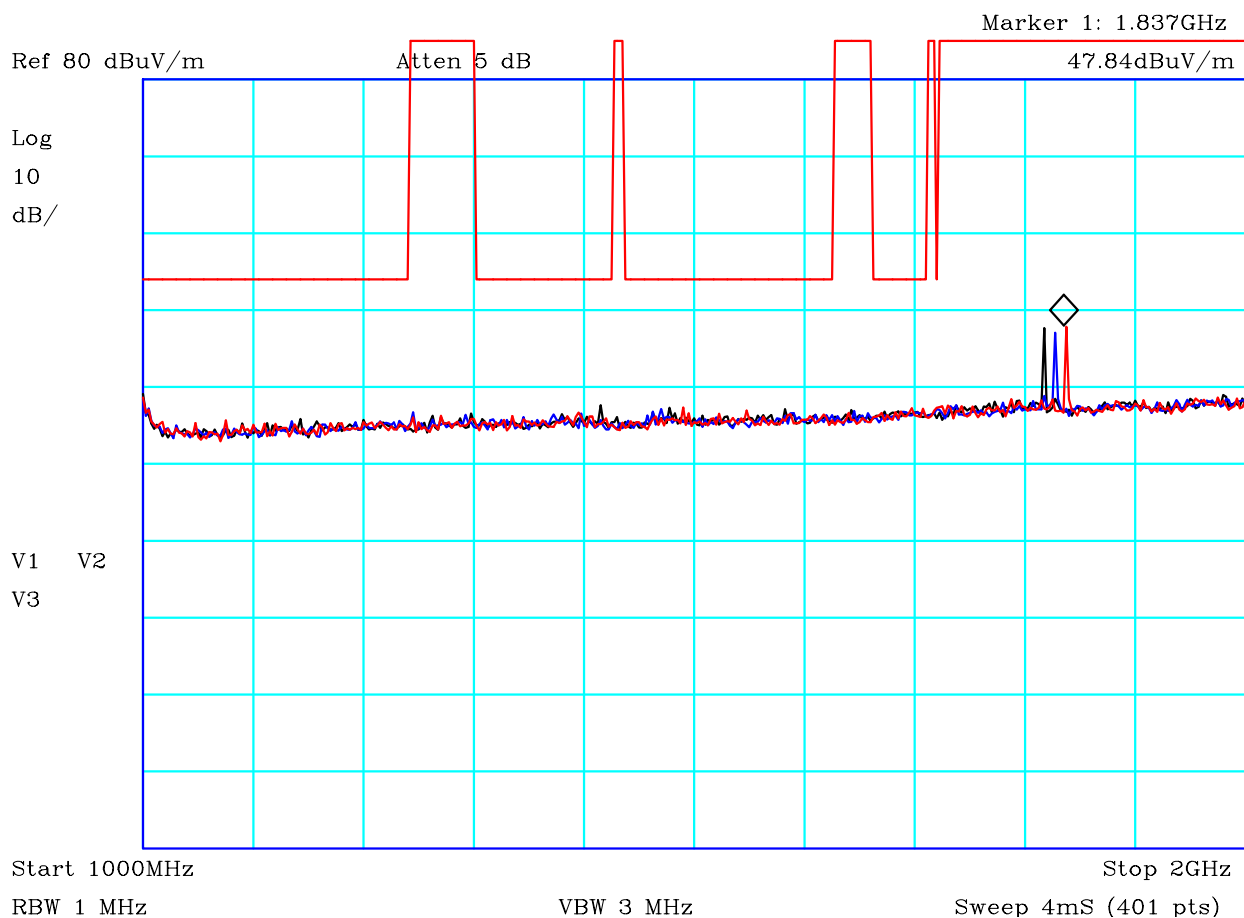


CF1:A24\_3m\_130215 CF2:CBL059\_CBL018\_CBL065\_CBL060\_100806 CF3:RFF16\_120716

## PLOT 2 Radiated Emissions - Tx - 500MHz to 1GHz

Company:	Quatro	Product:	Frequency Hopping Module
Date:	20/11/2013	Test Eng:	Dave Smith
Method:	ANSI C63.4	Method:	
Limit1:(RED)	FCC Restricted Bands at 3m	Limit2:	
Limit3:		Limit4:	
Black: 909 MHz Carrier. Blue: 914 MHz Carrier. Red: 919 MHz Carrier. Antenna fitted. Upright and on side. Canned modules. Carrier filtered out with notch filter.			
Facility:	Anech_2	Height	1.5m
Distance	3m	Polarisation	V+H
Angle	0-360	File:	H3A207F1
		Mode:	1
		Modification State:	2
		Analyser:	R8

	Report No: <b>R3295</b>	FCC ID: XL8WDLM914HP	
	Issue No: <b>3</b>		
	Test No: <b>T4651</b>	<b>Test Report</b>	




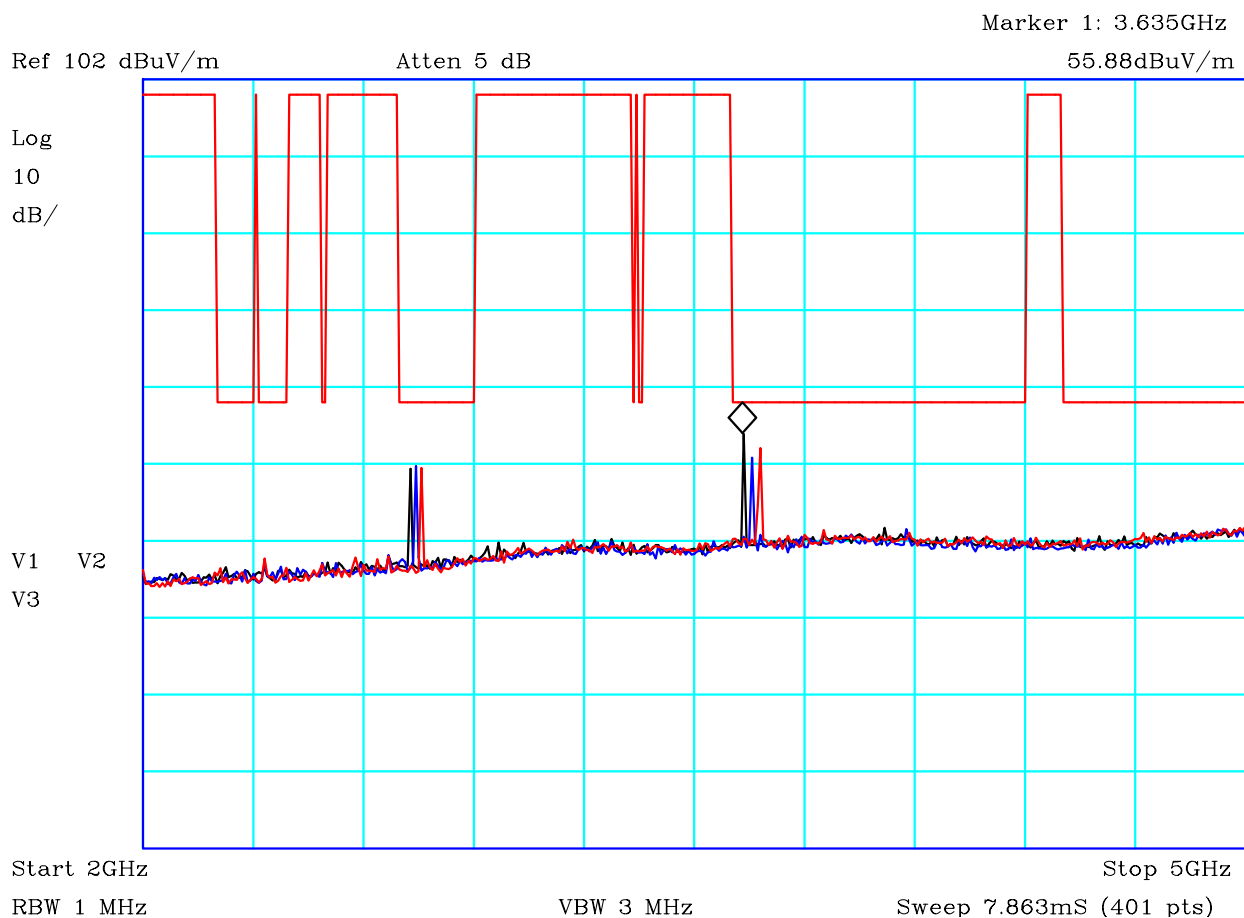
CF1:A8\_3m\_120807   CF2:PRE10\_120627   CF3:RFF15\_120716   CF4:CBL059\_CBL018\_CBL065\_CBL060\_100806

### PLOT 3 Radiated Emissions - Tx - 1GHz to 2GHz

Company:	Quatro	Product:	Frequency Hopping Module HP
Date:	10/09/2013	Test Eng:	Peter Barlow
Method:	ANSI C63.4	Method:	
Limit1:(RED)	FCC Restricted Bands at 3m	Limit2:	
Limit3:		Limit4:	
Black: 909 MHz Carrier. Blue: 914 MHz Carrier. Red: 919 MHz Carrier. Antenna fitted. Upright and on side. Canned modules.			
Facility:	Anech_2	Height	1.1m,1.5m,1.9m
Distance	3m	Polarisation	V+H
Angle	0-360	File:	H3810803
		Mode:	1
		Modification State:	0
		Analysar:	R8




	Report No: <b>R3295</b>	FCC ID: XL8WDLM914HP	
	Issue No: <b>3</b>		
	Test No: <b>T4651</b>	<b>Test Report</b>	Page: 25 of 54

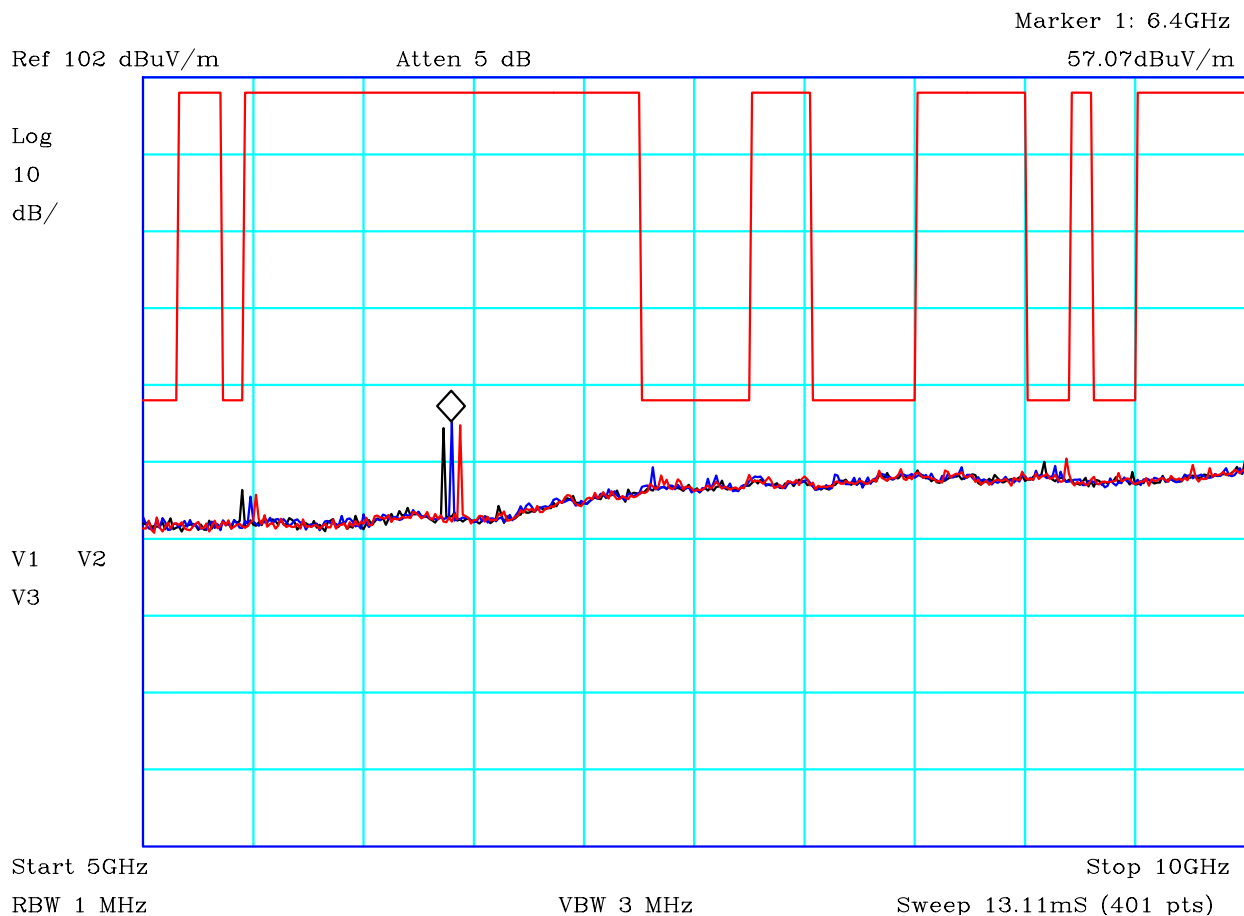


CF1:A8\_3m\_120807   CF2:PRE10\_120627   CF3:RFF22\_110221   CF4:CBL050\_110107

#### PLOT 4 Radiated Emissions - Tx - 2GHz to 5GHz

Company:	Quatro	Product:	Frequency Hopping Module HP
Date:	10/09/2013	Test Eng:	Peter Barlow
Method:	ANSI C63.4	Method:	
Limit1:(RED)	FCC Restricted Bands@1.5m	Limit2:	
Limit3:		Limit4:	
Black: 909 MHz Carrier. Blue: 914 MHz Carrier. Red: 919 MHz Carrier. Antenna fitted. Upright and on side. Canned modules.			
Facility:	Anech_2	Height	1.1m,1.5m,1.9m
Distance	1.5m	Polarisation	V+H
Angle	0-360	File:	H38104B6
		Mode:	1
		Modification State:	0
		Analysar:	R8


	Report No: <b>R3295</b>	FCC ID: XL8WDLM914HP	
	Issue No: <b>3</b>		
	Test No: <b>T4651</b>	<b>Test Report</b>	Page: 26 of 54

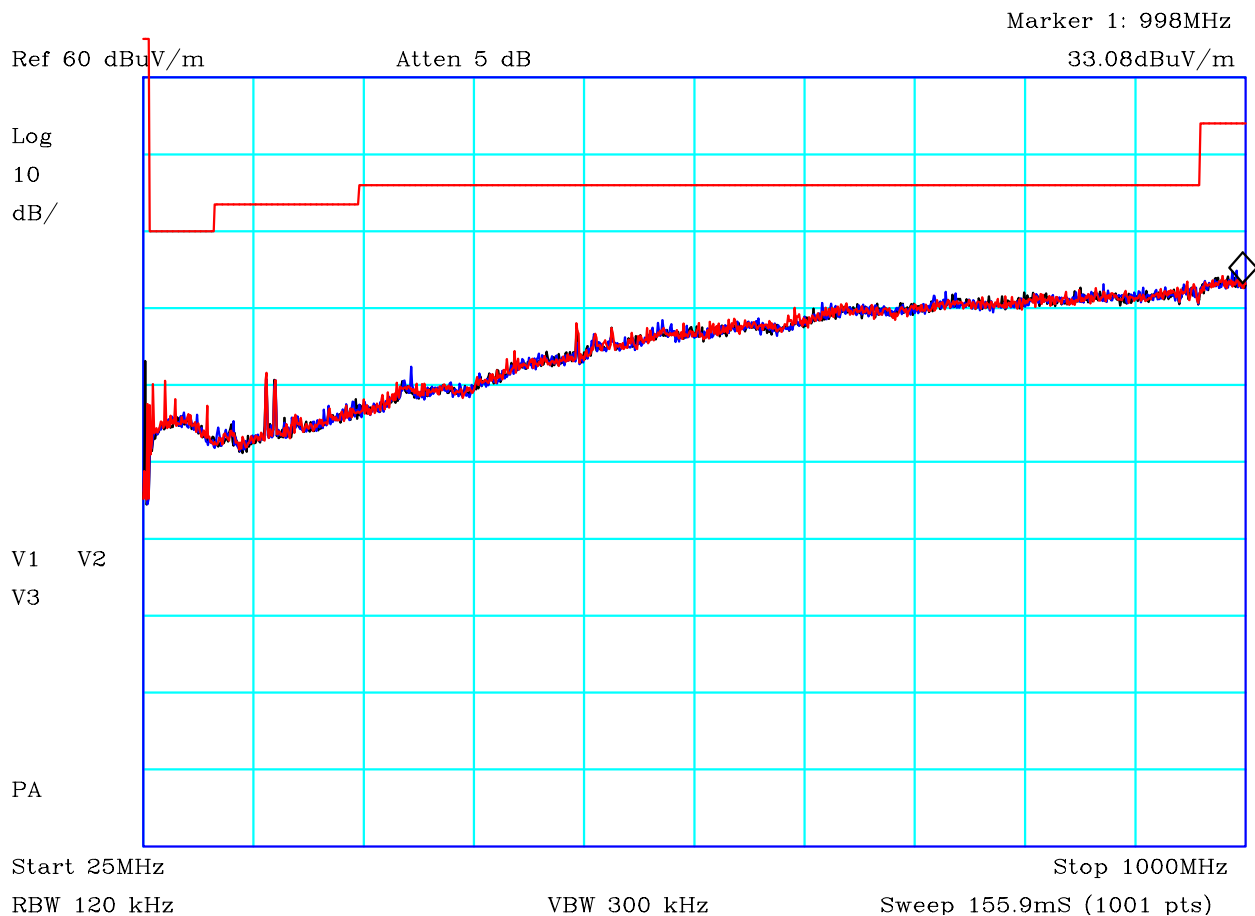


CF1:A8\_3m\_120807 CF2:PRE10\_120627 CF3:RFF22\_110221 CF4:CBL050\_110107

## PLOT 5 Radiated Emissions - Tx - 5GHz to 10GHz

Company:	Quatro	Product:	Frequency Hopping Module HP
Date:	10/09/2013	Test Eng:	Peter Barlow
Method:	ANSI C63.4	Method:	
Limit1:(RED)	FCC Restricted Bands@1.5m	Limit2:	
Limit3:		Limit4:	
Black: 909 MHz Carrier. Blue: 914 MHz Carrier. Red: 919 MHz Carrier. Antenna fitted. Upright and on side. Canned modules.			
Facility:	Anech_2	Height	1.1m,1.5m,1.9m
Distance	1.5m	Polarisation	V+H
Angle	0-360	File:	H38104E2
		Mode:	1
		Modification State:	0
		Analysar:	R8


	Report No: <b>R3295</b>	FCC ID: XL8WDLM914HP	
	Issue No: <b>3</b>		
	Test No: <b>T4651</b>	Test Report	Page: 27 of 54

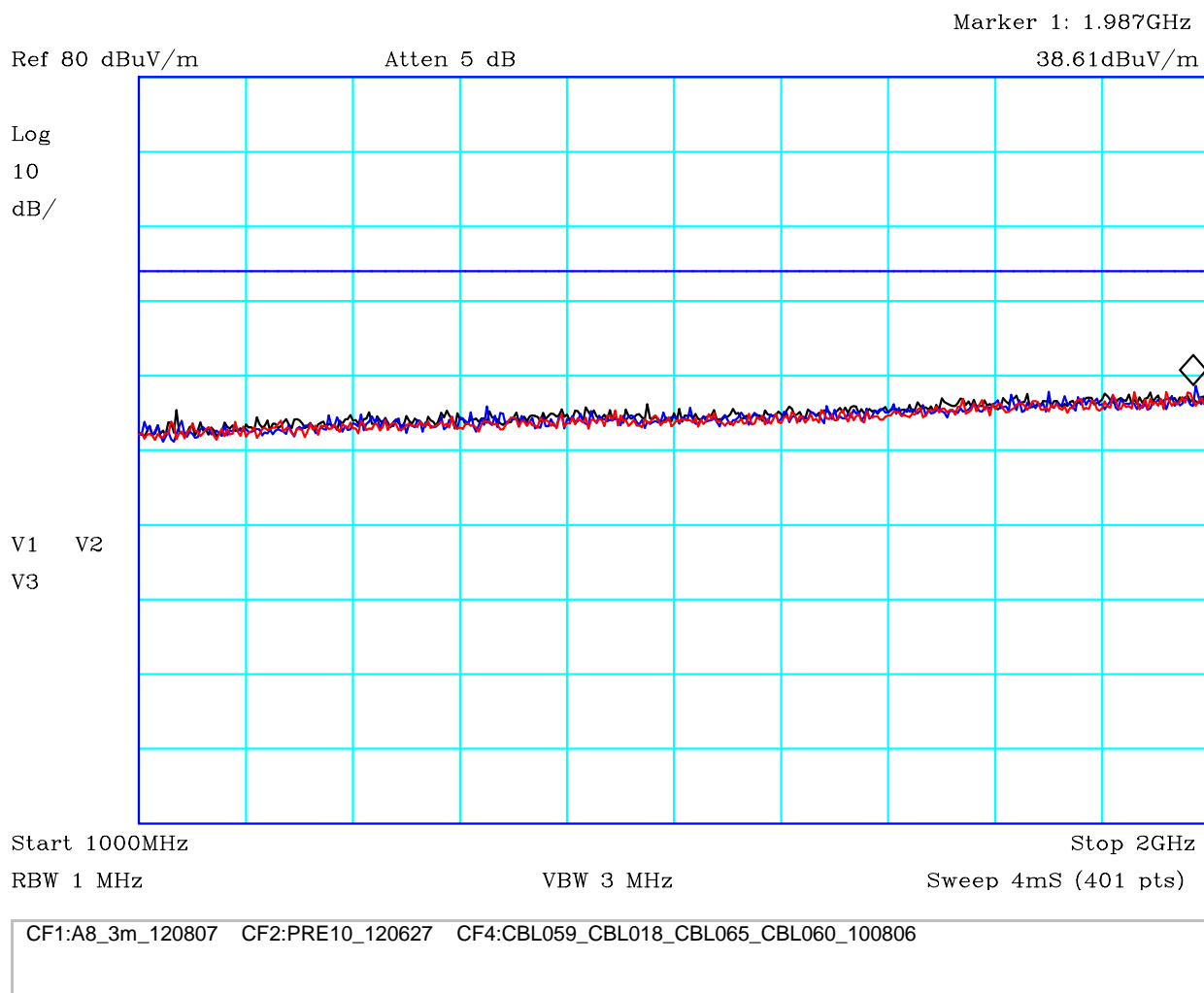


CF1:A24\_3m\_130215 CF2:CBL059\_CBL018\_CBL065\_CBL060\_100806

## PLOT 6 Radiated Emissions - Rx - 25MHz to 1GHz


Company:	Quatro	Product:	Frequency Hopping Module
Date:	20/11/2013	Test Eng:	Dave Smith
Method:	ANSI C63.4	Method:	
Limit1:(RED)	FCC(B)@3m	Limit2:	
Limit3:		Limit4:	
Black: 909 MHz Carrier. Blue: 914 MHz Carrier. Red: 919 MHz Carrier. Antenna fitted. Upright and on side. Canned modules. Rx mode			
Facility:	Anech_2	Height	1.5m
Distance	3m	Polarisation	V+H
Angle	0-360	File:	H3A213EB
		Mode:	4
		Modification State:	2
		Analyser:	R8

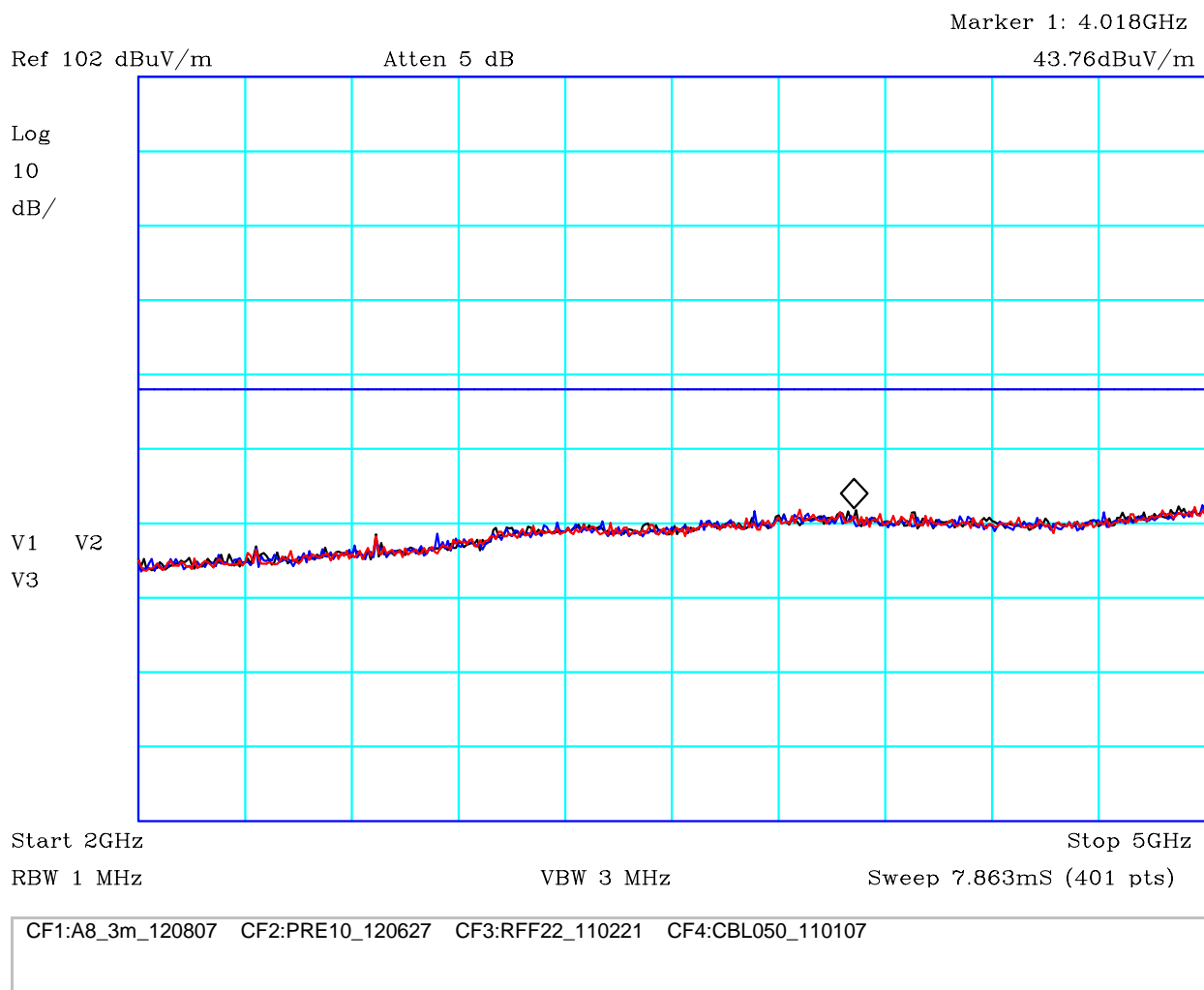
	Report No: <b>R3295</b>	FCC ID: XL8WDLM914HP	
	Issue No: <b>3</b>		
	Test No: <b>T4651</b>	<b>Test Report</b>	Page: 28 of 54



## PLOT 7 Radiated Emissions - Rx - 1GHz to 2GHz


Company:	Quatro	Product:	Frequency Hopping Module HP
Date:	10/09/2013	Test Eng:	Peter Barlow
Method:	ANSI C63.4	Method:	
Limit1:(BLU)	FCC(B)@3m	Limit2:	
Limit3:		Limit4:	
Black: 909 MHz Carrier. Blue: 914 MHz Carrier. Red: 919 MHz Carrier. Antenna fitted. Upright and on side. Canned modules.			
Facility:	Anech_2	Height	1.1m,1.5m,1.9m
Distance	3m	Polarisation	V+H
Angle	0-360	File:	H38107AE
		Mode:	4
		Modification State:	0
		Analysers:	R8

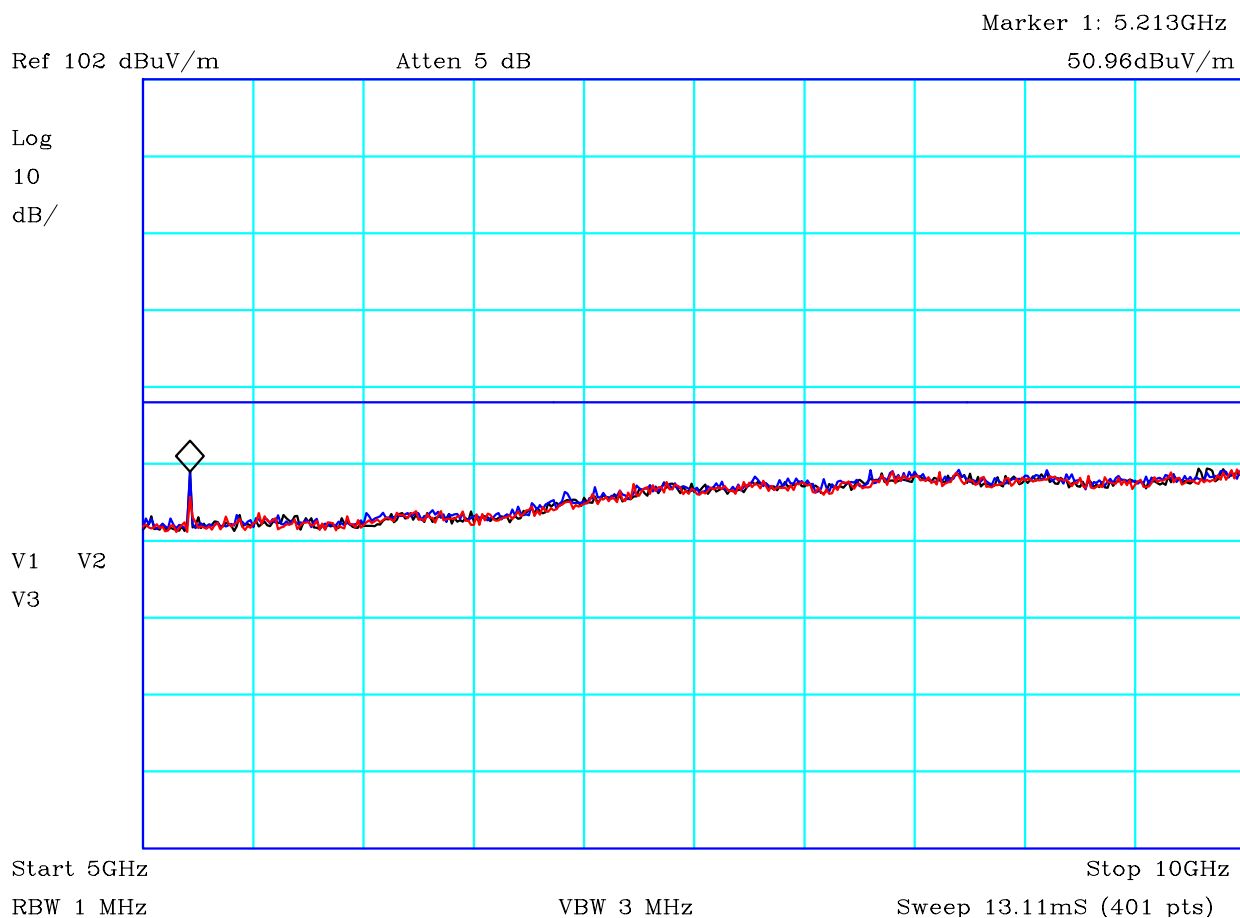
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	Issue No: <b>3</b>		
Test No: <b>T4651</b>	Test Report		Page: 29 of 54



## PLOT 8 Radiated Emissions - Rx - 2GHz to 5GHz

Company:	Quatro	Product:	Frequency Hopping Module HP
Date:	10/09/2013	Test Eng:	Peter Barlow
Method:	ANSI C63.4	Method:	
Limit1:(BLU)	FCC(B)@1.5m	Limit2:	
Limit3:		Limit4:	
Black: 909 MHz Carrier. Blue: 914 MHz Carrier. Red: 919 MHz Carrier. Antenna fitted. Upright and on side. Canned modules.			
Facility:	Anech_2	Height	1.1m,1.5m,1.9m
Distance	1.5m	Polarisation	V+H
Angle	0-360	File:	H381075C
		Mode:	4
		Modification State:	0
		Analysers:	R8


	Report No: <b>R3295</b>	FCC ID: XL8WDLM914HP	
	Issue No: <b>3</b>		
	Test No: <b>T4651</b>	<b>Test Report</b>	Page: 30 of 54

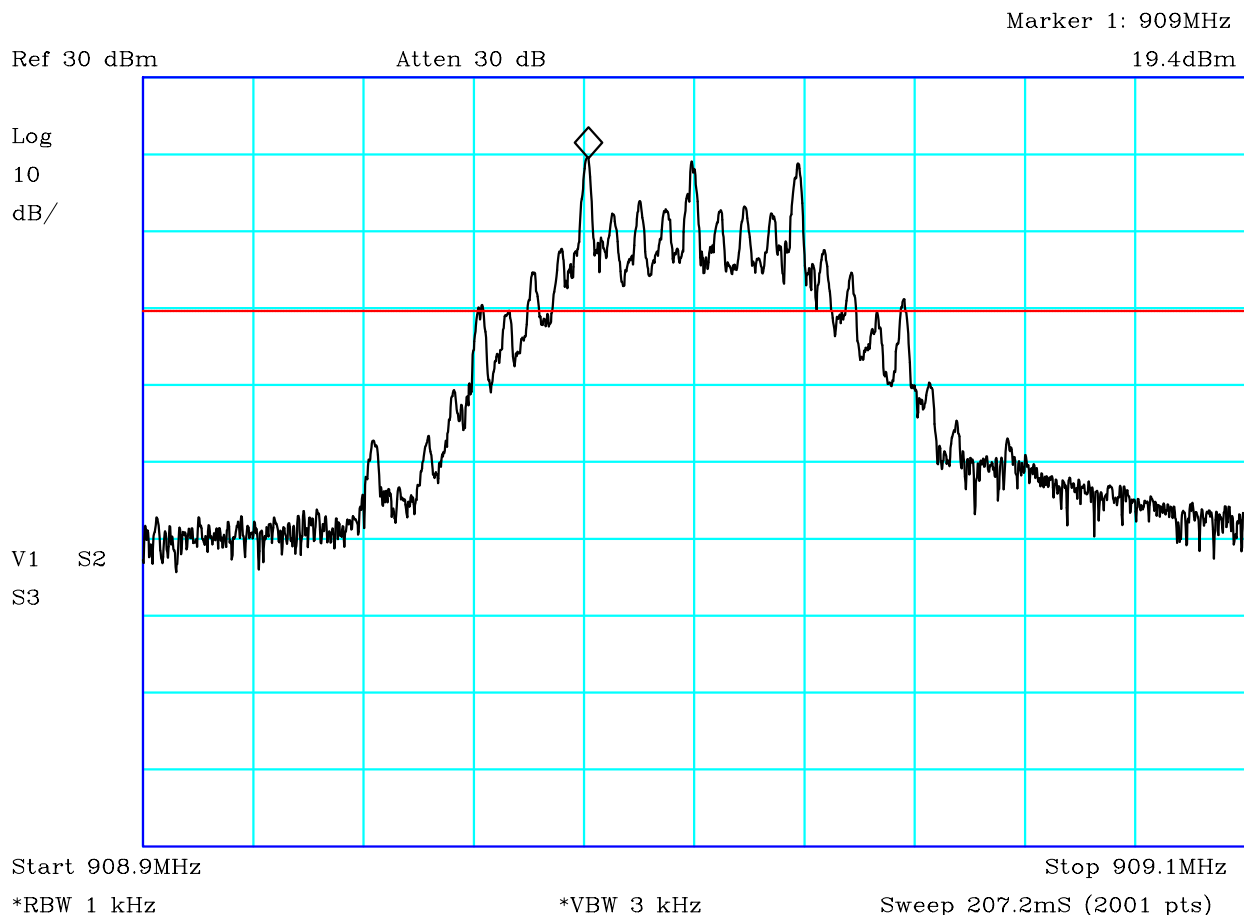


CF1:A8\_3m\_120807 CF2:PRE10\_120627 CF3:RFF22\_110221 CF4:CBL050\_110107

## PLOT 9 Radiated Emissions - Rx - 5GHz to 10GHz

Company:	Quatro	Product:	Frequency Hopping Module HP
Date:	10/09/2013	Test Eng:	Peter Barlow
Method:	ANSI C63.4	Method:	
Limit1:(BLU)	FCC(B)@1.5m	Limit2:	
Limit3:		Limit4:	
Black: 909 MHz Carrier. Blue: 914 MHz Carrier. Red: 919 MHz Carrier. Antenna fitted. Upright and on side. Canned modules.			
Facility:	Anech_2	Height	1.1m,1.5m,1.9m
Distance	1.5m	Polarisation	V+H
Angle	0-360	File:	H381077D
		Mode:	4
		Modification State:	0
		Analysers:	R8

	Report No: <b>R3295</b>	FCC ID: XL8WDLM914HP	
	Issue No: <b>3</b>		
Test No: <b>T4651</b>	<b>Test Report</b>		Page: <b>31 of 54</b>




CF1:10dB\_PAD

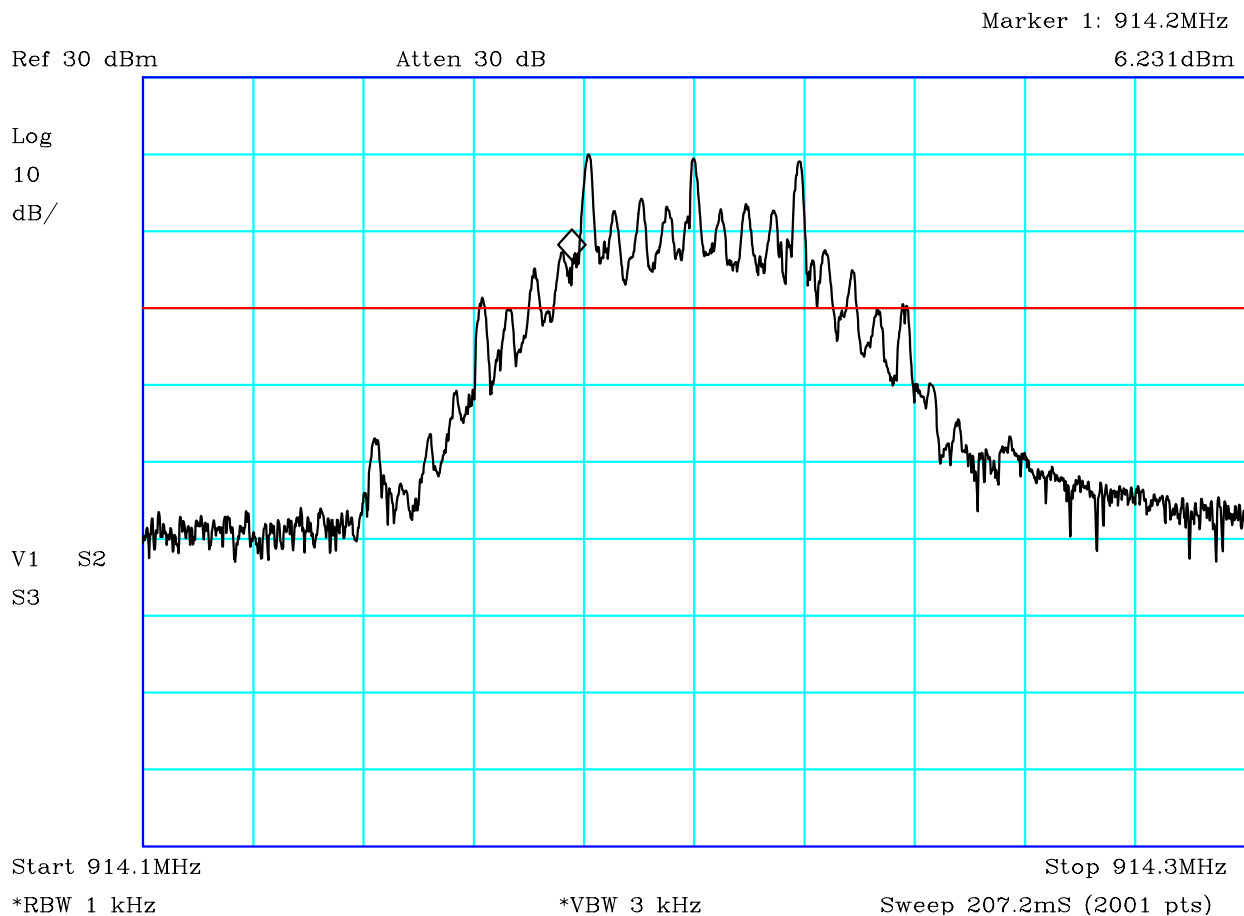
### PLOT 10 Conducted Antenna - 20dB Bandwidth - Low Channel

Company:	Quatro	Product:	Frequency Hopping Module
Date:	10/10/2013	Test Eng:	Dave Smith
Method:	DA 00-705	Method:	
Limit1:		Limit2:	
Limit3:		Limit4:	

20dB bandwidth = 77.5kHz  
Continuous modulation - Low Channel.

Facility:	Mode:	1	
	Modification State:	1	
File:	H3910749	Analysers:	R8

	Report No: <b>R3295</b>	FCC ID: XL8WDLM914HP	
	Issue No: <b>3</b>		
	Test No: <b>T4651</b>	<b>Test Report</b>	Page: <b>32 of 54</b>



CF1:10dB\_PAD

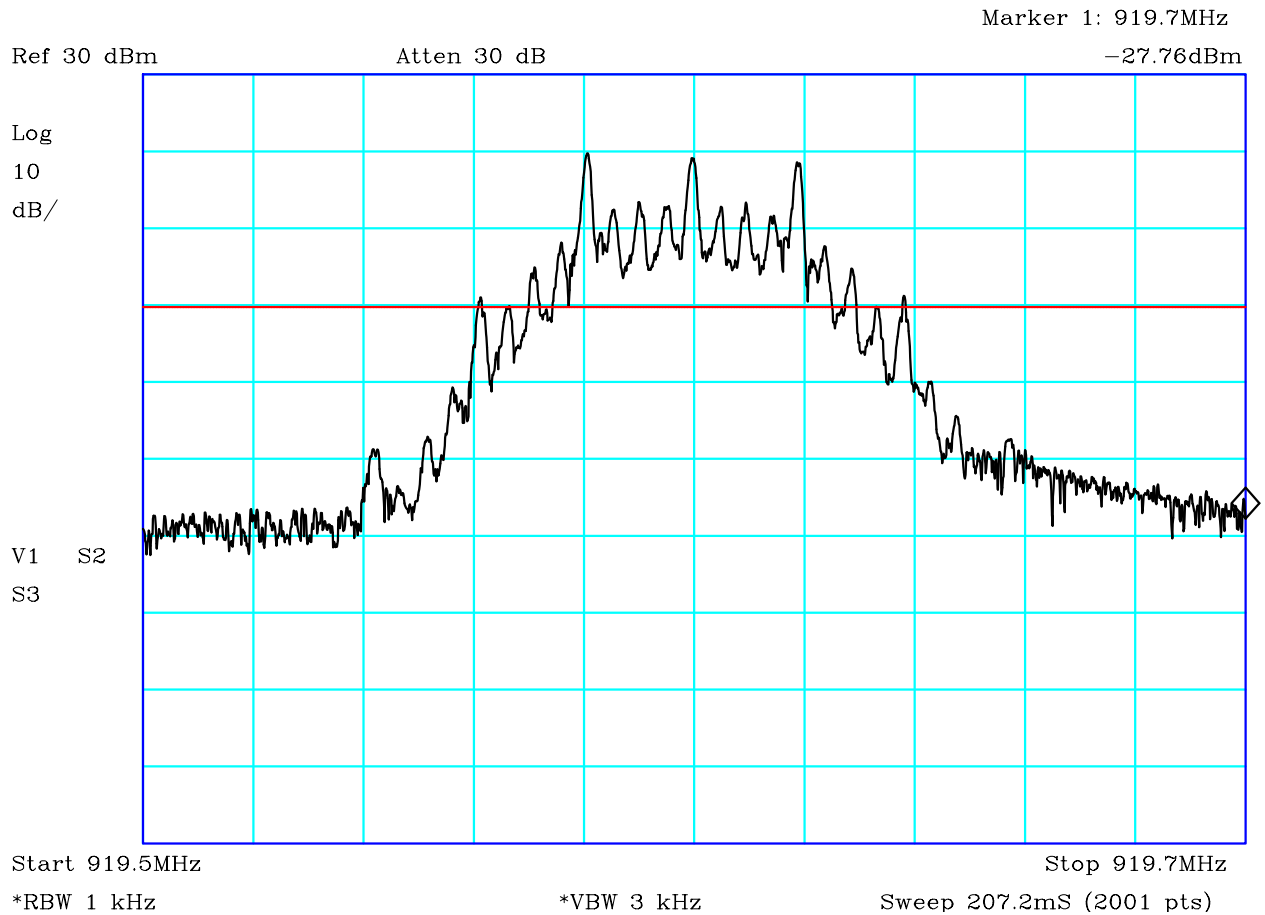
### PLOT 11 Conducted Antenna - 20dB Bandwidth - Mid Channel

Company:	Quatro	Product:	Frequency Hopping Module
Date:	10/10/2013	Test Eng:	Dave Smith
Method:	DA 00-705	Method:	
Limit1:		Limit2:	
Limit3:		Limit4:	

20dB bandwidth = 78kHz  
Continuous modulation - Mid Channel.

Facility:	Mode:	1	
	Modification State:	1	
File:	H391073D	Analysers:	R8




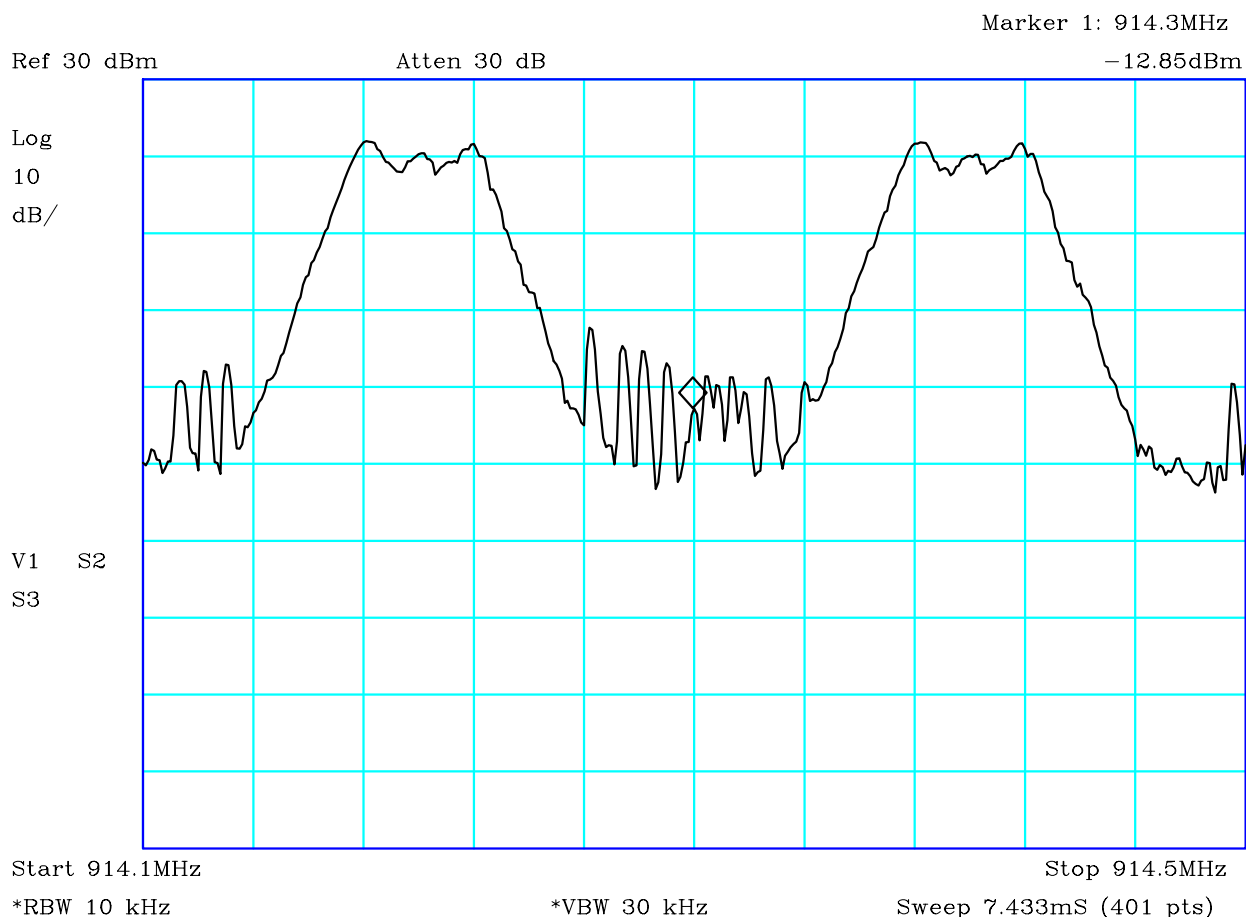


CF1:10dB\_PAD

## PLOT 12 Conducted Antenna - 20dB Bandwidth - High Channel

Company:	Quatro	Product:	Frequency Hopping Module
Date:	10/10/2013	Test Eng:	Dave Smith
Method:	DA 00-705	Method:	
Limit1:		Limit2:	
Limit3:		Limit4:	
20dB bandwidth = 77.6kHz Continuous modulation - High Channel.			
Facility:		Mode:	1
		Modification State:	1
File:	H3910768	Analyser:	R8

	Report No: <b>R3295</b>	FCC ID: XL8WDLM914HP	
	Issue No: <b>3</b>		
Test No: <b>T4651</b>	<b>Test Report</b>		Page: <b>34 of 54</b>



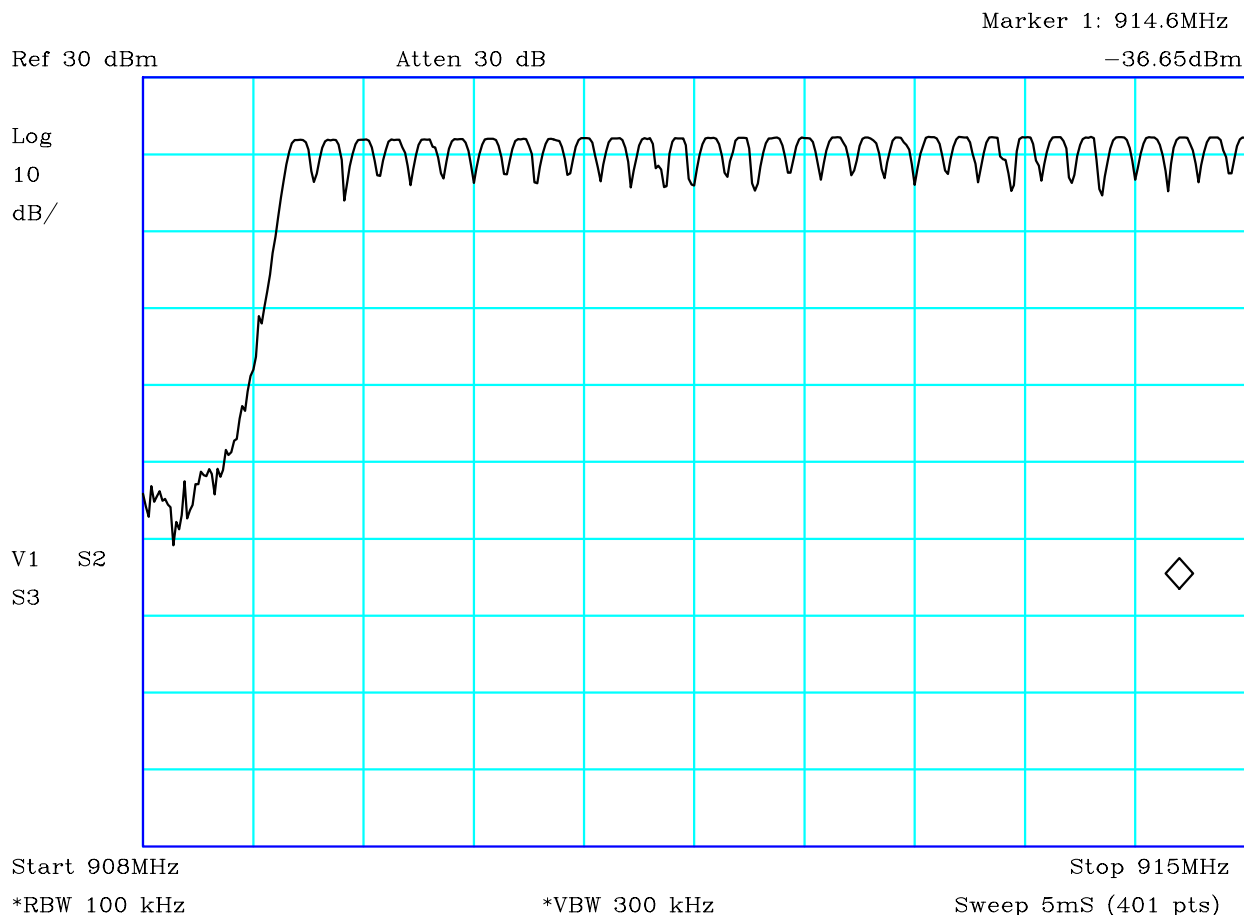
CF1:10dB\_PAD

### PLOT 13 Conducted Antenna - Channel Separation

Company:	Quatro	Product:	Frequency Hopping Module
Date:	10/10/2013	Test Eng:	Dave Smith
Method:	DA 00-705	Method:	
Limit1:		Limit2:	
Limit3:		Limit4:	

Channel Separation = 200kHz  
Continuous hopping mode.


Facility:	Mode:	2	
	Modification State:	1	
File:	H39106B6	Analysers:	R8

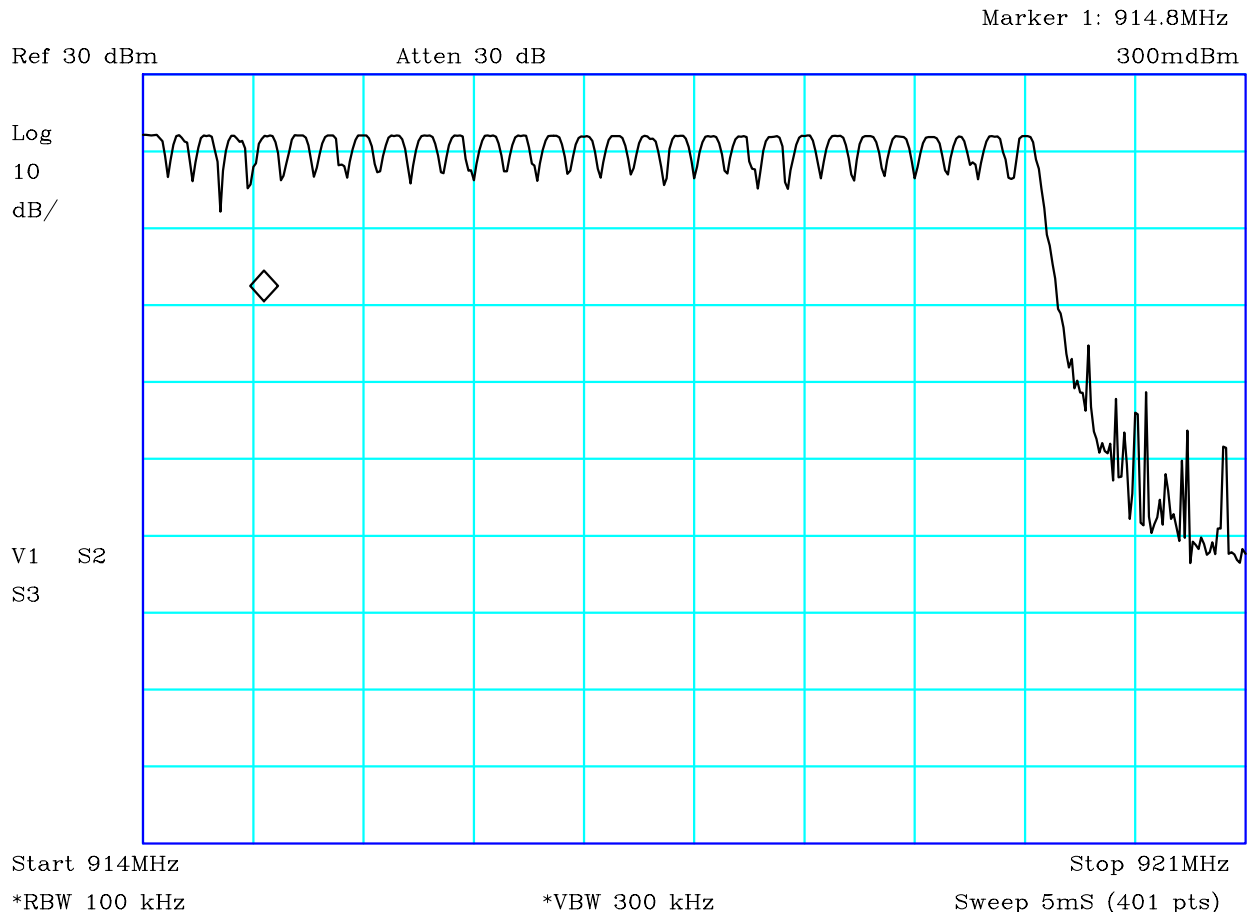


CF1:10dB\_PAD

## PLOT 14 Conducted Antenna - Number of Channels - Part 1 of 2

Company:	Quatro	Product:	Frequency Hopping Module
Date:	10/10/2013	Test Eng:	Dave Smith
Method:	DA 00-705	Method:	
Limit1:		Limit2:	
Limit3:		Limit4:	
29 channels between 908.997MHz and 914.615MHz			
Continuous hopping mode.			
Facility:		Mode:	2
		Modification State:	1
File:	H3910825	Analyser:	R8

	Report No: <b>R3295</b>	FCC ID: XL8WDLM914HP	
	Issue No: <b>3</b>		
Test No: <b>T4651</b>	Test Report		Page: 36 of 54




CF1:10dB\_PAD

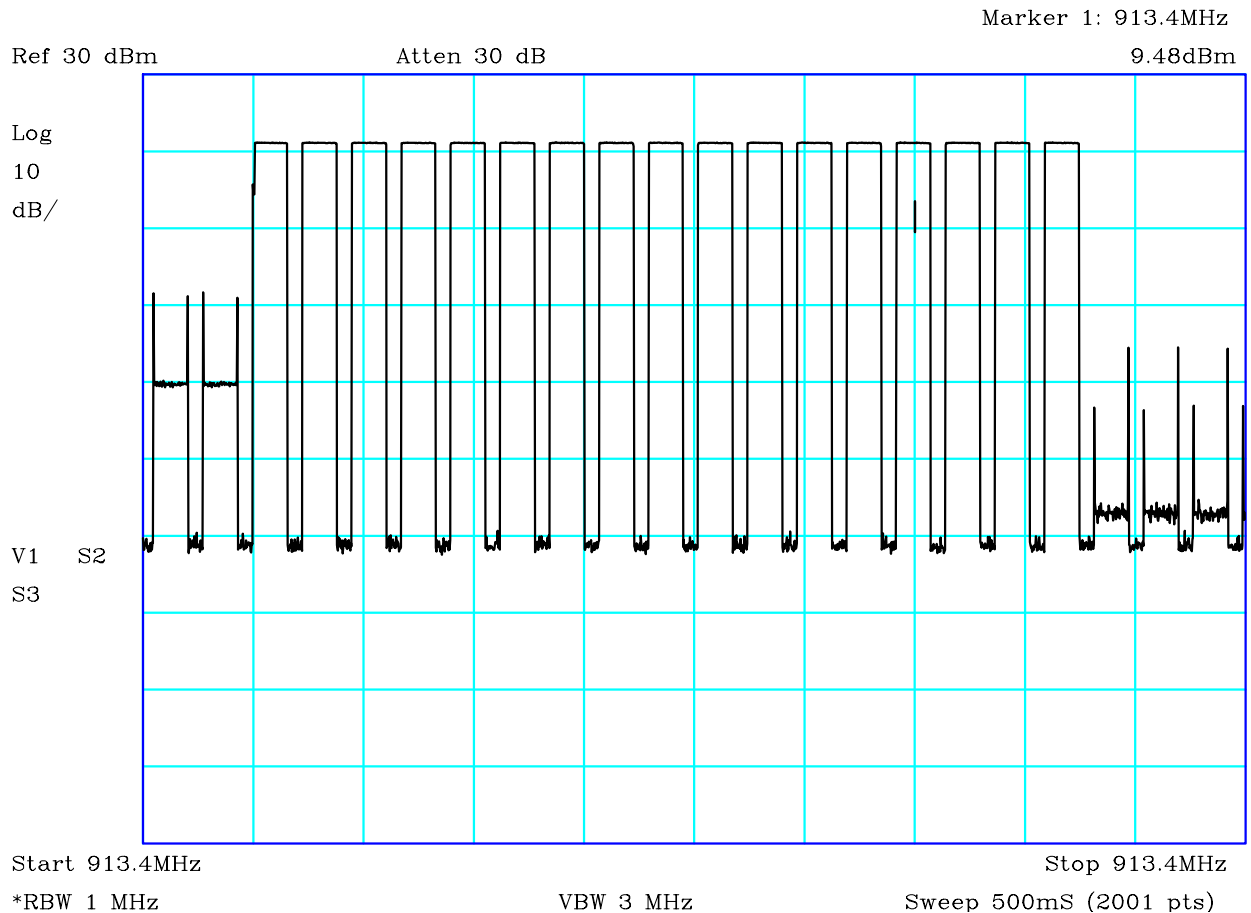
## PLOT 15 Conducted Antenna - Number of Channels - Part 2 of 2

Company:	Quatro	Product:	Frequency Hopping Module
Date:	10/10/2013	Test Eng:	Dave Smith
Method:	DA 00-705	Method:	
Limit1:		Limit2:	
Limit3:		Limit4:	

25 channels between 914.77MHz and 919.6MHz  
Total of 54 channels  
Continuous hopping mode.

Facility:	Mode:	2	
	Modification State:	1	
File:	H3910828	Analysar:	R8


	Report No: <b>R3295</b>	FCC ID: XL8WDLM914HP	
	Issue No: <b>3</b>		
	Test No: <b>T4651</b>	<b>Test Report</b>	Page: <b>37 of 54</b>

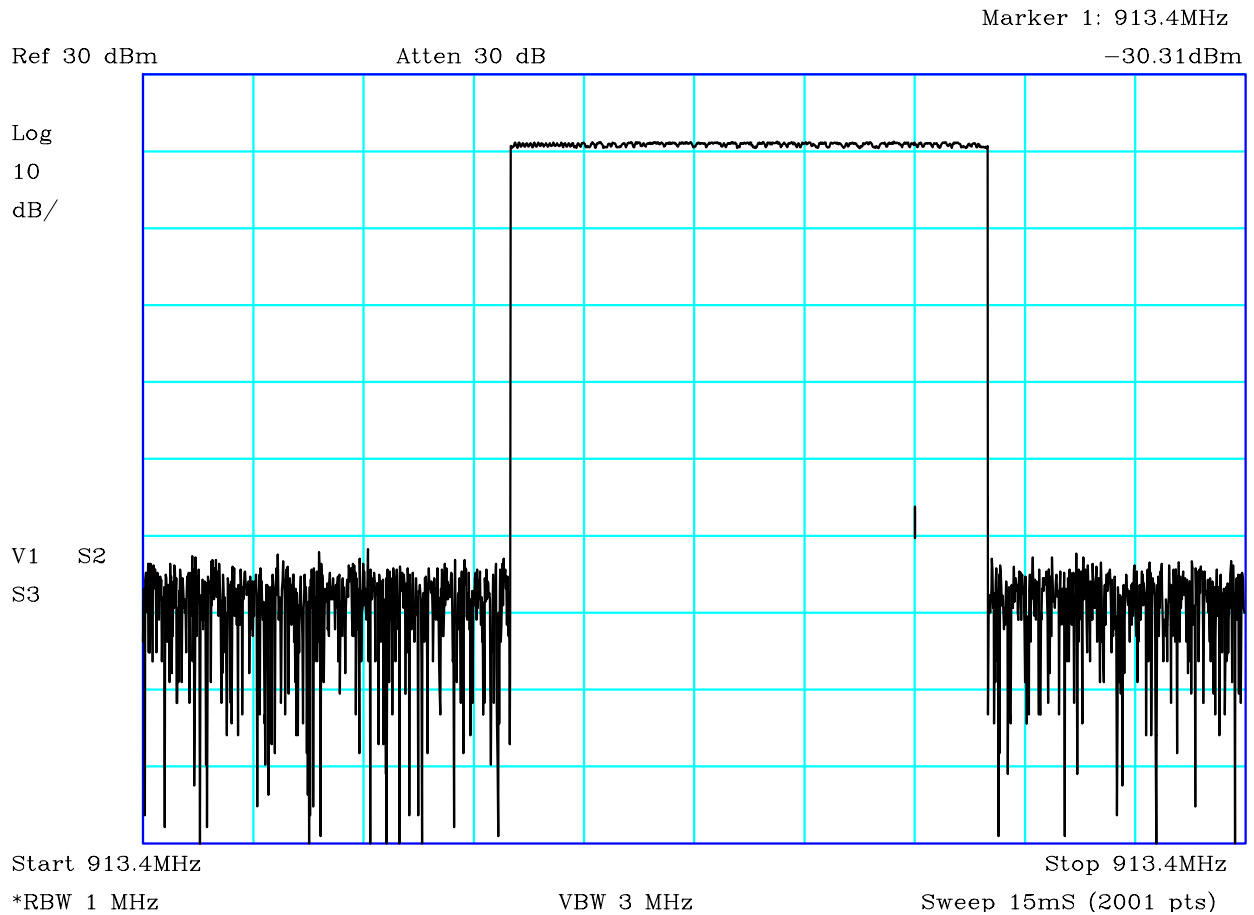


CF1:10dB\_PAD

### **PLOT 16    Conducted Antenna - Channel Dwell Time - Long Duration Data Sequence**

Company:	Quatro	Product:	Frequency Hopping Module
Date:	10/10/2013	Test Eng:	Dave Smith
Method:	DA 00-705	Method:	
Limit1:		Limit2:	
Limit3:		Limit4:	
Dwell Time = 374.8msec (ignoring short gaps in pulse train) Continuous hopping mode.			
Facility:		Mode:	2
		Modification State:	1
File:	H3910701	Analyser:	R8

	Report No: <b>R3295</b>	FCC ID: XL8WDLM914HP	
	Issue No: <b>3</b>		
	Test No: <b>T4651</b>	<b>Test Report</b>	Page: <b>38 of 54</b>




CF1:10dB\_PAD

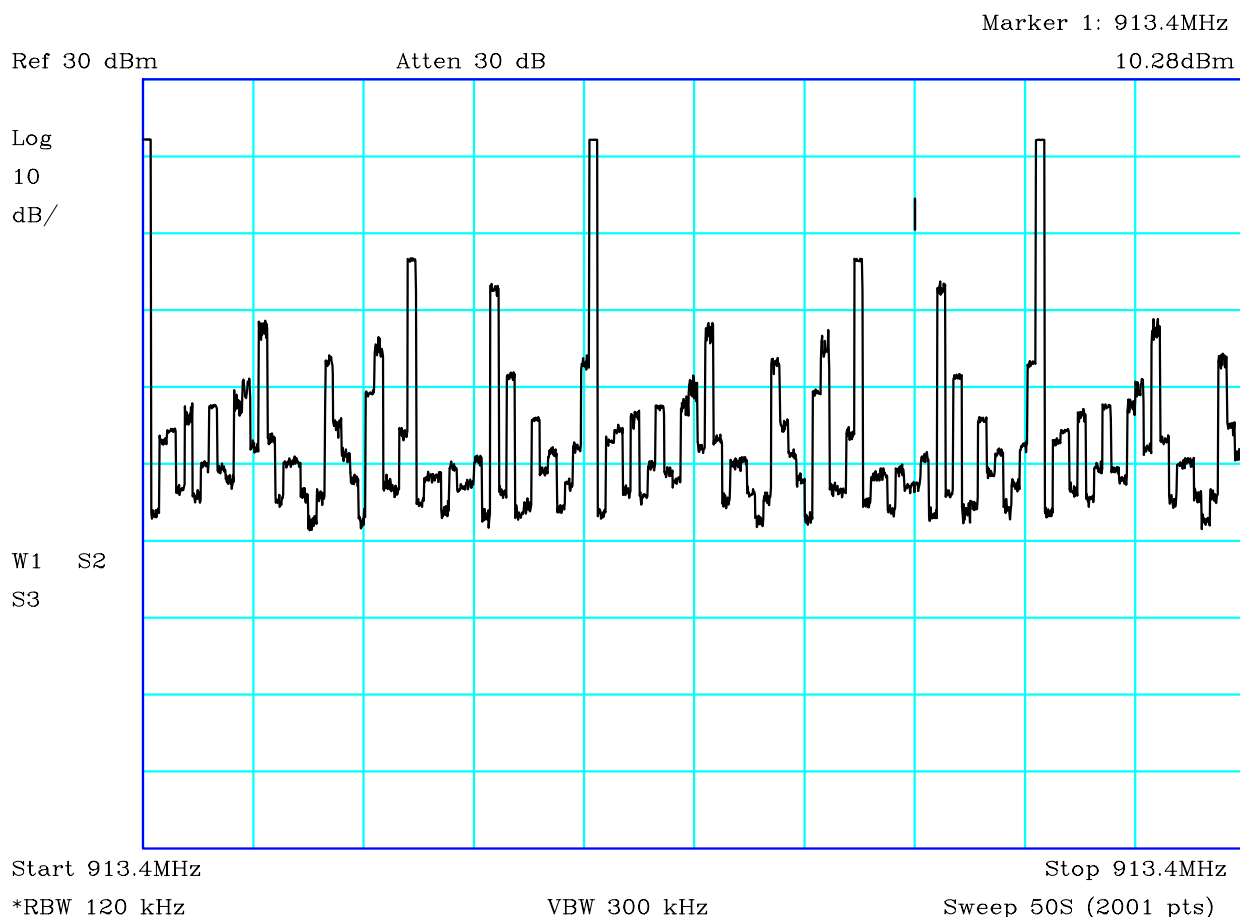
### PLOT 17 Conducted Antenna - Channel Dwell Time - Short Pulse Data Sequence

Company:	Quatro	Product:	Frequency Hopping Module
Date:	10/10/2013	Test Eng:	Dave Smith
Method:	DA 00-705	Method:	
Limit1:		Limit2:	
Limit3:		Limit4:	

Dwell Time = 6.502msec  
Short pulse hopping mode.

Facility:	Mode:	3
	Modification State:	1
File:	H3910707	Analysers:
		R8

	Report No: <b>R3295</b>	FCC ID: XL8WDLM914HP	
	Issue No: <b>3</b>		
Test No: <b>T4651</b>	<b>Test Report</b>		Page: 39 of 54



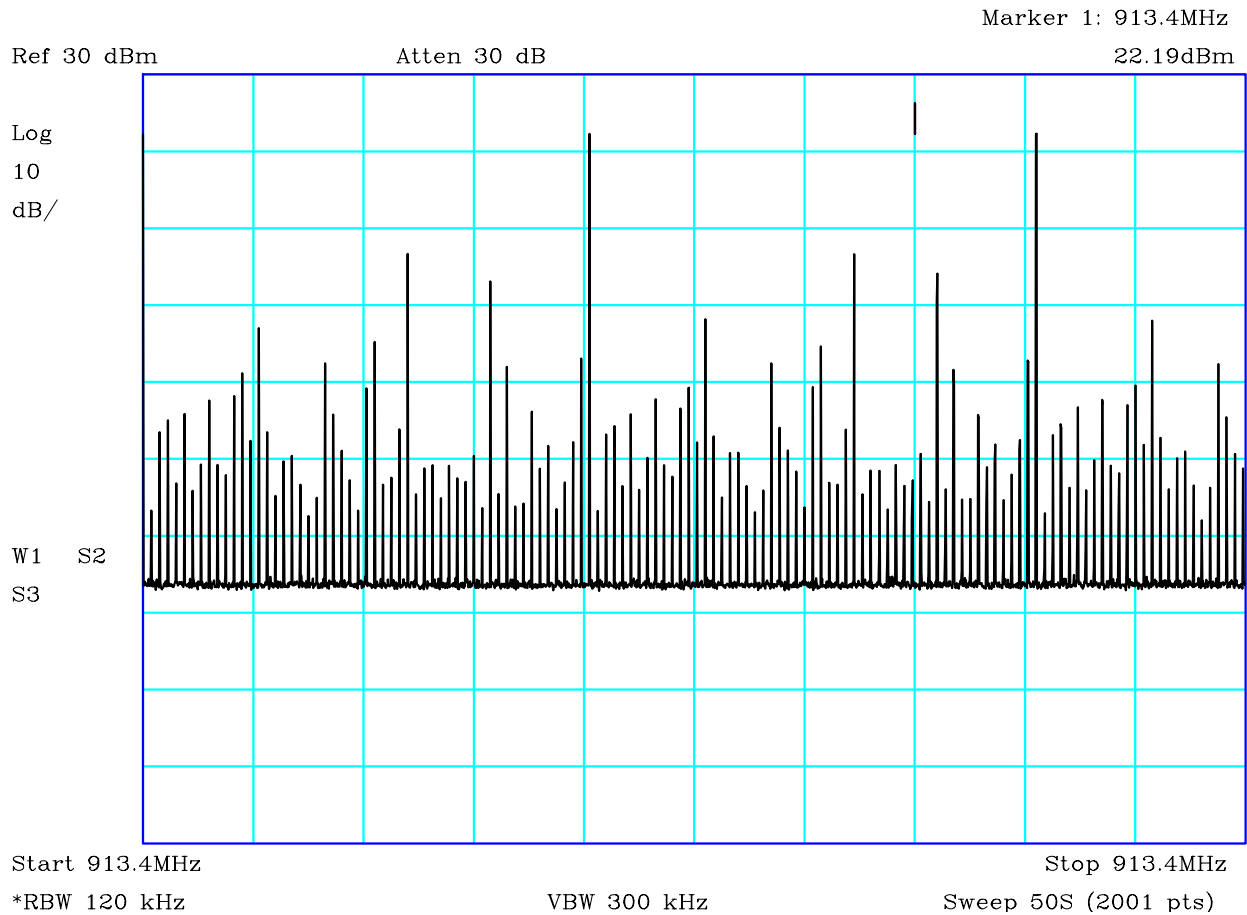
CF1:10dB\_PAD

## PLOT 18 Conducted Antenna - Channel Repetition Time - Long Data Sequence

Company:	Quatro	Product:	Frequency Hopping Module
Date:	10/10/2013	Test Eng:	Dave Smith
Method:	DA 00-705	Method:	
Limit1:		Limit2:	
Limit3:		Limit4:	

Time between transmissions per channel = 20.25 seconds  
Continuous hopping mode.

Facility:	Mode:	2	
	Modification State:	1	
File:	H3910724	Analysers:	R8




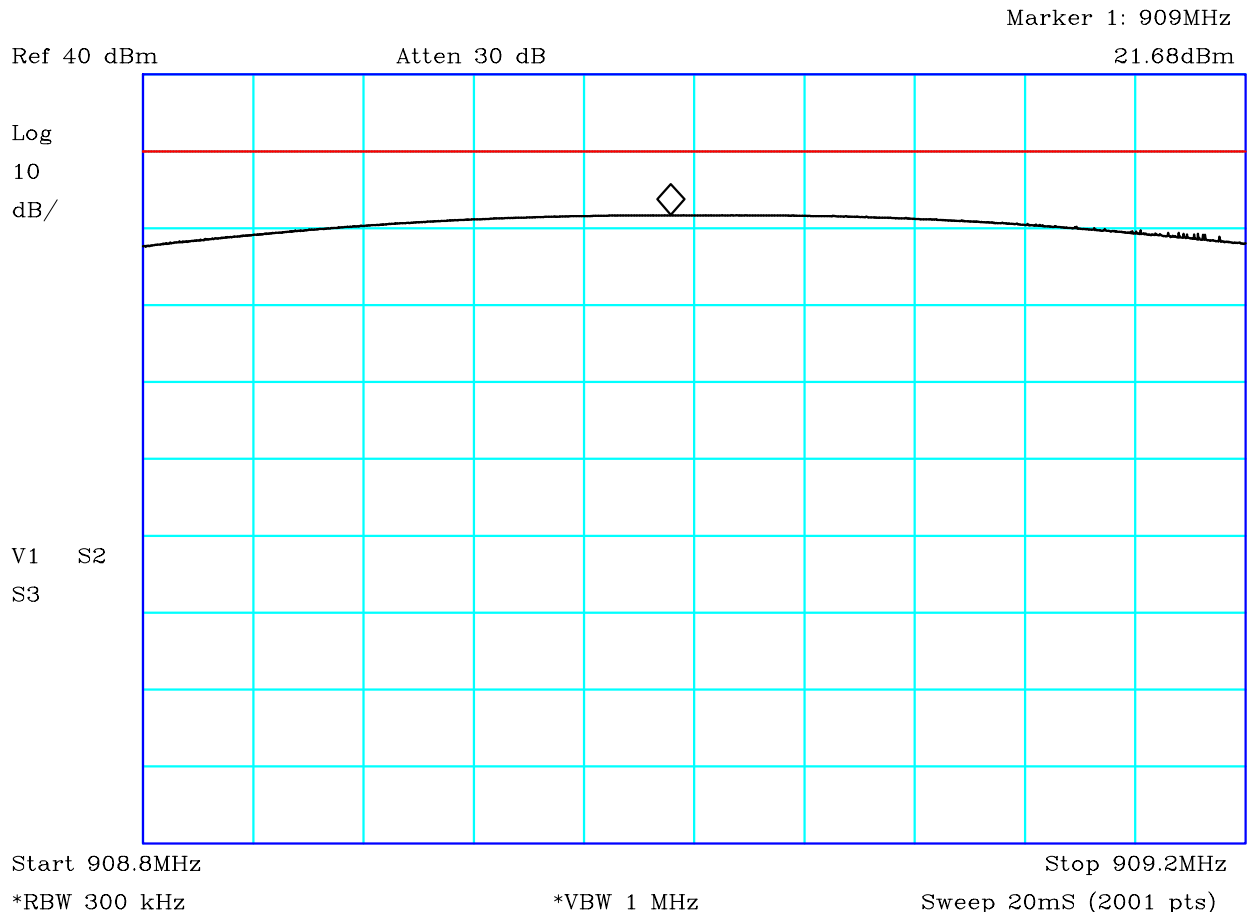
CF1:10dB\_PAD

## PLOT 19 Conducted Antenna - Channel Repetition Time - Short Data Sequence

Company:	Quatro	Product:	Frequency Hopping Module
Date:	10/10/2013	Test Eng:	Dave Smith
Method:	DA 00-705	Method:	
Limit1:		Limit2:	
Limit3:		Limit4:	
Time between transmissions per channel = 20.25 seconds Short pulse hopping mode.			
Facility:		Mode:	3
		Modification State:	1
File:	H3910729	Analyser:	R8



	Report No: <b>R3295</b>	FCC ID: XL8WDLM914HP	
	Issue No: <b>3</b>		
Test No: <b>T4651</b>	<b>Test Report</b>		Page: <b>41 of 54</b>




CF1:10dB\_PAD

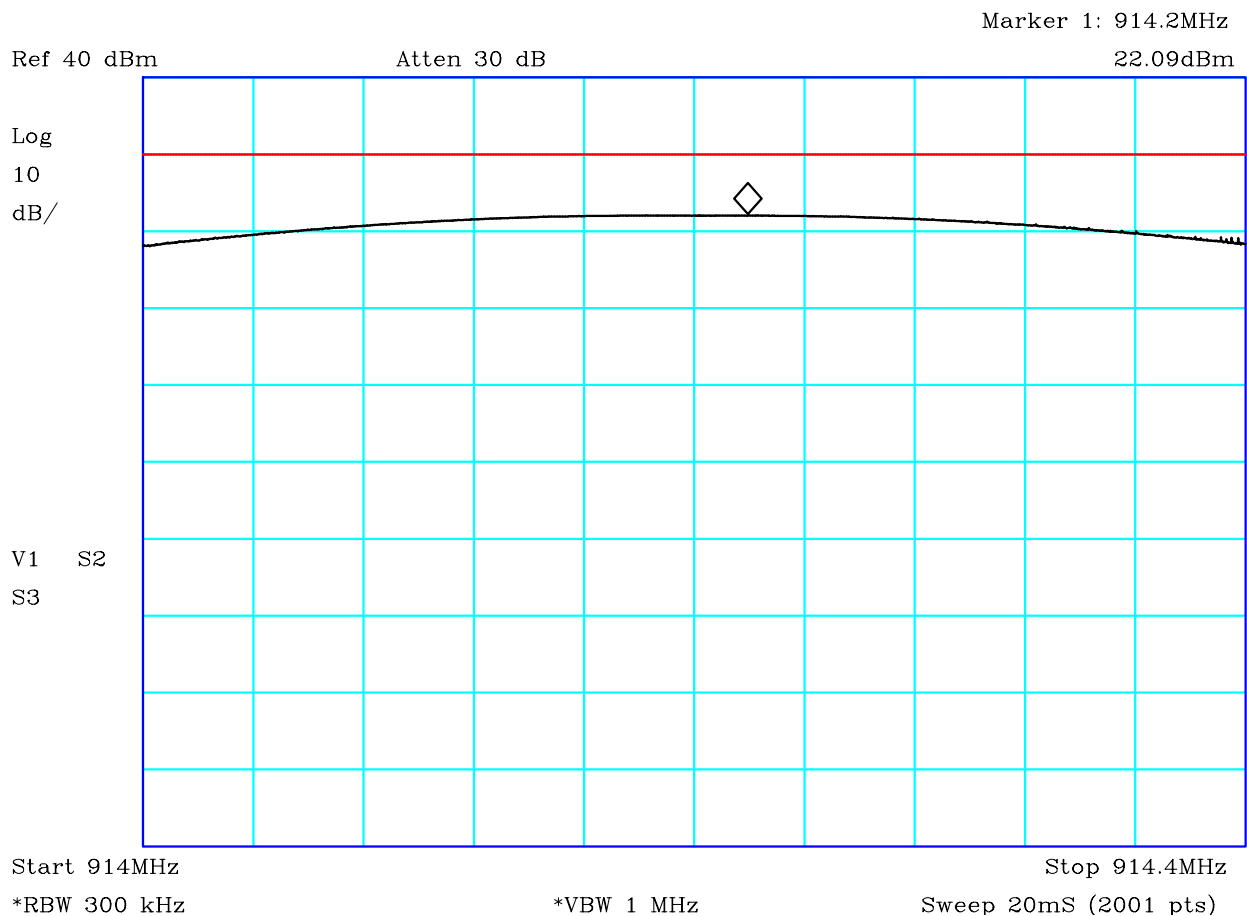
**PLOT 20    Conducted Antenna - Peak Power - Low Channel**

Company:	Quatro	Product:	Frequency Hopping Module
Date:	10/10/2013	Test Eng:	Dave Smith
Method:	DA 00-705	Method:	
Limit1:	30dBm	Limit2:	
Limit3:		Limit4:	

Continuous modulation - Low Channel.

Facility:		Mode:	1
		Modification State:	1
File:	H3910798	Analyser:	R8

	Report No: <b>R3295</b>	FCC ID: XL8WDLM914HP	
	Issue No: <b>3</b>		
Test No: <b>T4651</b>	<b>Test Report</b>		Page: <b>42 of 54</b>




CF1:10dB\_PAD

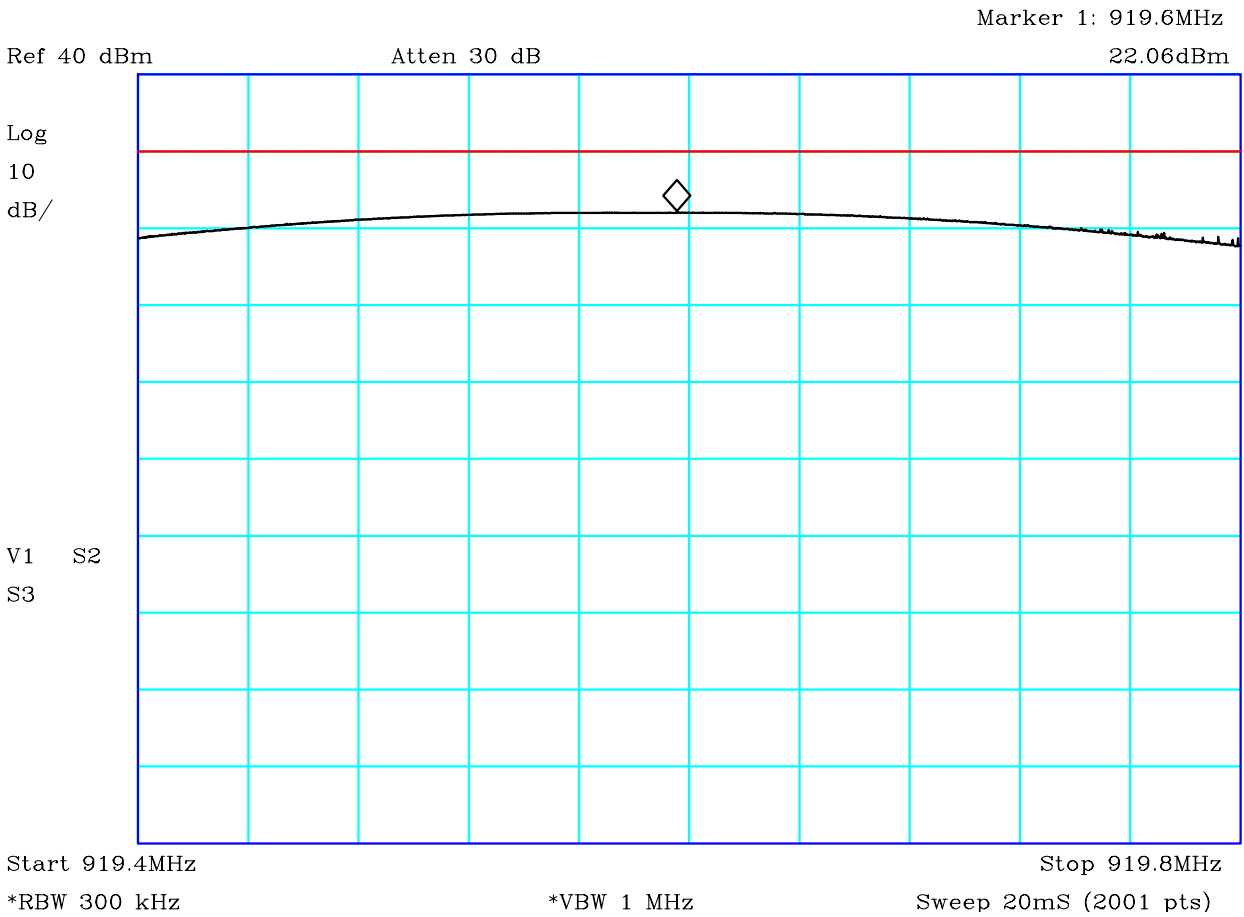
### **PLOT 21    Conducted Antenna - Peak Power - Mid Channel**

Company:	Quatro	Product:	Frequency Hopping Module
Date:	10/10/2013	Test Eng:	Dave Smith
Method:	DA 00-705	Method:	
Limit1:	30dBm	Limit2:	
Limit3:		Limit4:	

Continuous modulation - Mid Channel.

Facility:	Mode:	1	
	Modification State:	1	
File:	H3910796	Analyser:	R8

	Report No: <b>R3295</b>	FCC ID: XL8WDLM914HP	
	Issue No: <b>3</b>		
Test No: <b>T4651</b>	<b>Test Report</b>		Page: <b>43 of 54</b>




CF1:10dB\_PAD

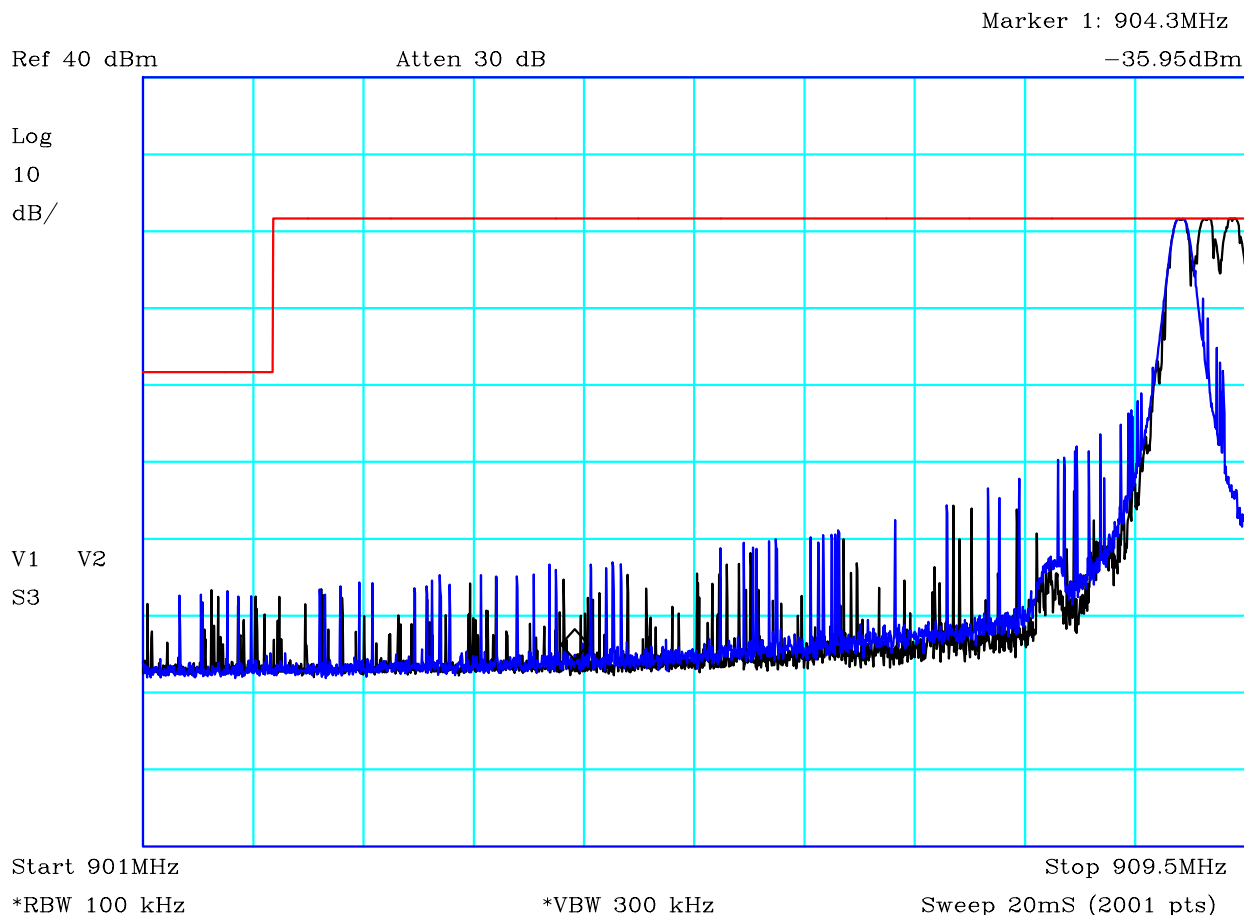
**PLOT 22 Conducted Antenna - Peak Power - High Channel**

Company:	Quatro	Product:	Frequency Hopping Module
Date:	10/10/2013	Test Eng:	Dave Smith
Method:	DA 00-705	Method:	
Limit1:	30dBm	Limit2:	
Limit3:		Limit4:	

Continuous modulation - High Channel.

Facility:	Mode:	1	
	Modification State:	1	
File:	H3910793	Analysr:	R8

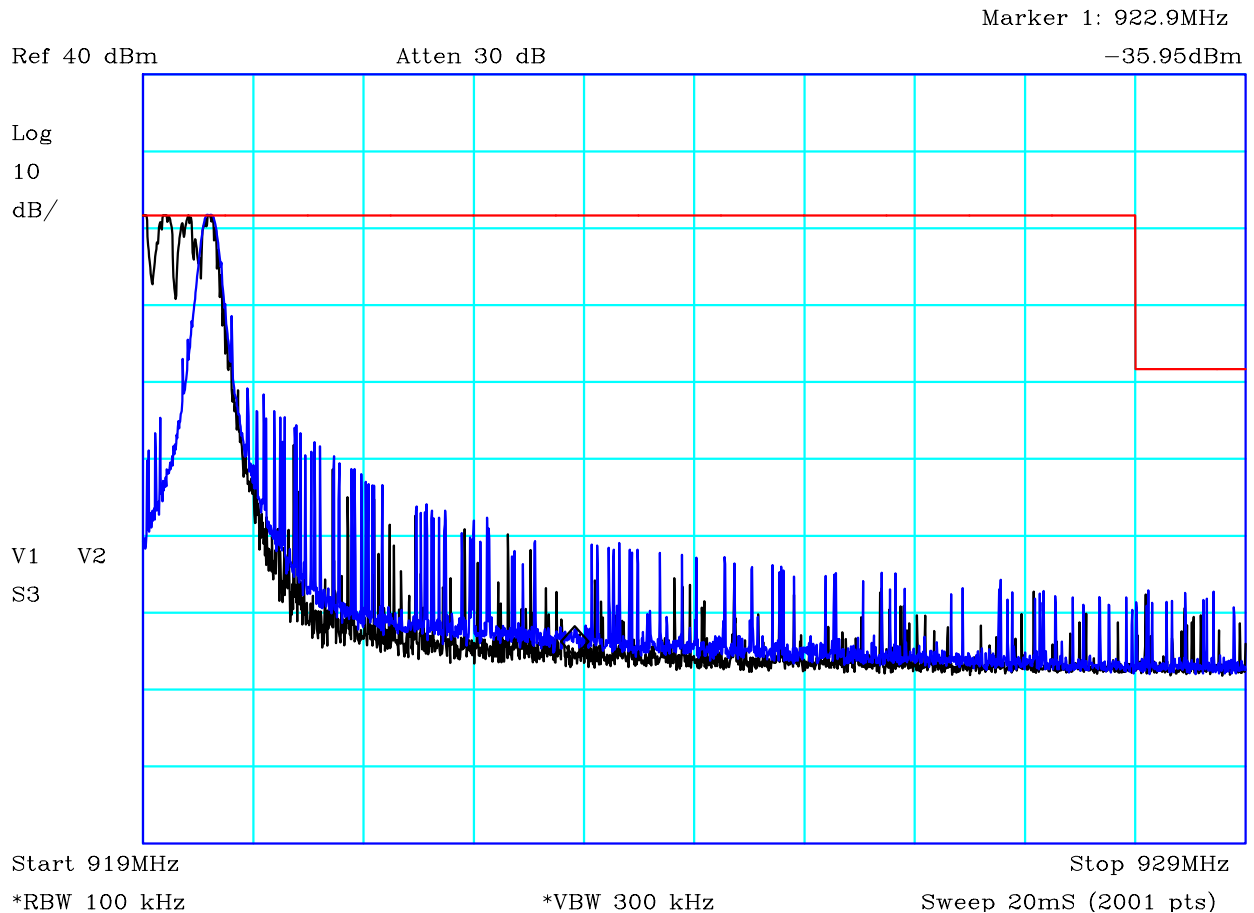
	Report No: <b>R3295</b>	FCC ID: XL8WDLM914HP	
	Issue No: <b>3</b>		
Test No: <b>T4651</b>	Test Report		Page: 44 of 54



CF1:10dB\_PAD

**PLOT 23    Conducted Antenna - Spurious Emissions - Low Channel Band Edge**

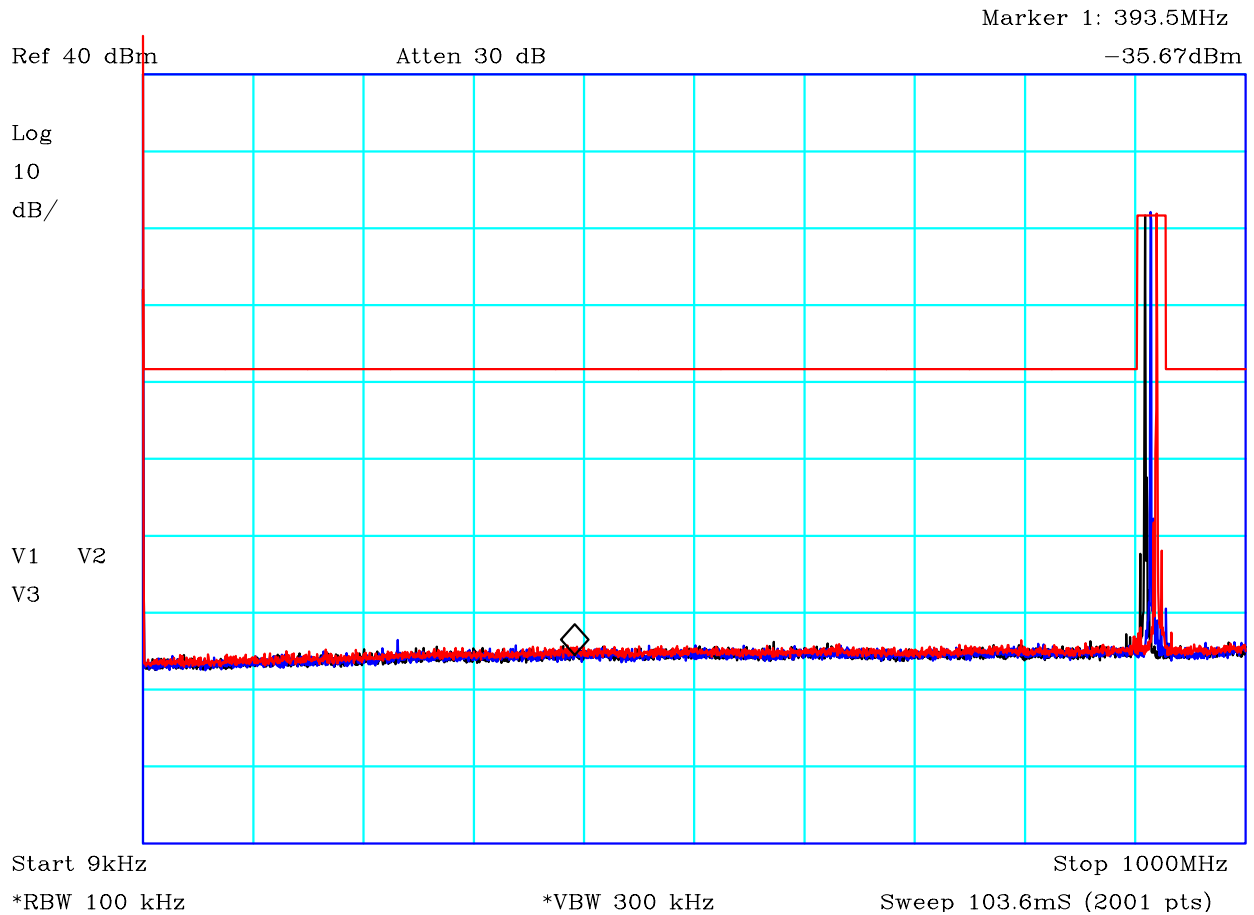
Company:	Quatro	Product:	Frequency Hopping Module
Date:	10/10/2013	Test Eng:	Dave Smith
Method:	DA 00-705	Method:	
Limit1:(RED)	-20dBc	Limit2:	
Limit3:		Limit4:	
Black: Hopping Blue: Low Channel Continuous modulation			
Facility:		Mode:	1
		Modification State:	1
File:	H39107BD	Analyser:	R8



CF1:10dB\_PAD

## PLOT 24 Conducted Antenna - Spurious Emissions - High Channel Band Edge


Company:	Quatro	Product:	Frequency Hopping Module
Date:	10/10/2013	Test Eng:	Dave Smith
Method:	DA 00-705	Method:	
Limit1:(RED)	-20dBc	Limit2:	
Limit3:		Limit4:	
Black: Hopping Blue: High Channel Continuous modulation			
Facility:		Mode:	1
		Modification State:	1
File:	H39107C3	Analyser:	R8

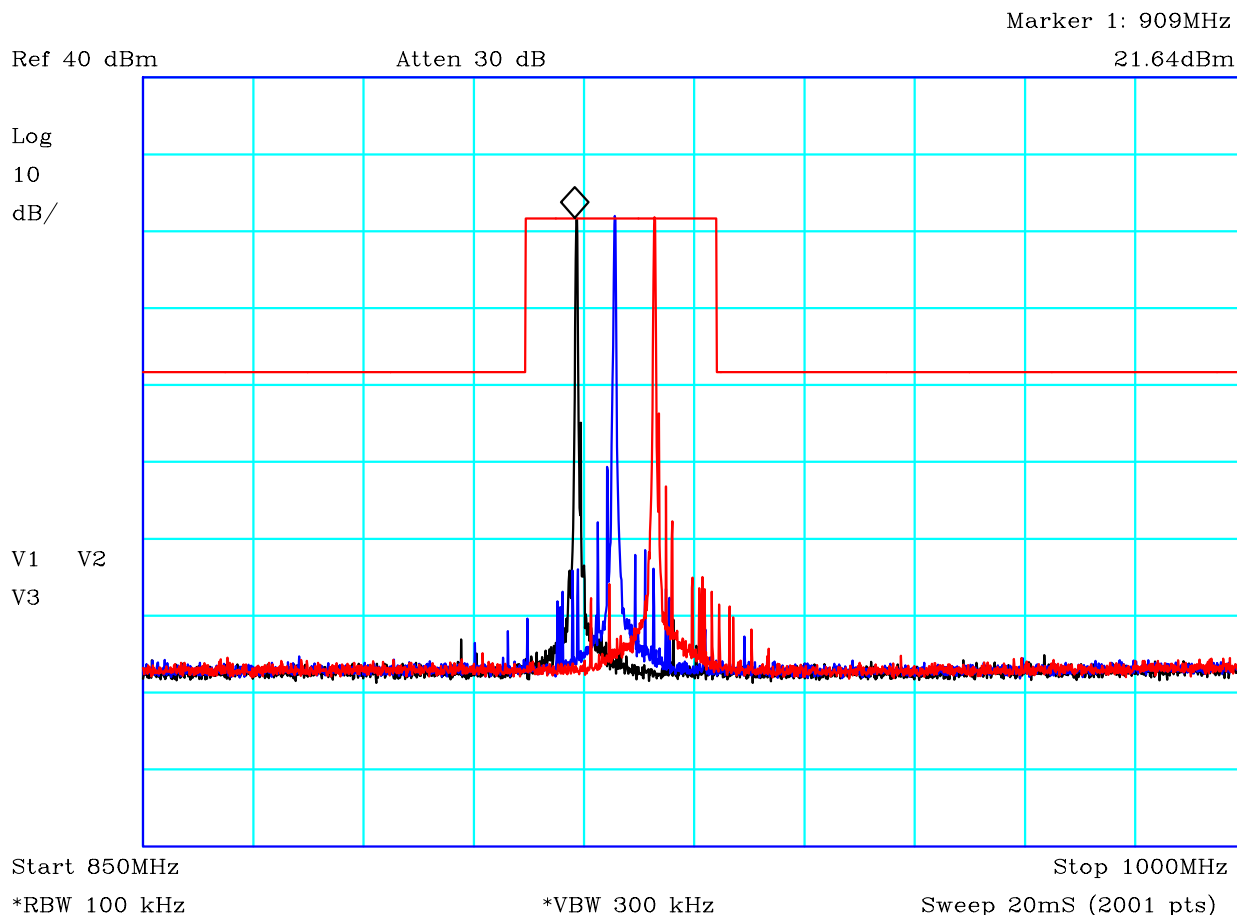


CF1:10dB\_PAD

## PLOT 25 Conducted Antenna - Spurious Emissions - 9kHz to 1GHz - Fixed Freq.

Company:	Quatro	Product:	Frequency Hopping Module
Date:	10/10/2013	Test Eng:	Dave Smith
Method:	DA 00-705	Method:	
Limit1:(RED)	-20dBc	Limit2:	
Limit3:		Limit4:	
Black: fixed at low channel Blue: fixed at high channel Red: fixed at high channel Continuous modulation			
Facility:	Height	Mode:	1
Distance	Polarisation	Modification State:	1
Angle	File: H39145D4	Analyser:	R8

	Report No: <b>R3295</b>	FCC ID: XL8WDLM914HP	
	Issue No: <b>3</b>		
Test No: <b>T4651</b>	Test Report		Page: 47 of 54




CF1:10dB\_PAD

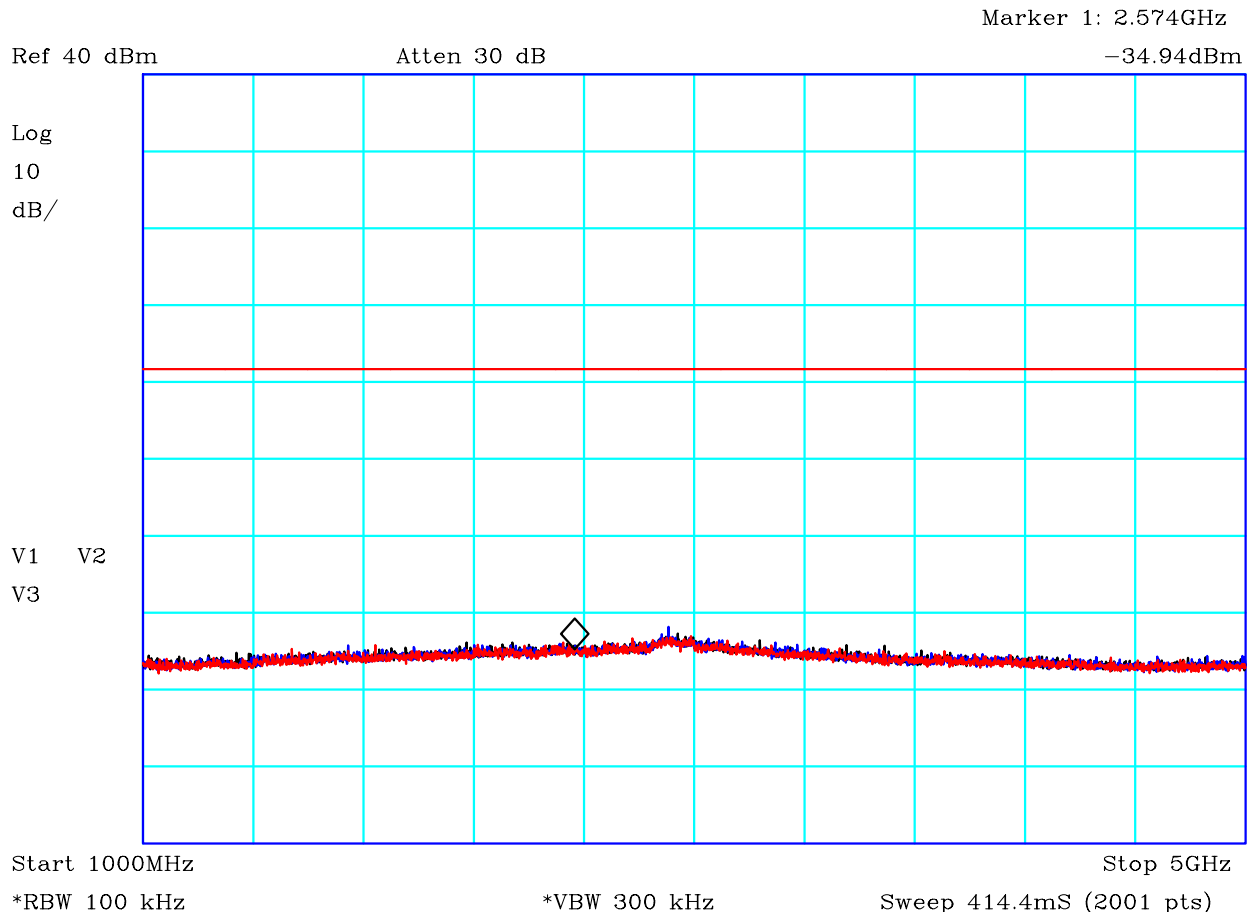
## PLOT 26 Conducted Antenna - Spurious Emissions - 850MHz to 1GHz Fixed Freq.

Company:	Quatro	Product:	Frequency Hopping Module
Date:	10/10/2013	Test Eng:	Dave Smith
Method:	DA 00-705	Method:	
Limit1:(RED)	-20dBc	Limit2:	
Limit3:		Limit4:	

Black: fixed at low channel  
Blue: fixed at high channel  
Red: fixed at high channel  
Continuous modulation

Facility:	Height	Mode:	1
Distance	Polarisation	Modification State:	1
Angle	File: H39145D6	Analyser:	R8

	Report No: <b>R3295</b>	FCC ID: XL8WDLM914HP	
	Issue No: <b>3</b>		
Test No: <b>T4651</b>	<b>Test Report</b>		Page: <b>48 of 54</b>



CF1:10dB\_PAD


**PLOT 27    Conducted Antenna - Spurious Emissions - 1GHz to 5GHz - Fixed Freq.**

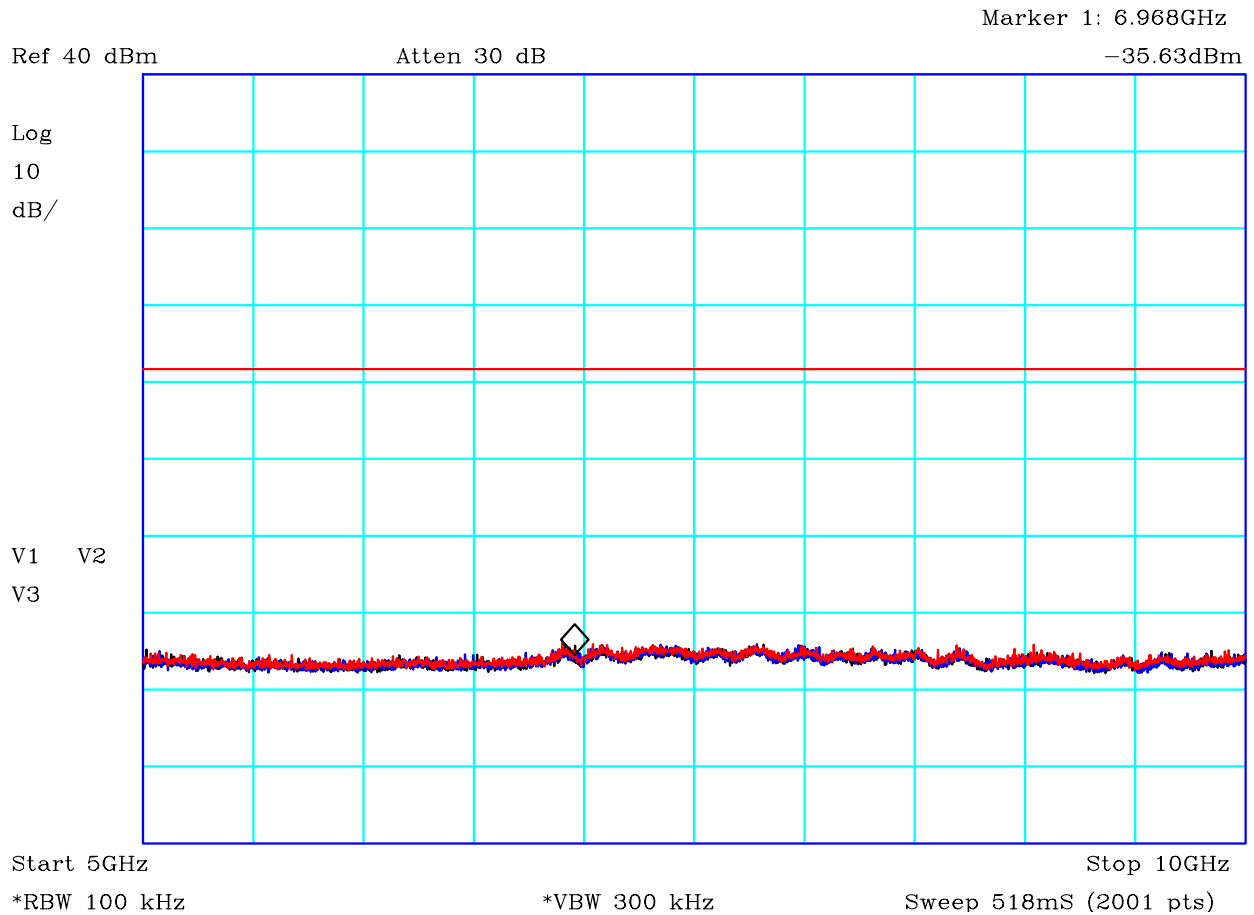
Company:	Quatro	Product:	Frequency Hopping Module
Date:	10/10/2013	Test Eng:	Dave Smith
Method:	DA 00-705	Method:	
Limit1:(RED)	-20dBc	Limit2:	
Limit3:		Limit4:	

Black: fixed at low channel  
Blue: fixed at high channel  
Red: fixed at high channel  
Continuous modulation

Facility:	Height	Mode:	1
Distance	Polarisation	Modification State:	1
Angle	File: H39145D7	Analyser:	R8



	Report No: <b>R3295</b>	FCC ID: XL8WDLM914HP	
	Issue No: <b>3</b>		
	Test No: <b>T4651</b>	<b>Test Report</b>	Page: <b>49 of 54</b>




CF1:10dB\_PAD

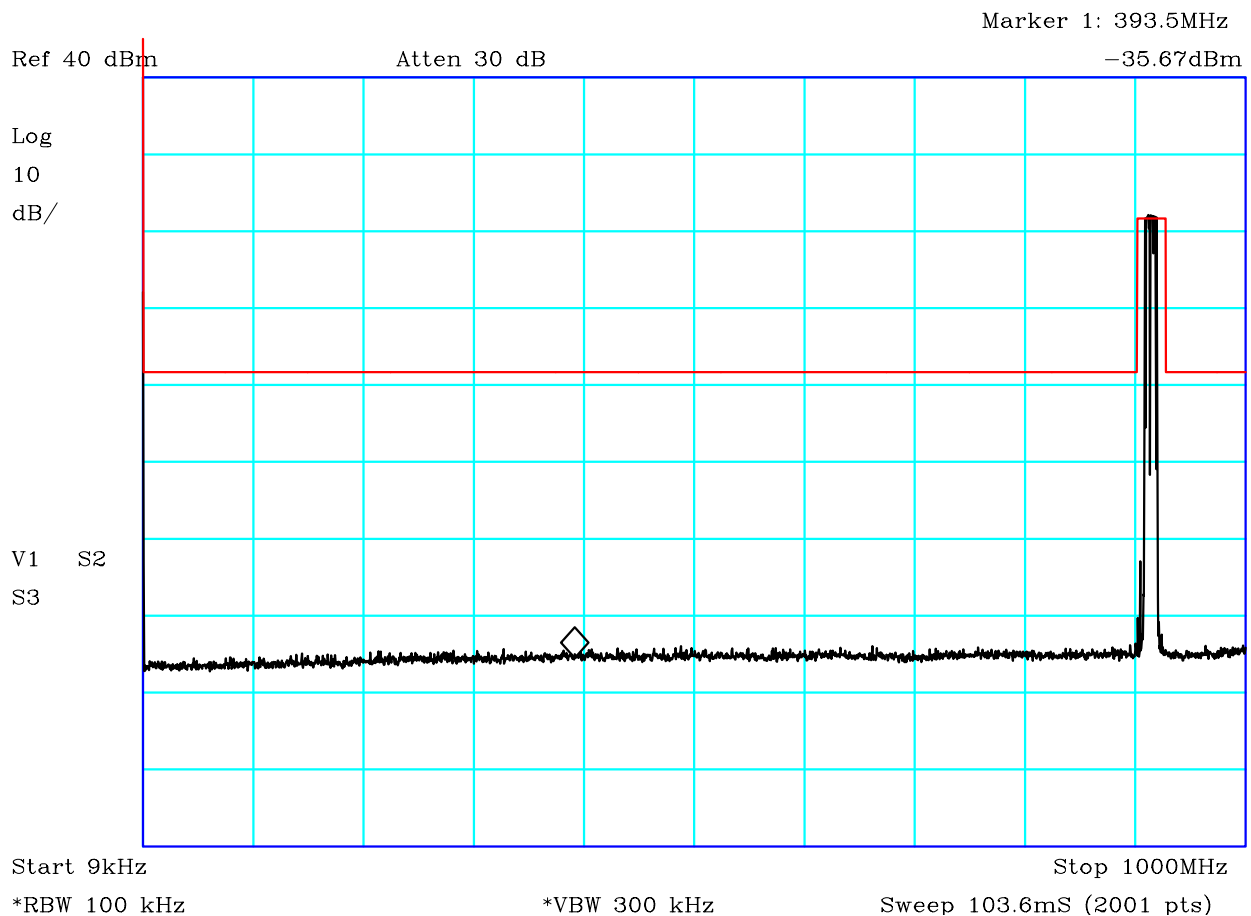
**PLOT 28 Conducted Antenna - Spurious Emissions - 5GHz to 10GHz - Fixed Freq.**

Company:	Quatro	Product:	Frequency Hopping Module
Date:	10/10/2013	Test Eng:	Dave Smith
Method:	DA 00-705	Method:	
Limit1:(RED)	-20dBc	Limit2:	
Limit3:		Limit4:	

Black: fixed at low channel  
Blue: fixed at high channel  
Red: fixed at high channel  
Continuous modulation

Facility:	Height	Mode:	1
Distance	Polarisation	Modification State:	1
Angle	File: H39145D8	Analyser:	R8


	Report No: <b>R3295</b>	FCC ID: XL8WDLM914HP	
	Issue No: <b>3</b>		
Test No: <b>T4651</b>	<b>Test Report</b>		Page: 50 of 54

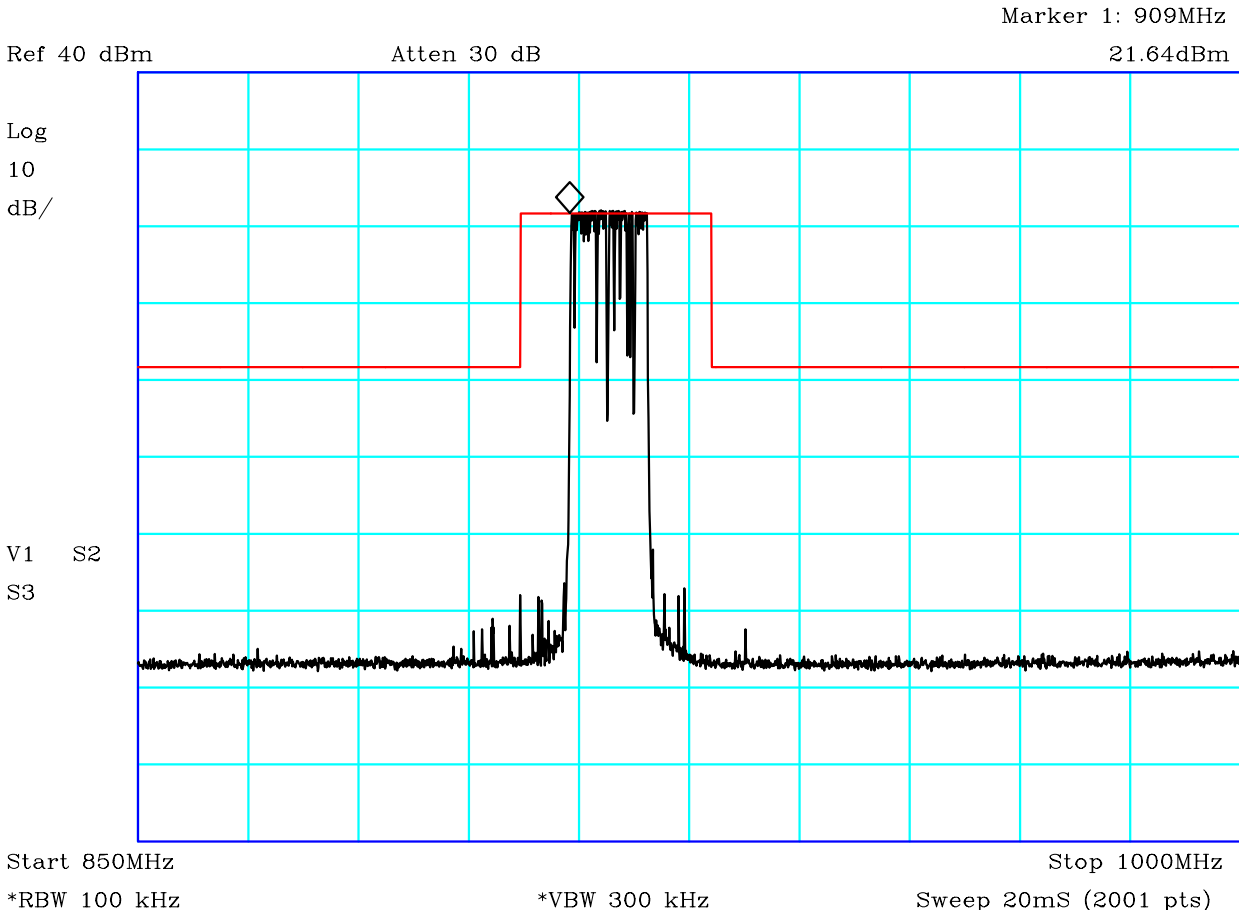


CF1:10dB\_PAD

## PLOT 29 Conducted Antenna -Spurious Emissions - 9kHz to 1GHz - Hopping

Company:	Quatro	Product:	Frequency Hopping Module
Date:	10/10/2013	Test Eng:	Dave Smith
Method:	DA 00-705	Method:	
Limit1:(RED)	-20dBc	Limit2:	
Limit3:		Limit4:	
Hopping Continuous modulation			
Facility:		Mode:	2
		Modification State:	1
File:	H39107CA	Analyser:	R8

	Report No: <b>R3295</b>	FCC ID: XL8WDLM914HP	
	Issue No: <b>3</b>		
Test No: <b>T4651</b>	<b>Test Report</b>		Page: <b>51 of 54</b>




CF1:10dB\_PAD

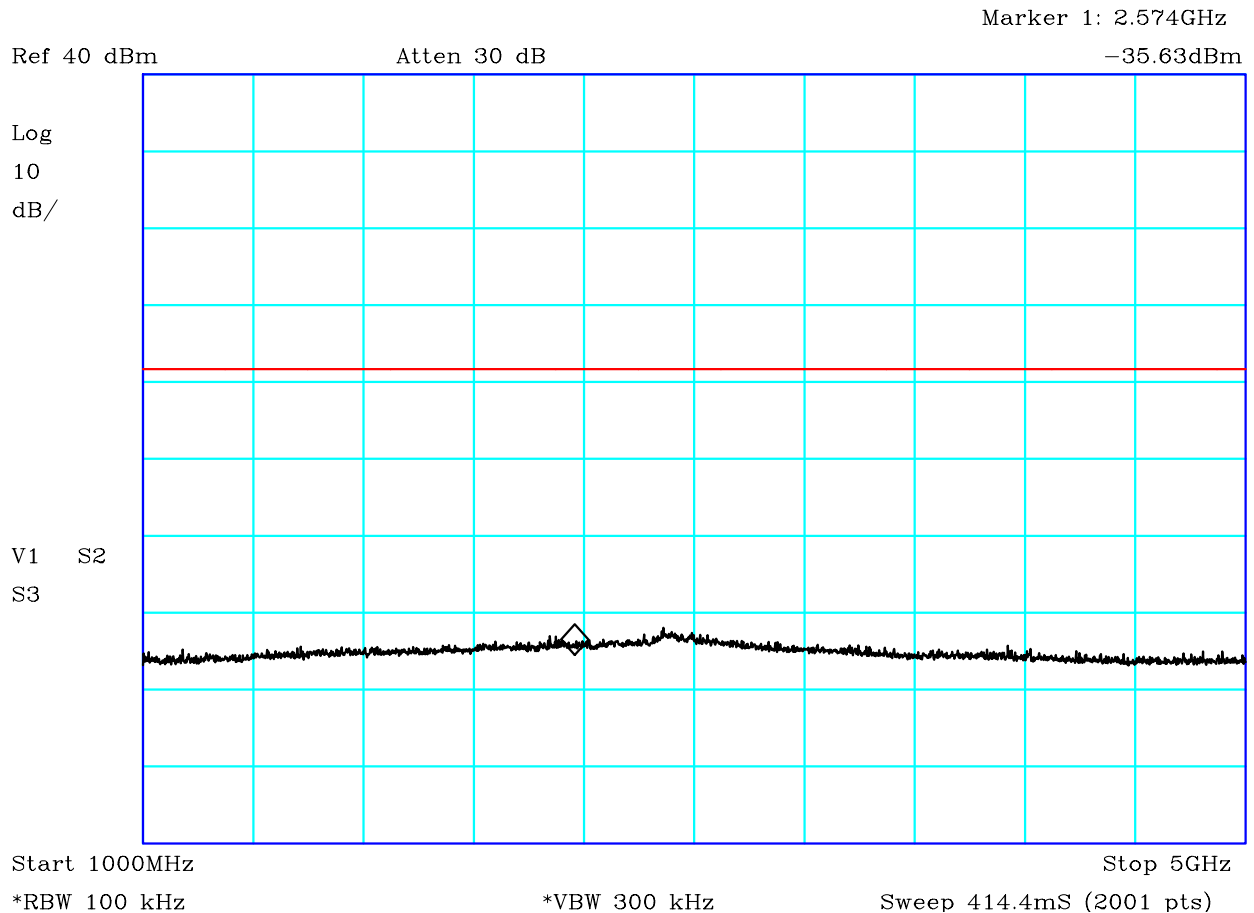
**PLOT 30    Conducted Antenna - Spurious Emissions - 850MHz to 1GHz Hopping**

Company: Quatro	Product: Frequency Hopping Module
Date: 10/10/2013	Test Eng: Dave Smith
Method: DA 00-705	Method:
Limit1:(RED) -20dBc	Limit2:
Limit3:	Limit4:

Hopping  
Continuous modulation

Facility:	Mode: 2	
	Modification State: 1	
File: H39107B7	Analyser: R8	


	Report No: <b>R3295</b>	FCC ID: XL8WDLM914HP	
	Issue No: <b>3</b>		
Test No: <b>T4651</b>	<b>Test Report</b>		Page: <b>52 of 54</b>

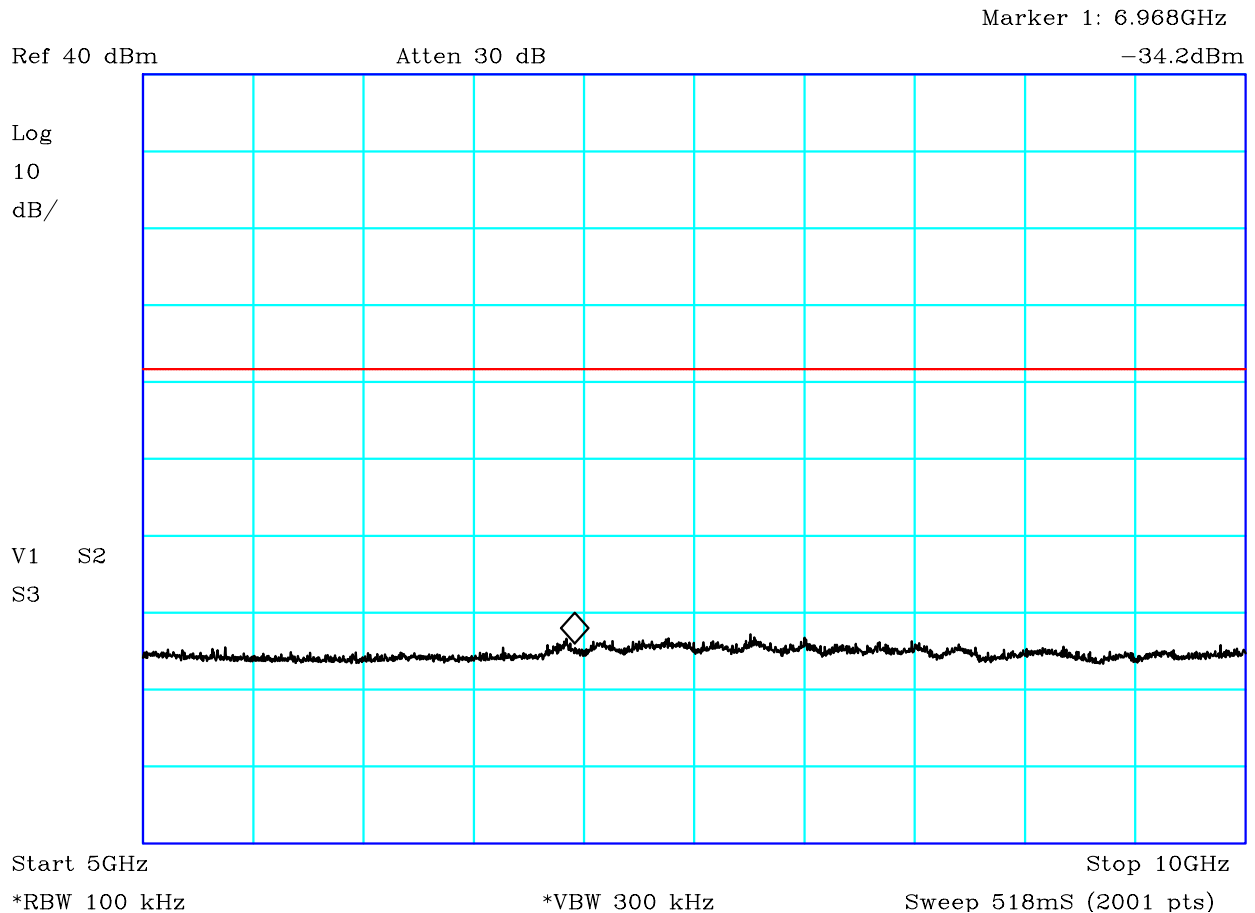


CF1:10dB\_PAD

### PLOT 31 Conducted Antenna - Spurious Emissions - 1GHz to 5GHz - Hopping

Company:	Quatro	Product:	Frequency Hopping Module
Date:	10/10/2013	Test Eng:	Dave Smith
Method:	DA 00-705	Method:	
Limit1:(RED)	-20dBc	Limit2:	
Limit3:		Limit4:	
Hopping Continuous modulation			
Facility:		Mode:	2
		Modification State:	1
File:	H39107DA	Analyser:	R8


	Report No: <b>R3295</b>	FCC ID: XL8WDLM914HP	
	Issue No: <b>3</b>		
Test No: <b>T4651</b>	Test Report		Page: 53 of 54

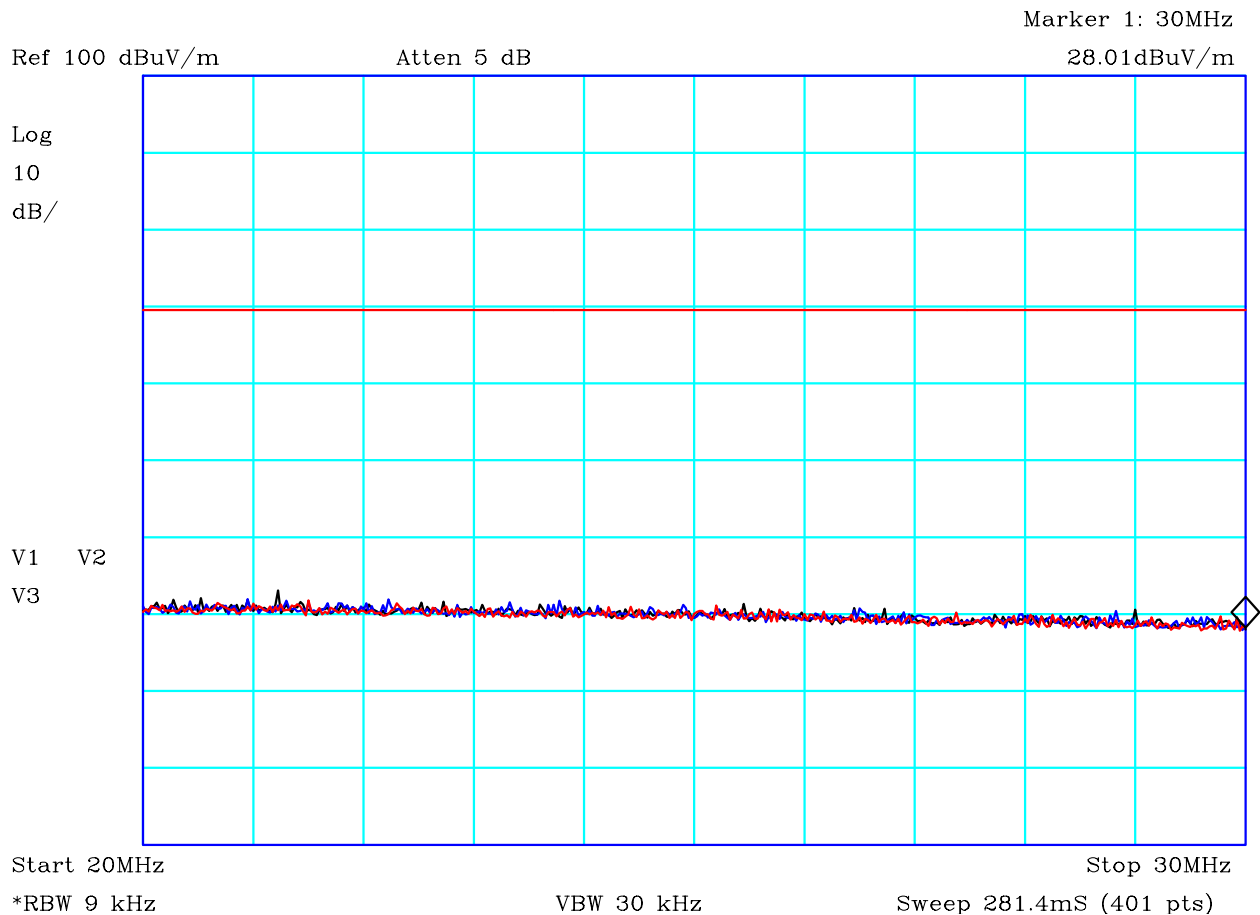


CF1:10dB\_PAD

### PLOT 32 Conducted Antenna - Spurious Emissions - 5GHz to 10GHz - Hopping

Company:	Quatro	Product:	Frequency Hopping Module
Date:	10/10/2013	Test Eng:	Dave Smith
Method:	DA 00-705	Method:	
Limit1:(RED)	-20dBc	Limit2:	
Limit3:		Limit4:	
Hopping Continuous modulation			
Facility:		Mode:	2
		Modification State:	1
File:	H39107E4	Analyser:	R8

	Report No: <b>R3295</b> Issue No: <b>3</b>	FCC ID: XL8WDLM914HP	
	Test No: <b>T4651</b>		
Test Report			Page: 54 of 54



CF1:A9\_HI\_V\_130117 CF2:CBL002\_CBL069\_100809

### PLOT 33 Radiated Emissions - 20MHz to 30MHz

Company:	Quatro	Product:	Frequency Hopping Module
Date:	22/01/2014	Test Eng:	Dave Smith
Method:	ANSI C63.4	Method:	
Limit1:(RED)	FCC 15.209	Limit2:	
Limit3:		Limit4:	
Black: 909 MHz Carrier. Blue: 914 MHz Carrier. Red: 919 MHz Carrier. High power. Antenna fitted. Upright and on side. Maximum with receiving antenna face on and edge on.  Limits extrapolated to 3m using 40dB/decade.			
Facility:	Anech_1	Height	1m
Distance	3m	Polarisation	F+E
Angle	0-360	File:	H402241B
Mode:	Tx Mode	Modification State:	2
Analysed:		Analysed:	R8

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