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**Choose certainty.  
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# Report On

FCC and Industry Canada Testing of the  
Domo Ltd SOLO4 Bodywire Module  
In accordance with FCC CFR 47 Part 2 and 90 and  
Industry Canada RSS-210 and RSS-Gen

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FCC ID: XRF-SOLOMTX  
IC ID: 8638A-SOLOMTX

Document 75910487 Report 02 Issue 4

July 2011



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COMMERCIAL-IN-CONFIDENCE

**REPORT ON**

FCC and Industry Canada Testing of the  
Domo Ltd SOLO4 Bodywire Module  
In accordance with FCC Part 2 and 90 and RSS-210 and RSS-Gen

Document 75910487 Report 02 Issue 4

July 2011

**PREPARED FOR**

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**PREPARED BY**

  
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Senior Administrator

**APPROVED BY**

  
**M Jenkins**  
Authorised Signatory

**DATED**

07 July 2011

**This report has been up-issued to Issue 4 to amend the FCC and IC specification dates.**

**ENGINEERING STATEMENT**

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC Part 2 and 90 and RSS-210 and RSS-Gen. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineers:

  
**B Airs**

  
**J Holcombe**





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## **SECTION 1**

### **REPORT SUMMARY**

FCC and Industry Canada Testing of the  
Domo Ltd SOLO4 Bodywire Module

In accordance with FCC Part 2 and 90 and RSS-210 and RSS-Gen



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## 1.1 INTRODUCTION

The information contained in this report is intended to show verification of the FCC and Industry Canada Testing of the Domo Ltd, SOLO4 Bodywire Module to the requirements of FCC Part 2 and 90 and RSS-210 and RSS-Gen.

Objective	To perform FCC and Industry Canada Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Cobham trading as Domo Ltd
Model Number(s)	SOLO4 Bodywire Module
Serial Number(s)	008954
Number of Samples Tested	One
Test Specification/Issue/Date	FCC Part 2: 2010 FCC Part 90: 2010 RSS-210: Issue 8: 2010 RSS-Gen: Issue 3: 2010
Disposal	Held Pending Disposal
Reference Number	Not Applicable
Date	Not Applicable
Order Number	6402
Date	23 July 2010
Start of Test	28 September 2010
Finish of Test	07 February 2011
Name of Engineer(s)	B Airs J Holcombe

Testing contained in this test report was performed in accordance with the 2009 versions of FCC Part 2 and FCC Part 90 and the 2007 versions of Industry Canada RSS-210 and RSS-Gen specifications, however a full comparison has been done and the results contained in this report are valid for the versions listed above.



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## 1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC Part 2 and 90 and RSS-210 and RSS-Gen is shown below.

Section	Spec Clause				Test Description	Mode	Result	Comments
	FCC Part 2	FCC Part 90	RSS-210	RSS-Gen				
2.1	-	90.210(b)(3)	A8.5	-	Spurious Emissions Outside Emissions Mask	Transmit Bottom	Pass	
2.2	2.1046	90.205	A8.4 (4)	-		Transmit Middle	Pass	
2.3	2.1046	90.205	A8.4 (4)	-		Transmit Top	Pass	
2.4	2.1047	90.207	-	-	EIRP Peak Power	Transmit Bottom	Pass	
2.5	2.1049	90.209	-	-		Transmit Middle	Pass	
2.6	2.1051	90.210	-			Transmit Top	Pass	
2.7	2.1055	90.213	-	4.5	Power and Antenna Height Limits / Transmitter Output Power	Transmit Bottom	N/A	
2.8	2.1047	-	-	-		Transmit Middle	Pass	
2.9	2.1051	90.210(b)(3)	A.8.5	-		Transmit Top	N/A	
2.10	-	-	A8.2(a)	-	Transmitter Frequency Stability	Transmit Bottom	Pass	
2.11	-	-	A8.2(b)	-		Transmit Middle	Pass	
						Transmit Top	Pass	

N/A – Not Applicable



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### 1.3 APPLICATION FORM

#### APPLICANT'S DETAILS

COMPANY NAME : Domo Ltd, Trading as Cobham Surveillance

ADDRESS : 11/12 Manor Court, Barnes Wallis Road, Segensworth, Hampshire PO15 5TH

NAME FOR CONTACT PURPOSES : Stuart Doe

TELEPHONE NO: 01489 566 750

FAX NO: 01489 880 538

E-MAIL: Stuart.doe@cobham.com

#### EQUIPMENT INFORMATION

##### Equipment designator:

Model name/number SOLO4 Bodywire Module

Identification number

S/N 003018

##### Supply Voltage:

[ ] AC mains State AC voltage ..... V and AC frequency ..... Hz  
[12] DC (external) State DC voltage 12V and DC current ..... 0.6 A  
[ ] DC (internal) State DC voltage ..... V and Battery type .....

##### Frequency characteristics:

Frequency range 2450 MHz to 2483.5 MHz

Channel spacing 2.5MHz (if channelized)

Designated test frequencies:

Bottom: 2452 MHz Middle: 2466 MHz

Top: 2481 MHz

##### Power characteristics:

Maximum transmitter power 100mW

Minimum transmitter power ..... W  
(if variable)

[ X ] Continuous transmission  
[ ] Intermittent transmission  
If intermittent, can transmitter be set to continuous transmit test mode? Y/N

##### Antenna characteristics:

[ X ] Antenna connector  
[ ] Temporary antenna connector  
[ ] Integral antenna

State impedance ..... ohm  
State impedance ..... ohm  
State gain 4 dBi

##### Modulation characteristics:

[ ] Amplitude  
[ ] Frequency  
[ ] Phase

[ X ] Other  
Details: COFDM

Can the transmitter operate un-modulated?

Y/N

ITU Class of emission: 2M 50D7FEF (Video)

##### Extreme conditions:

Maximum temperature 50 °C  
Maximum supply voltage 16V

Minimum temperature -10 °C  
Minimum supply voltage 5.9V



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I hereby declare that I am entitled to sign on behalf of the applicant and that the information supplied is correct and complete.

Signature : Held on file at TÜV SÜD Product Service Ltd

Name : Stuart Doe

Position held : Programme Manager

Date : 23 February 2011

TÜV SÜD Product Service Ltd formally certifies that the manufacturer's declaration as typed out in this report is a true and accurate record of the original received from the applicant.



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## 1.4 PRODUCT INFORMATION

### 1.4.1 Technical Description

The Equipment Under Test (EUT) was a Domo Ltd, SOLO4 Bodywire Module. A full technical description can be found in the manufacturer's documentation.

### 1.4.2 Test Configuration

#### Configuration 1: Stand Alone Powered

The EUT was configured as a standalone item and powered via a 12V DC supply.

### 1.4.3 EUT Cable / Port Identification

Port	Max Cable Length specified	Usage	Type	Screened
DC Power	<3m	Power Cable	DC Lead	No
RS232	<3m	Comms Cable	Serial Lead	No

### 1.4.4 Modes of Operation

Modes of operation of each EUT during testing were as follows:

Mode 1 - Transmit Bottom

Mode 2 - Transmit Middle

Mode 3 - Transmit Top

Information on the specific test modes utilised are detailed in the test procedure for each individual test.



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### **1.5 TEST CONDITIONS**

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure, test laboratories or an open test area as appropriate.

The EUT was powered from a 12V DC Power supply unit.

FCC Accreditation  
90987 Octagon House, Fareham Test Laboratory

Industry Canada Accreditation  
IC2932B-1 Octagon House, Fareham Test Laboratory

### **1.6 DEVIATIONS FROM THE STANDARD**

No deviations from the applicable test standards or test plan were made during testing.

### **1.7 MODIFICATION RECORD**

No modifications were made to the EUT during testing.



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## **SECTION 2**

### **TEST DETAILS**

FCC and Industry Canada Testing of the  
Domo Ltd SOLO4 Bodywire Module

In accordance with FCC Part 2 and 90 and RSS-210 and RSS-Gen



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## 2.1 SPURIOUS EMISSIONS OUTSIDE EMISSION MASK

### 2.1.1 Specification Reference

FCC Part 2 and 90, Clause 90.210(b)(3)  
RSS-210, Clause A8.5

### 2.1.2 Equipment Under Test

SOLO4 Bodywire Module, S/N: 008954

### 2.1.3 Date of Test and Modification State

07 February 2011 - Modification State 0

### 2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.1.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC Part 2 and 90 and RSS-210 and RSS-Gen.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1  
- Mode 2  
- Mode 3

### 2.1.6 Environmental Conditions

07 February 2011

Ambient Temperature 21°C

Relative Humidity 32%

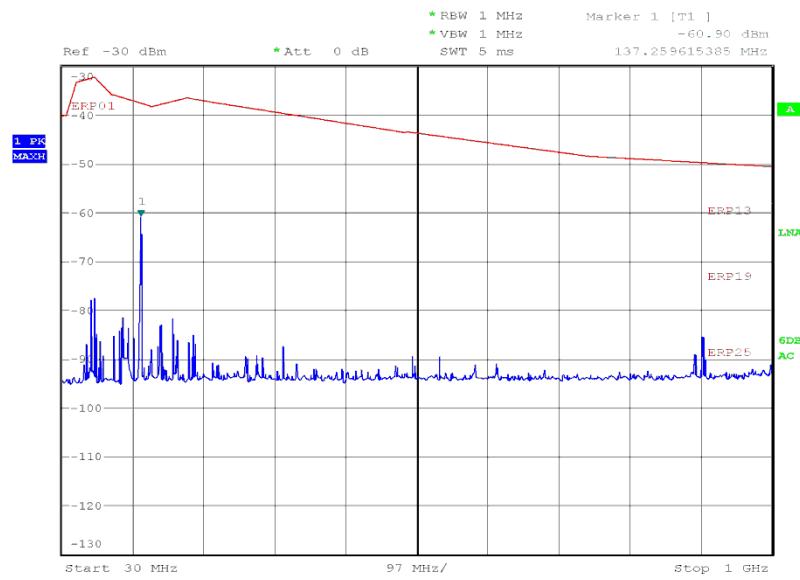
Atmospheric Pressure 1002mbar

### 2.1.7 Test Results

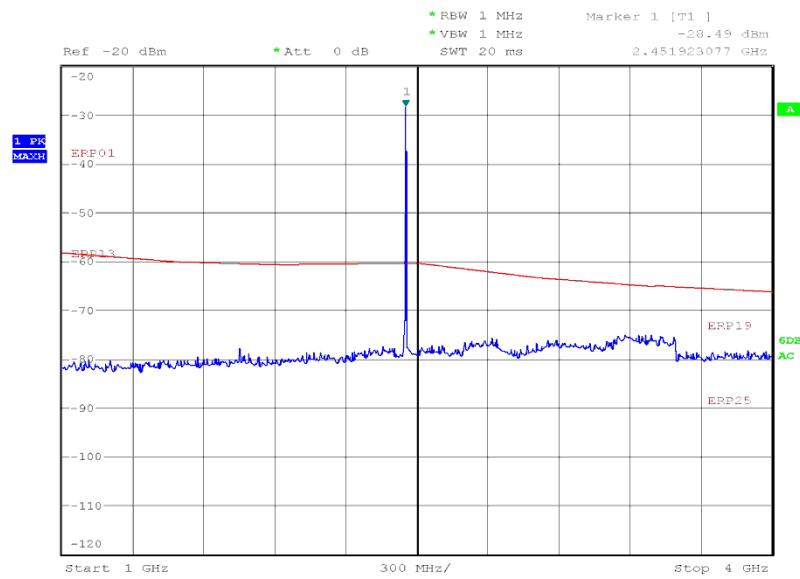
The EUT meet the requirements of FCC Part 2 and 90 and RSS-210 and RSS-Gen for Spurious Emissions Outside Emissions Mask or Emissions for Broadband PCS Equipment.

No emissions measured from the EUT were within 10dB of the limit.

The emission plots are shown on the following pages.

Configuration 1 - Mode 1
30MHz to 1GHz


Date: 7.FEB.2011 12:08:38

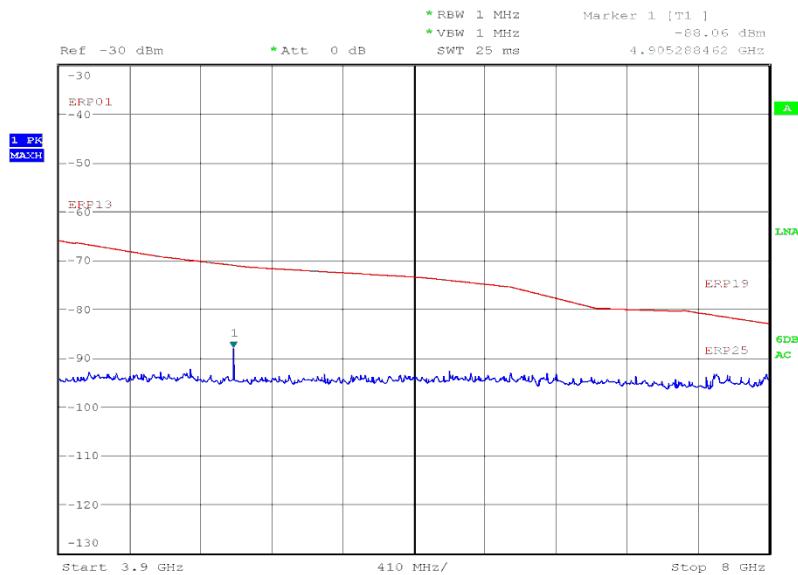
1GHz to 4GHz


Date: 7.FEB.2011 11:12:25



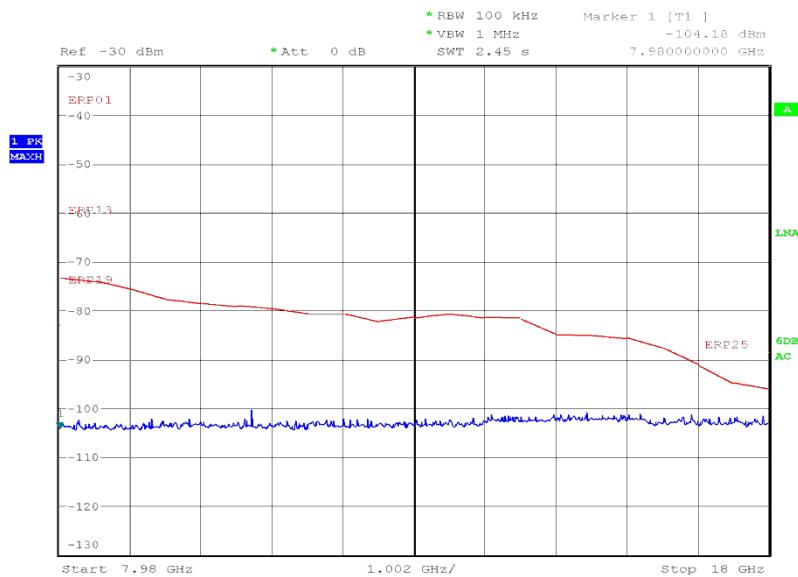
Product Service

### 4GHz to 8GHz



Date: 7.FEB.2011 11:18:20

### 8GHz to 18GHz

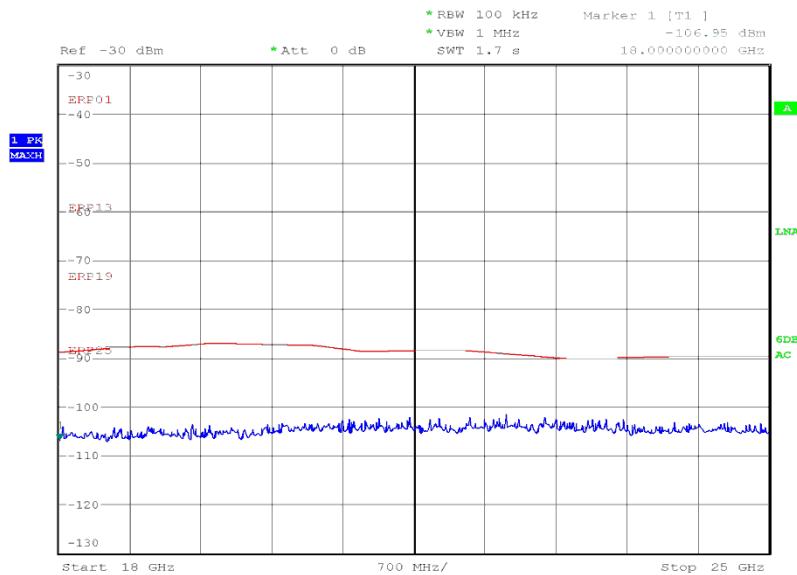


Date: 7.FEB.2011 11:32:17



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### 18GHz to 25GHz



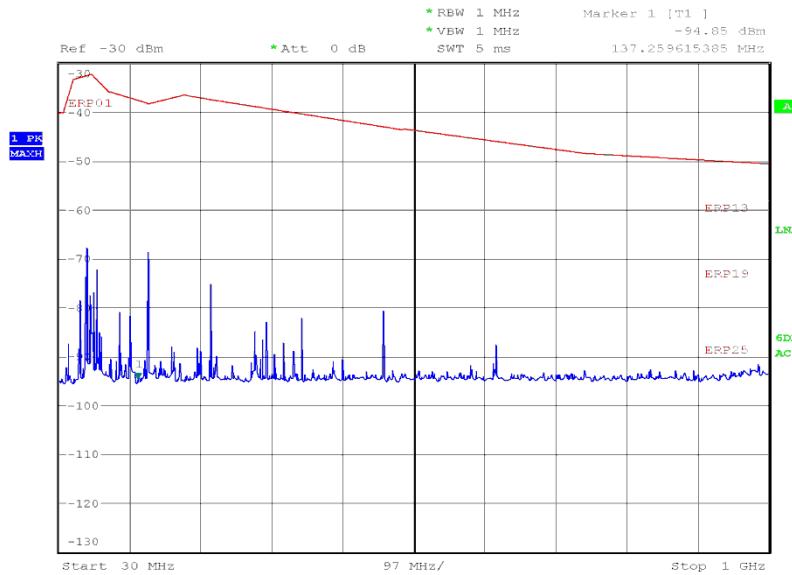
Date: 7.FEB.2011 11:56:14



Product Service

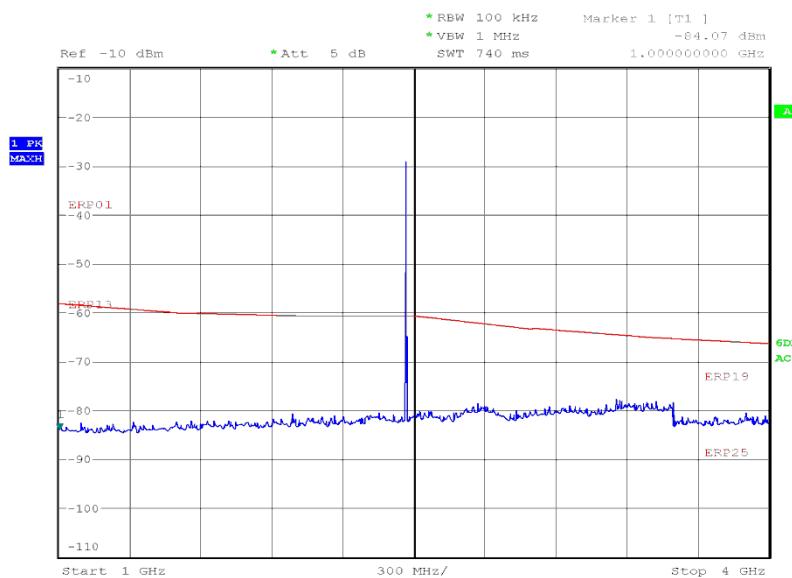
### Configuration 1 - Mode 2

#### 30MHz to 1GHz



Date: 7.FEB.2011 13:58:05

#### 1GHz to 4GHz

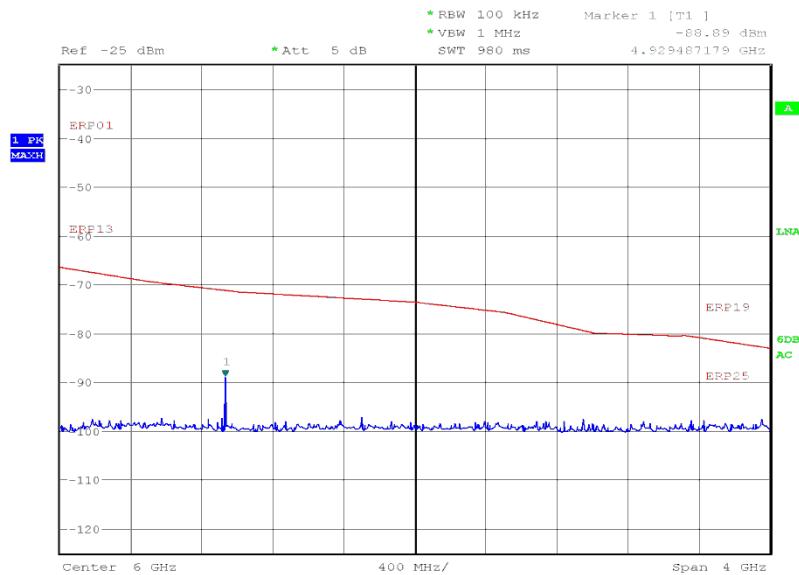


Date: 7.FEB.2011 14:07:40



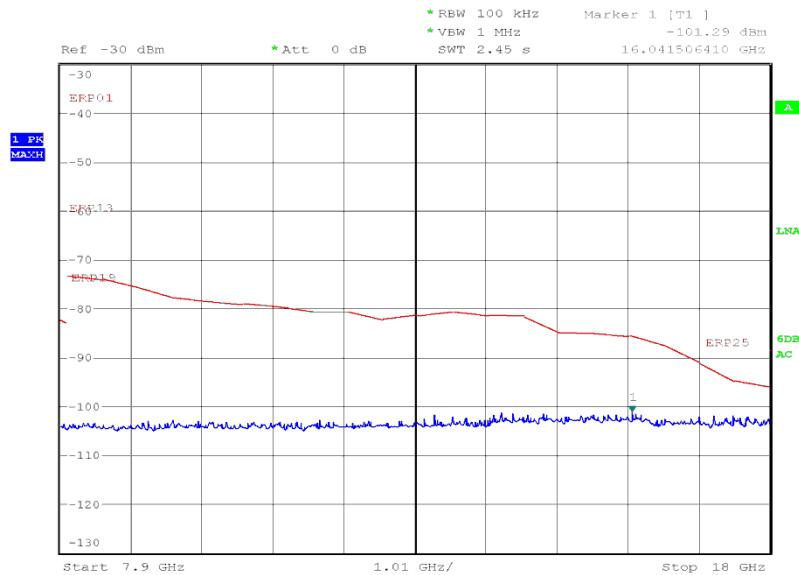
Product Service

### 4GHz to 8GHz



Date: 7.FEB.2011 14:19:05

### 8GHz to 18GHz

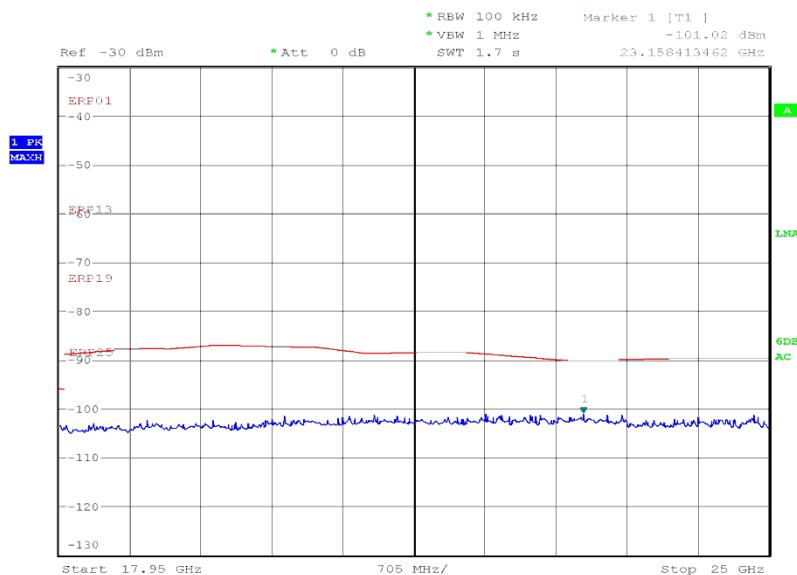


Date: 7.FEB.2011 14:23:35

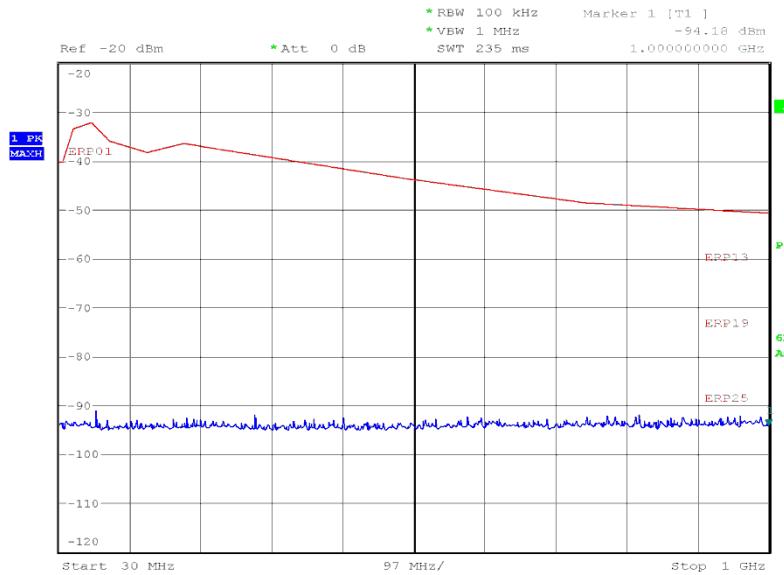


Product Service

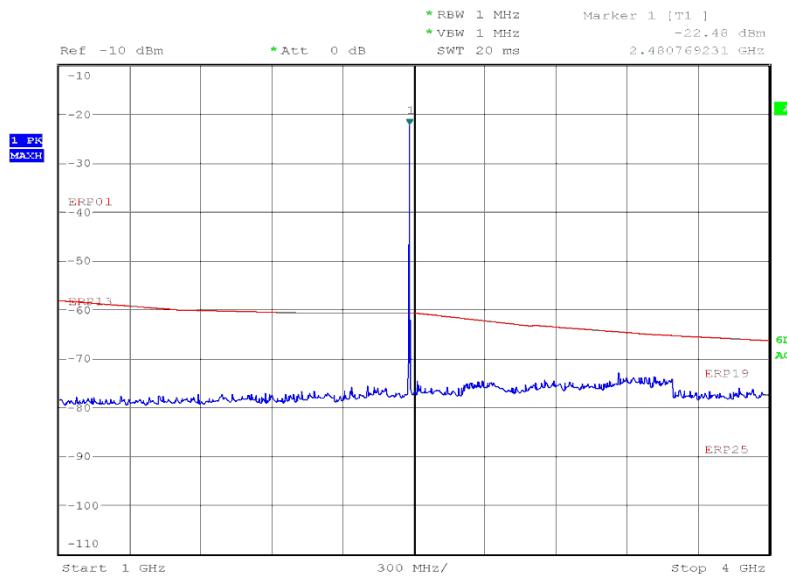
### 18GHz to 25GHz



Date: 7.FEB.2011 14:44:14

Configuration 1 - Mode 3
30MHz to 1GHz


Date: 7.FEB.2011 15:08:33

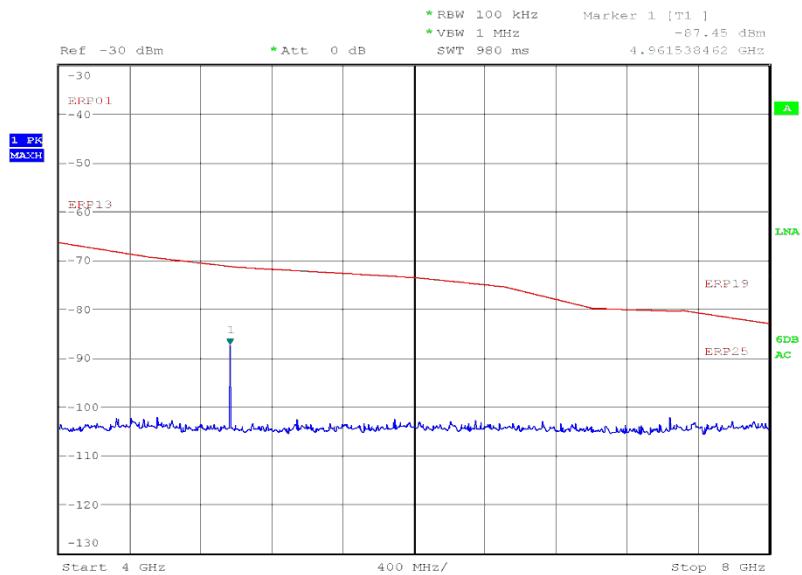
1GHz to 4GHz


Date: 7.FEB.2011 15:01:46



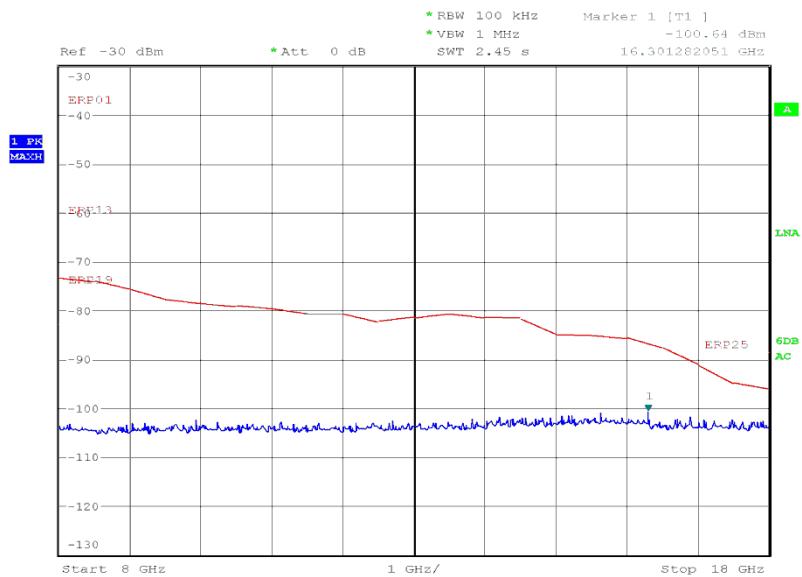
Product Service

### 4GHz to 8GHz



Date: 7.FEB.2011 14:58:40

### 8GHz to 18GHz

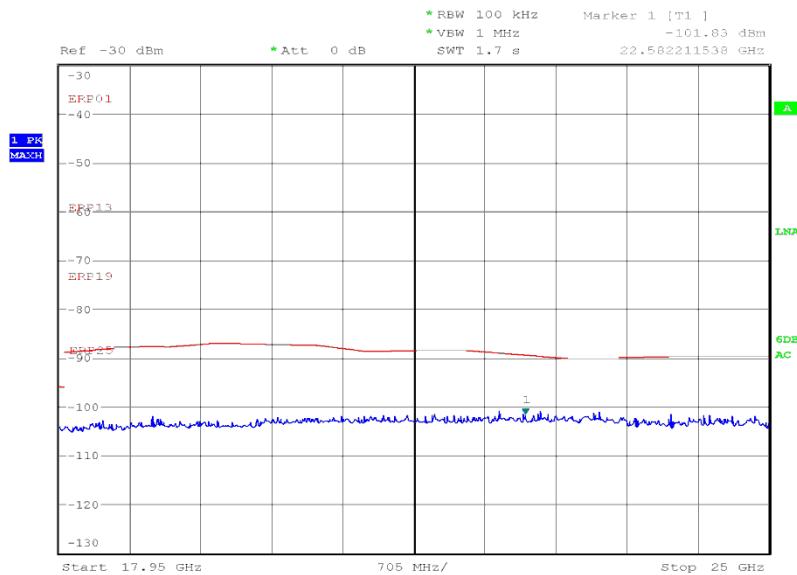


Date: 7.FEB.2011 14:55:19



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### 18GHz to 25GHz



Date: 7.FEB.2011 14:50:24



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## **2.2 EIRP PEAK POWER**

### **2.2.1 Specification Reference**

FCC Part 2 and 90, Clause 90.205, 2.1046  
RSS-210, Clause A8.4 (4)

### **2.2.2 Equipment Under Test**

SOLO4 Bodywire Module, S/N: 008954

### **2.2.3 Date of Test and Modification State**

07 February 2011 - Modification State 0

### **2.2.4 Test Equipment Used**

The major items of test equipment used for the above tests are identified in Section 3.1.

### **2.2.5 Test Method and Operating Modes**

The test was applied in accordance with the test method requirements of FCC Part 2 and 90 and RSS-210 and RSS-Gen.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1  
- Mode 2  
- Mode 3

### **2.2.6 Environmental Conditions**

07 February 2011

Ambient Temperature 21°C

Relative Humidity 32%

Atmospheric Pressure 1002mbar



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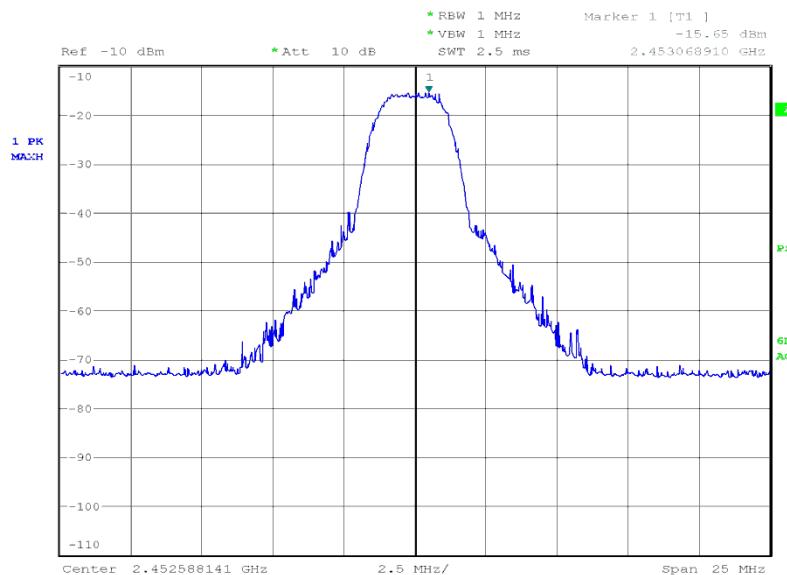
## 2.2.7 Test Results

For the period of test the EUT met the requirements of FCC Part 2 and 90 and RSS-210 and RSS-Gen for EIRP Peak Power.

The test results are shown below.

Configuration 1 - Mode 1

Frequency (GHz)	Result (dBm)	Limit (dBm)	Result (W)	Limit (W)
2.453	28.5	37.0	0.708	5.0



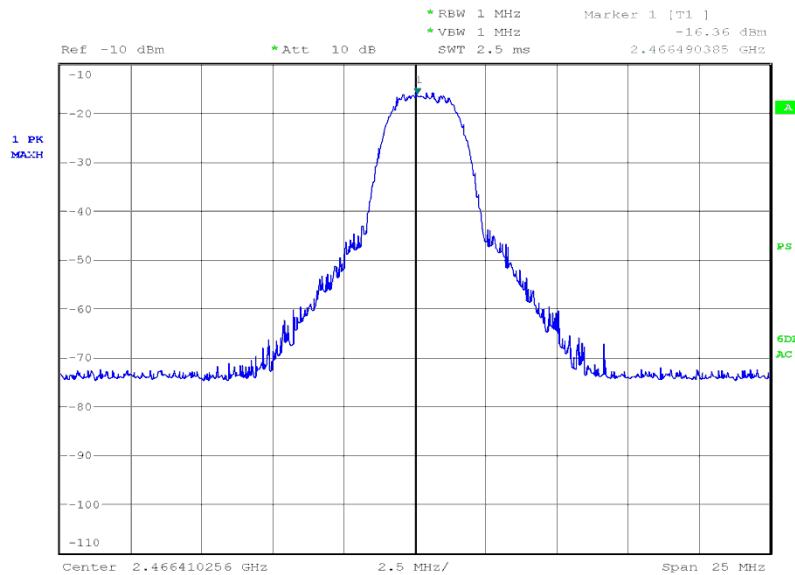
Date: 7.FEB.2011 16:16:37



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Configuration 1 - Mode 2

Frequency (GHz)	Result (dBm)	Limit (dBm)	Result (W)	Limit (W)
2.466	28.0	37.0	0.631	5.0



Date: 7.FEB.2011 16:11:43

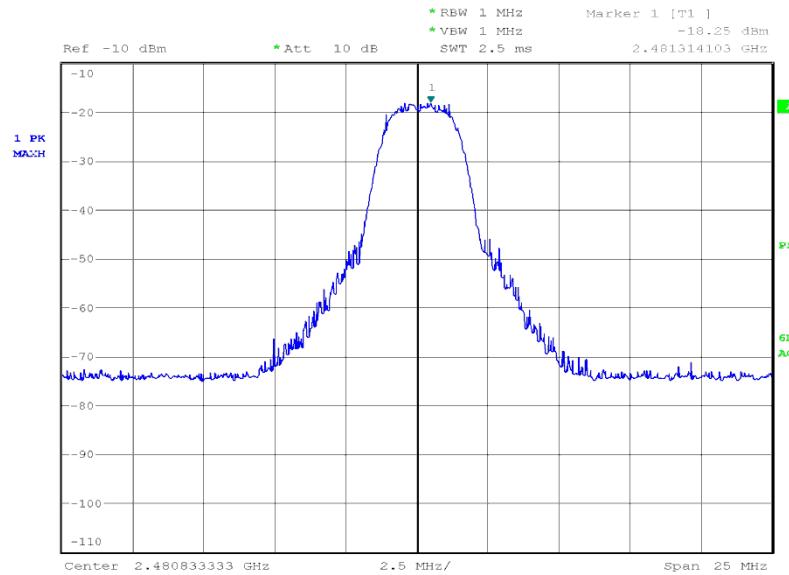


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### Configuration 1 - Mode 3

#### QPSK Modulation

Frequency (GHz)	Result (dBm)	Limit (dBm)	Result (W)	Limit (W)
2.481	25.9	37.0	0.389	5.0



Date: 7.FEB.2011 16:01:51



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## 2.3 POWER AND ANTENNA HEIGHT LIMITS

### 2.3.1 Specification Reference

FCC Part 2 and 90, Clause 90.205, 2.1046  
RSS-210, Clause A8.4 (4)

### 2.3.2 Equipment Under Test

SOLO4 Bodywire Module, S/N: 008954

### 2.3.3 Date of Test and Modification State

04 October 2010 – Modification State 0

### 2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.3.5 Test Procedure

Test Performed in accordance with FCC Part 2 and 90 and RSS-210.

The EUT was connected to a peak power analyser via a 30dB attenuator and cable. The path loss between the EUT and power sensor was measured and used as an offset in the measuring equipment. Both the peak and average power levels at maximum power and QPSK modulation schemes were measured. Due to the nature of the carrier (COFDM), the signal has a high peak to average ratio. The manufacturer declares their power as average, thus the power has also been measured as an average to demonstrate compliance with 90.205 (s).

### 2.3.6 Environmental Conditions

Ambient Temperature	04 October 2010
Relative Humidity	24°C
	55%



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### 2.3.7 Test Results

#### Carrier Power

Frequency (MHz)	QPSK			
	Average		Peak	
	dBm	mW	dBm	mW
2452.50	20.21	104.95	24.41	279.058
2466.75	20.06	101.39	24.65	291.743
2481.00	20.12	102.80	24.76	299.226

#### Limit Clause

90.205(o)

2450 – 2483.5 MHZ	≤ 5W
-------------------	------

90.205(s)

The output power shall not exceed 20% of the manufacturers rated output power 100mW	Limit: 120mW or 20.8dBm
---	-------------------------



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## **2.4 TYPES OF EMISSION**

### **2.4.1 Specification Reference**

FCC Part 2 and 90, Clause 90.207, 2.1047

### **2.4.2 Equipment Under Test**

SOLO4 Bodywire Module, S/N: 008954

### **2.4.3 Date of Test and Modification State**

04 October 2010 – Modification State 0

### **2.4.4 Test Procedure**

Test Performed in accordance with FCC Part 2 and 90.

The EUT operates with a measured channel bandwidth of 2.3MHz and has a declared authorised bandwidth of 2.5MHz. The EUT can operate with QPSK modulation. Therefore, the type of emission can be classified as follows:

QPSK: 2M5G2D

The measurements in section 2.3 Bandwidth Limitations show compliance with the emission designators described above.

### **2.4.5 Environmental Conditions**

	04 October 2010
Ambient Temperature	24°C
Relative Humidity	54%



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## 2.5 BANDWIDTH LIMITATIONS

### 2.5.1 Specification Reference

FCC Part 2 and 90, Clause 90.209, 2.1049

### 2.5.2 Equipment Under Test

SOLO4 Bodywire Module, S/N: 008954

### 2.5.3 Date of Test and Modification State

04 October 2010 – Modification State 0

### 2.5.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.5.5 Test Procedure

Test Performed in accordance with FCC Part 2 and 90.

The EUT was connected to a spectrum analyser using a 20dB attenuator and cable. Using the test software supplied, the EUT was configured to transmit with a 2.5MHz channel spacing with QPSK modulation schemes at maximum power. A resolution bandwidth of 10kHz was used in conjunction with the spectrum analysers occupied bandwidth function to determine the bandwidth of the transmitted signal.

### 2.5.6 Environmental Conditions

Ambient Temperature	24°C
Relative Humidity	54%
	04 October 2010

### 2.5.7 Test Results

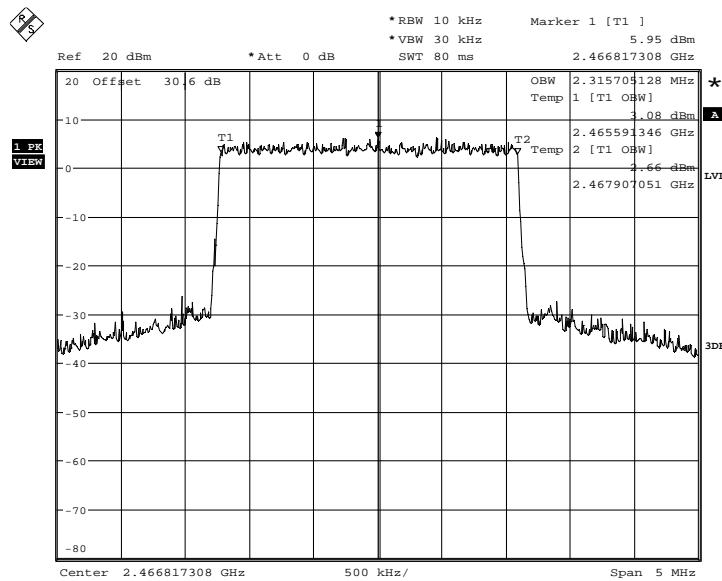
#### Carrier Power

Frequency (MHz)	Occupied Bandwidth (99%)
	QPSK
2466.75	2.315



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### QPSK



Date: 4.OCT.2010 16:43:07

### Limit Clause

The maximum authorised single channel bandwidth of emission is corresponding to the type of emission specified.



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## 2.6 EMISSION MASK

### 2.6.1 Specification Reference

FCC Part 2 and 90, Clause 90.210, 2.1051

### 2.6.2 Equipment Under Test

SOLO4 Bodywire Module, S/N: 008954

### 2.6.3 Date of Test and Modification State

05 October 2010 – Modification State 0

### 2.6.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.6.5 Test Procedure

Test Performed in accordance with FCC Part 2 and 90.

In clause 90.210, the frequency band 2450 – 2483.5MHz is not listed in the table. Therefore, “All other bands” mask has been used. In accordance with 90.210 (n), mask B has been used to demonstrate compliance. It was not possible to transmit an unmodulated carrier, therefore the wideband power was measured. Due to the wideband nature of the signal, it was not possible to measure the emission mask using a resolution bandwidth which would show the correct power level. Therefore, the difference between the measurement bandwidth and the occupied bandwidth was established.

$$10 \log \frac{2.338\text{MHz}}{10\text{kHz}} = 23.69\text{dB}$$

∴ Taking the worst case, (lowest power) the reference level would normally be 15.4dBm, however, because using a smaller RBW reduces the amplitude of the signal, the reference level is adjusted by 23.7dBm and becomes -8.3dBm.

The spectrum analyser RBW was chosen so the signal shape was not influenced by the RBW filter. The VBW was set to three times the RBW. The detector was set to RMS and trace averaging applied as the reference power was an average measurement. The plots were recorded and are shown on the following pages.

### 2.6.6 Environmental Conditions

Ambient Temperature	05 October 2010
Relative Humidity	24°C
	58%

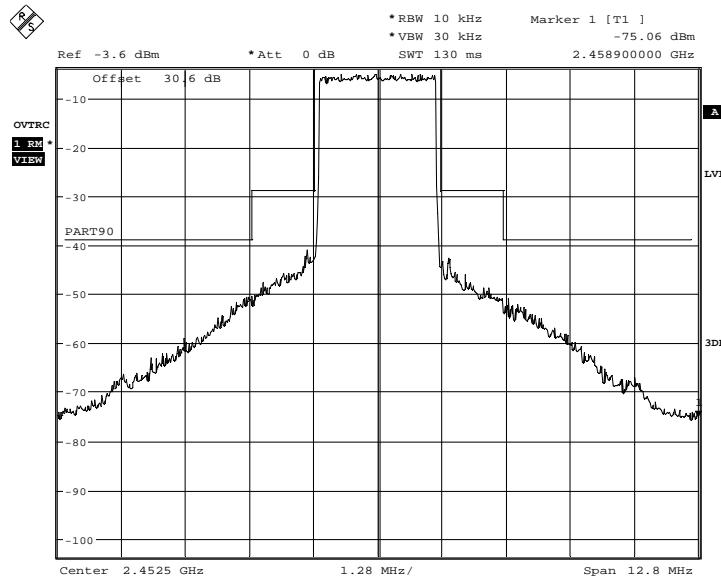


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## 2.6.7 Test Results

2452.50 MHz

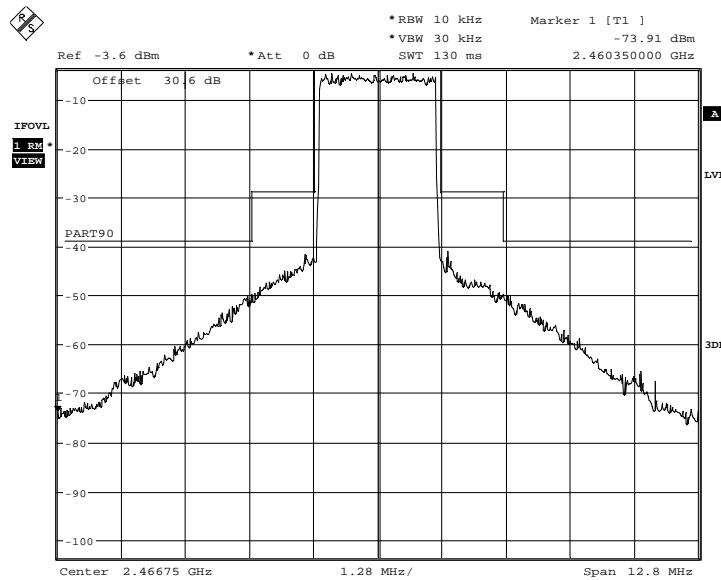
QPSK



Date: 5.OCT.2010 12:53:24

2466.75

QPSK



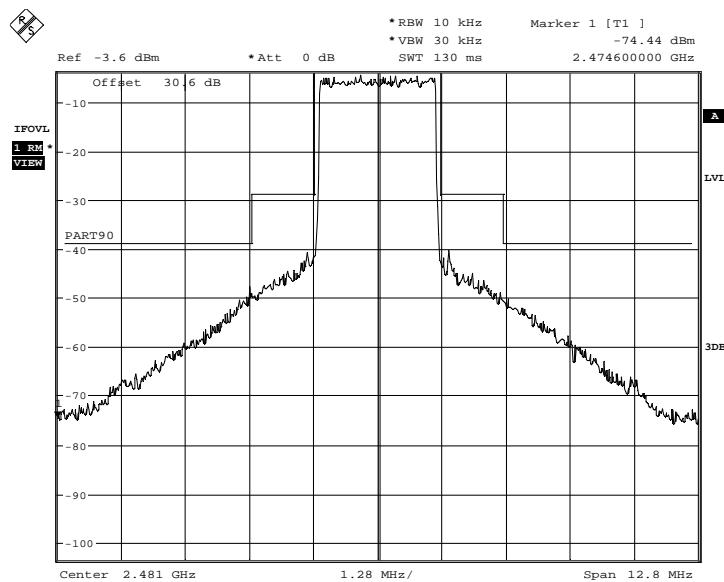
Date: 5.OCT.2010 12:55:32



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2481.00

QPSK



Date: 5.OCT.2010 12:52:19



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## 2.7 FREQUENCY STABILITY

### 2.7.1 Specification Reference

FCC Part 2 and 90, Clause 90.213, 2.1055  
RSS-Gen, Clause 4.5

### 2.7.2 Equipment Under Test

SOLO4 Bodywire Module, S/N: 008954

### 2.7.3 Date of Test and Modification State

05 October 2010 – Modification State 0

### 2.7.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.7.5 Test Procedure

Test Performed in accordance with FCC Part 2 and 90 and RSS-Gen.

The EUT was placed in a climatic chamber and set to transmit on maximum power on the middle channel. The EUT could not be operated without modulation, hence a spectrum analyser was used. To measure the frequency the -6dB points at the upper and lower part of the spectrum were recorded. The centre frequency was calculated by  $f_1 + (f_2 - f_1/2)$ , where  $f_1$  was the lower -6dB frequency and  $f_2$  was the upper -6dB frequency, the temperature was varied between -30°C and +50°C as defined in 2.1055. At 20°C the voltage was varied by 15% as defined in 2.1055(d)(1). The results are shown in the table below.

### 2.7.6 Environmental Conditions

Ambient Temperature	05 October 2010
Relative Humidity	24°C
	58%



Product Service

## 2.7.7 Test Results

### 2466.75 MHz

Temperature	Supply Voltage	Frequency Error (Hz)	Frequency Error (ppm)
+50°C	12 V DC	0	0
+40°C	12 V DC	0	0
+30°C	12 V DC	0	0
+20°C	13.8 V DC	0	0
+20°C	12 V DC	0	0
+20°C	10.2 V DC	0	0
+10°C	12 V DC	0	0
0°C	12 V DC	0	0
-10°C	12 V DC	0	0
-20°C	12 V DC	0	0
-30°C	12 V DC	0	0
Maximum frequency error (Hz)		0	0
Measurement Uncertainty (Hz)		±11	

### Limit

The frequency stability is to be determined by the station authorisation.



Product Service

## 2.8 MODULATION CHARACTERISTICS

### 2.8.1 Specification Reference

FCC Part 2 and 90, Clause 2.1047

### 2.8.2 Equipment Under Test

SOLO4 Bodywire Module, S/N: 008954

### 2.8.3 Test Procedure

As declared by the customer.

#### Description of Modulation

Orthogonal frequency-division multiplexing (OFDM) – essentially identical to Coded OFDM (COFDM) – is a scheme utilised as a digital multi-carrier modulation method. A large number of closely-spaced orthogonal sub-carriers are used to carry data. The data is divided into several parallel data streams or channels, one for each sub-carrier. Each sub-carrier is modulated with a conventional modulation scheme, such as Quadrature Phase Shift Keying (QPSK) or Quadrature Amplitude Modulation (QAM) at a low symbol rate, maintaining total data rates similar to conventional single-carrier modulation schemes in the same bandwidth.

Phase-shift keying (PSK) is a digital modulation scheme that conveys data by modulating the phase of the carrier wave. Quadrature phase-shift keying (QPSK) uses four points on the constellation diagram, equispaced around a circle. With four phases, QPSK can encode two bits per symbol.



Product Service

## **2.9 EMISSION MASK**

### **2.9.1 Specification Reference**

FCC Part 2 and 90, Clause 90.210(b)(3)  
RSS-210, Clause A8.5

### **2.9.2 Equipment Under Test**

SOLO4 Bodywire Module, S/N: 008954

### **2.9.3 Date of Test and Modification State**

07 October 2010– Modification State 0

### **2.9.4 Test Equipment Used**

The major items of test equipment used for the above tests are identified in Section 3.1.

### **2.9.5 Test Procedure**

Test Performed in accordance with FCC Part 2 and 90 and RSS-210.

In accordance with 2.1051 and 90.210(b)(3), the spurious emissions from the antenna terminal were measured. The transmitter output power going into the spectrum analyser was attenuated using a combination of filters and attenuators with the frequency spectrum being investigated between 9kHz and 25GHz. The EUT was set to transmit on full power with QPSK modulations.

The worst case path loss in each measurement range was measured and entered as a reference level offset in the spectrum analyser. The EUT was tested on bottom, middle and top channels. The RBW below 1000MHz was set to 100kHz and 1MHz above 1000MHz as defined in 90.210(o).

The detector was set to peak with the trace set to max hold.

A high frequency combiner was used with the following equipment:

From 9kHz to 4GHz a 10dB attenuator was used

From 4GHz to 18GHz a high pass filter and 10dB attenuator was used

From 18GHz to 25GHz a waveguide and 10dB attenuator was used.

### **2.9.6 Environmental Conditions**

Ambient Temperature	07 October 2010
Relative Humidity	23°C
	47%



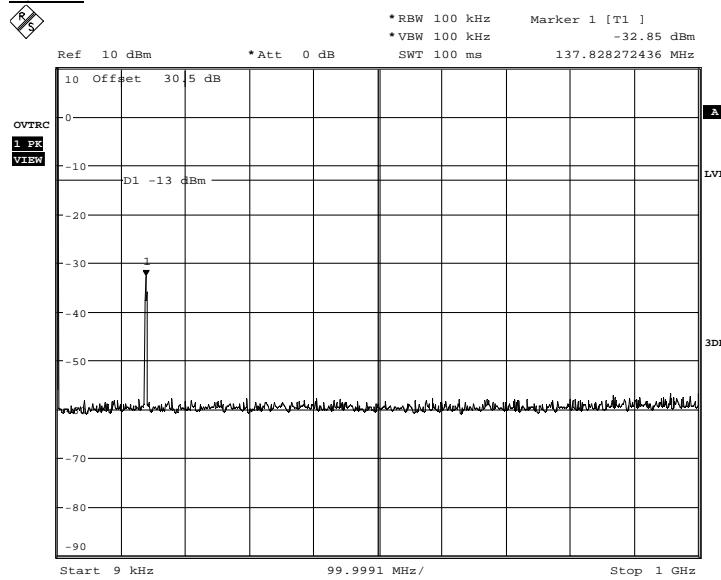
Product Service

## 2.9.7 Test Results

2452.50 MHz

9kHz to 1GHz

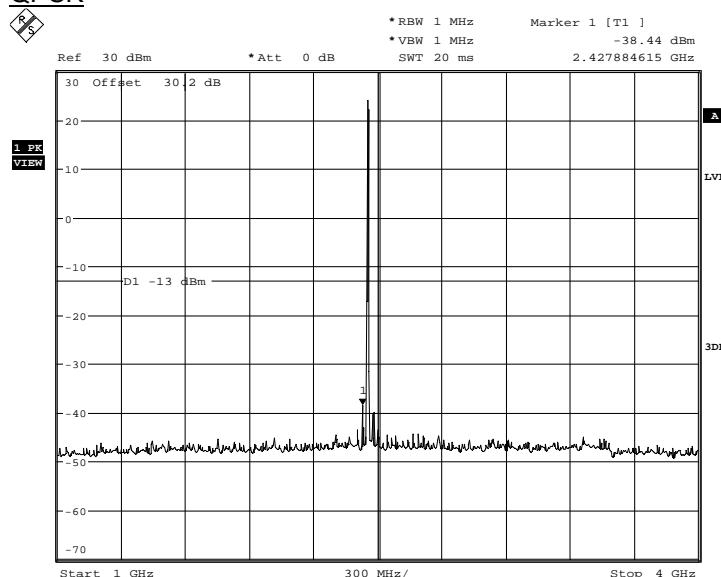
QPSK



Date: 6.OCT.2010 17:13:45

1GHz to 4GHz

QPSK



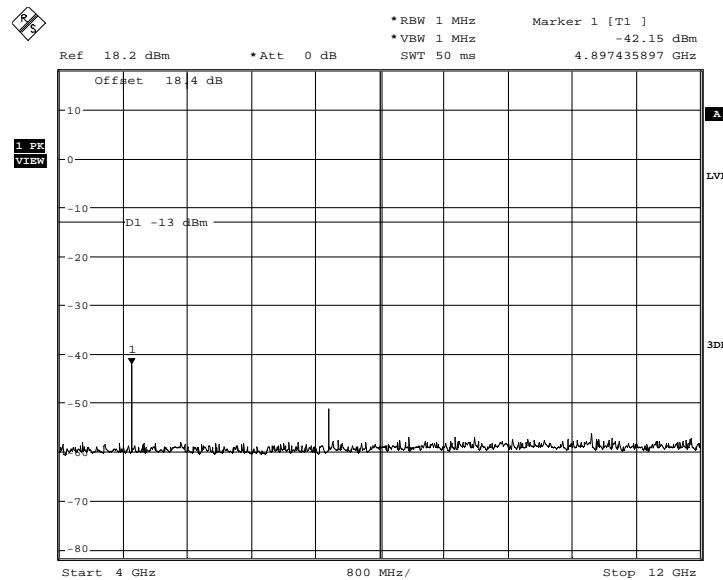
Date: 6.OCT.2010 17:36:09



Product Service

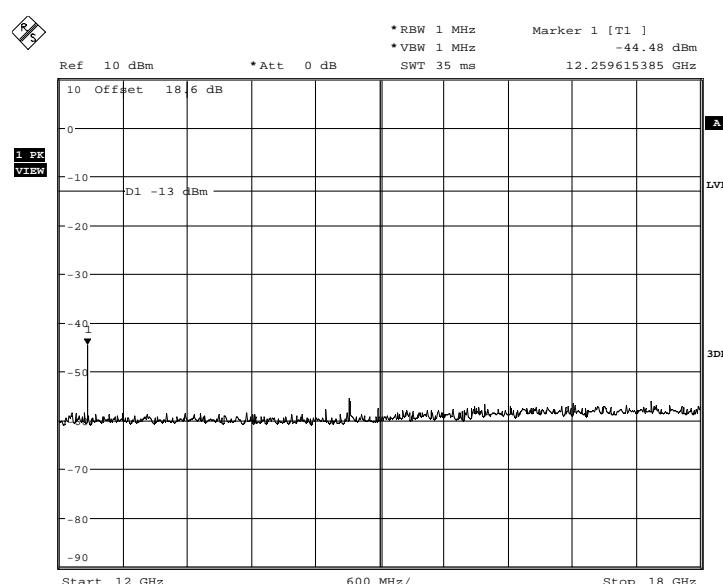
### 4GHz to 12GHz

#### QPSK



### 12GHz to 18GHz

#### QPSK

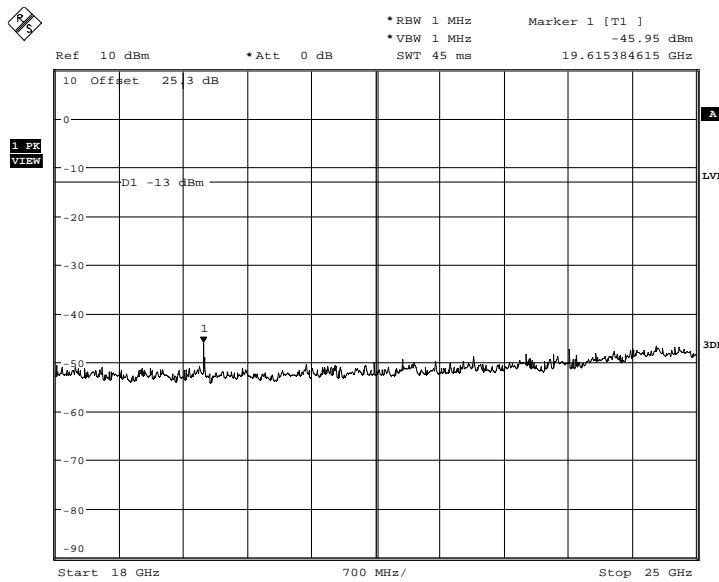




Product Service

## 18GHz to 25GHz

### QPSK

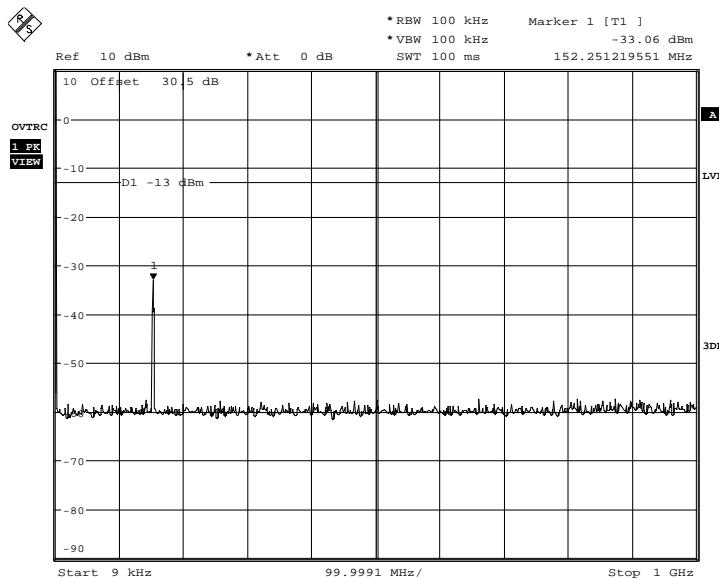


Date: 7.OCT.2010 11:59:22

## 2466.75 MHz

### 9kHz to 1GHz

### QPSK



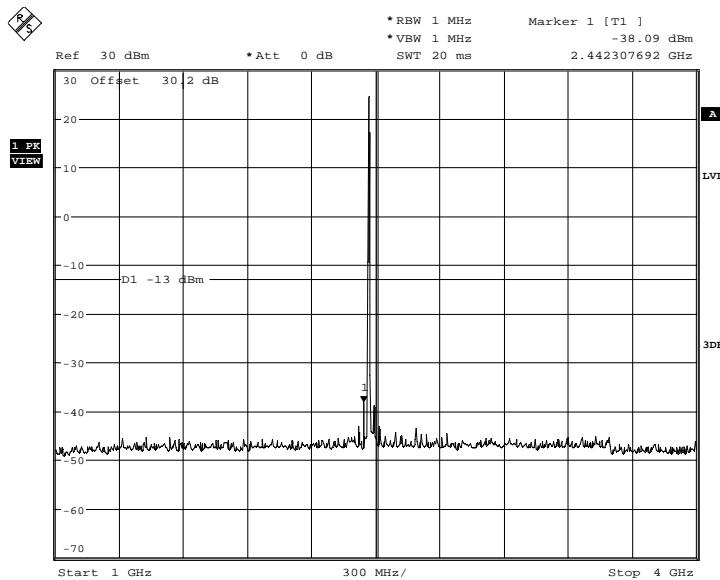
Date: 6.OCT.2010 17:15:02



Product Service

## 1GHz to 4GHz

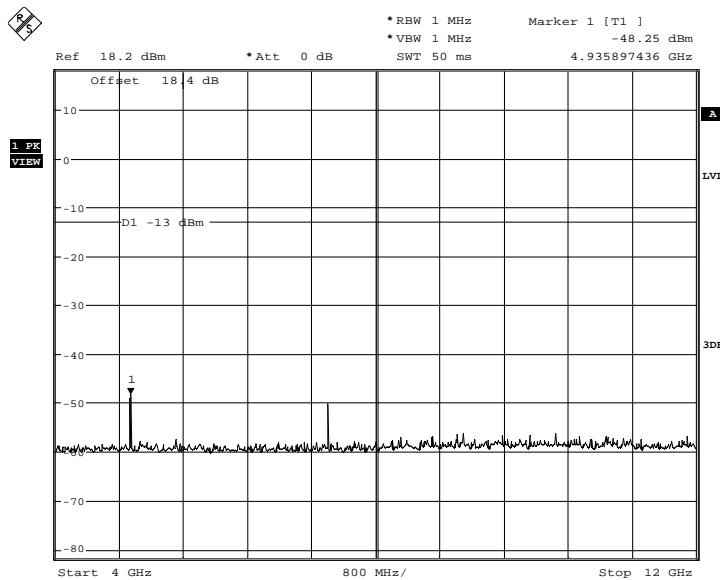
### QPSK



Date: 6.OCT.2010 17:38:15

## 4GHz to 12GHz

### QPSK



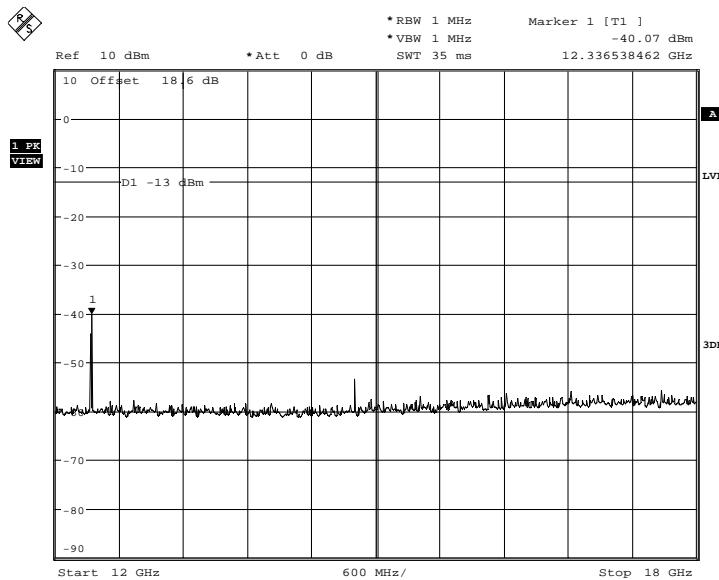
Date: 7.OCT.2010 11:01:39



Product Service

## 12GHz to 18GHz

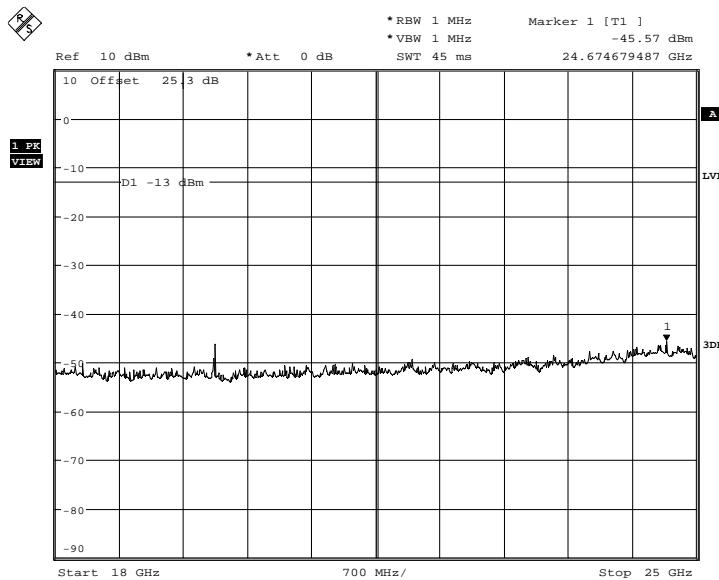
### QPSK



Date: 7.OCT.2010 11:15:41

## 18GHz to 25GHz

### QPSK



Date: 7.OCT.2010 12:00:48

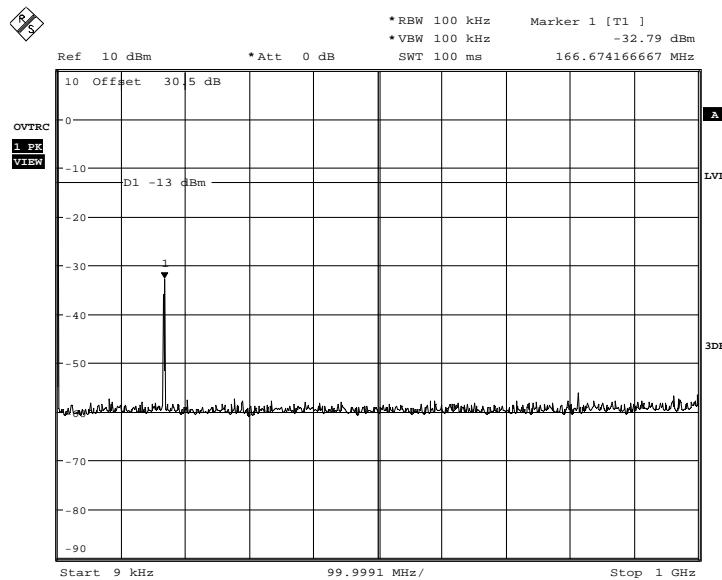


Product Service

2481.00 MHz

9kHz to 1GHz

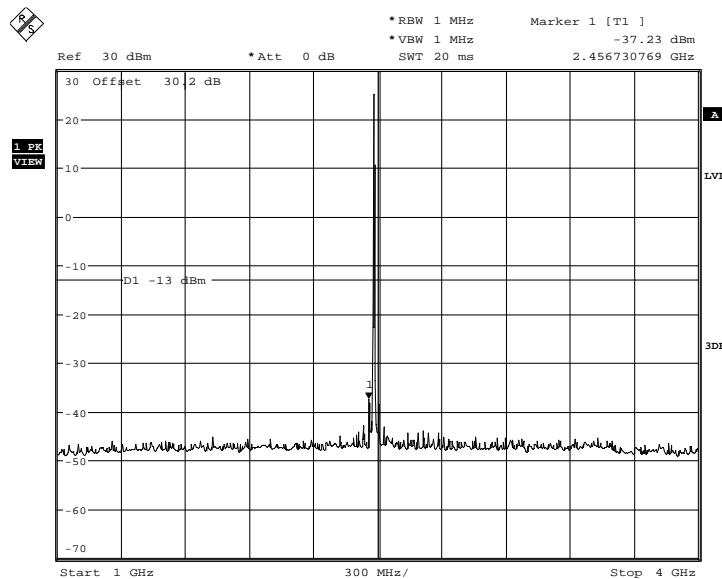
QPSK



Date: 6.OCT.2010 17:19:15

1GHz to 4GHz

QPSK



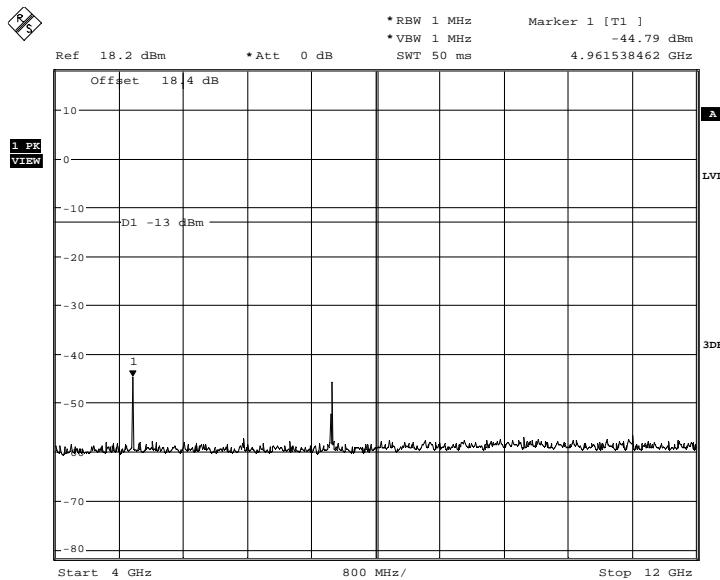
Date: 7.OCT.2010 10:50:03



Product Service

## 4GHz to 12GHz

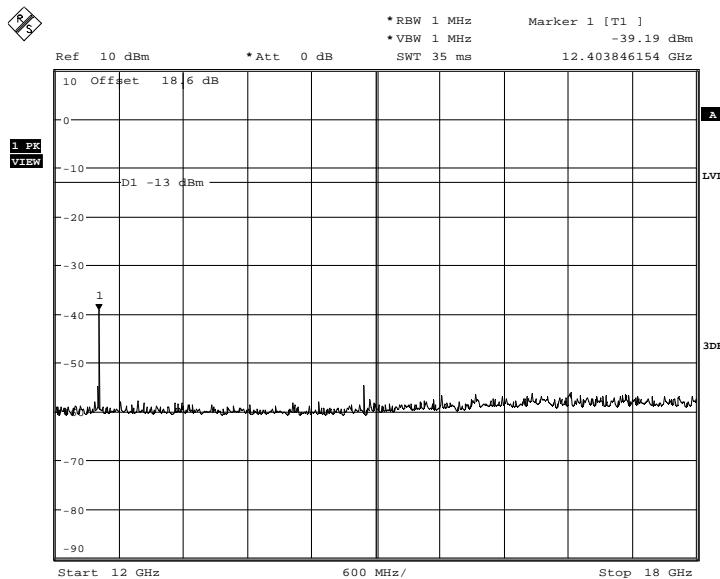
### QPSK



Date: 7.OCT.2010 11:03:07

## 12GHz to 18GHz

### QPSK



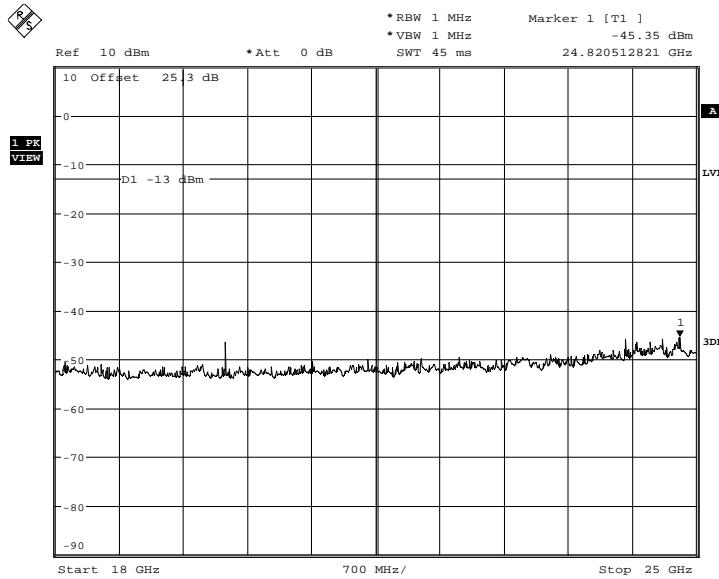
Date: 7.OCT.2010 11:22:28



Product Service

## 18GHz to 25GHz

### QPSK



Date: 7.OCT.2010 12:05:30

### Limit Clause

At least  $43 + 10 \log (P)$  dB or -13 dBm for FCC.

Please note that emissions testing has been carried out at different bandwidths to those specified in RSS-210, (100kHz). The bandwidth used was 1 MHz and the EUT meets a limit of -13 dBm.

The measured occupied bandwidth is 2.315 MHz. To determine the 100 kHz power, a correction factor of 23.7 dB can be applied to the maximum measured power. The lowest maximum wideband power measured was 20.06 dBm, therefore correcting to 100 kHz, equates to -3.63 dBm. Thus, setting the limit of -23.63 dBc on this value makes the limit -25.4 dBm.

From these calculations, it can be seen that the EUT meets the requirement defined in RSS-210 clause A8.5.



Product Service

## 2.10 6dB BANDWIDTH

### 2.10.1 Specification Reference

RSS-210, Clause A8.2(a)

### 2.10.2 Equipment Under Test

SOLO4 Bodywire Module, S/N: 008954

### 2.10.3 Date of Test and Modification State

04 October 2010 – Modification State 0

### 2.10.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.10.5 Test Procedure

Test Performed in accordance with RSS-210.

The EUT was connected to a spectrum analyser via a 10dB attenuator. The loss was measured between the EUT and the spectrum analyser and entered as a reference level offset. The peak response of the signal was established and the 6dB points determined using the markers.

A resolution bandwidth of 10kHz and a VBW of 30kHz were used with the trace set to max hold.

### 2.10.6 Environmental Conditions

Ambient Temperature	24°C	04 October 2010
Relative Humidity	54%	

### 2.10.7 Test Results

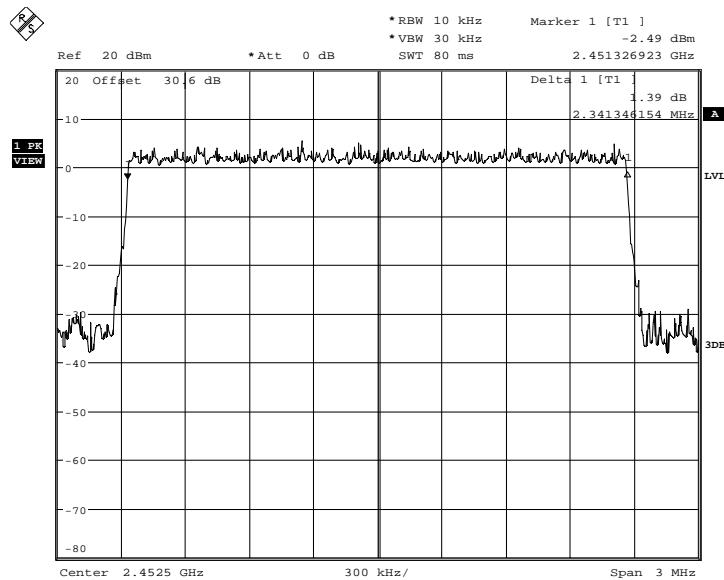
Frequency (MHz)	6dB Bandwidth (MHz)	Modulation Scheme
2452.50	2.341	QPSK
2466.75	2.341	QPSK
2481.00	2.336	QPSK



Product Service

2452.50 MHz

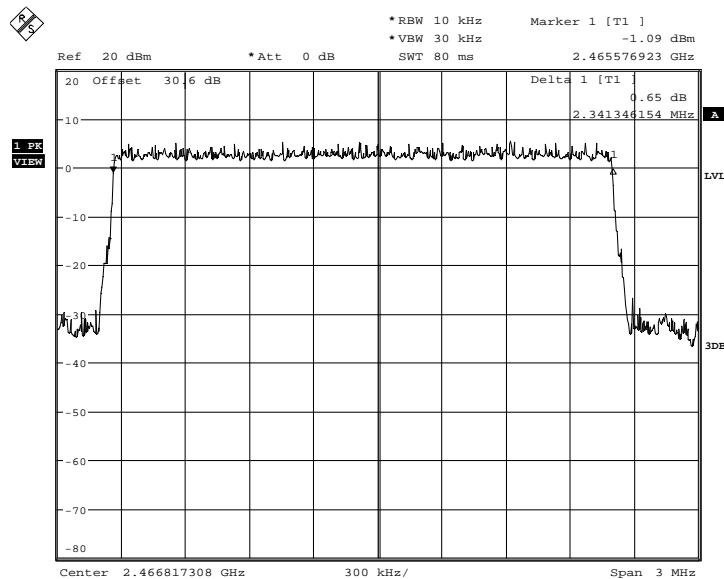
QPSK



Date: 4.OCT.2010 17:36:49

2466.75 MHz

QPSK



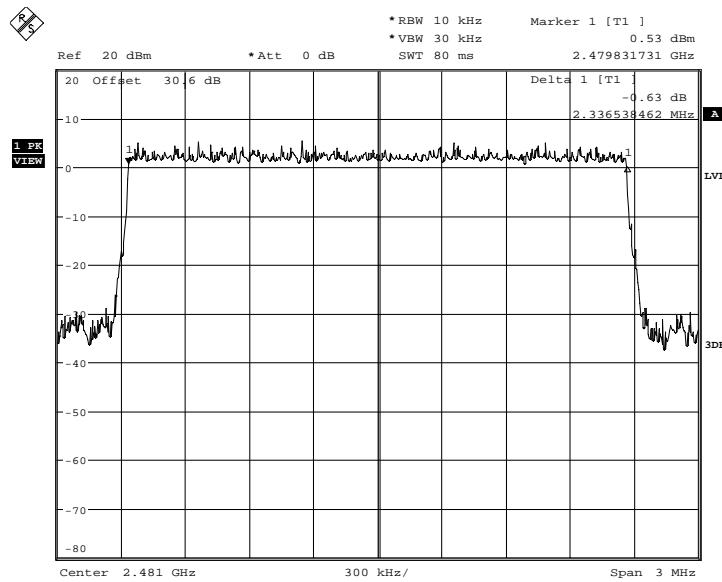
Date: 4.OCT.2010 17:34:35



Product Service

2481.00 MHz

QPSK



Date: 4.OCT.2010 17:40:33

Limit Clause

≥ 500kHz



Product Service

## 2.11 POWER SPECTRAL DENSITY

### 2.11.1 Specification Reference

RSS-210, Clause A8.2(b)

### 2.11.2 Equipment Under Test

SOLO4 Bodywire Module, S/N: 008954

### 2.11.3 Date of Test and Modification State

05 October 2010 – Modification State 0

### 2.11.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.11.5 Test Procedure

Test Performed in accordance with RSS-210.

The EUT was connected to a spectrum analyser via a 20dB directional coupler and a 10dB attenuator. The path loss was measured between the EUT and the spectrum analyser and entered as a reference level offset. The trace was set to max hold and using a peak detector the maximum response was established. With the spectrum analyser RBW at 3kHz and VBW at 10kHz the power density in a 3kHz bandwidth was measured. The results were recorded and are shown in the table below.

### 2.11.6 Environmental Conditions

Ambient Temperature	24°C	05 October 2010
Relative Humidity	58%	

### 2.11.7 Test Results

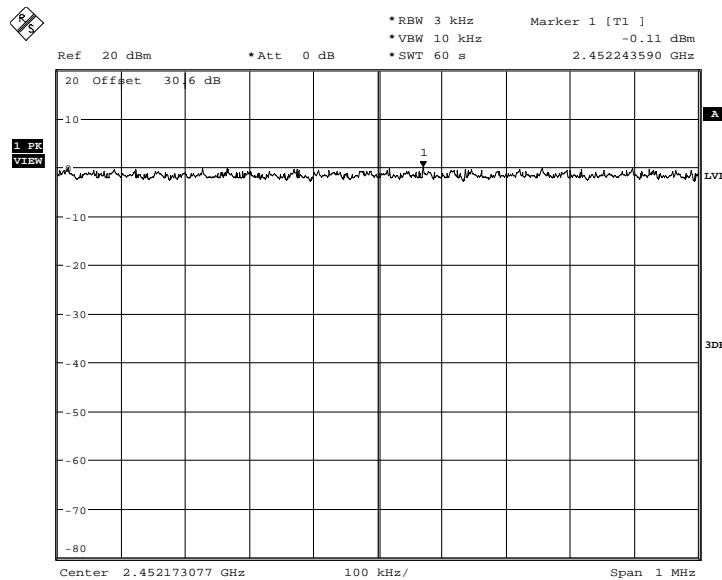
Frequency (MHz)	Power Spectral Density in 3kHz band (dBm)	Modulation Scheme
2452.50	-0.11	QPSK
2466.75	+0.37	QPSK
2481.00	-0.01	QPSK



Product Service

## 2452.50 MHz

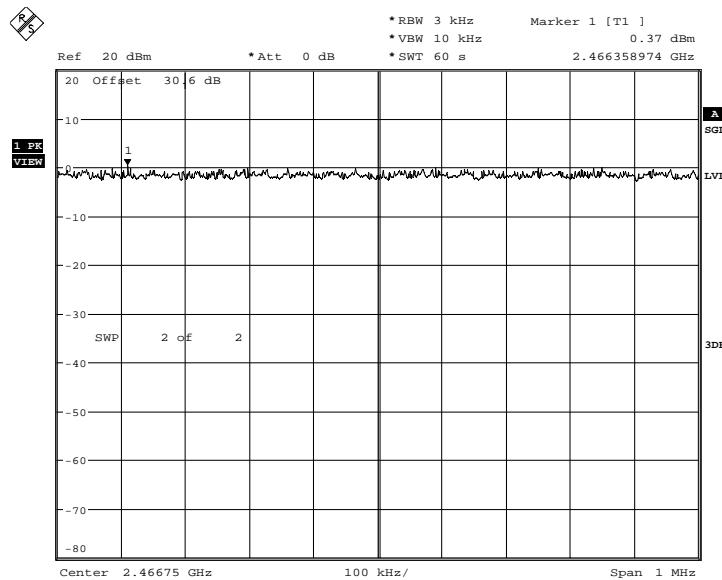
### QPSK



Date: 5.OCT.2010 11:17:35

## 2466.75 MHz

### QPSK



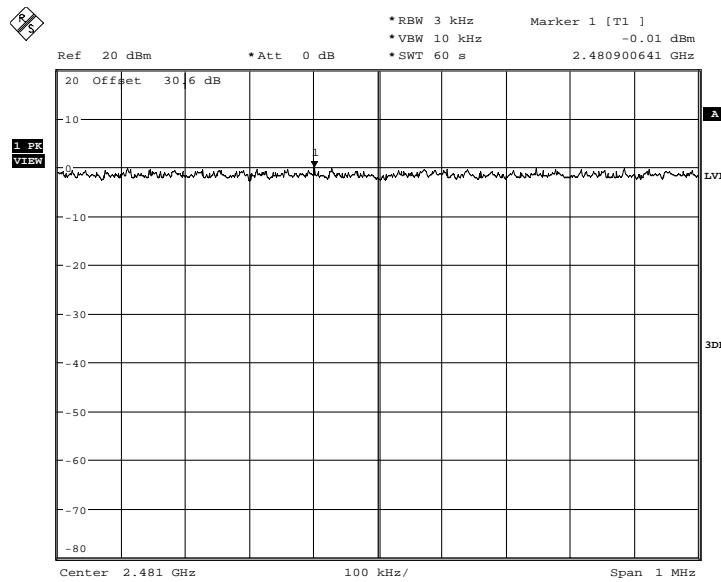
Date: 5.OCT.2010 11:57:31



Product Service

2481.00 MHz

QPSK



Date: 5.OCT.2010 11:36:51

Limit Clause

$\leq +8\text{dBm} / 3\text{kHz}$



Product Service

## **SECTION 3**

### **TEST EQUIPMENT USED**



Product Service

### 3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
<b>Section 2.1 and 2.2 – Spurious Emissions Outside Emission Mask and EIRP Peak Power</b>					
Peak Power Analyser	Hewlett Packard	8990A	107	12	10-Feb-2011
Antenna (Double Ridge Guide)	Link Microtek Ltd	AM180HA-K-TU2	230	-	TU
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	12-Nov-2011
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	12	12-Nov-2011
Screened Room (5)	Rainford	Rainford	1545	24	27-Jan-2013
Mast Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Turntable/Mast Controller	EMCO	2090	1607	-	TU
4GHz HPF	Sematron	F-100-4000-5-R	2245	-	TU
Power Sensor	Hewlett Packard	84812A	2743	-	TU
Antenna (Bilog)	Chase	CBL6143	2904	24	4-Dec-2011
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	3171	12	12-Aug-2011
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	9-Sep-2011
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	3-Jun-2011
<b>Section 2.3 - Power and Antenna Height Limits</b>					
Peak Power Analyser	Hewlett Packard	8990A	107	12	10-Feb-2011
Dual programable power supply	Thurlby	T-1000	418	-	TU
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	9-Mar-2011
Signal Generator	Marconi	2031	2015	12	10-Apr-2011
Power Sensor	Hewlett Packard	84812A	2743	-	TU
Attenuator (30dB/50W)	Aeroflex / Weinschel	47-30-34	3164	12	28-Nov-2010
Hygrometer	Rotronic	I-1000	3220	12	27-Apr-2011
DMM	Fluke	73	3460	12	23-Oct-2010
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	3-Jun-2011
<b>Section 2.5 - Bandwidth Limitations</b>					
Peak Power Analyser	Hewlett Packard	8990A	107	12	10-Feb-2011
Dual programable power supply	Thurlby	T-1000	418	-	TU
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	9-Mar-2011
Signal Generator	Marconi	2031	2015	12	10-Apr-2011
Power Sensor	Hewlett Packard	84812A	2743	-	TU
Attenuator (30dB/50W)	Aeroflex / Weinschel	47-30-34	3164	12	28-Nov-2010
Hygrometer	Rotronic	I-1000	3220	12	27-Apr-2011
DMM	Fluke	73	3460	12	23-Oct-2010
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	3-Jun-2011
<b>Section 2.6 and 2.9- Emission Mask</b>					
Dual programable power supply	Thurlby	T-1000	418	-	TU
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	9-Mar-2011
Signal Generator	Marconi	2031	2015	12	10-Apr-2011
High Pass Filter (4GHz)	RLC Electronics	F-100-4000-5-R	2773	12	6-Sep-2011
Attenuator (30dB/50W)	Aeroflex / Weinschel	47-30-34	3164	12	28-Nov-2010
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	3171	12	12-Aug-2011
Hygrometer	Rotronic	I-1000	3220	12	27-Apr-2011
Attenuator (10dB, 20W)	Lucas Weinschel	1	3225	12	13-Oct-2010
DMM	Fluke	73	3460	12	23-Oct-2010
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	3-Jun-2011



Product Service

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
<b>Section 2.7 - Frequency Stability</b>					
Dual programable power supply	Thurlby	T-1000	418	-	TU
Temperature Chamber	Montford	2F3	467	-	O/P Mon
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	9-Mar-2011
Thermocouple Thermometer	Fluke	51	3172	12	12-Jul-2011
Hygrometer	Rotronic	I-1000	3220	12	27-Apr-2011
DMM	Fluke	73	3460	12	23-Oct-2010
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	3-Jun-2011
<b>Section 2.10 - 6dB Bandwidth</b>					
Dual programable power supply	Thurlby	T-1000	418	-	TU
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	9-Mar-2011
Signal Generator	Marconi	2031	2015	12	10-Apr-2011
Attenuator (30dB/50W)	Aeroflex / Weinschel	47-30-34	3164	12	28-Nov-2010
Hygrometer	Rotronic	I-1000	3220	12	27-Apr-2011
DMM	Fluke	73	3460	12	23-Oct-2010
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	3-Jun-2011
<b>Section 2.11 - Power Spectral Density</b>					
Dual programable power supply	Thurlby	T-1000	418	-	TU
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	9-Mar-2011
Signal Generator	Marconi	2031	2015	12	10-Apr-2011
Attenuator (30dB/50W)	Aeroflex / Weinschel	47-30-34	3164	12	28-Nov-2010
Hygrometer	Rotronic	I-1000	3220	12	27-Apr-2011
DMM	Fluke	73	3460	12	23-Oct-2010
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	3-Jun-2011

TU – Traceability Unscheduled

OP/Mon – Output monitored using calibrated equipment



Product Service

### 3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

Test Discipline	Frequency / Parameter	MU
Radiated Emissions, Bilog Antenna, AOATS	30MHz to 1GHz Amplitude	5.1dB*
Radiated Emissions, Horn Antenna, AOATS	1GHz to 40GHz Amplitude	6.3dB*
Conducted Emissions, LISN	150kHz to 30MHz Amplitude	3.2dB*
Conducted Emissions, ISN	150kHz to 30MHz Amplitude	2.1dB
Substitution Antenna, Radiated Field	30MHz to 18GHz Amplitude	2.6dB
Discontinuous Interference	150kHz to 30MHz Amplitude	3.0dB*
Interference Power	30MHz to 300MHz Amplitude	3.0dB*
Radiated E-Field Susceptibility	26MHz to 2.5GHz Test Amplitude	1.4dB†
Conducted Susceptibility	100kHz to 250MHz Amplitude	1.8dB†
DC Input Ripple Immunity	Current Voltage	0.45% 0.91%
Power Frequency Magnetic Field	50Hz/60Hz Amplitude	0.45%
Magnetic Emissions	9kHz to 30MHz Amplitude	3.4dB*
Magnetic Field/Flux iaw EN 50366	10Hz to 400kHz	2.64%
Harmonics and Flicker	The test was applied using proprietary equipment that meets the requirements of EN 61000-3-2 and EN 61000-3-3	—
Mains Voltage Variations and Interrupts	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-11	—
Fast Transient Burst	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-4	—
Electrostatic Discharge	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-2	—
Surge	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-5	—
Vehicle Transients	The test was applied using proprietary equipment that meets the requirements of ISO 7637-1 and 2	—
Compass Safe Distance	Azimuth Accuracy	0.10°

Worst case error for both Time and Frequency measurement 12 parts in  $10^6$ .

\* In accordance with CISPR 16-4

† In accordance with UKAS Lab 34



Product Service

## **SECTION 4**

### **ACCREDITATION, DISCLAIMERS AND COPYRIGHT**



Product Service

#### 4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA  
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