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# Report On

FCC and Industry Canada Testing of the  
Ericsson AB  
RRUS 01 B2 / KRC 118 74/1

COMMERCIAL-IN-CONFIDENCE

FCC ID: TA8AKRC11874-1  
IC ID: 287AB-AS118741

Document 75913022 Report 01 Issue 1

March 2011



Product Service

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**REPORT ON** Limited FCC and Industry Canada Testing of the  
Ericsson AB  
RRUS 01 B2 / KRC 118 74/1

Document 75913022 Report 01 Issue 1

March 2011

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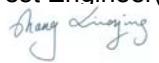
**DATED** 16 March 2011

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**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 compliance with FCC CFR 47: Part 24 and Industry Canada RSS-133. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s):

  
X Zhang

  
C Zhang





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## **SECTION 1**

### **REPORT SUMMARY**

Limited FCC and Industry Canada Testing of the  
Ericsson AB  
RRUS 01 B2 / KRC 118 74/1



## 1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Ericsson AB RRUS 01 B2 / KRC 118 74/1 to the requirements of FCC CFR 47 Part 24 and Industry Canada RSS-133.

Testing was carried out in support of a C2PC application for Grant of RRUS 01 B2 / KRC 118 74/1 for the hardware update.

Objective	To perform Limited 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	Ericsson AB
Product Name	RRUS 01 B2
Part Number	KRC 118 74/1
IC Model Name	AS118741
Serial Number(s)	CB4G624456
Software Version	CXP9017316/1_R25NU
Hardware Version	R1C
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 24: 2010 Industry Canada RSS-133: 2009
Incoming Release Date	Declaration of Build Status 23 February 2011
Order Number	PTP
Date	23 February 2011
Start of Test	24 February 2011
Finish of Test	04 March 2011
Name of Engineer(s)	X Zhang C Zhang
Related Document(s)	ANSI C63.4: 2009 FCC CFR 47 Part 2: 2009 Industry Canada RSS-GEN Issue 3: 2010



## 1.2 BRIEF SUMMARY OF RESULTS

A brief summary of results in accordance with FCC CFR 47 Part 24 and Industry Canada RSS-133, is shown below.

Configuration 1 – Base Station							
Section	Spec Clause		Test Description	Mode	Mod State	Result	Comments
	FCC Part 2 and 24	RSS-133 and RSS-GEN					
24.232 (a)	6.4	Effective Radiated Power		1932.4MHz		N/A	No integral antenna.
				1960.0MHz		N/A	
				1987.6MHz		N/A	
				1932.4MHz + 1947.4MHz		N/A	
				1960.0MHz + 1975.0MHz		N/A	
				1972.6MHz + 1987.6MHz		N/A	
				1932.4MHz + 1937.4MHz + 1942.4MHz + 1947.4MHz		N/A	
				1955.0MHz + 1960.0MHz + 1965.0MHz + 1970.0MHz		N/A	
				1972.6MHz + 1977.6MHz + 1982.6MHz + 1987.6MHz		N/A	
				1932.4MHz		N/A	
2.1	2.1046, 24.232 (a)	6.4	Maximum Peak Output Power - Conducted	1960.0MHz	0	Pass	-
				1987.6MHz		N/A	
				1932.4MHz + 1947.4MHz		N/A	
				1960.0MHz + 1975.0MHz		N/A	
				1972.6MHz + 1987.6MHz		N/A	
				1932.4MHz + 1937.4MHz + 1942.4MHz + 1947.4MHz		N/A	
				1955.0MHz + 1960.0MHz + 1965.0MHz + 1970.0MHz	0	Pass	
				1972.6MHz + 1977.6MHz + 1982.6MHz + 1987.6MHz		N/A	
				1932.4MHz		N/A	
2.2	24.232 (d)	-	Peak – Average Ratio	1960.0MHz	0	Pass	-
				1987.6MHz		N/A	
				1932.4MHz + 1947.4MHz		N/A	
				1960.0MHz + 1975.0MHz		N/A	
				1972.6MHz + 1987.6MHz		N/A	
				1932.4MHz + 1937.4MHz + 1942.4MHz + 1947.4MHz		N/A	
				1955.0MHz + 1960.0MHz + 1965.0MHz + 1970.0MHz	0	Pass	
				1972.6MHz + 1977.6MHz + 1982.6MHz + 1987.6MHz		N/A	



Configuration 1 – Base Station							
Section	Spec Clause		Test Description	Mode	Mod State	Result	Comments
	FCC Part 2 and 24	RSS-133 and RSS-GEN					
2.1047 (d)	6.2	Modulation Characteristics		1932.4MHz		N/A	Not tested <sup>1</sup>
				1960.0MHz		N/A	
				1987.6MHz		N/A	
				1932.4MHz + 1947.4MHz		N/A	
				1960.0MHz + 1975.0MHz		N/A	
				1972.6MHz + 1987.6MHz		N/A	
				1932.4MHz + 1937.4MHz + 1942.4MHz + 1947.4MHz		N/A	
				1955.0MHz + 1960.0MHz + 1965.0MHz + 1970.0MHz		N/A	
				1972.6MHz + 1977.6MHz + 1982.6MHz + 1987.6MHz		N/A	
				1932.4MHz		N/A	
2.3	2.1049, 24.238 (b)	RSS-Gen 4.6.1	Occupied Bandwidth	1960.0MHz	0	Pass	-
				1987.6MHz		N/A	
				1932.4MHz + 1947.4MHz		N/A	
				1960.0MHz + 1975.0MHz		N/A	
				1972.6MHz + 1987.6MHz		N/A	
				1932.4MHz + 1937.4MHz + 1942.4MHz + 1947.4MHz		N/A	
				1955.0MHz + 1960.0MHz + 1965.0MHz + 1970.0MHz		N/A	
				1972.6MHz + 1977.6MHz + 1982.6MHz + 1987.6MHz		N/A	
				1932.4MHz	0	Pass	-
2.4	2.1051, 24.238 (b)	6.5	Spurious Emissions at Antenna Terminals ( $\pm 1\text{MHz}$ )	1960.0MHz		N/A	
				1987.6MHz	0	Pass	
				1932.4MHz + 1937.4MHz	0	Pass	
				1960.0MHz + 1975.0MHz		N/A	
				1982.6MHz + 1987.6MHz	0	Pass	
				1932.4MHz + 1937.4MHz + 1942.4MHz + 1947.4MHz		N/A	
				1955.0MHz + 1960.0MHz + 1965.0MHz + 1970.0MHz		N/A	
				1972.6MHz + 1977.6MHz + 1982.6MHz + 1987.6MHz		N/A	



Configuration 1 – Base Station							
Section	Spec Clause		Test Description	Mode	Mod State	Result	Comments
	FCC Part 2 and 24	RSS-133 and RSS-GEN					
2.5	2.1053, 24.238 (a)	6.5	Radiated Spurious Emissions	1932.4MHz		N/A	-
				1960.0MHz	0	Pass	
				1987.6MHz		N/A	
				1932.4MHz + 1947.4MHz	0	Pass	
				1960.0MHz + 1975.0MHz		N/A	
				1972.6MHz + 1987.6MHz		N/A	
				1932.4MHz + 1937.4MHz + 1942.4MHz + 1947.4MHz		N/A	
				1955.0MHz + 1960.0MHz + 1965.0MHz + 1970.0MHz		N/A	
				1972.6MHz + 1977.6MHz + 1982.6MHz + 1987.6MHz		N/A	
2.6	2.1051, 24.238 (a)	6.5	Conducted Spurious Emissions	1932.4MHz		N/A	-
				1960.0MHz	0	Pass	
				1987.6MHz		N/A	
				1932.4MHz + 1947.4MHz	0	Pass	
				1960.0MHz + 1975.0MHz		N/A	
				1972.6MHz + 1987.6MHz		N/A	
				1932.4MHz + 1937.4MHz + 1942.4MHz + 1947.4MHz		N/A	
				1955.0MHz + 1960.0MHz + 1965.0MHz + 1970.0MHz		N/A	
				1972.6MHz + 1977.6MHz + 1982.6MHz + 1987.6MHz		N/A	
	2.1055, 24.235	6.3	Frequency Stability Under Temperature Variations	1932.4MHz		N/A	Not tested <sup>1</sup>
				1960.0MHz		N/A	
				1987.6MHz		N/A	
				1932.4MHz + 1947.4MHz		N/A	
				1960.0MHz + 1975.0MHz		N/A	
				1972.6MHz + 1987.6MHz		N/A	
				1932.4MHz + 1937.4MHz + 1942.4MHz + 1947.4MHz		N/A	
				1955.0MHz + 1960.0MHz + 1965.0MHz + 1970.0MHz		N/A	
				1972.6MHz + 1977.6MHz + 1982.6MHz + 1987.6MHz		N/A	



Configuration 1 – Base Station							
Section	Spec Clause		Test Description	Mode	Mod State	Result	Comments
	FCC Part 2 and 24	RSS-133 and RSS-GEN					
2.1055, 24.235	6.3	Frequency Stability Under Voltage Variations		1932.4MHz		N/A	Not tested <sup>1</sup>
				1960.0MHz		N/A	
				1987.6MHz		N/A	
				1932.4MHz + 1947.4MHz		N/A	
				1960.0MHz + 1975.0MHz		N/A	
				1972.6MHz + 1987.6MHz		N/A	
				1932.4MHz + 1937.4MHz + 1942.4MHz + 1947.4MHz		N/A	
				1955.0MHz + 1960.0MHz + 1965.0MHz + 1970.0MHz		N/A	
				1972.6MHz + 1977.6MHz + 1982.6MHz + 1987.6MHz		N/A	
-	6.6	Receiver Spurious Emissions		1932.4MHz		N/A	Not tested <sup>1</sup>
				1960.0MHz		N/A	
				1987.6MHz		N/A	
				1932.4MHz + 1947.4MHz		N/A	
				1960.0MHz + 1975.0MHz		N/A	
				1972.6MHz + 1987.6MHz		N/A	
				1932.4MHz + 1937.4MHz + 1942.4MHz + 1947.4MHz		N/A	
				1955.0MHz + 1960.0MHz + 1965.0MHz + 1970.0MHz		N/A	
				1972.6MHz + 1977.6MHz + 1982.6MHz + 1987.6MHz		N/A	

N/A – Not Applicable

Note<sup>1</sup> – Limited testing has been performed as this report is to be used as justification for Class II Permissive Change. See section 1.6.



## Product Service

## 1.3 DECLARATION OF BUILD STATUS

MAIN EUT	
<b>MANUFACTURING DESCRIPTION</b>	Radio Equipment
<b>MANUFACTURER</b>	Ericsson AB
<b>PRODUCT NAME</b>	RRUS 01 B2
<b>PART NUMBER</b>	KRC 118 74/1
<b>IC Model Name</b>	AS118741
<b>SERIAL NUMBER</b>	CB4G624456
<b>HARDWARE VERSION</b>	R1C
<b>SOFTWARE VERSION</b>	CXP9017316/1_R25NU
<b>TRANSMITTER OPERATING RANGE</b>	TX: 1932.4MHz - 1987.6MHz RX: 1852.4MHz - 1907.6MHz
<b>MODULATIONS</b>	QPSK, 16QAM, 64QAM
<b>INTERMEDIATE FREQUENCIES</b>	--
<b>ITU DESIGNATION OF EMISSION</b>	4M17F9W
<b>CHANNEL BANDWIDTH</b>	4.2 to 5MHz (configurable in steps of 100/200kHz)
<b>OUTPUT POWER (RMS) (W or dBm)</b>	Single Carrier: 1 x 47.8dBm (1 x 60W) Multi Carrier (x 2): 2 x 44.8dBm (2 x 30W) Multi Carrier (x 4): 4 x 41.8dBm (4 x 15W)
<b>FCC ID</b>	TA8AKRC11874-1
<b>IC ID</b>	287AB-AS118741
<b>TECHNICAL DESCRIPTION</b> (a brief description of the intended use and operation)	The equipment is the Radio Part of WCDMA Base Station.

### Signature

John P. J.

Date

24 February 2011

D of B S Serial No

75913022 /01

No responsibility will be accepted by TÜV SÜD Product Service Limited as to the accuracy of the information declared in this document by the manufacturer.



## 1.4 PRODUCT INFORMATION

### 1.4.1 Technical Description

The Equipment Under Test (EUT) RRUS 01 B2 / KRC 118 74/1 is an Ericsson AB Radio Equipment working in the public mobile service 1900MHz band which provides communication connections to WCDMA1900 network. The RRUS 01 B2 / KRC 118 74/1 operates from a -48V DC volt supply.

The Equipment Under Test (EUT) is shown in the photograph below. A full technical description can be found in the Manufacturer's documentation.



Equipment Under Test



#### 1.4.2 Test Configuration

##### Configuration 1: Base Station

The EUT was configured in accordance with FCC CFR 47 Part 24 and Industry Canada RSS-133.

The RRUS 01 B2 / KRC 118 74/1 supports Test Model TM1 at 1900MHz which is defined in 3GPP TS 25.141. Test Model 1 (TM1) uses the QPSK modulation.

The settings below with test model TM1 with 5MHz channel bandwidth were tested as the representative setting for all traffic scenarios and the worst case.

Single carrier:

Test Model 1 (TM1): 64 DPCHs at 30 ksp (SF=128)

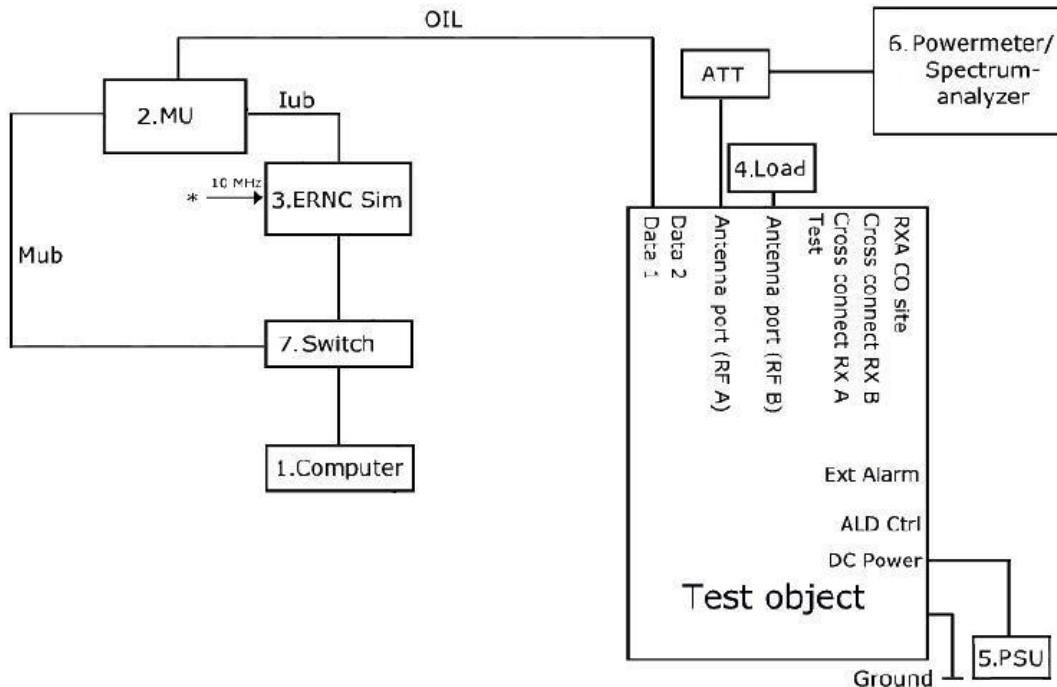
Multi carrier (1x2):

Test model 1 (TM1): 32 DPCHs at 30 ksp (SF=128) in each carrier

Multi carrier (1x4):

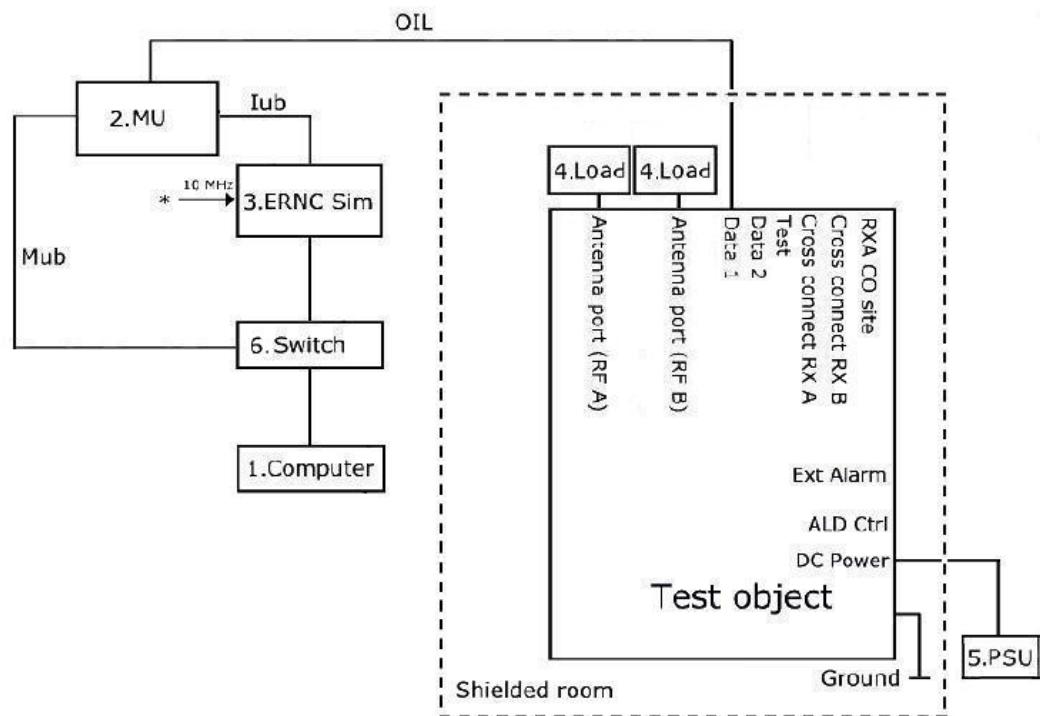
Test model 1 (TM1): 16 DPCHs at 30 ksp (SF=128) in each carrier

The EUT includes a Tx / Rx port and a RX port. The EUT can be configured to transmit with 1900MHz single or multi carrier at the RF output connector. All Tx Testing was performed on the combined Tx / Rx output connector ANT A of the EUT, with RX antenna port ANT B terminated. The complete testing was performed with the EUT transmitting at maximum RF power unless otherwise stated. The EUT was powered by a -48V DC Power supply.

**Test Setup, Conducted Measurement:**

Test Object	Part Number	Version	Serial Number
Radio Part	RRUS 01 B2 / KRC 118 74/1	R1C	CB4G624456

No.	Auxiliary Equipment	Part Number / Model Type	Version	Serial Number
1	Computer	Sun Blade 1500	--	MT41130005
2	RBS 6601 (Master)	BFL 901 009/1	--	--
	RBS 6601 Main Unit (DU1)	DUW 3001 KDU 127 161/3	R3A	C823662888
	SUP 6601	1/BFL 901 009/1	R3B	BR80907931
	RBS 6601 (Slave)	BFL 901 009/1	--	--
	RBS 6601 Main Unit (DU2)	DUW 3001 KDU 127 161/3	R3A	C823662896
	SUP 6601	1/BFL 901 009/1	R3B	BR80907930
3	ERNC Sim	ROJ 119 2106/53	R4E	TU8GH19419
4	Load	TFE50-3	--	090323003
5	Power Supply	DH1716-5D	--	200360033
	Power Supply	DH1716A-14	--	20080405
6	Power Metre	Rohde & Schwarz NRP	--	101592
	Thermal Power Sensor	Rohde & Schwarz NRP-Z51	--	102126
	Spectrum Analyzer	FSQ26	--	200835
7	Switch	Extreme summit X150-48T	--	0947G-80634

**Test Setup, Radiated Measurement:**


Test Object	Part Number	Version	Serial Number
Radio Part	RRUS 01 B2 / KRC 118 74/1	R1C	CB4G624456

No.	Auxiliary Equipment	Part Number / Model Type	Version	Serial Number
1	Computer	Sun Blade 1500	--	MT50620051
2	RBS 6601 (Master)	BFL 901 009/1	--	--
	RBS 6601 Main Unit (DU1)	DUW 3001 KDU 127 161/3	R3A	C823662888
	SUP 6601	1/BFL 901 009/1	R3B	BR80907931
	RBS 6601 (Slave)	BFL 901 009/1	--	--
	RBS 6601 Main Unit (DU2)	DUW 3001 KDU 127 161/3	R3A	C823662896
	SUP 6601	1/BFL 901 009/1	R3B	BR80907930
3	Mini SIM 4780A	6107B0	--	CH33100142
4	Load	TFE50-3	--	090323003
	Load	TF100	--	08011701
5	Power Supply	DH1716-5D	--	200360033
	Power Supply	DH1716A-10	--	1000303181
6	Hub	TL-HP8MU		05300902892



#### 1.4.3 Modes of Operation

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

Mode 1 – ARFCN 9662: 1932.4MHz (Bottom Channel)

Mode 2 – ARFCN 9800: 1960.0MHz (Middle Channel)

Mode 3 – ARFCN 9938: 1987.6MHz (Top Channel)

Mode 4 – ARFCN 9662 + 9737: 1932.4MHz + 1947.4MHz (B and B+15MHz)

Mode 5 – ARFCN 9662 + 9687: 1932.4MHz + 1937.4MHz (B and B+5MHz)

Mode 6 – ARFCN 9913 + 9938: 1982.6MHz + 1987.6MHz (T-5MHz and T)

Mode 7 – ARFCN 9775 + 9800 + 9825 + 9850:  
1955.0MHz + 1960.0MHz + 1965.0MHz + 1970.0MHz (M-5MHz, M, M+5MHz and M+10MHz)

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



## 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 -48V DC supply.

## 1.6 DEVIATIONS FROM THE STANDARD

Full testing has not been carried out in accordance with the specifications because this report is to be used as justification for a Class II Permissive Change to the EUT for the hardware update. This report verifies maintained performance of the EUT for the affected characteristics according to the FCC CFR 47 Part 2.1043 by re-testing the updated equipment as described in section 1.4.2.

## 1.7 MODIFICATION RECORD

No modifications were made to the EUT during testing.

## 1.8 ALTERNATIVE TEST SITE

Testing has been performed under the following site registrations:

FCC Accreditation 910917:  
The State Radio Monitoring Centre, No.80 Beilishi Road Xicheng District Beijing, China.

Industry Canada Accreditation 7308A:  
The State Radio Monitoring Centre, No.80 Beilishi Road Xicheng District Beijing, China.



Product Service

## **SECTION 2**

### **TEST DETAILS**

Limited FCC and Industry Canada Testing of the  
Ericsson AB  
RRUS 01 B2 / KRC 118 74/1



## 2.1 MAXIMUM PEAK OUTPUT POWER - CONDUCTED

### 2.1.1 Specification Reference

FCC CFR 47 Part 2.1046  
FCC CFR 47 Part 24, Clause 24.232 (a)  
Industry Canada RSS-133, Clause 6.4

### 2.1.2 Equipment Under Test

RRUS 01 B2 / KRC 118 74/1, S/N: CB4G624456

### 2.1.3 Date of Test and Modification State

24 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 CFR 47 Part 2 and Part 24 and Industry Canada RSS-133.

Using a power meter and attenuator(s), the output power of the EUT was measured at the antenna terminal. The carrier power was measured with QPSK using the test model described.

The path loss was measured and entered as a reference level offset.

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

Configuration 1 - Mode 2  
- Mode 7

### 2.1.6 Environmental Conditions

24 February 2011

Ambient Temperature 24.5°C

Relative Humidity 28.0%



### 2.1.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 24 and Industry Canada RSS-133 for Maximum Peak Output Power.

The test results are shown below

#### TM1

##### Single Carrier

###### Configuration 1 - Mode 2

UARFCN	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
9800 (Middle)	1960.0	41.8	47.76	59.70

##### Multi Carrier (1x4)

###### Configuration 1 - Mode 7

UARFCN	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
9775 & 9800 & 9913 & 9938	1955.0 & 1960.0 & 1965.0 & 1970.0	41.8	47.74	59.43

Limit	≤100W or ≤+50dBm
-------	------------------

##### Remarks

The EUT does not exceed 100W or 50dBm at the measured frequencies.



## 2.2 PEAK – AVERAGE RATIO

### 2.2.1 Specification Reference

FCC CFR 47 Part 24, Clause 24.232 (d)

### 2.2.2 Equipment Under Test

RRUS 01 B2 / KRC 118 74/1, S/N: CB4G624456

### 2.2.3 Date of Test and Modification State

24 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 CFR 47 Part 24.

A peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

The spectrum analyzer Measurement bandwidth was set to 10MHz for single carrier and 20MHz for multi carrier and the path loss measured and entered as a reference level offset.

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

Configuration 1 - Mode 2  
- Mode 7

### 2.2.6 Environmental Conditions

24 February 2011

Ambient Temperature 24.5°C

Relative Humidity 28.0%



## 2.2.7 Test Results

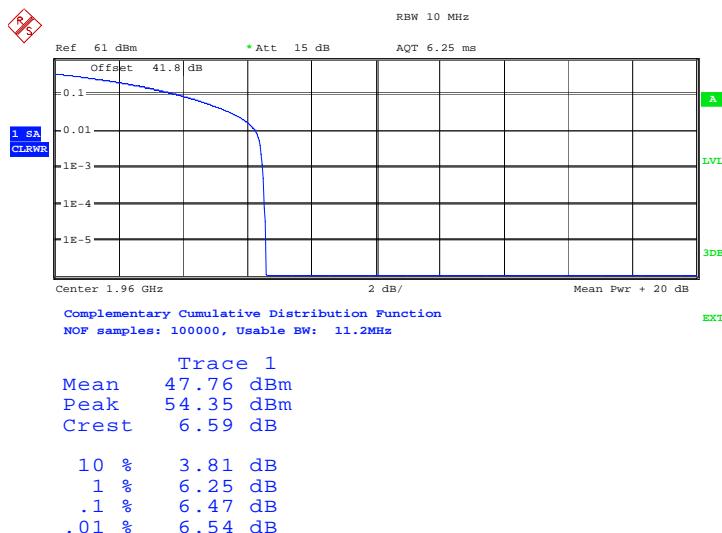
For the period of test the EUT met the requirements of FCC CFR 47 Part 24 Peak – Average Ratio.

The test results are shown below.

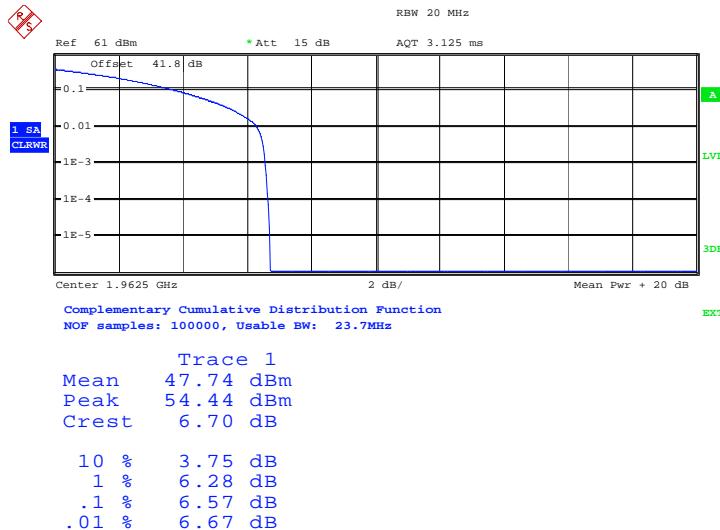
### TM1

#### Single Carrier

##### Configuration 1 - Mode 2



Date: 24.FEB.2011 15:21:14

**Multi Carrier (1x4)****Configuration 1 - Mode 7**

Date: 24.FEB.2011 16:11:41

Limit	13dB
-------	------

**Remarks**

The Peak – Average ratio does not exceed 13dB at the measured frequencies.



## 2.3 OCCUPIED BANDWIDTH

### 2.3.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1049 (h)  
 FCC CFR 47 Part 24, Clause 24.238 (b)  
 Industry Canada RSS-GEN, Clause 4.6.1

### 2.3.2 Equipment Under Test

RRUS 01 B2 / KRC 118 74/1, S/N: CB4G624456

### 2.3.3 Date of Test and Modification State

24 February 2011 – 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 Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 2 and Part 24 and Industry Canada RSS-GEN.

The EUT was transmitting at maximum power, modulated using the test model described. Using a resolution bandwidth of 50kHz and a video bandwidth of 500kHz. The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission. The -26dBc points were also established and the emission bandwidth determined.

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

Configuration 1 - Mode 2

### 2.3.6 Environmental Conditions

24 February 2011

Ambient Temperature 24.5°C

Relative Humidity 28.0%



### 2.3.7 Test Results

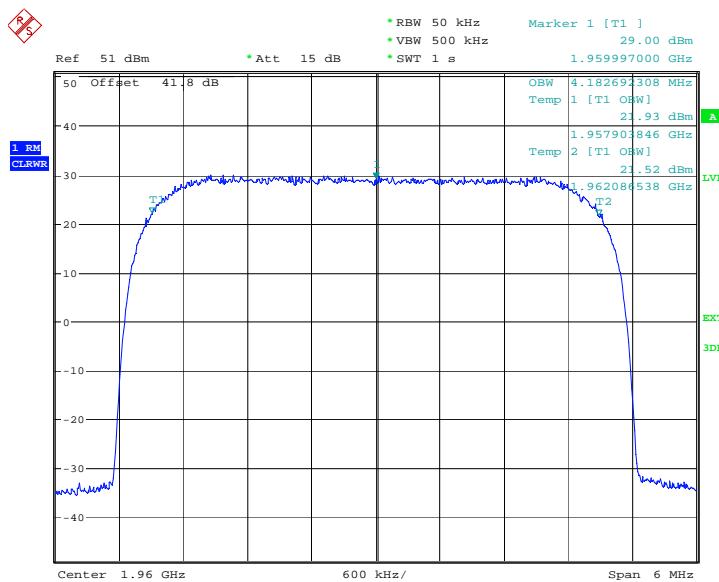
For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 24 and Industry Canada RSS-GEN for Occupied Bandwidth.

The test results are shown below

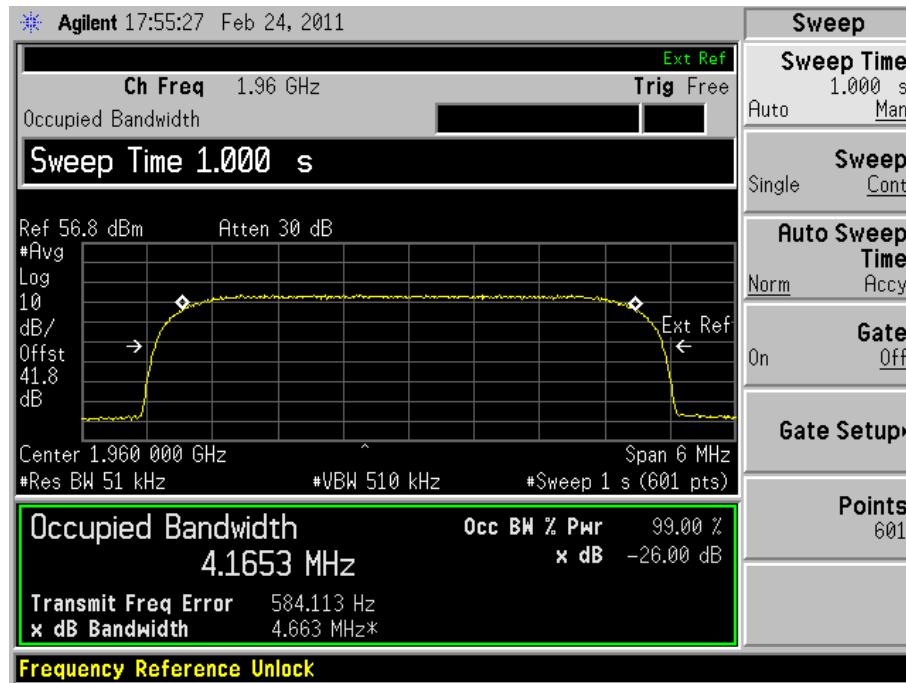
#### TM1

##### Single Carrier

###### Configuration 1 - Mode 1



Date: 24.FEB.2011 15:19:19

-26dBc Bandwidth



## 2.4 SPURIOUS EMISSIONS AT ANTENNA TERMINALS ( $\pm 1\text{MHz}$ )

### 2.4.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051  
 FCC CFR 47 Part 24, Clause 24.238 (a)  
 Industry Canada RSS-133 Clause 6.5

### 2.4.2 Equipment Under Test

RRUS 01 B2 / KRC 118 74/1, S/N: CB4G624456

### 2.4.3 Date of Test and Modification State

24 February 2011 – Modification State 0

### 2.4.4 Test Equipment Used

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

### 2.4.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 2 and Part 24 and Industry Canada RSS-133.

In accordance with 24.238(b), at least 1% of the 26dB bandwidth was used for the resolution and video bandwidths up to 1MHz away from the block edge. A resolution bandwidth of 30kHz was used up to 1MHz away from the band edges. 30kHz is <1% of the Emission Bandwidth (4.66MHz between the 26dB points for 5MHz nominal BW setting). To compensate for the reduced measurement bandwidth, the limit was adjusted to -15dBm up to 1MHz away from the band edges. A resolution bandwidth of 50kHz was used between 1MHz to 5MHz away from the band edge. As the FCC rules specify a RBW of 1MHz for measurements of emissions > 1MHz away from the band edges, the limit was adjusted with -13dB to -26dBm to compensate for the reduced measurement bandwidth. The Spectrum analyser detector was set as RMS.

The path loss measured and entered as a reference level offset.

The EUT was tested at its maximum power level.

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

Configuration 1 - Mode 1  
 - Mode 3  
 - Mode 5  
 - Mode 6

### 2.4.6 Environmental Conditions

24 February 2011

Ambient Temperature 24.5°C

Relative Humidity 28.0%



## 2.4.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 24 and Industry Canada RSS-133 for Spurious Emissions Antenna Terminals ( $\pm 1\text{MHz}$ )

Below are the Frequencies the EUT was tested against along with the tested channels.

### TM1

#### Single Carrier

##### Configuration 1 - Mode 1 and 3

Band Edge Frequency	Edge Test with QPSK modulation Channel No./Frequencies
Bottom 1930 MHz	Channel: 9662 Frequency: 1932.4 MHz
Top 1990 MHz	Channel: 9938 Frequency: 1987.6 MHz

#### Multi Carrier (1x2)

##### Configuration 1 - Mode 5 and 6

Band Edge Frequency	Edge Test with QPSK modulation Channel No./Frequencies
Bottom 1930 MHz	Channel: 9662 & 9687 Frequency: 1932.4 & 1937.4 MHz
Top 1990 MHz	Channel: 9913 & 9938 Frequency: 1982.6 & 1987.6 MHz

The channels shown in the table above are the minimum and maximum channels that can be used in the authorised frequency ranges to maintain compliance. Channels used outside of those stated and power levels used beyond those stated in the table exceed the specification limits, thus they cannot be used.

The channels outside of those shown in the table above were not tested at lower power levels to determine a level at which compliance would be achieved. Therefore, to maintain compliance, only the channels shown in the table above shall be used.

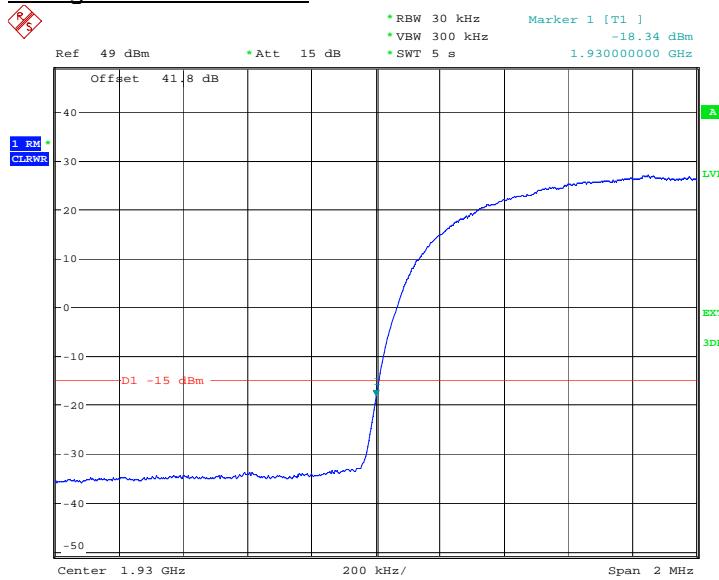


The test results are shown below

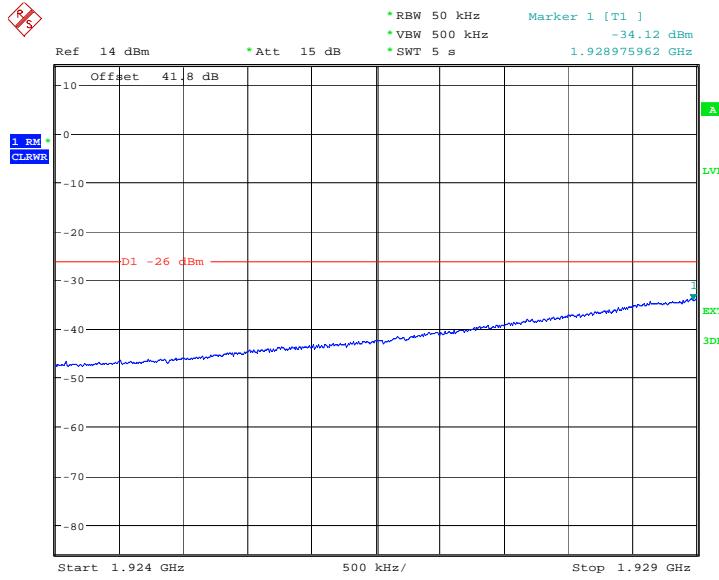
## TM1

### Single Carrier

#### Configuration 1 - Mode 1



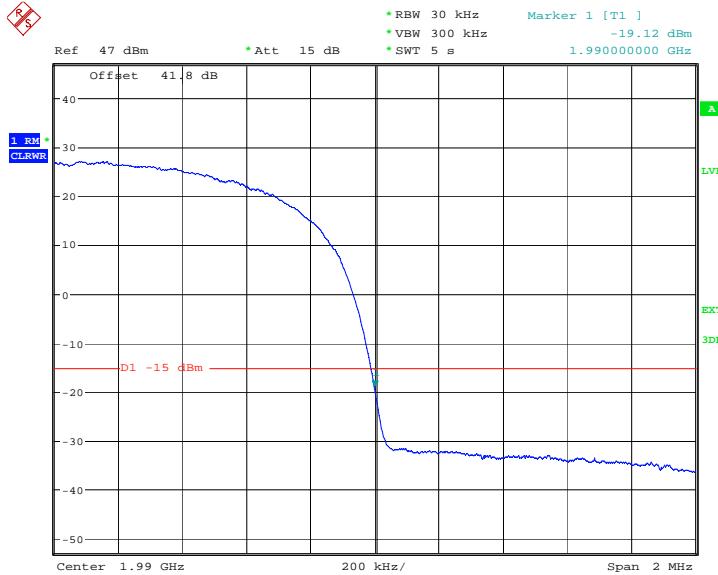
Date: 24.FEB.2011 15:10:17



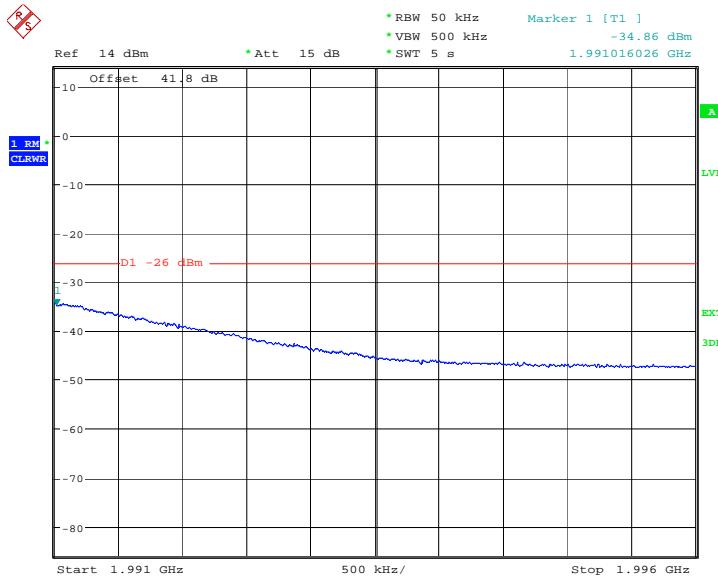
Date: 24.FEB.2011 15:08:20



Product Service

Configuration 1 - Mode 3

Date: 24.FEB.2011 14:58:33

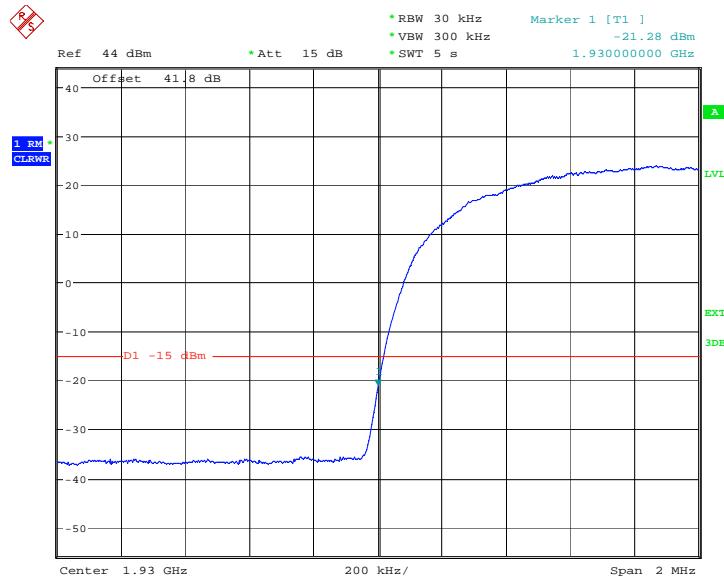


Date: 24.FEB.2011 14:59:53

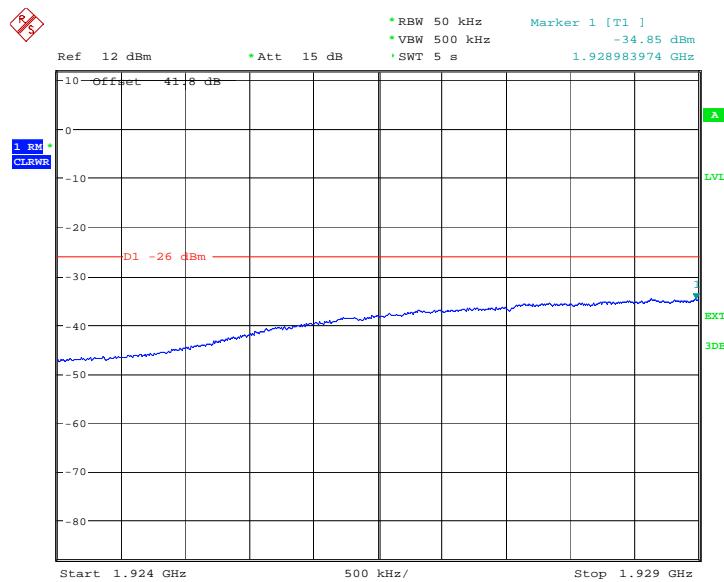


### Multi Carrier (1x2)

#### Configuration 1 - Mode 5



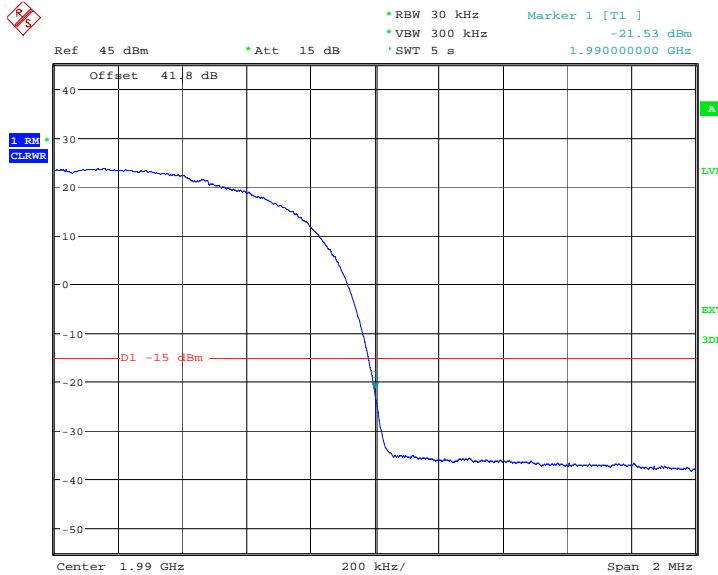
Date: 24.FEB.2011 14:19:10



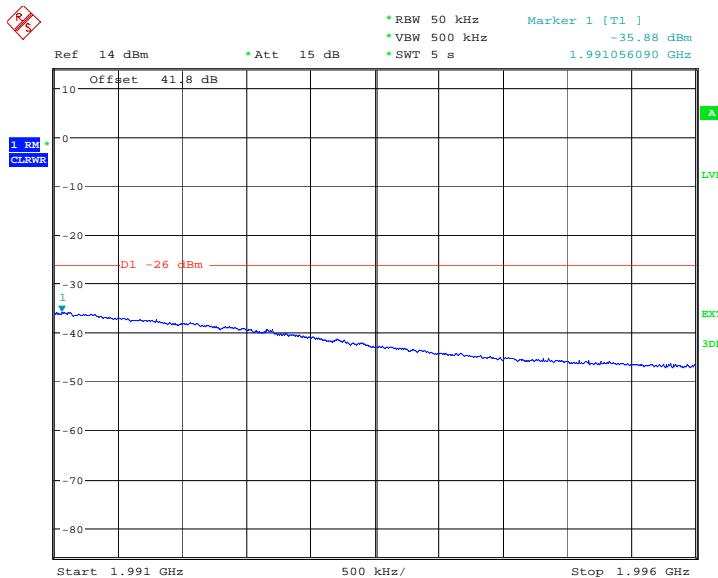
Date: 24.FEB.2011 14:15:59



### Configuration 1 - Mode 6



Date: 24.FEB.2011 14:34:44



Date: 24.FEB.2011 14:37:01

### Limit

The power of any emission outside the frequency band shall be attenuated below the transmitter power (P) by at least  $43 + 10\log P$  dB.



## 2.5 RADIATED SPURIOUS EMISSIONS

### 2.5.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1053  
 FCC CFR 47 Part 24, 24.238 (a)  
 Industry Canada RSS-133, Clause 6.5

### 2.5.2 Equipment Under Test

RRUS 01 B2 / KRC 118 74/1, S/N: CB4G624456

### 2.5.3 Date of Test and Modification State

04 March 2011 – 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 Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 2 and Part 24 and Industry Canada RSS-133.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within the chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations.

Emissions identified within the range 30MHz – 25GHz were then formally measured using a Peak detector as the worst case.

In the frequency Range 30MHz – 25GHz, the measurement was performed with a resolution bandwidth of 1MHz.

The measurements were performed at a 3m distance unless otherwise stated.

The limits for Spurious Emissions have been calculated, as shown below using the following formula:

Field Strength of Carrier - (43 + 10Log (P)) dB

Where:

Field Strength is measured in dB $\mu$ V/m

P is measured Transmitter Power in Watts



### Determination of Spurious Emission Limit

As the EUT does not have an integral antenna, the field strength of the carrier has been calculated assuming that the power is to be fed to a half-wave tuned dipoles as per 2.1053 (a).

$$E_{(V/m)} = (30 \times G_i \times P_o)^{0.5} / d$$

Where  $G_i$  is the antenna gain of ideal half-wave dipoles,  
 $P_o$  is the power out of the transceiver in W,  
 $d$  is the measurement distance in meter.

Therefore at 3m measurement distance the field strength using the lowest transceiver output power would be:

$$E_{(V/m)} = (30 \times 1.64 \times 60.12)^{0.5} / 3 = 18.129V/m = 145.2dB\mu V/m$$

As per 24.238(a) the spurious emission must be attenuated by  $43 + 10\log(P_o)$  dB this gives:

$$43 + 10\log(60.12) = 60.8dB$$

Therefore the limit at 3m measurement distance is:

$$145.2 - 60.8 = 84.4dB\mu V/m$$

This limit has been used to determine Pass or Fail for the harmonics measured and detailed in the following results.

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

Configuration 1 - Mode 2  
 - Mode 4

#### 2.5.6 Environmental Conditions

04 March 2011

Ambient Temperature 21.0°C

Relative Humidity 32.0%



### 2.5.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 & Part 24 and Industry Canada RSS-133 for Radiated Spurious Emissions.

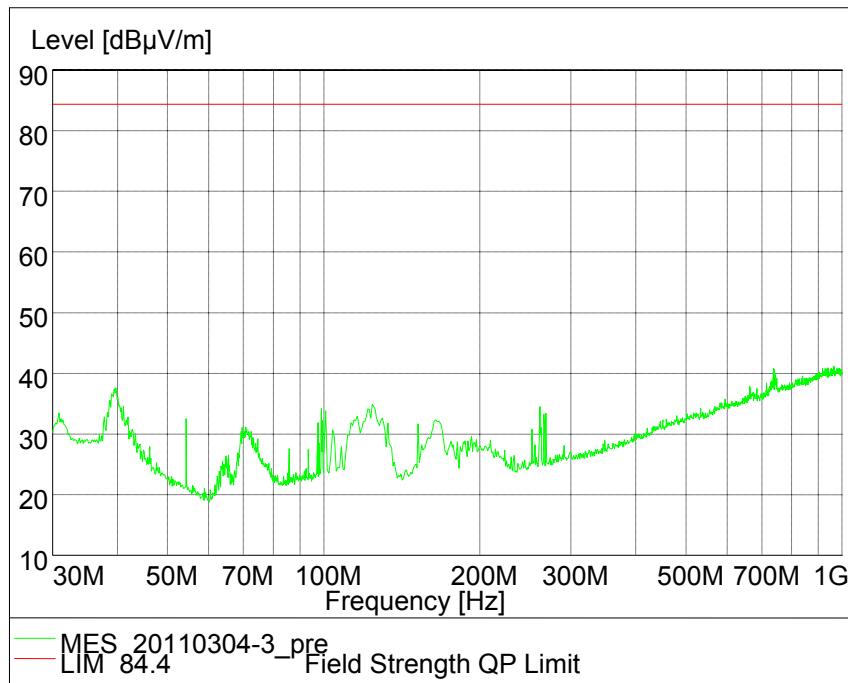
The test results are shown below

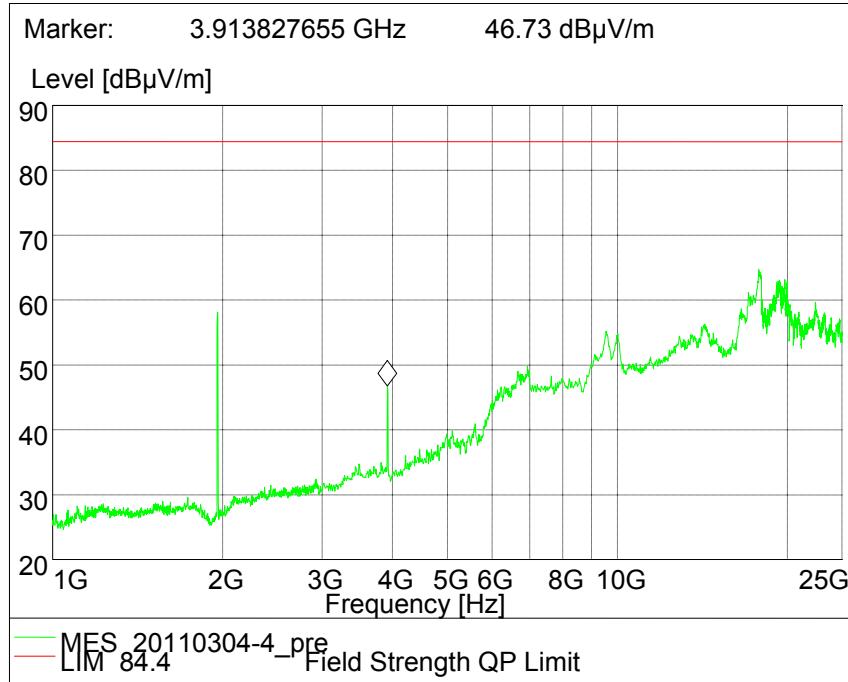
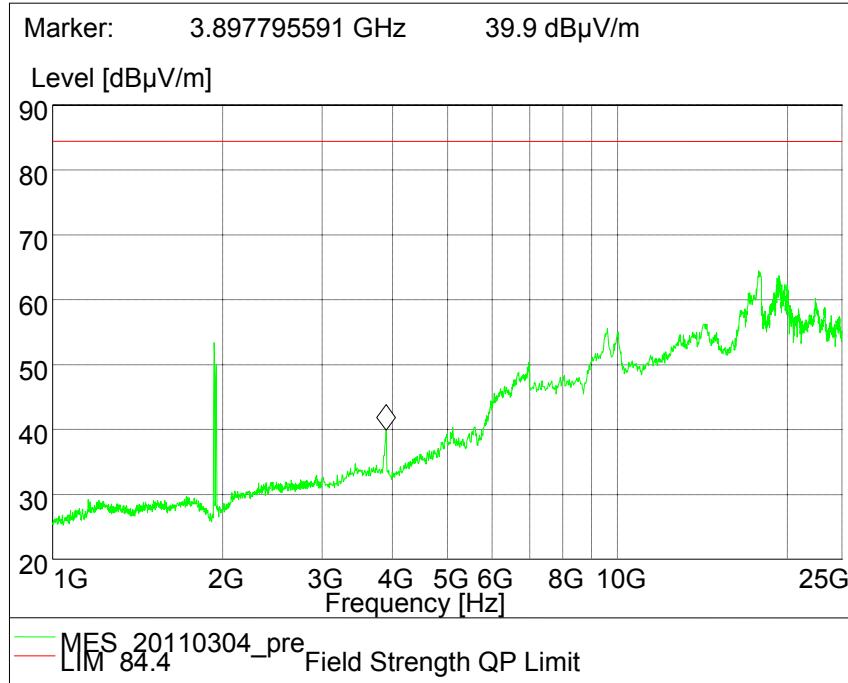
#### TM1

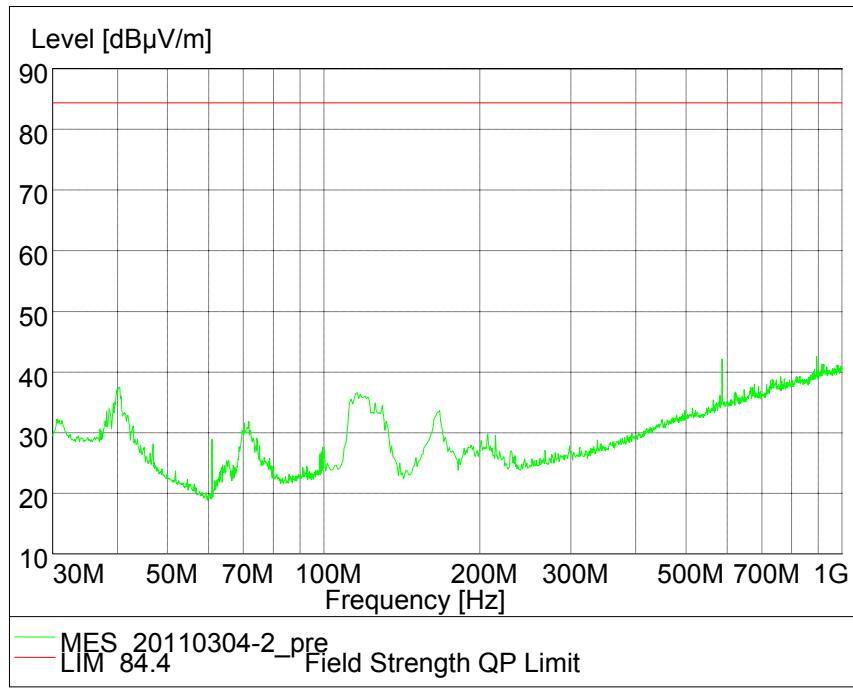
##### Single Carrier

###### Configuration 1 - Mode 2

###### 30MHz to 1GHz



1GHz to 25GHzMulti Carrier (1x2)Configuration 1 - Mode 430MHz to 1GHz

1GHz to 25GHz

Limit	-13dBm / 84.4dB $\mu$ V/m
-------	---------------------------

Remarks

The EUT does not exceed -13dBm / 84.4dB $\mu$ V/m at the measured frequencies.



## 2.6 CONDUCTED SPURIOUS EMISSIONS

### 2.6.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051  
 FCC CFR 47 Part 24, 24.238 (a)  
 Industry Canada RSS-133, Clause 6.5

### 2.6.2 Equipment Under Test

RRUS 01 B2 / KRC 118 74/1, S/N: CB4G624456

### 2.6.3 Date of Test and Modification State

24 and 28 February 2011 – 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 Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 2 and Part 24 and Industry Canada RSS-133.

In accordance with Part 2.1051, the spurious emissions from the antenna terminal were measured. The transmitter output power was attenuated using an attenuator and the frequency spectrum investigated from 9kHz to 25GHz. The EUT was set to transmit on maximum power. The EUT was tested for QPSK modulation type. The resolution was set to 1MHz for 9kHz to 25GHz thus meeting the requirements of Part 24.238(b). The spectrum analyser detector was set to peak and trace was kept on Max Hold.

The maximum path loss across the measurement band was used as the reference level offset to ensure worst case.

In addition, measurements were made up to the 10<sup>th</sup> harmonic of the highest internal frequency.

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

Configuration 1 - Mode 2  
 - Mode 4

### 2.6.6 Environmental Conditions

	24 February 2011	28 February 2011
Ambient Temperature	24.5°C	21.0°C
Relative Humidity	28.0%	30.2%



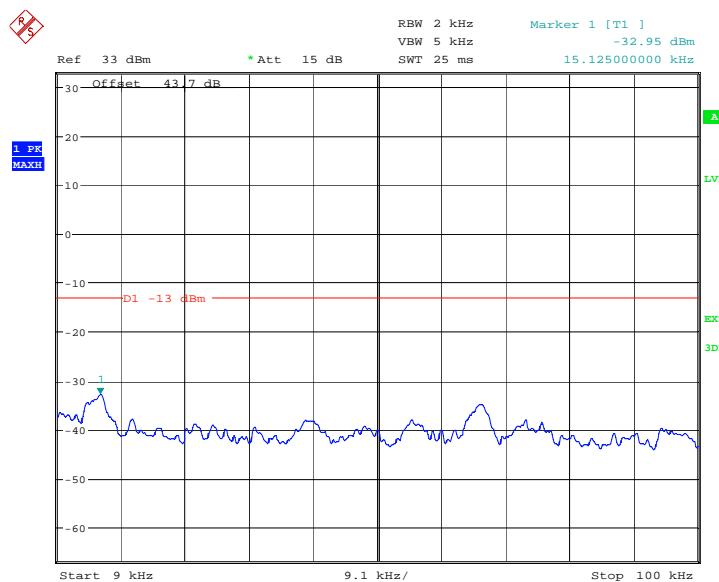
## 2.6.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 24 and Industry Canada RSS-133 for Conducted Spurious Emissions.

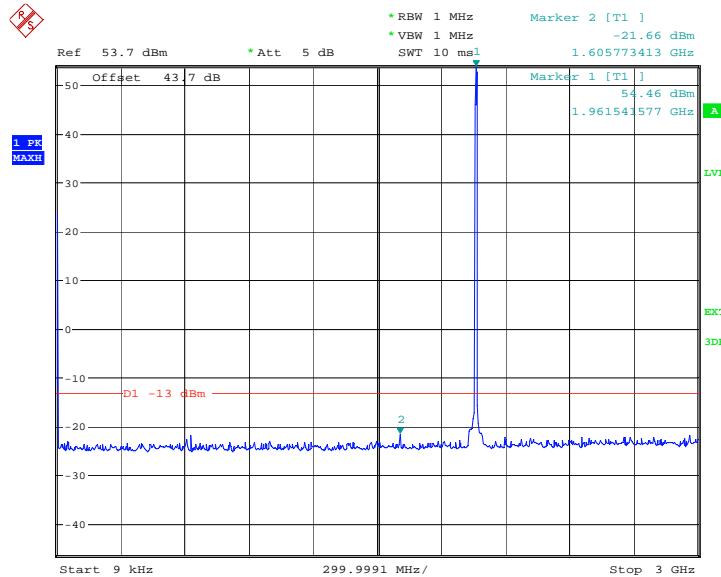
The test results are shown below

Remark:

The emissions at 9kHz on the plots was not generated by the test object. A complementary measurement with a smaller Span showed that it was related to the LO feedthrough.

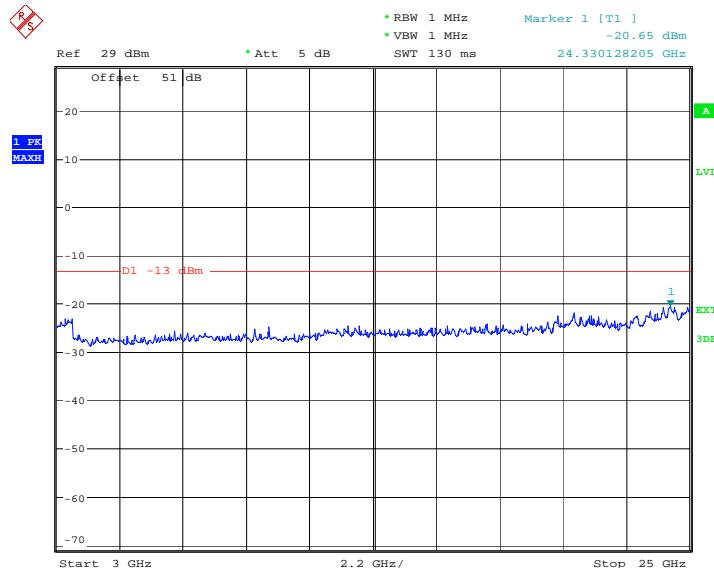


Date: 24.FEB.2011 13:30:20

**TM1****Single Carrier****Configuration - Mode 2****9kHz to 3GHz**

Date: 24.FEB.2011 13:45:02

Note: The emission beyond the limit is the operating frequency.

**3GHz to 25GHz**

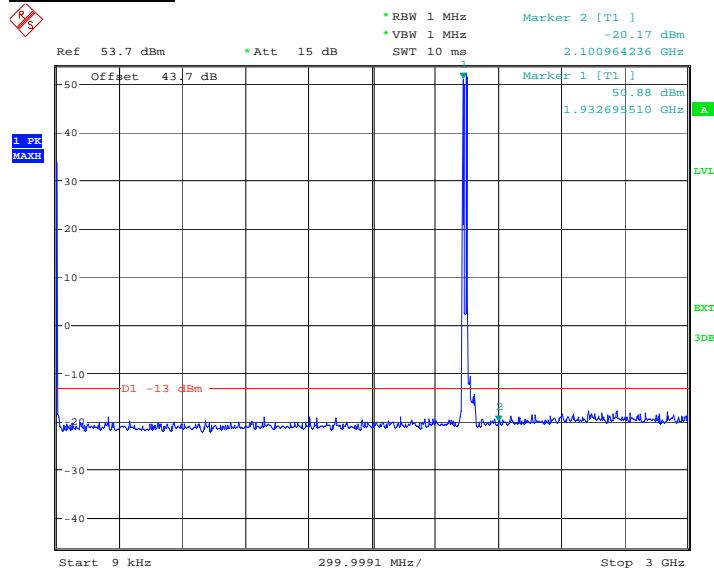
Date: 28.FEB.2011 13:16:30



### Multi Carrier (1x2)

#### Configuration 1 - Mode 4

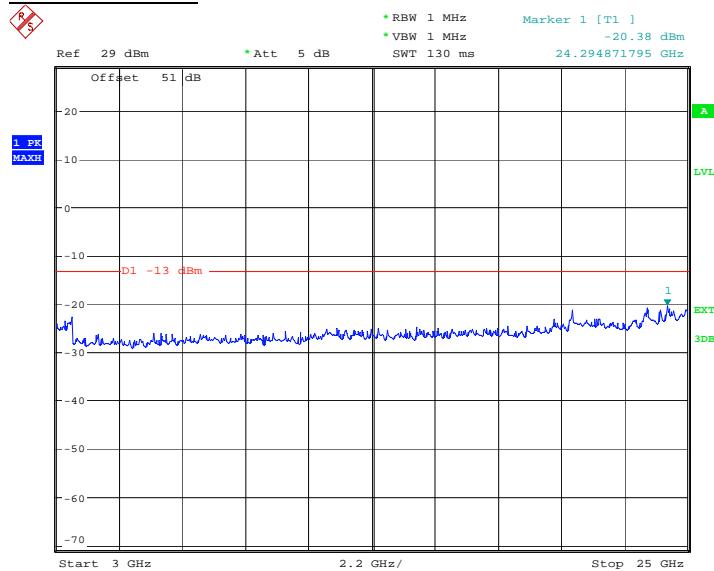
##### 9kHz to 3GHz



Date: 24.FEB.2011 13:29:19

Note: The emissions beyond the limit are the operating frequencies.

##### 3GHz to 25GHz



Date: 28.FEB.2011 13:29:27

Limit	-13dBm
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##### Remarks

The EUT does not exceed -13dBm at the frequency range of 9kHz to 25GHz.



Product Service

## **SECTION 3**

### **TEST EQUIPMENT USED**



### 3.1 TEST EQUIPMENT USED

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

Instrument	Manufacturer	Type No.	Serial No.	Calibration Due
<b>Section 2.1, 2.2, 2.3, 2.4 and 2.6 – Maximum Conducted Output Power, Peak – Average Ratio, Occupied Bandwidth, Spurious Emissions at Antenna Terminals (<math>\pm 1\text{MHz}</math>), Conducted Spurious Emissions and Receiver Spurious Emissions.</b>				
Spectrum Analyser	Rohde & Schwarz	FSQ26	200835	24-Aug-2011
Spectrum Analyser	Agilent	E4440A	MY46186610	24-Aug-2011
Power Metre	Rohde & Schwarz	NRP	101592	24-Aug-2011
Thermal Power Sensor	Rohde & Schwarz	NRP-Z51	102115	24-Aug-2011
Network Analyzer	Agilent	8720D	US38431317	24-Aug-2011
40dB Attenuator	Aeroflex / Weinschel	48-40-43-LIM	BR5020	O/P MON
Load	Shanghai Huaxiang	TFE50-3	090323003	O/P MON
Power Supply	Dahua	DH1716-5D	200360033	O/P MON
Power Supply	Dahua	DH1716A-14	20080405	O/P MON
Digital Multi-meter	FLUKE	179	91820401	03-Jan-2012
Thermo-hygrometer	AZ Instruments	8705	9151655	16-Dec-2011
<b>Section 2.5 – Radiated Spurious Emissions</b>				
Load	Shanghai Huaxiang	TFE5-3	090323089	O/P MON
Load	Shanghai Huaxiang	TF100	08011701	O/P MON
EMI Receiver	Rohde & Schwarz	ESI 40	100015	19-Aug-2011
Ultra log test antenna	Rohde & Schwarz	HL562	100167	19-Aug-2011
Double-Ridged Waveguide Horn Antenna	Rohde & Schwarz	HF 906	100029	19-Aug-2011
Antenna master	Frankonia	MA 260	-	19-Aug-2011
Relay Switch Unit	Rohde & Schwarz	331.1601.31	338965002	N/A
Semi Anechoic Chamber	Frankonia	23.18m×16.88m×9.60m	-	19-Aug-2011
Power Supply	Dahua	DH1716A-10	1000303181	O/P MON
Digital Multimeter	FLUKE	179	91820401	03-Jan-2012
Thermo-hygrometer	AZ Instruments	8705	9151655	16-Dec-2011

N/A – Not Applicable

O/P MON – Output monitored with calibration equipment



### 3.2 MEASUREMENT UNCERTAINTY

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

Test Discipline	Frequency / Parameter	MU
Conducted Maximum Peak Output Power	30MHz to 10GHz Amplitude	0.5dB*
Conducted Emissions	30MHz to 40GHz Amplitude	3.0dB*
Frequency Stability	30MHz to 2GHz Amplitude	$<1 \times 10^{-7}$
Radiated Emissions, Bilog Antenna, AOATS	30MHz to 1GHz Amplitude	5.1dB*
Radiated Emissions, Horn Antenna, AOATS	1GHz to 40GHz Amplitude	6.3dB*
Worst case error for both Time and Frequency measurement 12 parts in $10^6$		

\* In accordance with CISPR 16-4



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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