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# Report On

FCC and Industry Canada Testing of the  
Ericsson AB RRUS 12 B5 / KRC 161 321/2

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FCC ID: TA8AKRC161321-2  
IC ID: 287AB-AS1613212

Document 75923485 Report 01 Issue 1

August 2013



Product Service

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COMMERCIAL-IN-CONFIDENCE

**REPORT ON**

FCC and Industry Canada Testing of the  
Ericsson RRUS 12 B5 / KRC 161 321/2

Document 75923485 Report 01 Issue 1

August 2013

**PREPARED FOR**

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**PREPARED BY**

**Y He**  
Test Engineer

**APPROVED BY**

**M Jenkins**  
Authorised Signatory

**DATED**

22 August 2013

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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 22 and Industry Canada RSS-132. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

**Y He**

**C Zhang**





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## **SECTION 1**

### **REPORT SUMMARY**

FCC and Industry Canada Testing of the  
Ericsson RRUS 12 B5 / KRC 161 321/2



## 1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Ericsson RRUS 12 B5 / KRC 161 321/2 to the requirements of FCC CFR 47 Part 22 and Industry Canada RSS-132.

Testing was carried out in support of an application for Grant of Equipment Authorisation in the name of RRUS 12 B5 / KRC 161 321/2.

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	Ericsson AB
Product Name	RRUS 12 B5
Part Number	KRC 161 321/2
IC Model Number	AS1613212
Serial Number(s)	CB26989524
RBS Software Version	CXP 102 051/19 R18BA
PIS Software Version	CXP 901 3268/9 R51MM
Hardware Version	R1B
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 22: 2012 Industry Canada RSS-132 Issue 3: 2013
Incoming Release Date	Declaration of Build Status 16 July 2013
Order Number Date	PTP 17 July 2013
Start of Test	18 July 2013
Finish of Test	2 August 2013
Name of Engineer(s)	Y He C Zhang
Related Document(s)	ANSI C63.4: 2009 FCC CFR 47 Part 2: 2012 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 22 and Industry Canada RSS-132, is shown below.

Configuration 1 – Radio Equipment							
Section	Spec Clause		Test Description	Mode	Mod State	Result	Comments
	FCC Part 2 and 22	RSS-132 and RSS-GEN					
	22.913 (a)	5.4	Effective Radiated Power	869.88MHz		N/A	No integral antenna.
				881.52MHz		N/A	
				893.10MHz		N/A	
				869.88MHz+871.11MHz		N/A	
				881.52MHz+882.75MHz		N/A	
				891.87MHz+893.10MHz		N/A	
				869.88MHz+871.11MHz+872.34MHz		N/A	
				880.29MHz+881.52MHz+882.75MHz		N/A	
890.64MHz+891.87MHz+893.10MHz		N/A					
2.1	2.1046, 22.913 (a)	5.4	Maximum Peak Output Power - Conducted	869.88MHz	0	Pass	-
				881.52MHz	0	Pass	
				893.10MHz	0	Pass	
				869.88MHz+871.11MHz	0	Pass	
				881.52MHz+882.75MHz	0	Pass	
				891.87MHz+893.10MHz	0	Pass	
				869.88MHz+871.11MHz+872.34MHz	0	Pass	
				880.29MHz+881.52MHz+882.75MHz	0	Pass	
890.64MHz+891.87MHz+893.10MHz	0	Pass					
2.2	22.913 (a)	-	Peak – Average Ratio	869.88MHz	0	Pass	-
				881.52MHz	0	Pass	
				893.10MHz	0	Pass	
				869.88MHz+871.11MHz	0	Pass	
				881.52MHz+882.75MHz	0	Pass	
				891.87MHz+893.10MHz	0	Pass	
				869.88MHz+871.11MHz+872.34MHz	0	Pass	
				880.29MHz+881.52MHz+882.75MHz	0	Pass	
890.64MHz+891.87MHz+893.10MHz	0	Pass					



Configuration 1 – Radio Equipment							
Section	Spec Clause		Test Description	Mode	Mod State	Result	Comments
	FCC Part 2 and 22	RSS-132 and RSS-GEN					
2.3	2.1047 (d)	5.2	Modulation Characteristics	869.88MHz		N/A	-
				881.52MHz	0	Pass	
				893.10MHz		N/A	
2.4	2.1049, 22.917 (b)	RSS-Gen 4.6.1	Occupied Bandwidth	869.88MHz	0	Pass	-
				881.52MHz	0	Pass	
				893.10MHz	0	Pass	
2.5	2.1051, 22.917 (b)	5.5	Spurious Emissions at Antenna Terminals (±1MHz)	869.88MHz	0	Pass	-
				881.52MHz		N/A	
				893.10MHz	0	Pass	
				869.88MHz+871.11MHz	0	Pass	
				881.52MHz+882.75MHz		N/A	
				891.87MHz+893.10MHz	0	Pass	
				869.88MHz+871.11MHz+872.34MHz	0	Pass	
				880.29MHz+881.52MHz+882.75MHz		N/A	
890.64MHz+891.87MHz+893.10MHz	0	Pass					
2.6	2.1053, 22.917 (a)	5.5	Radiated Spurious Emissions	869.88MHz	0	Pass	-
				881.52MHz	0	Pass	
				893.10MHz	0	Pass	
				869.88MHz+871.11MHz		N/A	
				881.52MHz+882.75MHz	0	Pass	
				891.87MHz+893.10MHz		N/A	
				869.88MHz+871.11MHz+872.34MHz		N/A	
				880.29MHz+881.52MHz+882.75MHz	0	Pass	
890.64MHz+891.87MHz+893.10MHz		N/A					
2.7	2.1051, 22.917 (a)	5.5	Conducted Spurious Emissions	869.88MHz	0	Pass	-
				881.52MHz	0	Pass	
				893.10MHz	0	Pass	
				869.88MHz+871.11MHz	0	N/A	
				881.52MHz+882.75MHz	0	Pass	
				891.87MHz+893.10MHz	0	N/A	
				869.88MHz+871.11MHz+872.34MHz	0	N/A	
				880.29MHz+881.52MHz+882.75MHz	0	Pass	
890.64MHz+891.87MHz+893.10MHz	0	N/A					



Product Service

Configuration 1 – Radio Equipment							
Section	Spec Clause		Test Description	Mode	Mod State	Result	Comments
	FCC Part 2 and 22	RSS-132 and RSS-GEN					
2.8	2.1055, 22.355	5.3	Frequency Stability Under Temperature Variations	869.88MHz		N/A	-
				881.52MHz	0	Pass	
				893.10MHz		N/A	
2.9	2.1055, 22.355	5.3	Frequency Stability Under Voltage Variations	869.88MHz		N/A	-
				881.52MHz	0	Pass	
				893.10MHz		N/A	

N/A – Not Applicable





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## 1.3 DECLARATION OF BUILD STATUS

<b>MAIN EUT</b>	
<b>MANUFACTURING DESCRIPTION</b>	Radio Equipment
<b>MANUFACTURER</b>	Ericsson AB
<b>PRODUCT NAME</b>	RRUS 12 B5
<b>PART NUMBER</b>	KRC 161 321/2
<b>IC Model Number</b>	AS1613212
<b>SERIAL NUMBER(s)</b>	CB26989524
<b>HARDWARE VERSION</b>	R1B
<b>RBS SOFTWARE VERSION</b>	CXP 102 051/19 R18BA
<b>PIS SOFTWARE VERSION</b>	CXP 901 3268/9 R51MM
<b>TRANSMITTER OPERATING RANGE</b>	TX: 869MHz - 894MHz RX: 824MHz - 849MHz
<b>MODULATIONS</b>	QPSK, 8PSK, 16QAM
<b>INTERMEDIATE FREQUENCIES</b>	--
<b>ITU DESIGNATION OF EMISSION</b>	1M25F9W
<b>CHANNEL BANDWIDTH</b>	1.25 MHz
<b>OUTPUT POWER (RMS) (W or dBm)</b>	Single Carrier: 1 x 47.8dBm (1 x 60W) per port Multi Carrier (x 2): 2 x 44.8dBm (2 x 30W) per port Multi Carrier (x 3): 3 x 43.0dBm (3 x 20W) per port
<b>OUTPUT POWER TOLERANCE</b>	± 1.0dB
<b>NUMBER OF ANTENNA PORTS</b>	2 TX/ RX ports
<b>SUPPORTED CONFIGURATION</b>	Dual Single Carrier or Multi Carrier. Both RF chains are identical.
<b>FCC ID</b>	TA8AKRC161321-2
<b>IC ID</b>	287AB-AS1613212
<b>TECHNICAL DESCRIPTION (a brief description of the intended use and operation)</b>	The equipment is the Radio Part of CDMA Base Station.

Signature

Date

5 August 2013

D of B S Serial No

75923485/01

No responsibility will be accepted by TÜV SÜD Product Service 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 12 B5 / KRC 161 321/2 is an Ericsson Radio Equipment working in the public mobile service 850MHz band which provides communication connections to CDMA850 network. The RRUS 12 B5 / KRC 161 321/2 operates from a -48V DC supply.

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



Equipment Under Test



## 1.4.2 Test Configuration

### Configuration 1: Radio Equipment

The EUT was configured in accordance with FCC CFR 47 Part 22 and Industry Canada RSS-132.

The RRUS 12 B5 / KRC 161 321/2 supports CDMA with QPSK, 8PSK and 16QAM modulations at 850MHz. The setting below were found to be representative for all traffic scenarios when several settings with the different modulations and the number of carriers were tested to find the worst case setting. These settings were used for all measurements if not otherwise noted:

- Single carrier:  
QPSK Modulation  
Forward Traffic Channel using Spreading Rate 1 (1X), Voice  
User Channels: 6  
Channel rate: 9.6kbps

Channel bandwidth: 1.25MHz

For other modulations, the settings are as follows:

- QPSK Modulation: High Rate Packet Data  
User Channels: 14  
Channel rate: 614.4kbps
- 8PSK Modulation: High Rate Packet Data  
User Channels: 14  
Channel rate: 921.6kbps
- 16QAM Modulation: High Rate Packet Data  
User Channels: 14  
Channel rate: 2457.6kbps

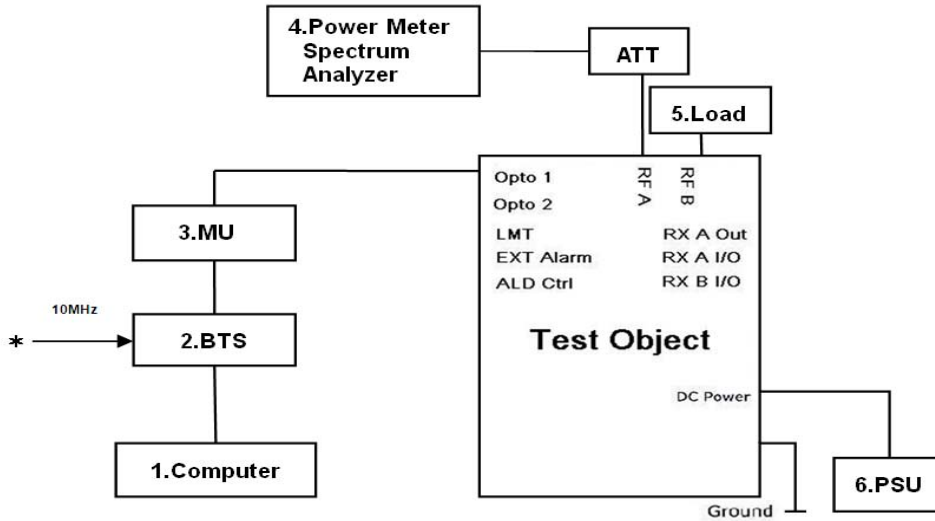
Channel bandwidth: 1.25MHz

The EUT has two TX/RX ports and it can be configured to transmit with 850MHz single or multi carrier at both RF output connectors. All TX measurements were performed on the combined TX/RX output connector RF A. Limited complementary TX measurements were done at connector RF B to verify identical performance for both transmitter chains. 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:**

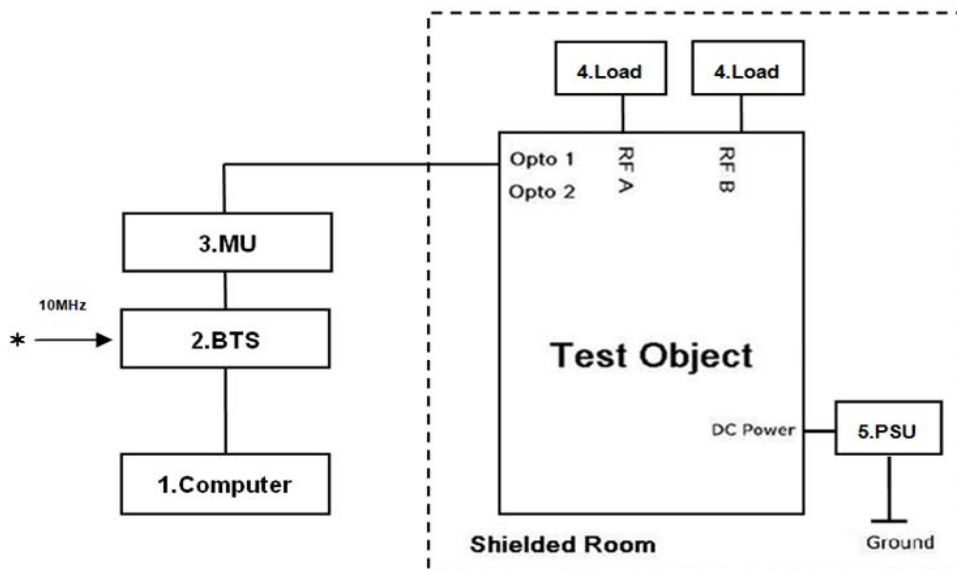


Test Object	Part Number	Version	Serial Number
Radio Part	RRUS 12 B5 / KRC 161 321/2	R1B	CB26989524

No.	Auxiliary Equipment	Part Number / Model Type	Version	Serial Number
1	Computer	HP DC5100SFF	--	CNG6510B8B
2	BTS 602	--	--	--
	DBA	NTLK90AAE5	A1	NNTMPX00MEM6
	XCEM-A	NTLK86AAE5	02	NNTMPX00MRRF
	XCEM-A	NTLK86AAE5	02	NNTMPX00MHPR
	XCEM-A	NTLK86AAE5	02	NNTMPX00MPRG
	AEM1302	NTLK85GAE5	07	NNTMPX00VRY0
	AEM1302	NTLK85GAE5	07	NNTMPX00VRY3
3	DUS 41 01	KDU 137 624/1	R5A	A402058111
	XMU 02 01	KDU 137 745/1	R2A	C825513812
	SUP 6601	BFL 901 009/1	R3B	BR81066826
4	Power Meter	R&S NRP	--	101593
	Power Sensor	R&S NRP Z51	--	102224
	Power Sensor	R&S NRP Z51	--	102933
	Spectrum Analyzer	R&S FSQ	--	201122
5	Load	TF100	--	09121602
6	Power Supply	DH1716A-14	--	20080401



**Test Setup, Radiated Measurement:**



Test Object	Part Number	Version	Serial Number
Radio Part	RRUS 12 B5 / KRC 161 321/2	R1B	CB26989524

No.	Auxiliary Equipment	Part Number / Model Type	Version	Serial Number
1	Computer	HP DC5100SFF	--	CNG6510B8B
2	BTS 602A	--	--	--
	DBA	NTLK90AAE5	A1	NNTMPX00MEM6
	XCEM-A	NTLK86AAE5	02	NNTMPX00MRRF
	XCEM-A	NTLK86AAE5	02	NNTMPX00MHPR
	XCEM-A	NTLK86AAE5	02	NNTMPX00MPRG
	AEM1302	NTLK85GAE5	07	NNTMPX00VRY0
	AEM1302	NTLK85GAE5	07	NNTMPX00VRY3
3	DUS 41 01	KDU 137 624/1	R5A	A402058111
	XMU 02 01	KDU 137 745/1	R2A	C825513812
	SUP 6601	BFL 901 009/1	R3B	BR81066826
4	Load	TF100	--	09121631
	Load	TF100	--	09121602
5	Power Supply	DH1716A-14	--	20080401



### 1.4.3 Modes of Operation

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

Mode 1 - Channel No. 1019: 869.88MHz (Bottom Channel)

Mode 2 - Channel No. 384: 881.52MHz (Middle Channel)

Mode 3 - Channel No. 770: 893.10MHz (Top Channel)

Mode 4 - Channel No. 1019 + 37: 869.88MHz + 871.11MHz (B and B+1.23MHz)

Mode 5 - Channel No. 384 + 425: 881.52MHz + 882.75MHz (M and M+1.23MHz)

Mode 6 - Channel No. 729 + 770: 891.87MHz + 893.10MHz (T-1.23MHz and T)

Mode 7 - Channel No. 1019 + 37 + 78:  
869.88MHz+871.11MHz+872.34MHz (B and B+1.23MHz, B+2.46MHz)

Mode 8 - Channel No. 343 + 384 + 425:  
880.29MHz+881.52MHz+882.75MHz (M-1.23MHz, M and M+1.23MHz)

Mode 9 - Channel No. 688 + 729 + 770:  
890.64MHz+891.87MHz+893.10MHz ( T-2.46MHz, T-1.23MHz and T)

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

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.

## 1.8 ALTERNATIVE TEST SITE

Under our group UKAS Accreditation, TÜV SÜD Product Service conducted the following tests at Ericsson in Beijing, China:

- Maximum Peak Output Power – Conducted
- Peak to Average Ratio
- Modulation Characteristics
- Occupied Bandwidth
- Band Edge
- Conducted Spurious Emissions
- Frequency Stability

Only Radiated Spurious Emissions 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-1:

The State Radio Monitoring Centre, No.80 Beilishi Road Xicheng District Beijing, China.



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## **SECTION 2**

### **TEST DETAILS**

FCC and Industry Canada Testing of the  
Ericsson RRUS 12 B5 / KRC 161 321/2





## 2.1 MAXIMUM PEAK OUTPUT POWER - CONDUCTED

### 2.1.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1046  
 FCC CFR 47 Part 22, Clause 22.913 (a)  
 Industry Canada RSS-132, Clause 5.4

### 2.1.2 Equipment Under Test

RRUS 12 B5 / KRC 161 321/2, S/N: CB26989524

### 2.1.3 Date of Test and Modification State

18 and 19 July 2013 – 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 22 and Industry Canada RSS-132.

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, 8PSK and 16QAM modulations.

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 1  
 - Mode 2  
 - Mode 3  
 - Mode 4  
 - Mode 5  
 - Mode 6  
 - Mode 7  
 - Mode 8  
 - Mode 9

### 2.1.6 Environmental Conditions

	18 July 2012	19 July 2012
Ambient Temperature	23.5°C	23.5°C
Relative Humidity	66.0%	60.5%



### 2.1.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 22 and Industry Canada RSS-132 for Maximum Peak Output Power.

The test results are shown below

#### Single Carrier

##### Configuration 1 - Mode 1, 2 and 3

#### QPSK

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
1019 (Bottom)	869.88	40.3	47.71	59.02
384 (Middle)	881.52	40.3	47.70	58.88
770 (Top)	893.10	40.3	47.67	58.48

#### 8PSK

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
1019 (Bottom)	869.88	40.3	47.53	56.62
384 (Middle)	881.52	40.3	47.76	59.70
770 (Top)	893.10	40.3	47.44	55.46

#### 16QAM

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
1019 (Bottom)	869.88	40.3	47.54	56.75
384 (Middle)	881.52	40.3	47.78	59.98
770 (Top)	893.10	40.3	47.42	55.21

**Multi Carrier (1x2)****Configuration 1 - Mode 4, 5 and 6****QPSK**

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
1019 & 37	869.88 & 871.11	40.3	47.59	57.41
384 & 425	881.52 & 882.75	40.3	47.69	58.75
729 & 770	891.87 & 893.10	40.3	47.63	57.94

**8PSK**

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
1019 & 37	869.88 & 871.11	40.3	47.55	56.89
384 & 425	881.52 & 882.75	40.3	47.61	57.68
729 & 770	891.87 & 893.10	40.3	47.55	56.89

**16QAM**

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
1019 & 37	869.88 & 871.11	40.3	47.64	58.08
384 & 425	881.52 & 882.75	40.3	47.70	58.88
729 & 770	891.87 & 893.10	40.3	47.68	58.61

**Multi Carrier (1x3)****Configuration 1 - Mode 7, 8 and 9****QPSK**

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
1019 & 37 & 78	869.88 & 871.11 & 872.34	40.3	47.84	60.81
343 & 384 & 425	880.29 & 881.52 & 882.75	40.3	47.87	61.24
688 & 729 & 770	890.64 & 891.87 & 893.10	40.3	47.77	59.84

**8PSK**

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
1019 & 37 & 78	869.88 & 871.11 & 872.34	40.3	47.64	58.08
343 & 384 & 425	880.29 & 881.52 & 882.75	40.3	47.63	57.94
688 & 729 & 770	890.64 & 891.87 & 893.10	40.3	47.45	55.59



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16QAM

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
1019 & 37 & 78	869.88 & 871.11 & 872.34	40.3	47.68	58.61
343 & 384 & 425	880.29 & 881.52 & 882.75	40.3	47.67	58.48
688 & 729 & 770	890.64 & 891.87 & 893.10	40.3	47.62	57.81

Limit	$\leq 500W$ or $\leq +57dBm$
-------	------------------------------

Remarks

The EUT does not exceed 500W or 57dBm at the measured frequencies.



## 2.2 PEAK – AVERAGE RATIO

### 2.2.1 Specification Reference

FCC CFR 47 Part 22, Clause 22.913 (a)

### 2.2.2 Equipment Under Test

RRUS 12 B5 / KRC 161 321/2, S/N: CB26989524

### 2.2.3 Date of Test and Modification State

29, 30 and 31 July 2013 – 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 22.

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 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 1  
 - Mode 2  
 - Mode 3  
 - Mode 4  
 - Mode 5  
 - Mode 6  
 - Mode 7  
 - Mode 8  
 - Mode 9

### 2.2.6 Environmental Conditions

	29 July 2013	30 July 2013	31 July 2013
Ambient Temperature	23.5°C	23.8°C	23.5°C
Relative Humidity	67.8%	64.0%	65.5%



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**2.2.7 Test Results**

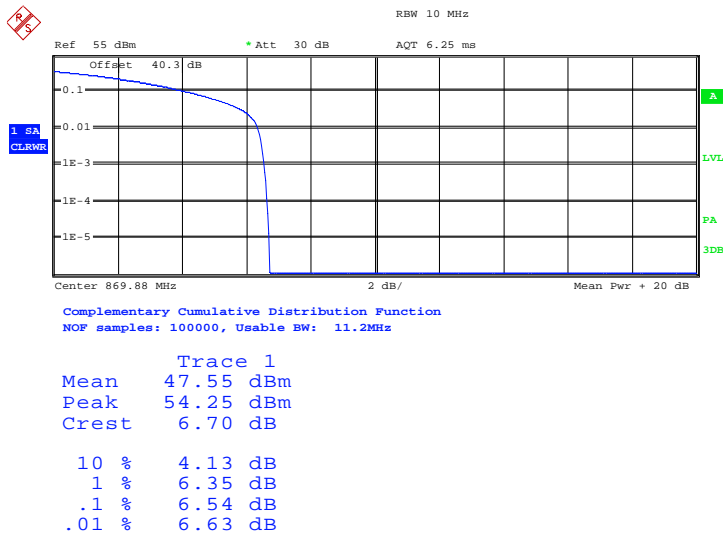
For the period of test the EUT met the requirements of FCC CFR 47 Part 22 for Peak – Average Ratio.

The test results are shown below.

**Single Carrier**

**Configuration 1 - Mode 1**

**QPSK**

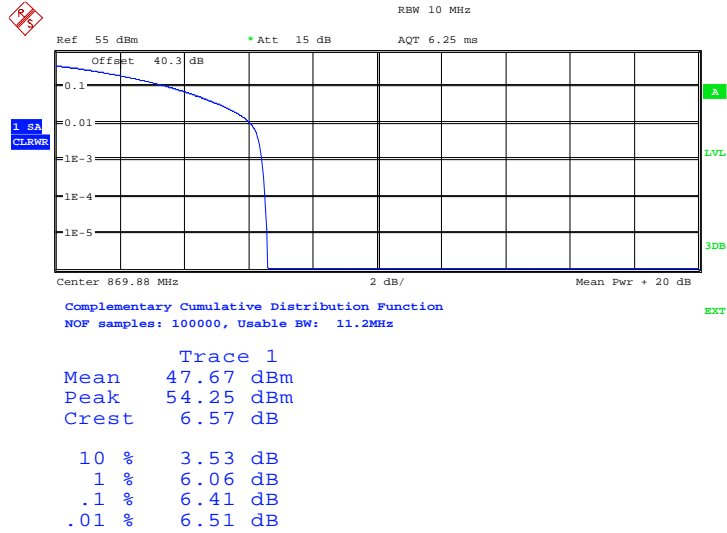


Date: 29.JUL.2013 11:03:00



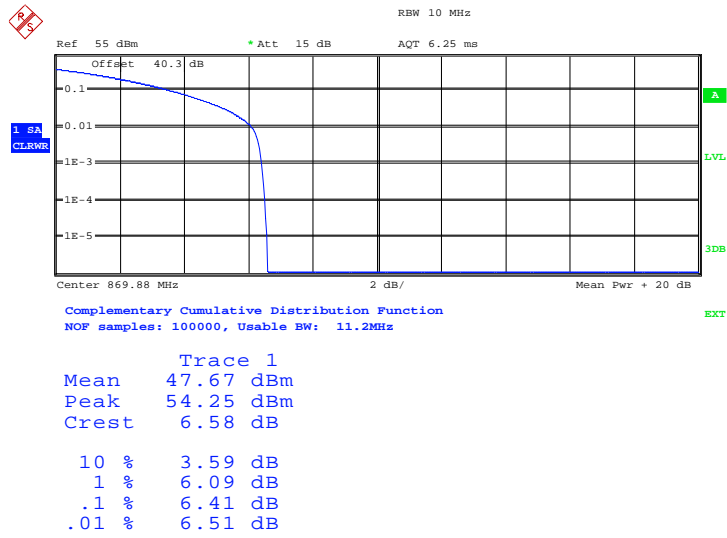
Product Service

**8PSK**



Date: 30.JUL.2013 14:10:50

**16QAM**



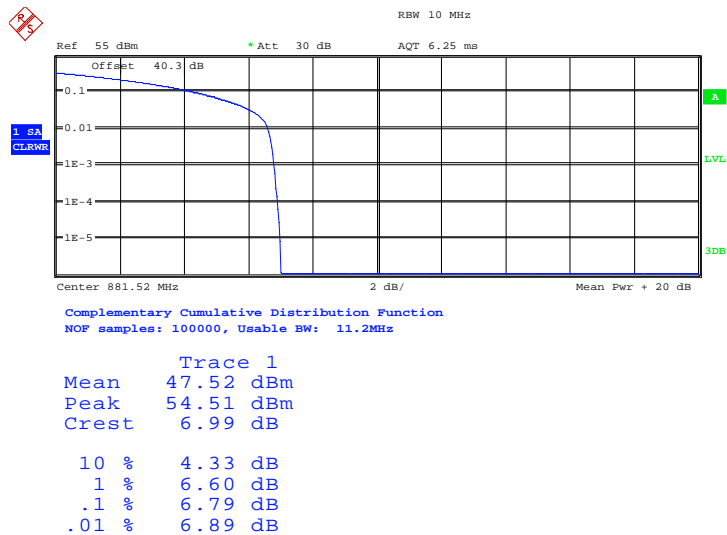
Date: 30.JUL.2013 14:26:46



Product Service

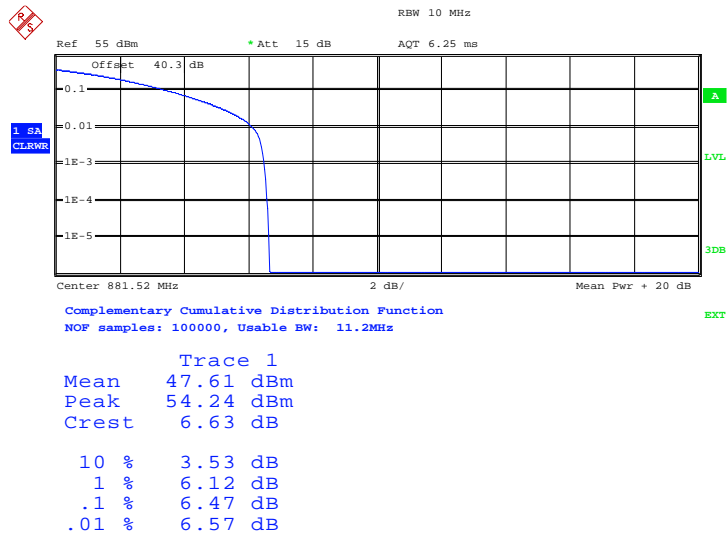
Configuration 1 - Mode 2

QPSK



Date: 29.JUL.2013 13:38:43

8PSK



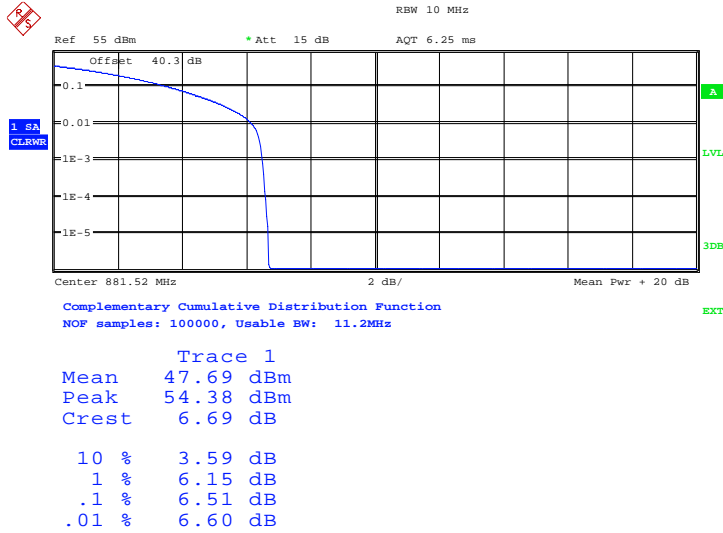
Date: 30.JUL.2013 13:14:31





Product Service

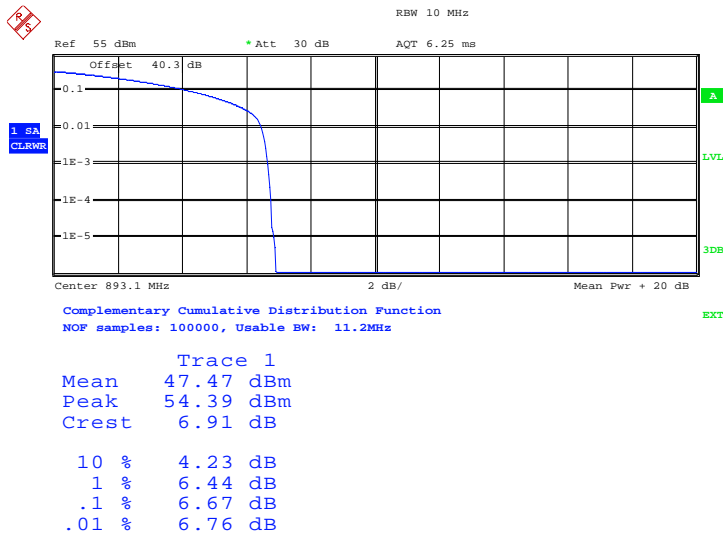
16QAM



Date: 30.JUL.2013 13:38:31

Configuration 1 - Mode 3

QPSK

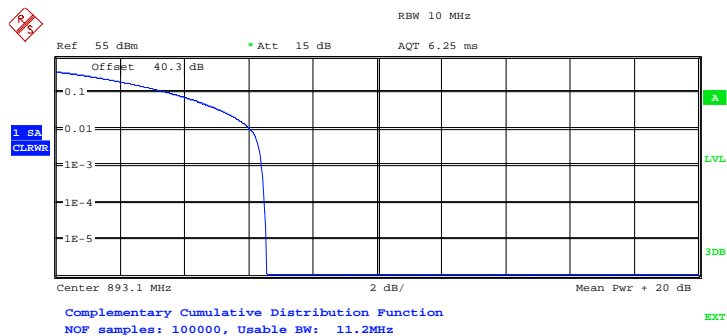


Date: 29.JUL.2013 14:35:14



Product Service

**8PSK**

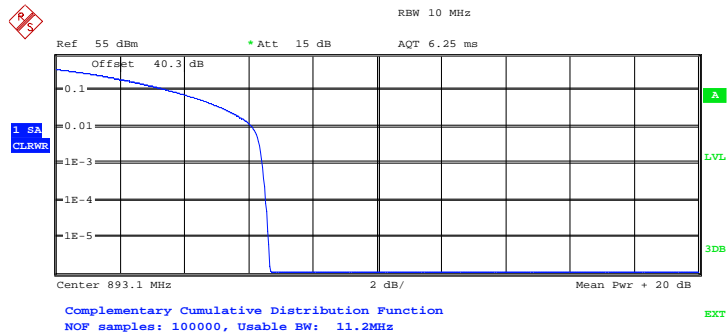


Trace 1  
 Mean    47.56 dBm  
 Peak    54.11 dBm  
 Crest    6.55 dB

10 %    3.56 dB  
 1 %     6.06 dB  
 .1 %    6.41 dB  
 .01 %   6.51 dB

Date: 30.JUL.2013 14:43:17

**16QAM**



Trace 1  
 Mean    47.58 dBm  
 Peak    54.25 dBm  
 Crest    6.67 dB

10 %    3.56 dB  
 1 %     6.09 dB  
 .1 %    6.44 dB  
 .01 %   6.54 dB

Date: 30.JUL.2013 14:53:17

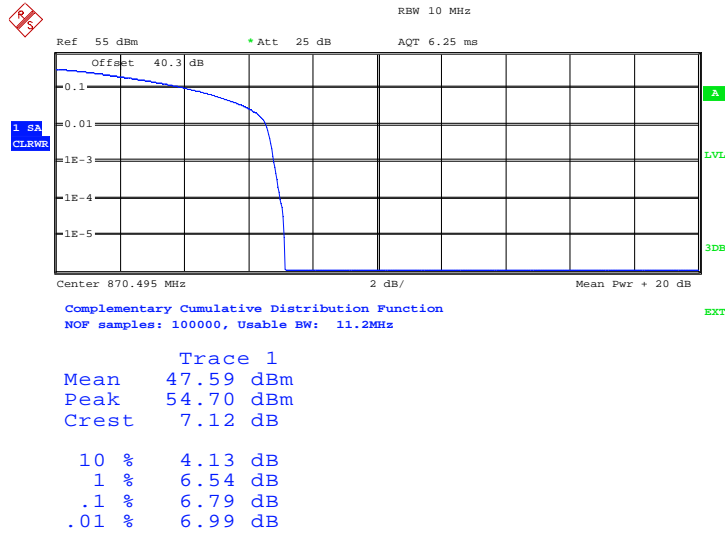


Product Service

**Multi Carrier (1x2):**

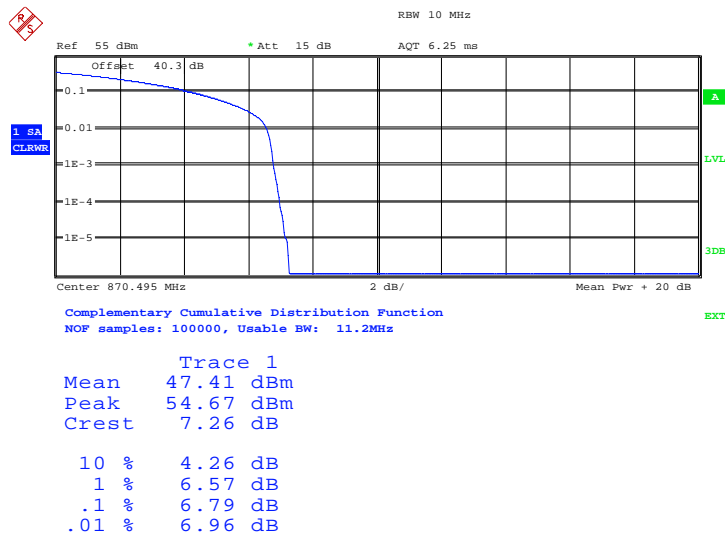
**Configuration 1 - Mode 4**

**QPSK**



Date: 29.JUL.2013 15:14:44

**8PSK**

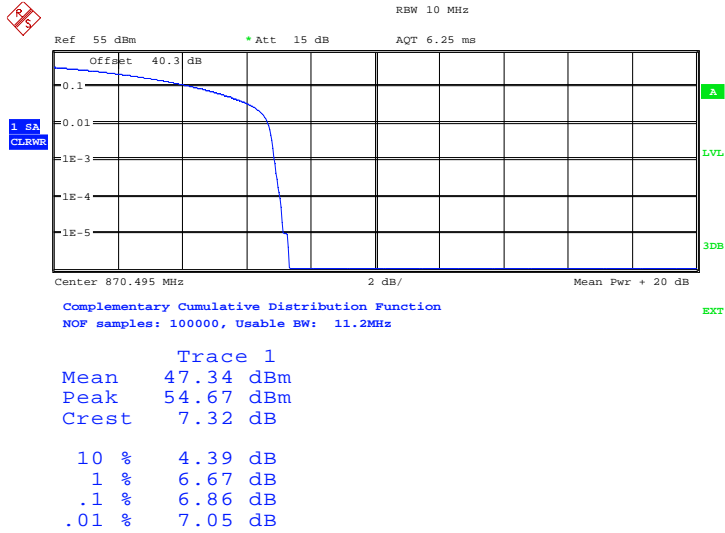


Date: 30.JUL.2013 15:32:48



Product Service

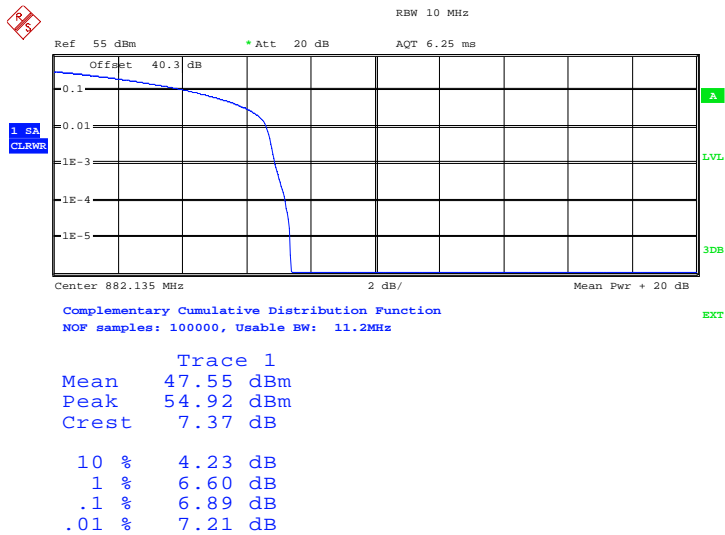
16QAM



Date: 30.JUL.2013 15:48:48

Configuration 1 - Mode 5

QPSK

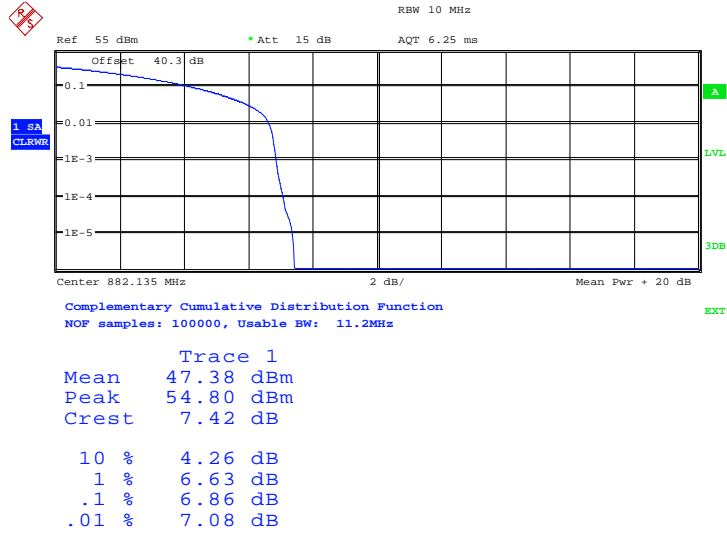


Date: 29.JUL.2013 15:37:07



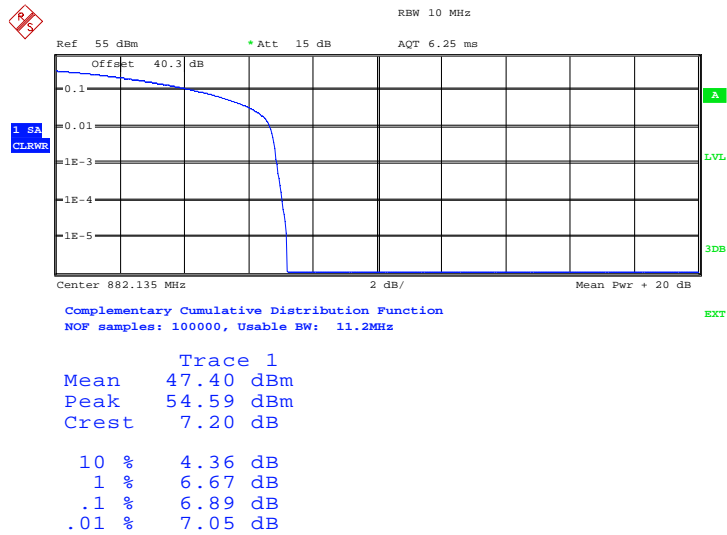
Product Service

**8PSK**



Date: 30.JUL.2013 16:12:05

**16QAM**



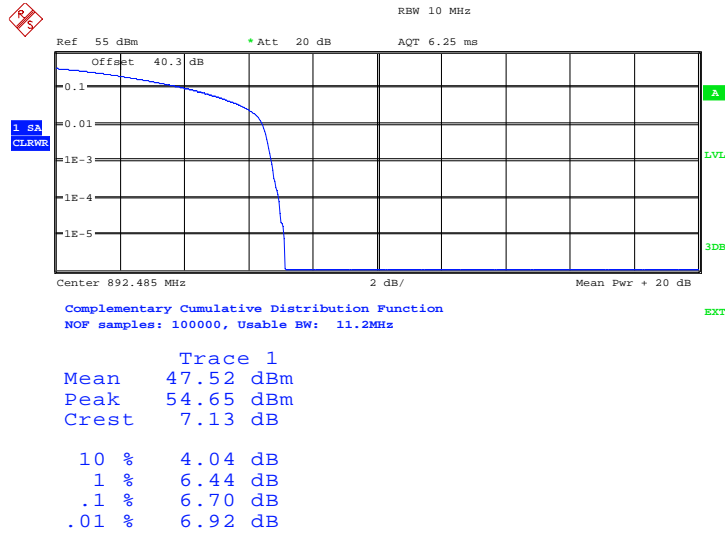
Date: 30.JUL.2013 16:23:55



Product Service

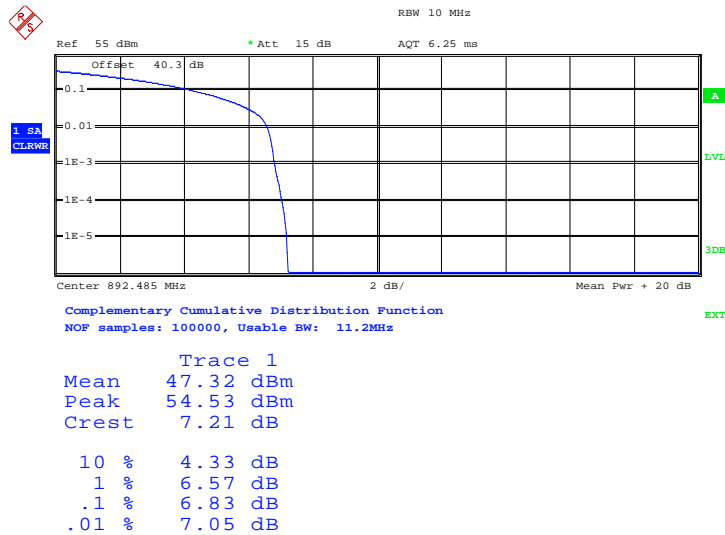
Configuration 1 - Mode 6

QPSK



Date: 29.JUL.2013 15:47:55

8PSK

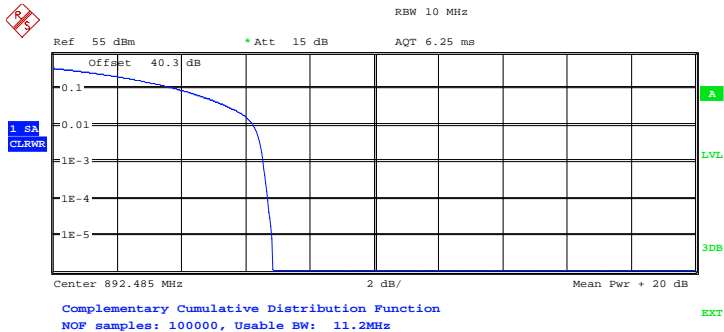


Date: 30.JUL.2013 16:48:04



Product Service

**16QAM**



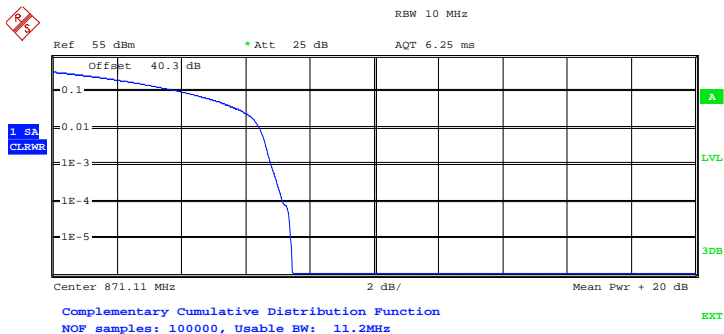
	Trace 1
Mean	47.54 dBm
Peak	54.39 dBm
Crest	6.84 dB
10 %	3.88 dB
1 %	6.25 dB
.1 %	6.54 dB
.01 %	6.70 dB

Date: 30.JUL.2013 16:55:46

**Multi Carrier (1x3):**

**Configuration 1 - Mode 7**

**QPSK**



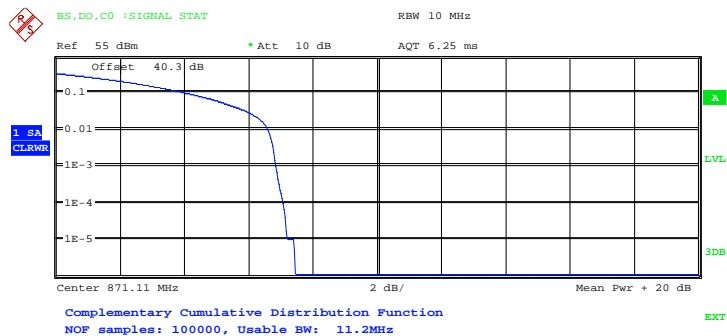
	Trace 1
Mean	47.66 dBm
Peak	55.13 dBm
Crest	7.46 dB
10 %	4.04 dB
1 %	6.44 dB
.1 %	6.79 dB
.01 %	7.15 dB

Date: 29.JUL.2013 16:38:20



Product Service

**8PSK**

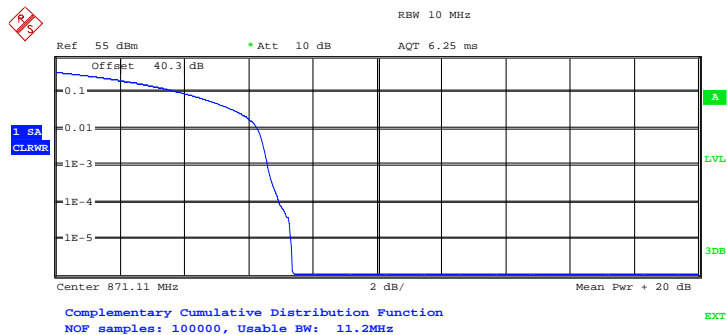


Trace 1

Mean	47.38 dBm
Peak	54.83 dBm
Crest	7.46 dB
10 %	4.07 dB
1 %	6.60 dB
.1 %	6.86 dB
.01 %	7.08 dB

Date: 31.JUL.2013 13:47:19

**16QAM**



Trace 1

Mean	47.61 dBm
Peak	54.98 dBm
Crest	7.37 dB
10 %	3.91 dB
1 %	6.28 dB
.1 %	6.60 dB
.01 %	6.96 dB

Date: 31.JUL.2013 13:51:40

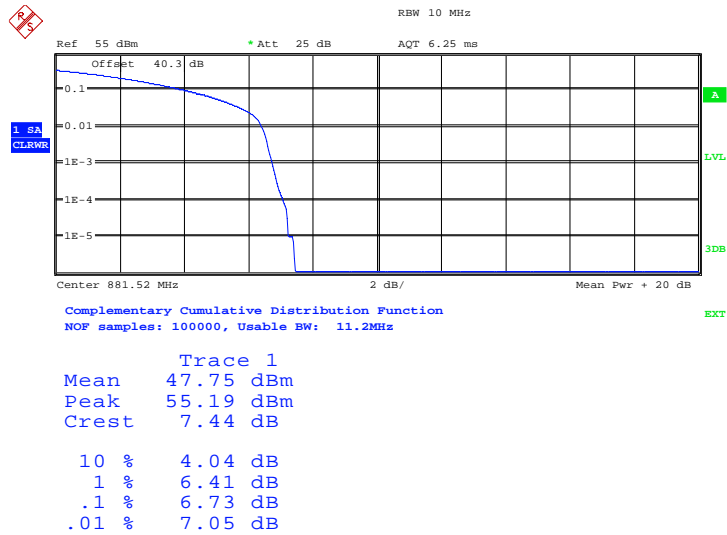




Product Service

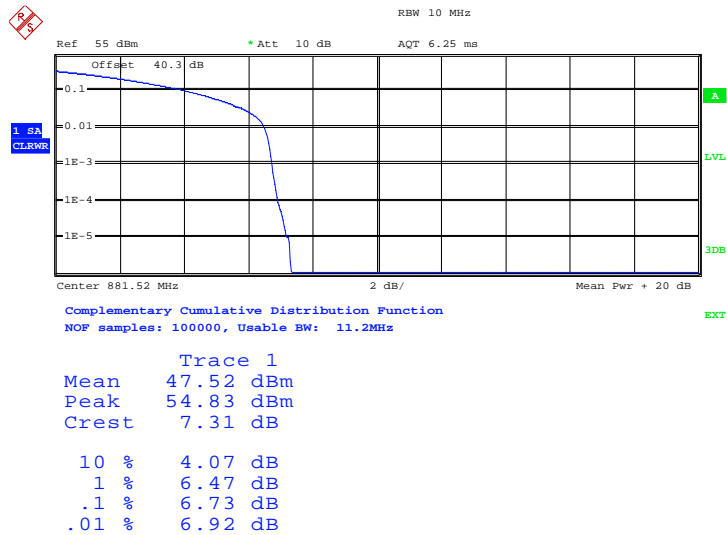
Configuration 1 - Mode 8

QPSK



Date: 29.JUL.2013 16:16:08

8PSK

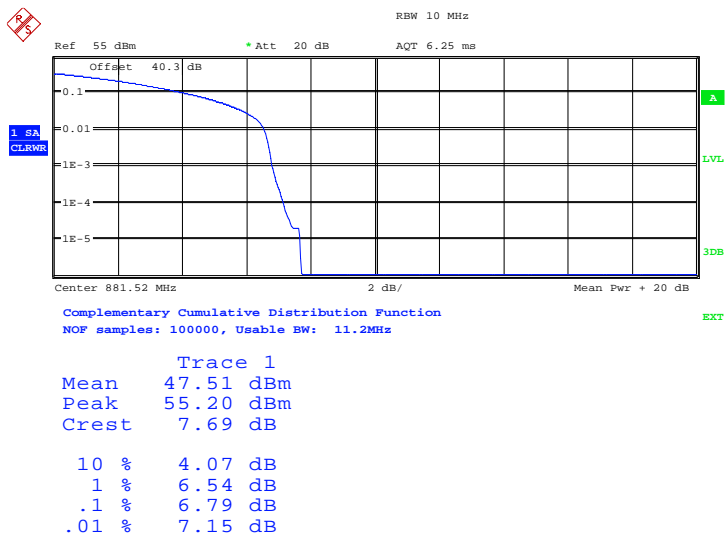


Date: 31.JUL.2013 14:38:09



Product Service

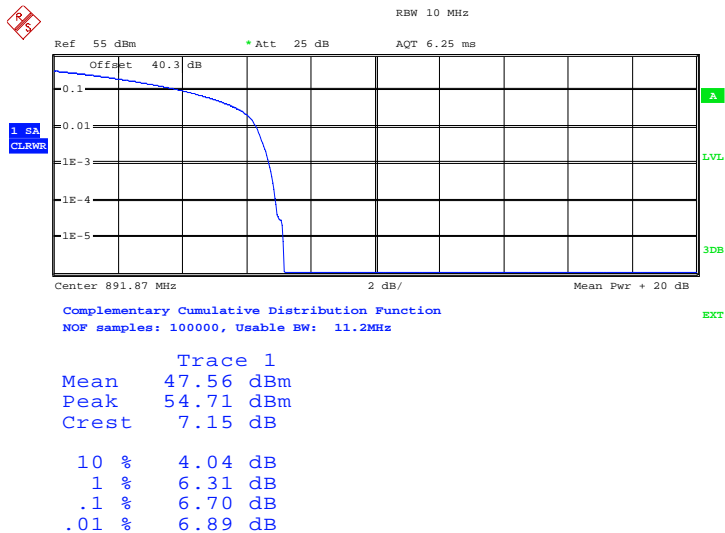
16QAM



Date: 31.JUL.2013 14:27:37

Configuration 1 - Mode 9

QPSK

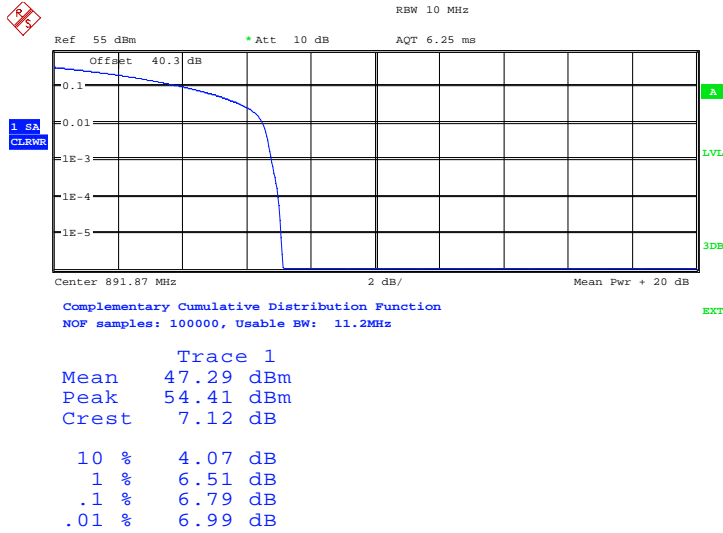


Date: 29.JUL.2013 17:04:14



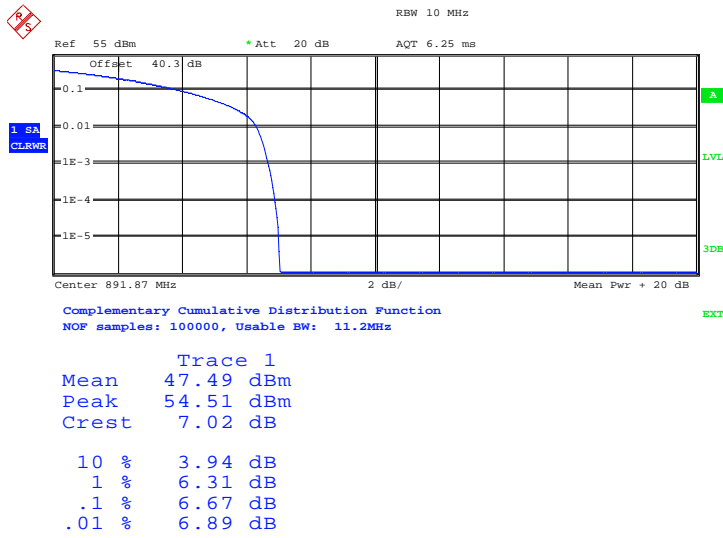
Product Service

**8PSK**



Date: 31.JUL.2013 15:41:10

**16QAM**



Date: 31.JUL.2013 15:27:26

Limit	13dB
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Remarks

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



Product Service

## 2.3 MODULATION CHARACTERISTICS

### 2.3.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1047 (d)  
Industry Canada RSS-132 Clause 5.2

### 2.3.2 Equipment Under Test

RRUS 12 B5 / KRC 161 321/2, S/N: CB26989524

### 2.3.3 Date of Test and Modification State

29 and 30 July 2013 – Modification State 0

### 2.3.4 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 2 and Industry Canada RSS-132.

Connect the TX output connector RF A to a spectrum analyzer with an attenuator. The other connector RF B was connected to match load. The EUT was controlled to transmit maximum power. Measure and record the constellation of the EUT by the spectrum analyzer.

The EUT supports QPSK, 8PSK and 16QAM modulations.

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

Configuration 1 - Mode 2

### 2.3.5 Environmental Conditions

	29 July 2013	30 July 2013
Ambient Temperature	23.5°C	23.8°C
Relative Humidity	67.8%	64.0%



### 2.3.6 Test Result

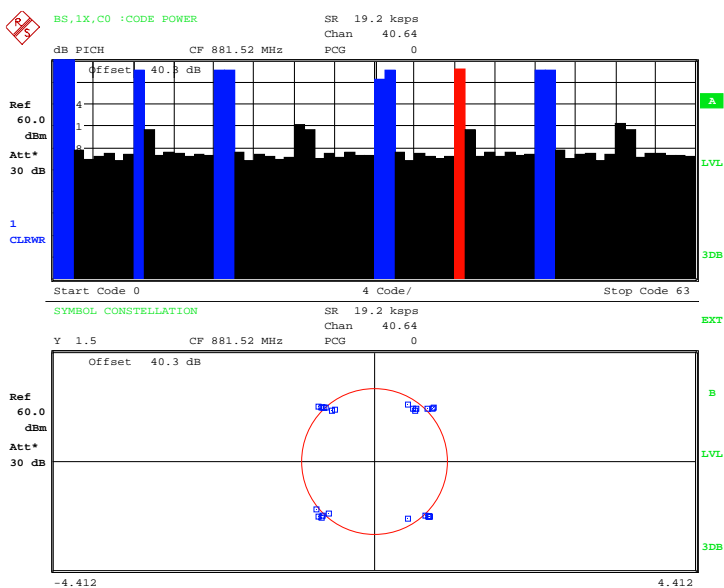
Plots are shown on the following showing the EUT transmitting with all of the modulations:

The test results are shown below

#### Single Carrier

#### Configuration 1 - Mode 2

EUT transmitting with QPSK modulation:

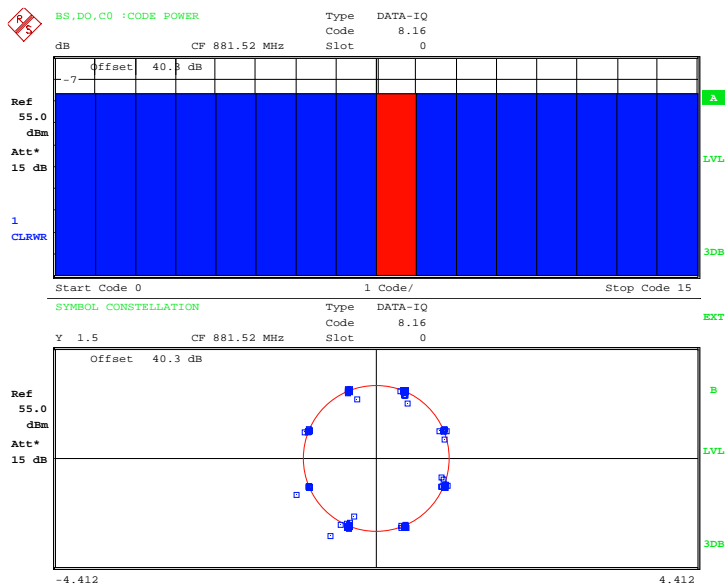


Date: 29.JUL.2013 14:05:08



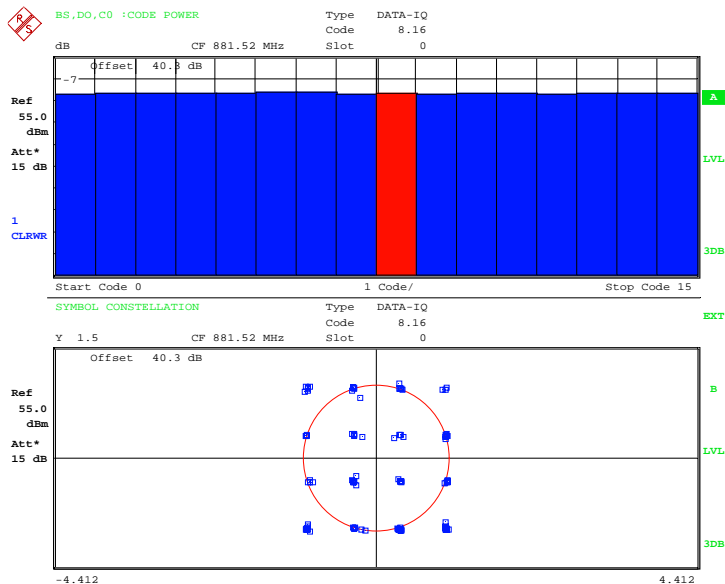
Product Service

**EUT transmitting with 8PSK modulation:**



Date: 30.JUL.2013 13:14:09

**EUT transmitting with 16QAM modulation:**



Date: 30.JUL.2013 13:36:46



Product Service

## 2.4 OCCUPIED BANDWIDTH

### 2.4.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1049 (h)  
 FCC CFR 47 Part 22, Clause 22.917 (b)  
 Industry Canada RSS-GEN, Clause 4.6.1

### 2.4.2 Equipment Under Test

RRUS 12 B5 / KRC 161 321/2, S/N: CB26989524

### 2.4.3 Date of Test and Modification State

29 and 30 July 2013 – 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 22 and Industry Canada RSS-GEN.

The EUT was transmitting at maximum power, modulated using QPSK as the representative test modulation. Using a resolution bandwidth of 20kHz and a video bandwidth of 200kHz. 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 test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1  
                           - Mode 2  
                           - Mode 3

### 2.4.6 Environmental Conditions

	29 July 2013	30 July 2013
Ambient Temperature	23.5°C	23.8°C
Relative Humidity	67.8%	64.0%



Product Service

**2.4.7 Test Results**

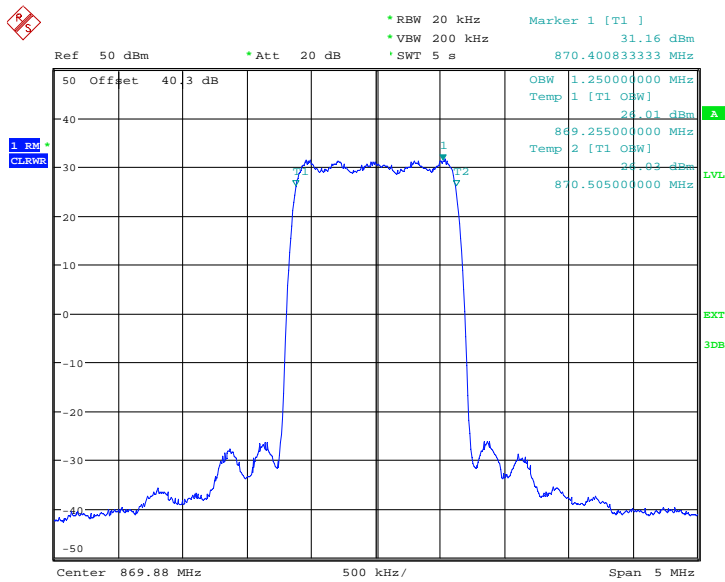
For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 22 and Industry Canada RSS-GEN for Occupied Bandwidth.

The test results are shown below

**Single Carrier**

**QPSK**

**Configuration 1 - Mode 1**



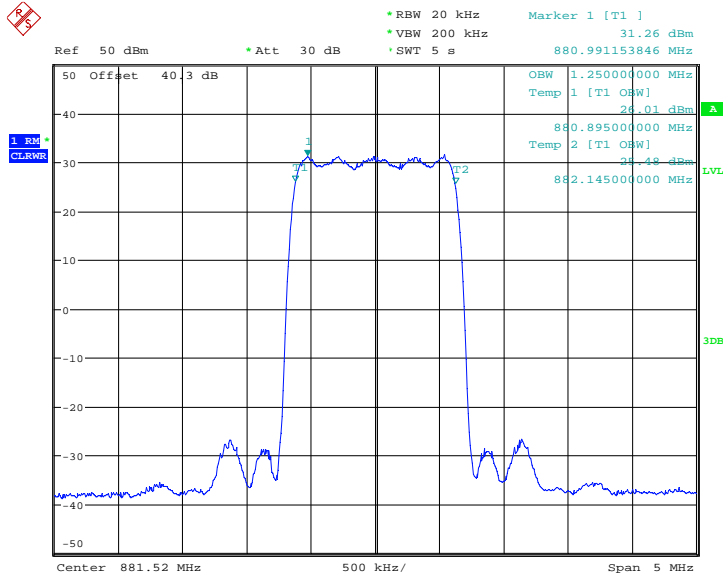
Date: 31.JUL.2013 16:01:29





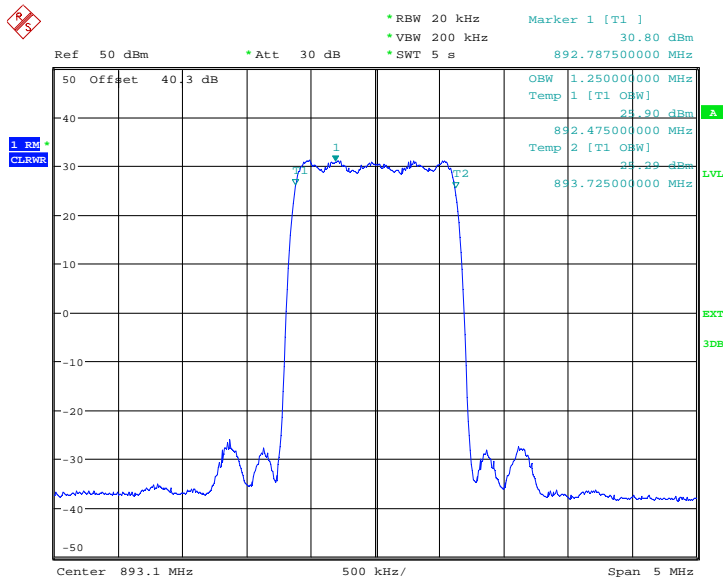
Product Service

Configuration 1 - Mode 2



Date: 29.JUL.2013 13:29:49

Configuration 1 - Mode 3



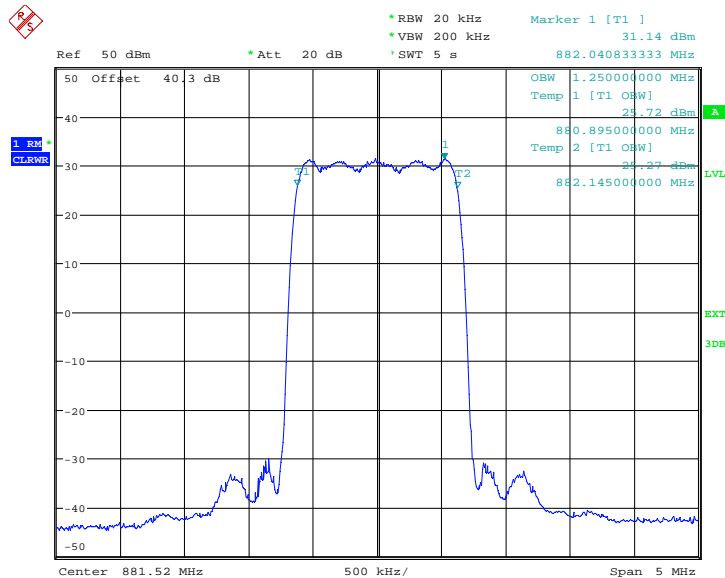
Date: 29.JUL.2013 14:36:18



Product Service

### 8PSK

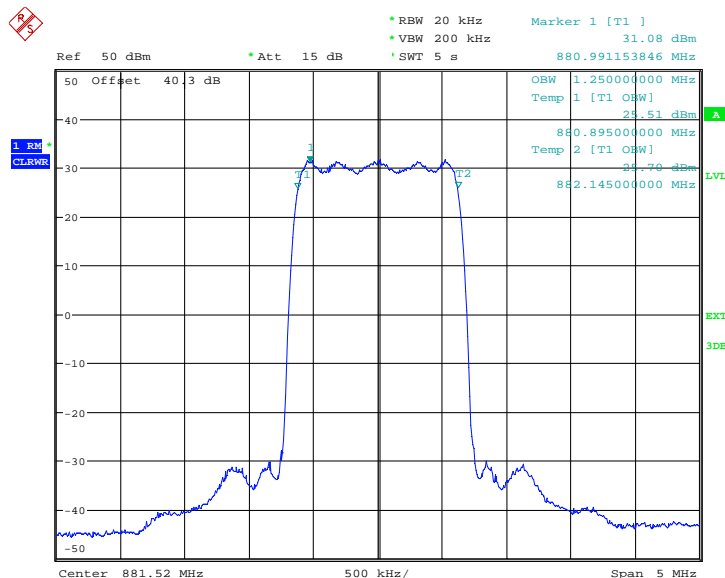
#### Configuration 1 - Mode 2



Date: 30.JUL.2013 13:15:44

### 16QAM

#### Configuration 1 - Mode 2



Date: 30.JUL.2013 13:35:06



## 2.5 SPURIOUS EMISSIONS AT ANTENNA TERMINALS ( $\pm 1$ MHz)

### 2.5.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051  
 FCC CFR 47 Part 22, Clause 22.917 (b)  
 Industry Canada RSS-132 Clause 5.5

### 2.5.2 Equipment Under Test

RRUS 12 B5 / KRC 161 321/2, S/N: CB26989524

### 2.5.3 Date of Test and Modification State

29, 30 and 31 July 2013 – 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 22 and Industry Canada RSS-132.

In accordance with 22.917(b), at least 1% of the emission bandwidth shall be used for the resolution bandwidth up to 1MHz away from the block edge and a RBW of 100kHz for measurements of emissions > 1MHz away from the band edges. 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. After calculation, the limit is -13dBm.

For Single Carrier and Multi Carrier, a resolution bandwidth of 20kHz was used up to 1MHz away from the band edges. A resolution bandwidth of 100kHz was used between 1MHz to 5MHz away from the band edge. Spectrum analyzer detector was set as RMS.

The EUT was tested at its maximum power level. 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 1  
                           - Mode 3  
                           - Mode 4  
                           - Mode 6  
                           - Mode 7  
                           - Mode 9

### 2.5.6 Environmental Conditions

	29 July 2013	30 July 2013	31 July 2013
Ambient Temperature	23.5°C	23.8°C	23.5°C
Relative Humidity	67.8%	64.0%	65.5%



**2.5.7 Test Results**

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 22 and Industry Canada RSS-132 for Spurious Emissions Antenna Terminals ( $\pm 1$ MHz)

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

**Single Carrier**

**Configuration 1 - Mode 1 and 3**

Band Edge Frequency	Edge Test with QPSK modulation Channel No./Frequencies
Bottom 869 MHz	Channel: 1019 Frequency: 869.88 MHz
Top 894 MHz	Channel: 770 Frequency: 893.10 MHz

**Multi Carrier (1x2)**

**Configuration 1 - Mode 4 and 6**

Band Edge Frequency	Edge Test with QPSK modulation Channel No./Frequencies
Bottom 869 MHz	Channel: 1019 & 37 Frequency: 869.88 & 871.11 MHz
Top 894 MHz	Channel: 729 & 770 Frequency: 891.87 & 893.10 MHz

**Multi Carrier (1x3)**

**Configuration 1 - Mode 7 and 9**

Band Edge Frequency	Edge Test with QPSK modulation Channel No./Frequencies
Bottom 869 MHz	Channel: 1019 & 37 & 78 Frequency: 869.88 & 871.11 & 872.34 MHz
Top 894 MHz	Channel: 688 & 729 & 770 Frequency: 890.64 & 891.87 & 893.10 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 outside of ranges shown in the above tables shall not be made available to the end user.



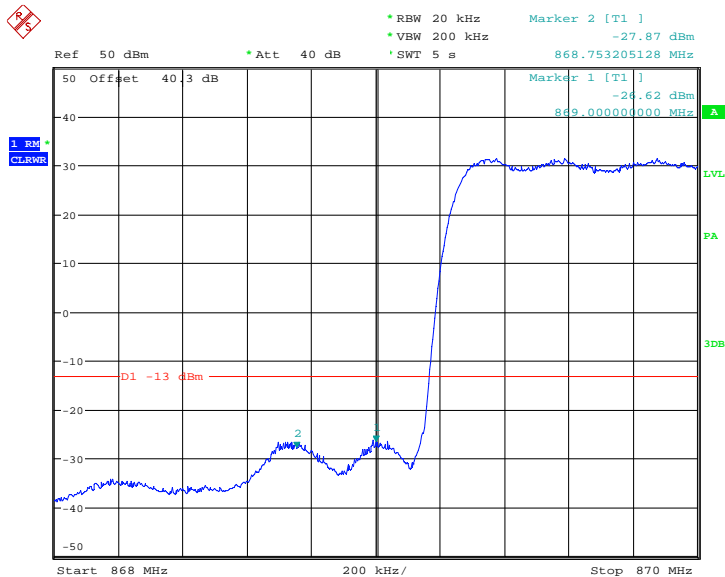
Product Service

The test results are shown below

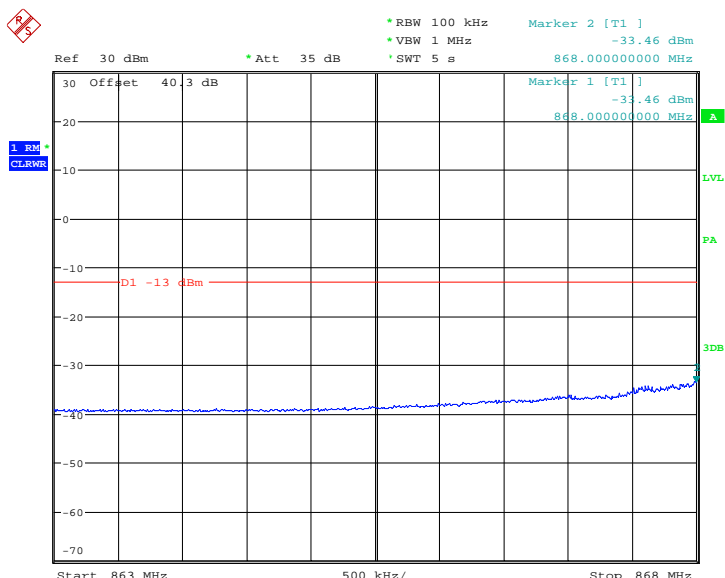
**QPSK**

**Single Carrier**

**Configuration 1 - Mode 1**



Date: 29.JUL.2013 11:10:41

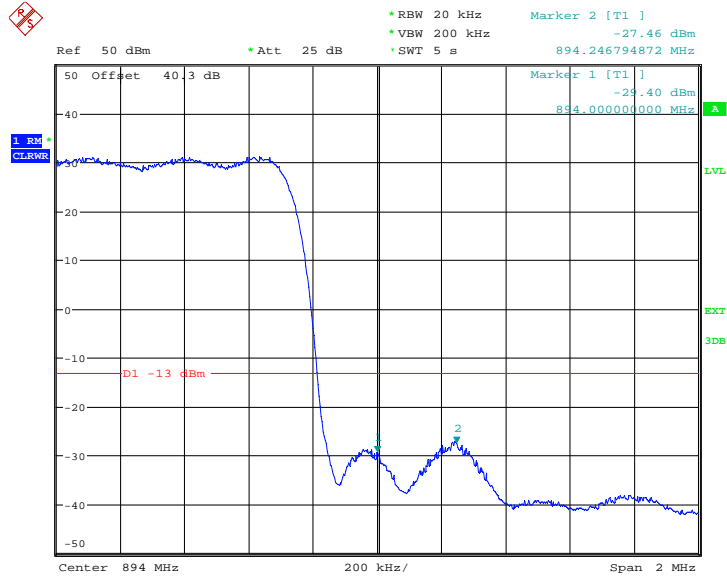


Date: 29.JUL.2013 11:11:53

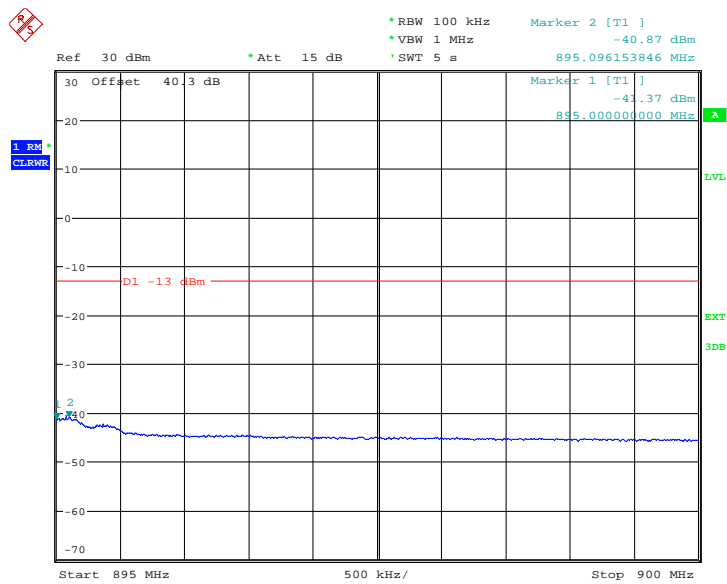


Product Service

Configuration 1 - Mode 3



Date: 29.JUL.2013 14:38:13



Date: 29.JUL.2013 14:39:08

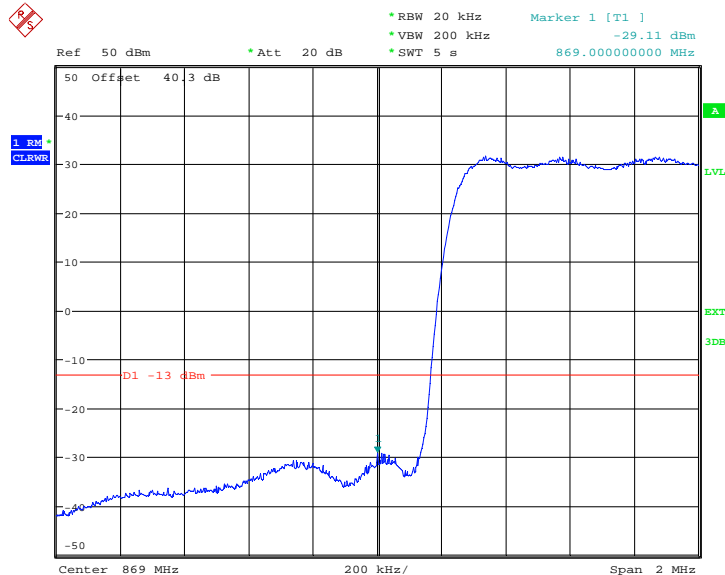


Product Service

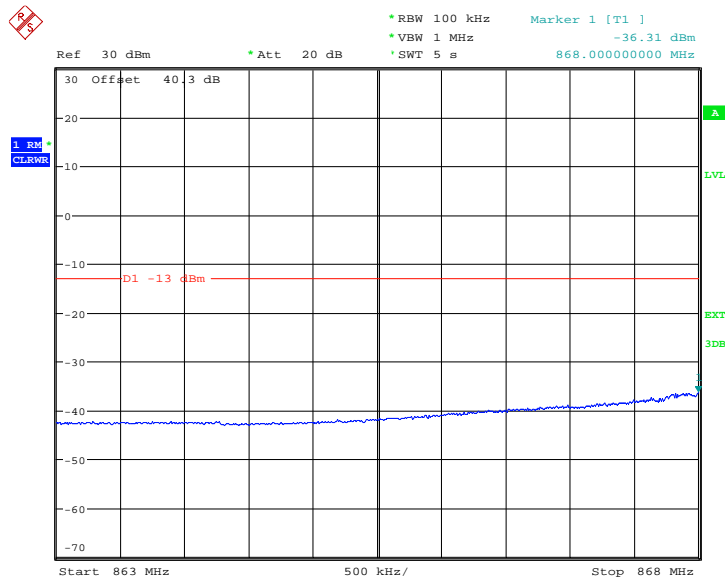
### 8PSK

### Single Carrier

### Configuration 1 - Mode 1



Date: 30.JUL.2013 14:14:54

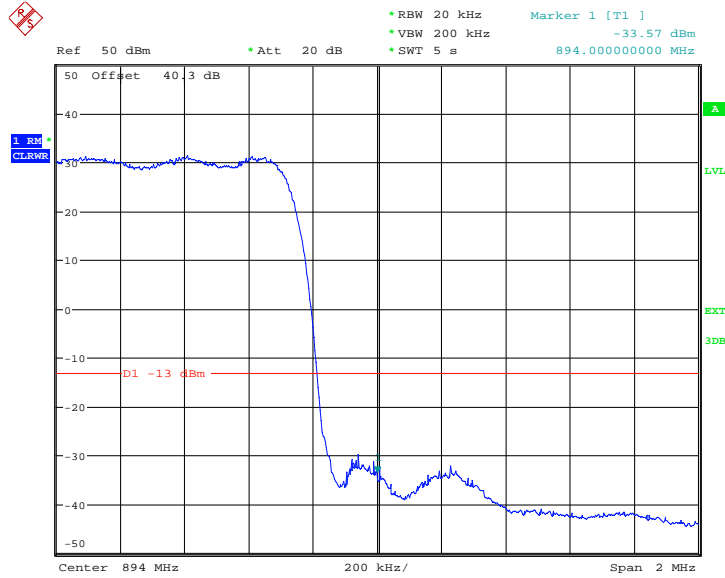


Date: 30.JUL.2013 14:20:18

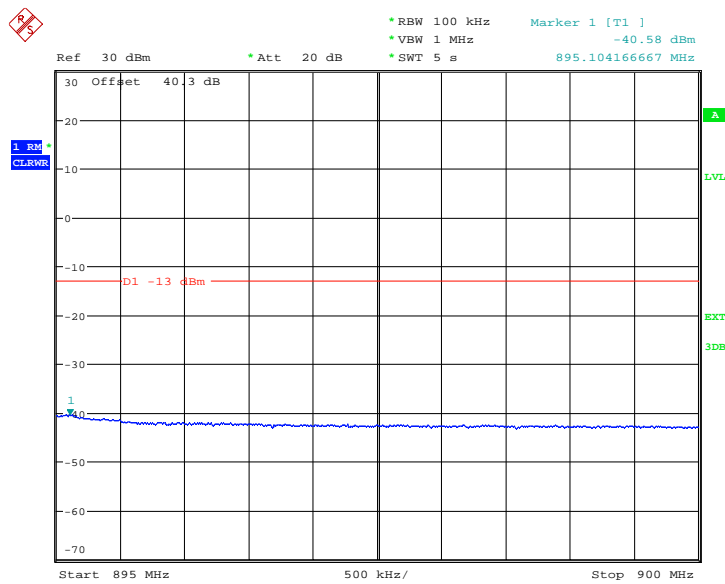


Product Service

Configuration 1 - Mode 3



Date: 30.JUL.2013 14:45:59



Date: 30.JUL.2013 14:46:37



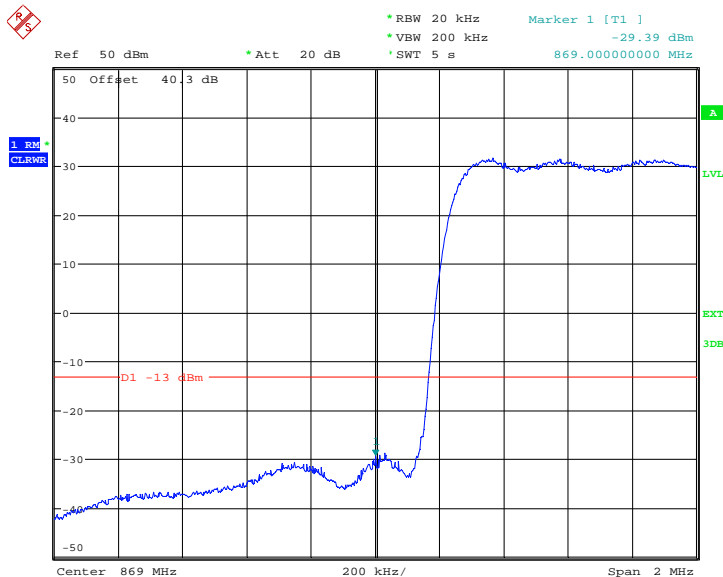


Product Service

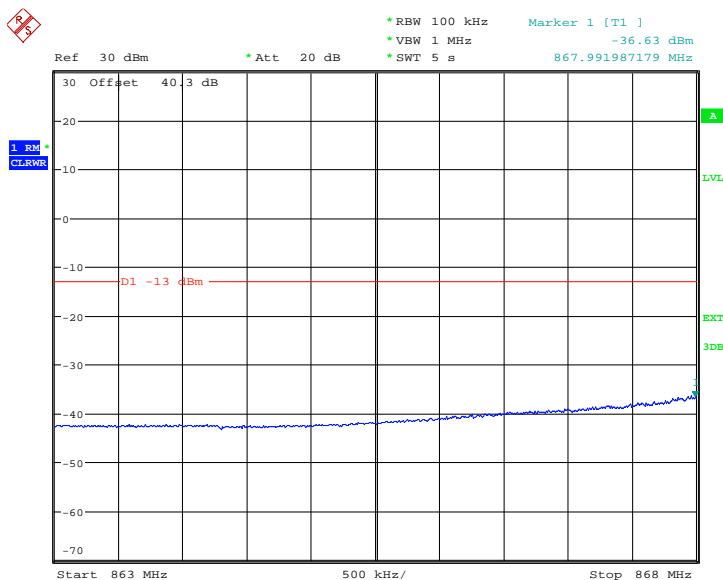
**16QAM**

**Single Carrier**

**Configuration 1 - Mode 1**



Date: 30.JUL.2013 14:24:01

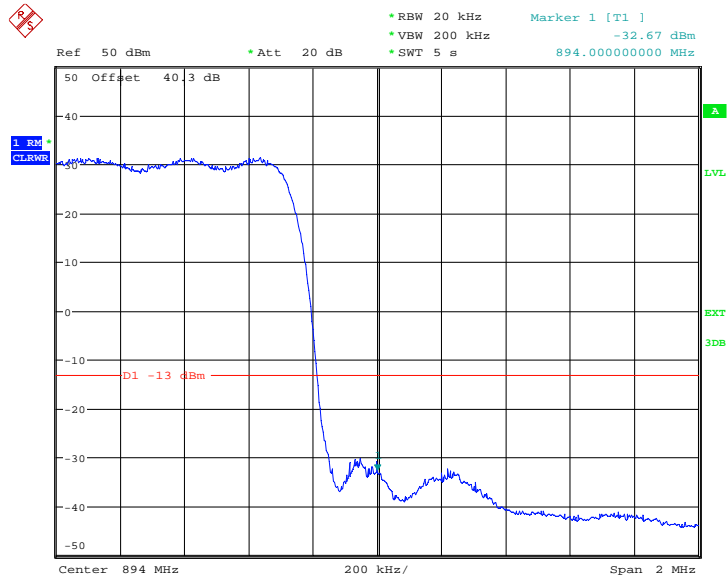


Date: 30.JUL.2013 14:24:41

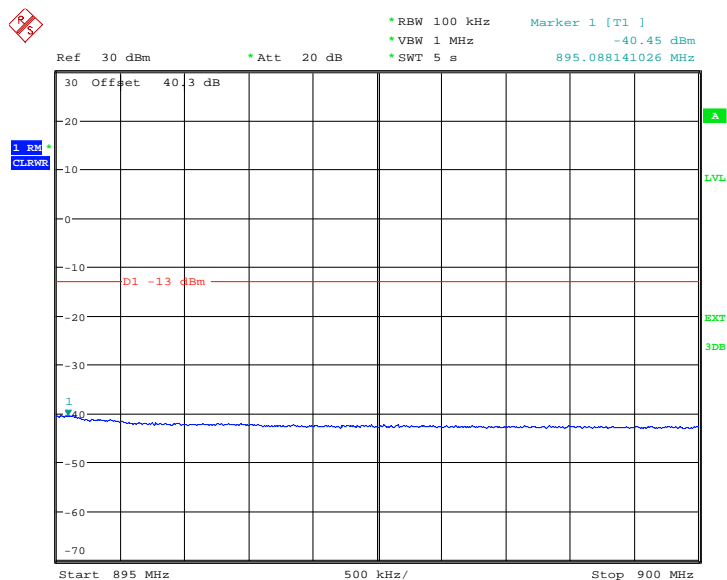


Product Service

Configuration 1 - Mode 3



Date: 30.JUL.2013 14:55:40



Date: 30.JUL.2013 14:56:14

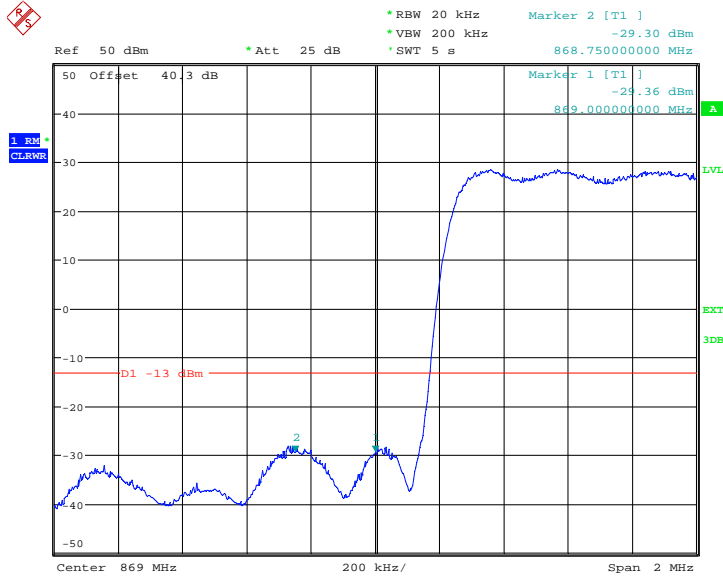


Product Service

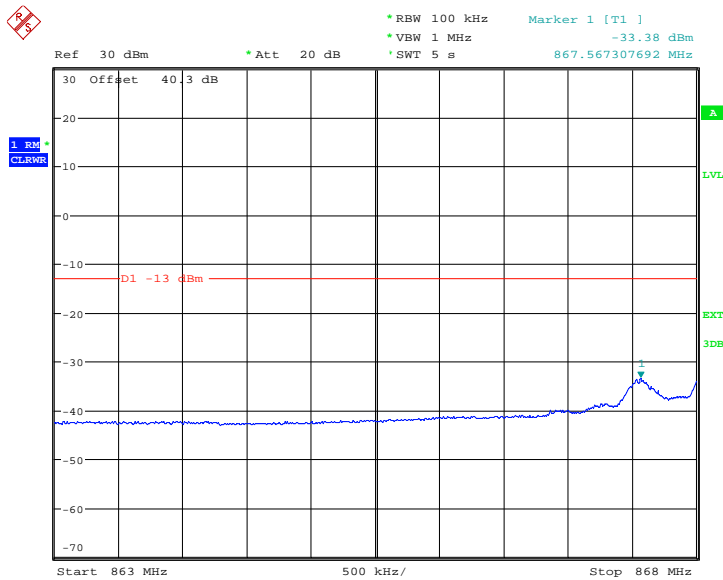
**QPSK**

**Multi Carrier (1x2)**

**Configuration 1 - Mode 4**



Date: 29.JUL.2013 15:11:57

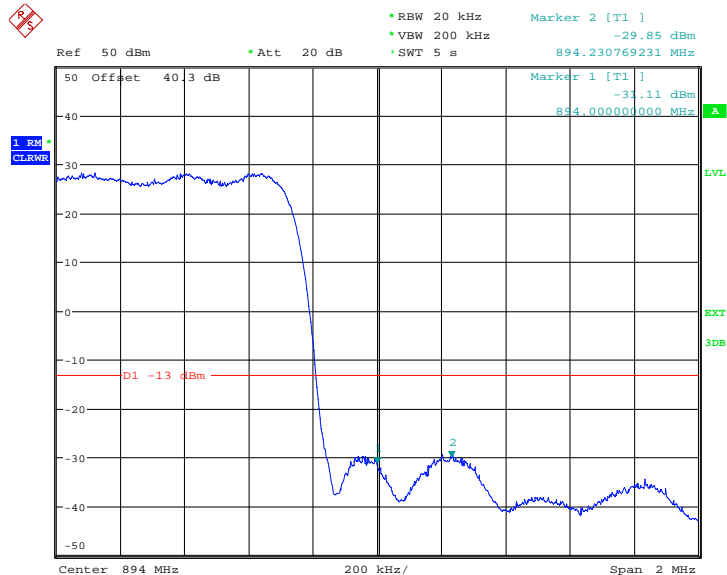


Date: 29.JUL.2013 15:13:14

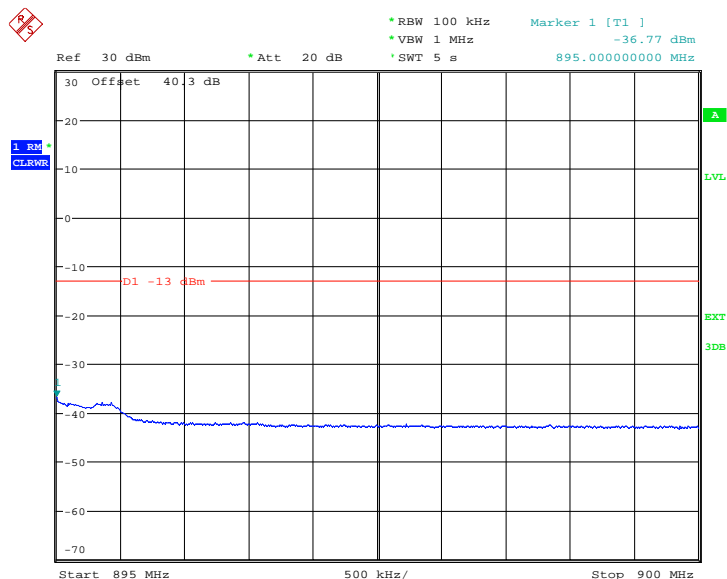


Product Service

Configuration 1 – Mode 6



Date: 29.JUL.2013 15:50:57



Date: 29.JUL.2013 15:51:57

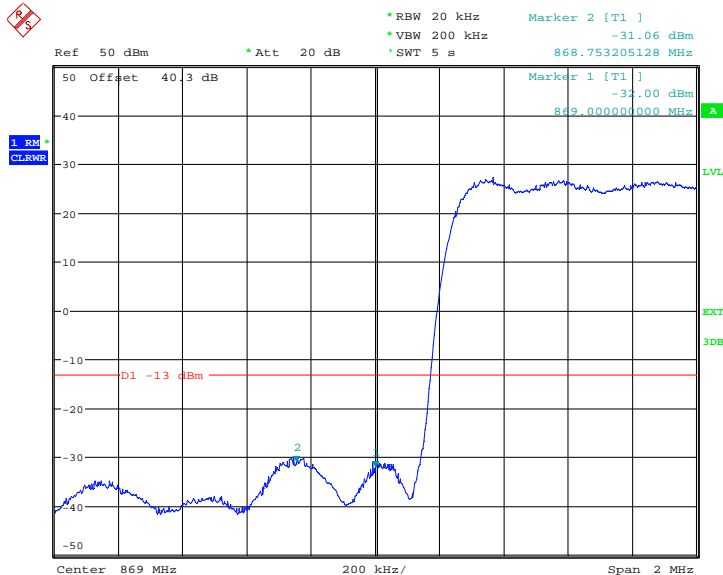


Product Service

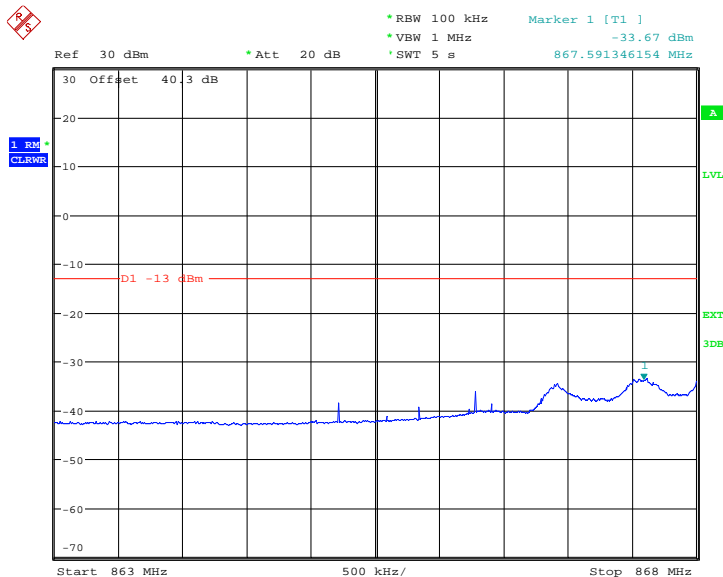
**QPSK**

**Multi Carrier (1x3)**

**Configuration 1 - Mode 7**



Date: 29.JUL.2013 16:40:22

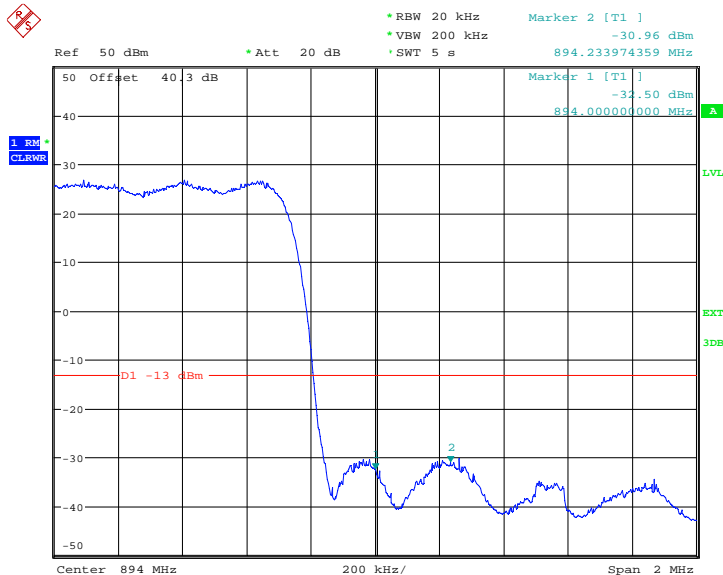


Date: 29.JUL.2013 16:41:37

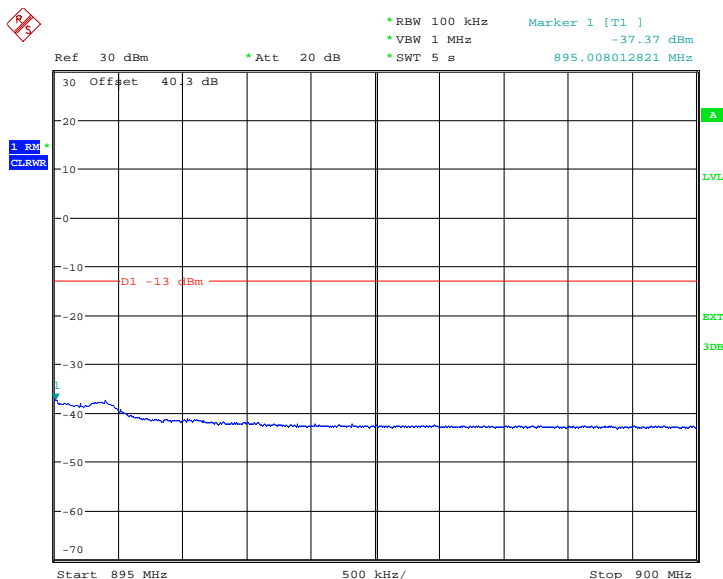


Product Service

Configuration 1 - Mode 9



Date: 29.JUL.2013 17:05:52



Date: 29.JUL.2013 17:06:43

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.



## **2.6 RADIATED SPURIOUS EMISSIONS**

### **2.6.1 Specification Reference**

FCC CFR 47 Part 2, Clause 2.1053  
FCC CFR 47 Part 22, Clause 22.917 (a)  
Industry Canada RSS-132, Clause 5.5

### **2.6.2 Equipment Under Test**

RRUS 12 B5 / KRC 161 321/2, S/N: CB26989524

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

23 and 24 July 2013 – 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 22 and Industry Canada RSS-132.

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 Polarizations.

Emissions identified within the range 30MHz – 10GHz were then formally measured using a Peak detector as the worst case.

In the frequency Range 30MHz – 10GHz, 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 -  $(43 + 10\text{Log}(P))$  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:

$$E_{(v/m)} = (30 \times 1.64 \times 55.21)^{0.5} / 3 = 17.373V/m = 144.80dB\mu V/m$$

As per 22.917(a) the spurious emission must be attenuated by  $43 + 10\log(P_o)$  dB this gives:

$$43 + 10\log(55.21) = 60.42dB$$

Therefore the limit at 3m measurement distance is:

$$144.80 - 60.42 = 84.4 \text{ dB}\mu V/m$$

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 operating on all modes in section 1.4.3 and record the result of the following configurations and modes of operation for worst case:

- Configuration 1 - Mode 1  
 - Mode 2  
 - Mode 3  
 - Mode 5  
 - Mode 8

### **2.6.6 Environmental Conditions**

	23 July 2013	24 July 2013
Ambient Temperature	27.5°C	29.0°C
Relative Humidity	45.5%	47.8%





## 2.6.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 & Part 22 and Industry Canada RSS-132 for Radiated Spurious Emissions.

The test results are shown below

Note: Only the worst case results plots have been included as all of the emissions are greater than 20dB below the limit. A set of plots have been included to show the measurement system noise floor

### QPSK

#### Single Carrier

##### Configuration 1 - Mode 2

No emissions were detected within 20dB of the limit.

### 8PSK

#### Single Carrier

##### Configuration 1 - Mode 2

No emissions were detected within 20dB of the limit.

### 16QAM

#### Single Carrier

##### Configuration 1 - Mode 1

No emissions were detected within 20dB of the limit.

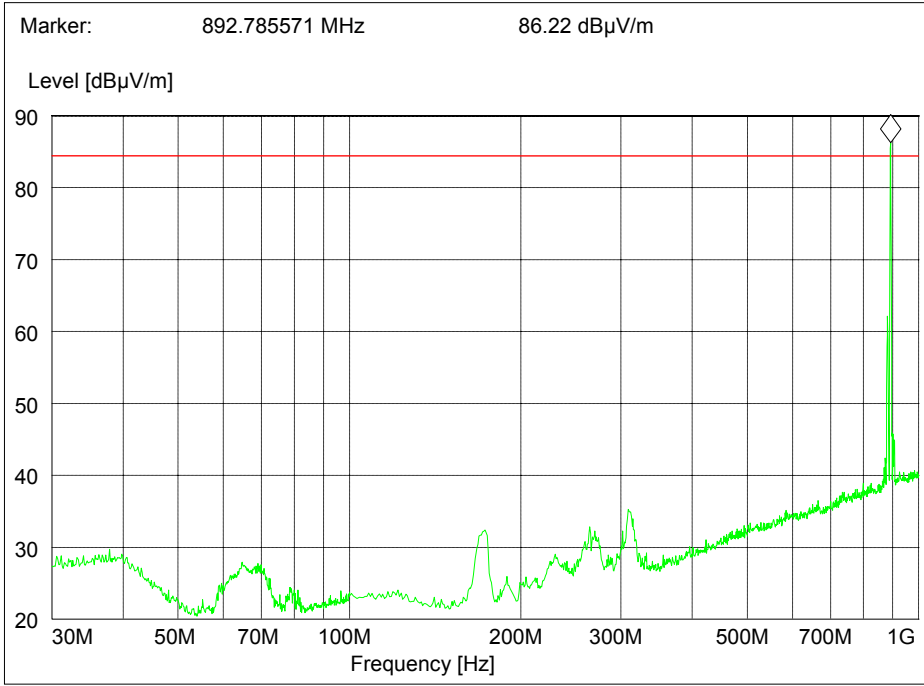
##### Configuration 1 - Mode 2

No emissions were detected within 20dB of the limit.



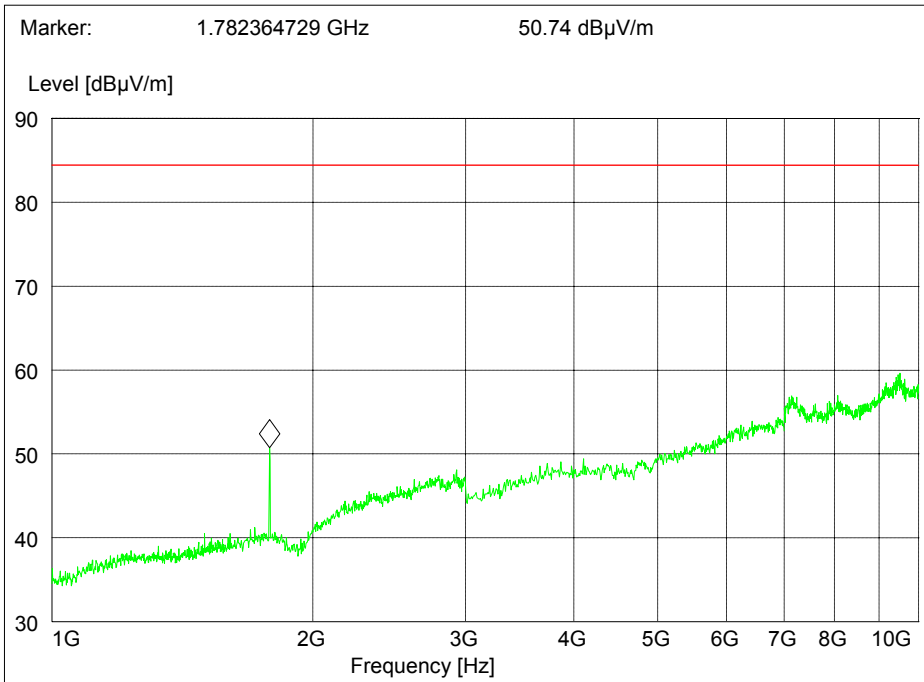
Configuration 1 - Mode 3

30MHz to 1GHz



Note: The emission marked is the operating frequency.

1GHz to 10GHz





Product Service

**QPSK****Multi Carrier (1x2)**Configuration 1 - Mode 5

No emissions were detected within 20dB of the limit.

**QPSK****Multi Carrier (1x3)**Configuration 1 - Mode 8

No emissions were detected within 20dB of the limit.

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

**Remarks**

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



## **2.7 CONDUCTED SPURIOUS EMISSIONS**

### **2.7.1 Specification Reference**

FCC CFR 47 Part 2, Clause 2.1051  
FCC CFR 47 Part 22, Clause 22.917 (a)  
Industry Canada RSS-132, Clause 5.5

### **2.7.2 Equipment Under Test**

RRUS 12 B5 / KRC 161 321/2, S/N: CB26989524

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

29, 30 and 31 July 2013 – 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 Method and Operating Modes**

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 2 and Part 22 and Industry Canada RSS-132.

In accordance with Part 22.917 (a), the spurious emissions from the antenna terminal were measured. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB. After calculation, the limit is -13dBm.

The transmitter output power was attenuated using an attenuator and the frequency spectrum investigated from 9kHz to 10GHz. The EUT was set to transmit on maximum power. The EUT was tested on Bottom, Middle and Top channels. The resolution was set to 100kHz for 9kHz to 10GHz thus meeting the requirements of Industry Canada RSS-132 Clause 5.5 and FCC Part22 Clause 22.917 (a). 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 1  
                          - Mode 2  
                          - Mode 3  
                          - Mode 5  
                          - Mode 8



**2.7.6 Environmental Conditions**

	29 July 2013	30 July 2013	31 July 2013
Ambient Temperature	23.5°C	23.8°C	23.5°C
Relative Humidity	67.8%	64.0%	65.5%

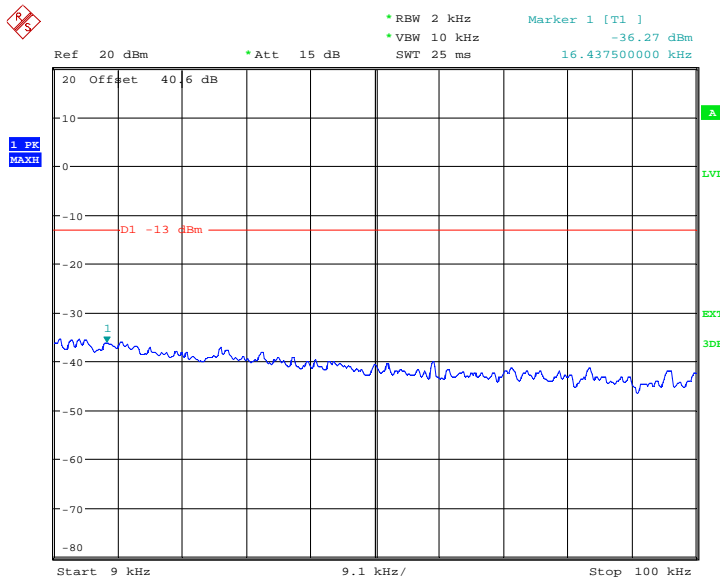
**2.7.7 Test Results**

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 22 and Industry Canada RSS-132 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: 29.JUL.2013 17:18:55



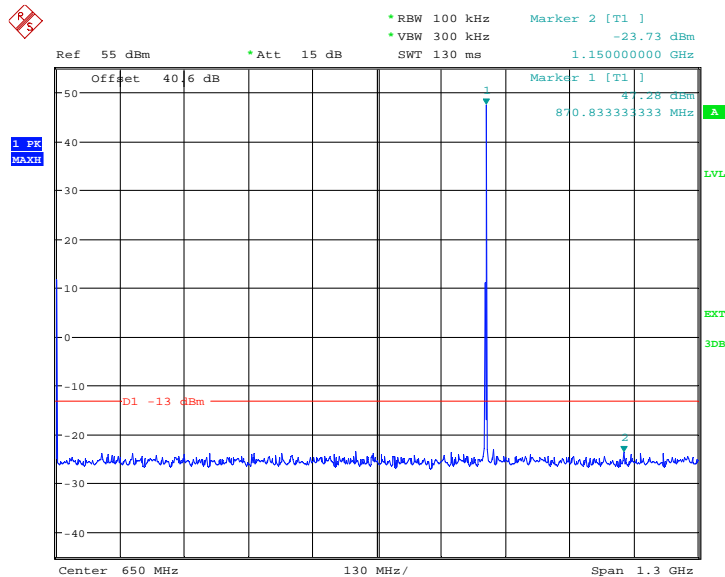
Product Service

**QPSK**

**Single Carrier**

**Configuration - Mode 1**

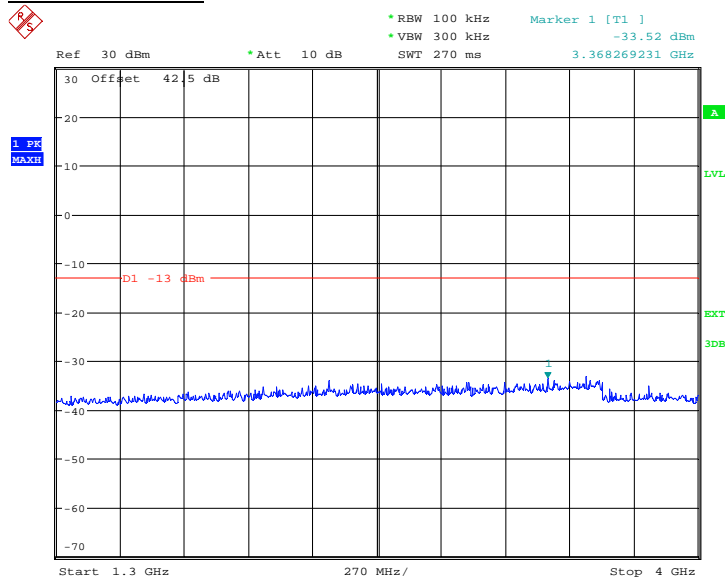
**9kHz to 1.3GHz**



Date: 29.JUL.2013 17:17:09

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

**1.3GHz to 4GHz**

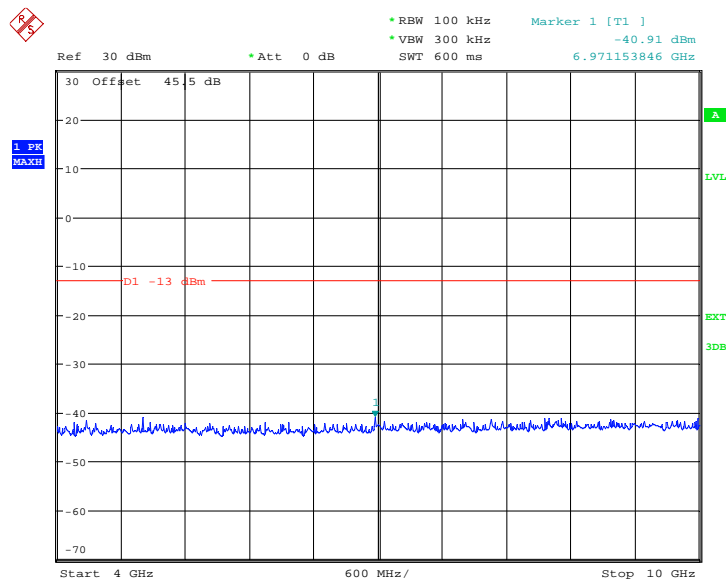


Date: 29.JUL.2013 15:20:20



Product Service

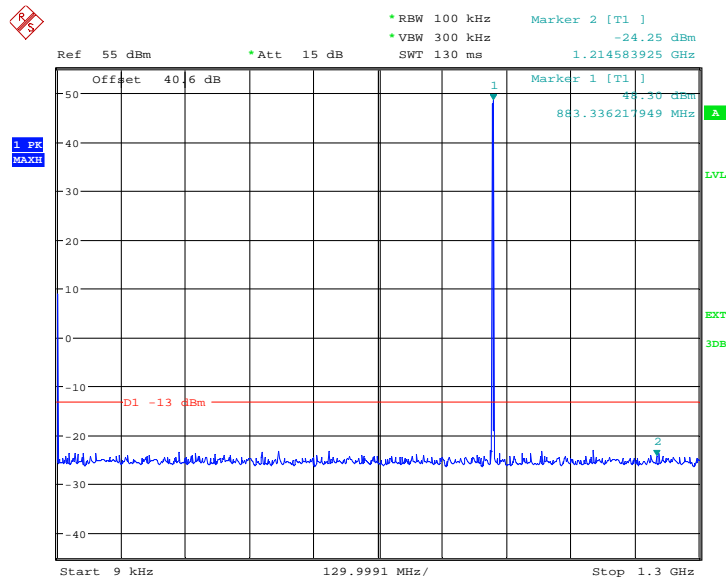
### 4GHz to 10GHz



Date: 29.JUL.2013 14:54:40

### Configuration 1 - Mode 2

### 9kHz to 1.3GHz



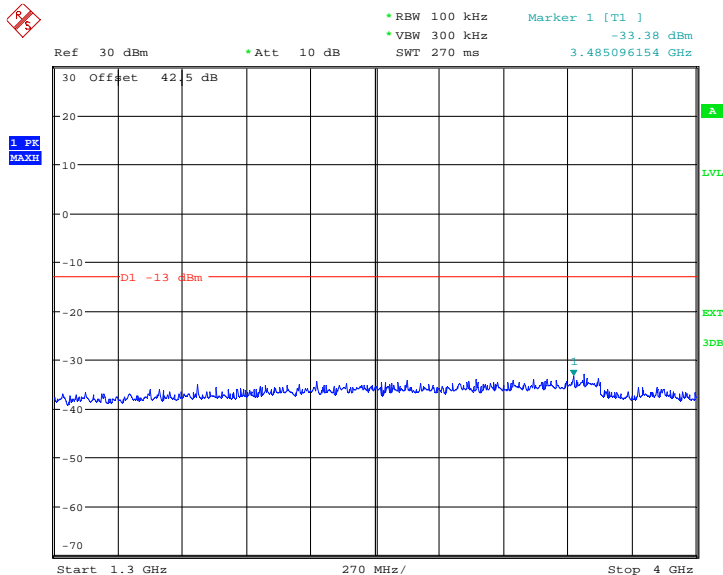
Date: 30.JUL.2013 09:38:17

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



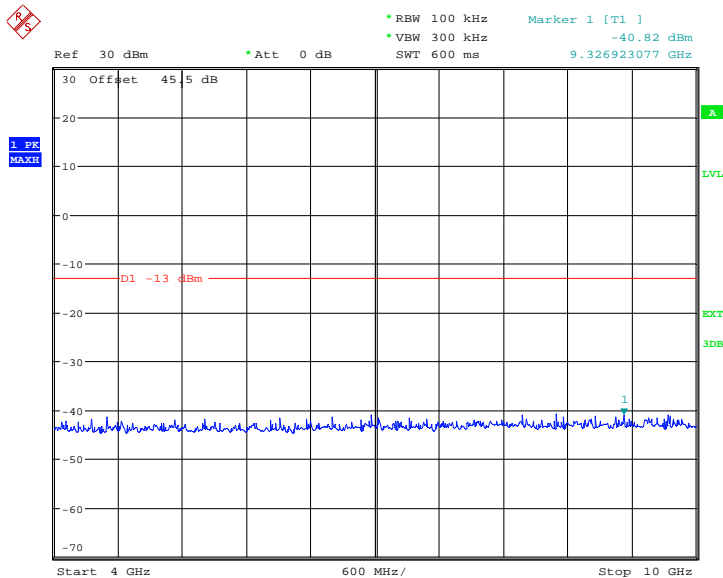
Product Service

### 1.3GHz to 4GHz



Date: 29.JUL.2013 15:19:24

### 4GHz to 10GHz



Date: 29.JUL.2013 14:55:10

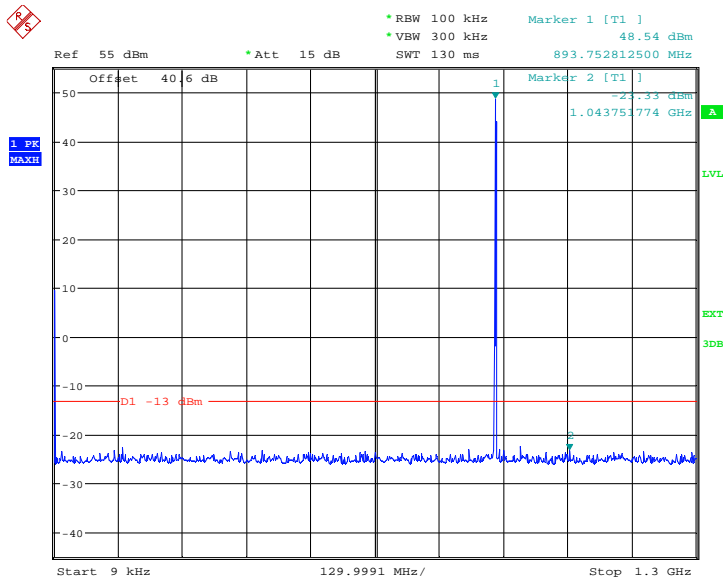




Product Service

Configuration 1 - Mode 3

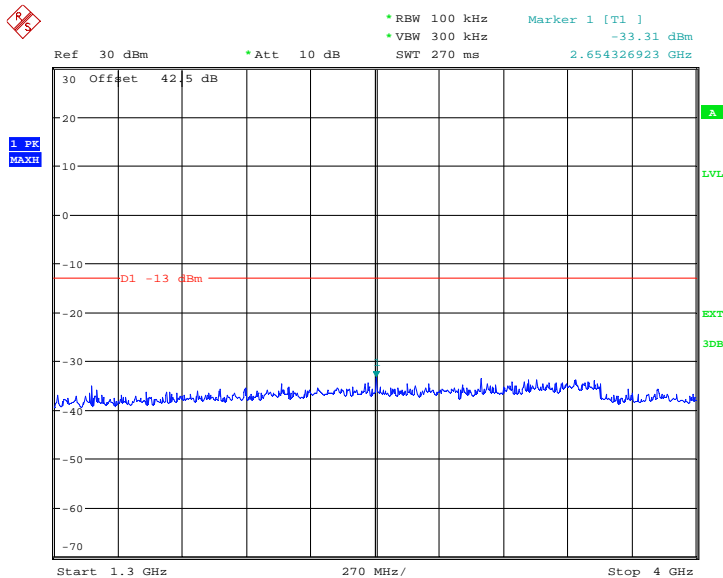
9kHz to 1.3GHz



Date: 29.JUL.2013 14:53:23

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

1.3GHz to 4GHz

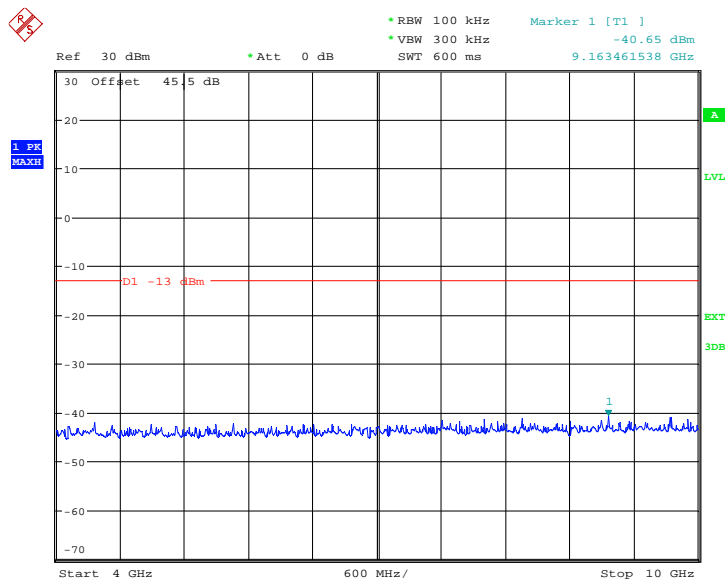


Date: 29.JUL.2013 14:47:22



Product Service

### 4GHz to 10GHz

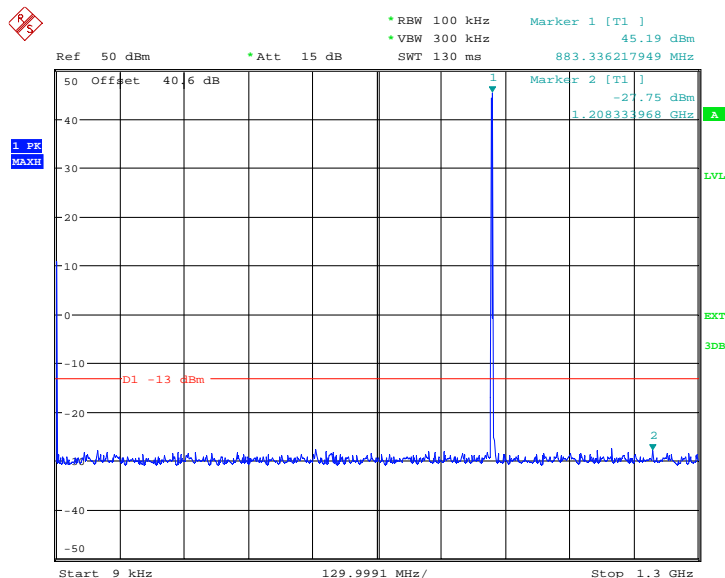


Date: 29.JUL.2013 15:08:11

### Multi Carrier (1x2)

#### Configuration 1 - Mode 5

### 9kHz to 1.3GHz



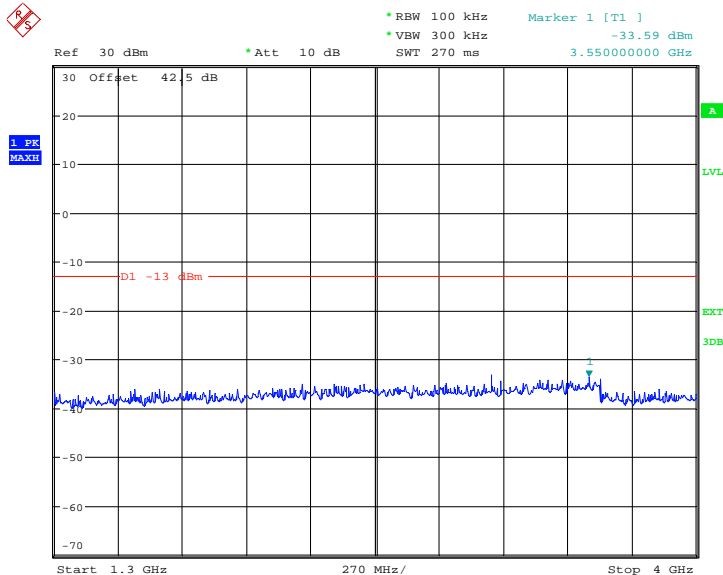
Date: 29.JUL.2013 15:35:57

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



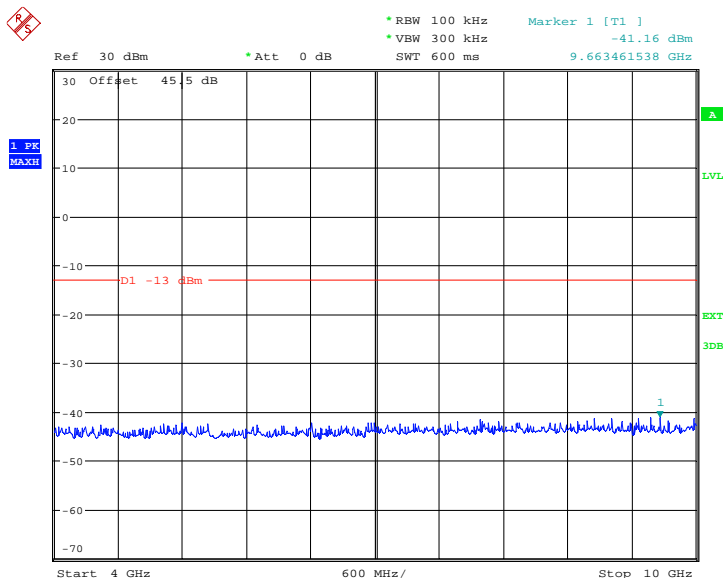
Product Service

1.3GHz to 4GHz



Date: 29.JUL.2013 15:31:20

4GHz to 10GHz



Date: 29.JUL.2013 15:34:30

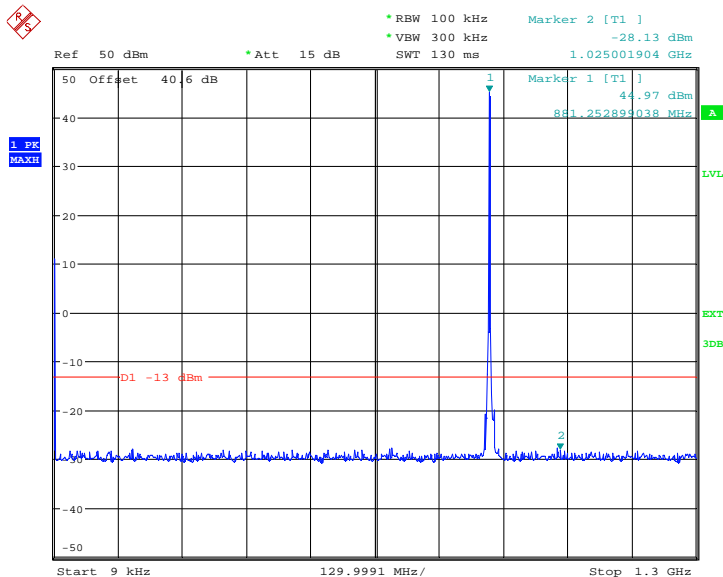


Product Service

**Multi Carrier (1x3)**

**Configuration 1 - Mode 8**

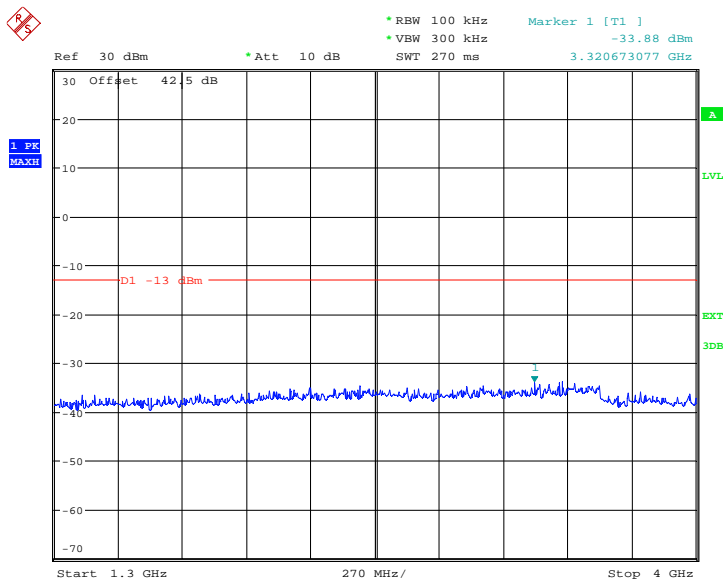
**9kHz to 1.3GHz**



Date: 29.JUL.2013 16:14:37

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

**1.3GHz to 4GHz**

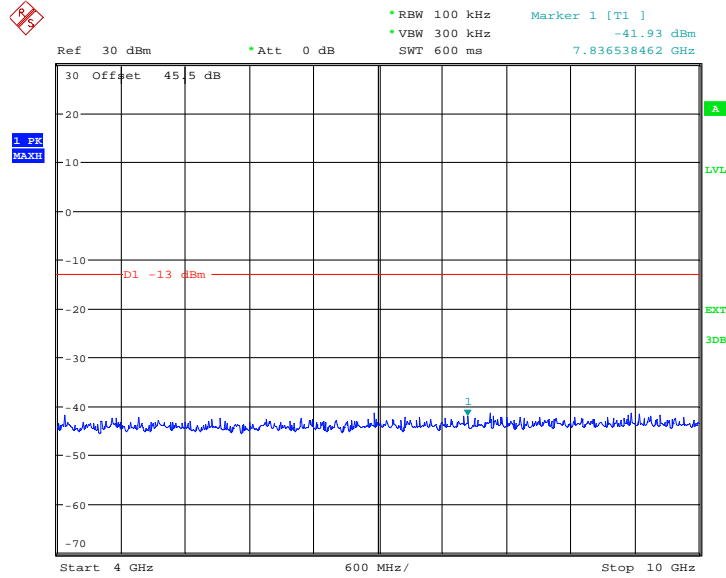


Date: 29.JUL.2013 16:10:02



Product Service

4GHz to 10GHz



Date: 29.JUL.2013 16:13:23

Limit	-13dBm
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Remarks

The EUT does not exceed -13dBm at the frequency range of 9kHz to 10GHz.



Product Service

## 2.8 FREQUENCY STABILITY UNDER TEMPERATURE VARIATIONS

### 2.8.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1055  
 FCC CFR 47 Part 22, Clause 22.355  
 Industry Canada RSS-132, Clause 5.3

### 2.8.2 Equipment Under Test

RRUS 12 B5 / KRC 161 321/2, S/N: CB26989524

### 2.8.3 Date of Test and Modification State

01 and 02 August 2013 – Modification State 0

### 2.8.4 Test Equipment Used

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

### 2.8.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 2 and Part 22 and Industry Canada RSS-132.

The EUT was set to transmit on maximum power. A Spectrum Analyser was used to measure the frequency error. The temperature was adjusted between -30°C and +50°C in 10° steps as per 2.1055.

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

Configuration 1 - Mode 2

### 2.8.6 Environmental Conditions

	01 August 2013	02 August 2013
Ambient Temperature	22.2°C	23.0°C
Relative Humidity	64.4%	58.5%



Product Service

### 2.8.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 22 and Industry Canada RSS-132 for Frequency Stability Under Temperature Variations.

The test results are shown below

Power Supply: -48V DC

#### Single Carrier

#### QPSK

#### Configuration 1 - Mode 2

Temperature Interval (°C)	Deviation (Hz)
-30	+2.21
-20	-2.22
-10	+2.35
0	-2.19
+10	+2.34
<b>+20</b>	<b>-3.64</b>
+30	-2.49
+40	+2.69
+50	-3.97

Limit	±1.5 ppm or ±1.322kHz
-------	-----------------------

#### Remarks

The frequency stability of the EUT is sufficient to keep it within the authorised frequency ranges at any temperature interval across the measured range.



## **2.9 FREQUENCY STABILITY UNDER VOLTAGE VARIATIONS**

### **2.9.1 Specification Reference**

FCC CFR 47 Part 2, Clause 2.1055  
FCC CFR 47 Part 22, Clause 22.355  
Industry Canada RSS-132, Clause 5.3

### **2.9.2 Equipment Under Test**

RRUS 12 B5 / KRC 161 321/2, S/N: CB26989524

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

02 August 2013 – 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 Method and Operating Modes**

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 2 and Part 22 and Industry Canada RSS-132.

The EUT was set to transmit on maximum power. A Spectrum Analyser was used to measure the frequency error. The supplied voltage was varied from 85 to 115 percent of the nominal value.

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

Configuration 1 - Mode 2

### **2.9.6 Environmental Conditions**

	02 August 2013
Ambient Temperature	23.0°C
Relative Humidity	58.5%





Product Service

### 2.9.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 22 and Industry Canada RSS-132 for Frequency Stability Under Voltage Variations.

The test results are shown below

Temperature: 20°C

#### Single Carrier

#### QPSK

#### Configuration 1 - Mode 2

DC Voltage (V)	Deviation (Hz)
-40.8	+2.61
<b>-48.0</b>	<b>-3.64</b>
-55.2	-2.69

Limit	±1.5 ppm or ±1.322kHz
-------	-----------------------

#### Remarks

The frequency stability of the EUT is sufficient to keep it within the authorised frequency ranges under voltage variations across the measured range.



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 Period (months)	Calibration Due
<b>Section 2.1, 2.2, 2.3, 2.4, 2.5 and 2.7– Maximum Conducted Output Power, Peak – Average Ratio, Modulation Characteristics, Occupied Bandwidth, Spurious Emissions at Antenna Terminals (<math>\pm 1</math>MHz), Conducted Spurious Emissions.</b>					
Spectrum Analyser	Rohde & Schwarz	FSQ	201122	12	07-Apr-2014
Power Meter	Rohde & Schwarz	NRP	101593	12	12-Aug-2013
Power Sensor	Rohde & Schwarz	NRP Z51	102224	12	16-Jul-2014
Power Sensor	Rohde & Schwarz	NRP Z51	102933	12	16-Jul-2014
Network Analyzer	Hewlett Packard	8720D	US36140166	12	09-Sep-2013
40 dB Attenuator	Aeroflex/Weinschel	66-40-33	CD4019	-	O/P MON
40 dB Attenuator	Aeroflex/Weinschel	48-40-43-LIM	BR5020	-	O/P MON
30 dB Attenuator	Shanghai Huaxiang	DTS100	-	-	O/P MON
10 dB Attenuator	Weinschel Corp	48-10-43	BB8290	-	O/P MON
Load	Shanghai Huaxiang	TF100	09121602	-	O/P MON
Power Supply	Dahua	DH1716A-10	1000303181	-	O/P MON
Digital Multi-meter	FLUKE	179	91820401	12	13-Dec-2013
Thermo-hygrometer	AZ Instruments	8705	9151655	12	16-Dec-2013
<b>Section 2.6 – Radiated Spurious Emissions</b>					
Load	Shanghai Huaxiang	TF100	09121631	-	O/P MON
Load	Shanghai Huaxiang	TF100	09121602	-	O/P MON
EMI Receiver	Rohde & Schwarz	ESI 40	100015	12	19-Aug-2013
Ultra log test antenna	Rohde & Schwarz	HL562	100167	12	19-Aug-2013
Double-Ridged Waveguide Horn Antenna	Rohde & Schwarz	HF 906	100029	12	19-Aug-2013
Pyramidal Horn Antenna	EMCO	3160-09	-	-	-
Antenna master	Frankonia	MA 260	-	12	19-Aug-2013
Relay Switch Unit	Rohde & Schwarz	331.1601.31	338965002	-	TU
Semi Anechoic Chamber	Frankonia	23.18m×16.88m×9.60m	-	12	19-Aug-2013
Power Supply	Dahua	DH1716A-14	20080401	-	O/P MON
Digital Multimeter	FLUKE	179	91820401	12	13-Dec-2013
Thermo-hygrometer	AZ Instruments	8705	9151655	12	16-Dec-2013



Product Service

<b>Section 2.8 and 2.9 – Frequency Stability Under Temperature and Voltage Variations</b>					
Spectrum Analyser	Rohde & Schwarz	FSQ	201122	12	07-Apr-2014
40 dB Attenuator	Aeroflex/Weinschel	66-40-33	CD4019	-	O/P MON
Load	Shanghai Huaxiang	TF100	09121602	-	O/P MON
Temperature Chamber	ZUNDAR	ZT1000	10080064	-	O/P MON
Power Supply	Dahua	DH1716A-14	20080401	-	O/P MON
Digital Multimeter	FLUKE	179	91820401	12	13-Dec-2013
Thermo-hygrometer	AZ Instruments	8705	9151655	12	16-Dec-2013

O/P MON      Output monitored with calibration equipment  
 TU              Traceability Unscheduled



Product Service

### 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	$<1 \times 10^{-7}$
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**



#### 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 (Not UKAS Accredited).

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