



Product Service

**Choose certainty.
Add value.**

Report On

FCC and Industry Canada Testing of the
Ericsson AB RUS 02 B5 / KRC 161 320/1

COMMERCIAL-IN-CONFIDENCE

FCC ID: TA8AKRC161320-1

IC ID: 287AB-AS1613201

Document 75924400 Report 01 Issue 1

January 2014



Product Service

TÜV SÜD Product Service Ltd, Octagon House, Concorde Way, Segensworth North,
Fareham, Hampshire, United Kingdom, PO15 5RL
Tel: +44 (0) 1489 558100. Website: www.tuvps.co.uk

COMMERCIAL-IN-CONFIDENCE

REPORT ON

FCC and Industry Canada Testing of the
Ericsson RUS 02 B5 / KRC 161 320/1

Document 75924400 Report 01 Issue 1

January 2014

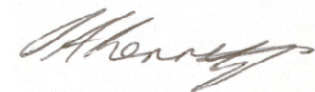
PREPARED FOR

ERICSSON AB
Isafjordsgatan 10,
SE-164 80
Stockholm 16480
Sweden

PREPARED BY


Y He
Test Engineer

APPROVED BY


S Bennett
Authorised Signatory

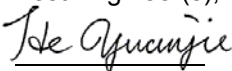
DATED


14 January 2014

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





CONTENTS

Section	Page No
1	REPORT SUMMARY 3
1.1	Introduction 4
1.2	Brief Summary of Results 5
1.3	Declaration of Build Status 8
1.4	Product Information 9
1.5	Test Conditions 14
1.6	Deviations From the Standard 14
1.7	Modification Record 14
1.8	Alternative Test Site 14
2	TEST DETAILS 15
2.1	Maximum Peak Output Power - Conducted 16
2.2	Peak – Average Ratio 20
2.3	Modulation Characteristics 30
2.4	Occupied Bandwidth 33
2.5	Spurious Emissions at Antenna Terminals (± 1 MHz) 37
2.6	Radiated Spurious Emissions 47
2.7	Conducted Spurious Emissions 52
2.8	Frequency Stability Under Temperature Variations 62
2.9	Frequency Stability Under Voltage Variations 64
3	TEST EQUIPMENT USED 66
3.1	Test Equipment Used 67
3.2	Measurement Uncertainty 69
4	ACCREDITATION, DISCLAIMERS AND COPYRIGHT 70
4.1	Accreditation, Disclaimers and Copyright 71



SECTION 1

1 REPORT SUMMARY

FCC and Industry Canada Testing of the
Ericsson RUS 02 B5 / KRC 161 320/1



1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Ericsson RUS 02 B5 / KRC 161 320/1 to the requirements of FCC CFR 47 Part 22 and Industry Canada RSS-132.

Testing was carried out in support of a C2PC application for Grant of RUS 02 B5 / KRC 161 320/1 to include CDMA wireless network.

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	RUS 02 B5
Part Number	KRC 161 320/1
IC Model Number	AS1613201
Serial Number(s)	CB27358543
RBS Software Version	CXP 102 051/19 R22EU
PIS Software Version	CXP 901 7316/2 R51MT
Hardware Version	R1C
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 22 September 2013
Order Number	PTP
Date	23 September 2013
Start of Test	24 September 2013
Finish of Test	31 October 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	
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+873.57MHz+874.80MHz+876.03MHz	0	Pass	
				879.06MHz+880.29MHz+881.52MHz+882.75MHz+883.98MHz+885.21MHz	0	Pass	
886.95MHz+888.18MHz+889.41MHz+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+873.57MHz+874.80MHz+876.03MHz	0	Pass	
				879.06MHz+880.29MHz+881.52MHz+882.75MHz+883.98MHz+885.21MHz	0	Pass	
886.95MHz+888.18MHz+889.41MHz+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	0	N/A	-
				881.52MHz		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+873.57MHz+874.80MHz+876.03MHz	0	Pass	
				879.06MHz+880.29MHz+881.52MHz+882.75MHz+883.98MHz+885.21MHz		N/A	
886.95MHz+888.18MHz+889.41MHz+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+873.57MHz+874.80MHz+876.03MHz		N/A	
				879.06MHz+880.29MHz+881.52MHz+882.75MHz+883.98MHz+885.21MHz	0	Pass	
886.95MHz+888.18MHz+889.41MHz+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+873.57MHz+874.80MHz+876.03MHz	0	N/A	
				879.06MHz+880.29MHz+881.52MHz+882.75MHz+883.98MHz+885.21MHz	0	Pass	
886.95MHz+888.18MHz+889.41MHz+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



Product Service

1.3 DECLARATION OF BUILD STATUS

MAIN EUT	
MANUFACTURING DESCRIPTION	Radio Equipment
MANUFACTURER	Ericsson AB
PRODUCT NAME	RUS 02 B5
PART NUMBER	KRC 161 320/1
IC Model Number	AS1613201
SERIAL NUMBER(s)	CB27358543
HARDWARE VERSION	R1C
RBS SOFTWARE VERSION	CXP 102 051/19 R22EU
PIS SOFTWARE VERSION	CXP 901 7316/2 R51MT
TRANSMITTER OPERATING RANGE	TX: 869MHz - 894MHz RX: 824MHz - 849MHz
MODULATIONS	QPSK, 8PSK, 16QAM
INTERMEDIATE FREQUENCIES	--
ITU DESIGNATION OF EMISSION	1M25F9W
CHANNEL BANDWIDTH	1.25 MHz
OUTPUT POWER (RMS) (W or dBm)	Single Carrier: 1 x 50.0dBm (1 x 100W) Multi Carrier (x 2): 2 x 47.0dBm (2 x 50W) Multi Carrier (x 6): 6 x 42.2dBm (6 x 16.7W)
OUTPUT POWER TOLERANCE	± 1.0dB
ANTENNA INFORMATION	No dedicated antenna, handled in licensing
NUMBER OF ANTENNA PORTS	1 TX/ RX port, 1RX port
SUPPORTED CONFIGURATION	Single Carrier or Multi Carrier.
FCC ID	TA8AKRC161320-1
IC ID	287AB-AS1613201
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	The equipment is the Radio Part of CDMA Base Station.

Signature

Date

21 October 2013

D of B S Serial No

75924400/01

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



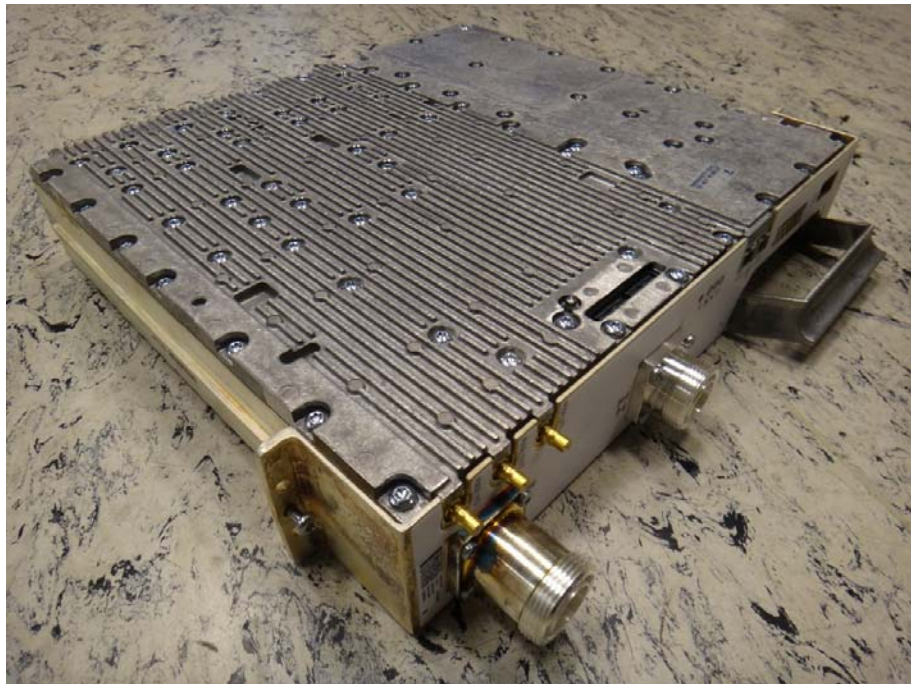
Product Service

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) RUS 02 B5 / KRC 161 320/1 is an Ericsson Radio Equipment working in the public mobile service 850MHz band which provides communication connections to CDMA850 network. The RUS 02 B5 / KRC 161 320/1 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 RUS 02 B5 / KRC 161 320/1 supports CDMA with QPSK, 8PSK and 16QAM modulations at 850MHz. The settings 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:

- 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

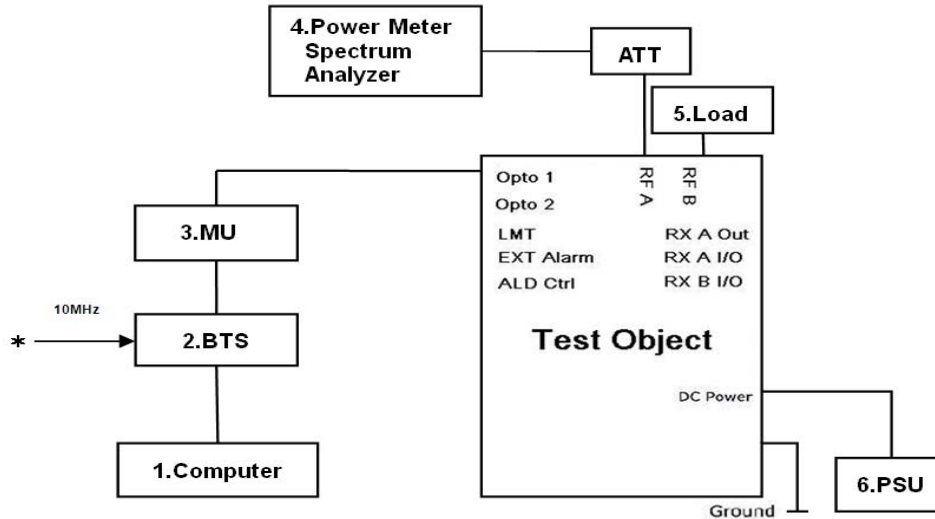
Channel bandwidth: 1.25MHz

The EUT has only one TX/RX port and one RX port and it can be configured to transmit with 850MHz Single carrier or Multi carrier at RF A output connector. All TX measurements were performed on the TX output connector RF A. 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:

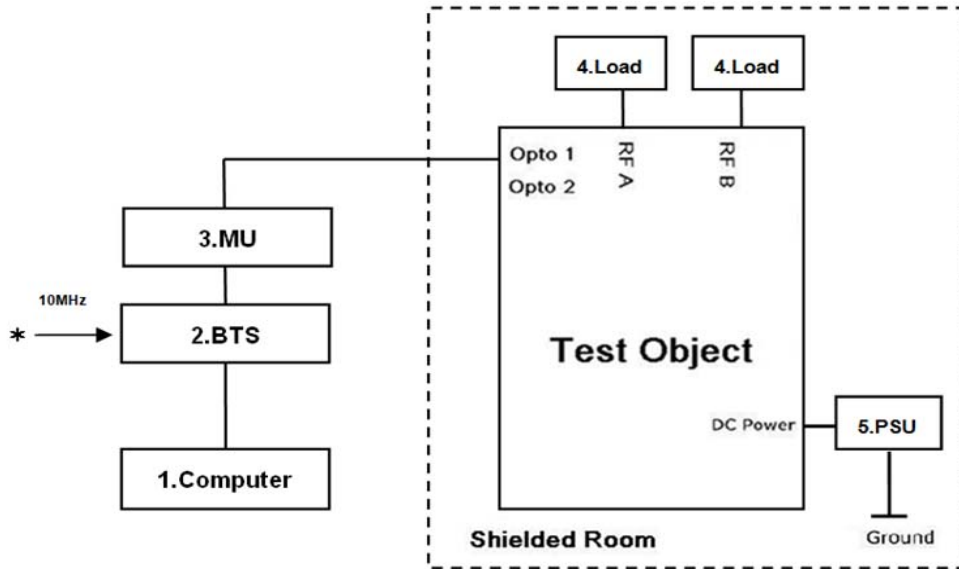


Test Object	Part Number	Version	Serial Number
Radio Part	RUS 02 B5 / KRC 161 320/1	R1C	CB27358543

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 NRP2	--	101283
	Power Sensor	R&S NRP Z51	--	102168
	Spectrum Analyzer	R&S FSQ	--	101127
5	Load	TF100	--	09121602
6	Power Supply	DH1716A-9	--	ETE/L676



Test Setup, Radiated Measurement:



Test Object	Part Number	Version	Serial Number
Radio Part	RUS 02 B5 / KRC 161 320/1	R1C	CB27358543

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-9	--	ETE/L676

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 + 119 + 160 + 201:
869.88MHz+871.11MHz+872.34MHz+873.57MHz+874.80MHz+876.03MHz
(B, B+1.23MHz, B+2.46MHz, B+3.69MHz, B+4.92MHz, and B+6.15MHz)

Mode 8 - Channel No. 302 + 343 + 384 + 425 + 466 + 507:
879.06MHz+880.29MHz+881.52MHz+882.75MHz+883.98MHz+885.21MHz
(M-2.46MHz, M-1.23MHz, M, M+1.23MHz, M+2.46MHz and M+3.69MHz)

Mode 9 - Channel No. 565 + 606 + 647 + 688 + 729 + 770:
886.95MHz+888.18MHz+889.41MHz+890.64MHz+891.87MHz+893.10MHz
(T-6.15MHz, T-4.92MHz, T-3.69MHz, 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

Modification State 0 - 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 413514:

TA Beijing Limited, Building B-4, No.1 JingHai 3rd Road, BDA East Park, Beijing, 100176, China

Industry Canada Accreditation 10852A-1:

TA Beijing Limited, Building B-4, No.1 JingHai 3rd Road, BDA East Park, Beijing, 100176, China



Product Service

SECTION 2

2 TEST DETAILS

FCC and Industry Canada Testing of the
Ericsson RUS 02 B5 / KRC 161 320/1



Product Service

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

RUS 02 B5 / KRC 161 320/1, S/N: CB27358543

2.1.3 Date of Test and Modification State

24, 25 September and 31 October 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 without antenna. 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

	24 Sep 2013	25 Sep 2013	31 Oct 2013
Ambient Temperature	22.8°C	23.5°C	23.0°C
Relative Humidity	45.6%	48.4%	48.0%



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

Declarative Maximum Output Power: 50.00dBm

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	40.2	49.32	85.51
384 (Middle)	881.52	40.2	49.59	90.99
770 (Top)	893.10	40.2	49.30	85.11

8PSK

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
1019 (Bottom)	869.88	40.2	49.35	86.10
384 (Middle)	881.52	40.2	49.62	91.62
770 (Top)	893.10	40.2	49.28	84.71

16QAM

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
1019 (Bottom)	869.88	40.2	49.30	85.11
384 (Middle)	881.52	40.2	49.59	90.99
770 (Top)	893.10	40.2	49.28	84.72

**Multi Carrier (1x2)****Declarative Maximum Output Power: 50.00dBm**Configuration 1 - Mode 4, 5 and 6QPSK

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
1019 & 37	869.88 & 871.11	40.2	49.25	84.14
384 & 425	881.52 & 882.75	40.2	49.55	90.16
729 & 770	891.87 & 893.10	40.2	49.26	84.33

8PSK

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
1019 & 37	869.88 & 871.11	40.2	49.20	83.18
384 & 425	881.52 & 882.75	40.2	49.63	91.83
729 & 770	891.87 & 893.10	40.2	49.16	82.41

16QAM

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
1019 & 37	869.88 & 871.11	40.2	49.25	84.14
384 & 425	881.52 & 882.75	40.2	49.62	91.62
729 & 770	891.87 & 893.10	40.2	49.22	83.56

Multi Carrier (1x6)**Declarative Maximum Output Power: 49.55dBm**Configuration 1 - Mode 7, 8 and 9QPSK

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
1019 & 37 & 78 & 119 & 160 & 201	869.88 & 871.11 & 872.34 & 873.57 & 874.80 & 876.03	40.2	49.04	80.17
302 & 343 & 384 & 425 & 466 & 507	879.06 & 880.29 & 881.52 & 882.75 & 883.98 & 885.21	40.2	49.15	82.22
565 & 606 & 647 & 688 & 729 & 770	886.95 & 888.18 & 889.41 & 890.64 & 891.87 & 893.10	40.2	48.93	78.16



Product Service

8PSK

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
1019 & 37 & 78 & 119 & 160 & 201	869.88 & 871.11 & 872.34 & 873.57 & 874.80 & 876.03	40.2	48.78	75.51
302 & 343 & 384 & 425 & 466 & 507	879.06 & 880.29 & 881.52 & 882.75 & 883.98 & 885.21	40.2	48.94	78.34
565 & 606 & 647 & 688 & 729 & 770	886.95 & 888.18 & 889.41 & 890.64 & 891.87 & 893.10	40.2	48.93	78.16

16QAM

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
1019 & 37 & 78 & 119 & 160 & 201	869.88 & 871.11 & 872.34 & 873.57 & 874.80 & 876.03	40.2	48.75	74.99
302 & 343 & 384 & 425 & 466 & 507	879.06 & 880.29 & 881.52 & 882.75 & 883.98 & 885.21	40.2	49.06	80.54
565 & 606 & 647 & 688 & 729 & 770	886.95 & 888.18 & 889.41 & 890.64 & 891.87 & 893.10	40.2	48.88	77.27

Limit	≤500W or ≤+57dBm
-------	------------------

Remarks

This unit is tested without antenna. ERP/EIRP compliance is addressed at the time of licensing, as required by the responsible FCC/IC Bureau(s). Licensees are required to take into account maximum allowed antenna gain used in combination with above power settings to prevent the radiated output power to exceed the limits.

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

RUS 02 B5 / KRC 161 320/1, S/N: CB27358543

2.2.3 Date of Test and Modification State

24, 25, 26 and 27 September 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 5
 - Mode 8

2.2.6 Environmental Conditions

	24 Sep 2013	25 Sep 2013	26 Sep 2013	27 Sep 2013
Ambient Temperature	22.8°C	23.5°C	24.0°C	24.0°C
Relative Humidity	45.6%	48.4%	54.5%	63.0%



Product Service

2.2.7 Test Results

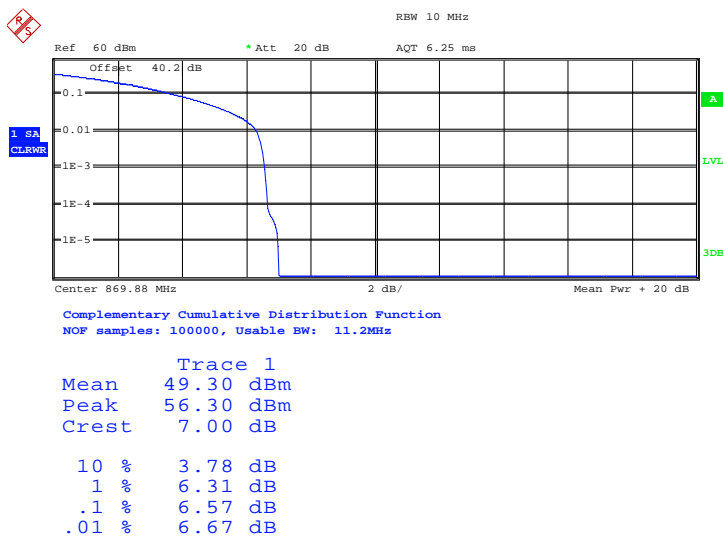
For the period of test the EUT met the requirements of FCC CFR 47 Part 22 for Peak – Average Ratio.

The test results are shown below.

Single Carrier

Configuration 1 - Mode 1

QPSK

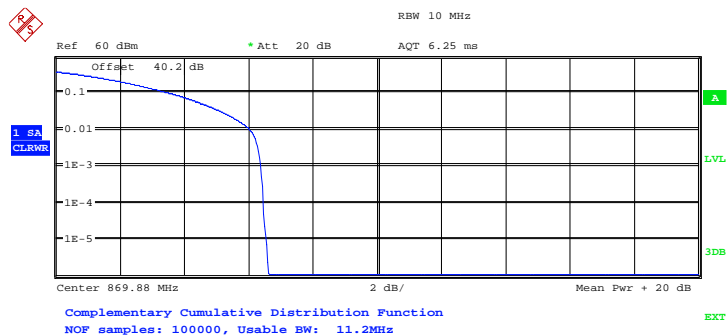


Date: 24.SEP.2013 09:33:06



Product Service

8PSK

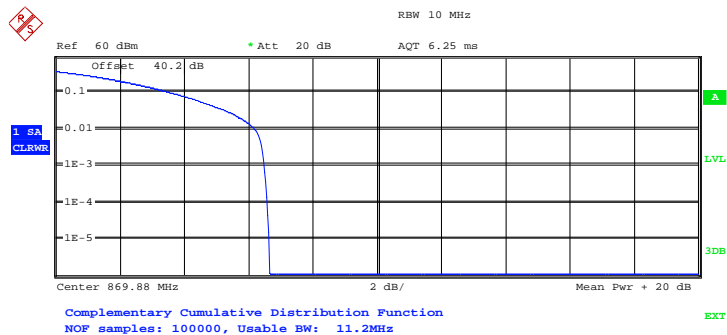


Trace 1
Mean 49.34 dBm
Peak 55.94 dBm
Crest 6.61 dB

10 % 3.53 dB
1 % 6.03 dB
.1 % 6.38 dB
.01 % 6.47 dB

Date: 26.SEP.2013 08:36:35

16QAM



Trace 1
Mean 49.30 dBm
Peak 55.94 dBm
Crest 6.64 dB

10 % 3.59 dB
1 % 6.19 dB
.1 % 6.51 dB
.01 % 6.57 dB

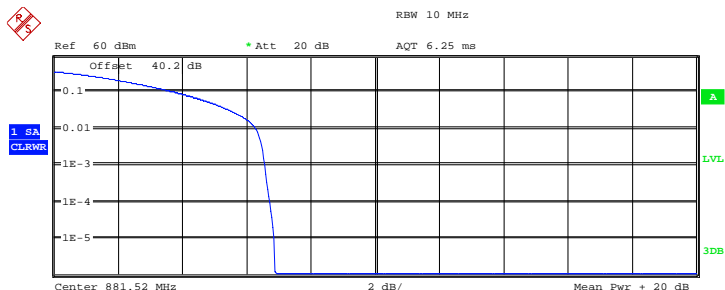
Date: 27.SEP.2013 08:23:44



Product Service

Configuration 1 - Mode 2

QPSK

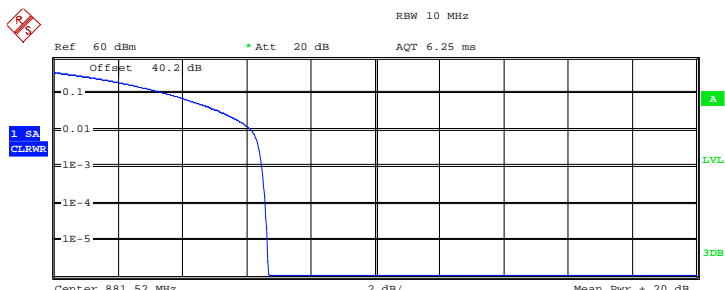


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

Trace 1	
Mean	49.59 dBm
Peak	56.47 dBm
Crest	6.88 dB
10 %	3.78 dB
1 %	6.28 dB
.1 %	6.57 dB
.01 %	6.73 dB

Date: 24.SEP.2013 09:57:26

8PSK



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

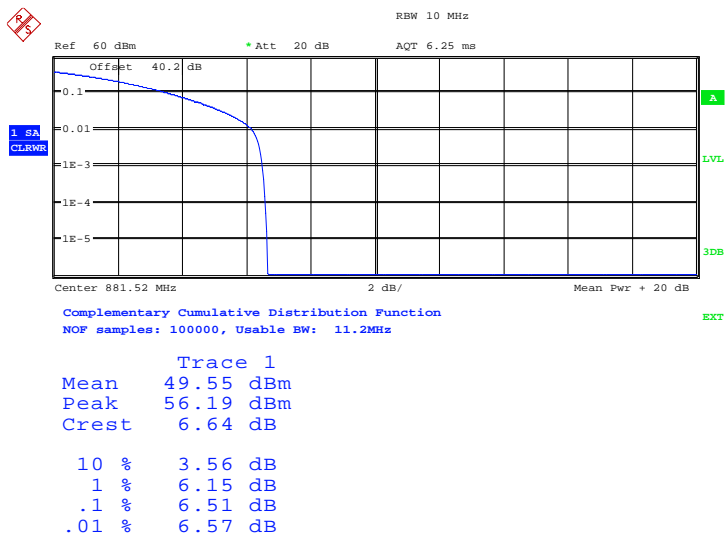
Trace 1	
Mean	49.60 dBm
Peak	56.26 dBm
Crest	6.66 dB
10 %	3.56 dB
1 %	6.12 dB
.1 %	6.47 dB
.01 %	6.57 dB

Date: 26.SEP.2013 09:17:49



Product Service

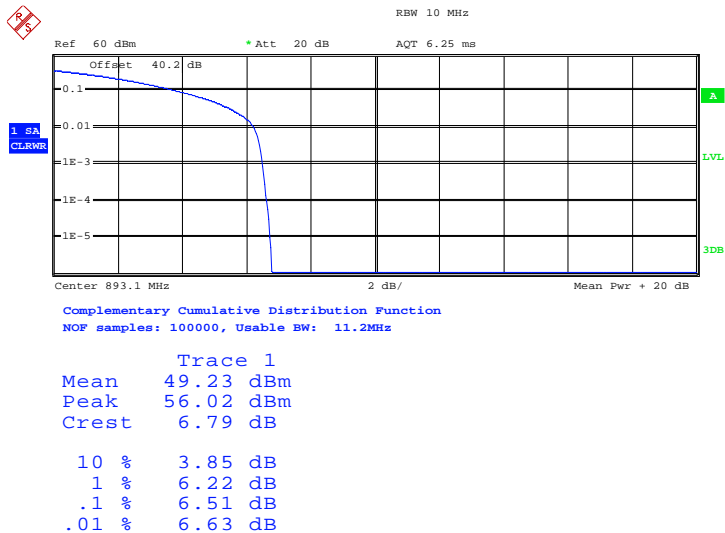
16QAM



Date: 27.SEP.2013 09:35:31

Configuration 1 - Mode 3

QPSK

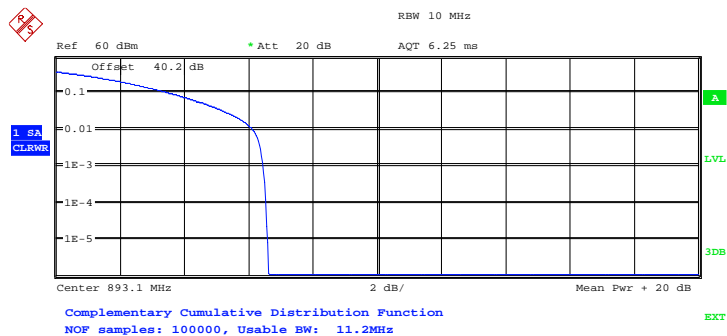


Date: 24.SEP.2013 10:13:38



Product Service

8PSK

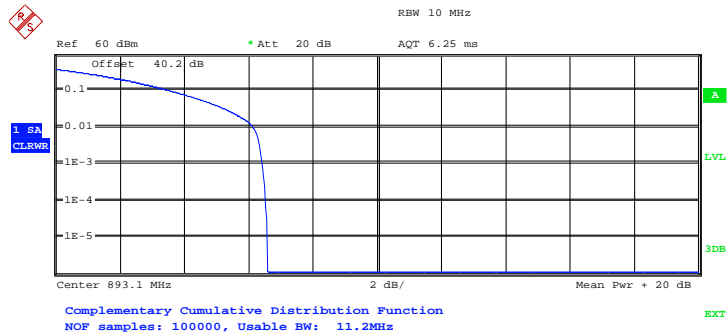


Trace 1

Mean	49.27 dBm
Peak	55.88 dBm
Crest	6.61 dB
10 %	3.56 dB
1 %	6.12 dB
.1 %	6.44 dB
.01 %	6.54 dB

Date: 26.SEP.2013 11:31:41

16QAM



Trace 1

Mean	49.22 dBm
Peak	55.81 dBm
Crest	6.59 dB
10 %	3.56 dB
1 %	6.12 dB
.1 %	6.44 dB
.01 %	6.54 dB

Date: 27.SEP.2013 10:37:48

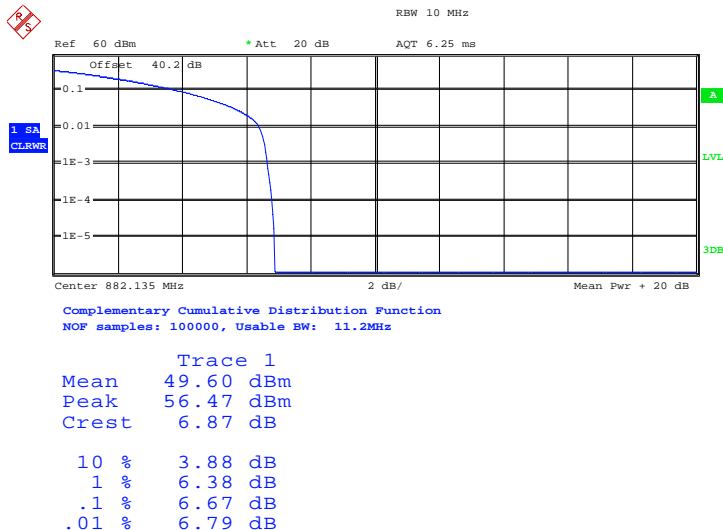


Product Service

Multi Carrier (1x2):

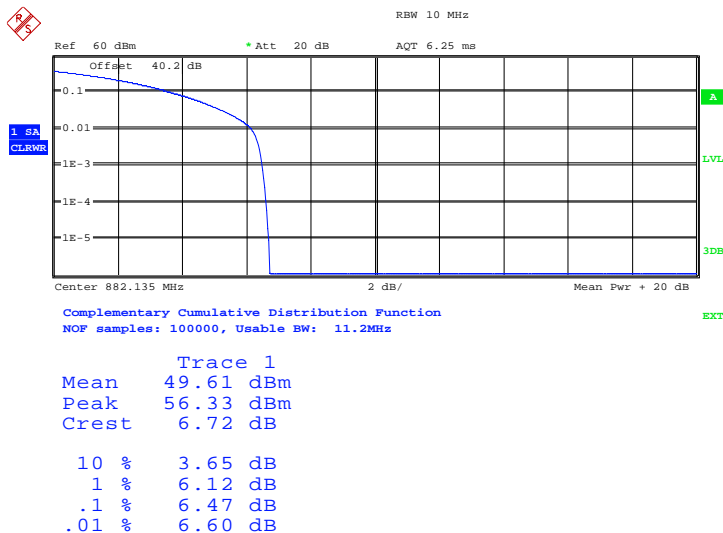
Configuration 1 - Mode 5

QPSK



Date: 24.SEP.2013 11:32:40

8PSK

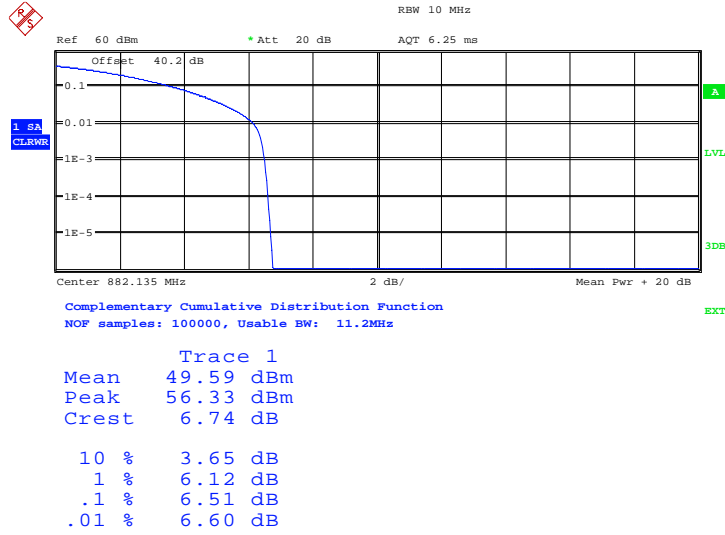


Date: 26.SEP.2013 10:02:47



Product Service

16QAM



Date: 27.SEP.2013 09:22:40

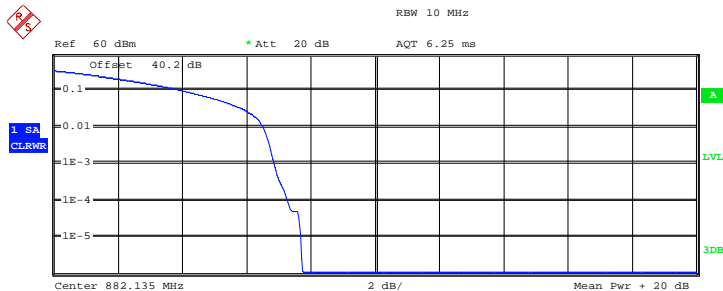


Product Service

Multi Carrier (1x6):

Configuration 1 - Mode 8

QPSK

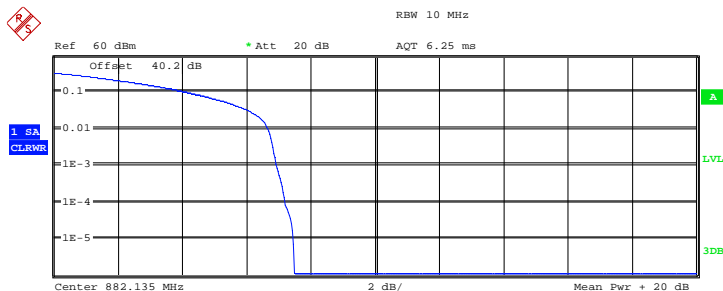


Center 882.135 MHz 2 dB/ Mean Pwr + 20 dB
 Complementary Cumulative Distribution Function
 NOF samples: 100000, Usable BW: 11.2MHz

Trace 1	
Mean	49.03 dBm
Peak	56.76 dBm
Crest	7.72 dB
10 %	4.04 dB
1 %	6.51 dB
.1 %	6.86 dB
.01 %	7.28 dB

Date: 25.SEP.2013 09:12:47

8PSK



Center 882.135 MHz 2 dB/ Mean Pwr + 20 dB
 Complementary Cumulative Distribution Function
 NOF samples: 100000, Usable BW: 11.2MHz

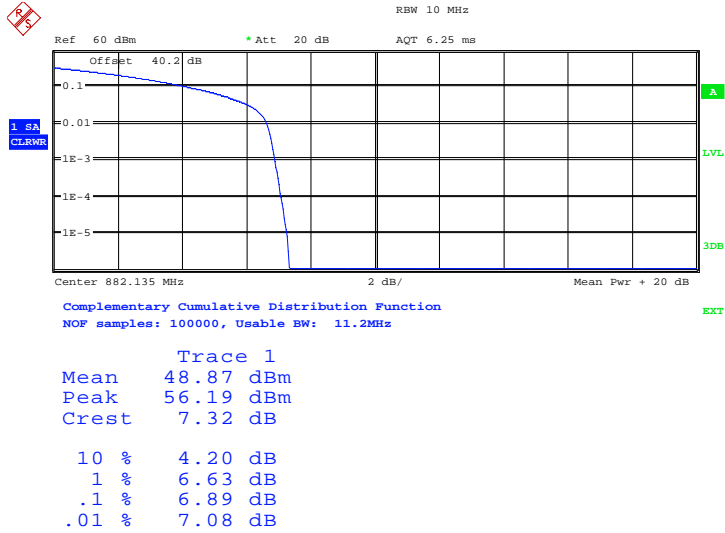
Trace 1	
Mean	48.85 dBm
Peak	56.33 dBm
Crest	7.48 dB
10 %	4.17 dB
1 %	6.67 dB
.1 %	6.92 dB
.01 %	7.21 dB

Date: 26.SEP.2013 09:53:55



Product Service

16QAM



Date: 27.SEP.2013 09:06:57

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

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

RUS 02 B5 / KRC 161 320/1, S/N: CB27358543

2.3.3 Date of Test and Modification State

24, 26 and 27 September 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

	24 Sep 2013	26 Sep 2013	27 Sep 2013
Ambient Temperature	22.8°C	24.0°C	24.0°C
Relative Humidity	45.6%	54.5%	63.0%



Product Service

2.3.6 Test Result

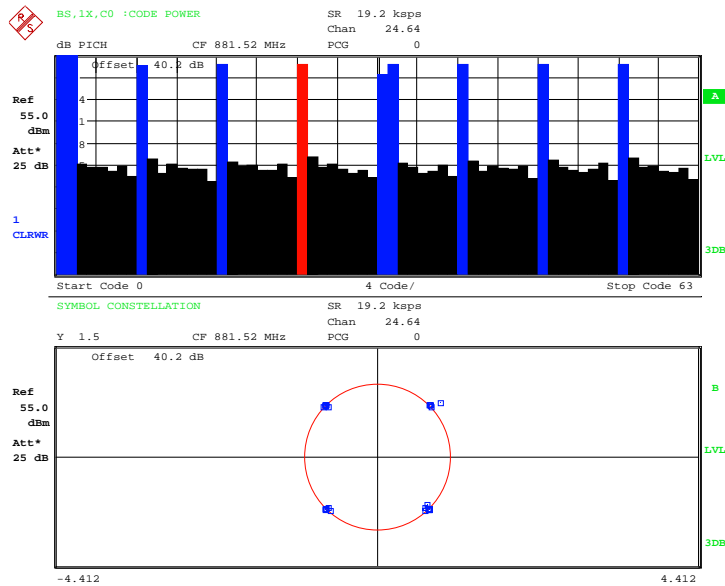
Plots are shown on the following showing the EUT transmitting with all of the modulations:

The test results are shown below

Single Carrier

Configuration 1 - Mode 2

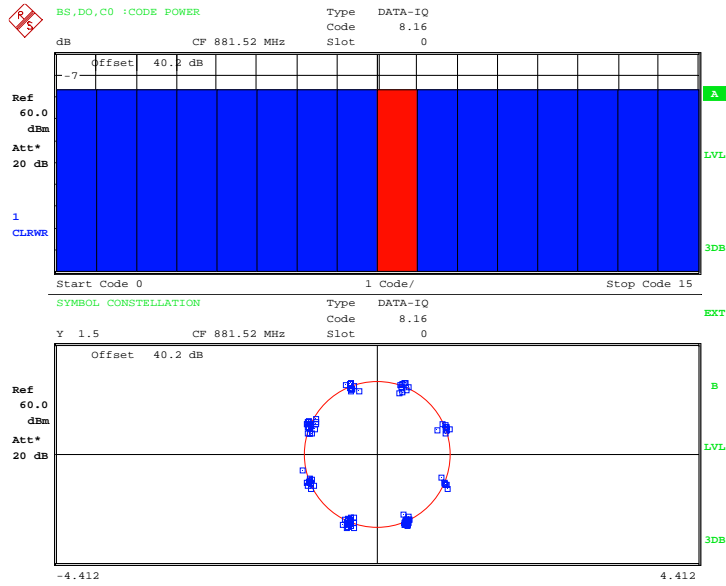
EUT transmitting with QPSK modulation:



Date: 24.SEP.2013 09:52:16

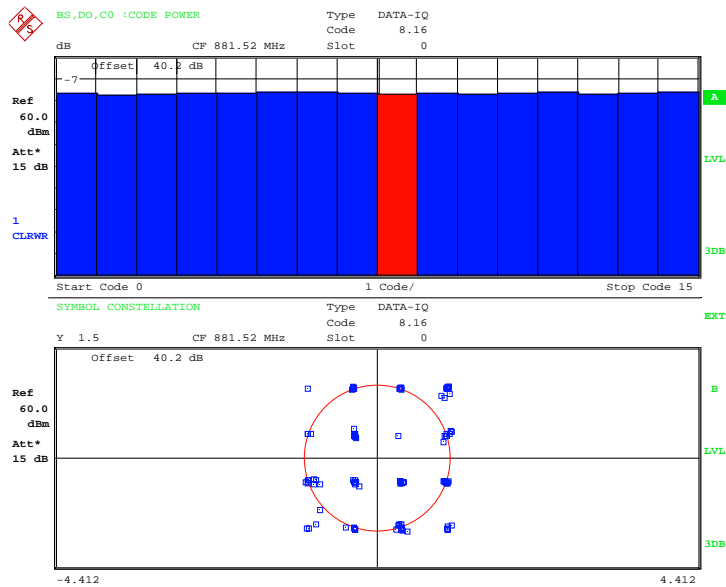


EUT transmitting with 8PSK modulation:



Date: 26.SEP.2013 09:17:24

EUT transmitting with 16QAM modulation:



Date: 27.SEP.2013 09:36:40



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

RUS 02 B5 / KRC 161 320/1, S/N: CB27358543

2.4.3 Date of Test and Modification State

24, 26 and 27 September 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

	24 Sep 2013	26 Sep 2013	27 Sep 2013
Ambient Temperature	22.8°C	24.0°C	24.0°C
Relative Humidity	45.6%	54.5%	63.0%



Product Service

2.4.7 Test Results

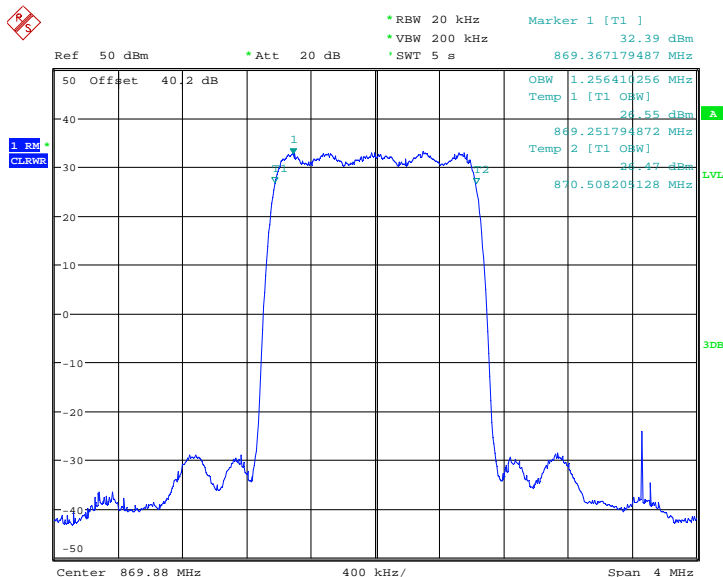
For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 22 and Industry Canada RSS-GEN for Occupied Bandwidth.

The test results are shown below

Single Carrier

QPSK

Configuration 1 - Mode 1

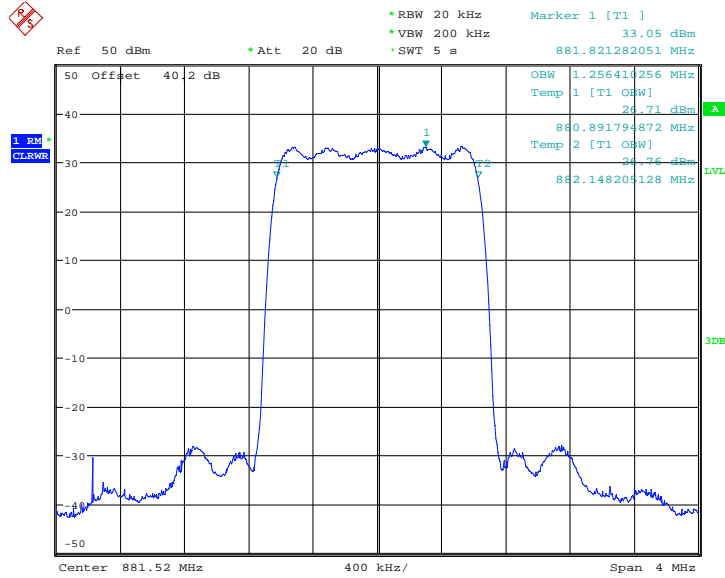


Date: 24.SEP.2013 09:32:16



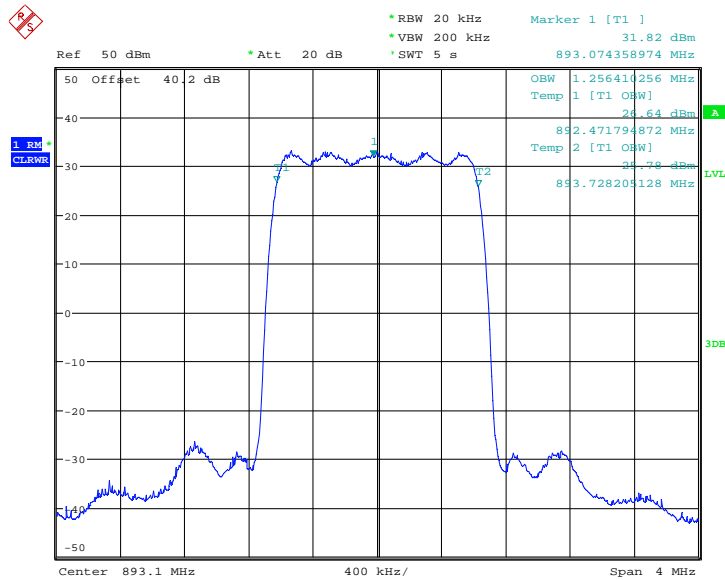
Product Service

Configuration 1 - Mode 2



Date: 24.SEP.2013 09:56:46

Configuration 1 - Mode 3



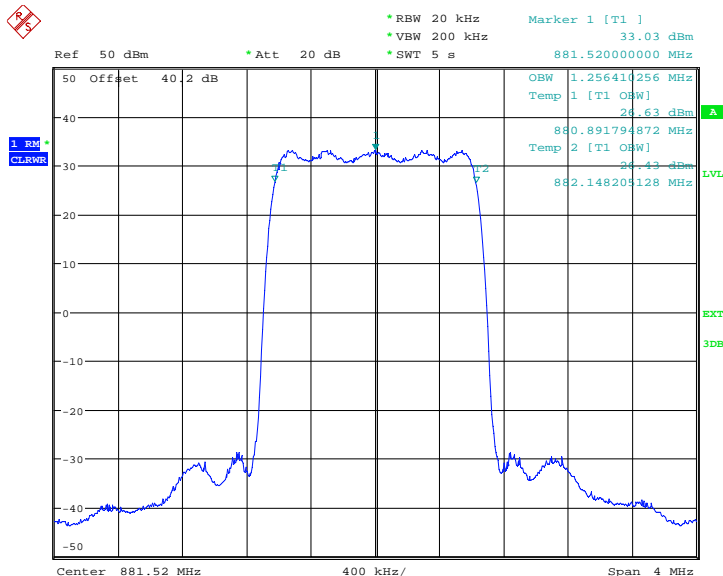
Date: 24.SEP.2013 10:17:33



Product Service

8PSK

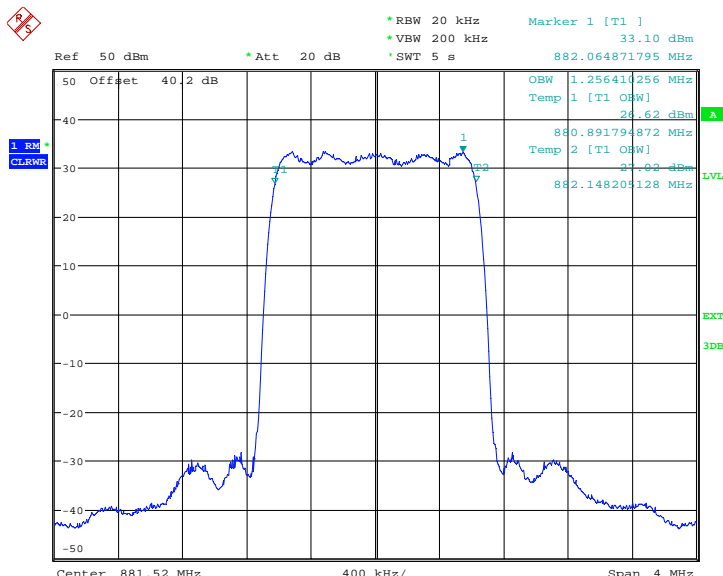
Configuration 1 - Mode 2



Date: 26.SEP.2013 09:18:55

16QAM

Configuration 1 - Mode 2



Date: 27.SEP.2013 09:37:32



2.5 SPURIOUS EMISSIONS AT ANTENNA TERMINALS (± 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

RUS 02 B5 / KRC 161 320/1, S/N: CB27358543

2.5.3 Date of Test and Modification State

24, 25, 26, 27 September and 31 October 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

	24 Sep 2013	25 Sep 2013	26 Sep 2013	27 Sep 2013	31 Oct 2013
Ambient Temperature	22.8°C	23.5°C	24.0°C	24.0°C	23.0°C
Relative Humidity	45.6%	48.4%	54.5%	63.0%	48.0%



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 (± 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 (1x6)

Configuration 1 - Mode 7 and 9

Band Edge Frequency	Edge Test with 8PSK, 16QAM modulation Channel No./Frequencies
Bottom 869 MHz	Channel: 1019 & 37 & 78 & 119 & 160 & 201 Frequency: 869.88 & 871.11 & 872.34 & 873.57 & 874.80 & 876.03MHz
Top 894 MHz	Channel: 565 & 606 & 647 & 688 & 729 & 770 Frequency: 886.95 & 888.18 & 889.41 & 890.64 & 891.87 & 893.10MHz

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.



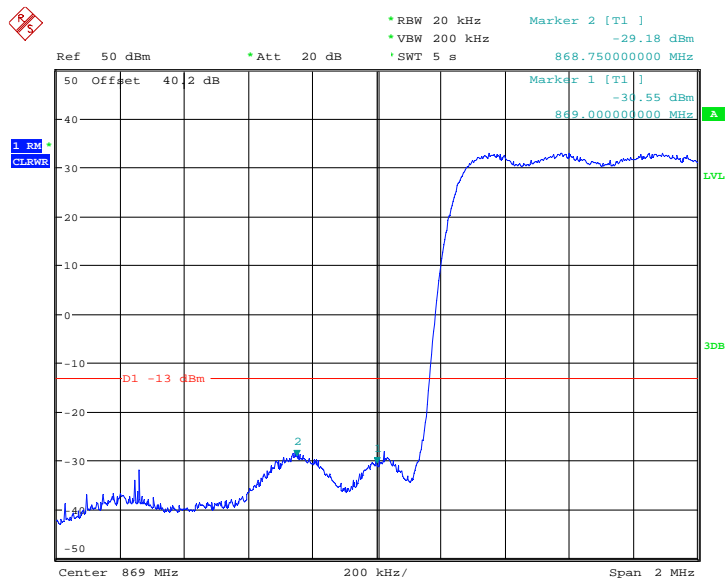
Product Service

The test results are shown below

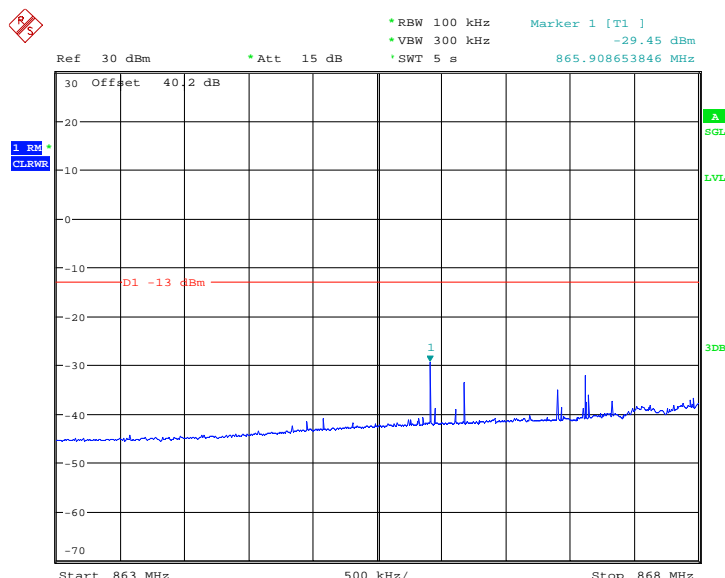
QPSK

Single Carrier

Configuration 1 - Mode 1



Date: 24.SEP.2013 09:28:33

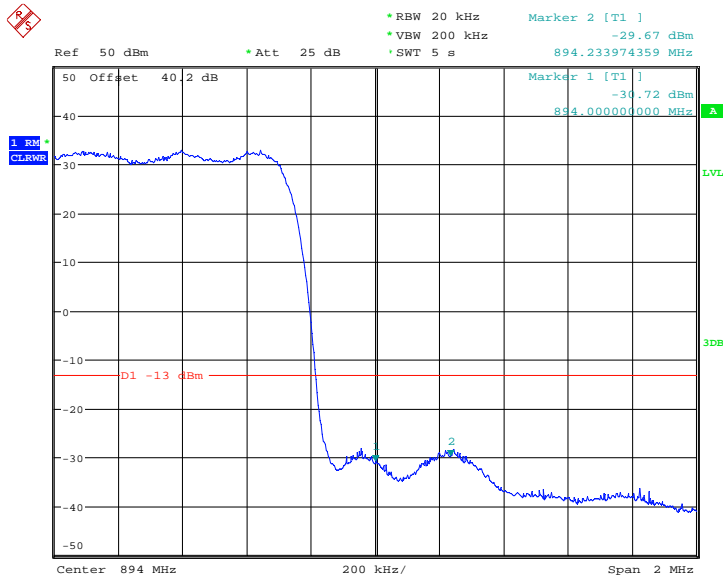


Date: 24.SEP.2013 09:30:45

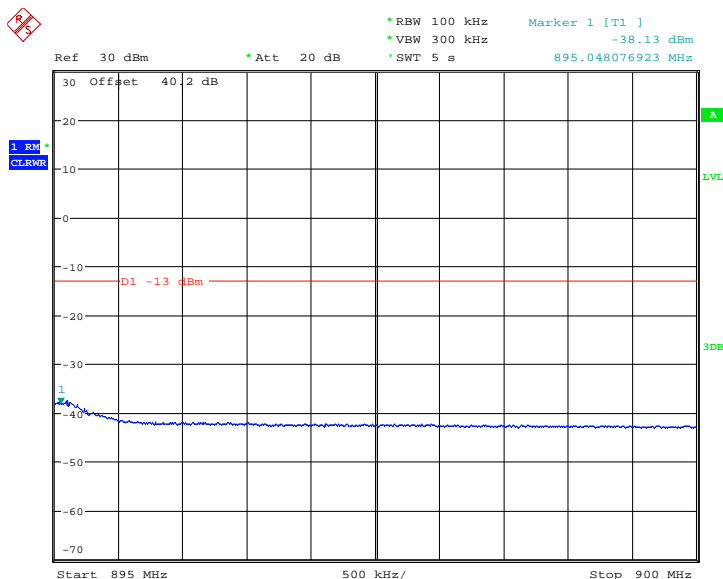


Product Service

Configuration 1 - Mode 3



Date: 24.SEP.2013 10:19:01



Date: 24.SEP.2013 10:19:55

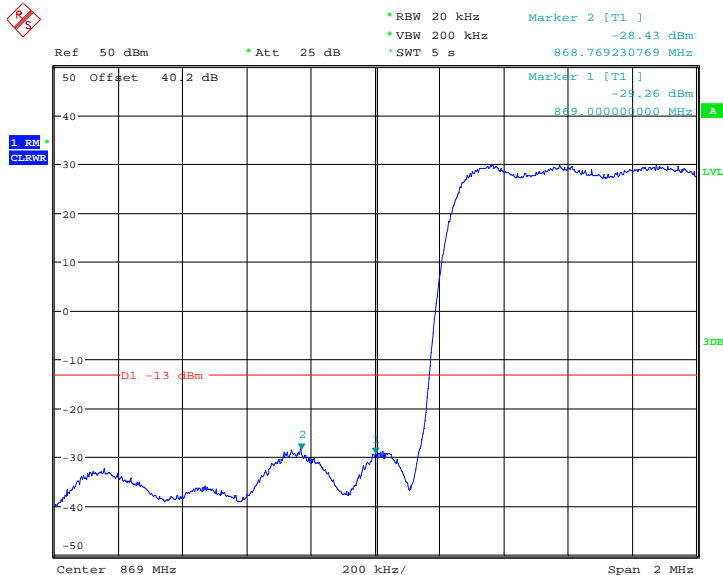


Product Service

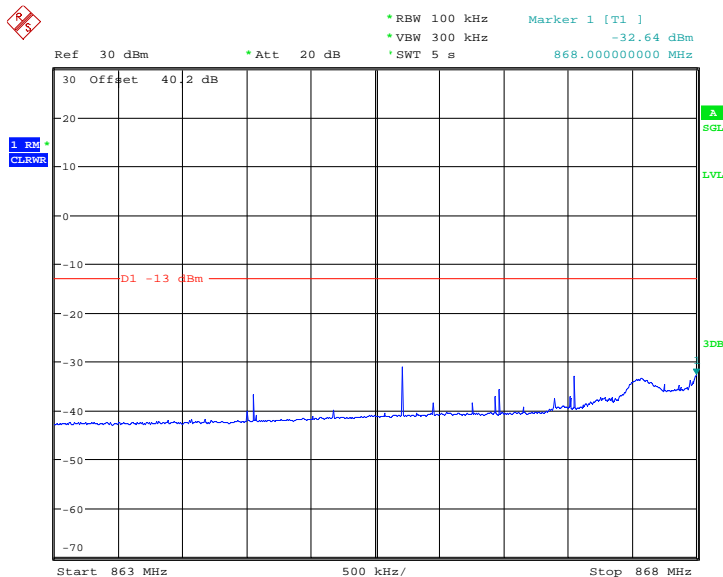
QPSK

Multi Carrier (1x2)

Configuration 1 - Mode 4



Date: 24.SEP.2013 11:09:44

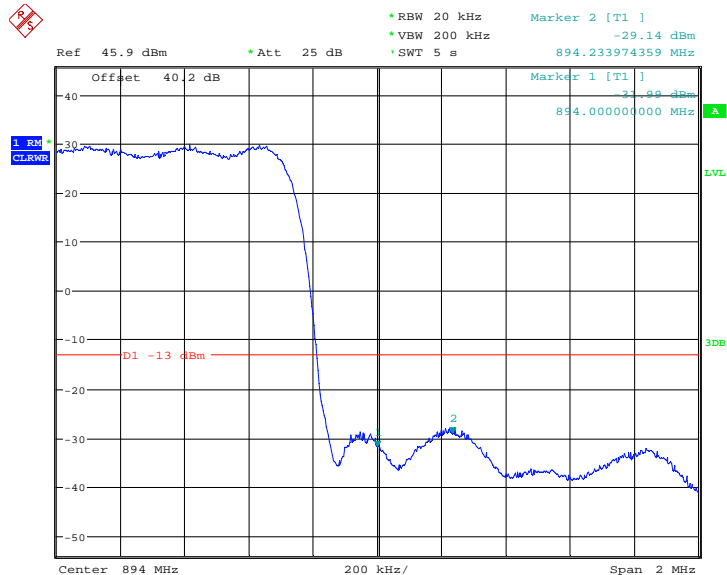


Date: 24.SEP.2013 11:11:29

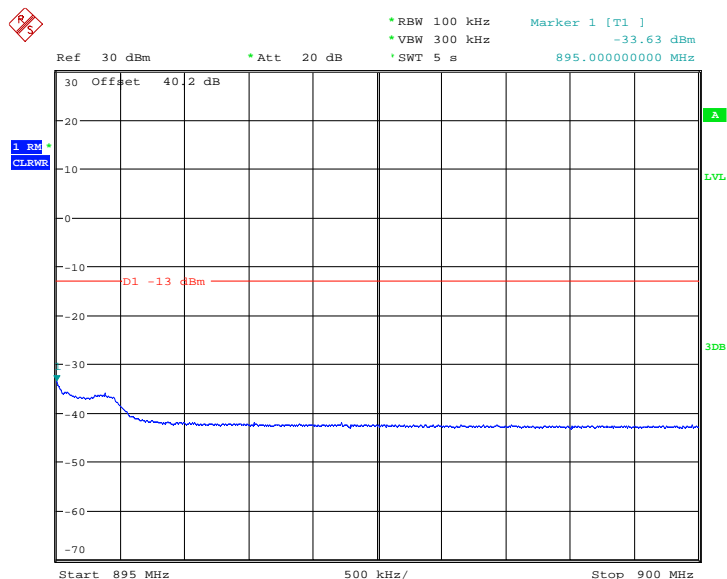


Product Service

Configuration 1 – Mode 6



Date: 25.SEP.2013 04:46:17



Date: 25.SEP.2013 04:47:01

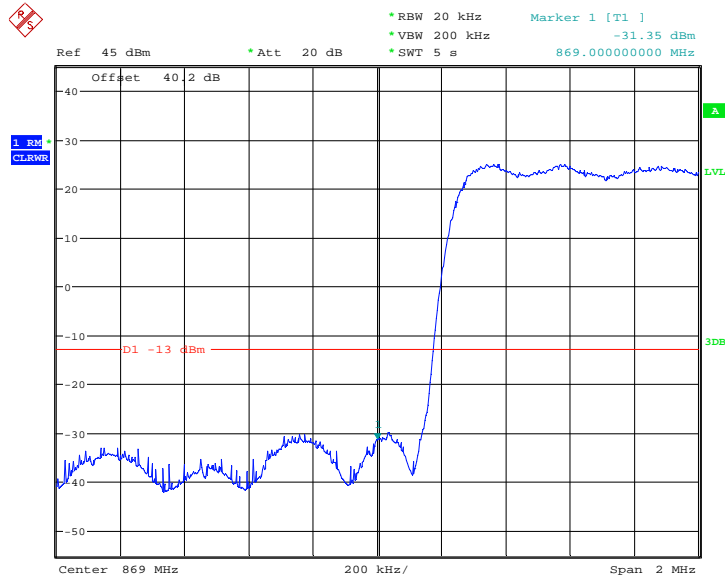


Product Service

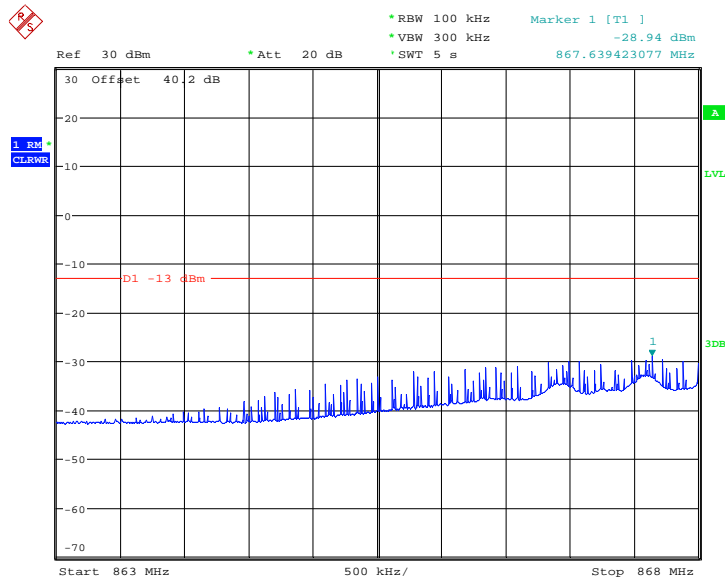
8PSK

Multi Carrier (1x6)

Configuration 1 - Mode 7



Date: 31.OCT.2013 11:56:58

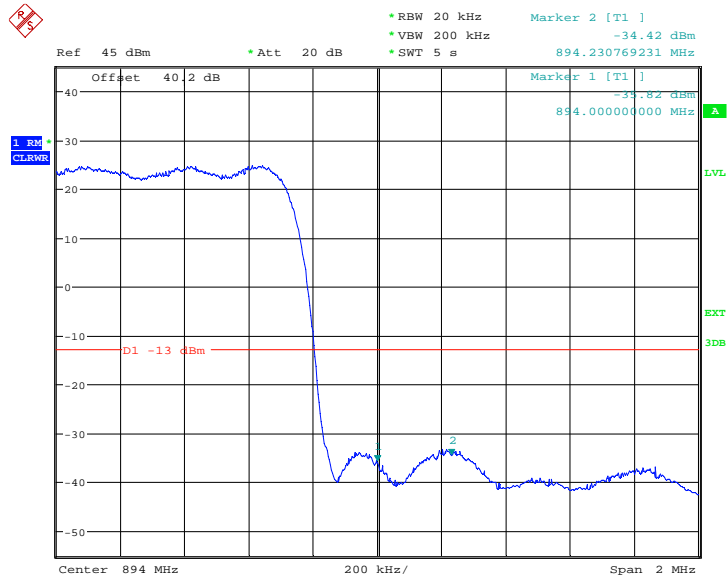


Date: 31.OCT.2013 11:58:12

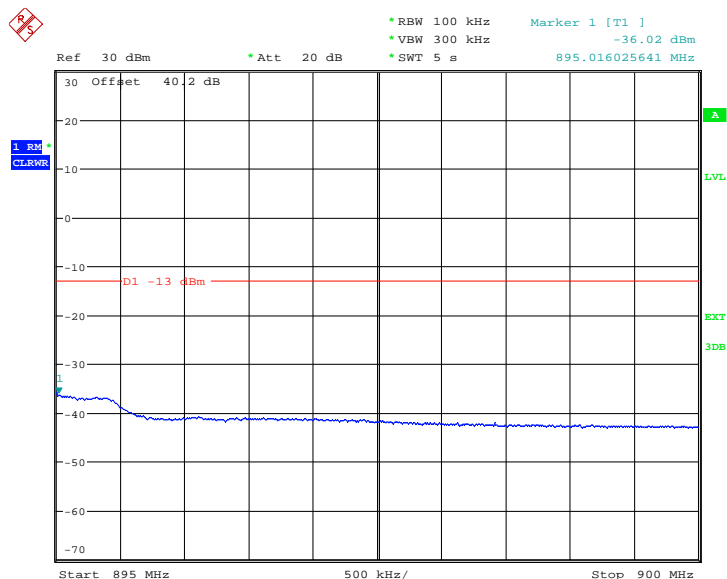


Product Service

Configuration 1 - Mode 9



Date: 26.SEP.2013 11:10:29



Date: 26.SEP.2013 11:11:37

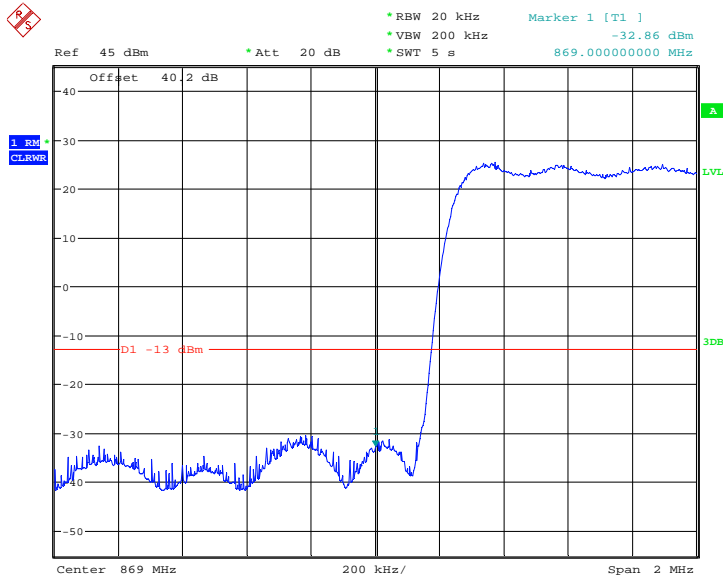


Product Service

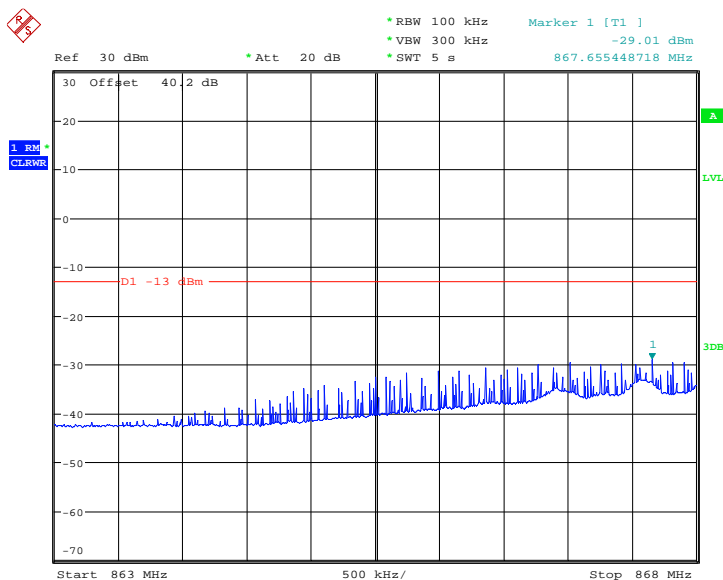
16QAM

Multi Carrier (1x6)

Configuration 1 - Mode 7



Date: 31.OCT.2013 12:12:14

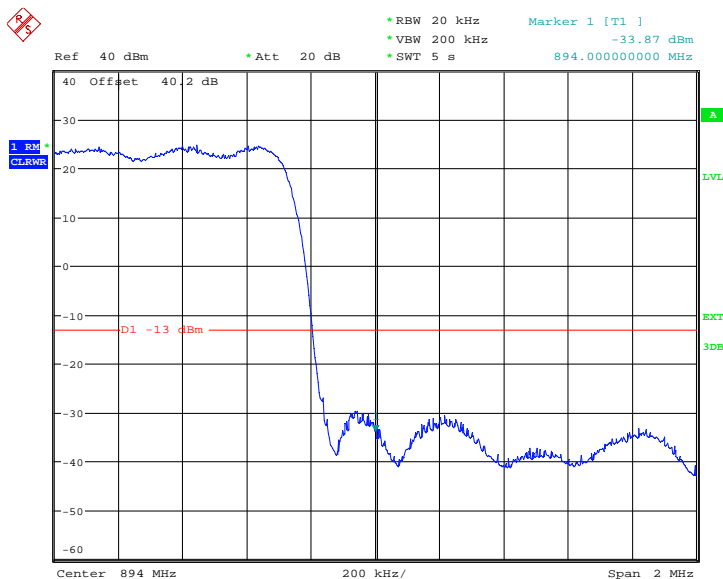


Date: 31.OCT.2013 12:12:46

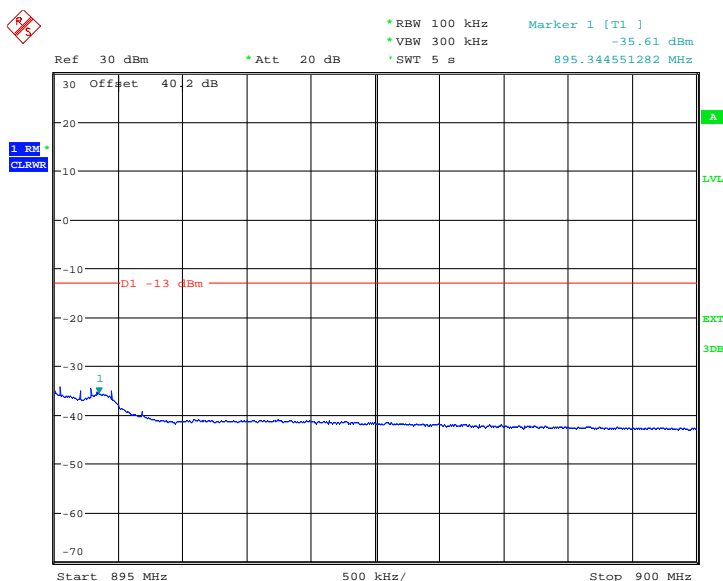


Product Service

Configuration 1 - Mode 9



Date: 27.SEP.2013 10:06:42



Date: 27.SEP.2013 10:07:46

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

RUS 02 B5 / KRC 161 320/1, S/N: CB27358543

2.6.3 Date of Test and Modification State

15 and 16 October 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 - $(43 + 10\log(P))$ dB

Where:

Field Strength is measured in dB μ 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:

$$E_{(v/m)} = (30 \times 1.64 \times 74.30)^{0.5} / 3 = 20.154V/m = 146.09dB\mu V/m$$

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

$$43 + 10\log(74.30) = 61.71dB$$

Therefore the limit at 3m measurement distance is:

$$146.09 - 61.71 = 84.4 \text{ dB}\mu V/m$$

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

	15 Oct 2013	16 Oct 2013
Ambient Temperature	19.0°C	20.5°C
Relative Humidity	60.0%	50.0%



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

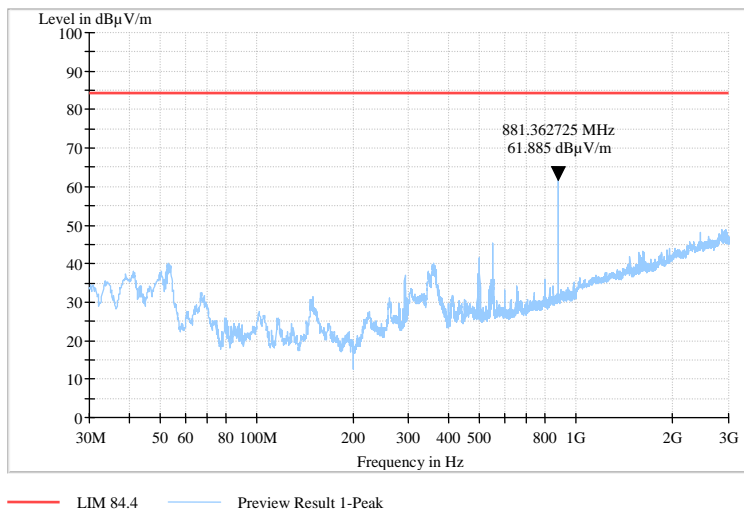
Single Carrier

Configuration 1 - Mode 1

No emissions were detected within 20dB of the limit.

Configuration 1 - Mode 2

30MHz to 3GHz

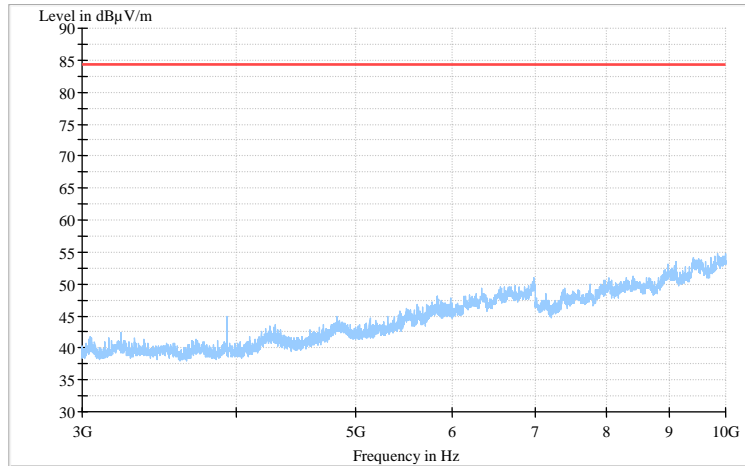


Note: The emission marked is the operating frequency.



Product Service

3GHz to 10GHz



— LIM 84.4 — Preview Result 1-Peak

Configuration 1 - Mode 3

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 2

No emissions were detected within 20dB of the limit.



Product Service

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

No emissions were detected within 20dB of the limit.

QPSK**Multi Carrier (1x6)**Configuration 1 - Mode 8

No emissions were detected within 20dB of the limit.

Limit	-13dBm / 84.4dB μ V/m
-------	---------------------------

Remarks

The EUT does not exceed -13dBm / 84.4dB μ 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

RUS 02 B5 / KRC 161 320/1, S/N: CB27358543

2.7.3 Date of Test and Modification State

24, 25, 26 and 27 September 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 10th 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



Product Service

2.7.6 Environmental Conditions

	24 Sep 2013	25 Sep 2013	26 Sep 2013	27 Sep 2013
Ambient Temperature	22.8°C	23.5°C	24.0°C	24.0°C
Relative Humidity	45.6%	48.4%	54.5%	63.0%

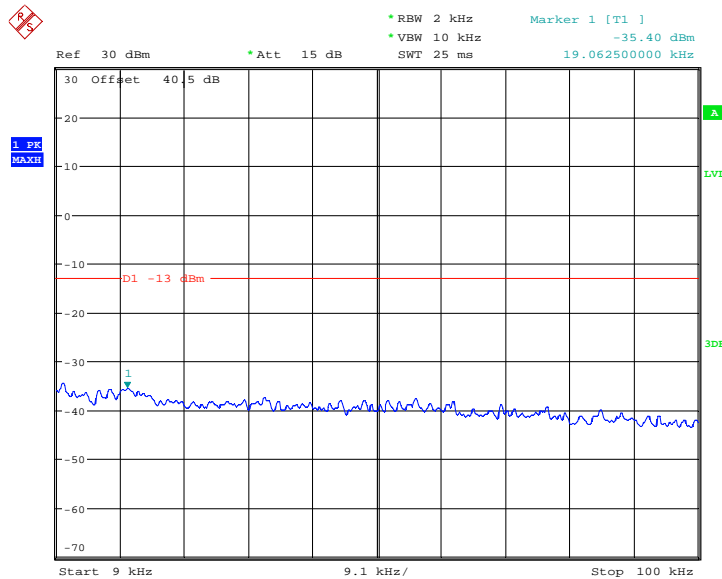
2.7.7 Test Results

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: 24.SEP.2013 10:21:53



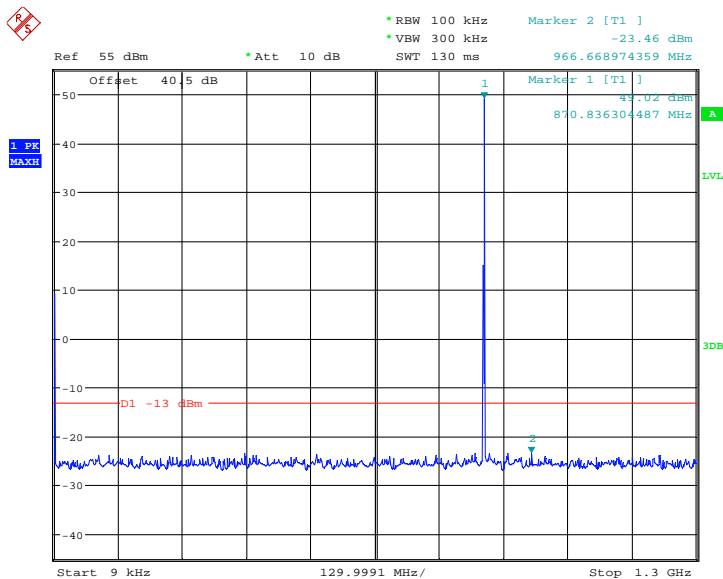
Product Service

QPSK

Single Carrier

Configuration - Mode 1

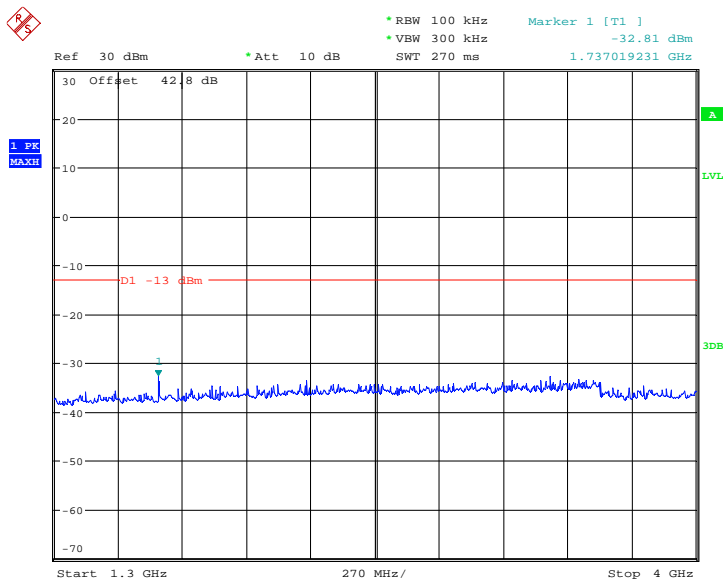
9kHz to 1.3GHz



Date: 24.SEP.2013 08:29:27

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

1.3GHz to 4GHz

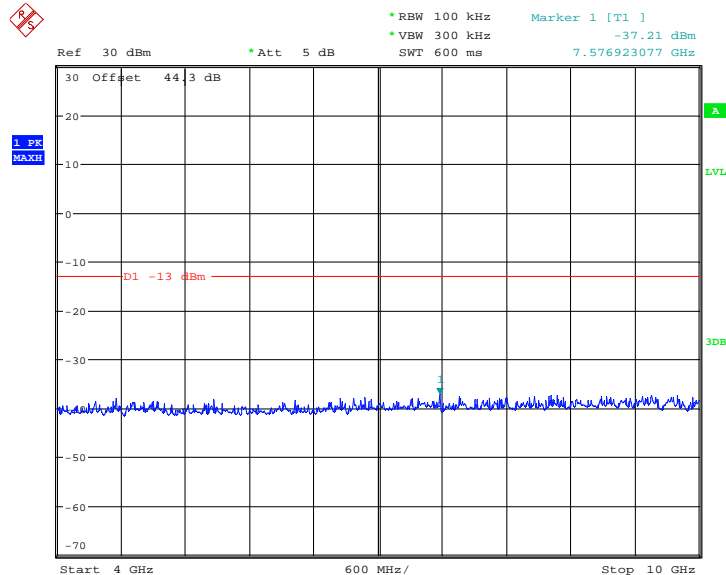


Date: 24.SEP.2013 09:38:08



Product Service

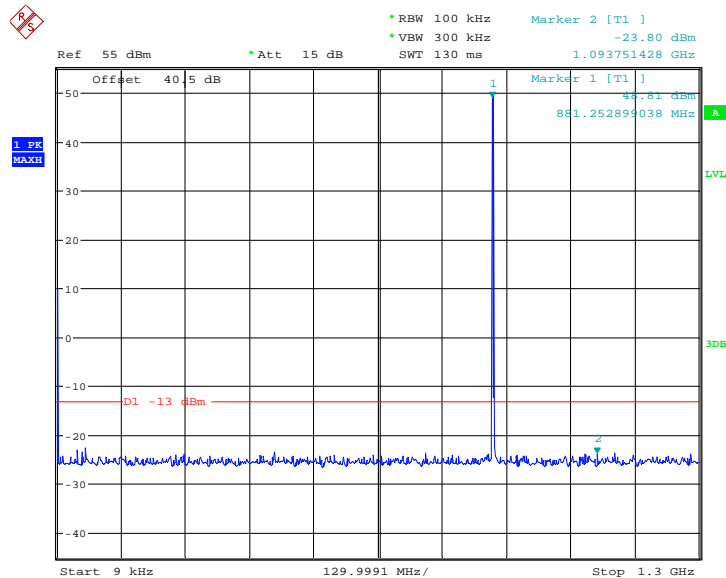
4GHz to 10GHz



Date: 24.SEP.2013 09:25:28

Configuration 1 - Mode 2

9kHz to 1.3GHz



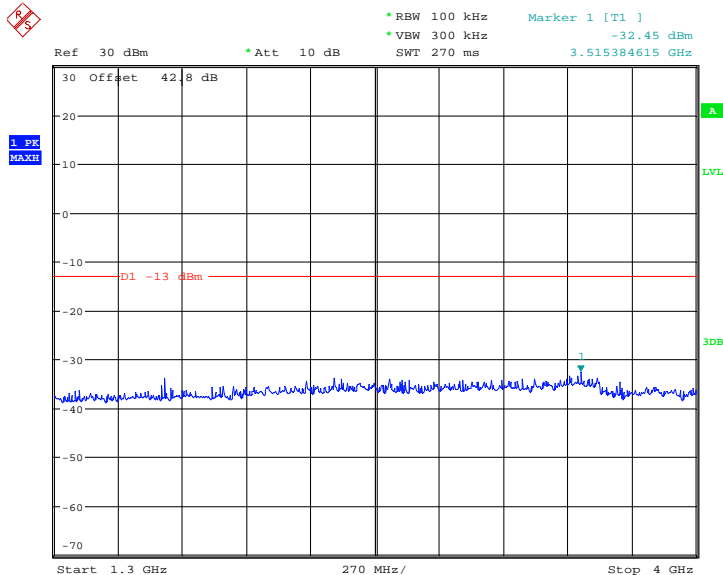
Date: 24.SEP.2013 09:53:45

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



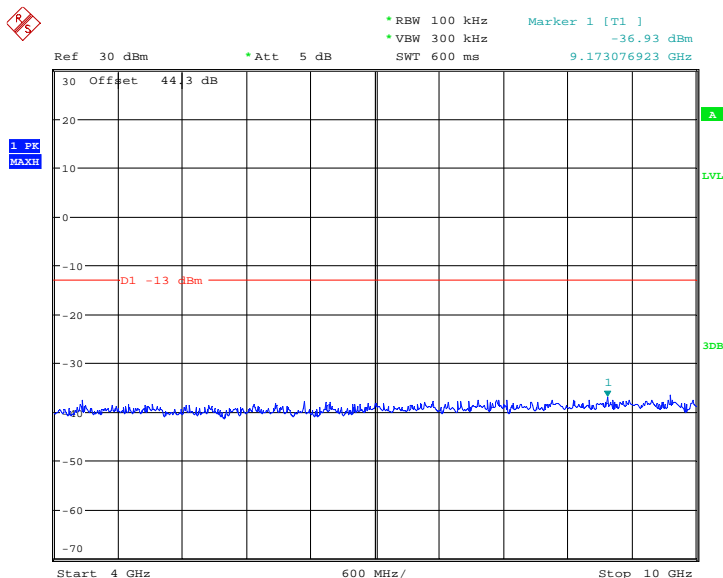
Product Service

1.3GHz to 4GHz



Date: 24.SEP.2013 09:48:53

4GHz to 10GHz



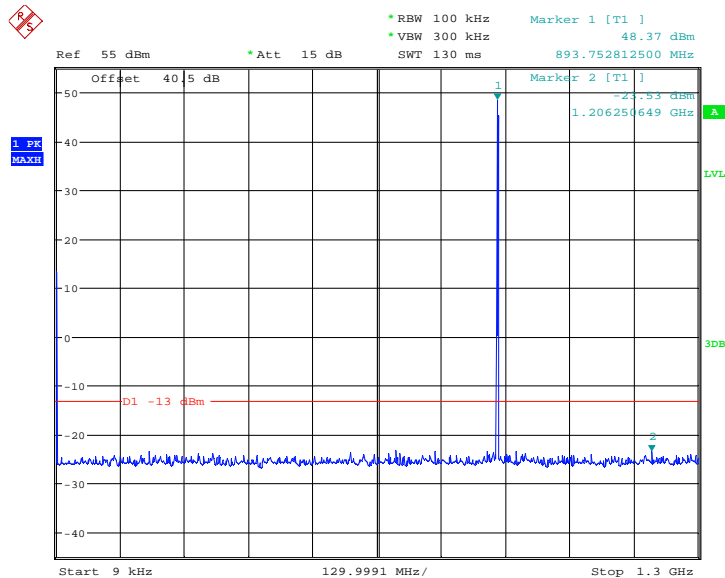
Date: 24.SEP.2013 09:54:56



Product Service

Configuration 1 - Mode 3

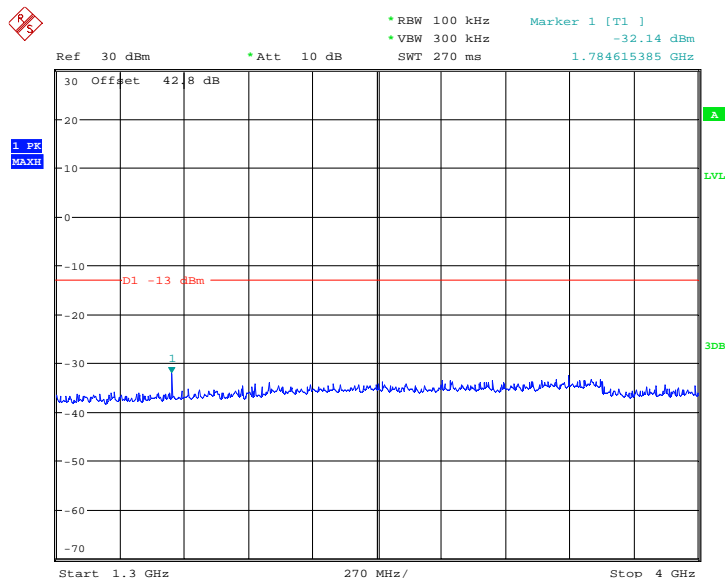
9kHz to 1.3GHz



Date: 24.SEP.2013 10:20:59

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

1.3GHz to 4GHz

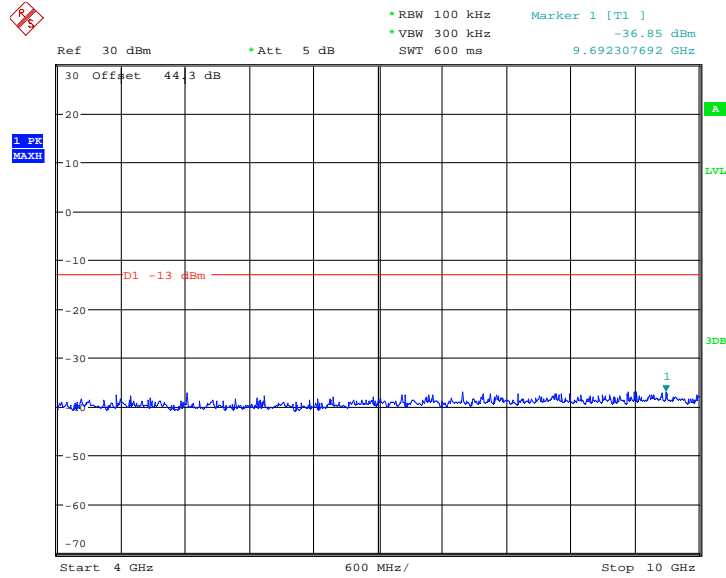


Date: 24.SEP.2013 10:27:16



Product Service

4GHz to 10GHz

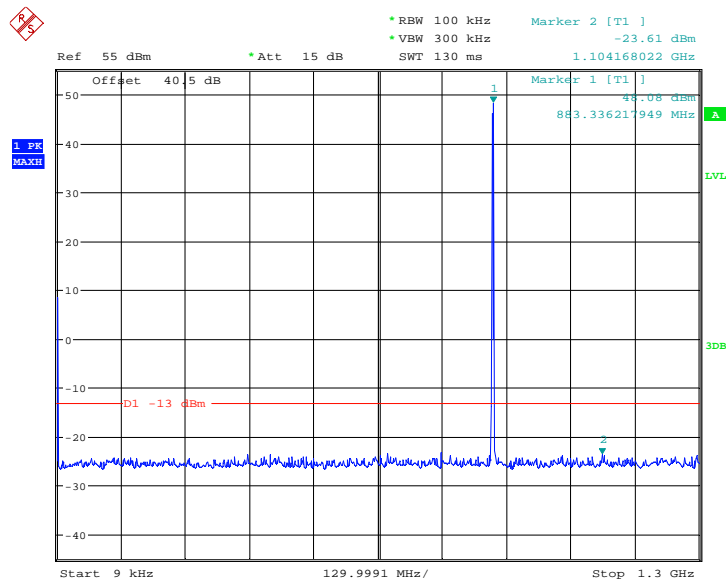


Date: 24.SEP.2013 10:23:01

Multi Carrier (1x2)

Configuration 1 - Mode 5

9kHz to 1.3GHz

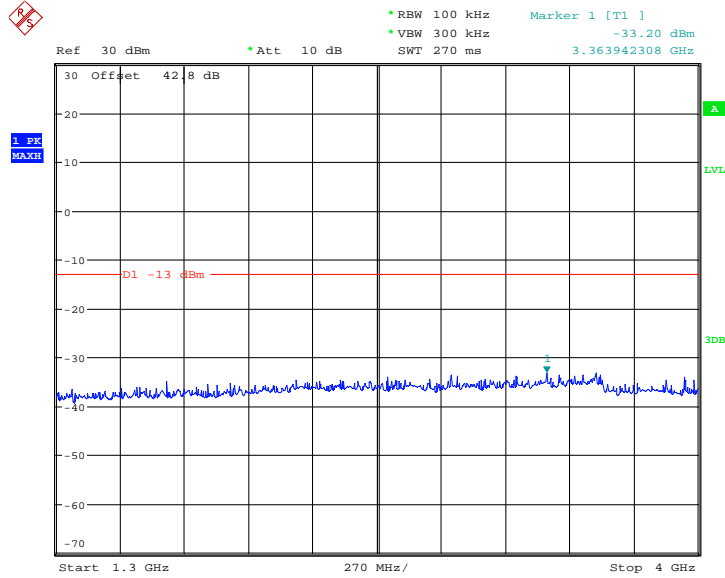


Date: 24.SEP.2013 11:33:43

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

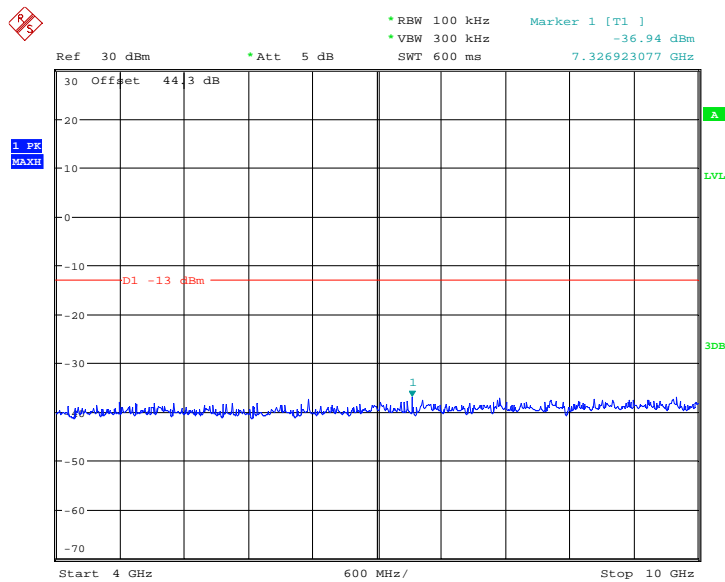


1.3GHz to 4GHz



Date: 24.SEP.2013 11:37:06

4GHz to 10GHz



Date: 24.SEP.2013 11:34:45

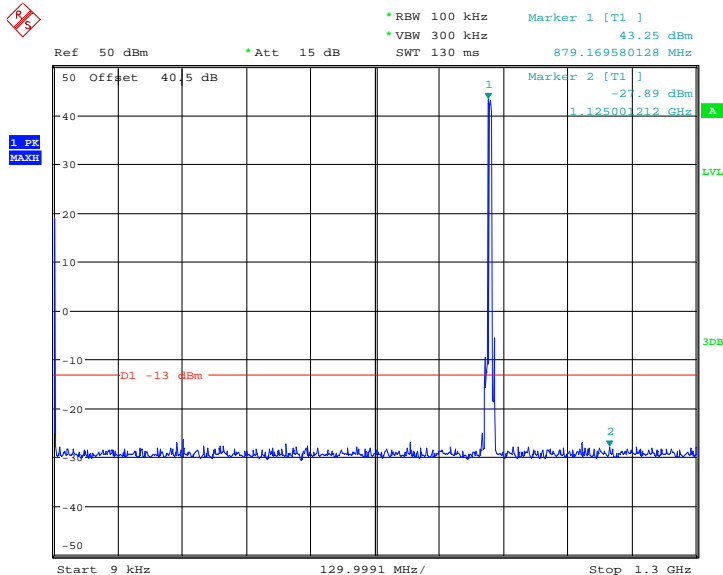


Product Service

Multi Carrier (1x6)

Configuration 1 - Mode 8

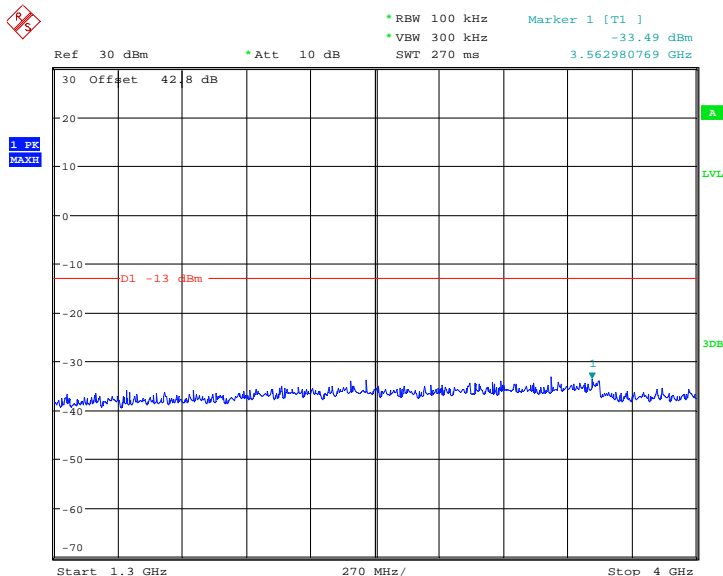
9kHz to 1.3GHz



Date: 25.SEP.2013 09:15:31

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

1.3GHz to 4GHz

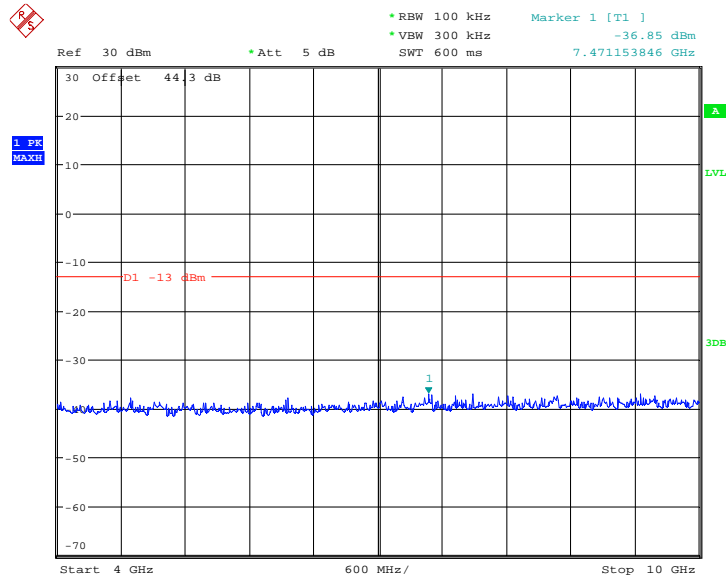


Date: 25.SEP.2013 09:26:16



Product Service

4GHz to 10GHz



Date: 25.SEP.2013 09:16:51

Limit	-13dBm
-------	--------

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

RUS 02 B5 / KRC 161 320/1, S/N: CB27358543

2.8.3 Date of Test and Modification State

21 and 22 October 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

	21 Oct 2013	22 Oct 2013
Ambient Temperature	20.5°C	21.0°C
Relative Humidity	56.2%	55.8%



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	-8.62
-20	-8.44
-10	-8.35
0	-8.21
+10	-8.87
+20	-9.64
+30	-8.53
+40	-8.50
+50	-8.33

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

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.



Product Service

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

RUS 02 B5 / KRC 161 320/1, S/N: CB27358543

2.9.3 Date of Test and Modification State

21 October 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

	21 October 2013
Ambient Temperature	20.5°C
Relative Humidity	56.2%



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	-9.58
-48.0	-9.64
-55.2	-10.01

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

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
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 (± 1MHz), Conducted Spurious Emissions.					
Spectrum Analyser	Rohde & Schwarz	FSQ	101127	12	04-Aug-2014
Power Meter	Rohde & Schwarz	NRP2	101283	12	04-Aug-2014
Power Sensor	Rohde & Schwarz	NRP Z51	102168	12	07-Apr-2014
Network Analyzer	Agilent	N5230C	MY49001112	12	04-Aug-2014
40 dB Attenuator	Aeroflex/Weinschel	66-40-33	CD4019	-	O/P MON
Pass filter	K&L	ULK 904 098/2	16	-	O/P MON
Load	Shanghai Huaxiang	TF100	09121602	-	O/P MON
Power Supply	Dahua	DH1716A-9	ETE/L676	-	28-Aug-2014
Digital Multi-meter	FLUKE	179	91820401	12	13-Dec-2013
Thermo-hygrometer	AZ Instruments	8705	9151655	12	16-Dec-2013
Section 2.6 – Radiated Spurious Emissions					
Load	Shanghai Huaxiang	TF100	09121631	-	O/P MON
Load	Shanghai Huaxiang	TF100	09121602	-	O/P MON
EMI Receiver	Rohde & Schwarz	ESIB26	100301	12	27-Mar-2014
Semi Anechoic Chamber	ETS-Lindgren	9.6m×6.72m×5.98m	-	12	18-Mar-2014
Double Ridge Guide Horn Antenna	ETS-Lindgren	EMCO 3117	00056662	36	15-Feb-2015
Double Ridge Guide Horn Antenna	ETS-Lindgren	EMCO 3117	00056645	36	15-Feb-2015
BiLog Antenna	Rohde & Schwarz	HL562	100488	36	15-Feb-2015
30MHz~3GHz Pre-amplifier	Rohde & Schwarz	SCU03	10005	-	O/P MON
3GHz~18GHz Pre-amplifier	Rohde & Schwarz	AFS42-00101800-25-S-42	1078388	-	O/P MON
Filters Array	Rohde & Schwarz	TS-Filt	-	-	O/P MON
Switches Array	Rohde & Schwarz	TS-RSP	100241	-	O/P MON
Multi-Device Controller	ETS-Lindgren	2090	00049393	-	-
Viedo monitoring system	ETS-Lindgren	Y21953A	2501103	-	-
Switches Array	Rohde & Schwarz	TS-RSP	100241	-	-
Power Supply	Dahua	DH1716A-9	ETE/L676	-	28-Aug-2014
Digital Multimeter	FLUKE	179	91820401	12	13-Dec-2013
Thermo-hygrometer	AZ Instruments	8705	9151655	12	16-Dec-2013



Product Service

Section 2.8 and 2.9 – Frequency Stability Under Temperature and Voltage Variations					
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-9	ETE/L676	-	28-Aug-2014
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 3GHz Amplitude	3.6dB*
Radiated Emissions, Horn Antenna, AOATS	3GHz to 18GHz Amplitude	4.6dB*
Worst case error for both Time and Frequency measurement 12 parts in 10^6		

* In accordance with CISPR 16-4



Product Service

SECTION 4

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).

This report must not be reproduced, except in its entirety, without the written permission of TÜV SÜD Product Service Limited

© 2014 TÜV SÜD Product Service Limited