Report On

FCC and Industry Canada Testing of the
Ericsson AB RRUS 01 B2 / KRC 118 74/2

COMMERCIAL-IN-CONFIDENCE

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IC ID: 287AB-AS118742

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REPORT ON FCC and Industry Canada Testing of the Ericsson RRUS 01 B2 / KRC 118 74/2

Document 75921090 Report 02 Issue 1

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APPROVED BY

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Authorised Signatory

DATED 28 March 2013

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate compliance with FCC CFR 47: Part 24 and Industry Canada RSS-133. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

G Dong X Zhang

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SECTION 1

REPORT SUMMARY

FCC and Industry Canada Testing of the
Ericsson RRUS 01 B2 / KRC 118 74/2

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1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Ericsson RRUS 01 B2 / KRC 118 74/2 to the requirements of FCC CFR 47 Part 24 and Industry Canada RSS-133.

Testing was carried out in support of a C2PC application for Grant of RRUS 01 B2 / KRC 118 74/2 for hardware update.

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 01 B2
Product Number	KRC 118 74/2
IC Model Number	AS118742
Serial Number(s)	D162554351 D162554353
Software Version	CXP 901 8350/1 R12B07
PIS Software Version	CXP 901 7316/1 R39UL
Hardware Version	R1F
Number of Samples Tested	2
Test Specification/Issue/Date	FCC CFR 47 Part 24: 2012 Industry Canada RSS-133 Issue 6: 2012
Incoming Release Date	Declaration of Build Status 13 December 2012
Order Number Date	PTP 13 December 2012
Start of Test	26 December 2012
Finish of Test	20 March 2013
Name of Engineer(s)	G Dong X Zhang
Related Document(s)	ANSI C63.4: 2009 FCC CFR 47 Part 2: 2012 Industry Canada RSS-GEN Issue 3: 2010

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1.2 BRIEF SUMMARY OF RESULTS

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

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

Product Service

Configuration 1 – Radio Equipment							
Section	Spec Clause		Test Description	Mode	Mod State	Result	Comments
	FCC Part 2 and 24	RSS-133 and RSS-GEN					
2.3	2.1047 (d)	6.2	Modulation Characteristics	1932.4MHz		N/A	-
				1960.0MHz	0	Pass	
				1987.6MHz		N/A	
				1932.4MHz + 1947.4MHz		N/A	
				1960.0MHz + 1975.0MHz		N/A	
				1972.6MHz + 1987.6MHz		N/A	
				1932.4MHz + 1937.4MHZ + 1942.4MHz + 1947.4MHz		N/A	
				1955.0MHz + 1960.0MHZ + 1965.0MHz + 1970.0MHz		N/A	
				1972.6MHz + 1977.6MHZ + 1982.6MHz + 1987.6MHz		N/A	
2.4	2.1049, 24.238 (b)	RSS-Gen 4.6.1	Occupied Bandwidth	1932.4MHz	0	Pass	-
				1960.0MHz	0	Pass	
				1987.6MHz	0	Pass	
				1932.4MHz + 1947.4MHz		N/A	
				1960.0MHz + 1975.0MHz		N/A	
				1972.6MHz + 1987.6MHz		N/A	
				1932.4MHz + 1937.4MHZ + 1942.4MHz + 1947.4MHz		N/A	
				1955.0MHz + 1960.0MHZ + 1965.0MHz + 1970.0MHz		N/A	
				1972.6MHz + 1977.6MHZ + 1982.6MHz + 1987.6MHz		N/A	
2.5	2.1051, 24.238 (b)	6.5	Spurious Emissions at Antenna Terminals (±1MHz)	1932.4MHz	0	Pass	-
				1960.0MHz		N/A	
				1987.6MHz	0	Pass	
				1932.4MHz + 1937.4MHz	0	Pass	
				1960.0MHz + 1975.0MHz		N/A	
				1982.6MHz + 1987.6MHz	0	Pass	
				1932.4MHz + 1937.4MHZ + 1942.4MHz + 1947.4MHz		N/A	
				1955.0MHz + 1960.0MHZ + 1965.0MHz + 1970.0MHz		N/A	
				1972.6MHz + 1977.6MHZ + 1982.6MHz + 1987.6MHz		N/A	

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Configuration 1 – Radio Equipment							
Section	Spec Clause		Test Description	Mode	Mod State	Result	Comments
	FCC Part 2 and 24	RSS-133 and RSS-GEN					
2.6	2.1053, 24.238 (a)	6.5	Radiated Spurious Emissions	1932.4MHz	0	Pass	-
				1960.0MHz	0	Pass	
				1987.6MHz	0	Pass	
				1932.4MHz + 1947.4MHz		N/A	
				1960.0MHz + 1975.0MHz	0	Pass	
				1972.6MHz + 1987.6MHz		N/A	
				1932.4MHz + 1937.4MHZ + 1942.4MHz + 1947.4MHz		N/A	
				1955.0MHz + 1960.0MHZ + 1965.0MHz + 1970.0MHz	0	Pass	
				1972.6MHz + 1977.6MHZ + 1982.6MHz + 1987.6MHz		N/A	
2.7	2.1051, 24.238 (a)	6.5	Conducted Spurious Emissions	1932.4MHz	0	Pass	-
				1960.0MHz	0	Pass	
				1987.6MHz	0	Pass	
				1932.4MHz + 1947.4MHz	0	Pass	
				1960.0MHz + 1975.0MHz	0	Pass	
				1972.6MHz + 1987.6MHz	0	Pass	
				1932.4MHz + 1937.4MHZ + 1942.4MHz + 1947.4MHz		N/A	
				1955.0MHz + 1960.0MHZ + 1965.0MHz + 1970.0MHz		N/A	
				1972.6MHz + 1977.6MHZ + 1982.6MHz + 1987.6MHz		N/A	
2.8	2.1055, 24.235	6.3	Frequency Stability Under Temperature Variations	1932.4MHz		N/A	-
				1960.0MHz		N/A	
				1987.6MHz		N/A	
				1932.4MHz + 1947.4MHz		N/A	
				1960.0MHz + 1975.0MHz		N/A	
				1972.6MHz + 1987.6MHz		N/A	
				1932.4MHz + 1937.4MHZ + 1942.4MHz + 1947.4MHz		N/A	
				1955.0MHz + 1960.0MHZ + 1965.0MHz + 1970.0MHz		N/A	
				1972.6MHz + 1977.6MHZ + 1982.6MHz + 1987.6MHz		N/A	

Product Service

Configuration 1 – Radio Equipment							
Section	Spec Clause		Test Description	Mode	Mod State	Result	Comments
	FCC Part 2 and 24	RSS-133 and RSS-GEN					
2.9	2.1055, 24.235	6.3	Frequency Stability Under Voltage Variations	1932.4MHz		N/A	-
				1960.0MHz		N/A	
				1987.6MHz		N/A	
				1932.4MHz + 1947.4MHz		N/A	
				1960.0MHz + 1975.0MHz		N/A	
				1972.6MHz + 1987.6MHz		N/A	
				1932.4MHz + 1937.4MHZ + 1942.4MHz + 1947.4MHz		N/A	
				1955.0MHz + 1960.0MHZ + 1965.0MHz + 1970.0MHz		N/A	
				1972.6MHz + 1977.6MHZ + 1982.6MHz + 1987.6MHz		N/A	

N/A – Not Applicable

Product Service

1.3 DECLARATION OF BUILD STATUS

MAIN EUT	
MANUFACTURING DESCRIPTION	Radio Equipment
MANUFACTURER	Ericsson AB
PRODUCT NUMBER	RRUS 01 B2
PART NUMBER	KRC 118 74/2
IC Model NUMBER	AS118742
SERIAL NUMBER	D162554351 D162554353
HARDWARE VERSION	R1F
SOFTWARE VERSION	CXP 901 8350/1 R12B07
PIS SOFTWARE VERSION	CXP 901 7316/1 R39UL
TRANSMITTER OPERATING RANGE	TX: 1932.4MHz - 1987.6MHz RX: 1852.4MHz - 1907.6MHz
MODULATIONS	QPSK, 16QAM, 64QAM
INTERMEDIATE FREQUENCIES	--
ITU DESIGNATION OF EMISSION	5M00F9W
CHANNEL BANDWIDTH	4.2 to 5MHz (configurable in steps of 100/200kHz)
OUTPUT POWER (RMS) (W or dBm)	Non-MIMO: Single Carrier: 1 x 49dBm (1 x 80W) Multi Carrier (x 2): 2 x 46dBm (2 x 40W) Multi Carrier (x 4): 4 x 43dBm (4 x 20W) MIMO: Single Carrier: 1 x 47dBm per port (1 x 50W per port) Multi Carrier (x 2): 2 x 46dBm per port (2 x 40W per port) Multi Carrier (x 4): 4 x 43dBm per port (4 x 20W per port)
OUTPUT POWER TOLERANCE	± 1dB
NUMBER OF ANTENNA PORTS	1 TX/ RX and 1 RX ports
FCC ID	TA8AKRC11874-2
IC ID	287AB-AS118742
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	The equipment is the Radio Part of WCDMA Base Station.

Signature 王艺

Date 20 March 2013

D of B S Serial No 75921090 /01

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

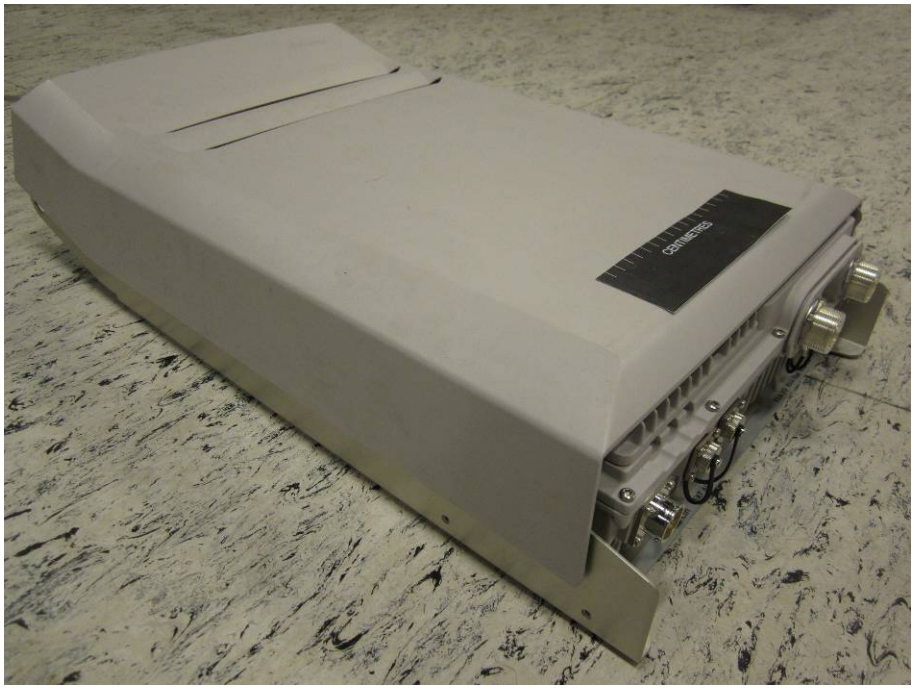
Product Service

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) RRUS 01 B2 / KRC 118 74/2 is an Ericsson Radio Equipment working in the public mobile service 1900MHz band which provides communication connections to WCDMA1900 network. The RRUS 01 B2 / KRC 118 74/2 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

Product Service

1.4.2 Test Configuration

Configuration 1: Base Station

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

The RRUS 01 B2 / KRC 118 74/2 supports Test Models TM1, TM5 and TM6 at 1900MHz defined in 3GPP TS 25.141. Test Model 1 (TM1) uses the QPSK modulation, Test Model 5 (TM5) includes the 16QAM modulation and Test Model 6 (TM6) includes 64QAM modulation.

The EUT can be configured to transmit in 1900MHz Non-MIMO mode with one TX/RX Port (RF A) and one RX Port (RF B). By combining two EUTs together, they can also be configured to transmit in MIMO mode with two TX/RX Ports (RF A1, RF A2) and two RX Ports (RF B1, RF B2). Both Non-MIMO and MIMO modes support single Carrier and Multi Carriers. Please refer to the table in clause 1.3 for the rated output power of Non-MIMO and MIMO modes.

The settings below were found to be representative for all traffic scenarios when several settings with the different modulations, channel bandwidths and the number of carriers were tested to find the worst case setting. These settings were used for all measurements unless otherwise stated.

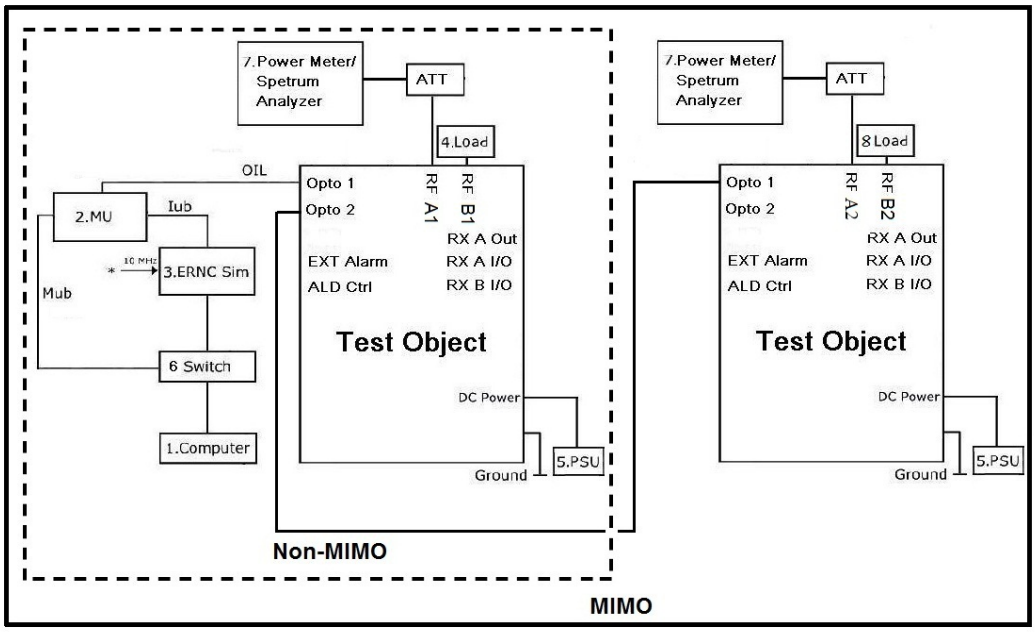
Non-MIMO:
Single carrier:
Test Model1 (TM1): 64 DPCHs at 30 ksps (SF=128)
Test Model 5 (TM5): 30 DPCHs at 30 ksps (SF=128) and 8 HS-PDSCHs at 240 ksps (SF=16)
Test Model 6 (TM6): 30 DPCHs at 30 ksps (SF=128) and 8 HS-PDSCHs at 240 ksps (SF=16)

MIMO:
Multi carrier (1x2):
Test model 1 (TM1): 32 DPCHs at 30 ksps (SF=128)
Test model 5 (TM5): 30 DPCHs at 30 ksps (SF=128) and 8 HS-PDSCHs at 240 ksps (SF=16)
Test model 6 (TM6): 30 DPCHs at 30 ksps (SF=128) and 8 HS-PDSCHs at 240 ksps (SF=16)

Channel bandwidth 5MHz.

The Output Power was tested on the Tx / Rx output connectors RF A1 and RF A2, all other cases were tested on the Tx / Rx output connector RF A1 as the representative port. RX antenna ports were terminated. The complete testing was performed with the EUT transmitting at maximum RF power unless otherwise stated. The EUT was powered by a -48V DC Power supply.

Test Setup, Conducted Measurement:

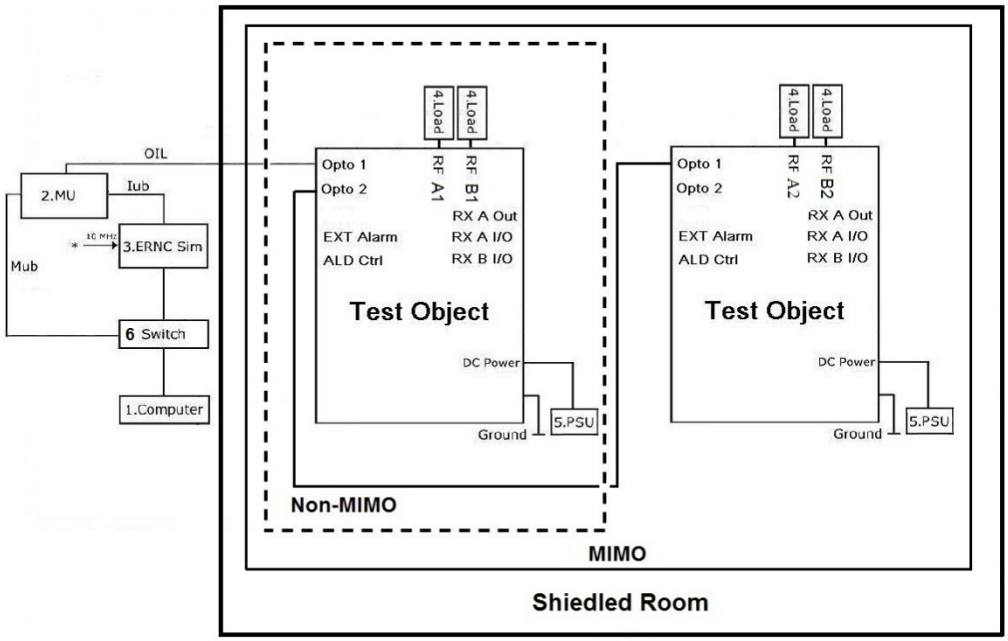


Product Name	Product Number	Version	Serial Number
RRUS 01 B2	KRC 118 74/2	R1F	D162554351
RRUS 01 B2	KRC 118 74/2	R1F	D162554353

No.	Auxiliary Equipment	Part Number / Model Type	Version	Serial Number
1	Computer	HP EliteBook 8540w	--	CND1234642
2	DUW 30 01 (housed in SUP 6601)	KDU 127 161/3	R4E	TD3M189973
	DUW 30 01 (housed in SUP 6601)	KDU 127 161/3	R4E	TD3M190000
3	eRNC sim	FAB102614	--	ETC/L167
4	Load	TFE100	--	09121647
5	Power Supply	DH1716A-10	--	1000303181
	Power Supply	DH1716A-14	--	20080401
6	Power Meter	Rohde & Schwarz NRP	--	102438
	Power Sensor	Rohde & Schwarz NRP-Z51	--	102434
	Spectrum Analyzer	FSQ26	--	200014
7	Switch	TL-SF1008+	2.1	09617800822
8	Load	TF2	--	051222151

Product Service

Test Setup, Radiated Measurement:



Product Name	Product Number	Version	Serial Number
RRUS 01 B2	KRC 118 74/2	R1F	D162554351
RRUS 01 B2	KRC 118 74/2	R1F	D162554353

No.	Auxiliary Equipment	Part Number / Model Type	Version	Serial Number
1	Computer	Sun Blade 500S	--	0826TFC1VD
2	DUW 30 01 (housed in SUP 6601)	KDU 127 161/3	R3C	CB4H371525
	DUW 30 01 (housed in SUP 6601)	KDU 127 161/3	R3C	CB4H415948
3	eRNC sim	FAB102614	--	ETC/L167
4	Load	TFE100	--	09121647
	Load	TFE100	--	09121631
	Load	TFE100	--	09121602
	Load	TF2	--	051222151
5	Power Supply	DH1716A-10	--	1000303181
	Power Supply	DH1716A-14	--	20080401
6	Switch	TL-SF1008+	2.1	09617800822

Product Service

1.4.3 Modes of Operation

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

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

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

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

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

Mode 5 – ARFCN 9800 + 9875: 1960.0MHz + 1975.0MHz (M and M+15MHz)

Mode 6 – ARFCN 9863 + 9938: 1982.6MHz + 1987.6MHz (T-15MHz and T)

Mode 7 – ARFCN 9662 + 9687: 1932.4MHz + 1937.4MHz (B and B+5MHz)

Mode 8 – ARFCN 9913 + 9938: 1982.6MHz + 1987.6MHz (T-5MHz and T)

Mode 9 - ARFCN 9662 + 9687 + 9712 + 9737:
1932.4MHz + 1937.4MHz + 1942.4MHz + 1947.4MHz (B, B+5MHz, B+10MHz and B+15MHz)

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

Mode 11 - ARFCN 9863 + 9888 + 9913 + 9938:
1972.6MHz + 1977.6MHz + 1982.6MHz + 1987.6MHz (T-15MHz, T-10MHz, T-5MHz and T)

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

Product Service

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

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.

Product Service

SECTION 2

TEST DETAILS

FCC and Industry Canada Testing of the
Ericsson RRUS 01 B2 / KRC 118 74/2

Product Service

2.1 MAXIMUM PEAK OUTPUT POWER - CONDUCTED

2.1.1 Specification Reference

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

2.1.2 Equipment Under Test

RRUS 01 B2 / KRC 118 74/2, S/N: D162554351/D162554353

2.1.3 Date of Test and Modification State

24 January 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 24 and Industry Canada RSS-133.

Using a power meter and attenuator(s), the output power of the EUT was measured at the antenna terminal. The carrier power was measured with QPSK, 16QAM, 64QAM using the test model described.

Since when working in MIMO mode, the EUT transmits on two antennas simultaneously in the same frequency range, the output power at both antennas were tested and the total power were then summed mathematically in linear power units by using the Measure-and Sum approach.

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 9
- Mode 10
- Mode 11

2.1.6 Environmental Conditions

	24 January 2013
Ambient Temperature	25.4°C
Relative Humidity	45.2%

Product Service

2.1.7 Test Results

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

The test results are shown below

Non-MIMO: Single Carrier: Rated output power is 49.0dBm

Configuration 1 - Mode 1, 2 and 3

TM1

UARFCN	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
9662 (Bottom)	1932.4	41.2	48.40	69.18
9800 (Middle)	1960.0	41.2	48.95	78.52
9938 (Top)	1987.6	41.2	48.36	68.55

TM5

UARFCN	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
9662 (Bottom)	1932.4	41.2	48.55	71.61
9800 (Middle)	1960.0	41.2	48.86	76.91
9938 (Top)	1987.6	41.2	48.34	68.23

TM6

UARFCN	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
9662 (Bottom)	1932.4	41.2	48.31	67.76
9800 (Middle)	1960.0	41.2	48.65	73.28
9938 (Top)	1987.6	41.2	48.14	65.16

MIMO: Single Carrier :Rated output power is 47.0dBm per port

Configuration 1 - Mode 1, 2 and 3

TM1

EARFCN	Frequency (MHz)	RF A1		RF A2		*Total (dBm) RMS	*Total (W) RMS
		Result (dBm) RMS	Result (W) RMS	Result (dBm) RMS	Result (W) RMS		
9662 (Bottom)	1932.4	47.02	50.35	47.02	50.35	50.03	100.70
9800 (Middle)	1960.0	47.11	51.40	46.93	49.31	50.03	100.71
9938 (Top)	1987.6	46.97	49.77	46.83	48.19	49.91	97.96

TM5

EARFCN	Frequency (MHz)	RF A1		RF A2		*Total (dBm) RMS	*Total (W) RMS
		Result (dBm) RMS	Result (W) RMS	Result (dBm) RMS	Result (W) RMS		
9662 (Bottom)	1932.4	47.01	50.23	47.00	50.11	50.01	100.34
9800 (Middle)	1960.0	47.10	51.29	46.96	49.66	50.04	100.95
9938 (Top)	1987.6	46.95	48.19	46.81	47.97	49.83	96.16

TM6

EARFCN	Frequency (MHz)	RF A1		RF A2		*Total (dBm) RMS	*Total (W) RMS
		Result (dBm) RMS	Result (W) RMS	Result (dBm) RMS	Result (W) RMS		
9662 (Bottom)	1932.4	46.85	48.42	46.87	48.64	49.87	97.06
9800 (Middle)	1960.0	46.91	49.09	46.75	47.31	49.84	96.40
9938 (Top)	1987.6	46.77	47.53	46.60	45.71	49.69	93.24

MIMO: Multi Carrier (x2): Rated output power is 2 x 46.0dBm per port

Configuration 1 - Mode 4, 5 and 6

TM1

EARFCN	Frequency (MHz)	RF A1		RF A2		*Total (dBm) RMS	*Total (W) RMS
		Result (dBm) RMS	Result (W) RMS	Result (dBm) RMS	Result (W) RMS		
9662 & 9737	1932.4 & 1947.4	48.99	79.25	48.74	74.82	52.00	158.73
9800 & 9875	1960.0 & 1975.0	48.81	76.03	48.89	77.45	51.86	153.48
9863 & 9938	1972.6 & 1987.6	48.83	76.38	48.71	74.30	51.78	150.68

TM5

EARFCN	Frequency (MHz)	RF A1		RF A2		*Total (dBm) RMS	*Total (W) RMS
		Result (dBm) RMS	Result (W) RMS	Result (dBm) RMS	Result (W) RMS		
9662 & 9737	1932.4 & 1947.4	48.98	79.07	48.95	78.52	51.97	157.59
9800 & 9875	1960.0 & 1975.0	48.98	79.07	49.04	80.17	52.02	159.24
9863 & 9938	1972.6 & 1987.6	48.95	78.52	48.88	77.27	51.92	155.79

TM6

EARFCN	Frequency (MHz)	RF A1		RF A2		*Total (dBm) RMS	*Total (W) RMS
		Result (dBm) RMS	Result (W) RMS	Result (dBm) RMS	Result (W) RMS		
9662 & 9737	1932.4 & 1947.4	49.01	79.62	48.95	78.52	51.99	158.41
9800 & 9875	1960.0 & 1975.0	49.08	80.91	49.09	81.09	52.09	162.00
9863 & 9938	1972.6 & 1987.6	48.96	78.70	48.87	77.09	51.92	155.79

MIMO: Multi Carrier (x4): Rated output power is 4 x 43.0dBm per port

Configuration 1 - Mode 9, 10 and 11

TM1

EARFCN	Frequency (MHz)	RF A1		RF A2		*Total (dBm) RMS	*Total (W) RMS
		Result (dBm) RMS	Result (W) RMS	Result (dBm) RMS	Result (W) RMS		
9662 & 9687 & 9712 & 9737	1932.4 & 1937.4 & 1942.4 & 1947.4	49.01	79.62	48.88	77.27	51.95	156.89
9775 & 9800 & 9913 & 9938	1955.0 & 1960.0 & 1965.0 & 1970.0	48.94	78.34	48.87	77.09	51.91	155.43
9863 & 9888 & 9913 & 9938	1972.6 & 1977.6 & 1982.6 7 1987.6	48.98	79.07	48.85	76.74	51.92	155.81

TM5

EARFCN	Frequency (MHz)	RF A1		RF A2		*Total (dBm) RMS	*Total (W) RMS
		Result (dBm) RMS	Result (W) RMS	Result (dBm) RMS	Result (W) RMS		
9662 & 9687 & 9712 & 9737	1932.4 & 1937.4 & 1942.4 & 1947.4	49.07	80.72	49.06	80.54	52.07	161.26
9775 & 9800 & 9913 & 9938	1955.0 & 1960.0 & 1965.0 & 1970.0	49.01	79.62	49.06	80.54	52.04	160.16
9863 & 9888 & 9913 & 9938	1972.6 & 1977.6 & 1982.6 7 1987.6	49.03	79.98	48.99	79.25	52.02	159.23

TM6

EARFCN	Frequency (MHz)	RF A1		RF A2		*Total (dBm) RMS	*Total (W) RMS
		Result (dBm) RMS	Result (W) RMS	Result (dBm) RMS	Result (W) RMS		
9662 & 9687 & 9712 & 9737	1932.4 & 1937.4 & 1942.4 & 1947.4	48.99	79.25	49.05	80.35	52.03	159.60
9775 & 9800 & 9913 & 9938	1955.0 & 1960.0 & 1965.0 & 1970.0	48.96	78.70	49.00	79.43	51.99	158.13
9863 & 9888 & 9913 & 9938	1972.6 & 1977.6 & 1982.6 7 1987.6	48.89	77.45	48.90	77.62	51.90	155.07

Note *:

Two transmitters output power were summed up according to FCC KDB662911 D01 for MIMO mode.

Limit	FCC: ≤1640W or ≤+62.15dBm IC: ≤100W or ≤+50dBm

Remarks

The total output power of the EUT does not exceed 1640W or 62.15Bm, and the output power per transmitter does not exceed 100W or 50dBm at the measured frequencies.

2.2 PEAK – AVERAGE RATIO

2.2.1 Specification Reference

FCC CFR 47 Part 24, Clause 24.232 (d)

2.2.2 Equipment Under Test

RRUS 01 B2 / KRC 118 74/2, S/N: D162554351/D162554353

2.2.3 Date of Test and Modification State

24 and 25 January 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 24.

A peak to average ratio measurment is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determined 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 Peak to Aaverage was measured with QPSK, 16QAM, 64QAM using the test models described.

The measurements were performed on the combined output connector RF A1. Limited complementary measurement were done at output conector RF A2 to verify identical performance for both transmitter chains in MIMO mode.

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

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

Configuration 1
- Mode 1
- Mode 2
- Mode 3
- Mode 4
- Mode 5
- Mode 6
- Mode 9
- Mode 10
- Mode 11

Product Service

2.2.6 Environmental Conditions

	24 January 2013	25 January 2013
Ambient Temperature	25.4°C	24.6°C
Relative Humidity	45.2%	38.8%

2.2.7 Test Results

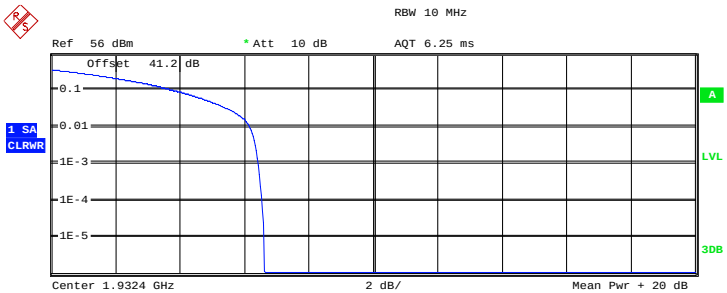
For the period of test the EUT met the requirements of FCC CFR 47 Part 24 Peak – Average Ratio.

The test results are shown below.

Non-MIMO: Single Carrier

Configuration 1 - Mode 1

TM1



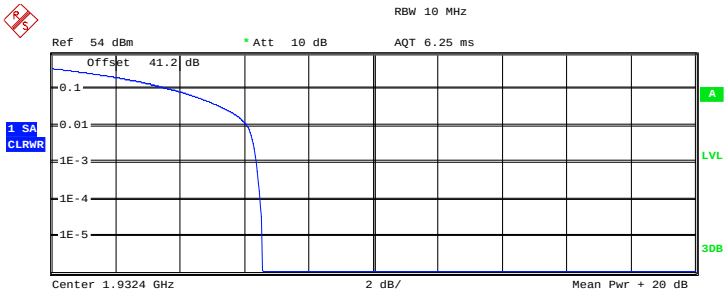
Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	48.73 dBm
Peak	55.36 dBm
Crest	6.63 dB
10 %	3.85 dB
1 %	6.15 dB
.1 %	6.44 dB
.01 %	6.54 dB

Date: 24.JAN.2013 01:21:11

Product Service

TM5

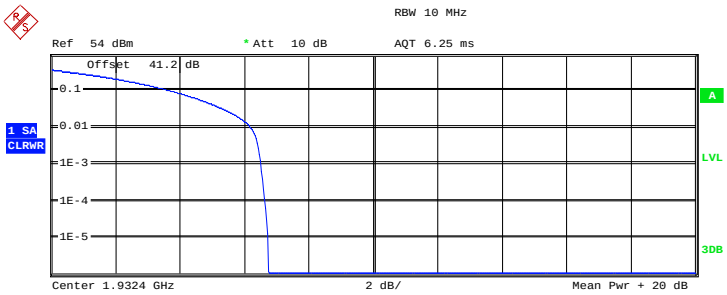


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	48.77 dBm
Peak	55.33 dBm
Crest	6.56 dB
10 %	3.78 dB
1 %	6.09 dB
.1 %	6.38 dB
.01 %	6.51 dB

Date: 24.JAN.2013 04:29:15

TM6



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

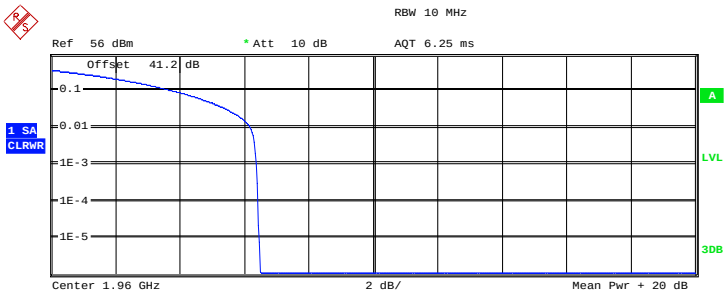
	Trace 1
Mean	48.59 dBm
Peak	55.33 dBm
Crest	6.74 dB
10 %	3.75 dB
1 %	6.19 dB
.1 %	6.51 dB
.01 %	6.63 dB

Date: 24.JAN.2013 05:41:43

Product Service

Configuration 1 – Mode 2

TM1

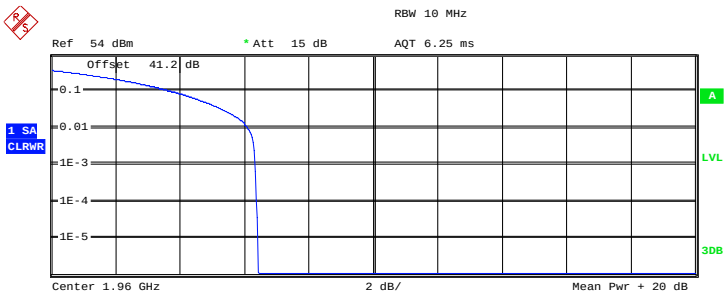


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	49.13 dBm
Peak	55.61 dBm
Crest	6.48 dB
10 %	3.81 dB
1 %	6.19 dB
.1 %	6.38 dB
.01 %	6.44 dB

Date: 24.JAN.2013 01:02:15

TM5



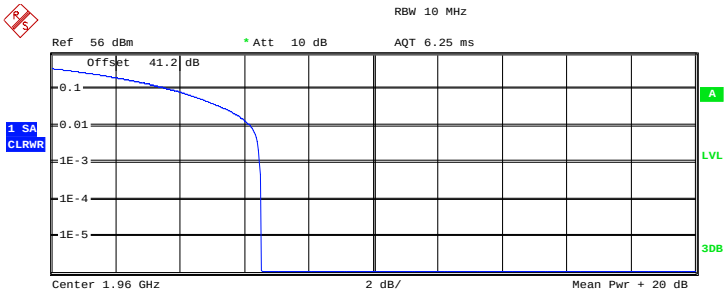
Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	49.13 dBm
Peak	55.54 dBm
Crest	6.42 dB
10 %	3.75 dB
1 %	6.09 dB
.1 %	6.35 dB
.01 %	6.38 dB

Date: 24.JAN.2013 04:42:31

Product Service

TM6



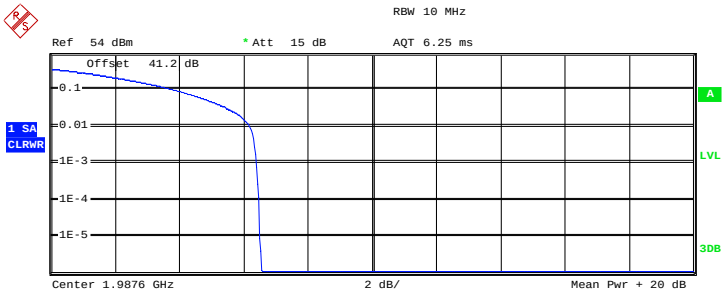
Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	48.87 dBm
Peak	55.40 dBm
Crest	6.52 dB
10 %	3.75 dB
1 %	6.19 dB
.1 %	6.47 dB
.01 %	6.54 dB

Date: 24.JAN.2013 06:02:09

Configuration 1 – Mode 3

TM1



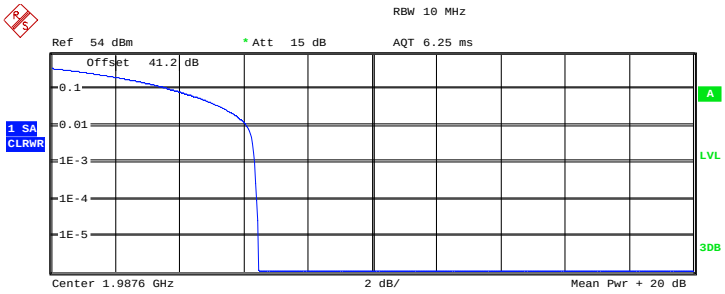
Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	48.64 dBm
Peak	55.19 dBm
Crest	6.55 dB
10 %	3.81 dB
1 %	6.19 dB
.1 %	6.41 dB
.01 %	6.47 dB

Date: 24.JAN.2013 03:07:17

Product Service

TM5

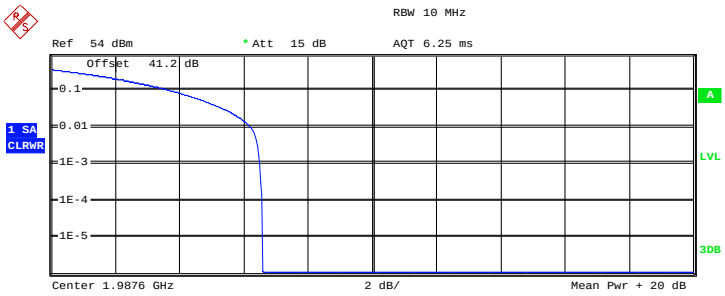


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	48.68 dBm
Peak	55.12 dBm
Crest	6.44 dB
10 %	3.75 dB
1 %	6.09 dB
.1 %	6.35 dB
.01 %	6.41 dB

Date: 24.JAN.2013 04:54:41

TM6



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

	Trace 1
Mean	48.46 dBm
Peak	55.05 dBm
Crest	6.59 dB
10 %	3.75 dB
1 %	6.19 dB
.1 %	6.51 dB
.01 %	6.57 dB

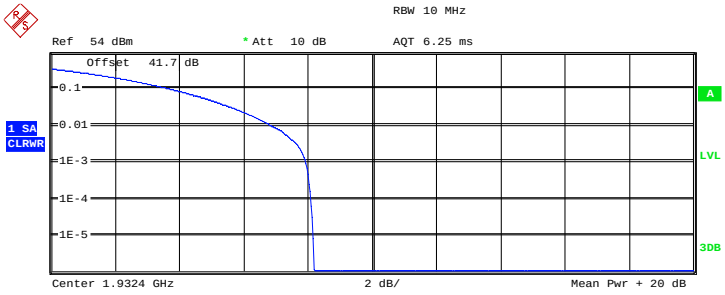
Date: 24.JAN.2013 05:03:27

Product Service

MIMO: Single Carrier

Configuration 1 - Mode 1

TM1

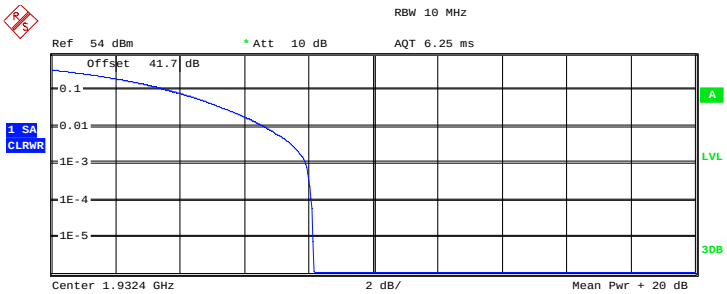


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	47.16 dBm
Peak	55.33 dBm
Crest	8.17 dB
10 %	3.75 dB
1 %	6.86 dB
.1 %	7.95 dB
.01 %	8.11 dB

Date: 26.MAR.2013 05:26:59

TM5



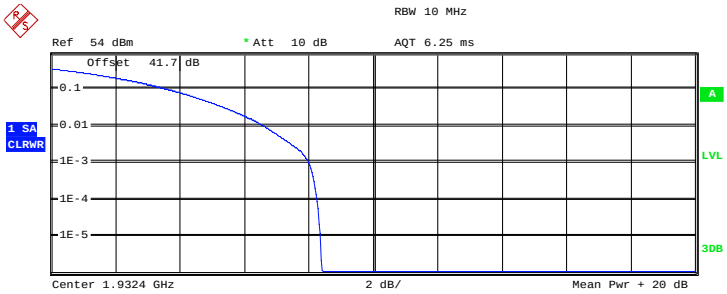
Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	47.20 dBm
Peak	55.33 dBm
Crest	8.13 dB
10 %	3.69 dB
1 %	6.63 dB
.1 %	7.92 dB
.01 %	8.08 dB

Date: 26.MAR.2013 06:07:13

Product Service

TM6



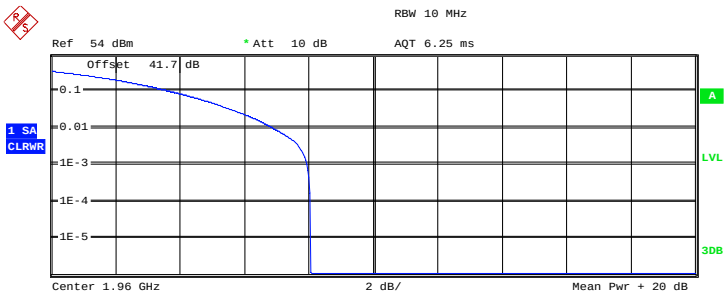
Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	47.01 dBm
Peak	55.40 dBm
Crest	8.39 dB
10 %	3.65 dB
1 %	6.60 dB
.1 %	8.01 dB
.01 %	8.27 dB

Date: 26.MAR.2013 06:12:18

Configuration 1 - Mode 2

TM1



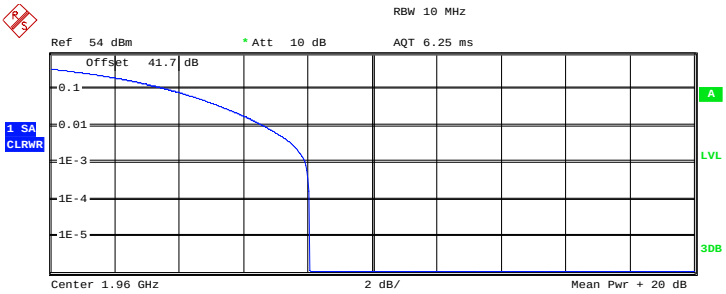
Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	47.18 dBm
Peak	55.23 dBm
Crest	8.05 dB
10 %	3.75 dB
1 %	6.89 dB
.1 %	7.95 dB
.01 %	8.04 dB

Date: 26.MAR.2013 05:35:03

Product Service

TM5

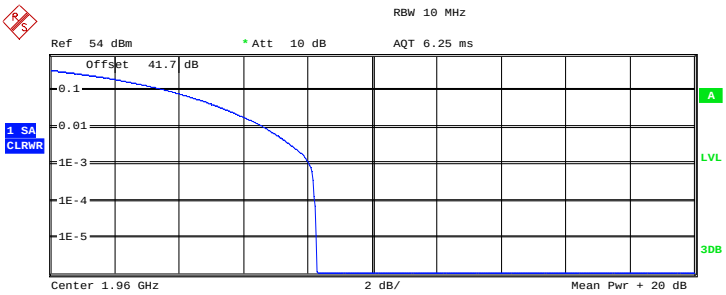


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 11.2MHz

	Trace 1
Mean	47.31 dBm
Peak	55.37 dBm
Crest	8.06 dB
10 %	3.69 dB
1 %	6.63 dB
.1 %	7.92 dB
.01 %	8.04 dB

Date: 26.MAR.2013 05:58:56

TM6



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

	Trace 1
Mean	47.11 dBm
Peak	55.37 dBm
Crest	8.26 dB
10 %	3.69 dB
1 %	6.63 dB
.1 %	8.04 dB
.01 %	8.21 dB

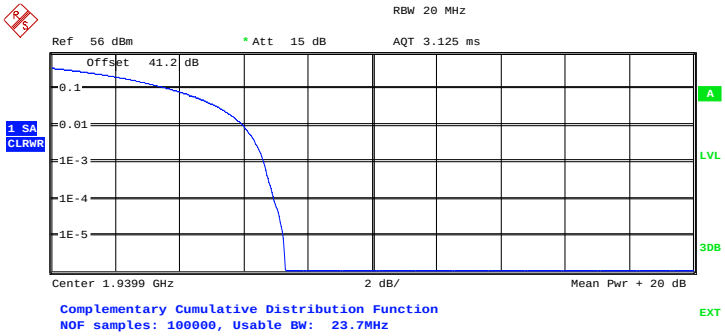
Date: 26.MAR.2013 06:19:05

Product Service

MIMO: Multi Carrier (x2)

Configuration 1 - Mode 4

TM1

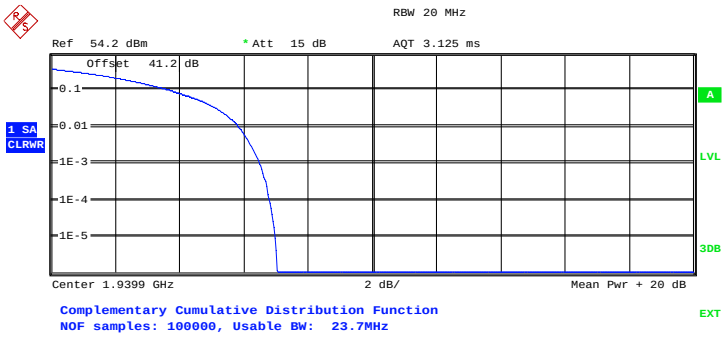


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

	Trace 1
Mean	49.10 dBm
Peak	56.39 dBm
Crest	7.28 dB
10 %	3.72 dB
1 %	5.96 dB
.1 %	6.63 dB
.01 %	6.92 dB

Date: 18.JAN.2013 03:58:33

TM5



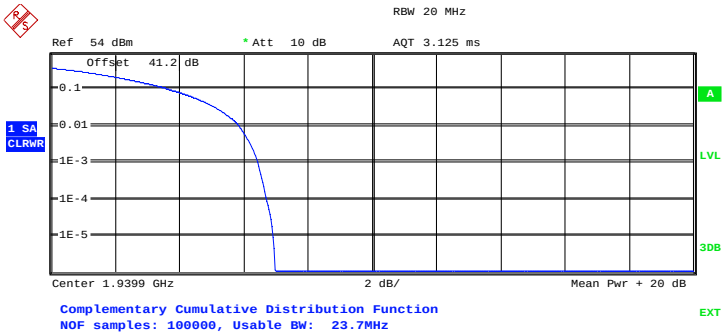
Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

	Trace 1
Mean	49.32 dBm
Peak	56.35 dBm
Crest	7.04 dB
10 %	3.72 dB
1 %	5.83 dB
.1 %	6.51 dB
.01 %	6.79 dB

Date: 18.JAN.2013 06:38:50

Product Service

TM6

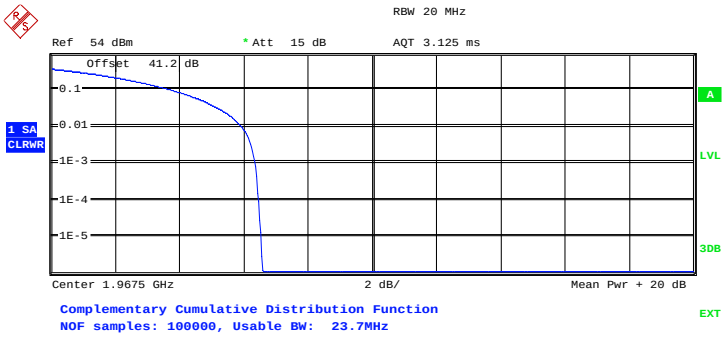


	Trace 1
Mean	49.22 dBm
Peak	56.19 dBm
Crest	6.97 dB
10 %	3.69 dB
1 %	5.83 dB
.1 %	6.44 dB
.01 %	6.70 dB

Date: 18.JAN.2013 07:32:07

Configuration 1 – Mode 5

TM1

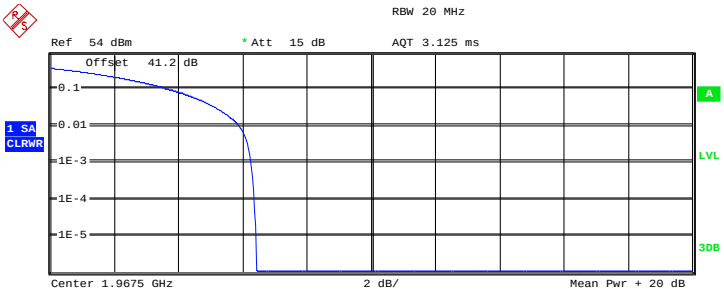


	Trace 1
Mean	49.14 dBm
Peak	55.71 dBm
Crest	6.57 dB
10 %	3.75 dB
1 %	5.93 dB
.1 %	6.35 dB
.01 %	6.47 dB

Date: 18.JAN.2013 04:16:11

Product Service

TM5

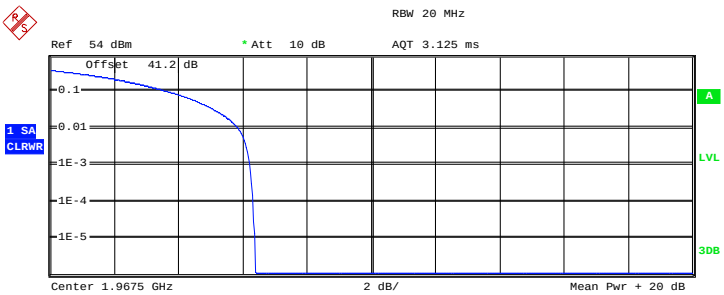


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

	Trace 1
Mean	49.28 dBm
Peak	55.71 dBm
Crest	6.43 dB
10 %	3.72 dB
1 %	5.87 dB
.1 %	6.25 dB
.01 %	6.38 dB

Date: 18.JAN.2013 06:23:18

TM6



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

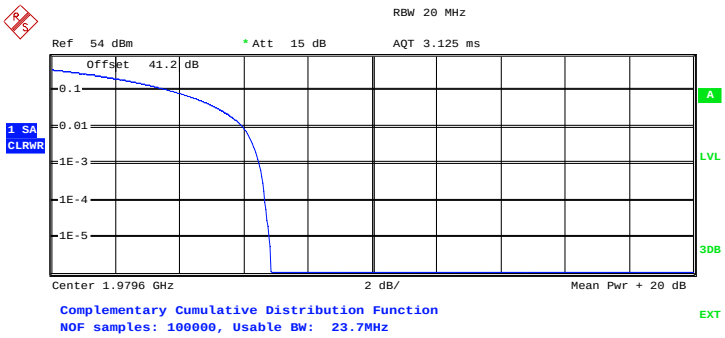
	Trace 1
Mean	49.21 dBm
Peak	55.60 dBm
Crest	6.40 dB
10 %	3.69 dB
1 %	5.83 dB
.1 %	6.22 dB
.01 %	6.31 dB

Date: 21.JAN.2013 00:28:59

Product Service

Configuration 1 – Mode 6

TM1

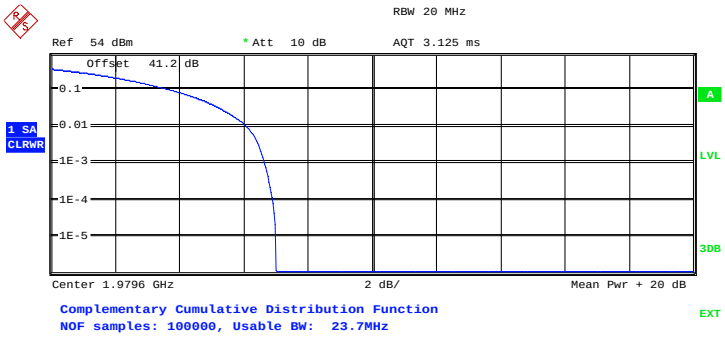


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

	Trace 1
Mean	49.07 dBm
Peak	55.93 dBm
Crest	6.85 dB
10 %	3.75 dB
1 %	5.96 dB
.1 %	6.47 dB
.01 %	6.67 dB

Date: 18.JAN.2013 04:33:54

TM5



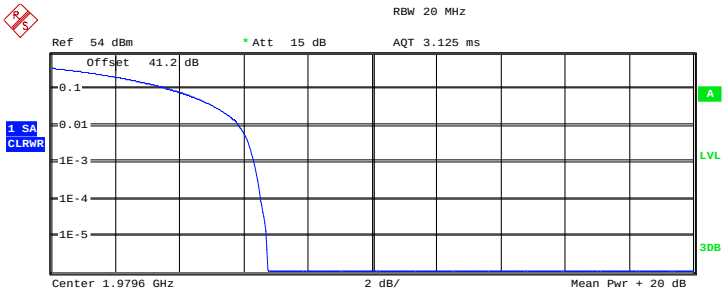
Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

	Trace 1
Mean	48.61 dBm
Peak	55.61 dBm
Crest	7.00 dB
10 %	3.75 dB
1 %	6.09 dB
.1 %	6.63 dB
.01 %	6.89 dB

Date: 18.JAN.2013 04:59:49

Product Service

TM6



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

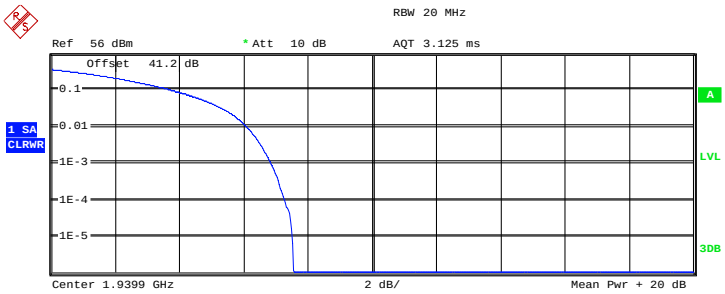
	Trace 1
Mean	49.26 dBm
Peak	56.00 dBm
Crest	6.73 dB
10 %	3.72 dB
1 %	5.83 dB
.1 %	6.31 dB
.01 %	6.54 dB

Date: 18.JAN.2013 07:06:32

Multi Carrier (1x4)

Configuration 1 – Mode 9

TM1

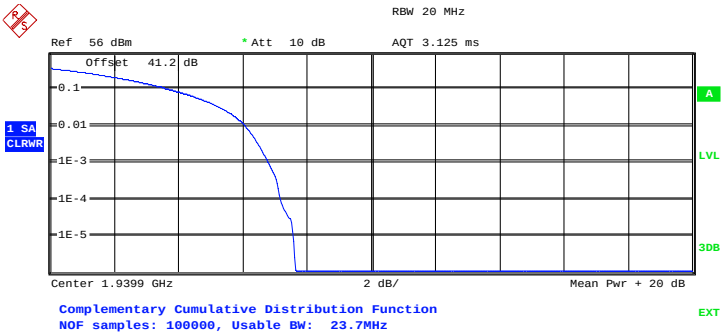


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

	Trace 1
Mean	49.25 dBm
Peak	56.79 dBm
Crest	7.54 dB
10 %	3.78 dB
1 %	6.06 dB
.1 %	6.86 dB
.01 %	7.28 dB

Date: 17.JAN.2013 04:16:17

TM5

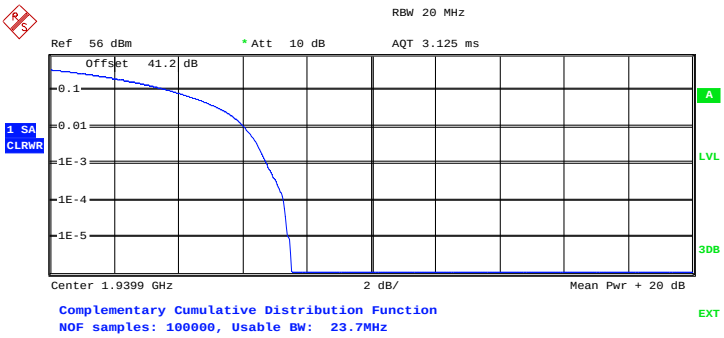


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

	Trace 1
Mean	49.30 dBm
Peak	56.93 dBm
Crest	7.63 dB
10 %	3.72 dB
1 %	6.06 dB
.1 %	6.79 dB
.01 %	7.18 dB

Date: 22.JAN.2013 06:26:29

TM6



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

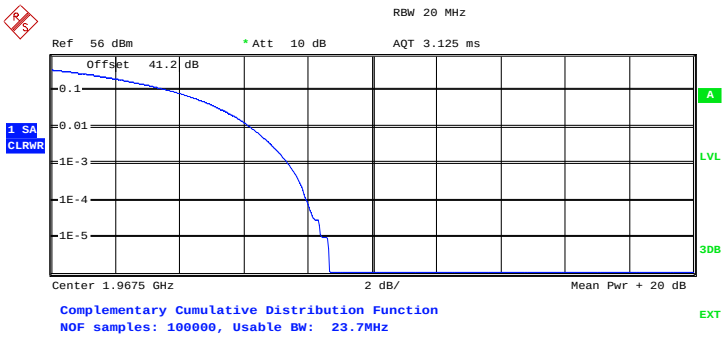
	Trace 1
Mean	49.27 dBm
Peak	56.79 dBm
Crest	7.51 dB
10 %	3.75 dB
1 %	6.03 dB
.1 %	6.73 dB
.01 %	7.28 dB

Date: 22.JAN.2013 06:58:52

Product Service

Configuration 1 – Mode 10

TM1

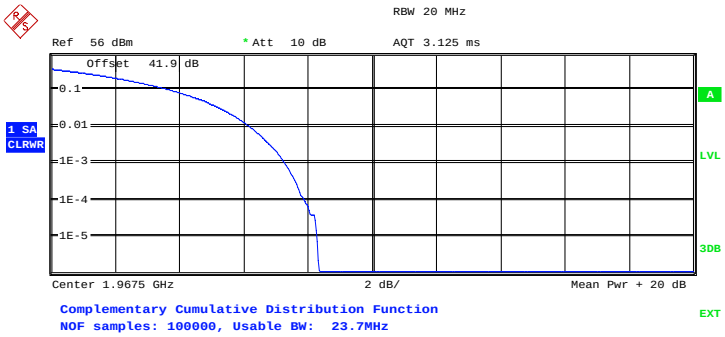


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

	Trace 1
Mean	48.31 dBm
Peak	56.98 dBm
Crest	8.67 dB
10 %	3.72 dB
1 %	6.19 dB
.1 %	7.37 dB
.01 %	7.95 dB

Date: 17.JAN.2013 04:44:59

TM5



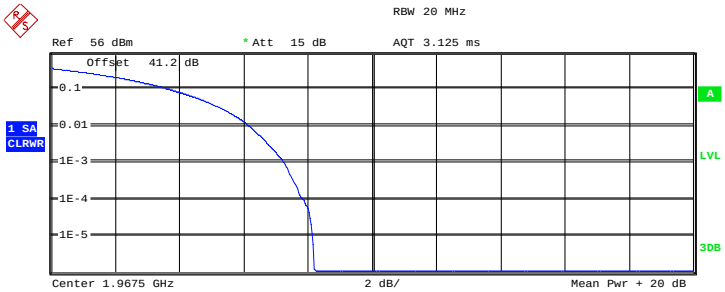
Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

	Trace 1
Mean	49.06 dBm
Peak	57.39 dBm
Crest	8.33 dB
10 %	3.72 dB
1 %	6.15 dB
.1 %	7.28 dB
.01 %	7.88 dB

Date: 18.JAN.2013 00:10:53

Product Service

TM6



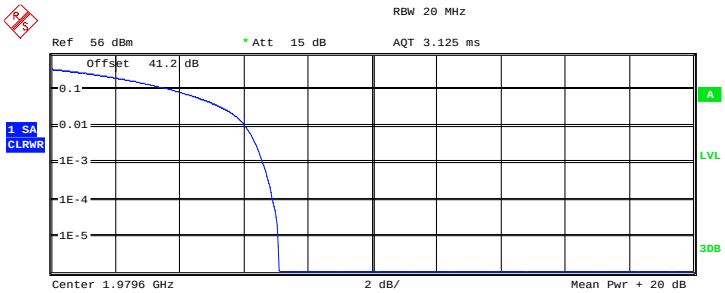
Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

	Trace 1
Mean	48.44 dBm
Peak	56.64 dBm
Crest	8.20 dB
10 %	3.72 dB
1 %	6.15 dB
.1 %	7.24 dB
.01 %	7.85 dB

Date: 18.JAN.2013 01:10:41

Configuration 1 – Mode 11

TM1



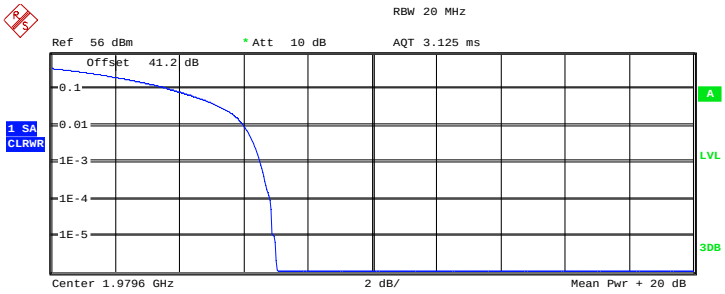
Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

	Trace 1
Mean	49.21 dBm
Peak	56.30 dBm
Crest	7.08 dB
10 %	3.78 dB
1 %	6.06 dB
.1 %	6.60 dB
.01 %	6.89 dB

Date: 17.JAN.2013 06:47:23

Product Service

TM5

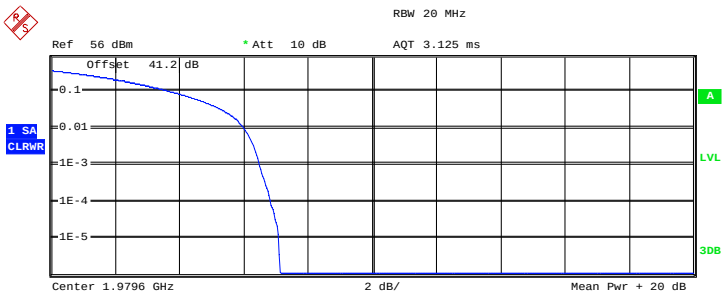


Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

	Trace 1
Mean	49.19 dBm
Peak	56.21 dBm
Crest	7.02 dB
10 %	3.75 dB
1 %	5.99 dB
.1 %	6.51 dB
.01 %	6.83 dB

Date: 22.JAN.2013 06:38:42

TM6



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 23.7MHz

	Trace 1
Mean	49.16 dBm
Peak	56.28 dBm
Crest	7.12 dB
10 %	3.75 dB
1 %	5.99 dB
.1 %	6.51 dB
.01 %	6.83 dB

Date: 22.JAN.2013 06:47:32

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-133 Clause 6.2

2.3.2 Equipment Under Test

RRUS 01 B2 / KRC 118 74/2, S/N: D162554351

2.3.3 Date of Test and Modification State

24 January 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-133.

The EUT supports QPSK, 16QAM and 64QAM modulations.

The measurements were performed with the EUT configured in Non-MIMO single carrier mode.

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 January 2013
Ambient Temperature	25.4°C
Relative Humidity	45.2%

Product Service

2.3.6 Test Results

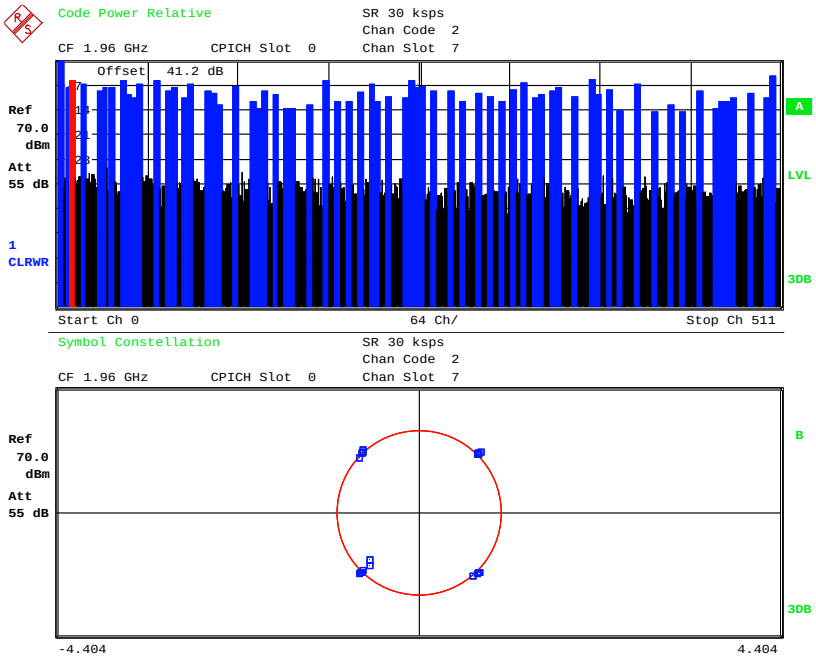
For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Industry Canada RSS-133 for Modulation Characteristics.

The test results are shown below

Single Carrier

Configuration 1 - Mode 2

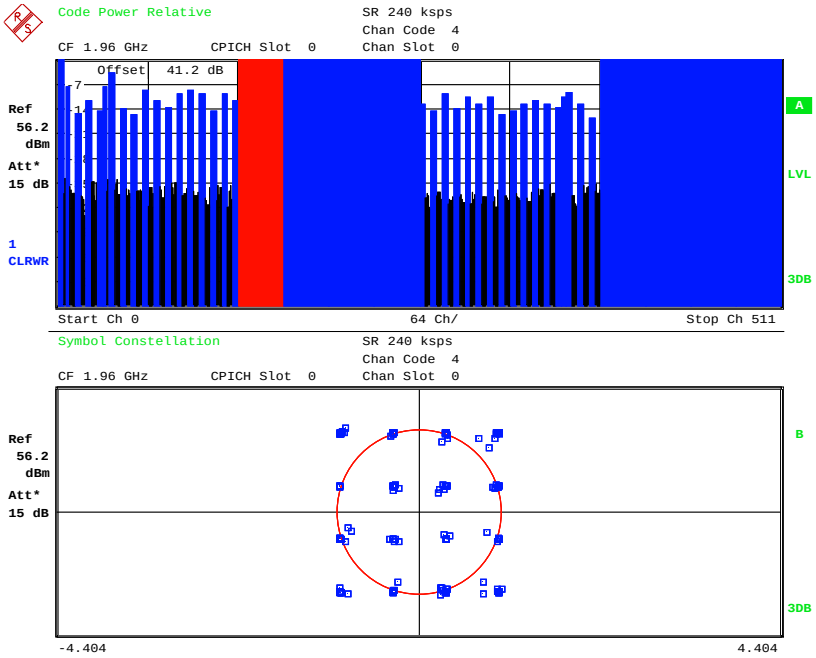
TM1: EUT transmitting with QPSK modulation:



Date: 24.JAN.2013 01:01:23

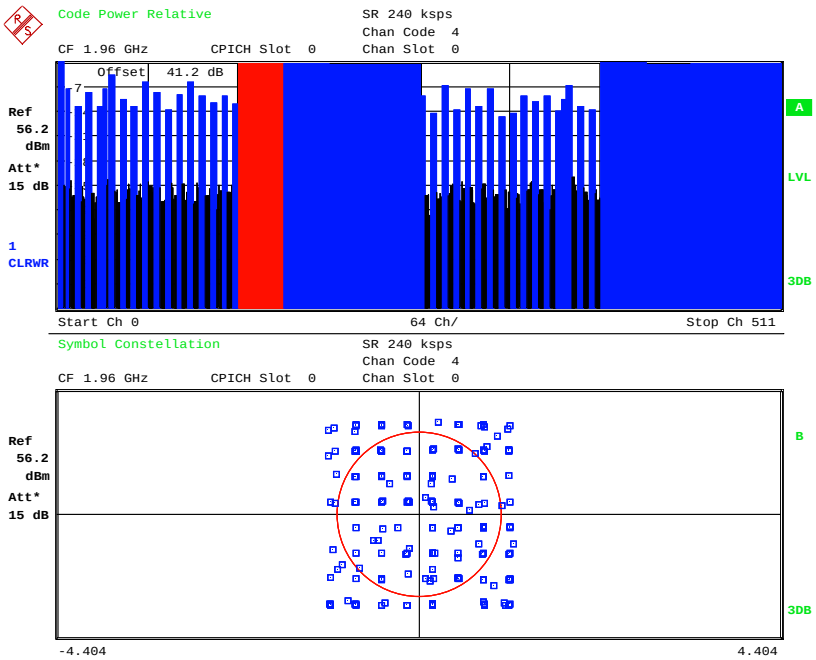
Product Service

TM5: EUT transmitting with 16QAM modulation:



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

TM6: EUT transmitting with 64QAM modulation:



Date: 24.JAN.2013 05:18:14

Product Service

2.4 OCCUPIED BANDWIDTH

2.4.1 Specification Reference

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

2.4.2 Equipment Under Test

RRUS 01 B2 / KRC 118 74/2, S/N: D162554351

2.4.3 Date of Test and Modification State

24 January 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 24 and Industry Canada RSS-GEN.

The EUT was transmitting at maximum power in Non-MIMO single carrier mode as the representative mode, modulated using the test models TM1, TM5 and TM6 described. Using a resolution bandwidth of 50kHz and a video bandwidth of 500kHz. The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

The 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 January 2013
Ambient Temperature	25.4°C
Relative Humidity	45.2%

Product Service

2.4.7 Test Results

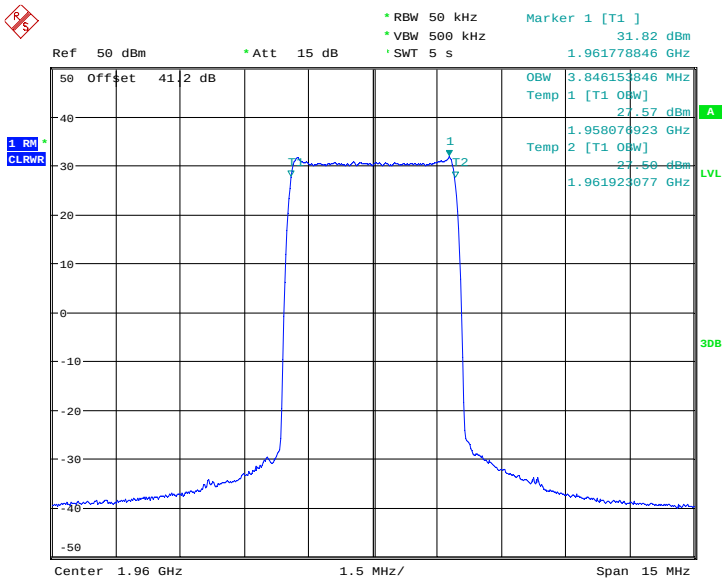
For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 24 and Industry Canada RSS-GEN for Occupied Bandwidth.

The test results are shown below

Single Carrier: 4.2MHz Bandwidth

TM1

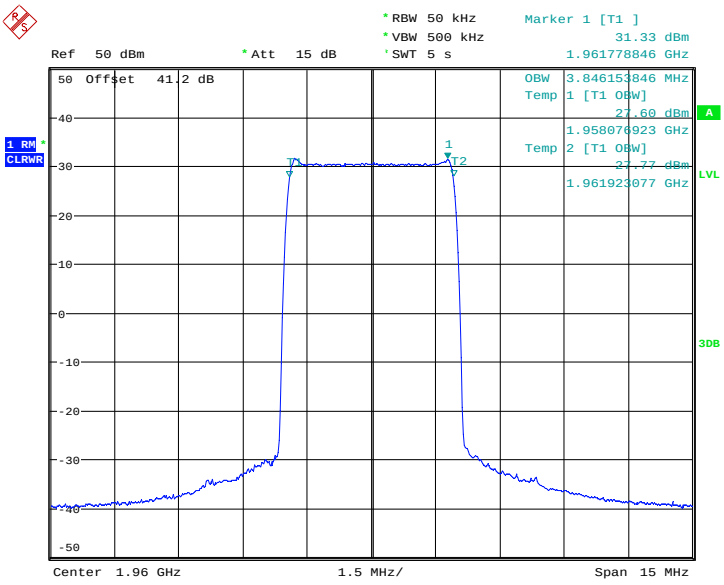
Configuration 1 - Mode 2



Product Service

TM5

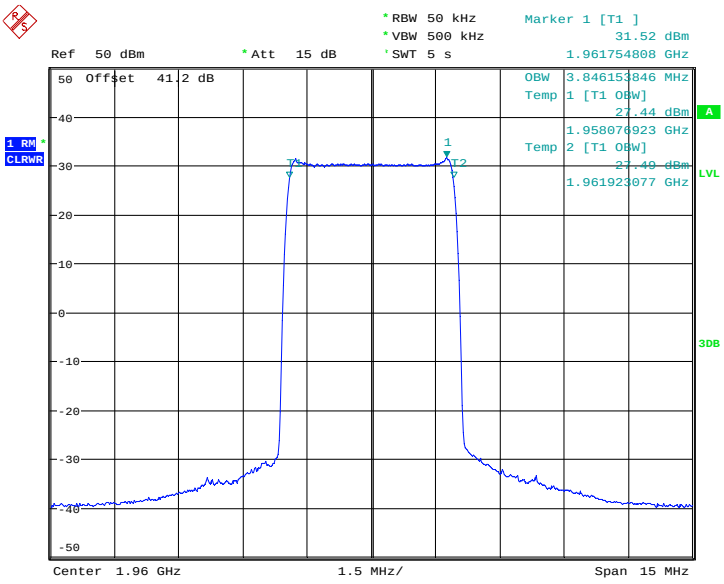
Configuration 1 - Mode 2



Date: 24.JAN.2013 07:15:32

TM6

Configuration 1 – Mode 2



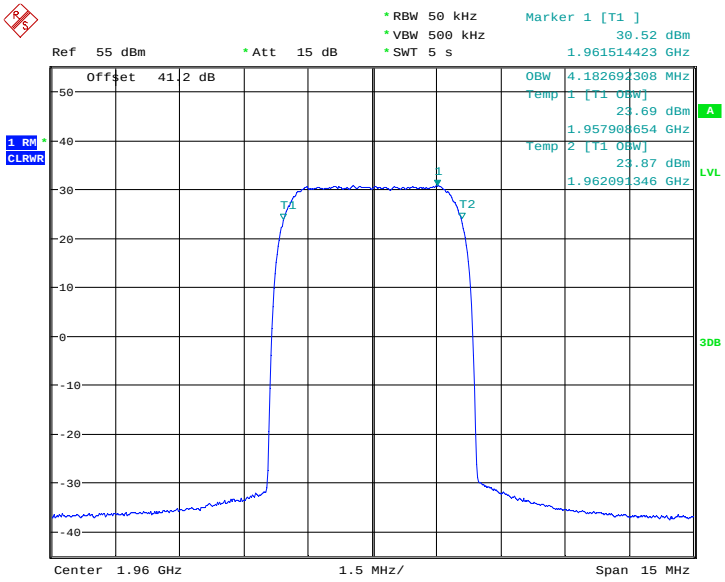
Date: 24.JAN.2013 07:21:58

Product Service

Single Carrier: 5MHz Bandwidth

TM1

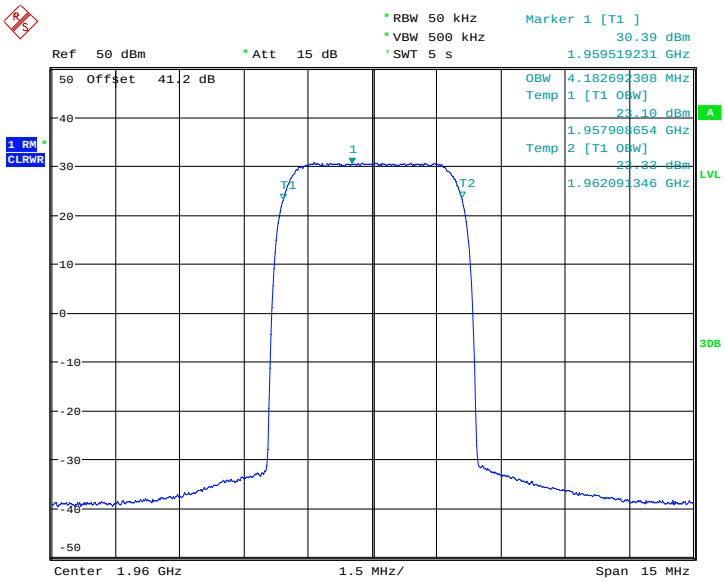
Configuration 1 – Mode 2



Date: 24.JAN.2013 06:20:24

TM5

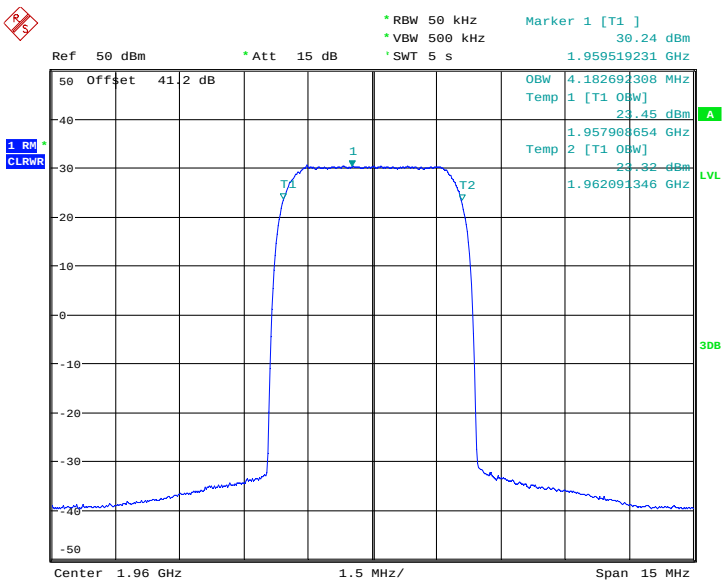
Configuration 1 – Mode 2



Date: 24.JAN.2013 06:11:03

TM6

Configuration 1 – Mode 2



2.5 SPURIOUS EMISSIONS AT ANTENNA TERMINALS (±1MHz)

2.5.1 Specification Reference

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

2.5.2 Equipment Under Test

RRUS 01 B2 / KRC 118 74/2, S/N: D162554351/D162554353

2.5.3 Date of Test and Modification State

24 January 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 24 and Industry Canada RSS-133.

In accordance with 24.238(b), at least 1% of the emission bandwith should be used for the resolution up to 1MHz away from the block edge. A resolution bandwidth of 20kHz was used up to 1MHz away from the band edges. 20kHz is <1% of the Emission Bandwidth (4.25MHz), to compensate for the reduced measurement bandwidth, at the frequency range up to 1MHz away from the band edges, the limit was adjusted from -13dBm to -16.4dBm in Non-MIMO mode. A resolution bandwidth of 50kHz was used between1MHz to 5MHz away from the band edge. As the FCC rules specify a RBW of 1MHz for measurements of emissions > 1MHz away from the band edges, the limit was adjusted from -13dBm to -26dBm in Non-MIMO mode.

For MIMO mode configurations, the limit was adjusted with a correction of -3dB [10Log(2)] by using the Measure and Add 10Log(N) dB technique according to FCC KDB662911 D01 accounting for simultaneous transmission from antennas port RF A1 and RF A2.

Spectrum analyser detector was set as RMS.

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

The EUT was tested at it's maximum power level.

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

Configuration 1 - Mode 1
- Mode 3
- Mode 7
- Mode 8

Product Service

2.5.6 Environmental Conditions

	24 January 2013
Ambient Temperature	25.4°C
Relative Humidity	45.2%

2.5.7 Test Results

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

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

Non-MIMO: Single Carrier

Configuration 1 - Mode 1 and 3

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

MIMO: Multi Carrier (x2)

Configuration 1 - Mode 7 and 8

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

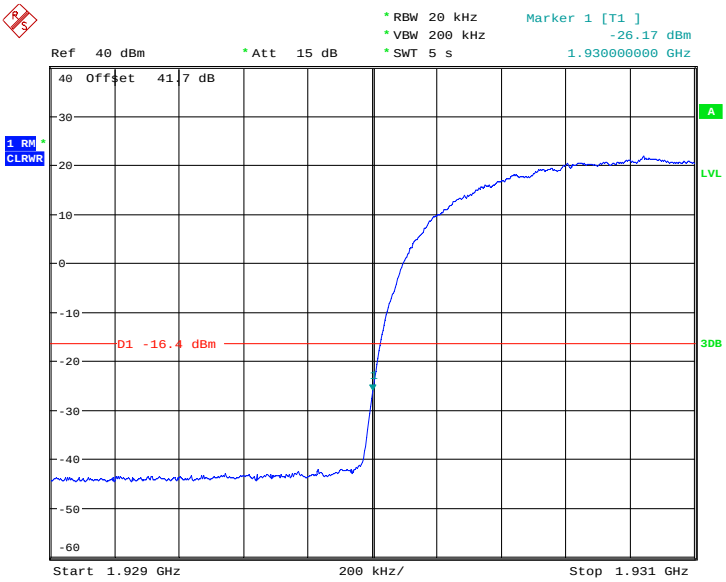
The channels shown in the table above are the minimum and maximum channels that can be used in the authorised frequency ranges to maintain compliance.

The test results are shown below

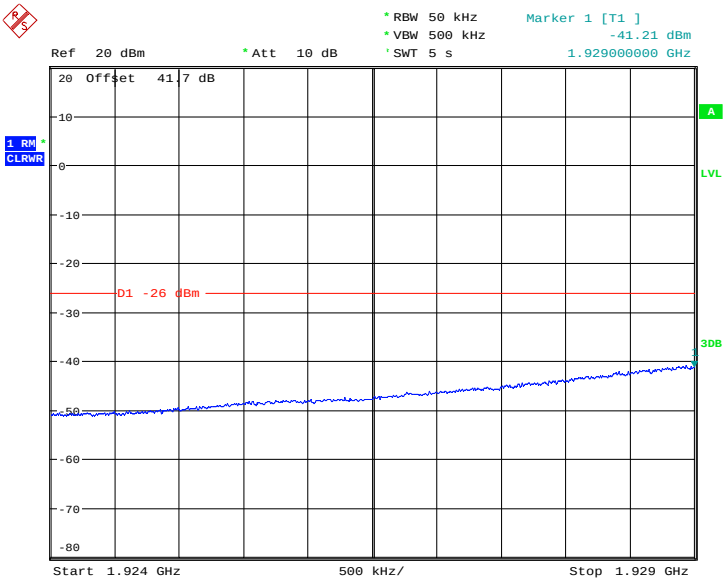
TM1

Non-MIMO: Single Carrier

Configuration 1 - Mode 1



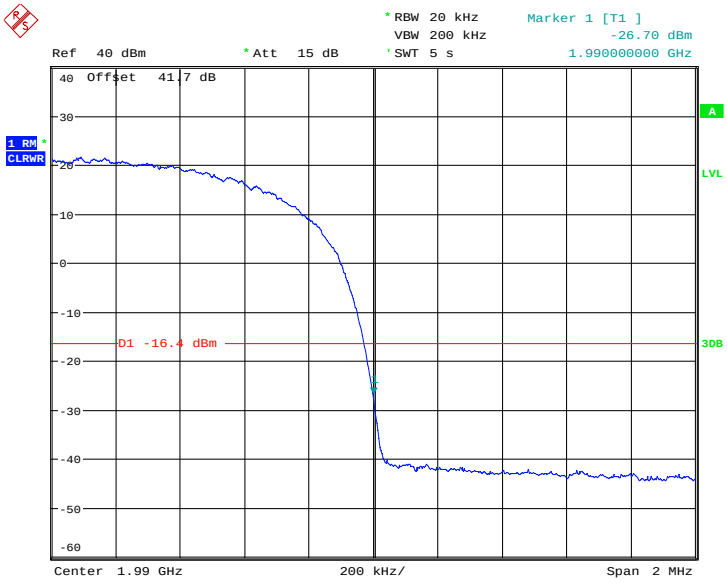
Date: 25.MAR.2013 06:15:44



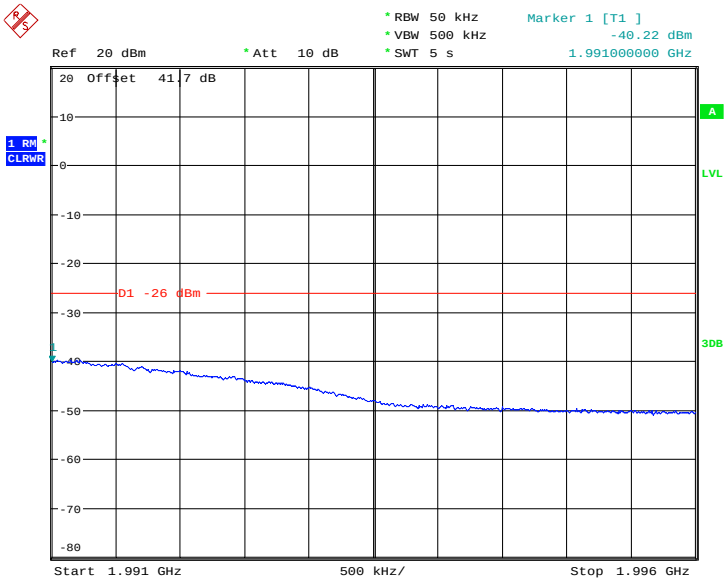
Date: 25.MAR.2013 06:17:27

Product Service

Configuration 1 – Mode 3



Date: 25.MAR.2013 06:44:06

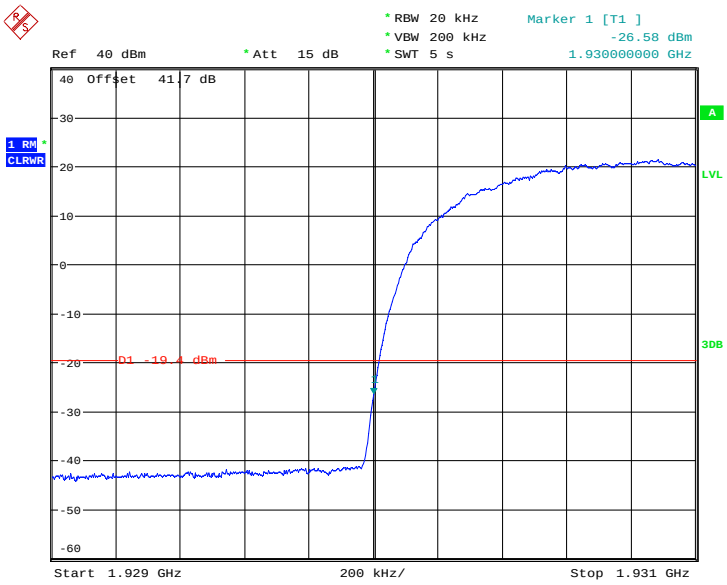


Date: 25.MAR.2013 06:42:31

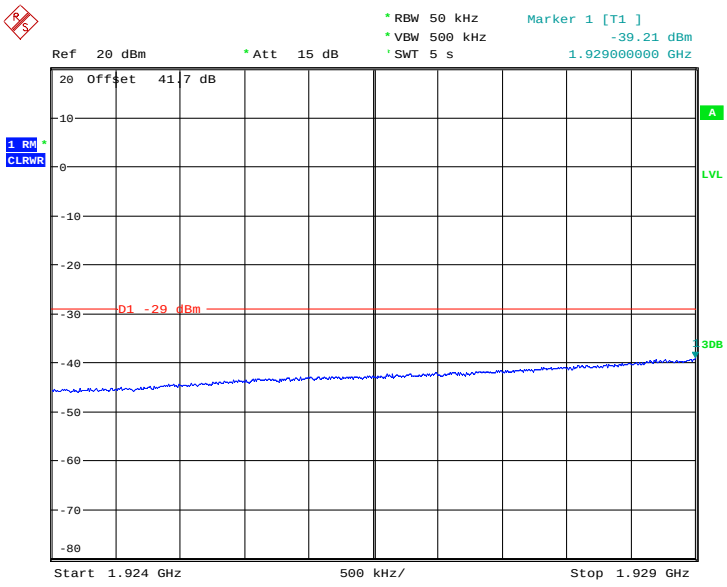
Product Service

MIMO: Multi Carrier (x2)

Configuration 1 - Mode 7



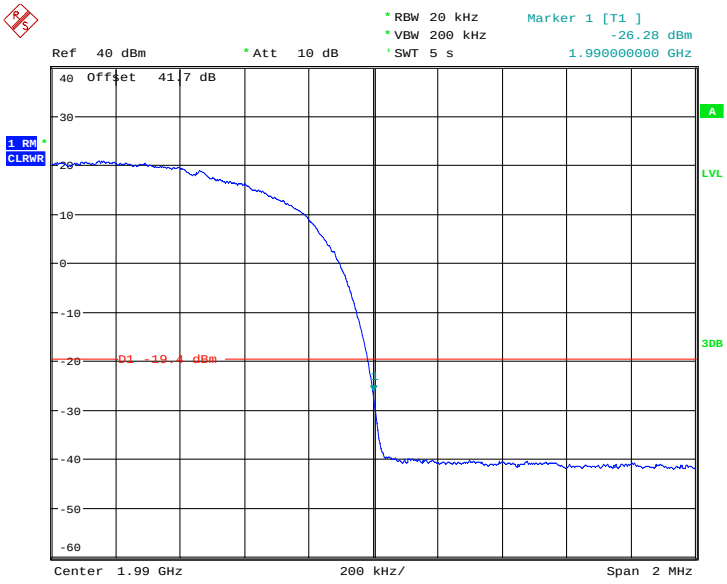
Date: 26.MAR.2013 00:42:58



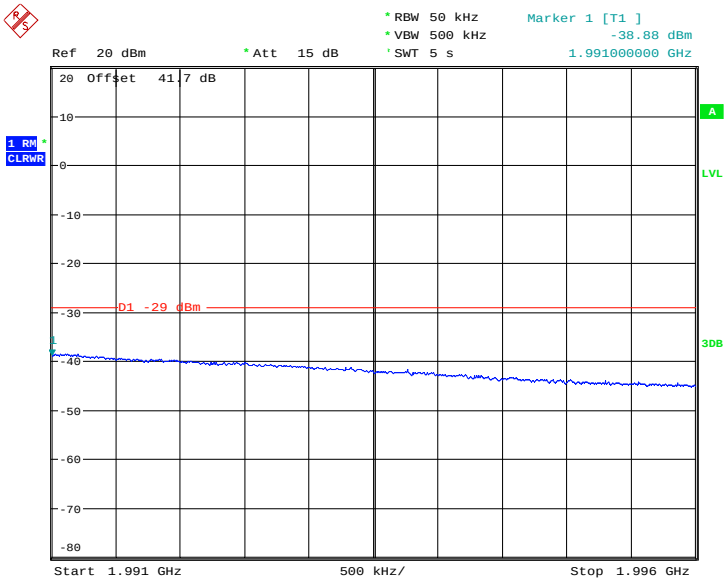
Date: 26.MAR.2013 00:44:55

Product Service

Configuration 1 - Mode 8



Date: 26.MAR.2013 03:17:37



Date: 26.MAR.2013 03:18:46

Limit

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

2.6 RADIATED SPURIOUS EMISSIONS

2.6.1 Specification Reference

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

2.6.2 Equipment Under Test

RRUS 01 B2 / KRC 118 74/2, S/N: D162554351/D162554353

2.6.3 Date of Test and Modification State

20 and 21 May 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 24 and Industry Canada RSS-133.

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

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

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

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

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

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

Where:
Field Strength is measured in dBµV/m
P is measured Transmitter Power in Watts

Product Service

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:

$E_{(v/m)}=(30 \times 1.64 \times 71.45)^{0.5} / 3 = 19.76V/m = 145.94dB\mu V/m$

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

43 + 10log(71.45) = 61.54dB

Therefore the limit at 3m measurement distance is:

145.94 – 61.54 = 84.4 dBµV/m

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

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

Configuration 1 - Mode 1
- Mode 2
- Mode 3
- Mode 5
- Mode 10

2.6.6 Environmental Conditions

	20 May 2013	21 May 2013
Ambient Temperature	25.3°C	24.8°C
Relative Humidity	41.5%	42.7%

Product Service

2.6.7 Test Results

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

The test results are shown below

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.

TM1

Non-MIMO: 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.

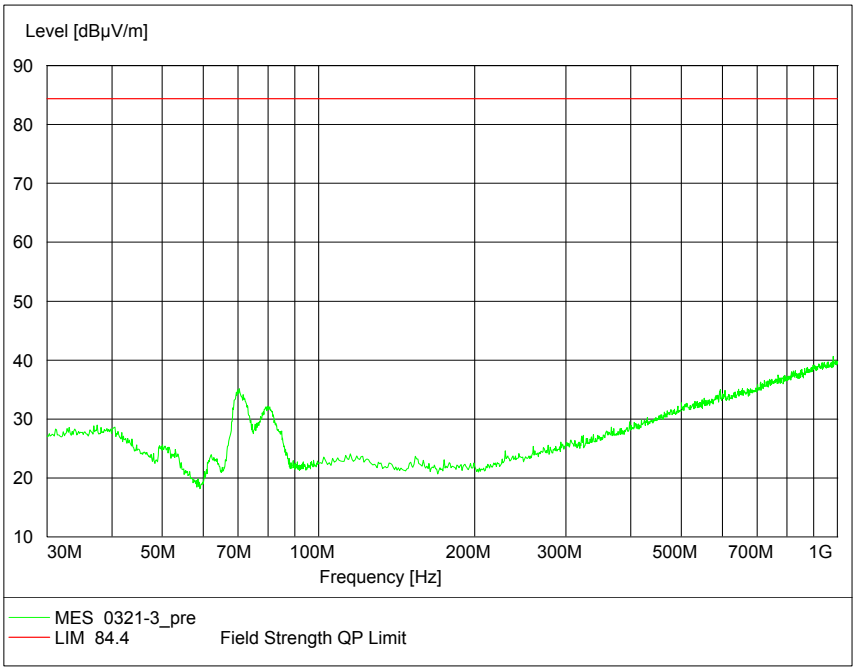
Configuration 1 – Mode 3

No emissions were detected within 20dB of the limit.

MIMO: Multi carrier (1x2)

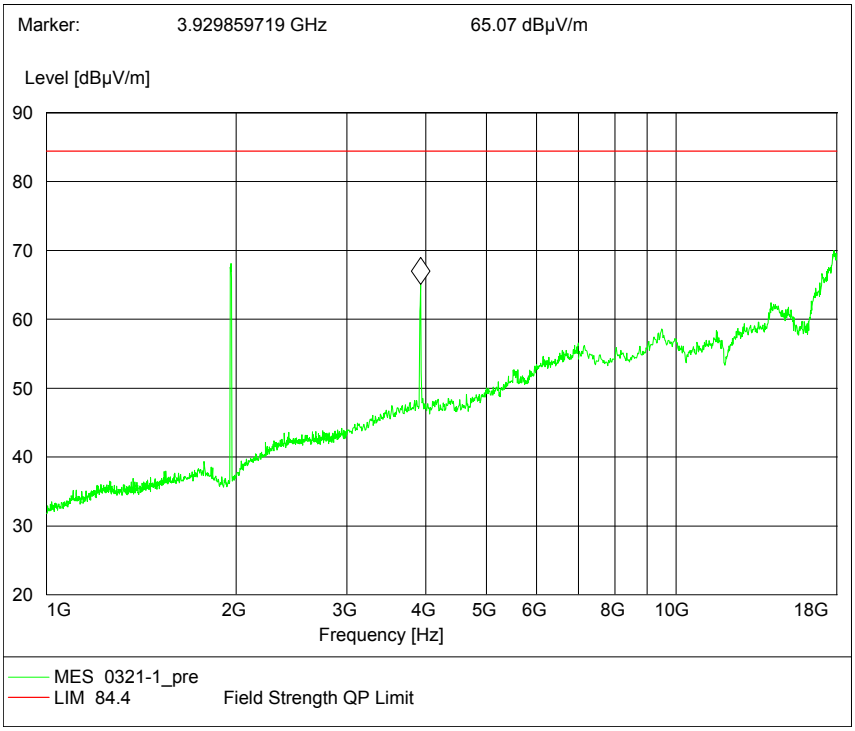
Configuration 1 – Mode 5

30MHz – 1GHz



Product Service

1GHz - 18GHz



18GHz -25GHz

MIMO: Multi carrier (1x4)

Configuration 1 – Mode 10

No emissions were detected within 20dB of the limit.

TM5

MIMO: Multi carrier (1x2)

Configuration 1 – Mode 5

No emissions were detected within 20dB of the limit.

TM6

MIMO: Multi carrier (1x2

Configuration 1 – Mode 5

No emissions were detected within 20dB of the limit.

Limit	-13dBm

Remarks

The EUT does not exceed -13dBm 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 24, 24.238 (a)
Industry Canada RSS-133, Clause 6.5

2.7.2 Equipment Under Test

RRUS 01 B2 / KRC 118 74/2, S/N: D162554351/D162554353

2.7.3 Date of Test and Modification State

14 and 24 January 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 24 and Industry Canada RSS-133.

In accordance with Part 2.1051, the spurious emissions from the antenna terminal were measured. The measurements were performed on the combined output connector RF A1. Limited complementary measurement were done at output conector RF A2 to verify identical performance for both transmitter chains in MIMO mode.The EUT was set to transmit on maximum power. The transmitter output power was attenuated using an attenuator and the frequency spectrum investigated from 9kHz to 25GHz. The resolution was set to 1MHz for 9kHz to 25GHz thus meeting the requirements of Part 24.238(b). The spectrum analyser detector was set to peak and trace was kept on Max Hold as worst case.

For MIMO mode configurations, the limit was adjusted with a correction of -3dB [10Log(2)] by using the Measure and Add 10Log(N) dB technique according to FCC KDB662911 D01 accounting for simultaneous transmission from antennas port RF A1 and RF A2.

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^{th} harmonic of the highest internal frequency.

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

Configuration 1

- Mode 1
- Mode 2
- Mode 3
- Mode 4
- Mode 5
- Mode 6

Product Service

2.7.6 Environmental Conditions

	14 January 2013	24 January 2013
Ambient Temperature	25.8°C	25.4°C
Relative Humidity	48.9%	45.2%

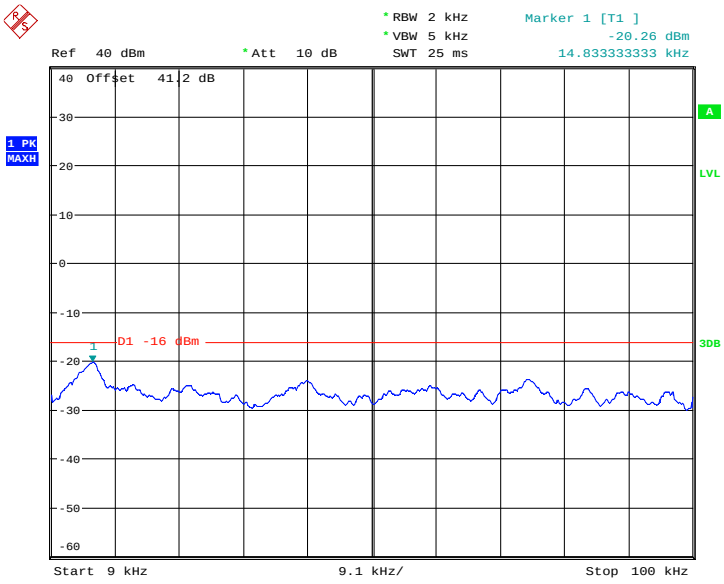
2.7.7 Test Results

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

The test results are shown below

Remark:

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

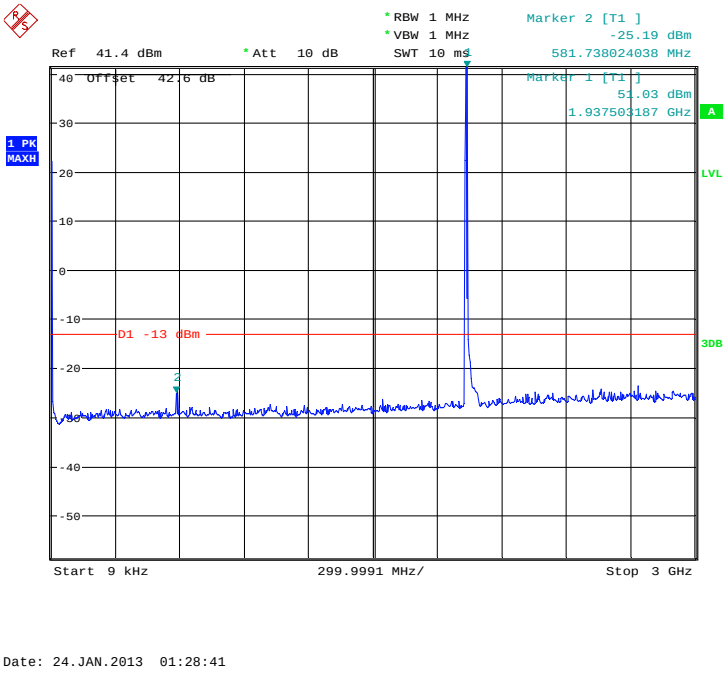


TM1

Non-MIMO: Single Carrier

Configuration 1 - Mode 1

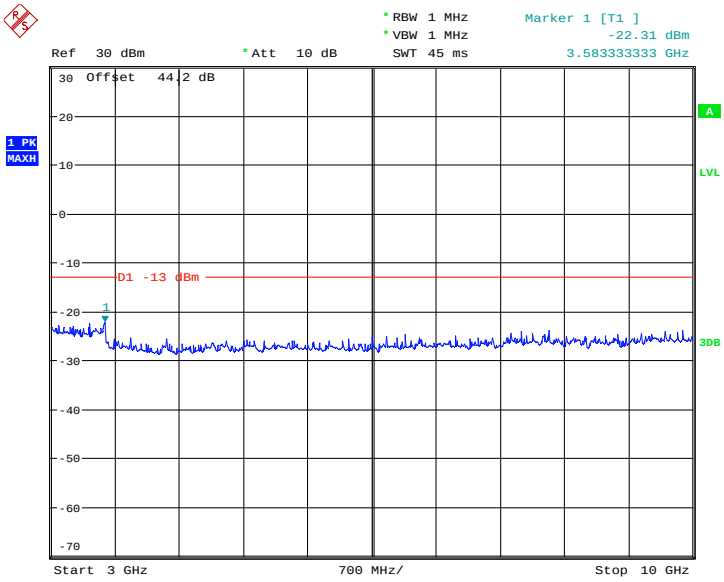
9kHz to 3GHz



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

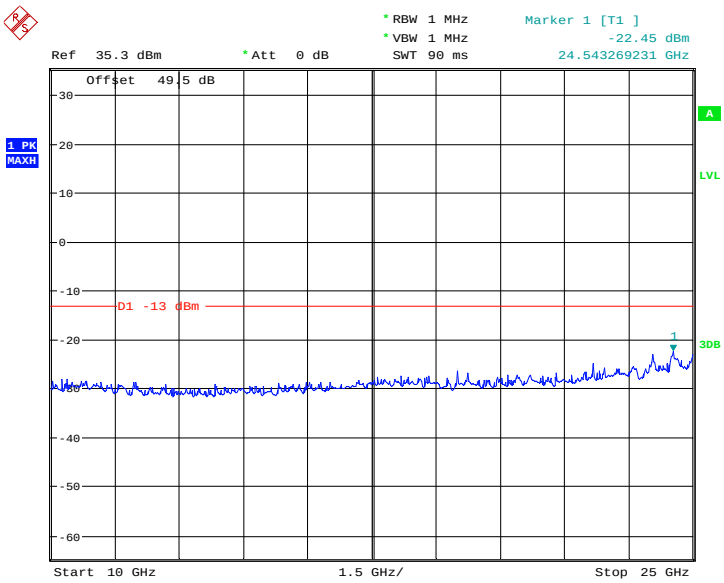
Product Service

3GHz to 10GHz



Date: 24.JAN.2013 01:29:18

10GHz to 25GHz

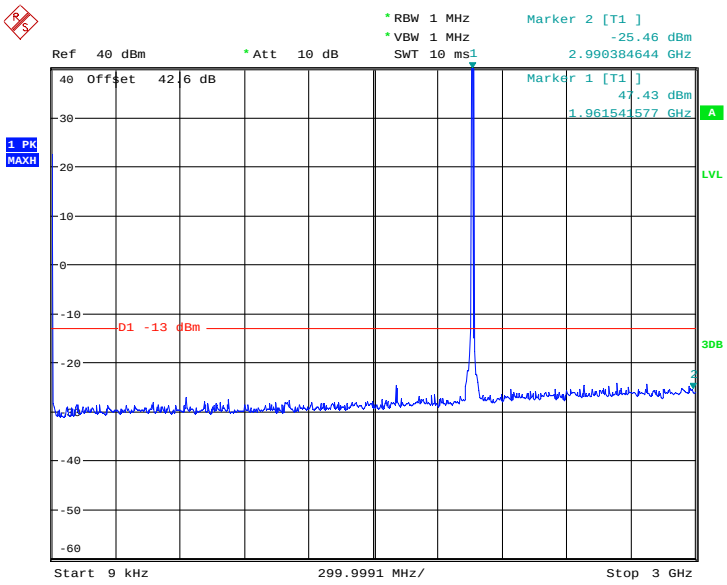


Date: 24.JAN.2013 01:30:05

Product Service

Configuration 1 - Mode 2

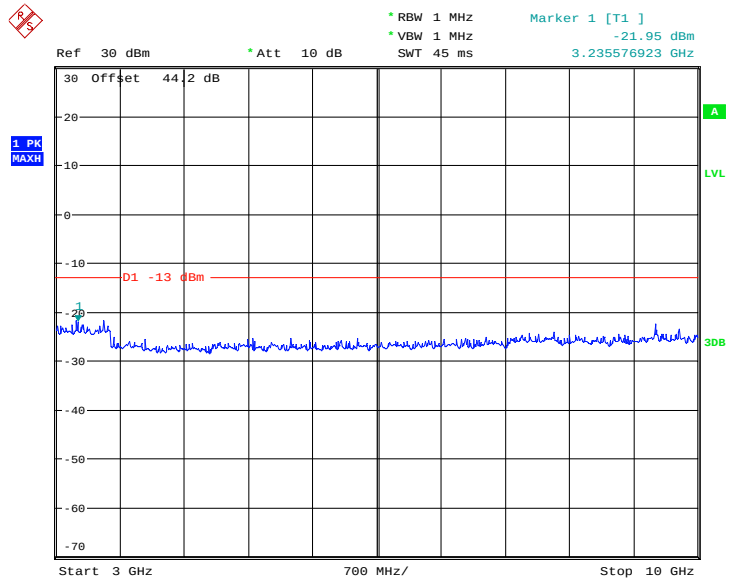
9kHz to 3GHz



Date: 24.JAN.2013 06:21:55

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

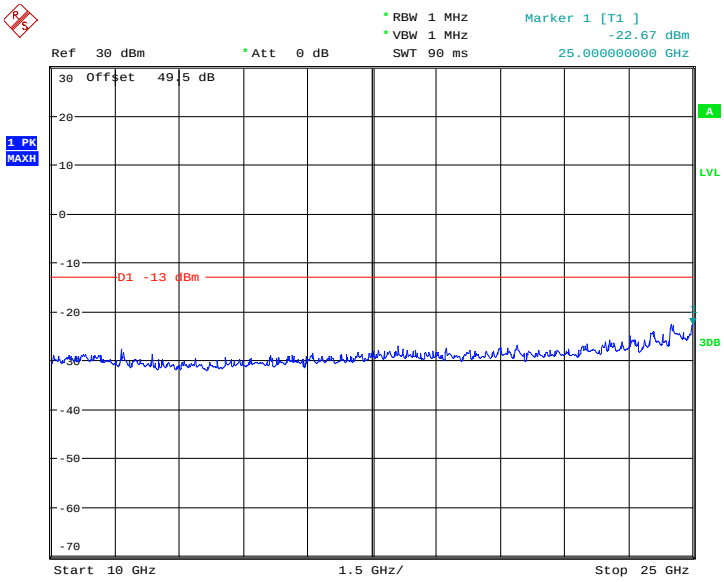
3GHz to 10GHz



Date: 24.JAN.2013 06:23:00

Product Service

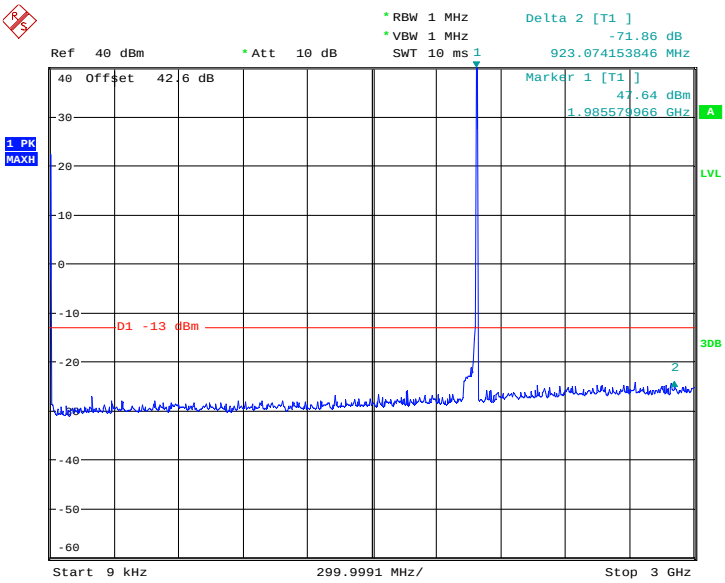
10GHz to 25GHz



Date: 24.JAN.2013 06:23:47

Configuration 1 – Mode 3

9kHz – 3GHz

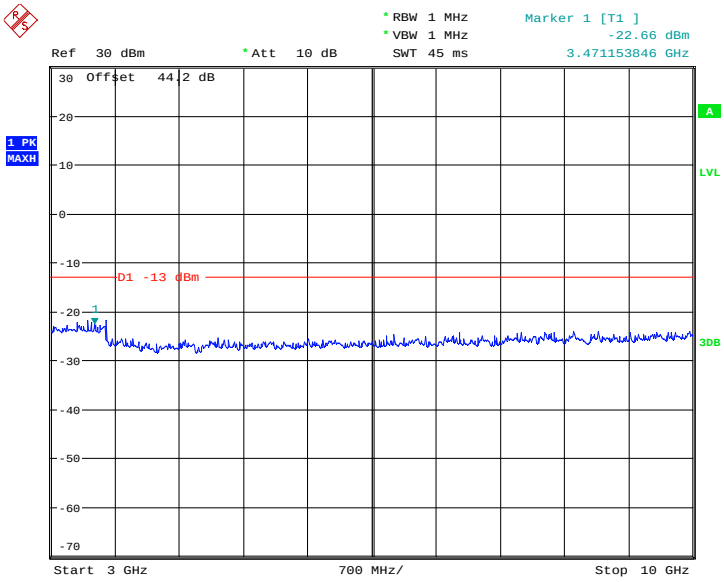


Date: 24.JAN.2013 03:14:35

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

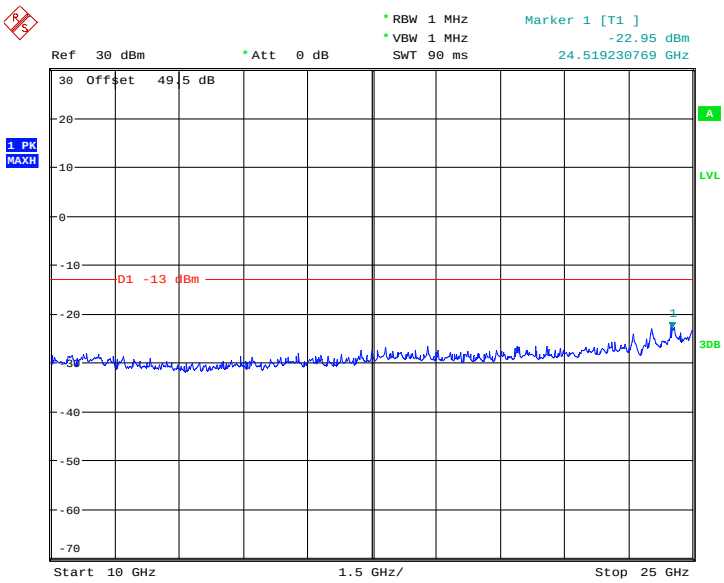
Product Service

3GHz to 10GHz



Date: 24.JAN.2013 03:17:42

10GHz to 25GHz



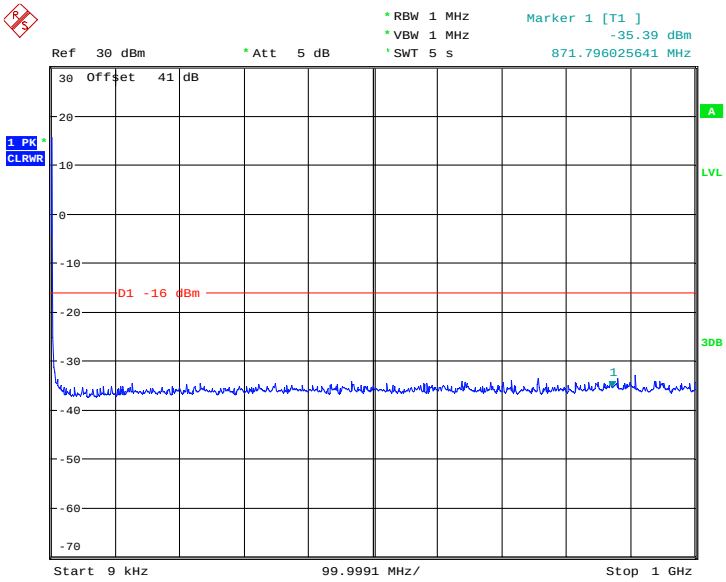
Date: 24.JAN.2013 03:16:21

Product Service

MIMO: Multi Carrier (1x2)

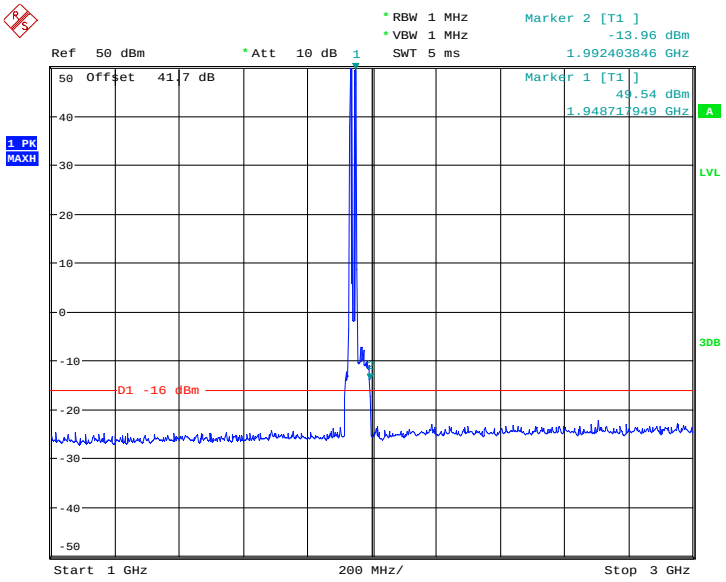
Configuration 1 - Mode 4

9kHz to 1GHz



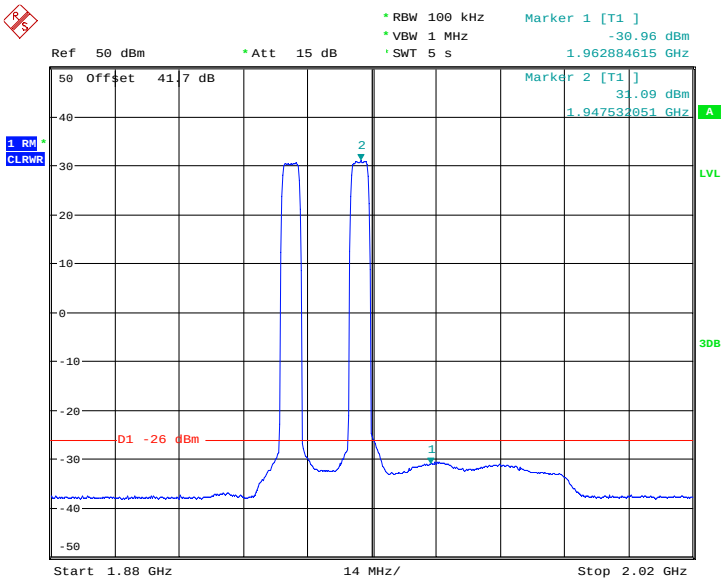
Date: 26.MAR.2013 00:54:59

1GHz to 3GHz



Date: 27.MAR.2013 06:39:15

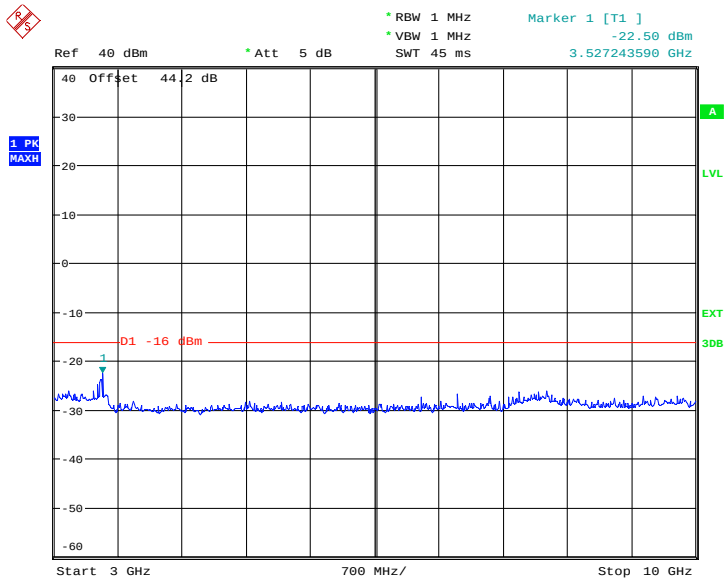
Note: The emissions beyond the limit are the operating frequencies.



Date: 27.MAR.2013 06:36:38

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

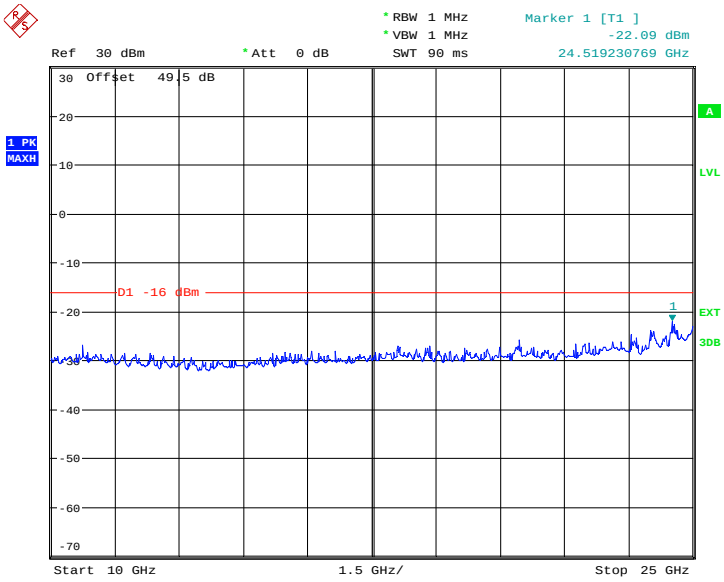
3GHz to 10GHz



Date: 18.JAN.2013 04:03:51

Product Service

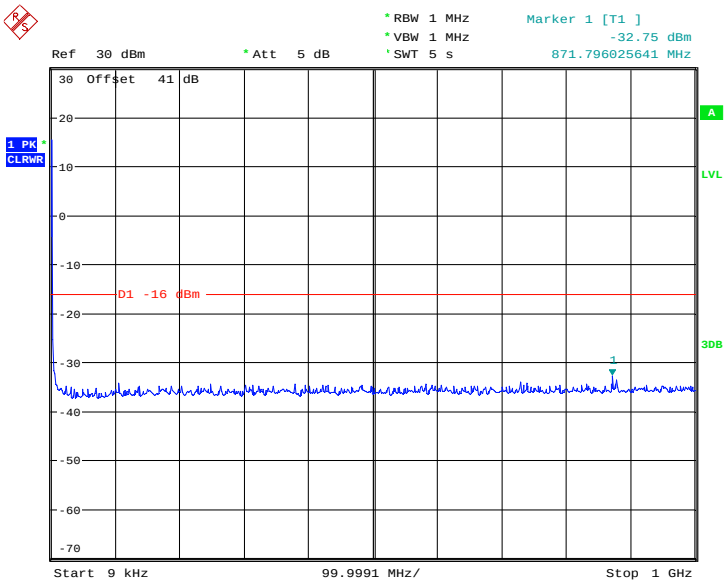
10GHz to 25GHz



Date: 18.JAN.2013 04:04:31

Configuration 1 - Mode 5

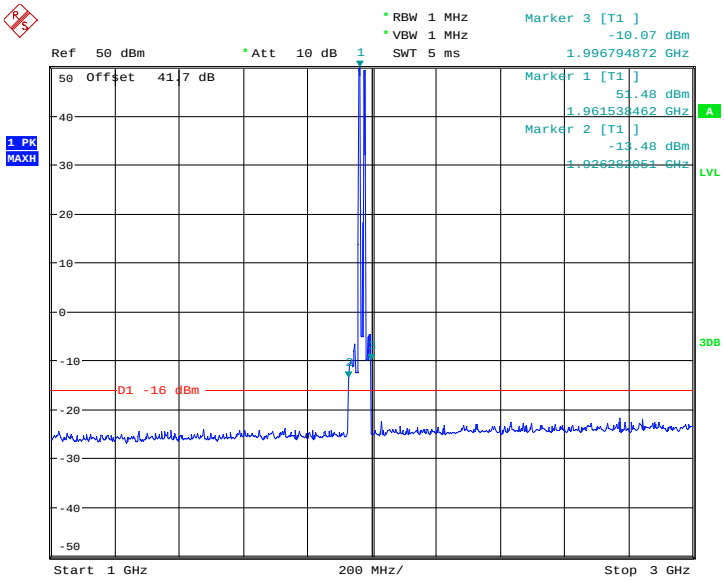
9kHz to 1GHz



Date: 26.MAR.2013 00:57:26

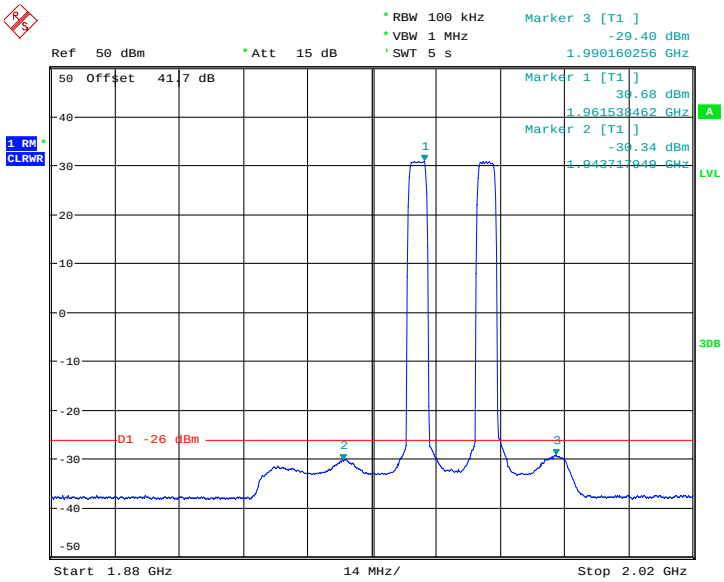
Product Service

1GHz to 3GHz



Date: 27.MAR.2013 06:24:08

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

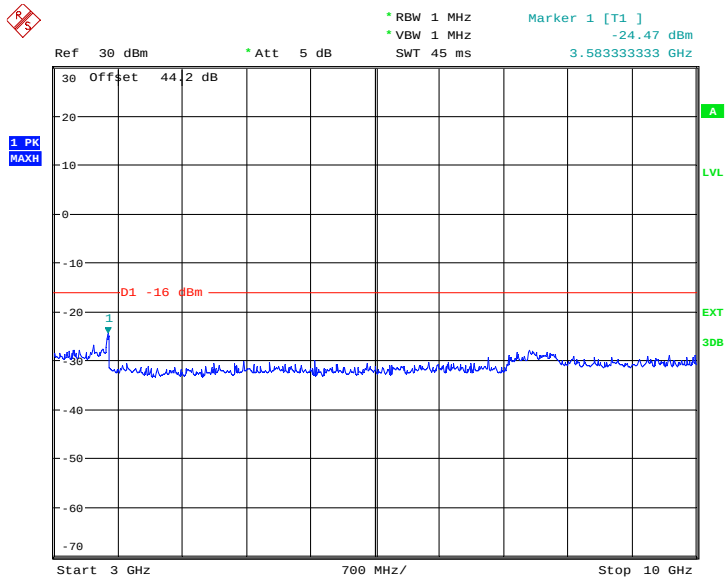


Date: 27.MAR.2013 06:26:57

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

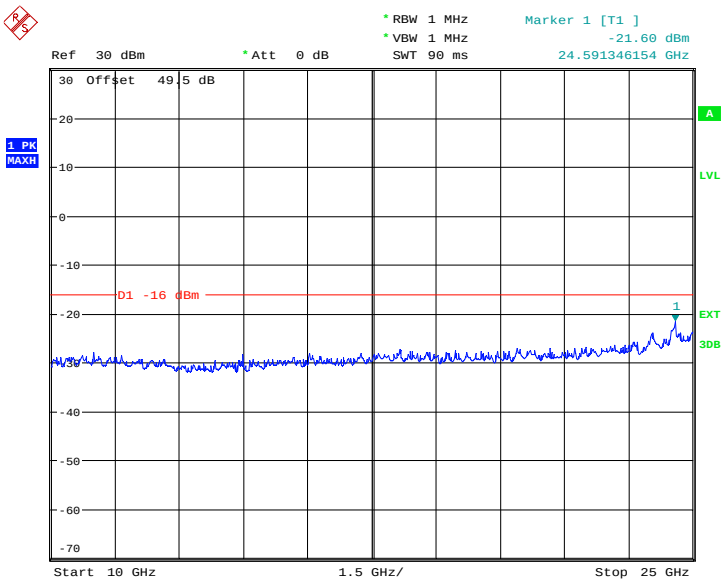
Product Service

3GHz to 10GHz



Date: 18.JAN.2013 04:19:26

10GHz to 25GHz

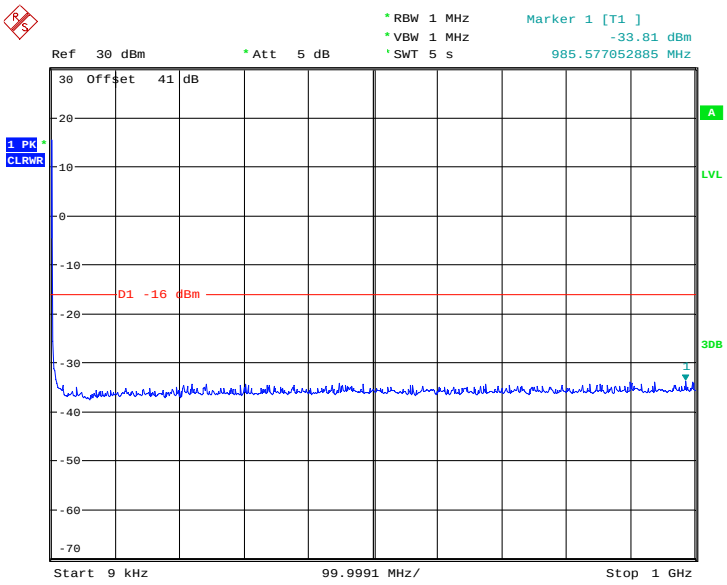


Date: 18.JAN.2013 04:20:05

Product Service

Configuration 1 - Mode 6

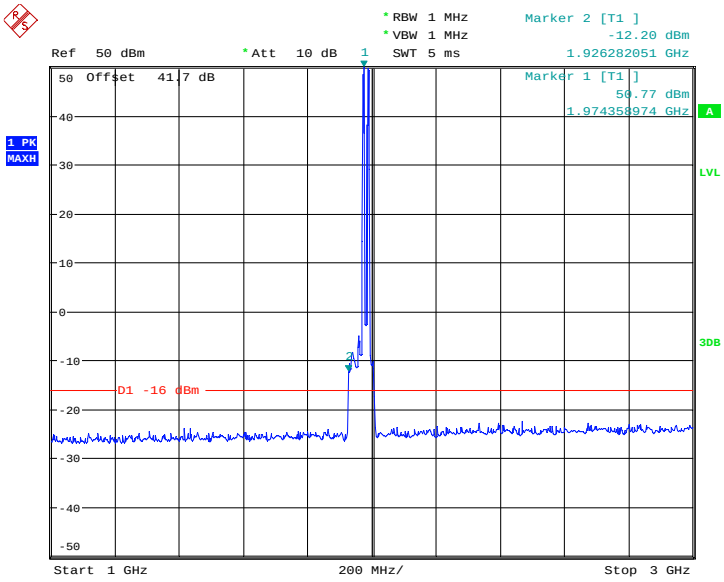
9kHz – 1GHz



Date: 26.MAR.2013 00:59:27

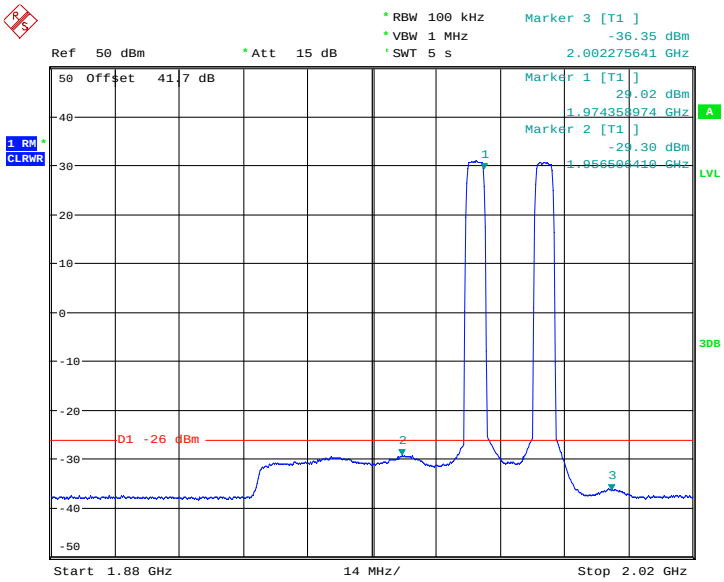
Product Service

1GHz to 3GHz



Date: 27.MAR.2013 06:48:16

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

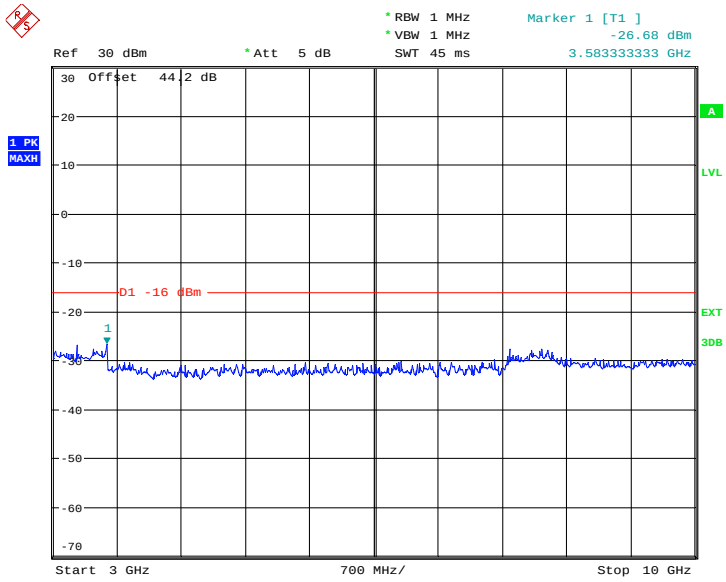


Date: 27.MAR.2013 06:51:14

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

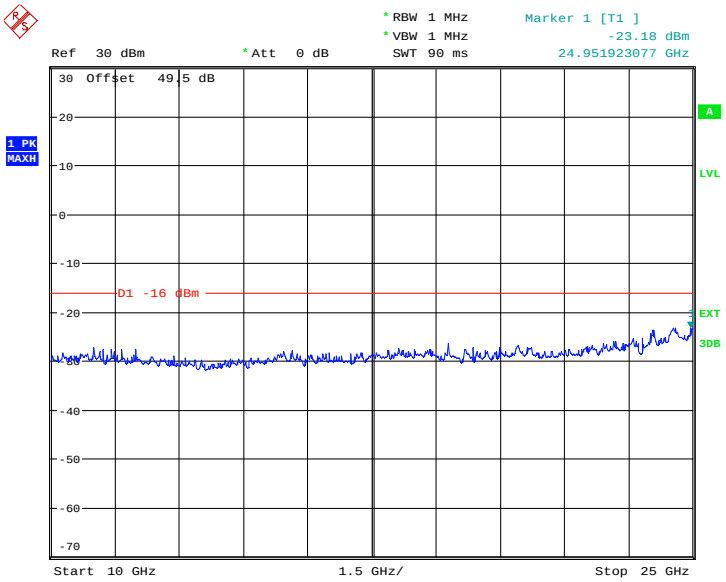
Product Service

3GHz to 10GHz



Date: 21.JAN.2013 00:46:33

10GHz to 25GHz



Date: 21.JAN.2013 00:49:09

Limit	-16dBm

Remarks

The EUT does not exceed -16dBm at the frequency range of 9kHz to 25GHz.

Product Service

SECTION 3

TEST EQUIPMENT USED

Product Service

3.1 TEST EQUIPMENT USED

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

Instrument	Manufacturer	Type No.	Serial No.	Calibration Period (months)	Calibration Due
Section 2.1, 2.2, 2.3, 2.4, 2.5, 2.7– Maximum Conducted Output Power, Peak – Average Ratio, Modulation Characteristics, Occupied Bandwidth, Spurious Emissions at Antenna Terminals (±1MHz), and Conducted Spurious Emissions.					
Spectrum Analyser	Rohde & Schwarz	FSQ	200014	12	06-Sep-2013
Power Metre	Rohde & Schwarz	NRP	102438	12	12-Aug-2013
Power Sensor	Rohde & Schwarz	NRP-Z51	102434	12	12-Aug-2013
Network Analyzer	Agilent	8720D	US38431317	12	24-Aug-2013
40dB Attenuator	Aeroflex / Weinschel	48-40-43-LIM	BR5020	-	O/P MON
30dB Attenuator	Lucas Weinschel	48-30-34	BA2851	-	O/P MON
30dB Attenuator	Shanghai Huaxiang	DTS50	06041306	-	O/P MON
10dB Attenuator	Weinschel Corp	48-10-34	BC1574	-	O/P MON
Load	Shanghai Huaxiang	TF100	09121647	-	O/P MON
Power Supply	Dahua	DH1716A-10	1000303181	-	O/P MON
Power Supply	Dahua	DH1716A-14	20080401	-	O/P MON
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	TF2	05122215	-	O/P MON
Load	Shanghai Huaxiang	TF100	09121647	-	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×16.88 m×9.60m	-	12	19-Aug-2013
Power Supply	Dahua	DH1716A-10	1000303181	-	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

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*
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).