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## Equipment Authorization measurements on WCDMA Base station transceiver unit with FCC ID: B5KAROJ1192233-1 in cabinet RBS 3202 (10 enclosures)

### Test objects

Transceiver Unit TRXB ROJ 119 2233/1, R1A

### Summary

Standard	Compliant	Enclosure	Remarks
<b>FCC CFR 47</b>			
2.1046 RF Power output	Yes	2	
2.1047 Modulation characteristics	Yes	3	
2.1049 Occupied bandwidth	Yes	4	
2.1049 Band edge	Yes	5	
2.1051 Spurious emission at antenna	Yes	6	
2.1053 Field strength of spurious radiation	Yes	7	
2.1055 Frequency stability	Yes	8	

### SP Swedish National Testing and Research Institute Electronics - EMC

  
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# REPORT

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## Description - Equipment Under Test (EUT)

Equipment: WCDMA Base station transceiver 1900 MHz

Tx Frequency range: 1930 MHz to 1970 MHz

Tested Channels: 1932.5 MHz, 1947.5 MHz, and 1967.5 MHz.

Product number: TRXB ROJ 119 2233/1, R1A

Serial number: See Hardware list in enclosure 9

If not otherwise stated the RF conducted measurements were done on the TX A port.

The identities of the units used can be found in the hardware list on encl. 9

### Configuration:

The transmitters were set-up according to 3GPP TS 25.141 V6.3.0 (2003-09) Test model 1. 16 DPCH:s at 30 ksps (SF=128) distributed randomly across the code space, at random power levels and random timing offsets are defined so as to simulate a realistic scenario which may have high PAR (Peak to Average ratio).

Manufacturer's

representative: Larry Lindström, Ericsson AB

## Purpose of test

The purpose of the tests is to verify compliance with the performance characteristics specified in FCC CFR47.

## Reservation

The test results in this report apply only to the particular Equipment Under Test (EUT) as declared in the report.

## Delivery of test object

The test object was delivered: 2003-11-11

## Test engineers

Jonas Bremholt

Fredrik Isaksson

## Test witnesses

Larry Lindström, Ericsson AB

Mats Iregren, Ericsson AB (partly present)

Sign:.....

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## RF Power output measurements according to 47CFR 2.1046

Date 2003-11-21	Temperature 23 °C ± 3 °C	Humidity 36 % ± 5 %
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### Test set-up and Procedure

The measurements were made per 3GPP TS 25.141. The output was connected to a Peak power analyzer via a 50 ohm attenuator. The RF power was measured with variation in supply voltage at the highest power level. Test was performed on -48 V DC supply voltage system. The transmitters were set up according to Test Model 1 in 3GPP TS 25.141 during the measurements.

Measurement equipment	Calibration Due	SP number
Boonton RF Peak power meter/analyzer	2004-01	503 144
Boonton Power sensor 56518-S/4	2004-01	503 145
Attenuator 10 dB	2004-04	503 720
Fluke 87	2004-10	502 190
Testo 615, Temperature and humidity meter	2005-09	503 498

### Results

Nominal power -48 V DC

Rated output power level at TX A connector: +7.5 dBm

Test conditions		Transmitter power (dBm)		
		Average		
		Remark 1 1932.5 MHz	Remark 2 1947.5 MHz	Remark 3 1967.5 MHz
T <sub>nom</sub> 23°C	V <sub>nom</sub> -48 V	7.6	7.6	7.9
T <sub>nom</sub> 23°C	V <sub>min</sub> -43.2 V	7.6	7.6	7.9
	V <sub>max</sub> -52.8 V	7.6	7.6	7.9
Measurement uncertainty		0.5 dB		

### Remarks

1. The unit with serial number AE50400171 was used for the measurement.
2. The unit with serial number AE50400152 was used for the measurement.
3. The unit with serial number AE50400116 was used for the measurement.

### Limits (according to §24.232)

The maximum output power shall not be greater than 100 W (50 dBm).

Complies?	Yes
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## Modulation characteristics measurements according to 47CFR 2.1047

Date 2003-11-21	Temperature 22 °C ± 3 °C	Humidity 27 % ± 5 %
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### Test set-up and Procedure

The measurement was made per 3GPP TS 25.141. The output was connected to a spectrum analyzer. The spectrum analyzer was connected to an external 10 MHz reference standard during measurement.

The transmitter was set up according to Test Model 1 in 3GPP TS 25.141 during the measurements.

Measurement equipment	Calibration Due	SP number
R&S FSIQ 40	2004-03	503 738
Attenuator 40 dB	2004-04	503 173
Multimeter Fluke 87	2004-09	502 190
Testo 610, Temperature and humidity meter	2004-12	502 658

### Results

Nominal Voltage -48 V DC  
+7.5 dBm output power at 1947.5 MHz

Test conditions		TX A
Supply voltage DC (V)	Temperature (°C)	Composite EVM (% <sub>RMS</sub> )
-48.0	+22	13.5
Maximum EVM (% <sub>RMS</sub> )		13.5
Measurement uncertainty		2.0 % <sub>RMS</sub>

### Remark

The unit with serial number AE50400152 was used for the measurement.

### Limits (according to 3GPP TS 25.141)

The Error Vector Magnitude (EVM) shall be less than 17.5%.

Complies?	Yes
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## Occupied bandwidth measurements according to 47CFR 2.1049

Date 2003-11-21	Temperature 22 °C ± 3 °C	Humidity 27 % ± 5 %
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### Test set-up and Procedure

The measurement test set-up was made per 3GPP TS 25.141. The output was connected to a spectrum analyzer. The spectrum analyzer was connected to an external 10 MHz reference standard during the measurements. The transmitter was set up according to Test Model 1 in 3GPP TS 25.141 during the measurements.

Measurement equipment	Calibration Due	SP number
R&S FSIQ 40	2004-03	503 738
Attenuator 10 dB	2004-04	503 720
Testo 615, Temperature and humidity meter	2005-09	503 498

**Measurement uncertainty:** 3.7 dB

### Results

#### Output TX A

- Diagram 1 1947.5 MHz, OBW Reference level, +7.5 dBm output power  
Diagram 2 1947.5 MHz, OBW 26 dB points, +7.5 dBm output power

### Remark

The unit with serial number AE50400152 was used for the measurement.

Complies?	Yes
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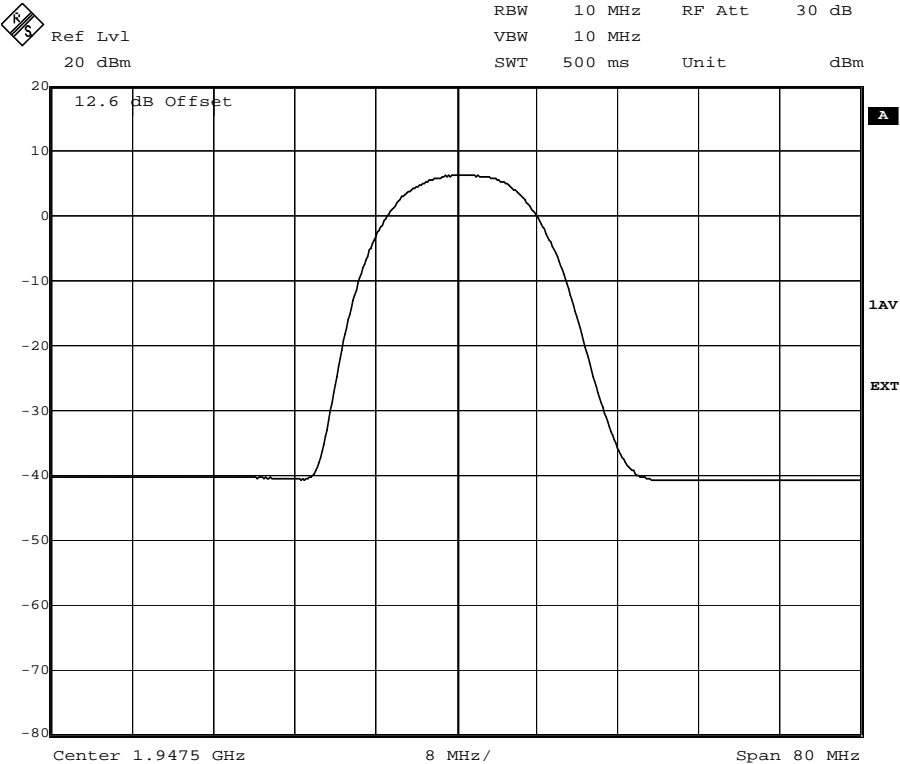
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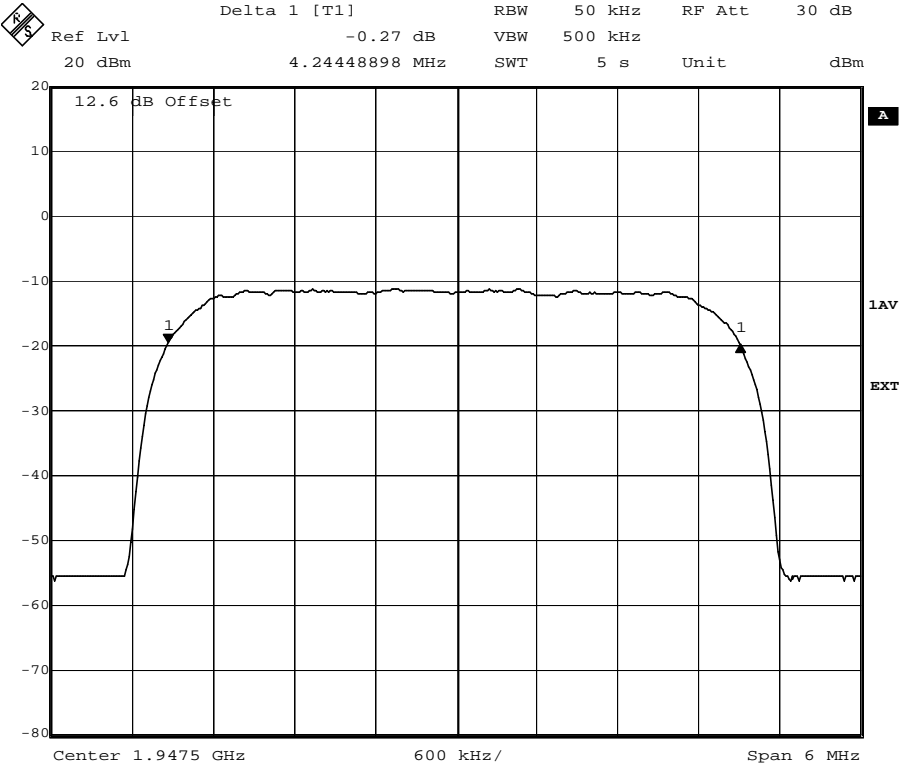
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Diagram 1



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Diagram 2



Date: 21.NOV.2003 10:39:37

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## Band edge measurements according to 47CFR 2.1049

Date 2003-11-21	Temperature 22 °C ± 3 °C	Humidity 27 % ± 5 %
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### Test set-up and Procedure

The output port was connected to a spectrum analyzer. The spectrum analyzer was connected to an external 10 MHz reference standard during the measurements. According to §24.238 a resolution bandwidth of 1% of the emission bandwidth was used in the 1 MHz band adjacent to the block edge. At frequencies more than 1 MHz away from the block edge the spectrum was integrated over 1MHz bandwidth. The transmitter was set up according to Test Model 1 in 3GPP TS 25.141 during the measurements.

Measurement equipment	Calibration Due	SP number
R&S FSIQ	2004-03	503 738
Attenuator 10 dB	2004-04	503 720
Attenuator 10 dB	2004-04	503 096
Testo 615, Temperature and humidity meter	2005-09	503 505

**Measurement uncertainty:** 3.7 dB

### Results

	Output TX A:	Remarks
Diagram 1	1932.5 MHz Band edge +7.5 dBm output power	1
Diagram 2	1932.5 MHz Band edge +7.5 dBm output power	1
<b>Output TX A:</b>		
Diagram 3	1967.5 MHz Band edge +7.5 dBm output power	2
Diagram 4	1967.5 MHz Band edge +7.5 dBm output power	2

### Remarks

- 1 The unit with serial number AE50400171 was used for the measurement.
- 2 The unit with serial number AE50400116 was used for the measurement.

### Limits

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.

Complies?	Yes
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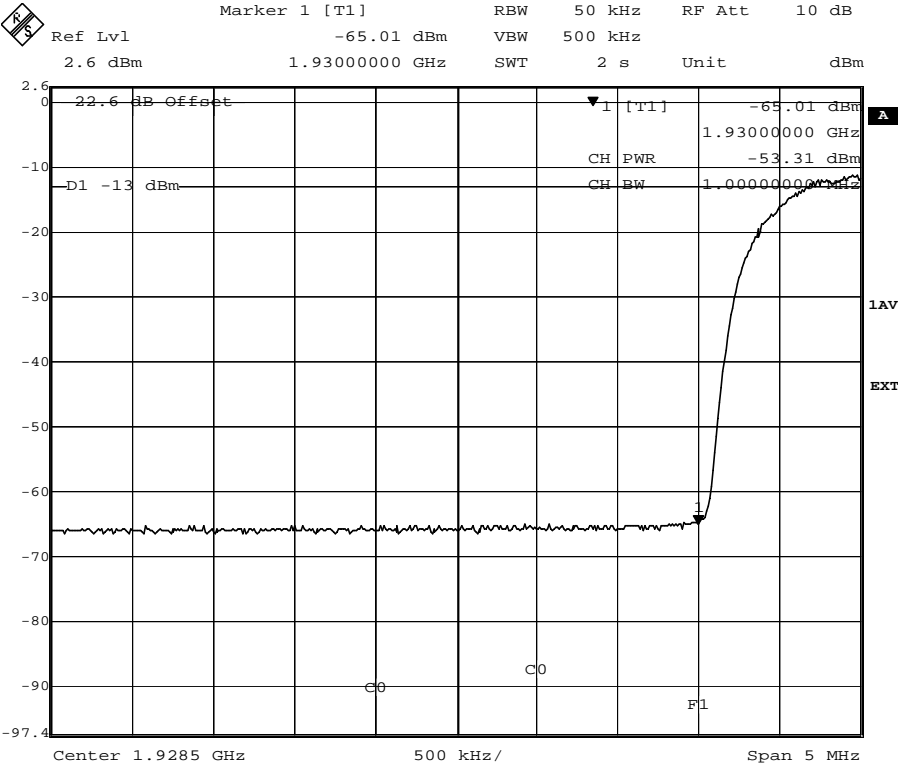
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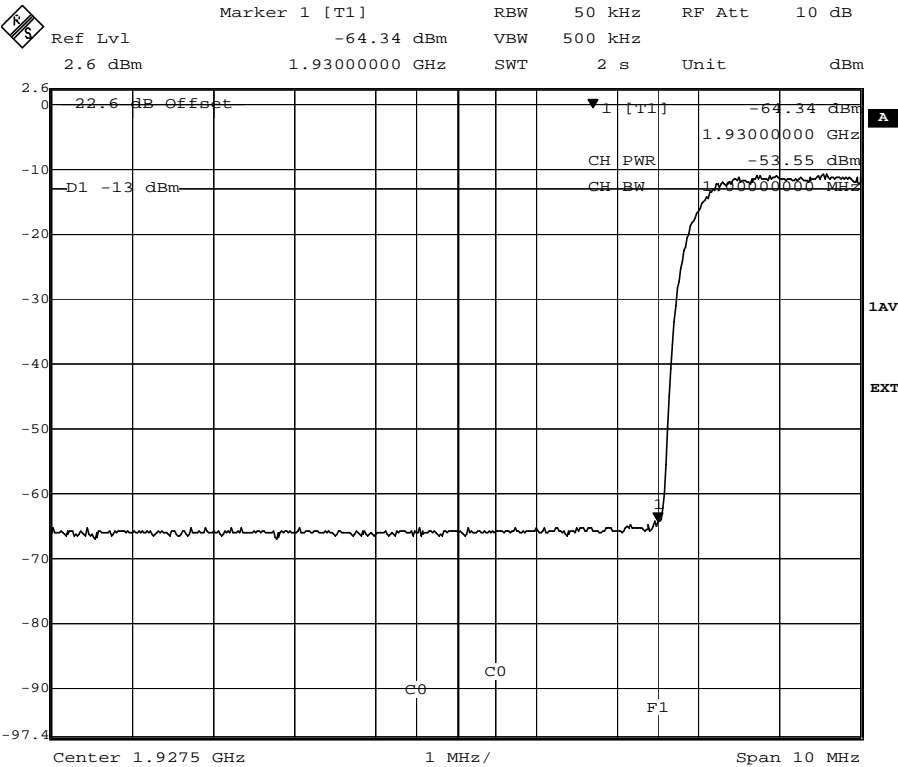
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Diagram 1



Date: 21.NOV.2003 08:40:11

Diagram 2



Date: 21.NOV.2003 08:40:57

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Diagram 3

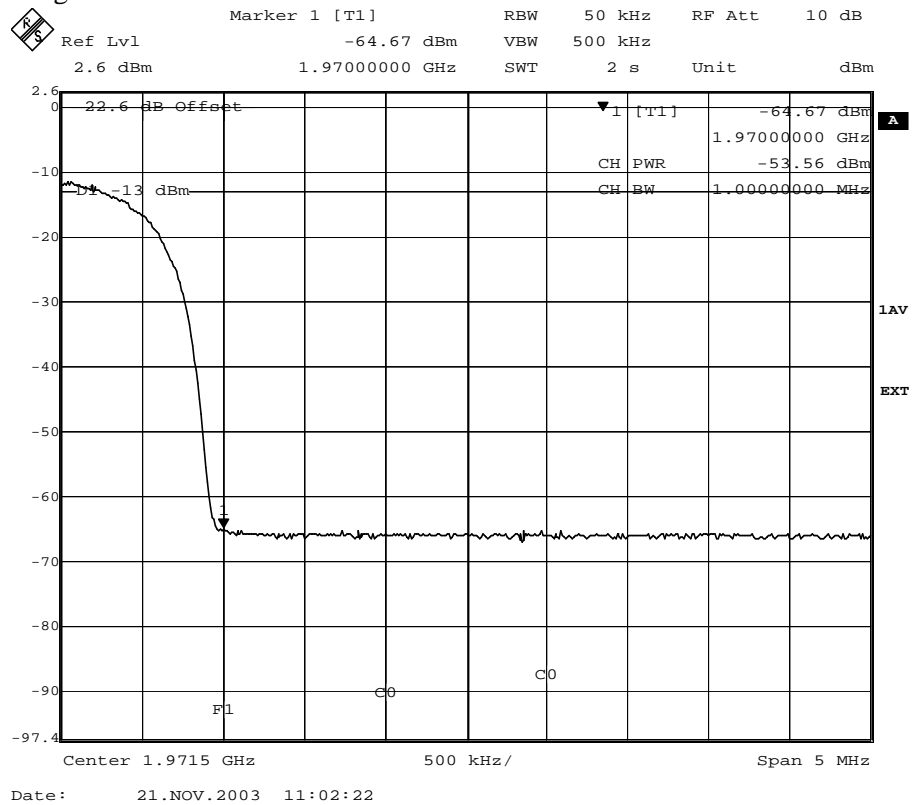
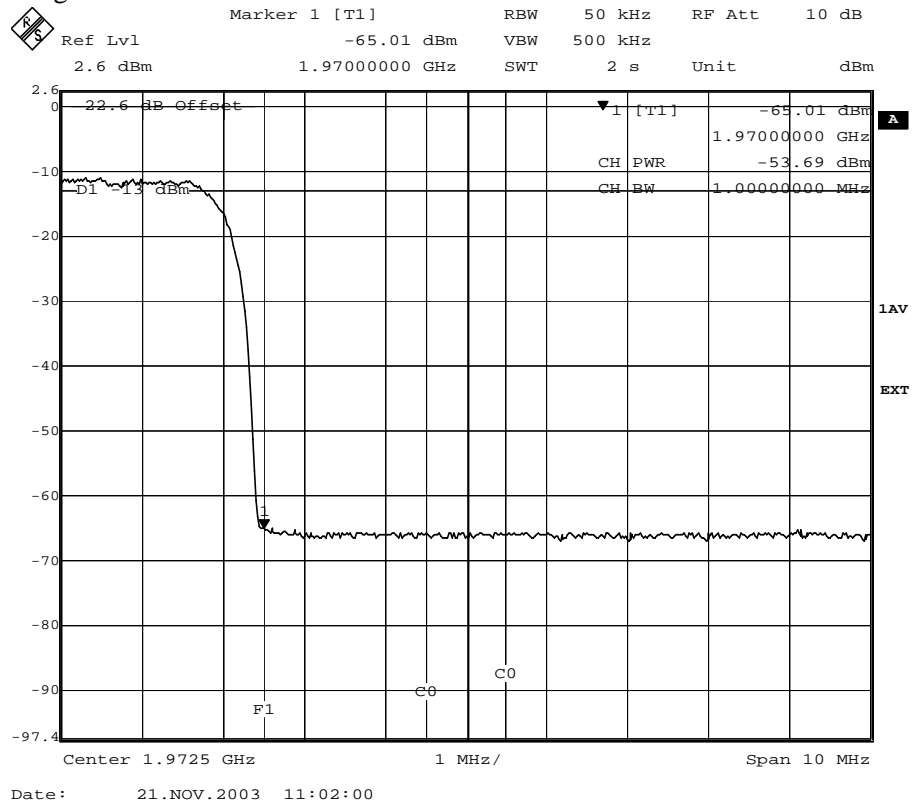


Diagram 4



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## Conducted spurious emission measurements according to 47CFR 2.1051

Date 2003-11-21	Temperature 22 °C ± 3 °C	Humidity 27 % ± 5 %
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### Test set-up and Procedure

The measurement was made per ANSI/TIA/EIA-603-2001. The output was connected to a spectrum analyzer. The spectrum analyzer was connected to an external 10 MHz reference standard during the measurements. The transmitter was set up according to Test Model 1 in 3GPP TS 25.141 during the measurements.

Measurement equipment	Calibration Due	SP number
R&S FSIQ 40	2004-03	503 125
Attenuator 10 dB	2004-04	503 720
Attenuator 10 dB	2004-04	503 096
Testo 610, Temperature and humidity meter	2004-12	502 658

**Measurement uncertainty:** 3.7 dB

### Results

	Output TX A:	Remarks
Diagram 1:	1932.5 MHz, +7.5 dBm, 9 kHz – 20 GHz	1
Diagram 2:	1967.5 MHz, +7.5 dBm, 9 kHz – 20 GHz	2

### Remarks

- 1 The unit with serial number AE50400171 was used for the measurement.
- 2 The unit with serial number AE50400116 was used for the measurement.

### Limits

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.

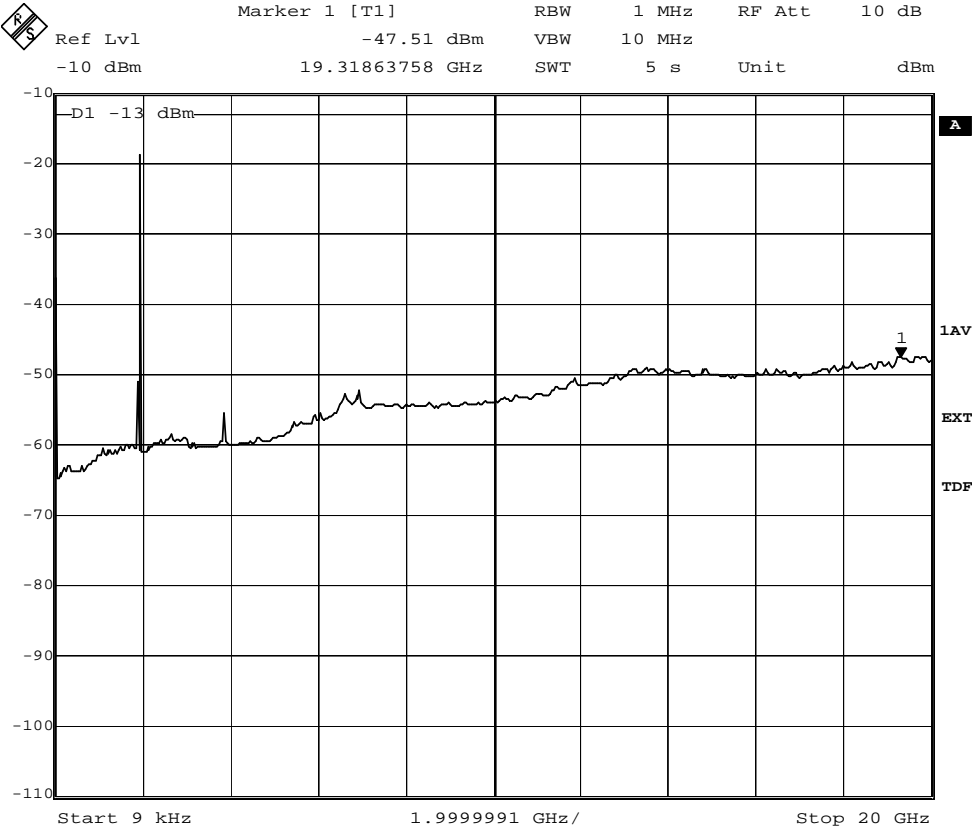
Complies?	Yes
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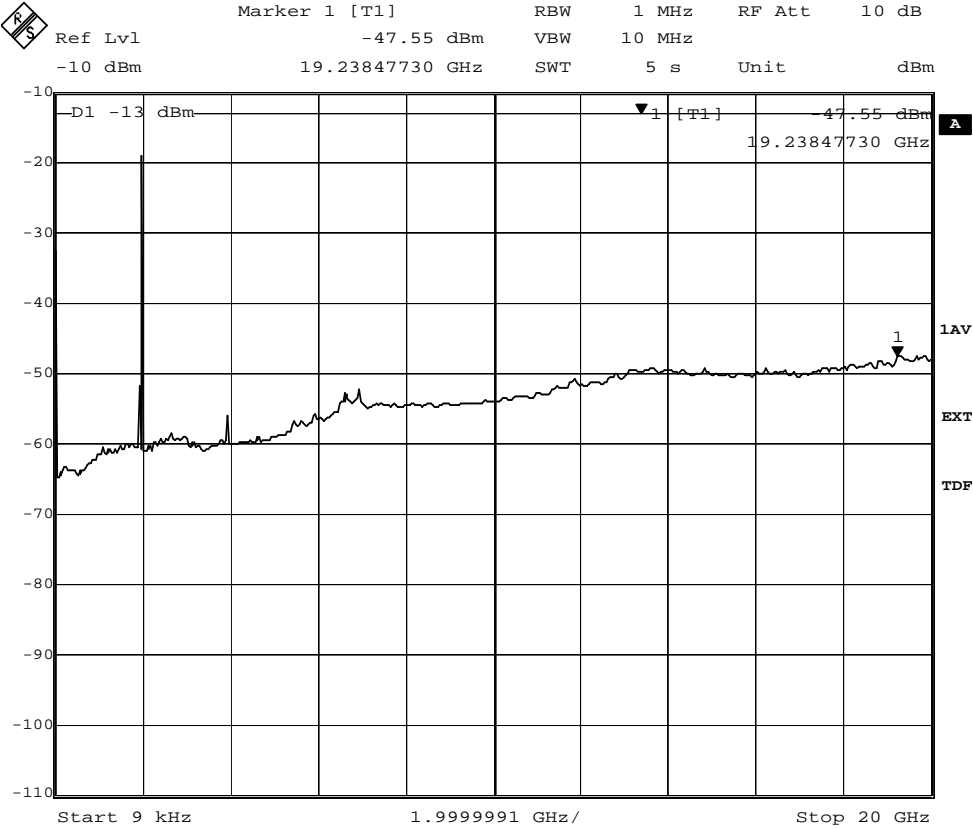
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Diagram 1



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Diagram 2



Date: 21.NOV.2003 11:09:24

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## Field strength of spurious radiation measurements according to 47CFR 2.1053

Date	Temperature	Humidity
2003-11-11	22 °C ± 3 °C	31 % ± 5 %
2003-11-12	21 °C ± 3 °C	35 % ± 5 %
2003-11-13	22 °C ± 3 °C	36 % ± 5 %

### Test set-up and Procedure

The measurement procedure is per ANSI/TIA/EIA-603-2001. The semi anechoic chamber is listed at FCC, Columbia with registration number: 93866. The test site also complies with RSS 212, Issue 1, Industry Canada file no. :IC 3482.

All 3 TRXes in the cabinet were activated and the output connectors J1, J2, and J3 were terminated with 50 ohm attenuators with termination. The transmitters were set up according to Test Model 1 in 3GPP TS 25.141 during the measurements.

The measurements were performed with both horizontal and vertical polarisation of the antenna. The antenna distance was 3 m and above 18 GHz the antenna distance was 1 m.

A pre-measurement was first performed:

In the frequency range 30 M-20 GHz the measurement was performed in power. A propagation loss in free space was calculated and used as a transducer. The used formula, was,  $\text{propagation loss} = 20 \log(4\pi \times \text{antenna distance} / \lambda)$ .

The measurement procedure was as the following:

1. The pre-measurement was first performed with peak detector. The EUT was measured in eight directions and with the antenna at three heights, 1.0 m, 1.5 m and 2.0 m.
2. Spurious radiation on frequencies closer than 20 dB to the limit was measured with the substitution method according to the standard.

Measurement equipment	Calibration Due	SP number
Anechoic chamber	-	15:115
R&S ESI 40	2004-07	503 125
Control computer	-	503 479
Software: R&S ES-K1, ver. 1.60	-	-
Chase Bilog antenna CBL 6111A	2003-12	503 182
EMCO Horn Antenna 3115	2004-11	502 175
EMCO Horn Antenna 3116	2004-09	503 279
MITEQ Low Noise Amplifier	2004-04	503 277
Testo 615, Temperature and humidity meter	2005-09	503 505

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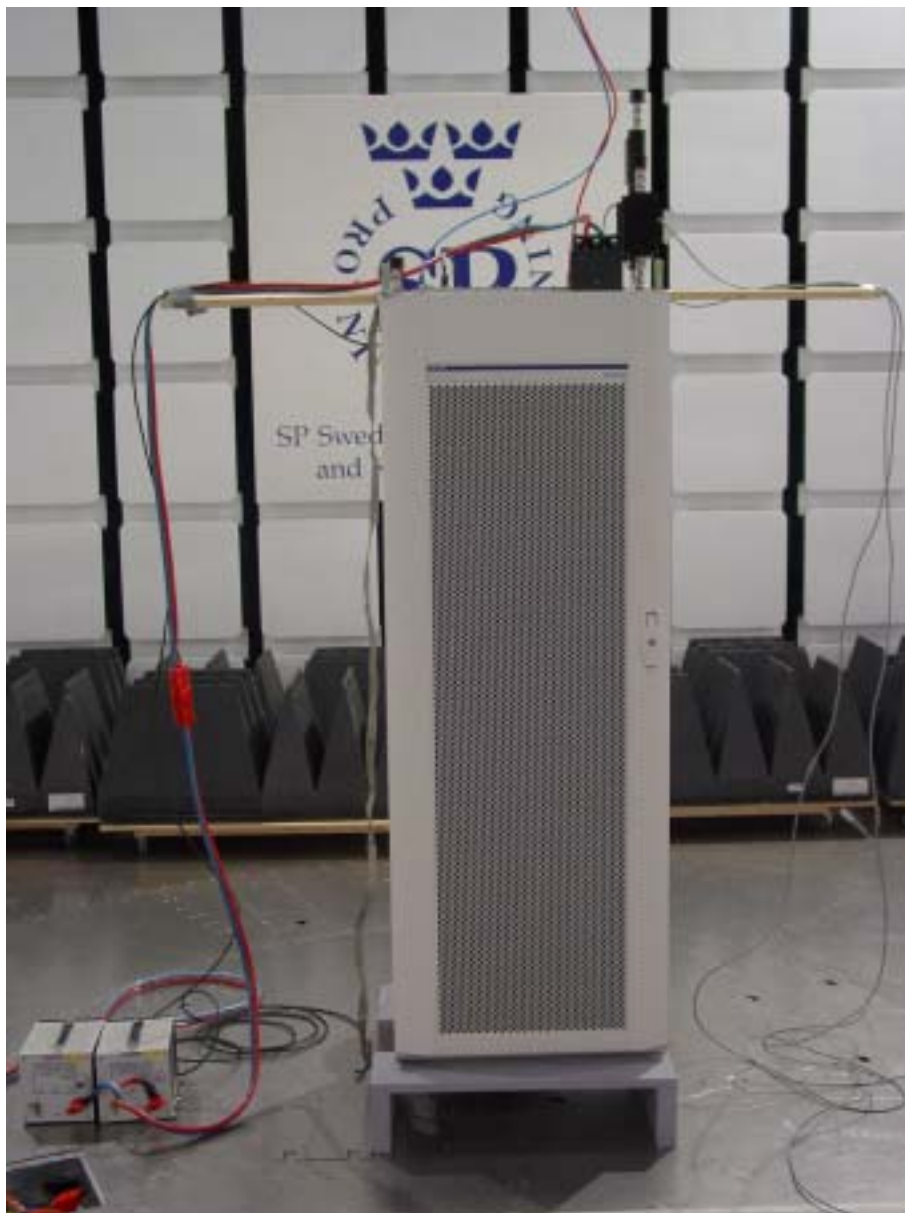
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The test set-up during the spurious radiation measurements can be seen in the picture below.



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## Results

Nominal Voltage -48 V DC

Output power: +43 dBm

The spurious radiation measured with the substitution method can be found in the table below:

		Spurious emission level (dBm)	
Frequency (MHz)	RBW	Vertical	Horizontal
30-20 000	1 MHz	All emission > 20 dB below limit	All emission > 20 dB below limit
Measurement uncertainty		4.7 dB	

## Limits

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.

Complies?	Yes
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Sign:.....

**Frequency stability measurements according to 47CFR 2.1055**

Date	Temperature (test equipment)	Humidity (test equipment)
2003-11-17	22 °C ± 3 °C	32 % ± 5 %
2003-11-18	22 °C ± 3 °C	38 % ± 5 %
2003-11-19	21 °C ± 3 °C	31 % ± 5 %
2002-11-20	21 °C ± 3 °C	34 % ± 5 %

**Test set-up and Procedure**

The measurement was made per 3GPP TS 25.141. Measurements were made at output connector J2. The output was connected to a spectrum analyzer. The spectrum analyzer was connected to an external 10 MHz reference standard during measurement. The transmitter was set up according to Test Model 1 in 3GPP TS 25.141 during the measurements.

Measurement equipment	Calibration Due	SP number
Climate chamber	2004-02	503 546
R&S FSIQ 40	2004-04	503 738
Multimeter Fluke 87	2004-10	502 190
Testo 610, Temperature and humidity meter	2004-12	502 658

**Results**

Nominal Voltage -48 V DC  
+43 dBm output power at 1947.5 MHz

Test conditions		Output J2
Supply voltage DC (V)	Temperature (°C)	Frequency error (Hz)
-48.0	+20	31
-55.2	+20	41
-40.8	+20	-23
-48.0	+30	-37
-48.0	+40	27
-48.0	+50	-28
-48.0	+10	42
-48.0	+5	45
-48.0	0	-46
Maximum freq. error (Hz)		46
Measurement uncertainty		$< \pm 1 \times 10^{-7}$

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## Remarks

The unit with serial number AE50400152 was used for the measurement.  
At  $-5^{\circ}\text{C}$  an error was reported and it was not possible to activate the transmitter.

## Limits (according to 3GPP TS 25.141)

The frequency Error shall be within  $\pm 0.05$  PPM (97.375 Hz).

Complies?	Yes
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## EUT Hardware configuration list RBS 3202

Position	Product name	Product number	R-state	Serial number
	RBS 3202 cab	3/BFE 401 1001	R2A	X891004463
	Door	SXX 109 4358/1650	R1B	X89
	CU Unit	BMF 904 31/1	R4A	SA22612164
	<b>BB Subrack, 26 slots</b>	BFX 901 11/1	R2A	X891007440
	BB subrack fan unit	BKV 301 487/1	R3A	TH4CE02099
1	SCB2	ROJ 119 2108/3	R2G/A	T012627119
2	ET-MC1	ROJ 119 2163/1	R5A	T012573806
3	ET-M1	ROJ 119 2101/2	R7E	TU80751941
4	TUB	ROJ 119 2104/4	R2B/A	T012510158
5	Dummy board	SXX 107 8896/1	R3B	X54
6	BBIFB	ROJ 119 2114/2	R2B	TU81743132
7	Dummy board	SXX 107 8896/1	R3B	X54
8	RAX3	ROJ 119 2187/2	R1A/A	AE50365898
9	RAX3	ROJ 119 2187/1	R4E	AE50115319
10	Dummy board	SXX 107 8896/1	R3B	X54
11	Dummy board	SXX 107 8896/1	R3B	X54
12	Dummy board	SXX 107 8896/1	R3B	X54
13	Dummy board	SXX 107 8896/1	R3B	X54
14	Dummy board	SXX 107 8896/1	R3B	X54
15	Dummy board	SXX 107 8896/1	R3B	X54
16	Dummy board	SXX 107 8896/1	R3B	X54
17	TXB	ROJ 119 2124/3	R1M	AE50194776
18	Dummy board	SXX 107 8896/1	R3B	X54
19	Dummy board	SXX 107 8896/1	R3B	X54
20	GPB31	ROJ 119 2106/31	R1H	TU81884067
21	Dummy board	SXX 107 8896/1	R3B	X54
22	Dummy board	SXX 107 8896/1	R3B	X54
23	Dummy board	SXX 107 8896/1	R3B	X54
24	Dummy board	SXX 107 8896/1	R3B	X54
25	Dummy board	SXX 107 8896/1	R3B	X54
26	Dummy board	SXX 107 8896/1	R3B	X54
27	Dummy board	SXX 107 8896/1	R3B	X54
28	Dummy board	SXX 107 8896/1	R3B	X54

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Position	Product name	Product number	R-state	Serial number
	<b>RF Subrack, 16 slots</b>	BFX 901 12/1	R1A	X891007441
	RF subrack fan unit	BKV 301 487/1	R3A	TH4CE02093
1	SCB2	ROJ 119 2108/3	R2G/A	TO12627249
2	RFIF	ROJ 119 2115/4	R1C/B	TO12050233
3	Dummy	SXK 107 8896/1	R3B	X54
4	TRXB	ROJ 119 2233/1	R1A	AE50400171
5	Dummy	SXK 107 8896/1	R3B	X54
6	AIU	KRC 101 1451/3	R1B	A4004BXZKQ
7	TRXB	ROJ 119 2233/1	R1A	AE50400152
8	Dummy	SXK 107 8896/1	R3B	X54
9	AIU	KRC 101 1451/3	R1B	A4004BZKK
10	TRXB	ROJ 119 2233/1	R1A	AE50400116
11	Dummy	SXK 107 8896/1	R3B	X54
12	AIU	KRC 101 1451/3	R1B	A4004CJRS
13	Dummy	SXK 107 8896/1	R3B	X54
14	Dummy	SXK 107 8896/1	R3B	X54
15	Dummy	SXK 107 8896/1	R3B	X54
16	Dummy	SXK 107 8896/1	R3B	X54
	<b>AMP Subrack, 6 slots</b>	BFL 119 414/1	R1B	X89
	MCPA hub	- -	- -	- -
1	Amplifier unit / MCPA	KRB 101 1112/2	R1A	A57003D8SE
2	Dummy	- -		
3	Amplifier unit / MCPA	KRB 101 1112/2	R1A	A57003DAAH
4	Dummy	- -		
5	Amplifier unit / MCPA	KRB 101 1112/2	R1A	A57003DAAF
6	Dummy	- -		
	AMP subrack fan unit	BKV 301 488/1	R3A	TH4D909560

Software	Revision
WEGA	INC 3.10

## Description of EUT

The EUT is a transceiver unit intended to be used in a WCDMA Base station designed to provide mobile telephone users with a connection to a mobile network or the PSTN.

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## Photos

### Transceiver Unit, ROJ 119 2233/1, R1A

FCC ID label



ID label



Front side



Back side



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Sign:.....

# REPORT

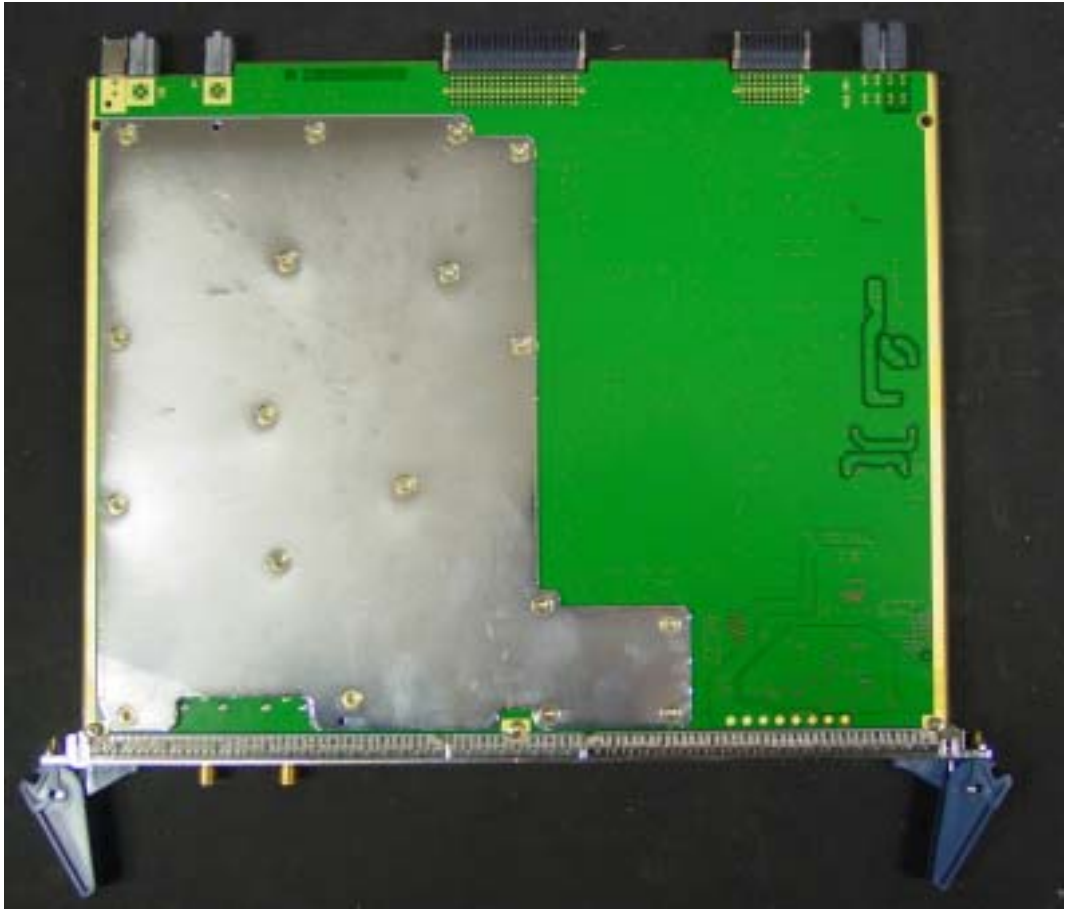
FCC ID: B5KAROJ1192233-1

Datum/Date  
2003-12-19

Beteckning/Reference  
F321478-F24

Sida/Page  
3 (10)  
Encl. 10

Bottom side



Sign:.....

# REPORT

FCC ID: B5KAROJ1192233-1

Datum/Date  
2003-12-19

Beteckning/Reference  
F321478-F24

Sida/Page  
4 (10)  
Encl. 10

PCB component side



Sign:.....



# REPORT

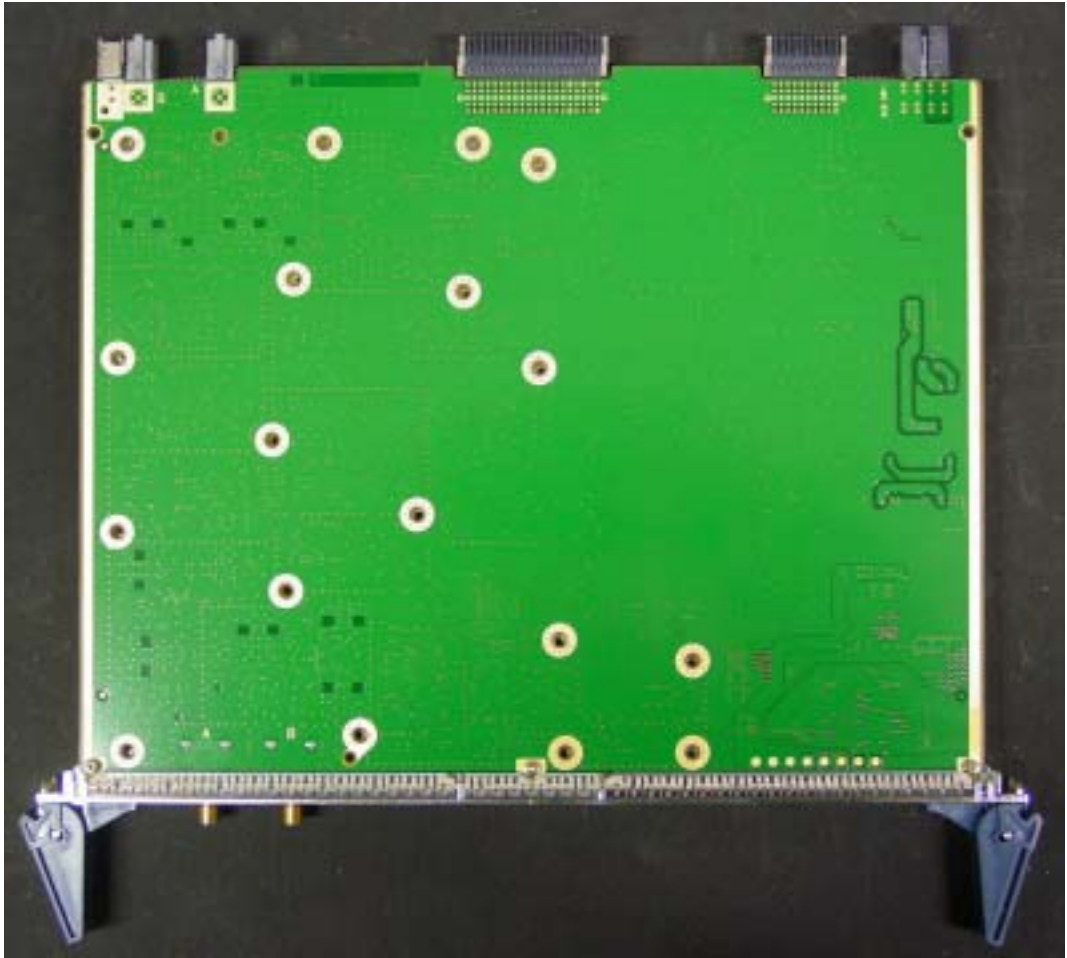
FCC ID: B5KAROJ1192233-1

Datum/Date  
2003-12-19

Beteckning/Reference  
F321478-F24

Sida/Page  
5 (10)  
Encl. 10

PCB rear side



Sign:.....

# REPORT

FCC ID: B5KAROJ1192233-1

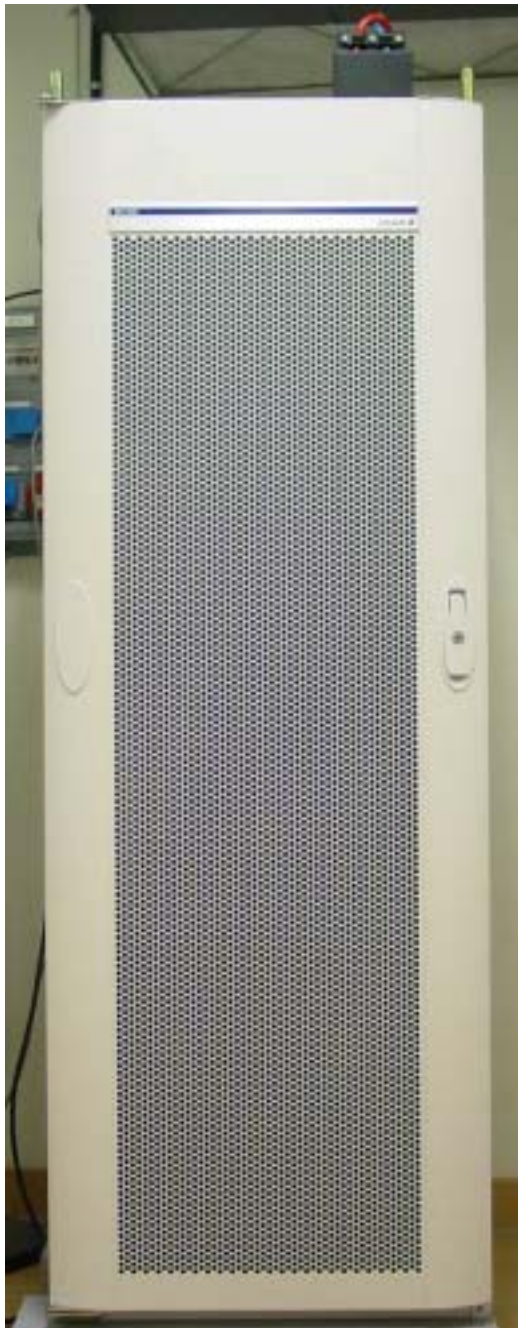
Datum/Date  
2003-12-19

Beteckning/Reference  
F321478-F24

Sida/Page  
6 (10)  
Encl. 10

## RBS 3202 Cabinet, -48 Volt DC system

Front view



Rear view



Sign:.....



# REPORT

FCC ID: B5KAROJ1192233-1

Datum/Date  
2003-12-19

Betekning/Reference  
F321478-F24

Sida/Page  
7 (10)  
Encl. 10

Internal view



Sign:.....

# REPORT

FCC ID: B5KAROJ1192233-1

Datum/Date  
2003-12-19

Beteckning/Reference  
F321478-F24

Sida/Page  
8 (10)  
Encl. 10

CU unit and BB Subrack,



Sign:.....

# REPORT

FCC ID: B5KAROJ1192233-1

Datum/Date  
2003-12-19

Beteckning/Reference  
F321478-F24

Sida/Page  
9 (10)  
Encl. 10

RF Subrack



Sign:.....

# REPORT

FCC ID: B5KAROJ1192233-1

Datum/Date  
2003-12-19

Beteckning/Reference  
F321478-F24

Sida/Page  
10 (10)  
Encl. 10

AMP Subrack



Sign:.....