

Date 2011-02-14

Reference FX100778-F22G

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1002 ISO/IEC 17025

Handled by, department Jonas Bremholt Electronics +46 (0)10 516 5438, jonas.bremholt@sp.se

issued by an FCC listed Laboratory Reg. no. 93866. The test site complies with RSS-Gen, IC file no: 3482A

> Ericsson AB Anders Johansson PDU Radio Base Station 164 80 Stockholm

Class II permissive change measurements on RUS 01 B5 850 MHz cellular equipment with FCC ID: TA8AKRC11864-2 and IC: 287AB-AS118642

(7 appendices)

Test object

RUS 01 B5, KRC 118 64/2, revision R2A

Summary

Appendix 1 describes the test object and set-ups during test. Appendix 7 presents photos of the test object.

Standard		Compliant	Appendix
FCC CFR 47 / IC RS	S-132		
2.1046 / RSS-132 4.4	RF power output	Yes	2
2.1049 / RSS-Gen 4.6.1	Occupied bandwidth	Yes	3
2.1051 / RSS-132 4.5	Band edge	Yes	4
2.1051 / RSS-132 4.5	Spurious emission at antenna terminals	Yes	5
2.1053 / RSS-132 4.5	Field strength of spurious radiation	Yes	6

Note 1: Above RSS-132 items are given as cross-reference only. Measurements were performed according to ANSI procedures referenced by FCC and covered by SP's accreditation.

Note 2: Reduced output power must be used on the channels adjacent to the frequency band edges in order to comply with band edge requirements, see appendix 4 for details.

SP Technical Research Institute of Sweden

Electronics - EMC

Jonas Bremholt
Technical Officer

Christer Karlsson Technical Manager

SP Technical Research Institute of Sweden

Postal address SP Box 857 SE-501 15 Borås

SWEDEN

Office location Västeråsen Brinellgatan 4 Borås Phone / Fax / E-mail +46 105 16 50 00 +46 33 13 55 02 info@sp.se Laboratories are accredited by the Swedish Board for Accreditation and Conformity Assessment (SWEDAC) under the terms of Swedish legislation. This report may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.



FCC ID: TA8AKRC11864-2 IC: 287AB-AS118642

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Appendix 1

FCC ID: TA8AKRC11864-2 IC: 287AB-AS118642

Description – Test object

Equipment: RUS 01 B5 radio equipment 850 MHz single and multi carrier

operating in GSM mode.

Antenna ports: RF A: TX/RX port

RF B: RX port

Frequency range: TX: 869.2 – 893.8 MHz

 $RX: 824.2 - 848.8 \ MHz$

Modulations: GMSK and 8-PSK

Nominal output power: Single carrier: 1x 47.8 dBm (1x 60W)

(Maximum) Multi carrier: 2x 44.8 dBm (2x 30W) / Carrier

4x 41.8 dBm (4x 15W) / Carrier

Nominal power voltage: -48 VDC

Tested channels

		Frequency (MHz)	
Channel	ARFCN	Downlink	Uplink
В	128	869.2	824.2
B+1	129	869.4	824.4
B+5	133	870.2	825.2
B+10	138	871.2	826.2
B+15	143	872.2	827.2
M	190	881.6	836.6
T-15	236	890.8	845.8
T-10	241	891.8	846.8
T-5	246	892.8	847.8
T-1	250	893.6	848.6
T	251	893.8	848.8

Operation mode during measurements

Unless otherwise stated, all measurements were performed with the test object transmitting pseudorandom data in all timeslots and settings for maximum transmitter output power applicable for each configuration.

Conducted measurements

The test object was mounted into an RBS 6201 cabinet and powered by the cabinets internal -48 VDC. All RF conducted TX measurements were performed at antenna port RF A, with antenna port RF B unterminated.



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Appendix 1

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Radiated measurements

The test object was tested stand-alone. It was powered with -48 VDC. All measurements were performed with the test object configured for maximum transmitter output power at port RF A. The port RF A was via a RF attenuator terminated into 50 ohm outside the shielded chamber. Antenna port RF B was unterminated. The modulation 8-PSK was found to be representative for worst case setting for the radiated measurements and was used for the measurements.

Purpose of test

The purpose of the tests is a class II permissive change verification of maintained compliance to the performance characteristics specified in applicable parts of FCC CFR 47 and IC RSS-132. The changes comprise a product revision update to version R2A due to minor HW changes as described in the client documentation. Limited verification measurements in GSM mode were performed and showed maintained compliance.

References

Measurements were done according to relevant parts of the following standards: ANSI 63.4-2003
ANSI/TIA/EIA-603-C-2004
J-STD007A Vol 1
ANSI/TIA/EIA 136-280-D-2002
CFR 47 part 2, October 1st, 2010
CFR 47 part 22, October 1st, 2010
RSS-Gen Issue 3
RSS-132 Issue 2

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Appendix 1

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Measurement equipment

Measurement equipment	Calibration Due	SP number
Semi anechoic chamber, Tesla	2012-10	503 881
Rohde & Schwarz FSIQ 40	2011-07	503 738
Rohde & Schwarz FSQ 40	2011-07	504 143
Rohde & Schwarz ESI 26	2011-08	503 292
EMI measurement computer	-	-
Software: R&S EMC32, ver. 8.20.1	-	503 745
High pass filter	2011-07	502 758
High pass filter	2011-07	503 739
High pass filter	2011-07	503 740
High pass filter	2011-07	504 199
High pass filter	2011-07	504 200
RF attenuator	2011-07	504 159
RF attenuator	2011-08	900 233
Boonton RF Peak power meter/analyzer	2011-10	503 144
Boonton Power sensor 56518-S/4	2012-10	503 145
Chase Bilog antenna CBL 6111A	2011-10	503 182
Horn antenna EMCO 3115	2014-01	502 175
Standard Gain model 20240-20	-	503 674
Low Noise Amplifier, Miteq	2011-07	503 285
μComp Nordic, Low Noise Amplifier	2011-07	504 160
Multimeter Fluke 87	2011-03	502 190
Testo 625 temperature and humidity meter	2011-04	504 117
Testo 635 temperature and humidity meter	2011-03	504 203

Uncertainties

Measurement and test instrument uncertainties are described in the quality assurance documentation "SP-QD 10885". The measurement uncertainties can be found in the table below. The uncertainties are calculated with a coverage factor k=2 (95% level of confidence).

Reservation

The test results in this report apply only to the particular test object as declared in the report.

Delivery of test object

The test objects were delivered: 2011-01-31.

Manufacturer's representative

Samir Catic, Ericsson AB

Test engineers

Andreas Johnson, Jörgen Wassholm, and Jonas Bremholt

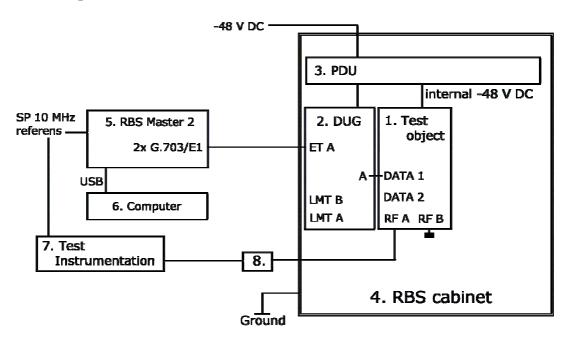
Test participants

Samir Catic, Ericsson AB (partially present)

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Appendix 1

Test set-up conducted measurements TX



Test object

1. RUS 01 B5, KRC 118 64/2, revision R2A, S/N: C823824691 FCC ID: TA8AKRC11864-2 and IC: 287AB-AS118642

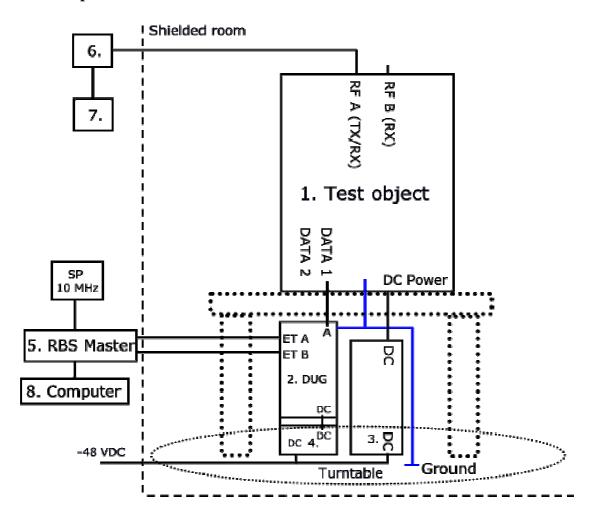
Functional test equipment

- 2. DUG 20 01, product KDU 137 569/1 revision R2B, S/N: C823856121
- 3. PDU 02 01, product BMG 980 336/4, revision R2A, SN BJ31528316
- 4. RBS 6201 cabinet, BAMS 1000778792
- 5. RBS Master 2, product LPY 107 1007/1, revision R1F/A, SN 0000000179
- 6. Computer, Compaq nc6000, BAMS 1000092619 running software RBS 2000 E1 RBSM4 Master2, version R7D05
- 7. SP test instrument according measurement equipment list
- 8. Attenuator and filter according measurement equipment list

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Appendix 1

Test set-up radiated measurements



Test object

RUS 01 B5, product KRC 118 64/2, revision R2A, S/N: C823990634.
 FCC ID: TA8AKRC11864-2 and IC: 287AB-AS118642

Functional test equipment

- 2. DUG 20 01, product KDU 137 569/1, revision R2B, S/N: C823856121
- 3. Power subrack, see below for hardware details
- 4. SUP 6601 1/BFL 901 009/1 Rev R1B, S/N: BR80867188
- 5. RBS Master 2, product LPY 107 1007/1, revision R1F/A, SN 0000000179
- 6. RF attenuator
- 7. Spectrum analyzer, Rohde & Schwarz FSIQ 40, SP 503 738, for supervision purposes
- 8. Computer, Compaq nc6000, BAMS 1000092619 running software RBS 2000 E1 RBSM4 Master2, version R7D05



Appendix 1

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Test object interfaces Type of port:

	- J P P
Power configuration: -48 VDC	DC Power
Ground via RBS frame during conducted measurements,	Ground
Ground via ground strap during radiated stand-alone measurements	
Antenna port RF A, combined TX/RX, female 7/16 connector	Antenna
Antenna port RF B, RX only, female 7/16 connector	Antenna
Cross connect RX A, not supported, omitted in set-up drawings above	-
Cross connect RX B, not supported, omitted in set-up drawings above	-
RXA CO-site, not supported, omitted in set-up drawings above	-
Data 1, connected to DUG port A	Signal
Data 2, not supported	-

Test object software

Software	Revision
CXP 1040007/04	R29E

Hardware of power subrack used during stand-alone radiated tests

Position	Product name	Product number	R-state	Serial number
	Power subrack	SXK 109 8115/1	R2A	
1	PDU 01 01	BMG 980 336/2	R4F	BJ31532384
2	PDU 01 01	BMG 980 336/2	R4F	BJ31532382
3	SHU 01 01	BGK 901 18/1	R3C	BJ31446269
4	DUMMY	SXK 109 8257/1	R1D	-
5	DUMMY	SXK 109 8257/1	R1D	-
6	PFU 01 01	KFE 101 1162/1	R1B	BR80910495
7	DUMMY	SXK 109 8257/1	R1D	-
8	DUMMY	SXK 109 8257/1	R1D	-
9	PCF 02 01	KFE 101 1157/1	R1C	BW95301450



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Appendix 2

RF power output measurements according to 47 CFR 2.1046, 22.913 / RSS-132 4.4

Date	Temperature	Humidity
2011-02-07	23 °C ± 3 °C	22 % ± 5 %

Test set-up and procedure

The output was connected to a peak power analyzer with the CDF mode activated.

Measurement equipment	SP number
Boonton RF Peak power meter/analyzer	503 144
Boonton Power sensor 56518-S/4	503 145
RF attenuator	504 159
Multimeter Fluke 87	502 190
Testo 635 temperature and humidity meter	504 203

Measurement uncertainty: 0.7 dB

Results

Single carrier: Rated output power level at port RF A (maximum): 47.8 dBm

Transmitter power (dBm/ dB) RMS / PAR			
Channel	В	M	Т
GMSK	-	47.5 / 0.7	-
8-PSK	-	47.1 / 3.8	-

Limit

According to CFR 47/ RSS there are no conducted limits at the antenna connector.

CFR § 22.913/ SRSP-503 5.1: The effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts (57 dBm).

RSS-132: The transmitter output power shall not exceed the limits given in SRSP-503

Complies?	Yes



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Appendix 3

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Occupied bandwidth measurements according to 47 CFR 2.1049 / RSS-Gen 4.6.1

Date	Temperature	Humidity
2011-02-07	23 °C ± 3 °C	22 % ± 5 %

Test set-up and procedure

The measurements were made as defined in §2.1049. The output was connected to a spectrum analyzer with the RMS detector activated. The spectrum analyzer was connected to an external 10 MHz reference standard during the measurements.

Measurement equipment	SP number
Rohde & Schwarz FSQ	504 143
RF attenuator	504 159
Testo 635 temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB

Results

The results are shown in appendix 3.1

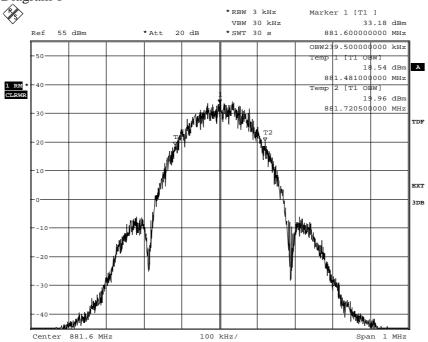
Modulation: 8-PSK

Channel OBW
Diagram 1 M 239 kHz



FCC ID: TA8AKRC11864-2 IC: 287AB-AS118642 Appendix 3.1





Date: 7.FEB.2011 09:36:58

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Band edge measurements according to 47 CFR 2.1051, 22.917 / RSS-132 4.5

Date	Temperature	Humidity
2011-02-07	23 °C ± 3 °C	22 % ± 5 %

Test set-up and procedure

The measurements were made as defined in §22.917. The output was connected to a spectrum analyzer with the RMS detector activated. The spectrum analyzer was connected to an external 10 MHz reference standard during the measurements. A resolution bandwidth of 3 kHz (1% of OBW) was used up to 1 MHz away from the band edges and 100 kHz was used from 1 MHz to 11 MHz away from the band edges.

Measurement equipment	SP number
Rohde & Schwarz FSIQ	503 738
RF attenuator	504 159
Testo 635 temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB

Results

The results are shown in appendix 4.1

Modulation GMSK

		Power setting	Measured RMS power
1:	В	P36	35.4 dBm
2:	B+1	P48 (Maximum)	47.3 dBm
3:	T-1	P48 (Maximum)	47.2 dBm
4:	T	P34	33.3 dBm
	2: 3:	2: B+1 3: T-1	1: B P36 2: B+1 P48 (Maximum) 3: T-1 P48 (Maximum)

Modulation 8-PSK

			Power setting	Measured RMS power
Diagram	5:	В	P36	35.0 dBm
Diagram	6:	B+1	P48 Maximum	47.0 dBm
Diagram	7	T-1	P48 Maximum	46.9 dBm
Diagram	8	T	P36	34.9 dBm

Remark

Above tables show the maximum reduced output power setting and corresponding measured RMS value for GMSK and 8-PSK modulation that meet band edge requirements for channels 128 and 251. Additional measurements were performed at maximum nominal TX output power with the carrier frequency moved one channel into the TX band.

Limits

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

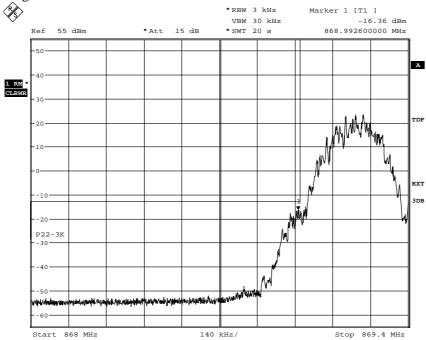
Complies?	Yes
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FCC ID: TA8AKRC11864-2 IC: 287AB-AS118642

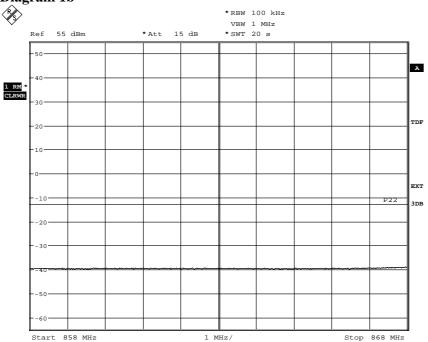
Appendix 4.1





Date: 7.FEB.2011 09:46:03

Diagram 1b

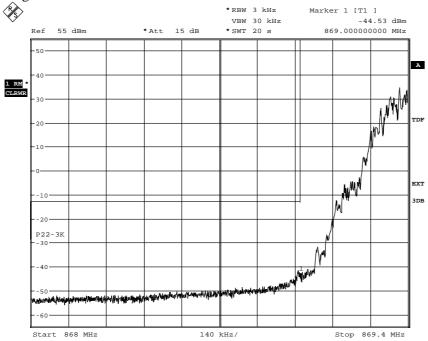




FCC ID: TA8AKRC11864-2 IC: 287AB-AS118642

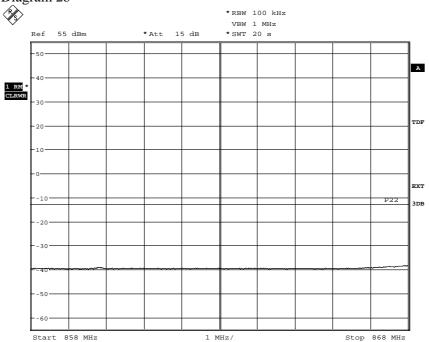
Appendix 4.1

Diagram 2a



Date: 7.FEB.2011 10:58:20

Diagram 2b

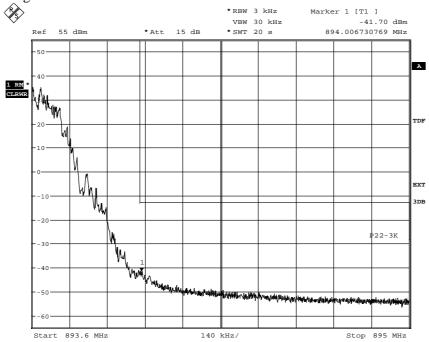




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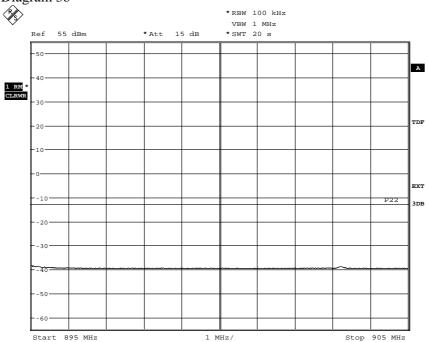
Appendix 4.1





Date: 7.FEB.2011 10:43:57

Diagram 3b

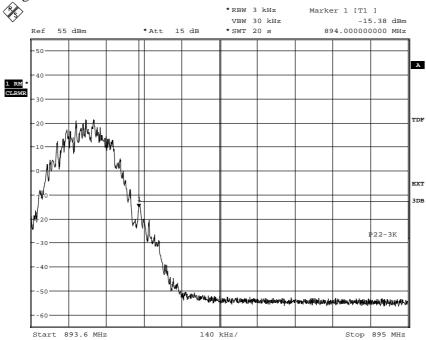




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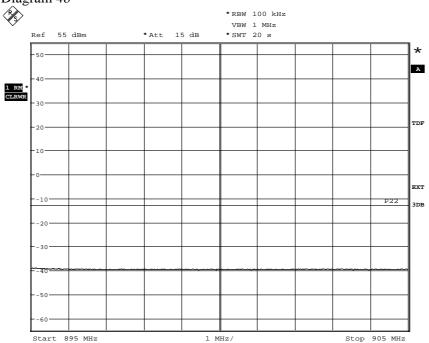
Appendix 4.1





Date: 7.FEB.2011 15:44:52

Diagram 4b

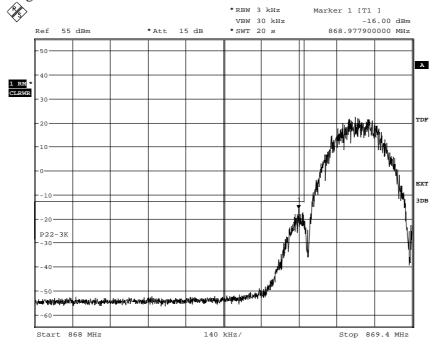




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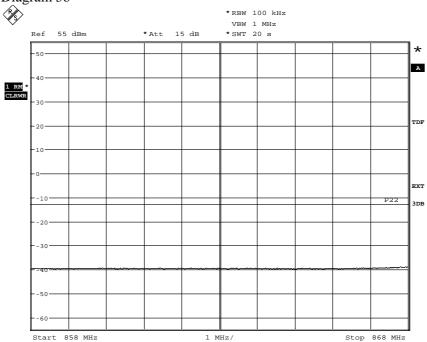
Appendix 4.1





Date: 7.FEB.2011 09:47:24

Diagram 5b

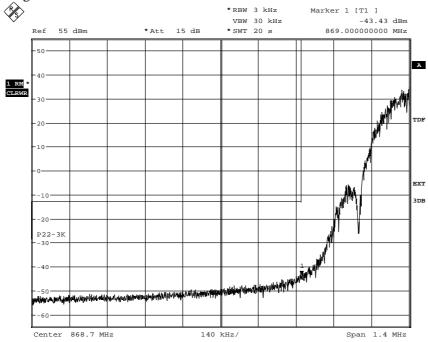




FCC ID: TA8AKRC11864-2 IC: 287AB-AS118642

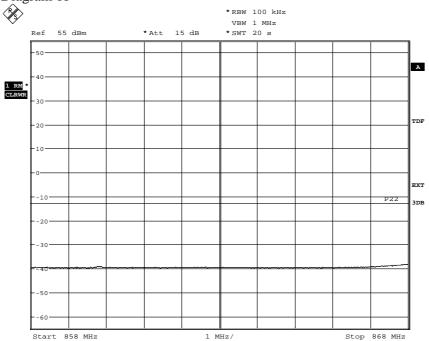
Appendix 4.1

Diagram 6a



Date: 7.FEB.2011 10:53:36

Diagram 6b



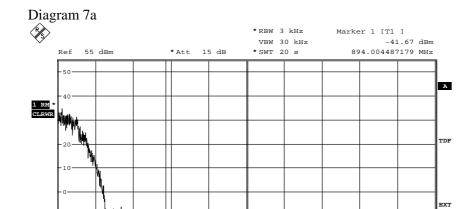


FCC ID: TA8AKRC11864-2 IC: 287AB-AS118642

Appendix 4.1

22-3K

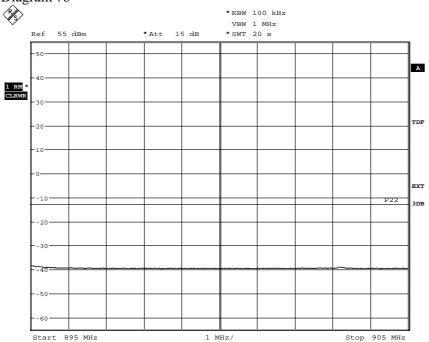
Stop 895 MHz



Date: 7.FEB.2011 10:46:17

Start 893.6 MHz

Diagram 7b



140 kHz/

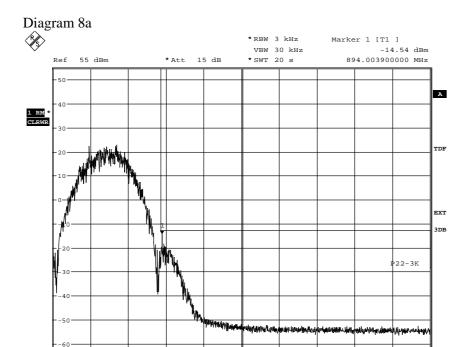
Date: 7.FEB.2011 10:24:56



FCC ID: TA8AKRC11864-2 IC: 287AB-AS118642

Appendix 4.1

Stop 895 MHz

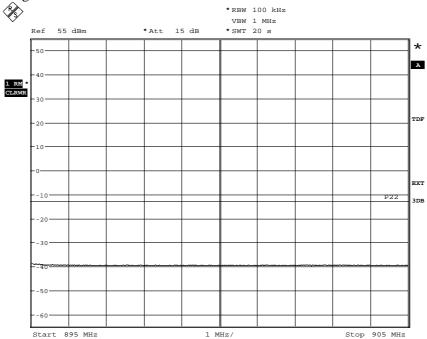


140 kHz/

Date: 7.FEB.2011 09:53:20

Start 893.6 MHz

Diagram 8b





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Appendix 5

Conducted spurious emission measurements according to 47 CFR 2.1051, 22.917 / RSS-132 4.5

Date	Temperature	Humidity
2011-02-07	23 °C ± 3 °C	22 % ± 5 %

Test set-up and procedure

The measurements were made per definition in §22.917. The output was connected to a spectrum analyzer. First a pre-measurement with activated peak detector was performed. An emission close to or above the limit is measured with activated RMS detector and the RMS measurement result is noted. The spectrum analyzer was connected to an external 10 MHz reference standard during the measurements.

Measurement equipment	SP number
Rohde & Schwarz FSQ	504 143
RF attenuator	504 159
RF attenuator	900 233
High pass filter	504 199
High pass filter	503 739
High pass filter	503 740
Testo 635, Temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB

Results

The results are shown in appendix 5.1

Single carrier

Channel GMSK 8-PSK M: Diagram 1 Diagram 2

Multi carrier 1x2 (2 carriers):

Channels GMSK 8-PSK B+(B+10): Diagram 3 Diagram 4

Remarks

The emission at 9 kHz on some plots was not generated by the test object. A complementary measurement with a smaller RBW showed that it was related to the LO feed-through.

The measurements in the frequency range 859 to 904 MHz were not intended to show compliance at the band edges. The purpose was to verify compliance for intermodulation products in multicarrier configurations. Band edge compliance was addressed in appendix 4.

The highest internal frequency as declared by the client was 2.4576 GHz, thus the choice of the upper frequency boundary was set to 10x2.5 GHz = 25 GHz for emission measurements.

The 2.4576 GHz frequency was identified as not used in the RF chain and is not affected by the power setting of the carrier frequency, the transmitter was activated for 40 W output power during the measurements in the frequency range 15 to 25 GHz. In the frequency range 9 kHz to 15 GHz the transmitter was activated for maximum output power.



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Appendix 5

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Limits

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

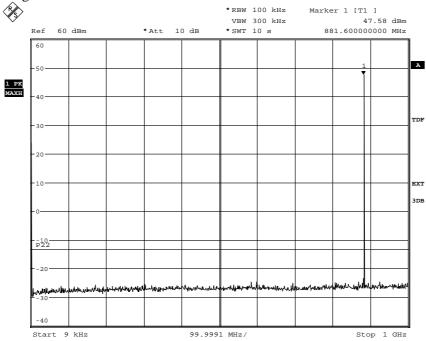
Complies?	Yes
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FCC ID: TA8AKRC11864-2 IC: 287AB-AS118642

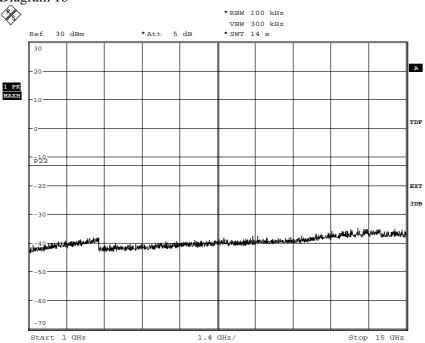
Appendix 5.1

Diagram 1a



Date: 7.FEB.2011 12:24:57

Diagram 1b

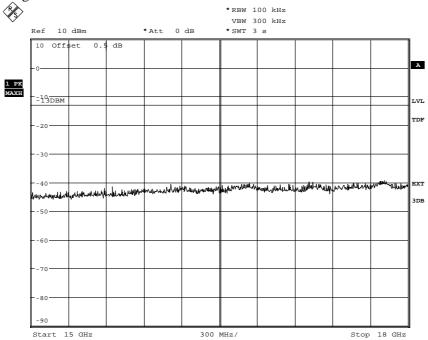




FCC ID: TA8AKRC11864-2 IC: 287AB-AS118642

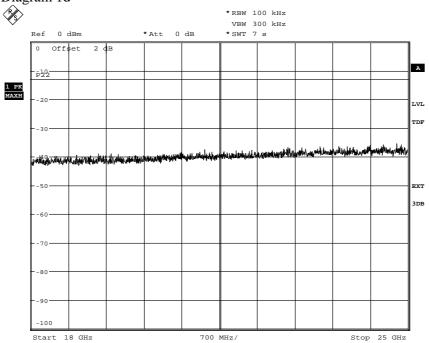
Appendix 5.1

Diagram 1c



Date: 7.FEB.2011 13:05:33

Diagram 1d

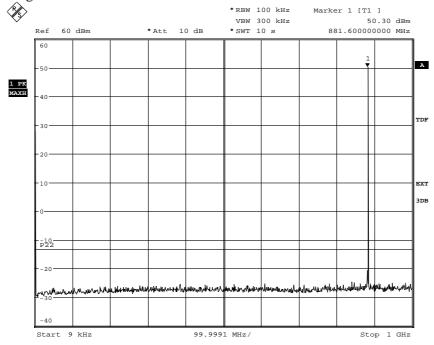




FCC ID: TA8AKRC11864-2 IC: 287AB-AS118642

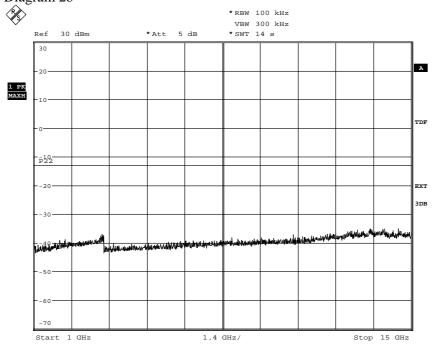
Appendix 5.1





Date: 7.FEB.2011 12:27:20

Diagram 2b

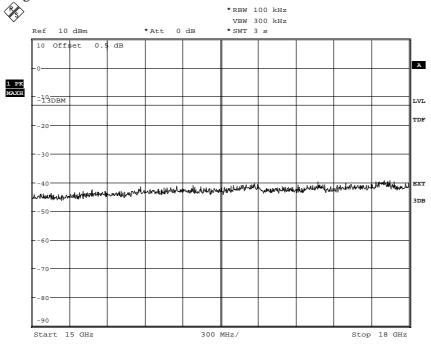




FCC ID: TA8AKRC11864-2 IC: 287AB-AS118642

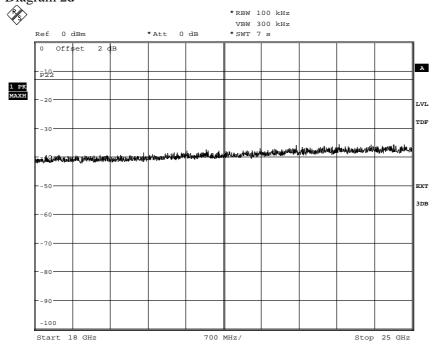
Appendix 5.1

Diagram 2c



Date: 7.FEB.2011 13:07:10

Diagram 2d

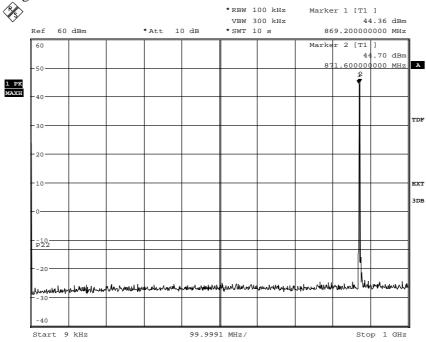




FCC ID: TA8AKRC11864-2 IC: 287AB-AS118642

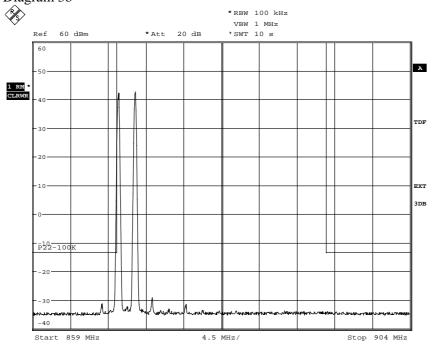
Appendix 5.1

Diagram 3a



Date: 7.FEB.2011 14:11:17

Diagram 3b

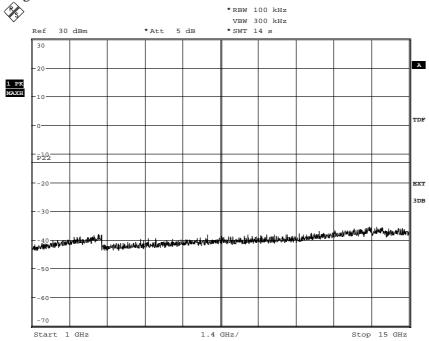




FCC ID: TA8AKRC11864-2 IC: 287AB-AS118642

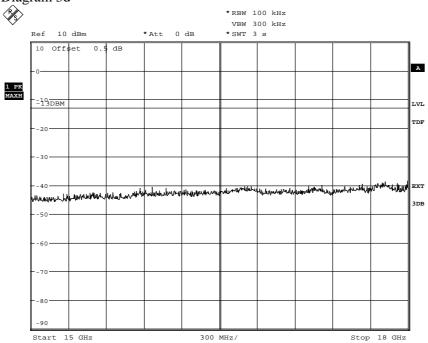
Appendix 5.1





Date: 7.FEB.2011 14:08:16

Diagram 3d

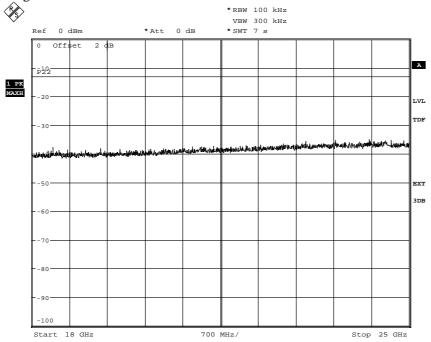




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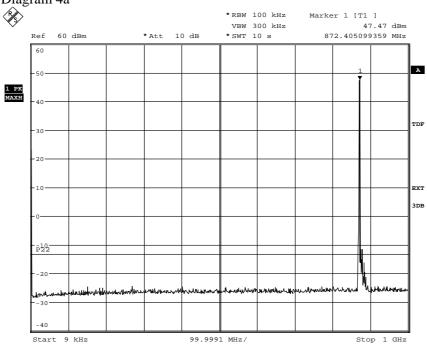
Appendix 5.1

Diagram 3e



Date: 7.FEB.2011 13:37:20

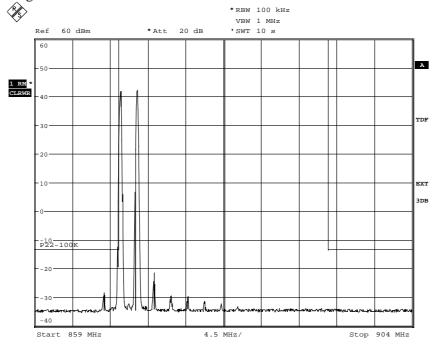
Diagram 4a





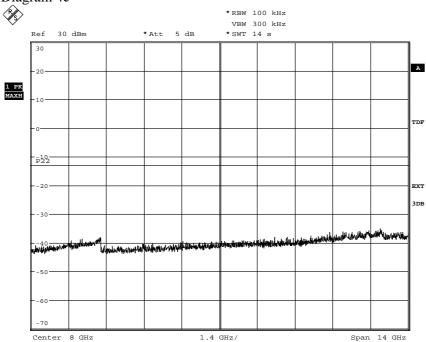
FCC ID: TA8AKRC11864-2 IC: 287AB-AS118642 Appendix 5.1





Date: 7.FEB.2011 14:50:33

Diagram 4c



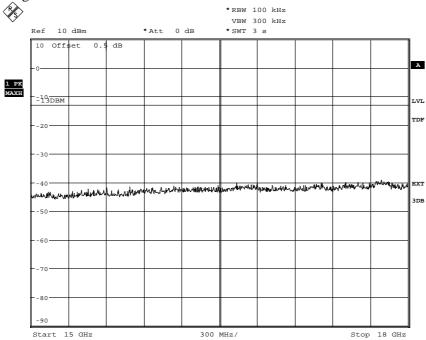
Date: 7.FEB.2011 15:36:57



FCC ID: TA8AKRC11864-2 IC: 287AB-AS118642

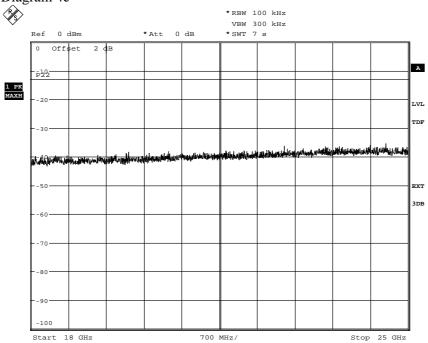
Appendix 5.1

Diagram 4d



Date: 7.FEB.2011 13:24:07

Diagram 4e





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Appendix 6

FCC ID: TA8AKRC11864-2 IC: 287AB-AS118642

Field strength of spurious radiation measurements according to 47 CFR 2.1053, 22.917 / RSS-132 4.5

Date	Temperature	Humidity
2011-01-31 to 2011-02-03	22 °C ± 3 °C	21 to 29 % \pm 5 %

Procedure

The test site is listed at FCC, Columbia with registration number: 93866. The test site also complies with RSS-Gen, Industry Canada file no.: 3482A-1.

The antenna port "RF A" was connected to functional test equipment outside the test chamber for signal monitoring. Antenna port "RF B" was unterminated.

The measurements were performed with both horizontal and vertical polarization of the antenna. The antenna distance was 3 m in the frequency range 30 MHz to 15 GHz and 1 m in the frequency range 15 to 25 GHz.

- 1. A pre-measurement was first performed.
- 2. In the frequency range 30 MHz-25 GHz the measurement was performed in power with a RBW of 100 kHz. A propagation loss in free space was calculated. The used formula was,

$$\gamma = 20 \log \left(\frac{4\pi D}{\lambda} \right)$$
, γ is the propagation loss and D is the antenna distance.

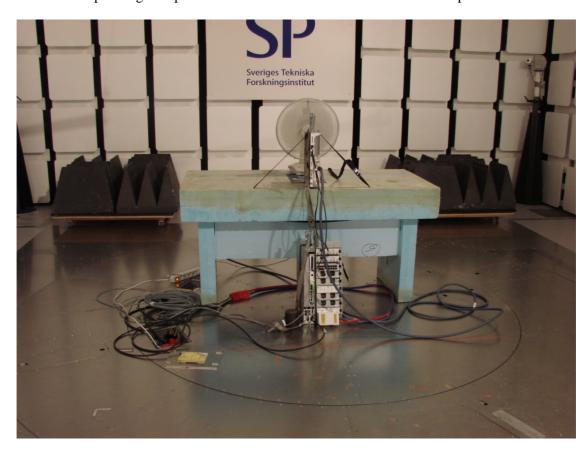
- 3. The measurement procedure was as the following.
- 4. The pre-measurement was first performed with peak detector. The EUT was measured in eight directions and with the antenna at three heights, 1.0 m, 1.5 m and 2.0 m.
- 5. Spurious radiation on frequencies closer than 20 dB to the limit is scanned 0-360 degrees and the antenna is scanned 1-4 m for maximum response. The emission is then measured with the RMS detector and the RMS value is reported, frequencies closer than 10 dB to the limit measured with the RMS detector were measured with the substitution method according to the standard.

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Appendix 6

Test set-up

The test set-up during the spurious radiation measurements is shown in the picture below:



Measurement equipment

Measurement equipment	SP number
Semi anechoic chamber Tesla	503 881
Rohde & Schwarz ESI 26	503 292
Rohde & Schwarz FSIQ 40	503 738
EMC 32 ver. 8.20.1	503 745
Chase Bilog antenna CBL 6111A	503 182
EMCO Horn Antenna 3115	502 175
Standard Gain model 20240-20	503 674
Highpass filter 1-15 GHz	504 199
Highpass filter 3-18 GHz	504 200
MITEQ Low Noise Amplifier	503 285
uComp Nordic Low Noise Amplifier	504 160
Testo 625 temperature and humidity meter	504 188



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Appendix 6

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Tested configurations

Single Carrier (One carrier configuration):

Cell	1	1	1
Channel	В	M	T

Multi Carrier 1x2 (Two carrier configuration):

Cell	1	2
Channels	В	B+10
Channels	Т	T-10

Multi Carrier 1x4 (Four carrier configuration):

Main Carrier IX (1 our Carrier Comigaration).					
Cell	1	2	3	4	
Channels	В	B+5	B+10	B+15	
Channels	Т	T-5	T-10	T-15	

Results

	Spurious emission level (dBm)		
Frequency (MHz)	Vertical	Horizontal	
30-25 000	All emission > 20 dB below limit	All emission > 20 dB below limit	

Measurement uncertainty:

3.2 dB up to 18 GHz, 3.6 dB above 18 GHz

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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Appendix 7

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External photos of the test object

Note: The pictures show the sample used for radiated tests.



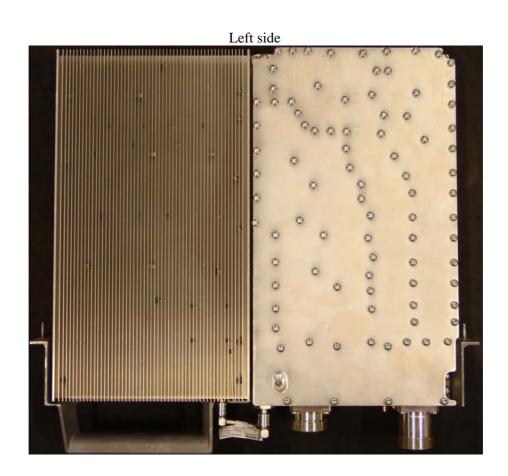


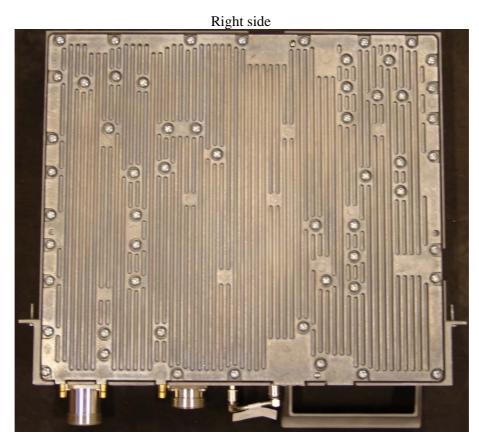


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Date 2011-02-14 $\begin{array}{ll} \text{Reference} & \text{Page} \\ FX100778\text{-}F22G & 3 \ (3) \end{array}$

Appendix 7

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