RADIO TEST REPORT

No. 712808R2

EQUIPMENT UNDER TEST

Equipment :	Remote Head
Type / model :	DDRxxx (DDR 100, 200, 300, 400 series)
Manufacturer :	Deltanode Solutions AB
Tested by request of :	Deltanode Solutions AB

SUMMARY

The equipment complies with the frequency stability requirements of the following standards:

47CFR part 2 (2008)

47CFR part 22 (2008) subpart H

47CFR part 24 (2008) subpart E

47CFR part 27 (2008) subpart C

Date of issue: 2009-08-07

Tested by: Niklas Boström Approved by: Niklas Boström

CONTENTS

Page

1. CLIENT INFORMATION

The EUT has been tested by request of

Company:	Deltanode Solutions AB Kvarnholmsvägen 52 SE 131 31Nacka Sweden
Name of contact:	Daniel Kerek +46 707 98 52 20

2. EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT

According to the manufacturer

Equipment:	Remote Head	
Type/Model:	DDR208 and DDR210	
Brand name:	Deltanode	
Serial number:	486 and 1025	
Manufacturer:	Deltanode Solutions AB	
Rating RF output power:	850 MHz band	CDMA 1 * 33dBm GSM 2 * 30dBm
	1900 MHz band	CDMA 1 * 33dBm GSM 2 * 30dBm
	AWS band	WCDMA 1 * 30dBm
Frequency range:	850 MHz band	869 – 894 MHz
	1900 MHz band	1930 – 1990 MHZ
	AWS band	2110 – 2155 MHz
External antenna connector:	Yes	
Temperature range:	-25 to +55 ^{o}C	
Modulation characteristic:	850 MHz band	CDMA (QPSK) GSM (GMSK)
	1900 MHz band	CDMA (QPSK) GSM (GMSK)
	AWS band	WCDMA (QPSK)

2.2 Additional hardware information about the EUT

DDR 100, 200, 300, 400 series are tested for the US frequency bands 850, 1900 and AWS. The product structure allows free configuration of the three bands up to four RF line-up's in one unit.

The part number DDR 100 is equipped with 1 RF line up and DDR 400 is equipped with four RF line up's.

The tested DDR210 is a dual band unit 850/1900, and DDR208 is a dual band unit 1900/AWS. The 1900 MHz subunits in the 1900/AWS dual band unit were disabled during all tests.

This measurement report reflects the RF line up's regardless of number of line up's in one unit and accordingly any combination of the three bands up to totally four bands are covered.

The EUT's consists of the following units:

Unit	**Type and version**	**Serial number**
850 / 1900 unit	DDR210	1025
With subunits	**Type and version**	**Serial number**
Fiber Optic Board	KS22.1	LH00402
PA Board 1900	KS27.1	DH00498
PA Board 850	KS28.1	DH00133
VGA Board 1900	KS30.3	LH00485
VGA Board 850	KS30.2	LH00153
Duplex filter 1900	3F600301	376
Duplex filter 850	3F600501	109

Unit	**Type and version**	**Serial number**
AWS unit	DDR208	4986
With subunits	**Type and version**	**Serial number**
Fiber Optic Board	KS22.1	LH00322
Duplex filter AWS	3F600401	224
PA Board AWS	KS27.2	DH326
VGA Board AWS	KS30.5	LH00382

Subunits for the 1900 band was also mounted in this unit, these were disabled during all tests.

2.3 Additional software information about the EUT

During the tests the EUT's supported the following software:

Software	Version
AM001001	2.6.16

2.4 Modification during the tests

No modifications have been made during the tests.

3. TEST SPECIFICATIONS

3.1 Standards

FCC
47CFR part 2 (2008)

47CFR part 22 (2008) subpart H

47CFR part 24 (2008) subpart E

47CFR part 27 (2008) subpart C

Measurements methods were according to ANSI C63.4-2003.

3.2 Additions, deviations and exclusions from standards and accreditation

Only frequency stability has been measured by request of the client.

No other additions, deviations or exclusions have been made from standard.

3.3 Test set-up

For conducted RF measurements the EUT was placed in a climatic chamber and connected to the measuring instrument with cables and suitable power attenuators. Measurement results were corrected for attenuation in the set-up configuration. The EUT was supplied with 120 V, (60 Hz) during the tests.

3.4 Test conditions

Parameter	Normal	Extreme
Supplying voltage, V AC	120	102 - 138
Air temperature, ^{o}C	20-25	-30 - +55

4. TEST SUMMARY

The results in this report apply only to the tested sample:

4.1 Tested parameters

Test	Result	Note
Frequency stability 850 band	PASS	
Frequency stability 1900 band	PASS	
Frequency stability AWS band	PASS	

5. FREQUENCY STABILITY 850 BAND

Date of test: 2009-08-05

Ambient temperature 24°C Relative humidity 55 %

5.1 Test protocol

The test was done with two different input signals:

- First test was with a GSM carrier and the frequency error was measured with a signal analyzer.

- Second test was with a CW signal and the frequency error was measured with a frequency counter.

Input signal: GSM carrier at 881,5 MHz
CW at 881,5 MHz

Frequency error		
Ambient temperature (°C)	GSM frequency error (Hz)	CW frequency error (Hz)
-30	+2	+2
-20	+3	+2
-10	+3	+2
0	+2	+2
10	+2	+2
20	+2	+2
30	+3	+3
40	+2	+2
50	+2	+2
55	+2	+2

Frequency error Nominal voltage: 120 VAC		
Voltage (V AC)	GSM frequency error (Hz)	CW frequency error (Hz)
85% of nominal = 102	+2	+2
90% of nominal = 108	+2	+2
95% of nominal = 114	+2	+2
100% of nominal = 120	+2	+2
105% of nominal = 126	+2	+2
110% of nominal = 132	+2	+2
115% of nominal = 138	+2	+2

5.2 Limits

The frequency tolerance for a fixed Base transmitter in 47 CFR §22.255 is 1.5 ppm, at 894MHz that equals 1.34kHz.

Fulfill requirements: YES

6. FREQUENCY STABILITY 1900 BAND

Date of test: 2009-08-05

Ambient temperature 24°C Relative humidity 55 %

6.1 Test protocol

The test was done with two different input signals:

- First test was with a GSM carrier and the frequency error was measured with a signal analyzer.

- Second test was with a CW signal and the frequency error was measured with a frequency counter.

Input signal: GSM carrier at 1960 MHz
CW at 1960 MHz

Frequency error		
Ambient temperature (°C)	GSM frequency error (Hz)	CW frequency error (Hz)
-30	+3	+4
-20	+2	+4
-10	+3	+4
0	+3	+4
10	+3	+4
20	+2	+4
30	+3	+4
40	+2	+4
50	+2	+4
55	+2	+4

Frequency error Nominal voltage: 120 VAC		
Voltage (V AC)	GSM frequency error (Hz)	CW frequency error (Hz)
85% of nominal = 102	+2	+4
90% of nominal = 108	+2	+4
95% of nominal = 114	+2	+4
100% of nominal = 120	+2	+4
105% of nominal = 126	+2	+4
110% of nominal = 132	+2	+4
115% of nominal = 138	+2	+4

6.2 Limits

The frequency tolerance in 47 CFR §24.135 is 1.0 ppm, at 1990MHz that equals 1.99kHz.

Fulfill requirements: YES

7. FREQUENCY STABILITY AWS BAND

Date of test: 2009-08-05 and 2009-08-07

Ambient temperature 24°C Relative humidity 55 %

7.1 Test protocol

The test was done with two different input signals:

- First test was with a WCDMA carrier and the frequency error was measured with a signal analyzer.

- Second test was with a CW signal and the frequency error was measured with a frequency counter.

Input signal: WCDMA carrier at 2132.5 MHz
CW at 2132.5 MHz

Frequency error		
Ambient temperature (°C)	GSM frequency error (Hz)	CW frequency error (Hz)
-30	+2	+5
-20	+2	+4
-10	+2	+3
0	+2	+4
10	+1	+4
20	+0	+3
30	+3	+5
40	+2	+4
50	+0	+4
55	+0	+4

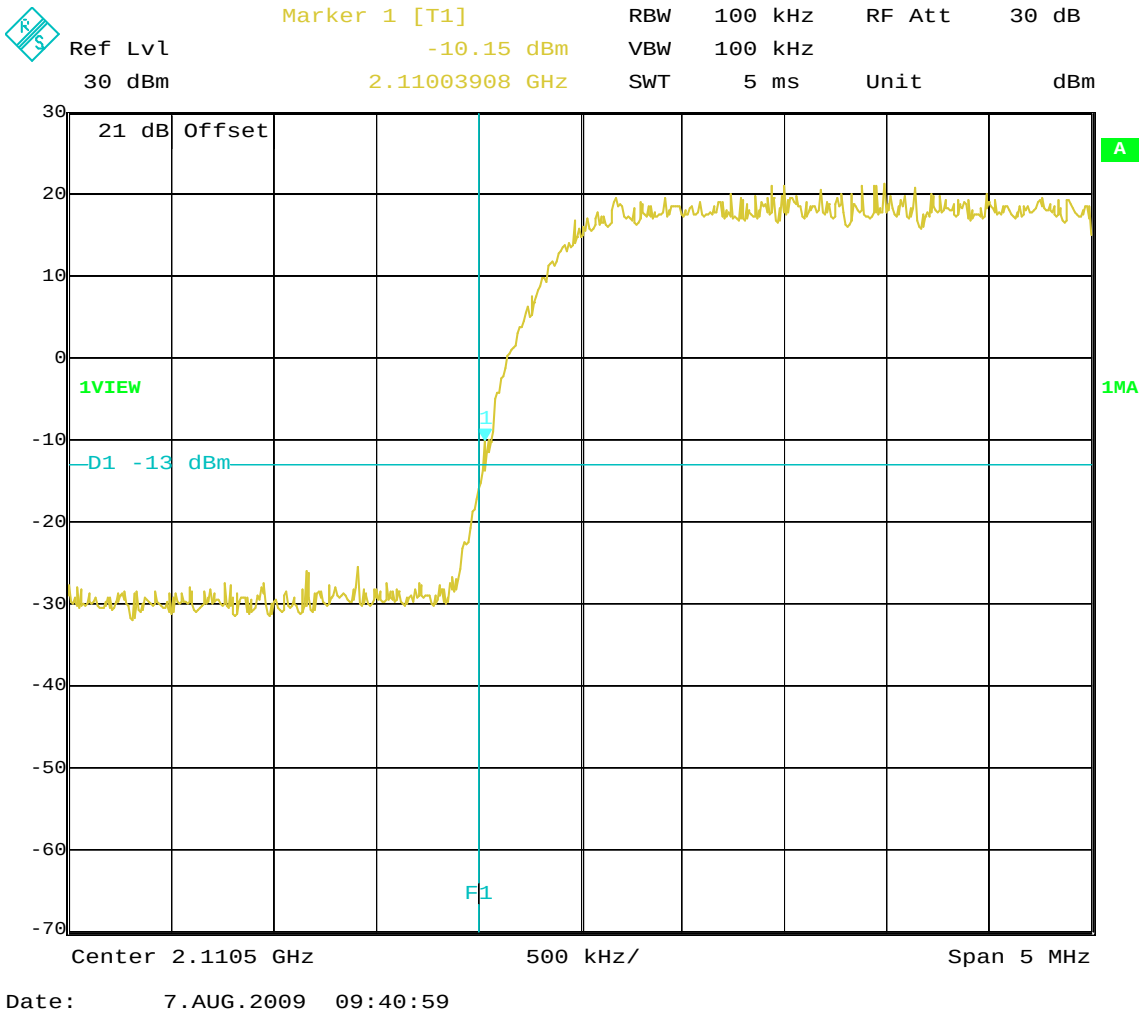
Frequency error Nominal voltage: 120 VAC		
Voltage (V AC)	GSM frequency error (Hz)	CW frequency error (Hz)
85% of nominal = 102	+2	+4
90% of nominal = 108	+2	+4
95% of nominal = 114	+2	+4
100% of nominal = 120	+2	+4
105% of nominal = 126	+2	+3
110% of nominal = 132	+2	+4
115% of nominal = 138	+2	+4

7.2 Band edge measurements

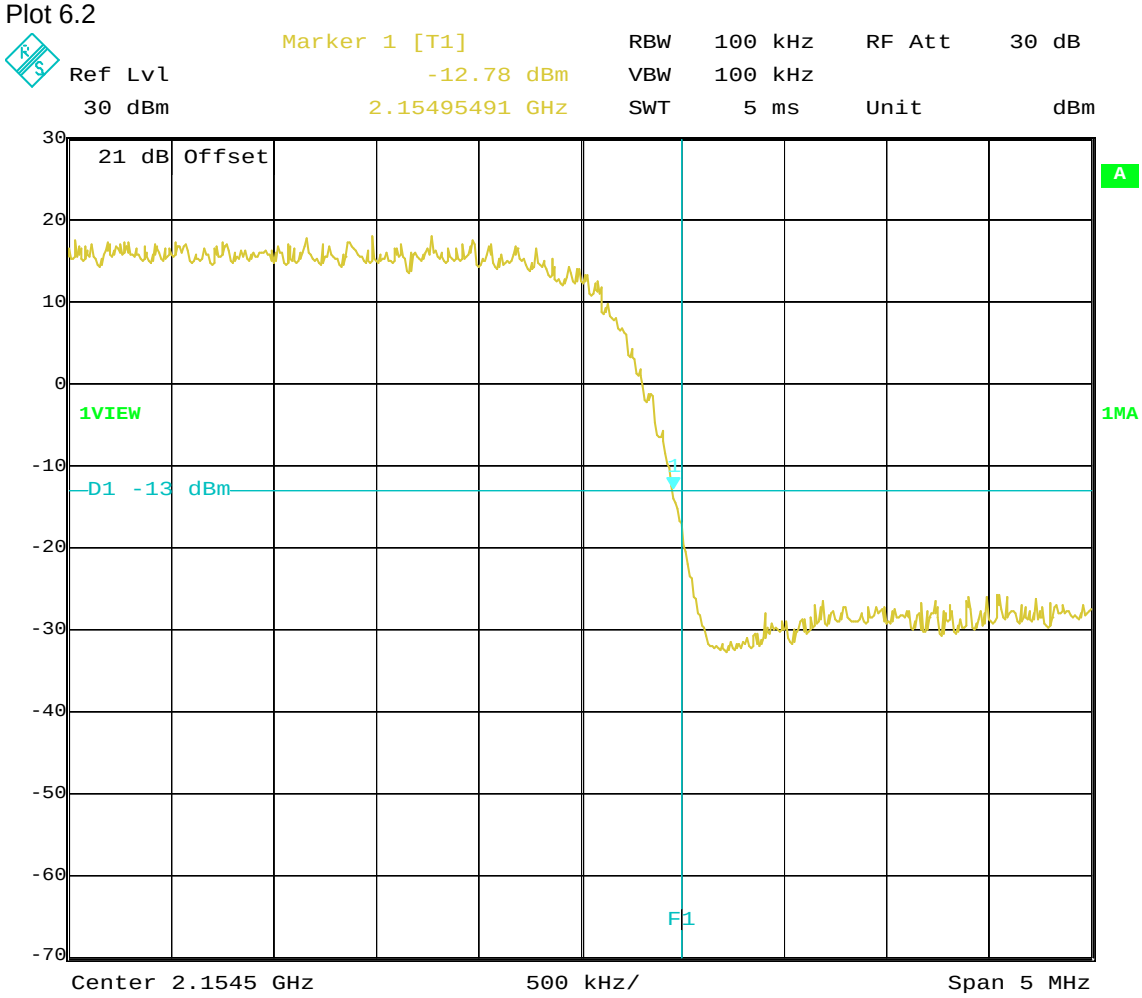
Band edge (MHz)	Carrier center frequency (MHz)	Lowest carrier frequency (MHz)	Margin (kHz)	Plots
2110	2112.5	2110.03908	39.1	Plot 6.1
2155	2152.5	2154.95491	45.1	Plot 6.2

With a margin of > 39 kHz and a frequency stability of < 10 Hz the transmitter will always stay within the band of operation.

Plot 6.1



Plot 6.2



7.3 Limits

In 47 CFR §27.54 the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

Fulfill requirements: YES

8 INSTRUMENTATION LIST

Equipment	Manufacturer	Type	SEMKO No.
Signal analyser	Rohde & Schwarz	FSIQ40	12793
Signal generator	Rohde & Schawrz	SMIQ03B	40017
Signal generator	Rohde & Schwarz	SMIQ03B	12792
Signal generator	Hewlett Packard	8642B	7007
Rubidium reference/ Frequency counter	Philips	PM6685R/071	40031
10 dB Attenuator	Aeroflex/Weinschel	46-10-34	9443
10 dB Attenuator	Hewlett Packard	8491A	7967
10 dB Attenuator	Hewlett Packard	8491A	30088

9 UNCERTAINTIES SUMMARY

All uncertainties are given with a level of confidence of approximately 95% (k=2).

Measurement uncertainty for Frequency error (Radio)	± 150 Hz

APPENDIX I – PHOTOS OF THE EUT

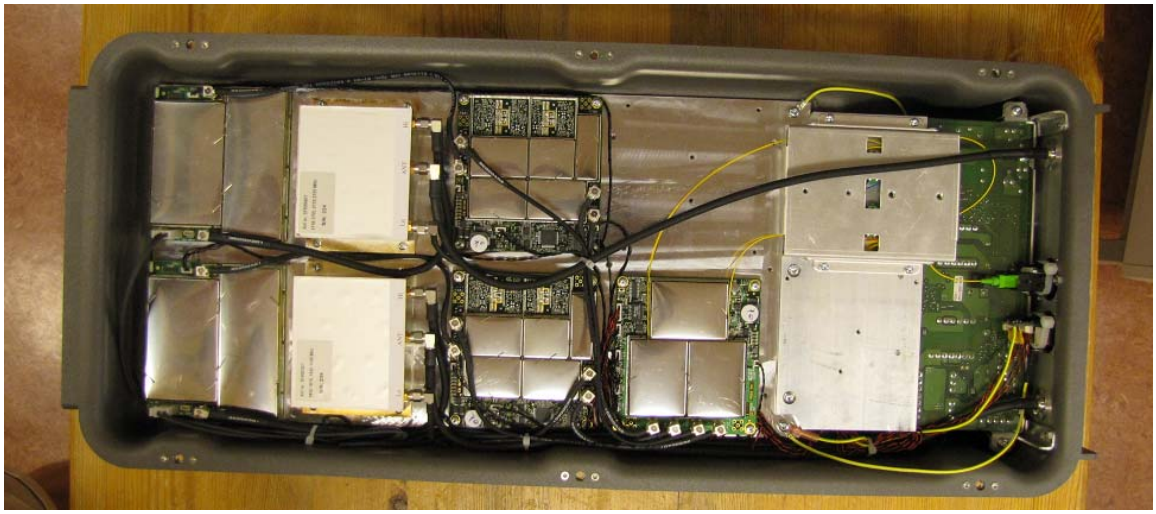
Front side

Back side

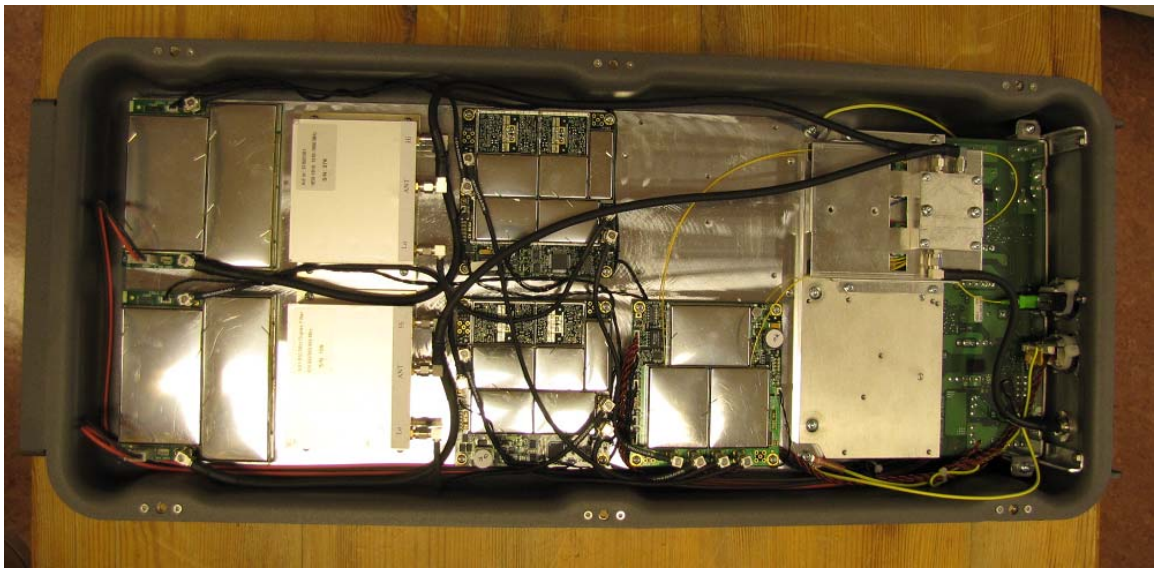
Bottom side with connectors and labels (850/1900 unit)

Bottom side with connectors and labels (AWS unit)

AWS unit without front cover



850/1900 unit without front cover



Test setup

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