telefication

Test Report
20103677301

based on:
IEC 61162-2 first edition 1998-09 (Clause 8.4.1
only)

AIS Class A and Inland Transponder
CNS Systems
VDL 6000

Contents

This report comprises of four modules. The total number of pages is: 31

Main module

1 Introduction

This report contains the result of tests performed by:

Telefication B.V.
Edisonstraat 12a
6902 PK Zevenaar
The Netherlands

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Ordering party:

Company name	:	C.N.S. Systems AB
Address	:	St. Larsgatan 32B
Zipcode	:	582 24
City/town	:	Linköping
Country	:	Sweden
Date of order	:	17 October 2011

2   Product

A sample of the following product was submitted for testing:

Product name   : AIS Class A and Inland Transponder
Manufacturer   : C.N.S. Systems AB
Trade mark   : CNS Systems
Type designation   : VDL 6000
Hardware version   : 1.0
Software version   : SW-6000-12-3.0.1
Serial number   : 1.44-6000-00010
FCC ID   : Y83VDL6000-4X

3   Test schedule

Tests are carried out in accordance with the specification detailed in chapter 6 "Summary" of this report.

Tests are carried out at the following location:

- Telefication, Zevenaar

The samples of the product were received on:

- 8 November 2011

Tests are carried out between the following date(s):

- 9 December 2011 and 13 March 2012

4   Product documentation

For production of this report the following product documentation is used:

Description	Identification	Date
Installation, maintenance and repair manual, issue P1B	Doc. No. CNSS-11-1601	2012-01-10
Manual, part II user's guide, issue P3I	Doc. No. CNSS-03-2114	2011-11-07

The above-mentioned documentation will be filed at Telefication bv for a period of 10 years following the issue of this report.

5   Observations and comments

On request of the applicant only the part of IEC 61162-2 dealing with the hardware, i.e. clause 8.4.1, is covered by this report.

6   Summary

The product is intended for use in the following application area(s):

Universal Automatic Identification System (AIS)

The sample is tested according to the following specification(s):

IEC 61162-2 first edition 1998-09 (Clause 8.4.1 only)

7 Conclusions

The sample of the product showed **NO NON-COMPLIANCES** to the specification stated in chapter 6 of this report.
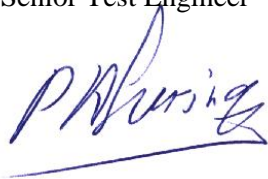
The results of the tests as stated in this report, are exclusively applicable to the product item as identified in this report. Telefication accepts no responsibility for any stated properties of product items in this test report, which are not supported by the tests as specified in section 6 "*Summary*".

All tests are performed by:

name   : ing. P.A. Suringa

function   : Senior Test Engineer

signature   :

Review of test methods and report by:

name   : G.J. Gort

function   : Senior Test Engineer

signature   :

The above conclusions have been verified by the following signatory:

date   : 15 May 2012

name   : ing. A. van der Valk

function   : Manager Laboratory

signature   :

Test results module

1 List of ports

Port name	function	Talker	Listener
X8	Navigation sensors	yes	yes
X9	Long Range & ext. display	yes	yes
X3	Pilot	yes	yes

2 Test results (Clause 8.4)

2.1 Electrical test of the interface (Clause 8.4.1)

2.1.1 Normal operating range (Clause 8.4.1.1)

2.1.1.1 Isolation of input circuits (Clause 8.4.1.1)

The manufacturer's documentation shall be checked by inspection for the electrical isolation of input circuits.

Result:

RS-422 input circuits use ADM 2587 device;
RS 232 port uses ADM 3251E device;
Blue sign port uses FOD 817A opto coupler device;
Alarm input uses relay.

2.1.1.2 Compatibility of hardware

2.1.1.2.1 Compliance of talker circuitry to ITU-T V.11, 4.1)

| Clause	Requirement description	Satisfactory
ITU-T V.11 4.1	**Transmitter:** When the signal condition 0 (space) for data circuits or ON for control and timing circuits is transmitted, the output point A is positive with respect to point B. When the signal condition 1 (mark) for data circuits or OFF for control and timing circuits is transmitted, the output point A is negative with respect to point B)	yes
ITU-T V.11 4.2	**Receiver:** The receiver differential significant levels are shown in table 1/V.11, where Va and Vb are respectively the voltages at Point A' and B' relative to point C'	yes

2.1.1.2.2 Open-circuit measurements (ITU-T V.11, 5.2.1)

Ambient temperature: +22 °C   Relative humidity: 40 %

Test conditions		ITU-T 5.2.1 Differential voltage Vo, Voa , Vob		
		A to B	**A to C**	**B to C**
T_{nom}	+ 15-35 °C	3.4	-3.4	+3.4
Limit		< 6.0 volt		

Remarks: The resistor between the A and B line was 3.9 k Ohm
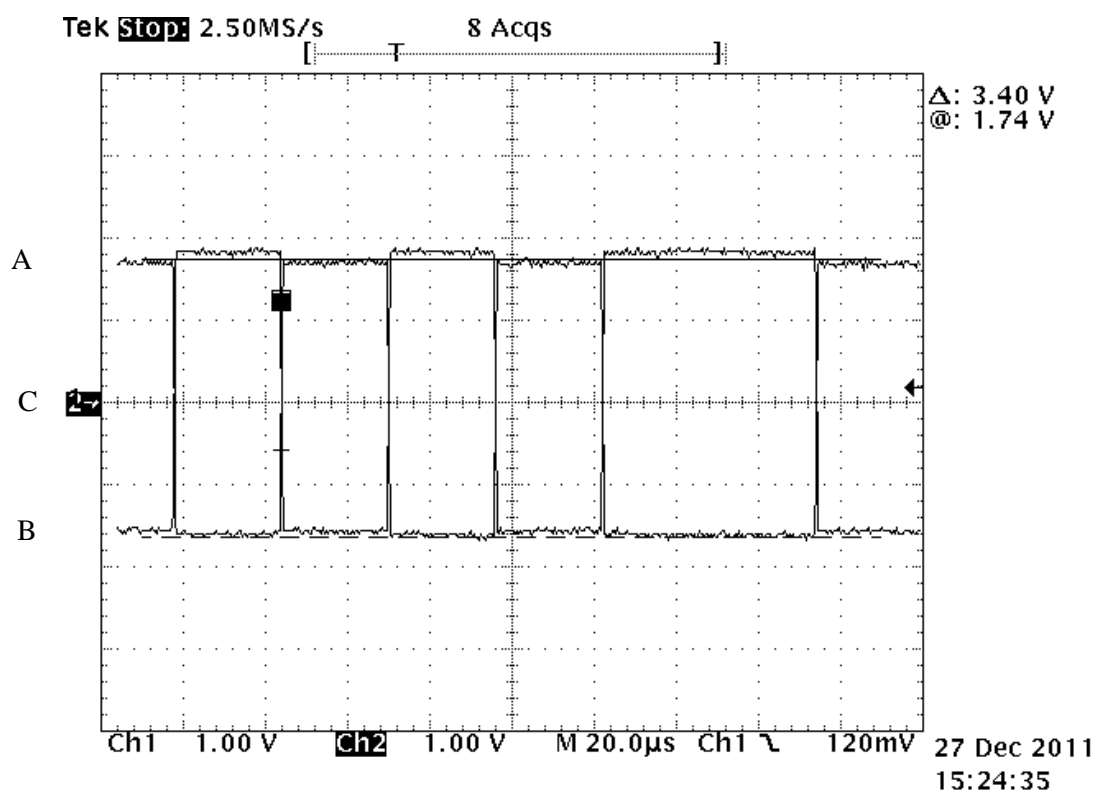
Test equipment:

Test equipment used: (Item numbers)	5, 6

2.1.1.2.3 Test-termination measurements (ITU-T V.11, 5.2.2)

Ambient temperature: +22 °C   Relative humidity: 40 %

Test conditions		ITU-T 5.2.2 Differential voltage Vt		
		Vt	- Vt	Vt subtract |-Vt|
T_{nom}	+ 15-35 °C	2.8	-2.75	0.05
Limit		2,0 volt or 50% of Vo, whichever is greater, between Vt and |-Vt | no more than 0.4 volt		

Remarks: resistors used between the A and C line and the B and C line, were 50 Ohm.

Test equipment:

Test equipment used: (Item numbers)	5, 6

2.1.1.2.4 Short-circuit measurements (ITU-T V.11, 5.2.3)

Ambient temperature: +22 °C   Relative humidity: 40 %

Test conditions		ITU-T 5.2.3 Maximam current : Isa or Isb	
		Isa (mA)	Isb (mA)
T_{nom}	+ 15-35 °C	20	20
Limit		< 150 mA	

Remark: Isa = current from A to C, Isb = current from B to C

Test equipment:

Test equipment used: (Item numbers)	5, 7

2.1.1.2.5 Power-off measurements (ITU-T V.11, 5.2.4)

Ambient temperature: +22 °C   Relative humidity: 40 %

Test conditions		ITU-T 5.2.4 Power Off current	
		Between A and C (µA)	**Between B and C (µA)**
T_{nom}	+ 15-35 °C	0	0
Limit		100µA max.	

Test equipment:

Test equipment used: (Item numbers)	1, 4

2.1.1.2.6 Dynamic voltage balance and rise time measurements (ITU-T V.11, 5.3)

Ambient temperature: +22 °C   Relative humidity: 40 %

Test conditions		ITU-T 5.3 Rise and Fall time		
		t_r+	t_r-	t_b
T_{nom}	+ 15-35 °C	422 ns	492 ns	13 µs
Limit		Tr ≤ 0.1 Tb = 0.1 * 13 µs = 1.3 µs		

Comment: The bit time @ 38k4 kbps = 13 µs

Test conditions		ITU-T 5.3 Steady state value	
		SS-low	SS-high
T_{nom}	+ 15-35 °C	110 mVpp	105 mVpp
Limit		< 0.1-vss	

Test conditions		ITU-T 5.3 Voltage due to imbalance
		Ve
T_{nom}	+ 15-35 °C	40 mVpp
Limit		Ve < 0.4 volt

Comment: see plots on next page.

Test equipment:

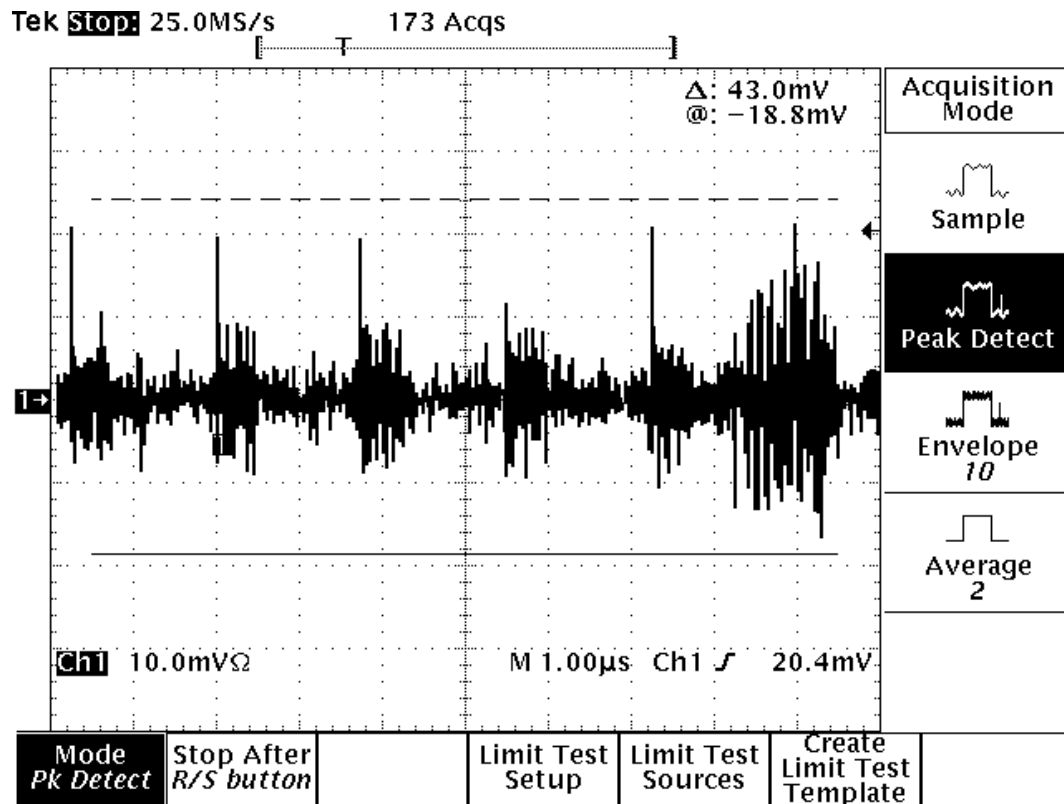| Test equipment used: (Item numbers)	5, 6

Plot: rise time
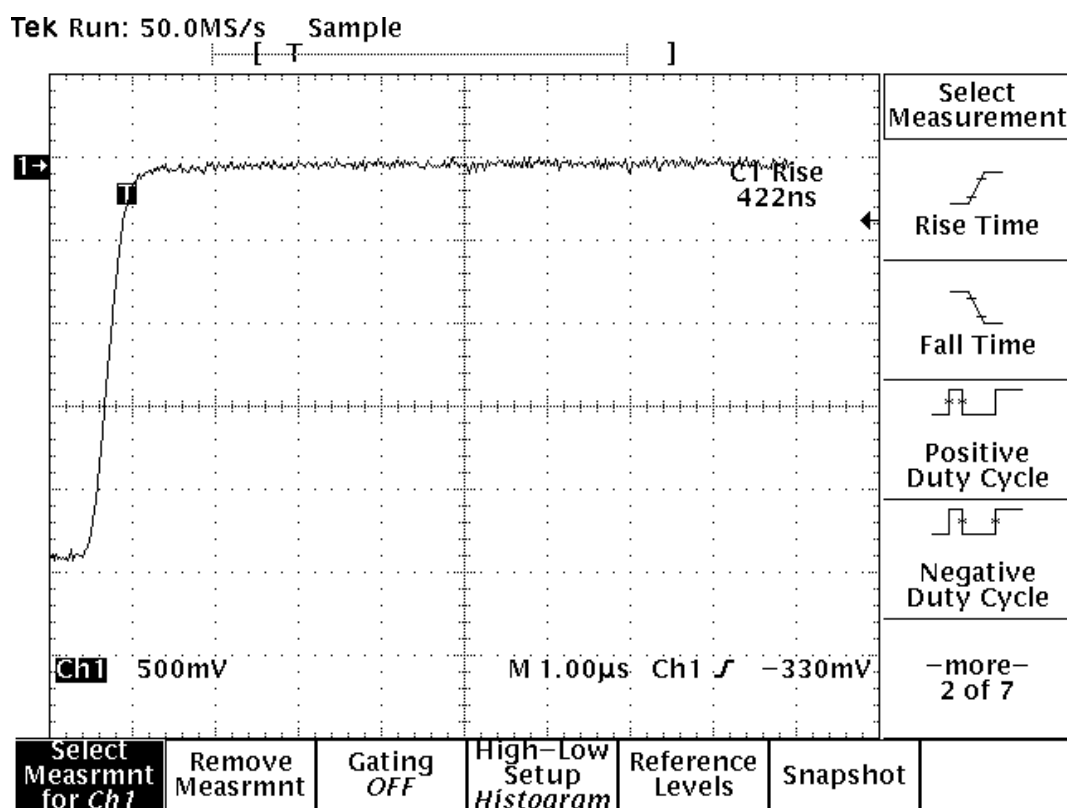
Plot: fall time
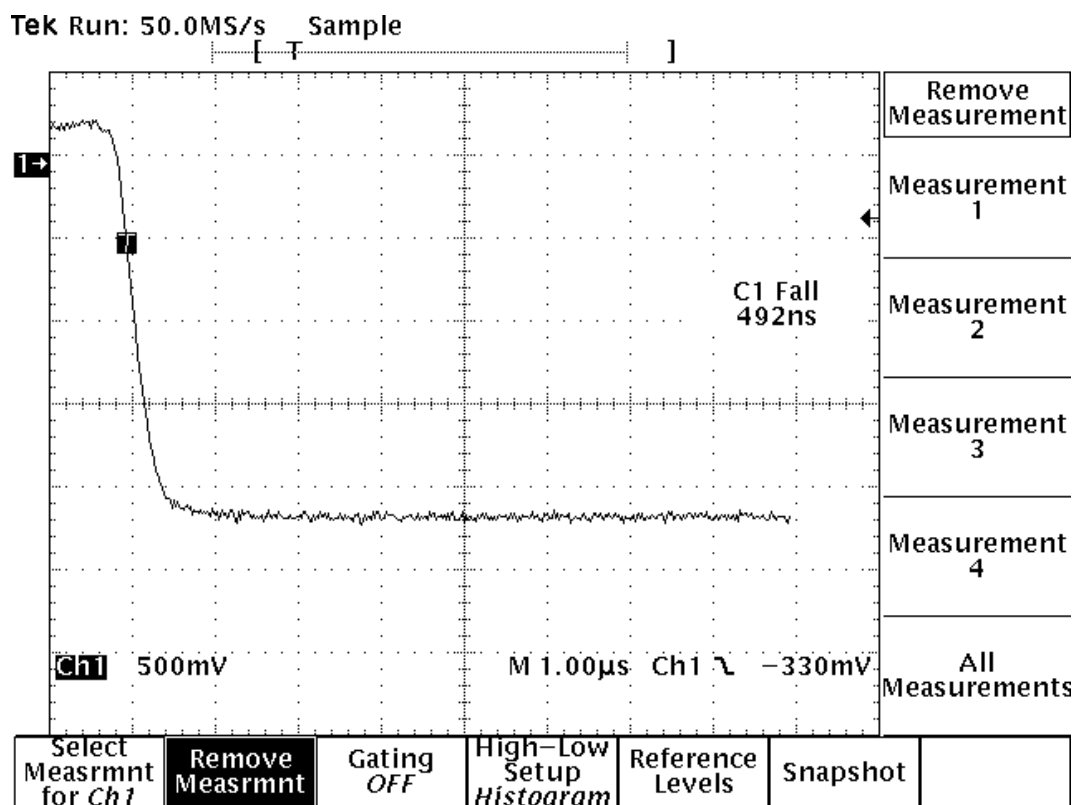
Plot: voltage due to unbalance

2.1.1.2.7 Receiver input voltage (ITU-T V.11, 6.2)

Ambient temperature: +22 °C   Relative humidity: 40 %

Power On condition:

Test conditions		ITU-T 6.2 Input voltage, current measurement	
		A = +10 to -10 volt, B = 0 volt	B = +10 to -10 volt, A = 0 volt
T_{nom}	+ 15-35 °C	0.6 mA	1 mA
Limit		ITU-T V.11, figure 6.	

Power Off condition:

Test conditions		ITU-T 6.2 Input voltage, current measurement	
		A = +10 to -10 volt, B = 0 volt	B = +10 to -10 volt, A = 0 volt
T_{nom}	+ 15-35 °C	0	0
Limit		ITU-T V.11, figure 6.	

Test equipment:

Test equipment used: (Item numbers)	1, 4

2.1.1.2.8 Receiver input, DC input sensitivity (ITU-T V.11, 6.3)

Ambient temperature: +22 °C   Relative humidity: 40 %

Test conditions		ITU-T 6.3 Input voltage, sensitivity			
		Via –Vib -12 – 0 volt	Via –Vib 0 - -12 volt	Via –Vib +12 – 0 volt	Via –Vib 0 - +12 volt
T$_{nom}$	+ 15-35 °C	-12	+12	+12	-12
Requirement		No damage			

Result: no damage

Test conditions		ITU-T 6.3 Input voltage, sensitivity			
		Via –Vib +10 - +4 volt	Via –Vib +4 - +10 volt	Via –Vib -10 - -4 volt	Via –Vib -4 - -10 volt
T$_{nom}$	+ 15-35 °C	1	0	0	1
Requirement		1	0	0	1

Test conditions		ITU-T 6.3 Input voltage, sensitivity			
		Via (volt)	Vib (volt)	Output (logic state)	Requirement
T$_{nom}$	+ 15-35 °C	0	0.3	0	logic low
		7.15	6.85	1	logic high
		6.85	7.15	0	logic low
		-6.85	-7.15	0	logic low
		-7.15	-6.85	1	logic high
		0.3	0	1	logic high

Test equipment:

Test equipment used: (Item numbers)	1, 2, 3, 7, 8

2.1.1.2.9 Receiver, input balance test (ITU-T V.11, 6.4)

Ambient temperature: +22 °C   Relative humidity: 40 %

Test conditions		ITU-T 6.4 Input balance behaviour	
		Vi = +720 mV, Vcm = -7 to +7 volt	Vi = -720 mV, Vcm = -7 to +7 volt
T_{nom}	+ 15-35 °C	--	--
Requirement		No change in binary state	

Comment: this test is not performed since this is optional (ref. ITU-T V.11, §10.2)

Test equipment:

Test equipment used: (Item numbers)	--

2.1.1.2.10 Receiver, termination (ITU-T V.11, 6.5)

Ambient temperature: +22 °C   Relative humidity: 40 %

Test conditions		ITU-T 6.5 Terminator
T_{nom}	+ 15-35 °C	--
Limit		> 100 Ohm

Comment: this test is not performed since the optional terminator is declared not applicable by the applicant.

Test equipment:

Test equipment used: (Item numbers)	--

2.1.1.2.11 Check of electrical isolation

Requirement:	Observation	Satisfactory
The electrical isolation of the input circuits shall be checked by inspection of the manufacturer's documentation and tests according to the values given in IEC 60945	RS-422 input circuits use ADM 2587 device; RS-232 interface uses ADM 3251E device; Blue sign input uses FOD 817A device; Alarm input uses relay contact.	Yes

2.1.1.3 Ability of input circuits to withstand maximum voltage on the bus (IEC 61162-2, 8.4.1.2)

Ambient temperature: +22 °C   Relative humidity: 40 %

Test conditions		Ability of input circuits to withstand maximum voltage					
		A to B	**A to B**	**A to C**	**A to C**	**B to C**	**B to C**
T_{nom}	+ 15-35 °C	+15V /1 min	-15V / 1 min	+15V /1 min	-15V /1 min	+15V /1 min	-15V /1 min
Limit		No damage or reading errors					

Result: No damage
Tested port: X9

Test equipment:

Test equipment used: (Item numbers)	3, 8

Used test equipment module

Item	Test equipment	Manufacturer	Type	ident
General Measurement Equipment				
1	Digital Multimeter	Fluke	Fluke 87	TE00210
2	Digital Multimeter	Fluke	Fluke 25	TE00183
3	Digital Multimeter	Fluke	Fluke 77	TE00250
4	Digital Multimeter	HP	34401A	TE00143
5	Digital oscilloscope	Tektronix	TDS680B	TE00204
6	Active probe (2x)	Tektronix	P6133	--
7	Current probe	EMCO	93511-1L	--
Auxiliaries				
8	Power supply	Delta	E060-0.6	TE 00649
9	Power supply	Delta	E060-0.6	TE 00717

Photographs module

Photograph module

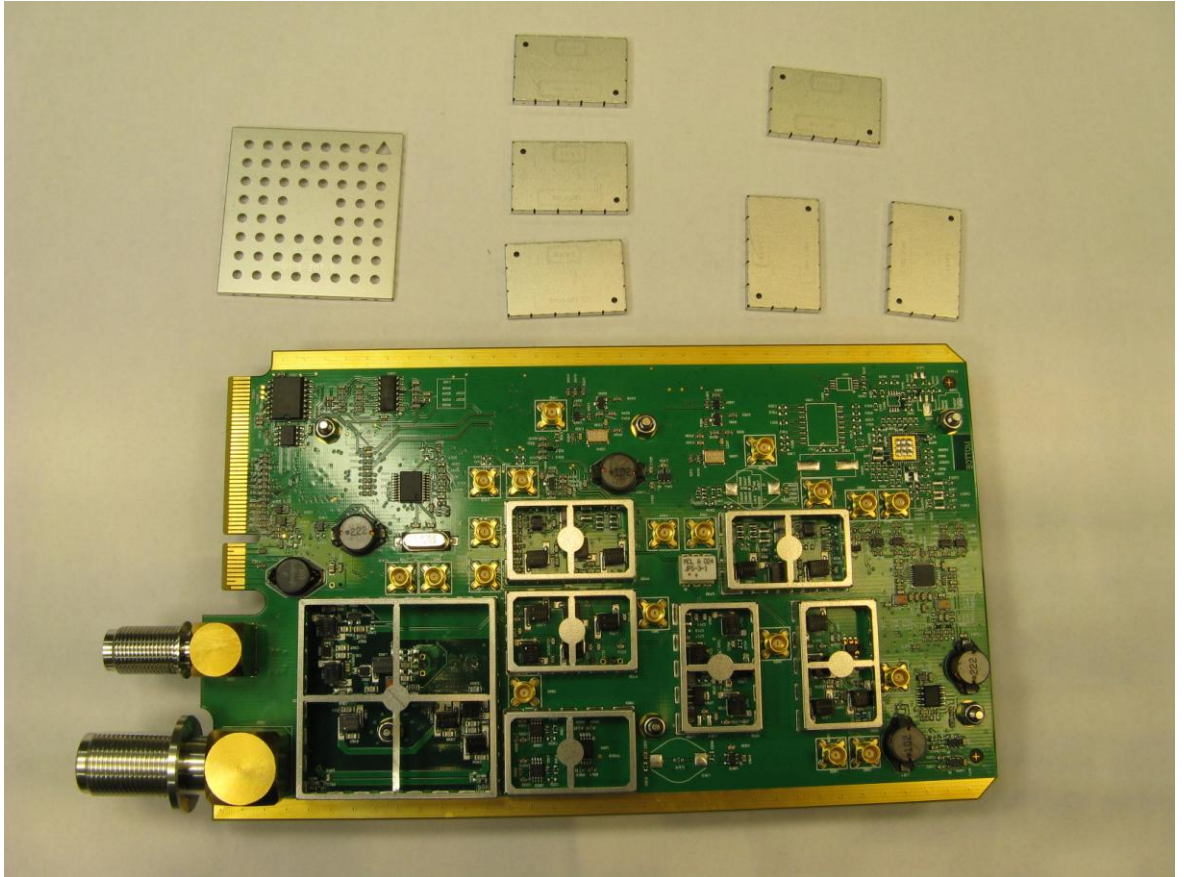Photograph 1: *Product front view*
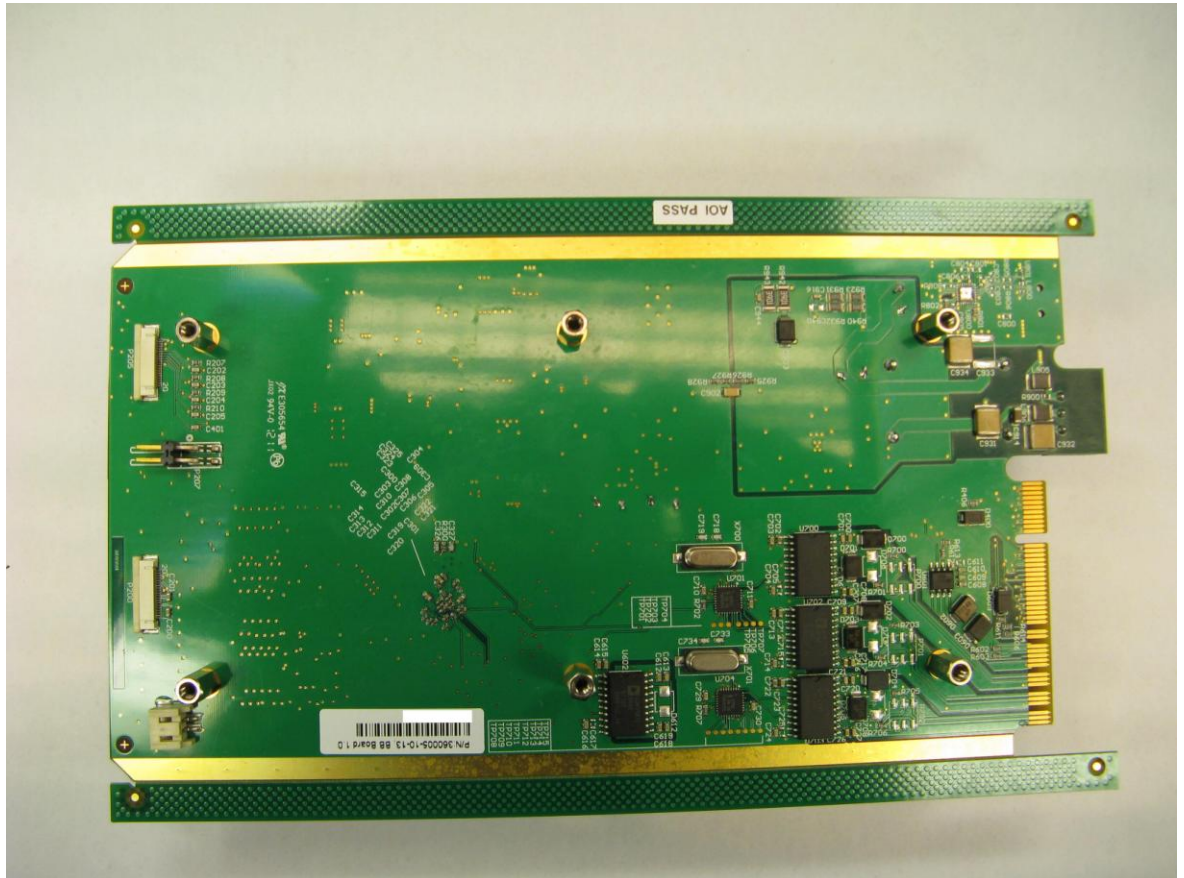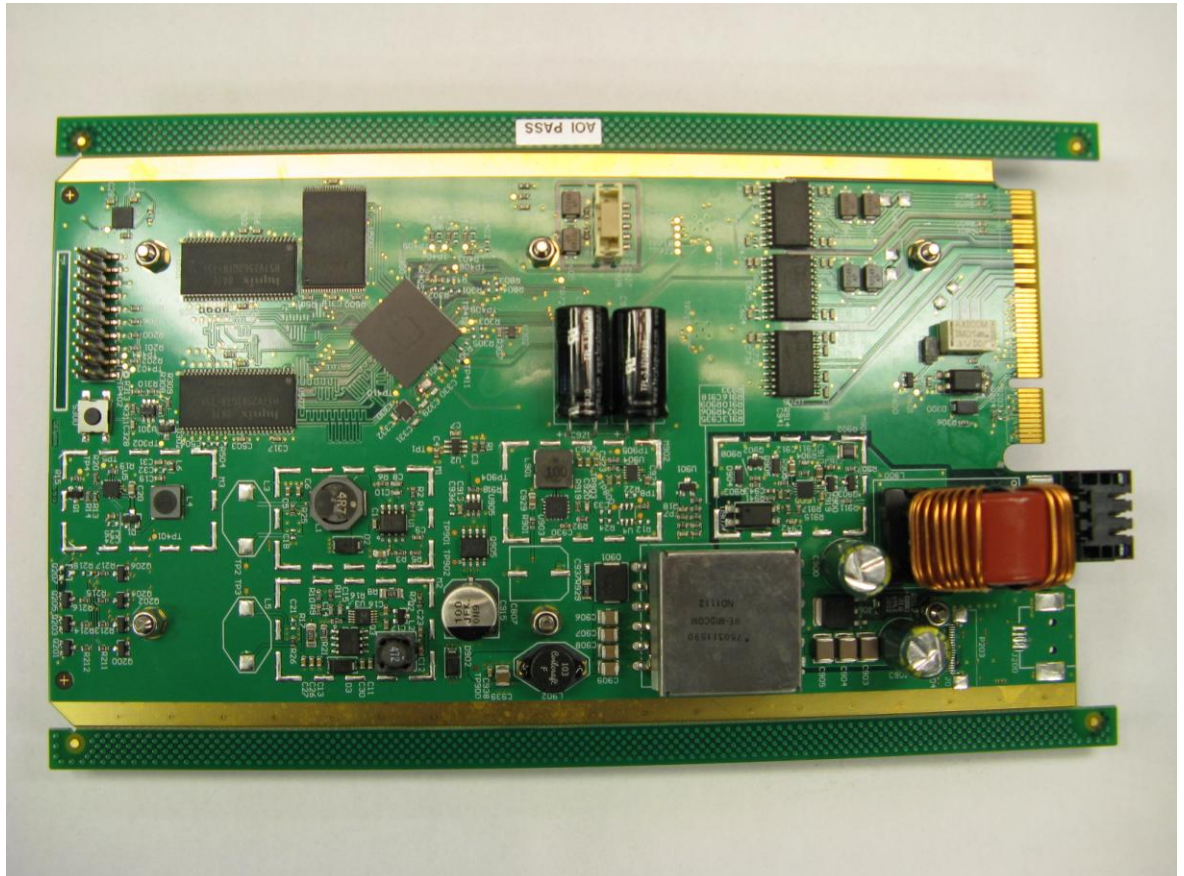
Photograph 2: *Product rear view*

Photograph 3: *RF board bottom side*
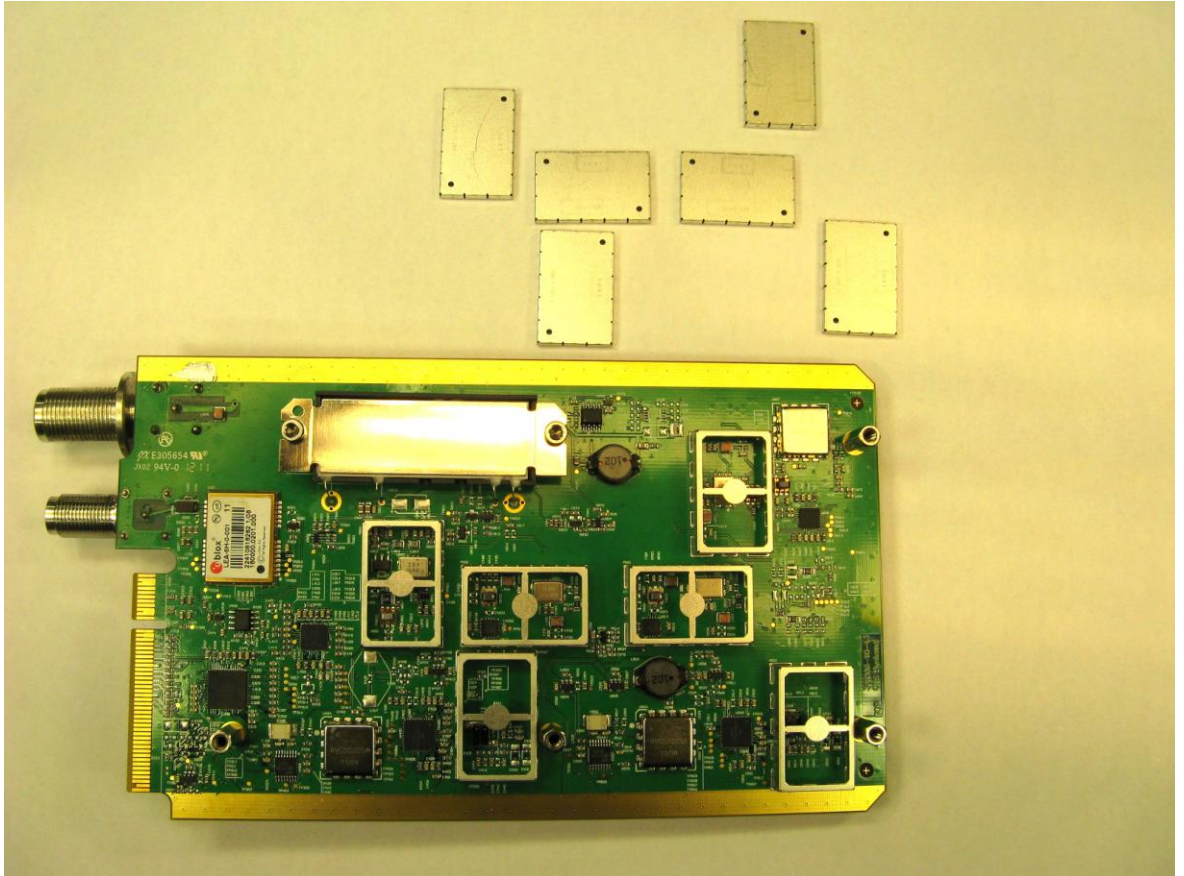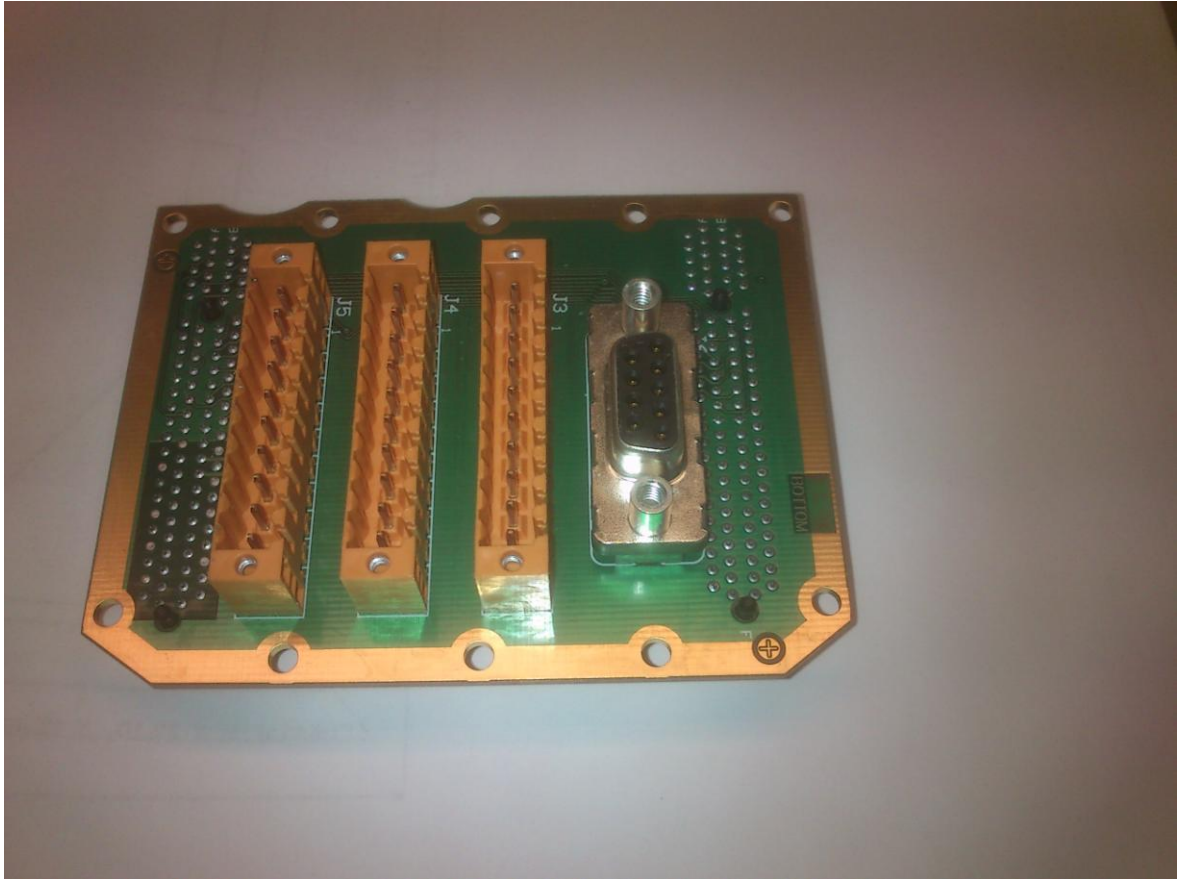
Photograph 4: *RF board top side*

Photograph 5: *Baseband board side 1*

Photograph 6: *Baseband board side 2*
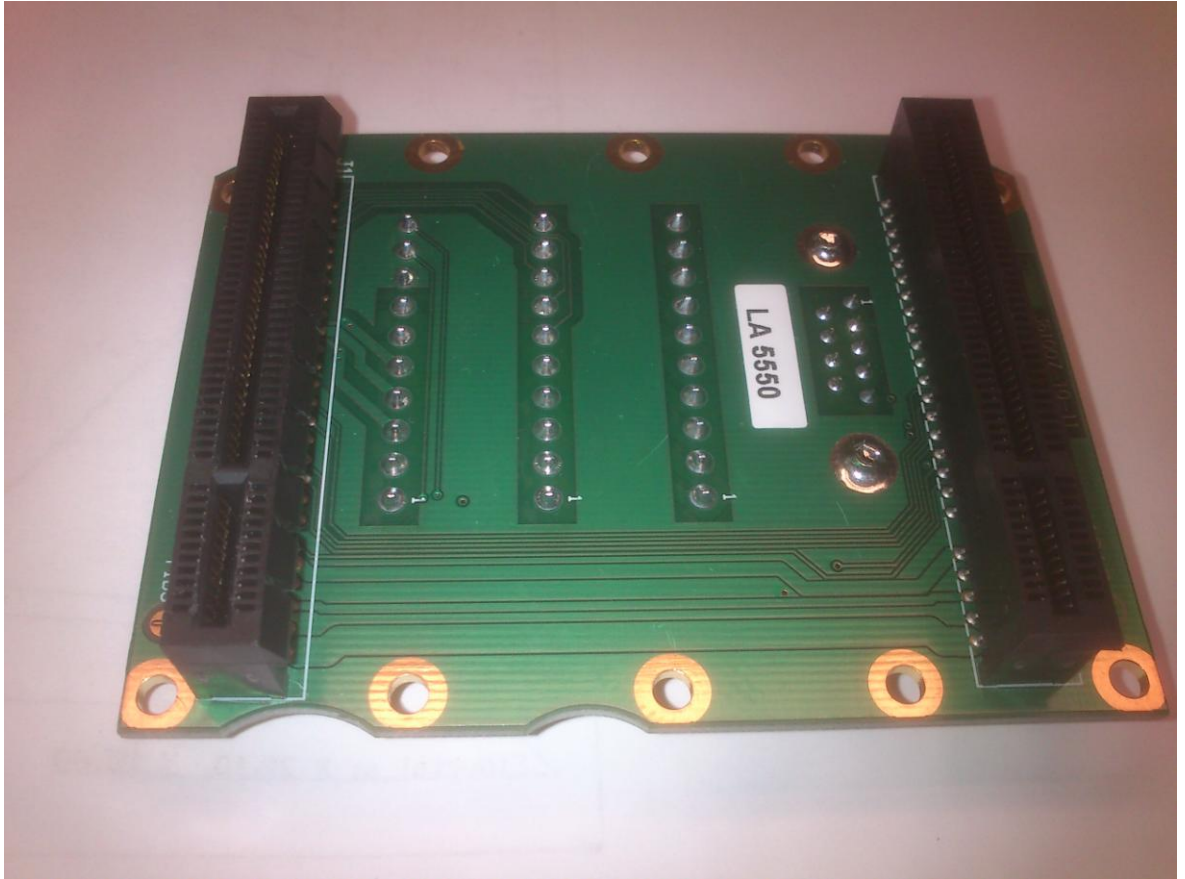
Photograph module

Photograph 7: *Back plane board outer side*

Photograph 8: *Back plane board inner side*

Photograph 9: *Labelling Class A*

See comments in 20103677300 report

Photograph 10: *Labelling Inland/Class A*

See comments 20103677300 report

Revision history

revision	date	remarks	revised by
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