



Accredited testing-laboratory

DAR registration number: DGA-PL-176/94-D1

**Federal Motor Transport Authority (KBA)
DAR registration number: KBA-P 00070-97**

**Recognized by the Federal Communications Commission
Anechoic chamber registration no.: 90462 (FCC)
Anechoic chamber registration no.: 3462C-1 (IC)
Certification ID: DE 0001
Accreditation ID: DE 0002**

Accredited Bluetooth® Test Facility (BQTF)

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**Test report no. : 1-2124-01-03/10
ID ISC.LRM 2000 (Reader)
+**
**Type identification : ID ISC.ANT1690/600 (antenna 1)
ID ISC.ANT1700/740 (antenna 2)
ID ISC.ANT310/310 (antenna 3)**
**Applicant : FEIG ELECTRONIC GmbH
FCC ID : PJMLRM2000-2
IC Certification No : 6633A-LRM2000-2
Test standards : 47 CFR Part 15
RSS - 210 Issue 7**

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1 General information

1.1 Notes

The test results of this test report relate exclusively to the test item specified in 3.1.1. The CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the CETECOM ICT Services GmbH.

Test laboratory manager:

2010-05-07	Marco Bertolino	
Date	Name	Signature

Technical responsibility for area of testing:

2010-05-07	Stefan Bös	
Date	Name	Signature

1.2 Testing laboratory

CETECOM ICT Services GmbH

Untertürkheimer Straße 6 - 10

66117 Saarbrücken

Germany

Phone: + 49 681 5 98 - 0

Fax: + 49 681 5 98 - 9075

e-mail: info@ICT.cetecom.de

Internet: http://www.cetecom-ict.de

State of accreditation:

The test laboratory (area of testing) is accredited according to

DIN EN ISO/IEC 17025

DAR registration number: DGA-PL-176/94-D1

Accredited by:

Federal Motor Transport Authority (KBA)

DAR registration number: KBA-P 00070-97

Testing location, if different from CETECOM ICT Services GmbH:

Name :

Street :

Town :

Country :

Phone :

Fax :

1.3 Details of applicant

Name:	FEIG ELECTRONIC GmbH
Street:	Lange Str. 4
Town:	35781 Weilburg-Waldhausen
Country:	GERMANY
Telephone:	+49 (0) 6471 31 09-0
Fax:	+49 (0) 6471 31 09-99
Contact:	Wolfgang Meißner
E-mail:	Wolfgang.Meissner@feig.de
Telephone:	+49 (0) 6471 31 09-436

1.4 Application details

Date of receipt of order:	2010-05-01
Date of receipt of test item:	2010-05-04
Date of start test:	2010-05-04
Date of end test:	2010-05-05
Persons(s) who have been present during the test:	-/-

2 Test standard/s

47 CFR Part 15

RSS - 210 Issue 7

**Title 47 of the Code of Federal Regulations; Chapter I-
Federal Communications Commission
subchapter A - general, Part 15-Radio frequency devices
Spectrum Management and Telecommunications - Radio
Standards Specification
Low-power Licence-exempt Radiocommunication Devices (All
Frequency Bands): Category I Equipment**

3 Technical tests

3.1 Details of manufacturer

Name:	FEIG ELECTRONIC GmbH
Street:	Lange Str. 4
Town:	35781 Weilburg-Waldhausen
Country:	Germany

3.2 Test Item

Kind of test item	:	RFID Gate
Type identification	:	ID ISC.LRM 2000 (Reader) + ID ISC.ANT1690/600 (antenna 1) ID ISC.ANT1700/740 (antenna 2) ID ISC.ANT310/310 (antenna 3)
S/N serial number	:	1887978 1887967 1888283
HW hardware status	:	No information available!
SW software status	:	No information available!
Frequency Band [MHz]	:	13.553 ≤ f ≤ 13.567
Frequency Range (or fixed frequency)	:	13.56 MHz
Type of Modulation	:	N0N
Number of channels	:	1
Antenna	:	Loop antenna – for more information please take a look at the sub clause 9 – Photos of the EUT
Power Supply	:	24 V DC by power supply
Temperature Range	:	-20 °C to +50 °C

FCC ID: PJMLRM2000-2
IC: 6633A-LRM2000-2

3.3 Test Item (Additional EUT information For IC Canada (appendix 2))

IC Registration Number:	6633A-LRM2000-2
Model Name:	ID ISC.LRM 2000 (Reader) + ID ISC.ANT1690/600 (antenna 1) ID ISC.ANT1700/740 (antenna 2) ID ISC.ANT310/310 (antenna 3)
Details of Manufacturer	
Company	: FEIG ELECTRONIC GmbH
Address	: Lange Str. 4
City	: 35781 Weilburg-Waldhausen
Country	: Germany
Details of EUT	
S/N serial number	: 1887978 1887967 1888283
HW hardware status	: No information available!
SW software status	: No information available!
Tested to Radio Standards Specification (RSS) No.	: RSS-210 Issue 7
Open Area Test Site Industry Canada Number	: IC 3462C-1
Frequency Range (or fixed frequency)	: 13.553 MHz ≤ f ≤ 13.567 MHz
Field Strength	: 67.5 dBµV/m @ 30 m (ID ISC.ANT1690/600) 67.5 dBµV/m @ 30 m (ID ISC.ANT1700/740) 83.5 dBµV/m @ 30 m (ID ISC.ANT310/310)
Occupied Bandwidth (99% BW)	: 1 kHz
Emission designator	: 1K00N0N
Type of Modulation	: N0N (inductive loop antenna)
Number of channels	: 1
Antenna information	: Loop antenna – for more information please take a look at the sub clause 9 – photos of the EUT
Transmitter Spurious (worst case)	: 50.7 dBµV/m @ 3m (11.9 GHz)
Power Supply	: 24 V DC by power supply / 115 AC by mains adapter
Temperature Range	: -20 °C to +50 °C

ATTESTATION:

I attest that the testing was performed or supervised by me; that the test measurements were made in accordance with the above-mentioned departmental standard(s), and that the radio equipment identified in this application has been subject to all applicable test conditions specified in the departmental standards and all of the requirements of the standards have been met.

Signature:

Test engineer: Marco Bertolino **Date:** 2010-05-07

3.4 Extreme conditions testing values

Description	Shortcut	Unit	Value
Nominal Temperature	T _{nom}	°C	20
Nominal Humidity	H _{nom}	%	40
Nominal Power Source	V _{nom}	V	24 / 115

Type of power source: 24 V DC by power supply / 115 AC by mains adapter

3.5 Reference documents

-/-

3.6 Additional comments

-/-

4 Statement of Compliance

4.1 Summary of Measurement Results

- No deviations from the technical specifications were ascertained**
 There were deviations from the technical specifications ascertained

4.2 CFR 47 Part 15.225

Section in this Report	Test Name / Section FCC Part 15	Test Name / Section RSS 210	applicable	Verdict
6.1	§ 15.225 (a) FIELDSTRENGTH OF FUNDAMENTAL	Annex 2.6	YES	passed
6.2	§ 15.225 (b,c,d) FIELDSTRENGTH OF HARMONICS and SPURIOUS	Annex 2.6	YES	passed
6.3	§ 15.225 (e) Frequency tolerance	Annex 2.6	YES	passed
6.4	§ 15.107 / 15.207 Conducted Limits	Section 6.6 , 7.4	YES	passed

5 Measurements and Results

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 1 GHz in semi-anechoic chambers or free field. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber.

The receiving antennas are conform with specifications ANSI C63.2-1996 clause 15 and ANSI C63.4-2003 clause

4.1.5. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test set-ups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received.

The wanted and unwanted emissions are received by spectrum analysers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63.4-2003 clause 4.2.

Antennas are conform with ANSI C63.2-1996 item 15.

150 kHz - 30 MHz: Quasi Peak measurement, 9 kHz Bandwidth, active loop antenna.

30 MHz - 1GHz: Quasi Peak measurement, 120 kHz Bandwidth, tri-log antenna

> 1 GHz: Average, RBW 1 MHz, VBW 10 Hz, wave guide horn

All measurement settings are according to FCC 15.209 and 15.207

6 FCC Part 15.225

6.1 Field strength of the fundamental

Reference

FCC:	CFR Part SUBCLAUSE § 15.225 (a)
IC:	RSS 210, Annex 2.6

Results: ID ISC.ANT1690/600 (antenna 1)

TEST CONDITIONS		MAXIMUM POWER (dB μ V/m)
Frequency		13.56 MHz
T _{nom}	V _{nom}	67.5 dBμV/m @ 30 m
Measurement uncertainty		± 3 dB

RBW/VBW: 200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz

Note:

Measured value = 87.5 dB μ V/m @ 10 m

Recalculation factor = 40 / decade (20dB - 10m to 30m)

Recalculated value = 87.5 dB μ V/m @ 10 m - 20 dB = 67.5 dB μ V/m @ 30 m

Limits: § 15.225 (a)

§ 15.225 (a) The field strength of any emission within the band 13.553 – 13.567 MHz shall not exceed 15,848 microvolts / meter at 30 meters (84 dB μ V/m @ 30 m)
--

Results: ID ISC.ANT1700/740 (antenna 2)

TEST CONDITIONS		MAXIMUM POWER (dB μ V/m)
Frequency		13.56 MHz
T _{nom}	V _{nom}	67.5 dBμV/m @ 30 m
Measurement uncertainty		± 3 dB

RBW/VBW: 200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz

Note:

Measured value = 87.5 dB μ V/m @ 10 m

Recalculation factor = 40 / decade (20dB - 10m to 30m)

Recalculated value = 87.5 dB μ V/m @ 10 m - 20 dB = 67.5 dB μ V/m @ 30 m

Limits: § 15.225 (a)

§ 15.225 (a) The field strength of any emission within the band 13.553 – 13.567 MHz shall not exceed 15,848 microvolts / meter at 30 meters (84 dB μ V/m @ 30 m)

Results: ID ISC.ANT310/310 (antenna 3)

TEST CONDITIONS		MAXIMUM POWER (dB μ V/m)
Frequency		13.56 MHz
T _{nom}	V _{nom}	83.5 dBμV/m @ 30 m
Measurement uncertainty		± 3 dB

RBW/VBW: 200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz

Note:

Measured value = 103.5 dB μ V/m @ 10 m

Recalculation factor = 40 / decade (20dB - 10m to 30m)

Recalculated value = 103.5 dB μ V/m @ 10 m - 20 dB = 83.5 dB μ V/m @ 30 m

Limits: § 15.225 (a)

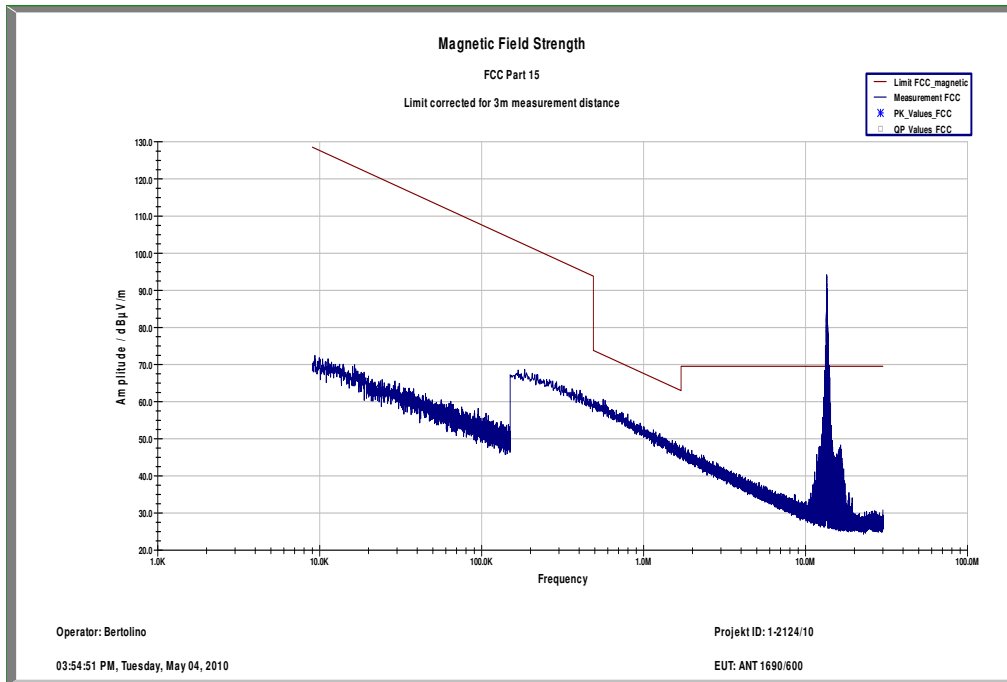
§ 15.225 (a) The field strength of any emission within the band 13.553 – 13.567 MHz shall not exceed 15,848 microvolts / meter at 30 meters (84 dB μ V/m @ 30 m)

6.2 Field strength of the harmonics and the spurious

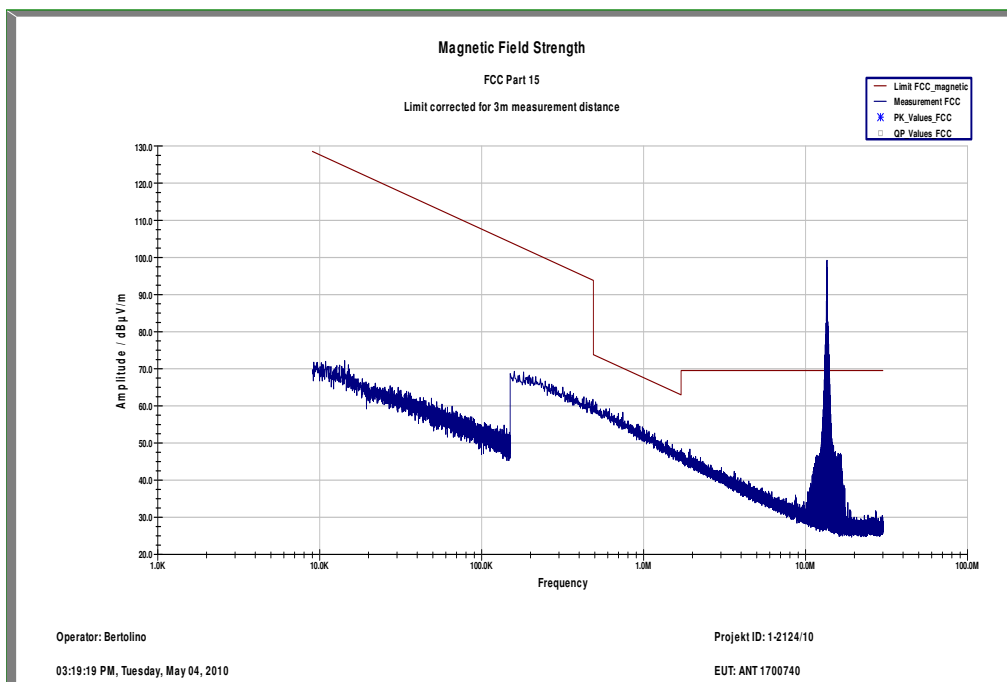
Reference

FCC:	CFR Part SUBCLAUSE § 15.209 (a) , §15.225 (d)
IC:	RSS 210, Annex 2.6

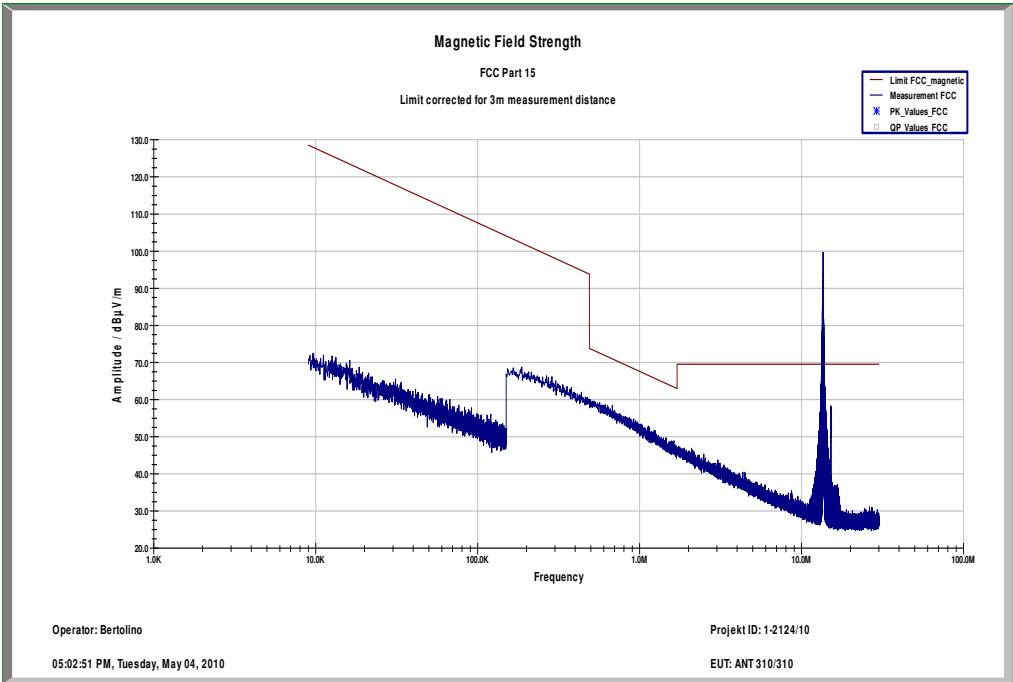
Plot 1: TX mode, 9 kHz – 30 MHz, ID ISC.ANT1690/600 (antenna 1)



Plot 2: TX mode, 9 kHz – 30 MHz, ID ISC.ANT1700/740 (antenna 2)



Plot 3: TX mode, 9 kHz – 30 MHz, ID ISC.ANT310/310 (antenna 3)



Results:

EMISSION LIMITATIONS					
f (MHz)		amplitude of emission (dB μ V/m)	limit max. allowed field strength	Distance (Meter)	results
No critical peaks detected. All emissions are below the limit.				300	
				30	
Measurement uncertainty			± 3dB		

Limits

SUBCLAUSE § 15.209 (a)

Fundamental Frequency (MHz)	Field strength of Fundamental (μ V/m)	Measurement Distance (meters)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30 (29.5 dB μ V/m)	30
30.0 – 88.0	100 (40 dB μ V/m)	3
88 – 216	150 (43.5 dB μ V/m)	3
216 – 960	200 (46 dB μ V/m)	3

RBW/VBW: 200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz

ID ISC.ANT1690/600 (ant. 1):

Plot 1: TX mode, 30 MHz – 1 GHz, vertical & horizontal polarization, ID ISC.ANT1690/600 (ant. 1)

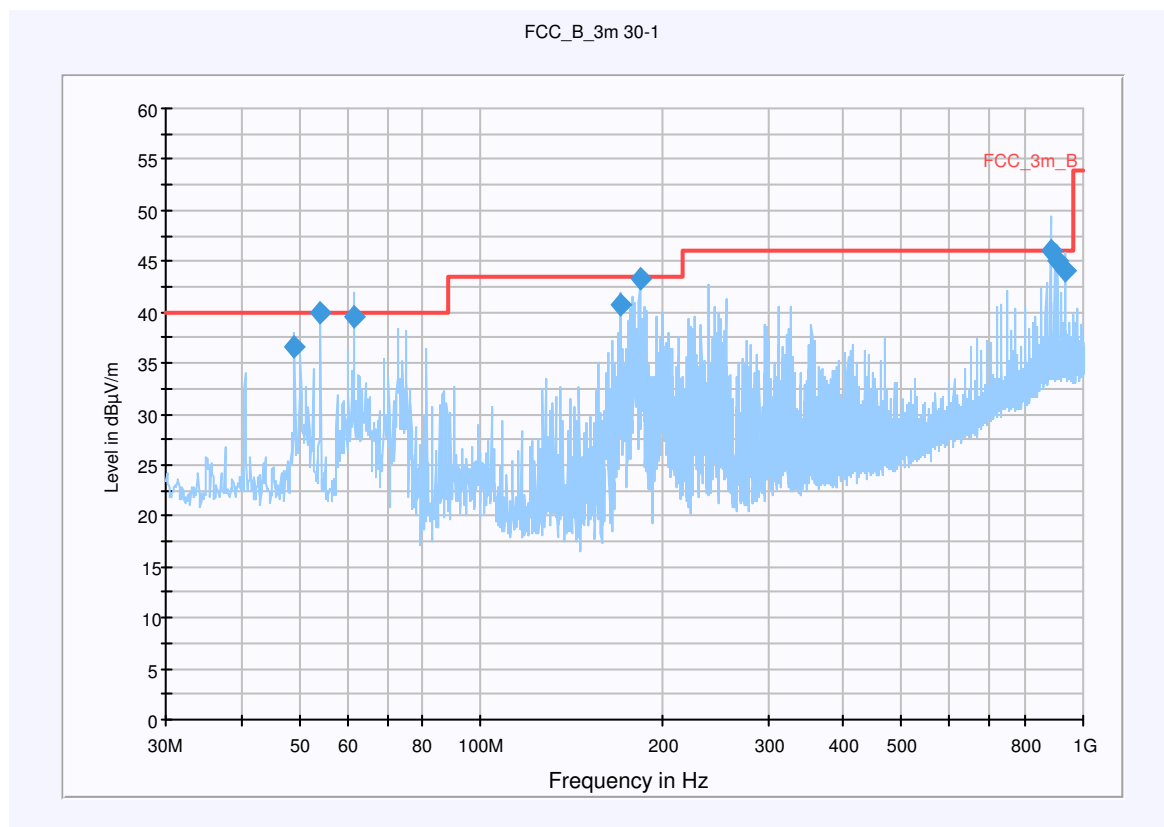
Common Information

EUT: ID ISC.ANT1690/600
 Serial Number: 1887967
 Test Description: FCC part 15 C Class B
 Operating Conditions: continous Tx
 Operator Name: LNG
 Comment: 24V DC

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Level Unit: dBμV/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1,05 GHz	QuasiPeak	120 kHz	15 s	Receiver



Final Result 1

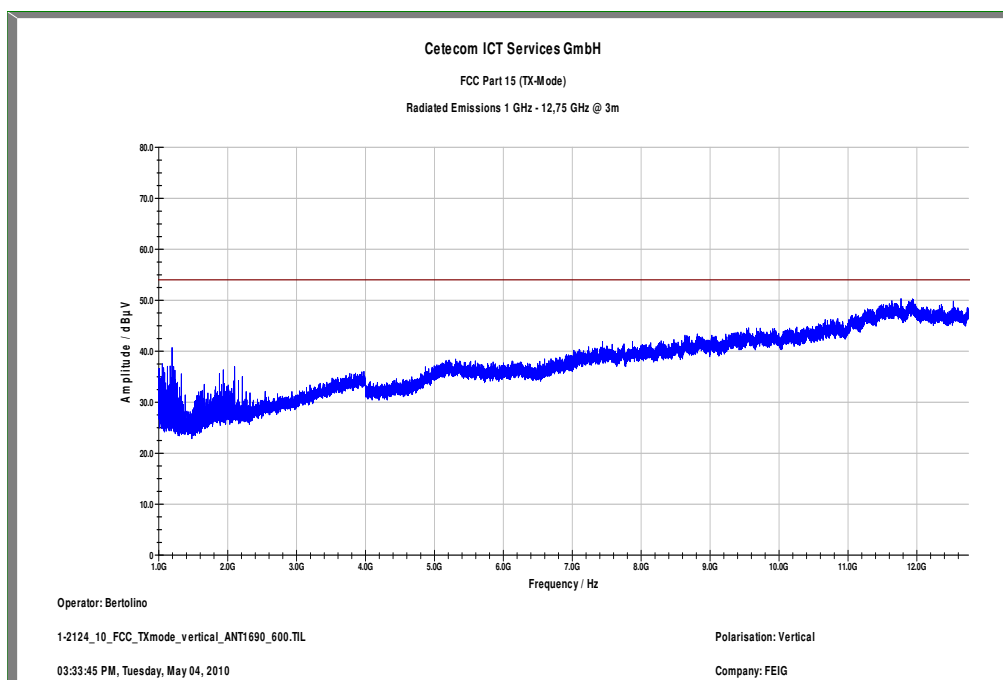
Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
48.989700	36.6	15000.000	120.000	100.0	V	-3.0	14.3	3.4	40.0	
54.246400	39.9	15000.000	120.000	127.0	V	20.0	13.9	0.1	40.0	
61.577200	39.5	15000.000	120.000	300.0	H	54.0	12.2	0.5	40.0	
170.919050	40.7	15000.000	120.000	100.0	H	167.0	10.6	2.8	43.5	
183.478650	43.3	15000.000	120.000	100.0	V	159.0	11.4	0.2	43.5	
881.421150	46.0	15000.000	120.000	100.0	H	184.0	26.4	0.0	46.0	
908.538950	45.1	15000.000	120.000	100.0	V	251.0	26.6	0.9	46.0	
935.655600	44.0	15000.000	120.000	114.0	V	222.0	26.8	2.0	46.0	

Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

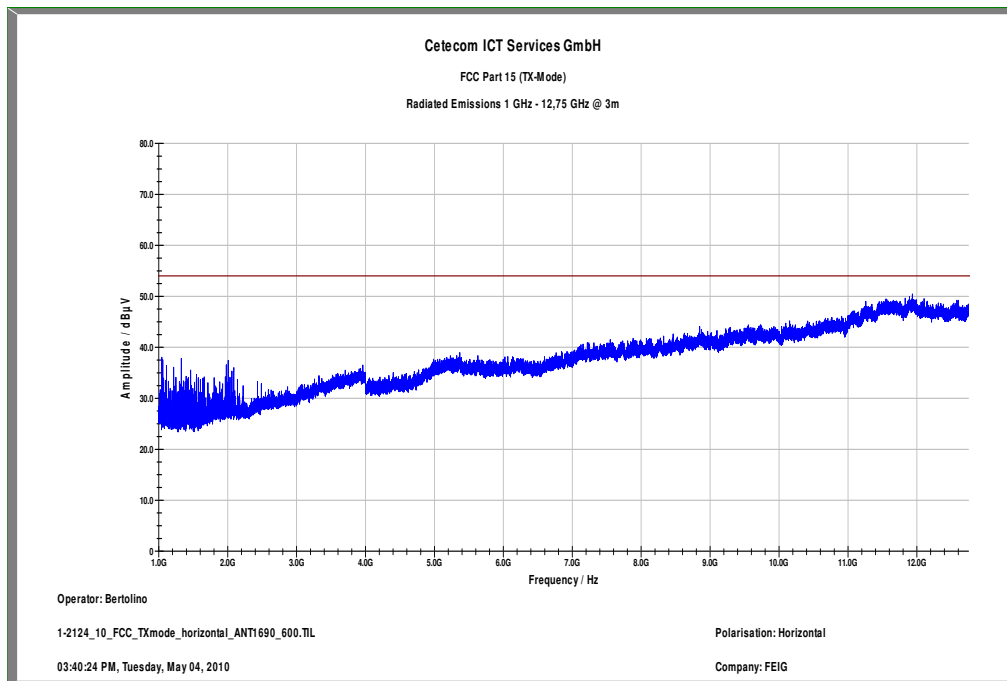
Subrange 1	
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113
Antenna Tower:	Correction Table: Cable_EN_1GHz (0909) Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

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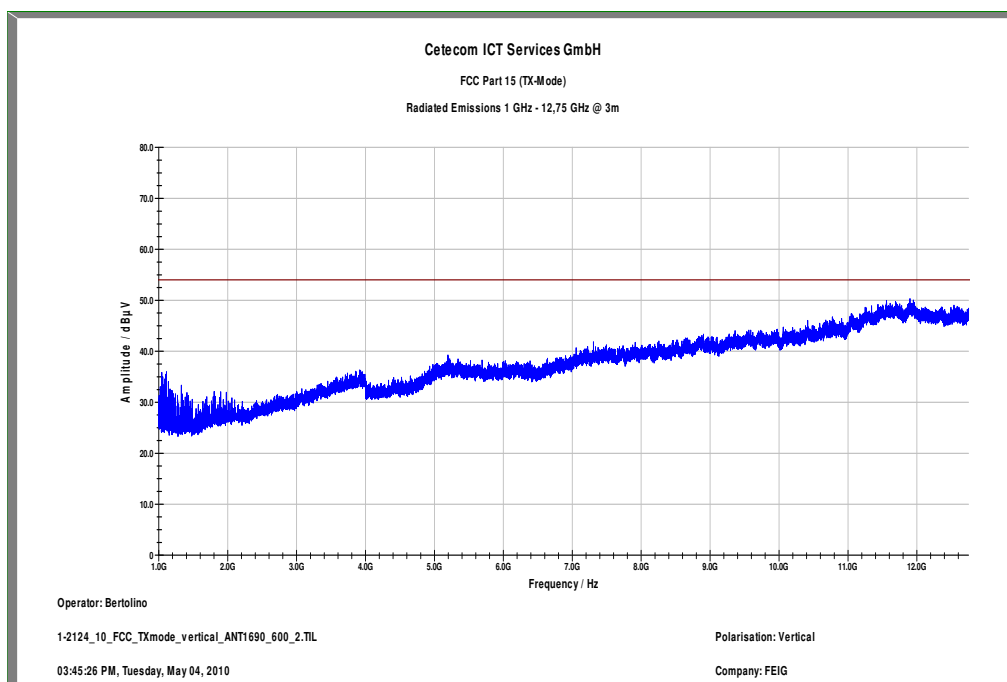
Plot 2: TX mode, 1 GHz – 12.75 GHz, vertical polarization, front side of the EUT ID ISC.ANT1690/600 (ant. 1)



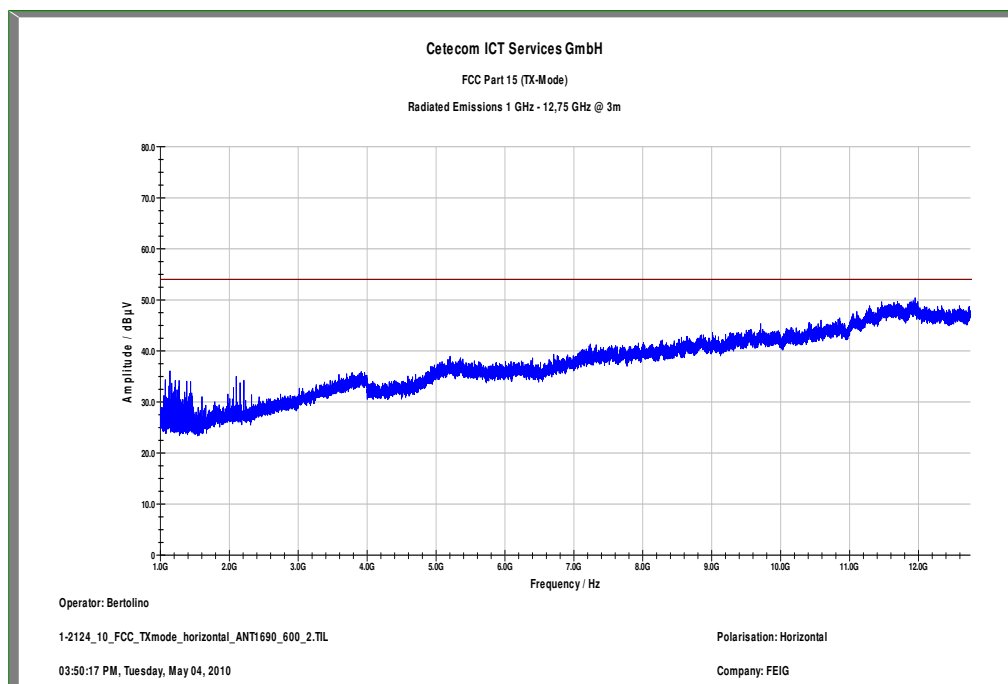
Plot 3: TX mode, 1 GHz – 12.75 GHz, horizontal polarization, front side of the EUT ID ISC.ANT1690/600 (ant. 1)



Plot 4: TX mode, 1 GHz – 12.75 GHz, vertical polarization, back side of the EUT ID ISC.ANT1690/600 (ant. 1)



Plot 5: TX mode, 1 GHz – 12.75 GHz, horizontal polarization, back side of the EUT ID ISC.ANT1690/600 (ant. 1)



ID ISC.ANT1700/740 (ant. 2):

Plot 1: TX mode, 30 MHz – 1 GHz, vertical & horizontal polarization, ID ISC.ANT1700/740 (ant. 2)

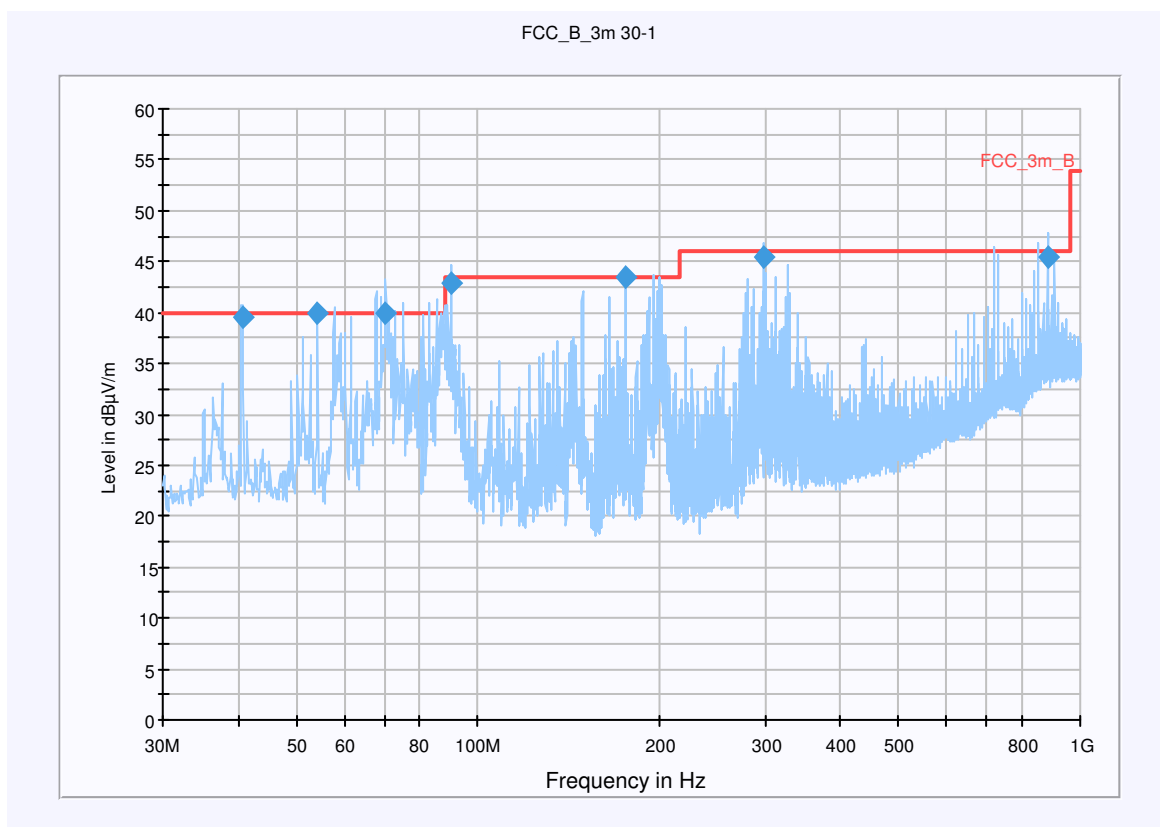
Common Information

EUT: LRM2000 ANT 1700700 A/B
 Serial Number: 1888283
 Test Description: FCC Part 15
 Operating Conditions: cont. TX 13,56 MHz
 Operator Name: Kraus
 Comment: DC 24V

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Level Unit: dBμV/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1,05 GHz	QuasiPeak	120 kHz	15 s	Receiver



Final Result 1

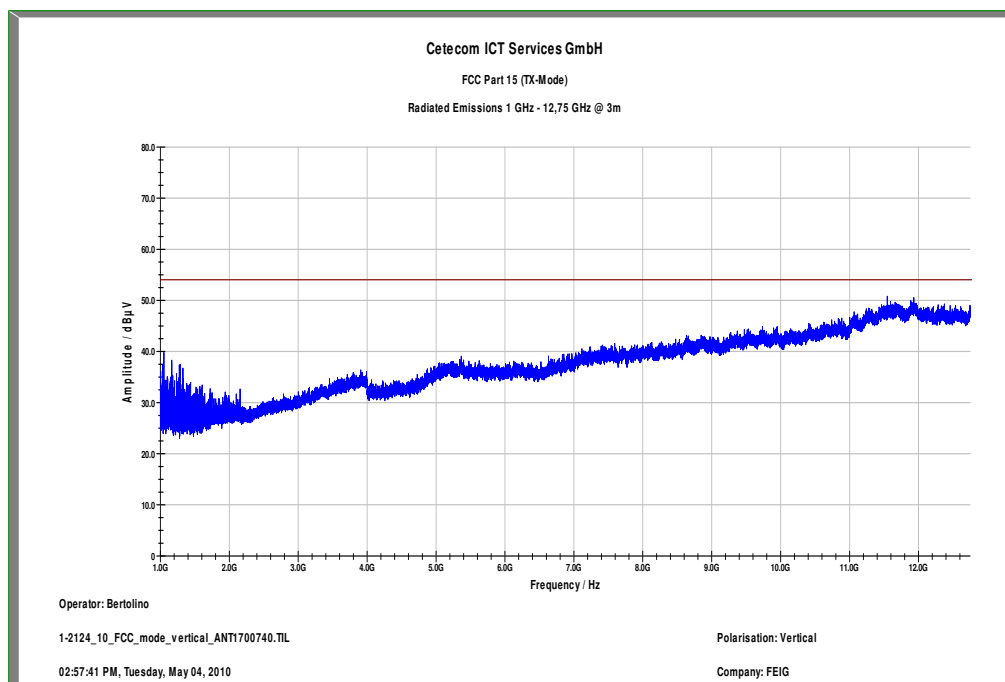
Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
40.685500	39.5	15000.000	120.000	98.0	V	300.0	14.3	0.5	40.0	
54.240050	40.0	15000.000	120.000	105.0	V	345.0	13.9	0.0	40.0	
70.404000	40.0	15000.000	120.000	167.0	V	8.0	10.2	0.0	40.0	
90.478850	42.9	15000.000	120.000	234.0	H	180.0	11.4	0.6	43.5	
176.282850	43.4	15000.000	120.000	115.0	H	7.0	10.9	0.1	43.5	
298.343650	45.5	15000.000	120.000	98.0	H	328.0	15.4	0.5	46.0	
881.416800	45.5	15000.000	120.000	98.0	V	187.0	26.4	0.5	46.0	

Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

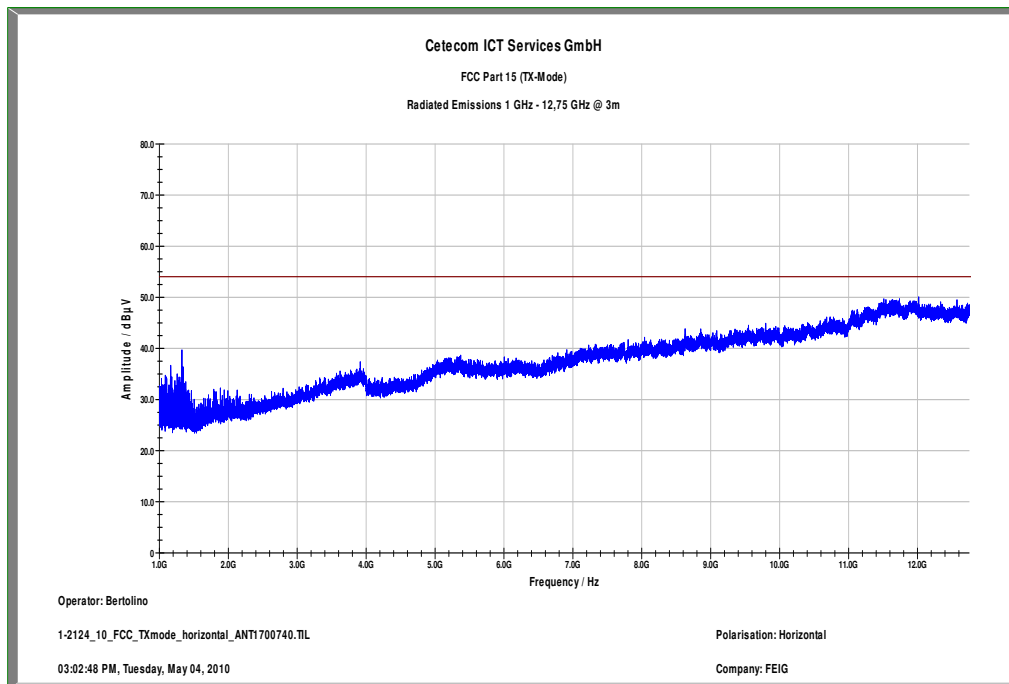
Subrange 1	
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113
Antenna Tower:	Correction Table: Cable_EN_1GHz (0909) Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

EMC 32 Version 8.10.00

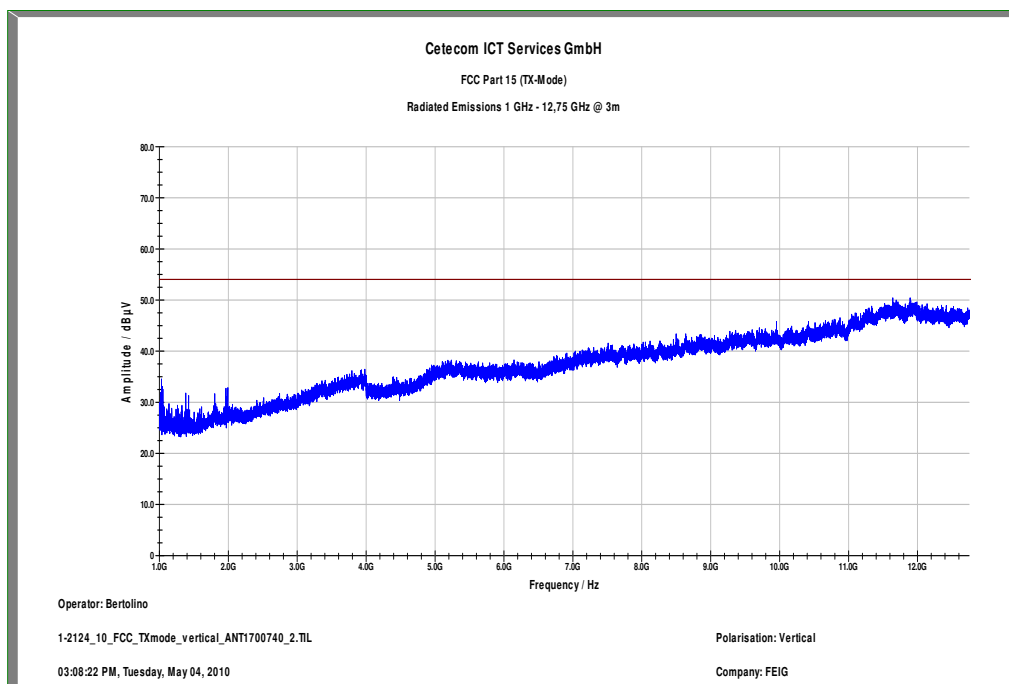
Plot 2: TX mode, 1 GHz – 12.75 GHz, vertical polarization, front side of the EUT ID ISC.ANT1700/740 (ant. 2)



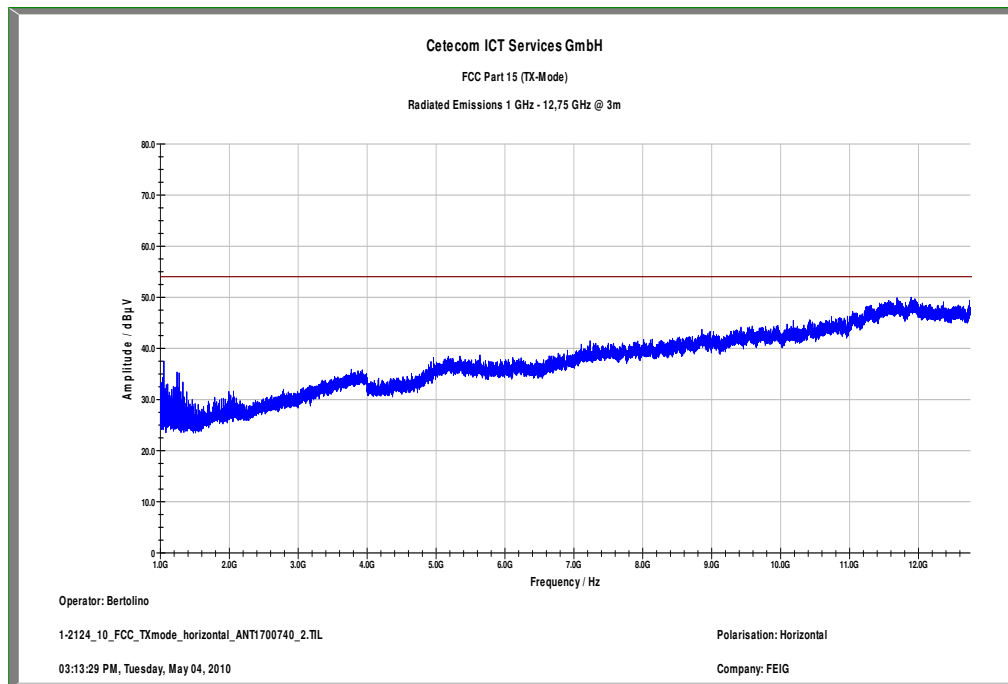
Plot 3: TX mode, 1 GHz – 12.75 GHz, horizontal polarization, front side of the EUT ID ISC.ANT1700/740 (ant. 2)



Plot 4: TX mode, 1 GHz – 12.75 GHz, vertical polarization, back side of the EUT ID ISC.ANT1700/740 (ant. 2)



Plot 5: TX mode, 1 GHz – 12.75 GHz, horizontal polarization, back side of the EUT ID ISC.ANT1700/740 (ant. 2)



ID ISC.ANT310/310 (ant. 3):

Plot 1: TX mode, 30 MHz – 1 GHz, vertical & horizontal polarization, ID ISC.ANT310/310 (ant. 3)

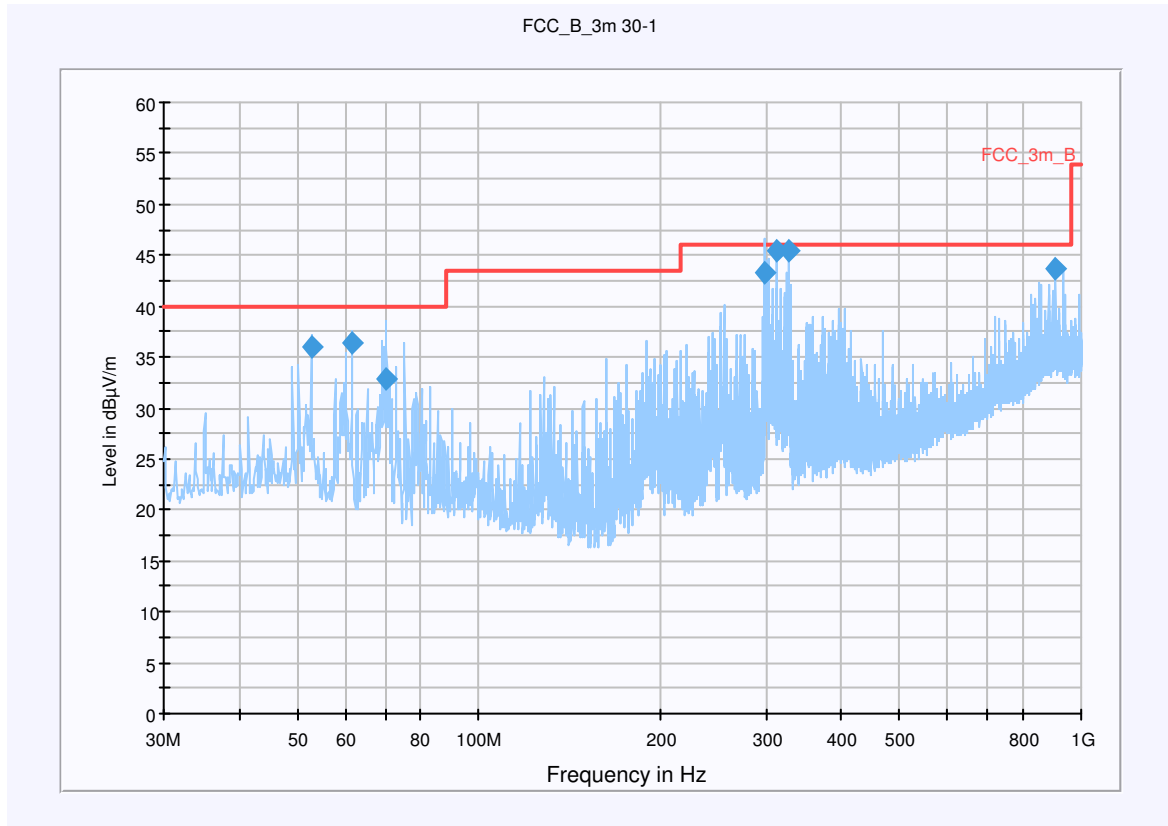
Common Information

EUT: ID ISC.ANT310/310-A
 Serial Number: 3187734
 Test Description: FCC part 15 C Class B
 Operating Conditions: continous Tx
 Operator Name: LNG
 Comment: 24V DC

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Level Unit: dBµV/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1,05 GHz	QuasiPeak	120 kHz	15 s	Receiver



Final Result 1

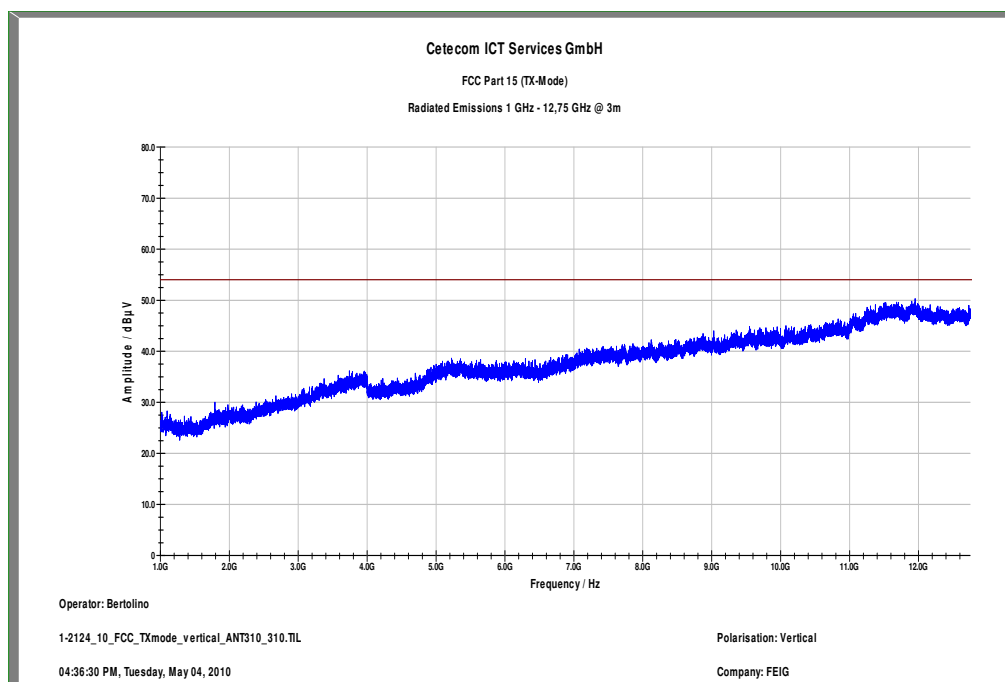
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
52.774750	35.9	15000.000	120.000	98.0	V	242.0	14.1	4.1	40.0	
61.594750	36.4	15000.000	120.000	98.0	V	245.0	12.2	3.6	40.0	
70.268350	32.8	15000.000	120.000	100.0	V	261.0	10.2	7.2	40.0	
298.327150	43.3	15000.000	120.000	98.0	H	224.0	15.4	2.7	46.0	
311.889600	45.5	15000.000	120.000	198.0	V	127.0	15.8	0.5	46.0	
326.397100	45.5	15000.000	120.000	167.0	V	110.0	16.3	0.5	46.0	
908.539750	43.6	15000.000	120.000	109.0	V	320.0	26.6	2.4	46.0	

Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

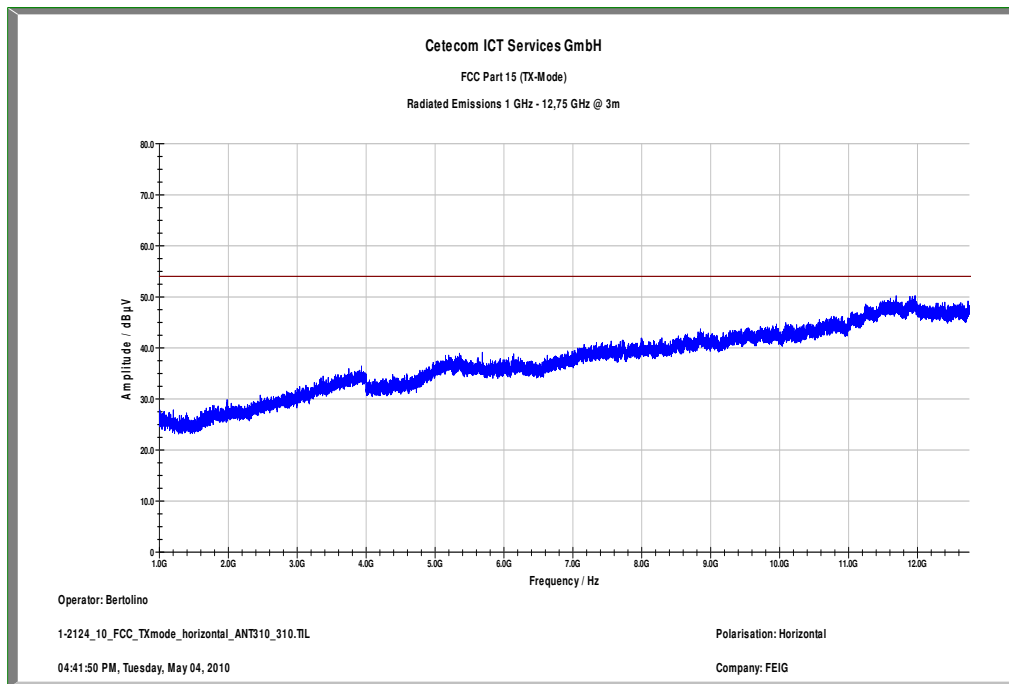
Subrange 1	
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113
Antenna Tower:	Correction Table: Cable_EN_1GHz (0909) Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

EMC 32 Version 8.10.00

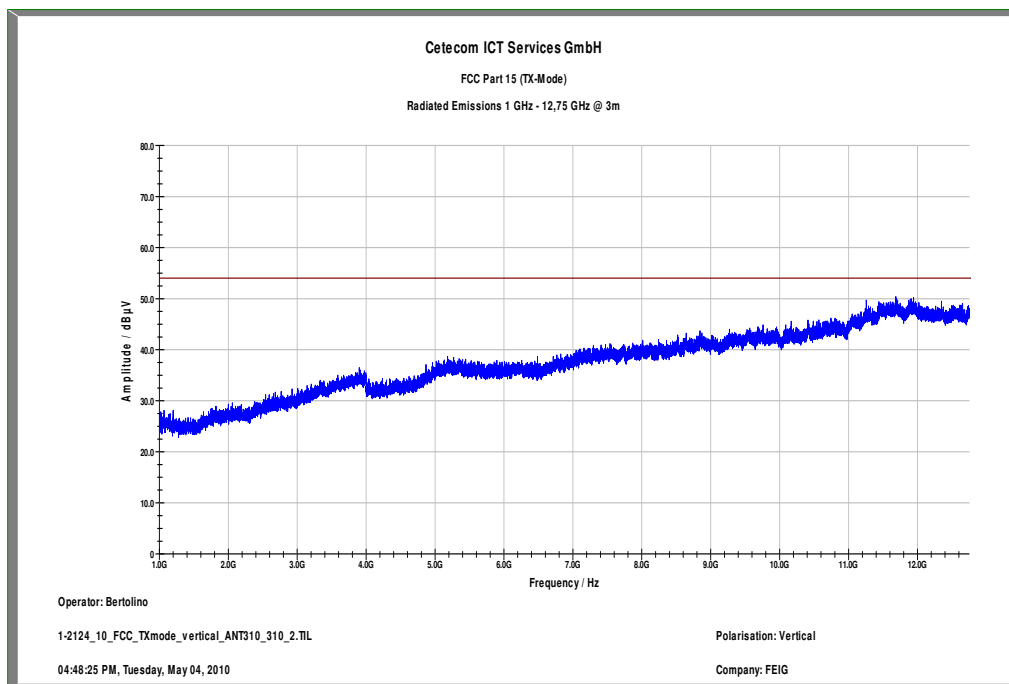
Plot 2: TX mode, 1 GHz – 12.75 GHz, vertical polarization, front side of the EUT ID ISC.ANT310/310 (ant. 3)



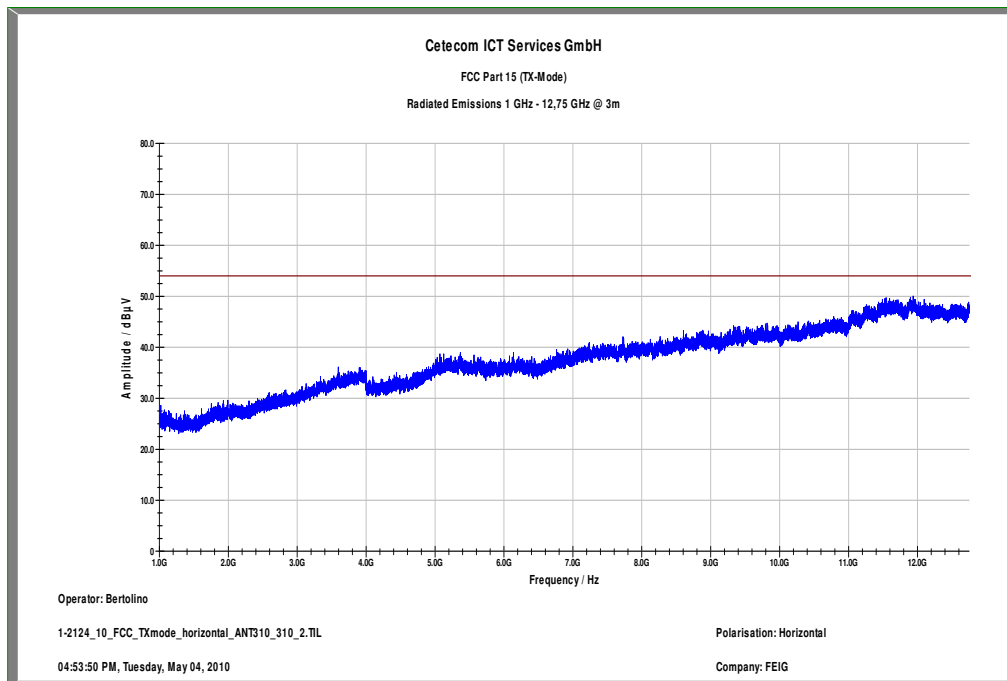
Plot 3: TX mode, 1 GHz – 12.75 GHz, horizontal polarization, front side of the EUT ID ISC.ANT310/310 (ant. 3)



Plot 4: TX mode, 1 GHz – 12.75 GHz, vertical polarization, back side of the EUT ID ISC.ANT310/310 (ant. 3)



Plot 5: TX mode, 1 GHz – 12.75 GHz, horizontal polarization, back side of the EUT ID ISC.ANT310/310 (ant. 3)



6.3 Frequency tolerance

Reference

FCC:	CFR Part SUBCLAUSE § 15.225 (e)
IC:	RSS 210, Annex 2.6

Results:

Frequency tolerance								
Over temperature variation			Over voltage variation					
T (°C)	Frequency [kHz]	result	Power voltage	Frequency [kHz]	result			
50	13560.294	0.29 kHz 21.68 ppm						
40	13560.310	0.31 kHz 22.86 ppm						
30	13560.411	0.41 kHz 30.31 ppm						
20	13560.429	0.43 kHz 31.64 ppm						
20			Vlow	13560.413	0.41 kHz 30.46 ppm			
20			Vhigh	13560.436	0.44 kHz 32.15 ppm			
10	13560.443	0.44 kHz 32.67 ppm						
0	13560.471	0.47 kHz 34.73 ppm						
-10	13560.495	0.50 kHz 36.50 ppm						
-20	13560.497	0.50 kHz 36.65 ppm						
Measurement uncertainty			±100 Hz					

Limits

SUBCLAUSE § 15.225 (e)

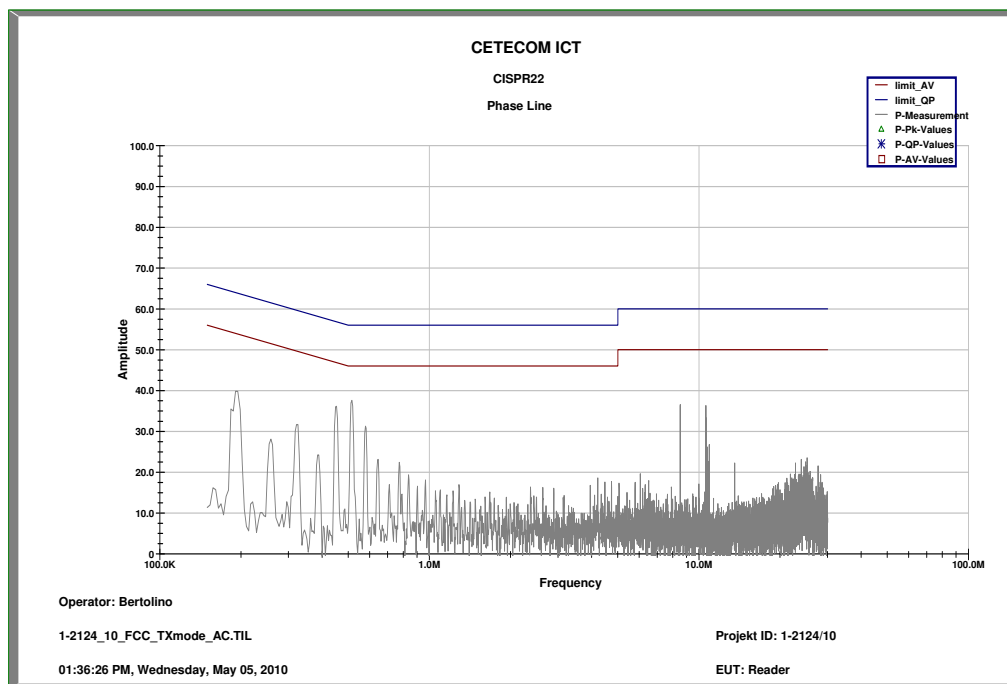
The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

6.4 Conducted Limits

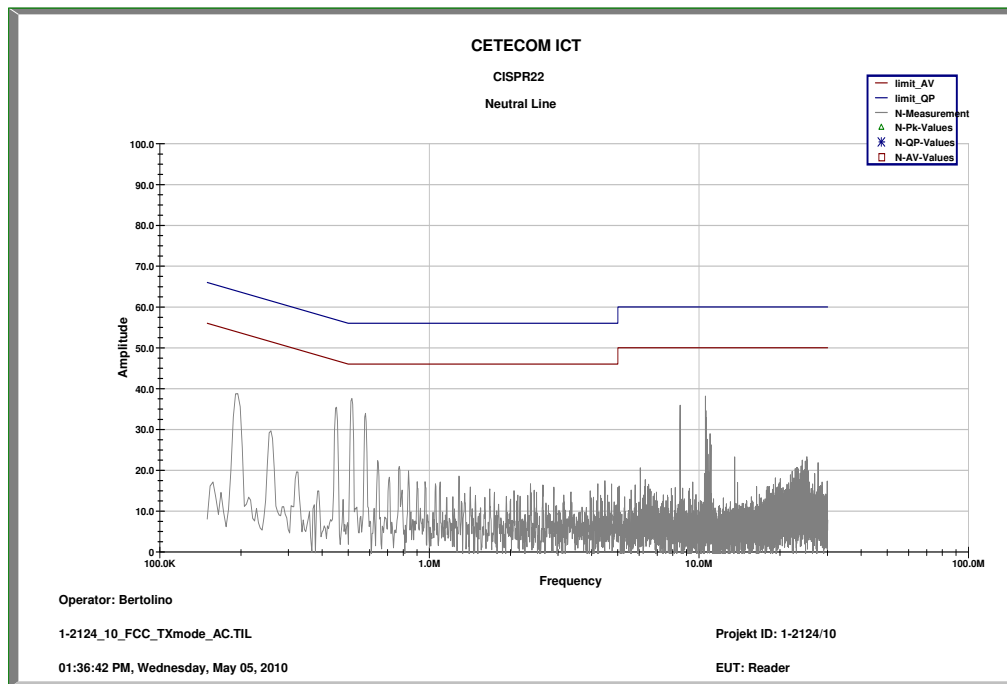
Reference

FCC:	CFR Part 15.207, 15.107
IC:	RSS 210, Issue 7, Section 6.6 , 7.4

Plot 1: Charging mode, phase line (class B)



Plot 2: Charging mode, neutral line (class B)



Limits: § 15.107 / 15.207

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56 *	56 to 46 *
0.5 – 5	56	46
5 - 30	60	50

* Decreases with the logarithm of the frequency

7 Test equipment and ancillaries used for tests

In order to simplify the identification of the equipment used at each specific test, each item of test equipment and ancillaries are provided with an identifier or number in the equipment list below.

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, rf-generating and signalling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

No.	Labor / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kal. Art	Last Calibration	Next Calibration
1	n. a.	Test Receiver	ESH2	R&S	871921/095	300002505	Ve	12.02.2010	12.02.2012
2	n. a.	Loop Antenna 9 KHz - 30 MHz	HFH2-Z2	R&S	872096/61	300001824	vlK I!	18.11.2008	18.11.2011
3	45	Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368	g		
4	50	Netzgerät	6032A	HP Meßtechnik	2920A04466	300000580	k	06.01.2009	06.01.2011
6	n. a.	EMI-Messempfänger	ESCI 1166.5950.03	R&S	100083	300003312	k	08.01.2010	08.01.2012
7	n. a.	Amplifier	JS42-00502650-28-5A	MITEQ	1084532	300003379	ev		
8	n. a.	Antennenmast	Model 2175	ETS-LINDGREN	64762	300003745	izw		
9	n. a.	Steuergerät	Model 2090	ETS-LINDGREN	64672	300003746	izw		
10	n. a.	Interface-Box für Drehtisch	Model 105637	ETS-LINDGREN	44583	300003747	izw		
11	n. a.	Spectrum-Analyzer	FSU26	R&S	200809	300003874	k	08.01.2010	08.01.2012
12	n. a.	Double-Ridged Waveguide Horn Antenna 1-26.5GHz	3115	EMCO	8812-3088	300001032	vlK I!	05.03.2009	05.03.2011
13	n. a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
14	n. a.	Anechoic chamber		MWB	87400/02	300000996			
15	Spec.A. 2_2e	System rack for EMI measurement solution	85900	HP I.V.	*	300000222	ne		
16	9	Artificial Mains 9 kHz to 30 MHz, 4 x 25 Ampere	ESH3-Z5	R&S	828576/020	300001210	Ve	06.01.2010	06.01.2012
17	n. a.	Relais Matrix	3488A	HP Meßtechnik	2719A15013	300001156	ne		
18	n. a.	Relais Matrix	PSU	R&S	890167/024	300001168	ne		
19	n. a.	Isolating	RT5A	Grundig	9242	300001	ne		

		Transformer				263			
20	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
21	n. a.	Switch / Control Unit	3488A	HP	2605e08770	300001443	ne		
22	n. a.	TILE-Software Emission	Quantum Change, Modell TILE-ICS/FULL	EMCO	none	300003451	ne		
23	n. a.	Highpass Filter	WHKX2.9/18G-12SS	Wainwright	1	300003492	ev		
24	n. a.	Highpass Filter	WHK1.1/15G-10SS	Wainwright	3	300003255	ev		
25	n. a.	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789	ne		
26	n. a.	PSA Spectrum Analyzer 3 Hz - 26.5 GHz	E4440A	Agilent Vertr. Bad Hom	MY48250080	300003812	k	05.08.2008	05.08.2010
27	n. a.	MXG Microwave Analog Signal Generator	N5183A	Agilent Vertr. Bad Hom	MY47420220	300003813	k	06.08.2008	06.08.2010
28	n. a.	RF Filter Section 9kHz - 1GHz	N9039A	Agilent Vertr. Bad Hom	MY48260003	300003825	vIK I!	19.08.2008	19.08.2010
29	n. a.	TRILOG Super Breitband Antenne	VULB9163	Schwarzbeck	371	300003854	vIK I!	17.12.2008	17.12.2010
30	n. a.	Power Supply	LA30/5GA	Zentro Elektronik	2046	300000711	NK !		
31	n. a.	Temperature Test Chamber	VT 4002	Heraeus Voetsch	521/83761	300002326	Ve	28.05.2009	28.05.2011
32	n. a.	Signal Analyzer 20Hz-26,5GHz-150 to + 30 DBM	FSIQ26	R&S	835540/018	300002681-0005	k	07.01.2010	07.01.2012

8 Photographs of the Test Set-up

Photo documentation:

Photo 1: ID ISC.ANT1690/600 (ant. 1)

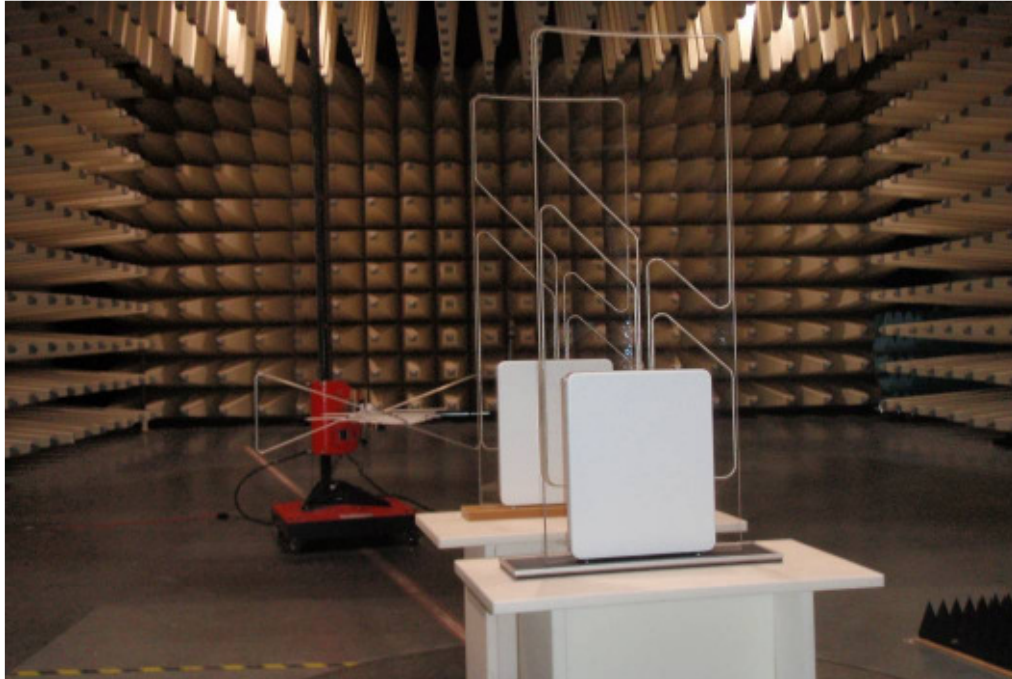


Photo 2: ID ISC.ANT1690/600 (ant. 1)

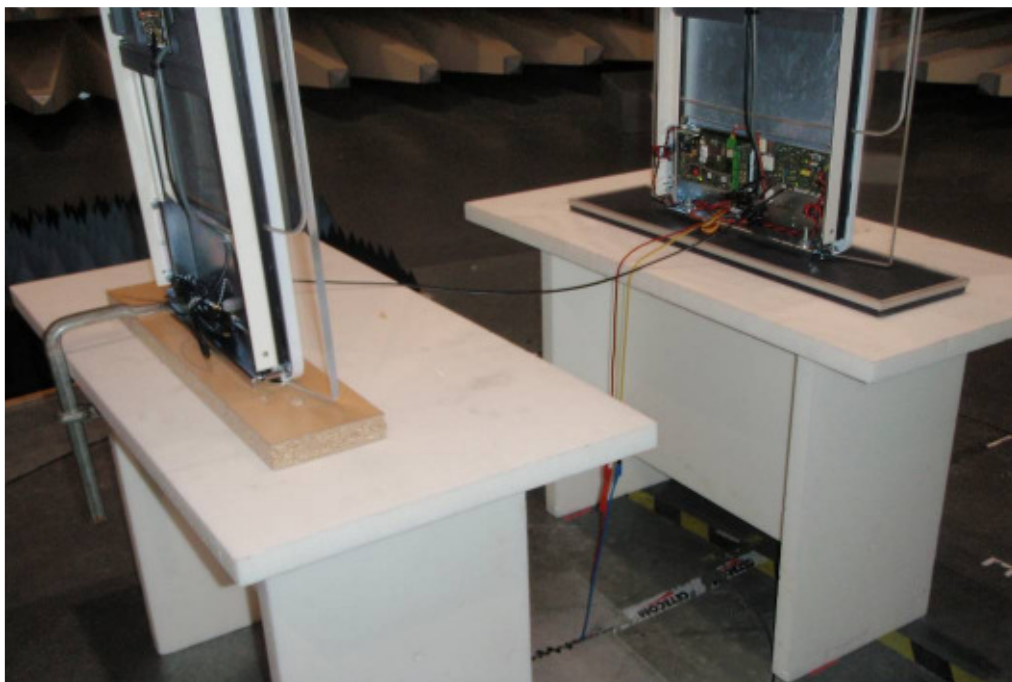


Photo 3: ID ISC.ANT1700/740 (ant. 2)

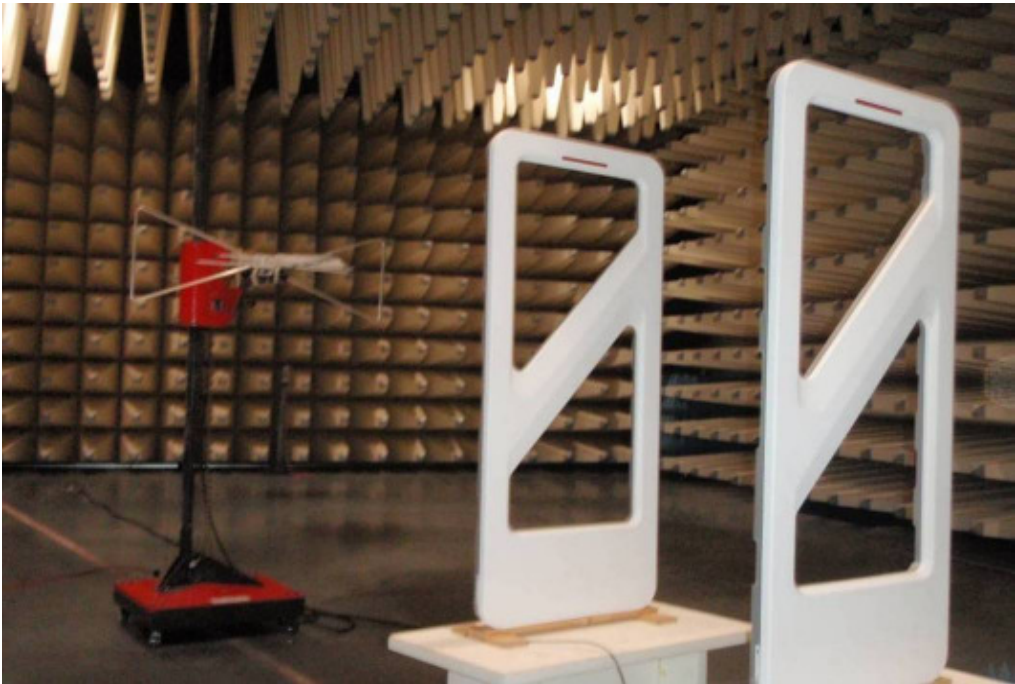


Photo 4: ID ISC.ANT1700/740 (ant. 2)

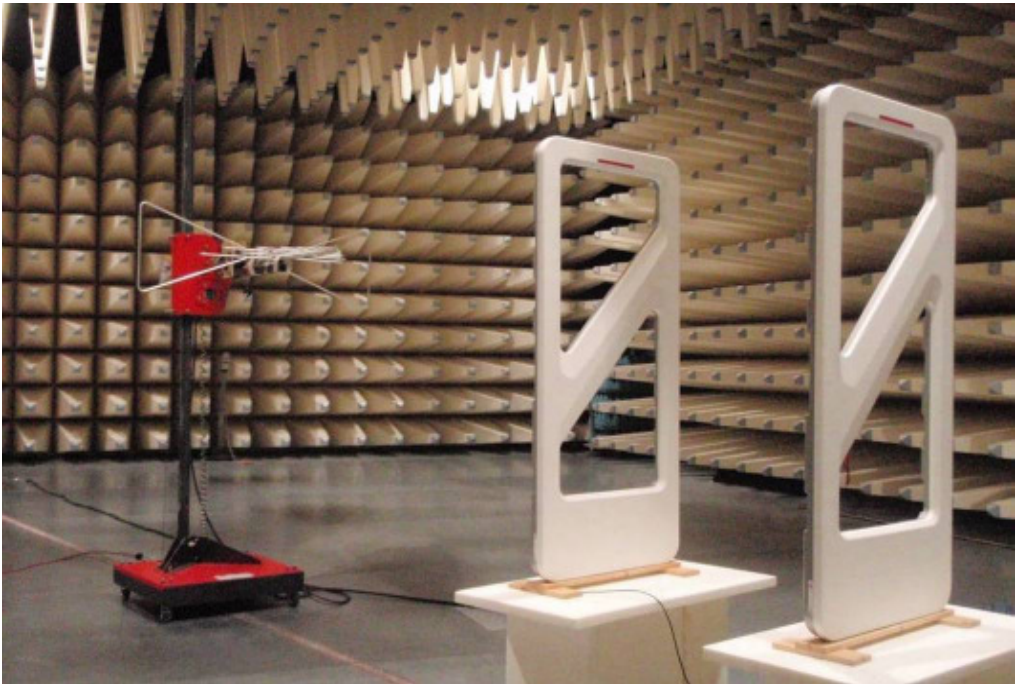


Photo 5: ID ISC.ANT310/310 (ant. 3)

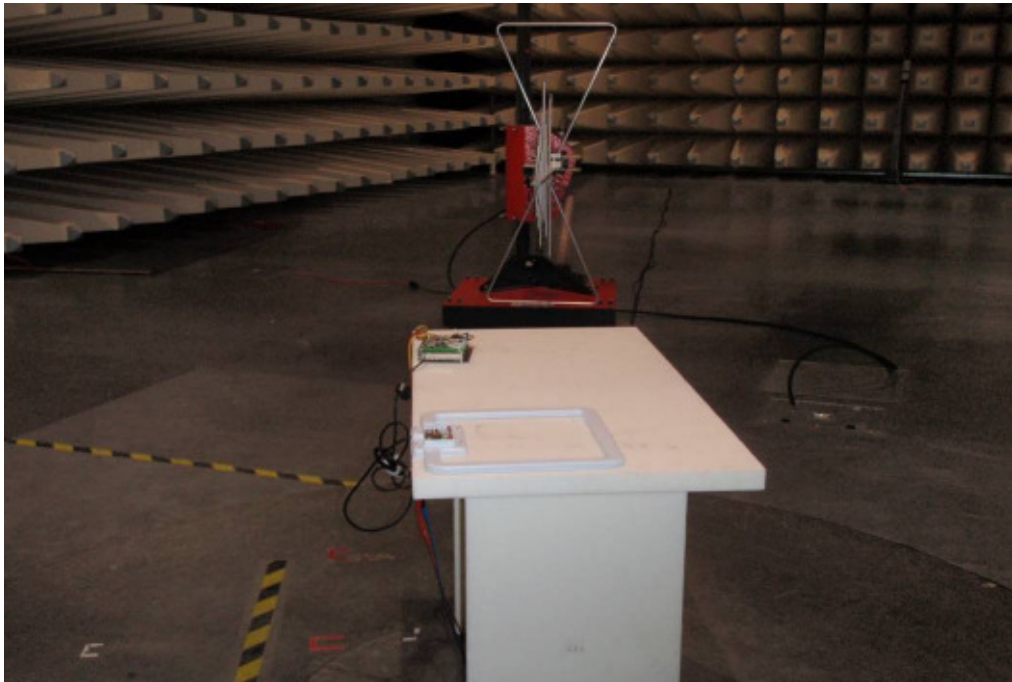


Photo 6: ID ISC.ANT310/310 (ant. 3)

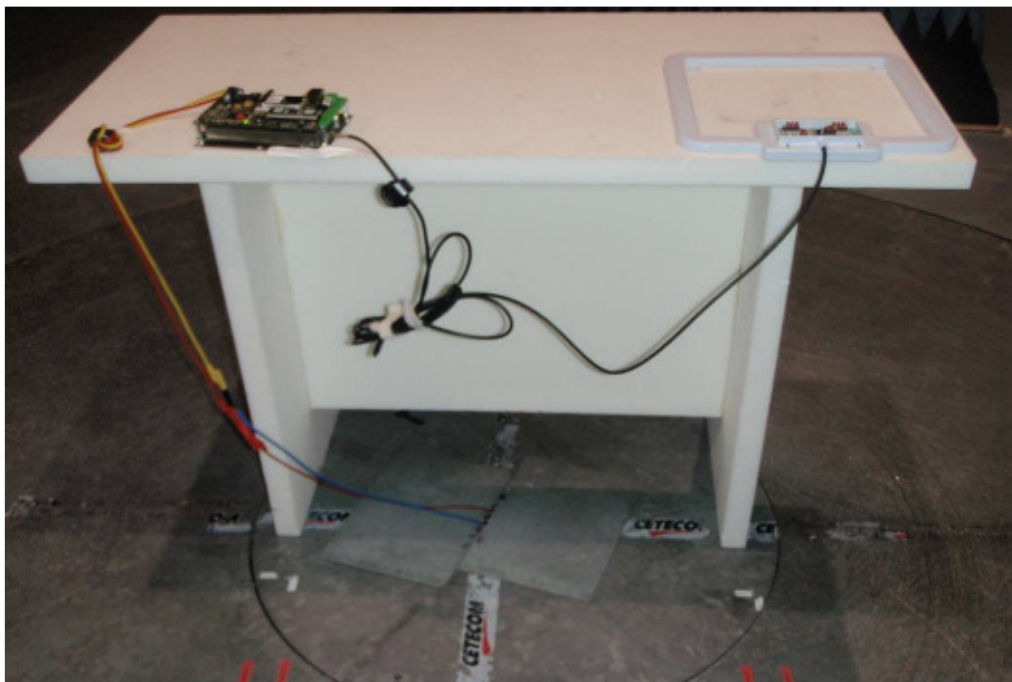


Photo 7: AC conducted



9 Photographs of the EUT

Photo documentation: external photos

Photo 1: ID ISC.ANT1690/600 (ant. 1)

Gate 1 (multiplexer only)

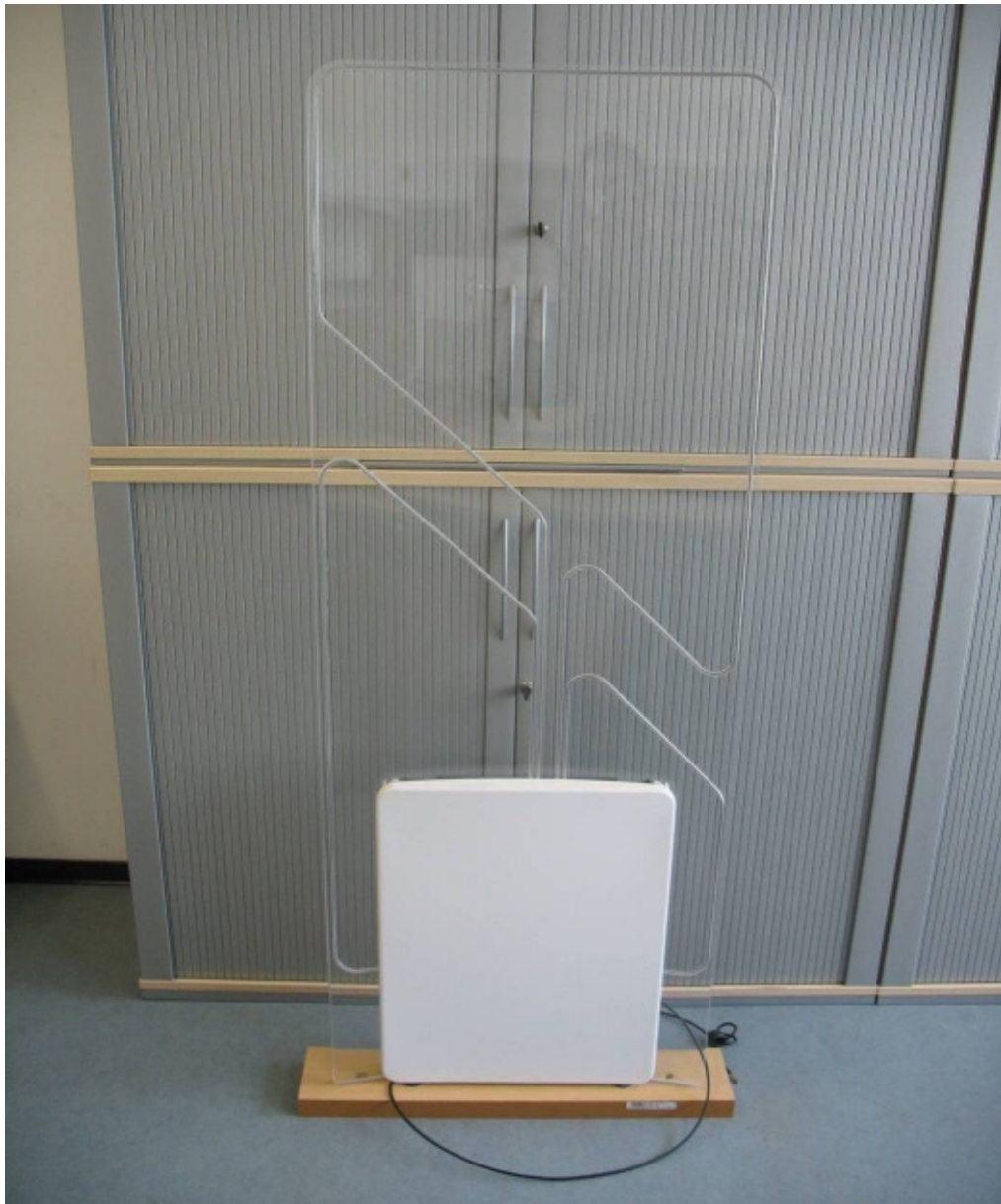


Photo 2: ID ISC.ANT1690/600 (ant. 1)

Gate 1 (multiplexer only)



Photo 3: ID ISC.ANT1690/600 (ant. 1)

Gate 2 (multiplexer & reader)



Photo 4: ID ISC.ANT1690/600 (ant. 1)

Gate 2 (multiplexer & reader)



Photo 1: ID ISC.ANT1700/740 (ant. 2)

Gate 1 (multiplexer only)



Photo 2: ID ISC.ANT1700/740 (ant. 2)

Gate 1 (multiplexer only)



Photo 3: ID ISC.ANT1700/740 (ant. 2)

Gate 2 (multiplexer & reader)



Photo 4: ID ISC.ANT1700/740 (ant. 2)

Gate 2 (multiplexer & reader)



Photo 5: ID ISC.ANT310/310 (ant. 3)



Photo 6: ID ISC.ANT310/310 (ant. 3)



Photo 3: ID ISC.ANT310/310 (ant. 3)



Photo documentation: internal photos

Photo 1: ID ISC.ANT1690/600 (ant. 1)

Gate 1 (multiplexer only)



Photo 2: ID ISC.ANT1690/600 (ant. 1)

Gate 1 (multiplexer only)

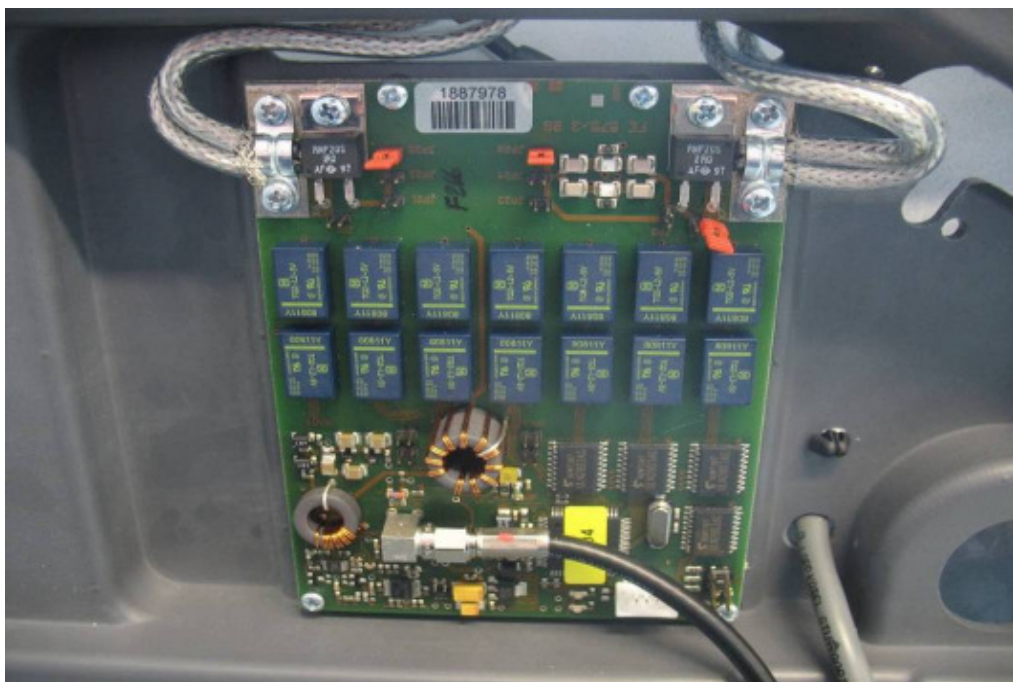


Photo 3: ID ISC.ANT1690/600 (ant. 1)

Gate 1 (multiplexer only)



Photo 4: ID ISC.ANT1690/600 (ant. 1)

Gate 2 (multiplexer & reader)



Photo 5: ID ISC.ANT1690/600 (ant. 1)

Gate 2 (multiplexer & reader)

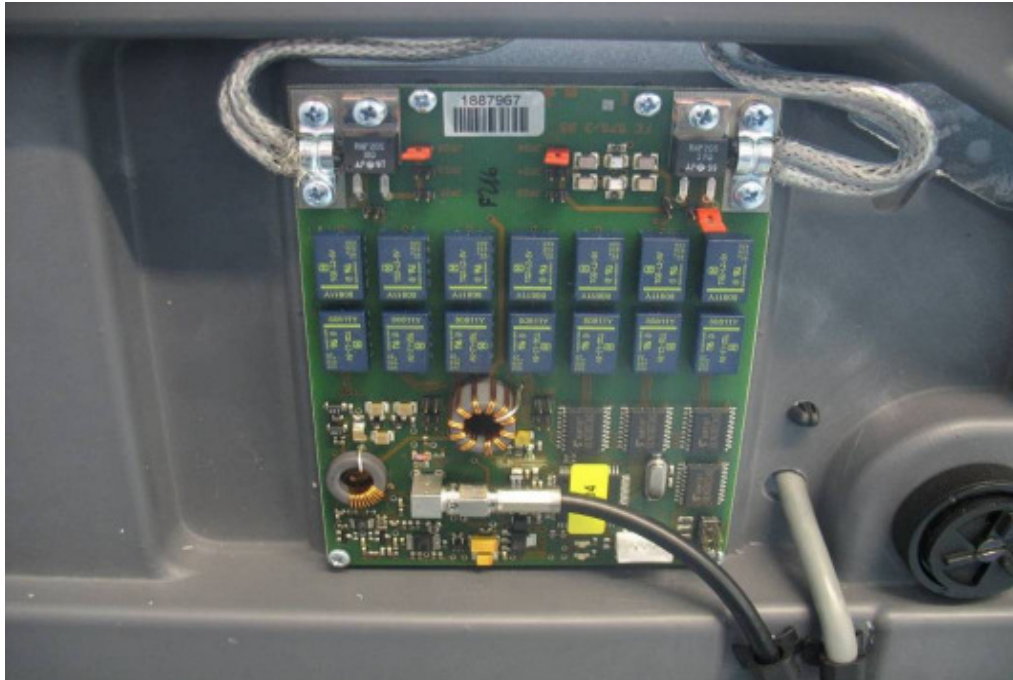


Photo 6: ID ISC.ANT1690/600 (ant. 1)

Gate 2 (multiplexer & reader)

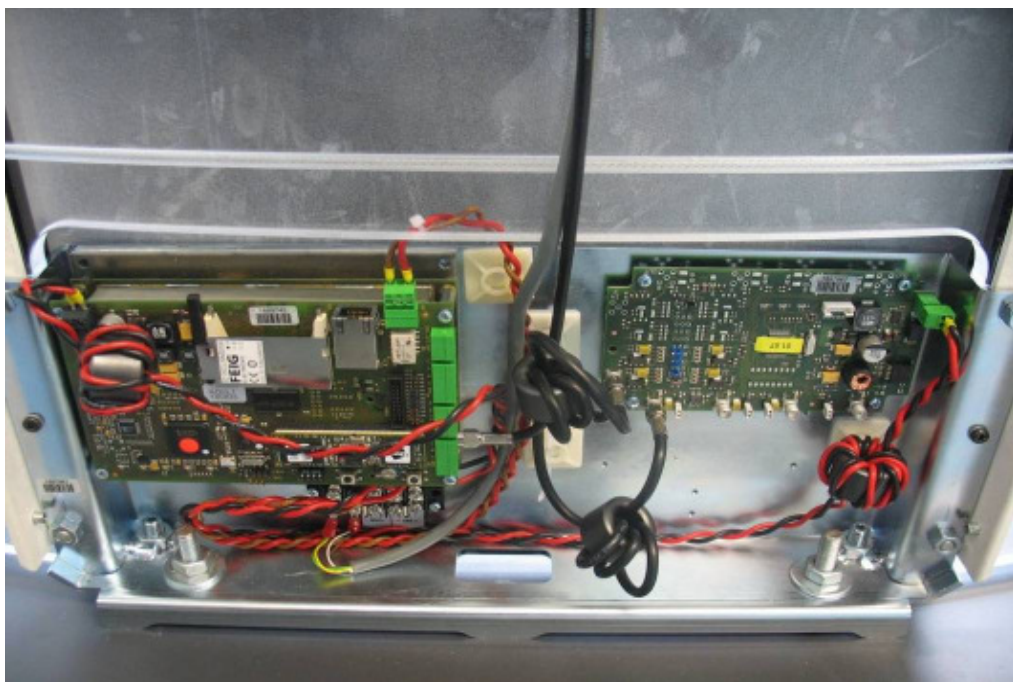


Photo 7: ID ISC.ANT1690/600 (ant. 1)

Gate 2 (multiplexer & reader)



Photo 8: ID ISC.ANT1690/600 (ant. 1)

Gate 2 (multiplexer & reader)



Photo 9: ID ISC.ANT1690/600 (ant. 1)

Gate 2 (multiplexer & reader)

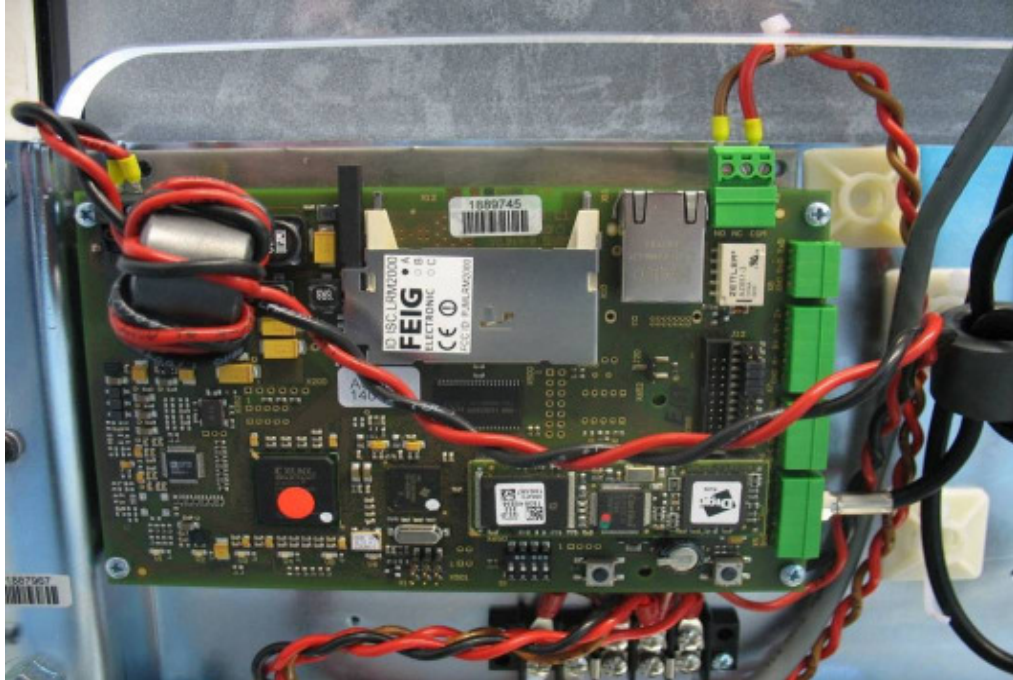


Photo 10: ID ISC.ANT1700/740 (ant. 2)

Gate 1 (multiplexer only)



Photo 11: ID ISC.ANT1700/740 (ant. 2)

Gate 1 (multiplexer only)



Photo 12: ID ISC.ANT1700/740 (ant. 2)

Gate 1 (multiplexer only)



Photo 13: ID ISC.ANT1700/740 (ant. 2)

Gate 2 (multiplexer & reader)



Photo 14: ID ISC.ANT1700/740 (ant. 2)

Gate 2 (multiplexer & reader)



Photo 15: ID ISC.ANT1700/740 (ant. 2)

Gate 2 (multiplexer & reader)

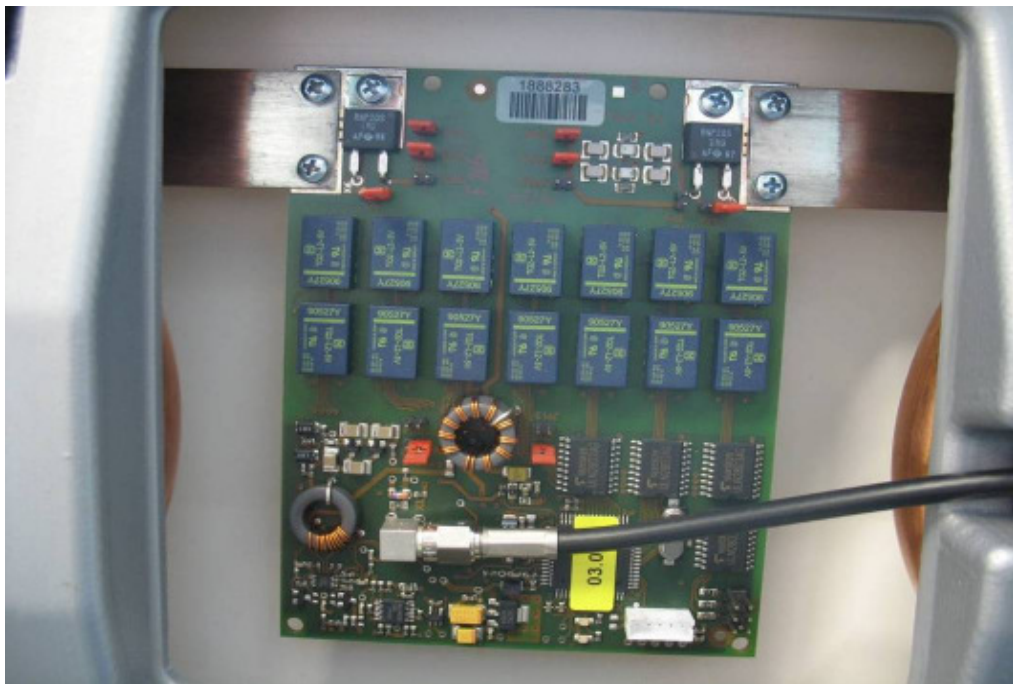


Photo 16: ID ISC.ANT1700/740 (ant. 2)

Gate 2 (multiplexer & reader)

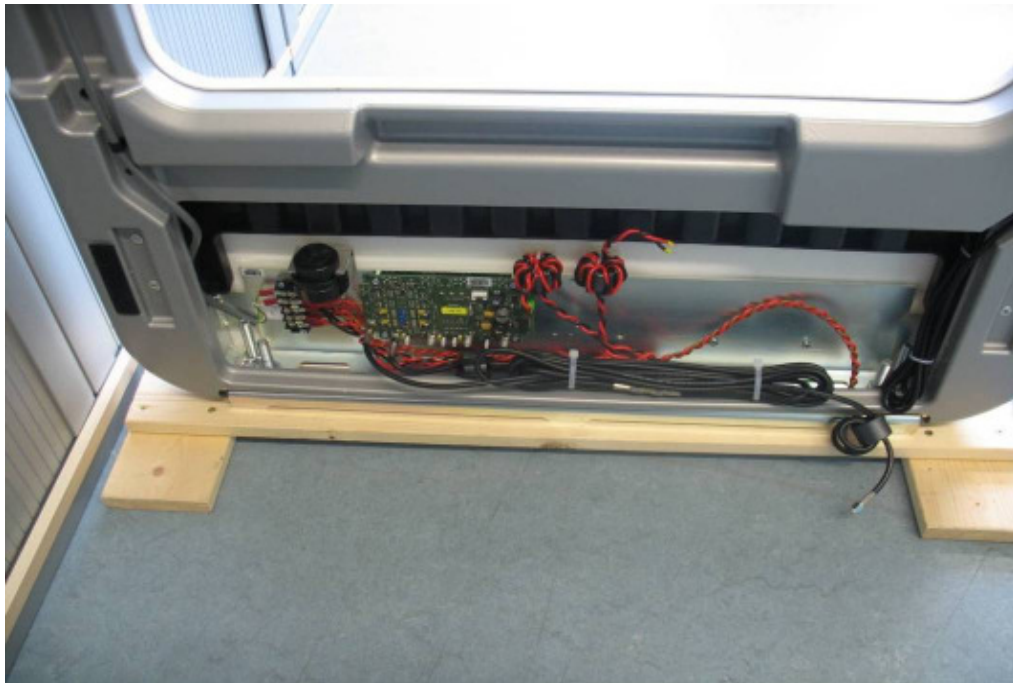


Photo 17: ID ISC.ANT1700/740 (ant. 2)

Gate 2 (multiplexer & reader)

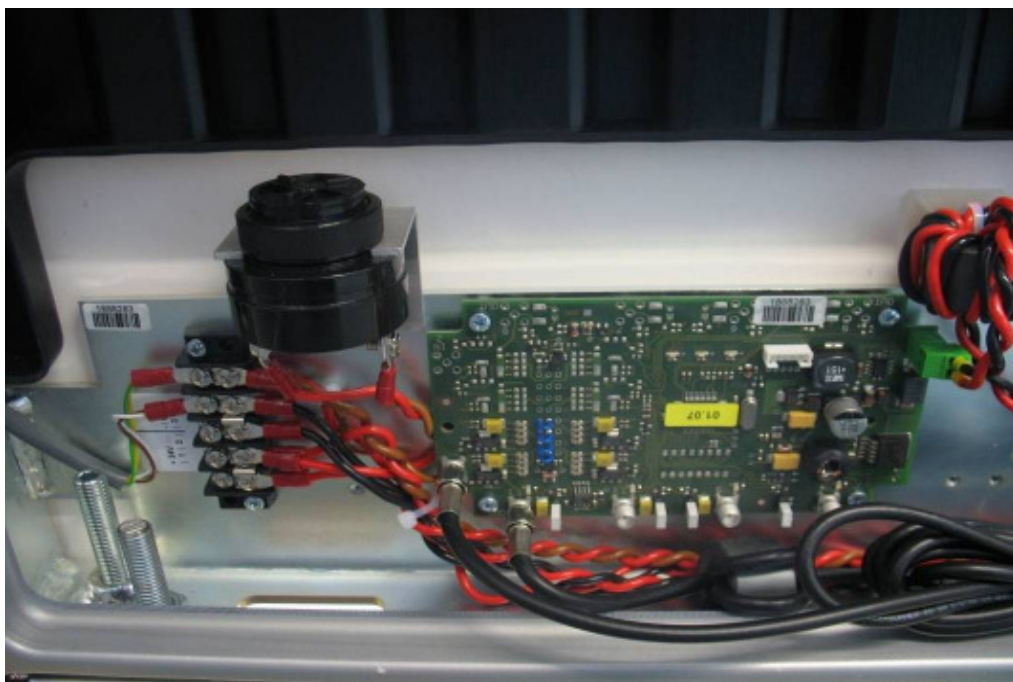


Photo 18: ID ISC.ANT1700/740 (ant. 2)

Gate 2 (multiplexer & reader)



Photo 19: ID ISC.ANT310/310 (ant. 3)

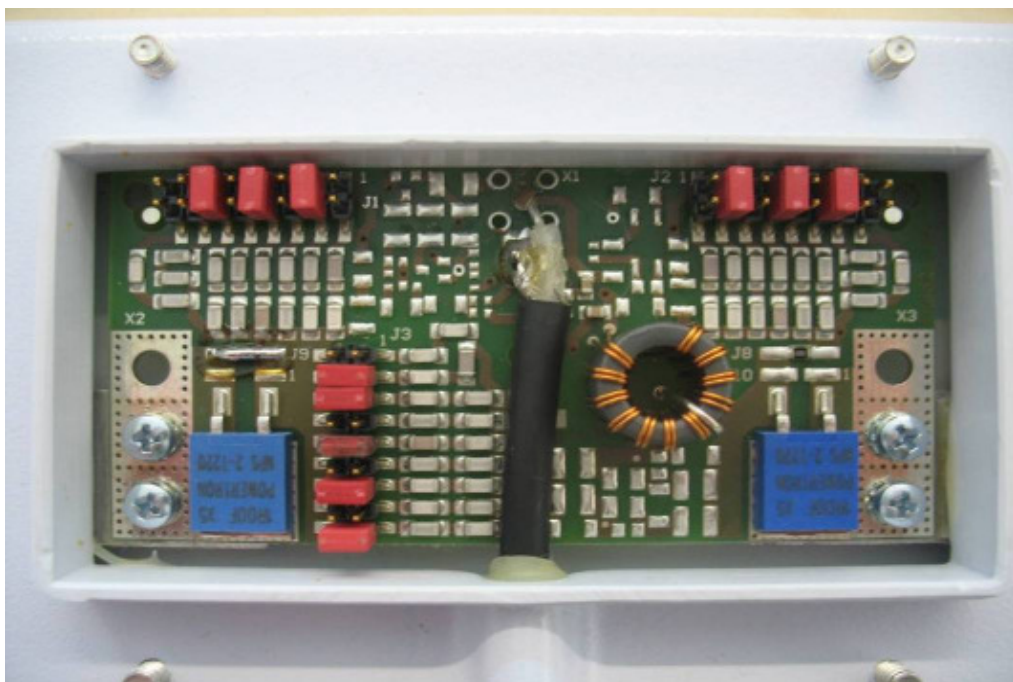


Photo 20: ID ISC.LRM 2000



Photo 21: ID ISC.LRM 2000

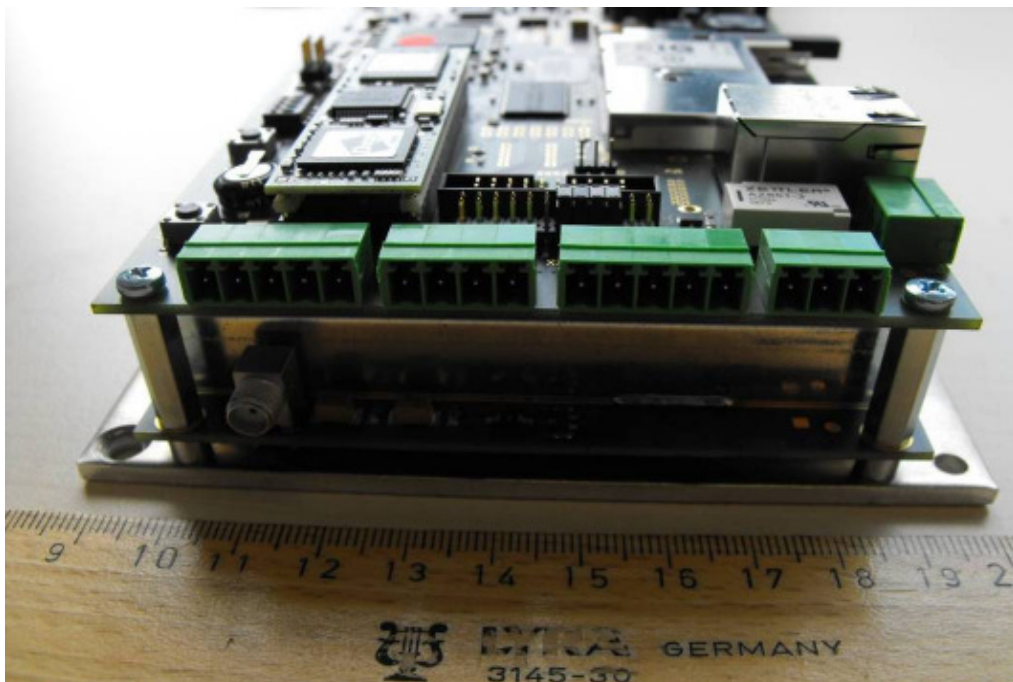


Photo 22: ID ISC.LRM 2000



Photo 23: ID ISC.LRM 2000



Photo 24: ID ISC.LRM 2000

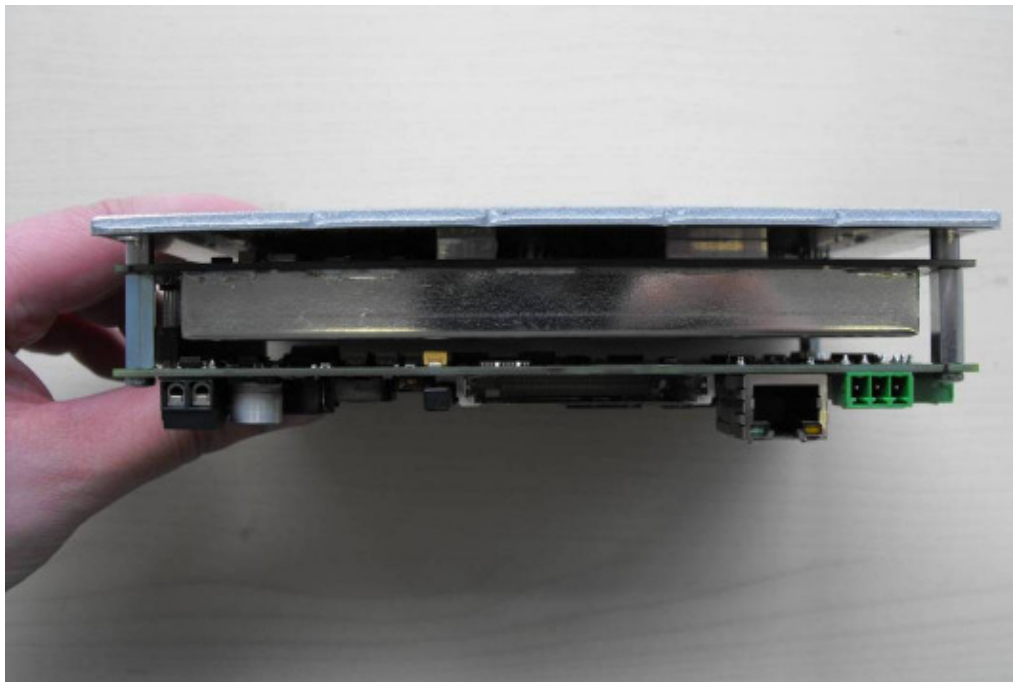


Photo 25: ID ISC.LRM 2000



Photo 26: ID ISC.LRM 2000



Photo 27: ID ISC.LRM 2000

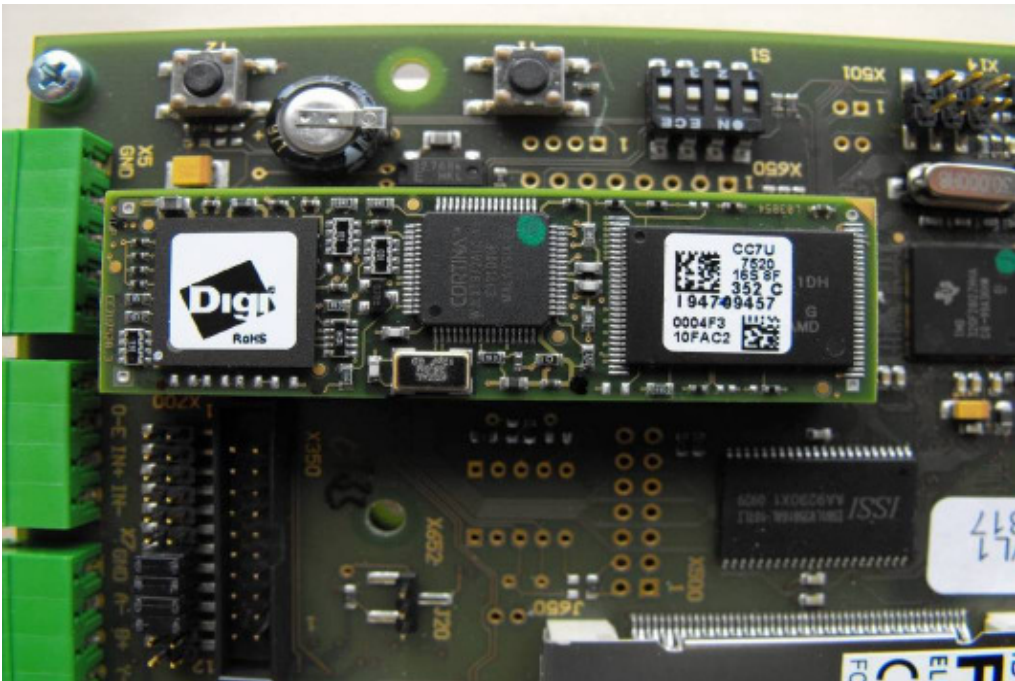


Photo 28: ID ISC.LRM 2000

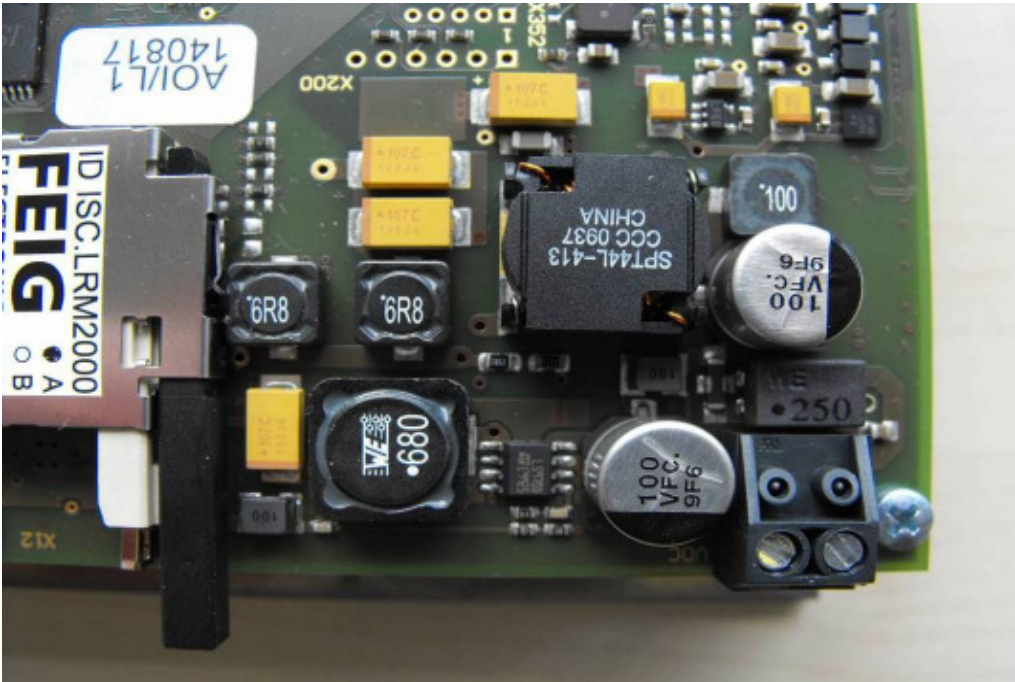


Photo 29: ID ISC.LRM 2000

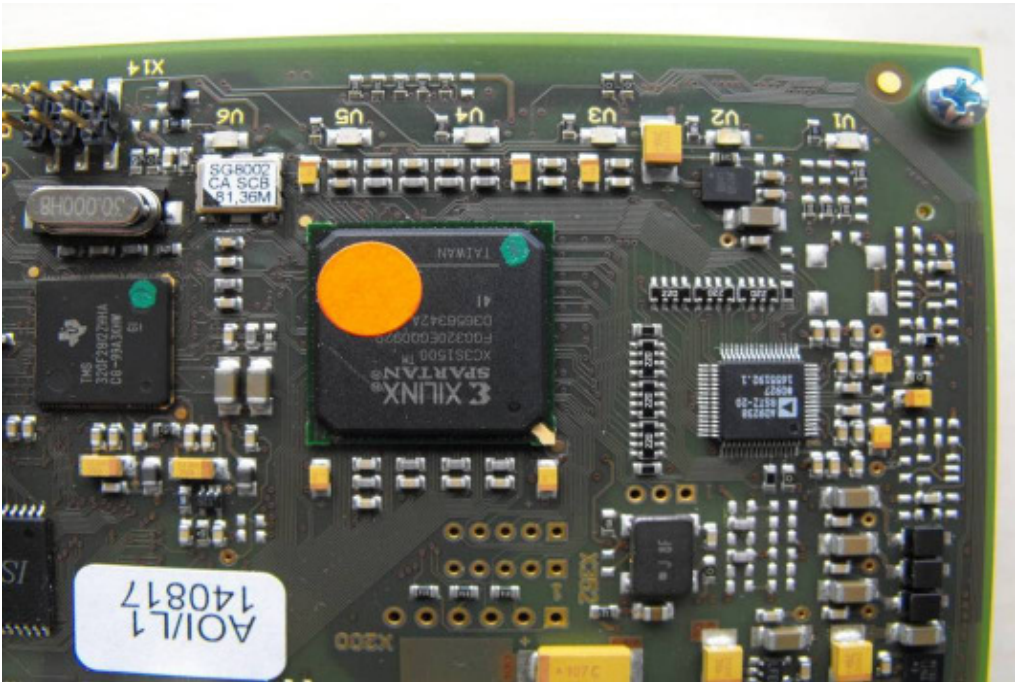


Photo 30: ID ISC.LRM 2000



Photo 31: ID ISC.LRM 2000



Photo 32: ID ISC.LRM 2000

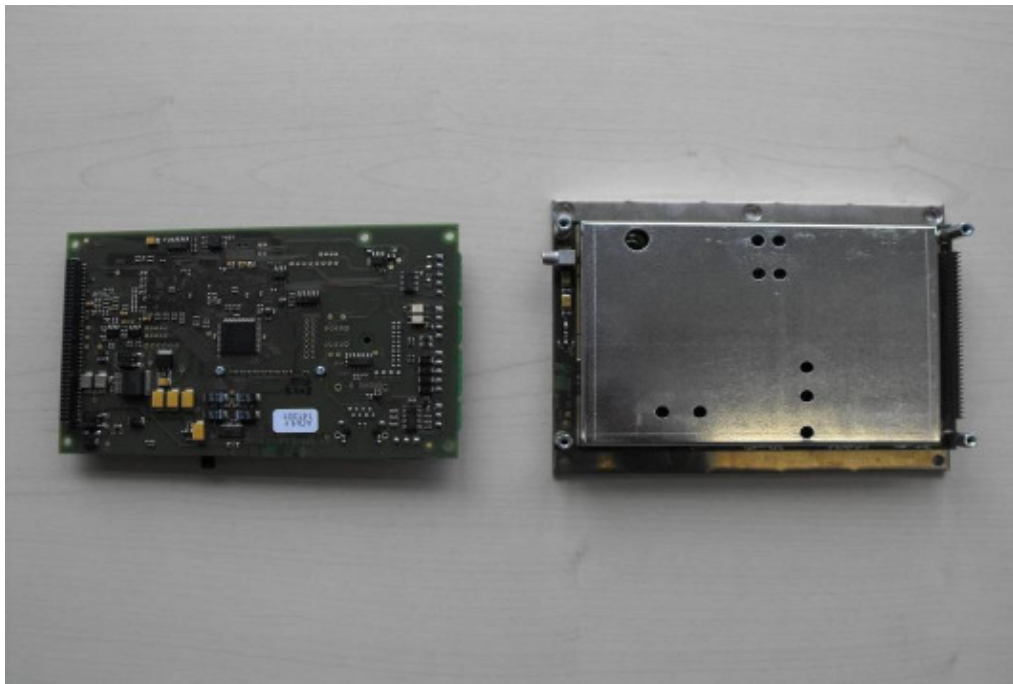


Photo 33: ID ISC.LRM 2000

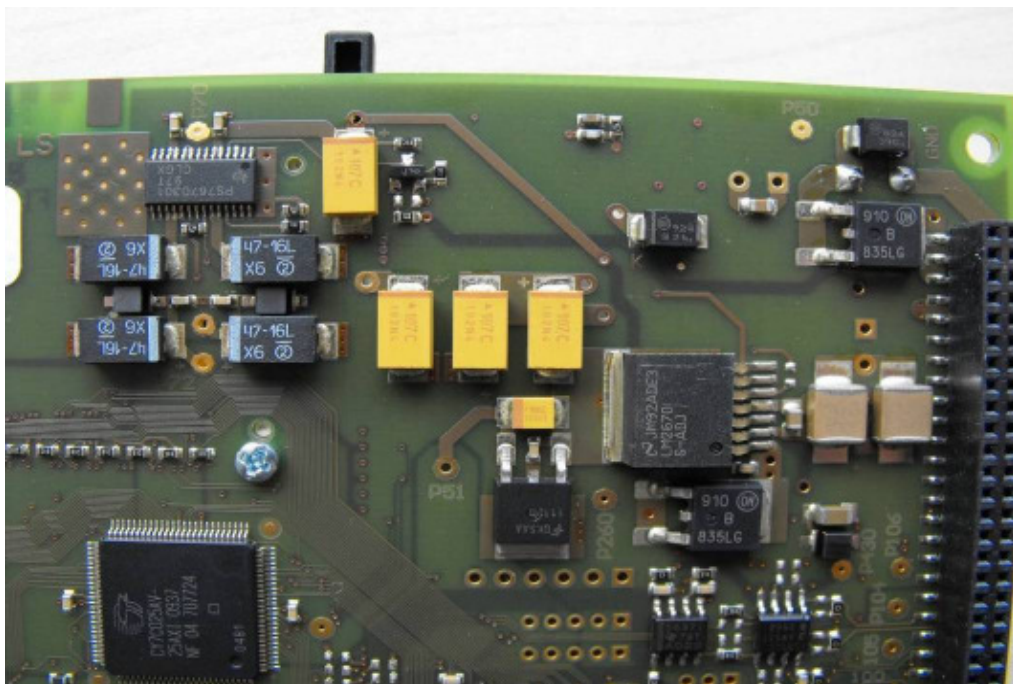


Photo 34: ID ISC.LRM 2000

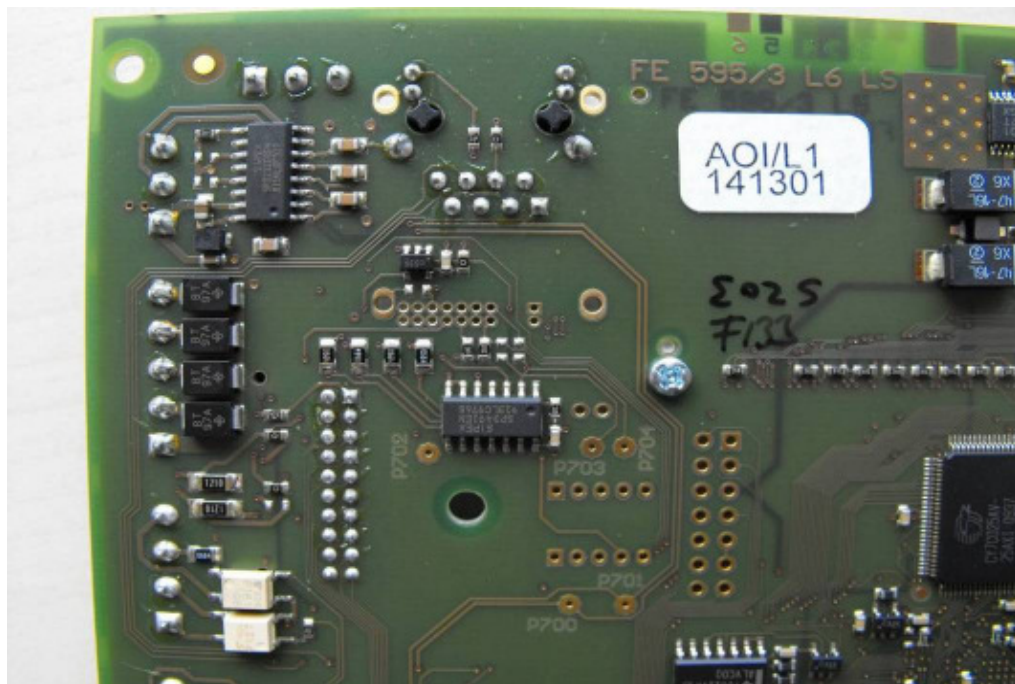


Photo 35: ID ISC.LRM 2000

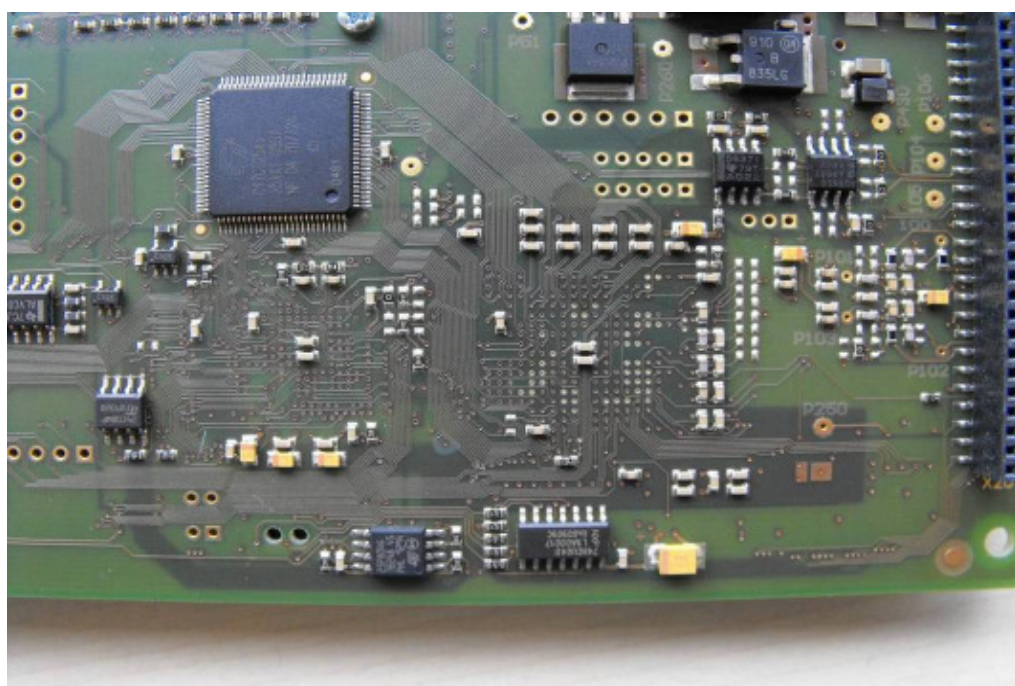


Photo 36: ID ISC.LRM 2000

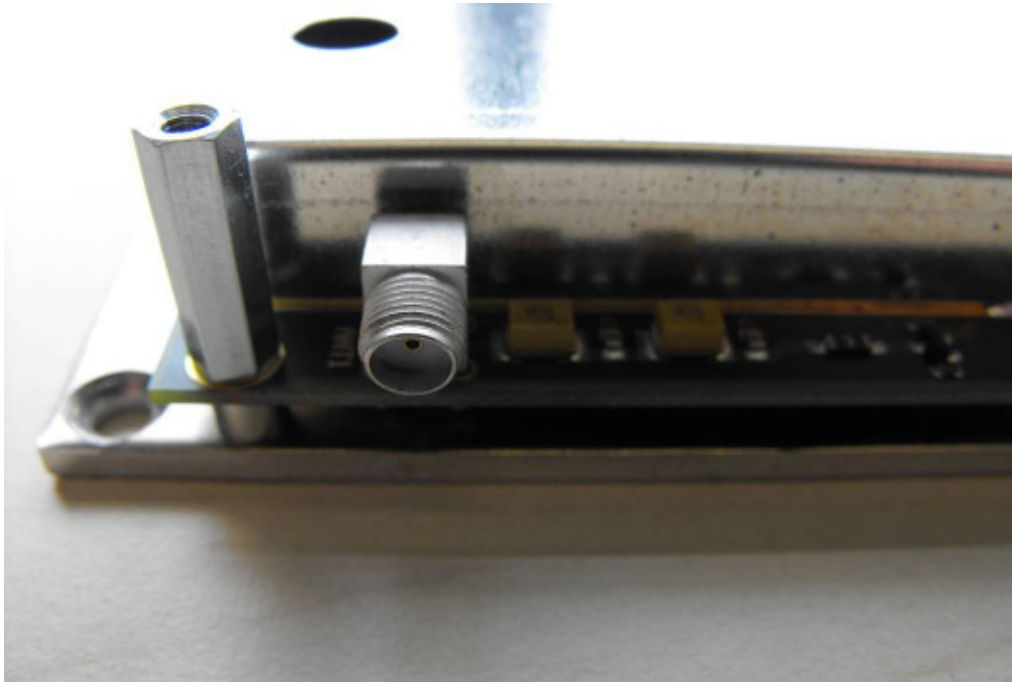


Photo 37: ID ISC.LRM 2000

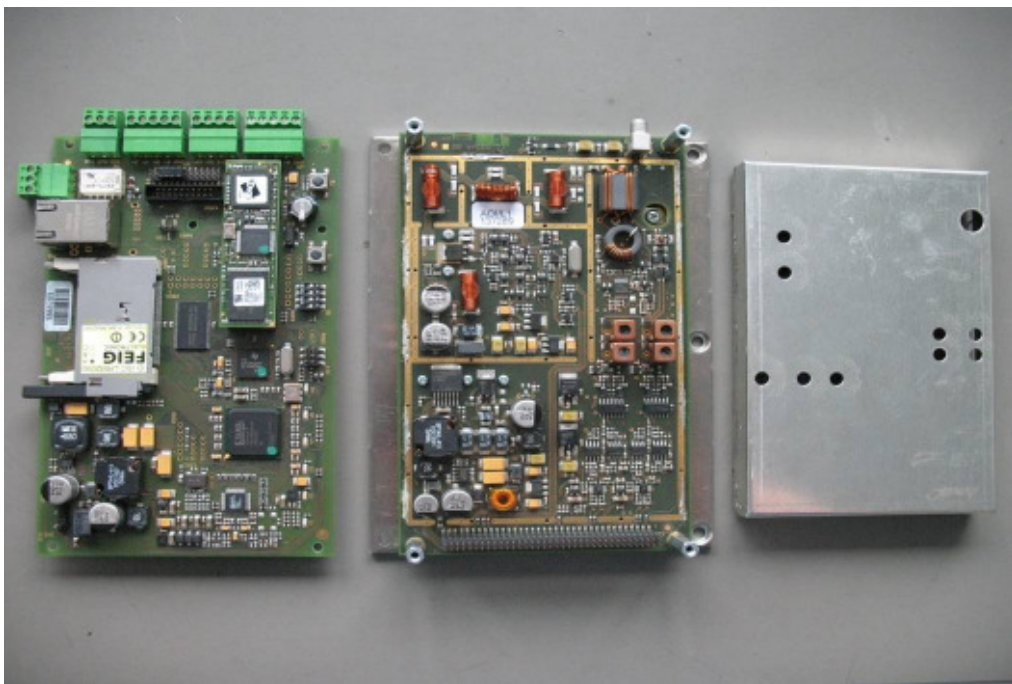


Photo 38: ID ISC.LRM 2000

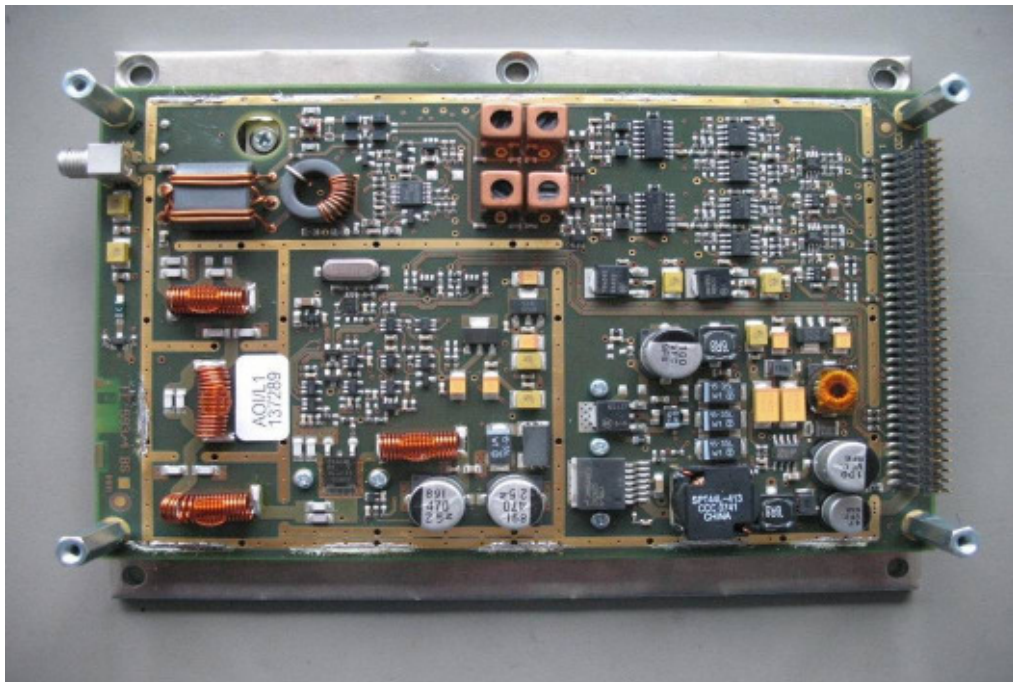


Photo 39: ID ISC.LRM 2000

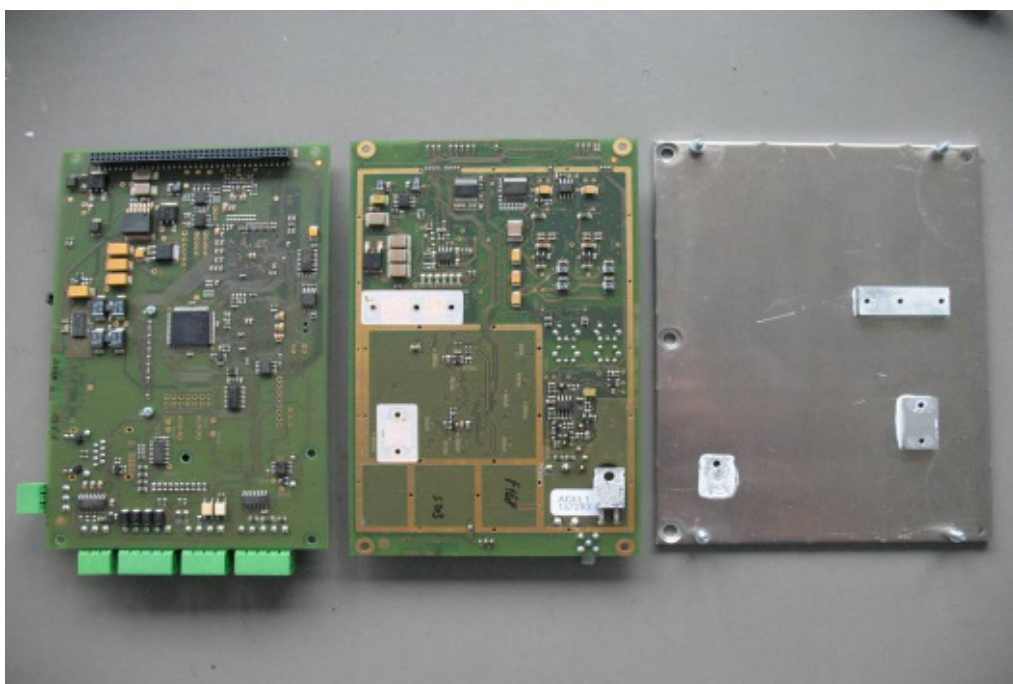


Photo 40: ID ISC.LRM 2000

