
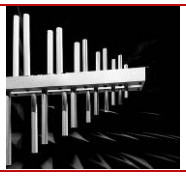
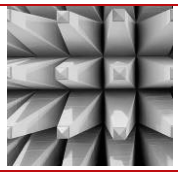

CETECOM™
CETECOM ICT Services
consulting - testing - certification

PARTIAL TEST REPORT

Test report no.: 1-6782/13-01-04-A

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-01

Testing laboratory

CETECOM ICT Services GmbH
Untertuerkheimer Strasse 6 – 10
66117 Saarbruecken / Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: http://www.cetecom.com
e-mail: ict@cetecom.com

Accredited Testing Laboratory:
The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)
The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-01
Area of Testing:
Radio Communications & Compatibility Testing (RCT)

Applicant

TÜV Rheinland Nederland
Eiberkamp 10
9351 VT Leek / NETHERLANDS
Phone: +31 (0)594 505005
Fax: +31 (0)594 504804
Contact: Richard Van der Meer
e-mail: richard.vandermeer@nl.tuv.com
Phone: +31 (0)594 505005

Manufacturer

TÜV Rheinland Nederland
Eiberkamp 10
9351 VT Leek / NETHERLANDS

Test standard/s

47 CFR Part 15	Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices
RSS - 210 Issue 8	Spectrum Management and Telecommunications Radio Standards Specification; Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

For further applied test standards please refer to section 3 of this test report.

Test Item

Kind of test item:	**RT2 Radar**
Model name:	**24 GHz Speed measurement**
FCC ID:	**-/-**
IC:	**-/-**
Frequency:	**24.000 GHz – 24.250 GHz**
Antenna:	Planar patch array
Power supply:	12 V DC
Temperature range:	-25 °C to +60 °C

This test report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

Test report authorised:

DN: cn=Karsten Geraldy, o=Cetecom ICT Services GmbH, ou=GER-101125, email=karsten.geraldy@cetecom.com, c=DE
Datum: 2013.10.10 11:57:43 +02'00'

Karsten Geraldy
Senior Testing Manager

Test performed:

DN: cn=Meheza Walla, o=CETECOM ICT Services GmbH, ou=WAL-100930, email=Meheza.Walla@cetecom.com, c=DE
Datum: 2013.10.09 17:44:41 +02'00'

Meheza Walla
Expert

1 Table of contents

2 General information

2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.
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In no case this test report can be considered as a Letter of Approval.

This test report is electronically signed and valid without handwritten signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

2.2 Application details

Date of receipt of order:	2013-08-09
Date of receipt of test item:	2013-08-26
Start of test:	2013-09-02
End of test:	2013-09-11
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 15	01.10.2012	Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices
RSS - 210 Issue 8	01.12.2010	Spectrum Management and Telecommunications Radio Standards Specification; Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

4 Test environment

Temperature:	T_{nom}	+22 °C during room temperature tests
Relative humidity content:		45 %
Barometric pressure:		not relevant for this kind of testing
Power supply:	V_{nom}	12 V DC

5 Test item

Kind of test item	**:**	**RT2 Radar**
Type identification	**:**	**24 GHz Speed measurement**
S/N serial number	**:**	**201207000011**
HW hardware status	**:**	**None**
SW software status	**:**	**None**
Frequency band	**:**	**24.000 GHz – 24.250 GHz**
Type of modulation	**:**	**FMCW**
Number of channels	**:**	**4**
Antenna	**:**	**Planar Patch Array**
Power supply	**:**	**12 V DC from Power Supply**
Temperature range	**:**	**-25°C to +60 °C**

6 Test laboratories sub-contracted

None

7 Summary of measurement results

☒	**No deviations from the technical specifications were ascertained**
☐	There were deviations from the technical specifications ascertained

TC Identifier	Description	Verdict	Date	Remark
RF-Testing	Partial Test (47 CFR Part 15, RSS 210, Issue 8, Annex 8)	Passed	2013-10-09	-/-

Test specification clause	Test case	Temperature conditions	Power source voltages	Pass	Fail	NA	NP	Results (max.)
§15.245(b) RSS 210 / A7.1	Field strength of emissions (wanted signal)	Nominal	Nominal	☐	☐	☐	☒	
§2.1049	Occupied bandwidth (99% bandwidth)	Nominal	Nominal	☐	☐	☐	☒	
§15.209(a) / §15.245(b)(1)(2)(3) RSS 210 / A7.1-4	Field strength of emissions (spurious)	Nominal	Nominal	☒	☐	☐	☐	Complies (40 – 100 GHz)
§15.207(a) ICES-003	Conducted emissions < 30 MHz	Nominal	Nominal	☐	☐	☐	☒	

Note: NA = Not Applicable; NP = Not Performed

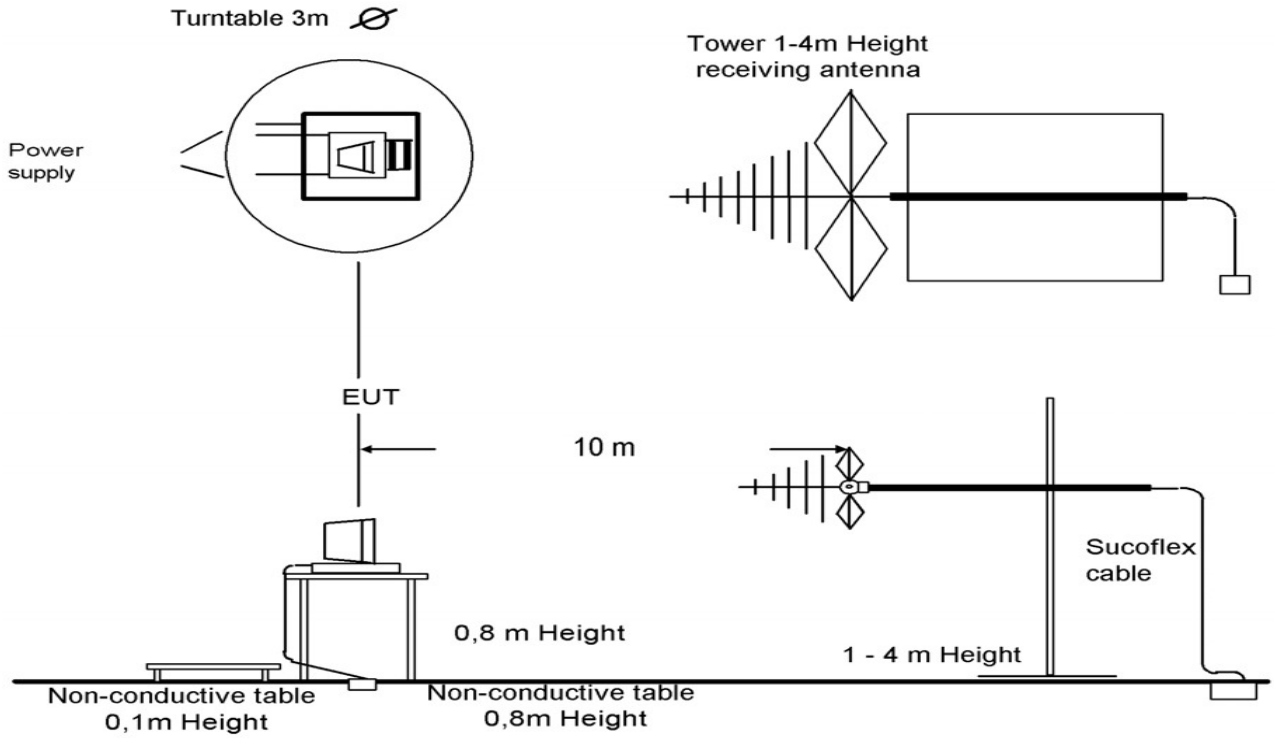
8 RF measurement testing

8.1 Description of test setup

8.1.1 Radiated measurements

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 25 GHz in semi-anechoic chambers. 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 confirmed with specifications ANSI C63.2-1996 clause 15 and ANSI C63.4-2009 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 setups 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 analyzers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63-4-2009 clause 4.2.
Antennas are confirmed with ANSI C63.2-1996 item 15.

Semi anechoic chamber

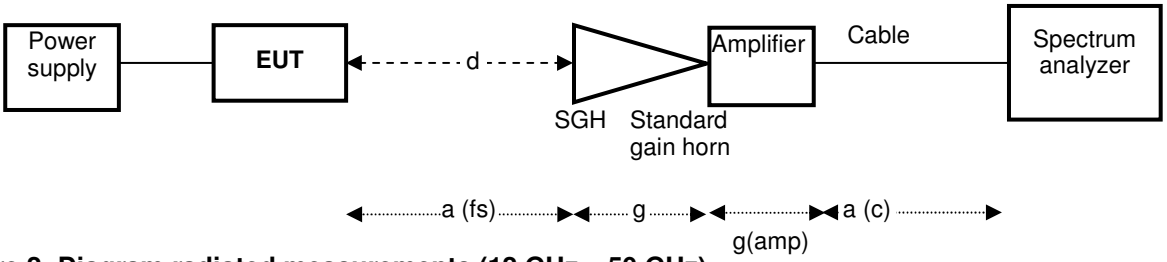


Picture 1: Diagram radiated measurements

9 kHz - 30 MHz:	active loop antenna
30 MHz – 1 GHz:	tri-log antenna
> 1 GHz:	horn antenna

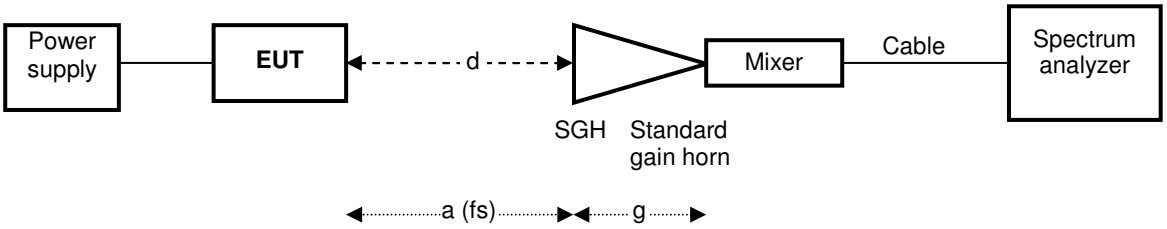
The EUT is powered by an external power supply with nominal voltage

Test set-up for the measurement of spurious radiation in the frequency range 12 GHz to 50 GHz:



Picture 2: Diagram radiated measurements (12 GHz – 50 GHz)

Test set-up for the measurement of spurious radiation and EIRP in the frequency range 50 GHz to 66 GHz:



Picture 3: Diagram radiated measurements (50 GHz – 100 GHz)

8.1.2 Conducted measurements

Not performed!

8.1.3 Additional comments

Reference documents: None

Special test descriptions: Refer to TI-43-03 RT2 and RT3 test instruction for TUV.pdf

Configuration descriptions: Refer to TI-43-03 RT2 and RT3 test instruction for TUV.pdf

Test mode: ☐ Normal operation, no special test mode available.

☒ Special software is used.

9 Measurement results

9.1 Field strength of emissions (wanted signal)

Not performed!

9.2 Occupied bandwidth (99% bandwidth)

Not performed!

9.3 Field strength of emissions (radiated spurious)

Description:

Measurement of the radiated spurious emissions in transmit mode.

Measurement:

Measurement parameter	
Detector:	Peak / Quasi Peak
Sweep time:	Auto
Video bandwidth:	Auto
Resolution bandwidth:	F < 1 GHz: 100 kHz F > 1 GHz: 1 MHz
Frequency range:	30 MHz to 110 GHz
Trace-Mode:	Max Hold

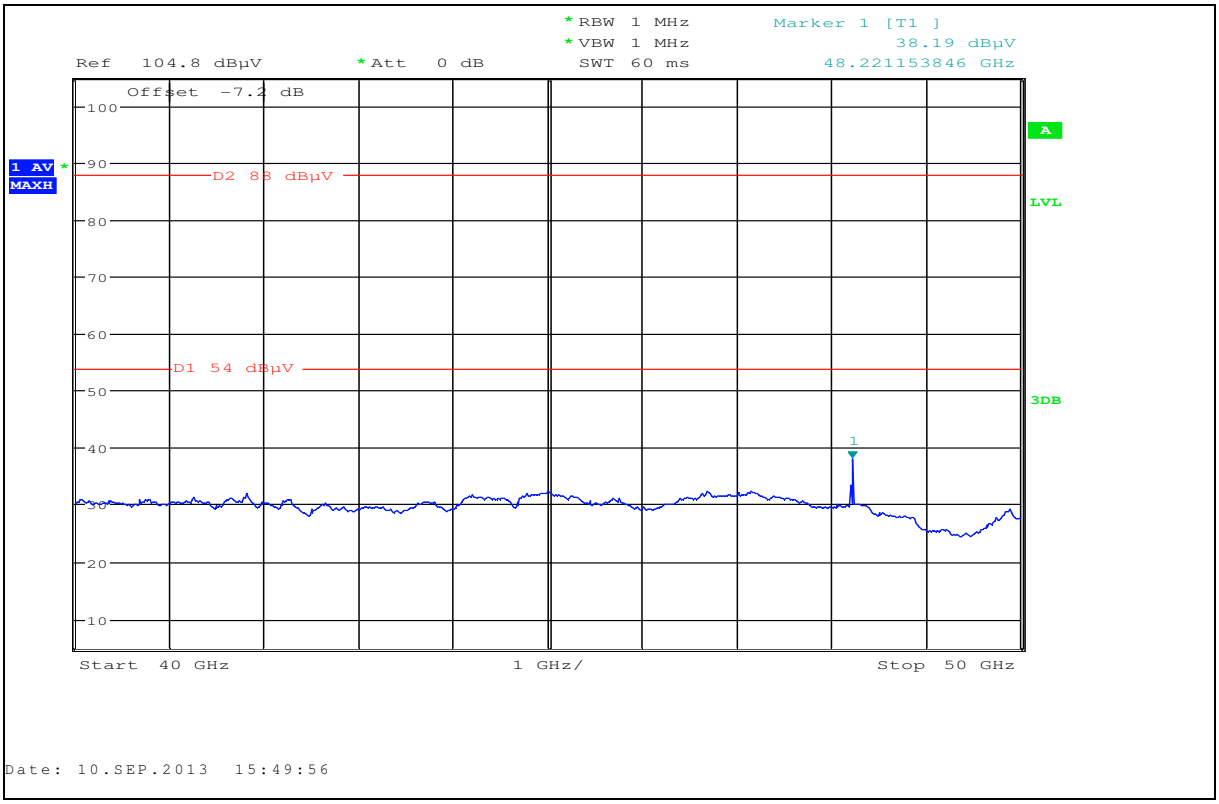
Limits:

FCC		IC
CFR Part 15.209(a)		RSS - GEN
Radiated Spurious Emissions		
Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.		
Frequency (MHz)	Field Strength (dBµV/m)	Measurement distance
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 88	30.0	10
88 – 216	33.5	10
216 – 960	36.0	10
Above 960	54.0	3

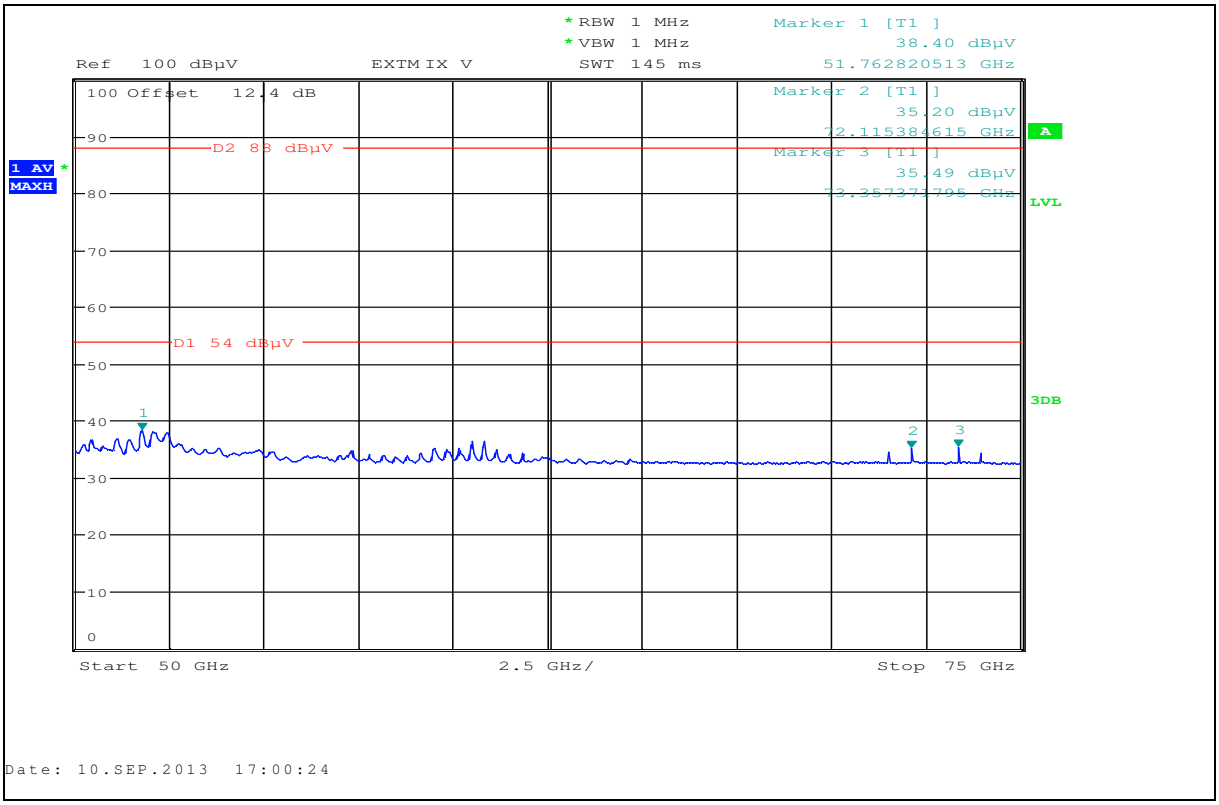
Note: Harmonics shall not exceed 25.0 millivolts/meter (88.0 dBµV/m)

Result: The measurement is passed.

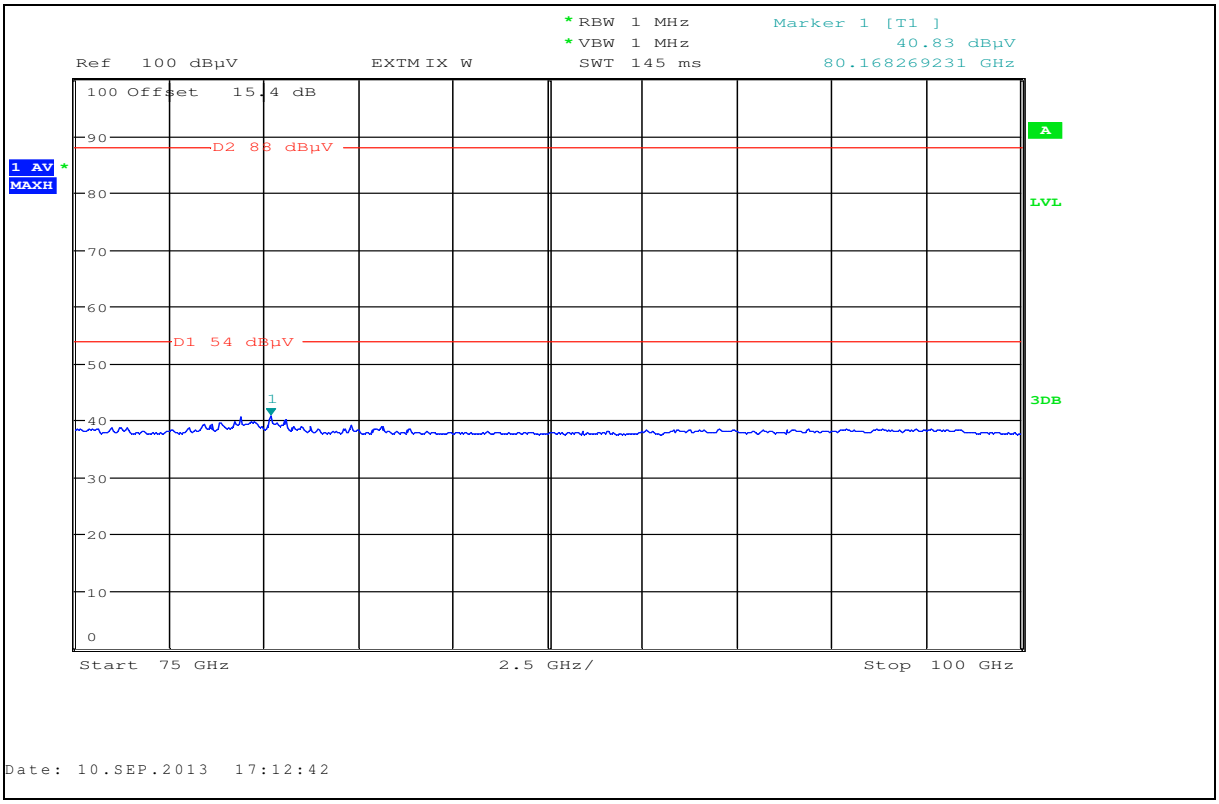
Plot 1: 40 GHz to 50 GHz, vertical / horizontal polarization



Plot 2: 50 GHz to 75 GHz, vertical / horizontal polarization



Plot 3: 75 GHz to 100 GHz, vertical / horizontal polarization



9.4 Conducted spurious emissions < 30 MHz

Not performed!

10 Test equipment and ancillaries used for tests

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).

In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Labor/Item).

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	A023	Std. Gain Horn Antenna 39.3-59.7 GHz	2424-20	Flann	75	300001979	ne		
2	A025	Std. Gain Horn Antenna 49.9-75.8 GHz	2524-20	Flann	*	300001983	ne		
3	5	DC Power Supply, 60V, 10A	6038A	HP Meßtechnik	2848A07027	300001174	Ve	05.01.2012	05.01.2015
4	n. a.	Spectrum Analyzer 20 Hz - 50 GHz	FSU50	R&S	200012	300003443	Ve	09.10.2012	09.10.2014
5	n. a.	Broadband Low Noise Amplifier 18-50 GHz	CBL18503070-XX	CERNEX	19338	300004273	ne		
6		Harmonic mixer 50 - 75 GHz	FS-Z75	R&S	100099	300003949			
7		Harmonic Mixer 2-Port, 75-110 GHz	SAM-110-7	Radiometer Physics GmbH	2	300004155			

Agenda: Kind of Calibration

k	calibration / calibrated		EK	limited calibration
ne	not required (k, ev, izw, zw not required)		zw	cyclical maintenance (external cyclical maintenance)
ev	periodic self verification		izw	internal cyclical maintenance
Ve	long-term stability recognized		g	blocked for accredited testing
vlkl!	Attention: extended calibration interval			
NK!	Attention: not calibrated		*)	next calibration ordered / currently in progress

11 Observations

No observations exceeding those reported with the single test cases have been made.

Annex A Photographs of the test setup

Photo 1:

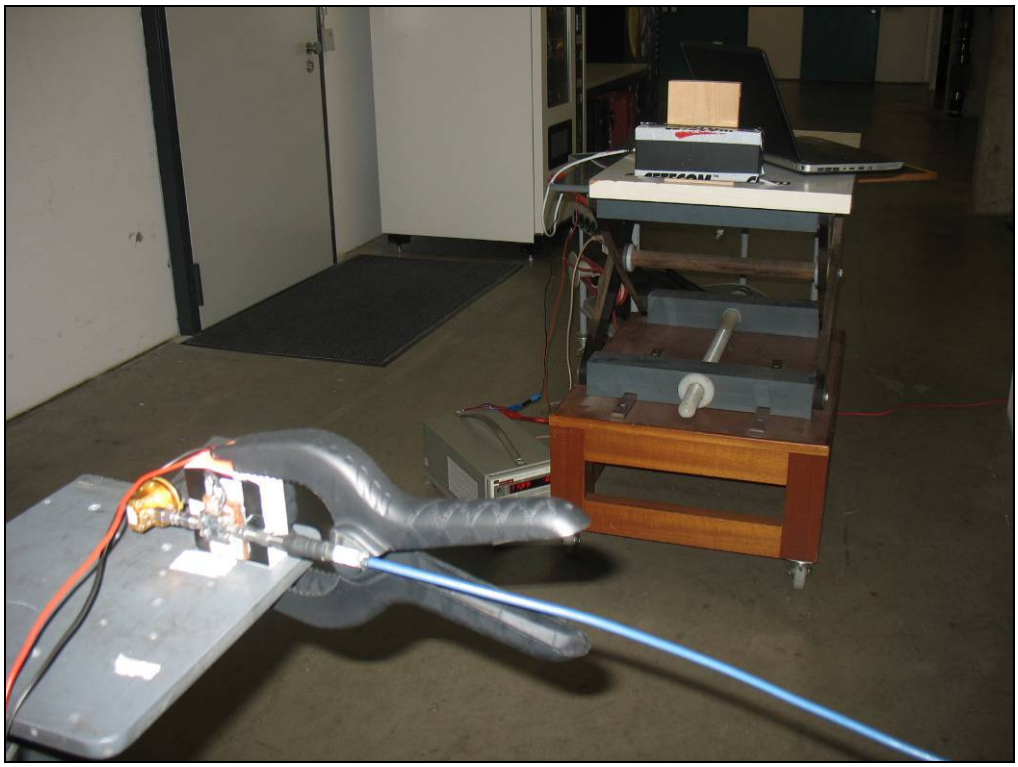


Photo 2:

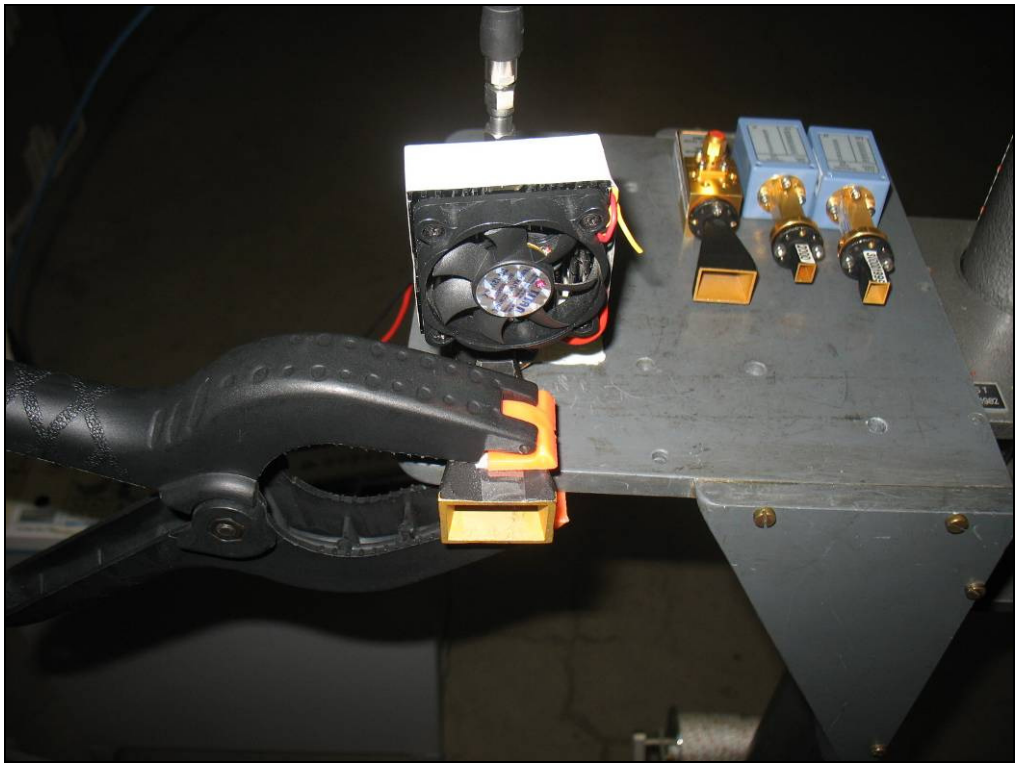


Photo 3: Std. Gain Horn Antenna 40 - 50 GHz

Photo 4: Harmonic mixer 50 - 75 GHz and 75 - 110 GHz

Photo 5: Amplifier

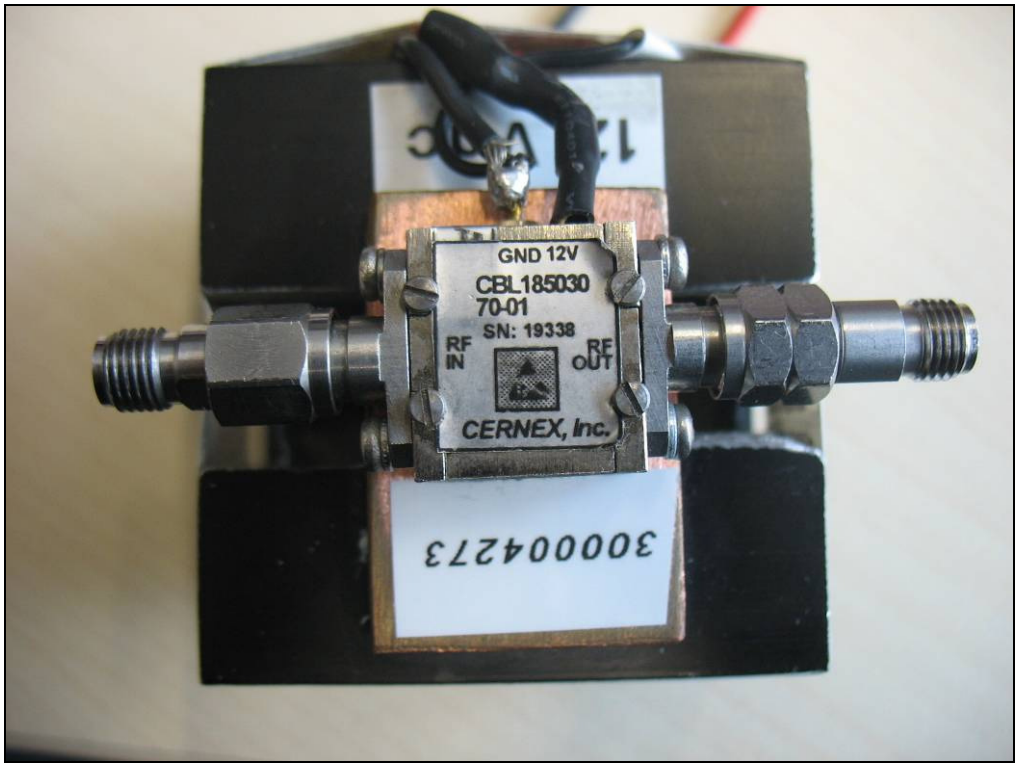
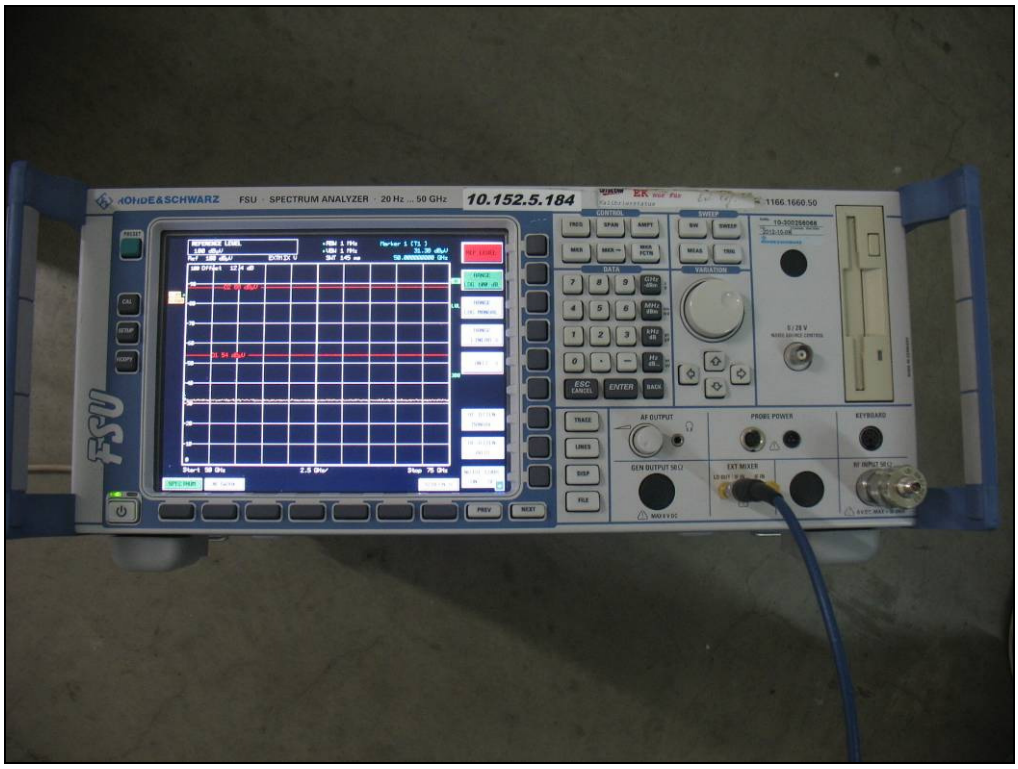


Photo 6: FSU



Annex B Photographs of the EUT

Photo 7:

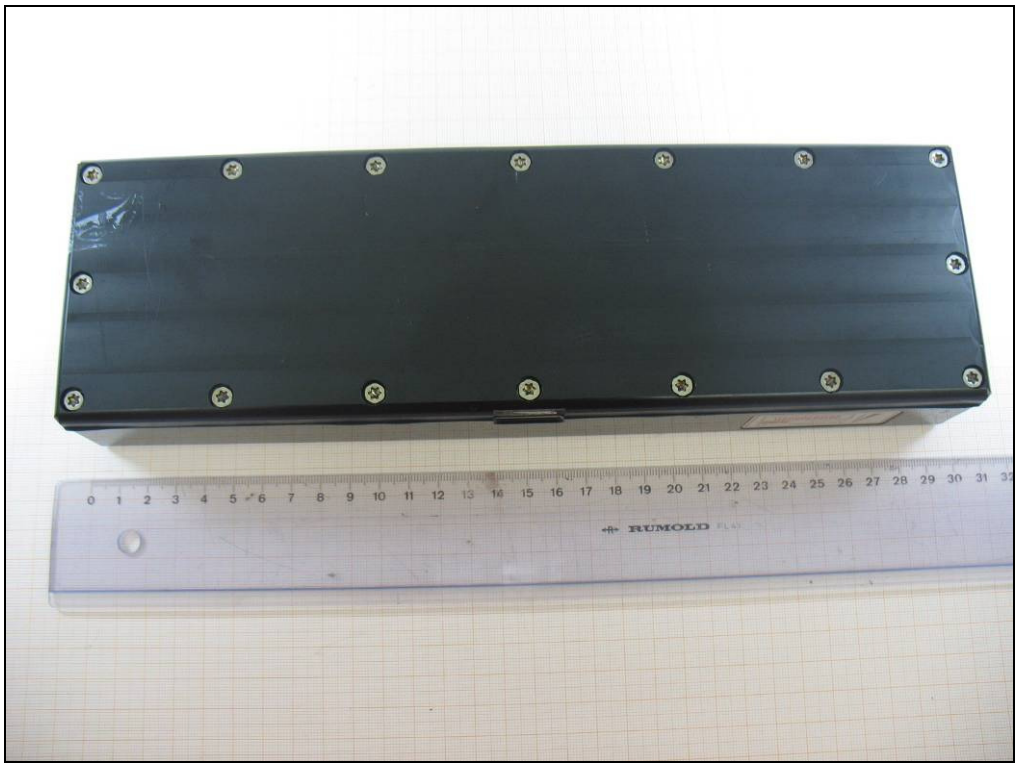


Photo 8:

Photo 9:

Photo 10:

Annex C Document history

Version	Applied changes	Date of release
1.0	Initial release	2013-09-26
-A	Test setup photos updated	2013-10-09

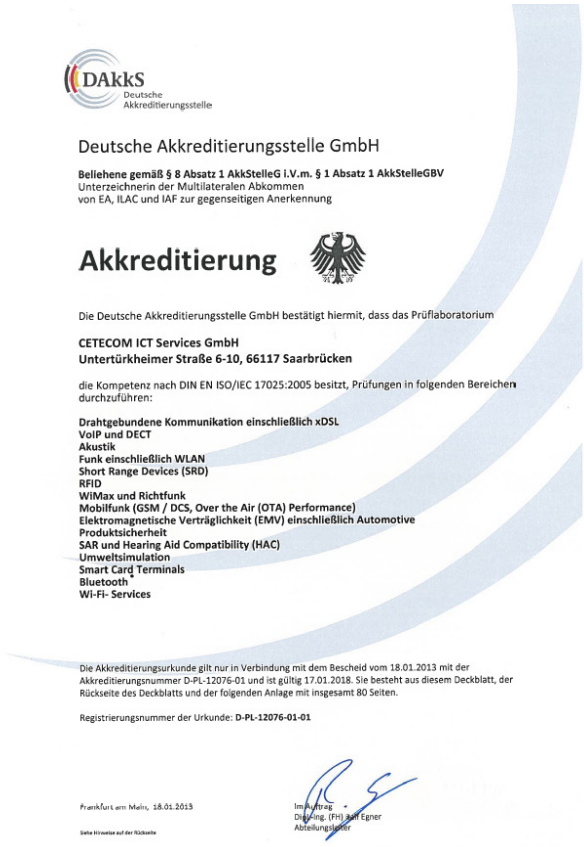
Annex D Further information

Glossary

AVG - Average
DUT - Device under test
EMC - Electromagnetic Compatibility
EN - European Standard
EUT - Equipment under test
ETSI - European Telecommunications Standard Institute
FCC - Federal Communication Commission
FCC ID - Company Identifier at FCC
HW - Hardware
IC - Industry Canada
Inv. No. - Inventory number
N/A - Not applicable
PP - Positive peak
QP - Quasi peak
S/N - Serial number
SW - Software

Annex E Accreditation Certificate

Front side of certificate



DAkkS
Deutsche Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH

Beliehene gemäß § 8 Absatz 1 AkkStelleG i.V.m. § 1 Absatz 1 AkkStelleGBV
Unterzeichnerin der Multilateralen Abkommen
von EA, ILAC und IAF zur gegenseitigen Anerkennung

Akkreditierung

Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium

CETECOM ICT Services GmbH
Untertürkheimer Straße 6-10, 66117 Saarbrücken

die Kompetenz nach DIN EN ISO/IEC 17025:2005 besitzt, Prüfungen in folgenden Bereichen durchzuführen:

Drahtgebundene Kommunikation einschließlich xDSL
VoIP und DECT
Akustik
Funk einschließlich WLAN
Short Range Devices (SRD)
RFID
WiMax und Richtfunk
Mobilfunk (GSM / DCS, Over the Air (OTA) Performance)
Elektromagnetische Verträglichkeit (EMV) einschließlich Automotive
Produktsicherheit
SAR und Hearing Aid Compatibility (HAC)
Umweltsimulation
Smart Card Terminals
Bluetooth
Wi-Fi- Services

Die Akkreditierungsurkunde gilt nur in Verbindung mit dem Bescheid vom 18.01.2013 mit der Akkreditierungsnummer D-PL-12076-01 und ist gültig 17.01.2018. Sie besteht aus diesem Deckblatt, der Rückseite des Deckblatts und der folgenden Anlage mit insgesamt 80 Seiten.

Registrierungsnummer der Urkunde: **D-PL-12076-01-01**

Frankfurt am Main, 18.01.2013

Im Auftrag
Dipl.-Ing. (FH) Karl Egner
Abteilungsleiter

Siehe Hinweise auf der Rückseite

Back side of certificate

Deutsche Akkreditierungsstelle GmbH

Standort Berlin
Spittelmarkt 10
10117 Berlin

Standort Frankfurt am Main
Gartenstraße 6
60594 Frankfurt am Main

Standort Braunschweig
Bundesallee 100
38116 Braunschweig

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Die DAkkS ist Unterzeichnerin der Multilateralen Abkommen zur gegenseitigen Anerkennung der European co-operation for Accreditation (EA), des International Accreditation Forum (IAF) und der International Laboratory Accreditation Cooperation (ILAC). Die Unterzeichner dieser Abkommen erkennen ihre Akkreditierungen gegenseitig an.

Der aktuelle Stand der Mitgliedschaft kann folgenden Webseiten entnommen werden:
EA: www.european-accreditation.org
ILAC: www.ilac.org
IAF: www.iaf.nu

Note:

The current certificate including annex is published on our website (see link below) or may be received from CETECOM ICT Services on request.

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