



CETECOM ICT Services

consulting - testing - certification >>>

TEST REPORT

Test report no.: 1-9651/15-01-02



Testing laboratory

CETECOM ICT Services GmbH

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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-12076-01-00

Applicant

FEIG ELECTRONIC GmbH

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35781 Weilburg-Waldhausen / GERMANY

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Manufacturer

FEIG ELECTRONIC GmbH

Lange Str. 4

35781 Weilburg-Waldhausen / GERMANY

Test standard/s

Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency 47 CFR Part 15

devices

Spectrum Management and Telecommunications Radio Standards Specification -RSS - 210 Issue 8

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: **RF Reader Module**

Model name: ID CPR44 FCC ID: PJMCPR44 IC: 6633A-CPR44 Frequency: 13.56 MHz Technology tested: **RFID**

Antenna: Integrated antenna Power supply: 5 V DC by power supply

-25°C to +70°C Temperature range:



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:							

Marco Bertolino Lab Manager Radio Communications & EMC

rest performed	
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Christoph Schneider **Testing Manager** Radio Communications & EMC



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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: 2015-03-31

Date of receipt of test item: 2015-04-01

Start of test: 2015-05-11

End of test: 2015-05-13

Person(s) present during the test: -/-

3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 15	-/-	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
RSS - Gen Issue 4	01.11.2014	Spectrum Management and Telecommunications Radio Standards Specifications - General Requirements and Information for the Certification of Radio Apparatus



4 Test environment

Temperature:

T_{nom} +22 °C during room temperature tests T_{max} +70 °C during high temperature tests

T_{min} -25 °C during low temperature tests

Relative humidity content: 43 %

Barometric pressure: not relevant for this kind of testing

V_{nom} 5 V DC by power supply

Power supply: V_{max} 5.25 V

 V_{min} 4.75 V

5 Test item

Kind of test item	:	RF Reader Module
PMN	:	ID CPR44
HVIN	:	ID CPR44
FVIN	:	-/-
HMN		-/-
S/N serial number	:	5299382
Hardware version	:	FE 670
Software version	:	03.95.00
Frequency band	:	13.56 MHz
Type of radio transmission	:	modulated carrier
Use of frequency spectrum	:	modulated carrier
Type of modulation	:	A1D
Number of channels	:	1
Antenna	:	Integrated antenna
Power supply	:	5 V DC by power supply
Temperature range	:	-25°C to +70°C

5.1 Additional information

The content of the following annexes is defined in the QA. It may be that not all of the listed annexes are necessary for this report, thus some values in between may be missing.

Test setup- and EUT-photos are included in test report: 1-9651/15-01-01_AnnexB

1-9651/15-01-01_AnnexD

6 Test laboratories sub-contracted

None



7 Description of the test setup

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 analysers 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 (Lab/Item).

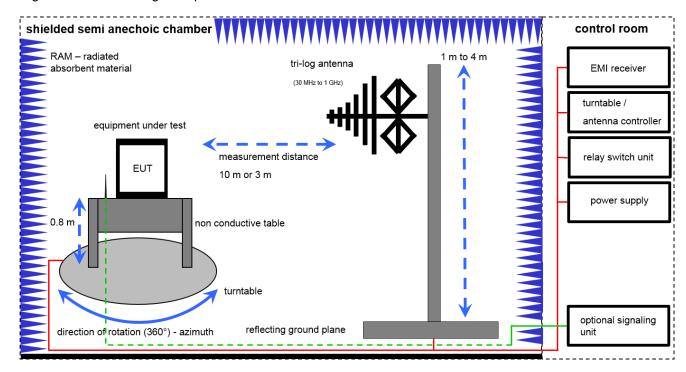
Agenda: Kind of Calibration

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



7.1 Shielded semi anechoic chamber

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 1 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. 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 analysers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63.

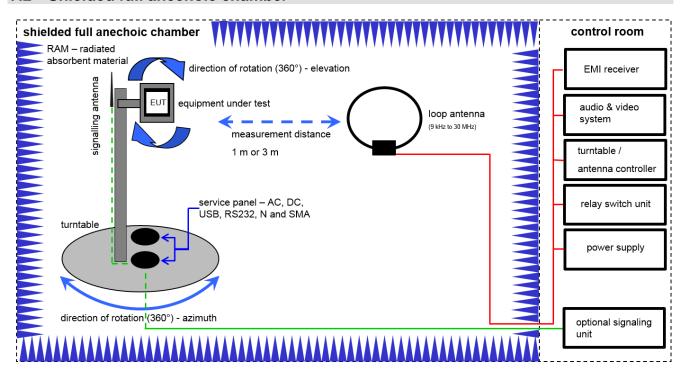


Equipment table:

No.	Lab / Item	Equipment	Туре	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
2	45	Switch-Unit	3488A	HP	2719A14505	300000368	g		
3	50	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP	2920A04466	300000580	ne		
4	50	EMI Test Receiver	ESCI 3	R&S	100083	300003312	k	26.01.2015	26.01.2016
5	50	Analyzer-Reference- System (Harmonics and Flicker)	ARS 16/1	SPS	A3509 07/0 0205	300003314	Ve	11.02.2014	11.02.2016
6	50	Antenna Tower	Model 2175	ETS-Lindgren	64762	300003745	izw		
7	50	Positioning Controller	Model 2090	ETS-Lindgren	64672	300003746	izw		
8	50	Turntable Interface- Box	Model 105637	ETS-Lindgren	44583	300003747	izw		
9	50	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787	k	22.04.2014	22.04.2016
10	50	Spectrum-Analyzer	FSU26	R&S	200809	300003874	k	26.01.2015	26.01.2016
11	50	Breitband Doppelsteg- Hornantenne	BBHA9120 B	Schwarzbeck	188	300003896	k	10.06.2013	10.06.2015



7.2 Shielded full anechoic chamber

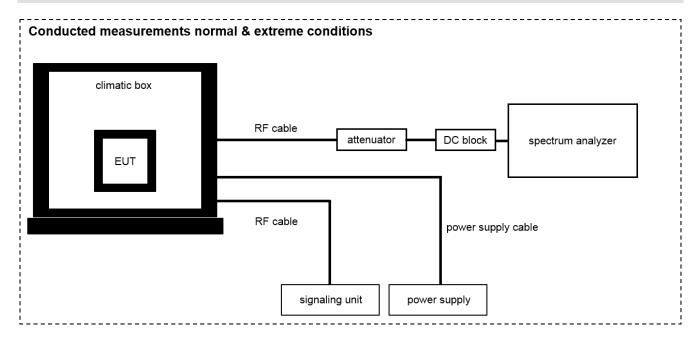


Equipment table:

No.	Lab / Item	Equipment	Туре	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
2	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP	2818A03450	300001040	Ve	20.01.2015	20.01.2018
3	90	Active Loop Antenna 10 kHz to 30 MHz	6502	Kontron Psychotech	8905-2342	300000256	k	13.06.2013	13.06.2015
4	90	MXE EMI Receiver 20 Hz to 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	06.03.2015	06.03.2016
5	90	4U RF Switch Platform	L4491A	Agilent Technologies	MY50000037	300004509	ne		



7.3 Conducted measurements normal and extreme conditions



Equipment table:

No.	Lab / Item	Equipment	Туре	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	n. a.	EMI Test Receiver 9 kHz - 3 GHz incl. Preselector	ESPI3	R&S	101713	300004059	k	23.01.2015	23.01.2016
2	n. a.	DC Power Supply 0 - 32V	1108-32	Heiden Elektronik	001802	300001383	Ve	29.01.2014	29.01.2017
3	n. a.	Temperature Test Chamber	T-40/50	CTS GmbH	064023	300003540	Ve	26.09.2013	26.09.2015



8 Summary of measurement results

\boxtimes	No deviations from the technical specifications were ascertained
	There were deviations from the technical specifications ascertained
	This test report is only a partial test report. The content and verdict of the performed test cases are listed below.

TC Identifier	Description	Verdict	Date	Remark
RF-Testing	CFR Part 15 RSS 210 Issue 8 RSS Gen Issue 4	See table!	2015-06-17	-/-

Test specification clause	Test case	Temperature conditions	Power source conditions	Pass	Fail	NA	NP	Remark
RSS Gen Issue 4	Occupied bandwidth	Nominal	Nominal					No pass / fail criteria
§ 15.225 (a)	Field strength of the fundamental	Nominal	Nominal	\boxtimes				complies
§ 15.209 & § 15.225 (b-d)	Field strength of the harmonics and spurious	Nominal	Nominal	\boxtimes				complies
§ 15.109	Receiver spurious emissions and cabinet radiations	Nominal	Nominal			\boxtimes		complies
§15.107 §15.207	Conducted limits	Nominal	Nominal	\boxtimes				complies
§ 15.225 (a)	Frequency tolerance	Normal & extreme conditions	Normal & extreme conditions	\boxtimes				complies

Note: NA = Not Applicable; NP = Not Performed

9 Additional comments

Reference documents: None

Special test descriptions: None

Configuration descriptions: None



10 Measurement results

10.1 Occupied bandwidth

Measurement:

The emission bandwidth (x dB) is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated x dB below the maximum in-band spectral density of the modulated signal.

Measurement parameters		
Detector:	Peak	
Resolution bandwidth:	1 % – 5 % of the occupied bandwidth	
Video bandwidth:	≥ 3x RBW	
Trace mode:	Max hold	
Analyser function:	99 % power function	

Limit:

IC
for RSP-100 test report coversheet only

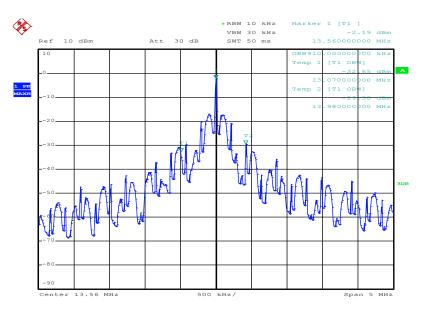
Result:

99% emission bandwidth		
910 kHz		
Measurement uncertainty	± RBW	



Plot:

Plot 1: 99 % emission bandwidth



Date: 11.MAY.2015 08:29:11



10.2 Field strength of the fundamental

Measurement:

The maximum detected field strength for the carrier signal.

Measurement parameters		
Detector:	Quasi peak / peak (worst case)	
Resolution bandwidth:	120 kHz	
Video bandwidth:	≥ 3x RBW	
Trace mode:	Max hold	

Limit:

	FCC & IC	
Frequency	Field strength	Measurement distance
(MHz)	(µV/m)	(m)
13.553 to 13.567	15,848 (84 dBµV/m)	30

Recalculation:

According to ANSI C63.10				
Frequency	Formula	Correction value		
13.56 MHz	$FS_{limit} = FS_{max} - 40 \log \left(rac{d_{\mathit{nearfield}}}{d_{\mathit{measure}}} ight) - 20 \log \left(rac{d_{\mathit{instit}}}{d_{\mathit{nearfield}}} ight)$	-21.76		

According to ANSI C63.10

Result:

Field strength of the fundamental			
Frequency	13.56	MHz	
Distance	@ 3 m @ 30 m		
Measured / calculated value	66.94 dBμV/m (peak) 45.18 dBμV/m (peak)		
Measurement uncertainty	±3 dB		



10.3 Field strength of the harmonics and spurious

Measurement:

The maximum detected field strength for the harmonics and spurious.

Measurement parameters		
Detector:	Quasi peak / average or	
Detector.	peak (worst case – pre-scan)	
	F < 150 kHz: 200 Hz	
Resolution bandwidth:	150 kHz < F < 30 MHz: 9 kHz	
	30 MHz < F < 1 GHz: 120 kHz	
	F < 150 kHz: 1 kHz	
Video bandwidth:	150 kHz < F < 30 MHz: 100 kHz	
	30 MHz < F < 1 GHz: 300 kHz	
Trace mode:	Max hold	

Limit:

	FCC & IC	
Frequency	Field strength	Measurement distance
(MHz)	(dBµV/m)	(m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 – 30	30 (29.5 dBμV/m)	30
30 – 88	100 (40 dBμV/m)	3
88 – 216	150 (43.5 dBµV/m)	3
216 – 960	200 (46 dBμV/m)	3

Note: For a reduced measurement distance, please take a look at the limit line and the ANSI C63.10-2013 sub clause 6.4 radiated emissions from unlicensed wireless devices below 30 MHz.

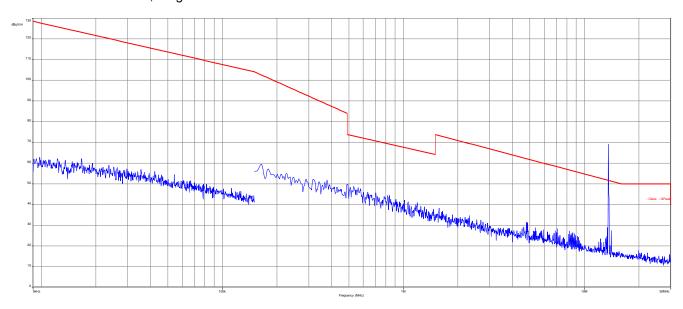
Result:

Detected emissions			
Frequency (MHz)	Detector	Resolution bandwidth (kHz)	Detected value
	See	plot 3	
Measurement uncertainty		±3	dB

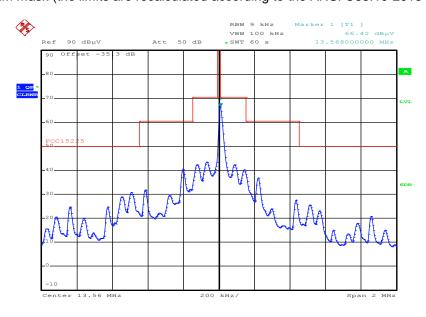


Plots:

Plot 1: 9 kHz - 30 MHz, magnetic emissions



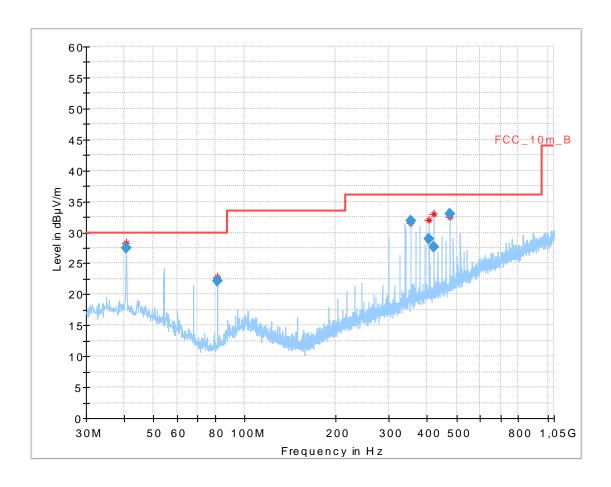
Plot 2: Spectrum mask (the limits are recalculated according to the ANSI C63.10-2013 sub clause 6.4)



Date: 18.MAY.2015 09:42:21



Plot 3: 30 MHz – 1 GHz, vertical and horizontal polarisation



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
40.689150	27.46	30.00	2.54	1000.0	120.000	100.0	٧	232	14.0
81.362250	22.19	30.00	7.81	1000.0	120.000	273.0	٧	282	8.4
352.564350	31.91	36.00	4.09	1000.0	120.000	349.0	٧	117	16.1
406.796700	28.97	36.00	7.03	1000.0	120.000	100.0	٧	3	17.0
420.347850	27.65	36.00	8.35	1000.0	120.000	100.0	٧	5	17.2
474.600000	32.95	36.00	3.05	1000.0	120.000	274.0	٧	53	18.2



10.4 Frequency error

Measurement:

The maximum detected field strength for the spurious.

Measurement parameters		
Detector:	Peak detector	
Resolution bandwidth:	10 Hz / 100 Hz	
Video bandwidth:	> RBW	
Trace mode:	Max hold	

Limit:

FCC

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. (±1.356 kHz)

Result: Temperature variation

Frequency tolerance			
Measured frequency (MHz)	Conditions	Result	
13.559812	-20 °C & 100% voltage	complies	
13.559846	-10 °C & 100% voltage	complies	
13.559857	0 °C & 100% voltage	complies	
13.559846	+10 °C & 100% voltage	complies	
13.559803	+20 °C & 100% voltage	complies	
13.559792	+30 °C & 100% voltage	complies	
13.559770	+40 °C & 100% voltage	complies	
13.559759	+50 °C & 100% voltage	complies	
Measurement uncertainty		± RBW	

Result: Voltage variation

Frequency tolerance			
Measured frequency (MHz)	Temperature	Result	
13.559802	+20 °C & 85% voltage	complies	
13.559803	+20 °C & 100% voltage	complies	
13.559803	+20 °C & 115% voltage	complies	
Measurement uncertainty		± RBW	



10.5 Conducted limits

Measurement:

Measurement of the conducted spurious emissions for an intentional radiator that is designed to be connected to the public utility (AC) power line.

Measurement parameters			
Detector:	Quasi peak / average or		
Detector.	peak (worst case – pre-scan)		
Resolution bandwidth:	F < 150 kHz: 200 Hz		
Resolution bandwidth.	F > 150 kHz: 9 kHz		
Video bandwidth:	F < 150 kHz: 1 kHz		
video baridwidin.	F > 150 kHz: 100 kHz		
Trace mode:	Max hold		

Limit:

FCC & IC			
Frequency	Quasi-peak	Average	
(MHz)	(dBµV/m)	(dBµV/m)	
0.15 – 0.5	66 to 56*	56 to 46*	
0.5 – 5	56	46	
5 – 30.0	60	50	

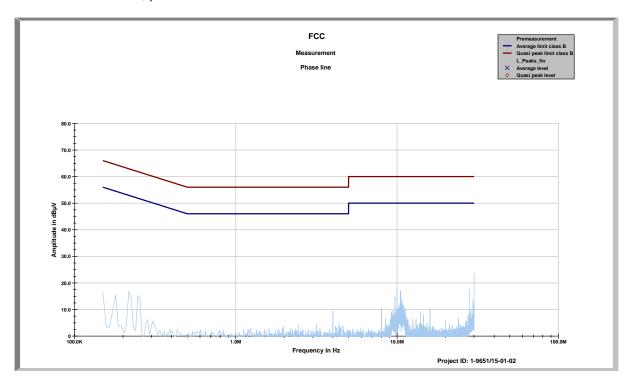
Result:

Detected emissions				
Frequency (MHz)	Detector	Resolution bandwidth (kHz)	Detected value	
All detected peak emissions are below the average limit.				

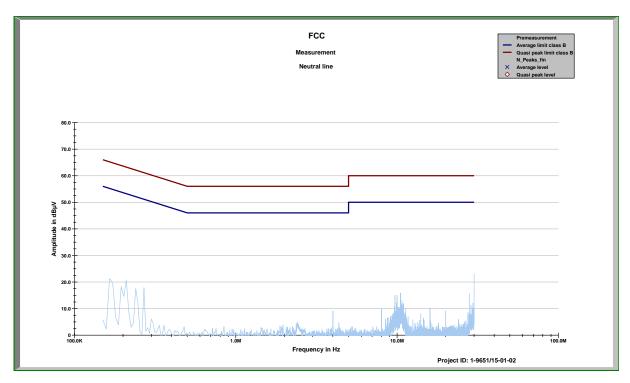


Plots:

Plot 1: 150 kHz to 30 MHz, phase line



Plot 2: 150 kHz to 30 MHz, neutral line





11	ıc)hse	2rv:	atic	ne

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



Annex A **Document history**

Version	Applied changes	Date of release
	Initial release	2015-06-17

Further information Annex B

Glossary

SW

AVG Average

DUT Device under test

Electromagnetic Compatibility EMC

European Standard ΕN Equipment under test EUT

European Telecommunications Standard Institute ETSI

Federal Communication Commission FCC

FCC ID -Company Identifier at FCC

Hardware HW IC **Industry Canada** Inv. No. -Inventory number N/A Not applicable PP Positive peak QΡ Quasi peak S/N Serial number

Software PMN Product marketing name Host marketing name HMN

Hardware version identification number HVIN **FVIN** Firmware version identification number



Accreditation Certificate Annex C

Front side of certificate

Back side of certificate

(DAkkS

Deutsche Akkreditierungsstelle GmbH

Bellehene gemäß § 8 Absatz 1 AkkStelleG i.V.m. § 1 Absatz 1 AkkStelleGBV Unterzeichnerin der Multilateralen Abkommen von EA, II.AC 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 Beruichen durchzuführen:

Drahtgebundene Kommunikation einschließlich xDSL VoIP und DECT Akustik

Akurtik

Funk einschieldlich WLAN
Short Range Devices (SRD)
RFID
WIMAx und Richtfunk
Mobilfunk (SØM) / OS, Over the Air (OTA) Performance)
Elektromagnetische Verträglichkeit (EMV) einschließlich Autom
Produktsicherheit
SAR und Hearing Aid Compatibility (HAC)
Umweltsimulation
Smart Card Terminals
Bluetooth
Wi-Fi- Services

Die Akkreditierungsurkunde gijf nur in Verbindung mit dem Bescheld vom 07.03 2014 mit der Akkreditierungsnummer D-PI-12076-01 und ist g3ltig 17.01.2018. Sie besteht aus diesem Deckblatt, der Rückseite des Deckblatts und der fulgenden Anlage mit Insgesamt 77 Seiten.

Frankfurt am Main, 07.03.2014

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Standort Frankfurt am Main Gartenstraße 6 60594 Frankfurt am Main

Standart Braunschweig Bundesallee 100 38116 Braunschweig

Der aktuelle Stund der Välglindschaft kann folgenden Webseiten entnommen werden: Fäl: www.insrepean-aucheit tillon.org IIAC www.inschaft Jäk: www.inschaft

Note:

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

http://www.cetecom.com/eu/de/cetecom-group/europa/deutschland-saarbruecken/akkreditierungen.html