**CETECOM™****CETECOM ICT Services**
consulting - testing - certification >>>

TEST REPORT

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

Deutsche
Akkreditierungsstelle
D-PL-12076-01-00

Testing laboratory

CETECOM ICT Services GmbH

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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-12076-01-00

Applicant

FEIG ELECTRONIC GmbH

Lange Str. 4

35781 Weilburg-Waldhausen / GERMANY

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Fax: +49 6471 310-999

Contact: Bernhard Schüssler

e-mail: bernhard.schuessler@feig.de

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Manufacturer

FEIG ELECTRONIC GmbH

Lange Str. 4

35781 Weilburg-Waldhausen / GERMANY

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: 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

Temperature range: -25°C to +70°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:

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Marco Bertolino
Lab Manager
Radio Communications & EMC

Test 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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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
Power supply:	V_{nom}	5 V DC by 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	:	
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).

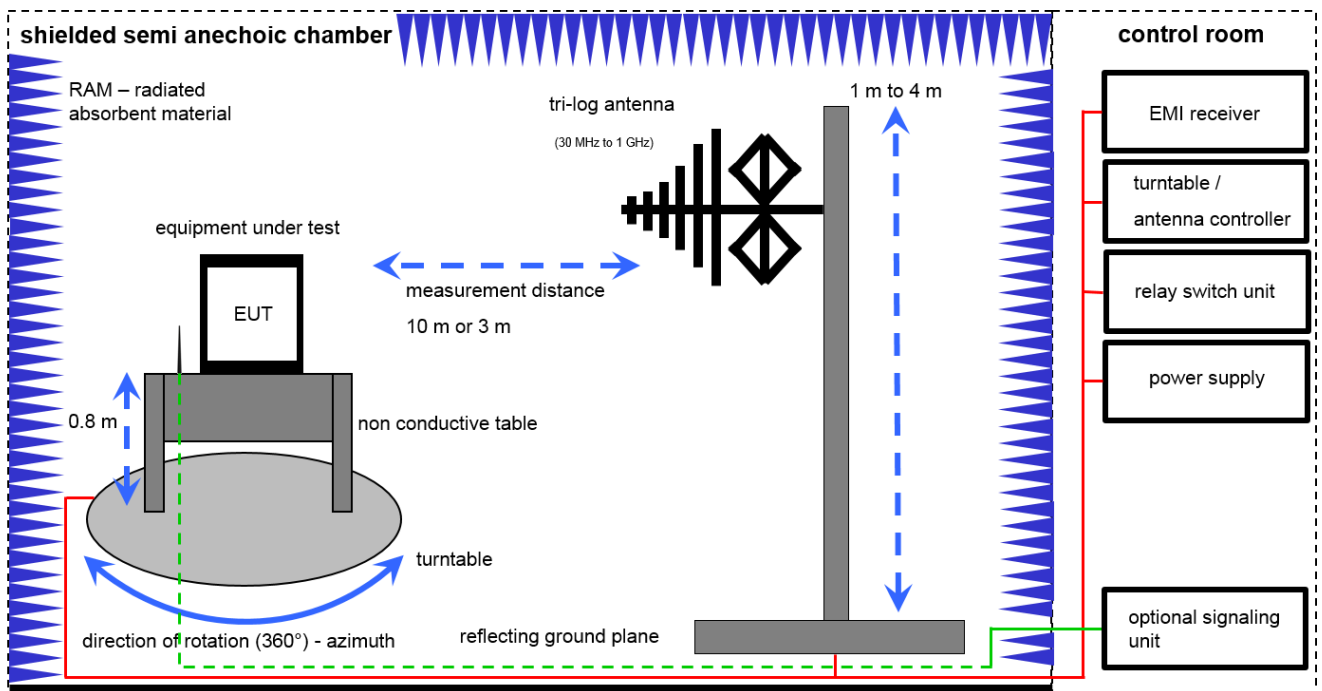
In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

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
v/k!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress

7.1 Shielded semi anechoic chamber

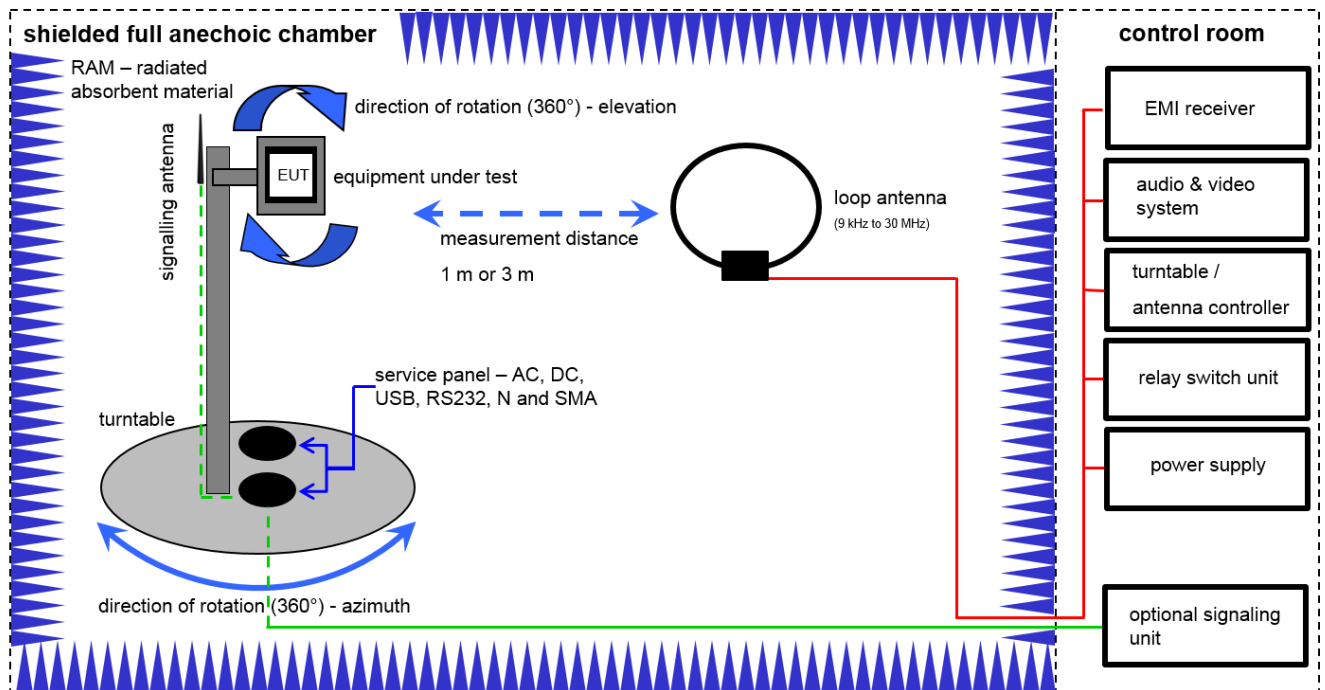
The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 1 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas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

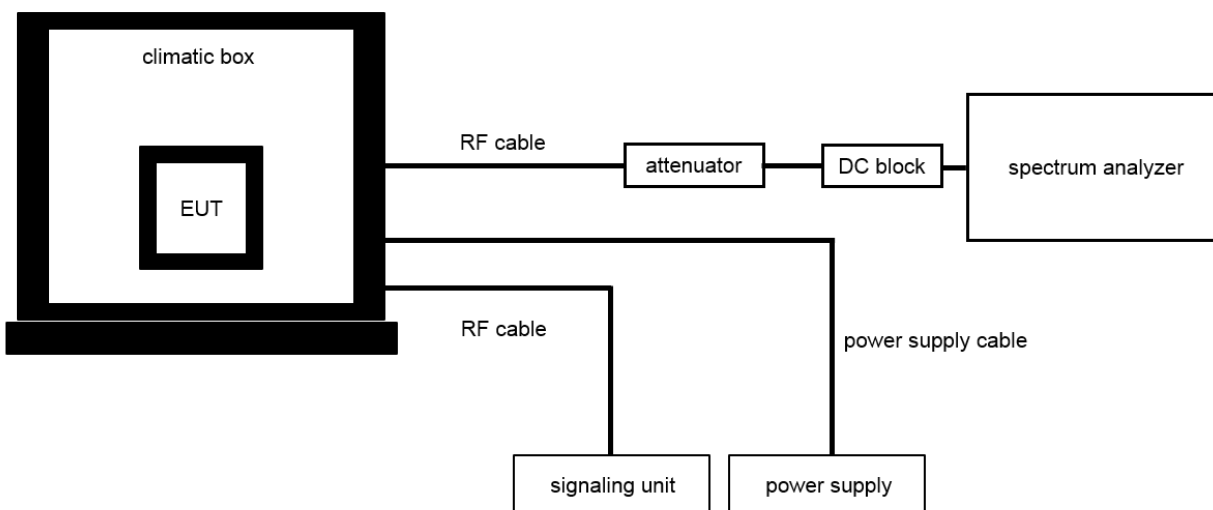


Equipment table:

No.	Lab / Item	Equipment	Type	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

Conducted measurements normal & extreme conditions



Equipment table:

No.	Lab / Item	Equipment	Type	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

☒	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	☒	☐	☐	☐	complies
§ 15.209 & § 15.225 (b-d)	Field strength of the harmonics and spurious	Nominal	Nominal	☒	☐	☐	☐	complies
§ 15.109	Receiver spurious emissions and cabinet radiations	Nominal	Nominal	☐	☐	☒	☐	complies
§15.107 §15.207	Conducted limits	Nominal	Nominal	☒	☐	☐	☐	complies
§ 15.225 (a)	Frequency tolerance	Normal & extreme conditions	Normal & extreme conditions	☒	☐	☐	☐	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

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 (MHz)	Field strength (μV/m)	Measurement distance (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	$FS_{\text{limit}} = FS_{\text{max}} - 40 \log\left(\frac{d_{\text{nearfield}}}{d_{\text{measure}}}\right) - 20 \log\left(\frac{d_{\text{limit}}}{d_{\text{nearfield}}}\right)$	-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 peak (worst case – pre-scan)
Resolution bandwidth:	F < 150 kHz: 200 Hz 150 kHz < F < 30 MHz: 9 kHz 30 MHz < F < 1 GHz: 120 kHz
Video bandwidth:	F < 150 kHz: 1 kHz 150 kHz < F < 30 MHz: 100 kHz 30 MHz < F < 1 GHz: 300 kHz
Trace mode:	Max hold

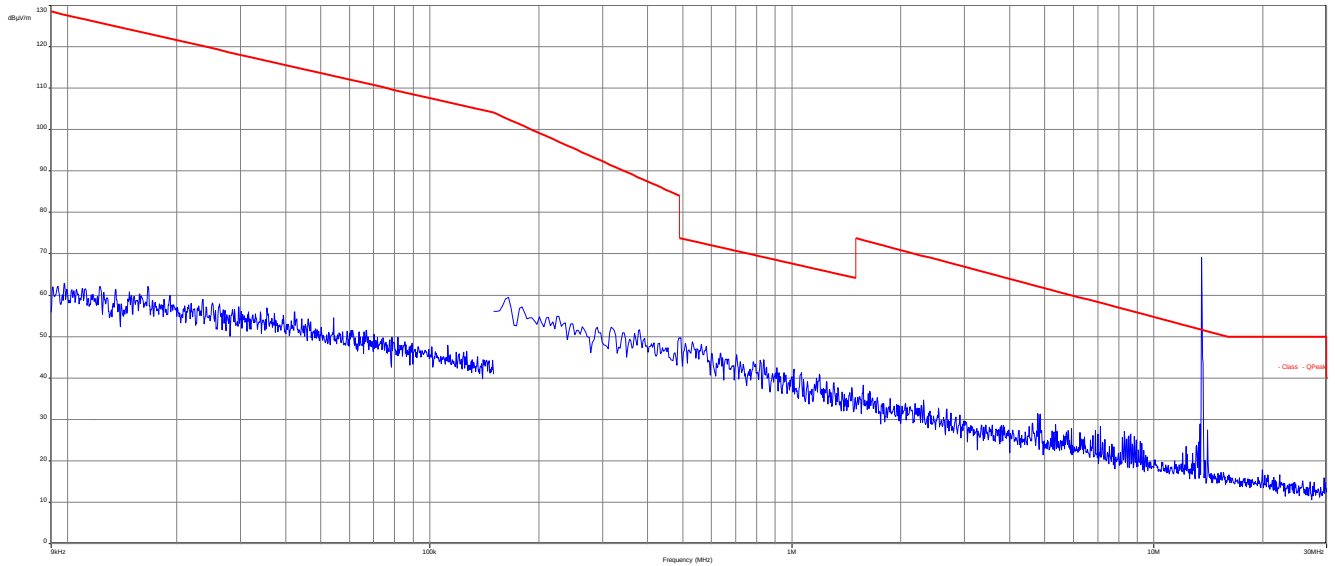
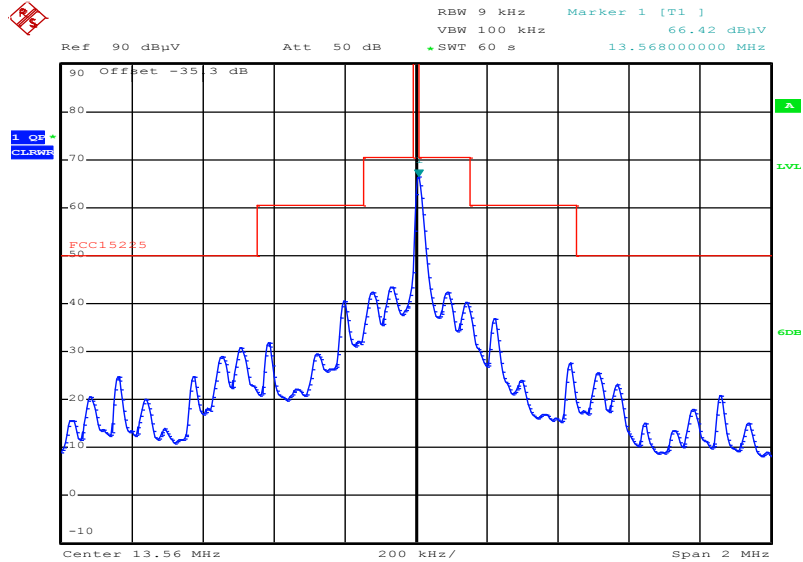
Limit:

FCC & IC		
Frequency (MHz)	Field strength (dB μ V/m)	Measurement distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30 (29.5 dB μ V/m)	30
30 – 88	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

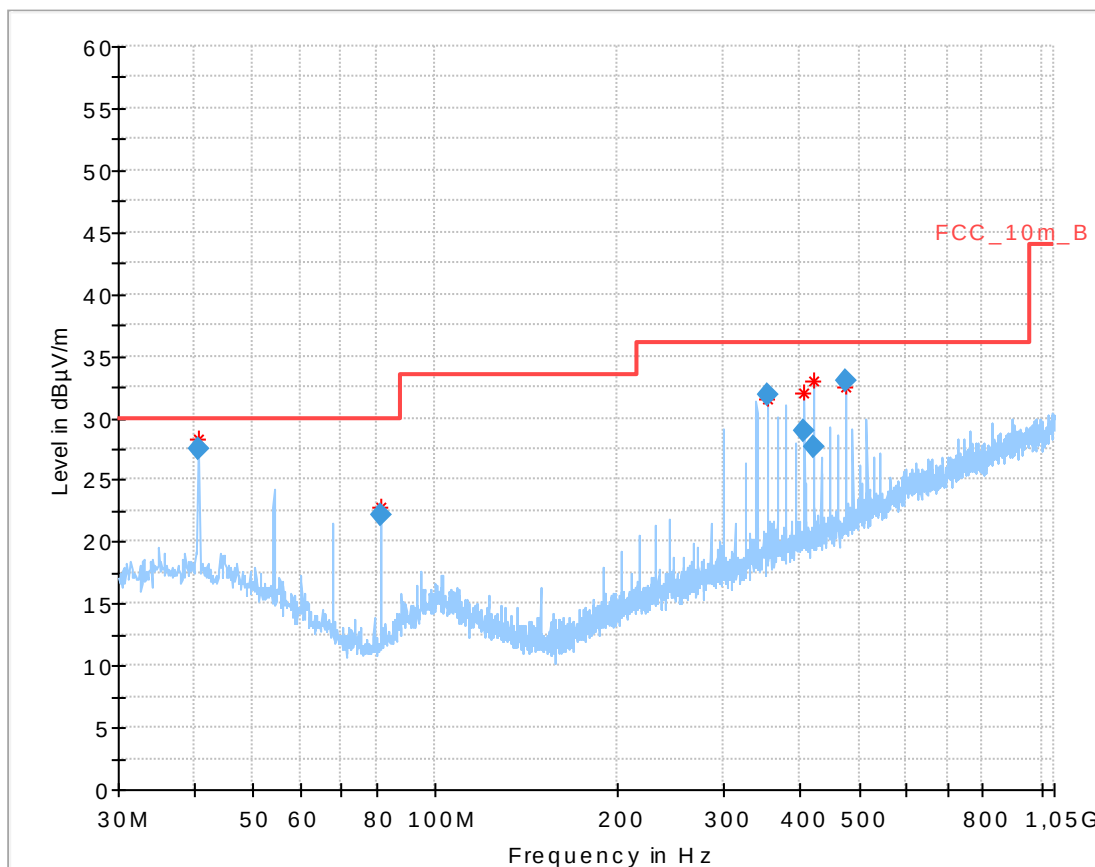
Note: For a reduced measurement distance, please take a look at the limit line and the ANSI C63.10-2013 sub clause 6.4 radiated emissions from unlicensed wireless devices below 30 MHz.

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	V	232	14.0
81.362250	22.19	30.00	7.81	1000.0	120.000	273.0	V	282	8.4
352.564350	31.91	36.00	4.09	1000.0	120.000	349.0	V	117	16.1
406.796700	28.97	36.00	7.03	1000.0	120.000	100.0	V	3	17.0
420.347850	27.65	36.00	8.35	1000.0	120.000	100.0	V	5	17.2
474.600000	32.95	36.00	3.05	1000.0	120.000	274.0	V	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		$\pm$ 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		$\pm$ 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.

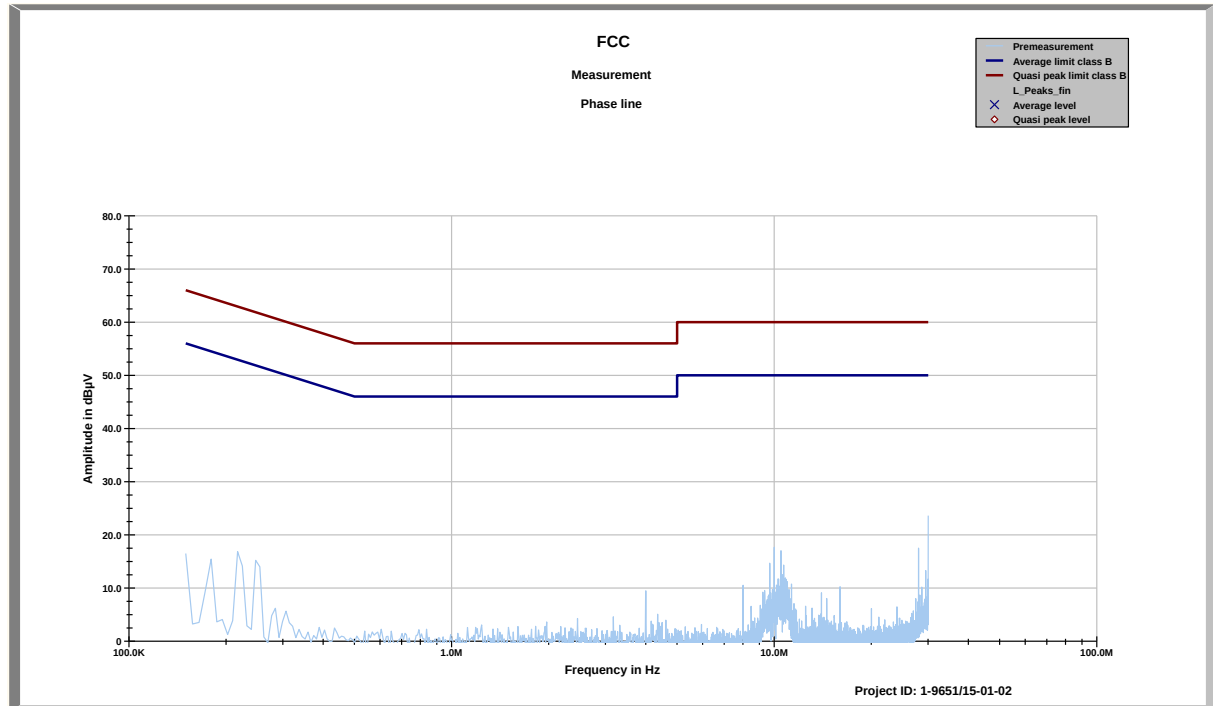
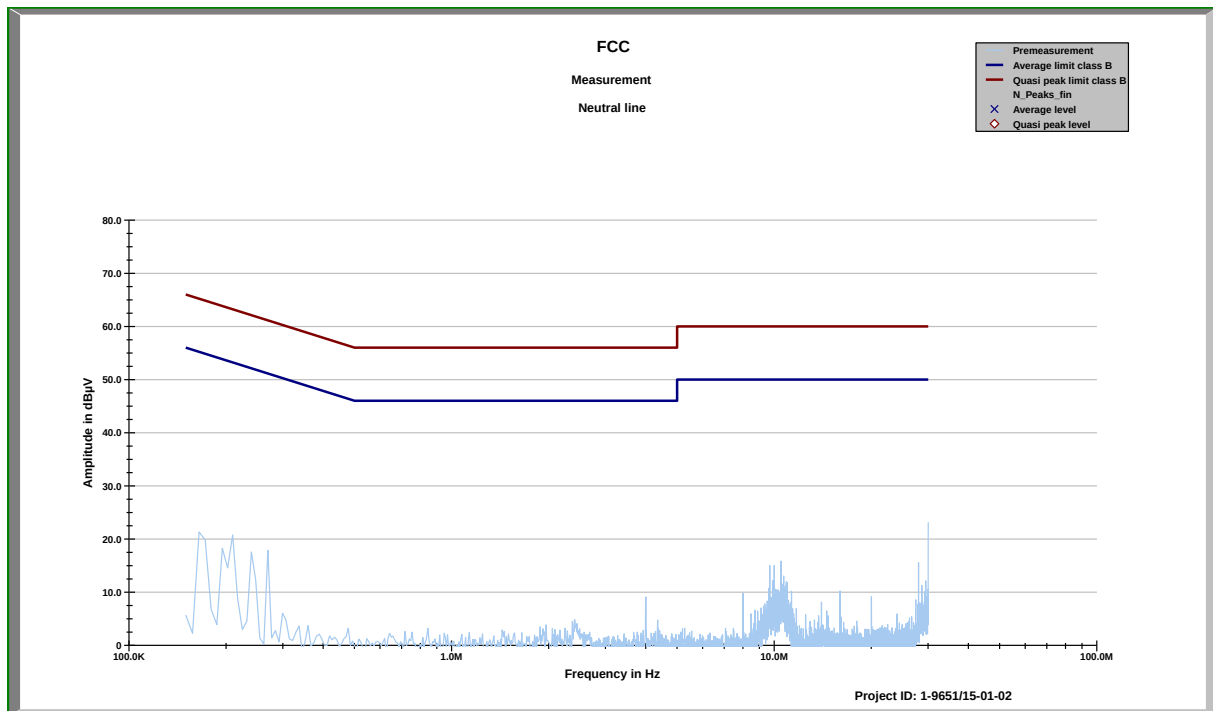
Measurement parameters	
Detector:	Quasi peak / average or peak (worst case – pre-scan)
Resolution bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Video bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Trace mode:	Max hold

Limit:

FCC & IC		
Frequency (MHz)	Quasi-peak (dB μ V/m)	Average (dB μ V/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 Observations

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

Annex B 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
PMN		Product marketing name
HMN		Host marketing name
HVIN		Hardware version identification number
FVIN		Firmware version identification number

Annex C Accreditation Certificate

Front side of certificate

Back side of certificate



Deutsche Akkreditierungsstelle GmbH

Befähigte 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 / DC, 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 Beschluss vom 07.03.2014 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 77 Seiten.

Registrierungsnummer der Urkunde: D-PL-12076-01-00

Frankfurt am Main, 07.03.2014

Zurücksendung an die Deutsche

Im Auftrag (D-PL-12076-01-00) Raffi Igner
 Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH

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 Spittelmarkt 10
 10117 Berlin

Standort Frankfurt am Main
 Gartenstraße 6
 60594 Frankfurt am Main

Standort Braunschweig
 Bundesallee 100
 38115 Braunschweig

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 und des Rates vom 9. Juli 2008 über die Vorschriften für die Akkreditierung und Marktüberwachung
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 IAF: www.iaf.org
 ILAC: www.ilac.org

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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