

TEST REPORT

Annex to Test Report No.: 1-2205-01-05/10-A



Testing Laboratory

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Accredited Test Laboratory:

The test laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025
DAR registration number: DGA-PL-176/94-D1

Area of Testing: Radio/Satellite Communications

Applicant

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SE-417 56 Gothenburg/Sweden
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e-mail: anna.jansson@ericsson.com

Manufacturer

Ericsson AB
Lindholmospiren 11
SE-417 56 Gothenburg/Sweden

Test Standard/s

47 CFR Part 15	Title 47 of the Code of Federal Regulations; Chapter I-Federal Communications Commission subchapter A - general, Part 15-Radio frequency devices
RSS - 210 Issue 7	Spectrum Management and Telecommunications - Radio Standards Specification Low-power Licence-exempt Radiocommunication Devices (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:	PCIe Wireless mini card		
Model name:	F5521gw		
FCC ID:	VV7-MBMF5521GW1		
IC:	287AG-MBMF5521GW1		
Frequency [MHz]:	GSM 850: 824.2 – 848.8 MHz,	PCS 1900:	1850.2 – 1909.8 MHz
	WCDMA Band V: 826.4 – 846.6 MHz,	WCDMA Band II:	1852.4 – 1907.6 MHz
Power supply:	3.3 V DC		
Temperature range:	-30 °C to +60 °C		

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

Test performed:

DN: cn=Daniel K. Muyunga, o=Cetecom ICT Services GmbH,
ou=MUY-100406, email=Daniel.Muyunga@ict.cetecom.de, c=DE
Datum: 2010.09.24 11:45:58 +02'00'

Daniel Muyunga

Test Report authorised:

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Stefan Bös

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2 General information

2.1 Notes

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 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 CETECOM ICT Services GmbH.

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.

2.2 Application details

Date of receipt of order:	2010-07-02
Date of receipt of test item:	2010-07-02
Start of test:	2010-07-27
End of test:	2010-09-07
Person(s) present during the test:	-/-

3 Test standard/s

Test Standard	Version	Test Standard Description
47 CFR Part 15	2009-10	Title 47 of the Code of Federal Regulations; Chapter I-Federal Communications Commission subchapter A - general, Part 15-Radio frequency devices
RSS - 210 Issue 7	2007-06	Spectrum Management and Telecommunications - Radio Standards Specification Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

4 Test environment

Temperature:	T_{nom}	+20 °C during room temperature tests
	T_{max}	+60 °C during high temperature test
	T_{min}	-30 °C during low temperature test
Relative humidity content:		50 %
Air pressure:		not relevant for this kind of testing
Power supply:	V_{nom}	3.3 V DC
	V_{max}	3.6 V
	V_{min}	3.0 V

5 Test item

Kind of test item	:	PCIe Wireless mini card
Model name	:	F5521gw Type : KRD 131 18/1
S/N serial number	:	A401168081 A401168073 A401194416
HW hardware status	:	R1
SW software status	:	R1A29
Frequency Band [MHz]	:	GSM 850: 824.2 – 848.8 MHz PCS 1900: 1850.2 – 1909.8 MHz WCDMA Band V: 826.4 – 846.6 MHz WCDMA Band II: 1852.4 – 1907.6 MHz
Type of Modulation	:	GMSK; 8-PSK; QPSK; 16QAM; 64QAM
Number of channels	:	300 (PCS1900) and 125 (PCS850) 103 (FDD V) / 278 (FDD II)
Antenna	:	External antenna
Power Supply	:	3.3 V DC
Temperature Range	:	-30 °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	CFR Part 15.107, 15.109 ICES-003, Issue 4	passed	2010-09-24	-/-

7.1 Receiver

Test Case	temperature conditions	power source voltages	Pass	Fail	NA	NP	Results (max.)
RX-Spurious Emissions Conducted < 30 MHz	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Spurious Emissions Radiated	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Note:

NA = Not applicable; NP = Not performed

8 Measurement results

8.1 AC line conducted < 30 MHz

Description:

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. The EUT is set to Idle mode. Both power lines, phase and neutral line, are measured. Found peaks are remeasured with average and quasi peak detection to show compliance to the limits.

Measurement:

Measurement parameter	
Detector:	Peak - Quasi Peak / Average
Sweep time:	Auto
Video bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Resolution bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Span:	9 kHz to 30 MHz
Trace-Mode:	Max Hold

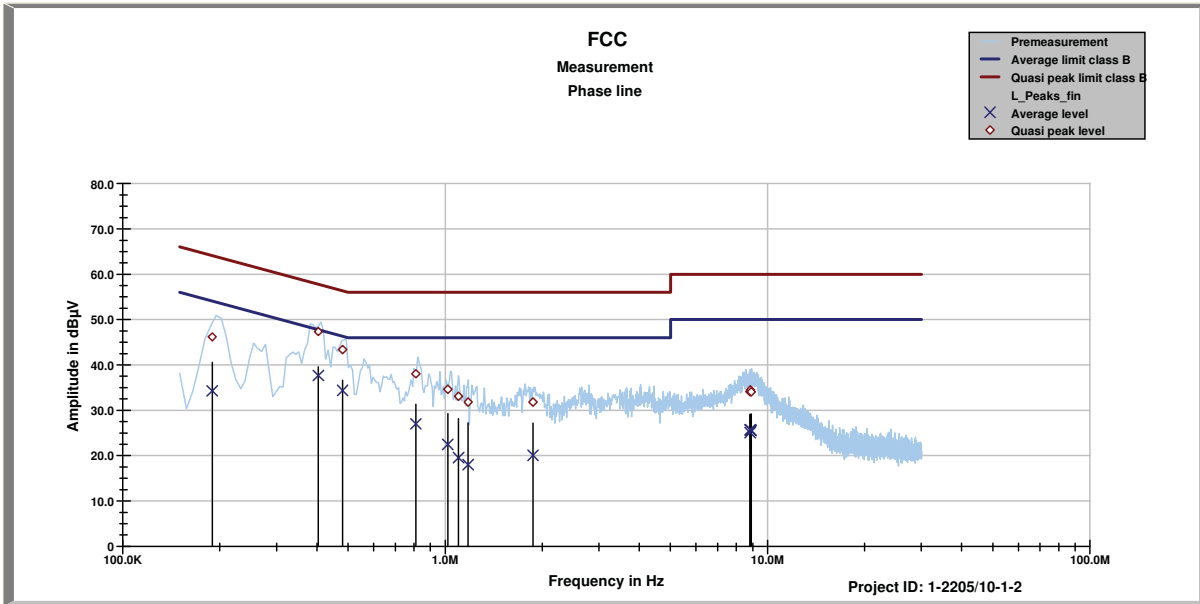
Limits:

FCC		IC	
CFR Part 15.107(a)		ICES-003, Issue 4	
TX Spurious Emissions Conducted < 30 MHz			
Frequency (MHz)	Quasi-Peak (dBµV/m)	Average (dBµV/m)	
0.15 – 0.5	66 to 56*	56 to 46*	
0.5 – 5	56	46	
5 – 30.0	60	50	

*Decreases with the logarithm of the frequency

Result: The result of the measurement is passed.

Plot 1: Phase line

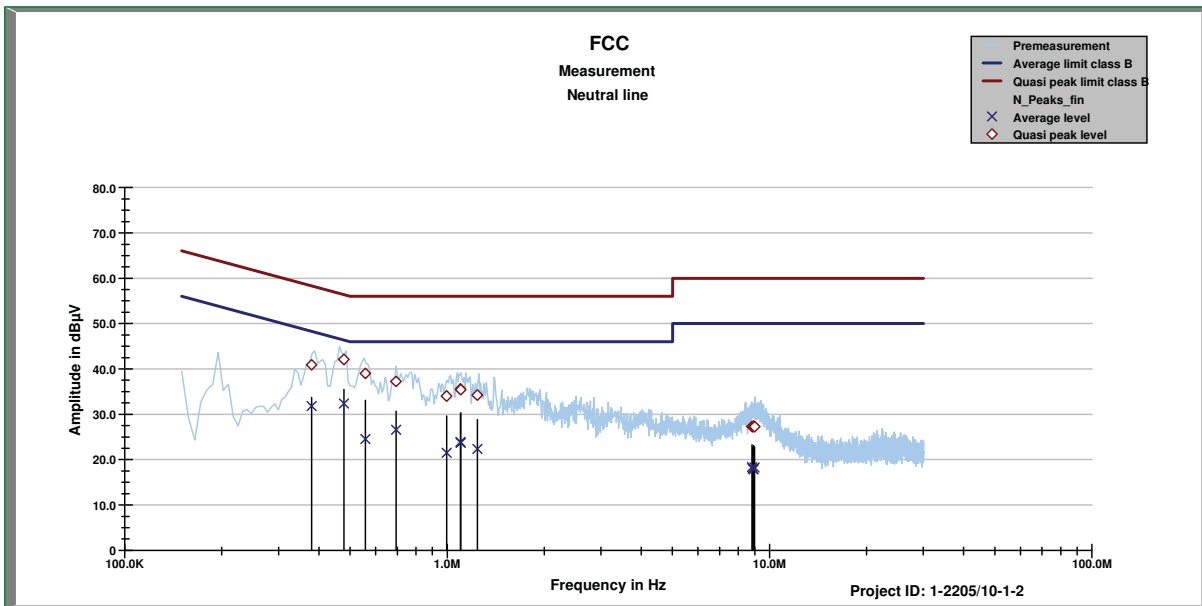


FCC
Project ID: 1-2205/10-1

Frequency MHz	Quasi peak level dBµV	Margin quasi peak dBµV	Average level dBµV	Margin average dBµV
0.18937	46.15	17.91	34.26	20.61
0.40444	47.35	10.41	37.66	11.07
0.48051	43.36	12.97	34.36	12.19
0.81095	38.05	17.95	26.99	19.01
1.01872	34.63	21.37	22.45	23.55
1.10033	33.06	22.94	19.54	26.46
1.17823	31.78	24.22	17.98	28.02
1.8722	31.80	24.20	20.06	25.94
8.8197	34.11	25.89	25.06	24.94
8.8294	34.09	25.91	25.68	24.32
8.842	34.48	25.52	25.68	24.32
8.8968	34.06	25.94	25.53	24.47

Project ID - 1-2205/10-1
EUT – F5521gw
Serial Number - A401134164
Operating mode - idle; USB connected

Plot 2: Neutral line



FCC
Project ID: 1-2205/10-1

Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
MHz	dBµV	dBµV	dBµV	dBµV
0.37997	40.91	17.37	31.82	17.61
0.47808	42.08	14.30	32.38	14.24
0.55717	39.00	17.00	24.51	21.49
0.69379	37.21	18.79	26.60	19.40
0.99537	34.02	21.98	21.49	24.51
1.09845	35.55	20.45	23.92	22.08
1.10164	35.41	20.59	23.70	22.30
1.23997	34.22	21.78	22.30	23.70
8.8224	27.27	32.73	18.35	31.65
8.8505	27.26	32.74	18.00	32.00
8.9171	27.42	32.58	17.83	32.17
8.9895	27.26	32.74	18.26	31.74

Project ID - 1-2205/10-1
 EUT – F5521gw
 Serial Number - A401134164
 Operating mode - idle; USB connected

8.2 Spurious emissions radiated – receiver mode

Description:

The measurement was performed in worst case. The EUT was not connected to the CMU 200. So the EUT performs a network search. In this mode all oscillators are active.

Measurement:

Measurement parameters	
Detector:	Below 1 GHz Peak / QuasiPeak Above 1 GHz Peak / Average
Sweep time:	2 sec
Video bandwidth:	Below 1 GHz 100 kHz Above 1 GHz 1 MHz
Resolution bandwidth:	1 MHz
Span:	100 MHz Steps
Trace-Mode:	Max Hold

Limits:

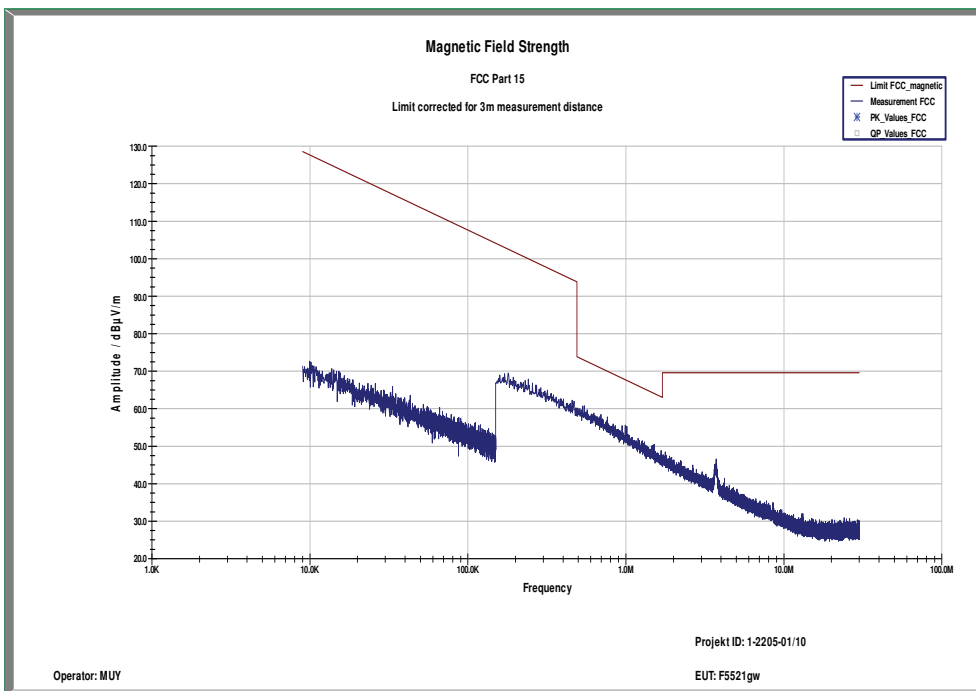
FCC		IC	
CFR Part 15.109 CFR Part 2.1053		RSS Gen, Issue 2, Section 4.10	
Spurious Emissions Radiated – Receiver Mode			
Frequency (MHz)	Field Strength (dB μ V/m)	Measurement distance (m)	
30 – 88	30.0	10	
88 - 216	33.5	10	
216 – 960	36.0	10	
Above 960	54.0	3	

Results:

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
31.557900	15.2	15000.000	120.000	198.0	V	224.0	12.7	14.8	30.0
39.801450	16.3	15000.000	120.000	126.0	V	356.0	13.4	13.7	30.0
87.494250	14.5	15000.000	120.000	135.0	V	143.0	10.2	15.5	30.0
124.896300	16.2	15000.000	120.000	98.0	V	323.0	9.8	17.3	33.5
161.878650	21.8	15000.000	120.000	98.0	V	276.0	9.3	11.7	33.5
177.195600	18.1	15000.000	120.000	98.0	V	245.0	10.3	15.4	33.5

Result: The result of the measurement is passed.

Plot 1: Receiver mode up to 30 MHz



Plot 2: Receiver mode (30 MHz – 1 GHz)

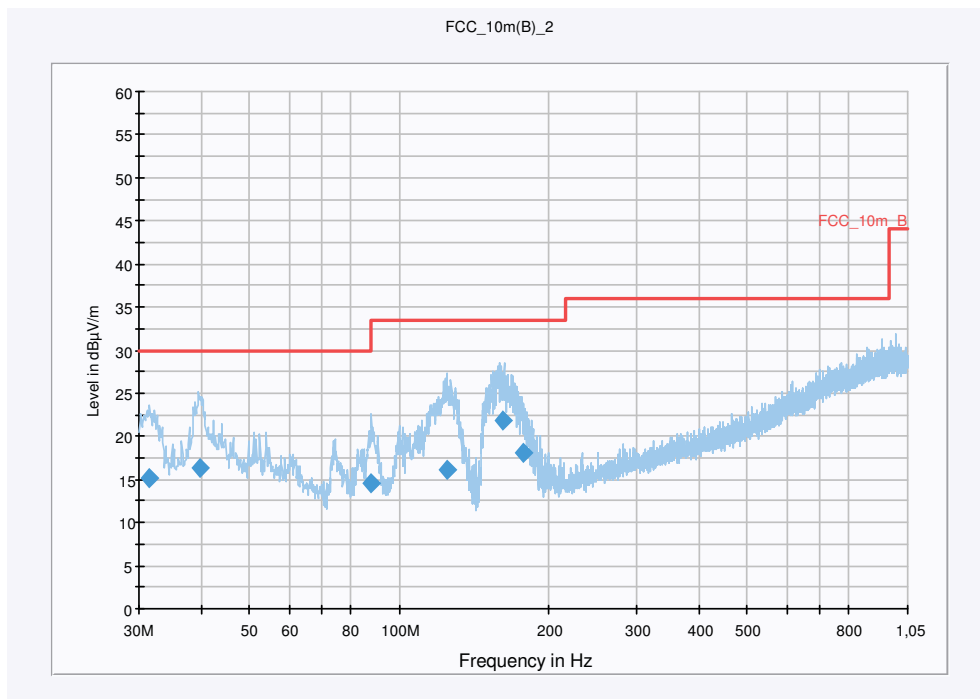
Common Information

EUT: F5521gw
Serial Number: A401134164
Test Description: FCC Part 15 B Class B < 1GHz @ 10 m
Operating Conditions: idle
Operator Name: LNG
Comment: AC 115V / 60 Hz; USB connected

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
Level Unit: dB μ V/m

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



9 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.	Labor / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kal. Art	Last Calibration	Next Calibration
1	n. a.	Horn Antenne 1-26.5GHz	3115	EMCO	9005-3440	300002190	ev		
3	n. a.	Horn Antenne 1-26.5GHz	3115	EMCO Elektronik	9709-5290	300000212	ev		
4	n. a.	Universal Communication Tester	CMU200	R&S	106826	300003346	k	12.01.2010	12.01.2011
5	n. a.	Software Option für CMU 200	CMU-Kxx	R&S		300003345	k	12.01.2010	12.01.2011
6	n. a.	Ultra Stable Notch Filter	WRCD1887.82/1889.55-5EE		1	300000115	ne		
7	n. a.	Funkstörmesempfänger 20Hz- 26,5GHz	ESU26	R&S	100037	300003555	k	08.01.2010	08.01.2011
8	n. a.	HF-Schaltmatrixgrundgerät	TS-RSP 1144.1500K03	R&S	100300	300003556	ev		
11	n. a.	Signalgenerator 1-20 GHz	SMR20	R&S	101697/020	300003593	k	08.01.2010	08.01.2012
12	n. a.	Turnable Band Reject	WRCT1850/2170-5/40-10EEK	Wainwright	7	300003386	ev		
13	n. a.	Software Option für CMU 200	CMU-K62	R&S	103288	300003600	k	12.01.2010	12.01.2011
14	n. a.	Software Option für CMU 200	CMU-K61	R&S	103354	300003612	k	12.01.2010	12.01.2011
15	n. a.	Software Option für CMU 200	CMU-K64	R&S	102017	300003613	k	12.01.2010	12.01.2011
16	n. a.	Software Option für CMU 200	CMU-K56	R&S	100251	300003614	k	12.01.2010	12.01.2011
18	n. a.	Tunable Band Reject	WRCT1850/2170-5/40-10EEK	Wainwright	40	300003872	ne		
19	n. a.	Tunable Band Reject	WRCT824/894-5/40-8EEK	Wainwright	27	300003873	ne		
20	n. a.	Universal Communication Tester	CMU200	R&S	103992	300003231	vIK!	30.06.2010	30.06.2012
21	45	Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368	g		
22	50	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580	k	06.01.2009	06.01.2011
23	n. a.	software	SPS_PHE 1.4f	Spitzberger & Spieß	B5981; 5D1081;B5979	300000210	ne		
24	n. a.	EMI Test Receiver	ESCI 1166.5950.03	R&S	100083	300003312	k	08.01.2010	08.01.2012
25	n. a.	Analyzer-Reference-System (Harmonics and Flicker)	ARS 16/1	SPS	A3509 07/0 0205	300003314	k	01.06.2009	01.06.2011
26	n. a.	Amplifier	JS42-00502650-28-5A	MITEQ	1084532	300003379	ev		
27	n. a.	Antenna Tower	Model 2175	ETS-LINDGREN	64762	300003745	izw		
28	n. a.	Positioning Controller	Model 2090	ETS-LINDGREN	64672	300003746	izw		
29	n. a.	Turntable Interface-Box	Model 105637	ETS-LINDGREN	44583	300003747	izw		
30	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787	k	01.04.2010	01.04.2012
31	n. a.	Spectrum-Analyzer	FSU26	R&S	200809	300003874	k	08.01.2010	08.01.2012
33	n. a.	Isolating Transformer	913501	Erfi		300001205	ne		
34	4	Radiocom. Analyzer	CMTA 54	R&S	894043/010	300001175	NK!	06.06.2007	
35	9	Signal Generator 0.1-4320 MHz, AM/FM/PHM/Puls Mod.	SMHU	R&S	894055/005	300001190	Ve	05.01.2010	05.01.2013
36	10	Signal Generator 0.1-	SMH	R&S	864219/033	300001410	Ve	18.08.2010	18.08.2013

		2000 MHz							
37	n. a.	DC Power Supply 0 – 32V	1108-32	Heiden	001802	300001383	Ve	23.06.2010	23.06.2013
38	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04590	300001041	Ve	08.01.2009	08.01.2012
39	n. a.	Temperature Test Chamber	VT 4002	Heraeus Voetsch	521/83761	300002326	Ve	28.05.2009	28.05.2011
40	n. a.	Audio Analyzer 2Hz - 300 kHz	UPD	R&S	841074/009	300001236	k	08.01.2010	08.01.2012
41	n. a.	Switch / Control Unit	3488A	HP	2605e08770	300001443	ne		
42	n. a.	Signal Analyzer 20Hz-26,5GHz-150 to + 30 DBM	FSIQ26	R&S	835111/0004	300002678	Ve	06.01.2009	06.01.2011
43	n. a.	Temperature Test Chamber	T-40/50	CTS GmbH	064023	300003540	vlK!	04.06.2009	04.06.2011

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
vlk!	Attention: extended calibration interval			
NK!	Attention: not calibrated			

*) next calibration ordered / will executed on ...

Annex A Document history

Version	Applied changes	Date of release
1.0	Initial release	2010-09-15
1.1	This “annex to test report 1-2205-01-05/10-A” replaces the “annex to test report 1-2205-01-05/10”. New test report release issued upon editorial changes	2010-09-24

Annex B Further information

Glossary

CS	-	Circuit switched
DUT	-	Device under Test
EMC	-	Electromagnetic Compatibility
ERP	-	Equivalent Radiated Power
EUT	-	Equipment under Test
FCC	-	Federal Communication Commission
FCC ID	-	Company and equipment Identifier at FCC
HW	-	Hardware
IC	-	Industry Canada
Inv. No.	-	Inventory number
N/A	-	not applicable
S/N	-	Serial Number
SW	-	Software