

Test Report

Customer:

Inventory Systems GmbH

Heerstraße 2

14052 Berlin

Tel.: +49 30 200 036 124

Fax: +49 30 200 036 172

RF test report

100393-AU02+W01



Industry
Canada

Industrie
Canada

Inventory Systems GmbH

Base Unit

DO-B1829



The test result refers exclusively
to the model tested.

This report must not be copied without
the written authorization by the lab.
Revision: 1.0



DGA-PL-224/95-03 / BNetzA-CAB-02/21-02/2

EMV **TESTHAUS** GmbH

Gustav-Hertz-Straße 35
94315 Straubing
Tel.: +49 9421 56868-0
Fax: +49 9421 56868-100
Email: company@emv-testhaus.com

Accreditation:



Registration number: DGA-PL-224/95-03
CAB (EMC) registration number: BNetzA-CAB-02/21-02/3
FCC facility registration number: 221458
MRA US-EU, FCC designation number: DE0010

Location of Testing:

EMV **TESTHAUS** GmbH
Gustav-Hertz-Straße 35
94315 Straubing
Germany

The technical accuracy is guaranteed through the quality management of the
EMV **TESTHAUS** GmbH



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Page 2 of 39

Table of contents

1	Applicable standards	5
2	Equipment under Test (EUT)	6
3	AC power line conducted emissions	8
4	Maximum conducted output power	15
5	Power spectral density measurement	18
6	6dB spectrum bandwidth measurement.....	21
7	Radiated emission measurement (<1 GHz)	24
8	Radiated emission measurement (>1 GHz)	32
9	Exposure of humans to RF fields.....	36
10	Equipment calibration status.....	37
11	Measurement uncertainty	38
12	Summary	39



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 Revision: 1.0

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 Base Unit

100393-AU02+W01

Page 3 of 39

List of pictures

Picture 1: Outline of conducted emission test setup	10
Picture 2: Conducted emission on mains, phase 1 (Chart)	11
Picture 3: Conducted emission on mains, phase 1 (Table)	12
Picture 4: Conducted emission on mains, neutral (Chart)	13
Picture 5: Conducted emission on mains, neutral (Table)	14
Picture 6: Test setup for conducted output power measurement	16
Picture 7: Conducted output power chart	17
Picture 8: Test setup for power spectral density measurement	19
Picture 9: Power spectral density chart	20
Picture 10: Test setup for 6dB spectrum bandwidth measurement	22
Picture 11: 6dB spectrum bandwidth chart	23
Picture 12: Test setup for radiated emission measurement (< 1 GHz)	26
Picture 13: Radiated emission 30 MHz – 1000MHz (TX mode)	28
Picture 14: Radiated emission 30 MHz – 1000MHz (TX mode, table)	29
Picture 15: Radiated emission 30 MHz – 1000MHz (RX mode)	30
Picture 16: Radiated emission 30 MHz – 1000MHz (RX mode)	31
Picture 17: Test setup for radiated emission measurement (> 1 GHz)	34
Picture 18: Radiated emission > 1 GHz (pre-scan)	35

List of tables

Table 1: Equipment Calibration status	37
Table 2: Measurement uncertainty	38



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Germany
Revision: 1.0

Inventory Systems GmbH

Base Unit

100393-AU02+W01

Page 4 of 39

1 Applicable standards

CFR 47 Part 2: 01-2010	Code of Federal Regulations Part 2 (Frequency allocation and radio treaty matters; General rules and regulations) of the Federal Communication Commission (FCC)
CFR 47 Part 15: 10-2009	Code of Federal Regulations Part 15 (Radio Frequency Devices) of the Federal Communication Commission (FCC)
ANSI C63.4: December 2003	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
RSS-Gen Issue 2 June 2007	General Requirements and Information for the Certification of Radiocommunication Equipment, published by Industry Canada
RSS-102: Issue 4 March 2010	Radio Frequency Exposure Compliance of Radiocommunications Apparatus
RSS-210: Issue 7 June 2007 Annex 8	Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, published by Industry Canada

1.1 Summary of test results

Standard	Test result
FCC CFR 47 Part 15	Passed
RSS-210 Issue 7 Annex 8 and RSS-Gen Issue 2	Passed



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Revision: 1.0

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Base Unit

100393-AU02+W01

Page 5 of 39

2 Equipment under Test (EUT)

Product type:	Base Unit
Model Name:	DO-B1829
Manufacturer:	Dommel GmbH Westring 15 91717 Wassertrüdingen
Serial number:	00100148
FCC ID:	YRADO-B1829
IC	9255A-B1829
Application freq. band:	902 MHz - 928 MHz
Frequency range:	915 MHz
Operating frequency:	915 MHz
Channel spacing:	N/A
Number of RF-channels:	1
Antenna type:	External dipole antenna <input checked="" type="checkbox"/> detachable <input type="checkbox"/> not detachable
Power supply:	External power supply Input: 100-240 VAC Output: 12 VDC
Temperature range:	0°C to +70°C



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Base Unit

100393-AU02+W01

Page 6 of 39

2.1 Photo documentation

See annex C

2.2 Short description of the EUT

The product is a monitoring system for atypical removal of products. This is the base station that is used to monitor multiple products that are located inside a special product pusher. The unit operates at a frequency of 915 MHz.

2.3 Operation mode

The base unit comes in a special version with the possibility to switch between transmit mode, receive mode. The test were carried out in transmit and in receive mode.

2.4 Configuration

The following peripheral devices and interface cables were connected during the tests:

Device	Model:	S/N
Base Unit	DO-B1829	00100148
Antenna	CTA 868/5/DT/SM/H1	N/A
Expander module	Expander module	N/A
AC adaptor	FRIWO FW7660/12	N/A

Used cables

Numbers:	Description: (type / lengths / remarks)	Serial No
1	Patch cable Cat 5e, shielded, 3m	N/A
1	Antenna cable, shielded, 3m	N/A



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Revision: 1.0

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Base Unit

100393-AU02+W01

Page 7 of 39

3 AC power line conducted emissions

according to CFR 47 Part 15, section 15.207

3.1 Test location

Description	Manufacturer	Inventory No.
Shielded chamber	Siemens - Matsushita	E00107

3.2 Test instruments

	Description	Manufacturer	Inventory No.
<input checked="" type="checkbox"/>	ESCS 30	Rohde & Schwarz	E00003
<input type="checkbox"/>	ESCI	Rohde & Schwarz	E00001
<input checked="" type="checkbox"/>	ESH3 Z2	Rohde & Schwarz	E00028
<input checked="" type="checkbox"/>	ESH 2-Z5	Rohde & Schwarz	E00004
<input checked="" type="checkbox"/>	ESH 2-Z5	Rohde & Schwarz	E00005



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Inventory Systems GmbH

Base Unit

100393-AU02+W01

Page 8 of 39

3.3 Limits

Frequency [MHz]	Quasi-peak [dB μ V]	Avarage [dB μ V]
0.15 – 0.5	66 - 56	56 – 46
0.5 – 5.0	56	46
5 – 30	60	50

3.4 Test procedure

1. The tests of conducted emission were carried out in a shielded room using a line impedance stabilization network (LISN) 50 μ H/50 Ohms and an EMI test receiver.
2. The EMI test receiver was connected to the LISN and set to a measurement bandwidth of 9 kHz in the frequency range form 0.15 MHz to 30 MHz.
3. The EUT was placed on a wooden table and connected to the LISN.
4. To accelerate the measurement the detector of the EMI test receiver was set to peak and the whole frequency range form 0.15 MHz to 30 MHz were scanned.
5. After that all peaks values with fewer margins than 10 dB to quasi-peak limit or exceeding the limit were marked and re-measured with quasi-peak detector.
6. If after that all values are under the average limit no addition measurement is necessary. In case there are still values between quasi-peak and average limit than these values were re-measured again with an average detector.
7. These measurements were done on all current carrying conductors.

According to ANSI C63.4, section 13.1.3.1 testing of intentional radiators with detachable antennas shall be done with a dummy load otherwise the tests should be done with connected antenna and if adjustable fully extended.



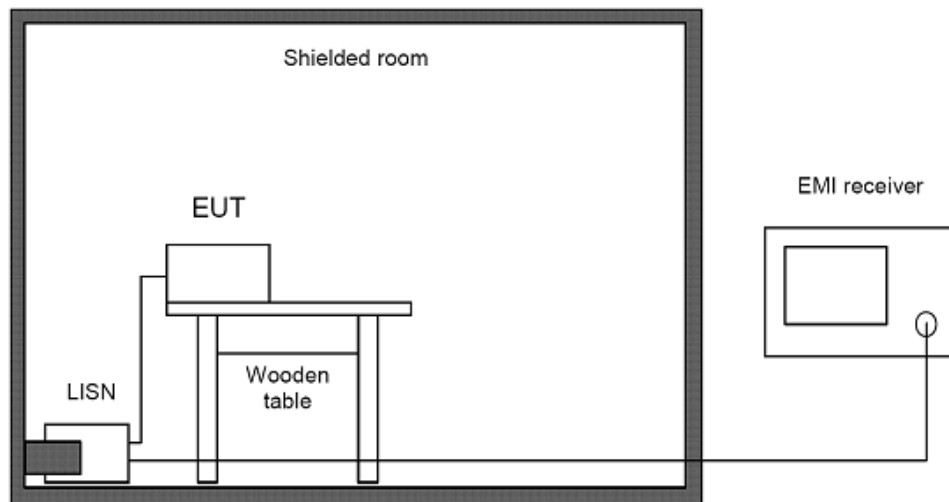
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Base Unit

100393-AU02+W01

Page 9 of 39

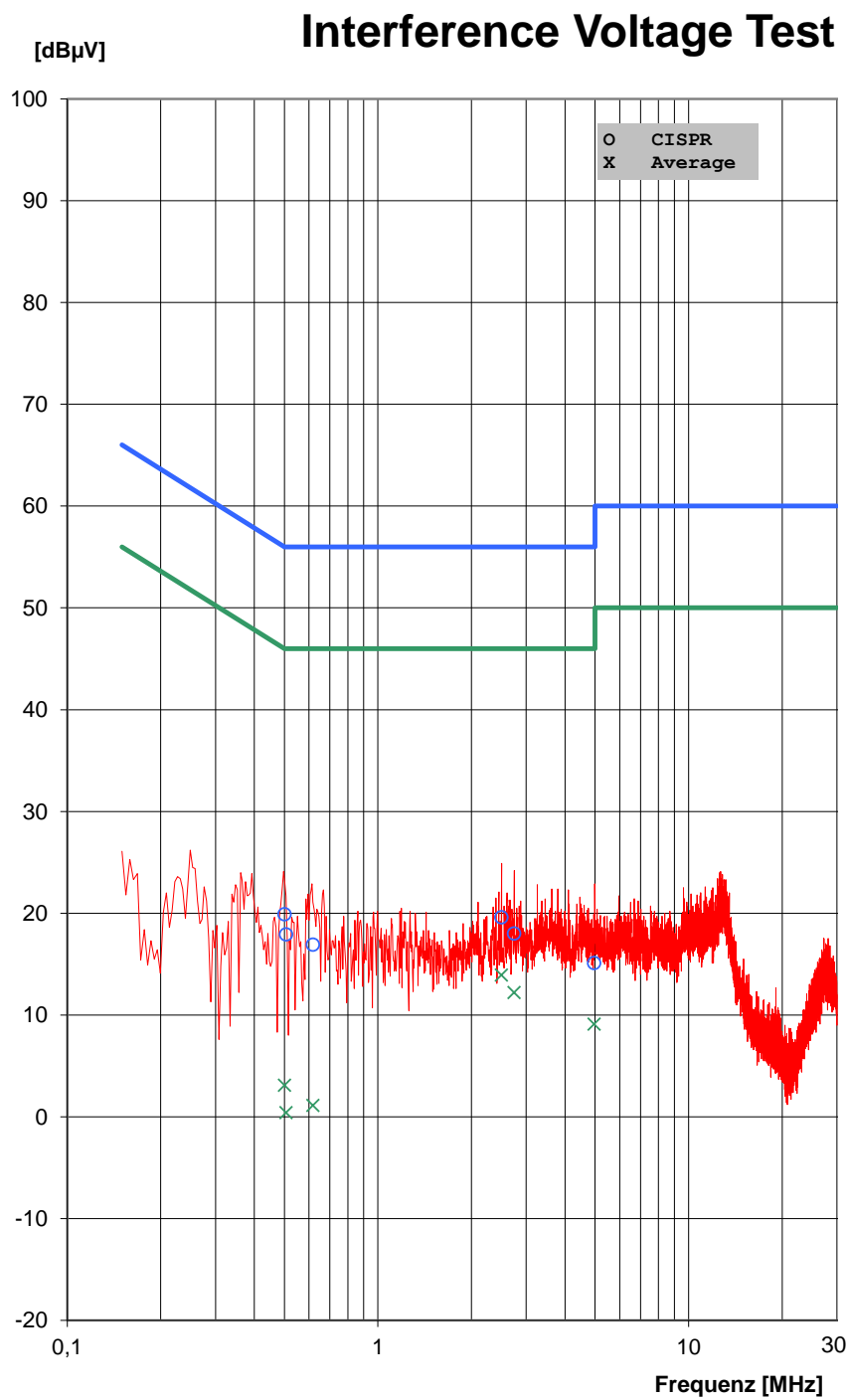
3.5 Test setup



Picture 1: Outline of conducted emission test setup

Comments: All peripheral devices were additionally decoupled by means of a line stabilization network.

3.6 Test result



REGULATIONS:
 FCC 15.207
 PEAK / CISPR / AV

TEST EQUIPMENT:
 ESCS30 (E00003)
 ESH2-Z5 (E00005)

ORDER NO.:
 100393-AU02+E01

EUT:
 Dommel GmbH
 Base Unit
 DO-B1829

OPERATION MODE:
 continuous transmitting

Mains 120V AC /60Hz
 Phase

TEST FACILITY:
 EMV TESTHAUS GmbH
 Gustav-Hertz-Straße 35
 94315 Straubing

DATE / TIME:
 2010-08-26
 25 °C 43 %H 98 kPa

TEST ENGINEER:
 Marco Janker

100393-AU01+E01 120V ss L1 01.E10

Picture 2: Conducted emission on mains, phase 1 (Chart)



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100393-AU02+W01

Page 11 of 39

Interference Voltage Test

Freq. [MHz]	U_CISPR [dBµV]	Limit [dBµV]	delta_U [dB]	U_AV [dBµV]	Limit [dBµV]	delta_U [dB]	Corr. [dB]	Remark
0,51	17,9	56,0	38,1	0,4	46,0	45,6	0,0	100393-AU01+F01_120V_ss.L1 01.E10
0,50	19,9	56,0	36,1	3,1	46,0	42,9	0,0	
0,62	16,9	56,0	39,1	1,1	46,0	44,9	0,0	
2,50	19,6	56,0	36,4	13,9	46,0	32,1	0,0	
2,75	18,0	56,0	38,0	12,2	46,0	33,8	0,0	
4,97	15,1	56,0	40,9	9,1	46,0	36,9	0,0	

Picture 3: Conducted emission on mains, phase 1 (Table)



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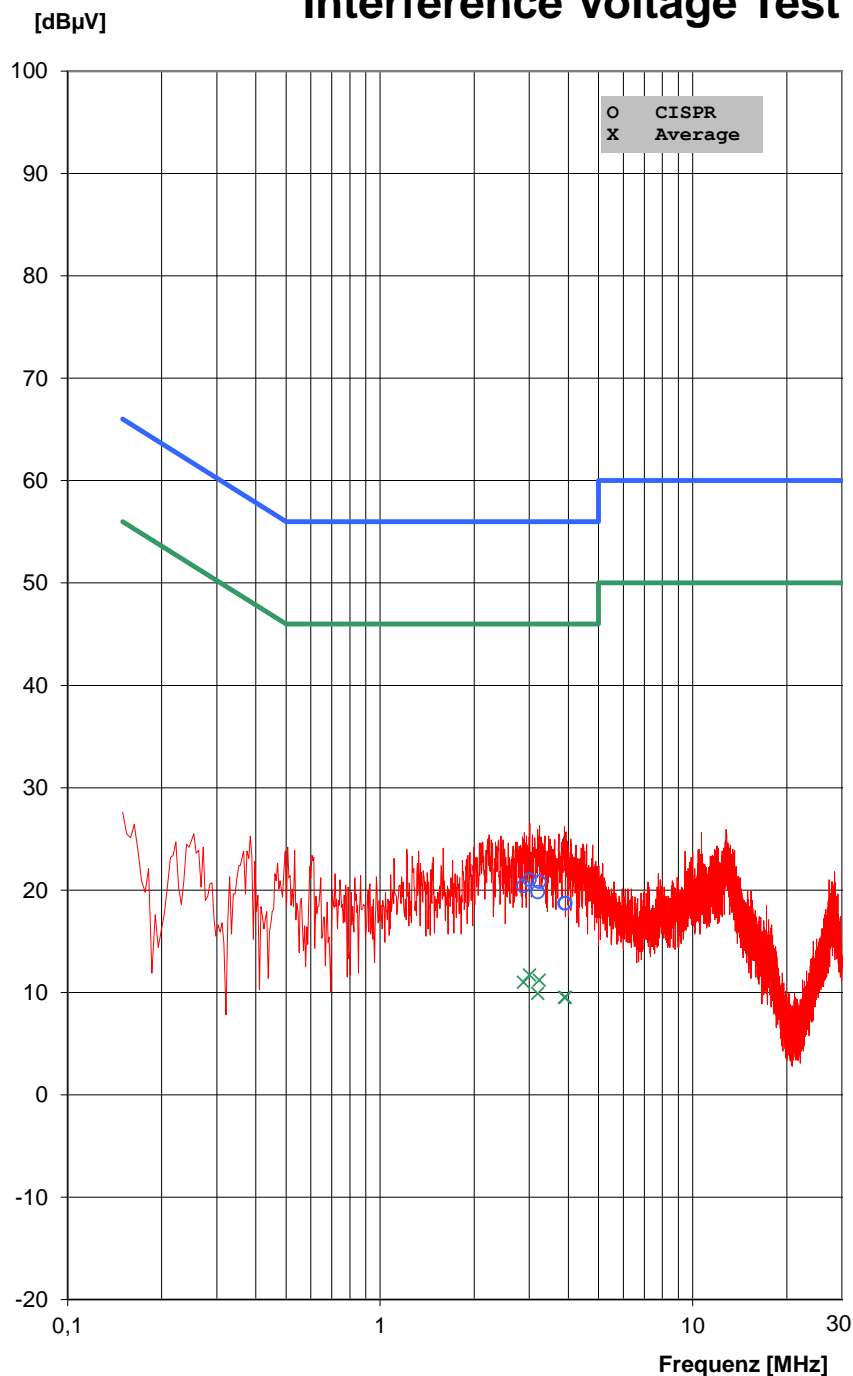
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100393-AU02+W01

Page 12 of 39

Interference Voltage Test



REGULATIONS:
FCC 15.207
PEAK / CISPR / AV

TEST EQUIPMENT:
ESCS30 (E00003)
ESH2-Z5 (E00005)

ORDER NO.:
100393-AU02+E01

EUT:
Dommel GmbH
Base Unit
DO-B1829

OPERATION MODE:
continuous transmitting

Mains 120V AC /60Hz
Phase

TEST FACILITY:
EMV TESTHAUS GmbH
Gustav-Hertz-Straße 35
94315 Straubing

DATE / TIME:
2010-08-26
25 °C 43 %H 98 kPa

TEST ENGINEER:
Marco Janker

100393-AU01+E01 120V ss N 01.E10

Picture 4: Conducted emission on mains, neutral (Chart)



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Base Unit

100393-AU02+W01

Page 13 of 39

Interference Voltage Test

Freq. [MHz]	U_CISPR [dBµV]	Limit [dBµV]	delta_U [dB]	U_AV [dBµV]	Limit [dBµV]	delta_U [dB]	Corr. [dB]	Remark
2,88	20,4	56,0	35,6	11,0	46,0	35,0	0,0	100393-AU01+E01 120V ss.N 01.E10
3,01	21,0	56,0	35,0	11,7	46,0	34,3	0,0	
3,20	19,8	56,0	36,2	9,9	46,0	36,1	0,0	
3,23	20,8	56,0	35,2	11,2	46,0	34,8	0,0	
3,89	18,7	56,0	37,3	9,5	46,0	36,5	0,0	
3,92	18,7	56,0	37,3	9,5	46,0	36,5	0,0	

Picture 5: Conducted emission on mains, neutral (Table)



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Base Unit

100393-AU02+W01

Page 14 of 39

4 Maximum conducted output power

according to CFR 47 Part 15, section 15.247(b)

4.1 Test location

- ☒ Conducted measurement
- ☐ Scan with peak detector in 3 m CDC
- ☐ CISPR measurement with quasi peak detector on 10m open area test site.
- ☐ Measurement with peak detector on 3m open area test site

Description	Manufacturer	Inventory No.
CDC	Albatross Projects	E00026
Open area test site	EMV TESTHAUS GmbH	E00354

4.2 Test instruments

	Description	Manufacturer	Inventory No.
<input type="checkbox"/>	ESCS 30 (FF)	Rohde & Schwarz	E00003
<input checked="" type="checkbox"/>	ESU	Rohde & Schwarz	W00002
<input type="checkbox"/>	ESCI (CDC)	Rohde & Schwarz	E00001
<input type="checkbox"/>	HFH2-Z2	Rohde & Schwarz	E00060
<input type="checkbox"/>	VULB 9163 (FF)	Schwarzbeck	E00013
<input type="checkbox"/>	VULB 9160 (CDC)	Schwarzbeck	E00011



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Revision: 1.0

Inventory Systems GmbH

Base Unit

100393-AU02+W01

Page 15 of 39

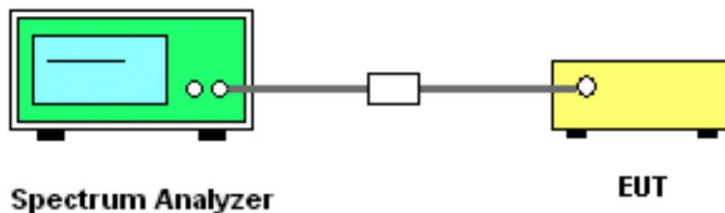
4.3 Limit

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands is 1 Watt (30dBm). The conducted output power limit is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.4 Test procedure

1. The test is performed in accordance with FCC Public Notice KBD 558074
2. The transmitter output (antenna port) was connected to the spectrum analyzer.
3. The unit was operated in continuous transmit mode with modulation.

4.5 Test setup



Picture 6: Test setup for conducted output power measurement

4.6 Test deviation

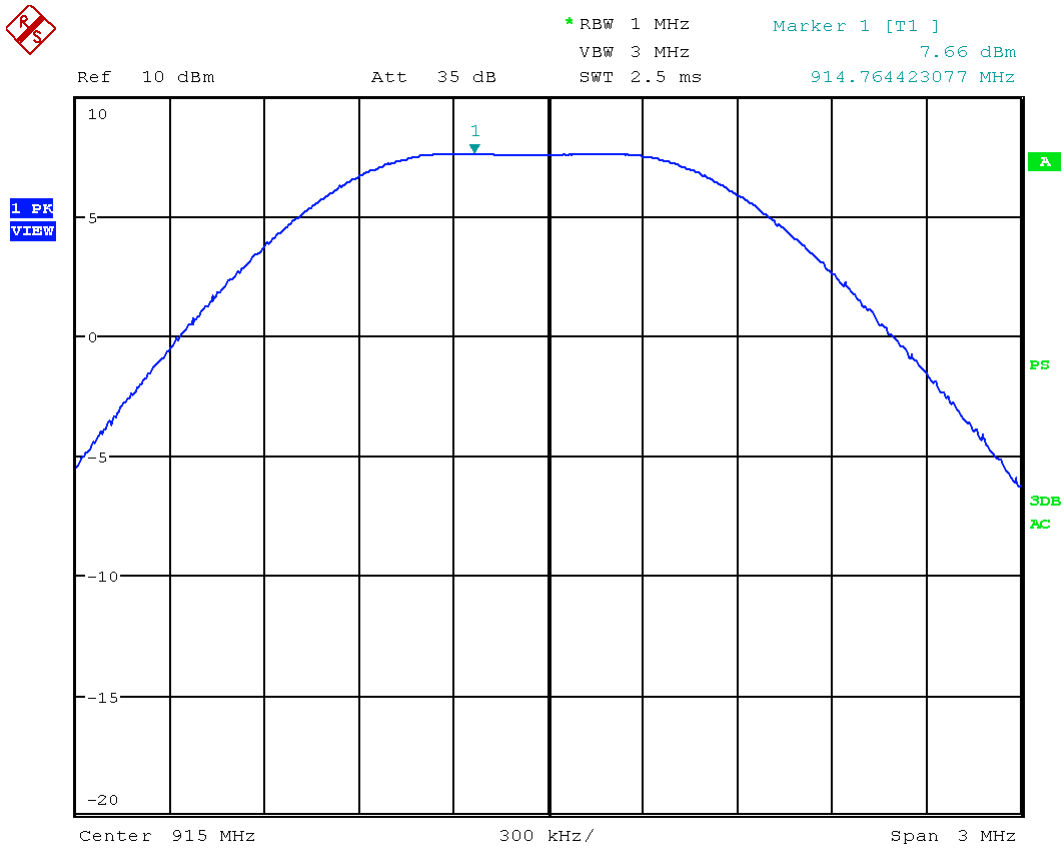
There is no deviation with the original standard.

4.7 EUT operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.8 Test result of maximum conducted output power

Channel	Frequency (MHz)	Conducted power (dBm)	Conducted power (mW)	Result
1	915	7.66	5.83	Passed



26.Aug 10 17:53

Picture 7: Conducted output power chart



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Revision: 1.0

Inventory Systems GmbH

Base Unit

100393-AU02+W01

Page 17 of 39

5 Power spectral density measurement

according to CFR 47 Part 15 section 2.247(e)

5.1 Test location

- ☒ Conducted measurement
- ☐ Scan with peak detector in 3 m CDC
- ☐ CISPR measurement with quasi peak detector on 10m open area test site.
- ☐ Measurement with peak detector on 3m open area test site

Description	Manufacturer	Inventory No.
CDC	Albatross Projects	E00026
Open area test site	EMV TESTHAUS GmbH	E00354

5.2 Test instruments

	Description	Manufacturer	Inventory No.
<input type="checkbox"/>	ESCS 30 (FF)	Rohde & Schwarz	E00003
<input checked="" type="checkbox"/>	ESU 26	Rohde & Schwarz	W00002
<input type="checkbox"/>	ESCI (CDC)	Rohde & Schwarz	E00001
<input type="checkbox"/>	HFH2-Z2	Rohde & Schwarz	E00060
<input type="checkbox"/>	VULB 9163 (FF)	Schwarzbeck	E00013
<input type="checkbox"/>	VULB 9160 (CDC)	Schwarzbeck	E00011



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Revision: 1.0

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Base Unit

100393-AU02+W01

Page 18 of 39

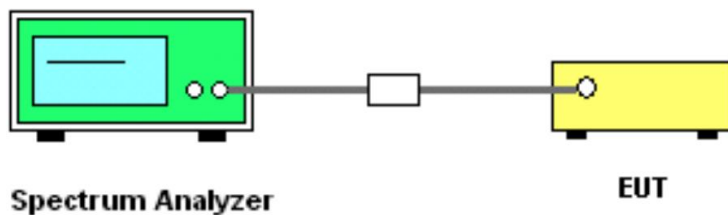
5.3 Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

5.4 Test procedure

1. The test is performed in accordance with FCC Public Notice KBD 558074
2. The transmitter output (antenna port) was connected to the spectrum analyser.
3. The unit was operated in continuous transmit mode with modulation.
4. Set RBW of spectrum analyzer to 3kHz and VBW to 10kHz. Set Detector to Peak, Trace to Max Hold.
5. Set the span to 1.5MHz and the sweep time to 500s and record the maximum peak value.
6. Mark the frequency with maximum peak power as the center of the display of the spectrum.

5.5 Test setup



Picture 8: Test setup for power spectral density measurement

5.6 Test Deviation

There is no deviation with the original standard.

5.7 EUT operation during test

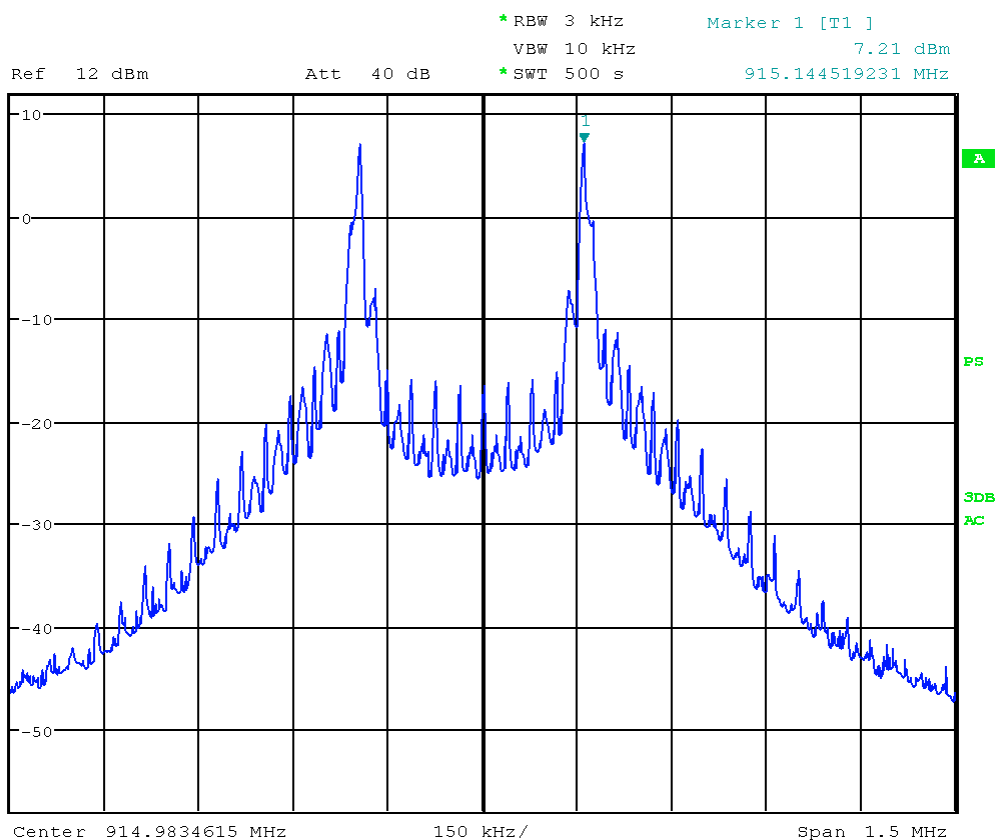
The EUT was programmed to be in continuously transmitting mode.

5.8 Test result of power spectral density

Channel	Frequency (MHz)	Power density (dBm)	Max. limit (dBm)	Result
1	915 MHz	7.21	8.0	Passed



1 PR
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26.Aug 10 18:13

Picture 9: Power spectral density chart



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Base Unit

100393-AU02+W01

Page 20 of 39

6 6dB spectrum bandwidth measurement

according to CFR 47 Part 15 section 2.247(a)(2)

6.1 Test location

- ☒ Conducted measurement
- ☐ Scan with peak detector in 3 m CDC
- ☐ CISPR measurement with quasi peak detector on 10m open area test site.
- ☐ Measurement with peak detector on 3m open area test site

Description	Manufacturer	Inventory No.
CDC	Albatross Projects	E00026
Open area test site	EMV TESTHAUS GmbH	E00354

6.2 Test Instruments

	Description	Manufacturer	Inventory No.
<input type="checkbox"/>	ESCS 30 (FF)	Rohde & Schwarz	E00003
<input checked="" type="checkbox"/>	ESU 26	Rohde & Schwarz	W00002
<input type="checkbox"/>	ESCI (CDC)	Rohde & Schwarz	E00001
<input type="checkbox"/>	HFH2-Z2	Rohde & Schwarz	E00060
<input type="checkbox"/>	VULB 9163 (FF)	Schwarzbeck	E00013
<input type="checkbox"/>	VULB 9160 (CDC)	Schwarzbeck	E00011



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 Revision: 1.0

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 Base Unit

100393-AU02+W01

Page 21 of 39

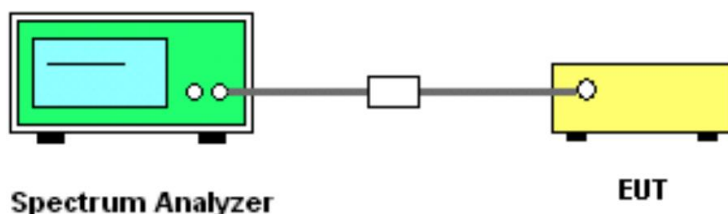
6.3 Limit

Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

6.4 Test procedure

1. The test is performed in accordance with FCC Public Notice KBD 558074
2. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
3. The unit was operated in continuous transmit mode with modulation.
4. The resolution bandwidth of 100 kHz and the video bandwidth of 100 kHz were used.
5. Measured the spectrum width with power higher than 6dB below carrier. The transmitter output (antenna port) was connected to the spectrum analyser.

6.5 Test setup



Picture 10: Test setup for 6dB spectrum bandwidth measurement

6.6 Test deviation

There is no deviation with the original standard.

6.7 EUT operation during test

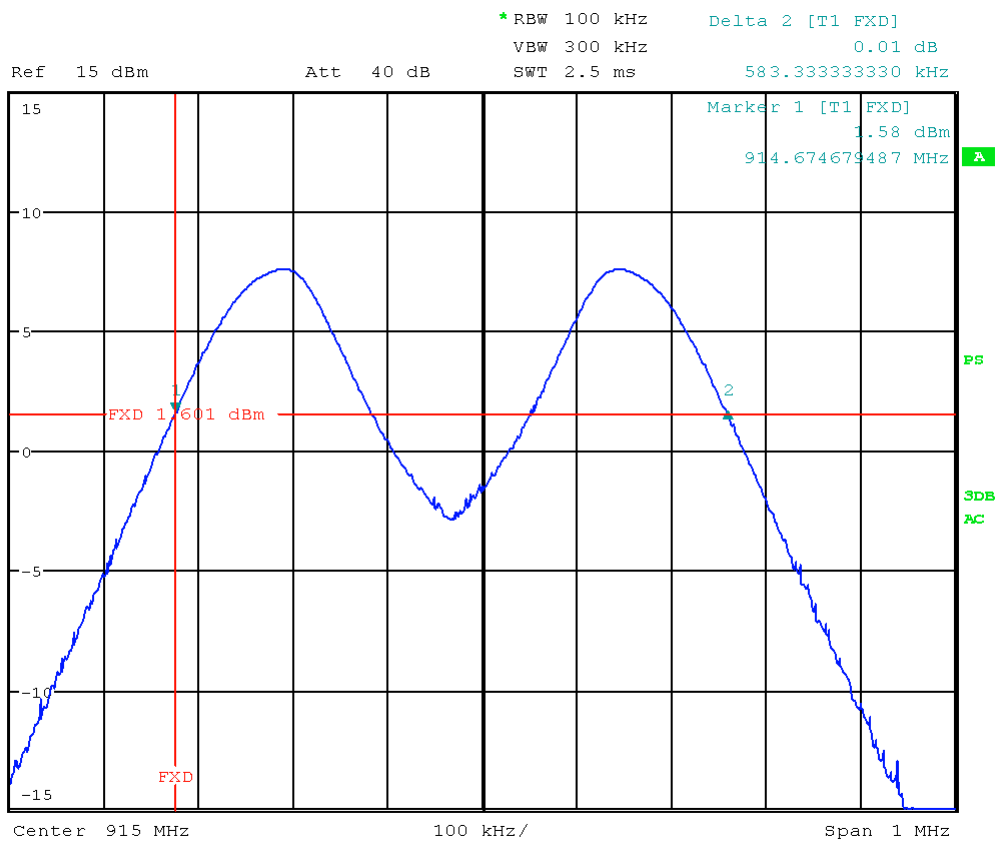
The EUT was programmed to be in continuously transmitting mode.

6.8 Test result of 6dB spectrum bandwidth

Channel	Frequency (MHz)	6 dB bandwidth (kHz)	Min. limit (kHz)	Result
1	915	583.33	500	Passed



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Picture 11: 6dB spectrum bandwidth chart



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Revision: 1.0

Inventory Systems GmbH

Base Unit

100393-AU02+W01

Page 23 of 39

7 Radiated emission measurement (<1 GHz)

according to CFR 47 Part 15, section 15.205(a), 15.209(a), 15.247(d)

7.1 Test Location

- ☒ Scan with peak detector in 3 m CDC.
- ☒ Final CISPR measurement with quasi peak detector on 3 m open area test site.

Description	Manufacturer	Inventory No.
CDC	Albatross Projects	E00026
Open site area	EMV TESTHAUS GmbH	E00354

7.2 Test instruments

	Description	Manufacturer	Inventory No.
<input checked="" type="checkbox"/>	ESCS 30 (FF)	Rohde & Schwarz	E00003
<input type="checkbox"/>	ESU 26	Rohde & Schwarz	W00002
<input checked="" type="checkbox"/>	ESCI (CDC)	Rohde & Schwarz	E00001
<input checked="" type="checkbox"/>	VULB 9163 (FF)	Schwarzbeck	E00013
<input checked="" type="checkbox"/>	VULB 9160 (CDC)	Schwarzbeck	E00011
<input type="checkbox"/>	HFH2-Z2	Rohde & Schwarz	E00060
<input checked="" type="checkbox"/>	Feedline OATS	Huber & Suhner	200024



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Germany
Revision: 1.0

Inventory Systems GmbH
Base Unit

100393-AU02+W01

Page 24 of 39

7.3 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequency [MHz]	Field strength Fs [μV/m]	Field strength [dBμV/m]	Measurement distance d [m]
30 – 88	100	40	3
88 – 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

7.4 Test procedure

1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The receiving antenna was placed 3 meters from the turntable. The test setup was placed inside a compact diagnostic chamber.
2. Power on the EUT and all peripherals.
3. The broadband antenna was set to vertical polarization.
4. The EMI receiver performed a scan from 30MHz to 1000MHz with the detector set to peak and the measurement bandwidth to 120 kHz.
5. The turn table was rotated to 6 different positions ($360^\circ / 6$) and the antenna polarization was changed to horizontal.
6. Repeat the test procedure at step 4 and 5.
7. The test setup was then placed in an OATS at 3 m distance and all peak values over or with less distance to limit then 6dB were marked and re-measured with a quasi-peak detector.
8. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
9. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization. The highest value was recorded.



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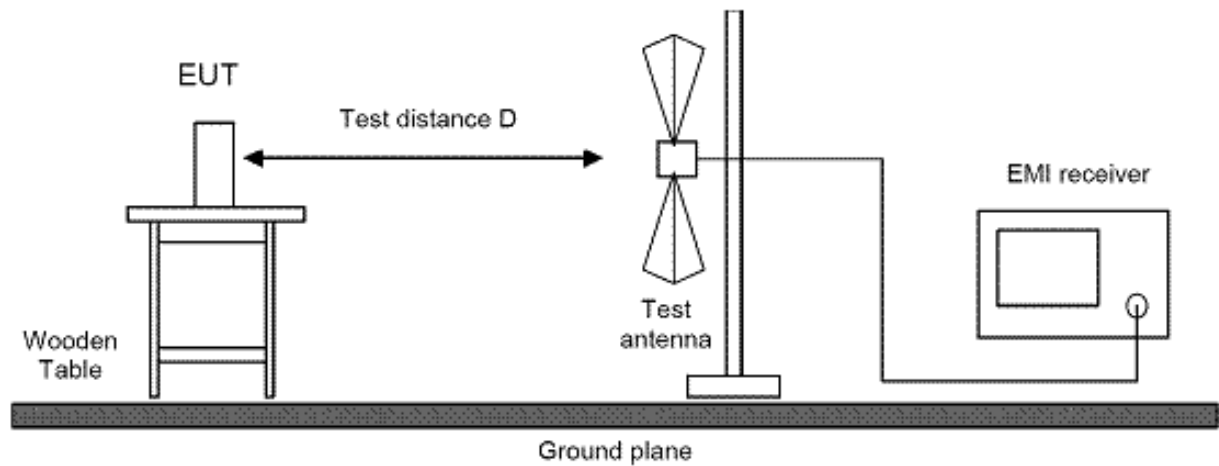
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100393-AU02+W01

Page 25 of 39

7.5 Test setup



Picture 12: Test setup for radiated emission measurement (< 1 GHz)

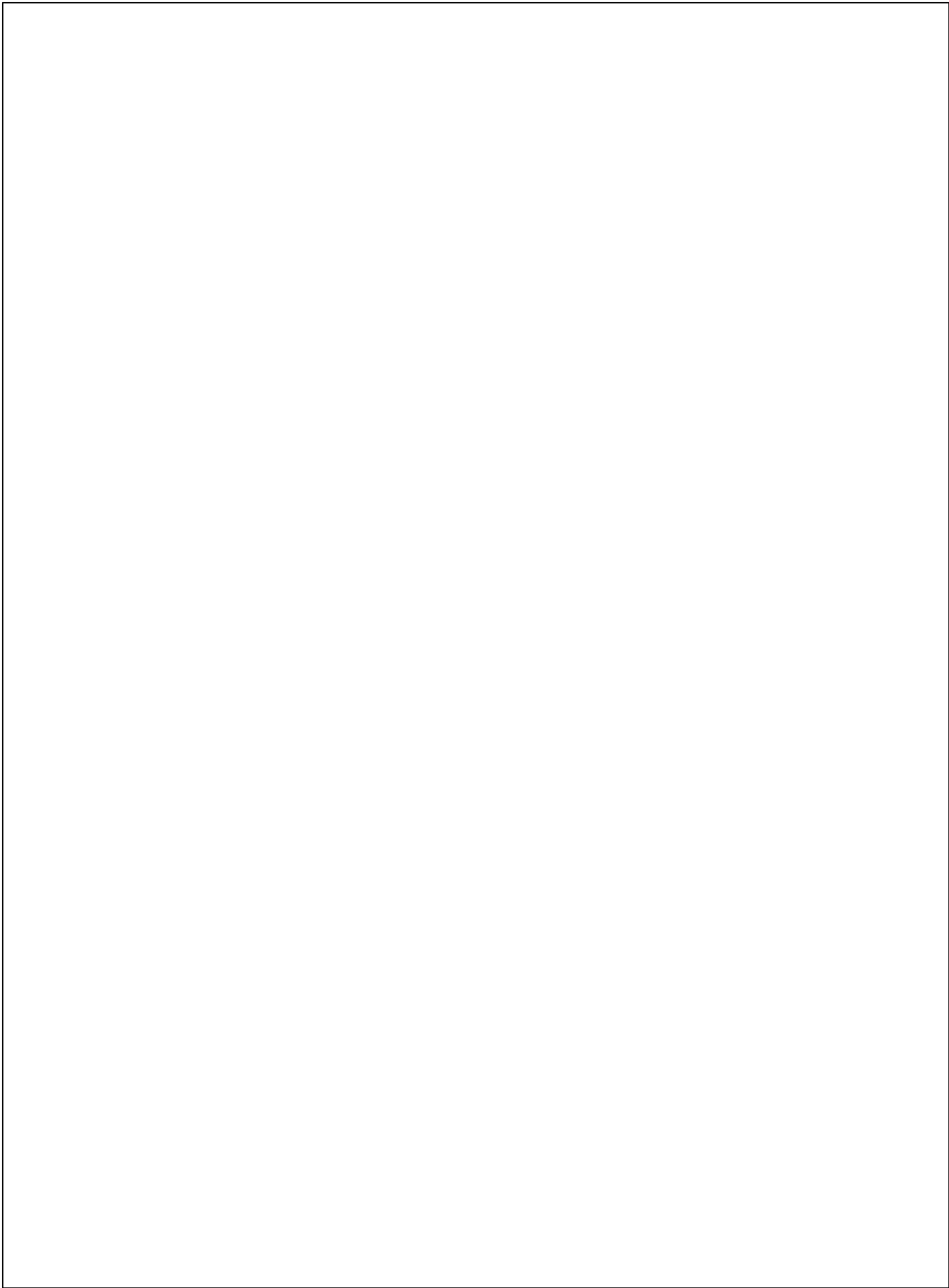
7.6 Test deviation

There is no deviation with the original standard.

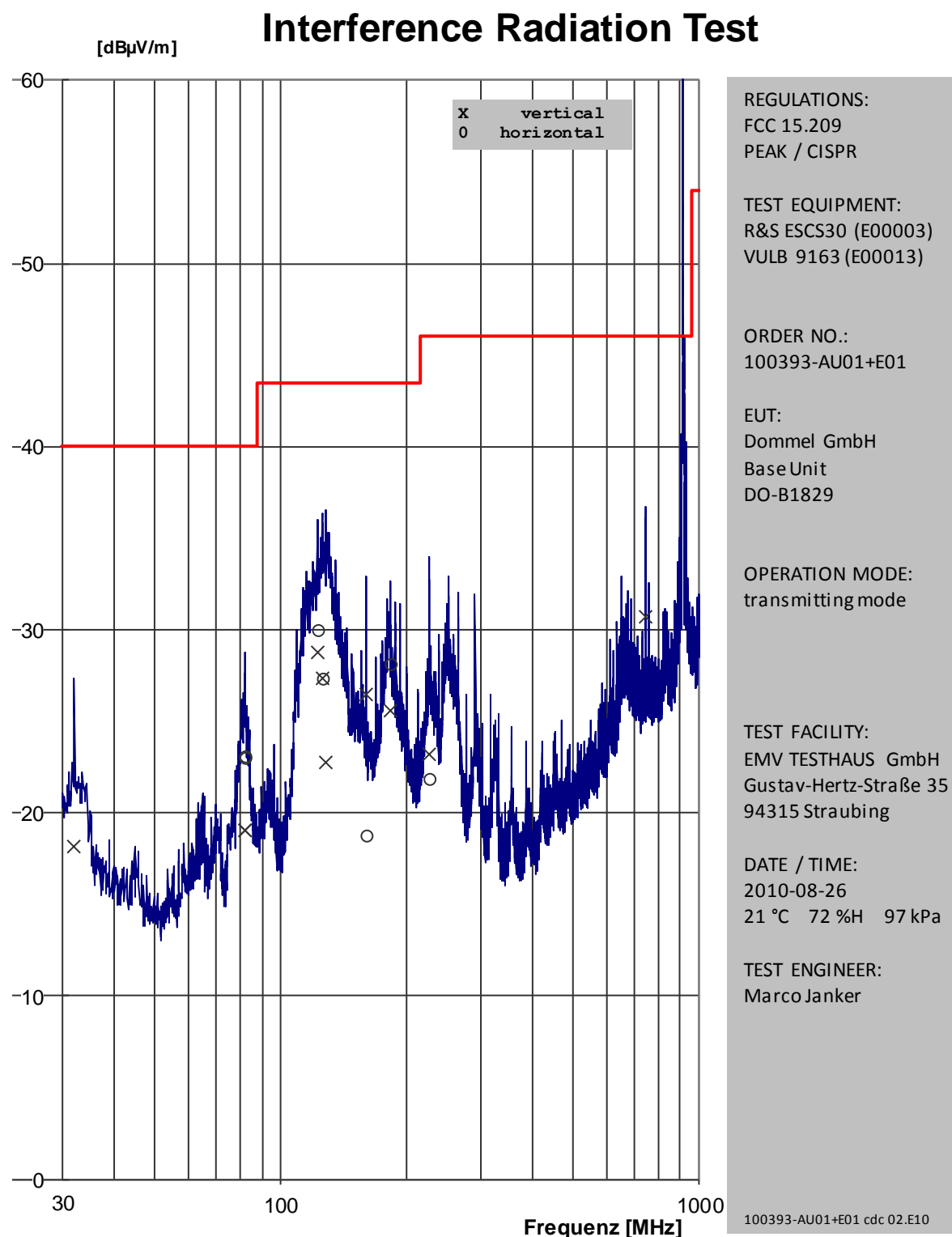
7.7 EUT operation during test

The EUT was programmed to be in continuously transmitting mode.

Comments: The disturbance at 915MHz is the fundamental frequency which is excluded from the measurement result.



7.8 Test result



Picture 13: Radiated emission 30 MHz – 1000MHz (TX mode)



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Germany
Revision: 1.0

Inventory Systems GmbH

Base Unit

100393-AU02+W01

Page 28 of 39

Interference Radiation Test

Freq. [MHz]	U_Rec [dBµV/m]	Limit [dBµV/m]	Corr. [dB]	U_Ant. [dBµV]	delta_U [dB]	Turn- table	Antenna	Pol.	Remark
100393-AU01+E01_cdc.02.F10									
32,00	18,2	40,0	13,2	4,9	21,9	210°	121 cm	V	
81,90	23,0	40,0	9,9	13,1	17,0	215°	223 cm	H	
81,90	19,0	40,0	9,9	9,1	21,0	315°	175 cm	V	
81,90	19,0	40,0	9,9	9,1	21,0	327°	165 cm	V	
81,90	23,2	40,0	9,9	13,3	16,9	230°	208 cm	H	
122,10	30,0	43,5	11,4	18,6	13,5	319°	283 cm	H	
122,10	28,8	43,5	11,4	17,4	14,7	162°	109 cm	V	
125,10	27,3	43,5	11,0	16,3	16,2	323°	291 cm	H	
125,10	27,4	43,5	11,0	16,4	16,1	162°	110 cm	V	
128,00	22,7	43,5	10,7	12,1	20,8	130°	100 cm	V	
160,00	18,8	43,5	10,0	8,8	24,7	190°	201 cm	H	
160,00	26,4	43,5	10,0	16,4	17,1	319°	110 cm	V	
182,00	28,2	43,5	11,2	17,0	15,3	303°	116 cm	H	
182,00	25,6	43,5	11,2	14,4	18,0	182°	110 cm	V	
225,90	23,2	46,0	13,0	10,2	22,8	146°	116 cm	V	
225,90	21,9	46,0	13,0	8,9	24,1	190°	116 cm	H	
746,10	30,7	46,0	22,3	8,3	15,3	141°	120 cm	V	

Picture 14: Radiated emission 30 MHz – 1000MHz (TX mode, table)



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Revision: 1.0

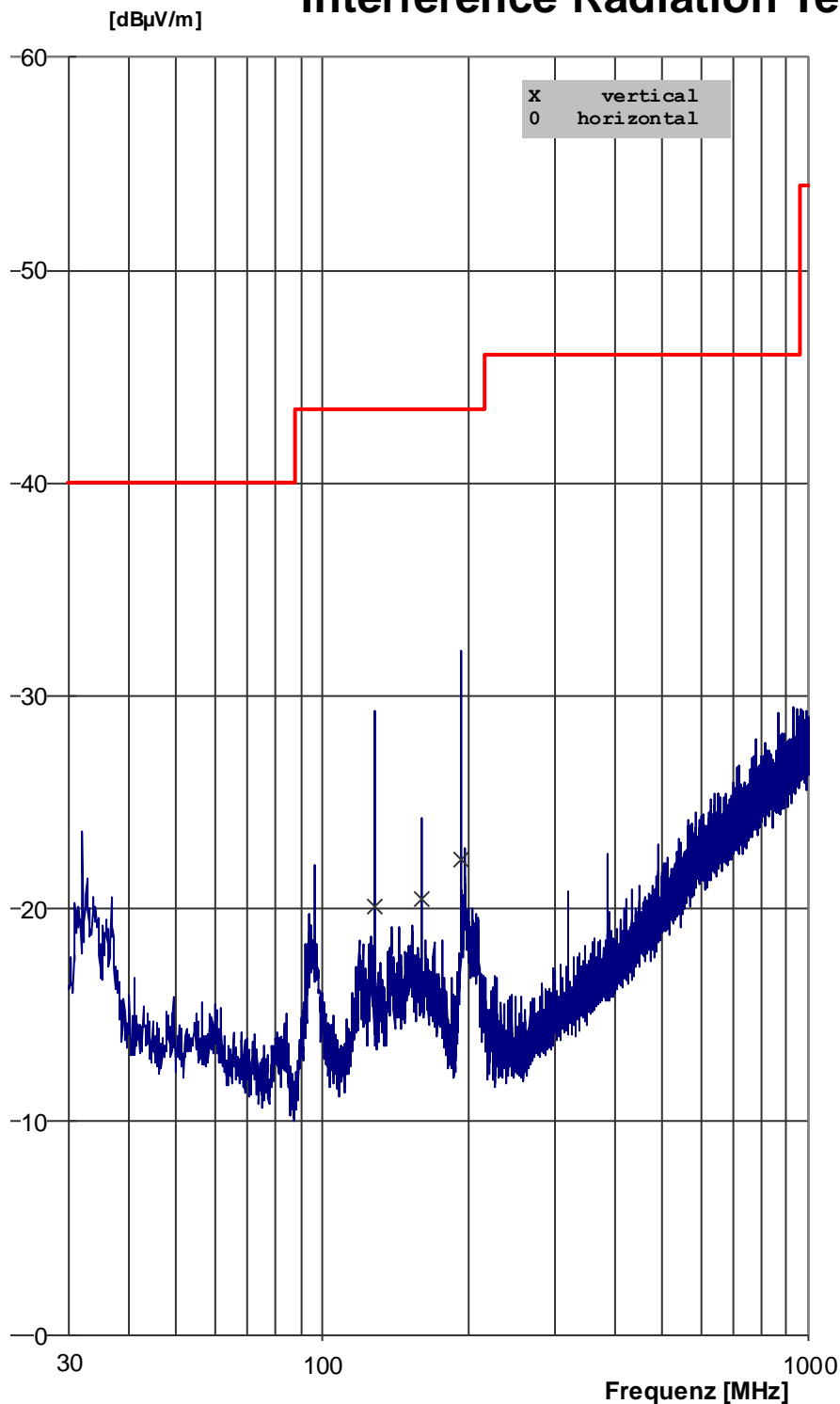
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Base Unit

100393-AU02+W01

Page 29 of 39

Interference Radiation Test



REGULATIONS:

FCC 15.209

PEAK / CISPR

TEST EQUIPMENT:

R&S ESCS30 (E00003)

VULB 9163 (E00013)

ORDER NO.:

100393-AU01+E01

EUT:

Dommel GmbH

Base Unit

DO-B1829

OPERATION MODE:

receive mode

TEST FACILITY:

EMV TESTHAUS GmbH
Gustav-Hertz-Straße 35
94315 Straubing

DATE / TIME:

2010-09-01

22 °C 51 %H 98 kPa

TEST ENGINEER:

Marco Janker

100393-AU01+E01 cdc
02_Kanada.E10

Picture 15: Radiated emission 30 MHz – 1000MHz (RX mode)



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94315 Straubing
Germany
Revision: 1.0

Inventory Systems GmbH

Base Unit

100393-AU02+W01

Page 30 of 39

Interference Radiation Test

Freq. [MHz]	U_Rec [dBµV/m]	Limit [dBµV/m]	Corr. [dB]	U_Ant. [dBµV]	delta_U [dB]	Turn- table	Antenna	Pol.	Remark
128,00	20,1	43,5	0,0	20,1	23,4	270°	100 cm	V	100393-AU01+E01_cdc 02_Kanada.E10
160,00	20,5	43,5	0,0	20,5	23,0	90°	100 cm	V	
192,10	22,3	43,5	0,0	22,3	21,2	180°	100 cm	V	

Picture 16: Radiated emission 30 MHz – 1000MHz (RX mode)



EMV **TESTHAUS** GmbH
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Germany
Revision: 1.0

Inventory Systems GmbH

Base Unit

100393-AU02+W01

Page 31 of 39

8 Radiated emission measurement (>1 GHz)

according to CFR 47 Part 15, section 15.205(a), 15.209(a), 15.247(d)

8.1 Test location

- ☒ Scan with peak detector in 3 m anechoic chamber
- ☒ Final measurement with average and max peak detector.

8.1.1 Location of measurement

Description	Manufacturer	Inventory No.
Anechoic chamber	EMV TESTHAUS GmbH	E00100

8.1.2 Measurement equipment

	Description	Manufacturer	Inventory No.
<input checked="" type="checkbox"/>	ESU26	Rohde & Schwarz	W00002
<input checked="" type="checkbox"/>	AMF-5D-00501800-28-13P	Parzich	W00089
<input type="checkbox"/>	AMF-6F-16002650-25-10P	Parzich	W00090
<input checked="" type="checkbox"/>	BBHA 9170	Schwarzbeck	W00054
<input type="checkbox"/>	BBHA 9170	Schwarzbeck	W00055
<input checked="" type="checkbox"/>	COSB 4-1-26	Conformitas	W00091



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94315 Straubing
Germany
Revision: 1.0

Inventory Systems GmbH

Base Unit

100393-AU02+W01

Page 32 of 39

8.2 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequency [MHz]	Field strength F_s [$\mu\text{V/m}$]	Field strength [dB $\mu\text{V/m}$]	Measurement distance d [m]
30 – 88	100	40	3
88 – 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

8.3 Test procedure

1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The receiving antenna was placed 3 meters from the turntable. The test setup was placed inside a fully anechoic chamber.
2. Power on the EUT and all peripherals. The unit was operated in continuous transmit mode with modulation.
3. The broadband antenna was set to vertical polarization.
4. The EMI receiver performed a scan from 1000 MHz to 10th harmonic of the fundamental frequency with the detector set to peak and the measurement bandwidth set to 1 MHz (VBW \geq 3 MHz). The trace data was recorded with the receiver Max Hold function.
5. The turn table was rotated in intervals of 15°.
6. After a full 360°-turn the antenna polarization was changed to horizontal and the test was repeated at step 4 and 5.
7. After the scan suspicious frequencies were selected and the RBW was set to 1 MHz and the VBW was set to 10Hz and the detector was changed to average reading.
8. The receiving antenna was set to vertical polarization.
9. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
10. The receiving antenna was then set to horizontal polarization and the measurement was repeated at step 9.
11. The highest recorded level was noted.



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94315 Straubing
Germany
Revision: 1.0

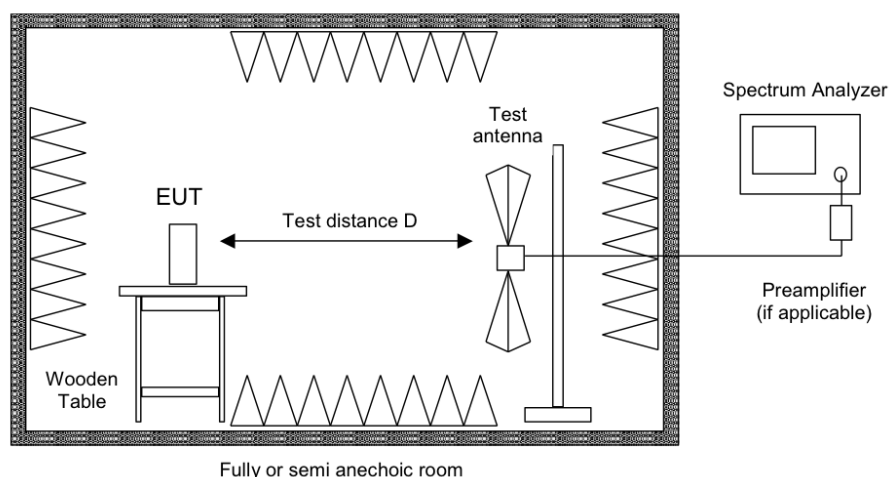
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Base Unit

100393-AU02+W01

Page 33 of 39

8.4 Test setup



Picture 17: Test setup for radiated emission measurement (> 1 GHz)

8.5 Test deviation

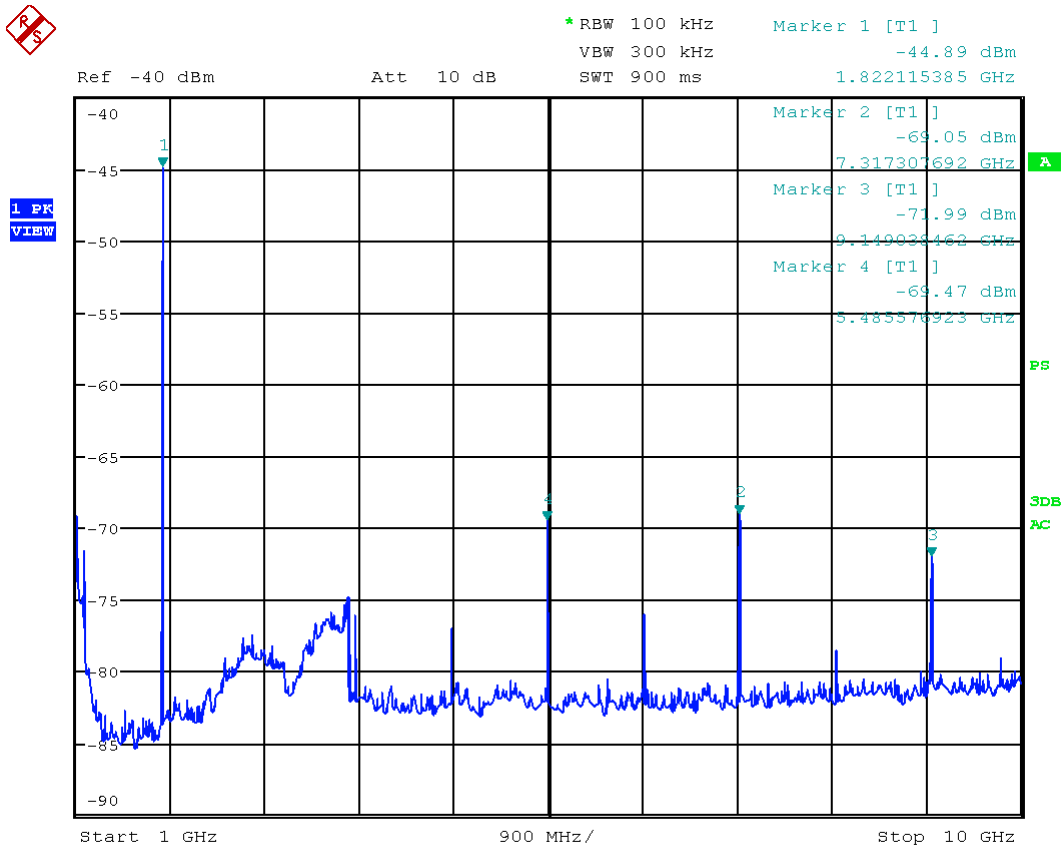
There is no deviation with the original standard.

8.6 EUT operation during test

The EUT was programmed to be in continuously transmitting mode.

8.7 Test result of radiated emission measurement (> 1 GHz)

Frequency (GHz)	Reading (dB μ V/m)	Detector	Limit (dB μ V/m)	Margin	Result
1.8211	-54.0	Average	54	-108	Passed
5.4856	-58.34	Average	54	-112.34	Passed
7.3173	-67.21	Average	54	-121.21	Passed
9.1490	-64.51	Average	54	-118.51	Passed



26.Aug 10 17:58

Picture 18: Radiated emission > 1 GHz (pre-scan)



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Germany
Revision: 1.0

Inventory Systems GmbH

Base Unit

100393-AU02+W01

Page 35 of 39

9 Exposure of humans to RF fields

according to RSS-Gen Issue 2, section 5.5 and
RSS-102 Issue 2, section 2.5

9.1 Antenna type and power calculation

☒ Antenna detachable

$$EIRP = G \cdot CP$$

G: numerical antenna gain
CP: conducted output power [W]

$$EIRP = 3 \cdot 5.83mW = 17.49mW$$

Limit:

$$60 / f [GHz]$$
$$= 60 / 0.915$$
$$= \underline{\underline{65.6mW}}$$

☐ Antenna not detachable

$$EIRP = \frac{(F_s \cdot D)^2}{30}$$

F_s: field strength [V/m]
D: distance between antennas [m]

Output power is less than 65.6 mW, therefore no MPE necessary.

10 Equipment calibration status

Inventory Number	Model Number	Manufacturer	Last calibration	Next calibration	Cycle of calibration
W00002	ESU26	Rohde & Schwarz	Sep 09	Sep 11	2 Years
E00001	ESCI	Rohde & Schwarz	Sep 09	Mar 11	2 Years
E00003	ESCS 30	Rohde & Schwarz	Aug 10	Aug 12	2 Year
E00004	ESH 2-Z5	Rohde & Schwarz	Oct. 08	Oct. 10	2 Years
E00005	ESH 2-Z5	Rohde & Schwarz	Sep 09	Sep 11	2 Years
E00060	HFH2-Z2	Rohde & Schwarz	Oct 08	Oct 11	2 Years
E00012	VULB 9163	Schwarzbeck	Apr. 09	Apr. 11	2 Years
E00013	VULB 9163	Schwarzbeck	Apr. 08	Apr. 10	2 Years
E00011	VULB 9160	Schwarzbeck	Sep. 09	Sep. 11	2 Years
C00015	VC34034	Vötsch	Jan 08	Jan 12	4 Years
C00014	VC4100	Vötsch	Jan 07	Jan 11	4 Years

Table 1: Equipment Calibration status



EMV **TESTHAUS** GmbH
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 94315 Straubing
 Germany
 Revision: 1.0

Inventory Systems GmbH
 Base Unit

100393-AU02+W01

Page 37 of 39

11 Measurement uncertainty

Standard	Description	Max. deviation	k=
DIN EN 55022	Conducted emission AMN (9kHz to 30 MHz)	+/- 4,0 dB	2
DIN EN 55022	Conducted emission ISN LAN (9kHz to 30 MHz)	+/- 4,1 dB	2
DIN EN 55022	Radiated emission open field (30 MHz to 1 GHz)	+/- 4,5 dB	2
DIN EN 55022	Radiated emission absorber chamber (> 1000 MHz)	+/- 5,4 dB	2
DIN EN 61000-4-2	ESD	inside specification *	
DIN EN 61000-4-3	Radiated immunity	+/- 2,7 dB ^{a.)}	1,64
DIN EN 61000-4-4	Burst	inside specification *	
DIN EN 61000-4-5	Surge	inside specification *	
DIN EN 61000-4-6	Conducted immunity with CDN (150 kHz to 230 MHz)	+/- 2,6 dB ^{b.)}	1,64
DIN EN 61000-4-6	Conducted immunity with BCI (150 kHz to 230 MHz)	+/- 2,8 dB ^{c.)}	1,64
DIN EN 61000-4-8	Magnetic field	+/- 1,5 dB	2
DIN EN 61000-4-11	Dips	inside specification *	2
DIN EN 61000-3-2	Harmonic currents	+/- 0,2 % ^{d.)}	1
DIN EN 61000-3-3	Flicker	annotation ^{e.)}	

Table 2: Measurement uncertainty

Comment: The uncertainty stated is the expanded uncertainty obtained by multiplying the standard uncertainty by the coverage factor k. If k=2 the value of the measurements lies within the assigned range of values with a probability of 95 %.

* The specific requirements regarding to the standard was kept

- a.) To maintain the claimed test level with a probability of 90 % an additional test level of 38 % percent must be added.
- b.) To maintain the claimed test level with a probability of 90 % an additional test level of 35 % percent must be added.
- c.) To maintain the claimed test level with a probability of 90 % an additional test level of 39 % percent must be added.
- d.) Measuring uncertainty (current): +/- 0,2% (fundamental oscillation), +/- 0,2% (rated current), voltage metering +/- 0,2% of the reading. Impacts on the measuring system by the EUT are not included.
- e.) Measuring uncertainty (flicker): dc and dmax +/- 5%, Pst +/- 8%. Impacts on the measuring system by the EUT are not included.



EMV **TESTHAUS** GmbH
Gustav-Hertz-Straße 35
94315 Straubing
Germany
Revision: 1.0

Inventory Systems GmbH

Base Unit

100393-AU02+W01

Page 38 of 39

12 Summary

The EMC Regulations according to the marked specifications are

☒ **KEPT**

The EUT does fulfill the general approval requirements mentioned.

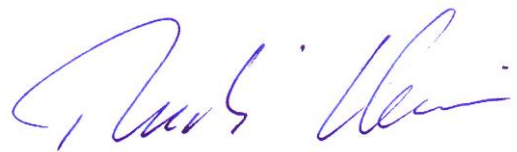
☐ **NOT KEPT**

The EUT does not fulfill the general approval requirements mentioned.

Place, Date: Straubing, September 20, 2010



Marco Janker
EMI / EMC Test Engineer



Rudolf Klein
GM / EMV **TESTHAUS** GmbH



EMV **TESTHAUS** GmbH
Gustav-Hertz-Straße 35
94315 Straubing
Germany
Revision: 1.0

Inventory Systems GmbH
Base Unit

100393-AU02+W01

Page 39 of 39