

# Test Report

**Customer:**

Inventory Systems GmbH

Heerstraße 2

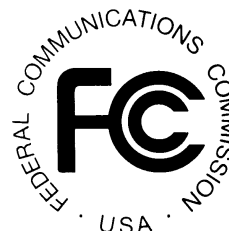
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## RF test report

100393-AU02+W03



Industry  
Canada

Industrie  
Canada

**Inventory Systems GmbH  
USB Configurator**

DO-G1116



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

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94315 Straubing  
Tel.: +49 9421 56868-0  
Fax: +49 9421 56868-100  
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## 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

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EMV **TESTHAUS** GmbH



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# 1 Test regulations

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	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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## 2 Equipment under Test (EUT)

Product type: USB Configurator

Model Name: DO-G1116

Manufacturer: Dommel GmbH  
Westring 15  
91717 Wassertrüdingen

Serial number:

FCC ID: YRADO-G1116

IC: 9255A-G1116

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: Integrated PCB antenna  
☐ detachable ☒ not detachable

Power supply: USB powered  
nominal: 5.0 V

Temperature range: 0°C to +70°C



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## 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 configuration stick that is used to transfer changes in the configuration to the main units. The unit operates at a frequency of 915 MHz.

## 2.3 Operation mode

The EUT was tested in the following operation modes:

- Tested in continuous transmit mode with modulation
- Tested in receive mode

## 2.4 Configuration

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

Device	Model:	S/N
USB Configurator	DO-G1116	
Testnotebook	Pro 600 IW	N/A

### Used cables

Numbers:	Description: (type / lengths / remarks)	Serial No
1	USB cable, shielded, 0.75 m	N/A
1	AC power cable, unshielded, 1.5 m	N/A



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## 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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### 3.3 Limits

Frequency [MHz]	Quasi-peak [dB $\mu$ V]	Avarage [dB $\mu$ 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  $\mu$ 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 via USB to a test notebook. This notebook was 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.



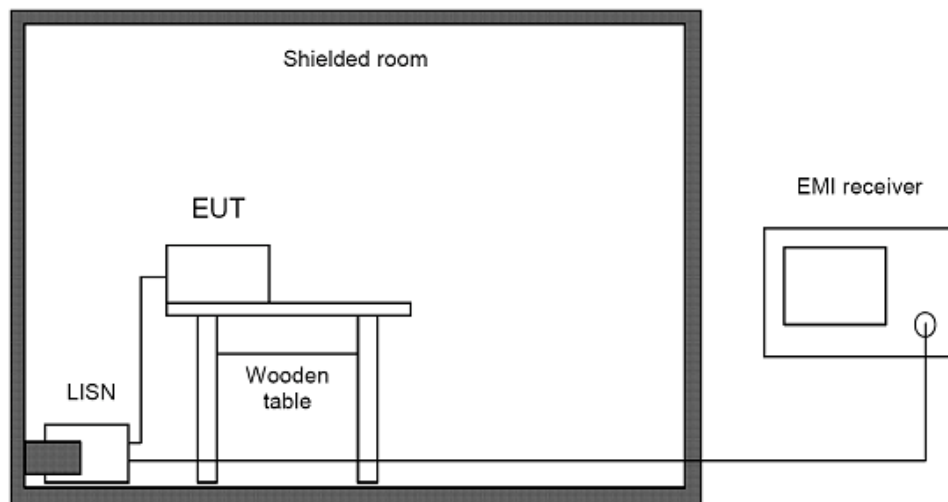
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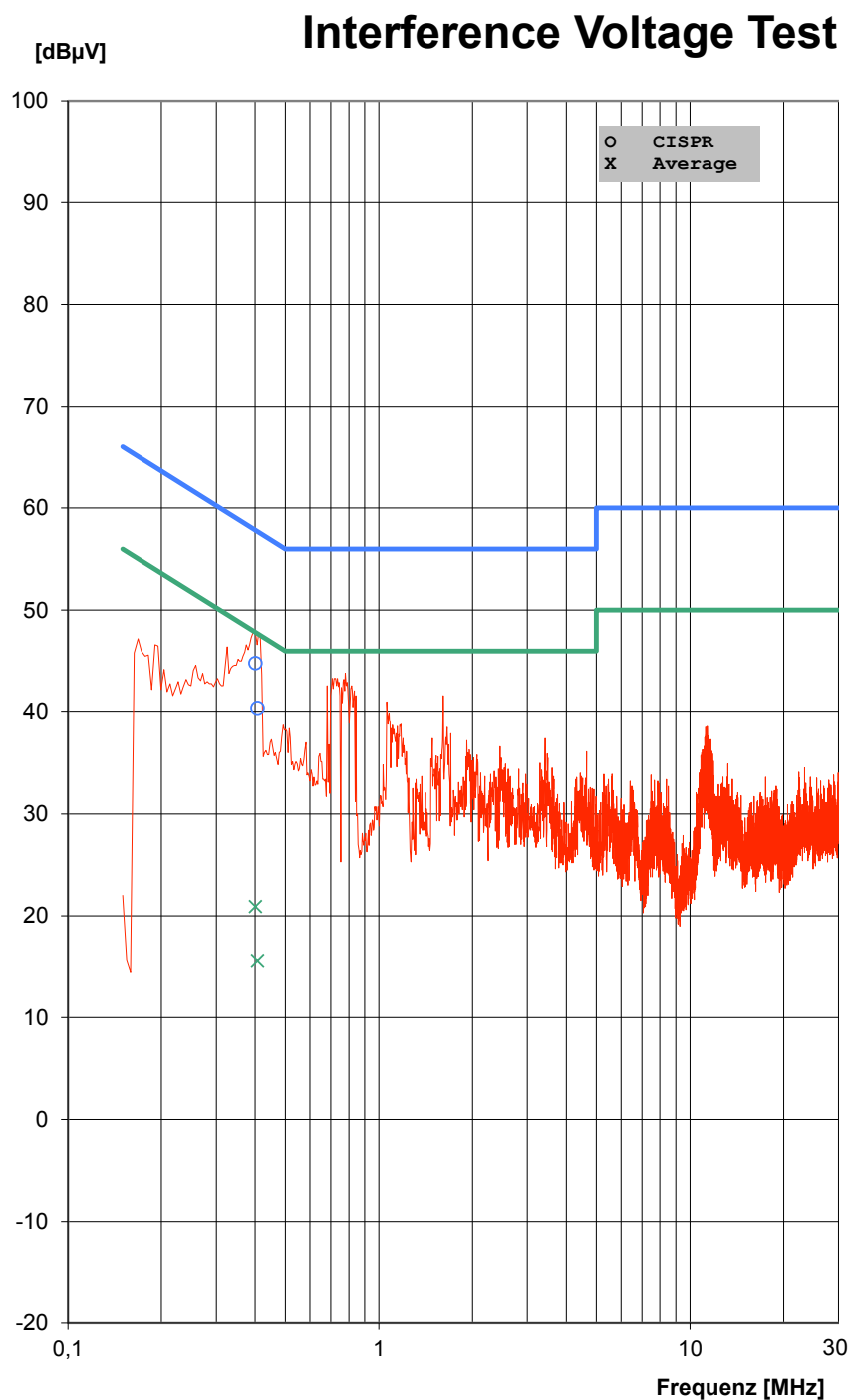
### 3.5 Test setup



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)  
ESH 2-Z5 (E00005)

ORDER NO.:  
100393-AU02+E03

EUT:  
Dommel GmbH  
USB Configurator  
DO-G1116

OPERATION MODE:  
  
connected to Notebook

Mains 120V AC /60Hz  
Phase

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

DATE / TIME:  
2010-09-01 15:38:43  
21 °C 53 %H 98 kPa

TEST ENGINEER:  
Marco Janker

100393-AU01+E03 ss\_j1\_01.E10

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



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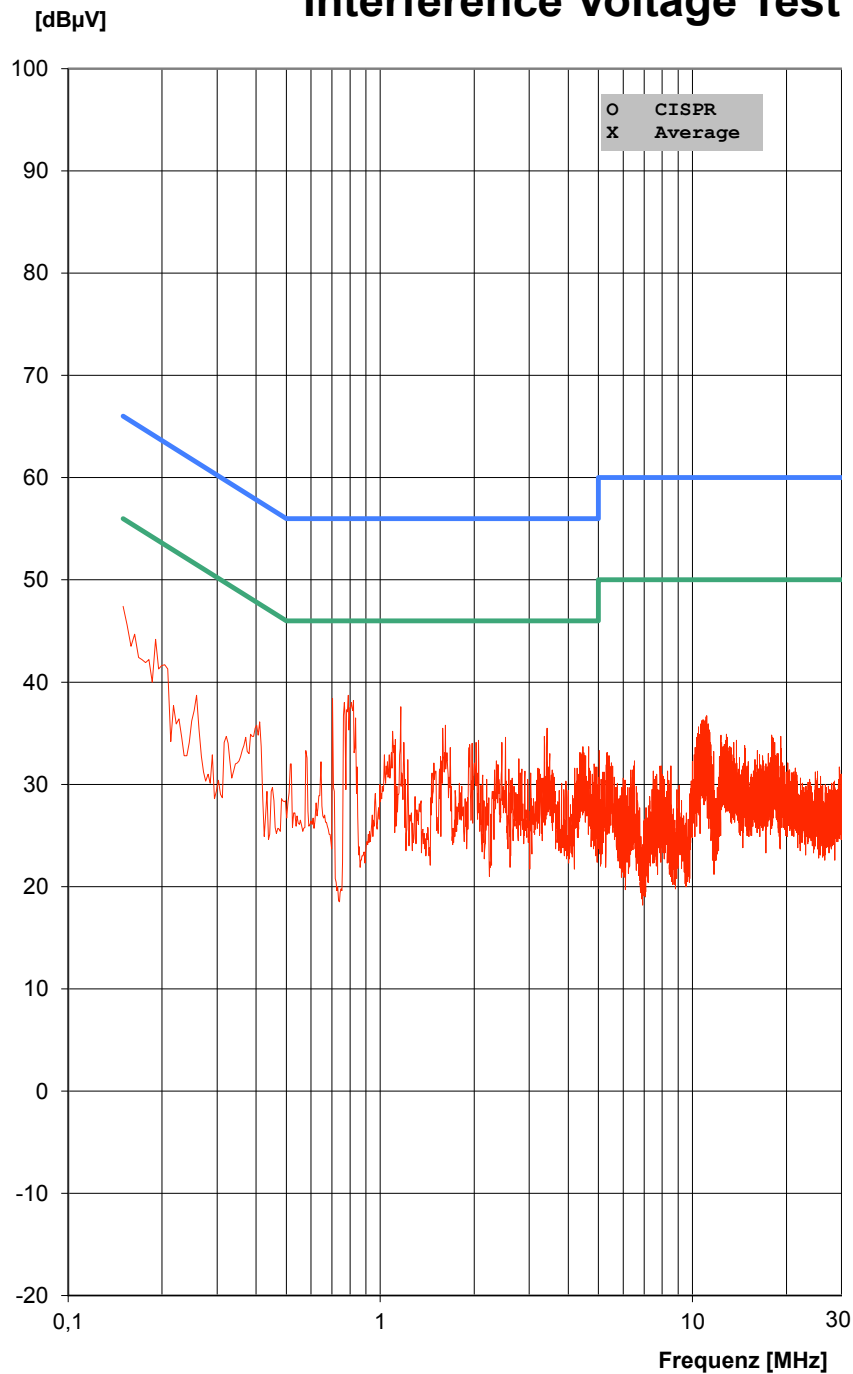
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## Interference Voltage Test

Freq. [MHz]	U_CISPR [dBµV]	Limit [dBµV]	delta_U [dB]	U_AV [dBµV]	Limit [dBµV]	delta_U [dB]	Corr. [dB]	Remark
0,41	40,3	57,7	17,4	15,6	47,7	32,1	0,0	100393-AU01+E03 ss_l1_01.E10
0,40	44,8	57,8	13,0	20,9	47,8	26,9	0,0	

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

# Interference Voltage Test



REGULATIONS:  
FCC 15.207  
PEAK / CISPR / AV

TEST EQUIPMENT:  
ESCS30 (E00003)  
ESH 2-Z5 (E00005)

ORDER NO.:  
100393-AU02+E03

EUT:  
Dommel GmbH  
USB Configurator  
DO-G1116

OPERATION MODE:  
  
connected to Notebbok

Mains 120V AC /60Hz  
Neutral

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

DATE / TIME:  
2010-09-01 15:38:15  
21 °C 53 %H 98 kPa

TEST ENGINEER:  
Marco Janker

100393-AU01+E03 ss\_n\_01.E10

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



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## 4 Maximum output power

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

### 4.1 Test location

- ☐ Conducted measurement  
☒ Radiated measurement

Description	Manufacturer	Inventory No.
CDC	Albatross Projects	E00026
Anechoic chamber	EMV <b>TESTHAUS</b> GmbH	E00100
Open area test site	EMV <b>TESTHAUS</b> GmbH	E00354

### 4.2 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 checked="" type="checkbox"/>	VULB 9163 (Anechoic)	Schwarzbeck	E00012
<input type="checkbox"/>	VULB 9160 (CDC)	Schwarzbeck	E00011



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## 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 unit was placed on a non conductive table inside an anechoic chamber at a distance of 3 m.
2. The unit was turned on and the transmitter was set to continuous transmit mode.
3. Test was performed in accordance with Measurement of Digital Transmission Systems Operating under Section 15.247 and FCC Public Notice KBD 558074 (Alternative test procedure).
4. To measure the maximum field strength the unit was rotated by 360° and the receiving antenna was set to vertical and horizontal polarization. In addition the unit was rotated around its 3 axis of rotation.
5. The maximum power was calculated with following formula:

$$P = \frac{(E \cdot d)^2}{(30 \cdot G)}$$

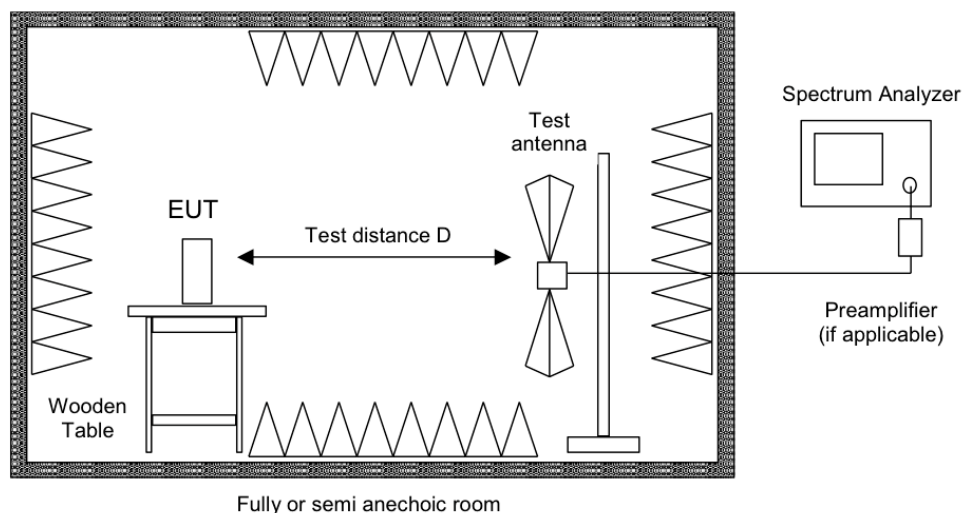
E = the measured maximum field strength in V/m

G = numeric gain of transmitting antenna over an isotropic radiator (assumed to be 1)

d = the distance in meters from which the field strength was measured (3 m)

P = the power in watts

## 4.5 Test setup



Picture 5: Test setup for 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 output power

$$P = \frac{(E \cdot d)^2}{(30 \cdot G)}$$

$$P = \frac{(0.0447 \frac{V}{m} \cdot 3m)^2}{(30 \cdot 1)}$$

$$P = 0.5999mW$$

$$\Rightarrow P = -2.22dBm$$

Channel	Frequency (MHz)	Calculated power (dBm)	Max. power (dBm)	Result
1	914.528	-2.22	30	Passed



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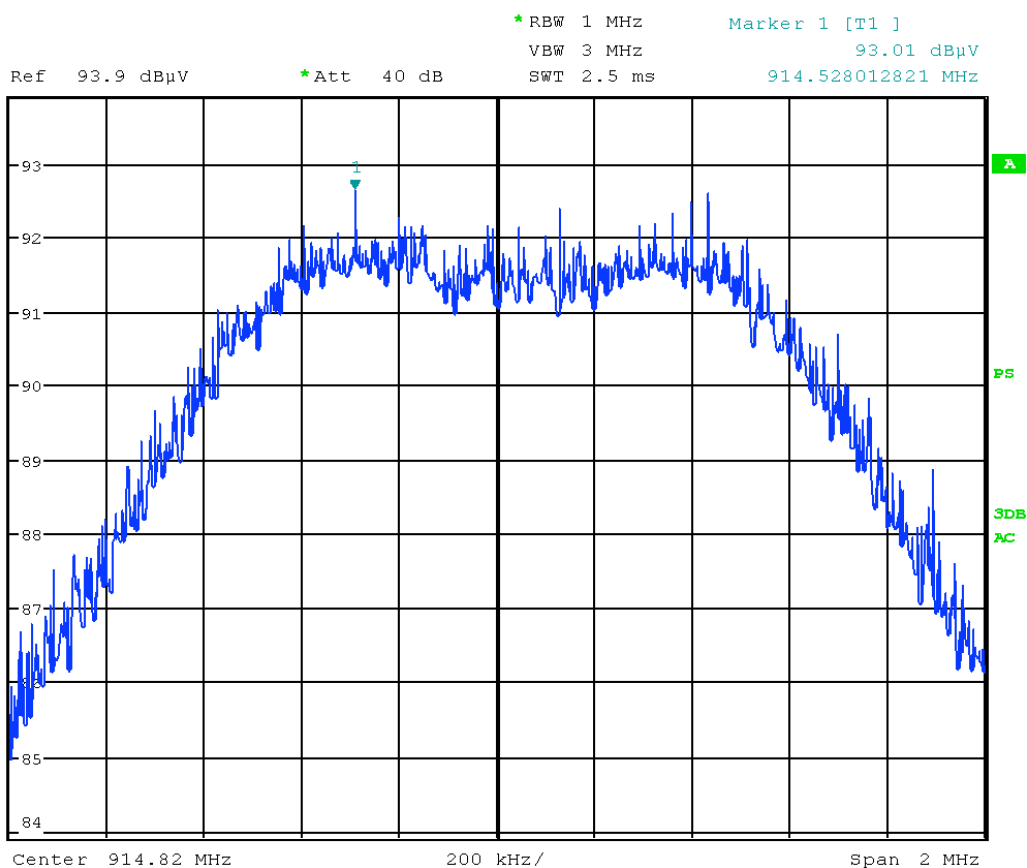
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1 AP  
CLRWR



01.Sep 10 14:34

Picture 6: Spectrum graph of field strength measurement



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# 5 Power spectral density measurement

according to CFR 47 Part 15 section 2.247(e)

## 5.1 Test location

- ☐ Conducted measurement  
☒ Radiated measurement

Description	Manufacturer	Inventory No.
CDC	Albatross Projects	E00026
Anechoic chamber	EMV <b>TESTHAUS</b> GmbH	E00100
Open area test site	EMV <b>TESTHAUS</b> 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 checked="" type="checkbox"/>	VULB 9163 (Anechoic)	Schwarzbeck	E00012
<input type="checkbox"/>	VULB 9160 (CDC)	Schwarzbeck	E00011



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## 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.

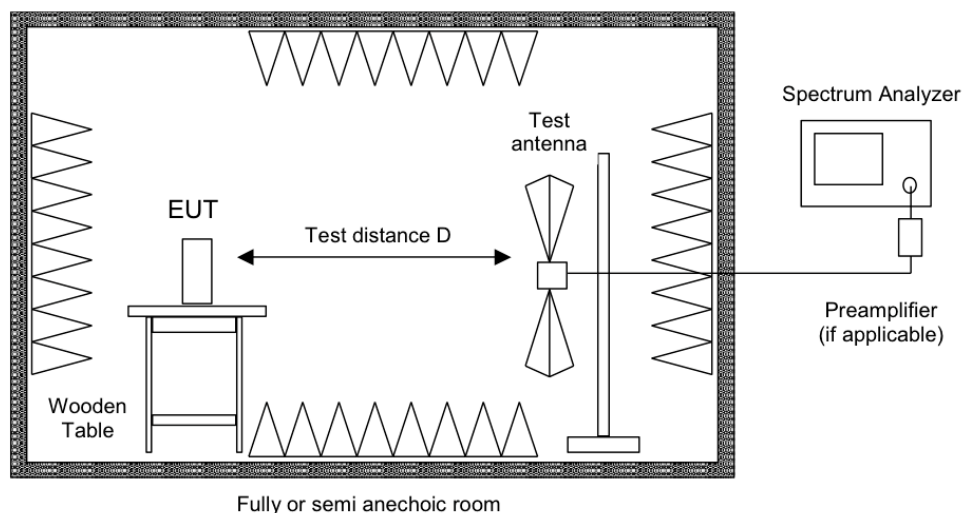
## 5.4 Test procedure

1. The unit was placed on a non conductive table inside an anechoic chamber at a distance of 3 m.
2. The unit was turned on and the transmitter was set to continuous transmit mode.
3. Test was performed in accordance with Measurement of Digital Transmission Systems Operating under Section 15.247 and FCC Public Notice KBD 558074 (Alternative test procedure).
4. To measure the maximum field strength the unit was rotated by 360° and the receiving antenna was set to vertical and horizontal polarization. In addition the unit was rotated around its 3 axis of rotation.
5. Set RBW of spectrum analyzer to 3kHz and VBW to 10kHz. Set Detector to Peak, Trace to Max Hold.
6. Set the span to 300 kHz and the sweep time to 100s and record the maximum peak value.
7. Mark the frequency with highest point of the maximized fundamental emission.
8. From the peak level obtained in (7), derive the field strength E. Using the equation

$$P = \frac{(E \cdot d)^2}{(30 \cdot G)}$$

calculate the power level for comparison to the +8 dBm limit.

## 5.5 Test setup



Picture 7: Test setup for 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

$$P = \frac{(E \cdot d)^2}{(30 \cdot G)}$$

$$P = \frac{(0.0311 \frac{V}{m} \cdot 3m)^2}{(30 \cdot 1)}$$

$$P = 0.289mW$$

$$\Rightarrow P = -5.39dBm$$

Channel	Frequency (MHz)	Power density (dBm)	Max. limit (dBm)	Result
1	915.172	-5.39	+8.00	Passed



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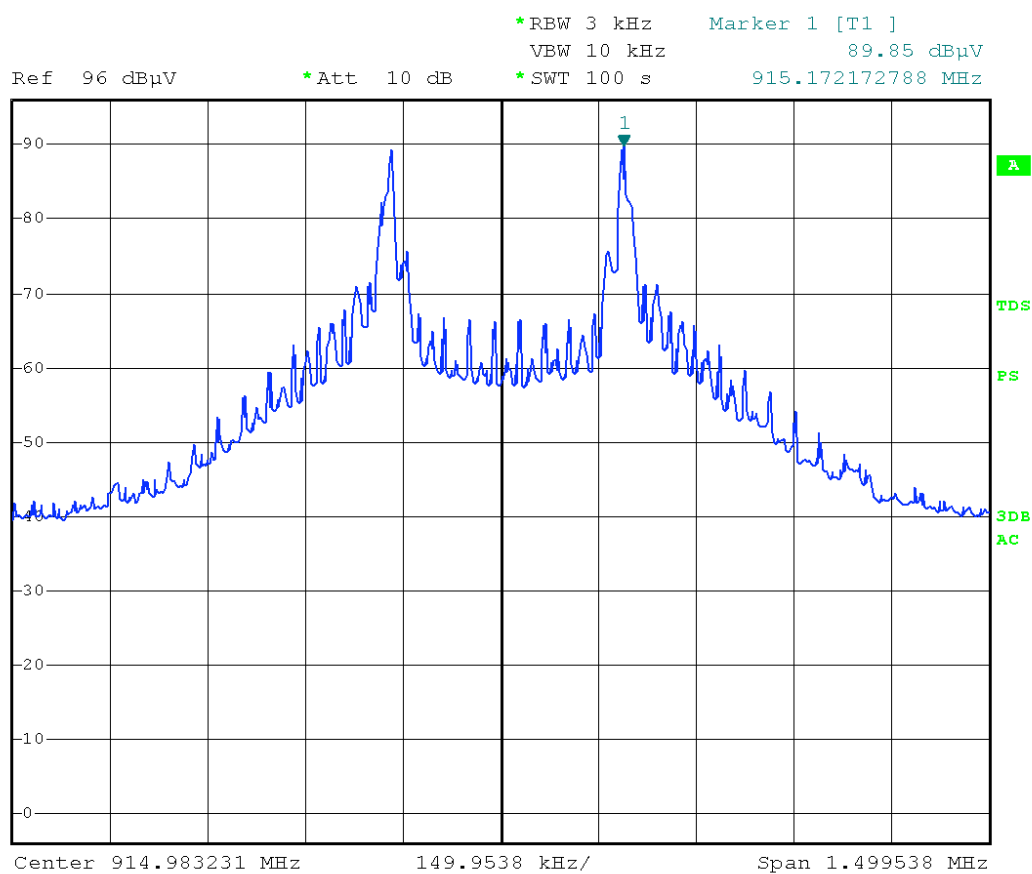
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1 PK  
MAXH



01.Sep 10 15:27

Picture 8: Spectrum graph of power spectral density measurement



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## 6 6dB spectrum bandwidth measurement

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

### 6.1 Test location

- ☐ Conducted measurement  
☒ Radiated measurement

Description	Manufacturer	Inventory No.
CDC	Albatross Projects	E00026
Anechoic chamber	EMV <b>TESTHAUS</b> GmbH	E00100
Open area test site	EMV <b>TESTHAUS</b> 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 checked="" type="checkbox"/>	VULB 9163 (Anechoic)	Schwarzbeck	E00012
<input type="checkbox"/>	VULB 9160 (CDC)	Schwarzbeck	E00011



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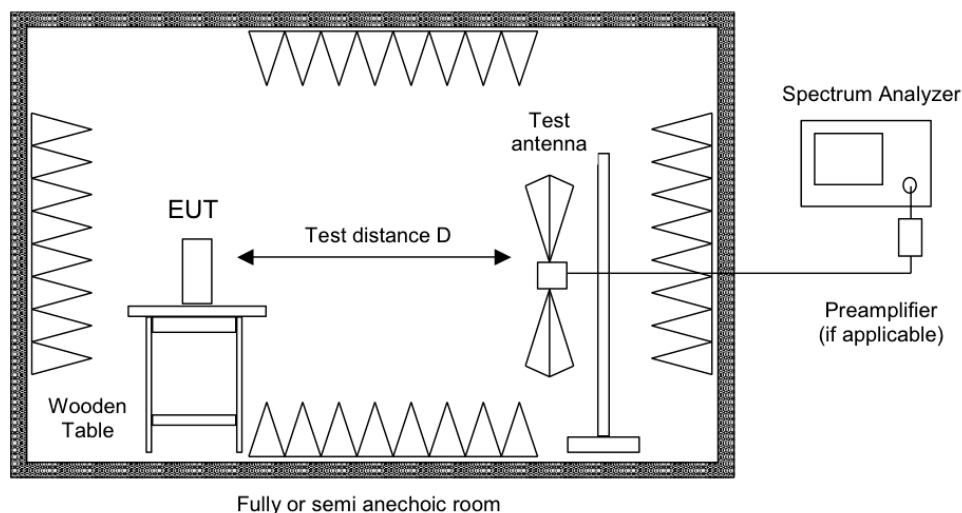
## 6.3 Limit

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 unit was placed on a non conductive table inside an anechoic chamber at a distance of 3 m.
2. The unit was turned on and the transmitter was set to continuous transmit mode.
3. Test was performed in accordance with Measurement of Digital Transmission Systems Operating under Section 15.247 and FCC Public Notice KBD 558074.
4. To measure the maximum bandwidth the unit was rotated by 360° and the receiving antenna was set to vertical and horizontal polarization. In addition the unit was rotated around its 3 axis of rotation.
5. The resolution bandwidth of 100 kHz and the video bandwidth of 300 kHz were used.
6. To derive the 6 dB bandwidth the marker of the spectrum analyzer was set to 6 dB below the carrier and the value was recorded.

## 6.5 Test setup



Picture 9: Test setup for 6dB spectrum bandwidth measurement

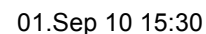
## 6.6 Test deviation

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 dB bandwidth (kHz)	Min. limit (kHz)	Result
584.82	500	Passed



Picture 10: Spectrum graph of 6dB spectrum bandwidth measurement



# 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 <b>TESTHAUS</b> 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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## 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.

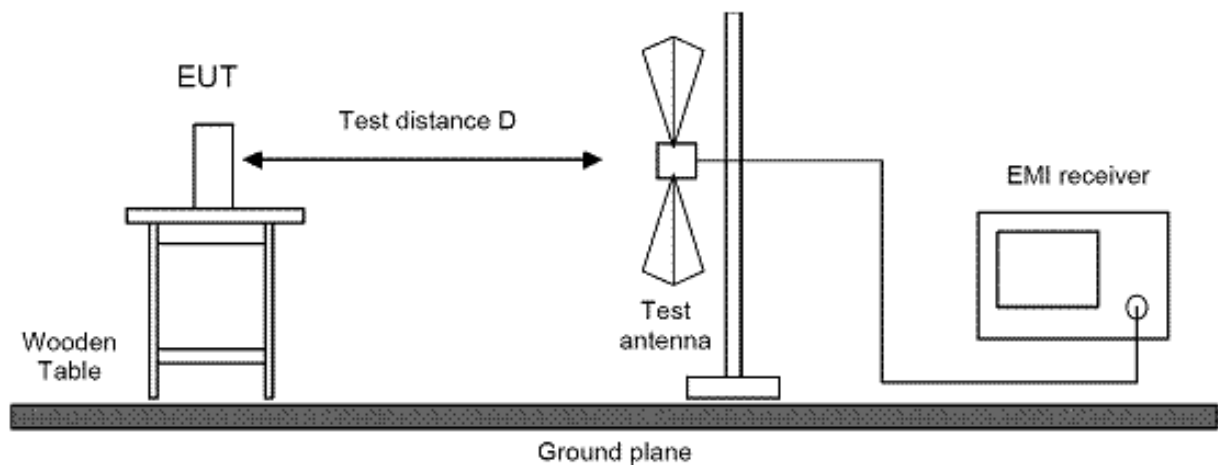
In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

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.

## 7.5 Test setup



Picture 11: Test setup for radiated emission measurement (< 1 GHz)

## 7.6 Test deviation

There is no deviation with the original standard.

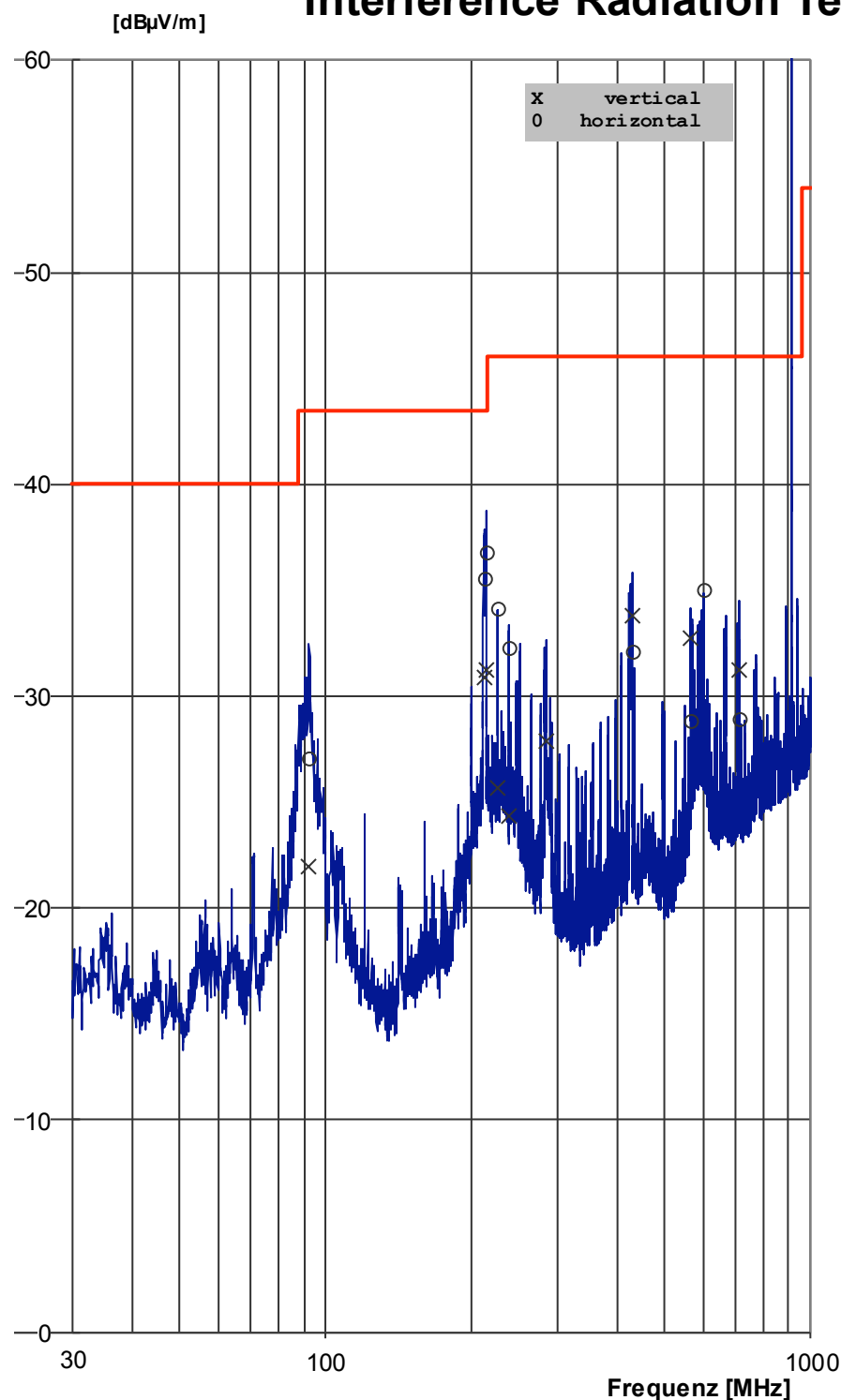
## 7.7 EUT operation during test

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

### Interference Radiation Test



REGULATIONS:  
FCC 15.209  
PEAK / CISPR

TEST EQUIPMENT:  
R&S ESCS30 (E00003)  
VULB 9163 (E00013)

ORDER NO.:  
100393-AU01+E03

EUT:  
Dommel GmbH  
USB Configurator  
DO-G1116

OPERATION MODE:  
continuous transmitting

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

DATE / TIME:  
2010-08-26  
22 °C 51 %H 98 kPa

TEST ENGINEER:  
Marco Janker

100393-AU01+E03 cdc 01.E10

Picture 12: Radiated emission 30 MHz – 1000MHz



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Germany  
Revision: 1.0

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## 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+E03_cdc.01.F10									
92,40	22,0	43,5	11,8	10,1	21,5	109°	100 cm	V	
92,40	27,0	43,5	11,8	15,2	16,5	162°	100 cm	H	
211,60	30,9	43,5	12,4	18,5	12,6	15°	100 cm	V	
211,60	35,6	43,5	12,4	23,1	7,9	103°	100 cm	H	
213,50	31,2	43,5	12,5	18,8	12,3	28°	100 cm	V	
213,50	36,8	43,5	12,5	24,3	6,7	90°	100 cm	H	
225,80	25,6	46,0	13,0	12,6	20,4	197°	100 cm	V	
225,80	34,2	46,0	13,0	21,1	11,8	256°	100 cm	H	
239,20	24,3	46,0	13,7	10,6	21,7	196°	100 cm	V	
239,20	32,3	46,0	13,7	18,6	13,7	240°	100 cm	H	
284,70	27,9	46,0	15,1	12,8	18,1	360°	100 cm	V	
427,10	32,1	46,0	18,5	13,6	13,9	103°	100 cm	H	
427,10	33,8	46,0	18,5	15,3	12,2	181°	100 cm	V	
564,50	28,8	46,0	21,3	7,6	17,2	58°	100 cm	H	
564,50	32,7	46,0	21,3	11,5	13,3	150°	100 cm	V	
602,80	35,0	46,0	22,1	12,9	11,0	149°	100 cm	H	
711,50	29,0	46,0	23,7	5,2	17,0	332°	100 cm	H	
711,50	31,3	46,0	23,7	7,5	14,7	346°	100 cm	V	

Picture 13: Radiated emission 30 MHz – 1000MHz (Table)



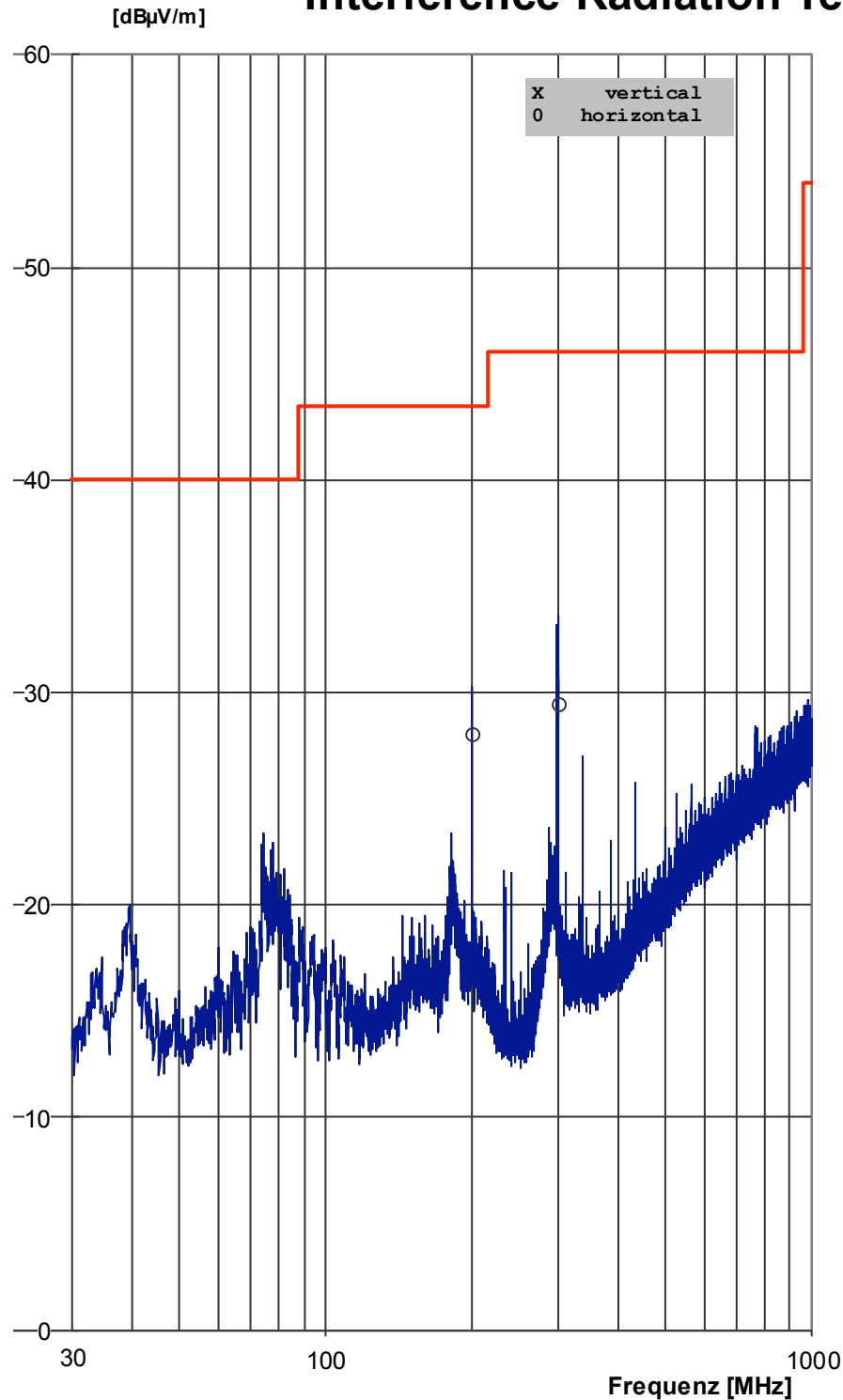
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# Interference Radiation Test



## REGULATIONS:

FCC 15.209

PEAK / CISPR

## TEST EQUIPMENT:

R&S ESCS30 (E00003)

VULB 9163 (E00013)

## ORDER NO.:

100393-AU01+E01

## EUT:

Dommel GmbH

USB Configurator

DO-G1116

## 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+E03 cdc  
01\_Kanada.E10

Picture 14: Radiated emission 30 MHz – 1000MHz (RX mode)



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# 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
200,00	28,1	43,5	0,0	28,1	15,4	90°	250 cm	H	100393-AU01+E03_cdc 01_Kanada.E10
300,00	29,5	46,0	0,0	29,5	16,5	180°	250 cm	H	

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



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## 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 <b>TESTHAUS</b> 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

### 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 Fs [ $\mu$ V/m]	Field strength [dB $\mu$ 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



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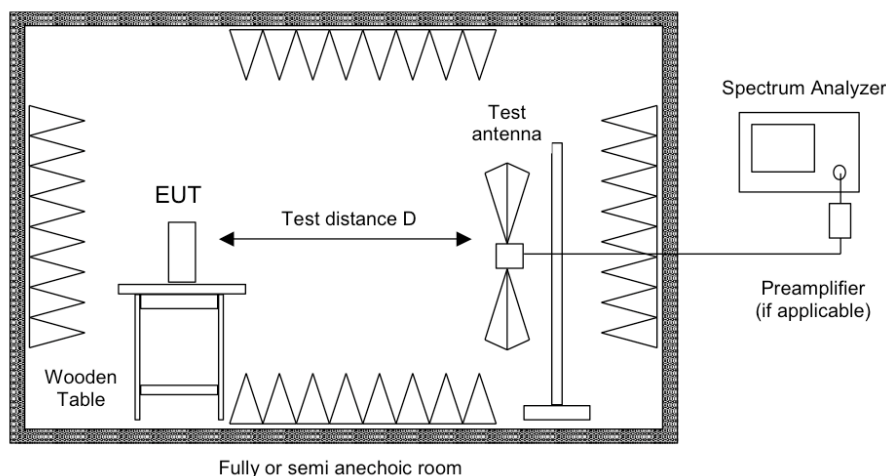
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## 8.3 Test procedure

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.
3. The broadband antenna was set to vertical polarization.
4. The bandwidth of the spectrum analyzer was set to 1000 MHz to 10<sup>th</sup> harmonic of the fundamental frequency with the detector set to peak and the resolution bandwidth set to 100 kHz (VBW  $\geq$  300 kHz). The trace data was recorded with the receiver Max Hold function.
5. The turntable 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.

## 8.4 Test setup



Picture 16: Test setup for radiated emission measurement (> 1 GHz)

## 8.5 Test deviation

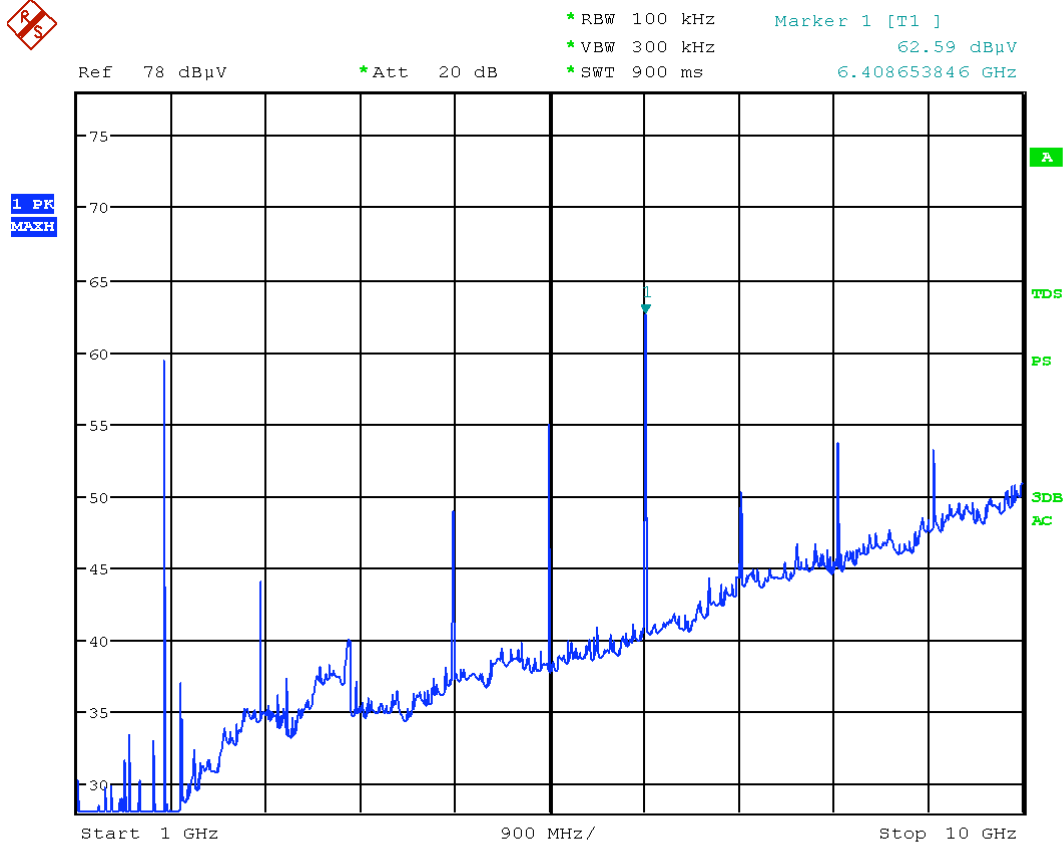
There is no deviation with the original standard.

## 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) Transmit mode

Frequency (GHz)	Reading (dB $\mu$ V/m)	Detector	Reading (dB $\mu$ V/m)	Detector	Limit (dB $\mu$ V/m)	Margin (dB)	Result
1.822	59.33	Peak	56.25	Average	73.01	16.76	Passed
2.745	44.04	Peak	42.12	Average	54	11.88	Passed
4.576	48.93	Peak	45.78	Average	54	8.22	Passed
5.485	54.96	Peak	51.01	Average	73.01	22.0	Passed
6.408	62.59	Peak	58.97	Average	73.01	14.04	Passed
7.317	50.18	Peak	47.81	Average	54	6.19	Passed
8.240	53.69	Peak	50.61	Average	54	3.39	Passed
9.149	53.15	Peak	50.24	Average	54	3.76	Passed



01.Sep 10 13:40

Picture 17: Radiated emission: Spectrum of radiated emission > 1GHz (pre-scan)



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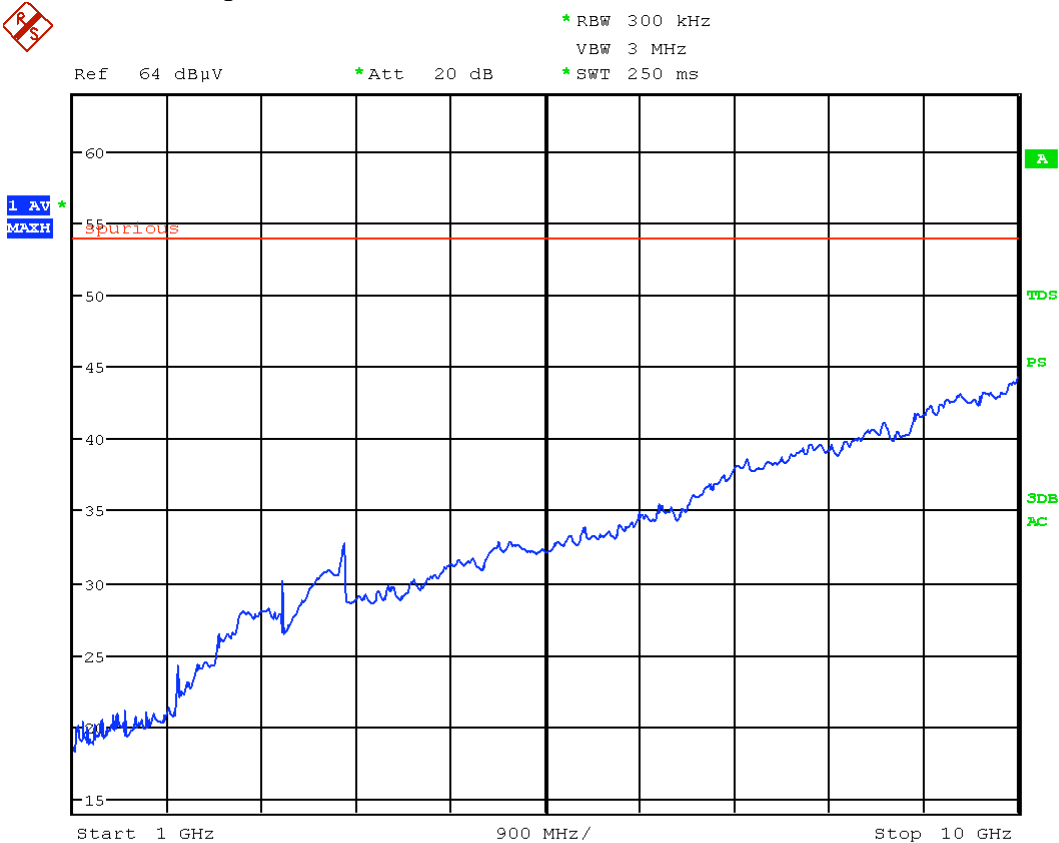
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# 8.8 Test result of radiated emission measurement (> 1 GHz) Receive mode

There were no significant disturbances above noise level!



02.Sep 10 09:04

Picture 18: Radiated emission: Spectrum of radiated emission > 1GHz (RX mode)

## 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]

☒ Antenna not detachable

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

F<sub>s</sub>: field strength [V/m]  
D: distance between antennas [m]

$$EIRP = \frac{(0.0447 \cdot 3)^2}{30} = 0.5999mW$$

$$\begin{aligned} &60 / f[GHz] \\ &= 60 / 0.915 \\ \text{Limit: } &= \underline{\underline{65.6mW}} \end{aligned}$$

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



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# 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 <sup>a.)</sup>	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 <sup>b.)</sup>	1,64
DIN EN 61000-4-6	Conducted immunity with BCI (150 kHz to 230 MHz)	+/- 2,8 dB <sup>c.)</sup>	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 % <sup>d.)</sup>	1
DIN EN 61000-3-3	Flicker	annotation <sup>e.)</sup>	

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.



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## 12 Summary

The EMC Regulations according to the marked specifications are

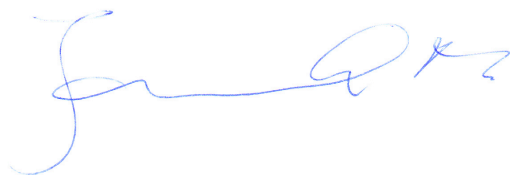
☒ **KEPT**

The EUT does fulfill the general approval requirements mentioned.

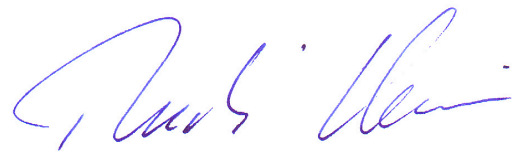
☐ **NOT KEPT**

The EUT does not fulfill the general approval requirements mentioned.

Place, Date:      Straubing, September 26, 2010



Marco Janker  
EMI / EMC Test Engineer



Rudolf Klein  
GM / EMV **TESTHAUS** GmbH