Zertifikat
Certificate

Das AS-Interface Produkt
The AS-Interface product

AS-Interface DC/DC Wandler; Eingang DC 24V; Ausgang 30,6V und 4A
AS-Interface DC/DC Converter; Input: DC 24V; Output: 30.6V and 4A

der Firma
of the company

PULS GmbH

in/at D-81925 Munich

wurde gemäß der Complete Specification (V 3.0) entwickelt.
has been developed according to the Complete Specification (V 3.0).

Das Produkt hat die Bezeichnung
The Product has the designation

SLAD4.100

Grundlage des Zertifikates ist die Complete Specification (V 3.0), die aktuelle Prüfordnung und die Zertifizierungsrichtlinie der AS-International Association e.V..

Die Baumusterprüfung des Referenzproduktes wurde durchgeführt im **AS-Interface Prüflabor des Steinbeis Transferzentrum Leipzig.**

Die Baumusterprüfung und die Herstellererklärung wurden für gut befunden.

Die Verantwortung für das Produkt verbleibt beim Hersteller.

The Certificate is based on the Complete Specification (V 3.0), the actual test requirements and the certification guideline of AS-International Association e.V..

The type test of the reference product was performed by the AS-Interface test laboratory at the Steinbeis Transferzentrum Leipzig.

The type test and the manufacturer declaration have been approved to be good.

The manufacturer is responsible for his product.

Dies Produkt darf mit dem Zertifizierungslogo und der Nummer der Zertifizierungsurkunde (ZU-Nr.) gekennzeichnet werden.
This product may be marked with the certification Logo and the Number of the certification document (ZU-No.).

AS-International Association
ZU-Nr.: 81601
Zertifizierungsstelle - certification office

Gelnhausen, Germany, 15.November 2007

i.A. T. Schmitz

Zertifizierungsstelle – certification office
AS-International Association

Test Report on an AS-Interface Power Supply

Tested Power Supply: **DC/DC-Converter 24Vdc to 30,5Vasi/4A**

Test Report: PSU 66 / 07

Kind of test: basic test

Date: 04. 10. 2007

Manufacturer/Customer: PULS GmbH

This report contains:

11 pages test sheets (altogether)

9 pages measuring papers and attachments

the test order form AS-Interface Power Supply by the customer

the manufacturers declaration by the customer

a set of documents provided by the customer (data sheets, description)

The test results of this report refer to the tested samples only.

Signature:	Authorized person: Telschow

 October 4, 2006

Test laboratory:	Steinbeis Transferzentrum "AIE"
Address:	Wächterstraße 13
	D-04107 Leipzig
Customer:	PULS GmbH
Address:	Arabellastraße 15
	D-81925 München
Manufacturer:	PULS GmbH
Address:	Arabellastraße 15
	D-81925 München
Test object:	DC/DC-Converter 24Vdc to 30,5Vasi/4A
Type:	SLDA4.100
Code of samples:	PS 1

The tests were conducted according to the following documents:

- EN 50295:1999: Low-voltage switchgear and controlgear; Controller-device interface systems; Actuator Sensor Interface (AS-i)
- Actuator-Sensor-Interface: Complete Spec., Version: 3.0, Rev. 1 of: 04. October 2006 inclusive Annex A, Annex B (Slave-/Master-Profiles) and Annex C (Test Requirements)
- Additional documents:

Date: 04. 10. 2007

Signature: i.V. Prof. Dr. sc. W. Kriesel

Authorized person

Signature:	Authorized person: Telschow

Standard and clause	Kind of tests and requirements Sample: PS1		Test values Results
5.3.4, 8.2.4	**IMPEDANCE** **TEST CIRCUIT** The test instruction allows to test the impedance of an AS-Interface power supply "in operative state" under laboratory conditions on the basis of a compensation method (bridge circuit). It is not the absolute impedance which is determined, but only the observation or exceeding of the required tolerance limit. **TEST PROCEDURE**		
	Test values:	PS1: I_{E1}: PS2: I_{E2} I_{max}	U1dc = 30,5 V I_{E1} = 4 A U2dc = ~ V I_{E2} = ~ A I_{max} = ~ A
	EVALUATION OF TEST RESULTS		Bridge alignment possible?
	Current I (PS2) = 0.1A (fixed)		
	Frequency = 50kHz; Current I (PS1):	0.1A	Yes [X] No [ ]
		I_{E1}	Yes [X] No [ ]
	Frequency = 300kHz; Current I (PS1):	0.1A	Yes [X] No [ ]
		I_{E1}	Yes [X] No [ ]
	Current I (PS 2) = I_{E2} (fixed)		
	Frequency = 50kHz; Current I (PS1):	0.1A	Yes [~] No [~]
		I_{E1}	Yes [~] No [~]
	Frequency = 300kHz; Current I (PS1):	0.1A	Yes [~] No [~]
		I_{E1}	Yes [~] No [~]
	Current I (PS1) = 0.1A (fixed)		
	Frequency = 50kHz; Current I (PS2):	0.1A	Yes [~] No [~]
		I_{E2}	Yes [~] No [~]
	Frequency = 300kHz; Current I (PS2):	0.1A	Yes [~] No [~]
		I_{E2}	Yes [~] No [~]
	Current I (PS1) = I_{E1} (fixed)		
	Frequency = 50kHz; Current I (PS2):	0.1A	Yes [~] No [~]
		I_{E2}	Yes [~] No [~]
	Frequency = 300kHz; Current I (PS2):	0.1A	Yes [~] No [~]
		I_{E2}	Yes [~] No [~]
		Impedance test passed:	YES [X] NO [ ]

Signature:	Authorized person: Telschow

Standard and clause	Kind of tests and requirements Sample: PS1		Test values Results
5.3.4 **8.2.4**	**SYMMETRY** **TEST CIRCUIT** The test instruction allows to test the symmetry of an AS-Interface power supply "in operative state" under laboratory conditions on the basis of a compensation method (bridge circuit). It is checked whether the required tolerance limit is observed or exceeded. **TEST PROCEDURE**		
	Test values:	PS1: I_{E1}: PS2: I_{E2} I_{max}	U1dc = 30,5 V I_{E1} = 4,0 A U2dc = - I_{E2} = - I_{max} = - A
	EVALUATION OF TEST RESULTS		Bridge alignment possible?
	Current I (PS2) = 0.1A (fixed)		
	Frequency = 50kHz; Current I (PS1):	0.1A I_{E1}	Yes [X] No [ ] Yes [X] No [ ]
	Frequency = 160kHz; Current I (PS1):	0.1A I_{E1}	Yes [X] No [ ] Yes [X] No [ ]
	Frequency = 300kHz; Current I (PS1):	0.1A I_{E1}	Yes [X] No [ ] Yes [X] No [ ]
	Current I (PS 2) = I_{E2} (fixed)		
	Frequency = 50kHz; Current I (PS1):	0.1A I_{E1}	Yes [-] No [-] Yes [-] No [-]
	Frequency = 160kHz; Current I (PS1):	0.1A I_{E1}	Yes [-] No [-] Yes [-] No [-]
	Frequency = 300kHz; Current I (PS1):	0.1A I_{E1}	Yes [-] No [-] Yes [-] No [-]
	Current I (PS1) = 0.1A (fixed)		
	Frequency = 50kHz; Current I (PS2):	0.1A I_{E2}	Yes [-] No [-] Yes [-] No [-]
	Frequency = 160kHz; Current I (PS2):	0.1A I_{E2}	Yes [-] No [-] Yes [-] No [-]
	Frequency = 300kHz; Current I (PS2):	0.1A I_{E2}	Yes [-] No [-] Yes [-] No [-]
	Current I (PS1) = I_{E1} (fixed)		
	Frequency = 50kHz; Current I (PS2):	0.1A I_{E2}	Yes [-] No [-] Yes [-] No [-]
	Frequency = 160kHz; Current I (PS2):	0.1A I_{E2}	Yes [-] No [-] Yes [-] No [-]
	Frequency = 300kHz; Current I (PS2):	0.1A I_{E2}	Yes [-] No [-] Yes [-] No [-]
		Symmetry test passed:	YES [X] NO [ ]

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Standard and clause	Kind of tests and requirements Sample: PS1	Test values Results
5.3.1	**NOISE EMISSION** **TEST CIRCUIT** The test instruction allows to verify the noise emission of an AS-Interface power supply in stationary state in the specified nominal-load range of 0.1A ... I_E under laboratory conditions. It is checked whether the required tolerance limit is observed. **TEST PROCEDURE** Test values: PS1: I_{E1}: PS2: I_{E2} I_{max} **EVALUATION OF TEST RESULTS**	U1dc = 30.5 V I_{E1} = 40 A U2dc = - V I_{E2} = - A I_{max} = - A
	PS1: Current I (PS2) = 0.1A Frequency range: 0...10kHz; (max. V_{pp} = 300mV_{pp}) Noise: Frequency range: 10...500kHz; (max. V_{pp} = 50mV_{pp}) Noise: **Current I (PS2) = IE2** Frequency range: 0...10kHz; (max. V_{pp} = 300mV_{pp}) Noise: Frequency range: 10...500kHz; (max. V_{pp} = 50mV_{pp}) Noise: PS1: Test passed:	V_{pp} 15 mV_{pp} V_{pp} 35 mV_{pp} V_{pp} - mV_{pp} V_{pp} - mV_{pp} Yes [ ] No [ ]
	PS2: Current I (PS1) = 0.1A Frequency range: 0...10kHz; (max. V_{pp} = 300mV_{pp}) Noise: Frequency range: 10...500kHz; (max. V_{pp} = 50mV_{pp}) Noise: **Current I (PS1) = I_{E1}** Frequency range: 0...10kHz; (max. V_{pp} = 300mV_{pp}) Noise: Frequency range: 10...500kHz; (max. V_{pp} = 50mV_{pp}) Noise: PS2: Test passed: *Noise emission test passed:*	V_{pp} - mV_{pp} V_{pp} - mV_{pp} V_{pp} - mV_{pp} V_{pp} - mV_{pp} Yes [-] No [-] YES [X] NO [ ]

Signature:	Authorized person: Telschow

Standard and clause	Kind of tests and requirements Sample: PS1	Test values Results
5.3.3, 8.2.2	**START UP BEHAVIOUR** **TEST CIRCUIT** The test instruction allows to verify the start up behaviour (time of readiness for service) of an AS-Interface power supply under maximum load of I_E under laboratory conditions. It is checked whether the required tolerance limits are observed. **TEST PROCEDURE** Test values: PS1: I_{E1}: PS2: I_{E2} I_{max} **EVALUATION OF TEST RESULTS** **PS1: Current I (PS2) = 0.1A** Voltage: 5.0...26.5V; (max. t = 2s) Timing: Voltage: 21.5...29.5V; (max. t = 1s) Timing: **Current I (PS2) = IE2** Voltage: 5.0...26.5V; (max. t = 2s) Timing: Voltage: 21.5...29.5V; (max. t = 1s) Timing: PS1: Test passed: **PS2:** **Current I (PS1) = 0.1A** Voltage: 5.0...26.5V; (max. t = 2s) Timing: Voltage: 21.5...29.5V; (max. t = 1s) Timing: **Current I (PS1) = IE1** Voltage: 5.0...26.5V; (max. t = 2s) Timing: Voltage: 21.5...29.5V; (max. t = 1s) Timing: PS2: Test passed: AS-Interface voltage waveforms continuous? Annex: Oscillogram plots (number: ....1.....) *Start up behaviour test passed:*	U1dc = 30,5 V I_{E1} = 40 A U2dc = - V I_{E2} = - A I_{max} = - A t = 360 ms t = 180 ms t = - ms t = - ms Yes [X] No [ ] t = - ms t = - ms t = - ms t = - ms Yes [-] No [-] Yes [X] No [ ] Yes [X] No [ ] YES [X] NO [ ]

Signature:	Authorized person: Telschow

Start up behaviour

report no: PSU 66/07

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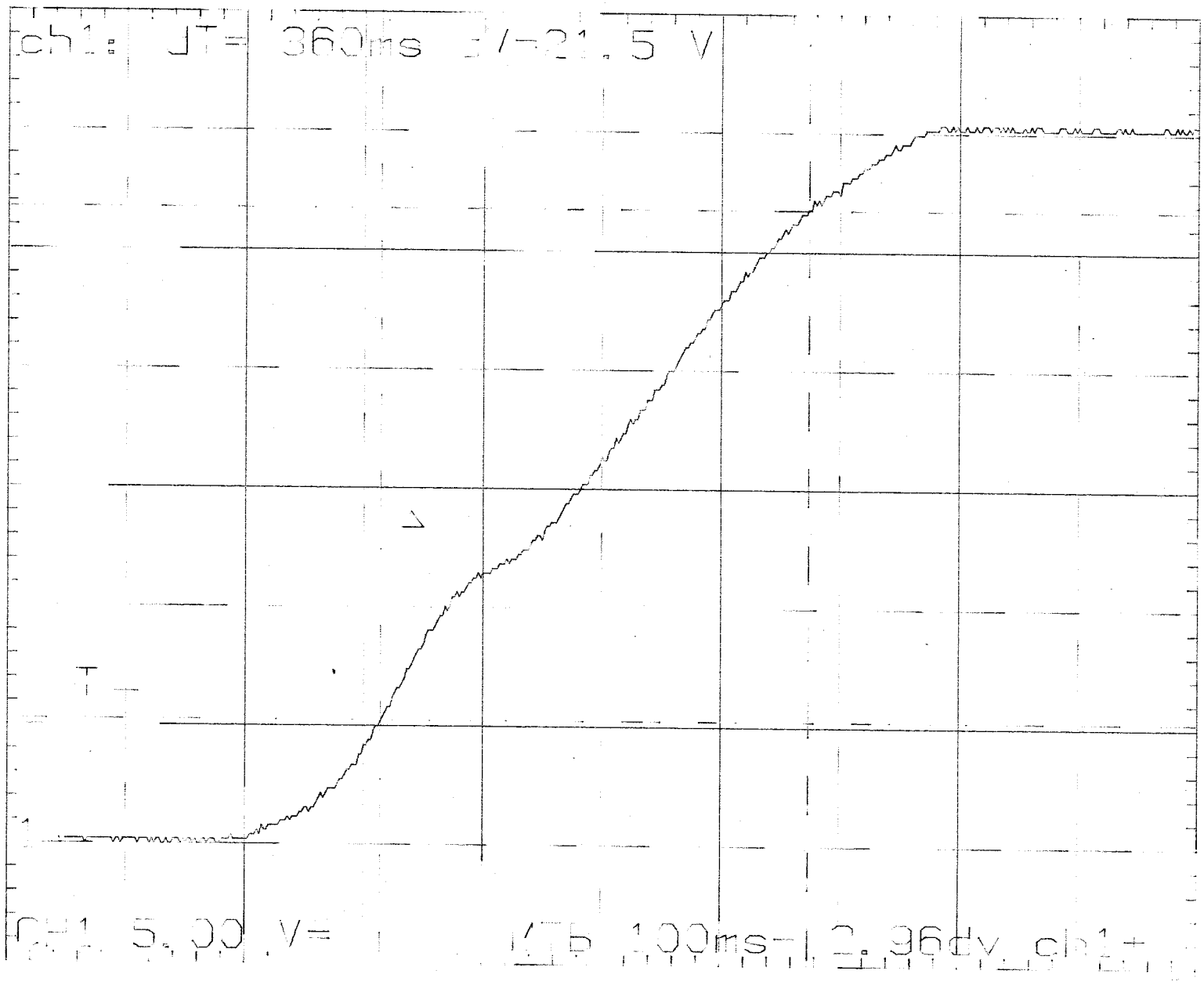
ch1

fuse

type: SLD44.100



Standard and clause	Kind of tests and requirements Sample: PS1	Test values Results
8.2.1, EN61000-4-4	**FAST TRANSIENT IMMUNITY (BURST)** **TEST CIRCUIT** The test is performed with quick, transient disturbances in the form of pulse groups (burst). The disturbances are capacity-coupled secondarily via a coupling clamp on the AS-Interface line, or via primary coupling filters. **TEST PROCEDURE** Test values: PS1: I_{E1}: PS2: I_{E2} I_{max} **EVALUATION OF TEST RESULTS** **1kV:** **PS1:** Output current of the power supply not being tested (PS2): **I_{E2} = 0.1A** BURST coupling: primary Positive polarity: N_{ref}: 0 errors Negative polarity: N_{ref}: 0 errors BURST coupling: secondary Positive polarity: N_{ref}: 0 errors Negative polarity: N_{ref}: 0 errors **I_{E2} = max. I** BURST coupling: primary Positive polarity: N_{ref}: ..... errors Negative polarity: N_{ref}: ..... errors BURST coupling: secondary Positive polarity: N_{ref}: ..... errors Negative polarity: N_{ref}: ..... errors Fast transient immunity PS1 (1 kV) test passed:	U1dc = 305 V I_{E1} = 4.0 A U2dc = ---- V I_{E2} = ---- A I_{max} = ---- A N_{meas} 0 errors N_{meas} 0 errors N_{meas} 0 errors N_{meas} 0 errors N_{meas} ---- errors N_{meas} ---- errors N_{meas} ---- errors N_{meas} ---- errors Yes [X] No [ ]
	PS2: Output current of the power supply not being tested (PS1): **I_{E1} = 0.1A** BURST coupling: primary Positive polarity: N_{ref}: ..... errors Negative polarity: N_{ref}: ..... errors BURST coupling: secondary Positive polarity: N_{ref}: ..... errors Negative polarity: N_{ref}: ..... errors **I_{E1} = max. I** BURST coupling: primary Positive polarity: N_{ref}: ..... errors Negative polarity: N_{ref}: ..... errors BURST coupling: secondary Positive polarity: N_{ref}: ..... errors Negative polarity: N_{ref}: ..... errors Fast transient immunity PS2 (1kV) test passed:	N_{meas} ---- errors N_{meas} ---- errors N_{meas} ---- errors N_{meas} ---- errors N_{meas} ---- errors N_{meas} ---- errors N_{meas} ---- errors N_{meas} ---- errors Yes [✓] No [✓]

Signature:	Authorized person: Telschow

Standard and clause	Kind of tests and requirements Sample: PS1		Test values Results	
8.2.1, EN61000-4-4	**EVALUATION OF TEST RESULTS** **2kV:** **PS1:** **I_{E1} = 0.1A** **I_{E2} = 0.1A** (Output current of the power supply (PS2) not being tested)			
	Test 1: U_{ASI} = 29.5V ... 31.6V		correct?	
	BURST coupling: secondary	Positive polarity:	Yes [X]	No [ ]
		Negative polarity:	Yes [X]	No [ ]
	Test 2: U_{ASI} < 31.6V with earthing,			
	BURST coupling: secondary	Positive polarity:	Yes [X]	No [ ]
		Power supply operational?	Yes [X]	No [ ]
		Negative polarity:	Yes [X]	No [ ]
		Power supply operational?	Yes [X]	No [ ]
	Test 3: U_{ASI} = 29.5V ... 31.6V			
	BURST coupling: primary	Positive polarity:	Yes [X]	No [ ]
		Power supply operational?	Yes [X]	No [ ]
		Negative polarity:	Yes [X]	No [ ]
		Power supply operational?	Yes [X]	No [ ]
	I_{E2} = max. Output current (PS2):			
	Test 1: U_{ASI} = 29.5V ... 31.6V			
	BURST coupling: secondarily	Positive polarity:	Yes [-]	No [-]
		Negative polarity:	Yes [-]	No [-]
	Test 2: U_{ASI} < 31.6V with earthing,			
	BURST coupling: secondary	Positive polarity:	Yes [-]	No [-]
		Power supply operational?	Yes [-]	No [-]
		Negative polarity:	Yes [-]	No [-]
		Power supply operational?	Yes [-]	No [-]
	Test 3: U_{ASI} = 29.5V ... 31.6V			
	BURST coupling: primary	Positive polarity:	Yes [-]	No [-]
		Power supply operational?	Yes [-]	No [-]
		Negative polarity:	Yes [-]	No [-]
		Power supply operational?	Yes [-]	No [-]

Signature:	Authorized person: Telschow

Standard and clause	Kind of tests and requirements Sample: PS1	Test values Results
8.2.1, EN61000-4-4	**EVALUATION OF TEST RESULTS** **2kV:** **PS1:** **I_{E1} = max. Output current (PS1)** **I_{E2} =0.1A** (Output current of the power supply (PS2) not being tested)	
	Test 1: U_{ASI} = 29.5V ... 31.6V	correct?
	BURST coupling: secondary Positive polarity:	Yes [X] No [ ]
	Negative polarity:	Yes [X] No [ ]
	Test 2: U_{ASI} < 31.6V with earthing,	
	BURST coupling: secondary Positive polarity:	Yes [X] No [ ]
	Power supply operational?	Yes [X] No [ ]
	Negative polarity:	Yes [X] No [ ]
	Power supply operational?	Yes [X] No [ ]
	Test 3: U_{ASI} = 29.5V ... 31.6V	
	BURST coupling: primary Positive polarity:	Yes [X] No [ ]
	Power supply operational?	Yes [X] No [ ]
	Negative polarity:	Yes [X] No [ ]
	Power supply operational?	Yes [X] No [ ]
	I_{E2} = max. Output current (PS2):	
	Test 1: U_{ASI} = 29.5V ... 31.6V	
	BURST coupling: secondary Positive polarity:	Yes [ ] No [ ]
	Negative polarity:	Yes [ ] No [ ]
	Test 2: U_{ASI} < 31.6V with earthing,	
	BURST coupling: secondary Positive polarity:	Yes [ ] No [ ]
	Power supply operational?	Yes [ ] No [ ]
	Negative polarity:	Yes [ ] No [ ]
	Power supply operational?	Yes [ ] No [ ]
	Test 3: U_{ASI} = 29.5V ... 31.6V	
	BURST coupling: primary Positive polarity:	Yes [ ] No [ ]
	Power supply operational?	Yes [ ] No [ ]
	Negative polarity:	Yes [ ] No [ ]
	Power supply operational?	Yes [ ] No [ ]
	Fast transient immunity PS1 (2kV) test passed:	YES [X] NO [ ]

Signature:	Authorized person: Telschow

Standard and clause	Kind of tests and requirements Sample: PSA	Test values Results
5.3, 8.2	**INTEROPERABILITY IN THE REFERENCE NETWORK** **TEST CIRCUIT** The test instruction allows to test the function of an AS-Interface power supply on the AS-Interface reference network under laboratory conditions. The purpose of this test is to prove the error-free communication between the master and all 31 slaves. **TEST PROCEDURE** Test values: PS1: / I_{E1}: / PS2: / I_{E2} / I_{max} **EVALUATION OF TEST RESULTS** Measuring time: **PS1:** Number of errors: < 1 errors/min.: PS1 Test passed: **PS2:** Number of errors: < 1 errors/min.: PS2 Test passed: *Interoperability in the reference network test passed:*	U1dc = 30,5 V I_{E1} = 4,0 A U2dc = - V I_{E2} = - A I_{max} = - A t = 2 min 0 errors Yes [X] No [ ] Yes [X] No [ ] - errors Yes [-] No [-] Yes [-] No [-] YES [X] NO [ ]

Signature:	Authorized person: Telschow

Recommendations to the Certification Office:

Concerning test report no.: PSW 66107

Test Result:

Comments / conditions: _____

_____

_____

_____

Certification: _____ Yes / ~~No~~ _____

Cancellation: _____ ~~Yes~~ / No _____

Withdrawal: _____ ~~Yes~~ / ~~No~~ _____

Conditions / restrictions: _____

Extensions (para. 2.4 ZRL) _____

Date of issue: 04. 10. 2007

Signature: i.V. Prof. Dr.-Ing. W. Kriesel

Authorized person