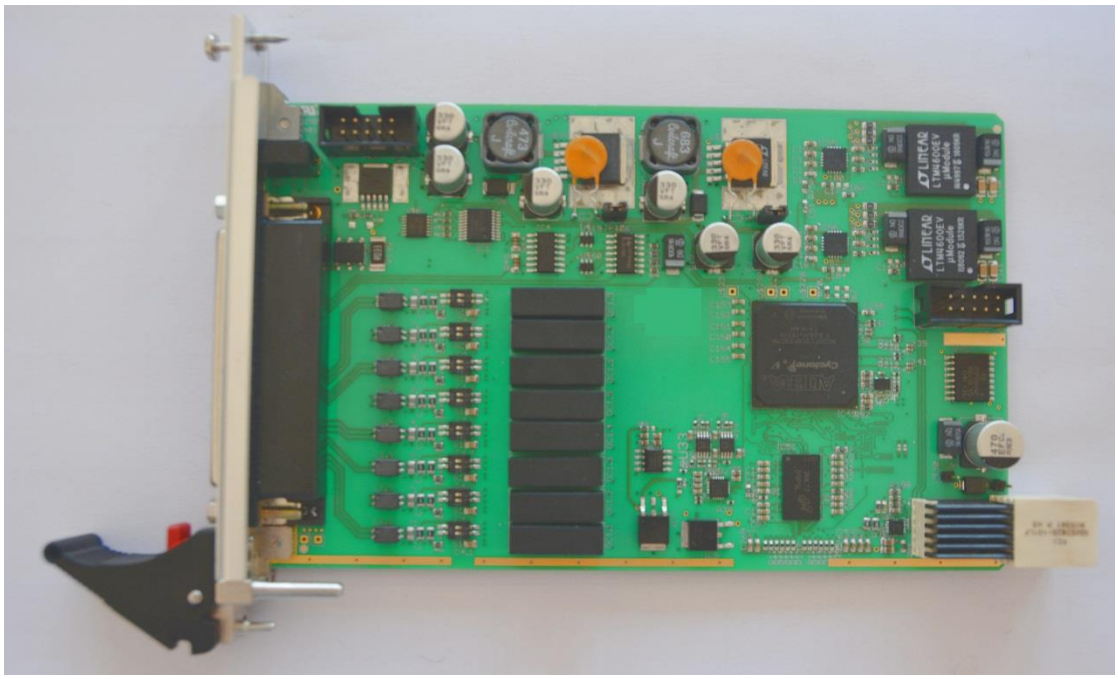
Simulyzer-RT
CAN-2 Card



Hardware-Version	1.0
Dokumentations-Version:	(1.0) 25.05.2022
Bestell Nr.:	20.5004

Safety instructions

To avoid damages to persons and devices the following safety instructions have to be noticed!

- Only qualified personnel are allowed to handle this device!
- Before any handling within the device the current supply has to be switched off!
- During operation the device have to be positioned, that enough air condition is supplied and no small parts can get into the ventilation slots.
- In case of any trouble the system has to be switched de-energized!
- The declared environmental conditions and max. voltage ranges have to be observed!
- To warranty the device remove all dust and dirt in periodically intervals.
- Make sure that the ventilation slots are unobstructed!

Intended use:

The Simulyzer RT CAN-1 card simulates 8 CAN bus systems within a RT proofing system and is only engineered to analyze and measure the sensors.

- The device is only permitted to use for the intended use.
  Any other use results the deletion of the guarantee!

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Table of contents

1. Technical data

- Current consumption: 12V / 380 mA (without external consumers)
- Operating temperature: 0°C … 40°C (32° F … 104°F)
- Rel. Humidity: Max. 85% not condensed
- Weight: 188 g
- Dimensions: Single Eurocard, 4 U

Test conditions: Environmental temperature 20°C to 26°C (68°F to 78,8°F)						
Num	**Evaluation**	**Symbol**	**typ.**	**min.**	**max.**	**description**
1	Permitted voltage range	U_{supp}	12V	11.4V	12.6V	
2	Current consumption	I_{supp}	380mA	-	450mA	Without sensor supply

2. Block diagram

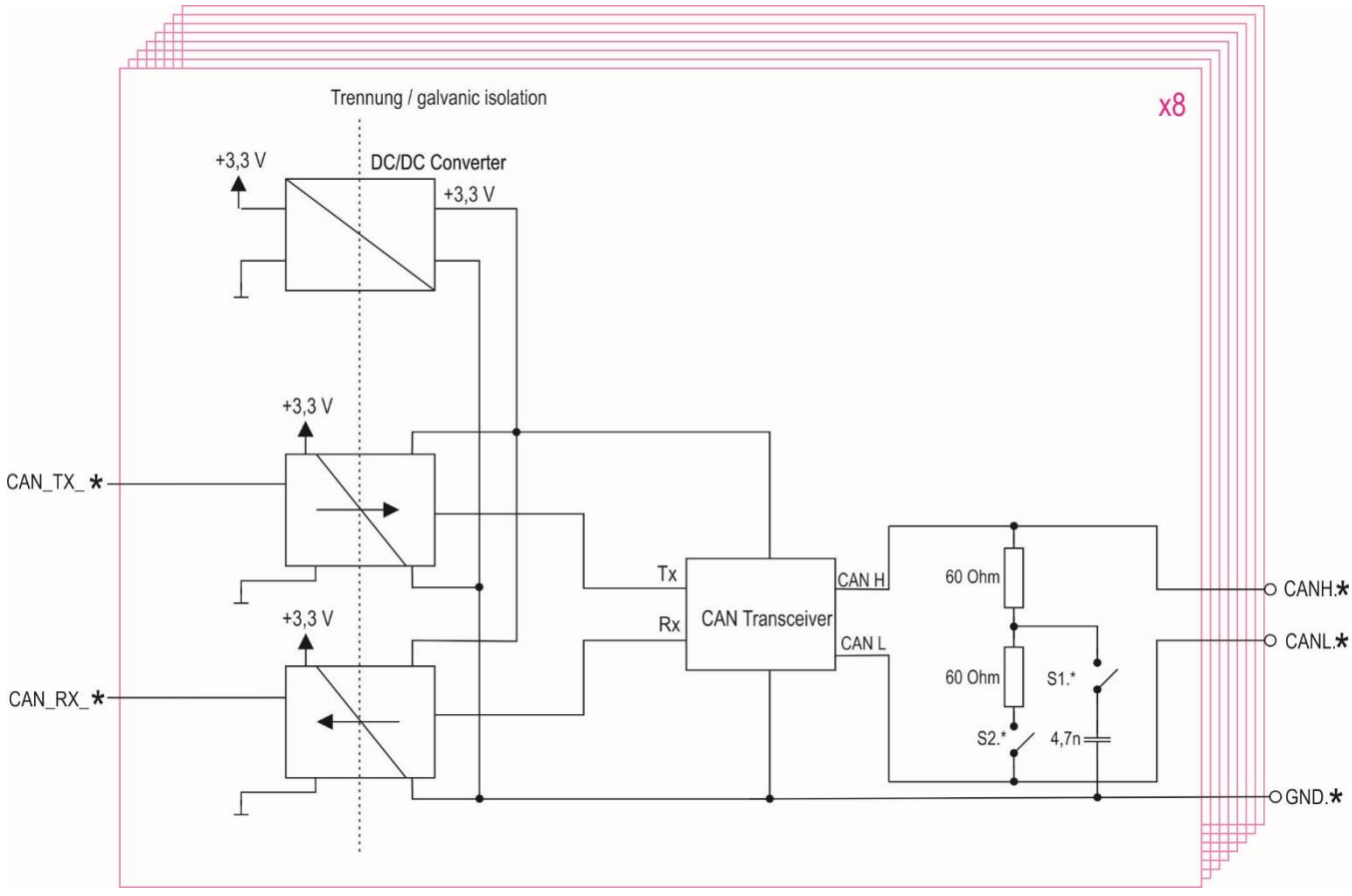


Fig. 1: 8x CAN interfaces

The voltage supply of the card and the voltage supply of the bus system is galvanic isolated.

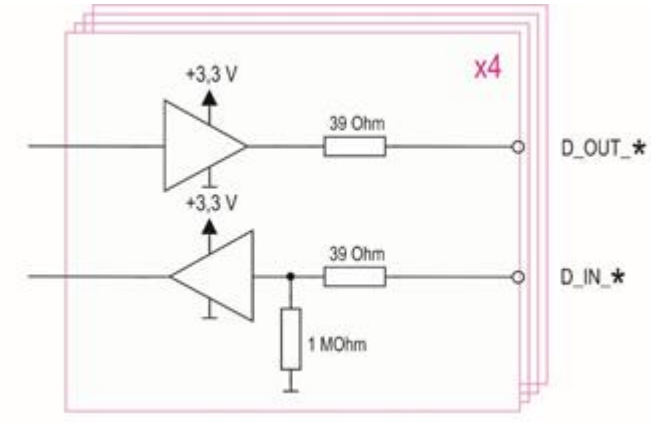


Fig. 2: 4x Digital In/Out interfaces

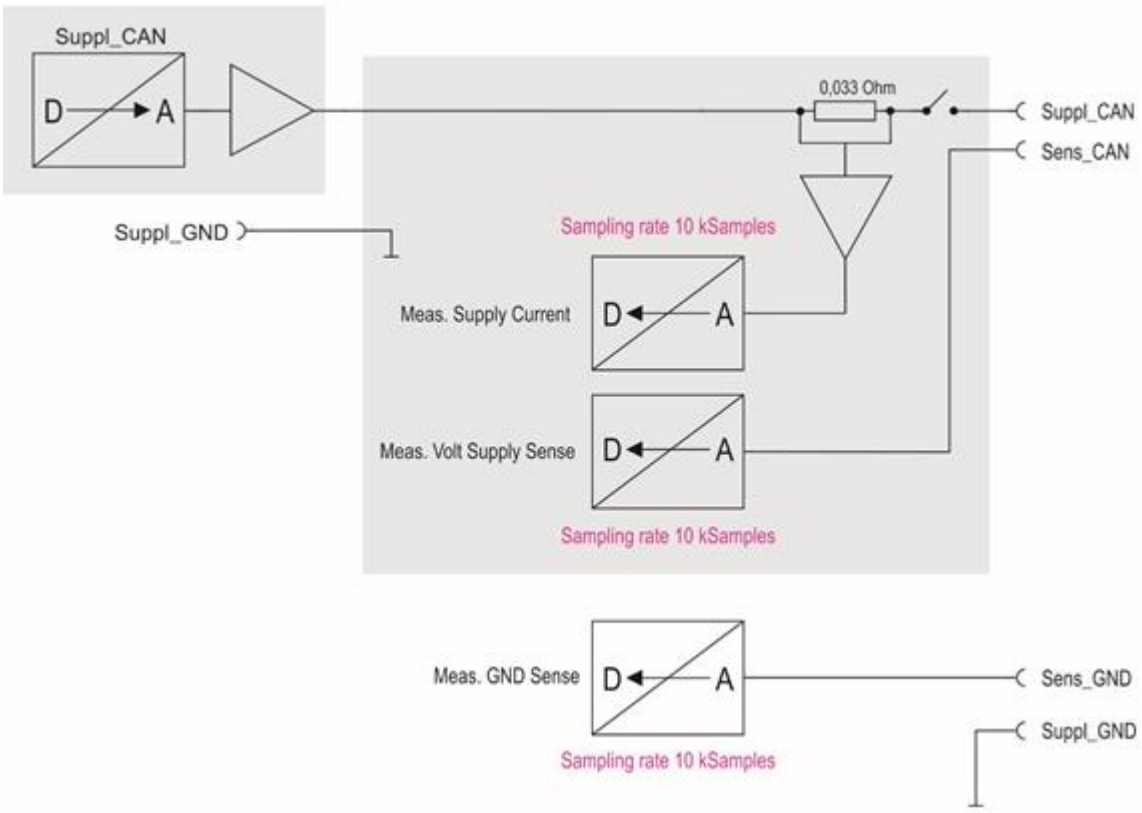
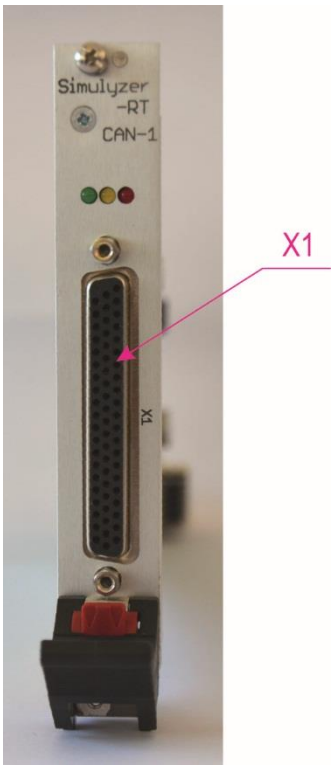


Fig. 3: adjustable sensor supply 2 .. 20V

3. Connectors/LEDs:

- **Connection to bus:** 1 PCIe Lane to CPU-1
  12V current supply, I2C parallel to all cards for synchronization

- **Connection of frontside:**
  HD D-Sub 62 Pin female connector (X1) with periphery.
  8x 3 Pins CANL.* / CANH.*/ GND.*,
  4 parallel pins with adjustable voltage supply
  4 parallel Pins GND (common)
  1 Pin readout the voltage supply,
  1 Pin readout GND,
  4 Pins digital inputs 1 … 4 (3,3 V level, 5 V tolerant)
  4 Pins digital outputs 1 ... 4 (3,3 V level)
  4 additional pins GND (common)

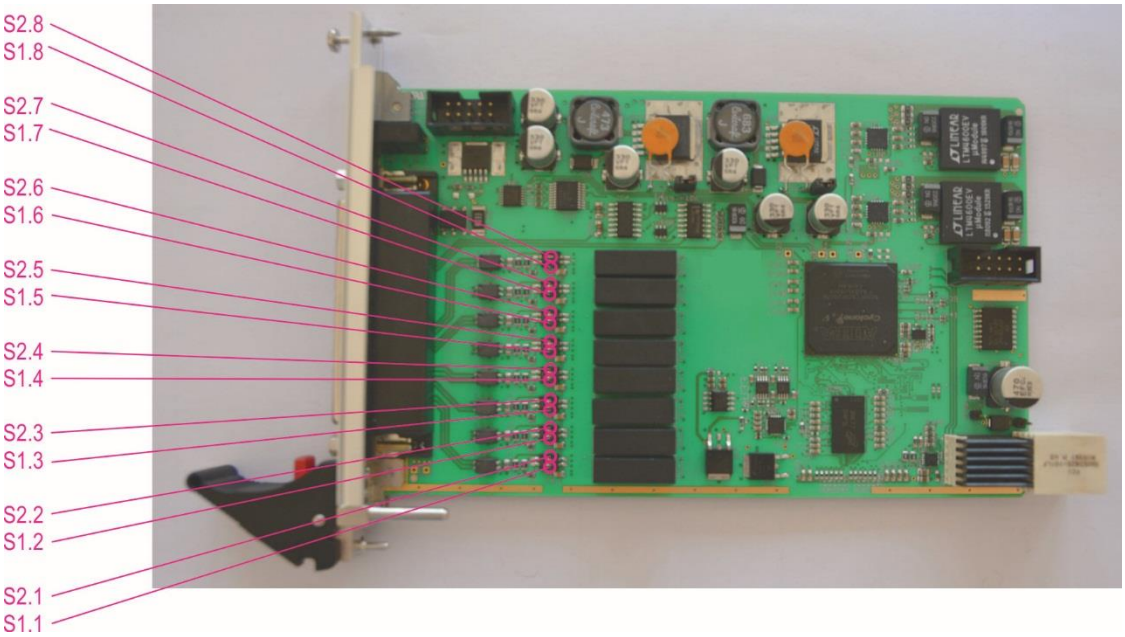


- **LEDs:**
  Green on – internal supply voltage applies
  Yellow on– FPGA has booted
  Red – not in use

4. Interfaces and FPGA:

- ALTERA FPGA Cyclone V to realize procedures
- PCI Express: protocol referred to PCIe 2.1, max. 2,5 GBit/s
- Instanceable 32-Bit NIOS µC within FPGA
- 500 MByte DDR3 RAM for NIOS µC
- Implementation of a CAN sensor supply plus measurement
- 8 galvanic isolated CAN interfaces
- All CAN baudrates adjustable to 1 Mbit/s, CAN-FD up to 4Mbit/s
- CAN FD (Flexible Data Rate) available on all 8 interfaces
- Supply voltage adjustable between 2 V to 20 V, 1 A, 16-Bit resolution
- Backward measurement of the supply voltage plus GND
- Shunt for measurement of the supply current: 0,033 Ohm
- Supply current measurable between 0 mA to 1000 mA, 16-Bit resolution
- Sampling rate of voltage/current measurement: 10 k samples/s (100 µs sample distance)
- Supply voltage short-circuit proofed and thermal protected
- Standard specifications: EN 61326-1, EN 61000-6-2, EN 61000-6-3

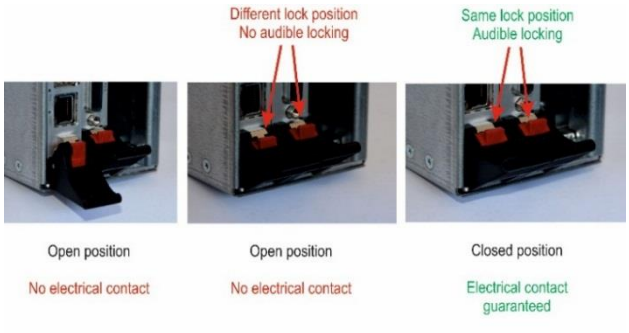
5. 8x Swith Settings S1 and S2

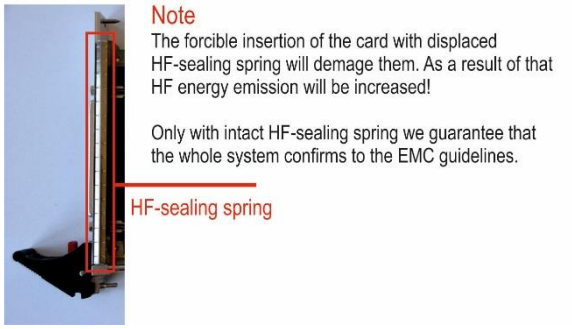


S1.*	S2.*	Description
OFF	**ON**	120 Ohm terminating resistor
OFF	**OFF**	No terminating resistor
ON	**ON**	120 Ohm Split Mode (less susceptible to interference) – *delievery state* -
ON	**OFF**	Not allowed!

6. Handling card/chassis

Pay attention that the ejection lever of the plug-in card is arrested correctly.
Only the correct position guarantees a justly connection of the bus system and the power supply!





7. Measurement accuracy

7.1. Time base

Test conditions: Environmental temperature 68° to 79°F						
Num	**Evaluation**	**Symbol**	**Typ**	**Max**	**Unit**	**Note**
1	Accuracy time base	$\Delta f/f$	±30	±50	ppm	-
2	Aging time base	$\Delta f/f_A$	±5		ppm/year	-
3	Temperature drift of the time base	$\Delta f/f_T$	±0.3	±0.7	ppm/K	-

7.1. Measurement of the supply voltage

Test conditions: Environmental temperature 68° to 79°F						
Num	**Evaluation**	**Symbol**	**Typ**	**Max**	**Unit**	**Note**
4	Accuracy of the measured voltages	U_{mea}	±0.075	±0.1	% of scfin 20 V	Range 1.0 V … 18.0 V
5	Aging of the measured voltages	U_{mea}		±0.1	%/year	Range 0.5 V … 6.0 V
6	Resolution of the measured voltage		16		Bit	0…16383
			0,305175781		mV/LSB	

7.2. Measurement of the supply current

Test conditions: Environmental temperature 68° to 79°F						
Num	**Evaluation**	**Symbol**	**Typ**	**Max**	**Unit**	**Note**
7	Accuracy of the measured currents	I_{mea}	±0.1	±0.15	% of scfin 150mA	Range 2mA .. 100mA
8	Aging of the measured current	I_{mea}		±0.1	% of scfin 150 mA/ year	Range 2mA .. 100mA
9	Resolution of the measured PSI5 current		16		Bit	0.. 65535
			2,288818359		µA/LSB	

7.3. Generation of the voltage

Test conditions: Environmental temperature 68° to 79°F						
Num	**Evaluation**	**Symbol**	**Typ**	**Max**	**Unit**	**Note**
10	Accuracy of the generated voltage	U_{mea}	±0.3	±0.4	% of scfin 20 V	Range 2.0V…18.0V
11	Aging of the generated voltage	U_{mea}		±0.01	%/ of scfin 20 V year	Range 2.0V…18.0V
12	Ripple and electromagnetic influence of voltage	U_{Ripp}		20	mV_{SS}	
13	Resolution of the generated voltage		16		Bit	0..65535
			0,096130371		mV/LSB	

8. Connection diagram X1

Pin		Pin		Pin	
X1.1	n.c	X1.22	n.c	X1.43	n.c.
X1.2	GND.1	X1.23	CANL.1	X1.44	CANH.1
X1.3	GND.2	X1.24	CANL.2	X1.45	CANH.2
X1.4	GND.3	X1.25	CANL.3	X1.46	CANH.3
X1.5	GND.4	X1.26	CANL.4	X1.47	CANH.4
X1.6	GND.5	X1.27	CANL.5	X1.48	CANH.5
X1.7	GND.6	X1.28	CANL.6	X1.49	CANH.6
X1.8	GND.7	X1.29	CANL.7	X1.50	CANH.7
X1.9	GND.8	X1.30	CANL.8	X1.51	CANH.8
X1.10	n.c	X1.31	n.c	X1.52	n.c.
X1.11	n.c	X1.32	n.c	X1.53	n.c.
X1.12	GND	X1.33	n.c	X1.54	n.c.
X1.13	D_IN_4	X1.34	GND	X1.55	n.c.
X1.14	D_IN_3	X1.35	D_OUT_4	X1.56	n.c.
X1.15	D_IN_2	X1.36	D_OUT_3	X1.57	n.c.
X1.16	D_IN_1	X1.37	D_OUT_2	X1.58	n.c.
X1.17	Sens_Supply_CAN	X1.38	D_OUT_1	X1.59	n.c.
X1.18	Suppl_CAN	X1.39	Sens_GND	X1.60	GND
X1.19	Suppl_CAN	X1.40	GND	X1.61	GND
X1.20	Suppl_CAN	X1.41	GND	X1.62	GND
X1.21	Suppl_CAN	X1.42	GND