

## Product Datasheet - Technical Specifications



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# ME-5810 fast, Multifunctional Opto Digital and Counter Board

- Fast, multifunctional, expandable opto-I/O and counter board with data streaming (models /S) and interrupt control.
- For PCI-Express and 3 U CompactPCI/PXI.
- 16 or 32 digital inputs and 16 or 32 digital outputs, opto-isolated, and 3 isolated 16 bit counters.
- Inputs: 3...60 V variable, outputs: 15...30 V variable, isolation voltage up to 1 kV.
- Sink/source per port software-selectable, sink 50 mA/channel, source 180...370 mA/channel.
- Channels can have various functions within a firmware, for example single digital-I/O, streaming digital-I/O (models /S), frequency measurement, frequency output.
- Operating modes: Simple read, bitpattern comparator (compare) with interrupt, bitchange with interrupt.
- Expandable with add-on boards ME-5001 and ME-5004, for example 2 additional bidirectional 8 bit TTL ports.
- Replacement model for the well-known ME-8100.

Model	Opto in	Opto out	Opto isolated counters	Standard firmware functions	Streaming	Bus platform
ME-5810A PCIe	16	16	3	Single digital-I/O, streaming digital-I/O (models /S), frequency measurement (4 of the 16 inputs; 300 kHz), frequency output (4 of the 16 outputs; 3 kHz), bitpattern comparison with with interrupt, bit-change with interrupt	-	PCI-Express
ME-5810A cPCI	16	16	3		-	3 HE CompactPCI/PXI
ME-5810A/S PCIe	16	16	3		yes	PCI-Express
ME-5810A/S cPCI	16	16	3		yes	3 HE CompactPCI/PXI
ME-5810B PCIe	32	32	3	Single digital-I/O, streaming digital-I/O (models /S), frequency measurement (8 of the 32 inputs; 300 kHz), frequency output (8 of the 32 outputs; 3 kHz), bitpattern comparison with interrupt, bit-change with interrupt	-	PCI-Express
ME-5810B cPCI	32	32	3		-	3 HE CompactPCI/PXI
ME-5810B/ PCIe	32	32	3		yes	PCI-Express
ME-5810B/S cPCI	32	32	3		yes	3 HE CompactPCI/PXI

# A Specification

(Ambient temperature 25 °C)

## PC Interface

PCI-Express Bus	32 bit, 33 MHz, 3.3 V, PCI-Express x1 specification version 2.0
CompactPCI Bus	32 bit, 33 MHz, 5 V, specification PICMG 2.0 R3.0
Plug&Play	is fully supported

## Digital Input/Output (general)

Measured Quantity/Criterion	Condition/Explanation	Value
Ports ME-5810 (base board)	subdevice 0 (Single/Streaming)	16-bit input port opto-isolated
	subdevice 1 (Single/Streaming)	16-bit output port opto-isolated
Ports ME-5002 (plug-on board)	subdevice 0 (Single)	16-bit input port opto-isolated
	subdevice 1 (single)	16-bit output port opto-isolated
Operation modes	single	software triggered read/write
	stream timer	timer controlled read/write of values via FIFO
	stream trigger sample	timer controlled read/write of values via FIFO
	interrupt	bit-pattern change, bit-pattern compare
FIFO-size	FIFO_IN	8192 values (16-bit-wide)
	FIFO_OUT	8192 values (16-bit-wide)

Transfer rate in streaming mode	between ME-5810 and PC	max. 25 MHz (cPCI) resp. 30 MHz (PCIe) (system-dependent)
Frequency input signal	symmetrical rectangular signal	max. 300 kHz
Frequency output signal	symmetrical rectangular signal	max. 3 kHz
	option „wraparound“	max. 3 kHz, without load for the Host PCs
Timer (CHAN-time)	input	30.30 ns...65 s (2..FFFFFFFFHex Ticks)
	output	0.15 ms...65 s (11000..FFFFFFFF-Hex Ticks)
Timer resolution	programmable	15.15 ns (1 Tick)
Ext. trigger inputs	ME-5810	DI_Ax, DO_Bx
Ext. trigger edges		Rising, falling, any
Input level	see the following tables	
Isolation voltage	$U_{ISO}$ (f = 60 Hz, t = 60 s)	max. 1000 VAC <sub>rms</sub>
Reference ground	isolated from PC ground	GND_EXT

### Opto-Isolated Inputs

Static values

Conditions: TA=25 °C

Measured Quantity	Test Criterion	MIN	Type	MAX	Unit
$U_{in,H}$		3		60	V
$U_{in,L}$		0		2.2	V
$R_{in}$	$U_{in}=24$ V		4.3		k $\Omega$
$I_{in}$	$U_{in}=24$ V		5.5	6	mA

### Limiting Values

Measured Quantity /Criterion	Condition/Explanation	Value
URWM over-voltage protection for inputs	max. 600 W pulse power at a pulse width of 1 ms	64.4 V

## Opto-Isolated Outputs

Conditions:  $T_A=25\text{ °C}$

Output-drivers	sink	2 x ULN2803 (ME-5810A)
		+ 2 x ULN2803 (ME-5002)
	source	2 x ISO1H811G (ME-5810A)
		+ 2 x ISO1H811G (ME-5002)
External supply	$U_{\text{ext}}$	15...30 V
	$U_{\text{Lmax}}$	$U_{\text{ext}}$

For further specifications see chapter sink driver resp. source driver

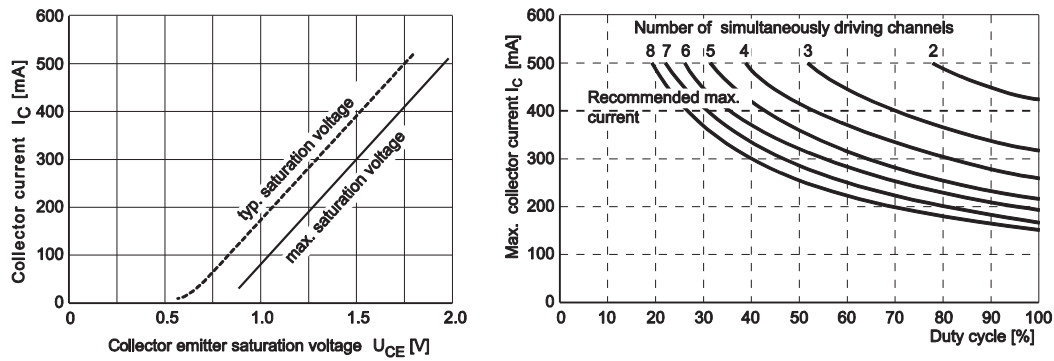
## Sink Driver (UDN2803)

Measured Quantity	Test Criterion	MIN	Type	MAX	Unit
$I_{\text{OUT}}=I_C$ (output current)	per channel			50	mA
	See also characteristics curves in picture 23				
$I_{\text{CEX}}$ (output leakage current)	$U_{\text{CE}}=50\text{ V}$ , $T_A=25\text{ °C}$ $U_{\text{CE}}=50\text{ V}$ , $T_A=85\text{ °C}$			50 100	$\mu\text{A}$
$U_{\text{CE(SAT)}}$ (collector emitter saturation voltage)	$I_{\text{OUT}}=350\text{ mA}$ $I_{\text{OUT}}=200\text{ mA}$ $I_{\text{OUT}}=100\text{ mA}$		1.3 1.1 0.9	1.6 1.3 1.1	V
$I_R$ (clamp diode reverse current)	$U_R=50\text{ V}$ , $T_A=25\text{ °C}$ $U_R=50\text{ V}$ , $T_A=85\text{ °C}$			50 100	$\mu\text{A}$
$U_F$ (clamp diode forward voltage)	$I_F=350\text{ mA}$			2.0	V
$t_{\text{on}}$ (switch-on time)	$R_L=125\ \Omega$ , $U_{\text{OUT}}=50\text{ V}$ , $C_L=15\text{ pF}$		0.1	1	$\mu\text{s}$
$t_{\text{off}}$ (switch-off time)	$R_L=125\ \Omega$ , $U_{\text{OUT}}=50\text{ V}$ , $C_L=15\text{ pF}$		0.2	1	$\mu\text{s}$

Output current

The maximum current per output ( $I_C$ ) depends of the saturation voltage  $U_{\text{CE}}$  and is limited by the power dissipation of the sum of the channels to  $P_{\text{tot}}=1\text{ W}$  per chip:

$$P_{\text{TOT}}=P_0+\dots+P_7 \leq 1\text{ W (bei } 70\text{ °C)}$$



Picture 23: Characteristic curves UDN2803

### Source Driver (ISO1H811G)

(short-circuit proof with current limiting and temperature monitoring)

Voltage supply

Conditions:  $U_{ext} = 15 \dots 30$  V,  $T_J = -25 \dots +125$  °C

Measured Quantity	Test Criterion	MIN	Type	MAX	Unit
$U_{OUT}$	$U_{ext} = 24$ V; 1 channel with $I_{out} = 0,625$ A		23.8		V
$I_{OUT}/channel$	1 channel			625	mA
	16 channel			370	mA
	32 channel (with ME-5002)			180	mA
$U_{USD}$ (undervoltage shutdown)		7		10.5	V
$R_{ON}$ (resistance if output active)	$I_{OUT} = 0.5$ A, $T_I = 25$ °C		150	200	mΩ
	$I_{OUT} = 0.5$ A, $T_J = 125$ °C		270	320	mΩ
$I_S$ (current consumption driver chip)	8 channels active per chip; without load		10	14	mA
$I_{L(off)}$ (output current in inactive state)	$U_{in} = U_{OUT} = 0$ V,	0	5	30	μA

### Switching Times

Measured Quantity	Test Criterion	MIN	Type	MAX	Unit
$t_{on}$ (switch-on time)	$R_L=47 \Omega$ , to 90 % $U_{out}$		64	120	$\mu s$
$t_{off}$ (switch-off time)	$R_L=47 \Omega$ , to 10 % $U_{out}$		89	120	$\mu s$
$dU_{out}/dt_{(on)}$ (slope on switch-on)	$R_L=47 \Omega$ , up 10...30 % $U_{out}$ , $U_{ext}=15 V$		1	2	$V/\mu s$
$dU_{out}/dt_{(off)}$ (slope on switch-off)	$R_L=47 \Omega$ , up 70...40 % $U_{out}$ , $U_{ext}=15 V$		1	2	$V/\mu s$

### Limiting Values

Measured Quantity	Test Criterion	MIN	Type	MAX	Unit
$T_{CSD}$ (housing switch-off temperature)		125	130	135	$^{\circ}C$
$T_{CR}$ (housing reset temperature)		110			$^{\circ}C$
$T_{TSD}$ (junction switch-off temperature)		150	175	200	$^{\circ}C$
$T_R$ (junction reset temperature)		135	1		$^{\circ}C$
$I_{lim}$ (DC-short-circuit current)	$U_{ext} = 24 V$ , $R_L=10 m\Omega$		1.1		A

### Frequency Input/Output

Availability	alternative subdevice configuration via ME-iDC
Signal-form	rectangular

### Frequency Measuring Channels

Measured Quantity/Criterion	Condition/Explanation	Value
Reference ground	isolated from PC ground	GND_EXT
Number of channels	ME-5810A (FI_A0...3)	4 inputs (opto-isolated)

	ME-5002 (FI_CO...3)	4 inputs (opto-isolated)
Input-level		see digital I/O
Input-current		see digital I/O
Period (T)	$T_{\min.} = T_{\min.asym.} = T_{\min.sym.}$ $T_{\max.asym.}$ $T_{\max.sym.}$	3.3 $\mu$ s (300 kHz) 16.25 s (0.06 Hz) 32.5 s (0.03 Hz)
Duty-cycle	variable, depending on T	measurable in steps of 1 tick
Resolution	1 tick	15.15 ns
Accuracy		$\pm$ 15.15 ns
Operating modes		single

### Pulse Generator Channels

Measured Quantity/Criterion	Condition/Explanation	Value
Reference ground	isolated from PC ground	GND_EXT
Number of channels	ME-5810A (FI_AO...3)	4 outputs (opto-isolated)
	ME-5002 (FI_CO...3)	4 outputs (opto-isolated)
Output level	sink or source driver	see digital I/O
Period (T)	$T_{\min.} = T_{\min.asym.} = T_{\min.sym.}$ $T_{\max.asym.}$ $T_{\max.sym.}$	0.3 ms (300 kHz) 16.25 s (0.06 Hz) 32.5 s (0.03 Hz)
Duty-cycle	variable, depending on T	to be set in steps of 1 tick
Resolution	1 tick	15.15 ns
Accuracy		$\pm$ 15.15 ns
Operating modes		single

### Counters

Number	3 x 16 bit (1 x 82C54)
Opto-isolation	yes (dimensioning of the I/O level for 24 V)
Counter-clock	up to 10 MHz by external source



### ...with Opto-Isolation

Measured Quantity/Criterion	Condition/Explanation	Value
Reference ground	isolated from PC ground	GND_EXT
External supply for opto-couplers	$U_{ext}$	24...30 V
<b>Level for Counter Outputs (OUT_x)</b>		
Type		"Open Collector"
$U_{Lmax}$		$U_{ext}$
$I_{Out}$		max. 30 mA
<b>Level for Counter Inputs CLK_x, Gate_x)</b>		
Logic level	inverted by opto-couplers	low-active
$I_F$		$7.5 \text{ mA} \leq I_F \leq 10 \text{ mA}$
$U_{IL}$		max. 0.8 V
$U_{IH}$		24..30 V, max. $U_{ext}$

### Interrupt

Measured Quantity/Criterion	Condition/Explanation	Value
Interrupt sources	passed directly to the PC	bit-pattern change bit-pattern compare

### General Data

Measured Quantity/Criterion	Condition/Explanation	Value
Power supply	CompactPCI	+5 V (via PCI-Bus)
	PCI-Express	+3.3 V (via PCIe-Bus), +5 V (via Molex plug from PC power supply unit)
Current consumption	CompactPCI	0.8... 1.2 A (full-load)
	PCI-Express	0.8... 1.2 A (full-load)
Board dimensions (without slot bracket and connector)	ComactPCI	3 U CompactPCI board
	PCI-Express	162 mm x 98 mm

Connections	ST1	78-pin D-sub female socket
	I/Os der ME-5002	via ST1 of base board
Operating temperature		0 °C...70 °C
Storage temperature		-40 °C...100 °C
Air humidity		20 %...55 % (non-condensing)
Certification	CE	

## B Pinout

**Note:** „ME-5810“ represents all models of the ME-5810 series.

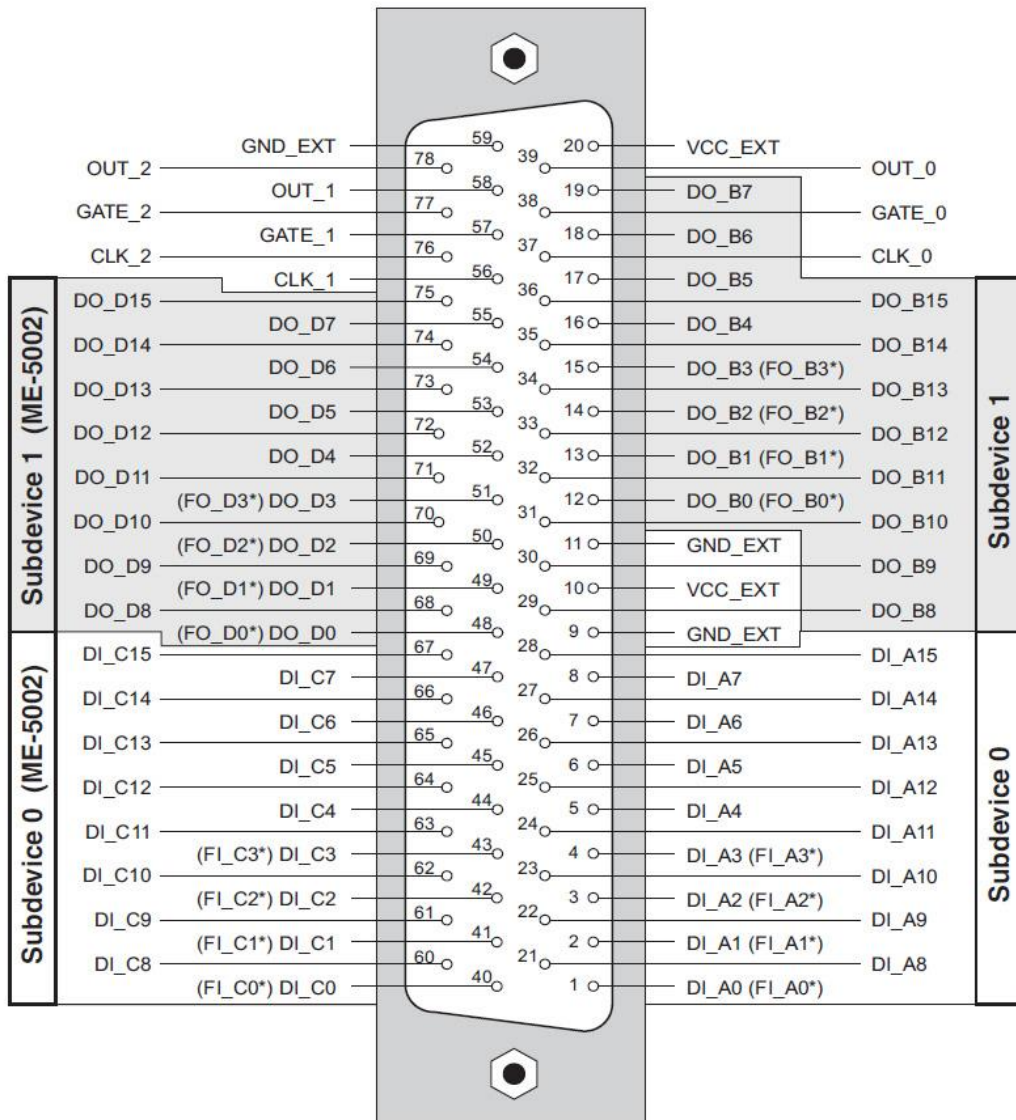
### Legend for pinouts:

Name	Function
DI_A0..15	digital inputs of ME-5810 (subdevice 0)
DO_B0..15	digital outputs of ME-5810 (subdevice 1)
DI_CO..15*	digital inputs of ME-5002 (subdevice 0)
DO_DO..15*-	digital inputs of ME-5002 (subdevice 1)
CLK_0..2	clock inputs for counters
GATE_0..2	gate inputs for counters (low-active)
OUT_0..2	Counter outputs (type "Open-Collector")
FI_A0..3	frequency measurement inputs of ME-5810 (subdevice 0, alternative configuration)
FO_B0..3	pulse generator outputs of ME-5810 (subdevice 1, alternative configuration)
FI_CO..3*	frequency measurement input of ME-5002 (subdevice 0, alternative configuration)
FO_DO..3*	pulse generator output of ME-5002 (subdevice 1, alternative configuration)
VCC_EXT	VCC input for ext. power supply of isolated ports, $U_{ext}$ typ. 24 VDC
GND_EXT	reference ground for isolated ports (isolated from PC ground)

**Note:** In the configuration "pulse generator" (FO) do not forget to take care of the unused pins DO\_B4..15 (ME-5810) and DO\_D4..15 (ME-5002). When used as sink drivers they are in high-impedance state, when used as source drivers they are connected to ground!

\*These signals are only available in combination with the plug-on board ME-5002 (note: ME-5810B = ME-5810 + ME-5002)

# B1 78-pin D-Sub (ST1) — ME-5810



Picture 24: 78-pin D-sub female connector ME-5810 (ST1)

\*These pins can only be used as frequency measurement inputs (FI\_x) resp. pulse generator outputs (FO\_x) after appropriate configuration of the corresponding subdevice with the ME-iDC. The remaining pins of the digital ports cannot be used for digital-I/O.