

M12-Transceiver 1300nm 125MBit/s

1 General

The M12 Transceiver is designed to suit applications with 50/125µm and 62.5/125µm multimode GI-fiber. The transceiver is supplied with an IP67 protection cap and a fastening nut. An I²C interface enables the control and management of the transceiver.

2 Application

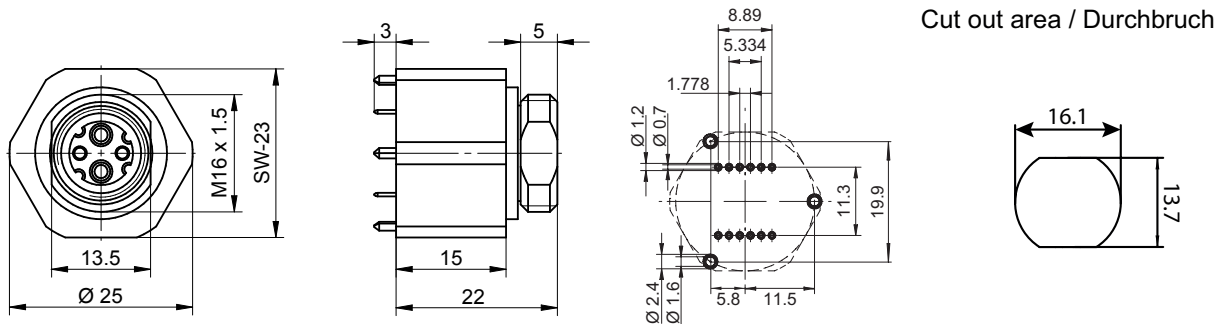
Due to the high data rate of 125 MBit/s, the good characteristics and the easy optical fiber termination, the transceiver may be used in many applications:

- optical networks
- Fast-Ethernet
- Industrial electronics
- Power electronics

3 Ordering information

Specification	Part number
1300nm M12	905TR130M1201

4 Technical drawing



Pic. 2 Drawing M12 Transceiver



Pic 1 M12 Transceiver

5 Features

- 1300nm wavelength
- suitable for 50/125µm and 62.5/125µm multimode GI-fiber
- 125MBit/s
- +3.3V Power supply
- PECL in-/outputs
- Signal Detect (SD) output
- I²C Management Interface
- metal housing
- connector endface acc. DIN / IEC 61754-27
- -40 to +85°C ambient operating temperature
- RoHS compliant

PCB drill layout

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6 Maximum ratings _____

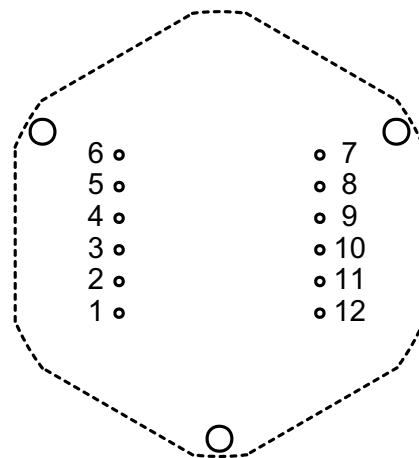
Stresses beyond those listed under „Maximum ratings“ may cause permanent damage to the device. Listed values are stress limits only and functional operation of the device at these conditions is not recommended. Exposure to maximum rating conditions for extended periods may affect the device reliability.

Parameter	Symbol	Condition	min.	typ.	max.	Unit
Storage temperature	T_s		-40		100	°C
Ambient operating temperature	T_c		-40		85	°C
Lead soldering temperature	T_{Sold}				260	°C
Lead soldering time	t_{Sold}				10	s
Supply voltage	V_{CC}				4	V
Data input voltage	V_i		-0.5		4	V
Differential input voltage	V_D	Peak to Peak			2	V
Output current PECL	ID_{Out}		-50		50	mA
ESD-Resitance - Air discharge	V_{ESD}	EN61000-6-2			8	kV
ESD-Resitance - Contact discharge	V_{ESD}	EN61000-6-2			4	kV
Electric field immunity	V_{EMI}	EN61000-6-2			10	V/m

CAUTION!
 The assembly of system components (transceiver, connectors and couplings) has to be made with manual/hand force!!!

7 Pin assignment _____

Pin	Name	Funktion
1	RD+	receive data out +
2	RD-	receive data out -
3	SD	signal detect
4	RxVcc	+3.3V receiver
5	RxGnd	Gnd receiver
6	SDA	PC serial data IO
7	Sclk	PC serial clock input
8	TD-	transmit data in -
9	TD+	transmit data in +
10	TxDis	disable transmitter input
11	TxGnd	Gnd transmitter
12	TxVcc	+3.3V transmitter



Pic 3 Top view



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8 Technical data

Parameter	Symbol	Condition	min.	typ.	max.	unit
Storage temperature	T_S		-40		100	°C
Ambient operating temperature	T_C		-40		85	°C
Supply voltage	V_{CC}		3	3.3	3.6	V
Differential input voltage	V_D		1	1.4	1.8	V
Data and signal detect output load			50			Ω
Signalling rate (Fast-Ethernet)	B			125		MBit/s
Humidity			5		95	%
Transmitter						
Output center wavelength	λ_{max}		1280	1310	1340	nm
Average output power	$P_{Out\ AVG}$	50/125 μ m GI-fiber 50% DC NA 0.2	-21		-18	dBm
Power supply current	I_{CC}			90	120	mA
Optical rise time	t_r				1.8	ns
Optical fall time	t_f				1.8	ns
Data input current low	I_{il}		-50			μ A
Data input current high	I_{ih}				50	μ A
Data input voltage low	$V_{il}-V_{CC}$		-1.81		-1.475	V
Data input voltage high	$V_{ih}-V_{CC}$		-1.165		-0.88	V
Receiver						
Receiver sensitivity					-31	dBm
Maximum input power			-3			dBm
Power supply current	I_{CC}	no load		70	80	mA
Signal detect - threshold value					-29.2	dBm
Signal detect - hysteresis			1.5	2.5	5	dB
Signal detect - assert time	A_{S_max}				10	μ s
Signal detect - deassert time	A_{NS_max}				10	μ s
Signal detect - output voltage low	$V_{ol}-V_{CC}$		-1.83		-1.55	V
Signal detect - output voltage high	$V_{oh}-V_{CC}$		-1.08		-0.88	V
Data output voltage low	$V_{ol}-V_{CC}$		-1.83		-1.55	V
Data output voltage high	$V_{oh}-V_{CC}$		-1.08		-0.88	V
Data output rise time	t_r	20-80%			2.2	ns
Data output fall time	t_f	80-20%			2.2	ns
Bit error rate		$\lambda=1310\text{nm}$, @125Mbps, Pin=-27dB/m, PRBS23		BER<1E-10		

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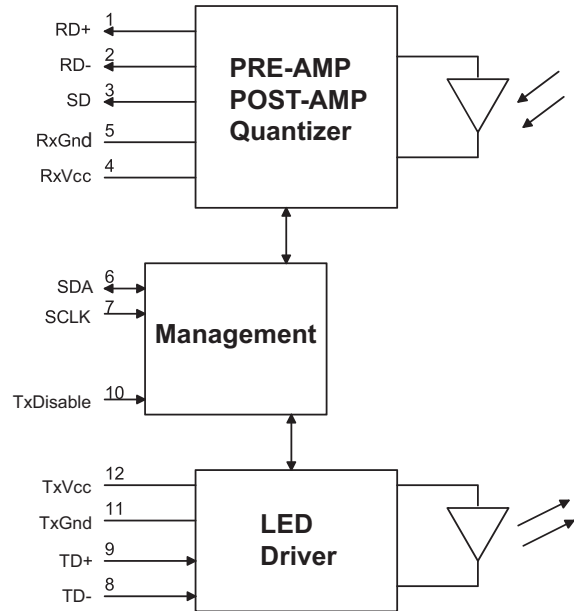
9 Application hints _____

The transceiver is designed for applications using 50/125µm multimode GI-fiber. Max. link length is 2500m. Best performance is achieved when using high quality connector assemblies.

10 External circuitry _____

To achieve an optimum performance of the transceiver a good power supply decoupling and signal line termination as shown in Pic 4 is mandatory. Place decoupling capacitors and termination resistors as close as possible to the inputs. Resistor values shown in table below.

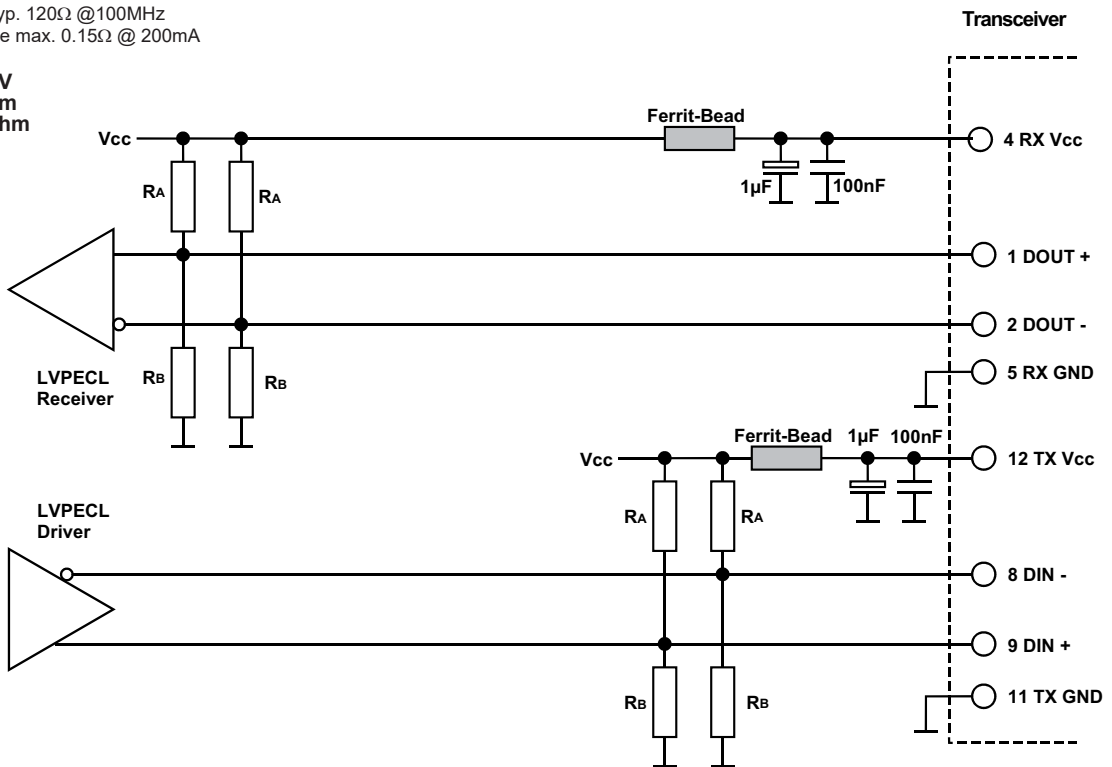
11 Schematic _____



Pic 5 Schematic M12-Transceiver

Ferrite:
 Impedance typ. 120Ω @100MHz
 DC resistance max. 0.15Ω @ 200mA

VCC = 3.3 V
 Ra = 820hm
 Rb = 1300hm



Pic 4 Parallel termination (Thevenin Equivalent)

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12 I²C Addresses _____

Serial Address = A0 (HEX)			
Address (HEX)	Field Size (Byte)	Name	Description
00-5F	96	Serial ID	GP NVRAM; R/W under valid OEM password
60-7F	32	Vendor Specific	Vendor specific EEPROM
80-FF	128	Reseved	Reseved for future use

Serial Address = A2 (HEX)			
Address (HEX)	Field Size (Byte)	Name	Description
00-27	40	Alarm and Warning Threshold	High/Low limits for warning and alarms
28-37	16	Reseved	Reseved – do not write; reads undefined
38-5B	36	Calibration Constants	Numerical constants for external calibration
5C-5E	3	Reseved	Reseved – do not write; reads undefined
5F	1	Checksum	GP NVRAM; R/W under valid OEM password
60-69	10	Analog Data	Real time analog parameter data
6A-6D	4	Reseved	Reseved – do not write; reads undefined
6E	1	Control/Status Bits	Control and status bits
6F	1	Reseved	Reseved – do not write; reads undefined
70-71	2	Alarm Flags	Alarm status bits; read only
72-73	2	Reseved	Reseved – do not write; reads undefined
74-75	2	Warning Flags	Warning status bits; read only
76-77	2	Reseved	Reseved – do not write; reads undefined
78-7B	4	OEMPW	OEM password entry field
7C-7F	4	Reseved	Reseved – do not write; reads undefined
80-F7	120	User Scatchpad	User writeable EEPROM
F8-F9	2	Reseved	Reseved – do not write; reads undefined
FA	1	USRPWSET	User password setting; read/write using any pw; returns zero otherwise
FB	1	USRPW	Entry field for user password
FC-FD	2	POH	Power-On hour meter result; read only;
FE	1	Data Ready Flags	Data ready bits for each measured parameter; read only
FF	1	Usern Control	End-user control and status bits



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12 I²C Addresses (continue) _____

Serial Address = A4 (HEX)			
Address (HEX)	Field Size (Byte)	Name	Description
00-3F	64	APCLUTn	APC look up table
40-7F	64	MODLUTn	VMOD look up table
80-BF	64	IFLTUT	Bias current fault threshold look up table
C0-FF	64	EOLLUTn	Bias current high alarm look up table

Serial Address = A6 (HEX)			
Address (HEX)	Field Size (Byte)	Name	Description
00	1	OEMCFG0	Control and status bits
01	1	OEMCFG1	Control and status bits
02	1	OEMCFG2	Control and status bits
03	1	APCSET0	APC setpoint 0
04	1	APCSET1	APC setpoint 1
05	1	APCSET2	APC setpoint 2
06	1	MODSET	DAC setpoint
07	1	IBFLT	Bias current fault comparator threshold
08	1	TXPFLT	TX power fault threshold
09	1	LOSFLT	RX loss fault comparator threshold
0A	1	FLTMR	Fault comparator masking interval timer setting
0B	1	FLTMSK	Fault source mask bits
0C-0F	2	OEMPWSET	OEM area access password
10	1	OEMCAL0	OEM calibration register 0
11	1	OEMCAL1	OEM calibration register 1
12	1	LUTINDEX	Look up table index read back
13	1	Reserved	Reserved for future use
14	1	APCDAC	Reads back current APC DAC setting
15	1	MODDAC	Reads back current MOD setting
16	1	OEMREAD	Reads back OEM calibration data
17	1	LOSFLTn	LOS de-assert threshold
18	1	RXPOT	RX-Pot tab selection
19	1	OEMCFG4	Start selection bits



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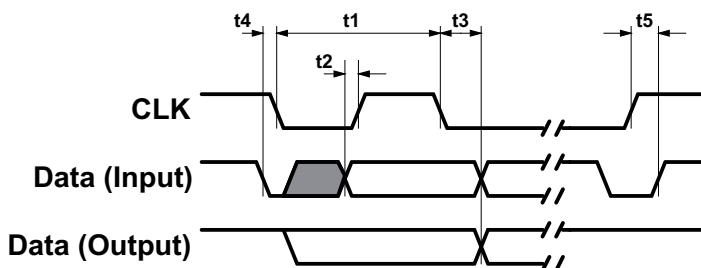
12 I²C Addresses (continue) _____

Serial Address = A6 (HEX)			
Address (HEX)	Field Size (Byte)	Name	Description
1A-1F	6	Reseved	Reseved for future use
20-27	8	POHDATA	Power-On hour meter scratchpad
28-47	32	RXLUT	RX power calibration look up table
48-49	2	Reseved	Reseved for future use
4A-57	18	CAL	Internal calibration slope and offset data
59-7D	37	Reseved	Reseved for future use
7E-FD	128	SCRATCH	Scratchpad area
FE	1	MFG_ID	42
FF	1	DEV_ID	Device and die revision

13 I²C Interface _____

I ² C Interface			
Parameter	Symbol	Value	Unit
Low output voltage	V_{OL}	0.8	V (max.)
High input voltage	V_{IH}	2.1	V (min.)
Clock period	t_1	2.5	μ s (min.)
Data IN setup time	t_2	100	ns (min.)
Data OUT stable	t_3	300	ns (min.)
Data low to Clk low	t_4	100	ns (min.)
Data high to Clk high	t_5	100	ns (min.)

14 I²C Timing _____



Pic 6 I²C Timing

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