

## TR1-M4-3023M

### Description :

The 1x9 ST duplex 1310nm O-E Transceivers can transmit digital data up to 2 km via multi mode optical fiber and the optical performances comply with the Fast Ethernet interface, 155Mbps ATM interface and FDDI PMD Standard.



### Features :

- Distance up to 2 Km
- Industry Standard 1x9 Package Footprint
- Duplex ST Connector
- Single Power Supply 3.3 V
- LVPECL Differential Data Inputs and Outputs
- LVPECL Signal Detection Output
- DC/DC Inputs and Outputs

### APPLICATIONS :

- ATM 155 Mbps Links
- SONET/SDH Equipment Interconnect
- Fast Ethernet 100 Mb/s Links
- Comply with Fast Ethernet, OC-3, STM-1 and FDDI Standards
- Class 1 Laser International Safety Standard IEC 825 Compliant

### Absolute maximum ratings

PARAMETER	SYMBOL	MIN	MAX	UNITS	NOTE
Storage Temperature	$T_s$	-40	85	°C	
Supply Voltage	$V_{CC}$	---	6	V	
Input Voltage	----	GND	$V_{CC}$	V	
Soldering Temperature	$T_{SOLD}$	---	260	°C	10s on leads
Output Current	$I_{out}$	0	60	mA	

### Recommended operating conditions

PARAMETER	SYMBOL	MIN	Typ	MAX	UNITS
Ambient Operating Temperature	$T_{AMB}$	0	---	70	°C
Supply Voltage	$V_{CC}$	3.15	3.3	3.45	V
Data Rate	---	---	155	---	Mb/s

## TR1-M4-3023M

### Ordering Information

T	R	1	-	M	4	-	3	0	2	3	M			
a	b		X	c	d	e	f	g	h					

<b>Function parameter</b>	P: may be Blank, or 000~999→ Pigtail length ( unit : cm)
	C: or 0-9 → Case Color ( 0: Black, 1: Blue )
	S: or B/F→ Shield ( B: Backward , F: Forward ,XNon)
	1~4 → Composite Specifications 1: Case Color Blue + Shield Forward
	W: 2: Case Color Blue + Shield Backward ,Lead pin X 6 (TBHalf Shield ,Lead pin X 6 ) 3: Case Color Blue + Full Shield Backward,Lead pin X 4 4: Case Color Black + Full Shield Backward,Lead pin X 6

<b>Function distinction</b>	may be Blank, or P ( P→ Pigtail ), or C( Case Color ), or S ( S→ Shield ), or R( R→ Single receiver ) or W ( W→ Composite Specifications ), or F( F→ POF ), or I( I→DDMI)
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<b>Potential energy &amp; temperature</b>	I→AC/AC PECL 0℃~70℃ RoHS	W→DC/AC TTL 0℃~70℃ RoHS
	J→AC/AC PECL -40℃~85℃ RoHS	N→DC/DC PECL -40℃~85℃ RoHS
	K→AC/AC TTL 0℃~70℃ RoHS	O→DC/DC TTL 0℃~70℃ RoHS
	L→AC/AC TTL -40℃~85℃ RoHS	P→DC/DC TTL -40℃~85℃ RoHS
	M→DC/DC PECL 0℃~70℃ RoHS	R→DC/DC PECL -10℃~85℃ RoHS
	Q→AC/AC TTL -10℃~85℃ RoHS	X→DC/AC TTL -40℃~85℃ RoHS

<b>Operating voltage</b>	3→3.3V	5→5V
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<b>Distance</b>	D1~D9 : D1→100M, D2→200M	01~99 : 01→1km, 10→10km	00→100km
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<b>Optical connector</b>	1→FC	2→SC	3→ST	4→LC
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<b>Wavelength</b>	M3→Multi-mode 850 nm	S1→Single-mode 1310 nm	S3→For Bi-direction : Single-mode Tx1310 / Rx1550 nm
	M4→Multi-mode 1310 nm	S2→Single-mode 1550 nm	S4→For Bi-direction : Single-mode Tx1550 / Rx1310 nm
	00~99 (CWDM Wavelength)		S5→For Bi-direction : Single-mode Tx1310 / Rx1490 nm S6→For Bi-direction : Single-mode Tx1490 / Rx1310 nm

<b>Bit rate</b>	1→155Mbps	3→1.0625Gbps	5→2.125Gbps	7→2.7Gbps	9→4.25Gbps
	2→622Mbps	4→1.25Gbps	6→2.5Gbps	8→3.125Gbps	0→10Gbps

<b>Electric connector</b>	TR→Dual Fiber 1×9 Transceiver	FB→Single Fiber SFF Transceiver	EUFB→ EPON ONU SFF 2×5 BIDI Transceiver
	TB→Single Fiber 1×9 Transceiver	PT→Dual Fiber SFP Transceiver	ETFB→ EPON OLT SFF 2×5 BIDI Transceiver
	FT→Dual Fiber SFF Transceiver	PB→Single Fiber SFP Transceiver	GUFB→ GPON ONU SFF 2×5 BIDI Transceiver
	UB→Dual Bi-Direction SFP Transceiver (OM PIN Assignment)		GTFB→ GPON OLT SFF 2×5 BIDI Transceiver
	UM→Dual Bi-Direction SFP Transceiver(CSFP MSA)		GUFM→GPON OLT SFF 2×5 BIDI Transceiver(DDMI)
UT→Quad Bi-Direction SFP Transceiver			

\*Please contact us for the released types.



## TR1-M4-3023M

### Transmitter optical Specifications ( 0 ° C < Topr < 70 ° C, 4.75 V < Vcc < 5.25 V )

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNITS	NOTE
<b>Optical</b>						
Output Optical Power	Pout	-20		-14	dBm	1
Extinction Ratio	ER	10	---	---	dB	
Output Eye	Compliant with Bellcore TR-NWT-000253 and ITU recommendation G.957					
Center Wavelength	$\lambda_C$	1260	1310	1350	nm	
Spectral Width(FWHM)	$\Delta\lambda$	---	---	200	nm	RMS( $\sigma$ )
Rise/Fall Time	$T_r, T_f$	0.6	---	3.0	ns	2
Relative Intensity Noise	RIN	---	---	-117	dB/Hz	
Total jitter	$T_j$	---	---	1.2	ns	3
Deterministic Jitter	$T_{DDJ}$	---	---	0.6	ns	
Random Jitter	$T_{RJ}$	---	---	0.69	ns	
<b>Electrical</b>						
Power Supply Current	Icc	---	---	160	mA	4
Differential Input Voltage	$V_{IH}-V_{IL}$	300	---	---	mV	5
Data Input Voltage-Low	$V_{IL}-V_{CC}$	-2.0	---	-1.58	V	
Data Input Voltage-High	$V_{IH}-V_{CC}$	-1.1	---	-0.74	V	

Notes:

1. Output power is coupled into a 62.5/125  $\mu$  m Multi-mode fiber.
2. 10% to 90% Values. Maximum  $t_R, t_F$  times tested against eye mask.
3. Measured with a  $2^{23}-1$  PRBS with 72 ones and 72 zeros.
4. Maximum current is specified at  $V_{CC} = \text{Maximum}$  @ maximum temperature.
5. These inputs are compatible with 10K, 10KH and 100K LVECL and LVPECL inputs.



## TR1-M4-3023M

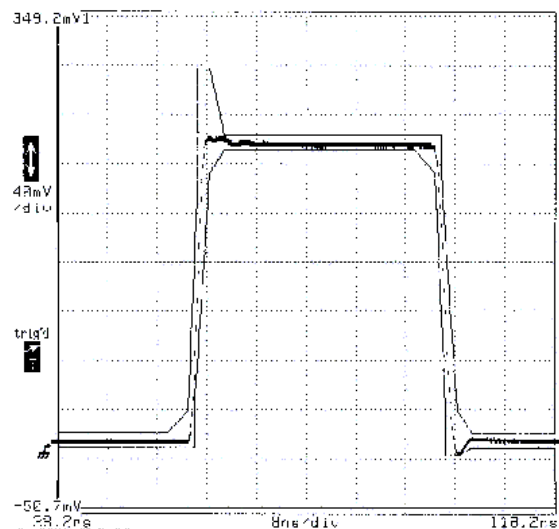
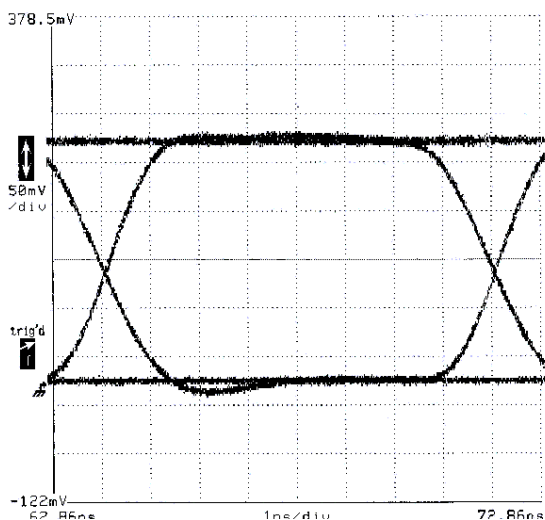
### Receiver optical Specifications ( 0 ° C < Topr < 70 ° C, 4.75 V < Vcc < 5.25 V )

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNITS	NOTE
Sensitivity	P <sub>IN</sub>	---	-34	-32	dBm	1
Maximum Input Power	P <sub>IN</sub>	-3	---	---	dBm	
Center Wavelength	λ <sub>C</sub>	1260	1310	1350	nm	
Signal Detect-Asserted	P <sub>A</sub>	---	---	-32	dBm	Average
Signal Detect-Deasserted	P <sub>D</sub>	-45	---	---	dBm	Average
Signal Detect-Hysteresis	P <sub>A</sub> -P <sub>D</sub>	---	3.0	---	dB	
Wavelength of Operation		1100	---	1650	nm	
<b>Electrical</b>						
Power Supply Current	I <sub>CC</sub>	---	---	100	mA	2
Data Output Voltage-Low	V <sub>OL</sub> - V <sub>CC</sub>	-2.0	---	-1.58	V	3
Data Output Voltage-High	V <sub>OH</sub> - V <sub>CC</sub>	-1.1	---	-0.74	V	
Signal Detect Voltage-Low	V <sub>OL</sub> -V <sub>CC</sub>	-2.0	---	-1.58	V	
Signal Detect Voltage-High	V <sub>OH</sub> -V <sub>CC</sub>	-1.1	---	-0.74	V	

#### Notes:

1. Minimum sensitivity and saturation levels at BER=1E-10 for a 2<sup>23</sup>-1 PRBS with 72 ones and 72 zeros.
2. The current excludes the output load current.
3. These outputs are compatible with 10K, 10KH and 100K LVECL and LVPECL outputs.

## TR1-M4-3023M



### CONNECTION DIAGRAM

- Receiver Signal Ground
- Receiver Data Out
- Receiver Data Out Bar
- Signal Detect
- Receiver Power Supply
- Transmitter Power Supply
- Transmitter Data In Bar
- Transmitter Data In
- Transmitter Signal Ground

- PIN. 1.(RX GND)
- PIN. 2.(RX+)
- PIN. 3.(RX-)
- PIN. 4.(SD)
- PIN. 5.(RX Vcc)
- PIN. 6.(TX Vcc)
- PIN. 7.(TX-)
- PIN. 8.(TX+)
- PIN. 9.(TX GND)



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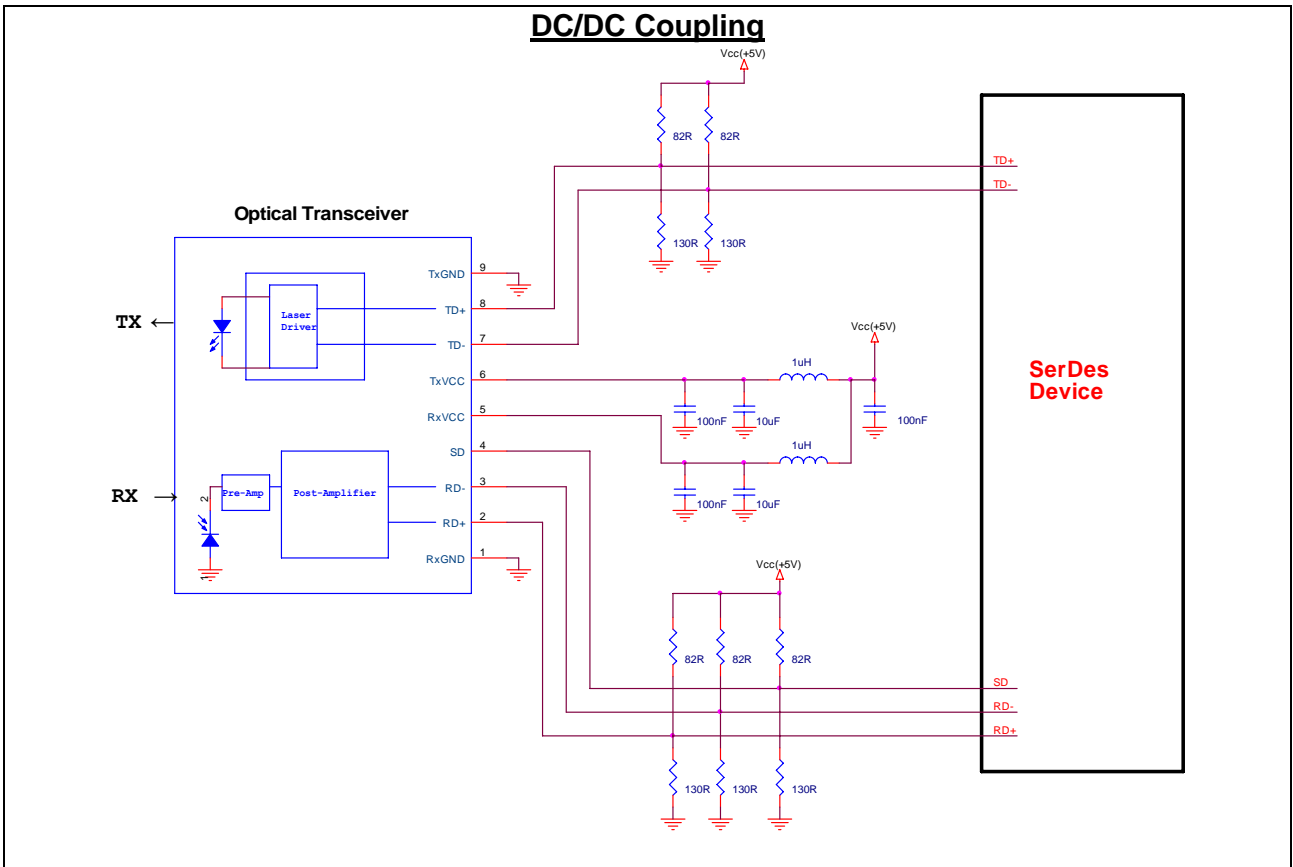
### TOP VIEW

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## TR1-M4-3023M

### Recommended Application Circuit



## TR1-M4-3023M

### Dimensions in mm

