



# Product Datasheet

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## Optical Transceiver

For Duplex LC Connector

< 50Mbps~12.5Gbps 850nm Multimode >

P/N : ARE-TR02-0004

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Confidential

## 1 General

This document specifies the physical interface dimensions and electrical and optical performances of the ARE-TR02-0004 for YOKOWO optical transceiver.

## 2 Product definitions

### 2.1 Absolute maximum rating

Absolute maximum ratings imply that no catastrophic damage will occur if the product is subjected to these ratings for short periods, provided each limiting parameter is in isolation and all other parameters have values within the normal performance parameters. It should not be assumed that limiting values of more than one parameter could be applied at any one time.

**Table 1 Absolute Maximum Rating**

Receiver Section				
Item	Symbol	Min.	Max.	Unit
Input Optical Power	Pin		10	mW
Supply Voltage	V <sub>cc</sub>	-0.3	4.5	V
Input Signal Pin Voltage	V <sub>in</sub>	GND-0.3	V <sub>cc</sub> +0.3	V
ESD (HBM,100pF,1.5kΩ) Note 1)	V <sub>esd</sub>		2.0	kV
Note 1) Other than the pins of signal input and output, HBM according to JESD22-A114-B				
Environmental condition				
Operating Case Temperature	T <sub>c</sub>	-40	+90	°C
Storage Temperature (Ambient)	T <sub>STG</sub>	-40	+100	°C
Lead Soldering Temperature (Maximum 10sec)	T <sub>s</sub>		260	°C

### 2.2 Functional description

ARE-TR02-0004 is a Duplex LC receptacle type optical signal transceiver for multimode optical fiber with a transmission wavelength of 850 nm. This transceiver needs only 3.3V power supply and has a versatile CML input/output stage for up to 12.5Gb/s signal.

Its transmitter section contains a driver IC which is integrated programmable temperature controller. This controller allows the automatic setting of the bias and pulse currents to the VCSEL by monitoring the internal temperature sensor. In addition, Its receiver section is integrated the trans-impedance pre-amplifier, the limiting post-amplifier and a versatile CML output stage.

\*Caution: ARE-TR02-0004 dose not have DC blocking capacitance at the RF signal interface. D<sub>in+</sub>, D<sub>in-</sub>, D<sub>out+</sub> and D<sub>out-</sub> terminals should be connected to signal lines of PCB through the capacitance.

Figure 1 shows schema of package outline.

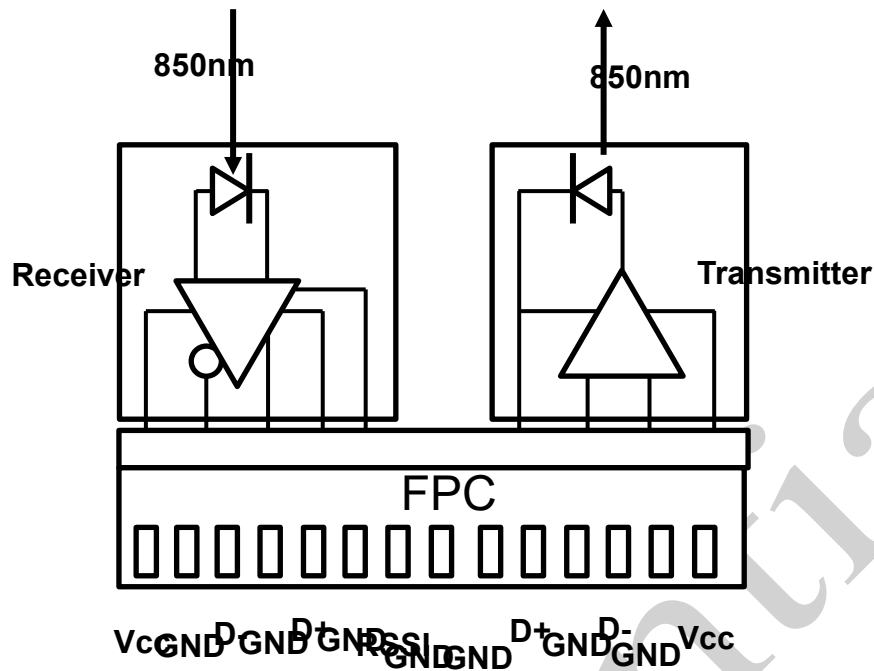


Figure 1 PKG Outline

**2.3 Electrical and Optical Characteristics**

Electrical and optical characteristics as for the items in Table 3 shall be satisfied at the operating environmental conditions specified in Table 2. It should be noted that optical characteristics are compliant with 10G-BASE SR which are specified in the IEEE802.3ae.

The D+ input indicates the input signal logic whilst the D- input follows the inverse of the input logic.

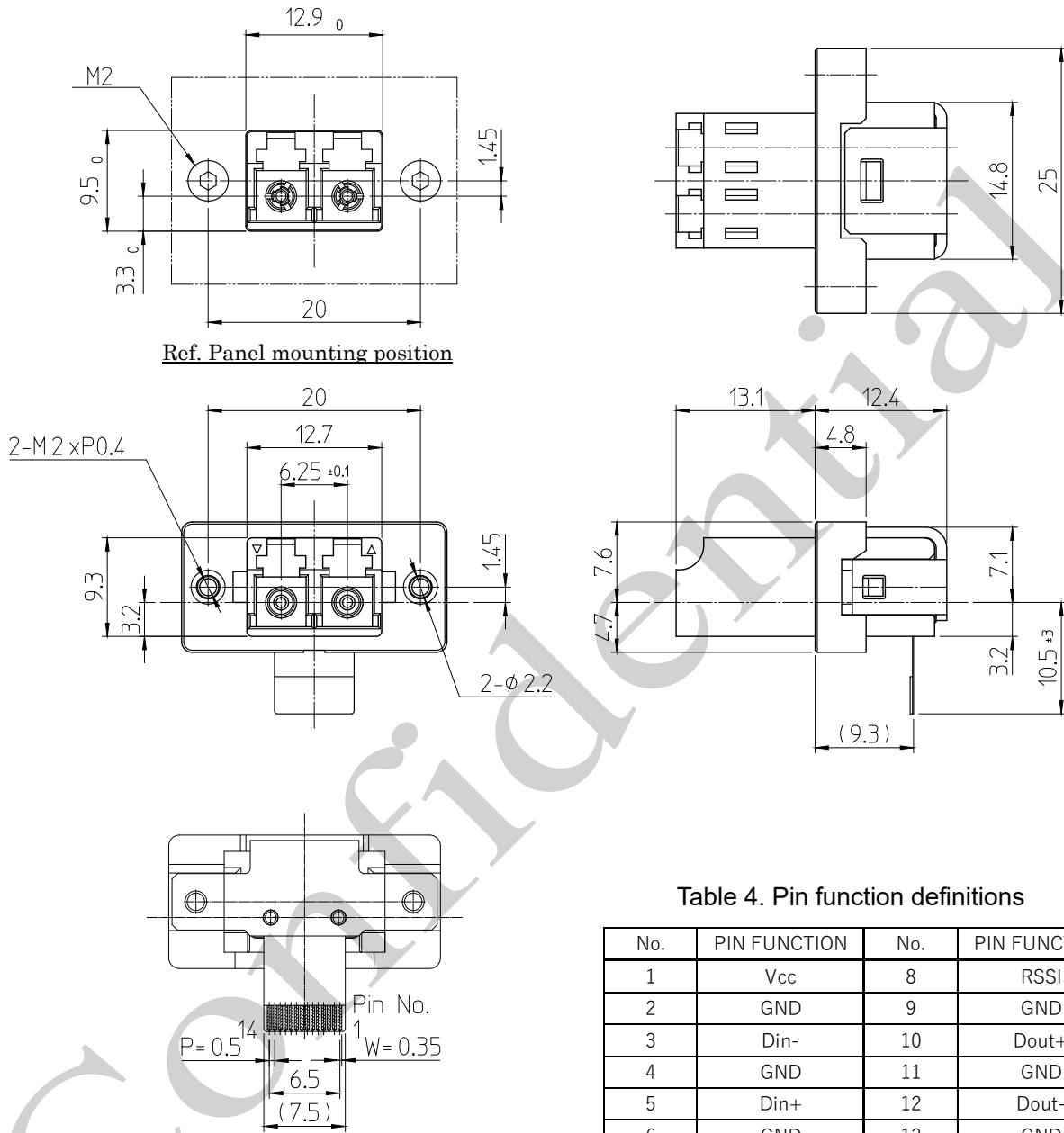
**Table 2 Operating environment**

Items	Letter symbol	Requirements			Units	Note
		Min.	Typ.	Max.		
Operating Case Temperature	Tc	-40		85	°C	1)
Ambient Humidity	RH	5		85	%	
Note 1) No condensation						

**Table 3 Electrical and optical characteristics**

Transmitter Section							
No.	Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
1	Power Supply Voltage	V <sub>cc</sub>	3.15	3.3	3.45	V	T <sub>c</sub> =25°C
2	Launched Power	P <sub>f</sub>	-5		-1	dBm	T <sub>c</sub> =25°C
3	Power Supply Current	V <sub>cc</sub>		8 10		mA	V <sub>cc</sub> =3.3V, T <sub>c</sub> =25°C V <sub>cc</sub> =3.3V, T <sub>c</sub> =85°C
4	Signal bandwidth	Bw	0.05		12.5	Gb/s	T <sub>c</sub> =25°C, Signal:NRZ-PRBS-2 <sup>31</sup> -1
5	Center Wavelength	λ <sub>c</sub>	840		860	nm	CW, T <sub>c</sub> =25 °C,
6	Eye mask margin	MM		25		%	Signal: 10.3125Gb/s-PRBS-2 <sup>31</sup> -1 Eye Mask: IEEE802.3 ae T <sub>c</sub> =25°C,
7	Tracking Error	TE	-1.5		+1.0	dB	Note 1)
8	Differential Input Voltage	V <sub>pp</sub>	300		1300	mV	Use AC coupled signal, Note 2)
<p>Note 1) TE= 10*log(P<sub>f</sub>(85°C)/ P<sub>f</sub>(25°C)), P<sub>f</sub> (T°C) is defined as launched power measured at T°C. During TE measurement, V<sub>cc</sub> should be maintained at 3.3V.</p> <p>Note 2) RF signal lines on the PCB should be connected to D<sub>in+</sub> and D<sub>in-</sub> terminals through capacitors.</p>							
Receiver Section							
No.	Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
9	Power Supply Voltage	V <sub>cc</sub>	3.15	3.3	3.45	V	T <sub>c</sub> =25°C
10	Power Supply Current	I <sub>cc</sub>		32		mA	V <sub>cc</sub> =3.3V, T <sub>c</sub> =25°C, 10.3Gbps
11	Signal Bandwidth	Bw	0.05		12.5	Gb/s	T <sub>c</sub> =25°C
12	PD Capacitance	C <sub>pd</sub>	0.1		0.2	pF	V <sub>pd</sub> =-1.7V, T <sub>c</sub> =25°C
13	Receiver Sensitivity (OMA)@10.3Gb/s	P <sub>sens</sub>			-9.8	dBm	T <sub>c</sub> =25°C, V <sub>cc</sub> =3.3V Optical input: 10.3125Gb/s -PRBS 2 <sup>31</sup> -1
14	Wavelength Range	λ	840		860	nm	T <sub>c</sub> =25°C
15	Receiver Reflectance	R <sub>r</sub>			-12	dB	
16	Differential Output	V <sub>pp</sub>	350	450	550	mV	Use AC coupled signal, Note 1)
<p>Note 1) RF signal lines on the PCB should be connected to D<sub>out+</sub> and D<sub>out-</sub> terminals through DC-blocking capacitors.</p>							

**2.4 Mechanical dimensions**



**Table 4. Pin function definitions**

No.	PIN FUNCTION	No.	PIN FUNCTION
1	Vcc	8	RSSI
2	GND	9	GND
3	Din-	10	Dout+
4	GND	11	GND
5	Din+	12	Dout-
6	GND	13	GND
7	GND	14	Vcc

**NOTES.**

Applied FPC Connector: Molex 503480-1400 or equivalent

### 3 Regulatory Compliance

#### 3.1 Class 1 Laser Product

ARE-TR02-0004 is Class 1 laser eye safety compliant per IEC 60825-1.

Because of size constraints, laser safety labeling is NOT affixed to this device but attached to the outside of the shipping carton. Product is not shipped with power supply.

**CAUTION: Use of controls, adjustments, and conditions other than those specified herein may result in hazardous laser radiation exposure.**

#### 3.2 RoHS compliant

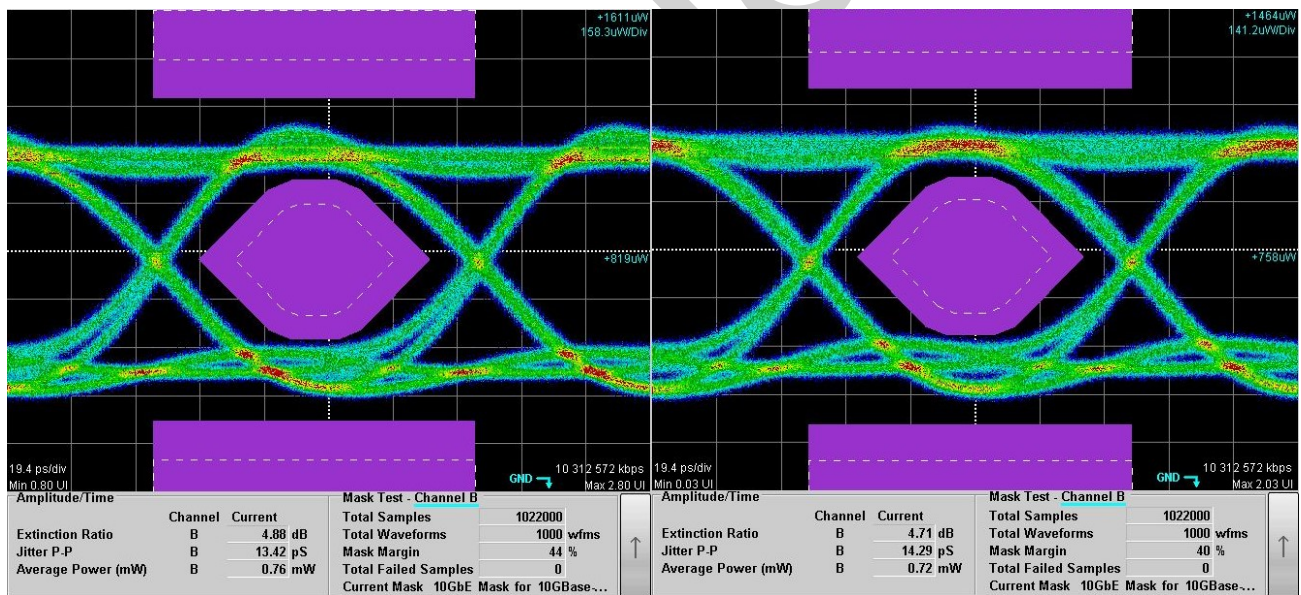
ARE-TR02-0004 is RoHS2(2011/65/EU) Compliant.

### 4 Reference

- 1) IEEE802.3ae.

### 5 Example of Waveform

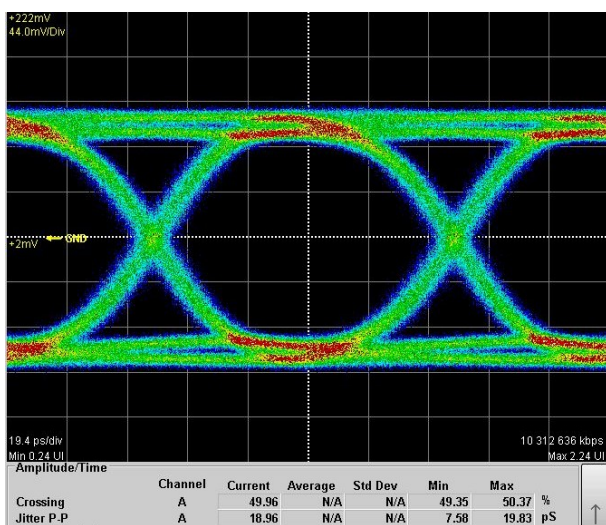
#### 5.1 Tx waveform



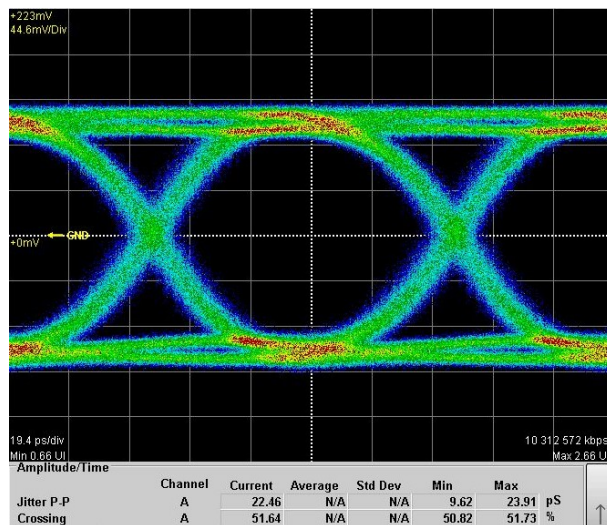
(a) Tc=25°C, 10.3125Gbps-PRBS-2<sup>31</sup>-1

(b) T=75°C, 10.3125Gbps-PRBS-2<sup>31</sup>-1

5.2 Rx waveform



(a) Tc=25°C, 10.3125Gbps-PRBS-2<sup>31</sup>-1



(b) T=75°C, 10.3125Gbps-PRBS-2<sup>31</sup>-1

Rev. No.	History of change	Date
00	New issue	2021/02/01
01	Revised cover	2021/04/06

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