

# Optical transceiver

P16548-01AT



## For 1.25 Gbps optical free-space communication

This optical transceiver is capable of free-space optical data communication. By placing two of this product facing each other on the optical axis, full-duplex two-way communication with a transmission distance of up to 100 mm is realized. Maximum data rate is 1.25 Gbps, and this characteristic is maintained even when communicating between a 360° rotating object and stationary object. This product also has a built-in transmitter and receiver. For the transmitter we use a 850 nm VCSEL, and by combining it with a driver IC that can compensate for temperature, it is possible to do stable communication over a wide operating temperature range. The receiver consists of a PIN photodiode and a signal processing IC, and is capable of high-speed operation.

### Features

- Data rate: 100 Mbps to 1.25 Gbps
- Transmission distance: 25 mm to 100 mm
- Full duplex two-way communication
- Supports 360° degree rotation mechanism
- CML interface
- 850 nm VCSEL (laser class 1)

### Applications

- Short-distance board-to-board communication
- Communication via rotation mechanism

### Absolute maximum ratings

Parameter	Symbol	Value	Unit
Supply voltage	Vcc	-0.4 to +3.6	V
Input voltage	Vin	-0.85 to +1.85	V
Operating temperature	Topr	-40 to +85	°C
Storage temperature	Tstg	-40 to +105	°C
Soldering temperature*1	Tsol	260 (twice)	°C

\*1: Reflow soldering, IPC/JEDEC J-STD-020 MSL3, see P.5

Note: Exceeding the absolute maximum ratings even momentarily may cause a drop in product quality. Always be sure to use the product within the absolute maximum ratings.

### Recommended operating conditions

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply voltage	Vcc		3.135	3.3	3.465	V
Data rate	DR	PRBS 2 <sup>7</sup> - 1, NRZ	100	-	1250	Mbps
Transmission distance*2	d1	DR: 100 to 625 Mbps	25	-	100	mm
	d2	DR: 625 Mbps to 1.25 Gbps	25	-	50	
Receiver output load	RL	Differential	-	100	-	Ω

\*2: Distance between the bottom faces of the optical transceivers when using optical transceivers facing each other

### Electrical and optical characteristics (Ta=-40 to +85 °C, Vcc=3.135 to 3.465 V, unless otherwise noted)

#### Transmitter

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Current consumption	I <sub>cc</sub>	*3	-	15	25	mA
Differential input voltage*4	V <sub>id</sub>	AC coupling, peak to peak	400	-	1600	mV
Input differential impedance	R <sub>in</sub>	AC coupling	-	100	-	Ω
Center emission wavelength	λ <sub>c</sub>		-	850	-	nm

\*3: Input signal

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input rise time	t <sub>r</sub>	20 to 80%, 1.25 Gbps	30	-	80	ps
Input fall time	t <sub>f</sub>	80 to 20%, 1.25 Gbps	30	-	80	ps
Total jitter	T <sub>j</sub>	1.25 Gbps	-	-	0.15	UI

\*4: Light output becomes indefinite below 400 mV

Note: Connect at least one bypass capacitor (0.1 μF) within 3 mm of the terminals (between V<sub>cc</sub>\_Tx and GND).

Also, connect other capacitors nearby.

#### Receiver

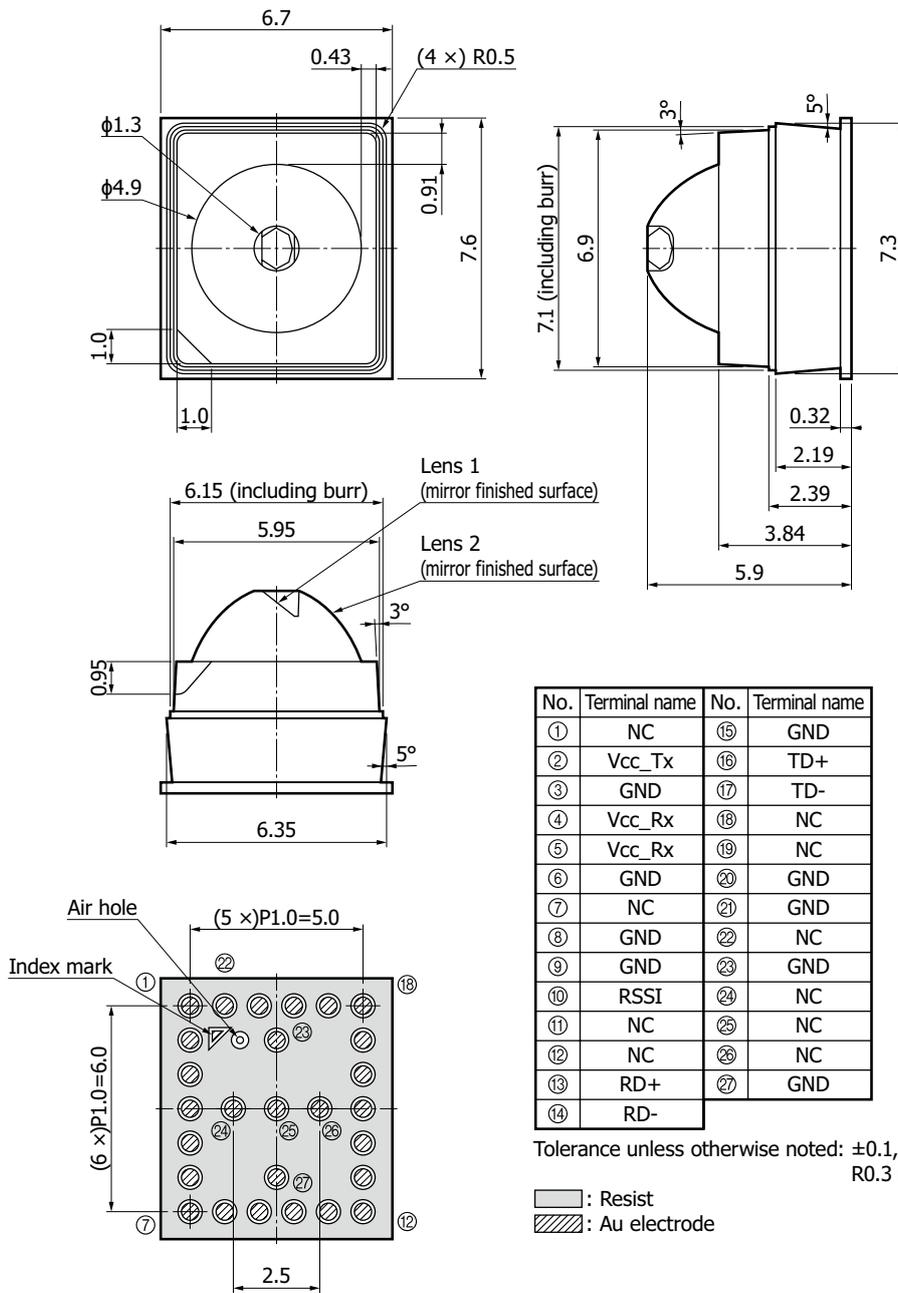
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Current consumption	I <sub>cc</sub>		-	60	75	mA
Differential output voltage	V <sub>od</sub>	AC coupling, differential load=100 Ω	400	-	700	mV
Output rise time	t <sub>r</sub>	20 to 80%	-	200	-	ps
Output fall time	t <sub>f</sub>	80 to 20%	-	200	-	ps
Output eye opening width	T <sub>eyex</sub>	When there is electrical signal input without jitter	0.5	-	-	UI
Signal detection time*5	T <sub>sd_on</sub>		-	-	100	μs

\*5: Time from optical signal input to stable output operation

Note: Connect at least one bypass capacitor (0.1 μF) within 3 mm of the terminals (between V<sub>cc</sub>\_Rx and GND).

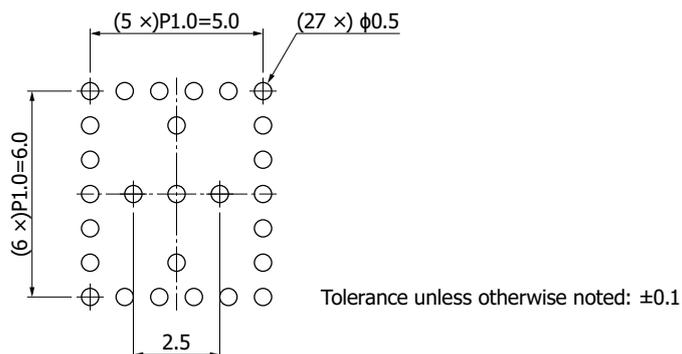
Also, connect other capacitors nearby.

**Dimensional outline (unit: mm)**



KPIC0120EA

**Recommended land pattern (unit: mm)**



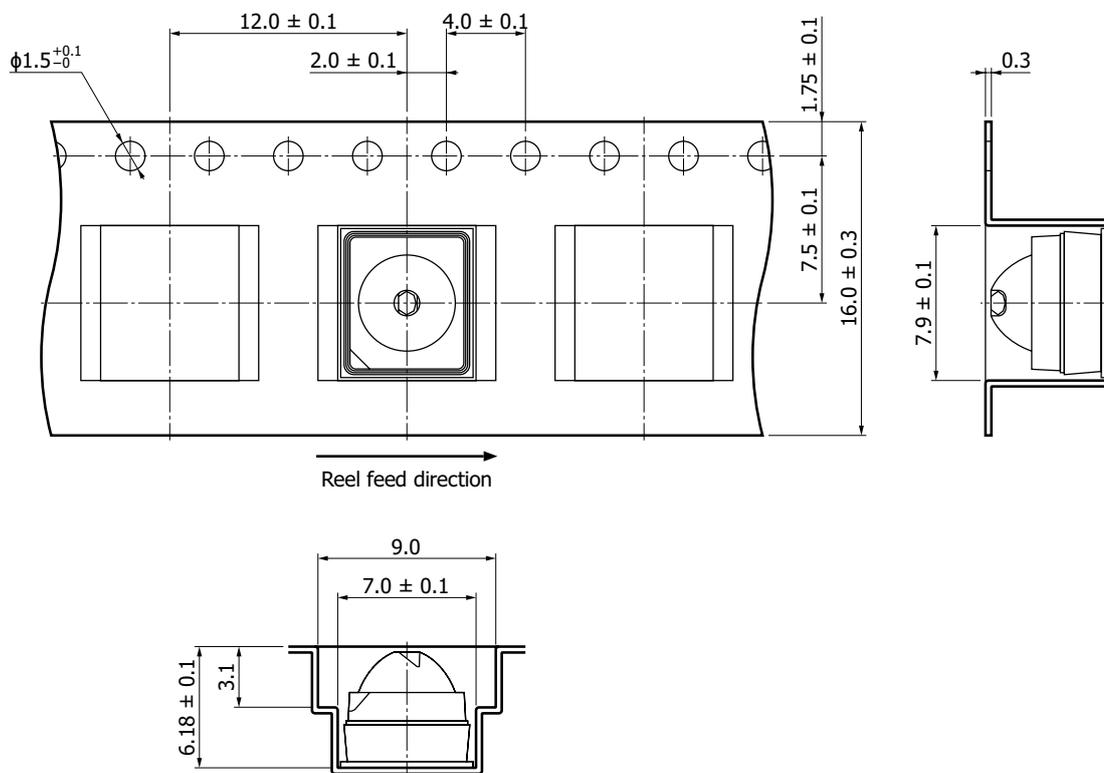
KPIC0393EA

**Reel packing specifications**

■ Reel (conforms to JEITA ET-7200)

Dimensions	Hub diameter	Tape width	Material	Electrostatic characteristics
φ330 mm	φ100 mm	16 mm	PS	Conductive

■ Embossed tape (unit: mm, material: PS, conductive)



KPIC0396EA

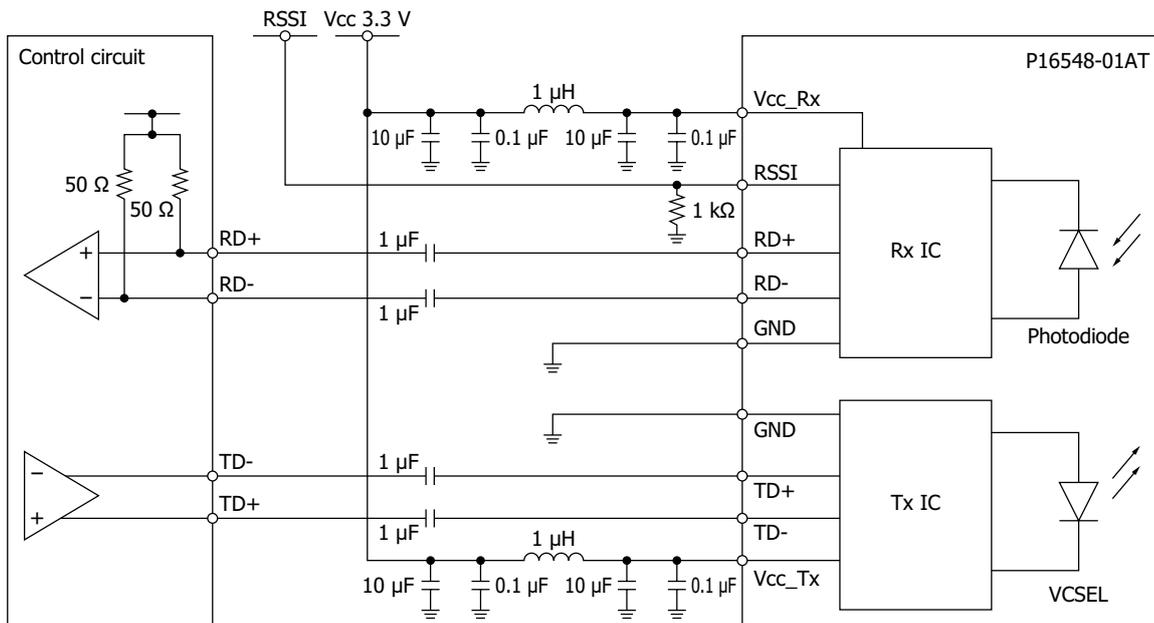
■ Packing quantity

500 pcs/reel

■ Packing state

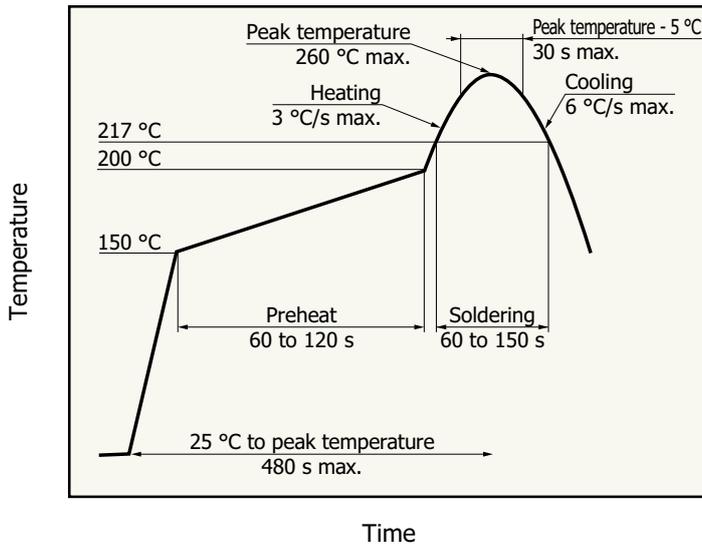
Reel and desiccant in moisture-proof packaging (vacuum-sealed)

Application circuit example



KPIC0394EA

Recommended reflow soldering conditions



KSPD80419EA

- Do not use a vapor phase reflow oven, because moisture may get inside the package through the air holes in the bottom of the package.
- Do not ultrasonic cleaning, steam cleaning, or soak washing.
- This product supports lead-free soldering. After unpacking, store it in an environment at a temperature of 30 °C or less and a humidity of 60% or less, and perform soldering within 168 hours.
- The effect that the product receives during reflow soldering varies depending on the circuit board and reflow oven that are used. When you set reflow soldering conditions, check that problems do not occur in the product by testing out the conditions in advance.

Evaluation kit M17545-01 for optical transceiver

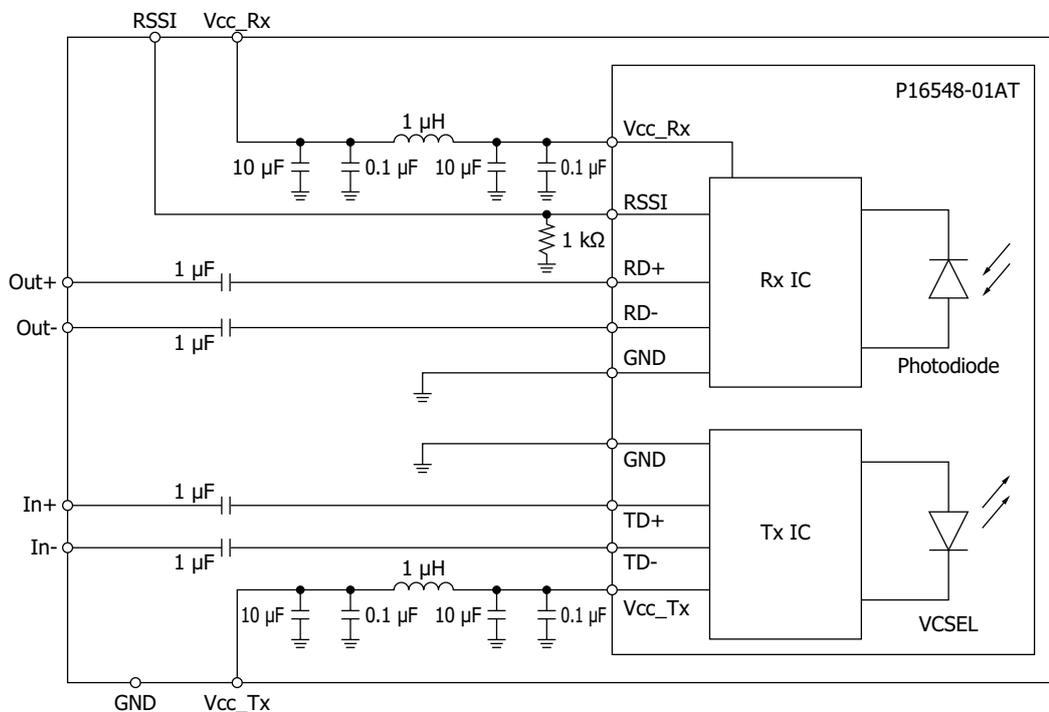
We offer an evaluation kit for the optical transceiver P16548-01AT. Contact us for detailed information.

**Structure**

- Evaluation board with optical transceiver P16548-01AT (×2)
- Power cable



**Equivalent circuit**



KPIC0395EA

## Related information

[www.hamamatsu.com/sp/ssd/doc\\_en.html](http://www.hamamatsu.com/sp/ssd/doc_en.html)

### ■ Precautions

- Disclaimer
- Precautions / Metal, ceramic, plastic package products
- Precautions / Surface mount type products

The content of this document is current as of December 2024.

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