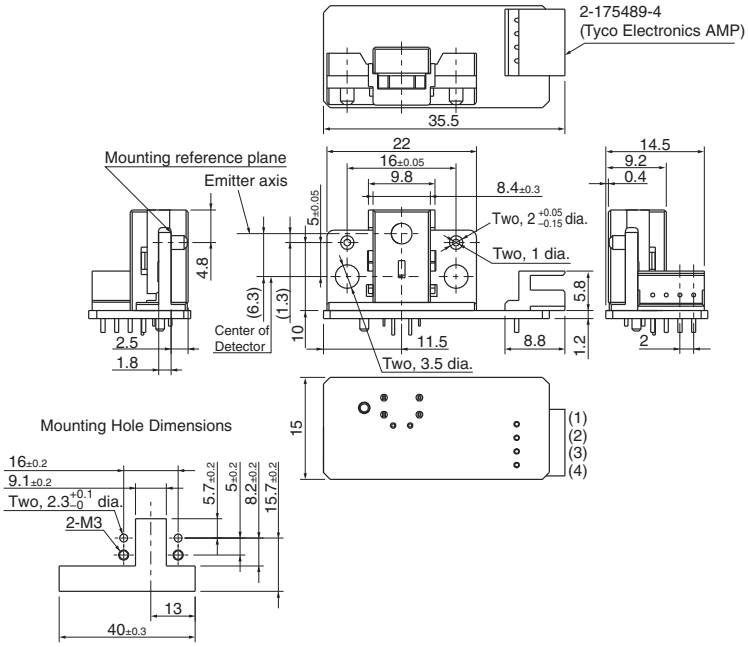
OMRON

Microphotonic Devices (Micro-displacement Sensor)
Z4D-B01

⚠ **Be sure to read *Precautions* on page 24.**

■ Dimensions

Note: All units are in millimeters unless otherwise indicated.



Recommended Mating Connectors:
Tyco Electronics AMP
175778-4 (crimp-type connector)
173977-4 (press-fit connector)

■ Features

- Easier control enabled by built-in processor circuit.
- Resolution: ±10 µm.
- Operating area: 6.5±1 mm.
- Adapts well to changes in reflection factor using division processing.

■ Applications

- Paper thickness detection
- Multi-feed detection
- Travel distance detection

Pin no.	Remarks	Name
1	PLS	LED pulse light emission control signal
2	Vcc	Power supply
3	OUT	Output
4	GND	Ground

Unless otherwise specified, the tolerances are as shown below.

Dimensions	Tolerance
3 mm max.	±0.3
3 < mm ≤ 6	±0.375
6 < mm ≤ 10	±0.45
10 < mm ≤ 18	±0.55
18 < mm ≤ 30	±0.65
30 < mm ≤ 50	±0.8

■ Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Value	Unit	Condition
Supply voltage	V_{CC}	7	VDC	---
LED pulse light emission control signal	PLS	7	VDC	LED
LED light emission pulse	T_{FP}	100 (see note)	ms	---
Operating temperature	T_{opr}	–10 to 65	°C	No freezing or condensation
Storage temperature	T_{stg}	–25 to 80	°C	---

Note: Refer to Pulsed Forward Current Rated Curve.

■ Electrical and Optical Characteristics (Ta = –10°C to 65°C)

Item	Symbol	Rated value	Condition
Power supply voltage	V_{CC}	5 VDC ±10%	Ripple (p-p): 10 mV p-p max.
Current consumption	OUT	0.2 VDC to (V_{CC}–0.3) V	(see note 1)
Response delay time (High to Low)	tr	100 µs max.	(see note 2)
Response delay time (Low to high)	PLS	3.5 VDC to V_{CC}	---

Note: 1. Load impedance (between OUT-GND) is set at more than 10 kΩ.
2. The time for output voltage to rise from 10% to 90% of the full output range.

■ Characteristics (Ta = –10°C to 65°C)

Object: N8.5 Munsell paper with a reflection factor of 70%.

Item	Value
Operating area (see note 1)	6.5 ±1 mm
Sensitivity variation (see note 2)	–1.4 mV/μm ±10% max.
Resolution (see note 3)	±10 μm max. (Ta = 25°C)
Linearity (see note 4)	2% F.S. (full scale) max.

Note: 1. Distance from Mounting Reference Plane to Target.

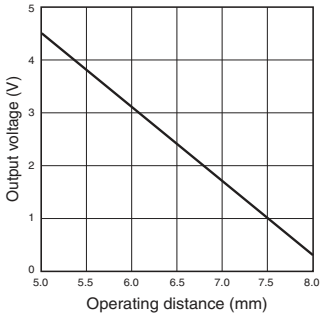
2. The sensitivity is defined as slope of the line and it represents the variation in the output voltage per unit length between different products.

3. This is the value of the electrical noise width in the output signal converted to a distance under the following conditions.
(1) A/D conversion time: 50 μs max.
(2) Ripple noise in the power supply voltage (Vcc): 10 mVp-p max.
(3) Low-pass filter time constant of the downstream signal processing circuit: 0.4 ms
(4) Distance from mounting reference plane to target: 6.5 mm

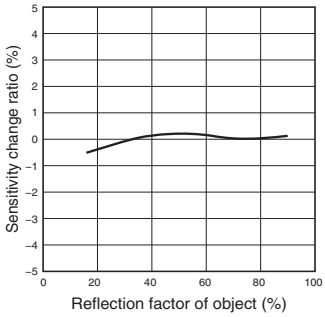
4. This is the peak-to-peak value of the deviation of the signal output from a straight line.
A linearity of 2% F.S. indicates the following value:
(1) Distance full-scale converted value: 2 mm × 0.02 = 0.04 mm (40 μm)
(2) Output voltage converted value: 1.4 mV/μm × 40 μm = 56 mV (for a sensor with a sensitivity of 1.4 mV/μm)

■ Engineering Data

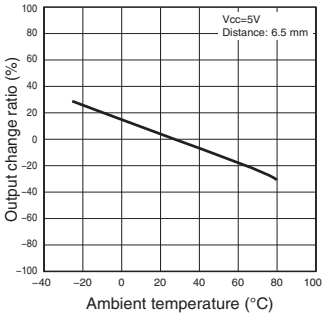
Operating Distance Characteristics (Typical)



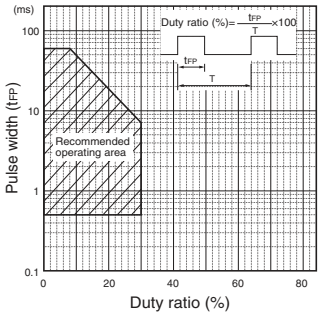
Dependency of Object on Reflection Factor (Typical)



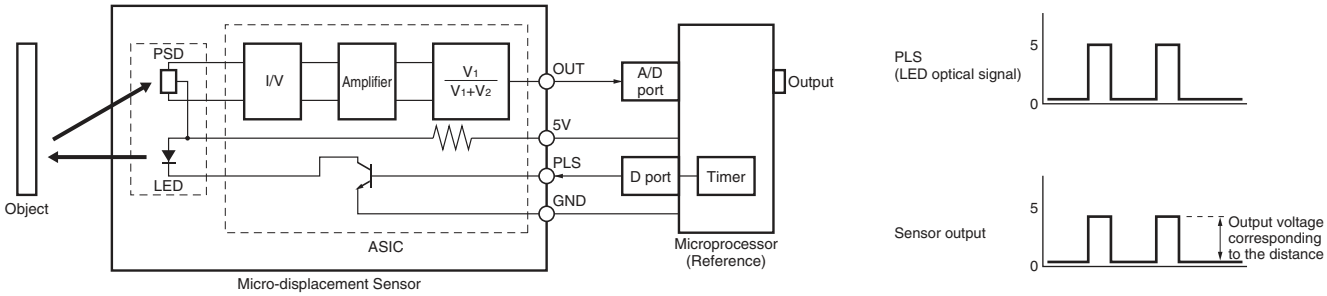
Temperature Characteristics (Typical)



Pulsed Forward Current Rated Curve



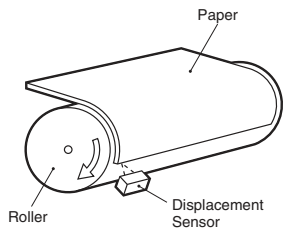
■ Circuit Diagram



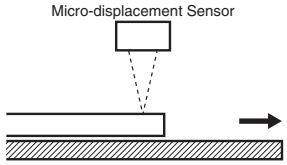
The sensor output is obtained by adding a pulse signal to the PLS terminal. An output cannot be obtained merely by adding a DC voltage to the PLS terminal. The output will be a pulse output synchronized with the PLS signal. The output must be held with a latching or sample-and-hold circuit in the microprocessor.

■ Typical Application

Detecting Paper Thickness in Printers



Detecting Two Sheets of Paper



Detecting Sheet Thickness