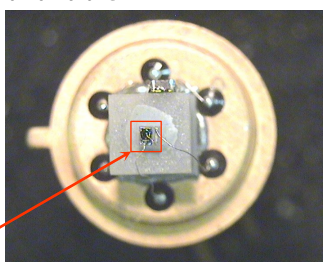


## Features

- High reliability
- Superior linearity
- Thermo stability
- Easy-to-use detector/amplifier modules are also available



Photodiode CHIP

## Description

Photodiode **PD48-03-NS-TEC** is a model of [photodetector](#) with narrow spectral range (**NS**) for detection of radiation in the Middle Infrared (Mid-IR) spectral range from 3700 to 4800 nm operating at room temperature.

Photodiode **PD48-03-NS-TEC** has thermo electric cooler (**TEC**) and thermistor for a control of temperature. Components are integrated inside the standard 9.2 mm TO-5 package with **TEC**.

Diameter of the photosensitive area of **PD48-03-NS-TEC** is 300  $\mu\text{m}$ . High speed of response makes it possible for detection of modulated radiation of laser diodes (LDs) and light-emitting diodes (LEDs).

Related products: **PD48-03-NS-TEC** can be used in optical pair with our [LED38...LED46](#).

## Applications

- Environment measurements
- Gas analysis ( $\text{CH}_4$ ,  $\text{CO}$ ,  $\text{CO}_2$ )
- Infrared spectrophotometry
- Analytical instruments

## Accessories (optional)

- [Amplifier with temperature controller](#)  
**AMT-07M**

## General characteristics

**NS** - narrow spectrum

| Package                      | Parameter                    | Symbol              | Value     | Unit               |
|------------------------------|------------------------------|---------------------|-----------|--------------------|
| <b>TO-5<br/>with<br/>TEC</b> | Sensitive area diameter      | d                   | 0.3       | mm                 |
|                              | Weight                       | m                   | 1.15      | g                  |
|                              | Operating temperature        | $T_{\text{opr}}$    | -20...+40 | $^{\circ}\text{C}$ |
|                              | Window material              | sapphire glass      |           |                    |
|                              | Cooling                      | one-stage TE-cooled |           |                    |
|                              | Soldering temperature        | $T_s$               | +230      | $^{\circ}\text{C}$ |
|                              | Storage temperature          | $T_{\text{stg}}$    | -20...+50 | $^{\circ}\text{C}$ |
|                              | Maximum reverse bias voltage | V                   | -0.5      | V                  |
|                              | Size                         | D                   | 9.2       | mm                 |
|                              |                              | H                   | 20.2      |                    |

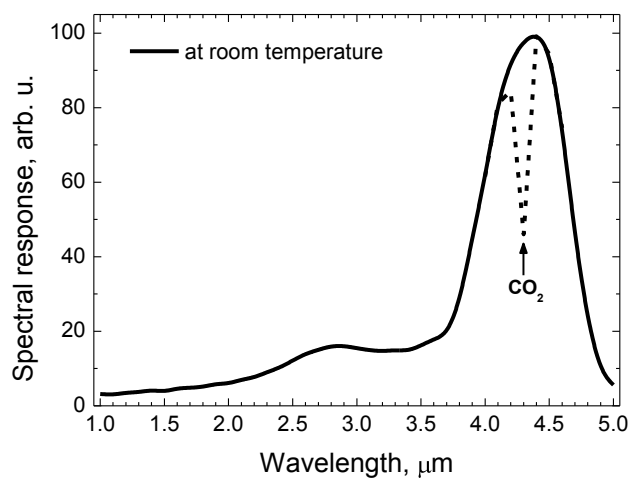
## ▼ Electrical and optical characteristics

| Parameter                   | Symbol      | Condition                                | Element temperature   |                      |                      | Unit                                                  |
|-----------------------------|-------------|------------------------------------------|-----------------------|----------------------|----------------------|-------------------------------------------------------|
|                             |             |                                          | -20°C                 | 0°C                  | +20°C                |                                                       |
| Spectral sensitivity range  | $\lambda$   | at level 10%                             | -                     | -                    | 2.5 - 4.9            | $\mu\text{m}$                                         |
| Peak sensitivity wavelength | $\lambda_p$ | at level 90%                             | -                     | -                    | 4.3 - 4.6            | $\mu\text{m}$                                         |
| Photo sensitivity           | S           | at $\lambda_p$                           | 0.7 - 0.9             | 0.6 - 0.8            | 0.6 - 0.8            | A/W                                                   |
| Detectivity                 | $D^*$       | at $\lambda_p$                           | $[8 - 10] \cdot 10^8$ | $[6 - 9] \cdot 10^8$ | $[5 - 9] \cdot 10^8$ | $\text{cm} \cdot \text{Hz}^{1/2} \cdot \text{W}^{-1}$ |
| Dark current                | $I_d$       | $V = -0.1 \text{ V}$                     | 0.2 - 0.4             | 0.4 - 0.6            | 0.6 - 1.0            | mA                                                    |
| Capacitance                 | C           | $V = 0 \text{ V}$<br>$f = 1 \text{ MHz}$ | 18 - 35               | 20 - 40              | 25 - 50              | pF                                                    |
| Rise time                   | $t_r$       | $V = 0 \text{ V}$<br>$R_L = 50 \Omega$   | $\leq 20$             |                      |                      | ns                                                    |
| Fall time                   | $t_f$       |                                          |                       |                      |                      |                                                       |
| Shunt resistance            | $R_0$       | $V \approx -10 \text{ mV}$               | 1.0 - 2.0             | 0.8 - 1.6            | 0.1 - 0.5            | k $\Omega$                                            |
| Noise equivalent power      | NEP         | at $D^*$                                 | -                     | -                    | -                    | $\text{W} \cdot \text{Hz}^{-1/2}$                     |

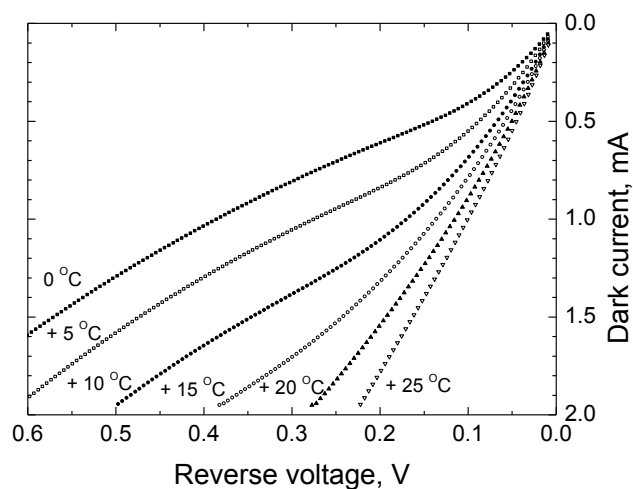
## ▼ TEC *TO506.1MC0400710.TB103* parameters (without load)

| Parameter             | Symbol                  | Condition               | Value | Unit       |
|-----------------------|-------------------------|-------------------------|-------|------------|
| Current               | $I_{\text{max}}$        | $\Delta T_{\text{max}}$ | 1.50  | A          |
| Voltage               | $U_{\text{max}}$        | $\Delta T_{\text{max}}$ | 0.80  | V          |
| Cooling energy        | $Q_{\text{max}}$        | -                       | 1.30  | W          |
| Temperature range     | $\Delta T_{\text{max}}$ | vacuum                  | 70    | K          |
| Thermistor resistance | $R_t$                   | at +20°C                | 10.00 | k $\Omega$ |

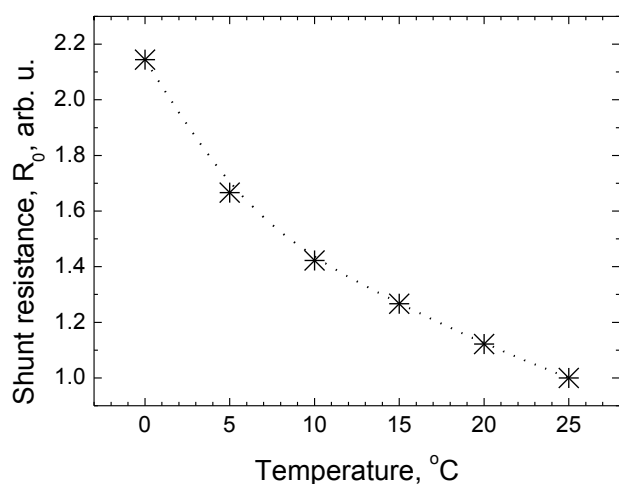
### ▼ Spectral response



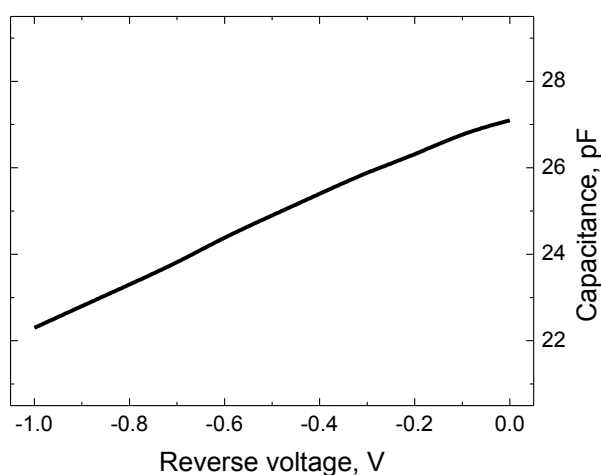
### ▼ Dark current vs. reverse voltage



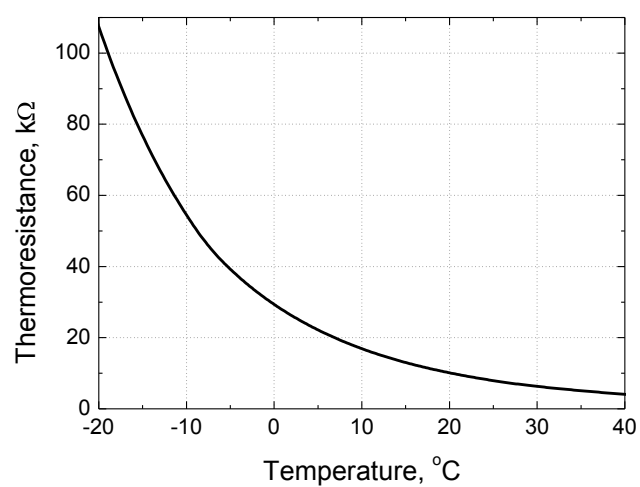
### ▼ Shunt resistance vs. temperature



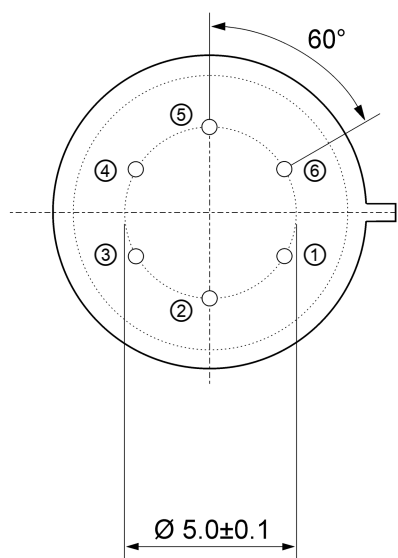
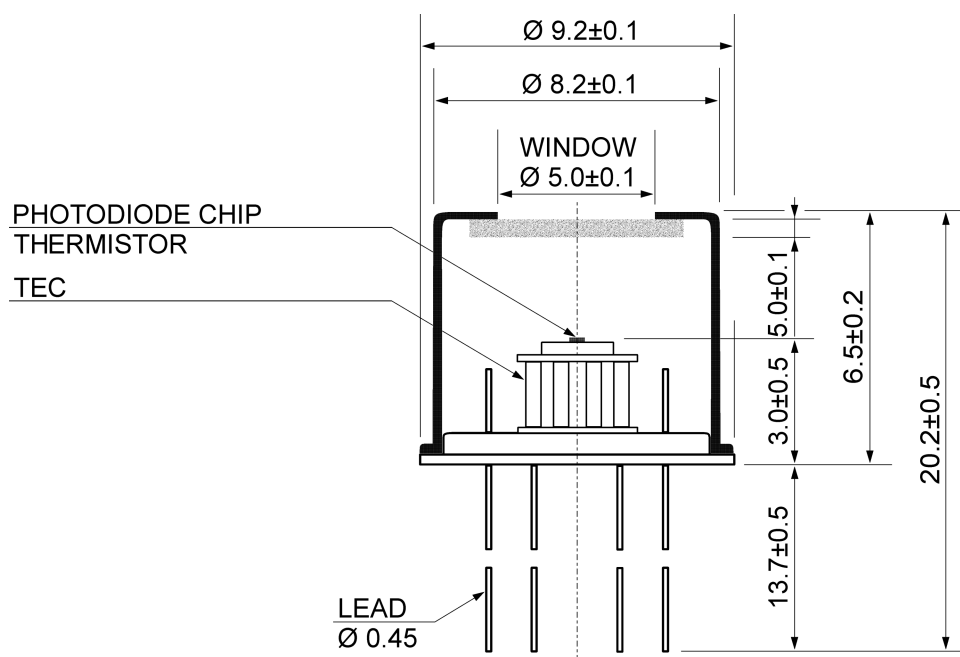
### ▼ Capacitance vs. reverse voltage



## ▼ Thermoresistance vs. temperature



▼ TO-5 package with TEC dimensions (unit: mm)



| Pin | Description         |
|-----|---------------------|
| ①   | TEC (anode)         |
| ②   | Detector (anode)*   |
| ③   | Detector (cathode)* |
| ④   | Thermistor TC103    |
| ⑤   |                     |
| ⑥   | TEC (catnode)       |

\*Special order: the pin polarity can be changed.