

# MCT photoconductive detector P3257/P3981/P2750 series

Non-cooled type and TE-cooled type suitable for long, continuous operation



## Features

- Choice of spectral response (up to 12  $\mu\text{m}$ )  
The band gap can be adjusted by controlling the composition ratio of HgTe and CdTe. Utilizing this fact, various types are available in different spectral characteristics.
- Photoconductive element that decreases its resistance by input of infrared light
- Custom devices available  
Custom devices not listed in this catalog are also available with different spectral response, active area size and number of element.
- Easy-to-use infrared detector modules with preamp available

## Applications

- Radiation thermometer
- Gas analyzer
- Infrared spectrophotometer
- FTIR
- CO<sub>2</sub> laser monitor

## Accessories (Optional)

- Heatsink for one-stage TE-cooler A3179
- Heatsink for two-stage TE-cooler A3179-01
- Heatsink for three-stage TE-cooler A3179-04
- Temperature controller C1103-05 (-25 to -75 °C)  
C1103-07 (20 to -30 °C)
- Preamp C5185-01 (P3981/P2750 series)
- Infrared detector modules with preamp  
P4631-10 (P3257-31)  
P4631 (P3981)  
P4631-04 (P2750)

## General ratings / Absolute maximum ratings

| Type No. | Dimensional outline/<br>Window material *1 | Package            | Cooling               | Active area<br>(mm) | Absolute maximum ratings             |                                    |                           |                                    |                                  |
|----------|--------------------------------------------|--------------------|-----------------------|---------------------|--------------------------------------|------------------------------------|---------------------------|------------------------------------|----------------------------------|
|          |                                            |                    |                       |                     | Thermistor power dissipation<br>(mW) | TE-cooler allowable current<br>(A) | Allowable current<br>(mA) | Operating temperature<br>Topr (°C) | Storage temperature<br>Tstg (°C) |
| P3257-30 | ①/Se                                       | with BNC connector | Non-cooled            | 1 × 1               | -                                    | -                                  | 50                        | -40 to +60                         | -55 to +60                       |
| P3257-31 | ②/Se                                       | TO-8               | One-stage TE-cooled   |                     | 0.2                                  | 1.5                                | 50                        |                                    |                                  |
| P3981    | ②/S                                        | TO-8               | Two-stage TE-cooled   |                     |                                      | 1.0                                | 3                         |                                    |                                  |
| P3981-01 | ③/S                                        | TO-66              |                       |                     |                                      |                                    | 3                         |                                    |                                  |
| P2750-08 | ②/S                                        | TO-8               |                       |                     |                                      |                                    | 6                         |                                    |                                  |
| P2750    | ④/S                                        | TO-3               | Three-stage TE-cooled | 0.25 × 0.25         |                                      |                                    | 6                         |                                    |                                  |
| P2750-06 |                                            |                    |                       |                     |                                      |                                    | 3                         |                                    |                                  |

\*1: Window material S : Sapphire glass  
Se: ZnSe

## Electrical and optical characteristics (Typ. unless otherwise noted)

| Type No. | Measurement condition    | Peak sensitivity wavelength<br>$\lambda_p$ | Cut-off wavelength<br>$\lambda_c$ | Photo sensitivity<br>S<br>$\lambda = \lambda_p$ *3 | D*<br>(500, 1200, 1) *4                                |                                                        | D*<br>( $\lambda_p$ *3, 1200, 1)               | NEP<br>$\lambda = \lambda_p$ *3 | Rise time<br>tr<br>0 to 63 % | Dark resistance<br>Rd |
|----------|--------------------------|--------------------------------------------|-----------------------------------|----------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------|------------------------------------------------|---------------------------------|------------------------------|-----------------------|
|          | Element temperature<br>T |                                            |                                   |                                                    |                                                        |                                                        |                                                |                                 |                              |                       |
|          | (°C)                     | ( $\mu\text{m}$ )                          | ( $\mu\text{m}$ )                 | (V/W)                                              | Min.<br>( $\text{cm} \cdot \text{Hz}^{1/2}/\text{W}$ ) | Typ.<br>( $\text{cm} \cdot \text{Hz}^{1/2}/\text{W}$ ) | ( $\text{cm} \cdot \text{Hz}^{1/2}/\text{W}$ ) | (W/Hz <sup>1/2</sup> )          | ( $\mu\text{s}$ )            | ( $\Omega$ )          |
| P3257-30 | 25                       | 6.0                                        | 11.0                              | $2 \times 10^{-3}$                                 | $5.0 \times 10^5$                                      | $3.0 \times 10^6$                                      | $2.0 \times 10^5$                              | $5.0 \times 10^{-7}$            | 1 (ns)                       | 30                    |
| P3257-31 | 0                        | 6.5                                        | 11.5                              | $5 \times 10^{-3}$                                 | $1.0 \times 10^6$                                      | $6.0 \times 10^6$                                      | $5.0 \times 10^5$                              | $2.0 \times 10^{-7}$            | 1 (ns)                       | 35                    |
| P3981    | -30                      | 3.6                                        | 3.7                               | $1 \times 10^4$                                    | $2.0 \times 10^8$                                      | $2.0 \times 10^9$                                      | $5.0 \times 10^{10}$                           | $2.0 \times 10^{-12}$           | 10                           | 600                   |
| P3981-01 |                          |                                            |                                   |                                                    |                                                        |                                                        |                                                |                                 |                              |                       |
| P2750-08 | -60                      | 4.8                                        | 5.4                               | $3 \times 10^2$                                    | $1.0 \times 10^8$                                      | $6.0 \times 10^8$                                      | $4.0 \times 10^9$                              | $2.5 \times 10^{-11}$           | 2                            | 160                   |
| P2750    |                          | 4.8                                        | 5.5                               | $2 \times 10^3$                                    | $5.0 \times 10^8$                                      | $3.0 \times 10^9$                                      | $2.0 \times 10^{10}$                           | $5.0 \times 10^{-12}$           | 3                            | 200                   |
| P2750-06 |                          |                                            |                                   | $3 \times 10^3$                                    |                                                        |                                                        |                                                | $1.3 \times 10^{-12}$           |                              |                       |

\*2: Photo sensitivity changes with the bias current. The values in the above table are measured with the optimum bias current.

\*3: P3257-30/-31:  $\lambda = 10.6 \mu\text{m}$

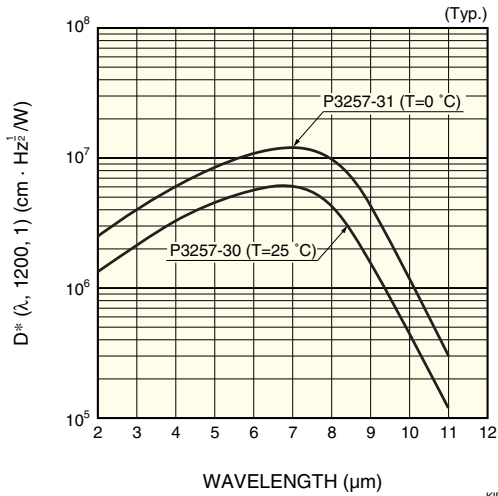
\*4: P3257-30/-31: (800, 1200, 1)

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# MCT photoconductive detector P3257/P3981/P2750 series

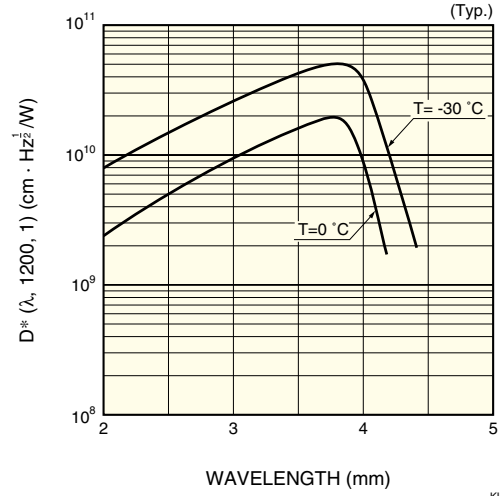
## ■ Spectral response

P3257-30/-31



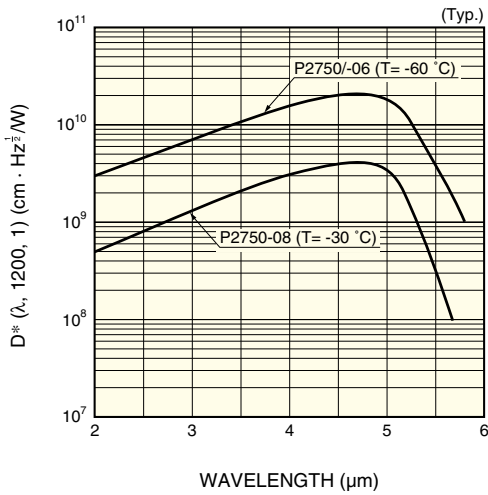
KIRDB0164EB

P3981/-01



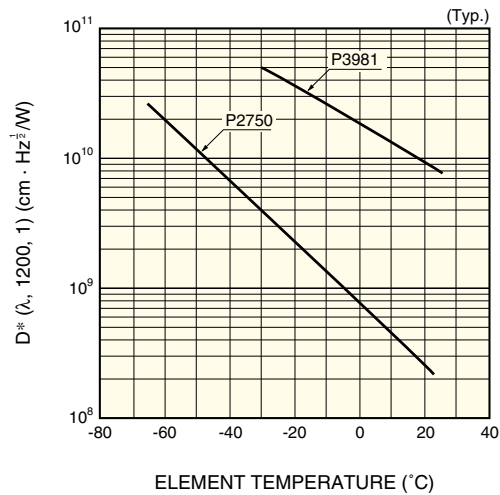
KIRDB0066EB

P2750/-06/-08



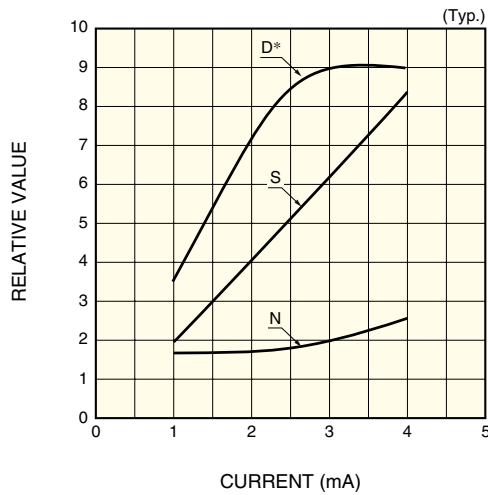
KIRDB0068EB

## ■ $D^*$ vs. element temperature



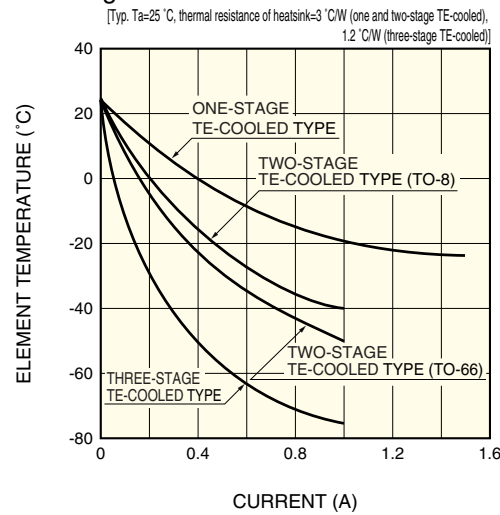
KIRDB0174EA

## ■ S/N vs. bias current (P2750)



KIRDB0070EC

## ■ Cooling characteristics of TE-cooler

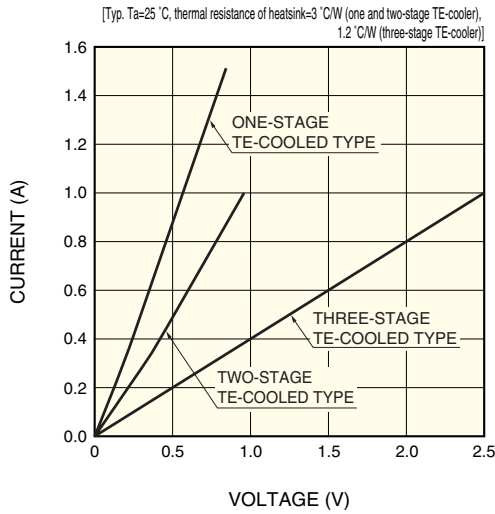


KIRDB0175EA

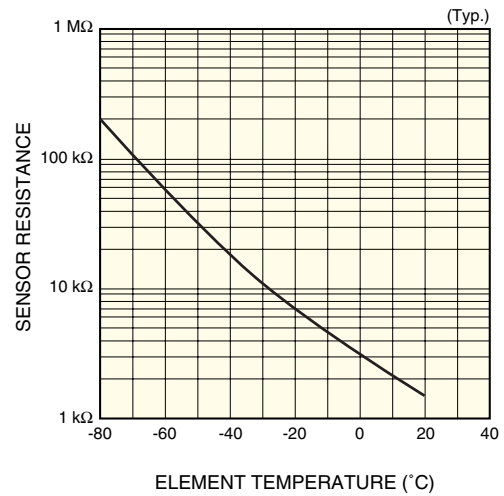
The detector must be operated in a range where the  $D^*$  becomes Max.

# MCT photoconductive detector P3257/P3981/P2750 series

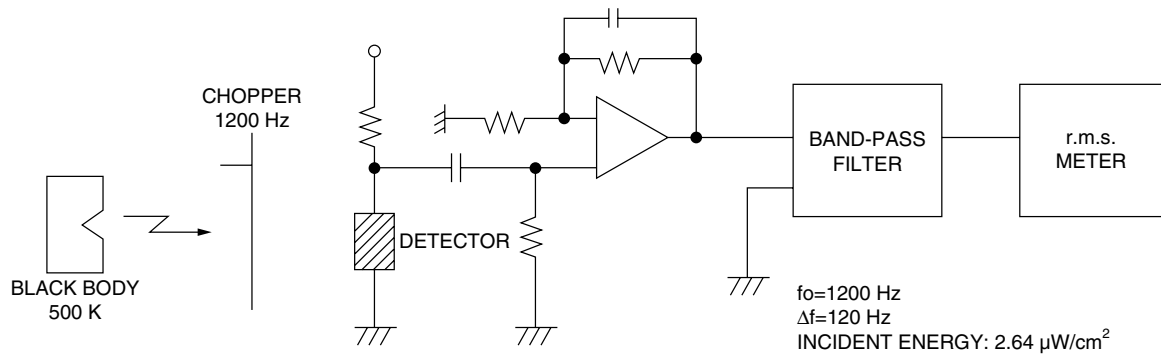
## Current vs. voltage characteristics of TE-cooler



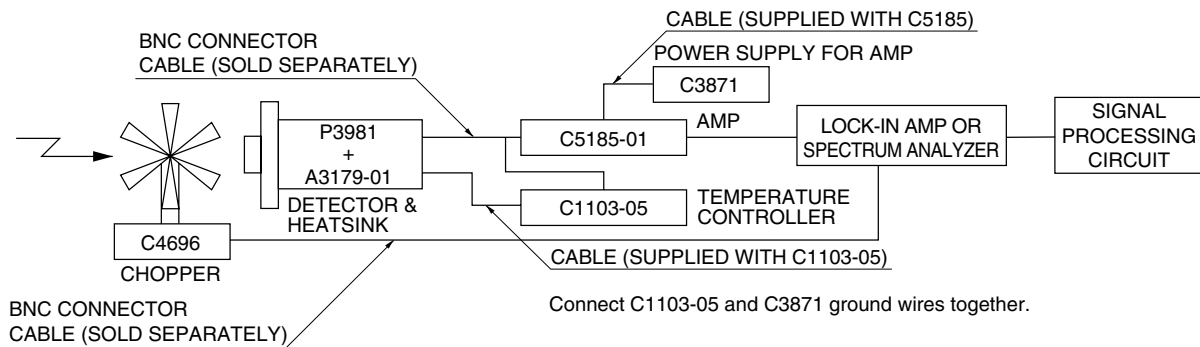
## Thermistor temperature characteristic



## Measurement circuit



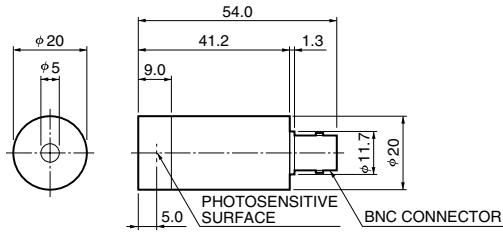
## Connection example (P3981)



# MCT photoconductive detector P3257/P3981/P2750 series

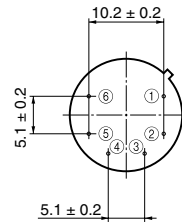
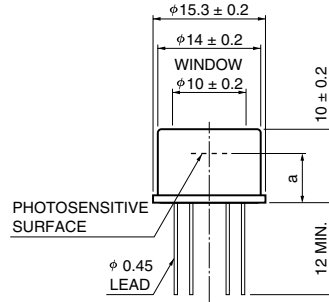
## ■ Dimensional outlines (unit: mm)

① P3257-30



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② P3257-31, P3981, P2750-08

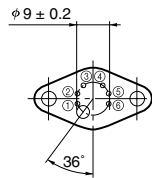
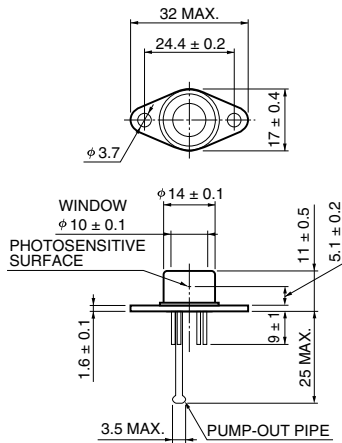


- ① DETECTOR
- ② DETECTOR
- ③ TE-COOLER (-)
- ④ TE-COOLER (+)
- ⑤ ⑥ THERMISTOR

|   | P3257-31  | P3981, P2750-08 |
|---|-----------|-----------------|
| a | 5.2 ± 0.2 | 6.6 ± 0.2       |

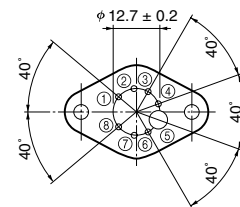
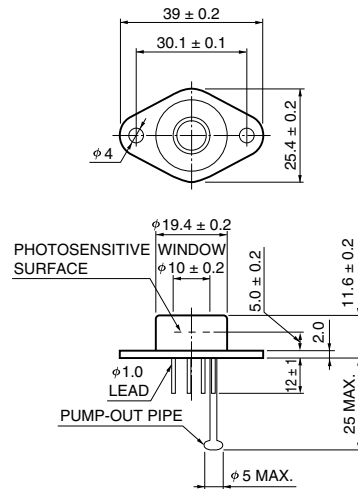
KIRDA0122EA

③ P3981-01



- ① ② THERMISTOR
- ③ DETECTOR
- ④ DETECTOR
- ⑤ TE-COOLER (-)
- ⑥ TE-COOLER (+)

④ P2750/-06



- ① TE-COOLER (+)
- ② ⑦ DETECTOR
- ③ ④ THERMISTOR
- ⑤ PUMP-OUT PIPE
- ⑥ NC
- ⑧ TE-COOLER (-)

KIRDA0123EB

KIRDA0045ED

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