

SFH 3201

Reflective Interrupter

Silicon NPN Phototransistor in SMT Package



Applications

- Access Control / Biometrics (IRIS, Scan, Vein scan)
- Electronic Equipment
- Industrial Automation (Machine controls, Light barriers, Vision controls)
- Mood Lighting

Features:

- Package: clear epoxy
- ESD: 2 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)
- High linearity
- Available only on tape and reel
- Spectral range of sensitivity: (typ) 460 ... 1080 nm

Ordering Information

| Type | Photocurrent $V_{CE} = 5 \text{ V}; \lambda = 950 \text{ nm}; E_e = 0.1 \text{ mW/cm}^2$ I_{PCE} | Ordering Code |
|----------------|--|---------------|
| SFH 3201 | 63 ... 320 μA | Q65110A1207 |
| SFH 3201-2-Z | 100 ... 200 μA | Q65110A2476 |
| SFH 3201-3-Z | 160 ... 320 μA | Q65110A2477 |
| SFH 3201-2/3-Z | 100 ... 320 μA | Q65110A2479 |

Only one bin within one packing unit (variation less than 2:1)

Maximum Ratings

$T_A = 25\text{ °C}$

| Parameter | Symbol | | Values |
|--|-----------------|--------------|------------------|
| Operating temperature | T_{op} | min. max. | -40 °C 100 °C |
| Storage temperature | T_{stg} | min. max. | -40 °C 100 °C |
| Collector-emitter voltage | V_{CE} | max. | 20 V |
| Collector-emitter voltage pulse $t \leq 2\text{ min}; T_A = 25\text{ °C}$ | $V_{CE\ pulse}$ | max. | 70 V |
| Collector current | I_C | max. | 50 mA |
| Collector surge current $\tau \leq 10\ \mu\text{s}$ | I_{CS} | max. | 100 mA |
| Emitter-collector voltage | V_{EC} | max. | 7 V |
| Total power dissipation | P_{tot} | max. | 120 mW |
| ESD withstand voltage acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2) | V_{ESD} | max. | 2 kV |

Characteristics

$T_A = 25\text{ °C}$

| Parameter | Symbol | | Values |
|---|--------------------------|--------------|----------------------|
| Wavelength of max sensitivity | $\lambda_{S\text{ max}}$ | typ. | 850 nm |
| Spectral range of sensitivity | $\lambda_{10\%}$ | typ. | 460 ... 1080 nm |
| Chip dimensions | L x W | typ. | 1 x 1 mm x mm |
| Radiant sensitive area | A | typ. | 0.55 mm ² |
| Half angle | φ | typ. | 60 ° |
| Photocurrent $V_{CE} = 5\text{ V}$; Std. Light A; $E_v = 1000\text{ lx}$ | I_{PCE} | typ. | 2600 μA |
| Dark current $V_{CE} = 20\text{ V}$; $E = 0$ | I_{CE0} | typ. max. | 3 nA 200 nA |
| Rise time $I_C = 1\text{ mA}$; $V_{CC} = 5\text{ V}$; $R_L = 1\text{ k}\Omega$ | t_r | typ. | 24 μs |
| Fall time $I_C = 1\text{ mA}$; $V_{CC} = 5\text{ V}$; $R_L = 1\text{ k}\Omega$ | t_f | typ. | 24 μs |
| Collector-emitter saturation voltage ¹⁾ Threefold saturated | V_{CEsat} | typ. max. | 170 mV 250 mV |
| Capacitance $V_{CE} = 0\text{ V}$; $f = 1\text{ MHz}$; $E = 0$ | C_{CE} | typ. | 15 pF |
| Thermal resistance junction ambient real | R_{thJA} | max. | 500 K / W |

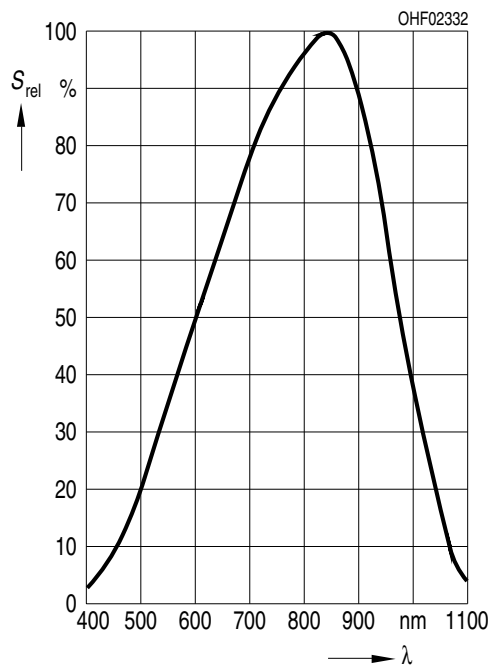
Grouping

$T_A = 25\text{ °C}$

| Group | Photocurrent $V_{CE} = 5\text{ V}$; $\lambda = 950\text{ nm}$; $E_e = 0.1\text{ mW/cm}^2$ min. I_{PCE} | Photocurrent $V_{CE} = 5\text{ V}$; $\lambda = 950\text{ nm}$; $E_e = 0.1\text{ mW/cm}^2$ max. I_{PCE} |
|-------|---|---|
| 1 | 63 μA | 125 μA |
| 2 | 100 μA | 200 μA |
| 3 | 160 μA | 320 μA |

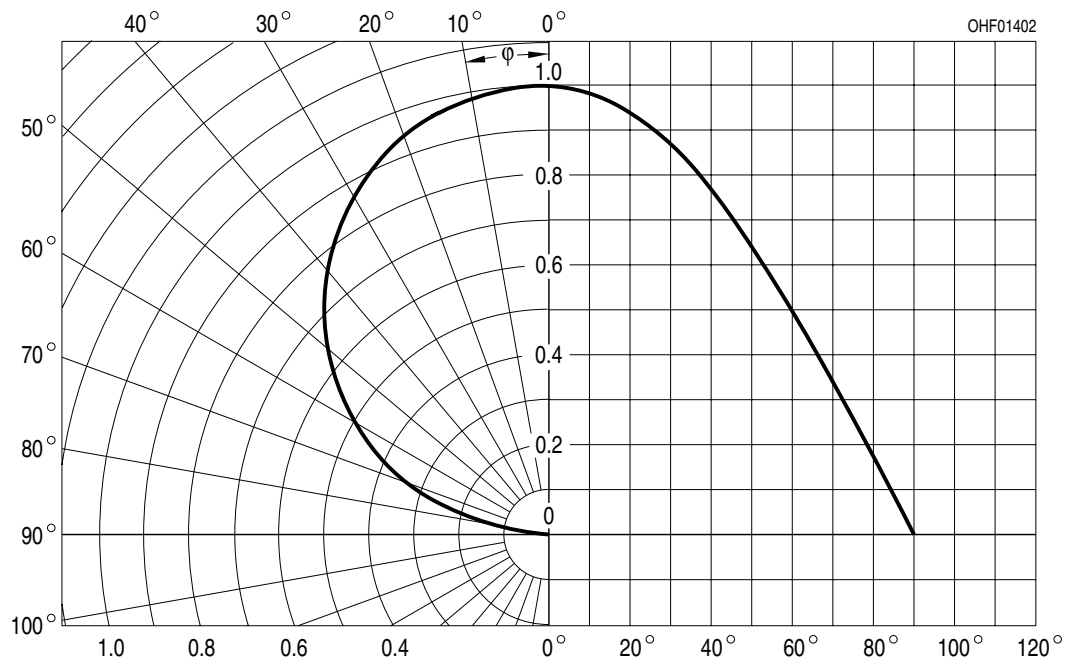
Relative Spectral Sensitivity ^{2), 3)}

$$S_{rel} = f(\lambda)$$



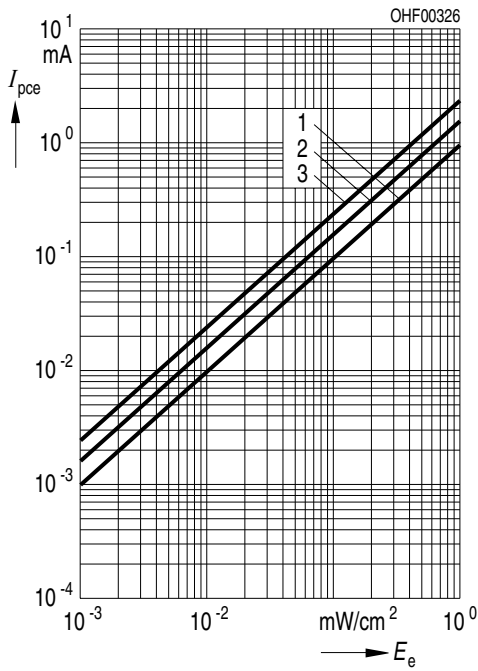
Directional Characteristics ^{2), 3)}

$$S_{rel} = f(\varphi)$$



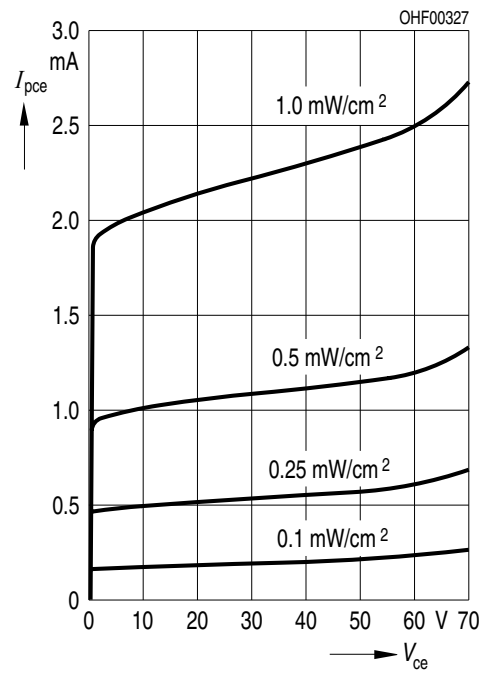
Photocurrent 2), 3)

$I_{PCE} = f(E_e); V_{CE} = 5\text{ V}$



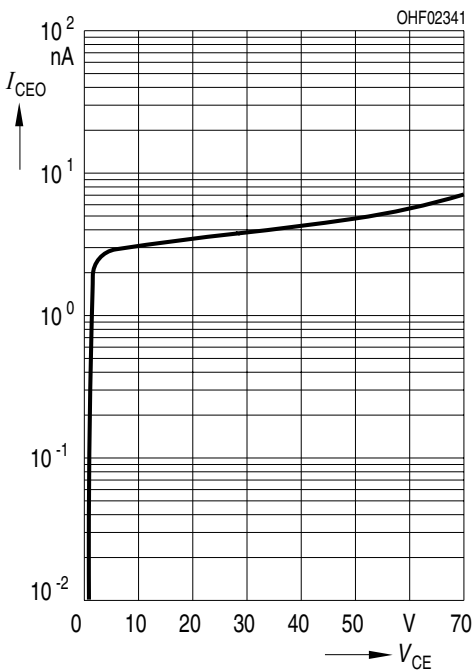
Photocurrent 2), 3)

$I_{PCE} = f(V_{CE}), E_e = \text{Parameter}$



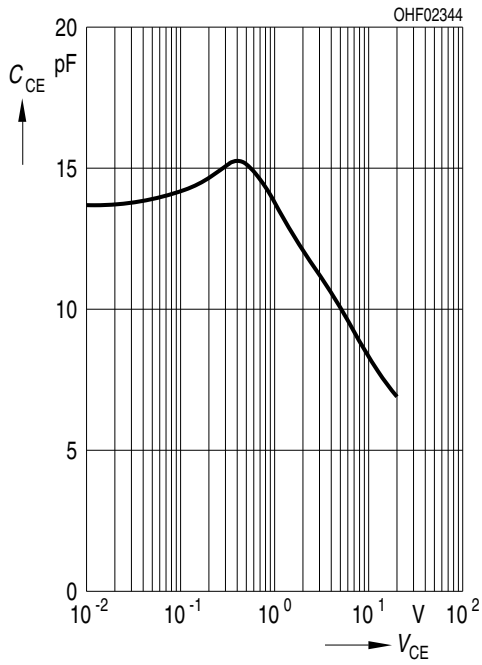
Dark Current 2), 3)

$I_{CEO} = f(V_{CE}); E = 0;$



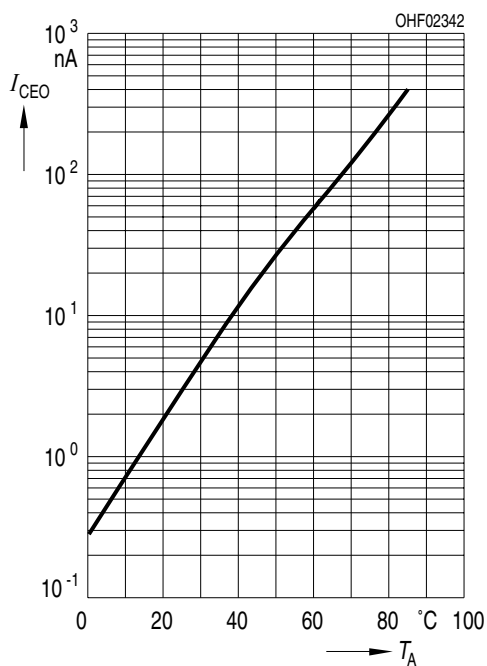
Collector-Emitter Capacitance ^{2), 3)}

$$C_{CE} = f(V_{CE}); f = 1 \text{ MHz}; E = 0 ;$$



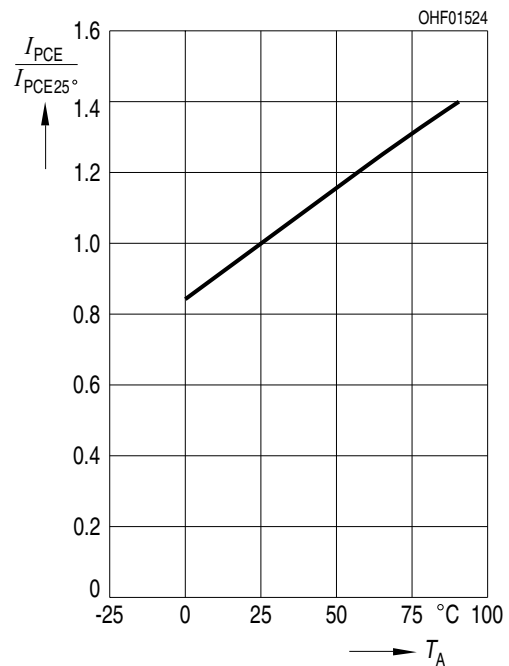
Dark Current ²⁾

$$I_{CEO} = f(T_A); E = 0$$



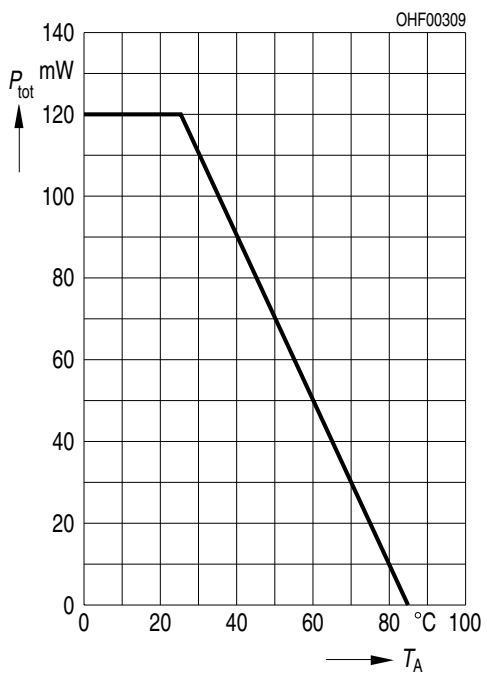
Photocurrent ²⁾

$$I_{PCE,rel} = f(T_A); V_{CE} = 5 \text{ V}$$

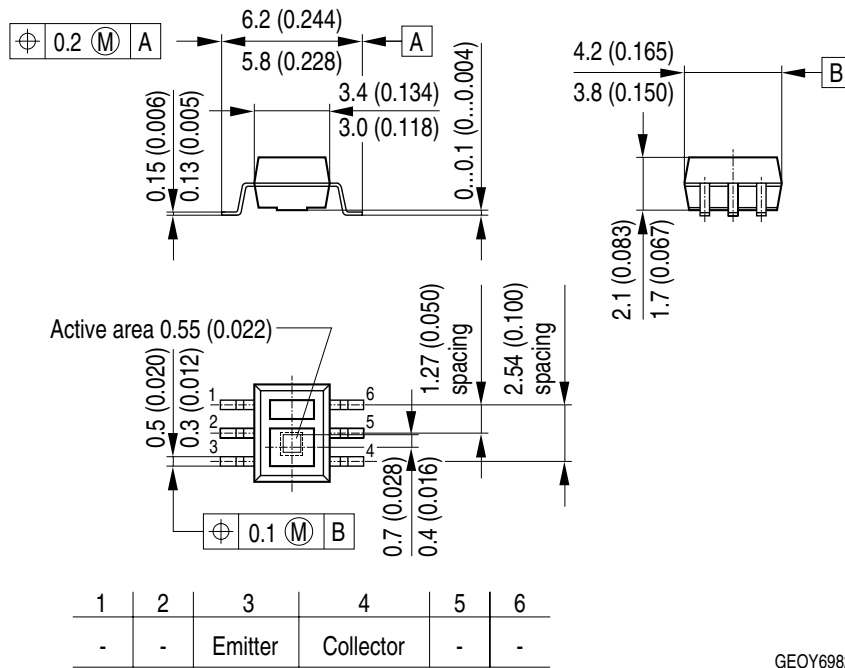


Power Consumption

$$P_{\text{tot}} = f(T_A)$$



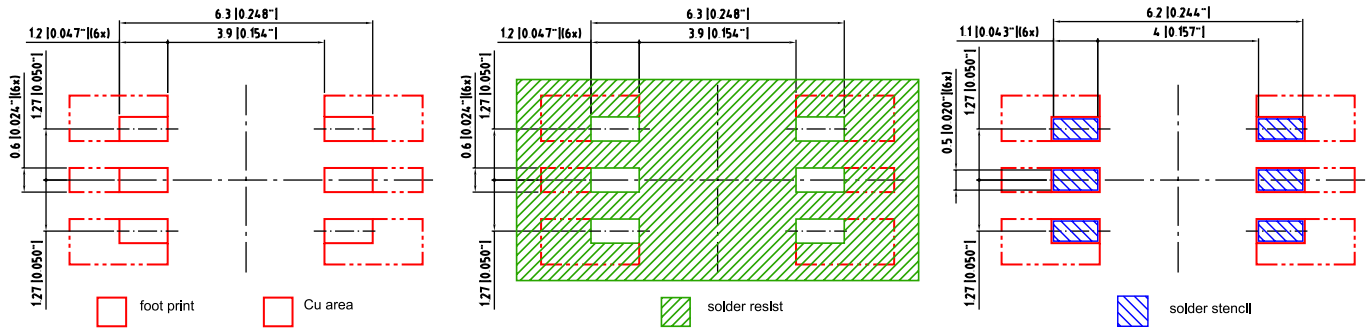
Dimensional Drawing ⁴⁾



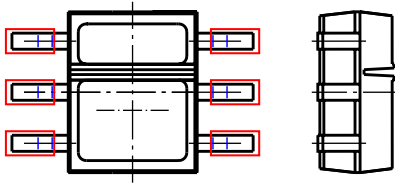
GEOY6982

Approximate Weight: 42.0 mg

Recommended Solder Pad ⁴⁾



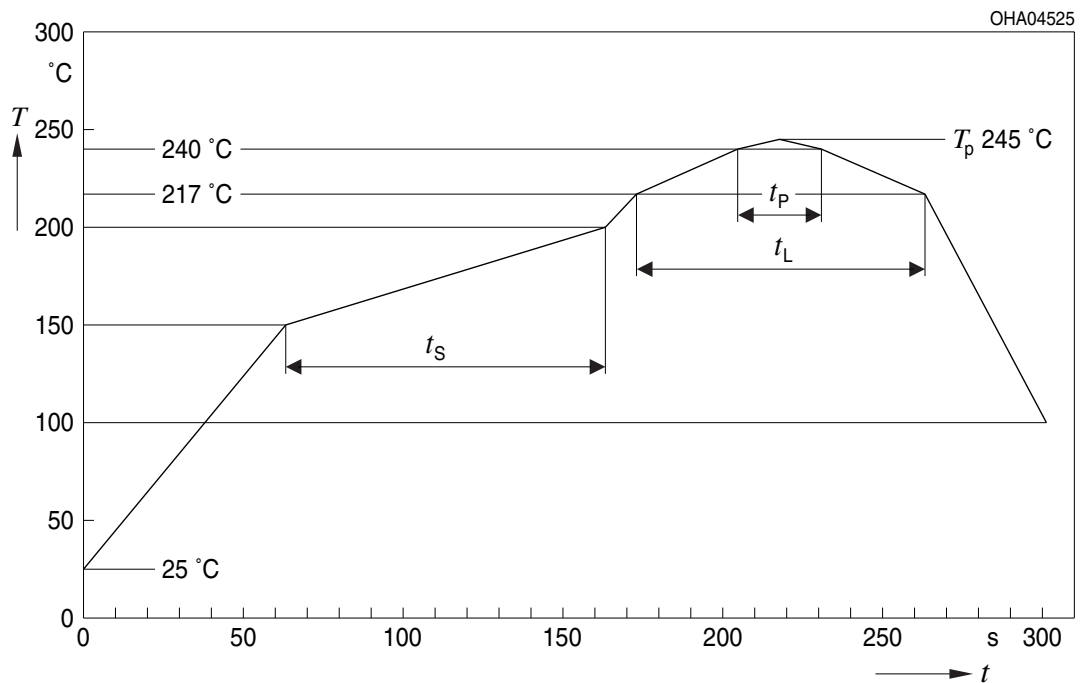
Component Location on Pad



E062.3010.158 -01

Reflow Soldering Profile

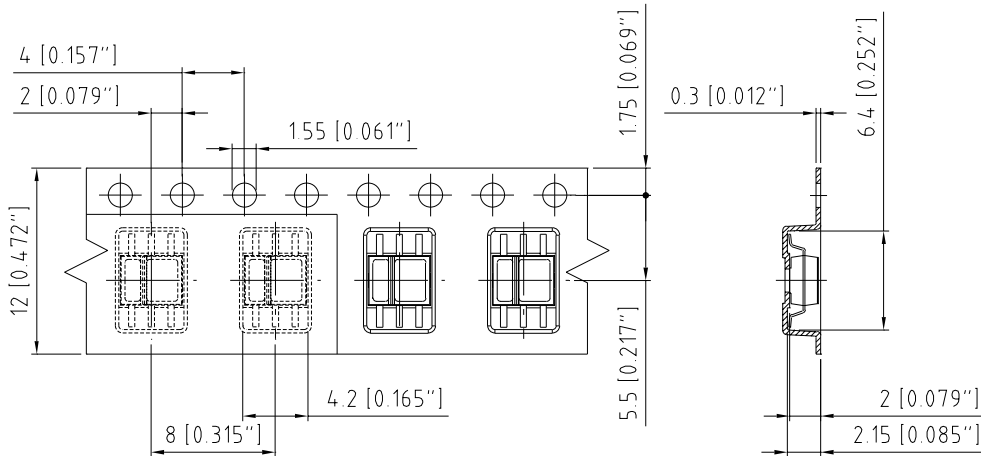
Product complies to MSL Level 4 acc. to JEDEC J-STD-020E



| Profile Feature | Symbol | Pb-Free (SnAgCu) Assembly | | | Unit |
|--|--------|---------------------------|----------------|---------|------|
| | | Minimum | Recommendation | Maximum | |
| Ramp-up rate to preheat*) 25 °C to 150 °C | | | 2 | 3 | K/s |
| Time t_s T_{Smin} to T_{Smax} | t_s | 60 | 100 | 120 | s |
| Ramp-up rate to peak*) T_{Smax} to T_p | | | 2 | 3 | K/s |
| Liquidus temperature | T_L | | 217 | | °C |
| Time above liquidus temperature | t_L | | 80 | 100 | s |
| Peak temperature | T_p | | 245 | 260 | °C |
| Time within 5 °C of the specified peak temperature $T_p - 5$ K | t_p | 10 | 20 | 30 | s |
| Ramp-down rate* T_p to 100 °C | | | 3 | 6 | K/s |
| Time 25 °C to T_p | | | | 480 | s |

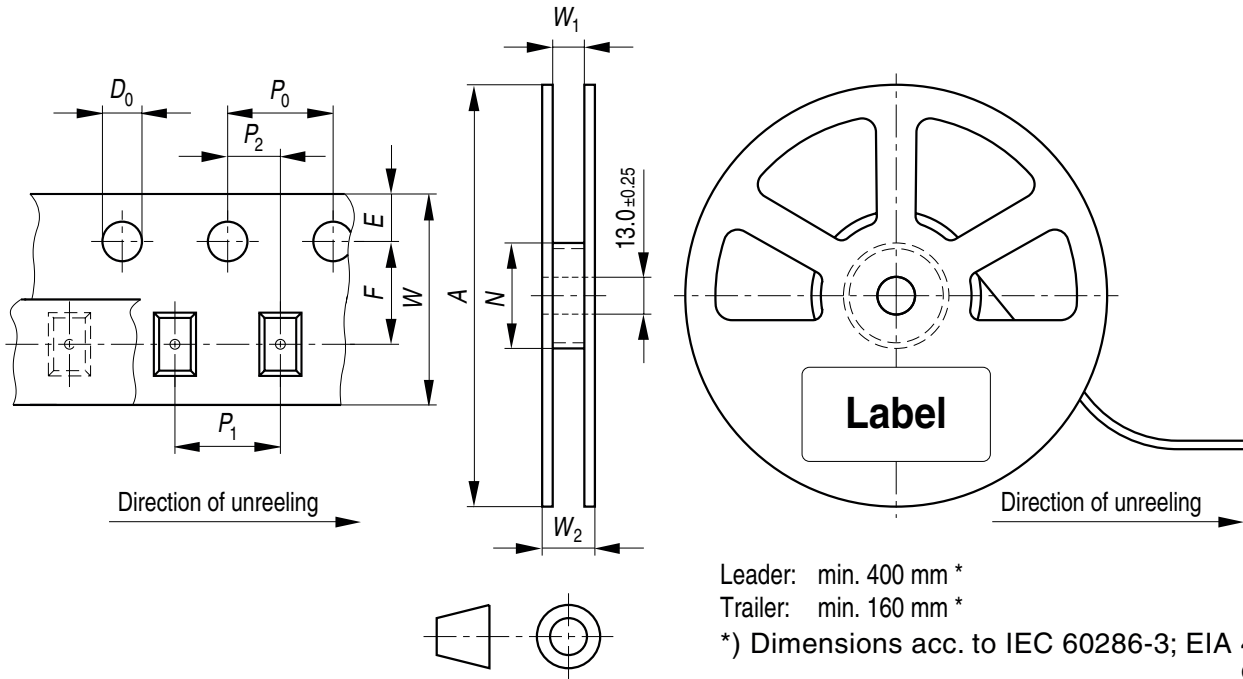
All temperatures refer to the center of the package, measured on the top of the component
 * slope calculation DT/Dt : Dt max. 5 s; fulfillment for the whole T-range

Taping ⁴⁾



C63062-A3059-B10 -03

Tape and Reel ⁵⁾



Leader: min. 400 mm *
 Trailer: min. 160 mm *

*) Dimensions acc. to IEC 60286-3; EIA 481-D
 OHAY0324

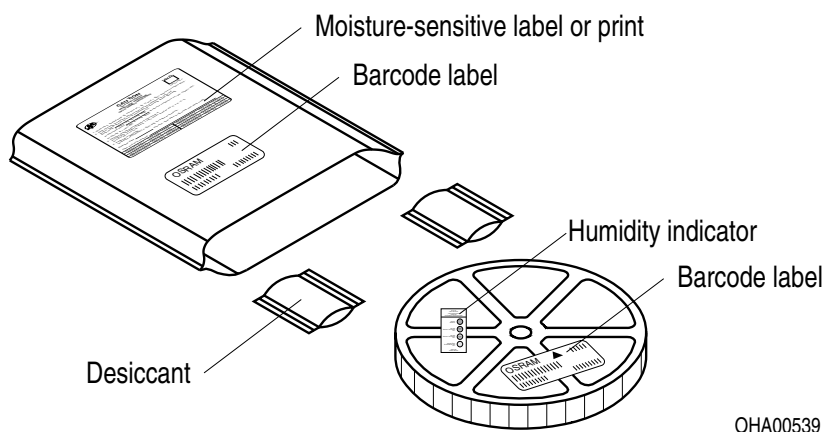
Reel dimensions [mm]

| A | W | N _{min} | W ₁ | W _{2max} | Pieces per PU |
|--------|------------------|------------------|----------------|-------------------|---------------|
| 180 mm | 12 + 0.3 / - 0.1 | 60 | 12.4 + 2 | 18.4 | 1000 |

Barcode-Product-Label (BPL)

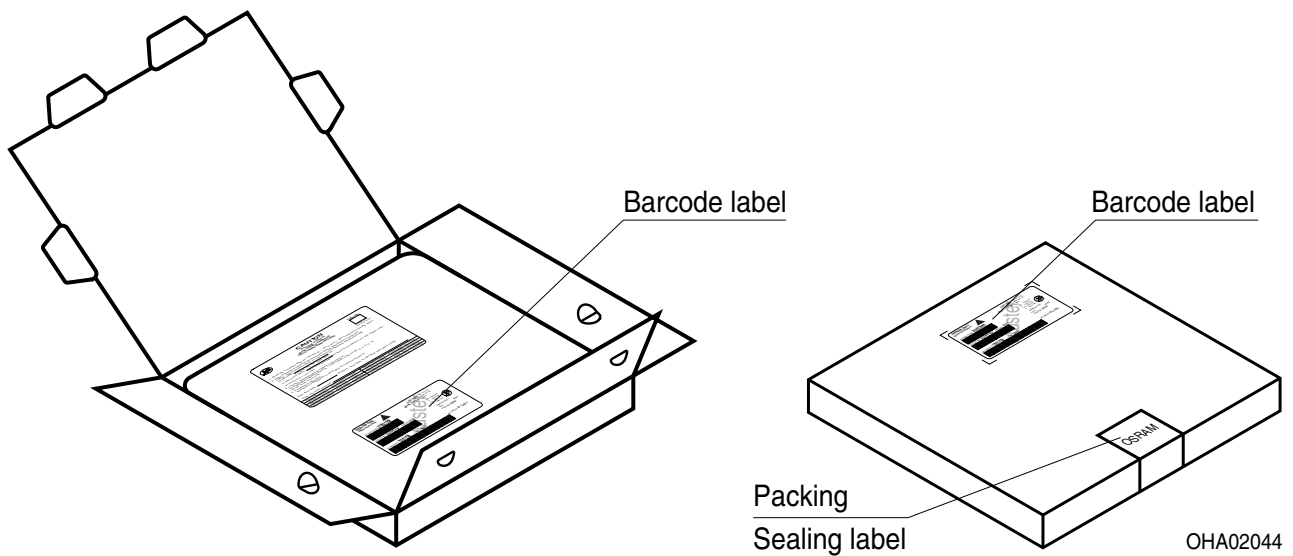


Dry Packing Process and Materials ⁴⁾



Moisture-sensitive product is packed in a dry bag containing desiccant and a humidity card according JEDEC-STD-033.

Transportation Packing and Materials ⁴⁾



Dimensions of transportation box in mm

| Width | Length | Height |
|------------|------------|-----------|
| 195 ± 5 mm | 195 ± 5 mm | 30 ± 5 mm |

Notes

The evaluation of eye safety occurs according to the standard IEC 62471:2006 (photo biological safety of lamps and lamp systems). Within the risk grouping system of this IEC standard, the LED specified in this data sheet falls into the class **exempt group (exposure time 10000 s)**. Under real circumstances (for exposure time, conditions of the eye pupils, observation distance), it is assumed that no endangerment to the eye exists from these devices. As a matter of principle, however, it should be mentioned that intense light sources have a high secondary exposure potential due to their blinding effect. When looking at bright light sources (e.g. headlights), temporary reduction in visual acuity and afterimages can occur, leading to irritation, annoyance, visual impairment, and even accidents, depending on the situation.

For further application related informations please visit www.osram-os.com/apnotes

Disclaimer

Disclaimer

Language english will prevail in case of any discrepancies or deviations between the two language wordings.

Attention please!

The information describes the type of component and shall not be considered as assured characteristics. Terms of delivery and rights to change design reserved. Due to technical requirements components may contain dangerous substances.

For information on the types in question please contact our Sales Organization.

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Packing

Please use the recycling operators known to you. We can also help you – get in touch with your nearest sales office.

By agreement we will take packing material back, if it is sorted. You must bear the costs of transport. For packing material that is returned to us unsorted or which we are not obliged to accept, we shall have to invoice you for any costs incurred.

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Glossary

- 1) **IPCEmin:** I_{PCEmin} is the min. photocurrent of the specified group.
- 2) **Typical Values:** Due to the special conditions of the manufacturing processes of LED, the typical data or calculated correlations of technical parameters can only reflect statistical figures. These do not necessarily correspond to the actual parameters of each single product, which could differ from the typical data and calculated correlations or the typical characteristic line. If requested, e.g. because of technical improvements, these typ. data will be changed without any further notice.
- 3) **Testing temperature:** $T_A = 25^\circ\text{C}$
- 4) **Tolerance of Measure:** Unless otherwise noted in drawing, tolerances are specified with ± 0.1 and dimensions are specified in mm.
- 5) **Tape and Reel:** All dimensions and tolerances are specified acc. IEC 60286-3 and specified in mm.

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