

Silicon NPN Phototransistor in SMT SIDELED®-Package

Version 1.3

SFH 325



Features:

- **Spectral range of sensitivity:** (typ) 450 ... 1120 nm
- **Package:** SIDELED
- **Special:** High linearity
- P-LCC-2 package
- Available in groups
- The product qualification test plan is based on the guidelines of AEC-Q101-REV-C, Stress Test Qualification for Automotive Grade Discrete Semiconductors.

Applications

- Miniature photointerrupters
- Industrial electronics
- For control and drive circuits

Ordering Information

| Type: | Photocurrent I_{PCE} [μ A] $\lambda = 950 \text{ nm}$, $E_e = 0.1 \text{ mW/cm}^2$, $V_{CE} = 5 \text{ V}$ | Ordering Code |
|-------------|--|---------------|
| SFH 325 | 16 ... 80 | Q65110A2486 |
| SFH 325-3 | 25 ... 50 | Q65110A2488 |
| SFH 325-3/4 | 25 ... 80 | Q65110A2491 |
| SFH 325-4 | 40 ... 80 | Q65110A2484 |

Note: Binning in half groups (see page 3), packing unit = only one half group

Maximum Ratings ($T_A = 25\text{ °C}$)

| Parameter | Symbol | Values | Unit |
|---|-------------------|-------------|------|
| Operating and storage temperature range | $T_{op}; T_{stg}$ | -40 ... 100 | °C |
| Collector-emitter voltage | V_{CE} | 35 | V |
| Collector current | I_C | 15 | mA |
| Collector surge current ($\tau < 10\text{ }\mu\text{s}$) | I_{CS} | 75 | mA |
| Total Power dissipation | P_{tot} | 165 | mW |
| ESD withstand voltage (acc. to ANSI/ ESDA/ JEDEC JS-001 - HBM) | V_{ESD} | 2000 | V |
| Thermal resistance for mounting on pcb | R_{thJA} | 450 | K/W |

Characteristics ($T_A = 25\text{ °C}$)

| Parameter | | Symbol | Values | Unit |
|---|-------------|--------------------|-----------------------|-----------------|
| Wavelength of max. sensitivity | (typ) | $\lambda_{S\ max}$ | 980 | nm |
| Spectral range of sensitivity | (typ) | $\lambda_{10\%}$ | (typ) 450 ... 1120 | nm |
| Radiant sensitive area | (typ) | A | 0.038 | mm ² |
| Dimensions of chip area | (typ) | L x W | (typ) 0.45 x 0.45 | mm x mm |
| Half angle | (typ) | φ | ± 60 | ° |
| Capacitance ($V_{CE} = 0\text{ V}$, $f = 1\text{ MHz}$, $E = 0$) | (typ) | C_{CE} | 5 | pF |
| Dark current ($V_{CE} = 20\text{ V}$, $E = 0$) | (typ (max)) | I_{CE0} | 1 (≤ 50) | nA |

Grouping

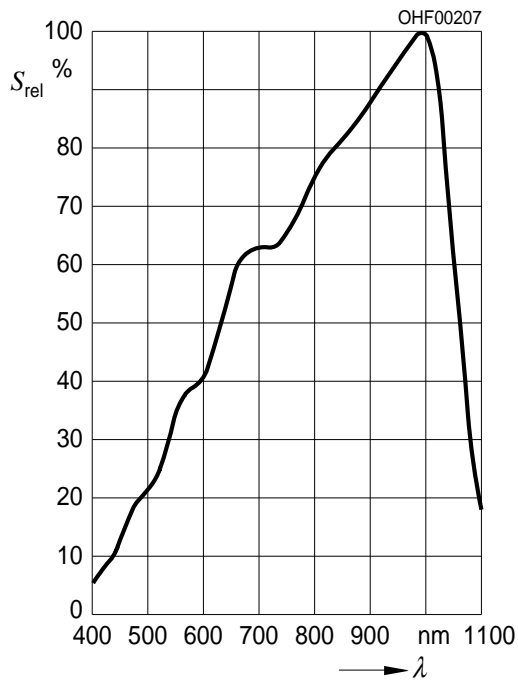
| Group | Min Photocurrent $E_e = 0.1 \text{ mW/cm}^2$, $V_{CE} = 5 \text{ V}$ $I_{PCE, \text{min}} [\mu\text{A}]$ | Max Photocurrent $E_e = 0.1 \text{ mW/cm}^2$, $V_{CE} = 5 \text{ V}$ $I_{PCE, \text{max}} [\mu\text{A}]$ | Typ Photocurrent $E_V = 1000 \text{ lx, Std. Light A, } V_{CE} = 5 \text{ V}$ $I_{PCE} [\mu\text{A}]$ | Rise and fall time $I_C = 1 \text{ mA, } V_{CC} = 5 \text{ V, } R_L = 1 \text{ k}\Omega$ $t_r, t_f [\mu\text{s}]$ |
|-------|--|--|---|---|
| -2A | 16 | 25 | 360 | 6 |
| -2B | 20 | 32 | 450 | 6 |
| -3A | 25 | 40 | 570 | 7 |
| -3B | 32 | 50 | 720 | 7 |
| -4A | 40 | 63 | 900 | 8 |
| -4B | 50 | 80 | 1140 | 8 |

| Group | Collector-emitter saturation voltage $I_C = I_{PCE\text{min}} \times 0.3, E_e = 0.1 \text{ mW/cm}^2$ $V_{CE\text{sat}} [\text{mV}]$ |
|-------|---|
| -2A | 150 |
| -2B | 150 |
| -3A | 150 |
| -3B | 150 |
| -4A | 150 |
| -4B | 150 |

Note.: $I_{PCE\text{min}}$ is the min. photocurrent of the specified group.

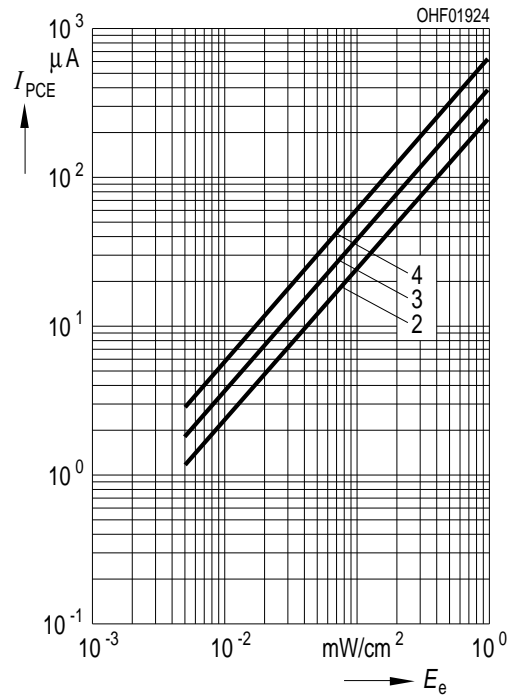
Relative Spectral Sensitivity ^{1) page 14}

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



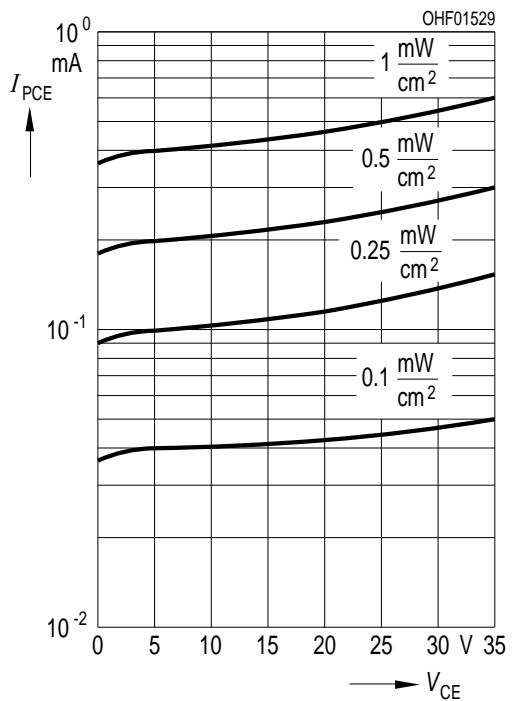
Photocurrent ^{1) page 14}

$I_{PCE} = f(E_e), V_{CE} = 5 V$



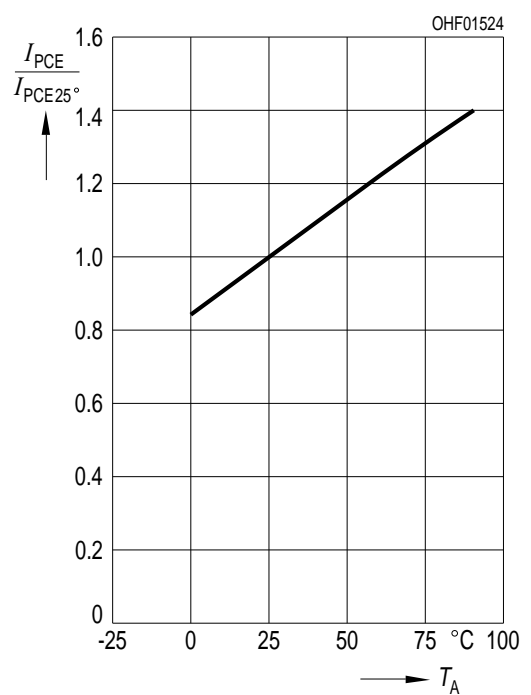
Photocurrent ^{1) page 14}

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



Photocurrent ^{1) page 14}

$I_{PCE} / I_{PCE}(25^\circ C) = f(T_A), V_{CE} = 5 V$



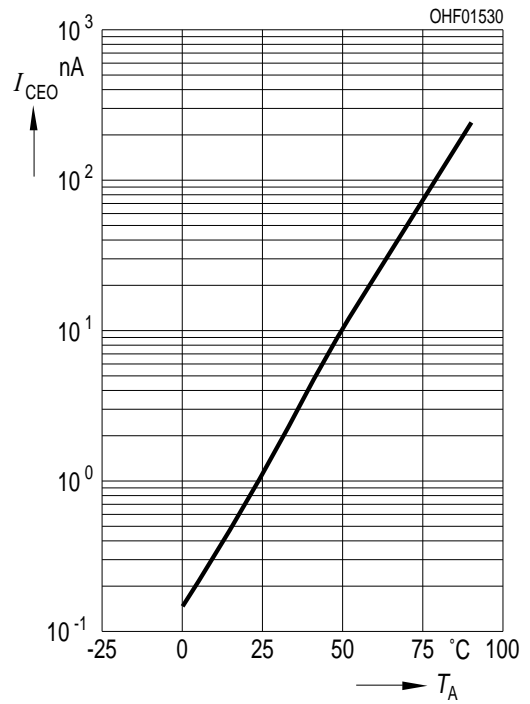
Dark Current ^{1) page 14}

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



Dark Current ^{1) page 14}

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



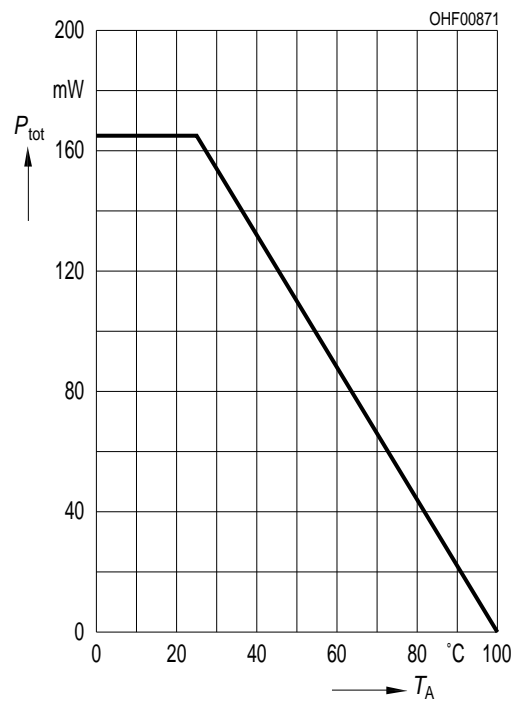
Collector-Emitter Capacitance ^{1) page 14}

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



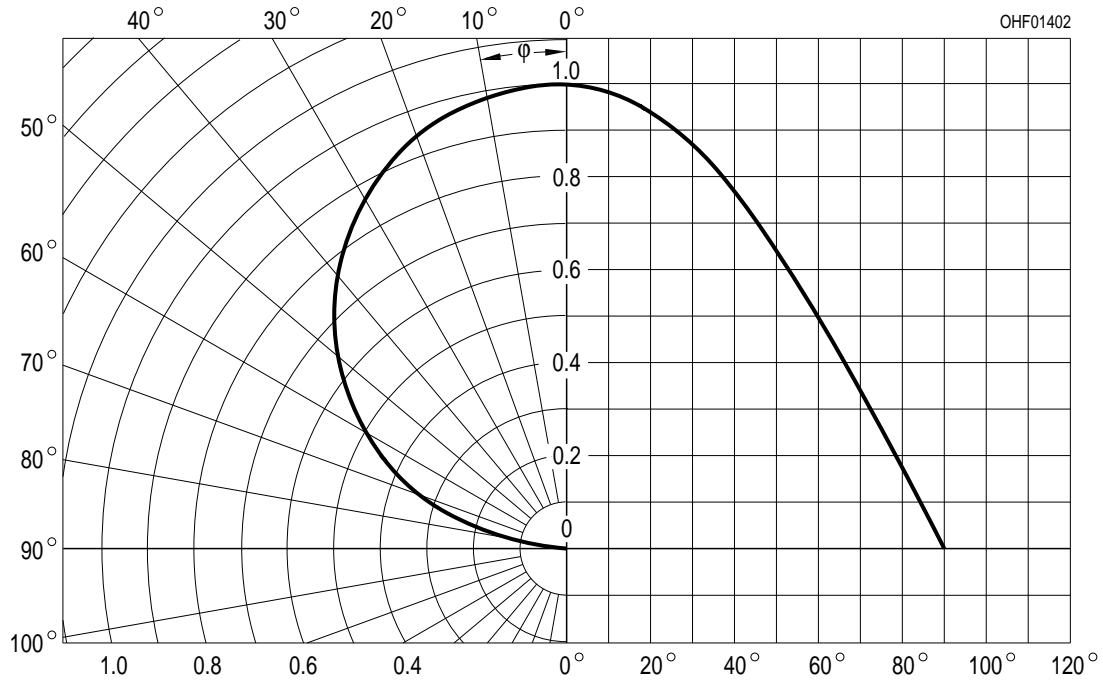
Power Consumption

$P_{tot} = f(T_A)$

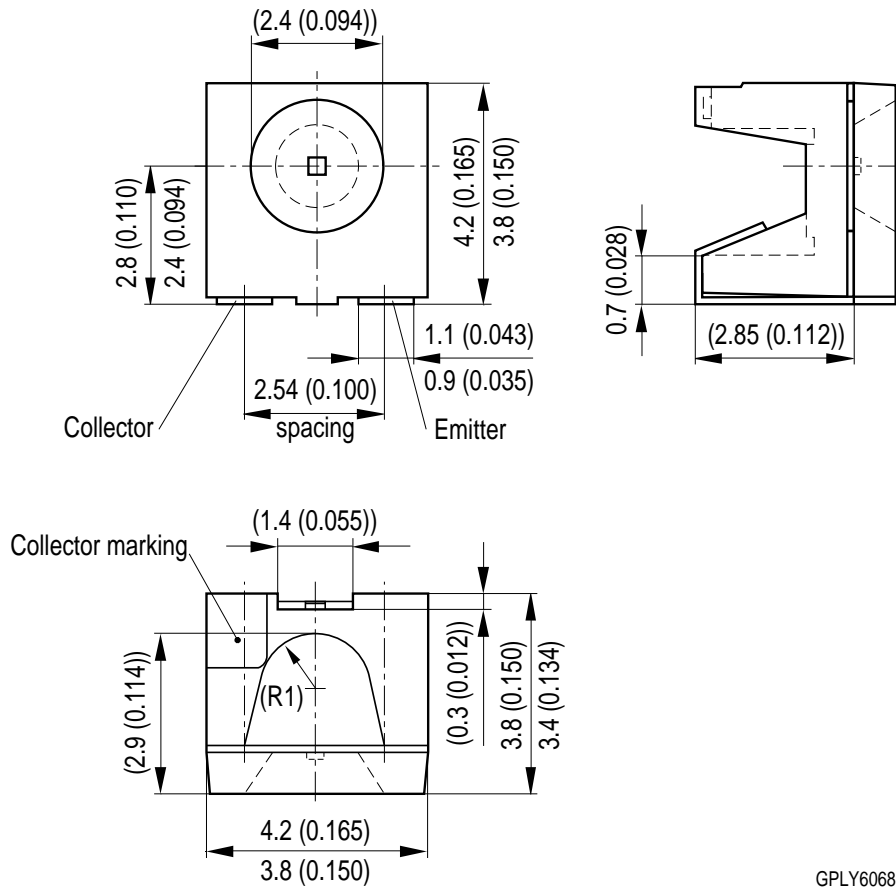


Directional Characteristics ^{1) page 14}

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



Package Outline



GPLY6068

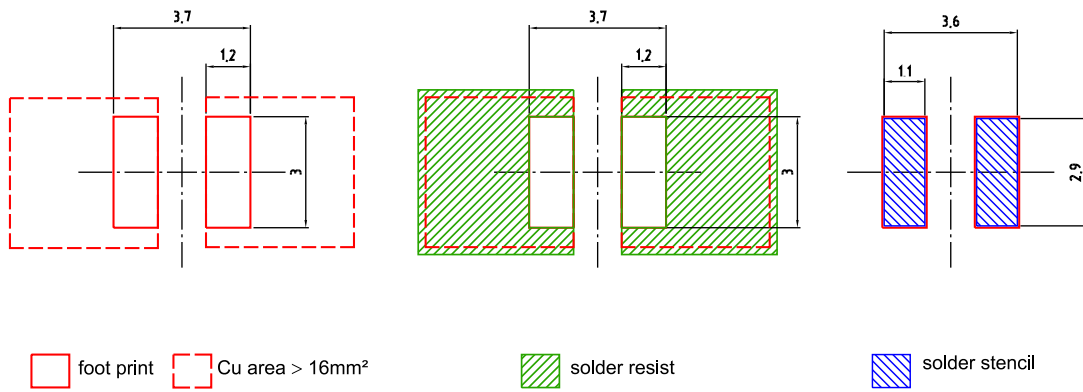
Dimensions in mm (inch).

Package
SIDELED

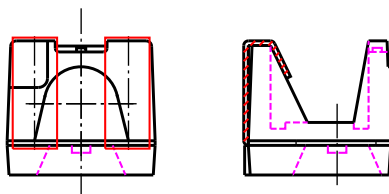
Approximate Weight:

76 mg

Recommended Solder Pad



Component Location on Pad

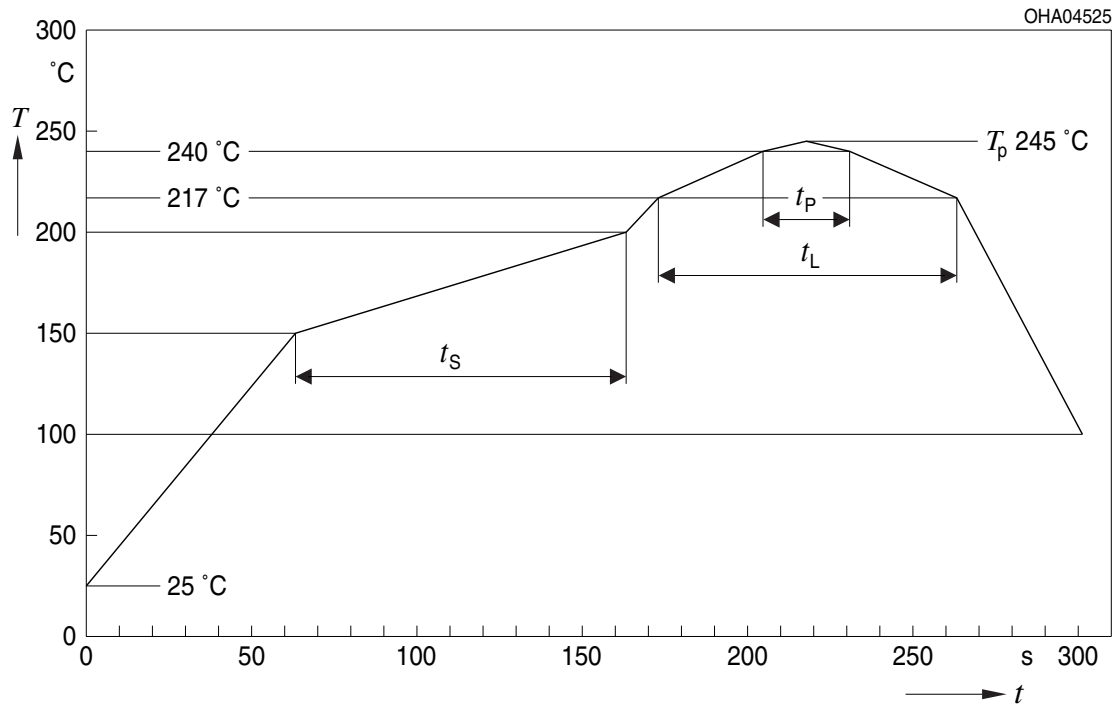


Dimensions in mm.

E062.3010.06 -02

Reflow Soldering Profile

Product complies to MSL Level 2 acc. to JEDEC J-STD-020D.01

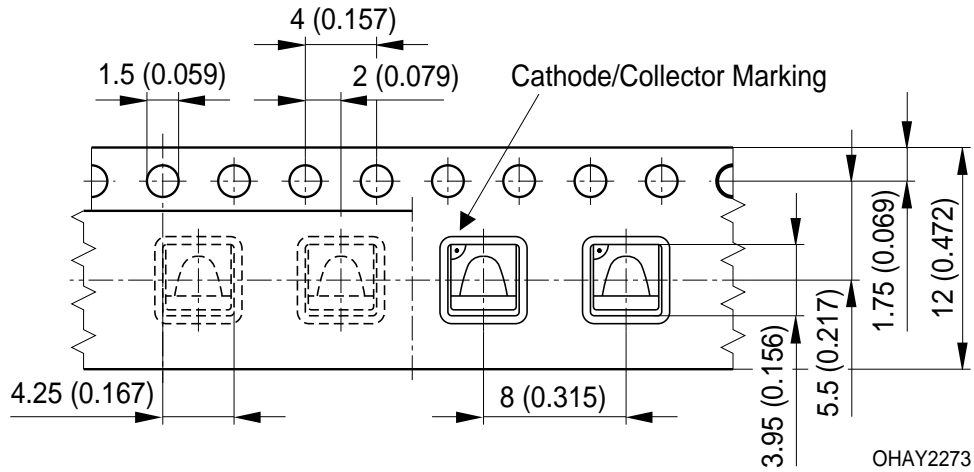


| Profil-Charakteristik Profile Feature | Symbol Symbol | Pb-Free (SnAgCu) Assembly | | | Einheit Unit |
|---|------------------|---------------------------|----------------|---------|-----------------|
| | | Minimum | Recommendation | Maximum | |
| Ramp-up Rate to Preheat*) 25 °C to 150 °C | | | 2 | 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 | 250 | °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 | 4 | 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

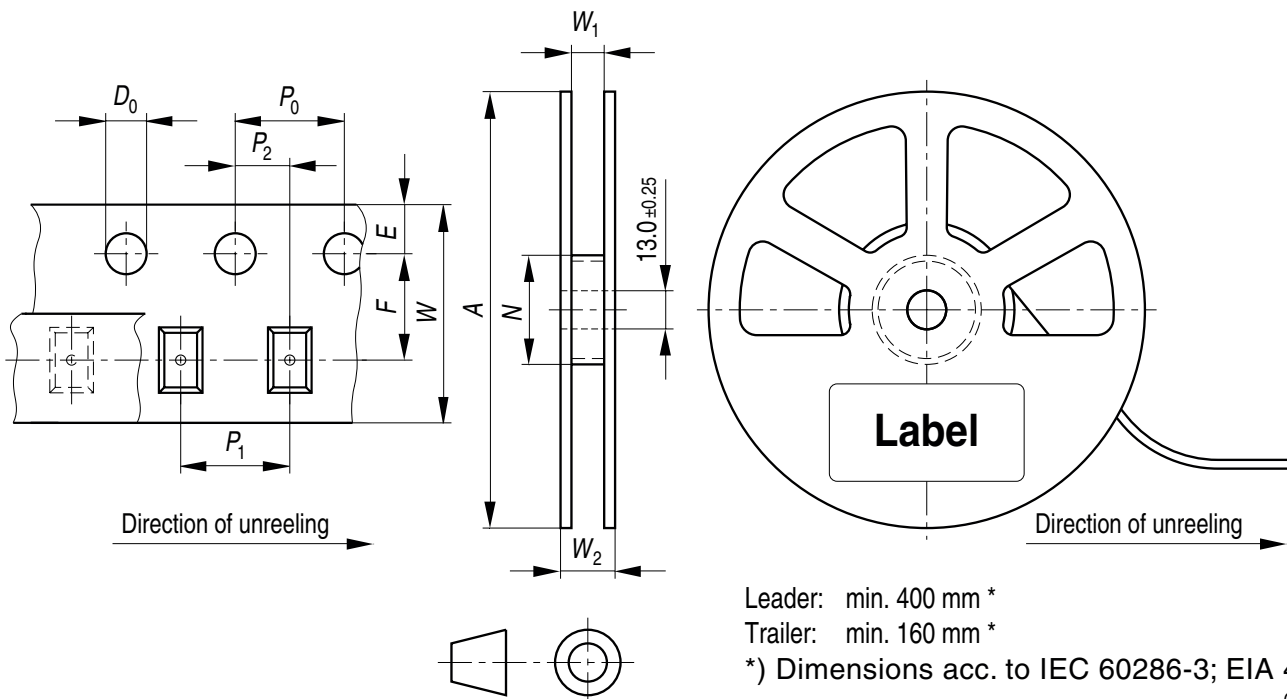
Taping



Dimensions in mm (inch).

Tape and Reel

12 mm tape with 2000 pcs. on \varnothing 330 mm reel



Leader: min. 400 mm *

Trailer: min. 160 mm *

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

OHAY0324

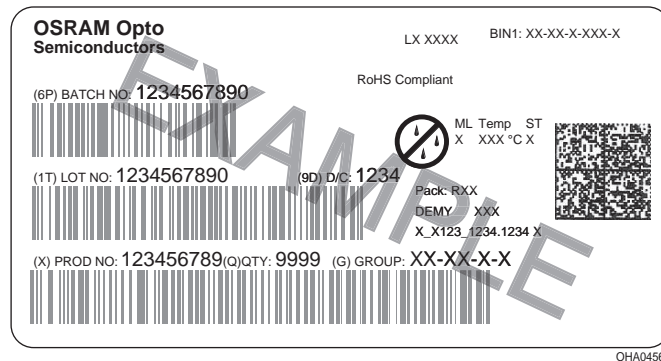
Tape dimensions [mm]

| W | P ₀ | P ₁ | P ₂ | D ₀ | E | F |
|------------------|----------------|--------------------------|----------------|----------------|------------|------------|
| 12 + 0.3 / - 0.1 | 4 ± 0.1 | 4 ± 0.1 or 8 ± 0.1 | 2 ± 0.05 | 1.5 ± 0.1 | 1.75 ± 0.1 | 5.5 ± 0.05 |

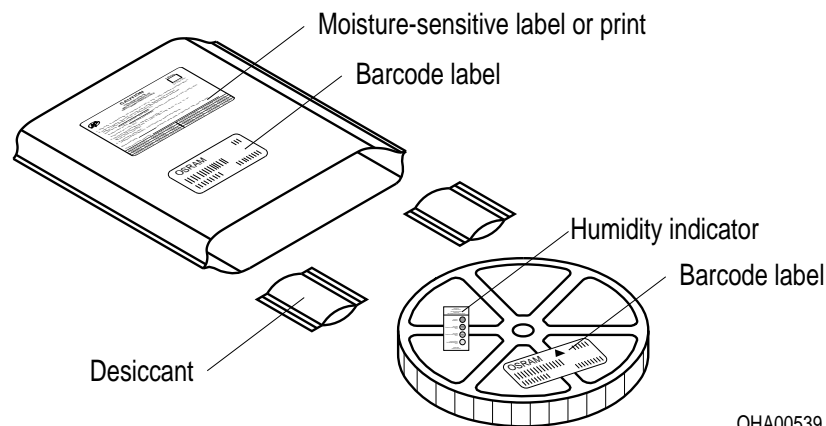
Reel dimensions [mm]

| A | W | N _{min} | W ₁ | W _{2max} |
|-----|----|------------------|----------------|-------------------|
| 330 | 12 | 60 | 12.4 + 2 | 18.4 |

Barcode-Product-Label (BPL)



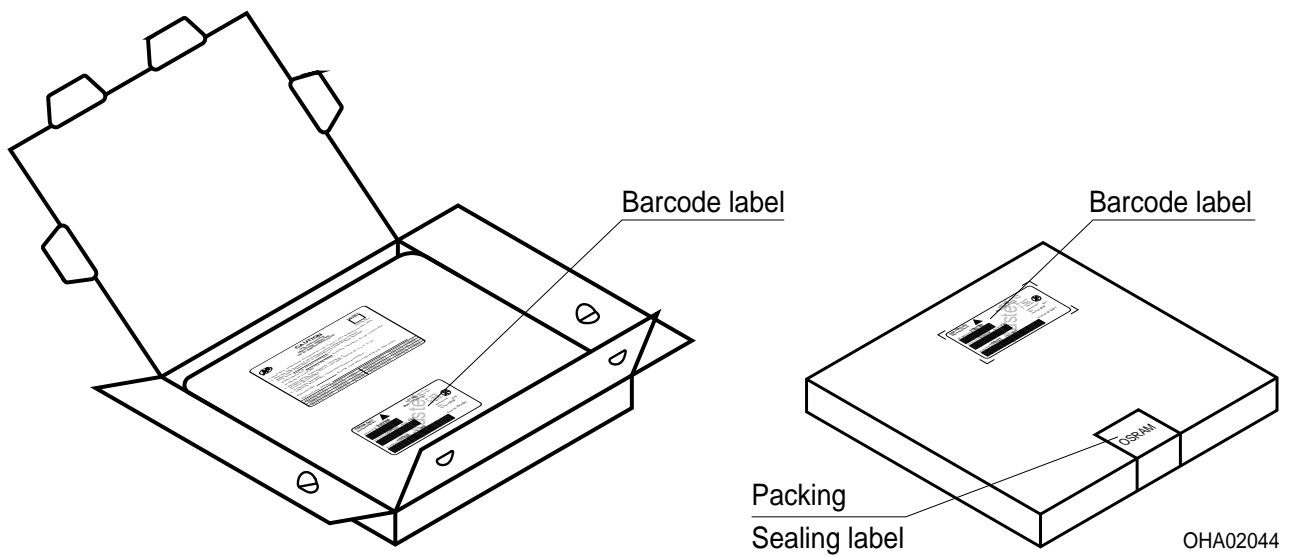
Dry Packing Process and Materials



Note:

Moisture-sensitive product is packed in a dry bag containing desiccant and a humidity card. Regarding dry pack you will find further information in the internet. Here you will also find the normative references like JEDEC.

Transportation Packing and Materials



Dimensions of transportation box in mm

| Width | Length | Height |
|---------|---------|--------|
| 349 ± 5 | 349 ± 5 | 33 ± 5 |

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.

If printed or downloaded, please find the latest version in the Internet.

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.

Components used in life-support devices or systems must be expressly authorized for such purpose!

Critical components* may only be used in life-support devices** or systems with the express written approval of OSRAM OS.

*) A critical component is a component used in a life-support device or system whose failure can reasonably be expected to cause the failure of that life-support device or system, or to affect its safety or the effectiveness of that device or system.

**) Life support devices or systems are intended (a) to be implanted in the human body, or (b) to support and/or maintain and sustain human life. If they fail, it is reasonable to assume that the health and the life of the user may be endangered.

Glossary

- ¹⁾ **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.

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Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru

moschip.ru_4

moschip.ru_6

moschip.ru_9