

Infrared-Emitter (850 nm) and Si-Phototransistor

Version 1.3

SFH 7250



Features:

- Available on tape and reel
- SMT package with IR emitter (850 nm) and Si-phototransistor
- Suitable for SMT assembly
- Emitter and detector can be controlled separately

Applications

- Data transmission
- Lock bar
- Infrared interface

Ordering Information

| Type: | Package: | Ordering Code |
|----------|-------------------|---------------|
| SFH 7250 | SMT Multi TOPLED® | Q65111A3188 |

Maximum Ratings

| Parameter | Symbol | Values | Unit |
|---|-------------------|-------------|------|
| Operating and storage temperature range | $T_{op}; T_{stg}$ | -40 ... 100 | °C |
| Junction temperature | T_j | 100 | °C |
| Electrostatic discharge (acc. to ANSI/ ESDA/ JEDEC JS-001 - HBM) | V_{ESD} | 2000 | V |

Emitter 1

| | | | |
|---|------------|-----|-------|
| Forward current | I_F | 70 | mA |
| Surge current ($t_p \leq 10 \mu s$, $D = 0$) | I_{FSM} | 0.7 | A |
| Reverse voltage | V_R | 5 | V |
| Power consumption | P_{tot} | 140 | mW |
| Thermal resistance junction - ambient ^{1) page 15} | R_{thJA} | 500 | K / W |
| Thermal resistance junction - solder point | R_{thJS} | 400 | K / W |

Phototransistor

| | | | |
|--|------------|-------|-------|
| Collector current | I_C | 15 | mA |
| Surge current ($t_p \leq 10 \mu s$, $D = 0$) | I_{FSM} | 0.075 | A |
| Collector-emitter voltage | V_{CE} | 35 | V |
| Total Power dissipation | P_{tot} | 165 | mW |
| Thermal resistance ^{1) page 15} | R_{thJA} | 450 | K / W |

The stated maximum ratings refer to one chip.

Characteristics

| Parameter | Symbol | Values | Unit |
|---|----------------------------|----------|------|
| Emitter 1 ($T_A = 25 \text{ °C}$) | | | |
| Peak wavelength ($I_F = 70 \text{ mA}$, $t_p = 20 \text{ ms}$) | (typ) λ_{peak} | 860 | nm |
| Centroid wavelength ($I_F = 70 \text{ mA}$, $t_p = 20 \text{ ms}$) | (typ) $\lambda_{centroid}$ | 850 | nm |
| Spectral bandwidth at 50% of I_{max} ($I_F = 70 \text{ mA}$, $t_p = 20 \text{ ms}$) | (typ) $\Delta\lambda$ | 30 | nm |
| Half angle | (typ) φ | ± 60 | ° |

| Parameter | | Symbol | Values | Unit |
|---|-------------|---------------------|------------------------------------|---------------|
| Dimensions of active chip area | (typ) | L x W | 0.2 x 0.2 | mm x mm |
| Rise and fall time of I_e (10% and 90% of $I_{e\ max}$) ($I_F = 70\ \text{mA}$, $R_L = 50\ \Omega$) | (typ) | t_r, t_f | 12 | ns |
| Forward voltage ($I_F = 70\ \text{mA}$, $t_p = 20\ \text{ms}$) | (typ (max)) | V_F | 1.6 (≤ 2) | V |
| Forward voltage ($I_F = 500\ \text{mA}$, $t_p = 100\ \mu\text{s}$) | (typ (max)) | V_F | 2.4 (≤ 3) | V |
| Reverse current ($V_R = 5\ \text{V}$) | (typ (max)) | I_R | not designed for reverse operation | μA |
| Total radiant flux ($I_F = 70\ \text{mA}$, $t_p = 20\ \text{ms}$) | (typ) | Φ_e | 40 | mW |
| Min Radiant Intensity ($I_F = 70\ \text{mA}$, $t_p = 20\ \text{ms}$) | | $I_{e, \min}$ | 6.3 | mW / sr |
| Radiant intensity ($I_F = 70\ \text{mA}$, $t_p = 20\ \text{ms}$) | | $I_{e, \text{typ}}$ | 10 | mW/sr |
| Typ Radiant Intensity ($I_F = 500\ \text{mA}$, $t_p = 100\ \mu\text{s}$) | | $I_{e, \text{typ}}$ | 60 | mW / sr |
| Temperature coefficient of I_e or Φ_e ($I_F = 70\ \text{mA}$, $t_p = 20\ \text{ms}$) | (typ) | TC_I | -0.5 | % / K |
| Temperature coefficient of V_F ($I_F = 70\ \text{mA}$, $t_p = 20\ \text{ms}$) | (typ) | TC_V | -0.7 | mV / K |
| Temperature coefficient of wavelength ($I_F = 70\ \text{mA}$, $t_p = 20\ \text{ms}$) | (typ) | TC_λ | 0.3 | nm / K |

Phototransistor $(T_A = 25\ ^\circ\text{C}$, $\lambda = 880\ \text{nm}$)

| | | | | |
|---|-------|---------------------|-------------------|---------------|
| Wavelength of max. sensitivity | (typ) | $\lambda_{S\ \max}$ | 990 | nm |
| Spectral range of sensitivity ($S = 10\%$ of S_{\max}) | (typ) | λ | 440 ... 1150 | nm |
| Radiant sensitive area ($\varnothing = 240\ \mu\text{m}$) | (typ) | A | 0.038 | mm^2 |
| Dimensions of chip area | (typ) | L x W | (typ) 0.45 x 0.45 | mm x mm |
| Distance chip front to case surface | (typ) | H | (typ) 0.5 ... 0.7 | mm |
| Half angle | (typ) | φ | ± 60 | $^\circ$ |
| Capacitance ($V_{CE} = 0\ \text{V}$, $f = 1\ \text{MHz}$, $E = 0$) | (typ) | C_{CE} | 5 | pF |

| Parameter | | Symbol | Values | Unit |
|---|-------------|---------------|------------------|---------------|
| Dark current ($V_{CE} = 25 \text{ V}$, $E = 0$) | (typ (max)) | I_{CE0} | 1 (≤ 200) | nA |
| Photocurrent ($\lambda = 880 \text{ nm}$, $E_e = 0.1 \text{ mW/cm}^2$, $V_{CE} = 5 \text{ V}$) | | I_{PCE} | ≥ 16 | μA |
| Rise and fall time ($I_C = 1 \text{ mA}$, $V_{CC} = 5 \text{ V}$, $R_L = 1 \text{ k}\Omega$) | (typ) | t_r , t_f | 7 | μs |
| Collector-emitter saturation voltage ($I_C = 5 \mu\text{A}$, $E_e = 0.1 \text{ mW/cm}^2$) | (typ) | V_{CEsat} | 150 | mV |

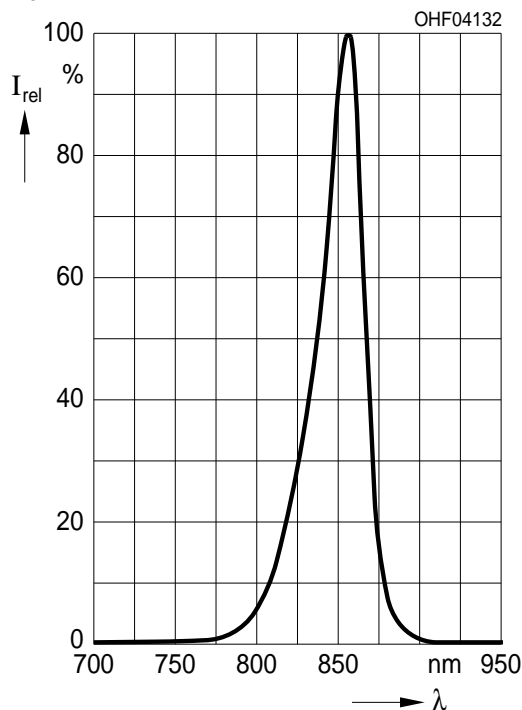
Grouping ($T_A = 25 \text{ }^\circ\text{C}$)

| Group | Min Radiant Intensity $I_F = 70 \text{ mA}$, $t_p = 20 \text{ ms}$ $I_{e, \text{min}}$ | Max Radiant Intensity $I_F = 70 \text{ mA}$, $t_p = 20 \text{ ms}$ $I_{e, \text{max}}$ | Typ Radiant Intensity $I_F = 500 \text{ mA}$, $t_p = 100 \mu\text{s}$ $I_{e, \text{typ}}$ |
|------------|---|---|--|
| SFH 7250-Q | 6.3 | 12.5 | 55 |
| SFH 7250-R | 10 | 20 | 90 |

Note: Measured at a solid angle of $\Omega = 0.01 \text{ sr}$.

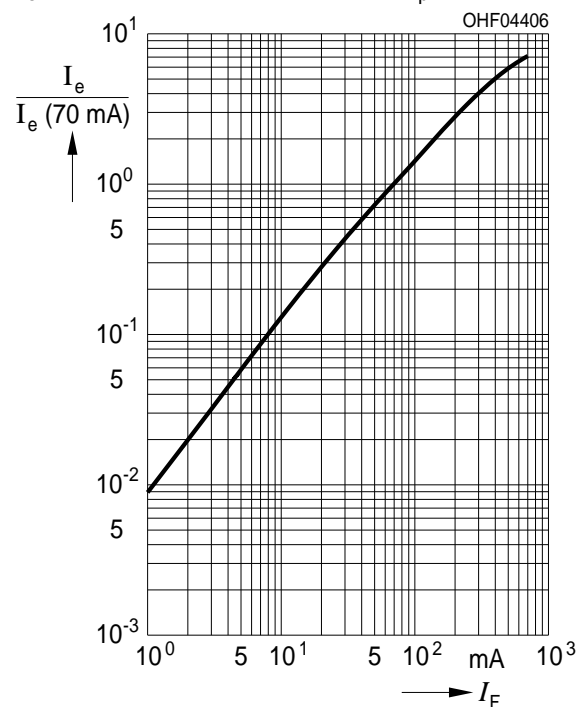
Relative Spectral Emission ^{2) page 15}

(typ) $I_{\text{rel}} = f(\lambda)$, $T_A = 25 \text{ }^\circ\text{C}$



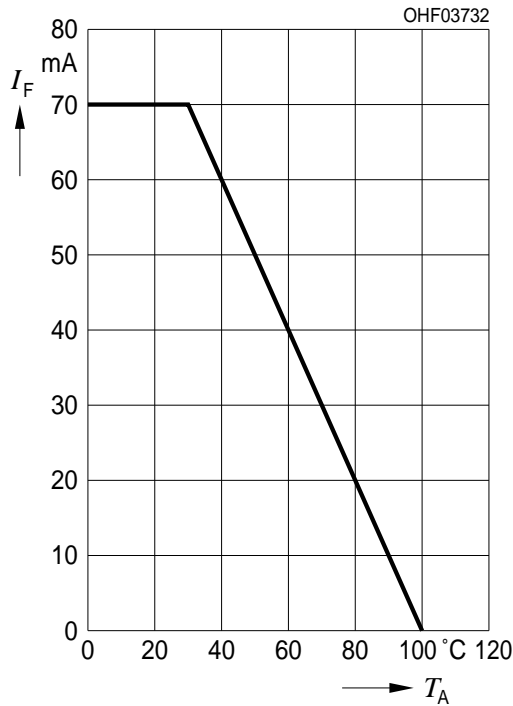
Radiant Intensity ^{2) page 15}

$I_e / I_e(70 \text{ mA}) = f(I_F)$, single pulse, $t_p = 25 \mu\text{s}$



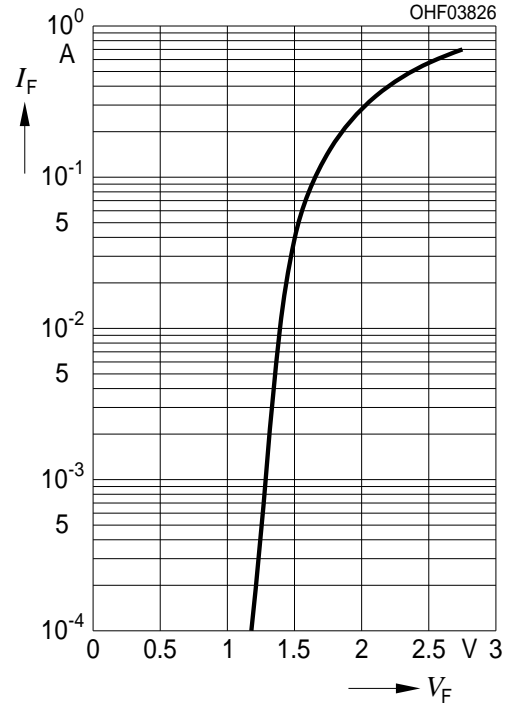
Max. Permissible Forward Current

$I_{F, \max} = f(T_A)$



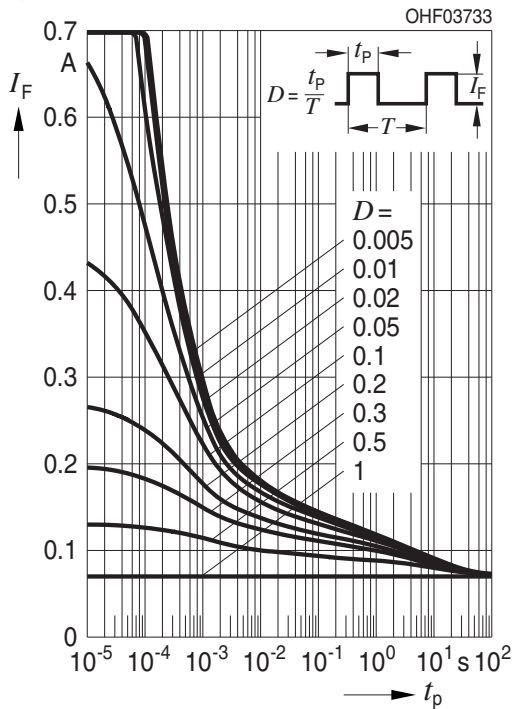
Forward Current ^{2) page 15}

$I_F = f(V_F), T_A = 25\text{ °C}$



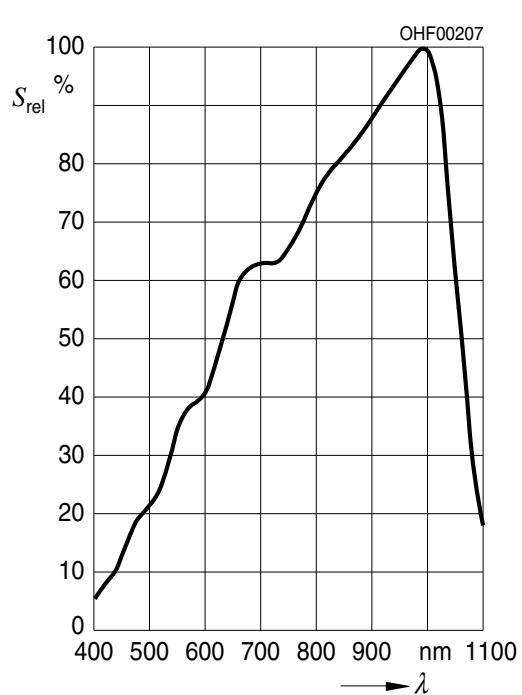
Permissible Pulse Handling Capability

$I_F = f(t_p), T_A = 25\text{ °C}, \text{ duty cycle } D = \text{parameter}$



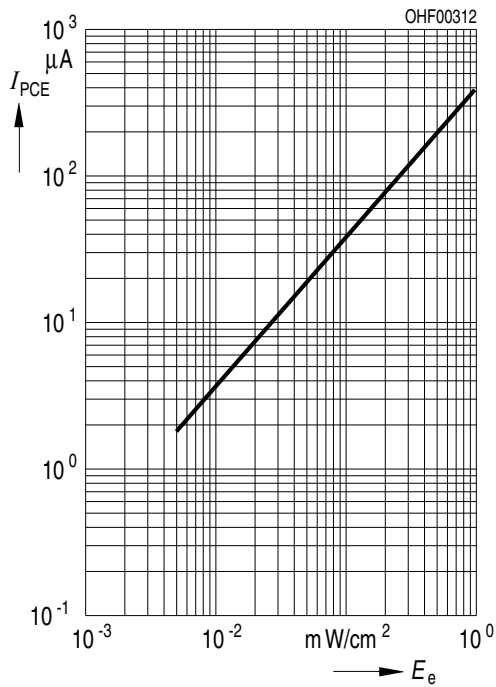
Relative Spectral Sensitivity ^{2) page 15}

$S_{rel} = f(\lambda), T_A = 25\text{ °C}$



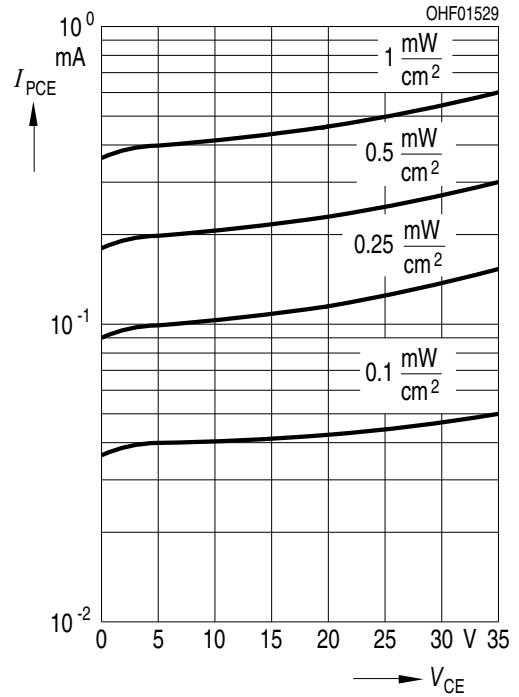
Photocurrent ^{2) page 15}

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



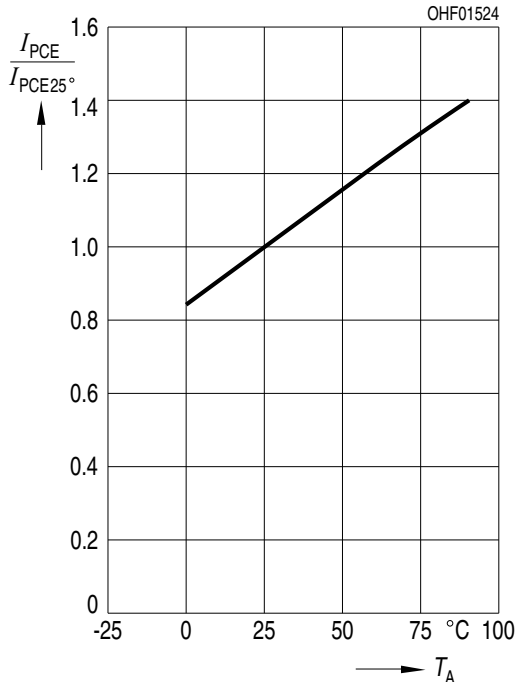
Photocurrent ^{2) page 15}

$I_{PCE} = f(V_{CE}), E_e = \text{Parameter}, T_A = 25^\circ\text{C}$



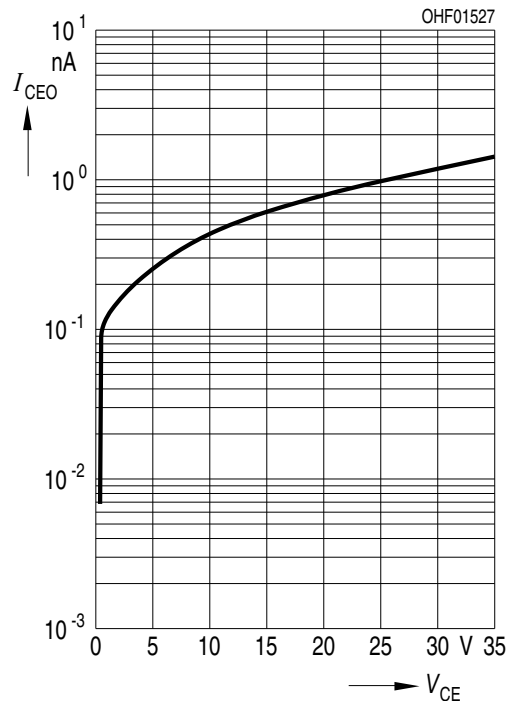
Photocurrent ^{2) page 15}

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



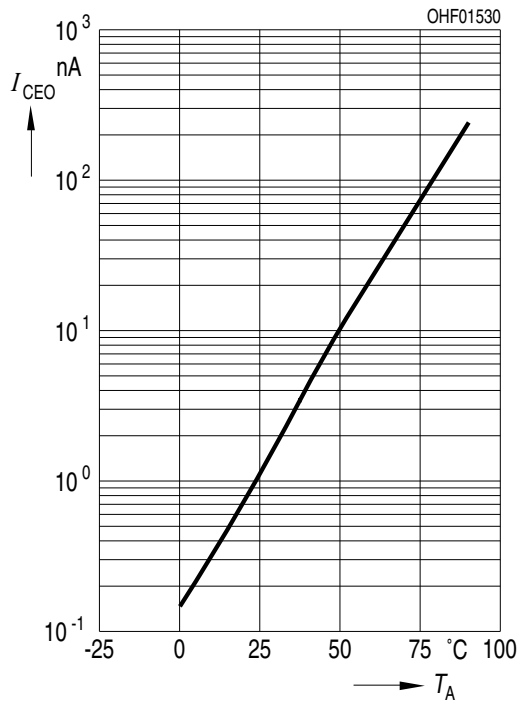
Dark Current ^{2) page 15}

$I_{CEO} = f(V_{CE}), E = 0, T_A = 25^\circ\text{C}$



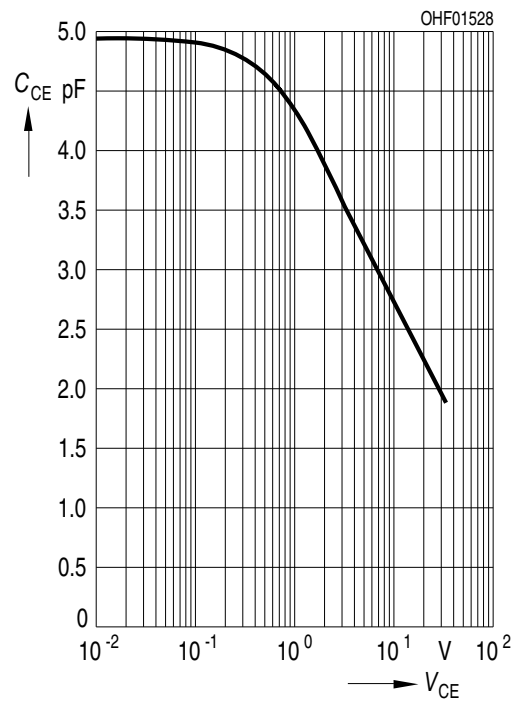
Dark Current ^{2) page 15}

$I_{CEO} = f(T_A), V_{CE} = 5 \text{ V}, E = 0$



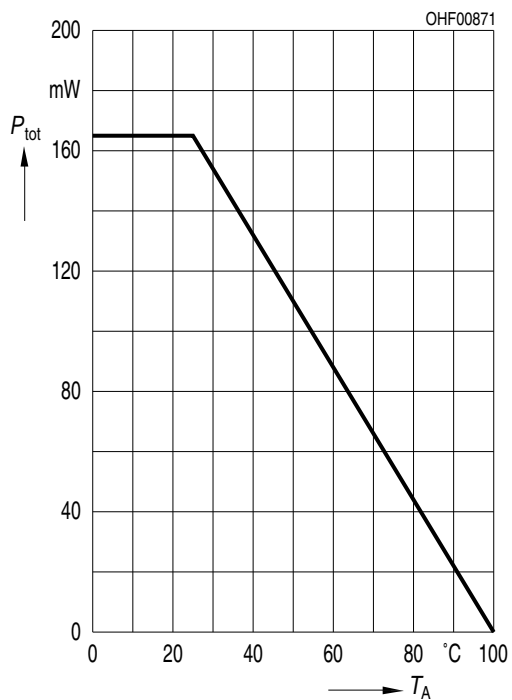
Collector-Emitter Capacitance ^{2) page 15}

$C_{CE} = f(V_{CE}), f = 1 \text{ MHz}, E = 0, T_A = 25^\circ\text{C}$



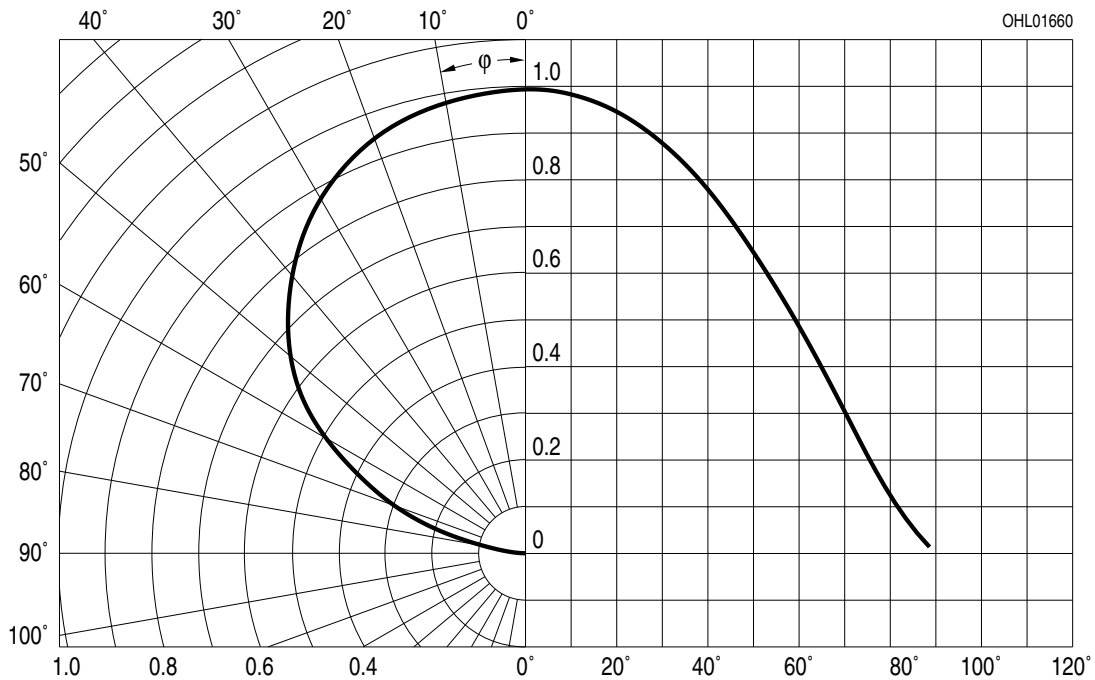
Power Consumption

$P_{tot} = f(T_A)$

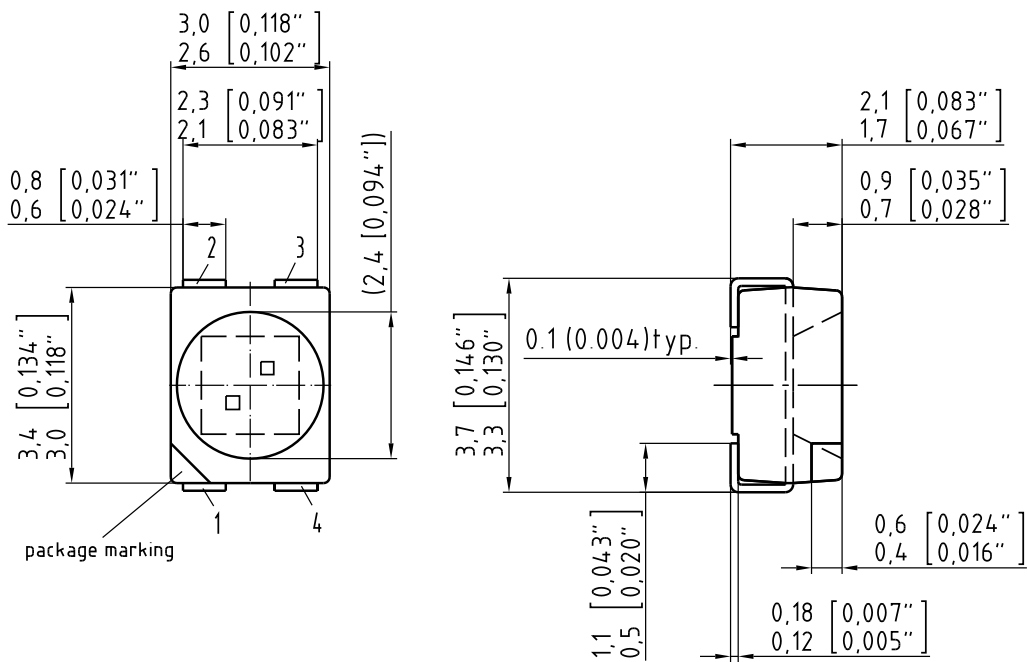


Emitter Radiation Characteristics / Phototransistor Directional Characteristics ^{2) page 15}

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



Package Outline



C63062-A4174-A1-02

Dimensions in mm (inch).

Pinning

| Pin | Description |
|-----|---------------------------|
| 1 | Anode Emitter 1 |
| 2 | Cathode Emitter 1 |
| 3 | Collector Phototransistor |
| 4 | Emitter Phototransistor |

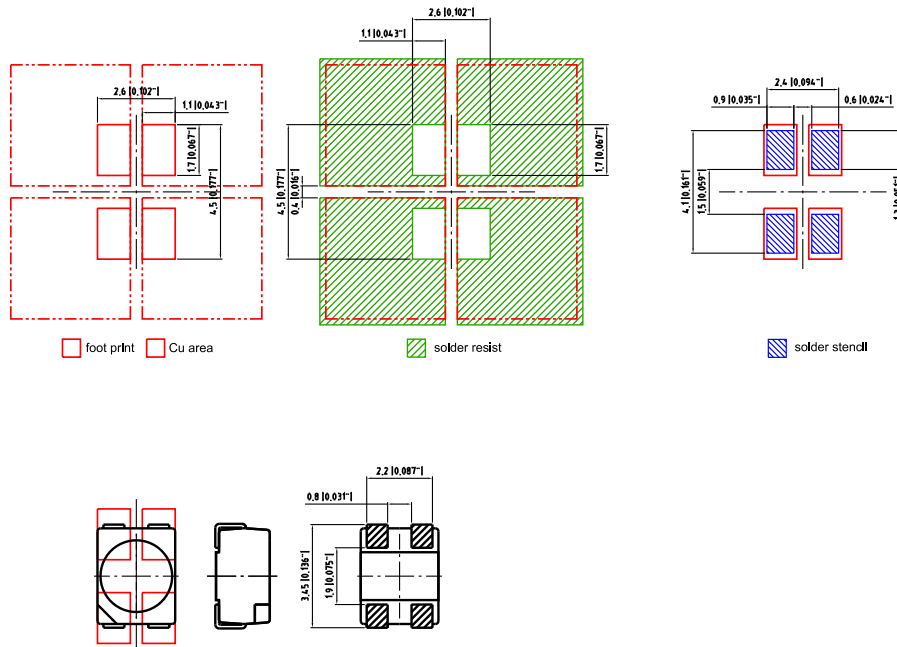
Package

Multi TOPLED

Approximate Weight:

34.0 mg

Recommended Solder Pad

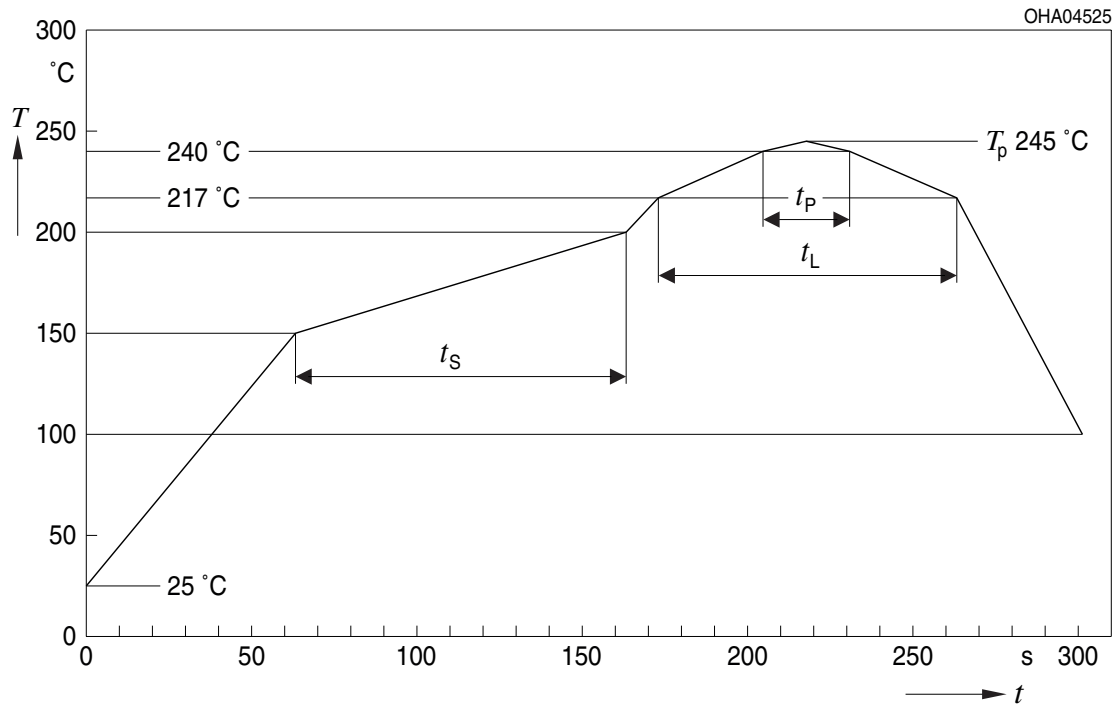


Dimensions in mm (inch).

E062.3010.14.8 -01

Reflow Soldering Profile

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



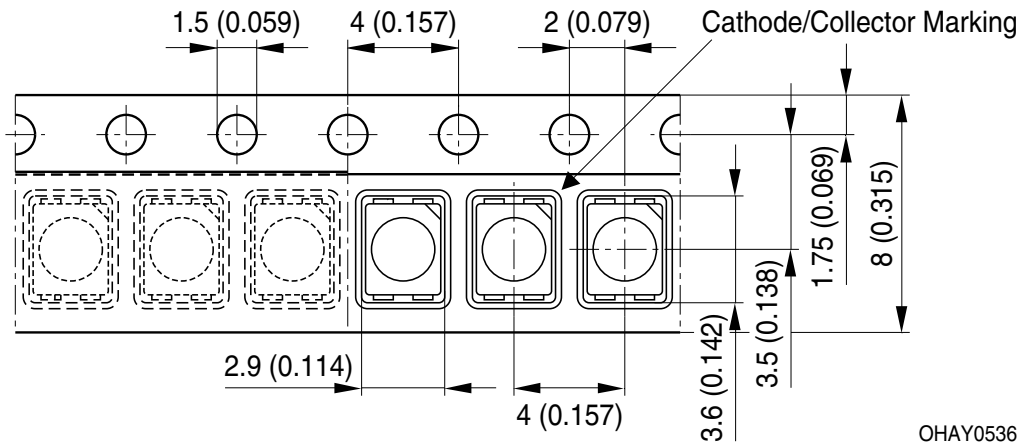
OHA04612

| Profile Feature Profil-Charakteristik | Symbol Symbol | Pb-Free (SnAgCu) Assembly | | | Unit Einheit |
|---|------------------|---------------------------|----------------|---------|-----------------|
| | | 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

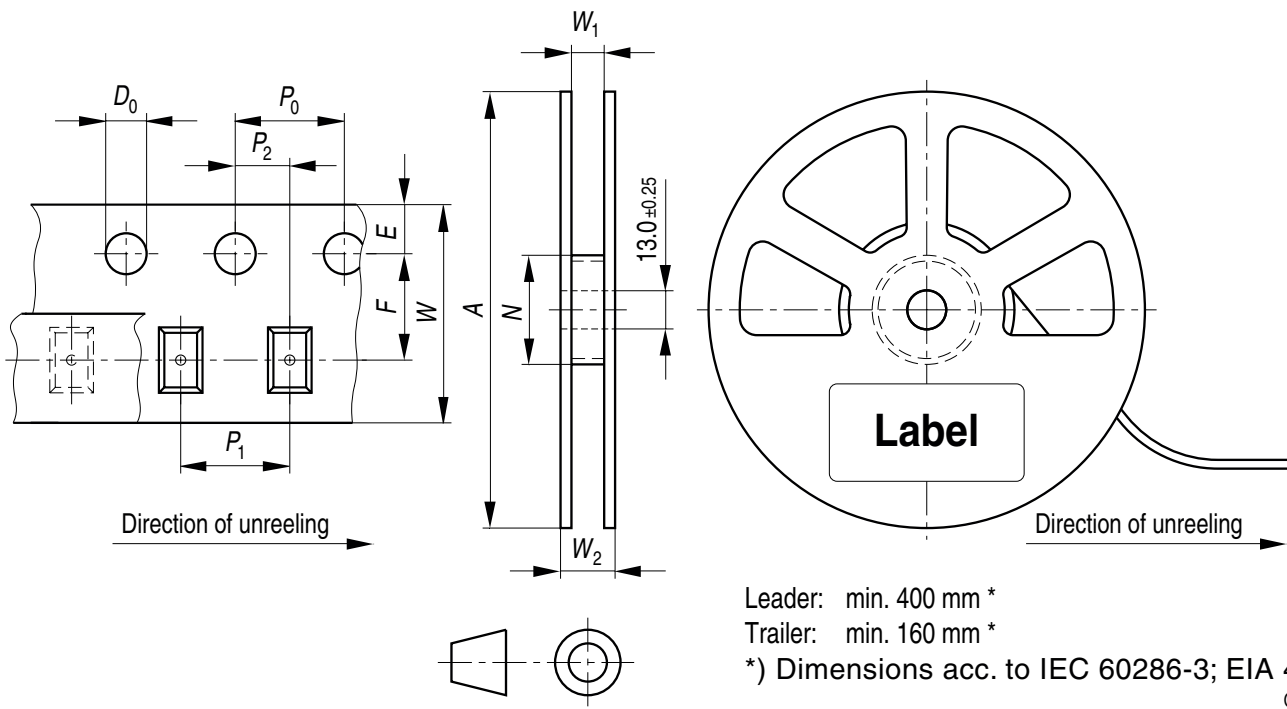


OHAY0536

Dimensions in mm (inch).

Tape and Reel

8 mm tape with 2000 pcs. on \varnothing 180 mm reel, 8000 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]

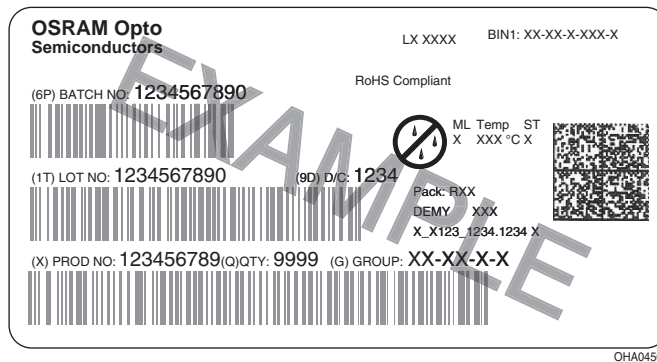
| W | P ₀ | P ₁ | P ₂ | D ₀ | E | F |
|----------------|----------------|---------------------------|----------------|----------------|------------|------------|
| 8 + 0.3 / -0.1 | 4 ± 0.1 | 2 ± 0.05 or 4 ± 0.1 | 2 ± 0.05 | 1.5 ± 0.1 | 1.75 ± 0.1 | 3.5 ± 0.05 |

Reel dimensions [mm]

| A | W | N _{min} | W ₁ | W _{2max} |
|-----|---|------------------|----------------|-------------------|
| 180 | 8 | 60 | 8.4 + 2 | 14.4 |

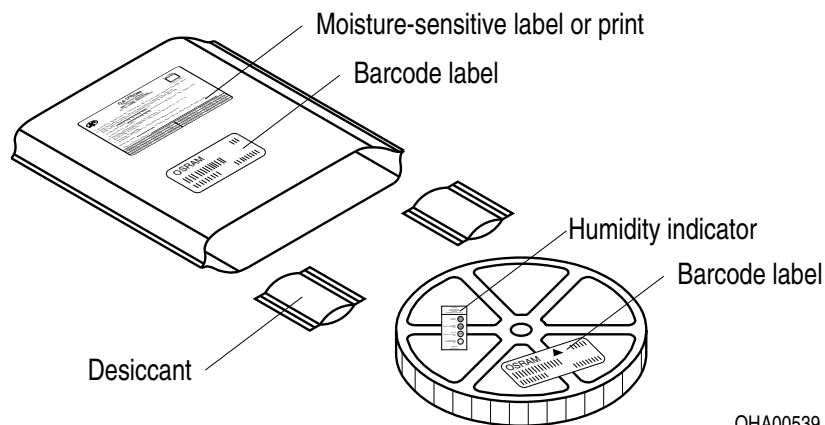
| A | W | N _{min} | W ₁ | W _{2max} |
|-----|---|------------------|----------------|-------------------|
| 330 | 8 | 60 | 8.4 + 2 | 14.4 |

Barcode-Product-Label (BPL)



OHA04563

Dry Packing Process and Materials



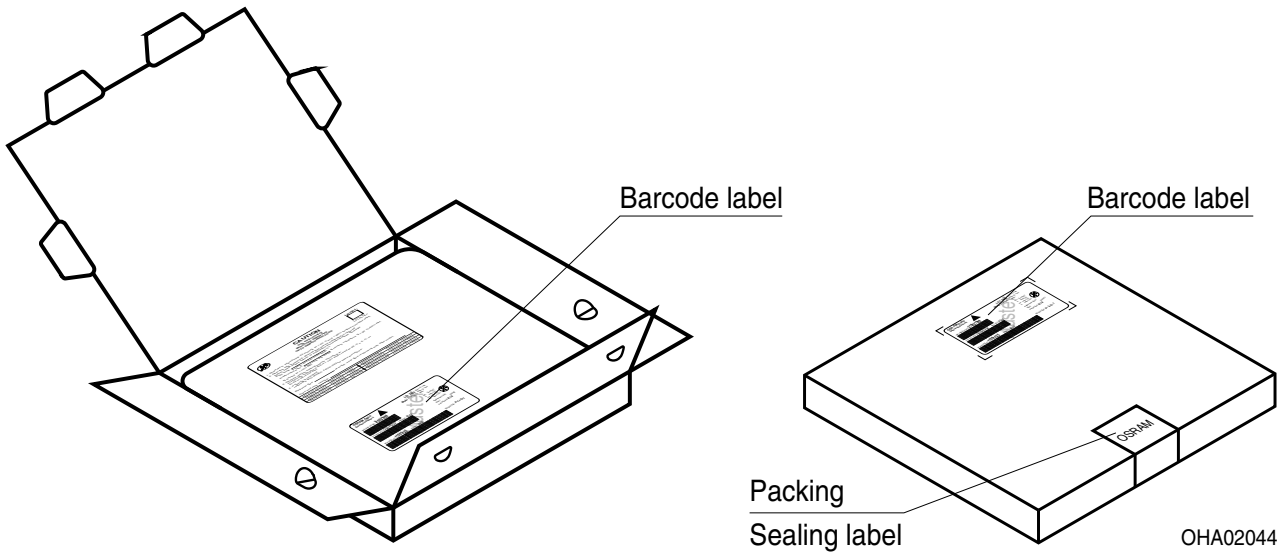
OHA00539

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 |
|---------|---------|--------|
| 200 ± 5 | 195 ± 5 | 30 ± 5 |
| 352 ± 5 | 352 ± 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.

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

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**) 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) **Thermal resistance:** junction -ambient, mounted on PC-board (FR4), pads size 16 mm² each
- 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.

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