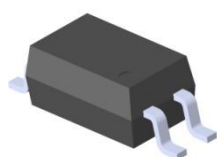
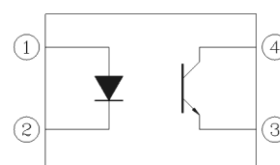


4 PIN SSOP PHOTOTRANSISTOR PHOTOCOUPLER EL3H7U-G Series

Preliminary



Schematic



Pin Configuration

1. Anode
2. Cathode
3. Emitter
4. Collector

Features:

- Halogens free
(Br <900 ppm , Cl <900 ppm , Br+Cl < 1500 ppm)
- Current transfer ratio
(CTR: 100~560% at $I_F = 0.5\text{mA}$, $V_{CE} = 5\text{V}$)
- Operating temperature $-40^\circ\text{C} \sim 125^\circ\text{C}$
- High isolation voltage between input and output (Viso=3750 V rms)
- Compact 4 Pin SSOP with a 2.0 mm profile
- Compliance with EU REACH
- UL and cUL approved (No. E214129)
- VDE approved (No. 132249)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved
- CQC approved

This is a preliminary specification intended for design purposes and subject to change without prior notice.

Description

The EL3H7U-G series devices consist of an infrared emitting diode, optically coupled to a phototransistor detector encapsulated with green compound.

They are packaged in a 4-pin small outline SMD package.

Applications

- DC-DC Converters
- Programmable controllers
- Telecommunication equipments
- Signal transmission between circuits of different potentials and impedances

Absolute Maximum Ratings (T_A=25°C) *1

| | Parameter | Symbol | Rating | Unit |
|-------------------------|---------------------------|------------------|------------|------------------|
| Input | Forward current | I _F | 20 | mA |
| | Reverse voltage | V _R | 5 | V |
| | Power dissipation | P _D | 40 | mW |
| Output | Collector current | I _C | 30 | mA |
| | Collector-Emitter voltage | V _{CEO} | 60 | V |
| | Emitter-Collector voltage | V _{ECO} | 5 | V |
| | Power dissipation | P _C | 150 | mW |
| Total Power Dissipation | | P _{TOT} | 200 | mW |
| Isolation Voltage*2 | | V _{ISO} | 3750 | V _{rms} |
| Operating temperature | | T _{OPR} | -40 ~ +125 | °C |
| Storage temperature | | T _{STG} | -40 ~ +150 | °C |
| Soldering Temperature*3 | | T _{SOL} | 260 | °C |

Notes:

*1 Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute maximum ratings for extended periods of the time can adversely affect reliability. The absolute maximum Ratings are stress only T_A=25°C unless otherwise specified.

*2 AC for 1 minute, R.H.= 40 ~ 60% R.H. In this test, pins 1, 2 are shorted together, and pins 3, 4 are shorted together.

*3 For 10 seconds

Electro-Optical Characteristics (T_A=25°C unless specified otherwise)

Input

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Condition |
|-------------------|-----------------|------|------|------|------|----------------------|
| Forward voltage | V _F | - | 1.3 | 1.7 | V | I _F = 1mA |
| Reverse current | I _R | - | - | 10 | μA | V _R = 5V |
| Input capacitance | C _{in} | - | 30 | 250 | pF | V = 0, f = 1kHz |

Output

| Parameter | Symbol | Min | Typ. | Max. | Unit | Condition |
|-------------------------------------|-------------------|-----|------|------|------|---|
| Collector-Emitter dark current | I _{CEO} | - | - | 100 | nA | V _{CE} = 20V, I _F = 0mA |
| Collector-Emitter breakdown voltage | BV _{CEO} | 60 | - | - | V | I _C = 0.1mA |
| Emitter-Collector breakdown voltage | BV _{ECO} | 5 | - | - | V | I _E = 0.1mA |

Transfer Characteristics (T_A=25°C unless specified otherwise)

| Parameter | Symbo | Min | Typ. | Max. | Unit | Condition |
|--------------------------------------|----------------------|--------------------|------|------|------|---|
| Current Transfer ratio | EL3H7U | 50 | - | 600 | % | I _F = 0.5mA, V _{CE} = 5V |
| | EL3H7UA | 100 | - | 200 | % | |
| | EL3H7UB | 150 | - | 300 | % | |
| | EL3H7UC | 200 | - | 400 | % | |
| Collector-Emitter saturation voltage | V _{CE(sat)} | - | - | 0.4 | V | I _F = 3mA, I _C = 1.6mA |
| Isolation resistance | R _{IO} | 5×10 ¹⁰ | - | - | Ω | V _{IO} = 500Vdc, 40~60% R.H. |
| Floating capacitance | C _{IO} | - | 0.3 | 1.0 | pF | V _{IO} = 0, f = 1MHz |
| Rise time | t _r | - | 8 | - | μs | V _{CE} = 2V, I _C = 2mA, R _L = 100Ω |
| Fall time | t _f | - | 10 | - | μs | |

* Typical values at T_A = 25°C

Typical Electro-Optical Characteristics Curves*

Figure 1. Forward Current vs Forward Voltage

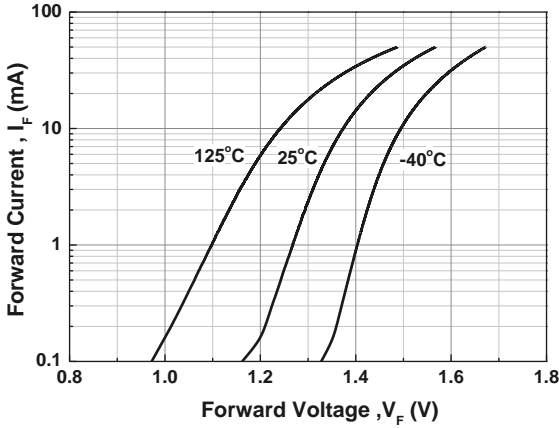


Figure 2. Collector Current vs Forward Current

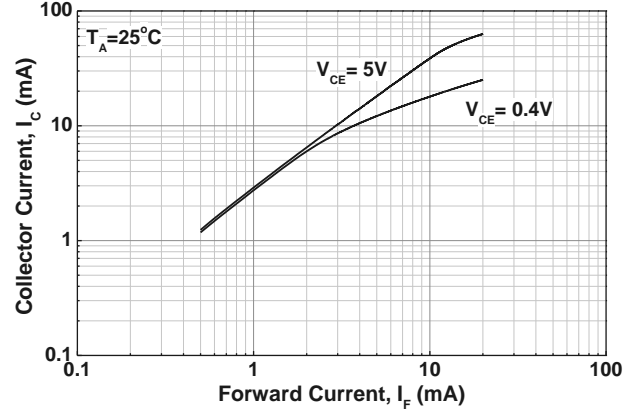


Figure 3. Normalized Current Transfer Ratio vs Forward Current

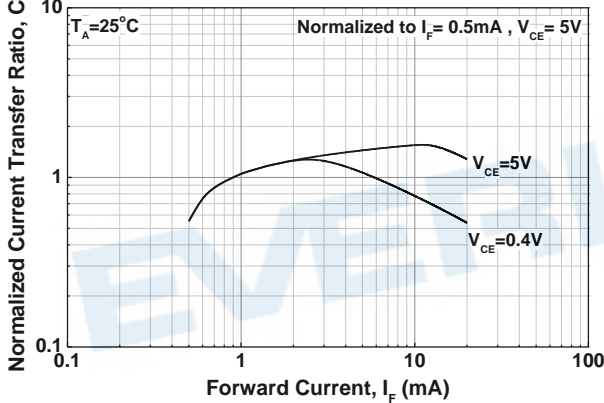


Figure 4. Collector Current vs Collector-Emitter Voltage

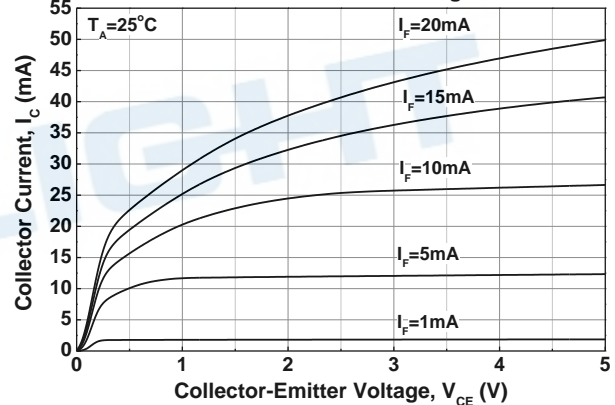


Figure 5. Collector Current vs Collector-Emitter Voltage

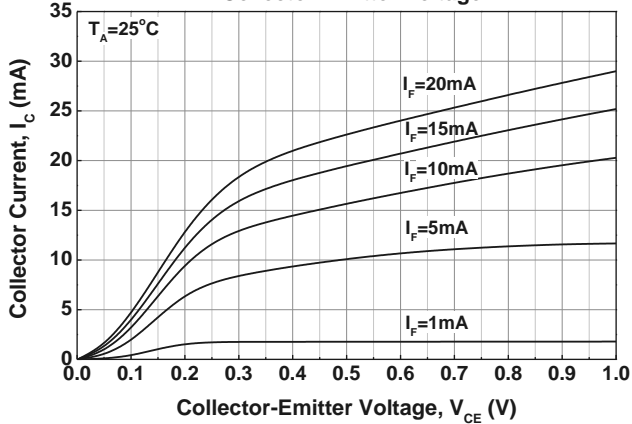


Figure 6. Collector Current vs Ambient Temperature

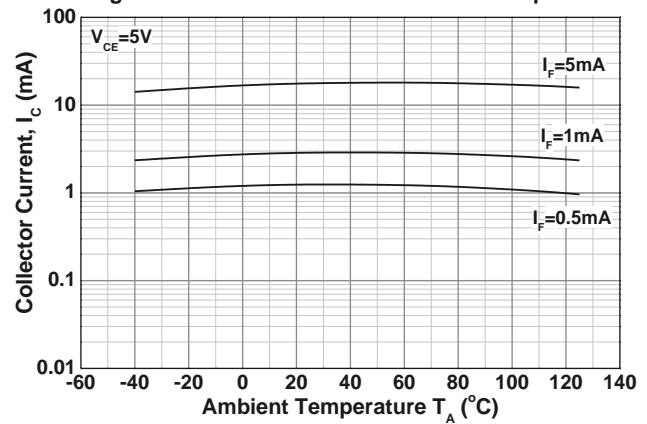


Figure 7. Normalized Current Transfer Ratio vs Ambient Temperature

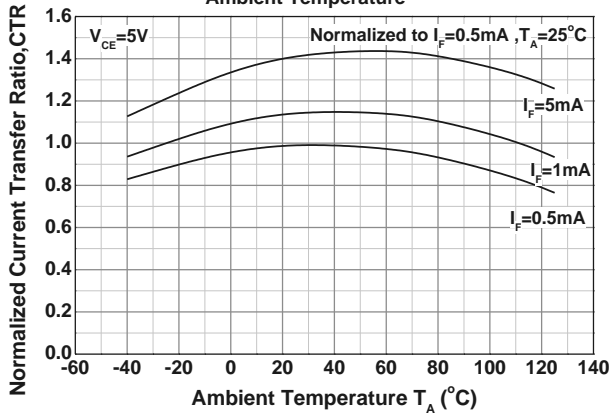


Figure 8. Dark Current vs Ambient Temperature

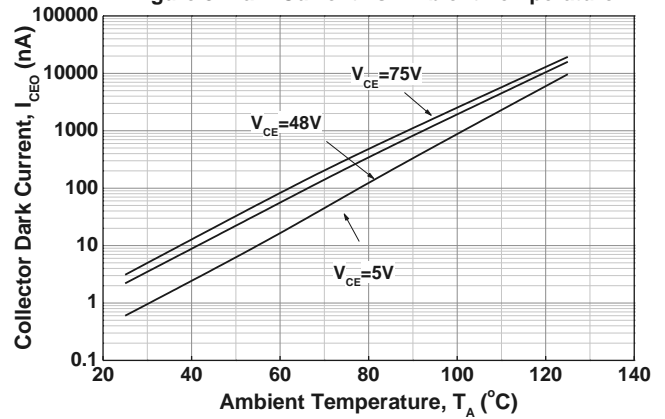


Figure 9. Switching Time vs Load Resistance

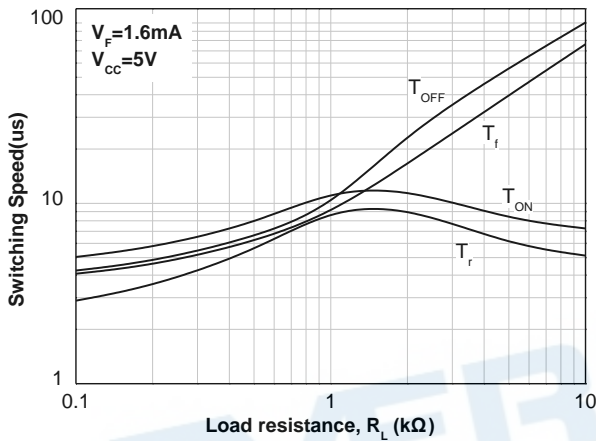
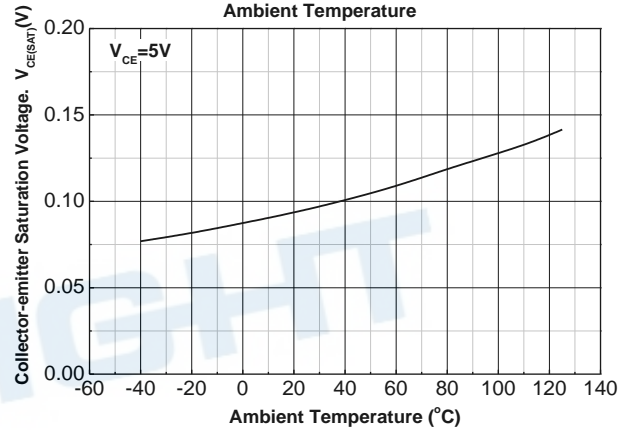


Figure 10. Collector-emitter Saturation Voltage vs Ambient Temperature



*Please be aware that all datas in the graph are just for reference and not for guaranteed by production test.

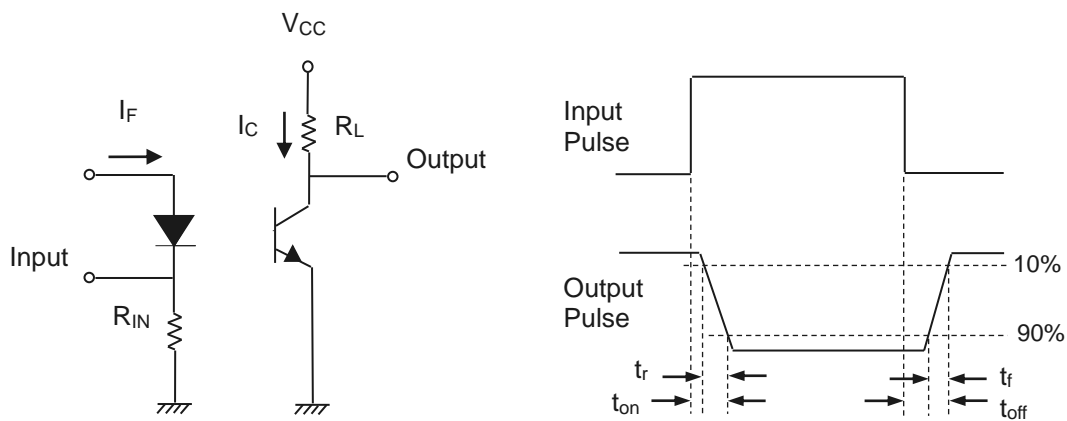


Figure 13. Switching Time Test Circuit & Waveforms

Order Information

Part Number

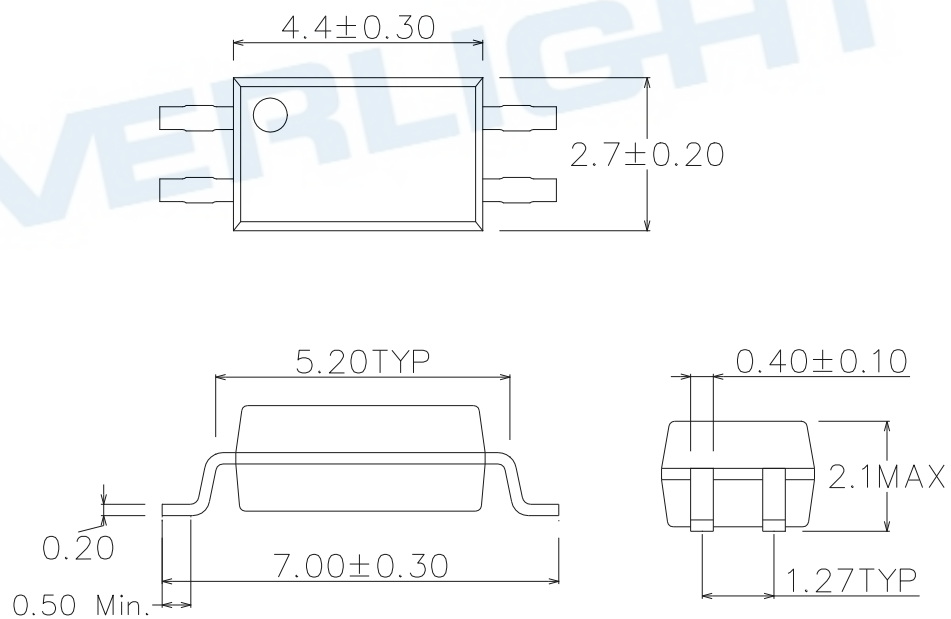
EL3H7U(X)(Y)-VG

Note

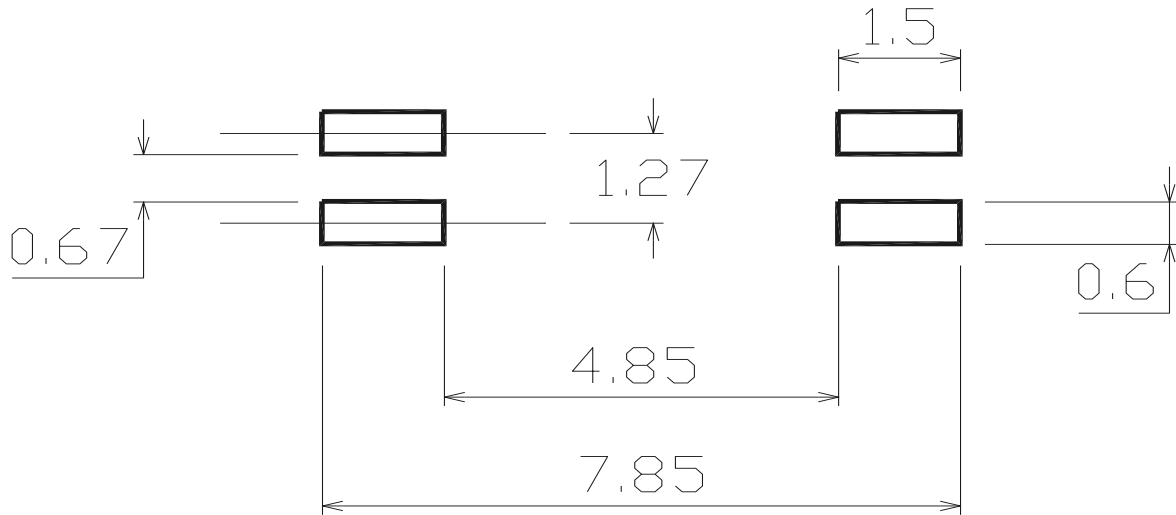
- X = CTR Rank (A, B, C or none)
- Y = Tape and reel option (TA, TB or none)
- V = VDE (optional)
- G = Halogens free

| Option | Description | Packing quantity |
|--------|-----------------------------|---------------------|
| (TA) | TA Tape & reel option | 5000 units per reel |
| (TB) | TB Tape & reel option | 5000 units per reel |
| (TA)-V | TA Tape & reel option + VDE | 5000 units per reel |
| (TB)-V | TB Tape & reel option + VDE | 5000 units per reel |

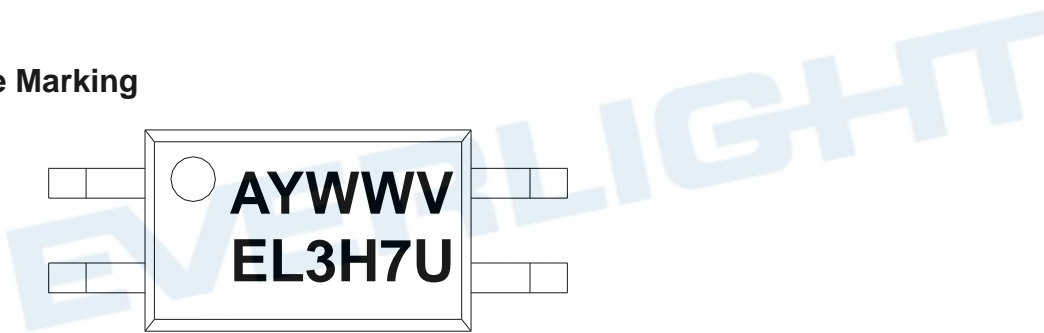
Package Dimension (Dimensions in mm)



Recommended pad layout for surface mount leadform



Device Marking

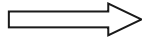
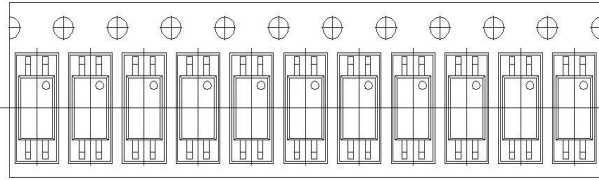


Notes

- EL denotes Everlight
- 3H7U denotes Device Number
- A denotes CTR Rank
- Y denotes 1 digit Year code
- WW denotes 2 digit Week code
- V denotes VDE (optional)

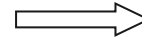
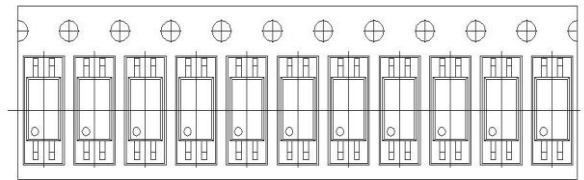
Tape & Reel Packing Specifications

Option TA



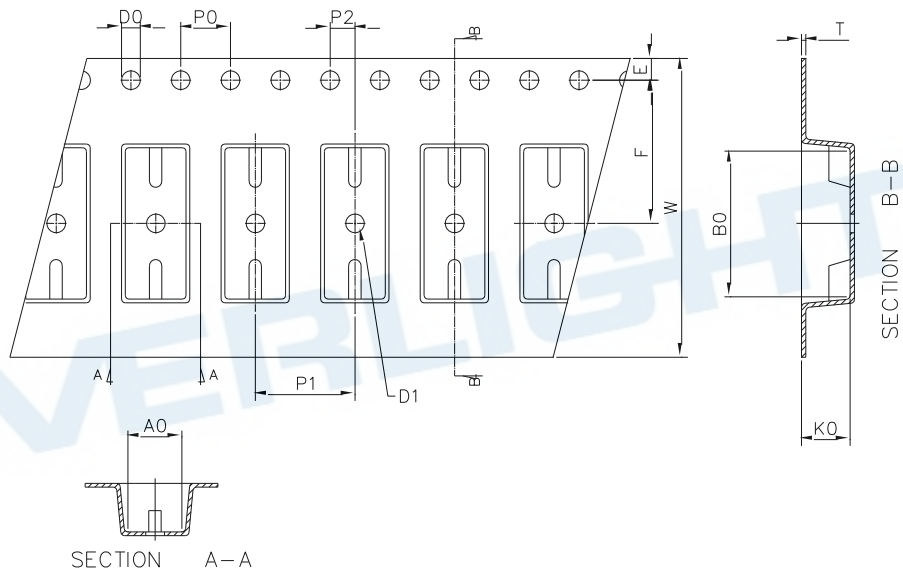
Direction of feed from reel

Option TB



Direction of feed from reel

Tape dimensions

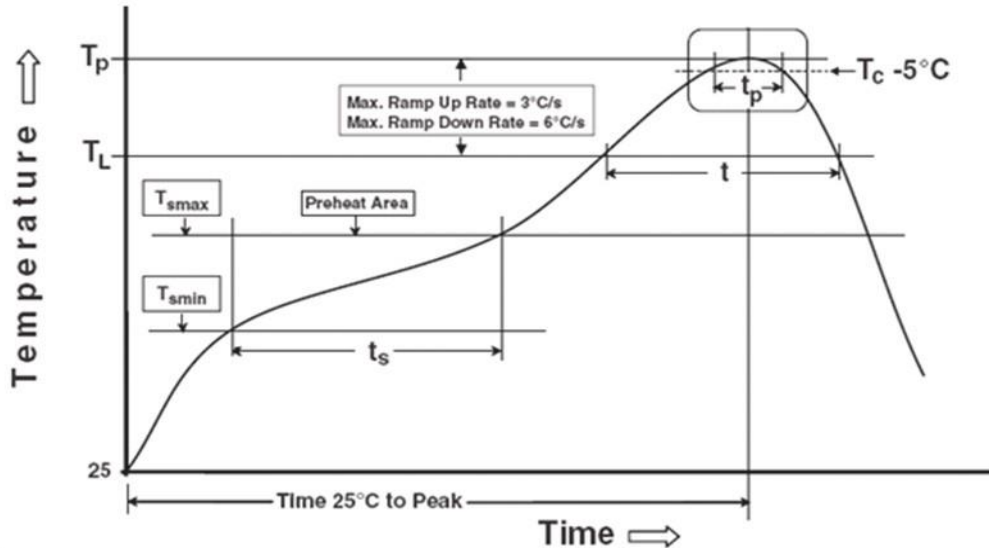


| | | | | | | |
|----------------|-------------|-------------|---------------|-------------|-------------|-------------|
| Dimension No. | A0 | B0 | D0 | D1 | E | F |
| Dimension (mm) | 3.00 ± 0.10 | 7.45 ± 0.10 | 1.50 + 0.1/-0 | 1.50 ± 0.10 | 1.75 ± 0.10 | 5.50 ± 0.10 |
| Dimension No. | P0 | P1 | P2 | t | W | K0 |
| Dimension (mm) | 4.00 ± 0.15 | 8.00 ± 0.10 | 2.00 ± 0.10 | 0.30 ± 0.05 | 12.1 ± 0.2 | 2.45 ± 0.1 |

Precautions for Use

1. Soldering Condition

1.1 (A) Maximum Body Case Temperature Profile for evaluation of Reflow Profile



Note:

Reference: IPC/JEDEC J-STD-020D

Preheat

| | |
|--|-----------------|
| Temperature min (T_{smin}) | 150 °C |
| Temperature max (T_{smax}) | 200°C |
| Time (T_{smin} to T_{smax}) (t_s) | 60-120 seconds |
| Average ramp-up rate (T_{smax} to T_p) | 3 °C/second max |

Other

| | |
|--|------------------|
| Liquidus Temperature (T_L) | 217 °C |
| Time above Liquidus Temperature (t_L) | 60-100 sec |
| Peak Temperature (T_p) | 260°C |
| Time within 5 °C of Actual Peak Temperature: $T_p - 5^\circ\text{C}$ | 30 s |
| Ramp- Down Rate from Peak Temperature | 6°C /second max. |
| Time 25°C to peak temperature | 8 minutes max. |
| Reflow times | 3 times |

DISCLAIMER

1. Above specification may be changed without notice. EVERLIGHT will reserve authority on material change for above specification.
2. The graphs shown in this datasheet are representing typical data only and do not show guaranteed values.
3. When using this product, please observe the absolute maximum ratings and the instructions for use outlined in these specification sheets. EVERLIGHT assumes no responsibility for any damage resulting from use of the product which does not comply with the absolute maximum ratings and the instructions included in these specification sheets.
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