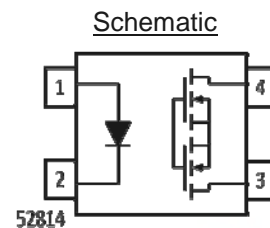
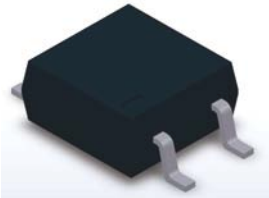


4PIN MINI FLAT PACKAGE SOLID STATE RELAY ELM4XXA(BMS) SERIES



Pin Configuration

- 1, LED Anode
- 2, LED Cathode
- 3,4, MOSFET

Features

- Compliance Halogen Free(Br < 900ppm, Cl < 900ppm, Br+Cl < 1500ppm)
- Normally open signal pole signal throw relay
- Small 4pin SOP package in the 400V & 600V load voltage series
- Lower operation current
- Low-level off state leakage current
- Low on resistance
- Compliance with EU REACH
- Pb free and RoHS compliant
- UL and cUL (approved)
- VDE (approved)
- SEMKO (approved)
- NEMKO (approved)
- FIMKO (approved)
- CQC (approved)
- Qualified to AEC-Q101 test guidelines

Description

The ELM4XXA(BMS) is solid state relays containing an AlGaAs infrared LEDs on the light emitting side (input side) optically coupled to a high voltage output detector circuit. The detector consists of a photovoltaic diode array and MOSFETs on the output side. The single channel configuration is equivalent to 1 form A EMR. The devices in a 4-pin small outline SMD package

Applications

- Exchange equipment
- Measurement and testing equipment
- FA/OA equipment
- Industrial controls
- Security

Absolute Maximum Ratings (T_A=25 °C, unless otherwise specified)

| | Parameter | Symbol | Rating | | Unit |
|-------------------------------------|---------------------------------------|--------------------|------------|---------|------|
| | | | ELM440A | ELM460A | |
| Input | Forward Current | I _F | 50 | | mA |
| | Reverse Voltage | V _R | 5 | | V |
| | Peak Forward Current* ¹ | I _{FP} | 1 | | A |
| | Power Dissipation | P _{in} | 75 | | mW |
| Output | Break Down Voltage* ² | V _L | 400 | 600 | V |
| | Continuous Load Current* ² | I _L | 120 | 50 | mA |
| | Pulse Load Current* ³ | I _{LPeak} | 0.3 | 0.15 | A |
| | Power Dissipation | P _{out} | 500 | | mW |
| Total Power Dissipation | | P _T | 550 | | mW |
| Isolation Voltage* ⁴ | | V _{iso} | 3750 | | Vrms |
| Storage Temperature | | T _{STG} | -40 to 150 | | °C |
| Operating Temperature | | T _{OPR} | -40 to 125 | | °C |
| Soldering Temperature* ⁵ | | T _{SOL} | 260 | | °C |

Notes:

*1. f =100Hz, Duty Cycle = 0.1%

*2. Indicate the peak AC and DC values

*3.A connection: 100ms (1 shot), V_L = DC or Peak AC

*4.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.

*5.For 10 seconds

Electro-Optical Characteristics (T_A=25 °C)

| | Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit | |
|--------------------------|---------------------------|--------------------|--|---|--------------------|------|------|----|
| Input | Forward Voltage | V _F | I _F = 10mA | - | 1.18 | 1.5 | V | |
| | Reverse Current | I _R | V _R = 5V | - | - | 1 | μA | |
| Output | Off State leakage Current | I _{leak} | I _F = 0mA, V _L = Max. | - | - | 1 | μA | |
| | On Resistance | ELM440A | I _F = 10mA, I _L = Max. t = 1s | - | 20 | 30 | Ω | |
| | | ELM460A | | | 40 | 70 | | |
| | Output Capacitance | ELM440A | C _{out} | V _L = 0V, f = 1MHz | - | 45 | - | pF |
| ELM460A | | 30 | | | | | | |
| Transfer Characteristics | LED turn on Current | ELM440A ELM460A | I _{F(on)} | I _L = Max. | - | 1 | 5 | mA |
| | LED turn off current | ELM440A ELM460A | I _{F(off)} | I _L = 1μA | 0.2 | 0.6 | - | mA |
| | Turn On Time | ELM440A | T _{on} | I _F = 10 mA, I _L = MAX. R _L = 200Ω , | - | 0.1 | 0.5 | ms |
| | | ELM460A | | | | | | |
| | Turn Off Time | ELM440A | T _{off} | I _F = 10 mA, I _L = MAX. R _L = 200Ω , | - | 0.2 | 0.5 | ms |
| | | ELM460A | | | | | | |
| | Isolation Resistance | | R _{I-O} | V _{I-O} = 500V DC | 5×10 ¹⁰ | - | - | Ω |
| Isolation Capacitance | | C _{I-O} | V = 0V, f = 1MHz | - | 1.5 | - | pF | |

Typical Electro-Optical Characteristics Curves

Figure 1. Load current vs Ambient temperature

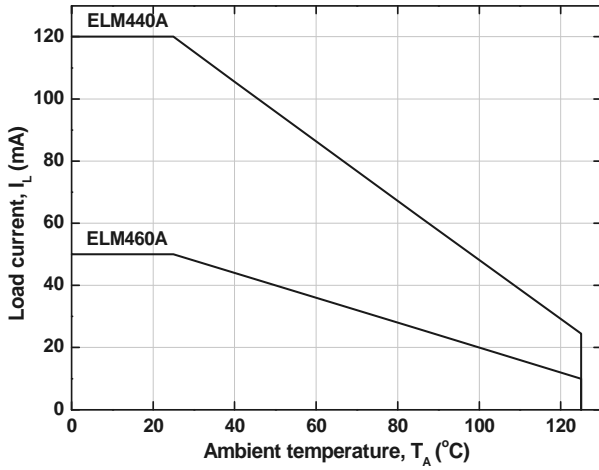


Figure 2. On Resistance vs Ambient Temperature

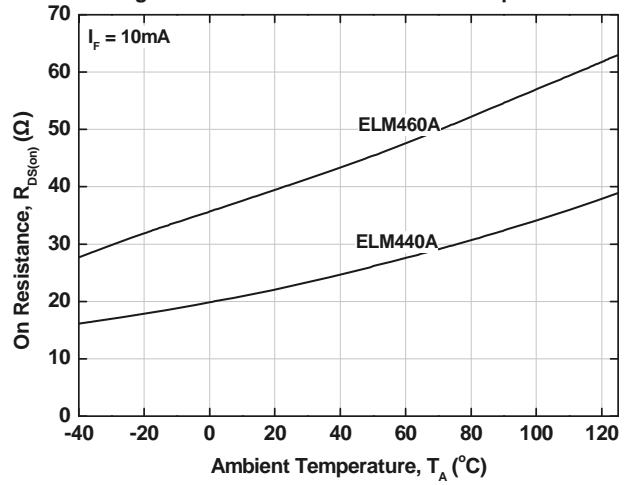


Figure 3. Switching Time vs Ambient Temperature

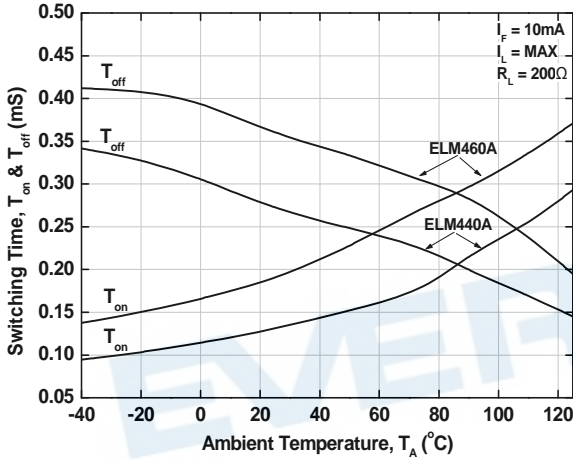


Figure 4. Switching time vs LED forward current

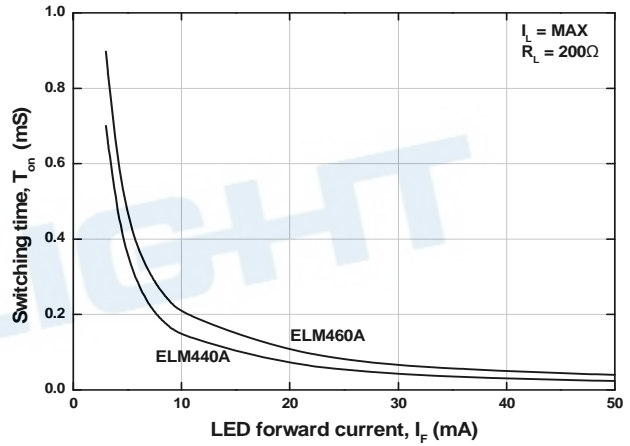


Figure 5. Switching time vs LED forward current

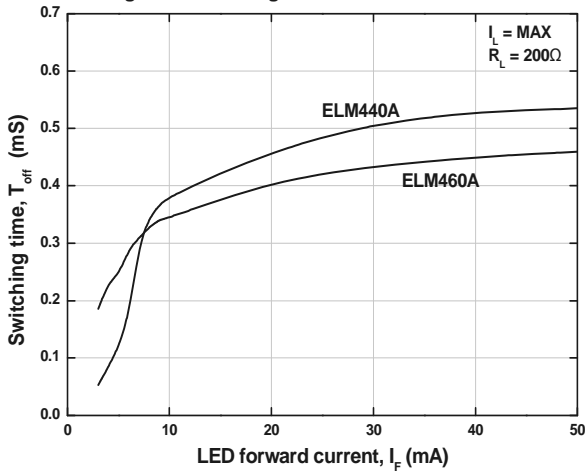


Figure 6. Normalized LED Operate on Current vs Ambient Temperature

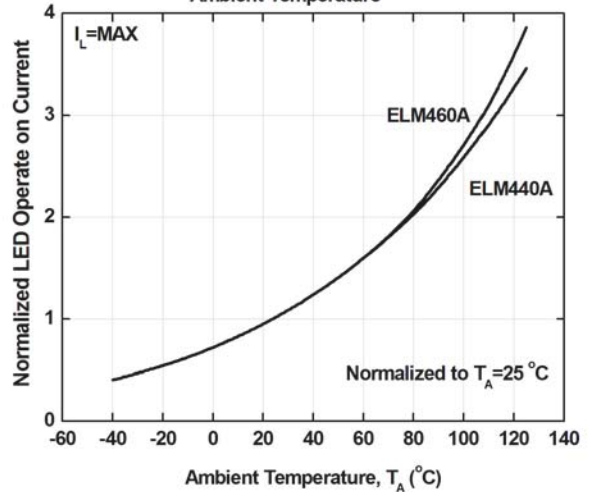


Figure 7. Normalized LED Operate off Current vs Ambient Temperature

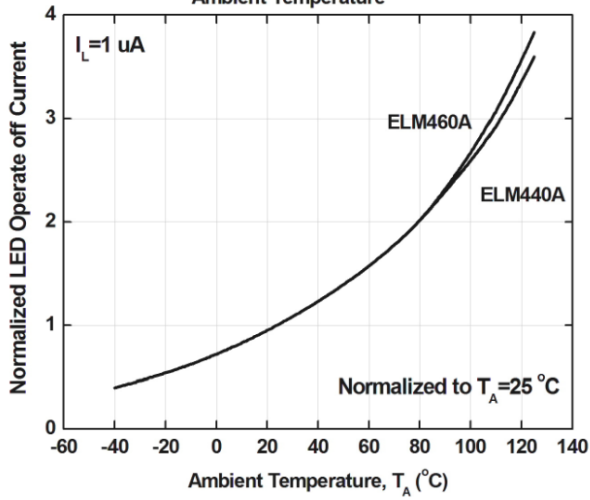


Figure 8. LED Dropout Voltage vs Ambient Temperature

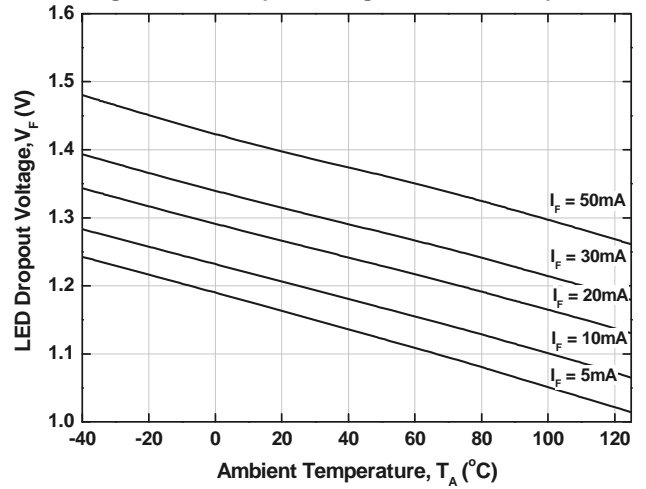


Figure 9. Load voltage vs Load current

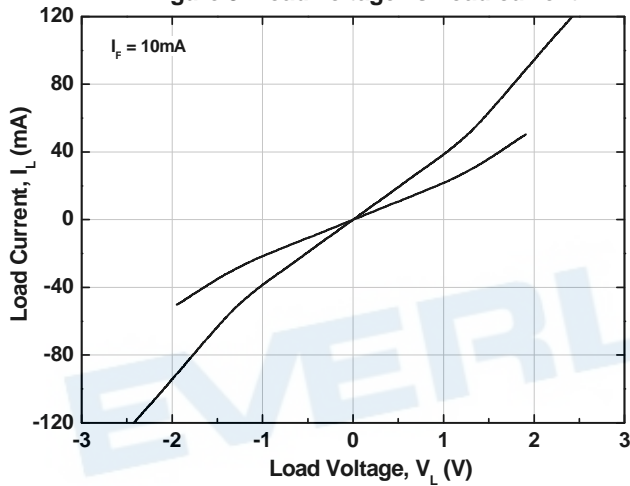


Figure 10. Off state leakage Current vs Load voltage

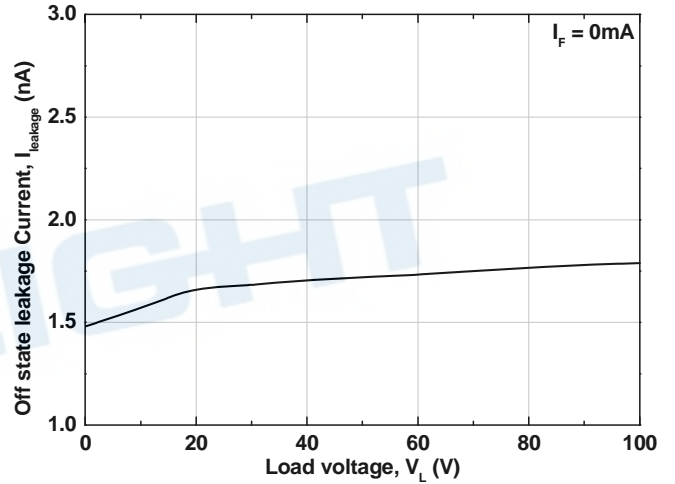
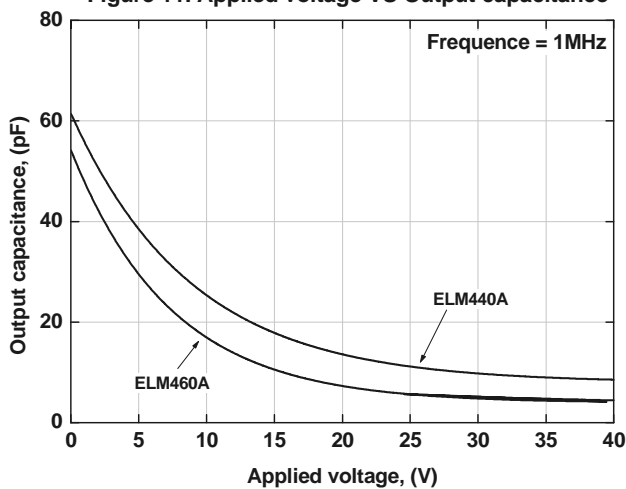
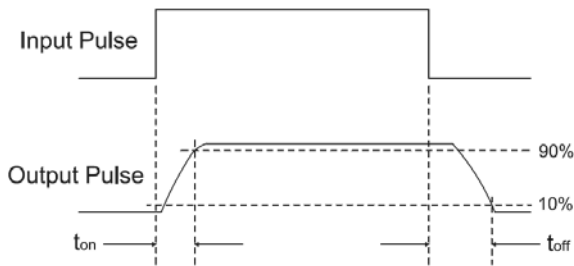


Figure 11. Applied voltage VS Output capacitance



Turn on/Turn off Time



Order Information

Part Number

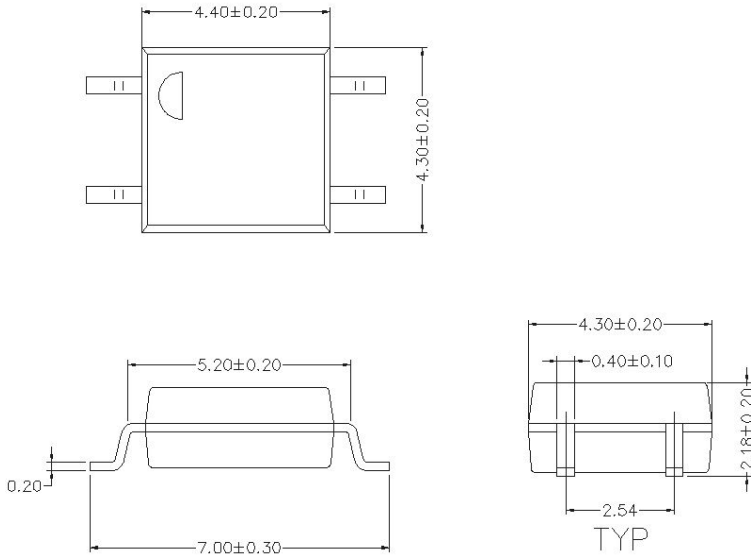
ELM4XXA(X)(BMS)-VG

Note:

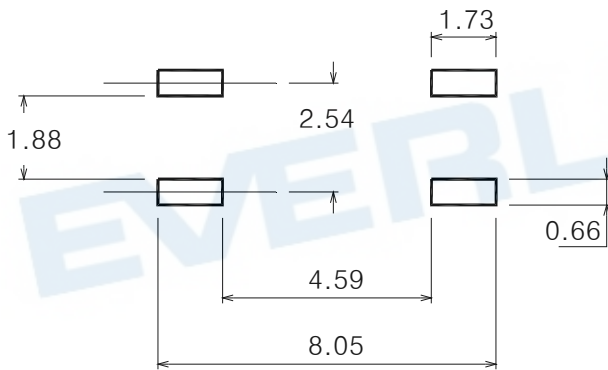
- 4XXA = Part No.(440A:400V 460A:600V)
- X = Tape and reel option (TA, TB or none)
- BMS = Customer code
- V = VDE (option)
- G = Halogen free

| Option | Description | Packing quantity |
|--------|-----------------------------|---------------------|
| None | Standard SMD option | 100 units per tube |
| -V | Standard SMD option + VDE | 100 units per tube |
| (TA) | TA Tape & reel option | 3000 units per reel |
| (TB) | TB Tape & reel option | 3000 units per reel |
| (TA)-V | TA Tape & reel option + VDE | 3000 units per reel |
| (TB)-V | TB Tape & reel option + VDE | 3000 units per reel |

Package Dimension (Dimensions in mm)



Recommended Pad Layout for Surface Mount Leadform



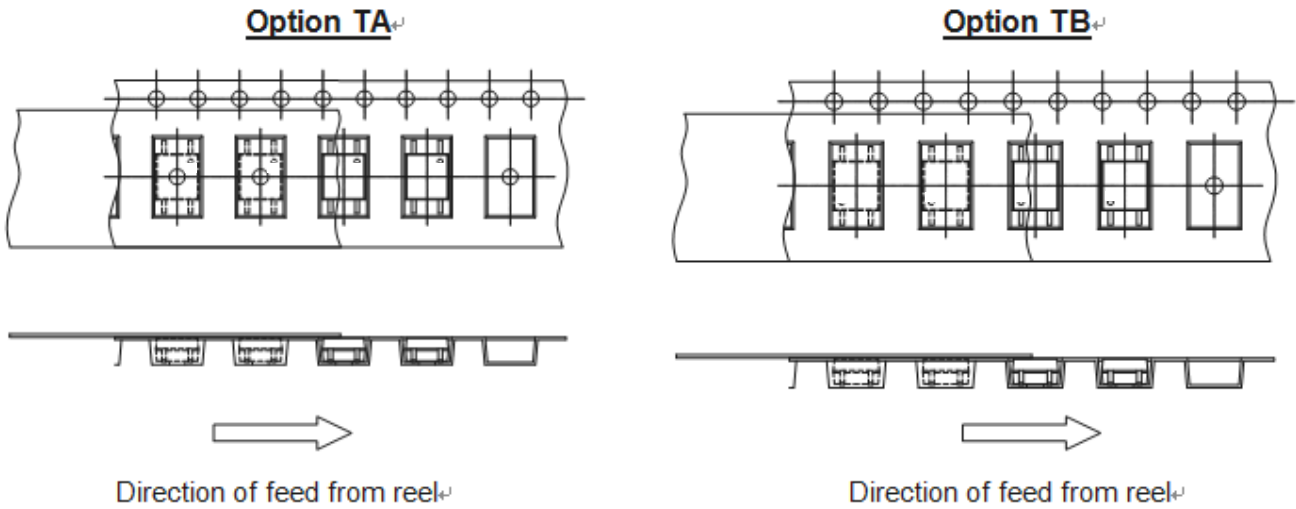
Device Marking



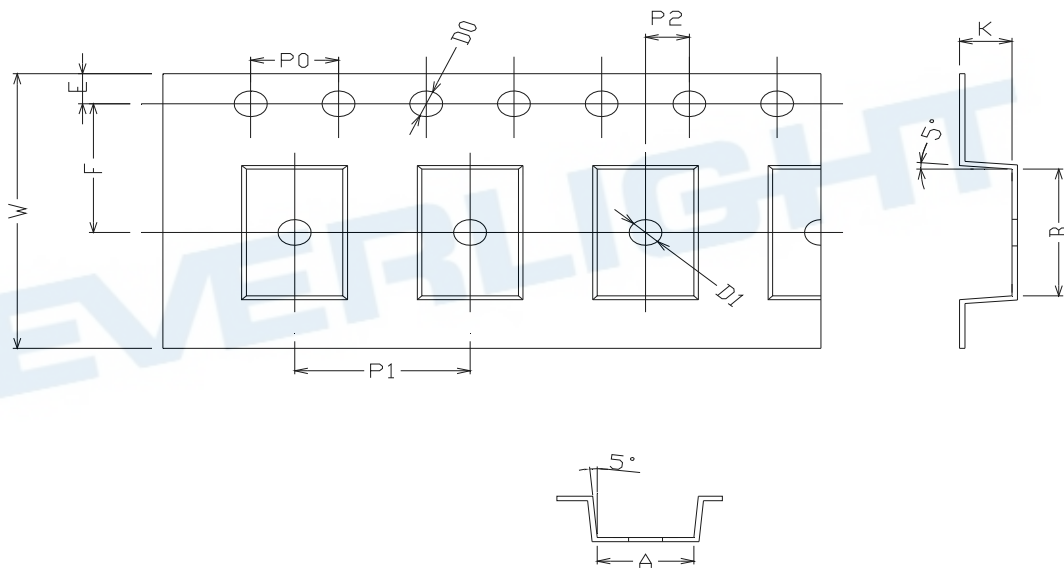
Notes

- EL denotes Everlight
- M440A denotes Part Number
- Y denotes 1 digit Year code
- WW denotes 2 digit Week code
- V denotes VDE approved (optional)

Tape & Reel Packing Specifications



Tape dimensions

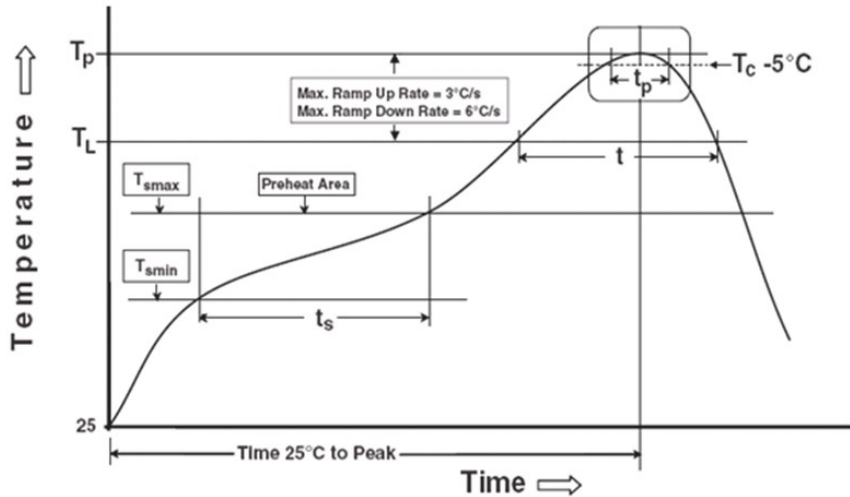


| | | | | | | |
|----------------|------------|-----------|--------------|-------------|------------|------------|
| Dimension No. | A | B | Do | D1 | E | F |
| Dimension (mm) | 4.4 ± 0.1 | 7.4 ± 0.1 | 1.5 + 0.1/-0 | 1.5 ± 0.1 | 1.75 ± 0.1 | 7.5 ± 0.05 |
| Dimension No. | Po | P1 | P2 | t | W | K |
| Dimension (mm) | 4.0 ± 0.15 | 8.0 ± 0.1 | 2.0 ± 0.1 | 0.25 ± 0.03 | 16.0 ± 0.2 | 2.4 ± 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.
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