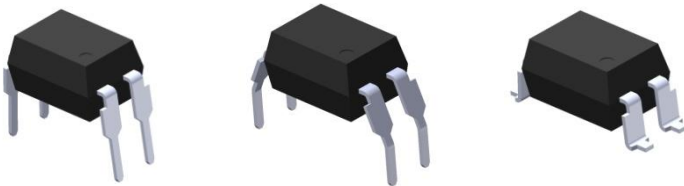
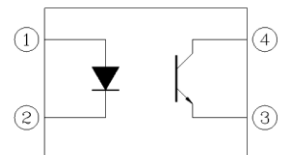


4 PIN DIP HIGH VOLTAGE PHOTOTRANSISTOR PHOTOCOUPLER EL851 Series

SchematicPin Configuration

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

Features:

- High collector- emitter voltage ($V_{CEO} = 350V$)
- Current transfer ratio
(CTR: 50~600% at $I_F = 5mA$, $V_{CE} = 5V$)
- High isolation voltage between input and output ($V_{iso} = 5000 V_{rms}$)
- Compact dual-in-line package
- Pb free and RoHS compliant.
- Compliance with EU REACH
- UL approved (No. E214129)
- VDE approved (No. 132249)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved
- CQC approved

Description

The EL851 series devices consist an infrared emitting diodes, optically coupled to a phototransistor detector.

The devices are in a 4-pin DIP package and available in wide-lead spacing and SMD option.

Applications

- Telephone line interface
- Interface to power supply circuit
- Controller for SSRs. DC motor
- Programmable Controllers

Absolute Maximum Ratings (Ta=25°C)

| | Parameter | Symbol | Rating | Unit |
|--------|----------------------------------|-----------|------------|-------|
| Input | Forward current | I_F | 60 | mA |
| | Peak forward current (1µs pulse) | I_{FM} | 1 | A |
| | Reverse voltage | V_R | 6 | V |
| | Power dissipation | P_D | 100 | mW |
| Output | Collector power dissipation | P_C | 150 | mW |
| | Collector-Emitter voltage | V_{CEO} | 350 | V |
| | Collector Current | I_C | 50 | mA |
| | Emitter-Collector voltage | V_{ECO} | 7 | V |
| | Total Power Dissipation | P_{TOT} | 200 | mW |
| | Isolation Voltage*1 | V_{ISO} | 5000 | V rms |
| | Operating Temperature | T_{OPR} | -55 to 100 | °C |
| | Storage Temperature | T_{STG} | -55 to 125 | °C |
| | Soldering Temperature*2 | T_{SOL} | 260 | °C |

Notes:

*1 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.

*2 For 10 seconds

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

Input

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Condition |
|-------------------|----------|------|------|------|---------------|--------------------------|
| Forward Voltage | V_F | - | 1.2 | 1.4 | V | $I_F = 10\text{mA}$ |
| Reverse Current | I_R | - | - | 10 | μA | $V_R = 5\text{V}$ |
| Input capacitance | C_{in} | - | 30 | 250 | pF | $V = 0, f = 1\text{kHz}$ |

Output

| Parameter | Symbol | Min | Typ. | Max. | Unit | Condition |
|-------------------------------------|------------|-----|------|------|------|---------------------------------------|
| Collector-Emitter dark current | I_{CEO} | - | - | 100 | nA | $V_{CE} = 200\text{V}$ |
| Collector-Emitter breakdown voltage | BV_{CEO} | 350 | - | - | V | $I_C = 0.1\text{mA}$ |
| Emitter-Collector breakdown voltage | BV_{ECO} | 7 | - | - | V | $I_E = 0.1\text{mA}$ |
| Collector-Emitter capacitance | C_{CE} | - | 10 | - | pF | $V_{CE} = 0\text{V}, f = 1\text{MHz}$ |

Transfer Characteristics

| Parameter | Symbol | Min | Typ. | Max. | Unit | Condition |
|--------------------------------------|---------------|-----------|------|------|---------------|---|
| Current Transfer Ratio | CTR | 50 | - | 600 | % | $I_F = 5\text{mA}, V_{CE} = 5\text{V}$ |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | - | - | 0.4 | V | $I_F = 20\text{mA}, I_C = 1\text{mA}$ |
| Isolation resistance | R_{IO} | 10^{11} | - | - | Ω | $V_{IO} = 500\text{Vdc}$ |
| Input-output capacitance | C_{IO} | - | 0.6 | - | pF | $V_{IO} = 0, f = 1\text{MHz}$ |
| Rise time | t_r | - | 4 | 18 | μs | $V_{CE} = 2\text{V}, I_C = 2\text{mA}, R_L = 100\Omega$ |
| Fall time | t_f | - | 5 | 18 | μs | |

* Typical values at $T_a = 25^\circ\text{C}$

Typical Electro-Optical Characteristics Curves

Figure 1. Forward Current vs Forward Voltage

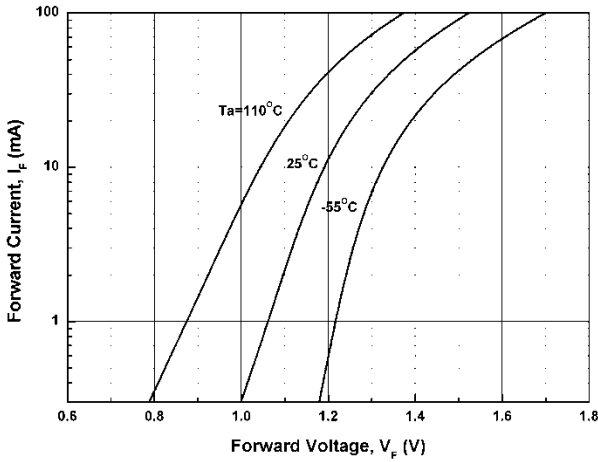


Figure 2. Current Transfer Ratio vs Forward Current

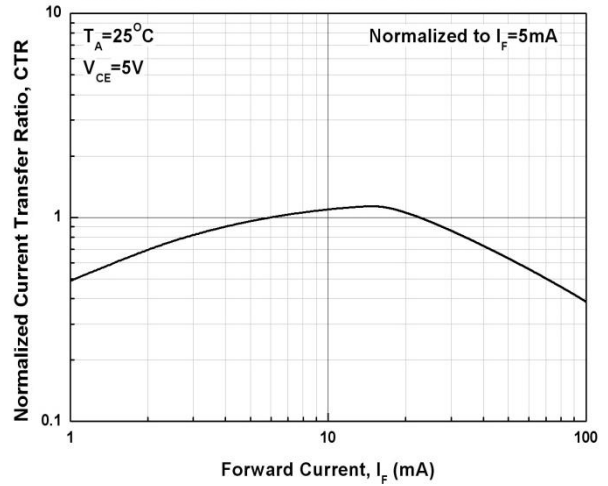


Figure 3. Collector Current vs Collector-emitter Voltage

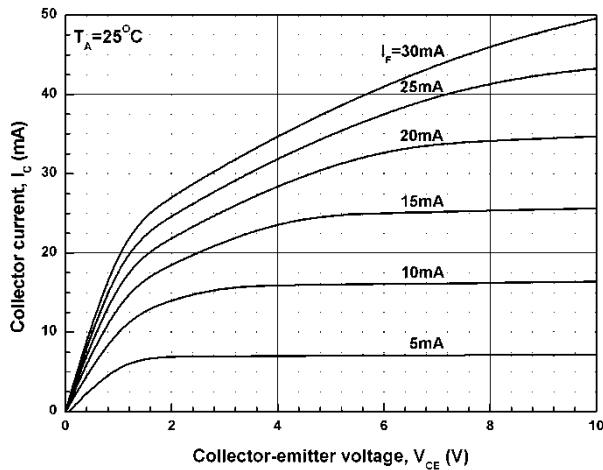


Figure 4. Relative Current Transfer Ratio vs Ambient Temperature

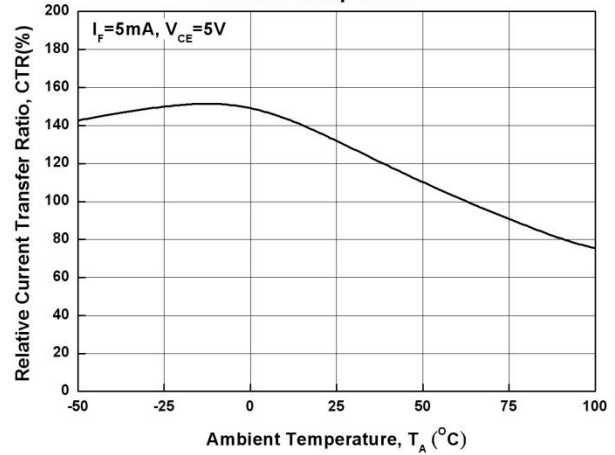


Figure 5. Collector-emitter Saturation Voltage vs Ambient Temperature

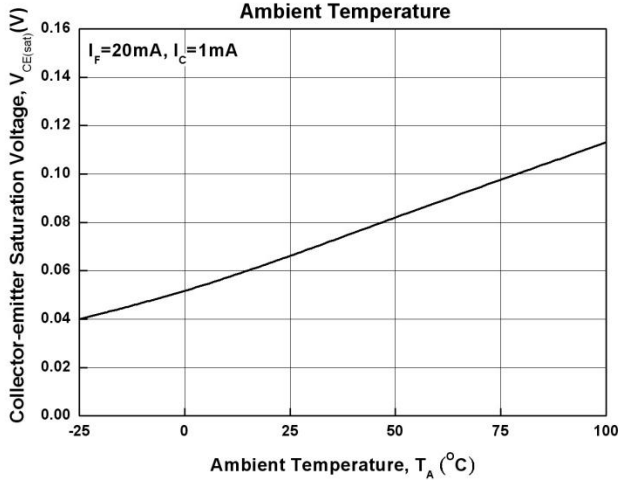


Figure 6. Dark Current vs Ambient Temperature

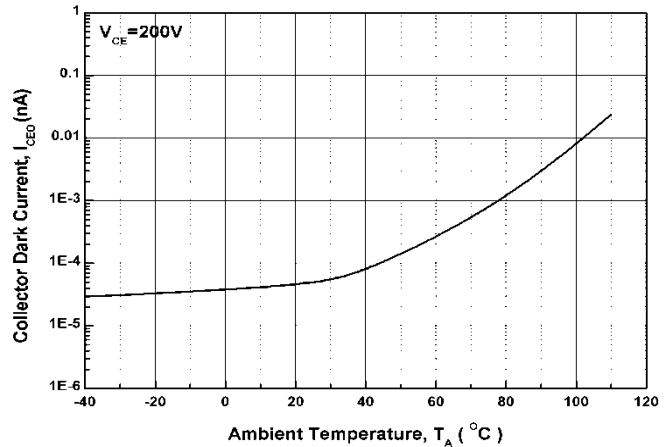


Figure .7 Switching Time vs. Load Resistance

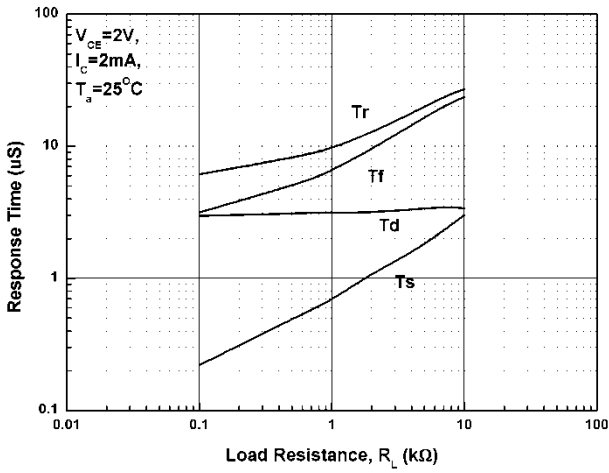


Figure 8. Collector-emitter Saturation Voltage vs Forward Current

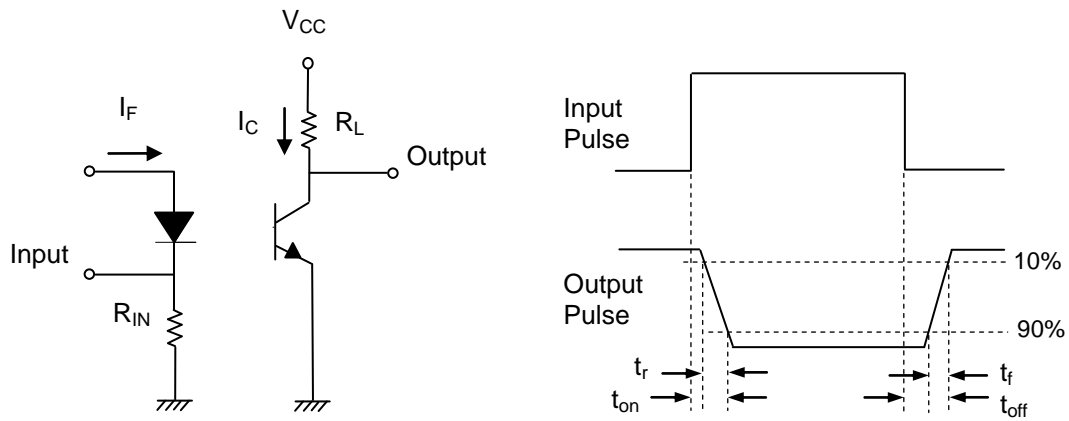
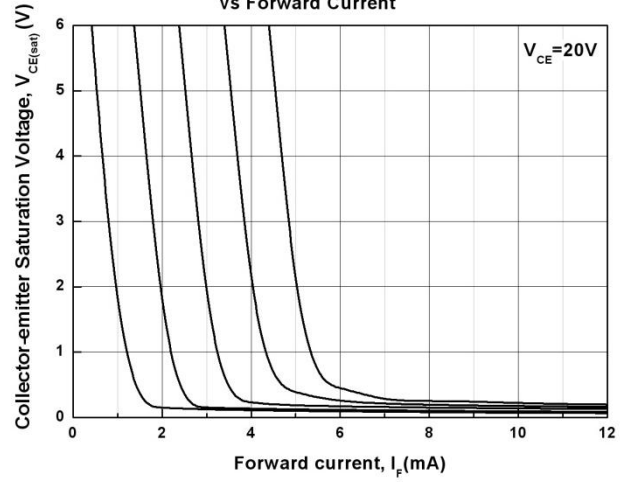


Figure 9. Switching Time Test Circuit & Waveforms

Order Information

Part Number

EL851X(Z)-V

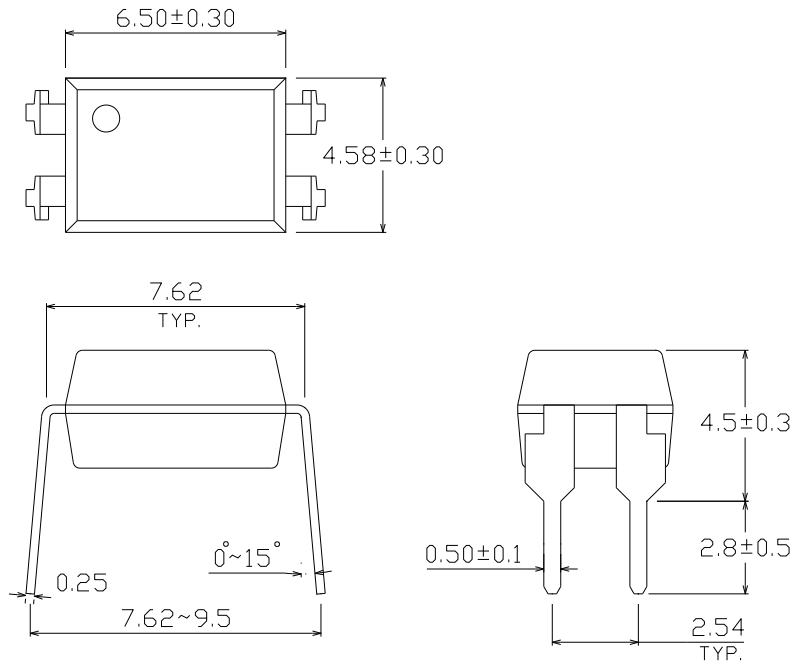
Note

- X = Lead form option (S, S1, M or none)
- Z = Tape and reel option (TA, TB, TU, TD or none)
- V = VDE safety (optional)

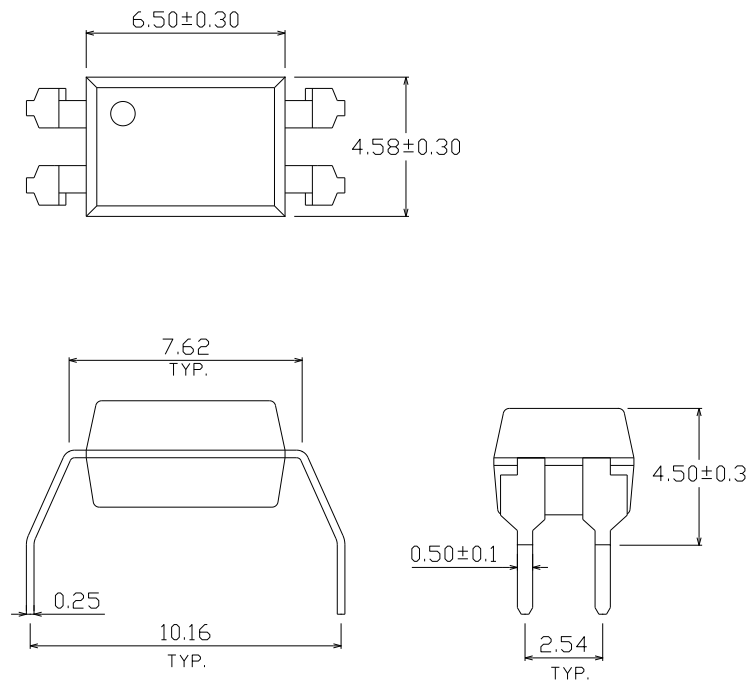
| Option | Description | Packing quantity |
|---------|---|---------------------|
| None | Standard DIP-4 | 100 units per tube |
| M | Wide lead bend (0.4 inch spacing) | 100 units per tube |
| S (TA) | Surface mount lead form + TA tape & reel option | 1000 units per reel |
| S (TB) | Surface mount lead form + TB tape & reel option | 1000 units per reel |
| S1 (TA) | Surface mount lead form (low profile) + TA tape & reel option | 1000 units per reel |
| S1 (TB) | Surface mount lead form (low profile) + TB tape & reel option | 1000 units per reel |
| S (TU) | Surface mount lead form + TU tape & reel option | 1500 units per reel |
| S (TD) | Surface mount lead form + TD tape & reel option | 1500 units per reel |
| S1 (TU) | Surface mount lead form (low profile) + TU tape & reel option | 1500 units per reel |
| S1 (TD) | Surface mount lead form (low profile) + TD tape & reel option | 1500 units per reel |

Package Dimension (Dimensions in mm)

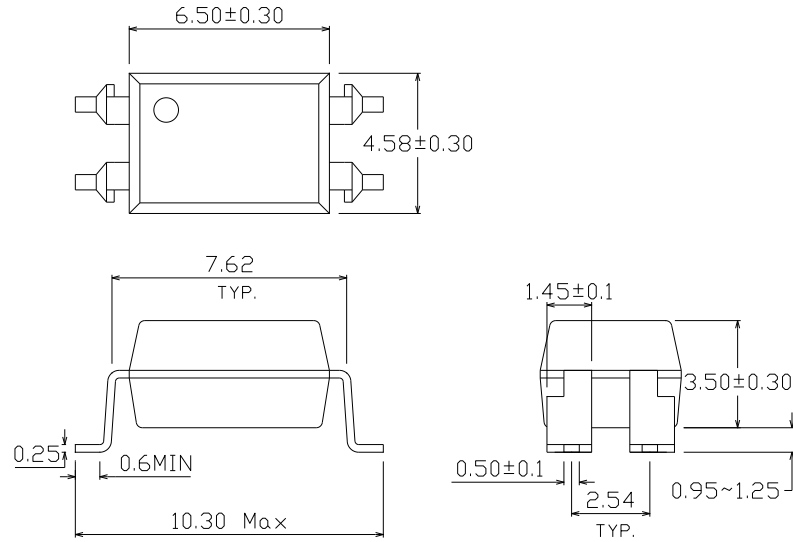
Standard DIP Type



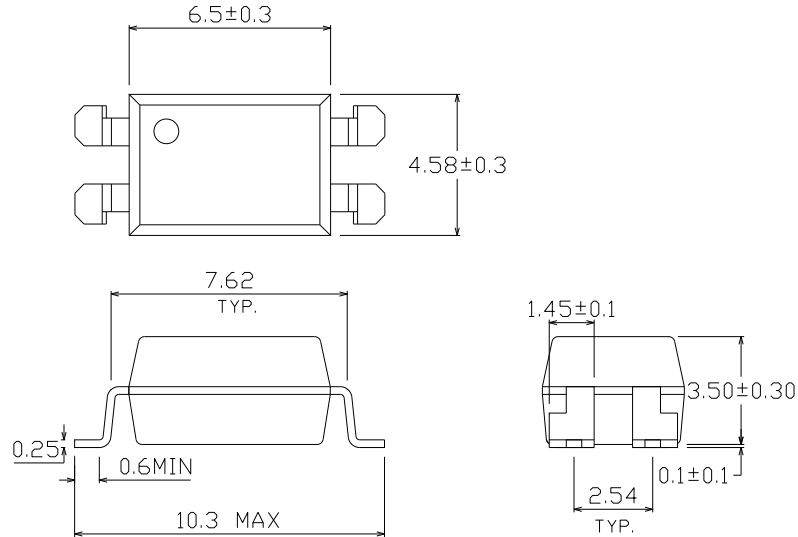
Option M Type



Option S Type

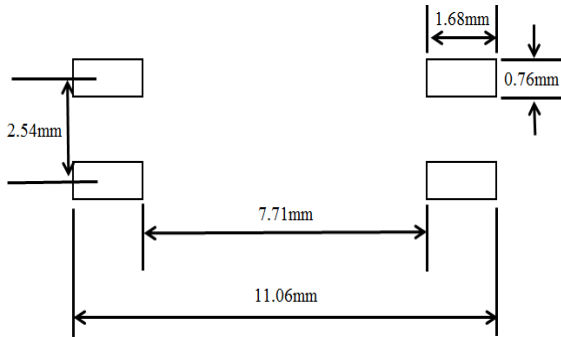


Option S1 Type

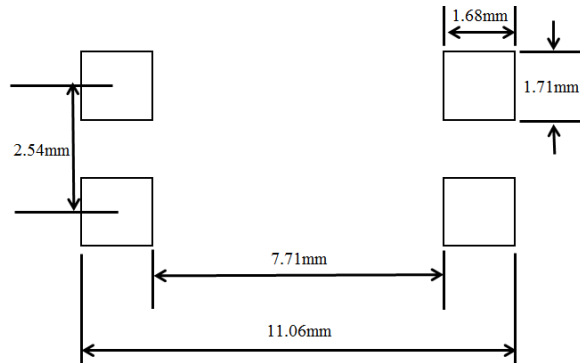


Recommended pad layout for surface mount leadform

For S option



For S1 option



Notes

Suggested pad dimension is just for reference only.
Please modify the pad dimension based on individual need.

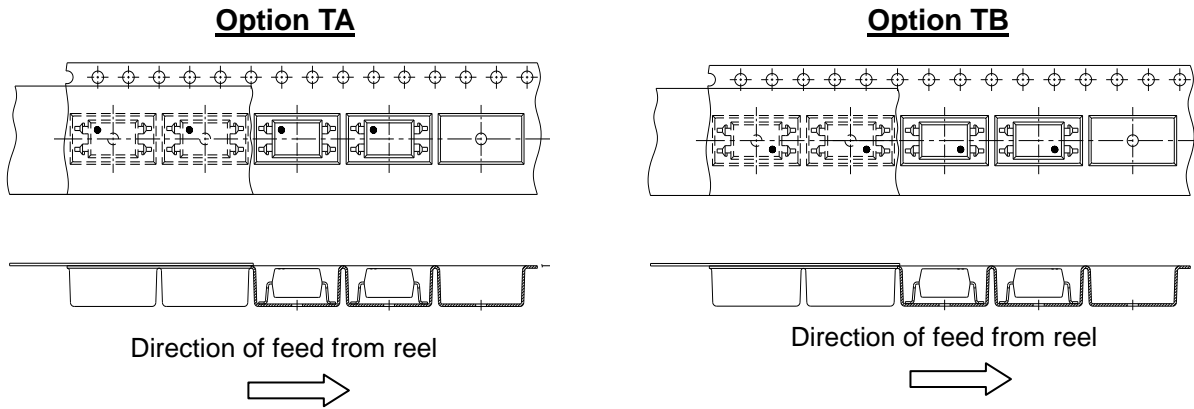
Device Marking



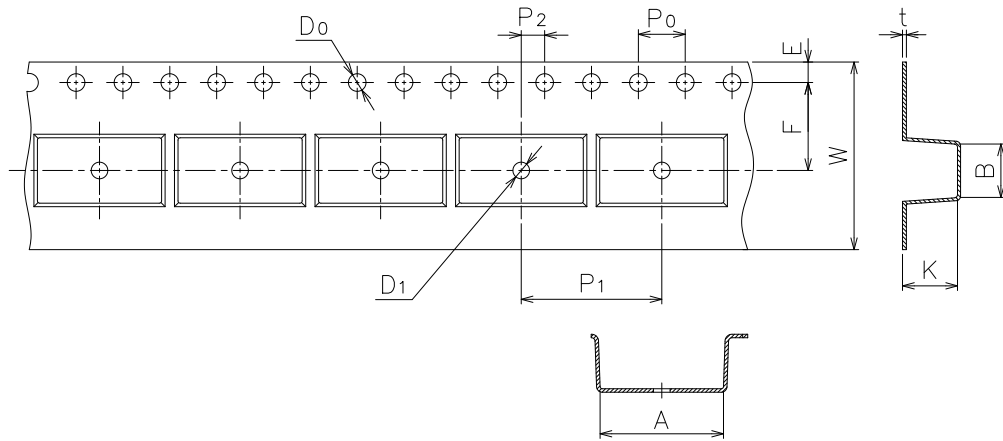
Notes

EL denotes EVERLIGHT
851 denotes Device Number
Y denotes 1 digit Year code
WW denotes 2 digit Week code
V denotes VDE (optional)

Tape & Reel Packing Specifications

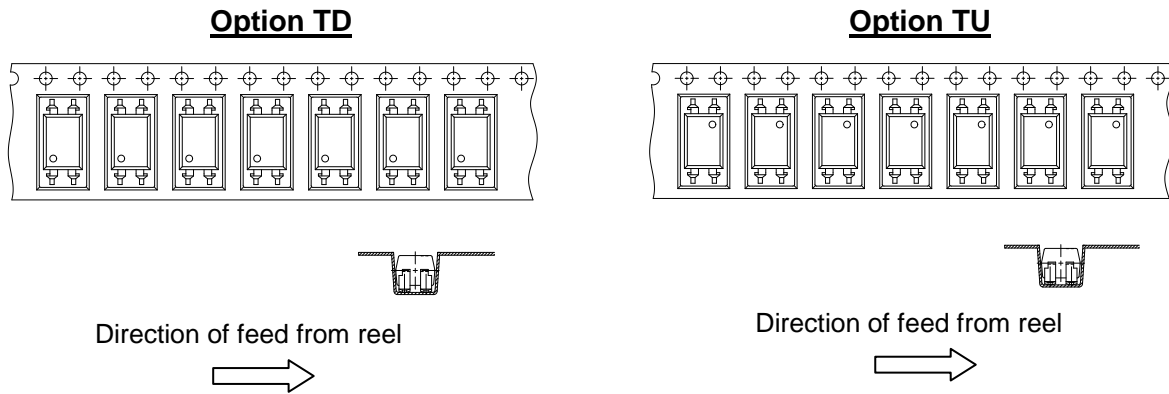


Tape dimensions

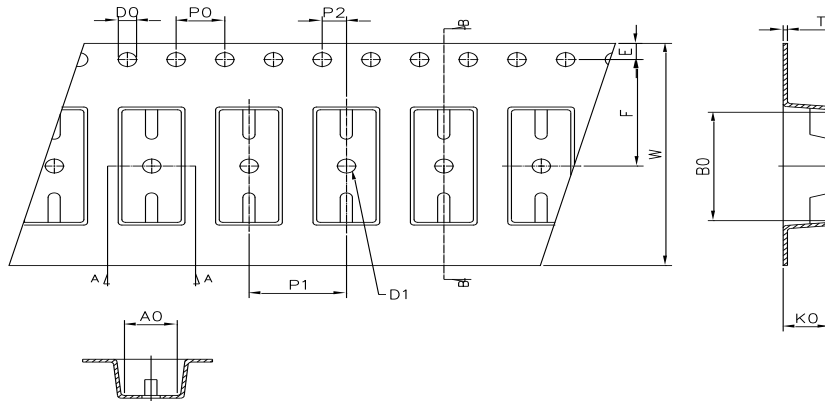


| | | | | | | |
|----------------------|-----------|-----------|-----------|-----------|----------|----------|
| Dimension No. | A | B | Do | D1 | E | F |
| Dimension (mm) S | 10.7±0.1 | 4.65±0.1 | 1.5±0.1 | 1.50±0.1 | 1.75±0.1 | 7.5±0.1 |
| Dimension (mm) S1 | 10.7±0.1 | 4.65±0.1 | 1.5±0.1 | 1.50±0.1 | 1.75±0.1 | 7.5±0.1 |
| Dimension No. | Po | P1 | P2 | t | W | K |
| Dimension (mm) S | 4.0±0.1 | 12.0±0.1 | 2.0±0.1 | 0.4±0.1 | 16.0±0.3 | 4.75±0.1 |
| Dimension (mm) S1 | 4.0±0.1 | 12.0±0.1 | 2.0±0.1 | 0.4±0.1 | 16.0±0.3 | 3.90±0.1 |

Tape & Reel Packing Specifications



Tape dimensions

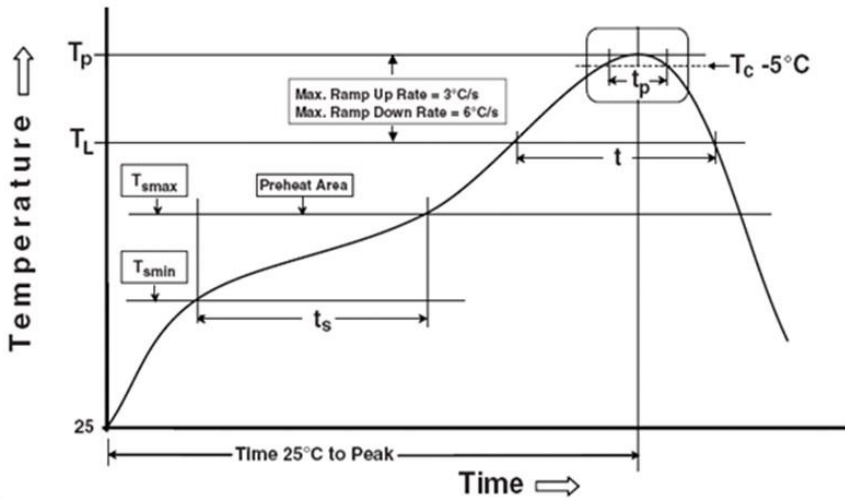


| | | | | | | |
|----------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Dimension No. | Ao | Bo | Do | D1 | E | F |
| Dimension (mm) | 4.90±0.1 | 10.40±0.1 | 1.5±0.1 | 1.50±0.1 | 1.75±0.1 | 7.50±0.1 |
| Dimension No. | Po | P1 | P2 | t | W | Ko |
| Dimension(mm) | 4.00±0.1 | 8.00±0.1 | 2.00±0.1 | 0.40±0.1 | 16.00±0.3 | 4.60±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 |

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