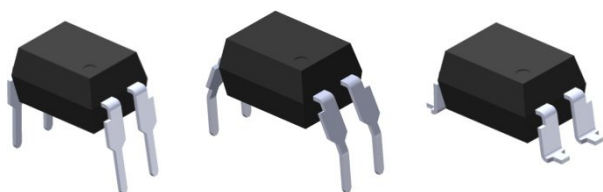
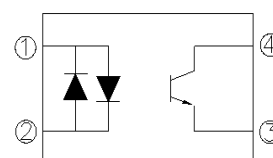


4 PIN DIP PHOTOTRANSISTOR PHOTOCOUPLER AC INPUT PHOTOCOUPLER EL814 Series



Schematic



Pin Configuration

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

Features:

- AC input response
- Current transfer ratio (CTR: Min. 20% at $I_F = \pm 1\text{mA}$, $V_{CE} = 5\text{V}$)
- High isolation voltage between input and output (Viso=5000 V rms)
- Wide Operating temperature range -55~110°C
- High collector-emitter voltage $V_{CEO}=80\text{V}$
- Compact dual-in-line package
- Pb free and RoHS compliant.
- UL and cUL approved(No. E214129)
- VDE approved (No. 132249)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved
- CQC approved

Description

The EL814 series of devices each consist of two infrared emitting diodes, connected in inverse parallel, optically coupled to a phototransistor detector. They are packaged in a 4-pin DIP package and available in side-lead spacing and SMD option.

Applications

- AC line monitor
- Programmable controllers
- Telephone line interface
- Unknown polarity DC sensor

Absolute Maximum Ratings (Ta=25 °C)

| | Parameter | Symbol | Rating | Unit |
|-------------------------|---------------------------------|-----------|------------|-------|
| Input | Forward current | I_F | ±60 | mA |
| | Peak forward current (t = 10µs) | I_{FM} | 1 | A |
| | Power dissipation | P_D | 100 | mW |
| | Derating factor (above 100 °C) | | 2.9 | mW/°C |
| Output | Power dissipation | P_C | 150 | mW |
| | Derating factor (above 100 °C) | | 5.8 | mW/°C |
| | Collector-Emitter voltage | V_{CEO} | 80 | V |
| | Emitter-Collector voltage | V_{ECO} | 6 | V |
| Total Power Dissipation | | P_{TOT} | 200 | mW |
| Isolation Voltage*1 | | V_{ISO} | 5000 | V rms |
| Operating Temperature | | T_{OPR} | -55 to 110 | °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 unless specified otherwise)

Input

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Condition |
|-------------------|----------|------|------|------|------|--------------------------|
| Forward Voltage | V_F | - | 1.2 | 1.4 | V | $I_F = \pm 20\text{mA}$ |
| Input capacitance | C_{in} | - | 50 | 250 | pF | $V = 0, f = 1\text{KHz}$ |

Output

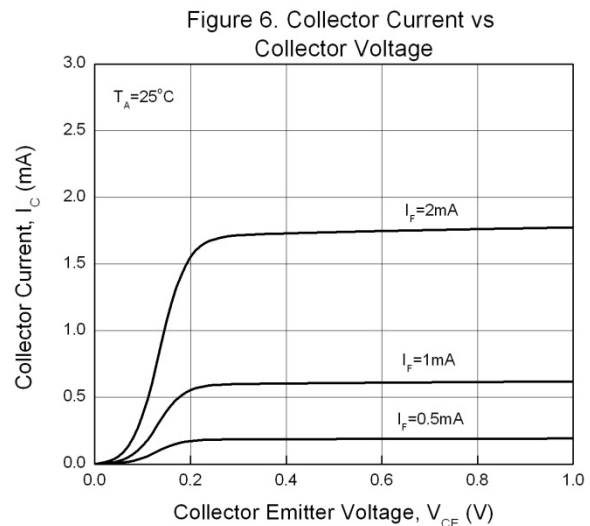
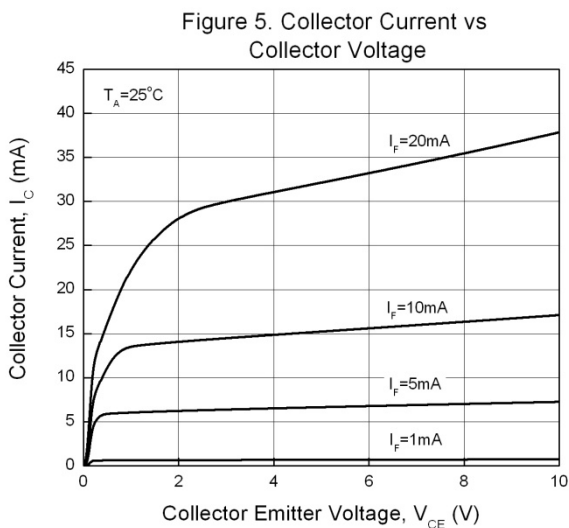
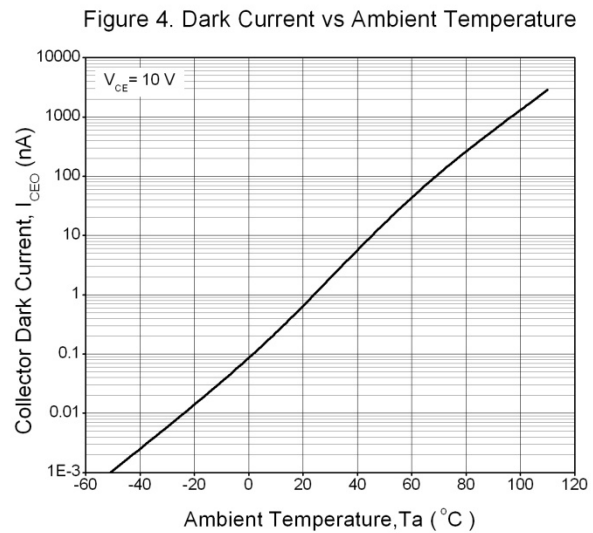
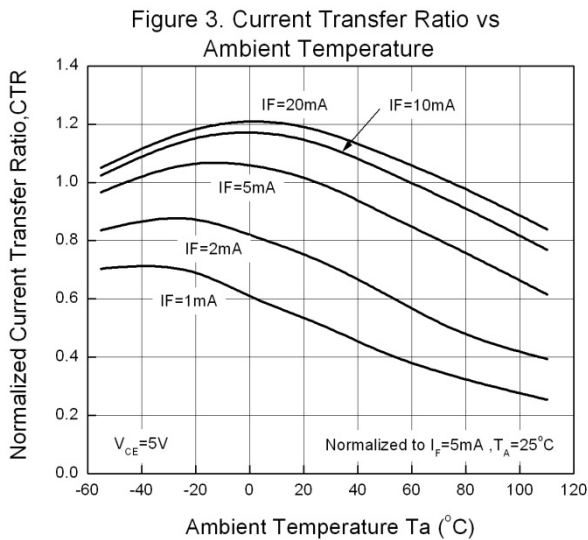
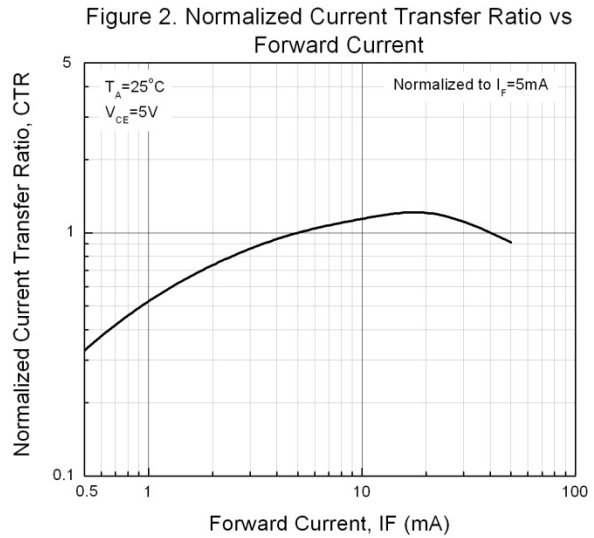
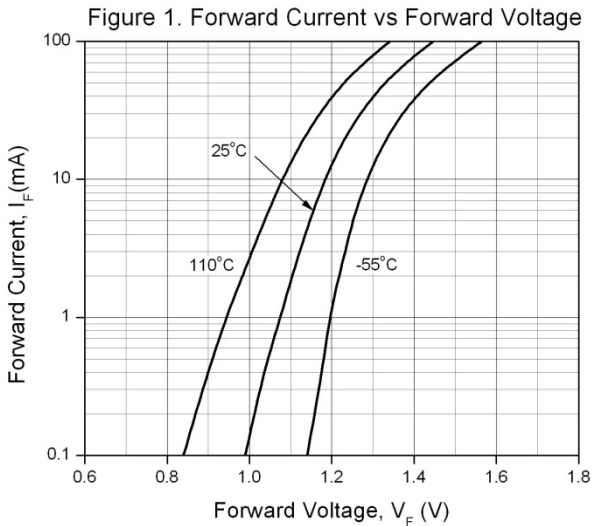
| Parameter | Symbol | Min | Typ. | Max. | Unit | Condition |
|-------------------------------------|------------|-----|------|------|------|---|
| Collector-Emitter dark current | I_{CEO} | - | - | 100 | nA | $V_{CE} = 20\text{V}, I_F = 0\text{mA}$ |
| Collector-Emitter breakdown voltage | BV_{CEO} | 80 | - | - | V | $I_C = 0.1\text{mA}$ |
| Emitter-Collector breakdown voltage | BV_{ECO} | 6 | - | - | V | $I_E = 0.1\text{mA}$ |

Transfer Characteristics

| Parameter | Symbol | Min | Typ. | Max. | Unit | Condition |
|--------------------------------------|------------------------|--------------------|-----------|------------|---------------|--|
| Current Transfer ratio | EL814 EL814A CTR | 20 50 | - - | 300 150 | % | $I_F = \pm 1\text{mA}, V_{CE} = 5\text{V}$ |
| CTR Symmetry | | 0.7 | | 1.3 | | $I_F = \pm 1\text{mA}, V_{CE} = 5\text{V}$ |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | - | 0.05 | 0.2 | V | $I_F = \pm 20\text{mA}, I_C = 1\text{mA}$ |
| Isolation resistance | R_{IO} | 5×10^{10} | 10^{11} | - | Ω | $V_{IO} = 500\text{Vdc}, 40\sim 60\%R.H$ |
| Cut-off frequency | f_c | - | 80 | - | kHz | $V_{CE}=5\text{V}, I_C=2\text{mA}, R_L=100\Omega, -3\text{dB}$ |
| Floating capacitance | C_{IO} | - | 0.6 | 1.0 | pF | $V_{IO} = 0, f = 1\text{MHz}$ |
| Rise time | T_r | - | 7 | 18 | μs | $V_{CE}=2\text{V}, I_C=2\text{mA}, R_L=100\Omega$ |
| Fall time | T_f | - | 11 | 18 | μs | |

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

Typical Electro-Optical Characteristics Curves



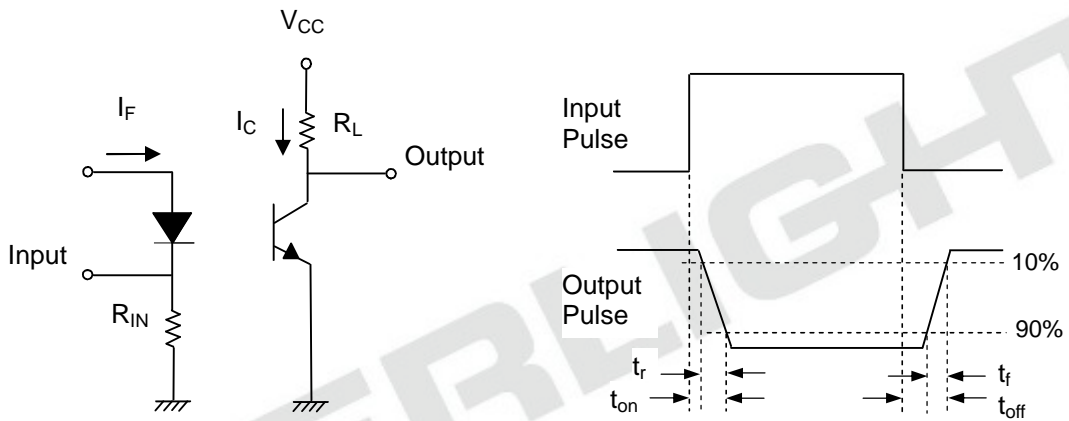
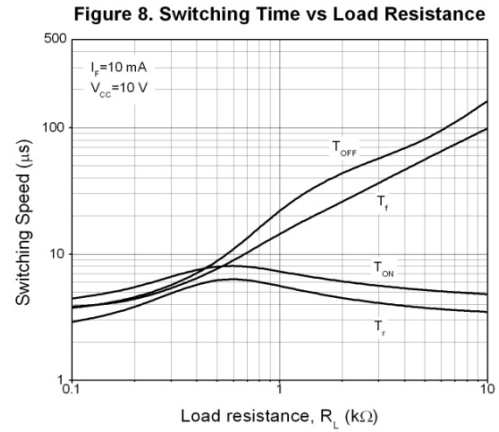
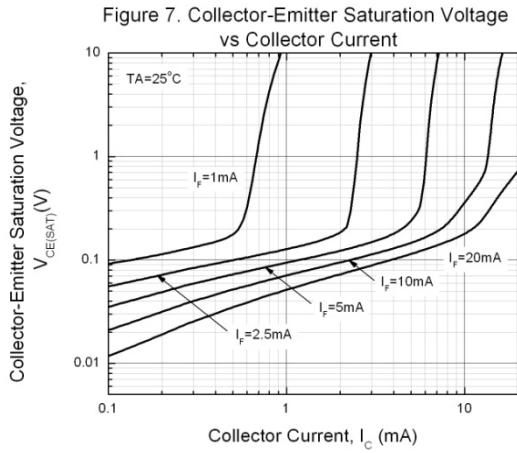


Figure 9. Switching Time Test Circuit & Waveforms

Order Information

Part Number

EL814X(Y)(Z)-V

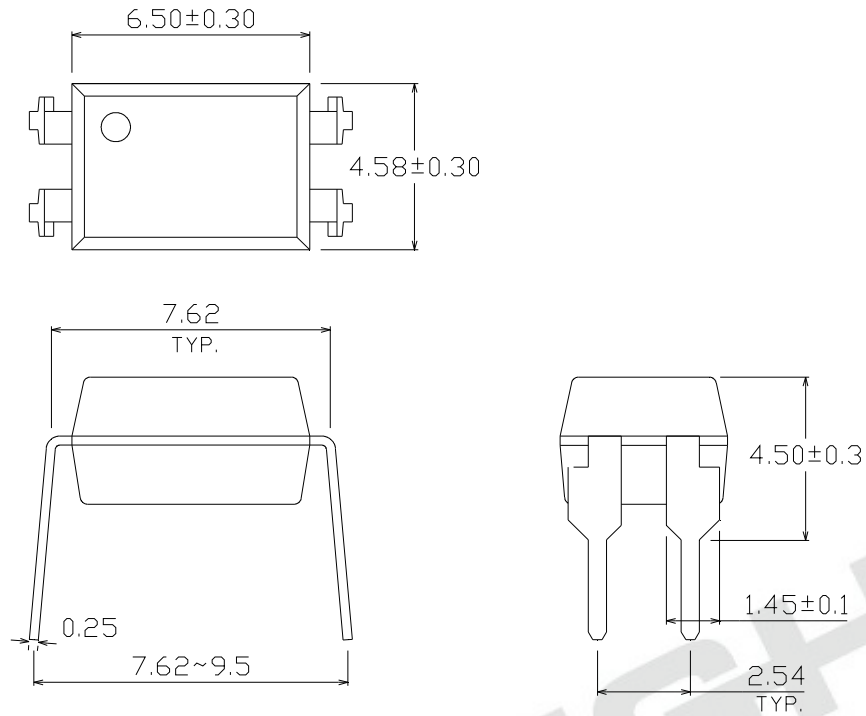
Note

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

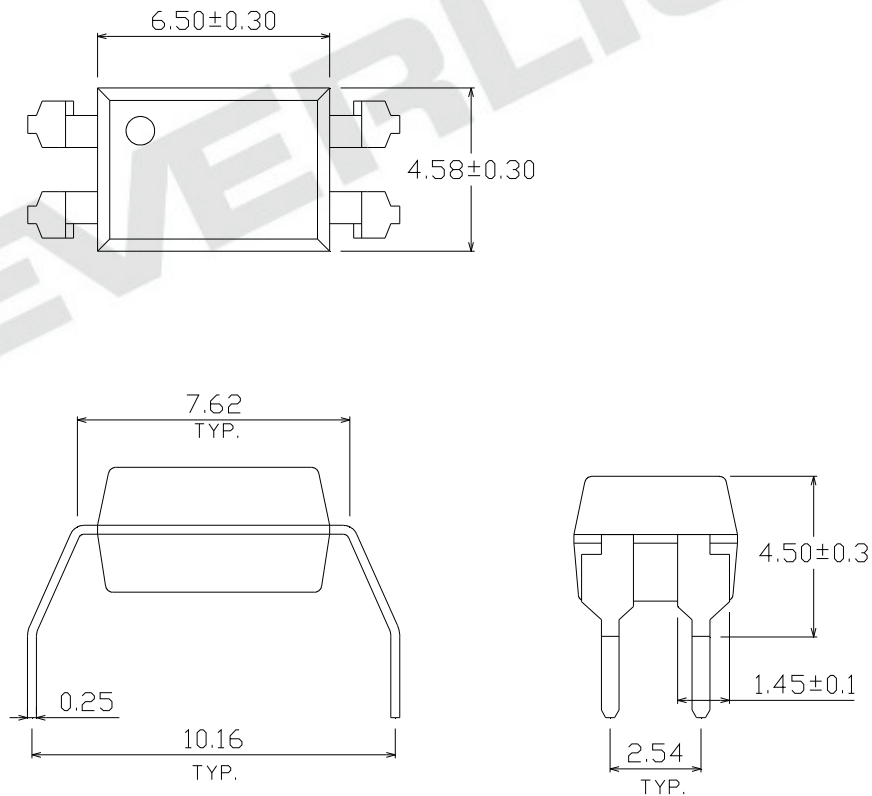
| Option | Description | Packing quantity |
|---------|---|---------------------|
| None | Standard DIP-4 | 100 units per tube |
| M | Wide lead bend (0.4 inch spacing) | 100 units per tube |
| S (TA) | Surface mount lead form + TA tape & reel option | 1000 units per reel |
| S (TB) | Surface mount lead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

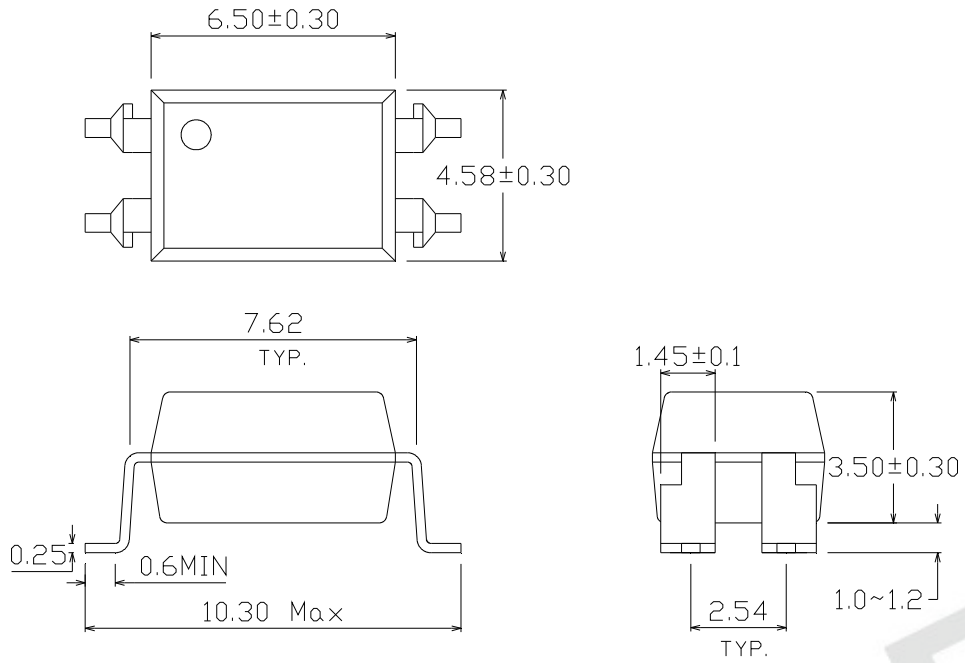
Standard DIP Type



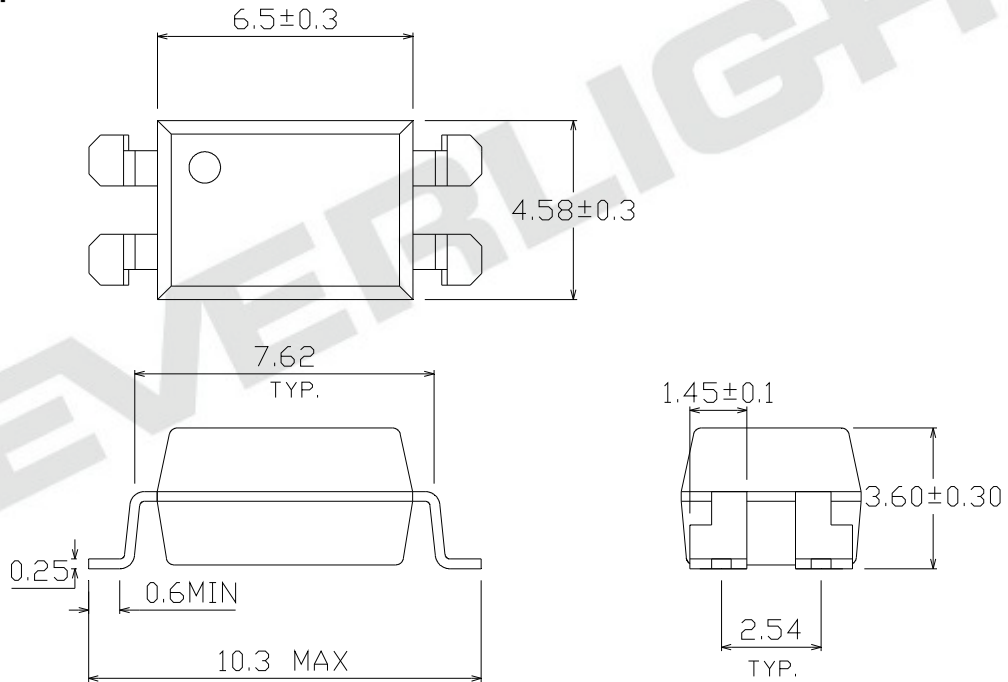
Option M Type



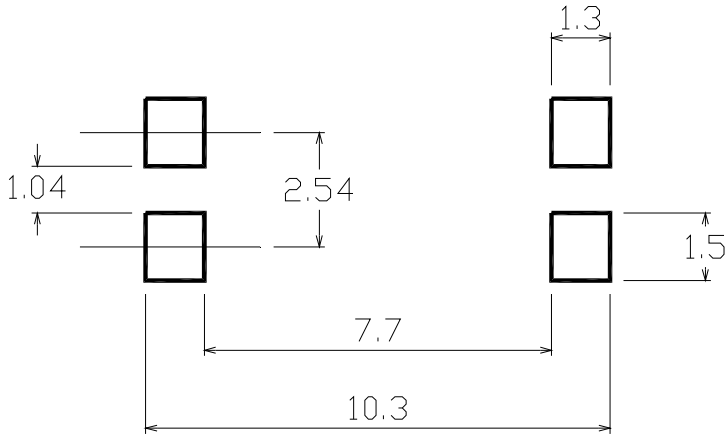
Option S Type



Option S1 Type



Recommended pad layout for surface mount leadform



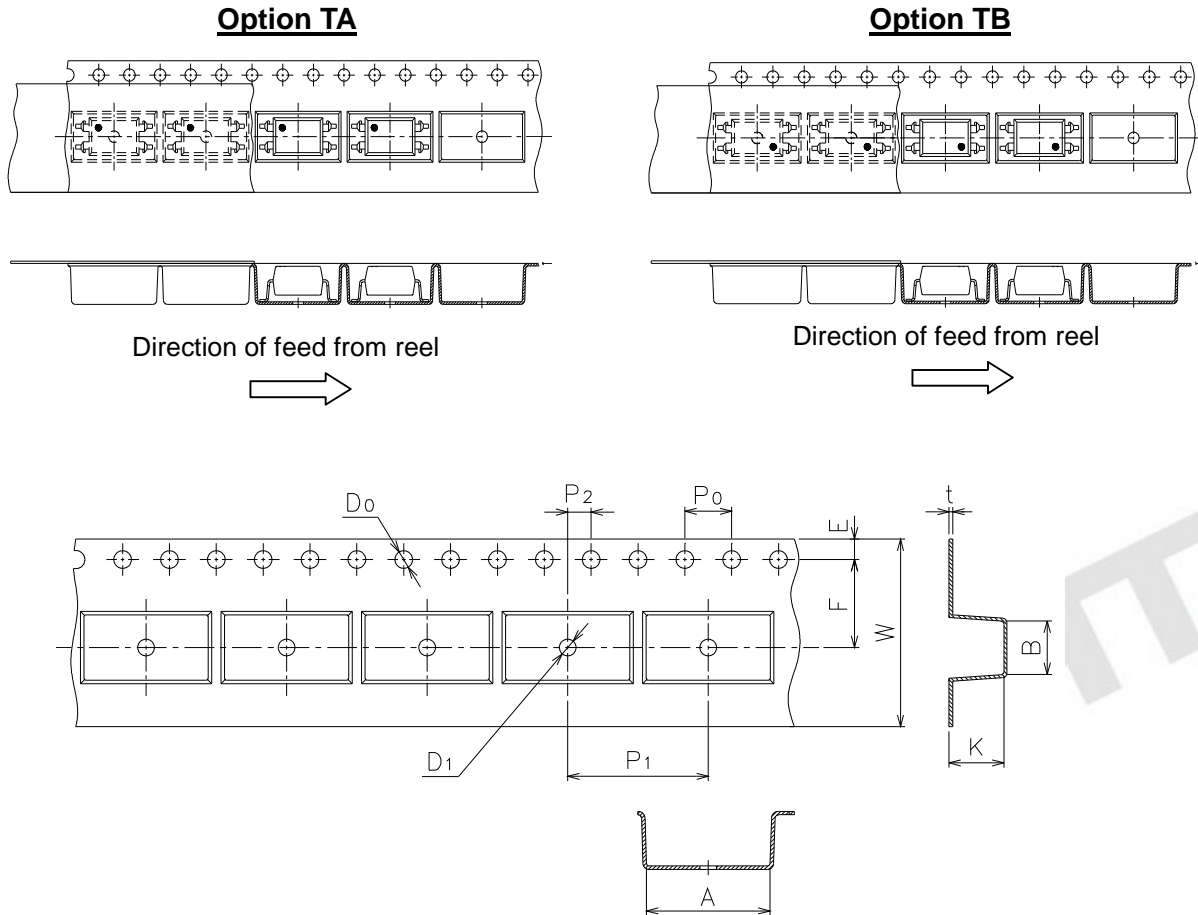
Device Marking



Notes

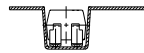
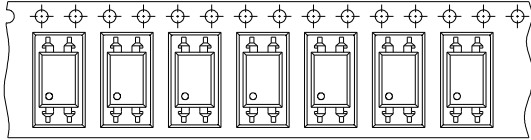
- EL denotes EVERLIGHT
- 814 denotes Device Number
- F denotes Factory Code (G: China and Green part)
- R denotes CTR Rank (A or none)
- Y denotes 1 digit Year code
- WW denotes 2 digit Week code
- V denotes VDE (optional)

Tape & Reel Packing Specifications

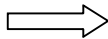


| | | | | | | |
|----------------------|-----------|-----------|-----------|-----------|----------|----------|
| Dimension No. | A | B | Do | D1 | E | F |
| Dimension (mm) S | 10.5±0.1 | 4.65±0.1 | 1.5±0.1 | 1.50±0.1 | 1.75±0.1 | 7.5±0.1 |
| Dimension (mm) S1 | 10.5±0.1 | 4.65±0.1 | 1.5±0.1 | 1.50±0.1 | 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 | 5.05±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 | 4.75±0.1 |

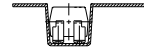
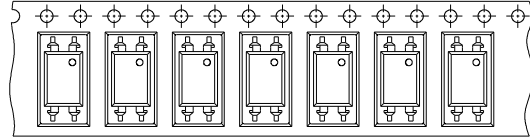
Option TD



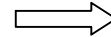
Direction of feed from reel



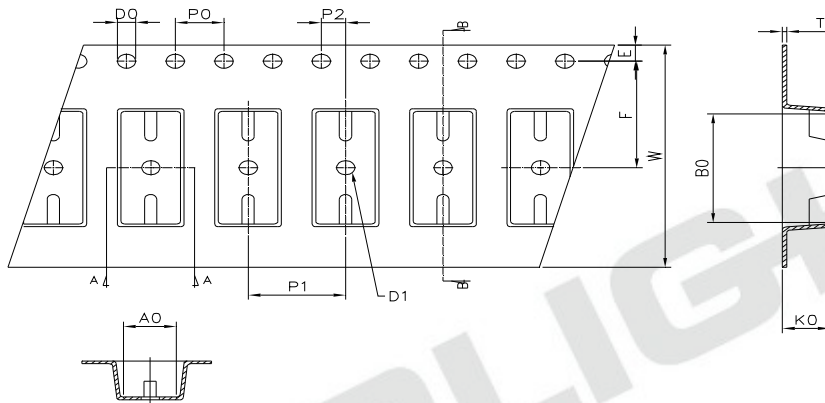
Option TU



Direction of feed from reel



Tape dimensions

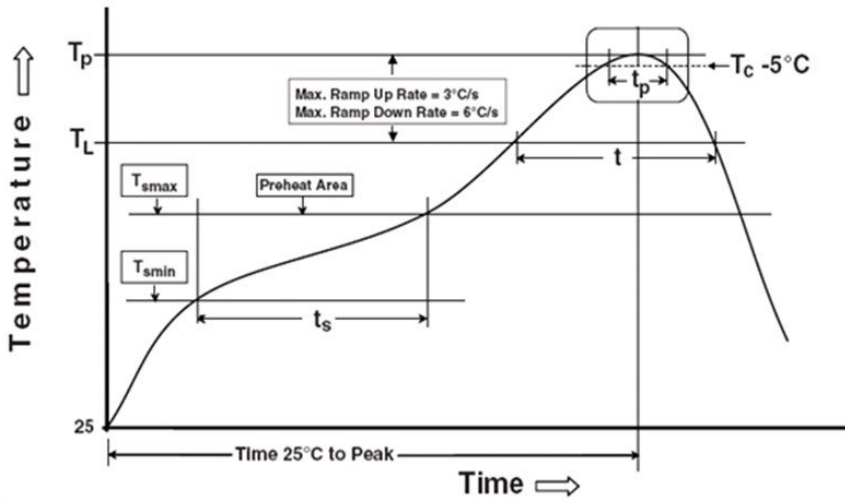


| | | | | | | |
|------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Dimension No. | Ao | Bo | Do | D1 | E | F |
| Dimension (mm) S.S1 | 4.90±0.1 | 10.40±0.1 | 1.5±0.1 | 1.50±0.1 | 1.75±0.1 | 7.50±0.1 |
| Dimension No. | Po | P1 | P2 | t | W | Ko |
| Dimension (mm) S.S1 | 4.00±0.1 | 8.00±0. | 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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