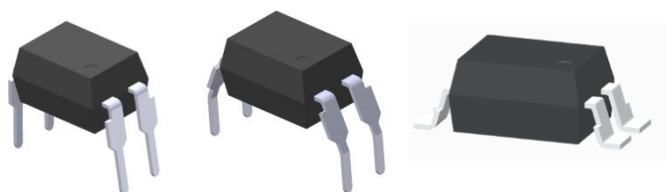




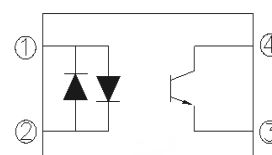
THE DATASHEET OF EL814



4 PIN DIP PHOTOTRANSISTOR PHOTOCOUPLER AC INPUT PHOTOCOUPLER EL814 Series



Schematic



Features

- Compliance Halogens Free
(Br < 900 ppm, Cl < 900 ppm, Br+Cl < 1500 ppm)
- 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 ($V_{iso} = 5000\text{ V rms}$)
- Wide Operating temperature range $-55\sim 110^\circ\text{C}$
- High collector-emitter voltage $V_{CEO} = 80\text{V}$
- Compact dual-in-line package
- The product itself will remain within RoHS compliant version
- Compliance with EU REACH
- UL and cUL approved (No. E214129)
- VDE approved (No. 132249)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved
- CQC approved

Pin Configuration

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

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°C 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

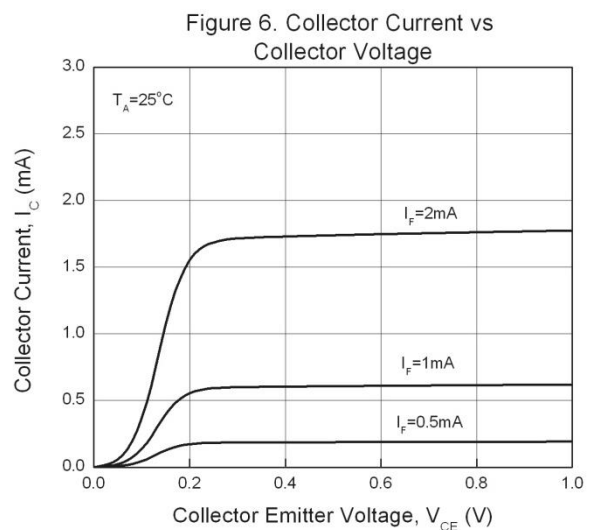
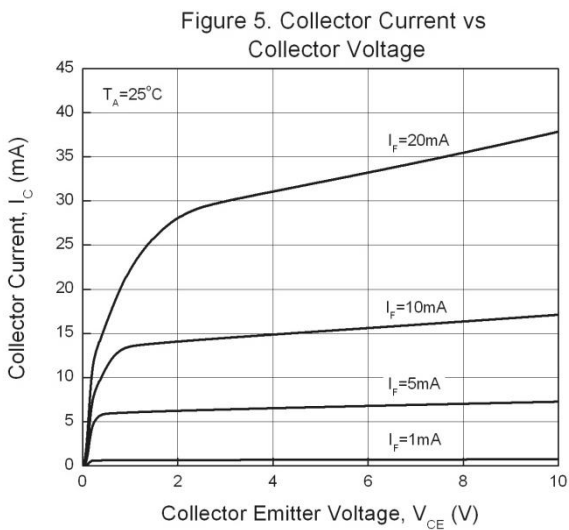
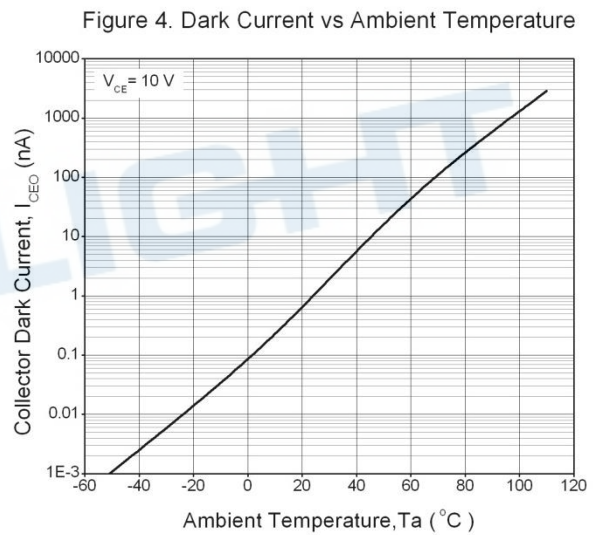
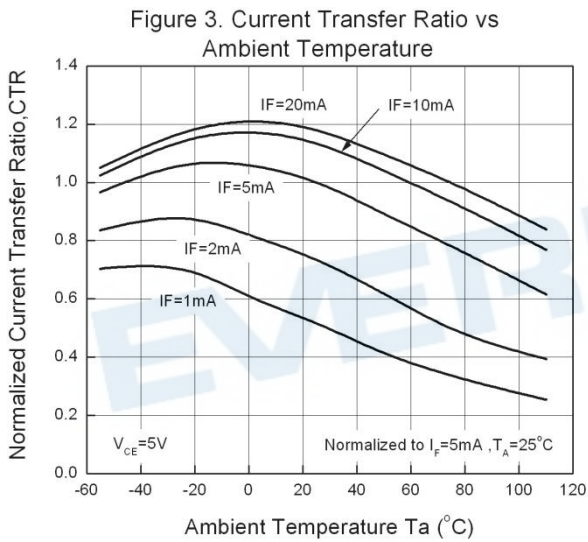
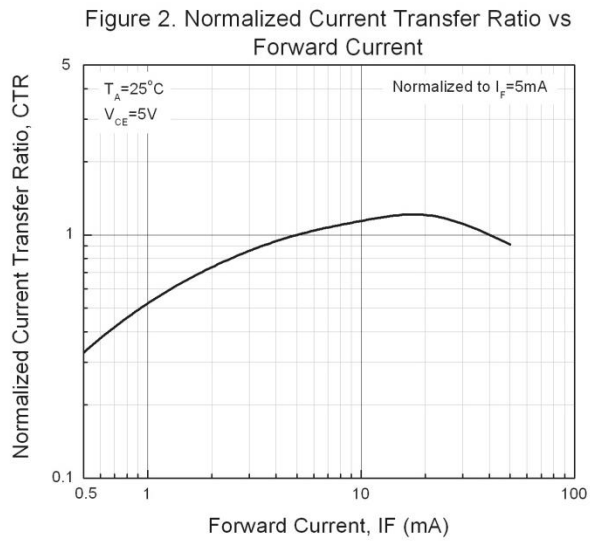
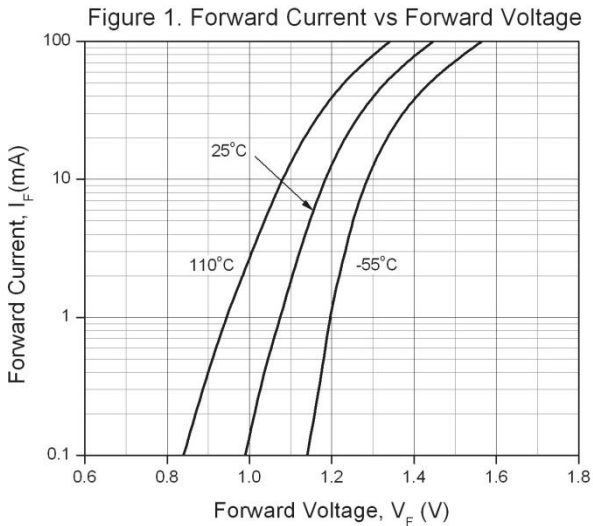
| Parameter | Symbol | Min | Typ. | Max. | Unit | Condition |
|-------------------------------------|------------|-----|------|------|------|---|
| Collector-Emitter dark current | I_{CEO} | - | - | 100 | nA | $V_{CE} = 20\text{V}, I_F = 0\text{mA}$ |
| Collector-Emitter breakdown voltage | BV_{CEO} | 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 CTR EL814A | 20 50 | - - | 300 150 | % | $I_F = \pm 1\text{mA}, V_{CE} = 5\text{V}$ |
| CTR Symmetry | | 0.5 | | 2.0 | | $I_F = \pm 1\text{mA}, V_{CE} = 5\text{V}$ |
| 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 | $V_{IO} = 500\text{Vdc}, 40\sim 60\% \text{R.H}$ |
| 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 | - | - | 18 | μs | $V_{CE} = 2\text{V}, I_C = 2\text{mA}, R_L = 100\Omega$ |
| Fall time | T_f | - | - | 18 | μs | |

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

Typical Electro-Optical Characteristics Curves



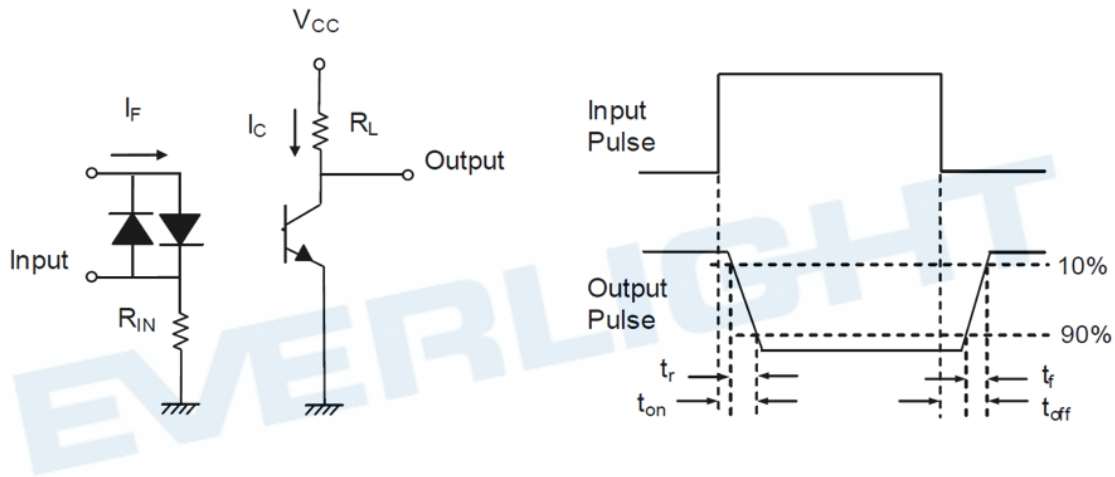
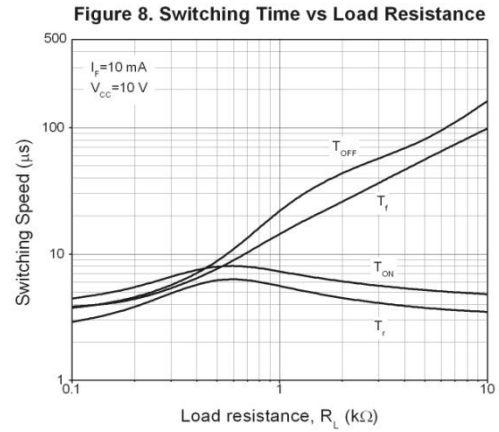
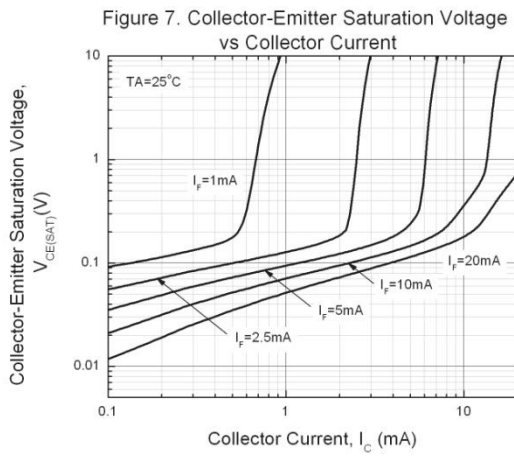


Figure 9. Switching Time Test Circuit & Waveforms

Order Information

Part Number

EL814X(Y)(Z)-V

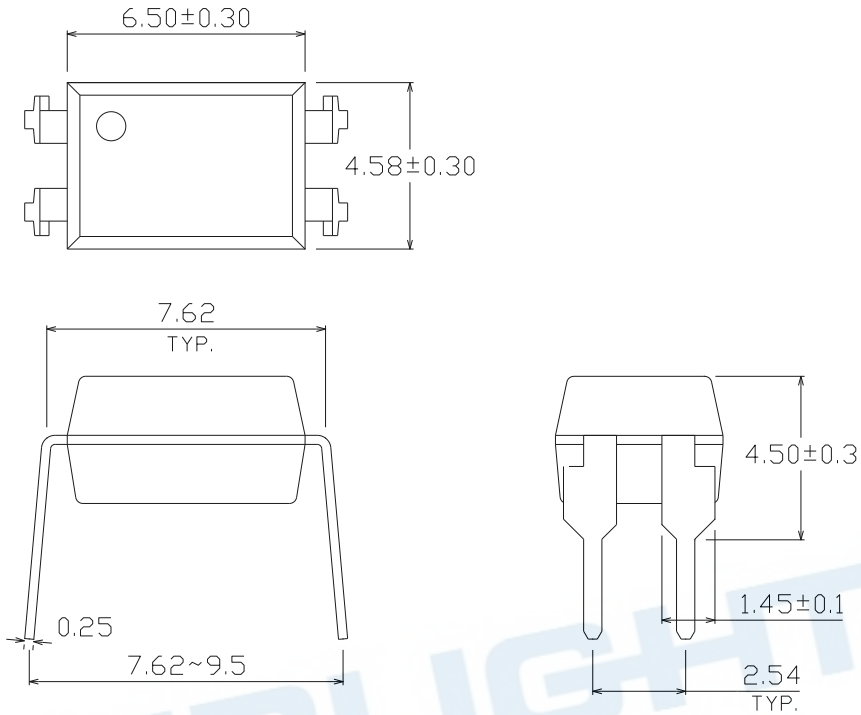
Notes

- 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)

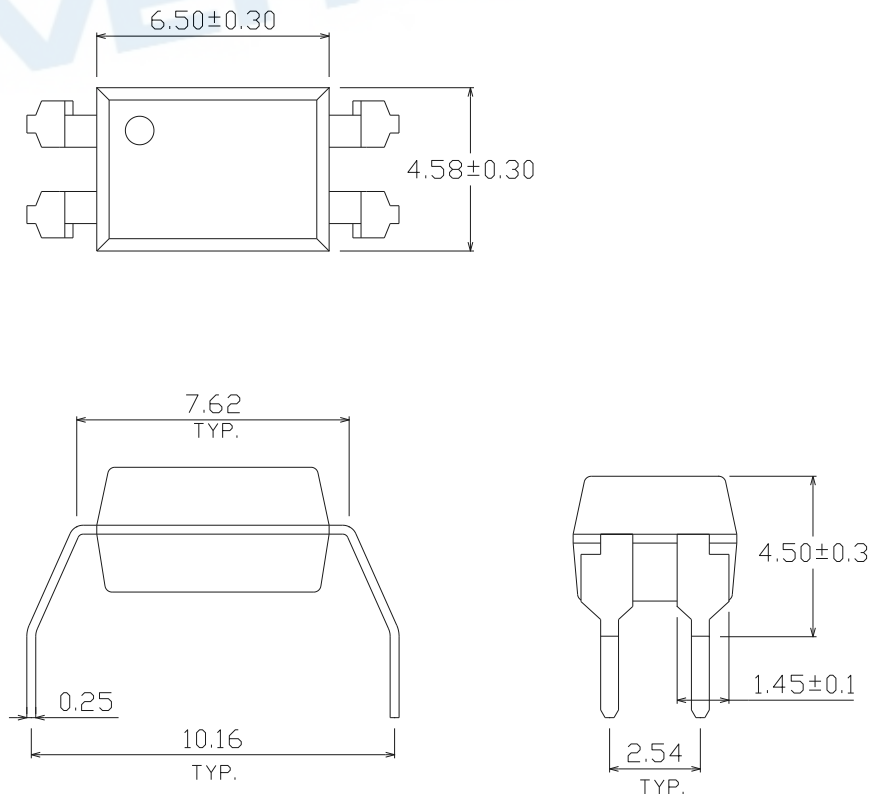
| Option | Description | Packing quantity |
|---------|---|---------------------|
| None | Standard DIP-4 | 100 units per tube |
| M | Wide lead bend (0.4 inch spacing) | 100 units per tube |
| S (TA) | Surface mount lead form + TA tape & reel option | 1000 units per reel |
| S (TB) | Surface mount lead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

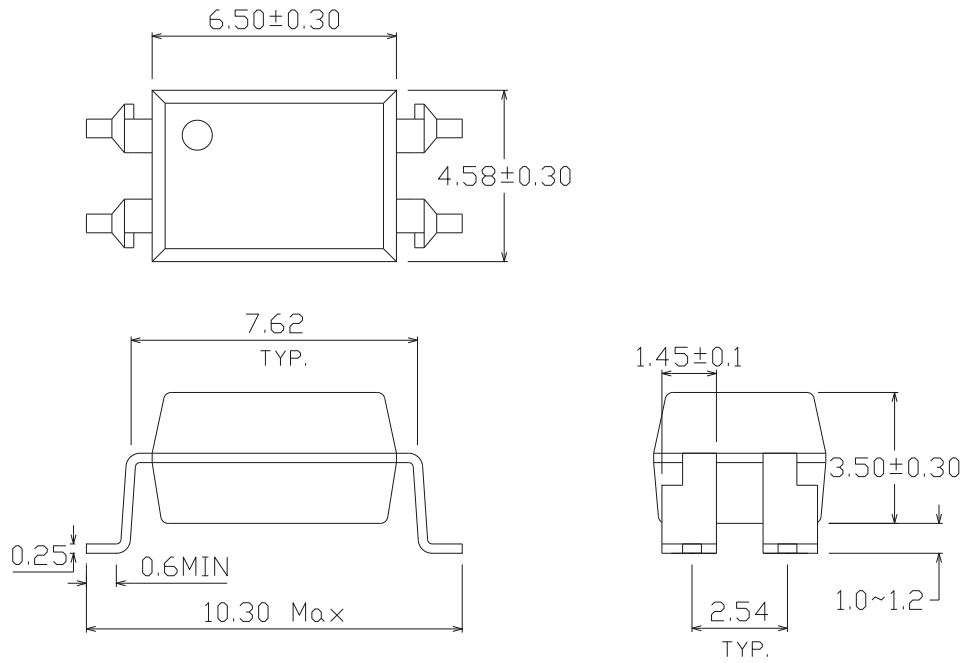
Standard DIP Type



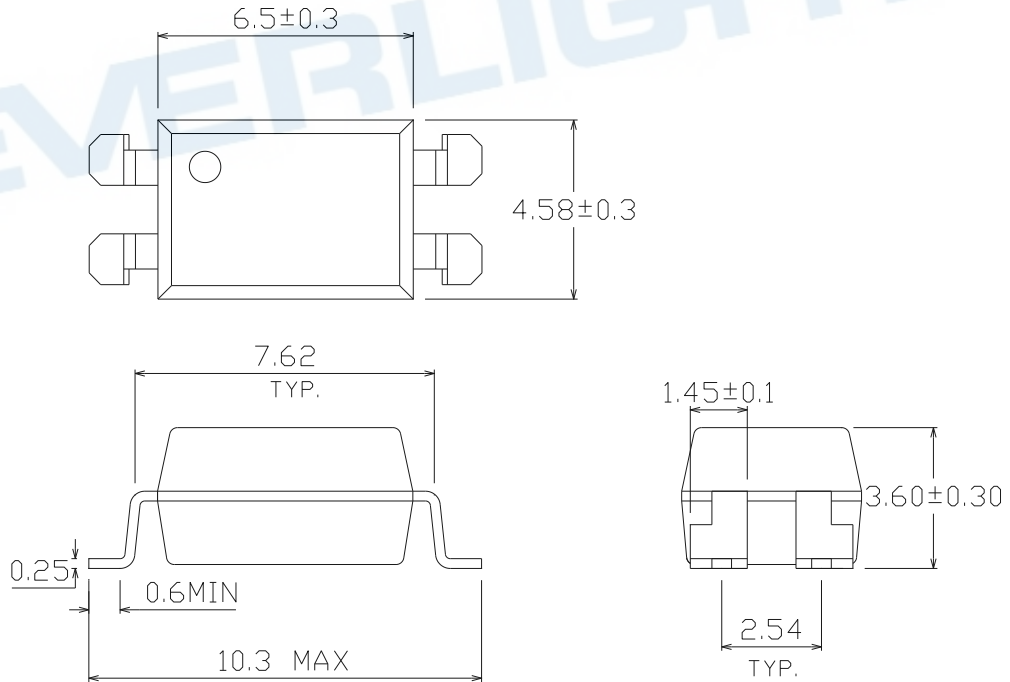
Option M Type



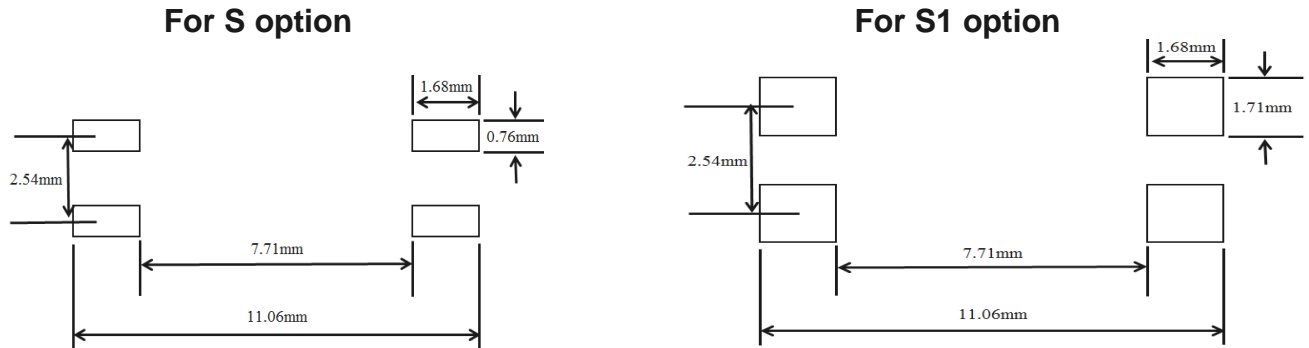
Option S Type



Option S1 Type



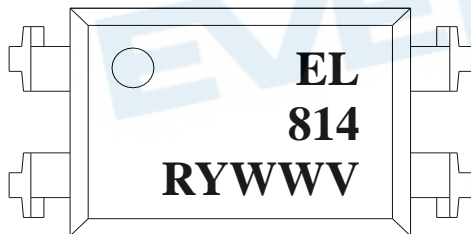
Recommended pad layout for surface mount leadform



Notes

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

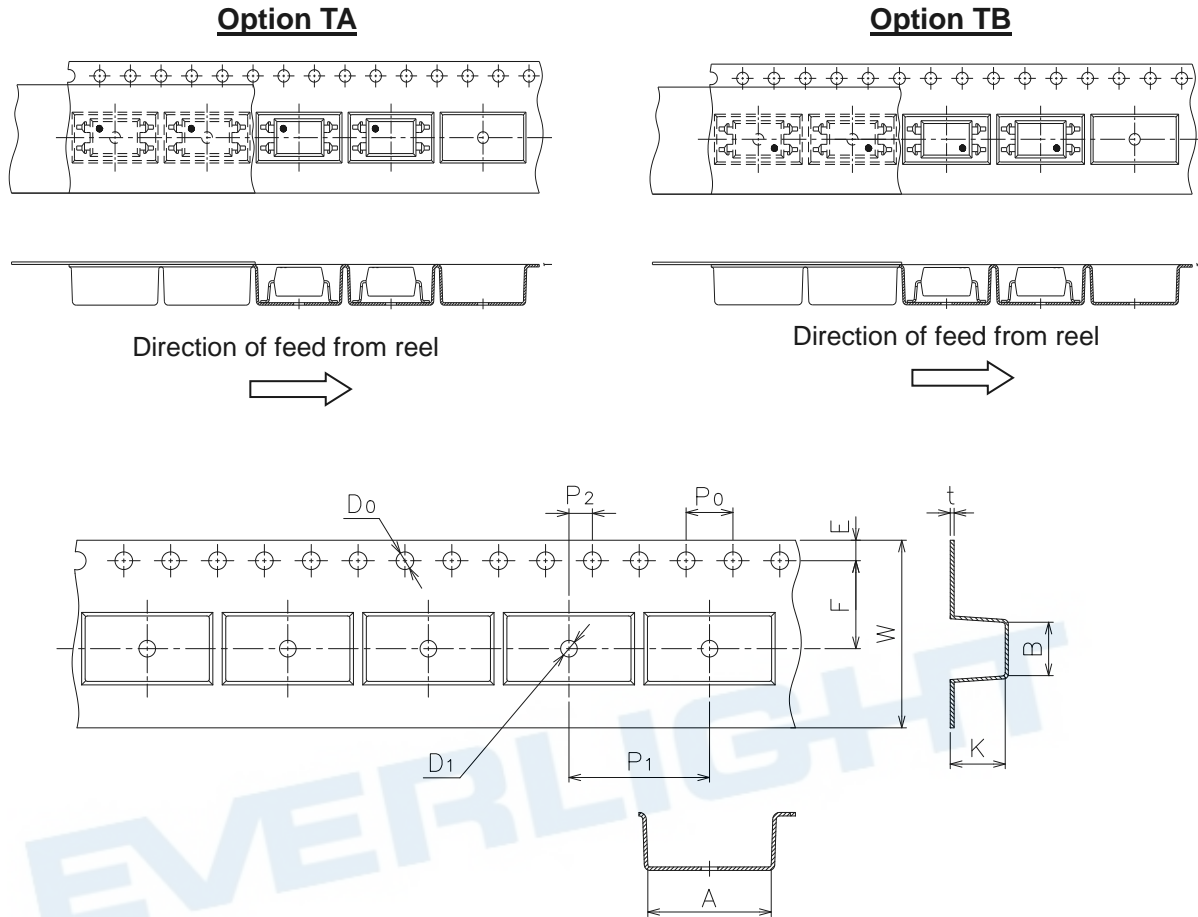
Device Marking



Notes

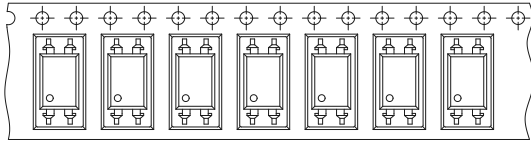
EL denotes EVERLIGHT
814 denotes Device Number
R denotes CTR Rank (A or none)
Y denotes 1 digit Year code
WW denotes 2 digit Week code
V denotes VDE (optional)

Tape & Reel Packing Specifications

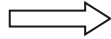


| | | | | | | |
|----------------------|-----------|-----------|-----------|-----------|----------|----------|
| Dimension No. | A | B | Do | D1 | E | F |
| Dimension (mm) S | 10.7±0.1 | 4.65±0.1 | 1.5±0.1 | 1.50±0.1 | 1.75±0.1 | 7.5±0.1 |
| Dimension (mm) S1 | 10.7±0.1 | 4.65±0.1 | 1.5±0.1 | 1.50±0.1 | 1.75±0.1 | 7.5±0.1 |
| Dimension No. | P0 | 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 |

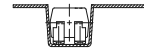
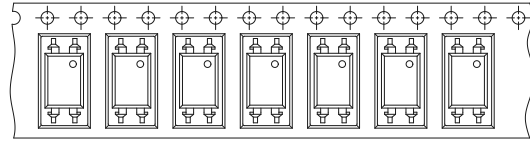
Option TD



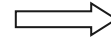
Direction of feed from reel



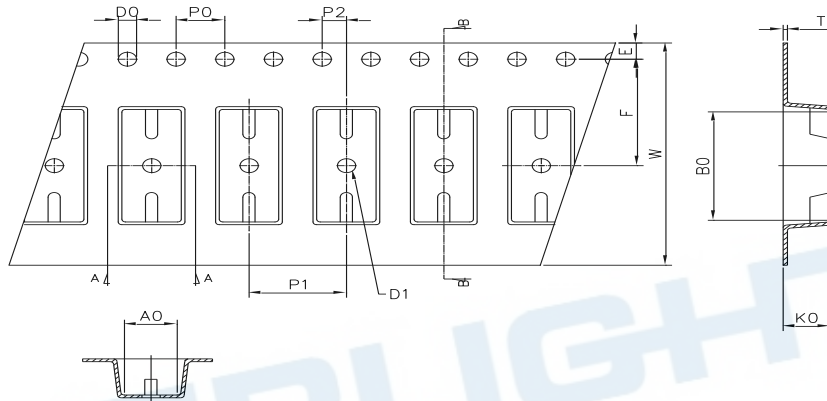
Option TU



Direction of feed from reel



Tape dimensions

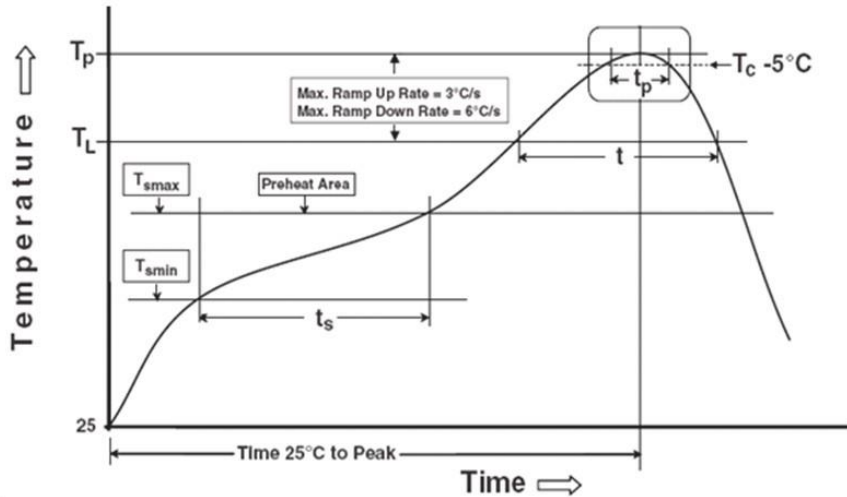


| | | | | | | |
|------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Dimension No. | Ao | Bo | Do | D1 | E | F |
| Dimension (mm) S.S1 | 4.90±0.1 | 10.40±0.1 | 1.5±0.1 | 1.50±0.1 | 1.75±0.1 | 7.50±0.1 |
| Dimension No. | Po | P1 | P2 | t | W | Ko |
| Dimension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



Notes

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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