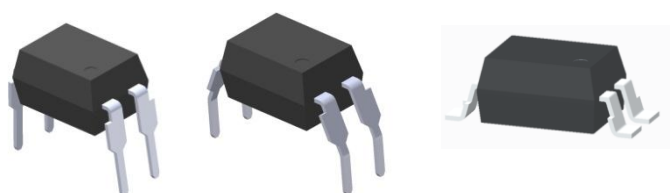
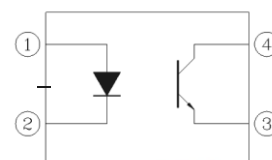


4 PIN DIP PHOTOTRANSISTOR PHOTOCOUPLER EL816 Series



Schematic



Pin Configuration

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

Features:

- Compliance Halogens Free (Only copper leadframe)
(Br < 900 ppm, Cl < 900 ppm, Br+Cl < 1500 ppm)
- Current transfer ratio
(CTR: 50~600% at $I_F = 5\text{mA}$, $V_{CE} = 5\text{V}$)
(CTR: 63~320% at $I_F = 10\text{mA}$, $V_{CE} = 5\text{V}$)
- High isolation voltage between input and output (Viso=5000Vrms)
- Creepage distance > 7.62mm
- Operating temperature up to +110°C
- Compact small outline 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

Description

The EL816 series of devices each consist of an infrared emitting diodes, optically coupled to a phototransistor detector. They are packaged in a 4-pin DIP package and available in wide-lead spacing and SMD option.

Applications

- Programmable controllers
- System appliances, measuring instruments
- Telecommunication equipments
- Home appliances, such as fan heaters, etc.
- Signal transmission between circuits of different potentials and impedances

Absolute Maximum Ratings (Ta=25°C)

| | Parameter | Symbol | Rating | Unit |
|-------------------------------------|---------------------------------------------------------------------------|------------|------------|-------------|
| Input | Forward current | I_F | 60 | mA |
| | Peak forward current (1us, pulse) | I_{FP} | 1 | A |
| | Reverse voltage | V_R | 6 | V |
| | Power Dissipation No derating required up to $T_a = 100^\circ\text{C}$ | P_D | 100 | mW |
| Output | Power dissipation Derating factor (above $T_a = 80^\circ\text{C}$) | P_C | 150 5.8 | mW mW/°C |
| | Collector current | I_C | 50 | mA |
| | 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 | Vrms | |
| 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 | $I_F = 20\text{mA}$ |
| Reverse Current | I_R | - | - | 10 | μA | $V_R = 4\text{V}$ |
| 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 | $V_{CE} = 20\text{V}, I_F = 0\text{mA}$ |
| 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 | EL816 | 50 | - | 600 | % | $I_F = 5\text{mA}, V_{CE} = 5\text{V}$ | | |
| | EL816A | 80 | - | 160 | | | | |
| | EL816B | 130 | - | 260 | | | | |
| | EL816C | 200 | - | 400 | | | | |
| | EL816D | 300 | - | 600 | | | | |
| | EL816X | 100 | - | 200 | | | | |
| | EL816Y | 150 | - | 300 | | | | |
| | EL816I | 63 | - | 125 | | | $I_F = 10\text{mA}, V_{CE} = 5\text{V}$ | |
| | EL816J | 100 | - | 200 | | | | |
| | EL816K | 160 | - | 320 | | | | |
| | EL816I | 22 | - | - | | | | |
| | EL816J | 34 | - | - | | | | $I_F = 1\text{mA}, V_{CE} = 5\text{V}$ |
| | EL816K | 56 | - | - | | | | |

Transfer Characteristics ($T_a=25^\circ\text{C}$ unless specified otherwise) Continuity

| Parameter | Symbol | Min | Typ. | Max. | Unit | Condition |
|--------------------------------------|---------------|--------------------|------|------|---------------|--------------------------------------------------------------------------|
| Collector-Emitter saturation voltage | $V_{CE(sat)}$ | - | 0.1 | 0.2 | V | $I_F = 20\text{mA}, I_C = 1\text{mA}$ |
| Isolation resistance | R_{IO} | 5×10^{10} | - | - | Ω | $V_{IO} = 500\text{Vdc}$, 40~60% R.H. |
| Floating capacitance | C_{IO} | - | 0.6 | 1.0 | pF | $V_{IO} = 0, f = 1\text{MHz}$ |
| Cut-off frequency | f_c | - | 80 | - | kHz | $V_{CE} = 5\text{V}, I_C = 2\text{mA}$ $R_L = 100\Omega, -3\text{dB}$ |
| 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 | - | 3 | 18 | μs | |

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

EVERLIGHT

Typical Electro-Optical Characteristics Curves

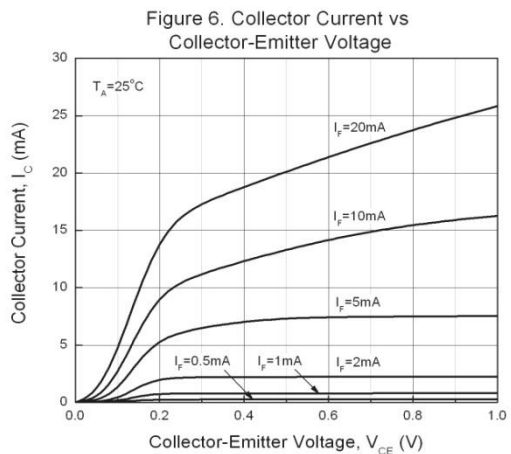
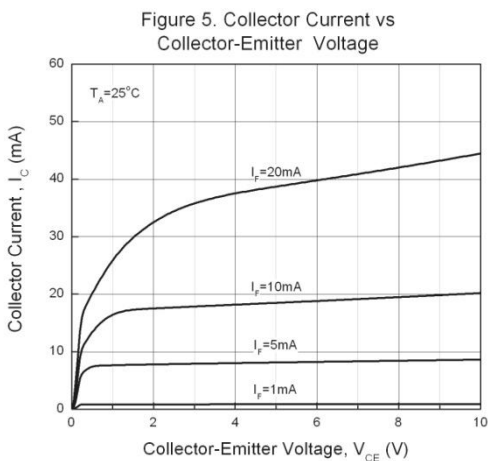
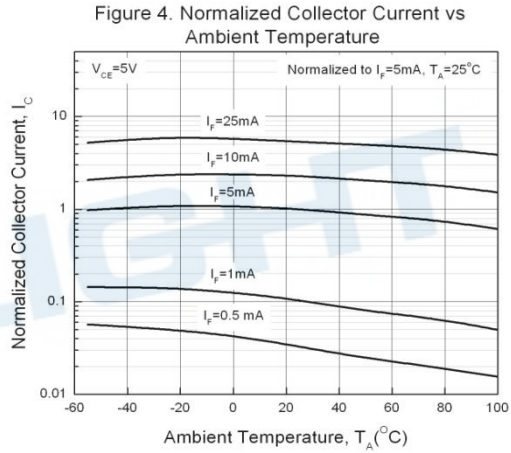
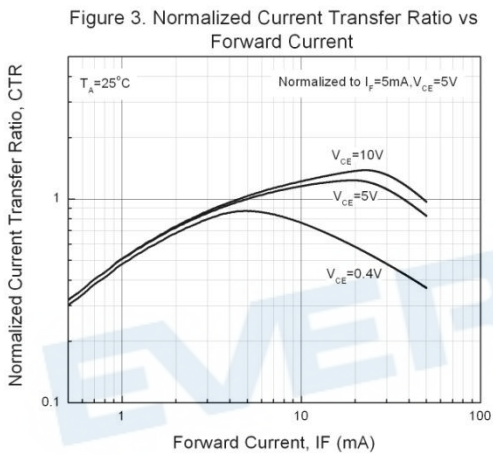
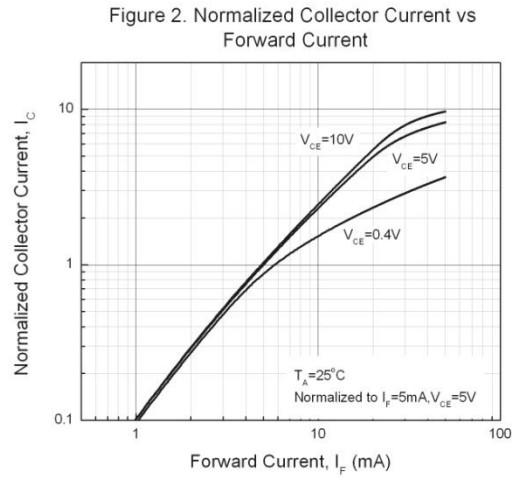
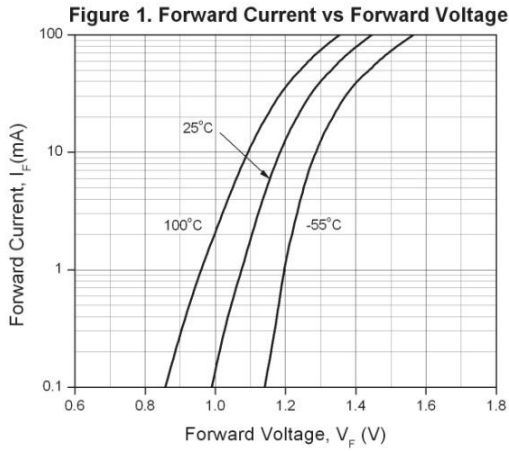


Figure 7. Collector Dark Current vs Ambient Temperature

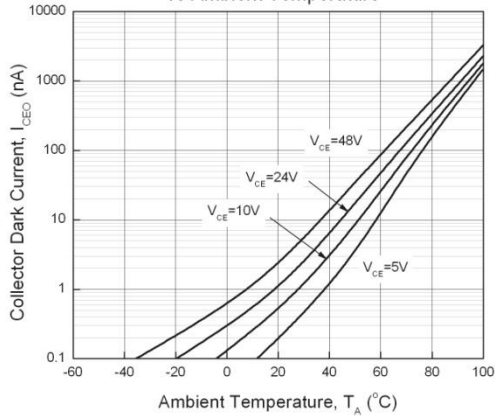


Figure 8. Switching Time vs Load Resistance

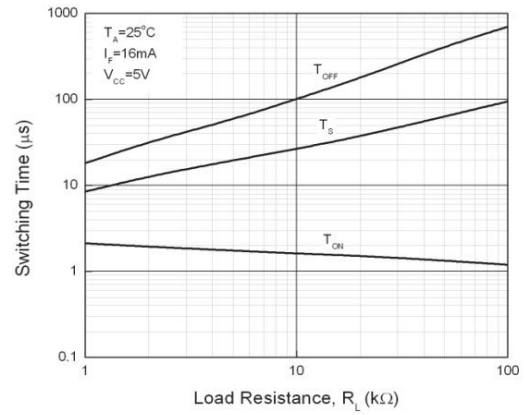


Figure 9. Collector-Emitter Saturation Voltage vs Ambient Temperature

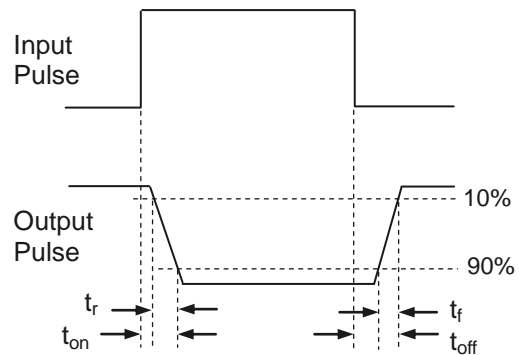
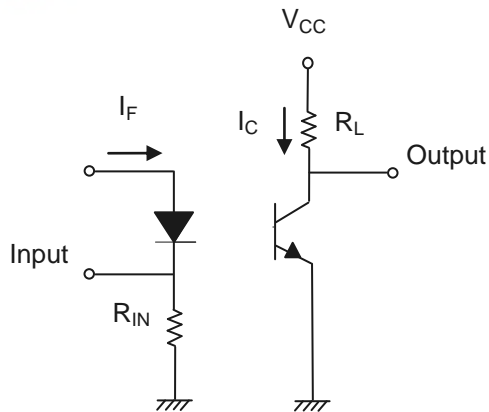
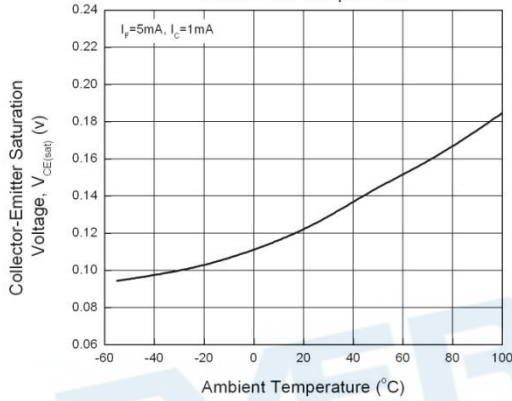


Figure 10. Switching Time Test Circuit & Waveforms

Order Information

Part Number

EL816X(Y)(Z)-FV

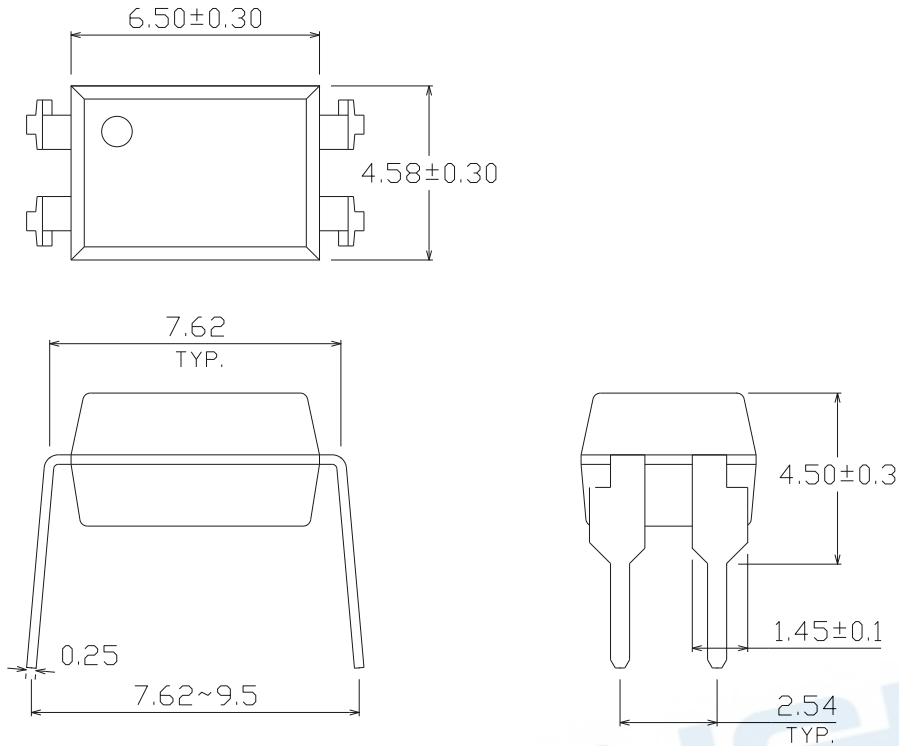
Note

- X = Lead form option (S1, S2, M or none)
- Y = CTR Rank (A, B, C, D, X, Y, I, J, K or none)
- Z = Tape and reel option (TU, TD or none).
- F = Lead frame option (F: Iron, None: copper)
- V = VDE safety (optional).

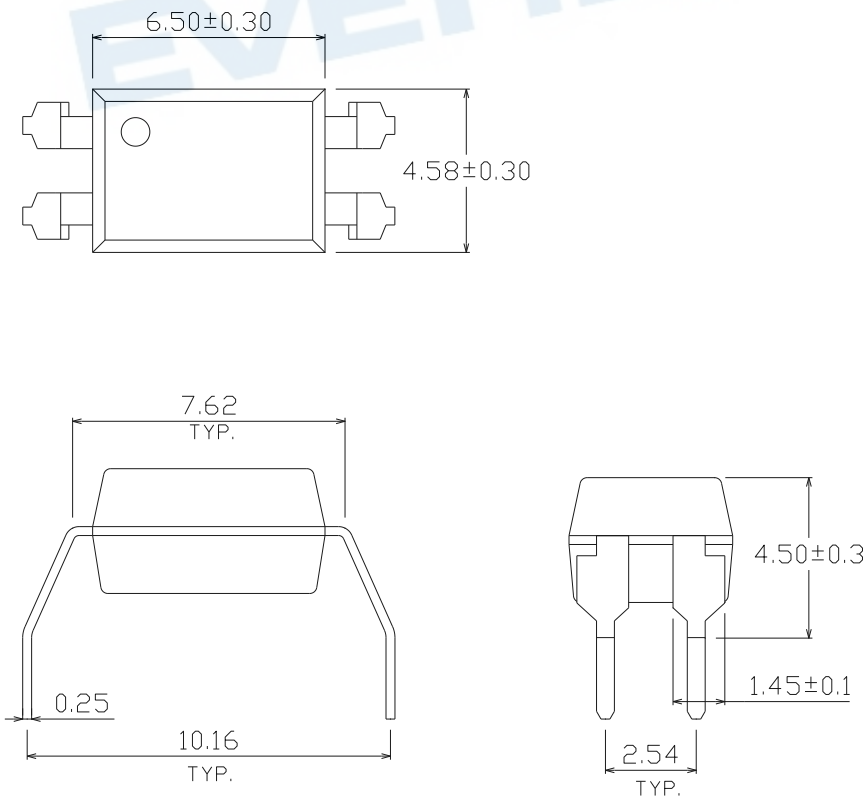
| Option | Description | Packing quantity |
|---------|---------------------------------------------------------------|---------------------|
| None | Standard DIP-4 | 100 units per tube |
| M | Wide lead bend (0.4 inch spacing) | 100 units per tube |
| S1 (TU) | Surface mount lead form (low profile) + TU tape & reel option | 1500 units per reel |
| S1 (TD) | Surface mount lead form (low profile) + TD tape & reel option | 1500 units per reel |
| S2 (TU) | Surface mount lead form (low profile) + TU tape & reel option | 2000 units per reel |
| S2 (TD) | Surface mount lead form (low profile) + TD tape & reel option | 2000 units per reel |

Package Dimension (Dimensions in mm)

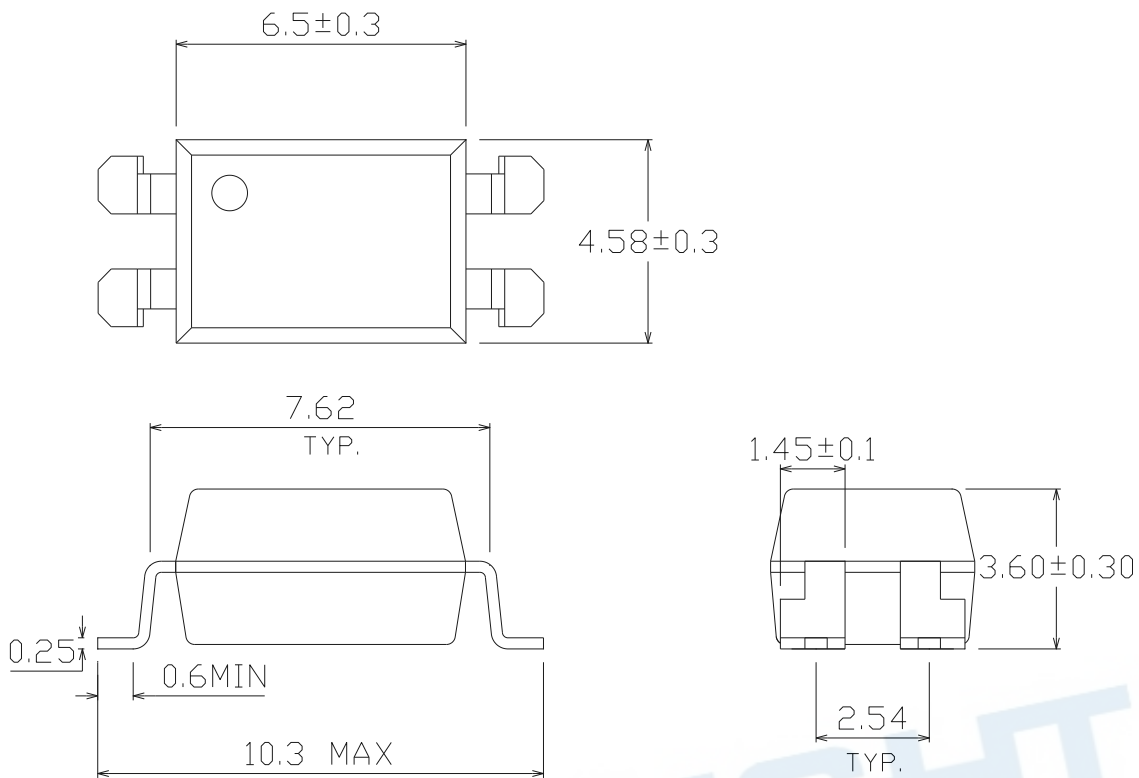
Standard DIP Type



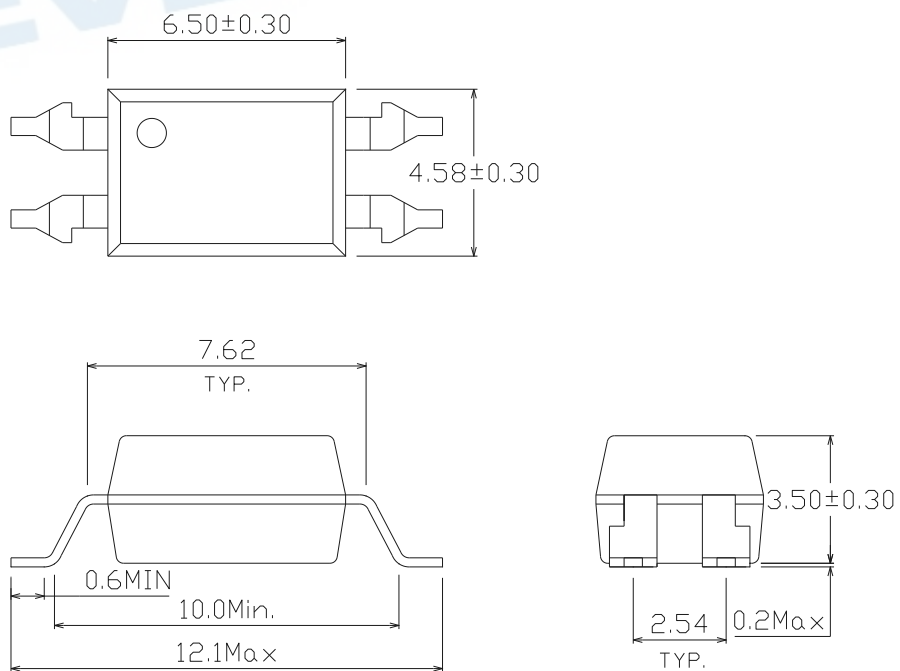
Option M Type



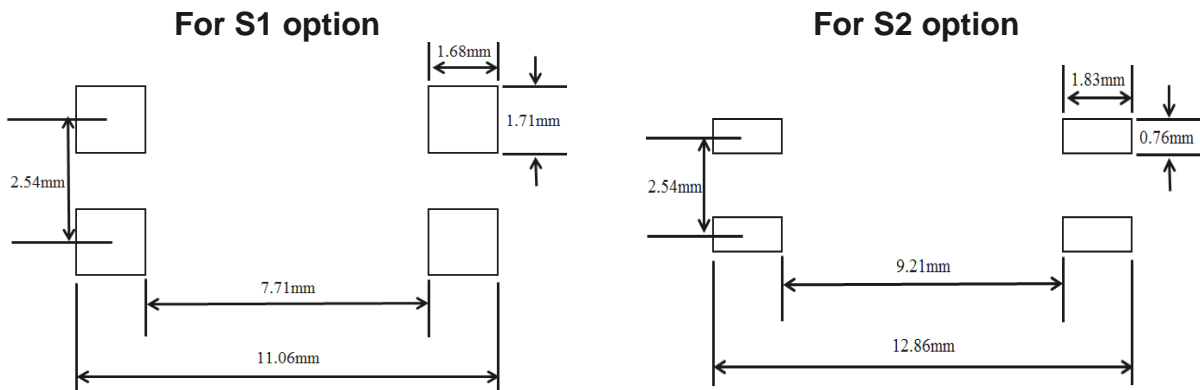
Option S1 Type



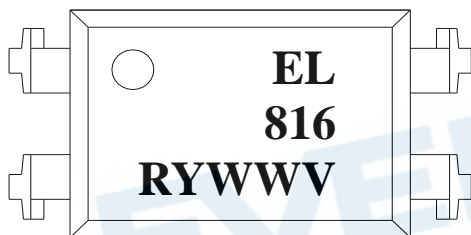
Option S2 Type



Recommended pad layout for surface mount leadform



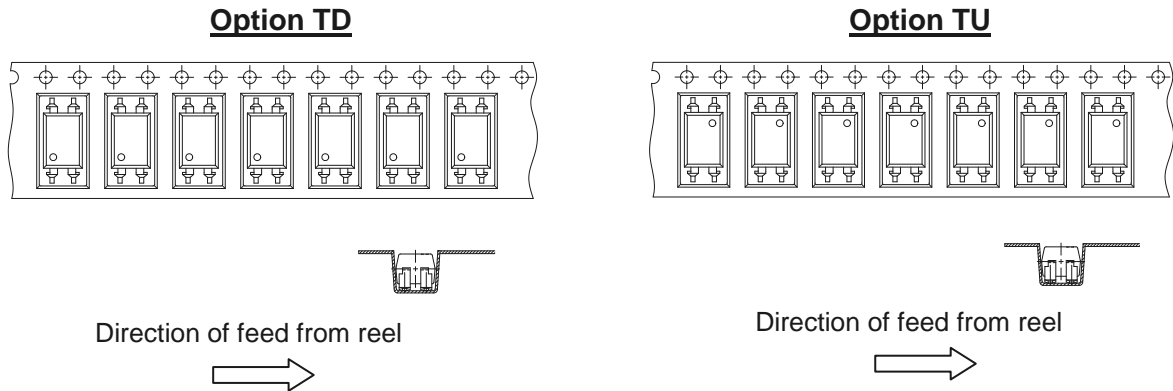
Device Marking



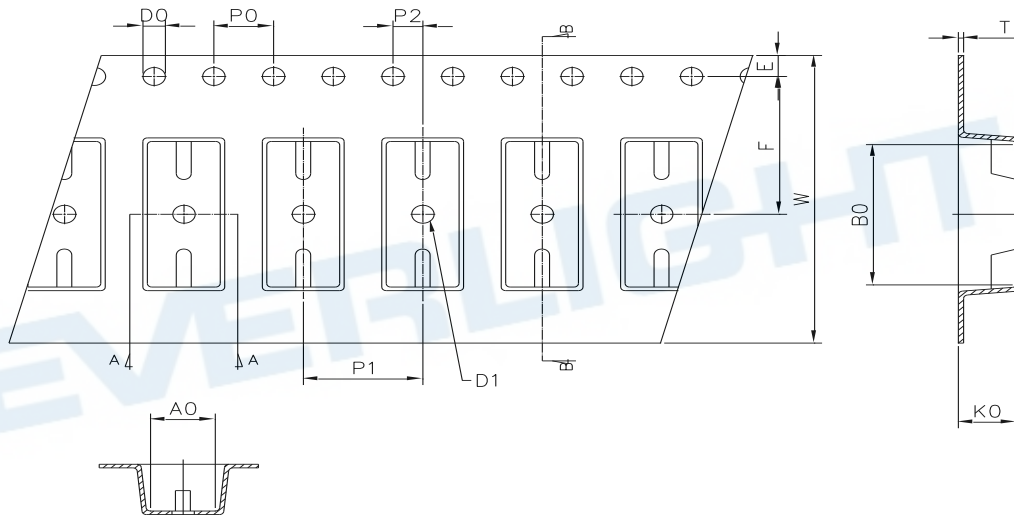
Notes

- EL denotes EVERLIGHT
- 816 denotes Device Number
- R denotes CTR Rank(A, B, C, D, X, Y, I, J, K or none)
- Y denotes 1 digit Year code
- WW denotes 2 digit Week code
- V denotes VDE (optional)

Tape & Reel Packing Specifications



Tape dimensions

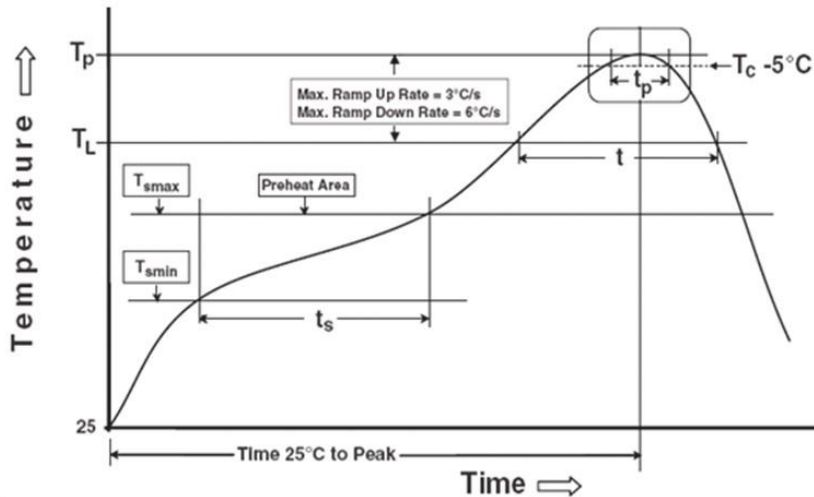


| | | | | | | |
|----------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Dimension No. | Ao | Bo | Do | D1 | E | F |
| Dimension (mm) S1 | 4.90±0.1 | 10.40±0.1 | 1.5±0.1 | 1.50±0.1 | 1.75±0.1 | 7.50±0.1 |
| Dimension (mm) S2 | 4.88±0.1 | 12.55±0.1 | 1.5±0.1 | 1.50±0.1 | 1.75±0.1 | 11.5±0.1 |
| Dimension No. | Po | P1 | P2 | t | W | Ko |
| Dimension (mm) S1 | 4.00±0.1 | 8.00±0. | 2.00±0.1 | 0.40±0.1 | 16.00±0.3 | 4.60±0.1 |
| Dimension (mm) S2 | 4.00±0.1 | 8.00±0.1 | 2.00±0.1 | 0.40±0.1 | 24.00±0.3 | 4.00±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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[TLP293\(GRH-TPL,E\(T](#) [TLP383\(D4GL-TR,E](#) [TLP185\(BLL-TL,SE\(T](#) [TLP2309\(TPL,E\(O](#) [TLP785\(BL-TP6,F\(C](#) [TLP185\(GRL-TL,SE\(T](#)
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