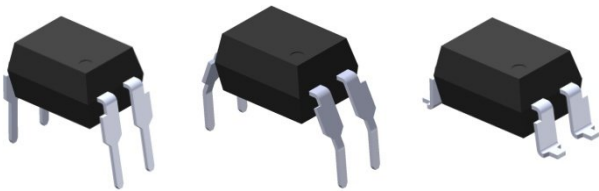
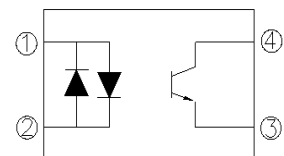


### 4 PIN DIP PHOTOTRANSISTOR PHOTOCOUPLER AC INPUT PHOTOCOUPLER EL814 Series



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  $-55\sim 110^\circ\text{C}$
- High collector-emitter voltage  $V_{CEO}=80\text{V}$
- Compact dual-in-line package
- Pb free and RoHS compliant.
- UL approved (No. E214129)
- VDE approved (No. 132249)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved
- CSA 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**

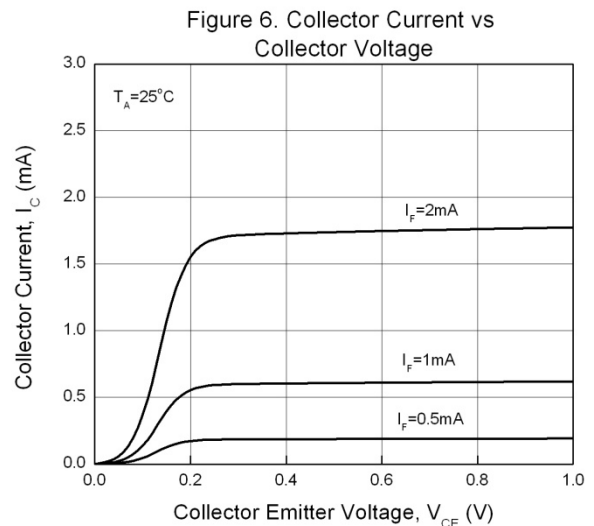
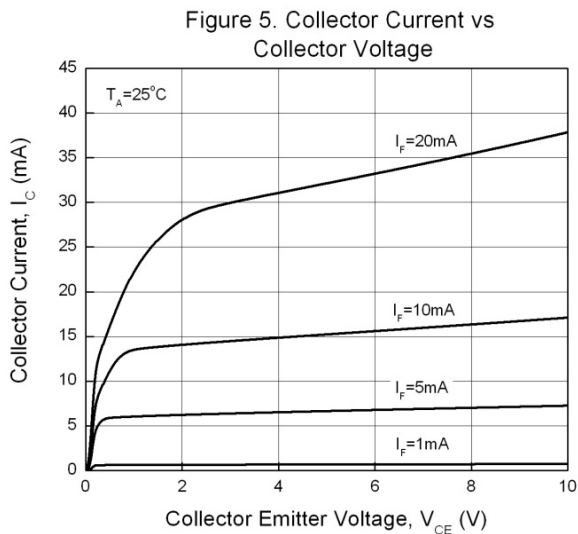
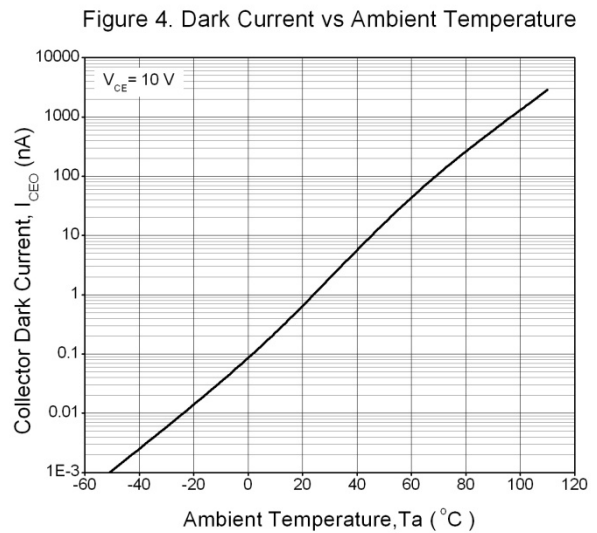
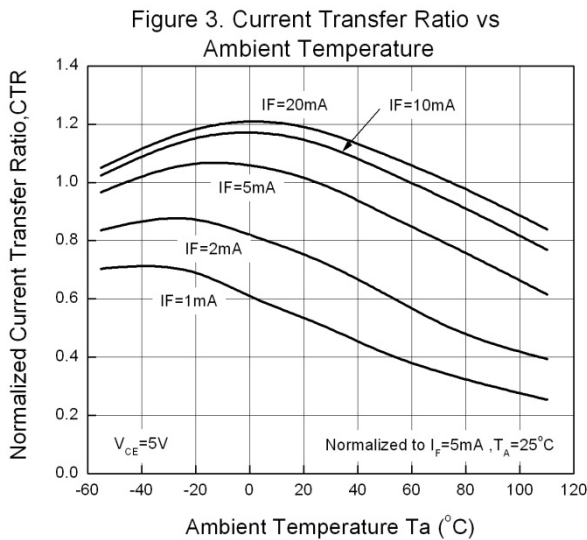
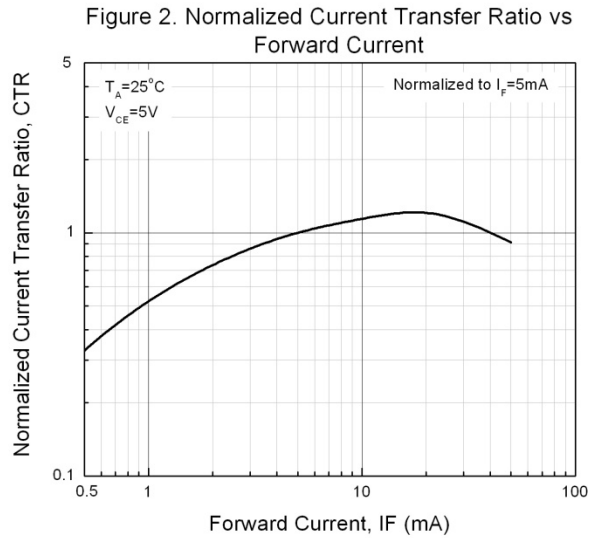
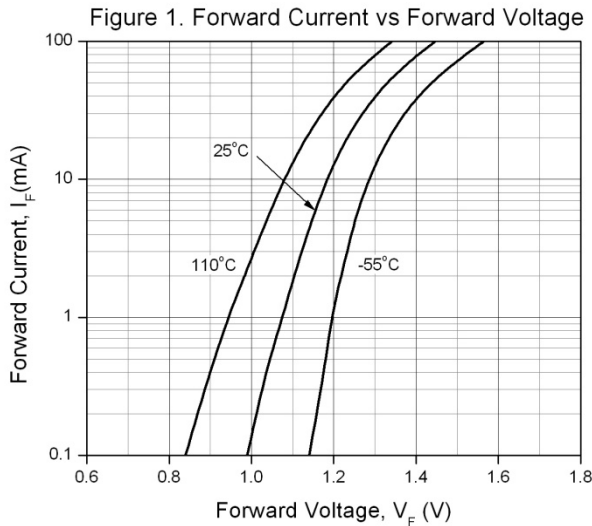
Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Collector-Emitter dark current	$I_{CEO}$	-	-	100	nA	$V_{CE} = 20\text{V}, I_F = 0\text{mA}$
Collector-Emitter breakdown voltage	$BV_{CEO}$	80	-	-	V	$I_C = 0.1\text{mA}$
Emitter-Collector breakdown voltage	$BV_{ECO}$	6	-	-	V	$I_E = 0.1\text{mA}$

**Transfer Characteristics**

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Current Transfer ratio	EL814	20	-	300	%	$I_F = \pm 1\text{mA}, V_{CE} = 5\text{V}$
	EL814A	50	-	150		
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	$R_{IO}$	$5 \times 10^{10}$	$10^{11}$	-	$\Omega$	$V_{IO} = 500\text{Vdc}, 40\sim 60\%R.H$
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	$\mu\text{s}$	$V_{CE} = 2\text{V}, I_C = 2\text{mA}, R_L = 100\Omega$
Fall time	$T_f$	-	11	18	$\mu\text{s}$	

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

Typical Electro-Optical Characteristics Curves



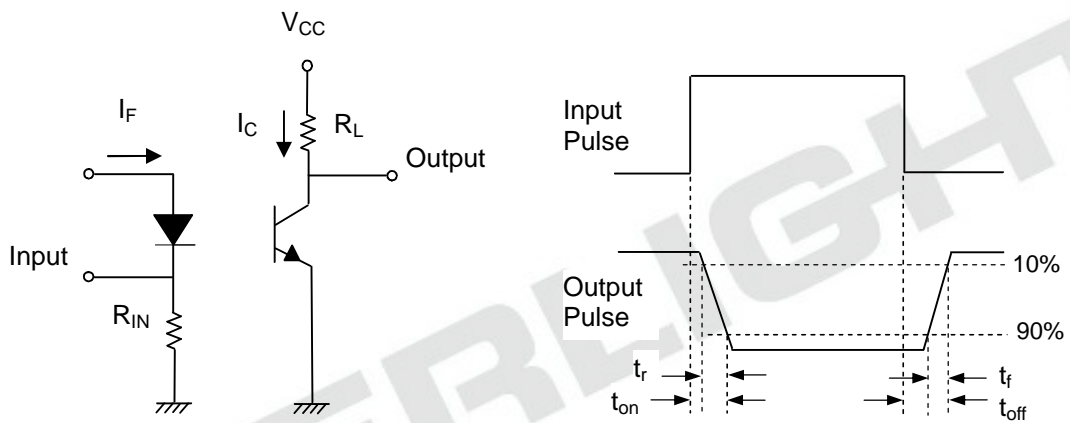
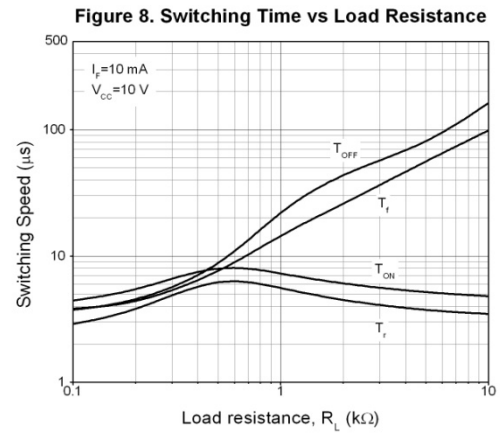
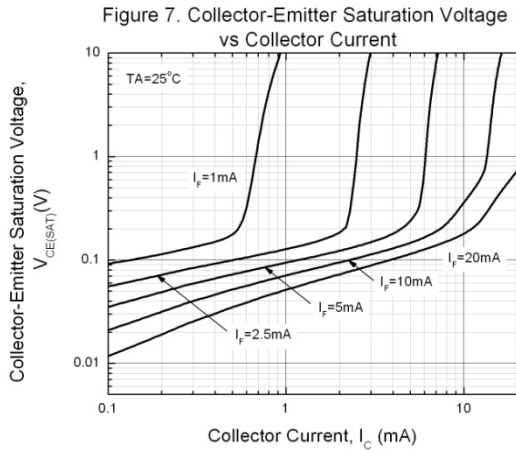


Figure 9. Switching Time Test Circuit & Waveforms

**Order Information**

**Part Number**

**EL814X(Y)(Z)-V**

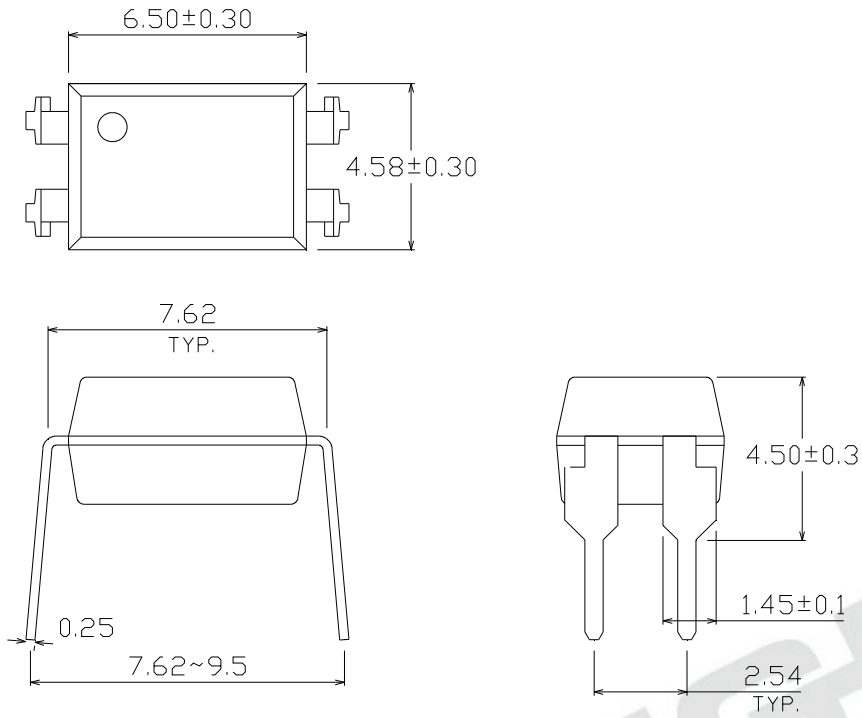
**Note**

- 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).

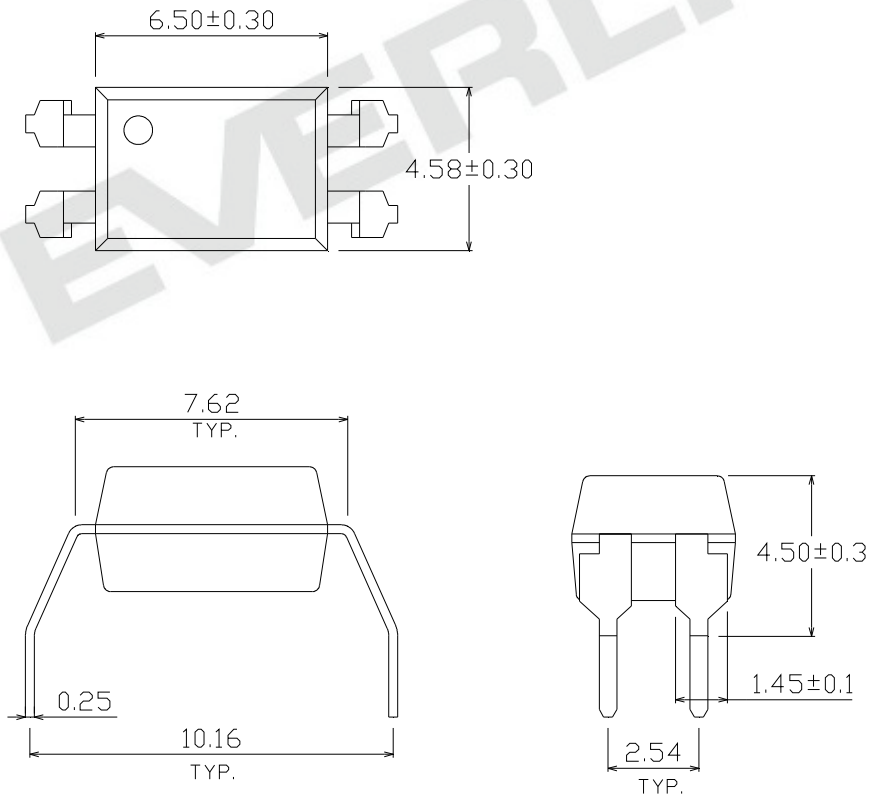
Option	Description	Packing quantity
None	Standard DIP-4	100 units per tube
M	Wide lead bend (0.4 inch spacing)	100 units per tube
S (TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
S (TB)	Surface mount lead form + TB tape & reel option	1000 units per reel
S1 (TA)	Surface mount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

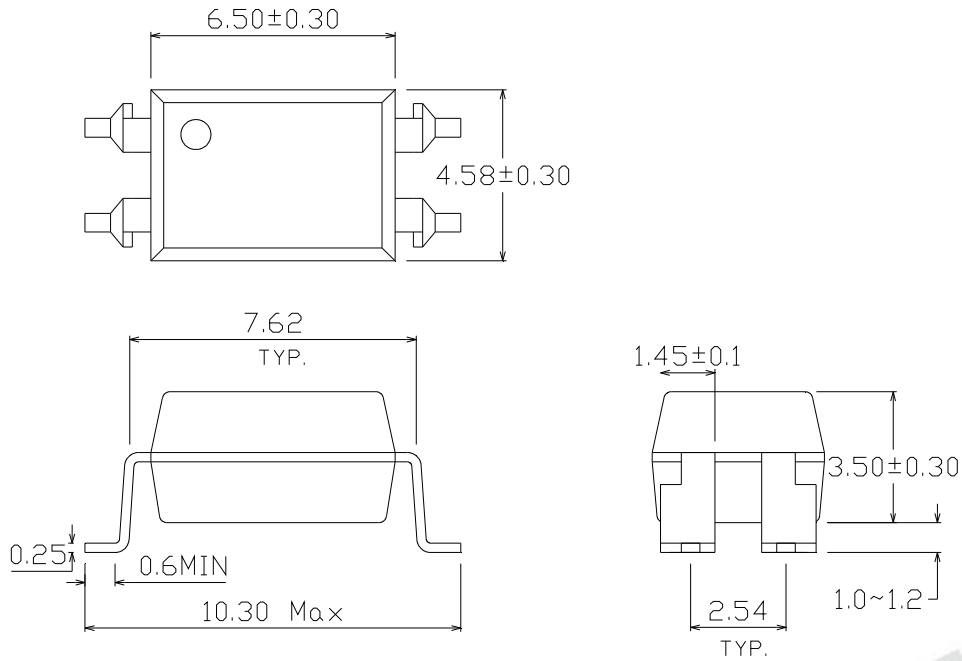
Standard DIP Type



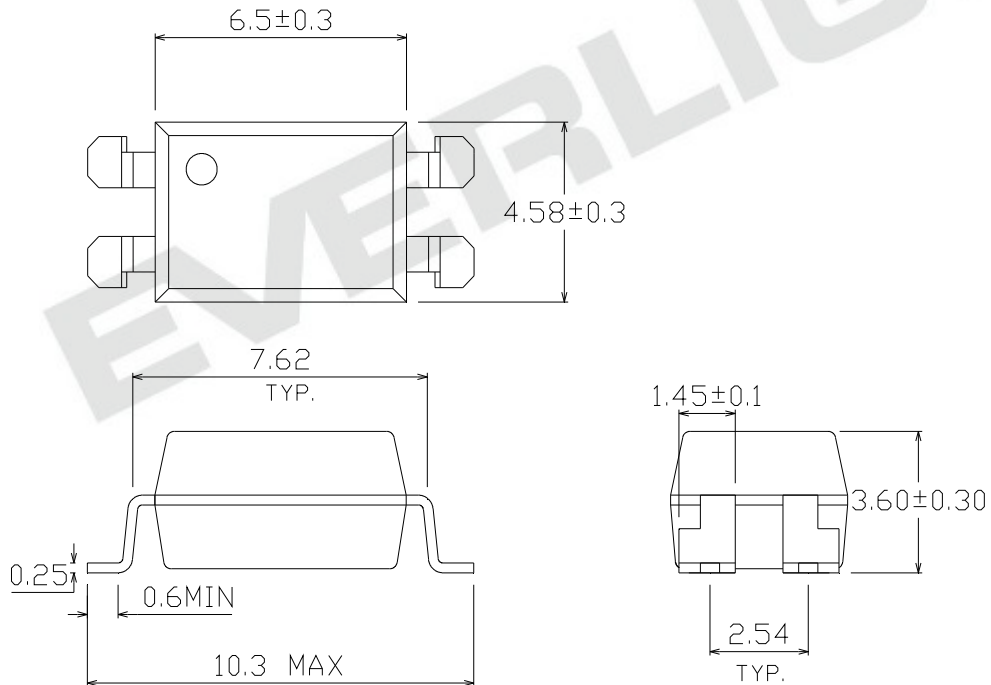
Option M Type



Option S Type

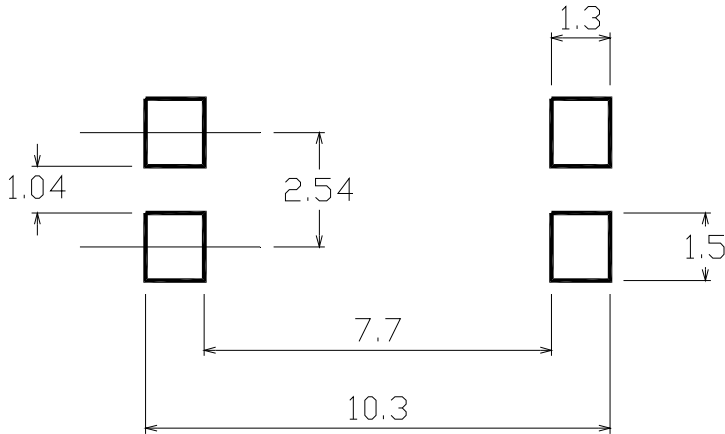


Option S1 Type





### Recommended pad layout for surface mount leadform



### Device Marking

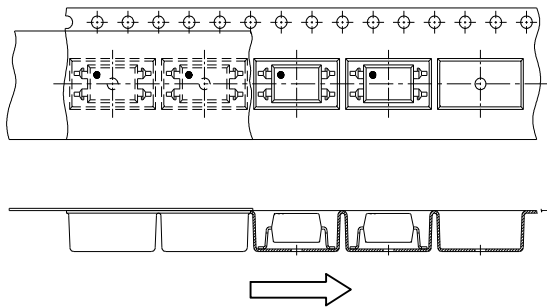


### Notes

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

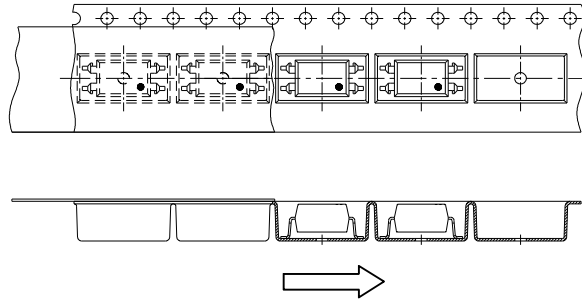
**Tape & Reel Packing Specifications**

**Option TA**



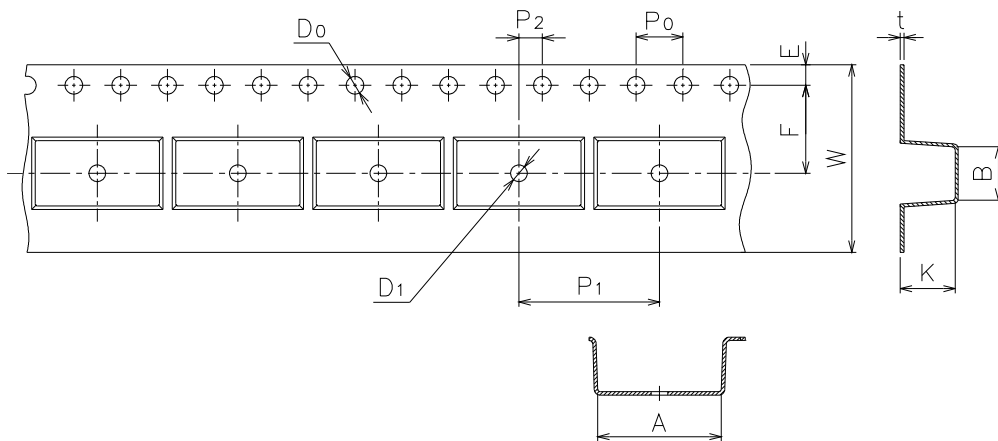
Direction of feed from reel

**Option TB**



Direction of feed from reel

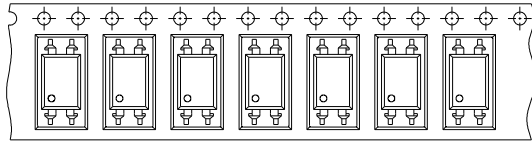
**Tape dimensions**



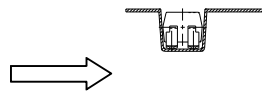
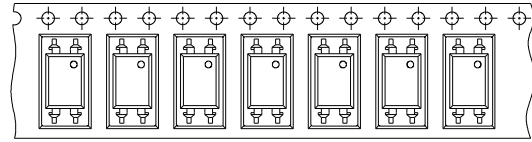
Dimension No.	<b>A</b>	<b>B</b>	<b>Do</b>	<b>D1</b>	<b>E</b>	<b>F</b>
Dimension (mm) S	10.5±0.1	4.65±0.1	1.55±0.1	1.50±0.1	1.75±0.1	7.5±0.1
Dimension (mm) S1	10.5±0.1	4.65±0.1	1.55±0.1	1.50±0.1	1.75±0.1	7.5±0.1
Dimension No.	<b>Po</b>	<b>P1</b>	<b>P2</b>	<b>t</b>	<b>W</b>	<b>K</b>
Dimension (mm) S	4.0±0.1	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

**Tape & Reel Packing Specifications**

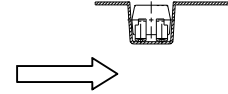
**Option TD**



**Option TU**

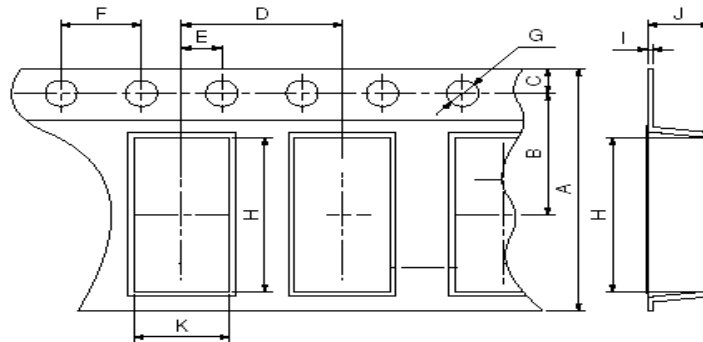


Direction of feed from reel



Direction of feed from reel

**Tape dimensions**

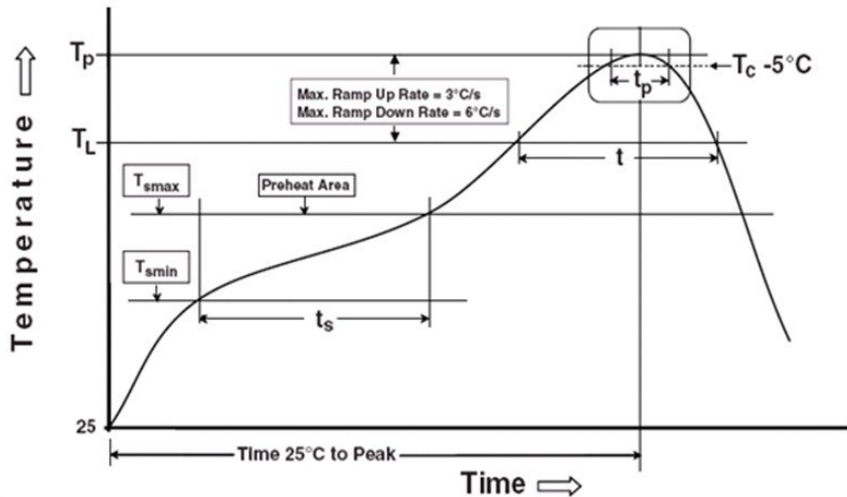


Dimension No.	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>
Dimension(mm)	16.00±0.3	7.5±0.1	1.75±0.1	8.0±0.1	2.0±0.1	4.0±0.1
Dimension No.	<b>G</b>	<b>H</b>	<b>I</b>	<b>J</b>	<b>K</b>	
Dimension(mm)	1.5±0.1	10.4±0.1	0.4±0.1	4.60±0.1	5.1±0.1	

## 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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