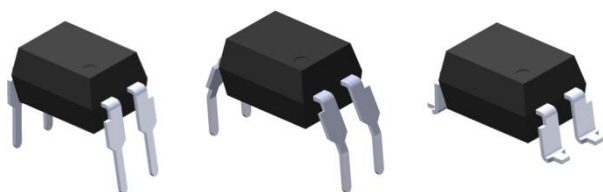
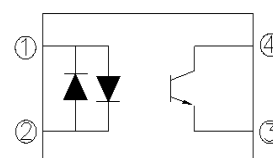


### 4 PIN DIP PHOTOTRANSISTOR PHOTOCOUPLER AC INPUT PHOTOCOUPLER EL814 Series



Schematic



#### 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
- 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 <sub>F</sub>	±60	mA
	Peak forward current (t = 10μs)	I <sub>FM</sub>	1	A
	Power dissipation	P <sub>D</sub>	100	mW
	Derating factor (above 100 °C)		2.9	mW/°C
Output	Power dissipation	P <sub>C</sub>	150	mW
	Derating factor (above 100 °C)		5.8	mW/°C
	Collector-Emitter voltage	V <sub>CEO</sub>	80	V
	Emitter-Collector voltage	V <sub>ECO</sub>	6	V
Total Power Dissipation		P <sub>TOT</sub>	200	mW
Isolation Voltage* <sup>1</sup>		V <sub>ISO</sub>	5000	V rms
Operating Temperature		T <sub>OPR</sub>	-55 to 110	°C
Storage Temperature		T <sub>STG</sub>	-55 to 125	°C
Soldering Temperature* <sup>2</sup>		T <sub>SOL</sub>	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	$\frac{\text{EL814}}{\text{EL814A}}$ CTR	20	-	300	%	$I_F = \pm 1\text{mA}, V_{CE} = 5\text{V}$
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	$R_{IO}$	$5 \times 10^{10}$	$10^{11}$	-	$\Omega$	$V_{IO} = 500\text{Vdc}, 40\sim 60\% \text{R.H}$
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	$\mu\text{s}$	$V_{CE}=2\text{V}, I_C=2\text{mA}, R_L=100\Omega$
Fall time	$T_f$	-	-	18	$\mu\text{s}$	

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

## Typical Electro-Optical Characteristics Curves

Figure 1. Forward Current vs Forward Voltage

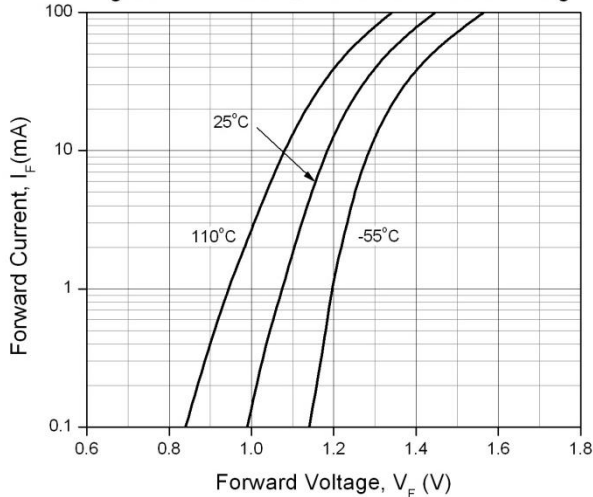


Figure 2. Normalized Current Transfer Ratio vs Forward Current

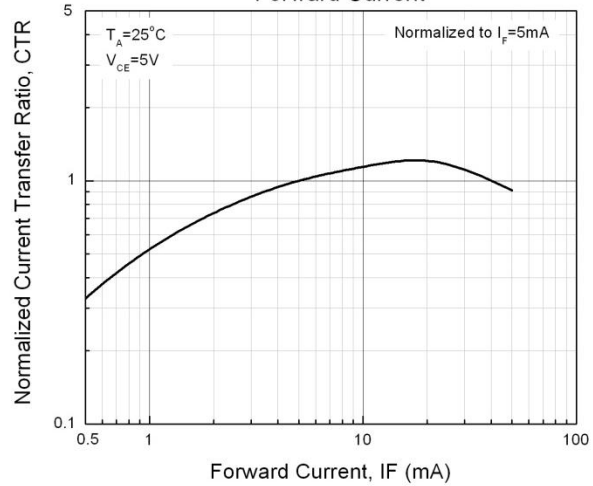


Figure 3. Current Transfer Ratio vs Ambient Temperature

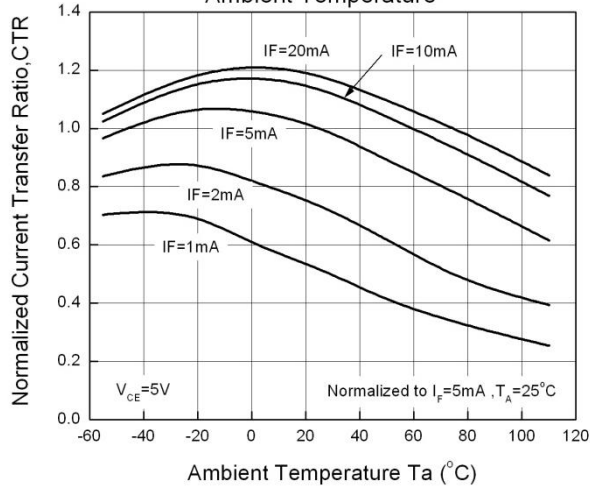


Figure 4. Dark Current vs Ambient Temperature

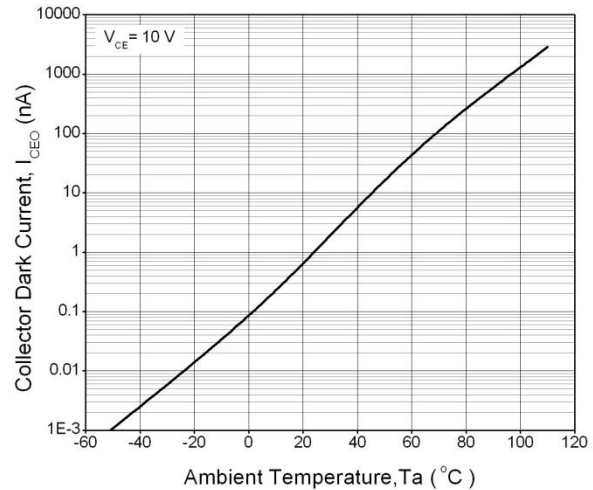


Figure 5. Collector Current vs Collector Voltage

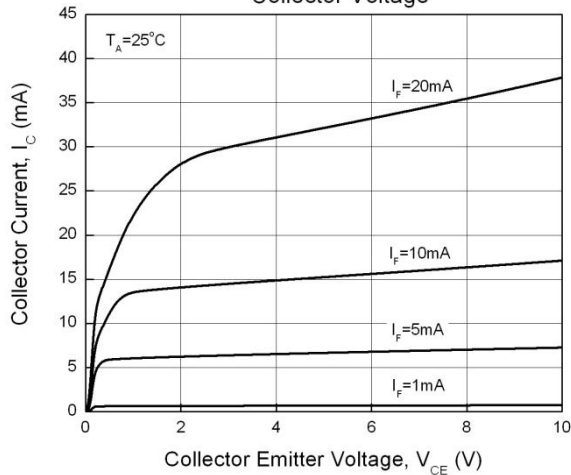
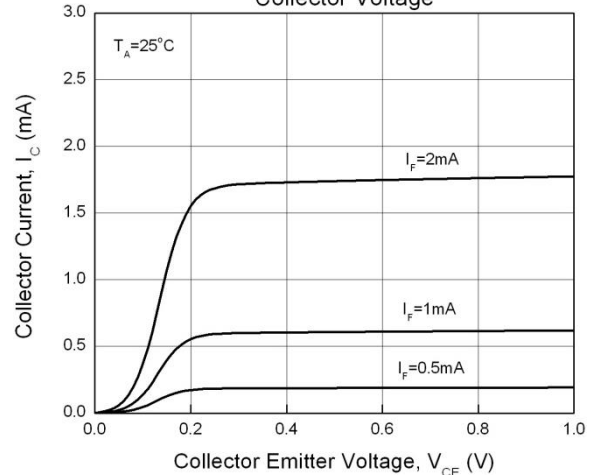


Figure 6. Collector Current vs Collector Voltage



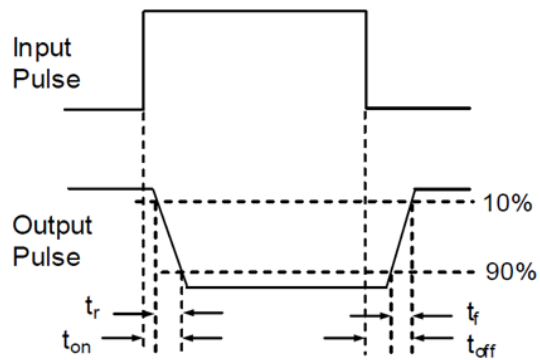
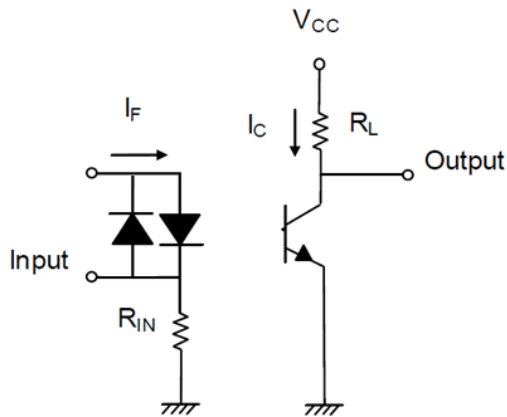
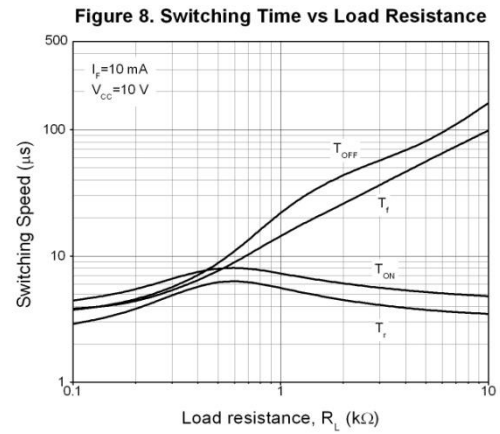
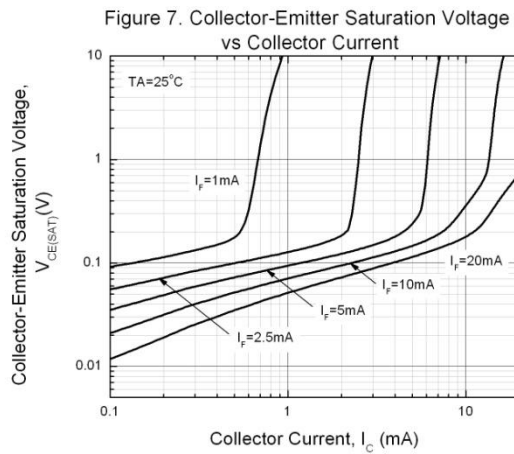


Figure 9. Switching Time Test Circuit & Waveforms

## Order Information

### Part Number

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

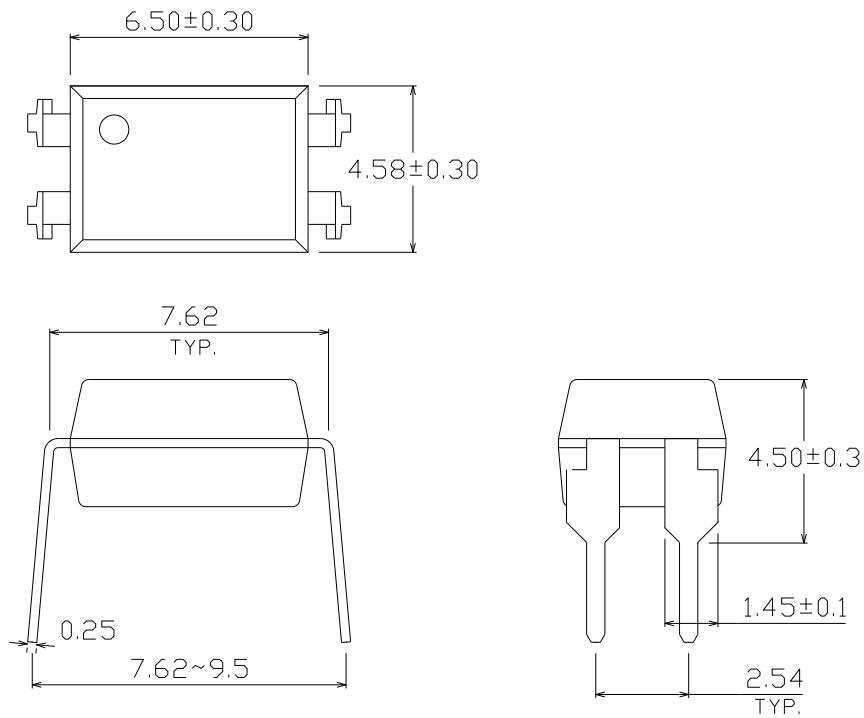
### Notes

- 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)

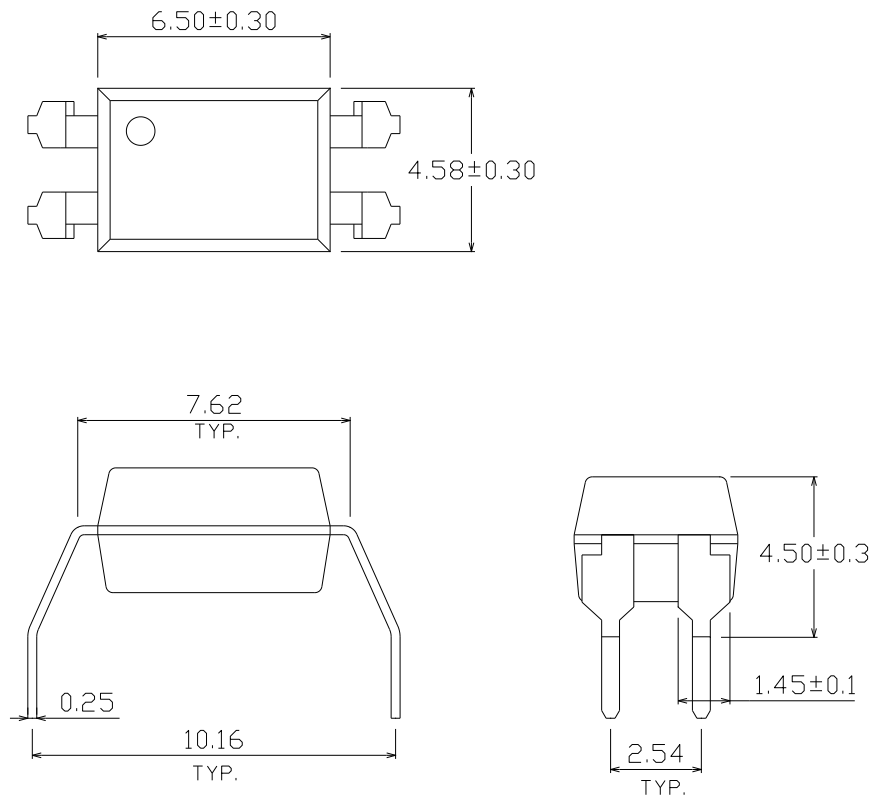
Option	Description	Packing quantity
None	Standard DIP-4	100 units per tube
M	Wide lead bend (0.4 inch spacing)	100 units per tube
S (TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
S (TB)	Surface mount lead form + TB tape & reel option	1000 units per reel
S1 (TA)	Surface mount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

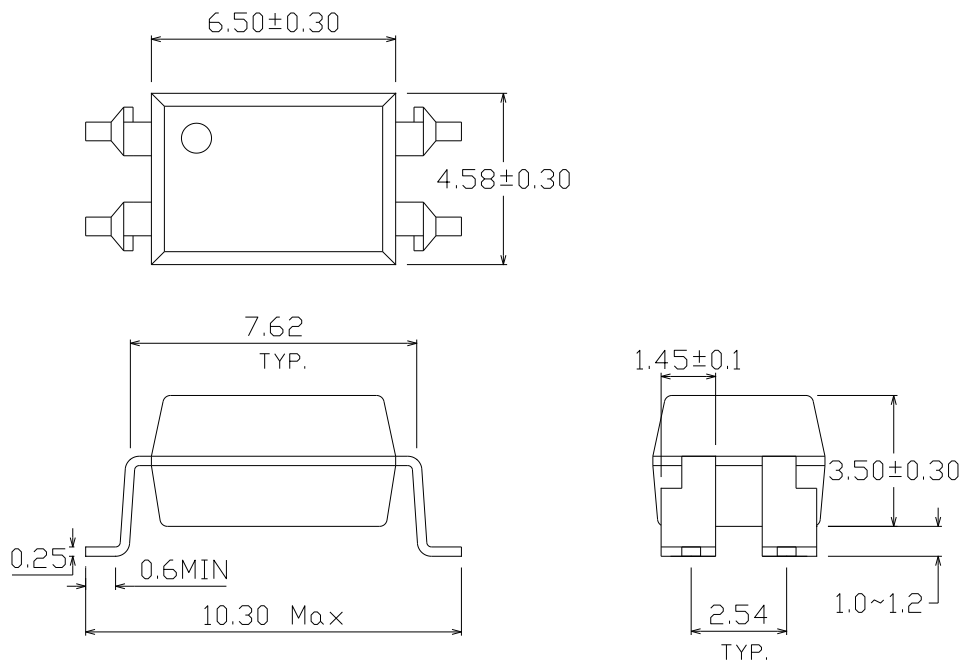
**Standard DIP Type**



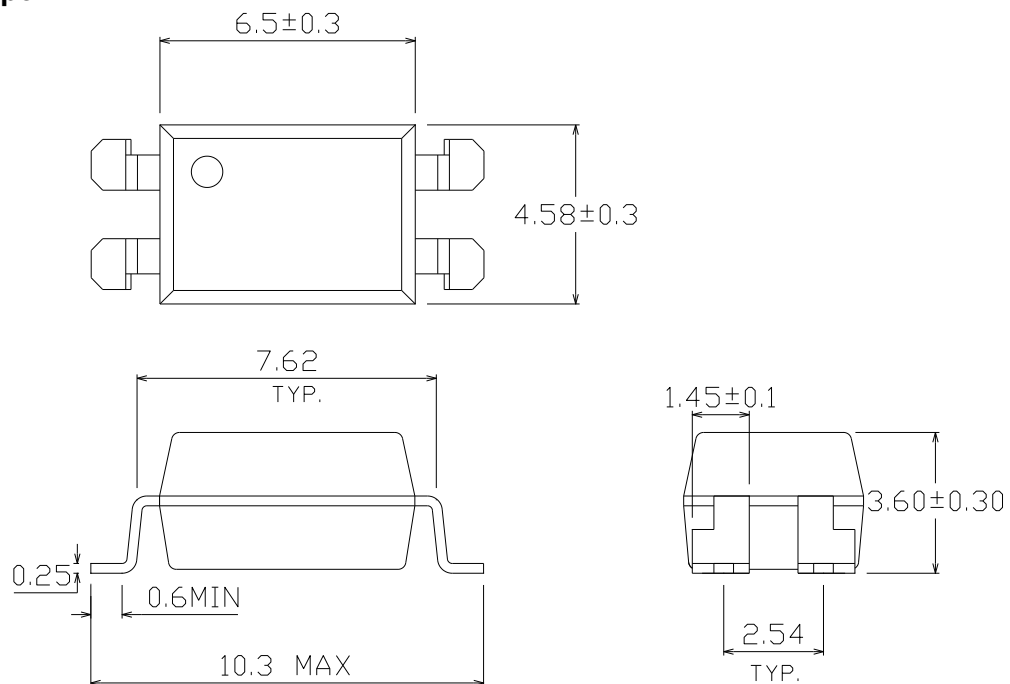
**Option M Type**



**Option S Type**



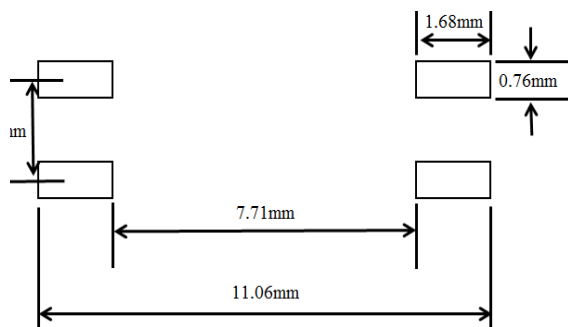
**Option S1 Type**



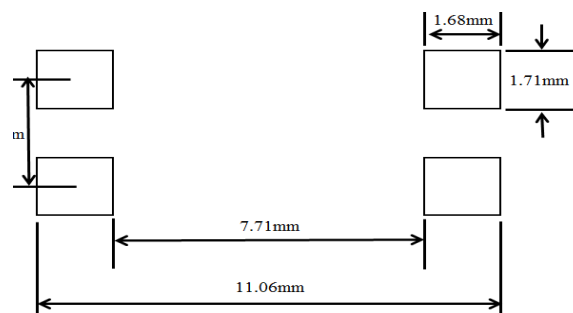


## Recommended pad layout for surface mount leadform

### 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

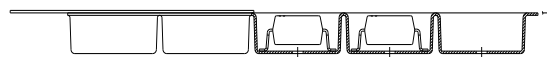
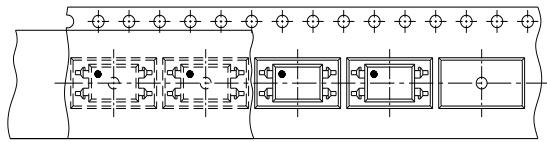


### Notes

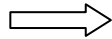
EL denotes EVERLIGHT  
814 denotes Device Number  
F denotes Factory Code (G: China and Green part)  
R denotes CTR Rank (A or none)  
Y denotes 1 digit Year code  
WW denotes 2 digit Week code  
V denotes VDE (optional)

## Tape & Reel Packing Specifications

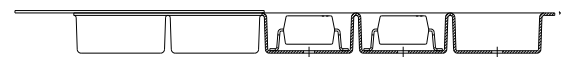
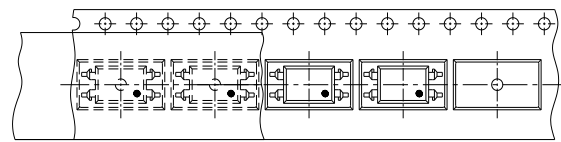
**Option TA**



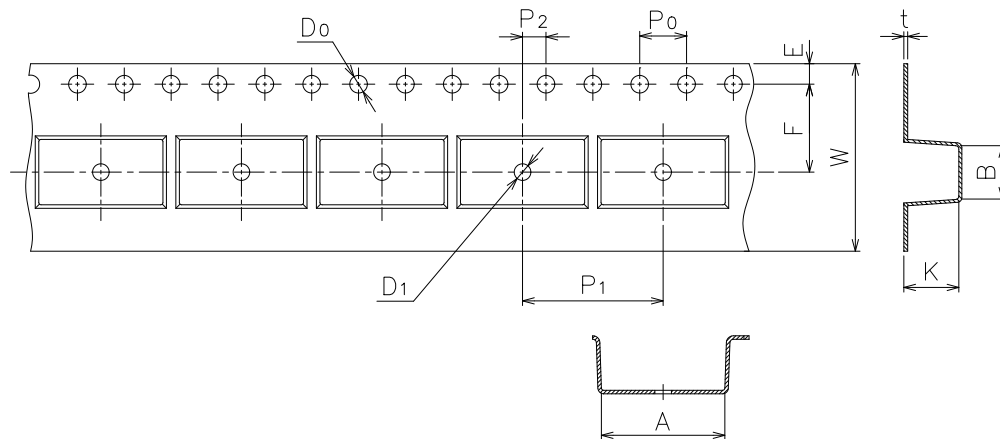
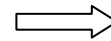
Direction of feed from reel



**Option TB**

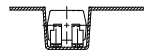
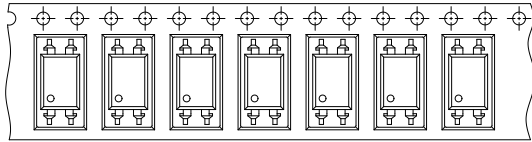


Direction of feed from reel

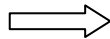


Dimension No.	A	B	Do	D1	E	F
Dimension (mm) S	10.5±0.1	4.65±0.1	1.5±0.1	1.50±0.1	1.75±0.1	7.5±0.1
Dimension (mm) S1	10.5±0.1	4.65±0.1	1.5±0.1	1.50±0.1	1.75±0.1	7.5±0.1
Dimension No.	Po	P1	P2	t	W	K
Dimension (mm) S	4.0±0.1	12.0±0.1	2.0±0.1	0.4±0.1	16.0±0.3	5.05±0.1
Dimension (mm) S1	4.0±0.1	12.0±0.1	2.0±0.1	0.4±0.1	16.0±0.3	4.75±0.1

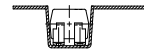
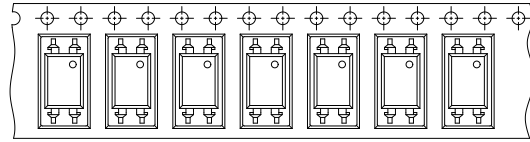
**Option TD**



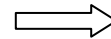
Direction of feed from reel



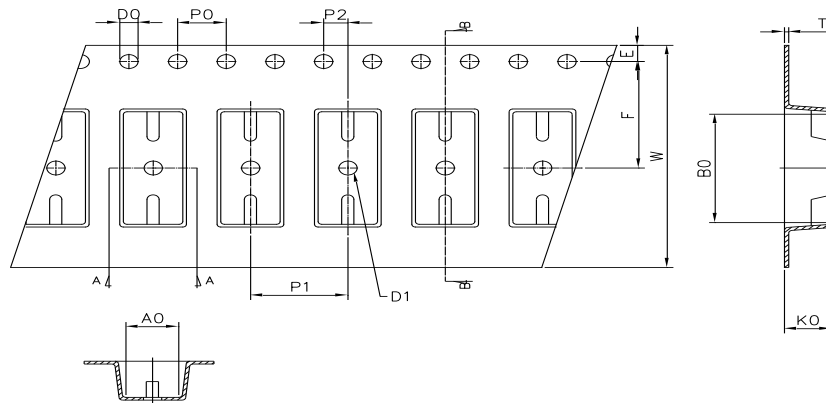
**Option TU**



Direction of feed from reel



**Tape dimensions**

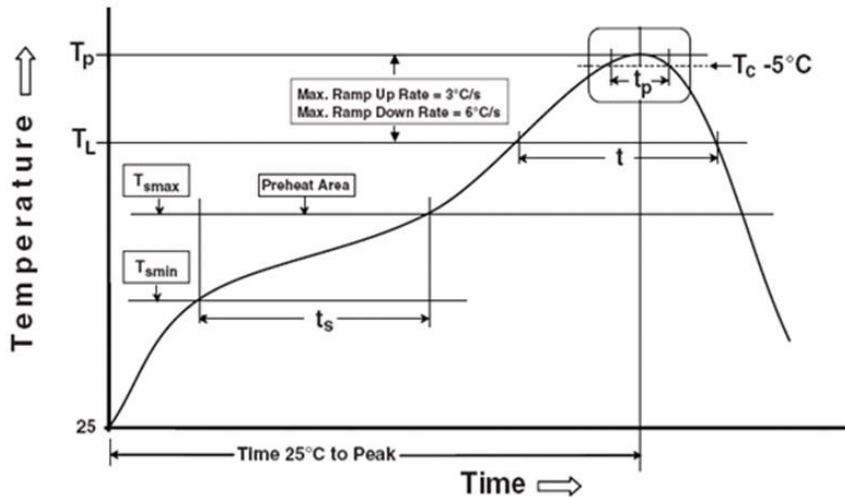


Dimension No.	<b>Ao</b>	<b>Bo</b>	<b>Do</b>	<b>D1</b>	<b>E</b>	<b>F</b>
Dimension (mm) S.S1	4.90±0.1	10.40±0.1	1.5±0.1	1.50±0.1	1.75±0.1	7.50±0.1
Dimension No.	<b>Po</b>	<b>P1</b>	<b>P2</b>	<b>t</b>	<b>W</b>	<b>Ko</b>
Dimension (mm) S.S1	4.00±0.1	8.00±0.1	2.00±0.1	0.40±0.1	16.00±0.3	4.60±0.1

## 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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