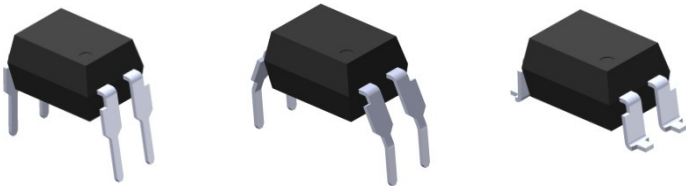
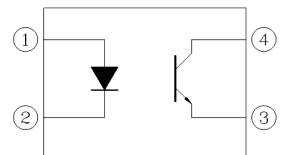


### 4 PIN DIP HIGH VOLTAGE PHOTOTRANSISTOR PHOTOCOUPLER EL851 Series



Schematic



Pin Configuration

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

#### Features:

- High collector- emitter voltage ( $V_{CEO}=350V$ )
- Current transfer ratio  
(CTR: 50~600% at  $I_F=5mA$ ,  $V_{CE}=5V$ )
- High isolation voltage between input and output ( $V_{iso}=5000 V rms$ )
- 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

#### Description

The EL851 series devices consist an infrared emitting diodes, optically coupled to a phototransistor detector.

The devices are in a 4-pin DIP package and available in wide-lead spacing and SMD option.

#### Applications

- Telephone line interface
- Interface to power supply circuit
- Controller for SSRs. DC motor
- Programmable Controllers

**Absolute Maximum Ratings (Ta=25°C)**

	Parameter	Symbol	Rating	Unit
Input	Forward current	$I_F$	60	mA
	Peak forward current (1μs pulse)	$I_{FM}$	1	A
	Reverse voltage	$V_R$	6	V
	Power dissipation	$P_D$	100	mW
Output	Collector power dissipation	$P_C$	150	mW
	Collector-Emitter voltage	$V_{CEO}$	350	V
	Collector Current	$I_C$	50	mA
	Emitter-Collector voltage	$V_{ECO}$	7	V
	Total Power Dissipation	$P_{TOT}$	200	mW
	Isolation Voltage*1	$V_{ISO}$	5000	V rms
	Operating Temperature	$T_{OPR}$	-55 to 100	°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	$I_F = 10\text{mA}$
Reverse Current	$I_R$	-	-	10	$\mu\text{A}$	$V_R = 5\text{V}$
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	$V_{CE} = 200\text{V}$
Collector-Emitter breakdown voltage	$BV_{CEO}$	350	-	-	V	$I_C = 0.1\text{mA}$
Emitter-Collector breakdown voltage	$BV_{ECO}$	7	-	-	V	$I_E = 0.1\text{mA}$
Collector-Emitter capacitance	$C_{CE}$	-	10	-	pF	$V_{CE} = 0\text{V}, f = 1\text{MHz}$

**Transfer Characteristics**

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Current Transfer Ratio	CTR	50	-	600	%	$I_F = 5\text{mA}, V_{CE} = 5\text{V}$
Collector-emitter saturation voltage	$V_{CE(sat)}$	-	-	0.4	V	$I_F = 20\text{mA}, I_C = 1\text{mA}$
Isolation resistance	$R_{IO}$	$10^{11}$	-	-	$\Omega$	$V_{IO} = 500\text{Vdc}$
Input-output capacitance	$C_{IO}$	-	0.6	-	pF	$V_{IO} = 0, f = 1\text{MHz}$
Rise time	$t_r$	-	4	18	$\mu\text{s}$	$V_{CE} = 2\text{V}, I_C = 2\text{mA}, R_L = 100\Omega$
Fall time	$t_f$	-	5	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

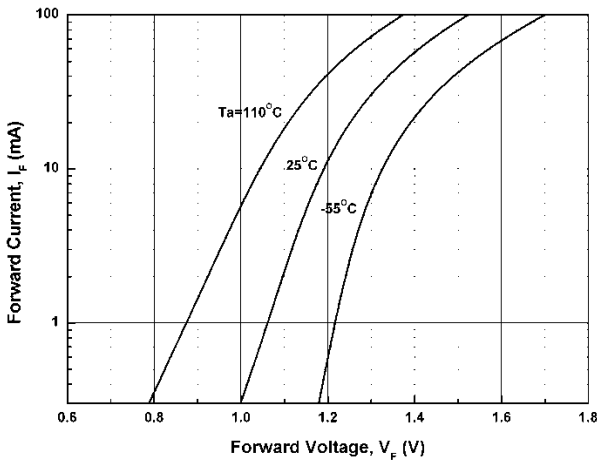


Figure 2. Current Transfer Ratio vs Forward Current

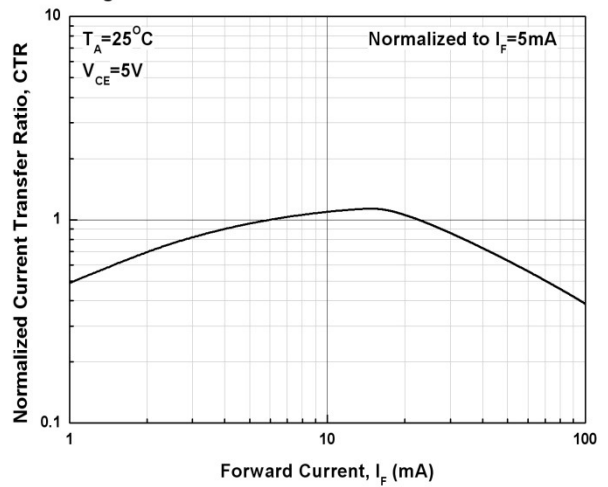


Figure 3. Collector Current vs Collector-emitter Voltage

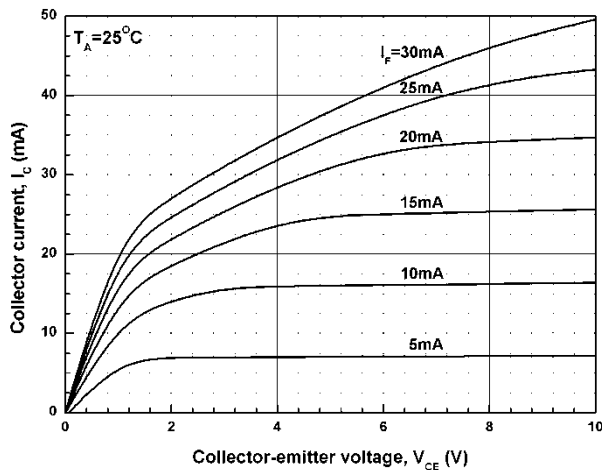


Figure 4. Relative Current Transfer Ratio vs Ambient Temperature

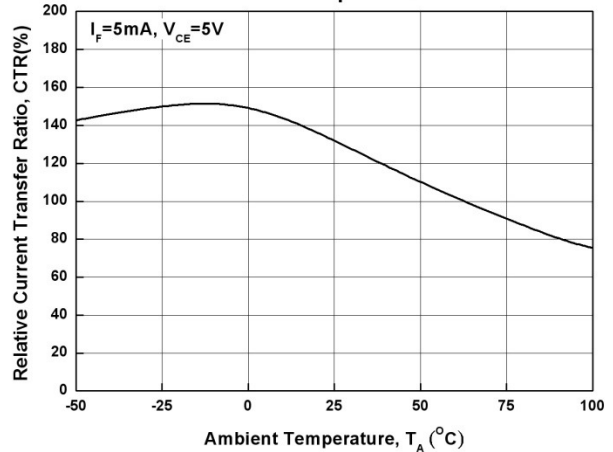


Figure 5. Collector-emitter Saturation Voltage vs Ambient Temperature

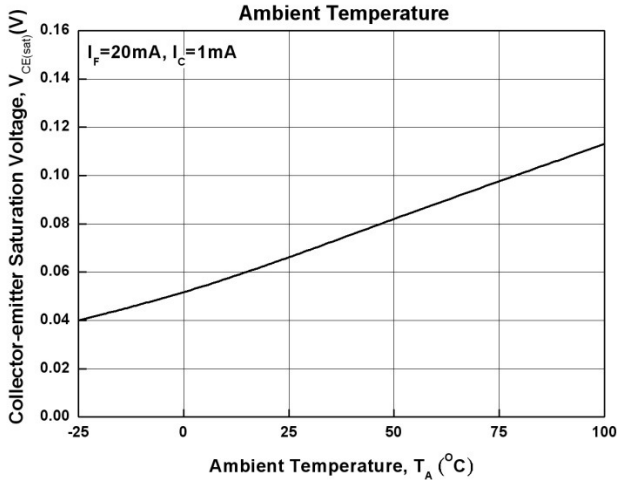


Figure 6. Dark Current vs Ambient Temperature

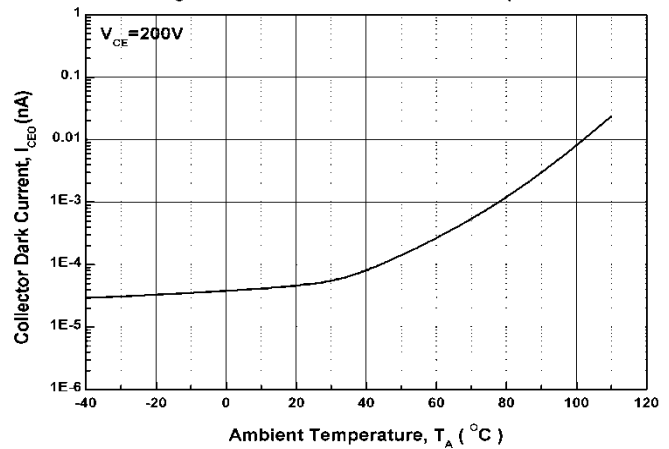


Figure 7. Switching Time vs. Load Resistance

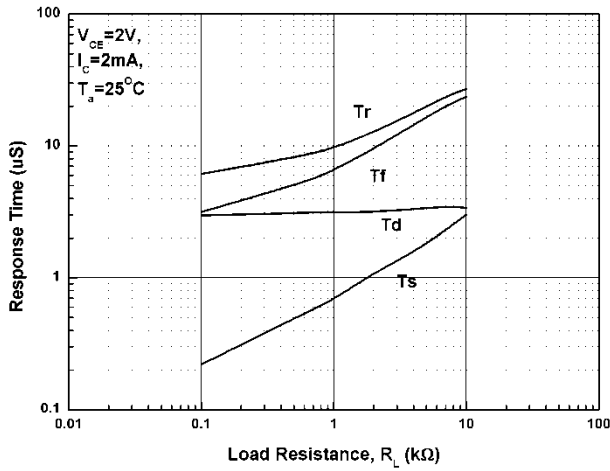


Figure 8. Collector-emitter Saturation Voltage vs Forward Current

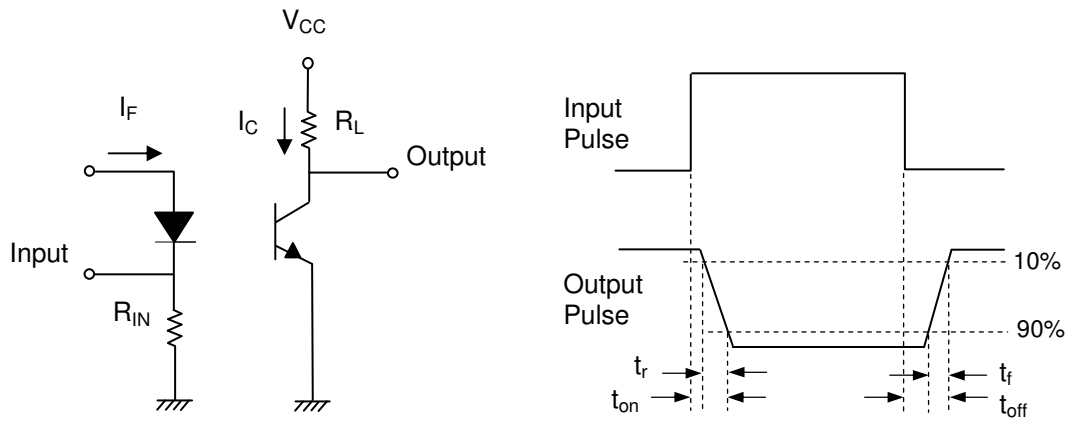
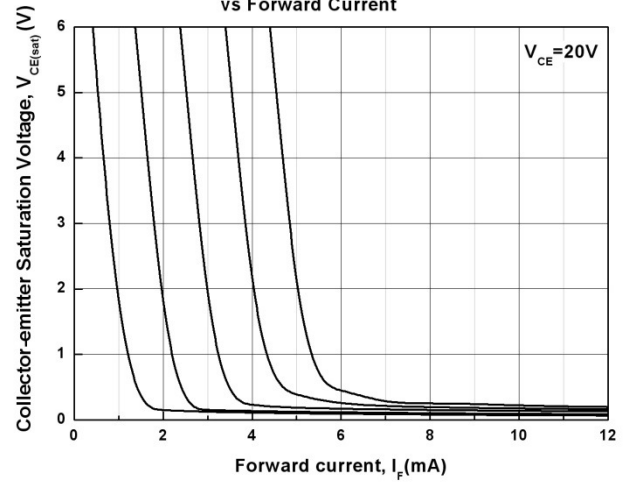


Figure 9. Switching Time Test Circuit & Waveforms

**Order Information**

**Part Number**

**EL851X(Z)-V**

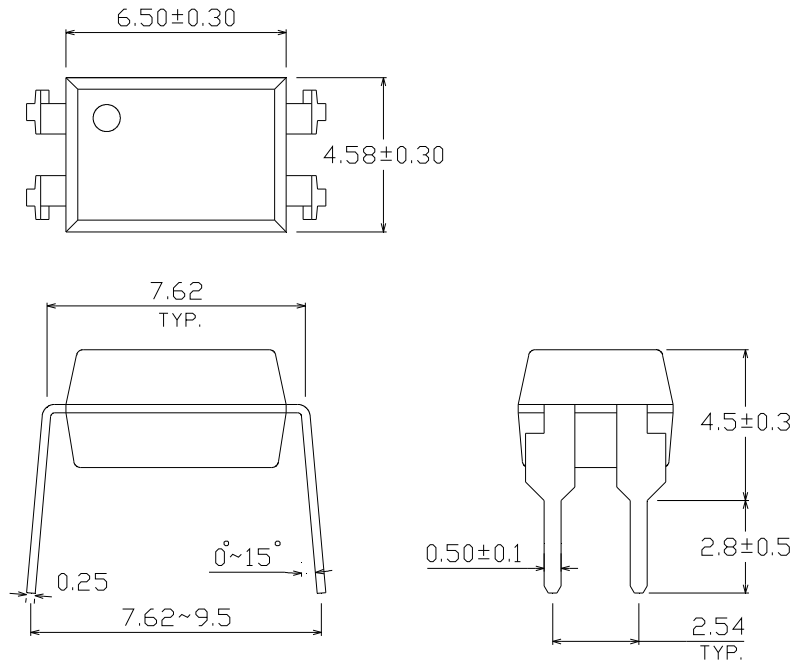
**Note**

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

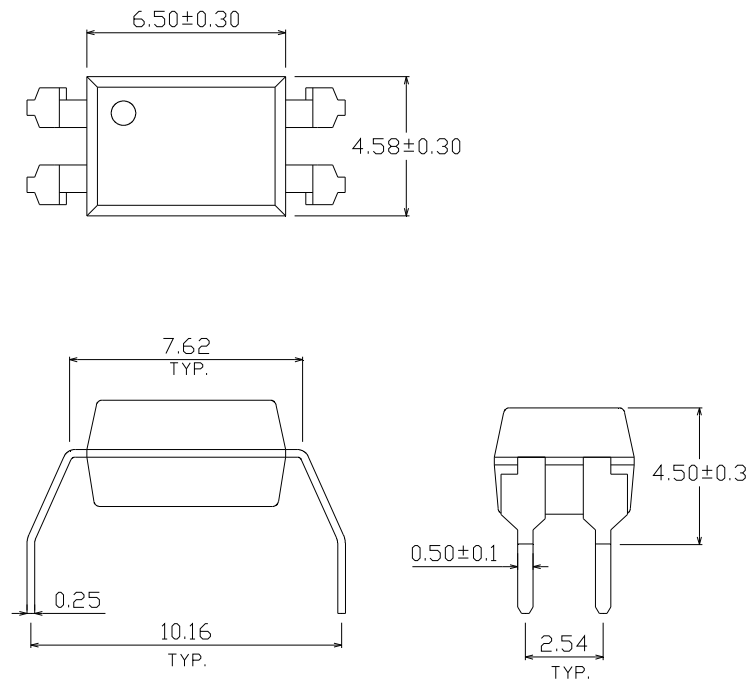
Option	Description	Packing quantity
None	Standard DIP-4	100 units per tube
M	Wide lead bend (0.4 inch spacing)	100 units per tube
S (TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
S (TB)	Surface mount lead form + TB tape & reel option	1000 units per reel
S1 (TA)	Surface mount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

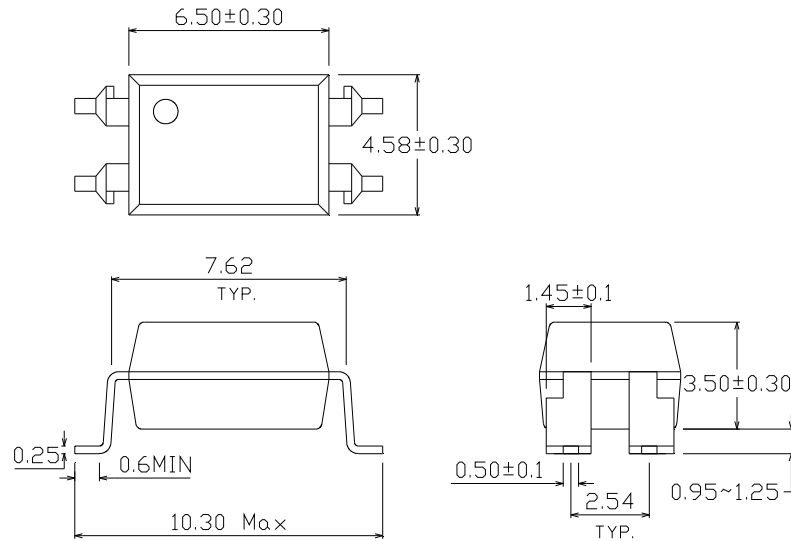
Standard DIP Type



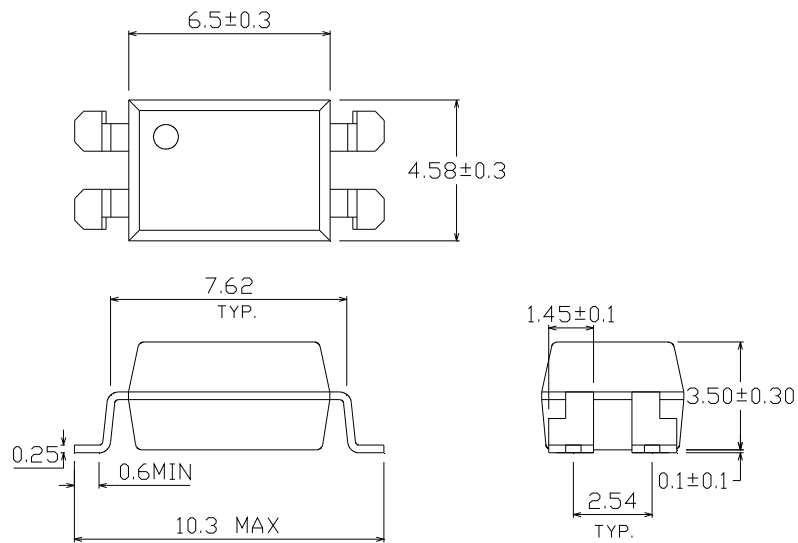
Option M Type



Option S Type

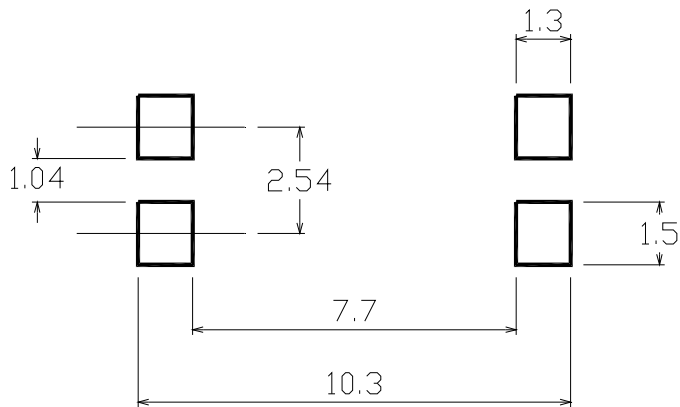


Option S1 Type





### Recommended pad layout for surface mount leadform



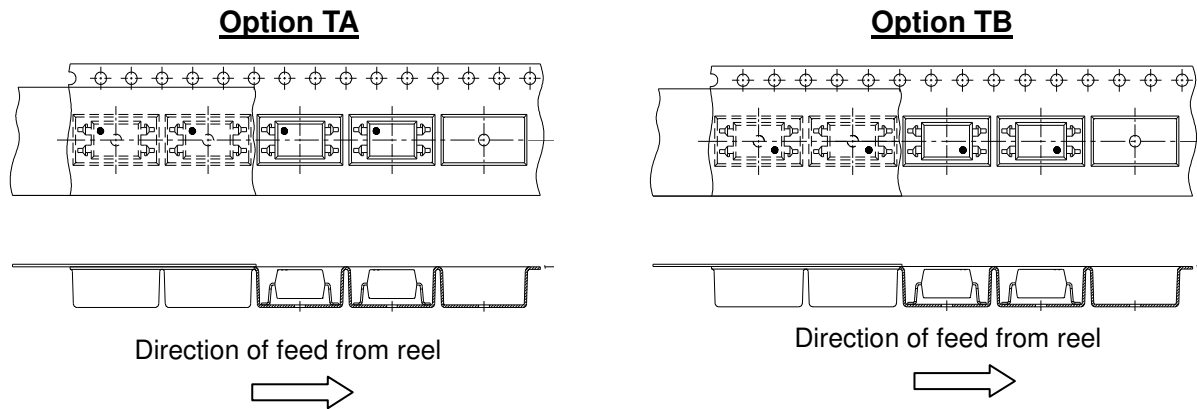
### Device Marking



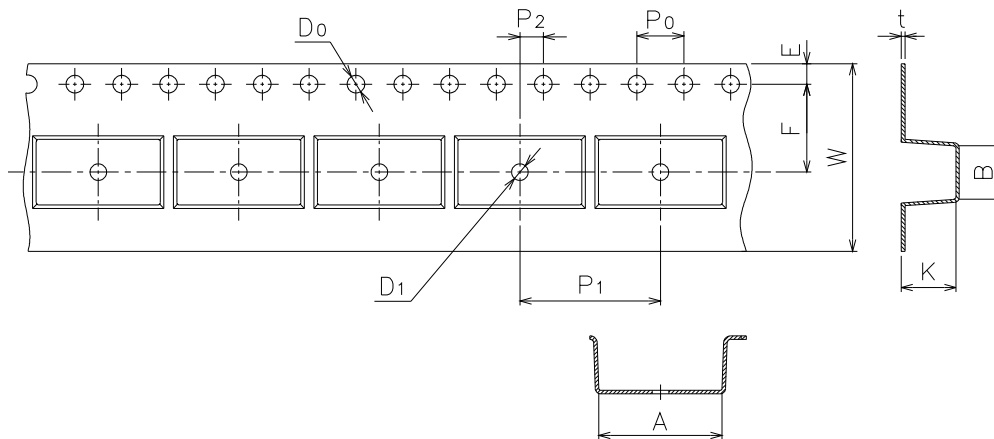
### Notes

- EL denotes EVERLIGHT
- 851 denotes Device Number
- Y denotes 1 digit Year code
- WW denotes 2 digit Week code
- V denotes VDE (optional)

**Tape & Reel Packing Specifications**

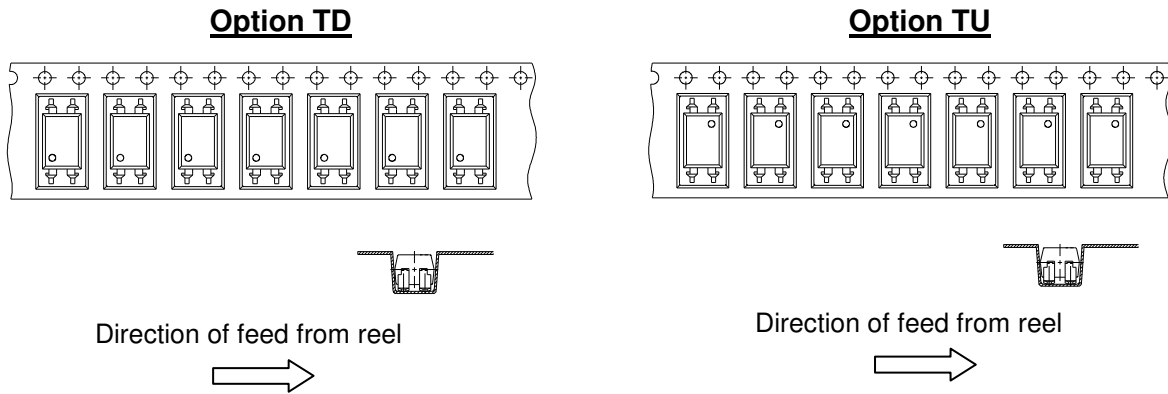


**Tape dimensions**

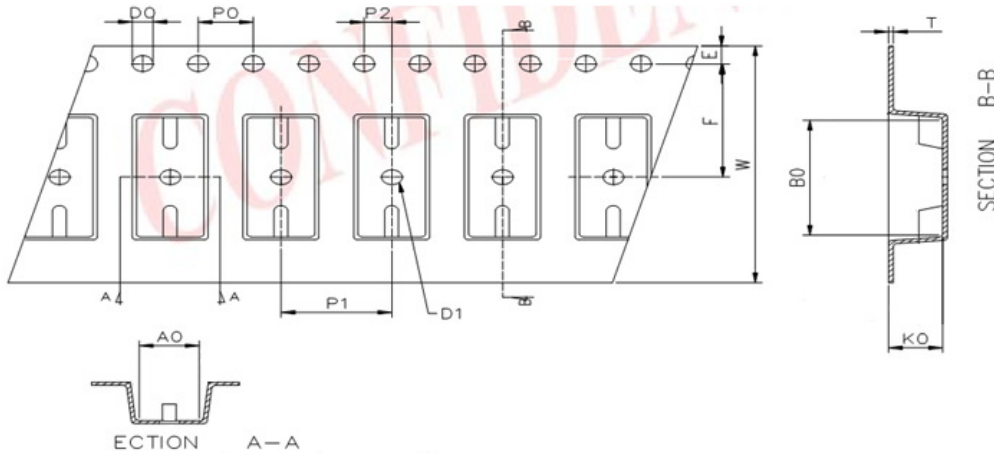


Dimension No.	<b>A</b>	<b>B</b>	<b>Do</b>	<b>D1</b>	<b>E</b>	<b>F</b>
Dimension (mm) S	10.5±0.1	4.65±0.1	1.5±0.1	1.50±0.1	1.75±0.1	7.5±0.1
Dimension (mm) S1	10.5±0.1	4.65±0.1	1.5±0.1	1.50±0.1	1.75±0.1	7.5±0.1
Dimension No.	<b>Po</b>	<b>P1</b>	<b>P2</b>	<b>t</b>	<b>W</b>	<b>K</b>
Dimension (mm) S	4.0±0.1	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**



**Tape dimensions**

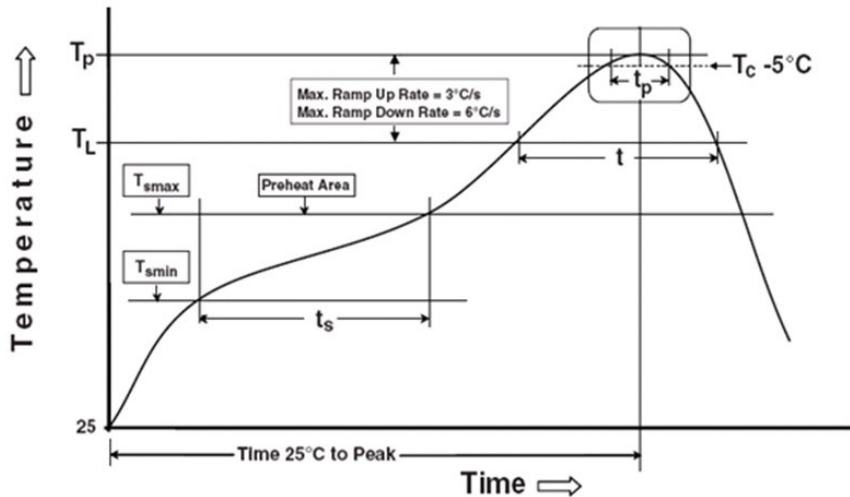


Dimension No.	<b>Ao</b>	<b>Bo</b>	<b>Do</b>	<b>D1</b>	<b>E</b>	<b>F</b>
Dimension (mm)	4.90±0.1	10.40±0.1	1.5±0.1	1.50±0.1	1.75±0.1	7.50±0.1
Dimension No.	<b>Po</b>	<b>P1</b>	<b>P2</b>	<b>t</b>	<b>W</b>	<b>Ko</b>
Dimension(mm)	4.00±0.1	8.00±0.	2.00±0.1	0.40±0.1	16.00±0.3	4.60±0.1

## 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

## **DISCLAIMER**

1. Above specification may be changed without notice. EVERLIGHT will reserve authority on material change for above specification.
2. When using this product, please observe the absolute maximum ratings and the instructions for using outlined in these specification sheets. EVERLIGHT assumes no responsibility for any damage resulting from use of the product which does not comply with the absolute maximum ratings and the instructions included in these specification sheets.
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