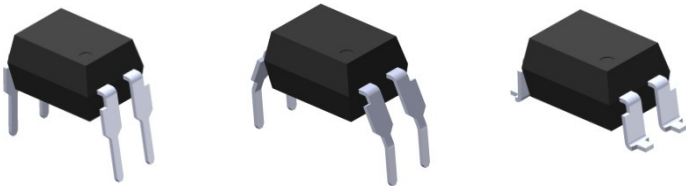
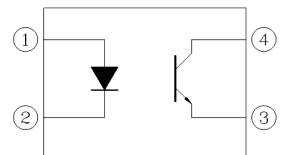


4 PIN DIP HIGH VOLTAGE PHOTOTRANSISTOR PHOTOCOUPLER EL851 Series



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	μA	$V_R = 5\text{V}$
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}	-	-	Ω	$V_{IO} = 500\text{Vdc}$
Input-output capacitance	C_{IO}	-	0.6	-	pF	$V_{IO} = 0, f = 1\text{MHz}$
Rise time	t_r	-	4	18	μs	$V_{CE} = 2\text{V}, I_C = 2\text{mA}, R_L = 100\Omega$
Fall time	t_f	-	5	18	μs	

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

Typical Electro-Optical Characteristics Curves

Figure 1. Forward Current vs Forward Voltage

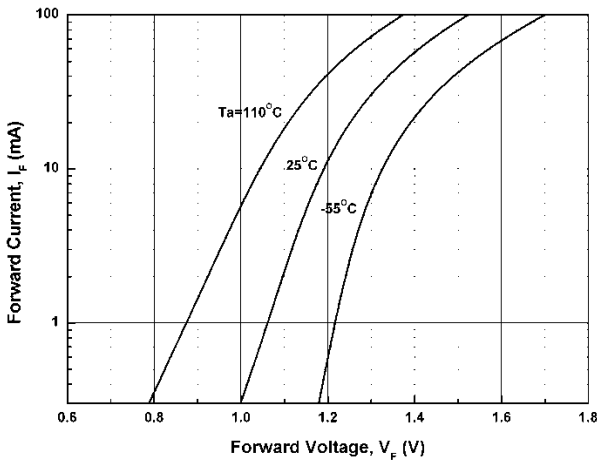


Figure 2. Current Transfer Ratio vs Forward Current

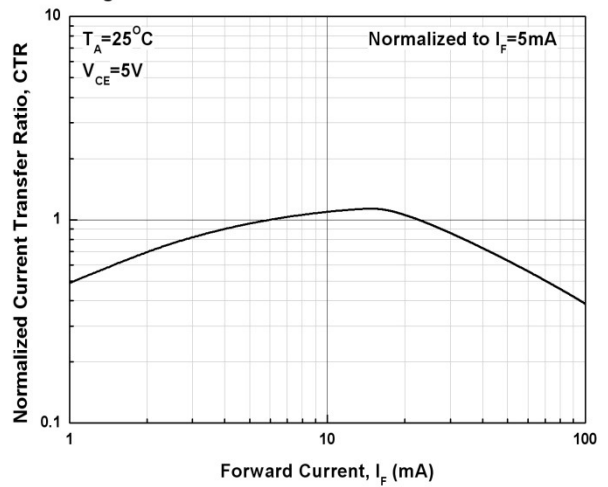


Figure 3. Collector Current vs Collector-emitter Voltage

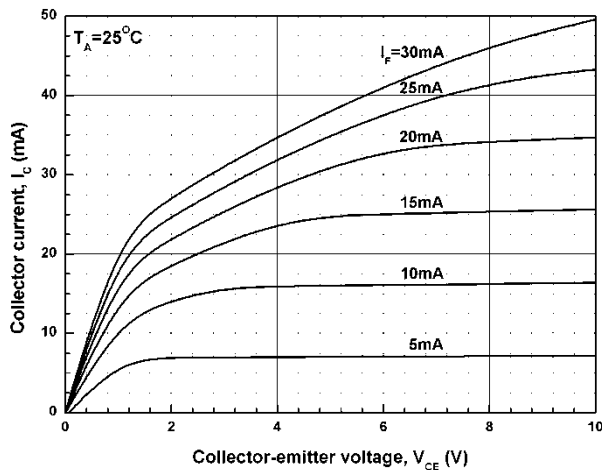


Figure 4. Relative Current Transfer Ratio vs Ambient Temperature

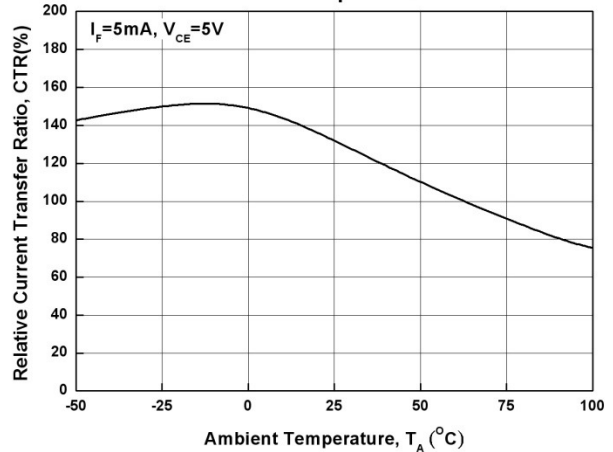


Figure 5. Collector-emitter Saturation Voltage vs Ambient Temperature

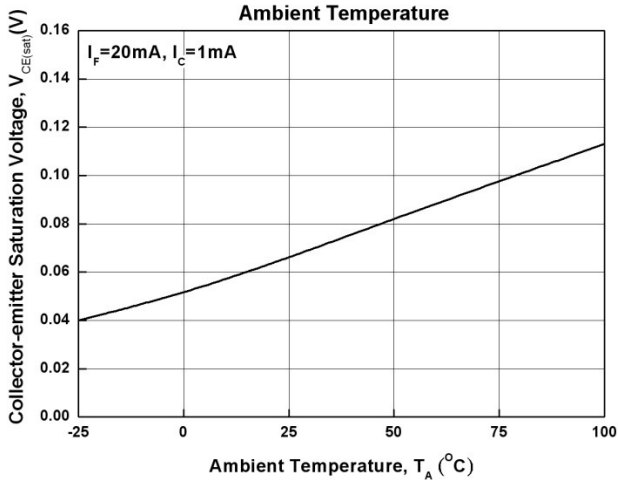


Figure 6. Dark Current vs Ambient Temperature

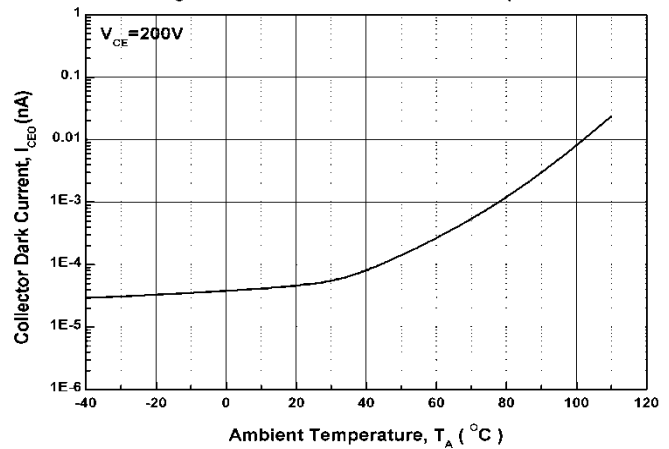


Figure 7. Switching Time vs. Load Resistance

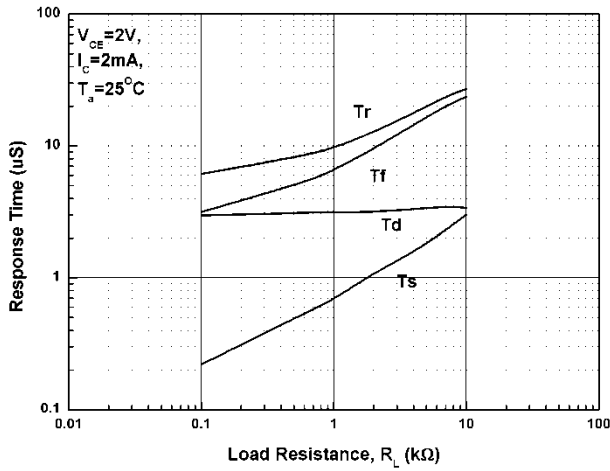


Figure 8. Collector-emitter Saturation Voltage vs Forward Current

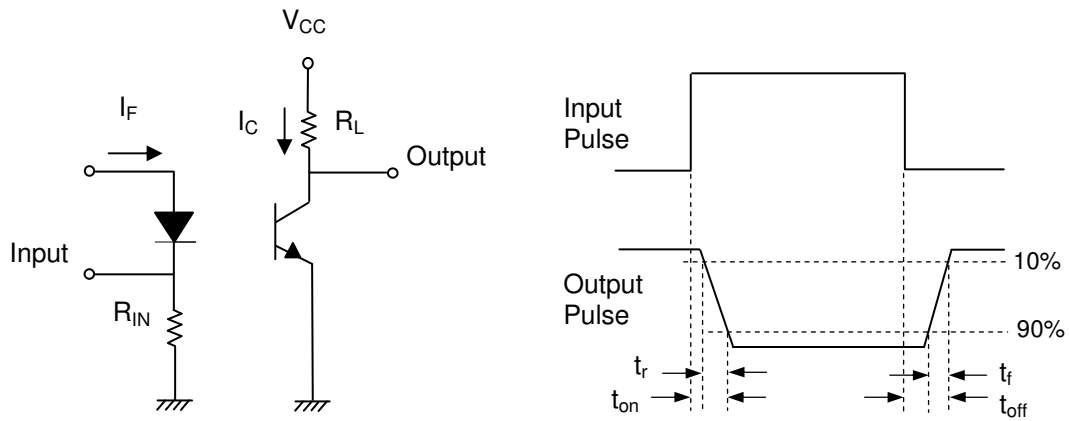
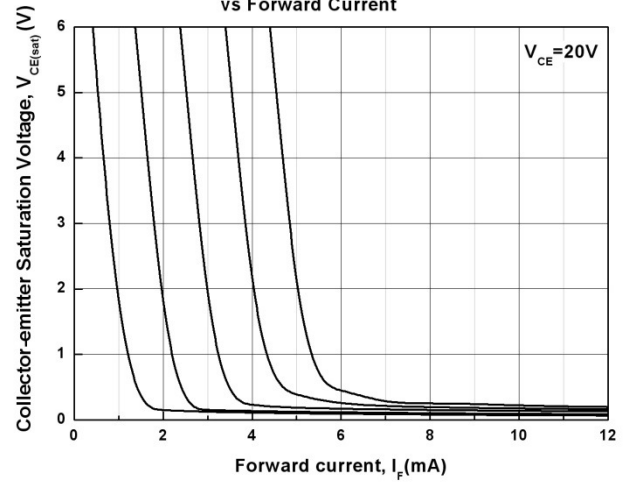


Figure 9. Switching Time Test Circuit & Waveforms

Order Information

Part Number

EL851X(Z)-V

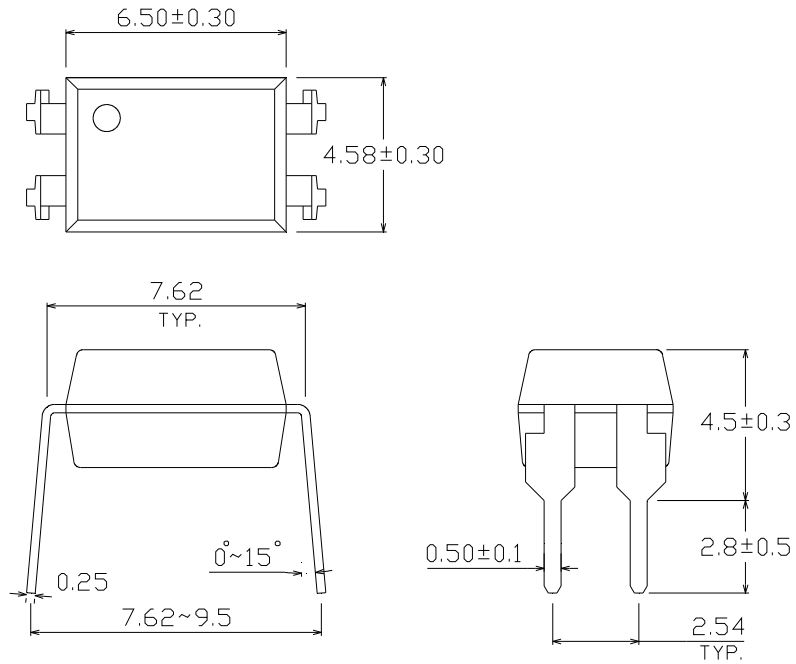
Note

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

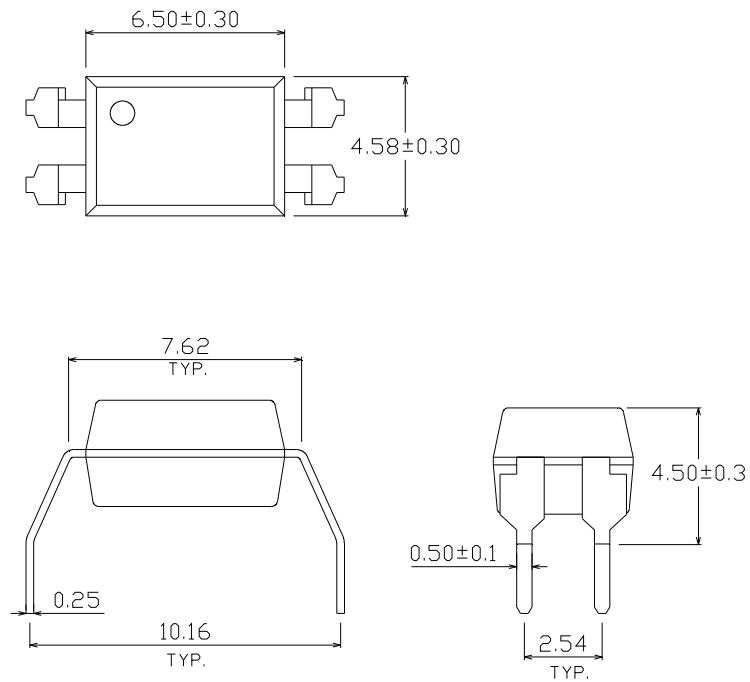
Option	Description	Packing quantity
None	Standard DIP-4	100 units per tube
M	Wide lead bend (0.4 inch spacing)	100 units per tube
S (TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
S (TB)	Surface mount lead form + TB tape & reel option	1000 units per reel
S1 (TA)	Surface mount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

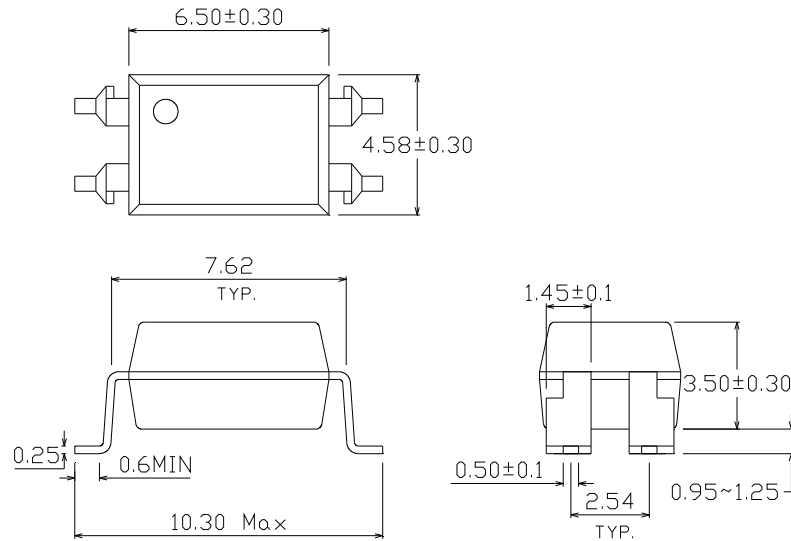
Standard DIP Type



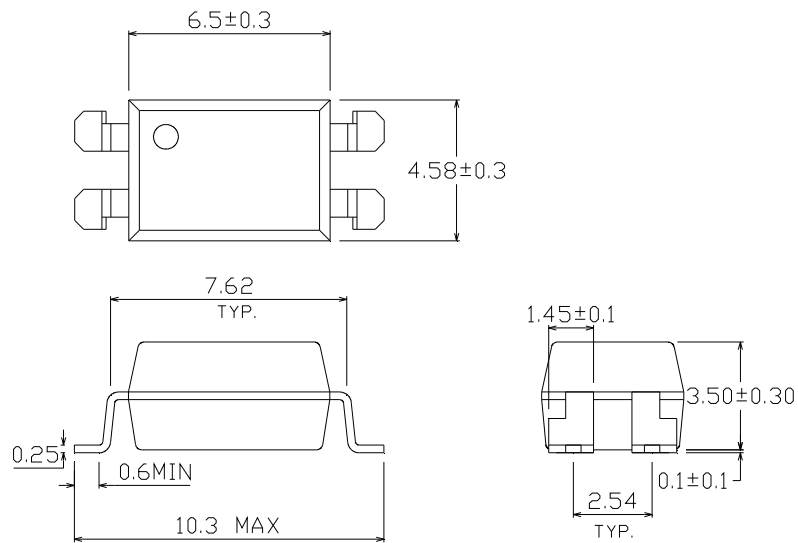
Option M Type



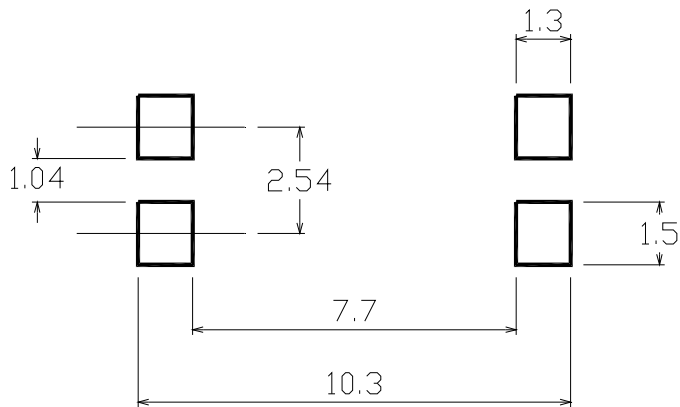
Option S Type



Option S1 Type



Recommended pad layout for surface mount leadform



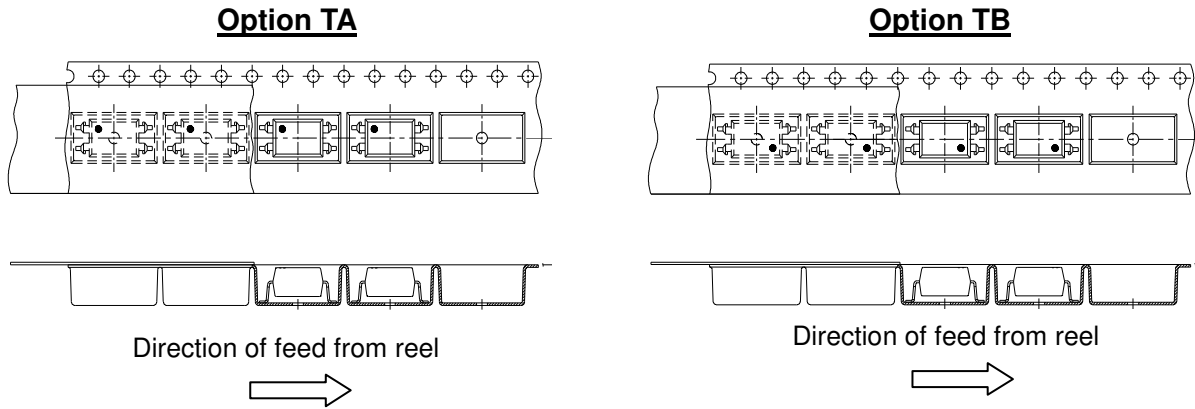
Device Marking



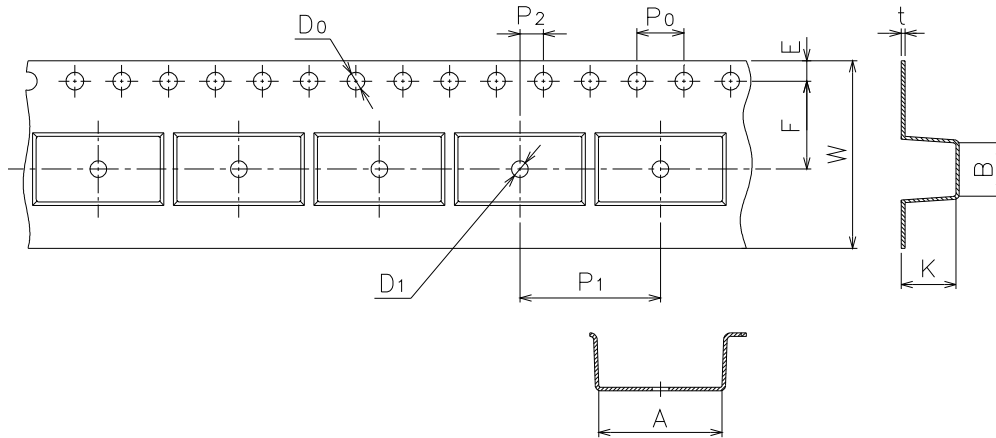
Notes

- 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

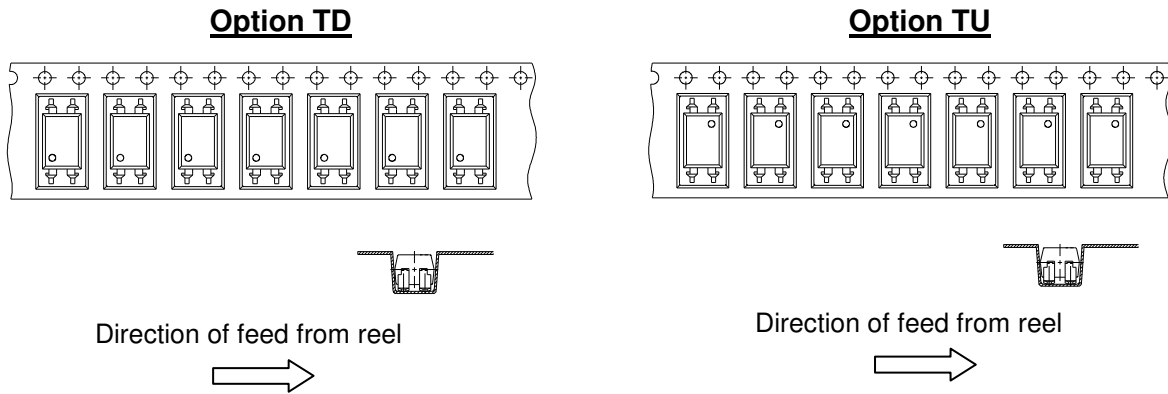


Tape dimensions

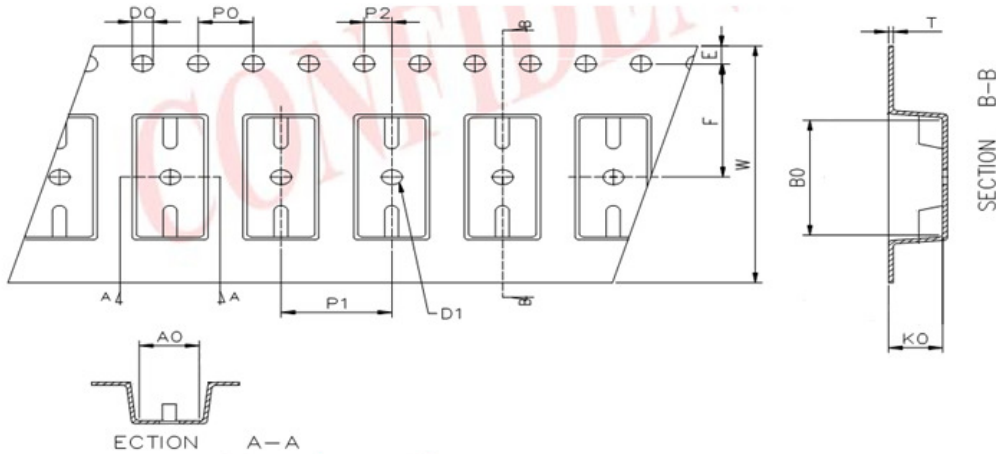


Dimension No.	A	B	Do	D1	E	F
Dimension (mm) S	10.5±0.1	4.65±0.1	1.5±0.1	1.50±0.1	1.75±0.1	7.5±0.1
Dimension (mm) S1	10.5±0.1	4.65±0.1	1.5±0.1	1.50±0.1	1.75±0.1	7.5±0.1
Dimension No.	Po	P1	P2	t	W	K
Dimension (mm) S	4.0±0.1	12.0±0.1	2.0±0.1	0.4±0.1	16.0±0.3	5.05±0.1
Dimension (mm) S1	4.0±0.1	12.0±0.1	2.0±0.1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

Tape & Reel Packing Specifications



Tape dimensions

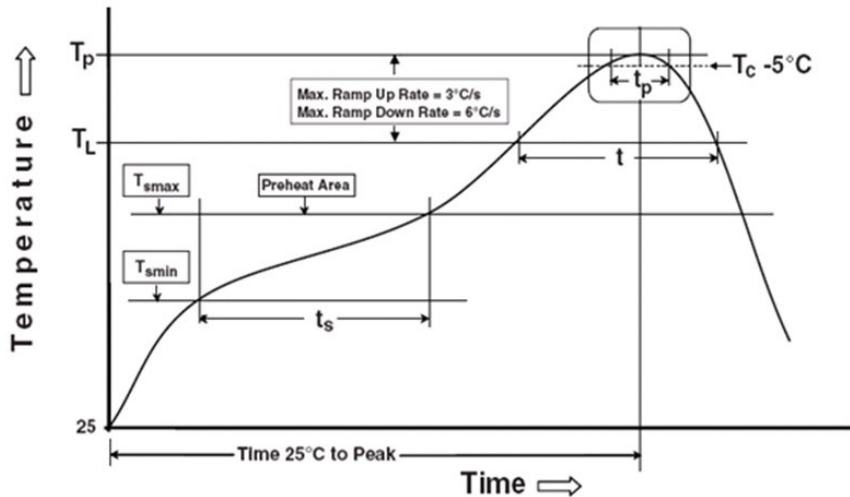


Dimension No.	Ao	Bo	Do	D1	E	F
Dimension (mm)	4.90±0.1	10.40±0.1	1.5±0.1	1.50±0.1	1.75±0.1	7.50±0.1
Dimension No.	Po	P1	P2	t	W	Ko
Dimension(mm)	4.00±0.1	8.00±0.	2.00±0.1	0.40±0.1	16.00±0.3	4.60±0.1

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