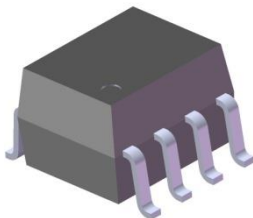


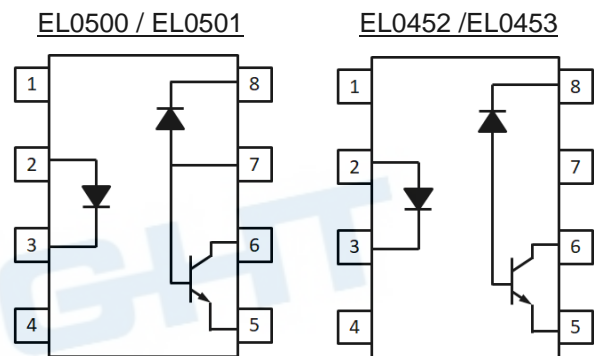
8 PIN SOP HIGH SPEED 1Mbit/s TRANSISTOR PHOTOCOUPLER EL045X EL050X Series



Features

- Compliance Halogen Free (Br <900 ppm , Cl <900 ppm , Br+Cl < 1500 ppm)
- High speed 1Mbit/s
- 15kV/μs minimum common mode transient immunity at VCM= 1500V (EL0453)
- High isolation voltage between input and output (Viso=3750 Vrms)
- Guaranteed performance from 0°C to 70°C
- Wide operating temperature range of -55°C to 100°C
- Compliance with EU REACH
- Pb free and RoHS compliant
- UL and cUL approved (No. E214129)
- VDE approved (No. 40028116)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved Description

Schematic



Pin Configuration

1. No Connection
2. Anode
3. Cathode
4. No Connection
5. Gnd
6. V_{out}
7. V_B
8. V_{CC}

Pin Configuration

1. No Connection
2. Anode
3. Cathode
4. No Connection
5. Gnd
6. V_{out}
7. No Connection
8. V_{CC}

Description

The EL0500, EL0501, EL0452 and EL0453 devices each consist of an infrared emitting diode, optically coupled to a high speed photo detector transistor. A separate connection for the photodiode bias and output-transistor collector increase the speed by several orders of magnitude over conventional phototransistor couplers by reducing the base-collector capacitance of the input transistor. The devices are packaged in an 8-pin small outline package which conforms to the standard SO-8 footprint.

Applications

- Line receivers
- Telecommunication equipments
- Power transistor isolation in motor drives
- Replacement for low speed phototransistor photo couplers

- Feedback loop in switch-mode power supplies
- Home appliances
- High speed logic ground isolation

Absolute Maximum Ratings (Ta=25°C)

Parameter		Symbol	Rating	Unit
Input	Forward current	I _F	25	mA
	Peak forward current (50% duty, 1ms P.W)	I _{FP}	50	mA
	Peak transient current (≤1μs P.W,300pps)	I _{Ftrans}	1	A
	Reverse voltage	V _R	5	V
	Power dissipation	P _{IN}	45	mW
	Power dissipation	P _O	100	mW
Output	Emitter-Base reverse voltage	EL0500 EL0501 V _{EBR}	5	V
	Base current	EL0500 EL0501 I _B	5	mA
	Average Output current	I _{O(AVG)}	8	mA
	Peak Output current	I _{O(PK)}	16	mA
	Output voltage	V _O	-0.5 to 20	V
	Supply voltage	V _{CC}	-0.5 to 30	V
Isolation voltage *1	V _{ISO}	3750	V rms	
Operating temperature	T _{OPR}	-55 ~ +100	°C	
Storage temperature	T _{STG}	-55 ~ +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, 3, 4 are shorted together, and pins 5, 6, 7, 8 are shorted together.

*2 For 10 seconds.

Electrical Characteristics (T_A=0 to 70°C unless specified otherwise)

Input

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward Voltage	V _F	-	1.45	1.8	V	I _F =16mA
Reverse Voltage	V _R	5.0	-	-	V	I _R = 10μA
Temperature coefficient of forward voltage	ΔV _F /ΔT _A	-	-1.9	-	mV/°C	I _F =16mA

Output

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Logic High Output Current	I _{OH}	-	0.001	0.5	μA	I _F =0mA, V _O =V _{CC} =5.5V, T _A =25°C
		-	0.01	1		I _F =0mA, V _O =V _{CC} =15V, T _A =25°C
		-	-	50		I _F =0mA, V _O =V _{CC} =15V
Logic Low Supply Current	I _{CCL}	-	140	200	μA	I _F =16mA, V _O =Open, V _{CC} =15V
Logic High Supply Current	I _{CCH}	-	0.01	1	μA	I _F =0mA, V _O =Open, V _{CC} =15V, T _A =25°C
		-	-	2		I _F =0mA, V _O =Open, V _{CC} =15V

Transfer Characteristics (T_A=0 to 70°C unless specified otherwise)

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Current Transfer Ratio	EL0500	7	-	50	%	I _F = 16mA, V _O = 0.4V, V _{CC} =4.5V, T _A =25°C
	EL0501	19	-	50		
	EL0452					
	EL0453					
	EL0500	5	-	-		
	EL0501	15	-	-		
EL0452						
EL0453						
Logic Low Output Voltage	EL0500	-	0.18	0.4	V	I _F = 16mA, I _O = 1.1mA, V _{CC} =4.5V, T _A =25°C
	EL0501	-	0.18	0.4		
	EL0452					
	EL0453					
	EL0500	-	-	0.5		I _F = 16mA, I _O = 0.8mA, V _{CC} =4.5V
	EL0501	-	-	0.5		
EL0452						
EL0453						

Switching Characteristics ($T_A=0$ to 70°C unless specified otherwise, $I_F=16\text{mA}$, $V_{CC}=5\text{V}$)

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Propagation Delay Time to Logic Low (Fig.8)	EL0500	-	-	1.5	μs	$R_L=4.1\text{K}\Omega$, $T_A=25^\circ\text{C}$
		-	-	2.0		$R_L=4.1\text{K}\Omega$
	EL0501 EL0452 EL0453	-	-	0.8		$R_L=1.9\text{K}\Omega$, $T_A=25^\circ\text{C}$
		-	-	1.0		$R_L=1.9\text{K}\Omega$
Propagation Delay Time to Logic High (Fig.8)	EL0500	-	-	1.5	μs	$R_L=4.1\text{K}\Omega$, $T_A=25^\circ\text{C}$
		-	-	2.0		$R_L=4.1\text{K}\Omega$
	EL0501 EL0452 EL0453	-	-	0.8		$R_L=1.9\text{K}\Omega$, $T_A=25^\circ\text{C}$
		-	-	1.0		$R_L=1.9\text{K}\Omega$
Common Mode Transient Immunity at Logic High (Fig.9) ^{*3}	EL0500	-	1,000	-	$\text{V}/\mu\text{s}$	$I_F = 0\text{mA}$, $V_{CM}=10\text{Vp-p}$, $R_L=4.1\text{K}\Omega$, $T_A =25^\circ\text{C}$
	EL0452 EL0501	-	1,000	-		$I_F = 0\text{mA}$, $V_{CM}=10\text{Vp-p}$, $R_L=1.9\text{K}\Omega$, $T_A =25^\circ\text{C}$
	EL0453	15000	-	-		$I_F = 0\text{mA}$, $V_{CM}=1500\text{Vp-p}$, $R_L=1.9\text{K}\Omega$, $T_A =25^\circ\text{C}$
Common Mode Transient Immunity at Logic Low (Fig.9) ^{*3}	EL0500	-	1,000	-	$\text{V}/\mu\text{s}$	$I_F = 16\text{mA}$, $V_{CM}=10\text{Vp-p}$, $R_L=4.1\text{K}\Omega$, $T_A =25^\circ\text{C}$
	EL0452 EL0501	-	1,000	-		$I_F = 16\text{mA}$, $V_{CM}=10\text{Vp-p}$, $R_L=1.9\text{K}\Omega$, $T_A=25^\circ\text{C}$
	EL0453	15000	-	-		$I_F = 16\text{mA}$, $V_{CM}=1500\text{Vp-p}$, $R_L=1.9\text{K}\Omega$, $T_A=25^\circ\text{C}$

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

Typical Electro-Optical Characteristics Curves

Figure 5. Logic High Output Current vs Ambient Temperature

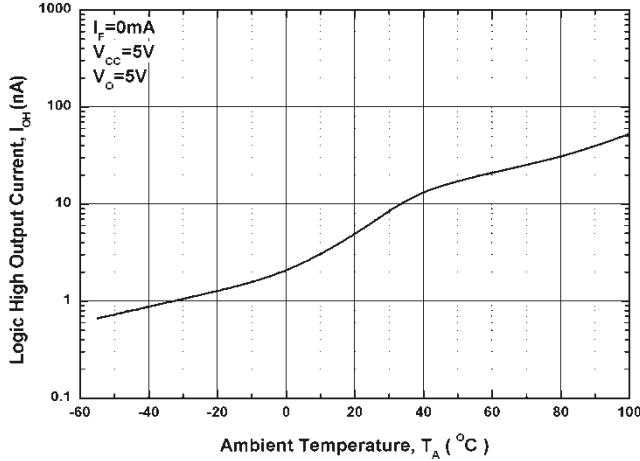


Figure 1. Forward Current vs Forward Voltage

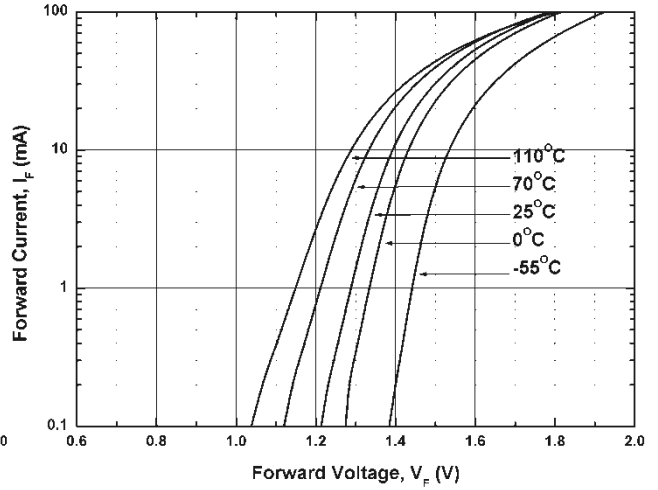


Figure 2. Current Transfer Ratio vs Forward Current

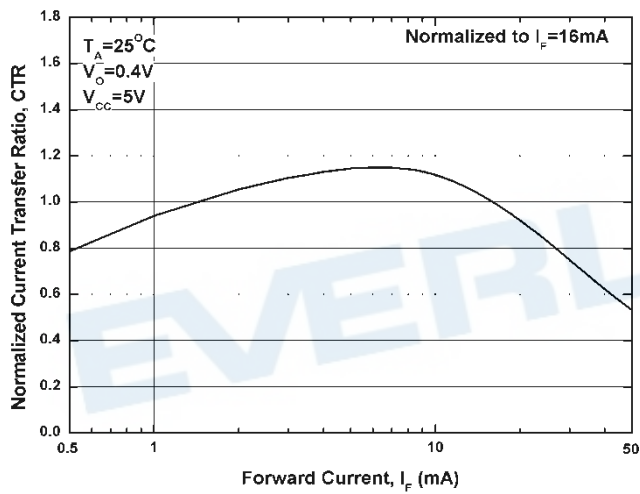


Figure 3. Current Transfer Ratio vs Ambient Temperature

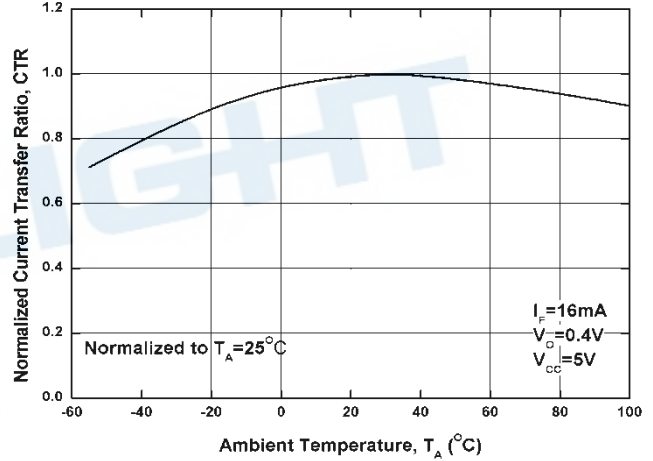


Figure 4. Output Current vs Output Voltage

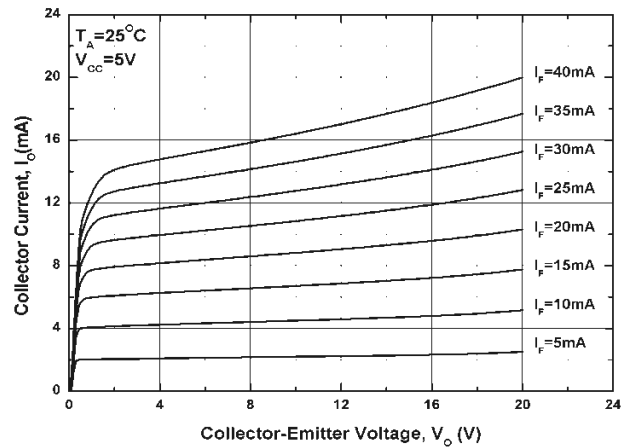
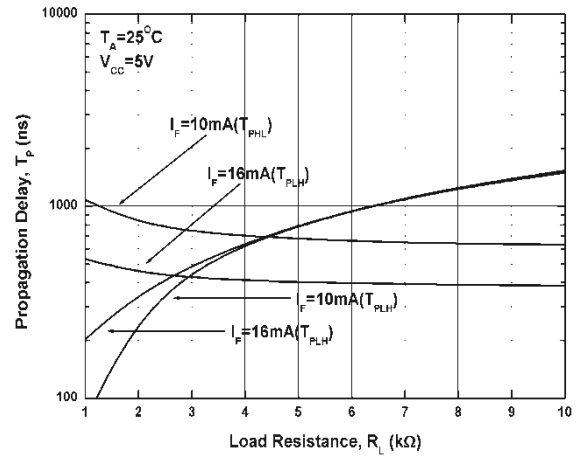


Figure 6. Propagation Delay vs. Load Resistance



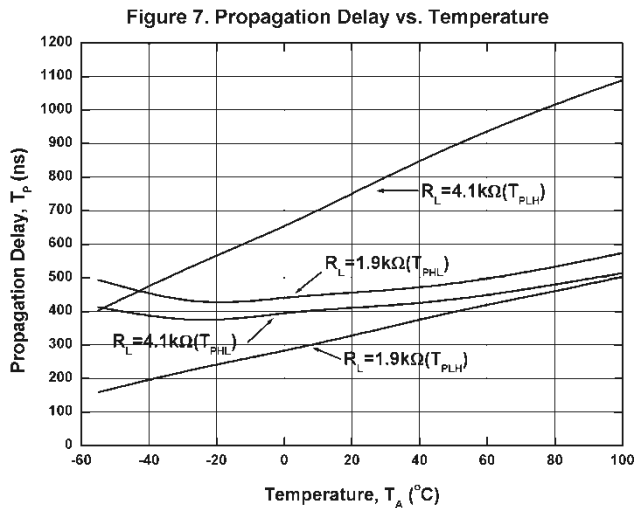


Figure 8 Switching Time Test Circuit & Waveform

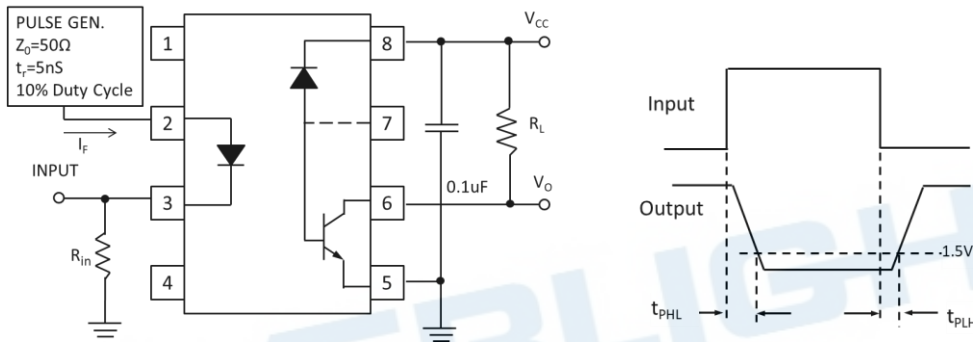
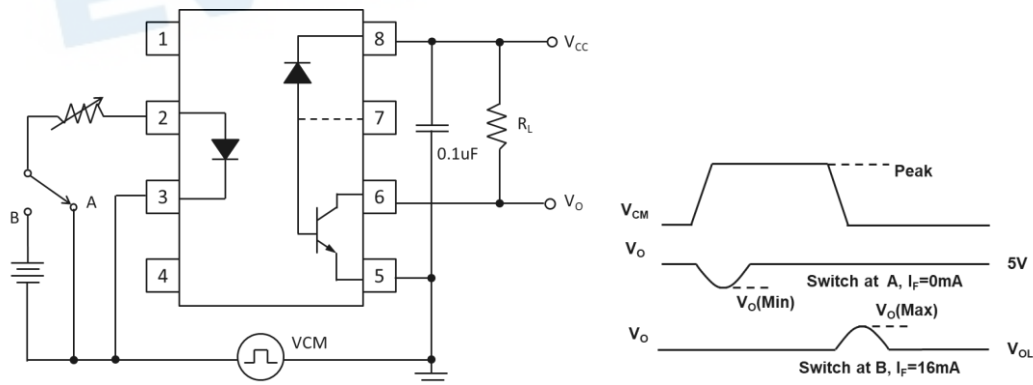


Figure 9 Transient Immunity Test Circuit & Waveform



Note:

*3 Common mode transient immunity in logic high level is the maximum tolerable (positive) dV_{cm}/dt on the leading edge of the common mode pulse signal VCM, to assure that the output will remain in a logic high state (i.e., $V_o > 2.0V$).

Common mode transient immunity in logic low level is the maximum tolerable (negative) dV_{cm}/dt on the trailing edge of the common mode pulse signal, VCM, to assure that the output will remain in a logic low state (i.e., $V_o < 0.8V$).

Order Information

Part Number

EL050X(Z)-V

Or

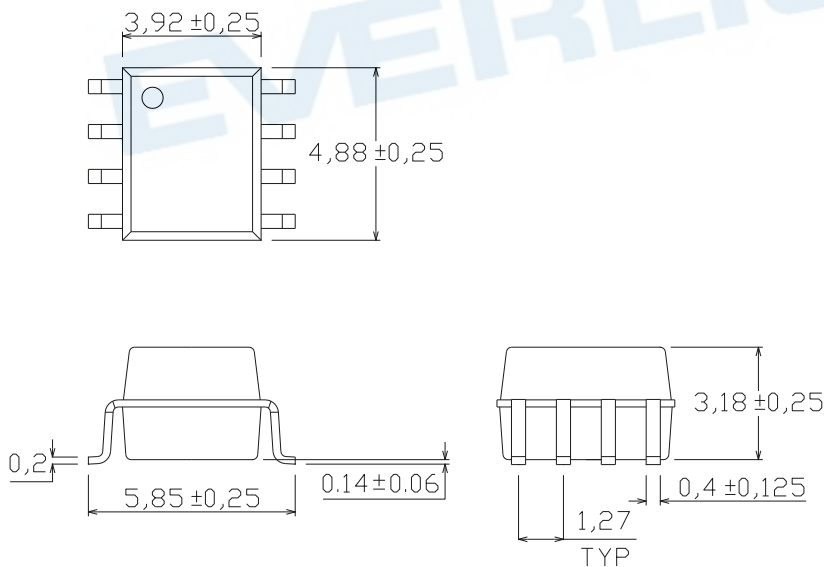
EL045X(Z)-V

Note

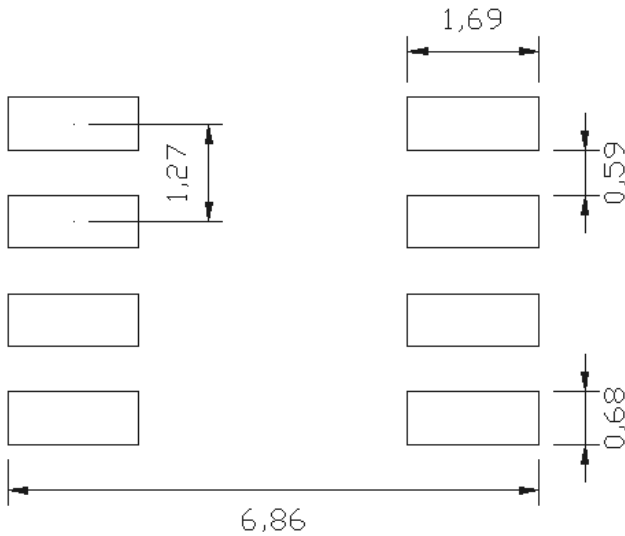
- X = Part No. (X = 0 or 1) for EL050X ; (X=2 or 3) for EL045X
- Z = Tape and reel option (TA, TB).
- V = VDE (optional)

Option	Description	Packing quantity
(TA)	TA tape & reel option	2000 units per reel
(TB)	TB tape & reel option	2000 units per reel
(TA)-V	TA tape & reel option + VDE	2000 units per reel
(TB)-V	TB tape & reel option + VDE	2000 units per reel

**Package Drawing
 (Dimensions in mm)**



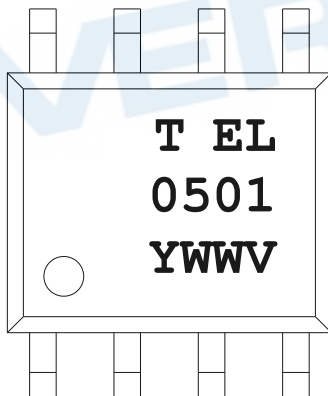
Recommended pad layout for surface mount leadform



Notes

Suggested pad dimension is just for reference only.
 Please modify the pad dimension based on individual need.

Device Marking

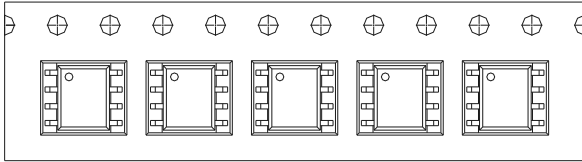


Notes

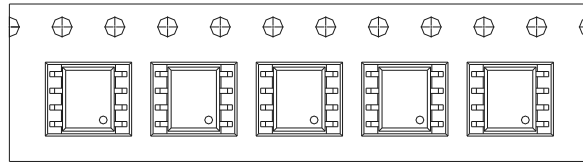
- T denotes Factory
 No code : made in China
 T : made in Taiwan
- EL denotes EVERLIGHT
- 0501 denotes Device Number
- Y denotes 1 digit Year code
- WW denotes 2 digit Week code
- V denotes VDE (optional)

Tape & Reel Packing Specifications

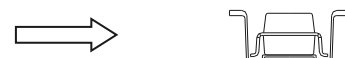
Option TA



Option TB

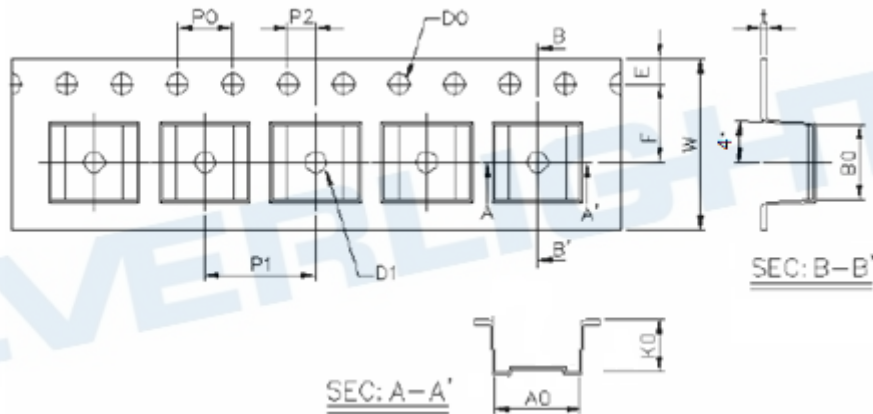


Direction of feed from reel



Direction of feed from reel

Tape dimensions

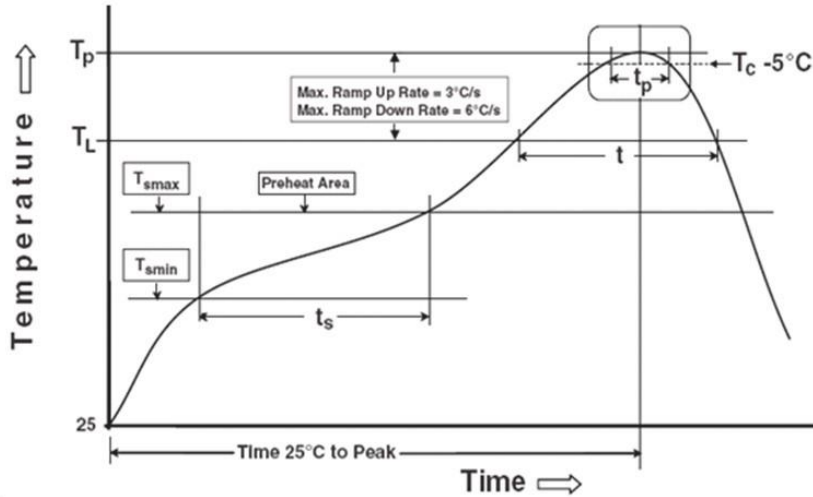


Dimension No.	A0	B0	D0	D1	E	F
Dimension(mm)	6.2±0.1	5.26±0.1	1.5±0.1	1.5±0.3	1.75±0.1	5.5±0.1
Dimension No.	Po	P1	P2	t	W	K0
Dimension(mm)	4.0±0.1	8.0±0.1	2.0±0.1	0.25±0.1	12.0+0.3/ -0.1	3.75±0.1

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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