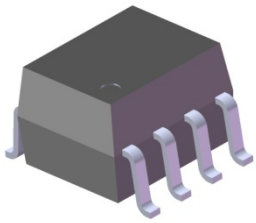
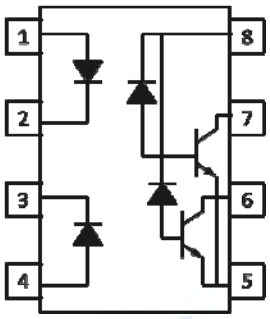
DATASHEET

8 PIN SOP DUAL CHANNEL HIGH SPEED 1Mbit/s TRANSISTOR PHOTOCOUPLER EL053X Series



Schematic



Pin Configuration
1. Anode
2. Cathode
3. Cathode
4. Anode
5. Gnd
6. $V_{out\ 2}$
7. $V_{out\ 1}$
8. V_{CC}

Features

- Compliance Halogen Free .
  (Br <900 ppm ,Cl <900 ppm , Br+Cl < 1500 ppm)
- High speed 1Mbit/s
- 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

The EL053X 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
Output	Power dissipation	P_O	100	mW
	Emitter-Base reverse voltage	V_{EBR}	5	V
	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	-	1.4	1.8	V	I_F = 16mA
Reverse Voltage	V_R	5.0	-	-	V	I_R = 10μA
Temperature coefficient of forward voltage	$\Delta V_F/\Delta T_A$	-	-1.6	-	mV/°C	I_F =16mA
Input Capacitance	C_{IN}	-	60	-	pF	V_F=0V, f=1MHz

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}	-	120	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	EL0530	CTR	7	-	50	%	I_F = 16mA ,V_O = 0.4V, V_{CC}=4.5V, T_A=25°C
	EL0531		19	-	50		
	EL0530		5	-	-		I_F = 16mA ,V_O = 0.5V, V_{CC}=4.5V
	EL0531		15	-	-		
Logic Low Output Voltage	EL0530	V_{OL}	-	0.18	0.4	V	I_F = 16mA ,I_O = 1.1mA, V_{CC}=4.5V, T_A=25°C
	EL0531		-	0.30	0.4		I_F = 16mA ,I_O = 3mA, V_{CC}=4.5V, T_A=25°C
	EL0530		-	-	0.5		I_F = 16mA ,I_O = 0.8mA, V_{CC}=4.5V
	EL0531		-	-	0.5		I_F=16mA ,I_O=2.4mA, V_{CC}=4.5V

Switching Characteristics (T_A=0 to 70°C unless specified otherwise, I_F=16mA, Vcc=5V)

Parameter		Symbol	Min	Typ.	Max.	Unit	Condition
Propagation Delay Time to Logic Low	EL0530	t_{PHL}	-	-	1.5	µs	R_L=4.1KΩ, T_A=25°C
			-	-	2.0		R_L=4.1KΩ
	EL0531		-	-	0.8		R_L=1.9KΩ, T_A=25°C
			-	-	1.0		R_L=1.9KΩ
Propagation Delay Time to Logic High	EL0530	t_{PLH}	-	-	1.5	µs	R_L=4.1KΩ, T_A=25°C
			-	-	2.0		R_L=4.1KΩ
	EL0531		-	-	0.8		R_L=1.9KΩ, T_A=25°C
			-	-	1.0		R_L=1.9KΩ
Common Mode Transient Immunity at Logic High	EL0530	CM_H	1,000	10,000	-	V/µs	I_F = 0mA , V_{CM}=10Vp-p, R_L=4.1KΩ, T_A =25°C
	EL0531		1,000	-	-		I_F = 0mA , V_{CM}=1500Vp-p, R_L=1.9KΩ, T_A =25°C
Common Mode Transient Immunity at Logic Low (Fig.9)*3	EL0530	CM_L	1,000	10,000	-	V/µs	I_F = 16mA , V_{CM}=10Vp-p, R_L=4.1KΩ, T_A =25°C
	EL0531		1,000	-	-		I_F = 16mA , V_{CM}=1500Vp-p, R_L=1.9KΩ, T_A=25°C

Typical Electro-Optical Characteristics Curves

Figure 1. Forward Current vs Forward Voltage

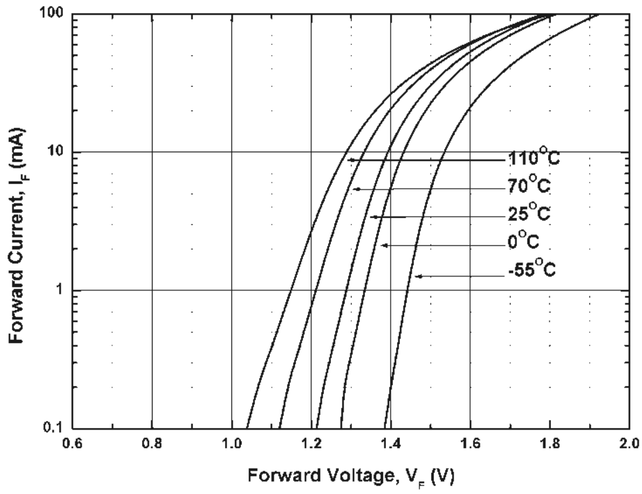


Figure 2. Current Transfer Ratio vs Forward Current

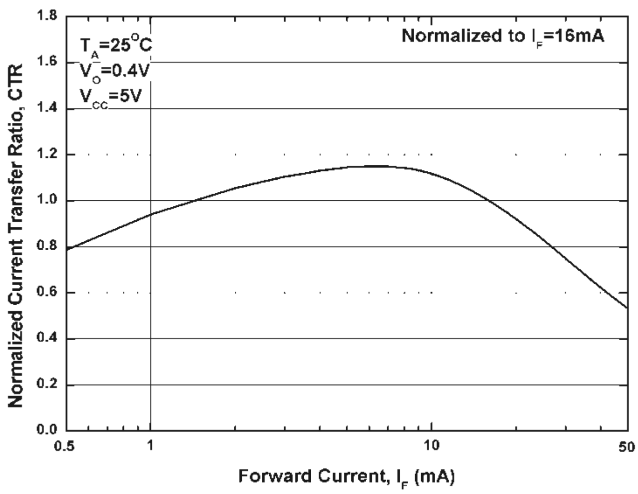


Figure 3. Current Transfer Ratio vs Ambient Temperature

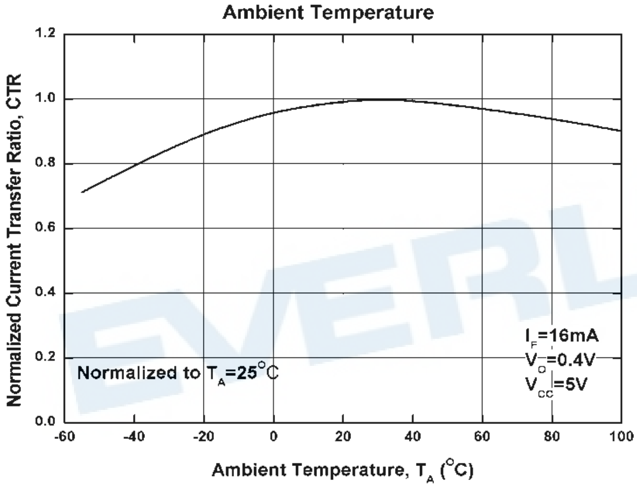


Figure 4. Output Current vs Output Voltage

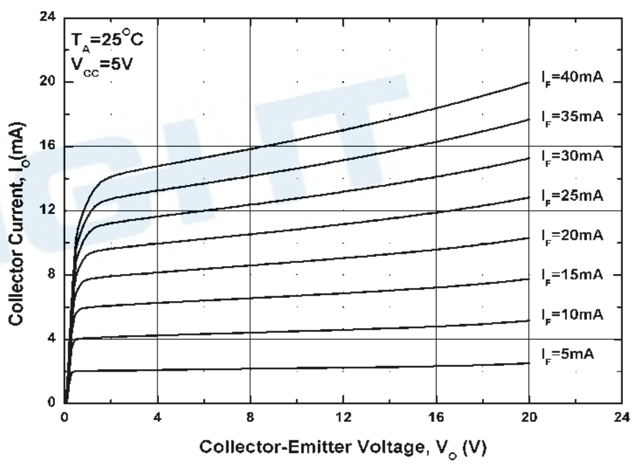


Figure 5. Logic High Output Current vs Ambient Temperature

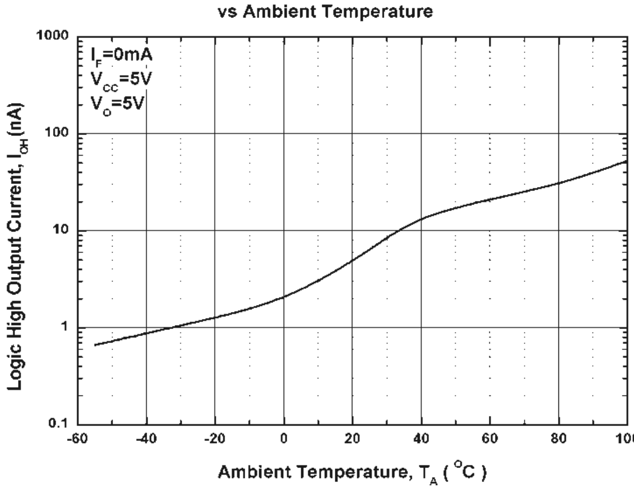
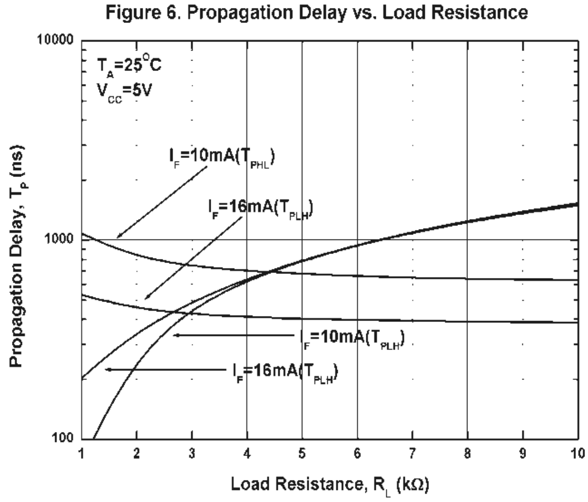


Figure 6. Propagation Delay vs. Load Resistance



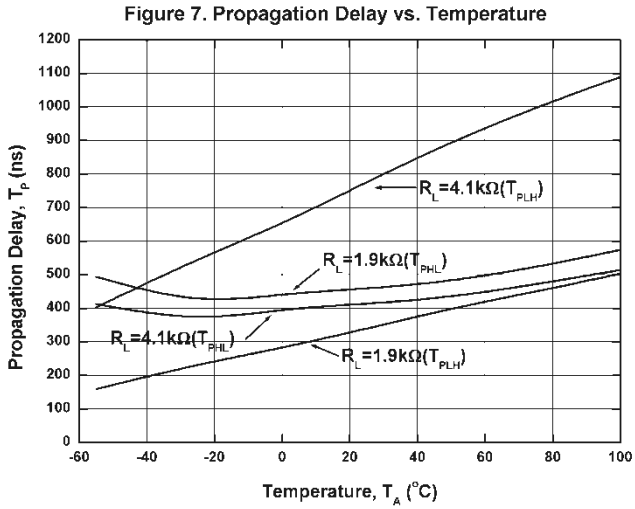


Figure 8 Switching Time Test Circuit & Waveform

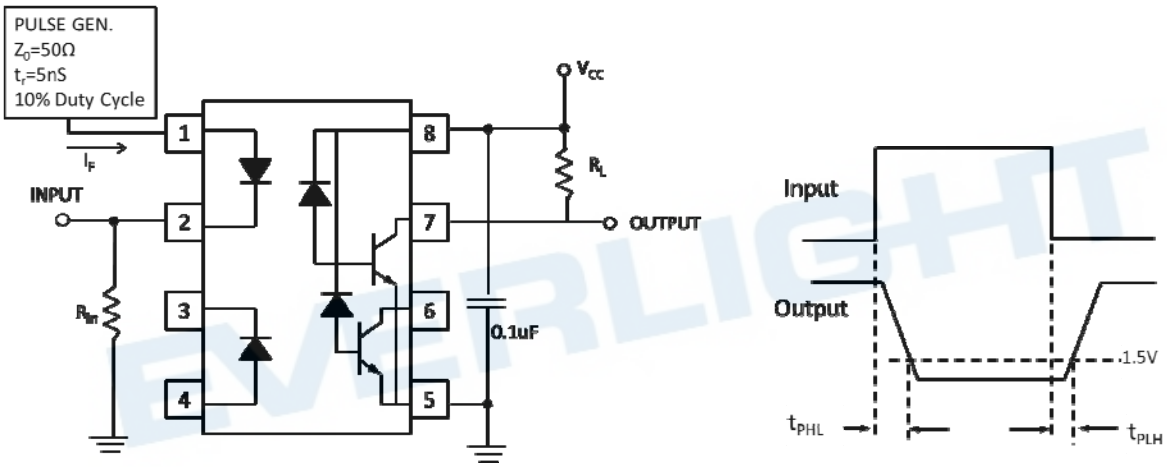
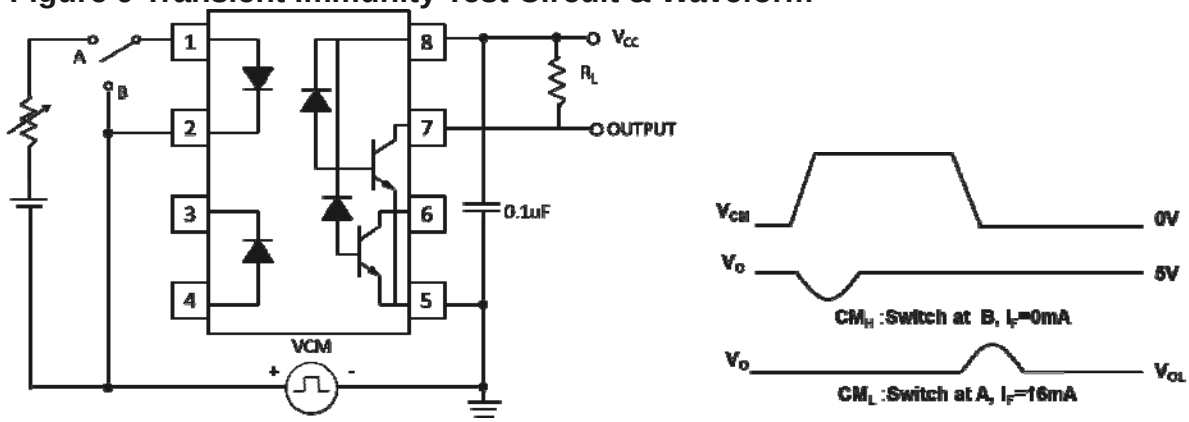


Figure 9 Transient Immunity Test Circuit & Waveform



Note:

*3 Common mode transient immunity in logic high level is the maximum tolerable (positive) dVcm/dt on the leading edge of the common mode pulse signal V_{CM}, 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) dVcm/dt on the trailing edge of the common mode pulse signal, V_{CM}, to assure that the output will remain in a logic low state (i.e., V_O < 0.8V).

Order Information

Part Number

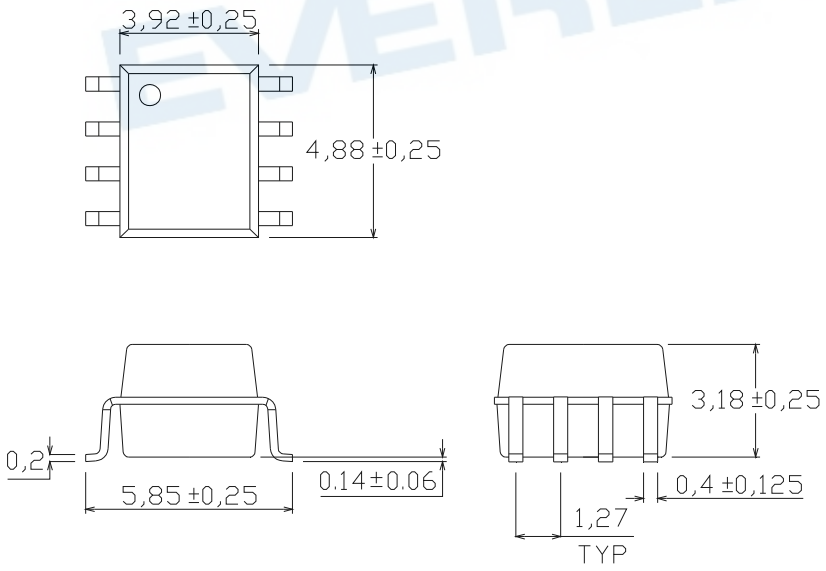
EL053X(Z)-V

Note

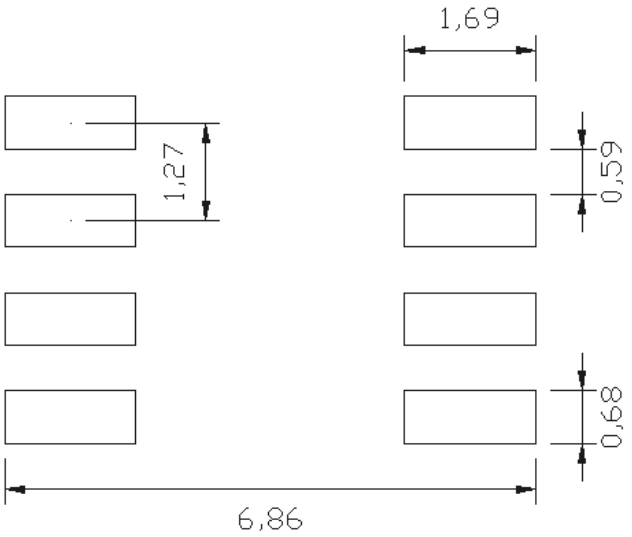
X = Part No. (X = 0 or 1)
Z = Tape and reel option (TA or TB).
V = VDE (optional)

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 Dimension
(Dimensions in mm)

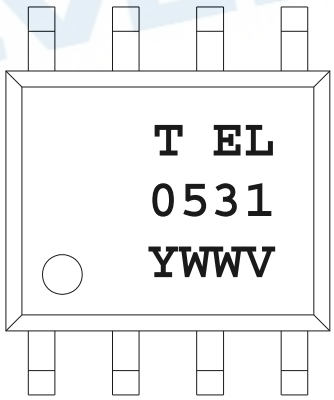


Recommended pad layout for surface mount leadform



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

Device Marking

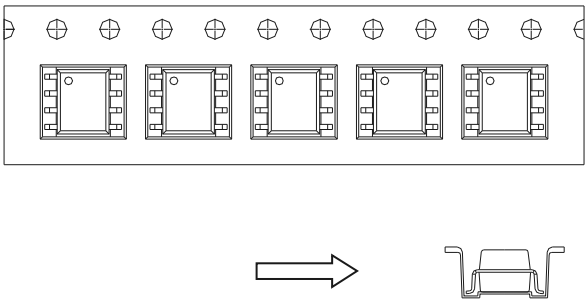


Notes

T	denotes Factory No code : made in China T : made in Taiwan
EL	denotes EVERLIGHT
0531	denotes Device Number
Y	denotes 1 digit Year code
WW	denotes 2 digit Week code
V	denotes VDE (optional)

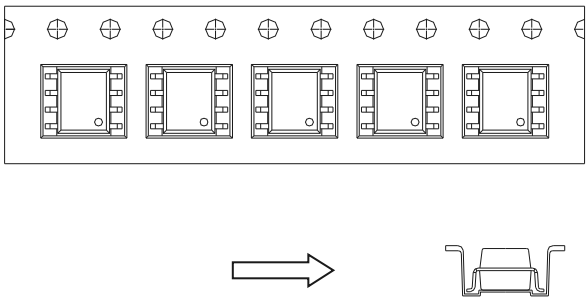
Tape & Reel Packing Specifications

Option TA



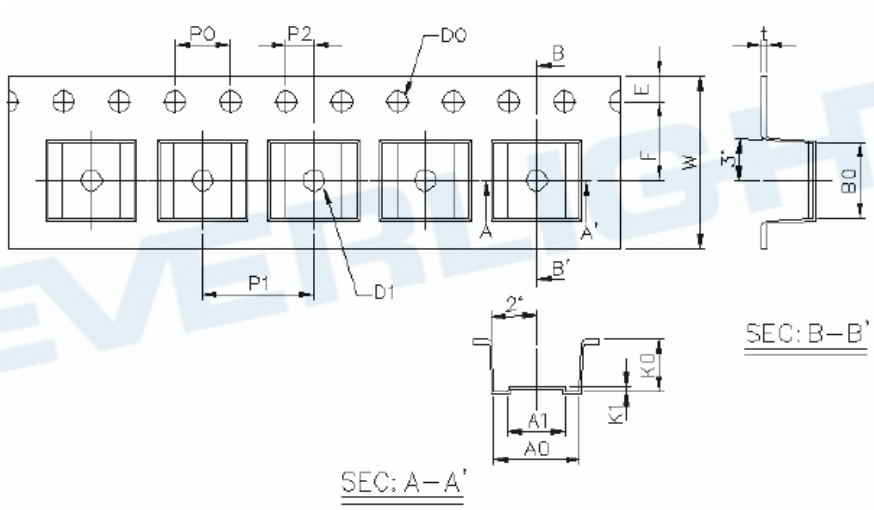
Direction of feed from reel

Option TB



Direction of feed from reel

Tape dimensions

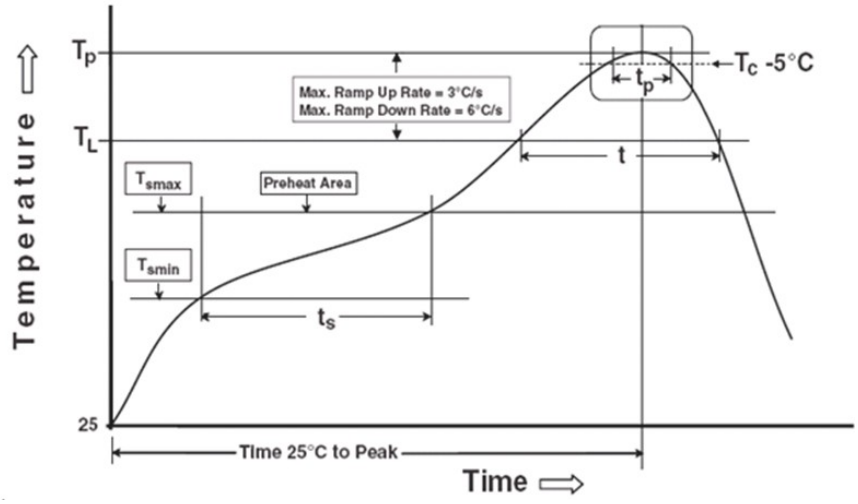


Dimension No.	A0	A1	B0	D0	D1	E	F
Dimension(mm)	6.2±0.1	4.1±0.1	5.28±0.1	1.5±0.1	1.5±0.3	1.75±0.1	5.5±0.1
Dimension No.	Po	P1	P2	t	W	K0	K1
Dimension(mm)	4.0±0.1	8.0±0.1	2.0±0.1	0.4±0.1	12.0+0.3/ -0.1	3.7±0.1	0.3±0.1

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°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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DISCLAIMER

1. Above specification may be changed without notice. EVERLIGHT will reserve authority on material change for above specification.
2. The graphs shown in this datasheet are representing typical data only and do not show guaranteed values.
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