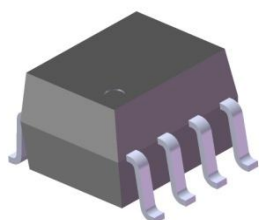


### 8 PIN SOP 3.3V HIGH SPEED 1Mbit/s TRANSISTOR PHOTOCOUPLER EL050L series



#### Features

- 3.3 and 5 V dual supply voltage
- High speed 1Mbit/s
- 15kV/ $\mu$ s minimum common mode transient immunity at  $V_{CM}= 1500V$
- High isolation voltage between input and output ( $V_{iso}=3750 V_{rms}$ )
- Guaranteed performance from 0°C to 70°C
- Compliance Halogen Free (Br <900 ppm , Cl <900 ppm , Br+Cl < 1500 ppm)
- 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
- CQC approved

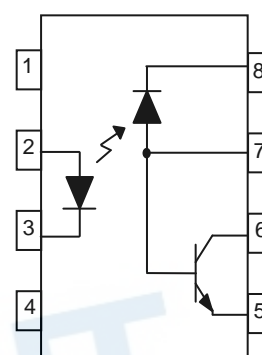
#### Description

The EL050L contains an infrared emitting diode optically coupled to a high speed integrated photo detector logic gate with a strobable output. It is packaged in a 8-pin SOP package and is suitable for surface mounting technology

#### Applications

- High voltage insulation
- Video signal isolation
- Power translator isolation in motor drives
- Line receivers
- Feedback element in switched mode power supplies
- High speed logic ground isolation – LVTTTL/LVCMOS
- Replaces pulse transformers
- Replaces slow phototransistor isolators
- Analog signal ground isolation

Schematic  
EL050L



Pin Configuration

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

**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 ( $\leq 1\mu s$ P.W, 300pps)	$I_{Ftrans}$	1	A
	Reverse voltage	$V_R$	5	V
	Power dissipation	$P_D$	45	mW
Output	Average Output current	$I_{O(avg)}$	8	mA
	Output voltage	$V_O$	-0.5 to 7	V
	Supply voltage	$V_{CC}$	-0.5 to 7	V
	Power dissipation	$P_C$	85	mW
	Isolation voltage <sup>*1</sup>	$V_{ISO}$	3750	V rms
	Operating temperature	$T_{OPR}$	-40 ~ +85	°C
	Storage temperature	$T_{STG}$	-40 ~ +125	°C
	Soldering temperature <sup>*2</sup>	$T_{SOL}$	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<sub>A</sub>= 0 to 70°C unless specified otherwise)**

**Input**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward Voltage	V <sub>F</sub>	-	1.45	1.8	V	I <sub>F</sub> = 16mA
Reverse Voltage	V <sub>R</sub>	5.0	-	-	V	I <sub>R</sub> = 10μA
Temperature coefficient of forward voltage	ΔV <sub>F</sub> /ΔT <sub>A</sub>	-	-1.9	-	mV/°C	I <sub>F</sub> = 16mA

**Output**

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Logic High Output Current	I <sub>OH</sub>	-	0.001	0.5	μA	I <sub>F</sub> = 0mA, V <sub>O</sub> = V <sub>CC</sub> = 3.3V
Logic Low Supply Current	I <sub>CCL</sub>	-	100	200	μA	I <sub>F</sub> = 16mA, V <sub>O</sub> = Open, V <sub>CC</sub> = 3.3V
Logic High Supply Current	I <sub>CCH</sub>	-	0.01	1	μA	I <sub>F</sub> = 0mA, V <sub>O</sub> = Open, V <sub>CC</sub> = 3.3V

**Transfer Characteristics (T<sub>A</sub>=0 to 70°C unless specified otherwise)**

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition	
Current Transfer Ratio	EL050L	7	-	50	%	I <sub>F</sub> = 16mA, V <sub>O</sub> = 0.4V, V <sub>CC</sub> = 3.3V, T <sub>A</sub> = 25°C	
	EL050L	5	-	-			
Logic Low Output Voltage	EL050L	V <sub>OL</sub>	-	0.12	0.4	V	I <sub>F</sub> = 16mA, I <sub>O</sub> = 3 mA, V <sub>CC</sub> = 3.3V, T <sub>A</sub> = 25°C

Switching Characteristics ( $T_A=0$  to  $70^\circ\text{C}$  unless specified otherwise,  $I_F=16\text{mA}$ ,  $V_{CC}=3.3\text{V}$ )

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition	
Propagation Delay Time to Logic Low (Fig.8)	EL050L	TPHL	-	-	2.0	$\mu\text{s}$	$R_L=4.1\text{K}\Omega$ , $T_A=25^\circ\text{C}$
			-	-	0.9		$R_L=1.9\text{K}\Omega$ , $T_A=25^\circ\text{C}$
Propagation Delay Time to Logic High (Fig.8)	EL050L	TPLH	-	-	2.0	$\mu\text{s}$	$R_L=4.1\text{K}\Omega$ , $T_A=25^\circ\text{C}$
			-	-	0.9		$R_L=1.9\text{K}\Omega$ , $T_A=25^\circ\text{C}$
Common Mode Transient Immunity at Logic High (Fig.9) <sup>*3</sup>	EL050L	$CM_H$	-	1,000	-	$\text{V}/\mu\text{s}$	$I_F=0\text{mA}$ , $V_{CM}=10\text{Vp-p}$ , $R_L=4.1\text{K}\Omega$ , $T_A=25^\circ\text{C}$
			-	1,000	-		$I_F=0\text{mA}$ , $V_{CM}=10\text{Vp-p}$ , $R_L=1.9\text{K}\Omega$ , $T_A=25^\circ\text{C}$
Common Mode Transient Immunity at Logic Low (Fig.9) <sup>*3</sup>	EL050L	$CM_L$	-	1,000	-	$\text{V}/\mu\text{s}$	$I_F=16\text{mA}$ , $V_{CM}=10\text{Vp-p}$ , $R_L=4.1\text{K}\Omega$ , $T_A=25^\circ\text{C}$
			-	1,000	-		$I_F=16\text{mA}$ , $V_{CM}=10\text{Vp-p}$ , $R_L=1.9\text{K}\Omega$ , $T_A=25^\circ\text{C}$

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

Typical Electro-Optical Characteristics Curves

Figure 1. Forward Current vs Forward Voltage

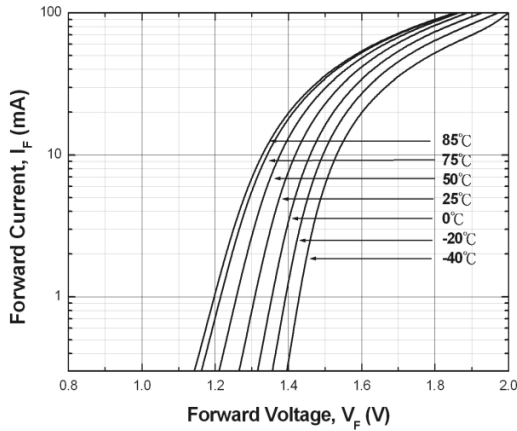


Figure 2. Current Transfer Ratio vs Forward Current

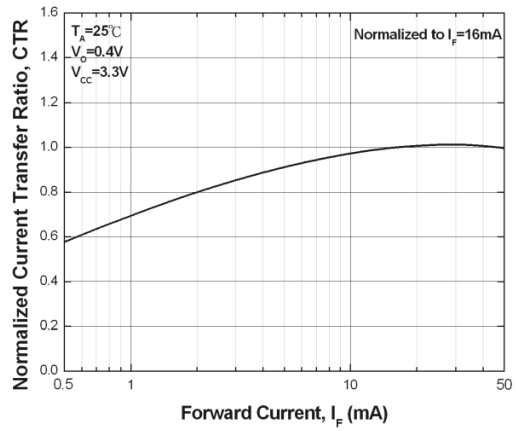


Figure 3. Current Transfer Ratio vs Ambient Temperature

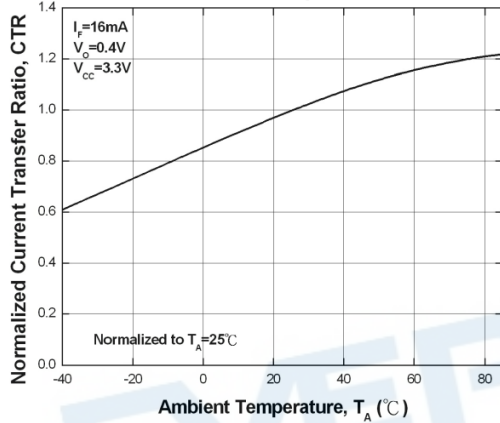


Figure 4. Output Current vs Output Voltage

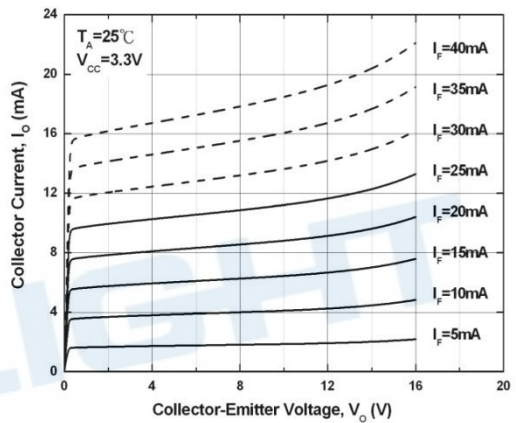


Figure 5. Logic High Output Current vs Ambient Temperature

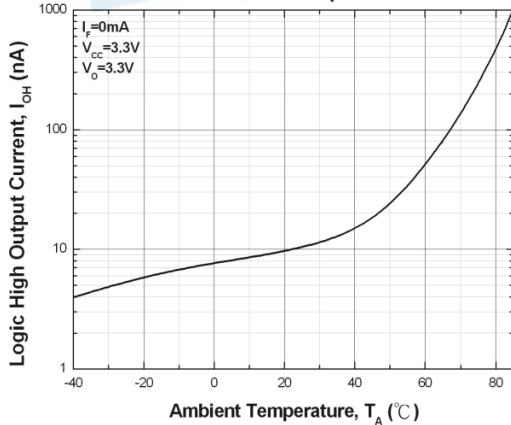


Figure 6. Propagation Delay vs. Load Resistance

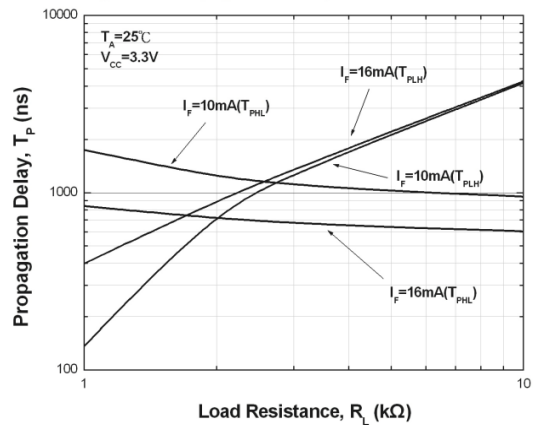


Figure 7. Propagation Delay vs. Temperature

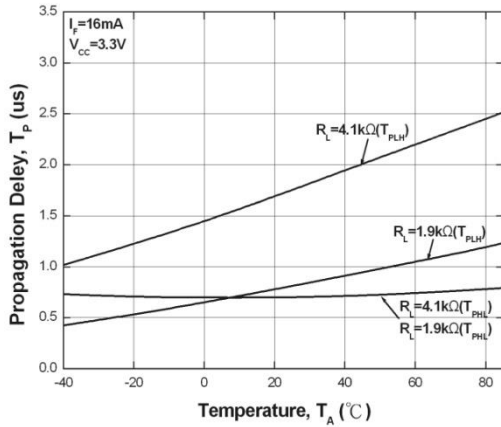


Figure 8 Switching Time Test Circuit & Waveform

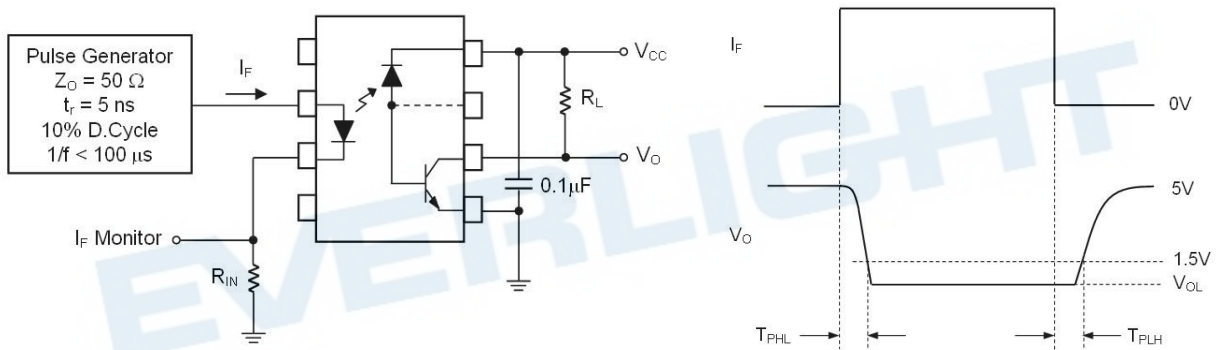
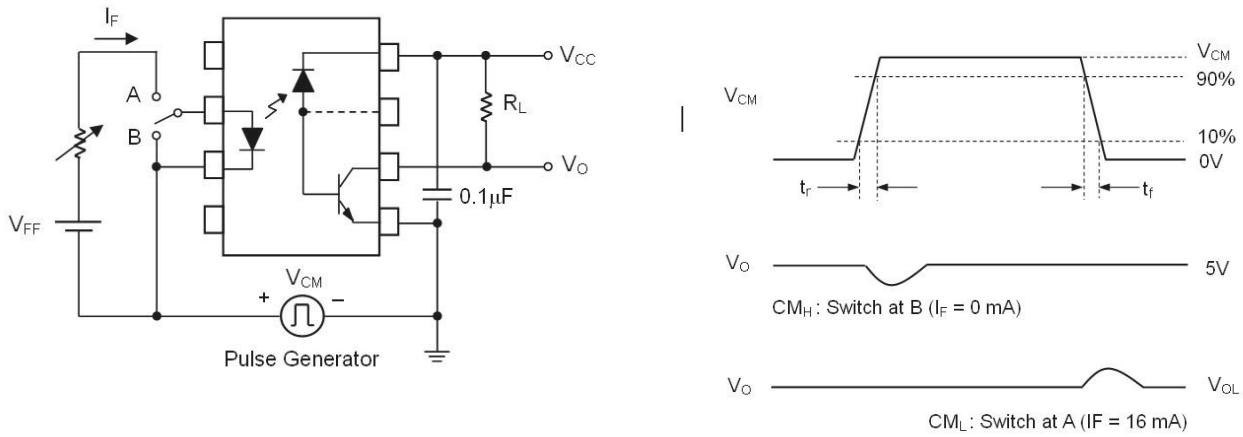


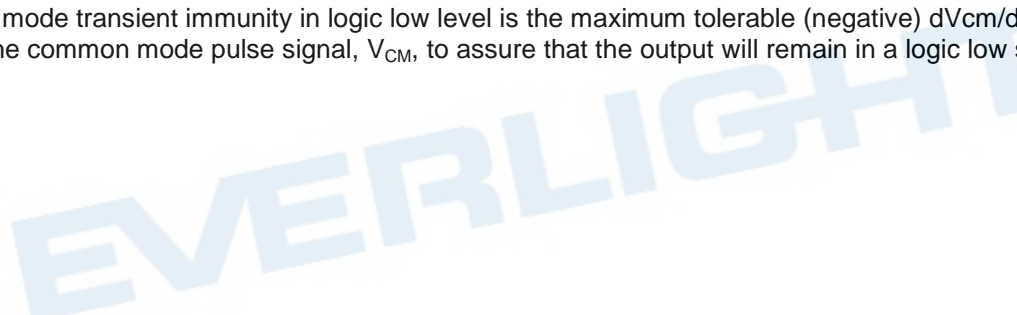
Figure 9 Transient Immunity Test Circuit & Waveform



**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  $V_{CM}$ , 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)  $dV_{cm}/dt$  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

**EL050L(Z)-V**

### Note

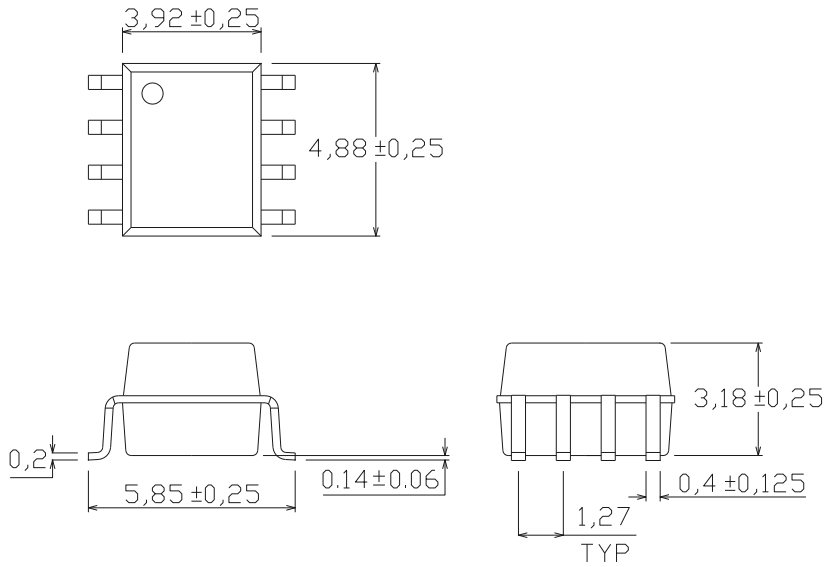
- Z = Tape and reel option (TA, TB or none)  
V = VDE (optional)

Option	Description	Packing quantity
None	Standard	100 units per tube
-V	Standard + VDE	100 units per tube
(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

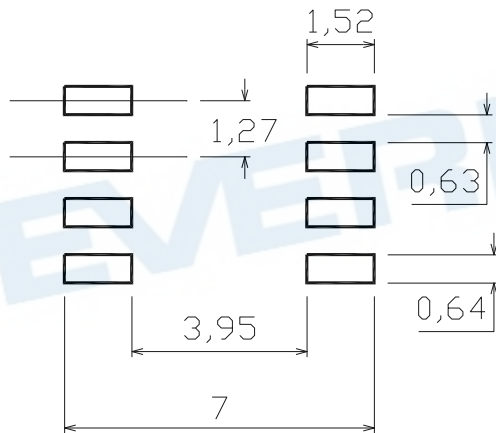
EVERLIGHT



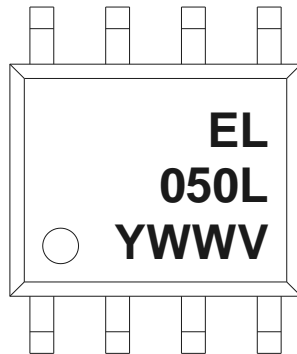
**Package Drawing**  
(Dimensions in mm)



**Recommended pad layout for surface mount leadform**



## Device Marking



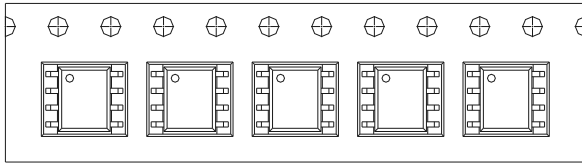
## Notes

EL	denotes EVERLIGHT
050L	denotes Device Number
Y	denotes 1 digit Year code
WW	denotes 2 digit Week code
V	denotes VDE (optional)

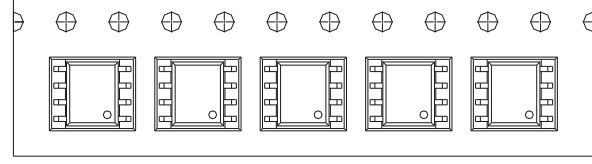
EVERLIGHT

**Tape & Reel Packing Specifications**

**Option TA**



**Option TB**

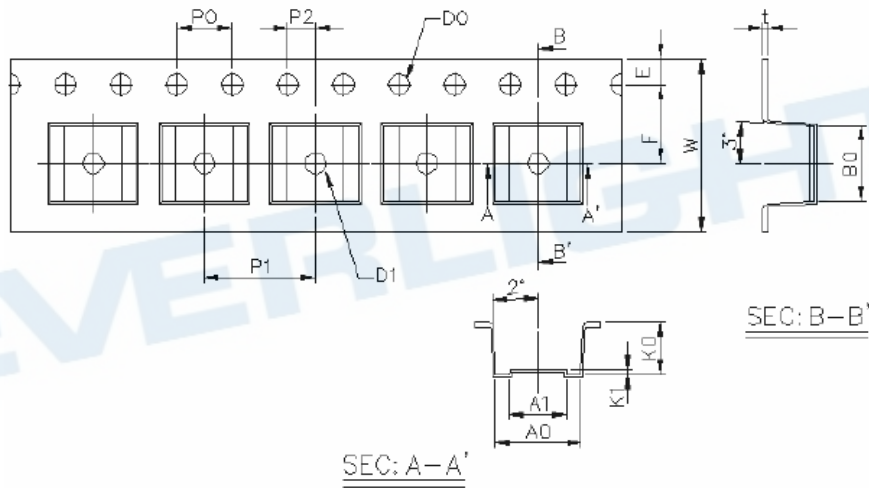


Direction of feed from reel



Direction of feed from reel

**Tape dimensions**

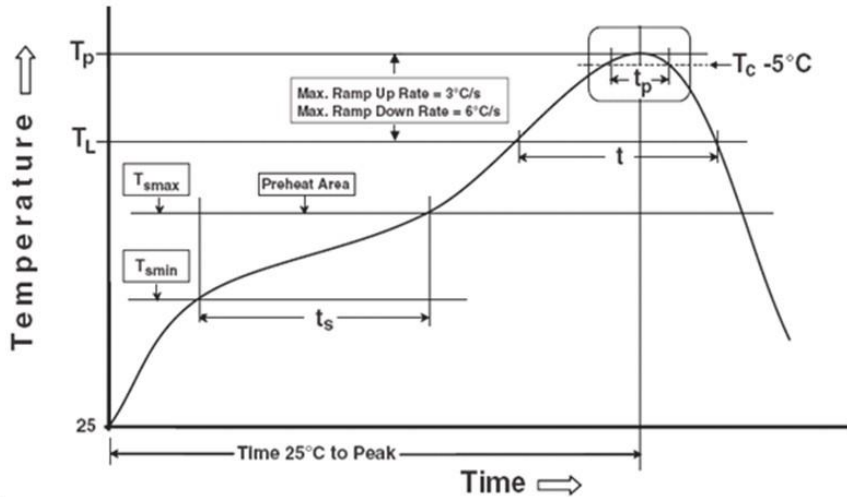


Dimension No.	<b>A0</b>	<b>A1</b>	<b>B0</b>	<b>D0</b>	<b>D1</b>	<b>E</b>	<b>F</b>
Dimension(mm)	6.2±0.1	4.1±0.1	5.28±0.1	1.5±0.1	1.5±0.3	1.75±0.1	5.5±0.1
Dimension No.	<b>Po</b>	<b>P1</b>	<b>P2</b>	<b>t</b>	<b>W</b>	<b>K0</b>	<b>K1</b>
Dimension(mm)	4.0±0.1	8.0±0.1	2.0±0.1	0.4±0.1	12.0+0.3/ -0.1	3.7±0.1	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: $T_p - 5^\circ\text{C}$	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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