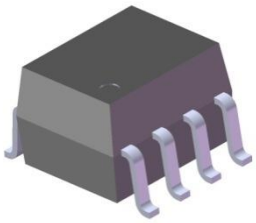
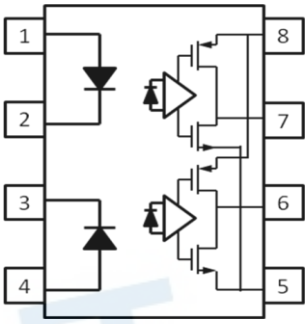
DATASHEET

# 8 PIN SOP 3.3V DUAL CHANNEL HIGH SPEED 15MBit/s LOGIC GATE PHOTOCOUPLER EL083L EL086L Series



Schematic




Pin Configuration

1, Anode
2, Cathode
3, Cathode
4, Anode
5, Gnd
6, Vout2
7, Vout1
8, $V_{CC}$

## Features

- •Compliance Halogen Free
  (Br <900 ppm ,Cl <900 ppm , Br+Cl < 1500 ppm)
- 3.3 and 5 V CMOS compability
- High speed 15Mbit/s
- 10kV/μs min. common mode transient immunity(EL086L)
- Guaranteed performance from -40 to 85℃
- Logic gate output, Fan out 10
- High isolation voltage between input and output (Viso=3750 V rms )
- Compliance with EU REACH
- Pb free and RoHS compliant
- UL and cUL approved
- VDE approved
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved

## Description

The EL08XL consists of an infrared emitting diode optically coupled to a CMOS detector ICs.

It is packaged in a 8-pin SOP package and is suitable for surface mounting technology.

## Applications

- Line receiver, data transmission
- Data multiplexing
- Switching power supplies
- Pulse transformer replacement
- Computer peripheral interface
- High speed logic ground isolation

**Truth Table (Positive Logic)**

| Input | Output |
|---|---|
| H | L |
| L | H |

## Absolute Maximum Ratings ($T_A$=25℃)

| Parameter | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Input | Forward current | $I_F$ | 20 | mA |
| | Reverse voltage | $V_R$ | 5 | V |
| | Power dissipation | $P_D$ | 35 | mW |
| Output | Power dissipation | $P_C$ | 85 | mW |
| | Output current | $I_O$ | 20 | mA |
| | Output voltage | $V_O$ | 5.5 | V |
| | Supply voltage | $V_{CC}$ | 5.5 | V |
| Output Power Dissipation | | $P_O$ | 85 | mW |
| Isolation voltage *2 | | $V_{ISO}$ | 3750 | V rms |
| Operating temperature | | $T_{OPR}$ | -40 ~ +85 | °C |
| Storage temperature | | $T_{STG}$ | -55 ~ +125 | °C |
| Soldering temperature *3 | | $T_{SOL}$ | 260 | °C |

Notes:
*1 The $V_{CC}$ supply must be bypassed by a 0.1μF capacitor or larger. This can be either a ceramic or solid tantalum capacitor with good high frequency characteristic and should be connected as close as possible to the package $V_{CC}$ and GND pins.

*2 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.

*3 For 10 seconds

## Electrical Characteristics ($T_A$=-40 to 85°C unless specified otherwise)

### Input

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Condition |
|---|---|---|---|---|---|---|
| Forward voltage | $V_F$ | - | 1.4 | 1.8 | V | $I_F$ = 8mA |
| Reverse voltage | $V_R$ | 5.0 | - | - | V | $I_R$ = 10μA |
| Temperature coefficient of forward voltage | $\Delta V_F/\Delta T_A$ | - | -1.8 | - | mV/°C | $I_F$ =14mA |
| Input capacitance | $C_{IN}$ | - | 60 | - | pF | $V_F$=0, f=1MHz |

### Output

| Parameter | Symbol | Min | Typ. | Max. | Unit | Condition |
|---|---|---|---|---|---|---|
| High level supply current | $I_{CCH}$ | - | 2.5 | 8 | mA | $I_F$=0mA |
| Low level supply current | $I_{CCL}$ | - | 2.5 | 8 | mA | $I_F$=8mA |
| High level output voltage | $V_{OH}$ | $V_{CC}$-1 | $V_{CC}$-0.3 | - | V | $V_{CC}$=3.3V,$I_F$=0mA, $I_O$=-4mA |
| | | $V_{CC}$-1 | $V_{CC}$-0.2 | - | V | $V_{CC}$=5V,$I_F$=0mA, $I_O$=-4mA |
| Low level output voltage | $V_{OL}$ | - | 0.21 | 0.6 | V | $V_{CC}$ = 3.3V, $I_F$=8mA, $I_O$=4mA |
| | | | 0.17 | 0.6 | V | $V_{CC}$ = 5.0V, $I_F$=8mA, $I_O$=4mA |
| Input threshold current | $I_{FT}$ | - | 2.5 | 5 | mA | $I_{OL}$=20uA |

## Switching Characteristics ($T_A$=-40 to 85°C, $V_{CC}$=3.3V, $I_F$=8mA unless specified otherwise)

| Parameter | | Symbol | Min | Typ. | Max. | Unit | Condition |
|---|---|---|---|---|---|---|---|
| Propagation delay time to output high level | | $t_{PHL}$ | - | 38 | 60 | ns | $I_F$=8mA ,$C_L$ = 15pF, $V_{CC}$=3.3V CMOS Signal Levels |
| | | | - | 35 | 60 | ns | $I_F$=8mA ,$C_L$ = 15pF, $V_{CC}$=5V CMOS Signal Levels |
| Propagation delay time to output low level | | $t_{PLH}$ | - | 41 | 60 | ns | $I_F$=8mA ,$C_L$ = 15pF, $V_{CC}$=3.3V CMOS Signal Levels |
| | | | | 46 | 60 | ns | $I_F$=8mA ,$C_L$ = 15pF, $V_{CC}$=5V CMOS Signal Levels |
| Pulse width distortion | | $\|t_{PHL} - t_{PLH}\|$ | 0 | 6 | 30 | ns | $I_F$=8mA ,$C_L$ = 15pF, $V_{CC}$=3.3V CMOS Signal Levels |
| | | | 0 | 8 | 30 | ns | $I_F$=8mA ,$C_L$ = 15pF, $V_{CC}$=5V CMOS Signal Levels |
| Output rise time | | $t_r$ | - | 5.5 | - | ns | $I_F$=8mA ,$C_L$ = 15pF, $V_{CC}$=3.3V CMOS Signal Levels |
| Output fall time | | $t_f$ | - | 6 | - | ns | $I_F$=8mA ,$C_L$ = 15pF, $V_{CC}$=3.3V CMOS Signal Levels |
| Common mode transient Immunity at logic high*4 | 083L | $\|CM_H\|$ | 5,000 | - | - | V/μS | $I_F$ = 0mA , $T_A$=25°C $V_{CM}$=1000Vp-p |
| | 086L | | 10,000 | | | V/μS | $I_F$ = 0mA , $T_A$=25°C $V_{CM}$=1000Vp-p |
| Common mode transient immunity at logic low*5 | 083L | $\|CM_L\|$ | 5,000 | - | - | V/μS | $I_F$ = 8mA , $T_A$=25°C $V_{CM}$=1000Vp-p |
| | 086L | | 10,000 | | | V/μS | $I_F$ = 8mA , $T_A$=25°C $V_{CM}$=1000Vp-p |

## Typical Electro-Optical Characteristics Curves

Figure 1. Forward Current vs. Forward Voltage

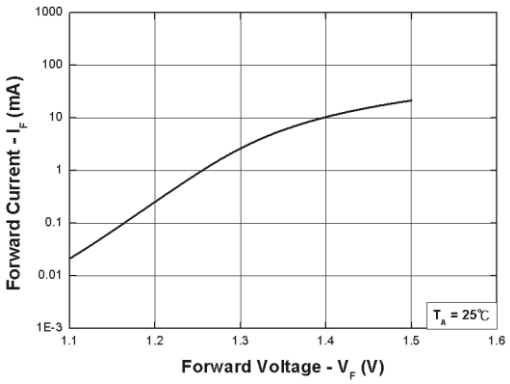



Figure 2. Input Threshold Current vs. Ambient Temperature

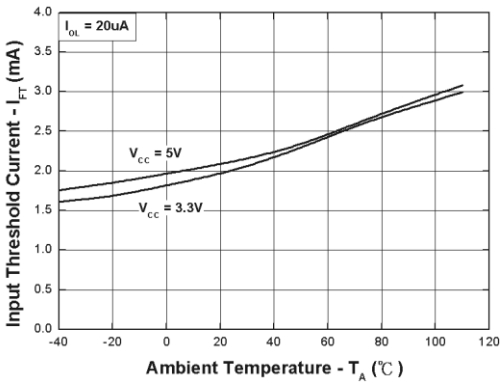



Figure 3. High Level Supply Current vs. Ambient Temperature

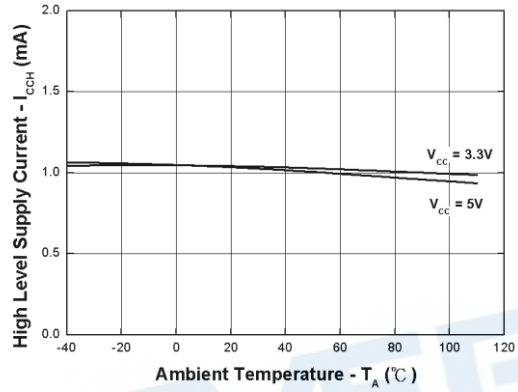



Figure 4. Low Level Supply Current vs. Ambient Temperature

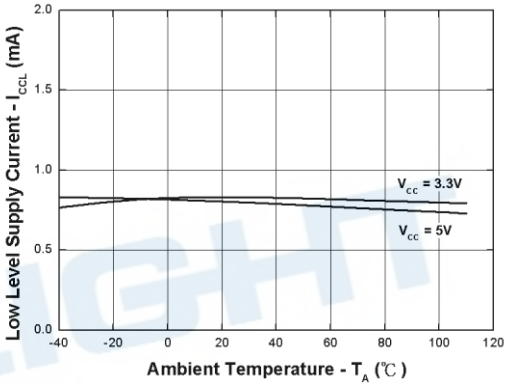



Figure 5. Switching Time vs. Forward Current

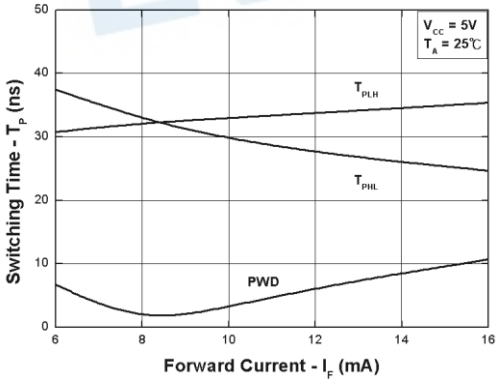



Figure 6. Switching Time vs. Forward Current

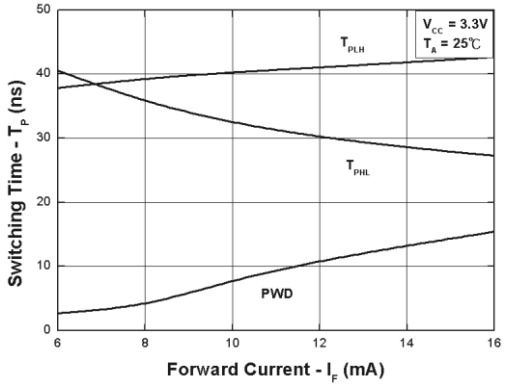


Figure 7. Forward voltage vs. Ambient Temperature

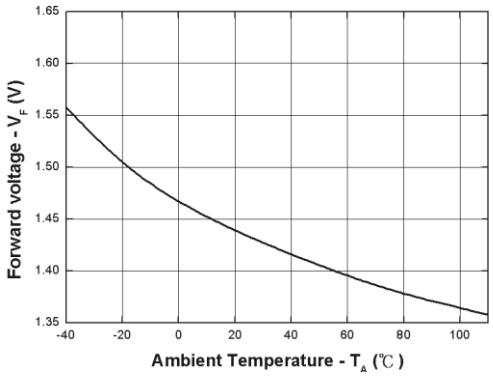



**Fig. 8 Test circuit and waveforms for $t_{PHL}$, $t_{PLH}$, $t_r$, and $t_f$**

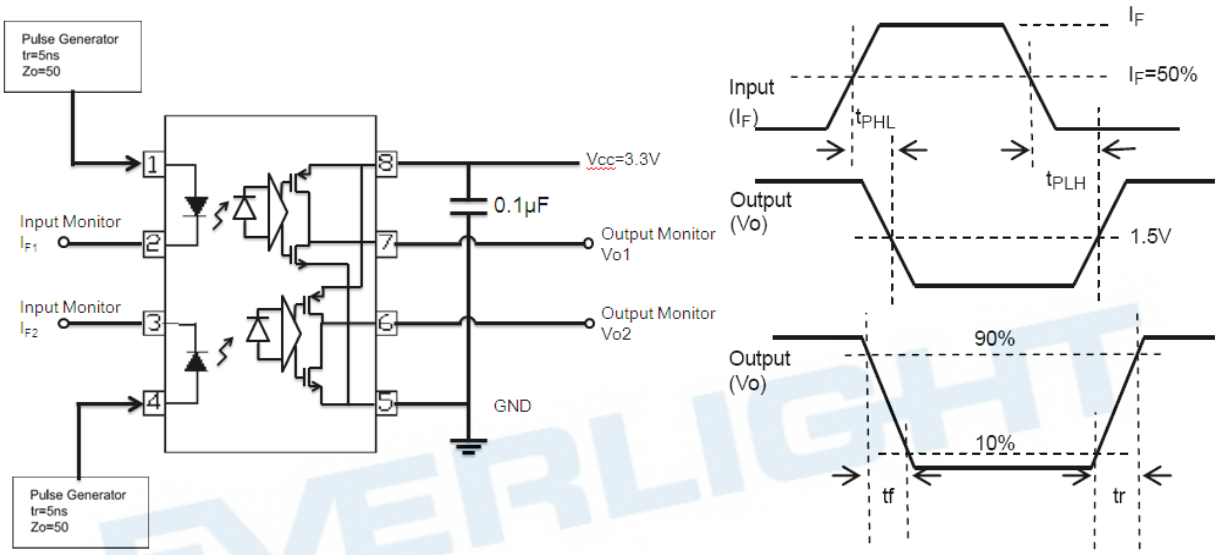
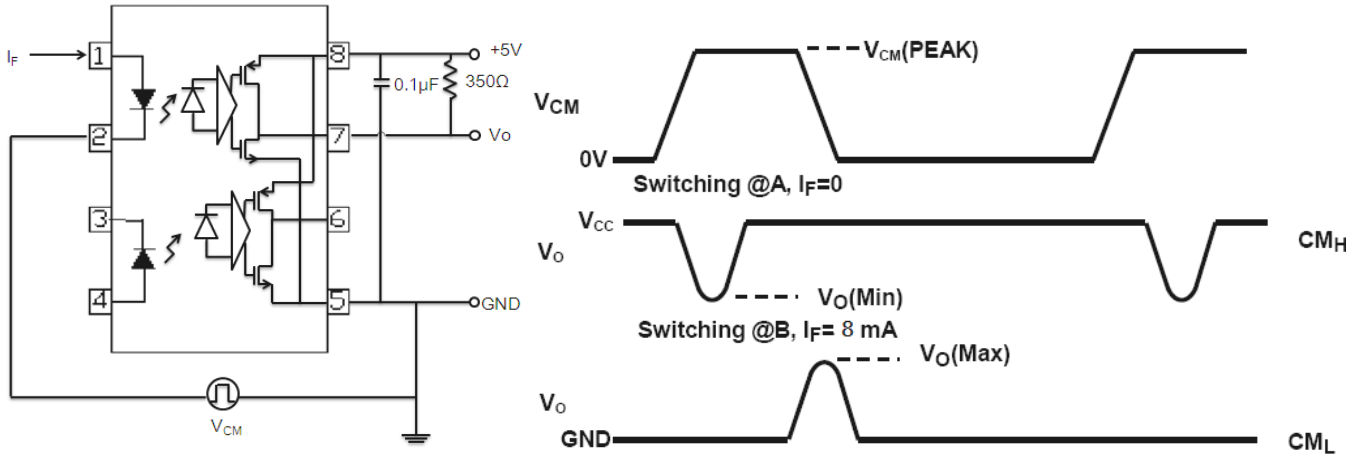



**Fig. 9 Test circuit Common mode Transient Immunity**




Note

*4. $CM_H$– The maximum tolerable rate of rise of the common mode voltage to ensure the output will remain in the HIGH state (i.e., $V_{OUT}$ > 2.0V).

*5. $CM_L$– The maximum tolerable rate of rise of the common mode voltage to ensure the output will remain in the LOW output state (i.e., $V_{OUT}$ < 0.8V).

## Order Information

### Part Number

# EL08XL(Z)-V

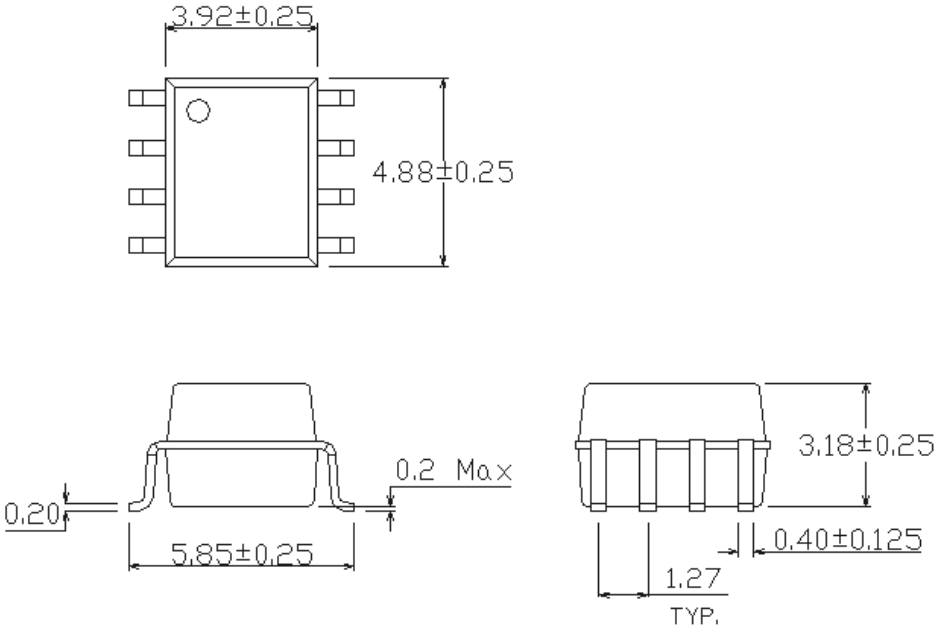
**Note**

08XL = Part No
Z = Tape and reel option (TA, TB).
V = VDE (optional)

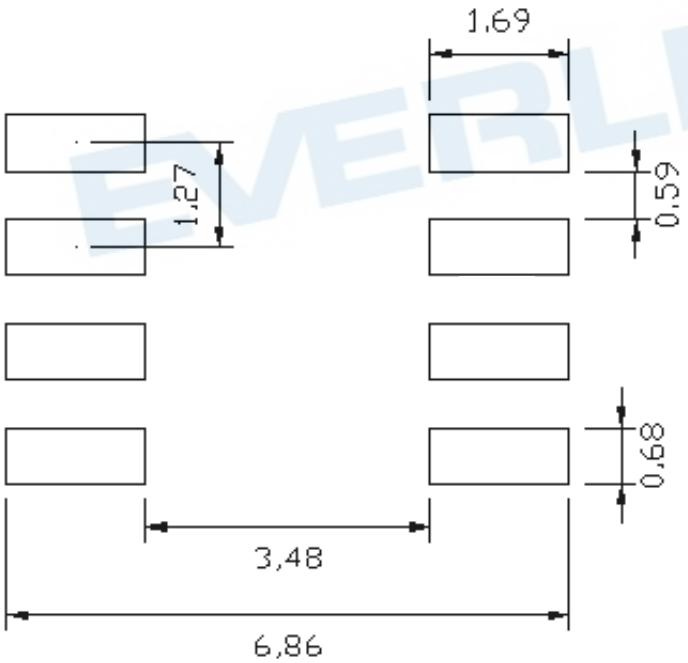
| Option | Description | Packing quantity |
|---|---|---|
| (TA) | TA tape & reel option | 2000 units per reel |
| (TB) | TB tape & reel option | 2000 units per reel |
| (TA)-V | TA tape & reel option + VDE | 2000 units per reel |
| (TB)-V | TB tape & reel option + VDE | 2000 units per reel |

## Package 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.

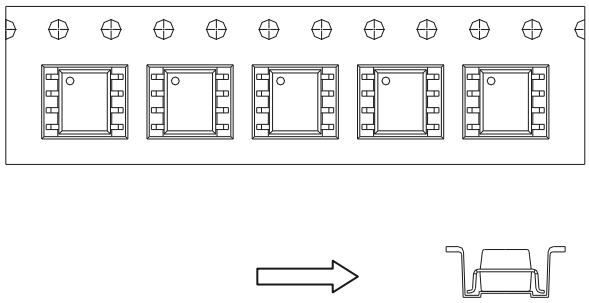
## Device Marking


## Notes

| | |
|---|---|
| EL | denotes EVERLIGHT |
| 083L | denotes Device Number |
| Y | denotes 1 digit Year code |
| WW | denotes 2 digit Week code |
| V | denotes VDE (optional) |

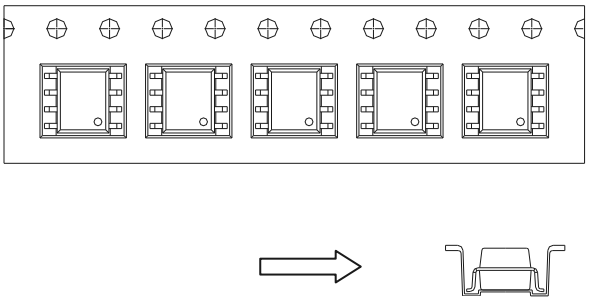
## Tape & Reel Packing Specifications

**Option TA**



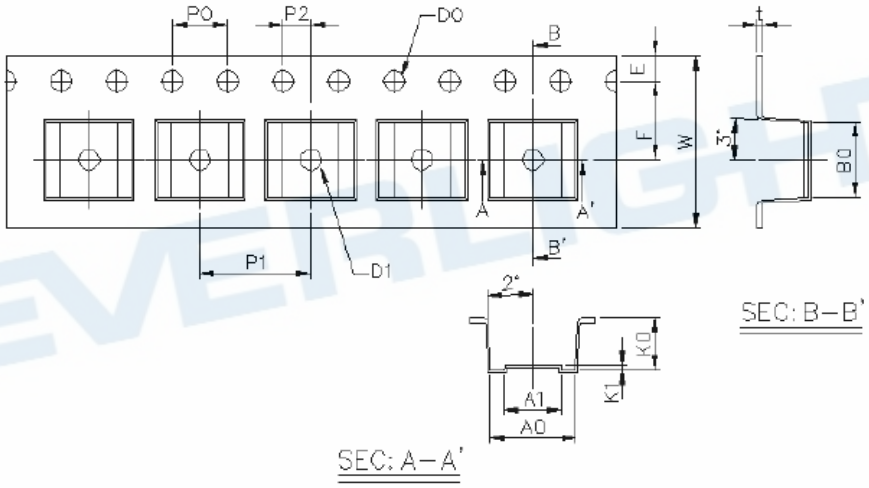
Direction of feed from reel

**Option TB**



Direction of feed from reel

### Tape dimension

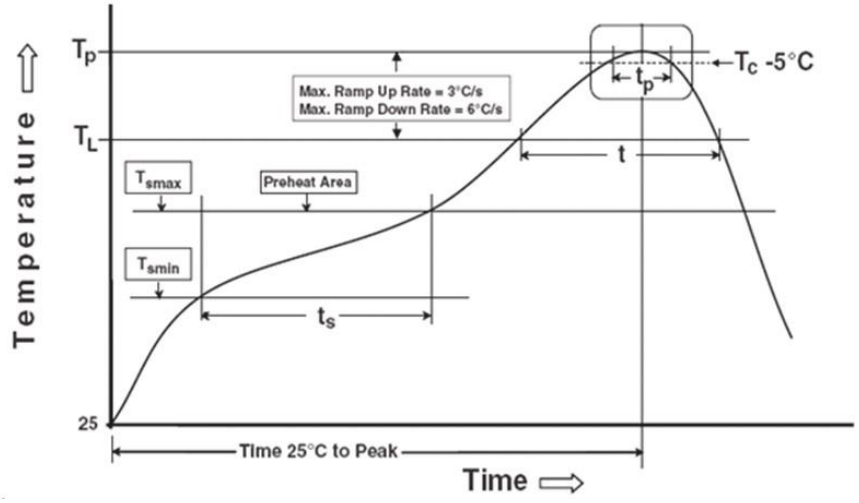



| Dimension No. | A0 | A1 | B0 | D0 | D1 | E | F |
|---|---|---|---|---|---|---|---|
| Dimension(mm) | 6.2±0.1 | 4.1±0.1 | 5.28±0.1 | 1.5±0.1 | 1.5±0.3 | 1.75±0.1 | 5.5±0.1 |
| Dimension No. | **Po** | **P1** | **P2** | **t** | **W** | **K0** | **K1** |
| Dimension(mm) | 4.0±0.1 | 8.0±0.1 | 2.0±0.1 |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