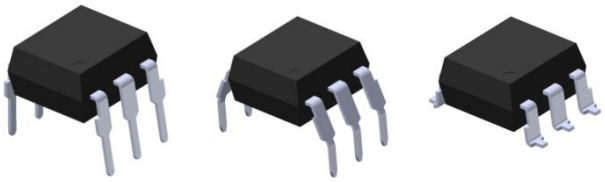
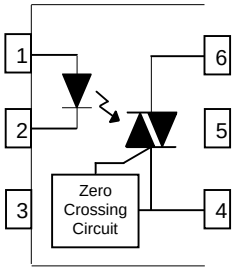
DATASHEET

6 PIN DIP ZERO-CROSS TRIAC DRIVER PHOTOCOUPLER
EL303X, EL304X, EL306X, EL308X Series



Schematic



Pin Configuration
1. Anode
2. Cathode
3. No Connection
4. Terminal
5. Substrate
   (do not connect)
6. Terminal

Features:

- Peak breakdown voltage
  - 250V: EL303X
  - 400V: EL304X
  - 600V: EL306X
  - 800V: EL308X
- High isolation voltage between input and output (Viso=5000 V rms)
- Zero voltage crossing
- Pb free and RoHS compliant.
- UL approved (No. E214129)
- VDE approved (No.132249)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved
- CSA approved

Description

The EL303X, EL304X, EL306X and EL308X series of devices each consist of a GaAs infrared emitting diode optically coupled to a monolithic silicon zero voltage crossing photo triac.

They are designed for use with a discrete power triac in the interface of logic systems to equipment powered from 110 to 380 VAC lines, such as solid-state relays, industrial controls, motors, solenoids and consumer appliances.

Applications

- Solenoid/valve controls
- Light controls
- Static power switch
- AC motor drivers
- E.M. contactors
- Temperature controls
- AC Motor starters

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LifecyclePhase: Approved
Expired Period: Forever

Absolute Maximum Ratings (Ta=25℃)

Parameter			Symbol	Rating	Unit
Input	Forward current		I_F	60	mA
	Reverse voltage		V_R	6	V
	Power dissipation		P_D	100	mW
	Derating factor (above T_a = 85°C)			3.8	mW /°C
Output	Off-state Output Terminal Voltage	EL303X	V_{DRM}	250	V
		EL304X		400	
		EL306X		600	
		EL308X		800	
	Peak Repetitive Surge Current (pw=1ms,120pps)		I_{TSM}	1	A
	On-State RMS Current		$I_{T(RMS)}$	100	mA
	Power dissipation		P_C	300	mW
	Derating factor (above T_a = 85°C)			7.6	mW/°C
Total power dissipation			P_{TOT}	330	mW
Isolation voltage *1			V_{ISO}	5000	Vrms
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&3 are shorted together, and pins 4, 5 & 6 are shorted together.
*2 For 10 seconds

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Electro-Optical Characteristics (Ta=25℃ unless specified otherwise)

Input

Parameter	Symbol	Min.	Typ.*	Max.	Unit	Condition
Forward Voltage	V_F	-	-	1.5	V	I_F = 30mA
Reverse Leakage current	I_R	-	-	10	μA	V_R = 6V

Output

Parameter		Symbol	Min.	Typ.*	Max.	Unit	Condition
Peak Blocking Current	EL303X EL304X	I_{DRM1}	-	-	100	nA	V_{DRM} = Rated V_{DRM}, I_F = 0mA
	EL306X EL308X				500		
Peak On-state Voltage		V_{TM}	-	-	3	V	I_{TM}=100mA peak, I_F=Rated I_{FT}
Critical Rate of Rise off-state Voltage	EL303X EL304X EL306X	dv/dt	1000	-	-	V/μs	V_{PEAK} =Rated V_{DRM}, I_F=0 (Fig. 10)
	EL308X		600	-	-		
Inhibit Voltage (MT1-MT2 voltage above which device will not trigger)		V_{INH}	-	-	20	V	I_F= Rated I_{FT}
Leakage in Inhibited State		I_{DRM2}	-	-	500	μA	I_F= Rated I_{FT}, V_{DRM}=Rated V_{DRM}, off state

Transfer Characteristics

Parameter		Symbol	Min.	Typ.*	Max.	Unit	Condition
LED Trigger Current	EL3031 EL3041 EL3061 EL3081	I_{FT}	-	-	15	mA	Main terminal Voltage=3V
	EL3032 EL3042 EL3062 EL3082		-	-	10		
	EL3033 EL3043 EL3063 EL3083		-	-	5		
Holding Current		I_H	-	280	-	μA	

* Typical values at T_a = 25°C

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Typical Electro-Optical Characteristics Curves

Figure 1. Forward Current vs Forward Voltage

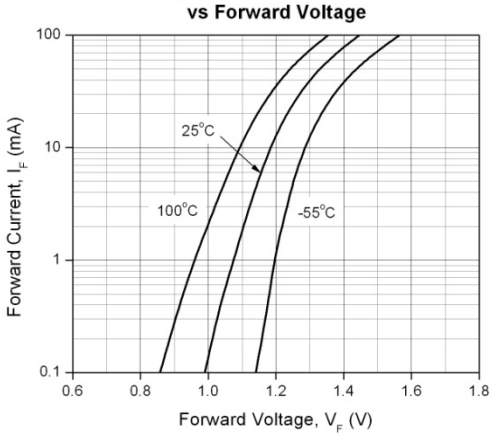

Figure 2. On-State Characteristics

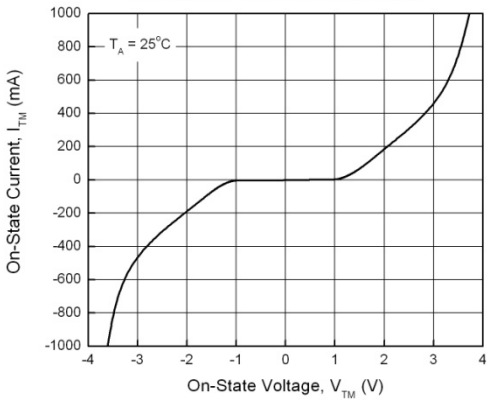

Figure 3. Holding Current vs. Ambient Temperature

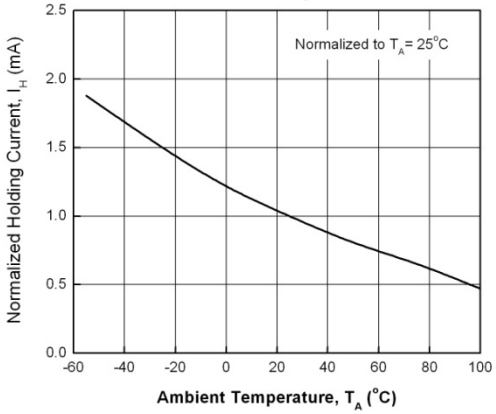

Figure 4. LED Current Required to Trigger vs. LED Pulse Width

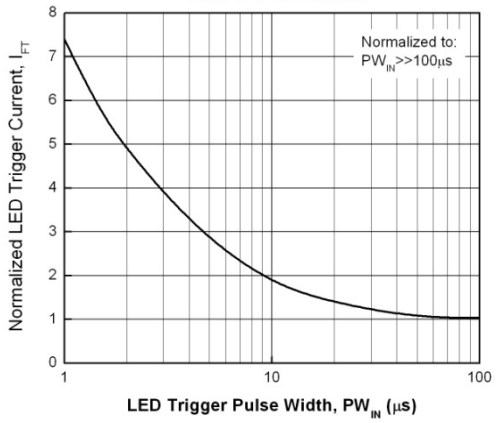

Figure 5. Leakage Current vs. Ambient Temperature

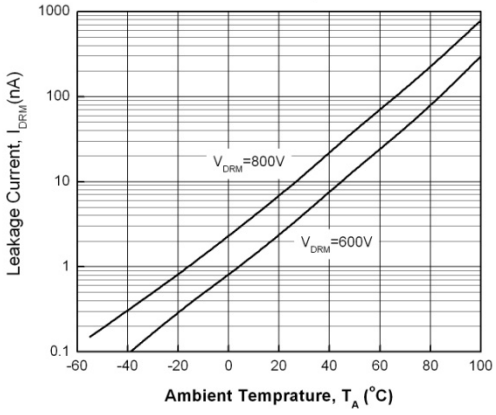

Figure 6. LED Trigger Current vs. Ambient Temperature

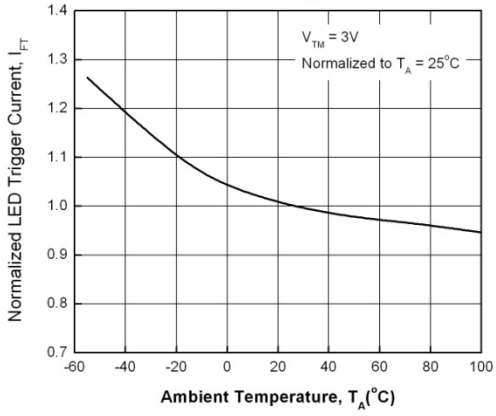

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Figure 7. Off-State Output Terminal Voltage vs. Ambient Temperature

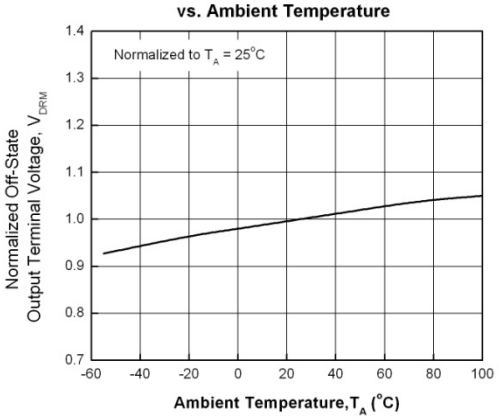

Figure 8. Leakage in Inhibit State vs. Ambient Temperature

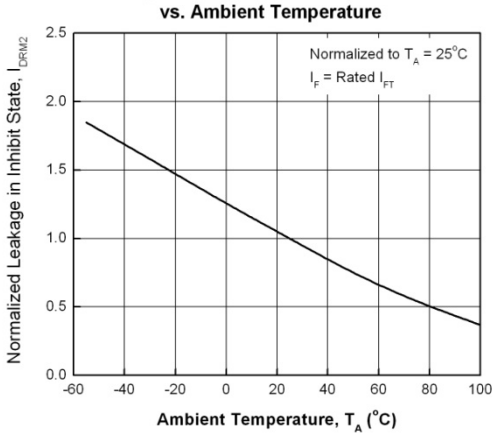

Figure 9. Inhibit Voltage vs. Ambient Temperature

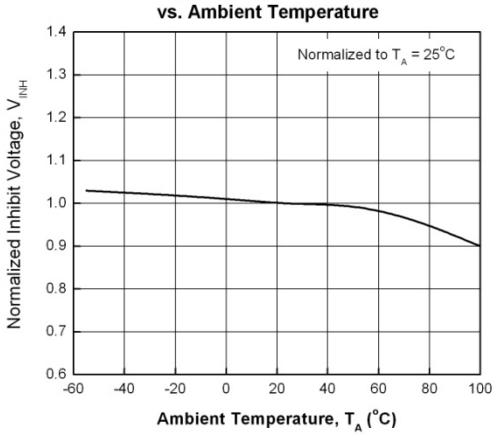

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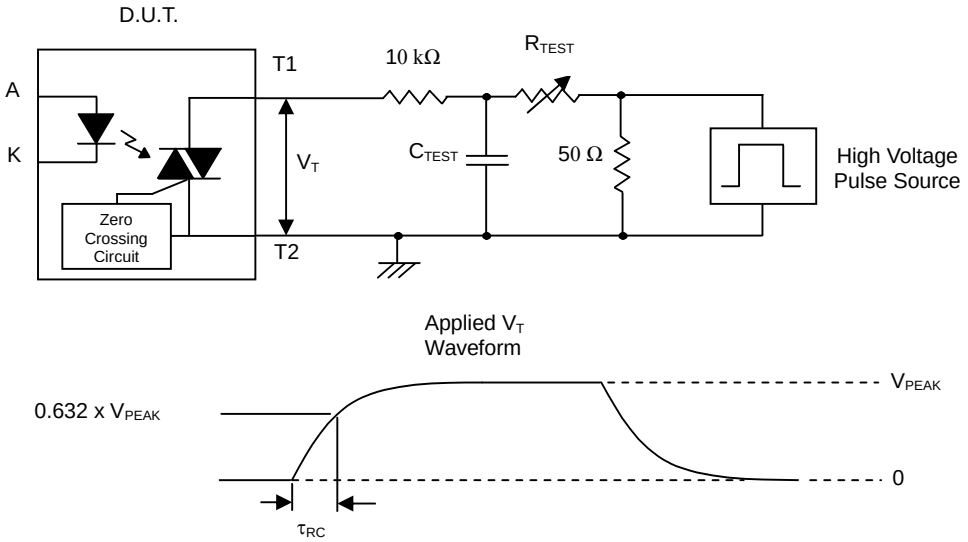
Figure 10. Static dv/dt Test Circuit & Waveform



Measurement Method

The high voltage pulse is set to the required V_{PEAK} value and applied to the D.U.T. output side through the RC circuit above. LED current is not applied. The waveform V_T is monitored using a x100 scope probe. By varying R_{TEST}, the dv/dt (slope) is increased, until the D.U.T. is observed to trigger (waveform collapses). The dv/dt is then decreased until the D.U.T. stops triggering. At this point, τ_{RC} is recorded and the dv/dt calculated.

$$dv/dt = \frac{0.632 \times V_{PEAK}}{\tau_{RC}}$$

For example, V_{PEAK} = 600V for EL306X series. The dv/dt value is calculated as follows:

$$dv/dt = \frac{0.63 \times 600}{\tau_{RC}} = \frac{378}{\tau_{RC}}$$

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Order Information

Part Number

EL303XY(Z)-V
or EL304XY(Z)-V
or EL306XY(Z)-V
or EL308XY(Z)-V

Note

X = Part No. (1, 2 or 3)
Y = Lead form option (S, S1, M or none)
Z = Tape and reel option (TA, TB or none).
V = VDE safety approved option

Option	Description	Packing quantity
None	Standard DIP-6	65 units per tube
M	Wide lead bend (0.4 inch spacing)	65 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

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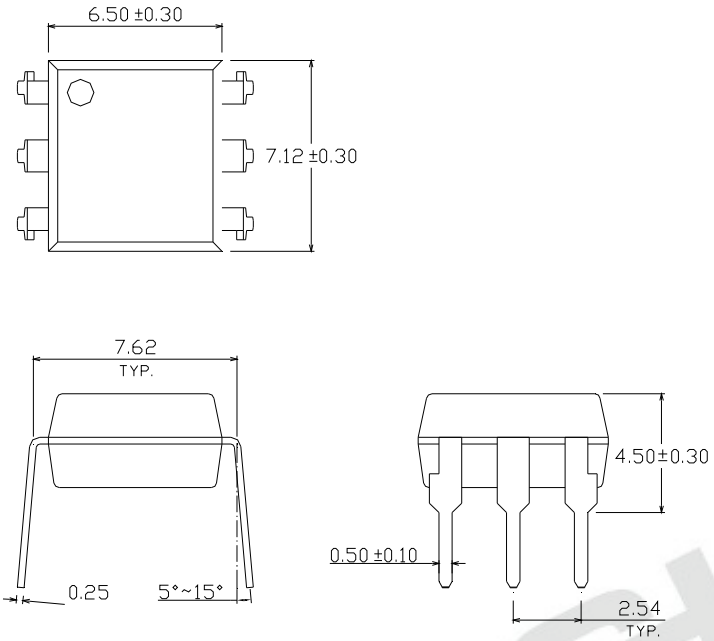
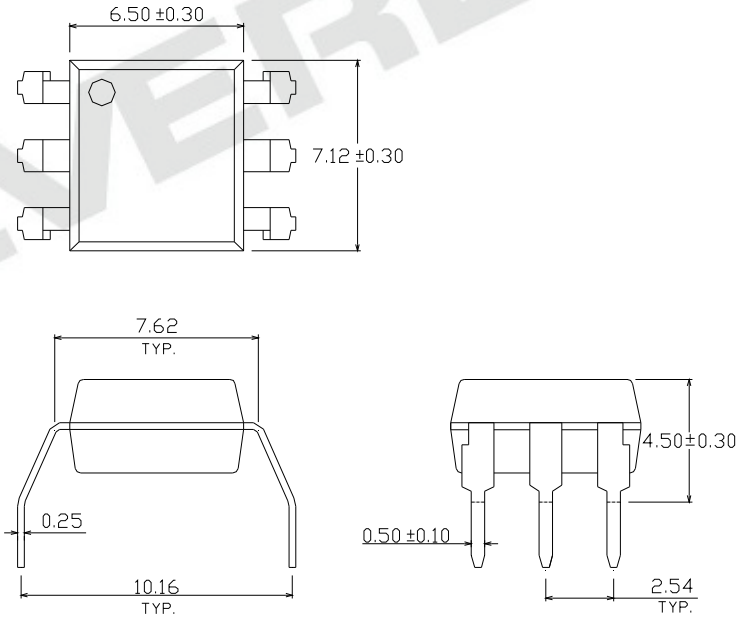
Package Dimension (Dimensions in mm)

Standard DIP Type



Option M Type



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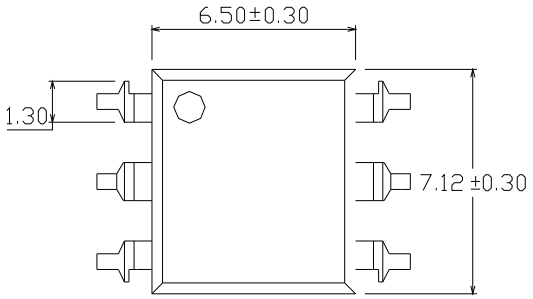
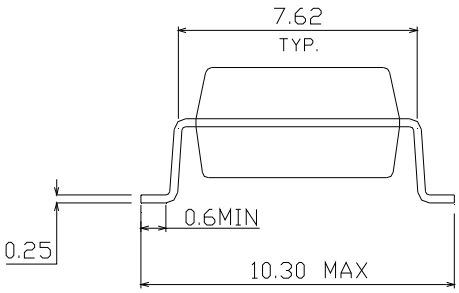
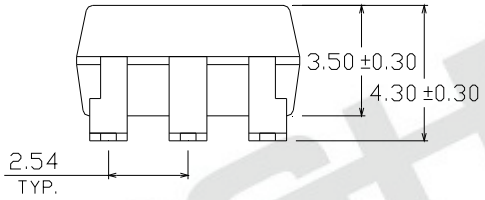
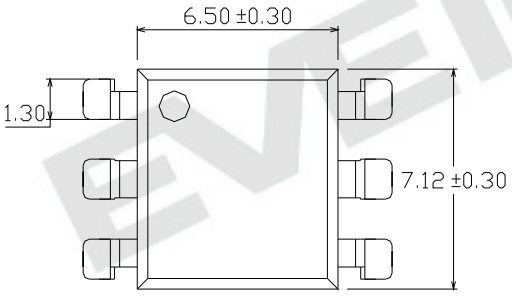
Option S Type

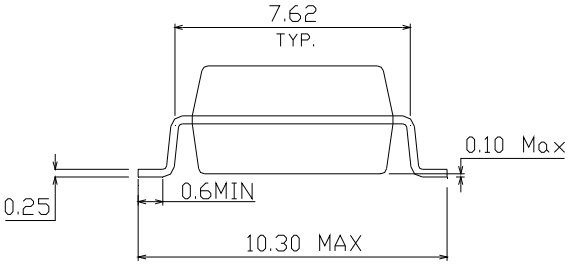


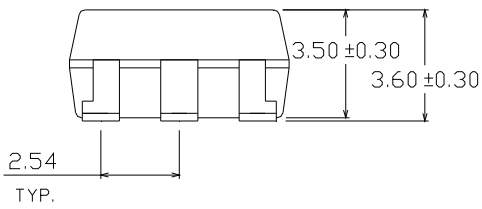




Option S1 Type







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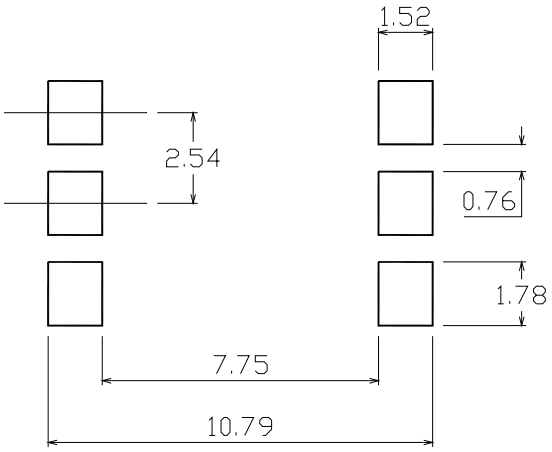
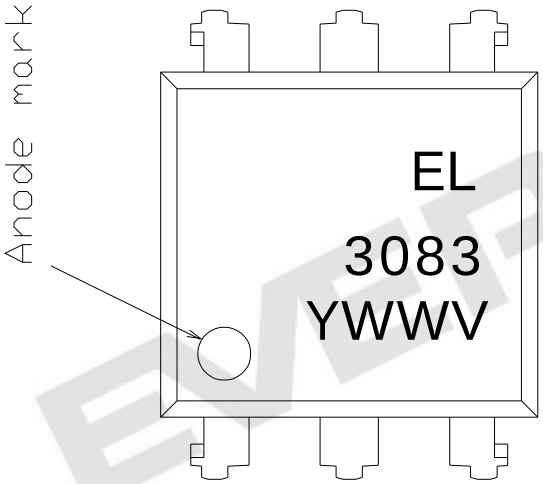
Recommended pad layout for surface mount leadform



Device Marking



Notes

EL	denotes Everlight
3083	denotes Device Number
Y	denotes 1 digit Year code
WW	denotes 2 digit Week code
V	denotes VDE option

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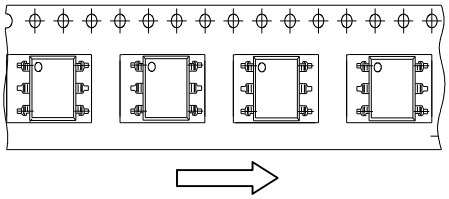
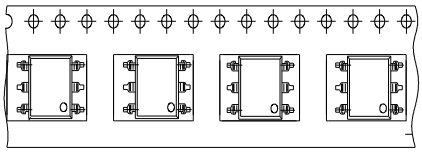
Tape & Reel Packing Specifications

Option TA



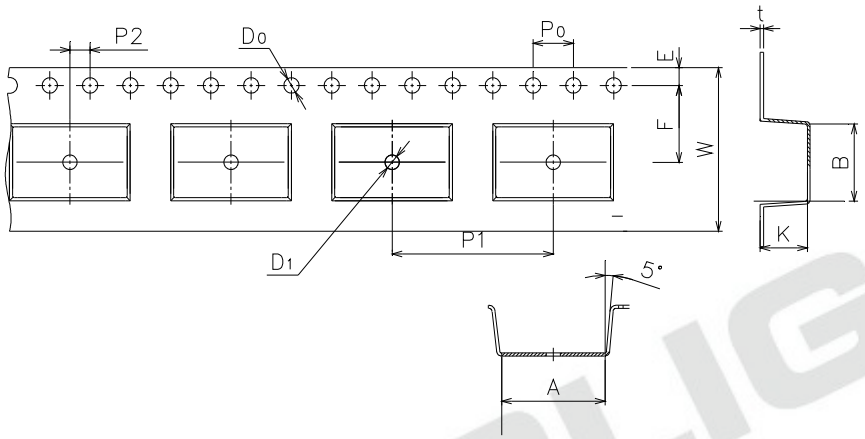
Direction of feed from reel

Option TB



Direction of feed from reel

Tape dimensions



Dimension No.	A	B	Do	D1	E	F
Dimension (mm)	10.4±0.1	7.5±0.1	1.5±0.1	1.5+0.1/-0	1.75±0.1	7.5±0.1

Dimension No.	Po	P1	P2	t	W	K
Dimension (mm)	4.0±0.15	12±0.1	2.0±0.1	0.35±0.03	16.0±0.2	4.5±0.1

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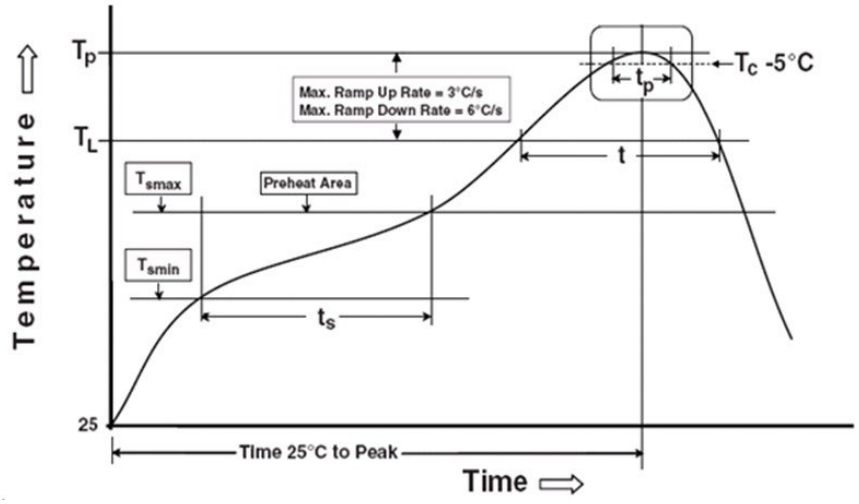
Precautions for Use

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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