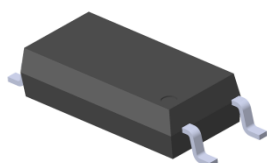
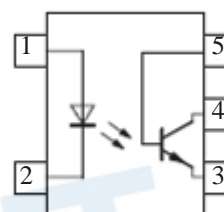


### 5 PIN LONG CREEPAGE SOP PHOTOTRANSISTOR PHOTOCOUPLER EL111X-G Series



Schematic



Pin Configuration

1. Anode
2. Cathode
3. Emitter
4. Collector
5. Base

#### Features:

- Compliance Halogen Free  
(Br <900 ppm ,Cl <900 ppm , Br+Cl < 1500 ppm)
- Current transfer ratio  
(CTR: 50~600% at  $I_F = 5\text{mA}$ ,  $V_{CE} = 5\text{V}$ )  
(CTR: 63~320% at  $I_F = 10\text{mA}$ ,  $V_{CE} = 5\text{V}$ )
- High isolation voltage between input and output (Viso=5000 V rms )
- Compact 5 Pin SOP with a 2.0 mm profile
- Compliance with EU REACH
- 8mm long creepage distance
- Pb free and RoHS compliant.
- UL and cUL approved(No. E214129)
- VDE approved (No. 40028391)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved

#### Description

The EL111X-G series devices consist of an infrared emitting diode, optically coupled to a phototransistor detector. Compound use free halogens and  $\text{Sb}_2\text{O}_3$ . They are packaged in a 5-pin SOP package

#### Applications

- Programmable controllers
- System appliances, measuring instruments
- Telecommunication equipments
- Home appliances, such as fan heaters, etc.
- Signal transmission between circuits of different potentials and impedances

**Absolute Maximum Ratings (Ta=25°C)**

	Parameter	Symbol	Rating	Unit
Input	Forward current	$I_F$	60	mA
	Peak forward current (1us, pulse)	$I_{FP}$	1.5	A
	Reverse voltage	$V_R$	6	V
	Power dissipation	$P_D$	100	mW
	Power dissipation	$P_C$	150	mW
Output	Collector current	$I_C$	50	mA
	Collector-Emitter voltage	$V_{CEO}$	80	V
	Emitter-Collector voltage	$V_{ECO}$	7	V
	Total Power Dissipation	$P_{TOT}$	250	mW
	Isolation Voltage* <sup>1</sup>	$V_{ISO}$	5000	V rms
	Operating Temperature	$T_{OPR}$	-55 to 110	°C
	Storage Temperature	$T_{STG}$	-55 to 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 are shorted together, and pins 3, 4 & 5 are shorted together.

\*2 For 10 seconds

**Electro-Optical Characteristics (Ta=25°C unless specified otherwise)**

**Input**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward Voltage	$V_F$	-	-	1.5	V	$I_F = 50\text{mA}$
Reverse current	$I_R$	-	-	10	$\mu\text{A}$	$V_R = 6\text{V}$
Input capacitance	$C_{in}$	-	50	-	pF	$V = 0, f = 1\text{kHz}$

**Output**

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Collector-Emitter dark current	$I_{CEO}$	-	-	100	nA	$V_{CE} = 20\text{V}, I_F = 0\text{mA}$
Collector-Emitter breakdown voltage	$BV_{CEO}$	80	-	-	V	$I_C = 0.1\text{mA}$
Emitter-Collector breakdown voltage	$BV_{ECO}$	7	-	-	V	$I_E = 0.1\text{mA}$

**Transfer Characteristics**

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition			
Current Transfer ratio	EL1110	50	-	600	%	$I_F = 5\text{mA}, V_{CE} = 5\text{V}$			
	EL1116	100	-	300					
	EL1117	CTR	80	-			160		
	EL1118	130	-	260					
	EL1119	200	-	400					
	EL1112	63	-	125					
	EL1113	100	-	200			$I_F = 10\text{mA}, V_{CE} = 5\text{V}$		
	EL1114	CTR	160	-			320		
	EL1112	22	-	-					
	EL1113	34	-	-			$I_F = 1\text{mA}, V_{CE} = 5\text{V}$		
	EL1114	56	-	-					
	Collector-Emitter saturation voltage	$V_{CE(sat)}$	-	-			0.4	V	$I_F = 10\text{mA}, I_C = 1\text{mA}$
	Isolation resistance	$R_{IO}$	$5 \times 10^{10}$	-			-	$\Omega$	$V_{IO} = 500\text{Vdc}, 40\sim 60\% \text{ R.H.}$
	Floating capacitance	$C_{IO}$	-	-			1.0	pF	$V_{IO} = 0, f = 1\text{MHz}$

### Transfer Characteristics

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Turn on time	Ton	-	4	-	μs	V <sub>CE</sub> = 5V, I <sub>C</sub> = 5mA, R <sub>L</sub> = 100Ω
Turn off time	Toff	-	3	-		
Rise time	t <sub>r</sub>	-	2	18	μs	V <sub>CE</sub> = 5V, I <sub>C</sub> = 5mA, R <sub>L</sub> = 100Ω
Fall time	t <sub>f</sub>	-	3	18		

\* Typical values at T<sub>a</sub> = 25°C

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Typical Electro-Optical Characteristics Curves

Figure 1. Forward Current vs. Forward Voltage

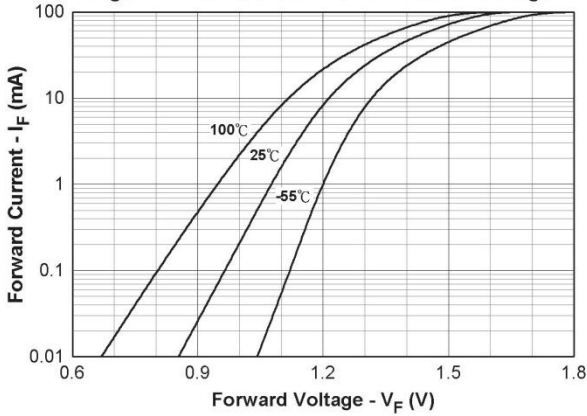


Figure.2 Collector Dark Current vs. Ambient Temperature

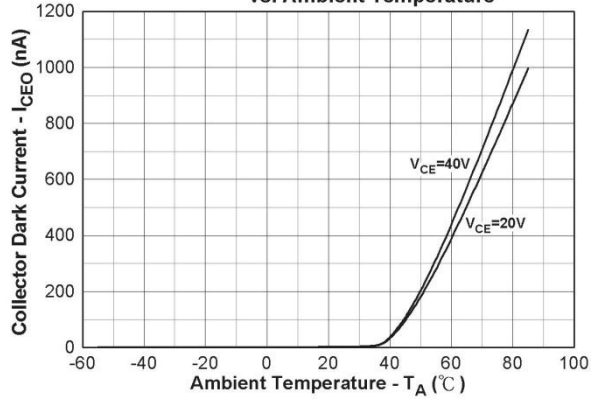


Figure 3. Collector Current vs. Collector Emitter Voltage

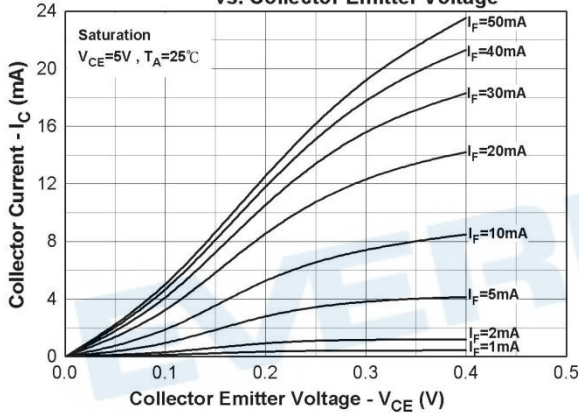


Figure 4. Collector Current vs. Collector Emitter Voltage

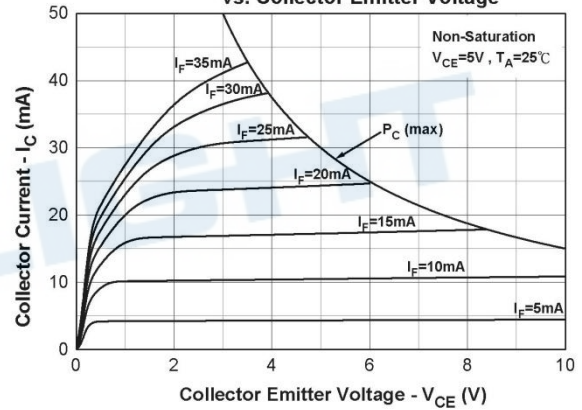


Figure 5. Normalized Collector Current vs. Forward Current

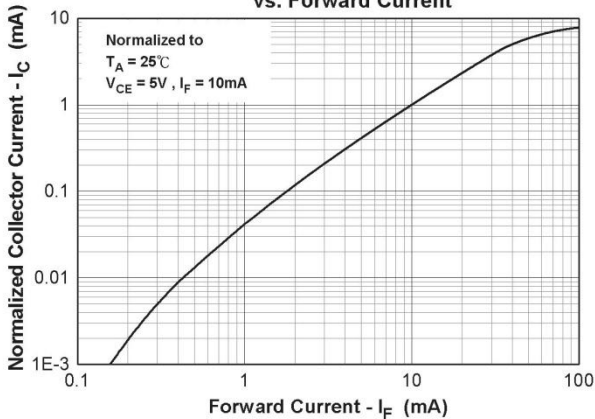


Figure 6. Normalized Current Transfer Ratio vs. Forward Current

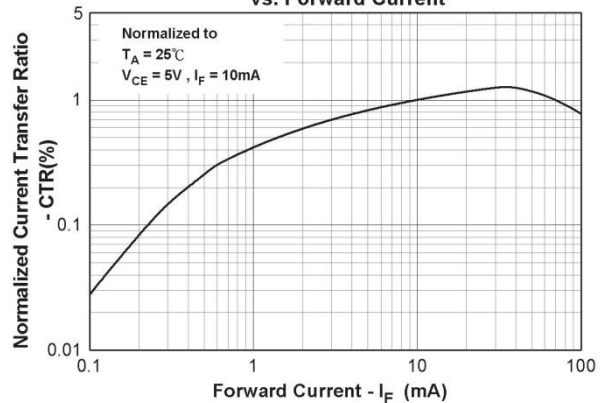


Figure 7. Normalized Current Transfer Ratio vs. Ambient Temperature

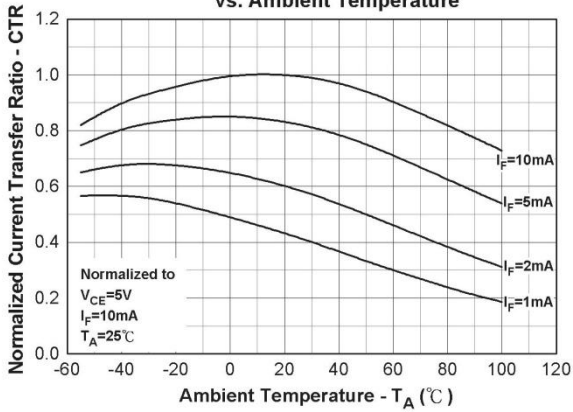


Figure 8. Normalized Current Transfer Ratio vs. Ambient Temperature

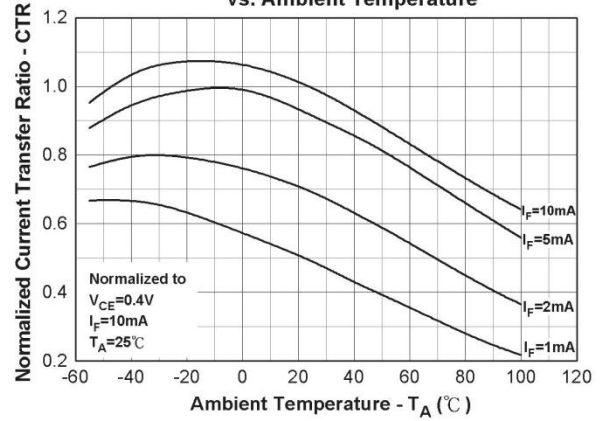


Figure 9. Turn on/off Time vs. Collector Current

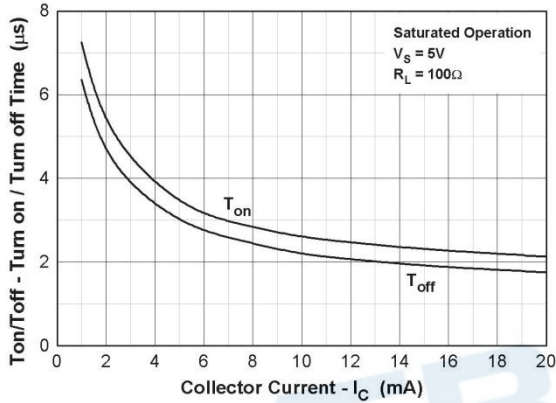


Figure 10. Turn on/off Time vs. Forward Current

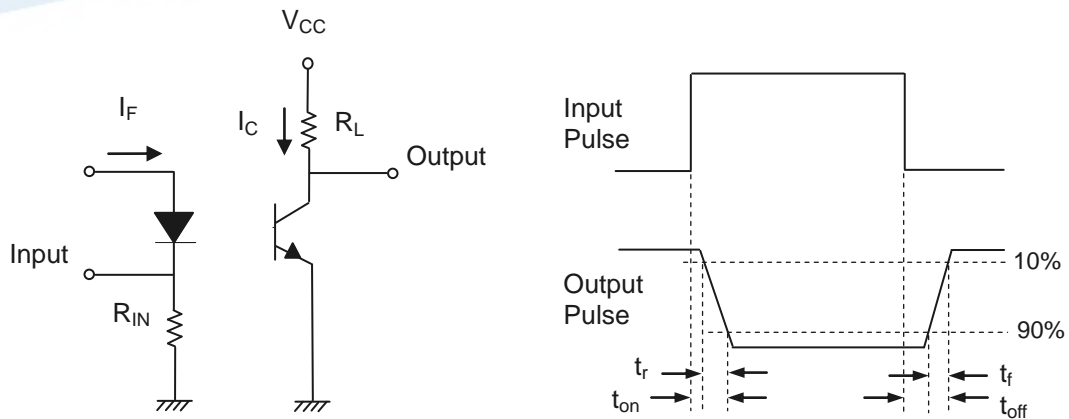
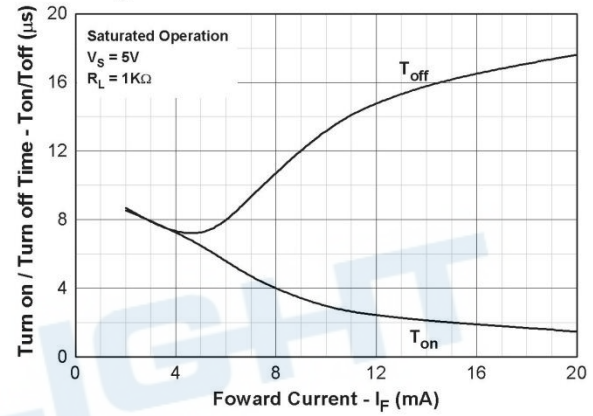


Figure 11. Switching Time Test Circuit & Waveforms

## Order Information

### Part Number

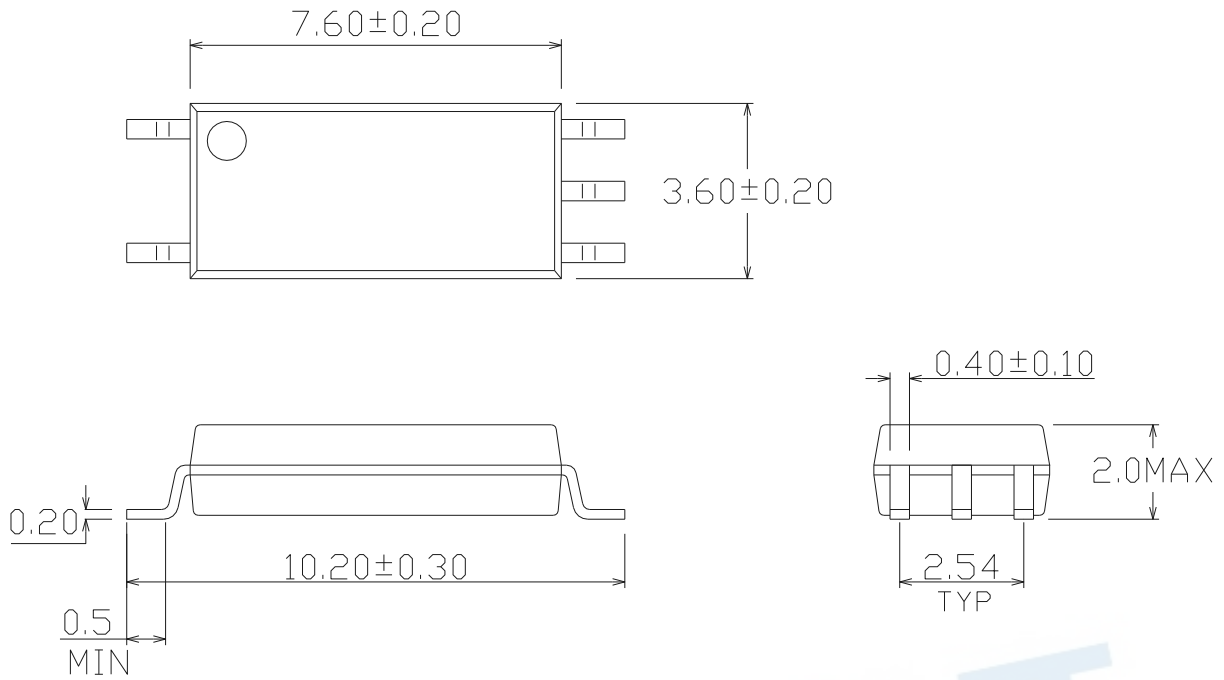
**EL111X(Y)-VG**

### Note

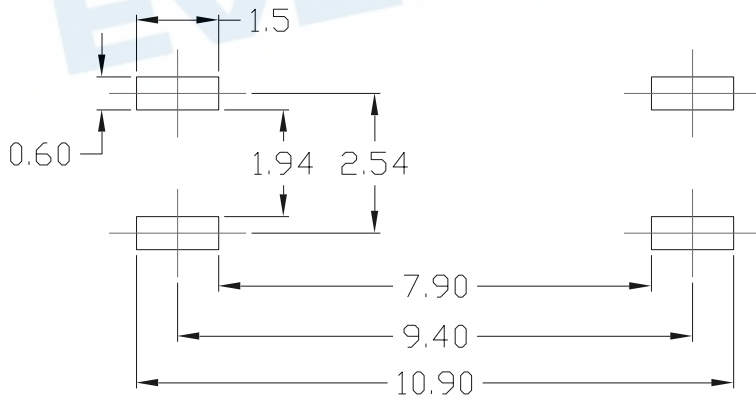
EL111 = Part No.  
X = CTR Rank (0, 2, 3, 4, 6, 7, 8 or 9)  
Y = Tape and reel option (TA, TB or none).  
V = VDE safety (optional)  
G = Halogens free

Option	Description	Packing quantity
None	Standard SMD option	100 units per tube
-V	Standard SMD option + VDE	100 units per tube
(TA)	TA Tape & reel option	3000 units per reel
(TB)	TB Tape & reel option	3000 units per reel
(TA)-V	TA Tape & reel option + VDE	3000 units per reel
(TB)-V	TB Tape & reel option + VDE	3000 units per reel

Package Dimension (Dimensions in mm)

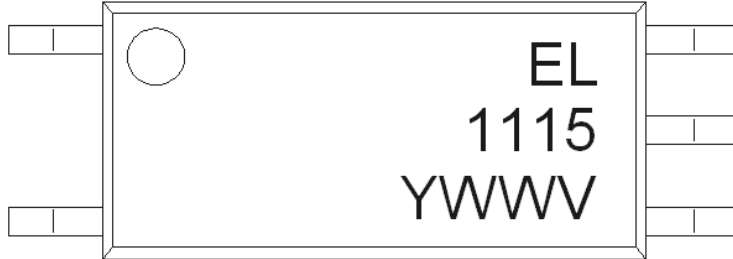


Recommended pad layout for surface mount leadform





## Device Marking

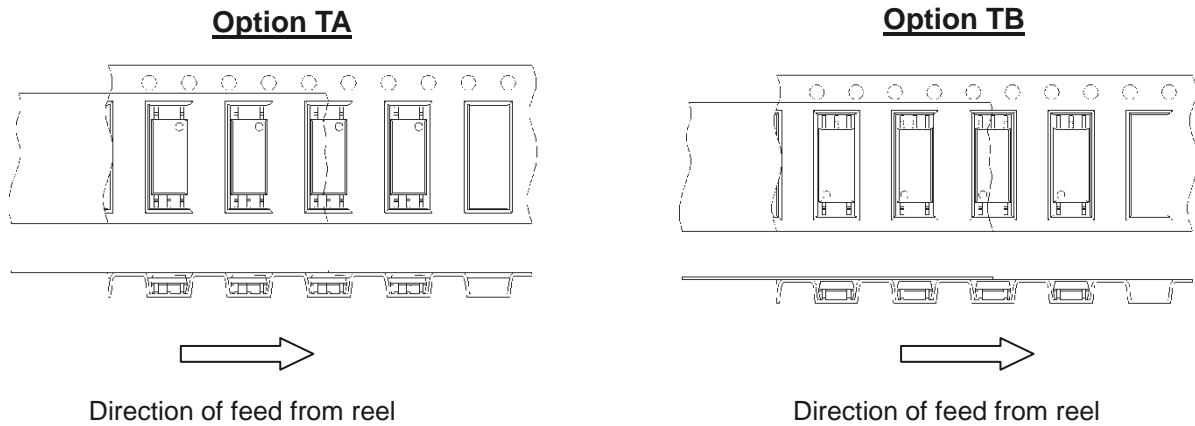


## Notes

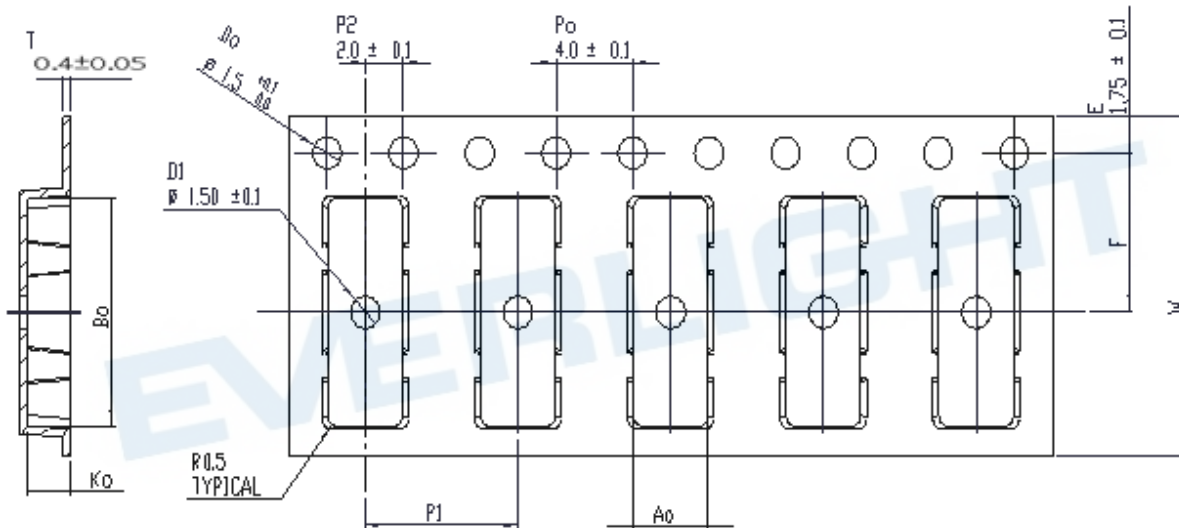
EL	denotes Everlight
1115	denotes Device Number
Y	denotes 1 digit Year code
WW	denotes 2 digit Week code
V	denotes VDE (optional)

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**Tape & Reel Packing Specifications**



**Tape dimensions**

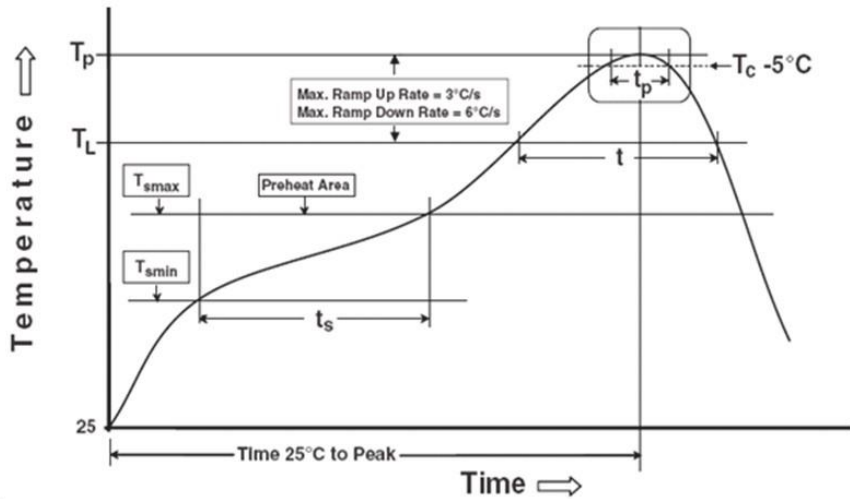


Dimension No.	<b>Ao</b>	<b>Bo</b>	<b>Do</b>	<b>D1</b>	<b>E</b>	<b>F</b>
Dimension (mm)	$3.9 \pm 0.10$	$10.75 \pm 0.10$	$1.5 + 0.1/-0$	$1.5 \pm 0.10$	$1.75 \pm 0.10$	$7.5 \pm 0.10$
Dimension No.	<b>Po</b>	<b>P1</b>	<b>P2</b>	<b>T</b>	<b>W</b>	<b>Ko</b>
Dimension (mm)	$4.0 \pm 0.10$	$8.0 \pm 0.10$	$2.0 \pm 0.10$	$0.4 \pm 0.05$	$16.0 \pm 0.30$	$2.25 \pm 0.10$

## 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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