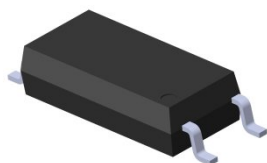




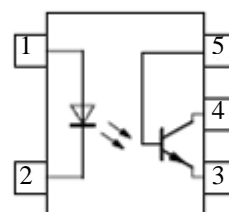
**THE DATASHEET OF  
EL1110(TA)-VG**



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



Schematic



Pin Configuration

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

#### Features:

- Free halogens compliant
- 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
- 8mm long creepage distance
- Pb free and RoHS compliant.
- UL 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*1	$V_{ISO}$	5000	V rms
	Operating Temperature	$T_{OPR}$	-55 to 110	°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 are shorted together, and pins 3, 4 & 5 are shorted together.

\*2 For 10 seconds

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

**Input**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward Voltage	$V_F$	-	-	1.5	V	$I_F = 50\text{mA}$
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				
	EL1116	100	-	300				
	EL1117	80	-	160			%	$I_F = 5\text{mA}, V_{CE} = 5\text{V}$
	EL1118	130	-	260				
	EL1119	200	-	400				
	EL1112	63	-	125				
	EL1113	100	-	200				
	EL1114	160	-	320			%	$I_F = 10\text{mA}, V_{CE} = 5\text{V}$
	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

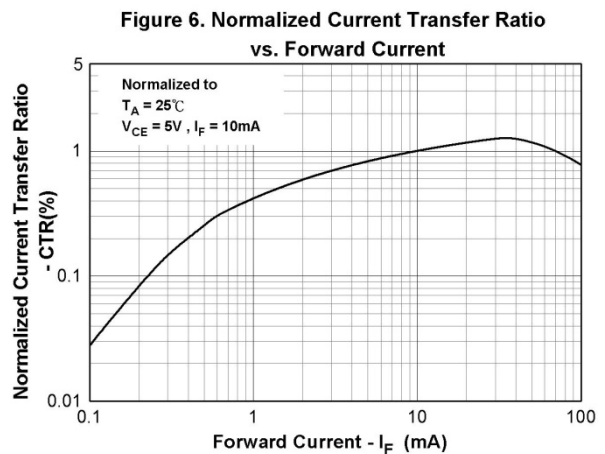
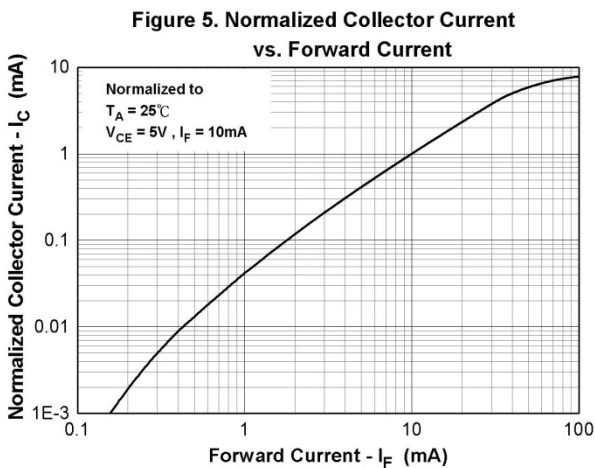
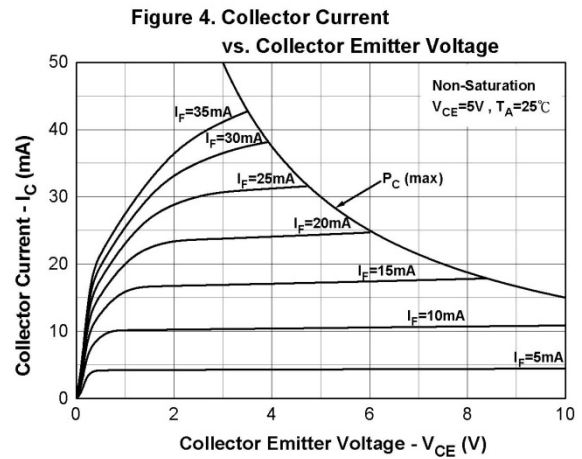
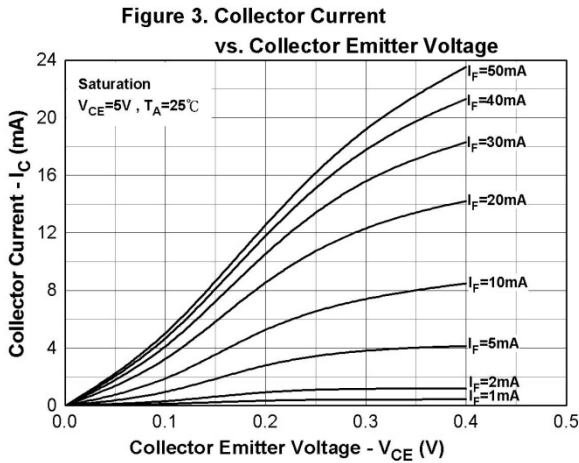
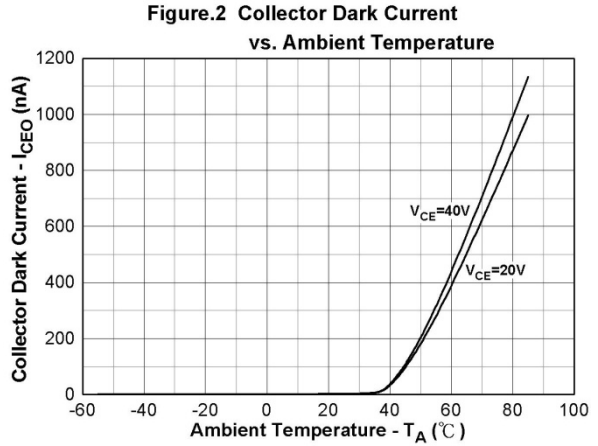
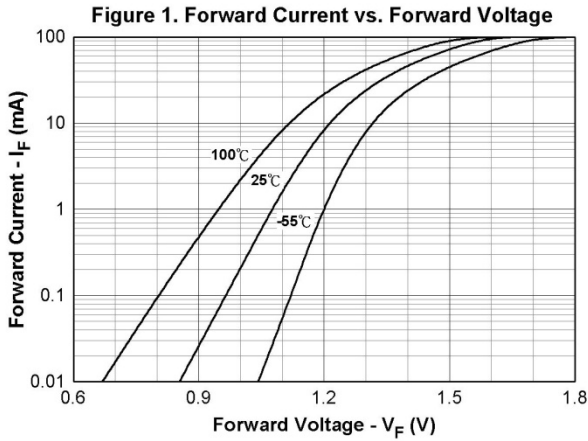


Figure 7. Normalized Current Transfer Ratio vs. Ambient Temperature

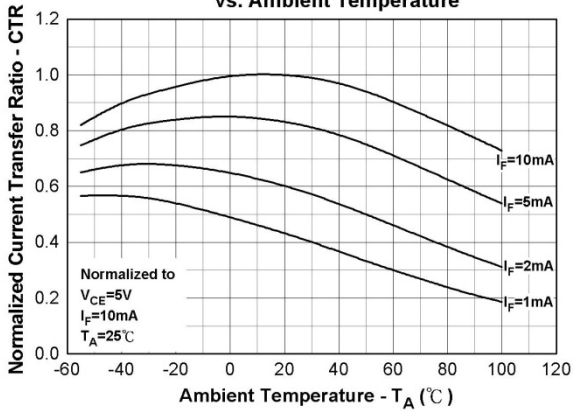


Figure 8. Normalized Current Transfer Ratio vs. Ambient Temperature

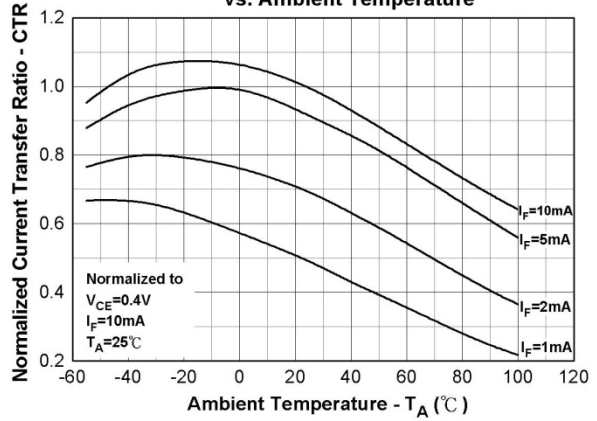


Figure 9. Turn on/off Time vs. Collector Current

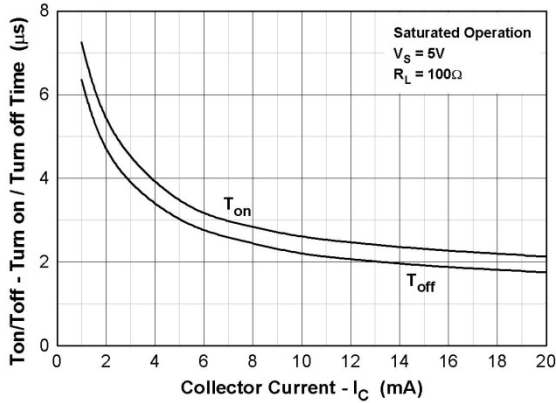


Figure 10. Turn on/off Time vs. Forward Current

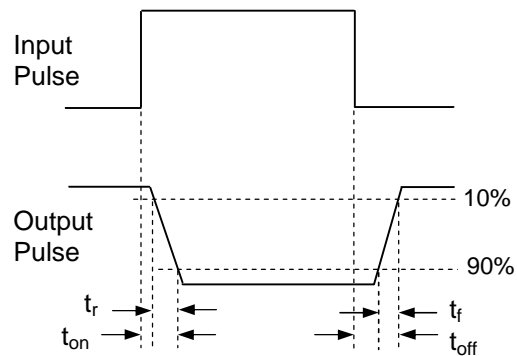
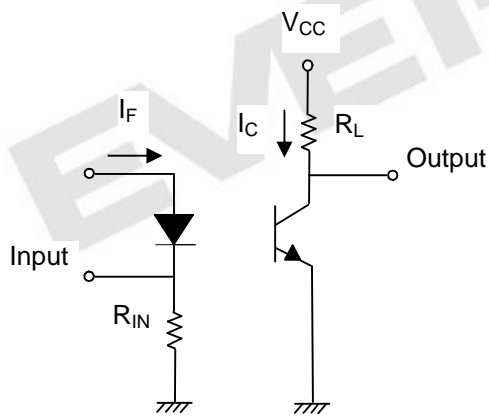
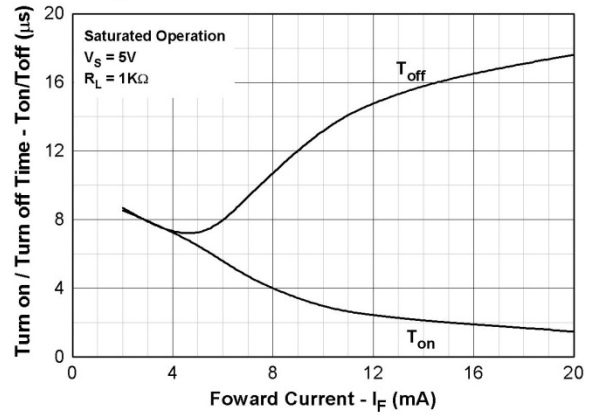


Figure 11. Switching Time Test Circuit & Waveforms

## Order Information

### Part Number

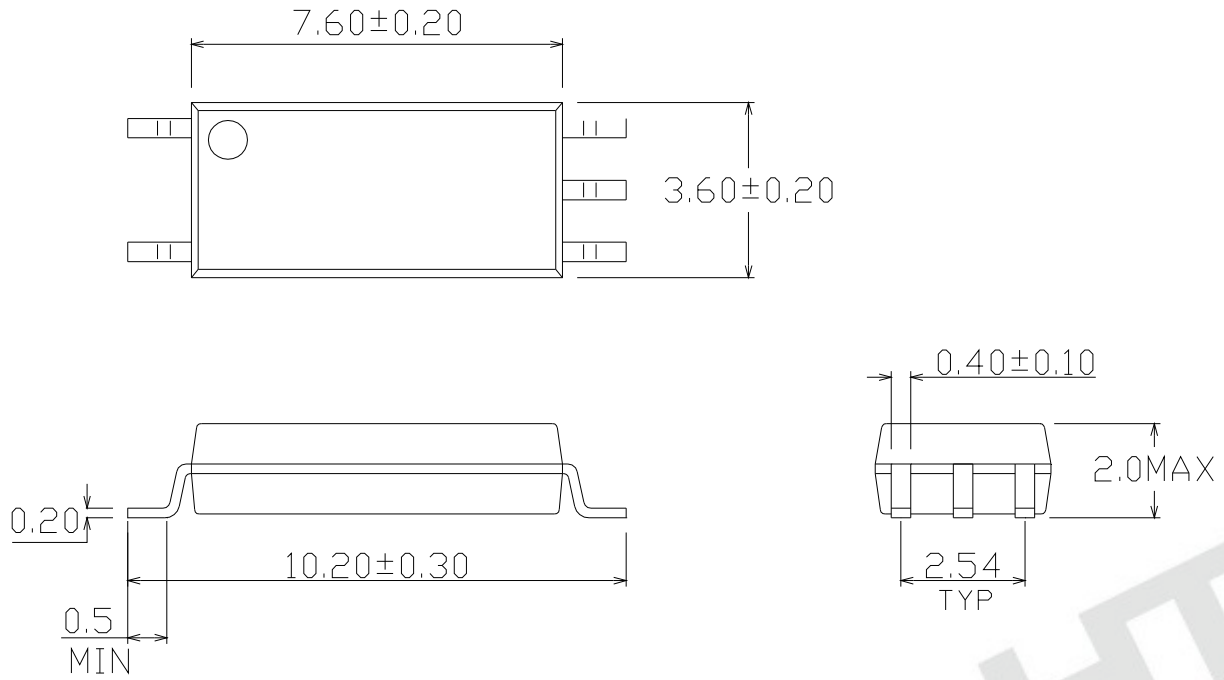
**EL111X(Y)-VG**

### Note

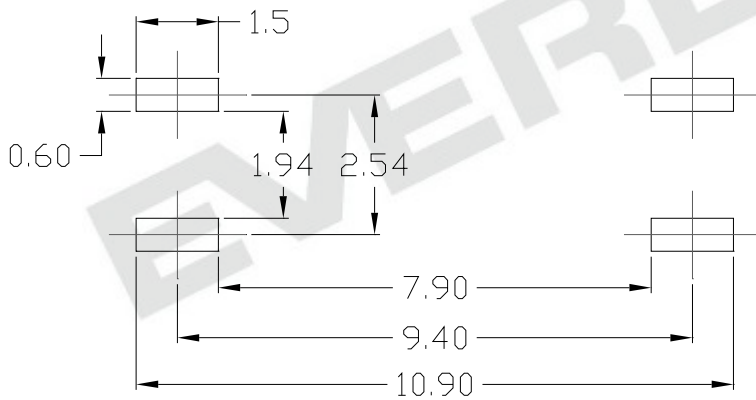
EL111 = Part No.  
X = CTR Rank (0, 2, 3, 4, 6, 7, 8 or 9)  
Y = Tape and reel option (TA, TB or none).  
V = VDE safety (optional)  
G = Halogens free

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

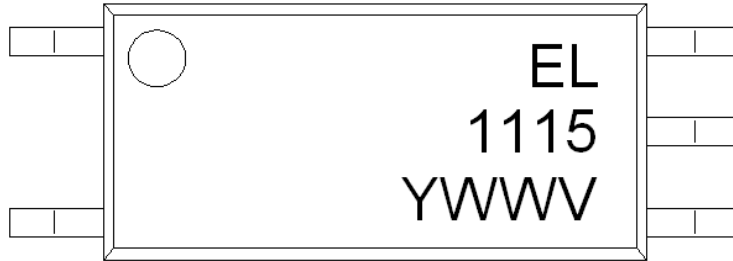
Package Dimension (Dimensions in mm)



Recommended pad layout for surface mount leadform



## Device Marking

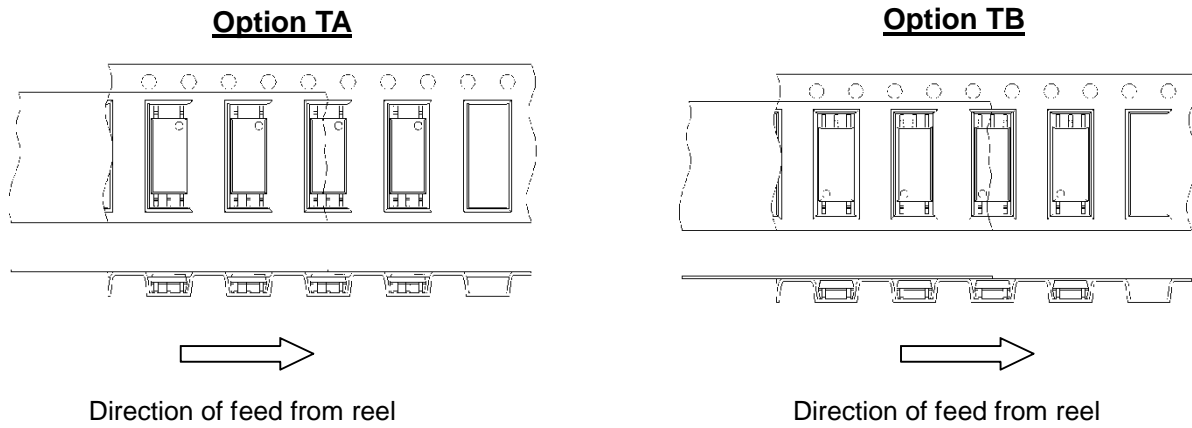


## Notes

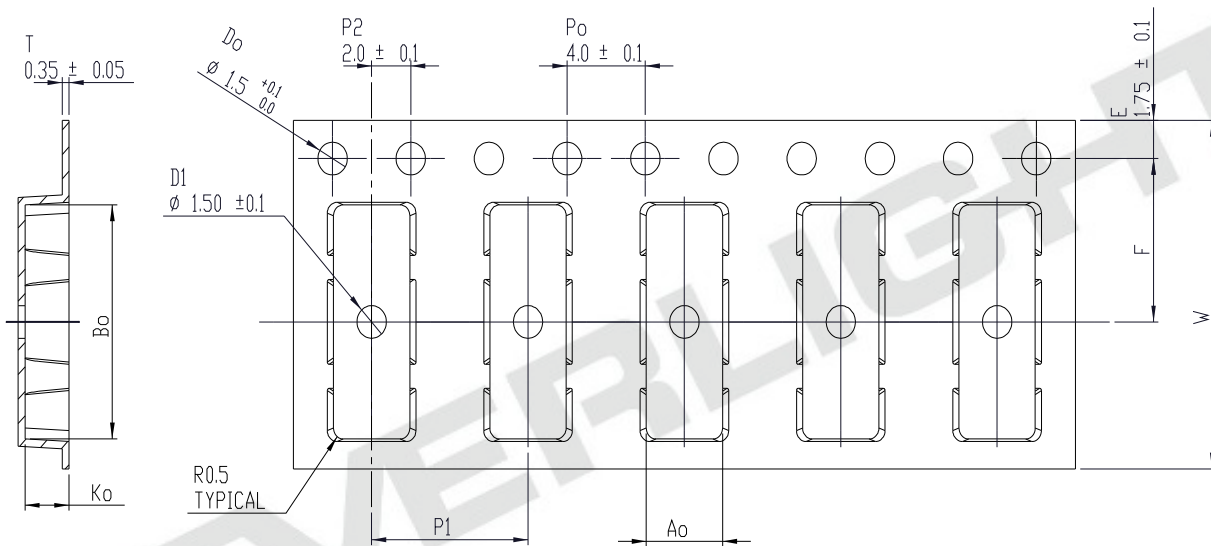
EL	denotes Everlight
1115	denotes Device Number
Y	denotes 1 digit Year code
WW	denotes 2 digit Week code
V	denotes VDE (optional)

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**Tape & Reel Packing Specifications**



**Tape dimensions**

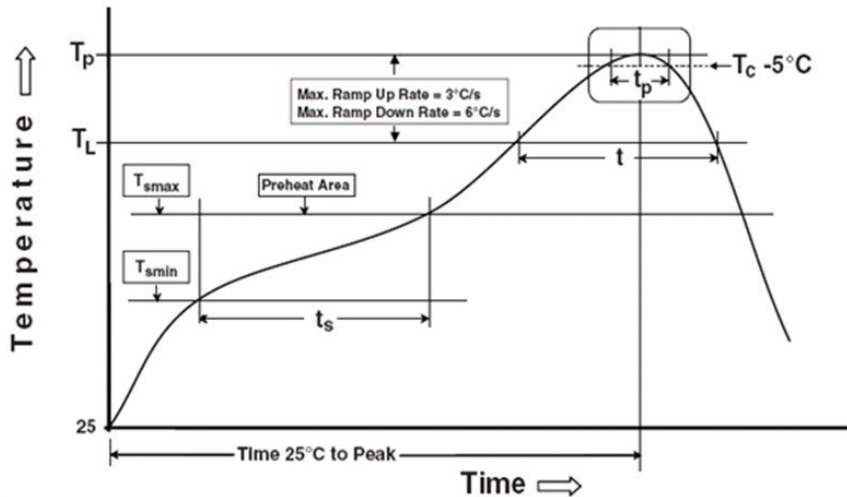


Dimension No.	<b>Ao</b>	<b>Bo</b>	<b>Do</b>	<b>D1</b>	<b>E</b>	<b>F</b>
Dimension (mm)	$3.9 \pm 0.10$	$10.75 \pm 0.10$	$1.5 + 0.1/-0$	$1.5 \pm 0.10$	$1.75 \pm 0.10$	$7.5 \pm 0.10$
Dimension No.	<b>Po</b>	<b>P1</b>	<b>P2</b>	<b>T</b>	<b>W</b>	<b>Ko</b>
Dimension (mm)	$4.0 \pm 0.10$	$8.0 \pm 0.10$	$2.0 \pm 0.10$	$0.35 \pm 0.05$	$16.0 \pm 0.30$	$2.25 \pm 0.10$

## 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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