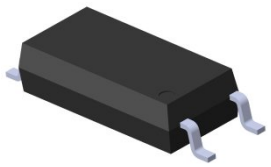
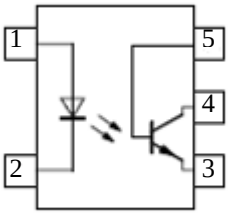
DATASHEET

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 =5mA, V_{CE} =5V)
  (CTR: 63~320% at I_F =10mA, V_{CE} =5V)
- 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 Sb_2O_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℃)

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
Output	Power dissipation	P_C	150	mW
	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 =50mA
Reverse current	I_R	-	-	10	μA	V_R = 6V
Input capacitance	C_{in}	-	50	-	pF	V = 0, f = 1kHz

Output

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

Transfer Characteristics

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

Transfer Characteristics

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Turn on time	Ton	-	4	-	μs	V_{CE} = 5V, I_C = 5mA, R_L = 100Ω
Turn off time	Toff	-	3	-		
Rise time	t_r	-	2	18	μs	V_{CE} = 5V, I_C = 5mA, R_L = 100Ω
Fall time	t_f	-	3	18		

* Typical values at T_a = 25°C

Typical Electro-Optical Characteristics Curves

Figure 1. Forward Current vs. Forward Voltage

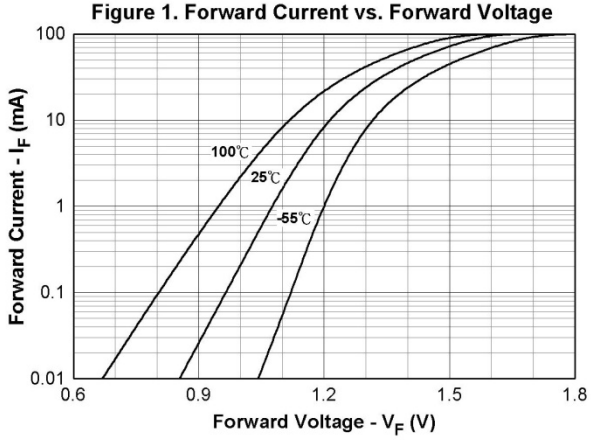


Figure.2 Collector Dark Current vs. Ambient Temperature

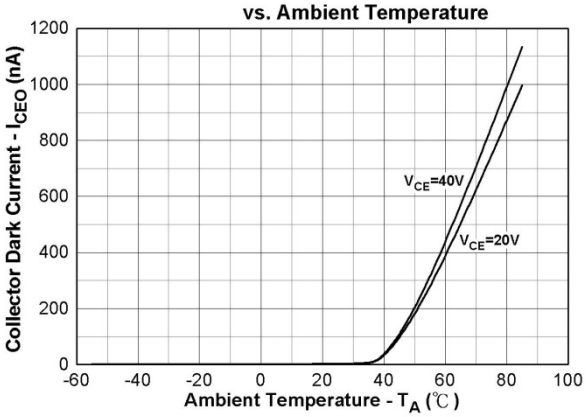


Figure 3. Collector Current vs. Collector Emitter Voltage

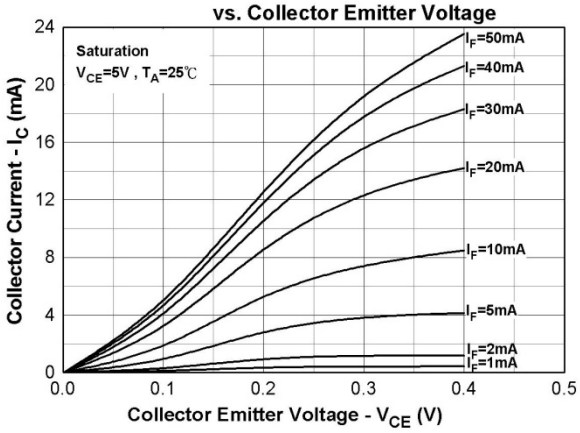


Figure 4. Collector Current vs. Collector Emitter Voltage

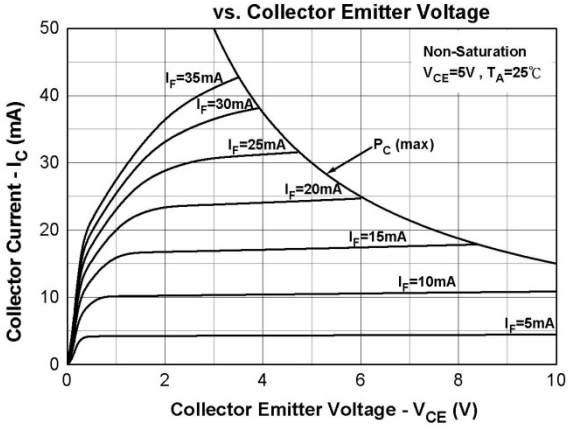


Figure 5. Normalized Collector Current vs. Forward Current

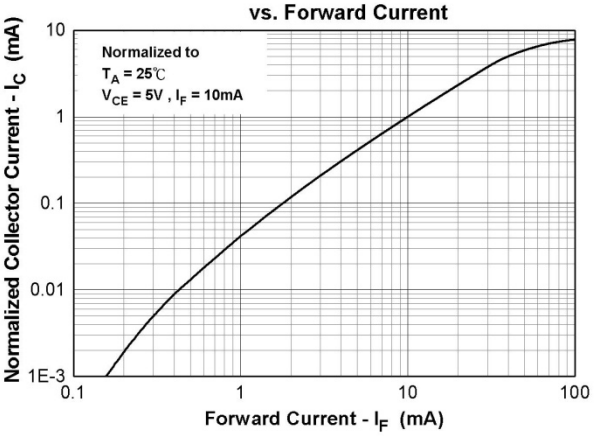


Figure 6. Normalized Current Transfer Ratio vs. Forward Current

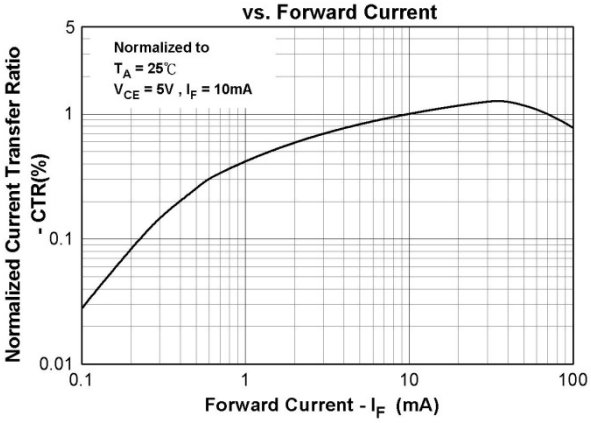


Figure 7. Normalized Current Transfer Ratio vs. Ambient Temperature

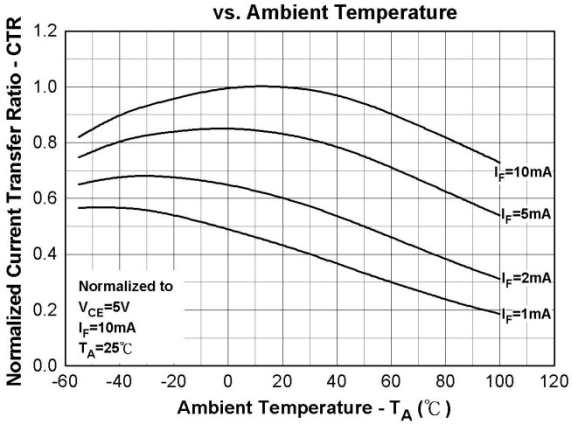


Figure 8. Normalized Current Transfer Ratio vs. Ambient Temperature

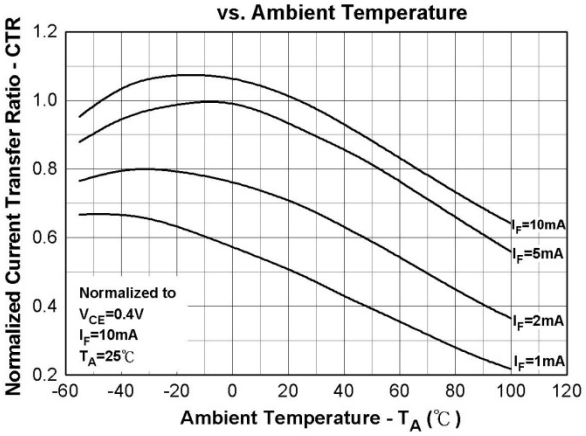


Figure 9. Turn on/off Time vs. Collector Current

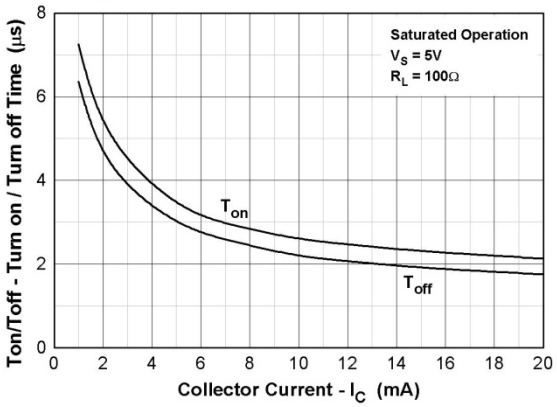
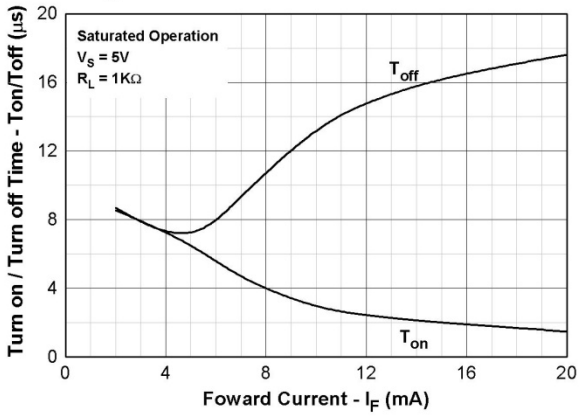


Figure 10. Turn on/off Time vs. Forward Current



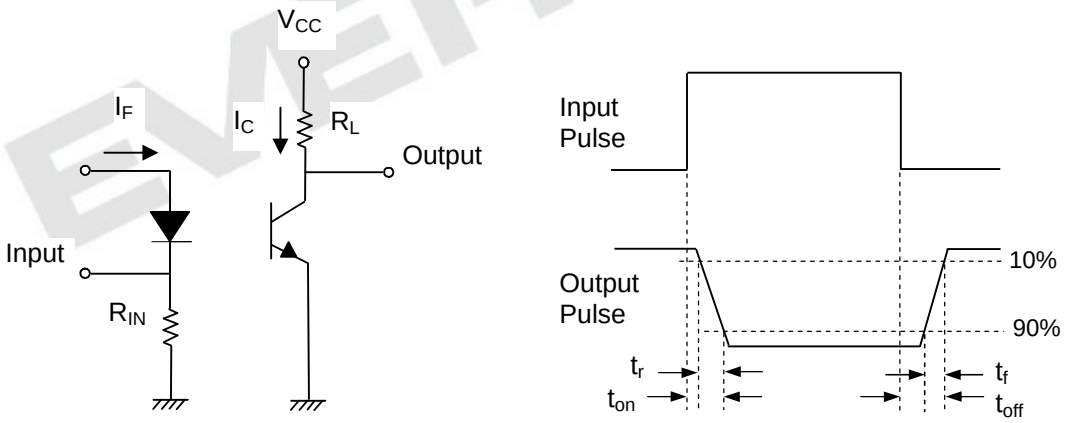


Figure 11. Switching Time Test Circuit & Waveforms

Order Information

Part Number

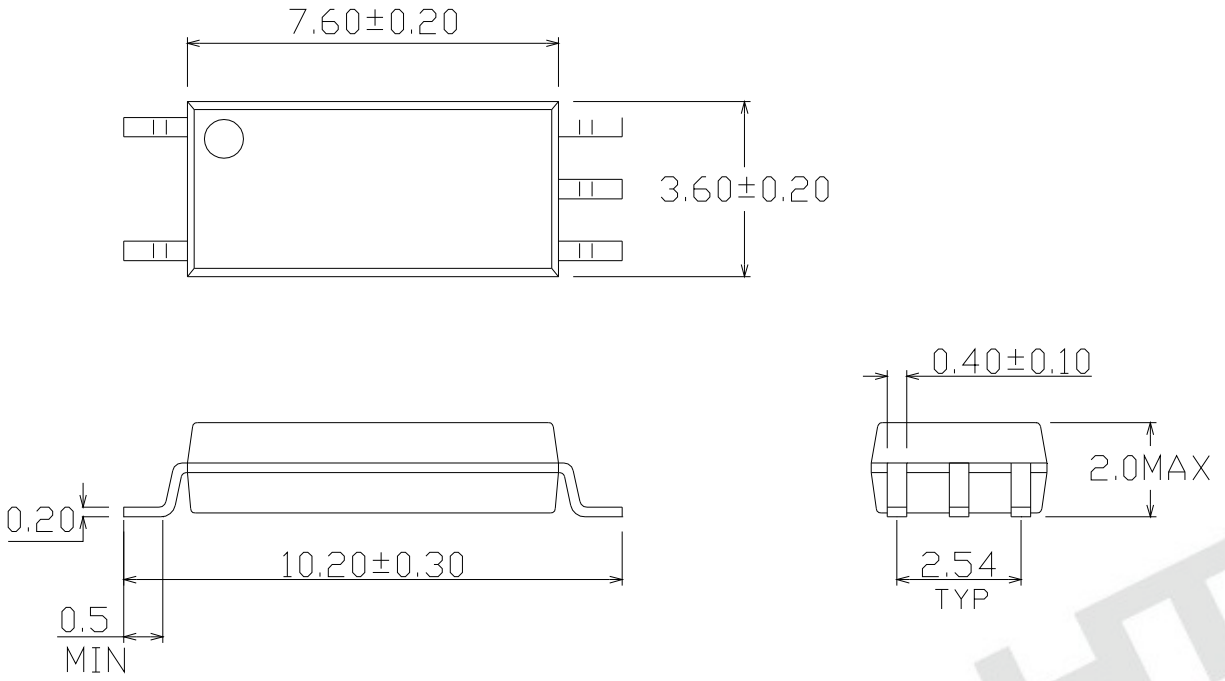
EL111X(Y)-VG

Note

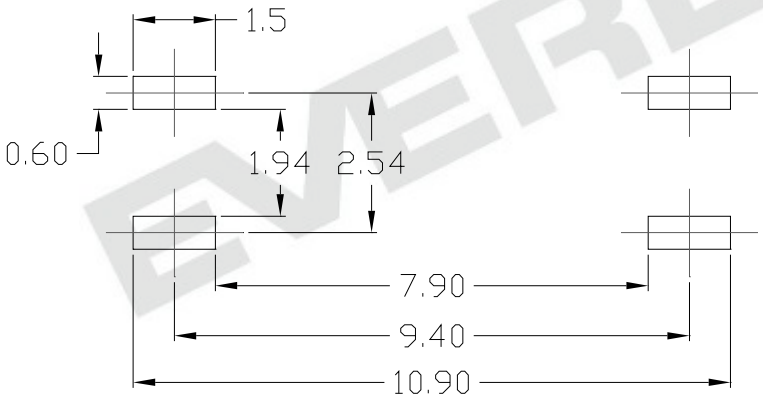
EL111 = Part No.
X = CTR Rank (0, 2, 3, 4, 6, 7, 8 or 9)
Y = Tape and reel option (TA, TB or none).
V = VDE safety (optional)
G = Halogens free

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

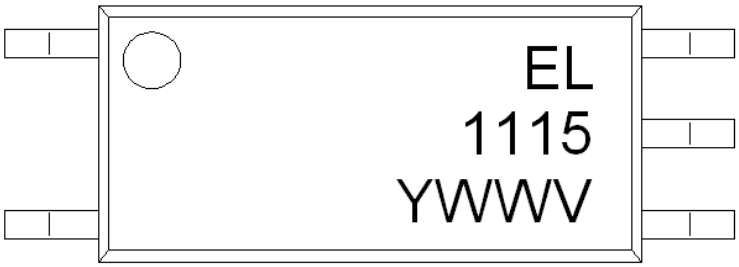
Package Dimension (Dimensions in mm)



Recommended pad layout for surface mount leadform



Device Marking

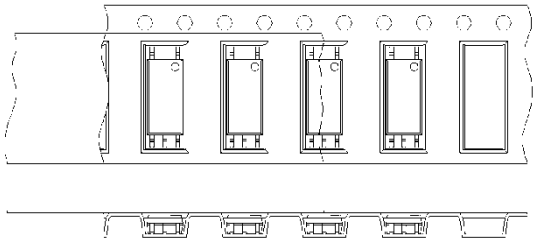


Notes

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

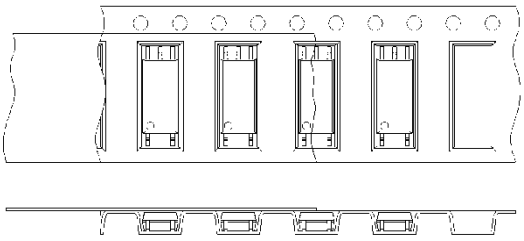
Tape & Reel Packing Specifications

Option TA



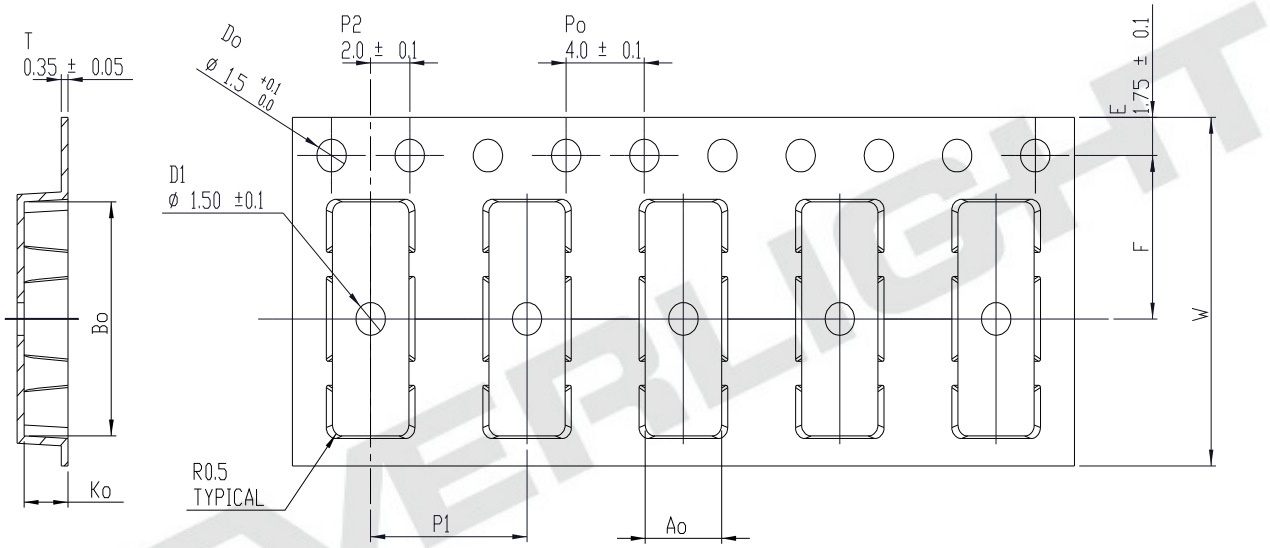
Direction of feed from reel

Option TB



Direction of feed from reel

Tape dimensions

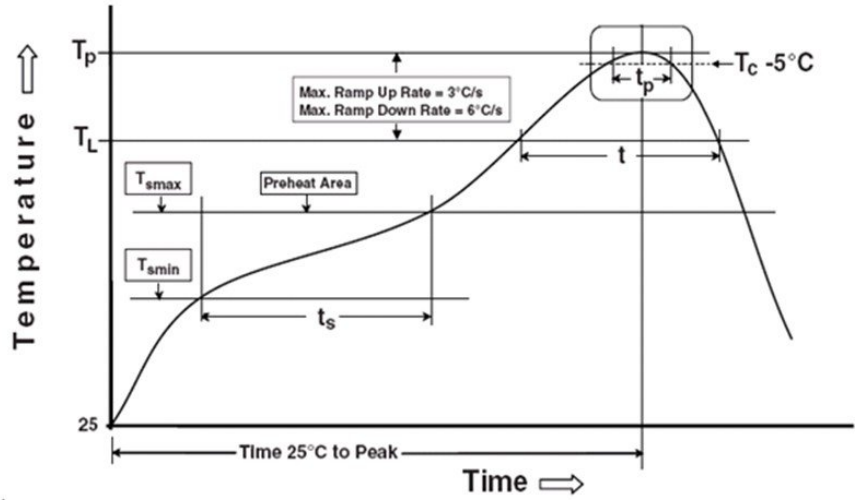


Dimension No.	**Ao**	**Bo**	**Do**	**D1**	**E**	**F**
Dimension (mm)	3.9 ± 0.10	10.75 ± 0.10	1.5 + 0.1/-0	1.5 ± 0.10	1.75± 0.10	7.5 ± 0.10
Dimension No.	**Po**	**P1**	**P2**	**T**	**W**	**Ko**
Dimension (mm)	4.0 ± 0.10	8.0 ± 0.10	2.0 ± 0.10	0.35± 0.05	16.0 ± 0.30	2.25 ± 0.10

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°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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