



# B1D03120E

1200V ▲ 3A ▲ SiC SCHOTTKY DIODE

SILICON CARBIDE SiC SCHOTTKY DIODE ▲ SMD type

Excellent surge capability

Easy paralleling due to positive  $V_F$  temperature coefficient

TO-252-2L (DPAK) package ▲ Epoxy meets UL94-V0 ▲ MSL3



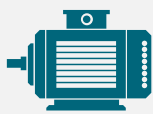




Low forward voltage

Temperature independent switching

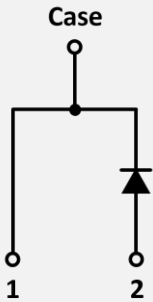
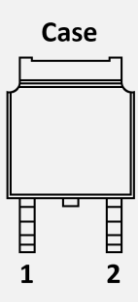
## SPECIFICATION

Item ( $T_C = 25^\circ\text{C}$ , unless otherwise noted)		Characteristics
Operating Temperature Range	$T_J$	$-55^\circ\text{C}$ to $+175^\circ\text{C}$
Storage Temperature Range	$T_S$	$-55^\circ\text{C}$ to $+175^\circ\text{C}$
Repetitive Peak Reverse Voltage	$V_{RRM}$	1200V
Continuous Forward Current at $T_C = 165^\circ\text{C}$	$I_F$	3A
Total Capacitive Charge ( $T_J = 25^\circ\text{C}$ )	$Q_C$	19nC
Capacitance Stored Energy ( $V_R = 800\text{V}$ )	$E_C$	9μJ
Diode Forward Voltage ( $T_J = 175^\circ\text{C}$ , $I_F = 3\text{A}$ )	$V_F$	1.9V
Power Dissipation	$P_{TOT}$	92W

## APPLICATIONS

EV Charging	Industrial Inverters	Motors & Drives	Power Factor Correction	Renewable Energy	SMPS	UPS
						

## PIN DESCRIPTION

Circuit Diagram	Outline - Top View	Pin No.	Description
		1 2	Cathode (Case Backside) Anode



## ABSOLUT MAXIMUM RATINGS ▲ $T_C = 25^{\circ}\text{C}$ , unless otherwise noted

Item	Condition	Symbol		Unit
Repetitive Peak Reverse Voltage		$V_{RRM}$	1200	V
Non-Repetitive Peak Reverse Voltage		$V_{RSM}$	1200	V
Continuous Forward Current	$T_C = 25^{\circ}\text{C}$	$I_F$	14	A
Continuous Forward Current	$T_C = 165^{\circ}\text{C}$	$I_F$	3	A
Non-Repetitive Forward Surge Current	$T_C = 25^{\circ}\text{C}$ , $t_p = 10\text{ms}$ , Half Sine Wave	$I_{FSM}$	30	A
$I^2t$ Value	$T_C = 25^{\circ}\text{C}$ , $t_p = 10\text{ms}$	$\int i^2 dt$	4.5	$\text{A}^2\text{s}$
Power Dissipation	$T_C = 25^{\circ}\text{C}$	$P_{TOT}$	92	W
Power Dissipation	$T_C = 110^{\circ}\text{C}$	$P_{TOT}$	39	W
Operating Junction Temperature		$T_J$	-55 to +175	$^{\circ}\text{C}$
Storage Temperature Range		$T_{STG}$	-55 to +175	$^{\circ}\text{C}$

## ELECTRICAL CHARACTERISTICS

Item	Condition	Symbol	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
DC Blocking Voltage	$T_J = 25^{\circ}\text{C}$	$V_{DC}$	1200			V
Diode Forward Voltage	$I_F = 3\text{A}$ , $T_J = 25^{\circ}\text{C}$	$V_F$		1.37		V
Diode Forward Voltage	$I_F = 3\text{A}$ , $T_J = 175^{\circ}\text{C}$	$V_F$		1.90		V
Reverse Current	$V_R = 1200\text{V}$ , $T_J = 25^{\circ}\text{C}$	$I_R$		1		$\mu\text{A}$
Reverse Current	$V_R = 1200\text{V}$ , $T_J = 175^{\circ}\text{C}$	$I_R$		20		$\mu\text{A}$

Item	Condition	Symbol	Min.	Typ.	Max.	Unit
<b>Dynamic Characteristics</b>						
Total Capacitive Charge	$V_R = 800\text{V}$ , $T_J = 25^{\circ}\text{C}$ $Q_C = \int_0^{V_R} C(V) dV$	$Q_C$		19		nC
Total Capacitance	$V_R = 1\text{V}$ , $f = 1\text{MHz}$ , $T_J = 25^{\circ}\text{C}$	$C$		200		pF
Total Capacitance	$V_R = 400\text{V}$ , $f = 1\text{MHz}$ , $T_J = 25^{\circ}\text{C}$	$C$		18		pF
Total Capacitance	$V_R = 800\text{V}$ , $f = 1\text{MHz}$ , $T_J = 25^{\circ}\text{C}$	$C$		13		pF
Capacitance Stored Energy	$V_R = 800\text{V}$ , $T_J = 25^{\circ}\text{C}$	$E_C$		9		$\mu\text{J}$

## THERMAL RESISTANCE PERFORMANCE

Item	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$		1.63		K/W



## REFERENCE DATA ▲ TYPICAL PERFORMANCE

Fig. 1 • Typical Forward Characteristics  $I_F$  vs.  $V_F$

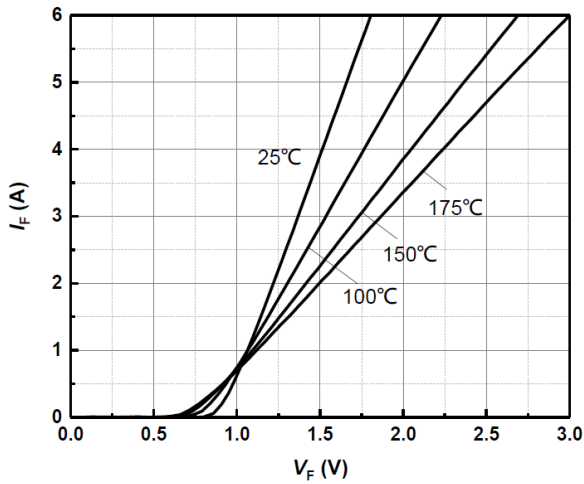


Fig. 2 • Typical Reverse Current  $I_R$  as function of Reverse Voltage  $V_R$

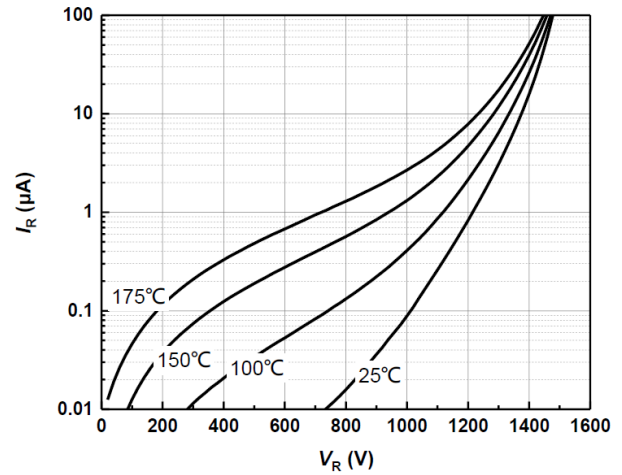


Fig. 3 • Diode Forward Current  $I_F$  as function of Case Temperature  $T_C$  ( $D = \text{Duty Cycle}$ )

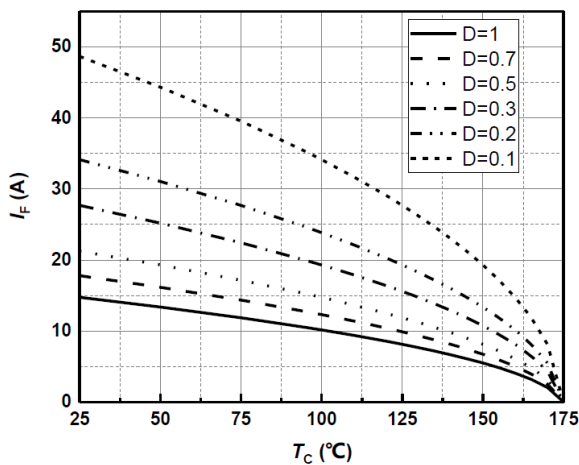


Fig. 4 • Typical Capacitance  $C$  as function of Reverse Voltage  $V_R$ ,  $C = f(V_R)$ ,  $T_J = 25^\circ\text{C}$ ,  $f = 1\text{MHz}$

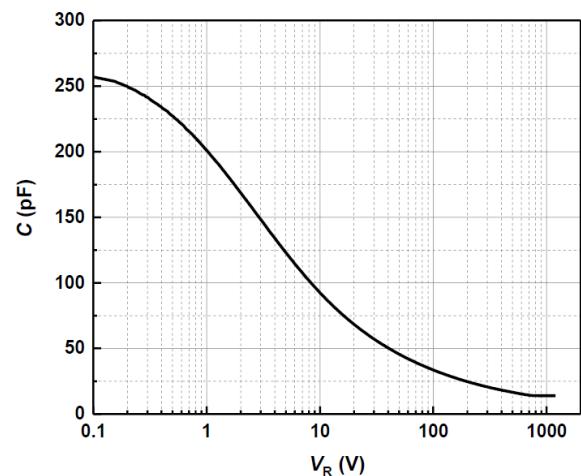


Fig. 5 • Typical Reverse Charge  $Q_C$  as function of Reverse Voltage  $V_R$

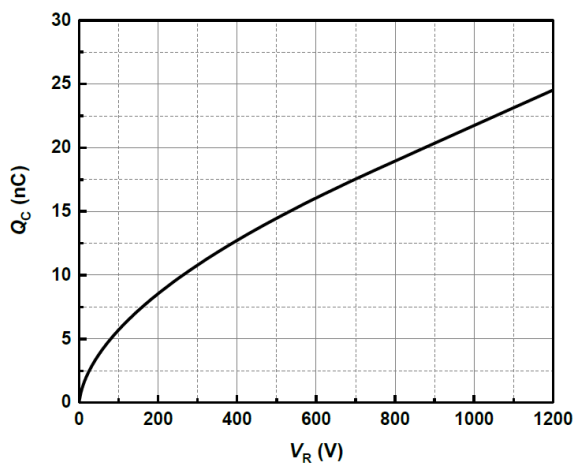
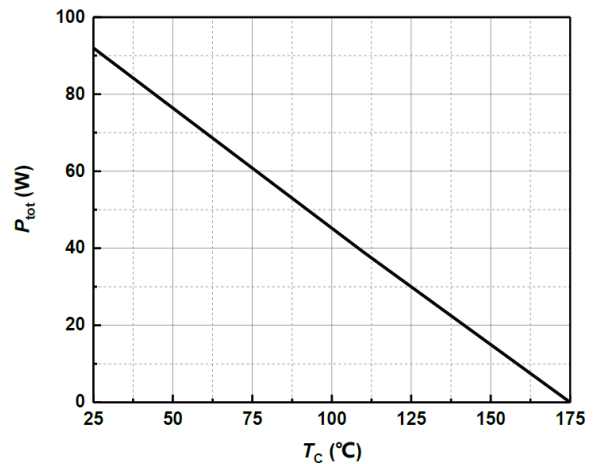


Fig. 6 • Power Dissipation  $P_{TOT}$  as function of Case Temperature  $T_C$





## REFERENCE DATA ▲ TYPICAL PERFORMANCE

Fig. 7 • Capacitance Stored Energy

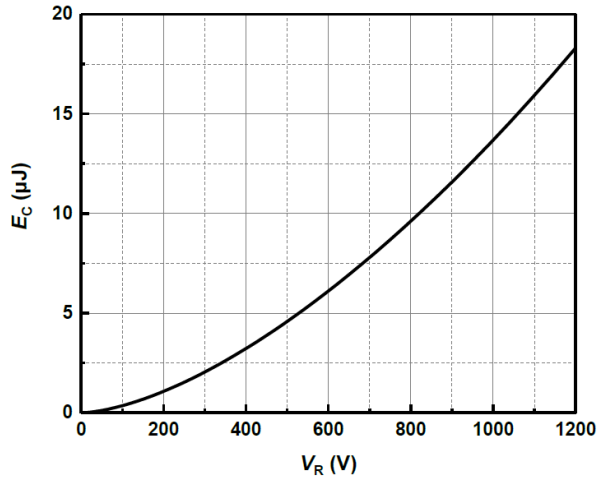
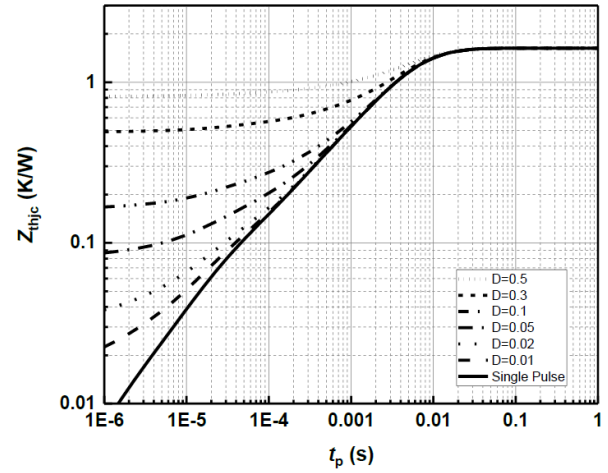
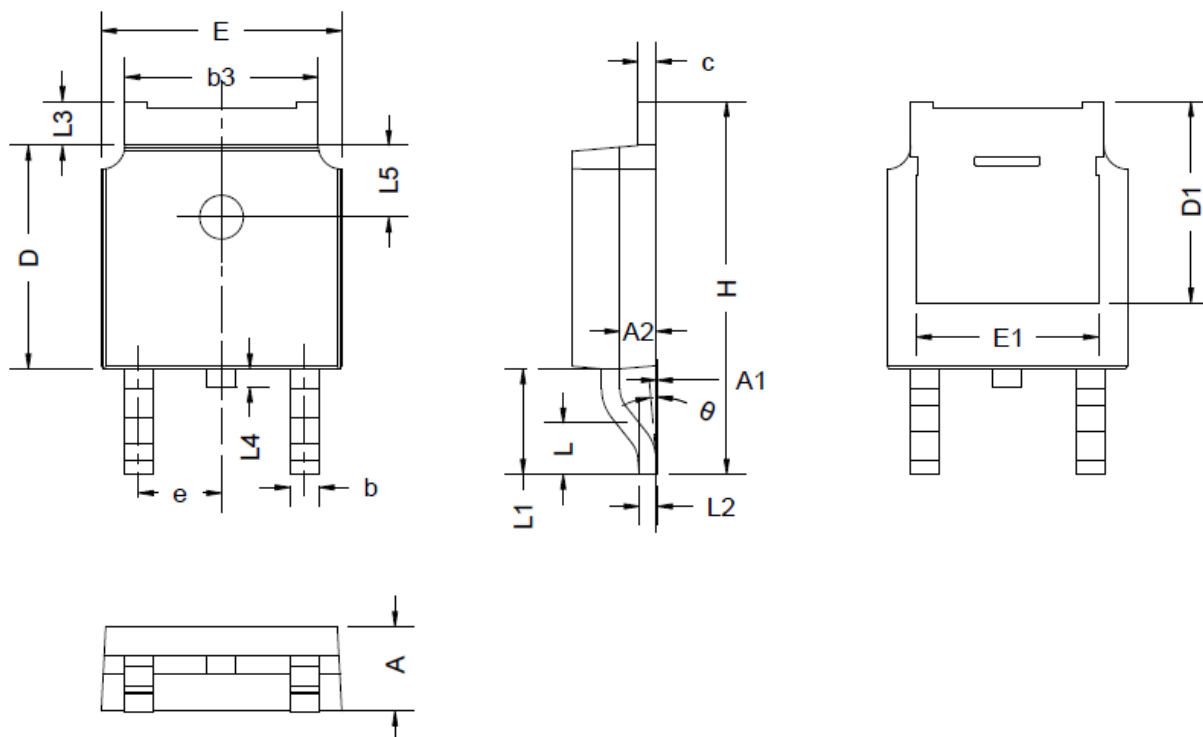


Fig. 8 • Maximum Transient Thermal Impedance,  $Z_{thjc} = f(t)$ , Parameter:  $D = t/T$





## PACKAGE OUTLINE



Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
A	2.20	2.30	2.38
A1	0.00	-	0.20
A2	0.90	1.07	1.17
b	0.68	0.78	0.90
b3	5.23	5.33	5.46
c	0.43	0.53	0.61
D	5.98	6.10	6.22
D1	5.30 REF		
E	6.40	6.60	6.73
E1	4.63	-	-

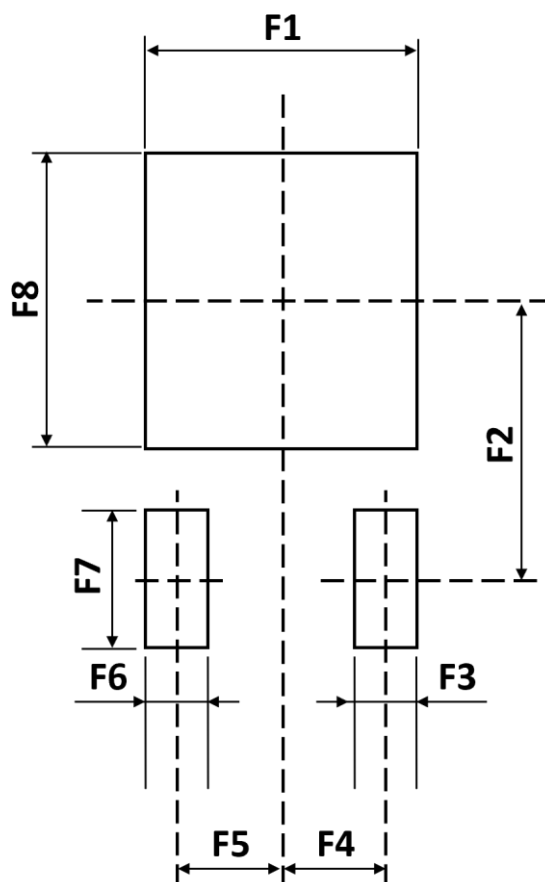
Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
e		2.286 BSC	
H	9.40	10.10	10.50
L	1.38	1.50	1.75
L1	2.90 REF		
L2	0.51 BSC		
L3	0.88	-	1.28
L4	0.50	.	1.00
L5	1.65	1.80	1.95
θ	0°	-	8°

## ORDERING INFORMATION

Part Number	Package	Packing	Reel Qty.	Inner Box Qty.	Outer Box Qty.
B1D03120E	TO-252-2L (DPAK)	Reel	2,500pcs	5,000pcs	30,000pcs



## RECOMMENDED PAD LAYOUT



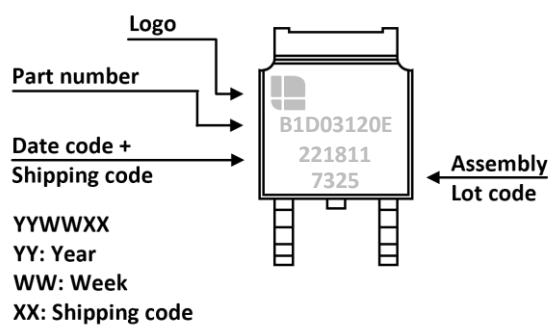
Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
F1	-	6.00	-
F2	-	6.25	-
F3	-	1.40	-
F4	-	2.29	-

Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
F5	-	2.29	-
F6	-	1.40	-
F7	-	3.00	-
F8	-	6.50	-

### Notes:

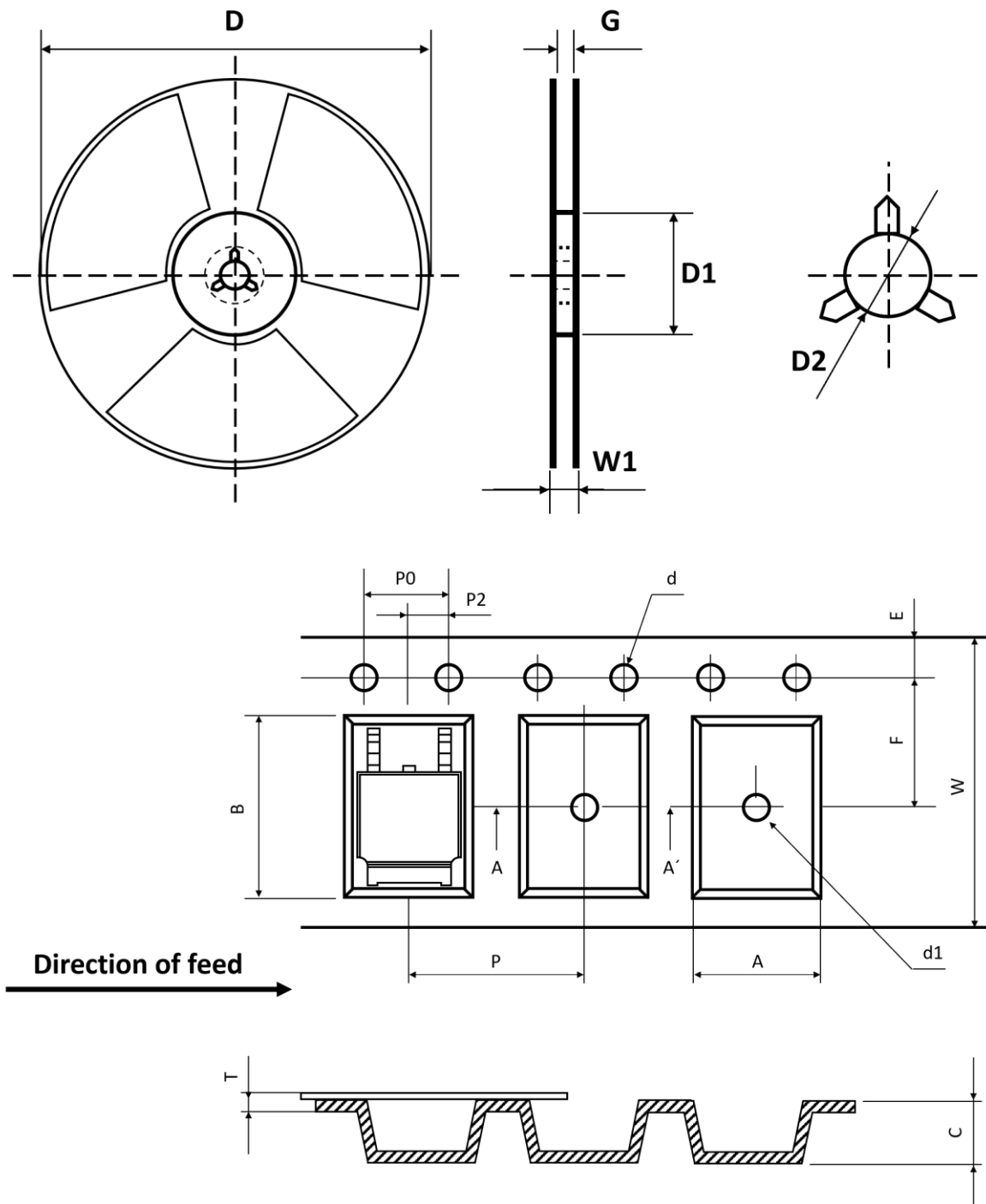
1. The suggested land pattern dimensions have been provided for reference only.
2. For further information, please reference document IPC-7351A.

## PART MARKING





## REEL AND TAPE DIMENSIONS ▲ All dimensions in mm

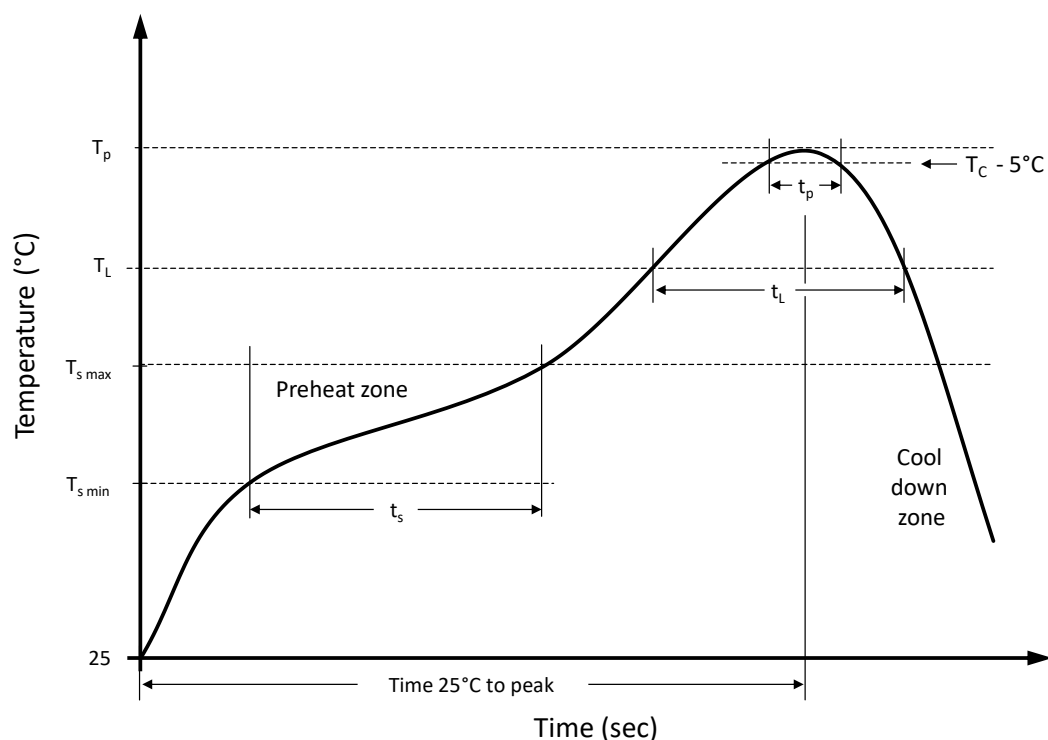


Package	W	A	B	C	d1	D	E	F	P	P0	T	D	D1	D2	G	W1
TO252-2L	16.00 ±0.30	6.90 ±0.10	10.50 ±0.10	2.70 ±0.10	1.50 Max.	1.50 ±0.10	1.75 ±0.10	7.50 ±0.10	8.00 ±0.10	4.00 ±0.10	0.30 ±0.10	330 ±0.30	50 Min.	13.00 ±0.50	16.40 Min.	22.00 Min.

**Note:** All dimensions meet EIA-481-D requirements.



## RECOMMENDED REFLOW SOLDERING PROFILE



### Recommended reflow soldering conditions ▲ Refer to JEDEC J-STD-020E

Profile Features		Sn-Pb Eutetic Assembly	Pb-Free Assembly
Preheat temperature min.	$T_{s \min}$	100 °C	150 °C
Preheat temperature max.	$T_{s \max}$	150 °C	200 °C
Preheat time $t_s$ from $T_{s \min}$ to $T_{s \max}$	$t_s$	120 seconds	120 seconds
Ramp-up rate ( $T_L$ to $T_p$ )		max. 3 °C/second	max. 3 °C/second
Liquidous temperature	$T_L$	183 °C	217 °C
Time $t_L$ maintained above $T_L$	$t_L$	150 seconds max.	150 seconds max.
Peak package body temperature	$T_p$	235°C	260°C
Timeframe of within 5°C below and up to max actual peak body temperature	$t_p$	20 seconds max.	30 seconds max.
Ramp-down rate ( $T_L$ to $T_p$ )		max. 6 °C/second	max. 6 °C/second
Time 25°C to peak temperature		max. 6 minutes	max. 8 minutes



## REVISION TABLE

Revision	Date	Status	Notes
001	30/09/2022	Initial release	Initial publication

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