

# B2D20065F

650V ▲ 20A ▲ SiC SCHOTTKY DIODE

SILICON CARBIDE SiC SCHOTTKY DIODE ▲ SMD type

Excellent surge capability

Easy paralleling due to positive  $V_F$  temperature coefficient

TO-263-3L package (D2PAK) ▲ Epoxy meets UL94-V0 ▲ MSL3



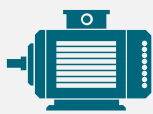




Temperature independent switching

Ultra-low forward voltage and high surge current

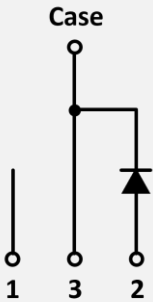
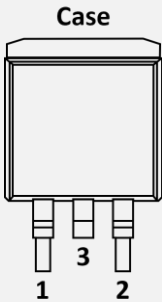
## SPECIFICATION

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	$V_{RRM}$	650V
Continuous Forward Current at $T_C = 150^\circ\text{C}$	$I_F$	20A
Total Capacitive Charge ( $T_J = 25^\circ\text{C}$ )	$Q_C$	65nC
Capacitance Stored Energy ( $V_R = 400\text{V}$ )	$E_C$	16μJ
Diode Forward Voltage ( $T_J = 175^\circ\text{C}$ , $I_F = 20\text{A}$ )	$V_F$	1.6V
Power Dissipation	$P_{TOT}$	177W

## 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 3	NC Anode Cathode (Case Backside)

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

Item	Condition	Symbol		Unit
Repetitive Peak Reverse Voltage		$V_{RRM}$	650	V
Non-Repetitive Peak Reverse Voltage		$V_{RSM}$	650	V
Continuous Forward Current	$T_C = 25^\circ\text{C}$	$I_F$	60	A
Continuous Forward Current	$T_C = 150^\circ\text{C}$	$I_F$	20	A
Non-Repetitive Forward Surge Current	$T_C = 25^\circ\text{C}$ , $t_p = 10\text{ms}$ , Half Sine Wave	$I_{FSM}$	155	A
$I^2t$ Value	$T_C = 25^\circ\text{C}$ , $t_p = 10\text{ms}$	$\int i^2 dt$	120	$\text{A}^2\text{s}$
Power Dissipation	$T_C = 25^\circ\text{C}$	$P_{TOT}$	177	W
Power Dissipation	$T_C = 110^\circ\text{C}$	$P_{TOT}$	77	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

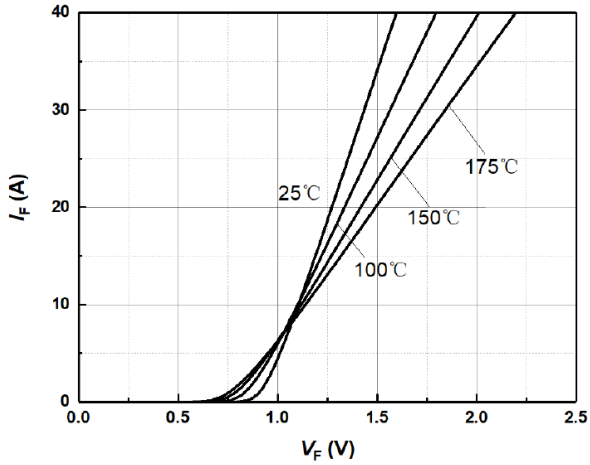
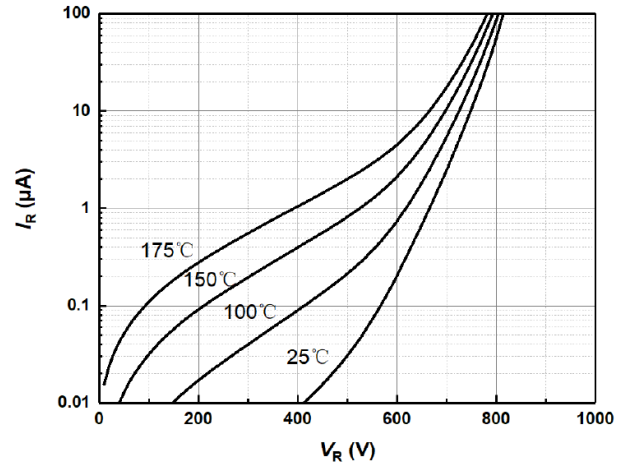
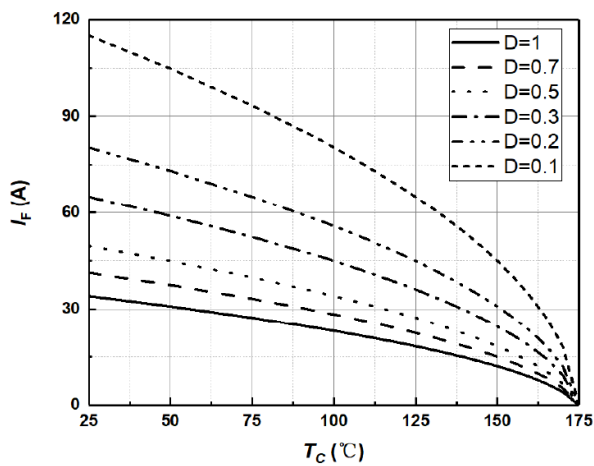
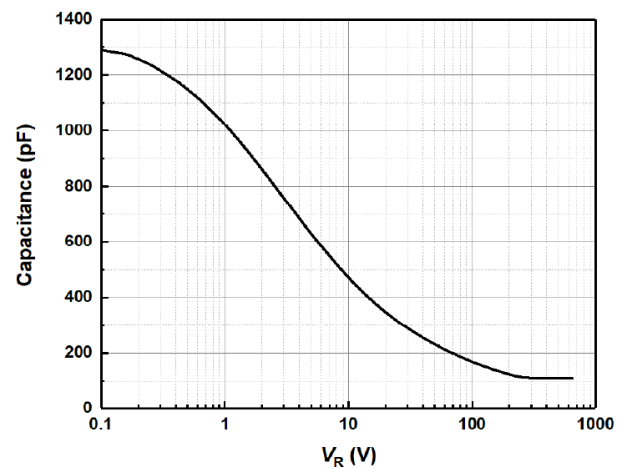
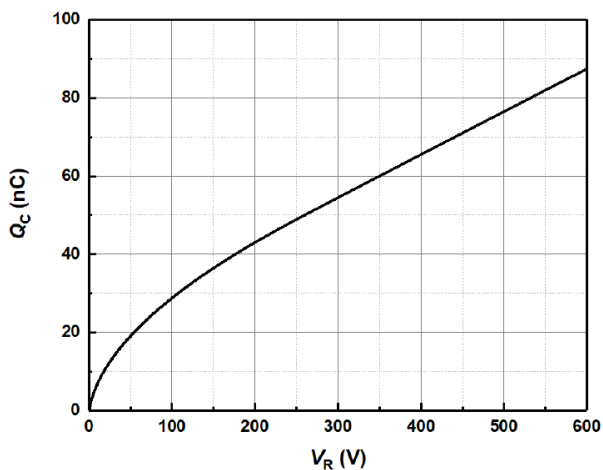
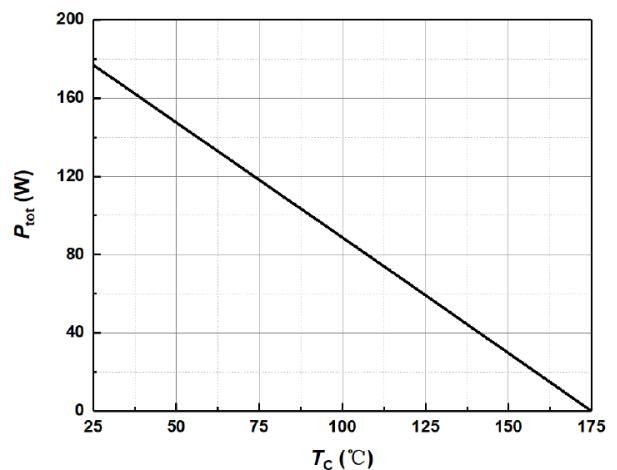
Item	Condition	Symbol	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
DC Blocking Voltage	$T_J = 25^\circ\text{C}$	$V_{DC}$	650			V
Diode Forward Voltage	$I_F = 20\text{A}$ , $T_J = 25^\circ\text{C}$	$V_F$		1.30	1.60	V
Diode Forward Voltage	$I_F = 20\text{A}$ , $T_J = 175^\circ\text{C}$	$V_F$		1.60	2.00	V
Reverse Current	$V_R = 650\text{V}$ , $T_J = 25^\circ\text{C}$	$I_R$		20	120	$\mu\text{A}$
Reverse Current	$V_R = 650\text{V}$ , $T_J = 175^\circ\text{C}$	$I_R$		30	300	$\mu\text{A}$

Item	Condition	Symbol	Min.	Typ.	Max.	Unit
<b>Dynamic Characteristics</b>						
Total Capacitive Charge	$V_R = 400\text{V}$ , $T_J = 25^\circ\text{C}$ $Q_C = \int_0^{V_R} C(V) dV$	$Q_C$		65		nC
Total Capacitance	$V_R = 1\text{V}$ , $f = 1\text{MHz}$ , $T_J = 25^\circ\text{C}$	$C$		1016		pF
Total Capacitance	$V_R = 300\text{V}$ , $f = 1\text{MHz}$ , $T_J = 25^\circ\text{C}$	$C$		110		pF
Total Capacitance	$V_R = 600\text{V}$ , $f = 1\text{MHz}$ , $T_J = 25^\circ\text{C}$	$C$		109		pF
Capacitance Stored Energy	$V_R = 400\text{V}$ , $T_J = 25^\circ\text{C}$	$E_C$		16		$\mu\text{J}$

## THERMAL RESISTANCE PERFORMANCE

Item	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$		0.843		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 = 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

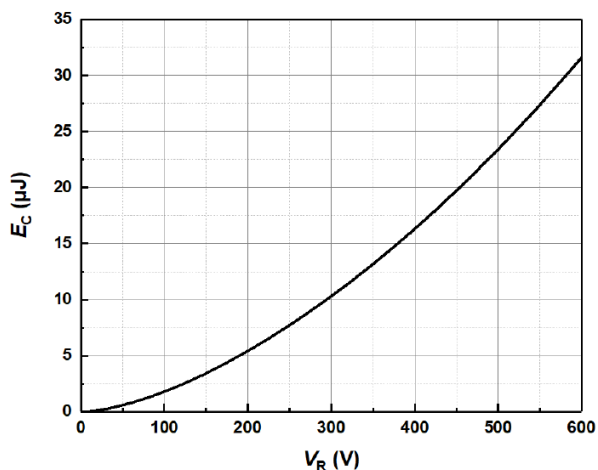
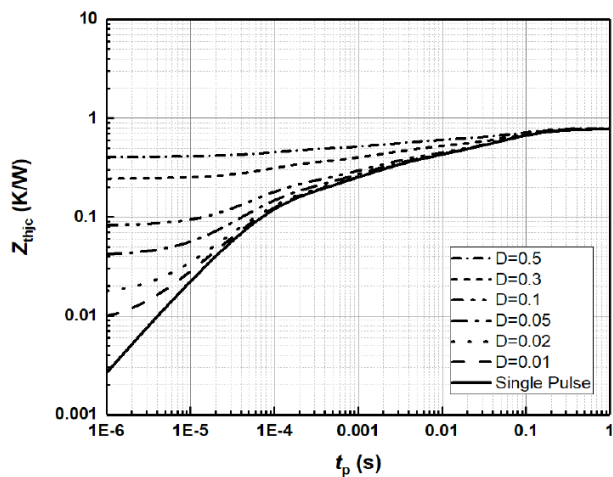
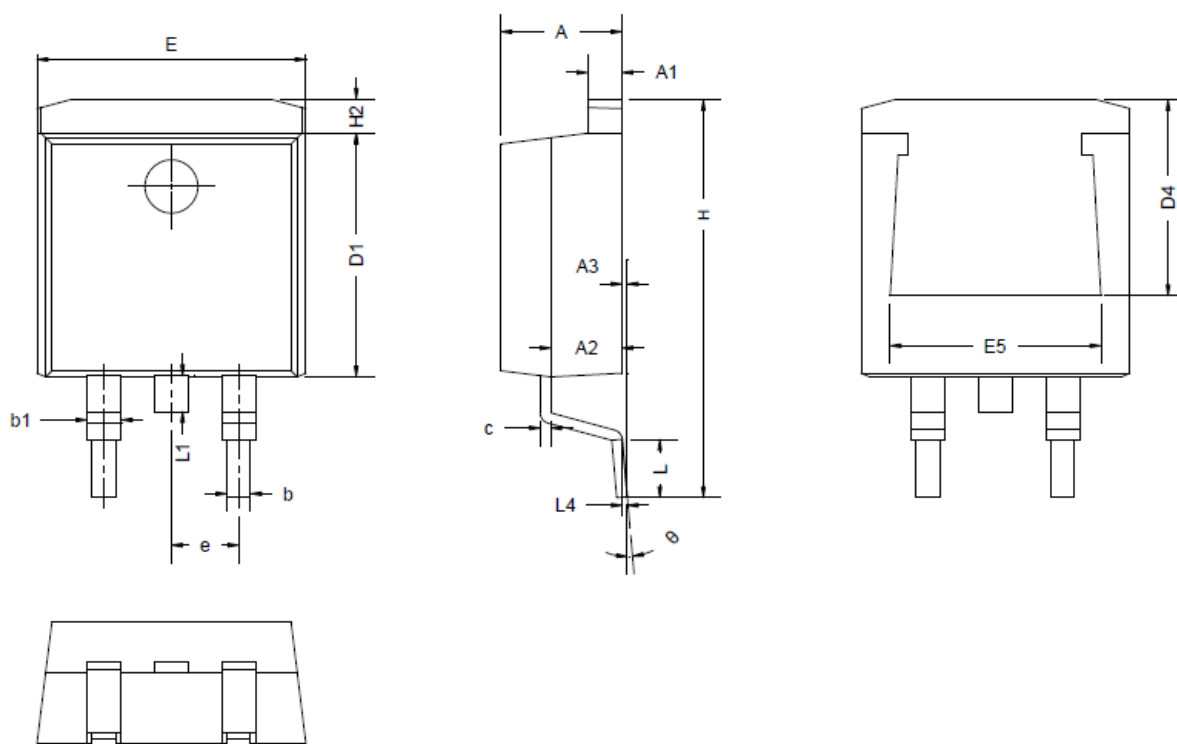


Fig. 8 • Maximum Transient Thermal Impedance,  $Z_{thjc} = f(t)$ , Parameter:  $D = t/T$



## PACKAGE OUTLINE



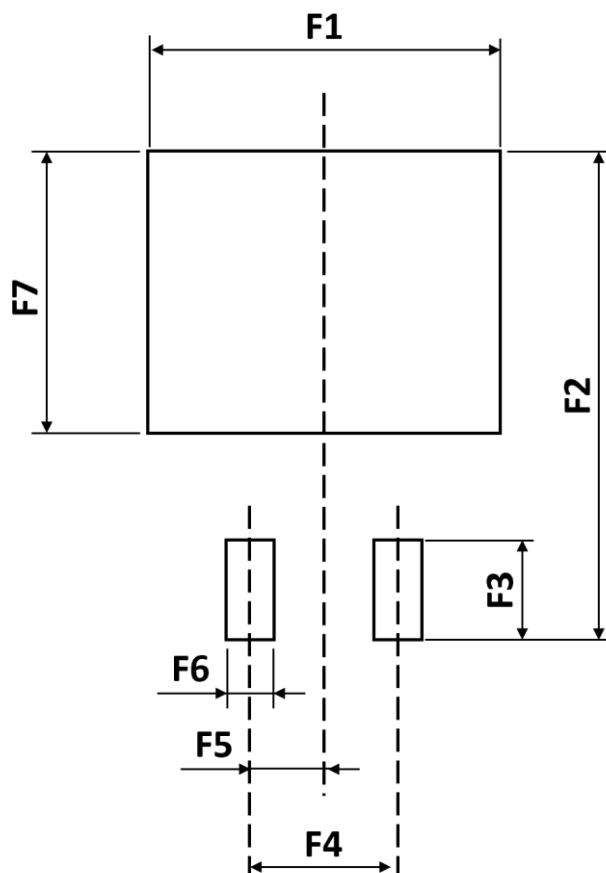
Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
A	4.37	4.57	4.77
A1	1.22	1.27	1.42
A2	2.49	2.69	2.89
A3	0.00	0.13	0.25
b	0.70	0.81	0.96
b1	1.17	1.27	1.47
c	0.30	0.38	0.53
D1	8.50	8.70	8.90
D4	6.60	-	-

Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
E	9.86	10.16	10.36
E5	7.06	-	-
e	2.54 BSC		
H	14.70	15.10	15.50
H2	1.07	1.27	1.47
L	2.00	2.30	2.60
L1	1.40	1.55	1.70
L4	0.25 BSC		
θ	0°	5°	9°

## ORDERING INFORMATION

Part Number	Package	Packing	Reel Qty.	Inner Box Qty.	Outer Box Qty.
B2D20065F	TO-263-3L (D2PAK)	Reel	800pcs	4,000pcs	4,000pcs

## RECOMMENDED PAD LAYOUT



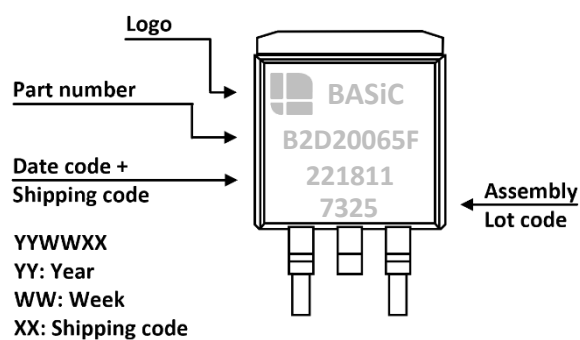
Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
F1	-	12.20	-
F2	-	16.90	-
F3	-	2.54	-
F4	-	5.08	-

Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
F5	-	2.54	-
F6	-	1.60	-
F7	-	9.75	-

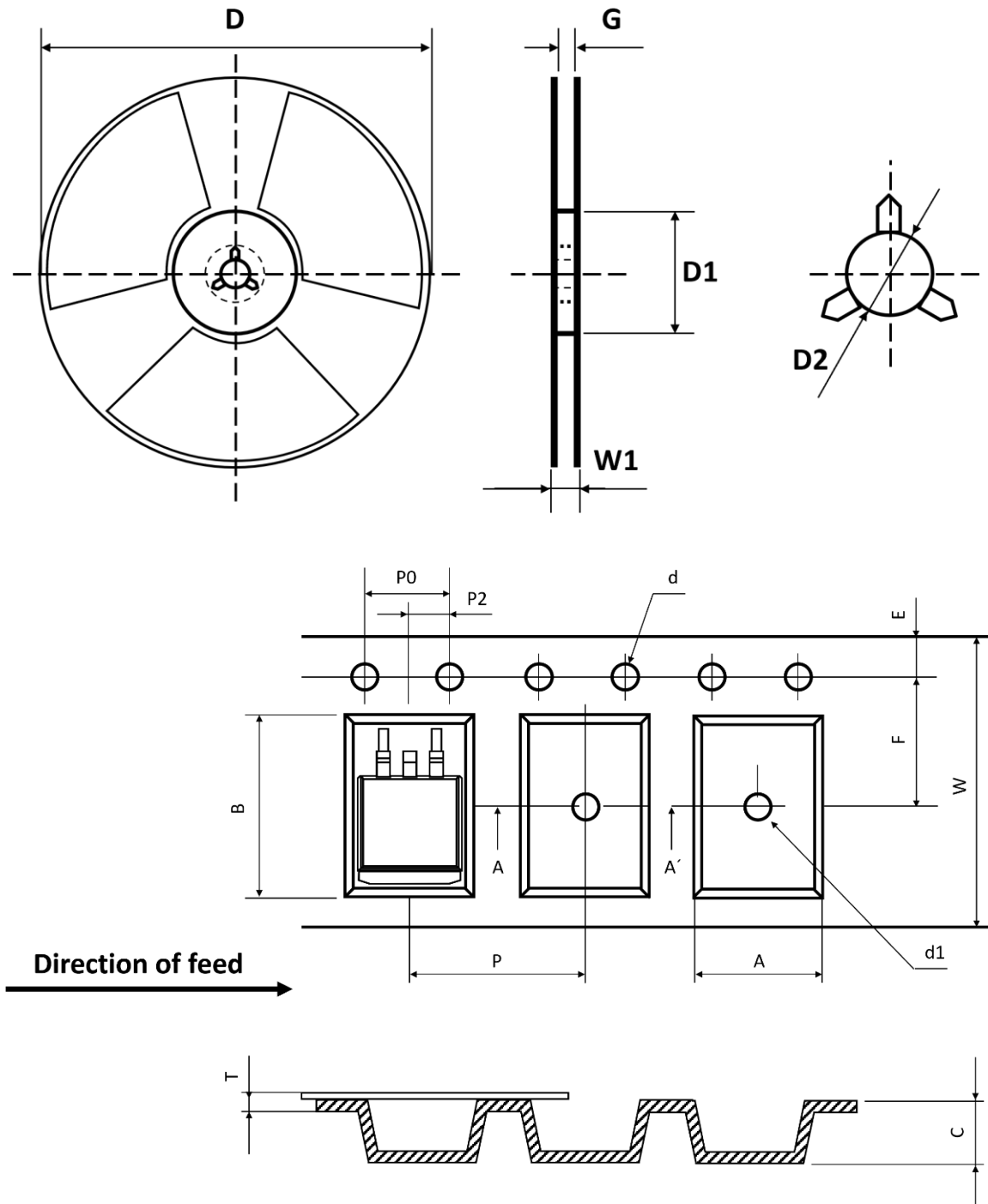
### Notes:

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

## PART MARKING



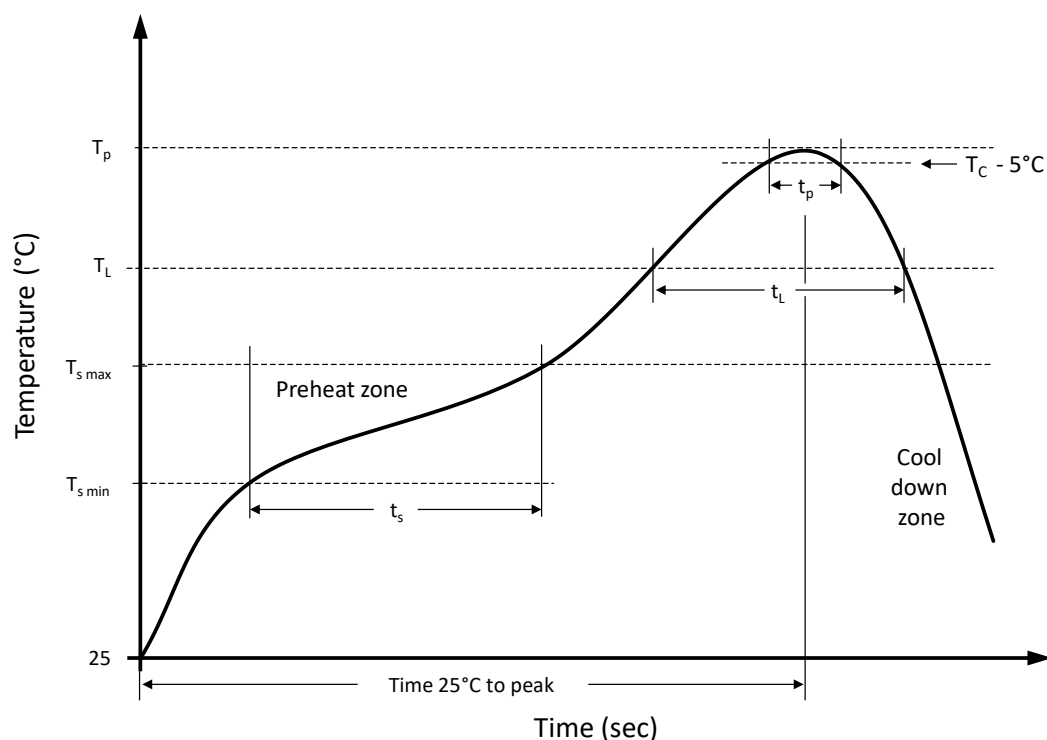
## REEL AND TAPE DIMENSIONS ▲ All dimensions in mm



Package	W	A	B	C	d1	D	E	F	P	P0	T	D	D1	D2	G	W1
TO263-3L	24.00 ±0.30	10.70 ±0.10	16.30 ±0.10	5.10 ±0.10	1.50 Max.	1.50 ±0.10	1.75 ±0.10	11.50 ±0.10	16.00 ±0.10	4.00 ±0.10	0.35 ±0.10	330 ±0.30	50 Min.	13.00 ±0.50	24.40 Min.	30.40 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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