



B1D04065E

650V ▲ 4A ▲ 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



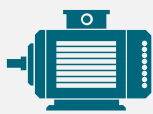




Low forward voltage

Temperature independent switching

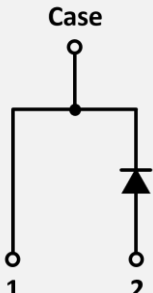
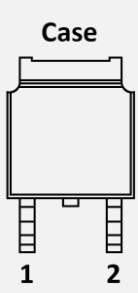
SPECIFICATION

Item ($T_C = 25^\circ\text{C}$, unless otherwise noted)		Characteristics
Operating Temperature Range	T_J	-55°C to $+175^\circ\text{C}$
Storage Temperature Range	T_S	-55°C to $+175^\circ\text{C}$
Repetitive Peak Reverse Voltage	V_{RRM}	650V
Continuous Forward Current at $T_C = 155^\circ\text{C}$	I_F	4A
Total Capacitive Charge ($T_J = 25^\circ\text{C}$)	Q_C	12nC
Capacitance Stored Energy ($V_R = 400\text{V}$)	E_C	3μJ
Diode Forward Voltage ($T_J = 175^\circ\text{C}$, $I_F = 4\text{A}$)	V_F	1.7V
Power Dissipation	P_{TOT}	60W

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}	650	V
Non-Repetitive Peak Reverse Voltage		V_{RSM}	650	V
Continuous Forward Current	$T_C = 25^\circ\text{C}$	I_F	14	A
Continuous Forward Current	$T_C = 155^\circ\text{C}$	I_F	4	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	A^2s
Power Dissipation	$T_C = 25^\circ\text{C}$	P_{TOT}	60	W
Power Dissipation	$T_C = 110^\circ\text{C}$	P_{TOT}	26	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
Static Characteristics						
DC Blocking Voltage	$T_J = 25^\circ\text{C}$	V_{DC}	650			V
Diode Forward Voltage	$I_F = 4\text{A}$, $T_J = 25^\circ\text{C}$	V_F		1.40	1.60	V
Diode Forward Voltage	$I_F = 4\text{A}$, $T_J = 175^\circ\text{C}$	V_F		1.70	2.20	V
Reverse Current	$V_R = 650\text{V}$, $T_J = 25^\circ\text{C}$	I_R		1	60	μA
Reverse Current	$V_R = 650\text{V}$, $T_J = 175^\circ\text{C}$	I_R		10	100	μA

Item	Condition	Symbol	Min.	Typ.	Max.	Unit
Dynamic Characteristics						
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		12		nC
Total Capacitance	$V_R = 1\text{V}$, $f = 1\text{MHz}$, $T_J = 25^\circ\text{C}$	C		181		pF
Total Capacitance	$V_R = 300\text{V}$, $f = 1\text{MHz}$, $T_J = 25^\circ\text{C}$	C		21.6		pF
Total Capacitance	$V_R = 600\text{V}$, $f = 1\text{MHz}$, $T_J = 25^\circ\text{C}$	C		21.3		pF
Capacitance Stored Energy	$V_R = 400\text{V}$, $T_J = 25^\circ\text{C}$	E_C		3		μJ

THERMAL RESISTANCE PERFORMANCE

Item	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$		2.473		K/W

REFERENCE DATA ▲ TYPICAL PERFORMANCE

Fig. 1 • Typical Forward Characteristics I_F vs. V_F

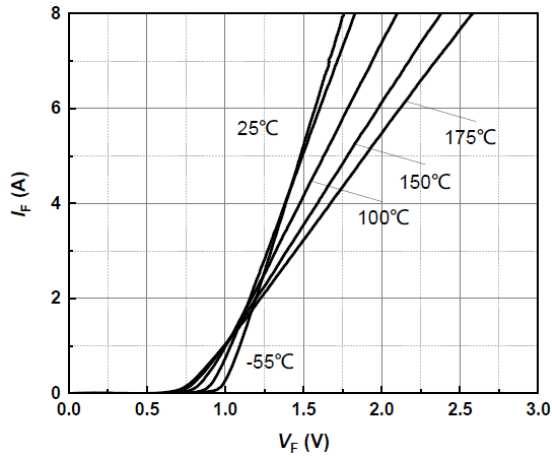


Fig. 2 • Typical Reverse Current I_R as function of Reverse Voltage V_R

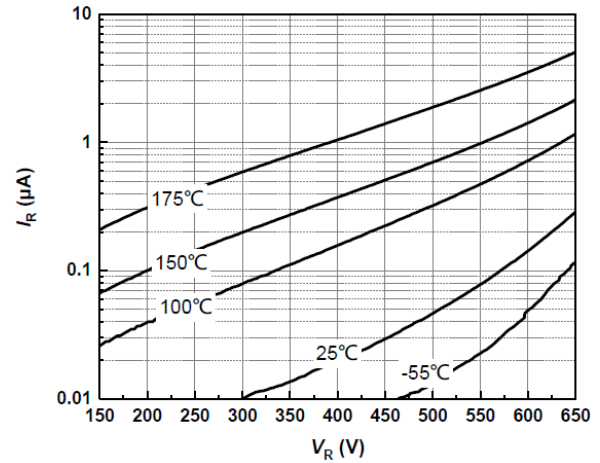


Fig. 3 • Diode Forward Current I_F as function of Case Temperature T_C (D = Duty Cycle)

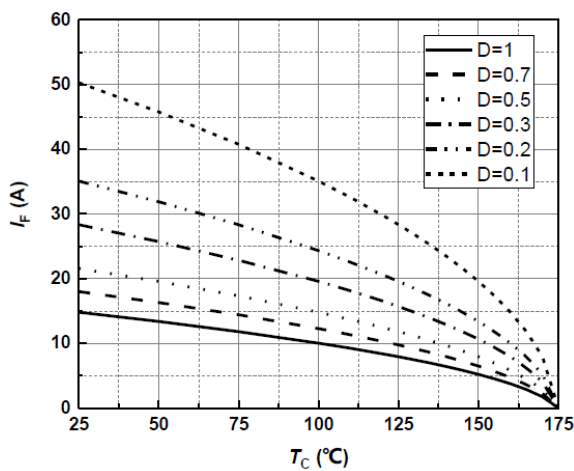


Fig. 4 • Typical Capacitance C as function of Reverse Voltage V_R , $C = f(V_R)$, $T_J = 25^\circ\text{C}$, $f = 1\text{MHz}$

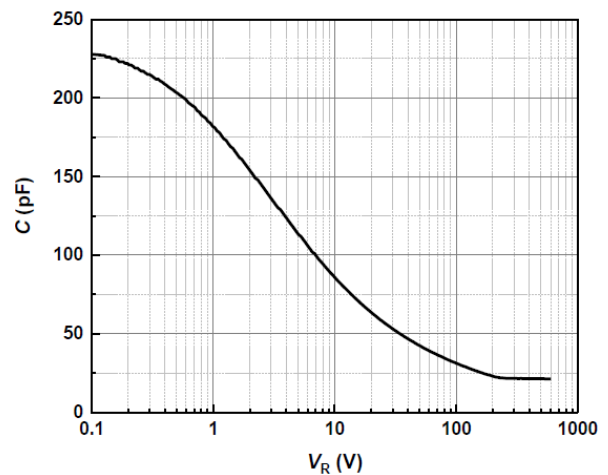


Fig. 5 • Typical Reverse Charge Q_C as function of Reverse Voltage V_R

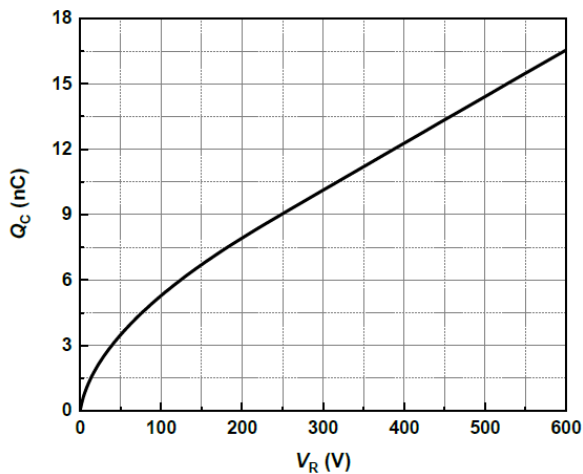
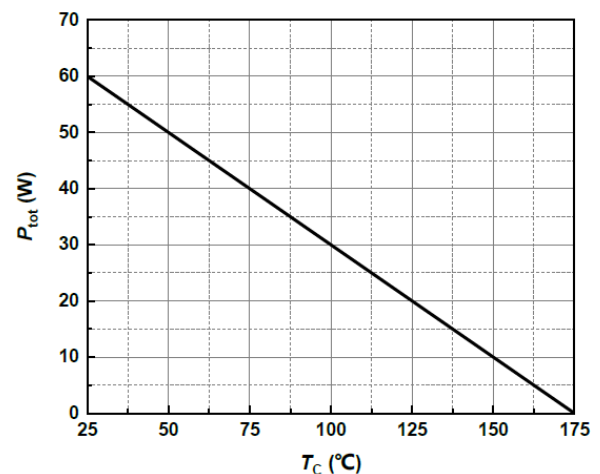
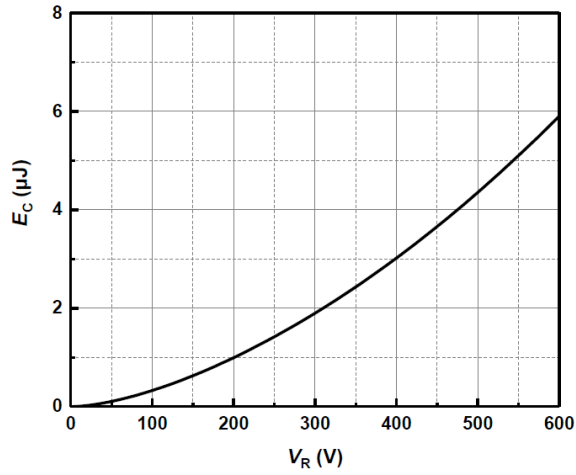
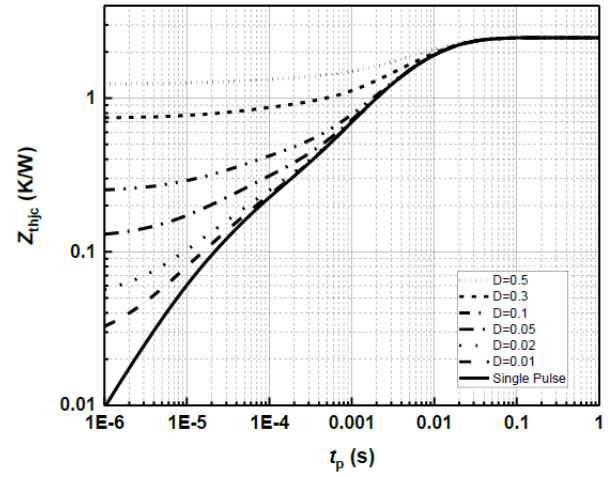


Fig. 6 • Power Dissipation P_{TOT} as function of Case Temperature T_C

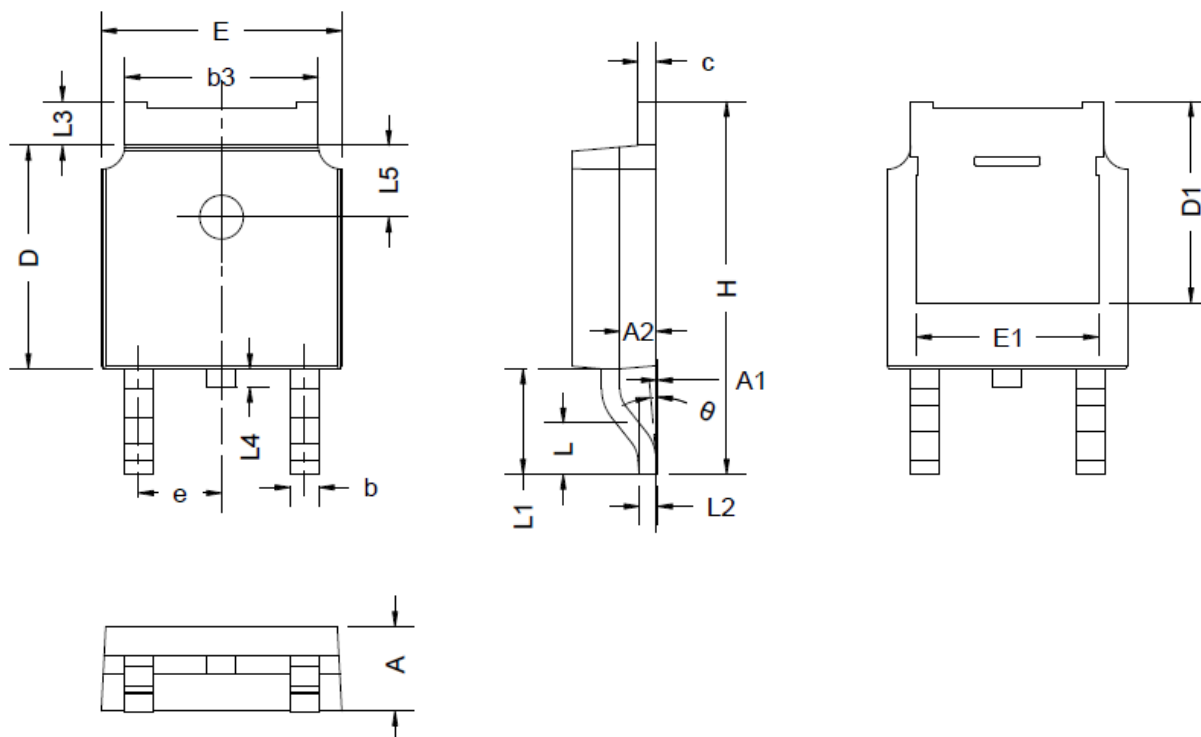


REFERENCE DATA ▲ TYPICAL PERFORMANCE

Fig. 7 • Capacitance Stored Energy


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


PACKAGE OUTLINE



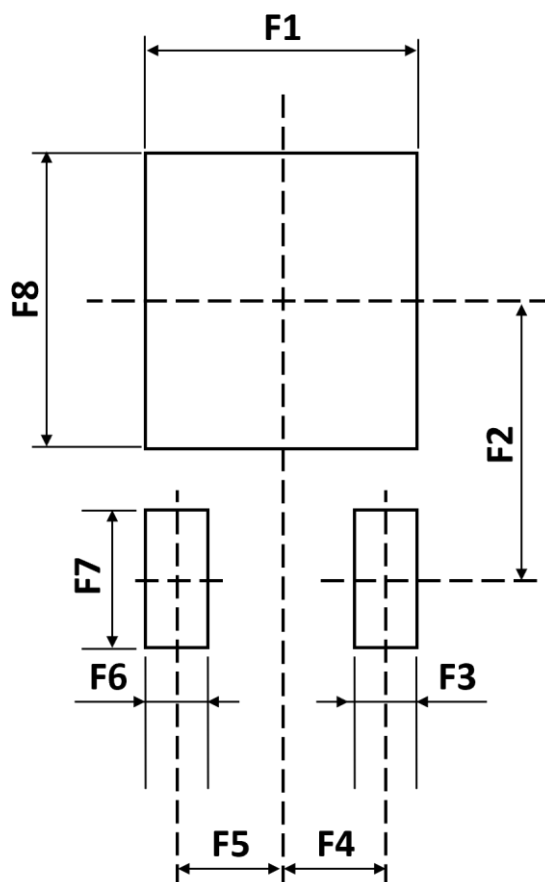
Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
A	2.20	2.30	2.38
A1	0.00	-	0.20
A2	0.90	1.07	1.17
b	0.68	0.78	0.90
b3	5.23	5.33	5.46
c	0.43	0.53	0.61
D	5.98	6.10	6.22
D1	5.30 REF		
E	6.40	6.60	6.73
E1	4.63	-	-

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.
B1D04065E	TO-252-2L (DPAK)	Reel	2,500pcs	5,000pcs	30,000pcs

RECOMMENDED PAD LAYOUT

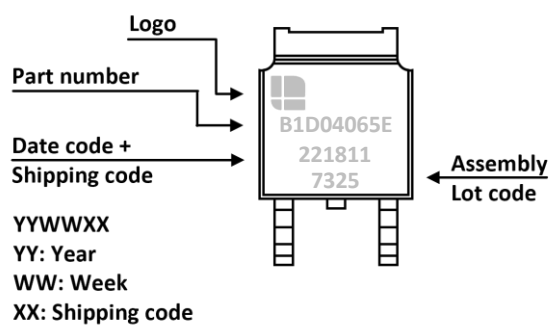


Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)	Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
F1	-	6.00	-	F5	-	2.29	-
F2	-	6.25	-	F6	-	1.40	-
F3	-	1.40	-	F7	-	3.00	-
F4	-	2.29	-	F8	-	6.50	-

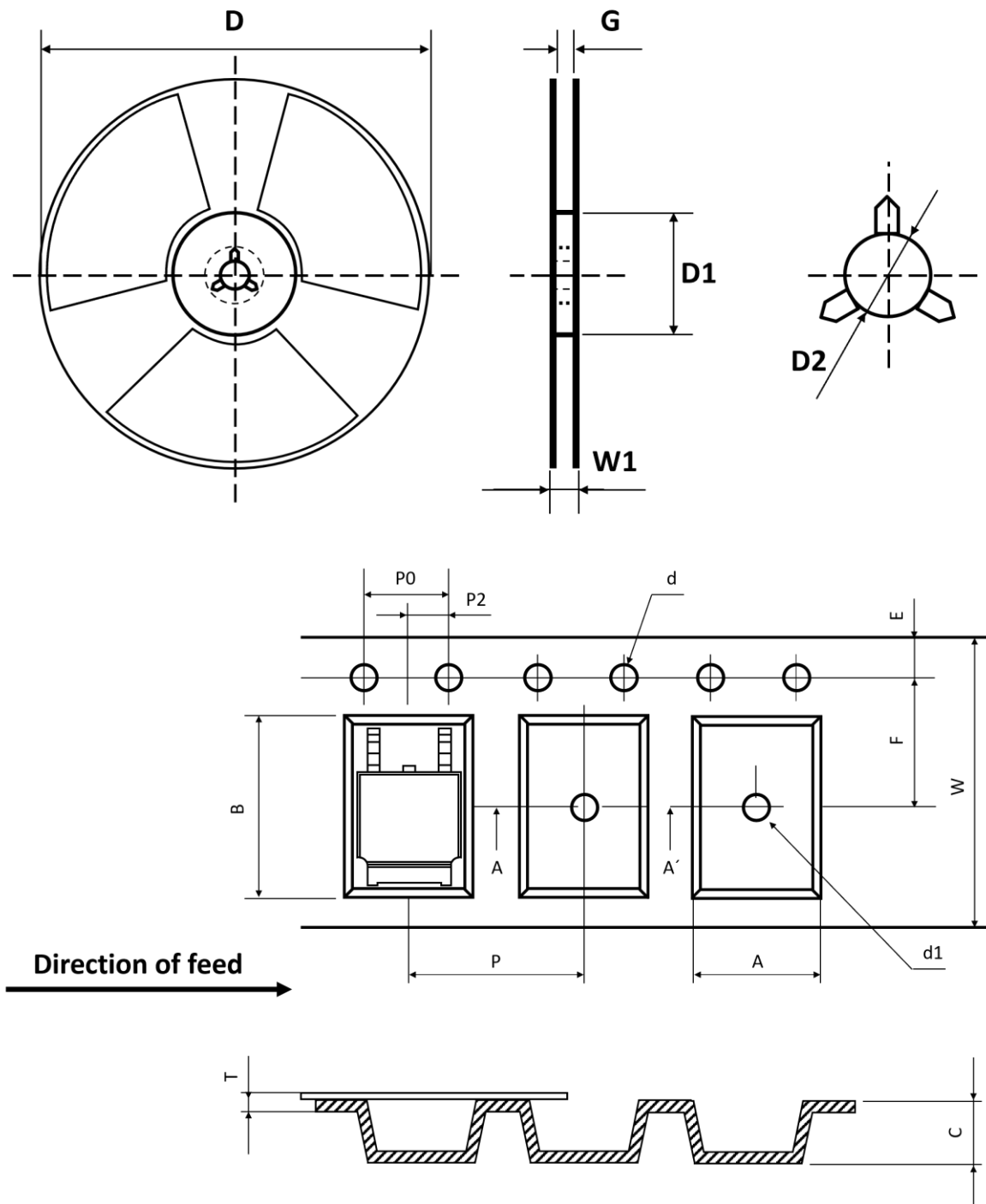
Notes:

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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