

# B1D40120HC

1200V ▲ 2x20A ▲ SiC SCHOTTKY DIODE

SILICON CARBIDE SiC SCHOTTKY DIODE ▲ THT type

Common cathode circuit configuration

Easy paralleling due to positive  $V_F$  temperature coefficient

TO-247-3L package ▲ Epoxy meets UL94-V0

Low forward voltage

Temperature independent switching



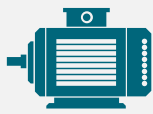




## SPECIFICATION

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 $T_C = 150^\circ\text{C}$ <sup>Note 1</sup>	$I_F$	20A
Continuous Forward Current at $T_C = 150^\circ\text{C}$ <sup>Note 2</sup>	$I_D$	40A
Total Capacitive Charge ( $T_J = 25^\circ\text{C}$ ) <sup>Note 2</sup>	$Q_C$	202nC
Diode Forward Voltage ( $T_J = 175^\circ\text{C}$ , $I_F = 20\text{A}$ ) <sup>Note 1</sup>	$V_F$	1.90V
Power Dissipation <sup>Note 1</sup>	$P_{TOT}$	269W

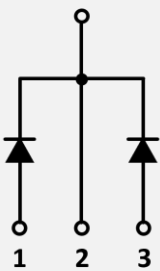
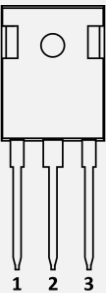
### Notes

- 1: Per leg  
2: Per device

## APPLICATIONS

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

## PIN DESCRIPTION

Circuit Diagram	Outline - Front View	Pin No.	Description
<p>Backside</p> 		<p>1</p> <p>2</p> <p>3</p>	<p>Anode Diode 1</p> <p>Common Cathode (Backside)</p> <p>Anode Diode 2</p>

## 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	$T_C = 25^\circ\text{C}$	$I_F$	60 <sup>Note 1</sup> / 120 <sup>Note 2</sup>	A
Continuous Forward Current	$T_C = 150^\circ\text{C}$	$I_F$	20 <sup>Note 1</sup> / 40 <sup>Note 2</sup>	A
Non-Repetitive Forward Surge Current	$T_C = 25^\circ\text{C}$ , $t_p = 10\text{ms}$ , Half Sine Wave	$I_{FSM}$	150 <sup>Note 1</sup>	A
$I^2t$ Value	$T_C = 25^\circ\text{C}$ , $t_p = 10\text{ms}$	$\int i^2 dt$	112.5 <sup>Note 1</sup>	$\text{A}^2\text{s}$
Power Dissipation	$T_C = 25^\circ\text{C}$	$P_{TOT}$	269 <sup>Note 1</sup>	W
Power Dissipation	$T_C = 150^\circ\text{C}$	$P_{TOT}$	116 <sup>Note 1</sup>	W
Operating Junction Temperature		$T_J$	-55 to +175	$^\circ\text{C}$
Storage Temperature Range		$T_{STG}$	-55 to +175	$^\circ\text{C}$
TO-247 Mounting Torque	M3 Screw		0.7	Nm

### Notes

- 1: Per leg  
2: Per device

## ELECTRICAL CHARACTERISTICS ▲ PER LEG

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	$I_F = 20\text{A}$ , $T_J = 25^\circ\text{C}$	$V_F$		1.46		V
Diode Forward Voltage	$I_F = 20\text{A}$ , $T_J = 175^\circ\text{C}$	$V_F$		1.90		V
Reverse Current	$V_R = 1200\text{V}$ , $T_J = 25^\circ\text{C}$	$I_R$		10		$\mu\text{A}$
Reverse Current	$V_R = 1200\text{V}$ , $T_J = 175^\circ\text{C}$	$I_R$		30		$\mu\text{A}$

Item	Condition	Symbol	Min.	Typ.	Max.	Unit
<b>Dynamic Characteristics</b>						
Total Capacitive Charge	$V_R = 800\text{V}$ , $T_J = 25^\circ\text{C}$ $Q_C = \int_0^{V_R} C(V) dV$	$Q_C$		101		nC
Total Capacitance	$V_R = 1\text{V}$ , $f = 1\text{MHz}$ , $T_J = 25^\circ\text{C}$	$C$		1170		pF
Total Capacitance	$V_R = 400\text{V}$ , $f = 1\text{MHz}$ , $T_J = 25^\circ\text{C}$	$C$		95		pF
Total Capacitance	$V_R = 800\text{V}$ , $f = 1\text{MHz}$ , $T_J = 25^\circ\text{C}$	$C$		69		pF
Capacitance Stored Energy	$V_R = 800\text{V}$ , $T_J = 25^\circ\text{C}$	$E_C$		52		$\mu\text{J}$

## THERMAL RESISTANCE PERFORMANCE

Item	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance, Junction to Case, per Leg	$R_{\theta,JC}$		0.557		K/W
Thermal Resistance, Junction to Case, per Device	$R_{\theta,JC}$		0.278		K/W

## REFERENCE DATA ▲ TYPICAL PERFORMANCE PER LEG

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

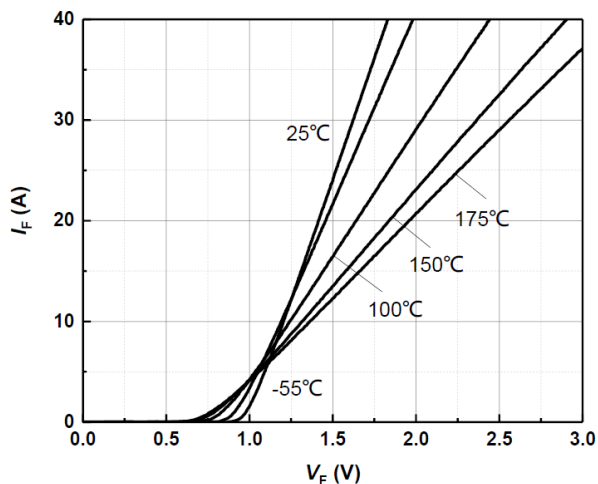


Fig. 2 • Typical Reverse Current  $I_R$  as function of Reverse Voltage  $V_R$

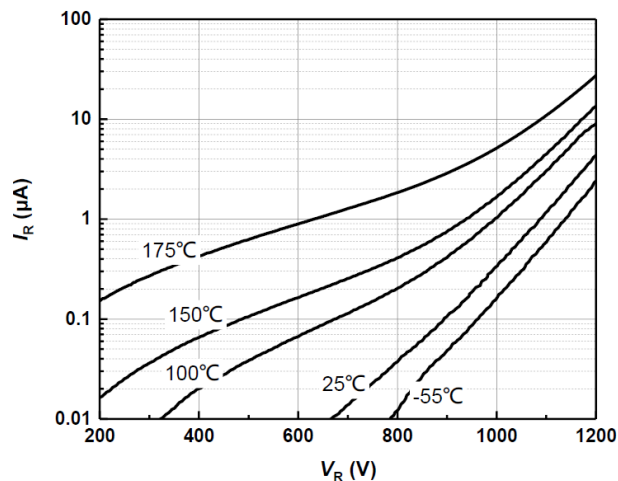


Fig. 3 • Diode Forward Current  $I_F$  as function of Case Temperature  $T_C$  ( $D = \text{Duty Cycle}$ )

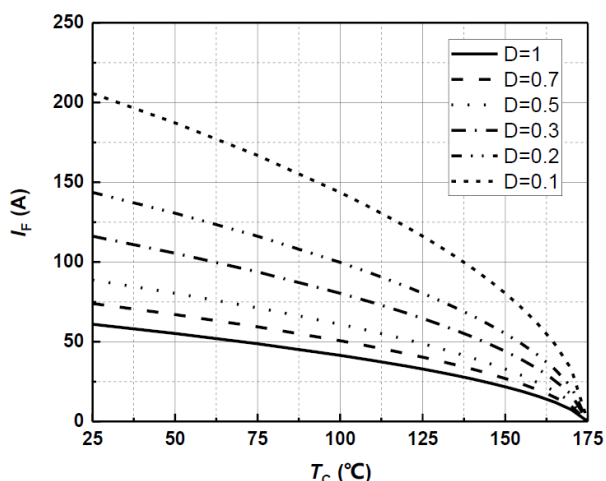


Fig. 4 • Typical Capacitance  $C$  as function of Reverse Voltage  $V_R$ ,  $C = f(V_R)$ ,  $T_J = 25^\circ\text{C}$ ,  $f = 1\text{MHz}$

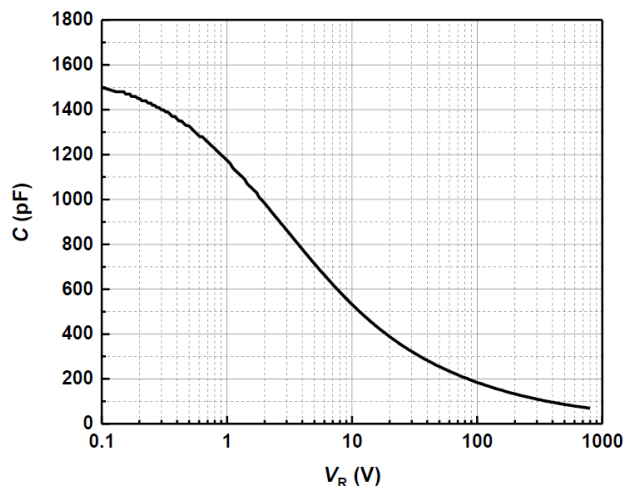


Fig. 5 • Typical Reverse Charge  $Q_C$  as function of Reverse Voltage  $V_R$

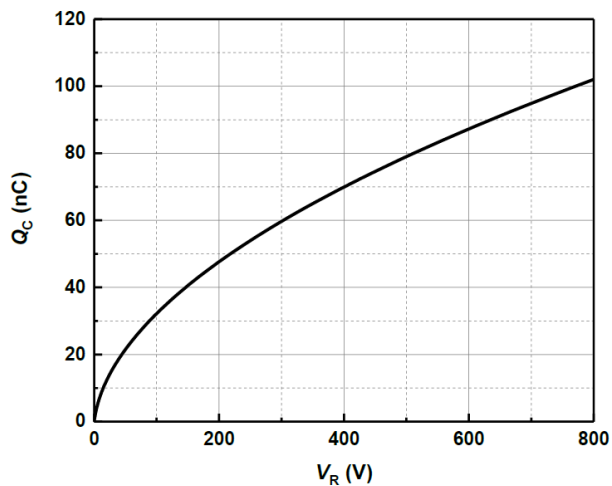
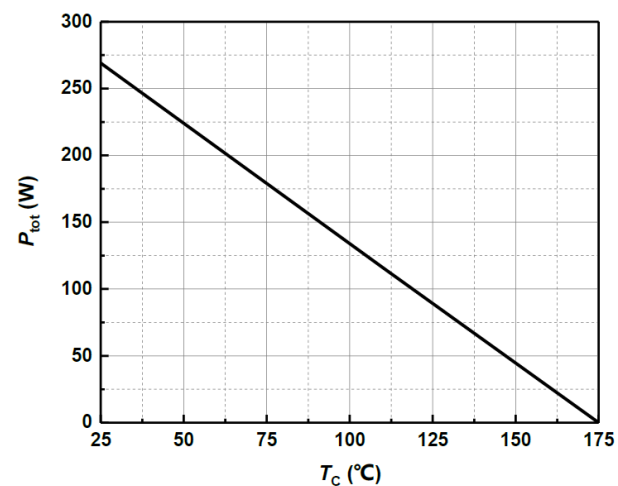


Fig. 6 • Power Dissipation  $P_{TOT}$  as function of Case Temperature  $T_C$



## REFERENCE DATA ▲ TYPICAL PERFORMANCE PER LEG

Fig. 7 • Capacitance Stored Energy

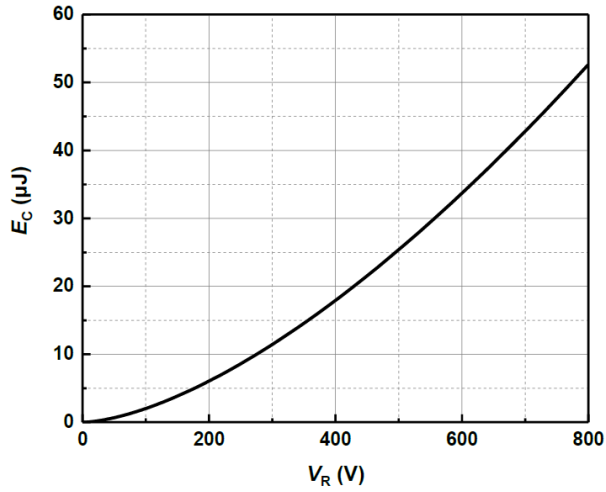
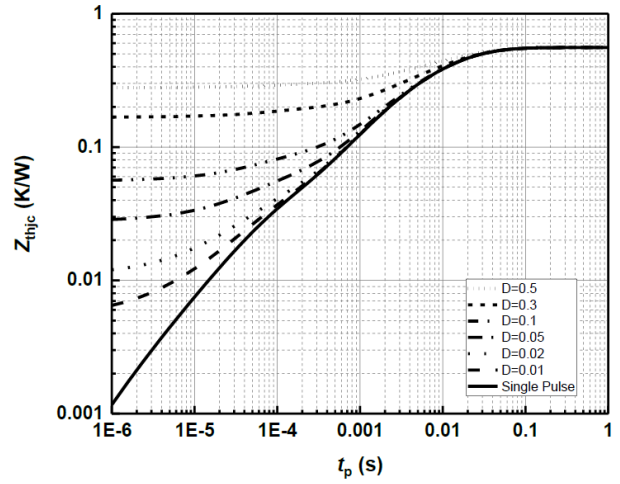
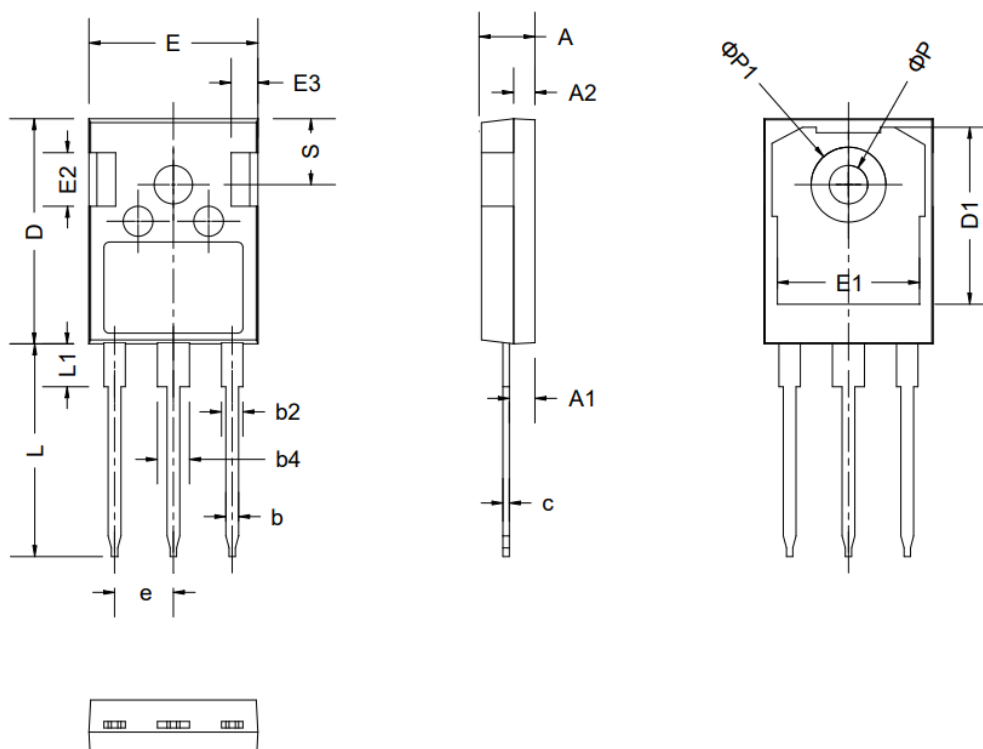


Fig. 8 • Maximum Transient Thermal Impedance,  $Z_{thjc} = f(t)$ , Parameter:  $D = t/T$



## PACKAGE OUTLINE



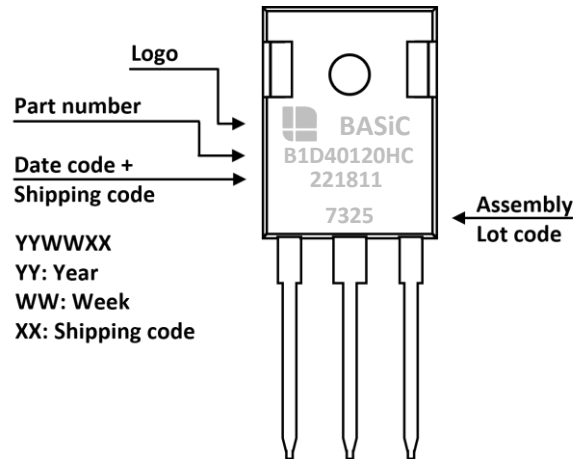
Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
A	4.80	5.00	5.20
A1	2.21	2.41	2.59
A2	1.85	2.00	2.15
b	1.11	1.21	1.36
b2	1.91	2.01	2.21
b4	2.91	3.01	3.21
c	0.51	0.61	0.75
D	20.80	21.00	21.30
D1	16.25	16.55	16.85
E	15.50	15.80	16.10

Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
e	5.44 BSC		
L	19.62	19.92	20.22
L1	-	-	4.30
ØP	3.40	3.60	3.80
ØP1	-	-	7.30
S	6.16 BSC		

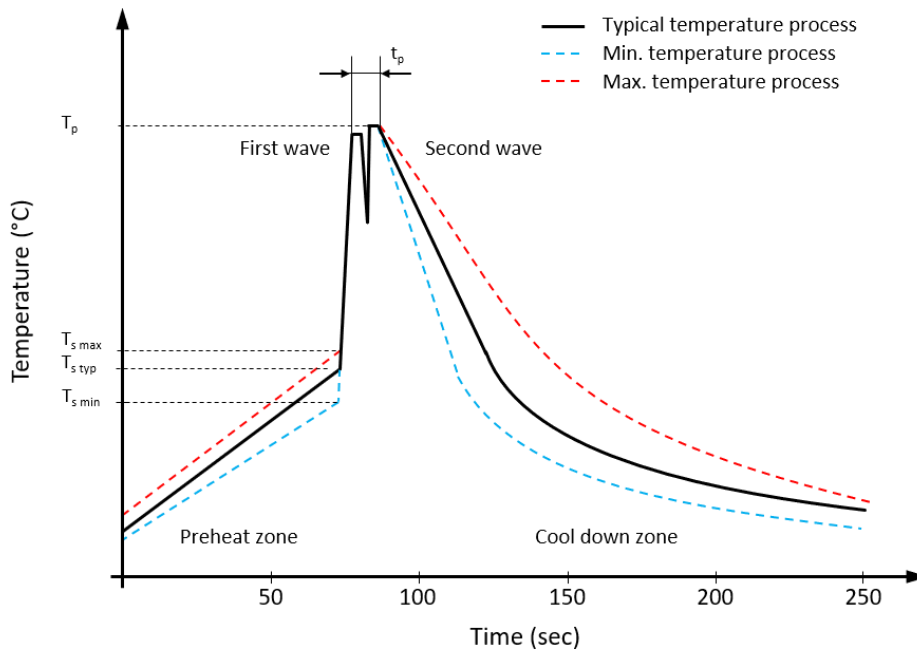
## ORDERING INFORMATION

Part Number	Package	Packing	Tube Qty.	Inner Box Qty.	Outer Box Qty.
B1D40120HC	TO-247-3L	Tube	30pcs	600pcs	3,000pcs

## PART MARKING



## RECOMMENDED WAVE SOLDERING PROFILE ▲ THT PACKAGE



### Classification wave soldering profile ▲ Refer to EN 61760-1: 2006

Profile Features		Value ▲ Sn-Pb Assembly	Value ▲ Pb-free Assembly
Preheat temperature min.	$T_{s\ min}$	100 °C	100 °C
Preheat temperature typical	$T_{s\ typ}$	120 °C	120 °C
Preheat temperature max.	$T_{s\ max}$	130 °C	130 °C
Preheat time $t_s$ from $T_{s\ min}$ to $T_{s\ max}$	$t_s$	70 seconds	70 seconds
Peak temperature	$T_p$	235 °C to 260 °C	245 °C to 260 °C
Time of actual peak temperature	$t_p$	Max. 10 seconds Max. 5 second each wave	Max. 10 seconds Max. 5 second each wave
Ramp-down date min.		~ 2 °C/second	~ 2 °C/second
Ramp-down rate typical		~ 3.5 °C/second	~ 3.5 °C/second
Ramp-down rate max.		~ 5 °C/second	~ 5 °C/second

## REVISION TABLE

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

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