

Product Summary

V_{RRM}	1200 V
$I_F (T_C=135/155^\circ\text{C})$	30** / 20** A
Q_C	100 nC**

* Per Leg, ** Per Device

Features

- Low leakage current (I_R)
- Zero reverse recovery current
- Temperature independent switching behavior
- Positive temperature coefficient on V_F
- High surge current capacity
- Low capacitive charge

Benefits

- System cost savings due to smaller magnetics
- System efficiency improvement over Si diodes
- Reduction of heat sink requirements
- Enabling higher frequency
- Reduced EMI

Applications

- Switch mode power supplies (SMPS)
- Uninterruptible power supplies
- Server/telecom power supplies
- Power factor correction
- Solar

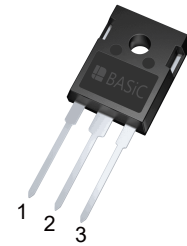
Package Pin Definitions

- Pin1 - Anode
- Pin2 and backside - Cathode
- Pin3 - Anode

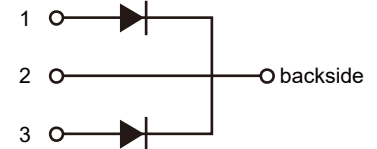
Package Parameters

Part Number	Marking	Package
B3D20120HC	B3D20120HC	TO-247-3

Package: TO-247-3



Electrical Connection



Maximum Ratings ($T_c=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Test conditions	Value	Unit
V_{RRM}	Repetitive peak reverse voltage		1200	V
V_{RSM}	Non-repetitive peak reverse voltage		1200	V
E_{AS}	Single pulse avalanche energy	$T_c=25^\circ\text{C}$, $L=1\text{mH}$, $I_{AS}=14\text{A}$, $V=140\text{V}$	98*	mJ
I_F	Continuous forward current	$T_c=25^\circ\text{C}$	33*/66**	A
		$T_c=135^\circ\text{C}$	15*/30**	
		$T_c=155^\circ\text{C}$	10*/20**	
I_{FSM}	Non-repetitive forward surge current	$T_c=25^\circ\text{C}$, $t_p=10\text{ms}$, Half sine wave	90*	A
		$T_c=110^\circ\text{C}$, $t_p=10\text{ms}$, Half sine wave	80*	
I_{FRM}	Repetitive forward surge current	$T_c=25^\circ\text{C}$, $t_p=10\text{ms}$, Half sine wave	70*	A
$\int i^2 dt$	i^2t value	$T_c=25^\circ\text{C}$, $t_p=10\text{ms}$	40.5*	A^2S
P_{tot}	Power dissipation	$T_c=25^\circ\text{C}$	167*	W
		$T_c=110^\circ\text{C}$	72*	
T_j	Operating junction temperature		-55~175	$^\circ\text{C}$
T_{stg}	Storage temperature		-55~175	$^\circ\text{C}$
	TO-247 mounting torque	M3 Screw	0.7	Nm

Thermal Characteristics

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
$R_{th(jc)}$	Thermal resistance from junction to case		0.90*/ 0.45**	1.25*/ /0.63**	K/W

* Per Leg, ** Per Device

Electrical Characteristics (Per Leg)
Static Characteristics

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
V_{DC}	DC blocking voltage	$T_J=25^{\circ}C, I_R=100\mu A$	1200			V
V_F	Diode forward voltage	$I_F=10A, T_J=25^{\circ}C$ $I_F=10A, T_J=175^{\circ}C$		1.40 2.05	1.60 2.64	V
I_R	Reverse current	$V_R=1200V, T_J=25^{\circ}C$ $V_R=1200V, T_J=175^{\circ}C$		1 10	50 100	μA

AC Characteristics

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
Q_C	Total capacitive charge	$V_R=800V, T_J=25^{\circ}C$ $Q_C=\int_0^{V_R} C(V)dV$		50		nC
C	Total capacitance	$V_R=1V, f=1MHz$ $V_R=400V, f=1MHz$ $V_R=800V, f=1MHz$		523 48 36		pF
E_C	Capacitance stored energy	$V_R=800V$		15		μJ

Typical Performance (Per Leg)

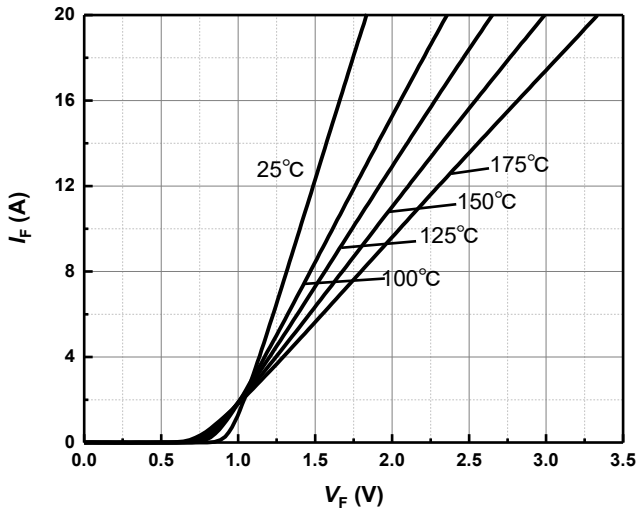


Figure 1 Typical forward characteristics

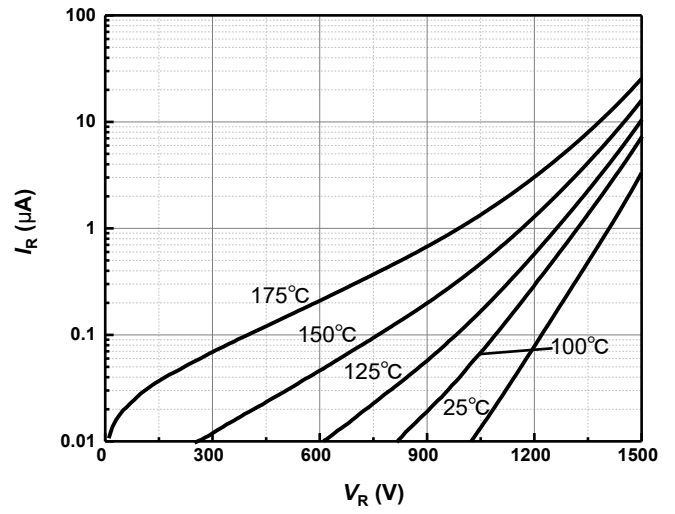


Figure 2 Typical reverse current as function of reverse voltage

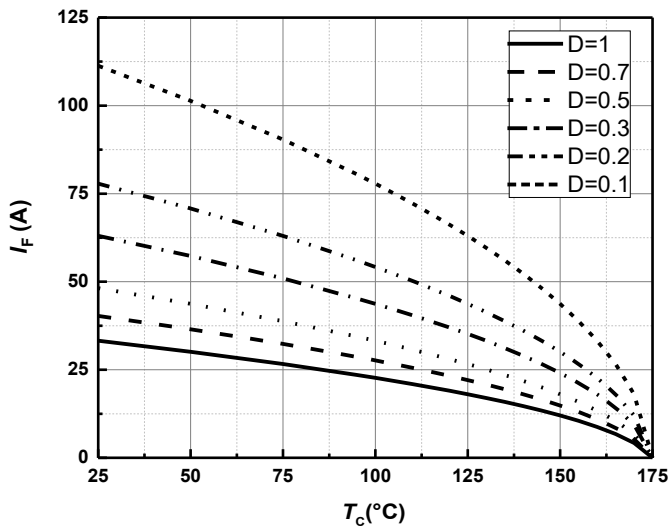


Figure 3 Diode forward current as function of temperature, D=duty cycle

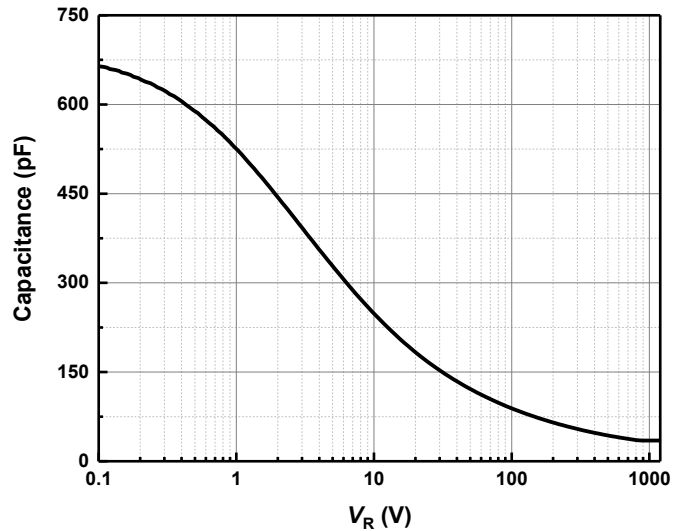


Figure 4 Typical capacitance as function of reverse voltage, $C=f(V_R)$; $T_j=25^{\circ}$ C; $f=1$ MHz

Typical Performance

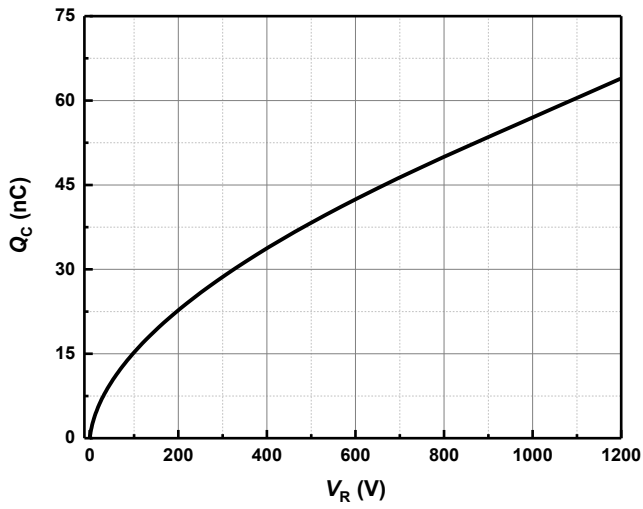


Figure 5 Typical reverse charge as function of reverse voltage

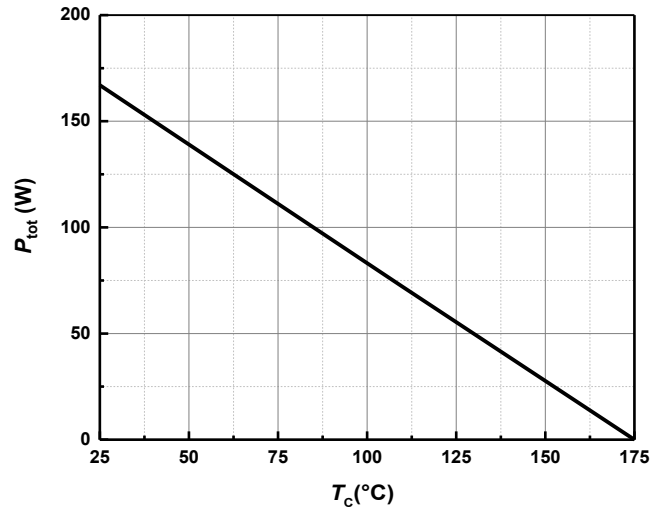


Figure 6 Power dissipation as function of case temperature

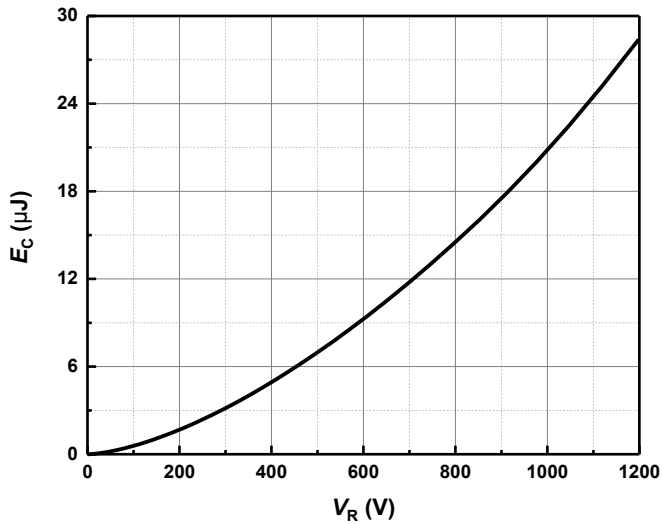


Figure 7 Capacitance stored energy

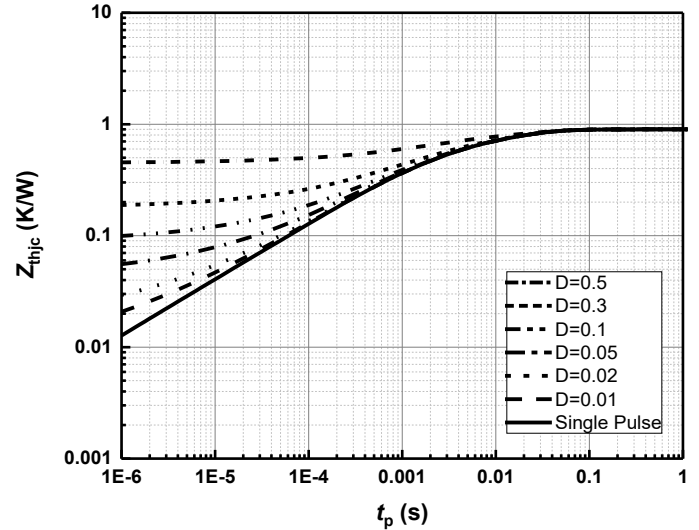
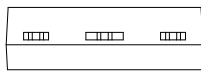
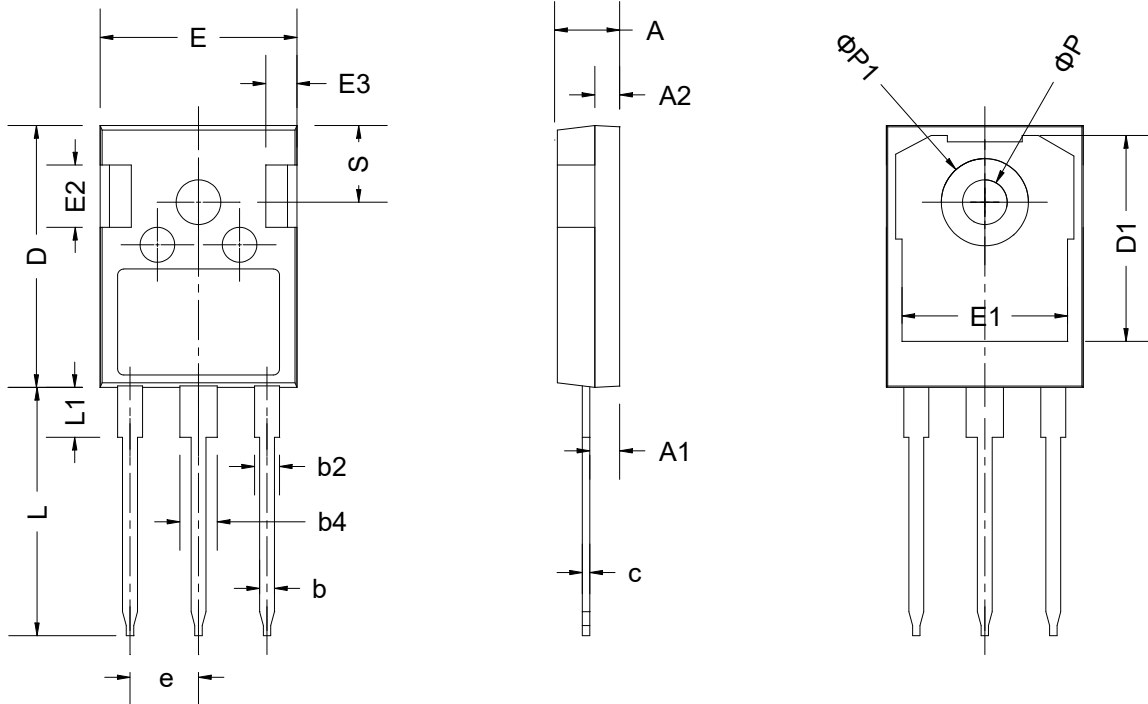
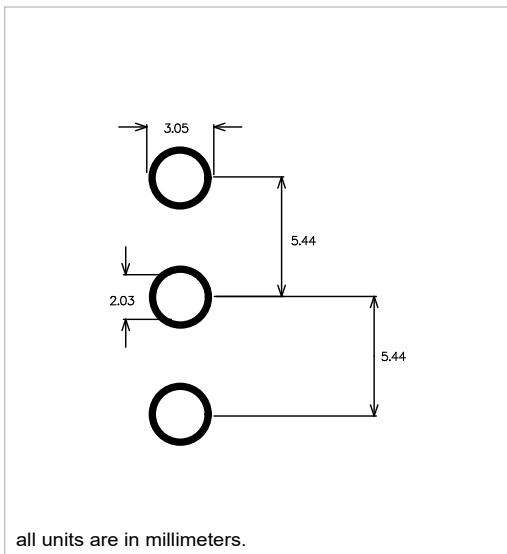


Figure 8 Max. transient thermal impedance, $Z_{thjc} = f(t)$, parameter: $D = t / T$

Package Dimensions



Recommended Solder Pad Layout



SYMBOL	mm		
	MIN	NOM	MAX
A	4.70	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
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
e	5.34	5.44	5.54
L	19.62	19.92	20.22
L1	-	-	4.30
ϕP	3.40	3.60	3.80
$\phi P1$	-	-	7.30
S	6.06	6.16	6.26

Revision History

Document Version	Date of Release	Description of Changes
Rev. 0.0	2024-09-07	Release of the datasheet.

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