

Product Summary

V_{RRM}	650 V
$I_F (T_C=155^\circ\text{C})$	40 A**
Q_C	118 nC**

Features

- Extremely low reverse current
- No reverse recovery current
- Temperature independent switching
- Positive temperature coefficient on V_F
- Excellent surge current capability
- Low capacitive charge

Benefits

- Essentially no switching losses
- System efficiency improvement over Si diodes
- Increased power density
- Enabling higher switching frequency
- Reduction of heat sink requirements
- System cost savings due to smaller magnetics
- Reduced EMI

Applications

- Switch mode power supplies (SMPS)
- Uninterruptible power supplies
- Motor drivers
- Power factor correction

Package Pin Definitions

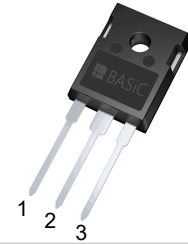
- Pin1 - Anode
- Pin2 and backside - Cathode
- Pin3 - Anode

Package Parameters

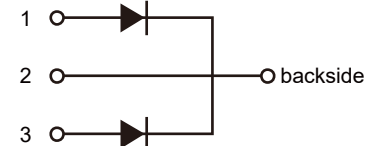
Part Number	Marking	Package
B2D40065HC1	B2D40065HC1	TO-247-3

* Per Leg, ** Per Device

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		650	V
V_{RSM}	Non-repetitive peak reverse voltage		650	V
I_F	Continuous forward current	$T_c=25^\circ\text{C}$	67*/134**	A
		$T_c=125^\circ\text{C}$	36*/72**	
		$T_c=155^\circ\text{C}$	20*/40**	
I_{FSM}	Non-repetitive forward surge current	$T_c=25^\circ\text{C}$, $t_p=10\text{ms}$ Half sine wave	146*	A
$\int i^2 dt$	i^2t value	$T_c=25^\circ\text{C}$, $t_p=10\text{ms}$	107*	A ² S
P_{tot}	Power dissipation	$T_c=25^\circ\text{C}$	268*	W
		$T_c=110^\circ\text{C}$	116*	
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

* Per Leg, ** Per Device

Thermal Characteristics

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
$R_{th(jc)}$	Thermal resistance from junction to case		0.56* 0.28**		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	$T_J=25^{\circ}C$	650			V
V_F	Diode forward voltage	$I_F=20A$ $T_J=25^{\circ}C$ $I_F=20A$ $T_J=175^{\circ}C$		1.34 1.7	1.6 2.4	V
I_R	Reverse current	$V_R=650V$ $T_J=25^{\circ}C$ $V_R=650V$ $T_J=175^{\circ}C$		1 16	100 160	μA

AC Characteristics

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
Q_C	Total capacitive charge	$V_R=400V$ $T_J=25^{\circ}C$ $Q_C=\int_0^{V_R} C(V)dV$		59		nC
C	Total capacitance	$V_R=1V$ $f=1MHz$ $V_R=300V$ $f=1MHz$ $V_R=600V$ $f=1MHz$		918 103 100		pF
E_C	Capacitance stored energy	$V_R=400V$		15		μJ

Typical Performance

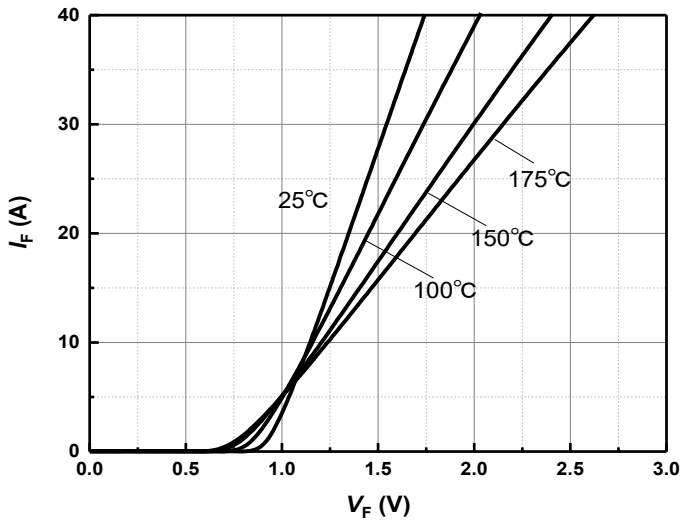


Figure 1 Typical forward characteristics

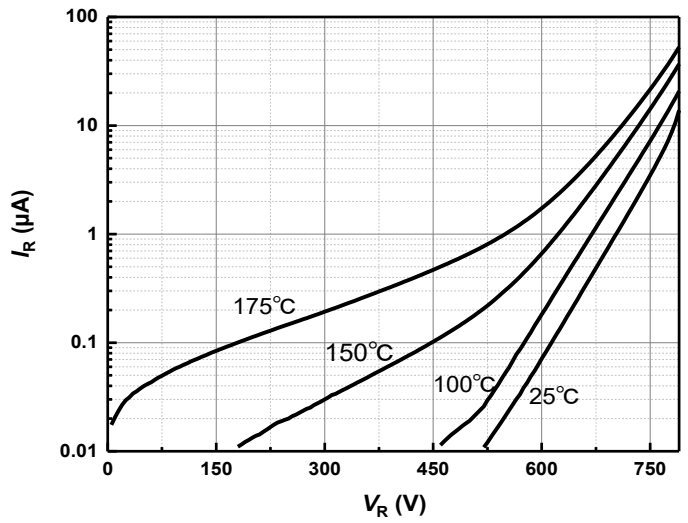


Figure 2 Typical reverse current as function of reverse voltage

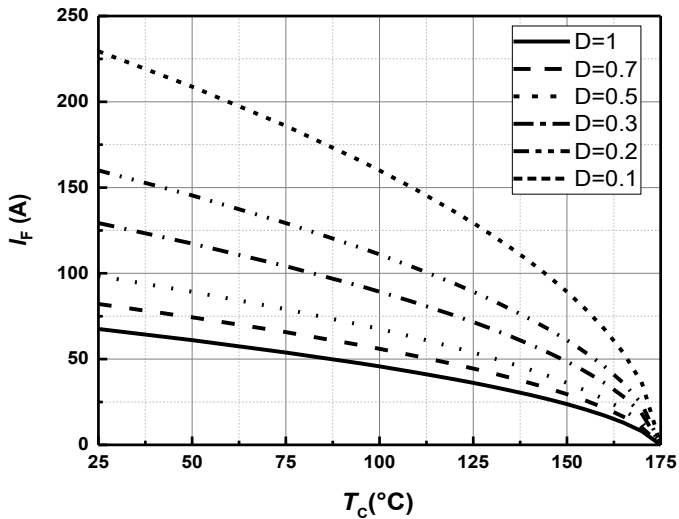


Figure 3 Diode forward current as function of temperature, D=duty cycle

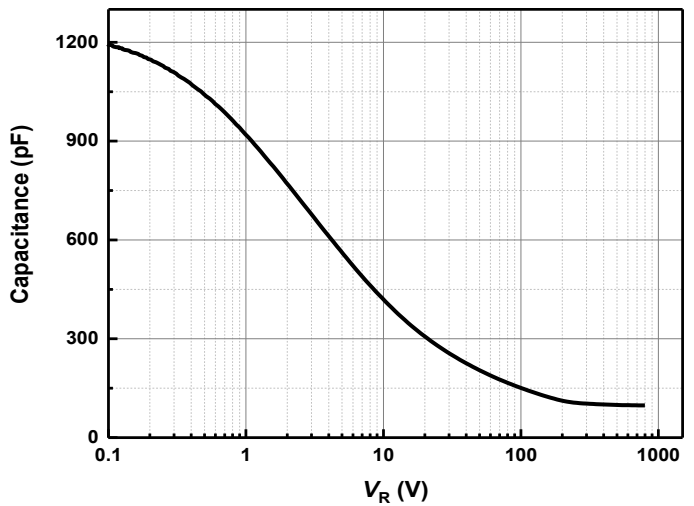


Figure 4 Typical capacitance as function of reverse voltage, $C=f(V_R)$; $T_j=25^{\circ}$ C; $f=1$ MHz

Typical Performance

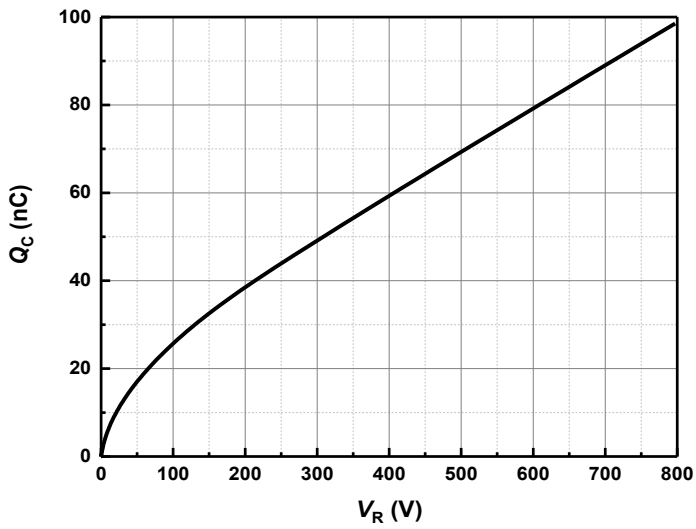


Figure 5 Typical reverse charge as function of reverse voltage

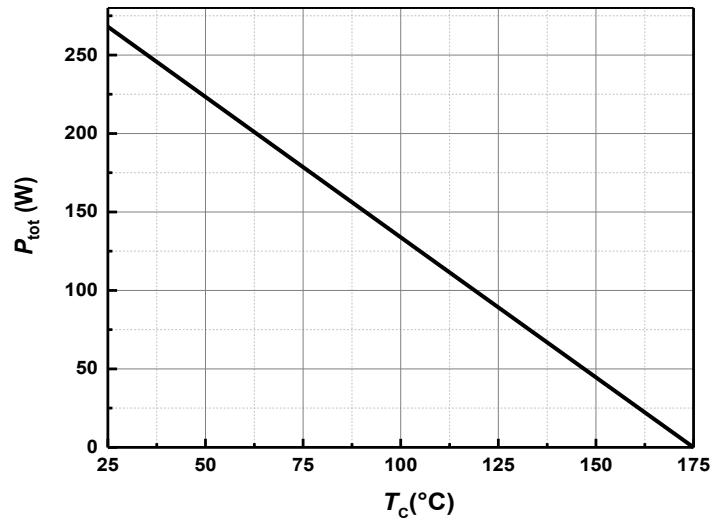


Figure 6 Power dissipation as function of case temperature

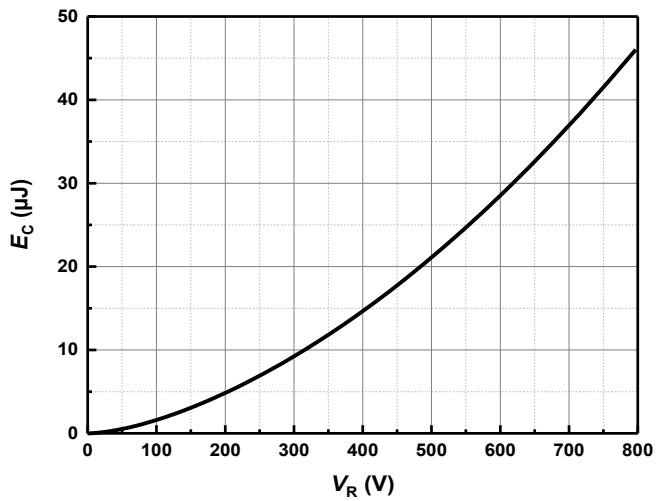


Figure 7 Capacitance stored energy

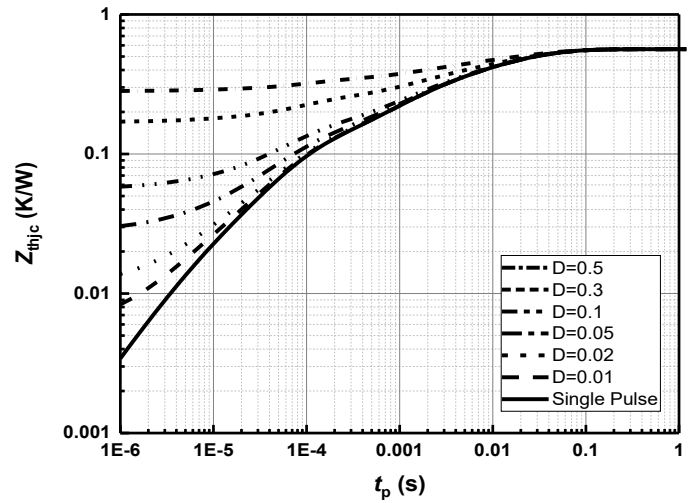
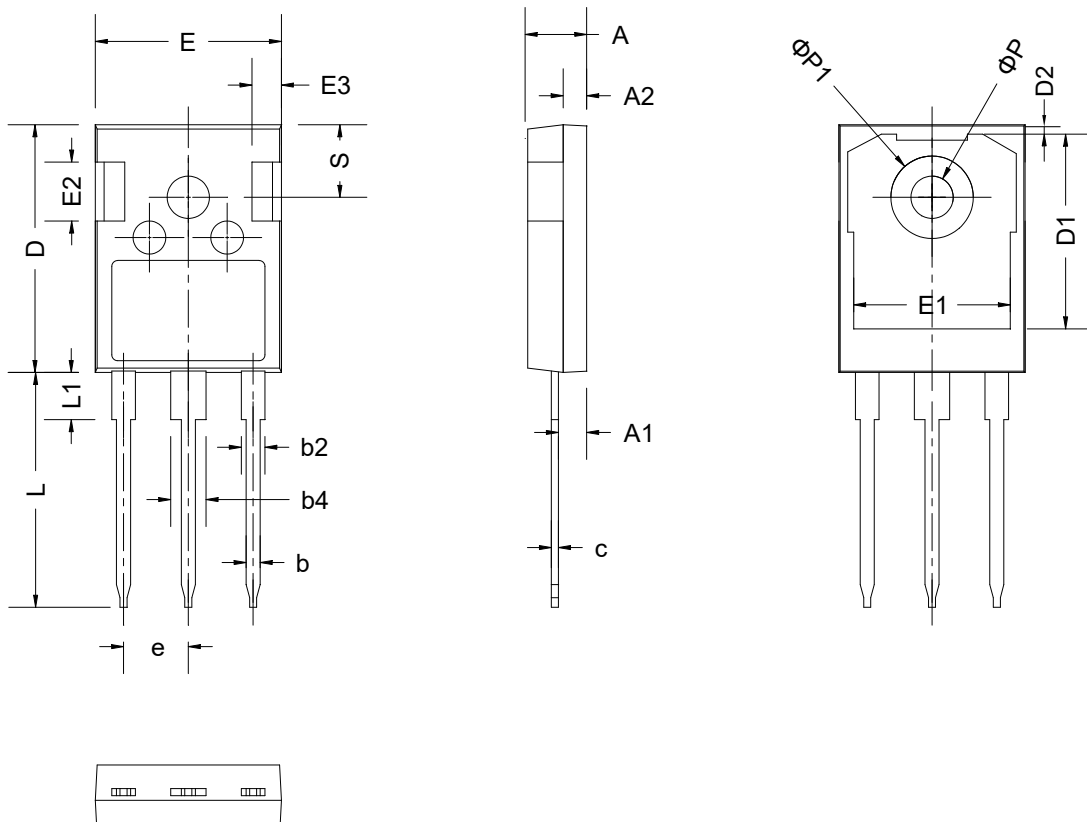


Figure 8 Max. transient thermal impedance, $Z_{thjc} = f(t)$, parameter: $D = t / T$

Package Dimensions


SYMBOL	mm		
	MIN	NOM	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	-	1.36
b2	1.91	2.01	2.21
b4	2.91	-	3.41
c	0.51	-	0.75
D	20.80	21.00	21.30
D1	16.25	16.55	16.85
D2	1.05	1.17	1.35
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
E2	4.40	-	5.20
E3	1.50	-	2.70
e	5.436BSC		
L	19.62	19.92	20.22
L1	-	-	4.30
φ P	3.40	3.60	3.80
φ P1	-	-	7.40
S	6.00	6.15	6.30

Revision History

Document Version	Date of Release	Description of Changes
Rev. 0.0	2022-09-26	Release of the datasheet.

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