

V_{RRM} = **650 V**
 $I_F (T_C=140^{\circ}\text{C})$ = **4 A**
 Q_C = **12 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

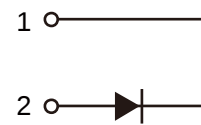
Package Pin Definitions

- Pin1- Cathode
- Pin2- Anode

Package Parameters

Part Number	Marking	Package
B1D04065KF	B1D04065KF	TO-220F-2

TO-220F-2



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	$T_c=25^\circ\text{C}$ $T_c=140^\circ\text{C}$	10 4	A
I_{FSM}	Non-repetitive forward surge current	$T_c=25^\circ\text{C}$, $t_p=10\text{ms}$, Half Sine Wave	30	A
$\int i^2 dt$	$i^2 t$ value	$T_c=25^\circ\text{C}$, $t_p=10\text{ms}$	4.5	A^2S
P_{tot}	Power dissipation	$T_c=25^\circ\text{C}$ $T_c=110^\circ\text{C}$	30 13	W
T_j	Operating junction temperature		-55~175	$^\circ\text{C}$
T_{stg}	Storage temperature		-55~175	$^\circ\text{C}$
	TO-220 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		4.996		K/W

Electrical Characteristics
Static Characteristics

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
V_{DC}	DC blocking voltage	$T_j=25^{\circ}\text{C}$	650			V
V_F	Diode forward voltage	$I_F=4\text{A } T_j=25^{\circ}\text{C}$ $I_F=4\text{A } T_j=175^{\circ}\text{C}$		1.40 1.70		V
I_R	Reverse current	$V_R=650\text{V } T_j=25^{\circ}\text{C}$ $V_R=650\text{V } T_j=175^{\circ}\text{C}$		1 10		μA

AC Characteristics

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
Q_C	Total capacitive charge	$V_R=400\text{V } T_j=25^{\circ}\text{C}$ $Q_C = \int_0^{V_R} C(V) dV$		12		nC
C	Total capacitance	$V_R=1\text{V } f=1\text{MHz}$ $V_R=300\text{V } f=1\text{MHz}$ $V_R=600\text{V } f=1\text{MHz}$		181 21.6 21.3		pF
E_C	Capacitance stored energy	$V_R=400\text{V}$		3		μJ

Typical Performance

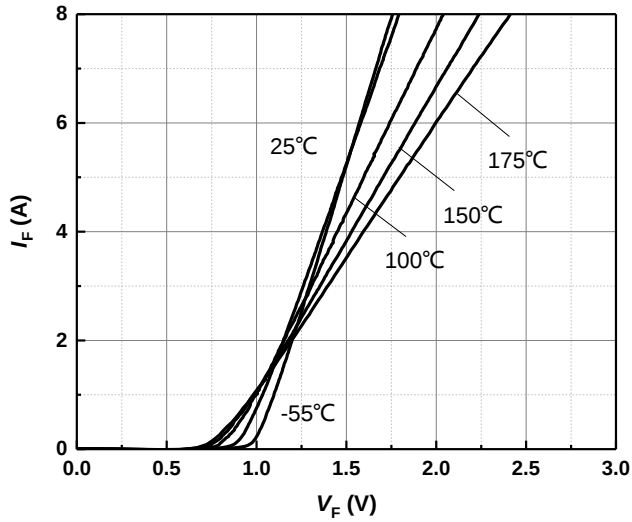


Figure 1. Typical forward characteristics

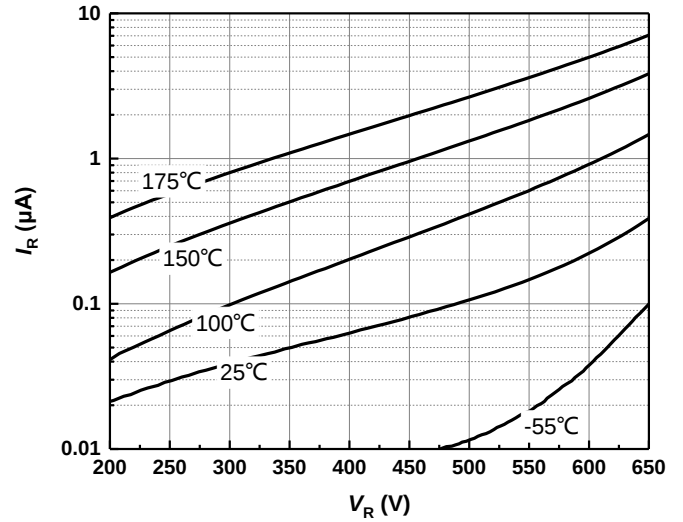


Figure 2. Typical reverse current as function of reverse voltage

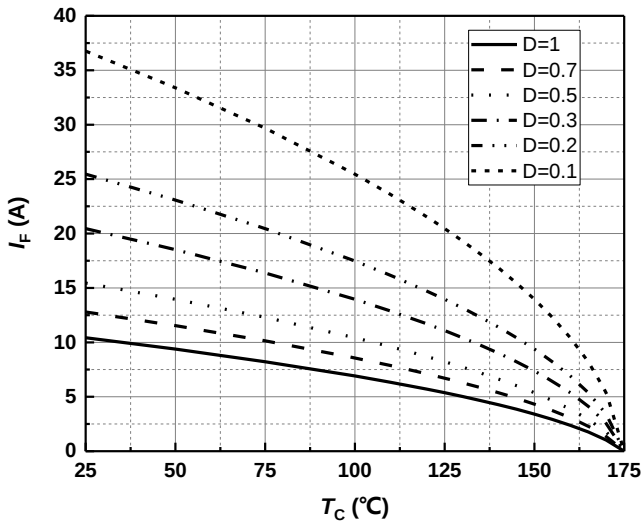


Figure 3. Diode forward current as function of temperature, D =duty cycle

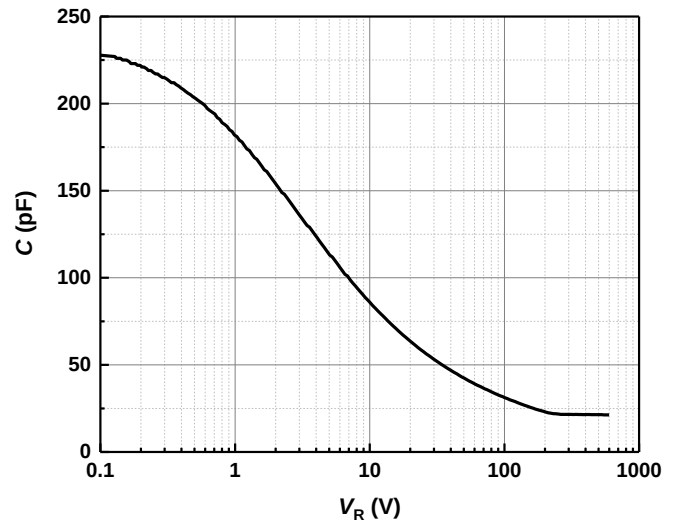


Figure 4. Typical capacitance as function of reverse voltage, $C=f(V_R)$; $T_J=25^\circ\text{C}$; $f=1\text{ MHz}$

Typical Performance

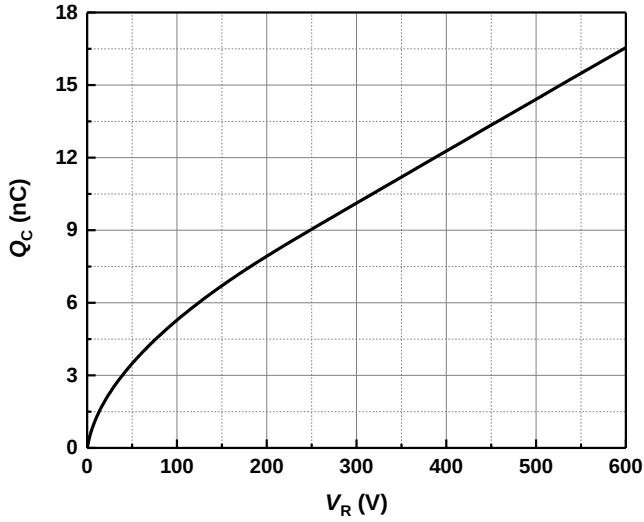


Figure 5. Typical reverse charge as function of reverse voltage

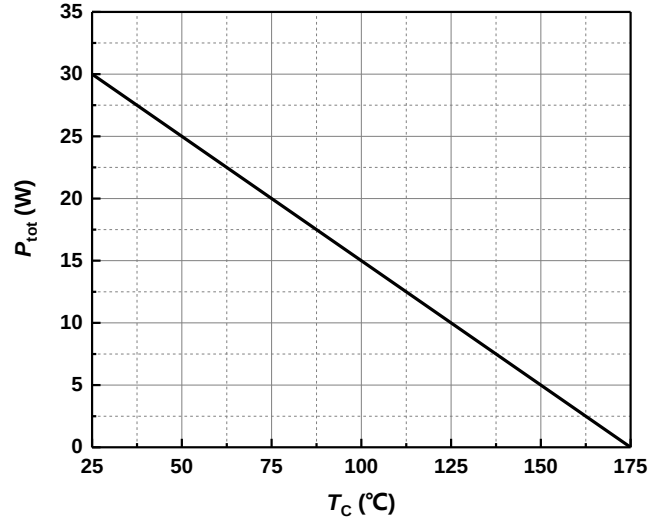


Figure 6. Power dissipation as function of case temperature

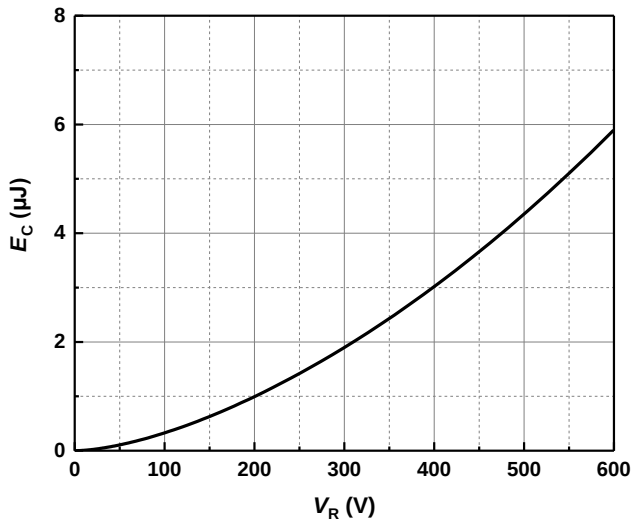


Figure 7. Capacitance stored energy

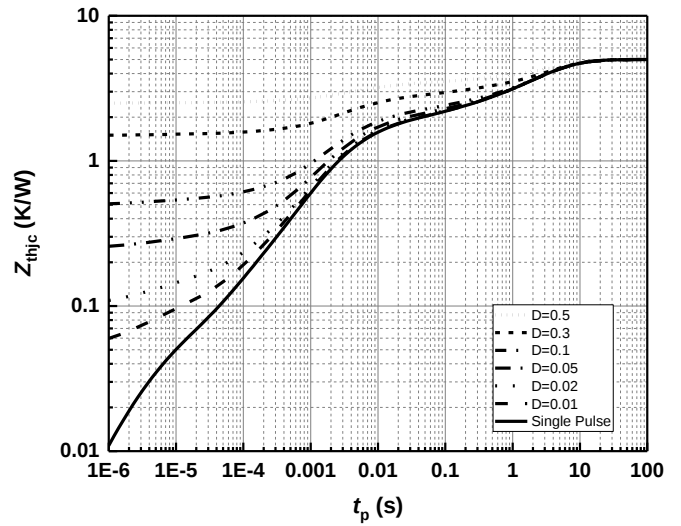
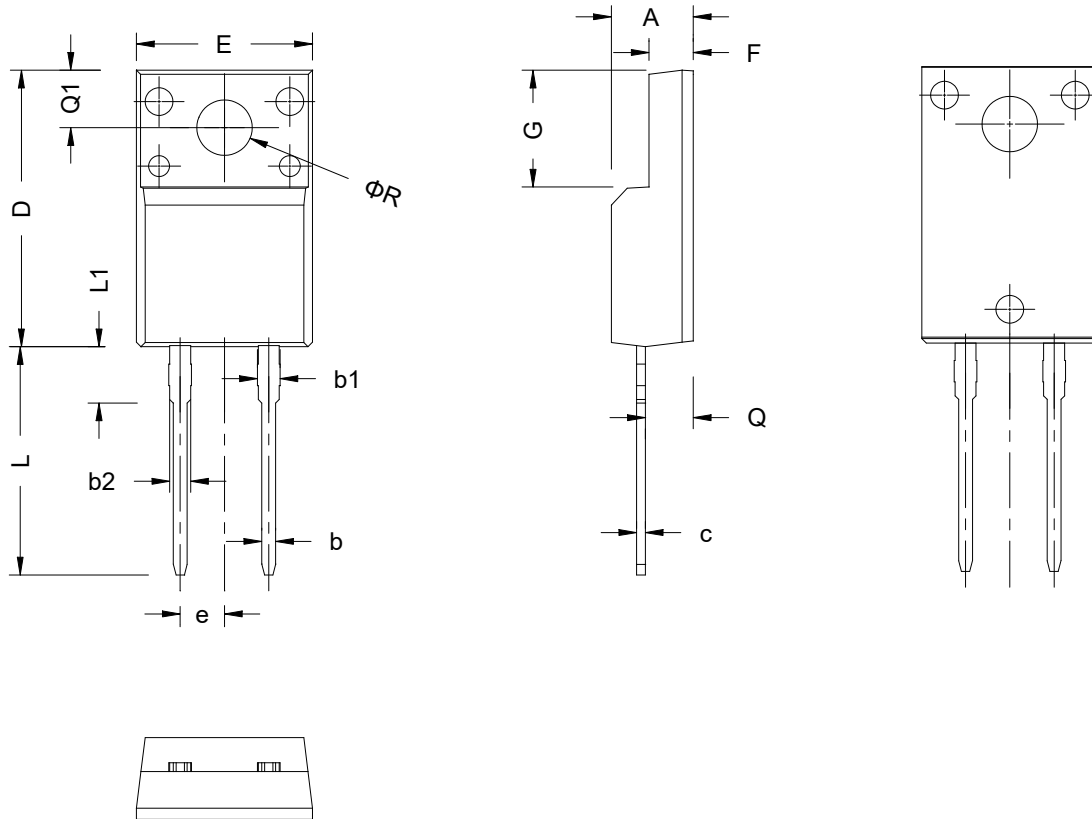


Figure 8. Max. transient thermal impedance, $Z_{thjc} = f(t)$, parameter: $D = t / T$

Package Dimensions



SYMBOL	mm		
	MIN	NOM	MAX
A	4.60	4.70	4.80
b	0.70	0.80	0.91
b1	1.20	1.30	1.47
b2	1.10	1.20	1.30
c	0.45	0.50	0.63
D	15.80	15.87	15.97
e	2.54 BSC		
E	10.00	10.10	10.30
F	2.44	2.54	2.64
G	6.50	6.70	6.90
L	12.90	13.10	13.30
L1	3.13	3.23	3.33
Q	2.65	2.75	2.85
Q1	3.20	3.30	3.40
φ R	2.08	3.18	3.28

Revision History

Document Version	Date of Release	Description of Changes
Rev. 1.0	2020-07-06	Release of the datasheet.
Rev. 1.1	2020-11-04	Characteristics updated.

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