

Product Summary

V_{RRM}	650 V
$I_F (T_C=155^{\circ}\text{C})$	4 A
Q_C	13 nC

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 - Cathode
- Pin2 - Anode

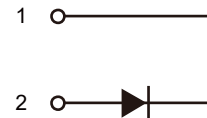
Package Parameters

Part Number	Marking	Package
B2D04065KF1	B2D04065KF1	TO-220F-2

Packing Quantities

Tube Packing	PCS/Tube	Tube/Box	PCS/Box
TO-220F-2	50	10	500

Package: TO-220F-2

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	$T_c=25^\circ\text{C}$	15	A
		$T_c=135^\circ\text{C}$	7	
		$T_c=155^\circ\text{C}$	4	
I_{FSM}	Non-repetitive forward surge current	$T_c=25^\circ\text{C}$, $t_p=10\text{ms}$ Half sine wave	41	A
$\int i^2 dt$	i^2t value	$T_c=25^\circ\text{C}$, $t_p=10\text{ms}$	8.4	A ² S
P_{tot}	Power dissipation	$T_c=25^\circ\text{C}$ $T_c=110^\circ\text{C}$	59 26	W
T_j	Operating junction temperature		-55~175	°C
T_{stg}	Storage temperature		-55~175	°C

Thermal Characteristics

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
$R_{th(jc)}$	Thermal resistance from junction to case		2.54		K/W

Electrical Characteristics
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	$I_F=4A$ $T_J=25^{\circ}C$ $I_F=4A$ $T_J=175^{\circ}C$		1.33 1.6	1.5 2.1	V
I_R	Reverse current	$V_R=650V$ $T_J=25^{\circ}C$ $V_R=650V$ $T_J=175^{\circ}C$		1 20	70 200	μA

AC Characteristics

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
Q_C	Total capacitive charge	$V_R=400V$ $T_J=25^{\circ}C$ $Q_C=\int_0^{V_R} C(V)dV$		13		nC
C	Total capacitance	$V_R=1V$ $f=1MHz$ $V_R=300V$ $f=1MHz$ $V_R=600V$ $f=1MHz$		200 24 23		pF
E_C	Capacitance stored energy	$V_R=400V$		3.2		μJ

Typical Performance

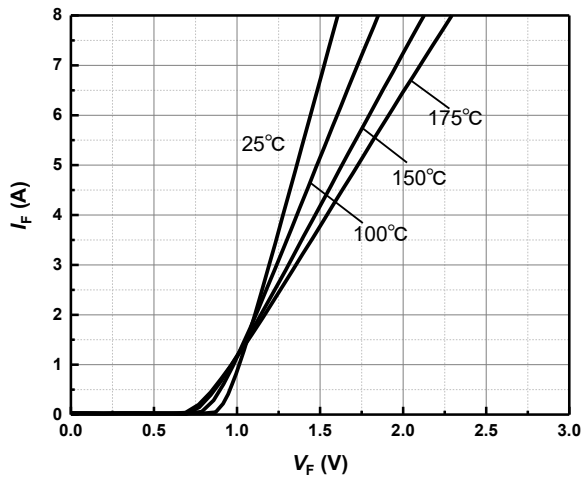


Figure 1 Typical forward characteristics

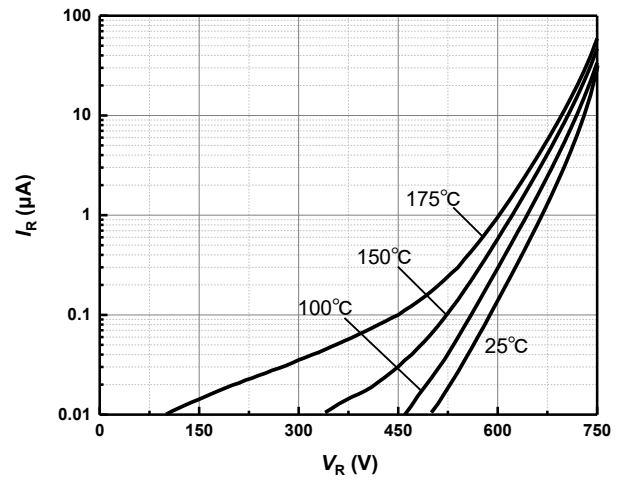


Figure 2 Typical reverse current as function of reverse voltage

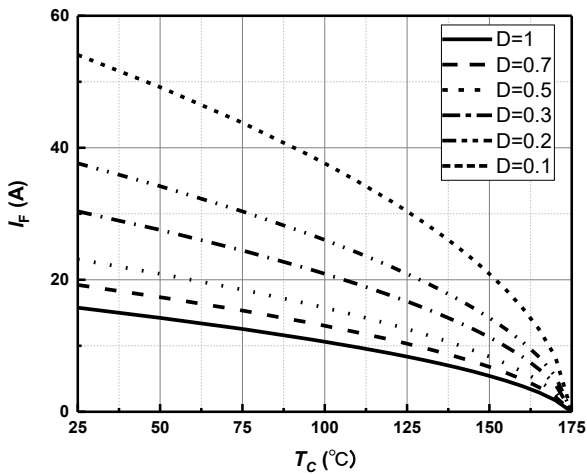


Figure 3 Diode forward current as function of temperature, D=duty cycle

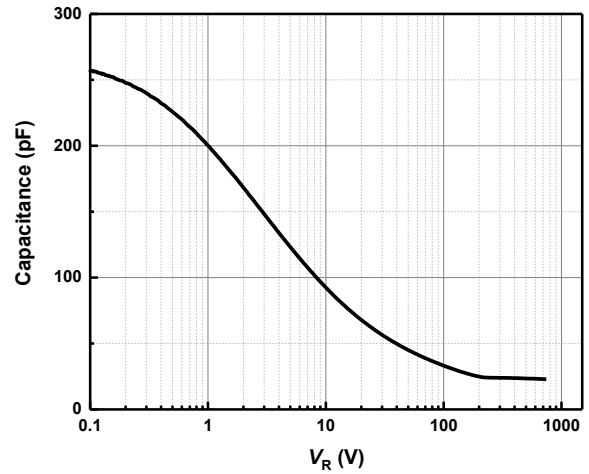


Figure 4 Typical capacitance as function of reverse voltage, $C=f(V_R)$; $T_J=25^\circ\text{C}$; $f=1\text{ MHz}$

Typical Performance

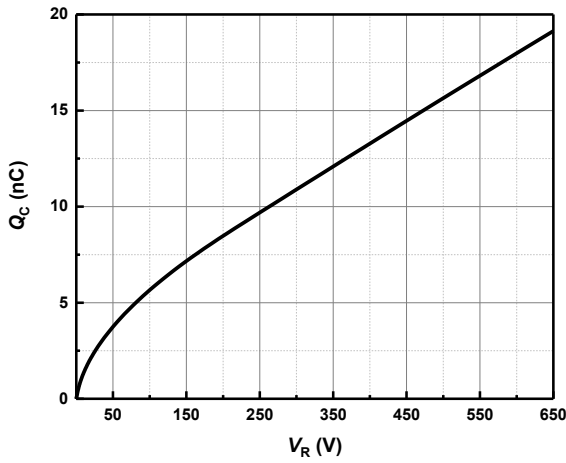


Figure 5 Typical reverse charge as function of reverse voltage

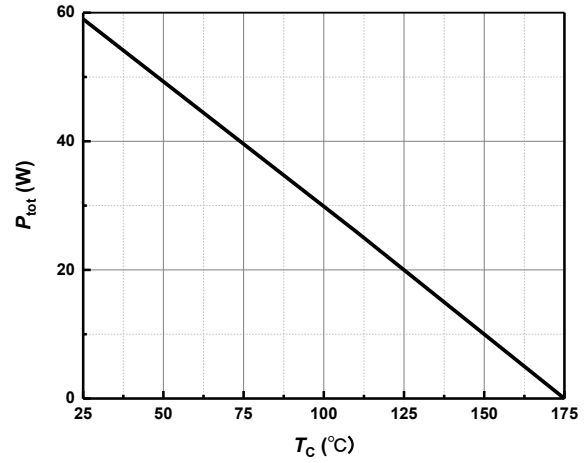


Figure 6 Power dissipation as function of case temperature

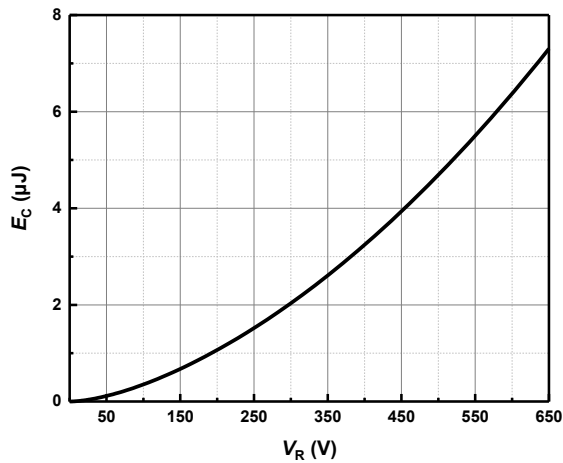


Figure 7 Capacitance stored energy

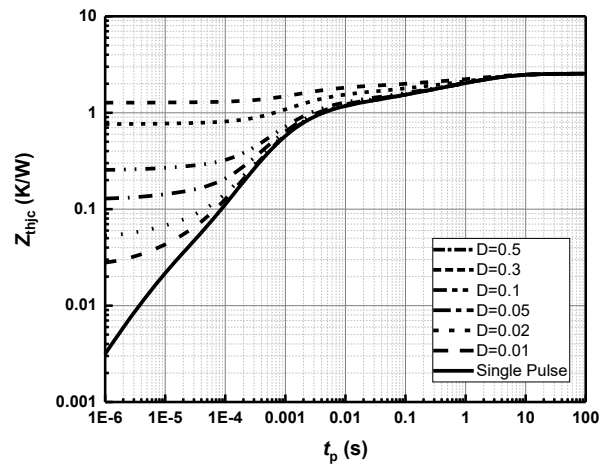
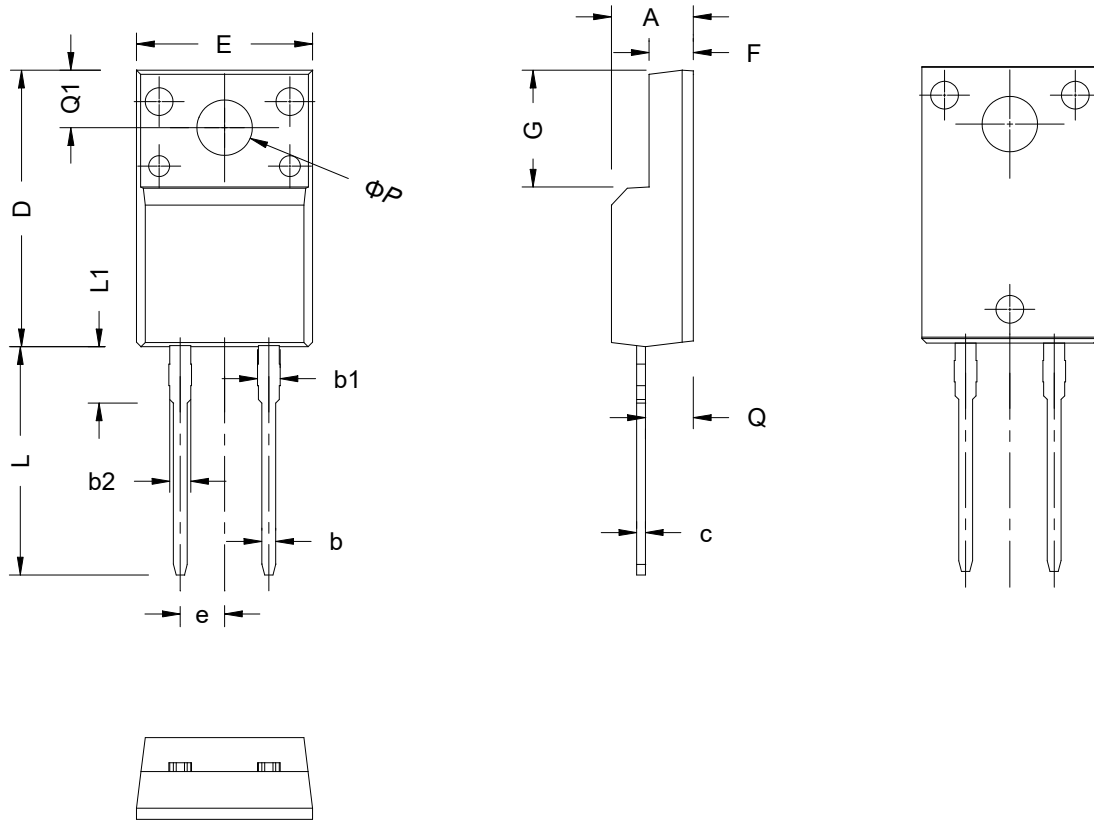
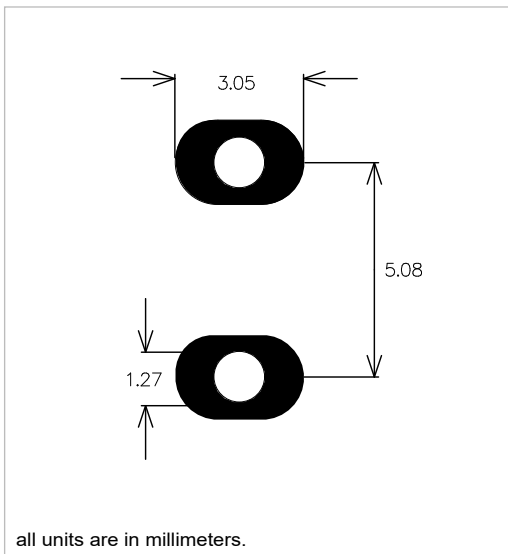


Figure 8 Max. transient thermal impedance, $Z_{thjc} = f(t)$, parameter: $D = t / T$

Package Dimensions



Recommended Solder Pad Layout



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
ϕP	3.08	3.18	3.28

Revision History

Document Version	Date of Release	Description of Changes
Rev. 0.0	2022-12-17	Release of the datasheet.

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