

Product Summary

V_{RRM}	650 V
$I_F (T_C=165^{\circ}\text{C})$	6 A
Q_C	18 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 and backside - Cathode
- Pin2 - Anode

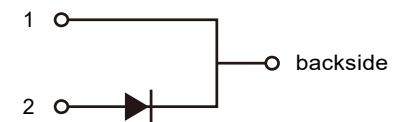
Package Parameters

Part Number	Marking	Package
B2D06065K1	B2D06065K1	TO-220-2

Packing Quantities

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

Package: TO-220-2

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	$T_c=25^\circ\text{C}$	27	A
		$T_c=135^\circ\text{C}$	13	
		$T_c=165^\circ\text{C}$	6	
I_{FSM}	Non-repetitive forward surge current	$T_c=25^\circ\text{C}$, $t_p=10\text{ms}$ Half sine wave	44	A
		$T_c=110^\circ\text{C}$, $t_p=10\text{ms}$ Half sine wave	38	
$I_{F, Max}$	Non-repetitive peak forward current	$T_c=25^\circ\text{C}$, $t_p=10\mu\text{s}$, pulse $T_c=110^\circ\text{C}$, $t_p=10\mu\text{s}$, pulse	410 380	A
$\int i^2 dt$	i^2t value	$T_c=25^\circ\text{C}$, $t_p=10\text{ms}$	10	A^2S
P_{tot}	Power dissipation	$T_c=25^\circ\text{C}$ $T_c=110^\circ\text{C}$	133 58	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		1.124		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	$I_F=6\text{A } T_J=25^{\circ}\text{C}$ $I_F=6\text{A } T_J=175^{\circ}\text{C}$		1.31 1.7	1.6 2.5	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 11	80 110	μA

AC Characteristics

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
Q_C	Total capacitive charge	$V_R=400\text{V } T_J=25^{\circ}\text{C}$ $Q_C=\int_0^{V_R} C(V)dV$		18		nC
C	Total capacitance	$V_R=1\text{V } f=1\text{MHz}$ $V_R=300\text{V } f=1\text{MHz}$ $V_R=600\text{V } f=1\text{MHz}$		275 29 27		pF
E_C	Capacitance stored energy	$V_R=400\text{V}$		4.6		μJ

Typical Performance

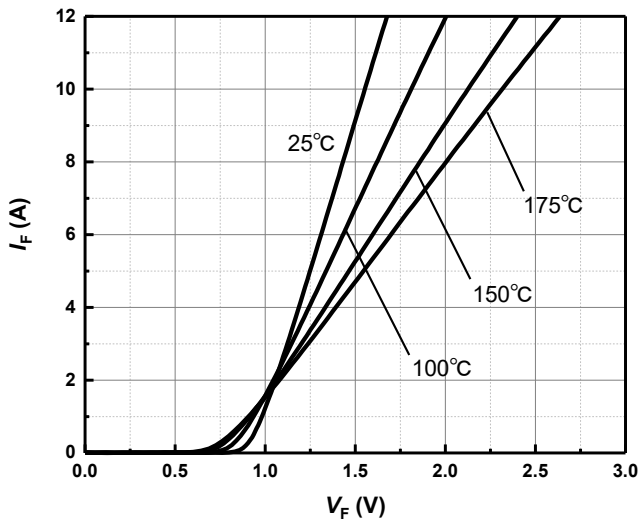


Figure 1 Typical forward characteristics

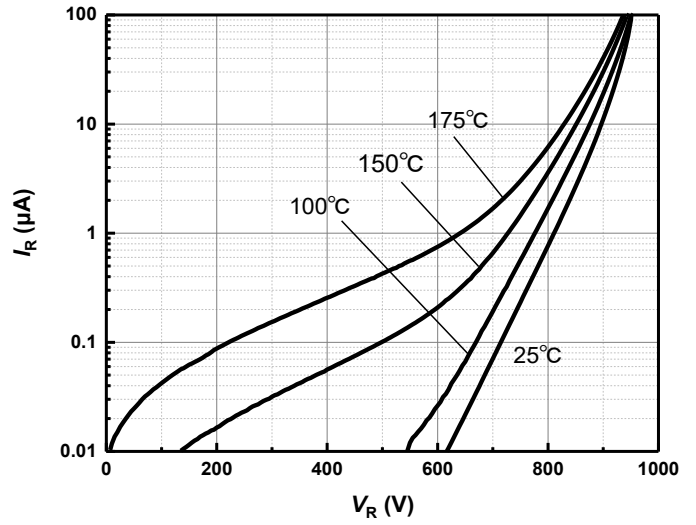


Figure 2 Typical reverse current as function of reverse voltage

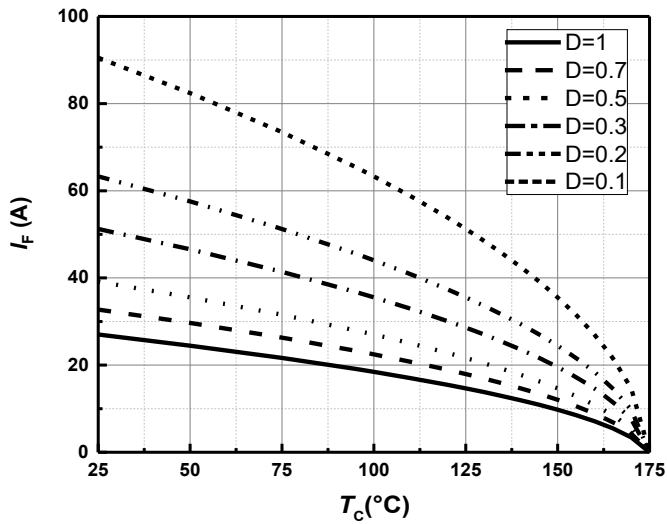


Figure 3 Diode forward current as function of temperature, D=duty cycle

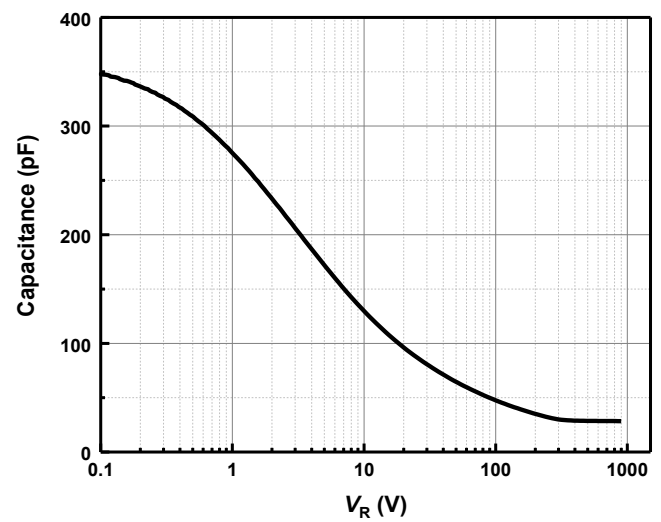


Figure 4 Typical capacitance as function of reverse voltage, $C=f(V_R)$; $T_J=25^\circ\text{C}$; $f=1\text{ MHz}$

Typical Performance

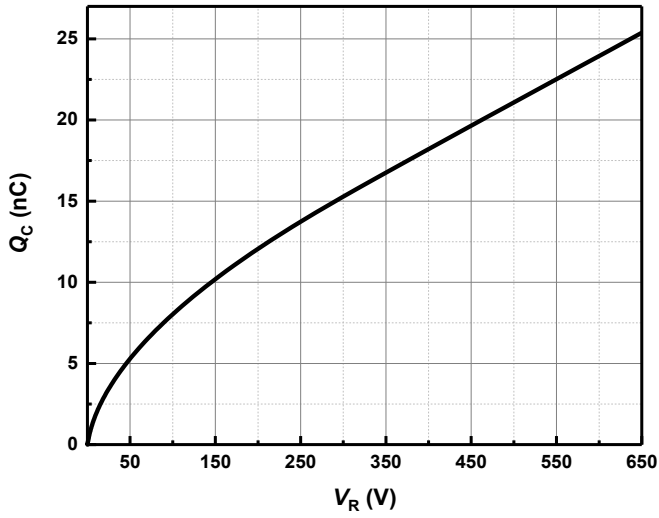


Figure 5 Typical reverse charge as function of reverse voltage

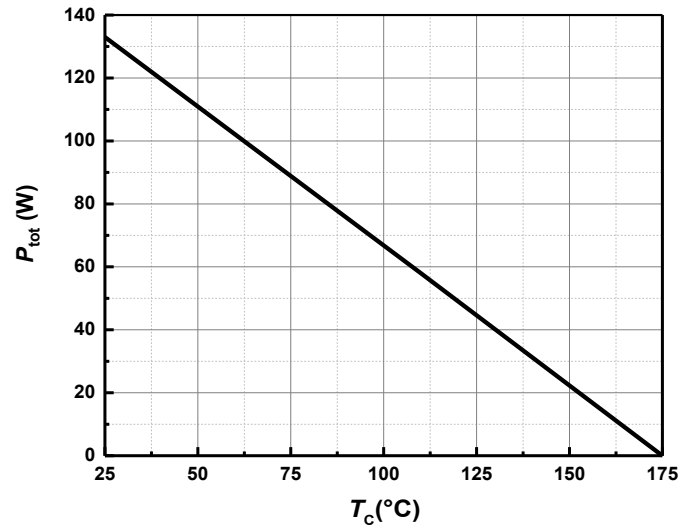


Figure 6 Power dissipation as function of case temperature

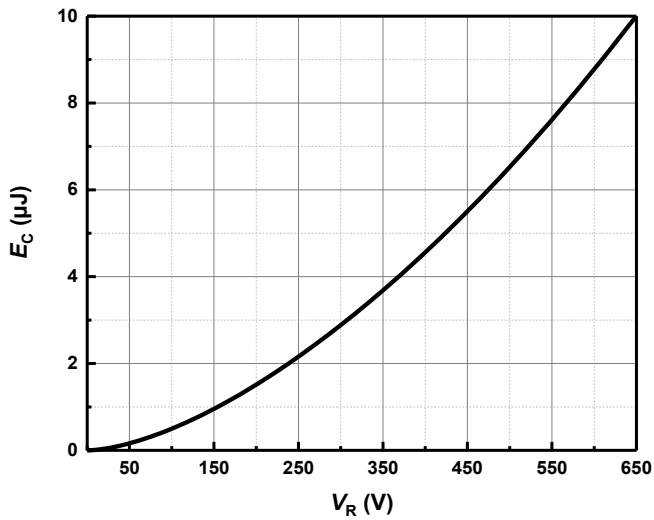


Figure 7 Capacitance stored energy

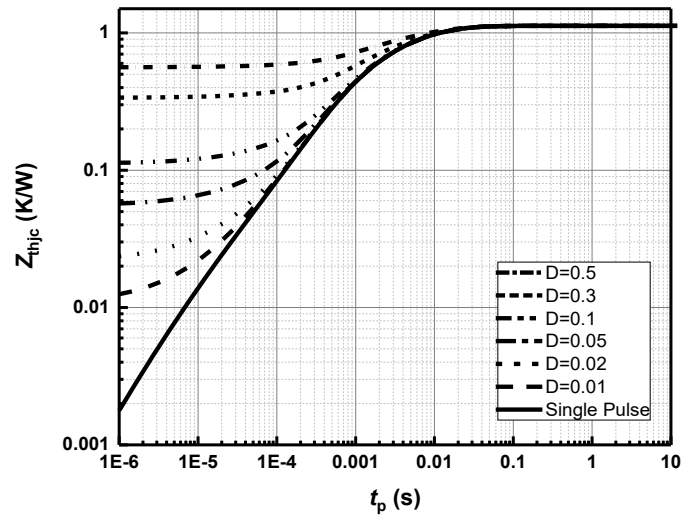


Figure 8 Max. transient thermal impedance, $Z_{thjc} = f(t)$, parameter: $D = t / T$

Typical Performance

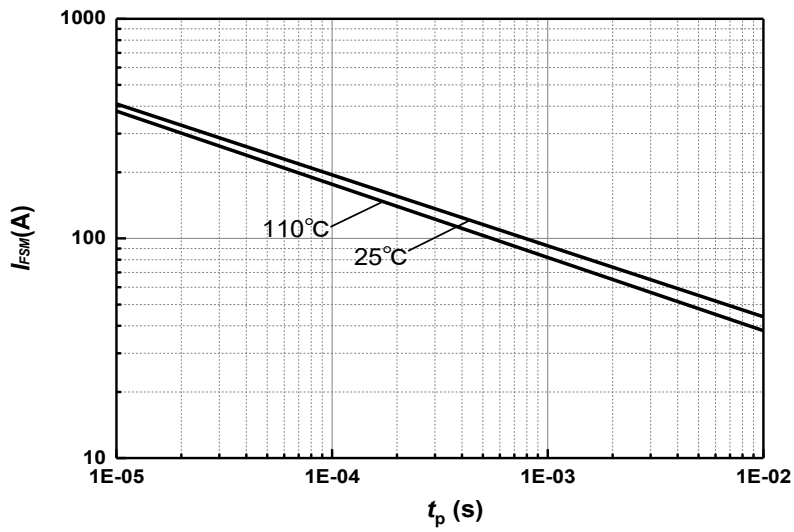
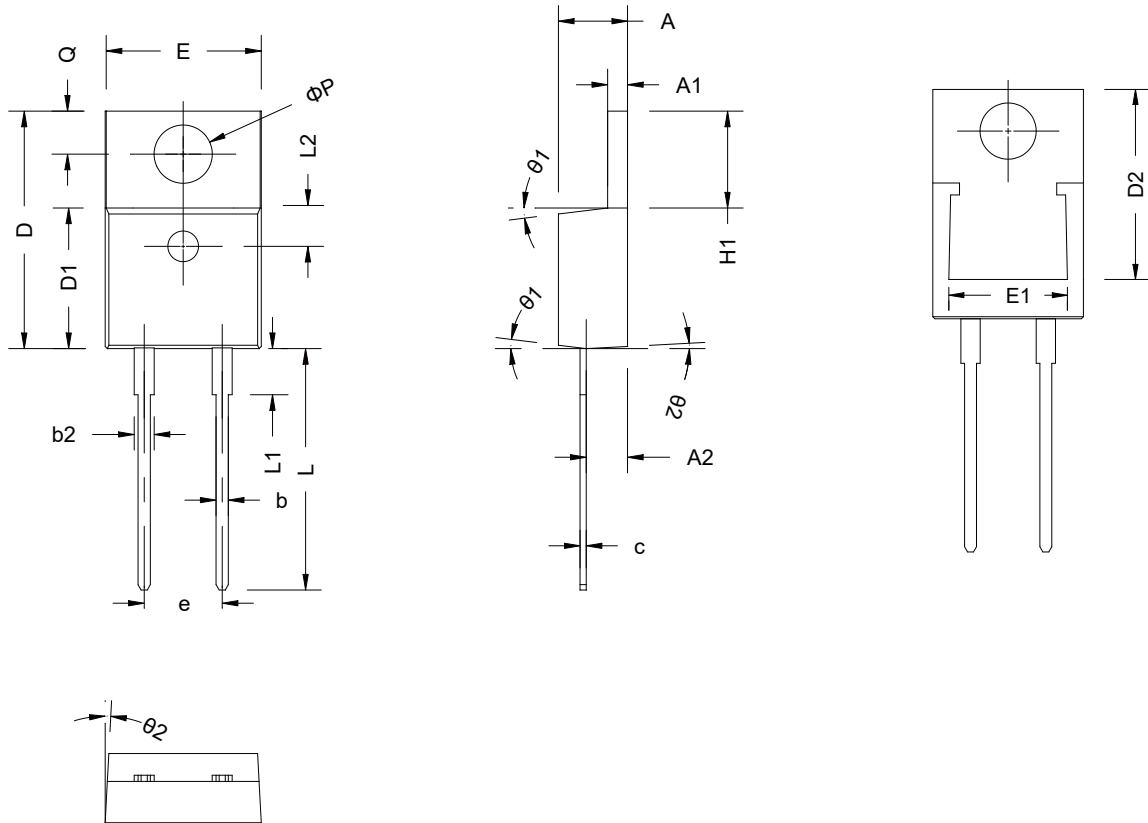
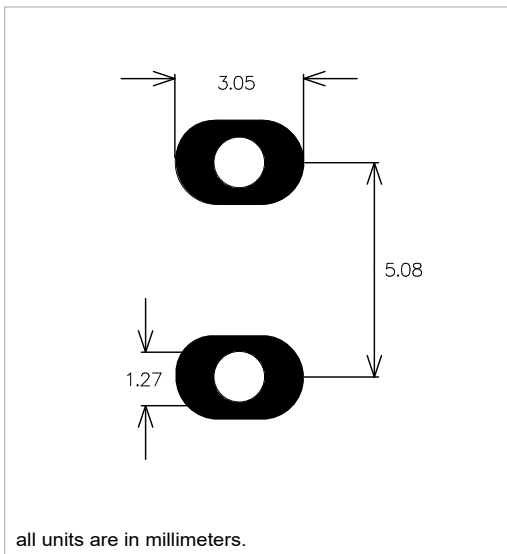


Figure 9 Non-repetitive peak forward surge current versus pulse duration (sinusoidal waveform)

Package Dimensions



Recommended Solder Pad Layout



SYMBOL	mm		
	MIN	NOM	MAX
A	4.37	4.57	4.77
A1	1.22	-	1.40
A2	2.49	2.69	2.89
b	0.75	-	0.96
b2	1.22	-	1.47
c	0.30	-	0.48
D	15.15	15.45	15.75
D1	9.05	9.15	9.25
D2	11.40	-	12.88
E	9.86	10.16	10.36
E1	6.86	-	8.89
e	4.98	5.08	5.18
H1	6.10	6.30	6.50
L	12.70	-	13.70
L1	-	-	4.10
L2	2.50 REF		
φ P	3.70	3.84	3.99
Q	2.54	-	2.94
θ1	5°	7°	9°
θ2	1°	3°	5°

REF: For reference only, no measurement is required.

Revision History

Document Version	Date of Release	Description of Changes
Rev. 0.0	2023-03-27	Release of the datasheet.
Rev. 0.1	2023-11-06	I_{FSM} , $I_{F, Max}$, Fig 9.

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