

TO-220-2 Silicon Carbide Schottky Diode

SiC Diode 650 V, 20 A, 76nC

General Description

This product family offers state of the art performance. It is designed for high frequency applications where high efficiency and high reliability are required.

Features

- Zero Forward/Reverse Recovery Current
- High Blocking Voltage
- High Frequency Operation
- Positive Temperature Coefficient on VF
- Temperature Independent Switching Behavior

Applications

- Motor Drives
- Solar
- AC/DC converters
- DC/DC converters
- Uninterruptable power supplies

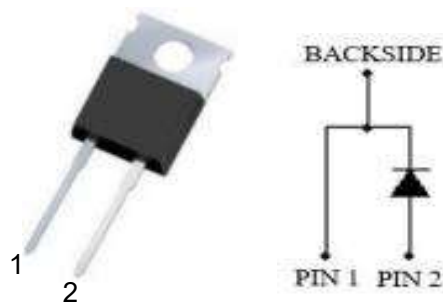
Benefits

- Higher System Efficiency
- Parallel Device Convenience without thermal runaway
- Higher Temperature Application
- No Switching loss
- Hard Switching & Higher Reliability
- Environmental Protection

Key performance parameters

Type	V_R	I_F $T_C=150^\circ\text{C}$	Q_C
KWSC65C20T2	650 V	20A	76 nC

Caution: This device is sensitive to electrostatic discharge .Users should follow ESD handling procedures.



TO-220-2
Pin definition

Typical Characteristics

Maximum Ratings

$T_C=25^{\circ}\text{C}$, unless otherwise specified

Parameter	Symbol	Value	Unit
Peak Repetitive Reverse Voltage	V_{RRM}	650	V
Peak Reverse Surge Voltage	V_{RSM}	650	V
DC Blocking Voltage	V_R	650	V

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
I_F	Continuous forward current	$T_C=25^{\circ}\text{C}$ $T_C=140^{\circ}\text{C}$	52 20	A
I_{FSM}	Non-Repetitive forward surge current	$T_C=25^{\circ}\text{C}$, $t_p=10\text{ms}$, Half Sine Wave	170	A
$\int i^2 dt$	i^2t value	$T_C=25^{\circ}\text{C}$, $t_p=10\text{ms}$	144	A^2S
P_{tot}	Power dissipation	$T_C=25^{\circ}\text{C}$ $T_C=110^{\circ}\text{C}$	125 54	W
T_j	Operating junction temperature		-55~175	$^{\circ}\text{C}$
T_{stg}	Storage temperature		-55~175	$^{\circ}\text{C}$

Thermal Resistance

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
$R_{th(jc)}$	Thermal Resistance from Junction to Cas		1.2		$^{\circ}\text{C/W}$

Typical Characteristics

Electrical Characteristic

$T_c = 25^\circ\text{C}$, unless otherwise specified

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	$I_F = 20\text{A}, T_j = 25^\circ\text{C}$ $I_F = 20\text{A}, T_j = 135^\circ\text{C}$ $I_F = 20\text{A}, T_j = 175^\circ\text{C}$		1.32 1.34 1.43	1.46 1.63 1.80	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 19	50 200	μA

AC Characteristic

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
Q_C	Total capacitive charge	$V_R = 400\text{V}, T_j = 25^\circ\text{C}$ $Q_C = \int_0^V R \cdot C(V) dV$		76		nC
C	Total capacitance	$V_R = 1\text{V}, f = 1\text{MHz}$ $V_R = 300\text{V}, f = 1\text{MHz}$ $V_R = 600\text{V}, f = 1\text{MHz}$		1091 123 104		pF
E_C	Capacitance stored energy	$V_R = 400\text{V}$		11.3		μJ

Typical Characteristics

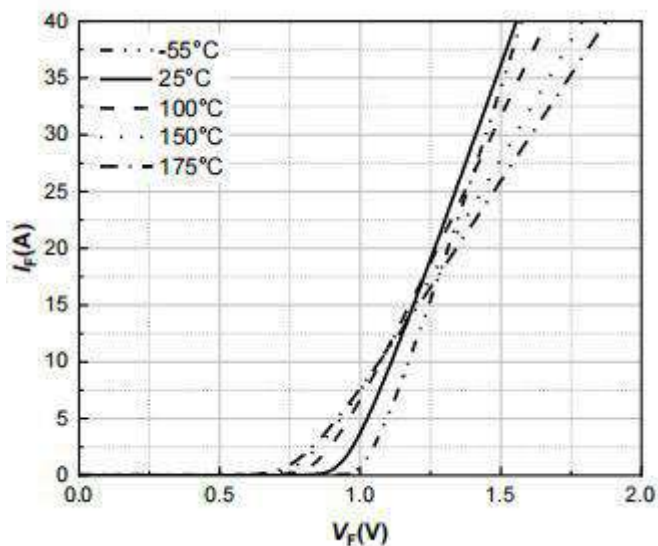


Figure 1. Typical forward characteristics

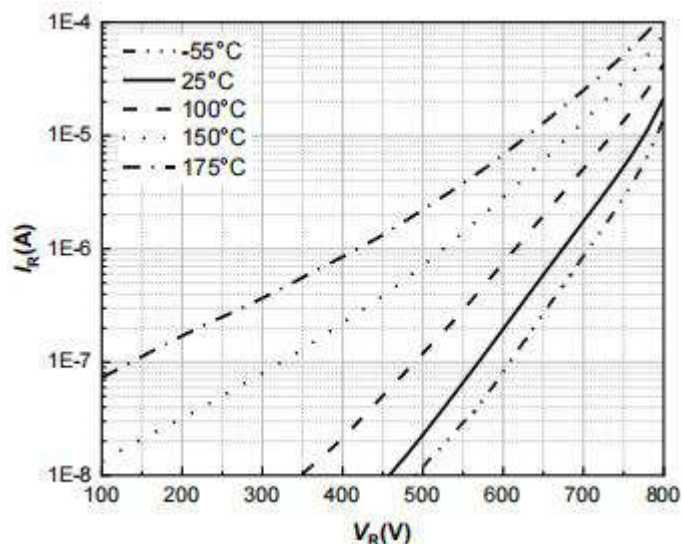


Figure 2. Typical reverse current as function of reverse voltage

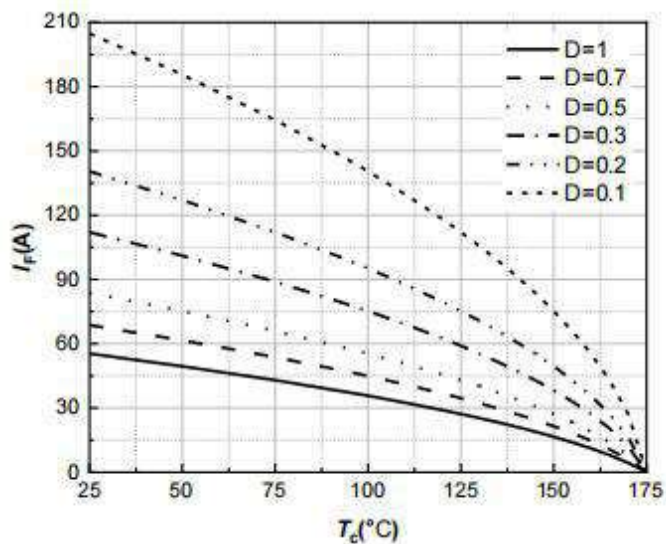


Figure 3. Diode forward current as function of temperature, D =duty cycle

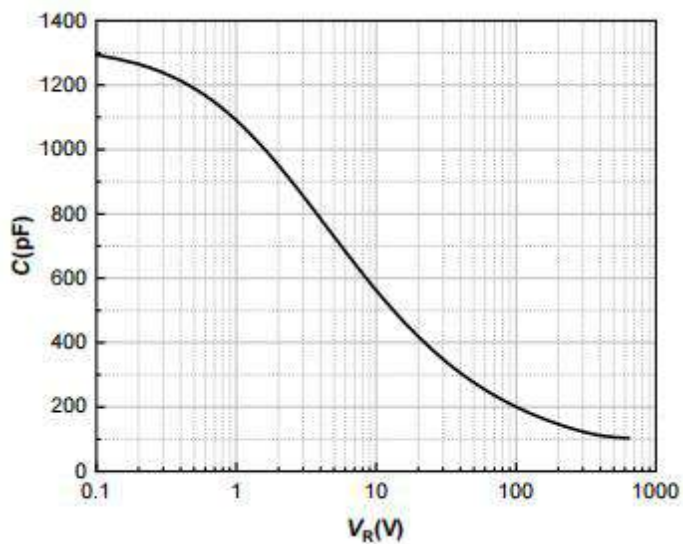


Figure 4. Typical capacitance as function of reverse voltage, $C=f(V_R)$; $T_J=25^\circ\text{C}$; $f=1\text{ MHz}$

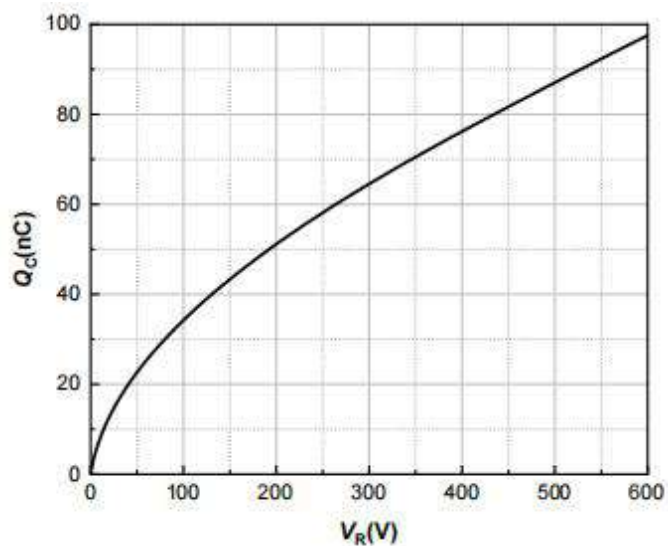


Figure 5. Typical reverse charge as function of reverse voltage

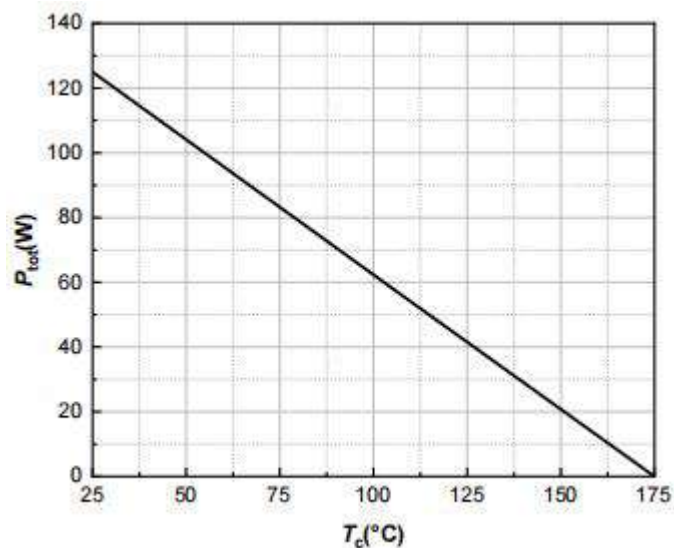


Figure 6. Power dissipation as function of case temperature

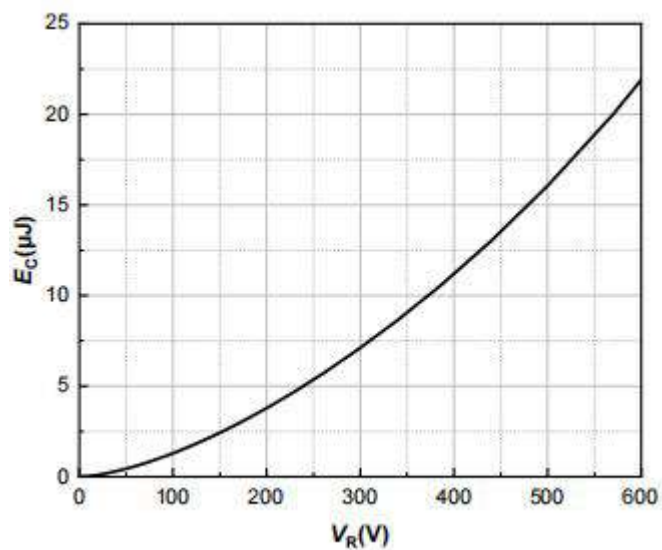


Figure 7. Capacitance stored energy

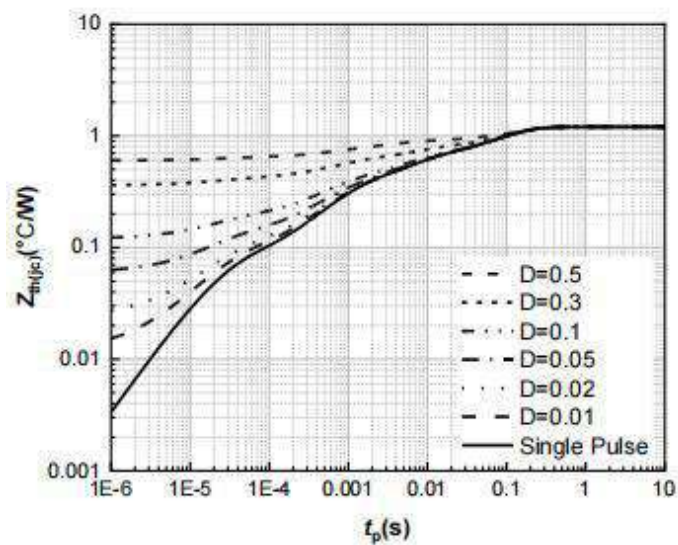
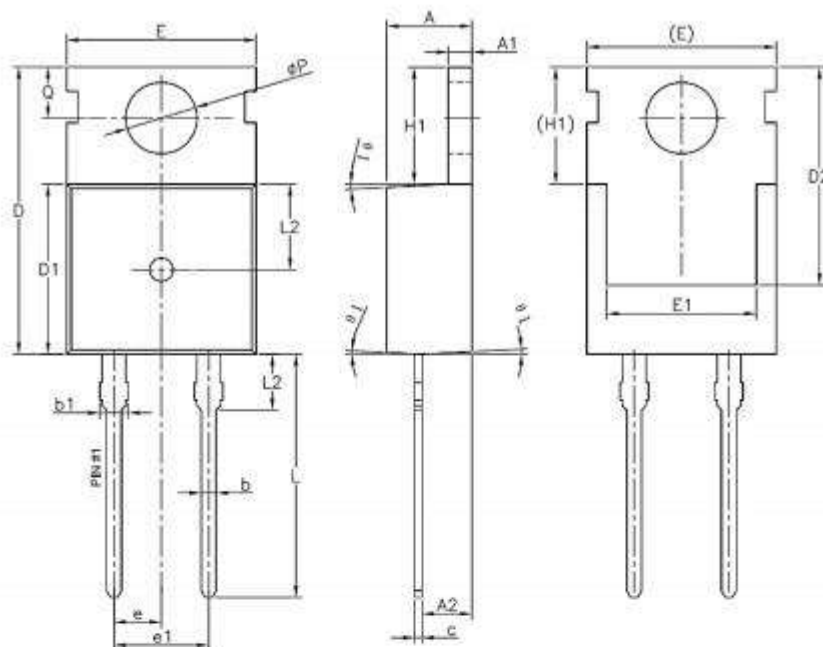


Figure 8. Max. transient thermal impedance, $Z_{th(jc)}=f(t_p)$, parameter: $D=t_p/T$

Package Outline Dimensions

Package Outline: TO-220-2



SYMBOL	Unit: mm		
	MIN	NOM	MAX
A	4.40	4.50	4.60
A1	1.27	1.30	1.33
A2	2.30	2.40	2.50
b	0.70	-	0.90
b1	1.42	-	1.57
c	0.45	0.50	0.60
D	15.30	15.70	16.10
D1	9.10	9.20	9.30
D2	13.10	-	13.70
E	9.70	9.90	10.20
E1	7.80	8.00	8.20
e	2.54 BSC		
e1	5.08 BSC		
H1	6.30	6.50	6.70
L	12.78	13.08	13.38
L1	-	-	3.50
L2	4.60 REF		
ØP	3.55	3.60	3.65
Q	2.73	-	2.87
θ1	1°	3°	5°