



# WS3A010065A

## Silicon Carbide Schottky Diode

$V_{RRM}$	=	650	V
$I_F (T_C \leq 135^\circ C)$	=	14.5	A
$Q_C$	=	25	nC

### Features

- Zero Reverse Recovery Current
- Zero Forward Recovery Voltage
- Positive Temperature Coefficient on  $V_F$
- Temperature-independent Switching
- 175°C Operating Junction Temperature

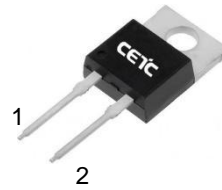
### Benefits

- Replace Bipolar with Unipolar Device
- Reduction of Heat Sink Size
- Parallel Devices Without Thermal Runaway
- Essentially No Switching Losses

### Applications

- Switch Mode Power Supplies
- Power Factor Correction
- Motor drive, PV Inverter, Wind Power Station

### Package



TO-220-2



Part Number	Package	Marking
WS3A010065A	TO-220-2	WS3A010065A

### Maximum Ratings

Symbol	Parameter	Value	Unit	Test Conditions	Note
$V_{RRM}$	Repetitive Peak Reverse Voltage	650	V	$T_C = 25^\circ C$	
$V_{RSM}$	Surge Peak Reverse Voltage	650	V	$T_C = 25^\circ C$	
$V_R$	DC Blocking Voltage	650	V	$T_C = 25^\circ C$	
$I_F$	Forward Current	29 14.5 10	A	$T_C \leq 25^\circ C$ $T_C \leq 135^\circ C$ $T_C \leq 153^\circ C$	
$I_{FSM}$	Non-Repetitive Forward Surge Current	85	A	$T_C = 25^\circ C, t_p = 8.3ms, \text{Half Sine Wave}$	
$P_{tot}$	Power Dissipation	129	W	$T_C = 25^\circ C$	Fig.3
$T_C$	Maximum Case Temperature	153	$^\circ C$		
$T_J, T_{STG}$	Operating Junction and Storage Temperature	-55 to 175	$^\circ C$		
	TO-220 Mounting Torque	1	Nm	M3 Screw	

## Electrical Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
$V_F$	Forward Voltage	1.4 1.75	1.65 2.3	V	$I_F = 10A, T_J = 25^\circ C$ $I_F = 10A, T_J = 175^\circ C$	Fig.1
$I_R$	Reverse Current	1 5	20 100	$\mu A$	$V_R = 650V, T_J = 25^\circ C$ $V_R = 650V, T_J = 175^\circ C$	Fig.2
C	Total Capacitance	440 57 46	/	pF	$V_R = 1V, T_J = 25^\circ C, f = 1MHz$ $V_R = 200V, T_J = 25^\circ C, f = 1MHz$ $V_R = 400V, T_J = 25^\circ C, f = 1MHz$	Fig.5
$Q_C$	Total Capacitive Charge	25	/	nC	$V_R = 650V, I_F = 10A$ $di/dt = 200A/\mu s, T_J = 25^\circ C$	Fig.4

## Thermal Characteristics

Symbol	Parameter	Typ.	Unit	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	1.16	$^\circ C/W$	Fig.6
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient	80	$^\circ C/W$	
$T_{sold}$	Soldering Temperature	260	$^\circ C$	

## Typical Performance

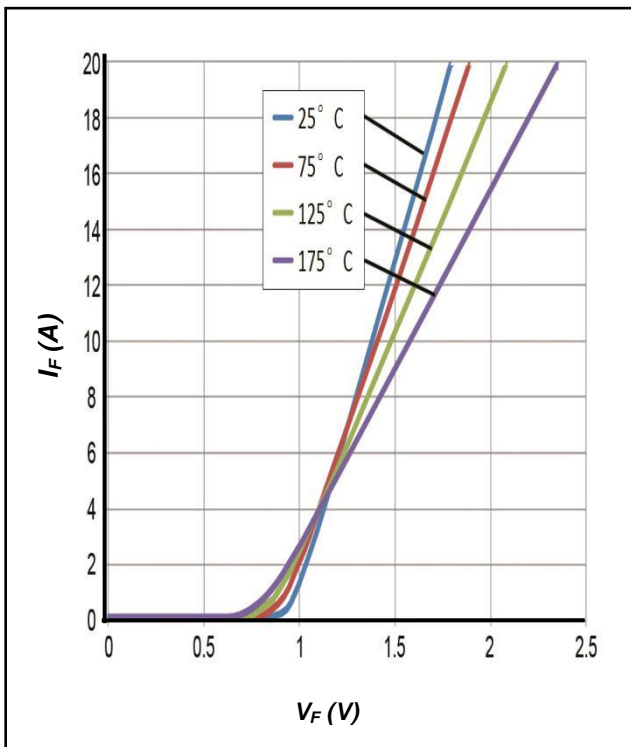


Figure 1. Forward Characteristics

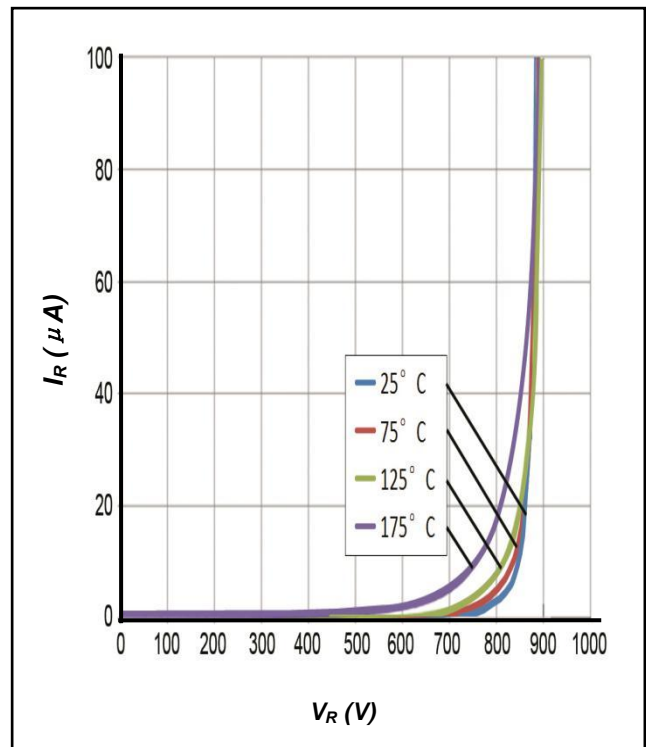


Figure 2. Reverse Characteristics

**Typical Performance**

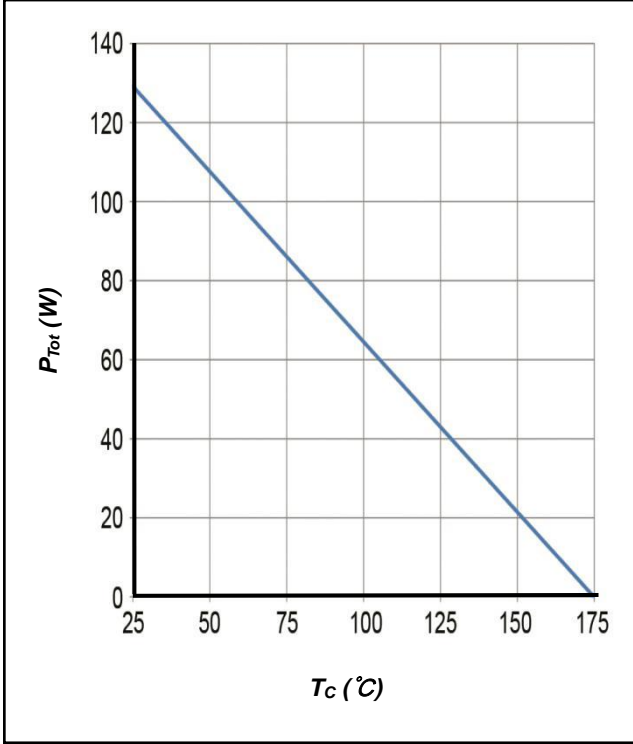


Figure 3. Power Derating

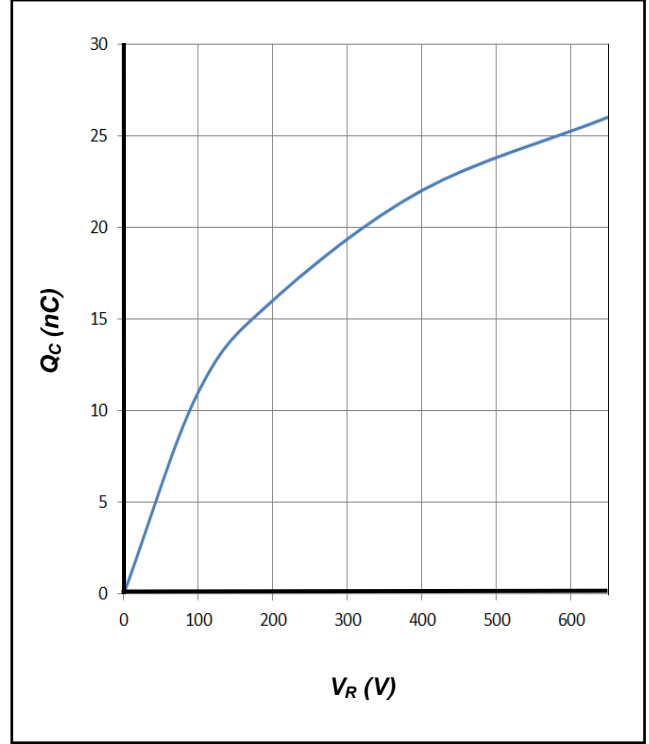


Figure 4. Total Capacitive Charge vs. Reverse Voltage

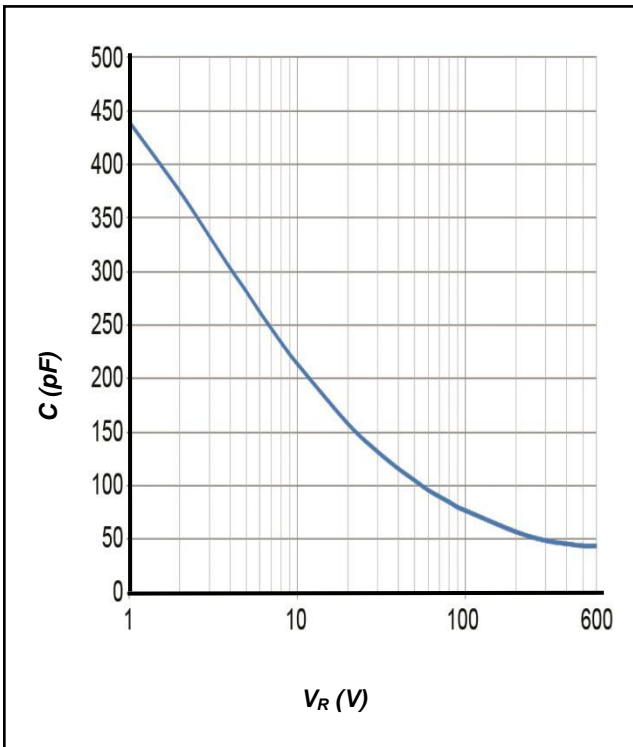


Figure 5. Total Capacitance vs. Reverse Voltage

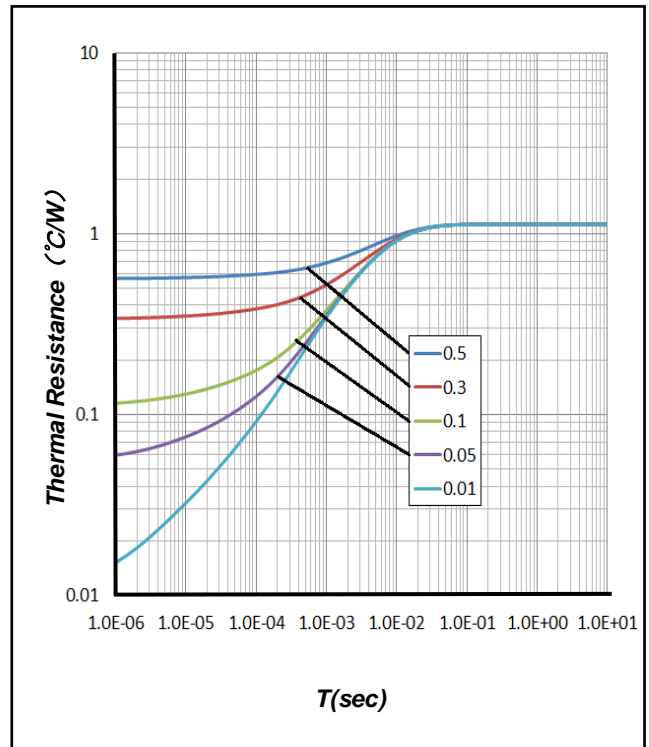
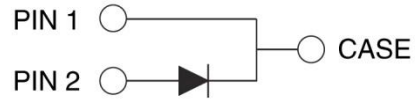
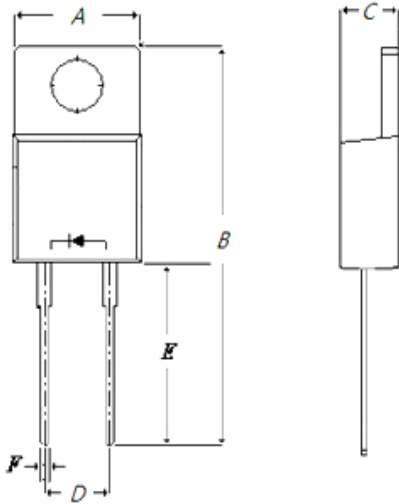


Figure 6. Transient Thermal Impedance

## Package Dimensions

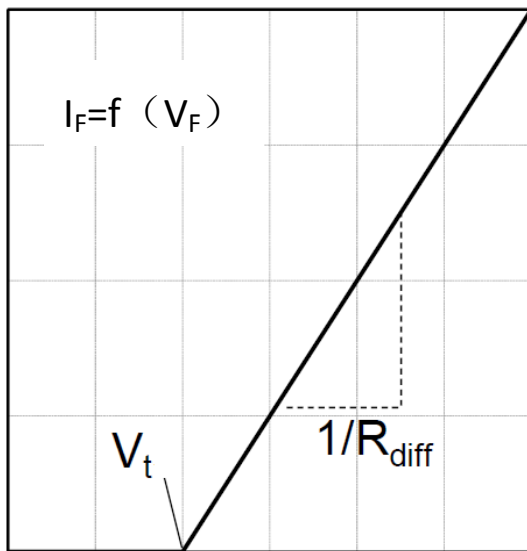
Package TO-220-2



Symbol	Min. (mm)	Typ. (mm)	Max. (mm)
A	9.17	10.08	10.91
B	27.00	28.58	30.00
C	3.89	4.50	5.00
D	4.20	5.10	5.80
E	11.70	13.30	14.97
F	0.50	0.80	1.21

## Simplified Diode Model

Equivalent IV Curve for Model



Mathematical Equation

$$V_F = V_t + I_F \times R_{diff}$$

$$V_t = -0.0011 \times T_j + 0.9701 \text{ [V]}$$

$$R_{diff} = 1 \times 10^{-6} \times T_j^2 + 9 \times 10^{-5} \times T_j + 0.0435 \text{ [\Omega]}$$

Note:

$T_j$  = Diode Junction Temperature In Degrees Celsius,  
valid from 25°C to 175°C

$I_F$  = Forward Current

Less than 20A



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