

## WS3A008065F

### Silicon Carbide Schottky Diode

$V_{RRM}$	=	650	V
$I_F (T_C \leq 128^\circ\text{C})$	=	8	A
$Q_C$	=	22	nC

#### Features

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

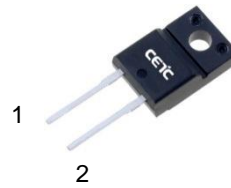
#### Benefits

- 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-220FM



Part Number	Package	Marking
WS3A008065F	TO-220FM	WS3A008065F

#### Maximum Ratings

Symbol	Parameter	Value	Unit	Test Conditions	Note
$V_{RRM}$	Repetitive Peak Reverse Voltage	650	V	$T_C = 25^\circ\text{C}$	
$V_{RSM}$	Surge Peak Reverse Voltage	650	V	$T_C = 25^\circ\text{C}$	
$V_R$	DC Blocking Voltage	650	V	$T_C = 25^\circ\text{C}$	
$I_F$	Forward Current	20 8	A	$T_C \leq 25^\circ\text{C}$ $T_C \leq 128^\circ\text{C}$	
$I_{FSM}$	Non-Repetitive Forward Surge Current	70	A	$T_C = 25^\circ\text{C}$ , $t_p = 8.3\text{ms}$ , Half Sine Wave	
$P_{tot}$	Power Dissipation	45	W	$T_C = 25^\circ\text{C}$	Fig.3
$T_J, T_{STG}$	Operating Junction and Storage Temperature	-55 to 175	$^\circ\text{C}$		
	TO-220 Mounting Torque	1	Nm	M3 Screw	

## Electrical Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
$V_F$	Forward Voltage	1.42 1.75	1.65 2.3	V	$I_F = 8A, T_J = 25^\circ C$ $I_F = 8A, T_J = 175^\circ C$	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	520 50 41	/	pF	$V_R = 0V, T_J = 25^\circ C, f = 1MHz$ $V_R = 200V, T_J = 25^\circ C, f = 1MHz$ $V_R = 400V, T_J = 25^\circ C, f = 1MHz$	Fig.5
$Q_C$	Total Capacitive Charge	22	/	nC	$V_R = 650V, I_F = 8A$ $di/dt = 200A/\mu s, T_J = 25^\circ C$	Fig.4

## Thermal Characteristics

Symbol	Parameter	Typ.	Unit	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	3.3	$^\circ C/W$	Fig.6
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient	80	$^\circ C/W$	
$T_{sold}$	Soldering Temperature	260	$^\circ C$	

## Typical Performance

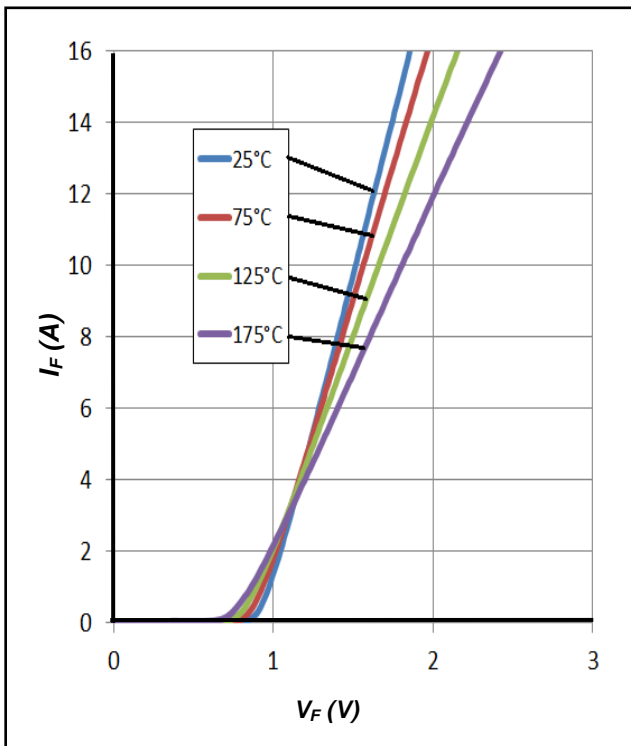


Figure 1. Forward Characteristics

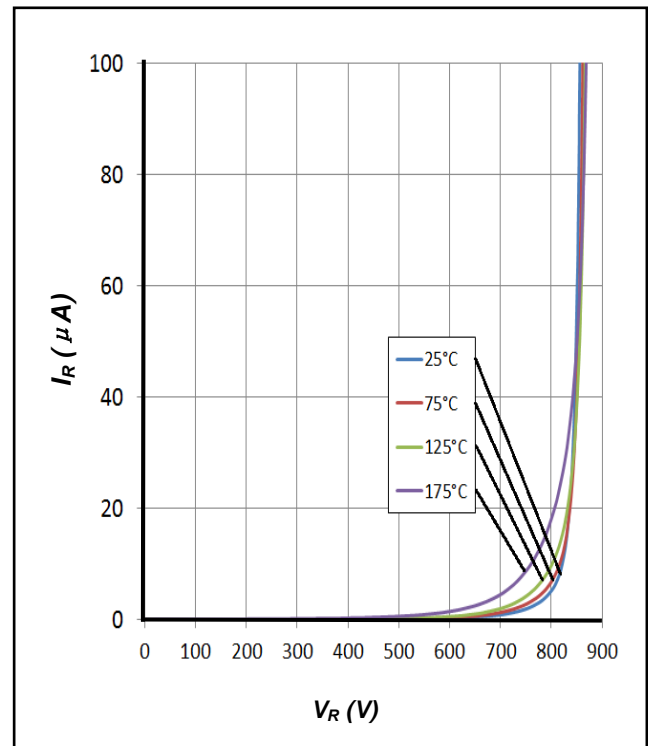


Figure 2. Reverse Characteristics

**Typical Performance**

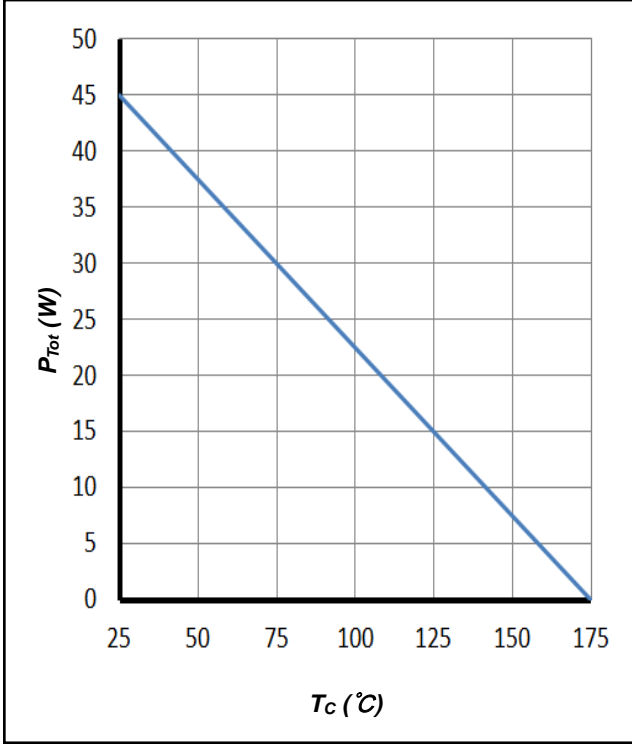


Figure 3. Power Derating

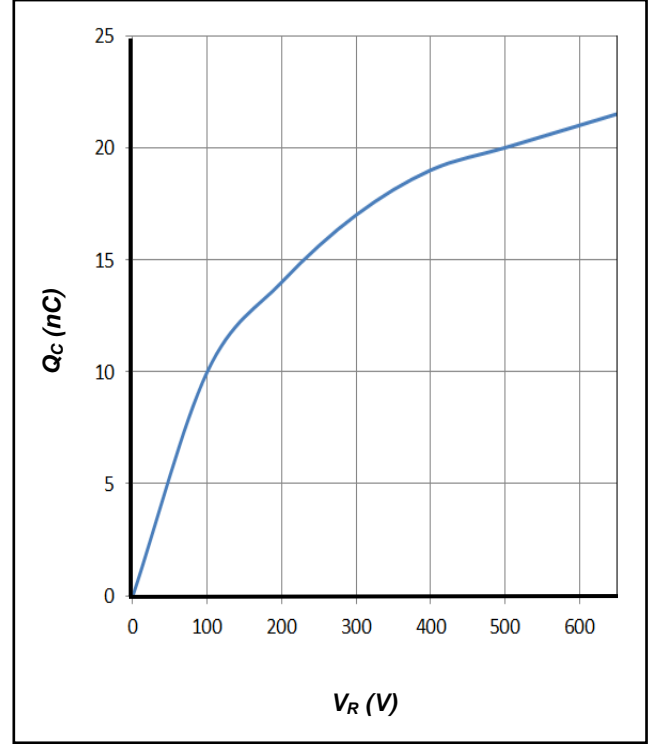


Figure 4. Total Capacitive Charge vs. Reverse Voltage

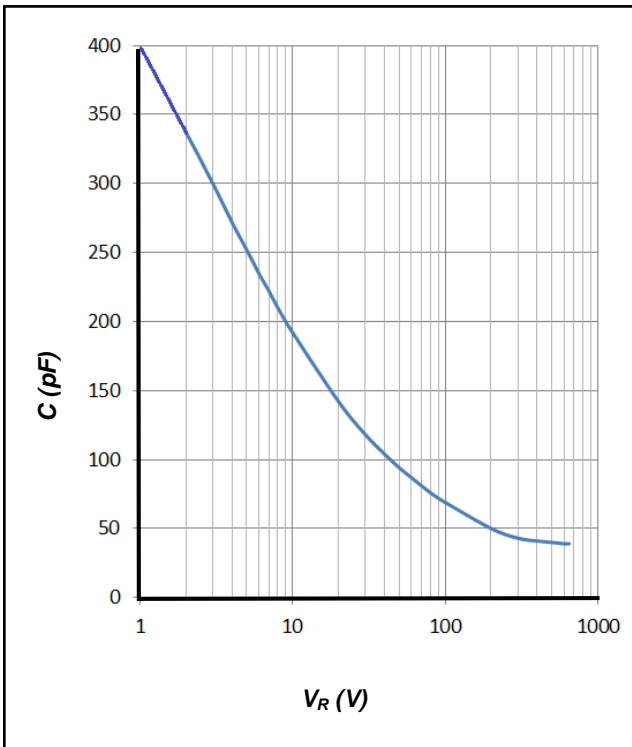


Figure 5. Total Capacitance vs. Reverse Voltage

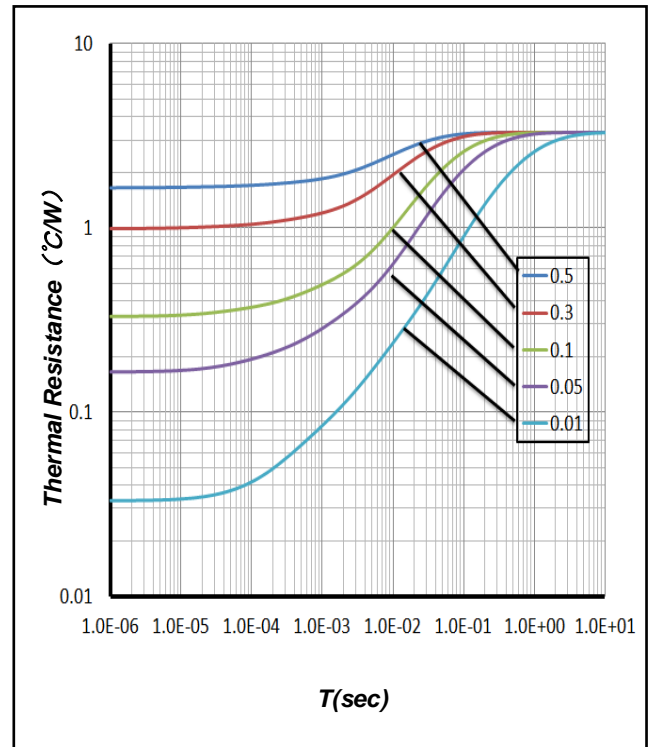
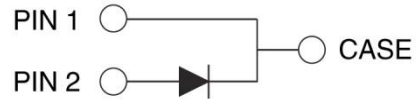
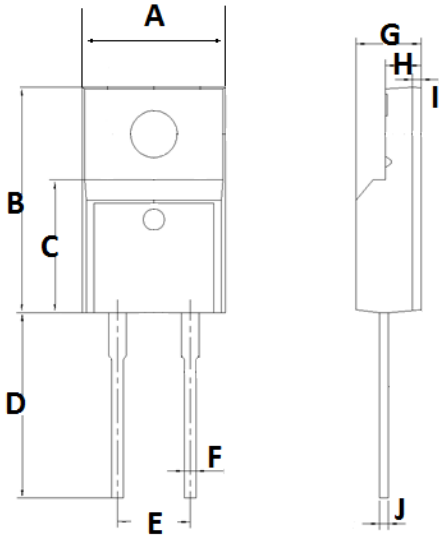


Figure 6. Transient Thermal Impedance

## Package Dimensions

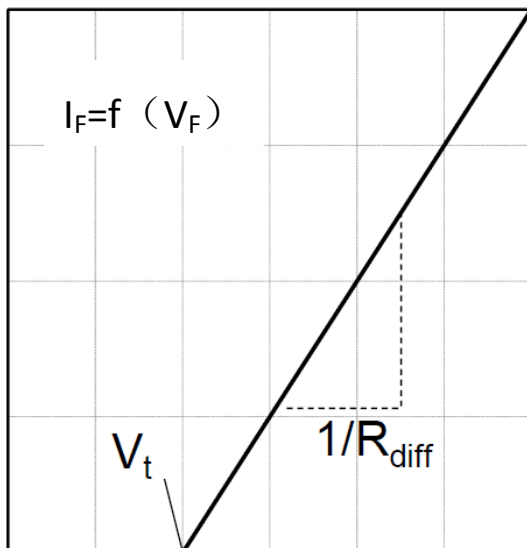
Package TO-220FM



Symbol	Min. (mm)	Typ. (mm)	Max. (mm)
A	9.90	10.10	10.30
B	15.80	16.00	16.20
C	9.10	9.30	9.50
D	12.90	13.20	13.50
E	4.70	5.00	5.30
F	0.60	0.80	1.00
G	4.55	4.75	4.95
H	2.40	2.60	2.80
I	0.40	0.60	0.80
J	0.42	0.50	0.58

## Simplified Diode Model

### Equivalent IV Curve for Model



### Mathematical Equation

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

$$V_t = -0.001 \times T_j + 0.97 \text{ [V]}$$

$$R_{diff} = 1 \times 10^{-6} \times T_j^2 + 1 \times 10^{-4} \times T_j + 0.054 \text{ [\Omega]}$$

Note:

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

$I_F$  = Forward Current

Less than 16A



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