



# WS3A006120E

## Silicon Carbide Schottky Diode

$V_{RRM}$	=	1200	V
$I_F (T_C \leq 135^\circ C)$	=	9.5	A
$Q_C$	=	20	nC

### Features

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

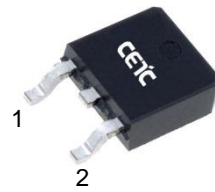
### Benefits

- 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
- AC/DC converters

### Package



TO-252



Part Number	Package	Marking
WS3A006120E	TO-252	WS3A006120E

### Maximum Ratings

Symbol	Parameter	Value	Unit	Test Conditions	Note
$V_{RRM}$	Repetitive Peak Reverse Voltage	1200	V	$T_C = 25^\circ C$	
$V_{RSM}$	Surge Peak Reverse Voltage	1200	V	$T_C = 25^\circ C$	
$V_R$	DC Blocking Voltage	1200	V	$T_C = 25^\circ C$	
$I_F$	Forward Current	19 9.5 6	A	$T_C \leq 25^\circ C$ $T_C \leq 135^\circ C$ $T_C \leq 160^\circ C$	
$I_{FSM}$	Non-Repetitive Forward Surge Current	60	A	$T_C = 25^\circ C, t_p = 8.3ms, \text{Half Sine Wave}$	
$P_{tot}$	Power Dissipation	136	W	$T_C = 25^\circ C$	Fig.3
$T_C$	Maximum Case Temperature	160	$^\circ C$		
$T_J, T_{STG}$	Operating Junction and Storage Temperature	-55 to 175	$^\circ C$		

## Electrical Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
$V_F$	Forward Voltage	1.55 2.2	1.8 2.5	V	$I_F = 6A, T_J = 25^\circ C$ $I_F = 6A, T_J = 175^\circ C$	Fig.1
$I_R$	Reverse Current	2 10	20 200	$\mu A$	$V_R = 1200V, T_J = 25^\circ C$ $V_R = 1200V, T_J = 175^\circ C$	Fig.2
C	Total Capacitance	387 28 22	/	pF	$V_R = 0V, T_J = 25^\circ C, f = 1MHz$ $V_R = 400V, T_J = 25^\circ C, f = 1MHz$ $V_R = 800V, T_J = 25^\circ C, f = 1MHz$	Fig.5
$Q_C$	Total Capacitive Charge	20	/	nC	$V_R = 800V, I_F = 6A$ $di/dt = 200A/\mu s, T_J = 25^\circ C$	Fig.4

## Thermal Characteristics

Symbol	Parameter	Typ.	Unit	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	1.1	$^\circ C/W$	Fig.6
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient	80	$^\circ C/W$	
$T_{sold}$	Soldering Temperature	260	$^\circ C$	

## Typical Performance

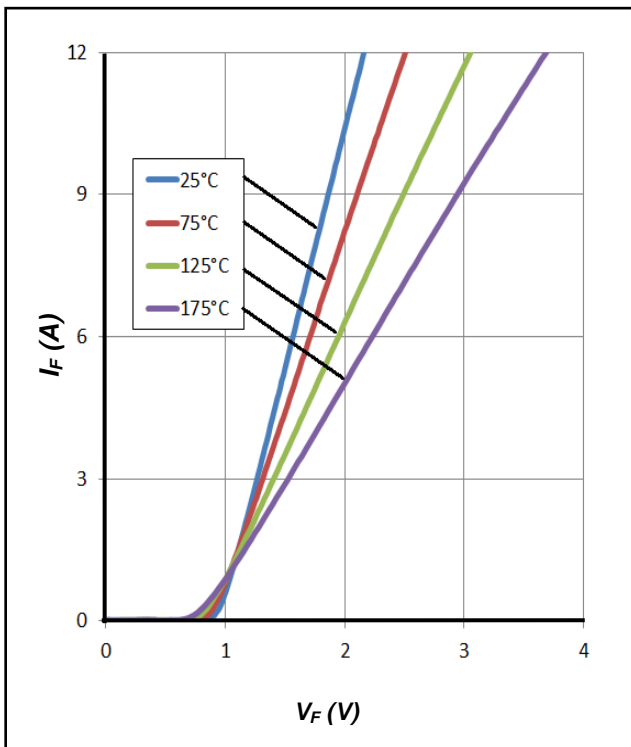


Figure 1. Forward Characteristics

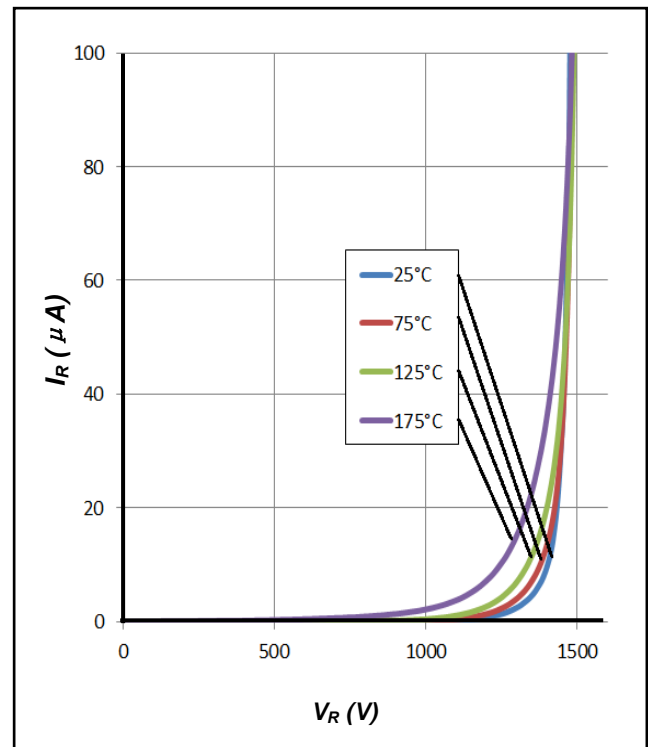


Figure 2. Reverse Characteristics

Typical Performance

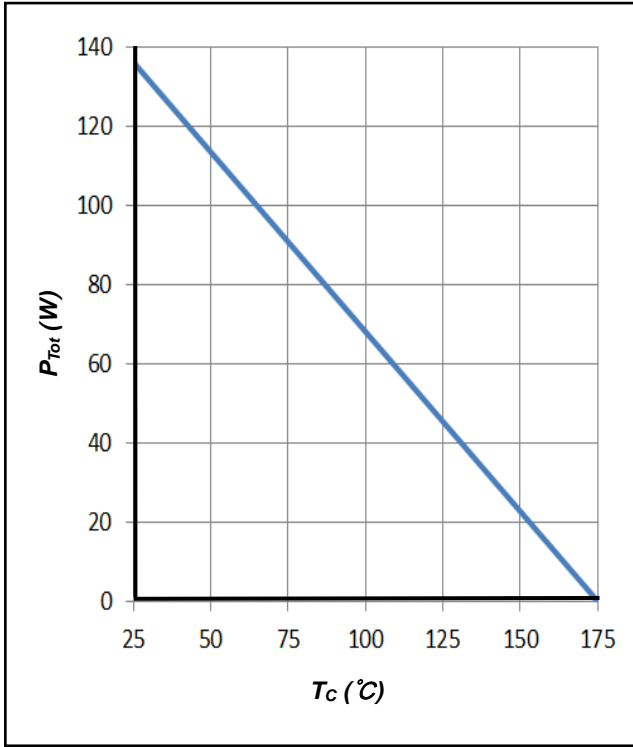


Figure 3. Power Derating

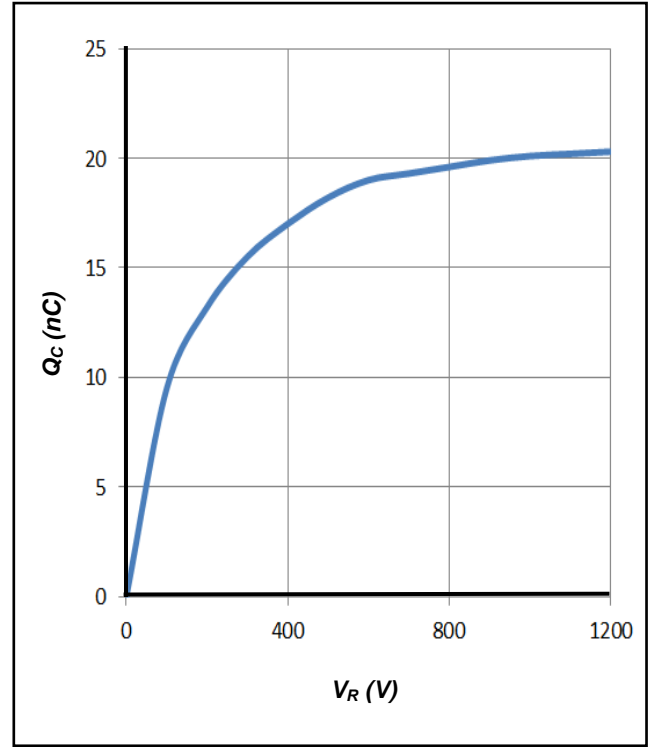


Figure 4. Total Capacitive Charge vs. Reverse Voltage

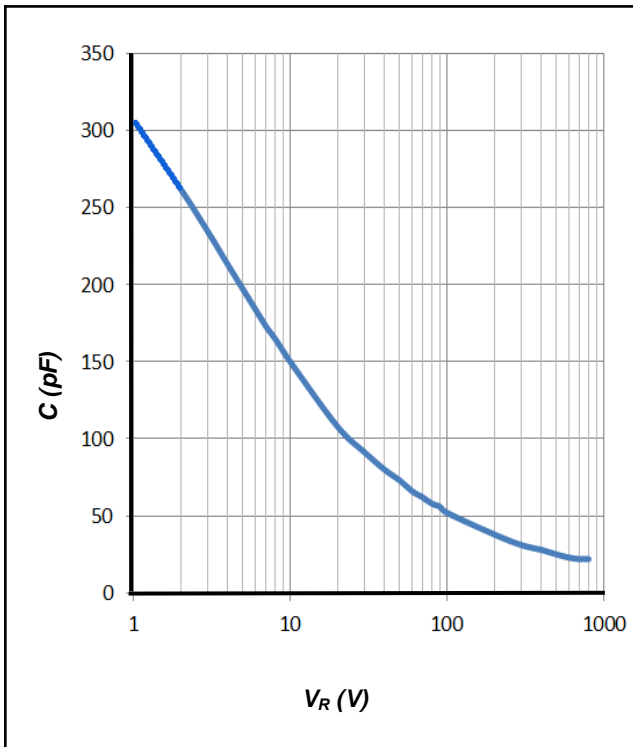


Figure 5. Total Capacitance vs. Reverse Voltage

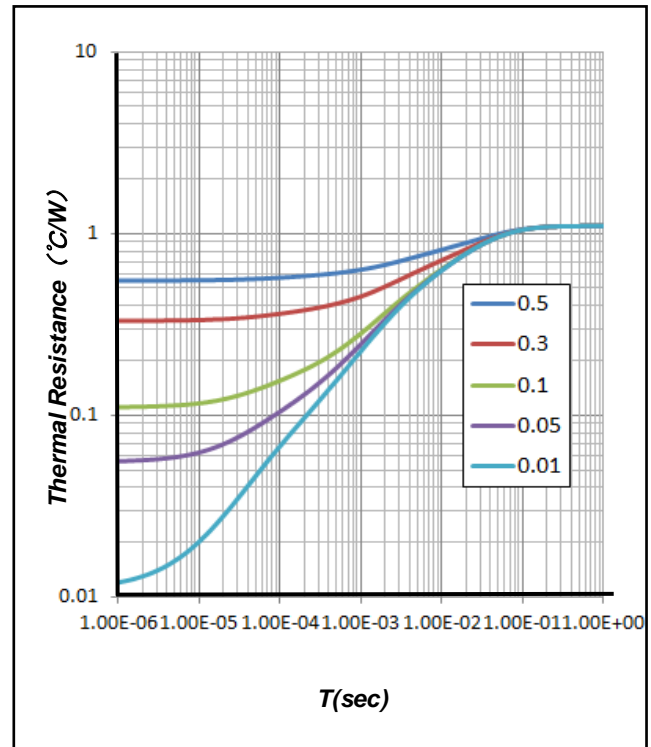
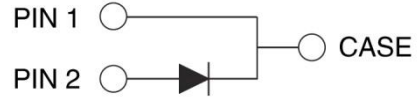
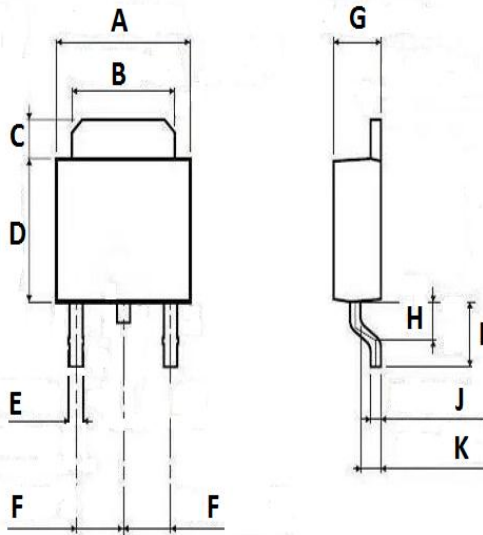


Figure 6. Transient Thermal Impedance

## Package Dimensions

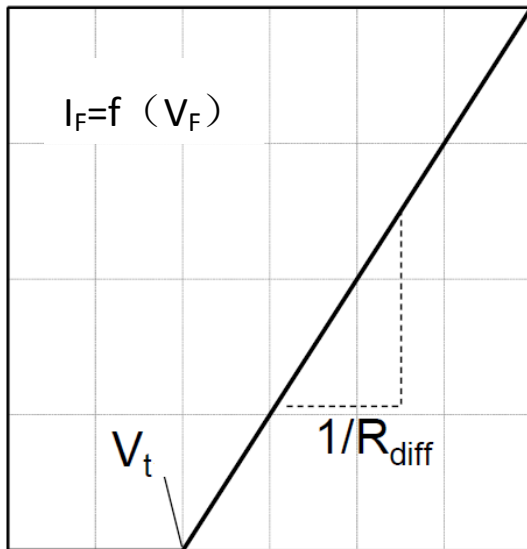
Package TO-252



Symbol	Min. (mm)	Typ. (mm)	Max. (mm)
A	6.3	6.5	6.7
B	5.2	5.3	5.4
C	1.15	1.25	1.35
D	5.7	5.9	6.1
E	0.65	0.7	0.75
F	2.1	2.3	2.5
G	2.2	2.3	2.4
H	1.45	1.5	1.55
I	2.9	3.0	3.1
J	0.45	0.5	0.55
K	0.9	1	1.1

## Simplified Diode Model

Equivalent IV Curve for Model



Mathematical Equation

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

$$V_t = -0.0011 \times T_j + 1 \text{ [V]}$$

$$R_{diff} = 2.3 \times 10^{-6} \times T_j^2 + 4.7 \times 10^{-4} \times T_j + 0.086 \text{ [\Omega]}$$

Note:

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

$I_F$  = Forward Current

Less than 12A



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