



## WS3A015120E

### Silicon Carbide Schottky Diode

$V_{RRM}$	=	1200	V
$I_F (T_C \leq 135^\circ\text{C})$	=	17	A
$Q_C$	=	43	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



Part Number	Package	Marking
WS3A015120E	TO-252	WS3A015120E

#### Maximum Ratings

Symbol	Parameter	Value	Unit	Test Conditions	Note
$V_{RRM}$	Repetitive Peak Reverse Voltage	1200	V	$T_C = 25^\circ\text{C}$	
$V_{RSM}$	Surge Peak Reverse Voltage	1200	V	$T_C = 25^\circ\text{C}$	
$V_R$	DC Blocking Voltage	1200	V	$T_C = 25^\circ\text{C}$	
$I_F$	Forward Current	36 17 15	A	$T_C \leq 25^\circ\text{C}$ $T_C \leq 135^\circ\text{C}$ $T_C \leq 143^\circ\text{C}$	
$I_{FSM}$	Non-Repetitive Forward Surge Current	135	A	$T_C = 25^\circ\text{C}$ , $t_p = 8.3\text{ms}$ , Half Sine Wave	
$P_{tot}$	Power Dissipation	161	W	$T_C = 25^\circ\text{C}$	Fig.3
$T_C$	Maximum Case Temperature	143	$^\circ\text{C}$		
$T_J, T_{STG}$	Operating Junction and Storage Temperature	-55 to 175	$^\circ\text{C}$		

## Electrical Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
$V_F$	Forward Voltage	1.55 2.2	1.8 2.5	V	$I_F = 15A, T_J = 25^\circ C$ $I_F = 15A, T_J = 175^\circ C$	Fig.1
$I_R$	Reverse Current	5 20	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	940 70 57	/	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	43	/	nC	$V_R = 800V, I_F = 15A$ $di/dt = 200A/\mu s, T_J = 25^\circ C$	Fig.4

## Thermal Characteristics

Symbol	Parameter	Typ.	Unit	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	0.93	$^\circ C/W$	Fig.6
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient	80	$^\circ C/W$	
$T_{sold}$	Soldering Temperature	260	$^\circ C$	

## Typical Performance

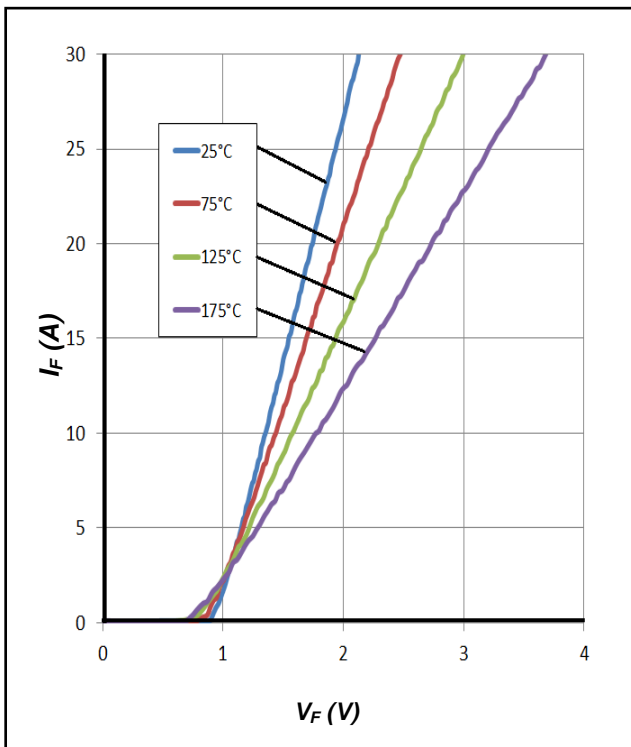


Figure 1. Forward Characteristics

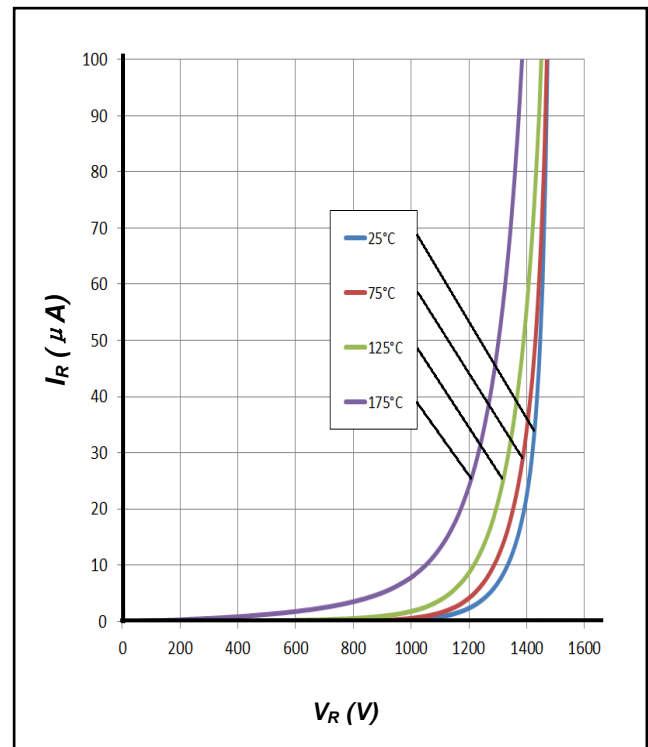


Figure 2. Reverse Characteristics

**Typical Performance**

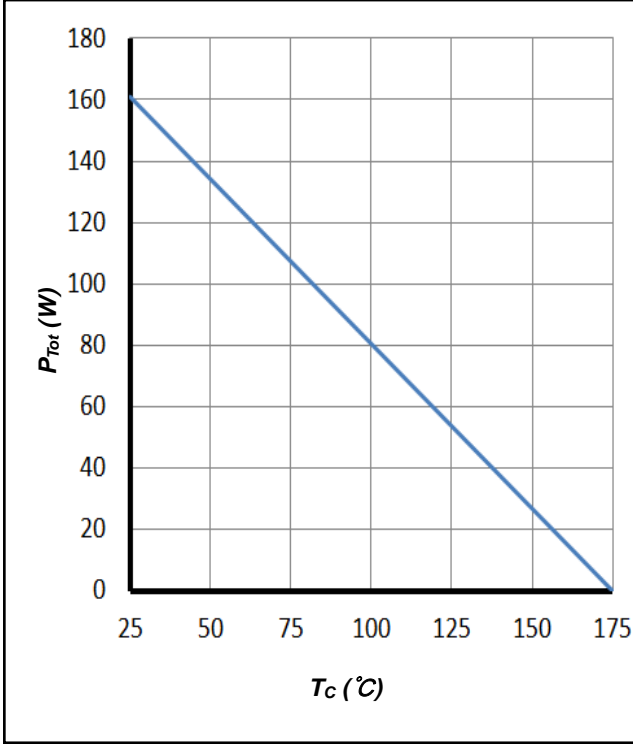


Figure 3. Power Derating

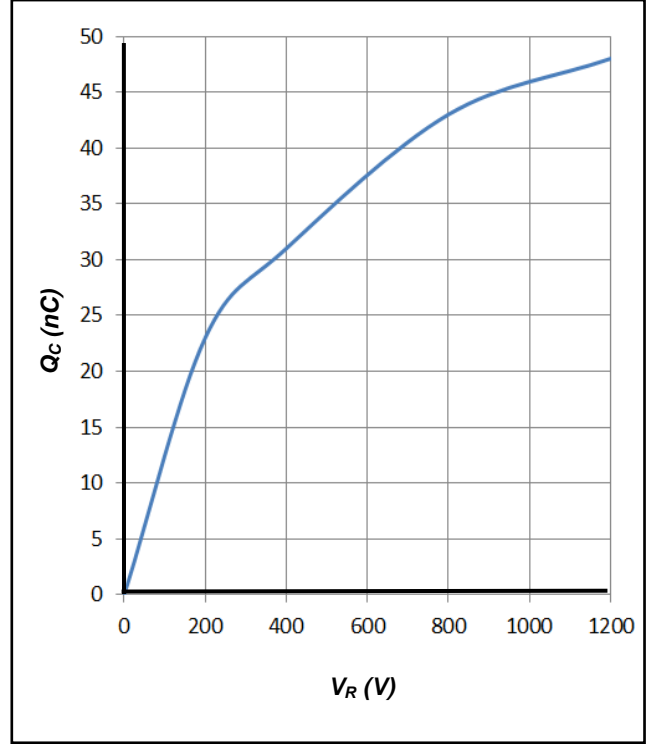


Figure 4. Total Capacitive Charge vs. Reverse Voltage

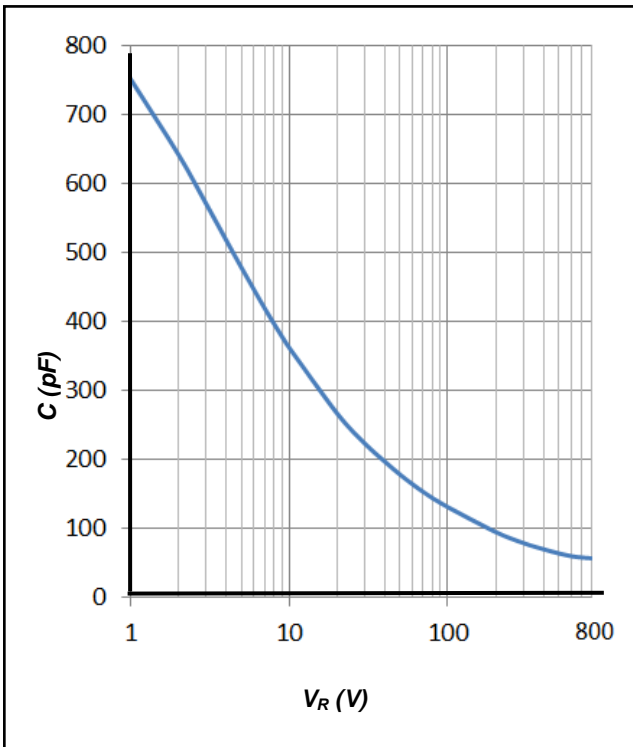


Figure 5. Total Capacitance vs. Reverse Voltage

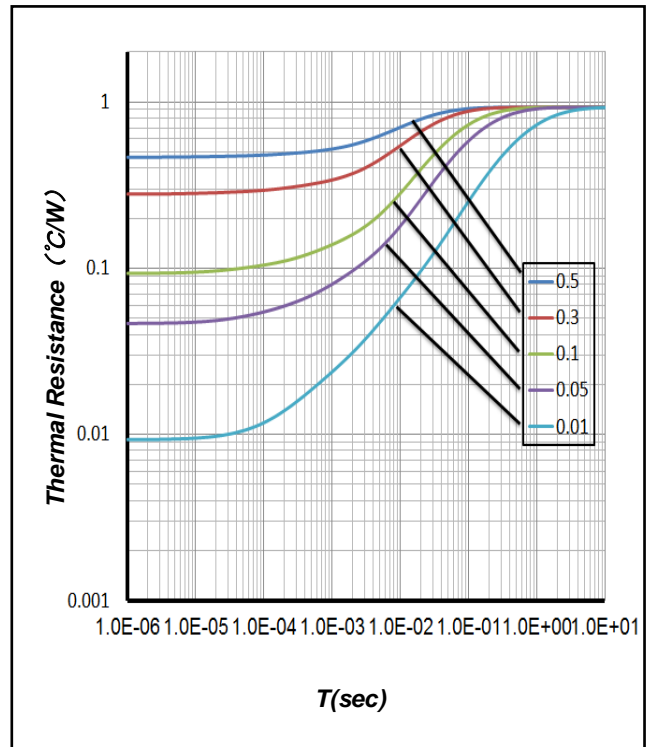
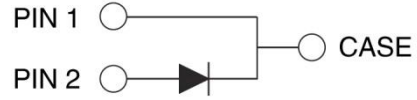
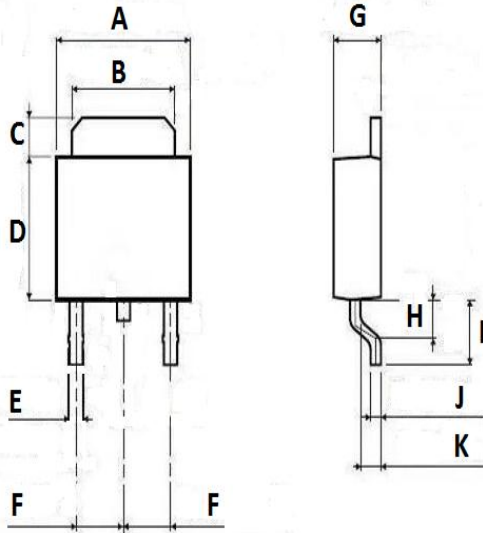


Figure 6. Transient Thermal Impedance

## Package Dimensions

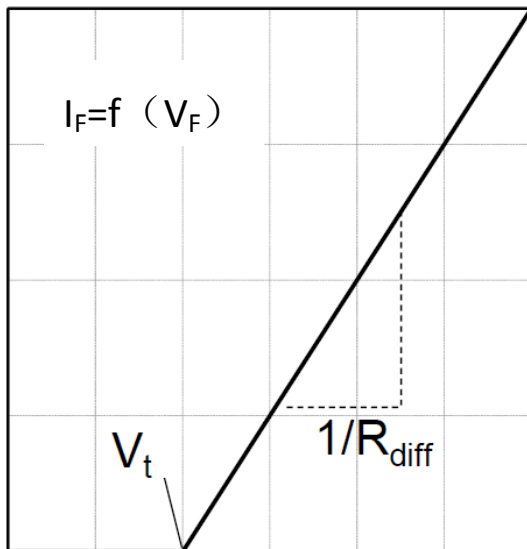
Package TO-252



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

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

$$V_t = -0.001 \times T_j + 0.98 \text{ [V]}$$

$$R_{diff} = 1 \times 10^{-6} \times T_j^2 + 1 \times 10^{-4} \times T_j + 0.035 \text{ [\Omega]}$$

Note:

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

$I_F$  = Forward Current

Less than 30A



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