

WS4A050120D

Silicon Carbide Schottky Diode

G4 MPS Technology

V_{RRM}	=	1200	V
$I_F (T_C \leq 142^\circ C)$	=	50	A
Q_C	=	196	nC

Features

- New Thin Wafer Technology
- Low Forward Voltage Drop (V_F)
- Zero Reverse Recovery Current
- Zero Forward Recovery Voltage
- Positive Temperature Coefficient on V_F
- Temperature-independent Switching

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
- Uninterruptible Power Supplies
- Motor drive, PV Inverter, Wind Power Station

Package



Part Number	Package	Marking
WS4A050120D	TO-247-2	WS4A050120D

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	50	A	$T_C \leq 142^\circ C$	
I_{FSM}	Non-Repetitive Forward Surge Current	500	A	$T_C = 25^\circ C, t_p = 8.3ms, \text{Half Sine Wave}$	
P_{tot}	Power Dissipation	428	W	$T_C = 25^\circ C$	Fig.3
T_J, T_{STG}	Operating Junction and Storage Temperature	-55 to 175	$^\circ C$		
T_{sold}	Soldering Temperature	260	$^\circ C$		
Md	TO-247 Mounting Torque	1	Nm	M3 Screw	

Electrical Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_F	Forward Voltage	1.40 1.90	1.65 /	V	$I_F = 50A, T_J = 25^{\circ}C$ $I_F = 50A, T_J = 175^{\circ}C$	Fig.1
I_R	Reverse Current	5 50	100 /	μA	$V_R = 1200V, T_J = 25^{\circ}C$ $V_R = 1200V, T_J = 175^{\circ}C$	Fig.2
C	Total Capacitance	6545 197 148	/	pF	$V_R = 0.1V, f = 1MHz, T_J = 25^{\circ}C$ $V_R = 400V, f = 1MHz, T_J = 25^{\circ}C$ $V_R = 800V, f = 1MHz, T_J = 25^{\circ}C$	Fig.5
Q_C	Total Capacitive Charge	196	/	nC	$V_R = 800V, I_F = 50A, T_J = 25^{\circ}C$	Fig.4

Thermal Characteristics

Symbol	Parameter	Typ.	Unit	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	0.35	$^{\circ}C/W$	Fig.6
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient	80	$^{\circ}C/W$	

Typical Performance

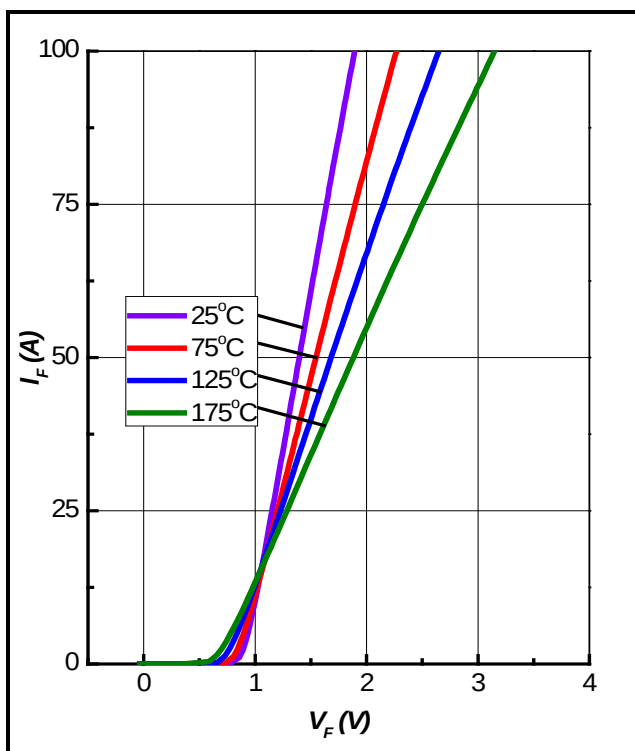


Figure 1. Forward Characteristics

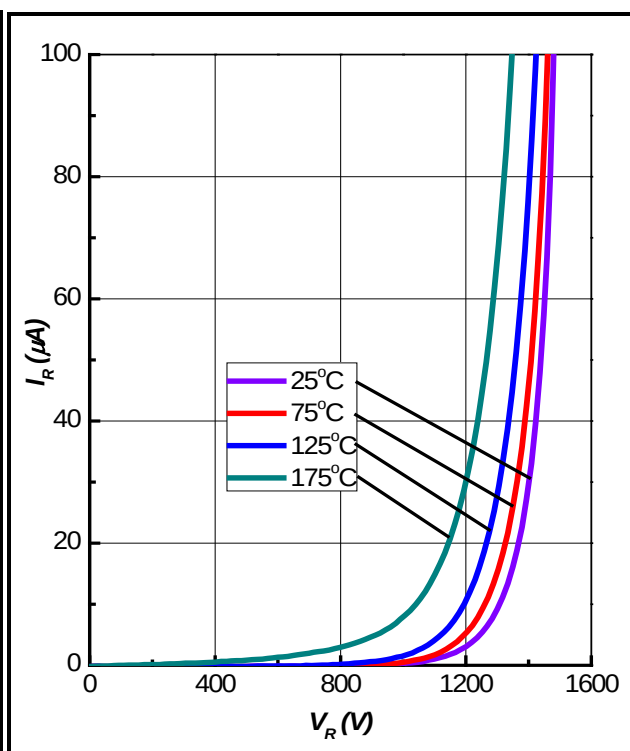


Figure 2. Reverse Characteristics

Typical Performance

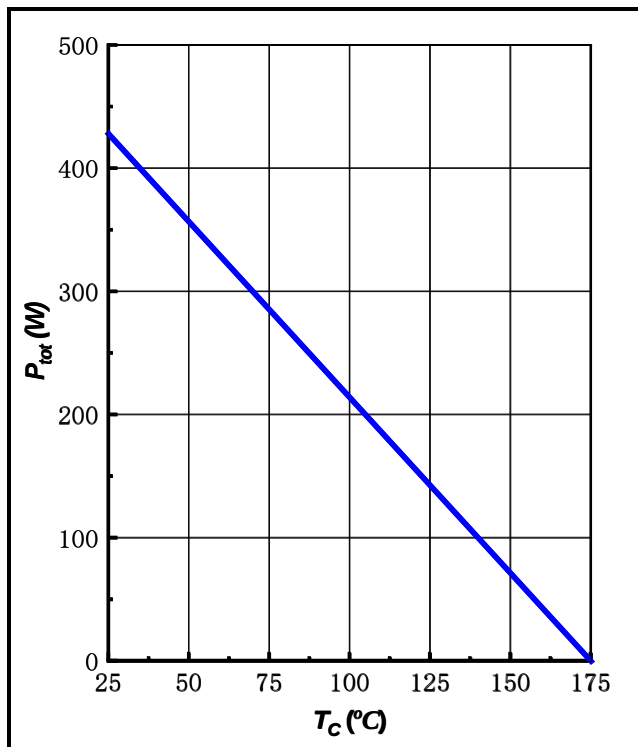


Figure 3. Power Derating

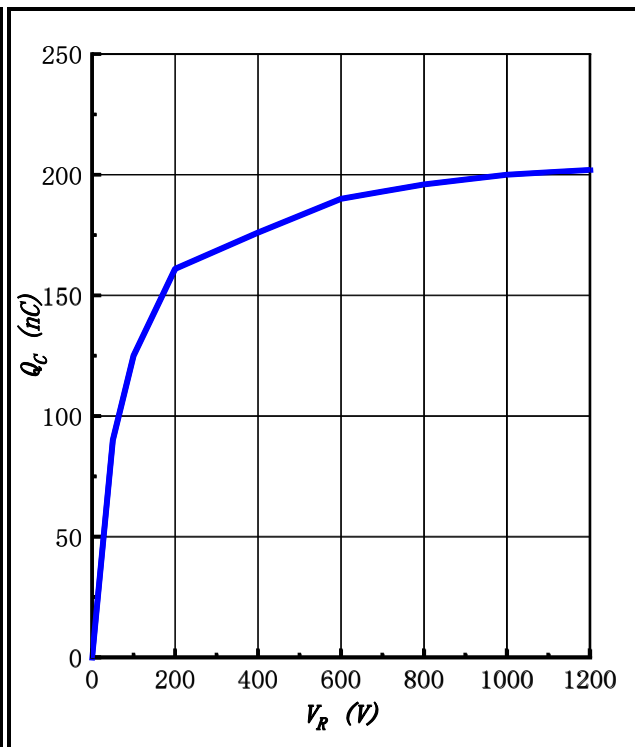


Figure 4. Total Capacitive Charge vs. Reverse Voltage

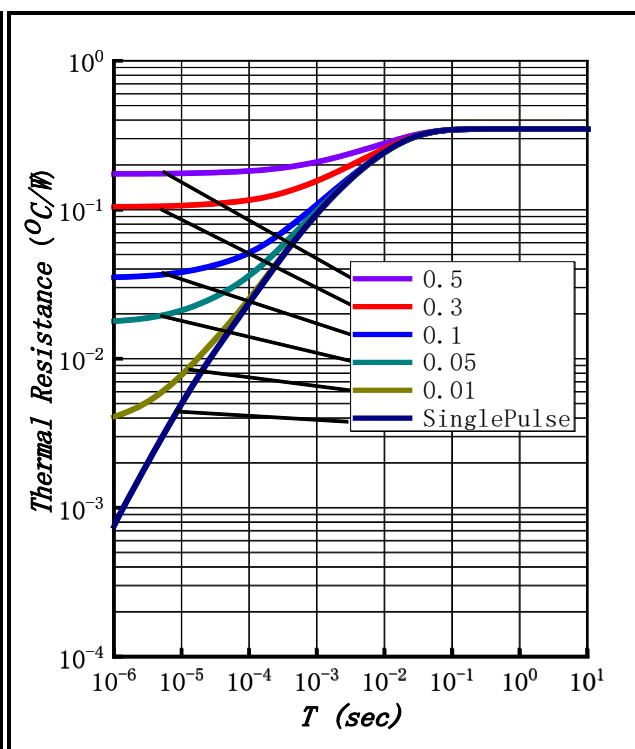
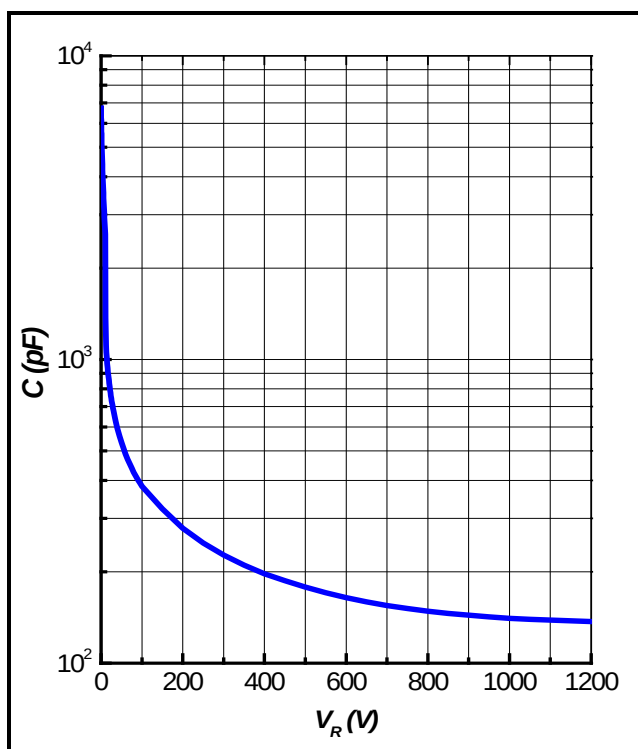
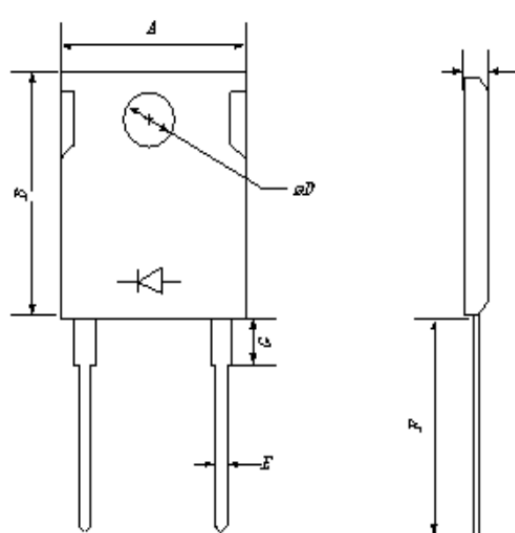


Figure 5. Total Capacitance vs. Reverse Voltage

Figure 6. Transient Thermal Impedance

Package Dimensions

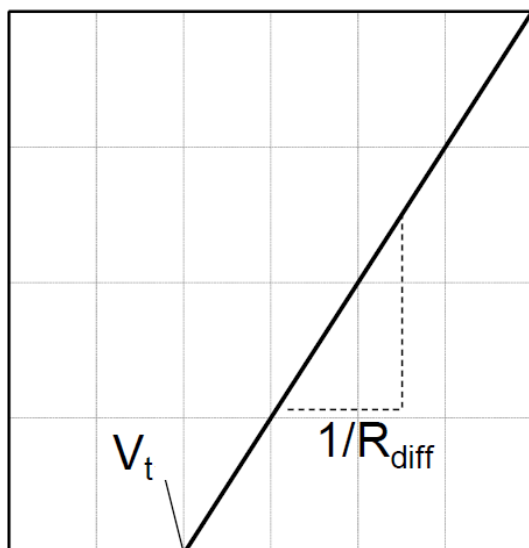
Package TO-247-2



Symbol	Min. (mm)	Typ. (mm)	Max. (mm)
A	14.18	15.75	17.33
B	18.45	20.5	22.55
C	4.50	5.00	5.50
D	3.15	3.50	3.85
E	1.08	1.20	1.32
F	18.27	20.30	22.33

Simplified Diode Model

Equivalent IV Curve for Model



Mathematical Equation

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

$$V_t = -0.002 \times T_j + 0.9775 \text{ [V]}$$

$$R_{diff} = 2 \times 10^{-7} \times T_j^2 + 6 \times 10^{-5} \times T_j + 0.0087 \text{ [\Omega]}$$

Note:

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

I_F = Forward Current

Less than 100A

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