

WS4A050065D

Silicon Carbide Schottky Diode

G4 MPS Technology

V_{RRM}	=	650	V
$I_F (T_C \leq 135^\circ\text{C})$	=	58	A
Q_C	=	110	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



TO-247-2



Part Number	Package	Marking
WS4A050065D	TO-247-2	WS4A050065D

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	58 50	A	$T_C \leq 135^\circ\text{C}$ $T_C \leq 140^\circ\text{C}$	
I_{FSM}	Non-Repetitive Forward Surge Current	350	A	$T_C = 25^\circ\text{C}$, $t_p = 8.3\text{ms}$, Half Sine Wave	
P_{tot}	Power Dissipation	288	W	$T_C = 25^\circ\text{C}$	Fig.3
T_J, T_{STG}	Operating Junction and Storage Temperature	-55 to 175	$^\circ\text{C}$		
T_{sold}	Soldering Temperature	260	$^\circ\text{C}$		
	TO-247 Mounting Torque	1	Nm	M3 Screw	

Electrical Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_F	Forward Voltage	1.3 1.4	1.5 1.7	V	$I_F = 50A, T_J = 25^{\circ}C$ $I_F = 50A, T_J = 175^{\circ}C$	Fig.1
I_R	Reverse Current	20 100	200 500	μA	$V_R = 650V, T_J = 25^{\circ}C$ $V_R = 650V, T_J = 175^{\circ}C$	Fig.2
C	Total Capacitance	2900 300 220	/	pF	$V_R = 0.1V, T_J = 25^{\circ}C, f = 1MHz$ $V_R = 200V, T_J = 25^{\circ}C, f = 1MHz$ $V_R = 400V, T_J = 25^{\circ}C, f = 1MHz$	Fig.5
Q_C	Total Capacitive Charge	110	/	nC	$V_R = 400V, I_F = 50A$ $di/dt = 200A/\mu s, T_J = 25^{\circ}C$	Fig.4

Thermal Characteristics

Symbol	Parameter	Typ.	Unit	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	0.52	$^{\circ}C/W$	Fig.6
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient	80	$^{\circ}C/W$	

Typical Performance

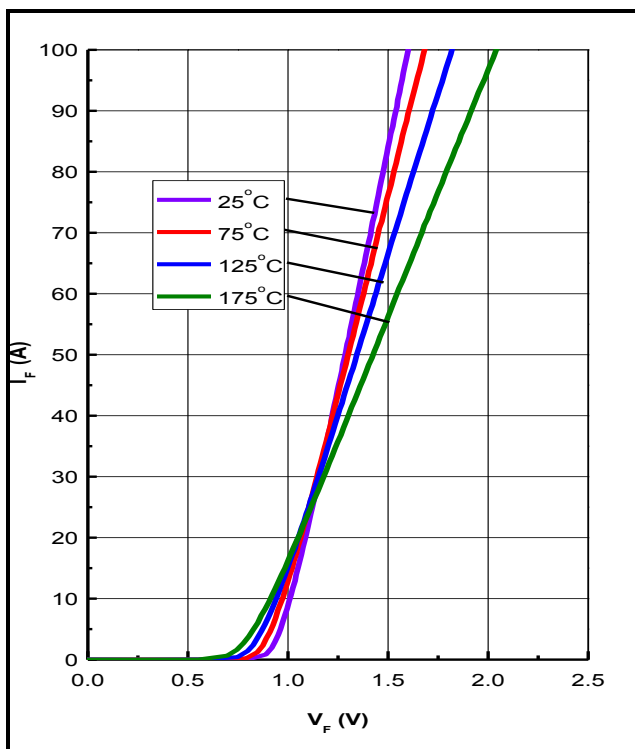


Figure 1. Forward Characteristics

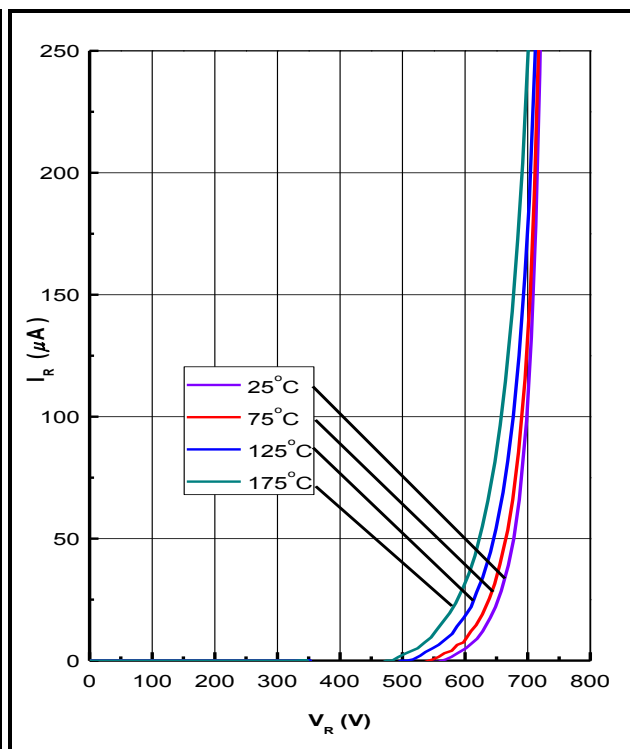


Figure 2. Reverse Characteristics

Typical Performance

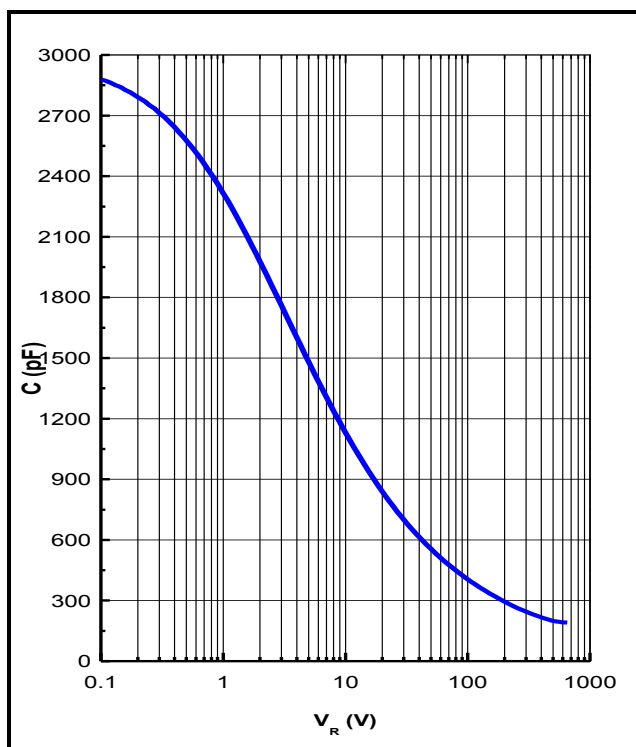


Figure 3. Total Capacitance vs. Reverse Voltage

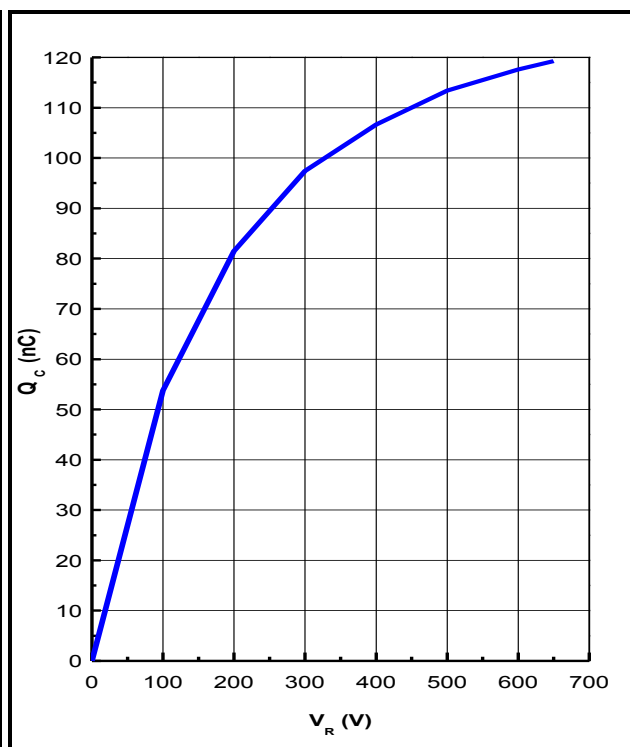
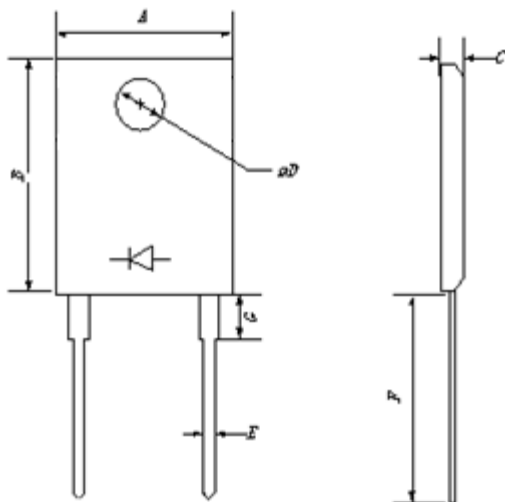


Figure 4. Total Capacitive Charge vs. Reverse Voltage

Package Dimensions

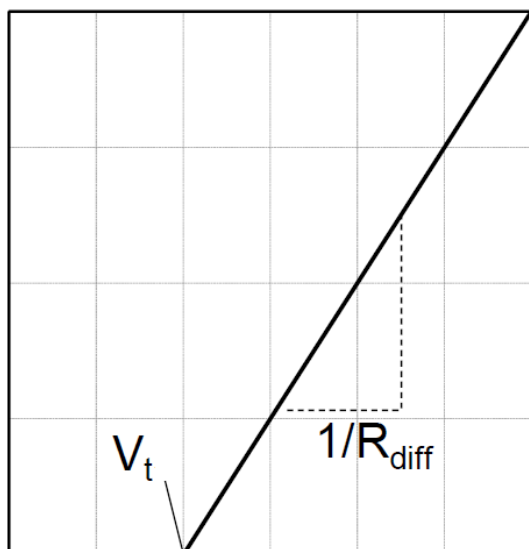
Package TO-247-2



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
G	3.80	4.10	4.40

Simplified Diode Model

Equivalent IV Curve for Model



Mathematical Equation

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

$$V_t = -0.001 \times T_j + 0.99 \text{ [V]}$$

$$R_{diff} = 2.47 \times 10^{-7} \times T_j^2 + 1.54 \times 10^{-5} \times T_j + 0.01 \text{ [\Omega]}$$

Note:

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

I_F = Forward Current

Less than 60A

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