

WS4A010120D

Silicon Carbide Schottky Diode

G4 MPS Technology

V_{RRM}	=	1200	V
$I_F (T_C \leq 130^\circ\text{C})$	=	14	A
Q_C	=	41	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
WS4A010120D	TO-247-2	WS4A010120D

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	14 10	A	$T_C \leq 135^\circ\text{C}$ $T_C \leq 155^\circ\text{C}$	
I_{FSM}	Non-Repetitive Forward Surge Current	90	A	$T_C = 25^\circ\text{C}$, $t_p = 8.3\text{ms}$, Half Sine Wave	
P_{tot}	Power Dissipation	166	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_{sld}	Soldering Temperature	260	$^\circ\text{C}$		

Electrical Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_F	Forward Voltage	1.45 2.0	1.8 2.5	V	$I_F = 10A, T_J = 25^{\circ}C$ $I_F = 10A, T_J = 175^{\circ}C$	Fig.1
I_R	Reverse Current	8 40	100 500	μA	$V_R = 1200V, T_J = 25^{\circ}C$ $V_R = 1200V, T_J = 175^{\circ}C$	Fig.2
C	Total Capacitance	700 49 41	/	pF	$V_R = 0.1V, T_J = 25^{\circ}C, f = 1MHz$ $V_R = 400V, T_J = 25^{\circ}C, f = 1MHz$ $V_R = 800V, T_J = 25^{\circ}C, f = 1MHz$	Fig.5
Q_C	Total Capacitive Charge	41	/	nC	$V_R = 800V, I_F = 10A$ $di/dt = 200A/\mu s, T_J = 25^{\circ}C$	Fig.4

Thermal Characteristics

Symbol	Parameter	Typ.	Unit	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	0.9	$^{\circ}C/W$	Fig.6
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient	80	$^{\circ}C/W$	

Typical Performance

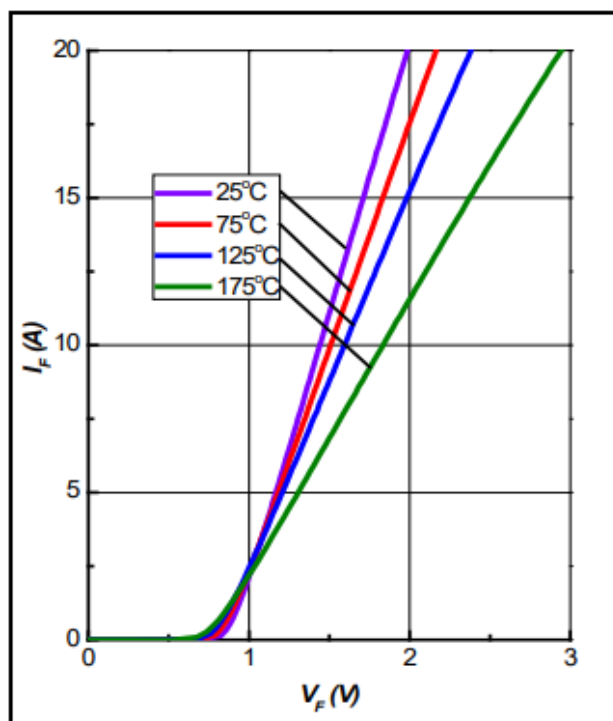


Figure 1. Forward Characteristics

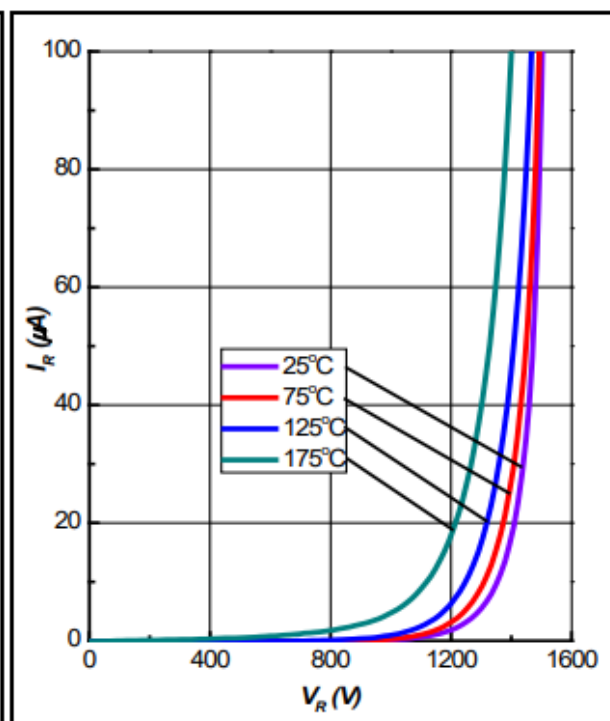


Figure 2. Reverse Characteristics

Typical Performance

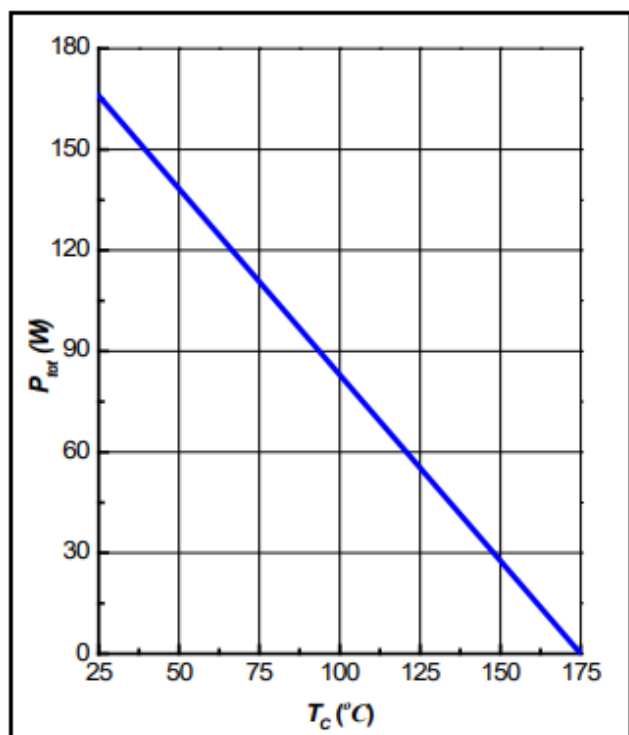


Figure 3. Power Derating

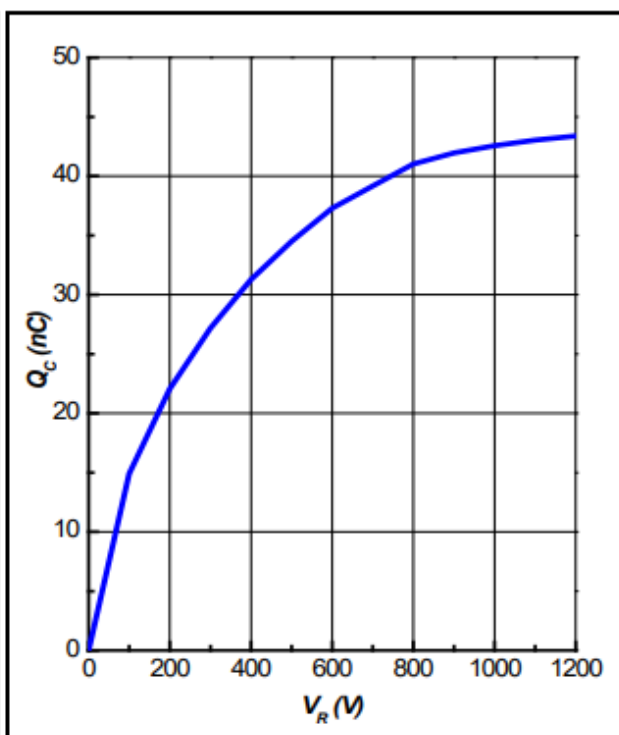


Figure 4. Total Capacitive Charge vs. Reverse Voltage

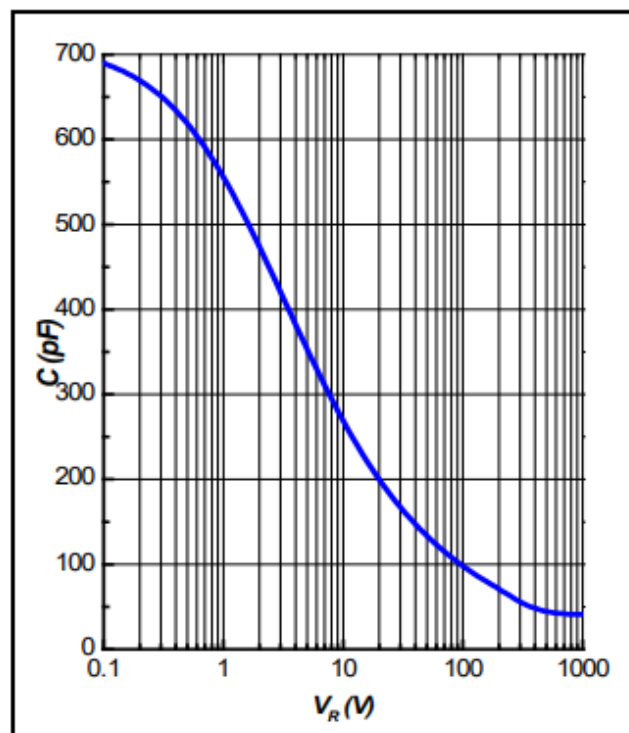


Figure 5. Total Capacitance vs. Reverse Voltage

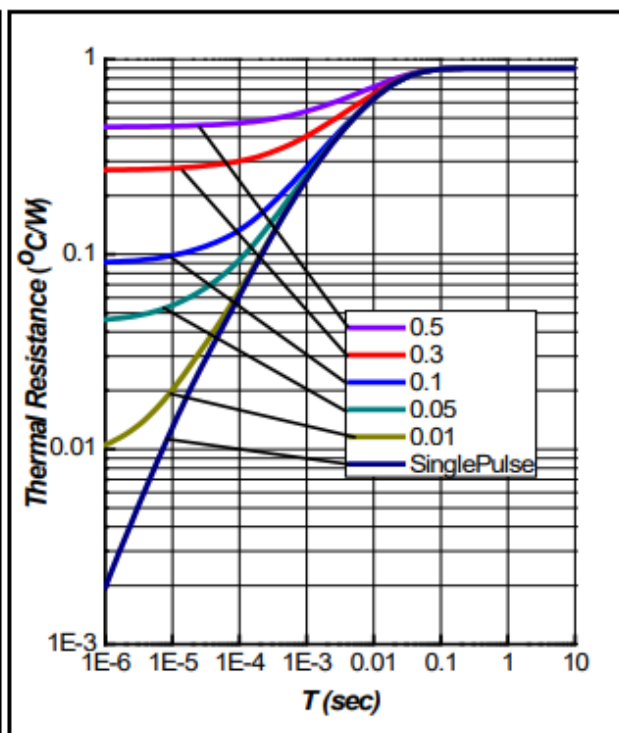
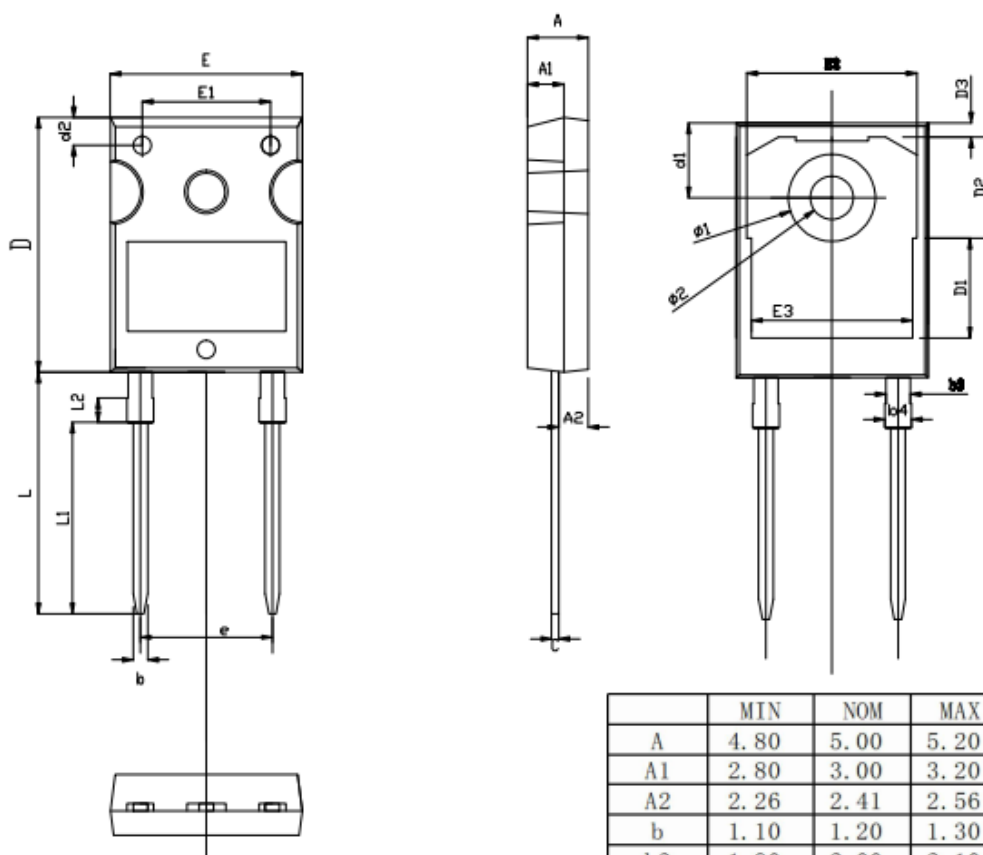


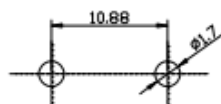
Figure 6. Transient Thermal Impedance

Package Dimensions

Package TO-247-2



RECOMMENDED LAND PATTERN

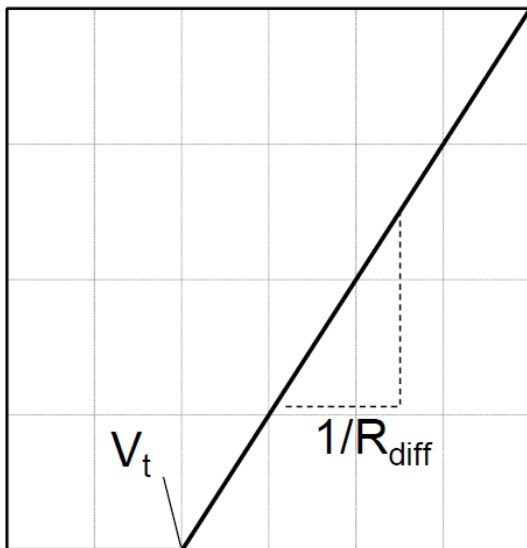


UNIT: mm

	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.80	3.00	3.20
A2	2.26	2.41	2.56
b	1.10	1.20	1.30
b3	1.90	2.00	2.10
b4	2.00	-	2.20
c	0.50	0.60	0.70
D	20.80	21.00	21.20
D1		8.23	
D2		8.32	
D3		1.17	
d1	6.00	6.15	6.30
d2	2.20	2.30	2.40
E	15.60	15.80	16.00
E1		10.50	
E2		14.02	
E3		13.50	
e		10.88	
L	19.72	19.92	20.12
L1		15.79	
L2		1.98	
ø1	7.10	7.19	7.30
ø2	3.50	3.60	3.70

Simplified Diode Model

Equivalent IV Curve for Model



Mathematical Equation

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

$$V_t = -0.00093 \times T_j + 0.98 [V]$$

$$R_{diff} = 2 \times 10^{-6} \times T_j^2 - 4.77 \times 10^{-5} \times T_j + 0.055 [\Omega]$$

Note:

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

I_F = Forward Current

Less than 20A

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