

A4G6D650NFM

650V Silicon Carbide Schottky Diode



Features

- New Thin Wafer Technology
- Low Forward Voltage Drop (VF)
- Zero Reverse Recovery Current
- Zero Forward Recovery Voltage
- Positive Temperature Coefficient on VF
- 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
- Server/Telecom Power Supplies
- Industrial Power Supplies

Product Summary

V_{DS}	650V
$I_D (T_C \leq 130^\circ\text{C})$	6A



Ordering Information

Part Number	Marking	Package	Packaging
A4G6D650NFM	A4G6D650NFM	TO-220F-2	Tube

Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	650	V
V_{RSM}	Surge Peak Reverse Voltage	650	
V_R	DC Blocking Voltage	650	
I_F	Forward Current	7.5 ($T_C \leq 110^\circ\text{C}$)	A
		6 ($T_C \leq 130^\circ\text{C}$)	
I_{FSM}	Non-Repetitive Forward Surge Current	50	A
P_{tot}	Power Dissipation	30 ($T_C = 25^\circ\text{C}$)	W
T_J, T_{stg}	Operating Junction and Storage Temperature	-55 to +175	$^\circ\text{C}$

Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise specified)

Typical Performance-Static

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	$I_F = 6\text{A}, T_J = 25^\circ\text{C}$		1.27	1.5	V
		$I_F = 6\text{A}, T_J = 175^\circ\text{C}$		1.38	1.6	V
I_R	Reverse Current	$V_R = 650\text{V}, T_J = 25^\circ\text{C}$		4	50	μA
		$V_R = 650\text{V}, T_J = 175^\circ\text{C}$		20	200	μA

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C	Total Capacitance	$V_R = 0V, T_J = 25^{\circ}C, f = 1MHz$	380	pF
		$V_R = 200V, T_J = 25^{\circ}C, f = 1MHz$	39	pF
		$V_R = 400V, T_J = 25^{\circ}C, f = 1MHz$	28	pF
Qc	Total Capacitive Charge	$V_R = 400V, I_F = 6A$ $di/dt = 200A/\mu s, T_J = 25^{\circ}C$	17	nC

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	5.0	$^{\circ}C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	80	$^{\circ}C/W$
T_{solder}	Soldering Temperature	260	$^{\circ}C$

Typical Performance

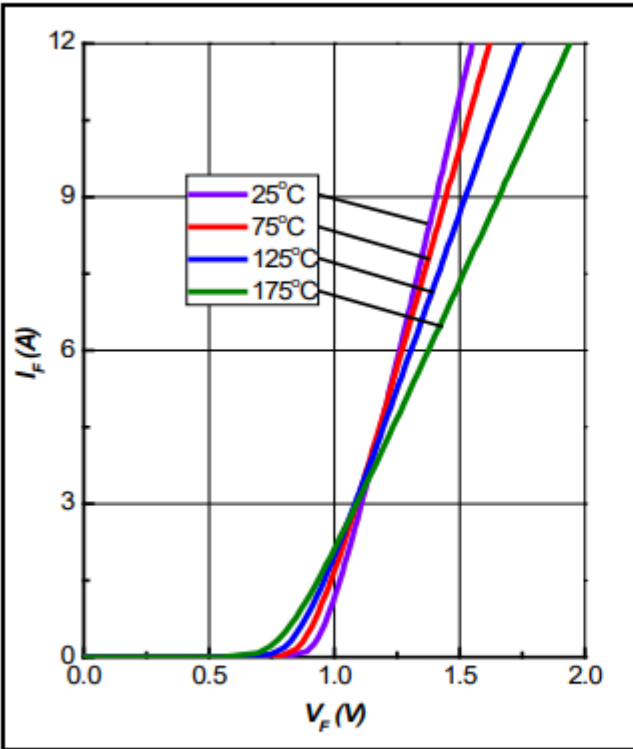


Figure 1. Forward Characteristics

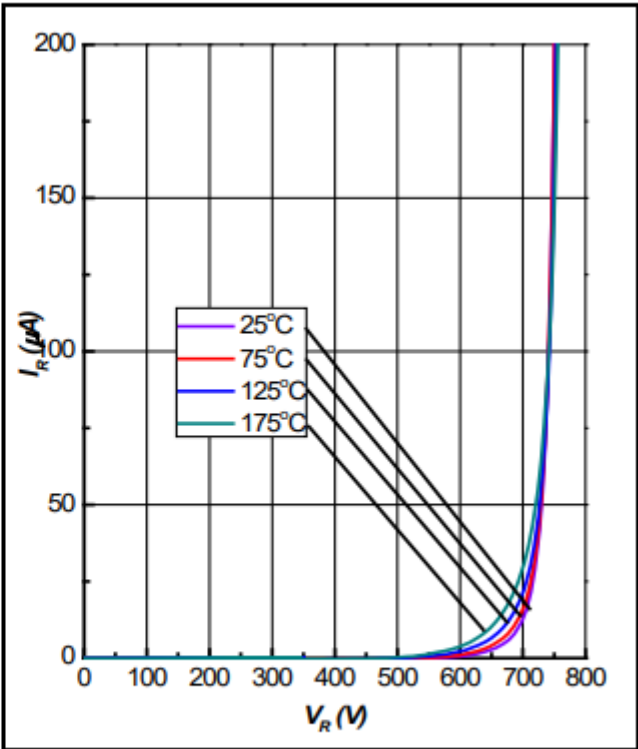


Figure 2. Reverse Characteristics

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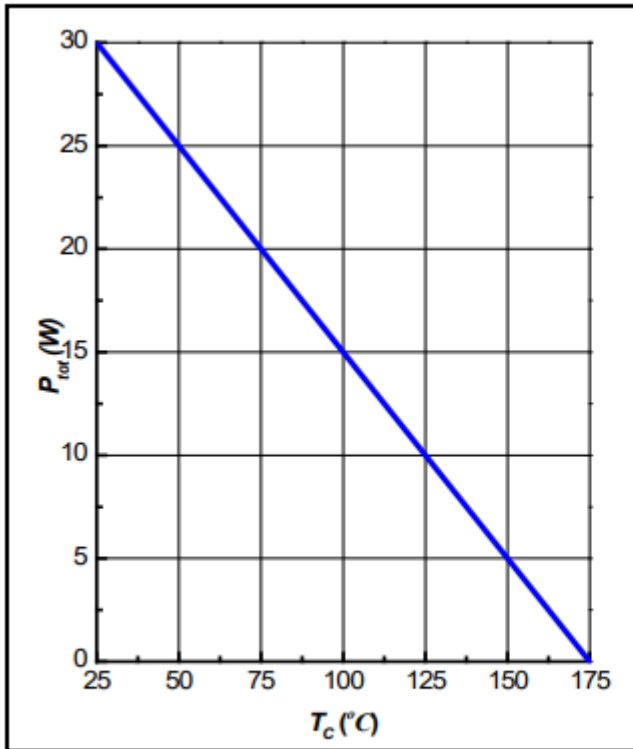


Figure 3. Power Derating

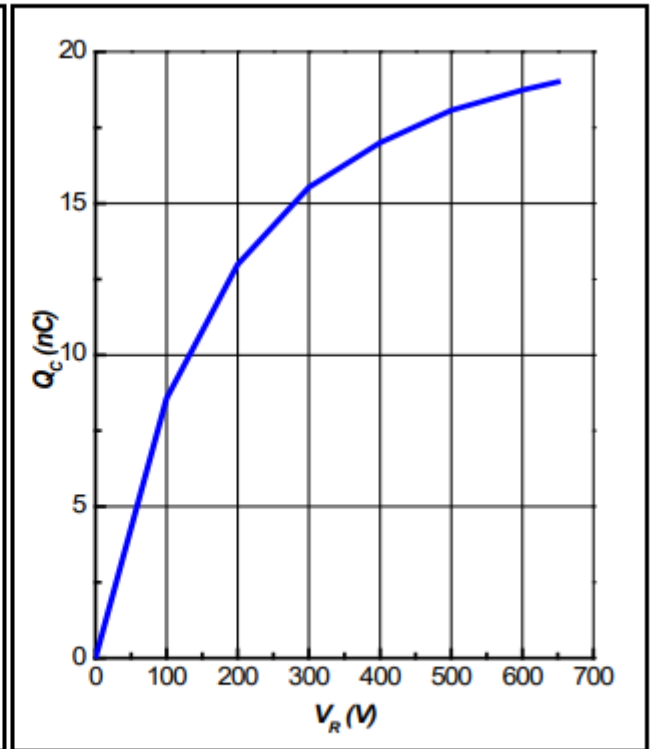


Figure 4. Total Capacitive Charge vs. Reverse Voltage

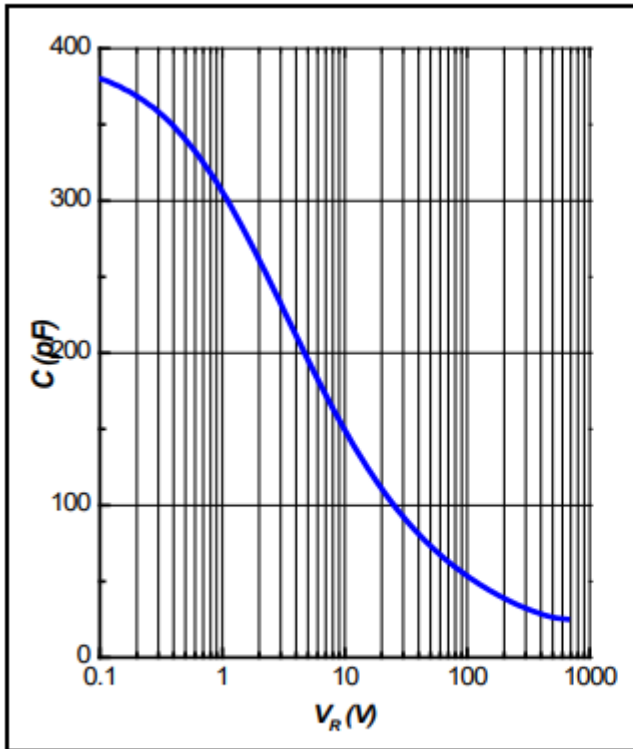


Figure 5. Total Capacitance vs. Reverse Voltage

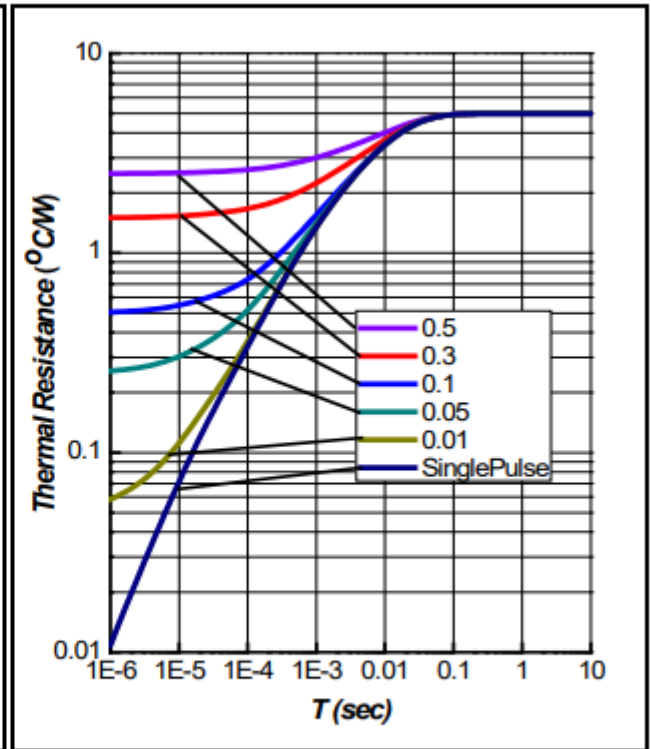
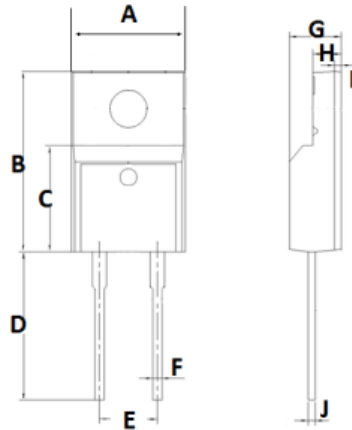


Figure 6. Transient Thermal Impedance

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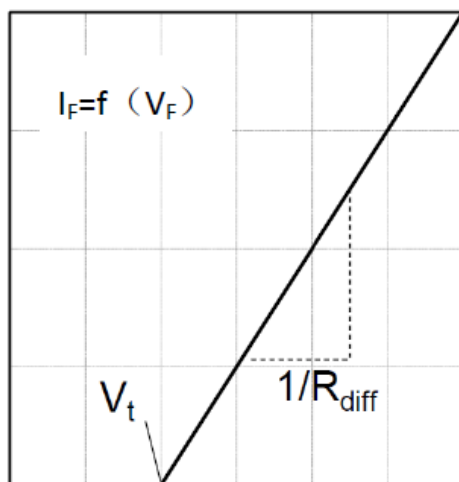
Package Drawing



Symbol	Min. (mm)	Typ. (mm)	Max. (mm)
A	9.17	10.08	10.91
B	27.00	28.58	30.00
C	3.89	4.50	5.00
D	4.20	5.10	5.80
E	11.70	13.30	14.97
F	0.50	0.80	1.21
G	4.55	4.75	4.95
H	2.40	2.60	2.80
I	0.40	0.60	0.80
J	0.42	0.50	0.58

Simplified Diode Model

Equivalent IV Curve for Model



Mathematical Equation

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

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

$$R_{diff} = 1.2 \times 10^{-6} \times T_j^2 + 7.2 \times 10^{-5} \times T_j + 0.46 \text{ [}\Omega\text{]}$$

Note:

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

I_F = Forward Current

Less than 12A

Revision version	Description	Date
1	Initial	08.2025