

# A4G10D650NFM

## 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 |
| $I_D (T_C \leq 130^\circ\text{C})$ | 10A  |



### Ordering Information

| Part Number  | Marking      | Package   | Packaging |
|--------------|--------------|-----------|-----------|
| A4G10D650NFM | A4G10D650NFM | 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                            | 10 ( $T_C \leq 130^\circ\text{C}$ ) | A                |
|                |                                            | 9 ( $T_C \leq 135^\circ\text{C}$ )  |                  |
| $I_{FSM}$      | Non-Repetitive Forward Surge Current       | 86                                  | A                |
| $P_{tot}$      | Power Dissipation                          | 150 ( $T_C = 25^\circ\text{C}$ )    | 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   | $I_F = 10\text{A}, T_J = 25^\circ\text{C}$                 |      | 1.27 | 1.5  | V             |
|        |                   | $I_F = 10\text{A}, T_J = 175^\circ\text{C}$                |      | 1.38 | 1.6  | V             |
| $I_R$  | Reverse Current   | $V_R = 650\text{V}, T_J = 25^\circ\text{C}$                |      | 6    | 50   | $\mu\text{A}$ |
|        |                   | $V_R = 650\text{V}, T_J = 175^\circ\text{C}$               |      | 25   | 200  | $\mu\text{A}$ |
| C      | Total Capacitance | $V_R = 0\text{V}, T_J = 25^\circ\text{C}, f = 1\text{MHz}$ |      | 640  |      | pF            |

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|       |                         |                                                                    |  |    |  |    |
|-------|-------------------------|--------------------------------------------------------------------|--|----|--|----|
|       |                         | $V_R = 200V, T_J = 25^{\circ}C, f = 1MHz$                          |  | 66 |  | pF |
|       |                         | $V_R = 400V, T_J = 25^{\circ}C, f = 1MHz$                          |  | 48 |  | pF |
| $Q_C$ | Total Capacitive Charge | $V_R = 400V, I_F = 10A$<br>$di/dt = 200A/\mu s, T_J = 25^{\circ}C$ |  | 25 |  | nC |

## Thermal Characteristics

| Symbol          | Parameter                               | Value | Unit          |
|-----------------|-----------------------------------------|-------|---------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case    | 3.2   | $^{\circ}C/W$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 80    | $^{\circ}C/W$ |
| $T_{sold}$      | Soldering Temperature                   | 260   | $^{\circ}C$   |

## Typical Performance

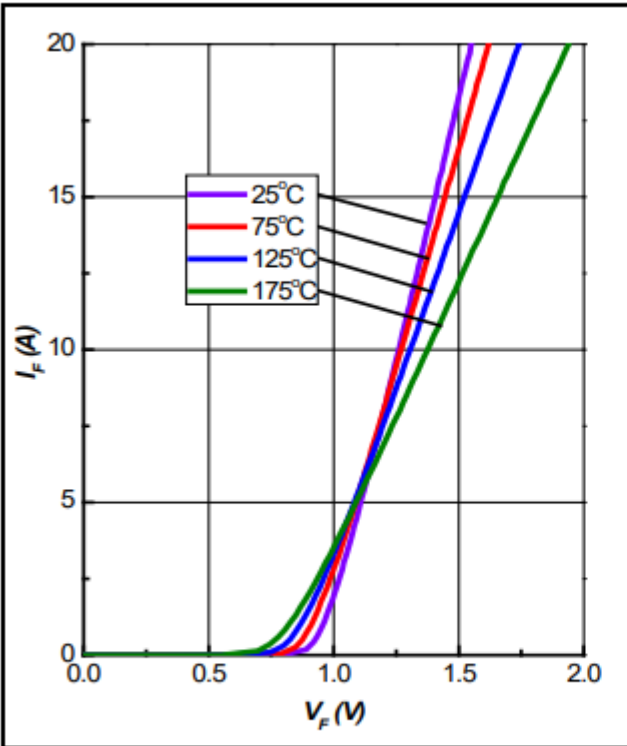


Figure 1. Forward Characteristics

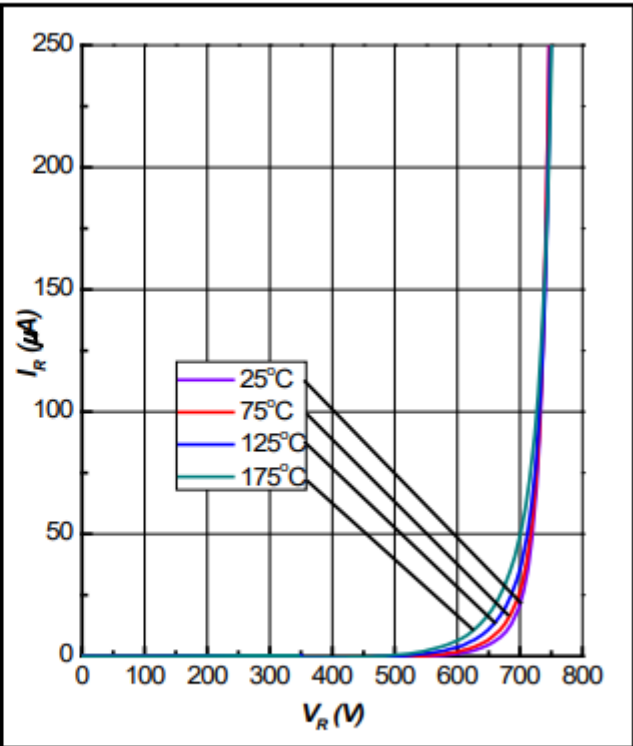


Figure 2. Reverse Characteristics

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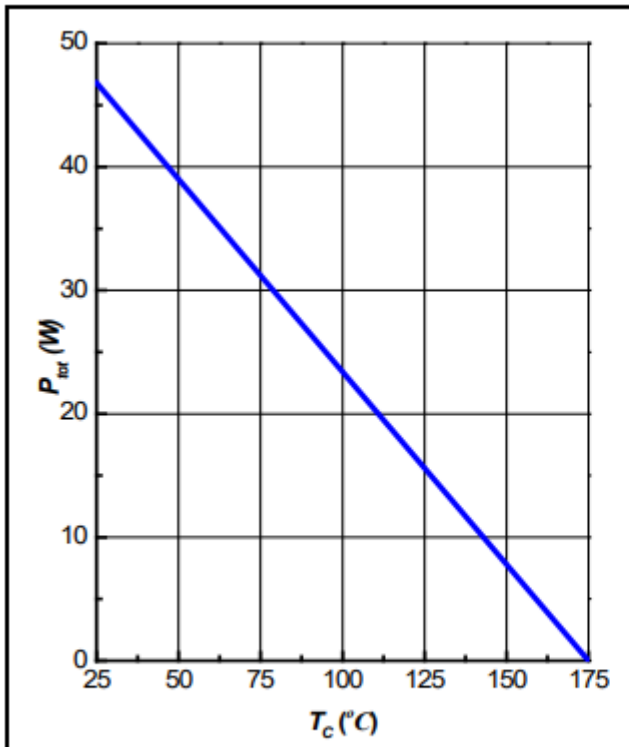


Figure 3. Power Derating

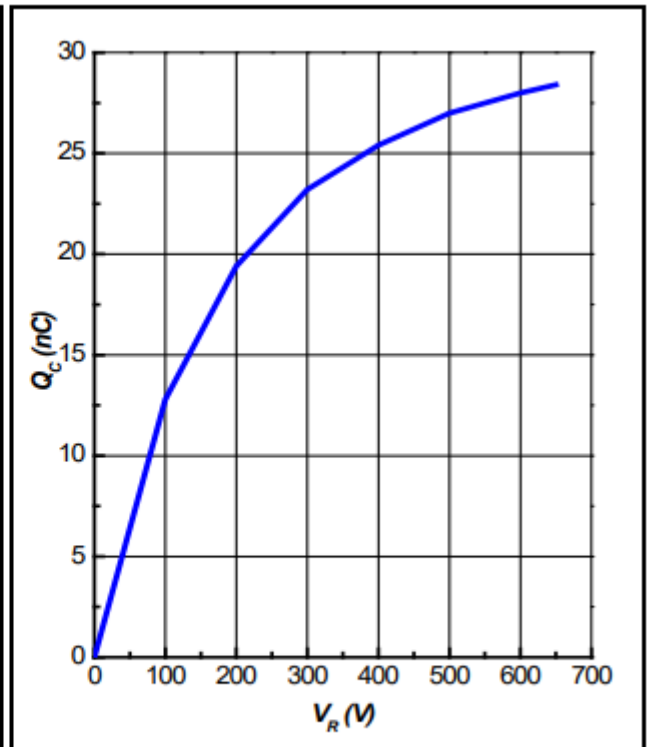


Figure 4. Total Capacitive Charge vs. Reverse Voltage

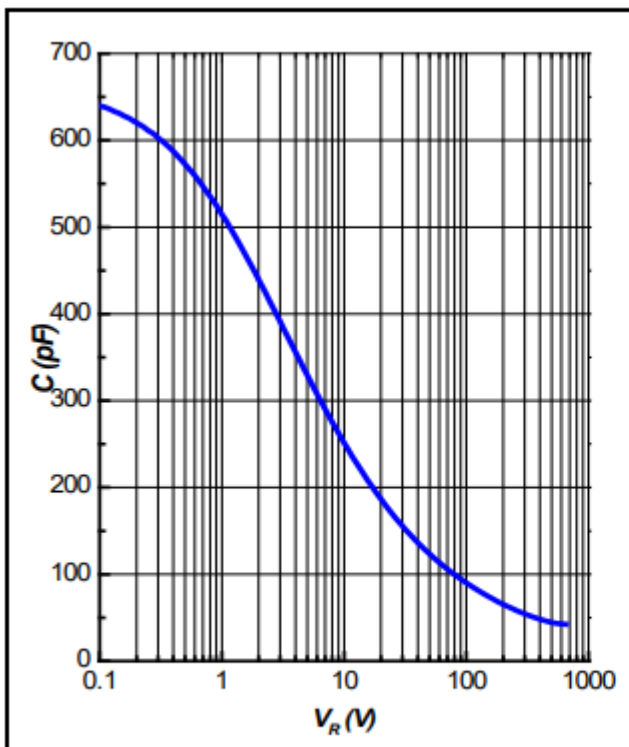


Figure 5. Total Capacitance vs. Reverse Voltage

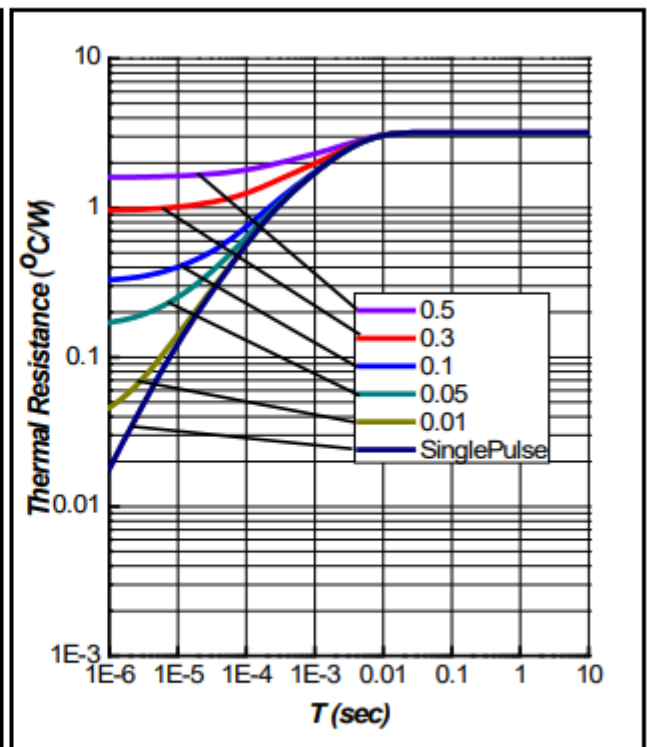
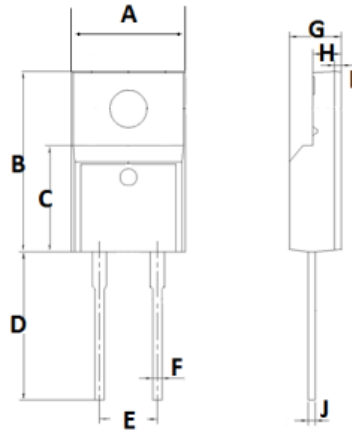


Figure 6. Transient Thermal Impedance

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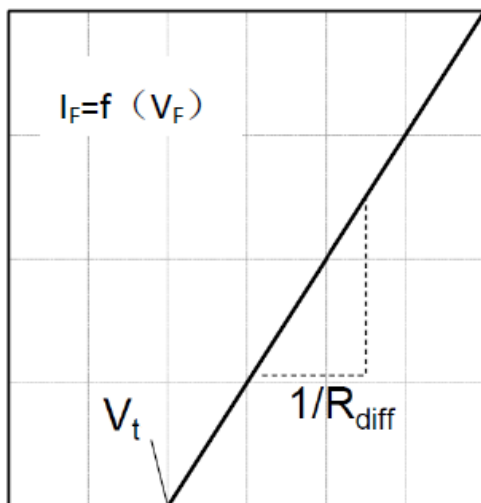
## Package Drawing



| 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

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

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

$$R_{diff} = 6.9 \times 10^{-7} \times T_j^2 + 4.3 \times 10^{-5} \times T_j + 0.28 \text{ [\Omega]}$$

Note:

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

$I_F$  = Forward Current

Less than 20A

| Revision version | Description | Date    |
|------------------|-------------|---------|
| 1                | Initial     | 08.2025 |