

# A4G6D650NF2

## 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 |
| $I_D (T_C \leq 156^\circ\text{C})$ | 6A   |



### Ordering Information

| Part Number | Marking     | Package  | Packaging |
|-------------|-------------|----------|-----------|
| A4G6D650NF2 | A4G6D650NF2 | TO-220-2 | 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                            | 25 ( $T_C \leq 25^\circ\text{C}$ )  | A                |
|                |                                            | 11 ( $T_C \leq 135^\circ\text{C}$ ) |                  |
|                |                                            | 6 ( $T_C \leq 156^\circ\text{C}$ )  |                  |
| $I_{FSM}$      | Non-Repetitive Forward Surge Current       | 52                                  | A                |
| $P_{tot}$      | Power Dissipation                          | 83 ( $T_C = 25^\circ\text{C}$ )     | 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   | $\mu\text{A}$ |

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|       |                         |                                                                   |  |     |     |         |
|-------|-------------------------|-------------------------------------------------------------------|--|-----|-----|---------|
|       |                         | $V_R = 650V, T_J = 175^{\circ}C$                                  |  | 20  | 200 | $\mu A$ |
| 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      |
| $Q_C$ | Total Capacitive Charge | $V_R = 400V, I_F = 6A$<br>$di/dt = 200A/\mu s, T_J = 25^{\circ}C$ |  | 17  |     | nC      |

## Thermal Characteristics

| Symbol          | Parameter                               | Value | Unit          |
|-----------------|-----------------------------------------|-------|---------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case    | 1.8   | $^{\circ}C/W$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 80    | $^{\circ}C/W$ |
| $T_{solder}$    | Soldering Temperature                   | 260   | $^{\circ}C$   |

## Typical Performance

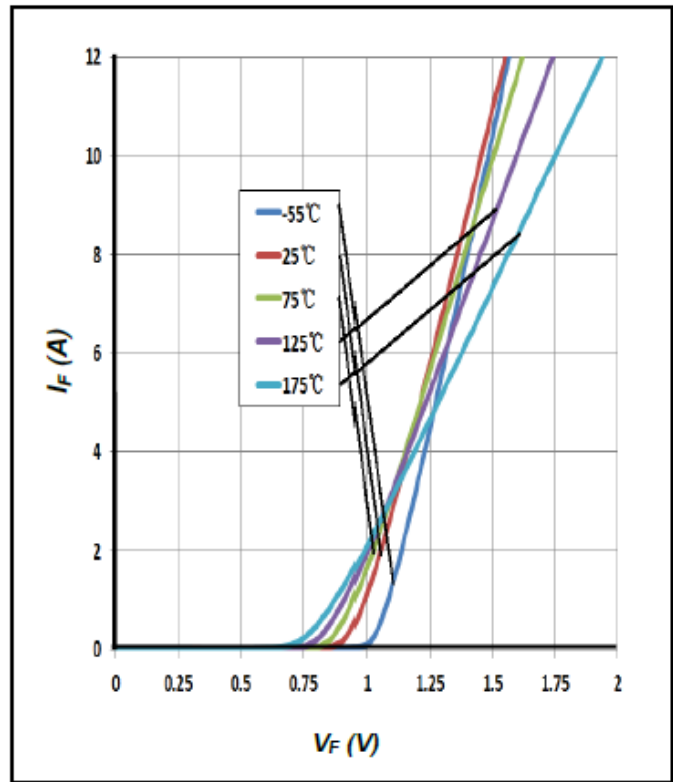


Figure 1. Forward Characteristics

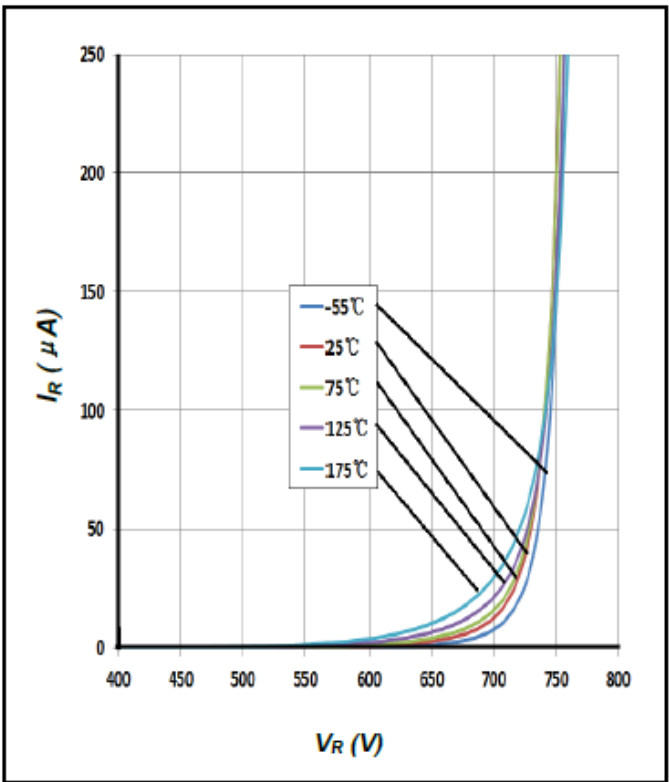


Figure 2. Reverse Characteristics

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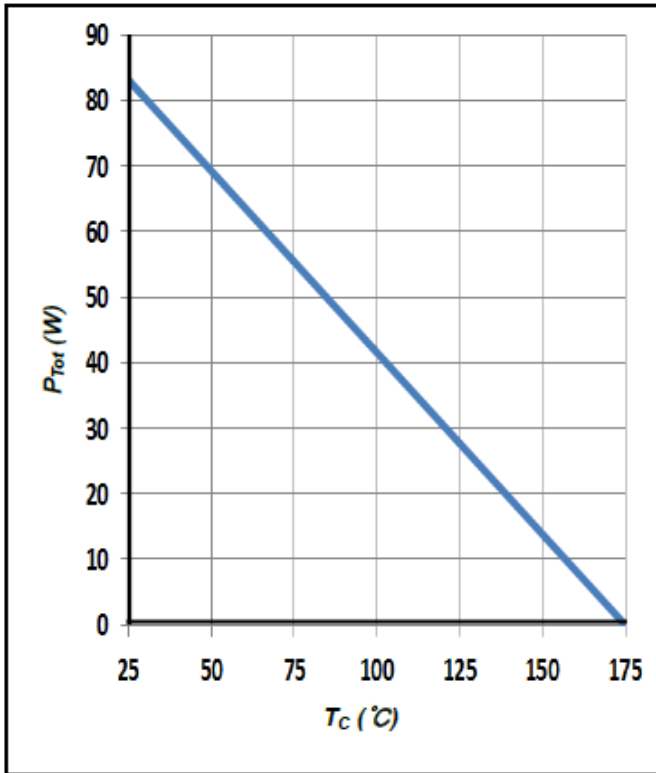


Figure 3. Power Derating

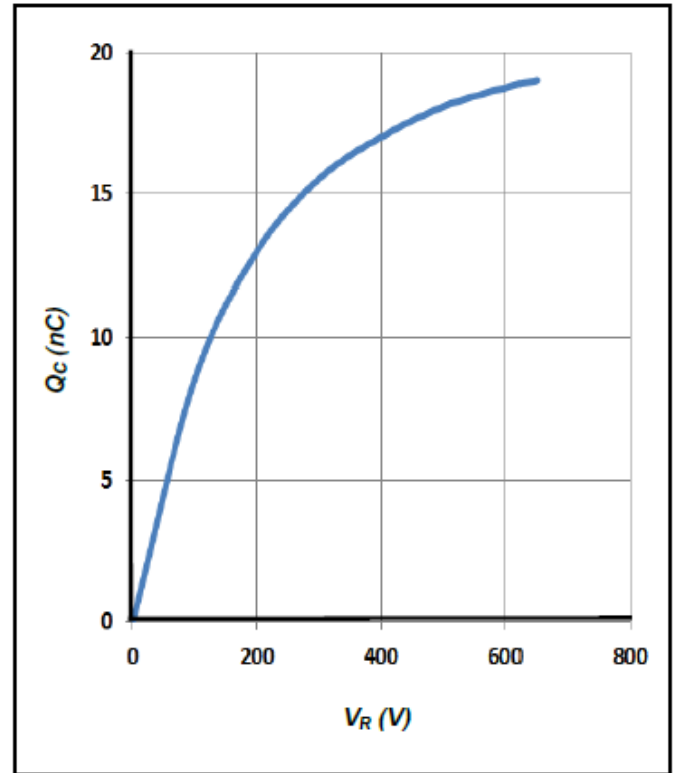


Figure 4. Total Capacitive Charge vs. Reverse Voltage

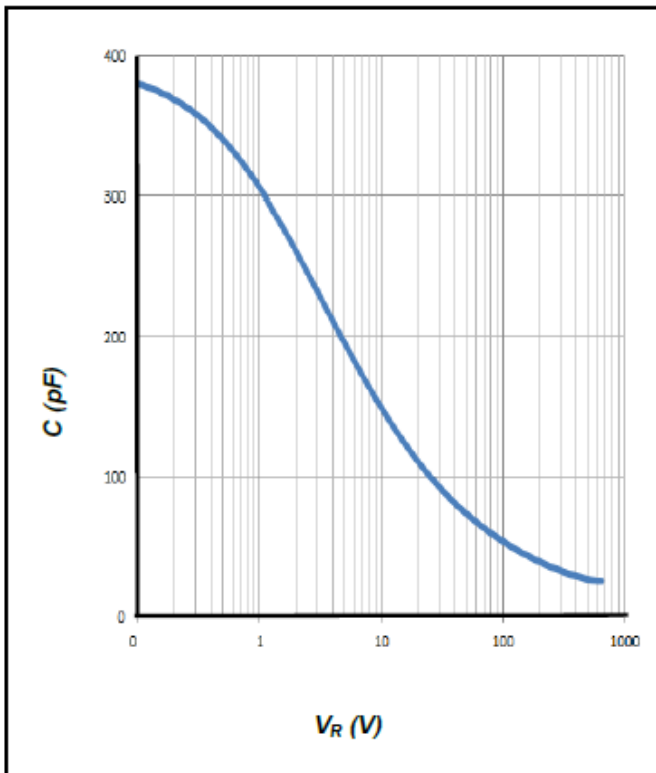


Figure 5. Total Capacitance vs. Reverse Voltage

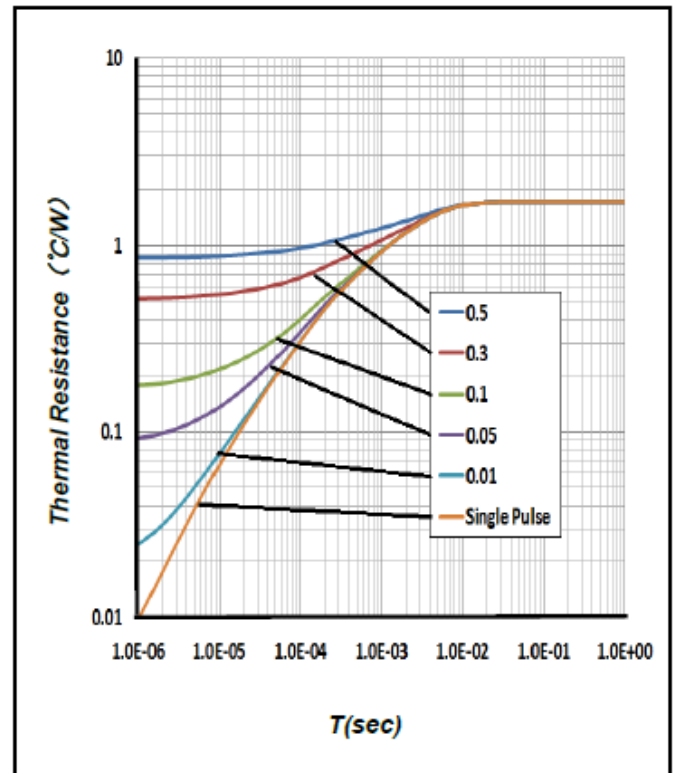
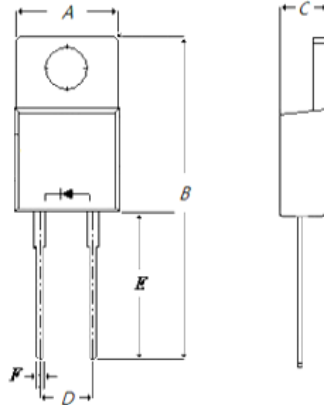


Figure 6. Transient Thermal Impedance

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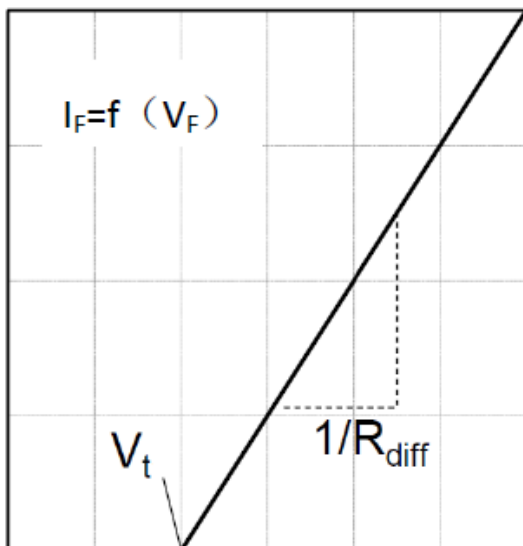
## Package Drawing



| 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      |

## Simplified Diode Model

### Equivalent IV Curve for Model



### Mathematical Equation

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

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

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

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 |