

# A4G40D650NT3C

## 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

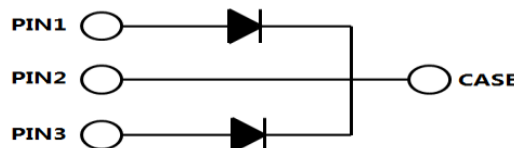
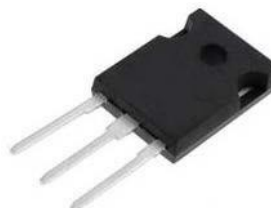
- Replace Bipolar with Unipolar Device
- Reduction of Heat Sink Size
- Parallel Devices Without Thermal Runaway
- Essentially No Switching Losses

### Applications

- Switch Mode Power Supplies
- Uninterruptible Power Supplies
- Server/Telecom Power Supplies
- Industrial Power Supplies

### Product Summary

|                                    |               |
|------------------------------------|---------------|
| $V_{DS}$                           | 650V          |
| $I_D (T_C \leq 152^\circ\text{C})$ | 20A (Per Leg) |



### Ordering Information

| Part Number   | Marking       | Package  | Packaging |
|---------------|---------------|----------|-----------|
| A4G40D650NT3C | A4G40D650NT3C | TO-247-3 | 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 (Per leg/Device)           | 28/56 ( $T_C \leq 135^\circ\text{C}$ ) | A                |
|                |                                            | 20/40 ( $T_C \leq 152^\circ\text{C}$ ) |                  |
| $I_{FSM}$      | Non-Repetitive Forward Surge Current       | 150 (Per leg)                          | A                |
| $P_{tot}$      | Power Dissipation (Per leg/Device)         | 214/428 ( $T_C = 25^\circ\text{C}$ )   | 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 | $I_F = 20\text{A}, T_J = 25^\circ\text{C}$   |      | 1.43 | 1.5  | V             |
|        |                 | $I_F = 20\text{A}, T_J = 175^\circ\text{C}$  |      | 1.4  | 1.7  | V             |
| $I_R$  | Reverse Current | $V_R = 650\text{V}, T_J = 25^\circ\text{C}$  |      | 10   | 100  | $\mu\text{A}$ |
|        |                 | $V_R = 650\text{V}, T_J = 175^\circ\text{C}$ |      | 40   | 400  | $\mu\text{A}$ |

# A4G40D650NT3C

|    |                         |                                                                    |      |    |
|----|-------------------------|--------------------------------------------------------------------|------|----|
| C  | Total Capacitance       | $V_R = 0.1V, T_J = 25^{\circ}C, f = 1MHz$                          | 1210 | pF |
|    |                         | $V_R = 200V, T_J = 25^{\circ}C, f = 1MHz$                          | 124  | pF |
|    |                         | $V_R = 400V, T_J = 25^{\circ}C, f = 1MHz$                          | 90   | pF |
| Qc | Total Capacitive Charge | $V_R = 400V, I_F = 20A$<br>$di/dt = 200A/\mu s, T_J = 25^{\circ}C$ | 41   | nC |

## Thermal Characteristics

| Symbol          | Parameter                                             | Value    | Unit          |
|-----------------|-------------------------------------------------------|----------|---------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case (Per leg/Device) | 0.7/0.35 | $^{\circ}C/W$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient               | 80       | $^{\circ}C/W$ |
| $T_{solder}$    | Soldering Temperature                                 | 260      | $^{\circ}C$   |

## Typical Performance

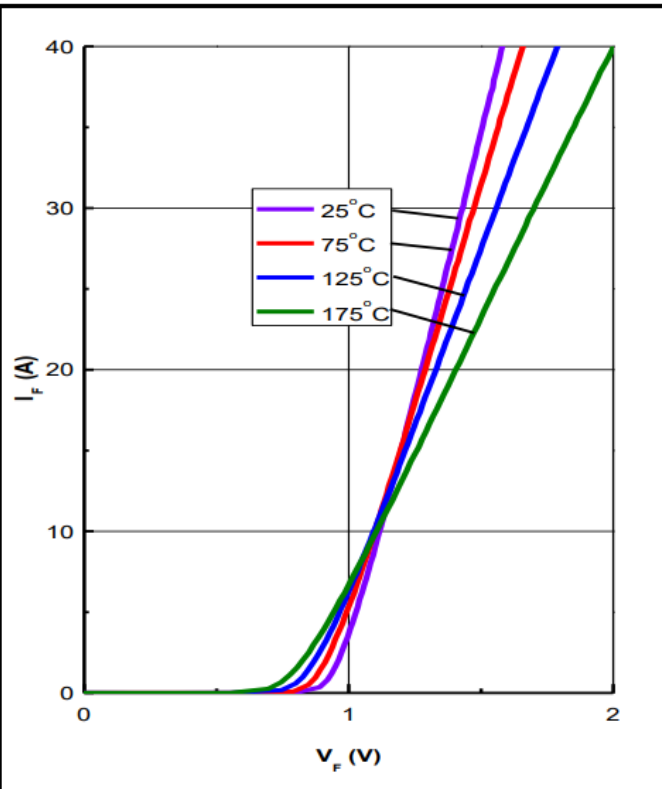


Figure 1. Forward Characteristics

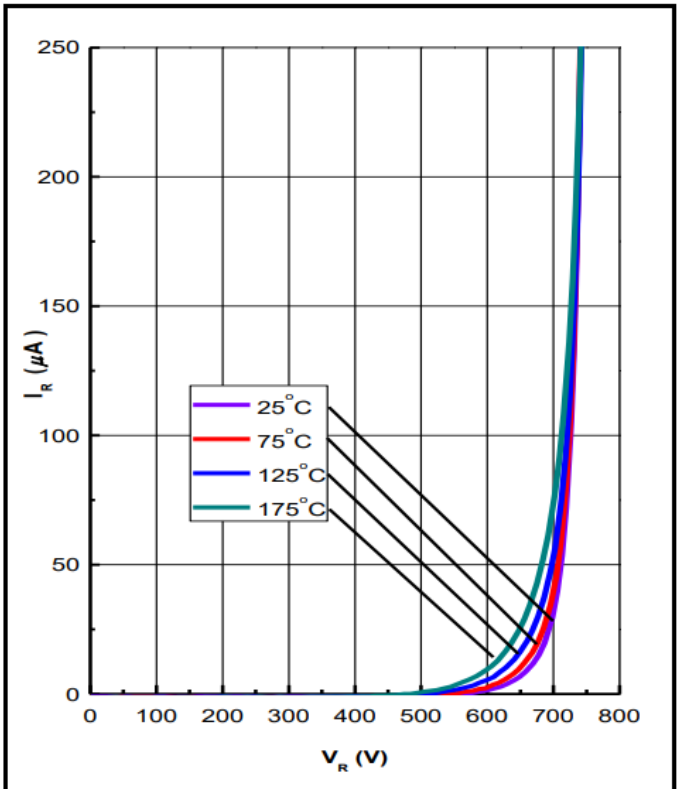


Figure 2. Reverse Characteristics

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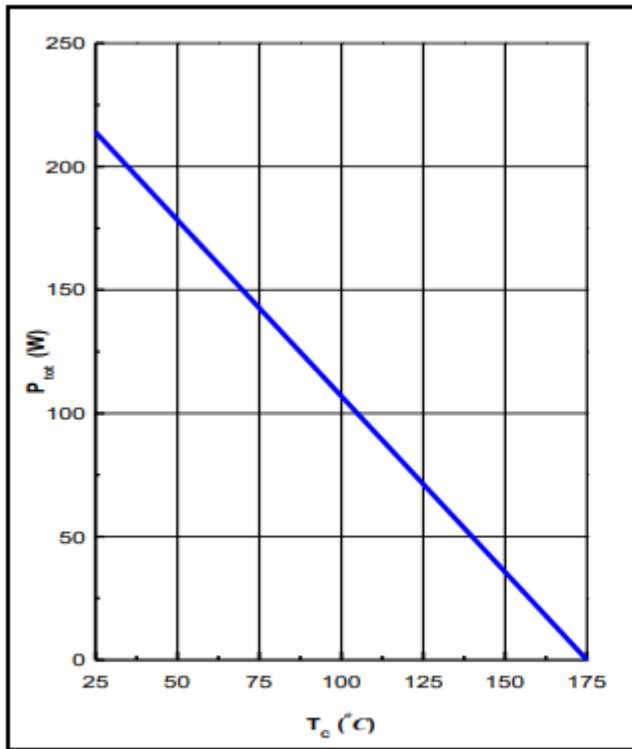


Figure 3. Power Derating

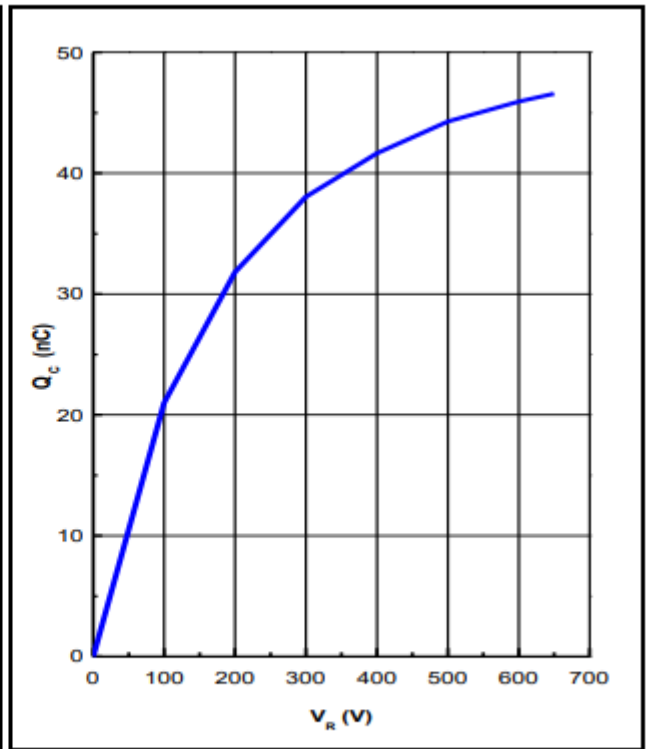


Figure 4. Total Capacitive Charge vs. Reverse Voltage

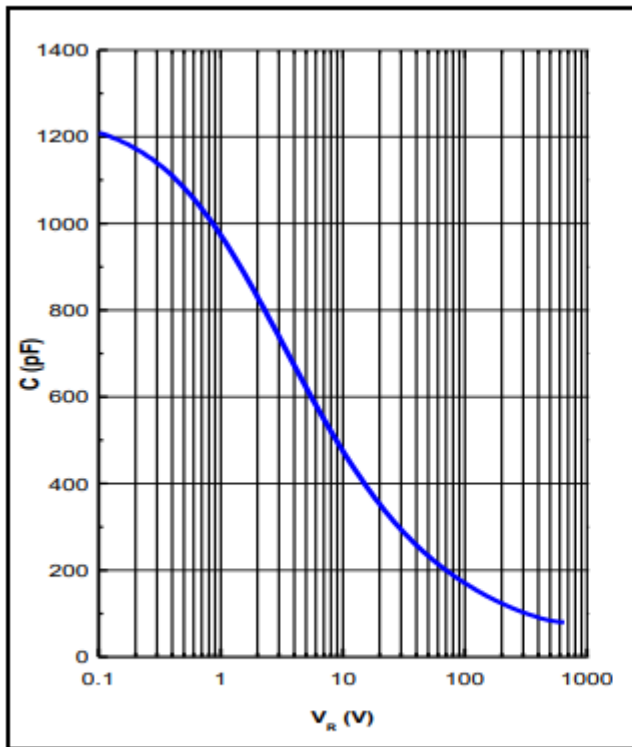


Figure 5. Total Capacitance vs. Reverse Voltage

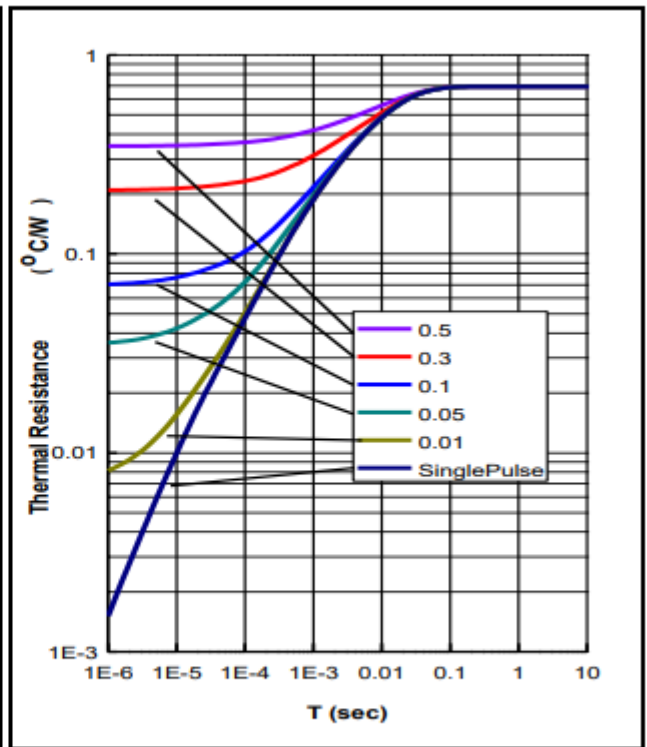
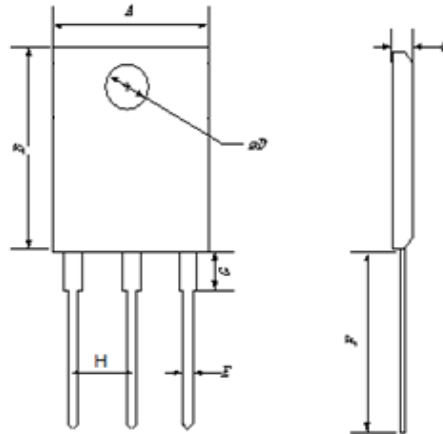


Figure 6. Transient Thermal Impedance

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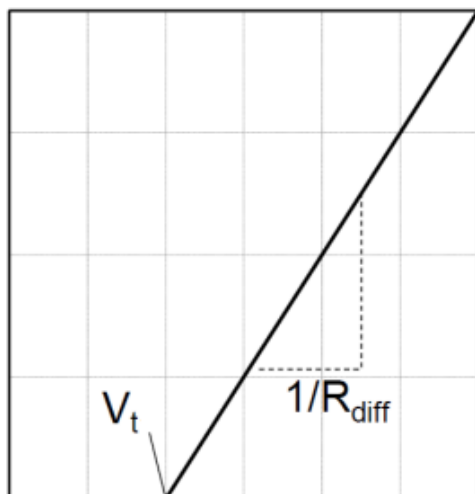
## Package Drawing



| Symbol | Min. (mm) | Typ. (mm) | Max. (mm) |
|--------|-----------|-----------|-----------|
| A      | 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     | 20.32     | 22.33     |
| G      | 4.21      | 4.68      | 5.15      |
| H      | 4.91      | 5.46      | 6.01      |

## Simplified Diode Model

Equivalent IV Curve for Model



Mathematical Equation

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

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

$$R_{diff} = 3.64 \times 10^{-7} \times T_j^2 - 2.27 \times 10^{-5} \times T_j + 0.015 \text{ [\Omega]}$$

Note:

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

$I_F$  = Forward Current

Less than 40A

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