

# FCW65D40D1Q

## eSiC Silicon Carbide Schottky Diode

650V, 40A



### Description

The 650V eSiC is an advanced Faster Semiconductor's silicon carbide diode family. This technology combines the benefits of excellent low capacitive charge and robustness. Consequently, the eSiC family is suitable for application requiring high power efficiency.

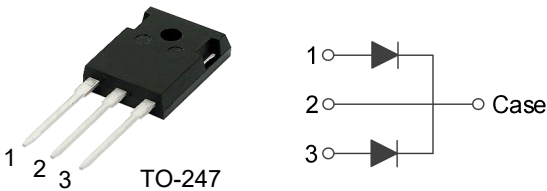
### Applications

- Power Factor Correction
- Industrial Power Supplies
- Solar Inverter, UPS

### Features

| $V_{RRM}$ | $I_F$     | $T_{J,max}$ | $Q_C$ |
|-----------|-----------|-------------|-------|
| 650 V     | 20 / 40 A | 175 °C      | 61 nC |

- No reverse recovery current
- Low capacitive charge
- 175°C Max junction temperature
- High surge current capability
- Switching behavior independent of temperature
- Pb-Free, Halogen Free and RoHS compliant



### Absolute Maximum Ratings (Per Leg / Device & Per Leg, $T_C = 25^{\circ}\text{C}$ unless otherwise noted)

| Symbol               | Parameter                                  |                                                | Value       | Unit                 |
|----------------------|--------------------------------------------|------------------------------------------------|-------------|----------------------|
| $V_{RRM}$            | Repetitive Peak Reverse Voltage            |                                                | 650         | V                    |
| $I_F$                | Forward Current                            | $T_C=122^{\circ}\text{C}$                      | 20 / 40     | A                    |
| $I_{F,SM}$           | Non-Repetitive Forward Surge Current       | $T_C=25^{\circ}\text{C}$ , $t_p=10\text{ ms}$  | 95          | A                    |
|                      |                                            | $T_C=150^{\circ}\text{C}$ , $t_p=10\text{ ms}$ | 80.8        | A                    |
| $I_{F,Max}$          | Non-Repetitive Peak Forward Current        | $T_C=25^{\circ}\text{C}$ , $t_p=10\text{ us}$  | 880         | A                    |
|                      |                                            | $T_C=150^{\circ}\text{C}$ , $t_p=10\text{ us}$ | 748         | A                    |
| $I^2dt\text{ value}$ | $\int i^2 dt$                              | $T_C=25^{\circ}\text{C}$ , $t_p=10\text{ ms}$  | 45.1        | $\text{A}^2\text{s}$ |
|                      |                                            | $T_C=150^{\circ}\text{C}$ , $t_p=10\text{ ms}$ | 32.6        | $\text{A}^2\text{s}$ |
| $P_{tot}$            | Power Dissipation                          | $T_C=25^{\circ}\text{C}$                       | 107         | W                    |
| $T_J, T_{STG}$       | Operating Junction and Storage Temperature |                                                | -55 to +175 | $^{\circ}\text{C}$   |

### Thermal Characteristics

| Symbol          | Parameter                                                        | Value     | Unit                 |
|-----------------|------------------------------------------------------------------|-----------|----------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case, Max.(Per Leg / Per Device) | 1.4 / 0.7 | $^{\circ}\text{C/W}$ |

Package Marking and Ordering Information

| Part Number | Top Marking | Package | Packing Method | Quantity |
|-------------|-------------|---------|----------------|----------|
| FCW65D40D1Q | FCW65D40D1Q | TO-247  | Tube           | 30 units |

Electrical Characteristics (Per Leg, T<sub>C</sub> = 25°C unless otherwise noted)

| Symbol         | Parameter                 | Test Conditions                              | Min | Typ  | Max | Unit |
|----------------|---------------------------|----------------------------------------------|-----|------|-----|------|
| V <sub>F</sub> | Forward Voltage           | I <sub>F</sub> =20 A, T <sub>C</sub> =25°C   |     | 1.40 | 1.7 | V    |
|                |                           | I <sub>F</sub> =20 A, T <sub>C</sub> =175°C  |     | 1.55 | -   |      |
| I <sub>R</sub> | Reverse Current           | V <sub>R</sub> =650 V, T <sub>C</sub> =25°C  |     | -    | 100 | μA   |
|                |                           | V <sub>R</sub> =650 V, T <sub>C</sub> =175°C |     | -    | 300 |      |
| Q <sub>C</sub> | Total Capacitive Charge   | V <sub>R</sub> =400 V, T <sub>C</sub> =25°C  |     | 61   |     | nC   |
| C              | Total Capacitance         | V <sub>R</sub> =1 V, f=100 kHz               |     | 997  |     | pF   |
|                |                           | V <sub>R</sub> =400 V, f=100 kHz             |     | 95   |     |      |
| E <sub>C</sub> | Capacitance Stored Energy | V <sub>R</sub> =400 V, T <sub>C</sub> =25°C  |     | 9    |     | μJ   |

Typical Performance Characteristics (Per Leg)

Figure 1. Power Derating

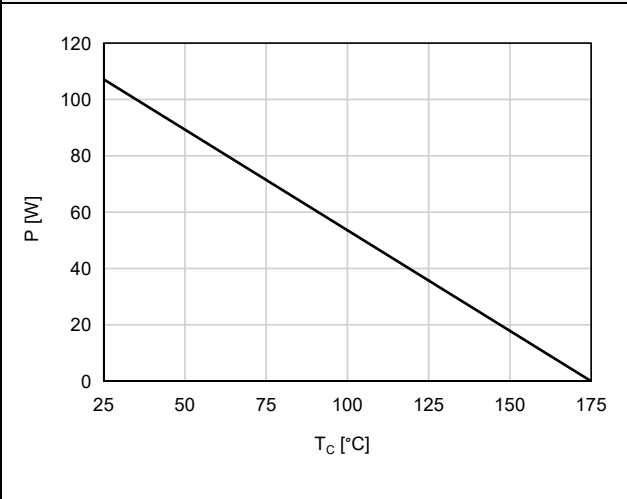


Figure 2. Current Derating

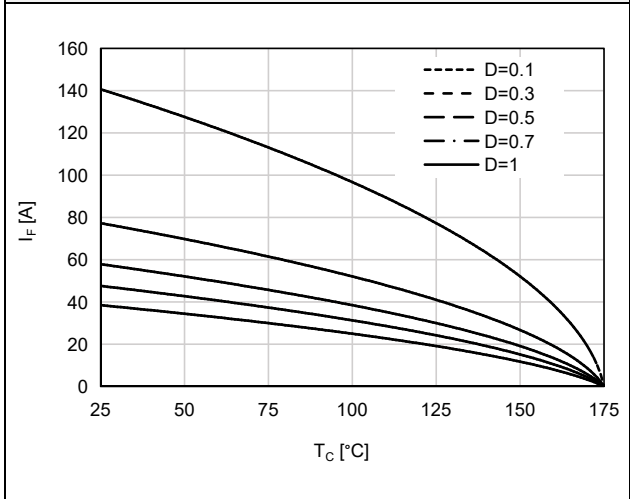


Figure 3. Forward Characteristics

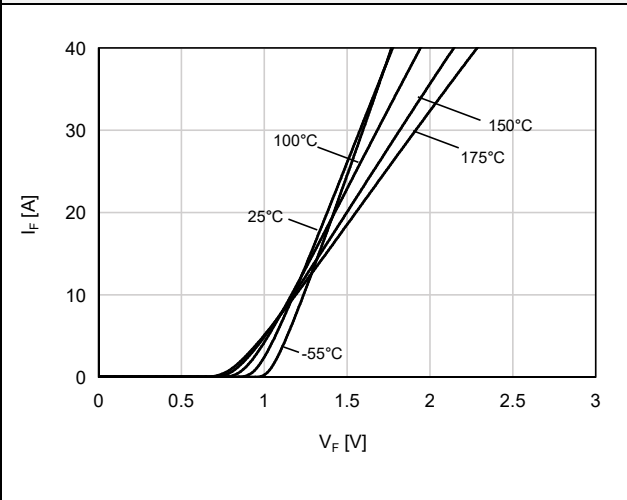


Figure 4. Reverse Characteristics

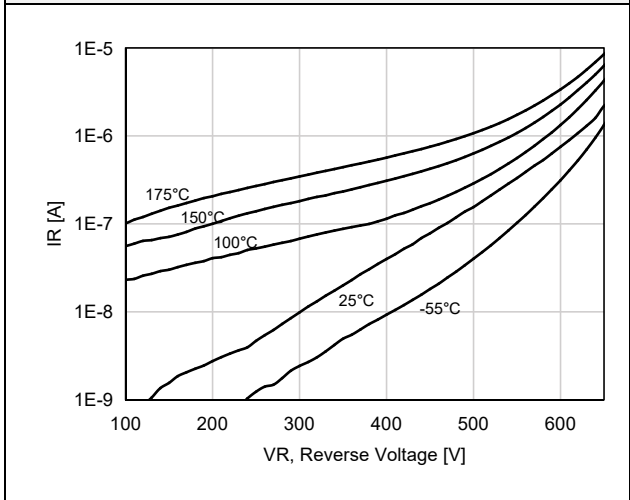


Figure 5. Capacitive Charge Characteristic

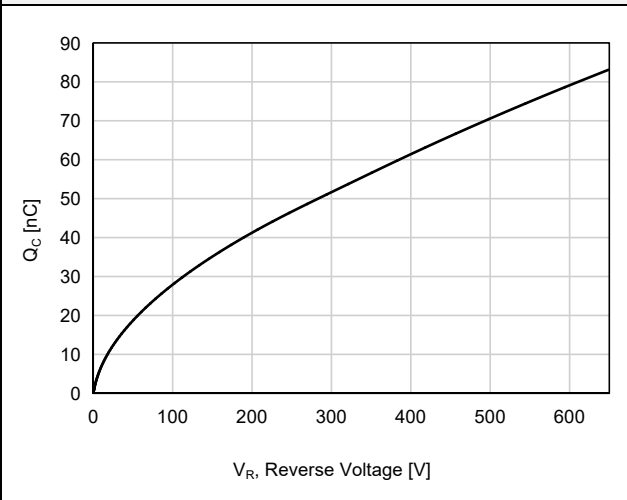
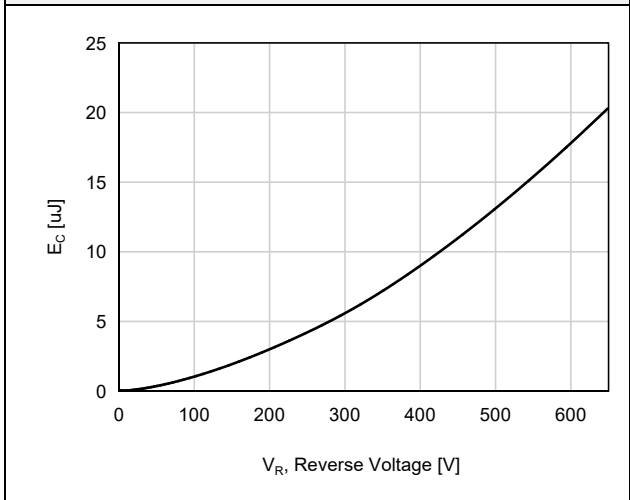


Figure 6. Capacitance Stored Energy



Typical Performance Characteristics (Per Leg)

Figure 7. Capacitance Characteristic

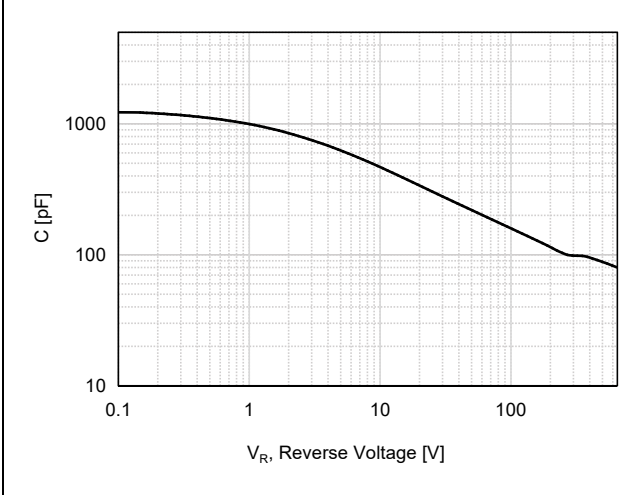
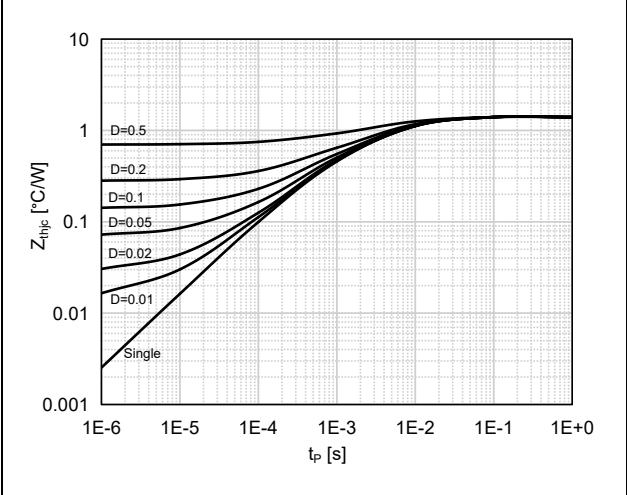
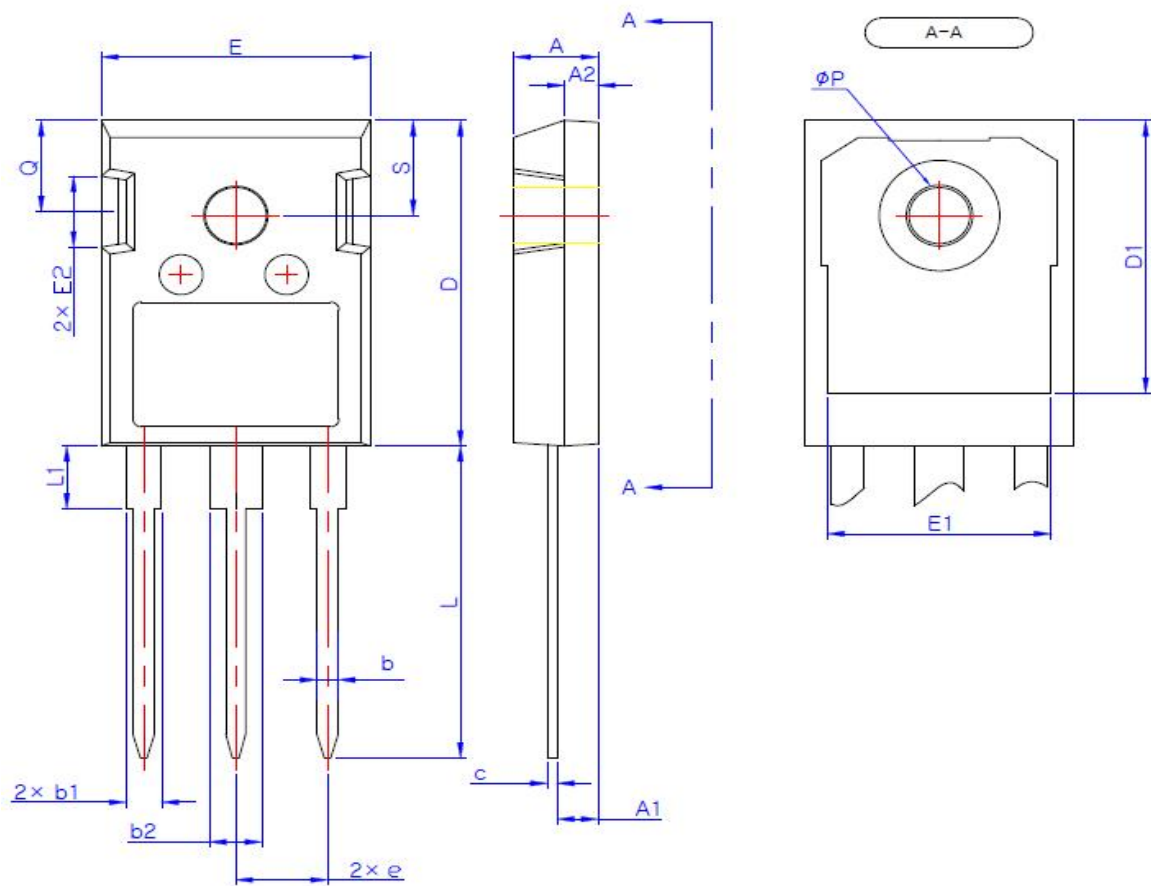


Figure 8. Transient Thermal Response Curve



Package Outlines

TO-247



| SYMBOL   | MIN      | NOM   | MAX   |
|----------|----------|-------|-------|
| A        | 4.80     | 5.00  | 5.20  |
| A1       | 2.29     | 2.42  | 2.54  |
| A2       | 1.90     | 2.00  | 2.10  |
| b        | 1.10     | 1.20  | 1.30  |
| b1       | 1.91     | 2.06  | 2.20  |
| b2       | 2.92     | 3.06  | 3.20  |
| c        | 0.50     | 0.60  | 0.70  |
| D        | 20.80    | 21.07 | 21.34 |
| D1       | 17.43    | 17.63 | 17.83 |
| E        | 15.75    | 15.94 | 16.13 |
| E1       | 13.06    | 13.26 | 13.46 |
| E2       | 4.32     | 4.58  | 4.83  |
| e        | 5.45 BSC |       |       |
| L        | 19.85    | 20.05 | 20.25 |
| L1       | 4.05     | 4.27  | 4.49  |
| $\phi P$ | 3.55     | 3.60  | 3.65  |
| Q        | 5.59     | 5.89  | 6.19  |
| S        | 6.15 BSC |       |       |

\* Dimensions in millimeters