

HCW120D40D1A

eSiC Automotive Silicon Carbide Schottky Diode

1200V, 40A

Description

The 1200V eSiC is an advanced Power Master Semiconductor's silicon carbide diode family. This technology combines the benefits of excellent low forward voltage and robustness. Consequently, the eSiC family is suitable for application requiring high power efficiency

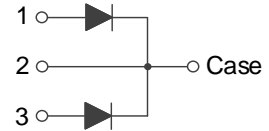
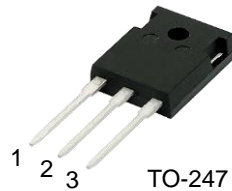
Applications

- OBC (On Board Charger)
- DC/DC Converter for EV/HEV
- Wireless Charger

Features (Per Leg/Device)

| V_{RRM} | I_F | $T_{J,max}$ | Q_C |
|-----------|-----------|-------------|--------|
| 1200 V | 20 / 40 A | 175 °C | 121 nC |

- No reverse recovery current
- Low forward voltage
- 175°C Max junction temperature
- High surge current capability
- Switching behavior independent of temperature
- AEC Q101 Qualified
- Pb-Free, Halogen Free and RoHS compliant



Absolute Maximum Ratings (Per Leg / Device, Per Leg unless otherwise specified)

| Symbol | Parameter | Value | Unit |
|----------------|--|--|------|
| V_{RRM} | Repetitive Peak Reverse Voltage | $T_C = 25^\circ\text{C}$ 1200 | V |
| I_F | Forward Current | $T_C = 146^\circ\text{C}$ 20 / 40 | A |
| $I_{F,SM}$ | Non-Repetitive Forward Surge Current | $T_C = 25^\circ\text{C}, t_p = 10\text{ ms}$ | 135 |
| | | $T_C = 150^\circ\text{C}, t_p = 10\text{ ms}$ | 115 |
| $I_{F,Max}$ | Non-Repetitive Peak Forward Current | $T_C = 25^\circ\text{C}, t_p = 10\ \mu\text{s}$ | 1180 |
| | | $T_C = 150^\circ\text{C}, t_p = 10\ \mu\text{s}$ | 980 |
| I^2dt value | $\int I^2 dt$ | $T_C = 25^\circ\text{C}, t_p = 10\text{ ms}$ | 91 |
| | | $T_C = 150^\circ\text{C}, t_p = 10\text{ ms}$ | 66 |
| P_{tot} | Power Dissipation | $T_C = 25^\circ\text{C}$ 217 | W |
| T_J, T_{STG} | Operating Junction and Storage Temperature | -55 to +175 | °C |

Thermal Characteristics

| Symbol | Parameter | Value | Unit |
|-----------------|--|-------------|------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case, Max.(Per Leg / Per Device) | 0.69 / 0.35 | °C/W |

Package Marking and Ordering Information

| Part Number | Top Marking | Package | Packing Method | Quantity |
|--------------|--------------|---------|----------------|----------|
| HCW120D40D1A | HCW120D40D1A | TO-247 | Tube | 30 units |

Electrical Characteristics (Per Leg, $T_C = 25^\circ\text{C}$ unless otherwise noted)

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|--------|---------------------------|--|-----|------|------|---------------|
| V_F | Forward Voltage | $I_F = 20\text{ A}, T_C = 25^\circ\text{C}$ | | 1.39 | 1.70 | V |
| | | $I_F = 20\text{ A}, T_C = 175^\circ\text{C}$ | | 1.8 | - | |
| I_R | Reverse Current | $V_R = 1200\text{ V}, T_C = 25^\circ\text{C}$ | | - | 100 | μA |
| | | $V_R = 1200\text{ V}, T_C = 175^\circ\text{C}$ | | - | 300 | |
| Q_C | Total Capacitive Charge | $V_R = 800\text{ V}, T_C = 25^\circ\text{C}$ | | 121 | | nC |
| C | Total Capacitance | $V_R = 1\text{ V}, f = 100\text{ kHz}$ | | 1357 | | pF |
| | | $V_R = 800\text{ V}, f = 100\text{ kHz}$ | | 85 | | |
| E_C | Capacitance Stored Energy | $V_R = 800\text{ V}, T_C = 25^\circ\text{C}$ | | 34 | | μJ |

Typical Performance Characteristics (Per Leg)

Figure 1. Power Derating

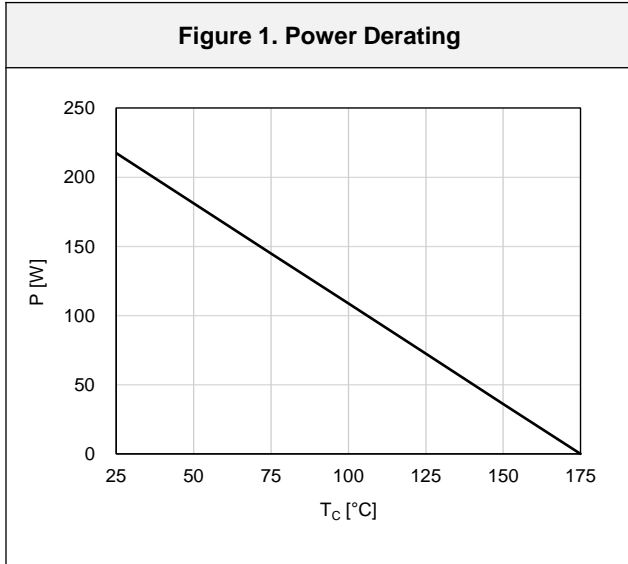


Figure 2. Current Derating

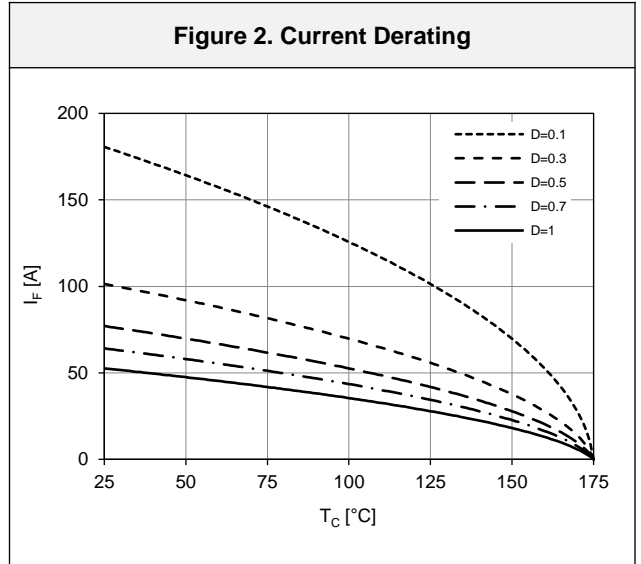


Figure 3. Forward Characteristics

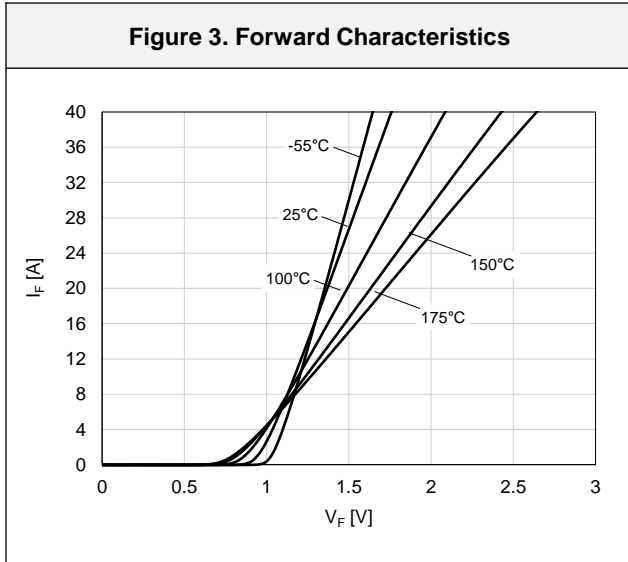


Figure 4. Reverse Characteristics

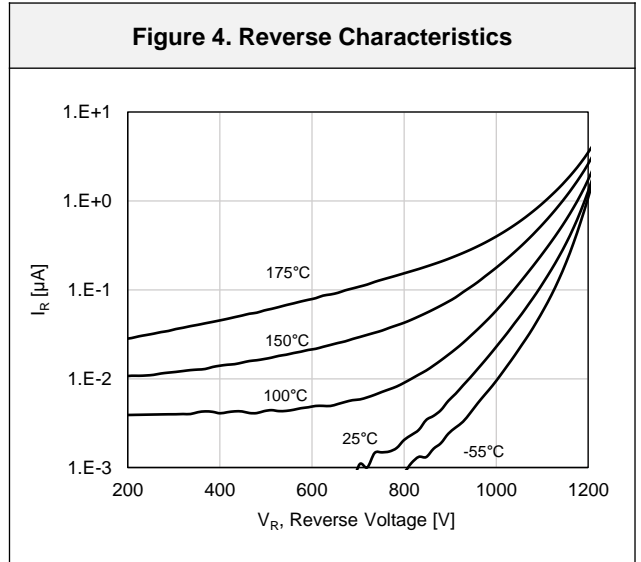


Figure 5. Capacitive Charge Characteristics

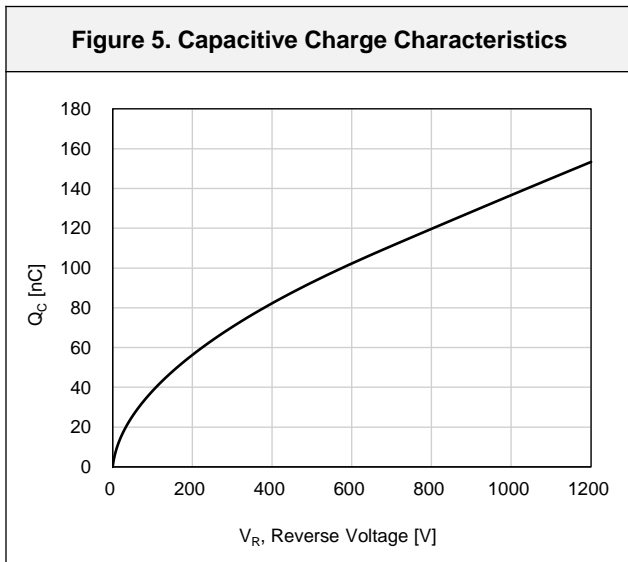
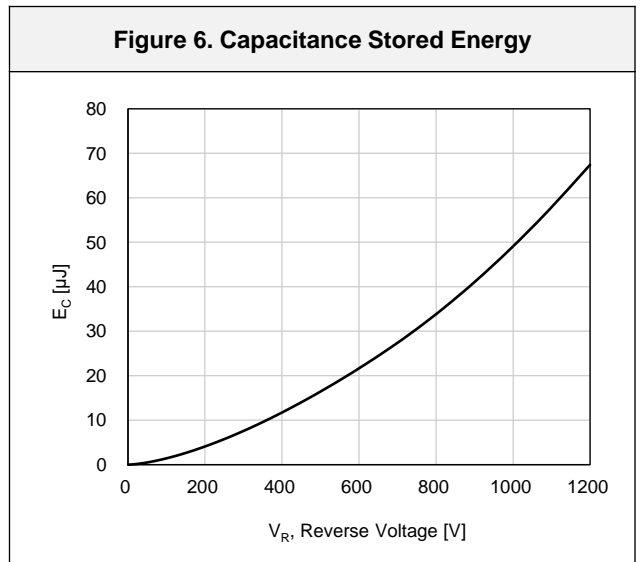


Figure 6. Capacitance Stored Energy



Typical Performance Characteristics (Per Leg)

Figure 7. Capacitance Characteristics

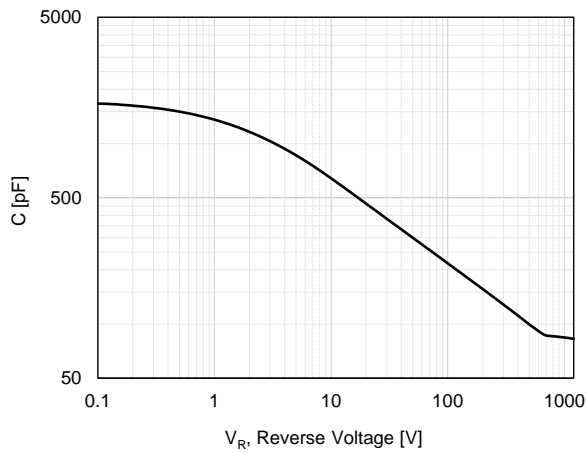
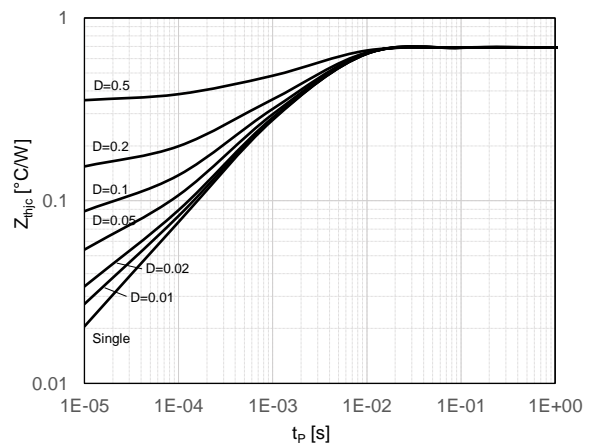
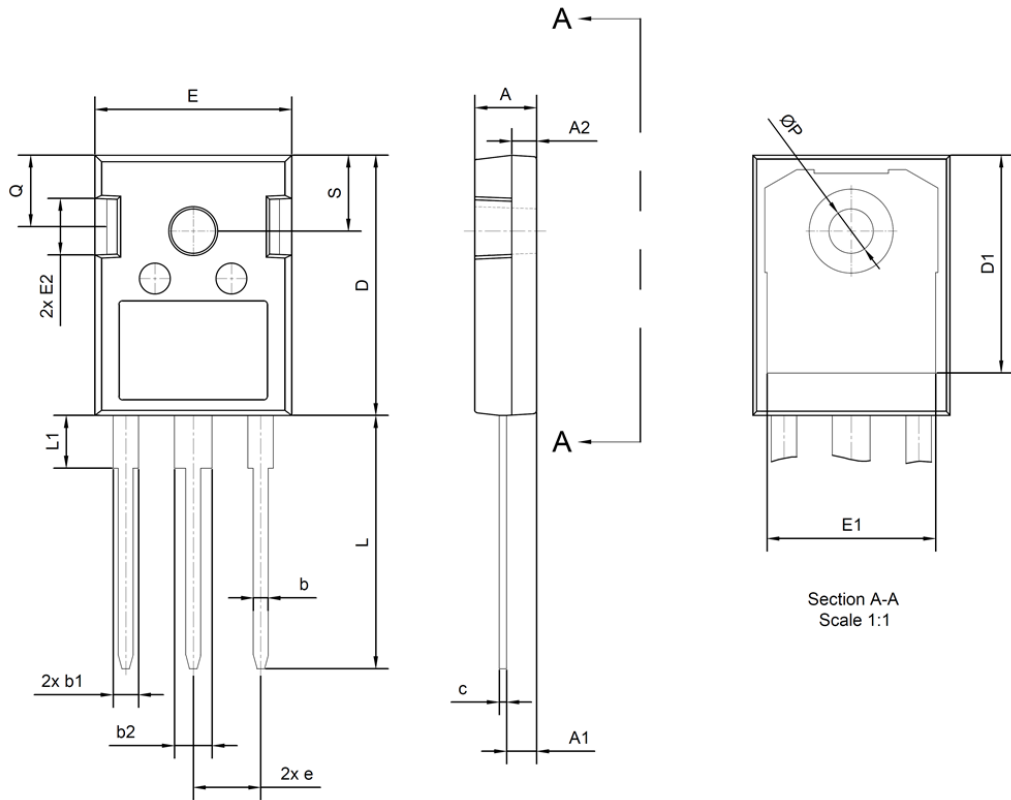


Figure 8. Transient Thermal Response Curve



Package Outlines

TO-247



| SYMBOL | Common | | |
|--------|--------------------------|-------|-------|
| | DIMENSIONS MILLIMETER | | |
| | 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 | 17.23 | 17.63 | 18.03 |
| E | 15.75 | 15.94 | 16.13 |
| E1 | 13.46 | 13.66 | 13.86 |
| E2 | 4.32 | 4.58 | 4.83 |
| e | 5.46 BSC | | |
| L | 19.85 | 20.05 | 20.25 |
| L1 | 4.05 | 4.27 | 4.48 |
| ØP | 3.56 | 3.61 | 3.66 |
| Q | 5.38 | 5.79 | 6.20 |
| S | 6.15 BSC | | |