C4D20120D
Silicon Carbide Schottky Diode

**Features**
- 1.2-KVolt Schottky Rectifier
- Zero Reverse Recovery Current
- High-Frequency Operation
- Temperature-Independent Switching Behavior
- Positive Temperature Coefficient on $V_f$

**Benefits**
- Replace Bipolar with Unipolar Rectifiers
- Essentially No Switching Losses
- Higher Efficiency
- Reduction of Heat Sink Requirements
- Parallel Devices Without Thermal Runaway

**Applications**
- Switch Mode Power Supplies
- Power Factor Correction
- Motor Drives

**Maximum Ratings** ($T_c=25^\circ C$ unless otherwise specified)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Value</th>
<th>Test Conditions</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{RRM}$</td>
<td>Repetitive Peak Reverse Voltage</td>
<td>1200 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_{RSM}$</td>
<td>Surge Peak Reverse Voltage</td>
<td>1300 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_{DC}$</td>
<td>DC Blocking Voltage</td>
<td>1200 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$I_F$</td>
<td>Continuous Forward Current (Per Leg/Device)</td>
<td>34/68 16.5/33 10/20 A</td>
<td>$T_c=25^\circ C$ $T_c=135^\circ C$ $T_c=157^\circ C$</td>
<td></td>
</tr>
<tr>
<td>$I_{FRM}$</td>
<td>Repetitive Peak Forward Surge Current</td>
<td>47* 31.5* A</td>
<td>$T_c=25^\circ C$, $t_p=10$ ms, Half Sine Pulse $T_c=-110^\circ C$, $t_p=10$ ms, Half Sine Pulse</td>
<td></td>
</tr>
<tr>
<td>$I_{FSM}$</td>
<td>Non-Repetitive Peak Forward Surge Current</td>
<td>71* 59.5* A</td>
<td>$T_c=25^\circ C$, $t_p=10$ ms, Half Sine Pulse $T_c=-110^\circ C$, $t_p=10$ ms, Half Sine Pulse</td>
<td></td>
</tr>
<tr>
<td>$I_{F,Max}$</td>
<td>Non-Repetitive Peak Forward Current</td>
<td>750* 620* A</td>
<td>$T_c=25^\circ C$, $t_p=10$ $\mu$s, Pulse $T_c=-110^\circ C$, $t_p=10$ $\mu$s, Pulse</td>
<td></td>
</tr>
<tr>
<td>$P_{tot}$</td>
<td>Power Dissipation(Per Leg/Device)</td>
<td>176/352 76/152 W</td>
<td>$T_c=25^\circ C$ $T_c=-110^\circ C$</td>
<td></td>
</tr>
<tr>
<td>$T_J$</td>
<td>Operating Junction Range</td>
<td>-55 to +175°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$T_{stg}$</td>
<td>Storage Temperature Range</td>
<td>-55 to +135°C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Electrical Characteristics (Per Leg)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
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<tbody>
<tr>
<td>$V_F$</td>
<td>Forward Voltage</td>
<td>1.5</td>
<td>2.2</td>
<td>V</td>
<td>$I_F = 10 , A , T_J = 25^\circ C$ $I_F = 10 , A , T_J = 175^\circ C$</td>
<td></td>
</tr>
<tr>
<td>$I_R$</td>
<td>Reverse Current</td>
<td>30</td>
<td>55</td>
<td>µA</td>
<td>$V_R = 1200 , V , T_J = 25^\circ C$ $V_R = 1200 , V , T_J = 175^\circ C$</td>
<td></td>
</tr>
<tr>
<td>$Q_c$</td>
<td>Total Capacitive Charge</td>
<td>52</td>
<td></td>
<td>nC</td>
<td>$V_R = 800 , V, I_F = 10 , A$ $d/dt = 200 , A/\mu s$ $T_J = 25^\circ C$</td>
<td></td>
</tr>
<tr>
<td>$C$</td>
<td>Total Capacitance</td>
<td>754</td>
<td>45</td>
<td>pF</td>
<td>$V_R = 800 , V, T_J = 25^\circ C, f = 1 , MHz$ $V_R = 400 , V, T_J = 25^\circ C, f = 1 , MHz$ $V_R = 800 , V, T_J = 25^\circ C, f = 1 , MHz$</td>
<td></td>
</tr>
</tbody>
</table>

Note:
1. This is a majority carrier diode, so there is no reverse recovery charge.

Thermal Characteristics

<table>
<thead>
<tr>
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<th>Unit</th>
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</tr>
</thead>
<tbody>
<tr>
<td>$R_{JJC}$</td>
<td>Thermal Resistance from Junction to Case</td>
<td>0.85*</td>
<td>0.43**</td>
<td>°C/W</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Per Leg, ** Per Device

Typical Performance (Per Leg)

Figure 1. Forward Characteristics

Figure 2. Reverse Characteristics
Typical Performance (Per Leg)

Figure 3. Current Derating

Figure 4. Power Derating

Figure 5. Recovery Charge vs. Reverse Voltage

Figure 6. Capacitance vs. Reverse Voltage
Typical Performance

Figure 7. Typical Capacitance Stored Energy, per leg

Figure 8. Non-Repetitive Peak Forward Surge Current versus Pulse Duration (sinusoidal waveform), per leg

Figure 9. Device Transient Thermal Impedance
**Package Dimensions**

Package TO-247-3

**Recommended Solder Pad Layout**

**Part Number** | **Package** | **Marking**
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C4D20120D | TO-247-3 | C4D20120

**Note:** Recommended soldering profiles can be found in the applications note here:

[http://www.cree.com/power_app_notes/soldering](http://www.cree.com/power_app_notes/soldering)
### Diode Model

\[ V_{ft} = V_T + I_T R_T \]

\[ V_T = 0.98 + (T_J - 1.71 \times 10^{-3}) \]

\[ R_T = 0.040 + (T_J \times 5.32 \times 10^{-4}) \]

Note: \( T_J \) = Diode Junction Temperature In Degrees Celsius, valid from 25°C to 175°C

### Notes

- **RoHS Compliance**
  The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2011/65/EC (RoHS2), as implemented January 2, 2013. RoHS Declarations for this product can be obtained from your Cree representative or from the Product Documentation sections of www.cree.com.

- **REACh Compliance**
  REACh substances of high concern (SVHCs) information is available for this product. Since the European Chemical Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future, please contact a Cree representative to insure you get the most up-to-date REACh SVHC Declaration. REACh banned substance information (REACh Article 67) is also available upon request.

- This product has not been designed or tested for use in, and is not intended for use in, applications implanted into the human body nor in applications in which failure of the product could lead to death, personal injury or property damage, including but not limited to equipment used in the operation of nuclear facilities, life-support machines, cardiac defibrillators or similar emergency medical equipment, aircraft navigation or communication or control systems, or air traffic control systems.

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Diode Model CSD04060

\[ V_T = 0.965 + (T_J - 1.3 \times 10^{-3}) \]

\[ R_T = 0.096 + (T_J \times 1.6 \times 10^{-3}) \]