

# **C3D1P7060Q** Silicon Carbide Schottky Diode *Z-REC®* RECTIFIER

### Features

- 600-Volt Schottky Rectifier
- Optimized for PFC Boost Diode Application
- Zero Reverse Recovery Current
- High-Frequency Operation
- Temperature-Independent Switching Behavior
- Extremely Fast Switching
- Positive Temperature Coefficient on V<sub>F</sub>

#### **Benefits**

- Small compact surface mount package
- Essentially No Switching Losses
- Higher Efficiency
- Reduction of Heat Sink Requirements
- Parallel Devices Without Thermal Runaway

### Applications

- Switch Mode Power Supplies
- LED Lighting
- Medical imaging systems

### Package



V<sub>RRM</sub>

**Q**\_

600 V

3.3 A

4 nC

=

=

 $I_{F}(T_{c}=135^{\circ}C) =$ 

PowerQFN 3.3x3.3

Part Number	Package	Marking		
C3D1P7060Q	QFN 3.3	C3D1P7060		

### Maximum Ratings (T<sub>c</sub> = 25 °C unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
V <sub>RRM</sub>	Repetitive Peak Reverse Voltage	600	V		
V <sub>RSM</sub>	Surge Peak Reverse Voltage	600	V		
V <sub>DC</sub>	DC Blocking Voltage	600	V		
I <sub>F</sub>	Continuous Forward Current	9.7 3.3 1.7	А	T <sub>c</sub> =25°C T <sub>c</sub> =135°C T <sub>c</sub> =150°C	Fig 3
I <sub>FRM</sub>	Repetitive Peak Forward Surge Current	7 4.5	А	$T_c=25$ °C, t <sub>p</sub> = 10 ms, Half Sine Wave $T_c=110$ °C, t <sub>p</sub> = 10 ms, Half Sine Wave	
I <sub>FSM</sub>	Non-Repetitive Peak Forward Surge Current	15 12	А	$T_c = 25^{\circ}C$ , $t_p = 10$ ms, Half Sine Wave $T_c = 110^{\circ}C$ , $t_p = 10$ ms, Half Sine Wave	Fig. 8
I <sub>F,Max</sub>	Non-Repetitive Peak Forward Surge Current	50 40		$T_c$ =25°C, t <sub>p</sub> = 10 µs, Pulse $T_c$ =110°C, t <sub>p</sub> = 10 µs, Pulse	Fig. 8
P <sub>tot</sub>	Power Dissipation	35.5 13	W	T <sub>c</sub> =25°C T <sub>c</sub> =110°C	Fig. 4
T <sub>J</sub> , T <sub>stg</sub>	Operating Junction and Storage Temperature	-55 to +160	°C		



### **Electrical Characteristics**

Symbol	Parameter	Тур.	Max.	Unit	Test Conditions	Note
V <sub>F</sub>	Forward Voltage	1.5 1.7	1.7 2.4	V	I <sub>F</sub> = 1.7 A T <sub>C</sub> =25°C I <sub>F</sub> = 1.7 A T <sub>C</sub> =150°C	Fig. 1
I <sub>R</sub>	Reverse Current	3 6	15 55	μA	$V_{R} = 600 V T_{C} = 25^{\circ}C$ $V_{R} = 600 V T_{C} = 150^{\circ}C$	Fig. 2
Q <sub>c</sub>	Total Capacitive Charge	4		nC	V <sub>R</sub> = 400 V, I <sub>F</sub> = 1.7A di/dt = 500 A/μs T <sub>c</sub> = 25°C	Fig. 5
С	Total Capacitance	82.5 7 6		pF	$V_{R} = 0 V, T_{C} = 25^{\circ}C, f = 1 MHz$ $V_{R} = 200 V, T_{C} = 25^{\circ}C, f = 1 MHz$ $V_{R} = 400 V, T_{C} = 25^{\circ}C, f = 1 MHz$	Fig. 6
E <sub>c</sub>	Capacitance Stored Energy	0.6		μJ	V <sub>R</sub> = 400 V	Fig. 7

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

### **Thermal Characteristics**

Symbol	Parameter	Тур.	Unit	Note
$R_{_{\!  ext{ heta}JC}}$	Thermal Resistance from Junction to Case	3.8	°C/W	Fig. 9

## **Typical Performance**









### **Typical Performance**



Figure 5. Total Capacitance Charge vs. Reverse Voltage





**Typical Performance** 



Figure 7. Capacitance Stored Energy

Figure 8. Non-repetitive peak forward surge current versus pulse duration (sinusoidal waveform)



Figure 9. Transient Thermal Impedance



# **Package Dimensions**

Package QFN 3.3



All Dimensions are in mm Tolerances are 0.05 mm if not specified NC = No Connect

5



### Recommended Landing Pattern (All Dimensions are in mm)



Note: The design of the land pattern and the size of the thermal pad depend mainly on the thermal characteristic and power dissipation. In general, the size of the thermal pad should be as close to the exposed pad of the package as possible, provided that there is no bridging between the thermal pad and the lead pads.

The 0.050mm extra length and width provides space to accommodate the placement tolerance of the component during pick and place process. The 0.150mm along the perimeter present areas for solder to form fillet along the side metal edges of the package.

Note: Recommended soldering profiles can be found in the applications note here: http://www.wolfspeed.com/power\_app\_notes/soldering









Note: T<sub>j</sub> = 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 Wolfspeed representative or from the Product Ecology section of our website at http://www.wolfspeed.com/power/tools-and-support/product-ecology.

#### 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.

### **Related Links**

- Cree SiC Schottky diode portfolio: http://www.wolfspeed.com/Power/Products#SiCSchottkyDiodes
- Schottky diode Spice models: http://www.wolfspeed.com/power/tools-and-support/DIODE-model-request2
- SiC MOSFET and diode reference designs: http://go.pardot.com/l/101562/2015-07-31/349i

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