

EPW4-1200-S020A

Silicon Carbide Schottky Diode E-Series Automotive

Features

- 4th Generation SiC Merged PIN Schottky Technology
- Zero Reverse Recovery Current
- High-Frequency Operation
- Temperature-Independent Switching Behavior
- AEC-Q101 Qualified and PPAP Capable
- Humidity Resistant

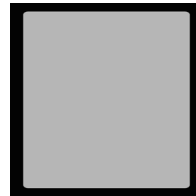
Applications

- Boost diodes in PFC or DC/DC stages
- Free Wheeling Diodes in Inverter stages
- AC/DC converters
- Automotive and Traction Power Conversion
- PV Inverters

Benefits

- Replace Bipolar with Unipolar Rectifiers
- Essentially No Switching Losses
- Higher Efficiency
- Reduction of Heat Sink Requirements
- Parallel Devices Without Thermal Runaway
- Ideal for Outdoor Environments

Chip



Chip Outline



Ordering Part Number	Wafer Size	Die Size	Anode	Cathode
EPW4-1200-S020A-FR6*	150mm	3.08 x 3.08 mm ²	Al	Ni/Au

*Bare die are shipped as sawn full wafers mounted to UV tape attached to a 150mm frame. Electronic wafer maps are provided.

Maximum Ratings ($T_c = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V		
V_R	DC Peak Reverse Voltage	1200	V		
I_F	Continuous Forward Current	20	A	$T_J=175^\circ\text{C}$	1
I_{FRM}	Repetitive Peak Forward Surge Current	91 61	A	$T_c=25^\circ\text{C}, t_p=10\text{ ms}, \text{Half Sine Pulse}$ $T_c=110^\circ\text{C}, t_p=10\text{ ms}, \text{Half Sine Pulse}$	1
dV/dt	Diode dV/dt ruggedness	250	V/ns	$V_R=0-960\text{V}$	
$\int i^2 dt$	i^2t value	84.5 60.5	A ² s	$T_c=25^\circ\text{C}, t_p=10\text{ ms}$ $T_c=110^\circ\text{C}, t_p=10\text{ ms}$	1
T_J, T_{stg}	Operating Junction and Storage Temperature	-55 to +175	$^\circ\text{C}$		
T_{Proc}	Maximum Processing Temperature	325	$^\circ\text{C}$	10 min. maximum	

Note (1): Assumes $R_{\theta JC}$ Thermal Resistance of 0.6 $^\circ\text{C}/\text{W}$ or less

Electrical Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_F	Forward Voltage	1.5 2.2	1.8	V	$I_F = 20\text{ A}$ $T_J = 25^\circ\text{C}$ $I_F = 20\text{ A}$ $T_J = 175^\circ\text{C}$	Fig. 1
I_R	Reverse Current	35 65	200	μA	$V_R = 1200\text{ V}$ $T_J = 25^\circ\text{C}$ $V_R = 1200\text{ V}$ $T_J = 175^\circ\text{C}$	Fig. 2
Q_C	Total Capacitive Charge	99		nC	$V_R = 800\text{ V}$, $I_F = 20\text{ A}$ $di/dt = 200\text{ A}/\mu\text{s}$ $T_J = 25^\circ\text{C}$	Fig. 3
C	Total Capacitance	1500 93 67		pF	$V_R = 0\text{ V}$, $T_J = 25^\circ\text{C}$, $f = 1\text{ MHz}$ $V_R = 400\text{ V}$, $T_J = 25^\circ\text{C}$, $f = 1\text{ MHz}$ $V_R = 800\text{ V}$, $T_J = 25^\circ\text{C}$, $f = 1\text{ MHz}$	Fig. 4
E_C	Capacitance Stored Energy	28		μJ	$V_R = 800\text{ V}$	

Mechanical Parameters

Parameter	Typ.	Unit
Die Size	3.08 x 3.08	mm
Anode Pad Size	2.79 x 2.79	mm
Anode Pad Opening	2.51 x 2.51	mm
Thickness	377 \pm 10%	μm
Wafer Size	150	mm
Anode Metalization (Al)	4	μm
Cathode Metalization (Ni/Au)	0.9	μm
Frontside Passivation	Polyimide	

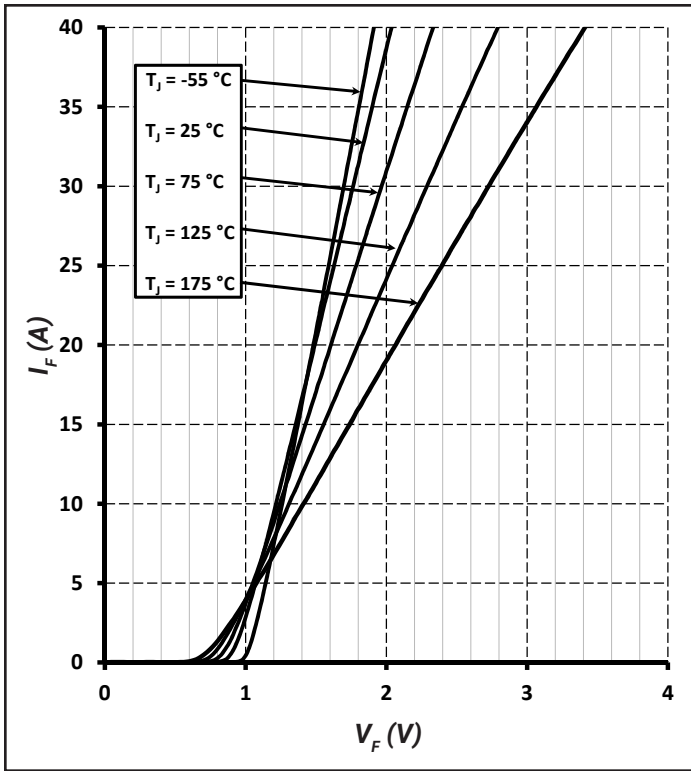


Figure 1. Forward Characteristics

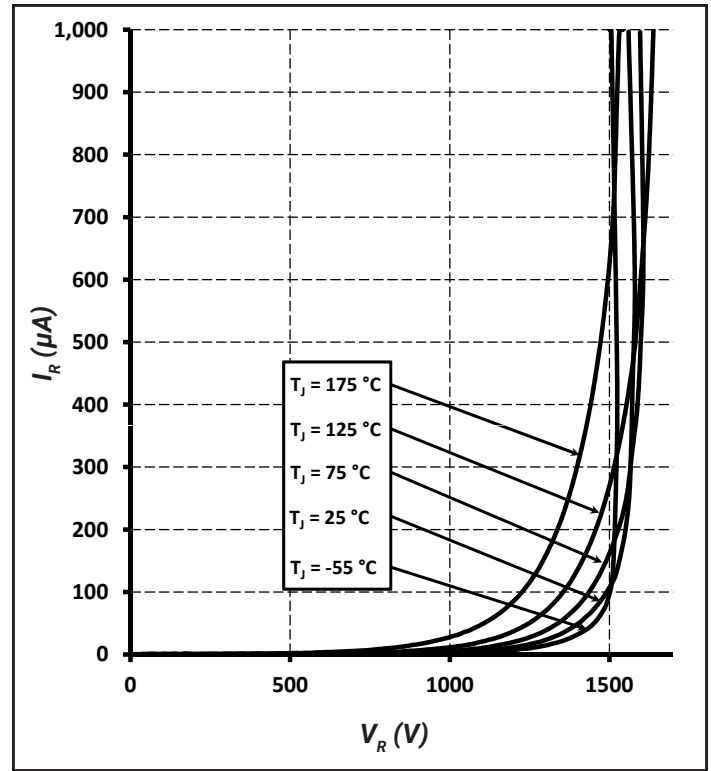


Figure 2. Reverse Characteristics

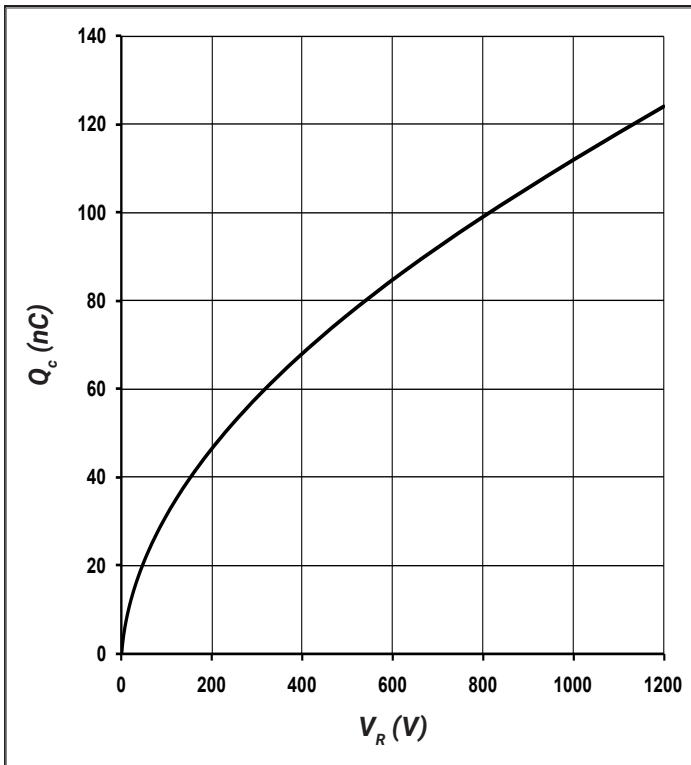


Figure 3. Total Capacitance Charge vs. Reverse Voltage

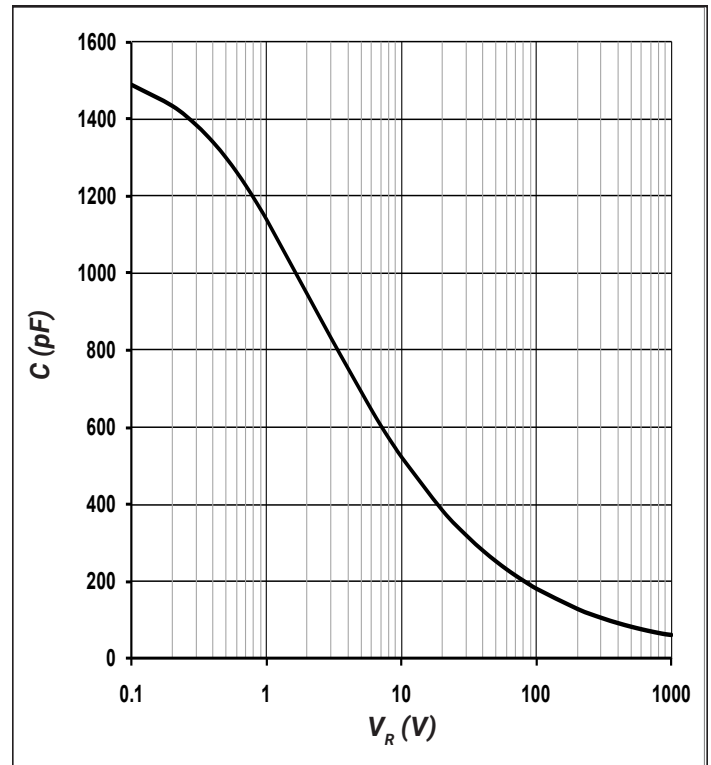
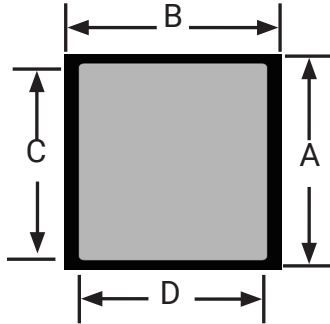


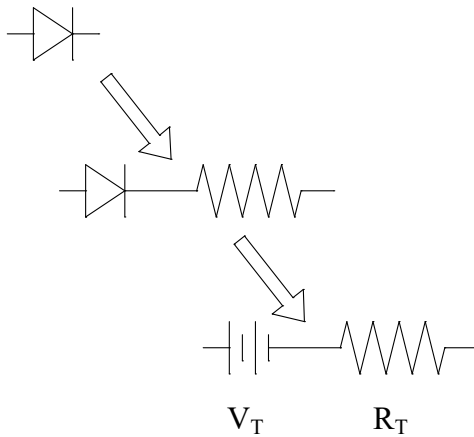
Figure 4. Capacitance vs. Reverse Voltage

Chip Dimensions



symbol	dimension	
	mm	inch
A	3.08	0.121
B	3.08	0.121
C	2.51	0.099
D	2.51	0.099

Diode Model



$$V_{fT} = V_T + I_f \cdot R_T$$

$$V_T = 0.97 + (T_J \cdot -1.40 \cdot 10^{-3})$$

$$R_T = 0.023 + (T_J \cdot 2.71 \cdot 10^{-4})$$

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.

Related Links

- Wolfspeed E-Series Family: <http://wolfspeed.com/E-Series>
- Wolfspeed 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>