



# PCD40120B

## 1200V Silicon Carbide Diode

### Features

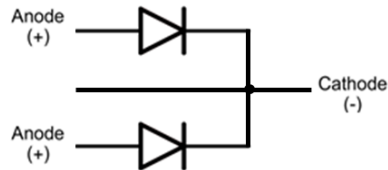
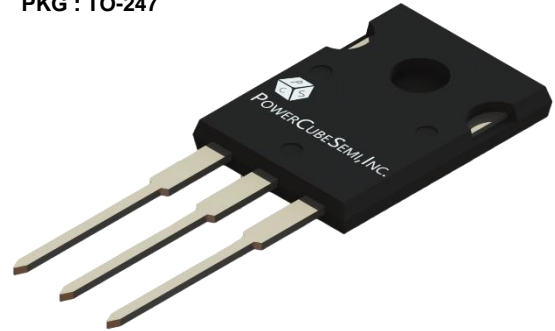
- 1200-Volt Schottky Rectifier
- Shorter recovery time
- High-speed switching possible
- High-Frequency Operation
- Temperature-Independent Switching Behavior
- Extremely Fast Switching
- Positive Temperature Coefficient on VF
- RoHS Compliant

### Applications

- Switch Mode Power Supplies
- Power Factor Correction
- Motor Drives
- Uninterruptible Power Supply
- Solar Inverter
- EV Charger

### Package Outline

PKG : TO-247



### Absolute Maximum Ratings

T<sub>C</sub> = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V <sub>RRM</sub>	Repetitive Peak Reverse Voltage	1200	V
V <sub>RSM</sub>	Surge Peak Reverse Voltage	1200	V
V <sub>DC</sub>	DC Blocking Voltage	1200	V
I <sub>F</sub>	Continuous Forward Current T <sub>C</sub> = 25°C T <sub>C</sub> = 150°C	53 / 106 20 / 40	A
I <sub>FRM</sub>	Repetitive Peak Forward Current T <sub>C</sub> = 110°C	124 / 248	A
I <sub>FSM</sub>	Non-Repetitive Forward Surge Current (PW=10ms sinusoidal) T <sub>C</sub> = 25°C T <sub>C</sub> = 110°C	160 / 320 128 / 256	A
P <sub>D</sub>	Power Dissipation T <sub>C</sub> = 25°C	230 / 460	W
T <sub>J</sub> , T <sub>stg</sub>	Operating Junction and Storage Temperature	-55 to +175	°C

\* Per Leg / Per Device

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$V_F$	Forward Voltage	$I_F = 20\text{A}, T_C = 25^\circ\text{C}$ $I_F = 20\text{A}, T_C = 175^\circ\text{C}$	--	1.45 2.0	1.75 2.4	V
$I_R$	Reverse Current	$V_R = 1200\text{V}, T_C = 25^\circ\text{C}$ $V_R = 1200\text{V}, T_C = 175^\circ\text{C}$	--	10 50	200 -	$\mu\text{A}$
$Q_C$	Total Capacitive Charge	$V_R = 800\text{V}$	--	119	--	nC
C	Total Capacitance	$V_R = 1\text{V}, T_J = 25^\circ\text{C}, f = 1\text{MHz}$ $V_R = 800\text{V}, T_J = 25^\circ\text{C}, f = 1\text{MHz}$	--	1204 88	--	pF

**Thermal Characteristics** $T_C = 25^\circ\text{C}$  unless otherwise noted

Symbol	Parameter	Min	Typ	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	--	0.65 / 0.33	0.78 / 0.39	$^\circ\text{C}/\text{W}$

\* Per Leg / Per Device

## Typical Characteristics (Per Leg)

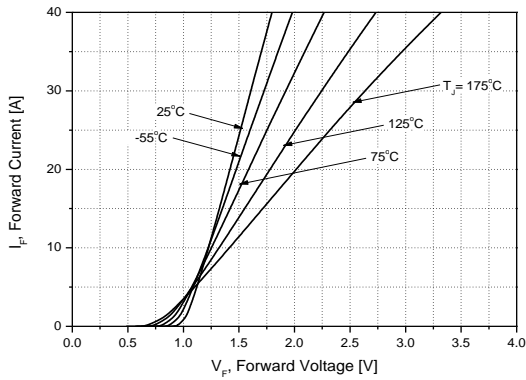


Figure 1. Forward Characteristics

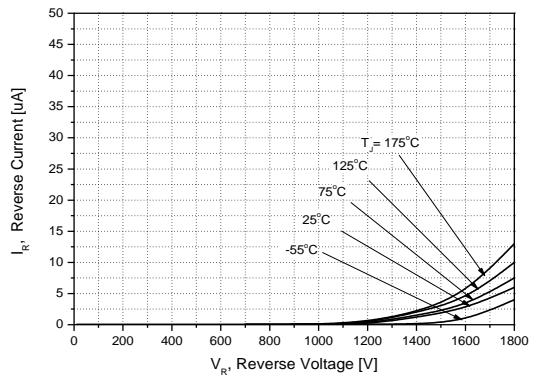


Figure 2. Reverse Characteristics

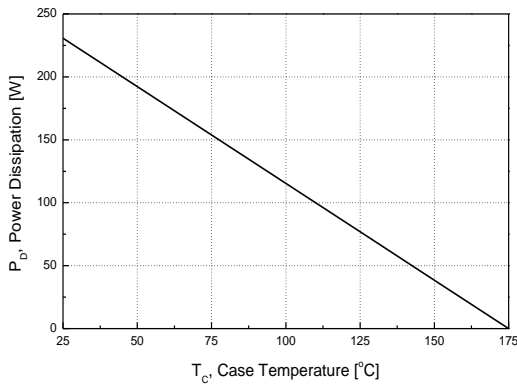


Figure 3. Power Dissipation

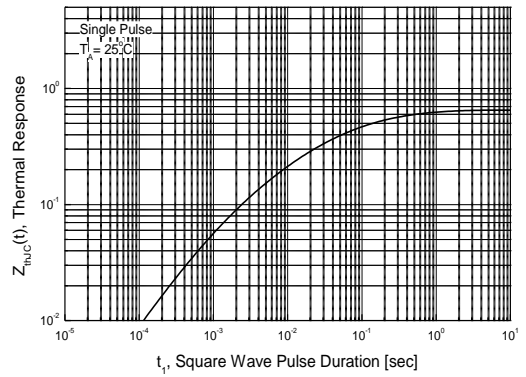


Figure 4. Transient Thermal Resistance

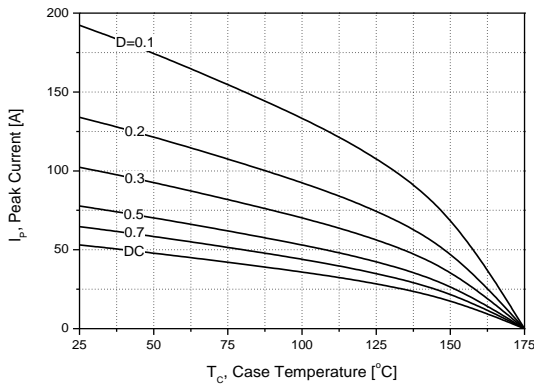


Figure 5. Peak Forward Current Derating

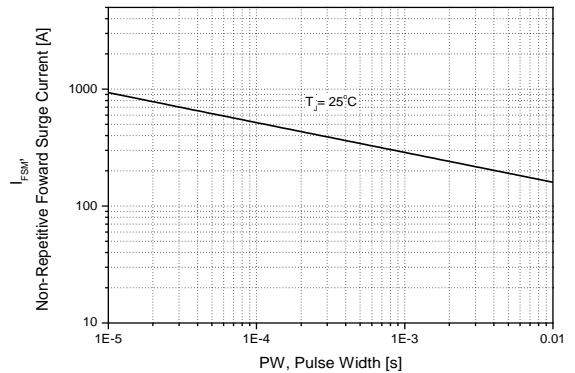


Figure 6. Non-Repetitive Peak Forward Surge Current vs. Pulse Duration

## Typical Characteristics (Per Leg)

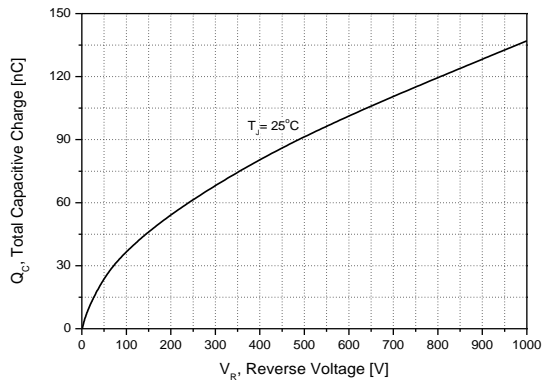


Figure 7. Total Capacitive Charge

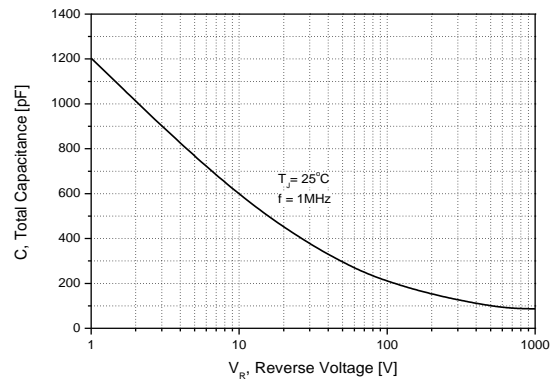


Figure 8. Total Capacitance

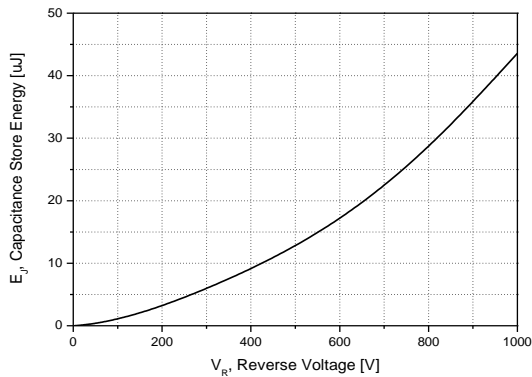


Figure 9. Capacitance Store Energy

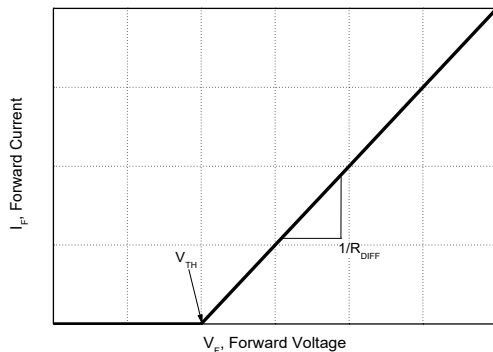


Figure 10. Equivalent Forward Current Curve

$$V_F = V_{TH} + R_{DIFF} \times I_F$$

### Threshold Voltage ( $V_{TH}$ )

$$V_{TH}(T_j) = -0.001 \times (T_j) + 0.950 \text{ [V]}$$

### Differential Resistance ( $R_{DIFF}$ )

$$R_{DIFF}(T_j) = A \times T_j^2 + B \times T_j + C \text{ [\Omega]}$$

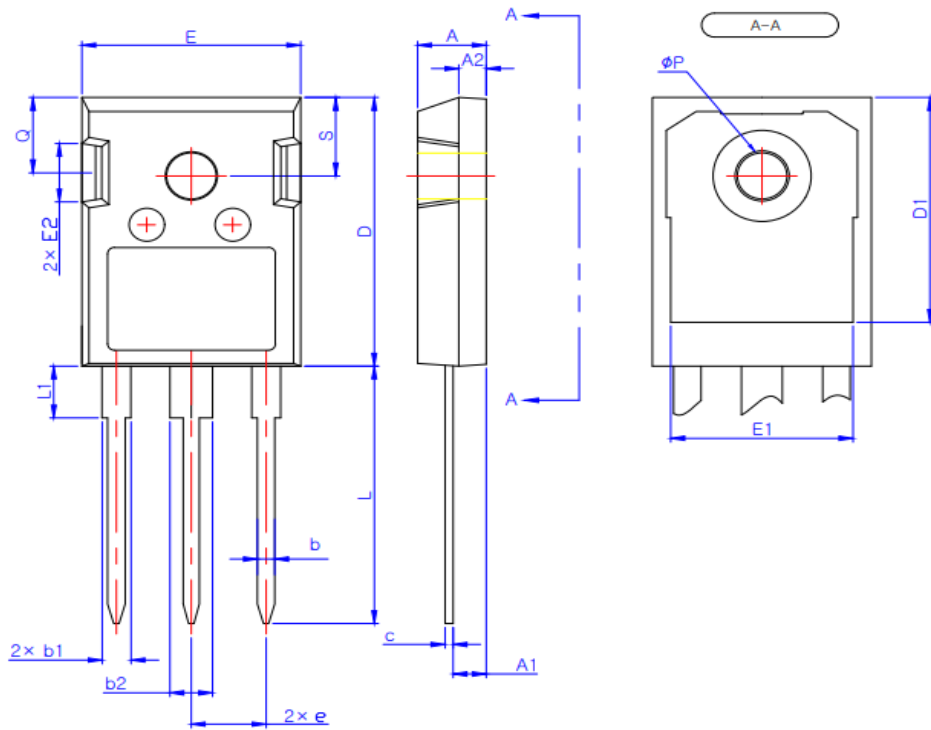
$$A = 9.05 \times 10^{-7}$$

$$B = 7.89 \times 10^{-5}$$

$$C = 2.30 \times 10^{-2}$$

$$[T_j \text{ [}^\circ\text{C]}; -55 \text{ }^\circ\text{C} \leq T_j \leq 175 \text{ }^\circ\text{C}; I_F \leq 20 \text{ A}]$$

# Package Information



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SYMBOL	MIN	MAX
A	4.80	5.20
A1	2.29	2.54
A2	1.90	2.10
b	1.10	1.30
b1	1.91	2.20
b2	2.92	3.20
c	0.50	0.70
D	20.80	21.34
D1	17.43	17.83
E	15.75	16.13
E1	13.06	13.46
E2	4.32	4.83
e	5.45 BSC	
L	19.85	20.25
L1	-	4.49
phi P	3.55	3.65
Q	5.59	6.19
S	6.15 BSC	

**NOTE**

1. THESE DIMENSION DO NOT INCLUDE MOLD PROTRUSION