

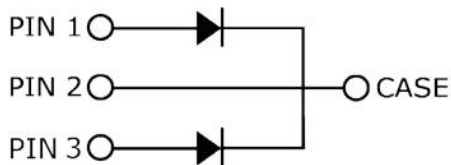
## S4D20120D 1200V SiC POWER SCHOTTKY RECTIFIER



### Description

S4D20120D is a single SiC Schottky rectifier packaged in TO-247AD(TO-247-3) case. The device is a high voltage Schottky rectifier that has very low total conduction losses and very stable switching characteristics over temperature extremes. The S4D20120D is ideal for energy sensitive, high frequency applications in challenging environments.

### Circuit Diagram



### Features

- 175°C T<sub>J</sub> operation
- Ultra-low switching loss
- Switching speeds independent of operating temperature
- Low total conduction losses
- High forward surge current capability
- High package isolation voltage
- Terminals finish: 100% Pure Tin
- “-A” is an AEC-Q101 qualified device
- Pb - Free Device
- All SMC parts are traceable to the wafer lot
- Additional electrical and life testing can be performed upon request

### Applications

- Alternative energy inverters
- Power Factor Correction (PFC)
- Free-Wheeling diodes
- Switching supply output rectification
- Reverse polarity protection

**Maximum Ratings:**

Characteristics	Symbol	Condition	Max.	Units
Peak Repetitive Reverse Voltage	$V_{RRM}$	-	1200	V
Working Peak Reverse Voltage	$V_{RWM}$			
DC Blocking Voltage	$V_R$			
Average Rectified Forward Current (per leg)	$I_{F(AV)1}$	$T_c = 25^\circ\text{C}$	36	A
	$I_{F(AV)2}$	$T_c = 157^\circ\text{C}$	10	A
Repetitive Peak Forward Surge Current (per leg)	$I_{FRM1}$	10 ms, Half Sine pulse, $T_c = 25^\circ\text{C}$	46	A
	$I_{FRM2}$	10 ms, Half Sine pulse, $T_c = 110^\circ\text{C}$	30	A
Peak One Cycle Non-Repetitive Surge Current (per leg)	$I_{FSM1}$	10ms, Half Sine pulse, $T_c = 25^\circ\text{C}$	105	A
	$I_{FSM2}$	10ms, Half Sine pulse, $T_c = 110^\circ\text{C}$	80	A
Non-Repetitive Peak Forward Surge Current (per leg)	$I_{F,Max1}$	10 $\mu\text{s}$ . Pulse, $T_c = 25^\circ\text{C}$	750	A
	$I_{F,Max2}$	10 $\mu\text{s}$ . Pulse, $T_c = 110^\circ\text{C}$	620	A
Power Dissipation (per leg)	$P_{tot1}$	$T_c = 25^\circ\text{C}$	178.6	W
	$P_{tot2}$	$T_c = 110^\circ\text{C}$	77.4	W

**Electrical Characteristics:**

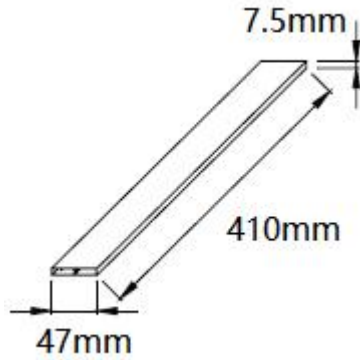
Characteristics	Symbol	Condition	Typ.	Max.	Units
Forward Voltage Drop*(per leg)	$V_{F1}$	@ 10A, Pulse, $T_J = 25^\circ\text{C}$	1.5	1.8	V
	$V_{F2}$	@ 10A, Pulse, $T_J = 175^\circ\text{C}$	2.2	3.0	V
Reverse Current*(per leg)	$I_{R1}$	@ $V_R = \text{rated } V_R$ $T_J = 25^\circ\text{C}$	2	30	$\mu\text{A}$
	$I_{R2}$	@ $V_R = \text{rated } V_R$ $T_J = 175^\circ\text{C}$	8	40	$\mu\text{A}$
Junction Capacitance(per leg)	$C_T$	$V_R = 0\text{V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{MHz}$	772	-	pF
Reverse Recovery Charge(per leg)	$Q_c$	$I_F = 10\text{A}$ , $di/dt = 200\text{A}/\mu\text{s}$ $V_R = 800\text{V}$ , $T_J = 25^\circ\text{C}$	56.46	-	nC
Capacitance Stored Energy(per leg)	$E_c$	$V_R = 800\text{V}$ , $T_J = 25^\circ\text{C}$	30.51	-	$\mu\text{J}$

\* Pulse width < 300  $\mu\text{s}$ , duty cycle < 2%

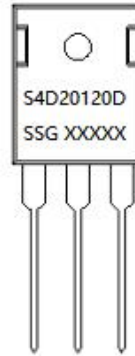
**Thermal-Mechanical Specifications:**

Characteristics	Symbol	Condition	Specification	Units
Junction Temperature	$T_J$	-	-55 to +175	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-	-55 to +175	$^\circ\text{C}$
Typical Thermal Resistance Junction to Case	$R_{\theta JC}$	DC operation, $T_J = 25^\circ\text{C}$	0.84(per leg) 0.42(both leg)	$^\circ\text{C}/\text{W}$

## Tube Specification



## Marking Diagram



Where XXXXX is YYWWL

S4D = Device Type  
D = Package type  
20 = Forward Current (20A)  
120 = Reverse Voltage (1200V)  
SSG = SSG  
YY = Year  
WW = Week  
L = Lot Number

**Cautions:** Molding resin  
Epoxy resin UL:94V-0

## Ordering Information

Device	Package	Shipping
S4D20120D	TO-247AD(TO-247-3)	25pcs /tube

**Ratings and Characteristics Curves (per leg)**

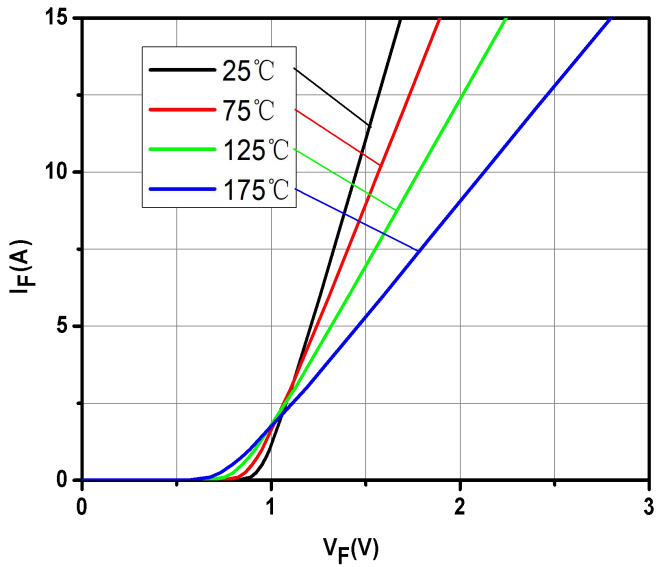


Fig.1-Typical Forward Voltage Characteristics

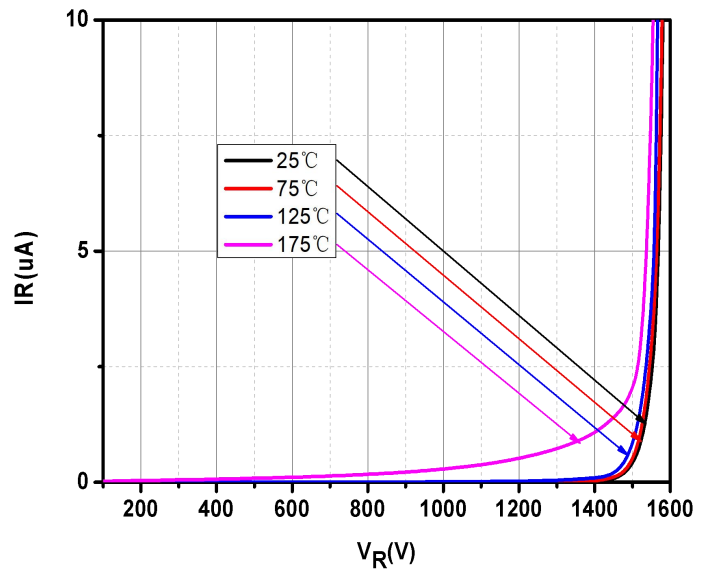


Fig.2-Typical Reverse Characteristics

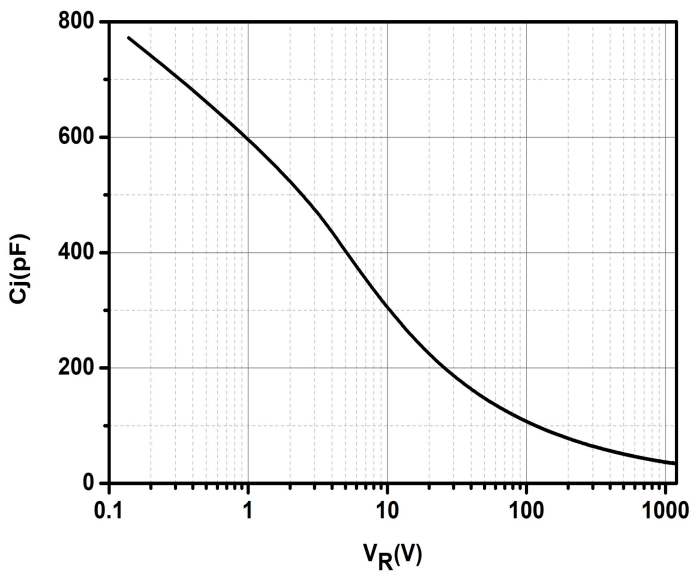


Fig.3-Capacitance vs. Reverse Voltage

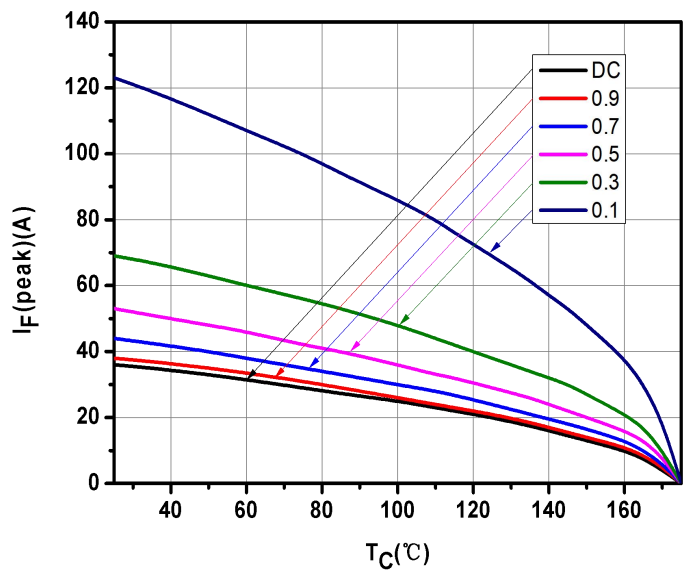


Fig.4-Current Derating

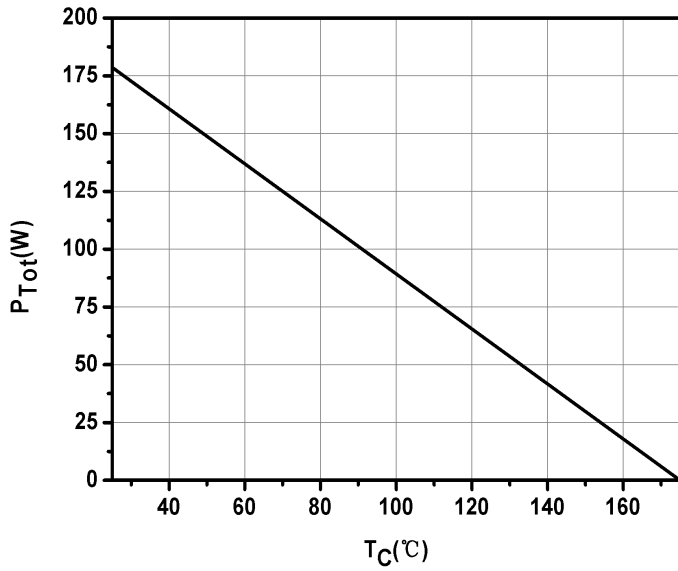


Fig.5-Power Derating

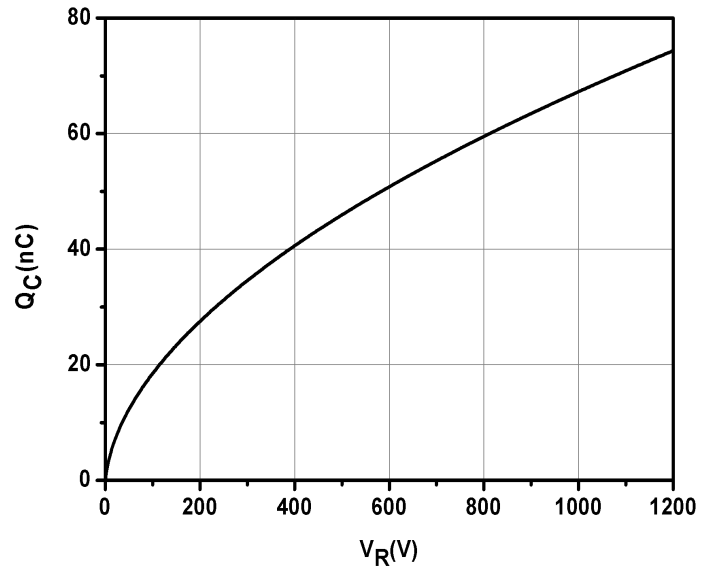


Fig.6-Total Capacitance Charge vs. Reverse Voltage

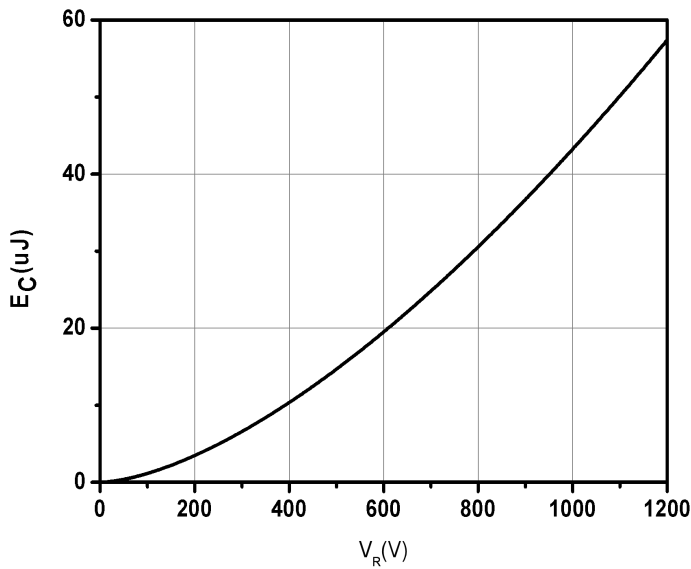


Fig.7-Capacitance Stored Energy

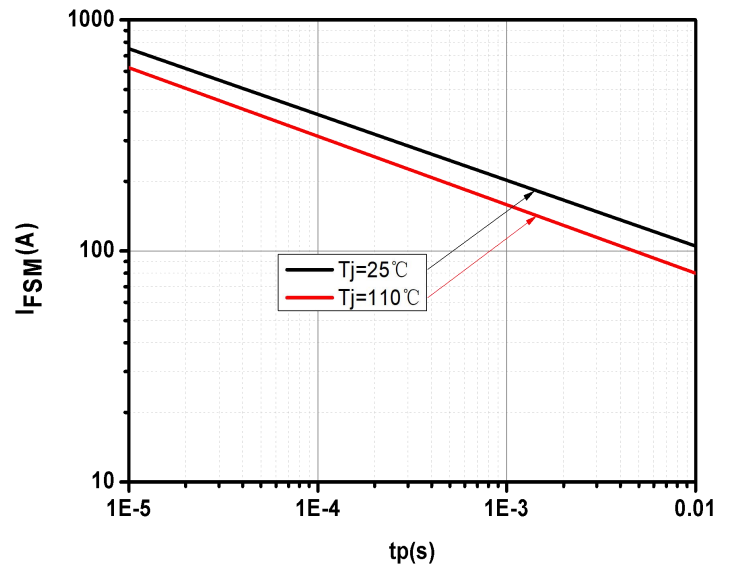
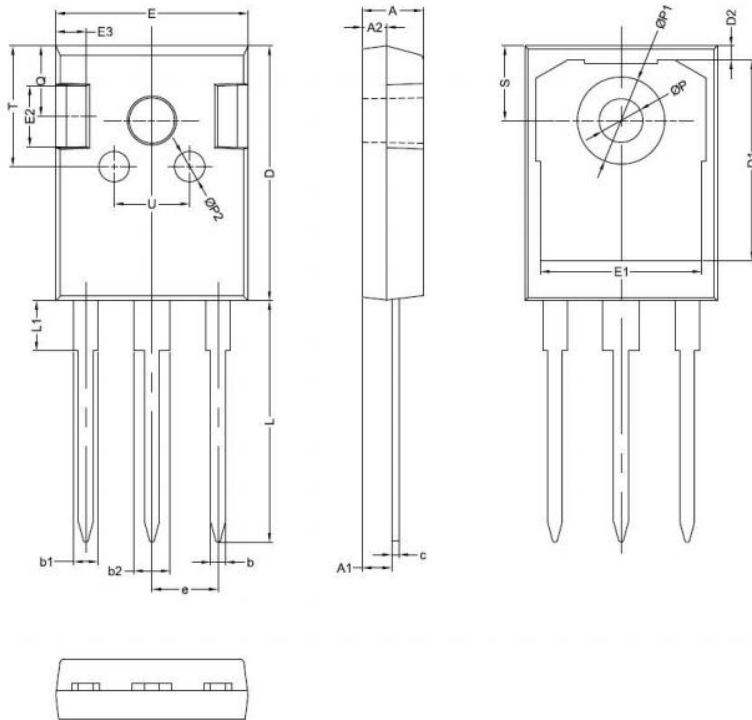


Fig.8-Non-repetitive peak forward surge current versus pulse duration (sinusoidal waveform)

**Mechanical Dimensions TO-247AD**



SYMBOL	Millimeters		
	MIN.	TYP.	MAX.
A	4.80	5.00	5.20
A1	2.20	2.41	2.61
A2	1.90	2.00	2.10
b	1.10	1.20	1.40
b1	1.80	2.00	2.20
b2	2.80	3.00	3.20
c	0.50	0.60	0.75
D	20.30	21.00	21.20
D1		16.55	
D2		1.20	
E	15.45	15.80	16.00
E1		13.30	
E2		5.00	
E3		2.50	
e		5.44	
L	19.42	19.92	20.70
L1		4.13	
P	3.50	3.60	3.70
P1	7.1		7.40
P2		2.50	
Q		5.80	
S	6.05	6.15	6.25
T		10.00	
U		6.20	

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