

## S3D20065D

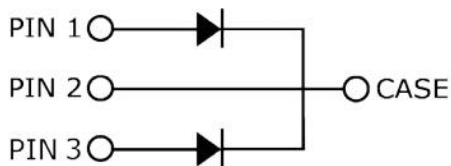
### 650V SiC POWER SCHOTTKY RECTIFIER



#### Description

S3D20065D is SiC Schottky rectifiers packaged in TO-247AD(TO-247-3) case. The device is high voltage Schottky rectifiers that have very low total conduction losses and very stable switching characteristics over temperature extremes. The S3D20065D 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(per leg)

| Characteristics                                                                        | Symbol                             | Condition                                           | Max. | Units |
|----------------------------------------------------------------------------------------|------------------------------------|-----------------------------------------------------|------|-------|
| Peak Repetitive Reverse Voltage<br>Working Peak Reverse Voltage<br>DC Blocking Voltage | $V_{RRM}$<br>$V_{RWM}$<br>$V_{DC}$ | -                                                   | 650  | V     |
| Average Rectified Forward Current                                                      | $I_{F(AV)1}$                       | $T_C=25^{\circ}\text{C}$                            | 45   | A     |
|                                                                                        | $I_{F(AV)2}$                       | $T_C=135^{\circ}\text{C}$                           | 20   | A     |
|                                                                                        | $I_{F(AV)3}$                       | $T_C=161^{\circ}\text{C}$                           | 10   | A     |
| Repetitive Peak Forward Surge Current                                                  | $I_{FRM1}$                         | 10ms, Half Sine pulse, $T_C=25^{\circ}\text{C}$     | 55   | A     |
|                                                                                        | $I_{FRM2}$                         | 10ms, Half Sine pulse, $T_C=110^{\circ}\text{C}$    | 40   | A     |
| Peak One Cycle Non-Repetitive Surge Current                                            | $I_{FSM1}$                         | 10ms, Half Sine pulse, $T_C=25^{\circ}\text{C}$     | 115  | A     |
|                                                                                        | $I_{FSM2}$                         | 10ms, Half Sine pulse, $T_C=110^{\circ}\text{C}$    | 80   | A     |
| Non-Repetitive Peak Forward Surge Current                                              | $I_{F,Max1}$                       | 10 $\mu\text{s}$ . Pulse, $T_C=25^{\circ}\text{C}$  | 995  | A     |
|                                                                                        | $I_{F,Max2}$                       | 10 $\mu\text{s}$ . Pulse, $T_C=110^{\circ}\text{C}$ | 685  | A     |
| Power Dissipation                                                                      | $P_{tot1}$                         | $T_C=25^{\circ}\text{C}$                            | 179  | W     |
|                                                                                        | $P_{tot2}$                         | $T_C=110^{\circ}\text{C}$                           | 77   | W     |

## Electrical Characteristics(per leg)

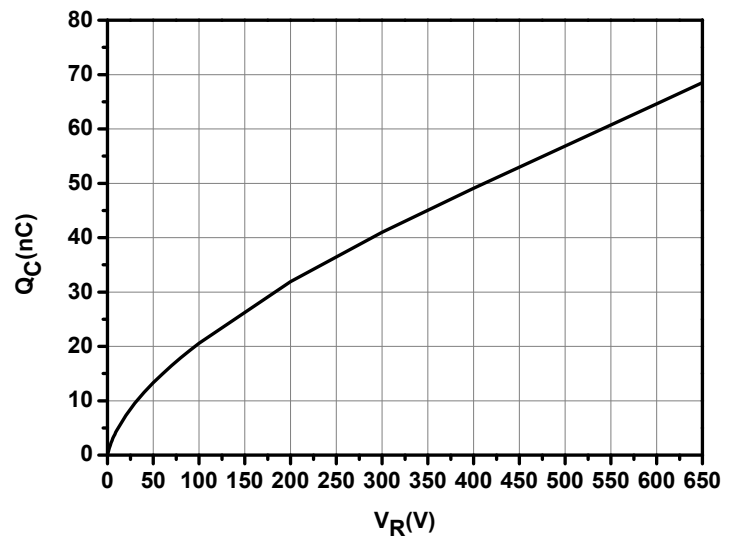
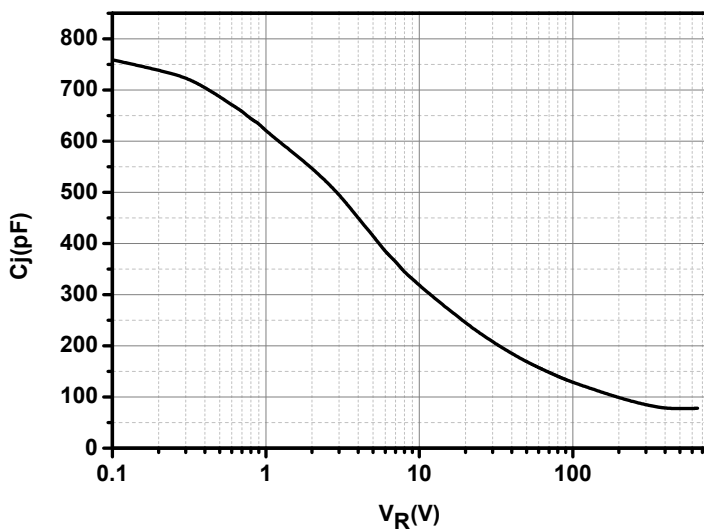
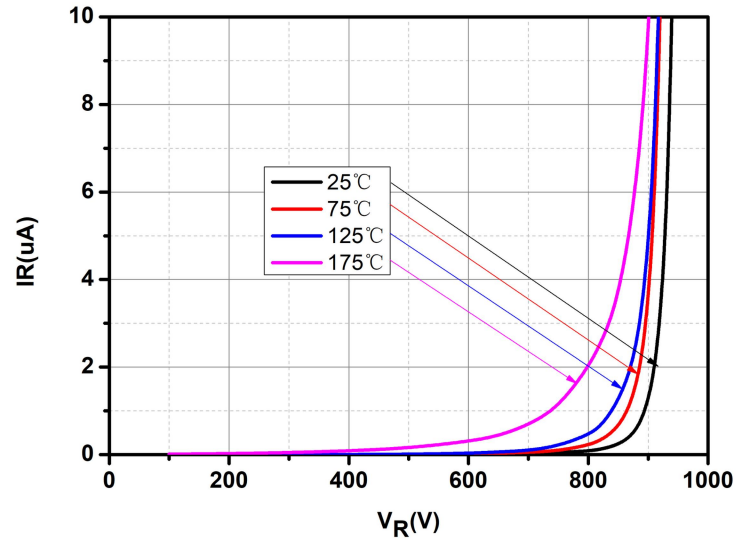
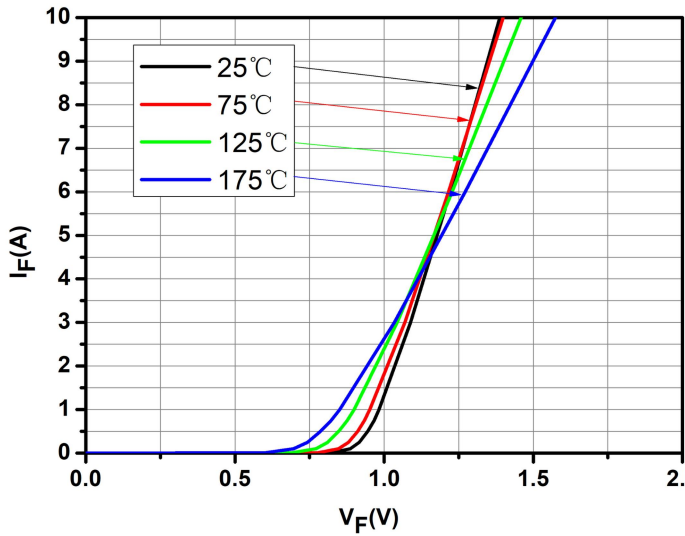
| Characteristics           | Symbol   | Condition                                                                                                  | Typ.  | Max. | Units         |
|---------------------------|----------|------------------------------------------------------------------------------------------------------------|-------|------|---------------|
| Forward Voltage Drop*     | $V_{F1}$ | @ 10A, Pulse, $T_J = 25^{\circ}\text{C}$                                                                   | 1.45  | 1.7  | V             |
|                           | $V_{F2}$ | @ 10A, Pulse, $T_J = 175^{\circ}\text{C}$                                                                  | 1.65  | 2.0  | V             |
| Reverse Current*          | $I_{R1}$ | @ $V_R$ = rated $V_R$ , $T_J = 25^{\circ}\text{C}$                                                         | 0.7   | 40   | $\mu\text{A}$ |
|                           | $I_{R2}$ | @ $V_R$ = rated $V_R$ , $T_J = 175^{\circ}\text{C}$                                                        | 7     | 160  | $\mu\text{A}$ |
| Junction Capacitance      | $C_T$    | $V_R=0\text{V}$ , $T_J=25^{\circ}\text{C}$ , $f=1\text{MHz}$                                               | 787   | -    | pF            |
| Reverse Recovery Charge   | $Q_C$    | $I_F = 10\text{A}$ , $di/dt = 200\text{A}/\mu\text{s}$<br>$V_R = 400\text{V}$ , $T_J = 25^{\circ}\text{C}$ | 49.1  | -    | nC            |
| Capacitance Stored Energy | $E_C$    | $V_R = 400\text{V}$ , $T_J = 25^{\circ}\text{C}$                                                           | 12.03 | -    | $\mu\text{J}$ |

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

## Thermal-Mechanical Specifications:

| Characteristics                                | Symbol          | S3D20065D                         | Units                       |
|------------------------------------------------|-----------------|-----------------------------------|-----------------------------|
| Junction Temperature                           | $T_J$           | -55 to +175                       | $^{\circ}\text{C}$          |
| Storage Temperature                            | $T_{stg}$       | -55 to +175                       | $^{\circ}\text{C}$          |
| Typical Thermal Resistance<br>Junction to Case | $R_{\theta JC}$ | 0.84(per leg)<br>0.42(per device) | $^{\circ}\text{C}/\text{W}$ |

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



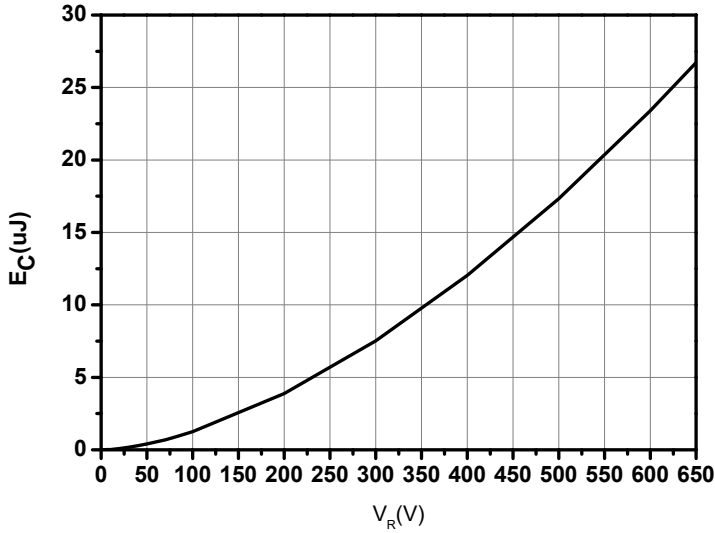


Fig.5-Capacitance Stored Energy

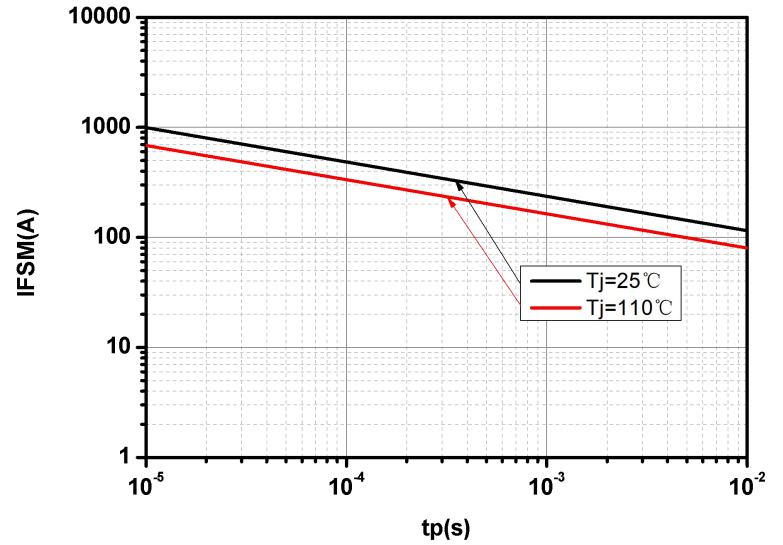


Fig.6-Non-repetitive peak forward surge current versus pulse duration (sinusoidal waveform)

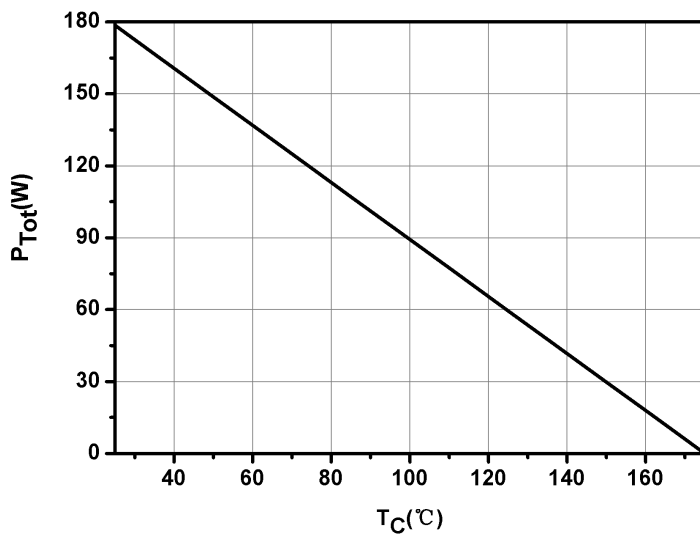


Fig.7-Power Derating

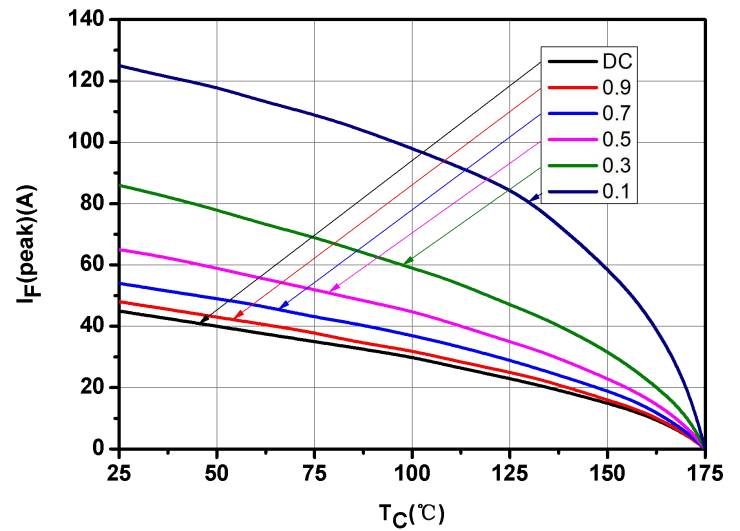
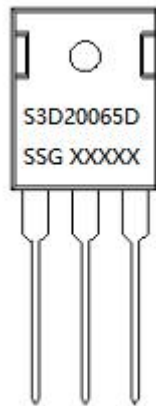


Fig.8-Current Derating

## Ordering Information

| Device    | Package            | Shipping    |
|-----------|--------------------|-------------|
| S3D20065D | TO-247AD(TO-247-3) | 25pcs /tube |

## Marking Diagram

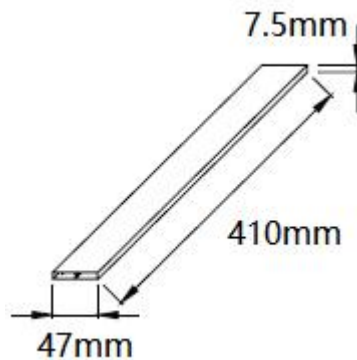


Where XXXXX is YYWWL

S3D = Device Type  
D = Package type  
20 = Forward Current (20A)  
065 = Reverse Voltage (650V)  
SSG = SSG  
YY = Year  
WW = Week  
L = Lot Number

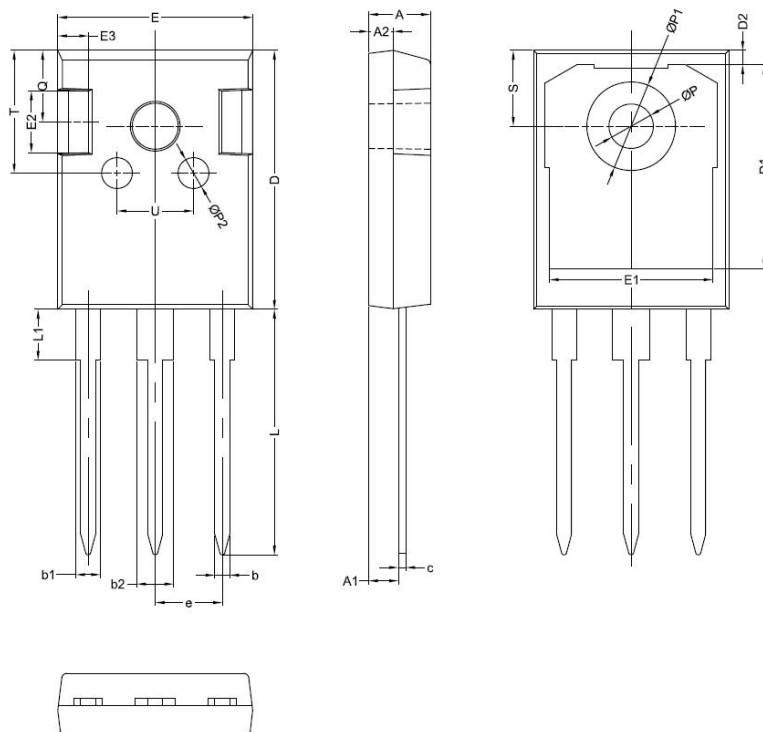
**Cautions:** Molding resin  
Epoxy resin UL94V-0

## Tube Specification



TO-247AD(TO-247-3)

## Mechanical Dimensions TO-247AD



| SYMBOL | Millimeters |       |       |
|--------|-------------|-------|-------|
|        | MIN.        | TYP.  | MAX.  |
| A      | 4.80        |       | 5.20  |
| A1     | 2.00        |       | 2.75  |
| A2     | 1.90        |       | 2.10  |
| b      | 1.00        |       | 1.40  |
| b1     | 1.80        |       | 2.40  |
| b2     | 2.80        |       | 3.40  |
| c      | 0.40        |       | 0.75  |
| D      | 19.80       |       | 21.20 |
| D1     |             | 16.55 |       |
| D2     |             | 1.20  |       |
| E      | 15.20       |       | 16.00 |
| E1     |             | 13.30 |       |
| E2     |             | 5.00  |       |
| E3     |             | 2.50  |       |
| e      | 5.20        |       | 5.70  |
| L      | 13.90       |       | 20.70 |
| L1     | 3.70        |       | 4.30  |
| P      | 3.50        |       | 3.70  |
| P1     | 7.1         |       | 7.40  |
| P2     |             | 2.50  |       |
| Q      |             | 5.80  |       |
| S      | 6.05        |       | 6.25  |
| T      |             | 10.00 |       |
| U      |             | 6.20  |       |

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