

## S6D02065A S6D02065E 650V SIC POWER SCHOTTKY RECTIFIERS

### Description




This 650V 2A diode is a high voltage Schottky rectifier that has very low total conduction losses and very stable switching characteristics over temperature extremes. The S6D02065A/S6D02065E are ideal for energy sensitive, high frequency applications in challenging environments.

### Applications

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

### 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

|   |   |
|---|---|
| S6D02065A<br> | S6D02065E<br> |
| TO-220AC<br>TO-220-2  | DPAK<br>(TO-252-2)  |
|              |   |

### Maximum Ratings:

| Characteristics                             | Symbol       | Condition                                  | Max. | Units |
|---|--------------|--|------|-------|
| Peak Repetitive Reverse Voltage             | $V_{RRM}$    | -  |      |       |
| Working Peak Reverse Voltage                | $V_{RWM}$    |  | 650  | V     |
| DC Blocking Voltage                         | $V_{DC}$     |  |      |       |
| Average Rectified Forward Current           | $I_{F(AV)1}$ | $T_C = 25^\circ C$                         | 12.5 | A     |
|   | $I_{F(AV)2}$ | $T_C = 165^\circ C$                        | 2    | A     |
| Repetitive Peak Forward Surge Current       | $I_{FRM1}$   | 10ms, Half Sine pulse, $T_C = 25^\circ C$  | 12   | A     |
|   | $I_{FRM2}$   | 10ms, Half Sine pulse, $T_C = 110^\circ C$ | 9    | A     |
| Peak One Cycle Non-Repetitive Surge Current | $I_{FSM1}$   | 10ms, Half Sine pulse, $T_C = 25^\circ C$  | 20   | A     |
|   | $I_{FSM2}$   | 10ms, Half Sine pulse, $T_C = 110^\circ C$ | 15   | A     |
| Power Dissipation                           | $P_{tot1}$   | $T_C = 25^\circ C$                         | 60   | W     |
|   | $P_{tot2}$   | $T_C = 110^\circ C$                        | 26   | W     |

### Electrical Characteristics:

| Characteristics                  | Symbol   | Condition  | Typ.  | Max. | Units   |
|----------------------------------|----------|--|-------|------|---------|
| Forward Voltage Drop*            | $V_{F1}$ | @ 2A, Pulse, $T_J = 25^\circ C$                                  | 1.27  | 1.5  | V       |
|                                  | $V_{F2}$ | @ 2A, Pulse, $T_J = 175^\circ C$                                 | 1.4   | 1.6  | V       |
| Reverse Current at DC condition* | $I_{R1}$ | @ $V_R = \text{rated } V_R$<br>$T_J = 25^\circ C$                | 0.3   | 3    | $\mu A$ |
| Reverse Current *                | $I_{R2}$ | @ $V_R = \text{rated } V_R$<br>$T_J = 175^\circ C$               | 6     | 25   | $\mu A$ |
| Junction Capacitance             | $C_T$    | $V_R = 0V, T_J = 25^\circ C, f = 1MHz$                           | 170   | -    | pF      |
| Reverse Recovery Charge          | $Q_c$    | $I_F = 2A, di/dt = 200A/\mu s$<br>$V_R = 400V, T_J = 25^\circ C$ | 10.60 | -    | nC      |
| Capacitance Stored Energy        | $E_c$    | $V_R = 400V, T_J = 25^\circ C$                                   | 2.60  | -    | $\mu J$ |

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

### Thermal-Mechanical Specifications:

| Characteristics                             | Symbol          | Condition    | S6D02065A   | S6D02065E | Units        |
|---|-----------------|--------------|-------------|-----------|--------------|
| Junction Temperature                        | $T_J$           | -            | -55 to +175 |           | $^\circ C$   |
| Storage Temperature                         | $T_{stg}$       | -            | -55 to +175 |           | $^\circ C$   |
| Typical Thermal Resistance Junction to Case | $R_{\theta JC}$ | DC operation | 2.5         | 2.4       | $^\circ C/W$ |

## Ordering Information

| Device    | Package            | Shipping      |
|-----------|--------------------|---------------|
| S6D02065A | TO-220AC(TO-220-2) | 50pcs /tube   |
| S6D02065E | DPAK(TO-252-2)     | 3000pcs /reel |

For information on tape and reel specifications, including part orientation and tape sizes, please refer to our tape and reel packaging specification.

## Ratings and Characteristics Curves

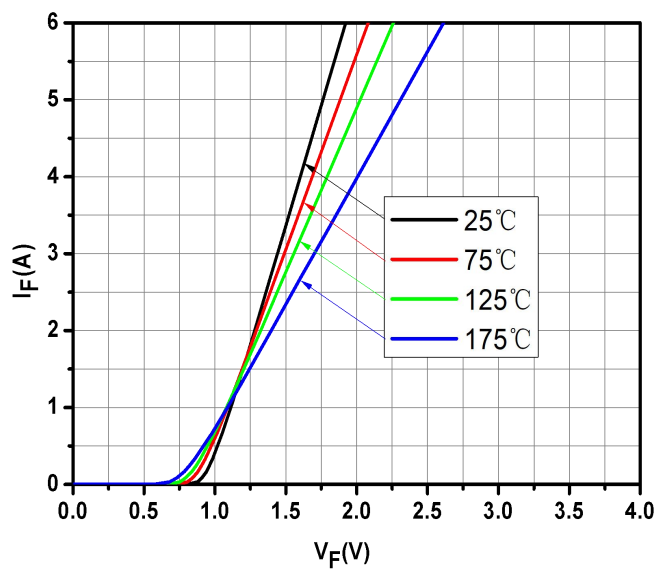


Fig.1-Typical Forward Voltage Characteristics

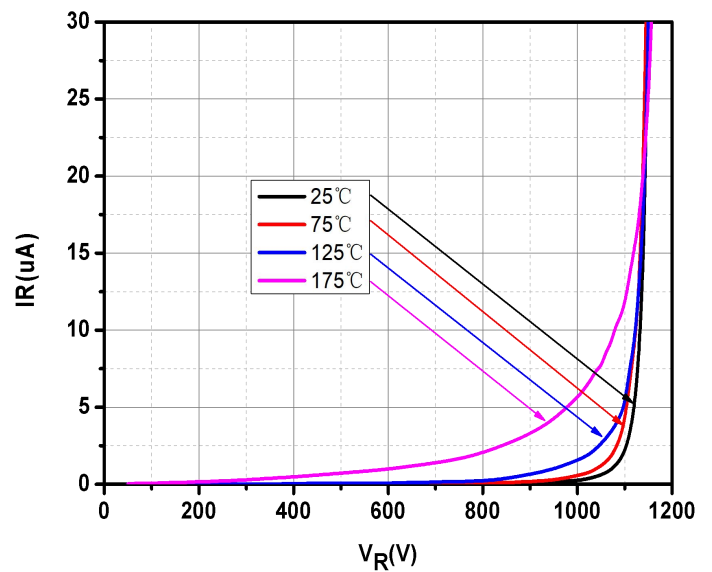


Fig.2-Typical Reverse Characteristics

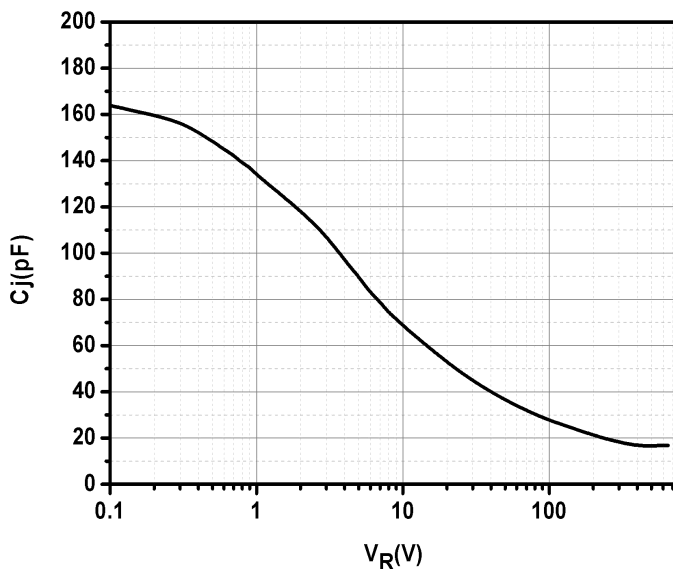


Fig.3-Capacitance vs. Reverse Voltage

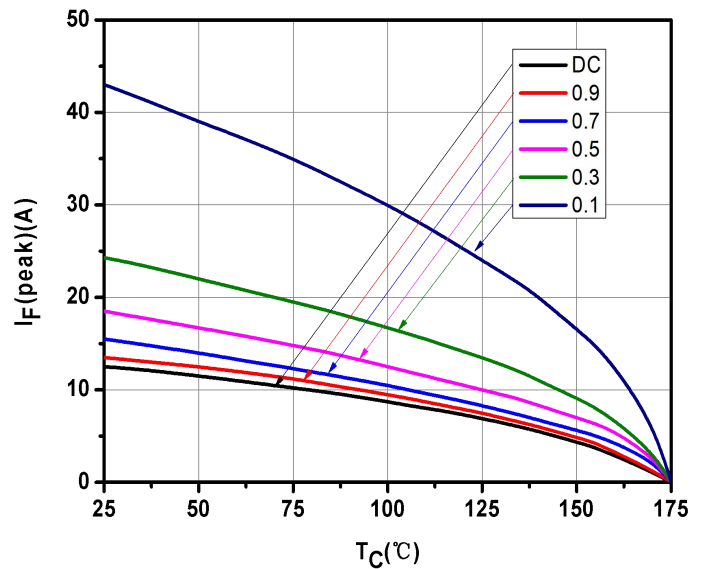


Fig.4-Current Derating

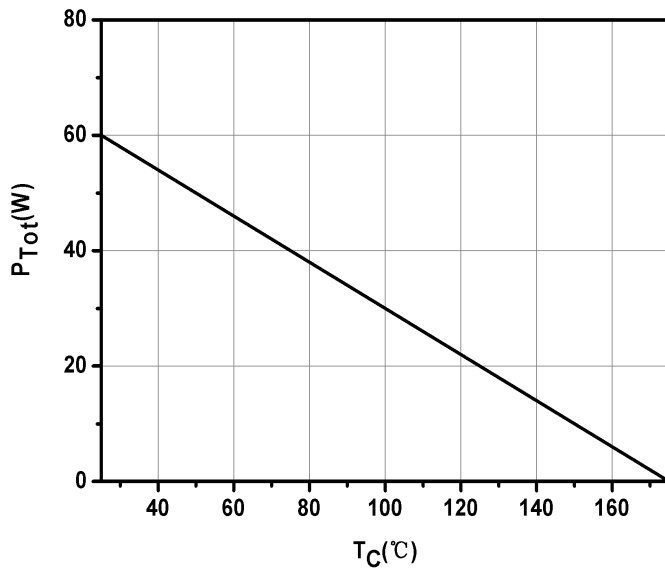


Fig.5-Power Derating

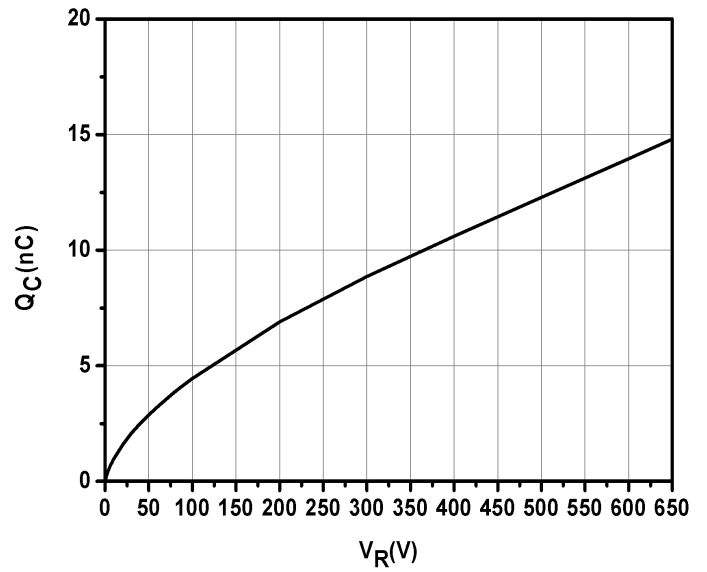


Fig.6-Total Capacitance Charge vs. Reverse Voltage

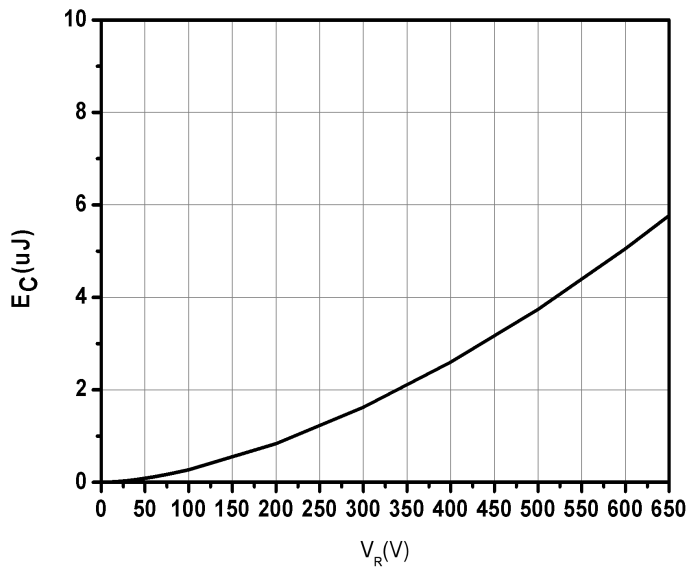
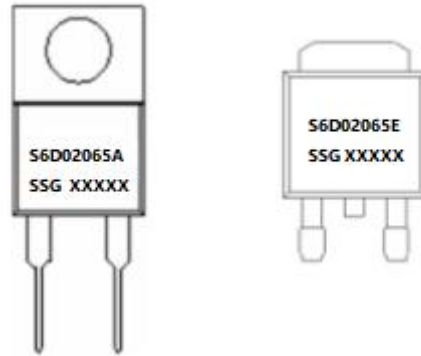


Fig.7-Capacitance Stored Energy vs. Reverse Voltage

## Marking Diagram

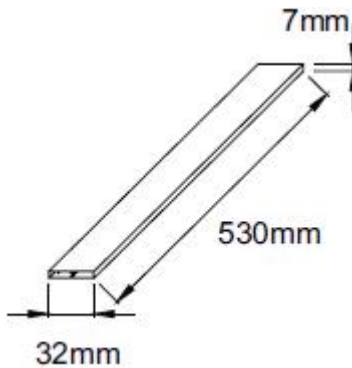


Where XXXXX is YYWWL

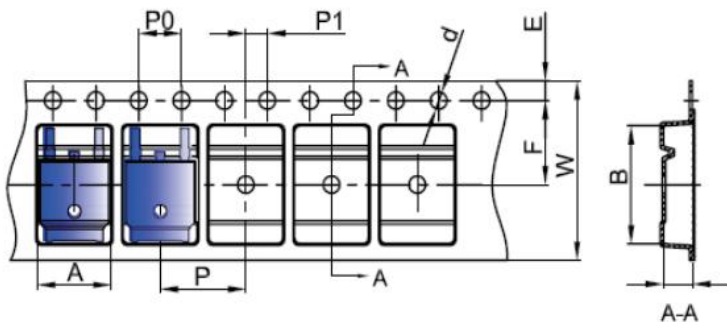
S6D = Device Type  
A/E = Package type  
02 = Forward Current (50A)  
065 = Reverse Voltage (650V)  
SSG = SSG  
YY = Year  
WW = Week  
L = Lot Number

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

## Tube Specification (TO-220-2)

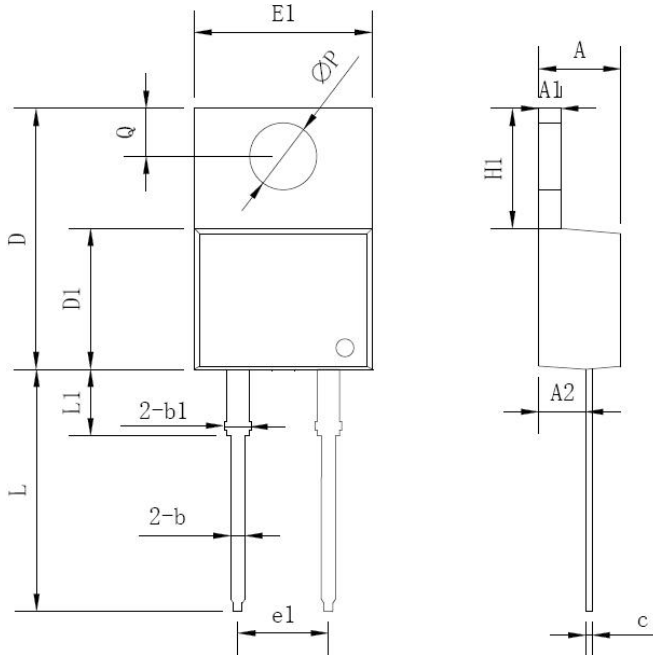


## Carrier Tape & Reel Specification



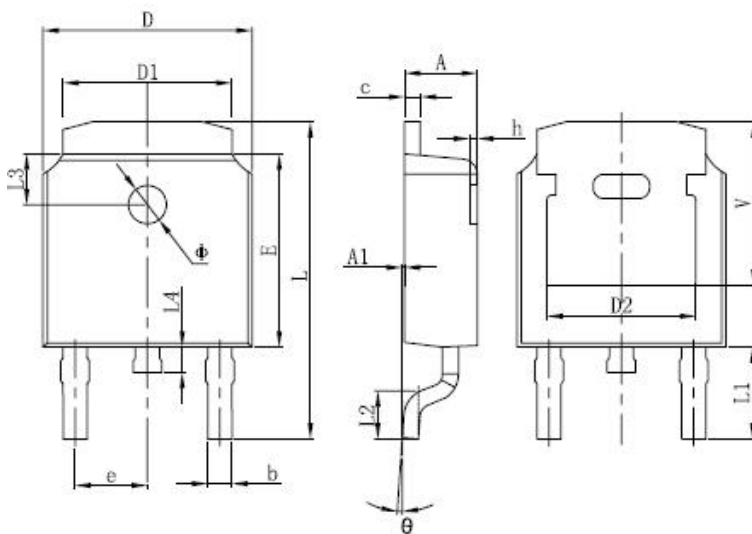
| SYMBOL | Millimeters |       |
|--------|-------------|-------|
|        | Min.        | Max.  |
| A      | 6.80        | 7.00  |
| B      | 10.40       | 10.60 |
| C      | 2.60        | 2.80  |
| d      | Φ1.45       | Φ1.65 |
| E      | 1.65        | 1.85  |
| F      | 7.40        | 7.60  |
| P0     | 3.90        | 4.10  |
| P      | 7.90        | 8.10  |
| P1     | 1.90        | 2.10  |
| W      | 15.90       | 16.30 |

**Mechanical Dimensions TO-220AC**



| Symbol | Dimensions in millimeters |         |       |
|--------|---------------------------|---------|-------|
|        | Min.                      | Typical | Max.  |
| A      | 3.56                      | -       | 4.83  |
| A1     | 0.51                      | -       | 1.40  |
| A2     | 2.03                      | -       | 2.92  |
| b      | 0.38                      | -       | 1.02  |
| b1     | 1.14                      | -       | 1.78  |
| c      | 0.31                      | -       | 0.61  |
| D      | 14.22                     | -       | 16.51 |
| D1     | 8.38                      | -       | 9.42  |
| E1     | 9.65                      | 10.16   | 10.67 |
| e1     | -                         | 5.08    | -     |
| H1     | 5.84                      | -       | 6.86  |
| L      | 12.70                     | -       | 14.73 |
| L1     | -                         | -       | 6.35  |
| ØP     | -                         | 3.56    | -     |
| Q      | 2.54                      | -       | 3.43  |

**Mechanical Dimensions DPAK(TO-252-2)**



| SYMBOL | Dimensions in millimeters |      |       |
|--------|---------------------------|------|-------|
|        | Min.                      | Typ. | Max.  |
| A      | 2.18                      | -    | 2.39  |
| A1     | -                         | -    | 0.13  |
| b      | 0.64                      | -    | 0.89  |
| c      | 0.46                      | -    | 0.89  |
| D      | 6.35                      | -    | 6.73  |
| D1     | 4.95                      | -    | 5.46  |
| D2     | 4.32                      | -    | -     |
| E      | 5.97                      | 6.1  | 6.22  |
| e      | 2.29BSC                   |      |       |
| L      | 9.4                       | -    | 10.41 |
| L1     | 2.90 REF.                 |      |       |
| L2     | 1.4                       | 1.52 | 1.78  |
| L3     | 1.60 REF.                 |      |       |
| L4     | -                         | -    | 1.02  |
| Ø      | 1.1                       | -    | 1.3   |
| Θ      | 0°                        | -    | 10°   |
| V      | 5.21                      | -    | -     |

**Technical Data**  
**Data Sheet N2582, REV.-**



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