

650V/20A Silicon Carbide Power Schottky Barrier Diode

Features

- Rated to 650V at 20 Amps
- Zero reverse recovery current
- Zero forward recovery voltage
- Temperature independent switching behavior
- High temperature operation
- High frequency operation

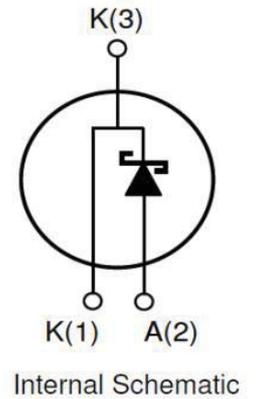
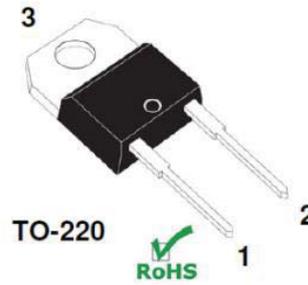
| Key Characteristics | | |
|-----------------------------------|------------|-----------|
| V_{RRM} | 650 | V |
| $I_F, T_c \leq 135^\circ\text{C}$ | 20 | A |
| Q_c | 56 | nC |

Benefits

- Unipolar rectifier
- Substantially reduced switching losses
- No thermal run-away with parallel devices
- Reduced heat sink requirements

Applications

- SMPS, e.g., CCM PFC;
- Motor drives, Solar application, UPS, Wind turbine, Rail traction, EV/HEV



| Part No. | Package Type | Marking |
|------------|--------------|---------|
| SC3S06520A | TO-220-2 pin | SC06520 |

Maximum Ratings

| Parameter | Symbol | Test Condition | Value | Unit |
|---|-----------|--|------------------------------------|-------------|
| Repetitive Peak Reverse Voltage | V_{RRM} | | 650 | V |
| Surge Peak Reverse Voltage | V_{RSM} | | 650 | V |
| DC Blocking Voltage | V_{DC} | | 650 | V |
| Continuous Forward Current | I_F | $T_C=25^{\circ}C$ $T_C=135^{\circ}C$ | 45 20 | A |
| Repetitive Peak Forward Surge Current | I_{FRM} | $T_C=25^{\circ}C$, $t_p=10ms$, Half Sine Wave, $D=0.3$ | 100 | A |
| Non-repetitive Peak Forward Surge Current | I_{FSM} | $T_C=25^{\circ}C$, $t_p=10ms$, Half Sine Wave | 200 | A |
| Power Dissipation | P_{TOT} | $T_C=25^{\circ}C$ | 141.5 | W |
| | | $T_C=110^{\circ}C$ | 61.3 | W |
| Operating Junction | T_j | | -55 $^{\circ}C$ to 175 $^{\circ}C$ | $^{\circ}C$ |
| Storage Temperature | T_{stg} | | -55 $^{\circ}C$ to 175 $^{\circ}C$ | $^{\circ}C$ |
| Mounting Torque | | M3 Screw | 1 | Nm |
| | | 6-32 Screw | 8.8 | lbf-in |

Thermal Characteristics

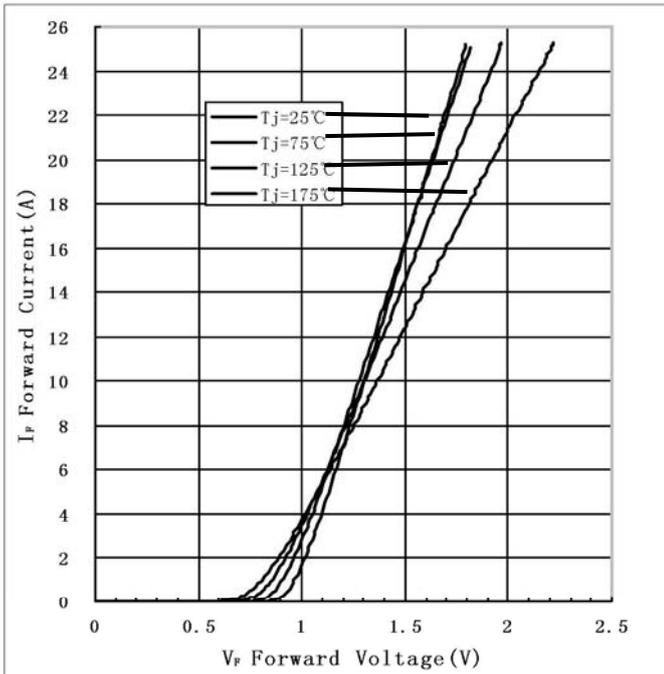
| Parameter | Symbol | Test Condition | Value | Unit |
|--|------------|----------------|-------|---------------|
| | | | Typ. | |
| Thermal resistance from junction to case | R_{thJC} | | 1.06 | $^{\circ}C/W$ |

Electrical Characteristics

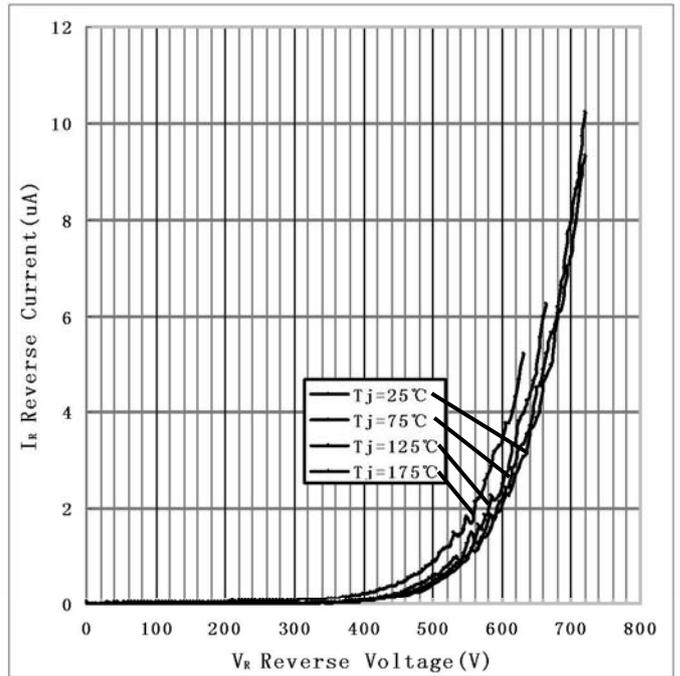
| Parameter | Symbol | Test Conditions | Numerical | | Unit |
|-------------------------|--------|--|-----------|------|---------|
| | | | Typ. | Max. | |
| Forward Voltage | V_F | $I_F=20A$, $T_j=25^{\circ}C$ | 1.7 | 1.8 | V |
| | | $I_F=20A$, $T_j=175^{\circ}C$ | 2 | 2.5 | |
| Reverse Current | I_R | $V_R=650V$, $T_j=25^{\circ}C$ | 30 | 100 | μA |
| | | $V_R=650V$, $T_j=175^{\circ}C$ | 60 | 200 | |
| Total Capacitive Charge | Q_C | $V_R=400V$, $T_j=150^{\circ}C$ $Q_C = \int_0^R C(V)dV$ | 56 | - | nC |
| Total Capacitance | C | $V_R=0V$, $T_j=25^{\circ}C$, $f=1MHz$ | 1170 | 1300 | pF |
| | | $V_R=200V$, $T_j=25^{\circ}C$, $f=1MHz$ | 110 | 120 | |
| | | $V_R=400V$, $T_j=25^{\circ}C$, $f=1MHz$ | 100 | 108 | |

RATING AND CHARACTERISTICS CURVES(SC3S06520A)

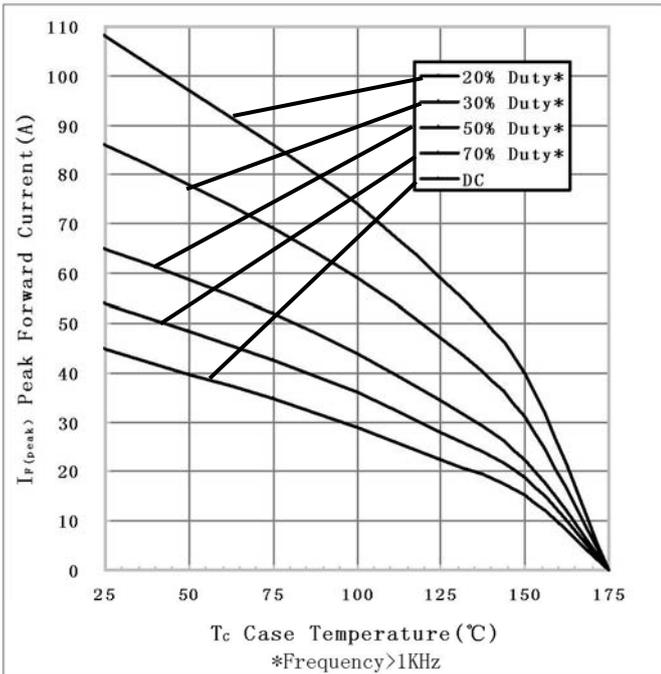
1) Forward IV characteristics as a function of Tj :



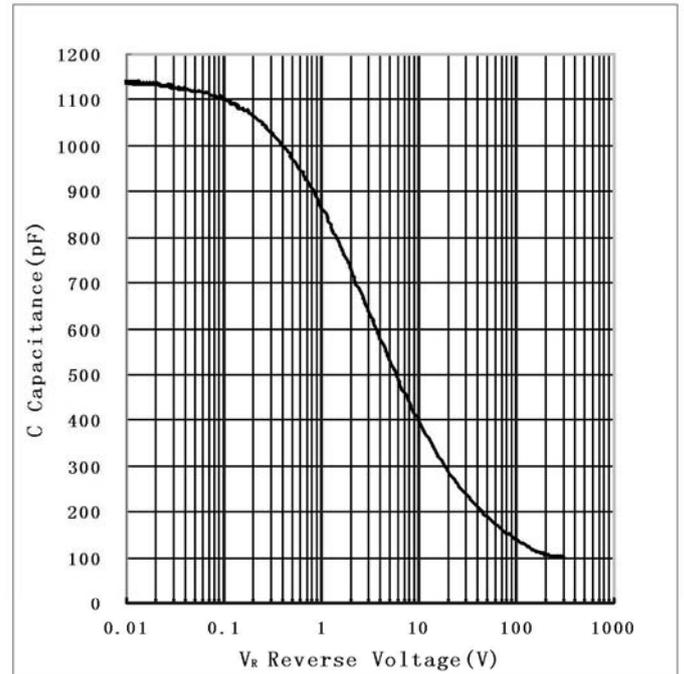
2) Reverse IV characteristics as a function of Tj :



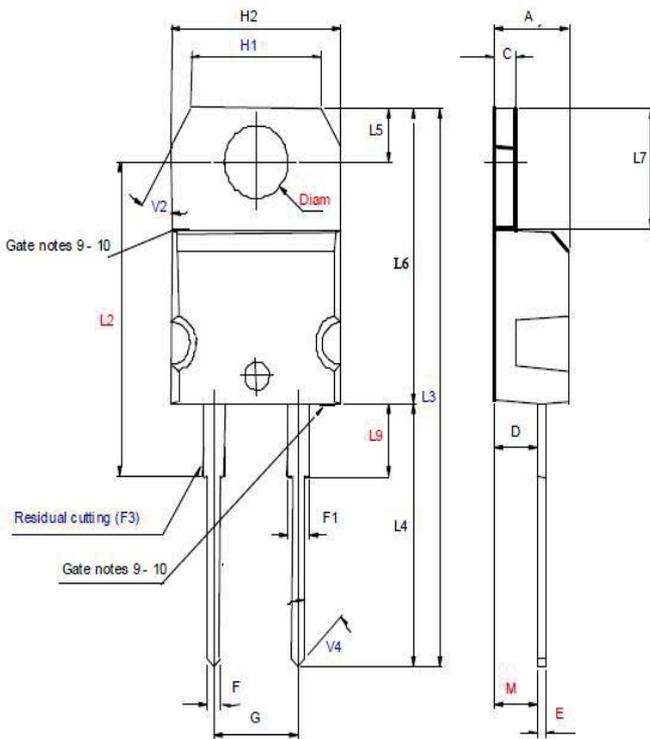
3) Current Derating



4) Capacitance vs. reverse voltage :



Package TO-220



| DIM | Millimeters | | Inches | |
|------|-------------|-------|--------|-------|
| | Min. | Max. | Min. | Max. |
| A | 4.4 | 4.6 | 0.173 | 0.181 |
| C | 1.23 | 1.32 | 0.048 | 0.052 |
| D | 2.4 | 2.72 | 0.094 | 0.107 |
| E | 0.49 | 0.7 | 0.019 | 0.028 |
| F | 0.61 | 0.88 | 0.024 | 0.035 |
| F1 | 1.14 | 1.7 | 0.045 | 0.067 |
| F3 | | 1 | | 0.039 |
| G | 4.95 | 5.15 | 0.195 | 0.203 |
| H1 | 7.7 | 7.9 | 0.303 | 0.311 |
| H2 | 10 | 10.4 | 0.394 | 0.409 |
| L2 | 16.4 | | 0.646 | |
| L3 | 28.9 | | 1.138 | |
| L4 | 13 | 14 | 0.512 | 0.551 |
| L5 | 2.65 | 2.95 | 0.104 | 0.116 |
| L6 | 15.25 | 15.75 | 0.600 | 0.620 |
| L7 | 6.2 | 6.6 | 0.244 | 0.260 |
| L9 | 3.5 | 3.93 | 0.138 | 0.155 |
| M | 2.6 | | | |
| V | 5° | | | |
| V2 | 30° | | | |
| V4 | 45° | | | |
| diam | 3.75 | 3.85 | 0.148 | 0.152 |