

1. General description

Silicon Carbide Schottky diode in a TO252 (DPAK) plastic package, designed for high frequency switched-mode power supplies.

2. Features and benefits

- Highly stable switching performance
- High forward surge capability I_{FSM}
- Extremely fast reverse recovery time
- Superior in efficiency to Silicon Diode alternatives
- Reduced losses in associated MOSFET
- Reduced EMI
- Reduced cooling requirements
- RoHS compliant

3. Applications

- Power factor correction
- Telecom / Server SMPS
- UPS
- PV inverter
- PC Silverbox
- LED / OLED TV
- Motor Drives

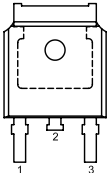

4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Values | | | Unit |
|--------------------------------|---------------------------------|--|--------|-----|-----|------|
| Absolute maximum rating | | | | | | |
| V_{RRM} | repetitive peak reverse voltage | | 650 | | | V |
| $I_{F(AV)}$ | average forward current | $\delta = 0.5$; square-wave pulse; $T_{mb} \leq 125$ °C; Fig. 1 ; Fig. 2 ; Fig. 3 | 6 | | | A |
| T_j | junction temperature | | 175 | | | °C |
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
| Static characteristics | | | | | | |
| V_F | forward voltage | $I_F = 6$ A; $T_j = 25$ °C; Fig. 5 | - | 1.5 | 1.7 | V |
| | | $I_F = 6$ A; $T_j = 150$ °C; Fig. 5 | - | 1.8 | 2.1 | V |
| Dynamic characteristics | | | | | | |
| Q_r | recovered charge | $I_F = 6$ A; $dI_F/dt = 500$ A/ μ s; $V_R = 400$ V; $T_j = 25$ °C; Fig. 7 | - | 9 | - | nC |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------------------------------|---|---|
| 1 | n.c. | not connected |  |  |
| 2 | K | cathode [1] | | |
| 3 | A | anode | | |
| mb | K | mounting base; connected to cathode | | |

[1] It is not possible to connect to pin 2 of the TO252 package.

6. Ordering information

Table 3. Ordering information

| Type number | Package name | Orderable part number | Packing method | Small packing quantity | Package version | Package issue date |
|-------------|--------------|-----------------------|----------------|------------------------|-----------------|--------------------|
| GKTSC06650D | TO252 | GKTSC06650D6J | Reel | 2500 | TO252NS | 04-Nov-2015 |

7. Marking

Table 4. Marking codes

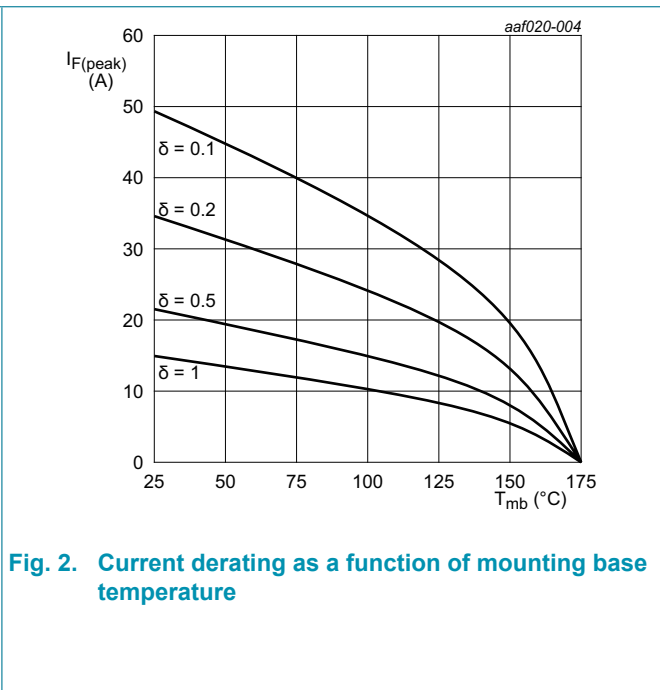
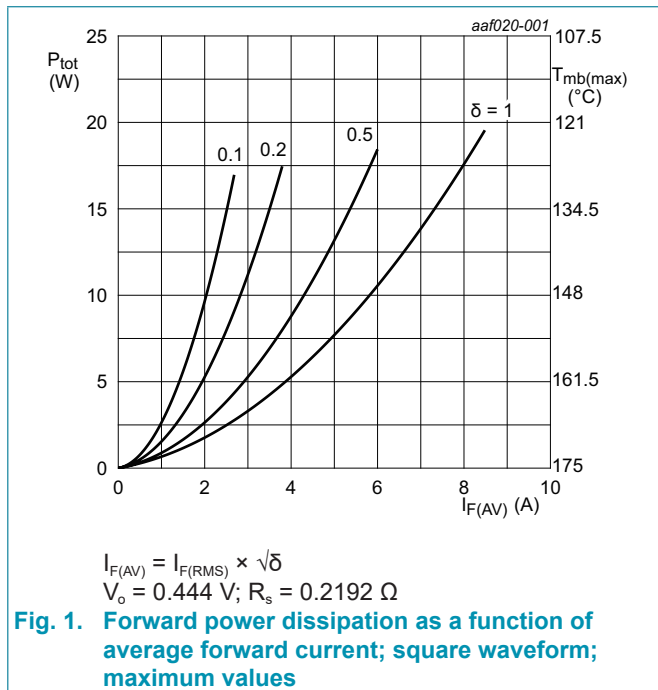
| Type number | Marking codes |
|-------------|-----------------|
| GKTSC06650D | GKTSC 06650D |

8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol | Parameter | Conditions | Values | Unit |
|-------------|-------------------------------------|---|------------|----------------------|
| V_{RRM} | repetitive peak reverse voltage | | 650 | V |
| V_{RWM} | crest working reverse voltage | | 650 | V |
| V_R | reverse voltage | DC | 650 | V |
| $I_{F(AV)}$ | average forward current | $\delta = 0.5$; square-wave pulse; $T_{mb} \leq 125\text{ }^\circ\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3 | 6 | A |
| I_{FRM} | repetitive peak forward current | $\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 125\text{ }^\circ\text{C}$; square-wave pulse | 12 | A |
| I_{FSM} | non-repetitive peak forward current | $t_p = 10\text{ ms}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; sine-wave pulse | 36 | A |
| | | $t_p = 10\text{ }\mu\text{s}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; square-wave pulse | 310 | A |
| I^2t | I^2t for fusing | sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; $t_p = 10\text{ ms}$ | 6.48 | A^2s |
| T_{stg} | storage temperature | | -55 to 175 | $^\circ\text{C}$ |
| T_j | junction temperature | | 175 | $^\circ\text{C}$ |



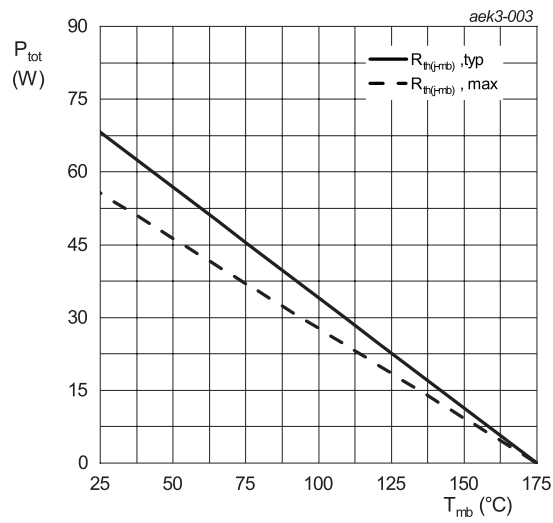


Fig. 3. Total power dissipation as a function of mounting base temperature

9. Thermal characteristics

Table 6. Thermal characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------------|--|--|-----|-----|-----|------|
| $R_{th(j-mb)}$ | thermal resistance from junction to mounting base | with heatsink compound; Fig. 4 | - | 2.2 | 2.7 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient free air | in free air | - | 60 | - | K/W |

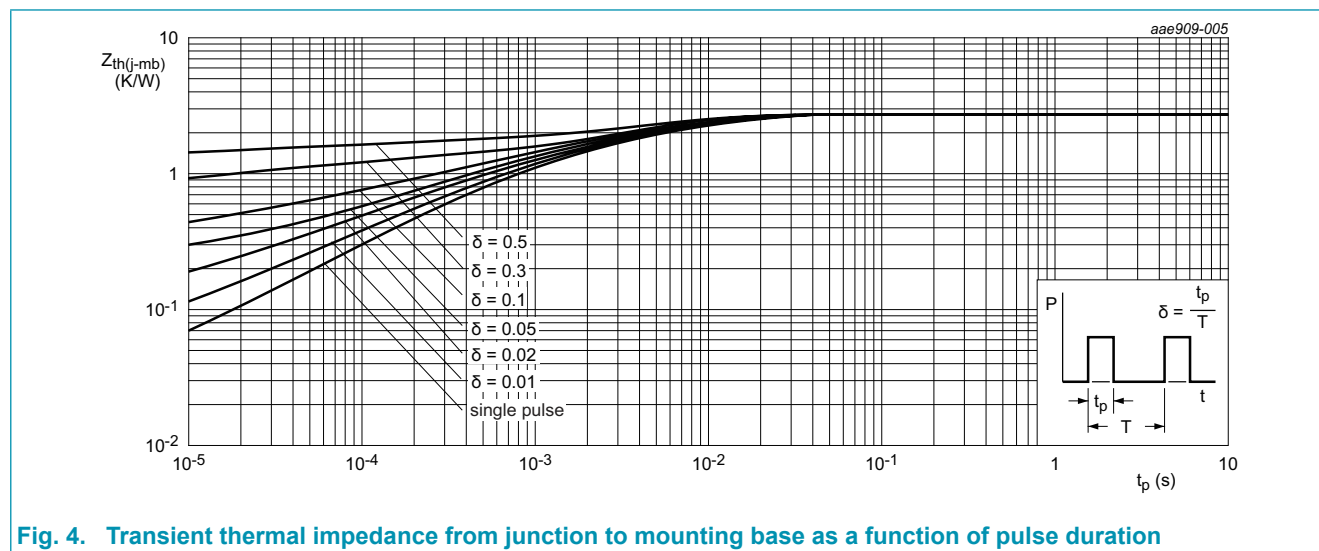
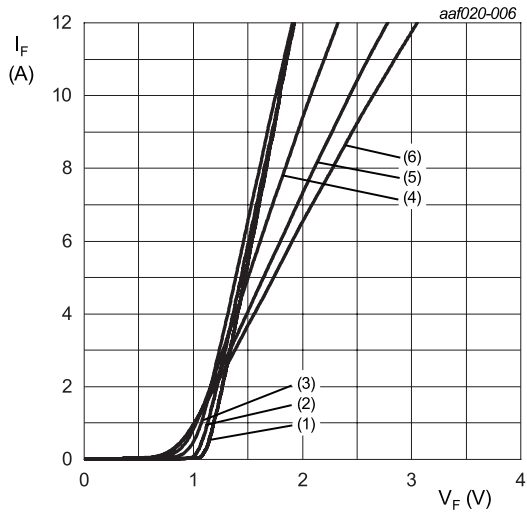


Fig. 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|---------------------------------|---|-----|-----|-----|---------------|
| Static characteristics | | | | | | |
| I_F | forward current | $I_F = 6 \text{ A}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 5}$ | - | 1.5 | 1.7 | V |
| | | $I_F = 6 \text{ A}; T_j = 150 \text{ }^\circ\text{C}; \text{ Fig. 5}$ | - | 1.8 | 2.1 | V |
| I_R | reverse current | $V_R = 650 \text{ V}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 6}$ | - | - | 40 | μA |
| | | $V_R = 650 \text{ V}; T_j = 150 \text{ }^\circ\text{C}; \text{ Fig. 6}$ | - | - | 160 | μA |
| Dynamic characteristics | | | | | | |
| Q_r | recovered charge | $I_F = 6 \text{ A}; V_R = 400 \text{ V}; \text{ d}I_F/\text{d}t = 500 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 7}$ | - | 9 | - | nC |
| C_d | diode capacitance | $f = 1 \text{ MHz}; V_R = 1 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$ | - | 190 | - | pF |
| | | $f = 1 \text{ MHz}; V_R = 300 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$ | - | 30 | - | pF |
| | | $f = 1 \text{ MHz}; V_R = 600 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$ | - | 29 | - | pF |
| E_{as} | non-repetitive avalanche energy | $I_R = 4.25 \text{ A}; L = 5 \text{ mH}; T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$ | 45 | - | - | mJ |



$V_o = 0.444 \text{ V}; R_s = 0.2192 \text{ } \Omega$
 (1) $T_j = -55 \text{ }^\circ\text{C}$; typical values
 (2) $T_j = 0 \text{ }^\circ\text{C}$; typical values
 (3) $T_j = 25 \text{ }^\circ\text{C}$; typical values
 (4) $T_j = 100 \text{ }^\circ\text{C}$; typical values
 (5) $T_j = 150 \text{ }^\circ\text{C}$; typical values
 (6) $T_j = 175 \text{ }^\circ\text{C}$; typical values

Fig. 5. Forward current as a function of forward voltage; typical values

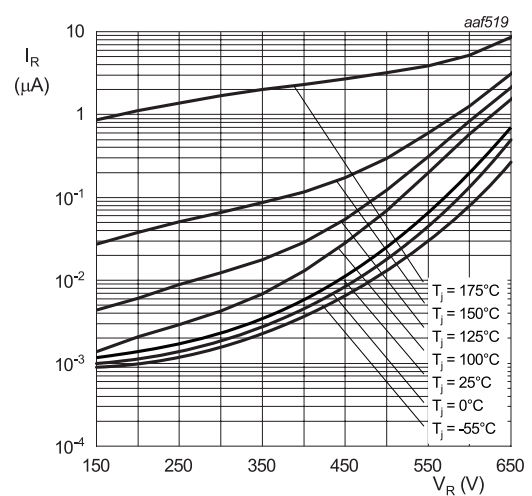


Fig. 6. Reverse leakage current as a function of reverse voltage; typical value

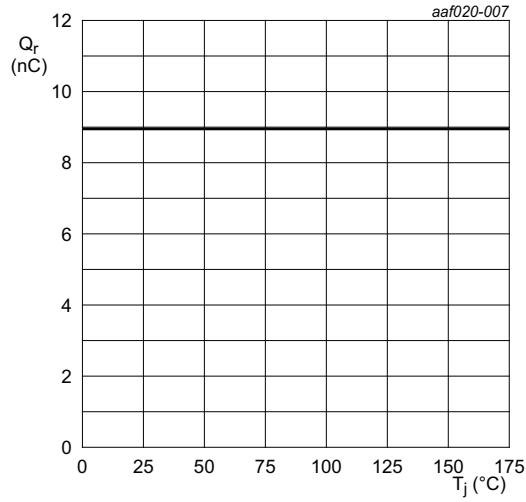
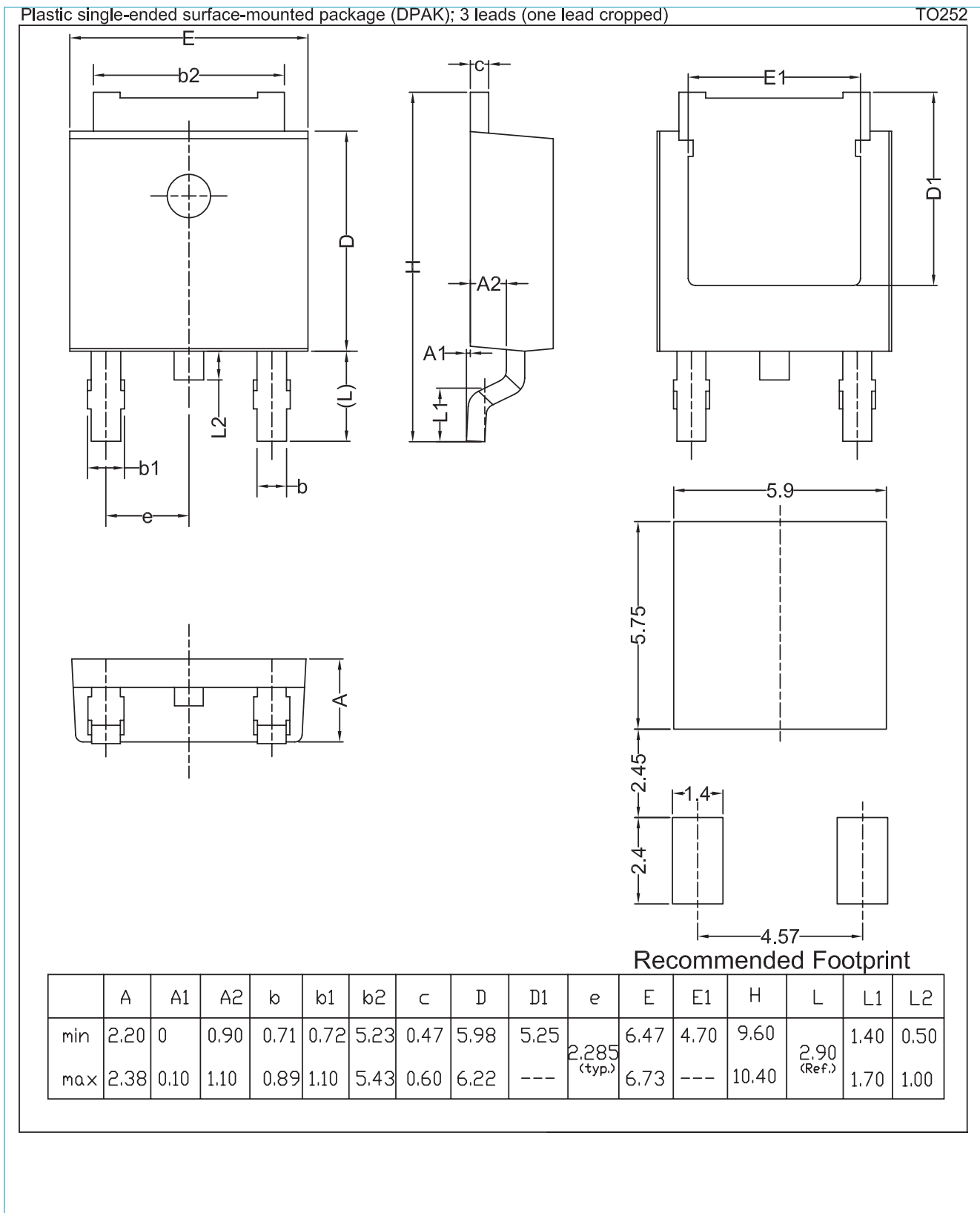


Fig. 7. Recovered charge as a function of junction temperature

11. Package outline



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