

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
- 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

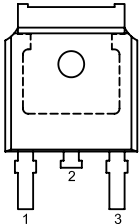
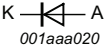
4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Notes | 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; $T_{mb} \leq 141$ °C; Fig. 1 ; Fig. 2 ; Fig. 3 | | 8 | | | A |
| T_j | junction temperature | | | -55 to 175 | | | °C |
| Symbol | Parameter | Conditions | Notes | Min | Typ | Max | Unit |
| Static characteristics | | | | | | | |
| V_F | forward voltage | $I_F = 8$ A; $T_j = 25$ °C; Fig. 5 | | - | 1.45 | 1.70 | V |
| | | $I_F = 8$ A; $T_j = 150$ °C; Fig. 5 | | - | 1.80 | 2.20 | V |
| Dynamic characteristics | | | | | | | |
| Q_r | recovered charge | $I_F = 8$ A; $di_F/dt = 500$ A/ μ s; $V_R = 400$ V; $T_j = 25$ °C; Fig. 7 | | - | 12 | - | 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 |
|--------------|--------------|-----------------------|----------------|------------------------|-----------------|--------------------|
| WNSC5D08650D | TO252 | WNSC5D08650D6J | Reel | 2500 | TO252NS | 14-Nov-2016 |

7. Marking

Table 4. Marking codes

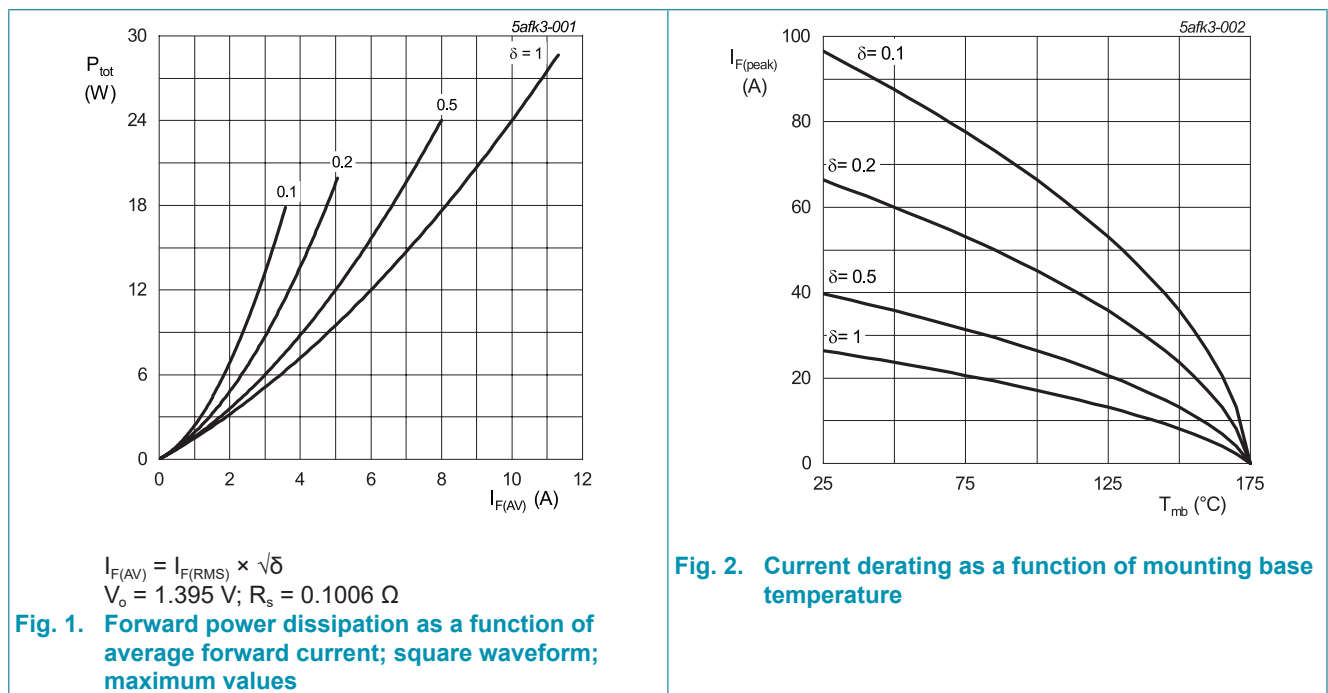
| Type number | Marking codes |
|--------------|------------------|
| WNSC5D08650D | WNSC5D 08650D |

8. Limiting values

Table 5. Limiting values

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

| Symbol | Parameter | Conditions | Notes | 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; $T_{mb} \leq 141\text{ }^\circ\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3 | | 8 | A |
| I_{FRM} | repetitive peak forward current | $\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 141\text{ }^\circ\text{C}$; square-wave pulse | | 16 | 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 | | 48 | A |
| | | $t_p = 10\text{ }\mu\text{s}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; square-wave pulse | | 420 | A |
| I^2t | I^2t for fusing | sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; $t_p = 10\text{ ms}$ | | 11.52 | A^2s |
| T_{stg} | storage temperature | | | -55 to 175 | $^\circ\text{C}$ |
| T_j | junction temperature | | | -55 to 175 | $^\circ\text{C}$ |



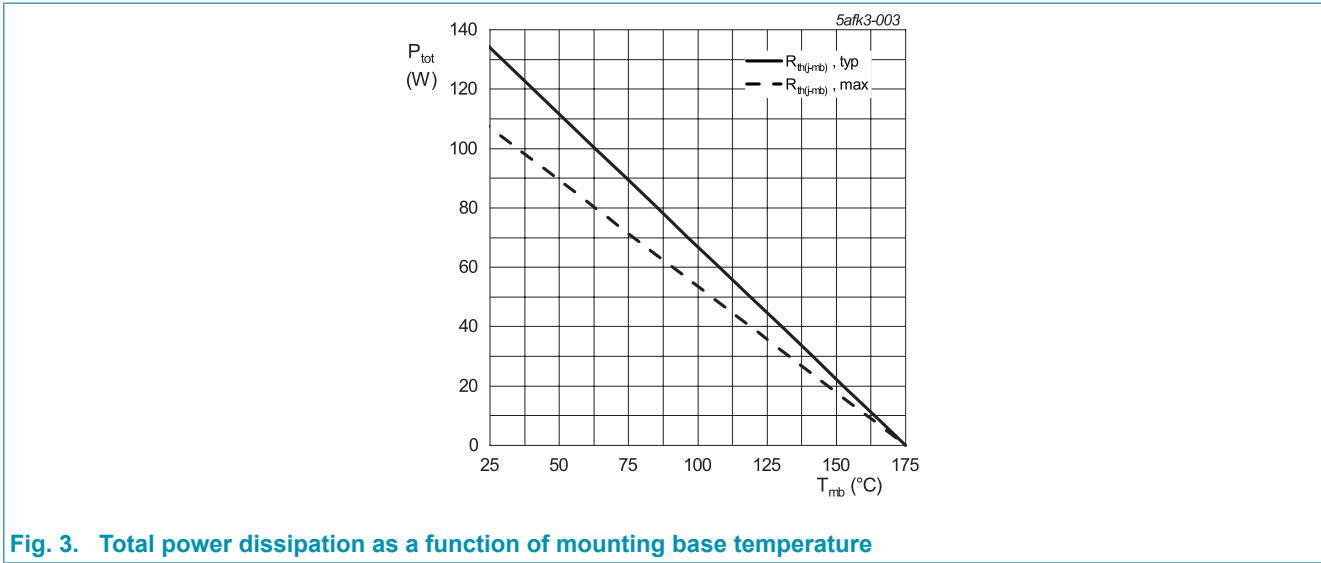


Fig. 3. Total power dissipation as a function of mounting base temperature

9. Thermal characteristics

Table 6. Thermal characteristics

| Symbol | Parameter | Conditions | Notes | Min | Typ | Max | Unit |
|----------------|--|------------------------|-------|-----|------|-----|------|
| $R_{th(j-mb)}$ | thermal resistance from junction to mounting base | Fig. 4 | | - | 1.12 | 1.4 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient free air | in free air | | - | 50 | - | K/W |

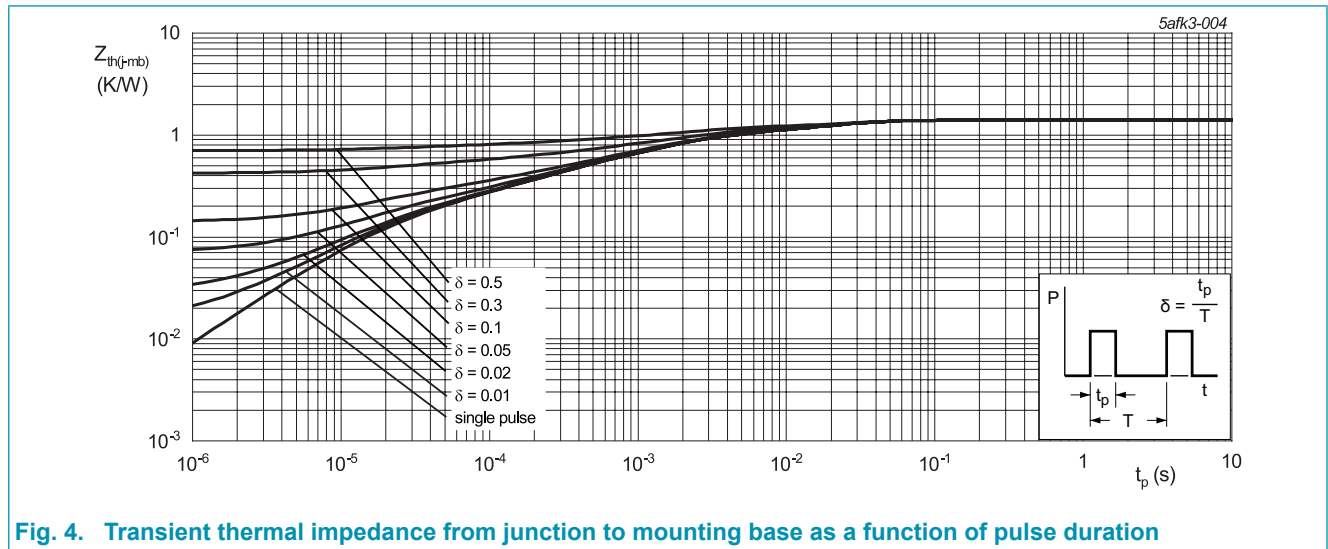
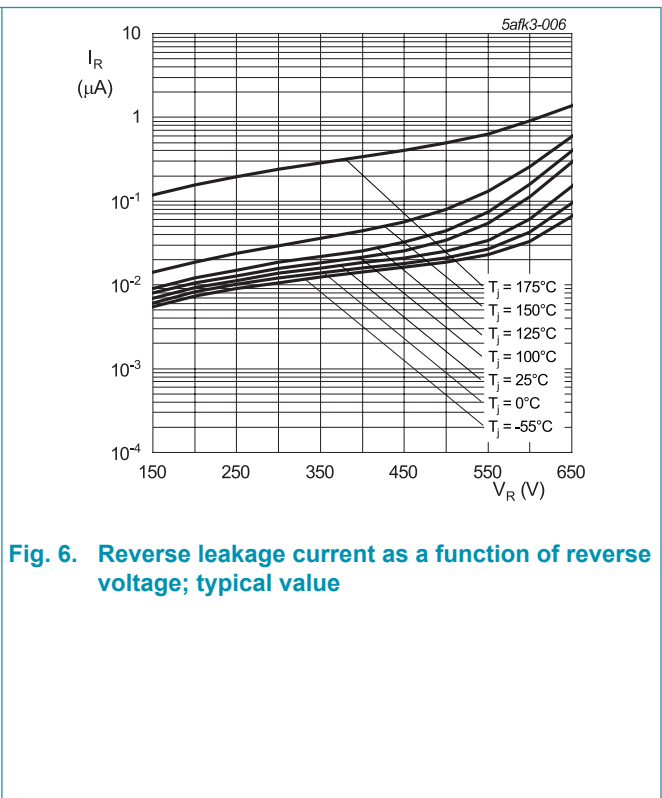
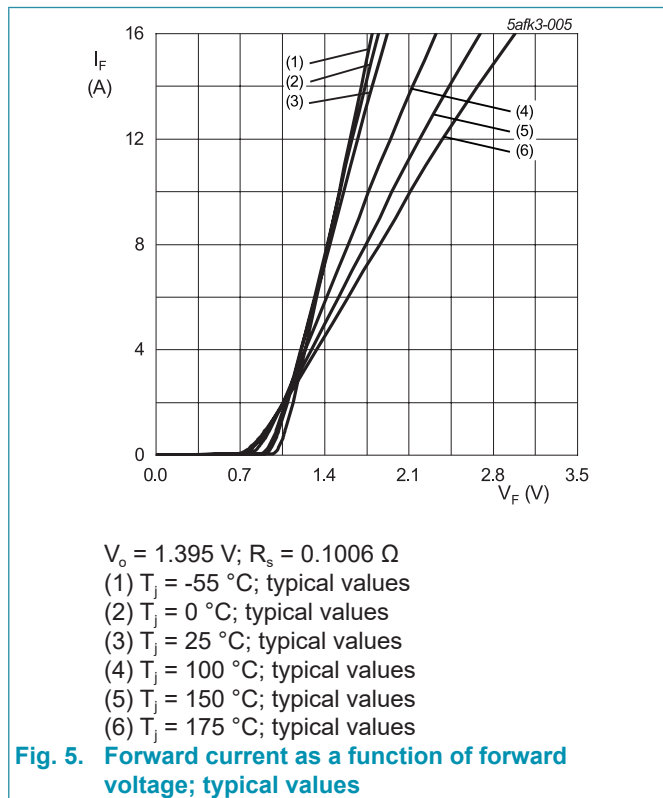


Fig. 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

| Symbol | Parameter | Conditions | Notes | Min | Typ | Max | Unit |
|--------------------------------|---------------------------------|---|-------|-----|------|------|---------------|
| Static characteristics | | | | | | | |
| V_F | forward current | $I_F = 8\text{ A}; T_j = 25\text{ °C}; \text{Fig. 5}$ | | - | 1.45 | 1.70 | V |
| | | $I_F = 8\text{ A}; T_j = 150\text{ °C}; \text{Fig. 5}$ | | - | 1.80 | 2.20 | V |
| | | $I_F = 8\text{ A}; T_j = 175\text{ °C}; \text{Fig. 5}$ | | - | 2.00 | 2.30 | V |
| I_R | reverse current | $V_R = 650\text{ V}; T_j = 25\text{ °C}; \text{Fig. 6}$ | | - | 0.4 | 40 | μA |
| | | $V_R = 650\text{ V}; T_j = 175\text{ °C}; \text{Fig. 6}$ | | - | 20 | 200 | μA |
| Dynamic characteristics | | | | | | | |
| Q_r | recovered charge | $I_F = 8\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 25\text{ °C}; \text{Fig. 7}$ | | - | 12 | - | nC |
| C_d | diode capacitance | $f = 1\text{ MHz}; V_R = 1\text{ V}; T_j = 25\text{ °C}$ | | - | 267 | - | pF |
| | | $f = 1\text{ MHz}; V_R = 300\text{ V}; T_j = 25\text{ °C}$ | | - | 32 | - | pF |
| | | $f = 1\text{ MHz}; V_R = 600\text{ V}; T_j = 25\text{ °C}$ | | - | 31 | - | pF |
| E_{as} | non-repetitive avalanche energy | $I_R = 4.2\text{ A}; L = 5\text{ mH}; T_{j(\text{init})} = 25\text{ °C}$ | | 45 | - | - | mJ |



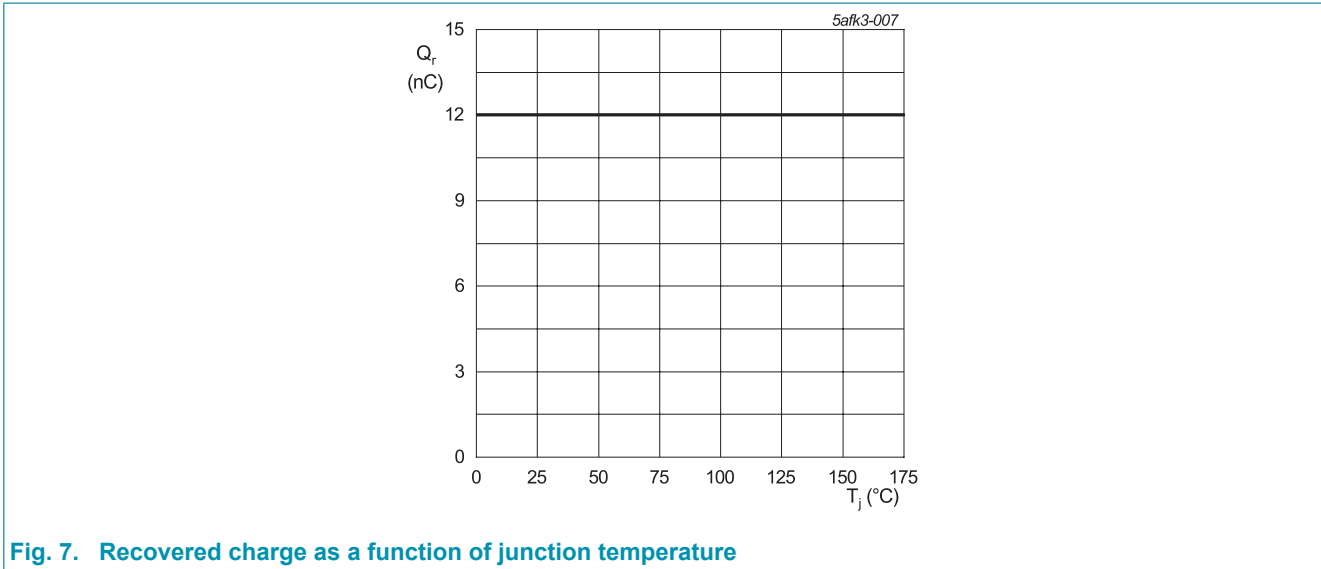
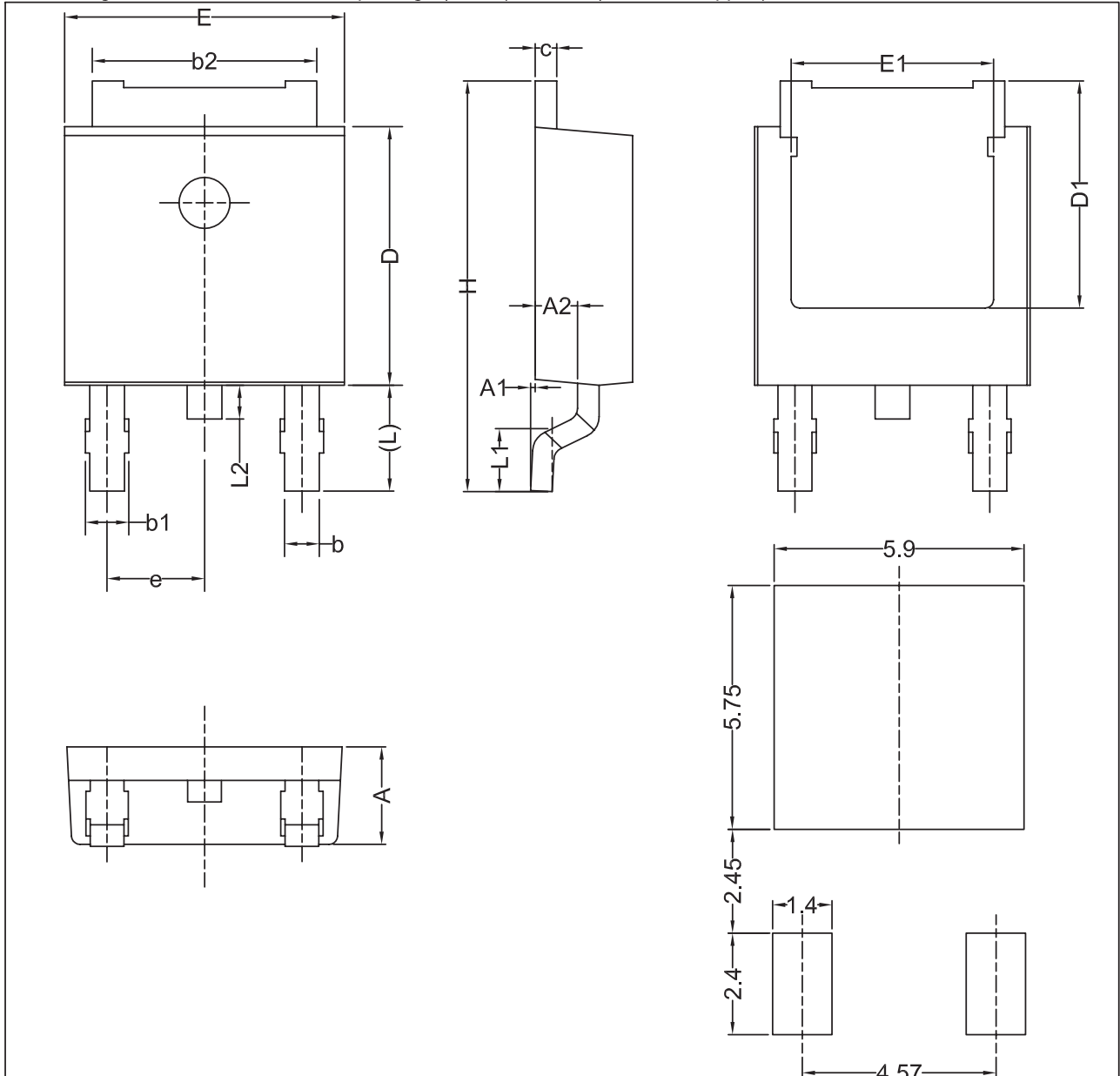


Fig. 7. Recovered charge as a function of junction temperature

11. Package outline

Plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped) TO252



Recommended Footprint

| | A | A1 | A2 | b | b1 | b2 | c | D | D1 | e | E | E1 | H | L | L1 | L2 |
|-----|------|------|------|------|------|------|------|------|------|-----------------|------|------|-------|----------------|------|------|
| min | 2.20 | 0 | 0.90 | 0.71 | 0.72 | 5.23 | 0.47 | 5.98 | 5.25 | 2.285 (typ.) | 6.47 | 4.70 | 9.60 | 2.90 (Ref.) | 1.40 | 0.50 |
| max | 2.38 | 0.10 | 1.10 | 0.89 | 1.10 | 5.43 | 0.60 | 6.22 | --- | --- | 6.73 | --- | 10.40 | --- | 1.70 | 1.00 |

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| Document status [1][2] | Product status [3] | Definition |
|--------------------------------|--------------------|---|
| Objective [short] data sheet | Development | This document contains data from the objective specification for product development. |
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- [2] The term 'short data sheet' is explained in section "Definitions".
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