

| | | |
|---------------|---|--------------------|
| V_{RRM} | = | 6000 V |
| $I_{F(AV)M}$ | = | 1100 A |
| I_{FSM} | = | 18×10^3 A |
| $V_{(T0)}$ | = | 1.5 V |
| r_T | = | 0.6 mW |
| $V_{DC-link}$ | = | 3800 V |

Fast Recovery Diode

5SDF 10H6004

Doc. No. 5SYA1109-02 Oct. 06

- Patented free-floating silicon technology
- Low on-state and switching losses
- Optimized for use as freewheeling diode in high-voltage GTO converters
- Industry standard housing
- Cosmic radiation withstand rating

Blocking

Maximum rated values ¹⁾

| Parameter | Symbol | Conditions | Value | Unit |
|---|---------------|--|-------|------|
| Repetitive peak reverse voltage | V_{RRM} | $f = 50$ Hz, $t_p = 10$ ms, $T_{vj} = 125^\circ\text{C}$ | 6000 | V |
| Permanent DC voltage for 100 FIT failure rate | $V_{DC-link}$ | Ambient cosmic radiation at sea level in open air. (100% Duty) | 3800 | V |

Characteristic values

| Parameter | Symbol | Conditions | min | typ | max | Unit |
|---------------------------------|-----------|--|-----|-----|-----|------|
| Repetitive peak reverse current | I_{RRM} | $V_R = V_{RRM}$, $T_{vj} = 125^\circ\text{C}$ | | | 50 | mA |

Mechanical data

Maximum rated values ¹⁾

| Parameter | Symbol | Conditions | min | typ | max | Unit |
|----------------|--------|------------------|-----|-----|-----|----------------|
| Mounting force | F_m | | 36 | 40 | 44 | kN |
| Acceleration | a | Device unclamped | | | 50 | m/s^2 |
| Acceleration | a | Device clamped | | | 200 | m/s^2 |

Characteristic values

| Parameter | Symbol | Conditions | min | typ | max | Unit |
|---------------------------|--------|------------|------|-----|------|------|
| Weight | m | | | | 0.83 | kg |
| Housing thickness | H | | 26.2 | | 26.6 | mm |
| Surface creepage distance | D_s | | 30 | | | mm |
| Air strike distance | D_a | | 20 | | | mm |

Note 1 Maximum rated values indicate limits beyond which damage to the device may occur

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On-state**Maximum rated values ¹⁾**

| Parameter | Symbol | Conditions | min | typ | max | Unit |
|--|--------------|--|-----|-----|--------------------|----------------------|
| Max. average on-state current | $I_{F(AV)M}$ | Half sine wave, $T_C = 85^\circ\text{C}$ | | | 1100 | A |
| Max. RMS on-state current | $I_{F(RMS)}$ | | | | 1700 | A |
| Max. peak non-repetitive surge current | I_{FSM} | $t_p = 10\text{ ms}$, $T_{vj} = 125^\circ\text{C}$, $V_R = 0\text{ V}$ | | | 18×10^3 | A |
| Limiting load integral | I^2t | | | | 1.62×10^6 | A^2s |
| Max. peak non-repetitive surge current | I_{FSM} | $t_p = 1\text{ ms}$, $T_{vj} = 125^\circ\text{C}$, $V_R = 0\text{ V}$ | | | 44×10^3 | A |
| Limiting load integral | I^2t | | | | 968×10^3 | A^2s |

Characteristic values

| Parameter | Symbol | Conditions | min | typ | max | Unit |
|-------------------|------------|--|-----|-----|-----|------------------|
| On-state voltage | V_F | $I_F = 2500\text{ A}$, $T_{vj} = 125^\circ\text{C}$ | | | 3 | V |
| Threshold voltage | $V_{(TO)}$ | $T_{vj} = 125^\circ\text{C}$ $I_F = 200\dots 6000\text{ A}$ | | | 1.5 | V |
| Slope resistance | r_T | | | | 0.6 | $\text{m}\Omega$ |

Turn-on**Characteristic values**

| Parameter | Symbol | Conditions | min | typ | max | Unit |
|-------------------------------|-----------|---|-----|-----|-----|------|
| Peak forward recovery voltage | V_{FRM} | $di_F/dt = 500\text{ A}/\mu\text{s}$, $T_{vj} = 125^\circ\text{C}$ | | | 150 | V |

Turn-off**Characteristic values**

| Parameter | Symbol | Conditions | min | typ | max | Unit |
|--------------------------|----------|---|-----|-----|------|---------------|
| Reverse recovery current | I_{RM} | $di/dt = 300\text{ A}/\mu\text{s}$, $I_{FQ} = 1000\text{ A}$, $T_j = 125^\circ\text{C}$, $V_{RM} = 2900\text{ V}$, | | | 1000 | A |
| Reverse recovery charge | Q_{rr} | | | | 6000 | μC |
| Turn-off energy | E_{rr} | $C_S = 3\text{ }\mu\text{F}$ (GTO snubber circuit) | | | 5 | J |

Thermal

Maximum rated values ¹⁾

| Parameter | Symbol | Conditions | min | typ | max | Unit |
|--------------------------------------|------------------|------------|-----|-----|-----|------|
| Operating junction temperature range | T _{vj} | | -40 | | 125 | °C |
| Storage temperature range | T _{stg} | | -40 | | 125 | °C |

Characteristic values

| Parameter | Symbol | Conditions | min | typ | max | Unit |
|-------------------------------------|-----------------------|--|-----|-----|-----|------|
| Thermal resistance junction to case | R _{th(j-c)} | Double-side cooled F _m = 36...44 kN | | | 12 | K/kW |
| | R _{th(j-c)A} | Anode-side cooled F _m = 36...44 kN | | | 24 | K/kW |
| | R _{th(j-c)C} | Cathode-side cooled F _m = 36...44 kN | | | 24 | K/kW |
| Thermal resistance case to heatsink | R _{th(c-h)} | Double-side cooled F _m = 36...44 kN | | | 3 | K/kW |
| | R _{th(c-h)} | Single-side cooled F _m = 36...44 kN | | | 6 | K/kW |

Analytical function for transient thermal impedance:

$$Z_{th(j-c)}(t) = \sum_{i=1}^n R_{th i} (1 - e^{-t/t_i})$$

| i | 1 | 2 | 3 | 4 |
|--------------------------|--------|--------|--------|--------|
| R _{th i} (K/kW) | 7.440 | 2.000 | 1.840 | 0.710 |
| τ _i (s) | 0.4700 | 0.0910 | 0.0100 | 0.0047 |

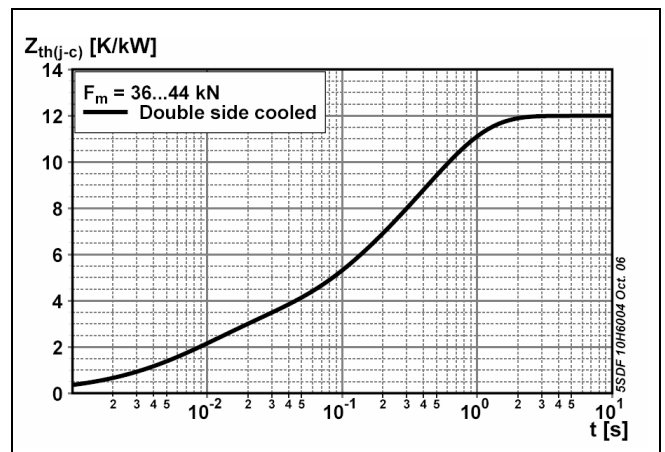


Fig. 1 Transient thermal impedance junction-to-case

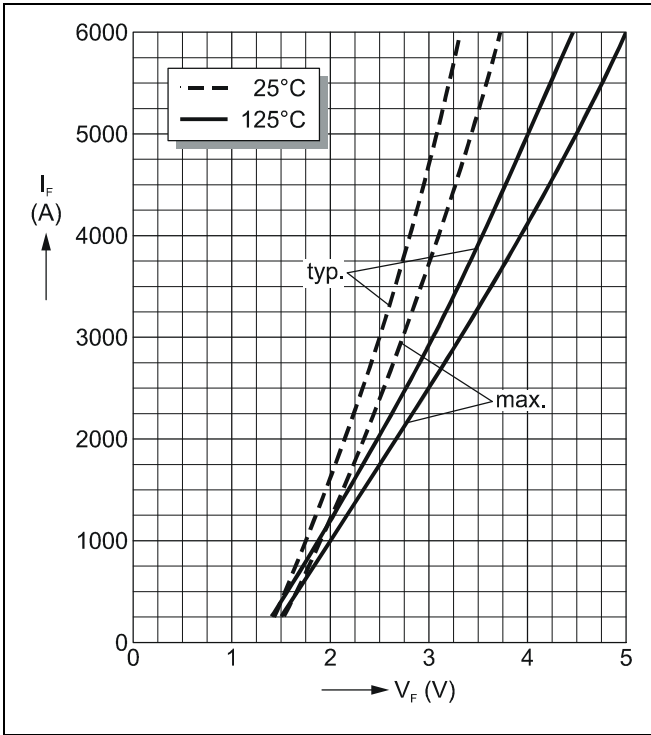


Fig. 2 Max. on-state voltage characteristics

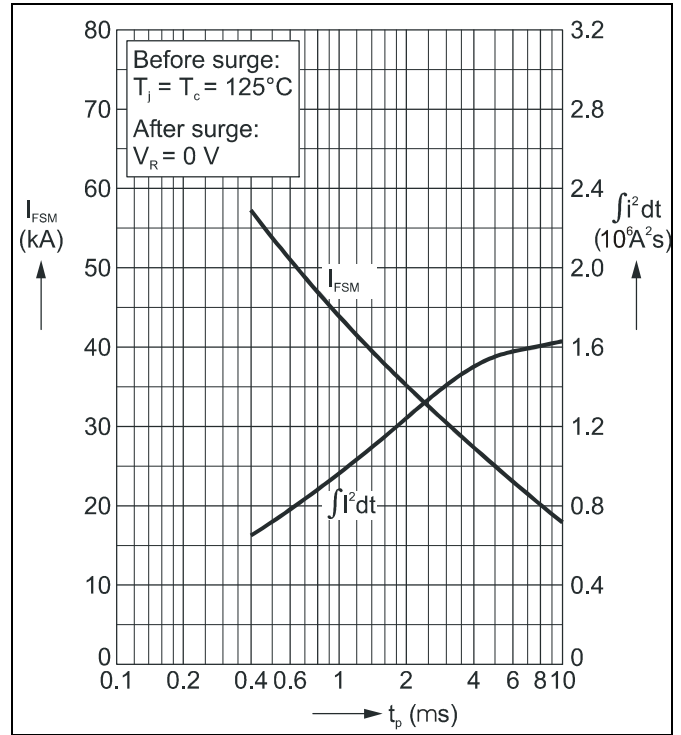


Fig. 3 Surge on-state current vs. pulse length. Half-sine wave

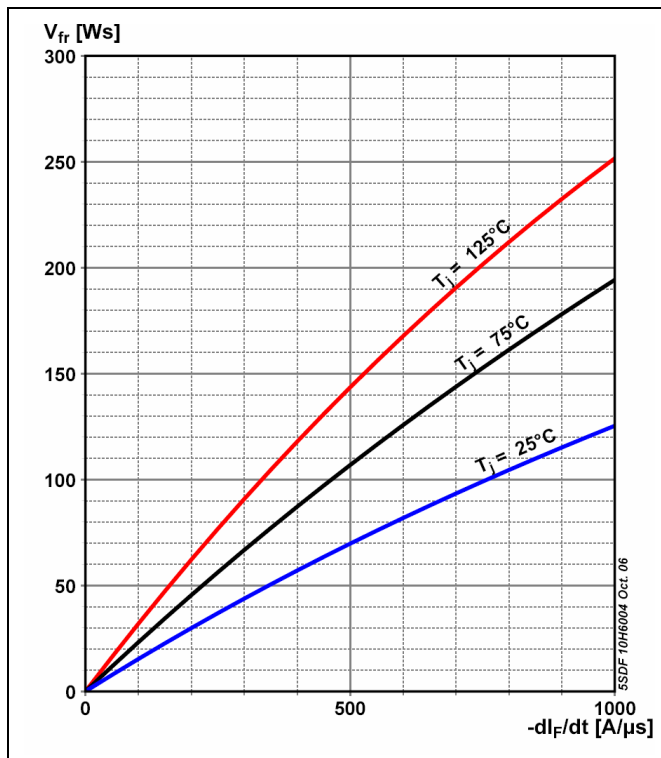


Fig. 4 Forward recovery vs. turn on di/dt (max. values)

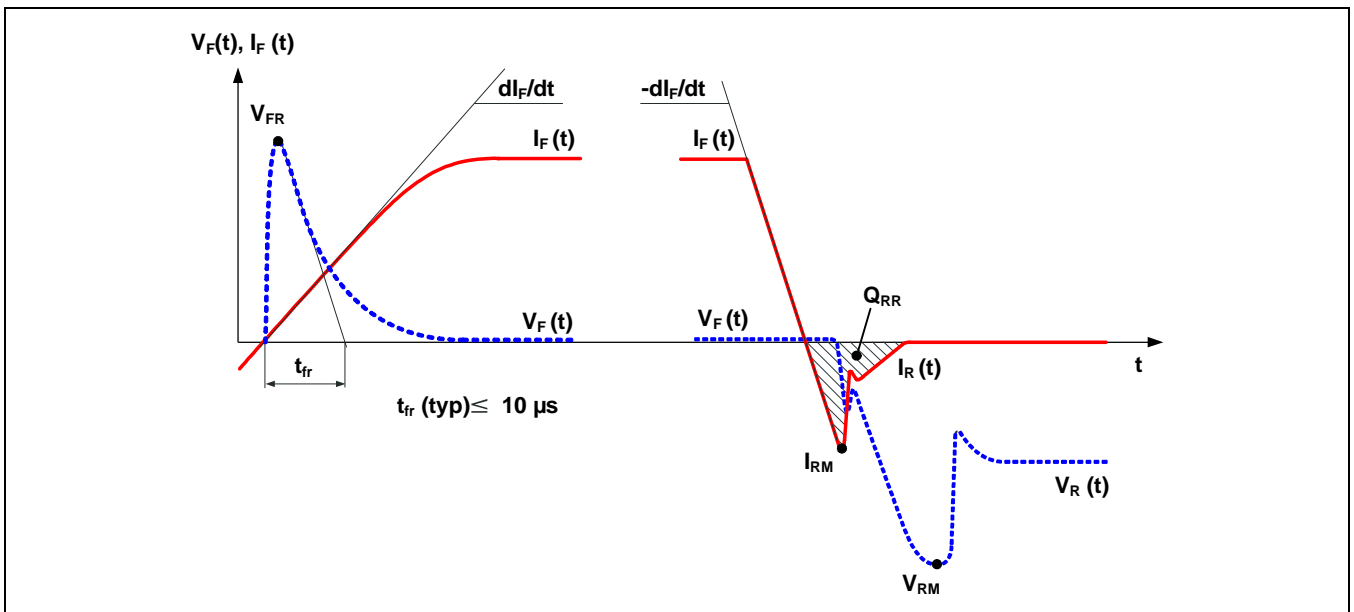


Fig. 5 General current and voltage waveforms

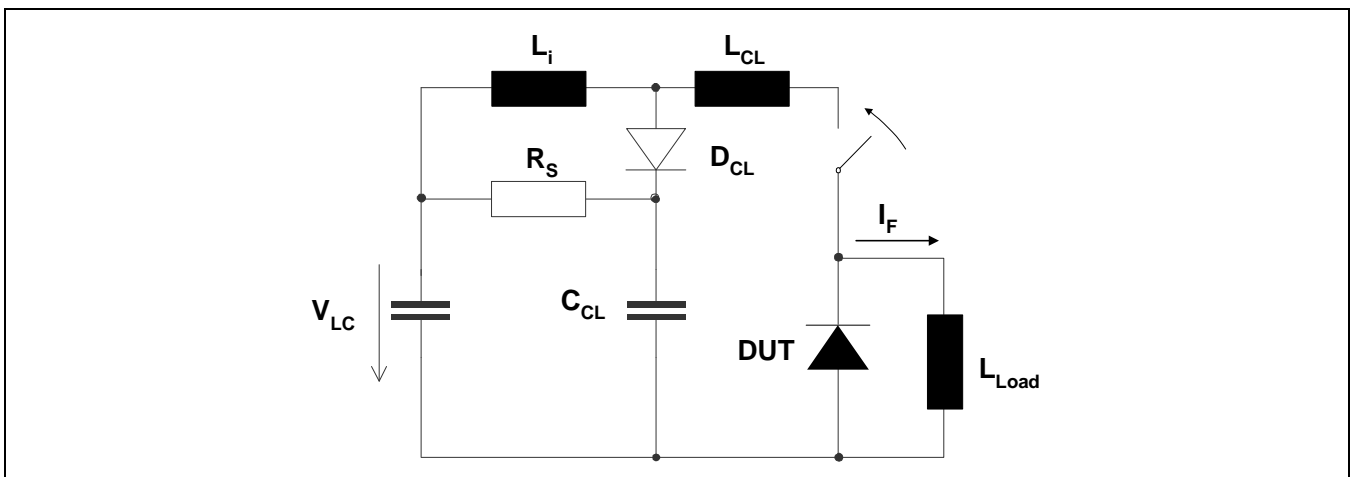


Fig. 6 Test circuit.

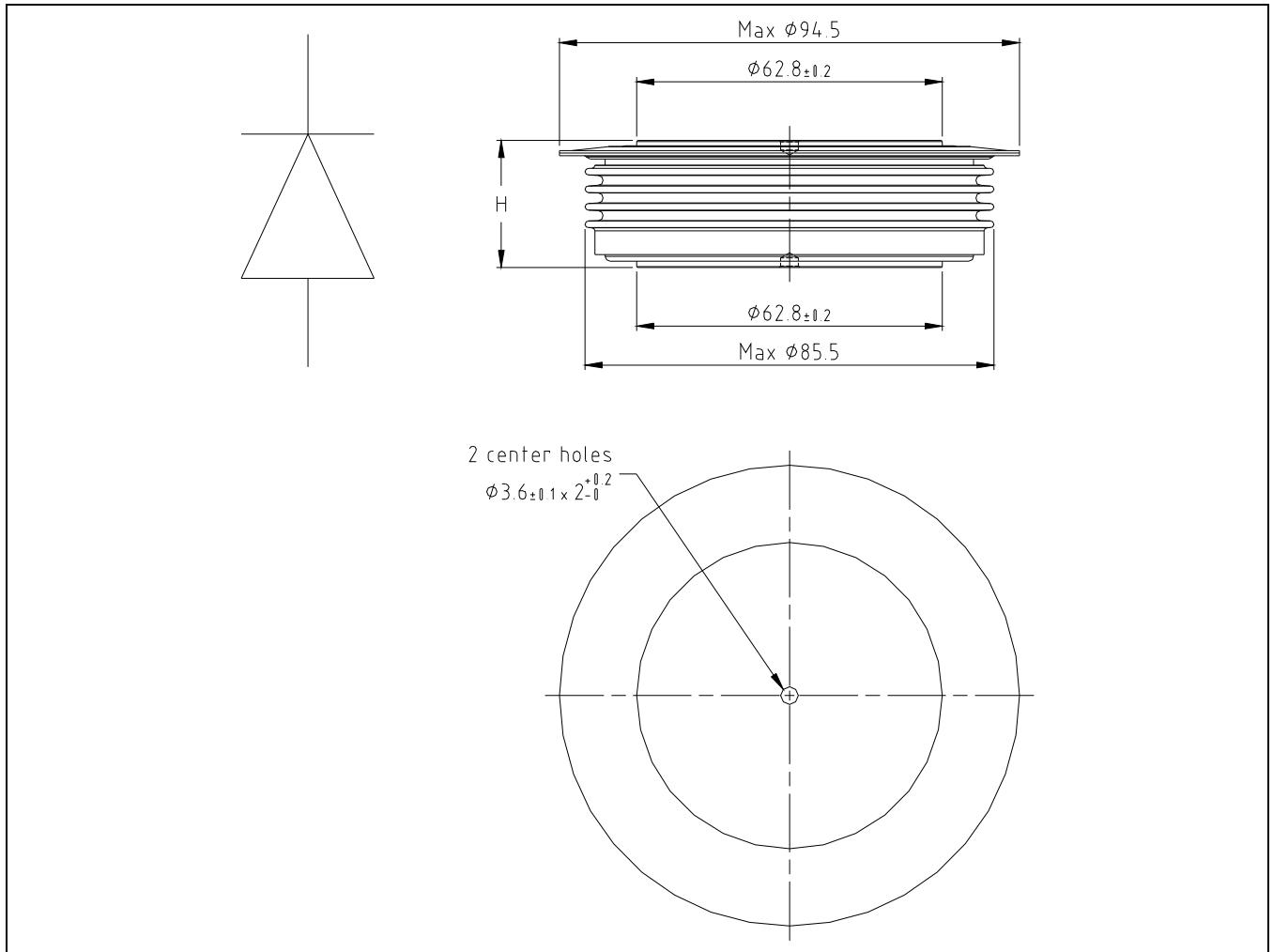


Fig. 7 Outline drawing, all dimensions are in millimeters and represent nominal values unless stated otherwise

Related documents:

| Doc. Nr | Titel |
|-----------|---|
| 5SYA 2036 | Recommendations regarding mechanical clamping of Press Pack High Power Semiconductors |
| 5SZK 9104 | Specification of environmental class for pressure contact diodes, PCTs and GTO, STORAGE available on request, please contact factory |
| 5SZK 9105 | Specification of environmental class for pressure contact diodes, PCTs and GTO, TRANSPORTATION available on request, please contact factory |

Please refer to <http://www.abb.com/semiconductors> for current version of documents.

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