| | | | |
|---|---|---|---|
| $V_{RRM}$ | = | 5500 | V |
| $I_{F(AV)M}$ | = | 175 | A |
| $I_{FSM}$ | = | $3×10^3$ | A |
| $V_{(T0)}$ | = | 3.35 | V |
| $r_T$ | = | 7.2 | mW |
| $V_{DC\text{-}link}$ | = | 3300 | V |

# Fast Recovery Diode
# 5SDF 02D6004
## PRELIMINARY

- **Patented free-floating technology**
- **Industry standard housing**
- **Cosmic radiation withstand rating**
- **Low on-state and switching losses**
- **Optimized for snubberless operation**

## Blocking
*Maximum rated values [1]*

| Parameter | Symbol | Conditions | Value | Unit |
|---|---|---|---|---|
| Repetitive peak reverse voltage | $V_{RRM}$ | f = 50 Hz, $t_p$ = 10ms, $T_{vj}$ = 115°C | 5500 | V |
| Permanent DC voltage for 100 FIT failure rate | $V_{DC\text{-}link}$ | Ambient cosmic radiation at sea level in open air. (100% Duty) | 3300 | V |
| Permanent DC voltage for 100 FIT failure rate | $V_{DC\text{-}link}$ | Ambient cosmic radiation at sea level in open air. (5% Duty) | 3900 | V |

*Characteristic values*

| Parameter | Symbol | Conditions | min | typ | max | Unit |
|---|---|---|---|---|---|---|
| Repetitive peak reverse current | $I_{RRM}$ | $V_R$ = $V_{RRM}$, $T_{vj}$ = 115°C | | | 20 | mA |

## Mechanical data
*Maximum rated values [1]*

| Parameter | Symbol | Conditions | min | typ | max | Unit |
|---|---|---|---|---|---|---|
| Mounting force | $F_m$ | | 14 | 16 | 18 | 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 | | | | 0.25 | kg |
| Housing thickness | H | | 26.0 | | 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, $T_C$ = 70 °C | | | 175 | A |
| Max. RMS on-state current | $I_{F(RMS)}$ | | | | 275 | A |
| Max. peak non-repetitive surge current | $I_{FSM}$ | $t_p$ = 10 ms, $T_{vj}$ = 115°C, $V_R$ = 0 V | | | $3 \times 10^3$ | A |
| Limiting load integral | $I^2t$ | | | | $45 \times 10^3$ | $A^2s$ |
| Max. peak non-repetitive surge current | $I_{FSM}$ | $t_p$ = 1 ms, $T_{vj}$ = 115°C, $V_R$ = 0 V | | | $8 \times 10^3$ | A |
| Limiting load integral | $I^2t$ | | | | $32 \times 10^3$ | $A^2s$ |

*Characteristic values*

| Parameter | Symbol | Conditions | min | typ | max | Unit |
|---|---|---|---|---|---|---|
| On-state voltage | $V_F$ | $I_F$ = 520 A, $T_{vj}$ = 115°C | | | 7.1 | V |
| Threshold voltage | $V_{(T0)}$ | $T_{vj}$ = 115°C | | | 3.35 | V |
| Slope resistance | $r_T$ | $I_F$ = 200...1000 A | | | 7.2 | mΩ |

# Turn-on

*Characteristic values*

| Parameter | Symbol | Conditions | min | typ | max | Unit |
|---|---|---|---|---|---|---|
| Peak forward recovery voltage | $V_{FRM}$ | $dI_F/dt$ = 1000 A/µs, $T_{vj}$ = 115°C | | | 370 | V |

# Turn-off

*Maximum rated values [1]*

| Parameter | Symbol | Conditions | min | typ | max | Unit |
|---|---|---|---|---|---|---|
| Max. decay rate of on-state current | $di/dt_{crit}$ | $I_{FM}$ = A, $T_{vj}$ = 115 °C  $V_{DC-link}$ = 3300 V | | | 220 | A/µs |

*Characteristic values*

| Parameter | Symbol | Conditions | min | typ | max | Unit |
|---|---|---|---|---|---|---|
| Reverse recovery current | $I_{RM}$ | $I_{FQ}$ = 520 A, $V_{DC-Link}$ = 3300 V | | | 300 | A |
| Reverse recovery charge | $Q_{rr}$ | $di/dt$ = 220 A/µs, $L_{CL}$ = nH | | | | µC |
| Turn-off energy | $E_{rr}$ | $C_{CL}$ = µF, $R_{CL}$ = Ω, $T_j$ = 115°C | | | 1.8 | J |

# Thermal

*Maximum rated values [1]*

| Parameter | Symbol | Conditions | min | typ | max | Unit |
|---|---|---|---|---|---|---|
| Operating junction temperature range | $T_{vj}$ | | -40 | | 115 | °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 $F_m$ = 14...18 kN | | | 40 | K/kW |
| | $R_{th(j-c)A}$ | Anode-side cooled $F_m$ = 14...18 kN | | | 80 | K/kW |
| | $R_{th(j-c)C}$ | Cathode-side cooled $F_m$ = 14...18 kN | | | 80 | K/kW |
| Thermal resistance case to heatsink | $R_{th(c-h)}$ | Double-side cooled $F_m$ = 14...18 kN | | | 8 | K/kW |
| | $R_{th(c-h)}$ | Single-side cooled $F_m$ = 14...18 kN | | | 16 | 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) | 25.699 | 9.472 | 3.381 | 1.466 |
| $\tau_i$(s) | 0.3802 | 0.0483 | 0.0060 | 0.0018 |



**Fig. 1** Transient thermal impedance (junction to case) vs. time in analytical and graphical form (max. values)

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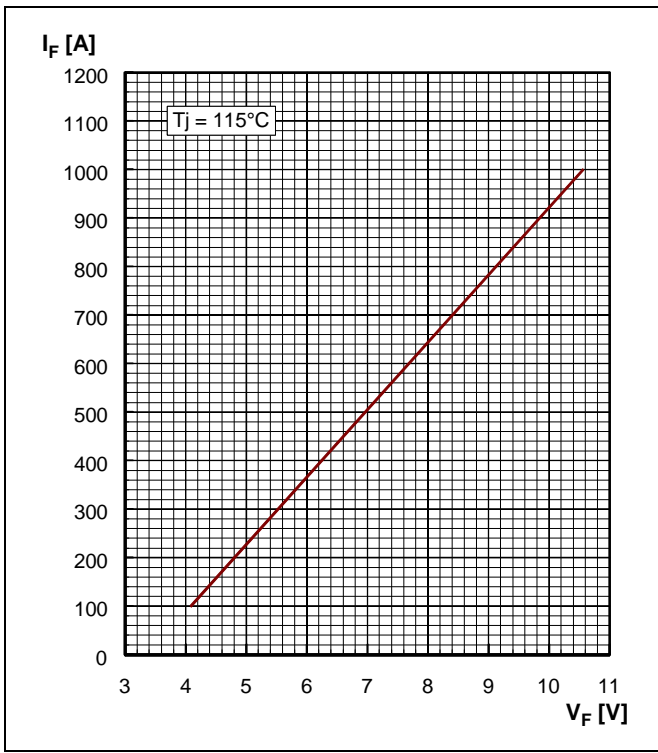
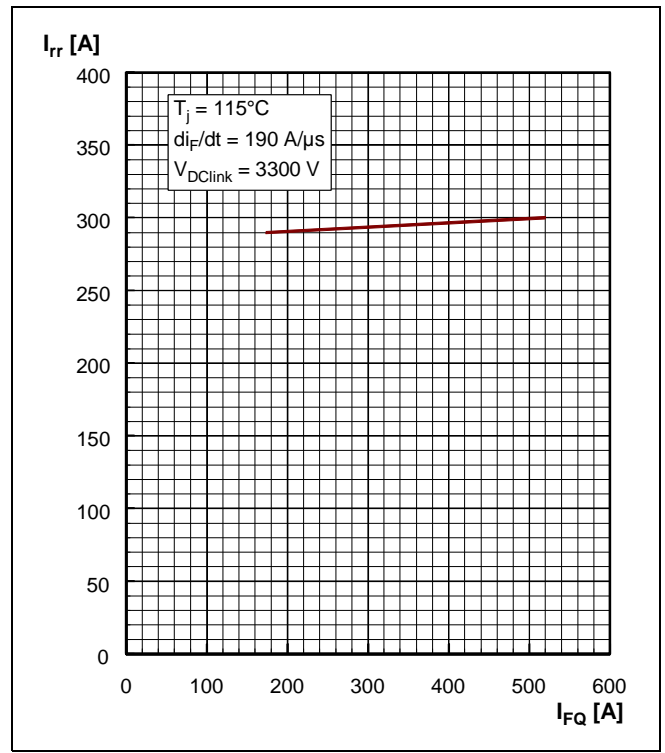**Fig. 2**  Forward current vs. forward voltage

**Fig. 3**  Diode reverse recovery current vs. turn-off current
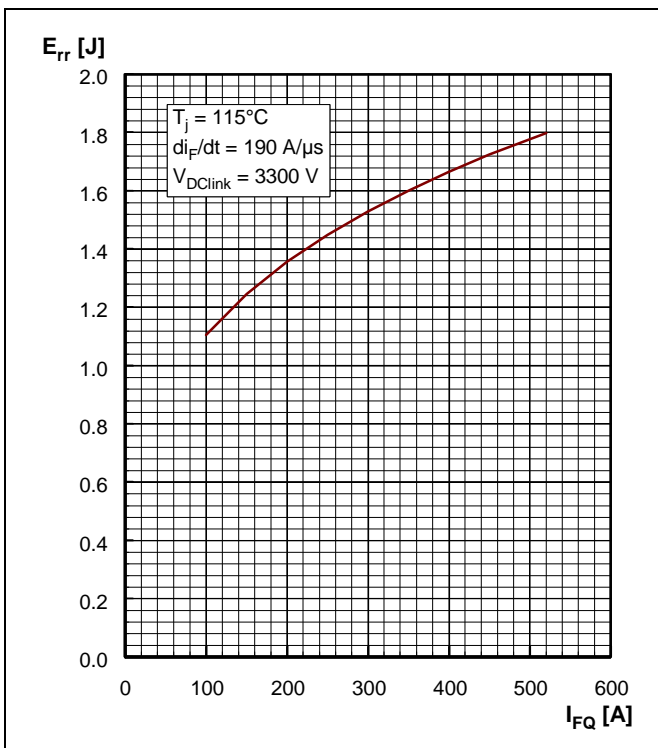
**Fig. 4**  Diode turn-off energy per pulse vs. turn-off current
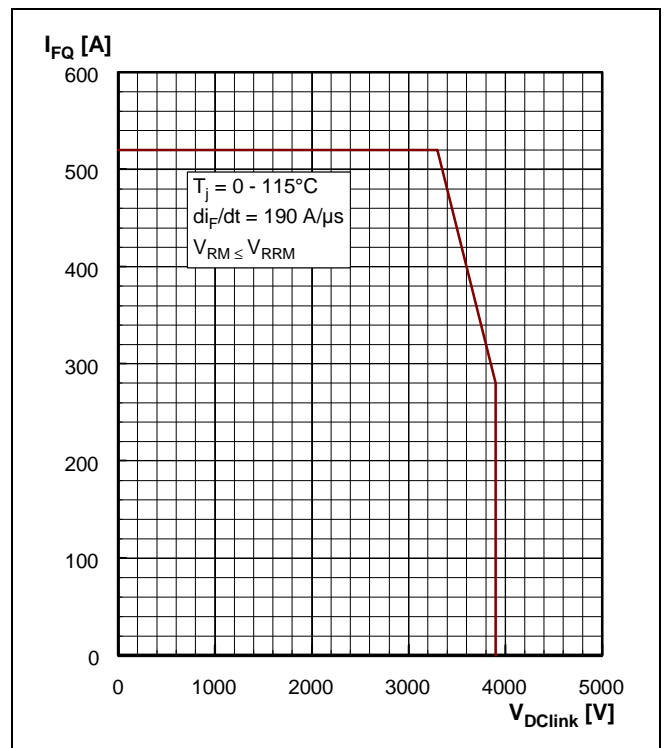
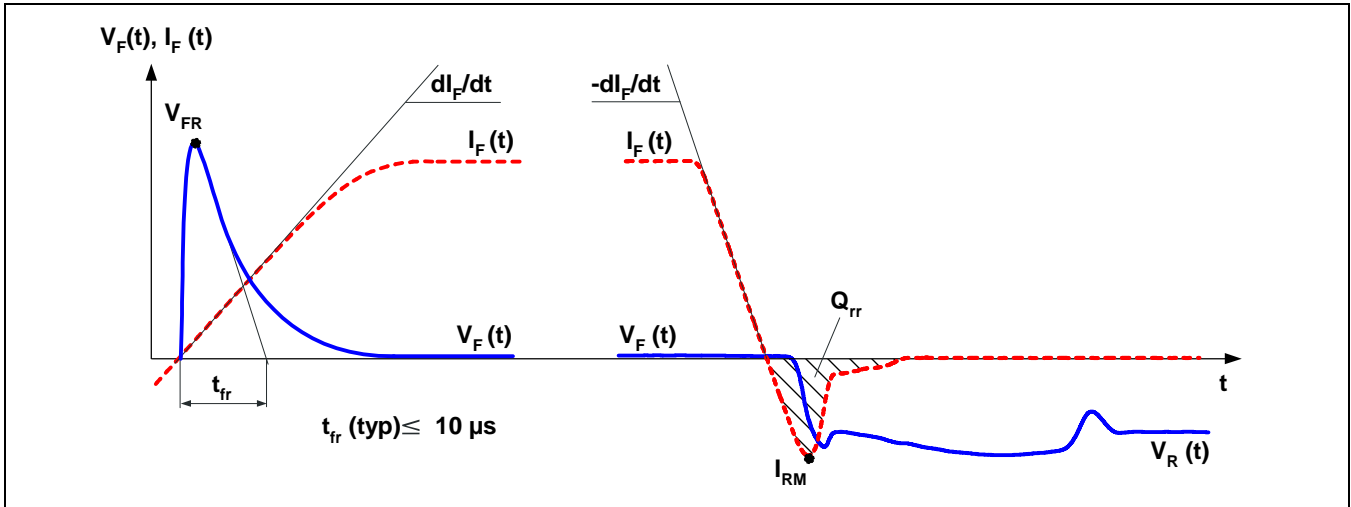**Fig. 5**  Max. repetitive diode forward current

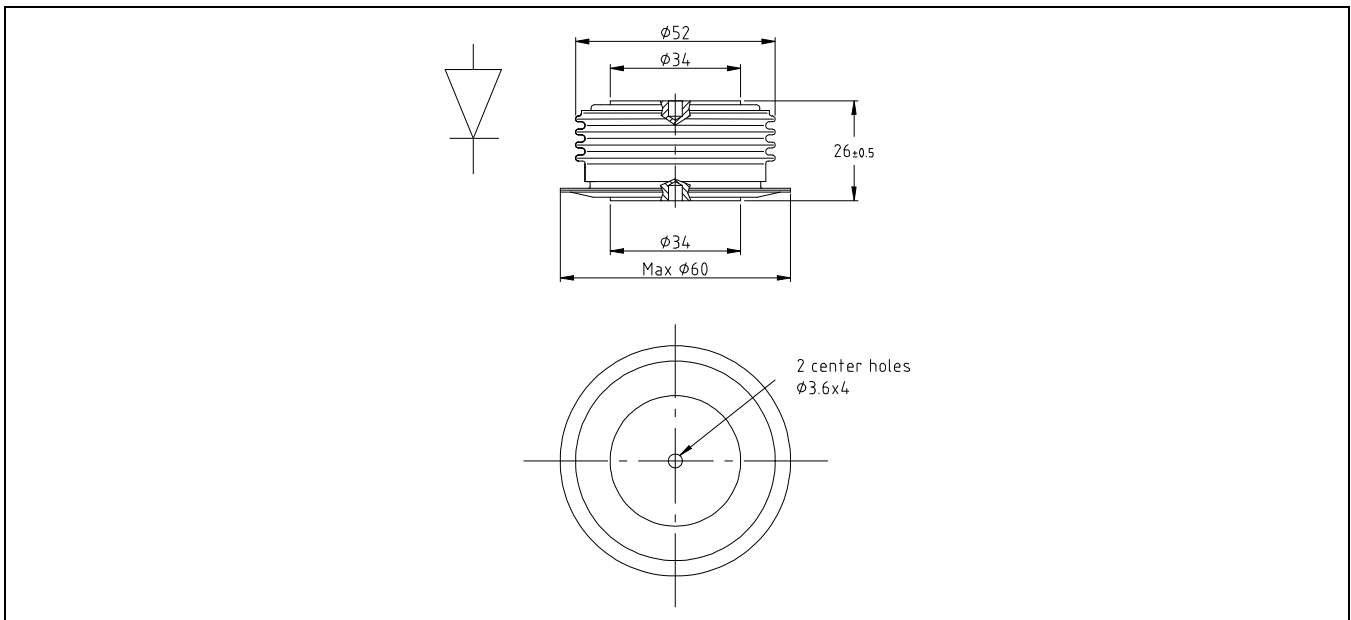**Fig. 6**   General current and voltage waveforms



**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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