

$V_{RRM} = 5500 \text{ V}$
 $I_{F(AV)M} = 635 \text{ A}$
 $I_{FSM} = 15.5 \cdot 10^3 \text{ A}$
 $V_{F0} = 2.9 \text{ V}$
 $r_F = 1.9 \text{ m}\Omega$
 $V_{DC-Link} = 3300 \text{ V}$

Fast Recovery Diode

5SDF 08H6005

Doc. No. 5SYA1116-02 Apr. 16

- 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 | 5SDF 08H6005 | Unit | |
|---|---------------|---|--------------|------|---|
| Repetitive peak reverse voltage | V_{RRM} | $f = 50 \text{ Hz}$, $t_p = 10 \text{ ms}$, $T_{vj} = 115 \text{ }^\circ\text{C}$ | 5500 | V | |
| Permanent DC voltage for 100 FIT failure rate | $V_{DC-link}$ | Ambient cosmic radiation at sea level in open air. | 100% Duty | 3300 | V |
| | | | 5% Duty | 3900 | |

Characteristic values

| Parameter | Symbol | Conditions | min | typ | max | Unit |
|-------------------------|-----------|---|-----|-----|-----|------|
| Reverse leakage current | I_{RRM} | V_{RRM} , $T_{vj} = 115 \text{ }^\circ\text{C}$ | | | 30 | mA |

Mechanical data

Maximum rated values ¹⁾

| Parameter | Symbol | Conditions | min | typ | max | Unit |
|----------------|--------|------------------|-----|-----|-----|----------------|
| Mounting force | F_M | | 36 | 40 | 46 | 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 | $F_M = 40 \text{ kN}$, $T_a = 25 \text{ }^\circ\text{C}$ | 26.2 | | 26.6 | mm |
| Surface creepage distance | D_s | | 30 | | | mm |
| Air strike distance | D_a | | 20 | | | mm |

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 |
|-----------------------------------|--------------|--|-----|-----|-------------------|--------|
| Average on-state current | $I_{F(AV)M}$ | Half sine wave, $T_c = 70\text{ °C}$ | | | 635 | A |
| RMS on-state current | $I_{F(RMS)}$ | | | | 1000 | A |
| Peak non-repetitive surge current | I_{FSM} | $t_p = 10\text{ ms}$, $T_{vj} = 115\text{ °C}$, sine half wave, $V_R = 0\text{ V}$, after surge | | | $15.5 \cdot 10^3$ | A |
| Limiting load integral | I^2t | | | | $1.2 \cdot 10^6$ | A^2s |

Characteristic values

| Parameter | Symbol | Conditions | min | typ | max | Unit |
|-------------------|----------|--|-----|-----|-----|-----------|
| On-state voltage | V_F | $I_F = 1800\text{ A}$, $T_{vj} = 115\text{ °C}$ | | | 6.3 | V |
| Threshold voltage | V_{F0} | 400...2500, $T_{vj} = 115\text{ °C}$ | | | 2.9 | V |
| Slope resistance | r_F | | | | 1.9 | $m\Omega$ |

Turn-on**Characteristic values**

| Parameter | Symbol | Conditions | min | typ | max | Unit |
|-------------------------------|-----------|--|-----|-----|-----|------|
| Peak forward recovery voltage | V_{FRM} | $di_F/dt = 1000\text{ A}/\mu\text{s}$, $T_{vj} = 115\text{ °C}$ | | | 230 | V |

Turn-off**Maximum rated values ¹⁾**

| Parameter | Symbol | Conditions | min | typ | max | Unit |
|-------------------------------------|----------------|--|-----|-----|-----|-----------------|
| Max. decay rate of on-state current | di/dt_{crit} | $I_{FM} = 1800\text{ A}$, $T_{vj} = 115\text{ °C}$, $V_{DC-Link} = 3300\text{ V}$ | | | 440 | $A/\mu\text{s}$ |

Characteristic values

| Parameter | Symbol | Conditions | min | typ | max | Unit |
|--------------------------|----------|---|-----|-----|------|----------------|
| Reverse recovery charge | Q_{rr} | $I_{FQ} = 1800\text{ A}$, $V_{DC-Link} = 3300\text{ V}$, $-di_F/dt = 440\text{ A}/\mu\text{s}$, $L_{CL} = 300\text{ nH}$, $C_{CL} = 10\text{ }\mu\text{F}$, $R_{CL} = 0.65\text{ }\Omega$, $D_{CL} = 5SDF\ 08H6005$, $T_{vj} = 115\text{ °C}$ | | | 3000 | μAs |
| Reverse recovery current | I_{RM} | | | | 900 | A |
| Turn-off energy | E_{rr} | | | | 6.5 | 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 $F_m = 36... 46$ kN | | | 12 | K/kW |
| | $R_{th(j-c)A}$ | Anode-side cooled $F_m = 36... 46$ kN | | | 24 | K/kW |
| | $R_{th(j-c)C}$ | Cathode-side cooled $F_m = 36... 46$ kN | | | 24 | K/kW |
| Thermal resistance case to heatsink | $R_{th(c-h)}$ | Double-side cooled $F_m = 36... 46$ kN | | | 3 | K/kW |
| | $R_{th(c-h)}$ | Single-side cooled $F_m = 36... 46$ kN | | | 6 | K/kW |

Analytical function for transient thermal impedance:

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

| i | 1 | 2 | 3 | 4 |
|--------------|--------|--------|--------|--------|
| R_i (K/kW) | 7.713 | 2.766 | 1.044 | 0.480 |
| τ_i (s) | 0.5316 | 0.0668 | 0.0078 | 0.0020 |

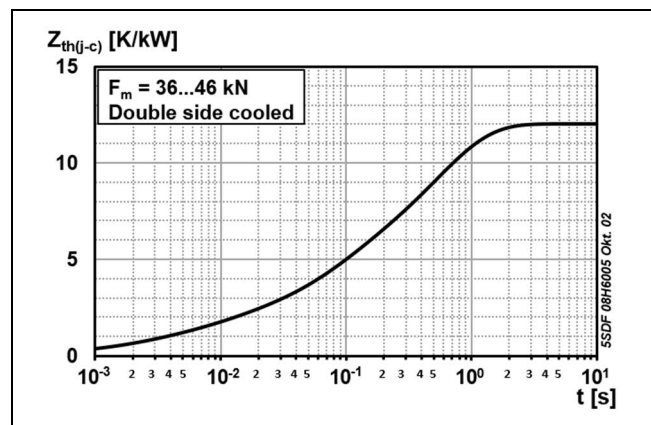


Fig. 1 Transient thermal impedance (junction-to-case) vs. time

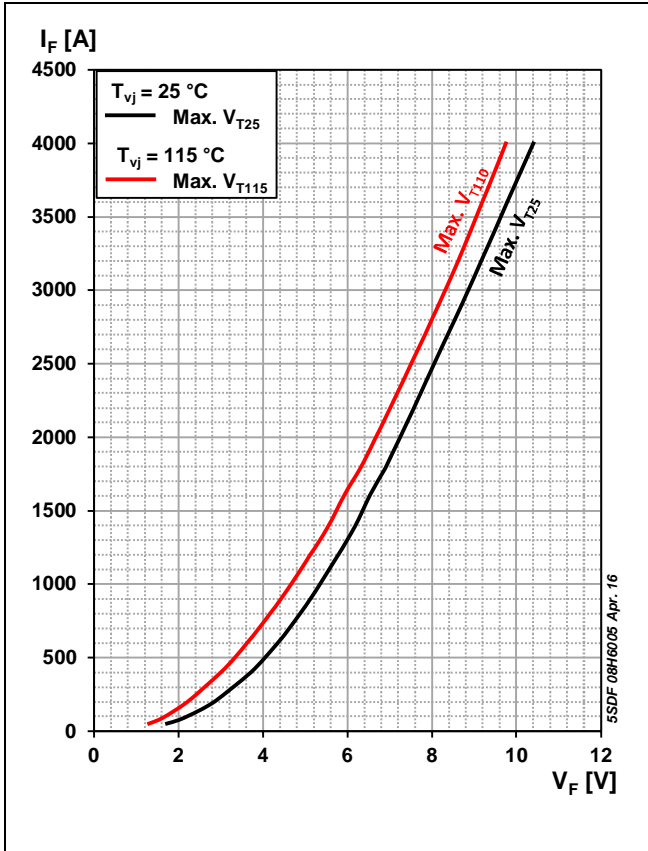


Fig. 2 On-state voltage characteristics

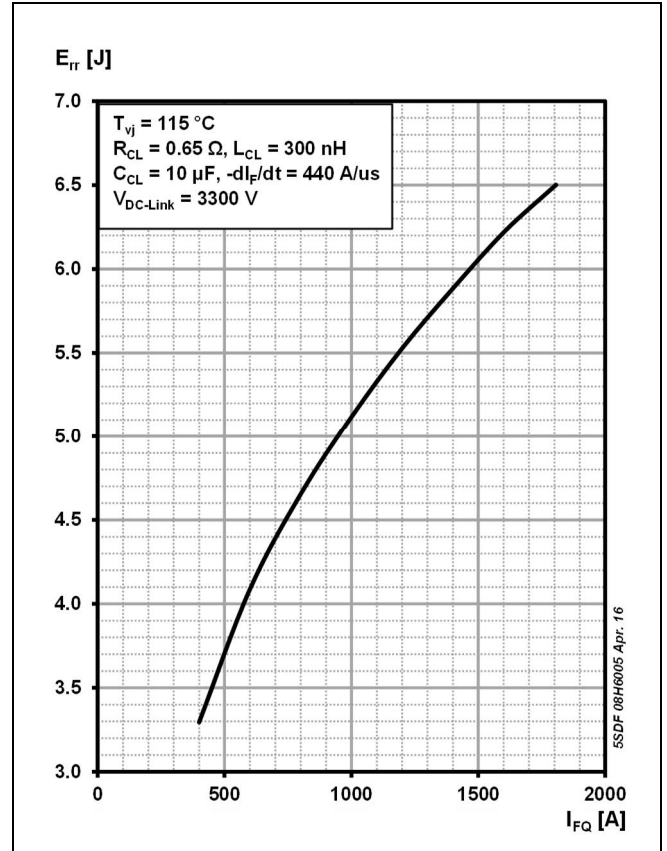


Fig. 3 Diode turn-off energy per pulse vs. turn-off current

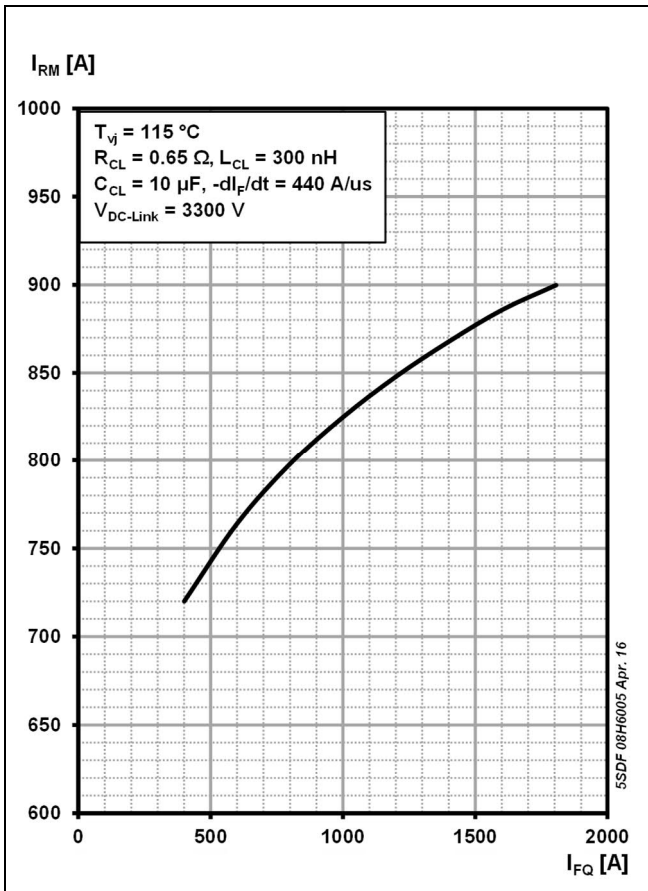


Fig. 4 Diode reverse recovery current vs. turn-off current

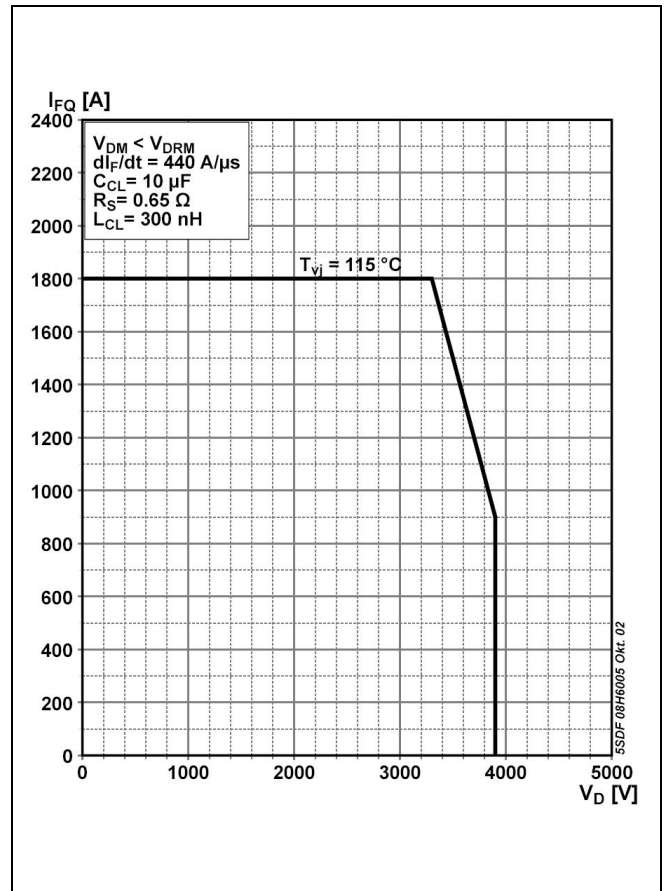


Fig. 5 Diode Safe Operating Area

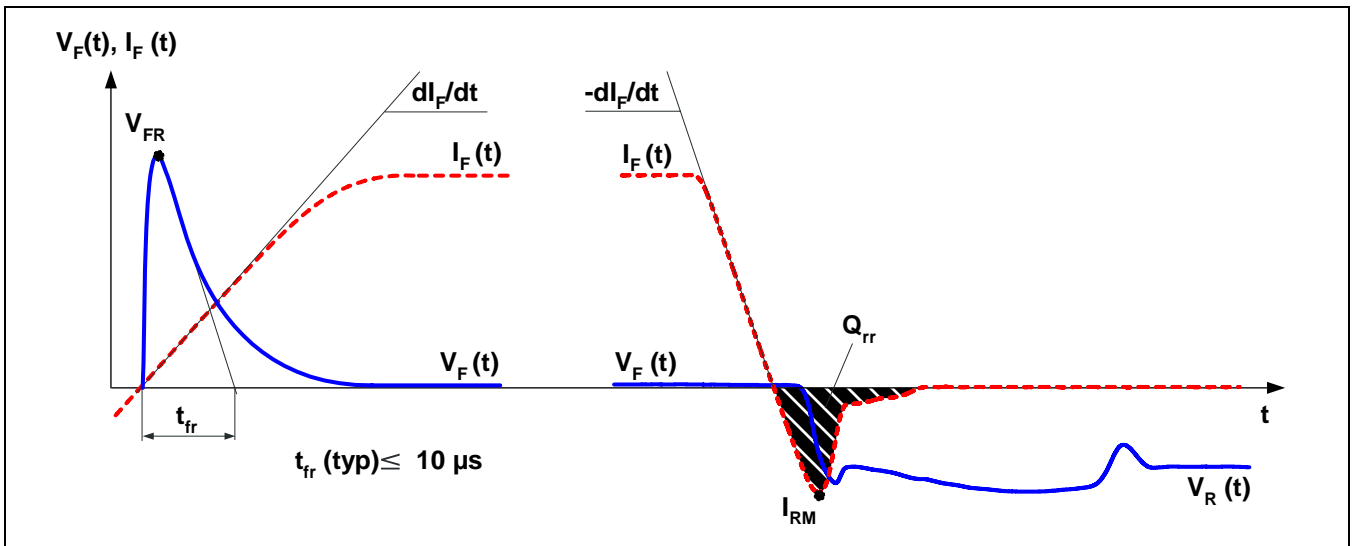


Fig. 6 General current and voltage waveforms

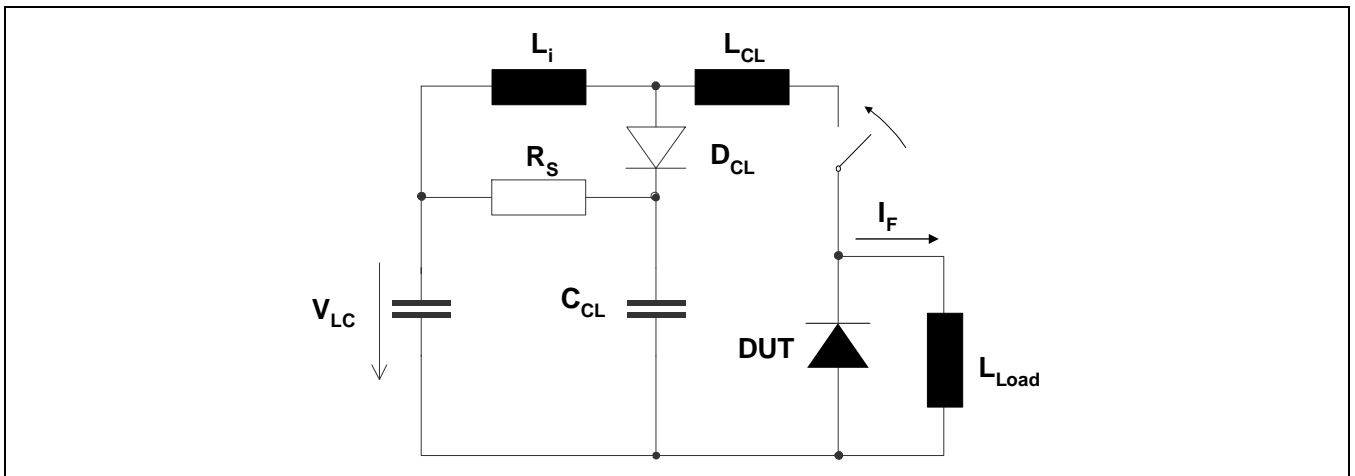


Fig. 7 Test circuit.

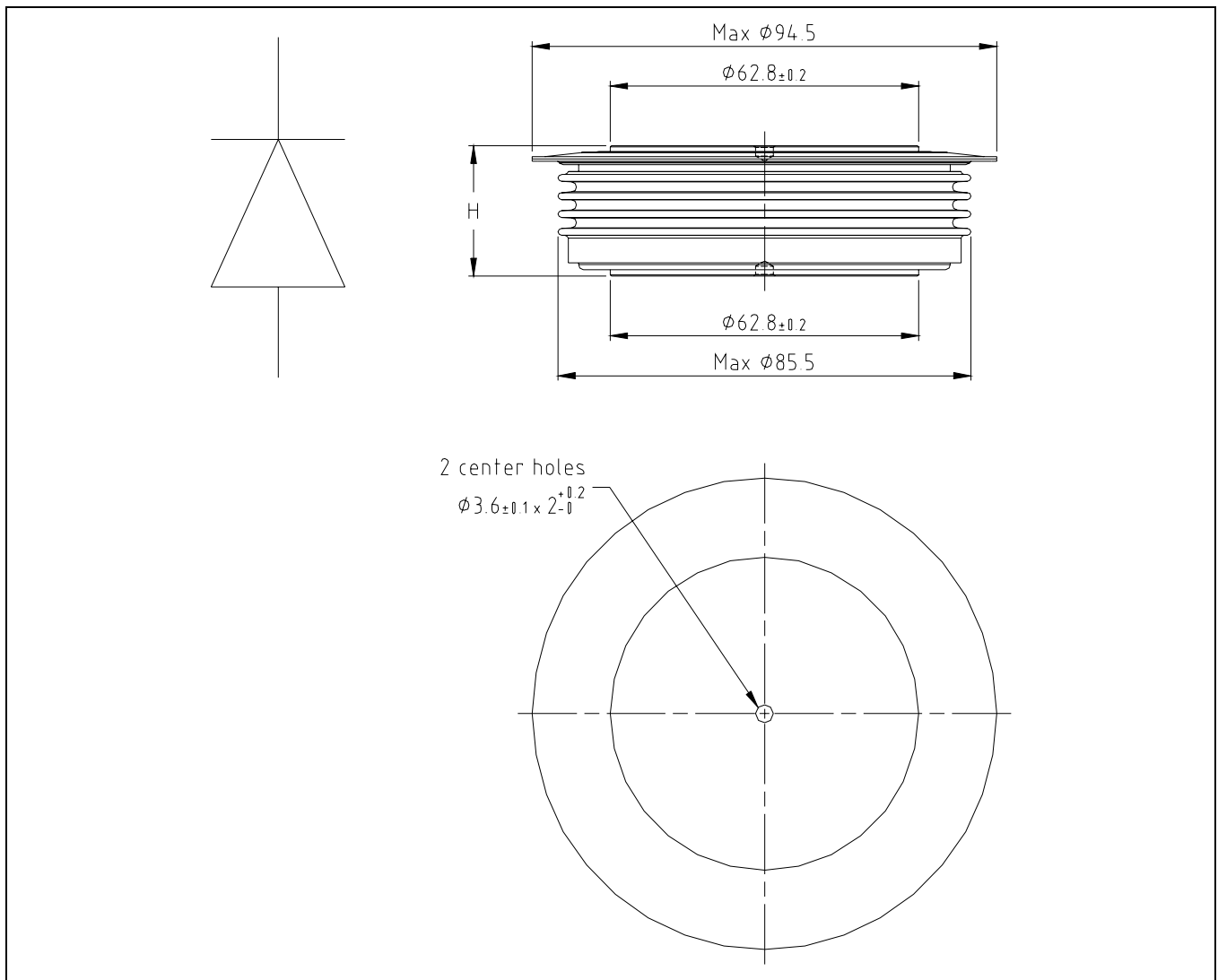


Fig. 8 Device Outline Drawing

Related documents:

| Doc. Nr. | Title |
|-----------|--|
| 5SYA 2036 | Recommendations regarding mechanical clamping of Press Pack High Power Semiconductors |
| 5SYA 2064 | Applying Fast Recovery Diodes |
| 5SZK 9104 | Specification of environmental class for pressure contact diodes, PCTs and GTO, STORAGE |
| 5SZK 9105 | Specification of environmental class for pressure contact diodes, PCTs and GTO, TRANSPORTATION |
| 5SZK 9115 | Specification of environmental class for presspack Diodes, PCTs and GTOs, OPERATION (Industry) |
| 5SZK 9116 | Specification of environmental class for presspack Diodes, PCTs and GTOs, OPERATION (Traction) |

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

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