

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

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.	3300	V
		100% Duty 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

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 ² s

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	mW

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/ μs

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 $F_m = 36... 46\text{ kN}$			12	K/kW
	$R_{th(j-c)A}$	Anode-side cooled $F_m = 36... 46\text{ kN}$			24	K/kW
	$R_{th(j-c)C}$	Cathode-side cooled $F_m = 36... 46\text{ kN}$			24	K/kW

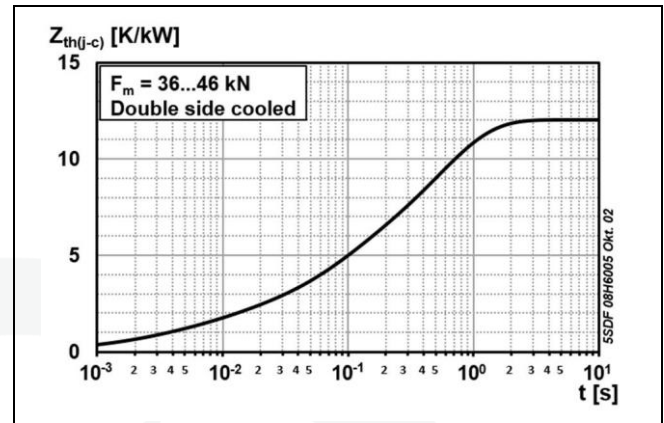


Fig. 1 Transient thermal impedance (junction-to-

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: η

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

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

case) vs. time

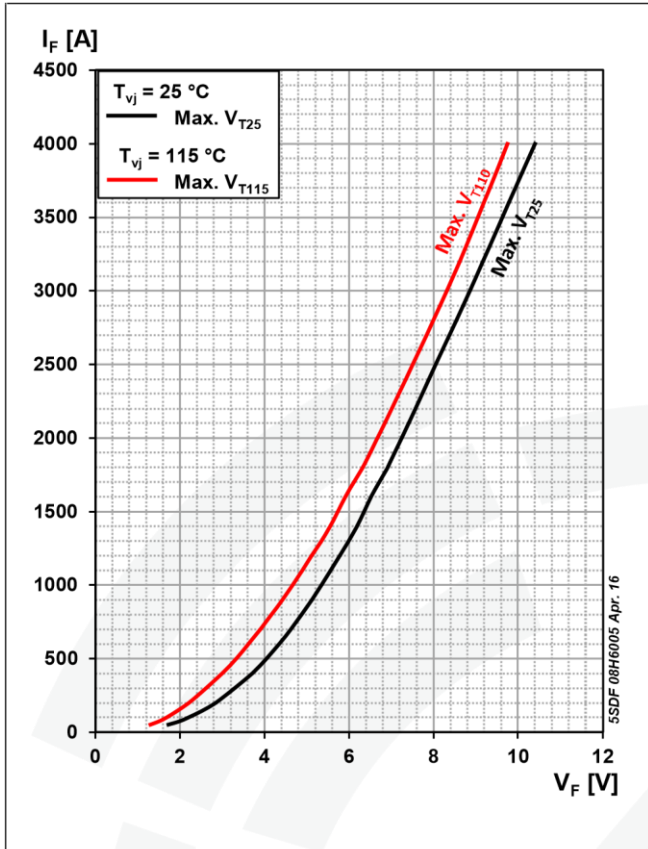


Fig. 2 On-state voltage characteristics

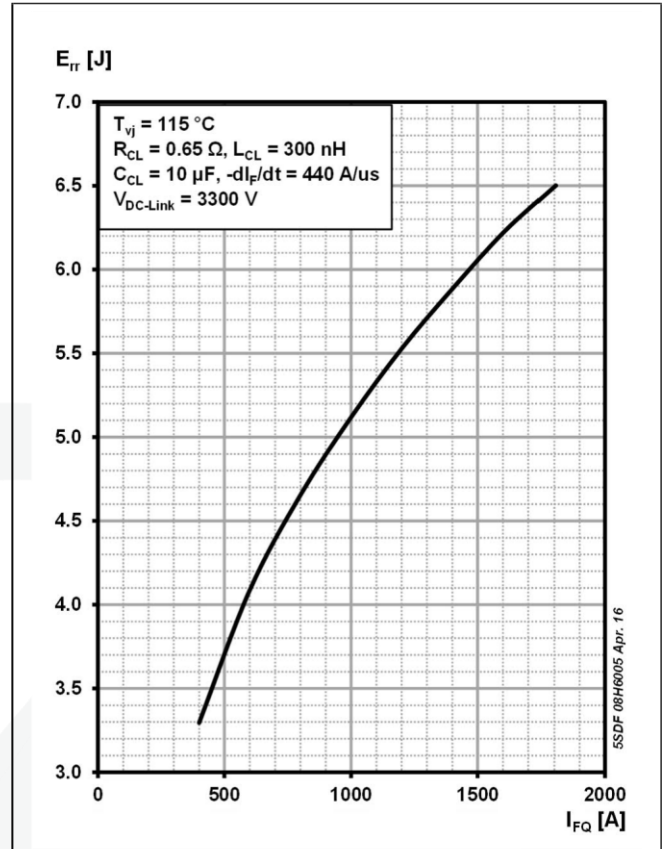


Fig. 3 Diode turn-off energy per pulse vs. turn-off current

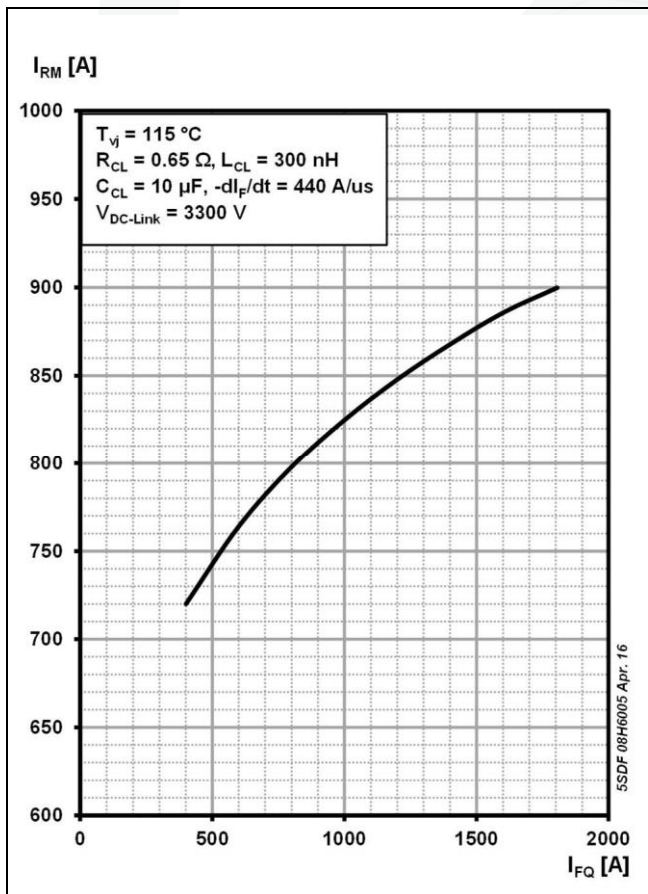


Fig. 4 Diode reverse recovery current vs. turn-off current

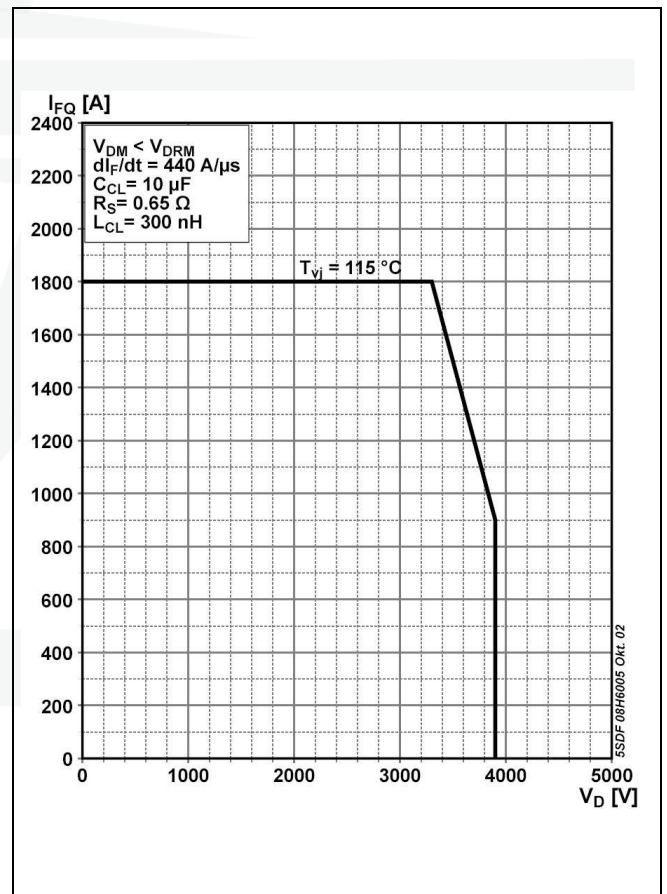


Fig. 5 Diode Safe Operating Area

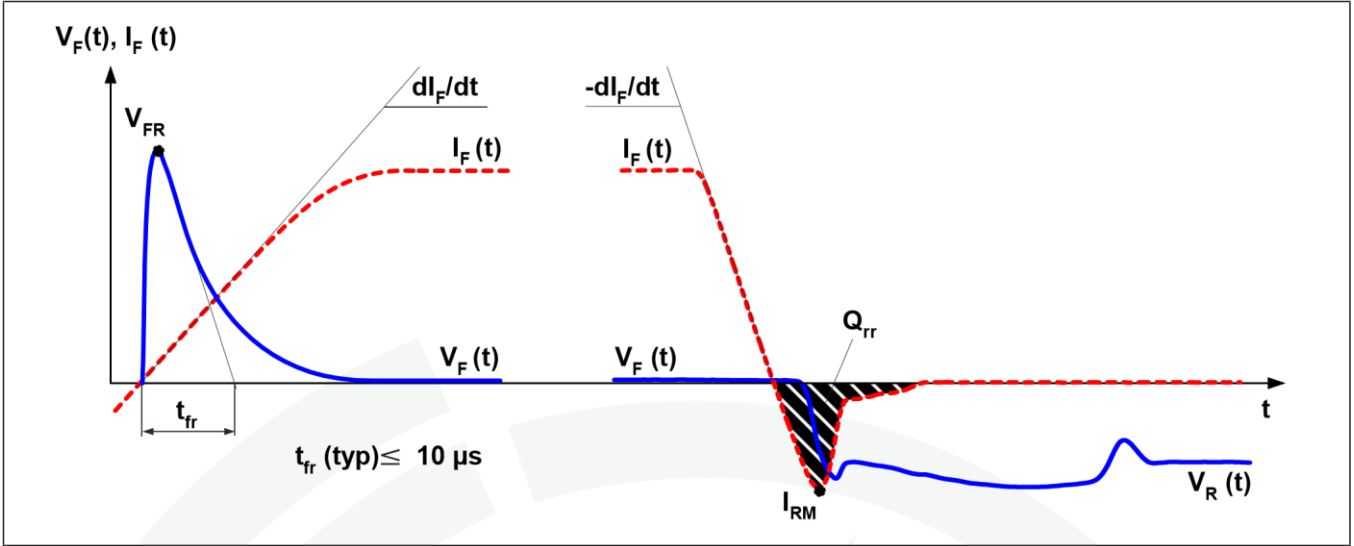


Fig. 6 General current and voltage waveforms

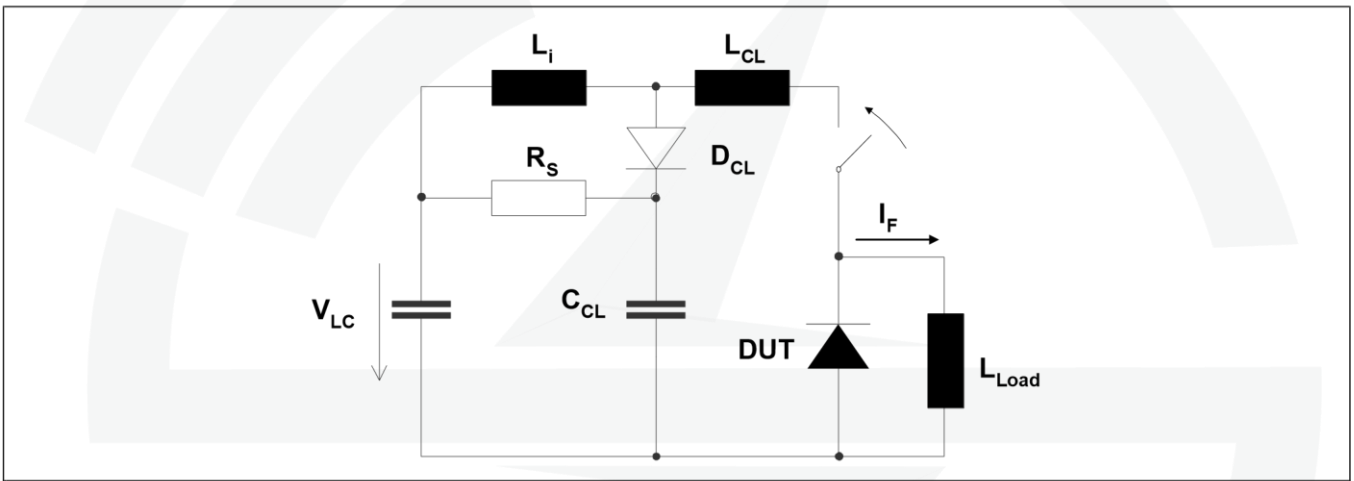


Fig. 7 Test circuit.

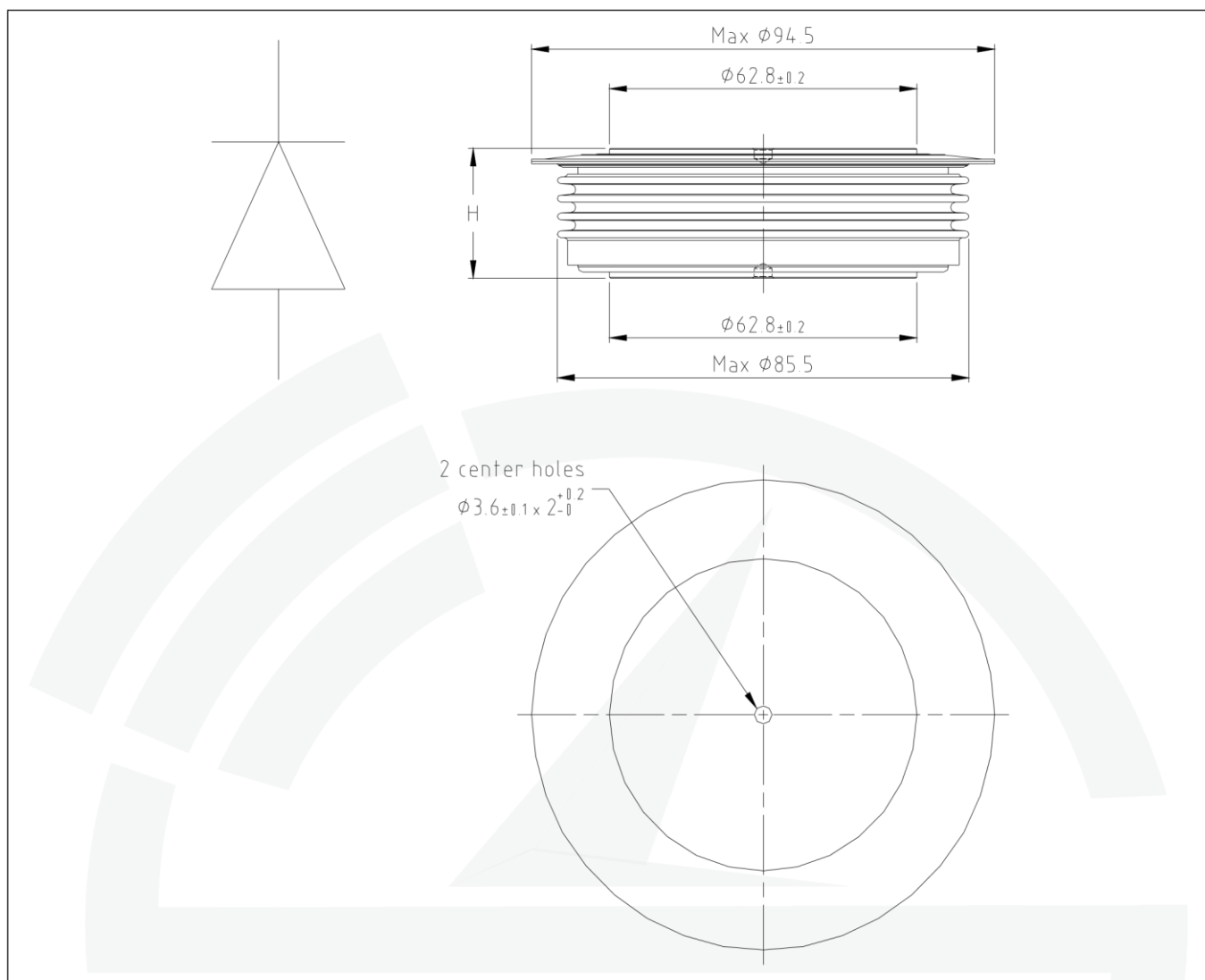


Fig. 8 Device Outline Drawing