

$V_{RRM} = 4500 \text{ V}$   
 $I_{F(AV)M} = 275 \text{ A}$   
 $I_{FSM} = 5.8 \cdot 10^3 \text{ A}$   
 $V_{F0} = 1.67 \text{ V}$   
 $r_F = 3.54 \text{ m}\Omega$   
 $V_{DC-Link} = 2800 \text{ V}$

## Fast Recovery Diode

# 5SDF 03D4502

Doc. No. 5SYA1117-03 Nov. 19

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

### Blocking

*Maximum rated values <sup>1)</sup>*

Parameter	Symbol	Conditions	5SDF 03D4502	Unit
Repetitive peak reverse voltage	$V_{RRM}$	$f = 50 \text{ Hz}$ , $t_p = 10 \text{ ms}$ , $T_{vj} = 115 \text{ }^\circ\text{C}$	4500	V
Permanent DC voltage for 100 FIT failure rate	$V_{DC-link}$	Ambient cosmic radiation at sea level in open air. 100% Duty	2800	V

*Characteristic values*

Parameter	Symbol	Conditions	min	typ	max	Unit
Reverse leakage current	$I_{RRM}$	$V_{RRM}$ , $T_{vj} = 115 \text{ }^\circ\text{C}$			8	mA

### Mechanical data

*Maximum rated values <sup>1)</sup>*

Parameter	Symbol	Conditions	min	typ	max	Unit
Mounting force	$F_M$		14	16	18	kN
Acceleration	a	Device unclamped			50	$\text{m/s}^2$
Acceleration	a	Device clamped			200	$\text{m/s}^2$

*Characteristic values*

Parameter	Symbol	Conditions	min	typ	max	Unit
Weight	m				0.25	kg
Housing thickness	H		25.77		26.42	mm
Pole-piece diameter	$D_P$			34		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

ABB Switzerland Ltd, Semiconductors reserves the right to change specifications without notice.



## On-state

### Maximum rated values <sup>1)</sup>

Parameter	Symbol	Conditions	min	typ	max	Unit
Average on-state current	$I_{F(AV)M}$	Half sine wave, $T_c = 70\text{ °C}$			275	A
RMS on-state current	$I_{F(RMS)}$				435	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			$5.8 \cdot 10^3$	A
Limiting load integral	$I^2t$				$1.68 \cdot 10^5$	$A^2s$

### Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
On-state voltage	$V_F$	$I_F = 630\text{ A}$ , $T_{vj} = 115\text{ °C}$		3.20	3.90	V
Threshold voltage	$V_{F0}$	$I_F = 200 \dots 700\text{ A}$ , $T_{vj} = 115\text{ °C}$		1.45	1.67	V
Slope resistance	$r_F$				2.78	3.54

## Turn-on

### Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Peak forward recovery voltage	$V_{FRM}$	$di_F/dt = 1000\text{ A}/\mu\text{s}$ , $T_{vj} = 115\text{ °C}$		205		V

## Turn-off

### Maximum rated values <sup>1)</sup>

Parameter	Symbol	Conditions	min	typ	max	Unit
Max. decay rate of on-state current	$di/dt_{crit}$	$I_F = 630\text{ A}$ , $T_{vj} = 115\text{ °C}$ , $V_{DC-Link} = 2800\text{ V}$			300	$A/\mu\text{s}$

### Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit	
Reverse recovery charge	$Q_{rr}$	$I_F = 630\text{ A}$ , $V_{DC-Link} = 2700\text{ V}$ , $-di_F/dt = 250\text{ A}/\mu\text{s}$ , $L_{CL} = 300\text{ nH}$ , $C_{CL} = 3\text{ }\mu\text{F}$ , $R_S = 1.25\text{ }\Omega$ , $D_{CL} = 5SDF\ 08H6005$ , $T_{vj} = 115\text{ °C}$		755	930	$\mu\text{As}$	
Reverse recovery current	$I_{RM}$				350	400	A
Turn-off energy	$E_{rr}$					1.8	J

## Thermal

### Maximum rated values<sup>1)</sup>

Parameter	Symbol	Conditions	min	typ	max	Unit
Operating junction temperature range	$T_{vj}$		0		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:

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

i	1	2	3	4
$R_i$ (K/kW)	25.613	9.407	3.385	1.595
$\tau_i$ (s)	0.3743	0.0454	0.0048	0.0013

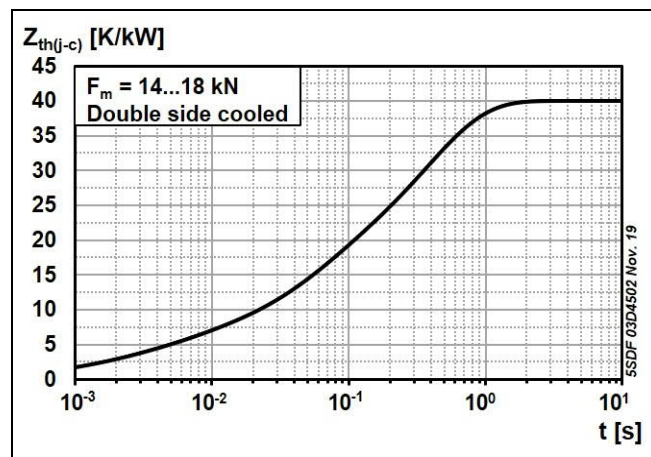


Fig. 1 Transient thermal impedance (junction-to-case) vs. time

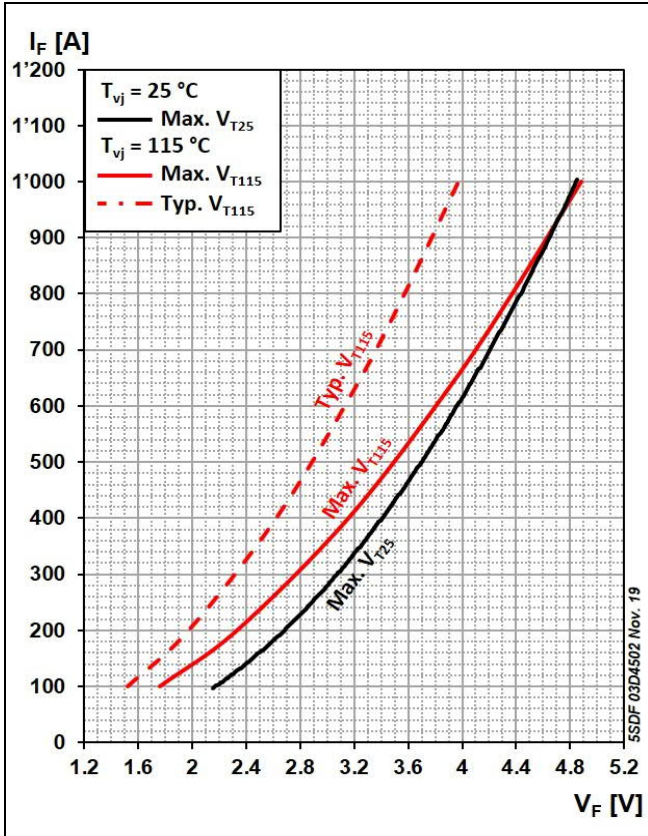


Fig. 2 Forward current vs. forward voltage

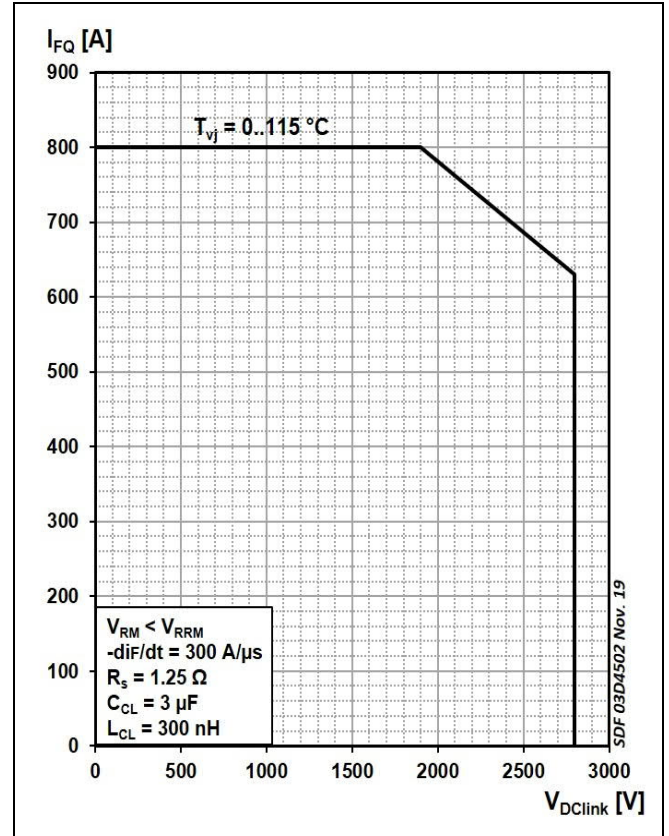


Fig. 3 Diode Safe Operating Area

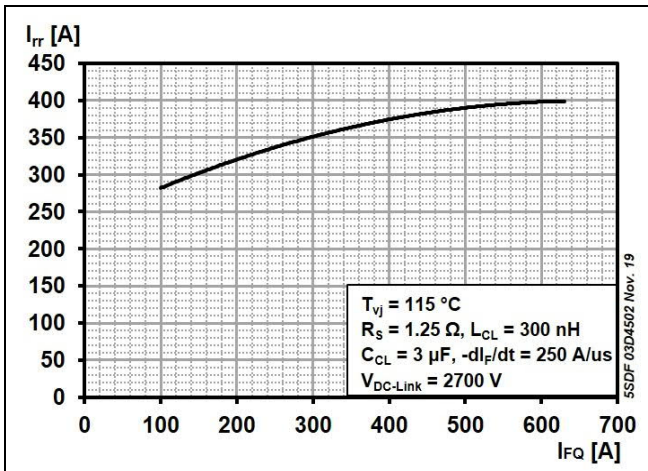


Fig. 4 Diode reverse recovery current vs. turn-off current

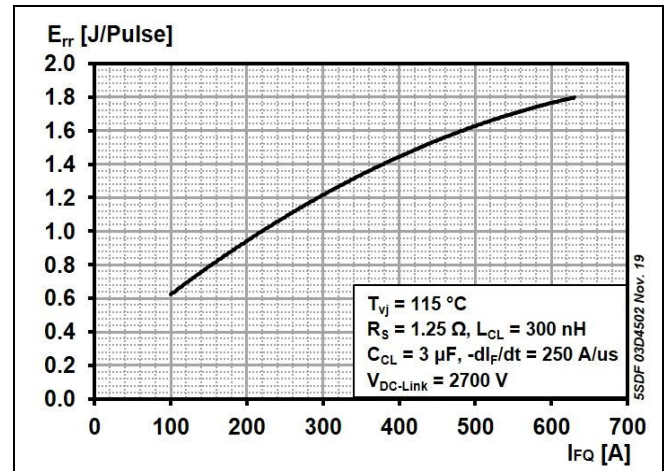
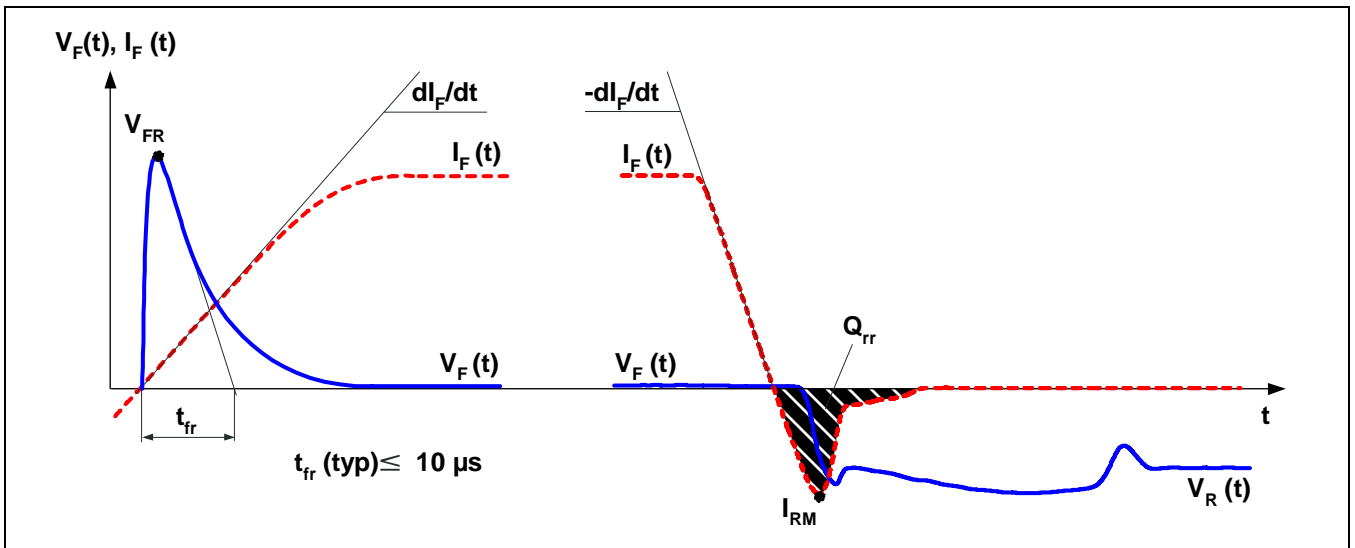
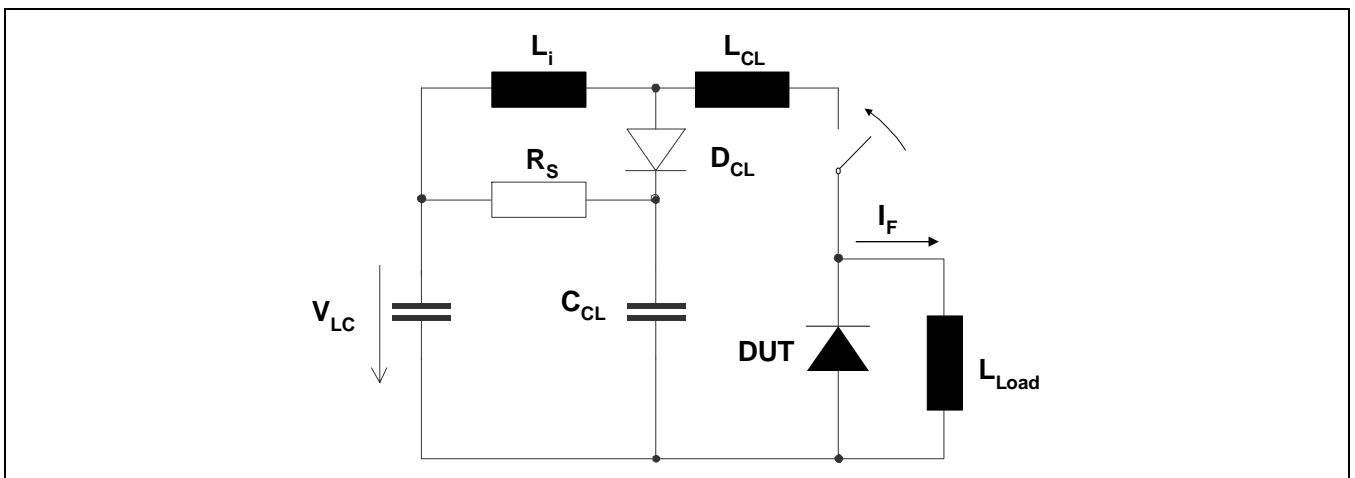


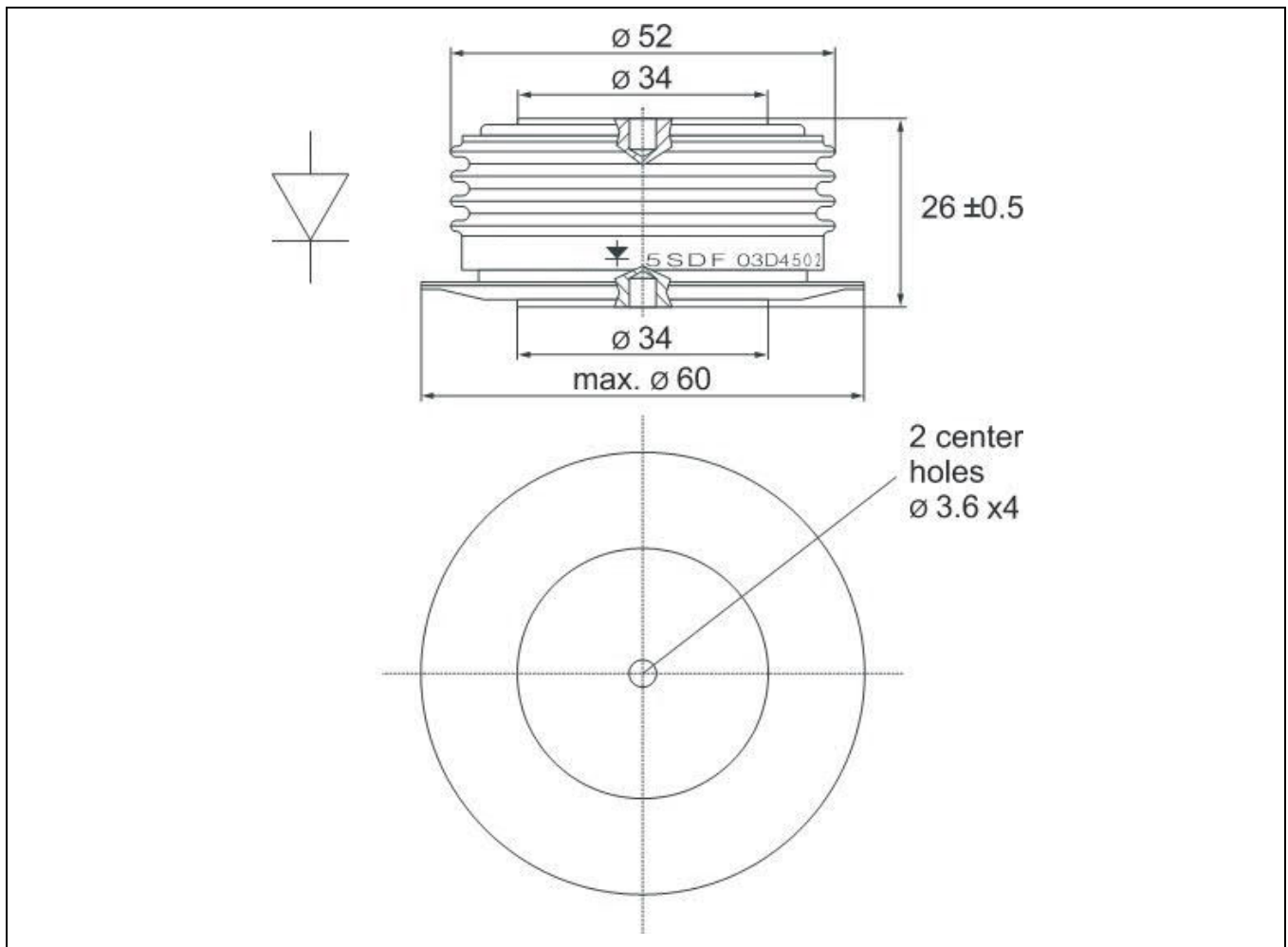
Fig. 5 Diode turn-off energy per pulse vs. turn-off current



**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.

**ABB Switzerland Ltd, Semiconductors reserves the right to change specifications without notice.**

# ABB

**ABB Switzerland Ltd**  
**Semiconductors**  
 Fabrikstrasse 3  
 CH-5600 Lenzburg, Switzerland

Doc. No. 5SYA1117-03 Nov. 19

Telephone +41 (0)58 586 1419  
 Fax +41 (0)58 586 1306  
 Email [abbsem@ch.abb.com](mailto:abbsem@ch.abb.com)  
 Internet [www.abb.com/semiconductors](http://www.abb.com/semiconductors)

## X-ON Electronics

Largest Supplier of Electrical and Electronic Components

*Click to view similar products for [Rectifiers](#) category:*

*Click to view products by [ABB](#) manufacturer:*

Other Similar products are found below :

[70HFR40](#) [RL252-TP](#) [1N5397](#) [NTE5841](#) [NTE6038](#) [SCF5000](#) [1N4002G](#) [1N4005-TR](#) [JANS1N6640US](#) [481235F](#) [RRE02VS6SGTR](#) [067907F](#)  
[MS306](#) [70HF40](#) [US2JFL-TP](#) [A1N5404G-G](#) [CRS04\(T5L,TEMQ\)](#) [ACGRA4007-HF](#) [ACGRB207-HF](#) [CLH03\(TE16L,Q\)](#) [ACGRC307-HF](#)  
[ACEFC304-HF](#) [NTE6356](#) [NTE6359](#) [NTE6002](#) [NTE6023](#) [NTE6039](#) [NTE6077](#) [85HFR60](#) [40HFR60](#) [1N1186RA](#) [70HF120](#) [85HFR80](#)  
[D126A45C](#) [SCF7500](#) [D251N08B](#) [SCHJ22.5K](#) [SM100](#) [SCPA2](#) [SDHD5K](#) [VS-12FL100S10](#) [ACGRA4001-HF](#) [D1821SH45T PR](#) [D1251S45T](#)  
[NTE5990](#) [NTE6358](#) [NTE6162](#) [NTE5850](#) [SKN20/08](#) [SKN300/16](#)