

$V_{RSM}$	=	6500 V
$I_{F(AV)M}$	=	5700 A
$I_{F(RMS)}$	=	8950 A
$I_{FSM}$	=	$82.0 \cdot 10^3$ A
$V_{F0}$	=	tbd V
$r_F$	=	tbd m $\Omega$

# Rectifier Diode

## 5SDD 57N6500

### Preliminary

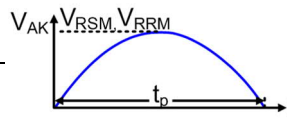
Doc. No. 5SYA 1190-01 Jan. 21

- High forward and surge current rating
- Low on-state and switching losses
- Optimum power handling capability

## Blocking

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

Parameter	Symbol	Conditions	Value	Unit
Max repetitive peak reverse voltage	$V_{RRM}$	$f = 50$ Hz, $t_p = 10$ ms, $T_{vj} = 0 \dots 160$ °C, Note 1	6500	V
Max non-repetitive peak reverse voltage	$V_{RSM}$	$f = 5$ Hz, $t_p = 10$ ms, $T_{vj} = 0 \dots 160$ °C, Note 1	6500	V



### Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Reverse leakage current	$I_{RRM}$	$V_{RRM}$ , $T_{vj} = 0 \dots 160$ °C			400	mA

Note 1: Voltage derating factor of 0.11% per °C is applicable for  $T_{vj}$  below 0 °C.

## Mechanical data

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

Parameter	Symbol	Conditions	min	typ	max	Unit
Mounting force	$F_M$		81	90	108	kN
Acceleration	a	Device unclamped			50	m/s <sup>2</sup>
Acceleration	a	Device clamped			100	m/s <sup>2</sup>

### Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Weight	m				2.9	kg
Housing thickness	H	$F_M = 90$ kN, $T_a = 25$ °C	34.5		35.2	mm
Surface creepage distance	$D_S$		56			mm
Air strike distance	$D_a$		22			mm

<sup>1)</sup> Maximum rated values indicate limits beyond which damage to the device may occur

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## 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, $T_c = 90^\circ\text{C}$			5700	A
RMS on-state current	$I_{F(RMS)}$				8950	A
Peak non-repetitive surge current	$I_{FSM}$	$t_p = 10\text{ ms}$ , $T_{vj} = 160^\circ\text{C}$ , sine half wave, $V_R = 0\text{ V}$ , after surge			$82.0 \cdot 10^3$	A
Limiting load integral	$I^2t$				$33.6 \cdot 10^6$	$\text{A}^2\text{s}$

### Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
On-state voltage	$V_F$	$I_F = 5000\text{ A}$ , $T_{vj} = 160^\circ\text{C}$		1.25	tbd	V
Threshold voltage	$V_{F0}$	$I_F = 2500 \dots 8000\text{ A}$ , $T_{vj} = 160^\circ\text{C}$		0.77	tbd	V
Slope resistance	$r_F$				0.096	tbd

## Switching

### Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Reverse recovery charge	$Q_{rr}$	$di_F/dt = -10\text{ A}/\mu\text{s}$ , $V_R = 200\text{ V}$ $I_F = 4000\text{ A}$ , $T_{vj} = 160^\circ\text{C}$		15000	20000	$\mu\text{As}$
Reverse recovery current	$I_{RM}$				360	450

## Thermal

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

Parameter	Symbol	Conditions	min	typ	max	Unit
Operating junction temperature range	$T_{vj}$		0		160	°C
Storage temperature range	$T_{stg}$		-40		150	°C

### Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Thermal resistance junction to case	$R_{th(j-c)}$	Double-side cooled $F_m = 81... 108 \text{ kN}$			4.7	K/kW
	$R_{th(j-c)A}$	Anode-side cooled $F_m = 81... 108 \text{ kN}$			8.5	K/kW
	$R_{th(j-c)C}$	Cathode-side cooled $F_m = 81... 108 \text{ kN}$			10.5	K/kW
Thermal resistance case to heatsink	$R_{th(c-h)}$	Double-side cooled $F_m = 81... 108 \text{ kN}$			1	K/kW
	$R_{th(c-h)}$	Single-side cooled $F_m = 81... 108 \text{ kN}$			2	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)	3.186	0.806	0.530	0.178
$\tau_i$ (s)	0.9464	0.1102	0.0149	0.0027

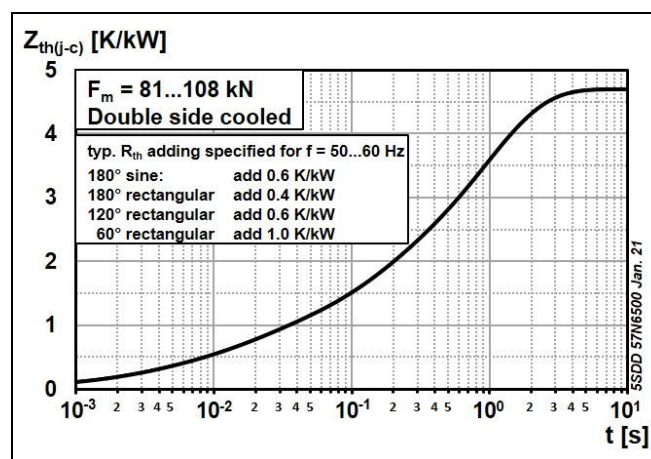
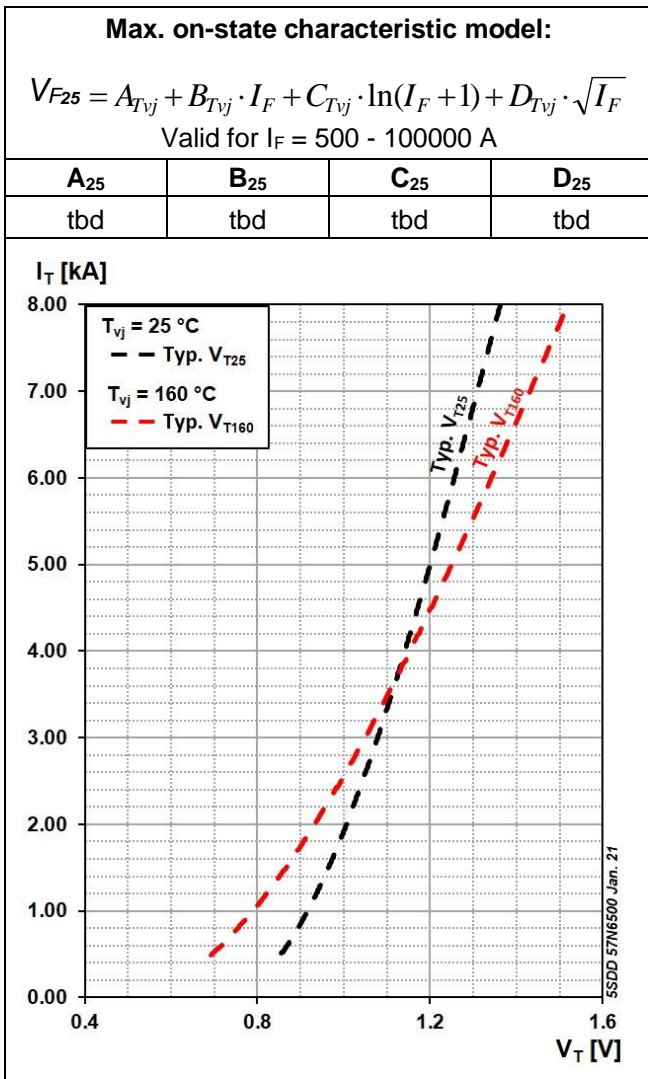
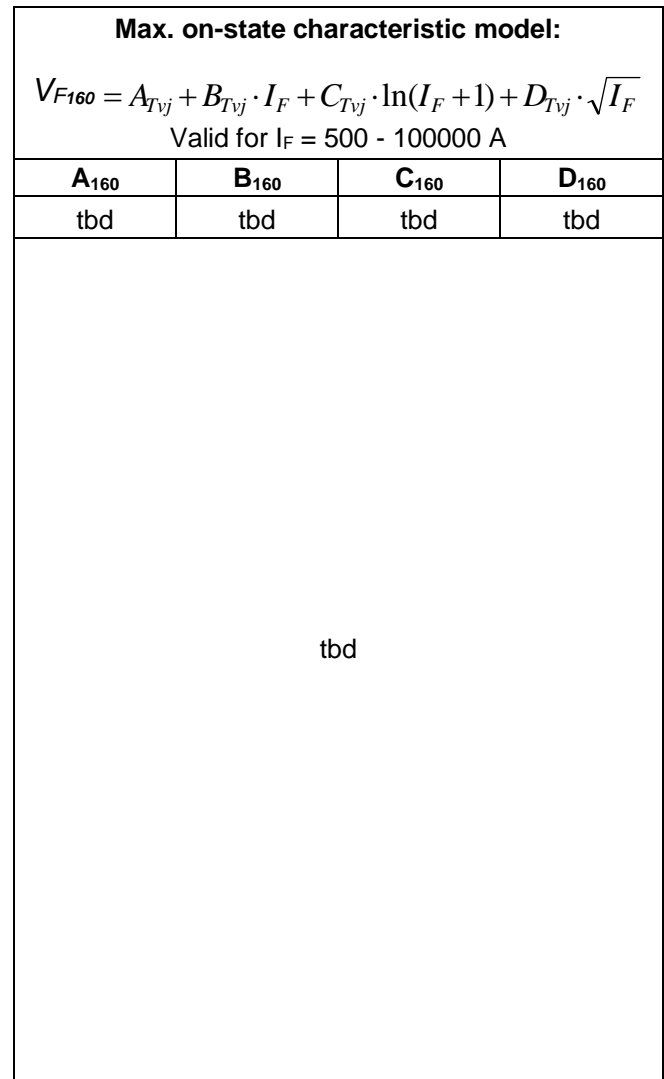


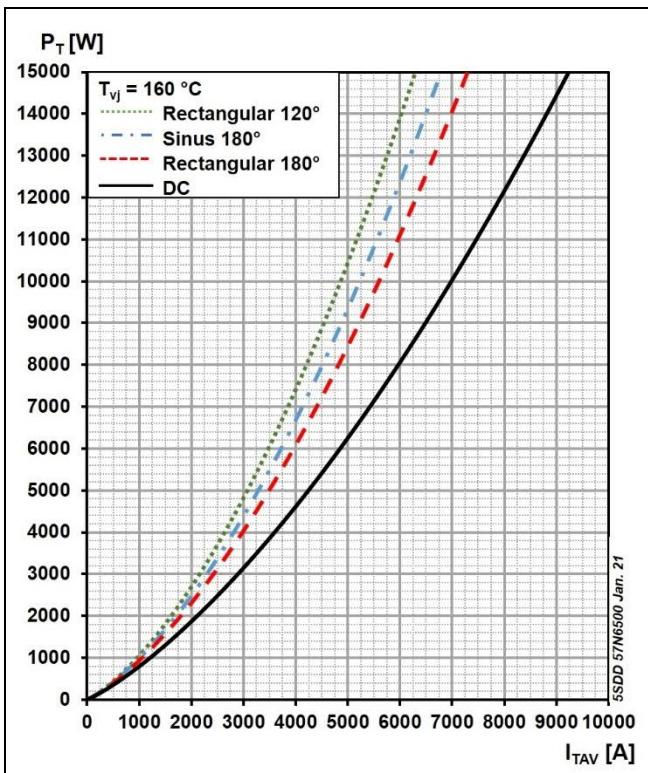
Fig. 1 Transient thermal impedance (junction-to-case) vs. time



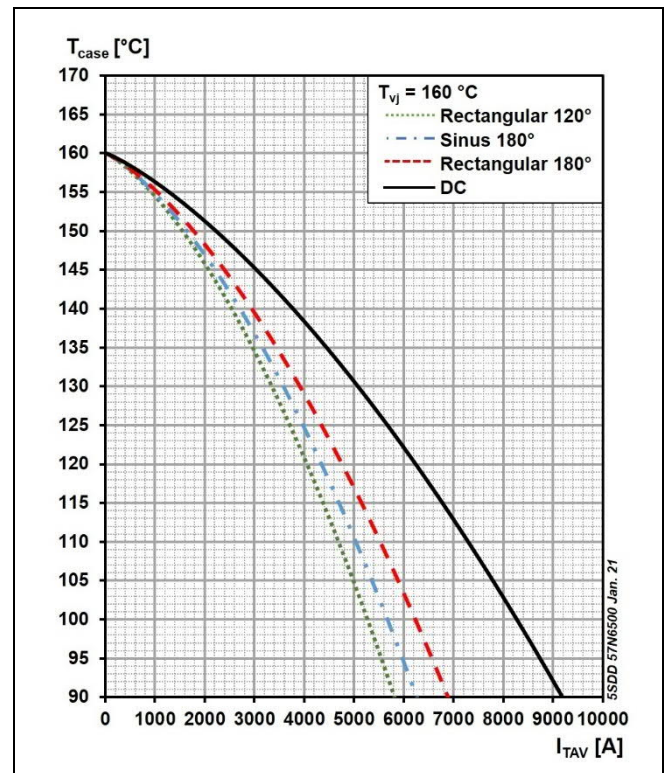
**Fig. 2** Typical On-state voltage characteristics



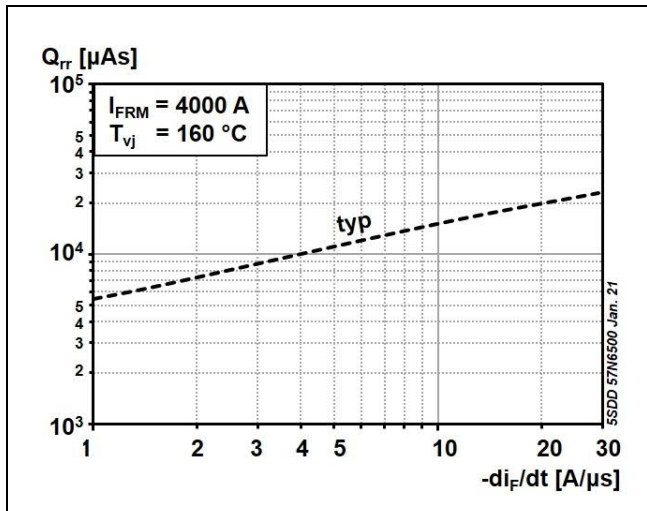
**Fig. 3** Typical On-state voltage characteristics



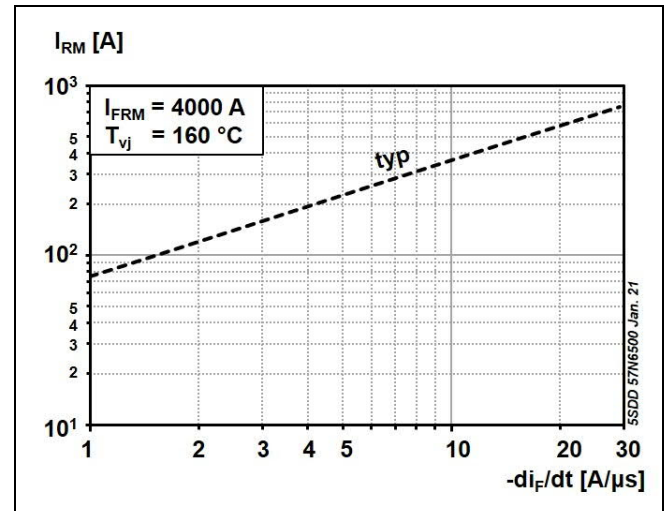
**Fig. 4** Typical On-state power dissipation vs. mean on-state current



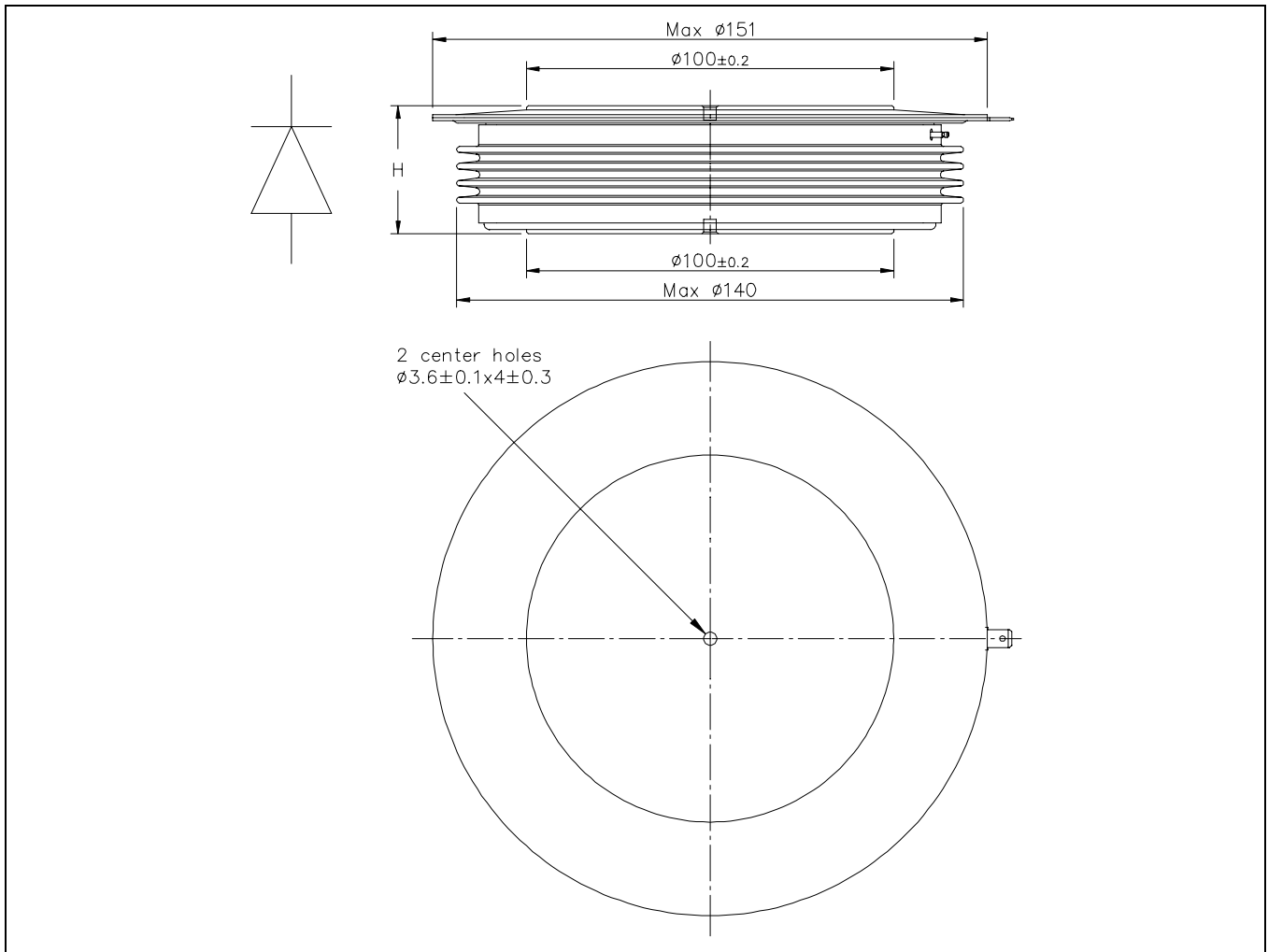
**Fig. 5** Typical permissible case temperature vs. mean on-state current



**Fig. 6** Typical reverse recovery charge vs. decay rate of on-state current



**Fig. 7** Typical peak reverse recovery current vs. decay rate of on-state current



**Fig. 8** Device Outline Drawing

### Related documents:

5SYA 2020	Design of RC-Snubbers for Phase Control Applications
5SYA 2029	High Power Rectifier Diodes
5SYA 2036	Recommendations regarding mechanical clamping of Press Pack High Power Semiconductors
5SYA 2048	Field Measurements on High Power Press-Pack Semiconductors
5SYA 2051	Voltage Ratings of High Power Semiconductors
5SZK 9118	General Environmental Conditions for High Power Semiconductors

Please refer to <https://www.hitachiabb-powergrids.com/semiconductors> for current version of documents.

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