

$V_{RSM} = 2800$  V  
 $I_{F(AV)M} = 5380$  A  
 $I_{F(RMS)} = 8450$  A  
 $I_{FSM} = 65 \times 10^3$  A  
 $V_{FO} = 0.77$  V  
 $r_F = 0.082$  mΩ

# Rectifier Diode

## 5SDD 51L2800

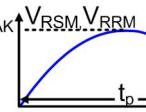
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- Patented free-floating silicon technology
- Very low on-state losses
- High average and surge current.

### 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, $V_{AK} = V_{RSM}$ , $T_{vj} = 0 \dots 175$ °C	2000	V
Max non-repetitive peak reverse voltage	$V_{RSM}$	$f = 5$ Hz, $t_p = 10$ ms, $T_{vj} = 0 \dots 175$ °C	2800	V



*Characteristic values*

Parameter	Symbol	Conditions	min	typ	max	Unit
Reverse leakage current	$I_{RRM}$	$V_{RRM}, T_{vj} = 175$ °C			400	mA

### Mechanical data

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

Parameter	Symbol	Conditions	min	typ	max	Unit
Mounting force	$F_M$		63	70	77	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				1.45	kg
Housing thickness	H	$F_M = 70$ kN, $T_a = 25$ °C	25.7		26.3	mm
Surface creepage distance	D <sub>S</sub>		35			mm
Air strike distance	D <sub>a</sub>		14			mm

1) 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 <sub>F(AV)M</sub>	50 Hz, Half sine wave, T <sub>C</sub> = 85 °C			5380	A
RMS on-state current	I <sub>F(RMS)</sub>				8450	A
Peak non-repetitive surge current	I <sub>FSM</sub>	t <sub>p</sub> = 10 ms, T <sub>vj</sub> = 175 °C, sine half wave, V <sub>R</sub> = 0 V, after surge			65×10 <sup>3</sup>	A
Limiting load integral	I <sup>2</sup> t				21.13×10 <sup>6</sup>	A <sup>2</sup> s
Peak non-repetitive surge current	I <sub>FSM</sub>	t <sub>p</sub> = 10 ms, T <sub>vj</sub> = 175 °C, sine half wave, V <sub>R</sub> = 0.6*V <sub>RRM</sub> , after surge				A
Limiting load integral	I <sup>2</sup> t					A <sup>2</sup> s

**Characteristic values**

Parameter	Symbol	Conditions	min	typ	max	Unit
On-state voltage	V <sub>F</sub>	I <sub>F</sub> = 5000 A, T <sub>vj</sub> = 175 °C		1.18		V
Threshold voltage	V <sub>F0</sub>	T <sub>vj</sub> = 175 °C			0.77	V
Slope resistance	r <sub>F</sub>	I <sub>T</sub> = 2500...7500 A			0.082	mΩ

**Switching****Characteristic values**

Parameter	Symbol	Conditions	min	typ	max	Unit
Reverse recovery charge	Q <sub>rr</sub>	di <sub>F</sub> /dt = -10 A/μs, V <sub>R</sub> = 200 V I <sub>F</sub> = 4000 A, T <sub>vj</sub> = 175 °C	5000		7000	μAs
Reverse recovery current	I <sub>RM</sub>					A

## Thermal

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

Parameter	Symbol	Conditions	min	typ	max	Unit
Operating junction temperature range	T <sub>vj</sub>		0		175	°C
Storage temperature range	T <sub>stg</sub>		-40		150	°C

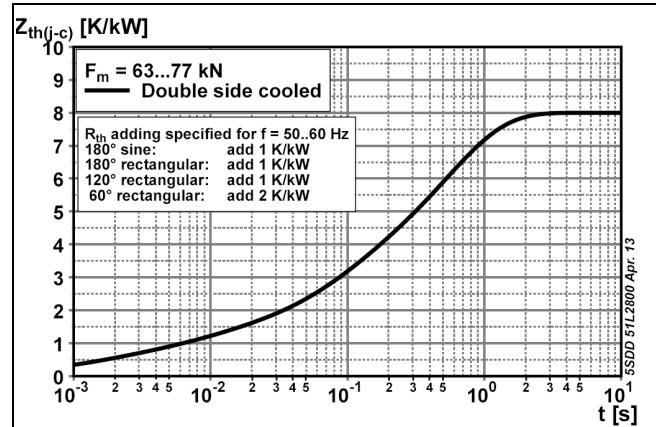
*Characteristic values*

Parameter	Symbol	Conditions	min	typ	max	Unit
Thermal resistance junction to case	R <sub>th(j-c)</sub>	Double-side cooled F <sub>m</sub> = 63...77 kN			8	K/kW
	R <sub>th(j-c)A</sub>	Anode-side cooled F <sub>m</sub> = 63...77 kN			16	K/kW
	R <sub>th(j-c)C</sub>	Cathode-side cooled F <sub>m</sub> = 63...77 kN			16	K/kW
Thermal resistance case to heatsink	R <sub>th(c-h)</sub>	Double-side cooled F <sub>m</sub> = 63...77 kN			3	K/kW
	R <sub>th(c-h)</sub>	Single-side cooled F <sub>m</sub> = 63...77 kN			6	K/kW

**Analytical function for transient thermal impedance:**

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

i	1	2	3	4
R <sub>th i</sub> (K/kW)	5.364	1.586	0.638	0.412
τ <sub>i</sub> (s)	0.5339	0.0684	0.0067	0.0013



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

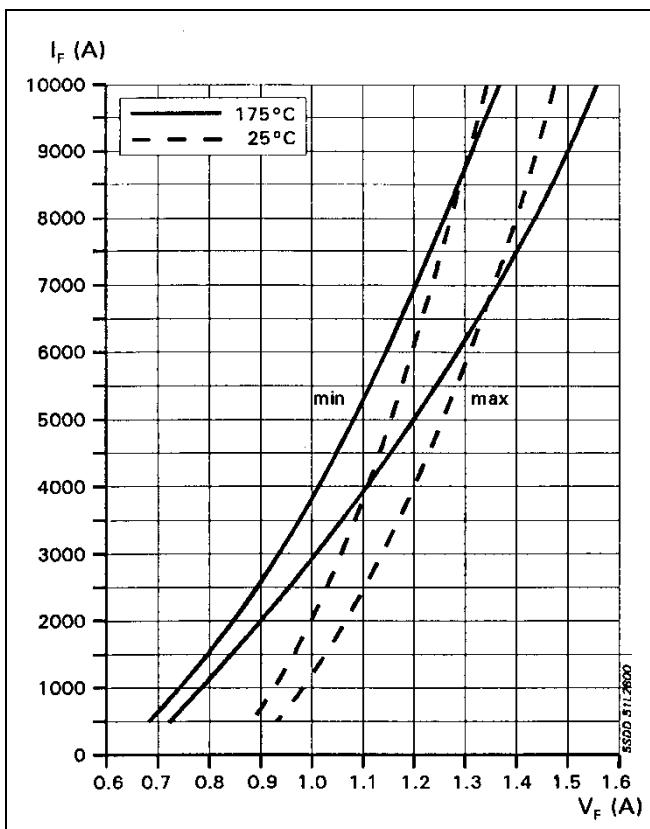


Fig. 2 On-state voltage characteristics

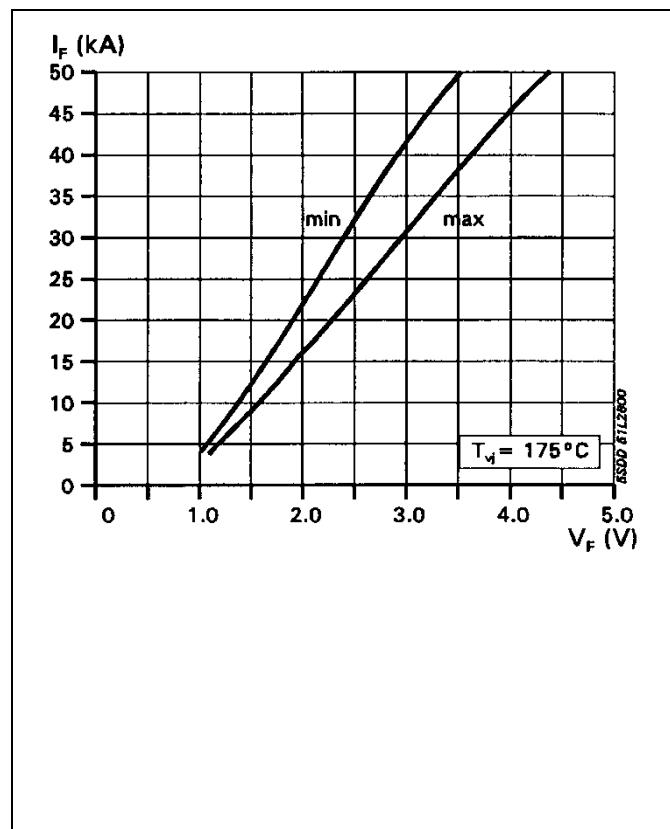


Fig. 3 On-state voltage characteristics

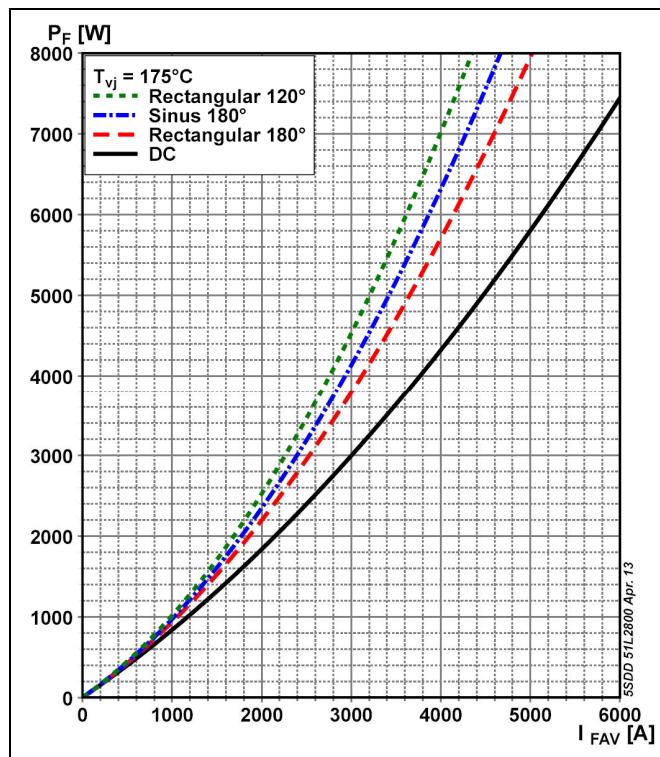


Fig. 4 On-state power dissipation vs. mean on-state current

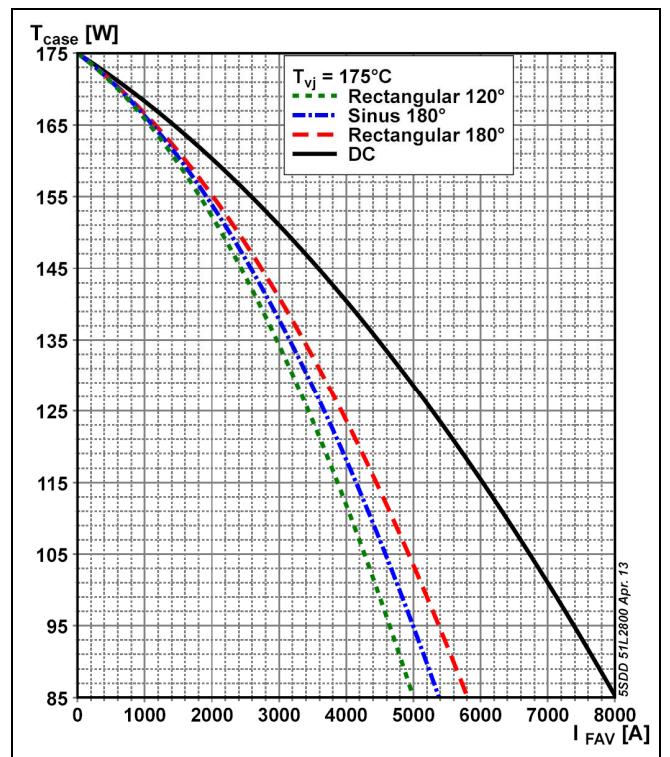
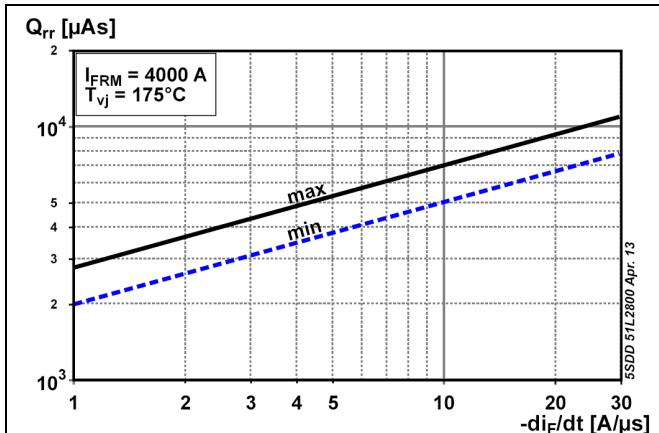
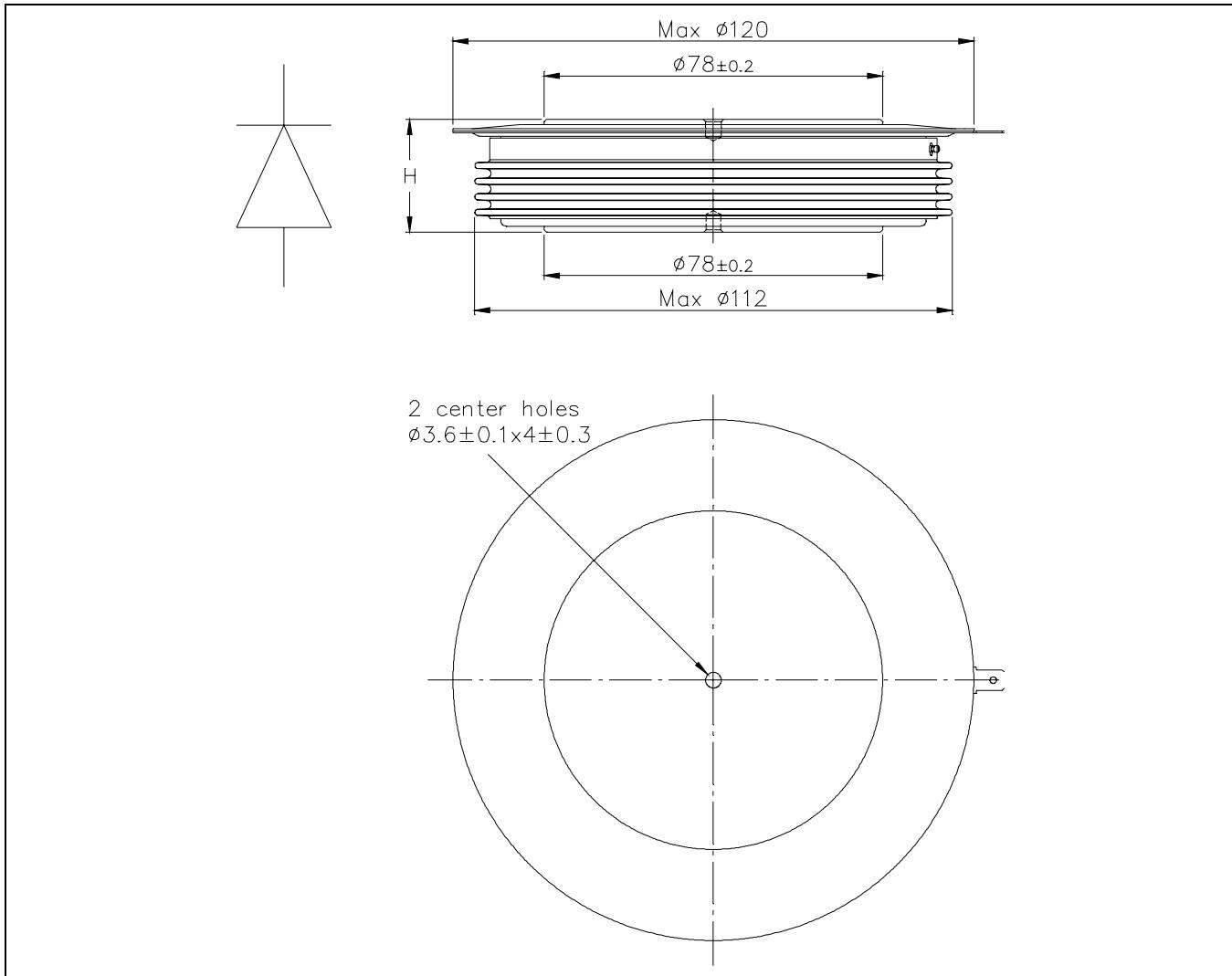


Fig. 5 Max. permissible case temperature vs. mean on-state current



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



**Fig. 7** Device Outline Drawing

### Related documents:

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- |           |  |
|-----------|--|
| 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 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) |

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