

# DA 807-680-38

## Avalanche Diode

### Properties

- low on-state voltage
- avalanche reverse characteristics
- high operational reliability
- suitable for parallel operation

### Key Parameters

$V_{RRM}$	=	3 800	V
$I_{FAVm}$	=	790	A
$I_{FSM}$	=	7 600	A
$V_{TO}$	=	1.010	V
$r_T$	=	0.720	mΩ

### Types

	$V_{RRM}$
DA 807-680-38	3 800 V
DA 807-680-32	3 200 V
Conditions: $T_j = -40 \div 160 \text{ }^\circ\text{C}$ , half sine waveform, $f = 50 \text{ Hz}$	

### Mechanical Data

$F_m$	Mounting force	$11 \pm 1 \text{ kN}$
$m$	Weight	0.23 kg
$D_s$	Surface creepage distance	30 mm
$D_a$	Air strike distance	20.5 mm

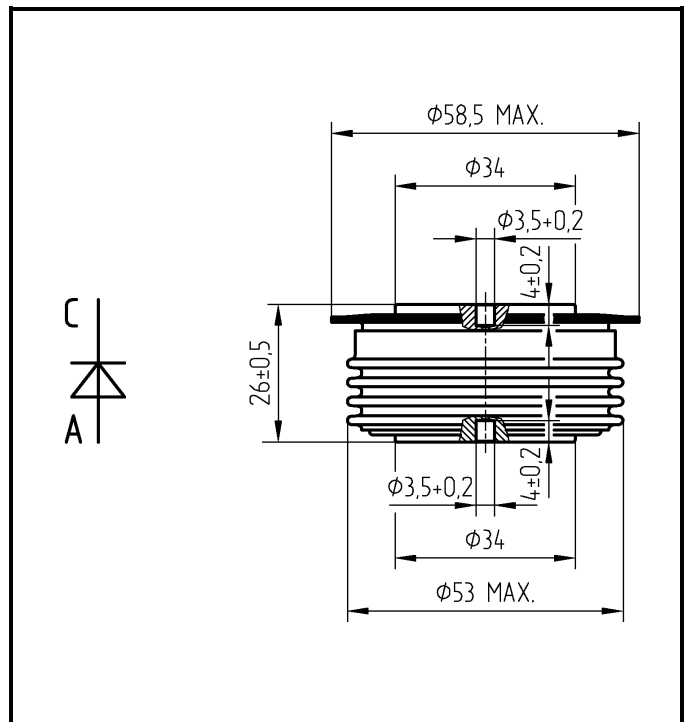


Fig. 1 Case

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<b>Maximum Ratings</b>			<b>Maximum Limits</b>	<b>Unit</b>
$V_{RRM}$	<b>Repetitive peak reverse voltage</b> $T_j = -40 \div 160 \text{ }^\circ\text{C}$	<b>DA 807-680-38</b> <b>DA 807-680-32</b>	<b>3 800</b> <b>3 200</b>	<b>V</b>
$I_{FAVm}$	<b>Average forward current</b> $T_c = 85 \text{ }^\circ\text{C}$		<b>790</b>	<b>A</b>
$I_{FRMS}$	<b>RMS forward current</b> $T_c = 85 \text{ }^\circ\text{C}$		<b>1 240</b>	<b>A</b>
$I_{RRM}$	<b>Repetitive reverse current</b> $V_R = V_{RRM}$		<b>50</b>	<b>mA</b>
$I_{FSM}$	<b>Non repetitive peak surge current</b> $V_R = 0 \text{ V, half sine pulse}$	$t_p = 8.3 \text{ ms}$	<b>8 100</b>	<b>A</b>
		$t_p = 10 \text{ ms}$	<b>7 600</b>	<b>A</b>
$I^2t$	<b>Limiting load integral</b> $V_R = 0 \text{ V, half sine pulse}$	$t_p = 8.3 \text{ ms}$	<b>270 000</b>	<b>A<sup>2</sup>s</b>
		$t_p = 10 \text{ ms}$	<b>289 000</b>	<b>A<sup>2</sup>s</b>
$P_{RSM}$	<b>Maximum avalanche power dissipation</b> <i>rectangular pulse 20 <math>\mu</math>s</i>		<b>50</b>	<b>kW</b>
$T_{jmin} - T_{jmax}$	<b>Operating temperature range</b>		<b>-40 <math>\div</math> 160</b>	<b><math>^\circ\text{C}</math></b>
$T_{STG}$	<b>Storage temperature range</b>		<b>-40 <math>\div</math> 160</b>	<b><math>^\circ\text{C}</math></b>

Unless otherwise specified  $T_j = 160 \text{ }^\circ\text{C}$

<b>Characteristics</b>		<b>Value</b>			<b>Unit</b>
		<i>min</i>	<i>typ</i>	<i>max</i>	
$V_{T0}$	<b>Threshold voltage</b>			<b>1.010</b>	<b>V</b>
$r_T$	<b>Forward slope resistance</b> $I_F = 800 \div 2400 \text{ A}$			<b>0.720</b>	<b>m<math>\Omega</math></b>
$V_{FM}$	<b>Maximum forward voltage</b> $I_{FM} = 1\,800 \text{ A, } T_j = 25 \text{ }^\circ\text{C}$			<b>2.000</b>	<b>V</b>
$Q_{rr}$	<b>Recovered charge</b> $V_R = 100 \text{ V, } I_{FM} = 1\,000 \text{ A, } di_F/dt = -5 \text{ A}/\mu\text{s}$		<b>1 350</b>		<b><math>\mu\text{C}</math></b>

Unless otherwise specified  $T_j = 160 \text{ }^\circ\text{C}$

<b>Thermal Parameters</b>			<b>Value</b>	<b>Unit</b>
$R_{thjc}$	<b>Thermal resistance junction to case</b>	<i>double side cooling</i>	<b>40</b>	<b>K/kW</b>
		<i>anode side cooling</i>	<b>65</b>	
		<i>cathode side cooling</i>	<b>104</b>	
$R_{thch}$	<b>Thermal resistance case to heatsink</b>	<i>double side cooling</i>	<b>10</b>	<b>K/kW</b>
		<i>single side cooling</i>	<b>20</b>	

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**Transient Thermal Impedance**

Analytical function for transient thermal impedance

$$Z_{thjc} = \sum_{i=1}^4 R_i (1 - \exp(-t / \tau_i))$$

Conditions:

$F_m = 11 \pm 1$  kN, Double side cooled

<i>i</i>	1	2	3	4
$R_i$ (K/kW)	20.95	10.57	7.15	1.33
$\tau_i$ (s)	0.396	0.072	0.009	0.0044

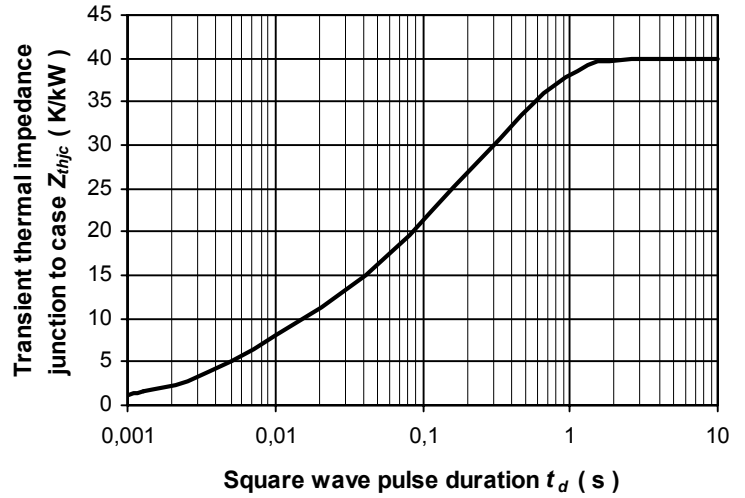


Fig. 2 Transient thermal impedance junction to case

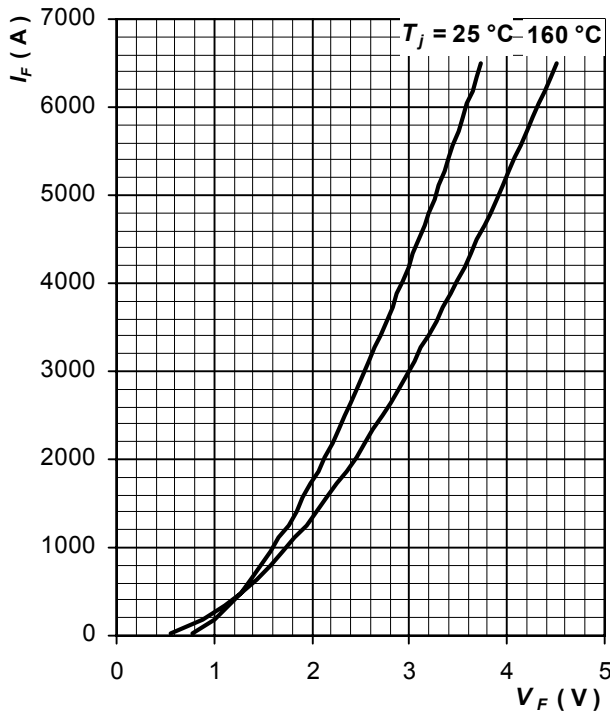


Fig. 3 Maximum forward voltage drop characteristics

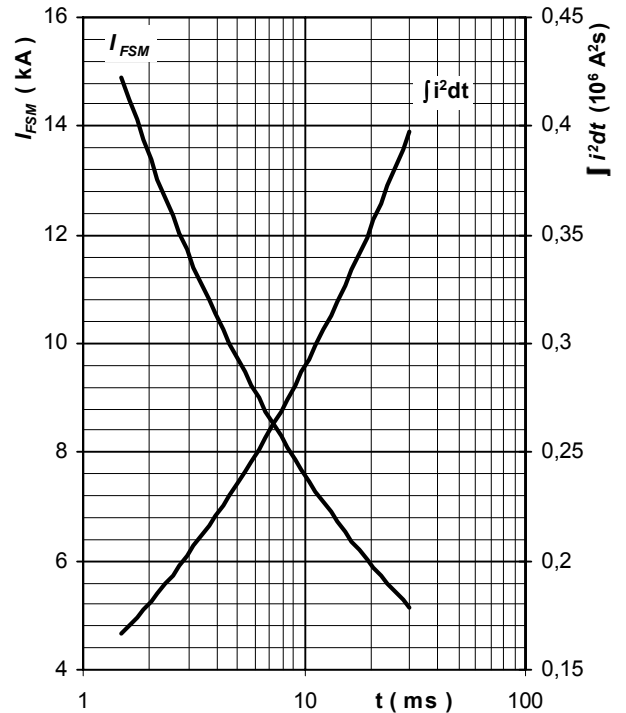


Fig. 4 Surge forward current vs. pulse length, half sine wave, single pulse,  $V_R = 0$  V,  $T_j = T_{jmax}$

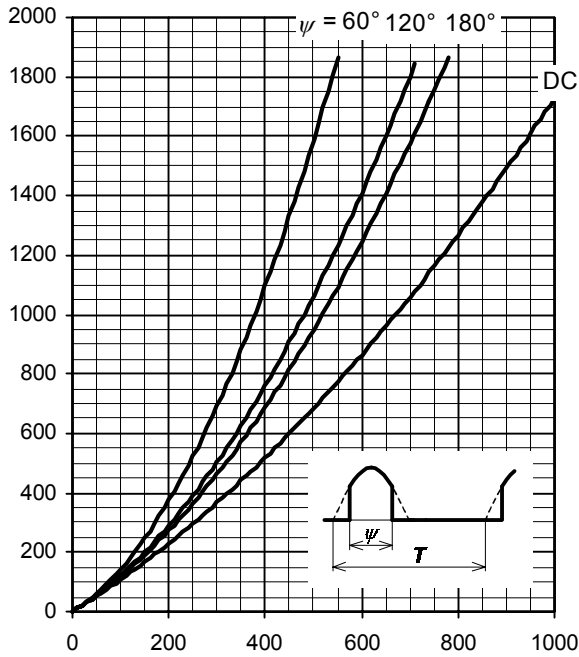


Fig. 5 Forward power loss vs. average forward current, sine waveform,  $f = 50 \text{ Hz}$ ,  $T = 1/f$

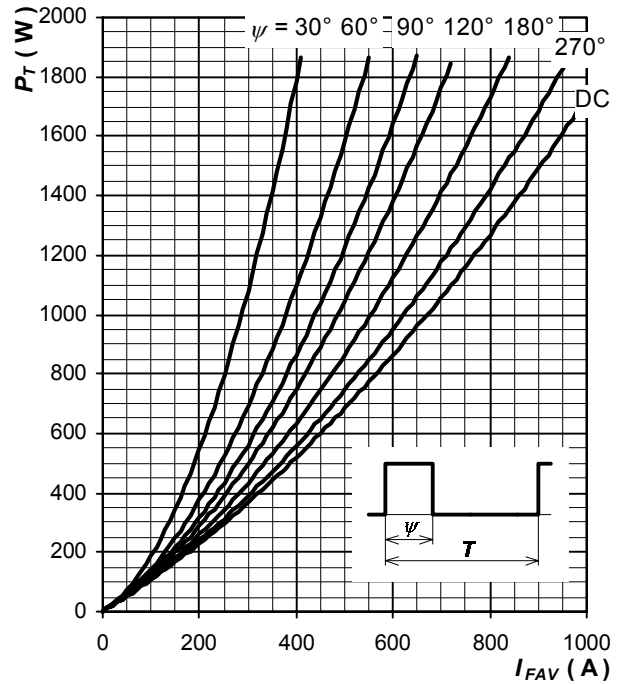


Fig. 6 Forward power loss vs. average forward current, square waveform,  $f = 50 \text{ Hz}$ ,  $T = 1/f$

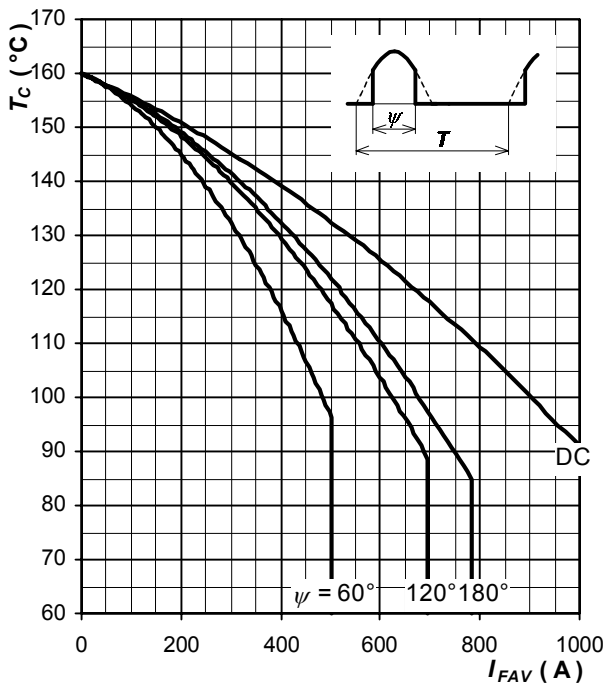


Fig. 7 Max. case temperature vs. aver. forward current, sine waveform,  $f = 50 \text{ Hz}$ ,  $T = 1/f$

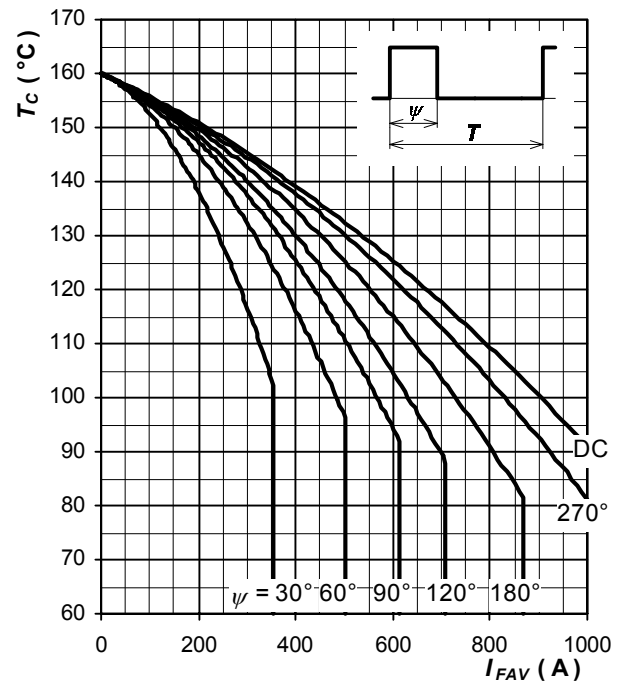


Fig. 8 Max. case temperature vs. aver. forward current, square waveform,  $f = 50 \text{ Hz}$ ,  $T = 1/f$

Notes

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