

# DA 807-590-50

## Avalanche Diode

### Properties

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

### Key Parameters

$V_{RRM}$	=	5 000	V
$I_{FAVm}$	=	690	A
$I_{FSM}$	=	7 000	A
$V_{TO}$	=	1.100	V
$r_T$	=	1.010	$\text{m}\Omega$

### Types

	$V_{RRM}$
DA 807-590-50	5 000 V
DA 807-590-44	4 400 V
DA 807-590-38	3 800 V

Conditions:  $T_j = -40 \div 160^\circ\text{C}$ ,  
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

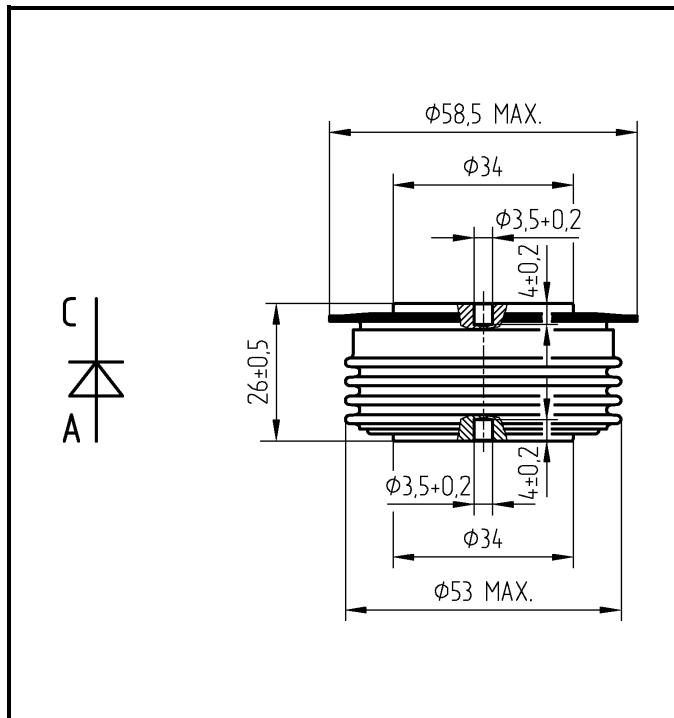


Fig. 1 Case

<b>Maximum Ratings</b>			<b>Maximum Limits</b>	<b>Unit</b>
$V_{RRM}$	Repetitive peak reverse voltage $T_j = -40 \div 160 \text{ }^\circ\text{C}$	DA 807-590-50 DA 807-590-44 DA 807-590-38	5 000 4 400 3 800	V
$I_{FAVm}$	Average forward current $T_c = 85 \text{ }^\circ\text{C}$		690	A
$I_{FRMS}$	RMS forward current $T_c = 85 \text{ }^\circ\text{C}$		1 080	A
$I_{RRM}$	Repetitive reverse current $V_R = V_{RRM}, T_j = 160 \text{ }^\circ\text{C},$		50	mA
$I_{FSM}$	Non repetitive peak surge current $V_R = 0 \text{ V, half sine pulse}$	$t_p = 8.3 \text{ ms}$	7 500	A
		$t_p = 10 \text{ ms}$	7 000	A
$I^2t$	Limiting load integral $V_R = 0 \text{ V, half sine pulse}$	$t_p = 8.3 \text{ ms}$	230 000	$\text{A}^2\text{s}$
		$t_p = 10 \text{ ms}$	245 000	$\text{A}^2\text{s}$
$P_{RSM}$	Maximum avalanche power dissipation <i>rectangular pulse 20 <math>\mu\text{s}</math></i>		50	kW
$T_{jmin} \text{ - } T_{jmax}$	Operating temperature range		-40 $\div$ 160	$^\circ\text{C}$
$T_{STG}$	Storage temperature range		-40 $\div$ 160	$^\circ\text{C}$

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>	
$V_{T0}$	Threshold voltage				1.100	V
$r_T$	Forward slope resistance $I_F = 700 \div 2000 \text{ A}$				1.010	$\text{m}\Omega$
$V_{FM}$	Maximum forward voltage $I_{FM} = 1 800 \text{ A, } T_j = 25 \text{ }^\circ\text{C}$				2.400	V
$Q_{rr}$	Recovered charge $V_R = 100 \text{ V, } I_{FM} = 1 000 \text{ A, } di_F/dt = -5 \text{ A}/\mu\text{s}$			1 620		$\mu\text{C}$

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

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

### Transient Thermal Impedance

**Analytical function for transient thermal impedance**

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

Conditions:

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

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

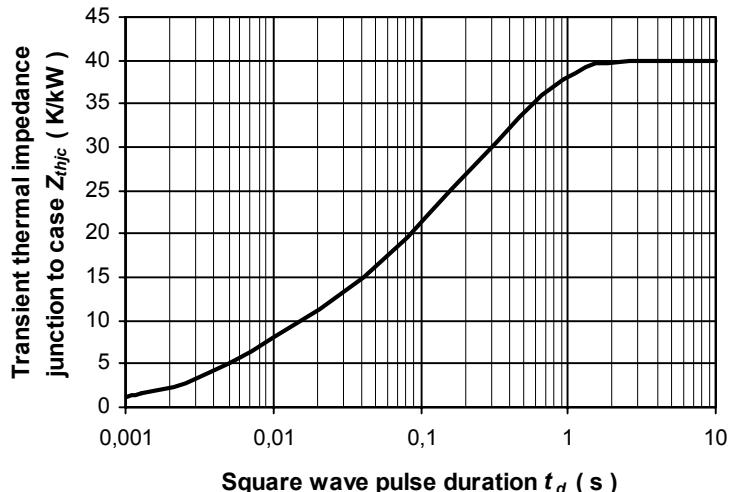


Fig. 2 Transient thermal impedance junction to case

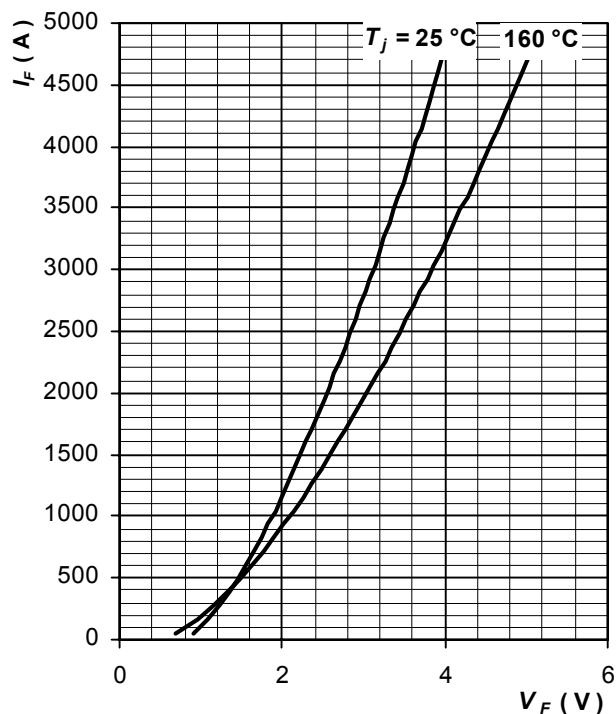


Fig. 3 Maximum forward voltage drop characteristics

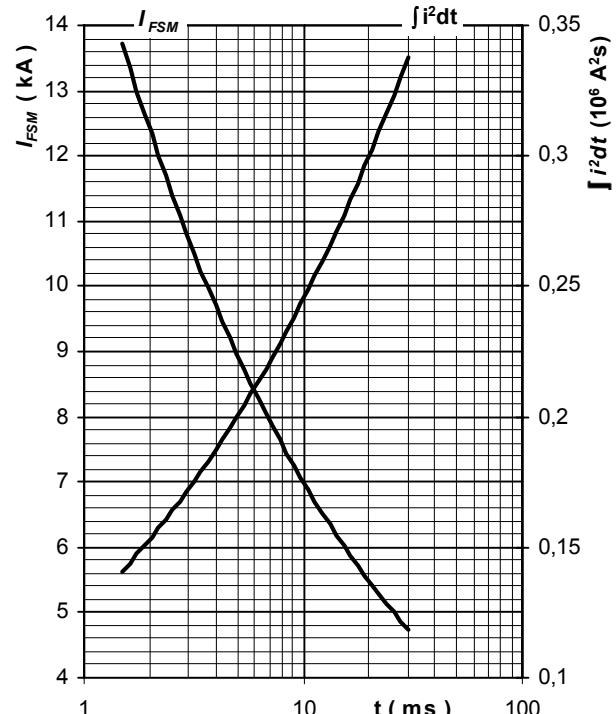


Fig. 4 Surge forward current vs. pulse length, half sine wave, single pulse,  
 $V_R = 0 \text{ V}$ ,  $T_j = T_{jmax}$

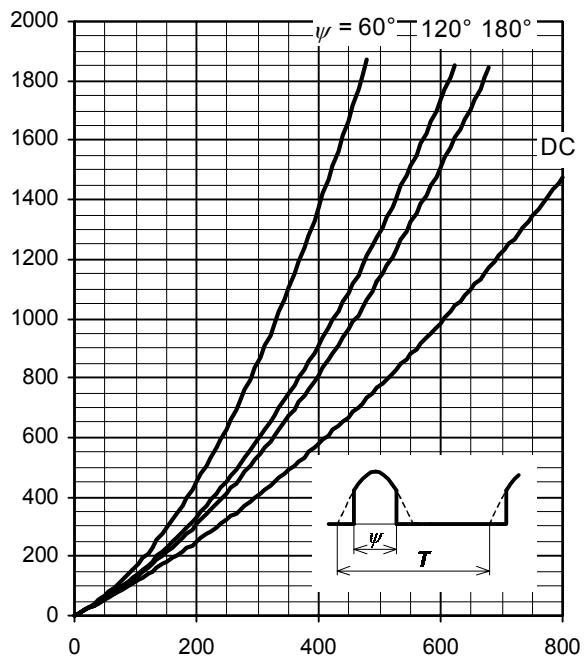


Fig. 5 Forward power loss vs. average forward current, sine waveform,  $f = 50$  Hz,  $T = 1/f$

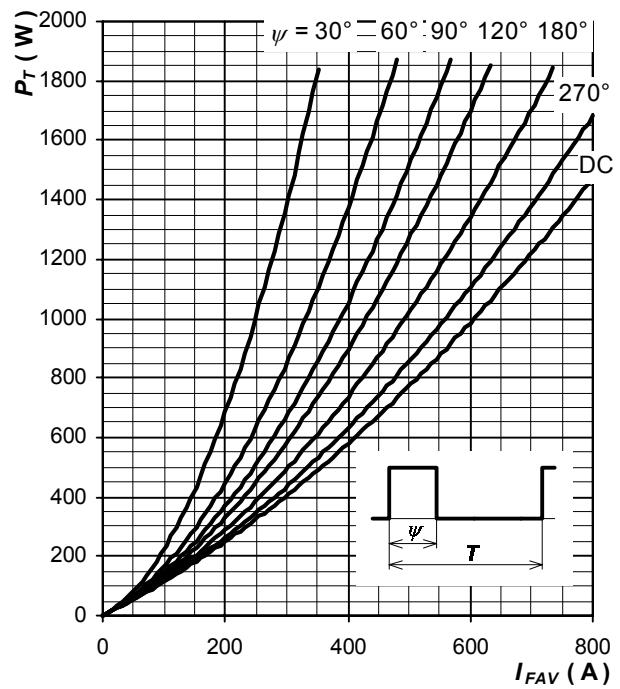


Fig. 6 Forward power loss vs. average forward current, square waveform,  $f = 50$  Hz,  $T = 1/f$

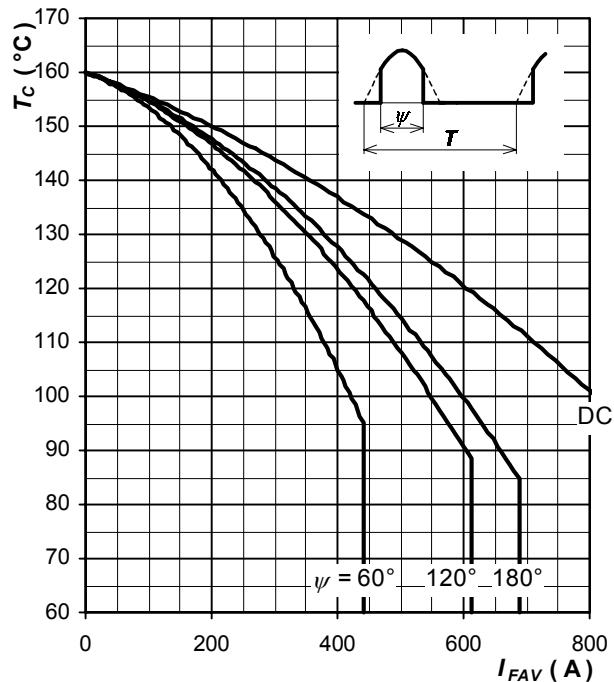


Fig. 7 Max. case temperature vs. aver. forward current, sine waveform,  $f = 50$  Hz,  $T = 1/f$

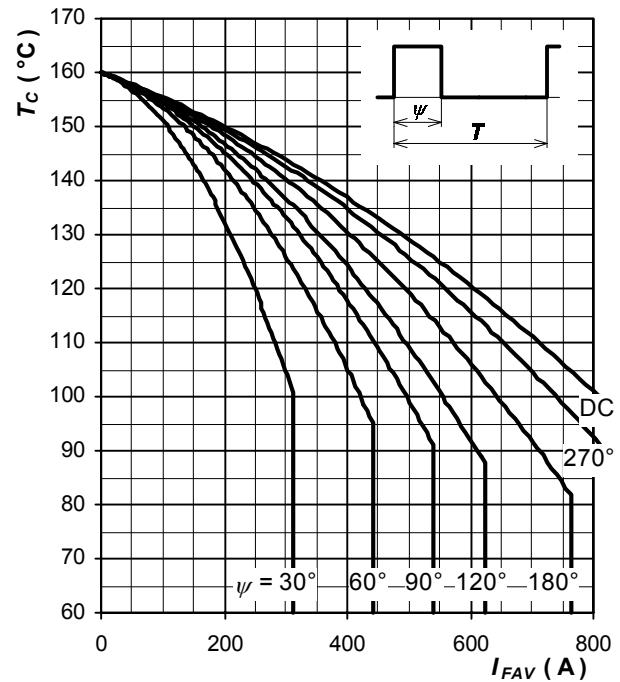


Fig. 8 Max. case temperature vs. aver. forward current, square waveform,  $f = 50$  Hz,  $T = 1/f$

Notes