

# 5SDA 16F3806

Old part no. DA 808-1620-38

|            |   |          |
|------------|---|----------|
| $V_{RRM}$  | = | 3 800 V  |
| $I_{FAVm}$ | = | 1 620 A  |
| $I_{FSM}$  | = | 20 500 A |
| $V_{TO}$   | = | 1.030 V  |
| $r_T$      | = | 0.320 mΩ |

## Avalanche Diode

### Properties

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

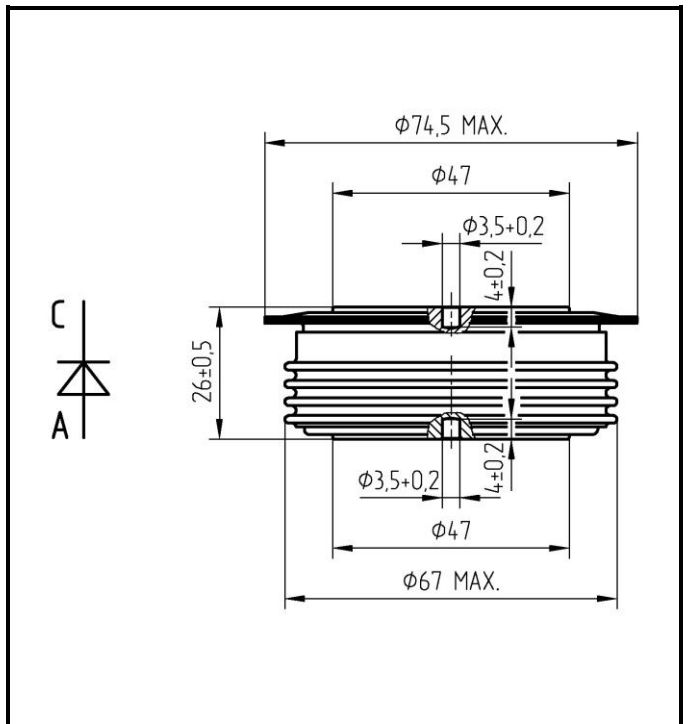
### Key Parameters

|                     |   |
|---------------------|---|
|                     | $V_{RRM}$   |
| <b>5SDA 16F3806</b> | <b>3 800 V</b>  |
| Conditions:         | $T_j = -40 \div 160 \text{ }^\circ\text{C}$ ,<br>half sine waveform,<br>$f = 50 \text{ Hz}$ |

|       |                                  |           |
|-------|----------------------------------|-----------|
| $F_m$ | <b>Mounting force</b>            | 22 ± 2 kN |
| $m$   | <b>Weight</b>                    | 0.46 kg   |
| $D_s$ | <b>Surface creepage distance</b> | 30 mm     |
| $D_a$ | <b>Air strike distance</b>       | 20.5 mm   |

## Types

## Mechanical Data



| <b>Maximum Ratings</b>                  |   | <b>Maximum Limits</b>            | <b>Unit</b>                        |                       |
|---|---|----------------------------------|------------------------------------|-----------------------|
| <b><math>V_{RRM}</math></b>             | <b>Repetitive peak reverse voltage</b><br>$T_j = -40 \div 160 \text{ }^\circ\text{C}$       | <b>3 800</b>                     | <b>V</b>                           |                       |
| <b><math>I_{FAVm}</math></b>            | <b>Average forward current</b><br>$T_c = 85 \text{ }^\circ\text{C}$                         | <b>1 620</b>                     | <b>A</b>                           |                       |
| <b><math>I_{FRMS}</math></b>            | <b>RMS forward current</b><br>$T_c = 85 \text{ }^\circ\text{C}$                             | <b>2 540</b>                     | <b>A</b>                           |                       |
| <b><math>I_{RRM}</math></b>             | <b>Repetitive reverse current</b><br>$V_R = V_{RRM}$  | <b>50</b>                        | <b>mA</b>                          |                       |
| <b><math>I_{FSM}</math></b>             | <b>Non repetitive peak surge current</b><br>$V_R = 0 \text{ V, half sine pulse}$            | $t_p = 8.3 \text{ ms}$           | <b>21 900</b>                      | <b>A</b>              |
|   |   | $t_p = 10 \text{ ms}$            | <b>20 500</b>                      | <b>A</b>              |
| <b><math>I^2t</math></b>                | <b>Limiting load integral</b><br>$V_R = 0 \text{ V, half sine pulse}$                       | $t_p = 8.3 \text{ ms}$           | <b>1 990 000</b>                   | <b>A<sup>2</sup>s</b> |
|   |   | $t_p = 10 \text{ ms}$            | <b>2 101 000</b>                   | <b>A<sup>2</sup>s</b> |
| <b><math>P_{RSM}</math></b>             | <b>Maximum avalanche power dissipation</b><br><i>rectangular pulse 20 <math>\mu</math>s</i> | <b>50</b>                        | <b>kW</b>                          |                       |
| <b><math>T_{jmin} - T_{jmax}</math></b> | <b>Operating temperature range</b>  | <b>-40 <math>\div</math> 160</b> | <b><math>^\circ\text{C}</math></b> |                       |
| <b><math>T_{STG}</math></b>             | <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>   |   |
| $V_{TO}$ $r_T$         | <b>Threshold voltage</b>   |              |             | <b>1.030</b> | <b>V</b>                                  |
|                        | <b>Forward slope resistance</b><br>$I_F = 1000 \div 3000$ A                            |              |             | <b>0.320</b> | <b>m<math>\Omega</math></b>               |
| $V_{FM}$               | <b>Maximum forward voltage</b><br>$I_{FM} = 4000$ A                                    |              |             | <b>2.320</b> | <b>V</b>                                  |
| $Q_{rr}$               | <b>Recovered charge</b><br>$V_R = 100$ V, $I_{FM} = 2000$ A, $di_F/dt = -5$ A/ $\mu$ s |              | <b>3700</b> |              | <b><math>\mu</math>C<math>\mu</math>s</b> |

Unless otherwise specified  $T_j = 160$  °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>20</b>    | <b>K/kW</b> |
|                           |  | <i>anode side cooling</i>   | <b>34</b>    |             |
|                           |  | <i>cathode side cooling</i> | <b>48</b>    |             |
| $R_{thch}$                | <b>Thermal resistance case to heatsink</b> | <i>double side cooling</i>  | <b>5</b>     | <b>K/kW</b> |
|                           |  | <i>single side cooling</i>  | <b>10</b>    |             |

| <b>Transient Thermal Impedance</b>                         |                                |              |             |             |             |  |
|--|--------------------------------|--------------|-------------|-------------|-------------|--|
| <b>Analytical function for transient thermal impedance</b> | <i>i</i>                       | <b>1</b>     | <b>2</b>    | <b>3</b>    | <b>4</b>    |  |
|  | <b><math>R_t</math> (K/kW)</b> | <b>11.83</b> | <b>4.26</b> | <b>1.63</b> | <b>2.28</b> |  |

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$$Z_{thjc} = R_j (1 - \exp(-t/\tau))$$

Conditions:  
 $F_m = 22 \pm 2$  kN, Double side cooled

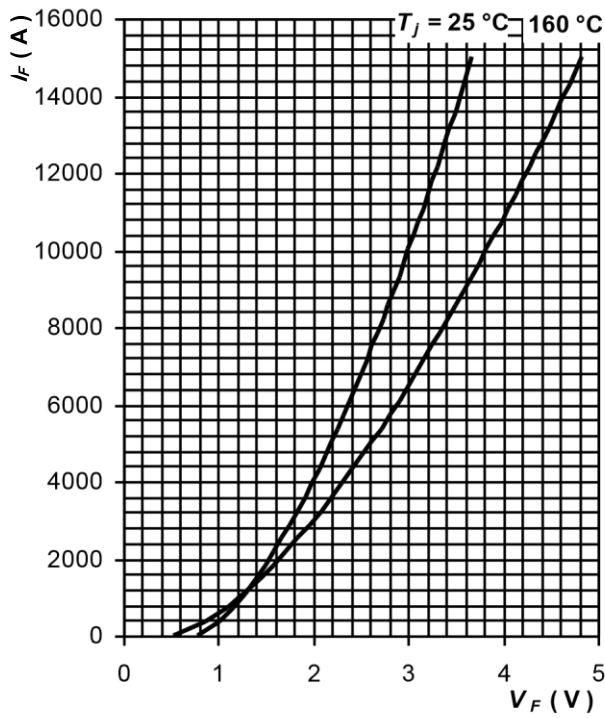
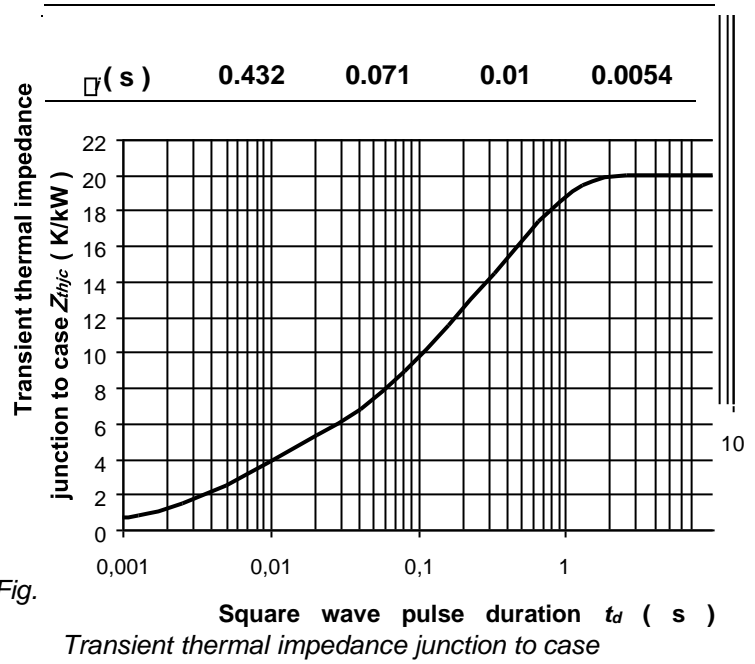


Fig. 3 Maximum forward voltage drop characteristics

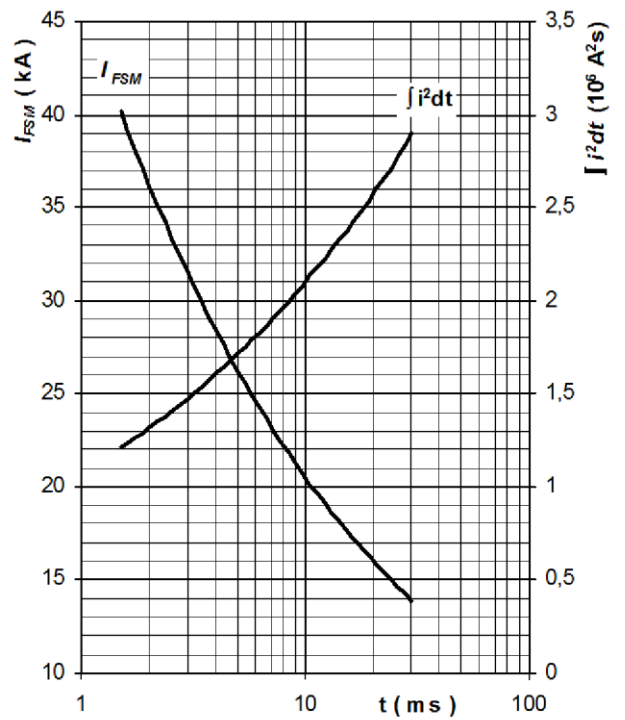


Fig. 4 Surge forward current vs. pulse length, half sine wave, single pulse,  $V_R = 0$  V,  $T_j = T_{jmax}$

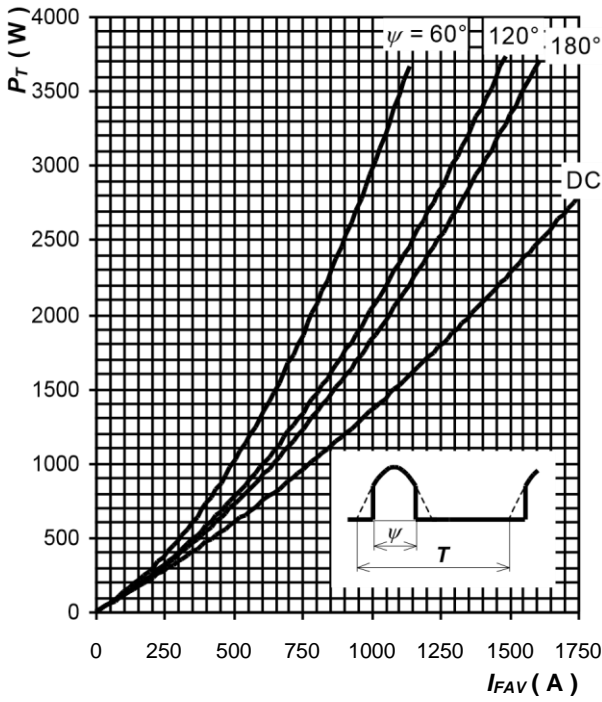


Fig. 5 Forward power loss vs. average forward current, sine waveform,  $f = 50 \text{ Hz}$ ,  $T = 1/f$

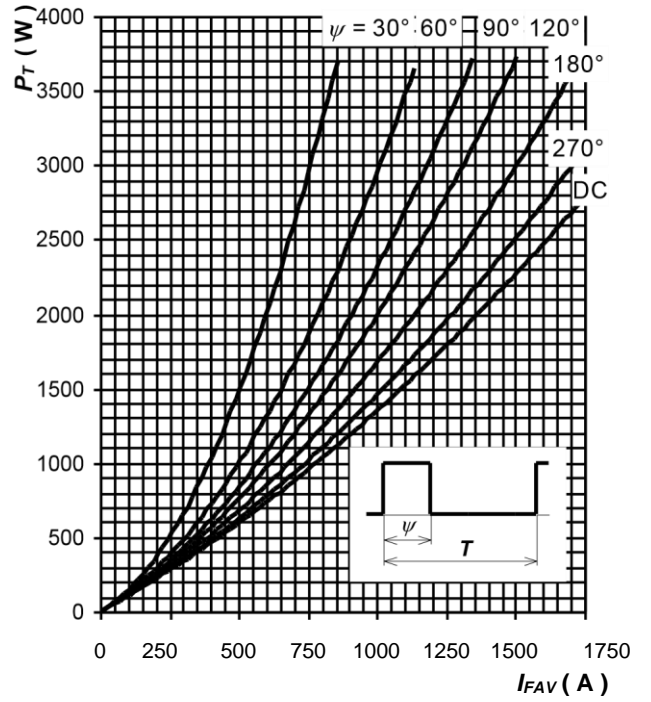


Fig. 6 Forward power loss vs. average forward current, square waveform,  $f = 50 \text{ Hz}$ ,  $T = 1/f$

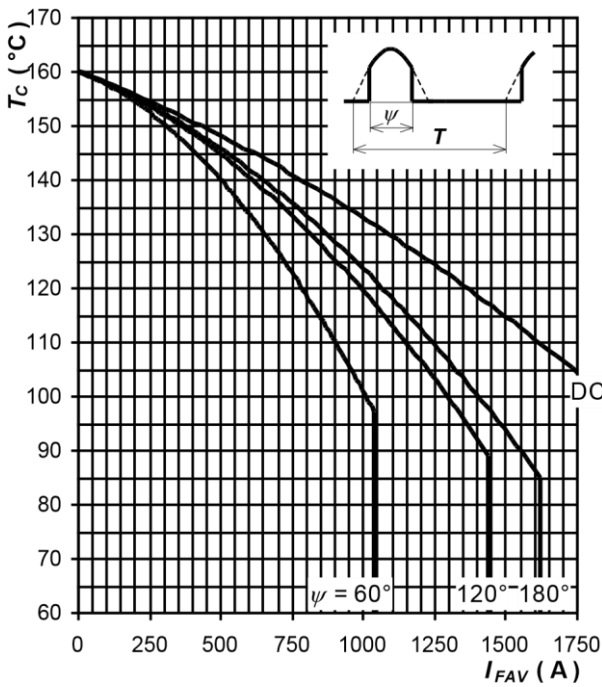
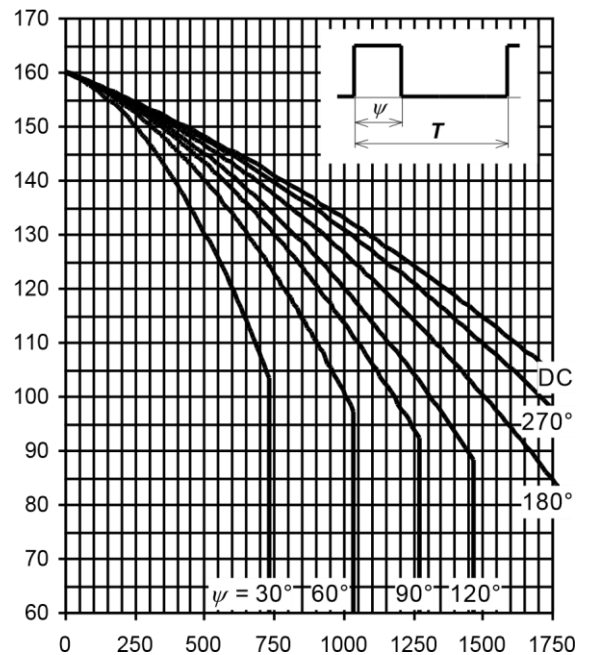


Fig. 7 Max. case temperature vs. aver. forward current, sine waveform,  $f = 50 \text{ Hz}$ ,  $T = 1/f$



$T = 1/f$

Notes:

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