High forward current capability
Low forward losses
Low thermal resistance
High load cycle capability

# Rectifier Diode For Welding
# Type D066-12500-4

| | | | |
|---|---|---|---|
| Average forward current | | $I_{FAV}$ | 14703 A |
| Repetitive peak reverse voltage | | $V_{RRM}$ | 200 ÷ 400 V |
| $V_{RRM}$, V | 200 | | 400 |
| Voltage code | 2 | | 4 |
| $T_j$, °C | – 60 ÷ 180 | | |

## MAXIMUM ALLOWABLE RATINGS

| Symbols and parameters | | Units | Values | Test conditions | |
|---|---|---|---|---|---|
| **ON-STATE** | | | | | |
| $I_{FAV}$ | Average forward current | A | 12060<br>12500<br>14703 | $T_c$= 110 °C; Double side cooled;<br>$T_c$= 106 °C; Double side cooled;<br>$T_c$= 85 °C; Double side cooled;<br>180° half-sine wave; 50 Hz | |
| $I_{FRMS}$ | RMS forward current | A | 19625 | $T_c$= 106 °C; Double side cooled;<br>180° half-sine wave; 50 Hz | |
| $I_{FSM}$ | Surge forward current | kA | 85.0<br>98.0 | $T_j$=$T_{j\,max}$<br>$T_j$=25 °C | 180° half-sine wave; 50 Hz<br>($t_p$=10 ms); single pulse;<br>$V_R$=0 V |
| | | | 90.0<br>104.0 | $T_j$=$T_{j\,max}$<br>$T_j$=25 °C | 180° half-sine wave; 60 Hz<br>($t_p$=8.3 ms); single pulse;<br>$V_R$=0 V |
| $I^2t$ | Safety factor | $A^2s\cdot10^3$ | 36125<br>48020 | $T_j$=$T_{j\,max}$<br>$T_j$=25 °C | 180° half-sine wave; 50 Hz<br>($t_p$=10 ms); single pulse;<br>$V_R$=0 V |
| | | | 33615<br>44885 | $T_j$=$T_{j\,max}$<br>$T_j$=25 °C | 180° half-sine wave; 60 Hz<br>($t_p$=8.3 ms); single pulse;<br>$V_R$=0 V |
| **BLOCKING** | | | | | |
| $V_{RRM}$ | Repetitive peak reverse voltages | V | 200 ÷ 400 | $T_{j\,min}$< $T_j$ <$T_{j\,max}$;<br>180° half-sine wave; 50 Hz | |
| $V_{RSM}$ | Non-repetitive peak reverse voltages | V | 250 ÷ 450 | $T_{j\,min}$< $T_j$ <$T_{j\,max}$;<br>180° half-sine wave; 50 Hz; single pulse | |
| $V_R$ | Reverse continuous voltages | V | 0.75·$V_{RRM}$ | $T_j$=$T_{j\,max}$ | |
| **THERMAL** | | | | | |
| $T_{stg}$ | Storage temperature | °C | – 50 ÷ 40 | | |
| $T_j$ | Operating junction temperature | °C | – 60 ÷ 180 | | |
| **MECHANICAL** | | | | | |
| F | Mounting force | kN | 60.0 ÷ 70.0 | | |
| a | Acceleration | $m/s^2$ | 50<br>100 | Device unclamped<br>Device clamped | |

## CHARACTERISTICS

| Symbols and parameters | | Units | Values | Conditions | |
|---|---|---|---|---|---|
| **ON-STATE** | | | | | |
| $V_{FM}$ | Peak forward voltage, max | V | 1.04<br>0.92 | $T_j$=25 °C; $I_{FM}$ =6300 A<br>$T_j$=$T_{j\,max}$; $I_{FM}$ = 8000 A | |
| $V_{F(TO)}$ | Forward threshold voltage, max | V | 0.72 | $T_j$=$T_{j\,max}$;<br>6300 A < $I_T$ < 14000 A | |
| $r_T$ | Forward slope resistance, max | mΩ | 0.026 | | |
| **BLOCKING** | | | | | |
| $I_{RRM}$ | Repetitive peak reverse current, max | mA | 50 | $T_j$=$T_{j\,max}$;<br>$V_R$=$V_{RRM}$ | |
| **SWITCHING** | | | | | |
| $Q_{rr}$ | Total recovered charge, max | μC | 1250 | $T_j$=$T_{j\,max}$; $I_{FM}$=1000 A;<br>$dI_{FM}/dt$=-30 A/μs; | |
| | | | 780 | $T_j$=$T_{j\,max}$; $I_{FM}$=1000 A;<br>$dI_{FM}/dt$=-10 A/μs; | |
| **THERMAL** | | | | | |
| $R_{thjc}$ | Thermal resistance, junction to case, max | °C/W | 0.0039 | Direct Current | Double side cooled |
| $R_{thjc-A}$ | | | 0.0050 | | Anode side cooled |
| $R_{thjc-K}$ | | | 0.0150 | | Cathode side cooled |
| $R_{thck}$ | Thermal resistance, case to heatsink, max | | 0.0030 | Direct Current | |
| **MECHANICAL** | | | | | |
| w | Weight, typ | g | 155 | | |
| $D_s$ | Surface creepage distance | mm (inch) | 2.0 (0.079) | | |
| $D_a$ | Air strike distance | mm (inch) | 2.0 (0.079) | | |

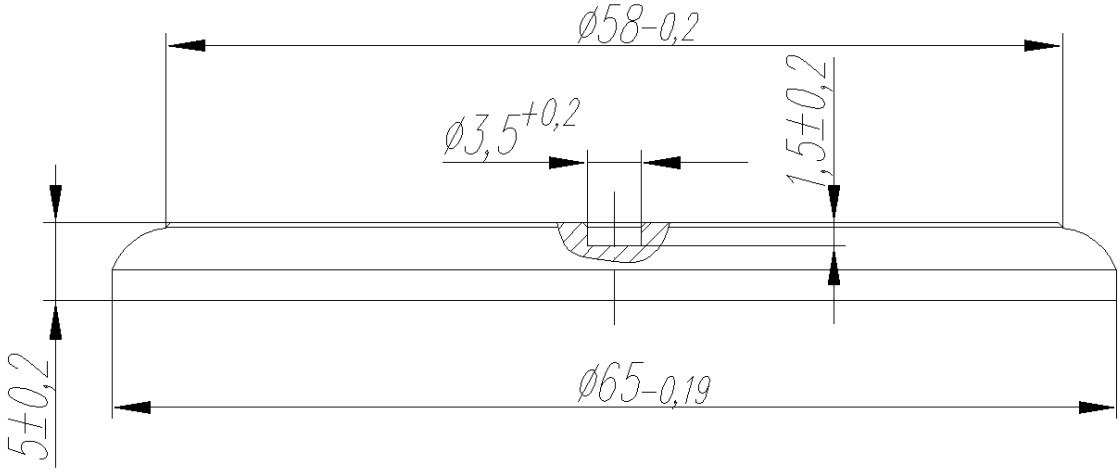
## PART NUMBERING GUIDE

| D | 066 | 12500 | 4 | N |
|---|---|---|---|---|
| 1 | | 2 | 3 | 4 |

1. Design version
2. Average forward current, A
3. Voltage code
4. Ambient conditions: N – normal

## OVERALL DIMENSIONS

**Package type: HOUSINGLESS**




All dimensions in millimeters (inches)

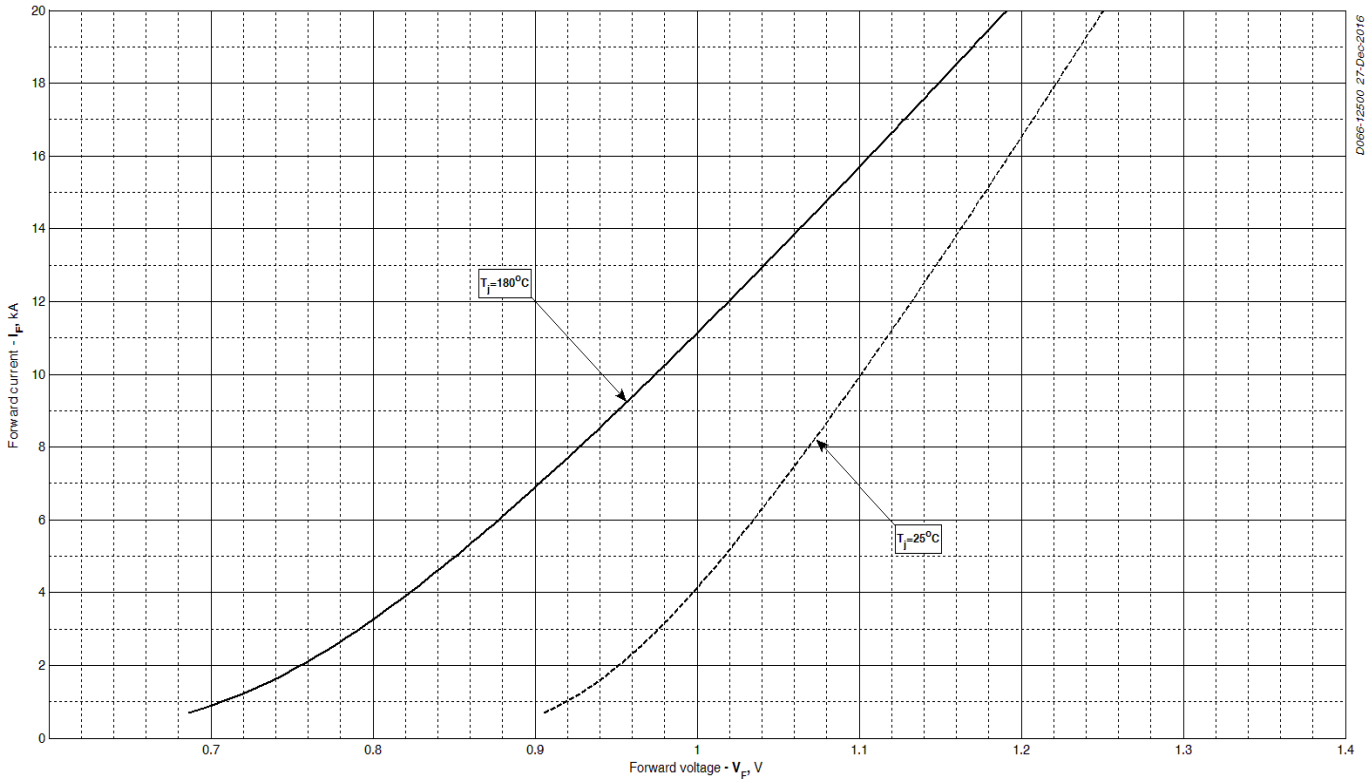



**Fig 1 – Forward characteristics of Limit device**

Analytical function for Forward characteristic:

$$V_F = A + B \cdot i_F + C \cdot \ln(i_F + 1) + D \cdot \sqrt{i_F}$$

| | Coefficients for max curves | |
|---|---|---|
| | $T_j$ = 25°C | $T_j = T_{j\,max}$ |
| **A** | 0.893489 | 0.669192 |
| **B** | 0.015430 | 0.022394 |
| **C** | 0.080109 | 0.121776 |
| **D** | -0.043722 | -0.066463 |

**Forward characteristic model (see Fig. 1).**

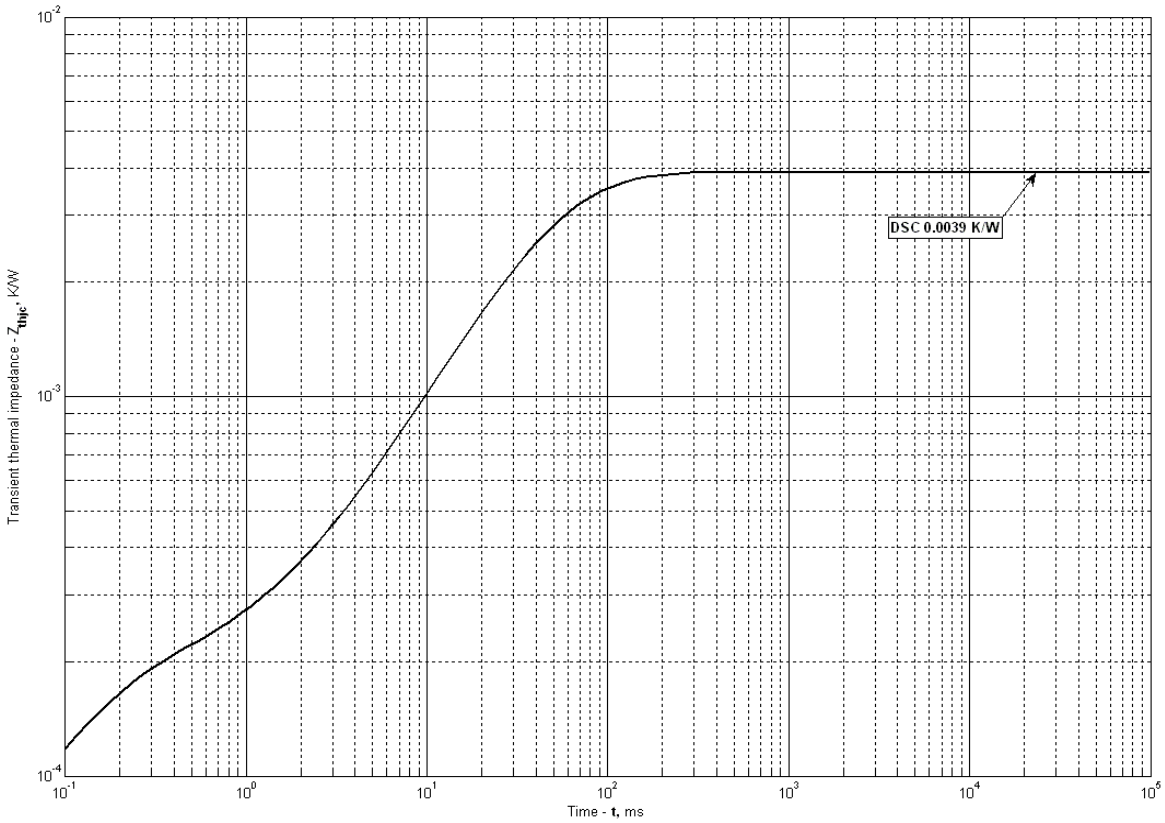



**Fig 2 – Transient thermal impedance**

Analytical function for Transient thermal impedance junction to case $Z_{thjc}$ for DC:

$$Z_{thjc} = \sum_{i=1}^{n} R_i \left( 1 - e^{-\frac{t}{\tau_i}} \right)$$

Where ***i*** = 1 to ***n***, ***n*** is the number of terms in the series.

**t** = Duration of heating pulse in seconds.
**$Z_{thjc}$** = Thermal resistance at time t.
**$R_i$** = Amplitude of $p_{th}$ term.
**$\tau_i$** = Time constatnt of $r_{th}$ term.

## DC Double side cooled

| i | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| **$R_i$, K/W** | 0.0006931 | 0.003018 | 0.000008917 | 0.00001092 | 0.0001425 | 0.0000266 |
| **$\tau_i$, s** | 0.07563 | 0.03513 | 0.003417 | 0.0004864 | 0.000118 | 0.00003592 |

**Transient thermal impedance junction to case $Z_{thjc}$ model (see Fig. 2)**

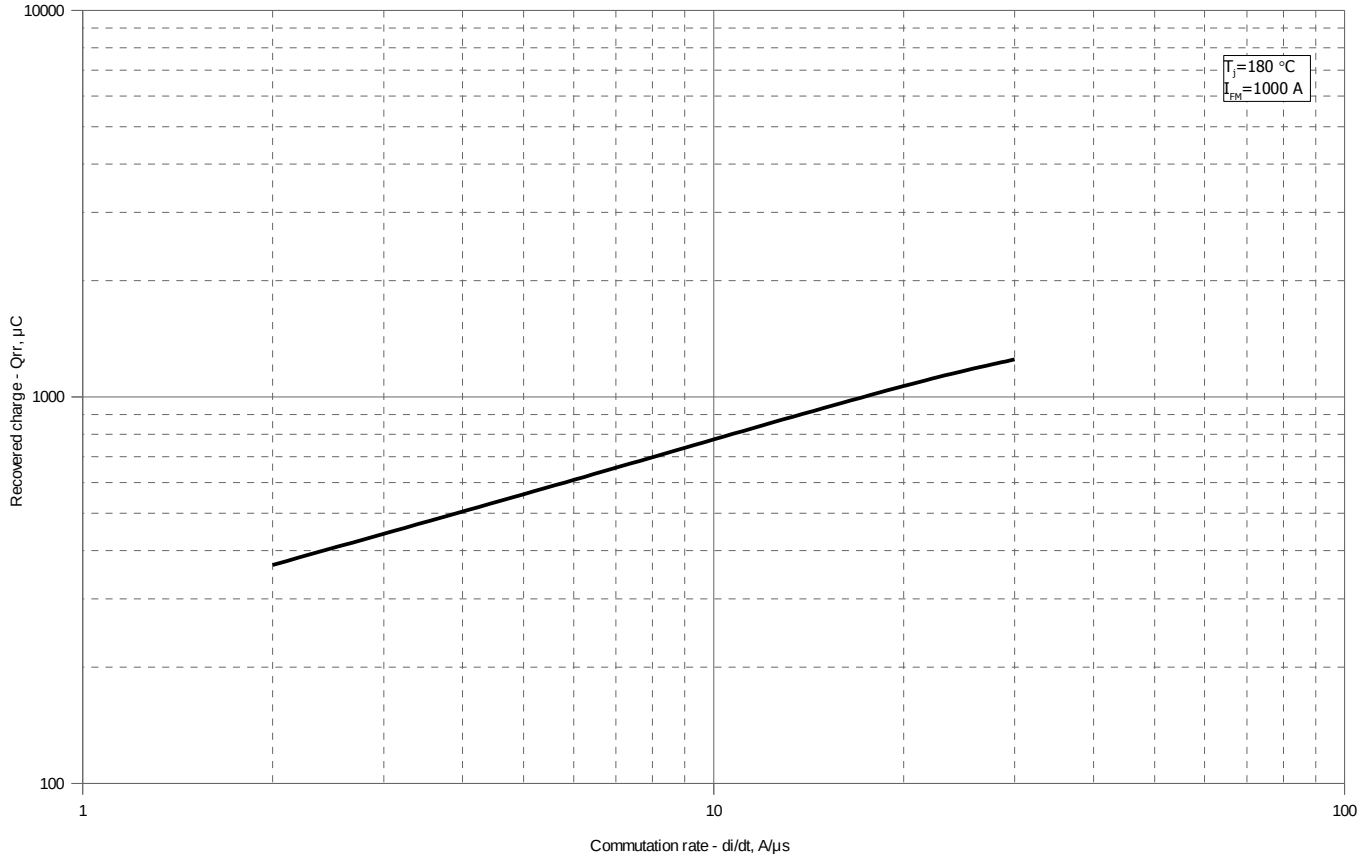



**Fig 3 - Recovered charge, $Q_{rr}$**

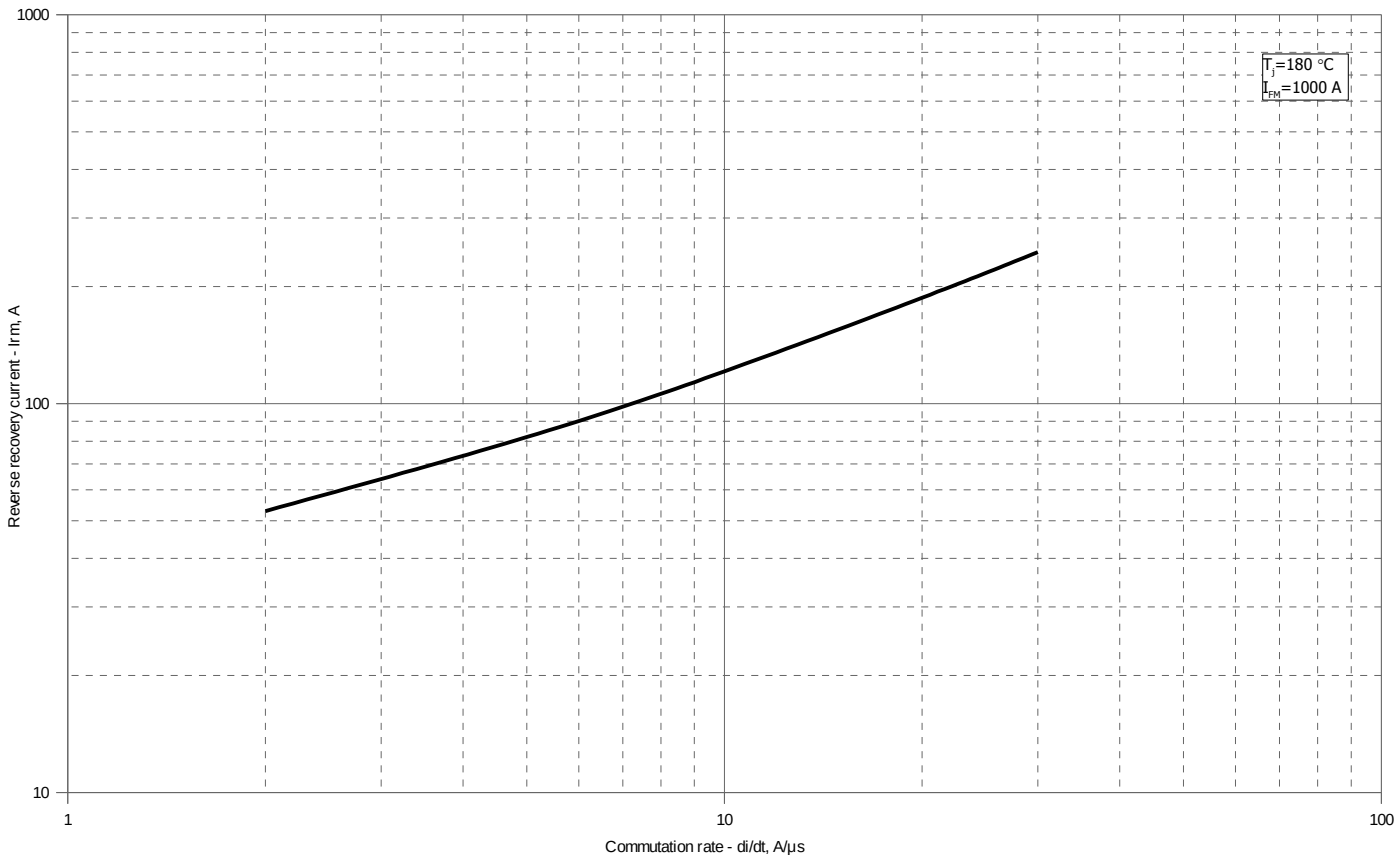



**Fig 4 – Peak reverse recovery current, $I_{rm}$**

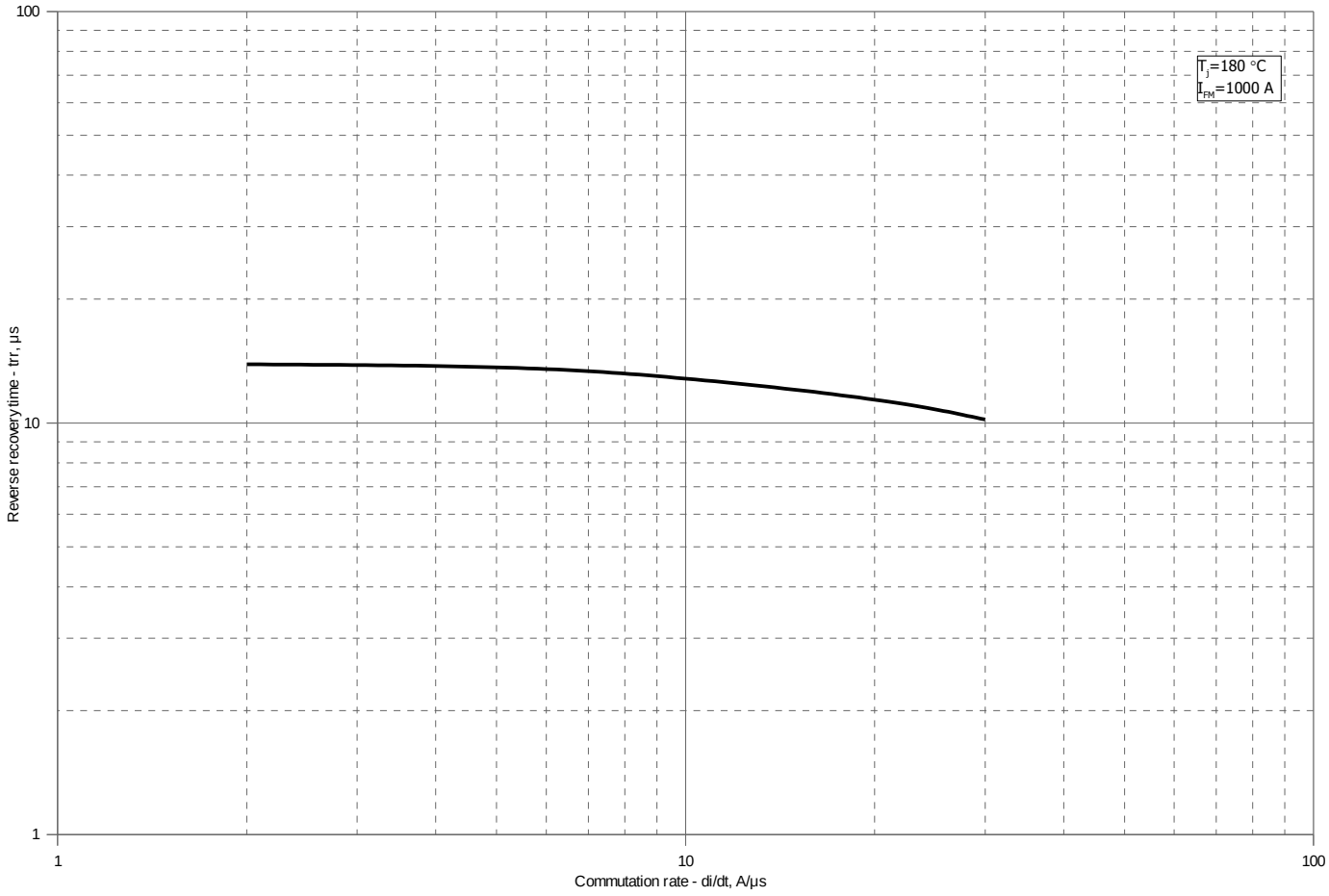



**Fig 5 – Maximum recovery time, $t_{rr}$ (linear)**

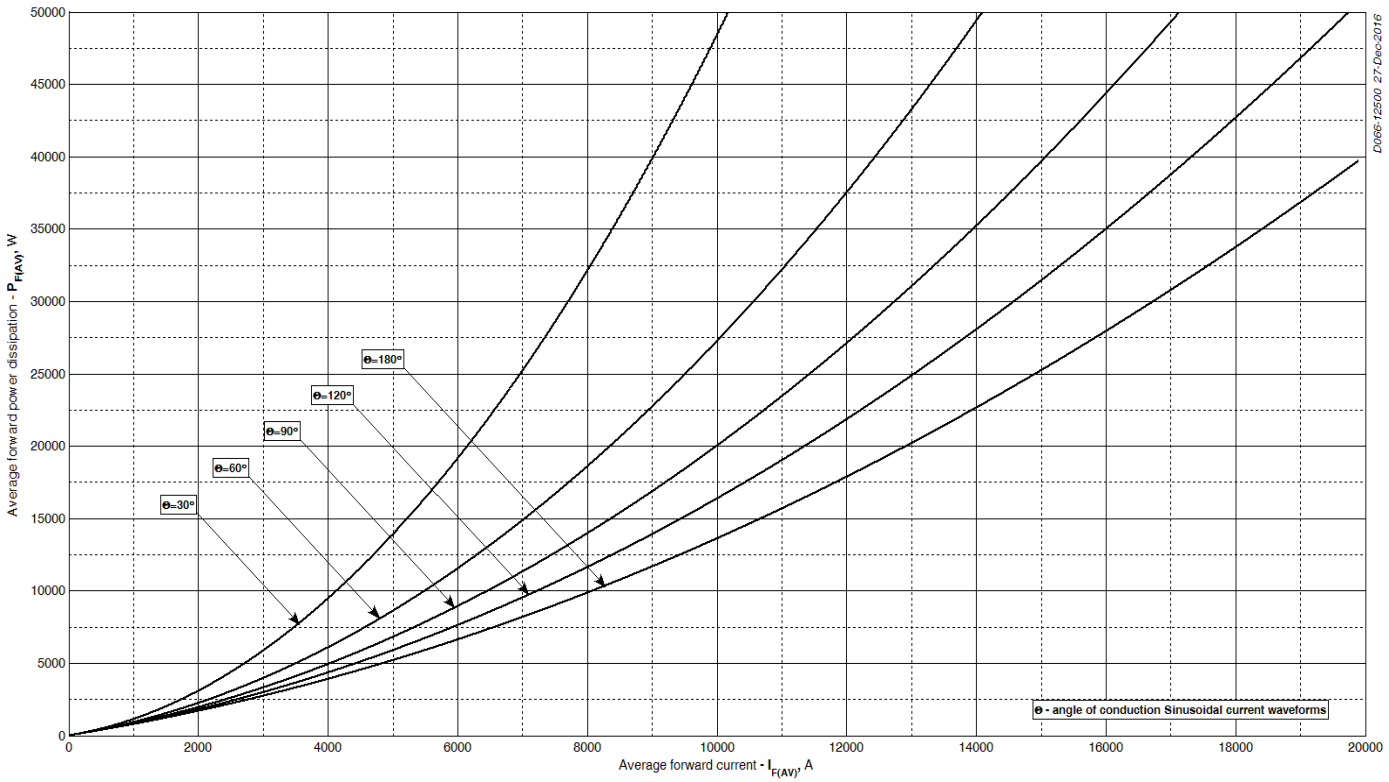



**Fig 6 – Mean forward power dissipation $P_{FAV}$ vs. Mean forward current $I_{FAV}$ for sinusoidal current waveforms at different conduction angles (f=50Hz, DSC)**

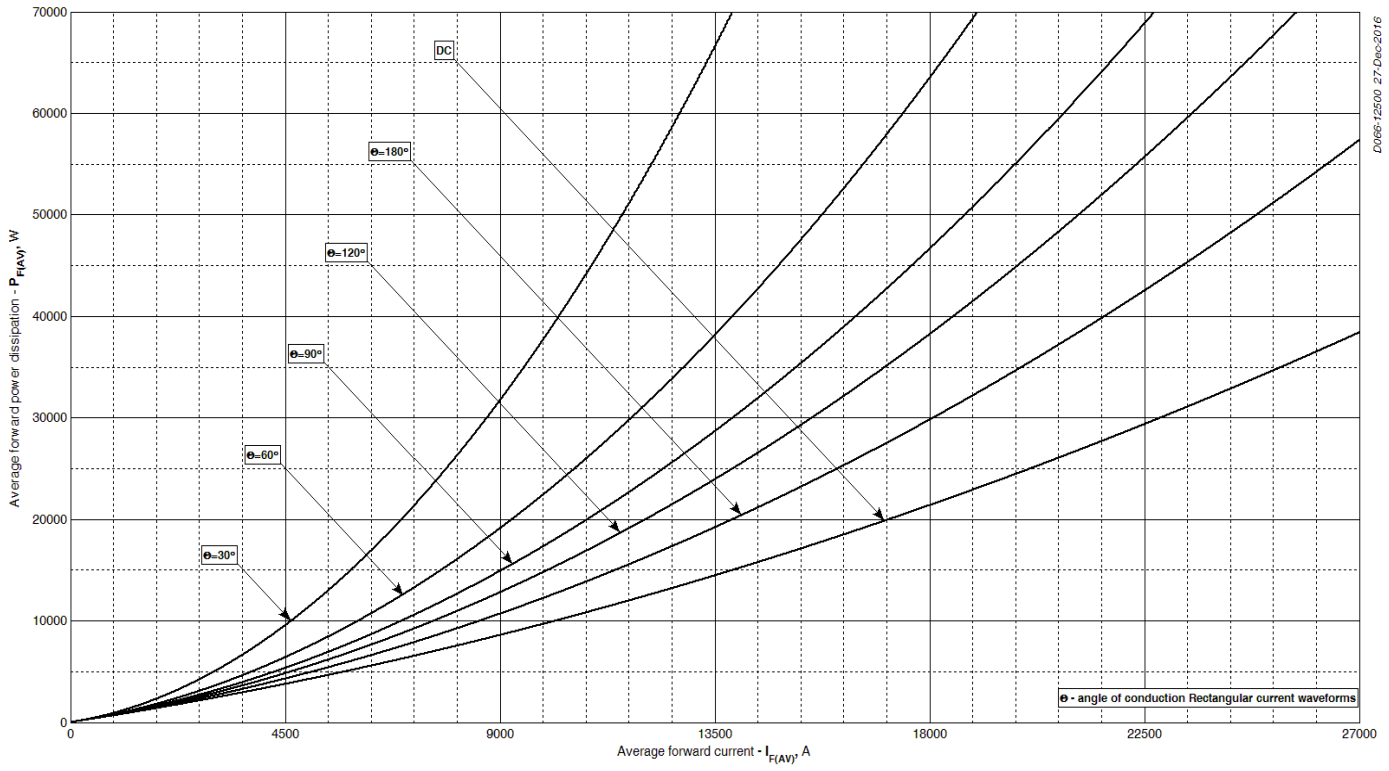



**Fig 7 – Mean forward power dissipation $P_{FAV}$ vs. Mean forward current $I_{FAV}$ for rectangular current waveforms at different conduction angles and for DC (f=50Hz, DSC)**

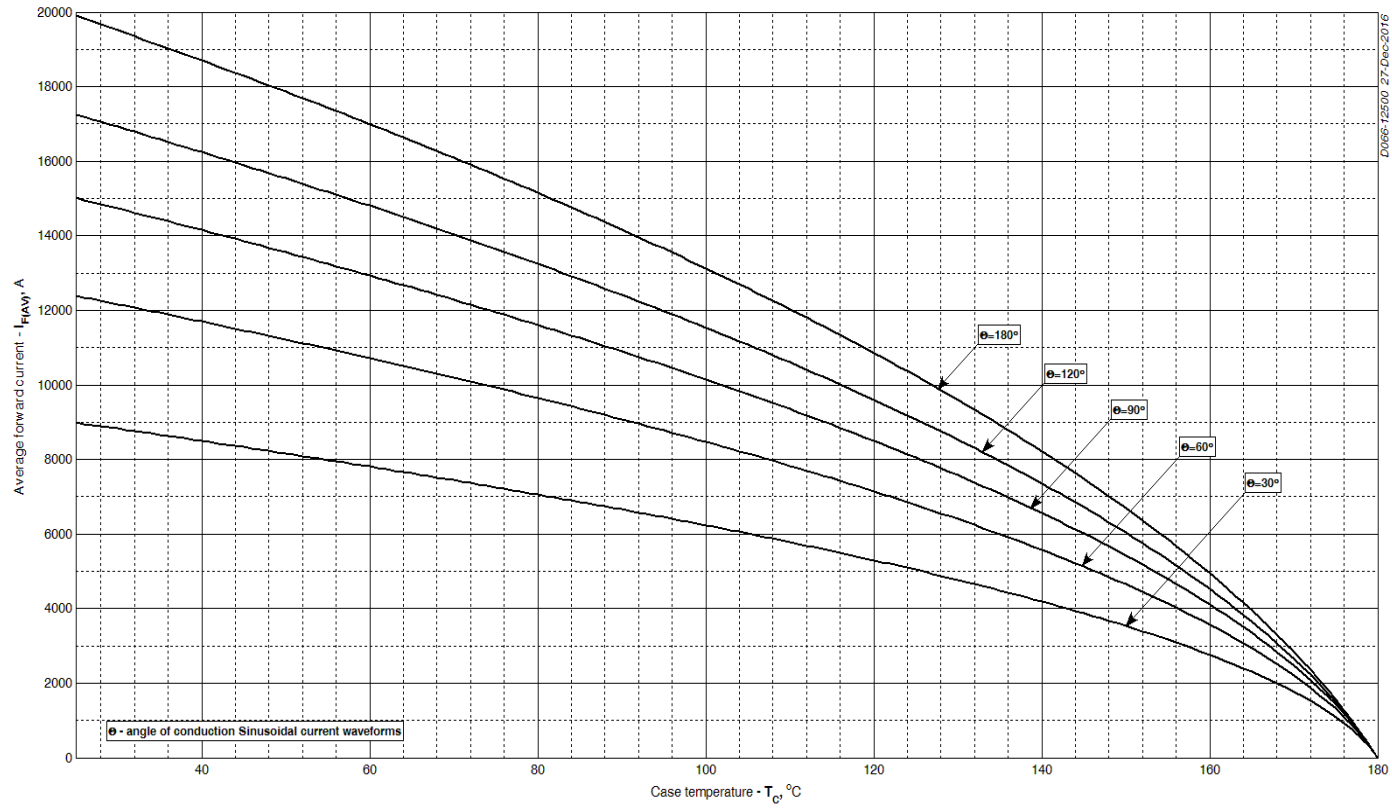



**Fig 8 - Mean forward current $I_{FAV}$ vs. Case temperature $T_C$ for sinusoidal current waveforms at different conduction angles (f=50Hz, DSC)**

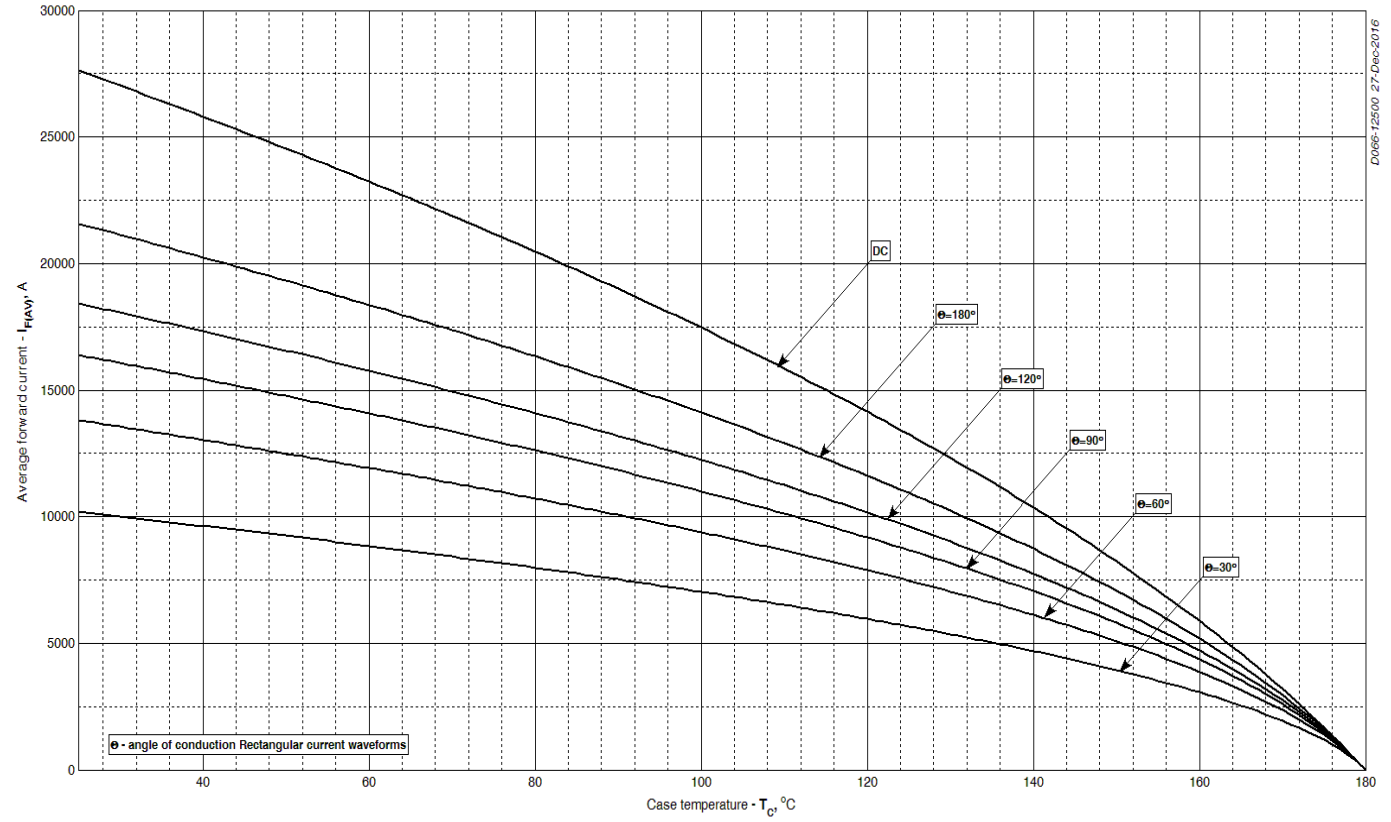



**Fig 9 – Mean forward current $I_{FAV}$ vs. Case temperature $T_C$ for rectangular current waveforms at different conduction angles and for DC (f=50Hz, DSC)**

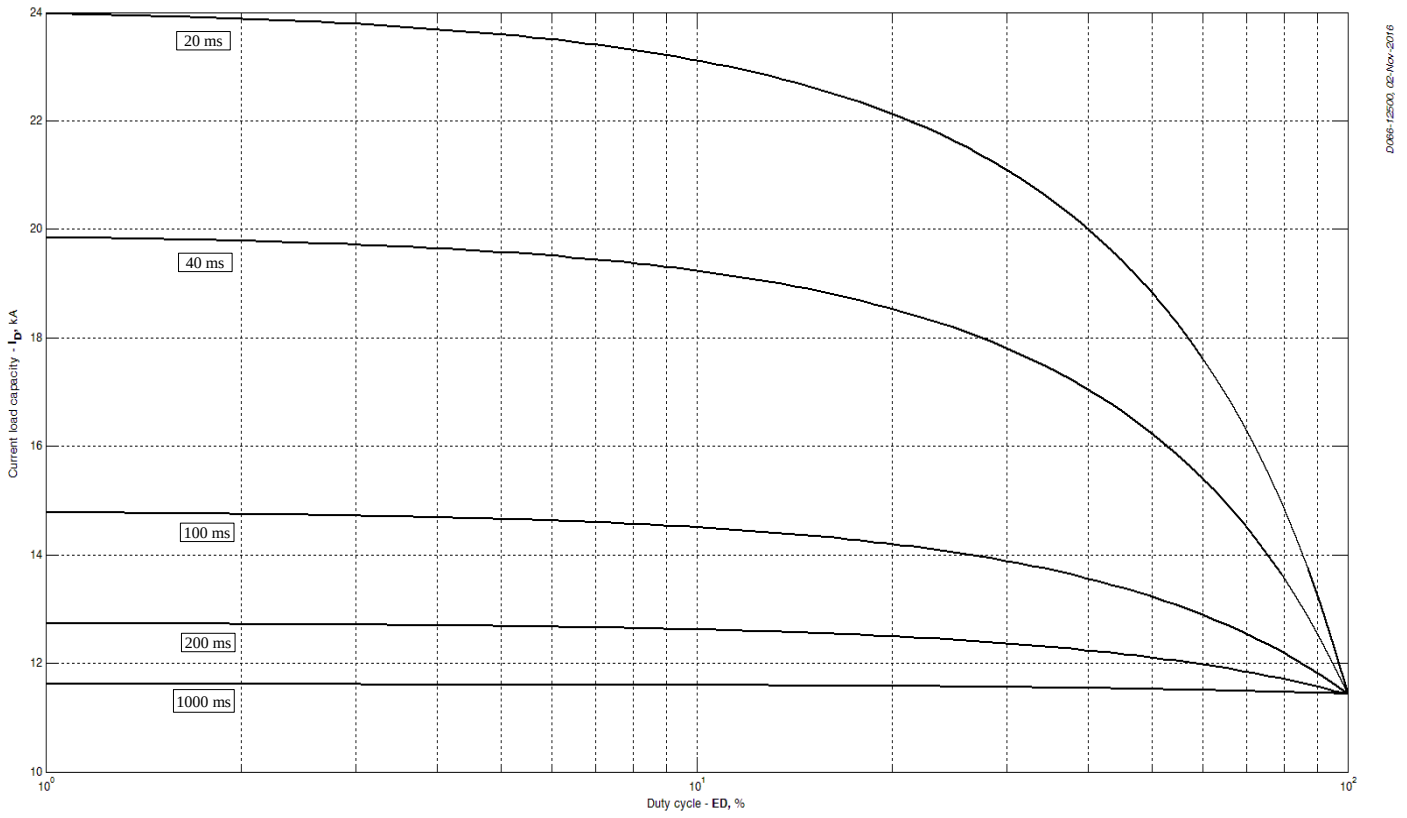



**Fig 10 – Current load capability (f=1000 Hz, square wave, $T_c$ = 40 °C)**

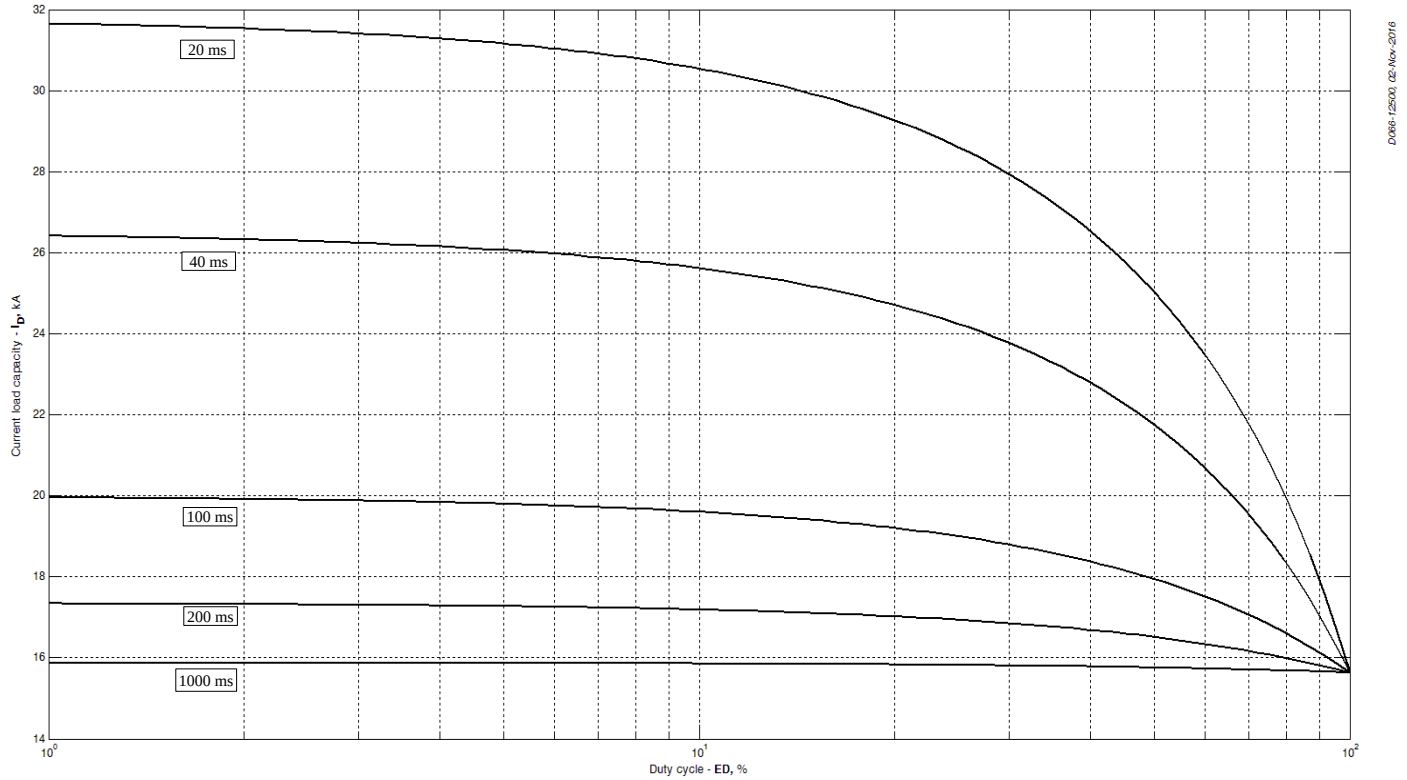



**Fig 11 – Current load capability (f=1000 Hz, square wave, $T_c$ = 60 °C)**

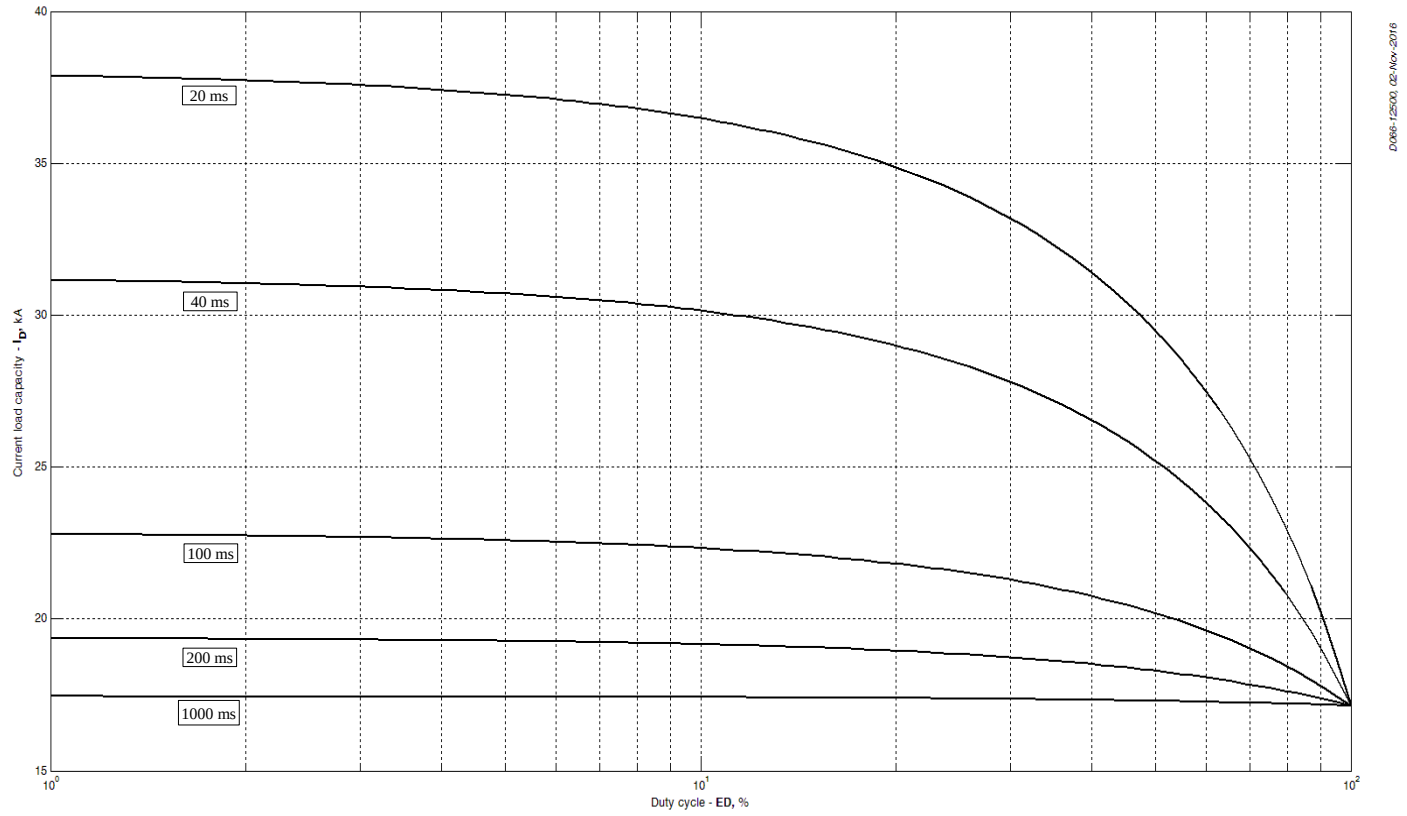



**Fig 12 – Current load capability (f=1000 Hz, square wave, $T_c$ = 70 °C)**

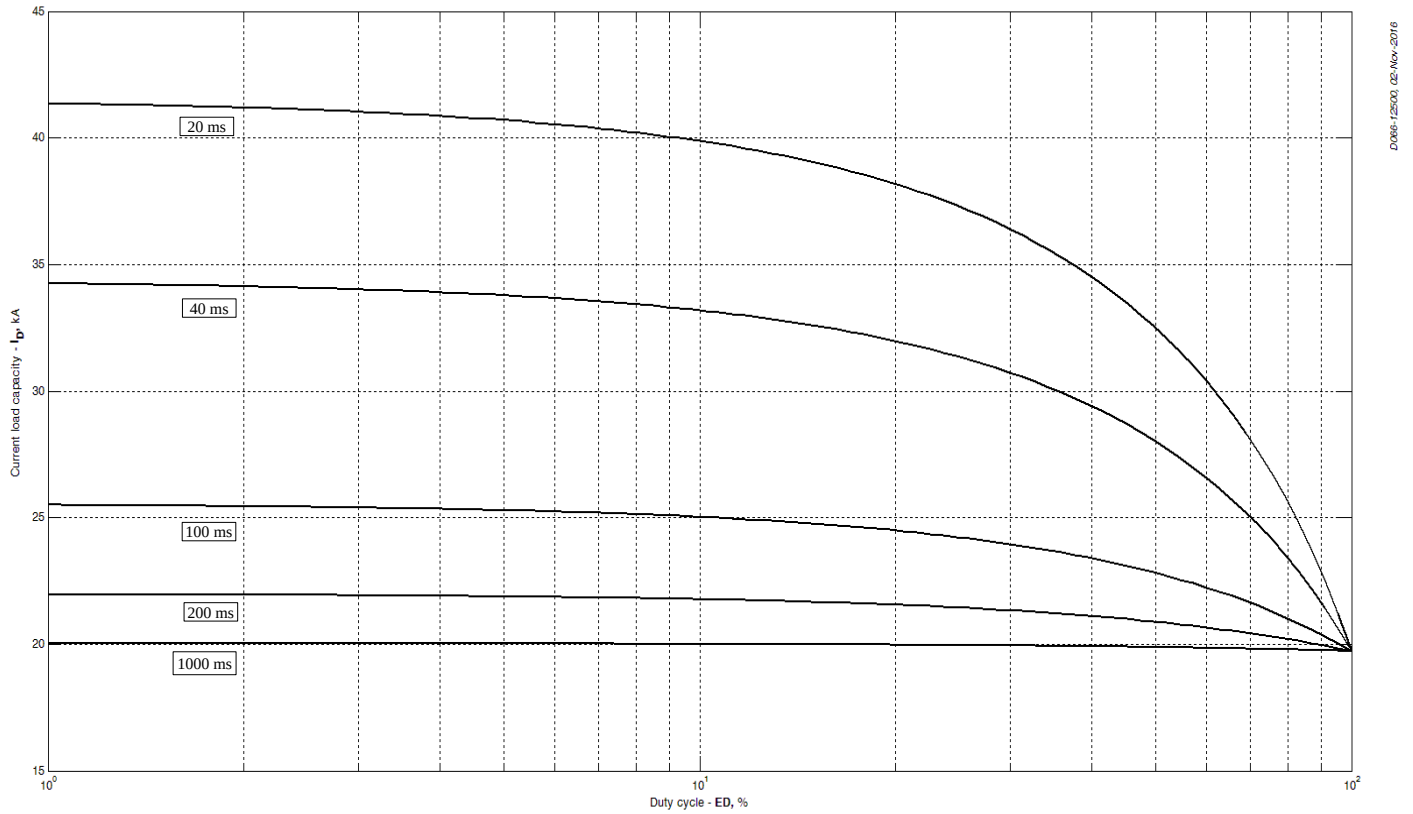



**Fig 13 – Current load capability (f=1000 Hz, square wave, $T_c$ = 80 °C)**

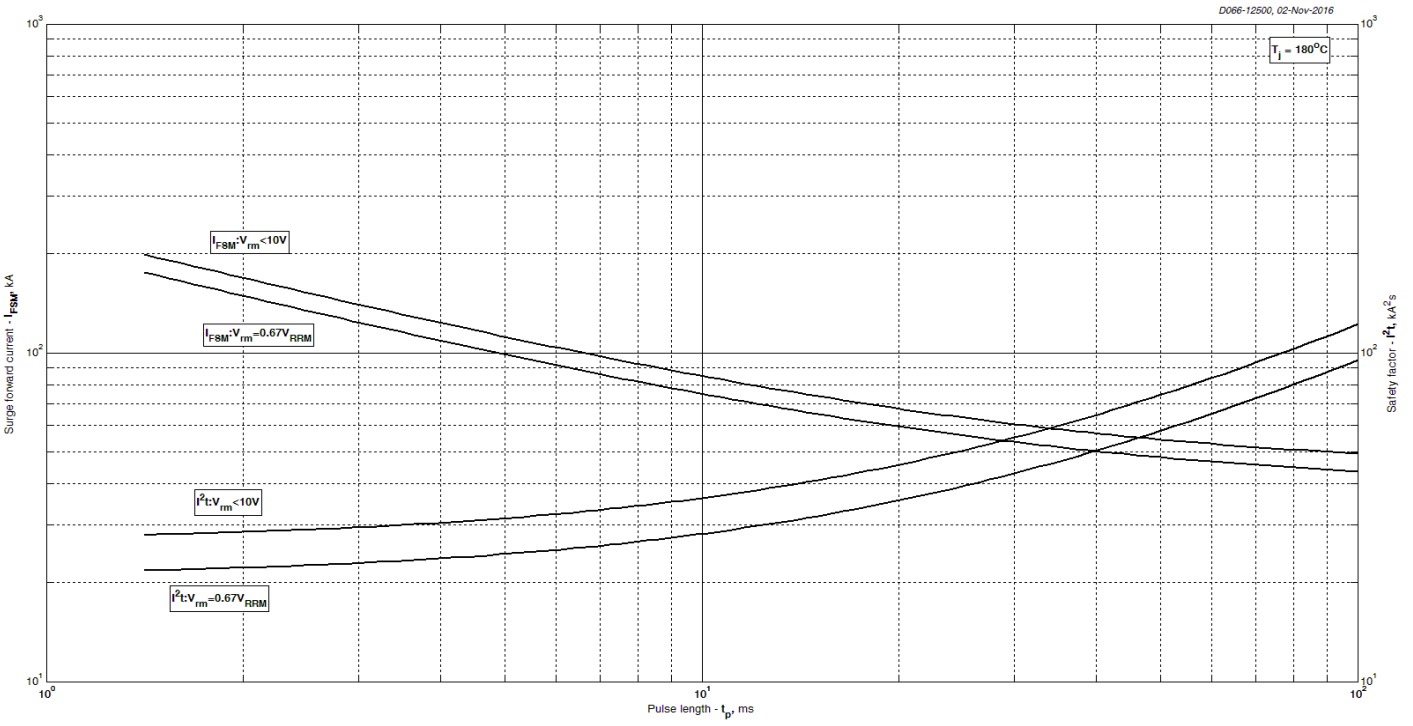



**Fig 14 – Maximum surge and $I^2t$ ratings**

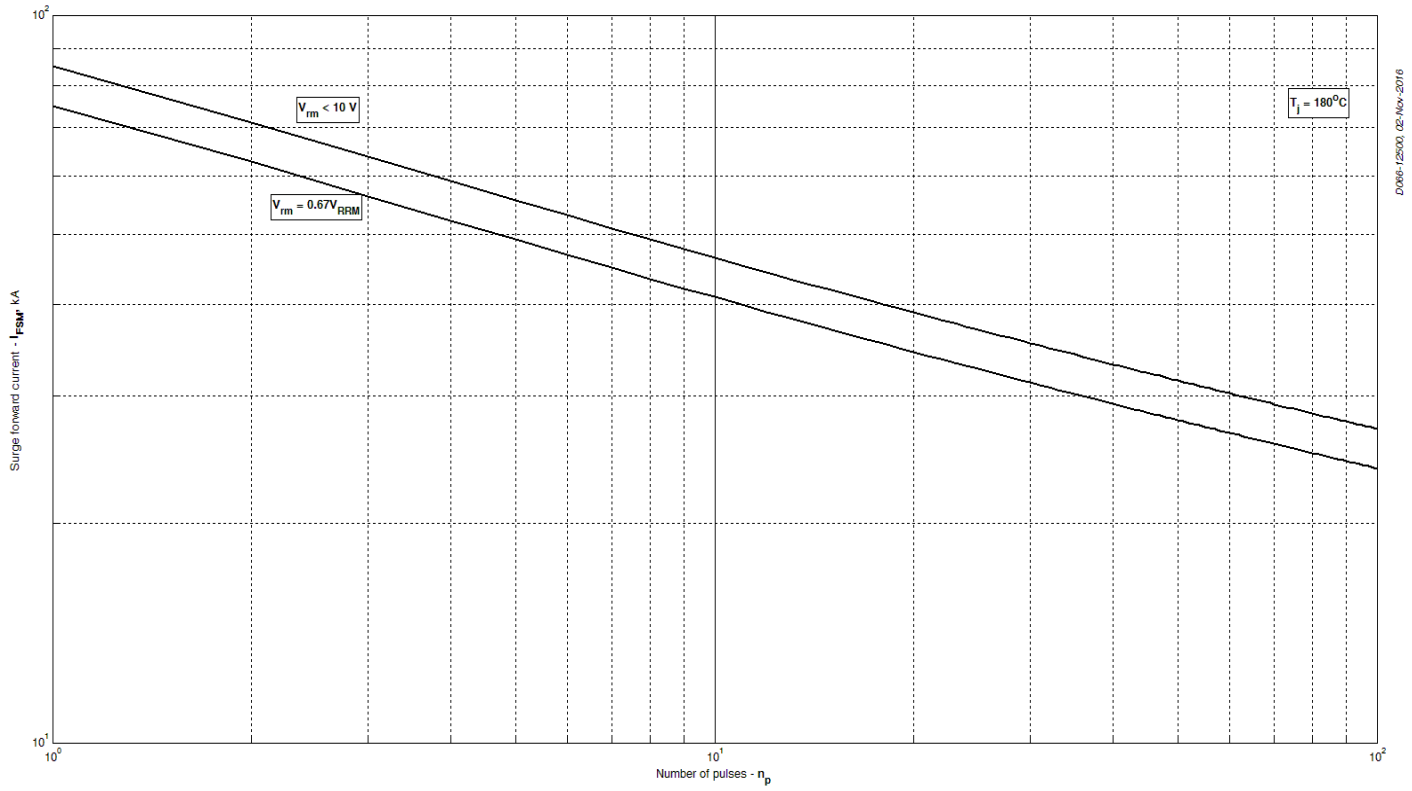



**Fig 15 – Maximum surge ratings**

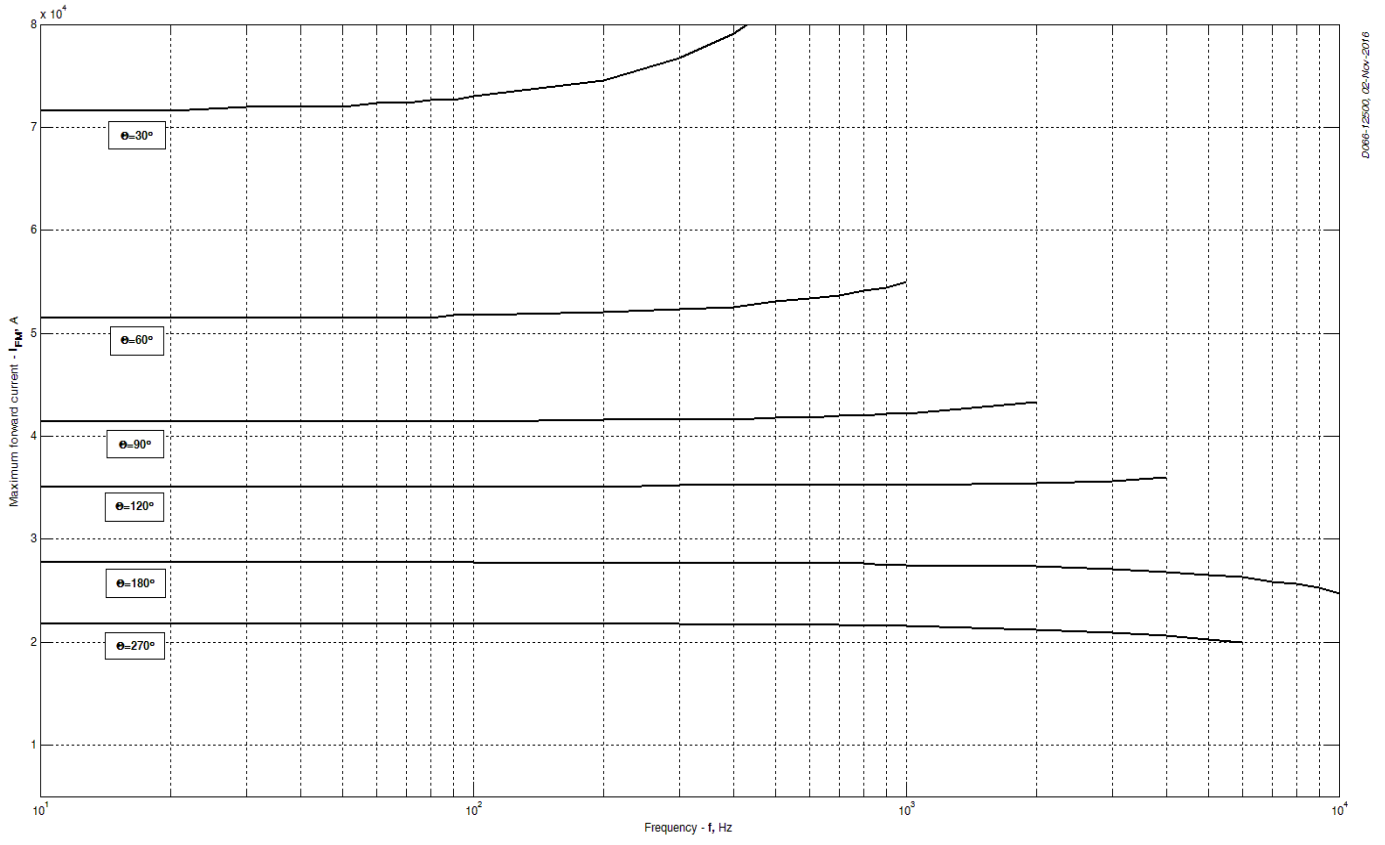



**Fig 16 –Maximum forward current vs. frequency, trapezoid waveform, $T_C$=85 °C, $di_F/dt$=±500 A/µs, $V_R$=100 V**

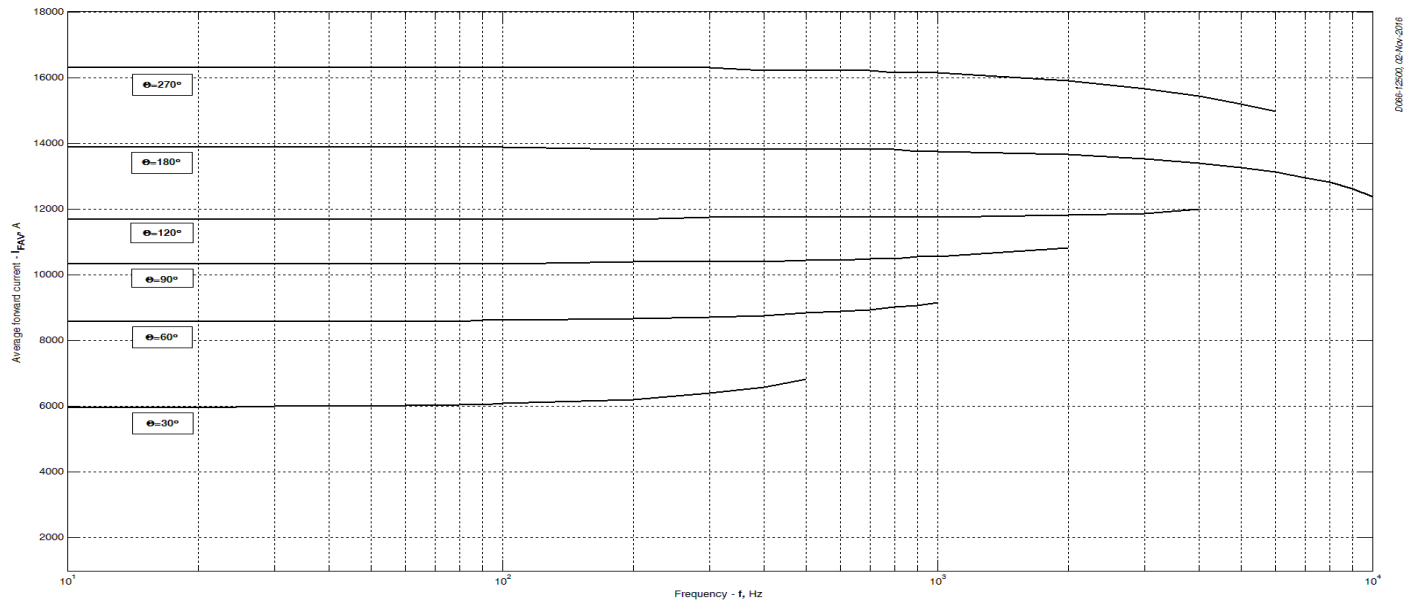



**Fig 17 –Average forward current vs. frequency, trapezoid waveform, $T_C$=85 °C, $di_F/dt$=±500 A/µs, $V_R$=100 V**