# 5SDF 06D2504

## Old part no. DM 827-620-25

## Fast Recovery Diode

### Properties

- Optimized recovery characteristics
- Industry standard housing

### Applications

- suited for GTO applications
- Snubber diode
- Freewheeling diode

### Key Parameters

| | | | |
|---|---|---|---|
| $V_{RRM}$ | = | 2 500 | V |
| $I_{FAVm}$ | = | 615 | A |
| $I_{FSM}$ | = | 10 000 | A |
| $V_{TO}$ | = | 1.196 | V |
| $r_T$ | = | 0.461 | mΩ |

### Types

| | $V_{RRM}$ |
|---|---|
| **5SDF 06D2504** | **2 500 V** |
| Conditions: | *$T_j$ = -40 ÷ 125 °C, half sine waveform, f = 50 Hz* |

### Mechanical Data

| | | | |
|---|---|---|---|
| $F_m$ | **Mounting force** | **10 ± 2** | **kN** |
| $m$ | **Weight** | **0.27** | **kg** |
| $D_S$ | **Surface creepage distance** | **30** | **mm** |
| $D_a$ | **Air strike distance** | **20** | **mm** |

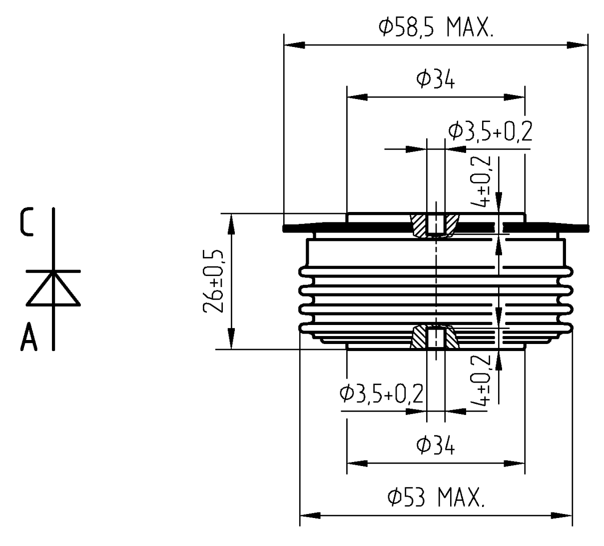


*Fig. 1 Case*

ABB s.r.o.
Novodvorska 1768/138a, 142 21 Praha 4, Czech Republic
tel.: +420 261 306 250, http://www.abb.com/semiconductors

| ***Maximum Ratings*** | | | ***Maximum Limits*** | ***Unit*** |
|---|---|---|---|---|
| $V_{RRM}$ | **Repetitive peak reverse voltage**<br>*$T_j$ = -40 ÷ 125 °C* | | **2 500** | **V** |
| $I_{FAVm}$ | **Average forward current**<br>*$T_c$ = 85 °C* | | **615** | **A** |
| $I_{FRMS}$ | **RMS forward current**<br>*$T_c$ = 85 °C* | | **966** | **A** |
| $I_{RRM}$ | **Repetitive reverse current**<br>*$V_R = V_{RRM}$* | | **50** | **mA** |
| $I_{FSM}$ | **Non repetitive peak surge current**<br>*$V_R$ = 0 V, half sine pulse* | *$t_p$ = 8.3 ms* | **10 700** | **A** |
| | | *$t_p$ = 10 ms* | **10 000** | **A** |
| $I^2t$ | **Limiting load integral**<br>*$V_R$ = 0 V, half sine pulse* | *$t_p$ = 8.3 ms* | **474 000** | **$A^2s$** |
| | | *$t_p$ = 10 ms* | **500 000** | **$A^2s$** |
| $T_{jmin}$ - $T_{jmax}$ | **Operating temperature range** | | **-40 ÷ 125** | **°C** |
| $T_{STG}$ | **Storage temperature range** | | **-40 ÷ 125** | **°C** |

*Unless otherwise specified $T_j$ = 125 °C*

| ***Characteristics*** | | ***Value*** | | | ***Unit*** |
|---|---|---|---|---|---|
| | | ***min*** | ***typ*** | ***max*** | |
| $V_{T0}$ | **Threshold voltage** | | | **1.196** | **V** |
| $r_T$ | **Forward slope resistance**<br>*$I_{F1}$ = 974 A, $I_{F2}$ = 2 922 A* | | | **0.461** | **mΩ** |
| $V_{FM}$ | **Maximum forward voltage**<br>*$I_{FM}$ = 1 000 A* | | | **1.660** | **V** |
| $Q_{rr}$ | **Recovered charge**<br>*$V_R$ = 100 V, $I_{FM}$ = 1000 A, di/dt = -80 A/µs* | | **260** | **400** | **µC** |
| $I_{rrM}$ | **Reverse recovery maximum current**<br>*the same conditions as at $Q_{rr}$* | | **120** | **200** | **A** |
| $t_{rr}$ | **Reverse recovery time**<br>*the same conditions as at $Q_{rr}$* | | | **4.0** | **µs** |
| $S$ | **Soft factor, $S = t_s / t_f$**<br>*$I_{FM}$ = 1 000 A, $di_F/dt$ = -200 A/µs, $V_R$ = 400 V* | | **2.0** | | **-** |
| $I_{rrM}$ | **Reverse recovery maximum current**<br>*the same conditions as at S* | | | **400** | **A** |
| $V_{rrM}$ | **Reverse recovery maximum voltage**<br>*the same conditions as at S* | | | **1 100** | **V** |

*Unless otherwise specified $T_j$ = 125 °C*

| *Thermal Parameters* | | | **Value** | **Unit** |
|---|---|---|---|---|
| $R_{thjc}$ | **Thermal resistance junction to case** | *double side cooling* | **32** | **K/kW** |
| | | *cathode side cooling* | **50** | |
| | | *anode side cooling* | **88** | |
| $R_{thch}$ | **Thermal resistance case to heatsink** | *double side cooling* | **8** | **K/kW** |
| | | *single side cooling* | **16** | |

### *Transient Thermal Impedance*

**Analytical function for transient thermal impedance**

$$Z_{thjc} = \sum_{i=1}^{5} R_i (1 - \exp(-t/\tau_i))$$

Conditions:
$F_m$ = 10 ± 2 kN, Double side cooled

**Correction for periodic waveforms**

| | | | |
|---|---|---|---|
| **180°** | **sine:** | **2.3** | **K/kW** |
| **180°** | **rectangular:** | **3.1** | **K/kW** |
| **120°** | **rectangular:** | **5.1** | **K/kW** |
| **60°** | **rectangular:** | **8.7** | **K/kW** |

| $i$ | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| $\tau_i$ ( s ) | 0.7033 | 0.2185 | 0.0588 | 0.0042 | 0.0006 |
| $R_i$( K/kW ) | 11.56 | 10.08 | 7.84 | 2.38 | 0.13 |

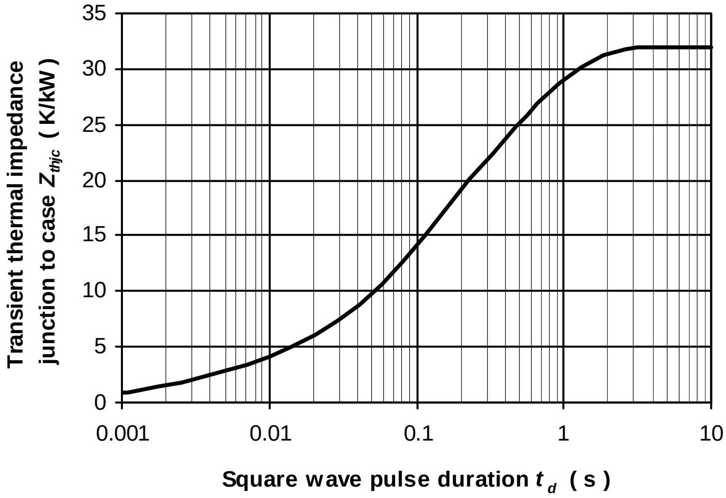


*Fig. 2 Dependence transient thermal impedance junction to case on square pulse*

***Forward Characteristics***

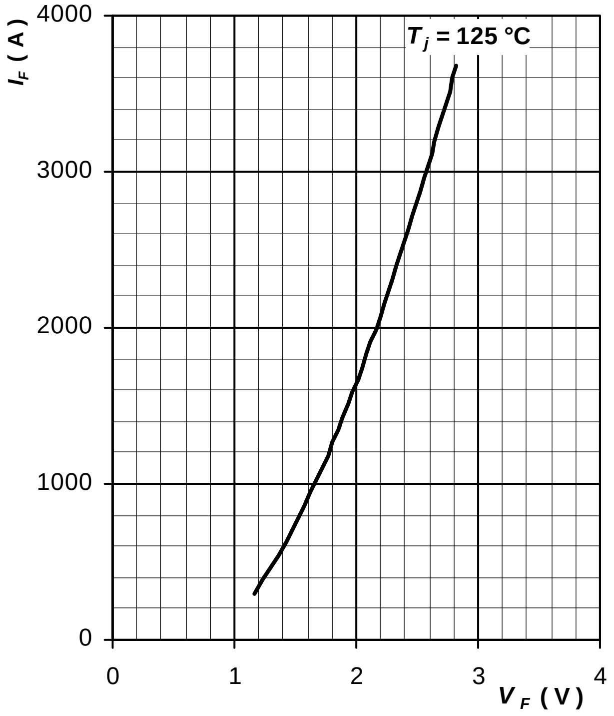


*Fig. 3 Maximum forward voltage drop characteristics*

## Surge Characteristics

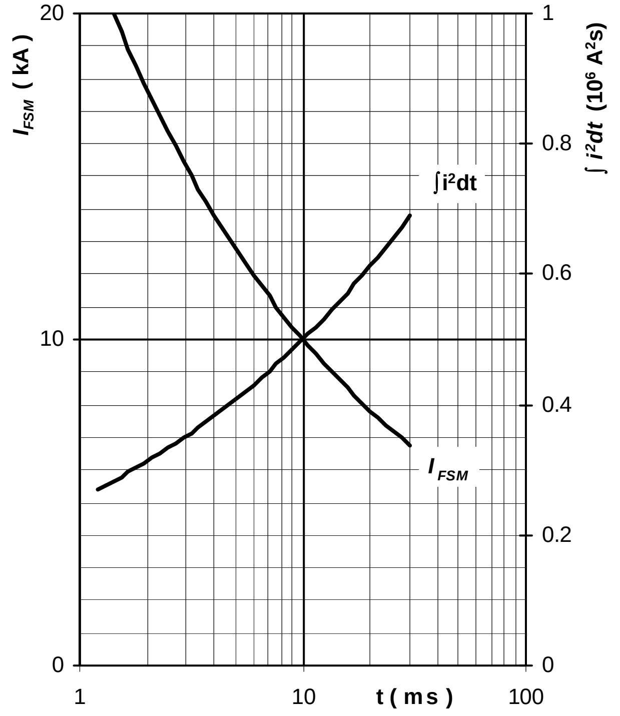


*Fig. 4 Surge forward current vs. pulse length, half sine wave, single pulse, $V_R$ = 0 V, $T_j = T_{jmax}$*

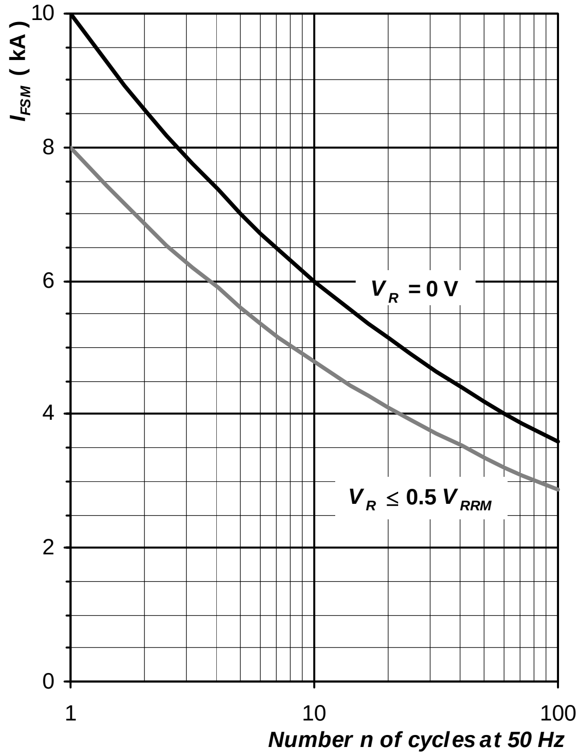


*Fig. 5 Surge forward current vs. number of pulses, half sine wave, $T_j = T_{jmax}$*

## Power Loss and Maximum Case Temperature Characteristics

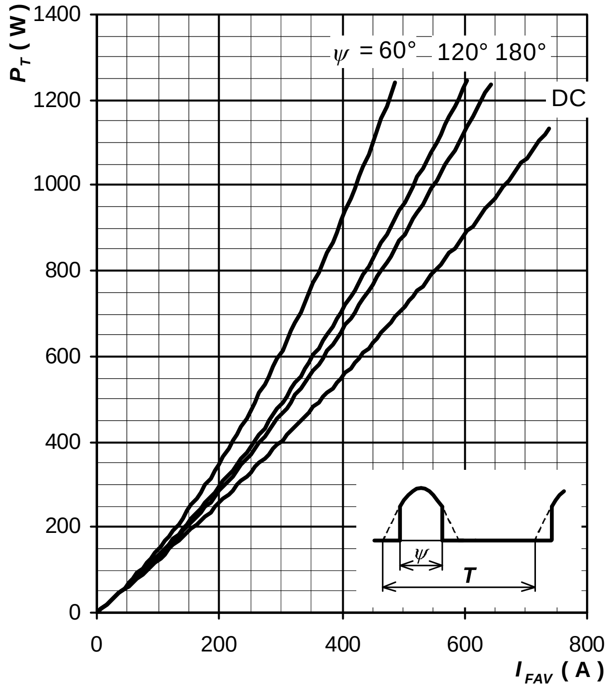


*Fig. 6 Forward power loss vs. average forward current, sine waveform, f = 50 Hz, T = 1/f*

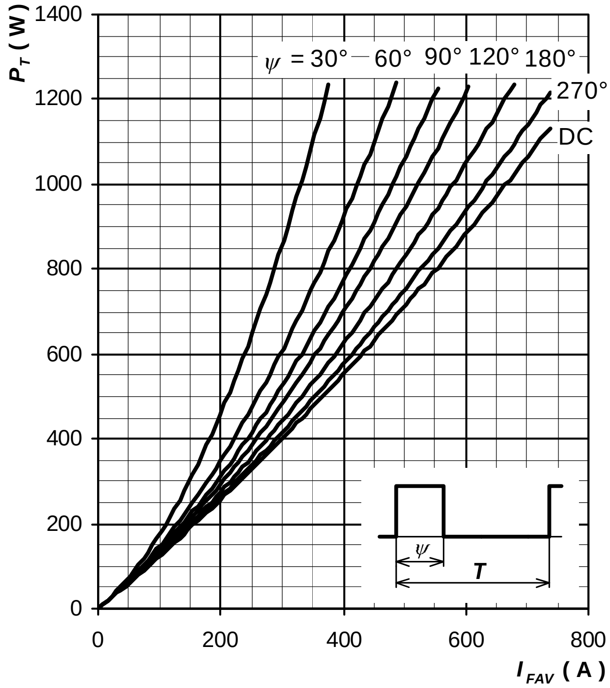


*Fig. 7 Forward power loss vs. average forward current, square waveform, f = 50 Hz, T = 1/f*

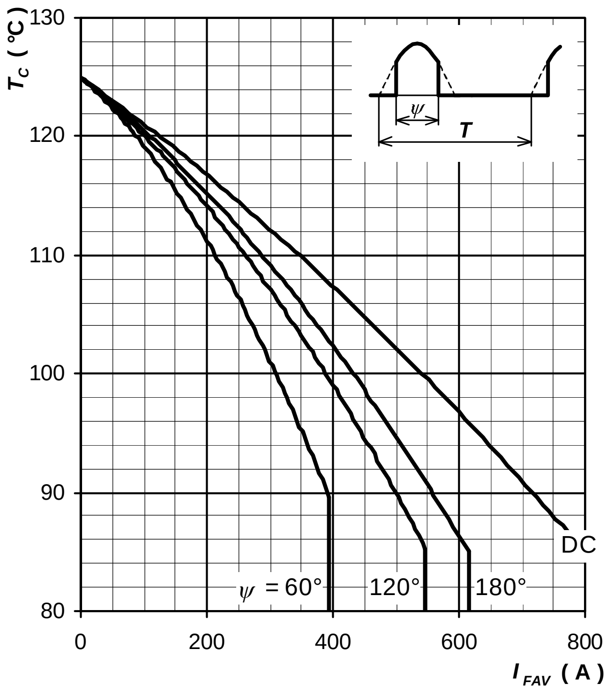


*Fig. 8 Max. case temperature vs. aver. forward current, sine waveform, f = 50 Hz, T = 1/f*

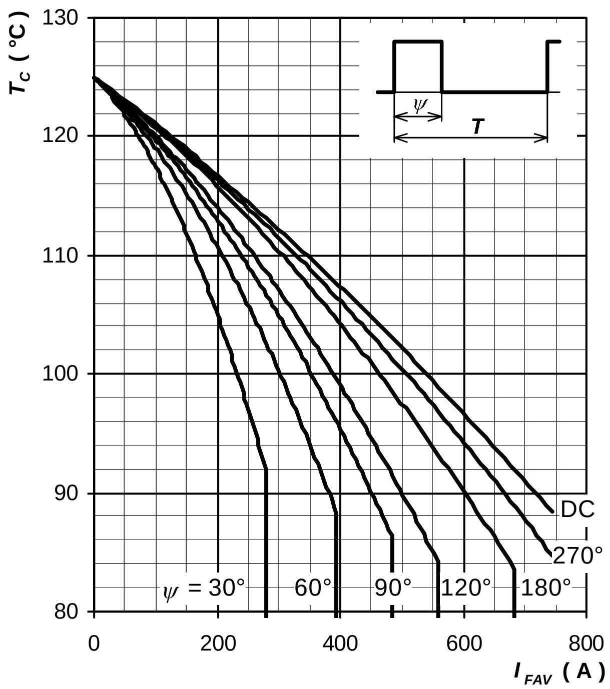


*Fig. 9 Max. case temperature vs. aver. forward current, square waveform, f = 50 Hz, T = 1/f*

*Note 2: Figures number 6 ÷ 9 have been calculated without considering any forward and reverse recovery losses. They are valid for f = 50 or 60 Hz operation.*

## Forward Recovery Characteristics

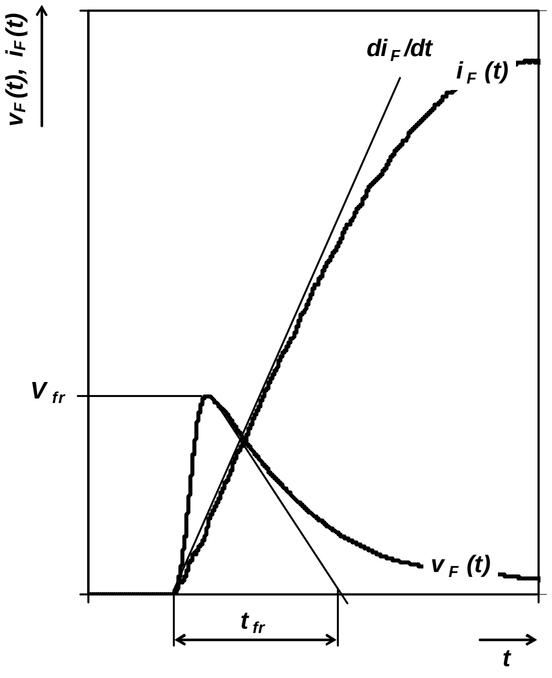


*Fig. 10 Typical forward recovery voltage waveform when the diode is turned on with high $di_F/dt$*

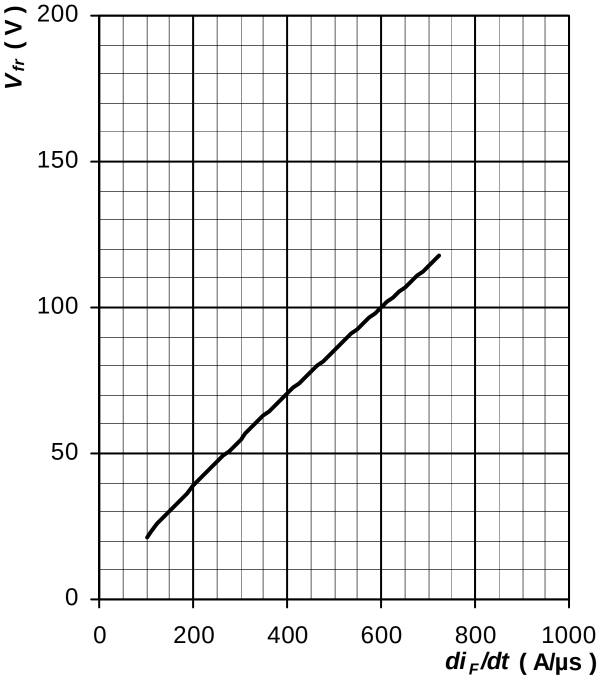


*Fig. 11 Max. forward recovery voltage vs. rate of rise of forward current, trapezoid pulse, $T_j = T_{jmax}$, $t_{fr} \leq 10$ µs*

### Reverse Recovery Characteristics

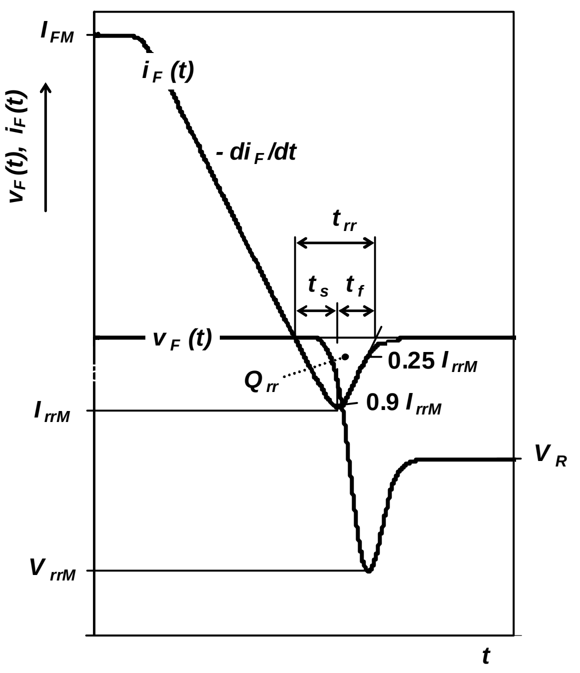


Fig. 12 Typical waveforms and definition of symbols at reverse recovery of a diode, inductive switching without RC snubber

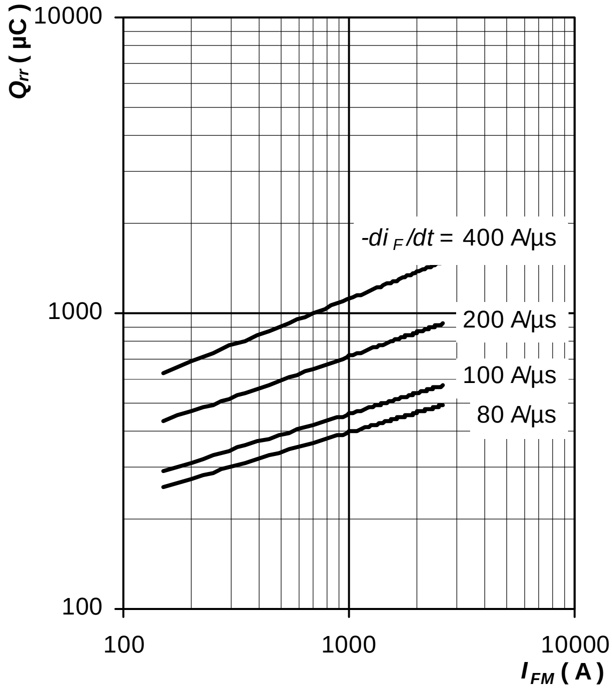


Fig. 13 Max. recovered charge vs. forward current, trapezoid pulse, $T_j = T_{jmax}$

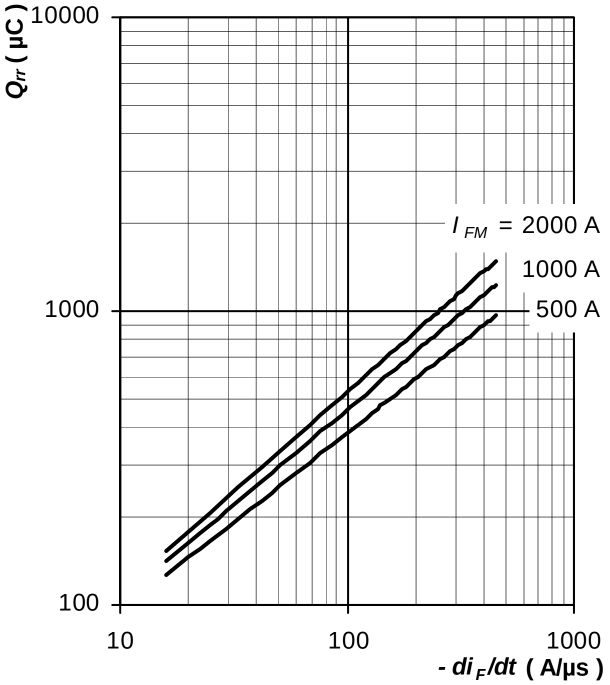


Fig. 14 Max. recovered charge vs. rate of fall of forward current, trapezoid pulse, $T_j = T_{jmax}$

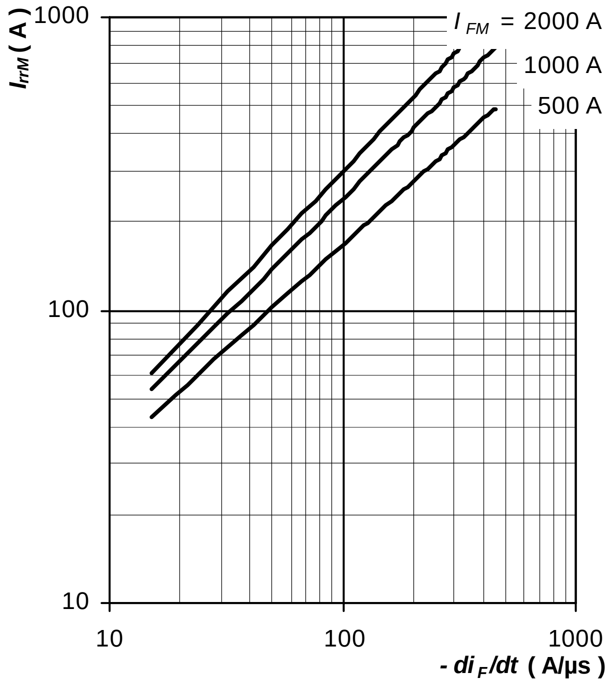


Fig. 15 Max. reverse recovery current vs. rate of fall of forward current, trapezoid pulse, $T_j = T_{jmax}$

Notes: