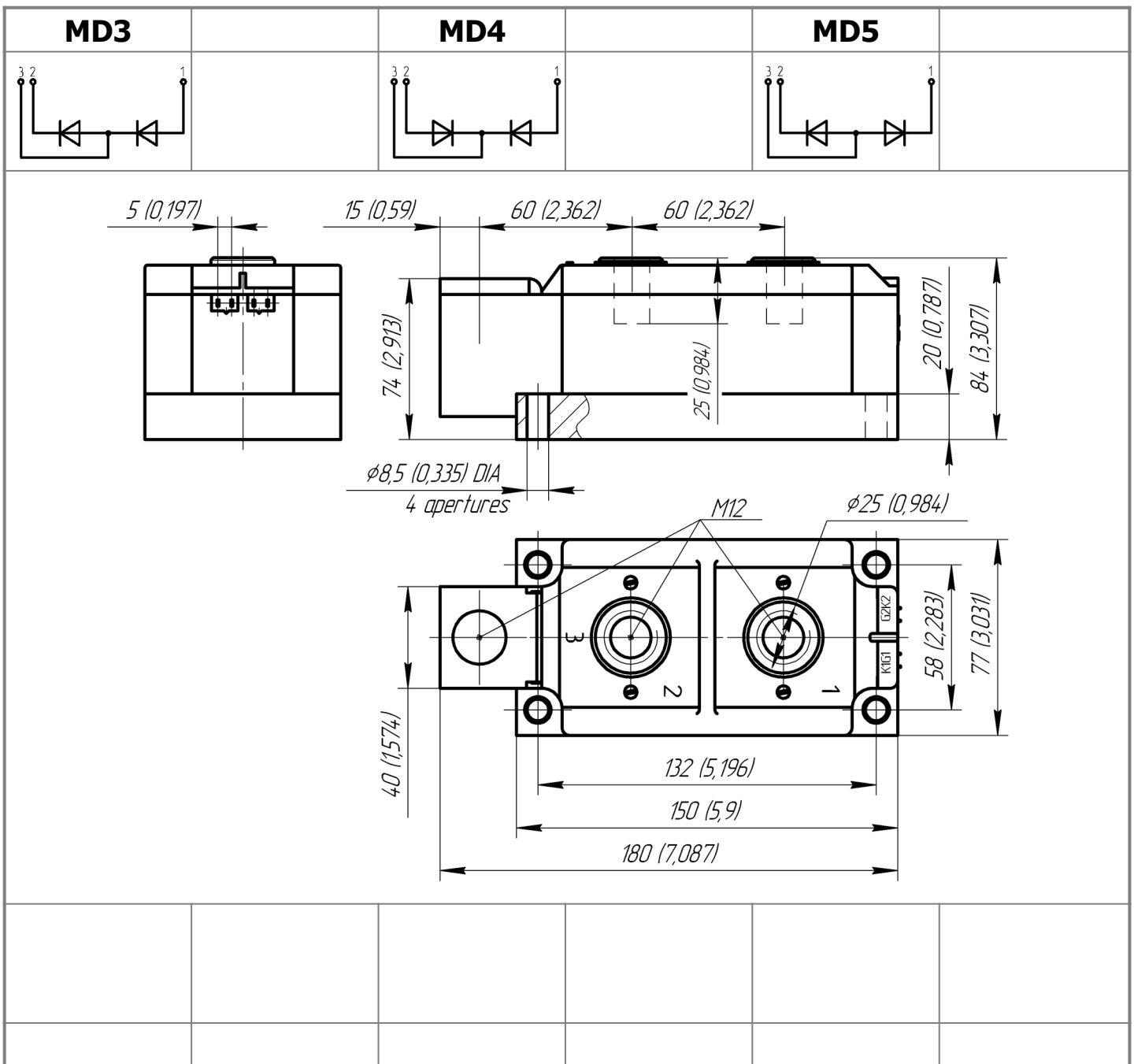




Double Diode Module
For Phase Control
MDx-800-44-D

Electrically isolated base plate
Industrial standard package
Simplified mechanical design, rapid assembly
Pressure contact

| | | | | |
|---------------------------------|------------|------|---------------|------|
| Average forward current | I_{FAV} | | 800 A | |
| Repetitive peak reverse voltage | V_{RRM} | | 3800 ÷ 4400 V | |
| V_{RRM}, V | 3800 | 4000 | 4200 | 4400 |
| Voltage code | 38 | 40 | 42 | 44 |
| $T_j, ^\circ C$ | - 40 ÷ 150 | | | |



All dimensions in millimeters (inches)


MAXIMUM ALLOWABLE RATINGS

| Symbols and parameters | | Units | Values | Test conditions | |
|------------------------|-------------------------------------|-------------------|---------------------|---|---|
| ON-STATE | | | | | |
| I_{FAV} | Average forward current | A | 800 665 | $T_c = 85\text{ }^\circ\text{C};$ $T_c = 100\text{ }^\circ\text{C};$ 180° half-sine wave; 50 Hz | |
| I_{FRMS} | RMS forward current | A | 1256 | $T_c = 85\text{ }^\circ\text{C};$ 180° half-sine wave; 50 Hz | |
| I_{FSM} | Surge forward current | kA | 23.0 26.0 | $T_j = T_{j\text{ max}}$ $T_j = 25\text{ }^\circ\text{C}$ | 180° half-sine wave; $t_p = 10\text{ ms};$ single pulse; $V_R = 0\text{ V};$ |
| | | | 24.0 28.0 | $T_j = T_{j\text{ max}}$ $T_j = 25\text{ }^\circ\text{C}$ | 180° half-sine wave; $t_p = 8.3\text{ ms};$ single pulse; $V_R = 0\text{ V};$ |
| I^2t | Safety factor | $A^2s \cdot 10^3$ | 2600 3300 | $T_j = T_{j\text{ max}}$ $T_j = 25\text{ }^\circ\text{C}$ | 180° half-sine wave; $t_p = 10\text{ ms};$ single pulse; $V_R = 0\text{ V};$ |
| | | | 2300 3200 | $T_j = T_{j\text{ max}}$ $T_j = 25\text{ }^\circ\text{C}$ | 180° half-sine wave; $t_p = 8.3\text{ ms};$ single pulse; $V_R = 0\text{ V};$ |
| BLOCKING | | | | | |
| V_{RRM} | Repetitive peak reverse voltage | V | 3800÷4400 | $T_{j\text{ min}} < T_j < T_{j\text{ max}};$ 180° half-sine wave; 50 Hz; | |
| V_{RSM} | Non-repetitive peak reverse voltage | V | 3900÷4500 | $T_{j\text{ min}} < T_j < T_{j\text{ max}};$ 180° half-sine wave; single pulse; | |
| V_R | Reverse continuous voltage | V | $0.6 \cdot V_{RRM}$ | $T_j = T_{j\text{ max}};$ | |
| THERMAL | | | | | |
| T_{stg} | Storage temperature | °C | - 40 ÷ 50 | | |
| T_j | Operating junction temperature | °C | - 40 ÷ 150 | | |
| $T_{c\text{ op}}$ | Operating temperature | °C | - 40 ÷ 125 | | |
| MECHANICAL | | | | | |
| a | Acceleration under vibration | m/s^2 | 50 | | |

CHARACTERISTICS

| Symbols and parameters | | Units | Values | Conditions | |
|------------------------|--------------------------------------|---------------|--------|--|----------|
| ON-STATE | | | | | |
| V_{FM} | Peak forward voltage, max | V | 1.77 | $T_j = 25\text{ }^\circ\text{C}; I_{FM} = 2512\text{ A}$ | |
| $V_{F(TO)}$ | Forward threshold voltage, max | V | 0.90 | $T_j = T_{j\text{ max}};$ | |
| r_T | Forward slope resistance, max | $m\Omega$ | 0.370 | $0.5 \pi I_{FAV} < I_T < 1.5 \pi I_{FAV}$ | |
| BLOCKING | | | | | |
| I_{RRM} | Repetitive peak reverse current, max | mA | 100 | $T_j = T_{j\text{ max}}; V_R = V_{RRM}$ | |
| SWITCHING | | | | | |
| Q_{rr} | Total recovered charge, max | μC | 5500 | $T_j = T_{j\text{ max}}; I_{FM} = 800\text{ A};$ $di_R/dt = -5\text{ A}/\mu\text{s};$ $V_R = 100\text{ V}$ | |
| t_{rr} | Reverse recovery time, max | μs | 75 | | |
| I_{rrM} | Peak reverse recovery current, max | A | 147 | | |
| THERMAL | | | | | |
| R_{thjc} | Thermal resistance, junction to case | | | 180° half-sine wave, 50 Hz | |
| | per module | °C/W | 0.0250 | | |
| | per arm | °C/W | 0.0500 | | |
| R_{thch} | Thermal resistance, case to heatsink | | | | |
| | per module | °C/W | 0.0080 | | |
| | per arm | °C/W | 0.0160 | | |
| INSULATION | | | | | |
| V_{ISOL} | Insulation test voltage | kV | 3.00 | Sine wave, 50 Hz; RMS | t=60 sec |
| | | | 3.60 | | t=1 sec |

| MECHANICAL | | | | |
|-------------------|--|----|-------|-----------------|
| M ₁ | Mounting torque (M8) ¹⁾ | Nm | 9.00 | Tolerance ± 15% |
| M ₂ | Terminal connection torque (M12) ¹⁾ | Nm | 18.00 | Tolerance ± 15% |
| w | Weight, max | g | 4100 | |

| PART NUMBERING GUIDE | | | | | | NOTES | | | | | |
|--|---|-------------------------------|-----|---|----|--------------|---|---|---|--|---|
| MD | 3 | - | 800 | - | 44 | - | D | - | N | | ¹⁾ The screws must be lubricated |
| 1 | 2 | | 3 | | 4 | | 5 | | 6 | | |
| 1. MD - Rectifier Diode 2. Circuit Schematic 3. Average Forward Current, A 4. Voltage Code 5. Package Type (M.D) 6. Ambient Conditions: N – Normal | | | | | | | | | | | |
|  | | UL certified file-No. E255404 | | | | | | | | | |

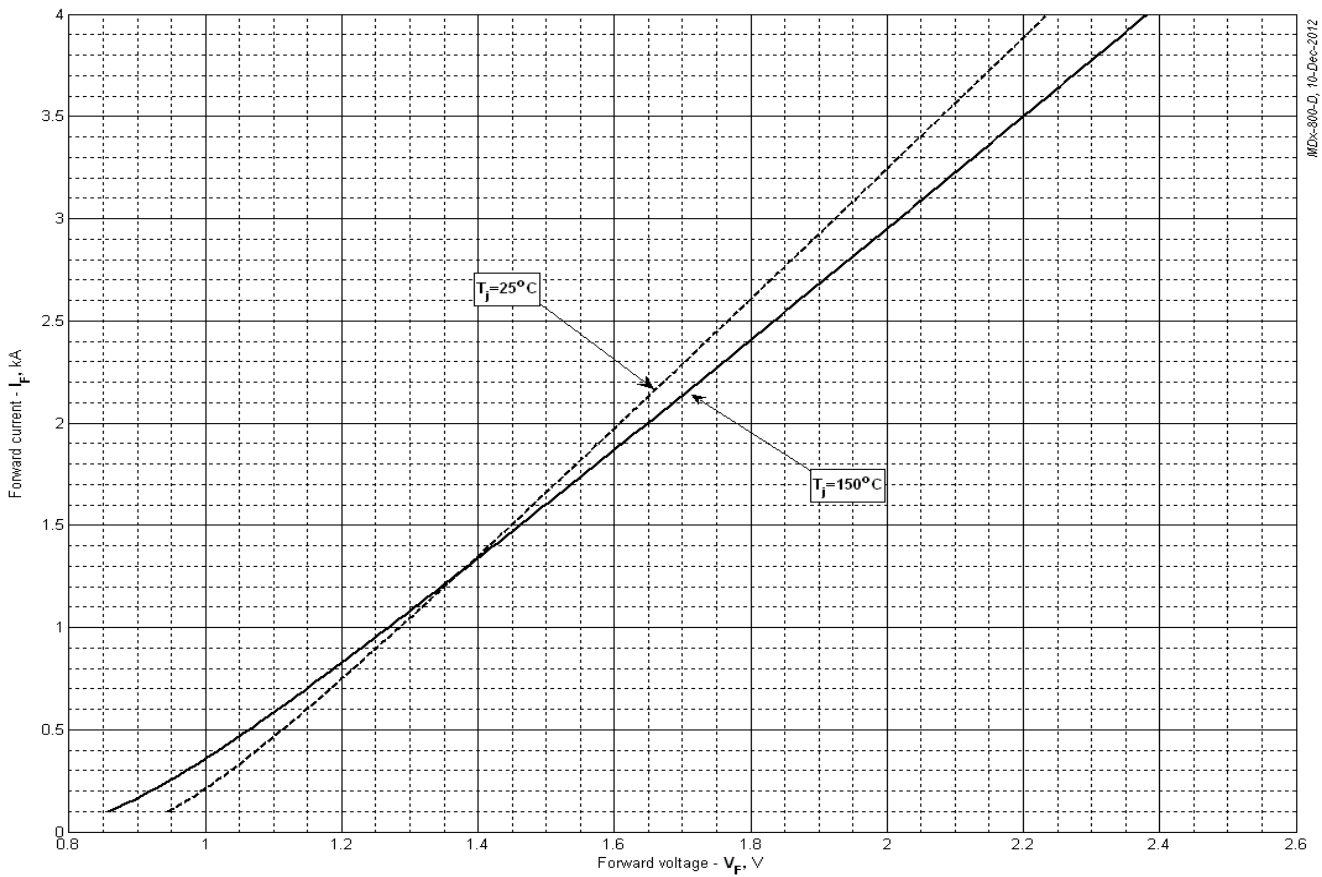


Fig 1 – On-state characteristics of Limit device

Analytical function for On-state characteristic:

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

| | Coefficients for max curves | |
|----------|-----------------------------|--------------------|
| | $T_J = 25^\circ\text{C}$ | $T_J = T_{j \max}$ |
| A | 0.848336 | 0.728001 |
| B | 0.273742 | 0.309759 |
| C | -0.148180 | -0.210336 |
| D | 0.265188 | 0.376424 |

On-state characteristic model (see Fig. 1)

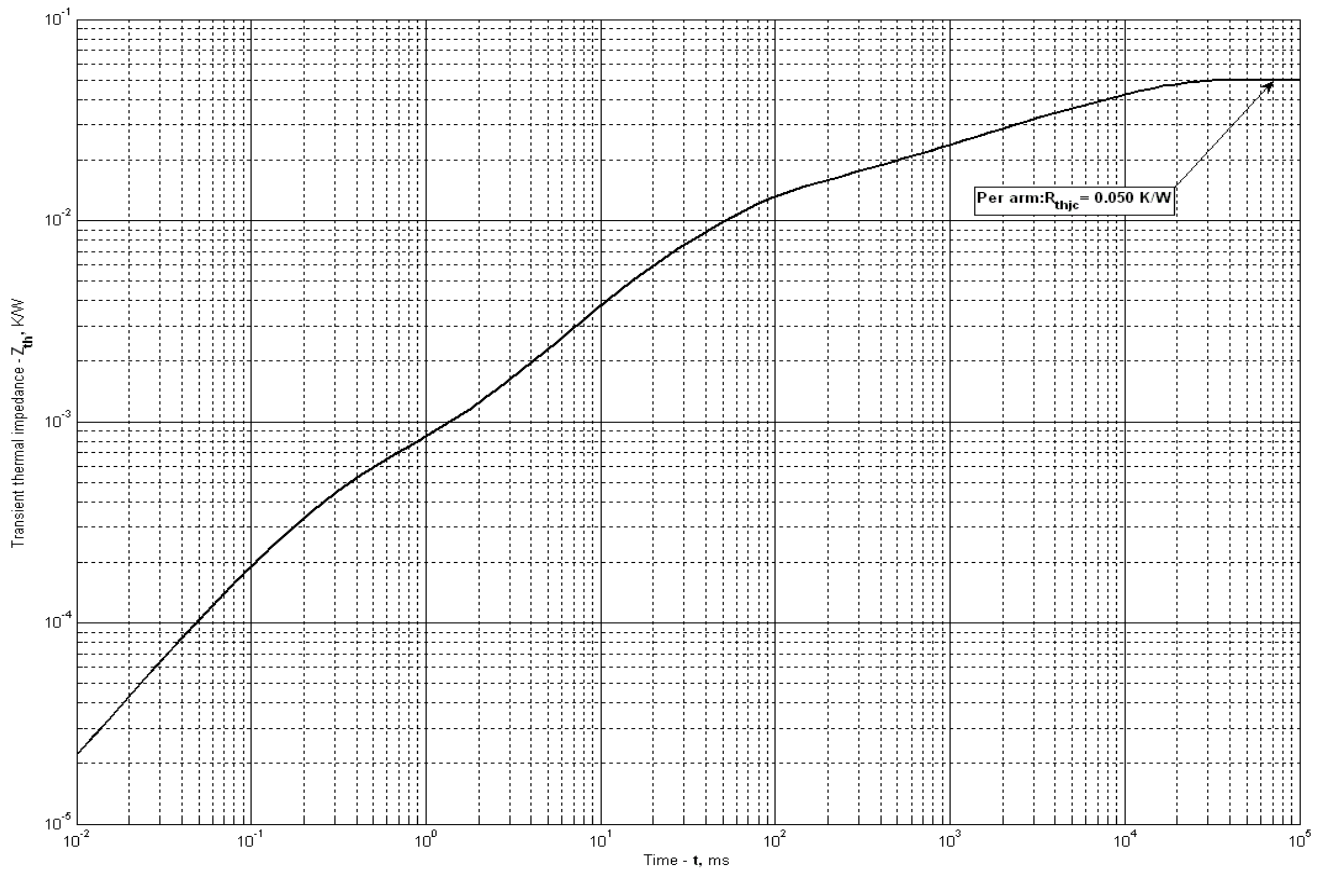


Fig 2 – Transient thermal impedance

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.

τ_i = Time constant of r_{th} term.

| i | 1 | 2 | 3 | 4 | 5 | 6 |
|-------------------------------|----------|----------|----------|----------|----------|-----------|
| R_i, K/W | 0.02506 | 0.009643 | 0.00348 | 0.009712 | 0.001719 | 0.0004399 |
| τ_i, s | 8.474 | 1.110 | 0.2289 | 0.04529 | 0.009524 | 0.0002414 |

| Supplementary thermal impedance | | | | | | |
|--|------------|------------|-------------|-------------|-------------|-----------|
| 30° | 60° | 90° | 120° | 180° | 270° | DC |
| 0.05927 | 0.05610 | 0.05472 | 0.05381 | 0.05252 | 0.05113 | 0.05005 |

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

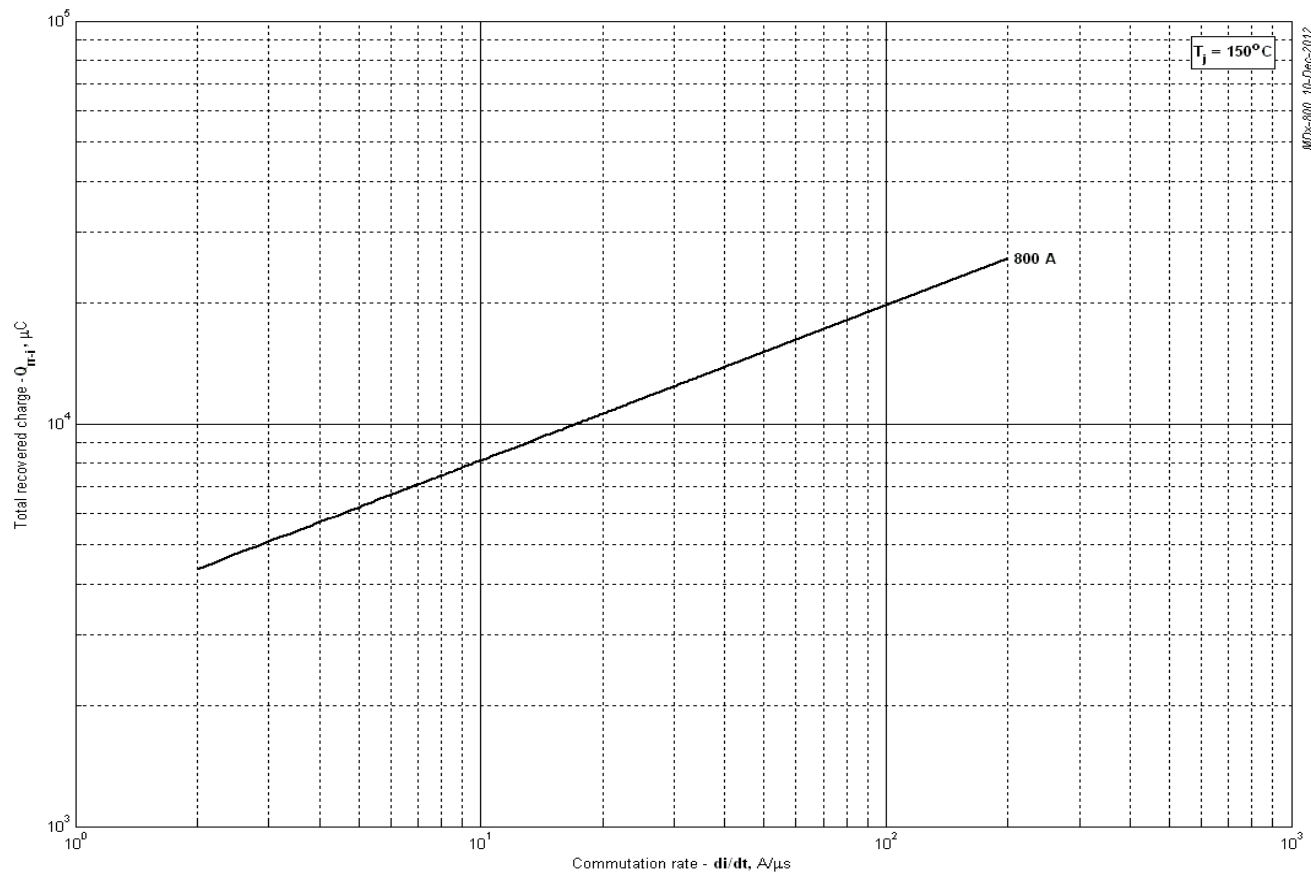


Fig 3 – Total recovered charge, Q_{rr-i} (integral)

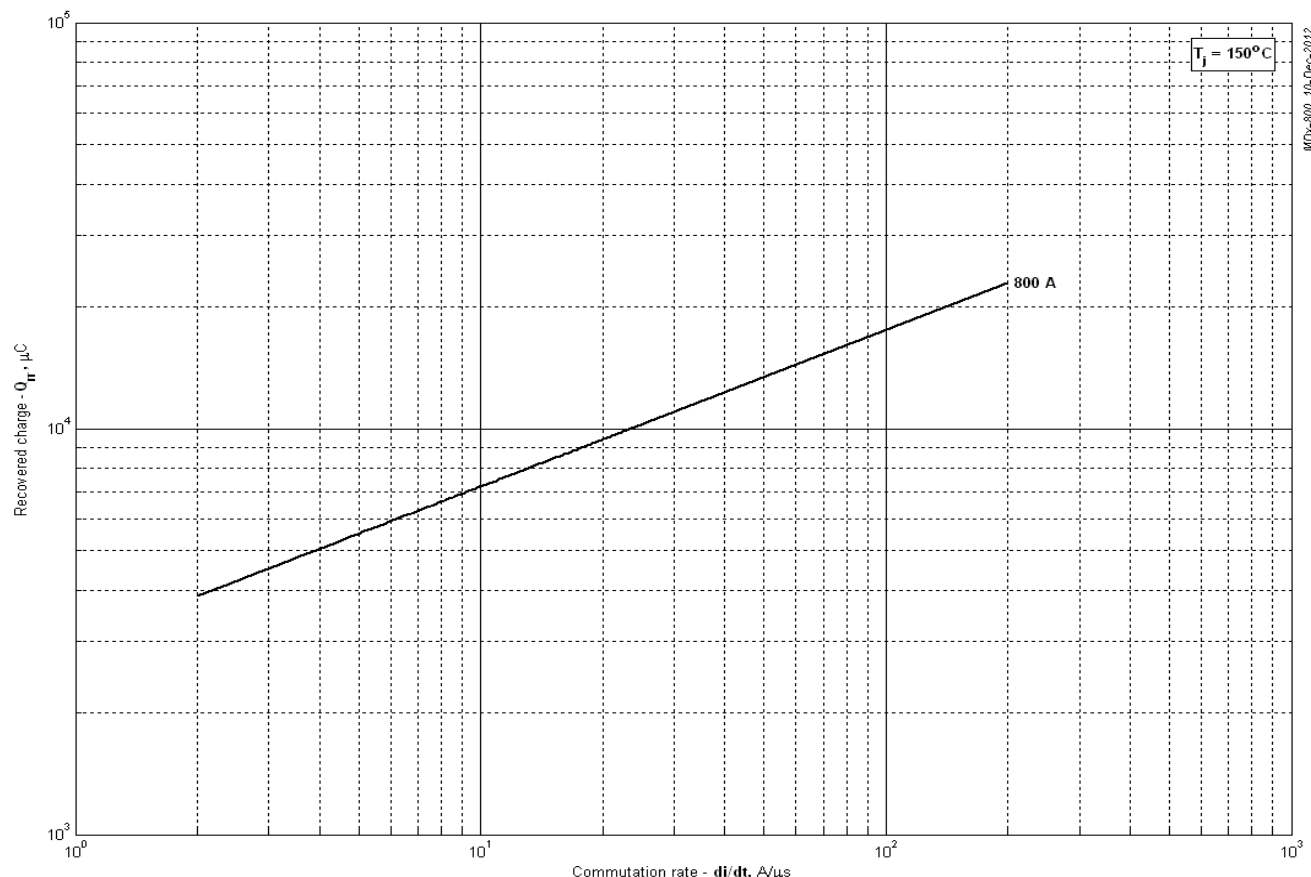


Fig 4 - Recovered charge, Q_{rr} (25% chord)

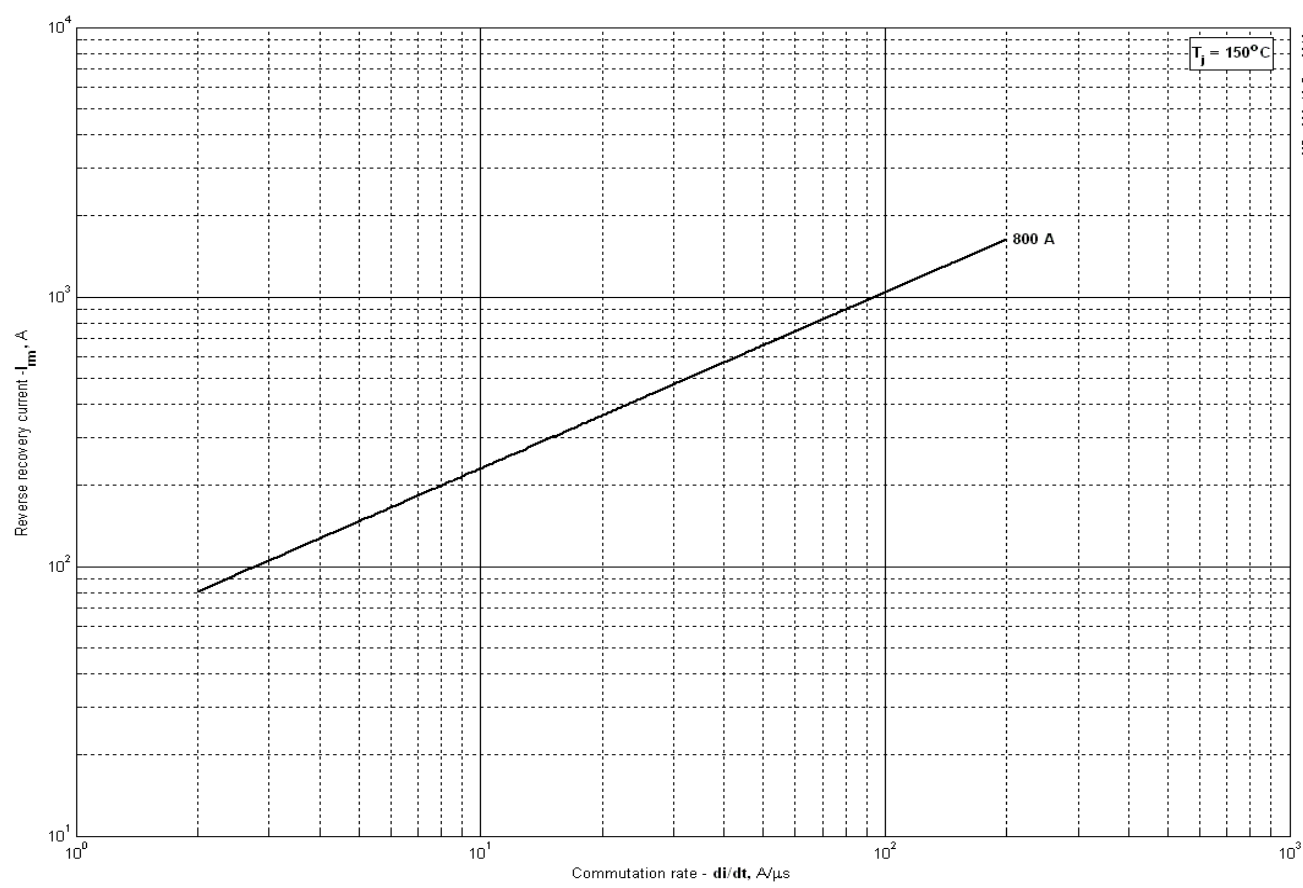


Fig 5 – Peak reverse recovery current, I_{rm}

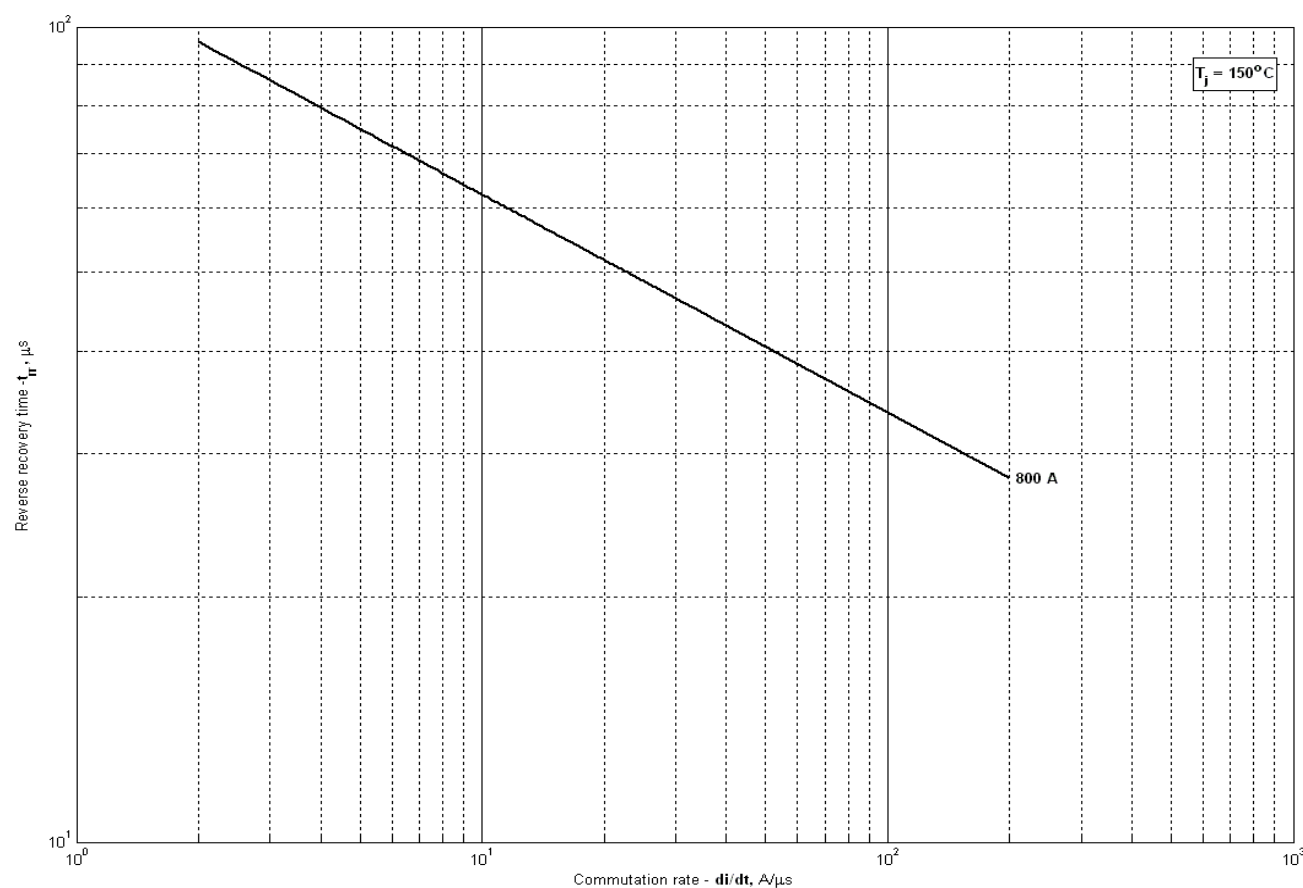


Fig 6 – Maximum recovery time, t_{tr} (25% chord)

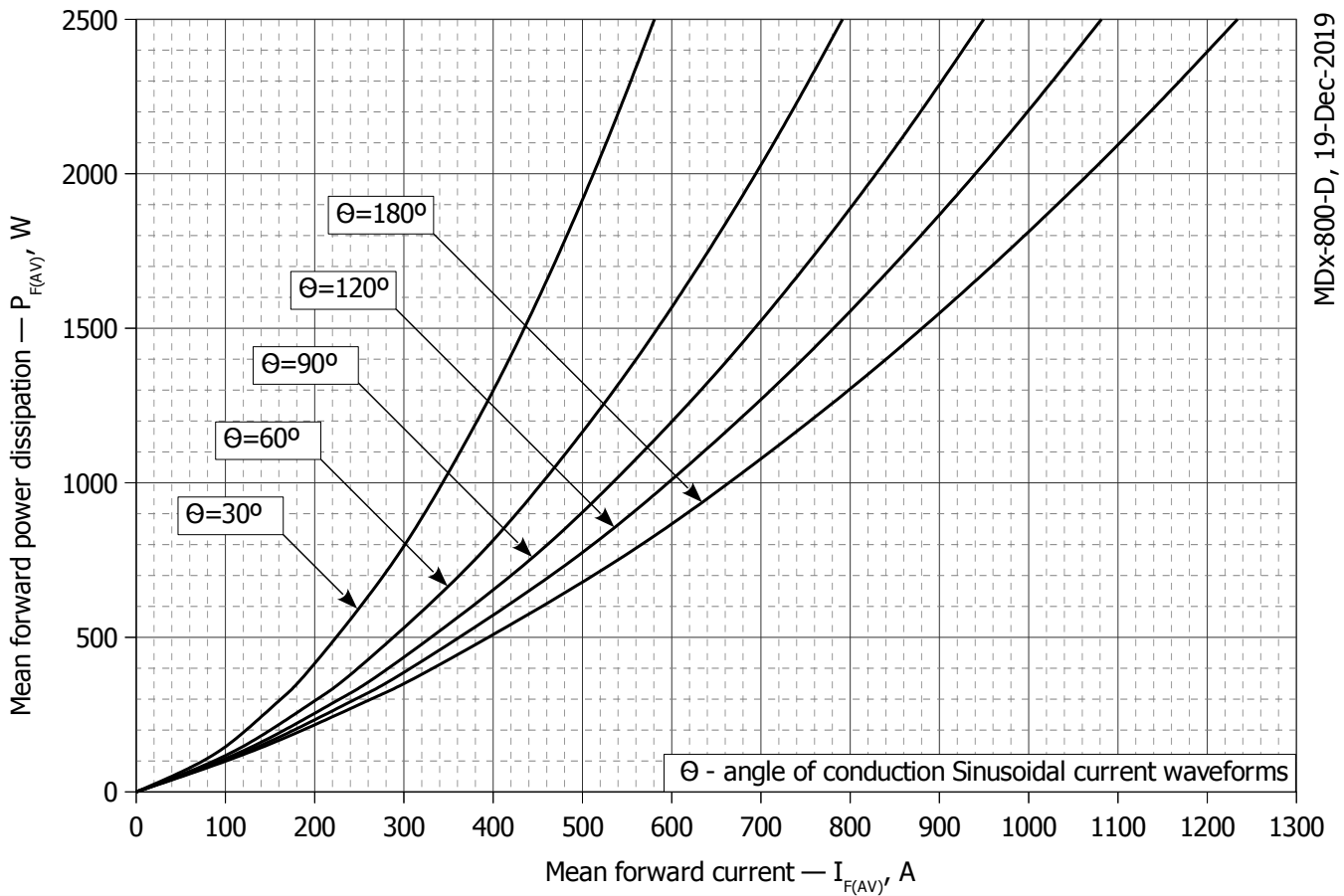


Fig 7 – On-state power loss (sinusoidal current waveforms)

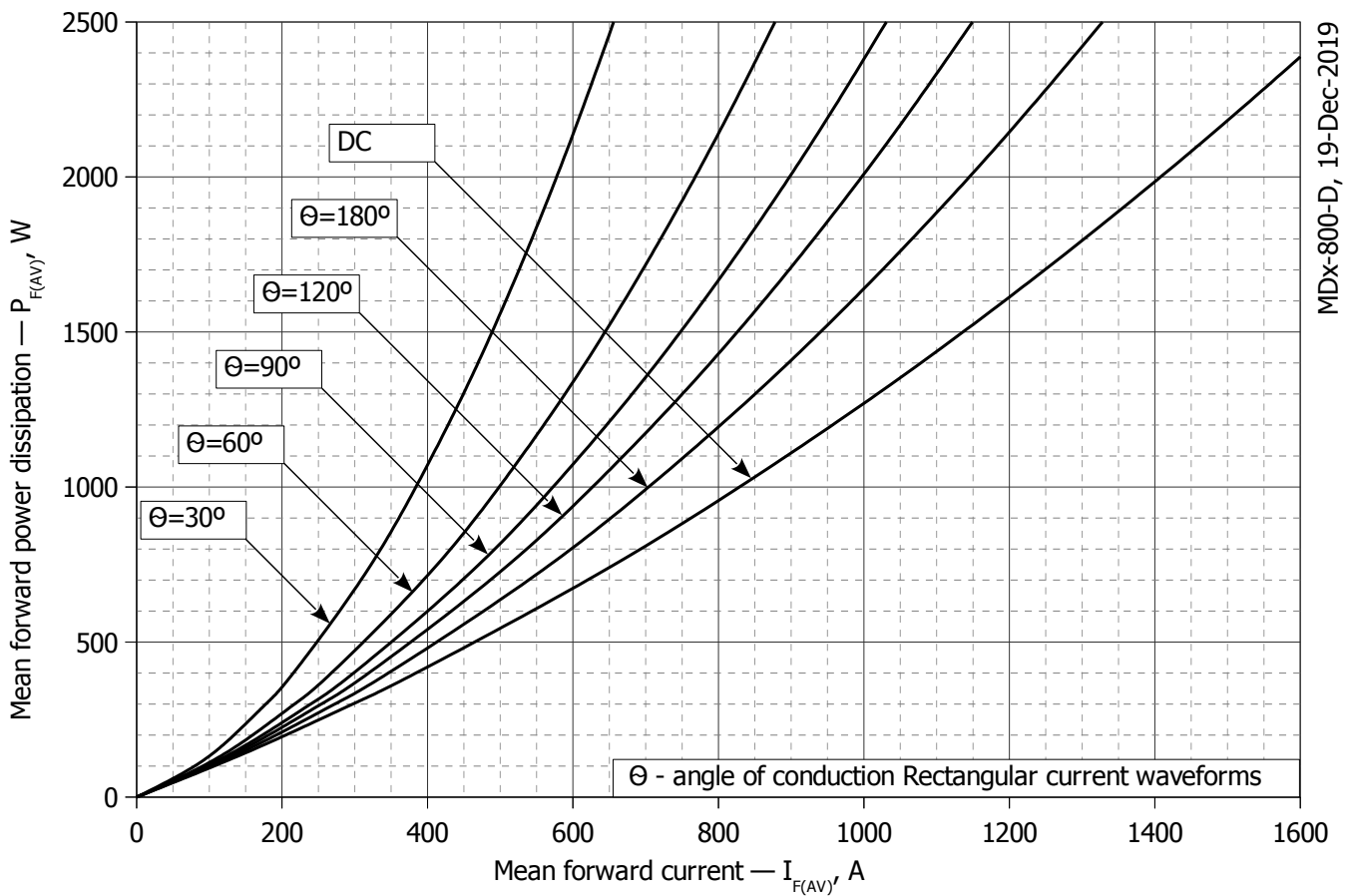


Fig 8 – On-state power loss (rectangular current waveforms)

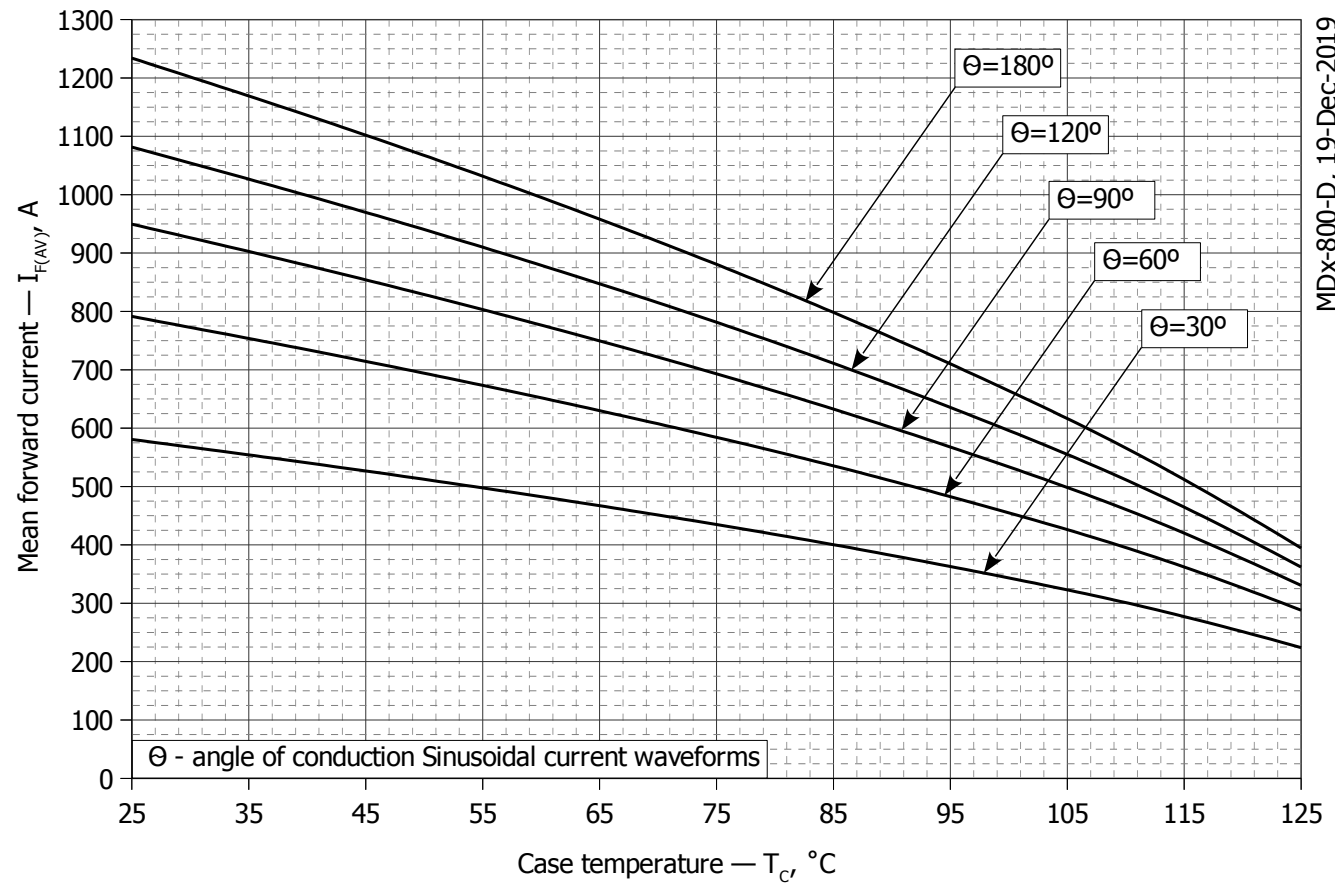


Fig 9 – Maximum case temperature DSC (sinusoidal current waveforms)

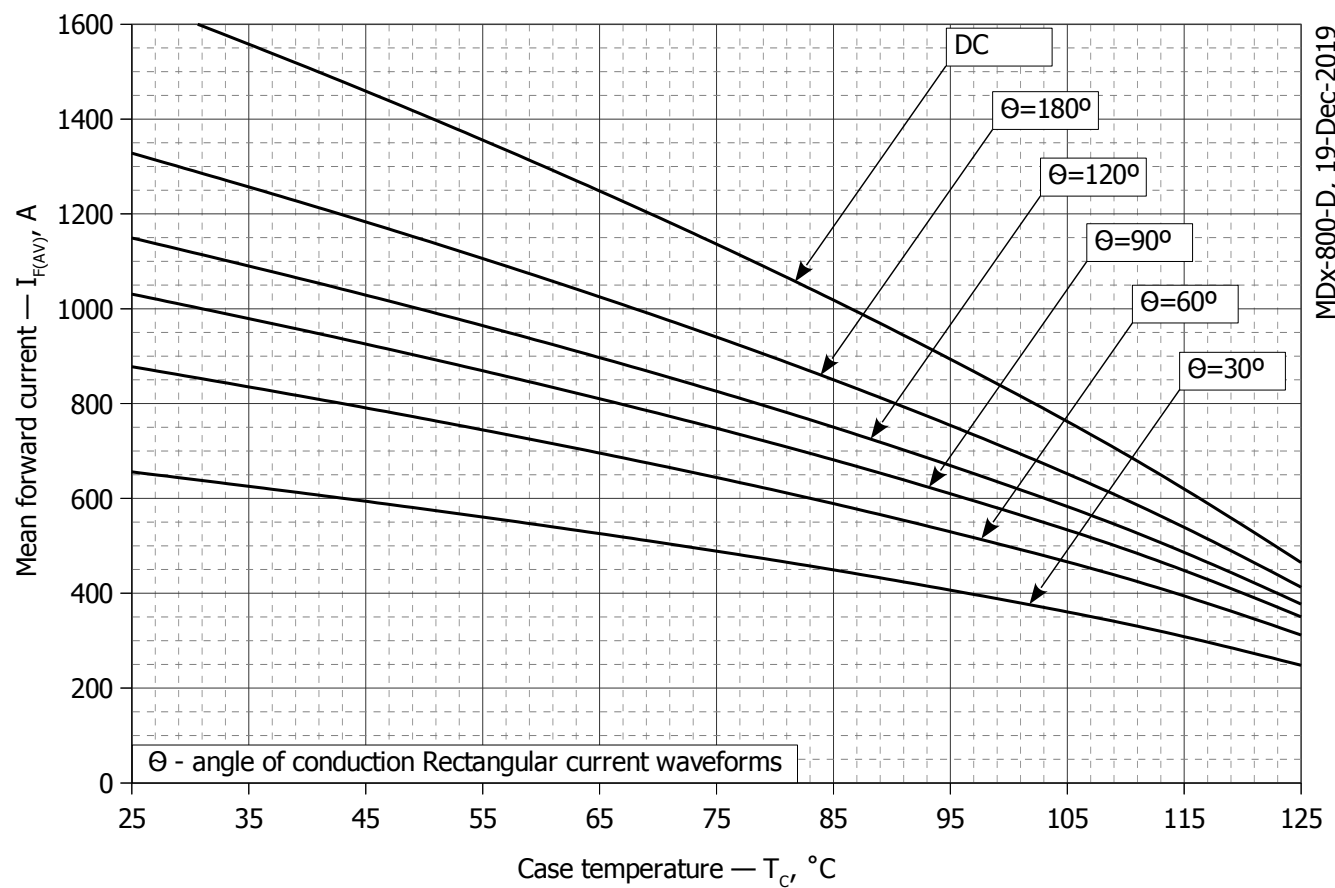


Fig 10 – Maximum case temperature DSC (rectangular current waveforms)

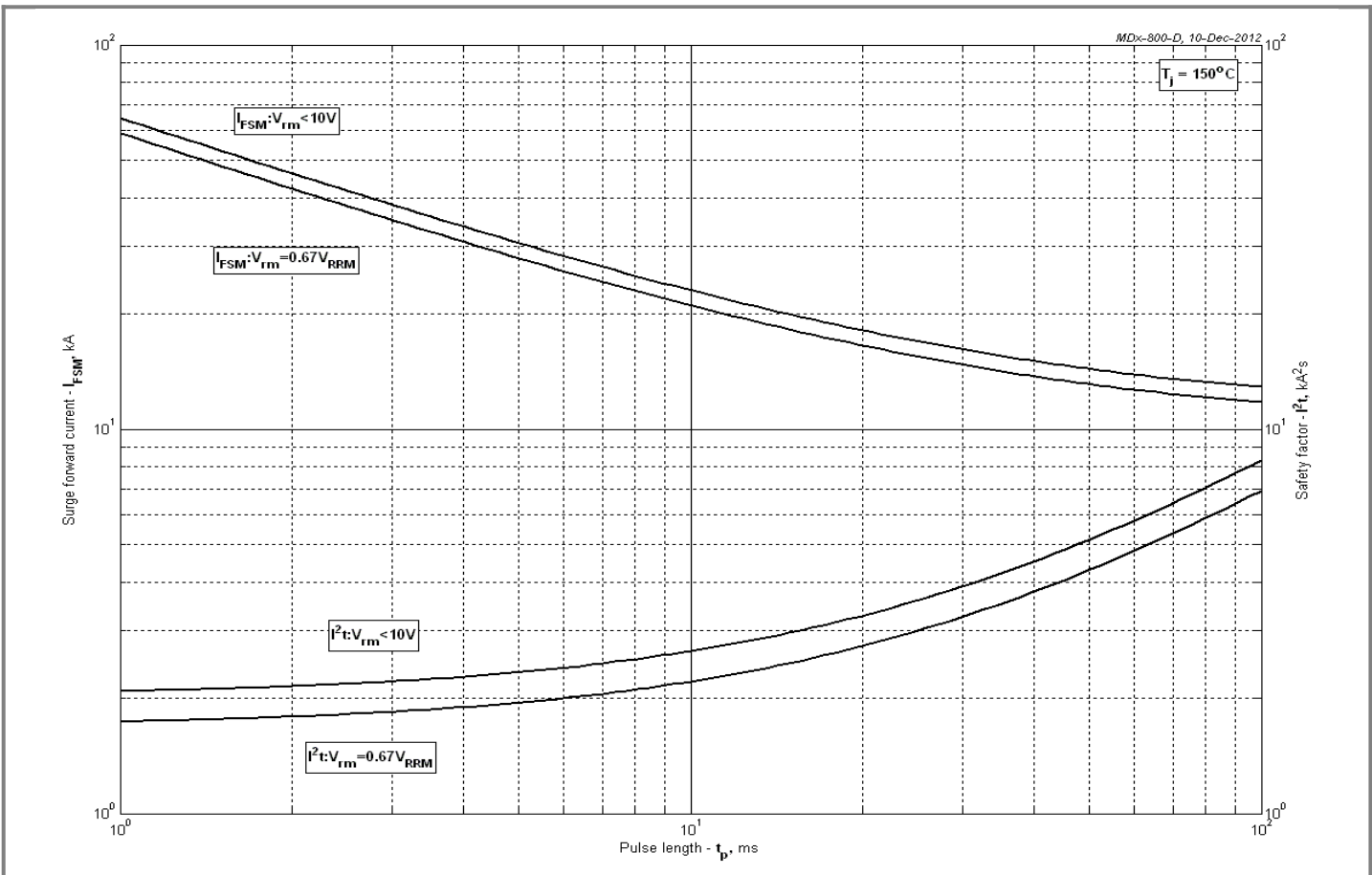


Fig 11 – Maximum surge and I^2t ratings

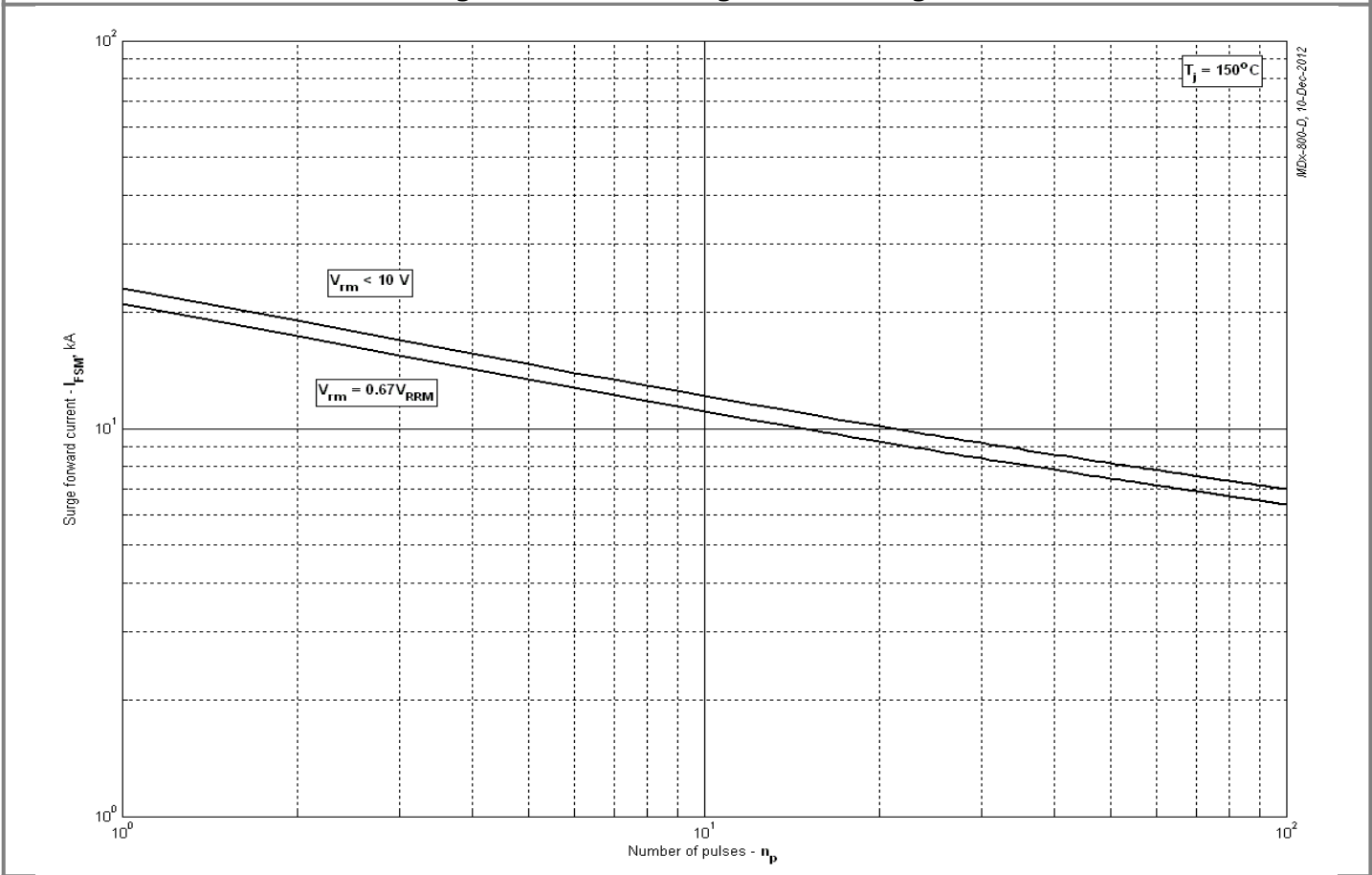


Fig 12 – Maximum surge ratings