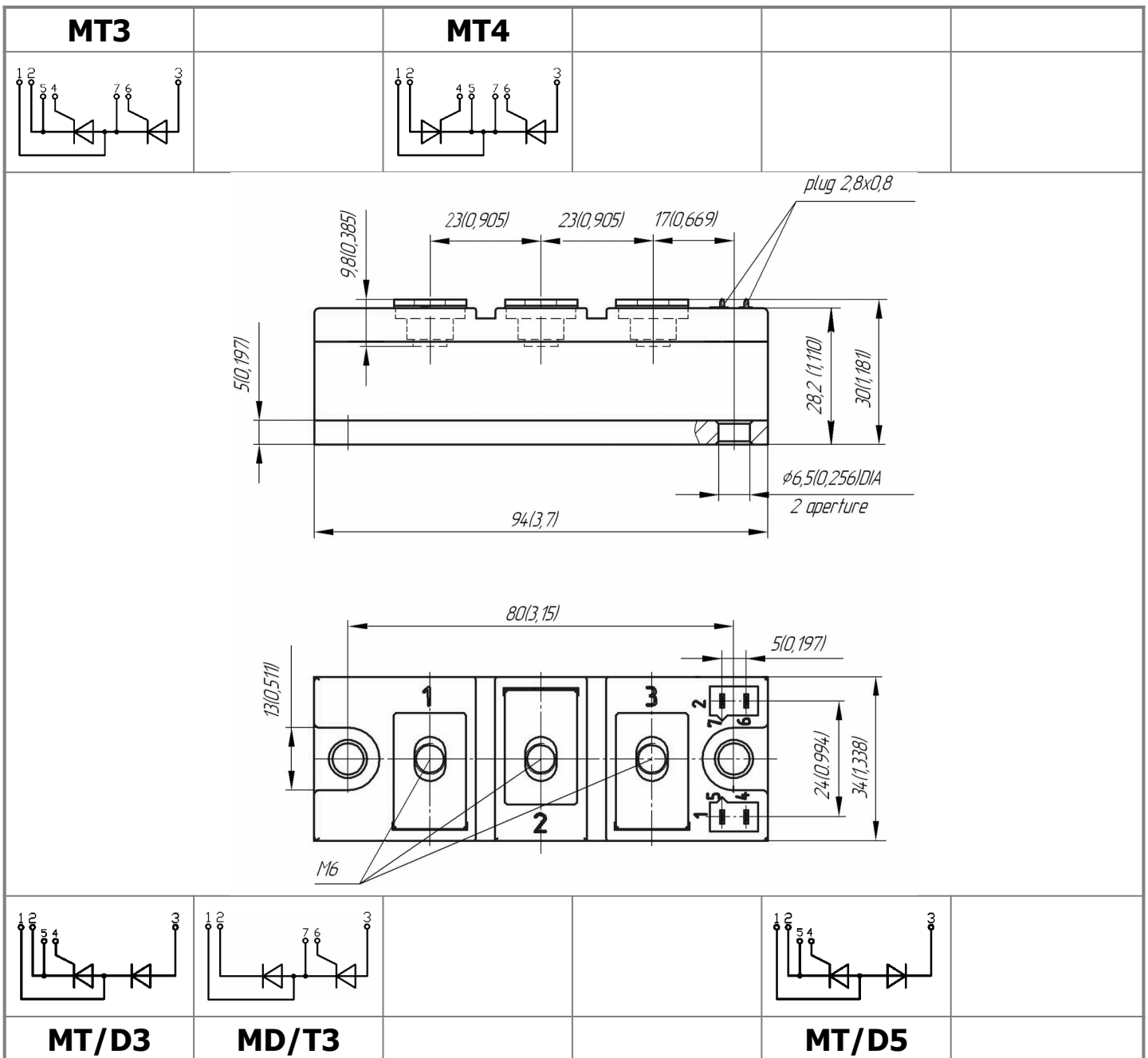




Electrically isolated base plate  
Industrial standard package  
Simplified mechanical design, rapid assembly  
Pressure contact

**Double Thyristor Module  
For Phase Control  
MTx-115-36-F**

|                                   |            |      |           |               |
|-----------------------------------|------------|------|-----------|---------------|
| Mean on-state current             |            |      | $I_{TAV}$ | 115 A         |
| Repetitive peak off-state voltage |            |      | $V_{DRM}$ | 3000 ÷ 3600 V |
| Repetitive peak reverse voltage   |            |      | $V_{RRM}$ |               |
| Turn-off time                     |            |      | $t_q$     | 400 $\mu s$   |
| $V_{DRM}, V_{RRM}, V$             | 3000       | 3200 | 3400      | 3600          |
| Voltage code                      | 30         | 32   | 34        | 36            |
| $T_j, ^\circ C$                   | - 40 ÷ 125 |      |           |               |



## MAXIMUM ALLOWABLE RATINGS

| Symbols and parameters |  | Units                          | Values                                   | Test conditions  |
|------------------------|--|--------------------------------|--|--|
| <b>ON-STATE</b>        |  |                                |  |  |
| $I_{TAV}$              | Mean on-state current  | A                              | 115                                      | $T_c = 85\text{ }^\circ\text{C}$ ;<br>180° half-sine wave; 50 Hz   |
| $I_{TRMS}$             | RMS on-state current   | A                              | 180                                      |  |
| $I_{TSM}$              | Surge on-state current   | kA                             | 2.5<br>3.0                               | $T_j = T_{j\max}$<br>$T_j = 25\text{ }^\circ\text{C}$<br>180° half-sine wave;<br>$t_p = 10\text{ ms}$ ; single pulse;<br>$V_D = V_R = 0\text{ V}$ ;<br>Gate pulse: $I_G = 2\text{ A}$ ;<br>$t_{GP} = 50\text{ }\mu\text{s}$ ; $di_G/dt \geq 1\text{ A}/\mu\text{s}$  |
|                        |  |                                | 2.5<br>3.0                               | $T_j = T_{j\max}$<br>$T_j = 25\text{ }^\circ\text{C}$<br>180° half-sine wave;<br>$t_p = 8.3\text{ ms}$ ; single pulse;<br>$V_D = V_R = 0\text{ V}$ ;<br>Gate pulse: $I_G = 2\text{ A}$ ;<br>$t_{GP} = 50\text{ }\mu\text{s}$ ; $di_G/dt \geq 1\text{ A}/\mu\text{s}$ |
| $I^2t$                 | Safety factor  | $\text{A}^2\text{s}\cdot 10^3$ | 30<br>40                                 | $T_j = T_{j\max}$<br>$T_j = 25\text{ }^\circ\text{C}$<br>180° half-sine wave;<br>$t_p = 10\text{ ms}$ ; single pulse;<br>$V_D = V_R = 0\text{ V}$ ;<br>Gate pulse: $I_G = 2\text{ A}$ ;<br>$t_{GP} = 50\text{ }\mu\text{s}$ ; $di_G/dt \geq 1\text{ A}/\mu\text{s}$  |
|                        |  |                                | 20<br>30                                 | $T_j = T_{j\max}$<br>$T_j = 25\text{ }^\circ\text{C}$<br>180° half-sine wave;<br>$t_p = 8.3\text{ ms}$ ; single pulse;<br>$V_D = V_R = 0\text{ V}$ ;<br>Gate pulse: $I_G = 2\text{ A}$ ;<br>$t_{GP} = 50\text{ }\mu\text{s}$ ; $di_G/dt \geq 1\text{ A}/\mu\text{s}$ |
| <b>BLOCKING</b>        |  |                                |  |  |
| $V_{DRM}, V_{RRM}$     | Repetitive peak off-state and Repetitive peak reverse voltages                 | V                              | 3000÷3600                                | $T_{j\min} < T_j < T_{j\max}$ ;<br>180° half-sine wave; 50 Hz;<br>Gate open  |
| $V_{DSM}, V_{RSM}$     | Non-repetitive peak off-state and Non-repetitive peak reverse voltages         | V                              | 3100÷3700                                | $T_{j\min} < T_j < T_{j\max}$ ;<br>180° half-sine wave; single pulse; Gate open  |
| $V_D, V_R$             | Direct off-state and Direct reverse voltages                                   | V                              | $0.6\cdot V_{DRM}$<br>$0.6\cdot V_{RRM}$ | $T_j = T_{j\max}$ ;<br>Gate open   |
| <b>TRIGGERING</b>      |  |                                |  |  |
| $I_{FGM}$              | Peak forward gate current  | A                              | 5  | $T_j = T_{j\max}$  |
| $V_{RGM}$              | Peak reverse gate voltage  | V                              | 5  |  |
| $P_G$                  | Gate power dissipation   | W                              | 3  | $T_j = T_{j\max}$ for DC gate current  |
| <b>SWITCHING</b>       |  |                                |  |  |
| $(di_T/dt)_{crit}$     | Critical rate of rise of on-state current non-repetitive ( $f = 1\text{ Hz}$ ) | $\text{A}/\mu\text{s}$         | 200                                      | $T_j = T_{j\max}$ ; $V_D = 0.67\cdot V_{DRM}$ ; $I_{TM} = 2 I_{TAV}$ ;<br>Gate pulse: $I_G = 2\text{ A}$ ;<br>$t_{GP} = 50\text{ }\mu\text{s}$ ; $di_G/dt \geq 2\text{ A}/\mu\text{s}$   |
| <b>THERMAL</b>         |  |                                |  |  |
| $T_{stg}$              | Storage temperature  | $^\circ\text{C}$               | -40 ÷ 50                                 |  |
| $T_j$                  | Operating junction temperature   | $^\circ\text{C}$               | -40 ÷ 125                                |  |
| $T_{c\text{ op}}$      | Operating temperature  | $^\circ\text{C}$               | -40 ÷ 125                                |  |
| <b>MECHANICAL</b>      |  |                                |  |  |
| a                      | Acceleration under vibration   | $\text{m}/\text{s}^2$          | 50                                       |  |

## CHARACTERISTICS

| Symbols and parameters |   | Units                     | Values               | Conditions  |   |
|------------------------|---|---------------------------|----------------------|---|---|
| <b>ON-STATE</b>        |   |                           |                      |   |   |
| $V_{TM}$               | Peak on-state voltage, max  | V                         | 2.45                 | $T_j=25\text{ }^\circ\text{C}; I_{TM}=500\text{ A}$   |   |
| $V_{T(TO)}$            | On-state threshold voltage, max                                     | V                         | 0.95                 | $T_j=T_{j\text{ max}};$   |   |
| $r_T$                  | On-state slope resistance, max                                      | m $\Omega$                | 3.000                | $0.5\pi I_{TAV} < I_T < 1.5\pi I_{TAV}$   |   |
| $I_L$                  | Latching current, max   | mA                        | 500                  | $T_j=25\text{ }^\circ\text{C}; V_D=12\text{ V};$<br>Gate pulse: $I_G=2\text{ A};$<br>$t_{GP}=50\text{ }\mu\text{s}; di_G/dt \geq 1\text{ A}/\mu\text{s}$  |   |
| $I_H$                  | Holding current, max  | mA                        | 250                  | $T_j=25\text{ }^\circ\text{C};$<br>$V_D=12\text{ V};$ Gate open   |   |
| <b>BLOCKING</b>        |   |                           |                      |   |   |
| $I_{DRM}, I_{RRM}$     | Repetitive peak off-state and Repetitive peak reverse currents, max | mA                        | 70                   | $T_j=T_{j\text{ max}};$<br>$V_D=V_{DRM}; V_R=V_{RRM}$   |   |
| $(dv_D/dt)_{crit}$     | Critical rate of rise of off-state voltage <sup>1)</sup> , min      | V/ $\mu\text{s}$          | 1000                 | $T_j=T_{j\text{ max}};$<br>$V_D=0.67\cdot V_{DRM};$ Gate open   |   |
| <b>TRIGGERING</b>      |   |                           |                      |   |   |
| $V_{GT}$               | Gate trigger direct voltage, max                                    | V                         | 4.00<br>2.50<br>2.00 | $T_j=T_{j\text{ min}}$<br>$T_j=25\text{ }^\circ\text{C}$<br>$T_j=T_{j\text{ max}}$  | $V_D=12\text{ V}; I_D=3\text{ A};$<br>Direct gate current |
| $I_{GT}$               | Gate trigger direct current, max                                    | mA                        | 400<br>250<br>200    | $T_j=T_{j\text{ min}}$<br>$T_j=25\text{ }^\circ\text{C}$<br>$T_j=T_{j\text{ max}}$  |   |
| $V_{GD}$               | Gate non-trigger direct voltage, min                                | V                         | 0.25                 | $T_j=T_{j\text{ max}};$<br>$V_D=0.67\cdot V_{DRM};$   |   |
| $I_{GD}$               | Gate non-trigger direct current, min                                | mA                        | 10.00                | Direct gate current   |   |
| <b>SWITCHING</b>       |   |                           |                      |   |   |
| $t_{gd}$               | Delay time  | $\mu\text{s}$             | 3.00                 | $T_j=25\text{ }^\circ\text{C}; V_D=1500\text{ V}; I_{TM}=I_{TAV};$<br>$di/dt=200\text{ A}/\mu\text{s};$<br>Gate pulse: $I_G=2\text{ A}; V_G=20\text{ V};$<br>$t_{GP}=50\text{ }\mu\text{s}; di_G/dt=2\text{ A}/\mu\text{s}$ |   |
| $t_q$                  | Turn-off time <sup>2)</sup> , max                                   | $\mu\text{s}$             | 400                  | $dv_D/dt=50\text{ V}/\mu\text{s}; T_j=T_{j\text{ max}}; I_{TM}=200\text{ A};$<br>$di_R/dt=-10\text{ A}/\mu\text{s}; V_R=100\text{ V};$<br>$V_D=0.67 V_{DRM};$   |   |
| <b>THERMAL</b>         |   |                           |                      |   |   |
| $R_{thjc}$             | Thermal resistance, junction to case                                |                           |                      |   |   |
|                        | per module  | $^\circ\text{C}/\text{W}$ | 0.0950               | 180° half-sine wave, 50 Hz  |   |
|                        | per arm   | $^\circ\text{C}/\text{W}$ | 0.1900               |   |   |
|                        | per module  | $^\circ\text{C}/\text{W}$ | 0.0900               | DC  |   |
| per arm                | $^\circ\text{C}/\text{W}$   | 0.1800                    |                      |   |   |
| $R_{thch}$             | Thermal resistance, case to heatsink                                |                           |                      |   |   |
|                        | per module  | $^\circ\text{C}/\text{W}$ | 0.0300               |   |   |
|                        | per arm   | $^\circ\text{C}/\text{W}$ | 0.0600               |   |   |
| <b>INSULATION</b>      |   |                           |                      |   |   |
| $V_{ISOL}$             | Insulation test voltage   | kV                        | 3.00                 | Sine wave, 50 Hz;   | t=60 sec  |
|                        |   |                           | 3.60                 | RMS   | t=1 sec   |
| <b>MECHANICAL</b>      |   |                           |                      |   |   |
| $M_1$                  | Mounting torque (M6) <sup>3)</sup>                                  | Nm                        | 6.00                 | Tolerance $\pm 15\%$  |   |
| $M_2$                  | Terminal connection torque (M6) <sup>3)</sup>                       | Nm                        | 6.00                 | Tolerance $\pm 15\%$  |   |
| w                      | Weight, max   | g                         | 350                  |   |   |

**PART NUMBERING GUIDE**

|    |   |   |     |   |    |   |    |    |   |   |   |   |
|----|---|---|-----|---|----|---|----|----|---|---|---|---|
| MT | 3 | - | 115 | - | 36 | - | A2 | H2 | - | F | - | N |
| 1  | 2 |   | 3   |   | 4  |   | 5  | 6  |   | 7 |   | 8 |

1. Thyristor module (MT)  
Thyristor – Diode module (MT/D)  
Diode – Thyristor module (MD/T)
2. Circuit Schematic:
3. Average On-state Current, A
4. Voltage Code
5. Critical rate of rise of off-state voltage
6. Group of turn-off time ( $dv_D/dt=50\text{ V}/\mu\text{s}$ )
7. Package Type (M.F)
8. Ambient Conditions:  
N – Normal

**NOTES**

<sup>1)</sup> Critical rate of rise of off-state voltage

|   |      |
|---|------|
| Symbol of group                           | A2   |
| $(dv_D/dt)_{crit}, \text{ V}/\mu\text{s}$ | 1000 |

<sup>2)</sup> Turn-off time ( $dv_D/dt=50\text{ V}/\mu\text{s}$ )

|                       |     |
|-----------------------|-----|
| Symbol of group       | H2  |
| $t_{qr}, \mu\text{s}$ | 400 |

<sup>3)</sup> The screws must be lubricated



UL certified file-No. E255404