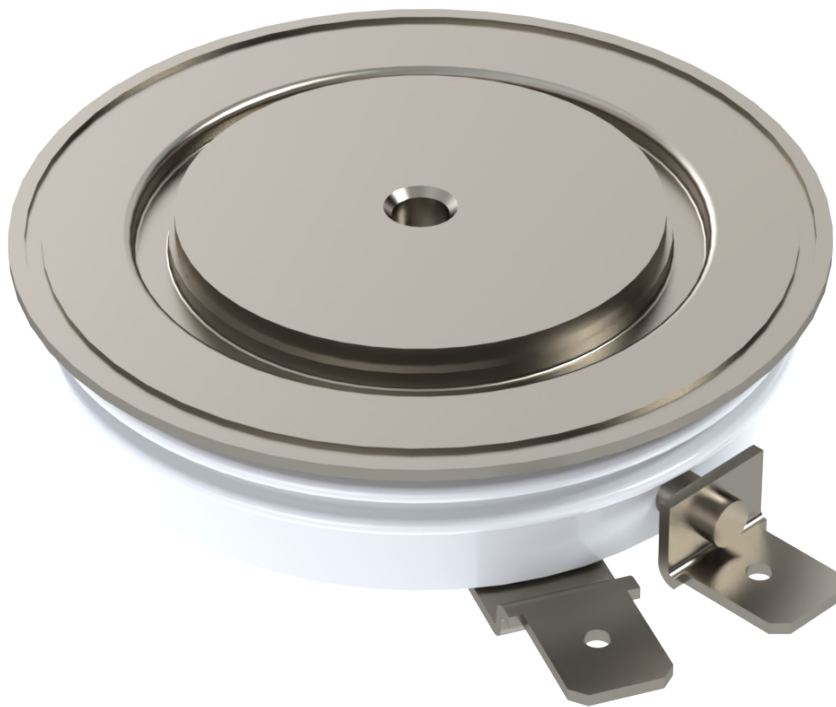


# Fast Symmetrical Gate Turn-Off Thyristor Type SA25XP0500FD

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Date: July, 2020  
Data Sheet Issue: 1



## ORDERING INFORMATION

(Please quote 12 to 15 digit code as below)

|    |              |              |              |           |              |               |
|----|--------------|--------------|--------------|-----------|--------------|---------------|
| SA | 25           | XP           | 0500         | F         | D            |               |
| -  | Voltage Code | Outline Code | Current code | Type code | Special code | Optional code |

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## Absolute Maximum Ratings

| VOLTAGE RATINGS |   | MAXIMUM LIMITS | UNITS |
|-----------------|---|----------------|-------|
| $V_{DRM}$       | Repetitive peak off-state voltage, (note 1)     | 2000           | V     |
| $V_{RSM}$       | Non-repetitive peak off-state voltage, (note 1) | 2100           | V     |
| $V_{RRM}$       | Repetitive peak reverse voltage                 | 2000           | V     |
| $V_{RSM}$       | Non-repetitive peak reverse voltage             | 2000           | V     |
| note 1)         | $V_{GK} = -2V$                                  |                |       |

| OTHER RATINGS  |  | MAXIMUM LIMITS  | UNITS       |
|----------------|--|-----------------|-------------|
| $I_{TGQ}$      | Peak turn-off current (note 1)   | 500             | A           |
| $L_S$          | Snubber loop impedance, $I_{TM} = I_{TGQ}$ (note 1)  | 0.3             | nH          |
| $I_{T(AV)M}$   | Mean on-state current, $T_{sink} = 55^{\circ}C$ , (note 2)   | 330             | A           |
| $I_{T(RMS)}$   | Nominal RMS on-state current, $T_{sink} = 25^{\circ}C$ (note 2)  | 640             | A           |
| $I_{TSM}$      | Peak non-repetitive surge current $t_p = 10ms$   | 4.0             | kA          |
| $I_{TSM2}$     | Peak non-repetitive surge current (note 3)   | 7.2             | kA          |
| $I^2t$         | $I^2t$ capacity for fusing $t_p = 10ms$  | $80 \cdot 10^3$ | $A^2s$      |
| $(di/dt)_{cr}$ | Critical rate of rise of on-state current, (note 4)  | 1000            | $A/\mu s$   |
| $P_{FGM}$      | Peak forward gate power  | 160             | W           |
| $P_{RGM}$      | Peak reverse gate power  | 5               | kW          |
| $I_{FGM}$      | Peak forward gate current  | 100             | A           |
| $V_{RGM}$      | Peak reverse gate voltage (note 5)   | 18              | V           |
| $t_{off}$      | Minimum permissible off-time, $I_{TM} = I_{TGQ}$ (note 1)  | 90              | $\mu s$     |
| $t_{on}$       | Minimum permissible on-time  | 20              | $\mu s$     |
| $T_{jop}$      | Operating temperature range  | -40 to +125     | $^{\circ}C$ |
| $T_{stg}$      | Storage temperature range  | -40 to +150     | $^{\circ}C$ |
| note 1)        | $T_j = 125^{\circ}C$ , $V_D = 80\%V_{DRM}$ , $V_{DM} \leq V_{DRM}$ , $di_{GQ}/dt = 20A/\mu s$ , $C_S = 1\mu F$ |                 |             |
| note 2)        | Double-side cooled, single phase, 50Hz, 180° half-sinewave.  |                 |             |
| note 3)        | Half-sinewave, $t_p = 2ms$   |                 |             |
| note 4)        | For $di/dt > 1000A/\mu s$ please consult factory.  |                 |             |
| note 5)        | May exceed this value during turn-off avalanche period.  |                 |             |

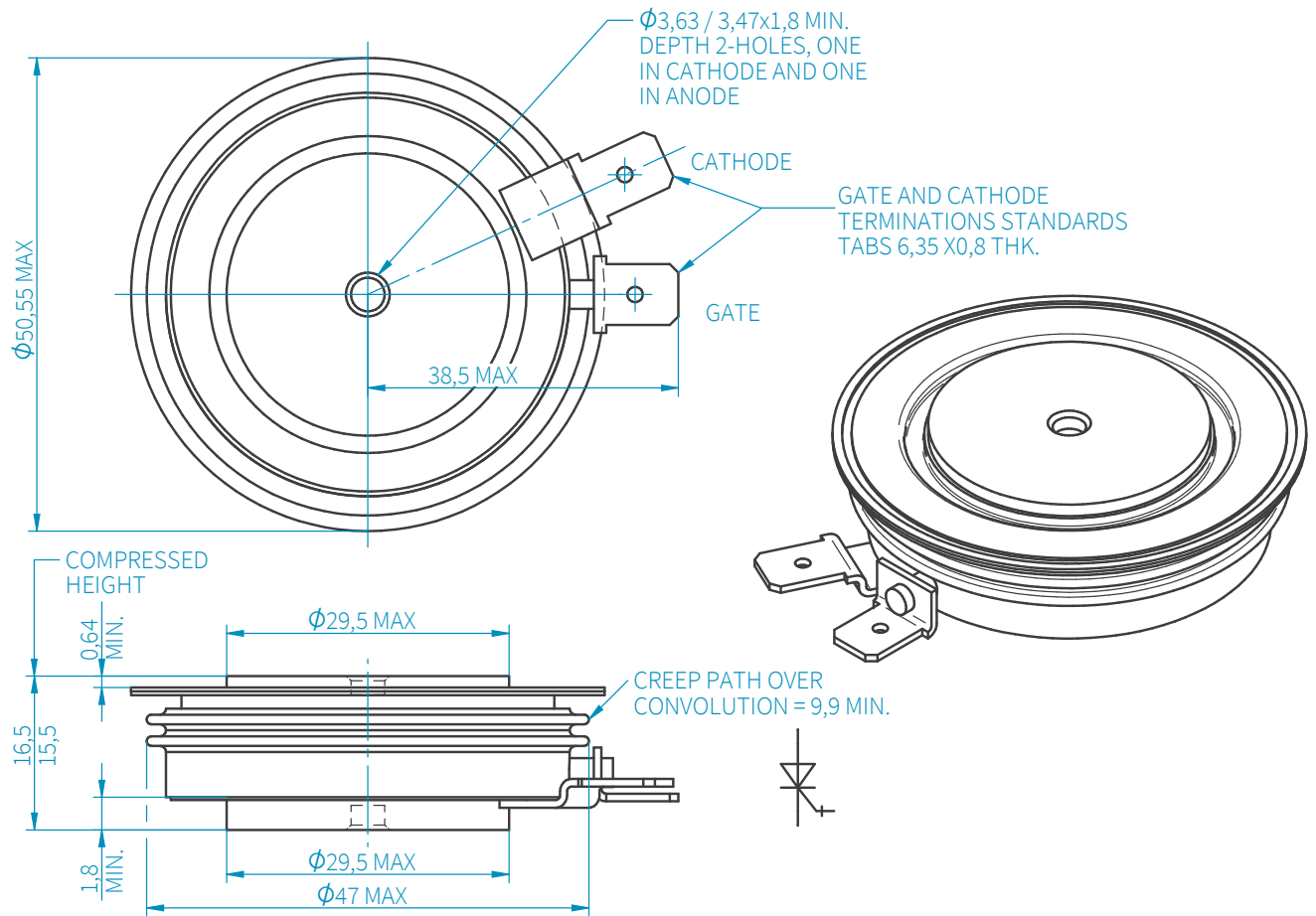
## Characteristics

|                | PARAMETER   | TEST CONDITIONS  | MIN  | TYP  | MAX   | UNITS      |
|----------------|---|--|------|------|-------|------------|
| $V_{TM}$       | Maximum peak on-state voltage   | $I_G = 2A, I_T = 500A$                                       | -    | 2    | 2.5   | V          |
| $I_L$          | Latching current  | $T_j = 25^\circ C$   | -    | 5    | -     | A          |
| $I_H$          | Holding current   |  | -    | 5    | -     | A          |
| $(dv/dt)_{cr}$ | Critical rate of rise of off-state voltage  | $V_D = 80\%V_{DRM}, V_{GR} = -2V$                            | 1000 | -    | -     | V/ $\mu s$ |
| $I_{DRM}$      | Peak off-state current  | Rated $V_{DRM}, V_{GR} = -2V$                                | -    | -    | 30    | mA         |
| $I_{RRM}$      | Peak reverse current  | Rated $V_{RRM}$  | -    | -    | 60    | mA         |
| $I_{GKM}$      | Peak negative gate leakage current  | $V_{GR} = -16V$  | -    | -    | 200   | mA         |
| $V_{GT}$       | Gate trigger voltage  | $T_j = -40^\circ C, V_D = 25V, R_L = 25m\Omega$              | -    | 0.9  | -     | V          |
|                |   | $T_j = 25^\circ C, V_D = 25V, R_L = 25m\Omega$               | -    | 0.8  | -     | V          |
|                |   | $T_j = 125^\circ C, V_D = 25V, R_L = 25m\Omega$              | -    | 0.7  | -     | V          |
| $I_{GT}$       | Gate trigger current  | $T_j = -40^\circ C, V_D = 25V, R_L = 25m\Omega$              | -    | 1.5  | 6     | A          |
|                |   | $T_j = 25^\circ C, V_D = 25V, R_L = 25m\Omega$               | -    | 0.5  | 2     | A          |
|                |   | $T_j = 125^\circ C, V_D = 25V, R_L = 25m\Omega$              | -    | 0.1  | 0.4   | A          |
| $t_d$          | Delay time  | (note 2)   | -    | 1.5  | -     | $\mu s$    |
| $t_{gt}$       | Turn-on time  | Conditions as for $t_d$ , (10% $I_{GM}$ to 10% $V_D$ )       | -    | 3.5  | 5     | $\mu s$    |
| $t_f$          | Fall time   | (note 3)   | -    | 0.8  | -     | $\mu s$    |
| $t_{gq}$       | Turn-off time   | Conditions as for $t_f$ , (10% $I_{GQ}$ to 10% $I_{TGQ}$ )   | -    | 10   | 11    | $\mu s$    |
| $I_{GQ}$       | Turn-off gate current   | Conditions as for $t_f$                                      | -    | 185  | -     | A          |
| $Q_{GQ}$       | Turn-off gate charge  |  | -    | 1200 | 1330  | mC         |
| $t_{tail}$     | Tail time   | Conditions as for $t_f$ , (10% $I_{TGQ}$ to $I_{TGQ} < 1A$ ) | -    | 50   | 75    | $\mu s$    |
| $t_{gw}$       | Gate off-time (note 4)  | Conditions as for $t_f$                                      | 150  | -    | -     | $\mu s$    |
| $R_{thJK}$     | Thermal resistance, junction to sink  | Double side cooled   | -    | -    | 0.065 | kW         |
|                |   | Cathode side cooled  | -    | -    | 0.24  | kW         |
|                |   | Anode side cooled  | -    | -    | 0.09  | kW         |
| F              | Mounting force  | (note 5)   | 4.5  | -    | 9.0   | kN         |
| $W_t$          | Weight  |  | -    | 120  | -     | g          |
| note 1)        | Unless otherwise indicated $T_j = 125^\circ C$  |  |      |      |       |            |
| note 2)        | $V_D = 50\%V_{DRM}, I_{TGQ} = 500A, I_{GM} = 10A, di_G/dt = 5A/\mu s, T_j = 25^\circ C, di/dt = 300A/\mu s, (10\%I_{GM} \text{ to } 90\%V_D)$ |  |      |      |       |            |
| note 3)        | $V_D = 80\%V_{DRM}, I_{TGQ} = 500A, C_S = 1\mu F, di_G/dt = 20A/\mu s, V_{GR} = -16V, (90\%I_{TGQ} \text{ to } 10\%I_{TGQ})$                  |  |      |      |       |            |
| note 4)        | The gate off-time is the period during which the gate circuit is required to remain low impedance to allow for the passage of tail current.   |  |      |      |       |            |
| note 5)        | For other clamping forces, consult factory.   |  |      |      |       |            |

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## Outline Drawing



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