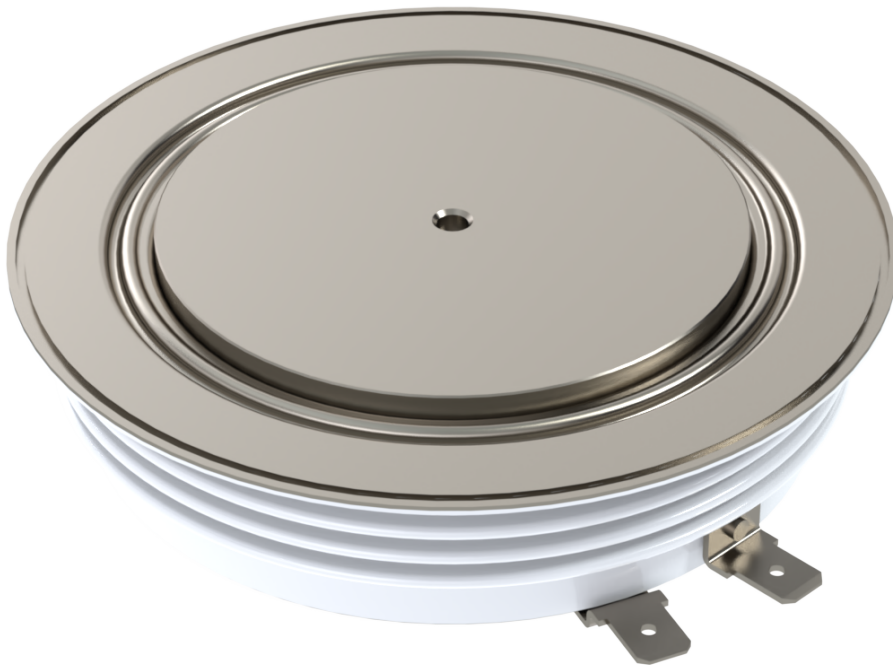


**Anode Shorted Gate  
Turn-Off Thyristor  
Type SA45US2000T0**

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Date: February, 2020  
Data Sheet Issue: 1



**ORDERING INFORMATION**

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|    |              |              |              |           |              |               |
|----|--------------|--------------|--------------|-----------|--------------|---------------|
| SA | 45           | US           | 2000         | T         | 0            |               |
| -  | 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)     | 4500           | V     |
| $V_{RSM}$       | Non-repetitive peak off-state voltage, (note 1) | 4500           | V     |
| $V_{RRM}$       | Repetitive peak reverse voltage                 | 18             | V     |
| $V_{RSM}$       | Non-repetitive peak reverse voltage             | 18             | V     |
| $V_{DC-link}$   | Maximum continuous DC-link voltage              | 2800           | V     |
| note 1)         | $V_{GK} = -2V$                                  |                |       |

| OTHER RATINGS  |  | MAXIMUM LIMITS   | UNITS       |
|----------------|--|------------------|-------------|
| $I_{TGQ}$      | Peak turn-off current (note 1)   | 2000             | A           |
| $L_S$          | Snubber loop impedance, $I_{TM} = I_{TGQ}$ (note 1)  | 200              | nH          |
| $I_{T(AV)M}$   | Mean on-state current, $T_{sink} = 55^{\circ}C$ , (note 2)   | 890              | A           |
| $I_{T(RMS)}$   | Nominal RMS on-state current, $T_{sink} = 25^{\circ}C$ (note 2)  | 1765             | A           |
| $I_{TSM}$      | Peak non-repetitive surge current $t_p = 10ms$ (note 3)  | 13.7             | kA          |
| $I_{TSM2}$     | Peak non-repetitive surge current $t_p = 2ms$ (note 3)   | 24               | kA          |
| $I^2t$         | $I^2t$ capacity for fusing $t_p = 10ms$  | $938 \cdot 10^3$ | $A^2s$      |
| $(di/dt)_{cr}$ | Critical rate of rise of on-state current, (note 4)  | 500              | $A/\mu s$   |
| $P_{FGM}$      | Peak forward gate power  | 120              | W           |
| $P_{RGM}$      | Peak reverse gate power  | 12               | kW          |
| $I_{FGM}$      | Peak forward gate current  | 60               | A           |
| $V_{RGM}$      | Peak reverse gate voltage (note 5)   | 18               | V           |
| $T_{jop}$      | Operating temperature range  | -40 to +125      | $^{\circ}C$ |
| $T_{stg}$      | Storage temperature range  | -40 to +125      | $^{\circ}C$ |
| note 1)        | $T_j = 125^{\circ}C$ , $V_D = 2800V$ , $V_{DM} \leq 4500V$ , $di_{GQ}/dt = 30A/\mu s$ , $I_{TGQ} = 2000A$ and $C_S = 4\mu F$ |                  |             |
| note 2)        | Double-side cooled, single phase, 50Hz, 180° half-sinewave.  |                  |             |
| note 3)        | $T_{j(initial)} = 125^{\circ}C$ , single phase, 50Hz, 180° sinewave, re-applied voltage $V_D = V_R \leq 10V$                 |                  |             |
| note 4)        | $I_T = 2000A$ repetitive, $I_{GM} = 25A$ , $di_{GM}/dt = 20A/\mu s$ . For $di/dt > 500A/\mu s$ please consult factory.       |                  |             |
| note 5)        | May exceed this value during turn-off avalanche period.  |                  |             |

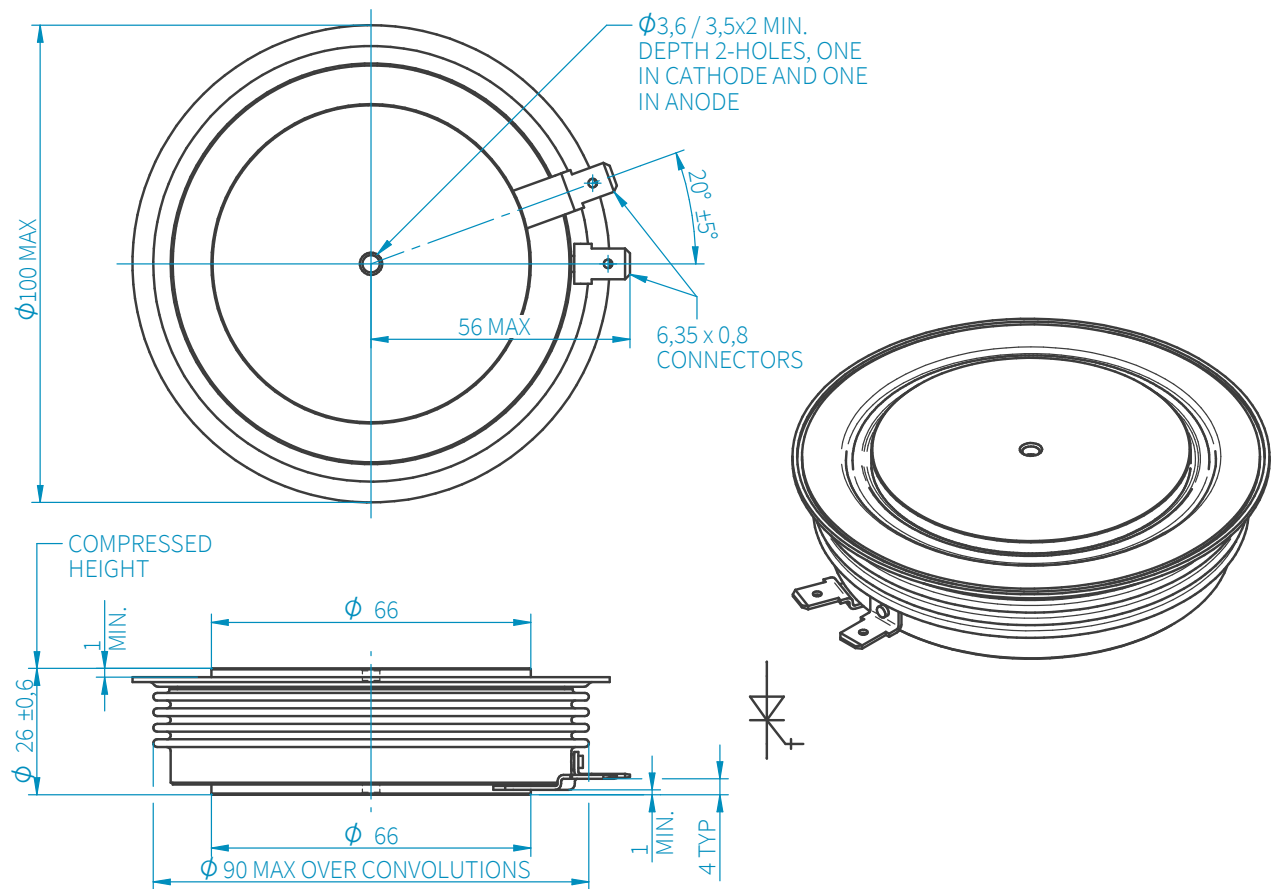
## Characteristics

|                | PARAMETER                                      | TEST CONDITIONS                                    | MIN  | TYP | MAX | UNITS      |
|----------------|--|--|------|-----|-----|------------|
| $V_{TM}$       | Maximum peak on-state voltage                  | $I_G = 5A, I_T = 2000A$                            | -    | -   | 3.5 | V          |
| $I_L$          | Latching current                               | $T_J = 25^\circ C$                                 | -    | 40  | -   | A          |
| $I_H$          | Holding current                                | $T_J = 25^\circ C$                                 | -    | 40  | -   | A          |
| $(dv/dt)_{cr}$ | Critical rate of rise of off-state voltage     | $V_D = 3000V, V_{GR} = -2V$                        | 1000 | -   | -   | V/ $\mu s$ |
| $I_{DRM}$      | Peak off-state current                         | Rated $V_{DRM}, V_{GR} = -2V$                      | -    | -   | 60  | mA         |
| $I_{RRM}$      | Peak reverse current                           | $V_{RR} = 18V$                                     | -    | -   | 20  | mA         |
| $I_{GKM}$      | Peak negative gate leakage current             | $V_{GR} = -18V$                                    | -    | -   | 20  | mA         |
| $V_{GT}$       | Gate trigger voltage                           | $T_J = -40^\circ C, V_D = 25V, R_L = 25m\Omega$    | -    | 0.9 | -   | V          |
|                |  | $T_J = 25^\circ C, V_D = 25V, R_L = 25m\Omega$     | -    | 0.7 | 1.0 | V          |
|                |  | $T_J = 125^\circ C, V_D = 25V, R_L = 25m\Omega$    | -    | 0.4 | -   | V          |
| $I_{GT}$       | Gate trigger current                           | $T_J = -40^\circ C, V_D = 25V, R_L = 25m\Omega$    | -    | -   | 3.5 | A          |
|                |  | $T_J = 25^\circ C, V_D = 25V, R_L = 25m\Omega$     | -    | -   | 2   | A          |
|                |  | $T_J = 125^\circ C, V_D = 25V, R_L = 25m\Omega$    | 0.05 | -   | 1   | A          |
| $t_d$          | Delay time                                     | $V_D = 2800V, I_{TGQ} = 2000A,$                    | -    | 1.5 | 3   | $\mu s$    |
| $t_{gt}$       | Turn-on time                                   | $di_T/dt = 200A/\mu s, I_{GM} = 30A,$              | -    | 4   | 10  | $\mu s$    |
| $E_{on}$       | Turn-on energy                                 | $di_G/dt = 20A/\mu s, C_S = 4\mu F, R_S = 5\Omega$ | -    | 0.4 | 1   | J          |
| $t_f$          | Fall time                                      |  | -    | 2   | -   | $\mu s$    |
| $t_s$          | Storage time                                   |  | -    | -   | 25  | $\mu s$    |
| $t_{gq}$       | Turn-off time                                  | $V_D = 2800V, V_{DM} = 3600V,$                     | -    | -   | 30  | $\mu s$    |
| $I_{CQM}$      | Peak turn-off gate current                     | $di_{GQ}/dt = 30A/\mu s, I_{TGQ} = 2000A,$         | -    | 600 | -   | A          |
| $Q_{GQ}$       | Turn-off gate charge                           | $V_{GR} = -16V, C_S = 4\mu F$                      | -    | 7   | -   | mC         |
| $t_{tail}$     | Tail time                                      |  | -    | 17  | -   | $\mu s$    |
| $E_{off}$      | Turn-off energy                                |  | -    | 6.5 | 8   | J          |
| $R_{thJK}$     | Thermal resistance, junction to sink           | Double side cooled                                 | -    | -   | 22  | K/kW       |
|                |  | Cathode side cooled                                | -    | -   | 48  | K/kW       |
|                |  | Anode side cooled                                  | -    | -   | 42  | K/kW       |
| F              | Mounting force                                 | (note 2)   | 21   | -   | 26  | kN         |
| $W_t$          | Weight   |  | -    | 800 | -   | g          |
| note 1)        | Unless otherwise indicated $T_J = 125^\circ C$ |  |      |     |     |            |
| note 2)        | For other clamping forces, consult factory.    |  |      |     |     |            |

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## Outline Drawing



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