

# Symmetrical Gate Turn-Off Thyristor Type SA25AP1200FK

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Data Sheet Issue: 1



## ORDERING INFORMATION

(Please quote 12 to 15 digit code as below)

|    |              |              |              |           |              |               |
|----|--------------|--------------|--------------|-----------|--------------|---------------|
| SA | 25           | AP           | 1200         | F         | K            |               |
| -  | 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)     | 2500           | V     |
| $V_{RSM}$       | Non-repetitive peak off-state voltage, (note 1) | 2600           | V     |
| $V_{RRM}$       | Repetitive peak reverse voltage                 | 1250           | V     |
| $V_{RSM}$       | Non-repetitive peak reverse voltage             | 1250           | V     |
| note 1)         | $V_{GK} = -2V$                                  |                |       |

| OTHER RATINGS  |  | MAXIMUM LIMITS   | UNITS       |
|----------------|--|------------------|-------------|
| $I_{TGQ}$      | Peak turn-off current (note 1)   | 1200             | 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)   | 790              | A           |
| $I_{T(RMS)}$   | Nominal RMS on-state current, $T_{sink} = 25^{\circ}C$ (note 2)  | 1600             | A           |
| $I_{TSM}$      | Peak non-repetitive surge current $t_p = 10ms$   | 13.0             | kA          |
| $I_{TSM2}$     | Peak non-repetitive surge current (note 3)   | 23.0             | kA          |
| $I^2t$         | $I^2t$ capacity for fusing $t_p = 10ms$  | $840 \cdot 10^3$ | $A^2s$      |
| $(di/dt)_{cr}$ | Critical rate of rise of on-state current, (note 4)  | 1000             | $A/\mu s$   |
| $P_{FGM}$      | Peak forward gate power  | 200              | W           |
| $P_{RGM}$      | Peak reverse gate power  | 8                | kW          |
| $I_{FGM}$      | Peak forward gate current  | 140              | A           |
| $V_{RGM}$      | Peak reverse gate voltage (note 5)   | 18               | V           |
| $t_{off}$      | Minimum permissible off-time, $I_{TM} = I_{TGQ}$ (note 1)  | 80               | $\mu s$     |
| $t_{on}$       | 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)        | $T_j = 125^{\circ}C$ , $V_D = 80\%V_{DM}$ , $V_{DM} \leq V_{DRM}$ , $di_{GQ}/dt = 20A/\mu s$ , $I_{TM} = I_{TGQ}$ and $C_S = 3\mu F$ |                  |             |
| 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   | $I_G = 2A, I_T = 1200A$  | -    | 2.4  | 2.7   | V          |
| $I_L$          | Latching current  | $T_j = 25^\circ C$   | -    | 10   | -     | A          |
| $I_H$          | Holding current   |  | -    | 10   | -     | 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 $V_{DRM}, V_{GR} = -2V$                                      | -    | -    | 50    | mA         |
| $I_{RRM}$      | Peak reverse current  | Rated $V_{RRM}$  | -    | -    | 100   | mA         |
| $I_{GKM}$      | Peak negative gate leakage current  | $V_{GR} = -16V$  | -    | -    | 200   | mA         |
| $V_{GT}$       | Gate trigger voltage  | $T_j = -40^\circ C, V_D = 25V, R_L = 25m\Omega$                    | -    | 1.0  | -     | V          |
|                |   | $T_j = 25^\circ C, V_D = 25V, R_L = 25m\Omega$                     | -    | 0.9  | -     | V          |
|                |   | $T_j = 125^\circ C, V_D = 25V, R_L = 25m\Omega$                    | -    | 0.8  | -     | V          |
| $I_{GT}$       | Gate trigger current  | $T_j = -40^\circ C, V_D = 25V, R_L = 25m\Omega$                    | -    | 2    | 7     | A          |
|                |   | $T_j = 25^\circ C, V_D = 25V, R_L = 25m\Omega$                     | -    | 0.5  | 2     | A          |
|                |   | $T_j = 125^\circ C, V_D = 25V, R_L = 25m\Omega$                    | -    | 50   | 300   | mA         |
| $t_d$          | Delay time  | (note 2)   | -    | 1.5  | -     | $\mu s$    |
| $t_{gt}$       | Turn-on time  | Conditions as for $t_d$ , $(10\%I_{GM} \text{ to } 10\%V_D)$       | -    | 4.5  | 8.0   | $\mu s$    |
| $t_f$          | Fall time   | (note 3)   | -    | 1    | -     | $\mu s$    |
| $t_{gq}$       | Turn-off time   | Conditions as for $t_f$ , $(10\%I_{GQ} \text{ to } 10\%I_{TGQ})$   | -    | 19   | 22    | $\mu s$    |
| $I_{GQ}$       | Turn-off gate current   | Conditions as for $t_f$  | -    | 300  | -     | A          |
| $Q_{GQ}$       | Turn-off gate charge  |  | -    | 4000 | 5000  | mC         |
| $t_{tail}$     | Tail time   | Conditions as for $t_f$ , $(10\%I_{TGQ} \text{ to } I_{TGQ} < 1A)$ | -    | 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   | -    | -    | 0.027 | kW         |
|                |   | Cathode side cooled  | -    | -    | 0.070 | kW         |
|                |   | Anode side cooled  | -    | -    | 0.045 | kW         |
| F              | Mounting force  | (note 5)   | 15   | -    | 25    | kN         |
| $W_t$          | Weight  |  | -    | 480  | -     | g          |
| note 1)        | Unless otherwise indicated $T_j = 125^\circ C$  |  |      |      |       |            |
| note 2)        | $V_D = 50\%V_{DRM}, I_{TGQ} = 1200A, I_{GM} = 20A, di_G/dt = 10A/\mu s, T_j = 25^\circ C, di/dt = 300A/\mu s, (10\%I_{GM} \text{ to } 90\%V_D)$ |  |      |      |       |            |
| note 3)        | $V_D = 80\%V_{DRM}, I_{TGQ} = 1200A, C_S = 3\mu F, di_G/dt = 20A/\mu s, V_{GR} = -16V, (90\%I_{TGQ} \text{ to } 10\%I_{TGQ})$                   |  |      |      |       |            |
| 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



# SANCONA®

*technical solutions*

### SANCONA GmbH

An der Hebemärchte 26  
D-04316 Leipzig

// ☎ +49 341 652355-0  
☎ +49 341 652355-99  
✉ [info@sancona.com](mailto:info@sancona.com)  
🌐 [www.sancona.com](http://www.sancona.com)

// Registry Court: Leipzig HRB 32946  
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