

Symmetrical Gate Turn-Off Thyristor Type SA20AP1200UH

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Data Sheet Issue: 1



ORDERING INFORMATION

(Please quote 12 to 15 digit code as below)

| | | | | | | |
|----|--------------|--------------|--------------|-----------|--------------|---------------|
| SA | 20 | AP | 1200 | U | H | |
| - | 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 | 1200 | V |
| V_{RSM} | Non-repetitive peak reverse voltage | 1200 | 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 | μH |
| $I_{T(AV)M}$ | Mean on-state current, $T_{sink} = 55^{\circ}C$, (note 2) | 670 | A |
| $I_{T(RMS)}$ | Nominal RMS on-state current, $T_{sink} = 25^{\circ}C$ (note 2) | 1340 | A |
| I_{TSM} | Peak non-repetitive surge current $t_p = 10ms$ | 10.5 | kA |
| I_{TSM2} | Peak non-repetitive surge current (note 3) | 19 | kA |
| I^2t | I^2t capacity for fusing $t_p = 10ms$ | $550 \cdot 10^3$ | 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 | 210 | 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 | μs |
| t_{on} | Minimum permissible on-time | 20 | μs |
| T_{jop} | Operating temperature range | -40 to +125 | $^{\circ}C$ |
| T_{stg} | Storage temperature range | -40 to +150 | $^{\circ}C$ |
| note 1) | $T_j = 125^{\circ}C$, $V_D = 80\%V_{DM}$, $V_{DM} \leq V_{DRM}$, $di_{GQ}/dt = 20A/\mu s$, $C_S = 3\mu F$ | | |
| 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 | $I_G = 2A, I_T = 1200A$ | - | 3.0 | 3.3 | V |
| I_L | Latching current | $T_j = 25^\circ C$ | - | 15 | - | A |
| I_H | Holding current | | - | 15 | - | A |
| $(dv/dt)_{cr}$ | Critical rate of rise of off-state voltage | $V_D = 80\%V_{DRM}, V_{GR} = -2V$ | 1000 | - | - | V/ μs |
| 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 | $T_j = -40^\circ C, V_D = 25V, R_L = 25m\Omega$ | - | 3.0 | 8.0 | A |
| | | $T_j = 25^\circ C, V_D = 25V, R_L = 25m\Omega$ | - | 0.6 | 2.5 | A |
| | | $T_j = 125^\circ C, V_D = 25V, R_L = 25m\Omega$ | - | 60 | 500 | mA |
| t_d | Delay time | (note 2) | - | 1.0 | - | μs |
| t_{gt} | Turn-on time | Conditions as for t_d , ($10\%I_{GM}$ to $10\%V_D$) | - | 3.0 | 7.0 | μs |
| t_f | Fall time | (note 3) | - | 0.8 | - | μs |
| t_{gq} | Turn-off time | Conditions as for t_f , ($10\%I_{GQ}$ to $10\%I_{TGQ}$) | - | 12 | 13 | μs |
| I_{GQ} | Turn-off gate current | Conditions as for t_f | - | 250 | - | A |
| Q_{GQ} | Turn-off gate charge | | - | 1600 | 2000 | mC |
| t_{tail} | Tail time | Conditions as for t_f , ($10\%I_{TGQ}$ to $I_{TGQ} < 1A$) | - | 40 | 60 | μs |
| t_{gw} | Gate off-time (note 4) | Conditions as for t_f | 150 | - | - | μs |
| R_{thJK} | Thermal resistance, junction to sink | Double side cooled | - | - | 0.027 | K/W |
| | | Cathode side cooled | - | - | 0.070 | K/W |
| | | Anode side cooled | - | - | 0.045 | K/W |
| 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) | $V_D = 50\%V_{DRM}, I_{TGQ} = 1200A, I_{GM} = 40A, di_G/dt = 20A/\mu s, T_j = 25^\circ C, di/dt = 300A/\mu s, (10\%I_{GM} \text{ to } 90\%V_D)$ | | | | | |
| note 3) | $V_D = 80\%V_{DRM}, I_{TGQ} = 1200A, C_S = 3\mu F, di_G/dt = 40A/\mu s, V_{GR} = -16V, (90\%I_{TGQ} \text{ to } 10\%V_D)$ | | | | | |
| 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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