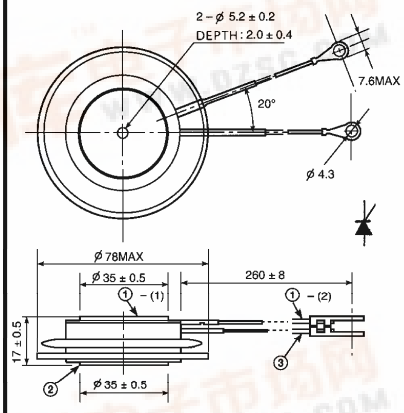
TOSHIBA ALLOY-FREE HIGHT SPEED THYRISTOR

# SH400R33B

HIGH POWER CONTROL APPLICATIONS

Unit in mm

- Repetitive Peak Off-State Voltage : $V_{DRM}$ } = 1300V
- Repetitive Peak Reverse Voltage : $V_{RRM}$ }
- Average On-State Current : $I_{T(AV)}$ = 400A
- Turn-Off Time : $t_q$ = 25 $\mu$s (Max.)
- Critical Rate of Rise of On-State Current : di / dt = 200A / $\mu$s
- Critical Rate of Rise of Off-State Voltage : dv / dt = 500V / $\mu$s
- Weight : 260g
- Flat Package




1-(1) CATHODE
1-(2) CATHODE (BLACK)
2. ANODE
3. GATE (WHITE)

| | |
|---|---|
| JEDEC | — |
| EIAJ | — |
| TOSHIBA | 13-78F1A |

961001EAA1

MAXIMUM RATINGS

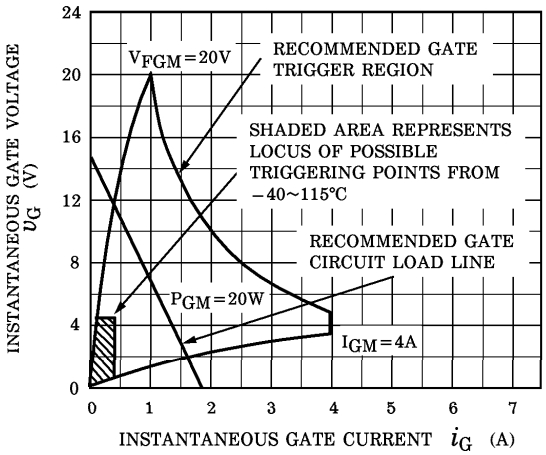
| CHARACTERISTIC | SYMBOL | RATING | UNIT |
|---|---|---|---|
| Repetitive Peak Off-State Voltage and Repetitive Peak Reverse Voltage | $V_{DRM}$ $V_{RRM}$ | 1300 | V |
| Non-Repetitive Peak Reverse Voltage (Non-Repetitive < 5ms, $T_j$ = 0~125°C) | $V_{RSM}$ | 1400 | V |
| R.M.S On-State Current | $I_{T(RMS)}$ | 628 | A |
| Average On-State Current | $I_{T(AV)}$ | 400 | A |
| Peak One Cycle Surge On-State Current (Non-Repetitive) | $I_{TSM}$ | 8000 (50Hz) | V |
| | | 8800 (60Hz) | |
| $I^2t$ Limit Value | $I^2t$ | $3.2\times10^5$ | $A^2s$ |
| Critical Rate of Rise of On-State Current (Note) | di / dt | 200 | A / $\mu$s |
| Peak Gate Power Dissipation | $P_{GM}$ | 20 | W |
| Average Gate Power Dissipation | $P_{G(AV)}$ | 4 | W |
| Peak Forward Gate Current | $I_{GM}$ | 4 | A |
| Peak Forward Gate Voltage | $V_{FGM}$ | 20 | V |
| Peak Reverse Gate Voltage | $V_{RGM}$ | 5 | V |
| Junction Temperature | $T_j$ | −40~115 | °C |
| Storage Temperature Range | $T_{stg}$ | −40~115 | °C |
| Mounting Force | — | 14.7±1.5 | kN |

Note : $V_D$ = 650V, f = 50Hz, $T_j$ = 110°C, Gate Supply ($V_G$ = 15V, $R_G$ = 8Ω, $t_r \leqq 1\mu s$)

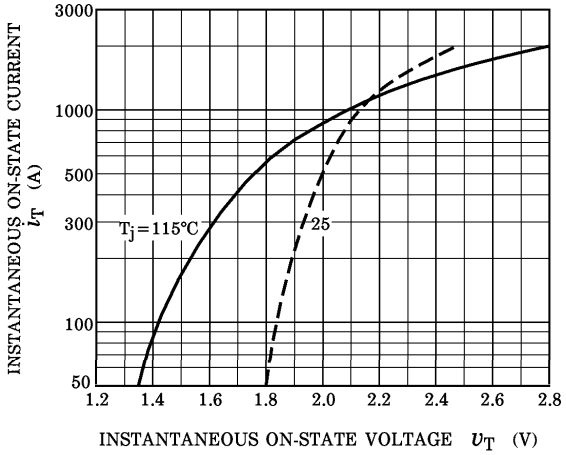
ELECTRICAL CHARACTERISTICS

| CHARACTERISTIC | SYMBOL | TEST CONDITION | | MIN. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Repetitive Peak Off-State Current and Repetitive Peak Reverse Current | $I_{DRM}$ $I_{RRM}$ | $V_{DRM}=V_{RRM}=1300V$ $T_j=115°C$ | | — | 50 | mA |
| Peak On-State Voltage | $V_{TM}$ | $I_{TM}=1250A$, $T_j=25°C$ | | — | 2.2 | V |
| Gate Trigger Voltage | $V_{GT}$ | $V_D=6V$, $R_L=6\Omega$ | $T_j=-40°C$ | — | 4.5 | V |
| | | | $T_j=25°C$ | — | 3.5 | |
| Gate Trigger Current | $I_{GT}$ | | $T_j=-40°C$ | — | 400 | mA |
| | | | $T_j=25°C$ | — | 260 | |
| Gate Non-Trigger Voltage | $V_{GD}$ | $V_D=650V$, $T_j=115°C$ | | 0.2 | — | V |
| Gate Non-Trigger Current | $I_{GD}$ | | | 5 | — | mA |
| Delay Time | $t_d$ | $V_D=650V$, $T_j=25°C$ Gate Supply ($V_G=15V$, $R_G=8\Omega$, $t_r\leqq 1\mu s$) | | — | 4 | $\mu$s |
| Gate Turn-On Time | $t_{gt}$ | | | — | 6 | $\mu$s |
| Turn-Off Time | $t_q$ | $I_{TM}=800A$, $V_R\geqq 50V$ $dv/dt=20V/\mu s$, $T_j=110°C$ $V_{DRM}=650V$ | | — | 25 | $\mu$s |
| Holding Current | $I_H$ | $T_j=25°C$, $R_L=6\Omega$ | | — | 400 | mA |
| Critical Rate of Rise of Off-State Voltage | $dv/dt$ | $V_{DRM}=870V$, $T_j=115°C$ Gate Open, Exponential Rise | | 500 | — | V/$\mu$s |
| Thermal Resistance (Junction to Case) | $R_{th\,(j\text{-}f)}$ | DC | | — | 0.04 | °C/W |

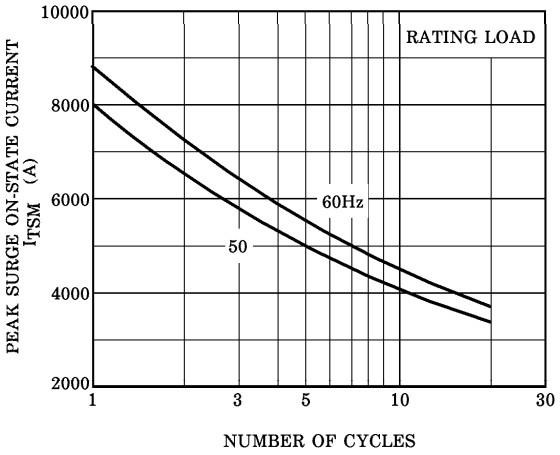
GATE TRIGGER CHARACTERISTIC




$i_T - v_T$



SURGE ON-STATE CURRENT




$r_{th\,(j\text{-}f)}$ – t