TENTATIVE   TOSHIBA GATE TURN-OFF THYRISTOR
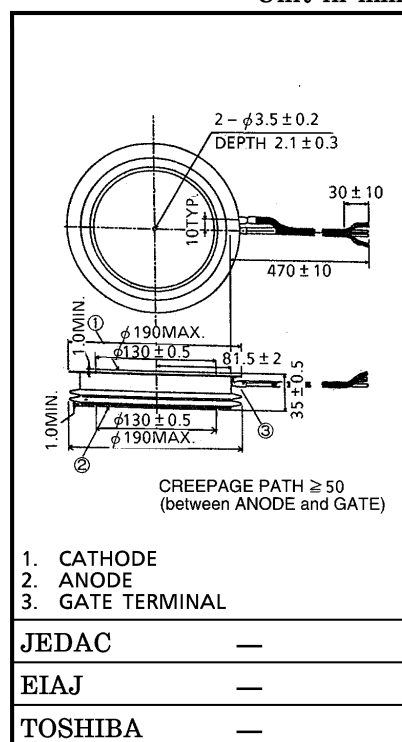
SG4500GXH25

INVERTER APPLICATION

Unit in mm

- Repetitive Peak Off-State Voltage : $V_{DRM} = 4500V$ (Note 1)
- Repetitive Peak Reverse Voltage : $V_{RRM} = 4000V$
- R.M.S On-State Current : $I_{T(RMS)} = 3000A$
- Peak Turn-Off Current : $I_{TGQM} = 4500A$
- Critical Rate of Rise of On-State Current : $di/dt = 300A/\mu s$
- Critical Rate of Rise of Off-State Voltage : $dv/dt = 1000V/\mu s$

MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	RATING	UNIT
Repetitive Peak Off-State Voltage (Note 1)	V_{DRM}	4500	V
Repetitive Peak Reverse Voltage	V_{RRM}	4000	V
Peak Turn-Off Current (Note 2)	I_{TGQM}	4500	A
R.M.S On-State Current (Note 3)	$I_{T(RMS)}$	3000	A
Peak One Cycle Surge On-State Current (Non Repetitive, 10ms-Width Half Sine Waveform)	I_{TSM}	46000	A
Critical Rate of Rise of On-State Current (Note 4)	di/dt	300	$A/\mu s$
Peak Forward Gate Current	I_{FGM}	200	A
Average Forward Gate Power Dissipation	$P_{FG(AV)}$	190	W
Average Reverse Gate Reverse Dissipation	$P_{RG(AV)}$	550	W
R.M.S Gate Current (Note 5)	$I_{G(RMS)}$	84	A
Peak Reverse Gate Voltage (At Static)	V_{RGM}	17	V
Operation Junction Temperature Range	T_j	$-40\sim115$	°C
Storage Temperature Range	T_{stg}	$-40\sim115$	°C
Mounting Force	—	$98\sim120$	kN

2 - φ3.5±0.2 DEPTH 2.1±0.3
30±10
470±10
φ190MAX.
φ130±0.5
81.5±2
φ130±0.5
φ190MAX.
35±0.5
10TYP.
1.0MIN.

CREEPAGE PATH ≧ 50 (between ANODE and GATE)

1. CATHODE
2. ANODE
3. GATE TERMINAL

JEDAC	—
EIAJ	—
TOSHIBA	—

Weight : 6000g

(Note 1) $V_{GK} = -10V$
(Note 2) $V_D = 2250V$, $V_{DM} \leqq 3600V$, $C_S \geqq 6\mu F$, $di_{GQ}/dt \geqq 60A/\mu s$, $V_{DSP} \leqq 1200V$, $L_S \leqq 80nH$ (non-snubber)
(Note 3) 50Hz Half Sine Waveform, $T_j = 80°C$
(Note 4) $V_D \leqq 2250V$, $I_{TM} \leqq 4500A$, $I_G \geqq 100A$ ($t_r \leqq 1\mu s$), $f \leqq 50Hz$, $C_S \leqq 6\mu F$, $R_S \geqq 5\Omega$, $25°C \leqq T_j \leqq 115°C$
(Note 5) Ambient Temperature of coaxial gate-cathode lead = 90°C

961001EAA2

ELECTRICAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Repetitive Peak Off-State Current	I_{DRM}	$V_{DRM}=4500V$, $V_{GK}=-10V$ $T_j=115°C$		—	—	300	mA
Repetitive Peak Reverse Current	I_{RRM}	$V_{RRM}=4000V$ $T_j=115°C$		—	—	300	mA
Repetitive Peak Reverse Gate Current	I_{RGM}	$V_{RGM}=17V$ $T_j=125°C$		—	—	10	mA
Peak On-State Voltage	V_{TM}	$I_{TM}=4500A$, $T_j=115°C$		—	—	4.0	V
Gate Trigger Voltage	V_{GT}	$V_D=24V$ $R_L=0.1\Omega$	$T_j=-40°C$	—	—	—	V
			$T_j=25°C$	—	—	2.0	V
Gate Trigger Current	I_{GT}		$T_j=-40°C$	—	—	—	A
			$T_j=25°C$	—	—	10	A
Turn-On Delay Time	t_d	$V_D=2250V$, $I_{TM}=4500A$ $di_F/dt=300A/\mu s$		—	—	4.0	μs
Turn-On Time	t_{gt}	$I_{GM}=100A$ ($t_r=1\mu s$) $T_j=25°C$, non-snubber		—	—	12	μs
Critical Rate of Rise of Off-State Voltage	dv/dt	$V_{DRM}=2250V$ $T_j=115°C$, $V_{GK}=-10V$ Exponential Rise		1000	—	—	$V/\mu s$
Storage Time	t_S	$I_{TGQ}=4500A$ $V_{DM}=3600V$, $T_j=115°C$ $V_D=2000V$, $C_S=6\mu F$ $di_{GQ}/dt=60A/\mu s$ Off squeeze current$\geq 600mA$		—	—	45	μs
Gate Turn-Off Time	t_{gq}			—	—	48	μs
Tail Time	t_{tail}			—	—	800	μs
Gate Turn-Off Current	I_{GQ}			—	—	1500	A
Thermal Resistance	$R_{th(j-f)}$	Junction to fin		—	—	0.0043	°C/W
Reverse Recovery Charge	Q_{rr}	$I_T=2000A$, $V_R=1500V$ $di_T/dt=-300A/\mu s$, $C_S=6\mu F$ $R_S=5\Omega$, $T_j=115°C$	$V_{TM}\leq 2.6V$			15000	μC
			$V_{TM}=4.0V$			8000	

$i_T - v_T$ (MAX.)

INSTANTANEOUS ON-STATE CURRENT i_T (A)

INSTANTANEOUS ON-STATE VOLTAGE v_T (V)

$T_j = 115°C$

$I_{GT} - T_j$ (TYP.)

GATE TRIGGER CURRENT I_{GT} (A)

JUNCTION TEMPERATURE T_j (°C)

$V_D = 24V$
$R_L = 0.2\Omega$

$E_{ON} - I_{TM}$ (TYP.)

TURN-ON ENERGY PER A PULSE E_{ON} (J)

ON-STATE CURRENT I_{TM} (A)

$V_D \leqq 2250V$
$di/dt = 300A/\mu s$
$I_{GM} \geqq 100A (t_r = 1\mu s)$
$C_S = 6\mu F, R_S = 5\Omega$
$T_j = 115°C$

$E_{OFF} - I_{TGQ}$ (TYP.)

TURN-OFF ENERGY PER A PULSE E_{OFF} (J)

V_{DM} (V)

TURN-OFF CURRENT I_{TGQ} (A)

V_{DM}

$V_{TM} = 2.6V$

4.0V

V_{DM} CONDITION AS
THE UPPER SIDE
$V_D = 2250V, C_S = 6\mu F$
$di_{GQ}/dt = 60A/\mu s$
$R_S = 5\Omega, T_j = 115°C$

$r_{th(j-f)} - t$ (MAX.)

TRANSIENT THERMAL IMPEDANCE $r_{th(j-f)}$ (°C/W)

TIME t (ms and s)

① CATHODE SIDE (ms)
② ANODE SIDE (ms)
③ DOUBLE SIDE (ms)

CATHODE SIDE

ANODE SIDE (s) ①

DOUBLE (s) ②

③