TENTATIVE

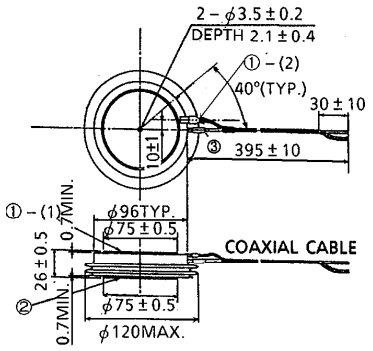
TOSHIBA GATE TURN-OFF THYRISTOR

SG3000GXH25

INVERTER APPLICATION

- Repetitive Peak Off-State Voltage : V_{DRM} = 4500 V (Note 1)
- Repetitive Peak Reverse Voltage : V_{RRM} = 4000 V
- R.M.S On-State Current : $I_{T(RMS)}$ = 800 A
- Peak Turn-Off Current : I_{TGQM} = 3000 A
- Critical Rate of Rise of On-State Current : di / dt = 300 A / μs
- Critical Rate of Rise of Off-State Voltage : dv / dt = 900 V / μs

Unit in mm



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

JEDAC	—
EIAJ	—
TOSHIBA	—

Weight : 1500 g

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}	3000	A
R.M.S On-State Current (Note 3)	$I_{T(RMS)}$	800	A
Peak One Cycle Surge On-State Current (Non Repetitive, 10 ms-Width Half Sine Waveform)	I_{TSM}	16000	A
Critical Rate of Rise of On-State Current (Note 4)	di / dt	300	A / μs
Peak Forward Gate Current	I_{FGM}	100	A
Average Gate Power Dissipation	$P_{G(AV)}$	150	W
R.M.S Gate Current (Note 5)	$I_{G(RMS)}$	42	A
Peak Reverse Gate Voltage (At Static)	V_{RGM}	16	V
Operation Junction Temperature Range	T_j	−40~115	°C
Storage Temperature Range	T_{stg}	−40~115	°C
Mounting Force	—	33.3 ± 4.9	kN

(Note 1) : V_{GK} = −2 V

(Note 2) : V_D = 2400 V, $V_{DM} \leqq$ 3000 V, $C_S \geqq$ 6 μF, $di_{GQ}/dt \geqq$ 40 A / μs, $V_{DSP} \leqq$ 800 V, $L_S \leqq$ 0.2 μH (TOSHIBA METHOD)

(Note 3) : 50 Hz Half Sine Waveform

(Note 4) : $V_D \leqq$ 2400 V, $I_{TM} \leqq$ 3000 A, $I_G \geqq$ 30 A ($t_r \leqq$ 1 μs), f ≦ 50 Hz, $C_S \leqq$ 6 μF, $R_S \geqq$ 10 Ω, 25°C ≦ T_j ≦ 115°C

(Note 5) : Ambient Temperature of coaxial gate-cathode lead = 90°C

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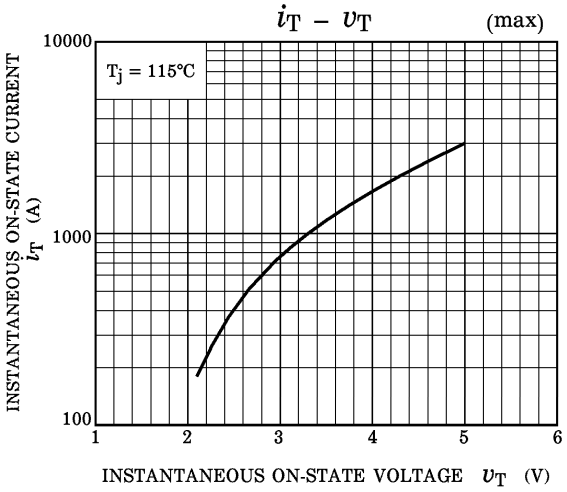
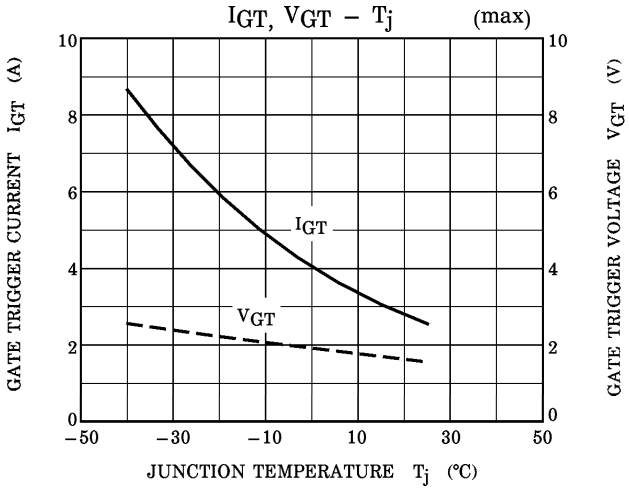
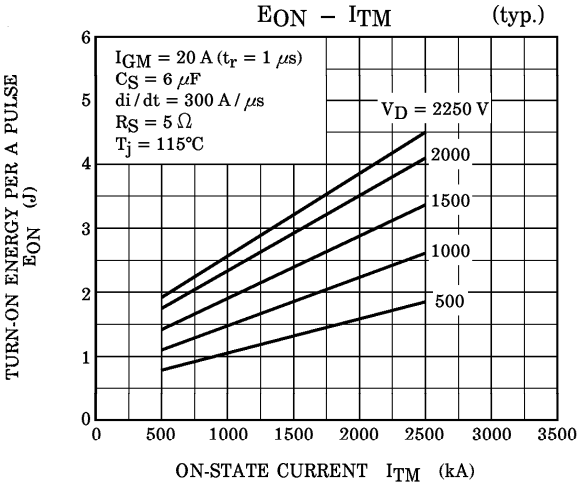
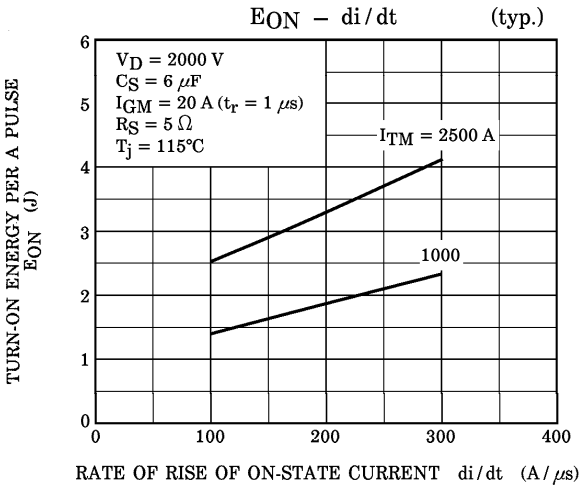
ELECTRICAL CHARACTERISTICS

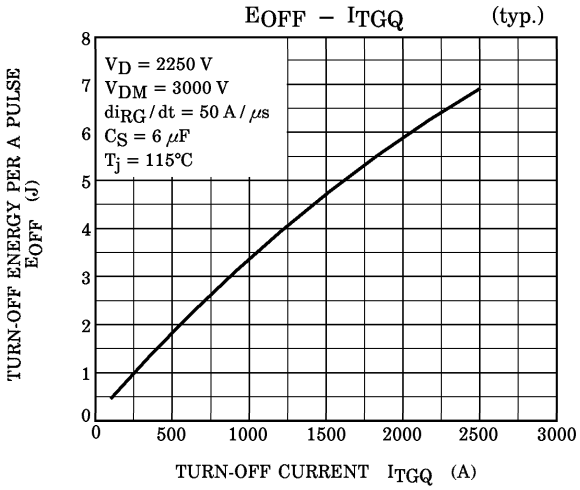
CHARACTERISTIC	SYMBOL	TEST CONDITION		MIN	TYP.	MAX	UNIT
Repetitive Peak Off-State Current	I_{DRM}	V_{DRM} = 4500 V, V_{GK} = −2 V T_j = 115°C		—	—	150	mA
Repetitive Peak Reverse Current	I_{RRM}	V_{RRM} = 4000 V T_j = 115°C		—	—	150	mA
Repetitive Peak Reverse Gate Current	I_{RGM}	V_{RGM} = 16 V T_j = 115°C		—	—	10	mA
Peak On-State Voltage	V_{TM}	I_{TM} = 2500 A, T_j = 115°C		—	—	4.6	V
Gate Trigger Voltage	V_{GT}	V_D = 24 V R_L = 0.1 Ω	T_j = −40°C	—	—	2.5	V
			T_j = 25°C	—	—	1.5	V
Gate Trigger Current	I_{GT}		T_j = 0°C	—	—	8.5	A
			T_j = 25°C	—	—	2.5	A
Turn-On Delay Time	t_d	V_D = 2250 V, I_{TM} = 2500 A di_F/dt = 300 A/μs I_{GM} = 30 A (t_r = 1 μs) T_j = 25°C, non-snubber		—	—	3.0	μs
Turn-On Time	t_{gt}			—	—	15	μs
Critical Rate of Rise of Off-State Voltage	dv/dt	V_{DRM} = 3000 V T_j = 115°C, V_{GK} = −4 V Exponential Rise		900	—	—	V/μs
Storage Time	t_s	I_{TGQ} = 2500 A V_{DM} = 3000 V, T_j = 115°C V_D = 2250 V, C_S = 6 μF di_{GQ}/dt = 50 A/μs Off squeeze current ≧ 300 mA		—	—	20	μs
Gate Turn-Off Time	t_{gq}			—	—	22	μs
Tail Time	t_{tail}			—	—	250	μs
Gate Turn-Off Current	I_{GQ}			—	—	750	A
Reverse Recovery Charge	Q_{rr}	I_T = 3000 A, V_R = 1500 V C_S = 6 μF, R_S = 5 Ω di_T/dt = −300 A/μs T_j = 115°C		—	—	4800	μC
Reverse Recovery Current	t_{rr}			—	—	10	μs
Thermal Resistance	$R_{th\ (j\text{-}f)}$	Junction to fin		—	—	0.014	°C/W

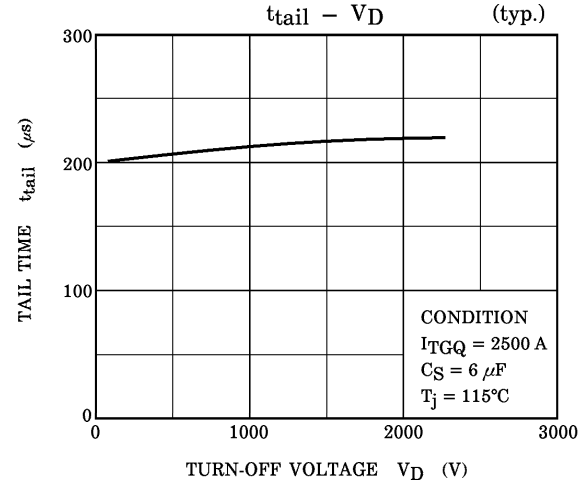

i_T – v_T (max)
T_j = 115°C
INSTANTANEOUS ON-STATE CURRENT i_T (A)
INSTANTANEOUS ON-STATE VOLTAGE v_T (V)

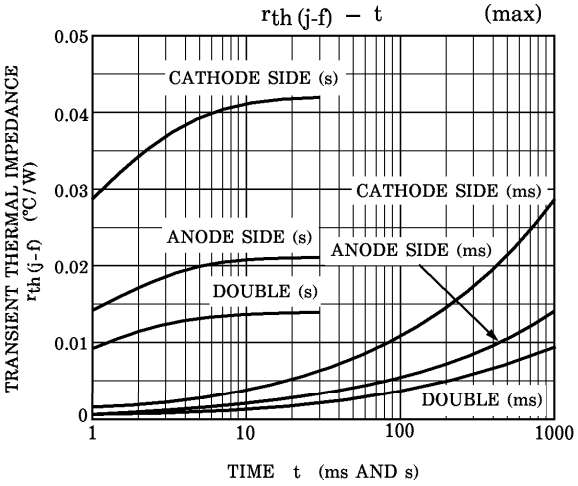

I_{GT}, V_{GT} – T_j (max)
I_{GT}
V_{GT}
GATE TRIGGER CURRENT I_{GT} (A)
GATE TRIGGER VOLTAGE V_{GT} (V)
JUNCTION TEMPERATURE T_j (°C)


E_{ON} – I_{TM} (typ.)
I_{GM} = 20 A (t_r = 1 μs)
C_S = 6 μF
di / dt = 300 A / μs
R_S = 5 Ω
T_j = 115°C
V_D = 2250 V
2000
1500
1000
500
TURN-ON ENERGY PER A PULSE E_{ON} (J)
ON-STATE CURRENT I_{TM} (kA)


E_{ON} – di / dt (typ.)
V_D = 2000 V
C_S = 6 μF
I_{GM} = 20 A (t_r = 1 μs)
R_S = 5 Ω
T_j = 115°C
I_{TM} = 2500 A
1000
TURN-ON ENERGY PER A PULSE E_{ON} (J)
RATE OF RISE OF ON-STATE CURRENT di / dt (A / μs)


E_{OFF} – I_{TGQ} (typ.)
V_D = 2250 V
V_{DM} = 3000 V
di_{RG} / dt = 50 A / μs
C_S = 6 μF
T_j = 115°C
TURN-OFF ENERGY PER A PULSE E_{OFF} (J)
TURN-OFF CURRENT I_{TGQ} (A)


t_{tail} – V_D (typ.)
CONDITION
I_{TGQ} = 2500 A
C_S = 6 μF
T_j = 115°C
TAIL TIME t_{tail} (μs)
TURN-OFF VOLTAGE V_D (V)


rth (j-f) – t (max)
TRANSIENT THERMAL IMPEDANCE rth (j-f) (°C/W)
0.05
0.04
0.03
0.02
0.01
0
CATHODE SIDE (s)
CATHODE SIDE (ms)
ANODE SIDE (s)
ANODE SIDE (ms)
DOUBLE (s)
DOUBLE (ms)
1
10
100
1000
TIME t (ms AND s)