TENTATIVE

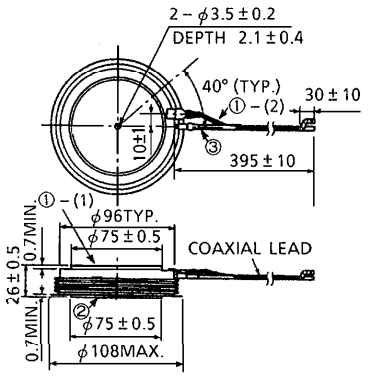
TOSHIBA GATE TURN-OFF THYRISTOR

SG3000JX26G

INVERTER APPLICATION

- Repetitive Peak Off-State Voltage : V_{DRM} = 6000 V (Note 1)
- Repetitive Peak Reverse Voltage : V_{RRM} = 17 V
- R.M.S On-State Current : $I_{T(RMS)}$ = 1200 A
- Peak Turn-Off Current : I_{TGQM} = 3000 A
- Critical Rate of Rise of On-State Current : di / dt = 400 A / μs
- Critical Rate of Rise of Off-State Voltage : dv / dt = 1000 V / μs

Unit in mm



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

JEDAC	—
EIAJ	—
TOSHIBA	—

Weight : 1290 g

MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	RATING	UNIT
Repetitive Peak Off-State Voltage (Note 1)	V_{DRM}	6000	V
Repetitive Peak Reverse Voltage	V_{RRM}	17	V
Peak Turn-Off Current (Note 2)	I_{TGQM}	3000	A
R.M.S On-State Current (Note 3)	$I_{T(RMS)}$	1200	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	400	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}	17	V
Operation Junction Temperature Range	T_j	−40~125	°C
Storage Temperature Range	T_{stg}	−40~150	°C
Mounting Force	—	33.3 ± 4.9	kN

(Note 1) : V_{GK} = −2 V
(Note 2) : V_D = 3000 V, $V_{DM} \leqq$ 5000 V, $C_S \geqq$ 3 μF, $di_{GQ}/dt \geqq$ 40 A / μs, $V_{DSP} \leqq$ 1000 V, $L_S \leqq$ 0.2 μH
(Note 3) : 50 Hz Half Sine Waveform
(Note 4) : $V_D \leqq$ 4000 V, $I_{TM} \leqq$ 3000 A, $I_G \geqq$ 35 A ($t_r \leqq$ 1 μs), f ≦ 50 Hz, $C_S \leqq$ 6 μF, $R_S \geqq$ 5 Ω, 25°C ≦ T_j ≦ 125°C
(Note 5) : Ambient Temperature of coaxial gate-cathode lead = 90°C

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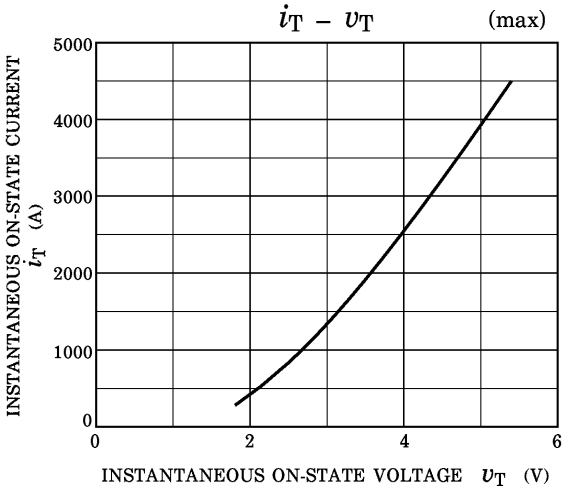
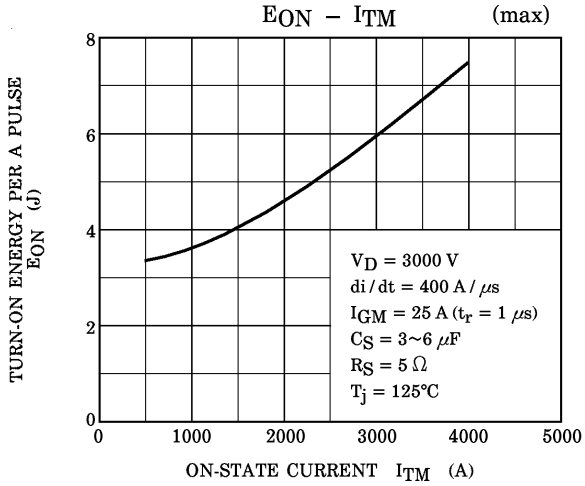
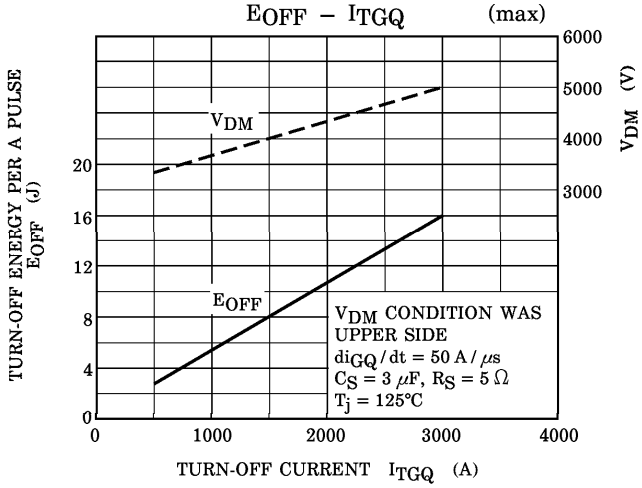
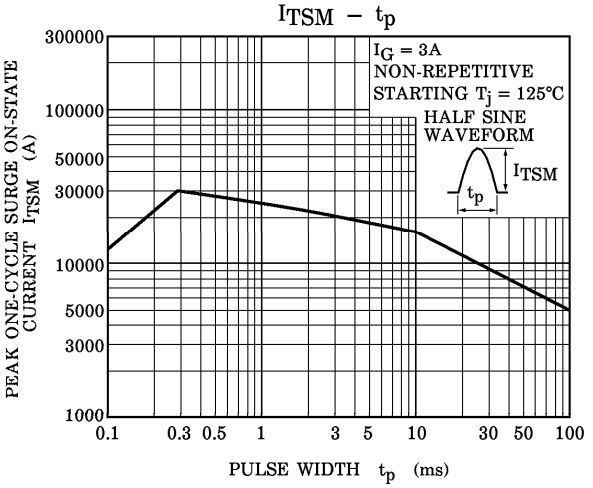
ELECTRICAL CARACTERISTICS

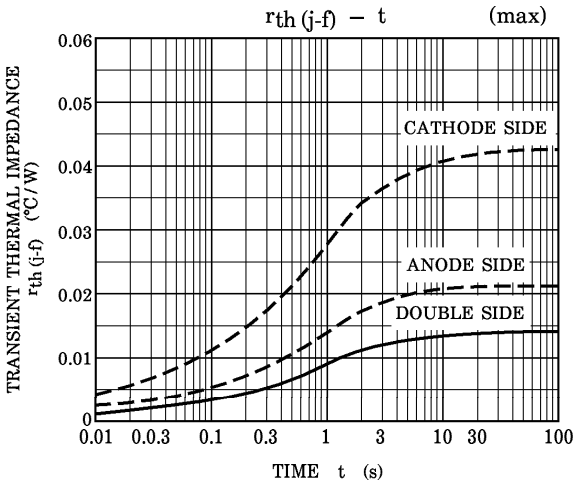
CHARACTERISTICS	SYMBOL	TEST CONDITION		MIN	TYP.	MAX	UNIT
Repetitive Peak Off-State Current	I_{DRM}	V_{DRM} = 6000 V, V_{GK} = −2 V T_j = 125°C		—	—	200	mA
Repetitive Peak Reverse Current	I_{RRM}	V_{RRM} = 17 V T_j = 125°C		—	—	10	mA
Repetitive Peak Reverse Gate Current	I_{RGM}	V_{RGM} = 17 V T_j = 125°C		—	—	10	mA
Peak On-State Voltage	V_{TM}	I_{TM} = 3000 A, T_j = 125°C		—	—	4.3	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 = −40°C	—	—	—	A
			T_j = 25°C	—	—	3.5	A
Turn-On Delay Time	t_d	V_D = 3000 V, I_{TM} = 3000 A di / dt = 400 A / μs		—	—	3.0	μs
Turn-On Time	t_{gt}	I_{GM} = 35 A (t_r = 1 μs) T_j = 25°C, non-snubber		—	—	10	μs
Critical Rate of Rise of Off-State Voltage	dv / dt	V_{DRM} = 3000 V T_j = 125°C, V_{GK} = −5 V Exponential Rise		1350	—	—	V / μs
Storage Time	t_s	I_{TGQ} = 3000 A V_{DM} = 5000 V, T_j = 125°C V_D = 3000 V, C_S = 3 μF di_{GQ} / dt = 50 A / μs Off squeeze current ≧ 300 mA		—	—	30	μs
Gate Turn-Off Time	t_{gq}			—	—	33	μs
Tail Time	t_{tail}			—	—	120	μs
Gate Turn-Off Current	I_{GQ}			—	—	850	A
Thermal Resistance	$R_{th\,(j\text{-}f)}$	Junction to fin		—	—	0.014	°C / W


i_T – v_T (max)
INSTANTANEOUS ON-STATE CURRENT i_T (A)
INSTANTANEOUS ON-STATE VOLTAGE v_T (V)
5000
4000
3000
2000
1000
0
0
2
4
6


E_{ON} – I_{TM} (max)
TURN-ON ENERGY PER A PULSE E_{ON} (J)
ON-STATE CURRENT I_{TM} (A)
V_D = 3000 V
di / dt = 400 A / μs
I_{GM} = 25 A (t_r = 1 μs)
C_S = 3~6 μF
R_S = 5 Ω
T_j = 125°C
8
6
4
2
0
0
1000
2000
3000
4000
5000


E_{OFF} – I_{TGQ} (max)
TURN-OFF ENERGY PER A PULSE E_{OFF} (J)
V_{DM} (V)
TURN-OFF CURRENT I_{TGQ} (A)
V_{DM}
E_{OFF}
V_{DM} CONDITION WAS UPPER SIDE
di_{GQ} / dt = 50 A / μs
C_S = 3 μF, R_S = 5 Ω
T_j = 125°C
20
16
12
8
4
0
6000
5000
4000
3000
0
1000
2000
3000
4000


I_{TSM} – t_p
PEAK ONE-CYCLE SURGE ON-STATE CURRENT I_{TSM} (A)
PULSE WIDTH t_p (ms)
I_G = 3A
NON-REPETITIVE
STARTING T_j = 125°C
HALF SINE WAVEFORM
I_{TSM}
t_p
300000
100000
50000
30000
10000
5000
3000
1000
0.1
0.3
0.5
1
3
5
10
30
50
100


$r_{th\,(j\text{-}f)}$ – t (max)
TRANSIENT THERMAL IMPEDANCE $r_{th\,(j\text{-}f)}$ (°C / W)
TIME t (s)
CATHODE SIDE
ANODE SIDE
DOUBLE SIDE
0.06
0.05
0.04
0.03
0.02
0.01
0
0.01
0.03
0.1
0.3
1
3
10
30
100