

TENTATIVE TOSHIBA GATE TURN-OFF THYRISTOR LOWER LOSS, REVERSE CONDUCTING TYPE

SGR3500GXH29

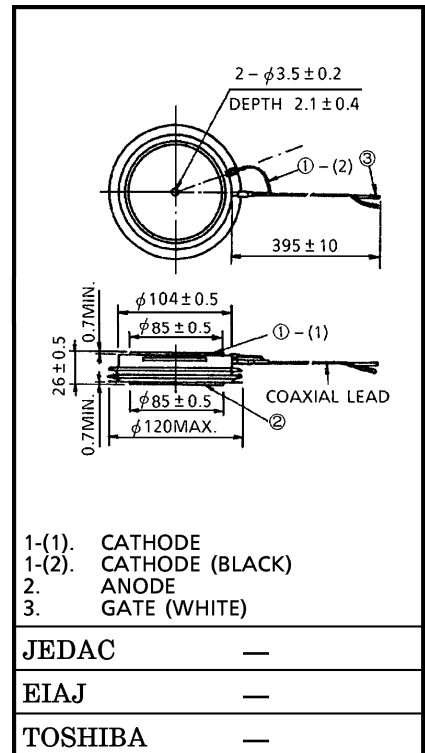
INVERTER APPLICATION

Unit in mm

- Repetitive Peak Off-State Voltage : $V_{DRM} = 4500 \text{ V}$ (Note 1)
- Repetitive Peak Reverse Voltage : $V_{RRM} = 17 \text{ V}$
- R.M.S On-State Current : $I_T (\text{RMS}) = 1200 \text{ A}$
- R.M.S Reverse Current : $I_R (\text{RMS}) = 900 \text{ A}$
- Peak Turn-Off Current : $I_{TGQM} = 3500 \text{ A}$
- Critical Rate of Rise of On-State Current : $di/dt = 600 \text{ A}/\mu\text{s}$
- Critical Rate of Rise of Off-State Voltage : $dv/dt = 1000 \text{ V}/\mu\text{s}$

MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	RATING	UNIT
Repetitive Peak Off-State Voltage (Note 1)	V_{DRM}	4500	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)	$I_T (\text{RMS})$	1200	A
R.M.S Reverse Current (Note 3)	$I_R (\text{RMS})$	900	A
Peak One Cycle Surge On-State Current (Non Repetitive, 10 ms-Width Half Sine Waveform)	I_{TSM}	16000	A
Peak One Cycle Surge Reverse Current (Non Repetitive, 10ms-Width Half Sine Waveform)	I_{RSM}	14000	A
Critical Rate of Rise of On-State Current (Note 4)	di/dt	600	A / μs
Average Forward Gate Power Dissipation	$P_{FG} (\text{AV})$	50	W
Average Reverse Gate Power Dissipation	$P_{RG} (\text{AV})$	230	W
R.M.S Gate Current (Note 5)	$I_G (\text{RMS})$	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	—	39.2~44.1	kN



Weight : 1700 g

(Note 1) : $V_{GK} = -2 \text{ V}$

(Note 2) : $V_D = 2250 \text{ V}$, $V_{DM} \leq 3600 \text{ V}$, $C_S \geq 4.0 \mu\text{F}$, $di_{GQ}/dt \geq 50 \text{ A}/\mu\text{s}$, $V_{DSP} \leq 1030 \text{ V}$, $L_S \leq 100 \text{ nH}$

(Note 3) : 50 Hz Half Sine Waveform, $T_f = 77^\circ\text{C}$

(Note 4) : $V_D \leq 2250 \text{ V}$, $I_{TM} \leq 4500 \text{ A}$, $I_G \geq 100 \text{ A}$ ($t_r \leq 1 \mu\text{s}$), $f \leq 50 \text{ Hz}$, $C_S \leq 0.5 \mu\text{F}$, $R_S \geq 5 \Omega$, $25^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$

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

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ELECTRICAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT	
Repetitive Peak Off-State Current	I_{DRM}	$V_{DRM} = 4500 \text{ V}$, $V_{GK} = -2 \text{ V}$ $T_j = 125^\circ\text{C}$	—	—	100	mA	
Repetitive Peak Reverse Current	I_{RRM}	$V_{RRM} = 17 \text{ V}$ $T_j = 125^\circ\text{C}$	—	—	10	mA	
Repetitive Peak Reverse Gate Current	I_{RGM}	$V_{RGM} = 17 \text{ V}$ $T_j = 125^\circ\text{C}$	—	—	10	mA	
Peak On-State Voltage	V_{TM}	$I_{TM} = 3000 \text{ A}$, $T_j = 125^\circ\text{C}$	—	—	3.0	V	
Peak Reverse Voltage	V_{RM}	$I_{RM} = 3000 \text{ A}$, $T_j = 125^\circ\text{C}$	—	—	3.0	V	
Gate Trigger Voltage	V_{GT}	$V_D = 24 \text{ V}$ $R_L = 0.1 \Omega$	$T_j = -40^\circ\text{C}$	—	—	—	V
			$T_j = 25^\circ\text{C}$	—	—	1.2	V
Gate Trigger Current	I_{GT}		$T_j = -40^\circ\text{C}$	—	—	—	A
			$T_j = 25^\circ\text{C}$	—	1.8	—	A
Turn-On Delay Time	t_d	$V_D = 2800 \text{ V}$, $I_{TM} = 3000 \text{ A}$ $di_F/dt = 600 \text{ A}/\mu\text{s}$	—	—	3.0	μs	
Turn-On Time	t_{gt}	$I_{GM} = 30 \text{ A}$ ($t_r = 1 \mu\text{s}$) $T_j = 25^\circ\text{C}$, non-snubber	—	—	10	μs	
Critical Rate of Rise of Off-State Voltage	dv/dt	$V_{DRM} = 3000 \text{ V}$ $T_j = 125^\circ\text{C}$, $V_{GK} = -5 \text{ V}$ Exponential Rise	1000	—	—	$\text{V}/\mu\text{s}$	
Storage Time	t_s	$I_{TGQ} = 3500 \text{ A}$, $L_S = 0.2 \mu\text{H}$ $V_{DM} = 3600 \text{ V}$, $T_j = 125^\circ\text{C}$	—	31	—	μs	
Gate Turn-Off Time	t_{gq}	$V_D = 2250 \text{ V}$, $C_S = 4 \mu\text{F}$ $di_{GQ}/dt = 50 \text{ A}/\mu\text{s}$	—	34	—	μs	
Tail Time	t_{tail}	Off squeeze current $\geq 600 \text{ mA}$	—	—	—	μs	
Gate Turn-Off Current	I_{GQ}	Off squeeze current $\geq 600 \text{ mA}$	—	1100	—	A	
Thermal Resistance	$R_{th(j-f)}$	Junction to fin (DC)	GTO side	—	0.015	$^\circ\text{C}/\text{W}$	
			FRD side	—	0.020		
Commutating Critical Rate of Rise of Off-State Voltage	$dv/dt(c)$	$I_{RM} = 3500 \text{ A}$, $V_D = 1500 \text{ V}$ $di_R/dt = 300 \text{ A}/\mu\text{s}$, $V_{DM} = 3000 \text{ V}$ $C_S = 3.5 \mu\text{F}$, $V_{GK} = -15 \text{ V}$	350	—	—	$\text{V}/\mu\text{s}$	
Reverse Recovery Charge	Q_{rr}	$I_T = 2 \text{ kA}$, $di_R/dt = 600 \text{ A}/\mu\text{s}$ $V_{DM} = 3600 \text{ V}$, $T_j = 125^\circ\text{C}$ $C_S = 4 \mu\text{F}$, $R_S = 5 \Omega$	—	—	—	μC	

