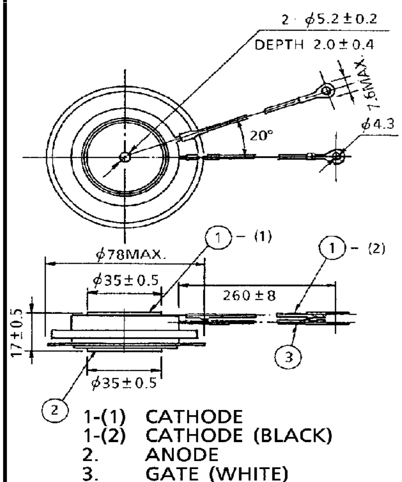
TOSHIBA ALLOY-FREE REVERSE CONDUCTING THYRISTOR

SHR400R22

HIGH POWER CONTROL APPLICATIONS

Unit in mm

- Repetitive Peak Off-State Voltage : V_{DRM}=1300V
- R.M.S On-State Current : $I_{T(RMS)}$=630A
- Turn-Off Time : t_q=40μs (Max.)
- Flat Package



JEDEC	—
EIAJ	—
TOSHIBA	13-78D1A

Weight : 260g

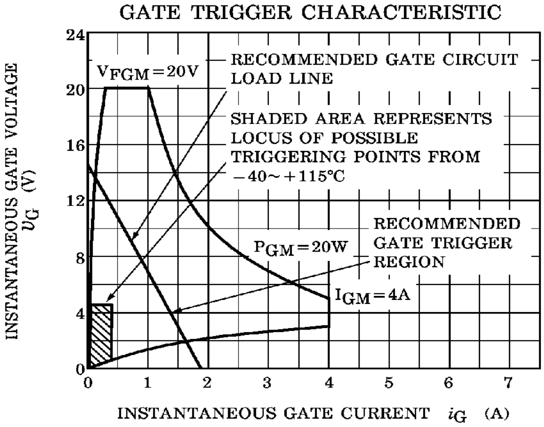
MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	RATING	UNIT
Repetitive Peak Off-State Voltage	V_{DRM}	1300	V
Non-Repetitive Peak Off-State Voltage (Non-Repetitive<5ms, T_j=0~115°C)	V_{DSM}	1300	V
R.M.S On-State Current	$I_{T(RMS)}$	630	A
R.M.S Reverse Current	$I_{R(RMS)}$	235	
Average On-State Current	$I_{T(AV)}$	400	A
Average Reverse Current	$I_{R(AV)}$	150	
Peak One Cycle Surge On-State Current (Non-Repetitive)	I_{TSM}	7200 (50Hz)	A
		8000 (60Hz)	
Peak One Cycle Surge Reverse Current (Non-Repetitive)	I_{RSM}	2500 (50Hz)	
		2750 (60Hz)	
I^2t Limit Value	I^2t	200×10^3 (On-Current)	A^2s
		31×10^3 (Reverse Current)	
Critical Rate of Rise of On-State Current	di / dt	100	A / μs
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	—	1350~1650	kg

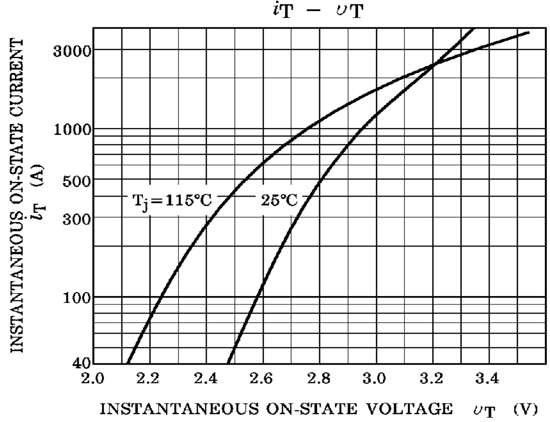
ELECTRICAL CHARACTERISTICS

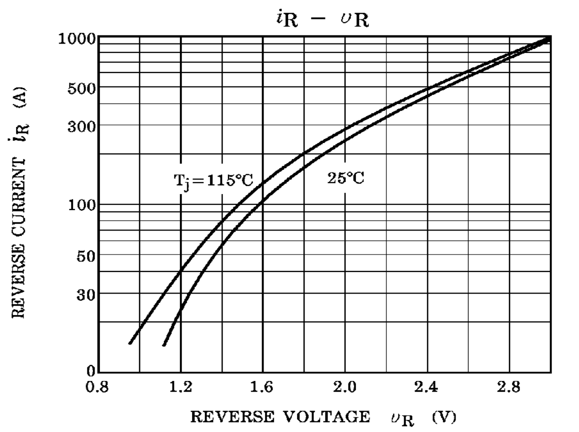
CHARACTERISTIC	SYMBOL	TEST CONDITION		MIN.	MAX.	UNIT
Repetitive Peak Off-State Current	I_{DRM}	V_{DRM} = Rated, T_j = 115°C		—	35	mA
Peak On-State Voltage	V_{TM}	I_{TM} = 1250A, T_j = 25°C		—	3.0	V
Peak Reverse Voltage	V_{RM}	I_{RM} = 500A, T_j = 25°C		—	2.5	V
Gate Trigger Voltage	V_{GT}	V_D = 6V, R_L = 6Ω	Tc = −40°C	—	4.5	V
			Tc = 25°C	—	3.0	
Gate Trigger Current	I_{GT}		Tc = −40°C	—	400	mA
			Tc = 25°C	—	200	
Gate Non-Trigger Voltage	V_{GD}	V_D = 1 / 2 Rated, T_j = 115°C		0.15	—	V
Gate Non-Trigger Current	I_{GD}			1.5	—	mA
Delay Time	t_d	V_D = 1 / 2 Rated, T_j = 25°C, Gate Supply (V_G = 15V, R_G = 8Ω, $t_r \leqq 1\mu$s)		—	4	μs
Gate Turn-On Time	t_{gt}			—	6	μs
Turn-Off Time	t_q	I_{TM} = 400A, I_R = 10A, V_{DRM} = 1 / 2 Rated, dv / dt (C) = 200V / μs, T_j = 115°C		—	40	μs
Holding Current	I_H	T_j = 25°C, R_L = 6Ω		—	500	mA
Critical Rate of Rise of Commutating OFF-State Voltage	dv / dt (C)	I_{TM} = 2000A, I_{RM} = 1000A, V_{DRM} = 1 / 2 Rated, Pulse width 60μs, T_j = 115°C		200	—	V / μs
Thermal Resistance (Junction to Case)	$R_{th\ (j\text{-}f)}$	DC		—	0.04	°C / W
Critical Rate of Rise of Off-State Voltage	dv / dt	V_D = 650V, T_j = 115°C, Gate Open, Exponential Rise		1000	—	V / μs

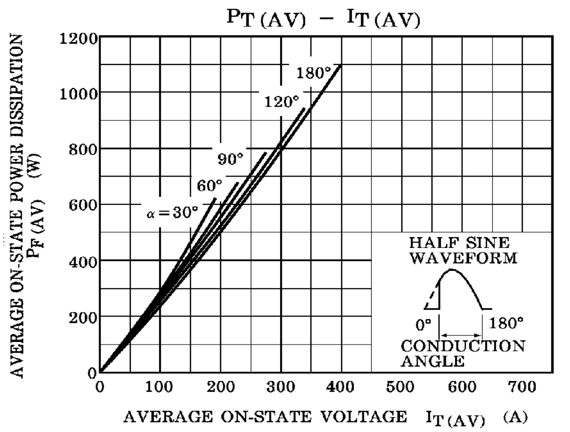
GATE TRIGGER CHARACTERISTIC

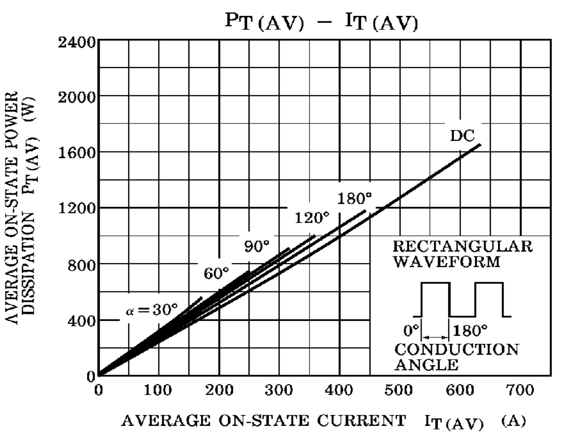


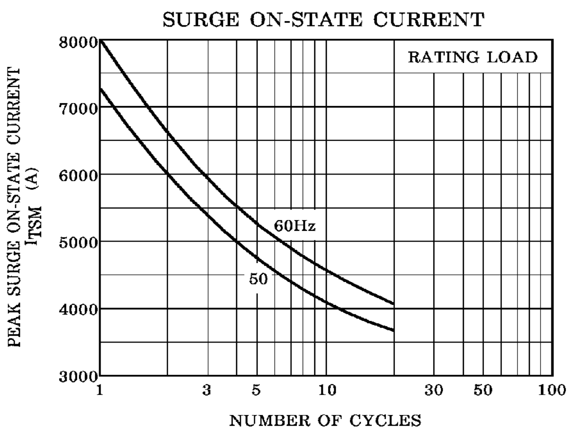
i_T − v_T

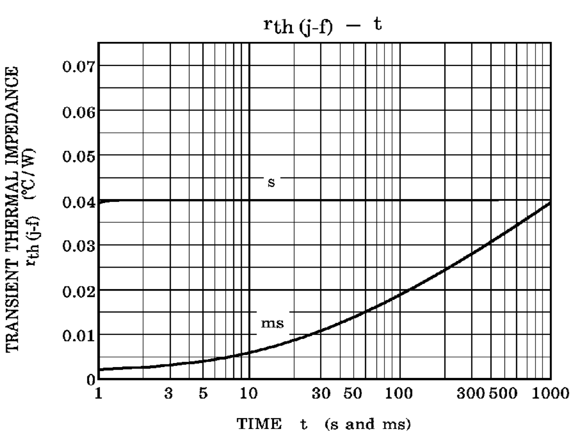



i_R − υ_R
REVERSE CURRENT i_R (A)
REVERSE VOLTAGE υ_R (V)
T_j=115°C
25°C


$P_{T(AV)}$ − $I_{T(AV)}$
AVERAGE ON-STATE POWER DISSIPATION $P_{F(AV)}$ (W)
AVERAGE ON-STATE VOLTAGE $I_{T(AV)}$ (A)
180°
120°
90°
60°
α=30°
HALF SINE WAVEFORM
0°
180°
CONDUCTION ANGLE


$P_{T(AV)}$ − $I_{T(AV)}$
AVERAGE ON-STATE POWER DISSIPATION $P_{T(AV)}$ (W)
AVERAGE ON-STATE CURRENT $I_{T(AV)}$ (A)
DC
180°
120°
90°
60°
α=30°
RECTANGULAR WAVEFORM
0°
180°
CONDUCTION ANGLE


SURGE ON-STATE CURRENT
PEAK SURGE ON-STATE CURRENT I_{TSM} (A)
NUMBER OF CYCLES
RATING LOAD
60Hz
50


$r_{th(j-f)}$ − t
TRANSIENT THERMAL IMPEDANCE $r_{th(j-f)}$ (°C/W)
TIME t (s and ms)
s
ms