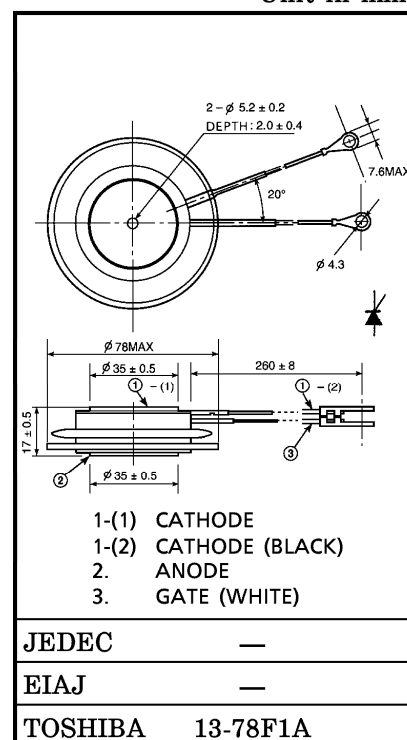## TOSHIBA ALLOY-FREE HIGHT SPEED THYRISTOR
SH400R33B

HIGH POWER CONTROL APPLICATIONS

Unit in mm

- Repetitive Peak Off-State Voltage : V_{DRM} }
- Repetitive Peak Reverse Voltage : V_{RRM} } $=1300V$

- Average On-State Current : $I_{T(AV)}=400A$

- Turn-Off Time : $t_q=25\mu s$ (Max.)

- Critical Rate of Rise of On-State Current
  : $di/dt=200A/\mu s$

- Critical Rate of Rise of Off-State Voltage
  : $dv/dt=500V/\mu s$

- Weight : 260g

- Flat Package

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

JEDEC	—
EIAJ	—
TOSHIBA	13-78F1A

961001EAA1

MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	RATING	UNIT
Repetitive Peak Off-State Voltage and Repetitive Peak Reverse Voltage	V_{DRM} V_{RRM}	1300	V
Non-Repetitive Peak Reverse Voltage (Non-Repetitive<5ms, T_j=0~125°C)	V_{RSM}	1400	V
R.M.S On-State Current	$I_{T(RMS)}$	628	A
Average On-State Current	$I_{T(AV)}$	400	A
Peak One Cycle Surge On-State Current (Non-Repetitive)	I_{TSM}	8000 (50Hz) / 8800 (60Hz)	V
I^2t Limit Value	I^2t	3.2×10^5	A^2s
Critical Rate of Rise of On-State Current (Note)	di / dt	200	$A/\mu s$
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	—	14.7±1.5	kN

Note : V_D=650V, f=50Hz, T_j=110°C, Gate Supply (V_G=15V, R_G=8Ω, $t_r \leq 1\mu s$)

ELECTRICAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITION		MIN.	MAX.	UNIT
Repetitive Peak Off-State Current and Repetitive Peak Reverse Current	I_{DRM} I_{RRM}	$V_{DRM} = V_{RRM} = 1300V$ $T_j = 115°C$		—	50	mA
Peak On-State Voltage	V_{TM}	$I_{TM} = 1250A$, $T_j = 25°C$		—	2.2	V
Gate Trigger Voltage	V_{GT}	$V_D = 6V$, $R_L = 6\Omega$	$T_j = -40°C$	—	4.5	V
			$T_j = 25°C$	—	3.5	
Gate Trigger Current	I_{GT}		$T_j = -40°C$	—	400	mA
			$T_j = 25°C$	—	260	
Gate Non-Trigger Voltage	V_{GD}	$V_D = 650V$, $T_j = 115°C$		0.2	—	V
Gate Non-Trigger Current	I_{GD}			5	—	mA
Delay Time	t_d	$V_D = 650V$, $T_j = 25°C$ Gate Supply ($V_G = 15V$, $R_G = 8\Omega$, $t_r \leqq 1\mu s$)		—	4	μs
Gate Turn-On Time	t_{gt}			—	6	μs
Turn-Off Time	t_q	$I_{TM} = 800A$, $V_R \geqq 50V$ $dv / dt = 20V / \mu s$, $T_j = 110°C$ $V_{DRM} = 650V$		—	25	μs
Holding Current	I_H	$T_j = 25°C$, $R_L = 6\Omega$		—	400	mA
Critical Rate of Rise of Off-State Voltage	dv / dt	$V_{DRM} = 870V$, $T_j = 115°C$ Gate Open, Exponential Rise		500	—	$V / \mu s$
Thermal Resistance (Junction to Case)	$R_{th (j-f)}$	DC		—	0.04	$°C / W$

GATE TRIGGER CHARACTERISTIC

INSTANTANEOUS GATE VOLTAGE v_G (V)

$V_{FGM} = 20V$

RECOMMENDED GATE TRIGGER REGION

SHADED AREA REPRESENTS LOCUS OF POSSIBLE TRIGGERING POINTS FROM $-40 \sim 115°C$

RECOMMENDED GATE CIRCUIT LOAD LINE

$P_{GM} = 20W$

$I_{GM} = 4A$

INSTANTANEOUS GATE CURRENT i_G (A)

$i_T - v_T$

INSTANTANEOUS ON-STATE CURRENT i_T (A)

$T_j = 115°C$ / 25

INSTANTANEOUS ON-STATE VOLTAGE v_T (V)

SURGE ON-STATE CURRENT

PEAK SURGE ON-STATE CURRENT I_{TSM} (A)

RATING LOAD

60Hz

50

NUMBER OF CYCLES

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

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

s

ms

TIME t (ms and s)