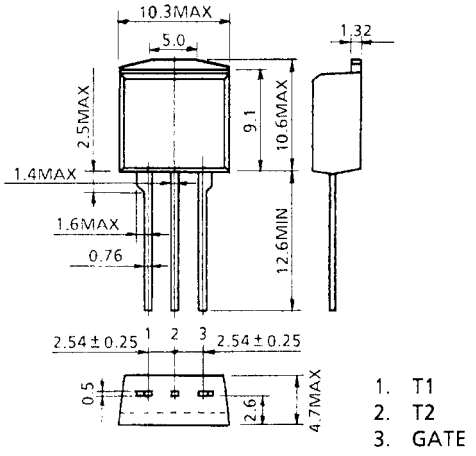
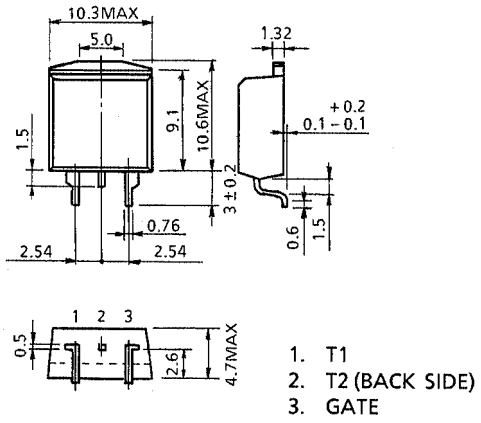
TOSHIBA BI-DIRECTIONAL TRIODE THYRISTOR SILICON PLANAR TYPE

SM12G48,USM12G48,SM12J48,USM12J48 SM12G48A,USM12G48A,SM12J48A,USM12J48A

AC POWER CONTROL APPLICATIONS

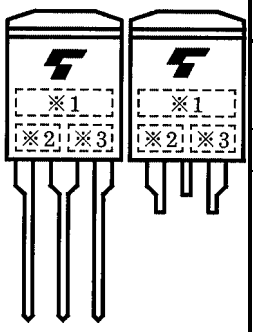
- Repetitive Peak Off-State Voltage : V_{DRM}=400, 600V
- R.M.S. On-State Current : $I_{T\ (RMS)}$ =12A
- Gate Trigger Current : I_{GT}=30mA Max.
  : I_{GT}=20mA Max. ("A"Type)

Unit in mm

SM12G48, SM12J48, SM12G48A, SM12J48A	USM12G48, USM12J48, USM12G48A, USM12J48A
	
JEDEC —	JEDEC —
JEITA —	JEITA —
TOSHIBA 13-10J1A	TOSHIBA 13-10J2A

Weight : 1.7g

MARKING



NUMBER	SYMBOL		MARK
*1	TYPE	SM12G48, SM12G48A, USM12G48, USM12G48A	SM12G48
		SM12J48, SM12J48A, USM12J48, USM12J48A	SM12J48
*2		SM12G48A,SM12J48A,USM12G48A,USM12J48A	A
*3	Lot Number □□ ← Month (Starting from Alphabet A) Year (Last Decimal Digit of the Year of Manufacture)		Example 8A : January 1998 8B : February 1998 8L : December 1998

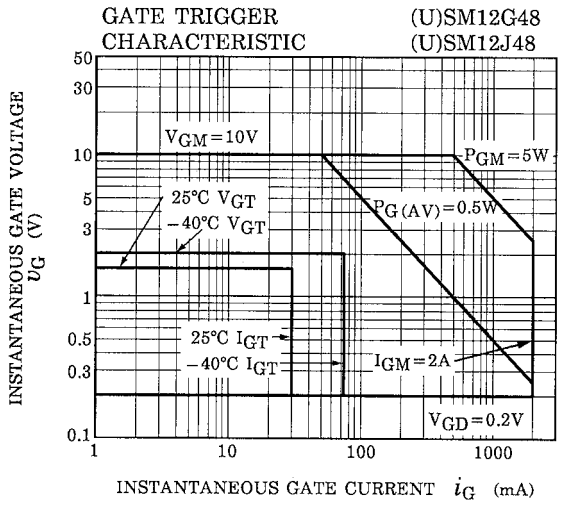
MAXIMUM RATINGS

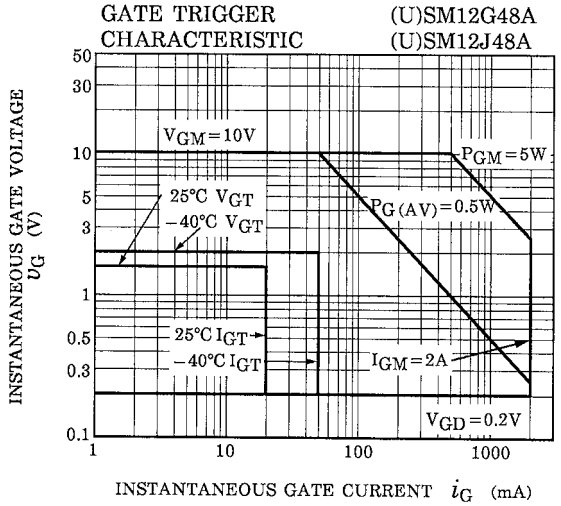
CHARACTERISTIC		SYMBOL	RATING	UNIT
Repetitive Peak Off-State Voltage	(U)SM12G48 (U)SM12G48A	V_{DRM}	400	V
	(U)SM12J48 (U)SM12J48A		600	
R.M.S On-State Current		$I_{T\ (RMS)}$	12	A
Peak One Cycle Surge On-State Current (Non-Repetitive)		I_{TSM}	120 (50Hz)	A
			132 (60Hz)	
I^2t Limit Value		I^2t	72	A^2s
Critical Rate of Rise of On-State Current (Note 1)		di /dt	50	A / μs
Peak Gate Power Dissipation		P_{GM}	5	W
Average Gate Power Dissipation		$P_{G\ (AV)}$	0.5	W
Peak Forward Gate Voltage		V_{GM}	10	V
Peak Forward Gate Current		I_{GM}	2	A
Junction Temperature		T_j	−40~125	°C
Storage Temperature Range		T_{stg}	−40~125	°C

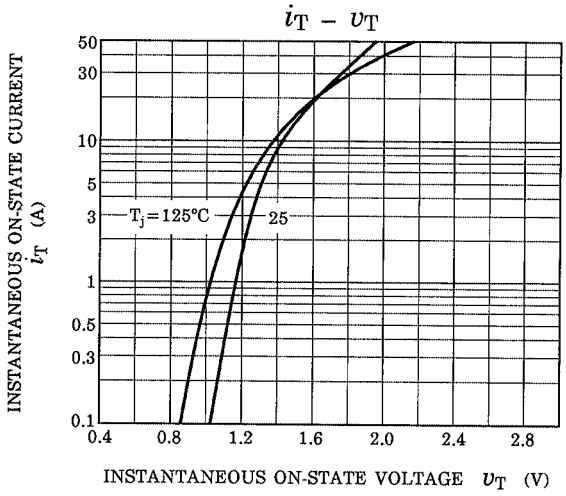
Note 1 : V_{DRM}=0.5×Rated
I_{TM}≤15A
t_{gw}≥10μs
t_{gr}≤250ns
i_{gp}=I_{GT}×2.0

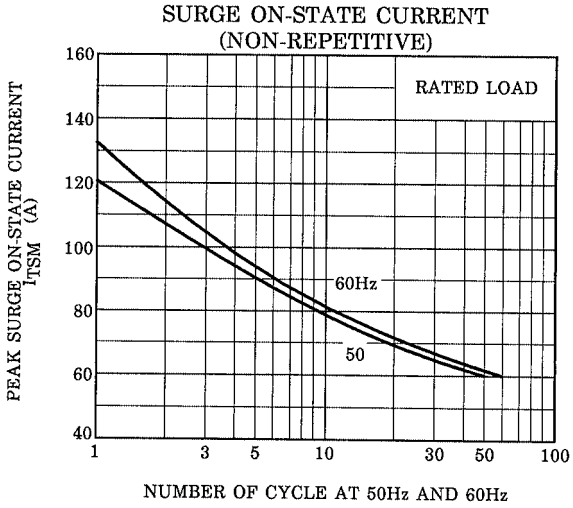
ELECTRICAL CHARACTERISTICS (Ta=25°C)

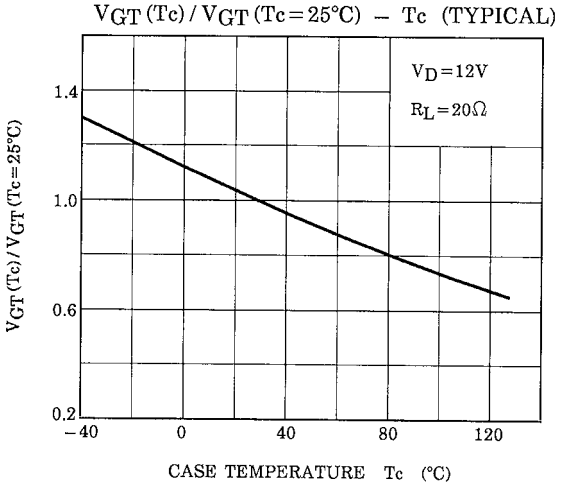
CHARACTERISTIC			SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Repetitive Peak Off-State Current			I_{DRM}	V_{DRM}=Rated		—	—	20	μA
Gate Trigger Voltage		I	V_{GT}	V_D=12V R_L=20Ω	T2 (+) , Gate (+)	—	—	1.5	V
		II			T2 (+) , Gate (−)	—	—	1.5	
		III			T2 (−) , Gate (−)	—	—	1.5	
		IV			T2 (−) , Gate (+)	—	—	—	
Gate Trigger Current	SM12G48 SM12J48	I	I_{GT}	V_D=12V R_L=20Ω	T2 (+) , Gate (+)	—	—	30	mA
		II			T2 (+) , Gate (−)	—	—	30	
		III			T2 (−) , Gate (−)	—	—	30	
		IV			T2 (−) , Gate (+)	—	—	—	
	SM12G48A SM12J48A	I			T2 (+) , Gate (+)	—	—	20	
		II			T2 (+) , Gate (−)	—	—	20	
		III			T2 (−) , Gate (−)	—	—	20	
		IV			T2 (−) , Gate (+)	—	—	—	
Peak On-State Voltage			V_{TM}	I_{TM}=17A		—	—	1.5	V
Gate Non-Trigger Voltage			V_{GD}	V_D=Rated, Tc=125°C		0.2	—	—	V
Holding Current			I_H	V_D=12V, I_{TM}=1A		—	—	50	mA
Thermal Resistance			$R_{th\ (j-c)}$	Junction to Case, AC		—	—	2.4	°C / W
Critical Rate of Rise of Off-State Voltage	(U)SM12G48 (U)SM12J48		dv / dt	V_{DRM}=Rated, T_j=125°C Exponential Rise		—	300	—	V / μs
	(U)SM12G48A (U)SM12J48A					—	200	—	
Critical Rate of Rise of Off-State Voltage at Commutation	(U)SM12G48 (U)SM12J48		(dv / dt) c	V_{DRM}=400V, T_j=125°C (di / dt) c=−6.5A / ms		10	—	—	V / μs
	(U)SM12G48A (U)SM12J48A					4	—	—	

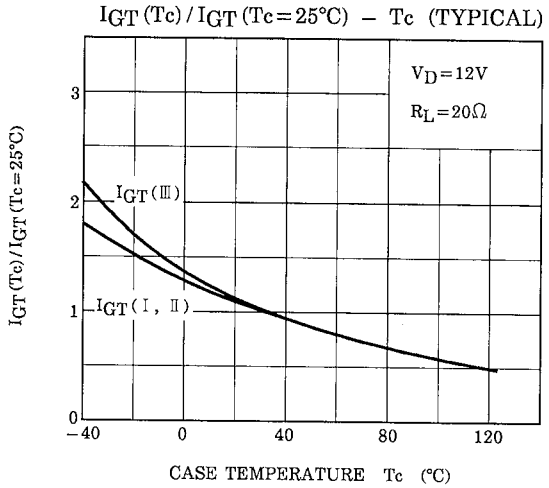

GATE TRIGGER CHARACTERISTIC
(U)SM12G48
(U)SM12J48
INSTANTANEOUS GATE VOLTAGE v_G (V)
V_{GM}=10V
P_{GM}=5W
25°C V_{GT}
−40°C V_{GT}
$P_{G(AV)}$=0.5W
25°C I_{GT}
−40°C I_{GT}
I_{GM}=2A
V_{GD}=0.2V
INSTANTANEOUS GATE CURRENT i_G (mA)


GATE TRIGGER CHARACTERISTIC
(U)SM12G48A
(U)SM12J48A
INSTANTANEOUS GATE VOLTAGE v_G (V)
V_{GM}=10V
P_{GM}=5W
25°C V_{GT}
−40°C V_{GT}
$P_{G(AV)}$=0.5W
25°C I_{GT}
−40°C I_{GT}
I_{GM}=2A
V_{GD}=0.2V
INSTANTANEOUS GATE CURRENT i_G (mA)

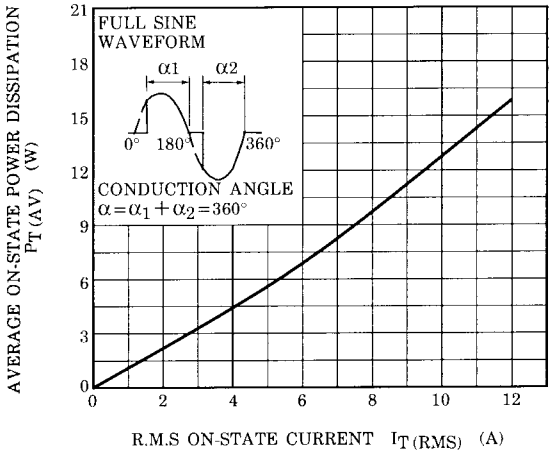

$i_T - v_T$
INSTANTANEOUS ON-STATE CURRENT i_T (A)
T_j=125°C
25
INSTANTANEOUS ON-STATE VOLTAGE v_T (V)


SURGE ON-STATE CURRENT
(NON-REPETITIVE)
RATED LOAD
PEAK SURGE ON-STATE CURRENT I_{TSM} (A)
60Hz
50
NUMBER OF CYCLE AT 50Hz AND 60Hz

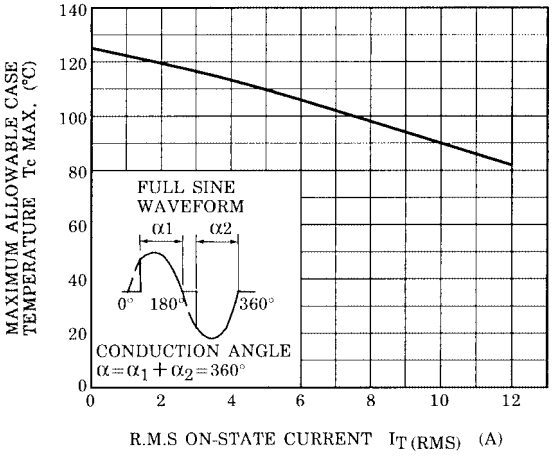

V_{GT} (Tc) / V_{GT} (Tc=25°C) − Tc (TYPICAL)
V_D=12V
R_L=20Ω
V_{GT} (Tc) / V_{GT} (Tc=25°C)
CASE TEMPERATURE Tc (°C)


I_{GT} (Tc) / I_{GT} (Tc=25°C) − Tc (TYPICAL)
V_D=12V
R_L=20Ω
I_{GT} (Tc) / I_{GT} (Tc=25°C)
I_{GT} (Ⅲ)
I_{GT} (Ⅰ, Ⅱ)
CASE TEMPERATURE Tc (°C)

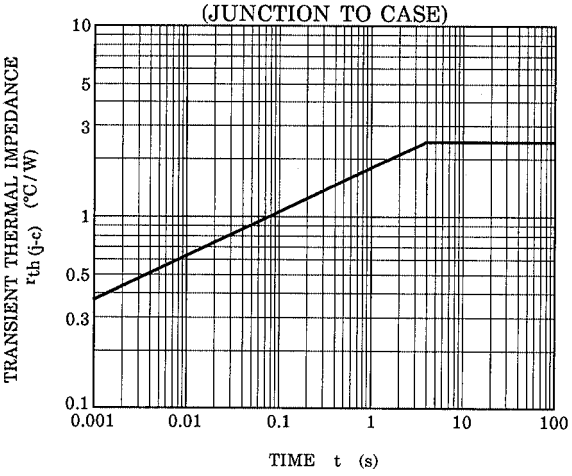
$P_{T(AV)}$ – $I_{T(RMS)}$



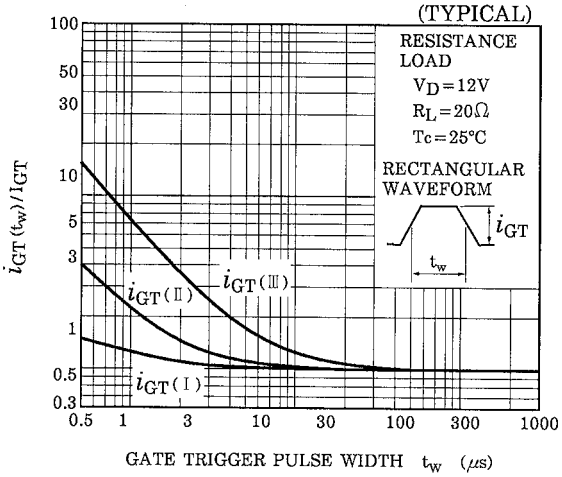
Tc MAX. – $I_{T(RMS)}$



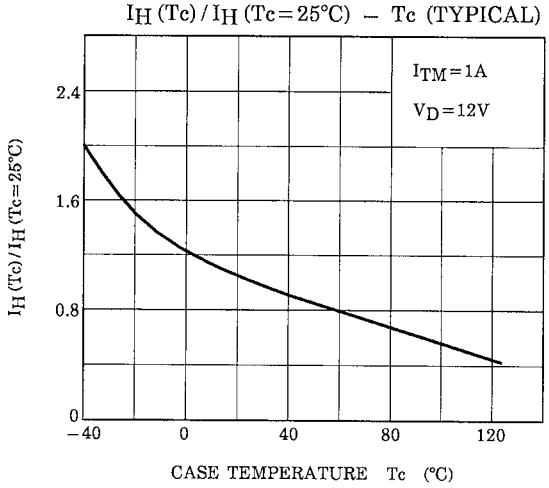
TRANSIENT THERMAL IMPEDANCE (JUNCTION TO CASE)



PULSE TRIGGER CHARACTERISTIC (TYPICAL)



I_H (Tc) / I_H (Tc=25°C) – Tc (TYPICAL)



RESTRICTIONS ON PRODUCT USE

000707EAA

- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.
  In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the “Handling Guide for Semiconductor Devices,” or “TOSHIBA Semiconductor Reliability Handbook” etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury (“Unintended Usage”). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer’s own risk.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.