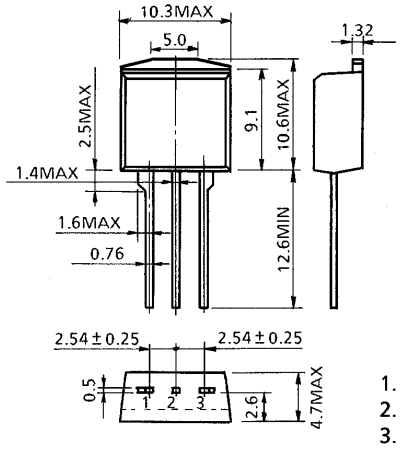
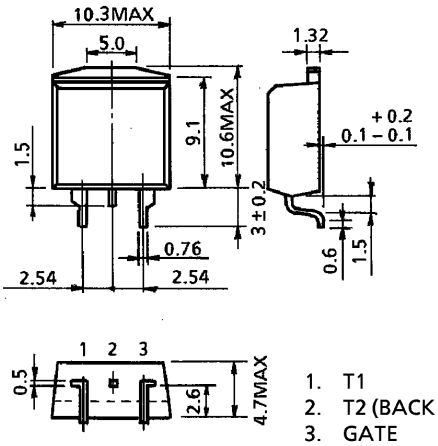
TOSHIBA BI-DIRECTIONAL TRIODE THYRISTOR SILICON PLANAR TYPE

SM16G48, USM16G48, SM16J48, USM16J48
SM16G48A, USM16G48A, SM16J48A, USM16J48A

AC POWER CONTROL APPLICATIONS

- Repetitive Peak Off-State Voltage : V_{DRM} = 400, 600V
- R.M.S On-State Current : $I_{T(RMS)}$ = 16A
- Gate Trigger Current : I_{GT} = 30mA Max.
  : I_{GT} = 20mA Max. ("A"Type)

Unit in mm

SM16G48, SM16J48, SM16G48A, SM16J48A	USM16G48, USM16J48, USM16G48A, USM16J48A
 1. T1 2. T2 3. GATE	 1. T1 2. T2 (BACK SIDE) 3. GATE
JEDEC —	JEDEC —
EIAJ —	EIAJ —
TOSHIBA 13-10J1A	TOSHIBA 13-10J2A

MAXIMUM RATINGS (Ta = 25°C)

Weight : 1.7g

CHARACTERISTIC		SYMBOL	RATING	UNIT
Repetitive Peak Off-State Voltage	(U)SM16G48 (U)SM16G48A	V_{DRM}	400	V
	(U)SM16J48 (U)SM16J48A		600	
R.M.S On-State Current		$I_{T(RMS)}$	16	A
Peak One Cycle Surge On-State Current (Non-Repetitive)		I_{TSM}	150 (50Hz)	A
			165 (60Hz)	
I^2t Limit Value		I^2t	112.5	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

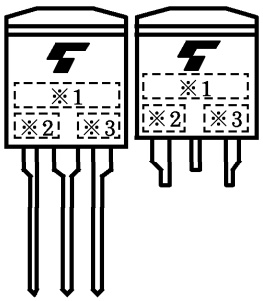
(Note 1) $V_{DRM} = 0.5 \times$ Rated
$I_{TM} \leqq 25A$
$t_{gw} \geqq 10\mu s$
$t_{gr} \leqq 250ns$
$i_{gp} = I_{GT} \times 2.0$

961001EAA2

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

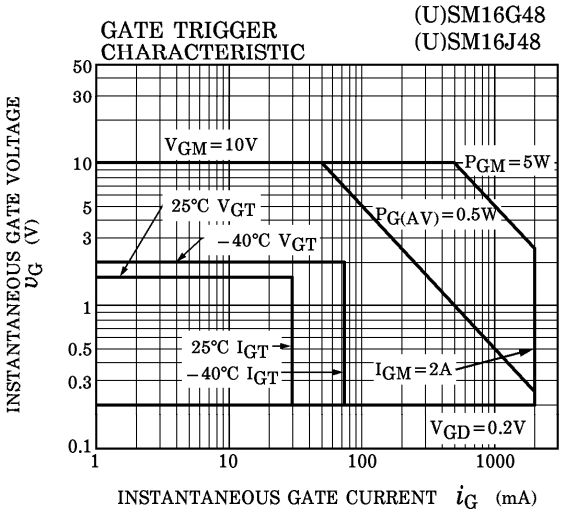
CHARACTERISTIC			SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Repetitive Peak Off-State Current			I_{DRM}	V_{DRM} = Rated		—	—	20	μA
Gate Trigger Voltage		Ⅰ	V_{GT}	V_D = 12V, R_L = 20Ω	T2(+), GATE(+)	—	—	1.5	V
		Ⅱ			T2(+), GATE(−)	—	—	1.5	
		Ⅲ			T2(−), GATE(−)	—	—	1.5	
		Ⅳ			T2(−), GATE(+)	—	1.0	—	
Gate Trigger Current	(U)SM16G48 (U)SM16J48	Ⅰ	I_{GT}	V_D = 12V, R_L = 20Ω	T2(+), GATE(+)	—	—	30	mA
		Ⅱ			T2(+), GATE(−)	—	—	30	
		Ⅲ			T2(−), GATE(−)	—	—	30	
		Ⅳ			T2(−), GATE(+)	—	50	—	
	(U)SM16G48A (U)SM16J48A	Ⅰ			T2(+), GATE(+)	—	—	20	
		Ⅱ			T2(+), GATE(−)	—	—	20	
		Ⅲ			T2(−), GATE(−)	—	—	20	
		Ⅳ			T2(−), GATE(+)	—	30	—	
Peak On-State Voltage			V_{TM}	I_{TM} = 25A		—	—	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			$R_{th\,(j\text{-}c)}$	Junction to Case, AC		—	—	2.0	°C / W
Critical Rate of Rise of Off-State Voltage	(U)SM16G48 (U)SM16J48		dv / dt	V_{DRM} = Rated, T_j = 125°C Exponential Rise		—	300	—	V / μs
	(U)SM16G48A (U)SM16J48A					—	200	—	
Critical Rate of Rise of Off-State Voltage at Commutation	(U)SM16G48 (U)SM16J48		(dv / dt) c	V_{DRM} = 400V, T_j = 125°C (di / dt) c = −8.7A / ms		10	—	—	V / μs
	(U)SM16G48A (U)SM16J48A					4	—	—	

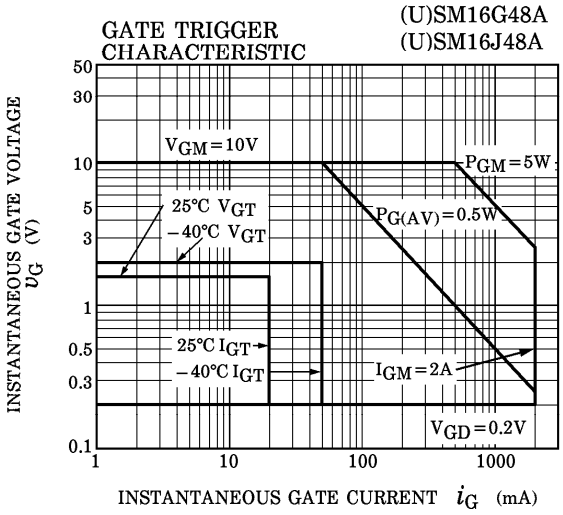
MARKING

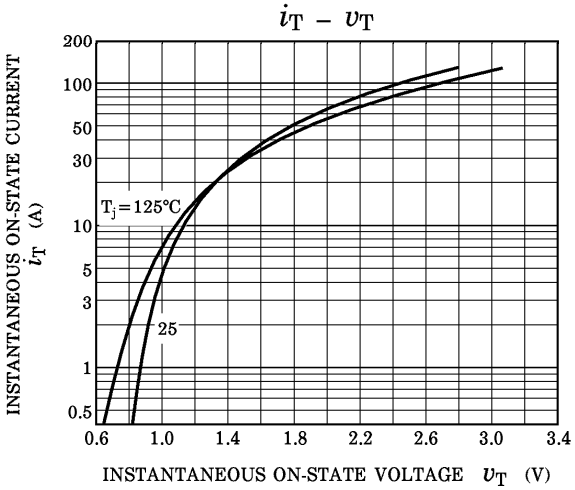


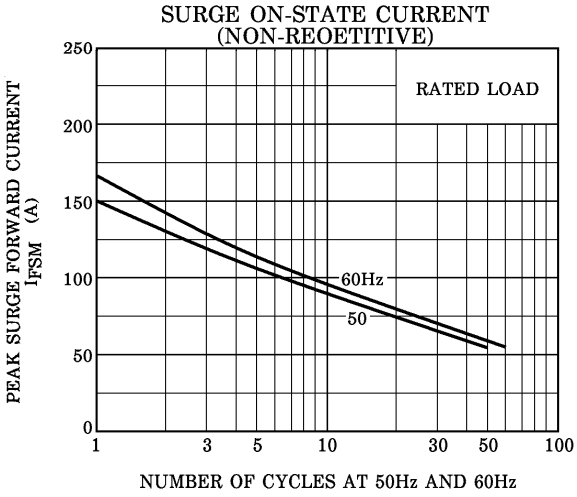
NUMBER	SYMBOL		MARK
※ 1	TYPE	SM16G48, SM16G48A, USM16G48, USM16G48A	M16G48
		SM16J48, SM16J48A, USM16J48, USM16J48A	M16J48
※ 2		SM16G48A,SM16J48A,USM16G48A,USM16J48A	A
※ 3	Lot Number □□ Month (Starting from Alphabet A) Year (Last Decimal Digit of the Current Year)		Example 8A:January 1998 8B:Febrary 1998 8L:December 1998

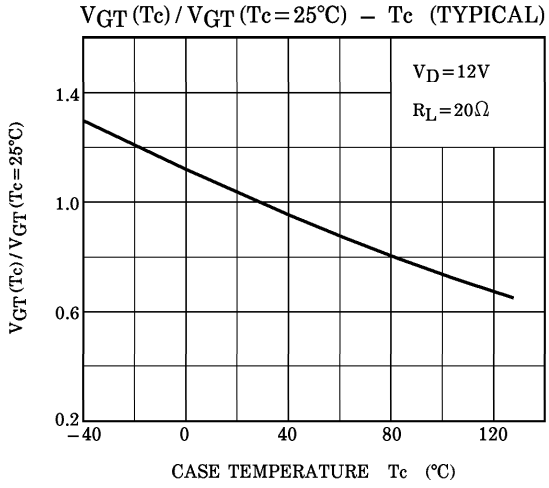
961001EAA2'

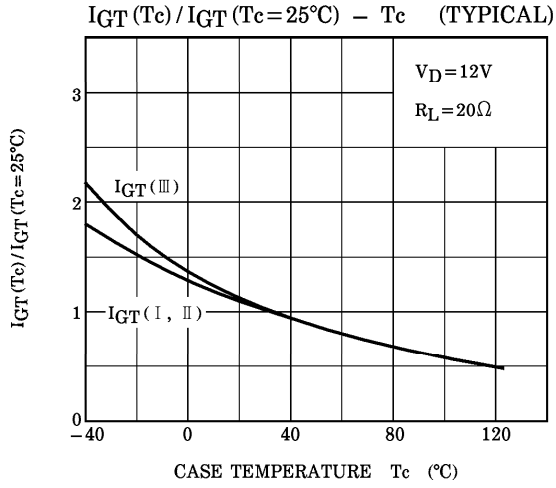

GATE TRIGGER CHARACTERISTIC
(U)SM16G48
(U)SM16J48
INSTANTANEOUS GATE VOLTAGE v_G (V)
V_{GM}=10V
P_{GM}=5W
25°C V_{GT}
−40°C V_{GT}
$P_{G(AV)}$=0.5W
25°C I_{GT}
−40°C I_{GT}
I_{GM}=2A
V_{GD}=0.2V
INSTANTANEOUS GATE CURRENT i_G (mA)


GATE TRIGGER CHARACTERISTIC
(U)SM16G48A
(U)SM16J48A
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)

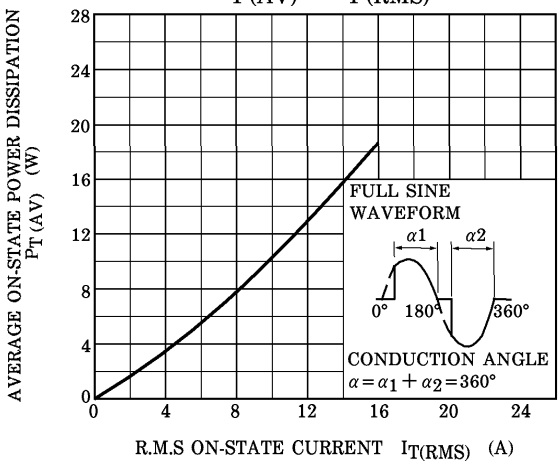

$i_T - v_T$
INSTANTANEOUS ON-STATE CURRENT i_T (A)
T_j=125°C
25
INSTANTANEOUS ON-STATE VOLTAGE v_T (V)


SURGE ON-STATE CURRENT
(NON-REOETITIVE)
RATED LOAD
PEAK SURGE FORWARD CURRENT I_{FSM} (A)
60Hz
50
NUMBER OF CYCLES AT 50Hz AND 60Hz

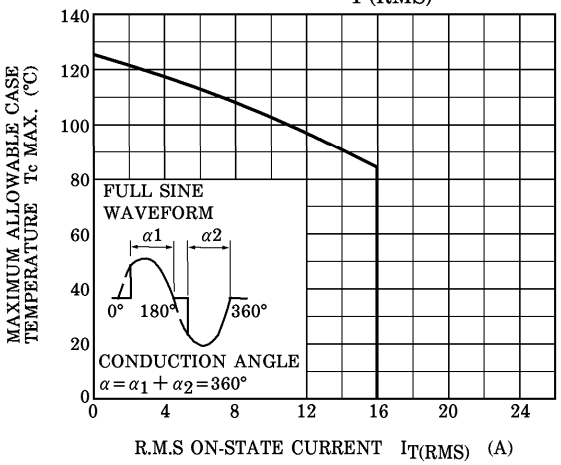

V_{GT} (Tc) / V_{GT} (Tc=25°C) − Tc (TYPICAL)
V_D=12V
R_L=20Ω
V_{GT}(Tc) / V_{GT}(Tc=25°C)
CASE TEMPERATURE Tc (°C)


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

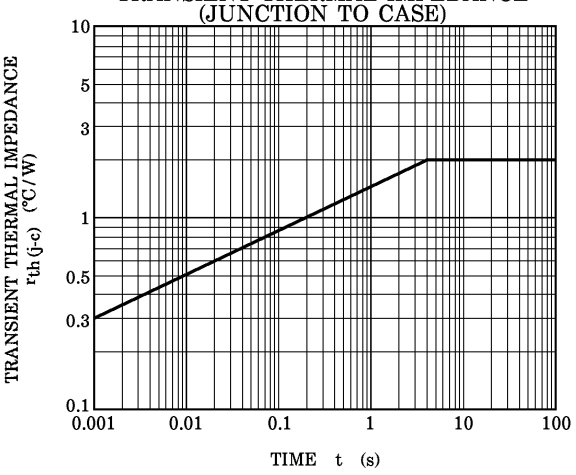
$P_{T(AV)}$ – $I_{T(RMS)}$



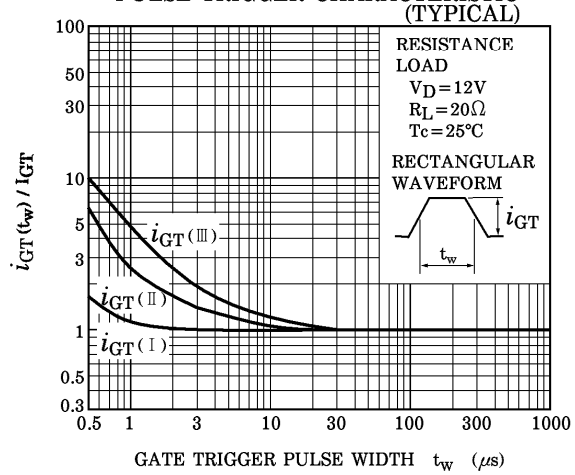
Tc MAX – $I_{T(RMS)}$



TRANSIENT THERMAL IMPEDANCE
(JUNCTION TO CASE)



PULSE TRIGGER CHARACTERISTIC
(TYPICAL)



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