

# TOSHIBA SM16(G,J)48,USM16(G,J)48,SM16(G,J)48A,USM16(G,J)48A

TOSHIBA BI-DIRECTIONAL TRIODE THYRISTOR SILICON PLANAR TYPE

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

### AC POWER CONTROL APPLICATIONS

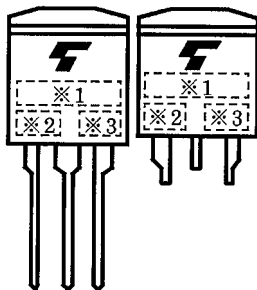
- Repetitive Peak Off-State Voltage :V<sub>DRM</sub>=400, 600V
- R.M.S On-State Current :I<sub>T</sub> (RMS)=16A
- Gate Trigger Current :I<sub>GT</sub>=30mA Max.  
:I<sub>GT</sub>=20mA Max. ("A"Type)

Unit in mm

SM16G48, SM16J48, SM16G48A, SM16J48A	USM16G48, USM16J48, USM16G48A, USM16J48A
JEDEC —	JEDEC —
JEITA —	JEITA —
TOSHIBA 13-10J1A	TOSHIBA 13-10J2A

Weight : 1.7g

### 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 		Example 8A : January 1998 8B : February 1998 8L : December 1998

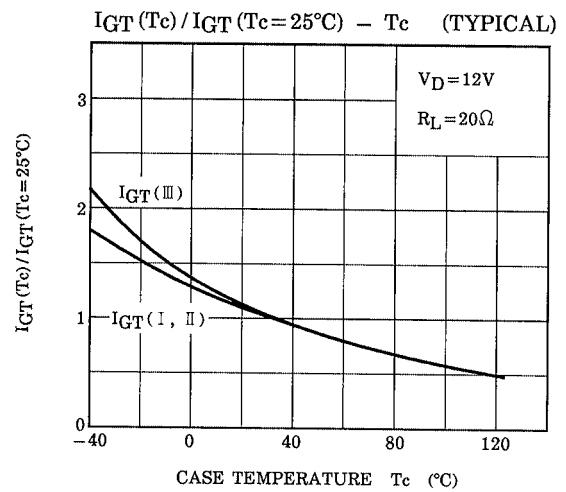
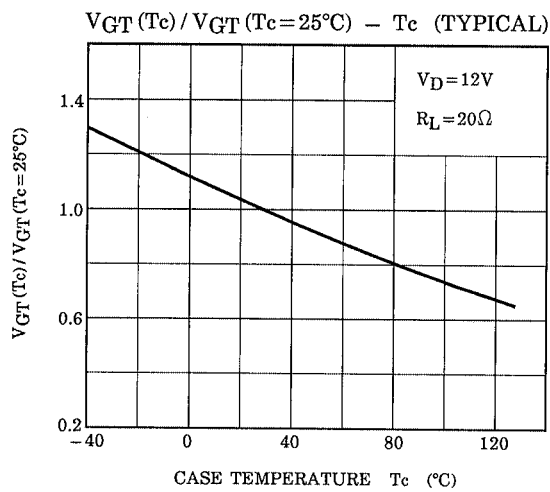
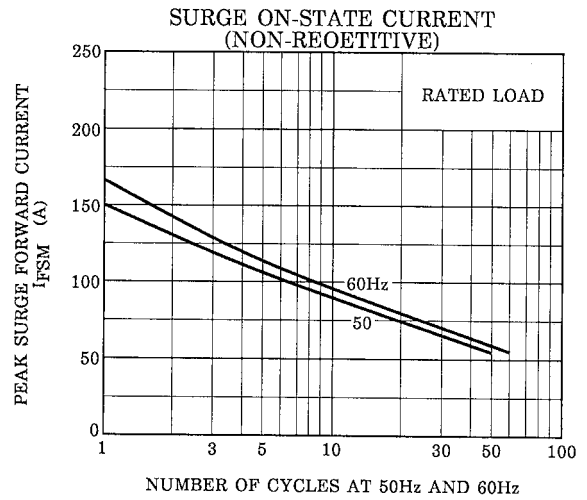
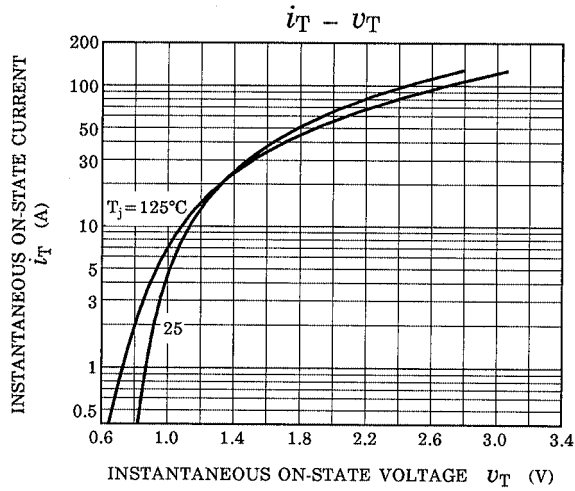
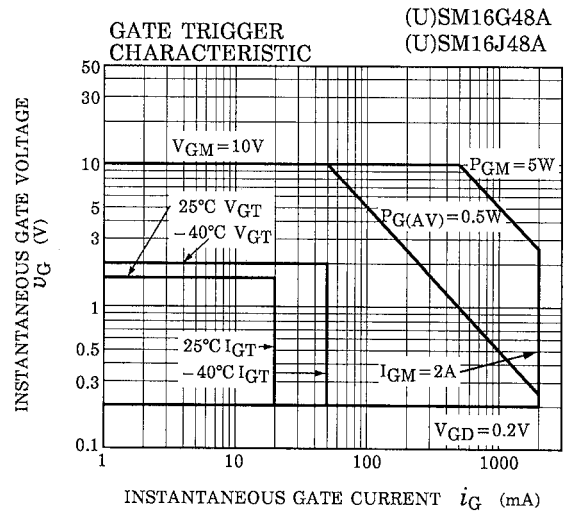
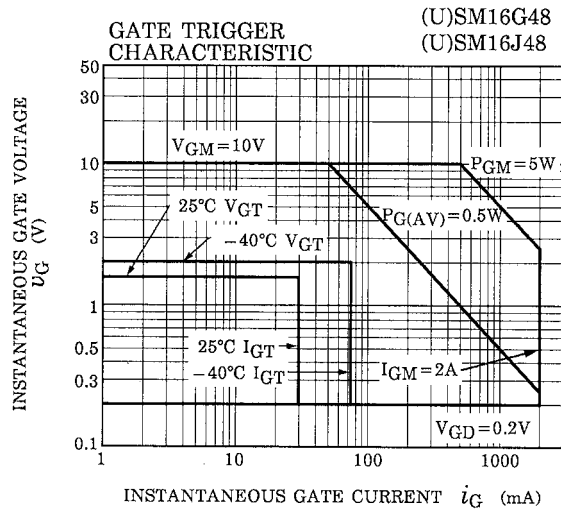
## MAXIMUM RATINGS (Ta=25°C)

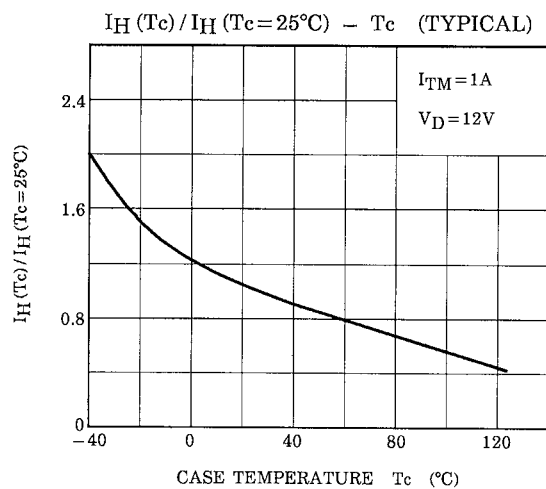
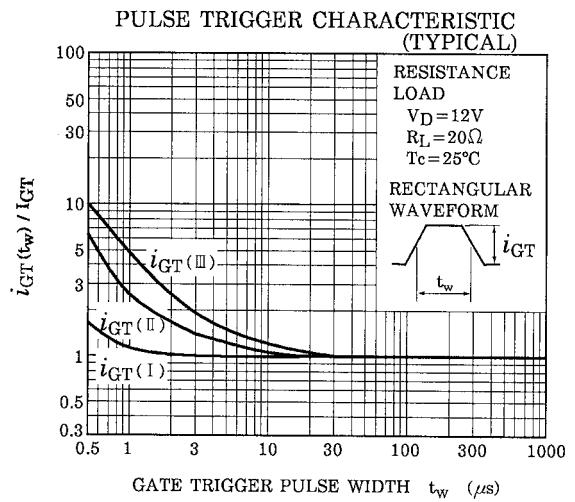
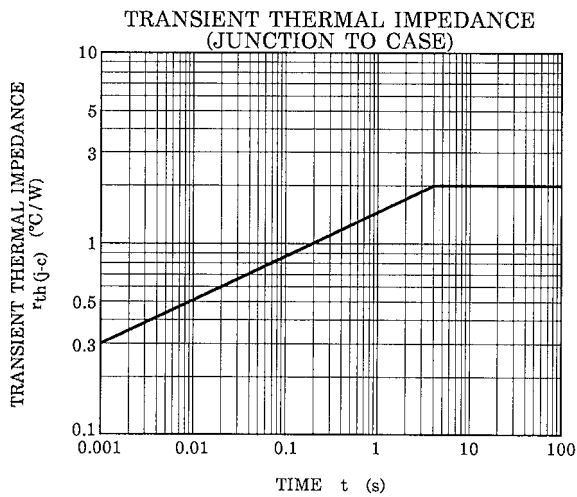
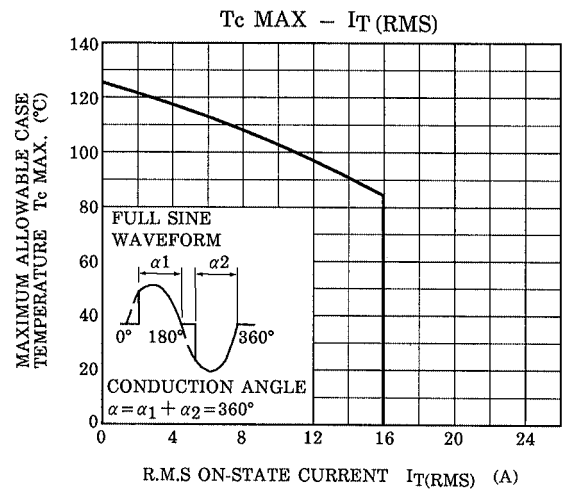
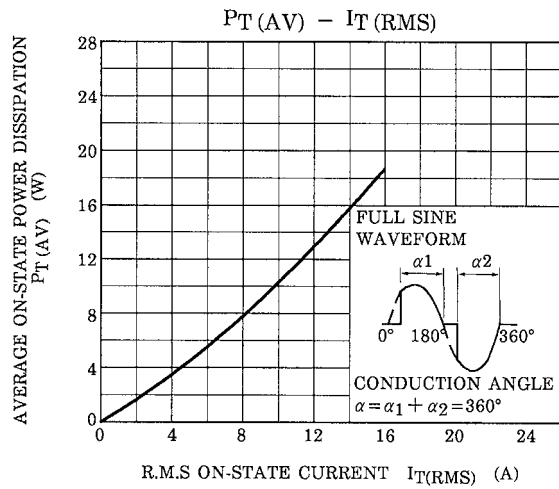
CHARACTERISTIC		SYMBOL	RATING	UNIT
Repetitive Peak Off-State Voltage	(U)SM12G48 (U)SM12G48A	V <sub>DRM</sub>	400	V
	(U)SM12J48 (U)SM12J48A		600	
R.M.S On-State Current		I <sub>T</sub> (RMS)	16	A
Peak One Cycle Surge On-State Current (Non-Repetitive)		I <sub>TSM</sub>	150 (50Hz)	A
			165 (60Hz)	
I <sup>2</sup> Limit Value		I <sup>2</sup> <sub>t</sub>	112.5	A <sup>2</sup> s
Critical Rate of Rise of On-State Current (Note 1)		di / dt	50	A / μs
Peak Gate Power Dissipation		P <sub>GM</sub>	5	W
Average Gate Power Dissipation		P <sub>G</sub> (AV)	0.5	W
Peak Forward Gate Voltage		V <sub>GM</sub>	10	V
Peak Forward Gate Current		I <sub>GM</sub>	2	A
Junction Temperature		T <sub>j</sub>	-40~125	°C
Storage Temperature Range		T <sub>stg</sub>	-40~125	°C

Note 1 : V<sub>DRM</sub>=0.5×Rated  
I<sub>TM</sub>≤25A  
t<sub>gw</sub>≥10μs  
t<sub>gr</sub>≤250ns  
i<sub>gp</sub>=I<sub>GT</sub>×2.0

## ELECTRICAL CHARACTERISTICS (Ta=25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT		
Repetitive Peak Off-State Current		I <sub>DRM</sub>	V <sub>DRM</sub> =Rated		—	—	20	μA		
Gate Trigger Voltage		I	V <sub>GT</sub>	V <sub>D</sub> =12V R <sub>L</sub> =20Ω	T2 (+) , Gate (+)		—	—	1.5	V
		II			T2 (+) , Gate (—)		—	—	1.5	
		III			T2 (—) , Gate (—)		—	—	1.5	
		IV			T2 (—) , Gate (+)		—	—	—	
Gate Trigger Current	(U)SM16G48 (U)SM16J48	I	I <sub>GT</sub>	V <sub>D</sub> =12V R <sub>L</sub> =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 (+)		—	—	—	
Peak On-State Voltage		V <sub>TM</sub>	I <sub>TM</sub> =17A		—	—	1.5	—		
Gate Non-Trigger Voltage		V <sub>GD</sub>	V <sub>D</sub> =Rated, T <sub>c</sub> =125°C		0.2	—	—	V		
Holding Current		I <sub>H</sub>	V <sub>D</sub> =12V, I <sub>TM</sub> =1A		—	—	50	mA		
Thermal Resistance		R <sub>th</sub> (j-c)	Junction to Case, AC		—	—	2.0	°C / W		
Critical Rate of Rise of Off-State Voltage	(U)SM16G48 (U)SM16J48	dv / dt	V <sub>DRM</sub> =Rated, T <sub>j</sub> =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 <sub>DRM</sub> =400V, T <sub>j</sub> =125°C (di / dt) c=–8.7A / ms		10	—	—	V / μs		
	(U)SM16G48A (U)SM16J48A				4	—	—			





## **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.