

TOSHIBA BI-DIRECTIONAL TRIODE THYRISTOR SILICON PLANAR TYPE

# SM3GZ47, SM3JZ47

## AC POWER CONTROL APPLICATIONS

- Repetitive Peak Off-State Voltage:  $V_{DRM} = 400V, 600V$
- R.M.S On-State Current:  $I_T (RMS) = 3A$
- High Commutating ( $dv / dt$ )
- Isolation Voltage:  $V_{ISOL} = 1500V AC$

## ABSOLUTE MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	RATING	UNIT
Repetitive Peak Off-State Voltage	SM3GZ47	400	V
	SM3JZ47	600	
R.M.S On-State Current (Full Sine Waveform $T_c = 110^\circ C$ )	$I_T (RMS)$	3	A
Peak One Cycle Surge On-State Current (Non-Repetitive)	$I_{TSM}$	30 (50Hz)	A
		33 (60Hz)	
$I^2t$ Limit Value ( $t = 1\sim 10ms$ )	$I^2t$	4.5	$A^2s$
Critical Rate of Rise of On-State Current (Note 1)	$di / dt$	50	$A / \mu s$
Peak Gate Power Dissipation	$P_{GM}$	5	W
Average Gate Power Dissipation	$P_{G(AV)}$	0.5	W
Peak Gate Voltage	$V_{GM}$	10	V
Peak Gate Current	$I_{GM}$	2	A
Junction Temperature	$T_j$	-40~125	$^\circ C$
Storage Temperature Range	$T_{stg}$	-40~125	$^\circ C$
Isolation Voltage (AC, $t = 1min.$ )	$V_{ISOL}$	1500	V

Note 1:  $di / dt$  test condition

$$V_{DRM} = 0.5 \times \text{Rated}$$

$$I_{TM} \leq 4.5A$$

$$t_{gw} \geq 10\mu s$$

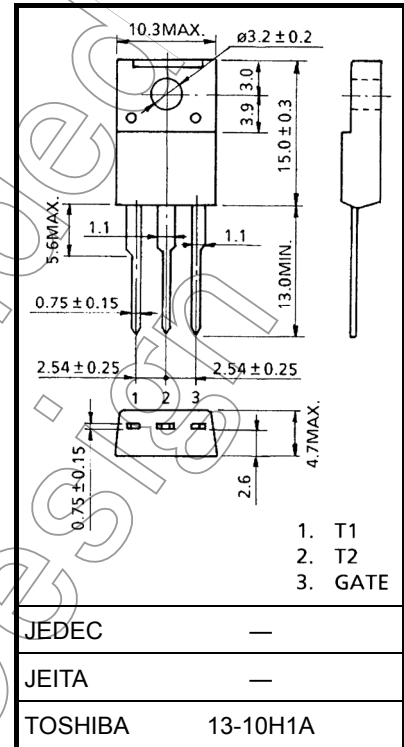
$$t_{gr} \leq 250ns$$

$$i_{gp} = I_{GT} \times 2.0$$

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Unit: mm

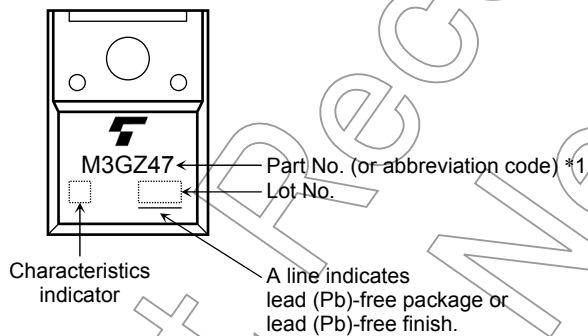


Weight: 1.7 g (typ.)

## ELECTRICAL CHARACTERISTICS (Ta = 25°C)

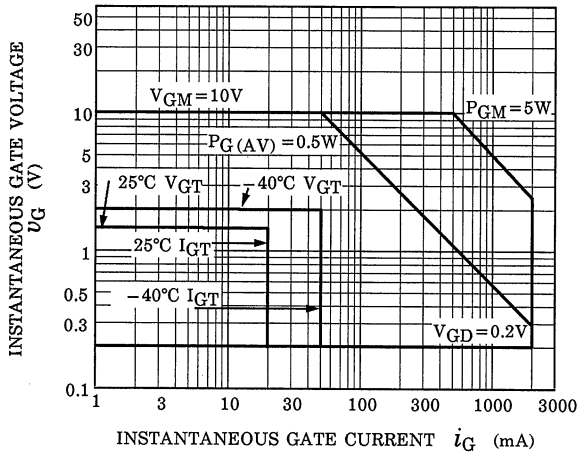
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT	
Repetitive Peak Off-State Current		$I_{DRM}$	$V_{DRM} = \text{Rated}$	—	—	20	$\mu\text{A}$	
Gate Trigger Voltage	I	$V_{GT}$	$V_D = 12\text{V}$ $R_L = 20\Omega$	T2 (+), Gate (+)	—	—	1.5	V
	II			T2 (+), Gate (-)	—	—	1.5	
	III			T2 (-), Gate (-)	—	—	1.5	
	IV			T2 (-), Gate (+)	—	—	—	
Gate Trigger Current	I	$I_{GT}$	$V_D = 12\text{V}$ $R_L = 20\Omega$	T2 (+), Gate (+)	—	—	20	mA
	II			T2 (+), Gate (-)	—	—	20	
	III			T2 (-), Gate (-)	—	—	20	
	IV			T2 (-), Gate (+)	—	—	—	
Peak On-State Voltage		$V_{TM}$	$I_{TM} = 4.5\text{A}$	—	—	1.5	V	
Gate Non-Trigger Voltage		$V_{GD}$	$V_D = \text{Rated}, T_c = 125^\circ\text{C}$	0.2	—	—	V	
Holding Current		$I_H$	$V_D = 12\text{V}, I_{TM} = 1\text{A}$	—	—	30	mA	
Thermal Resistance		$R_{th(j-c)}$	Junction to Case, AC	—	—	4.2	$^\circ\text{C} / \text{W}$	
Critical Rate of Rise of Off-State Voltage		$dv / dt$	$V_{DRM} = \text{Rated}, T_j = 125^\circ\text{C}$ Exponential Rise	—	300	—	$\text{V} / \mu\text{s}$	
Critical Rate of Rise of Off-State Voltage at Commutation		$(dv / dt)_c$	$V_{DRM} = 400\text{V}, T_j = 125^\circ\text{C}$ $(di / dt)_c = -2.0\text{A} / \text{ms}$	10	—	—	$\text{V} / \mu\text{s}$	

## MARKING

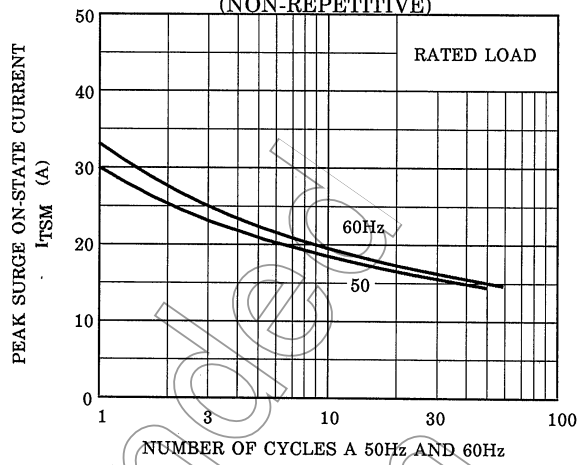


*1	Part No. (or abbreviation code)	Part No.
	M3GZ47	SM3GZ47
	M3JZ47	SM3JZ47

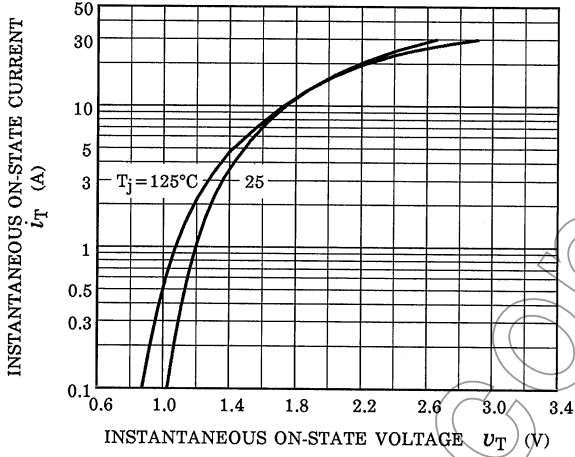
GATE TRIGGER CHARACTERISTIC



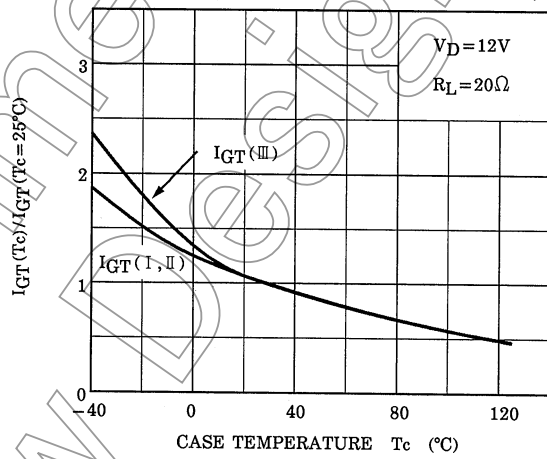
SURGE ON-STATE CURRENT (NON-REPETITIVE)



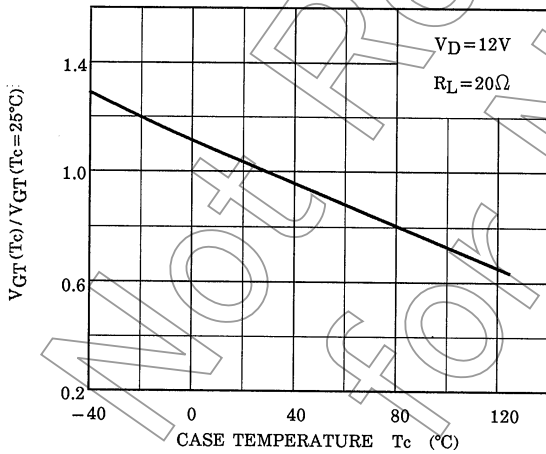
$i_T - v_T$



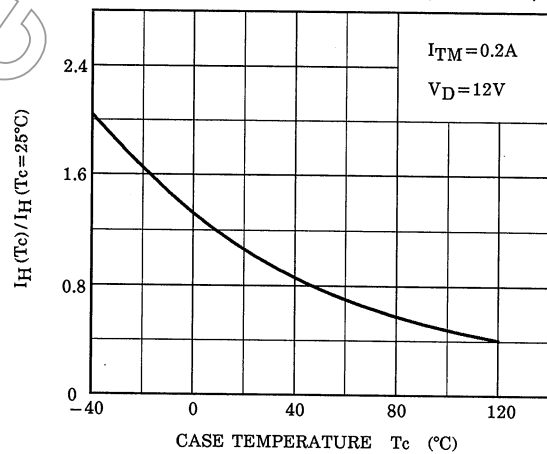
$I_{GT}(T_c) / I_{GT}(T_c = 25^\circ C) - T_c$  (TYPICAL)

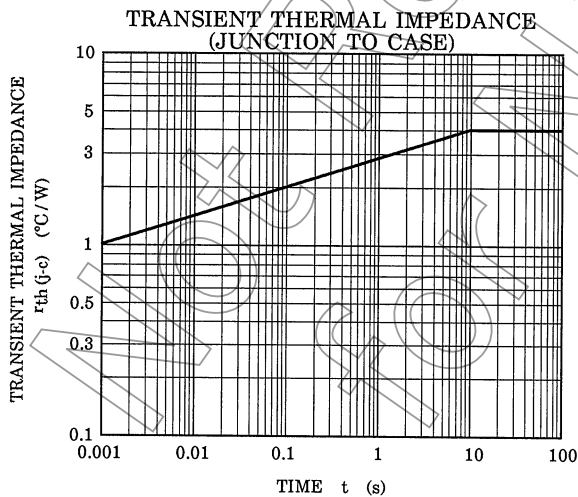
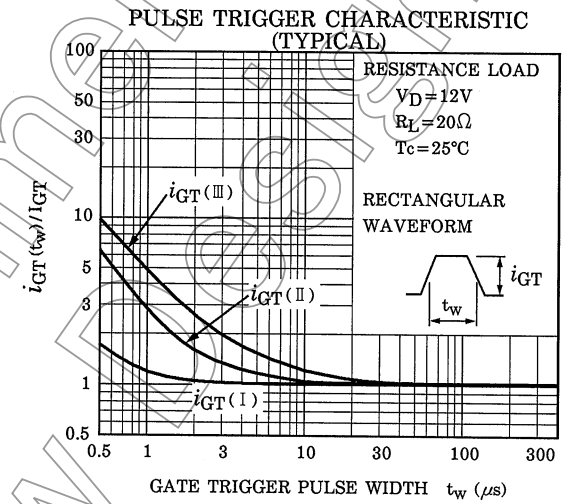
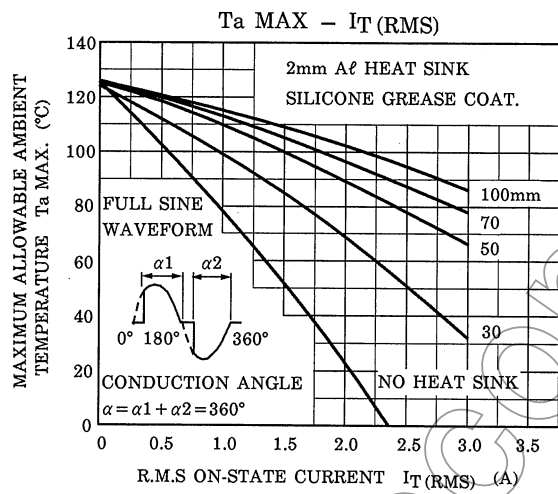
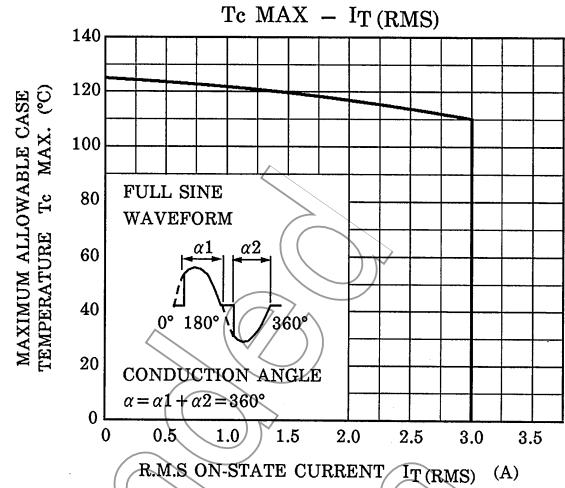
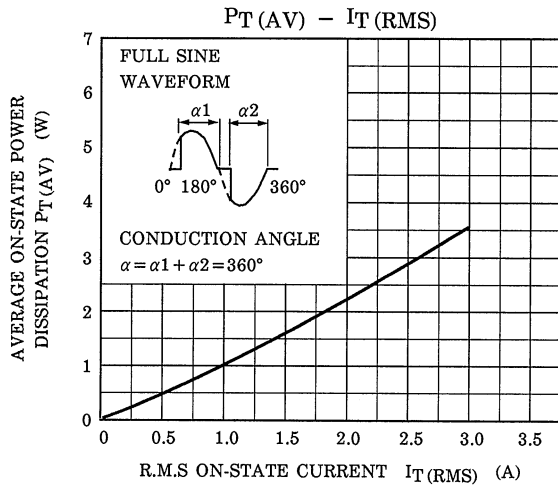


$V_{GT}(T_c) / V_{GT}(T_c = 25^\circ C) - T_c$  (TYPICAL)



$I_H(T_c) / I_H(T_c = 25^\circ C) - T_c$  (TYPICAL)





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