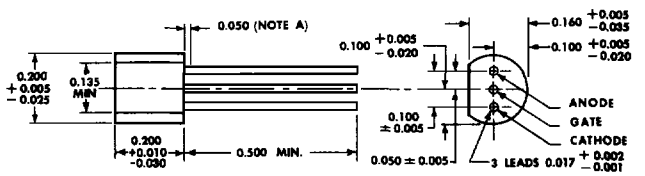
TYPES 2N5060 THRU 2N5064, TIC60 THRU TIC64
P-N-P-N SILICON REVERSE-BLOCKING TRIODE THYRISTORS

SILECT† THYRISTORS‡
800 mA DC • 30 thru 200 VOLTS

mechanical data

These thyristors are encapsulated in a plastic compound specifically designed for this purpose, using a highly mechanized process developed by Texas Instruments. The case will withstand soldering temperatures without deformation. These devices exhibit stable characteristics under high-humidity conditions and are capable of meeting MIL-STD-202C method 106B. The thyristors are insensitive to light.

THE GATE LEAD IS CONNECTED A P REGION



NOTES: A. Lead diameter is not controlled in this area.
B. All dimensions are in inches.

*ALL JEDEC TO-92 DIMENSIONS AND NOTES ARE APPLICABLE

CGA

absolute maximum ratings at specified case temperature

		2N5060 TIC60	2N5061 TIC61	2N5062 TIC62	2N5063 TIC63	2N5064 TIC64	UNIT
*Repetitive Peak Off-State Voltage, V_{DRM} (See Note 1)	−65°C to 125°C	30	60	100	150	200	V
*Repetitive Peak Reverse Voltage, V_{RRM}	−65°C to 125°C	30	60	100	150	200	V
*Nonrepetitive Peak Reverse Voltage, V_{RSM} (Pulse Width ≤ 5 ms)	−65°C to 125°C	45	80	125	180	230	V
Continuous On-State Current (See Note 2)	−65°C to 50°C	800					mA
*Average On-State Current (180° Conduction Angle, See Note 3)	−65°C to 67°C	510					mA
*Surge On-State Current (See Note 4)	25°C	6					A
*Peak Positive Gate Current (Pulse Width ≤ 300 μs, f ≤ 120 pps)	25°C	1					A
*Peak Gate Reverse Voltage	−65°C to 125°C	5					V
*Average Gate Power Dissipation (See Note 5)	25°C	10					mW
*Peak Gate Power Dissipation (Pulse Width ≤ 300 μs)	25°C	100					mW
*Operating Case Temperature Range		−65 to 125					°C
*Storage Temperature Range		−65 to 150					°C
*Lead Temperature 1/16 Inch from Case for 10 Seconds		230					°C

NOTES: 1. These values apply when the gate-cathode resistance R_{GK} = 1 kΩ.
2. These values apply for continuous d-c operation with resistive load. Above 50°C derate according to Figure 1.
3. This value may be applied continuously under single-phase 60-Hz half-sine-wave operation with resistive load. Above 67°C derate according to Figure 1.
4. This value applies for one 60-Hz half sine wave when the device is operating at (or below) rated values of peak reverse voltage and on-state current. Surge may be repeated after the device has returned to original thermal equilibrium.
5. This value applies for a maximum averaging time of 16.6 ms.

*JEDEC registered data. The asterisk identifies JEDEC registered data for the 2N5060 through 2N5064 only. This data sheet contains all applicable registered data in effect at the time of publication.

† Trademark of Texas Instruments

‡U.S. Patent No. 3,439,238

electrical characteristics at specified case temperature

PARAMETER		TEST CONDITIONS			2N5060 THRU 2N5064 MIN	2N5060 THRU 2N5064 MAX	TIC60 THRU TIC64 MIN	TIC60 THRU TIC64 MAX	UNIT
I_{DRM}	Repetitive Peak Off-State Current	V_D = Rated V_{DRM},	R_{GK} = 1 kΩ	125°C		50*		50	μA
I_{RRM}	Repetitive Peak Reverse Current	V_R = Rated V_{RRM},	R_{GK} = 1 kΩ	125°C		50*		50	μA
I_{GT}	Gate Trigger Current	V_{AA} = 7 V,	R_L = 100 Ω,	−65°C		350*			μA
		R_{GK} = 1 kΩ,	$t_{p(g)} \geq 1$ ms	25°C		200		200	
V_{GT}	Gate Trigger Voltage	V_{AA} = 7 V,	R_L = 100 Ω,	−65°C		1.2*			V
		R_{GK} = 1 kΩ,	$t_{p(g)} \geq 1$ ms	25°C		0.8		0.8	
		V_D = Rated V_{DRM},	R_L = 100 Ω,	125°C	0.1*		0.1		
		R_{GK} = 1 kΩ,	$t_{p(g)} \geq 1$ ms						
I_H	Holding Current	V_{AA} = 7 V,	R_{GK} = 1 kΩ,	−65°C		10*			mA
		Initiating I_T = 20 mA		25°C		5		5	
V_{TM}	Peak On-State Voltage	I_{TM} = 1.2 A,	See Note 6	25°C		1.7*		1.7	V

*thermal characteristics

PARAMETER		MAX	UNIT
$R_{\theta JC}$	Junction-to-Case Thermal Resistance	75	°C/W

NOTE 6: This parameter must be measured using pulse techniques. t_w = 300 μs, duty cycle ≤ 1%. Voltage-sensing contacts, separate from the current-carrying contacts, are located within 0.125 inch from the device body.

*JEDEC registered data

7

THERMAL INFORMATION

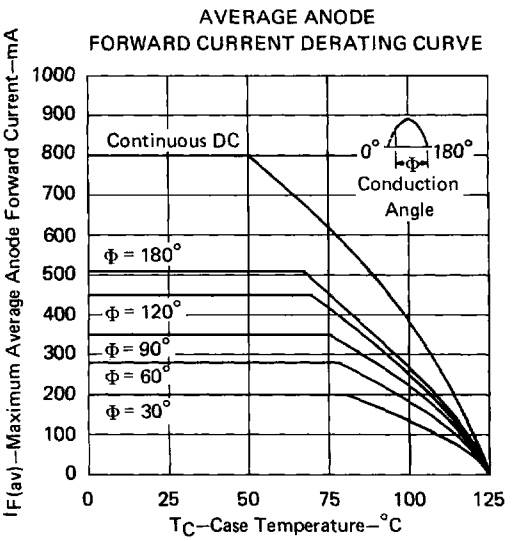


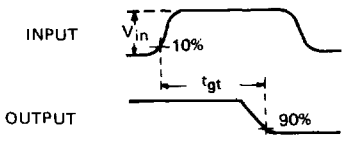
FIGURE 1

TEXAS INSTRUMENTS
INCORPORATED
POST OFFICE BOX 5012 • DALLAS, TEXAS 75222

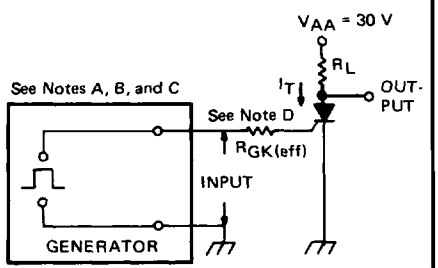
switching characteristics at 25°C case temperature

PARAMETER	TEST CONDITIONS	TYP	UNIT
t_{gt} Gate-Controlled Turn-On-Time	V_{AA} = 30 V, R_L = 39 Ω, $R_{GK(eff)}$ = 20 kΩ, V_{in} = 20 V, See Figure 2	3	μs
t_q Circuit-Commutated Turn-Off Time	V_{AA} = 30 V, R_L = 30 Ω, I_{RM} ≈ 7 A, See Figure 3	7	μs

PARAMETER MEASUREMENT INFORMATION

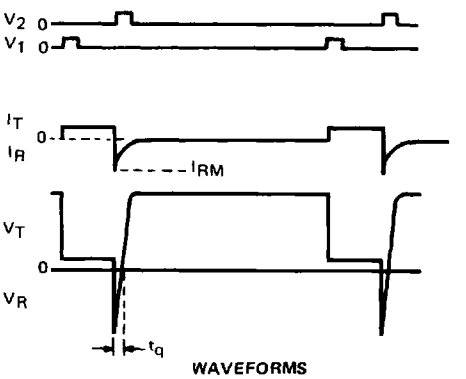


VOLTAGE WAVEFORMS

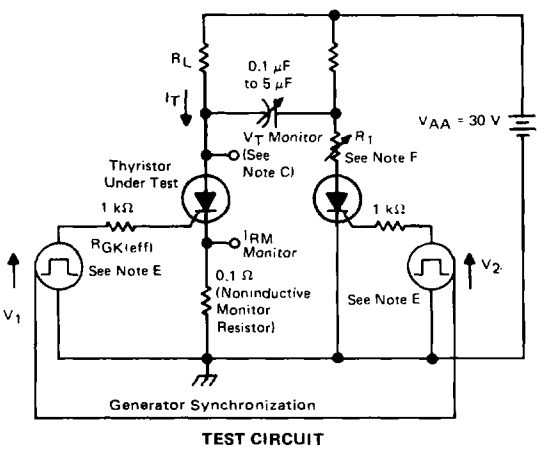


TEST CIRCUIT

FIGURE 2–GATE-CONTROLLED TURN-ON TIME



WAVEFORMS



TEST CIRCUIT

FIGURE 3–CIRCUIT-COMMUTATED TURN-OFF TIME

NOTES: A. V_{in} is measured with gate and cathode terminals open.
B. The input waveform of Figure 2 has the following characteristics: $t_r \leq 40$ ns, $t_w \geq 20$ μs.
C. Waveforms are monitored on an oscilloscope with the following characteristics: $t_r \leq 14$ ns, $R_{in} \geq 10$ MΩ, $C_{in} \leq 12$ pF.
D. $R_{GK(eff)}$ includes the total resistance of the generator and the external resistor.
E. Pulse generators for V_1 and V_2 are synchronized to provide an anode current waveform with the following characteristics: t_w = 50 to 300 μs, duty cycle = 1%. The pulse widths of V_1 and V_2 are ≥ 10 μs.
F. Resistor R_1 is adjusted for I_{RM} ≈ 7 A.

TYPICAL CHARACTERISTICS

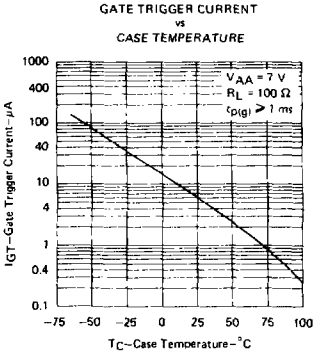


FIGURE 4

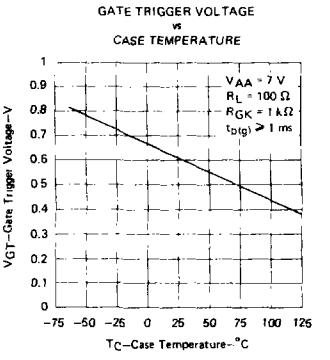


FIGURE 5

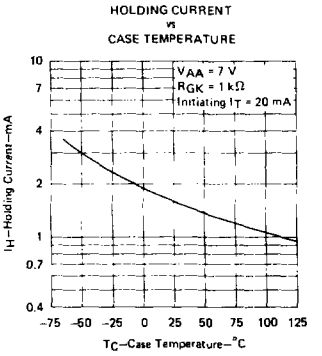


FIGURE 6

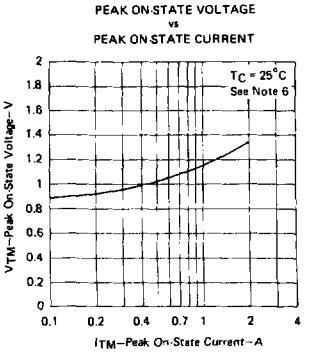


FIGURE 7

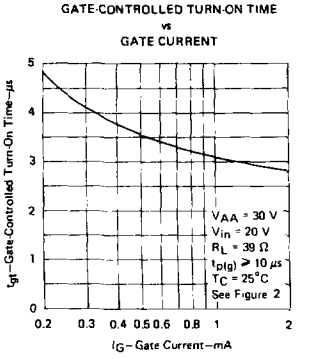


FIGURE 8

NOTE 6: *This parameter must be measured using pulse techniques.* t_w = 300 μs, duty cycle ≤ 2%. *Voltage-sensing contacts, separate from the current-carrying contacts, are located within* 0.125 inch from the device body.

TEXAS INSTRUMENTS
INCORPORATED
POST OFFICE BOX 5012 • DALLAS, TEXAS 75222