

8961726 TEXAS INSTR (OPTO)

62C 36692 D

T-25-13

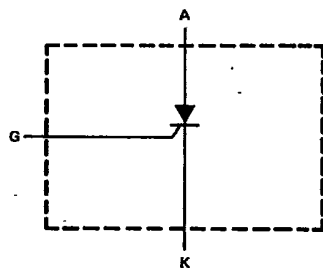
TIC106A, TIC106B, TIC106C, TIC106D,
TIC106E, TIC106F, TIC106M

P-N-P-N SILICON REVERSE-BLOCKING TRIODE THYRISTORS

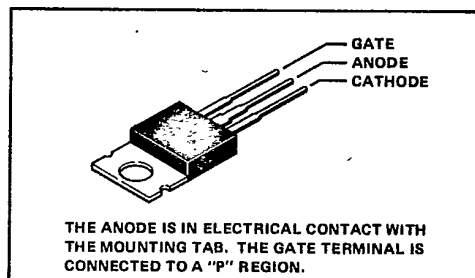
APRIL 1971 - REVISED OCTOBER 1984

- Silicon Controlled Rectifiers
- 50 V to 600 V
- 5 A DC
- 30 A Surge Current
- MAX IGT of 200 A

device schematic



TO-220AB PACKAGE



absolute maximum ratings at 25°C case temperature (unless otherwise noted)

	TIC106F	TIC106A	TIC106B	TIC106C
Repetitive peak off-state voltage, V_{DRM} (see Note 1)	50 V	100 V	200 V	300 V
Repetitive peak reverse voltage, V_{RRM}	50 V	100 V	200 V	300 V
Continuous on-state current at (or below) 80°C case temperature (see Note 2)	5 A			
Average on-state current (180° conduction angle) at (or below) 80°C case temperature (see Note 3)	3.2 A			
Surge on-state current (see Note 4)	30 A			
Peak positive gate current (pulse duration $\leq 300 \mu s$)	0.2 A			
Peak gate power dissipation (pulse duration $\leq 300 \mu s$)	1.3 W			
Average gate power dissipation (see Note 5)	0.3 W			
Operating case temperature range	-40°C to 110°C			
Storage temperature range	-40°C to 125°C			
Lead temperature 1.6 mm (1/16 inch) from case for 10 seconds	230°C			

- NOTES: 1. These values apply when the gate-cathode resistance $R_{GK} = 1 k\Omega$.
2. These values apply for continuous d-c operation with resistive load. Above 80°C derate according to Figure 3.
3. This value may be applied continuously under single-phase 50-Hz half-sine-wave operation with resistive load. Above 80°C derate according to Figure 3.
4. This value applies for one 50-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 20 ms.

4

TIC Devices

8961726 TEXAS INSTR (OPT0)

62C 36693 D

7-25-13

TIC106A, TIC106B, TIC106C, TIC106D,
TIC106E, TIC106F, TIC106M
P-N-P-N SILICON REVERSE-BLOCKING TRIODE THYRISTORS

absolute maximum ratings at 25°C case temperature (unless otherwise noted)

	TIC106D	TIC106E	TIC106M
Repetitive peak off-state voltage, V_{DRM} (see Note 1)	400 V	500 V	600 V
Repetitive peak reverse voltage, V_{RRM}	400 V	500 V	600 V
Continuous on-state current at (or below) 80°C case temperature (see Note 2)	5 A		
Average on-state current (180° conduction angle) at (or below) 80°C case temperature (see Note 3)	3.2 A		
Surge on-state current (see Note 4)	30 A		
Peak positive gate current (pulse duration $\leq 300 \mu s$)	0.2 A		
Peak gate power dissipation (pulse duration $\leq 300 \mu s$)	1.3 W		
Average gate power dissipation (see Note 5)	0.3 W		
Operating case temperature range	-40°C to 110°C		
Storage temperature range	-40°C to 125°C		
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	230°C		

- NOTES: 1. These values apply when the gate-cathode resistance $R_{GK} = 1 \text{ k}\Omega$.
 2. These values apply for continuous d-c operation with resistive load. Above 80°C derate according to Figure 3.
 3. This value may be applied continuously under single-phase 50-Hz half-sine-wave operation with resistive load. Above 80°C derate according to Figure 3.
 4. This value applies for one 50-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 20 ms.

electrical characteristics at 25°C case temperature (unless otherwise noted)

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
I_{DRM} Repetitive Peak Off-State Current	$V_D = \text{Rated } V_{DRM}, R_{GK} = 1 \text{ k}\Omega, T_C = 110^\circ\text{C}$		400		μA
I_{RRM} Repetitive Peak Reverse Current	$V_R = \text{Rated } V_{RRM}, I_G = 0, T_C = 110^\circ\text{C}$		1		mA
I_{GT} Gate Trigger Current	$V_{AA} = 6 \text{ V}, R_L = 100 \Omega, t_{w(g)} \geq 20 \mu s$	60	200		μA
V_{GT} Gate Trigger Voltage	$V_{AA} = 6 \text{ V}, R_L = 100 \Omega, R_{GK} = 1 \text{ k}\Omega, t_{w(g)} \geq 20 \mu s, T_C = -40^\circ\text{C}$		1.2		V
	$V_{AA} = 6 \text{ V}, R_L = 100 \Omega, R_{GK} = 1 \text{ k}\Omega, t_{w(g)} \geq 20 \mu s$	0.4	0.6	1	
	$V_{AA} = 6 \text{ V}, R_L = 100 \Omega, R_{GK} = 1 \text{ k}\Omega, t_{w(g)} \geq 20 \mu s, T_C = -110^\circ\text{C}$	0.2			
I_H Holding Current	$V_{AA} = 6 \text{ V}, R_{GK} = 1 \text{ k}\Omega, \text{Initiating } I_T = 10 \text{ mA}$		5		mA
	$V_{AA} = 6 \text{ V}, R_{GK} = 1 \text{ k}\Omega, \text{Initiating } I_T = 10 \text{ mA}, T_C = -40^\circ\text{C}$		8		
V_{TM} Peak On-State Voltage	$I_{TM} = 5 \text{ A}, \text{See Note 6}$		1.7		V
dv/dt Critical Rate of Rise of Off-State Voltage	$V_D = \text{Rated } V_D, R_{GK} = 1 \text{ k}\Omega, T_C = 110^\circ\text{C}$		10		V/ μs

NOTE 6: These parameters must be measured using pulse techniques, $t_w = 300 \mu s$, duty cycle $\leq 2\%$. Voltage-sensing contacts, separate from the current-carrying contacts, are located within 3,2 mm (1/8 inch) from the device body.

thermal characteristics

PARAMETER	MIN	TYP	MAX	UNIT
$R_{\theta JC}$			3.5	°C/W
$R_{\theta JA}$			62.5	

8961726 TEXAS INSTR (OPTO)

62C 36694 D

7-25-13

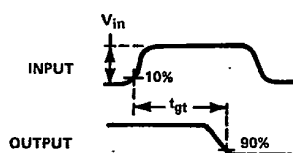
TIC106A, TIC106B, TIC106C, TIC106D,
TIC106E, TIC106F, TIC106M

P-N-P-N SILICON REVERSE-BLOCKING TRIODE THYRISTORS

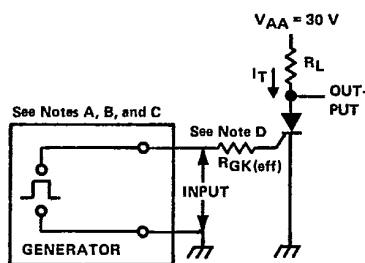
resistive-load switching characteristics at 25°C case temperature

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{gt} Gate-Controlled Turn-On Time	$V_{AA} = 30\text{ V}$, $V_{in} = 50\text{ V}$, $R_L = 6\ \Omega$, See Figure 1		1.75		μs
t_q Circuit-Commutated Turn-Off Time	$V_{AA} = 30\text{ V}$, $R_L = 6\ \Omega$, See Figure 2		7.7		

PARAMETER MEASUREMENT INFORMATION

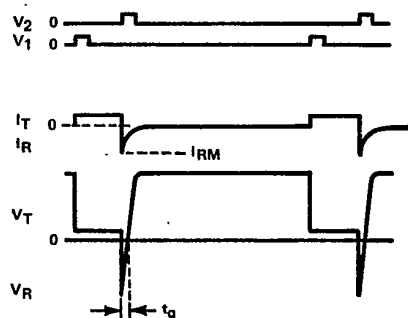


VOLTAGE WAVEFORMS

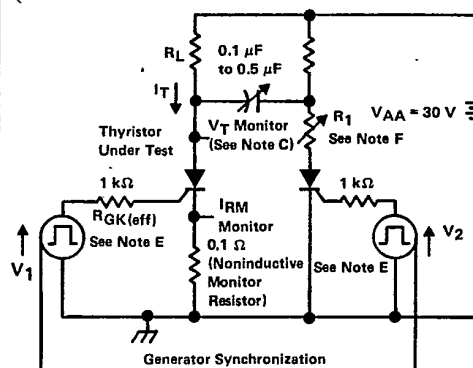


TEST CIRCUIT

FIGURE 1. GATE-CONTROLLED TURN-ON TIME



WAVEFORMS



TEST CIRCUIT

FIGURE 2. CIRCUIT-COMMUTATED TURN-OFF TIME

- NOTES: A. V_{in} is measured with gate and cathode terminals open.
 B. The input waveform of Figure 1 has the following characteristics: $t_r \leq 40\text{ ns}$, $t_w \geq 20\ \mu\text{s}$.
 C. Waveforms are monitored on an oscilloscope with the following characteristics: $t_r \leq 14\text{ ns}$, $R_{in} \geq 10\text{ M}\Omega$, $C_{in} \leq 12\text{ pF}$.
 D. $R_{GK(off)}$ 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: $t_w = 50\text{ to }300\ \mu\text{s}$, duty cycle = 1%. The pulse widths of V_1 and V_2 are $\geq 10\ \mu\text{s}$.
 F. Resistor R_1 is adjusted for $I_{RM} \approx 8\text{ A}$.

8961726 TEXAS INSTR (OPTO)

62C 36695 D

T-25-13

TIC106A, TIC106B, TIC106C, TIC106D,
TIC106E, TIC106F, TIC106M
P-N-P-N SILICON REVERSE-BLOCKING TRIODE THYRISTORS

THERMAL INFORMATION

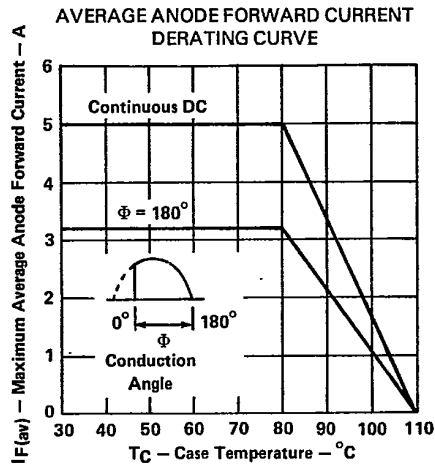


FIGURE 3

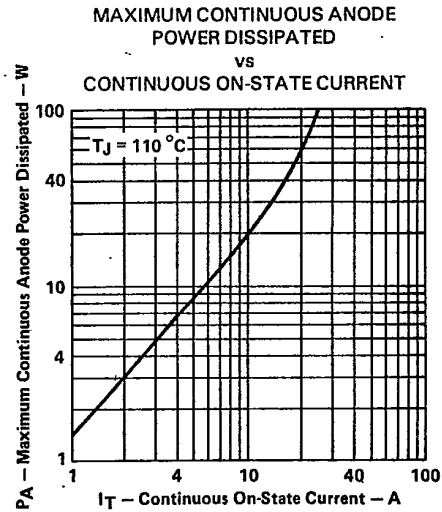


FIGURE 4

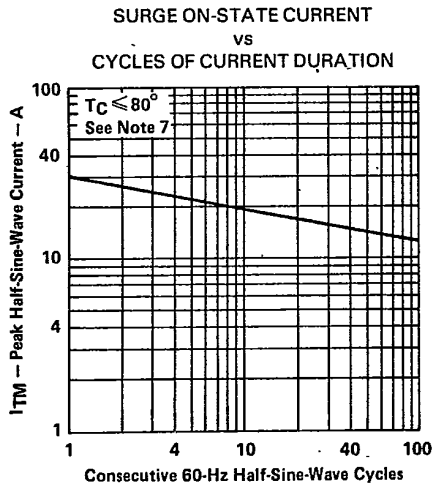


FIGURE 5

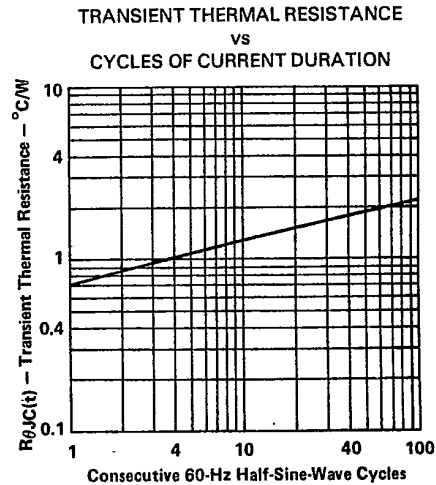


FIGURE 6

NOTE 7: This curve shows the maximum number of cycles of surge current for which gate control is guaranteed provided the device is initially at nonoperating thermal equilibrium.

TIC Devices

8961726 TEXAS INSTR {OPT0}

62C 36696 D

TIC106A, TIC106B, TIC106C, TIC106D,
TIC106E, TIC106F, TIC106M
P-N-P-N SILICON REVERSE-BLOCKING TRIODE THYRISTORS

TYPICAL CHARACTERISTICS

T-25-13

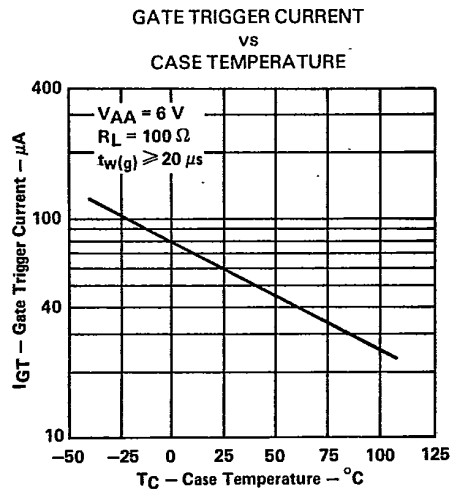


FIGURE 7

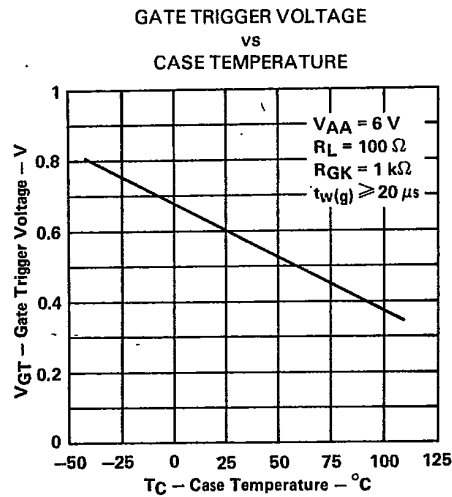


FIGURE 8

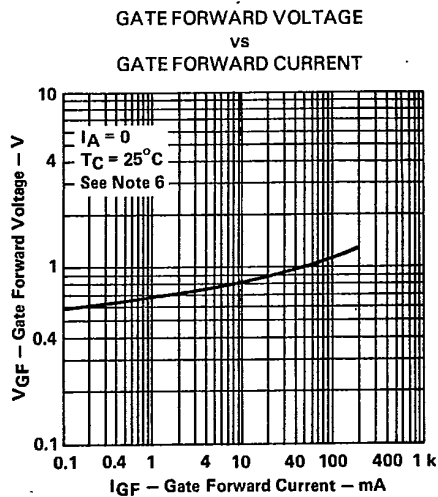


FIGURE 9

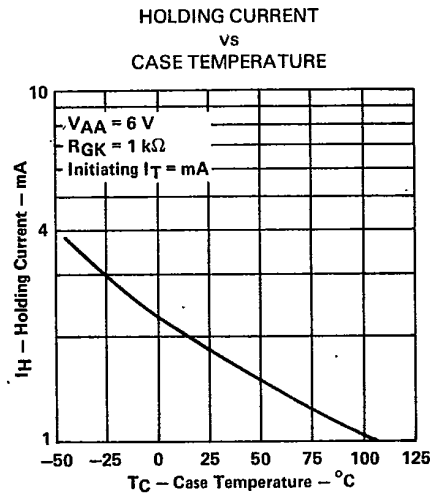


FIGURE 10

NOTE 6: These parameters must be measured using pulse techniques, $t_w = 300\ \mu\text{s}$, duty cycle $\leq 2\%$. Voltage-sensing contacts, separate from the current-carrying contacts, are located within 3.2 mm (1/8 inch) from the device body.

4

TIC Devices

8961726 TEXAS INSTR (OPT0)

62C 36697 D

T-25-13

TIC106A, TIC106B, TIC106C, TIC106D,
TIC106E, TIC106F, TIC106M
P-N-P-N SILICON REVERSE-BLOCKING TRIODE THYRISTORS

TYPICAL CHARACTERISTICS

PEAK ON-STATE VOLTAGE
vs
PEAK ON-STATE CURRENT

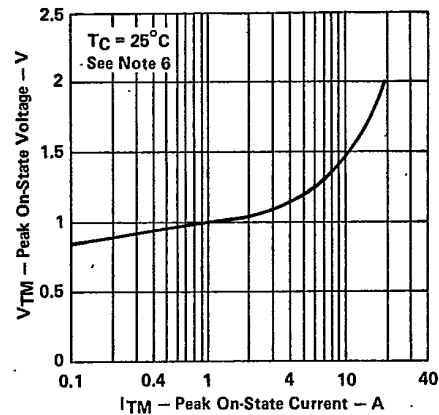


FIGURE 11

GATE-CONTROLLED TURN-ON TIME
vs
GATE CURRENT

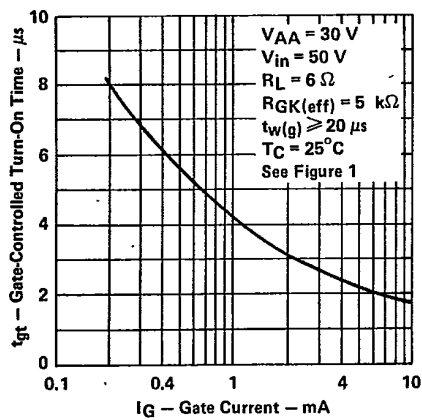


FIGURE 12

CIRCUIT-COMMUTATED TURN-OFF TIME
vs
CASE TEMPERATURE

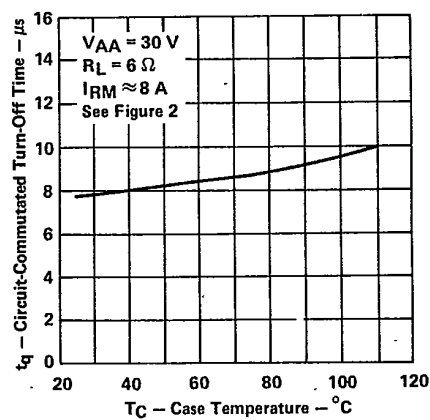


FIGURE 13

NOTE 6: These parameters must be measured using pulse techniques, $t_w = 300\ \mu\text{s}$, duty cycle $\leq 2\%$. Voltage-sensing contacts, separate from the current-carrying contacts, are located within 3.2 mm (1/8 inch) from the device body.

TIC Devices