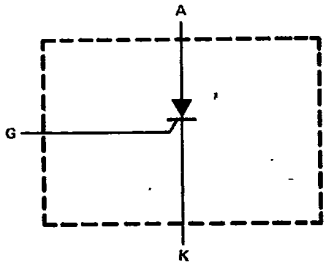
SERIES TIC116, TIC126
P-N-P-N SILICON REVERSE-BLOCKING TRIODE THYRISTORS

T-25-15

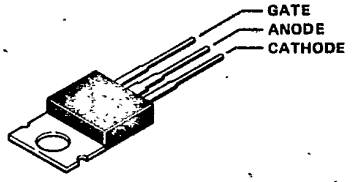
APRIL 1971 – REVISED OCTOBER 1984

- Silicon Controlled Rectifiers
- 50 V to 600 V
- 8 A and 12 A DC
- 80 A and 100 A Surge Current
- Max I_{GT} of 20 mA

device schematic



TO-220AB PACKAGE



THE ANODE IS IN ELECTRICAL CONTACT WITH THE MOUNTING TAB. THE GATE TERMINAL IS CONNECTED TO A "P" REGION.

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

	SUFFIX	SERIES	
		TIC116	TIC126
Repetitive peak off-state voltage, V_{DRM} (see Note 1) Repetitive peak reverse voltage, V_{RRM}	F	50 V	50 V
	A	100 V	100 V
	B	200 V	200 V
	C	300 V	300 V
	D	400 V	400 V
	E	500 V	500 V
	M	600 V	600 V
Continuous on-state current at (or below) 70°C case temperature (see Note 2)		8 A	12 A
Average on-state current (180° conduction angle) at (or below) 70°C case temperature (see Note 3)		5 A	7.5 A
Surge on-state current (see Note 4)		80 A	100 A
Peak positive gate current (pulse duration ≤ 300 μs)		3 A	
Peak gate power dissipation (pulse duration ≤ 300 μs)		5 W	
Average gate power dissipation (see Note 5)		1 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 kΩ.
2. These values apply for continuous d-c operation with resistive load. Above 70°C derate according to Figure 3.
3. This value may be applied continuously under single-phase 60-Hz half-sine-wave operation with resistive load. Above 70°C derate according to Figure 9.
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.

SERIES TIC116, TIC126
P-N-P-N SILICON REVERSE-BLOCKING TRIODE THYRISTORS

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 = Rated V_{DRM},	R_{GK} = 1 kΩ,	T_C = 100°C			2	mA
I_{RRM}	Repetitive Peak Reverse Current	V_R = Rated V_{RRM},	I_G = 0,	T_C = 110°C			2	mA
I_{GT}	Gate Trigger Current	V_{AA} = 6 V,	R_L = 100 Ω,	$t_{w(g)} \geq 20\ \mu s$		5	20	mA
V_{GT}	Gate Trigger Voltage	V_{AA} = 6 V, R_{GK} = 1 kΩ,	R_L = 100 Ω, T_C = 40°C	$t_{w(g)} \geq 20\ \mu s$,			2.5	V
		V_{AA} = 6 V, R_{GK} = 1 kΩ	R_L = 100 Ω,	$t_{w(g)} \geq 20\ \mu s$,		0.8	1.5	V
		V_{AA} = 6 V, R_{GK} = 1 kΩ,	R_L = 100 Ω, T_C = 110°C	$t_{w(g)} \geq 20\ \mu s$,	0.2			V
I_H	Holding Current	V_{AA} = 6 V, R_{GK} = 1 kΩ,	Initiating I_T = 100 mA, T_C = −40°C				70	mA
		V_{AA} = 6 V, R_{GK} = 1 kΩ	Initiating I_T = 100 mA,				40	mA
V_{TM}	Peak On-State Voltage	I_{TM} = 8 A,	See Note 6	SERIES TIC116			1.7	
		I_{TM} = 12 A,	See Note 6	SERIES TIC126			1.4	
dv/dt	Critical Rate of Rise of Off-State Voltage	V_D = Rated V_D,	I_G = 0,	T_C = 110°C	100			V/μs

NOTE 6: These parameters 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 3,2 mm (1/8 inch) from the device body.

thermal characteristics

PARAMETER	SERIES TIC116			SERIES TIC126			UNIT
	MIN	TYP	MAX	MIN	TYP	MAX	
$R_{\theta JC}$			3			2.4	°C/W
$R_{\theta JA}$			62.5			62.5	°C/W

resistive-load switching characteristics at 25°C case temperature

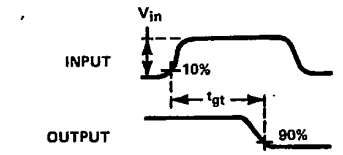
	PARAMETER	TEST CONDITIONS			MIN	TYP	MAX	UNIT
t_{gt}	Gate-Controlled Turn-On Time	V_{AA} = 30 V, V_{in} = 20 V,	R_L = 6 Ω, See Figure 1	$R_{GK(off)}$ = 100 Ω,		0.8		μs
t_q	Circuit-Commutated Turn-Off Time	V_{AA} = 30 V, See Figure 2	R_L = 6 Ω,	I_{RM} = 10 A,		11		μs

TEXAS INSTRUMENTS
POST OFFICE BOX 225012 • DALLAS, TEXAS 75265

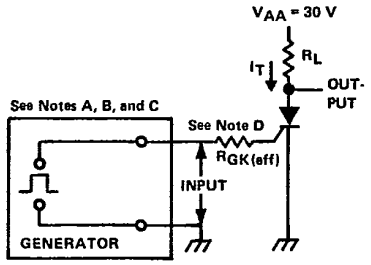
SERIES TIC116, TIC126
P-N-P-N SILICON REVERSE-BLOCKING TRIODE THYRISTORS

T-25-15

PARAMETER MEASUREMENT INFORMATION

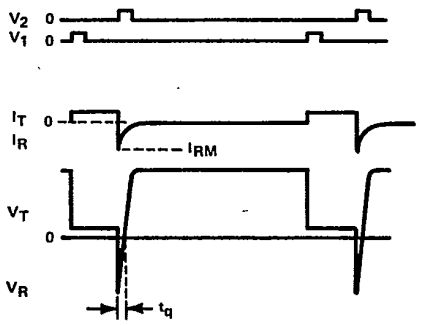


VOLTAGE WAVEFORMS

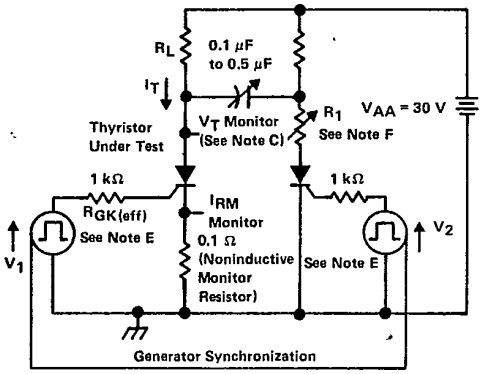


TEST CIRCUIT

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: $t_r \leq 40$ ns, $t_w \geq 20\,\mu$s.
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 duration of V_1 and V_2 are ≥ 10 μs.
F. Resistor R_1 is adjusted for $I_{RM} \approx 10$ A.

SERIES TIC116, TIC126
P-N-P-N SILICON REVERSE-BLOCKING TRIODE THYRISTORS

THERMAL INFORMATION

AVERAGE ON-STATE CURRENT
DERATING CURVE

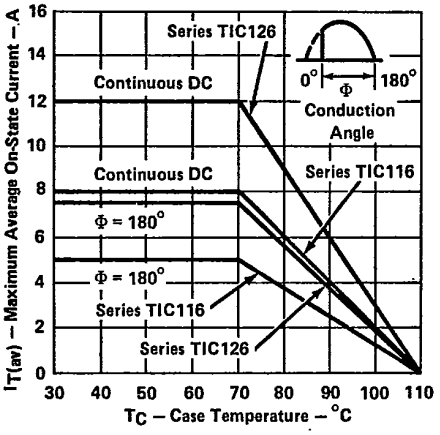


FIGURE 3

MAXIMUM CONTINUOUS ANODE POWER
DISSIPATED
vs
CONTINUOUS ON-STATE CURRENT

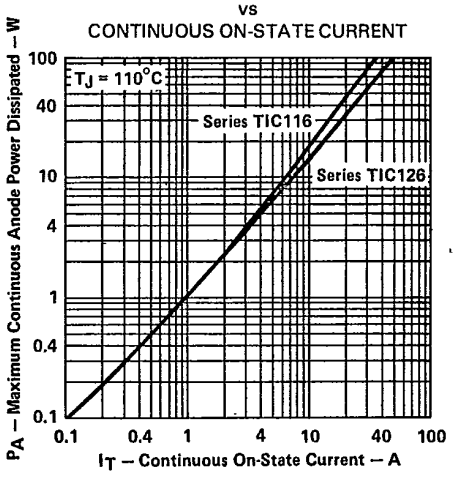


FIGURE 4

SURGE ON-STATE CURRENT
vs
CYCLES OF CURRENT DURATION

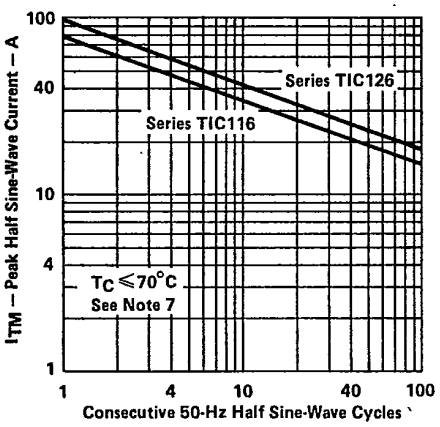


FIGURE 5

TRANSIENT THERMAL RESISTANCE
vs
CYCLES OF CURRENT DURATION

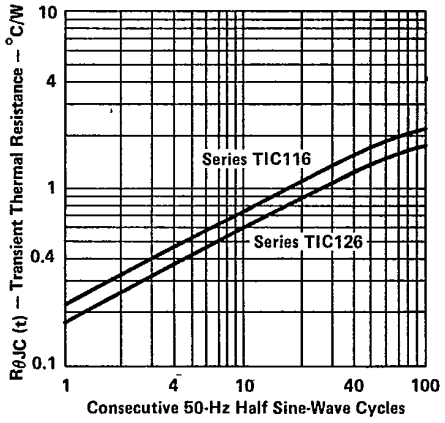


FIGURE 6

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.

TEXAS INSTRUMENTS
POST OFFICE BOX 225012 • DALLAS, TEXAS 75265

TYPICAL CHARACTERISTICS

GATE TRIGGER CURRENT
vs
CASE TEMPERATURE

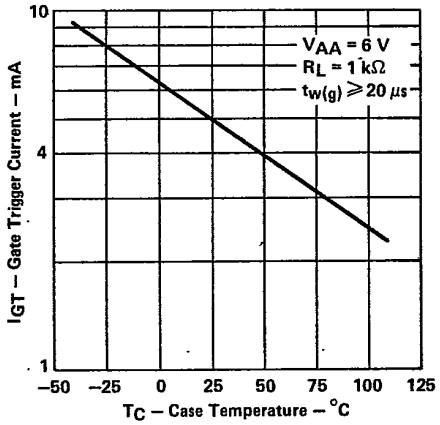


FIGURE 7

GATE TRIGGER VOLTAGE
vs
CASE TEMPERATURE

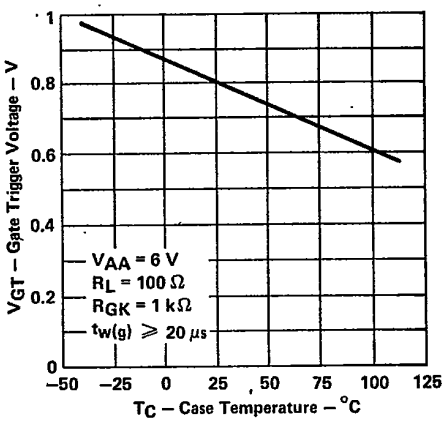


FIGURE 8

GATE FORWARD VOLTAGE
vs
GATE FORWARD CURRENT

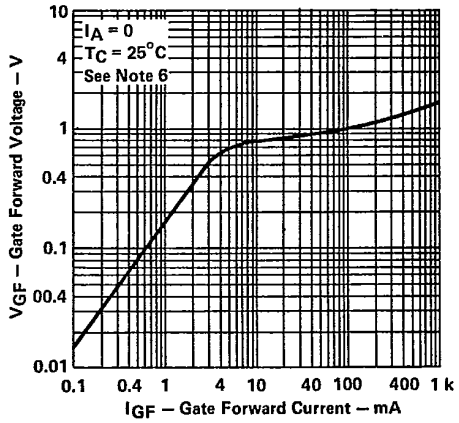


FIGURE 9

HOLDING CURRENT
vs
CASE TEMPERATURE

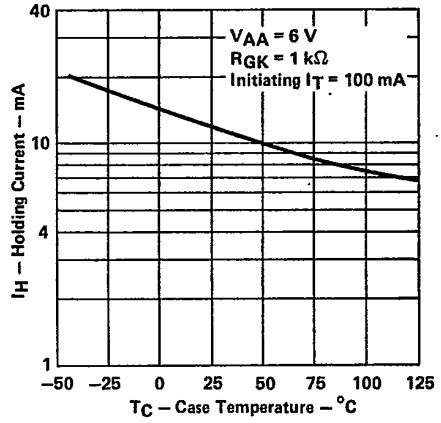


FIGURE 10

NOTE 6: These parameters 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 3,2 mm (1/8 inch) from the device body.

SERIES TIC116, TIC126
P-N-P-N SILICON REVERSE-BLOCKING TRIODE THYRISTORS

TYPICAL CHARACTERISTICS

PEAK ON-STATE VOLTAGE
vs
PEAK ON-STATE CURRENT

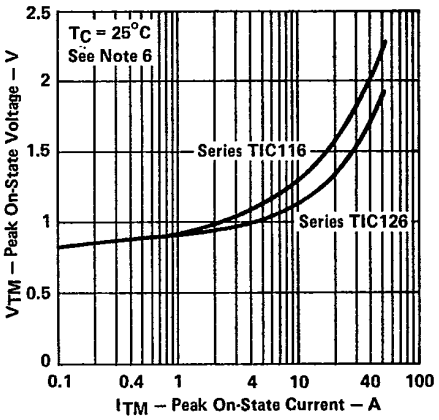


FIGURE 11

GATE-CONTROLLED TURN-ON TIME
vs
GATE CURRENT

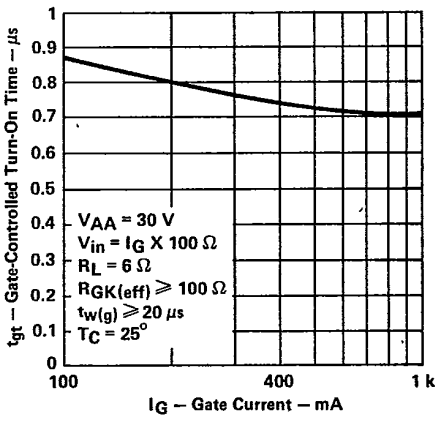


FIGURE 12

CIRCUIT-COMMUTATED TURN-OFF TIME
vs
CASE TEMPERATURE

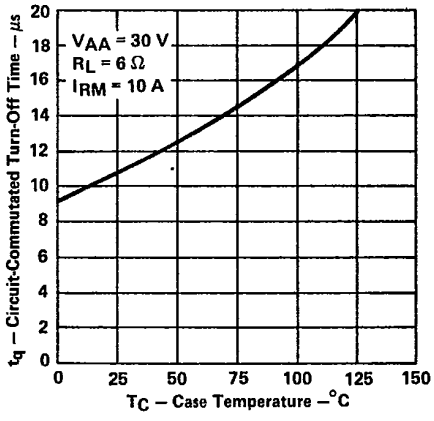


FIGURE 13

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

TEXAS INSTRUMENTS
POST OFFICE BOX 225012 • DALLAS, TEXAS 75265