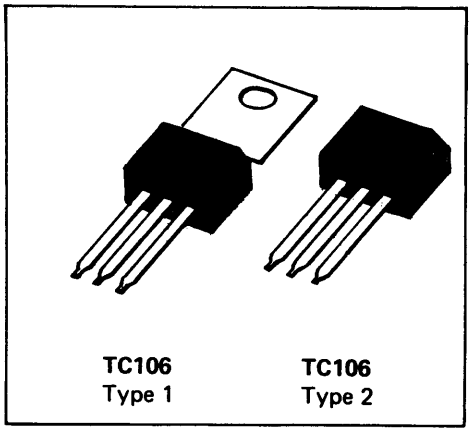
SILICON PLANAR REVERSE BLOCKING TRIODE THYRISTORS

(PLASTIC ENCAPSULATED SCRs)



TC106 Type 1 TC106 Type 2

DESIGN FEATURES

- Eutectic Bonding for Fatigue-Free Operation
- Blocking Capability to 400V
- Package Optimized for Mounting Flexibility
- 4 Amperes at 75°C

Transitron's new TC106 series plastic SCR's were developed specifically for those industrial and consumer applications where excellent electrical performance, high reliability, and low cost are companion requirements. These new SCR's are exceptionally well suited to such industrial and consumer/appliance applications as solenoid drivers, sequence timers, lamp drivers, relay replacement, voltage and current sensing, motor control, and a host of other current and voltage switching requirements.

REPETITIVE PEAK OFF-STATE VOLTAGE (V_{DRM}) and REPETITIVE PEAK REVERSE VOLTAGE (V_{RRM})

Symbol	TC106Q	TC106Y	TC106F	TC106A	TC106B	TC106C	TC106D	Test Conditions
V_{DRM} – VOLTS	15	30	50	100	200	300	400	T_C = 125°C
V_{RRM} – VOLTS	15	30	50	100	200	300	400	R_{GK} = 1.0K

See package configuration outlines on page 2-54.

Add suffix 1, 2, 3, or 4 to device type number to indicate type of package configuration desired.
Example: TC106A1 indicates device with type 1 package.

ABSOLUTE MAXIMUM RATINGS @ T_C = 75°C

Definitions	Symbol	Limits
RMS On-State Current	$I_{T(RMS)}$	4 A
Peak One-Cycle Surge Current (60 Hz)	I_{TSM}	20 A
Peak Reverse Gate Voltage	V_{GRM}	6V
Peak Gate Power	P_{GM}	500 mW
Average Gate Power	$P_{G(AV)}$	100 mW
Operating Temperature Range	T_{op}	–40 to 125°C
Storage Temperature Range	T_{stg}	–40 to 150°C

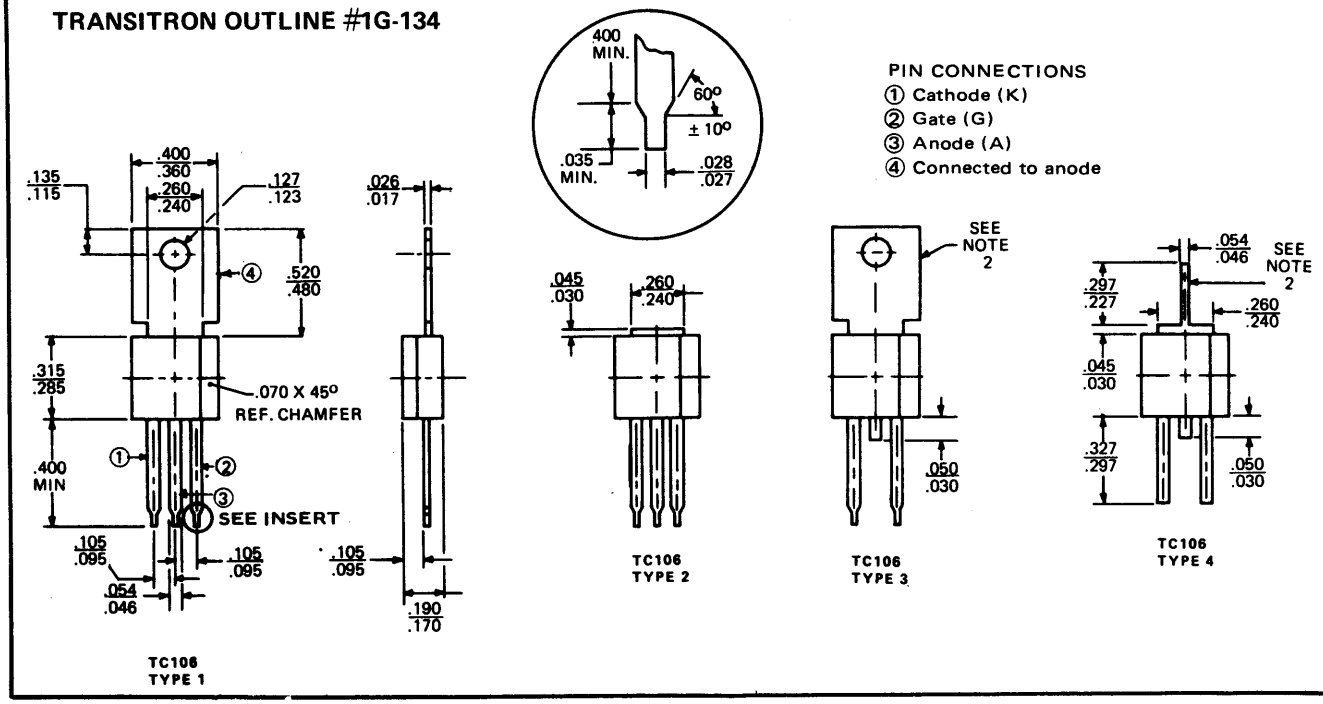
ELECTRICAL CHARACTERISTICS

PARAMETER			LIMITS		TEST CONDITIONS			
Symbol	Units	Definitions	Min.	Max.	T °C	R_{GK} ohms	V_{AA} volts	Other Conditions
V_{TM}	Volts	Max. On-State Voltage	–	2.2	25	–	–	I_{TM} = 4 Amps peak
I_{DRM}	μA	Rep. Peak Off-State Current	–	10	25	1K	V_{DRM}	
			–	100	125	1K	V_{DRM}	
I_{RRM}	μA	Rep. Peak Reverse Current	–	10	25	1K	V_{RRM}	
			–	100	125	1K	V_{RRM}	
I_{GT}	μA	Gate Trigger Current	–	200	25	∞	6	
V_{GT}	Volts	Gate Trigger Voltage	–	0.8	25	∞	6	
I_H	mA	Holding Current	–	3.0	25	1K	6	
I_L	mA	Latching Current	–	4.0	25	1K	6	
t_{on}	μs	Turn-on Time ($t_d + t_r$)	–	1.0*	25	∞	V_{DRM}	I_T = 1A, I_G = 135 mA
t_q	μs	Turn-off Time	–	100	125	1K	OPEN	$I_F = I_R$ = 1A
dv/dt	V/μs	Rate of rise of V_{DRM}	100*	–	25	1K	V_{DRM}	

*Typical

PACKAGING DATA

TRANSITRON OUTLINE #1G-134



NOTES ON SCR PARAMETER CURVES

INTRODUCTION

The operating parameters of SCRs are very dependent on temperature, gate drive current, and the value of gate-to-cathode bias resistor. When selecting a SCR for a particular application, a study of the information contained in curves showing variations of these parameters will prove highly valuable. For this reason Transitron's SCR data sheets include many curves of parameter data, providing information to cover the needs of most applications. Two main families of curves are included; one is of a statistical nature and the other a typical parameter plot.

PARAMETER VARIATION CURVES (Nos. 1 – 8)

The parameter variation curves are of a statistical nature, and indicate the expected spread of certain SCR parameters for different test conditions, with respect to the parameter value at one specified reference condition. The amount of change in SCR parameters going from one test condition to another varies considerably from unit to unit. As an example, an SCR which has 2 mA for holding at +25°C can increase to I_H of 10 mA at −55°C while another unit from the same lot which has an I_H of 2 mA at +25°C can have an I_H of 4 mA at −55°C. As a result, one finds I_H at −55°C increased by 2 to 5 times its value at +25°C. The parameter variation curves provide this type of information calculated with a 95% confidence level.

The curve's vertical axis presents the amount of change in the value of a particular parameter from its value measured at standard published test conditions. For example, if the published value for I_H on a particular family of SCR is 5 mA maximum at +25°C, then from the parameter variation curve titled "Change in I_H with Temperature, R_{GK} =1K" one can determine the maximum and minimum change in I_H at any desired temperature.

The heavy lines represent the maximum and minimum limits whereas the dashed line indicates the mean change in value. The reference condition is the same as the published test condition for the parameter under consideration, so that by multiplying the published parameter value by the ratio indicated on the vertical axis of the curve, the actual maximum and minimum values of the parameter for other conditions may be determined.

These curves will provide circuit designers the maximum limits to be expected under variable extremes so that worst-case designs may be readily determined.

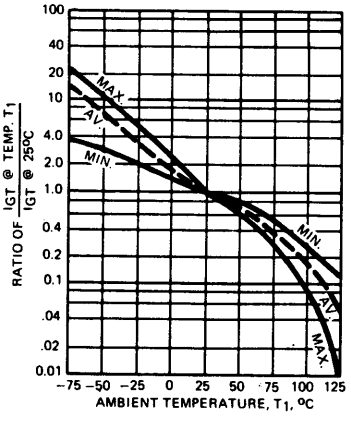
TYPICAL PARAMETER CURVES (Nos. 9 – 16)

This form of curve is the most widely used in the semiconductor industry. It gives the typical value of various SCR parameters under specified test conditions.

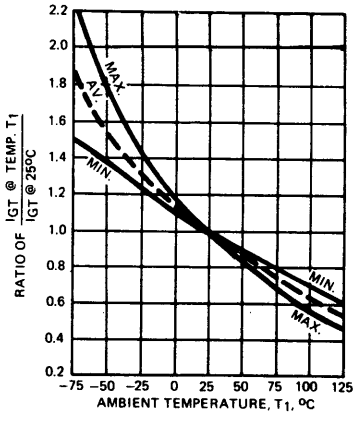
A study of these curves along with the parameter variation curves will provide information on the performance of the SCR under various conditions.

ELECTRICAL PARAMETER CHARACTERISTIC CURVES

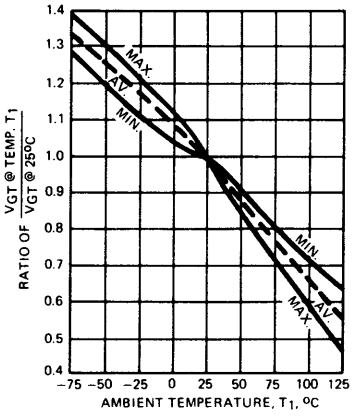
(1) CHANGE IN I_{GT} WITH TEMPERATURE, $R_{GK} = \infty$



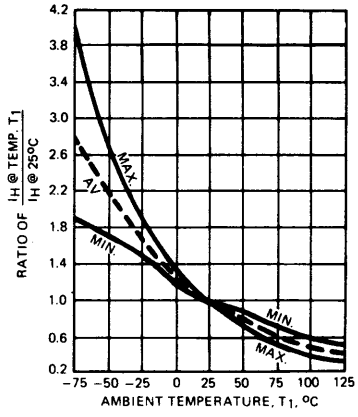
(2) CHANGE IN I_{GT} WITH TEMPERATURE, $R_{GK} = 1\Omega$



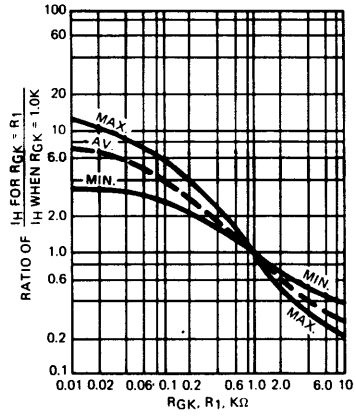
3 CHANGE IN V_{GT} WITH TEMPERATURE, $R_{GK} = \infty$



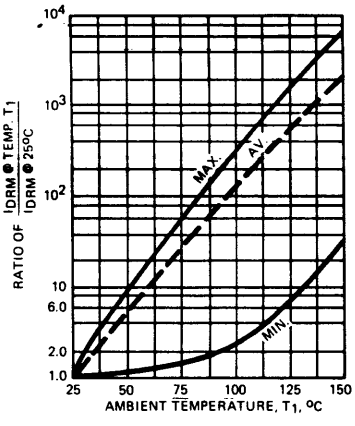
4 CHANGE IN I_H WITH TEMPERATURE, $R_{GK} = 1K\Omega$



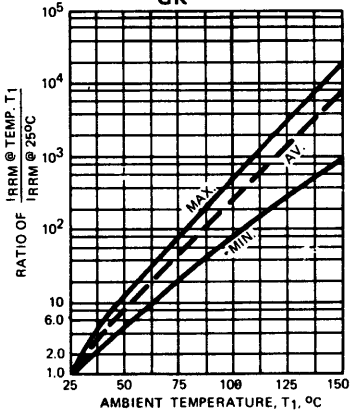
5 CHANGE IN I_H WITH R_{GK}, @ 25°C



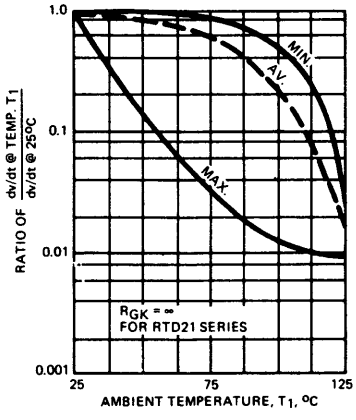
6 CHANGE IN I_{DRM} WITH TEMPERATURE, $R_{GK} = 1K\Omega$



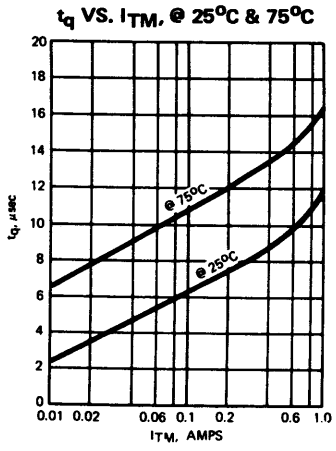
7 CHANGE IN I_{RRM} WITH TEMPERATURE, $R_{GK} = 1K\Omega$



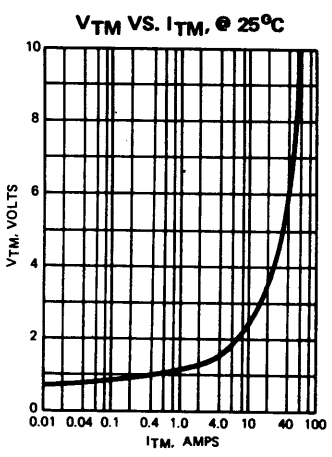
8 CHANGE IN dv/dt WITH TEMPERATURE, $R_{GK} = 1K\Omega$



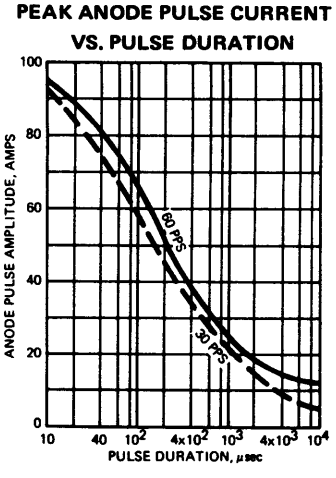
(9)


t_q VS. I_{TM}, @ 25°C & 75°C
t_q, μsec
@ 75°C
@ 25°C
I_{TM}, AMPS

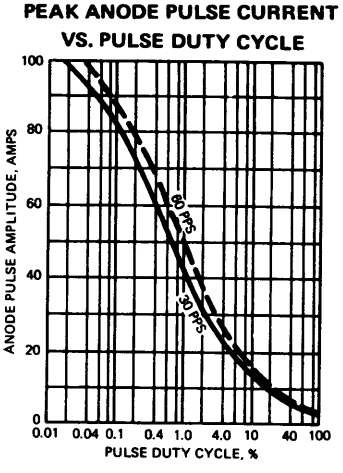
(10)


V_{TM} VS. I_{TM}, @ 25°C
V_{TM}, VOLTS
I_{TM}, AMPS

(11)


PEAK ANODE PULSE CURRENT
VS. PULSE DURATION
ANODE PULSE AMPLITUDE, AMPS
60 PPS
PULSE DURATION, μsec

(12)


PEAK ANODE PULSE CURRENT
VS. PULSE DUTY CYCLE
ANODE PULSE AMPLITUDE, AMPS
60 PPS
30 PPS
PULSE DUTY CYCLE, %

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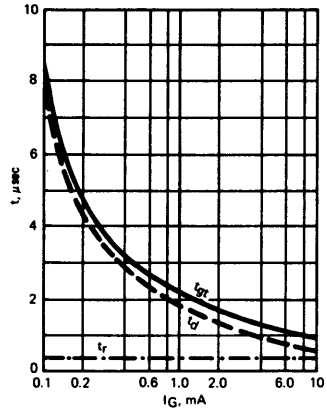
t_d, t_r, t_{gt} VS. I_G, @ 25°C



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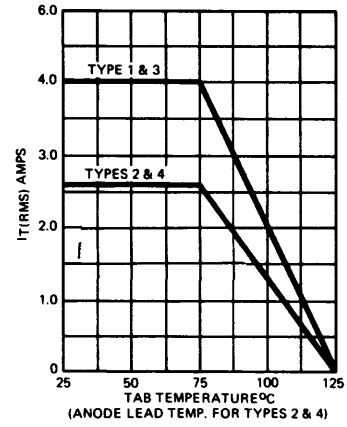
MAXIMUM RATED CURRENT HANDLING CAPABILITY, $I_{T(RMS)}$ VS. TAB TEMPERATURE



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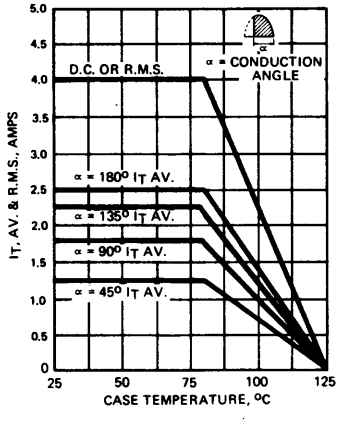
TC106 TYPE 1

MAXIMUM RATED CURRENT HANDLING CAPABILITY, I_T AV. & R.M.S., VS. CASE TEMPERATURE



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TC106 TYPE 1

TYPICAL CURRENT HANDLING CAPABILITY, I_T AV. & R.M.S., VS. AMBIENT (STILL-AIR) TEMPERATURE