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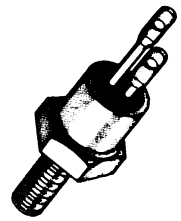
2N1600 2N1602
2N1601 2N1603
2N1604

4.8 AMP SCR

REVERSE BLOCKING TRIODE THYRISTORS

(SCRs)


TO-64

DESIGN FEATURES

- Blocking to 400 V
- Operation to 150°C
- 25 A surge capability

hermetically sealed 2N1600 SCR series is designed specifically for those industrial and consumer applications where excellent electrical performance and high reliability are companion requirements. These SCRs are exceptionally well suited to such applications as solenoid and lamp drivers, temperature controllers, voltage and current sensing, motor control, and many other current and voltage switching requirements.

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

Symbol	2N 1600	2N 1601	2N 1602	2N 1603	2N 1604	Test Conditions
V_{DRM} – VOLTS	50	100	200	300	400	T_C = 125°C
V_{RRM} – VOLTS	50	100	200	300	400	

ABSOLUTE MAXIMUM RATINGS @ T_C = 80°C

Definitions	Symbol	Limits
Average On-State Current	$I_{T(AV)}$	3.0 A
RMS On-State Current	$I_{T(RMS)}$	4.8 A
Peak One-Cycle Surge Current	I_{TSM}	25 A
Peak Reverse Gate Voltage	V_{GRM}	6 V
Peak Gate Power	P_{GM}	5 W
Average Gate Power	$P_{G(AV)}$	500 mW
Operating Temperature Range	T_{op}	–65 to +150°C
Storage Temperature Range	T_{stg}	–65 to +150°C

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4.8 AMP SCR

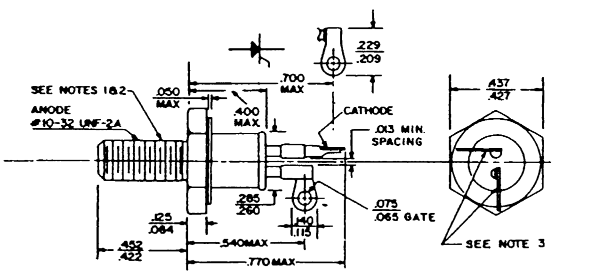
ELECTRICAL CHARACTERISTICS

PARAMETERS			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	–	2.0	25	–	–	$I_{TM} = 3$ A
I_{DRM}	mA	Rep. Peak Off-State Current	–	.25	25	∞	V_{DRM}	
			–	1.0	125	∞	V_{DRM}	
I_{RRM}	mA	Rep. Peak Reverse Current	–	.25	25	∞	V_{RRM}	
			–	1.0	125	∞	V_{RRM}	
I_{GT}	mA	Gate Trigger Current	–	10	25	∞	6	
V_{GT}	Volts	Gate Trigger Voltage	–	3.0	25	∞	6	
I_H	mA	Holding Current	–	25	25	∞	6	
T_Q	μs	Turn-off Time	–	5*	25	∞	–	$I_{TM} = 3.0$ A = I_R
dv/dt	V/μs	Rate of rise of V_{DRM}	100*	–	25	∞	V_{DRM}	

*Typical

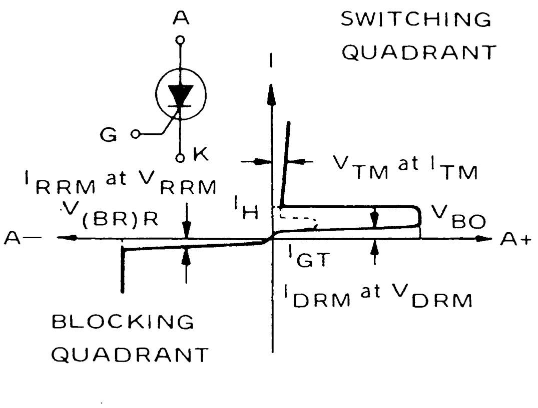
NOTE
FOR CHARACTERISTIC CURVES FOR THIS FAMILY REFER TO THE END OF THIS GROUP OF SPECIFICATIONS.

PACKAGING DATA



NOTES: 1. COMPLETE THREADS EXTEND TO WITHIN 2-1/2 THREADS OF HEAD.
2. DIAMETER OF UNTHREADED PORTION .190 MAX.
3. ANGULAR ORIENTATION OF THESE TERMINALS IS UNDEFINED.
4. CASE IS ANODE CONNECTION.
5. ALL DIMENSIONS IN INCHES.

V-I CHARACTERISTICS



CHARACTERISTIC CURVES FOR TO-64 SCRs

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 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.

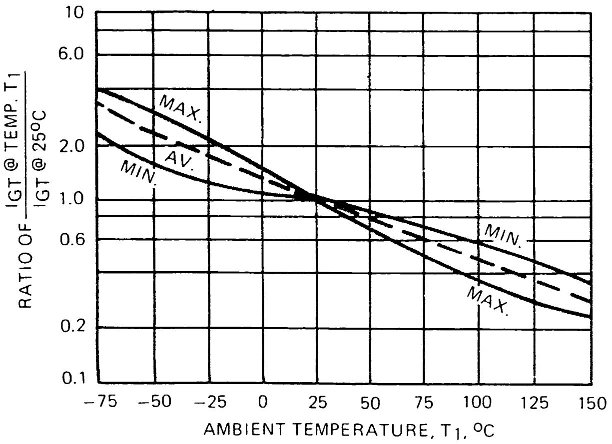
TYPICAL PARAMETER CURVES (Nos. 9 – 13)

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.

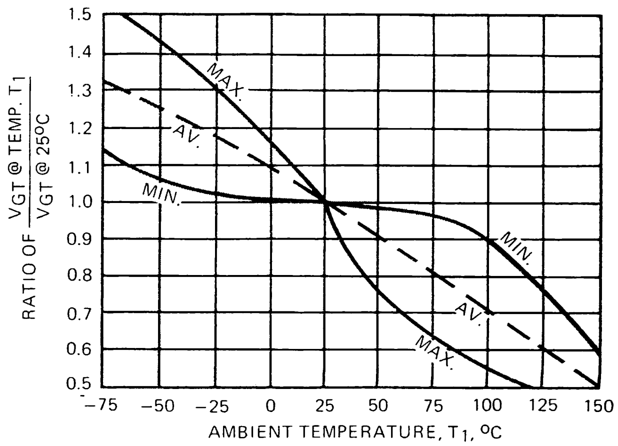
(1)

CHANGE IN
I_{GT} VERSUS TEMPERATURE, $R_{GK} = \infty$



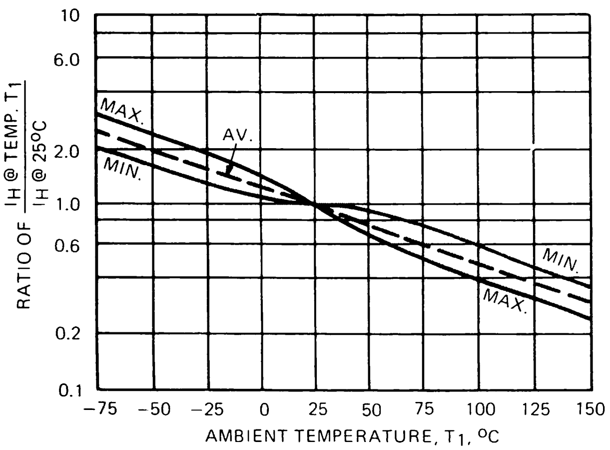
(2)

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



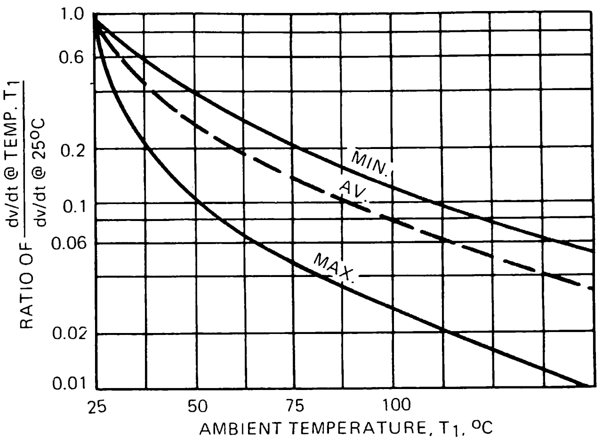
3

CHANGE IN
I_H VERSUS TEMPERATURE, $R_{GK} = \infty$



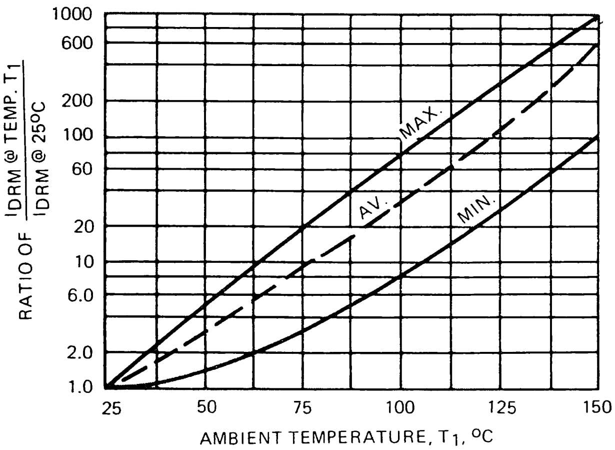
4

CHANGE IN
dv/dt VERSUS TEMPERATURE, $R_{GK} = \infty$



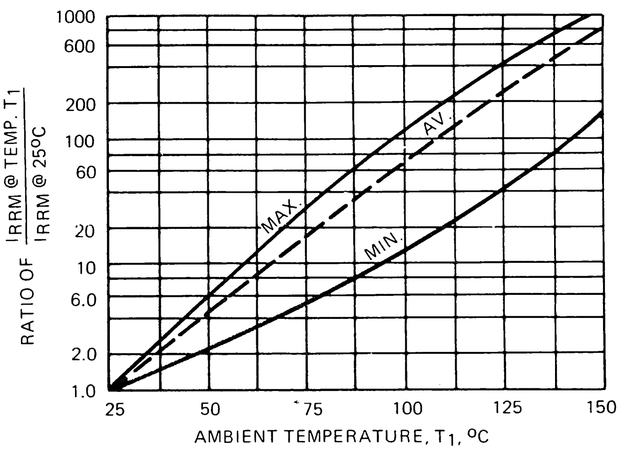
5

CHANGE IN
I_{DRM} VERSUS TEMPERATURE, $R_{GK} = \infty$



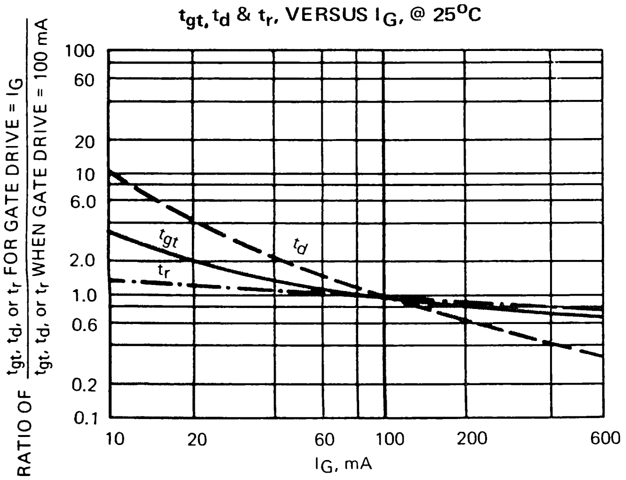
6

CHANGE IN
I_{RRM} VERSUS TEMPERATURE, $R_{GK} = \infty$



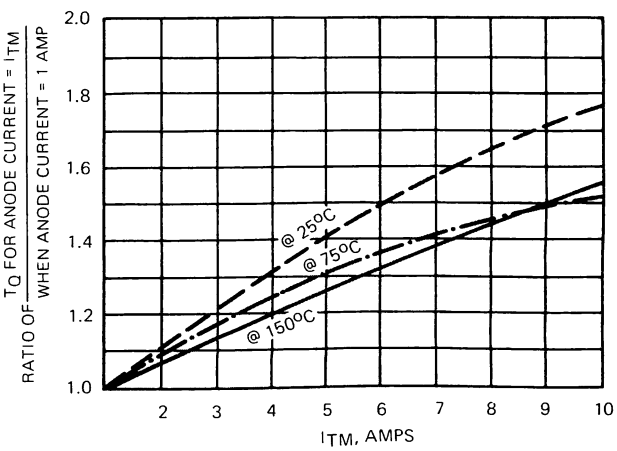
7

CHANGE IN
t_{gt}, t_d & t_r, VERSUS I_G, @ 25°C



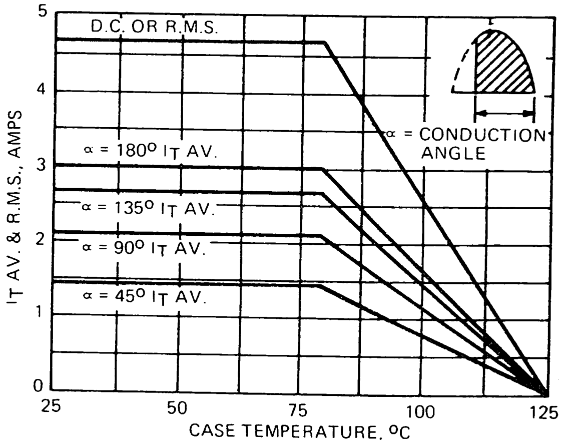
8

CHANGE IN
T_Q VERSUS I_{TM}, @ 25°C, 75°C, 150°C



(9)

(2N1600,
MAXIMUM RATED CURRENT HANDLING
CAPABILITY, I_T AV. & R.M.S., vs. CASE TEMPERATURE



(10)

V_{TM} VERSUS I_{TM}, @ 25°C