

Thyristors

Silicon Controlled Rectifiers

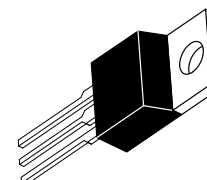
... designed primarily for half-wave ac control applications, such as motor controls, heating controls and power supply crowbar circuits.

- Glass Passivated Junctions with Center Gate Fire for Greater Parameter Uniformity and Stability
- Small, Rugged, Thermowatt Constructed for Low Thermal Resistance, High Heat Dissipation and Durability
- Blocking Voltage to 800 Volts
- 300 A Surge Current Capability

2N6504
thru
2N6509*

*Motorola preferred devices

SCRs
25 AMPERES RMS
50 thru 800 VOLTS



CASE 221A-04
(TO-220AB)
STYLE 3

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted.)

| Rating | Symbol | Value | Unit |
|---|---------------------------------------|---------------------------------------|------------------|
| * Peak Forward and Reverse Blocking Voltage ⁽¹⁾ (Gate Open, $T_J = 25$ to 125°C) | V_{DRM} , V_{RRM} | 50 100 200 400 600 800 | Volts |
| Forward Current ($T_C = 85^\circ\text{C}$) (180° Conduction Angle) | $I_T(\text{RMS})$ $I_T(\text{AV})$ | 25 16 | Amps |
| Peak Non-repetitive Surge Current — (1/2 Cycle, Sine Wave) | I_{TSM} | 300 350 | Amps |
| Forward Peak Gate Power | P_{GM} | 20 | Watts |
| Forward Average Gate Power | $P_{G(\text{AV})}$ | 0.5 | Watt |
| Forward Peak Gate Current | I_{GM} | 2 | Amps |
| Operating Junction Temperature Range | T_J | -40 to +125 | $^\circ\text{C}$ |
| Storage Temperature Range | T_{stg} | -40 to +150 | $^\circ\text{C}$ |

*THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|--------------------------------------|-----------------------|-----|--------------------|
| Thermal Resistance, Junction to Case | $R_{\theta\text{JC}}$ | 1.5 | $^\circ\text{C/W}$ |

*Indicates JEDEC Registered Data.

1. V_{DRM} and V_{RRM} for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; however, positive gate voltage shall not be applied concurrent with negative potential on the anode. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.

Preferred devices are Motorola recommended choices for future use and best overall value.

REV 1

2N6504 thru 2N6509

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted.)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|--|--------------------|--------|----------|----------|------------------------|
| * Peak Forward or Reverse Blocking Current ($V_{AK} = \text{Rated } V_{DRM} \text{ or } V_{RRM}$, Gate Open) $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$ | I_{DRM}, I_{RRM} | — — | — — | 10 2 | μA mA |
| * Forward "On" Voltage(1) ($I_{TM} = 50 \text{ A}$) | V_{TM} | — | — | 1.8 | Volts |
| * Gate Trigger Current (Continuous dc) (Anode Voltage = 12 Vdc, $R_L = 100 \text{ Ohms}$) $T_C = 25^\circ\text{C}$ $T_C = -40^\circ\text{C}$ | I_{GT} | — — | — 25 | 40 75 | mA |
| * Gate Trigger Voltage (Continuous dc) (Anode Voltage = 12 Vdc, $R_L = 100 \text{ Ohms}$, $T_C = -40^\circ\text{C}$) | V_{GT} | — | 1 | 1.5 | Volts |
| Gate Non-Trigger Voltage (Anode Voltage = Rated V_{DRM} , $R_L = 100 \text{ Ohms}$, $T_J = 125^\circ\text{C}$) | V_{GD} | 0.2 | — | — | Volts |
| * Holding Current (Anode Voltage = 12 Vdc, $T_C = -40^\circ\text{C}$) | I_H | — | 35 | 40 | mA |
| * Turn-On Time ($I_{TM} = 25 \text{ A}$, $I_{GT} = 50 \text{ mAdc}$) | t_{gt} | — | 1.5 | 2 | μs |
| Turn-Off Time ($V_{DRM} = \text{rated voltage}$) ($I_{TM} = 25 \text{ A}$, $I_R = 25 \text{ A}$) ($I_{TM} = 25 \text{ A}$, $I_R = 25 \text{ A}$, $T_J = 125^\circ\text{C}$) | t_q | — — | 15 35 | — — | μs |
| Critical Rate of Rise of Off-State Voltage (Gate Open, Rated V_{DRM} , Exponential Waveform) | dv/dt | — | 50 | — | $\text{V}/\mu\text{s}$ |

*Indicates JEDEC Registered Data.

1. Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2\%$.

FIGURE 1 — AVERAGE CURRENT DERATING

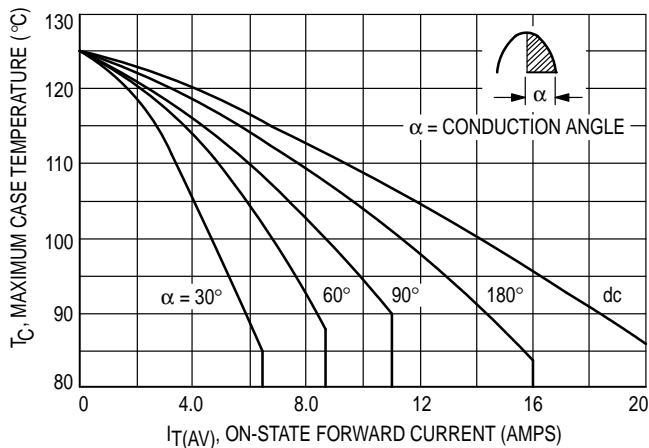


FIGURE 2 — MAXIMUM ON-STATE POWER DISSIPATION

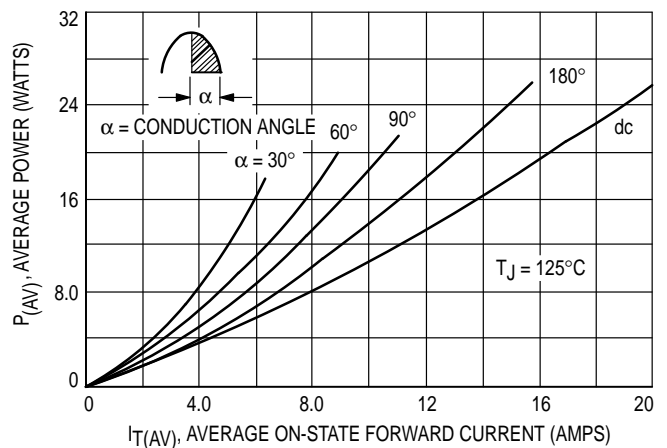


FIGURE 3 — MAXIMUM FORWARD VOLTAGE

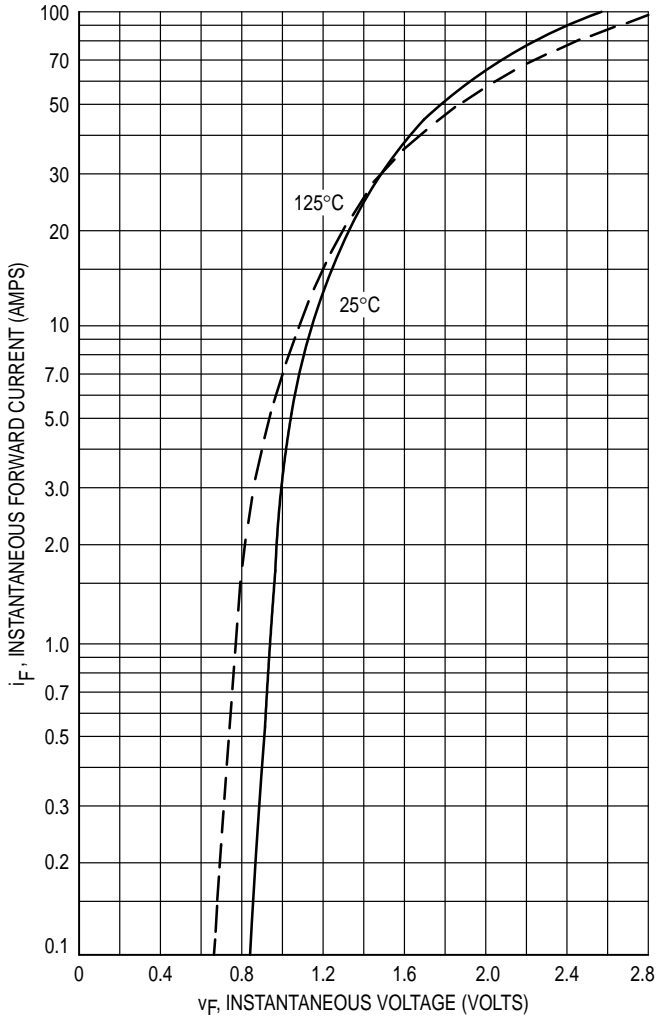


FIGURE 4 — MAXIMUM NON-REPETITIVE SURGE CURRENT

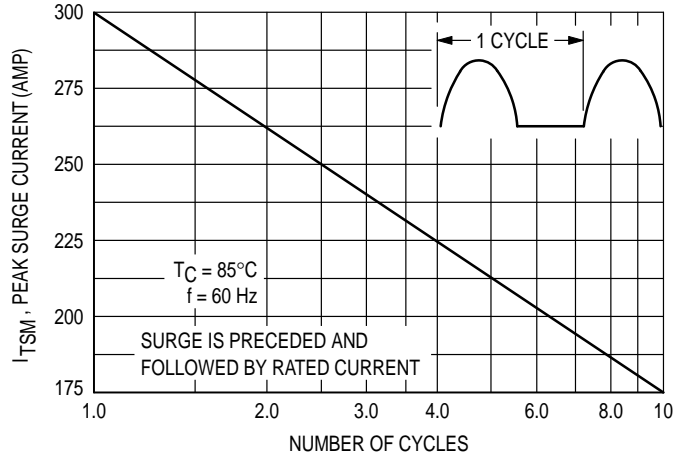


FIGURE 5 — CHARACTERISTICS AND SYMBOLS

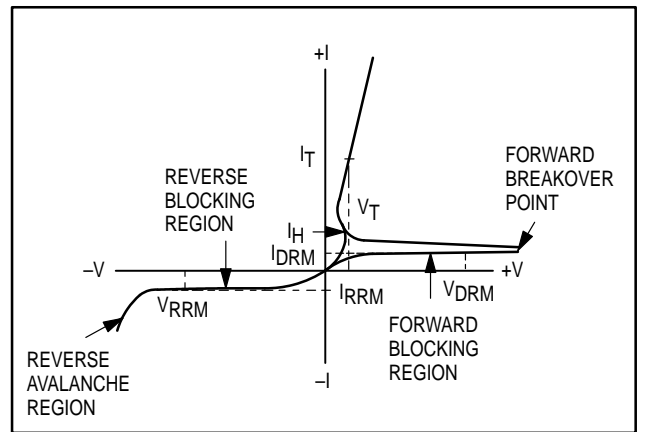
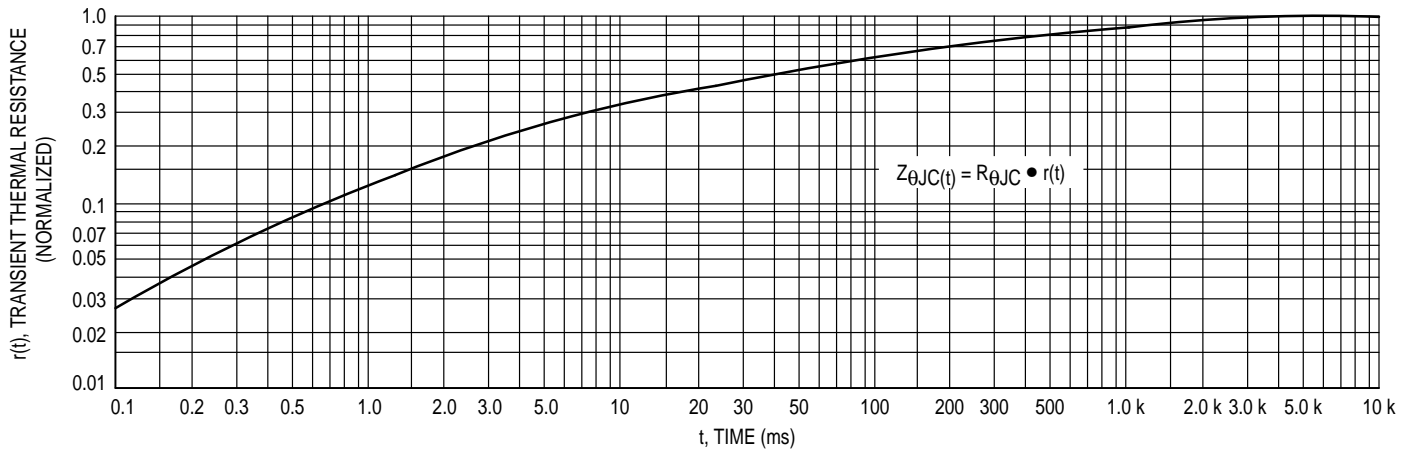


FIGURE 6 — THERMAL RESPONSE



TYPICAL TRIGGER CHARACTERISTICS

FIGURE 7 — GATE TRIGGER CURRENT

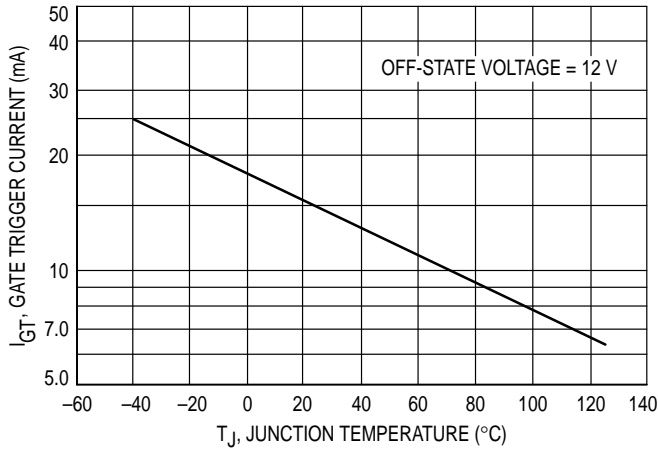


FIGURE 8 — GATE TRIGGER VOLTAGE

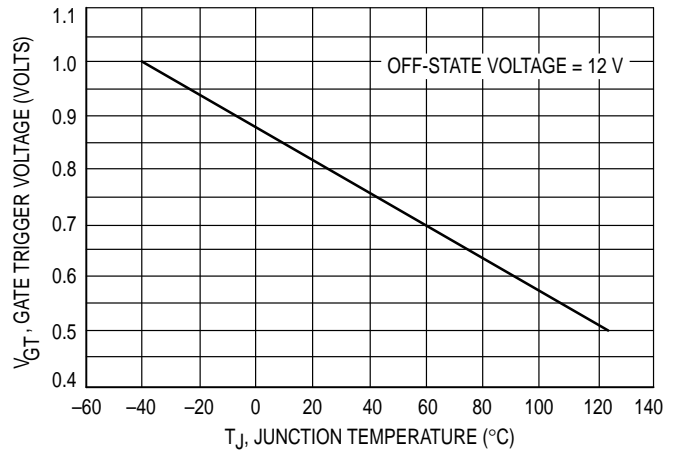
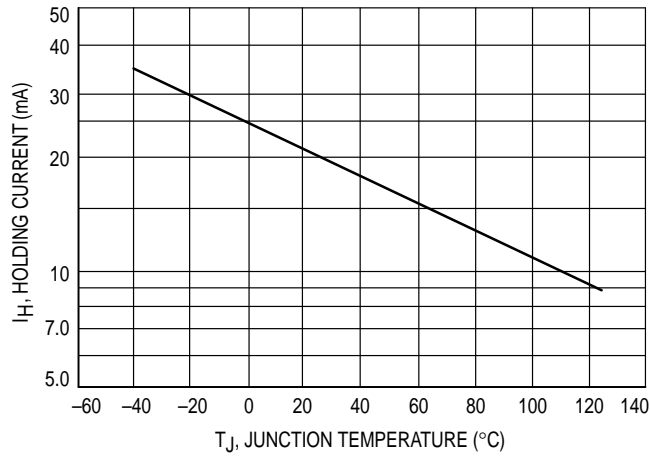
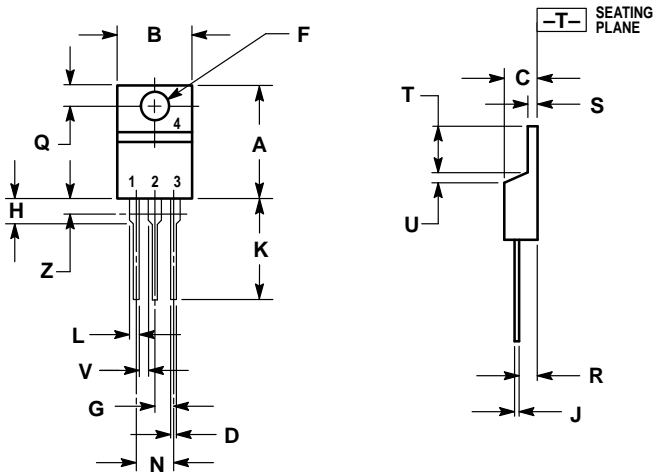


FIGURE 9 — HOLDING CURRENT



PACKAGE DIMENSIONS



STYLE 3:
 PIN 1. CATHODE
 2. ANODE
 3. GATE
 4. ANODE

- NOTES:
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

| DIM | INCHES | | MILLIMETERS | |
|-----|--------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.570 | 0.620 | 14.48 | 15.75 |
| B | 0.380 | 0.405 | 9.66 | 10.28 |
| C | 0.160 | 0.190 | 4.07 | 4.82 |
| D | 0.025 | 0.035 | 0.64 | 0.88 |
| F | 0.142 | 0.147 | 3.61 | 3.73 |
| G | 0.095 | 0.105 | 2.42 | 2.66 |
| H | 0.110 | 0.155 | 2.80 | 3.93 |
| J | 0.014 | 0.022 | 0.36 | 0.55 |
| K | 0.500 | 0.562 | 12.70 | 14.27 |
| L | 0.045 | 0.055 | 1.15 | 1.39 |
| N | 0.190 | 0.210 | 4.83 | 5.33 |
| Q | 0.100 | 0.120 | 2.54 | 3.04 |
| R | 0.080 | 0.110 | 2.04 | 2.79 |
| S | 0.045 | 0.055 | 1.15 | 1.39 |
| T | 0.235 | 0.255 | 5.97 | 6.47 |
| U | 0.000 | 0.050 | 0.00 | 1.27 |
| V | 0.045 | — | 1.15 | — |
| Z | — | 0.080 | — | 2.04 |

CASE 221A-04
 (TO-220AB)

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