

# 2N6344A, 2N6348A, 2N6349A

Preferred Device

## Triacs

### Silicon Bidirectional Thyristors

Designed primarily for full-wave AC control applications, such as light dimmers, motor controls, heating controls and power supplies; or wherever full-wave silicon gate controlled solid-state devices are needed. Triac type thyristors switch from a blocking to a conducting state for either polarity of applied anode voltage with positive or negative gate triggering.

#### Features

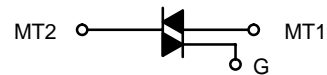
- Blocking Voltage to 800 V
- All Diffused and Glass Passivated Junctions for Greater Parameter Uniformity and Stability
- Small, Rugged, Thermowatt Construction for Low Thermal Resistance, High Heat Dissipation and Durability
- Gate Triggering Guaranteed in all Four Quadrants
- For 400 Hz Operation, Consult Factory
- 8.0 A Devices Available as 2N6344 thru 2N6349
- Pb-Free Packages are Available\*



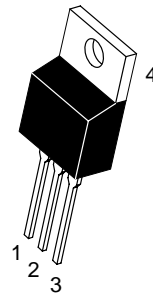
**ON Semiconductor®**

<http://onsemi.com>

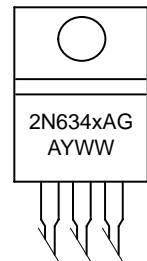
**TRIACS**  
**12 AMPERES RMS**  
**600 thru 800 VOLTS**



#### MARKING DIAGRAM



**TO-220AB**  
**CASE 221A**  
**STYLE 4**



2N634xA = Device Code  
x = 4, 8, or 9  
A = Assembly Location  
Y = Year  
WW = Work Week  
G = Pb-Free Package

#### PIN ASSIGNMENT

| PIN ASSIGNMENT |                 |
|----------------|-----------------|
| 1              | Main Terminal 1 |
| 2              | Main Terminal 2 |
| 3              | Gate            |
| 4              | Main Terminal 2 |

#### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

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

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

## 2N6344A, 2N6348A, 2N6349A

### MAXIMUM RATINGS

| Characteristics   | Symbol                                 | Value       | Unit                 |
|---|--|-------------|----------------------|
| *Peak Repetitive Off-State Voltage (Note 1)<br>(Gate Open, $T_J = -40$ to $+110^\circ\text{C}$ , Sine Wave 50 to 60 Hz, Gate Open)<br>2N6344A, 2N6348A<br>2N6349A | $V_{\text{DRM}}$ ,<br>$V_{\text{RRM}}$ | 600<br>800  | V                    |
| *On-State RMS Current (Full Cycle Sine Wave 50 to 60 Hz)<br><br>( $T_C = +80^\circ\text{C}$ )<br>( $T_C = +95^\circ\text{C}$ )                                    | $I_{\text{T(RMS)}}$                    | 12<br>6.0   | A                    |
| *Peak Non-repetitive Surge Current (One Full Cycle, 60 Hz, $T_C = +80^\circ\text{C}$ )<br>Preceded and followed by rated current                                  | $I_{\text{TSM}}$                       | 100         | A                    |
| Circuit Fusing Consideration ( $t = 8.3$ ms)  | $I^2t$                                 | 59          | $\text{A}^2\text{s}$ |
| *Peak Gate Power ( $T_C = +80^\circ\text{C}$ , Pulse Width = 2.0 $\mu\text{s}$ )  | $P_{\text{GM}}$                        | 20          | W                    |
| *Average Gate Power ( $T_C = +80^\circ\text{C}$ , $t = 8.3$ ms)   | $P_{\text{G(AV)}}$                     | 0.5         | W                    |
| *Peak Gate Current (Pulse Width = 2.0 $\mu\text{s}$ ; $T_C = +80^\circ\text{C}$ )   | $I_{\text{GM}}$                        | 2.0         | A                    |
| *Peak Gate Voltage (Pulse Width = 2.0 $\mu\text{s}$ ; $T_C = +80^\circ\text{C}$ )   | $V_{\text{GM}}$                        | $\pm 10$    | V                    |
| *Operating Junction Temperature Range   | $T_J$                                  | -40 to +125 | $^\circ\text{C}$     |
| *Storage Temperature Range  | $T_{\text{stg}}$                       | -40 to +150 | $^\circ\text{C}$     |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

\*Indicates JEDEC Registered Data.

- $V_{\text{DRM}}$  and  $V_{\text{RRM}}$  for all types can be applied on a continuous basis. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.

### THERMAL CHARACTERISTICS

| Characteristic  | Symbol                | Max | Unit               |
|---|-----------------------|-----|--------------------|
| *Thermal Resistance, Junction-to-Case   | $R_{\theta\text{JC}}$ | 2.0 | $^\circ\text{C/W}$ |
| Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 10 Seconds | $T_L$                 | 260 | $^\circ\text{C}$   |

### ORDERING INFORMATION

| Device   | Package               | Shipping        |
|----------|-----------------------|-----------------|
| 2N6344A  | TO-220AB              | 500 Units / Box |
| 2N6344AG | TO-220AB<br>(Pb-Free) |                 |
| 2N6348A  | TO-220AB              |                 |
| 2N6348AG | TO-220AB<br>(Pb-Free) |                 |
| 2N6349A  | TO-220AB              |                 |
| 2N6349AG | TO-220AB<br>(Pb-Free) |                 |

## 2N6344A, 2N6348A, 2N6349A

### ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ unless otherwise noted; Electricals apply in either direction)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

#### OFF CHARACTERISTICS

|   |   |                        |        |        |           |                     |
|---|---|------------------------|--------|--------|-----------|---------------------|
| *Peak Repetitive Blocking Current<br>( $V_D = \text{Rated } V_{DRM}, V_{RRM}: \text{Gate Open}$ ) | $T_J = 25^\circ\text{C}$<br>$T_J = 110^\circ\text{C}$ | $I_{DRM}$<br>$I_{RRM}$ | –<br>– | –<br>– | 10<br>2.0 | $\mu\text{A}$<br>mA |
|---|---|------------------------|--------|--------|-----------|---------------------|

#### ON CHARACTERISTICS

|  |  |          |        |          |          |               |
|--|--|----------|--------|----------|----------|---------------|
| *Peak On-State Voltage<br>( $I_{TM} = \pm 17 \text{ A Peak}; \text{Pulse Width} = 1 \text{ to } 2 \text{ ms}, \text{Duty Cycle} \leq 2\%$ )                                |  | $V_{TM}$ | –      | 1.3      | 1.75     | V             |
| Gate Trigger Current (Continuous dc)<br>( $V_D = 12 \text{ Vdc}, R_L = 100 \Omega$ )   |  | $I_{GT}$ |        |          |          | mA            |
| Quadrant I: MT2(+), G(+) <span style="float: right;">All</span>  |  |          | –      | 6.0      | 50       |               |
| Quadrant II: MT2(+), G(–) <span style="float: right;">2N6348A and 2N6349A only</span>  |  |          | –      | 6.0      | 75       |               |
| Quadrant III: MT2(–), G(–) <span style="float: right;">All</span>  |  |          | –      | 10       | 50       |               |
| Quadrant IV: MT2(–), G(+) <span style="float: right;">2N6348A and 2N6349A only</span>  |  |          | –      | 25       | 75       |               |
| *MT2(+), G(+); MT2(–), G(–) $T_C = -40^\circ\text{C}$  |  |          | –      | –        | 100      |               |
| *MT2(+), G(–); MT2(–), G(+) $T_C = -40^\circ\text{C}$  |  |          | –      | –        | 125      |               |
| Gate Trigger Voltage (Continuous dc)<br>( $V_D = 12 \text{ Vdc}, R_L = 100 \Omega$ )   |  | $V_{GT}$ |        |          |          | V             |
| Quadrant I: MT2(+), G(+) <span style="float: right;">All</span>  |  |          | –      | 0.9      | 2.0      |               |
| Quadrant II: MT2(+), G(–) <span style="float: right;">2N6348A and 2N6349A only</span>  |  |          | –      | 0.9      | 2.5      |               |
| Quadrant III: MT2(–), G(–) <span style="float: right;">All</span>  |  |          | –      | 1.1      | 2.0      |               |
| Quadrant IV: MT2(–), G(+) <span style="float: right;">2N6348A and 2N6349A only</span>  |  |          | –      | 1.4      | 2.5      |               |
| *MT2(+), G(+); MT2(–), G(–) $T_C = -40^\circ\text{C}$  |  |          | –      | –        | 2.5      |               |
| *MT2(+), G(–); MT2(–), G(+) $T_C = -40^\circ\text{C}$  |  |          | –      | –        | 3.0      |               |
| Gate Non-Trigger Voltage ( $V_D = \text{Rated } V_{DRM}, R_L = 10 \text{ k } \Omega, T_J = 110^\circ\text{C}$ )<br>*MT2(+), G(+); MT2(–), G(–); MT2(+), G(–); MT2(–), G(+) |  | $V_{GD}$ | 0.2    | –        | –        | V             |
| Holding Current<br>( $V_D = 12 \text{ Vdc}, \text{Gate Open}$ )<br>Initiating Current = $\pm 200 \text{ mA}$   | $T_C = 25^\circ\text{C}$<br>$*T_C = -40^\circ\text{C}$ | $I_H$    | –<br>– | 6.0<br>– | 40<br>75 | mA            |
| *Turn-On Time<br>( $V_D = \text{Rated } V_{DRM}, I_{TM} = 17 \text{ A}, I_{GT} = 120 \text{ mA}$ ,<br>Rise Time = $0.1 \mu\text{s}$ , Pulse Width = $2 \mu\text{s}$ )      |  | $t_{gt}$ | –      | 1.5      | 2.0      | $\mu\text{s}$ |

#### DYNAMIC CHARACTERISTICS

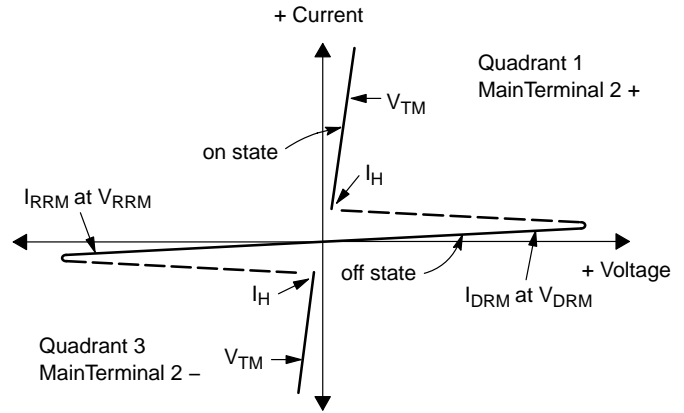
|  |  |            |   |     |   |                        |
|--|--|------------|---|-----|---|------------------------|
| Critical Rate of Rise of Commutation Voltage<br>( $V_D = \text{Rated } V_{DRM}, I_{TM} = 17 \text{ A}, \text{Commutating } di/dt = 6.1 \text{ A/ms}$ ,<br>Gate Unenergized, $T_C = 80^\circ\text{C}$ ) |  | $dv/dt(c)$ | – | 5.0 | – | $\text{V}/\mu\text{s}$ |
|--|--|------------|---|-----|---|------------------------|

\*Indicates JEDEC Registered Data.

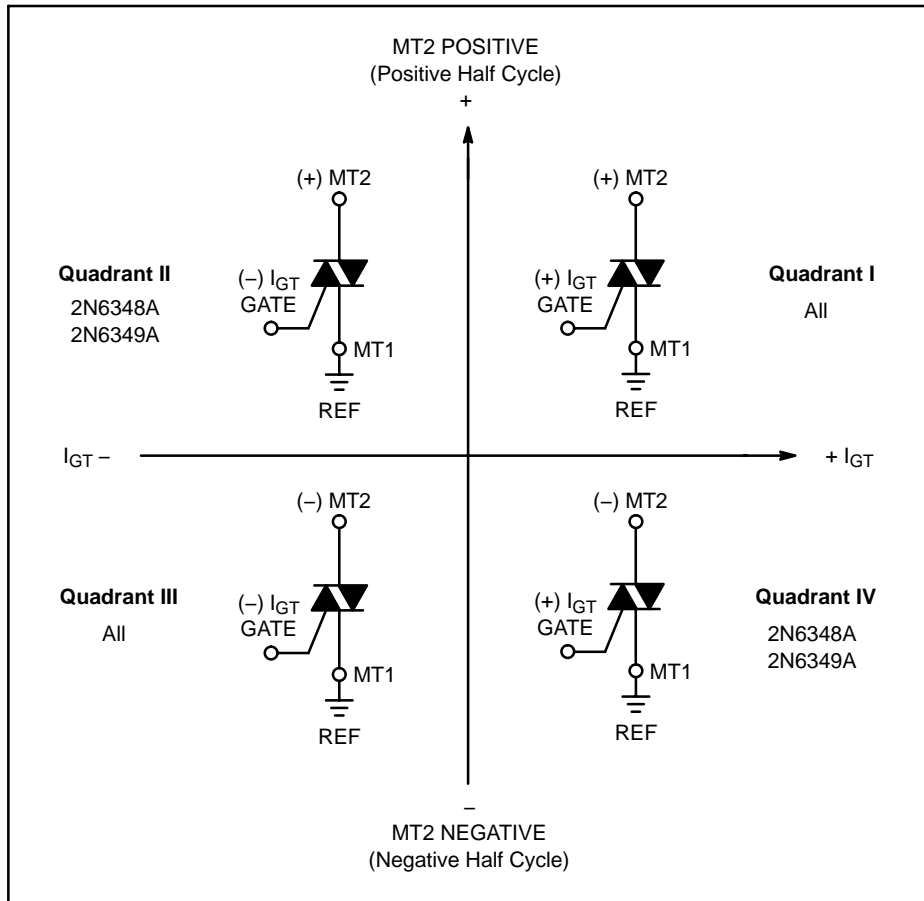
# 2N6344A, 2N6348A, 2N6349A

## Voltage Current Characteristic of Triacs (Bidirectional Device)

| Symbol    | Parameter                                 |
|-----------|---|
| $V_{DRM}$ | Peak Repetitive Forward Off State Voltage |
| $I_{DRM}$ | Peak Forward Blocking Current             |
| $V_{RRM}$ | Peak Repetitive Reverse Off State Voltage |
| $I_{RRM}$ | Peak Reverse Blocking Current             |
| $V_{TM}$  | Maximum On State Voltage                  |
| $I_H$     | Holding Current                           |



### Quadrant Definitions for a Triac



All polarities are referenced to MT1.  
With in-phase signals (using standard AC lines) quadrants I and III are used.

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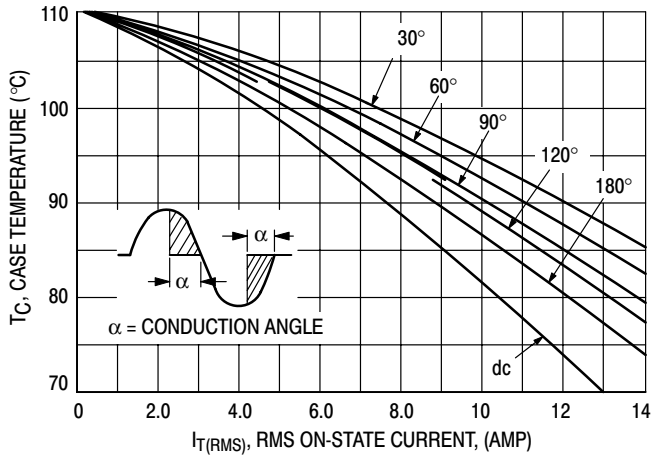


Figure 1. RMS Current Derating

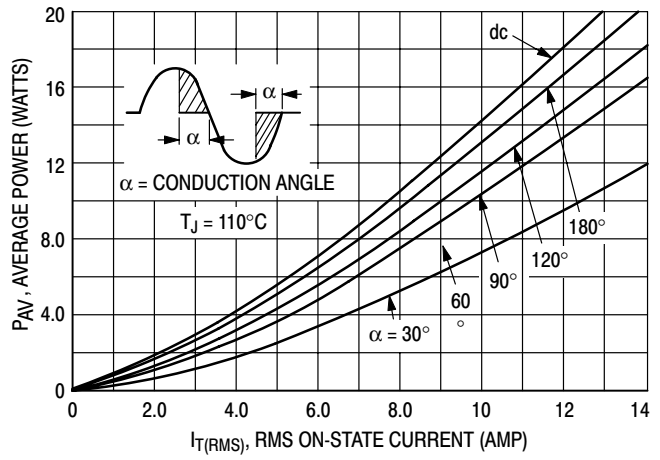


Figure 2. On-State Power Dissipation

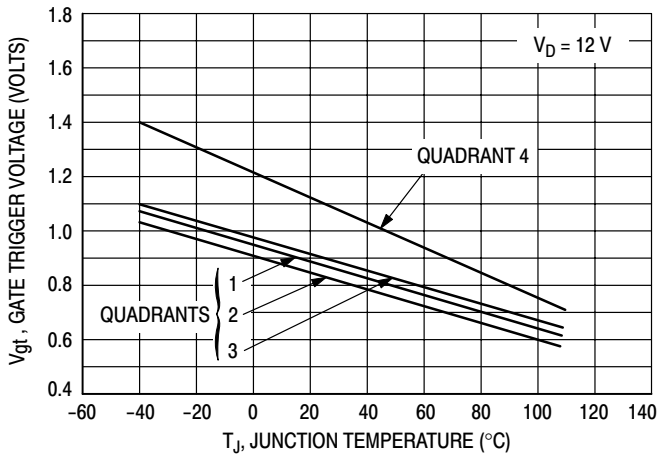


Figure 3. Typical Gate Trigger Voltage

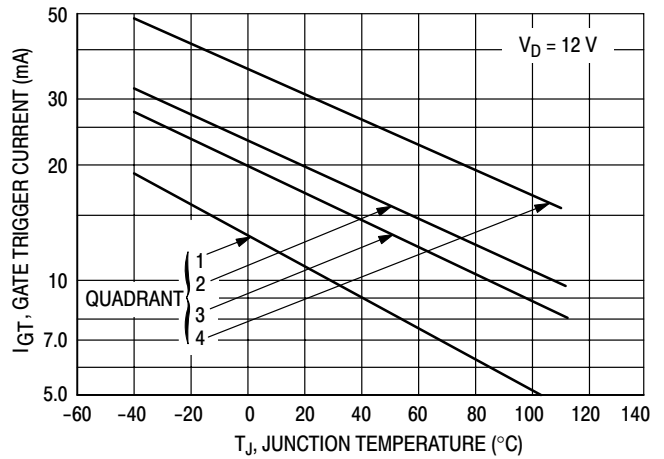


Figure 4. Typical Gate Trigger Current

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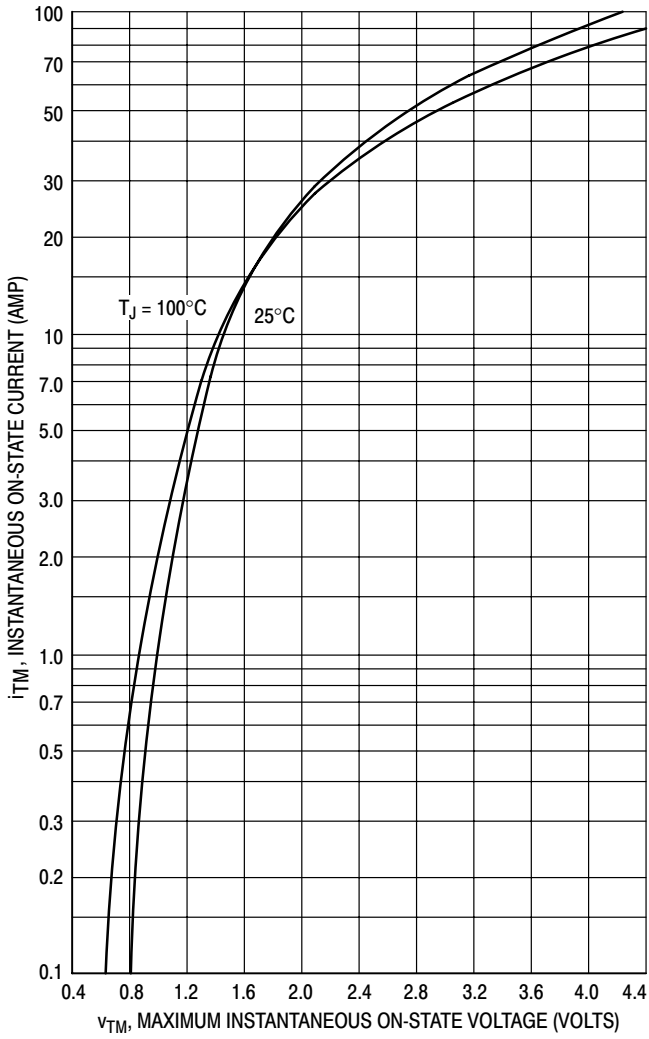


Figure 5. On-State Characteristics

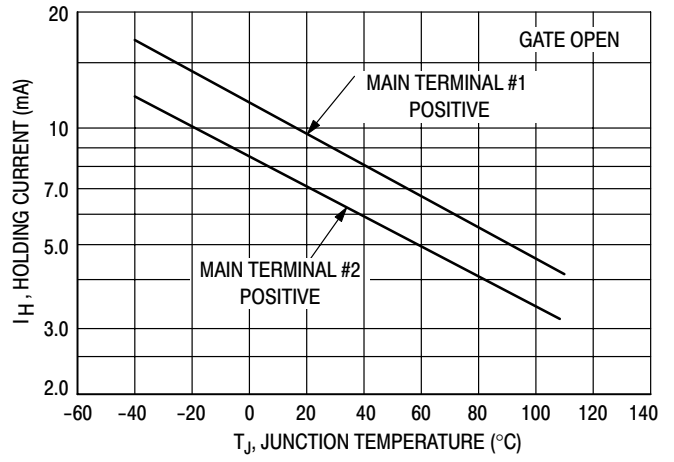


Figure 6. Typical Holding Current

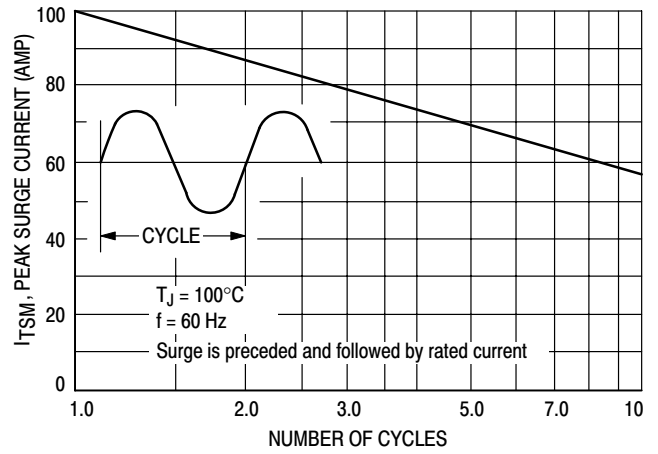


Figure 7. Maximum Non-Repetitive Surge Current

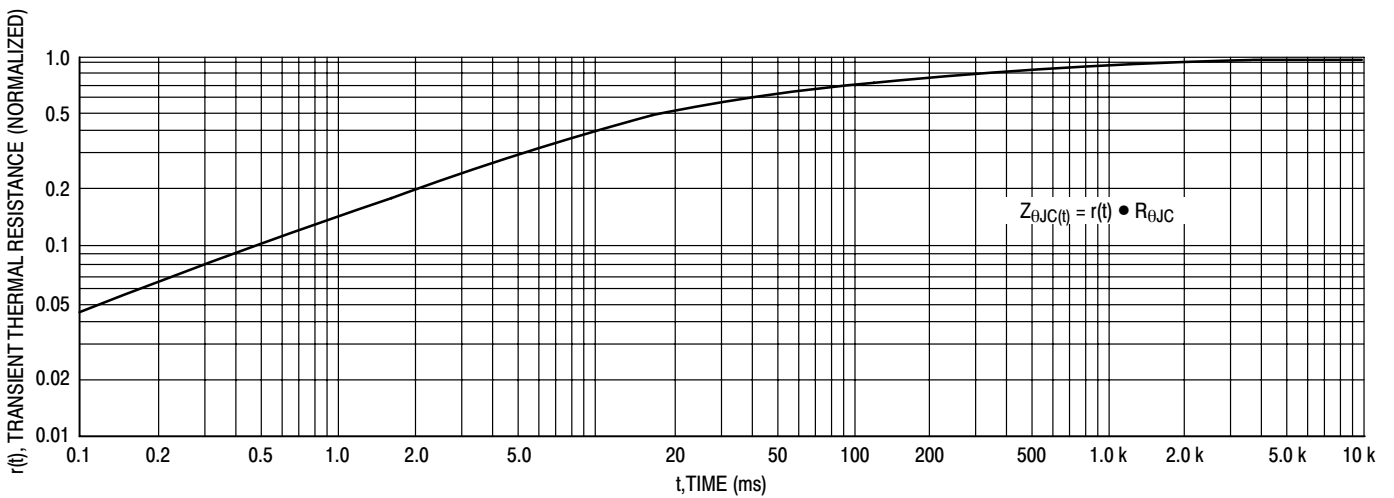
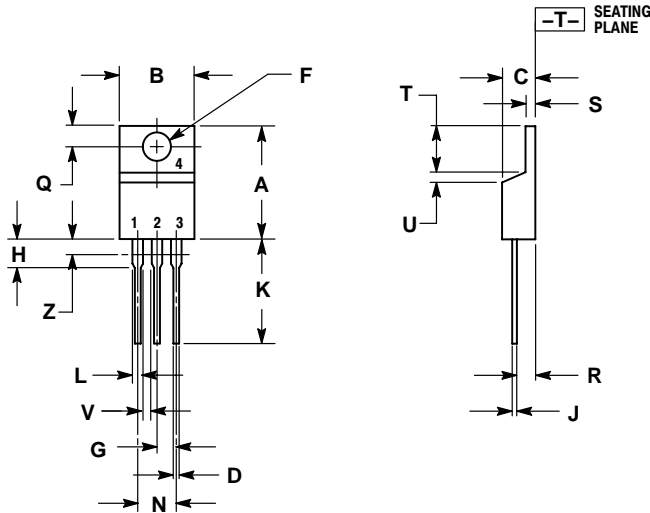


Figure 8. Typical Thermal Response

# 2N6344A, 2N6348A, 2N6349A

## PACKAGE DIMENSIONS

TO-220AB  
CASE 221A-07  
ISSUE AA




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  | 0.060 | 1.15        | 1.52  |
| 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  |

STYLE 4:

- PIN 1. MAIN TERMINAL 1
- PIN 2. MAIN TERMINAL 2
- PIN 3. GATE
- PIN 4. MAIN TERMINAL 2

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- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
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- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

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- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



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