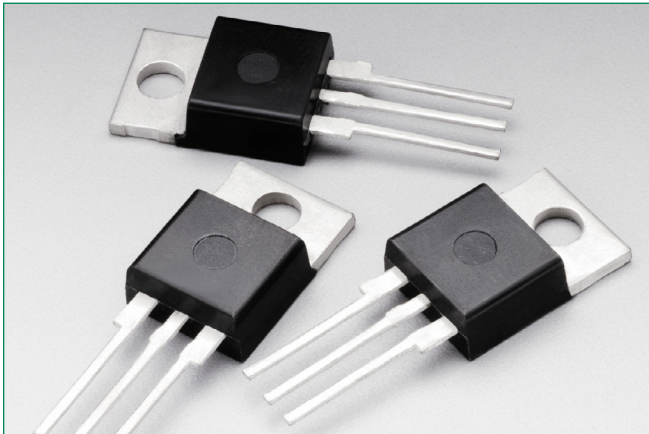


# 2N6394

Surface Mount – 50 - 800V



## Description

The 2N6394 is designed primarily for half-wave AC control applications, such as motor controls, heating controls and power supplies.

## Features

- Glass Passivated Junctions for Greater Parameter Uniformity and Stability
- Blocking Voltage to 800 V
- These are Pb-Free Devices
- Small, Rugged, Thermowatt Construction for Low Thermal Resistance, High Heat Dissipation and Durability

## Additional Information



Resources

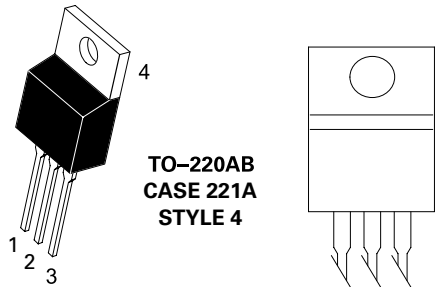


Accessories

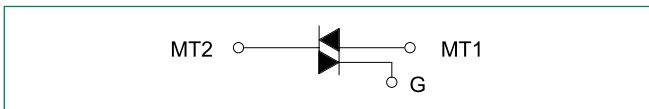


Samples

## Pin Out



## Functional Diagram



**2N6394**

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**Maximum Ratings † (T<sub>J</sub> = 25°C unless otherwise noted)**

Rating	Symbol	Value	Unit
Peak Repetitive Off-State Voltage (Note 1) (T <sub>J</sub> = -40 to 110°C, Sine Wave, 50 to 60 Hz, Gate Open)	2N6394	50	V
	2N6395	100	
	2N6397	400	
	2N6399	800	
On-State RMS Current (180° Conduction Angles; T <sub>C</sub> = 90°C)	I <sub>T (RMS)</sub>	12	A
Peak Non-Repetitive Surge Current (1/2 Cycle, Sine Wave, 60 Hz, T <sub>J</sub> = 90°C)	I <sub>TSM</sub>	100	A
Circuit Fusing Considerations (t = 8.3 ms)	I <sub>2t</sub>	40	A <sup>2</sup> s
Forward Peak Gate Power (Pulse Width ≤ 1.0 μs, T <sub>C</sub> = 90°C)	P <sub>GM</sub>	20	W
Forward Average Gate Power (t = 8.3 ms, T <sub>C</sub> = 90°C)	P <sub>G(AV)</sub>	0.5	W
Forward Peak Gate Current (Pulse Width ≤ 1.0 μs, T <sub>C</sub> = 90°C)	I <sub>GM</sub>	2.0	A
Operating Junction Temperature Range	T <sub>J</sub>	-40 to +125	°C
Storage Temperature Range	T <sub>stg</sub>	-40 to +125	°C

†Indicates JEDEC Registered Data

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.

1. V<sub>DRM</sub> and V<sub>RRM</sub> 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.**Thermal Characteristics**

Rating	Symbol	Value	Unit
† Thermal Resistance, Junction to Case	R <sub>θJC</sub>	2.0	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T <sub>L</sub>	260	°C

† Indicates JEDEC Registered Data.

**Electrical Characteristics - OFF (T<sub>C</sub> = 25°C unless otherwise noted; Electricals apply in both directions)**

Characteristic	Symbol	Min	Typ	Max	Unit
*Peak Repetitive Blocking Current (V <sub>D</sub> = V <sub>DRM</sub> = V <sub>RRM</sub> ; Gate Open)	I <sub>DRM</sub> I <sub>RRM</sub>	-	-	1.0	μA
		-	-	2.0	mA

**Electrical Characteristics - ON (T<sub>C</sub> = 25°C unless otherwise noted; Electricals apply in both directions)**

Characteristic	Symbol	Min	Typ	Max	Unit
†Peak Forward On-State Voltage (Note 2) (I <sub>TM</sub> = 24 A Peak)	V <sub>TM</sub>	-	1.7	2.2	V
†Gate Trigger Voltage (Continuous DC), All Quadrants (Continuous dc) (V <sub>D</sub> = 12 Vdc, R <sub>L</sub> = 100 Ohms)	I <sub>GT</sub>	-	5.0	30	mA
†Gate Trigger Voltage (Continuous dc) (V <sub>D</sub> = 12 Vdc, R <sub>L</sub> = 100 Ohms)	V <sub>GT</sub>	-	0.7	1.5	V
Gate Non-Trigger Voltage (V <sub>D</sub> = 12 Vdc, R <sub>L</sub> = 100 Ohms, T <sub>J</sub> = 125°C)	V <sub>GD</sub>	0.2	-	-	V
†Holding Current (V <sub>D</sub> = 12 Vdc, Initiating Current = 200 mA, Gate Open)	I <sub>H</sub>	-	6.0	50	mA
Turn-On Time (I <sub>TM</sub> = 12 A, I <sub>GT</sub> = 40 mAdc, V <sub>D</sub> = Rated V <sub>DRM</sub> )	t <sub>gt</sub>	-	1.0	2.0	μs
Turn-Off Time (V <sub>D</sub> = Rated V <sub>DRM</sub> )	t <sub>q</sub>	(I <sub>TM</sub> = 12 A, I <sub>R</sub> = 12 A)	-	15	μs
		(I <sub>TM</sub> = 12 A, I <sub>R</sub> = 12 A, T <sub>J</sub> = 125°C)	-	35	

†Indicates JEDEC Registered Data

2. Pulse Test: Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%.

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## Dynamic Characteristics

Characteristic	Symbol	Min	Typ	Max	Unit
Critical Rate-of-Rise of Off-State Voltage Exponential ( $V_D = \text{Rated } V_{DRM}, T_J = 125^\circ\text{C}$ )	$dv/dt(c)$	–	50	–	$V/\mu\text{s}$

## 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

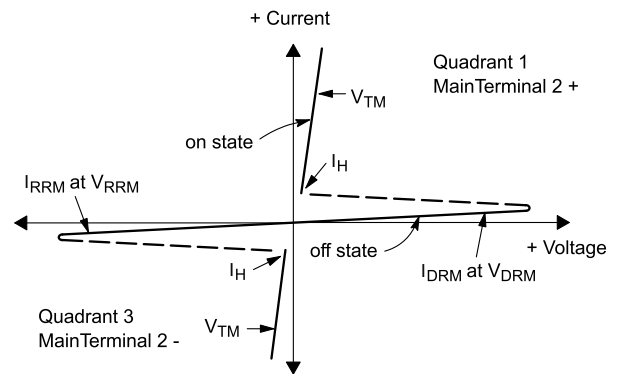


Figure 1. Current Derating

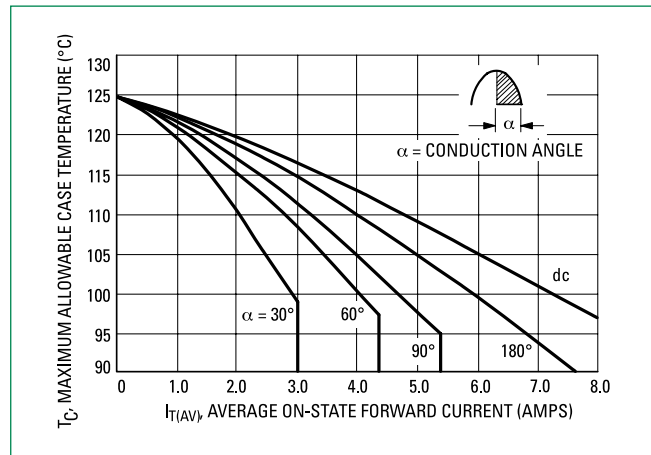
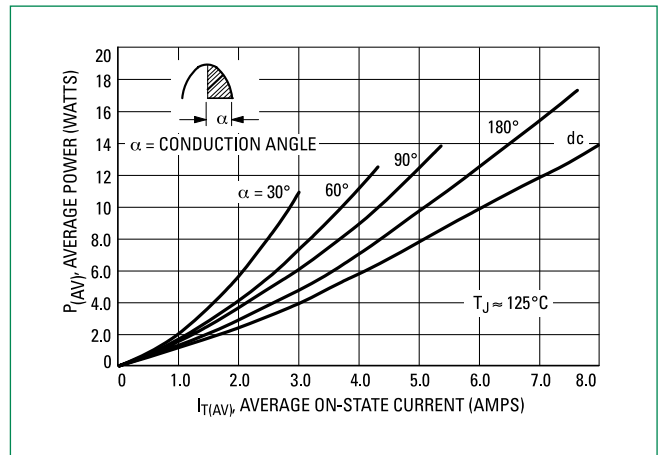


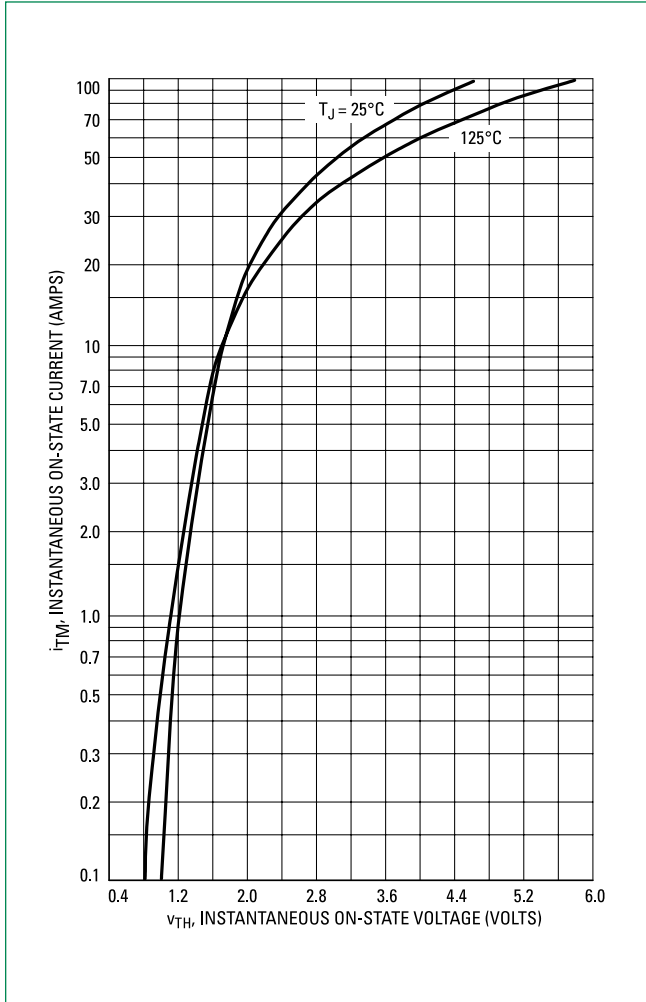
Figure 2. Maximum On-State Characteristics



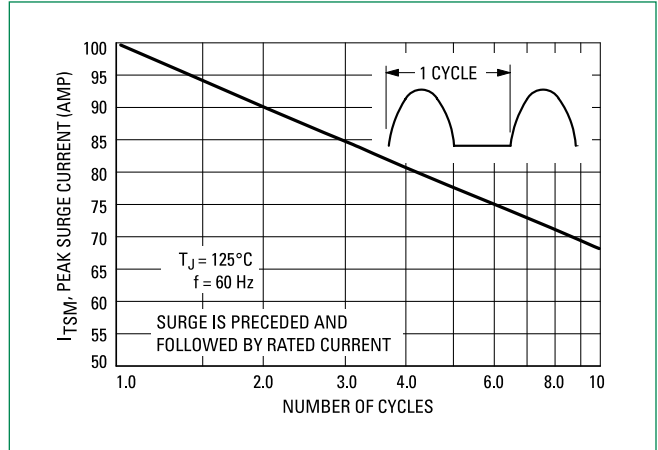
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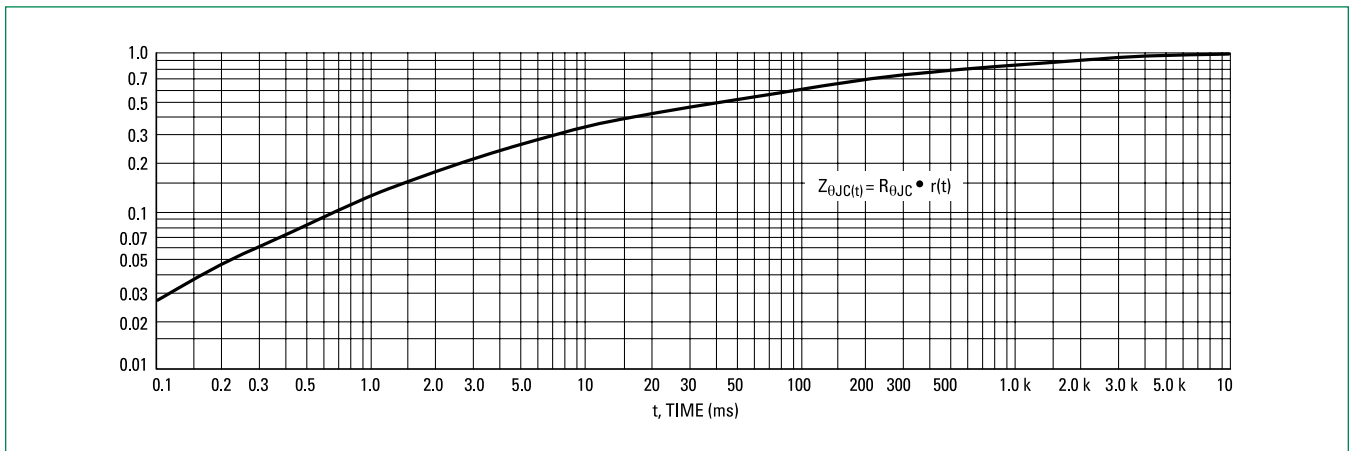
**Figure 3. On-State Characteristics**



**Figure 4. Maximum Non-Repetitive Surge Current**



**Figure 5. Typical Thermal Response**



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## Typical Characteristics

Figure 6. Typical Gate Trigger Current vs. Pulse Width

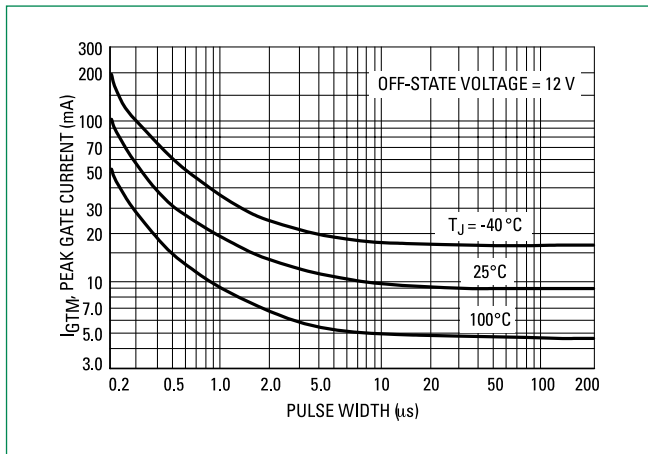


Figure 7. Typical Gate Trigger Current vs. Temperature

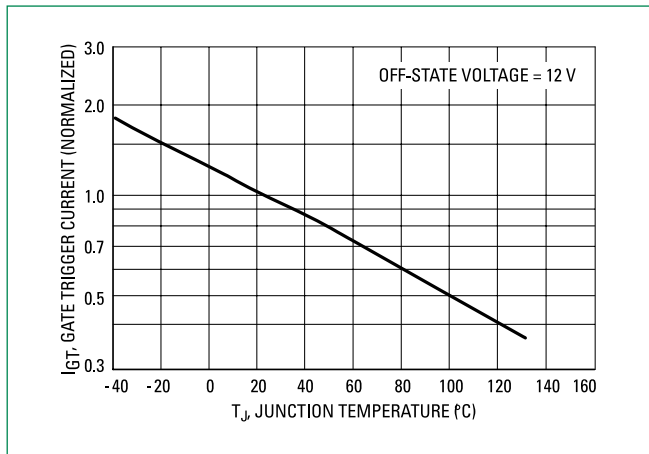


Figure 8. Typical Gate Trigger Voltage vs. Temperature

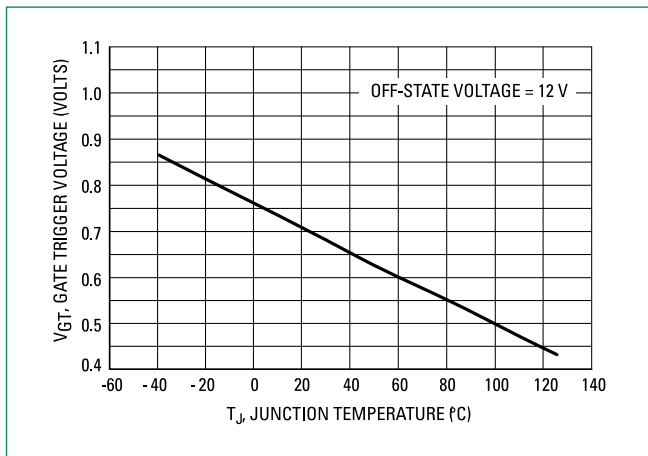
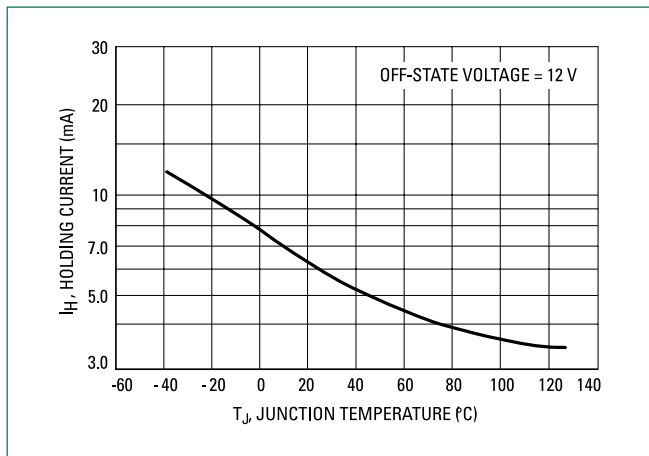


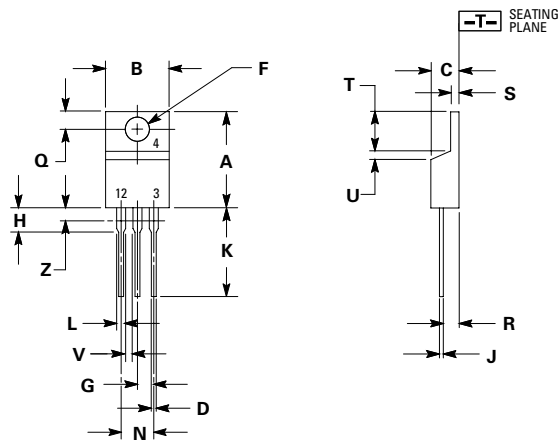
Figure 9. Typical Holding Current vs. Temperature



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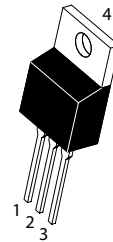
## Dimensions



Dim	Inches		Millimeters	
	Min	Max	Min	Max
A	0.590	0.620	14.99	15.75
B	0.380	0.420	9.65	10.67
C	0.178	0.188	4.52	4.78
D	0.025	0.035	0.64	0.89
F	0.142	0.147	3.61	3.73
G	0.095	0.105	2.41	2.67
H	0.110	0.130	2.79	3.30
J	0.018	0.024	0.46	0.61
K	0.540	0.575	13.72	14.61
L	0.060	0.075	1.52	1.91
N	0.195	0.205	4.95	5.21
Q	0.105	0.115	2.67	2.92
R	0.085	0.095	2.16	2.41
S	0.045	0.060	1.14	1.52
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

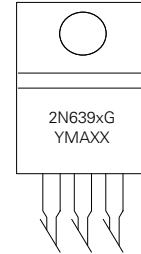
1. Dimensioning and tolerancing per ansi y14.5m, 1982.
2. Controlling dimension: inch.
3. Dimension z defines a zone where all body and lead irregularities are allowed.

## Part Marking System



**TO-220AB  
CASE 221A  
STYLE 12**

- x =D, M, or N
- Y =Year
- M =Month
- A =Assembly Site
- XX =Lot Serial Code
- G =Pb-Free Package



Pin Assignment	
1	Cathode
2	Anode
3	Gate
4	Anode

## Ordering Information

Device	Package	Shipping
2N6394G	TO-220AB (Pb-Free)	1000 Units / Box
2N6394TG		1000 Units / Box
2N6395G		1000 Units / Box
2N6397G		1000 Units / Box
2N6397TG		1000 Units / Box
2N6399G		1000 Units / Box
2N6399TG		1000 Units / Box

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