

### FEATURES

- Available as "HR" (high reliability) screened per MIL-PRF-19500, JANTX level. Add "HR" suffix to base part number.
- Available as non-RoHS (Sn/Pb plating), standard, and as RoHS by adding "-PBF" suffix.

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Peak Reverse Blocking Voltage, Note 1 ( $T_J = 105^\circ\text{C}$ )	$V_{RRM}$	50	Volts
Peak Forward Blocking Voltage, Note 1 ( $T_C = 105^\circ\text{C}$ )	$V_{DRM}$	2N4199	300
		2N4200	400
		2N4201	500
		2N4202	600
		2N4203	700
2N4204	800		
Repetitive Peak On-State Current ( $PW = 3 \mu\text{s}$ , Duty Cycle = 0.6%, $T_C = 85^\circ\text{C}$ )	$I_{TRM}$	100	Amps
Continuous On-State Current ( $T_C = 65^\circ\text{C}$ )	$I_T$	5	Amps
Current Application Rate, Note 2	$di/dt$	5000	A/ $\mu\text{s}$
Peak Forward Gate Power	$P_{GFM}$	20	Watt
Average Forward Gate Power	$P_{GF(AV)}$	1	Watt
Peak Forward Gate Current	$I_{GFM}$	5	Amps
Peak Gate Voltage – Forward Reverse, Note 3	$V_{GFM}$	10	Volts
	$V_{GRM}$	10	
Operating Junction Temperature Range Blocking State Conducting State	$T_J$	-65 to +105	$^\circ\text{C}$
		-65 to +200	
Storage Temperature Range	$T_{stg}$	-65 to +200	$^\circ\text{C}$
Stud Torque	-	15	In. lb.
Thermal resistance, junction to case	$R_{\theta JC}$	3	$^\circ\text{C}/\text{W}$

Note 1: Characterized for unilateral applications where reverse blocking capability is not important.  $V_{DRM}$  and  $V_{RRM}$  may be applied as a continuous dc voltage for zero or negative gate voltage but positive gate voltage must not be applied concurrently with a negative potential on the anode. When checking blocking capability, do not permit the applied voltage to exceed the rated voltage.

Note 2: Minimum Gate Trigger Pulse:  $I_G = 200 \text{ mA}$ ,  $PW = 1 \mu\text{s}$ ,  $t_r = 20 \text{ ns}$ .

Note 3: Do not reverse bias gate during forward conduction if anode current exceeds 10 amperes.

### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise specified)

Characteristics	Symbol	Min	Max	Unit
Peak Forward or Reverse Blocking Current (Rated $V_{DRM}$ or $V_{RRM}$ , gate open) $T_C = 105^\circ\text{C}$ )	$I_{DRM}, I_{RRM}$	-	2	mA
Gate Trigger Current (Continuous dc) (Anode Voltage = 7 Vdc, $R_L = 100 \text{ ohms}$ , $T_C = 25^\circ\text{C}$ ) (Anode Voltage = 7 Vdc, $R_L = 100 \text{ ohms}$ , $T_C = -65^\circ\text{C}$ )	$I_{GT}$	-	50	mA
		-	100	
Gate Trigger Voltage (Continuous dc) (Anode Voltage = rated $V_{DRM}$ , $R_L = 100 \text{ ohms}$ , $T_C = 105^\circ\text{C}$ ) (Anode Voltage = 7 Vdc, $R_L = 100 \text{ ohms}$ , $T_C = 25^\circ\text{C}$ ) (Anode Voltage = 7 Vdc, $R_L = 100 \text{ ohms}$ , $T_C = -65^\circ\text{C}$ )	$V_{GT}$	0.2	-	Volts
		-	1.5	
		-	2	

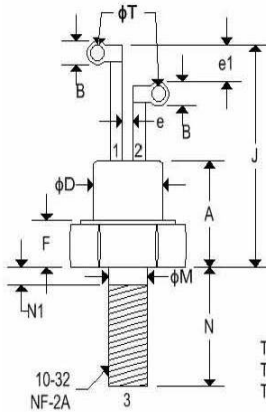
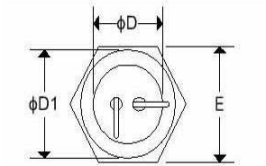
Characteristics	Symbol	Min	Max	Unit	
<b>Holding Current</b> (Anode Voltage = 7 Vdc, gate open, T <sub>C</sub> = 105°C)	I <sub>H</sub>	3	-	mA	
<b>Forward "on" Voltage</b> (I <sub>TM</sub> = 5 Adc, PW = 1 ms max, Duty Cycle ≤ 1%)	V <sub>TM</sub>	2.6	-	Volts	
<b>Dynamic Forward "on" Voltage</b> (0.5 μs after 50% decay point on dynamic forward voltage waveform) <b>Forward Current: 30 A pulse</b> <b>Gate Pulse: at 200 mA, PW = 1 μs, t<sub>r</sub> = 20 ns</b>	V <sub>TM</sub>	-	25	Volts	
<b>Turn-on Time I<sub>TM</sub> = 30 A</b> <b>Delay Time</b> <b>Rise Time</b>	t <sub>d</sub> t <sub>r</sub>	All Types	-	200	ns
		2N4199 & 2N4200	-	200	
		2N4201	-	150	
		2N4202	-	130	
	2N4203 & 2N4204	-	100		
<b>Pulse Turn-off Time</b> <b>Test Conditions: PFN discharge; Forward Current = 30 A pulse;</b> <b>Reverse Current = 5 A, T<sub>C</sub> = 85°C, dv/dt = 250V/μs to Rated V<sub>DRM</sub>;</b> <b>Reverse Anode Voltage during turn-off interval = 0 V;</b> <b>Reverse gate bias during turn-off interval = 6 V</b>	t <sub>q</sub>	-	20	μs	
<b>Forward Voltage Application Rate (Linear Rise of Voltage)</b> (T <sub>C</sub> = 105°, gate open, V <sub>D</sub> = Rated V <sub>DRM</sub> )	dv/dt	250	-	V/μs	

# 2N4199-2N4204

## SILICON CONTROLLED RECTIFIER

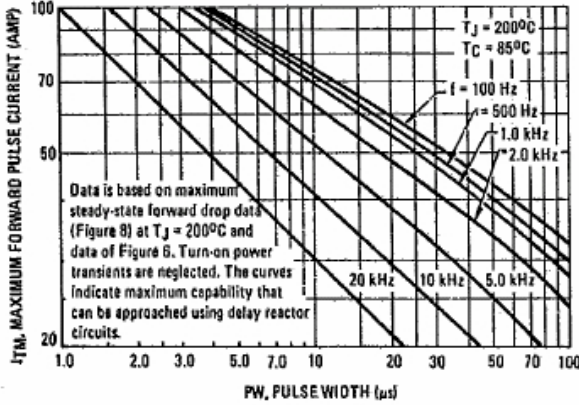
### MECHANICAL CHARACTERISTICS

Case	TO-64
Marking	Alpha-numeric
Pin out	See below

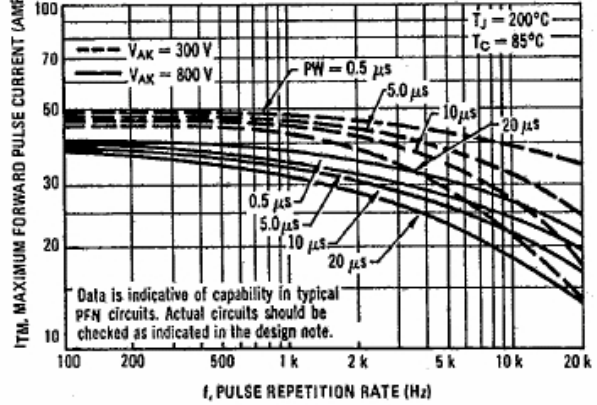


	TO-64			
	Inches		Millimeters	
	Min	Max	Min	Max
A	0.300	0.400	7.620	10.160
B	0.080	0.136	2.030	3.450
$\Phi D$	-	0.424	-	10.770
$\Phi D_1$	0.400	-	10.160	-
E	0.424	0.437	10.770	11.100
e	0.013	-	0.330	-
$e_1$	0.060	-	1.520	-
F	0.060	0.175	1.520	4.450
J	0.700	0.855	17.780	21.720
$\Phi M$	0.163	0.189	4.140	4.800
N	0.400	0.453	10.160	11.510
$N_1$	-	0.078	-	1.980
$\Phi T$	0.040	0.075	1.020	1.910

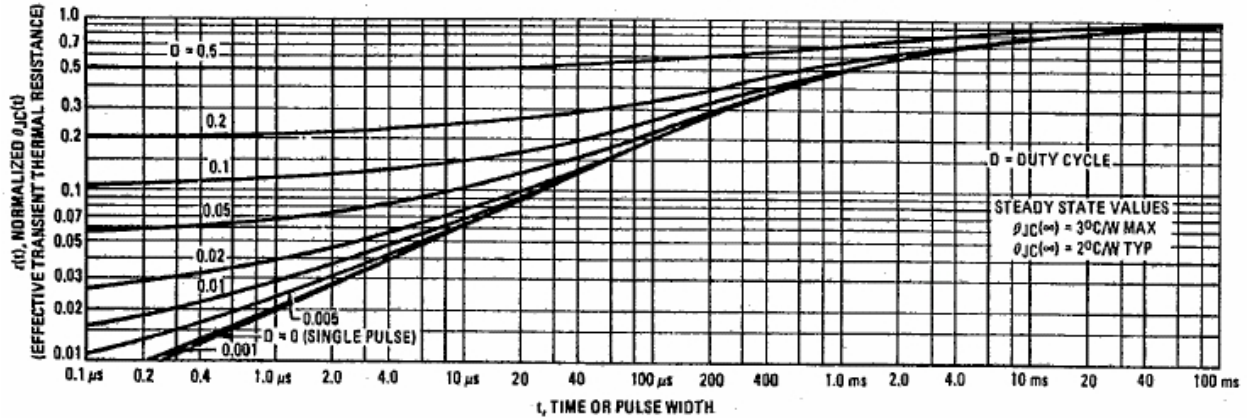
**DERATING USING NO SWITCHING LOSSES**



**DERATING USING TYPICAL SWITCHING LOSSES**

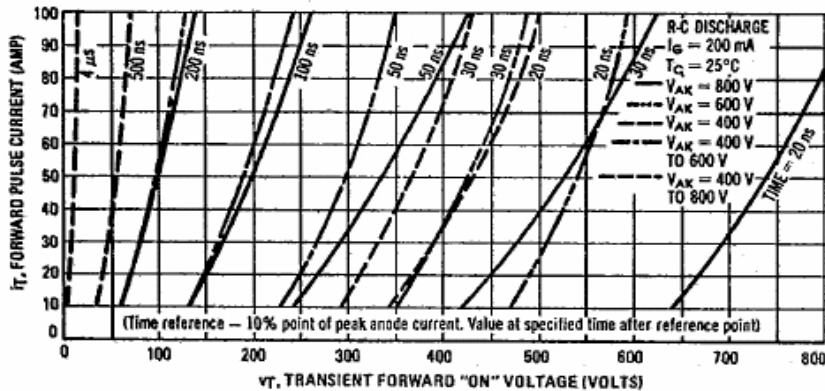


**NORMALIZED EFFECTIVE TRANSIENT THERMAL RESISTANCE**

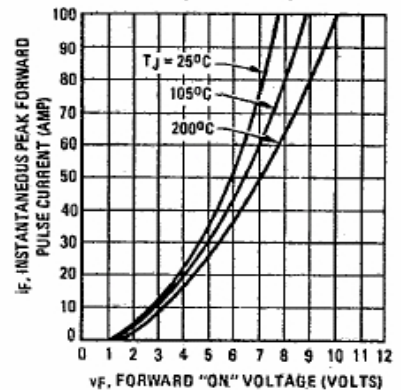


**FORWARD "ON" VOLTAGE DATA**

**TYPICAL DYNAMIC FORWARD "ON" VOLTAGE**

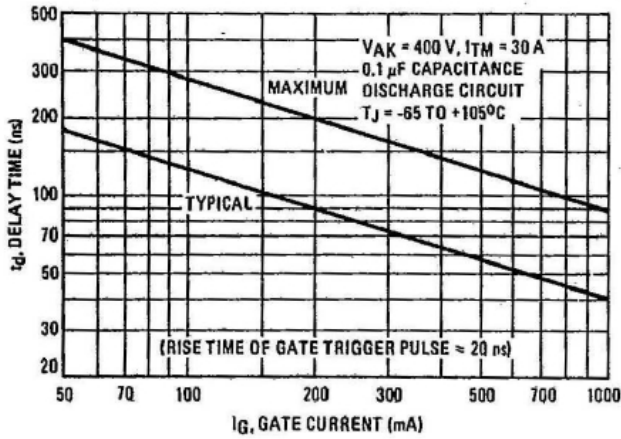


**MAXIMUM STEADY-STATE**

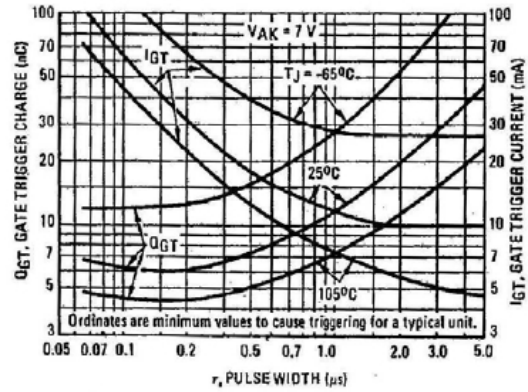


### SWITCHING CHARACTERISTICS

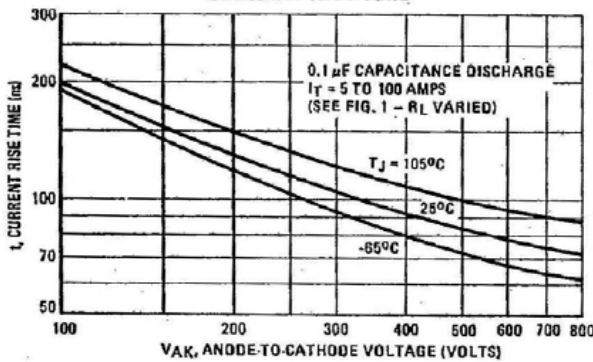
#### DELAY TIME



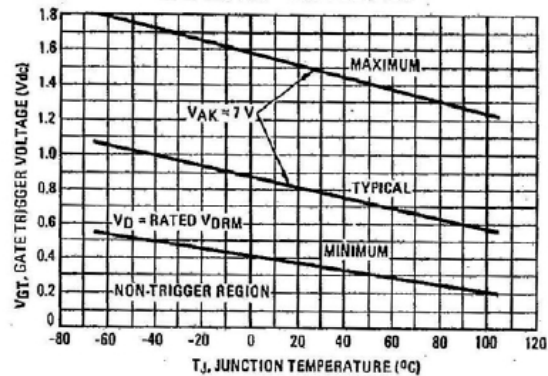
#### TYPICAL PULSE TRIGGER CHARGE/CURRENT



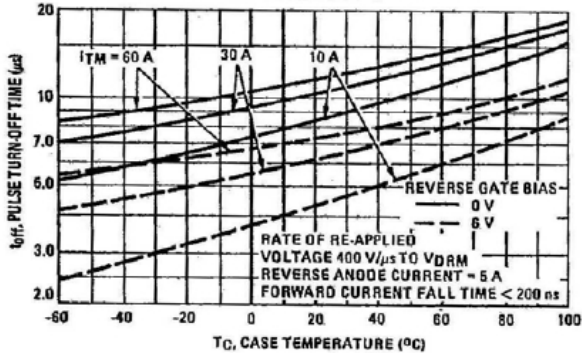
#### CURRENT RISE TIME



#### DC GATE TRIGGER VOLTAGE



#### TYPICAL TURN-OFF TIME



#### DC GATE TRIGGER CURRENT

