DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

2N4199-2N4204

SILICON CONTROLLED RECTIFIER

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°C)**		V_{RRM}	50	Volts
Peak Forward Blocking Voltage, Note 1 **(T_C = 105°C)**	2N4199	V_{DRM}	300	Volts
	2N4200		400	
	2N4201		500	
	2N4202		600	
	2N4203		700	
	2N4204		800	
Repetitive Peak On-State Current (PW = 3 µs, Duty Cycle = 0.6%, T_C = 85°C)		I_{TRM}	100	Amps
Continuous On-State Current (T_C = 65°C)		I_T	5	Amps
Current Application Rate, Note 2		di/dt	5000	A/µs
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		V_{GFM}	10	Volts
Reverse, Note 3		V_{GRM}	10	
Operating Junction Temperature Range				°C
Blocking State		T_J	-65 to +105	
Conducting State			-65 to +200	
Storage Temperature Range		T_{stg}	-65 to +200	°C
Stud Torque		-	15	In. lb.
Thermal resistance, junction to case		$R_{\Theta JC}$	3	°C/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 mA, PW = 1 µs, t_r = 20 ns.
Note 3: Do not reverse bias gate during forward conduction if anode current exceeds 10 amperes.

ELECTRICAL CHARACTERISTICS (T_A = 25°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°C)	I_{DRM}, I_{RRM}	-	2	mA
Gate Trigger Current (Continuous dc)	I_{GT}			mA
(Anode Voltage = 7 Vdc, R_L = 100 ohms, T_C = 25°C)		-	50	
(Anode Voltage = 7 Vdc, R_L = 100 ohms, T_C = -65°C)		-	100	
Gate Trigger Voltage (Continuous dc)	V_{GT}			Volts
(Anode Voltage = rated V_{DRM}, R_L = 100 ohms, T_C = 105°C)		0.2	-	
(Anode Voltage = 7 Vdc, R_L = 100 ohms, T_C = 25°C)		-	1.5	
(Anode Voltage = 7 Vdc, R_L = 100 ohms, T_C = -65°C)		-	2	

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

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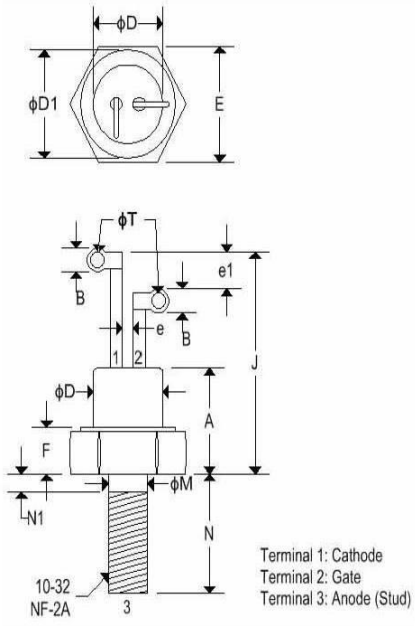
MECHANICAL CHARACTERISTICS

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
ΦD	-	0.424	-	10.770
ΦD_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
ΦM	0.163	0.189	4.140	4.800
N	0.400	0.453	10.160	11.510
N_1	-	0.078	-	1.980
ΦT	0.040	0.075	1.020	1.910

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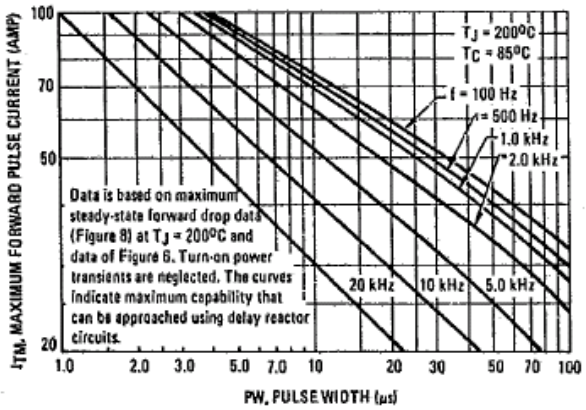
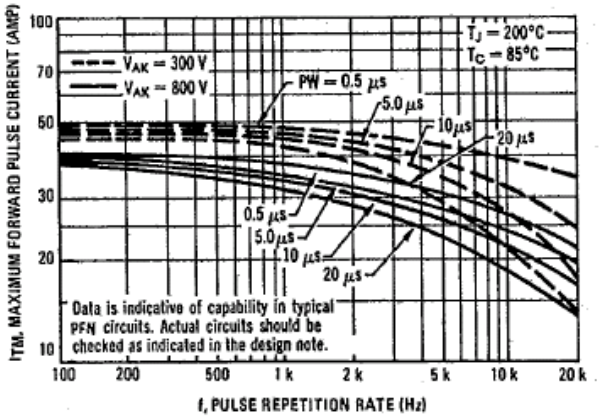
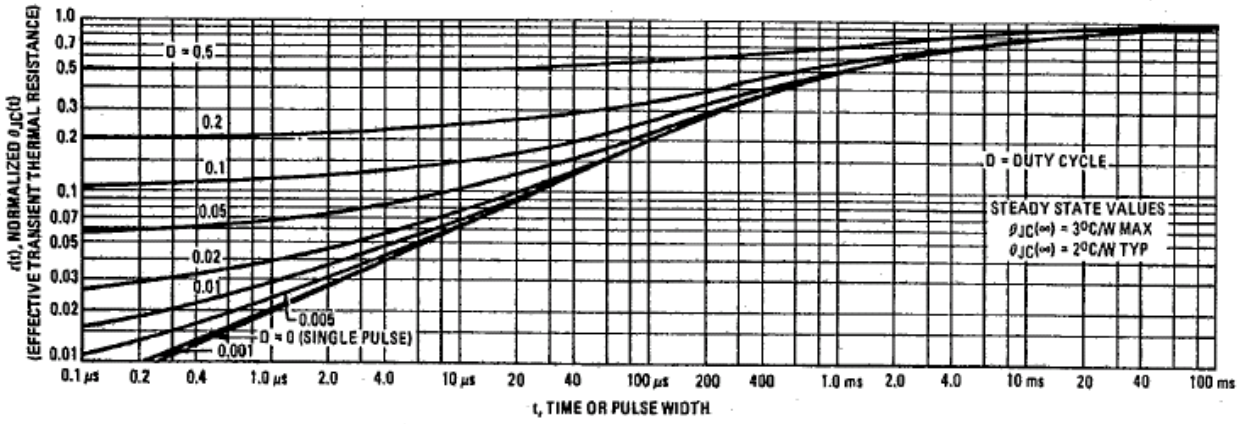
DERATING USING NO SWITCHING LOSSES



DERATING USING TYPICAL SWITCHING LOSSES

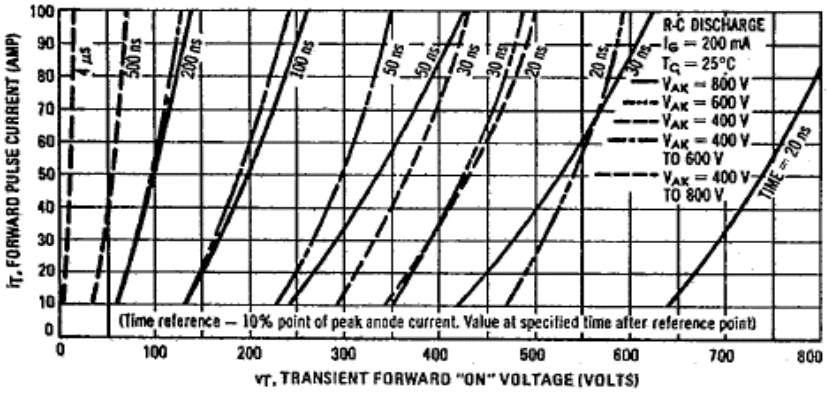


NORMALIZED EFFECTIVE TRANSIENT THERMAL RESISTANCE

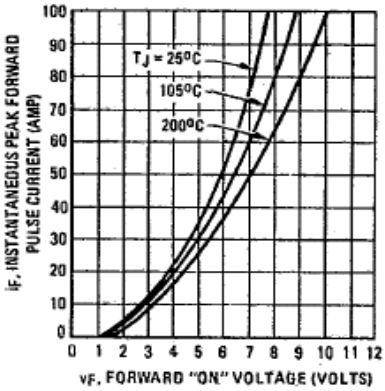


FORWARD "ON" VOLTAGE DATA

TYPICAL DYNAMIC FORWARD "ON" VOLTAGE



MAXIMUM STEADY-STATE



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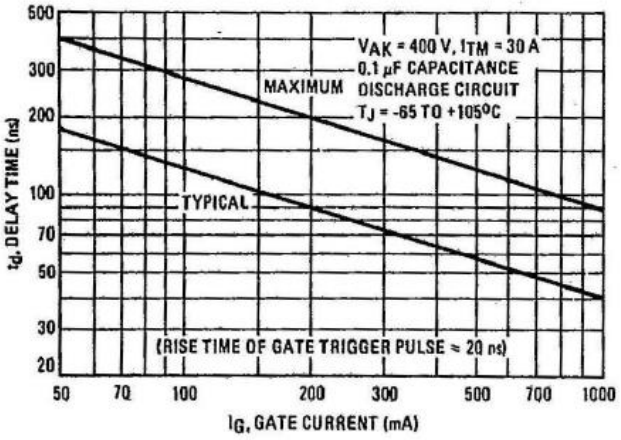
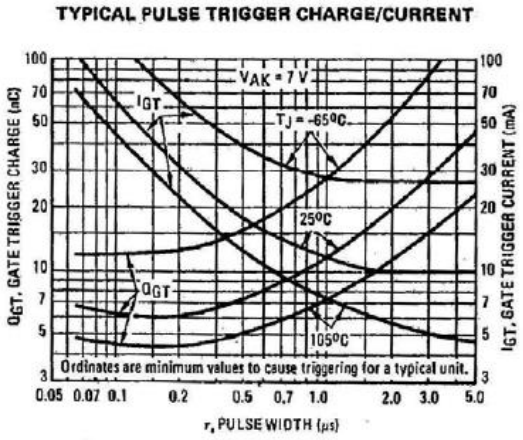
SWITCHING CHARACTERISTICS

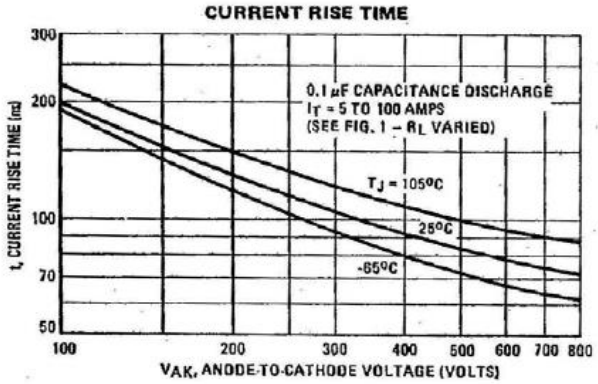
DELAY TIME



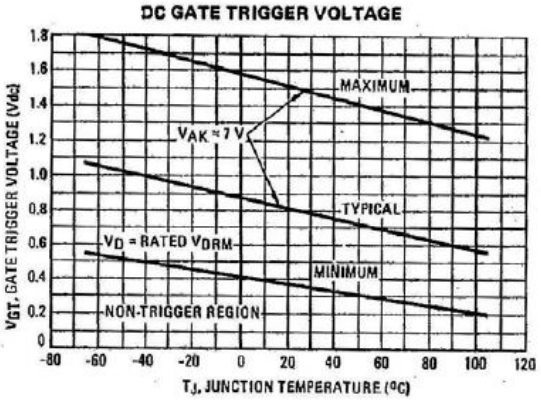
TYPICAL PULSE TRIGGER CHARGE/CURRENT



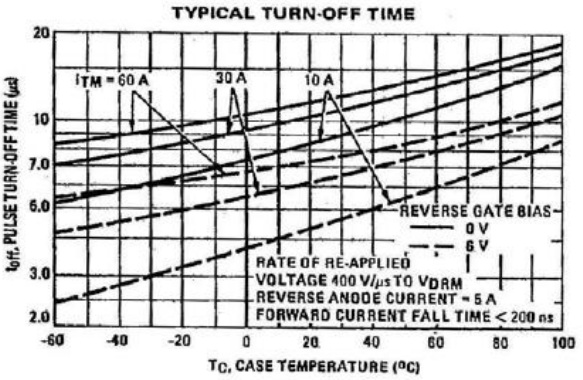
CURRENT RISE TIME



DC GATE TRIGGER VOLTAGE



TYPICAL TURN-OFF TIME



DC GATE TRIGGER CURRENT