DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

2N3027-2N3032

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

Characteristic	Symbol	2N3027 2N3030	2N3028 2N3031	2N3029 2N3032
Repetitive peak off-state voltage	V_{DRM}	30V	60V	100V
Repetitive peak reverse voltage	V_{RRM}	30V	60V	100V
DC on-state current 100°C case 75°C ambient	I_T		500mA 250mA	
Repetitive peak on-state current	I_{TRM}		30A	
Surge (non-repetitive) on-state current 50ms 8ms	I_{TSM}		5A 8A	
Peak gate current	I_{GM}		250mA	
Average gate current	$I_{G(AV)}$		25mA	
Reverse gate voltage	V_{GR}		5V	
Reverse gate current	I_{GR}		3mA	
Storage temperature range	T_{stg}		-65°C to +200°C	
Operating temperature range	T_J		-65°C to +150°C	

Blocking voltage ratings apply over the operating temperature range, provided the gate is connected to the cathode through an appropriate resistor, or adequate gate bias is used.

ELECTRICAL CHARACTERISTIC (@ 25°C unless otherwise noted) (2N3027-2N3029)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
25°C tests						
Off state current	I_{DRM}	-	0.002	0.100	µA	R_{GK} = 1KΩ, V_{DRM} = rating
Reverse current	I_{RRM}	-	0.002	0.100	µA	R_{GK} = 1KΩ, V_{RRM} = rating
Reverse gate voltage	V_{GR}	5	8	-	V	I_{GR} = 0.1mA
Gate trigger current	I_{GT}	-5	8	200	µA	R_{GS} = 10KΩ, V_D = 5V
Gate trigger voltage	V_{GT}	0.400	0.550	0.800	V	R_{GS} = 100Ω, V_D = 5V
On-state voltage	V_T	0.800	1.200	1.500	V	I_T = 1A (pulse test)
Holding current	I_H	0.300	0.700	5.000	mA	R_{GK} = 1KΩ, V_D = 5V
Off-state voltage – critical rate of rise	dv/dt	30 15 10	60 30 25	- - -	V/µs	R_{GK} = 1KΩ, V_D = 30V (2N3027) R_{GK} = 1KΩ, V_D = 60V (2N3028) R_{GK} = 1KΩ, V_D = 100V (2N3029)
Gate trigger-on pulse width	$t_{pg(on)}$	-	0.070	0.200	µs	I_G = 10mA, I_T = 1A, V_D = 30V
Delay time	t_d	-	0.080	-	µs	I_G = 10mA, I_T = 1A, V_D = 30V
Rise time	t_r	-	0.040	-	µs	I_G = 10mA, I_T = 1A, V_D = 30V
Circuit commutated turn-off time	t_g	-	0.700	2.000	µs	I_T = 1A, I_R = 1A, R_{GK} = 1KΩ

DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

2N3027-2N3032

SILICON CONTROLLED RECTIFIER

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
150°C Tests						
High temperature off-state current	I_{DRM}	-	2	20	µA	R_{GK} = 1KΩ, V_{DRM} = rating
High temperature reverse current	I_{RRM}	-	20	50	µA	R_{GK} = 1KΩ, V_{RRM} = rating
High temperature gate trigger voltage	V_{GT}	0.100	0.150	0.600	V	R_{GS} = 100Ω, V_D = 5V
High temperature holding current	I_H	0.050	0.200	1.000	mA	R_{GK} = 1KΩ, V_D = 5V
-65°C Tests						
Low temperature gate trigger voltage	V_{GT}	0.600	0.750	1.100	V	R_{GS} = 100Ω, V_D = 5V
Low temperature gate trigger current	I_{GT}	0	150	1.200	mA	R_{GS} = 10KΩ, V_D = 5V
Low temperature holding current	I_H	0.500	3.500	10	mA	R_{GK} = 1KΩ, V_D = 5V

ELECTRICAL CHARACTERISTIC (@ 25°C unless otherwise noted) (2N3030-2N3032)

25°C tests						
Off state current	I_{DRM}	-	0.002	0.100	µA	R_{GK} = 1KΩ, V_{DRM} = rating
Reverse current	I_{RRM}	-	0.002	0.100	µA	R_{GK} = 1KΩ, V_{RRM} = rating
Reverse gate voltage	V_{GR}	5	8	-	V	I_{GR} = 0.1mA
Gate trigger current	I_{GT}	-5		20	µA	R_{GS} = 10KΩ, V_D = 5V
Gate trigger voltage	V_{GT}	0.440		0.600	V	R_{GS} = 100Ω, V_D = 5V
On-state voltage	V_T	0.800	1.200	1.500	V	I_T = 1A (pulse test)
Holding current	I_H	0.300	1.000	4.000	mA	R_{GK} = 1KΩ, V_D = 5V
Off-state voltage – critical rate of rise	dv/dt	30 15 10	60 30 25	- - -	V/µs	R_{GK} = 1KΩ, V_D = 30V (2N3030) R_{GK} = 1KΩ, V_D = 60V (2N3031) R_{GK} = 1KΩ, V_D = 100V (2N3032)
Gate trigger-on pulse width	$t_{pg(on)}$	-	0.050	0.100	µs	I_G = 10mA, I_T = 1A, V_D = 30V
Delay time	t_d	-	0.100	-	µs	I_G = 10mA, I_T = 1A, V_D = 30V
Rise time	t_r	-	0.050	-	µs	I_G = 10mA, I_T = 1A, V_D = 30V
Circuit commutated turn-off time	t_g	-	0.700	2.000	µs	I_T = 1A, I_R = 1A, R_{GK} = 1K
150°C Tests						
High temperature off-state current	I_{DRM}	-	2	20	µA	R_{GK} = 1KΩ, V_{DRM} = rating
High temperature reverse current	I_{RRM}	-	20	50	µA	R_{GK} = 1KΩ, V_{RRM} = rating
High temperature gate trigger voltage	V_{GT}	0.100	0.150	0.400	V	R_{GS} = 100Ω, V_D = 5V
High temperature holding current	I_H	0.050	0.300	2.000	mA	R_{GK} = 1K, V_D = 5V
-65°C Tests						
Low temperature gate trigger voltage	V_{GT}	0.440	0.800	0.950	V	R_{GS} = 100Ω, V_D = 5V
Low temperature gate trigger current	I_{GT}	0	0.400	0.500	mA	R_{GS} = 10KΩ, V_D = 5V
Low temperature holding current	I_H	0.500	5.000	8	mA	R_{GK} = 1KΩ, V_D = 5V

DIGITRON™ Semiconductors

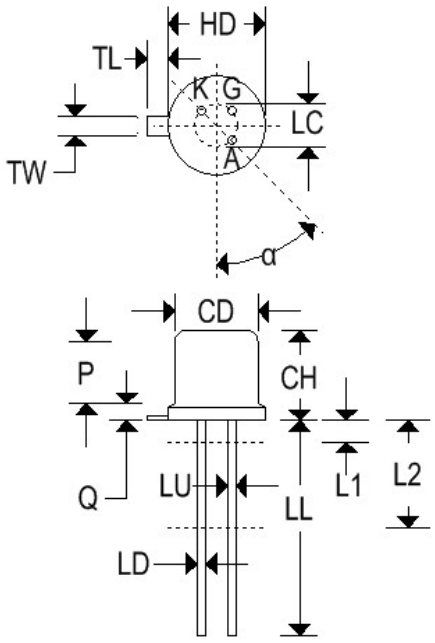
High-reliability discrete products
and engineering services since 1977

2N3027-2N3032

SILICON CONTROLLED RECTIFIER

MECHANICAL CHARACTERISTICS

Case	TO-18
Marking	Alpha-numeric
Pin out	See below



	TO-18			
	Inches		Millimeters	
	Min	Max	Min	Max
A	0.209	0.230	5.310	5.840
B	0.178	0.195	4.520	4.950
C	0.170	0.210	4.320	5.330
D	0.016	0.021	0.406	0.533
E	-	0.030	-	0.762
F	0.016	0.019	0.406	0.483
G	0.100 BSC		2.540 BSC	
H	0.036	0.046	0.914	1.170
J	0.028	0.048	0.711	1.220
K	0.500	-	12.700	-
L	0.250	-	6.350	-
M	45°C BSC		45° BSC	
N	0.050 BSC		1.270 BSC	
P	-	0.050	-	1.270

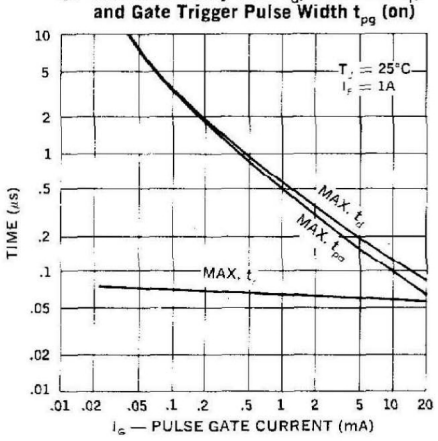
DIGITRON™ Semiconductors

High-reliability discrete products and engineering services since 1977

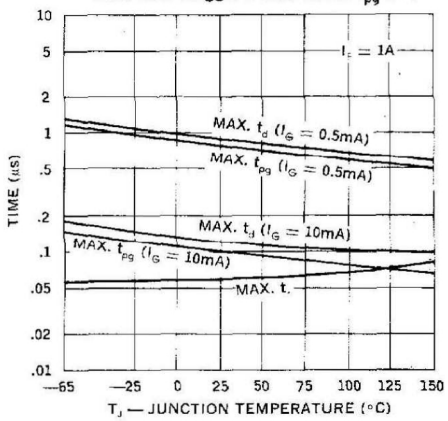
2N3027-2N3032

SILICON CONTROLLED RECTIFIER

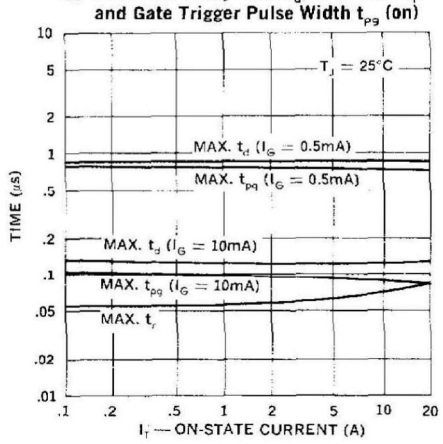
S1 Maximum Delay Time t_d, Rise Time t_r, and Gate Trigger Pulse Width t_{pg} (on)



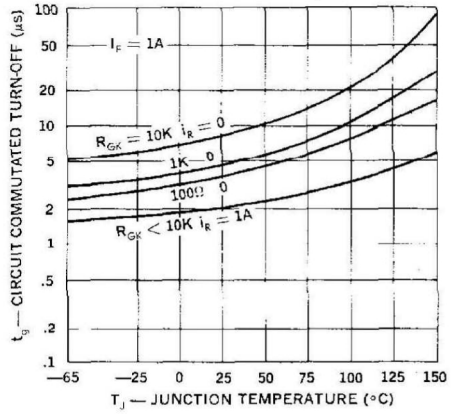
S2 Maximum Delay Time t_d, Rise Time t_r, and Gate Trigger Pulse Width t_{pg} (on)



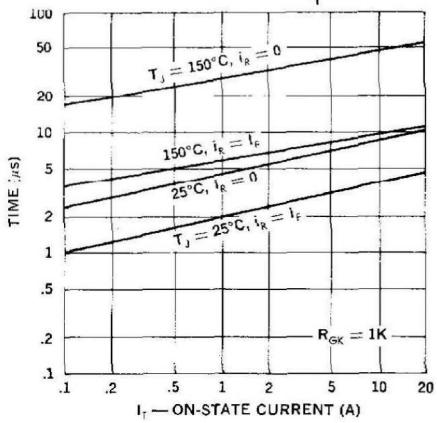
S3 Maximum Delay Time t_d, Rise Time t_r, and Gate Trigger Pulse Width t_{pg} (on)



S4 Maximum Circuit Commutated Turn-off Time t_q



S5 Maximum Circuit Commutated Turn-off Time t_q



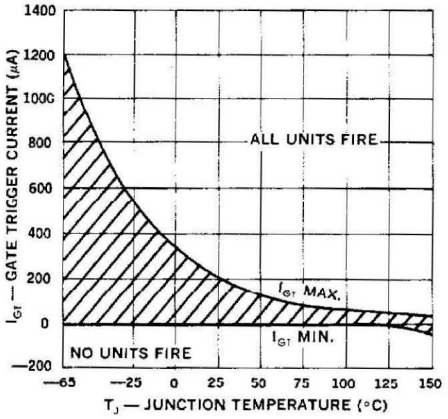
DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

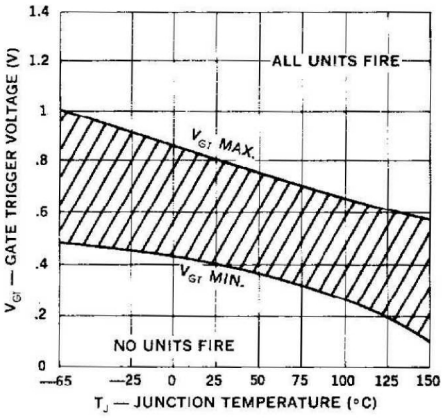
2N3027-2N3032

SILICON CONTROLLED RECTIFIER

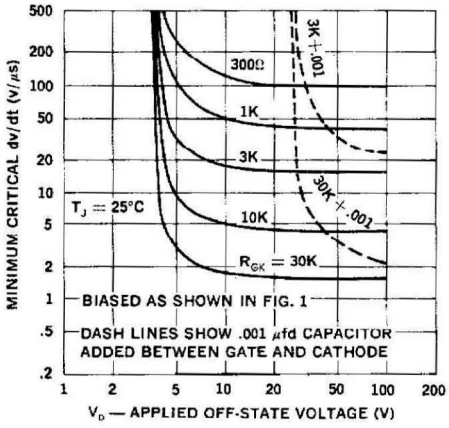
1 Gate Trigger Current



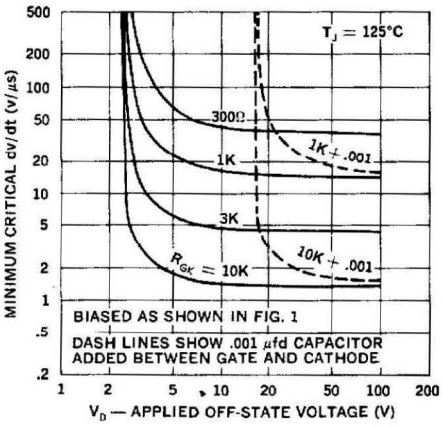
2 Gate Trigger Voltage



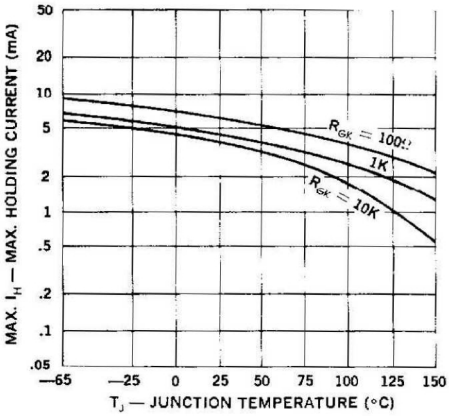
3 Min. Critical dv/dt (25°C — R Bias)



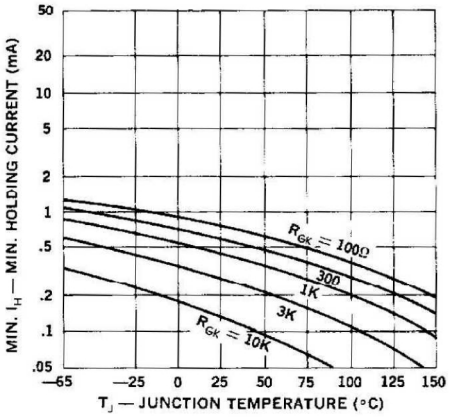
4 Min. Critical dv/dt (125°C — R Bias)



5 Max. Holding Current (Resistor Bias)



6 Min. Holding Current (Resistor Bias)



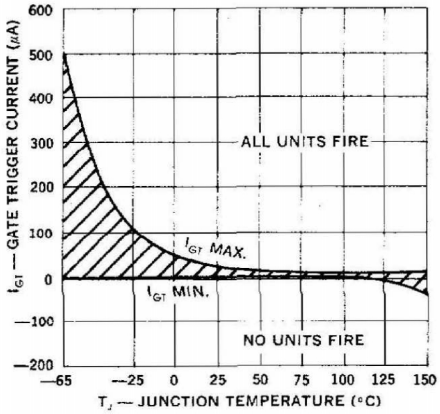
DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

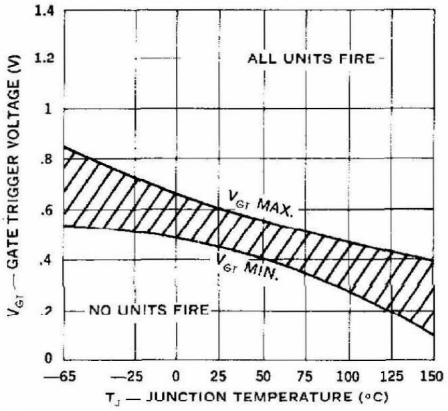
2N3027-2N3032

SILICON CONTROLLED RECTIFIER

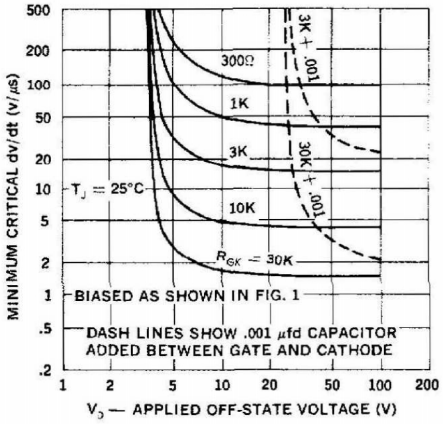
1 Gate Trigger Current



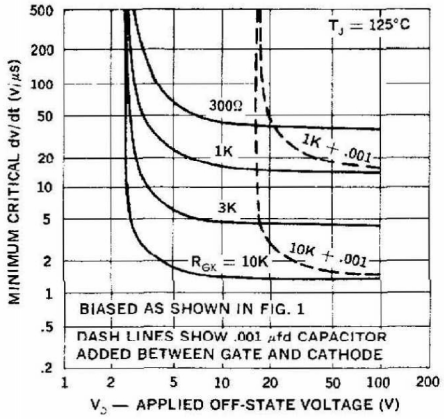
2 Gate Trigger Voltage



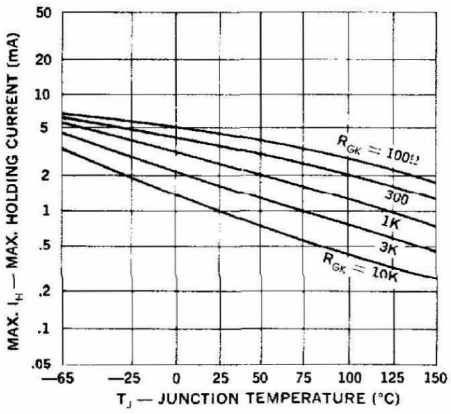
3 Min. Critical dv/dt (25°C — R Bias)



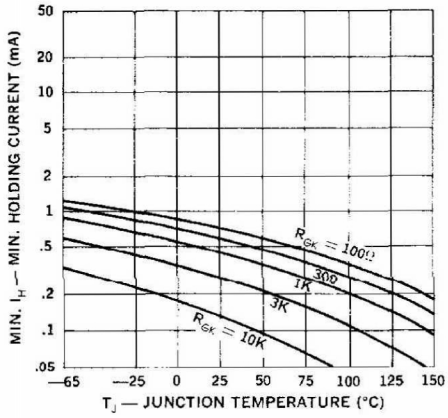
4 Min. Critical dv/dt (125°C — R Bias)



5 Max. Holding Current (Resistor Bias)



6 Min. Holding Current (Resistor Bias)



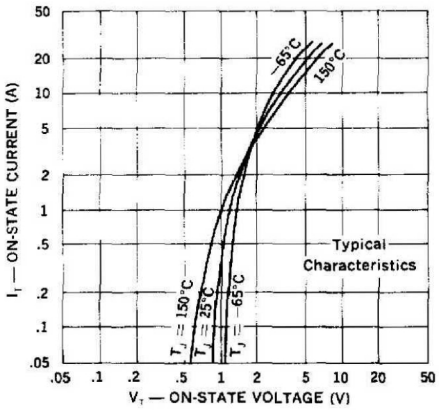
DIGITRON™ Semiconductors

High-reliability discrete products and engineering services since 1977

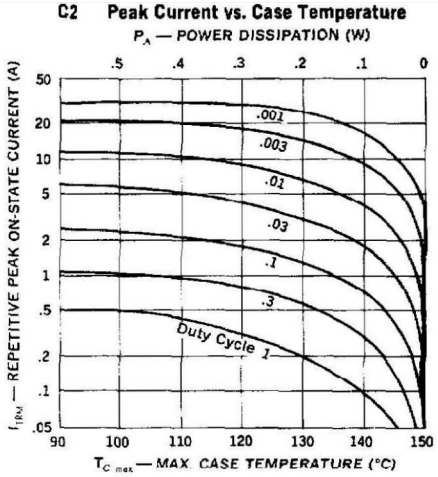
2N3027-2N3032

SILICON CONTROLLED RECTIFIER

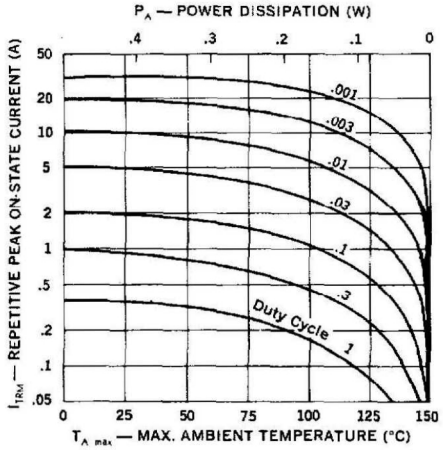
C1 Forward on Current vs. Voltage



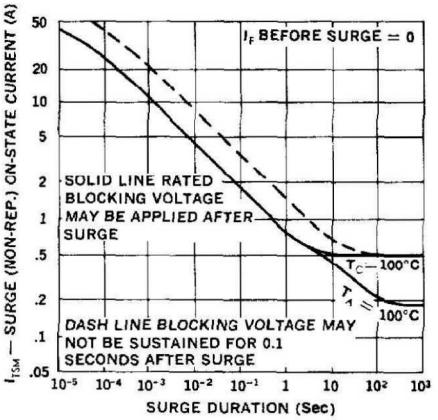
C2 Peak Current vs. Case Temperature



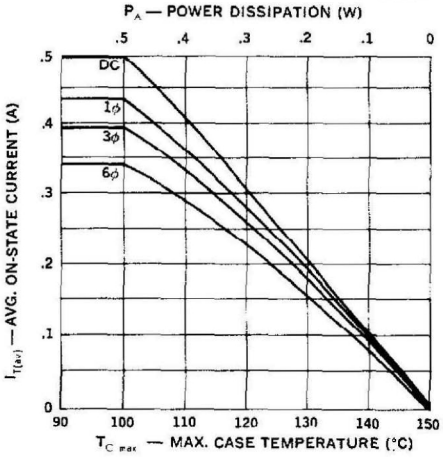
C3 Peak Current vs. Ambient Temperature TO-18 Ratings (see note)



C4 Surge Current vs. Time



C5 Average Current vs. Case Temperature



C6 Average Current vs. Ambient Temperature TO-18 Ratings (see note)