Silicon Controlled Rectifiers

SCR OPERATION ADVANTAGES AND RELIABILITY

Fairchild has produced Silicon Controlled Rectifiers since 1964. Because all Fairchild Thyristors are made by the PLANAR* process, they offer the user the following advantages in operating characteristics and reliability.

Operation Advantages

Consistently higher maximum operating junction temperatures (T_j MAX = 150°C) allow operation of Fairchild thyristors over a wider range of ambient temperature excursion without sacrificing blocking voltage, forward current, or gate triggering abilities.

Lower blocking (leakage) currents allow lower gate trigger currents in the thyristor and reduce the power loss during the non-conducting or blocking state.

Increased gate sensitivity allows control of higher load currents with lower gate trigger currents. This results in higher power gain and increased design flexibility for the triggering circuit.

Reliability

Reliability of a semiconductor depends on the susceptibility of a given junction to ambient influences within the encapsulation. The passivation techniques of the PLANAR process prohibit external influences from contaminating and degrading the junction surface, thus insuring longtime reliability.

The long term stability of the PLANAR passivated junctions allows more exacting circuit design and reduces circuit drift with time.

PLANAR SILICON CONTROLLED RECTIFIER SELECTION GUIDE

Current Category	Package	D.C. Forward Current @ T_{MAX}	Max. Gate Trigger Current @ 25°C	Rated Frwd. & Rev. Blocking Voltage	FSC Type Number
		Amp @ °C	mA	Volts	
0.5 Amp	TO - 46	0.40 @ 85° Case	0.20	50	2N4096
				100	2N4097
				200	2N4098
		0.25 @ 75° Case	0.05	15	2N892
				30	2N894
				60	2N896
				100	2N898
				200	2N900
		0.26 @ 125° Case	0.02	30	2N948
				60	2N949
				100	2N950
				200	2N951
	TO - 18	0.35 @ 100° Case	0.20	15	2N876
				30	2N877
				60	2N878
				100	2N879
				150	2N880
				200	2N881
				300	2N882
			0.02	15	2N884
				30	2N885
				60	2N886
				100	2N887
				150	2N888
				200	2N889
				300	2N890
		0.40 @ 85° Case	0.20	50	2N4108
				100	2N4109
				200	2N4110
		1.25 @ 85° Case	0.10	25	2N4212
				50	2N4213
				100	2N4214
				150	2N4215
				200	2N4216
				250	2N4217
				300	2N4218
2.0 Amp	TO - 5	1.25 @ 100° Case	2.0	30	FT1881
				60	FT1882
				100	FT1883
				150	FT1884
				200	FT1885
			0.20	15	FT1869
				30	FT1870
				60	FT1871
				100	FT1872
				150	FT1873
				200	FT1874

* Planar is a patented Fairchild process.

PLANAR SILICON CONTROLLED RECTIFIER SELECTION GUIDE

Current Category	Package	D.C. Forward Current @ T_{MAX}	Max. Gate Trigger Current @ 25°C	Rated Frwd. & Rev. Blocking Voltage	FSC Type Number
		Amp @ °C	mA	Volts	
		1.30 @ 80° Case	0.20	25	FT2009
				50	FT2010
				100	FT2011
				200	FT2012
				300	FT2013
4.0 Amp	TO - 5	1.60 @ 85° Case	0.10	25	2N2322
				50	2N2323
				100	2N2324
				150	2N2325
				200	2N2326
				250	2N2327
				300	2N2328
			.025	25	2N2322A
				50	2N2323A
				100	2N2324A
				150	2N2325A
				200	2N2326A
				250	2N2327A
				300	2N2328A

SUGGESTED FAIRCHILD PLANAR EQUIVALENTS

The following are all released EIA registered thyristors which Fairchild offers, or for which a close equivalent is offered.

Where Fairchild does not offer the registered type, an equivalent is suggested based on approximate forward current rating, same or closest equivalent package, blocking voltage and gate sensitivity.

All FT numbered types are identical to EIA registered types except for slight package differences (EIA TO-9 or isolated case TO-5 versus FSC TO-5 with anode connected to case).

EIA Type	EIA Pkg.	FSC Equiv. Type	FSC Equiv. Pkg.	EIA Type	EIA Pkg.	FSC Equiv. Type	FSC Equiv. Pkg.	EIA Type	EIA Pkg.	FSC Equiv. Type	FSC Equiv. Pkg.
2N876	TO - 18	2N876	TO - 18	2N1884	TO - 9	FT1884	TO - 5	2N3005	TO - 18	2N4108	TO - 18
2N877	TO - 18	2N877	TO - 18	2N1885	TO - 9	FT1885	TO - 5	2N3006	TO - 18	2N4109	TO - 18
2N878	TO - 18	2N878	TO - 18	2N2009	Isol. Case	FT2009	TO - 5	2N3007	TO - 18	2N4109	TO - 18
2N879	TO - 18	2N879	TO - 18	2N2010	TO - 5	FT2010	TO - 5	2N3008	TO - 18	2N4110	TO - 18
2N880	TO - 18	2N880	TO - 18	2N2011	TO - 5	FT2011	TO - 5	2N3027	TO - 18	2N4108	TO - 18
2N881	TO - 18	2N881	TO - 18	2N2012	TO - 5	FT2012	TO - 5	2N3028	TO - 18	2N4109	TO - 18
2N882	TO - 18	2N882	TO - 18	2N2013	Isol. Case	FT2013	TO - 5	2N3029	TO - 18	2N4109	TO - 18
2N884	TO - 18	2N884	TO - 18	2N2322	TO - 5	2N2322	TO - 5	2N3030	TO - 18	2N885	TO - 18
2N885	TO - 18	2N885	TO - 18	2N2322A	TO - 5	2N2322A	TO - 5	2N3031	TO - 18	2N886	TO - 18
2N886	TO - 18	2N886	TO - 18	2N2323	TO - 5	2N2323	TO - 5	2N3032	TO - 18	2N887	TO - 18
2N887	TO - 18	2N887	TO - 18	2N2323A	TO - 5	2N2323A	TO - 5	2N3254	TO - 46	2N884	TO - 18
2N888	TO - 18	2N888	TO - 18	2N2324	TO - 5	2N2324	TO - 5	2N3255	TO - 46	2N885	TO - 18
2N889	TO - 18	2N889	TO - 18	2N2324A	TO - 5	2N2324A	TO - 5	2N3256	TO - 46	2N886	TO - 18
2N890	TO - 18	2N890	TO - 18	2N2325	TO - 5	2N2325	TO - 5	2N3257	TO - 46	2N4096	TO - 46
2N892	TO - 18	2N892	TO - 18	2N2325A	TO - 5	2N2325A	TO - 5	2N3258	TO - 46	2N4096	TO - 46
2N894	TO - 18	2N894	TO - 18	2N2326	TO - 5	2N2326	TO - 5	2N3259	TO - 46	2N4097	TO - 46
2N896	TO - 18	2N896	TO - 18	2N2326A	TO - 5	2N2326A	TO - 5	2N3555	TO - 5	2N2323A	TO - 5
2N898	TO - 18	2N898	TO - 18	2N2327	TO - 5	2N2327	TO - 5	2N3556	TO - 5	2N2324A	TO - 5
2N900	TO - 18	2N900	TO - 18	2N2327A	TO - 5	2N2327A	TO - 5	2N3557	TO - 5	2N2324A	TO - 5
2N948	TO - 18	2N948	TO - 18	2N2328	TO - 5	2N2328	TO - 5	2N3558	TO - 5	2N2326A	TO - 5
2N949	TO - 18	2N949	TO - 18	2N2328A	TO - 5	2N2328A	TO - 5	2N3559	TO - 5	2N2323	TO - 5
2N950	TO - 18	2N950	TO - 18	2N2344	TO - 5	2N2322A	TO - 5	2N3560	TO - 5	2N2324	TO - 5
2N951	TO - 18	2N951	TO - 18	2N2345	TO - 5	2N2323A	TO - 5	2N3561	TO - 5	2N2324	TO - 5
2N1869	TO - 9	FT1869	TO - 5	2N2346	TO - 5	2N2324A	TO - 5	2N3562	TO - 5	2N2326	TO - 5
2N1870	TO - 9	FT1870	TO - 5	2N2347	TO - 5	2N2325A	TO - 5	2N4096	TO - 46	2N4096	TO - 46
2N1870A	TO - 9	FT1870	TO - 5	2N2348	TO - 5	2N2326A	TO - 5	2N4097	TO - 46	2N4097	TO - 46
2N1871	TO - 9	FT1871	TO - 5	2N2679	TO - 18	2N885	TO - 18	2N4098	TO - 46	2N4098	TO - 46
2N1871A	TO - 9	FT1871	TO - 5	2N2680	TO - 18	2N886	TO - 18	2N4108	TO - 18	2N4108	TO - 18

SUGGESTED FAIRCHILD PLANAR EQUIVALENTS

EIA Type	EIA Pkg.	FSC Equiv. Type	FSC Equiv. Pkg.	EIA Type	EIA Pkg.	FSC Equiv. Type	FSC Equiv. Pkg.	EIA Type	EIA Pkg.	FSC Equiv. Type	FSC Equiv. Pkg.
2N1872	TO - 9	FT1872	TO - 5	2N2681	TO - 18	2N887	TO - 18	2N4109	TO - 18	2N4109	TO - 18
2N1872A[1]	TO - 9	FT1872	TO - 5	2N2682	TO - 18	2N889	TO - 18	2N4110	TO - 18	2N4110	TO - 18
2N1873	TO - 9	FT1873	TO - 5	2N2683[2]	TO - 18	2N885	TO - 18	2N4144	TO - 52	2N4108	TO - 18
2N1874	TO - 9	FT1874	TO - 5	2N2684[2]	TO - 18	2N886	TO - 18	2N4145	TO - 52	2N4108	TO - 18
2N1874A[1]	TO - 9	FT1874	TO - 5	2N2685[2]	TO - 18	2N887	TO - 18	2N4146	TO - 52	2N4109	TO - 18
2N1875[1]	TO - 9	2N2322A	TO - 5	2N2686[2]	TO - 18	2N889	TO - 18	2N4147	TO - 52	2N4109	TO - 18
2N1876[1]	TO - 9	2N2323A	TO - 5	2N2687	TO - 18	2N4108	TO - 18	2N4148	TO - 52	2N4110	TO - 18
2N1877[1]	TO - 9	2N2324A	TO - 5	2N2688	TO - 18	2N4109	TO - 18	2N4149	TO - 52	2N4110	TO - 18
2N1878[1]	TO - 9	2N2324A	TO - 5	2N2689	TO - 18	2N4109	TO - 18	2N4212	TO - 5	2N4212	TO - 5
2N1879[1]	TO - 9	2N2325A	TO - 5	2N2690	TO - 18	2N4110	TO - 18	2N4213	TO - 5	2N4213	TO - 5
2N1880[1]	TO - 9	2N2326A	TO - 5	2N3001	TO - 18	2N885	TO - 18	2N4214	TO - 5	2N4214	TO - 5
2N1881	TO - 9	FT1881	TO - 5	2N3002	TO - 18	2N886	TO - 18	2N4215	TO - 5	2N4215	TO - 5
2N1882	TO - 9	FT1882	TO - 5	2N3003	TO - 18	2N887	TO - 18	2N4216	TO - 5	2N4216	TO - 5
2N1883	TO - 9	FT1883	TO - 5	2N3004	TO - 18	2N889	TO - 18	2N4217	TO - 5	2N4217	TO - 5
								2N4218	TO - 5	2N4218	TO - 5

SILICON CONTROLLED RECTIFIERS NUMERICAL INDEX

2N876 THROUGH 2N882

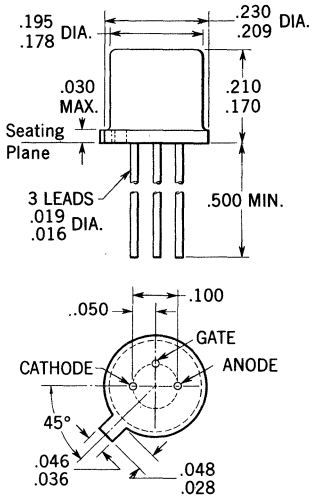
PNPN SILICON CONTROLLED RECTIFIERS

DIFFUSED SILICON PLANAR* THYRISTORS

- **FORWARD CURRENT RATING OF 0.35 AMPS DC AT $T_C = 100°C$**
- **BLOCKING VOLTAGE CAPABILITY TO 300 VOLTS**
- **MAXIMUM GATE TRIGGER CURRENT OF 200 μA AT $T_C = 25°C$**
- **RELIABLE PLANAR CONSTRUCTION**

PHYSICAL DIMENSIONS

in accordance with JEDEC (TO-18) outline



NOTES: All dimensions in inches
Leads are gold-plated Kovar
Anode internally connected to case
Package weight is 0.43 grams

ABSOLUTE MAXIMUM RATINGS (Note 1)

Maximum Temperatures

†Storage Temperature				−65°C to +150°C
†Operating Temperature				−65°C to +150°C
†Lead Temperature (Soldering, 10 second time limit)				+230°C

Maximum Currents

RMS Forward Current	$T_C = 100°C$	$I_{F(RMS)}$		430 mA
(180° Conduction Angle) (Note 2)	$T_A = 25°C$			300 mA
Continuous Forward Current	†$T_C = 100°C$	$I_{F(DC)}$		350 mA
(Note 2)	$T_A = 25°C$			240 mA
Average Forward Current	$T_C = 100°C$	$I_{F(AV)}$		280 mA
(180° Conduction Angle) (Note 2)	$T_A = 25°C$			192 mA
†Peak Recurrent Forward Current (Repetition rate of 60 pps or higher, ≤ 0.01 duty cycle)	$T_C = 100°C$	I_{FRM}		20 Amps
†Surge Current (Rectangular pulse of 0.2 ms duration, peak)	$T_C = 100°C$	$I_{FM(surge)}$		20 Amps
†Peak Forward Gate Current	$T_C = 100°C$	I_{GFM}		250 mA

Maximum Voltages ($T_C = -65°C$ to $+100°C$)

†Peak Reverse Gate Voltage	V_{GRM}		5.0 Volts
†DC Forward and Reverse Blocking Voltage	V_{FM}, V_{RM}	2N876	15 Volts
		2N877	30 Volts
		2N878	60 Volts
		2N879	100 Volts
		2N880	150 Volts
		2N881	200 Volts
		2N882	300 Volts

ELECTRICAL CHARACTERISTICS (25°C Case Temperature unless otherwise noted)

SYMBOL	CHARACTERISTIC	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
†I_{FX}	Forward Blocking Current		0.004	10	μA	V_{AK} = Rated V_{FM}, R_{GK} = 1.0 kΩ
†I_{FX}(125°C)	Forward Blocking Current		1.5	100	μA	V_{AK} = Rated V_{FM}, R_{GK} = 1.0 kΩ
†I_{RX}	Reverse Blocking Current		0.004	10	μA	V_{AK} = Rated V_{RM}, R_{GK} = 1.0 kΩ
†I_{RX}(125°C)	Reverse Blocking Current		1.5	100	μA	V_{AK} = Rated V_{RM}, R_{GK} = 1.0 kΩ
†I_{GR}	Reverse Gate Current (except 2N882)		0.1	10	μA	V_{GK} = −2.0 V, I_A = 0
†I_{GR}	Reverse Gate Current (2N882 only)		0.1	10	μA	V_{GK} = −5.0 V, I_A = 0
†I_{GT}	Gate Trigger Current		100	200	μA	V_{AA} = 5.0 V, R_L = 100 Ω, R_{GS} = 10 kΩ
†V_{GT}	Gate Trigger Voltage	0.40	0.64	0.80	Volts	V_{AA} = 5.0 V, R_L = 100 Ω, R_{GS} = 100 Ω
†I_{HX}	Holding Current		1.4	5.0	mA	V_{AA} = 5.0 V, I_G = −150 μA
†V_F	On Voltage (Note 3)		1.0	1.5	Volts	I_F = 200 mA
dV/dt	Critical Rate Of Rise Of Anode Voltage		95		V/μs	V_{AA} = Rated V_{FM}, R_{GK} = 1.0 kΩ

†JEDEC Registered Values

*Planar is a patented Fairchild process.

NOTES:

(1) These ratings are limiting values above which the reliability of the device may be impaired.

(2) These ratings give a maximum junction temperature of 150°C with the maximum average power dissipation and a maximum junction to case thermal resistance of 44.5°C/Watt and a junction to ambient thermal resistance of 350°C/Watt.

(3) Pulse Conditions: Length = 300 μs; Duty Cycle ≤ 2%.

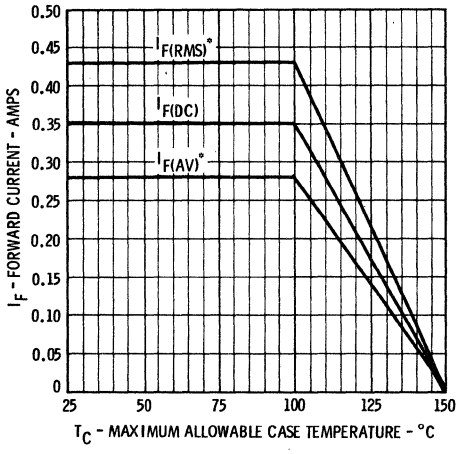
(4) Ambient temperature derating curves are derived with no external heat sink connected.

FAIRCHILD
SEMICONDUCTOR
A DIVISION OF FAIRCHILD CAMERA AND INSTRUMENT CORPORATION

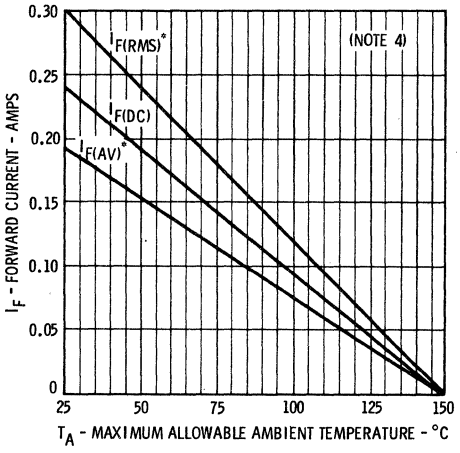
313 FAIRCHILD DRIVE, MOUNTAIN VIEW, CALIFORNIA, (415) 962-5011, TWX: 910-379-6435

MAXIMUM RATINGS

FORWARD CURRENT VERSUS MAXIMUM ALLOWABLE CASE TEMPERATURE HALF WAVE CONDUCTION*



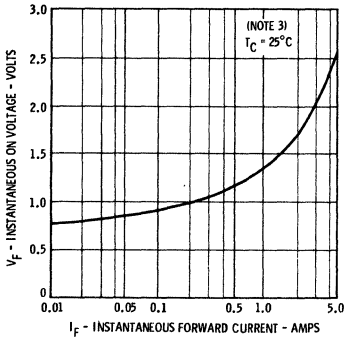
FORWARD CURRENT VERSUS MAXIMUM ALLOWABLE AMBIENT TEMPERATURE HALF WAVE CONDUCTION*



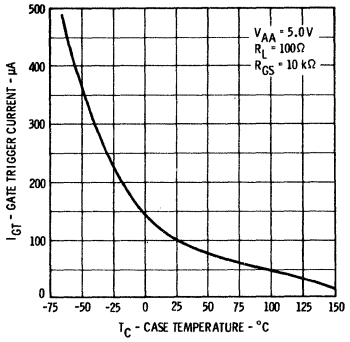
*180° Conduction Angle for Sinusoidal Current Waveform: 50 to 400 Hz.

TYPICAL ELECTRICAL CHARACTERISTICS

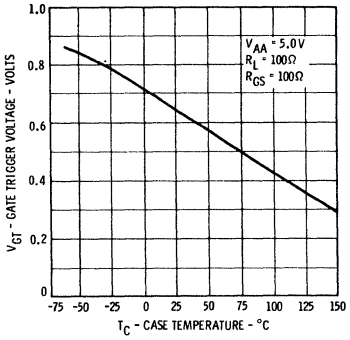
INSTANTANEOUS ON VOLTAGE VERSUS FORWARD CURRENT



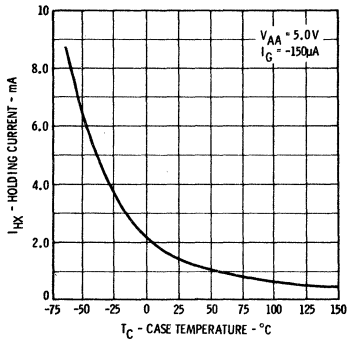
GATE TRIGGER CURRENT VERSUS CASE TEMPERATURE



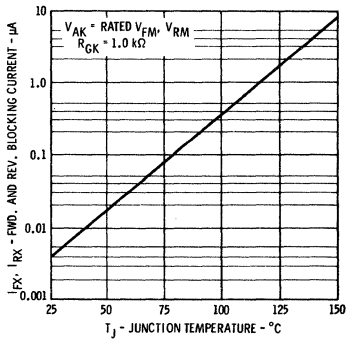
GATE TRIGGER VOLTAGE VERSUS CASE TEMPERATURE



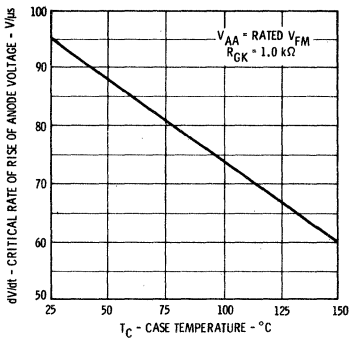
HOLDING CURRENT VERSUS CASE TEMPERATURE



FORWARD AND REVERSE BLOCKING CURRENT VERSUS JUNCTION TEMPERATURE



ALLOWABLE CRITICAL RATE OF RISE OF ANODE VOLTAGE VERSUS CASE TEMPERATURE



2N884 THROUGH 2N890

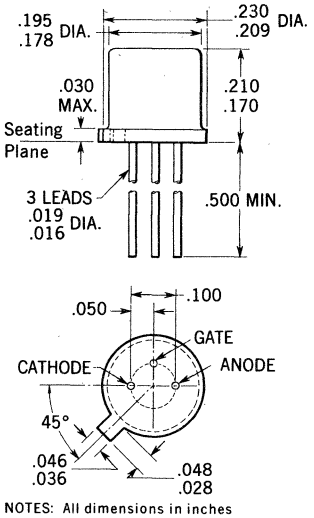
PNPN SILICON CONTROLLED RECTIFIERS

DIFFUSED SILICON PLANAR* THYRISTORS

- **FORWARD CURRENT RATING OF 0.35 AMPS DC AT $T_C = 100°C$**
- **BLOCKING VOLTAGE CAPABILITY TO 300 VOLTS**
- **MAXIMUM GATE TRIGGER CURRENT OF 20 μA AT $T_C = 25°C$**
- **RELIABLE PLANAR CONSTRUCTION**

PHYSICAL DIMENSIONS

in accordance with JEDEC (TO-18) outline



NOTES: All dimensions in inches
Leads are gold-plated Kovar
Anode internally connected to case
Package weight is 0.43 grams

ABSOLUTE MAXIMUM RATINGS (Note 1)

Maximum Temperatures				
†Storage Temperature				−65°C to +150°C
†Operating Temperature				−65°C to +150°C
†Lead Temperature (Soldering, 10 second time limit)				+230°C
Maximum Currents				
RMS Forward Current	$T_C = 100°C$	$I_{F(RMS)}$		430 mA
(180° Conduction Angle) (Note 2)	$T_A = 25°C$			300 mA
Continuous Forward Current	†$T_C = 100°C$	$I_{F(DC)}$		350 mA
(Note 2)	$T_A = 25°C$			240 mA
Average Forward Current	$T_C = 100°C$	$I_{F(AV)}$		280 mA
(180° Conduction Angle) (Note 2)	$T_A = 25°C$			192 mA
†Peak Recurrent Forward Current (Repetition rate 60 pps or higher, ≤ 0.01 duty cycle)	$T_C = 100°C$	I_{FRM}		20 Amps
†Surge Current (Rectangular pulse of 0.2 ms duration, peak)	$T_C = 100°C$	$I_{FM(surge)}$		20 Amps
†Peak Forward Gate Current	$T_C = 100°C$	I_{GFM}		250 mA
Maximum Voltages ($T_C = -65°C$ to $+100°C$)				
†Peak Reverse Gate Voltage		V_{GRM}		5.0 Volts
†DC Forward and Reverse Blocking Voltage		V_{FM}, V_{RM}	2N884	15 Volts
			2N885	30 Volts
			2N886	60 Volts
			2N887	100 Volts
			2N888	150 Volts
			2N889	200 Volts
			2N890	300 Volts

ELECTRICAL CHARACTERISTICS (25°C Case Temperature unless otherwise noted)

SYMBOL	CHARACTERISTIC	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
†I_{FX}	Forward Blocking Current		0.004	1.0	μA	V_{AK} = Rated V_{FM}, R_{GK} = 1.0 kΩ
†I_{FX}(125°C)	Forward Blocking Current		1.5	20	μA	V_{AK} = Rated V_{FM}, R_{GK} = 1.0 kΩ
†I_{RX}	Reverse Blocking Current		0.004	1.0	μA	V_{AK} = Rated V_{RM}, R_{GK} = 1.0 kΩ
†I_{RX}(125°C)	Reverse Blocking Current		1.5	20	μA	V_{AK} = Rated V_{RM}, R_{GK} = 1.0 kΩ
†I_{GR}	Reverse Gate Current (except 2N890)		0.1	10	μA	$V_{GK} = -2.0$ V, $I_A = 0$
†I_{GR}	Reverse Gate Current (2N890 only)		0.1	10	μA	$V_{GK} = -5.0$ V, $I_A = 0$
†I_{GT}	Gate Trigger Current		10	20	μA	$V_{AA} = 5.0$ V, $R_L = 100\ \Omega$, $R_{GS} = 10$ kΩ
†V_{GT}	Gate Trigger Voltage	0.44	0.57	0.60	Volts	$V_{AA} = 5.0$ V, $R_L = 100\ \Omega$, $R_{GS} = 100\ \Omega$
†I_{HX}	Holding Current	0.1	0.15	1.0	mA	$V_{AA} = 5.0$ V, $I_G = -50\ \mu$A
†V_F	On Voltage (Note 3)		1.0	1.5	Volts	$I_F = 200$ mA
dV/dt	Critical Rate of Rise of Anode Voltage		95		V/μs	V_{AA} = Rated V_{FM}, R_{GK} = 1.0 kΩ

†JEDEC Registered Values

*Planar is a patented Fairchild process

NOTES:

(1) These ratings are limiting values above which the reliability of the device may be impaired.

(2) These ratings give a maximum junction temperature of 150°C with the maximum average power dissipation and a maximum junction to case thermal resistance of 44.5°C/Watt and a junction to ambient thermal resistance of 350°C/Watt.

(3) Pulse Conditions: Length = 300 μs; Duty Cycle ≤ 2%.

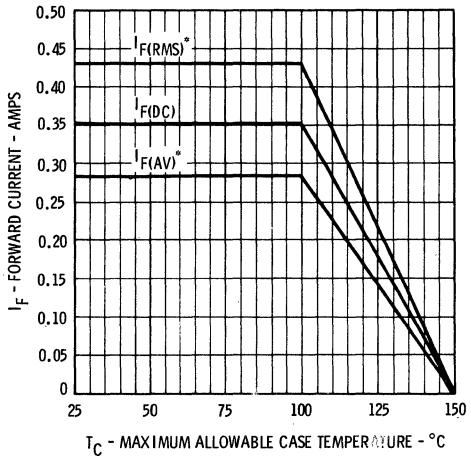
(4) Ambient temperature derating curves are derived with no external heat sink connected.

FAIRCHILD
SEMICONDUCTOR
A DIVISION OF FAIRCHILD CAMERA AND INSTRUMENT CORPORATION

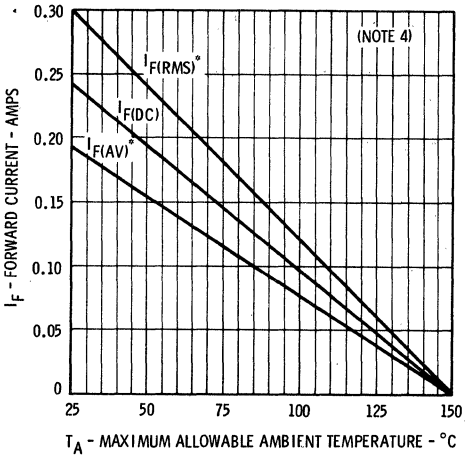
313 FAIRCHILD DRIVE, MOUNTAIN VIEW, CALIFORNIA, (415) 962-5011, TWX: 910-379-6435

MAXIMUM RATINGS

FORWARD CURRENT VERSUS MAXIMUM ALLOWABLE CASE TEMPERATURE HALF WAVE CONDUCTION*



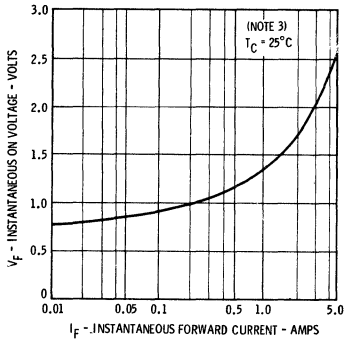
FORWARD CURRENT VERSUS MAXIMUM ALLOWABLE AMBIENT TEMPERATURE HALF WAVE CONDUCTION*



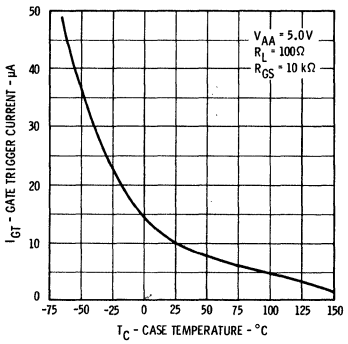
*180° Conduction Angle for Sinusoidal Current Waveform: 50 to 400 Hz.

TYPICAL ELECTRICAL CHARACTERISTICS

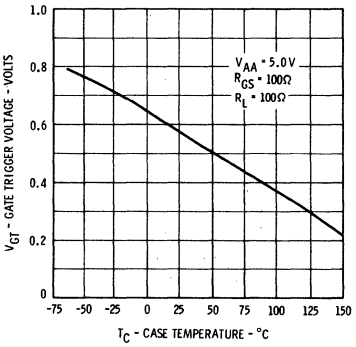
INSTANTANEOUS ON VOLTAGE VERSUS FORWARD CURRENT



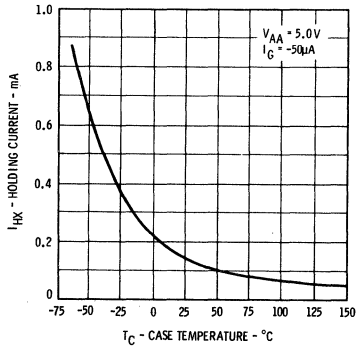
GATE TRIGGER CURRENT VERSUS CASE TEMPERATURE



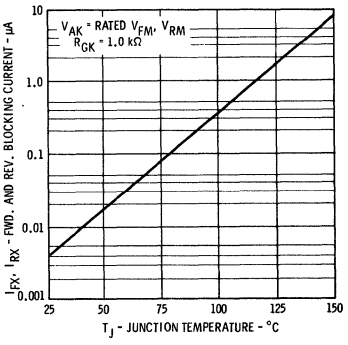
GATE TRIGGER VOLTAGE VERSUS CASE TEMPERATURE



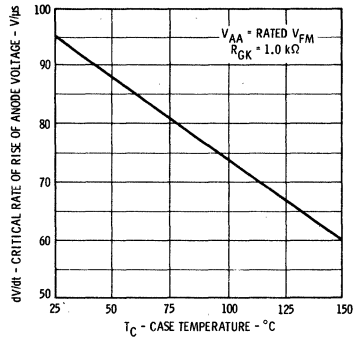
HOLDING CURRENT VERSUS CASE TEMPERATURE



FORWARD AND REVERSE BLOCKING CURRENT VERSUS JUNCTION TEMPERATURE



ALLOWABLE CRITICAL RATE OF RISE OF ANODE VOLTAGE VERSUS CASE TEMPERATURE



2N892 • 2N894 • 2N896 • 2N898 • 2N900

PNPN SILICON CONTROLLED RECTIFIERS

DIFFUSED SILICON PLANAR* THYRISTORS

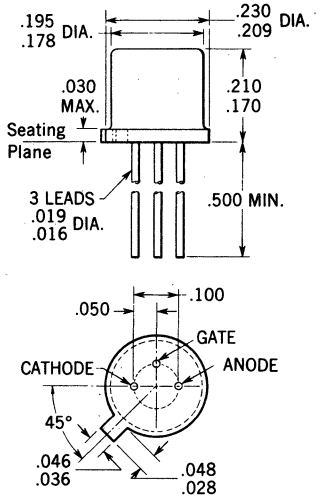
- **CHARACTERIZED FOR TURN-OFF CAPABILITY**
- **FORWARD CURRENT RATING OF 0.3 AMPS AT $T_C = 75°C$**
- **MAXIMUM GATE TRIGGER CURRENT OF 50 μA AT $T_C = 25°C$**
- **RELIABLE PLANAR CONSTRUCTION**

ABSOLUTE MAXIMUM RATINGS (Note 1)

Maximum Temperatures				
†Storage Temperature				−65°C to +150°C
†Operating Temperature				−65°C to +125°C
†Lead Temperature (Soldering, 10 second time limit)				+230°C
Maximum Currents				
RMS Forward Current	$T_C = 75°C$	$I_{F(RMS)}$		300 mA
(180° Conduction Angle) (Note 2)	$T_A = 25°C$			188 mA
Continuous Forward Current	†$T_C = 75°C$	$I_{F(DC)}$		250 mA
(Note 2)	$T_A = 25°C$			145 mA
Average Forward Current	$T_C = 75°C$	$I_{F(AV)}$		190 mA
(180° Conduction Angle) (Note 2)	$T_A = 25°C$			120 mA
†Peak Recurrent Forward Current (Repetition rate of 60 pps or higher, ≤ 0.01 duty cycle)	$T_C = 75°C$	I_{FRM}		10 Amps
†Surge Current (Rectangular pulse of 0.2 ms duration, peak)	$T_C = 75°C$	$I_{FM(surge)}$		20 Amps
†Peak Forward Gate Current	$T_C = 75°C$	I_{GFM}		250 mA
Maximum Voltages (T_C = −65°C to +75°C)				
†Peak Reverse Gate Voltage		V_{GRM}		5.0 Volts
†DC Reverse Blocking Voltage		V_{RM}		15 Volts
†DC Forward Blocking Voltage		V_{FM}	2N892	15 Volts
			2N894	30 Volts
			2N896	60 Volts
			2N898	100 Volts
			2N900	200 Volts

PHYSICAL DIMENSIONS

in accordance with JEDEC (TO-18) outline



NOTES: All dimensions in inches
Leads are gold-plated Kovar
Anode internally connected to case
Package weight is 0.43 grams

ELECTRICAL CHARACTERISTICS (25°C Case Temperature unless otherwise noted)

SYMBOL	CHARACTERISTIC	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
†I_{RX}	Reverse Blocking Current		0.004	10	μA	$V_{AK} = -15$ V, $R_{GK} = 1.0$ kΩ
†I_{FX}	Forward Blocking Current		0.004	10	μA	V_{AK} = Rated V_{FM}, $R_{GK} = 1.0$ kΩ
†I_{FX}(125°C)	Forward Blocking Current		2.0	100	μA	V_{AK} = Rated V_{FM}, $R_{GK} = 1.0$ kΩ
†I_{GR}	Reverse Gate Current		0.1	10	μA	$V_{GK} = -5.0$ V, $I_A = 0$
†I_{GT}	Gate Trigger Current		20	50	μA	$V_{AA} = 5.0$ V, $R_L = 100\ \Omega$, $R_{GS} = 10$ kΩ
†V_{GT}	Gate Trigger Voltage	0.4	0.64	0.7	Volts	$V_{AA} = 5.0$ V, $R_L = 100\ \Omega$, $R_{GS} = 100\ \Omega$
†I_{GQ}	Gate Turn-Off Current			2.0	mA	$I_F = 4.0$ mA
†V_{GQ}	Gate Turn-Off Voltage			1.5	Volts	$I_F = 4.0$ mA
†V_F	On Voltage (Note 3)		1.05	2.0	Volts	$I_F = 250$ mA
†V_F	On Voltage (Note 3)		0.75	1.0	Volts	$I_F = 4.0$ mA
†t_{gq}	Gate Controlled Turn-Off Time (Note 4)			15	μs	$I_F = 4.0$ mA, $V_{GQ} = 4.0$ V

†JEDEC Registered Values

*Planar is a patented Fairchild process

NOTES:

(1) These ratings are limiting values above which the reliability of the device may be impaired.

(2) These ratings give a maximum junction temperature of 125°C with the maximum average power dissipation and a maximum junction to case thermal resistance of 44.5°C/Watt and a junction to ambient thermal resistance of 350°C/Watt.

(3) Pulse Conditions: Length = 300 μs; Duty Cycle ≤ 2%.

(4) Measured in test circuit shown on page 2.

(5) Ambient temperature derating curves are derived with no external heat sink connected.

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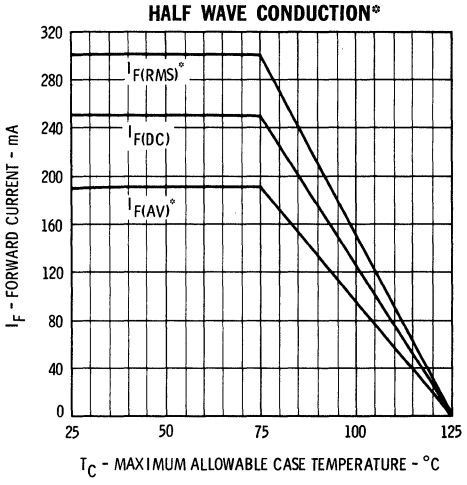
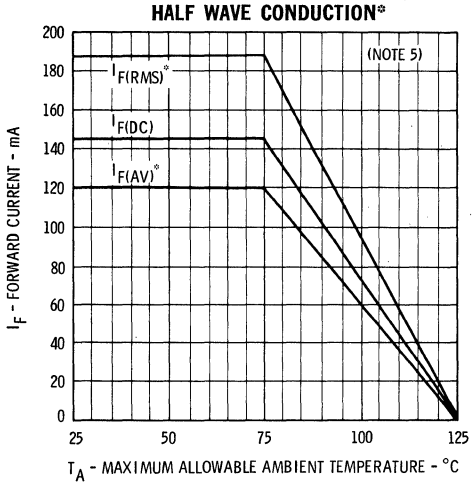
MAXIMUM RATINGS

FORWARD CURRENT VERSUS MAXIMUM ALLOWABLE CASE TEMPERATURE HALF WAVE CONDUCTION*



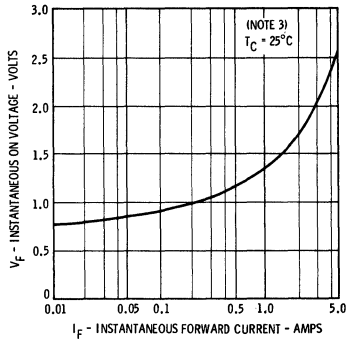
FORWARD CURRENT VERSUS MAXIMUM ALLOWABLE AMBIENT TEMPERATURE HALF WAVE CONDUCTION*



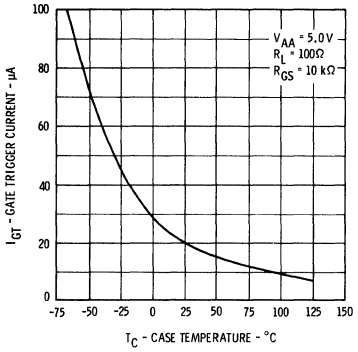
*180° Conduction Angle for Sinusoidal Current Waveform: 50 to 400 Hz.

TYPICAL ELECTRICAL CHARACTERISTICS

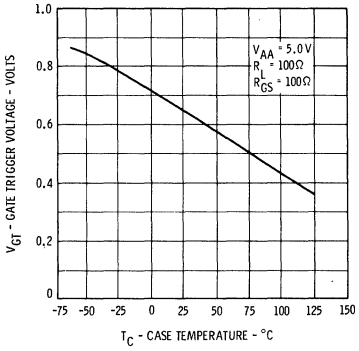
INSTANTANEOUS ON VOLTAGE VERSUS FORWARD CURRENT



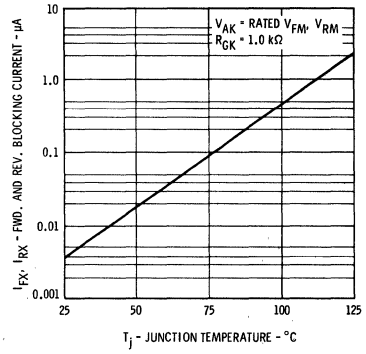
GATE TRIGGER CURRENT VERSUS CASE TEMPERATURE



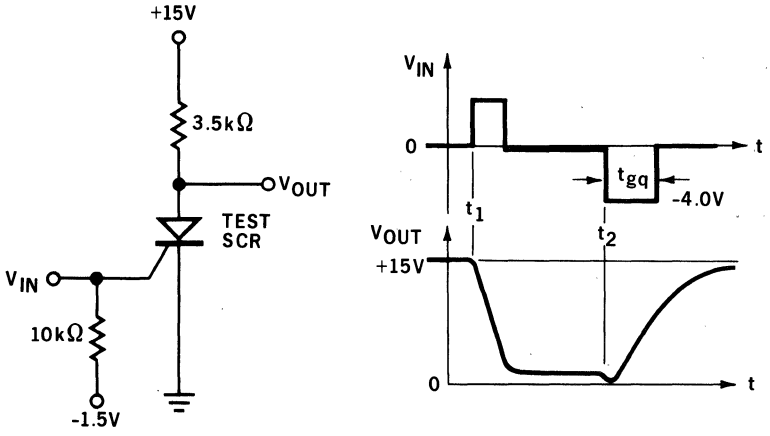
GATE TRIGGER VOLTAGE VERSUS CASE TEMPERATURE



FORWARD AND REVERSE BLOCKING CURRENT VERSUS JUNCTION TEMPERATURE



GATE CONTROLLED TURN-OFF TIME TEST CIRCUIT



Time t_{gq} is the maximum negative pulse duration required to turn-off all devices.

2N948 THROUGH 2N951

PNPN SILICON CONTROLLED RECTIFIERS

DIFFUSED SILICON PLANAR* THYRISTORS

- **FORWARD CURRENT RATING OF 0.26 AMPS DC AT $T_C = 125°C$**
- **BLOCKING VOLTAGE CAPABILITY TO 200 VOLTS**
- **MAXIMUM GATE TRIGGER CURRENT OF 20 μA AT $T_C = 25°C$**
- **RELIABLE PLANAR CONSTRUCTION**

ABSOLUTE MAXIMUM RATINGS (Note 1)

Maximum Temperatures

†Storage Temperature	−65°C to +150°C
†Operating Temperature	−65°C to +150°C
†Lead Temperature (Soldering, 10 second time limit)	+230°C

Maximum Currents and Power

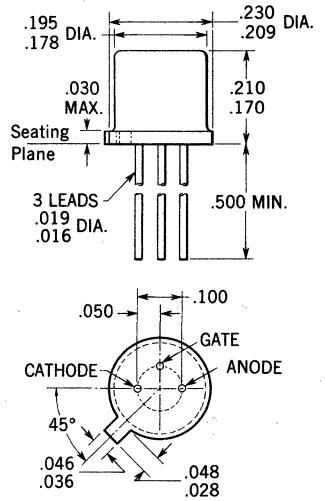
RMS Forward Current	†$T_C = 125°C$	$I_{F(RMS)}$	314 mA
(180° Conduction Angle) (Note 2)	$T_A = 25°C$		236 mA
Continuous Forward Current	†$T_C = 125°C$	$I_{F(DC)}$	260 mA
(Note 2)	$T_A = 25°C$		180 mA
Average Forward Current	†$T_C = 75°C$	$I_{F(AV)}$	200 mA
(180° Conduction Angle) (Note 2)	$T_A = 25°C$		150 mA
†Peak Recurrent Forward Current	$T_C = 110°C$	I_{FRM}	660 mA
†Surge Current	$T_C = 75°C$	$I_{FM(surge)}$	1.0 Amp
(½ cycle sine wave, 60 Hz, peak)			
†Peak Forward Gate Current	$T_C = 125°C$	I_{GFM}	100 mA
†Peak Gate Power Dissipation	$T_C = 125°C$	P_{GM}	200 mW
†Average Gate Power Dissipation	$T_C = 125°C$	$P_{G(AV)}$	20 mW

Maximum Voltages ($T_C = +25°C$ to $+125°C$)

†Peak Reverse Gate Voltage		V_{GRM}	5.0 Volts
†DC Forward and Reverse Blocking Voltages		V_{FM}, V_{RM}	2N948 30 Volts
			2N949 60 Volts
			2N950 100 Volts
			2N951 200 Volts

PHYSICAL DIMENSIONS

in accordance with JEDEC (TO-18) outline



NOTES: All dimensions in inches
Leads are gold-plated Kovar
Anode internally connected to case
Package weight is 0.43 grams

ELECTRICAL CHARACTERISTICS (25°C Case Temperature unless otherwise noted)

SYMBOL	CHARACTERISTIC	TYP.	MAX.	UNITS	TEST CONDITIONS
†I_{FX}	Forward Blocking Current	0.004	1.0	μA	V_{AK} = Rated V_{FM}, $I_G = -20\ \mu A$
†I_{FX}(125°C)	Forward Blocking Current	1.5	20	μA	V_{AK} = Rated V_{FM}, $I_G = -20\ \mu A$
†I_{RO}	Reverse Blocking Current	0.004	1.0	μA	V_{AK} = Rated V_{RM}, $I_G = 0$
†I_{RO}(125°C)	Reverse Blocking Current	1.5	20	μA	V_{AK} = Rated V_{RM}, $I_G = 0$
†I_{GR}	Reverse Gate Current	0.001	10	mA	$V_{GK} = -5.0$ V, $I_A = 0$
†I_{GT}	Gate Trigger Current	10	20	μA	$V_{AA} = 10$ V, $R_L = 100\ \Omega$
†V_{GT}	Gate Trigger Voltage	0.59	1.0	Volts	$V_{AA} = 10$ V, $R_L = 100\ \Omega$
†I_{HO}	Holding Current	0.14	1.0	mA	$R_L = 1.0\ k\Omega$, $I_G = 0$
†V_F	On Voltage (Note 3)	1.0	2.0	Volts	$I_F = 200$ mA
†V_F	On Voltage (Note 3)	0.75	1.2	Volts	$I_F = 10$ mA
dV/dt	Critical Rate of Rise of Anode Voltage	95		V/μs	V_{AA} = Rated V_{FM}, $R_{GK} = 1.0\ k\Omega$

†JEDEC Registered Values

*Planar is a patented Fairchild process

NOTES:

(1) These ratings are limiting values above which the reliability of the device may be impaired.

(2) These ratings give a maximum junction temperature of 150°C with the maximum average power dissipation and a maximum junction to case thermal resistance of 44.5°C/Watt and a junction to ambient thermal resistance of 350°C/Watt.

(3) Pulse Conditions: Length = 300 μs; Duty Cycle $\leq$ 2%.

(4) Ambient temperature derating curves are derived with no external heat sink connected.

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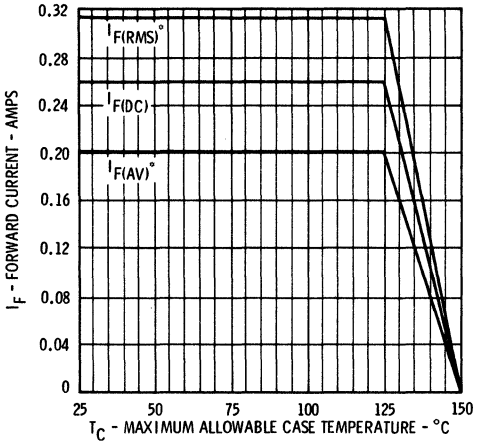
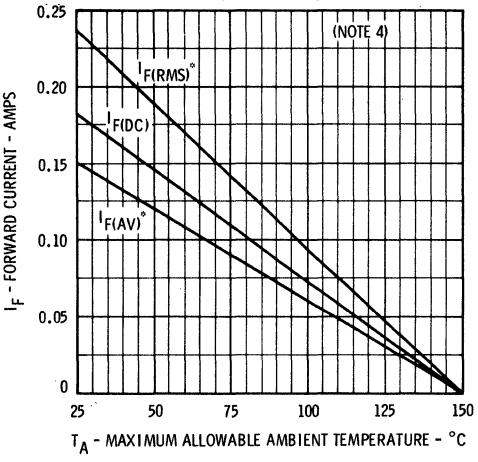
MAXIMUM RATINGS

FORWARD CURRENT VERSUS MAXIMUM ALLOWABLE CASE TEMPERATURE HALF WAVE CONDUCTION*



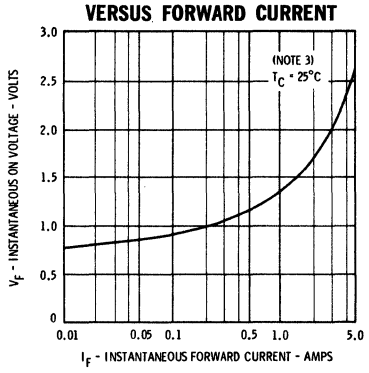
FORWARD CURRENT VERSUS MAXIMUM ALLOWABLE AMBIENT TEMPERATURE HALF WAVE CONDUCTION*



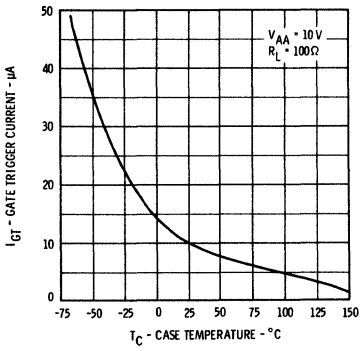
*180° Conduction Angle for Sinusoidal Current Waveform: 50 to 400 Hz.

TYPICAL ELECTRICAL CHARACTERISTICS

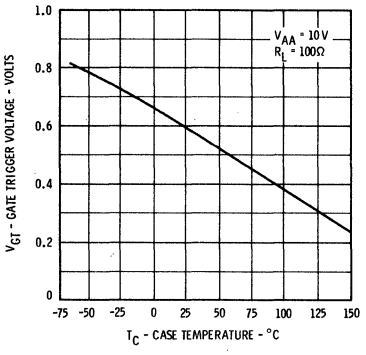
INSTANTANEOUS ON VOLTAGE VERSUS FORWARD CURRENT



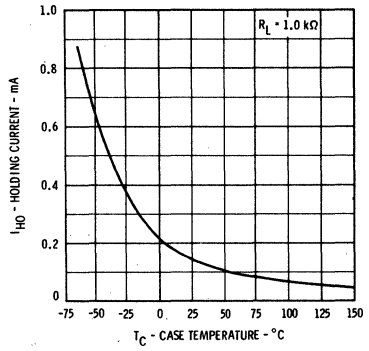
GATE TRIGGER CURRENT VERSUS CASE TEMPERATURE



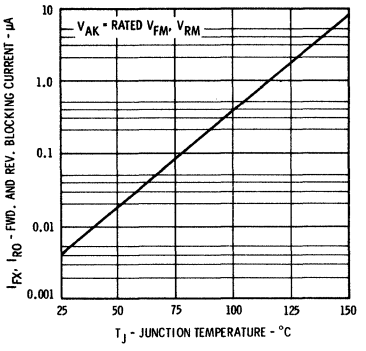
GATE TRIGGER VOLTAGE VERSUS CASE TEMPERATURE



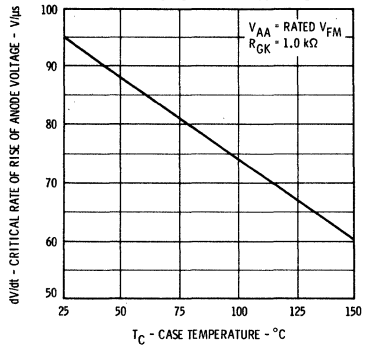
HOLDING CURRENT VERSUS CASE TEMPERATURE



FORWARD AND REVERSE BLOCKING CURRENT VERSUS JUNCTION TEMPERATURE



ALLOWABLE CRITICAL RATE OF RISE OF ANODE VOLTAGE VERSUS CASE TEMPERATURE



FT1869 THROUGH FT1874

PNPN SILICON CONTROLLED RECTIFIERS

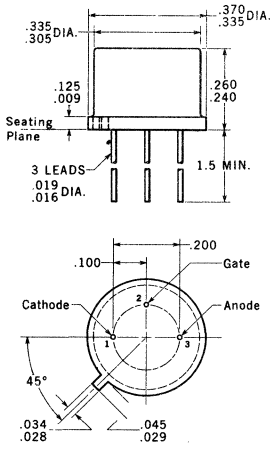
DIFFUSED SILICON PLANAR* THYRISTORS

- **FORWARD CURRENT RATING OF 1.25 AMPS DC AT $T_C = 100°C$**
- **BLOCKING VOLTAGE CAPABILITY TO 200 VOLTS**
- **MAXIMUM GATE TRIGGER CURRENT OF 200 μA AT $T_C = 25°C$**
- **IDENTICAL TO 2N1869 THROUGH 2N1874 EXCEPT ANODE CONNECTED TO CASE**
- **RELIABLE PLANAR CONSTRUCTION**

ABSOLUTE MAXIMUM RATINGS (Note 1)

Maximum Temperatures				
Storage Temperature		T_{stg}		−65°C to +150°C
Operating Junction Temperature		T_J		−65°C to +150°C
Maximum Currents and Power				
rms Forward Current	$T_C = 100°C$	$I_{F(rms)}$		1.57 Amps
(180° Conduction Angle) (Note 2)	$T_A = 25°C$			590 mA
Continuous Forward Current (Note 2)	$T_C = 100°C$	$I_{F(DC)}$		1.25 Amps
	$T_A = 25°C$			430 mA
Average Forward Current	$T_C = 100°C$	$I_{F(AV)}$		1.0 Amps
(180° Conduction Angle) (Note 2)	$T_A = 25°C$			380 mA
Surge Current	$T_C = 100°C$	$I_{FM(surge)}$		20 Amps
(Rectangular Pulse, Peak, $t_p = 0.2$ ms)				
Peak Forward Gate Current	$T_C = 100°C$	I_{GFM}		0.25 Amps
Maximum Voltages ($T_C = -65°C$ to $+150°C$)				
Peak Reverse Gate Voltage		V_{GRM}		5.0 Volts
Peak Forward and Reverse Blocking Voltages		V_{FM}, V_{RM}	FT1869	15 Volts
			FT1870	30 Volts
			FT1871	60 Volts
			FT1872	100 Volts
			FT1873	150 Volts
			FT1874	200 Volts

PHYSICAL DIMENSIONS
in accordance with
JEDEC (TO-5) outline



NOTES: All dimensions in inches
Leads are gold plated kovar
Anode internally connected to case
Package weighs 1.23 grams

ELECTRICAL CHARACTERISTICS (25°C Case Temperature unless otherwise noted)

SYMBOL	CHARACTERISTIC	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS	
I_{FX}	Forward Blocking Current		0.02	10	μA	V_{AK} = Rated V_{FM}	$R_{GK} = 1.0\ k\Omega$
$I_{FX}(125°C)$	Forward Blocking Current		6.0	100	μA	V_{AK} = Rated V_{FM}	$R_{GK} = 1.0\ k\Omega$
I_{RX}	Reverse Blocking Current		0.02	10	μA	V_{AK} = Rated V_{RM}	$R_{GK} = 1.0\ k\Omega$
$I_{RX}(125°C)$	Reverse Blocking Current		6.0	100	μA	V_{AK} = Rated V_{RM}	$R_{GK} = 1.0\ k\Omega$
I_{GT}	Gate Trigger Current		40	200	μA	$V_{AA} = 5.0$ V	$R_L = 100\ \Omega$
V_{GT}	Gate Trigger Voltage	0.4	0.55	0.8	Volts	$V_{AA} = 5.0$ V	$R_L = 100\ \Omega$
I_{HX}	Holding Current	0.3	0.47	5.0	mA	$V_{AA} = 5.0$ V	$I_G = -150\ \mu$A
I_{GR}	Reverse Gate Current		0.005	10	μA	$V_{GK} = 2.0$ V	$I_A = 0$
V_F	On Voltage (Note 4)		1.6	2.5	Volts	$I_F = 2.0$ A	
dv/dt	Critical Rate of Rise of Anode Voltage		150		V/μs	V_{AA} = Rated V_{FM}	$R_{GK} = 500\ \Omega$

*Planar is a patented Fairchild process.

NOTES:

(1) These ratings are limiting values above which the reliability of the device may be impaired.
(2) These ratings give a maximum junction temperature of 150°C with the maximum average power dissipation and a junction to case and junction to ambient thermal resistance of 20°C/Watt and 225°C/Watt respectively.
(3) Ambient temperature derating curves are derived with no external heat sink connected.
(4) Pulse Conditions: length = 300 μs; duty cycle $\leq$ 2%.

FAIRCHILD
SEMICONDUCTOR
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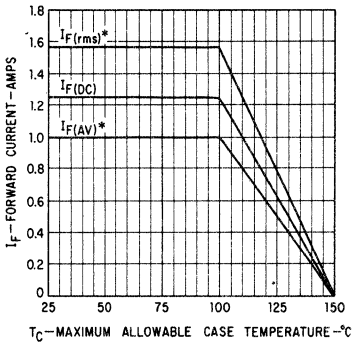
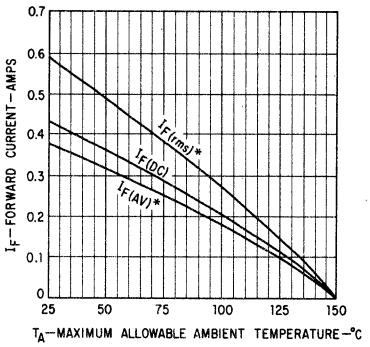
MAXIMUM RATINGS

FORWARD CURRENT VERSUS MAXIMUM ALLOWABLE CASE TEMPERATURE — HALF WAVE CONDUCTION*



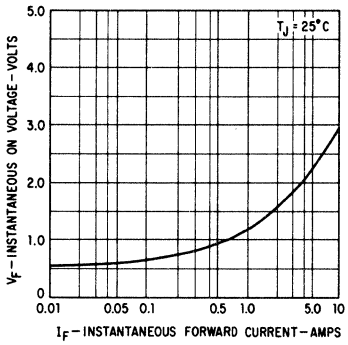
FORWARD CURRENT VERSUS MAXIMUM ALLOWABLE AMBIENT TEMPERATURE — HALF WAVE CONDUCTION* (Note 3)



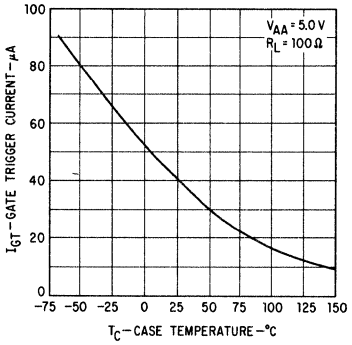
*180° Conduction Angle for Sinusoidal Current Waveform –50 to 400 Hz.

TYPICAL ELECTRICAL CHARACTERISTICS

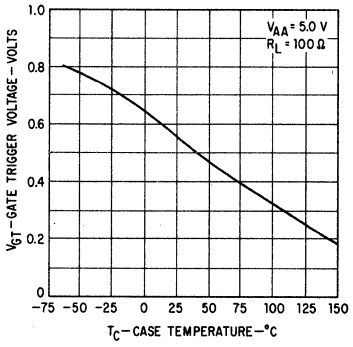
INSTANTANEOUS ON VOLTAGE VERSUS FORWARD CURRENT (Note 4)



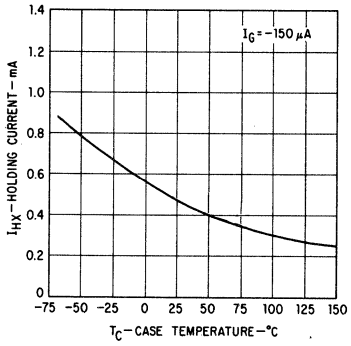
GATE TRIGGER CURRENT VERSUS CASE TEMPERATURE



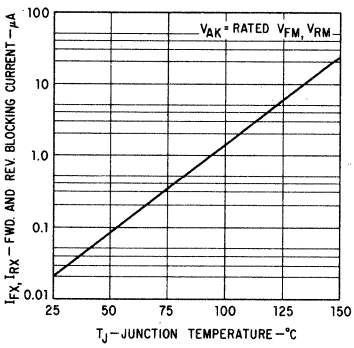
GATE TRIGGER VOLTAGE VERSUS CASE TEMPERATURE



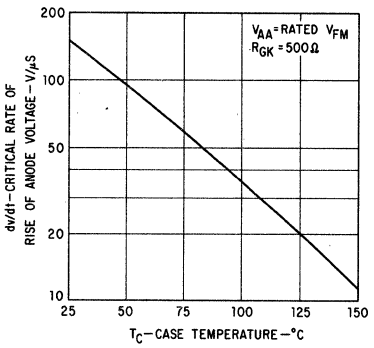
HOLDING CURRENT VERSUS CASE TEMPERATURE



FORWARD AND REVERSE BLOCKING CURRENT VERSUS JUNCTION TEMPERATURE



ALLOWABLE CRITICAL RATE OF RISE OF ANODE VOLTAGE VERSUS CASE TEMPERATURE



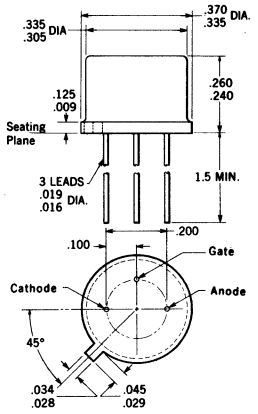
FT1881 THROUGH FT1885

PNPN SILICON CONTROLLED RECTIFIERS

DIFFUSED SILICON PLANAR* THYRISTORS

- **FORWARD CURRENT RATING OF 1.25 AMPS DC AT $T_C = 100°C$**
- **BLOCKING VOLTAGE CAPABILITY TO 200 VOLTS**
- **MAXIMUM GATE TRIGGER CURRENT OF 2.0 mA AT 25°C**
- **IDENTICAL TO 2N1881 THRU 2N1885 EXCEPT ANODE CONNECTED TO CASE**
- **RELIABLE PLANAR* CONSTRUCTION**

PHYSICAL DIMENSIONS
in accordance with
JEDEC (TO-5) outline



NOTES: All dimensions in inches
Leads are gold-plated Kovar
Anode internally connected to case
Package weight is 1.23 grams

ABSOLUTE MAXIMUM RATINGS (Note 1)

Maximum Temperatures				
Storage Temperature		T_{stg}		−65°C to +150°C
Operating Junction Temperature		T_J		−65°C to +150°C
Maximum Currents and Power				
rms Forward Current	$T_C = 100°C$	$I_{F(rms)}$		1.57 Amps
(180° conduction angle)(Note 2)	$T_A = 25°C$			590 mA
Continuous Forward Current	$T_C = 100°C$	$I_{F(DC)}$		1.25 Amps
	$T_A = 25°C$			430 mA
Average Forward Current	$T_C = 100°C$	$I_{F(AV)}$		1.0 Amps
(180° conduction angle)(Note 2)	$T_A = 25°C$			380 mA
Surge Current (Rectangular Pulse, Peak, $t_p = 0.2$ ms)	$T_C = 100°C$	$I_{FM(surge)}$		20 Amps
Peak Forward Gate Current	$T_C = 100°C$	I_{GFM}		0.25 Amps
Maximum Voltages				
Peak Reverse Gate Voltage	$T_C = 100°C$	V_{GRM}		5.0 Volts
Peak Forward and Reverse Blocking Voltages	$T_C = 100°C$	V_{FM}, V_{RM}	FT1881	30 Volts
			FT1882	60 Volts
			FT1883	100 Volts
			FT1884	150 Volts
			FT1885	200 Volts

ELECTRICAL CHARACTERISTICS (25°C Case Temperature unless otherwise noted)

SYMBOL	CHARACTERISTIC	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
I_{FX}	Forward Blocking Current		0.02	10	μA	V_{AK} = Rated V_{FM}, $R_{GK} = 1.0$ kΩ
I_{FX}(125°C)	Forward Blocking Current		6	200	μA	V_{AK} = Rated V_{FM}, $R_{GK} = 1.0$ kΩ
I_{RX}	Reverse Blocking Current		0.02	10	μA	V_{AK} = Rated V_{RM}, $R_{GK} = 1.0$ kΩ
I_{RX}(125°C)	Reverse Blocking Current		6	200	μA	V_{AK} = Rated V_{RM}, $R_{GK} = 1.0$ kΩ
I_{GT}	Gate Trigger Current		0.04	2.0	mA	$V_{AA} = 5.0$ V, $R_L = 100$ Ω
V_{GT}	Gate Trigger Voltage	0.4	0.55	2.0	Volts	$V_{AA} = 5.0$ V, $R_L = 100$ Ω
I_{HO}	Holding Current		0.23	2.0	mA	$R_{GK} = \infty$, $R_L = 100$ Ω
I_{GR}	Reverse Gate Current		0.005	1.0	μA	$V_{GK} = -5.0$ V, $I_A = 0$
I_{GR}(125°C)	Reverse Gate Current		0.005		mA	$V_{GK} = -5.0$ V, $I_A = 0$
V_F	On Voltage (Note 4)		1.2	2.0	Volts	$I_F = 1.0$ Amps
dV/dt	Critical Rate of Rise of Anode Voltage		150		V/μs	V_{AA} = Rated V_{FM}, $R_{GK} = 500$ Ω

*Planar is a patented Fairchild process.

NOTES:

(1) These ratings are limiting values above which the reliability of the device may be impaired.
(2) These ratings give a maximum junction temperature of 150°C with the maximum average power dissipation and a maximum junction to case thermal resistance of 20°C/Watt and a junction to ambient thermal resistance of 225°C/Watt.
(3) Ambient temperature derating curves are derived with no external heat sink connected.
(4) Pulse Conditions: Length = 300 μs; Duty Cycle ≤ 2%.

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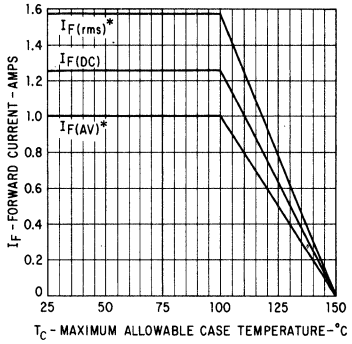
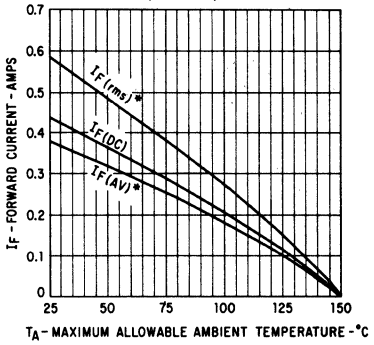
MAXIMUM RATINGS

FORWARD CURRENT VERSUS MAXIMUM ALLOWABLE CASE TEMPERATURE HALF WAVE CONDUCTION*



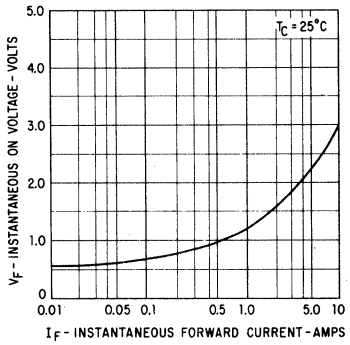
FORWARD CURRENT VERSUS MAXIMUM ALLOWABLE AMBIENT TEMPERATURE HALF WAVE CONDUCTION* (Note 3)



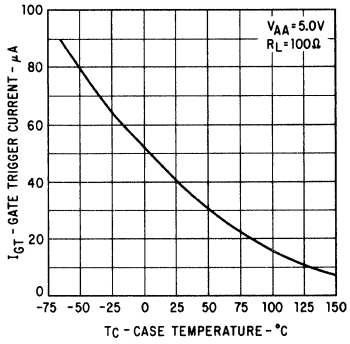
*180° Conduction Angle for Sinusoidal Current Waveform —50 to 400 Hz.

TYPICAL ELECTRICAL CHARACTERISTICS

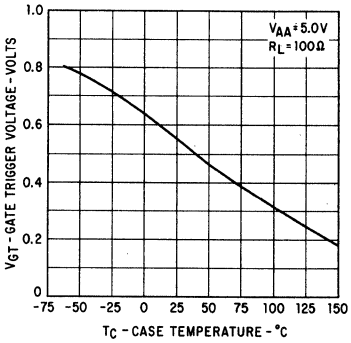
INSTANTANEOUS ON VOLTAGE VERSUS FORWARD CURRENT (Note 4)



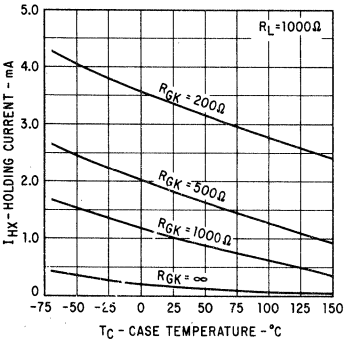
GATE TRIGGER CURRENT VERSUS CASE TEMPERATURE



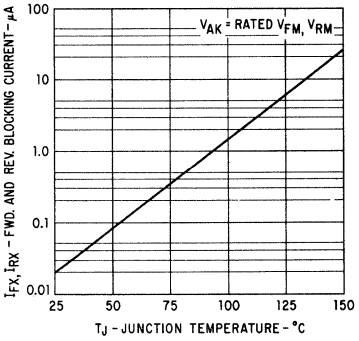
GATE TRIGGER VOLTAGE VERSUS CASE TEMPERATURE



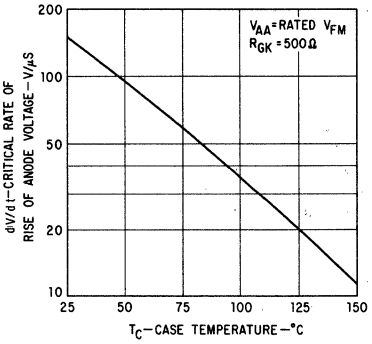
HOLDING CURRENT VERSUS CASE TEMPERATURE



FORWARD AND REVERSE BLOCKING CURRENT VERSUS JUNCTION TEMPERATURE



ALLOWABLE CRITICAL RATE OF RISE OF ANODE VOLTAGE VERSUS CASE TEMPERATURE



FT2009 THROUGH FT2014

PNPN SILICON CONTROLLED RECTIFIERS

DIFFUSED SILICON PLANAR* THYRISTORS

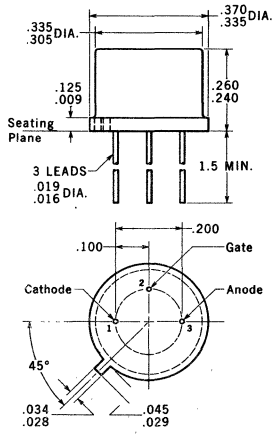
- **FORWARD CURRENT RATING OF 1.3 AMPS DC AT $T_C = 80°C$**
- **BLOCKING VOLTAGE CAPABILITY TO 400 VOLTS**
- **MAXIMUM GATE TRIGGER CURRENT OF 200 μA AT $T_C = 25°C$**
- **IDENTICAL TO 2N2009 THROUGH 2N2014 EXCEPT ANODE CONNECTED TO CASE**
- **RELIABLE PLANAR CONSTRUCTION**

ABSOLUTE MAXIMUM RATINGS (Note 1)

Maximum Temperatures				
Storage Temperature		T_{stg}		−65°C to +150°C
Operating Junction Temperature		T_J		−65°C to +150°C
Maximum Currents and Power				
rms Forward Current	$T_C = 80°C$	$I_{F(rms)}$		1.57 Amps
(180° conduction angle, note 2)	$T_A = 25°C$			590 mA
Continuous Forward Current	$T_C = 80°C$	$I_{F(DC)}$		1.3 Amps
	$T_A = 25°C$			430 mA
Average Forward Current	$T_C = 80°C$	$I_{F(AV)}$		1.0 Amps
(180° conduction angle, note 2)	$T_A = 25°C$			375 mA
Surge Current				
(½ cycle sine wave, 60 Hz, peak)	$T_C = 80°C$	$I_{FM(surge)}$		15 Amps
Peak Forward Gate Current				
(pulse width = 8 ms)	$T_C = 125°C$	I_{GFM}		1.3 Amps
Peak Gate Power Dissipation		P_{GM}		0.2 Watt
Average Gate Power Dissipation		$P_{G(AV)}$		0.05 Watt
Maximum Voltages ($T_C = +25°C$ to $+80°C$)				
Peak Reverse Gate Voltage		V_{GRM}		6.0 Volts
Peak Forward and Reverse		V_{FM}, V_{RM}	FT2009	25 Volts
Blocking Voltages			FT2010	50 Volts
			FT2011	100 Volts
			FT2012	200 Volts
			FT2013	300 Volts
			FT2014	400 Volts

PHYSICAL DIMENSIONS

in accordance with JEDEC (TO-5) outline



NOTES:
All dimensions in inches
Leads are gold-plated Kovar
Anode internally connected to case
Package weight is 1.23 grams

ELECTRICAL CHARACTERISTICS (25°C Case Temperature unless otherwise noted)

SYMBOL	CHARACTERISTIC	TYP.	MAX.	UNITS	TEST CONDITIONS
I_{FX}	Forward Blocking Current	20	100	nA	V_{AK} = Rated V_{FM}, $R_{GK} = 1.0\ k\Omega$
$I_{FX}(125°C)$	Forward Blocking Current	6.0	100	μA	V_{AK} = Rated V_{FM}, $V_{GK} = -0.5$ V
I_{RO}	Reverse Blocking Current	20	100	nA	V_{AK} = Rated V_{RM}, $R_{GK} = \infty$
$I_{RO}(125°C)$	Reverse Blocking Current	6.0	100	μA	V_{AK} = Rated V_{RM}, $R_{GK} = \infty$
I_{GT}	Gate Trigger Current	40	200	μA	$V_{AA} = 5.0$ V, $R_L = 1.0\ k\Omega$
V_{GT}	Gate Trigger Voltage	0.55	1.0	Volts	$V_{AA} = 12$ V, $R_L = 1.0\ k\Omega$
I_{HO}	Holding Current	0.25	2.0	mA	$R_{GK} = \infty$, $R_L = 1.0\ k\Omega$
$I_{HO}(80°C)$	Holding Current	0.16	5.0	mA	$R_{GK} = \infty$, $R_L = 1.0\ k\Omega$
I_{GR}	Reverse Gate Current	0.005	1.0	μA	$V_{GK} = -6.0$ V, $I_A = 0$
$I_{GR}(125°C)$	Reverse Gate Current	0.005	1.0	mA	$V_{GK} = -6.0$ V, $I_A = 0$
V_F	On Voltage (Note 4)	1.2	2.0	Volts	$I_F = 1.0$ A
dV/dt	Critical Rate of Rise of Anode Voltage	150		V/μs	V_{AA} = Rated V_{FM}, $R_{GK} = 500\ \Omega$

NOTES:

(1) These ratings are limiting values above which the reliability of the device may be impaired.

(2) These ratings give a maximum junction temperature of 150°C with the maximum average power dissipation and a maximum junction to case thermal resistance of 35°C/Watt and a junction to ambient thermal resistance of 225°C/Watt.

(3) Ambient temperature derating curves are derived with no external heat sink connected.

(4) Pulse Conditions: Length = 300 μs; Duty Cycle $\leq$ 2%.

*Planar is a patented Fairchild process.

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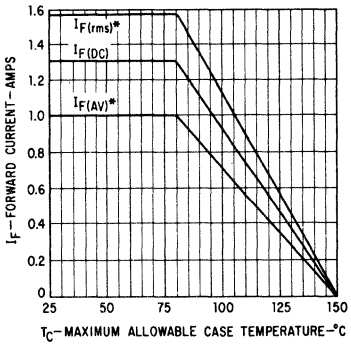
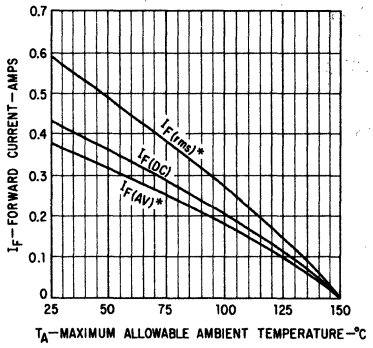
MAXIMUM RATINGS

FORWARD CURRENT VERSUS MAXIMUM ALLOWABLE CASE TEMPERATURE HALF WAVE CONDUCTION*



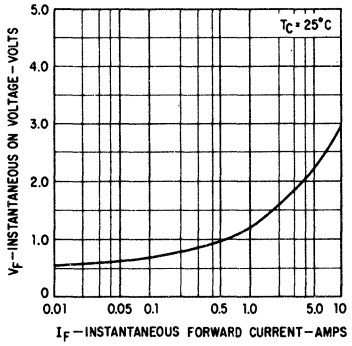
FORWARD CURRENT VERSUS MAXIMUM ALLOWABLE AMBIENT TEMPERATURE HALF WAVE CONDUCTION* (Note 3)



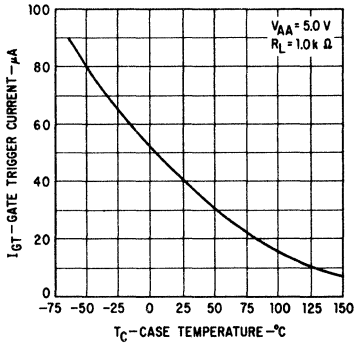
*180° Conduction Angle for Sinusoidal Current Waveform 50 to 400 Hz.

TYPICAL ELECTRICAL CHARACTERISTICS

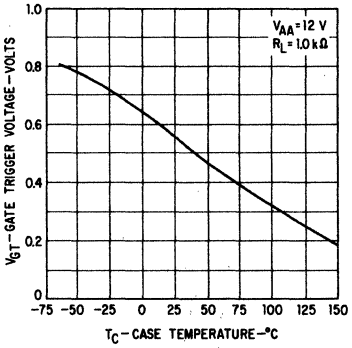
INSTANTANEOUS ON VOLTAGE VERSUS FORWARD CURRENT (Note 4)



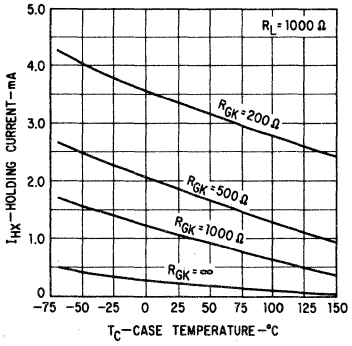
GATE TRIGGER CURRENT VERSUS CASE TEMPERATURE



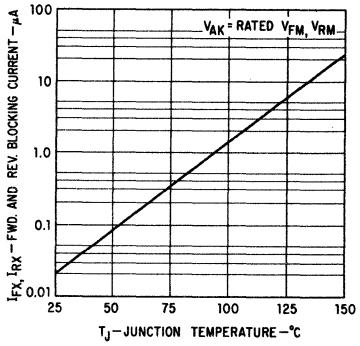
GATE TRIGGER VOLTAGE VERSUS CASE TEMPERATURE



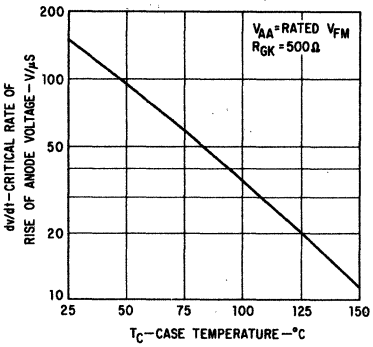
HOLDING CURRENT VERSUS CASE TEMPERATURE



FORWARD AND REVERSE BLOCKING CURRENT VERSUS JUNCTION TEMPERATURE



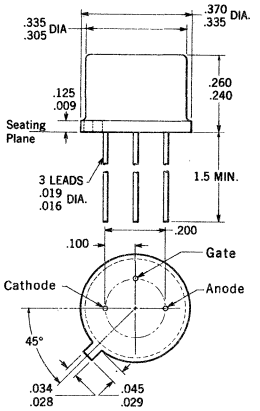
ALLOWABLE CRITICAL RATE OF RISE OF ANODE VOLTAGE VERSUS CASE TEMPERATURE



2N2322 THROUGH 2N2329
2N2322A THROUGH 2N2329A
PNPN SILICON CONTROLLED RECTIFIERS
DIFFUSED SILICON PLANAR* THYRISTORS

- **FORWARD CURRENT RATING OF 1.6 AMP DC AT $T_C = 85°C$**
- **BLOCKING VOLTAGE CAPABILITY TO 400 VOLTS**
- **MAXIMUM GATE TRIGGER CURRENT OF 100 μA FOR 2N2322 SERIES AND 25 μA FOR 2N2322A SERIES AT $T_C = 25°C$**
- **RELIABLE PLANAR CONSTRUCTION**

PHYSICAL DIMENSIONS
in accordance with JEDEC (TO-5) outline



NOTES:
All dimensions in inches.
Leads are gold plated kovar.
Anode internally connected to case.
Package weight is 1.23 grams.

ABSOLUTE MAXIMUM RATINGS (Note 1)

Maximum Temperatures

†Storage Temperature	T_{stg}	−65°C to +150°C
†Operating Junction Temperature	T_J	−65°C to +125°C
†Lead Temperature (Soldering, 10 second time limit)		+230°C

Maximum Currents and Power

rms Forward Current	$T_C = 85°C$	$I_{F(rms)}$	2.0 Amps
(180° Conduction Angle)	$T_C = 25°C$		490 mA
Continuous Forward Current	†$T_C = 85°C$	$I_{F(DC)}$	1.6 Amps
	$T_A = 25°C$		355 mA
Average Forward Current	†$T_C = 85°C$	$I_{F(AV)}$	1.0 Amp
(180° Conduction Angle)	$T_A = 25°C$		310 mA
†Surge Current	$T_C = 85°C$	$I_{FM(surge)}$	15 Amps
(½ cycle, sine wave, 60 Hz, Peak)			
†Peak Forward Gate Current	$T_C = 85°C$	I_{GFM}	100 mA
†Peak Gate Power Dissipation	$T_C = 85°C$	P_{GM}	0.1 Watt
†Average Gate Power Dissipation	$T_C = 85°C$	$P_{G(AV)}$	0.01 Watt

Maximum Voltages, ($T_C = -65°C$ TO $+125°C$)

†Peak Reverse Gate Voltage V_{GRM} 6.0 Volts

		2N2322 2N2322A	2N2323 2N2323A	2N2324 2N2324A	2N2325 2N2325A	2N2326 2N2326A	2N2327 2N2327A	2N2328 2N2328A	2N2329 2N2329A	
†Peak Forward and Reverse Blocking Voltages	V_{FM}, V_{RM}	25	50	100	150	200	250	300	400	Volts
†Transient Peak Reverse Blocking Voltage (5 ms Max.)	V_{RSM}	40	75	150	225	300	350	400	500	Volts

ELECTRICAL CHARACTERISTICS (25°C Case Temperature unless otherwise noted)

SYMBOL	CHARACTERISTIC	2N2322 through 2N2329 TYP.	2N2322 through 2N2329 MAX.	2N2322A through 2N2329A TYP.	2N2322A through 2N2329A MAX.	UNITS	TEST CONDITIONS	
I_{FX}	Forward Blocking Current	20		20		nA	V_{AK} = Rated V_{FM}	$R_{GK} = 1\,k\Omega$
†I_{FX}(125°C)	Forward Blocking Current	10	100			μA	V_{AK} = Rated V_{FM}	$R_{GK} = 1\,k\Omega$
†I_{FX}(125°C)	Forward Blocking Current			10	100	μA	V_{AK} = Rated V_{FM}	$R_{GK} = 2\,k\Omega$
I_{RX}	Reverse Blocking Current	20		20		nA	V_{AK} = Rated V_{RM}	$R_{GK} = 1\,k\Omega$
†I_{RX}(125°C)	Reverse Blocking Current	10	100			μA	V_{AK} = Rated V_{RM}	$R_{GK} = 1\,k\Omega$
†I_{RX}(125°C)	Reverse Blocking Current			10	100	μA	V_{AK} = Rated V_{RM}	$R_{GK} = 2\,k\Omega$
I_{GT}	Gate Trigger Current	40	100	12	25	μA	$V_{AA} = 6.0\,V$	$R_L = 100\,\Omega$
†I_{GT}(−65°C)	Gate Trigger Current	120	350	36	75	μA	$V_{AA} = 6.0\,V$	$R_L = 100\,\Omega$

†JEDEC Registered Values

*Planar is a patented Fairchild process.

NOTES:
(1) These ratings are limiting values above which the reliability of the device may be impaired.
(2) Ambient temperature derating curves are derived with no external heat sink connected.
(3) Pulse Conditions: length = 300 μs; duty cycle $\leq$ 2%.

FAIRCHILD SEMICONDUCTOR
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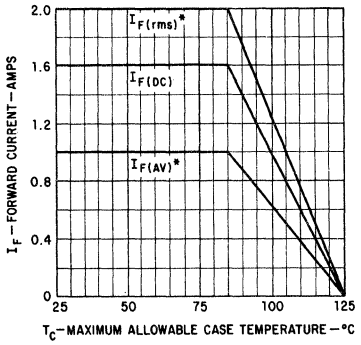
313 FAIRCHILD DRIVE, MOUNTAIN VIEW, CALIFORNIA, (415) 962-5011, TWX: 910-379-6435

ELECTRICAL CHARACTERISTICS (25°C Case Temperature unless otherwise noted)

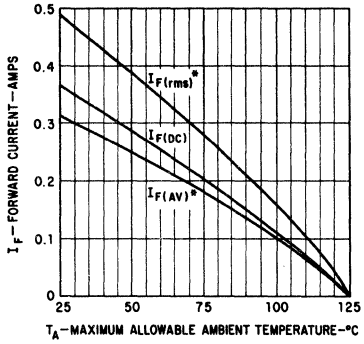
SYMBOL	CHARACTERISTICS	2N2322 through 2N2329 MIN.	TYP.	MAX.	2N2322A through 2N2329A MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
V_{GT}	Gate Trigger Voltage		0.55			0.55		Volts	V_{AA} = 6.0 V, R_L = 100 Ω
†V_{GT}(−65°C)	Gate Trigger Voltage		0.81	1.0		0.81	0.9	Volts	V_{AA} = 6.0 V, R_L = 100 Ω
†V_{GT}(125°C)	Gate Trigger Voltage	0.1	0.2		0.1	0.2		Volts	V_{AA} = Rated V_{FM}, R_L = 100 Ω
I_{HX}	Holding Current		0.9					mA	R_{GK} = 1 kΩ, R_L = 10 kΩ
I_{HX}	Holding Current					0.4		mA	R_{GK} = 2 kΩ, R_L = 10 kΩ
†I_{HX}(−65°C)	Holding Current		1.75	3.0				mA	R_{GK} = 1 kΩ, R_L = 10 kΩ
†I_{HX}(−65°C)	Holding Current					0.7	3.0	mA	R_{GK} = 2 kΩ, R_L = 10 kΩ
†I_{HX}(125°C)	Holding Current	0.15	0.2					mA	R_{GK} = 1 kΩ, R_L = 50 kΩ
†I_{HX}(125°C)	Holding Current				0.10	0.15		mA	R_{GK} = 2 kΩ, R_L = 50 kΩ
†V_F(85°C)	On Voltage		1.7	2.0		1.7	2.0	Volts	I_F = 3.14 A
†V_F(85°C)	On Voltage		1.3	1.5		1.3	1.5	Volts	I_F = 1.6 A
dV/dt	Critical Rate of Rise of Anode Voltage		150			150		V/μs	V_{AA} = Rated V_{FM}, R_{GK} = 500 Ω

MAXIMUM RATINGS

FORWARD CURRENT VERSUS MAXIMUM ALLOWABLE CASE TEMPERATURE HALF WAVE CONDUCTION*



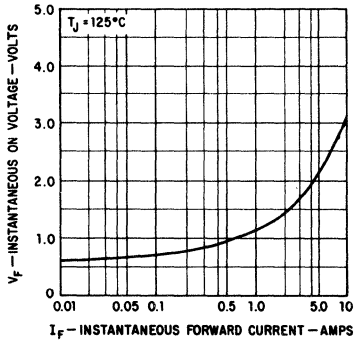
FORWARD CURRENT VERSUS MAXIMUM ALLOWABLE AMBIENT TEMPERATURE HALF WAVE CONDUCTION*(Note 2)



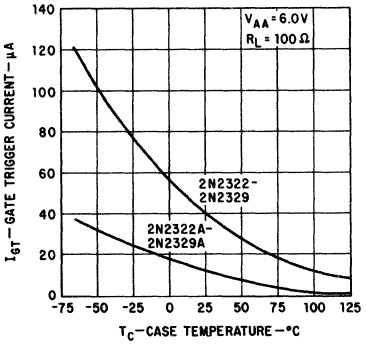
*180° Conduction Angle for Sinusoidal Current Waveform; 50 to 400 Hz.

TYPICAL ELECTRICAL CHARACTERISTICS

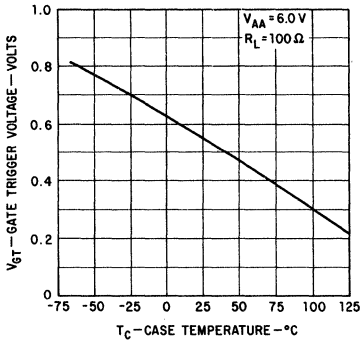
INSTANTANEOUS ON VOLTAGE VERSUS FORWARD CURRENT (Note 3)



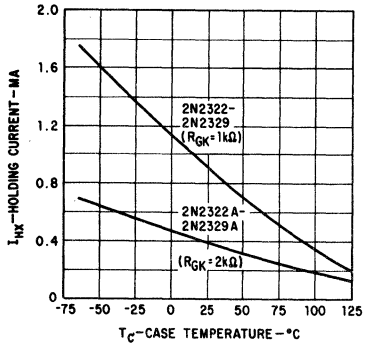
GATE TRIGGER CURRENT VERSUS CASE TEMPERATURE



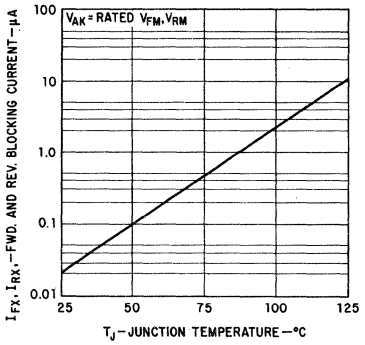
GATE TRIGGER VOLTAGE VERSUS CASE TEMPERATURE



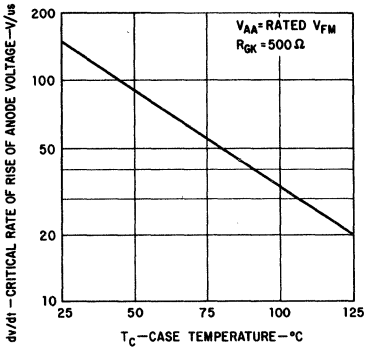
HOLDING CURRENT VERSUS CASE TEMPERATURE



FORWARD AND REVERSE BLOCKING CURRENT VERSUS JUNCTION TEMPERATURE



ALLOWABLE CRITICAL RATE OF RISE OF ANODE VOLTAGE VERSUS CASE TEMPERATURE



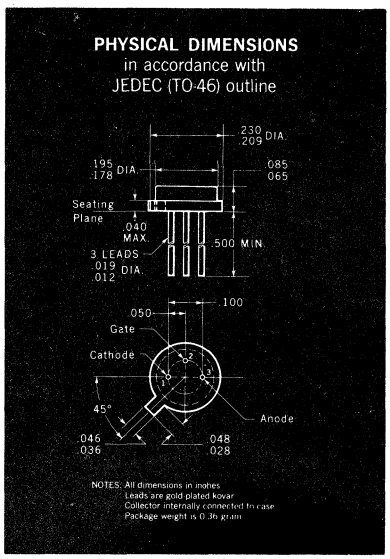
†JEDEC Registered Values

2N4096 • 2N4097 • 2N4098

PNPN SILICON CONTROLLED RECTIFIERS

DIFFUSED SILICON PLANAR DEVICES

- **OPERATION TO 125°C GUARANTEED WITH NO FORWARD OR REVERSE VOLTAGE DERATING.**
- **LOW FORWARD "ON" VOLTAGE GUARANTEED AT 3 POINTS.**
- **LOW FORWARD AND REVERSE LEAKAGES GUARANTEED.**
- **PLANAR RELIABILITY BUILT IN.**



ABSOLUTE MAXIMUM RATINGS (Note 1)

Maximum Temperatures

Storage Temperature	− 65°C to + 125°C
Operating Junction Temperature	− 65°C to + 125°C
Lead Temperature (Soldering, 10 sec. time limit)	+ 260°C Maximum

Maximum Power Dissipation

Average Gate Power Dissipation at 25°C Ambient Temperature (Note 2)	**0.1 Watt**

Maximum Currents

DC Forward Current at 25°C Case Temperature (Note 2)	1.0 Amp.
DC Forward Current at 25°C Ambient Temperature	175 mA
Surge Current at 25°C Ambient Temperature (Note 2) (½ cycle sine wave =8.3 msec)	**4.0 Amps.**
Average Forward Current at 25°C Ambient Temperature 180° Conduction	130 mA

ELECTRICAL CHARACTERISTICS (25°C Free Air Temperature unless otherwise specified)

SYMBOL	CHARACTERISTICS		MIN	TYP	MAX	UNITS	TEST CONDITIONS
V_{FX}	Forward Blocking Voltage (T_A = − 65°C to + 125°C)	2N4096	50			Volts	I_{FX} = 0.05 μA, R_{GK} = 1.0 KΩ
		2N4097	100			Volts	
		2N4098	200			Volts	
V_{RO}	Reverse Blocking Voltage (T_A = − 65°C to + 125°C)	2N4096	50			Volts	I_{RO} = 0.05 μA, R_{GK} = ∞
		2N4097	100			Volts	
		2N4098	200			Volts	
I_{FX}	Forward Blocking Current (at rated V_{FX})			8	50	nA	R_{GK} = 1.0 KΩ
I_{FX} (125°C)	Forward Blocking Current (at rated V_{FX})			5	20	μA	R_{GK} = 1.0 KΩ
I_{RO}	Reverse Blocking Current (at rated V_{RO})			8	50	nA	R_{GK} = ∞
I_{RO} (125°C)	Reverse Blocking Current (at rated V_{RO})			5	20	μA	R_{GK} = ∞
I_{GT}	Gate Trigger Current			0.060	**0.2**	mA	V_{AK} = 10V, R_L = 100Ω
I_{GT} (−55°C)	Gate Trigger Current			0.110	2.0	mA	V_{AK} = 10V, R_L = 100Ω
V_{GT}	Gate Trigger Voltage			0.58	0.8	Volts	V_{AK} = 10V, R_L = 100Ω
V_{GT} (−55°C)	Gate Trigger Voltage			0.75	1.1	Volts	V_{AK} = 10V, R_L = 100Ω
V_{GT} (125°C)	Gate Trigger Voltage (at rated V_{FX})		0.2	0.4		Volts	R_L = 10 KΩ

Additional Electrical Characteristics on page 2

NOTES:

(1) These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

(2) These ratings give a maximum junction temperature of 125°C and junction to case thermal resistance of 44.5°C/Watt (derating factor of 22.5 mW/°C); junction to ambient thermal resistance of 500°C/W (derating factor of 2.0 mW/°C).

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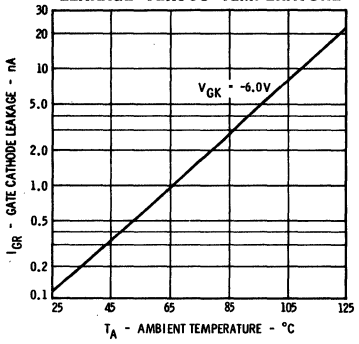
ELECTRICAL CHARACTERISTICS (25°C Free Air Temperature unless otherwise specified)

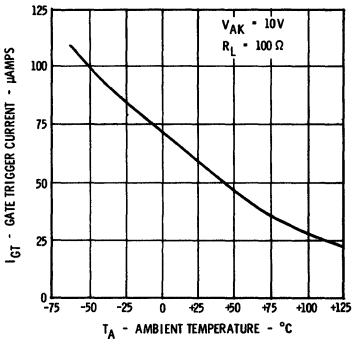
SYMBOL	CHARACTERISTICS	MIN	TYP	MAX	UNITS	TEST CONDITIONS
V_F	On Voltage		0.95	1.15	Volts	I_F = 175 mA
V_F	On Voltage		1.05	**1.2**	Volts	I_F = **250 mA**
V_F	On Voltage		1.2	**1.6**	Volts	I_F = **500 mA**
I_{HO}	Holding Current		0.7	2.0	mA	$R_G = \infty$, R_L = 1.0 KΩ
I_{GR}	Gate Leakage Current		0.13	25	nA	I_F = 0, V_{GK} = − 6.0 V
I_{GR} (125°C)	Gate Leakage Current		0.024	10	μA	I_F = 0, V_{GK} = − 6.0 V
t_{on}	Turn On Time		0.56	**1.5**	μsec	$I_F \approx$ 200 mA, I_{GF} = 10 mA
t_{off}	Turn Off Time (see t_{off} circuit)		6.5	**15**	μsec	$I_F = I_R \approx$ 200 mA
dv/dt	Critical Rate of Rise (at rated V_{FX})	75	200		Volts/μsec	R_{GK} = 1 KΩ, R_L = 100 Ω

GATE CHARACTERISTICS

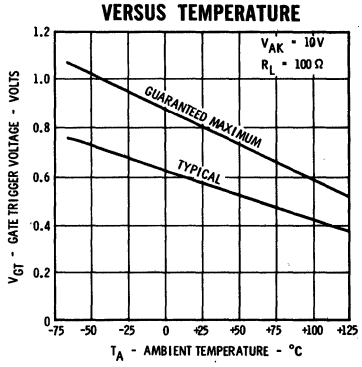
REVERSE GATE-CATHODE LEAKAGE VERSUS TEMPERATURE



GATE TRIGGER CURRENT VERSUS TEMPERATURE

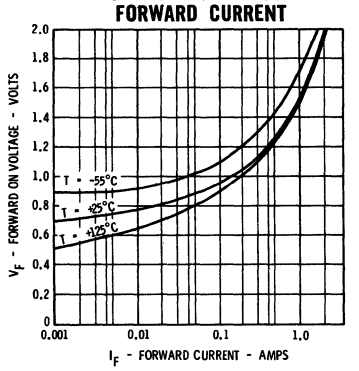


GATE TRIGGER VOLTAGE VERSUS TEMPERATURE

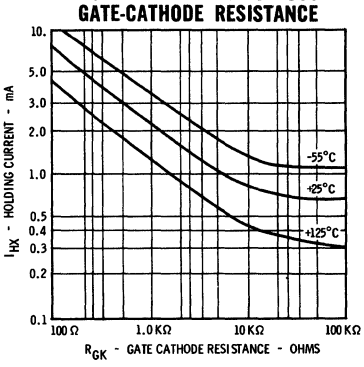


TYPICAL ELECTRICAL CHARACTERISTICS

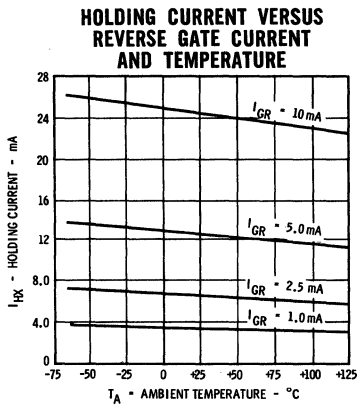
ON VOLTAGE VERSUS FORWARD CURRENT



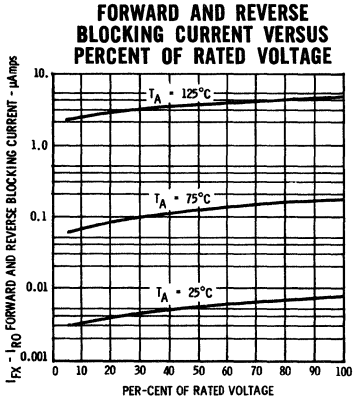
HOLDING CURRENT VERSUS GATE-CATHODE RESISTANCE



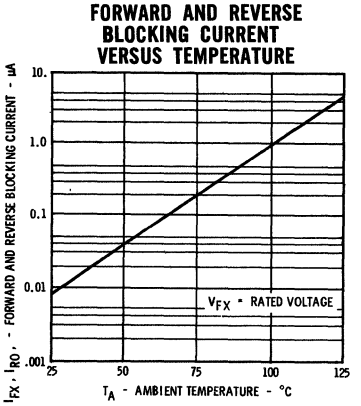
HOLDING CURRENT VERSUS REVERSE GATE CURRENT AND TEMPERATURE



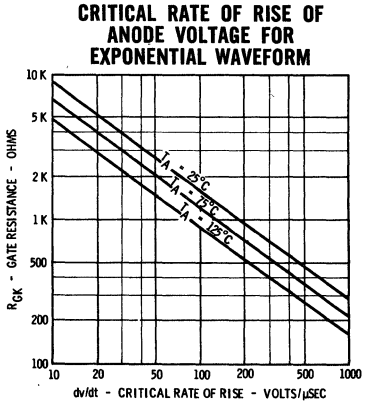
FORWARD AND REVERSE BLOCKING CURRENT VERSUS PERCENT OF RATED VOLTAGE



FORWARD AND REVERSE BLOCKING CURRENT VERSUS TEMPERATURE

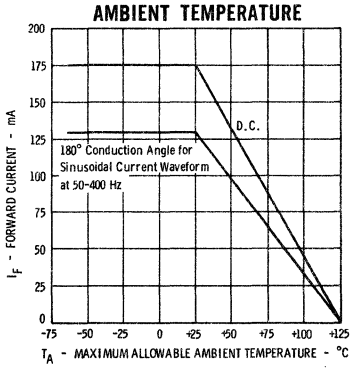


CRITICAL RATE OF RISE OF ANODE VOLTAGE FOR EXPONENTIAL WAVEFORM

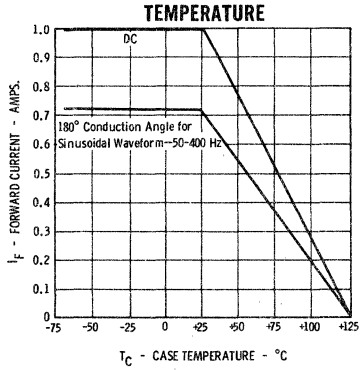


MAXIMUM RATINGS

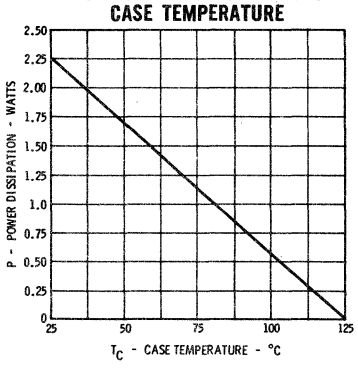
FORWARD CURRENT VERSUS MAXIMUM ALLOWABLE AMBIENT TEMPERATURE



FORWARD CURRENT VERSUS MAXIMUM ALLOWABLE CASE TEMPERATURE

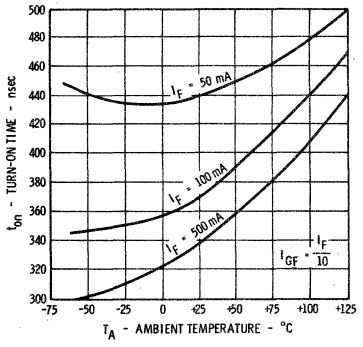


POWER DISSIPATION VERSUS CASE TEMPERATURE

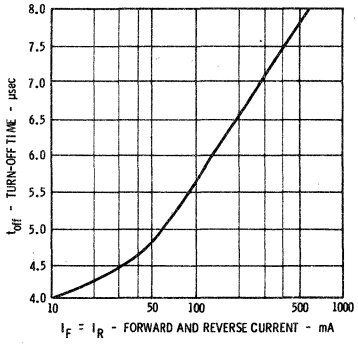


SWITCHING CHARACTERISTICS

TURN-ON TIME VERSUS AMBIENT TEMPERATURE

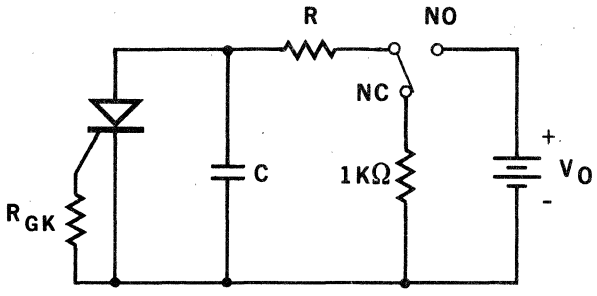


TURN-OFF TIME VERSUS FORWARD AND REVERSE CURRENT



$\frac{dv}{dt}$ CIRCUIT

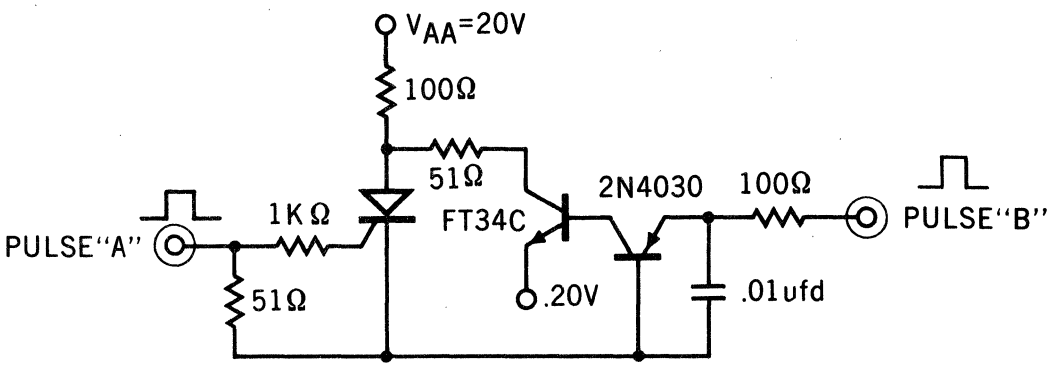
MERCURY RELAY



$$\frac{dv}{dt} = 0.632 \frac{V_O}{RC}$$

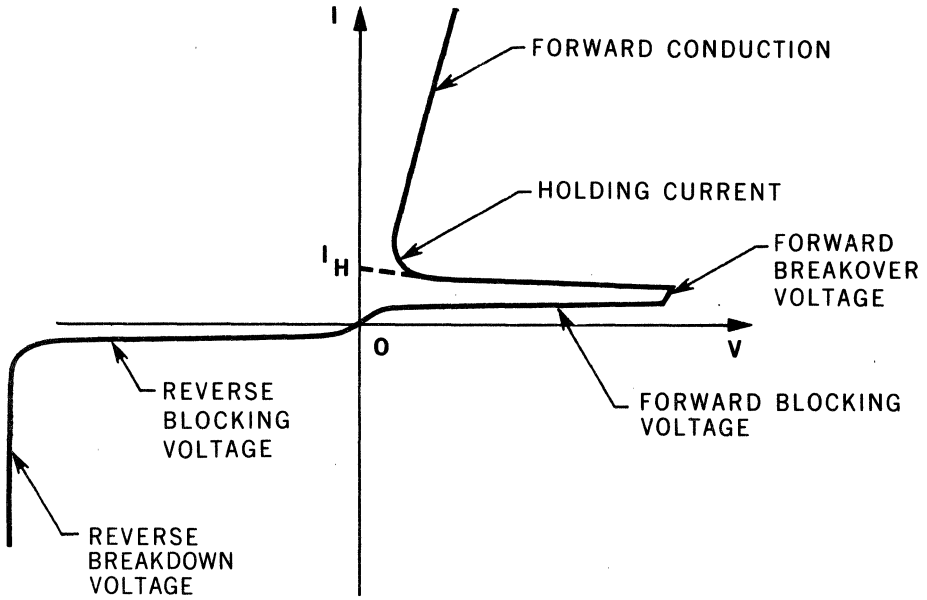
V_O = RATED VOLTAGE

t_{off} CIRCUIT



PULSE B DELAYED FROM PULSE A BY APPROXIMATELY 100 µsec.

ANODE CHARACTERISTIC



FAIRCHILD
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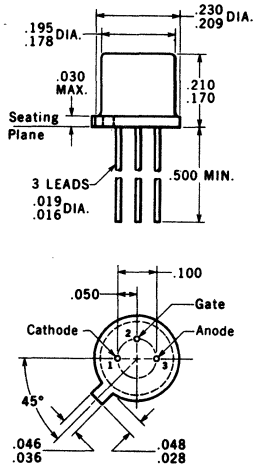
2N4108 • 2N4109 • 2N4110

PNPN SILICON CONTROLLED RECTIFIERS

DIFFUSED SILICON PLANAR DEVICES

OPERATION TO 125°C GUARANTEED WITH NO FORWARD OR REVERSE VOLTAGE DERATING.
LOW FORWARD "ON" VOLTAGE GUARANTEED AT 3 POINTS.
LOW FORWARD AND REVERSE LEAKAGES GUARANTEED.
PLANAR RELIABILITY BUILT IN.

PHYSICAL DIMENSIONS
in accordance with
JEDEC (TO-18) outline



NOTES: All dimensions in inches
Leads are gold-plated kovar
Anode internally connected to case
Package weight is 0.44 gram

ABSOLUTE MAXIMUM RATINGS (Note 1)

Maximum Temperatures

Storage Temperature	− 65°C to + 125°C
Operating Junction Temperature	− 65°C to + 125°C
Lead Temperature (Soldering, 10 sec. time limit)	+ 260°C Maximum

Maximum Power Dissipation

Average Gate Power Dissipation at 25°C Ambient Temperature (Note 2)	**0.1 Watt**

Maximum Currents

DC Forward Current at 25°C Case Temperature (Note 2)	1.0 Amp.
DC Forward Current at 25°C Ambient Temperature	235 mA
Surge Current at 25°C Ambient Temperature (Note 2) (½ cycle sine wave = 8.3 msec)	**4.0 Amps.**
Average Forward Current at 25°C Ambient Temperature 180° Conduction	180 mA

ELECTRICAL CHARACTERISTICS (25°C Free Air Temperature unless otherwise specified)

SYMBOL	CHARACTERISTICS		MIN	TYP	MAX	UNITS	TEST CONDITIONS
V_{FX}	Forward Blocking Voltage (T_A = − 65°C to + 125°C)	2N4108 2N4109 2N4110	50 100 200			Volts Volts Volts	I_{FX} = 0.05 μA, R_{GK} = 1.0 kΩ
V_{RO}	Reverse Blocking Voltage (T_A = − 65°C to + 125°C)	2N4108 2N4109 2N4110	50 100 200			Volts Volts Volts	I_{RO} = 0.05 μA, R_{GK} = ∞
I_{FX}	Forward Blocking Current (at rated V_{FX})			8	50	nA	R_{GK} = 1.0 kΩ
I_{FX} (125°C)	Forward Blocking Current (at rated V_{FX})			5	20	μA	R_{GK} = 1.0 kΩ
I_{RO}	Reverse Blocking Current (at rated V_{RO})			8	50	nA	R_{GK} = ∞
I_{RO} (125°C)	Reverse Blocking Current (at rated V_{RO})			5	20	μA	R_{GK} = ∞
I_{GT}	Gate Trigger Current			0.060	**0.2**	mA	V_{AK} = 10V, R_L = 100Ω
I_{GT} (−55°C)	Gate Trigger Current			0.110	2.0	mA	V_{AK} = 10V, R_L = 100Ω
V_{GT}	Gate Trigger Voltage			0.58	0.8	Volts	V_{AK} = 10V, R_L = 100Ω
V_{GT} (−55°C)	Gate Trigger Voltage			0.75	1.1	Volts	V_{AK} = 10V, R_L = 100Ω
V_{GT} (125°C)	Gate Trigger Voltage (at rated V_{FX})		0.2	0.4		Volts	R_L = 10 kΩ

Additional Electrical Characteristics on page 2

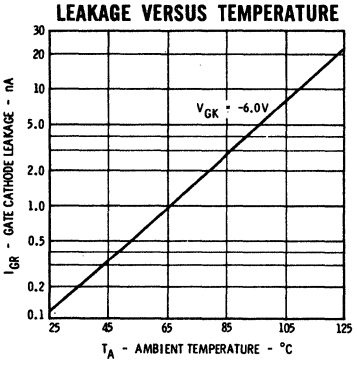
NOTES:
(1) These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.
(2) These ratings give a maximum junction temperature of 125°C and junction to case thermal resistance of 44.5°C/Watt (derating factor of 22.5 mW/°C); junction to ambient thermal resistance of 350°C/W (derating factor of 2.84 mW/°C).

ELECTRICAL CHARACTERISTICS (25°C Free Air Temperature unless otherwise specified)

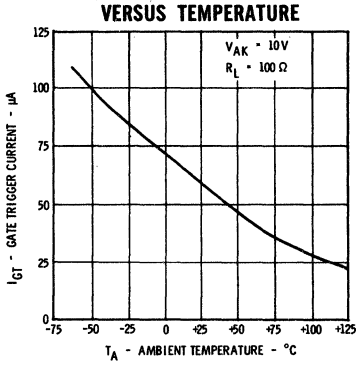
SYMBOL	CHARACTERISTICS	MIN	TYP	MAX	UNITS	TEST CONDITIONS
V_F	On Voltage		0.95	1.15	Volts	I_F = 175 mA
V_F	On Voltage		1.05	**1.2**	Volts	I_F = **250 mA**
V_F	On Voltage		1.2	**1.6**	Volts	I_F = **500 mA**
I_{HO}	Holding Current		0.7	2.0	mA	$R_G = \infty$, R_L = 1.0 KΩ
I_{GR}	Gate Leakage Current		0.13	25	nA	I_F = 0, V_{GK} = − 6.0 V
I_{GR} (125°C)	Gate Leakage Current		0.024	10	μA	I_F = 0, V_{GK} = − 6.0 V
t_{on}	Turn On Time		0.56	**1.5**	μs	$I_F \approx$ 200 mA, I_{GF} = 10 mA
t_{off}	Turn Off Time (see t_{off} circuit)		6.5	**15**	μs	$I_F = I_R \approx$ 200 mA
dv/dt	Critical Rate of Rise (at rated V_{FX})	75	200		Volts/μs	R_{GK} = 1 KΩ, R_L = 100 Ω

GATE CHARACTERISTICS

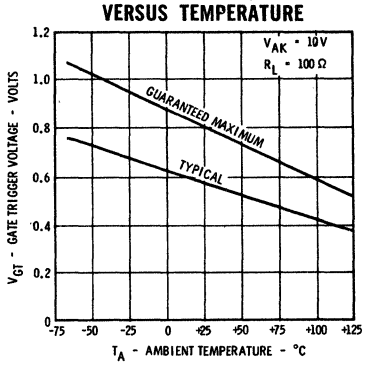
REVERSE GATE-CATHODE LEAKAGE VERSUS TEMPERATURE



GATE TRIGGER CURRENT VERSUS TEMPERATURE

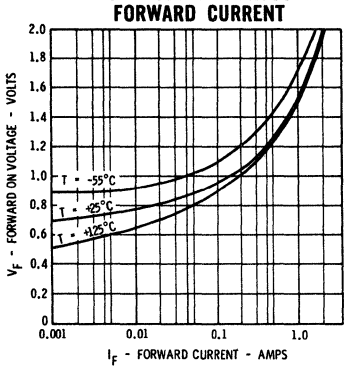


GATE TRIGGER VOLTAGE VERSUS TEMPERATURE

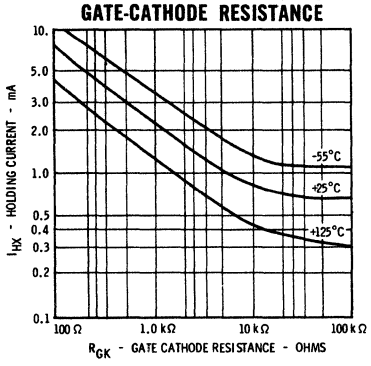


TYPICAL ELECTRICAL CHARACTERISTICS

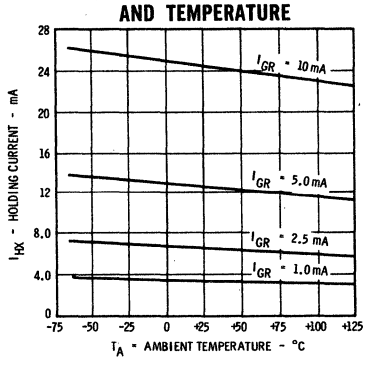
ON VOLTAGE VERSUS FORWARD CURRENT



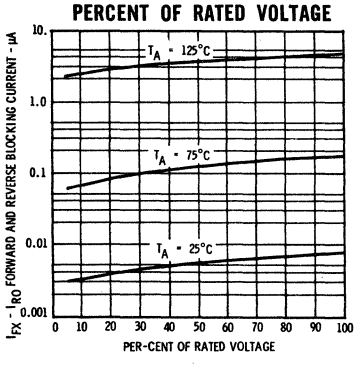
HOLDING CURRENT VERSUS GATE-CATHODE RESISTANCE



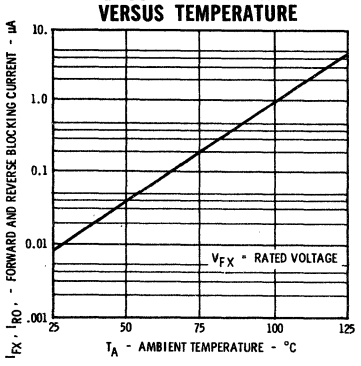
HOLDING CURRENT VERSUS REVERSE GATE CURRENT AND TEMPERATURE



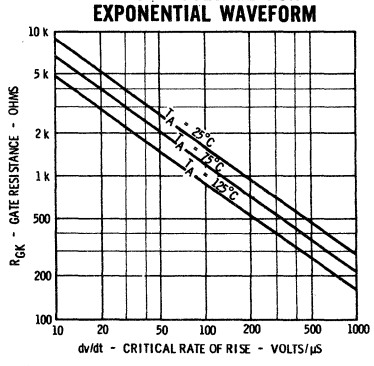
FORWARD AND REVERSE BLOCKING CURRENT VERSUS PERCENT OF RATED VOLTAGE



FORWARD AND REVERSE BLOCKING CURRENT VERSUS TEMPERATURE

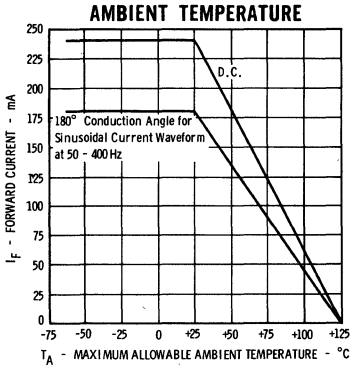


CRITICAL RATE OF RISE OF ANODE VOLTAGE FOR EXPONENTIAL WAVEFORM

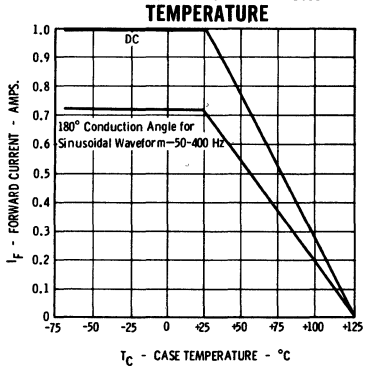


MAXIMUM RATINGS

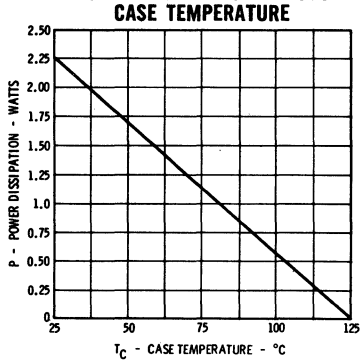
FORWARD CURRENT VERSUS MAXIMUM ALLOWABLE AMBIENT TEMPERATURE



FORWARD CURRENT VERSUS MAXIMUM ALLOWABLE CASE TEMPERATURE

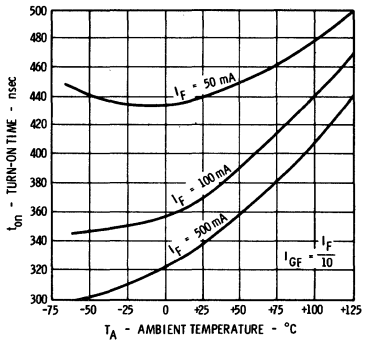


POWER DISSIPATION VERSUS CASE TEMPERATURE

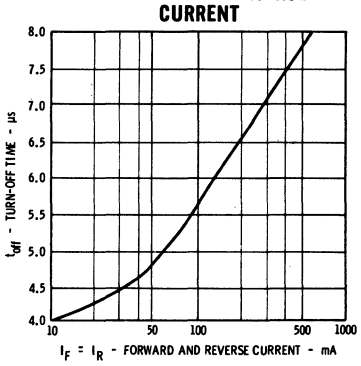


SWITCHING CHARACTERISTICS

TURN-ON TIME VERSUS AMBIENT TEMPERATURE

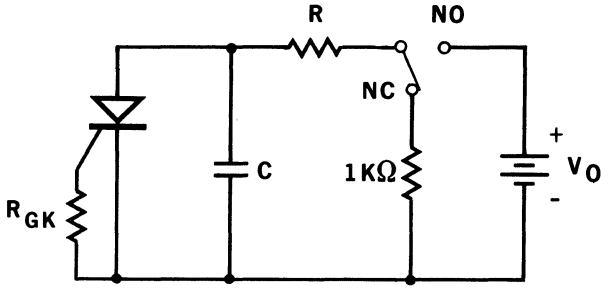


TURN-OFF TIME VERSUS FORWARD AND REVERSE CURRENT



$\frac{dv}{dt}$ CIRCUIT

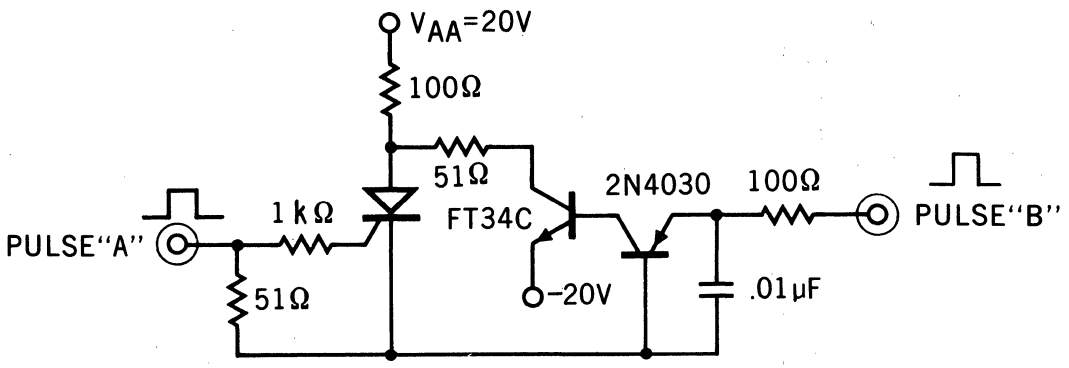
MERCURY RELAY



$$\frac{dv}{dt} = 0.632 \frac{V_O}{RC}$$

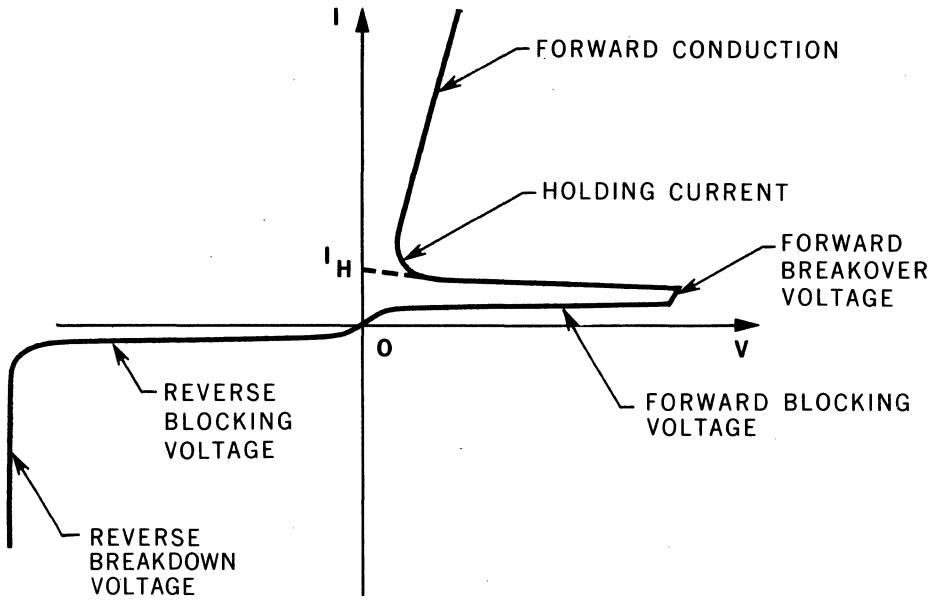
V_O = RATED VOLTAGE

t_{off} CIRCUIT



PULSE B DELAYED FROM PULSE A BY APPROXIMATELY 100 μs

ANODE CHARACTERISTIC



2N4212 THROUGH 2N4218

PNPN SILICON CONTROLLED RECTIFIERS

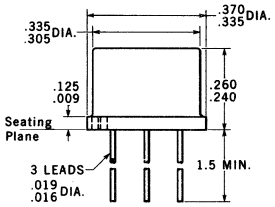
DIFFUSED SILICON PLANAR* THYRISTORS

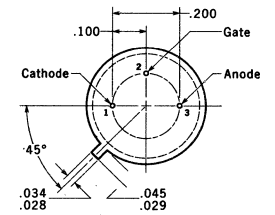
- **FORWARD CURRENT RATING OF 1.25 AMPS D.C. AT $T_C = 85°C$**
- **BLOCKING VOLTAGE CAPABILITY THROUGH 300 VOLTS**
- **MAXIMUM GATE TRIGGER CURRENT OF 100 μA AT $T_C = 25°C$**
- **RELIABLE PLANAR*CONSTRUCTION**

ABSOLUTE MAXIMUM RATINGS (Note 1)

Maximum Temperatures			
†Storage Temperature		T_{stg}	−65°C to +150°C
†Operating Junction Temperature		T_J	−65°C to +125°C
Maximum Currents			
rms Forward Current	$T_C = 85°C$	$I_{F(rms)}$	1.6 Amps
(180° Conduction Angle) (Note 2)	$T_A = 25°C$		490 mA
Continuous Forward Current	$T_C = 85°C$	$I_{F(DC)}$	1.25 Amps
	$T_A = 25°C$		355 mA
Average Forward Current	†$T_C = 85°C$	$I_{F(AV)}$	1.0 Amp
(180° Conduction Angle)(Note 2)	†$T_C = 105°C$		0.5 Amp
	$T_A = 25°C$		310 mA
†Surge Current	$T_C = 85°C$	$I_{FM(surge)}$	15 Amps
(½ cycle sine wave, 60 Hz peak)			
†Peak Forward Gate Current	$T_C = 25°$	I_{GFM}	0.1 Amp
(180° Conduction Angle)			
Maximum Gate Power ($T_C = 85°C$)			
†Peak Gate Power Dissipation		P_{GM}	0.1 Watt
†Average Gate Power Dissipation		$P_{GM(AV)}$	0.01 Watt
Maximum Voltages ($T_C = -65°C$ to 125°C)			
†Peak Reverse Gate Voltage		V_{GRM}	6.0 Volts
†Peak Forward and Reverse Blocking Voltages		V_{FM}, V_{RM}	**2N4212** 25 Volts
			2N4213 50 Volts
			2N4214 100 Volts
			2N4215 150 Volts
			2N4216 200 Volts
			2N4217 250 Volts
			2N4218 300 Volts

PHYSICAL DIMENSIONS
in accordance with
JEDEC (TO-5) outline





NOTES:
All dimensions in inches.
Leads are gold-plated Kovar.
Anode internally connected to case.
Package weight is 1.23 grams

ELECTRICAL CHARACTERISTICS (25°C Case Temperature unless otherwise noted)

SYMBOL	CHARACTERISTIC	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
I_{FX}	Forward Blocking Current		40	200	nA	V_{AK} = Rated V_{FM} $R_{GK} = 1.0\ k\Omega$
†I_{FX}(125°C)	Forward Blocking Current		20	200	μA	V_{AK} = Rated V_{FM} $R_{GK} = 1.0\ k\Omega$
I_{RX}	Reverse Blocking Current		40	200	nA	V_{AK} = Rated V_{RM} $R_{GK} = 1.0\ k\Omega$
†I_{RX}(125°C)	Reverse Blocking Current		20	200	μA	V_{AK} = Rated V_{RM} $R_{GK} = 1.0\ k\Omega$
I_{GT}	Gate Trigger Current		40	100	μA	$V_{AA} = 7.0$ V $R_L = 100\ \Omega$
†I_{GT}(−65°C)	Gate Trigger Current		120	300	μA	$V_{AA} = 7.0$ V $R_L = 100\ \Omega$
V_{GT}	Gate Trigger Voltage		0.58	0.7	Volt	$V_{AA} = 7.0$ V, $R_{GK} = 1.0\ k\Omega$, $R_L = 100\ \Omega$
†V_{GT}(−65°C)	Gate Trigger Voltage		0.8	1.0	Volt	$V_{AA} = 7.0$ V, $R_{GK} = 1.0\ k\Omega$, $R_L = 100\ \Omega$
†V_{GT}(125°C)	Gate Trigger Voltage	0.1	0.21		Volt	V_{AA} = Rated V_{FM}, $R_{GK} = 1.0\ k\Omega$, $R_L = 100\ \Omega$
I_{HX}	Holding Current		0.9		mA	$V_{AA} = 7.0$ V $R_{GK} = 1.0\ k\Omega$
†I_{HX}(−65°C)	Holding Current		1.75	7.0	mA	$V_{AA} = 7.0$ V $R_{GK} = 1.0\ k\Omega$
I_{GR}	Reverse Gate Current		.005	1.0	μA	$V_{GK} = -6.0$ V $I_A = 0$
†V_F	On Voltage (Note 4)		1.7	2.0	Volts	$I_F = 3.14$ A
dV/dt	Critical Rate of Rise of Anode Voltage		150		V/μs	V_{AA} = Rated V_{FM} $R_{GK} = 500\ \Omega$

†JEDEC Registered Values.

*Planar is a patented Fairchild process.

NOTES:
(1) These ratings are limiting values above which the reliability of the device may be impaired.
(2) These ratings give a maximum junction temperature of 125°C with the maximum average power dissipation and a maximum junction to case thermal resistance of 18°C/Watt and a junction to ambient thermal resistance of 225°C/Watt.
(3) Ambient temperature derating curves are derived with no external heat sink connected.
(4) Pulse Conditions: length = 1ms max; duty cycle ≤ 1%.

FAIRCHILD
SEMICONDUCTOR
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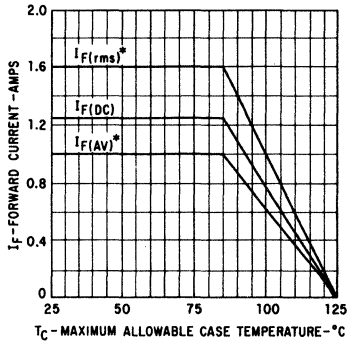
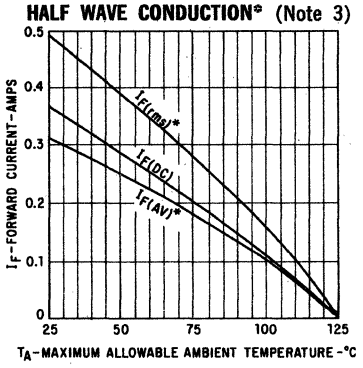
313 FAIRCHILD DRIVE, MOUNTAIN VIEW, CALIFORNIA, (415) 962-5011, TWX: 910-379-6435

MAXIMUM RATINGS

FORWARD CURRENT VERSUS MAXIMUM ALLOWABLE CASE TEMPERATURE HALF WAVE CONDUCTION*



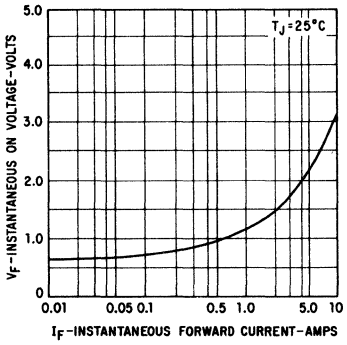
FORWARD CURRENT VERSUS MAXIMUM ALLOWABLE AMBIENT TEMPERATURE HALF WAVE CONDUCTION* (Note 3)



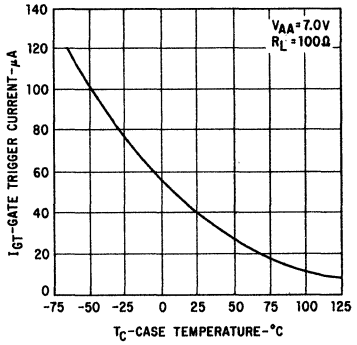
*180° Conduction Angle for Sinusoidal Current Waveform; 50 to 400 Hz.

TYPICAL ELECTRICAL CHARACTERISTICS

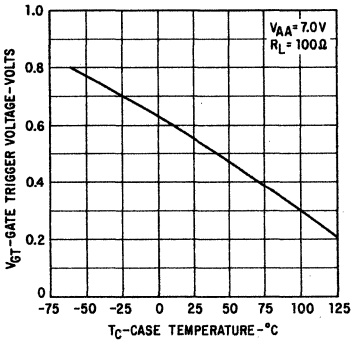
INSTANTANEOUS ON VOLTAGE VERSUS FORWARD CURRENT (Note 4)



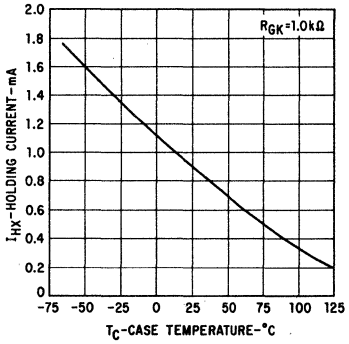
GATE TRIGGER CURRENT VERSUS CASE TEMPERATURE



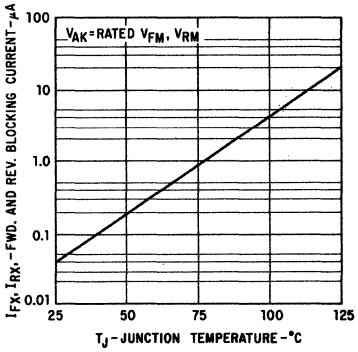
GATE TRIGGER VOLTAGE VERSUS CASE TEMPERATURE



HOLDING CURRENT VERSUS CASE TEMPERATURE



FORWARD AND REVERSE BLOCKING CURRENT VERSUS JUNCTION TEMPERATURE



ALLOWABLE CRITICAL RATE OF RISE OF ANODE VOLTAGE VERSUS CASE TEMPERATURE