SPECIAL DEVICES

SILICON UNIJUNCTION TRANSISTOR (UJT)

NTE Type Number	Case Style	Diagram Number	Maximum Ratings				Intrinsic Stand Off Ratio		Interbase Resistance (kΩ)		Valley Point Current (mA)
			RMS Emitter Current (mA)	Interbase Voltage (Volts)	RMS Power Dissipation (mW)	Emitter Reverse Current (μA)			R_{BBO}		I_V
			I_E	V_{BB}	P_D	I_{EO}	MIN	MAX	MIN	MAX	
6400	TO39	125	50	35	450	12	0.45	0.80	4	12	8 Min
6400A	TO39	125	50	55	450	1	0.54	0.67	4	12	8 Min
6401	TO18	126	50	35	300	12	0.56	0.75	4.7	9.1	4 Min
6409	TO18	126	50	35	300	0.2	0.68	0.82	4.7	9.1	8 Min
6410	TO92	9k	50	35	300	0.005 Typ	0.70	0.85	4	9.1	4 Min

PROGRAMMABLE UNIJUNCTION TRANSISTOR (PUT)

NTE Type Number	Case Style	Diagram Number	Maximum Ratings				Gate Current (mA)	Peak Current @ V_S = 10V (μA)	Offset Voltage @ V_S = 10V (Volts)	Minimum Valley Voltage @ V_S = 10V (μA)
			Gate to Cathode Forward Voltage (Volts)	Gate to Cathode Reverse Voltage (Volts)	Anode to Cathode Voltage (Volts)	Power Dissipation (mW)				
			BV_{GKF}	BV_{GKR}	BV_{AK}	P_D	I_G	I_P	V_T	I_V
6402	TO98/TO92	127a/9g	+40	–5	±40	300	±20	2 @ R_S = 1MΩ	1.6 @ R_g = 1MΩ	70 @ R_g = 1MΩ
								5 @ R_S = 10kΩ	0.6 @ R_g = 10kΩ	1.5mA @ R_g = 10kΩ

DESCRIPTION:

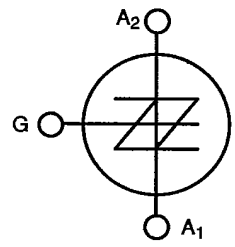
This device has been characterized as a Programmable Unijunction Transistor (PUT), offering many advantages over conventional unijunction transistors. The designer can select R_1 and R_2 to program unijunction characteristics such as η, R_{BB}, I_P, and I_V to meet particular needs. Applications of the PUT include timers, high gain phase control circuits, and relaxation oscillators.

SILICON BILATERAL SWITCH (SBS)

NTE Type Number	Case Style	Diagram Number	Maximum Ratings							
			Peak Recurrent Forward Current (Amps)	DC Forward Anode Current (mA)	Power Dissipation (mW)	Switching Voltage (Volts)	Switching Current (μA)	Holding Current (mA)	Off-State Current @ 5V (μA)	On-State Forward Voltage Drop I_F = 175mA (Volts)
			I_{FP}	I_F	P_D	V_S	I_S	I_{Hold}	I_B	V_F
6403	TO92/TO98	9h/127b	1	175	300	6 Min 10 Max	500	1.5	1	1.7

DESCRIPTION:

Silicon Bilateral Switches are specifically designed and characterized for applications where stability of switching voltage over a wide temperature range and well matched bilateral characteristics are an asset. They are ideally suited for half wave and full wave triggering in low voltage SCR and TRIAC phase control circuits.



SBS CIRCUIT SYMBOL

See Diagrams, beginning on Page 1–91

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SIDAC–BIDIRECTIONAL THYRISTOR DIODES
(For Pulse Generating and Switching Applications)

NTE Type Number	Diagram Number	Breakover Voltage (Volts)	Maximum Ratings			Holding Current (mA)	Power Dissipation (mW)
			On Voltage (Volts)	Effective Current (Amps)	Surge Current (Amps)		
		V_{BO}	V_T	I_{TRMS}	I_{TSM}	I_{Hold}	P_D
6415	395	40 to 60	1.5	1	13	50	850
6416	395	55 to 65	1.5	1	13	50	850
6417	395	95 to 113	1.5	1	13	50	850
6418	395	104 to 118	1.5	1	13	50	850
6419	395	110 to 125	1.5	1	13	50	850

Storage Temperature: –30° to +30°C
Junction Temperature: +125°C

DESCRIPTION:

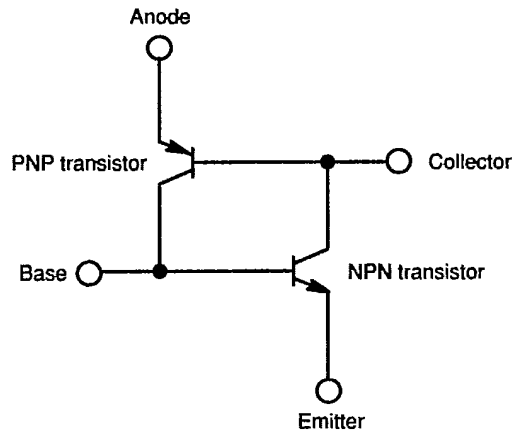
The SIDAC is a silicon bilateral voltage triggered switch with greater power handling capabilities than standard DIACs. Upon application of a voltage exceeding the SIDAC breakover voltage point, the SIDAC switches on through a negative resistance region to a low on–state voltage. Conduction will continue until the current is interrupted or drops below the minimum holding current of the device.

Applications:

- High voltage lamp ignitors
- Natural gas ignitors
- Gas oil ignitors
- High voltage power supplies
- Xenon ignitors
- Overvoltage protection
- Pulse generators
- Fluorescent lighting ignitors

SILICON CONTROLLED SWITCH (SCS)

NTE Type Number	Case Style	Diagram Number	Polarity	Maximum Ratings								DC Current Gain @ $V_{CB} = 0$, $I_E = 1mA$
				Collector to Base Breakdown Voltage (Volts)	Emitter to Base Breakdown Voltage (Volts)	Collector to Emitter Breakdown Voltage $R_{BE} = 10k$ (Volts)	Emitter Current (mA)	Collector Current (mA)	Peak Emitter Current (mA)	Holding Current (mA)	Power Dissipation (mW)	
				BV_{CBO}	BV_{EBO}	BV_{CER}	I_E	I_C	I_{EM}	I_{Hold}	P_D	h_{FE}
239	TO72	129	PNP	–70	–70	–70	100	50	500	1	250	0.72 to 2.5
			NPN	70	5	70	–100		–500			



SCS CIRCUIT SYMBOL

See Diagrams, beginning on Page 1–91

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SPECIAL DEVICES

T-25-01

SILICON ASYMMETRICAL AC TRIGGER (SAS)

NTE Type Number	Case Style	Diagram Number	Switching Voltages (Volts)				Switching Current (μA)	Forward Voltage Drop (Volts)		Off–State Current (nA)	Maximum Continuous Current (mA)	Maximum Pulsed Current (mA)	Average Power Dissipation (mW)	Switching Speeds (μs)	
			V_{S1}		V_{S2}		I_{S1}/I_{S2}	V_{F1}	V_{F2}	I_{12}/I_{21}	I_{21}	I_{21}	P_D	Turn–On	Turn–Off
			Min	Max	Min	Max								t_{on}	t_{off}
6405	TO98	386	14	18	7	9	80	10	1.6	100	200	500	350	1	30

DESCRIPTION:

The NTE6405 is an asymmetrical AC trigger integrated circuit for use in TRIAC phase controls. This device greatly reduces the snap–on effects that are present in symmetrical trigger circuits and minimizes control circuit hysteresis. This performance is possible with a single RC time constant, whereas a symmetrical circuit of comparable performance would require at least three additional passive components.

SILICON UNILATERAL SWITCH (SUS)

NTE Type Number	Case Style	Diagram Number	Forward Switching Voltage (Volts)		Forward Current (μA)	Holding Current (mA)	Power Dissipation (mW)	DC Forward Anode Current (mA)	Peak Recurrent Forward Current (Amps)	Forward Voltage Drop @ I_F (Volts)	Switching Speeds (μs)	
			V_S		I_S	I_{Hold}	P_D	I_F	I_F(Peak)	V_F	Turn–On	Turn–Off
			Min	Max							t_{on}	t_{off}
6404	TO98	5	7	9	200	0.75	300	175	1	1.5	1	25

DESCRIPTION:

The NTE6404 is a silicon planer, monolithic integrated circuit having thyristor electrical characteristics closely approximating those of an "ideal" four layer diode. This device is designed to switch at 8V with a 0.02%/°C temperature coefficient. A gated lead is provided to eliminate rate effect, obtain triggering at lower voltages and to obtain transient free wave forms.

Silicon Unilateral Switches are specifically designed and characterized for use in monostable and bistable applications where low cost is of prime importance.

Applications:

- SCR triggers
- Frequency dividers
- Ring counters
- Cross point switching
- Overvoltage sensors

DIACS–SILICON 3–LAYER BILATERAL TRIGGER DIODES

NTE Type Number	Diagram Number	Breakover Voltage (Forward & Reverse) (Volts)	Maximum Breakover Current (μA)	Maximum Peak Pulse (Amps)	Minimum Switching Voltage Change (Both Directions) (Volts)	DO7/DO35 Maximum Power Dissipation (mW)
		V_{BO}	$I_{(BR)1}$ & $I_{(BR)2}$	I_{Pulse}	ΔV	P_D
6407	130	28 ± 4	100	2	6	250
6408	130	32 ± 4	100	2	6	250
6411	130	40 ± 5	100	2	6	250
6412	130	63 ± 7	100	2	6	250

DESCRIPTION:

The NTE6407, NTE6408, NTE6411, and NTE6412 bilateral trigger DIACs offer a range of voltage characteristics from 28 to 63 Volts.

The DIAC semiconductor is a full–wave or bidirectional thyristor. It is triggered from a blocking–to–conduction state for either polarity of applied voltage exceeds the breakover voltage rating of the DIAC.

See Diagrams, beginning on Page 1–91

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SPECIAL DEVICES

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VARACTOR DIODES FOR RADIO TUNING

NTE Type Number	Diagram Number	Application	Reverse Breakdown Voltage (Volts)	Maximum Forward Current (mA)	Power Dissipation (mW)	Minimum Figure of Merit	Minimum Diode Capacitance (pF)	Capacitance Ratio
			$V_{(BR)}$	I_F	P_D	Q	C_T	C_R
617	394	FM Tuning	32	200	280	100 @ 3V	34 @ 3V	2.5 Min
618	393	AM Tuning	18	50	280	150 @ 1V	440 @ 1V	15

MATCHED VARACTORS FOR UHF/VHF TV TUNERS

(Matched Set of Four)

NTE Type Number	Diagram Number	Maximum Reverse Voltage (Volts)	Maximum Forward Voltage (Volts)	Capacitance Ratio (C_2/C_{24})	Series Resistance (Ω)
		V_R	V_F	C_R	R_S
616	93	30	–	5 – 6	0.8
616P	519	30	0.96V @ 100mA	5 – 6.1	0.42 – 0.62

VOLTAGE VARIABLE CAPACITANCE DIODES

(Tuning Diodes)

NTE Type Number	Diagram Number	Nominal Diode Capacitance @ V_R = 4V, f = 1MHz (pF)	Typical Tuning Ratio C_2/C_{30} @ f = 1MHz	Maximum Reverse Breakdown Voltage (Volts)	Maximum Forward Current (mA)	Maximum Power Dissipation (Watts)	Minimum Figure of Merit @ V_R = 4Vdc, f = 50MHz
		C_T	T_R	$V_{(BR)}$	I_F	P_D	Q
610	109	6.8	2.7	30	200	280	450
611	109	10	2.9	30	200	280	400
612	109	12	2.9	30	200	280	400
613	109	22	2.9	30	200	280	350
614	109	33	3.0	30	200	280	200

MICROWAVE MIXER DIODES

NTE Type Number	Diagram Number	Test Frequency (GHz)	Maximum Noise Figure (dB)	IF Impedence @ 30MHz (Ω)	Maximum VSWR Ratio	ERGS Burn Out
1N415C	515	9.375	9.5	325 – 475	1.5	2
1N415E	515	9.375	7.5	335 – 465	1.3	2
1N416C	515	3.060	–	300 – 700	1.5	2
1N416E	515	3.060	7.0	350 – 450	1.3	5

SILICON HOT–CARRIER DIODE

(Schottky Barrier Diode, Pin Diode)

NTE Type Number	Diagram Number	Description and Application	Reverse Breakdown Voltage (Volts)	Maximum Series Resistance (Ω)	Maximum Reverse Leakage Current (nA)	Maximum Diode Capacitance (pF)	Typical Series Inductance (nH)	Maximum Forward Power Dissipation (mW)
			$V_{(BR)R}$	R_S	I_R	C_T	L_S	P_F
553	93	Silicon Diode for UHF and VHF Switch	30	1.2	150	2	2.5	200
555	102	Silicon Diode for UHF and VHF Detectors	50	0.7	200	1	3.0	400

See Diagrams, beginning on Page 1–91

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DIMENSIONAL OUTLINE DRAWINGS

T-25-01

Diagram 5

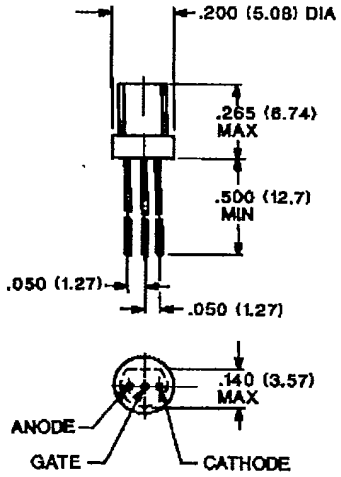
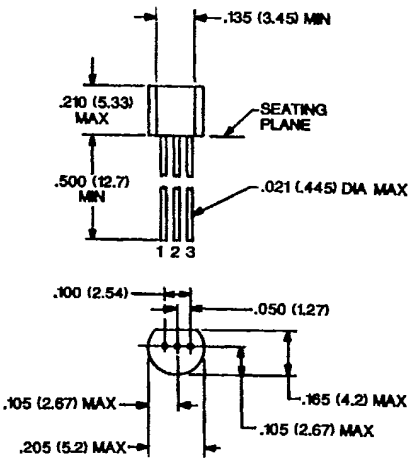


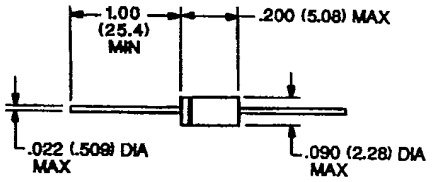
Diagram 9



TO92

	1	2	3
g	A	G	K
h	A_1	G	A_2
k	B_1	E	B_2

Diagram 93



DO35

Diagram 102

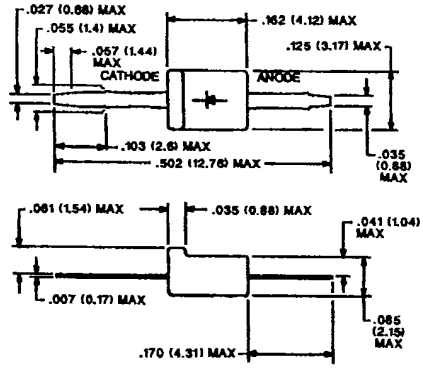
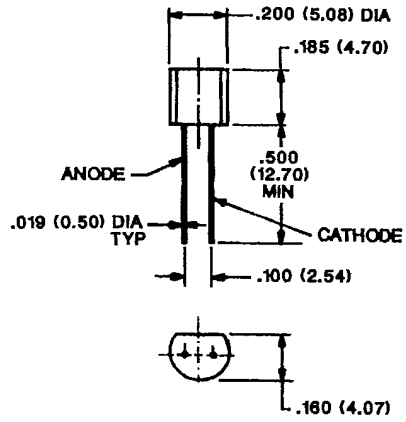
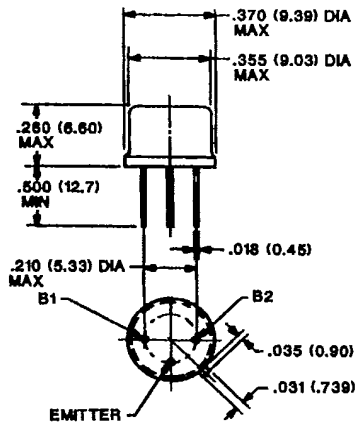


Diagram 109



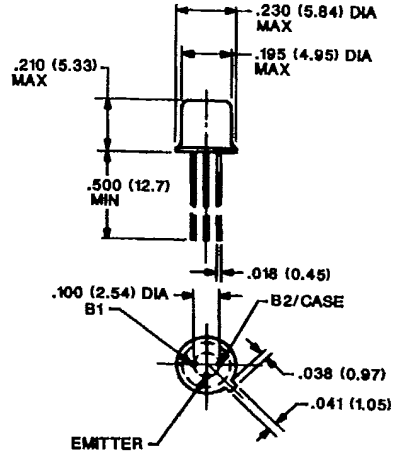
TO92

Diagram 125



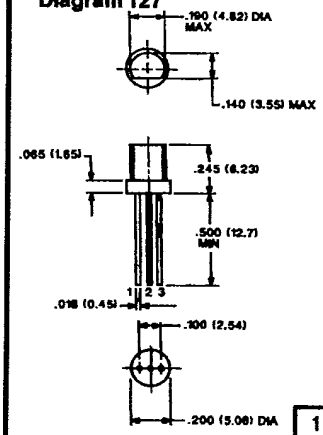
TO39

Diagram 126



TO18

Diagram 127



TO98

	1	2	3
a	A	G	K
b	A_1	G	A_2

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DIMENSIONAL OUTLINE DRAWINGS

T-25-01

Diagram 129

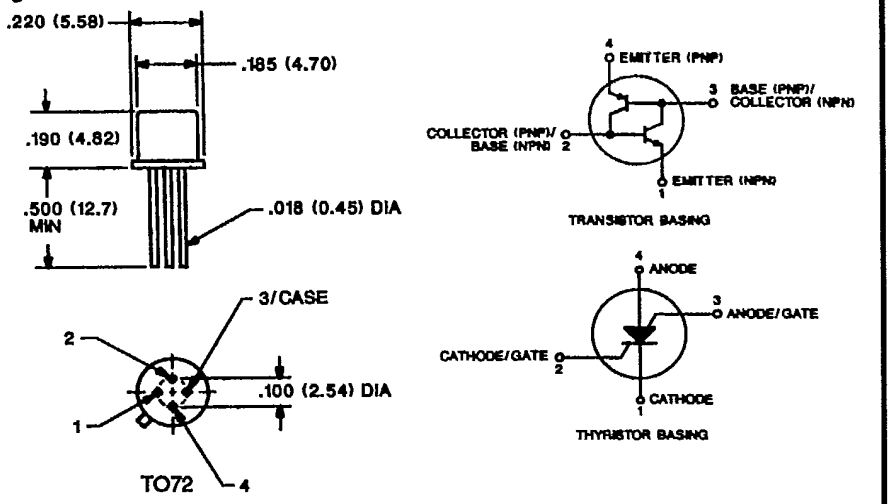


Diagram 130

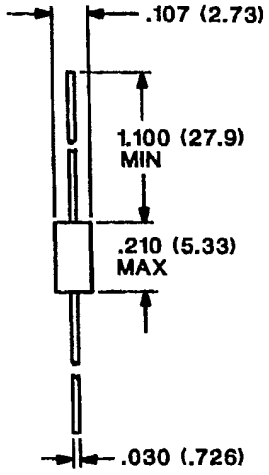


Diagram 386

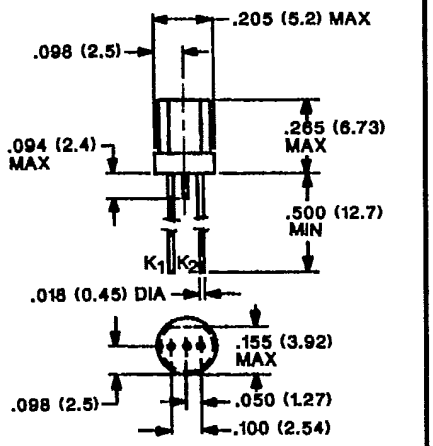


Diagram 393

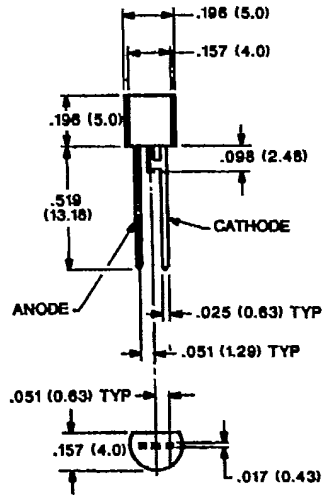


Diagram 394

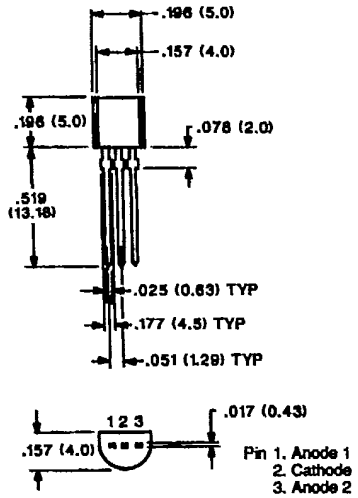


Diagram 395

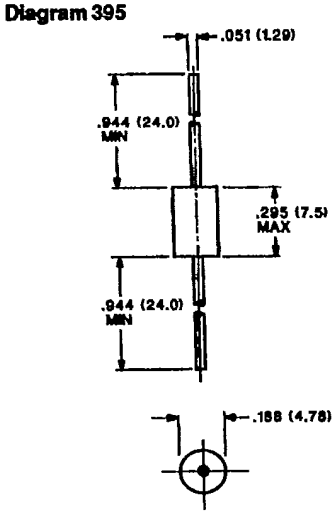
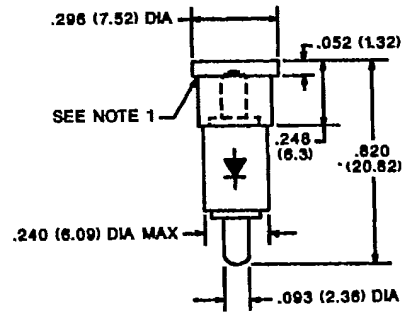
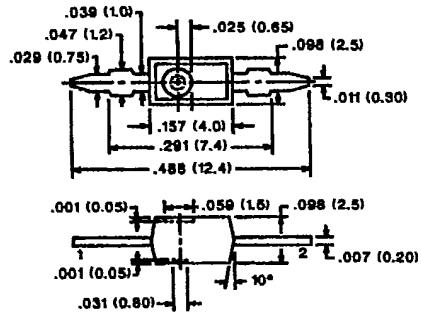


Diagram 515



NOTE 1. DIODE POLARITY IS REVERSED WHEN BRASS CAP IS REMOVED AND PLACED ON OPPOSITE END

Diagram 519



Pin 1. Cathode
2. Anode

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