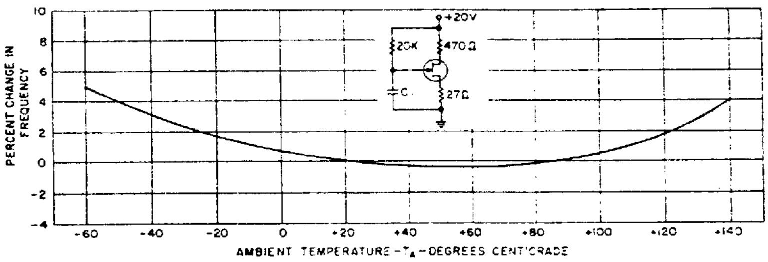
Germanium Power Devices Corp.

SILICON UNIJUNCTION TRANSISTOR *Specifications*

SILICON TYPES
2N489,A,B
THROUGH
2N494,A,B

Silicon Unijunction Transistors are three-terminal devices having a stable "N" type negative resistance characteristic over a wide temperature range. A stable peak point and a high peak current rating make these devices useful in oscillators, timing circuits, trigger circuits, and bistable circuits, where it can serve the purpose of two conventional silicon transistors. Fixed-Bed Construction makes these transistors extremely reliable under severe conditions of mechanical shock, vibration, centrifugal force, and thermal shock. It also provides a lower terminal resistance and improved uniformity of electrical characteristics. These transistors are hermetically sealed in welded cases. Types 2N489 through 2N494 are housed in TO- 5 size cases with special lead configuration (TO-33)



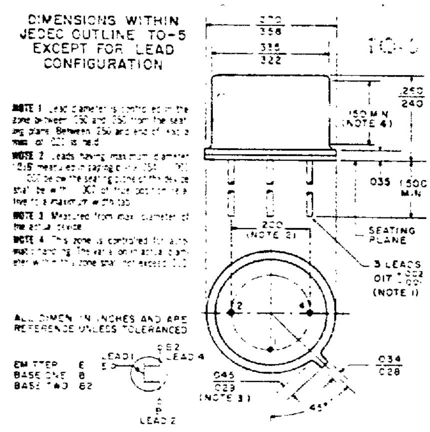
absolute maximum ratings*

	2N489, A, B THROUGH 2N494, A, B	
Total RMS Power Dissipation—Unstabilized[3]	450[1]	mw
Total RMS Power Dissipation—Stabilized[3]	600[1]	mw
RMS Emitter Current	←——— 70	ma
Peak Emitter Current[3, 4] (T_J = 150°C)	←——— 2	amps
Emitter Reverse Voltage (T_J = 150°C)	←——— 60	volts
Operating Temperature Range	←—— −65 to +140	°C
Operating Temperature-Range—Stabilized[3]	←—— −65 to +175	°C
Storage Temperature Range	←—— −65 to +175	°C

1. Derate 3.9 mw/°C increase in amb. temp. (Thermal resistance to case = 0.16°C/mw)
2. Derate 2.6 mw/°C increase in amb. temp. (Thermal resistance to case = 0.08°C/mw)
3. Under normal operation, thermal runaway conditions cannot exist with the UJT up to a junction temperature of 140°C since the temperature coefficient of R_{BB} is positive below this temperature and I_{EO} is negligible. For this reason an unstabilized power rating can be used with the UJT which is derated to zero at 140°C. The UJT can be used at temperatures above 140°C but in this case external resistance must be used in the emitter and interbase circuits to limit the power dissipation and prevent thermal runaway. The power rating for this condition is the stabilized power rating and is derated to zero at 175°C. It is also important to provide circuit stabilization in the interbase circuit when the UJT is used in pulse type applications since the instantaneous temperature of the silicon could rise to a high enough value to permit runaway.
4. Emitter peak current should be limited to two amperes for discharge capacitances up to 10μfd, with a peak point voltage of 30 volts. For higher values of C or V_P, resistance must be added in series with the capacitor to protect the emitter circuit.

FEATURES

- Stable Operation over Wide Temperature Range
- Low Leakage Current
- Low Peak Point Current
- Guaranteed Minimum Pulse Voltage



description

General Electric's Silicon Unijunction Transistor consists of an "N" type silicon bar mounted between two ohmic base contacts with a "P" type emitter near base-two. The device operates by conductivity modulation of the silicon between the emitter and base-one when the emitter is forward biased. In the cutoff, or standby condition, the emitter and interbase power supplies establish potentials between the base contacts, and at the emitter, such that the emitter is back biased. If the emitter potential is increased sufficiently to overcome this bias, holes (minority carriers) are injected into the silicon bar. These holes are swept toward base-one by the internal field in the bar. The increased charge concentration, due to these holes, decreases the resistance and hence decreases the internal voltage drop from the emitter to base-one. The emitter current then increases regeneratively until it is limited by the emitter power supply. The effect of this conductivity modulation is also noticed as an effective modulation of the interbase current.

*25°C, unless otherwise specified.

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Germanium Power Devices Corp. 300 Brickstone Sq. Andover, Ma 01810
tel 508-475-5982 --- fax 508-470-1512

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Unijunction Transistors are specified primarily in three ranges of stand-off ratio and two ranges of interbase resistance. Each range of stand-off ratio has limits of ±10% from the center value and each range of interbase resistance has limits of ±20% from the center value.

Type No.	Intrinsic Standoff Ratio (See note 1) V_{BB} = 10V η Min.	Max.	Interbase Resistance (See note 2) V_{BB} = 3V R_{BBO} ohms Min.	Max.	Modulated Interbase Current I_E = 50 ma V_{BB} = 10V $I_{B2(MOD)}$ ma Min.	Max.	MAXIMUM: Emitter Saturation Voltage I_E = 50 ma V_{BB} = 10V $V_{E(SAT)}$ volts	Emitter Reverse Current V_{B2E} = 60V I_{EB2O} μa	Emitter Reverse Current T_J = 150°C V_{B2E} = 10V I_{EB2O} μa	Emitter Reverse Current V_{B2E} = 30V I_{EB2O} μa	Peak Point Current V_{BB} = 25V I_P μa	MINIMUM: Valley Point Current R_{B2} = 100Ω V_{BB} = 20V I_V ma	Base One Peak Pulse Voltage (See note 3) V_{OB1} volts
2N489	.51	.62	4.7	6.8	6.8	22	5	2	20		12	8	
2N489A	.51	.62	4.7	6.8	6.8	22	4	2	20		12	8	3
2N489B	.51	.62	4.7	6.8	6.8	22	4	2	20	0.2	6	8	3
2N490	.51	.62	6.2	9.1	6.8	22	5	2	20		12	8	
2N490A	.51	.62	6.2	9.1	6.8	22	4	2	20		12	8	3
2N490B	.51	.62	6.2	9.1	6.8	22	4	2	20	0.2	6	8	3
2N491	.56	.68	4.7	6.8	6.8	22	5	2	20		12	8	
2N491A	.56	.68	4.7	6.8	6.8	22	4.3	2	20		12	8	3
2N491B	.56	.68	4.7	6.8	6.8	22	4.3	2	20	0.2	6	8	3
2N492	.56	.68	6.2	9.1	6.8	22	5	2	20		12	8	
2N492A	.56	.68	6.2	9.1	6.8	22	4.3	2	20		12	8	3
2N492B	.56	.68	6.2	9.1	6.8	22	4.3	2	20	0.2	6	8	3
2N493	.62	.75	4.7	6.8	6.8	22	5	2	20		12	8	
2N493A	.62	.75	4.7	6.8	6.8	22	4.6	2	20		12	8	3
2N493B	.62	.75	4.7	6.8	6.8	22	4.6	2	20	0.2	6	8	3
2N494	.62	.75	6.2	9.1	6.8	22	5	2	20		12	8	
2N494A	.62	.75	6.2	9.1	6.8	22	4.6	2	20		12	8	3
2N494B	.62	.75	6.2	9.1	6.8	22	4.6	2	20	0.2	6	8	3

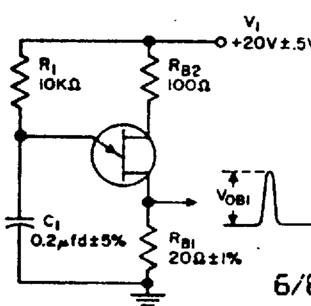
1. The intrinsic standoff ratio, η, is essentially constant with temperature and interbase voltage. η is defined by the equation:

$$V_P = \eta V_{BB} + \frac{200}{T_J}$$

Where
V_P = Peak point emitter voltage
V_{BB} = Interbase voltage
T_J = Junction Temperature (Degrees Kelvin)

2. The interbase resistance is nearly ohmic and increases with temperature in a well defined manner. The temperature coefficient at 25°C is approximately 0.8%/°C.

3. The base-one peak pulse voltage is measured in the circuit at right. This specification on the A and B versions is used to ensure a minimum pulse amplitude for applications in SCR firing circuits and other types of pulse circuits.



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3947375 0000738 T49 tel 508-475-5982 --- fax 508-470-1512