

TYPES 2N1042, 2N1043, 2N1044, 2N1045 • 2N2560, 2N2561, 2N2562, 2N2563 • 2N2564, 2N2565, 2N2566, 2N2567 P-N-P ALLOY-JUNCTION GERMANIUM MEDIUM-POWER TRANSISTORS

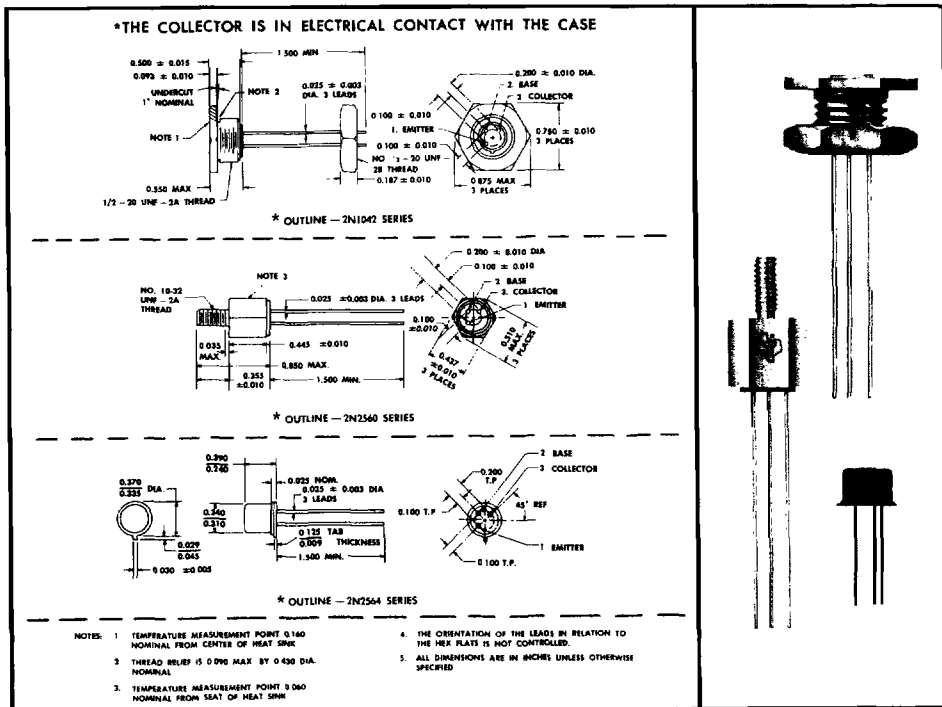
40-, 60-, 80-, or 100-VOLT UNITS
20 WATTS AT 25°C CASE TEMPERATURE
Choice of TO-5, Stud, or Hex Package
Guaranteed Beta at 3 amps and 50 ma I_c

Guaranteed I_{CEX} at 85°C
LOW r_{CS} • LOW I_{CBO} • LOW V_{BE}
for
RELAY DRIVERS • PULSE AMPLIFIERS
SERVO AMPLIFIERS • AUDIO AMPLIFIERS

TYPES 2N1042 THRU 2N1045, 2N2560 THRU 2N2567
BULLETIN NO. DL-5 692398, JULY 1963
REVISED JANUARY 1969

mechanical data

The transistors are in hermetically sealed, resistance-welded cases with glass-to-metal seals between case and leads. These devices are available in (1) a hexagonal flanged-nut heat-sink package which weighs approximately 8.6 grams (2N1042 series), (2) a stud heat-sink package which weighs approximately 5.4 grams (2N2560 series) and (3) a round TO-5 package weighing approximately 2.4 grams (2N2564 series). Mounting hardware available is shown on page 8.



*Indicates JEDEC Registered Data.

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P-N-P ALLOY-JUNCTION GERMANIUM MEDIUM-POWER TRANSISTORS

*absolute maximum ratings at 25°C case temperature (unless otherwise noted)

	2N1042 2N2560 2N2564	2N1043 2N2561 2N2565	2N1044 2N2562 2N2566	2N1045 2N2563 2N2567
Collector-Base Voltage	40 v	60 v	80 v	100 v
Collector-Emitter Voltage (see Note 1)	40 v	60 v	80 v	100 v
Emitter-Base Voltage	←————— 20 v —————→			
Collector Current	←————— 3.5 a —————→			
Base Current	←————— 1 a —————→			
Total Device Dissipation at (or below) 25°C				
Case Temperature (see Note 2)	←————— 20 w —————→			
Operating Case Temperature Range	←————— -55°C to +100°C —————→			
Storage Temperature Range	←————— -55°C to +100°C —————→			

NOTES: 1. This value applies when base-emitter voltage $V_{BE} = +0.2$ v.
2. Derate linearly to +100°C case temperature at the rate of 267 mw/C°.

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electrical characteristics at 25°C case temperature (unless otherwise noted)

PARAMETER	TEST CONDITIONS	TYPE	MIN	TYP	MAX	UNIT
V_{CBO} Collector-Base Breakdown Voltage	$I_C = -650 \mu a, I_E = 0$	2N1042 2N2560 2N2564	-40			v
		2N1043 2N2561 2N2565	-60			
		2N1044 2N2562 2N2566	-80			
		2N1045 2N2563 2N2567	-100			
V_{CEO} Collector-Emitter Breakdown Voltage	$I_C = -100 ma, I_B = 0$	2N1042 2N2560 2N2564	-30			v
		2N1043 2N2561 2N2565	-40			
		2N1044 2N2562 2N2566	-50			
		2N1045 2N2563 2N2567	-60			

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P-N-P ALLOY-JUNCTION GERMANIUM MEDIUM-POWER TRANSISTORS

electrical characteristics at 25°C case temperature (unless otherwise noted)

PARAMETER	TEST CONDITIONS	TYPE	MIN	TYP	MAX	UNIT
$^*I_{CBO}$ Collector Cutoff Current	$V_{CB} = -20 \text{ v}, I_E = 0$	2N1042 2N2560 2N2564			-125	μA
	$V_{CB} = -30 \text{ v}, I_E = 0$	2N1043 2N2561 2N2565				
	$V_{CB} = -40 \text{ v}, I_E = 0$	2N1044 2N2562 2N2566				
	$V_{CB} = -50 \text{ v}, I_E = 0$	2N1045 2N2563 2N2567				
$^*I_{CEO}$ Collector Cutoff Current	$V_{CE} = -15 \text{ v}, I_B = 0$	2N1042 2N2560 2N2564			-25	mA
	$V_{CE} = -20 \text{ v}, I_B = 0$	2N1043 2N2561 2N2565			-20	
	$V_{CE} = -25 \text{ v}, I_B = 0$	2N1044 2N2562 2N2566			-20	
	$V_{CE} = -30 \text{ v}, I_B = 0$	2N1045 2N2563 2N2567			-20	
$^*I_{CEX}$ Collector Cutoff Current	$V_{CE} = -40 \text{ v}, V_{BE} = +0.2 \text{ v}$	2N1042 2N2560 2N2564			-650	μA
	$V_{CE} = -60 \text{ v}, V_{BE} = +0.2 \text{ v}$	2N1043 2N2561 2N2565				
	$V_{CE} = -80 \text{ v}, V_{BE} = +0.2 \text{ v}$	2N1044 2N2562 2N2566				
	$V_{CE} = -100 \text{ v}, V_{BE} = +0.2 \text{ v}$	2N1045 2N2563 2N2567				
$^*I_{CEX}$ Collector Cutoff Current	$V_{CE} = -20 \text{ v}, V_{BE} = +0.2 \text{ v}$ $T_C = +85^\circ\text{C}$	2N1042 2N2560 2N2564			-5	mA
	$V_{CE} = -30 \text{ v}, V_{BE} = +0.2 \text{ v}$ $T_C = +85^\circ\text{C}$	2N1043 2N2561 2N2565				
	$V_{CE} = -40 \text{ v}, V_{BE} = +0.2 \text{ v}$ $T_C = +85^\circ\text{C}$	2N1044 2N2562 2N2566				
	$V_{CE} = -50 \text{ v}, V_{BE} = +0.2 \text{ v}$ $T_C = +85^\circ\text{C}$	2N1045 2N2563 2N2567				
$^*I_{EBO}$ Emitter Cutoff Current	$V_{EB} = -20 \text{ v}, I_C = 0$	All			-650	μA

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P-N-P ALLOY-JUNCTION GERMANIUM MEDIUM-POWER TRANSISTORS

electrical characteristics at 25°C case temperature (unless otherwise noted)

PARAMETER	TEST CONDITIONS	TYPE	MIN	TYP	MAX	UNIT
h_{IE} Static Common-Emitter Input Impedance	$V_{CE} = -1.0 \text{ v}$, $I_C = -3 \text{ a}$ (see Note 3)	All			30	ohm
$^*h_{FE}$ Static Forward Current Transfer Ratio	$V_{CE} = -1.0 \text{ v}$, $I_C = -3 \text{ a}$ (see Note 3)	All	20		60	
	$V_{CE} = -1.0 \text{ v}$, $I_C = -1 \text{ a}$ (see Note 3)	All			150	
	$V_{CE} = -0.5 \text{ v}$, $I_C = -50 \text{ ma}$	All	50			
h_{FE} Static Forward Current Transfer Ratio	$V_{CE} = -1.0 \text{ v}$, $I_C = -3 \text{ a}$ $T_C = -55^\circ\text{C}$ (see Note 3)	All	15		60	
	$V_{CE} = -1.0 \text{ v}$, $I_C = -3 \text{ a}$ $T_C = +85^\circ\text{C}$ (see Note 3)	All	20		75	
Y_{FE} Static Common-Emitter Forward Transfer Admittance	$V_{CE} = -1.0 \text{ v}$, $I_C = -3 \text{ a}$ (see Note 3)	All	2.0			mho
$^*V_{BE}$ Base-Emitter Voltage	$V_{CE} = -1.0 \text{ v}$, $I_C = -3 \text{ a}$ (see Note 3)	All			-1.5	v
V_{BE} Base-Emitter Voltage	$V_{CE} = -1.0 \text{ v}$, $I_C = -50 \text{ ma}$	All			-0.5	v
$^*V_{CE(sat)}$ Collector-Emitter Saturation Voltage	$I_B = -0.3 \text{ a}$, $I_C = -3 \text{ a}$ (see Note 3)	All			-0.75	v
	$I_B = -100 \text{ ma}$, $I_C = -1 \text{ a}$ (see Note 3)	All			-0.25	v
$^*h_{fo}$ Small-Signal Common-Emitter Forward Current Transfer Ratio	$V_{CE} = -1.5 \text{ v}$, $I_C = -0.5 \text{ a}$ $f = 1 \text{ kc}$	All	25		100	
$^* h_{fo} $ Small-Signal Common-Emitter Forward Current Transfer Ratio	$V_{CE} = -1.5 \text{ v}$, $I_C = -0.5 \text{ a}$ $f = 125 \text{ kc}$	All	2.0			
C_{ob} Common-Base Open-Circuit Output Capacitance	$V_{CB} = -6 \text{ v}$, $I_E = 0$ $f = 135 \text{ kc}$	All		100		pf

NOTES: 3. Measurements are made with voltage sensing contacts located 0.25 inches from header of transistor. Voltage sensing contacts are separate from current carrying contacts.

*Indicates JEDEC Registered Data.

switching characteristics at 25°C case temperature

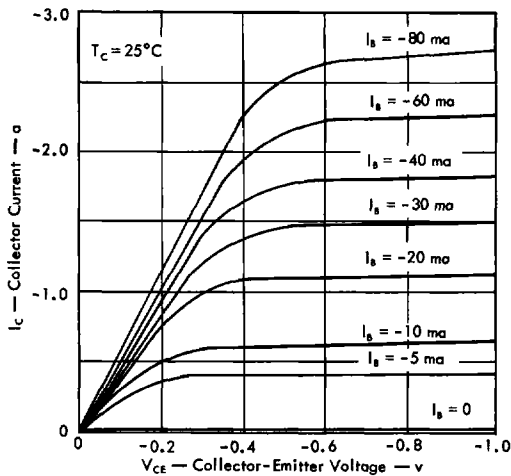
PARAMETER	TEST CONDITIONS †	TYPICAL	UNIT
t_d Delay Time	$I_C = -3 \text{ a}$ $V_{BE(off)} = 8.2 \text{ v}$ $R_L = 10 \Omega$ (See circuit on Page 8)	0.20	μsec
t_r Rise Time		0.48	μsec
t_s Storage Time		0.29	μsec
t_f Fall Time		2.15	μsec
t_T Total Switching Time		3.12	μsec

†Voltage and current values shown are nominal; exact values vary slightly with device parameters.

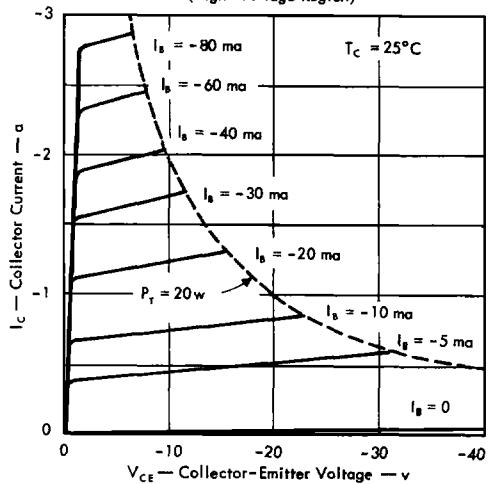
**TYPES 2N1042, 2N1043, 2N1044, 2N1045 • 2N2560, 2N2561,
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P-N-P ALLOY-JUNCTION GERMANIUM MEDIUM-POWER TRANSISTORS**

TYPICAL CHARACTERISTICS

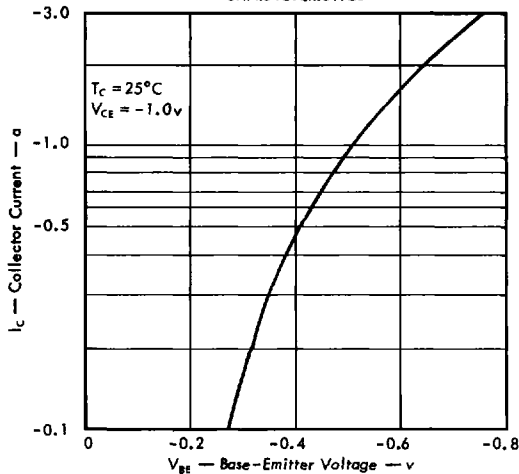
COMMON-EMITTER COLLECTOR
CHARACTERISTICS
(Low-Voltage Region)



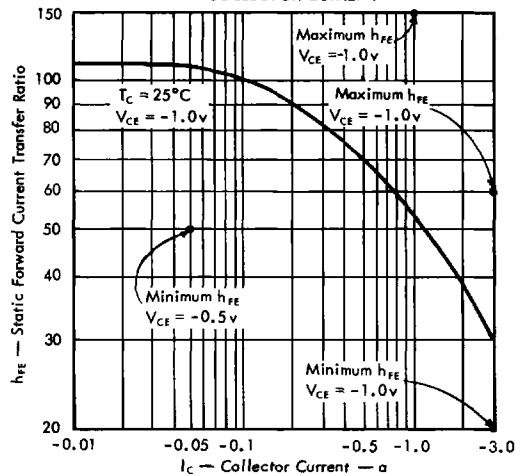
COMMON-EMITTER COLLECTOR
CHARACTERISTICS
(High-Voltage Region)



COMMON-EMITTER TRANSFER
CHARACTERISTICS

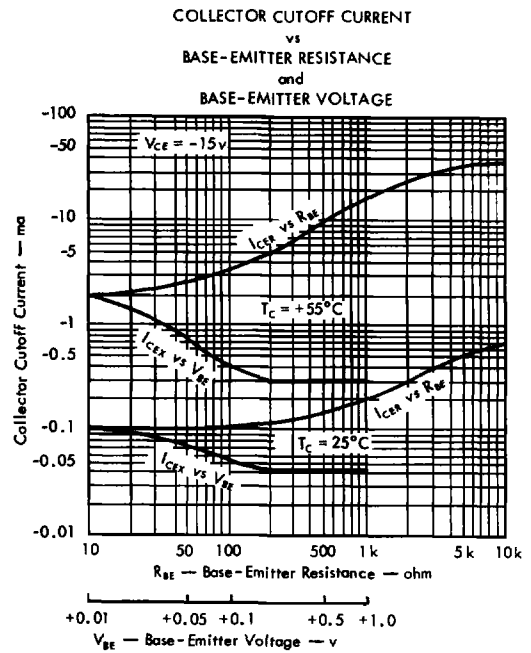
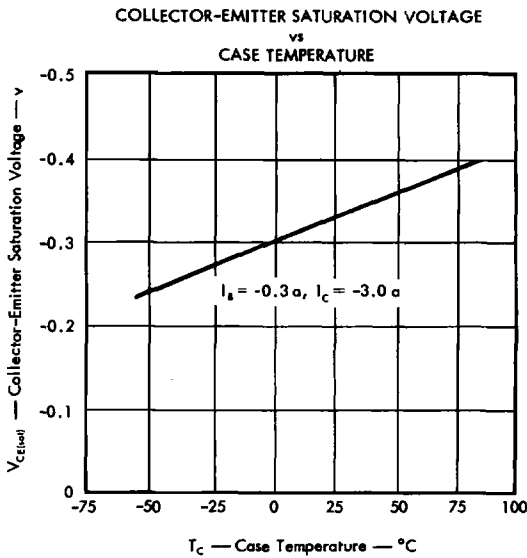
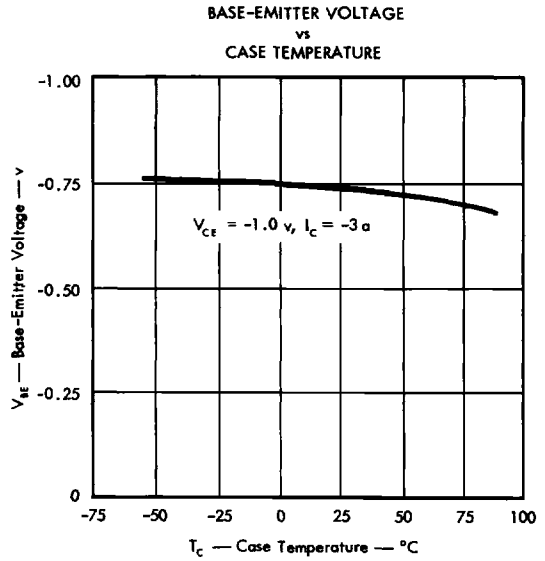
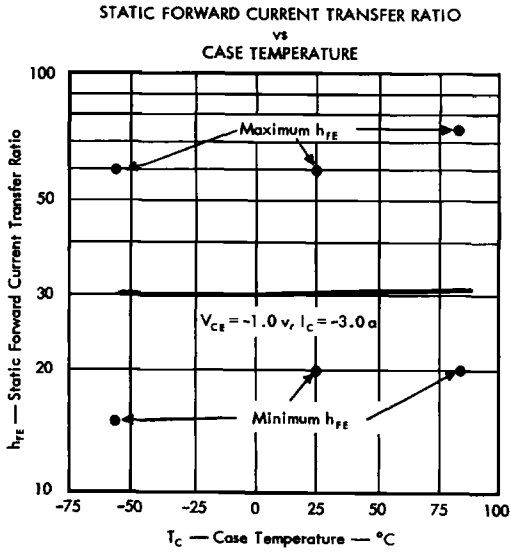


STATIC FORWARD CURRENT TRANSFER RATIO
vs
COLLECTOR CURRENT



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TYPICAL CHARACTERISTICS

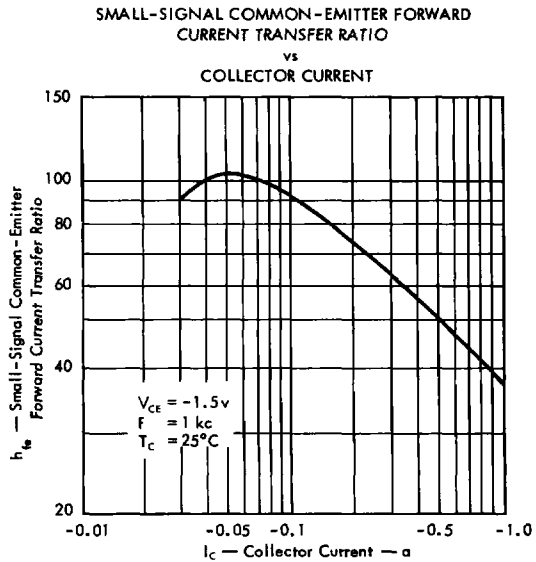
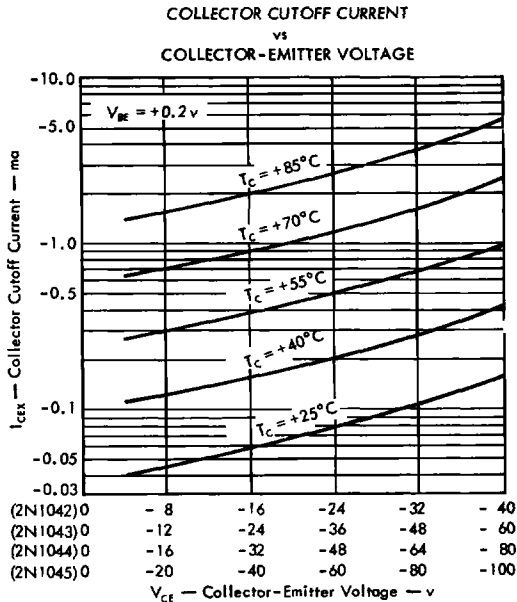


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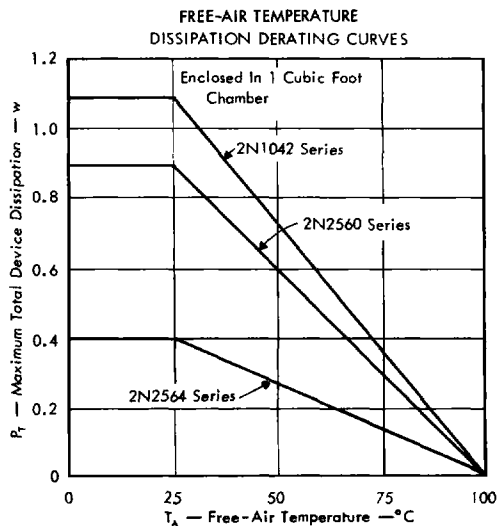
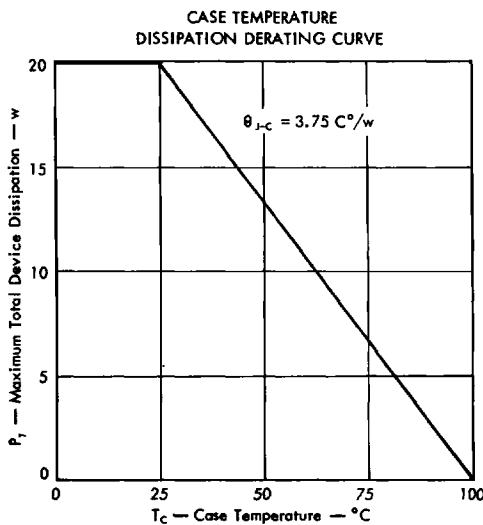
P-N-P ALLOY-JUNCTION GERMANIUM MEDIUM-POWER TRANSISTORS

TYPICAL CHARACTERISTICS



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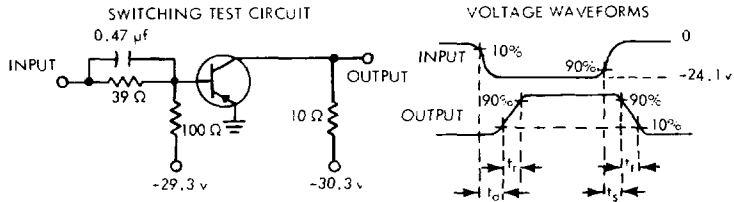
THERMAL CHARACTERISTICS



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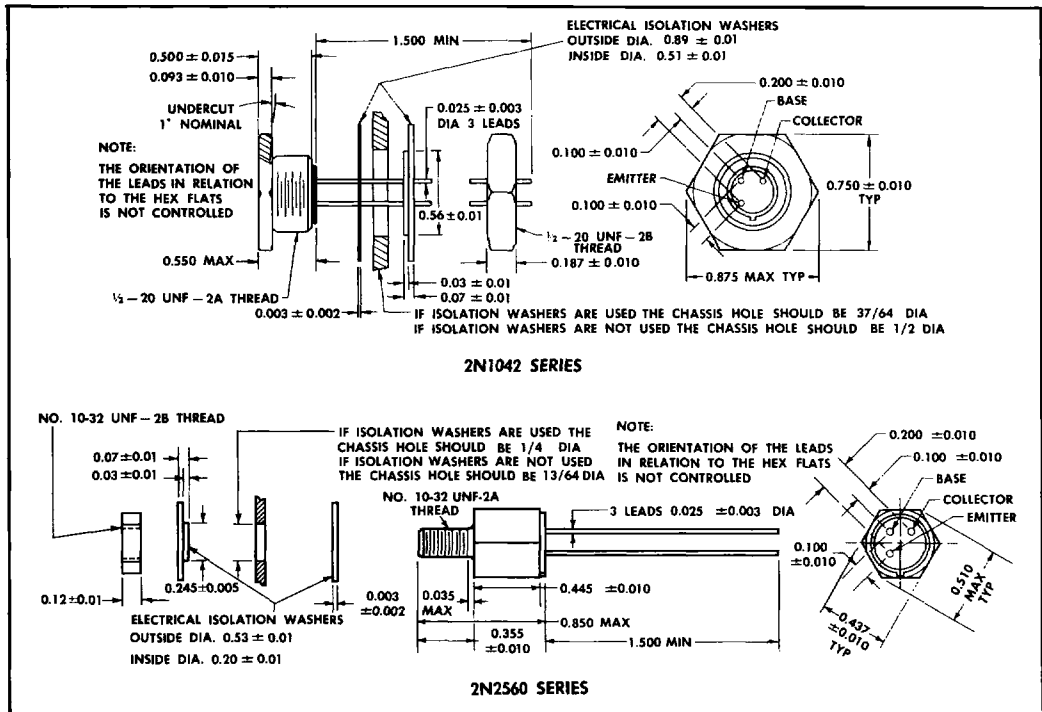
P-N-P ALLOY-JUNCTION GERMANIUM MEDIUM-POWER TRANSISTORS

PARAMETER MEASUREMENT INFORMATION



- NOTES: a. The input waveform has the following characteristics: $t_r \leq 10$ nsec, $t_f \leq 10$ nsec, PW = 1.6 msec, Duty Cycle = 10%.
 b. Waveforms are monitored on an oscilloscope with the following characteristics: $t_r \leq 14$ nsec, $R_{in} \geq 10$ M Ω , $C_{in} \leq 11.5$ pf.
 c. Resistors must be non-inductive types.

MOUNTING HARDWARE INFORMATION



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