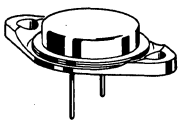
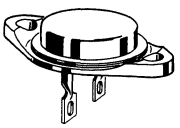
2N1539 thru 2N1548 (GERMANIUM)
2N1539A thru 2N1542A, 2N1544A thru 2N1547A

PNP germanium power transistors for switching and amplifier applications in high-reliability equipment.



CASE 11
(TO-3)



CASE 4-04
(TO-41)

For units with solder lugs attached, specify devices MP1539, A etc. (TO-41 package)

MAXIMUM RATINGS

Rating	Symbol	2N1539 2N1544	2N1540 2N1545	2N1541 2N1546	2N1542 2N1547	2N1543 2N1548	Unit
Collector-Emitter Voltage	V_{CEO}	20	30	40	50	60	Vdc
Collector-Emitter Voltage	V_{CES}	30	45	60	75	90	Vdc
Collector-Emitter Voltage	V_{CEX}	40	60	80	100	120	Vdc
Collector-Base Voltage	V_{CB}	40	60	80	100	120	Vdc
Emitter-Base Voltage	V_{EB}	20	30	40	50	60	Vdc
Collector Current-Continuous	I_C	5.0					Adc
Peak	I_C	10					Adc
Total Device Dissipation @T_C = 25° C	P_D	106					Watts
Operating Junction Temperature Range	T_J	-65 to +110					°C

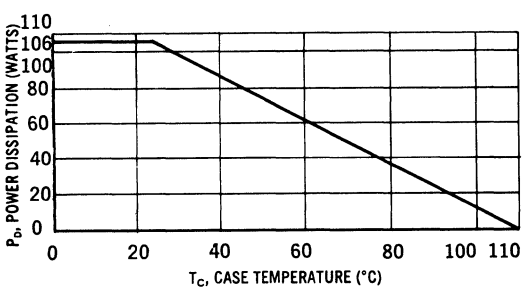
THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	θ_{JC}	0.8	°C/W

The maximum continuous power is related to maximum junction temperature, by the thermal resistance factor. For d. c. or frequencies below 25 cps the transistor must be operated within the constant P_D = Vc x Ic hyperbolic curve. This curve has a value of 106 Watts at case temperatures of 25°C and is 0 Watts at 110°C with a linear relation between the two temperatures such that

$$P_D \text{ allowable} = \frac{110^{\circ} - Tc}{0.8}$$

POWER-TEMPERATURE DERATING CURVE



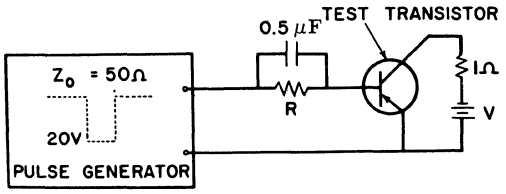
ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage‡ (I_C = 500 mAdc, I_B = 0)	2N1539, 2N1544	BV_{CEO}‡	20	-	volts
	2N1540, 2N1545		30	-	
	2N1541, 2N1546		40	-	
	2N1542, 2N1547		50	-	
	2N1543, 2N1548		60	-	
Collector-Emitter Breakdown Voltage‡ (I_C = 500 mAdc, V_{BE} = 0)	2N1539, 2N1544	BV_{CES}‡	30	-	volts
	2N1540, 2N1545		45	-	
	2N1541, 2N1546		60	-	
	2N1542, 2N1547		75	-	
	2N1543, 2N1548		90	-	
Collector-Base Breakdown Voltage (I_C = 20 mAdc, I_E = 0)	2N1539, 2N1544	BV_{CBO}	40	-	volts
	2N1540, 2N1545		60	-	
	2N1541, 2N1546		80	-	
	2N1542, 2N1547		100	-	
	2N1543, 2N1548		120	-	
Collector Cutoff Current (V_{CE} @ rated V_{CB}, V_{BE} = 1.0 Vdc)		I_{CEX}	-	20	mA
Collector Cutoff Current (V_{CB} = 2.0 Vdc, I_E = 0)		I_{CBO}	-	0.2	mA
(V_{CB} = 1/2 V_{CES} rating, T_C = 90°C)			-	20	
Collector Cutoff Current (V_{CB} = 25 Vdc, I_E = 0)	2N1539, 2N1544	I_{CBO1}	-	2.0	mA
(V_{CB} = 40 Vdc, I_E = 0)	2N1540, 2N1545		-	2.0	
(V_{CB} = 55 Vdc, I_E = 0)	2N1541, 2N1546		-	2.0	
(V_{CB} = 65 Vdc, I_E = 0)	2N1542, 2N1547		-	2.0	
(V_{CB} = 80 Vdc, I_E = 0)	2N1543, 2N1548		-	2.0	
ON CHARACTERISTICS					
DC Current Gain (I_C = 3.0 Adc, V_{CE} = 2.0 Vdc)	2N1539-2N1543	h_{FE1}	50	100	-
	2N1544-2N1548		75	150	
DC Transconductance (I_C = 3.0 Adc, V_{CE} = 2.0 Vdc)	2N1539-2N1543	g_{FE}	3.0	-	mhos
	2N1544-2N1548		5.0	-	
Collector-Emitter Saturation Voltage (I_C = 3.0 Adc, I_B = 300 mAdc)	2N1539-2N1543	$V_{CE(sat)}$	-	0.3	volts
	2N1544-2N1548		-	0.2	
Base-Emitter Saturation Voltage (I_C = 3.0 Adc, I_B = 300 mAdc)	2N1539-2N1543	$V_{BE(sat)}$	-	0.7	volts
	2N1544-2N1548		-	0.5	
DYNAMIC CHARACTERISTICS					
Common-Emitter Cutoff Frequency (I_C = 3.0 Adc, V_{CE} = 2.0 Vdc)		$f_{\alpha e}$	Typ 4.0		kHz

Characteristics apply to corresponding A type numbers also.

‡To avoid excessive heating of collector junction, perform this test with a sweep method.

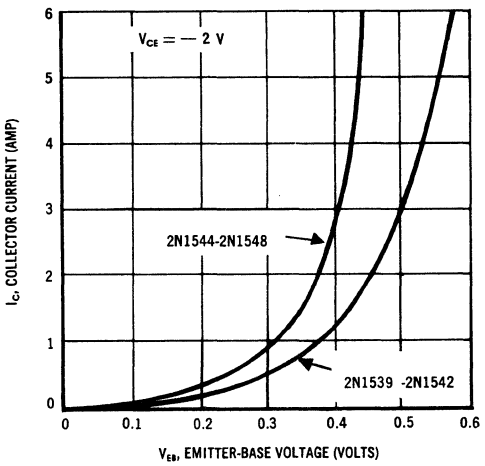
SWITCHING TIME MEASURING UNIT



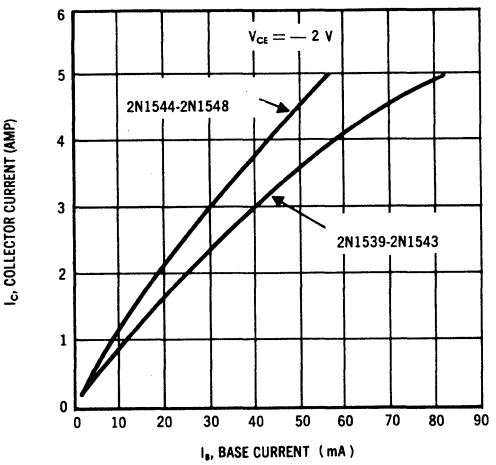
Devices	Conditions*			Typical Switching Times		
	I_C (Amp)	V (Volts)	R (ohms)	$t_d + t_r$ (μs)	t_s (μs)	t_f (μs)
2N1539-43	3	3	165	5	3	5
2N1544-48	3	3	250	5	3	8

*Input Pulse Repetition Rate = 2 kHz, Pulse Width = 50 μs

COLLECTOR CURRENT versus EMITTER BASE VOLTAGE



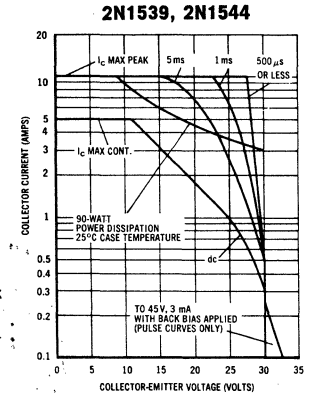
COLLECTOR CURRENT versus BASE CURRENT



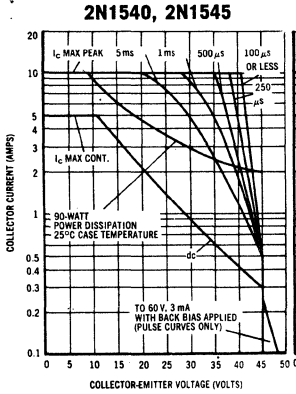
SAFE OPERATING AREAS

The Safe Operating Area Curves indicate $I_C - V_{CE}$ limits below which the device will not go into secondary breakdown. Collector load lines for specific circuits must fall within the applicable Safe Area to avoid causing a collector-emitter short. (Case temperature and duty cycle of the excursions make no significant change in these safe areas.) To insure operation below the maximum T_J, the power-temperature derating curve must be observed for both steady state and pulse power conditions.

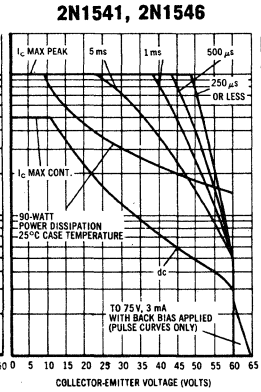
2N1539, 2N1544



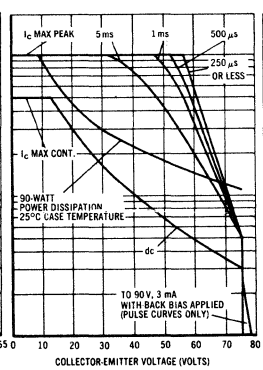
2N1540, 2N1545



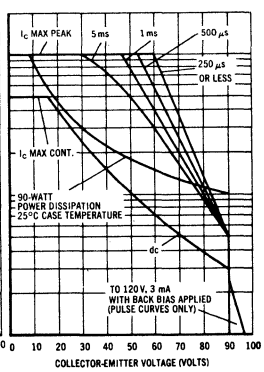
2N1541, 2N1546



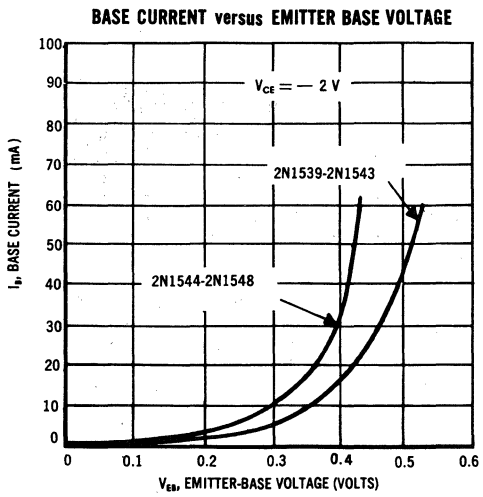
2N1542, 2N1547

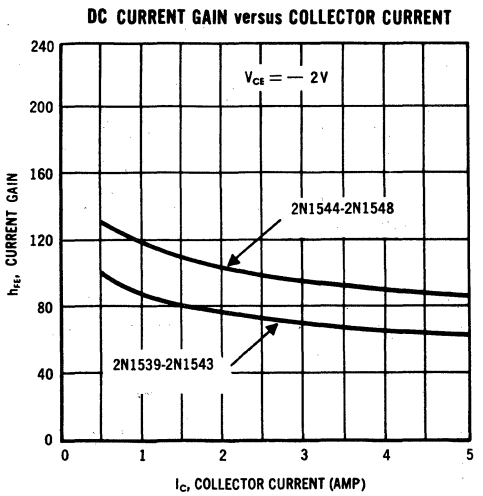


2N1543, 2N1548



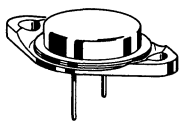
2N1539 thru 2N1548 (continued)





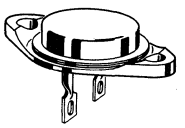
2N1549, A thru 2N1560, A (GERMANIUM)

PNP germanium power transistors for switching and amplifier applications in high-reliability equipment.



CASE 11A
(TO-3 modified)

For units with solder lugs attached, specify devices MP1549, A etc. (TO-41 package)



CASE 4-04
(TO-41)

MAXIMUM RATINGS Apply to corresponding "Hi-Rel" Series also

Rating	Symbol	2N1549 2N1553 2N1557	2N1550 2N1554 2N1558	2N1551 2N1555 2N1559	2N1552 2N1556 2N1560	Units
Collector-Emitter Voltage	V_{CEX}	40	60	80	100	Vdc
Collector-Emitter Voltage	V_{CES}*	30	45	60	75	Vdc
Collector-Emitter Voltage	V_{CEO}*	20	30	40	50	Vdc
Collector-Base Voltage	V_{CB}	40	60	80	100	Vdc
Emitter-Base Voltage	V_{EB}	20	30	40	50	Vdc
Collector Current (Continuous)	I_C	15				Amp
Collector Current (Peak)	I_C	20				Amp
Collector Junction Temperature	T_J	-65 to +110				°C
Collector Dissipation (25°C Case Temp.)	P_D	106				Watts
Thermal Resistance	θ_{JC}	0.8				°C/W

*To avoid excessive heating of collector junction, perform this test with a sweep method.