2N1545–2N1641

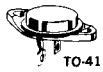
TYPE	MATERIAL	POLARITY	REPLACEMENT	PAGE NUMBER	USE	MAXIMUM RATINGS						ELECTRICAL CHARACTERISTICS							
						P_D @ 25°C	Ref Point	T_J °C	V_{CB} (volts)	V_{CE-} (volts)	Subscript	h_{FE} @ I_C (min)	(max)	Units	$V_{CE(SAT)}$ @ I_C (volts)	Units	h_{f-}	Subscript	f_- Units	Subscript
2N1545	G	P		7-64	LPA	90W	C	100	60	45	S	75	150	3.0A	0.2	3.0A			1.0K	E
2N1545A	G	P		7-64	LPA	90W	C	100	60	45	S	75		3.0A	0.2	3.0A			3.0K	E
2N1546	G	P		7-64	LPA	90W	C	100	80	60	S	75	150	3.0A	0.2	3.0A			1.0K	E
2N1546A	G	P		7-64	LPA	90W	C	100	80	60	S	75		3.0A	0.2	3.0A			3.0K	E
2N1547	G	P		7-64	LPA	90W	C	100	100	75	S	75	150	3.0A	0.2	3.0A			1.0K	E
2N1547A	G	P		7-64	LPA	90W	C	100	100	75	S	75		3.0A	0.2	3.0A			3.0K	E
2N1548	G	P		7-64	LPA	90W	C	100	120	90	S	75	150	3.0A	0.2	3.0A			1.0K	E
2N1549	G	P		7-67	LPA	90W	C	100	40	30	S	10	30	10A	1.0	10A				
2N1549A	G	P		7-67	LPA	90W	C	100	40	30	S	10	30	10A	1.0	10A			5.0K	E
2N1550	G	P		7-67	LPA	90W	C	100	60	45	S	10	30	10A	1.0	10A				
2N1550A	G	P		7-67	LPA	90W	C	100	60	45	S	10	30	10A	1.0	10A			5.0K	E
2N1551	G	P		7-67	LPA	90W	C	100	80	60	S	10	30	10A	1.0	10A				
2N1551A	G	P		7-67	LPA	90W	C	100	80	60	S	10	30	10A	1.0	10A			5.0K	E
2N1552	G	P		7-67	LPA	90W	C	100	100	75	S	10	30	10A	1.0	10A				
2N1552A	G	P		7-67	LPA	90W	C	100	100	75	S	10	30	10A	1.0	10A			5.0K	E
2N1553	G	P		7-67	LPA	90W	C	100	40	30	S	30	60	10A	0.5	10A			1.0K	E
2N1553A	G	P		7-67	LPA	90W	C	100	40	20	O	30	60	10A	0.5	10A			3.0K	E
2N1554	G	P		7-67	LPA	90W	C	100	60	45	S	30	60	10A	0.5	10A			1.0K	E
2N1554A	G	P		7-67	LPA	90W	C	100	60	30	O	30	60	10A	0.5	10A			3.0K	E
2N1555	G	P		7-67	LPA	90W	C	100	80	60	S	30	60	10A	0.5	10A			1.0K	E
2N1555A	G	P		7-67	LPA	90W	C	100	80	40	O	30	60	10A	0.5	10A			3.0K	E
2N1556	G	P		7-67	LPA	90W	C	100	100	75	S	30	60	10A	0.5	10A			1.0K	E
2N1556A	G	P		7-67	LPA	90W	C	100	100	50	O	30	60	10A	0.5	10A			3.0K	E
2N1557	G	P		7-67	LPA	90W	C	100	40	30	S	50	100	10A	0.4	10A			1.0K	E
2N1557A	G	P		7-67	LPA	90W	C	100	40	20	O	50	100	10A	0.5	10A			3.0K	E
2N1558	G	P		7-67	LPA	90W	C	100	60	45	S	50	100	10A	0.4	10A			1.0K	E
2N1558A	G	P		7-67	LPA	90W	C	100	60	30	O	50	100	10A	0.5	10A			3.0K	E
2N1559	G	P		7-67	LPA	90W	C	100	80	60	S	50	100	10A	0.4	10A			1.0K	E
2N1559A	G	P		7-67	LPA	90W	C	100	80	40	O	50	100	10A	0.5	10A			3.0K	E
2N1560	G	P		7-67	LPA	90W	C	100	100	75	S	50	100	10A	0.4	10A			1.0K	E
2N1560A	G	P		7-67	LPA	90W	C	100	100	50	O	50	100	10A	0.5	10A			3.0K	E
2N1561	G	P		9-24	RFA	250M	A	100	25	15	O					3.0 200M				
2N1562	G	P		9-24	RFA	250M	A	100	25	15	O					4.0 200M				
2N1564	S	N	2N2218	8-108	AFA	600M	A	175	80	60	O	15	50	5.0M	1.0	10M	20	E		
2N1565	S	N	2N2218	8-108	AFA	600M	A	175	80	60	O	30	100	5.0M	1.0	10M	40	E		
2N1566	S	N	2N2219	8-108	AFA	600M	A	175	80	60	O	60	200	5.0M	1.0	10M	80	E		
2N1566A	S	N	2N2219	8-108	AFA	600M	A	175	80	60	O	60	200	5.0M	0.95	10M	80	E	100M	T
2N1572	S	N			AFA	600M	A	175	125	80	O	15	50	5.0M	1.0	10M	20	E		
2N1573	S	N			AFA	600M	A	175	125	80	O	30	100	5.0M	1.0	10M	40	E		
2N1574	S	N			AFA	600M	A	175	125	80	O	60	200	5.0M	1.0	10M	80	E		
2N1585	G	N			RFA	750M	A	100	25	10	O	20		10M						
2N1586	S	N			AFA	125M	A	85	15	10	O	5.0	27	1.0M	1.5	5.0M	9.0	E	5.0M	B
2N1587	S	N			AFA	125M	A	85	30	20	O	5.0	27	1.0M	1.5	5.0M	9.0	E	5.0M	B
2N1588	S	N			AFA	125M	A	85	60	40	O	5.0	27	1.0M	1.5	5.0M	9.0	E	5.0M	B
2N1589	S	N			AFA	125M	A	85	15	10	O	20	75	1.0M	1.5	5.0M	25	E	5.0M	B
2N1590	S	N			AFA	125M	A	85	30	20	O	20	75	1.0M	1.5	5.0M	25	E	5.0M	B
2N1591	S	N			AFA	125M	A	85	60	40	O	20	75	1.0M	1.5	5.0M	25	E	5.0M	B
2N1592	S	N			AFA	125M	A	85	15	10	O	40	210	1.0M	1.5	5.0M	70	E	5.0M	B
2N1593	S	N			AFA	125M	A	85	30	20	O	40	210	1.0M	1.5	5.0M	70	E	5.0M	B
2N1594	S	N			AFA	125M	A	85	60	40	O	40	210	1.0M	1.5	5.0M	70	E	5.0M	B
2N1595 thru 2N1604	Thyristors, see Table on Page 1-154																			
2N1605	G	N			MSS	150M	A	100	25	24	O	40		20M	0.15	12M			4.0M	B
2N1605A	G	N			MSS	0.2W	A	100	40	40		40		20M	0.15	12M			4.0M	B
2N1606	S	P			HSS	100M	A	140	10	10	S	6.0	30	15M	0.15	5.0M			7.2M	T
2N1607	S	P			HSS	100M	A	140	10	10	S	6.0	30	15M	0.15	5.0M			10M	T
2N1608	S	P			HSS	100M	A	140	10	10	S	6.0	30	15M	0.15	5.0M			25M	T
2N1609	G	P	2N2140	7-78	LPA			95	80	60	O	30	75	100M	1.0	500M				
2N1610	G	P	2N2145	7-78	LPA			95	80	60	O	50	125	100M	0.6	500M				
2N1611	G	P	2N2138	7-78	LPA			95	60	40	O	30	75	100M	1.0	500M				
2N1612	G	P	2N2143	7-78	LPA			95	60	40	O	50	125	100M	0.6	500M				
2N1613	S	N		8-30	MSA	800M	A	200	75	50	R	40	120	150M	1.5	150M	30	E	60M	T
2N1613A	S	N	2N2218	8-108	MSA	1.0W	A	200	75	50	R	40	120	150M	1.0	150M	30	E	60M	T
2N1613B	S	N			MSA	1.0W	A	200	120	55	R	40	120	150M	0.2	150M	30	E	60M	T
2N1614	G	P	2N1924	6-37	MSA	240M	A	100	65	40	R	18	43	20M	0.13	20M			500K	B
2N1615	S	N			RFA	5.5M	A	200	100	100	O	25		5.0M	5.0	50M			2.0M	T
2N1616	S	N	2N3487	7-115	HPA	60W	C	175	60	60	O	15	75	2.0A	2.0	2.0A			3.0M	T
2N1616A	S	N	2N3487	7-115	LPA	85W	C	200	60	60	O	20	60	2.0A	1.0	2.0A			3.0M	T
2N1617	S	N	2N3487	7-115	HPA	60W	C	175	80	80	V	15	75	2.0A	2.0	2.0A			3.0M	T
2N1617A	S	N	2N3487	7-115	LPA	85W	C	200	80	70	O	20	60	2.0A	1.0	2.0A			3.0M	T
2N1618	S	N	2N3488	7-115	HPA	60W	C	175	100	100	V	15	75	2.0A	2.0	2.0A			3.0M	T
2N1618A	S	N	2N3488	7-115	LPA	85W	C	200	100	80	O	20	60	2.0A	1.0	2.0A			3.0M	T
2N1620	S	N	2N3446	7-111	HPA	60W	C	175	100	100	V	15	75	2.0A	2.0	2.0A			3.0M	T
2N1622	G	N			AFA	0.12W	A	85	90	90	S	40		5.0M		5.0M				
2N1623	S	P			AFA	250M	A	160	50	20	O	9.0	40	1.0M	0.3	5.0M			100K	B
2N1624	G	N			MSS	0.15W	A	100	25	20	R	60	180	30M					5.0M	B
2N1631	G	P	2N3325	9-71	RFC	80M	A	85	34								40	E		
2N1632	G	P	2N3325	9-71	RFC	80M	A	85	34								40	E		
2N1633	G	P			RFC	80M	A	85	34								27	E		
2N1634	G	P			RFC	80M	A	85	34								27	E		
2N1635	G	P			RFC	80M	A	85	34								40	E		
2N1636	G	P			RFC	80M	A	85	34								40	E		
2N1637	G	P	2N3325	9-71	RFC	80M	A	85	34								40	E		
2N1638	G	P	2N3325	9-71	RFC	80M	A	85	34								70	E		
2N1639	G	P	2N3325	9-71	RFC	80M	A	85	34								40	E		
2N1640	S	P			CHP	250M	A	160	30	20	U	6.0		100*						
2N1641	S	P			CHP	250M	A	160	30	10	U	10		100*						

GERMANIUM POWER TRANSISTOR SELECTOR GUIDE (continued)

10-AMP — HIGH-VOLTAGE LOW-SATURATION SWITCH

$P_D = 85$ W
$f_T = 0.7$ MHz
*$P_D = 56$ W
*$f_T = 1.0$ MHz


TO-3


TO-41†①

h_{FE} $I_C = 3$ A, $V_{CE} = 2$ V	V_{CEO}	80 V	120 V	160 V	V_{CES}	
	V_{CB}	80 V	120 V	160 V	200 V	320 V
20-50 20 min *		2N2526	2N2527	2N2528	MP3730*	MP3731*

15-AMP — GENERAL PURPOSE SWITCH AND AMPLIFIER

$P_D = 170$ W
$f_T = 0.3$ MHz


TO-36

h_{FE} $I_C = 5$ A, $V_{CE} = 2$ V	V_{CES}	40 V	50 V	70 V	80 V	
	V_{CB}	40 V	50 V	70 V	80 V	
20-40		2N2078	2N2077	2N2076	2N2075	
35-70		2N2082	2N2081	2N2080	2N2079	

15-AMP — GENERAL PURPOSE SWITCH AND AMPLIFIER

$P_D = 150$ W
$f_T = 0.3$ MHz


TO-36

h_{FE} $I_C = 5$ A, $V_{CE} = 2$ V	V_{CES}	40 V	45 V	50 V	70 V	80 V
	V_{CB}	40 V	50 V	60 V	80 V	100 V
20-40		2N441	2N442	2N443		
25-50					2N174	2N1100
35-70		2N277	2N278	2N173	2N1099	

15-AMP — HIGH-FREQUENCY SWITCH AND AMPLIFIER

$P_D = 106$ W


TO-3

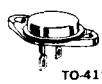

TO-41†①

h_{FE} $I_C = 10$ A, $V_{CE} = 2$ V	V_{CES}	30 V	45 V	60 V	75 V	
	V_{CB}	40 V	60 V	80 V	100 V	
10-30 $f_T = 0.55$ MHz		2N1549	2N1550	2N1551	2N1552	
30-60 $f_T = 0.4$ MHz		2N1553	2N1554	2N1555	2N1556	
50-100 $f_T = 0.4$ MHz		2N1557	2N1558	2N1559	2N1560	

20-AMP — HIGH-SPEED SWITCH

$P_D = 85$ W
$f_T = 18$ MHz

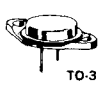

TO-3

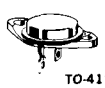

TO-41†①

h_{FE} $I_C = 10$ A, $V_{CE} = 2$ V	V_{CEO}	50 V		75 V		100 V
	V_{CB}	80 V		120 V		140 V
25-100		2N2832		2N2833		2N2834

25-AMP — HIGH DC GAIN SWITCH

$P_D = 106$ W
$f_T = 0.4$ MHz


TO-3


TO-41†②

h_{FE} $I_C = 25$ A, $V_{CE} = 1$ V	V_{CES}	35 V		60 V		75 V
	V_{CB}	50 V		80 V		100 V
15-65		2N1162		2N1164		2N1166
		2N1163†		2N1165†		2N1167†

25-AMP — HIGH DC GAIN LOW-SATURATION SWITCH

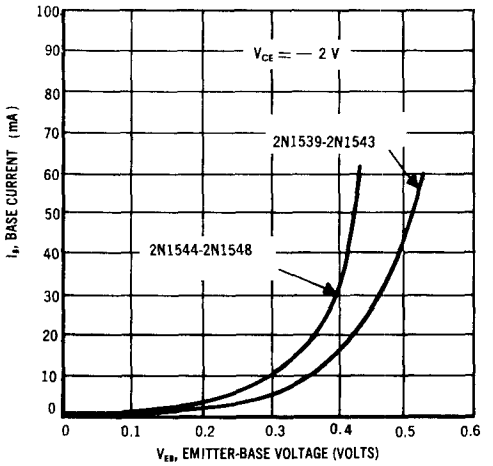
$P_D = 75$ W
$f_T = 10$ MHz


CASE 8

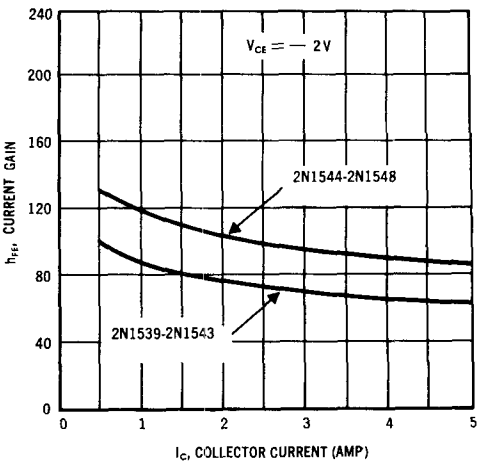
h_{FE} $I_C = 5$ A, $V_{CE} = 2$ V	$V_{CE(sat)}$ $I_C = 25$ A, $I_B = 2.5$ A			0.5 V		
	V_{CB}			15 V		
200-800				2N2912		

2N1539 thru 2N1548 (continued)

BASE CURRENT versus EMITTER BASE VOLTAGE

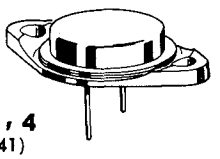


DC CURRENT GAIN versus COLLECTOR CURRENT



2N1549, A thru 2N1560, A (GERMANIUM)
2N1549A JAN thru 2N1556A JAN
2N1560A JAN AVAILABLE)

$V_{CB} = 40\text{-}100$ V
$I_C = 15$ A
$P_D = 106$W



CASE 3, 4
(TO-3, 41)

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

For units with solder lugs attached,
specify devices MP1549A etc. (TO-41 package)

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	15	15	15	Amp
Collector Current (Peak)	I_C	20	20	20	20	Amp
Collector Junction Temperature	T_J	-65 to +110				°C
Collector Dissipation (25 C Case Temp.)	P_D	106	106	106	106	Watts
Thermal Resistance	θ_{JC}	0.8				°C/W

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

2N1549 thru 2N1560 (continued)

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

Characteristic		Symbol	Min	Max	Unit
Collector-Base Cutoff Current		I_{CBO1}			mA
(V_{CB} = 25 V)	2N1549, 2N1553, 2N1557		-	3.0	
(V_{CB} = 40 V)	2N1550, 2N1554, 2N1558		-	3.0	
(V_{CB} = 55 V)	2N1551, 2N1555, 2N1559		-	3.0	
(V_{CB} = 65 V)	2N1552, 2N1556, 2N1560		-	3.0	
Collector-Base Cutoff Current		I_{CBO}			mA
(V_{CB} = 2 V)			-	0.2	
(V_{CB} = 1/2 BV_{CES} rating; T_C = +90°C)			-	20	
Emitter-Base Cutoff Current		I_{EBO}			mA
(V_{EB} = 12 V)			-	0.5	
Collector-Emitter Breakdown Voltage		BV_{CES}			volts
(I_C = 300 mA)					
	2N1549, 2N1553, 2N1557		30	-	
	2N1550, 2N1554, 2N1558		45	-	
	2N1551, 2N1555, 2N1559		60	-	
	2N1552, 2N1556, 2N1560		75	-	
Collector-Emitter Leakage Current		I_{CEX}			mA
(V_{BE} = 1.0 V, V_{CE} @ rated BV_{CBO})			-	20	
Collector-Emitter Breakdown Voltage*		BV_{CEO}*			volts
(I_C = 300 mA, I_B = 0)					
	2N1549, 2N1553, 2N1557		20	-	
	2N1550, 2N1554, 2N1558		30	-	
	2N1551, 2N1555, 2N1559		40	-	
	2N1552, 2N1556, 2N1560		50	-	
Collector-Base Breakdown Voltage		BV_{CBO}			volts
(I_C = 20 mA)					
	2N1549, 2N1553, 2N1557		40	-	
	2N1550, 2N1554, 2N1558		60	-	
	2N1551, 2N1555, 2N1559		80	-	
	2N1552, 2N1556, 2N1560		100	-	
Current Gain		h_{FE1}			-
(V_{CE} = 2.0 V, I_C = 10 A)					
	2N1549 - 2N1552		10	30	
	2N1553 - 2N1556		30	60	
	2N1557 - 2N1560		50	100	
Base-Emitter Drive Voltage		V_{BE}			volts
(I_C = 10 A, I_B = 1.0 A)					
	2N1549 - 2N1552		-	1.3	
	2N1553 - 2N1556		-	1.0	
	2N1557 - 2N1560		-	0.7	
Collector Saturation Voltage		$V_{CE(sat)}$			volts
(I_C = 10 A, I_B = 1.0 A)					
	2N1549 - 2N1552		-	1.0	
	2N1553 - 2N1556		-	0.7	
	2N1557 - 2N1560		-	0.5	

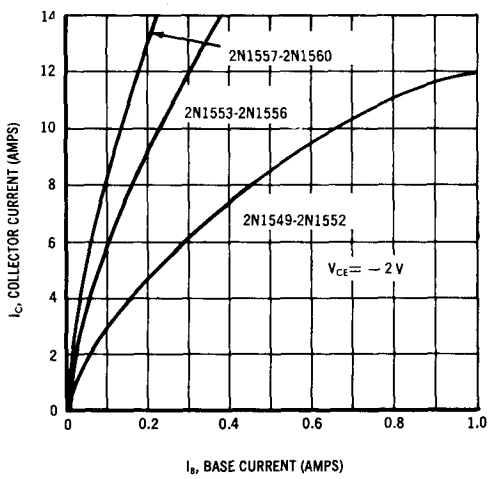
Characteristics apply to corresponding A type numbers also.
*To avoid excessive heating of collector junction, perform this test with a sweep method.

2N1549 thru 2N1560 (continued)

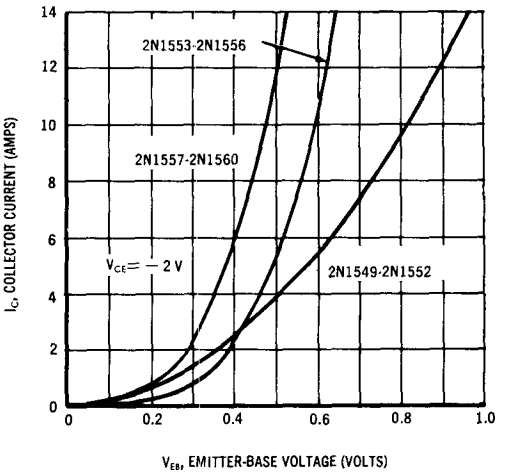
ELECTRICAL CHARACTERISTICS (continued)

Characteristic	Symbol	Min	Max	Unit
Transconductance (V_{CE} = 2.0 V, I_C = 10 A)	g_{FE}			mhos
2N1549 - 2N1552		6	18	
2N1553 - 2N1556		8	30	
2N1557 - 2N1560		12	40	
Frequency Cutoff	f_{ae}	Typ		kHz
2N1549 - 2N1552		10		
2N1553 - 2N1556		6		
2N1557 - 2N1560		5		

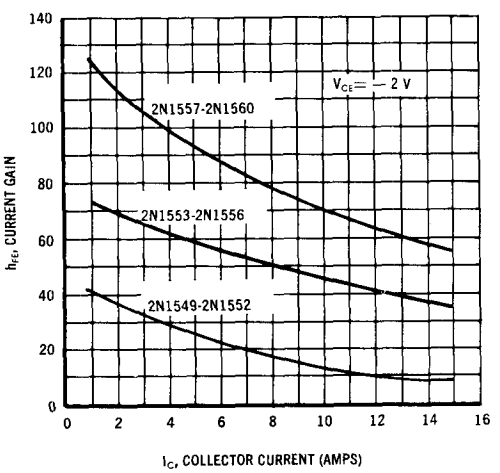
COLLECTOR CURRENT versus BASE CURRENT



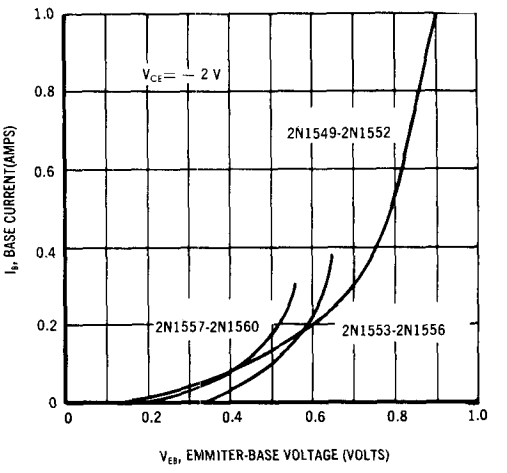
COLLECTOR CURRENT versus EMITTER-BASE VOLTAGE



CURRENT GAIN versus COLLECTOR CURRENT



BASE CURRENT versus EMITTER-BASE VOLTAGE

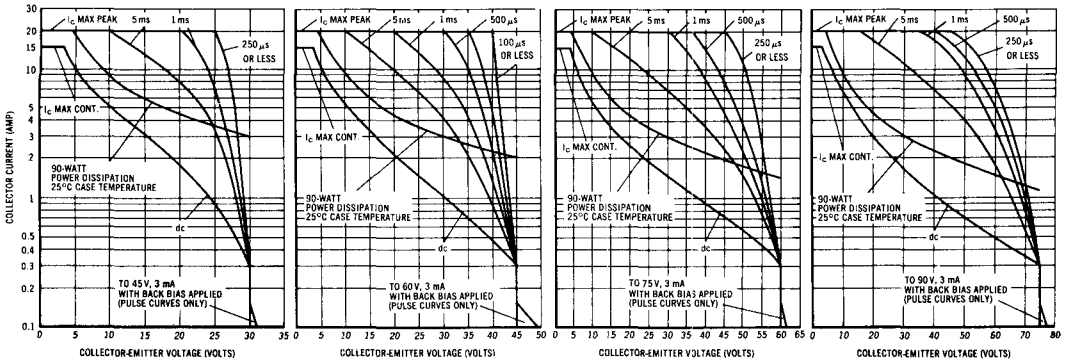


2N1549 thru 2N1560 (continued)

SAFE OPERATING AREAS

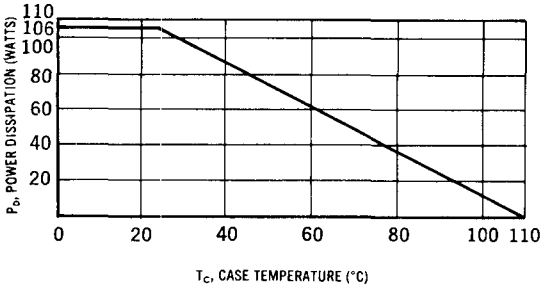
The Safe Operating Area Curves indicate I_C — V_{CE} limits below which the device will not go into secondary breakdown. Collector load lines for specific circuits must fall within the applicable Safe Area to avoid causing a collector-emitter short. (Duty cycle of the excursions make no significant change 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.

2N1549, 2N1553, 2N1557 **2N1550, 2N1554, 2N1558** **2N1551, 2N1555, 2N1559** **2N1552, 2N1556, 2N1560**

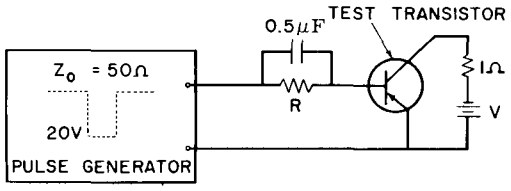


POWER-TEMPERATURE DERATING CURVE

The maximum continuous power is related to maximum junction temperature, by the thermal resistance factor. For dc or frequencies below 25 Hz the transistor must be operated within the constant $P_D = Vc \times Ic$ 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 allowable $= \frac{110^{O} - Tc}{0.8}$



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)
2N1549 -52	10	10	10	5	2	10
2N1553 -56	10	10	30	10	5	25
2N1557 -60	10	10	50	10	5	25

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