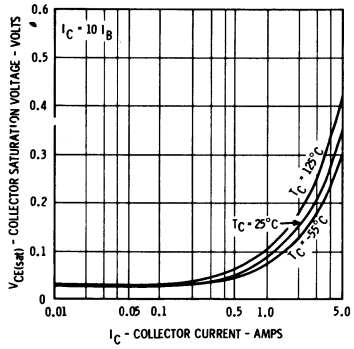
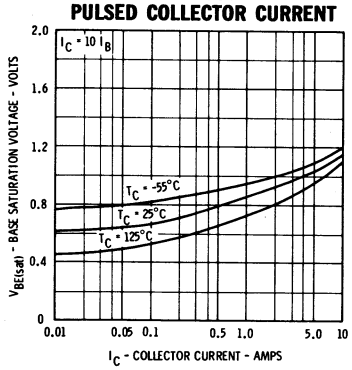
TYPICAL ELECTRICAL CHARACTERISTICS

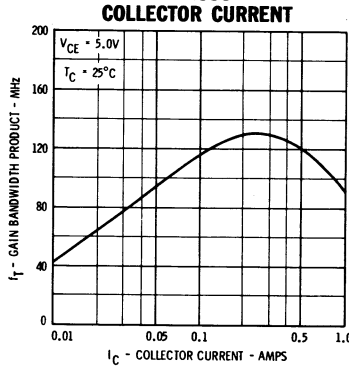
COLLECTOR SATURATION VOLTAGE VERSUS PULSED COLLECTOR CURRENT



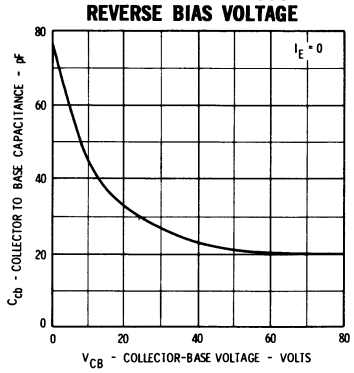
BASE SATURATION VOLTAGE VERSUS PULSED COLLECTOR CURRENT



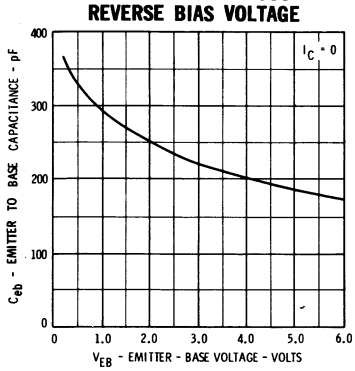
GAIN BANDWIDTH PRODUCT VERSUS COLLECTOR CURRENT



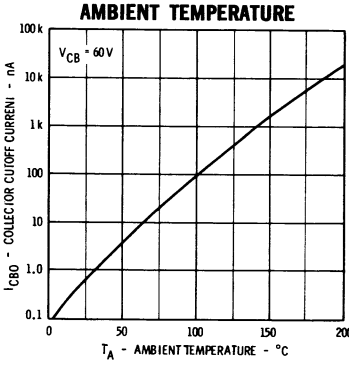
COLLECTOR TO BASE CAPACITANCE VERSUS REVERSE BIAS VOLTAGE



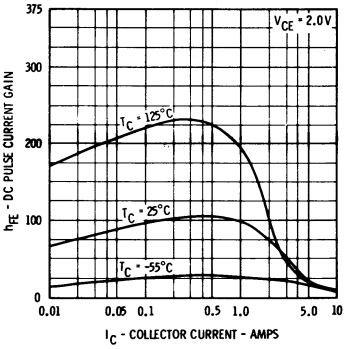
EMITTER TO BASE CAPACITANCE VERSUS REVERSE BIAS VOLTAGE



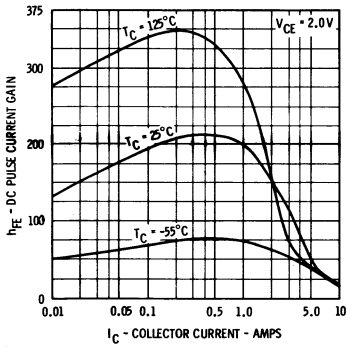
COLLECTOR CUTOFF CURRENT VERSUS AMBIENT TEMPERATURE



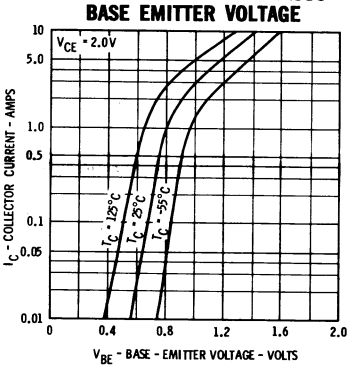
2N5083 • 2N5085 DC PULSE CURRENT GAIN VERSUS COLLECTOR CURRENT



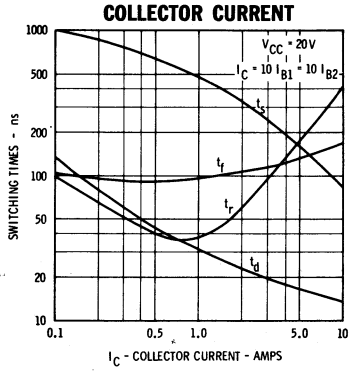
2N5084 DC PULSE CURRENT GAIN VERSUS COLLECTOR CURRENT



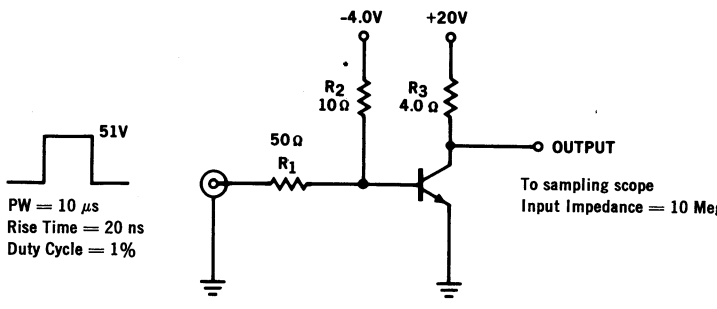
COLLECTOR CURRENT VERSUS BASE EMITTER VOLTAGE



SWITCHING TIMES VERSUS COLLECTOR CURRENT



SWITCHING TIME TEST CIRCUIT

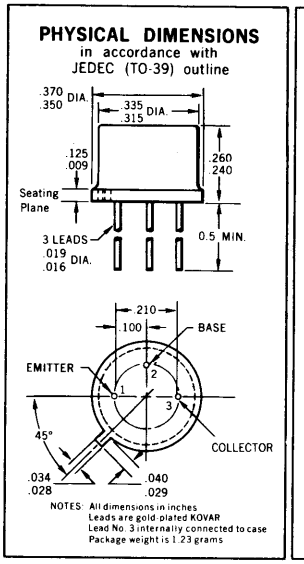


2N5106 • 2N5107

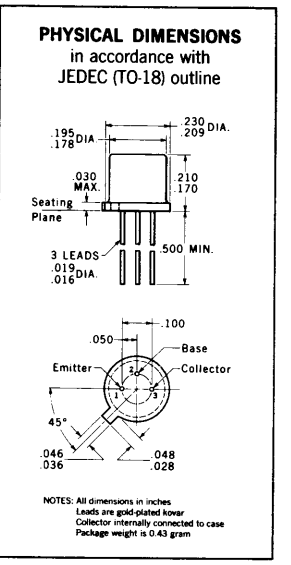
NPN RADIATION RESISTANT GENERAL PURPOSE AMPLIFIERS AND SWITCHES

DOUBLE DIFFUSED SILICON PLANAR* EPITAXIAL TRANSISTORS

- **GUARANTEED PERFORMANCE AFTER NEUTRON IRRADIATION OF 3 x 10^{14} nvt > 10 keV**
- **GAIN . . . . . h_{FE} = 8.0 (MIN), 13 (TYP) AT 150 mA**
  h_{FE} = 100 (MIN) AT 150 mA PREIRRADIATION
  f_T = 200 MHz (MIN) AT 50 mA
- **BREAKDOWN VOLTAGE . . . LV_{CEO} = 30 V (MIN)**



2N5106



2N5107

ABSOLUTE MAXIMUM RATINGS (Note 1)

Maximum Temperatures

Storage Temperature	−65°C to +200°C
Operating Junction Temperature	+200°C
Lead Temperature (Soldering, 60 second time limit)	+300°C

Maximum Power Dissipation (Notes 2 and 3)	**2N5106**	**2N5107**
Total Dissipation at 25°C Case Temperature	3.0 Watts	1.8 Watts
at 25°C Ambient Temperature	0.8 Watt	0.36 Watt

Maximum Voltages and Current

V_{CBO}	Collector to Base Voltage	60 Volts	60 Volts
V_{CEO}	Collector to Emitter Voltage (Note 4)	30 Volts	30 Volts
V_{EBO}	Emitter to Base Voltage	5.0 Volts	5.0 Volts
I_C	Collector Current	500 mA	500 mA

ELECTRICAL CHARACTERISTICS (25°C Free Air Temperature unless otherwise noted)

SYMBOL	CHARACTERISTICS	PRE-IRRADIATION MIN.	PRE-IRRADIATION TYP.	PRE-IRRADIATION MAX.	POST-IRRADIATION (3×10^{14} nvt > 10 keV) MIN.	POST-IRRADIATION (3×10^{14} nvt > 10 keV) TYP.	POST-IRRADIATION (3×10^{14} nvt > 10 keV) MAX.	UNITS	TEST CONDITIONS	
V_{CEO}(sust)	**Collector to Emitter Sustaining Voltage** (Notes 4 and 5)	**30**	**42**		**30**	**56**		**Volts**	**I_C = 10 mA**	**I_B = 0**
BV_{CES}	Collector to Emitter Breakdown Voltage	60	80		60	87		Volts	$I_C = 10\ \mu A$	$V_{BE} = 0$
BV_{CBO}	Collector to Base Breakdown Voltage	60			60			Volts	$I_C = 10\ \mu A$	$I_E = 0$
BV_{EBO}	Emitter to Base Breakdown Voltage	5.0	7.0		5.0	7.0		Volts	$I_C = 0$	$I_E = 10\ \mu A$
h_{FE}	DC Pulse Current Gain (Note 5)	50	100		5.0	9.0			I_C = 1.0 mA	V_{CE} = 10 V
h_{FE}	DC Pulse Current Gain (Note 5)	75	205		8.0	16			I_C = 10 mA	V_{CE} = 10 V
h_{FE}	DC Pulse Current Gain (Note 5)	50			5.0				I_C = 150 mA	V_{CE} = 1.0 V
h_{FE}	**DC Pulse Current Gain** (Note 5)	**100**	**220**	**300**	**8.0**	**13**			**I_C = 150 mA**	**V_{CE} = 10 V**
h_{FE}(−35°C)	DC Pulse Current Gain (Note 5)	50			5.0				I_C = 150 mA	V_{CE} = 10 V
h_{FE}(−55°C)	DC Pulse Current Gain (Note 5)	35			3.0				I_C = 150 mA	V_{CE} = 10 V
h_{FE}	DC Pulse Current Gain (Note 5)	50	100		5.0	9.0			I_C = 500 mA	V_{CE} = 10 V
h_{fe}	**High Frequency Current Gain (f = 100 MHz)**	**2.5**	**4.5**	**9.0**	**2.0**	**4.0**			**I_C = 50 mA**	**V_{CE} = 10 V**

*Planar is a patented Fairchild process.

FAIRCHILD SEMICONDUCTOR
A DIVISION OF FAIRCHILD CAMERA AND INSTRUMENT CORPORATION

313 FAIRCHILD DRIVE, MOUNTAIN VIEW, CALIFORNIA, (415) 962-5011, TWX: 910-379-6435

ELECTRICAL CHARACTERISTICS (25°C Free Air Temperature unless otherwise noted)

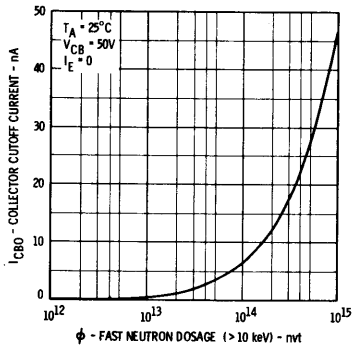
SYMBOL	CHARACTERISTIC	PRE-IRRADIATION MIN.	PRE-IRRADIATION TYP.	PRE-IRRADIATION MAX.	POST-IRRADIATION (3×10^{14} nvt > 10 keV) MIN.	POST-IRRADIATION TYP.	POST-IRRADIATION MAX.	UNITS	TEST CONDITIONS	
I_{CBO}	Collector Cutoff Current		0.2	10		18	100	nA	$I_E = 0$	$V_{CB} = 50$ V
I_{CBO}(150°C)	Collector Cutoff Current			10			100	μA	$I_E = 0$	$V_{CB} = 50$ V
V_{CE}(sat)	Pulsed Collector Saturation Voltage (Note 5)		0.11	0.22		0.33	0.5	Volts	$I_C = 150$ mA	$I_B = 50$ mA
V_{BE}(sat)	Pulsed Base Saturation Voltage (Note 5)			1.5			1.5	Volts	$I_C = 150$ mA	$I_B = 50$ mA
V_{BE}(on)	Pulsed Base Emitter On Voltage (Note 5)			1.2			1.2	Volts	$I_C = 150$ mA	$V_{CE} = 10$ V
I_{EBO}	Emitter Cutoff Current		0.1	10			100	nA	$I_C = 0$	$V_{EB} = 3.0$ V
V_{CE}(sat)	Pulsed Collector Saturation Voltage (Note 5)			0.45			1.6	Volts	$I_C = 300$ mA	$I_B = 100$ mA
V_{BE}(sat)	Pulsed Base Saturation Voltage (Note 5)			1.5			1.6	Volts	$I_C = 300$ mA	$I_B = 100$ mA
C_{cb}	Collector to Base Capacitance		6.0	8.0			8.0	pF	$I_E = 0$	$V_{CB} = 10$ V
C_{eb}	Emitter to Base Capacitance		14	20			20	pF	$I_C = 0$	$V_{EB} = 2.0$ V
t_{on}	Turn On Time (Note 6)			65			65	ns	$I_C \approx 300$ mA	$I_{B1} \approx 100$ mA
t_{off}	Turn Off Time (Note 6)			550			550	ns	$I_C \approx 300$ mA	$I_{B1} \approx 100$ mA $I_{B2} \approx -100$ mA

NOTES:

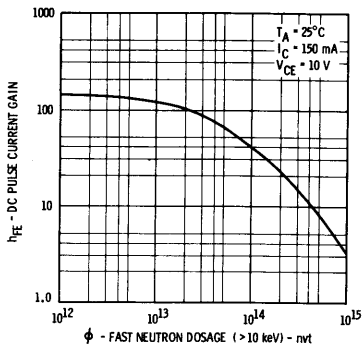
(1) These ratings are limiting values above which the serviceability of any individual semiconductor device may be impaired.
(2) These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.
(3) These ratings give a maximum junction temperature of 200°C and junction to case thermal resistance of 58.3°C/Watt (derating factor of 17.2 mW/°C) for the 2N5106 and 140°C/Watt (derating factor of 7.1 mW/°C) for the 2N5107. Junction to ambient thermal resistance of 219°C/Watt (derating factor of 4.57 mW/°C) for the 2N5106 and 486°C/Watt (derating factor of 2.06 mW/°C) for the 2N5107.
(4) Rating refers to a high-current point where collector to emitter voltage is lowest.
(5) Pulse Conditions: length = 300 μs; duty cycle = 1%.
(6) See switching circuit for exact values of I_C, I_{B1}, and I_{B2}.

TYPICAL ELECTRICAL CHARACTERISTICS

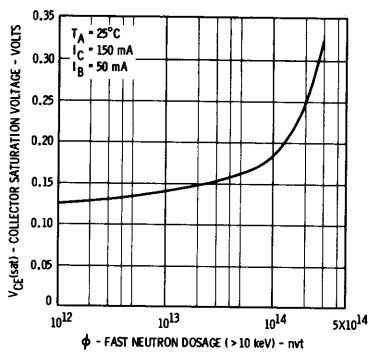
COLLECTOR CUTOFF CURRENT VERSUS FAST NEUTRON DOSAGE



DC PULSE CURRENT GAIN VERSUS FAST NEUTRON DOSAGE

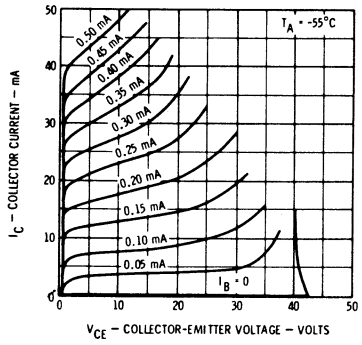


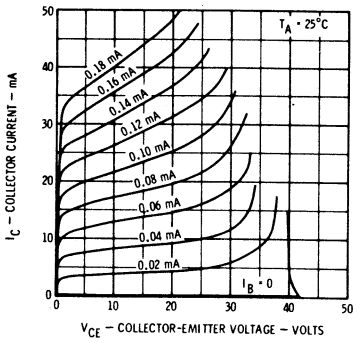
COLLECTOR SATURATION VOLTAGE VERSUS FAST NEUTRON DOSAGE

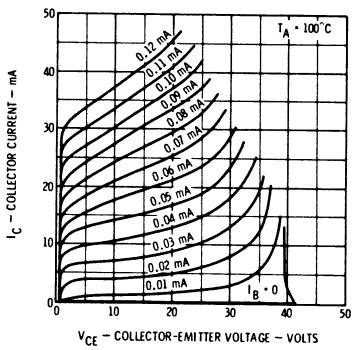


TYPICAL COLLECTOR CHARACTERISTICS*

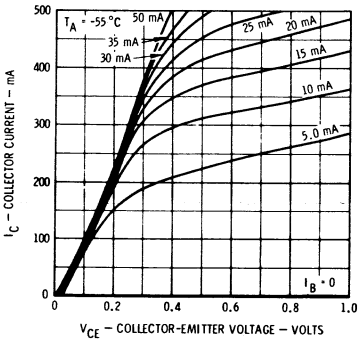
ACTIVE REGION*

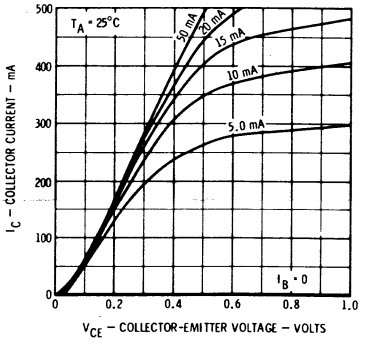


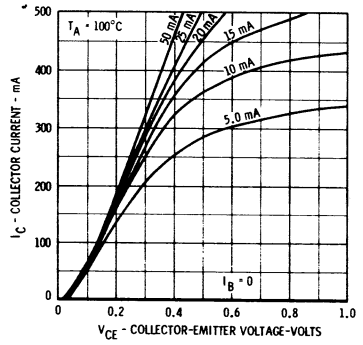




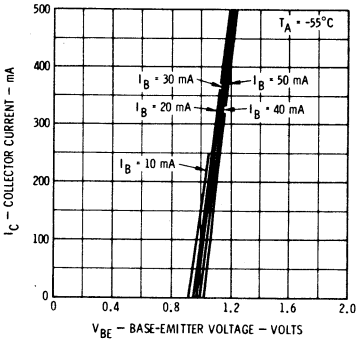
SATURATION REGION*

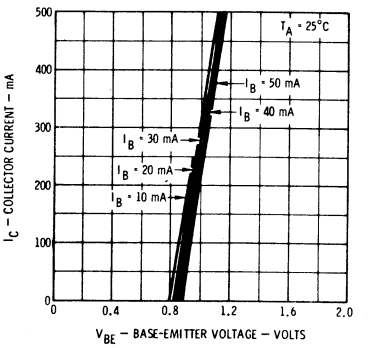


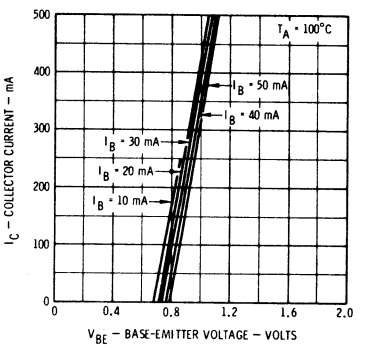




TYPICAL BASE CHARACTERISTICS*



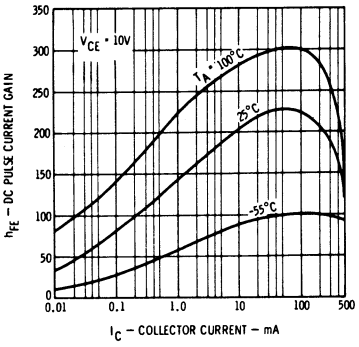




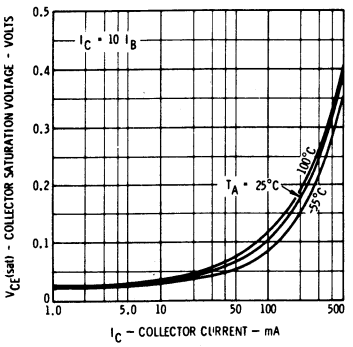
*Single family characteristic on Transistor Curve Tracer.

TYPICAL ELECTRICAL CHARACTERISTICS

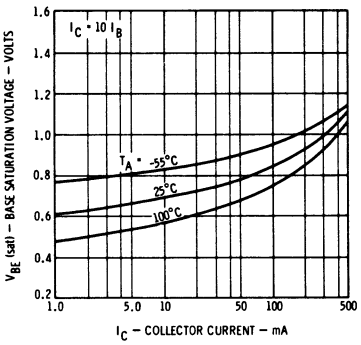
DC PULSE CURRENT GAIN VERSUS COLLECTOR CURRENT



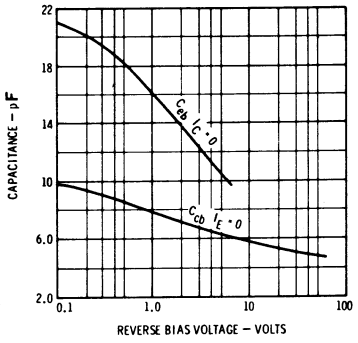
COLLECTOR SATURATION VOLTAGE VERSUS COLLECTOR CURRENT



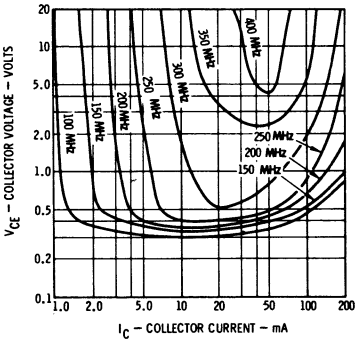
BASE SATURATION VOLTAGE VERSUS COLLECTOR CURRENT



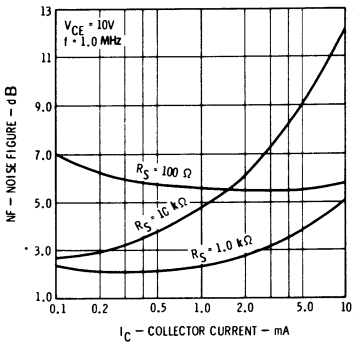
INPUT AND OUTPUT CAPACITANCE VERSUS REVERSE BIAS VOLTAGE



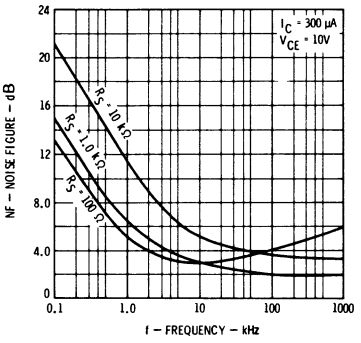
CONTOURS OF CONSTANT GAIN BANDWIDTH PRODUCT (f_T)



NOISE FIGURE VERSUS COLLECTOR CURRENT



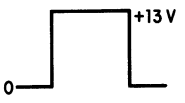
NOISE FIGURE VERSUS FREQUENCY



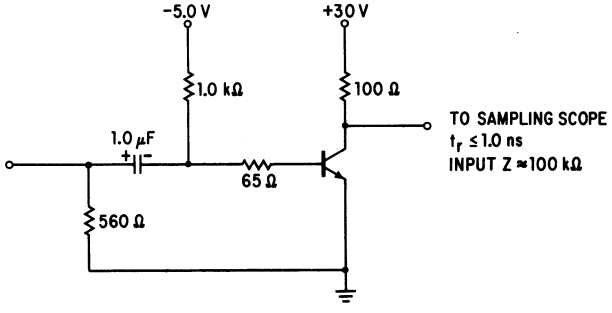
SWITCHING CIRCUIT

FIGURE 1

t_{on} AND t_{off} TEST CIRCUIT



PULSE WIDTH = 2.5 µS
t_r ≤ 1.0 ns
t_f ≤ 20 ns
DUTY CYCLE ≤ 2%
Z_{IN} = 50 Ω



2N5126

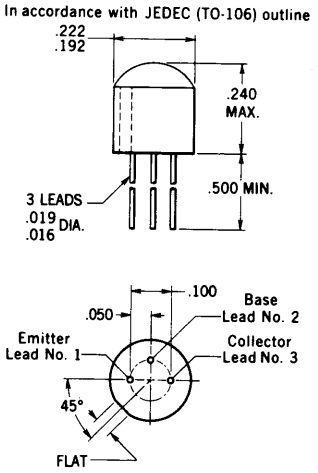
NPN RF AMPLIFIER

DIFFUSED SILICON PLANAR* TRANSISTOR

- **LOW FEEDBACK CAPACITANCE . . . C_{cb} = 1.6 pF (MAX)**
- **HIGH POWER GAIN . . . . . PG AT 100 MHz = 26 dB (TYP)**
- **BREAKDOWN VOLTAGE . . . . . LV_{CEO} = 20 V (MIN)**
- **LOW NOISE FIGURE . . . . . NF AT 100 MHz = 5.5 dB (TYP)**
- **FORWARD AGC CHARACTERISTIC**

PHYSICAL DIMENSIONS

In accordance with JEDEC (TO-106) outline



NOTES: All dimensions in inches
All leads electrically isolated from case
Package weight is 0.31 gram. Package is electrically non-conductive material

ABSOLUTE MAXIMUM RATINGS (Notes 1 and 2)

Maximum Temperatures

Operating Junction Temperature	+125°C
Storage Temperature	−55°C to +125°C
Lead Temperature (Soldering, 10 second time limit)	+260°C

Maximum Power Dissipation (Note 2)

Total Dissipation at 25°C Case Temperature	0.5 Watt
at 25°C Ambient Temperature	0.2 Watt

Maximum Voltages and Current

V_{CBO}	Collector to Base Voltage	20 Volts
V_{CEO}	Collector to Emitter Voltage (Note 3)	20 Volts
V_{EBO}	Emitter to Base Voltage	3.0 Volts

ELECTRICAL CHARACTERISTICS (25°C Free Air Temperature unless otherwise noted)

SYMBOL	CHARACTERISTICS	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS	
C_{cb}	**Collector-Base Capacitance**		**1.1**	**1.6**	**pF**	**$I_E = 0$**	**$V_{CB} = 10$ V**
NF	**Noise Figure** (Note 5)		**5.5**		**dB**	**$I_C = 4.0$ mA**	**$V_{CC} = 15$ V**
						f = 100 MHz	$R_S = 100\Omega$
h_{fe}	High Frequency Current Gain (f = 100 MHz)	3.0	6.0			$I_C = 4.0$ mA	$V_{CE} = 10$ V
A_V	**Voltage Gain (f = 455 kHz)** (Note 5)		**37**		**dB**	$I_C = 4.0$ mA	$V_{CC} = 12$ V
PG	**Power Gain (f = 10.7 MHz)** (Note 5)		**30**		**dB**	**$I_C = 4.0$ mA**	**$V_{CC} = 12$ V**
PG	**Power Gain (f = 100 MHz)** (Note 5)		**26**		**dB**	**$I_C = 4.0$ mA**	**$V_{CC} = 15$ V**
AGC	**Automatic Gain Control (f = 100 MHz)** (Note 5)		**9**		**mA**	**I_C for which PG_{AGC} = PG − 30 dB**	
V_{CE}(sat)	Collector Saturation Voltage			2.0	Volts	$I_C = 10$ mA	$I_B = 5.0$ mA
V_{BE}(sat)	Pulsed Base Saturation Voltage (Note 4)			0.98	Volt	$I_C = 10$ mA	$I_B = 5.0$ mA
h_{FE}	DC Pulse Current Gain (Note 4)	20	70	350		$I_C = 4.0$ mA	$V_{CE} = 10$ V
I_{CBO}	Collector Cutoff Current		1.0	50	nA	$I_E = 0$	$V_{CB} = 10$ V
I_{CBO}(65°C)	Collector Cutoff Current			5.0	μA	$I_E = 0$	$V_{CB} = 10$ V
V_{CEO}(sust)	**Collector to Emitter Sustaining Voltage** (Notes 3 and 4)	**20**			**Volts**	**$I_C = 3.0$ mA**	**$I_B = 0$**
BV_{CBO}	Collector to Base Breakdown Voltage	20			Volts	$I_C = 100$ μA	$I_E = 0$
BV_{EBO}	Emitter to Base Breakdown Voltage	3.0			Volts	$I_C = 0$	$I_E = 100$ μA
h_{fe}	Small Signal Current Gain (f = 1.0 kHz)	15		400		$I_C = 4.0$ mA	$V_{CE} = 10$ V
V_{BE}(on)	Base to Emitter On Voltage (Note 5)			0.98	Volts	$I_C = 10$ mA	$V_{CE} = 10$ V

*Planar is a patented Fairchild process.

NOTES:

(1) These ratings are limiting values above which the serviceability of any individual semiconductor device may be impaired.
(2) These ratings give a maximum junction temperature of 125°C and junction to case thermal resistance of 200°C/watt (derating factor of 5.0 mW/°C); junction to ambient thermal resistance of 500°C/watt (derating factor of 2.0 mW/°C).
(3) Rating refers to a high-current point where collector to emitter voltage is lowest.
(4) Pulse Conditions: length = 300 μs; duty cycle = 1%.
(5) See Test Circuit.

FAIRCHILD SEMICONDUCTOR
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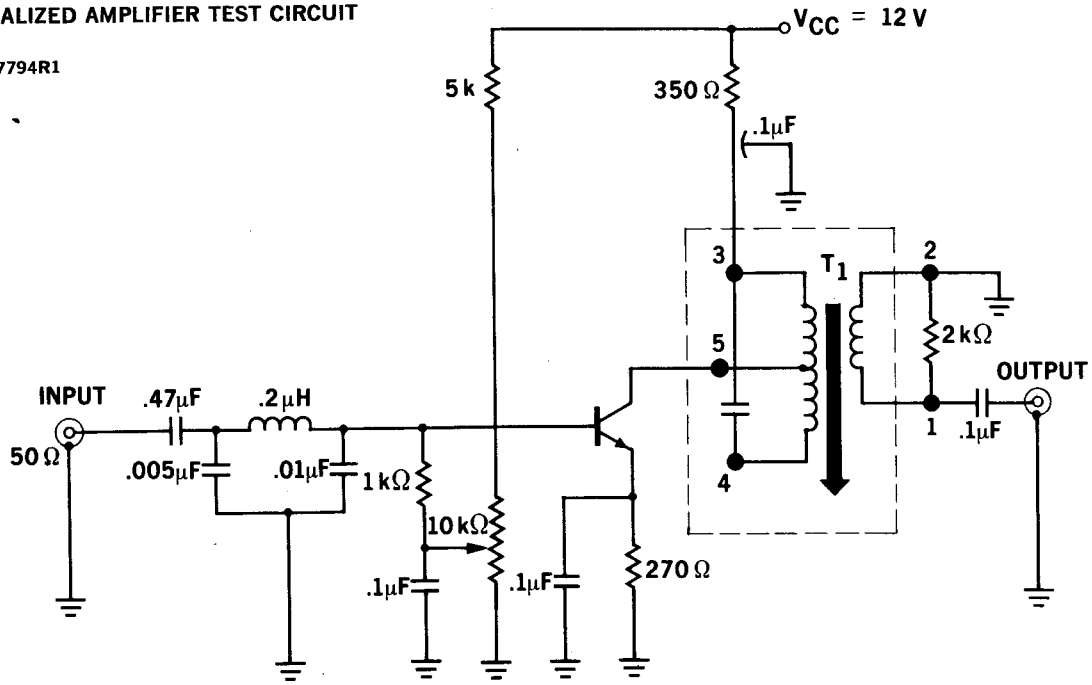
313 FAIRCHILD DRIVE, MOUNTAIN VIEW, CALIFORNIA, (415) 962-5011, TWX: 910-379-6435

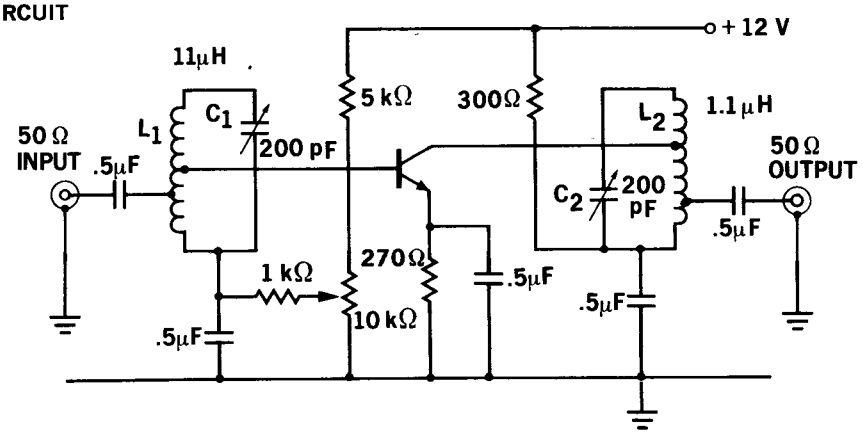
FAIRCHILD TRANSISTOR 2N5126

455 kHz UNNEUTRALIZED AMPLIFIER TEST CIRCUIT

T_1 = T.R.W. #17794R1



10.7 MHz UNNEUTRALIZED AMPLIFIER TEST CIRCUIT



C_1 and C_2 ARCO #465

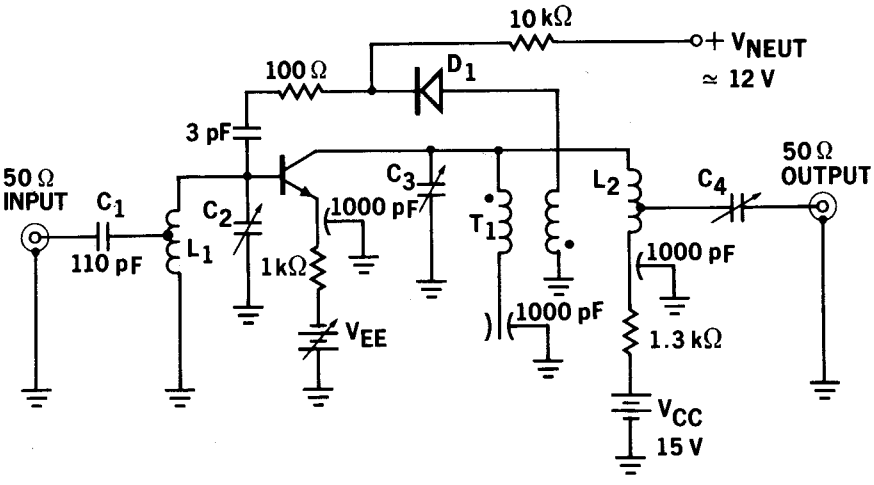
L_1 = 11 μH (0.9 inch of #632 AIRDUX COIL)
Input Tap at 2.9T from cold side
Output Tap at 3.66T from cold side

L_2 = 1.1 μH (1.5 inches of #608 AIRDUX COIL)
Input Tap at 2.3T from cold side
Output Tap at 0.5T from cold side

All resistors are ½ watt.

Typical gain at I_C = 4 mA is 34 dB.

100 MHz AGC AND NF TEST CIRCUIT



L_1 = #14 Buss Wire — 3T — ⅜" I.D. — 5/12" long
Tap at 1½T from cold end

L_2 = #18 enameled — 5T — ⅜" I.D. — 5/16" long
Tap at 1½T from cold end

T_1 = #36 Bifilar — 1T in balum core Q_3

C_2 = 1 to 35 pF Johanson #803 (or equivalent)

C_3, C_4 = 1 to 35 pF Johanson #803 (or equivalent)

D_1 — FD 300

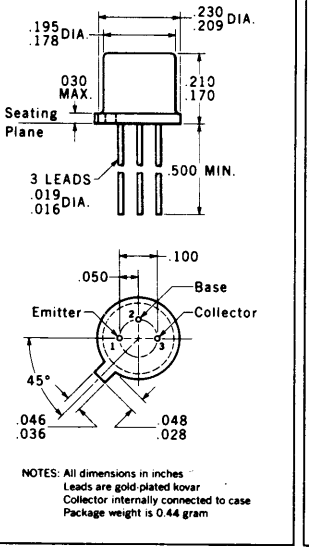
2N5144 • 2N5145

NPN RADIATION RESISTANT HIGH-VOLTAGE, HIGH-SPEED SWITCHES

DOUBLE DIFFUSED SILICON PLANAR* EPITAXIAL TRANSISTORS

- **GUARANTEED PERFORMANCE AFTER NEUTRON IRRADIATION OF 3×10^{14} nvt $>$ 10 keV**
- **FAST SWITCHING** . . . . . $t_{on} = 35$ ns (MAX) AT 500 mA
  $t_{off} = 60$ ns (MAX) AT 500 mA
- **HIGH BREAKDOWN VOLTAGE** . . . $LV_{CEO} = 30$ V (MIN)
- **HIGH GAIN** . . . . . $h_{FE} = 9.0$ (MIN) AT 100 mA, 1.0 V
  $h_{FE} = 5.0$ (MIN) AT 500 mA, 1.0 V

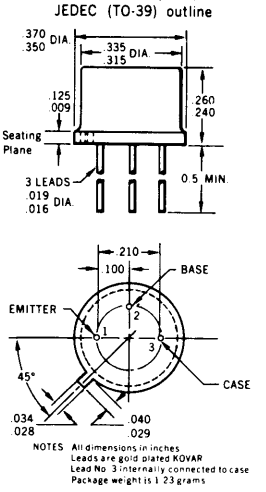
PHYSICAL DIMENSIONS in accordance with JEDEC (TO-18) outline



NOTES: All dimensions in inches
Leads are gold-plated kovar
Collector internally connected to case
Package weight is 0.44 gram

2N5144

PHYSICAL DIMENSIONS in accordance with JEDEC (TO-39) outline



NOTES: All dimensions in inches
Leads are gold-plated KOVAR
Lead No. 3 internally connected to case
Package weight is 1.23 grams

2N5145

ABSOLUTE MAXIMUM RATINGS (Note 1)

Maximum Temperatures

Storage Temperature	−65°C to +200°C
Operating Junction Temperature	+200°C
Lead Temperature (Soldering, 60 second time limit)	+300°C

Maximum Power Dissipation (Notes 2 and 3)	**2N5144**	**2N5145**
Total Dissipation at 25°C Case Temperature	1.2 Watts	3.5 Watts
at 25°C Ambient Temperature	0.36 Watt	0.8 Watt

Maximum Voltages and Current

V_{CBO}	Collector to Base Voltage	50 Volts
V_{CES}	Collector to Emitter Voltage	50 Volts
V_{CEO}	Collector to Emitter Voltage (Note 4)	30 Volts
V_{EBO}	Emitter to Base Voltage	6.0 Volts
I_C	Collector Current	500 mA

ELECTRICAL CHARACTERISTICS (25°C Free Air Temperature unless otherwise noted)

SYMBOL	CHARACTERISTICS	PRE-IRRADIATION MIN.	PRE-IRRADIATION TYP.	PRE-IRRADIATION MAX.	POST IRRADIATION 3×10^{14} nvt (>10 keV) MIN.	POST IRRADIATION 3×10^{14} nvt (>10 keV) TYP.	POST IRRADIATION 3×10^{14} nvt (>10 keV) MAX.	UNITS	TEST CONDITIONS	
h_{FE}	DC Pulse Current Gain (Note 5)	30	60		5.0	7.0			$I_C = 10$ mA	$V_{CE} = 1.0$ V
h_{FE}	**DC Pulse Current Gain** (Note 5)	**60**	**90**	**150**	**9.0**	**12**			**$I_C = 100$ mA**	**$V_{CE} = 1.0$ V**
h_{FE}	**DC Pulse Current Gain** (Note 5)	**35**	**50**		**5.0**	**6.0**			**$I_C = 500$ mA**	**$V_{CE} = 1.0$ V**
$h_{FE}(-55°C)$	DC Pulse Current Gain (Note 5)	30			5.0				$I_C = 100$ mA	$V_{CE} = 1.0$ V
$V_{BE(sat)}$	Base Saturation Voltage (Note 5)		0.75	0.86		0.79	0.90	Volts	$I_C = 100$ mA	$I_B = 10$ mA
$V_{BE(sat)}$	Base Saturation Voltage (Note 5)		0.78	0.90		0.82	0.95	Volts	$I_C = 100$ mA	$I_B = 20$ mA
$V_{BE(sat)}$	Base Saturation Voltage (Note 5)	0.9	0.95	1.2	0.8	0.99	1.3	Volts	$I_C = 500$ mA	$I_B = 50$ mA
$V_{BE(sat)}$	Base Saturation Voltage (Note 5)	0.9	1.0	1.3	0.9	1.1	1.5	Volts	$I_C = 500$ mA	$I_B = 100$ mA
I_{CBO}	Collector Cutoff Current		0.25	1.7			1.7	μA	$I_E = 0$	$V_{CB} = 40$ V
$I_{CBO}(+100°C)$	Collector Cutoff Current		25	120			120	μA	$I_E = 0$	$V_{CB} = 40$ V
BV_{CBO}	Collector to Base Breakdown Voltage	50			50			Volts	$I_C = 10\ \mu$A	$I_E = 0$
BV_{CES}	Collector to Emitter Breakdown Voltage	50			50			Volts	$I_C = 10\ \mu$A	$V_{BE} = 0$
BV_{EBO}	Emitter to Base Breakdown Voltage	6.0			6.0			Volts	$I_C = 0$	$I_E = 10\ \mu$A

*Planar is a patented Fairchild process.

NOTES:

(1) These ratings are limiting values above which the serviceability of any individual semiconductor device may be impaired.
(2) These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.
(3) These ratings give a maximum junction temperature of 200°C and junction to case thermal resistance of 50°C/Watt (derating factor of 20 mW/°C) for the 2N5144 and 146°C/Watt (derating factor of 6.85 mW/°C) for the 2N5145. Junction to ambient thermal resistance of 219°C/Watt (derating factor of 4.56 mW/°C) for the 2N5144 and 485°C/Watt (derating factor of 2.06 mW/°C) for the 2N5145.
(4) Rating refers to a high-current point where collector to emitter voltage is lowest.
(5) Pulse Conditions: length = 300 μs; duty cycle = 1%.

FAIRCHILD SEMICONDUCTOR
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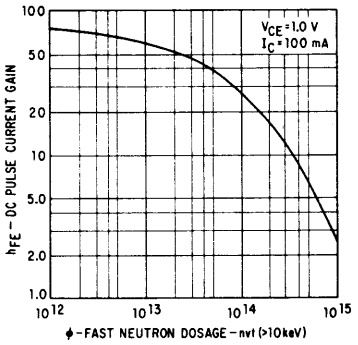
313 FAIRCHILD DRIVE, MOUNTAIN VIEW, CALIFORNIA, (415) 962-5011, TWX: 910-379-6435

ELECTRICAL CHARACTERISTICS (25°C Free Air Temperature unless otherwise noted)

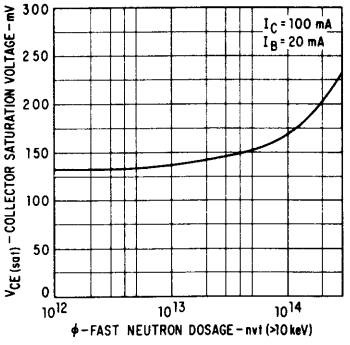
SYMBOL	CHARACTERISTICS	PRE-IRRADIATION MIN.	PRE-IRRADIATION TYP.	PRE-IRRADIATION MAX.	POST IRRADIATION 3×10^{14} nvt (>10 keV) MIN.	POST IRRADIATION 3×10^{14} nvt (>10 keV) TYP.	POST IRRADIATION 3×10^{14} nvt (>10 keV) MAX.	UNITS	TEST CONDITIONS	
$V_{CEO(sus)}$	**Collector to Emitter Sustaining Voltage** (Notes 4 and 5)	**30**			**30**			**Volts**	$I_C = 10$ mA	$I_B = 0$
$V_{CE(sat)}$	Pulsed Collector Saturation Voltage (Note 5)		0.13	0.2				Volts	$I_C = 100$ mA	$I_B = 10$ mA
$V_{CE(sat)}$	Pulsed Collector Saturation Voltage (Note 5)		0.11	0.18		0.23	0.4	Volts	$I_C = 100$ mA	$I_B = 20$ mA
$V_{CE(sat)}$	Pulsed Collector Saturation Voltage (Note 5)		0.3	0.42				Volts	$I_C = 500$ mA	$I_B = 50$ mA
$V_{CE(sat)}$	Pulsed Collector Saturation Voltage (Note 5)		0.27	0.4		0.56	1.1	Volts	$I_C = 500$ mA	$I_B = 100$ mA
t_{on}	**Turn On Time** (See circuit below)			**35**			**35**	**ns**	$I_C \approx 500$ mA	$I_{B1} \approx 100$ mA
t_{off}	**Turn Off Time** (See circuit below)			**60**			**60**	**ns**	$I_C \approx 500$ mA	$I_{B1} \approx 100$ mA $I_{B2} \approx -100$ mA
h_{fe}	High Frequency Current Gain (f = 100 MHz)	3.0	4.5		2.5	4.0			$I_C = 50$ mA	$V_{CE} = 10$ V
C_{cb}	Collector to Base Capacitance			12			12	pF	$I_E = 0$	$V_{CB} = 10$ V
C_{eb}	Emitter to Base Capacitance			55			55	pF	$I_C = 0$	$V_{EB} = 0.5$ V

TYPICAL ELECTRICAL CHARACTERISTICS

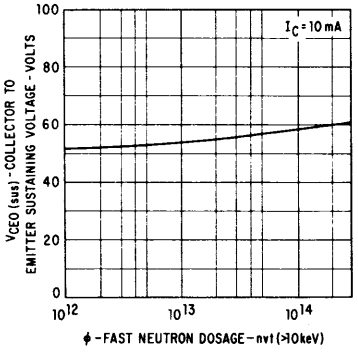
DC PULSE CURRENT GAIN VERSUS FAST NEUTRON DOSAGE



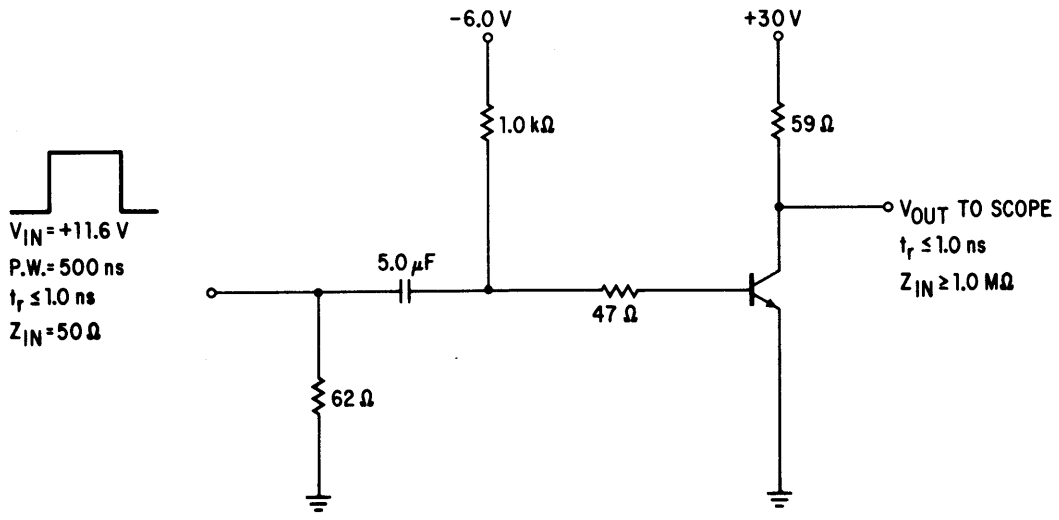
COLLECTOR SATURATION VOLTAGE VERSUS FAST NEUTRON DOSAGE



COLLECTOR TO EMITTER SUSTAINING VOLTAGE VERSUS FAST NEUTRON DOSAGE

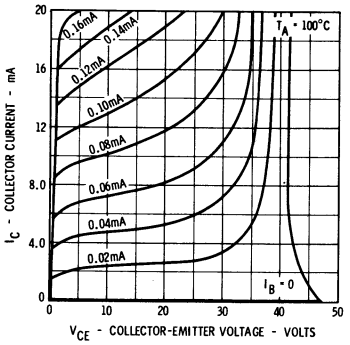


t_{on}, t_{off} TEST CIRCUIT

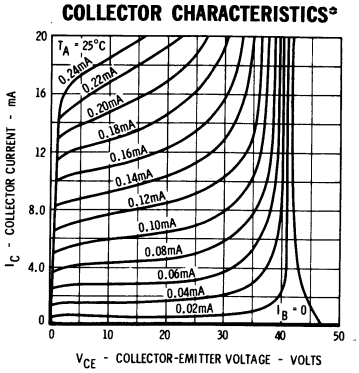


TYPICAL ELECTRICAL CHARACTERISTICS

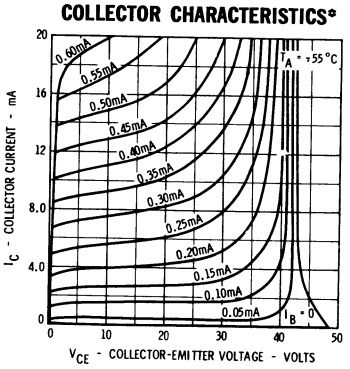
COLLECTOR CHARACTERISTICS*



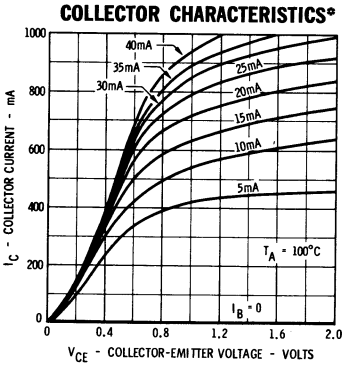
COLLECTOR CHARACTERISTICS*



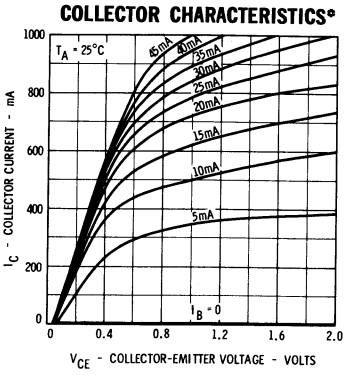
COLLECTOR CHARACTERISTICS*



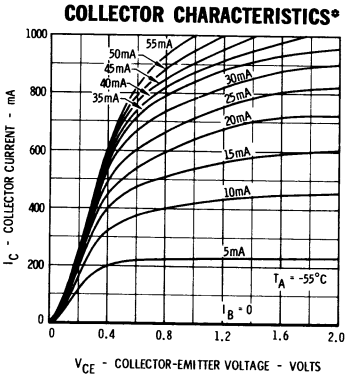
COLLECTOR CHARACTERISTICS*



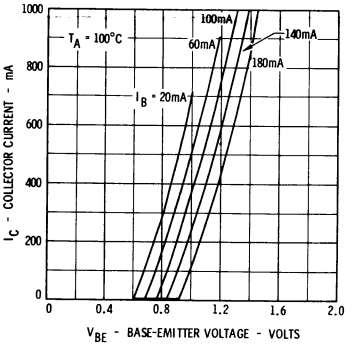
COLLECTOR CHARACTERISTICS*



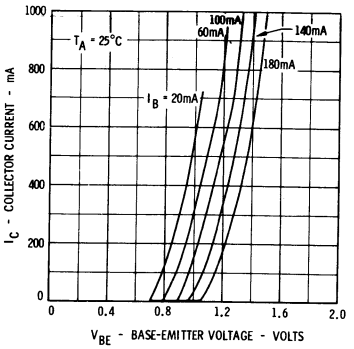
COLLECTOR CHARACTERISTICS*



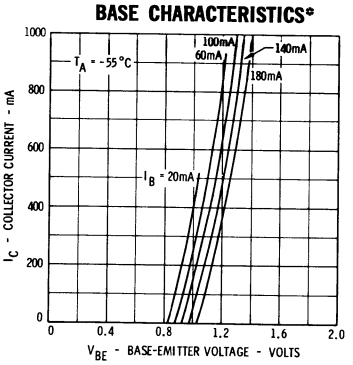
BASE CHARACTERISTICS*



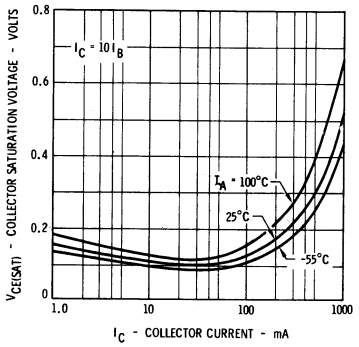
BASE CHARACTERISTICS*



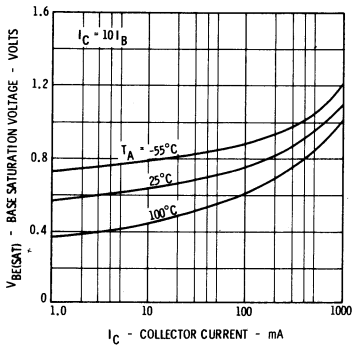
BASE CHARACTERISTICS*



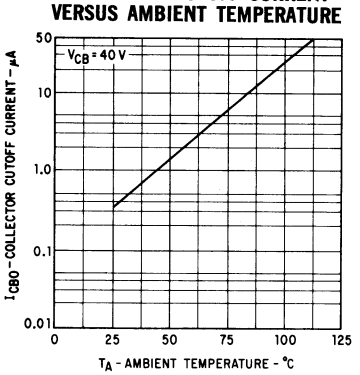
COLLECTOR SATURATION VOLTAGE VERSUS COLLECTOR CURRENT



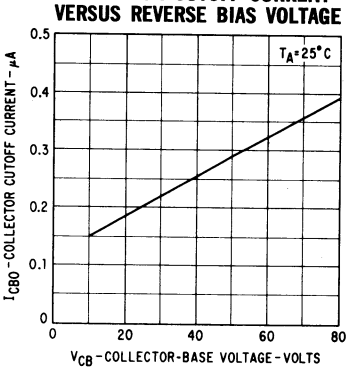
BASE SATURATION VOLTAGE VERSUS COLLECTOR CURRENT



COLLECTOR CUTOFF CURRENT VERSUS AMBIENT TEMPERATURE



COLLECTOR CUTOFF CURRENT VERSUS REVERSE BIAS VOLTAGE



*Single family characteristics on Transistor Curve Tracer.

2N5147 • 2N5149

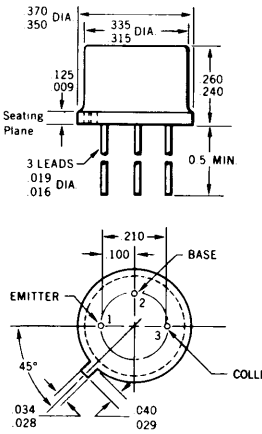
6 WATT PNP POWER TRANSISTORS

DIFFUSED SILICON PLANAR* EPITAXIAL TRANSISTORS

SEE 2N5148 • 2N5150 FOR NPN COMPLEMENT

- **HIGH POWER** . . . . . **6 WATTS AT $T_C = 50°C$, $V_{CE} = -40$ V**
- **HIGH VOLTAGE** . . . . . **−80 V (MIN) LV_{CEO}**
- **HIGH CURRENT SATURATION VOLTAGE** . . . **−0.85 V (MAX) $V_{CE(sat)}$ AT $I_C = 2.0$ A**
- **HIGH FREQUENCY** . . . . . **50 AND 60 MHz (MIN) f_T**
- **BETA GUARANTEED AT 3 POINTS** . . . . . **50 mA, 1.0 A AND 2.0 A**
- **DISCRETE EMITTER GEOMETRY WITH INTEGRATED FEEDBACK RESISTORS**

PHYSICAL DIMENSIONS
in accordance with
JEDEC (TO-39) outline



NOTES:
All dimensions in inches.
Leads are gold plated Kovar.
Lead No. 3 internally connected to case.
Package weight is 1.23 grams.

ABSOLUTE MAXIMUM RATINGS (Note 1)

Maximum Temperatures

Storage Temperature	−65°C to +200°C
Operating Junction Temperature	−65°C to +200°C
Lead Temperature (Soldering, 60 second time limit)	+300°C

Maximum Power Dissipation

Total Dissipation at 50°C Case Temperature, $V_{CE} = -40$ V	**6.0 Watts**
at 25°C Ambient Temperature	1.0 Watt
(See Maximum Permissible Power Curve and Note 4)	

Maximum Voltages and Current

V_{CES}	Collector to Emitter Voltage	−100 Volts
V_{CEO}	Collector to Emitter Voltage (Note 2)	−80 Volts
V_{EBO}	Emitter to Base Voltage	−5.5 Volts
I_C	Collector Current	2.0 Amps

ELECTRICAL CHARACTERISTICS (25°C Free Air Temperature unless otherwise noted)

		2N5147			2N5149				
SYMBOL	CHARACTERISTICS	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
$V_{CEO(sus)}$	**Collector to Emitter Sustaining Voltage** (Notes 2 & 3)	**−80**			**−80**			**Volts**	$I_C = 100$ mA $I_B = 0$
BV_{CES}	Collector to Emitter Breakdown Voltage	−100			−100			Volts	$I_C = 1.0$ mA $V_{BE} = 0$
BV_{EBO}	Emitter to Base Breakdown Voltage	−5.5			−5.5			Volts	$I_C = 0$ $I_E = 1.0$ mA
h_{FE}	**DC Pulse Current Gain** (Note 3)	20	39		50	85			$I_C = 50$ mA $V_{CE} = -5.0$ V
h_{FE}	**DC Pulse Current Gain** (Note 3)	**30**	**40**	**90**	**70**	**87**	**200**		$I_C = 1.0$ A $V_{CE} = -5.0$ V
$h_{FE}(-55°C)$	DC Pulse Current Gain (Note 3)	15	24		35	52			$I_C = 1.0$ A $V_{CE} = -5.0$ V
h_{FE}	**DC Pulse Current Gain** (Note 3)	**15**	**28**		**30**	**50**			$I_C = 2.0$ A $V_{CE} = -5.0$ V
h_{fe}	**High Frequency Current Gain (f = 20 MHz)**	**2.5**	**4.8**		**3.0**	**6.1**			$I_C = 0.2$ A $V_{CE} = -5.0$ V
$V_{CE(sat)}$	Pulsed Collector Saturation Voltage (Notes 3 & 5)		−0.38	−0.46		−0.38	−0.46	Volts	$I_C = 1.0$ A $I_B = 0.1$ A
$V_{CE(sat)}$	**Pulsed Collector Saturation Voltage** (Notes 3 & 5)		**−0.73**	**−0.85**		**−0.73**	**−0.85**	**Volts**	$I_C = 2.0$ A $I_B = 0.2$ A

Additional Electrical Characteristics on page 2 Notes on page 2.

*Planar is a patented Fairchild process.

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ELECTRICAL CHARACTERISTICS (25°C Free Air Temperature unless otherwise noted)

SYMBOL	CHARACTERISTICS	2N5147 MIN.	2N5147 TYP.	2N5147 MAX.	2N5149 MIN.	2N5149 TYP.	2N5149 MAX.	UNITS	TEST CONDITIONS	
$V_{BE(sat)}$	Pulsed Base Saturation Voltage (Notes 3 and 5)		−0.96	−1.2		−0.96	−1.2	Volts	$I_C = 1.0$ A	$I_B = 0.1$ A
$V_{BE(sat)}$	Pulsed Base Saturation Voltage (Notes 3 and 5)		−1.28	−1.5		−1.28	−1.5	Volts	$I_C = 2.0$ A	$I_B = 0.2$ A
$V_{BE(on)}$	Pulsed Base Emitter "ON" Voltage (Notes 3 and 5)			−1.5			−1.5	Volts	$I_C = 2.0$ A	$V_{CE} = -5.0$ V
I_{CES}	Collector Cutoff Current		.002	1.0		.002	1.0	μA	$V_{CE} = -60$ V	$V_{BE} = 0$
I_{EBO}	Emitter Cutoff Current			1.0			1.0	μA	$I_C = 0$	$V_{EB} = -4.0$ V
I_{CEX}(150°C)	Collector Reverse Current			500			500	μA	$V_{CE} = -60$ V	$V_{EB} = -2.0$ V
C_{cb}	Collector to Base Capacitance		46	120		46	120	pF	$I_E = 0$	$V_{CB} = -10$ V

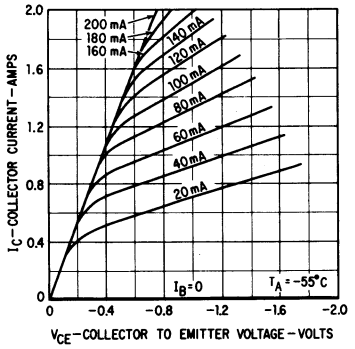
NOTES:

(1) These ratings are limiting values above which the serviceability of any individual semiconductor device may be impaired.
(2) This rating refers to a high current point where collector to emitter voltage is lowest. For more information send for Fairchild Publication APP-4/2.
(3) Pulse Conditions: length = 300 μs; duty cycle = 1%.
(4) Device is thermally limited under free air (ambient) operating conditions. Maximum junction to ambient thermal resistant is 175°C/Watt.
(5) $V_{BE(on)}$ and saturation voltages measured ¼" from header.

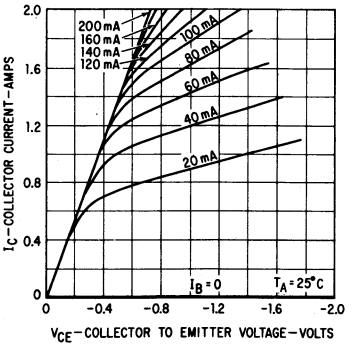
MAXIMUM PERMISSIBLE DC FORWARD BIASED POWER DISSIPATION

TYPICAL ELECTRICAL CHARACTERISTICS

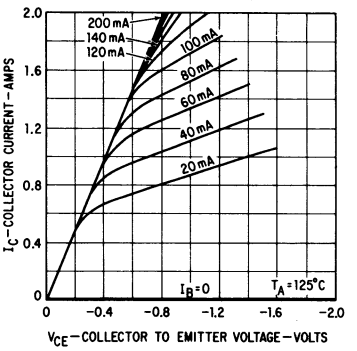
COLLECTOR CHARACTERISTICS* SATURATION REGION



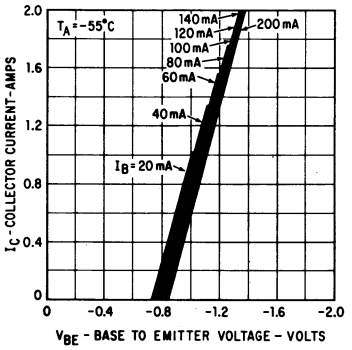
COLLECTOR CHARACTERISTICS* SATURATION REGION



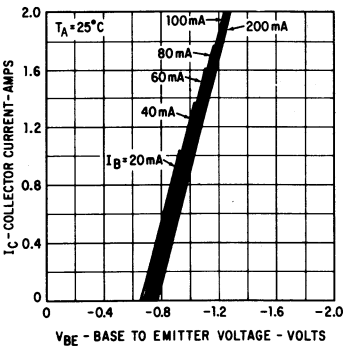
COLLECTOR CHARACTERISTICS* SATURATION REGION



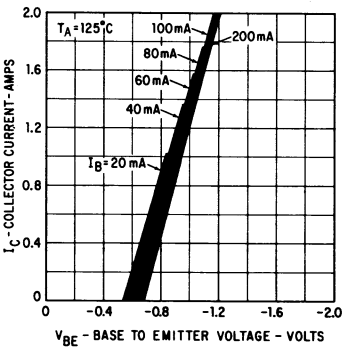
BASE CHARACTERISTICS*



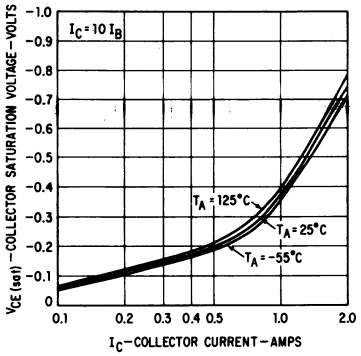
BASE CHARACTERISTICS*



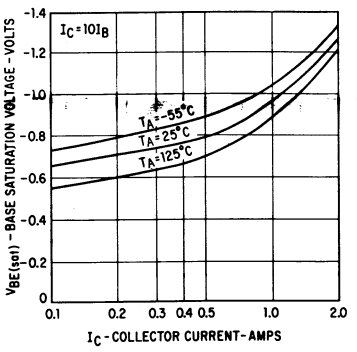
BASE CHARACTERISTICS*



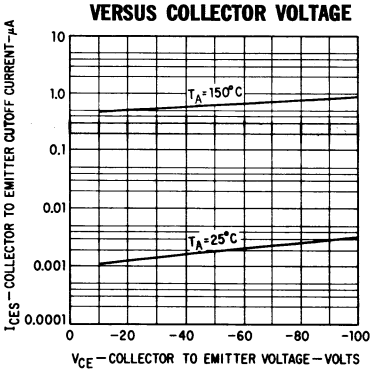
COLLECTOR SATURATION VOLTAGE VERSUS COLLECTOR CURRENT



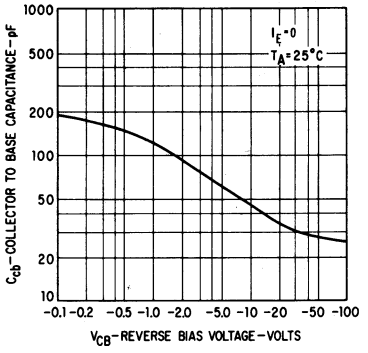
BASE SATURATION VOLTAGE VERSUS COLLECTOR CURRENT



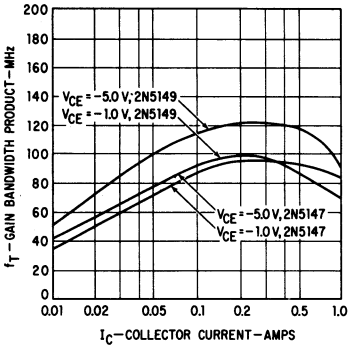
COLLECTOR CUTOFF CURRENT VERSUS COLLECTOR VOLTAGE



COLLECTOR TO BASE CAPACITANCE VERSUS REVERSE BIAS VOLTAGE



GAIN BANDWIDTH PRODUCT VERSUS COLLECTOR CURRENT

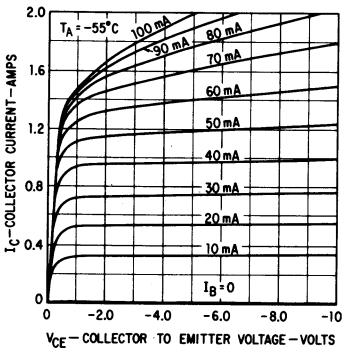


*Single Family Characteristics on Transistor Curve Tracer.

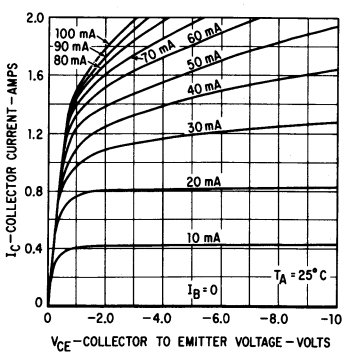
TYPICAL ELECTRICAL CHARACTERISTICS

2N5147

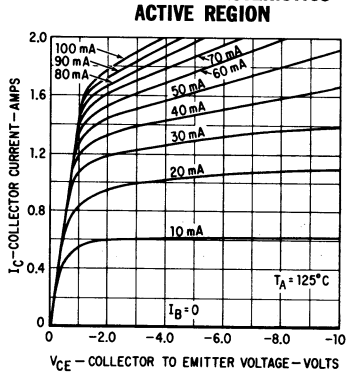
COLLECTOR CHARACTERISTICS* ACTIVE REGION



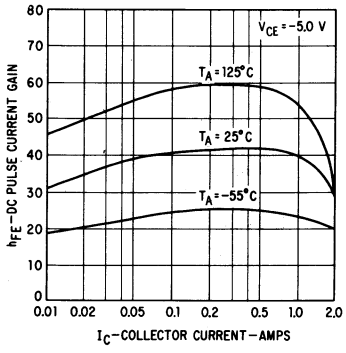
COLLECTOR CHARACTERISTICS* ACTIVE REGION



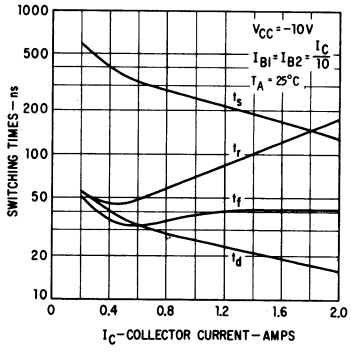
COLLECTOR CHARACTERISTICS* ACTIVE REGION



DC PULSE CURRENT GAIN VERSUS COLLECTOR CURRENT

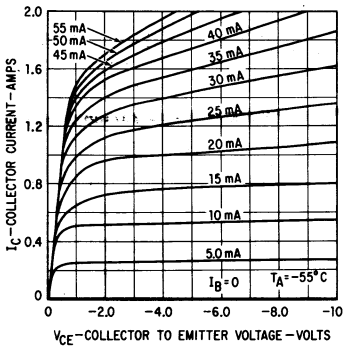


SWITCHING TIMES VERSUS COLLECTOR CURRENT

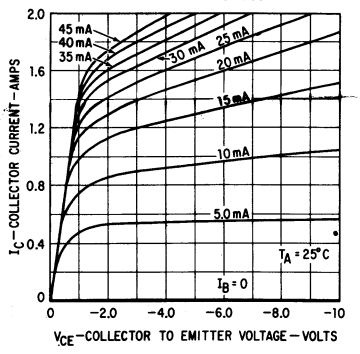


2N5149

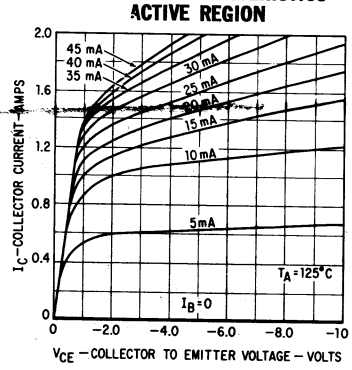
COLLECTOR CHARACTERISTICS* ACTIVE REGION



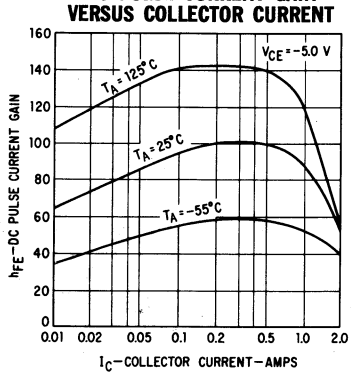
COLLECTOR CHARACTERISTICS* ACTIVE REGION



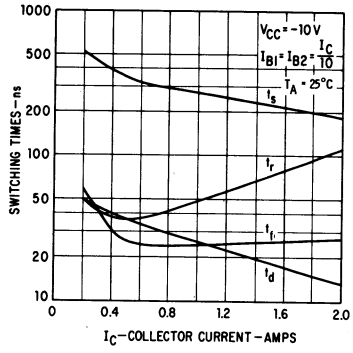
COLLECTOR CHARACTERISTICS* ACTIVE REGION



DC PULSE CURRENT GAIN VERSUS COLLECTOR CURRENT



SWITCHING TIMES VERSUS COLLECTOR CURRENT



*Single Family Characteristics on Transistor Curve Tracer.

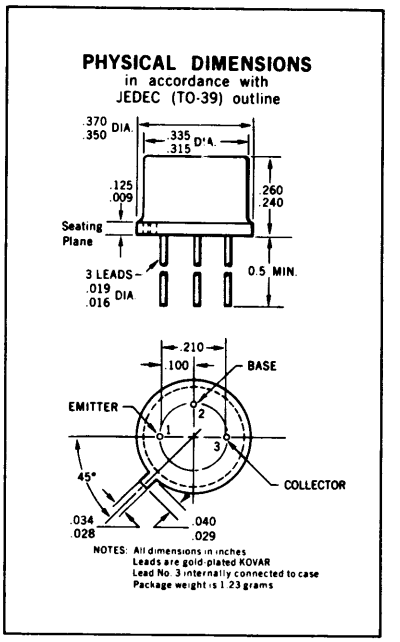
2N5148 • 2N5150

6 WATT NPN POWER TRANSISTORS

DIFFUSED SILICON PLANAR* EPITAXIAL TRANSISTORS

SEE 2N5147 • 2N5149 FOR PNP COMPLEMENT

- **HIGH POWER** . . . . . 6.0 WATTS AT $T_C = 50°C$, $V_{CE} = 40$ V
- **HIGH VOLTAGE** . . . . . 80 V (MIN) LV_{CEO}
- **HIGH CURRENT SATURATION VOLTAGE** . . . 0.85 V (MAX) $V_{CE(sat)}$ AT 2.0 A
- **HIGH FREQUENCY** . . . . . 50 AND 60 MHz (MIN) f_T
- **BETA GUARANTEED AT 3 POINTS** . . . . . 50 mA, 1.0 A AND 2.0 A
- **DISCRETE EMITTER GEOMETRY WITH INTEGRATED FEEDBACK RESISTORS**



ABSOLUTE MAXIMUM RATINGS (Note 1)

Maximum Temperatures

Storage Temperature	−65°C to +200°C
Operating Junction Temperature	−65°C to +200°C
Lead Temperature (Soldering, 60 second time limit)	+300°C

Maximum Power Dissipation (Note 4)

Total Dissipation at 50°C Case Temperature, $V_{CE} = 40$ V	**6.0 Watts**
at 25°C Ambient Temperature	1.0 Watt

Maximum Voltages and Current

V_{CES}	Collector to Emitter Voltage	100 Volts
V_{CEO}	Collector to Emitter Voltage (Note 2)	80 Volts
V_{EBO}	Emitter to Base Voltage	6.0 Volts
I_C	Collector Current	2.0 Amps

ELECTRICAL CHARACTERISTICS (25°C Free Air Temperature unless otherwise noted)

SYMBOL	CHARACTERISTICS	2N5148 MIN.	2N5148 TYP.	2N5148 MAX.	2N5150 MIN.	2N5150 TYP.	2N5150 MAX.	UNITS	TEST CONDITIONS
$V_{CEO(sus)}$	**Collector to Emitter Sustaining Voltage** (Notes 2 and 3)	**80**			**80**			**Volts**	$I_C = 100$ mA $I_B = 0$
BV_{CES}	Collector to Emitter Breakdown Voltage	100			100			Volts	$I_C = 1.0$ mA $V_{BE} = 0$
BV_{EBO}	Emitter to Base Breakdown Voltage	6.0			6.0			Volts	$I_C = 0$ $I_E = 1.0$ mA
h_{FE}	**DC Pulse Current Gain** (Note 3)	**20**	**64**		**50**	**120**			$I_C = 50$ mA $V_{CE} = 5.0$ V
h_{FE}	**DC Pulse Current Gain** (Note 3)	**30**	**63**	**90**	**70**	**110**	**200**		$I_C = 1.0$ A $V_{CE} = 5.0$ V
$h_{FE}(-55°C)$	DC Pulse Current Gain (Note 3)	15	45		35	63			$I_C = 1.0$ A $V_{CE} = 5.0$ V
h_{FE}	**DC Pulse Current Gain** (Note 3)	**15**	**33**		**30**	**56**			$I_C = 2.0$ A $V_{CE} = 5.0$ V
h_{fe}	**High Frequency Current Gain** ($f = 20$ MHz)	**2.5**	**3.8**		**3.0**	**4.3**			$I_C = 0.2$ A $V_{CE} = 5.0$ V
$V_{CE(sat)}$	Pulsed Collector Saturation Voltage (Notes 3 and 5)		0.38	0.46		0.38	0.46	Volts	$I_C = 1.0$ A $I_B = 0.1$ A
$V_{CE(sat)}$	**Pulsed Collector Saturation Voltage** (Notes 3 and 5)		**0.75**	**0.85**		**0.75**	**0.85**	**Volts**	$I_C = 2.0$ A $I_B = 0.2$ A

Additional Electrical Characteristics on page 2
Notes on page 2

*Planar is a patented Fairchild process.

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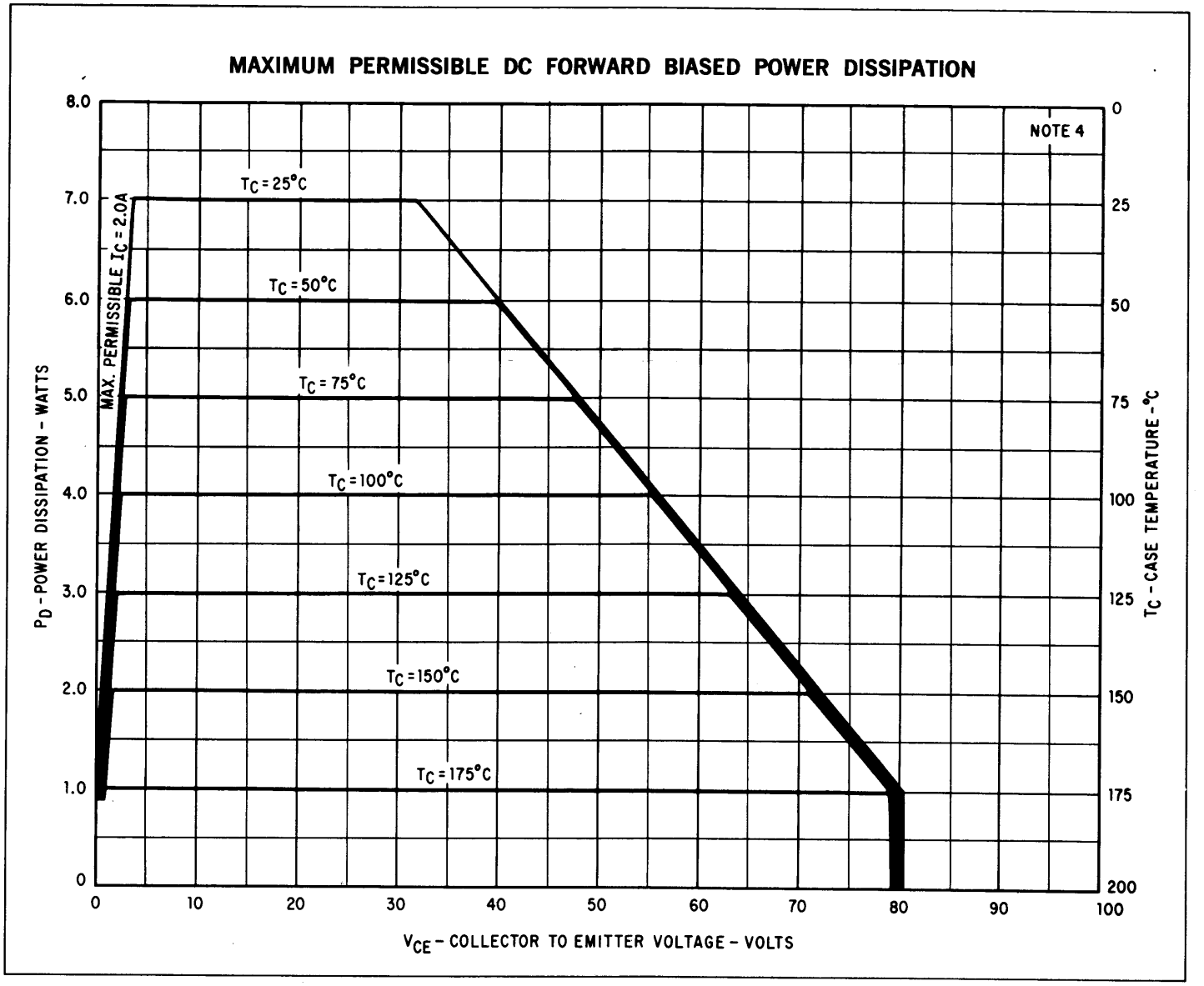
ELECTRICAL CHARACTERISTICS (25°C Free Air Temperature unless otherwise noted)

SYMBOL	CHARACTERISTICS	2N5148 MIN.	2N5148 TYP.	2N5148 MAX.	2N5150 MIN.	2N5150 TYP.	2N5150 MAX.	UNITS	TEST CONDITIONS	
$V_{BE(sat)}$	Pulsed Base Saturation Voltage (Notes 3 and 5)		0.98	1.2		0.98	1.2	Volts	$I_C = 1.0$ A	$I_B = 0.1$ A
$V_{BE(sat)}$	Pulsed Base Saturation Voltage (Notes 3 and 5)		1.30	1.5		1.30	1.5	Volts	$I_C = 2.0$ A	$I_B = 0.2$ A
V_{BE}(on)	Pulsed Base Emitter "ON" Voltage (Notes 3 and 5)			1.5			1.5	Volts	$I_C = 2.0$ A	$V_{CE} = 5.0$ V
I_{CES}	Collector Cutoff Current		.002	1.0		.002	1.0	μA	$V_{CE} = 60$ V	$V_{BE} = 0$
I_{EBO}	Emitter Cutoff Current			1.0			1.0	μA	$I_C = 0$	$V_{EB} = 5.0$ V
I_{CEX}(+150°C)	Collector Reverse Current			500			500	μA	$V_{CE} = 60$ V	$V_{EB} = 2.0$ V
C_{cb}	Collector to Base Capacitance		30	70		30	70	pF	$I_E = 0$	$V_{CB} = 10$ V

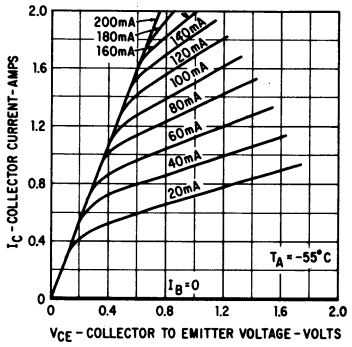
NOTES:

(1) These ratings are limiting values above which the serviceability of any individual semiconductor device may be impaired.
(2) This rating refers to a high current point where collector to emitter voltage is lowest. For more information send for Fairchild Publication APP-4/2.
(3) Pulse Conditions: length = 300μs; duty cycle = 1%.
(4) Device is thermally limited under free air (ambient) operating conditions. Maximum junction-to-ambient thermal resistance is 175°C/Watt. Contact factory for maximum permissible power under pulsed or reversed biased operating conditions.
(5) $V_{BE(on)}$ and saturation voltages measured ¼" from header.

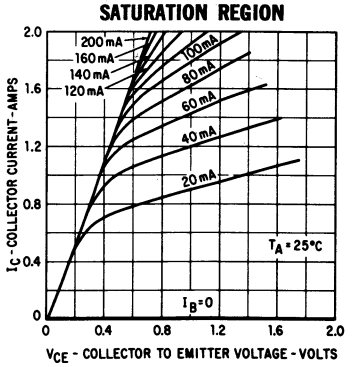


TYPICAL ELECTRICAL CHARACTERISTICS

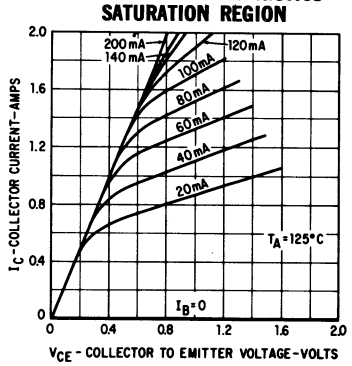
COLLECTOR CHARACTERISTICS* SATURATION REGION



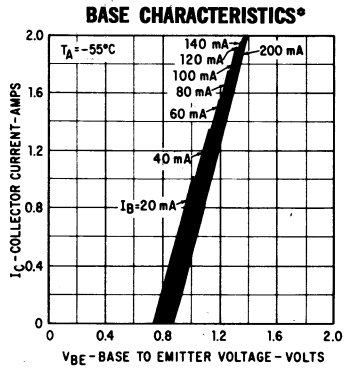
COLLECTOR CHARACTERISTICS* SATURATION REGION



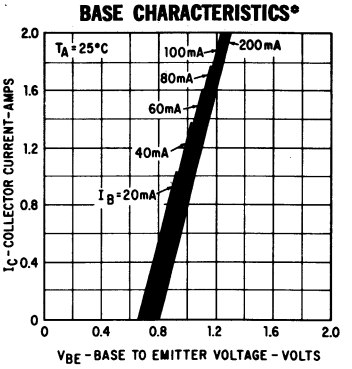
COLLECTOR CHARACTERISTICS* SATURATION REGION



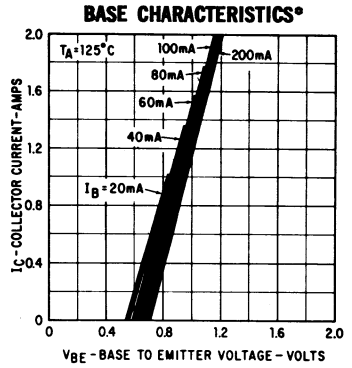
BASE CHARACTERISTICS*



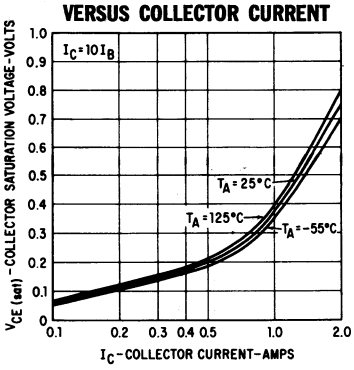
BASE CHARACTERISTICS*



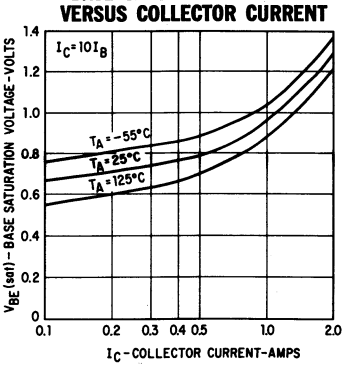
BASE CHARACTERISTICS*



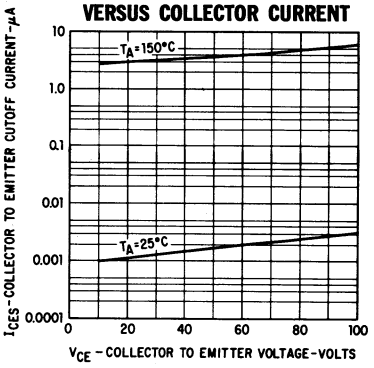
COLLECTOR SATURATION VOLTAGE VERSUS COLLECTOR CURRENT



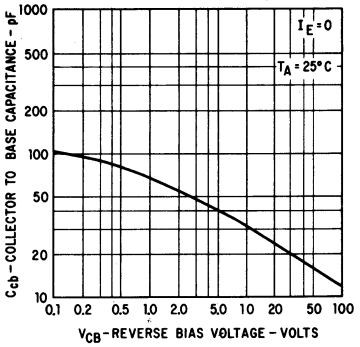
BASE SATURATION VOLTAGE VERSUS COLLECTOR CURRENT



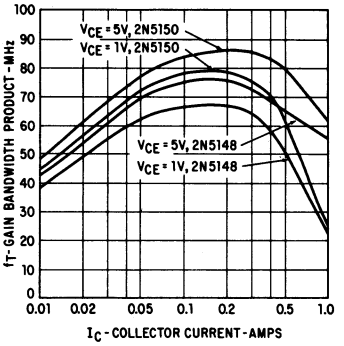
COLLECTOR CUTOFF CURRENT VERSUS COLLECTOR CURRENT



COLLECTOR TO BASE CAPACITANCE VERSUS REVERSE BIAS VOLTAGE



GAIN BANDWIDTH PRODUCT VERSUS COLLECTOR CURRENT

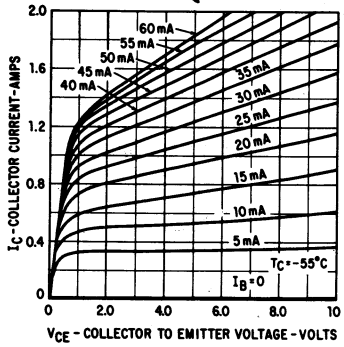


*Single Family Characteristics on Transistor Curve Tracer.

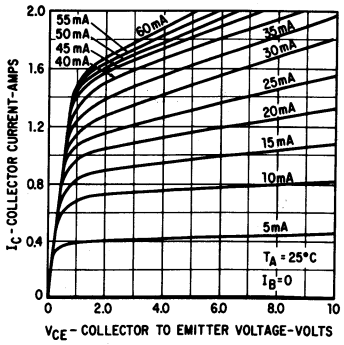
TYPICAL ELECTRICAL CHARACTERISTICS

2N5148

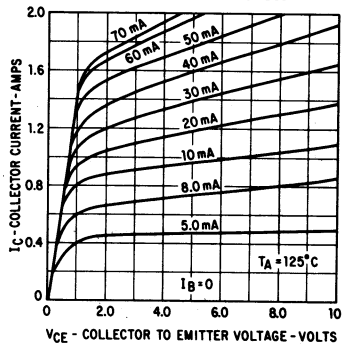
COLLECTOR CHARACTERISTICS* SATURATION REGION



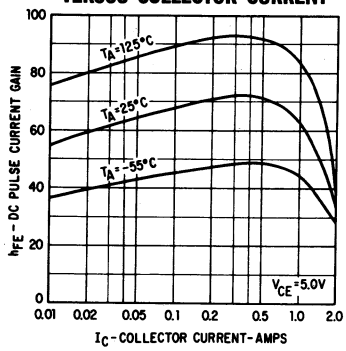
COLLECTOR CHARACTERISTICS* SATURATION REGION



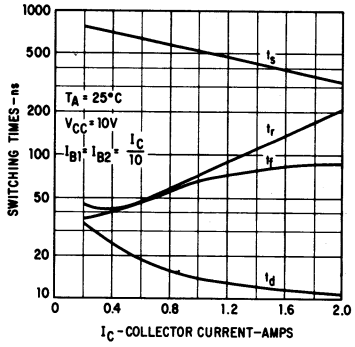
COLLECTOR CHARACTERISTICS* SATURATION REGION



DC PULSE CURRENT GAIN VERSUS COLLECTOR CURRENT

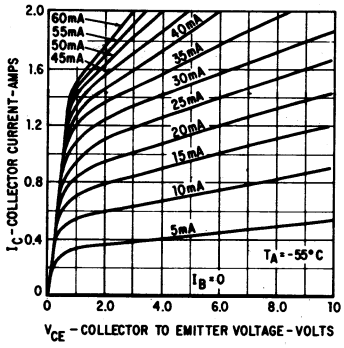


SWITCHING TIMES VERSUS COLLECTOR CURRENT

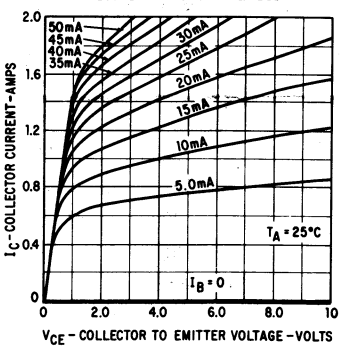


2N5150

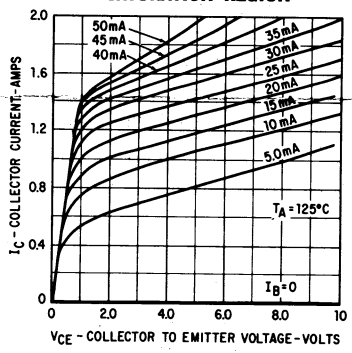
COLLECTOR CHARACTERISTICS* SATURATION REGION



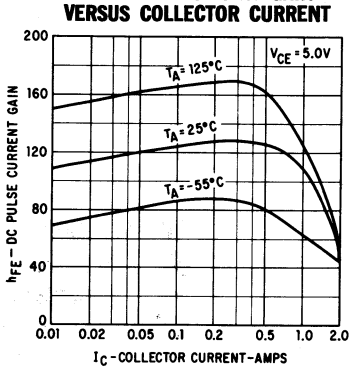
COLLECTOR CHARACTERISTICS* SATURATION REGION



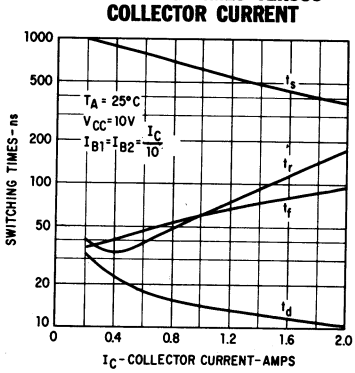
COLLECTOR CHARACTERISTICS* SATURATION REGION



DC PULSE CURRENT GAIN VERSUS COLLECTOR CURRENT



SWITCHING TIMES VERSUS COLLECTOR CURRENT



*Single Family Characteristics on Transistor Curve Tracer.

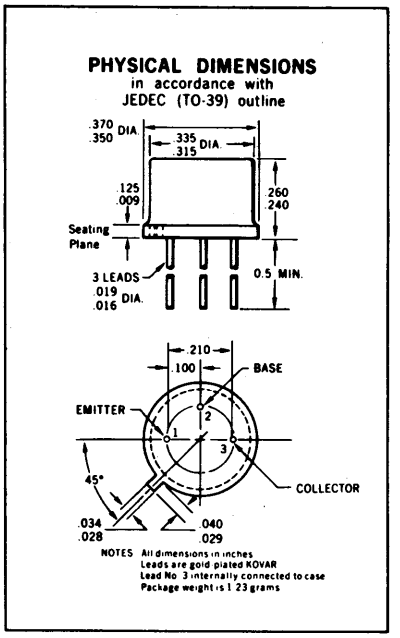
2N5151 • 2N5153

10 WATT PNP POWER TRANSISTORS

DIFFUSED SILICON PLANAR* EPITAXIAL TRANSISTORS

SEE 2N5152 • 2N5154 FOR NPN COMPLEMENT

- **HIGH POWER** . . . . . **10 WATTS AT $T_C = 50°C$, $V_{CE} = -40$ V**
- **HIGH VOLTAGE** . . . . . **— 80 V (MIN) LV_{CEO}**
- **HIGH CURRENT SATURATION VOLTAGE** . . . **— 1.5 V (MAX) $V_{CE(sat)}$ AT 5.0 A**
- **HIGH FREQUENCY** . . . . . **60 AND 70 MHz (MIN) f_T**
- **BETA GUARANTEED AT 3 POINTS** . . . . . **50 mA, 2.5 A AND 5.0 A**
- **DISCRETE EMITTER GEOMETRY WITH INTEGRATED FEEDBACK RESISTORS**



ABSOLUTE MAXIMUM RATINGS (Note 1)

Maximum Temperatures

Storage Temperature	−65°C to +200°C
Operating Junction Temperature	−65°C to +200°C
Lead Temperature (Soldering, 60 second time limit)	+300°C

Maximum Power Dissipation (Note 4)

Total Dissipation at 50°C Case Temperature, $V_{CE} = -40$ V (See Maximum Permissible Power Curve)	**10 Watts**
Total Dissipation at 25°C Ambient Temperature	1.0 Watt

Maximum Voltages and Current

V_{CES}	Collector to Emitter Voltage	−100 Volts
V_{CEO}	Collector to Emitter Voltage (Note 2)	−80 Volts
V_{EBO}	Emitter to Base Voltage	−5.5 Volts
I_C	Collector Current	5.0 Amps

ELECTRICAL CHARACTERISTICS (25°C Free Air Temperature unless otherwise noted)

SYMBOL	CHARACTERISTICS	2N5151 MIN.	2N5151 TYP.	2N5151 MAX.	2N5153 MIN.	2N5153 TYP.	2N5153 MAX.	UNITS	TEST CONDITIONS	
$V_{CEO(sus)}$	**Collector to Emitter Sustaining Voltage** (Notes 2 and 3)	**−80**			**−80**			**Volts**	$I_C = 100$ mA	$I_B = 0$
BV_{CES}	Collector to Emitter Breakdown Volage	−100			−100			Volts	$I_C = 1.0$ mA	$V_{BE} = 0$
BV_{EBO}	Emitter to Base Breakdown Voltage	−5.5			−5.5			Volts	$I_C = 0$	$I_E = 1.0$ mA
h_{FE}	**DC Pulse Current Gain** (Note 3)	**20**	**52**		**50**	**133**			$I_C = 50$ mA	$V_{CE} = -5.0$ V
h_{FE}	**DC Pulse Current Gain** (Note 3)	**30**	**50**	**90**	**70**	**114**	**200**		$I_C = 2.5$ A	$V_{CE} = -5.0$ V
$h_{FE}(-55°C)$	DC Pulse Current Gain (Note 3)	15	32		35	90			$I_C = 2.5$ A	$V_{CE} = -5.0$ V
h_{FE}	**DC Pulse Current Gain** (Note 3)	**20**	**38**		**40**	**77**			$I_C = 5.0$ A	$V_{CE} = -5.0$ V
h_{fe}	**High Frequency Current Gain (f = 20 MHz)**	**3.0**	**4.05**		**3.5**	**4.85**			$I_C = 0.5$ A	$V_{CE} = -5.0$ V
$V_{CE(sat)}$	Pulsed Collector Saturation Voltage (Notes 3 and 5)		−0.45	−0.75		−0.45	−0.75	Volts	$I_C = 2.5$ A	$I_B = 0.25$ A
$V_{CE(sat)}$	**Pulsed Collector Saturation Voltage** (Notes 3 and 5)		**−0.9**	**−1.5**		**−0.9**	**−1.5**	**Volts**	$I_C = 5.0$ A	$I_B = 0.5$ A

Additional Electrical Characteristics on page 2

*Planar is a patented Fairchild process.

FAIRCHILD
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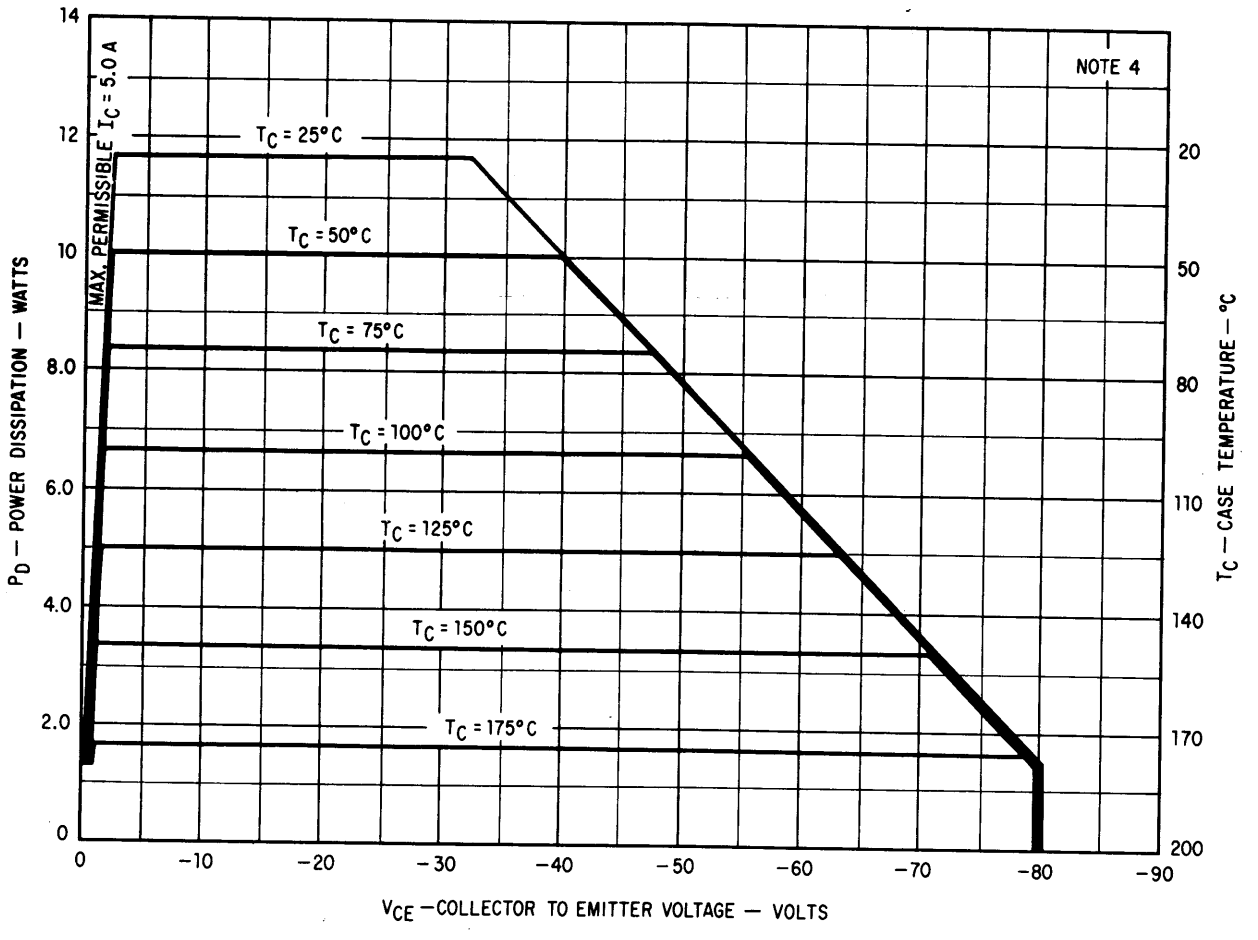
ELECTRICAL CHARACTERISTICS (25°C Free Air Temperature unless otherwise noted)

SYMBOL	CHARACTERISTICS	2N5151 MIN.	2N5151 TYP.	2N5151 MAX.	2N5153 MIN.	2N5153 TYP.	2N5153 MAX.	UNITS	TEST CONDITIONS	
$V_{BE(sat)}$	Pulsed Base Saturation Voltage (Notes 3 and 5)		−1.1	−1.45		−1.1	−1.45	Volts	$I_C = 2.5$ A	$I_B = 0.25$ A
$V_{BE(sat)}$	Pulsed Base Saturation Voltage (Notes 3 and 5)		−1.55	−2.2		−1.55	−2.2	Volts	$I_C = 5.0$ A	$I_B = 0.5$ A
$V_{BE(on)}$	Pulsed Base Emitter "On" Voltage (Notes 3 and 5)			−1.45			−1.45	Volts	$I_C = 2.5$ A	$V_{CE} = -5.0$ V
I_{CES}	Collector Cutoff Current		0.006	1.0		0.006	1.0	μA	$V_{CE} = -60$ V	$V_{BE} = 0$
I_{EBO}	Emitter Cutoff Current			1.0			1.0	μA	$I_C = 0$	$V_{BE} = 4.0$ V
$I_{CEX}(150°C)$	Collector Reverse Current			500			500	μA	$V_{CE} = -60$ V	$V_{BE} = 2.0$ V
C_{cb}	Collector to Base Capacitance		170	250		170	250	pF	$I_E = 0$	$V_{CB} = -10$ V

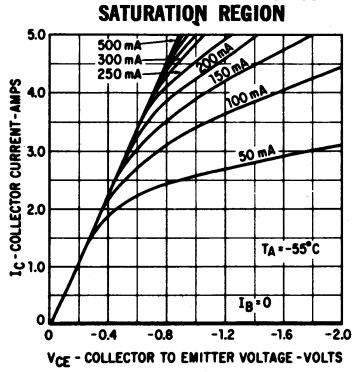
NOTES:
(1) These ratings are limiting values above which the serviceability of any individual semiconductor device may be impaired.
(2) This rating refers to a high current point where collector to emitter voltage is lowest. For more information send for Fairchild Publication APP-4/2.
(3) Pulse Conditions: length = 300 μs; duty cycle = 1%.
(4) Device is thermally limited under free air (ambient) operating conditions. Maximum junction-to-ambient thermal resistance is 175°C/Watt. Contact factory for maximum permissible power under pulsed or reversed biased operating conditions.
(5) $V_{BE(on)}$ and saturation voltages measured ¼" from header.

MAXIMUM PERMISSIBLE DC FORWARD BIASED POWER DISSIPATION

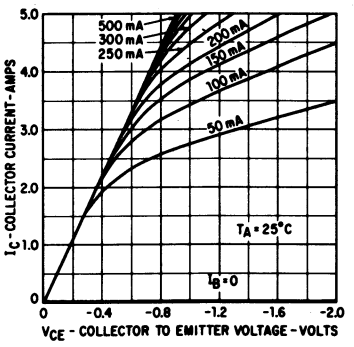


TYPICAL ELECTRICAL CHARACTERISTICS

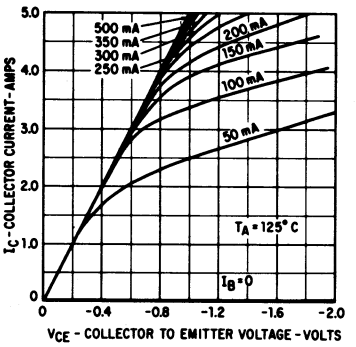
COLLECTOR CHARACTERISTICS* SATURATION REGION



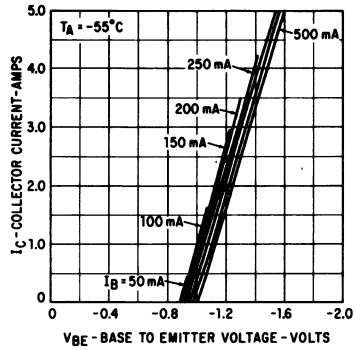
COLLECTOR CHARACTERISTICS* SATURATION REGION



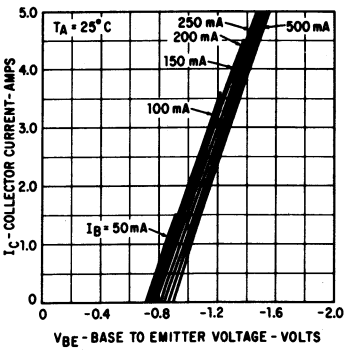
COLLECTOR CHARACTERISTICS* SATURATION REGION



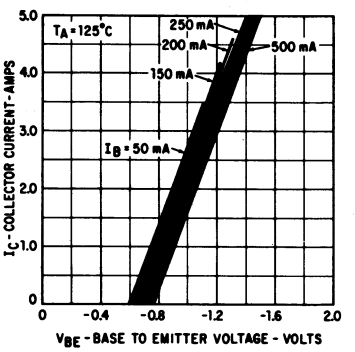
BASE CHARACTERISTICS*



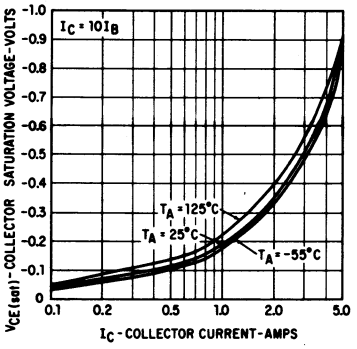
BASE CHARACTERISTICS*



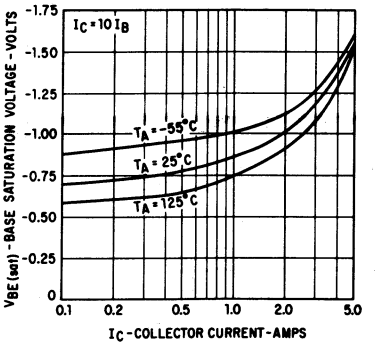
BASE CHARACTERISTICS*



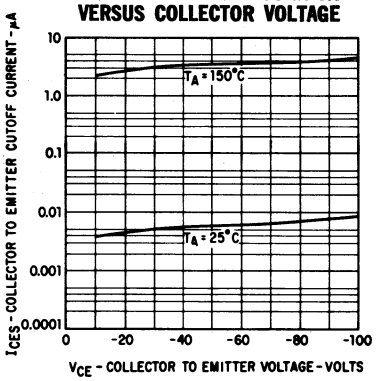
COLLECTOR SATURATION VOLTAGE VERSUS COLLECTOR CURRENT



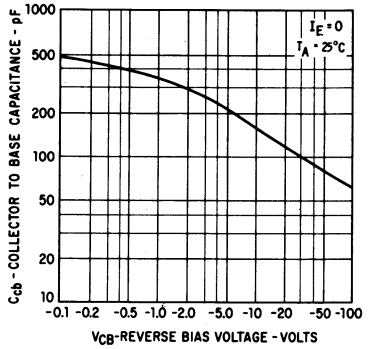
BASE SATURATION VOLTAGE VERSUS COLLECTOR CURRENT



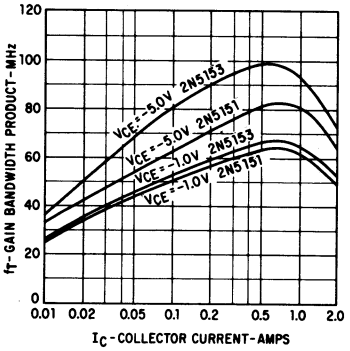
COLLECTOR CUTOFF CURRENT VERSUS COLLECTOR VOLTAGE



COLLECTOR TO BASE CAPACITANCE VERSUS REVERSE BIAS VOLTAGE



GAIN BANDWIDTH PRODUCT VERSUS COLLECTOR CURRENT

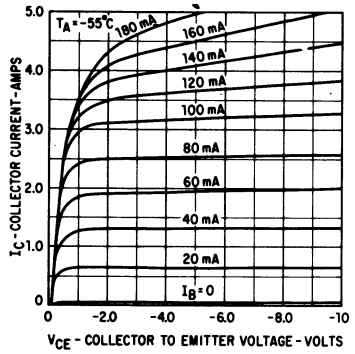


*Single Family Characteristics on Transistor Curve Tracer.

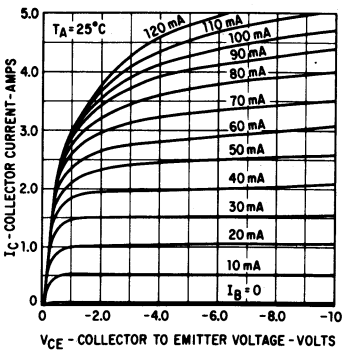
TYPICAL ELECTRICAL CHARACTERISTICS

2N5151

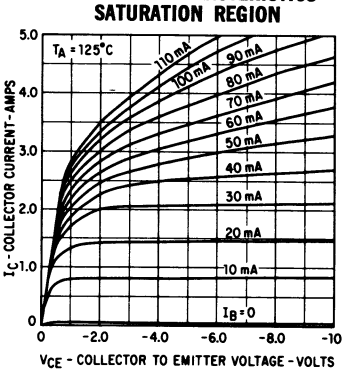
COLLECTOR CHARACTERISTICS* SATURATION REGION



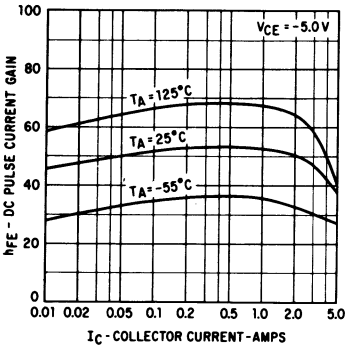
COLLECTOR CHARACTERISTICS* SATURATION REGION



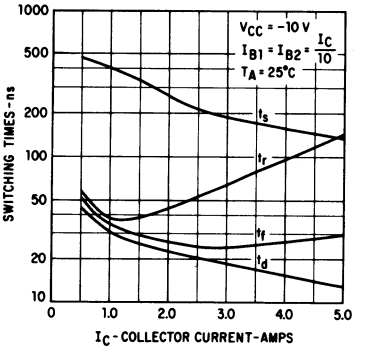
COLLECTOR CHARACTERISTICS* SATURATION REGION



DC PULSE CURRENT GAIN VERSUS COLLECTOR CURRENT

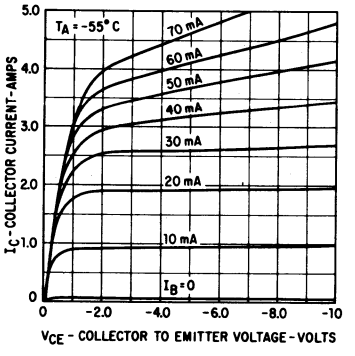


SWITCHING TIMES VERSUS COLLECTOR CURRENT

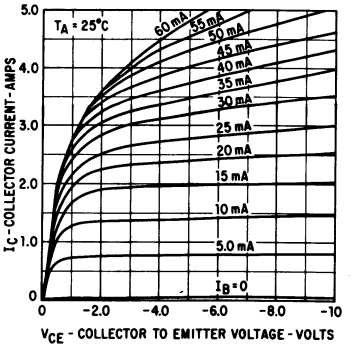


2N5153

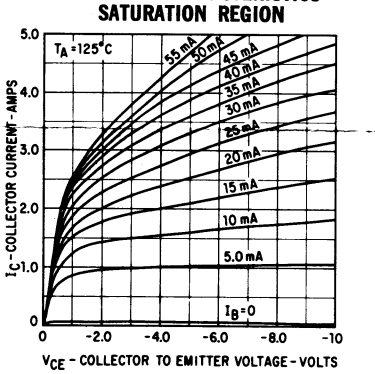
COLLECTOR CHARACTERISTICS* SATURATION REGION



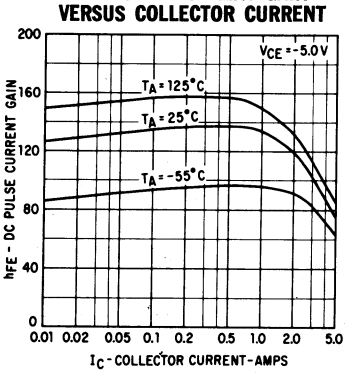
COLLECTOR CHARACTERISTICS* SATURATION REGION



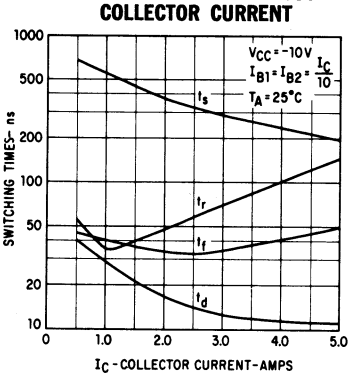
COLLECTOR CHARACTERISTICS* SATURATION REGION



DC PULSE CURRENT GAIN VERSUS COLLECTOR CURRENT



SWITCHING TIMES VERSUS COLLECTOR CURRENT



*Single Family Characteristics on Transistor Curve Tracer.

2N5152 • 2N5154

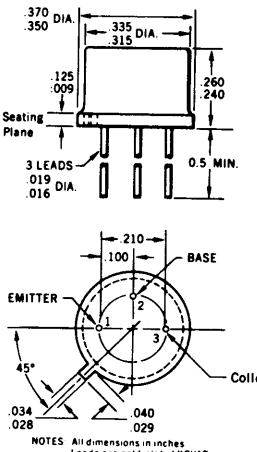
10 WATT NPN POWER TRANSISTORS

DIFFUSED SILICON PLANAR* EPITAXIAL TRANSISTORS

SEE 2N5151 • 2N5153 FOR PNP COMPLEMENT

- **HIGH POWER** . . . . . **10 WATTS AT $T_C = 50°C$, $V_{CE} = 40$ V**
- **HIGH VOLTAGE** . . . . . **80 V (MIN) LV_{CEO}**
- **HIGH CURRENT SATURATION VOLTAGE** . . . **1.5 V (MAX) $V_{CE(sat)}$ AT 5.0 A**
- **HIGH FREQUENCY** . . . . . **60 AND 70 MHz (MIN) f_T**
- **BETA GUARANTEED AT 3 POINTS** . . . . . **50 mA, 2.5 A AND 5.0 A**
- **DISCRETE EMITTER GEOMETRY WITH INTEGRATED FEEDBACK RESISTORS**

PHYSICAL DIMENSIONS
in accordance with
JEDEC (TO-39) outline



ABSOLUTE MAXIMUM RATINGS (Note 1)

Maximum Temperatures

Storage Temperature	−65°C to +200°C
Operating Junction Temperature	−65°C to +200°C
Lead Temperature (Soldering, 60 second time limit)	+300°C

Maximum Power Dissipation (Note 4)

Total Dissipation at 50°C Case Temperature, $V_{CE} = 40$ V (See Maximum Permissible Power Curve)	**10 Watts**
Total Dissipation at 25°C Ambient Temperature	1.0 Watt

Maximum Voltages and Current

V_{CES}	Collector to Emitter Voltage	100 Volts
V_{CEO}	Collector to Emitter Voltage (Note 2)	80 Volts
V_{EBO}	Emitter to Base Voltage	6.0 Volts
I_C	Collector Current	5.0 Amps

ELECTRICAL CHARACTERISTICS (25°C Free Air Temperature unless otherwise noted)

SYMBOL	CHARACTERISTICS	2N5152 MIN.	2N5152 TYP.	2N5152 MAX.	2N5154 MIN.	2N5154 TYP.	2N5154 MAX.	UNITS	TEST CONDITIONS	
$V_{CEO(sus)}$	**Collector to Emitter Sustaining Voltage** (Notes 2 and 3)	**80**			**80**			**Volts**	**$I_C = 100$ mA**	**$I_B = 0$**
BV_{CES}	Collector to Emitter Breakdown Voltage	100			100			Volts	$I_C = 1.0$ mA	$V_{BE} = 0$
BV_{EBO}	Emitter to Base Breakdown Voltage	6.0			6.0			Volts	$I_C = 0$	$I_E = 1.0$ mA
h_{FE}	**DC Pulse Current Gain** (Note 3)	**20**	**46**		**50**	**100**			**$I_C = 50$ mA**	**$V_{CE} = 5.0$ V**
h_{FE}	**DC Pulse Current Gain** (Note 3)	**30**	**64**	**90**	**70**	**114**	**200**		**$I_C = 2.5$ A**	**$V_{CE} = 5.0$ V**
$h_{FE}(-55°C)$	DC Pulse Current Gain (Note 3)	15	26		35	50			$I_C = 2.5$ A	$V_{CE} = 5.0$ V
h_{FE}	**DC Pulse Current Gain** (Note 3)	**20**	**53**		**40**	**65**			**$I_C = 5.0$ A**	**$V_{CE} = 5.0$ V**
h_{fe}	**High Frequency Current Gain ($f = 20$ MHz)**	**3.0**	**3.4**		**3.5**	**4.4**			**$I_C = 0.5$ A**	**$V_{CE} = 5.0$ V**
$V_{CE(sat)}$	Pulsed Collector Saturation Voltage (Notes 3 and 5)		0.43	0.75		0.43	0.75	Volts	$I_C = 2.5$ A	$I_B = 0.25$ A
$V_{CE(sat)}$	**Pulsed Collector Saturation Voltage** (Notes 3 and 5)		**0.85**	**1.5**		**0.85**	**1.5**	**Volts**	**$I_C = 5.0$ A**	**$I_B = 0.5$ A**

Additional Electrical Characteristics on page 2
Notes on page 2

*Planar is a patented Fairchild process.

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A DIVISION OF FAIRCHILD CAMERA AND INSTRUMENT CORPORATION

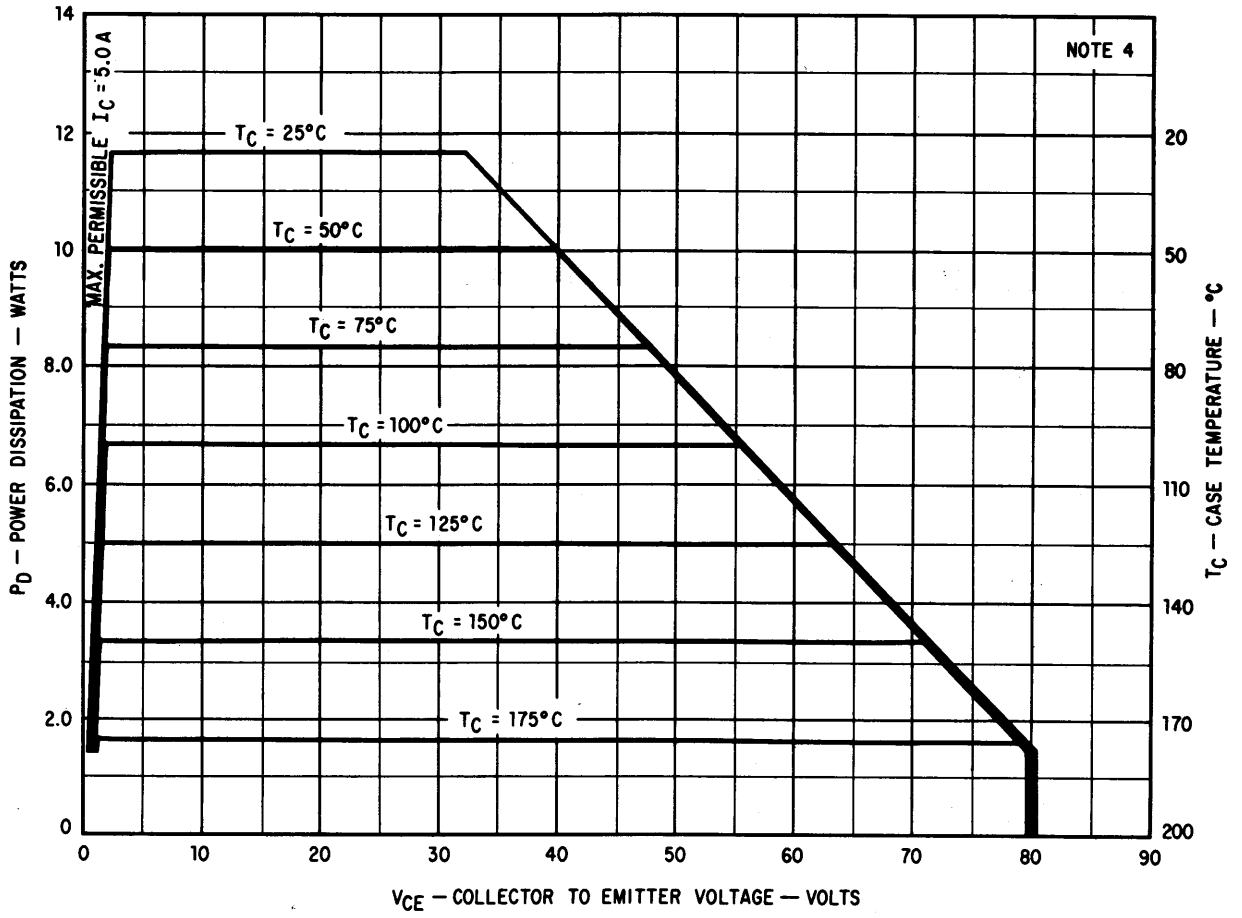
ELECTRICAL CHARACTERISTICS (25°C Free Air Temperature unless otherwise noted)

SYMBOL	CHARACTERISTICS	2N5152 MIN.	2N5152 TYP.	2N5152 MAX.	2N5154 MIN.	2N5154 TYP.	2N5154 MAX.	UNITS	TEST CONDITIONS	
$V_{BE(sat)}$	Pulsed Base Saturation Voltage (Notes 3 and 5)		1.16	1.45		1.16	1.45	Volts	$I_C = 2.5$ A	$I_B = 0.25$ A
$V_{BE(sat)}$	Pulsed Base Saturation Voltage (Notes 3 and 5)		1.52	2.2		1.52	2.2	Volts	$I_C = 5.0$ A	$I_B = 0.5$ A
$V_{BE}(on)$	Pulsed Base Emitter "ON" Voltage (Notes 3 and 5)			1.45			1.45	Volts	$I_C = 2.5$ A	$V_{CE} = 5.0$ V
I_{CES}	Collector Cutoff Current		0.007	1.0		0.007	1.0	μA	$V_{CE} = 60$ V	$V_{BE} = 0$
I_{EBO}	Emitter Cutoff Current			1.0			1.0	μA	$I_C = 0$	$V_{EB} = 5.0$ V
$I_{CEX}(+150°C)$	Collector Reverse Current			500			500	μA	$V_{CE} = 60$ V	$V_{EB} = 2.0$ V
C_{cb}	Collector to Base Capacitance		80	250		80	250	pF	$I_E = 0$	$V_{CB} = 10$ V

NOTES:

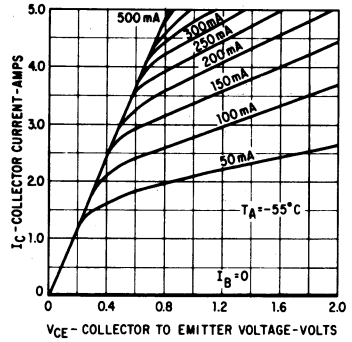
(1) These ratings are limiting values above which the serviceability of any individual semiconductor device may be impaired.
(2) This rating refers to a high current point where collector to emitter voltage is lowest. For more information send for Fairchild Publication APP-4/2.
(3) Pulse Conditions: length = 300μs; duty cycle = 1%.
(4) Device is thermally limited under free air (ambient) operating conditions. Maximum junction-to-ambient thermal resistance is 175°C/Watt. Contact factory for maximum permissible power under pulsed or reversed biased operating conditions.
(5) $V_{BE(on)}$ and saturation voltages measured ¼" from header.

MAXIMUM PERMISSIBLE DC FORWARD BIASED POWER DISSIPATION

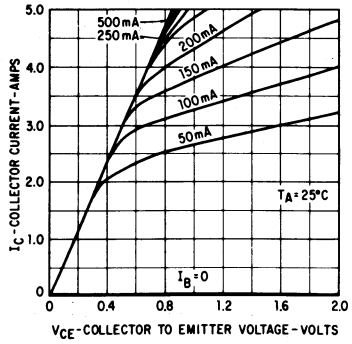


TYPICAL ELECTRICAL CHARACTERISTICS

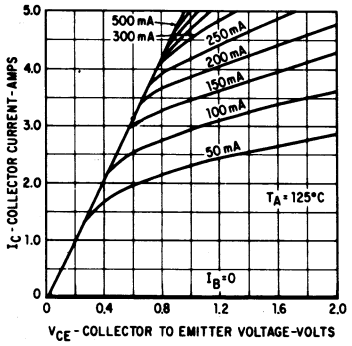
COLLECTOR CHARACTERISTICS* SATURATION REGION



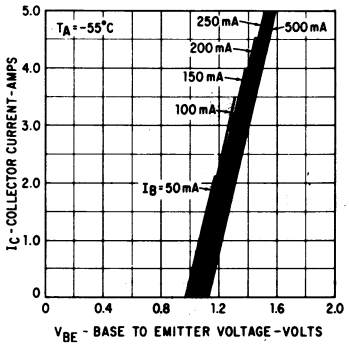
COLLECTOR CHARACTERISTICS* SATURATION REGION



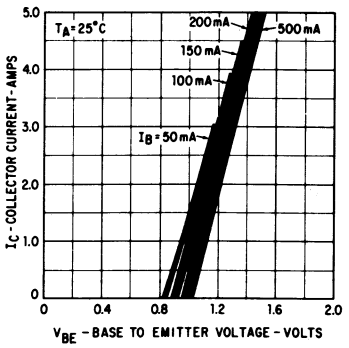
COLLECTOR CHARACTERISTICS* SATURATION REGION



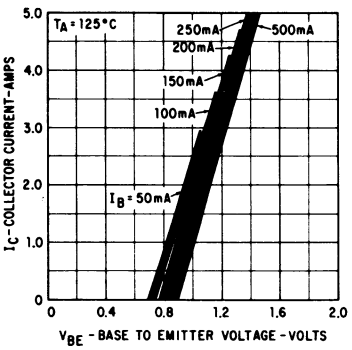
BASE CHARACTERISTICS*



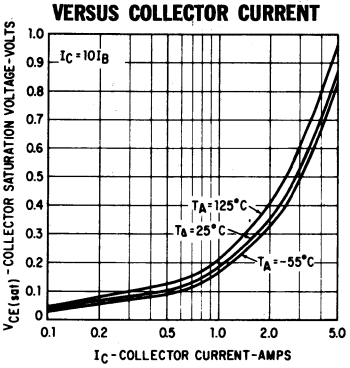
BASE CHARACTERISTICS*



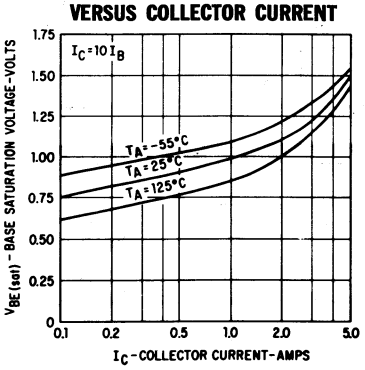
BASE CHARACTERISTICS*



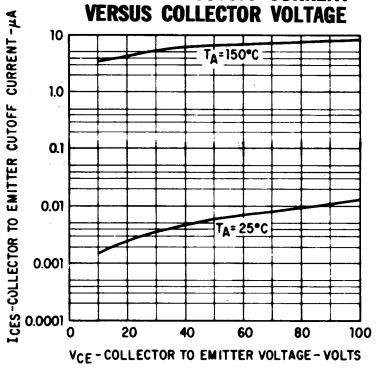
COLLECTOR SATURATION VOLTAGE VERSUS COLLECTOR CURRENT



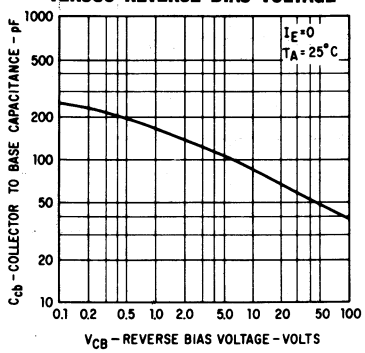
BASE SATURATION VOLTAGE VERSUS COLLECTOR CURRENT



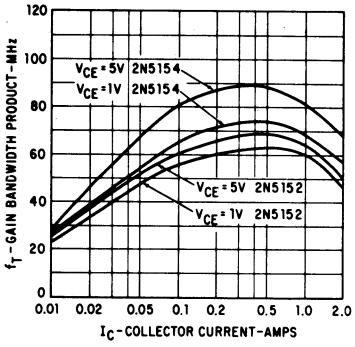
COLLECTOR CUTOFF CURRENT VERSUS COLLECTOR VOLTAGE



COLLECTOR TO BASE CAPACITANCE VERSUS REVERSE BIAS VOLTAGE



GAIN BANDWIDTH PRODUCT VERSUS COLLECTOR CURRENT

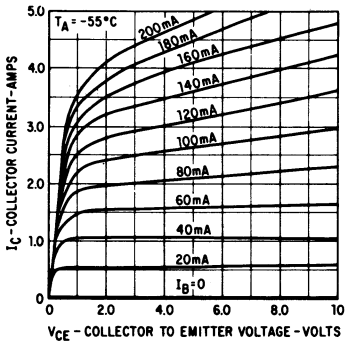


*Single Family Characteristics on Transistor Curve Tracer.

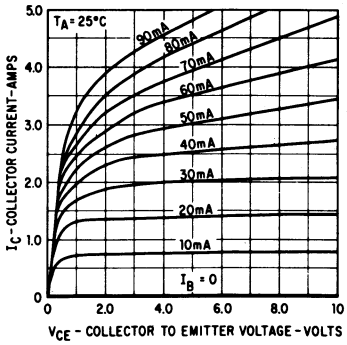
TYPICAL ELECTRICAL CHARACTERISTICS

2N5152

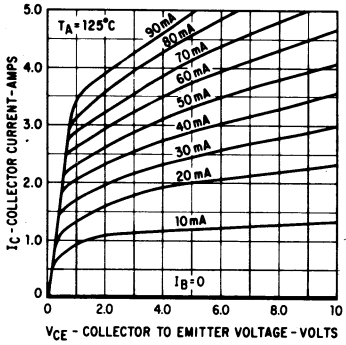
COLLECTOR CHARACTERISTICS* ACTIVE REGION



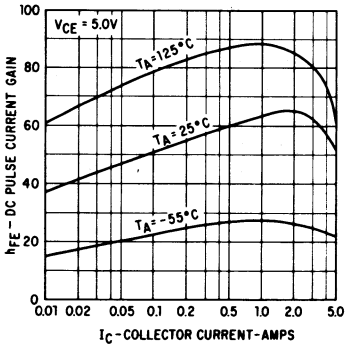
COLLECTOR CHARACTERISTICS* ACTIVE REGION



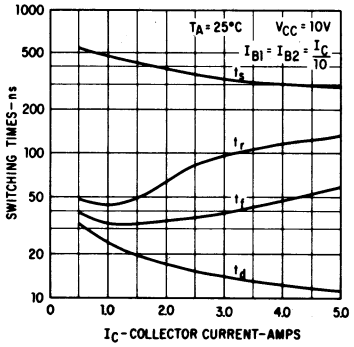
COLLECTOR CHARACTERISTICS* ACTIVE REGION



DC PULSE CURRENT GAIN VERSUS COLLECTOR CURRENT

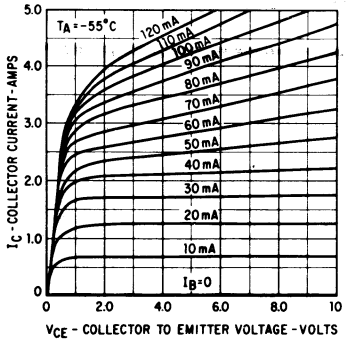


SWITCHING TIMES VERSUS COLLECTOR CURRENT

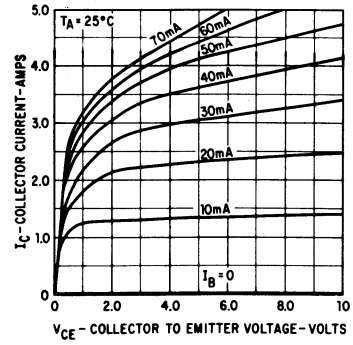


2N5154

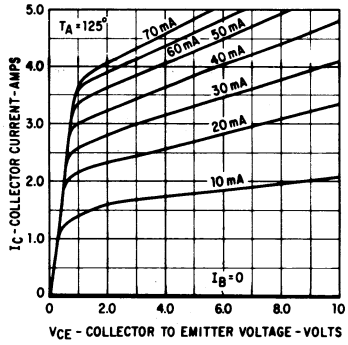
COLLECTOR CHARACTERISTICS* ACTIVE REGION



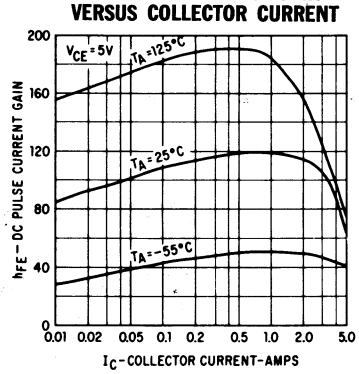
COLLECTOR CHARACTERISTICS* ACTIVE REGION



COLLECTOR CHARACTERISTICS* ACTIVE REGION



DC PULSE CURRENT GAIN VERSUS COLLECTOR CURRENT



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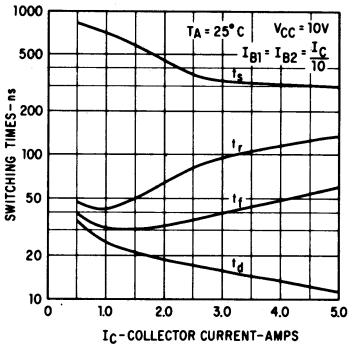

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