2N1252

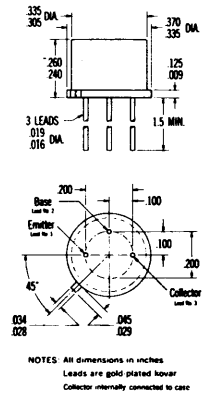
NPN LOW STORAGE TYPE

DIFFUSED SILICON TRANSISTOR

LOW STORAGE TIME – Low storage times and low saturation voltage make the 2N1252 ideal for all types of saturated circuitry from low logic levels to ½ ampere core driving levels. These units make 5 mc saturating switching circuits possible. Turn off time at 150 mA is guaranteed less than 150 millimicroseconds. Total switching times are typically 100 millimicroseconds at 500 mA.

BROAD OPERATING RANGE AND HIGH RELIABILITY– Power rating is 2 watts dissipation at 25° C. case temperature. At 150 mA, the base-on voltage is 1.3 volts and maximum saturation resistance is 10 ohms.

PHYSICAL DIMENSIONS
in accordance with
JEDEC (TO-5) outline



NOTES: All dimensions in inches
Leads are gold plated kovar
Collector internally connected to case

ABSOLUTE MAXIMUM RATINGS (25° C.) [Note 1]

V_{CBO}	–	Collector to base voltage	30v
V_{CER}	–	Collector to emitter voltage ($R_{BE} \leqq 10\Omega$) [Note 2]	20v
V_{EBO}	–	Emitter to base voltage	5v
Total dissipation at case temperature 25° C. [Note 3]			2 watts
at case temperature 100° C.			1 watt
at free air temperature 25° C.			0.6 watt

ELECTRICAL CHARACTERISTICS (25° C.)

SYMBOL	CHARACTERISTIC	MIN.	TYPICAL	MAX.	TEST CONDITIONS	
h_{FE}	D. C. pulse current gain [Note 4]	15	35	45	I_C=150mA	V_C=10V
$V_{BE\ SAT.}$	Base saturation voltage		0.9V	1.3V	I_C=150mA	I_B=15mA
$V_{CE\ SAT.}$	Collector saturation voltage		0.6V	1.5V	I_C=150mA	I_B=15mA
h_{fe}	Small signal current gain at f=20mc	2	4		I_C= 50mA	V_C=10V
C_{ob}	Collector capacitance		30μμf	45μμf	I_E= 0mA	V_C=10V
I_{CBO}	Collector cutoff current		0.1μA	10μA	V_C= 20V	T= 25° C.
			100μA	600μA	V_C= 20V	T=150° C.
t_s+t_f	Turn off time		75mμs	150mμs	I_C=150mA	I_{B1}=15mA
					I_{B2}= 5mA	R_L=40Ω
					Pulse width ≧ 10 μsec	

NOTES:
(1) The maximum ratings are limiting absolute values above which life or satisfactory performance may be impaired.
(2) Rating refers to a high current point where collector-to-emitter voltage is lowest.
(3) These ratings give a maximum junction temperature of 175°C and junction-to-case thermal resistance of 75°C/watt (derating factor of 13.3 mw/°C).
(4) Pulse conditions: length = 300 μs.; duty cycle ≤1%.

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SEMICONDUCTOR
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2N1253

NPN LOW STORAGE TYPE

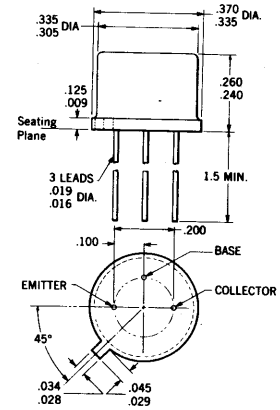
DIFFUSED SILICON PLANAR* TRANSISTOR

FOR IMPROVED PERFORMANCE SEE FAIRCHILD 2N2845

LOW STORAGE TIME – Low storage times and low saturation voltage make the 2N1253 ideal for all types of saturated circuitry from low logic levels to ½ ampere core driving levels. These units make 5 MHz saturating switching circuits possible. Turn off time at 150 mA is guaranteed less than 150 ns. Total switching times are typically 100 ns at 500 mA.

PHYSICAL DIMENSIONS

in accordance with JEDEC (TO-5) outline



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

ABSOLUTE MAXIMUM RATINGS (25° C.) [Note 1]

V_{CBO}	–	Collector to base voltage	30v
V_{CER}	–	Collector to emitter voltage ($R_{BE} \leqq 10\Omega$) [Note 2]	20v
V_{EBO}	–	Emitter to base voltage	5v
Total dissipation at case temperature 25° C. [Note 3]			2 watts
at case temperature 100° C.			1 watt
at free air temperature 25° C.			0.6 watt

ELECTRICAL CHARACTERISTICS (25° C.)

SYMBOL	CHARACTERISTIC	MIN.	TYPICAL	MAX.	TEST CONDITIONS
h_{FE}	D. C. pulse current gain [Note 4]	30	45	90	I_C=150mA V_C=10V
$V_{BE\ SAT.}$	Base saturation voltage		0.9V	1.3V	I_C=150mA I_B=15mA
$V_{CE\ SAT.}$	Collector saturation voltage		0.6V	1.5V	I_C=150mA I_B=15mA
h_{fe}	Small signal current gain at f=20MHz	2.5	5.5		I_C= 50mA V_C=10V
C_{obo}	Collector capacitance		30 pF	45 pF	I_E= 0mA V_C=10V
I_{CBO}	Collector cutoff current		0.1μA	10μA	V_C= 20V T= 25° C.
			100μA	600μA	V_C= 20V T=150° C.
t_s+t_f	Turn-off time		75ns	150ns	I_C=150mA I_{B1}=10mA
					I_{B2}= 5mA R_L=40Ω
					Pulse width=10 μs

* Planar is a patented Fairchild process.

NOTES:
(1) The maximum ratings are limiting absolute values above which life or satisfactory performance may be impaired.
(2) Rating refers to a high current point where collector-to-emitter voltage is lowest.
(3) These ratings give a maximum junction temperature of 175°C. and junction-to-case thermal resistance of 75°C./watt (derating factor of 13.3 mw/°C.).
(4) Pulse conditions: length = 300μs.; duty cycle ≦ 1%.

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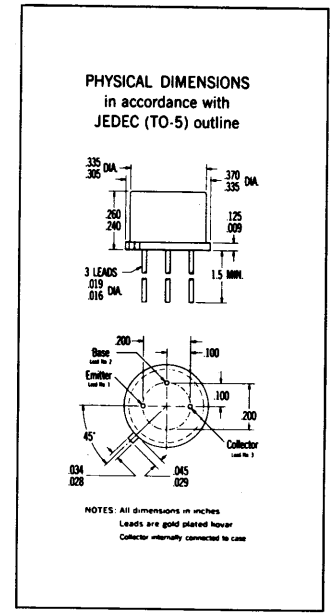
FAIRCHILD SEMICONDUCTOR
A DIVISION OF FAIRCHILD CAMERA AND INSTRUMENT CORPORATION

2N1983 • 2N1984 • 2N1985

NPN SMALL SIGNAL TYPE

DIFFUSED SILICON TRANSISTORS

GENERAL DESCRIPTION - These transistors: 2N1983, 2N1984, and 2N1985, are double diffused silicon NPN transistors packaged in the popular JEDEC TO-5 outline. They are designed to provide high performance in a wide range of small-signal applications including AF and RF amplifiers, oscillators and special circuits requiring silicon performance and reliability.



ABSOLUTE MAXIMUM RATINGS [Note 1]

Maximum Temperatures

Storage Temperature	-65°C to +150°C
Operating Junction Temperature	+150°C Maximum

Maximum Power Dissipation

Total Dissipation at 25°C Case Temperature [Note 2 & 3]	2.0 Watts
at 100°C Case Temperature [Note 2 & 3]	1.0 Watt
at 25°C Ambient Temperature	0.6 Watt

Maximum Voltages

V_{CBO} — Collector to Base Voltage	50 Volts
V_{CER} — Collector to Emitter Voltage ($R_{BE} \leq 10\Omega$) [Note 4]	30 Volts
V_{CEO} — Collector to Emitter Voltage	25 Volts
V_{EBO} — Emitter to Base Voltage	5.0 Volts

ELECTRICAL CHARACTERISTICS (25°C unless otherwise noted)

Symbol	Characteristic	Min.	Max.	Units	Test Conditions
V_{BE}	Non-Saturated Base Voltage		.85	Volts	I_C = 1.0 mA V_{CE} = 5.0 V
R_{CS}	Saturation Resistance		50	ohms	I_C = 5.0 mA I_B = 0.5 mA
h_{fe}	High Frequency Current Gain f = 20 mc	2.0			I_C = 50 mA V_{CE} = 10 V
C_{ob}	Output Capacitance		45	pf	I_E = 0 V_{CB} = 10 V
I_{CBO}	Collector Cutoff Current		5.0	μA	I_E = 0 V_{CB} = 30 V
I_{CBO}(+150°C)	Collector Cutoff Current		200	μA	I_E = 0 V_{CB} = 30 V
V_{CER}(sust)	Collector to Emitter Sustaining Voltage (Pulsed) [Note 4]	30		Volts	I_C = 100 mA $R_{BE} \leq$ 10 Ω
V_{CEO}(sust)	Collector to Emitter Sustaining Voltage (Pulsed) [Note 4]	25		Volts	I_C = 100 mA I_B = 0
I_{EBO}	Emitter Current		100	μA	I_C = 0 V_{EB} = 2.0 V

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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 operation.

(3) These ratings give a maximum junction temperature of 150°C and junction-to-case thermal resistance of 62.5°C/Watt (derating factor of 16 mW/°C).

(4) Rating refers to a high current point where collector-to-emitter voltage is lowest.

(5) Pulse conditions: length = 300 μsec; duty cycle $\leq$ 1%.

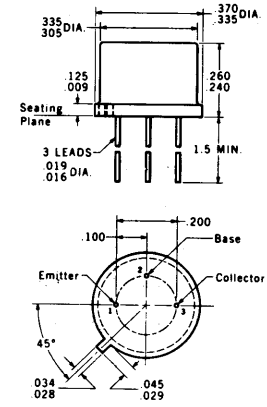
SMALL SIGNAL CHARACTERISTICS (f = 1 kc)

Symbol	Characteristic	2N1983 Min.	2N1983 Max.	2N1984 Min.	2N1984 Max.	2N1985 Min.	2N1985 Max.	Units	Test Conditions
h_{fe}	Current Gain	70	210	35	100	15	45		I_C = 1.0 mA V_{CE} = 5.0 V
		80	240	40	120	20	80		I_C = 5.0 mA V_{CE} = 5.0 V
h_{ib}	Input Resistance	20	30	20	30	20	30	ohms	I_C = 1.0 mA V_{CB} = 5.0 V
		4.0	8.0	4.0	8.0	4.0	8.0	ohms	I_C = 5.0 mA V_{CB} = 5.0 V
h_{rb}	Voltage Feedback Ratio		7.0		5.0		5.0	x 10^{-4}	I_C = 1.0 mA V_{CB} = 5.0 V
			7.0		5.0		5.0	x 10^{-4}	I_C = 5.0 mA V_{CB} = 5.0 V
h_{ob}	Output Conductance		1.0		1.0		1.5	μmho	I_C = 1.0 mA V_{CB} = 5.0 V
			1.5		1.5		2.0	μmho	I_C = 5.0 mA V_{CB} = 5.0 V
h_{ie}	Input Resistance		2000		1200		1000	ohms	I_C = 5.0 mA V_{CE} = 5.0 V
h_{oe}	Output Conductance		200		100		75	μmho	I_C = 5.0 mA V_{CE} = 5.0 V

2N1986 • 2N1987
NPN SWITCHES
DIFFUSED SILICON PLANAR* TRANSISTORS

GENERAL DESCRIPTION - The 2N1986 and 2N1987 are Double Diffused Silicon NPN Transistors packaged in the JEDEC TO-5 outline. They are designed for high-speed switching, high-frequency amplifier applications, and may be used as core drivers, relay drivers, and pulse generators.

PHYSICAL DIMENSIONS
in accordance with
JEDEC (TO-5) outline



NOTES: All dimensions in inches
Leads are gold plated kovar
Collector internally connected to case
Package weight is 1.11 grams

ABSOLUTE MAXIMUM RATINGS (Note 1)

Maximum Temperatures

Storage Temperature	-65°C to +150°C
Operating Junction Temperature	+150°C Maximum

Maximum Power Dissipation

Total Dissipation at 25°C Case Temperature	(Notes 2 and 3)	2.0 Watts
at 100°C Case Temperature	(Notes 2 and 3)	1.0 Watt
at 25°C Ambient Temperature		0.6 Watt

Maximum Voltages

V_{CBO}	Collector to Base Voltage	50 Volts
V_{CER}	Collector to Emitter Voltage ($R_{BE} \leq 10\,\Omega$) (Note 4)	40 Volts
V_{CEO}	Collector to Emitter Voltage	25 Volts
V_{EBO}	Emitter to Base Voltage	5.0 Volts

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

Symbol	Characteristic	2N1986 Min.	2N1986 Max.	2N1987 Min.	2N1987 Max.	Units	Test Conditions
h_{FE}	DC Pulse Current Gain (Note 5)	60	240	20	80		I_C = 150 mA V_{CE} = 10 V
h_{FE}	DC Pulse Current Gain (Note 5)	60		20			I_C = 30 mA V_{CE} = 10 V
$V_{BE}(sat)$	Base Saturation Voltage		0.9		0.9	Volts	I_C = 30 mA I_B = 3.0 mA
$V_{CE}(sat)$	Collector Saturation Voltage		0.6		0.6	Volts	I_C = 30 mA I_B = 3.0 mA
$V_{BE}(sat)$	Base Saturation Voltage		1.3		1.3	Volts	I_C = 150 mA I_B = 15 mA
$V_{CE}(sat)$	Collector Saturation Voltage		1.5		1.5	Volts	I_C = 150 mA I_B = 15 mA
h_{fe}	High Frequency Current Gain (f = 20 MHz)	2.0		2.0			I_C = 50 mA V_{CE} = 10 V
C_{obo}	Output Capacitance		35		35	pF	I_E = 0 V_{CB} = 10 V
I_{CBO}	Collector Cutoff Current		5.0		5.0	μA	I_E = 0 V_{CB} = 30 V
$I_{CBO}(+150°C)$	Collector Cutoff Current		200		200	μA	I_E = 0 V_{CB} = 30 V
BV_{CBO}	Collector Breakdown Voltage	40		40		Volts	I_C = 100 μA I_E = 0
$V_{CER}(sust)$	Collector to Emitter Sustaining Voltage (Note 4)	30		30		Volts	I_C = 100 mA (pulsed) $R_{BE} \leq 10\,\Omega$
$V_{CEO}(sust)$	Collector to Emitter Sustaining Voltage (Note 4)	25		25		Volts	I_C = 100 mA (pulsed) I_B = 0
BV_{EBO}	Emitter Breakdown Voltage	5.0		5.0		Volts	I_C = 0 I_E = 1.0 mA

NOTES:

* Planar is a patented Fairchild process.

(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 operation.

(3) These ratings give a maximum junction temperature of 150°C and junction-to-case thermal resistance of 62.5°C/Watt (derating factor of 16 mW/°C).

(4) Rating refers to a high current point where collector-to-emitter voltage is lowest.

(5) Pulse conditions: Length = 300 μsec; duty cycle ≤ 1%.

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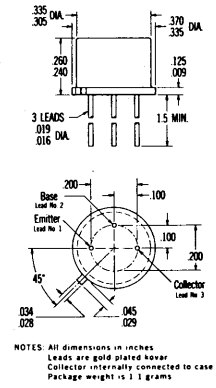
2N1988 • 2N1989
NPN HIGH-VOLTAGE
DIFFUSED SILICON PLANAR* TRANSISTORS

GENERAL DESCRIPTION - The 2N1988 and 2N1989 are double diffused silicon NPN transistors packaged in the popular JEDEC TO-5 configuration. They are characterized by high breakdown and sustaining voltages. They are designed for use in AC and DC amplifiers ... RF amplifiers and oscillators ... servo amplifiers ... and as relay, core, and drum memory drivers.

PHYSICAL DIMENSIONS
in accordance with
JEDEC (TO-5) outline



NOTES: All dimensions in inches
Leads are gold plated kovar
Collector internally connected to case
Package weight is 1.1 grams

ABSOLUTE MAXIMUM RATINGS (Note 1)

Maximum Temperatures

Storage Temperature	-65°C to +150°C
Operating Junction Temperature	+150°C Maximum

Maximum Power Dissipation

Total Dissipation at 25°C Case Temperature	(Notes 2 & 3)	2.0 Watts
at 100°C Case Temperature	(Notes 2 & 3)	1.0 Watt
at 25°C Ambient Temperature		0.6 Watt

Maximum Voltages

V_{CBO}	Collector to Base Voltage		100 Volts
V_{CER}	Collector to Emitter Voltage ($R_{BE} \leq 10\Omega$)	(Note 4)	60 Volts
V_{CEO}	Collector to Emitter Voltage		45 Volts
V_{EBO}	Emitter to Base Voltage		5.0 Volts

ELECTRICAL CHARACTERISTICS (25°C)

Symbol	Characteristics		2N1988 Min.	2N1988 Max.	2N1989 Min.	2N1989 Max.	Units	Test Conditions
h_{FE}	DC Pulse Current Gain	(Note 5)	35	120	20	60		I_C = 30 mA V_{CE} = 10 V
V_{BE}(sat)	Base Saturation Voltage			1.0		1.0	Volts	I_C = 30 mA I_B = 3.0 mA
V_{CE}(sat)	Collector Saturation Voltage			2.0		2.0	Volts	I_C = 30 mA I_B = 3.0 mA
h_{fe}	High Frequency Current Gain (f = 20 MHz)		2.0		2.0			I_C = 50 mA V_{CE} = 10 V
C_{obo}	Output Capacitance			20		20	pF	I_E = 0 V_{CB} = 10 V
I_{CBO}	Collector Cutoff Current			5.0		5.0	μA	I_E = 0 V_{CB} = 50 V
I_{CBO}(+150°C)	Collector Cutoff Current			400		400	μA	I_E = 0 V_{CB} = 50 V
V_{CER}(sust)	Collector to Emitter Sustaining Voltage (pulsed)	(Note 4)	60		60		Volts	I_C = 50 mA $R_{BE} \geq$ 10 Ω
V_{CEO}(sust)	Collector to Emitter Sustaining Voltage (pulsed)	(Note 4)	45		45		Volts	I_C = 50 mA I_B = 0
I_{EBO}	Emitter Current			100		100	μA	I_C = 0 V_{EB} = 2.0 V

* Planar is a patented Fairchild process.

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SMALL SIGNAL CHARACTERISTICS (f = 1 kHz)

Symbol	Characteristics	2N1988 Min.	2N1988 Max.	2N1989 Min.	2N1989 Max.	Units	Test Conditions
h_{fe}	Small Signal Current Gain	20	100	10			I_C = 1.0 mA V_{CE} = 5.0 V
h_{ib}	Input Resistance	20	30	20	30	ohms	I_C = 1.0 mA V_{CB} = 5.0 V
h_{rb}	Voltage Feedback Ratio		1.5		1.5	$x10^{-4}$	I_C = 1.0 mA V_{CB} = 5.0 V
h_{ob}	Output Conductance		1.0		1.0	μmho	I_C = 1.0 mA V_{CB} = 5.0 V

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 operation.
3. These ratings give a maximum junction temperature of 150°C and junction-to-case thermal resistance of 62.5°C/Watt (derating factor of 16 mW/°C).
4. Rating refers to a high current point where collector-to-emitter voltage is lowest.
5. Pulse conditions: length = 300 μsec; duty cycle $\leq$1%.

2N2008

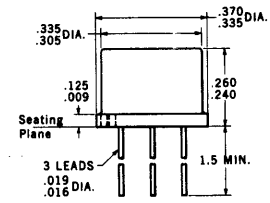
NPN MEDIUM POWER AUDIO AMPLIFIER

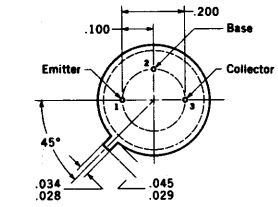
SILICON PLANAR* TRANSISTOR

FOR IMPROVED PERFORMANCE SEE FAIRCHILD 2N3114

GENERAL DESCRIPTION- The Fairchild 2N2008 is an NPN silicon PLANAR transistor designed primarily for large-signal, medium-power audio applications.

PHYSICAL DIMENSIONS
in accordance with
JEDEC (TO-5) outline





NOTES: All dimensions in inches
Leads are gold-plated kovar
Collector internally connected to case

ABSOLUTE MAXIMUM RATINGS (Note 1)

Maximum Temperatures	
Storage Temperature	-65°C to 200°C
Operating Junction Temperature	200°C Maximum
Maximum Power Dissipation	
Total Dissipation at 25°C Case Temperature (Notes 2 and 3)	3.0 Watts
at 25°C Ambient Temperature (Notes 2 and 3)	0.8 Watt
Maximum Voltages and Current	
V_{CBO} Collector to Base Voltage	175 Volts
V_{CEO} Collector to Emitter Voltage (Note 4)	110 Volts
V_{EBO} Emitter to Base Voltage	8.0 Volts
I_C Collector Current	500 mA

ELECTRICAL CHARACTERISTICS (25°C free air temperature unless otherwise noted)

Symbol	Characteristic	Min.	Max.	Unit	Test Conditions
h_{FE}	DC Pulse Current Gain (Note 5)	40	120		I_C = 50 mA V_{CE} = 10 V
h_{FE}	DC Current Gain	30	90		I_C = 10 mA V_{CE} = 10 V
h_{FE}	DC Current Gain	20			I_C = 1.0 mA V_{CE} = 10 V
V_{BE}(sat)	Base Saturation Voltage		1.0	Volts	I_C = 25 mA I_B = 5.0 mA
V_{CE}(sat)	Collector Saturation Voltage		2.5	Volts	I_C = 25 mA I_B = 5.0 mA
h_{ib}	Input Resistance (f = 1 kHz)	20	30	Ohms	I_E = 1.0 mA V_{CB} = 5.0 V
h_{ib}	Input Resistance (f = 1 kHz)	4.0	10	Ohms	I_E = 5.0 mA V_{CB} = 5.0 V
h_{ob}	Output Conductance (f = 1 kHz)	0.1	0.5	μmhos	I_E = 1.0 mA V_{CB} = 5.0 V
h_{ob}	Output Conductance (f = 1 kHz)	0.1	0.5	μmhos	I_E = 5.0 mA V_{CB} = 5.0 V
h_{rb}	Voltage Feedback Ratio (f = 1 kHz)		250	$x10^{-6}$	I_E = 1.0 mA V_{CB} = 5.0 V
h_{rb}	Voltage Feedback Ratio (f = 1 kHz)		250	$x10^{-6}$	I_E = 5.0 mA V_{CB} = 5.0 V
h_{fe}	Small Signal Current Gain (f = 1 kHz)	20	100		I_E = 1.0 mA V_{CE} = 5.0 V
h_{fe}	Small Signal Current Gain (f = 1 kHz)	35	120		I_E = 5.0 mA V_{CE} = 5.0 V
h_{fe}	High Frequency Current Gain (f = 20 MHz)	2.0			I_E = 50 mA V_{CE} = 10 V
I_{CBO}	Collector-Base Cutoff Current		50	nA	I_E = 0 V_{CB} = 100 V
I_{CBO}(150°C)	Collector-Base Cutoff Current		50	μA	I_E = 0 V_{CB} = 100 V
C_{obo}	Output Capacitance (f = 1.0 mc)		15	pF	I_E = 0 V_{CB} = 10 V
BV_{CBO}	Collector to Base Breakdown Voltage	175		Volts	I_E = 0 I_C = 100 μA
V_{CEO}(sust)	Collector to Emitter Sustaining Voltage (Notes 4 and 5)	110		Volts	I_B = 0 I_C = 10 mA (pulsed)
BV_{EBO}	Emitter to Base Breakdown Voltage	8.0		Volts	I_C = 0 I_E = 100 μA

* 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 58.3°C/watt (derating factor of 17.2 mW/°C); junction-to-ambient thermal resistance of 219°C/watt (derating factor of 4.56 mW/°C).

(4) This rating refers to a high-current point where collector-to-emitter voltage is lowest.

(5) Pulse Conditions: length ≤ 300 μsec; duty cycle = 1%.

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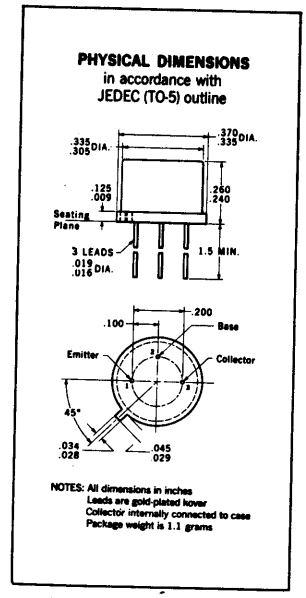
2N2049 • 2N2645

NPN LOW NOISE, HIGH GAIN

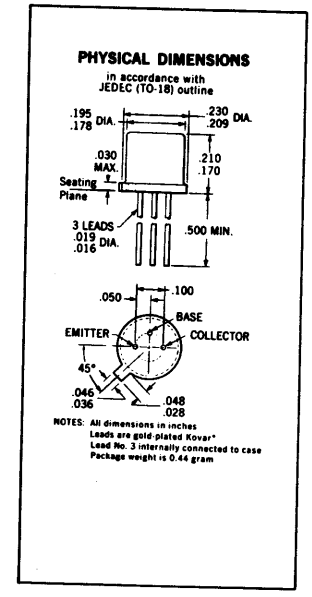
DIFFUSED SILICON PLANAR* TRANSISTORS

GENERAL DESCRIPTION - The 2N2049 and 2N2645 are designed for use in a broad range of amplifier and oscillator circuits where Planar performance is desirable. These transistors provide useful gain over more than five decades of collector current with low leakage and very low noise. These characteristics together with a 35 megacycle alpha cutoff at one milliampere make them particularly suitable for low-level broad-band input stages such as TV camera preamplifiers, transducer preamplifiers, and null detectors.

The very low corner (typically 220 Hz at 10 μA) substantially reduces 1/f noise in such applications as tape recorder preamplifiers, digital voltmeters, audio systems and servo amplifiers.



2N2049



2N2645

ABSOLUTE MAXIMUM RATINGS (Note 1)

Maximum Temperatures			
Storage Temperature		-65°C to +300°C	
Operating Junction Temperature		200°C Maximum	
Maximum Power Dissipation		2N2645	2N2049
Total Dissipation at 25°C Case Temperature (Notes 2 and 3)		1.8 Watts	3.0 Watts
Total Dissipation at 100°C Case Temperature (Notes 2 and 3)		1.0 Watt	1.7 Watts
Total Dissipation at 25°C Ambient Temperature		0.5 Watt	0.8 Watt
Maximum Voltages			
V_{CBO}	Collector to Base Voltage	75 Volts	75 Volts
V_{CER}	Collector to Emitter Voltage ($R_{BE} \leq 10\,\Omega$) (Note 4)	50 Volts	50 Volts
V_{EBO}	Emitter to Base Voltage	7.0 Volts	7.0 Volts

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

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Conditions
NF	Narrow-Band Noise Figure (Note 5)		0.6	2.5	dB	I_C = 0.1 mA V_{CE} = 10 V
NF	Narrow-Band Noise Figure (Note 6)		1.4	3.0	dB	I_C = 0.1 mA V_{CE} = 10 V
NF	Broad-Band Noise Figure (Note 7)			3.5	dB	I_C = 0.01 mA V_{CE} = 5 V
NF	Narrow-Band Noise Figure (Note 8)		7.5	12	dB	I_C = 0.1 mA V_{CE} = 10 V
h_{FE}	DC Pulse Current Gain (Note 9)	100	130	300		I_C = 150 mA V_{CE} = 10 V
h_{FE}	DC Current Gain	60	80			I_C = 0.1 mA V_{CE} = 10 V
h_{FE}	DC Current Gain	20	55			I_C = 0.01 mA V_{CE} = 10 V
V_{BE}(sat)	Base Saturation Voltage	0.6	0.7	0.8	Volts	I_C = 10 mA I_B = 1.0 mA
V_{CE}(sat)	Collector Saturation Voltage		0.12	0.4	Volts	I_C = 10 mA I_B = 1.0 mA
h_{fe}	High Frequency Current Gain (f = 20 MHz)	2.5	4.3			I_C = 10 mA V_{CE} = 10 V
C_{obo}	Output Capacitance		17	25	pF	I_E = 0 V_{CB} = 10 V
C_{ibo}	Input Capacitance		50	80	pF	I_C = 0 V_{EB} = 0.5 V
I_{CBO}	Collector Cutoff Current		0.4	10	nA	I_E = 0 V_{CB} = 60 V
I_{CBO}(150°C)	Collector Cutoff Current		0.4	10	μA	I_E = 0 V_{CB} = 60 V
BV_{CBO}	Collector to Base Breakdown Voltage	75			Volts	I_C = 0.1 mA I_E = 0
V_{CER}(sust)	Collector to Emitter Sustaining Voltage (Note 4)	50			Volts	I_C = 100 mA (pulsed) $R_{BE} \leq 10\,\Omega$
BV_{EBO}	Emitter to Base Breakdown Voltage	7.0			Volts	I_C = 0 I_E = 0.1 mA
I_{EBO}	Emitter Cutoff Current		0.03	10	nA	I_C = 0 V_{EB} = 5.0 V

*Planar is a patented Fairchild process.

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SMALL SIGNAL CHARACTERISTICS (f=1kHz)

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Conditions
h_{ib}	Input Resistance	24	27	34	Ohms	I_C = 1.0 mA V_{CB} = 5.0 V
h_{ob}	Output Conductance	0.1	0.17	0.5	μmho	I_C = 1.0 mA V_{CB} = 5.0 V
h_{rb}	Voltage Feedback Ratio		1.25	5.0	$x10^{-4}$	I_C = 1.0 mA V_{CB} = 5.0 V
h_{fe}	Small Signal Current Gain	75	110			I_C = 1.0 mA V_{CE} = 5.0 V
h_{ie}	Input Resistance		4.4		kOhms	I_C = 1.0 mA V_{CE} = 5.0 V
h_{oe}	Output Conductance		23.8		μmho	I_C = 1.0 mA V_{CE} = 5.0 V
h_{re}	Voltage Feedback Ratio		7.3		$x10^{-4}$	I_C = 1.0 mA V_{CE} = 5.0 V

NOTES:

(1) These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

(2) These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operation.

(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 2N2049 and 97.2°C/Watt (derating factor of 10.3 mW/°C) for the 2N2645.

(4) Rating refers to a high current point where collector-to-emitter voltage is lowest.

(5) f = 10kHz; R_S = 2 kΩ; Power Bandwidth of 2kHz.

(6) f = 1kHz; R_S = 2 kΩ; Power Bandwidth of 200 Hz.

(7) R_S = 10 kΩ; Power Bandwidth of 15.7kHz with 3-dB points at 10 Hz and 10 kHz.

(8) f = 100 Hz ; R_S = 2 kΩ; Power Bandwidth of 20 Hz .

(9) Pulse Conditions: length = 300 μs ; duty cycle = 1%.