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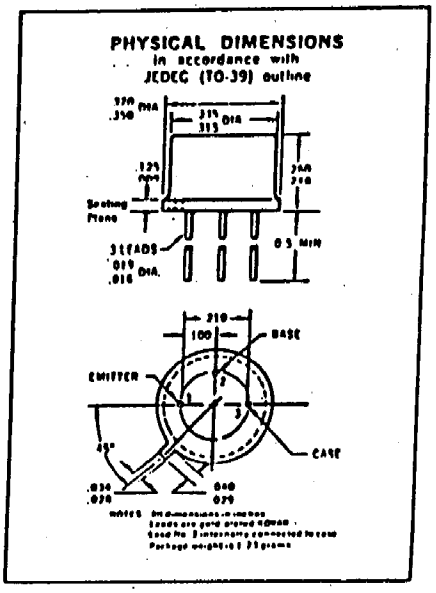
2N5042

PNP HIGH CURRENT AMPLIFIER

- EXCELLENT BETA LINEARITY - - $\frac{h_{FE} @ 500\ mA}{h_{FE} @ 150\ mA} = 0.75$ (min.)
- LOW SATURATION VOLTAGE - - $V_{CE}(sat) = 0.45$ (typ.) @ $I_C = 1.0$ A, $I_B = 33$ mA
- HIGH BREAKDOWN VOLTAGE - - $LV_{CEO} = 40$ V (min.) @ $I_C = 30$ mA
- LOW DISTORTION - - 0.5% (typ.) @ 5.0 WATTS



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		
Total Dissipation		
at 25°C Case Temperature (Notes 2 & 3)		4.0 Watts
at 25°C Ambient Temperature (Notes 2 & 3)		0.8 Watt
Maximum Voltages		
V_{CBO}	Collector to Base Voltage	−40 Volts
V_{CEO}	Collector to Emitter Voltage (Note 4)	−40 Volts
V_{EBO}	Emitter to Base Voltage	−5.0 Volts

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

SYMBOL	CHARACTERISTIC	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS	
h_{FE2} / h_{FE1}	DC Pulse Current Gain Ratio (Note 5)	0.75	0.85			h_{FE1} @ I_C = 150 mA	V_{CE} = −1.0 V
						h_{FE2} @ I_C = 500 mA	V_{CE} = −1.0 V
h_{FE1}	DC Pulse Current Gain (Note 5)	40	75	150		I_C = 150 mA	V_{CE} = −1.0 V
h_{FE2}	DC Pulse Current Gain (Note 5)	30	65			I_C = 500 mA	V_{CE} = −1.0 V
h_{FE}	DC Pulse Current Gain (Note 5)	30	85	225		I_C = 10 mA	V_{CE} = −1.0 V
$V_{CEO}(sust)$	Collector to Emitter Sustaining Voltage (Notes 4 & 5)	−40			Volts	I_C = 30 mA (pulsed)	I_B = 0
BV_{CBO}	Collector to Base Breakdown Voltage	−40			Volts	I_C = 100 μA	I_E = 0
BV_{EBO}	Emitter to Base Breakdown Voltage	−5.0			Volts	I_C = 0	I_E = 10 μA
$V_{CE}(sat)$	Pulsed Collector Saturation Voltage (Note 5)		−0.09	−0.25	Volt	I_C = 150 mA	I_B = 15 mA
$V_{CE}(sat)$	Pulsed Collector Saturation Voltage (Note 5)		−0.20	−0.50	Volt	I_C = 500 mA	I_B = 50 mA
$V_{CE}(sat)$	Pulsed Collector Saturation Voltage (Note 5)		−0.45	−1.3	Volts	I_C = 1.0 A	I_B = 100 mA
$V_{BE}(on)$	Pulsed Base Emitter On Voltage (Note 5)		−0.69	−0.75	Volt	I_C = 20 mA	V_{CE} = −5.0V
$V_{BE}(sat)$	Pulsed Base Saturation Voltage (Note 5)		−0.82	−1.1	Volts	I_C = 150 mA	I_B = 15 mA
$V_{BE}(sat)$	Pulsed Base Saturation Voltage (Note 5)		−0.85	−1.1	Volts	I_C = 500 mA	I_B = 50 mA
$V_{BE}(sat)$	Pulsed Base Saturation Voltage (Note 5)		−0.95	−1.2	Volts	I_C = 1.0 A	I_B = 100 mA
I_{CBO}	Collector Cutoff Current		0.2	50	nA	I_E = 0	V_{CB} = −30 V
$I_{CBO}(150°C)$	Collector Cutoff Current		1.0	20	μA	I_E = 0	V_{CB} = −30 V
I_{EBO}	Emitter Cutoff Current		0.1	50	nA	I_C = 0	V_{EB} = −4.0 V
h_{fe}	High Frequency Current Gain (f = 100 MHz)	1.0	2.0	5.0		I_C = 50 mA	V_{CE} = −10 V
C_{cb}	Collector to Base Capacitance (f = 1.0 MHz)		15	35	pF	I_E = 0	V_{CB} = −10 V
C_{eb}	Emitter to Base Capacitance (f = 1.0 MHz)		75	120	pF	I_C = 0	V_{EB} = −0.5 V
t_{on}	Turn On Time (Note 6)		23		ns	I_C ≈ 500 mA	I_{B1} ≈ 50 mA
t_{off}	Turn Off Time (Note 6)		200		ns	I_C ≈ 500 mA	$I_{B1} = I_{B2}$ ≈ 50 mA
NF	Narrow Band Noise Figure (f = 1.0 kHz)		1.0		dB	I_C = 200 μA	V_{CE} = 5.0 V, R_S = 1.0 kΩ

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 43.8°C/Watt (derating factor of 22.8 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 μs; duty cycle = 1%.
6) See switching circuit for exact values of I_C, I_{B1}, and I_{B2}.