

2N3728

NPN HIGH PERFORMANCE DIFFERENTIAL AMPLIFIERS

- $\frac{hFE1}{hFE2} \dots 0.9-1.0$ FROM 100 μ A to 1.0 mA @ 25°C, 0.8-1.0 FROM 100 μ A to 1.0 mA, -55°C to +125°C
- $|V_{BE1}-V_{BE2}| \dots 3.0$ mV (MAX) FROM 100 μ A to 1.0 mA
- $|\Delta V_{BE}| \dots 10$ μ V/°C (MAX) FROM 100 μ A to 1.0 mA, -55°C to +125°C

ABSOLUTE MAXIMUM RATINGS (Note 1)

Maximum Temperatures

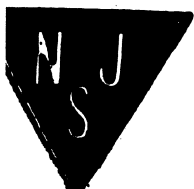
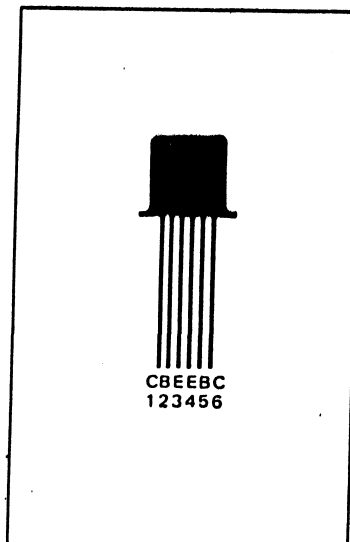
Storage Temperature	-65°C to +200°C
Operating Junction Temperature	200°C
Lead Temperature (60 seconds)	300°C

Maximum Power Dissipation (Notes 2 & 3)

	One Side	Both Sides
Total Dissipation at 25°C Case Temperature	1.0 W	1.6 W
at 100°C Case Temperature	0.67 W	0.91 W
at 25°C Ambient Temperature	0.45 W	0.55 W

Maximum Voltages and Current

VCBO	Collector to Base Voltage	60 V
VCEO	Collector to Emitter Voltage (Note 4)	30 V
VEBO	Emitter to Base Voltage	5.0 V
IC	Collector Current	500 mA
VC1C2	Collector ₁ to Collector ₂ Voltage	±200 V
	Voltage Rating any Lead to Case	±200 V



ELECTRICAL CHARACTERISTICS (25°C Ambient Temperature unless otherwise noted) (Cont'd.)

SYMBOL	CHARACTERISTIC	MIN.	MAX.	UNITS	TEST CONDITIONS
h _{FE}	DC Current Gain	30			I _C = 0.1 mA, V _{CE} = 5.0 V
		45	180		I _C = 1.0 mA, V _{CE} = 5.0 V
		80	280		I _C = 150 mA, V _{CE} = 5.0 V (Note 6)
BV _{CB0}	Collector to Base Breakdown Voltage	80			I _C = 10 μA, I _E = 0
BV _{EB0}	Emitter to Base Breakdown Voltage	5.0			I _C = 0, I _E = 10 μA
V _{CEO(sus)}	Collector to Emitter Sustaining Voltage (Notes 4 & 6)	30			I _C = 10 mA, I _B = 0
V _{CE(sat)}	Collector Saturation Voltage (Note 6)		0.22	V	I _C = 150 mA, I _B = 15 mA
V _{BE(sat)}	Base Saturation Voltage (Note 6)		1.1	V	I _C = 150 mA, I _B = 15 mA
I _{CBO}	Collector Cutoff Current		10	nA	I _E = 0, V _{CB} = 50 V
			10	μA	I _E = 0, V _{CB} = 50 V, T _A = 150°C
I _{EBO}	Emitter Cutoff Current		10	nA	I _C = 0, V _{EB} = 3.0 V
h _{fe}	High Frequency Current Gain	4.0			I _C = 1.0 mA, V _{CE} = 10 V, f = 20 MHz
		2.5	6.0		I _C = 50 mA, V _{CE} = 10 V, f = 100 MHz
C _{ob}	Common Base, Open Circuit, Output Capacitance		8.0	pF	I _E = 0, V _{CB} = 10 V, f = 140 kHz
C _{ib}	Common Base, Open Circuit, Input Capacitance		20	pF	I _C = 0, V _{EB} = 2.0 V, f = 140 kHz
h _{ie}	Input Impedance	1.2	6.0	kΩ	I _C = 1.0 mA, V _{CE} = 10 V, f = 1.0 kHz
h _{re}	Reverse Voltage Feedback Ratio		300	x10 ⁻⁶	I _C = 1.0 mA, V _{CE} = 10 V, f = 1.0 kHz
h _{oe}	Output Conductance		20		I _C = 1.0 mA, V _{CE} = 10 V, f = 1.0 kHz
h _{fe}	Forward Current Transfer Ratio	50	200		I _C = 1.0 mA, V _{CE} = 10 V, f = 1.0 kHz
NF	Wide Band Noise Figure		7.0	dB	I _C = 0.1 mA, V _{CE} = 5.0 V, f = 15.7 kHz, 3.0 dB pts. @ 25 Hz and 10 kHz, R _S = 1.0 kΩ
$\frac{h_{FE1}}{h_{FE2}}$	DC Current Gain Ratio (Note 5)	0.8	1.0		I _C = 100 μA to 1.0 mA, V _{CE} = 5.0 V
V _{BE1} -V _{BE2}	Base to Emitter Voltage Differential		5.0	mV	I _C = 100 μA to 1.0 mA, V _{CE} = 5.0 V
Δ(V _{BE1} -V _{BE2})	Base to Emitter Voltage Differential		1.6 (20 μV/°C)	mV	I _C = 100 μA to 1.0 mA, V _{CE} = 5.0 V T _A = -55°C to +25°C
Δ(V _{BE1} -V _{BE2})	Base to Emitter Voltage Differential		2.0 (20 μV/°C)	mV	I _C = 100 μA to 1.0 mA, V _{CE} = 5.0 V T _A = +25°C to +125°C

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 ambient thermal resistance of 384°C/W (derating factor of 2.57 mW/°C) for one side; 318°C/W (derating factor of 3.14 mW/°C) for both sides; junction to case thermal resistance of 175°C/W (derating factor of 5.71 mW/°C) for one side; 109°C/W (derating factor of 9.15 mW/°C) for both sides.
4. Rating refers to a high current point where collector to emitter voltage is lowest.
5. Lowest of two h_{FE} readings is taken as h_{FE1} for purposes of this ratio.
6. Pulse conditions: length = 300 μs; duty cycle = 1%.