National Semiconductor

NB011,012 (NPN) NB021,022 (PNP) 30mA general purpose transistors

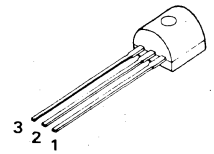
features

- 35 to 50 Volt at 30 mA collector ratings
- 300 mV guaranteed V_{CE} (sat) characteristics at I_C = 10 mA and I_B = 0.5 mA
- Matched HFE groupings for complementary applications
- "Epoxy B" packaging concept for excellent reliability

applications

- Small signal amplifier circuits
- Equalizer preamplifiers
- Low current switching circuits
- TV receivers

1 package and lead coding

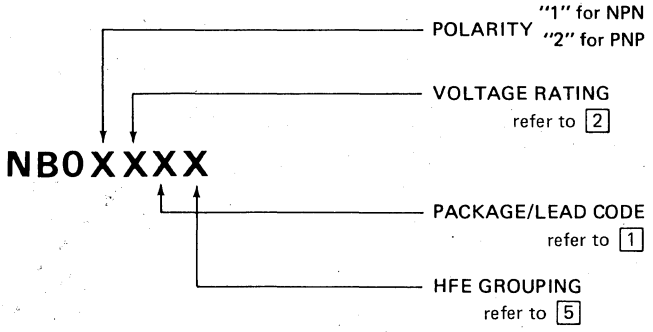


PACKAGE CODE TO-92	LEAD 1	2	3
E	E	B	C
F	E	C	B
H	C	B	E

2 maximum ratings

PARAMETER	SYMBOL	NB011 NB021	NB012 NB022	UNIT
Collector-Emitter Voltage	V_{CEO}	35	50	V_{DC}
Collector-Base Voltage	V_{CB}	40	55	V_{DC}
Emitter-Base Voltage	V_{EB}	5	5	V_{DC}
Collector Current (continuous)	I_C (max)	30	30	mA_{DC}
Power Dissipation (T_A = 25°C)	P_D	0.6	0.6	W
Power Dissipation (T_C = 25°C)	P_D	1.0	1.0	W
Thermal Resistance	θ_{JA}	208	208	°C/W
	θ_{JC}	125	125	°C/W
Temperature, Junction and Storage	Tj, Tstg	−55 to + 150	−55 to + 150	°C

3 ordering information



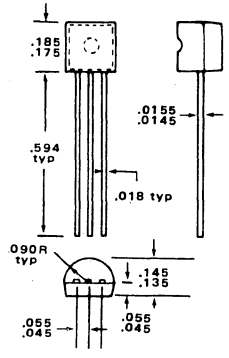
4 electrical characteristics $T_C = 25^\circ C$

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
BV_{CEO}	Collector-Emitter Sustaining Voltage	I_C = 1 mA				
	NB011/021		35			V
	NB012/022		50			V
BV_{CBO}	Collector-Base Breakdown Voltage	I_C = 100μA				
	NB011/021		40			V
	NB012/022		55			V
BV_{EBO}	Emitter-Base Breakdown Voltage	I_E = 10μA	5			V
I_{CEO}	Collector-Emitter Leakage Current	V_{CE} = 30V NB011			1	μA
		45V NB012			1	μA
I_{CES}	Collector-Emitter Leakage Current	V_{CE} = 30V NB021			0.5	μA
		45V NB022			0.5	μA
I_{CBO}	Collector-Base Leakage Current	V_{CB} = 35V NB011/021			0.1	μA
		50V NB012/022			0.1	μA
I_{EBO}	Emitter-Base Leakage Current	V_{EB} = 4V			0.1	μA
V_{BE} (sat)	Base-Emitter Saturation Voltage	I_C = 10 mA, I_B = 0.5 mA		0.75	0.95	V
V_{CE} (sat)	Collector-Emitter Saturation Voltage	I_C = 10 mA, I_B = 0.5 mA		0.1	0.3	V
Cob	Collector Output Capacitance	V_{CB} = 10V, f = 1 MHz				
	NPN types			2		pF
	PNP types			3		pF
f_t	Current Gain Bandwidth Product	I_C = 1 mA, V_{CE} = 5V	50	120		MHz

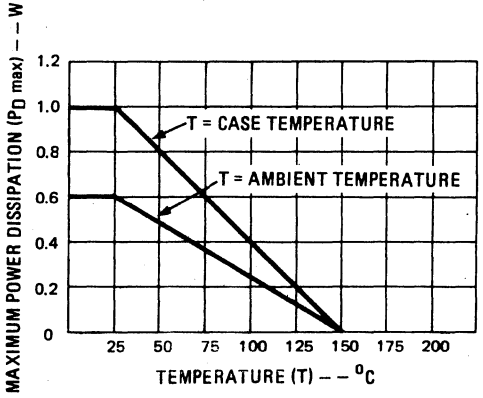
5 HFE groupings

GROUPING	PARAMETER	CONDITIONS	MIN	TYP	MAX	RATIO
I	DC Current Gain	I_C = 1 mA, V_{CE} = 5V	140	180	240	1:1.6
J	DC Current Gain	I_C = 1 mA, V_{CE} = 5V	200	260	350	1:1.6
K	DC Current Gain	I_C = 1 mA, V_{CE} = 5V	300	380	500	1:1.6
L	DC Current Gain	I_C = 1 mA, V_{CE} = 5V	450	580	750	1:1.6
T	DC Current Gain	I_C = 1 mA, V_{CE} = 5V	100	150	240	1:2.4
U	DC Current Gain	I_C = 1 mA, V_{CE} = 5V	200	320	500	1:2.4
V	DC Current Gain	I_C = 1 mA, V_{CE} = 5V	450	700	1100	1:2.4
Y	DC Current Gain	I_C = 1 mA, V_{CE} = 5V	100	190	350	1:3.5
Z	DC Current Gain	I_C = 1 mA, V_{CE} = 5V	300	580	1100	1:3.5

6 physical dimensions



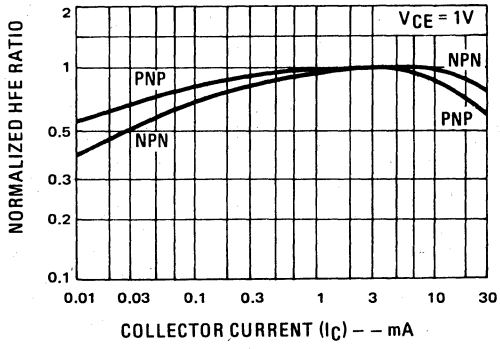
7 max power dissipation



8 typical performance characteristics

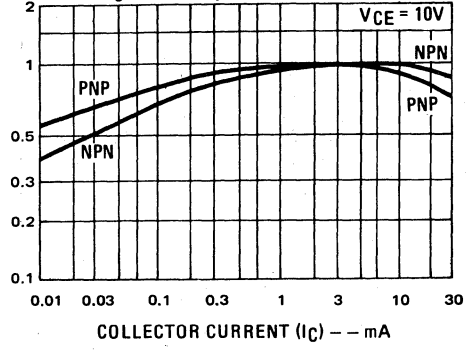
HFE1/HFE2

current gain linearity ratio (A)



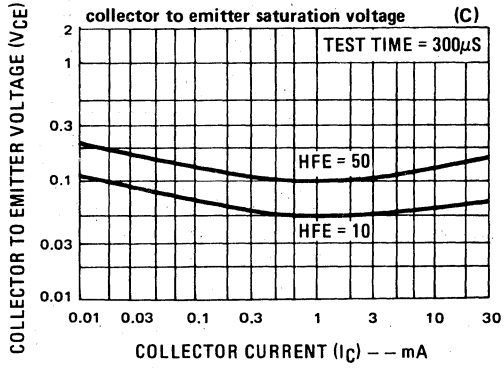
HFE1/HFE2

current gain linearity ratio (B)



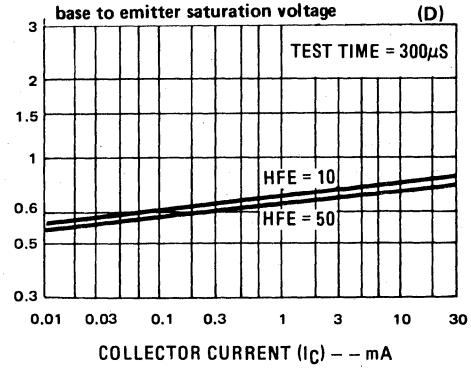
VCE (sat)

collector to emitter saturation voltage (C)



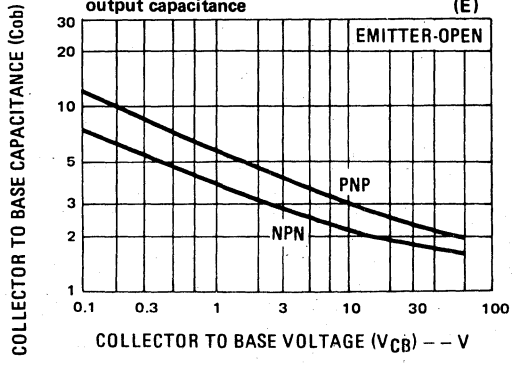
VBE (sat)

base to emitter saturation voltage (D)



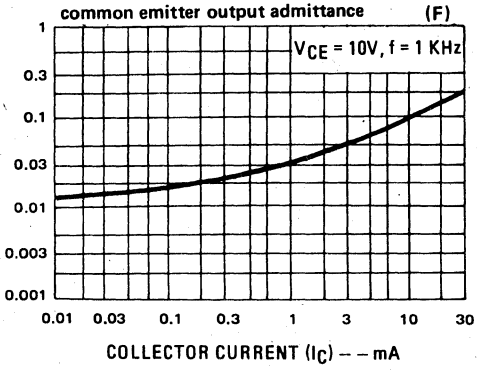
Cob

output capacitance (E)



hoe

common emitter output admittance (F)



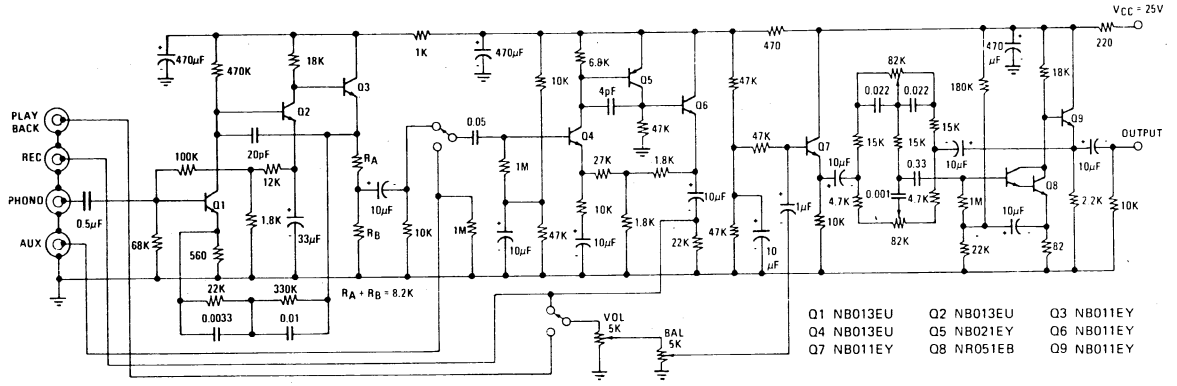


Figure A. High Quality Preamplifier with Tone Control Circuit

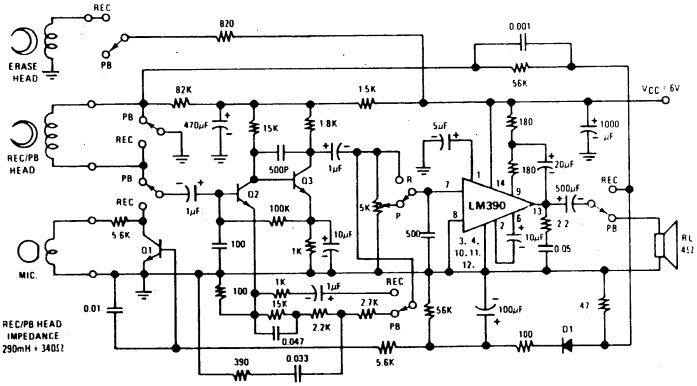


Figure B. Battery Operated Recording/Playback Cassette Circuit

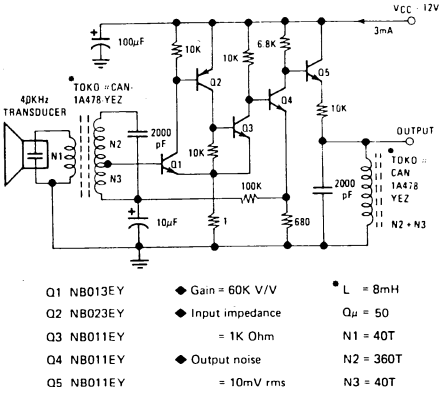


Figure C. High Gain Ultrasonic Amplifier