T-29-21

T-33-07

National Semiconductor

NB311, 312, 313 (NPN)
NB321, 322, 323 (PNP) 1.5Amp complementary power drivers

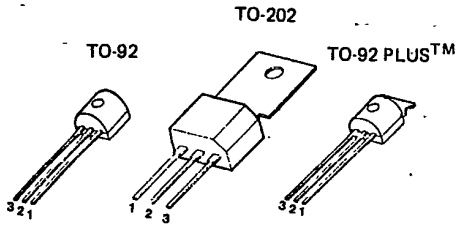
features

- 35 to 65 Volt at 1.5 Amp collector ratings
- Low V_{CE} (sat) and V_{BE} (sat) characteristics with I_C = 300 mA and I_B = 10 mA drive
- Available in TO-92, TO-92 PLUS™ and TO-202 packages
- "Epoxy B" packaging concept for excellent reliability

applications

- Driver stages in high-power audio amplifiers
- Medium-power switching circuits
- Converter/inverter circuits
- TV receivers

[1] packages and lead coding

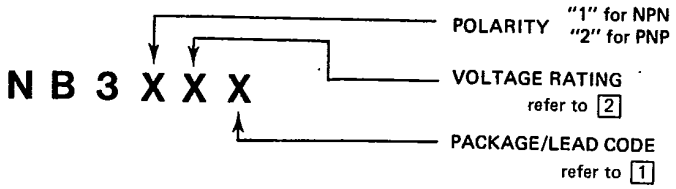


PACKAGE CODE			LEAD		
TO-92	TO-92 PLUS	TO-202	1	2	3
E	X	K	E	B	C
F	Y	L	E	C	B
	Z	M	B	C	E
H			C	B	E

[2] maximum ratings

PARAMETER	SYMBOL	NB311 NB321	NB312 NB322	NB313 NB323	UNIT
Collector-Emitter Voltage	V_{CEO}	35	50	65	V_{DC}
Collector-Base Voltage	V_{CB}	40	55	70	V_{DC}
Emitter-Base Voltage	V_{EB}	6	6	6	V_{DC}
Collector Current (continuous)	I_C	1.5	1.5	1.5	A_{DC}
Power Dissipation (T_A = 25°C)	P_D				
TO-92		0.6	0.6	0.6	W
TO-92 PLUS		0.75	0.75	0.75	W
TO-202		1.75	1.75	1.75	W
Power Dissipation (T_C = 25°C)	P_D				
TO-92		1.0	1.0	1.0	W
TO-92 PLUS		2.5	2.5	2.5	W
TO-202		10	10	10	W
Temperature, Junction and Storage	T_j, T_{stg}	−55 to +150	−55 to +150	−55 to +150	°C

[3] ordering information



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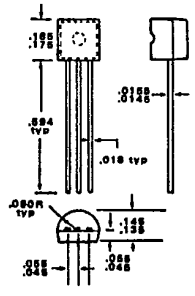
4 electrical characteristics $T_C = 25^\circ C$

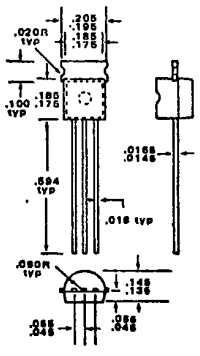
SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
BV_{CEO}	Collector-Emitter Sustaining Voltage	I_C = 1 mA				
	NB311/321		35			V
	NB312/322		50			V
	NB313/323		65			V
BV_{CBO}	Collector-Base Breakdown Voltage	I_C = 100 μA				
	NB311/321		40			V
	NB312/322		55			V
	NB313/323		70			V
BV_{EBO}	Emitter-Base Breakdown Voltage	I_E = 10 μA	6			V
I_{CEO}	Collector-Emitter Leakage Current	V_{CE} = 30V NB311/321			50	μA
		45V NB312/322			50	μA
		60V NB313/323			50	μA
I_{CBO}	Collector-Base Leakage Current	V_{CB} = 35V NB311/321			0.5	μA
		50V NB312/322			0.5	μA
		65V NB313/323			0.5	μA
I_{EBO}	Emitter-Base Leakage Current	V_{EB} = 5V			0.5	μA
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	I_C = 300 mA, I_B = 10 mA		0.9	1	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C = 300 mA, I_B = 10 mA		0.15	0.5	V
HFE_1	DC Current Gain	I_C = 1 mA, V_{CE} = 10V	30			
HFE_2	DC Current Gain	I_C = 100 mA, V_{CE} = 10V	50			
C_{ob}	Collector Output Capacitance	V_{CB} = 10V, f = 1 MHz				
	NPN types			10		pF
	PNP types			17		pF
f_t	Current Gain Bandwidth Product	I_C = 100 mA, V_{CE} = 10V	20			MHz

5 physical dimensions

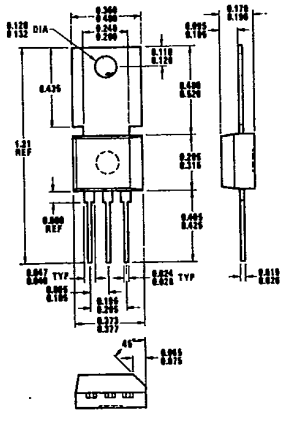
TO-92



TO-92 PLUS



TO-202



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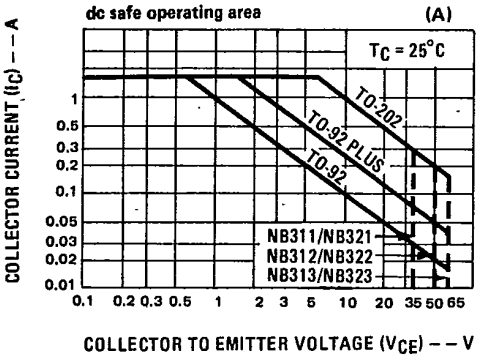
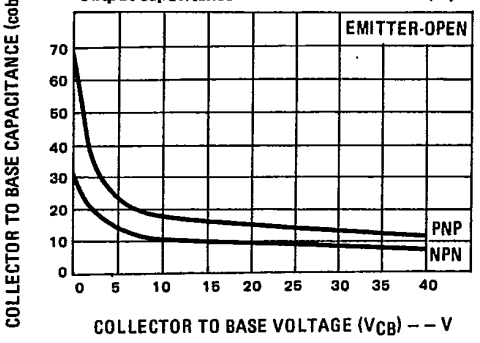
NB311, 312, 313(NPN); NB321, 322, 323(PNP)

6 typical performance characteristics

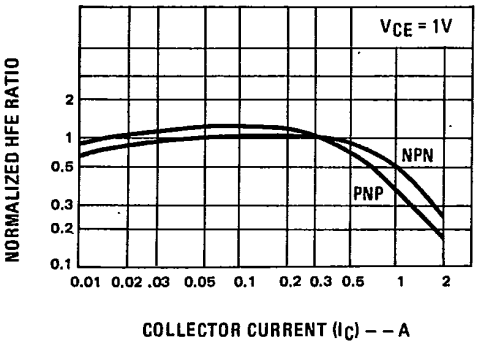
SOA
dc safe operating area (A)



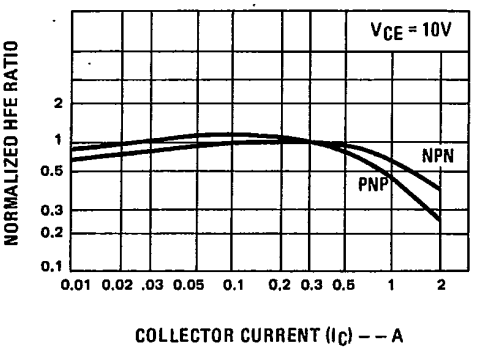
Cob
output capacitance (B)



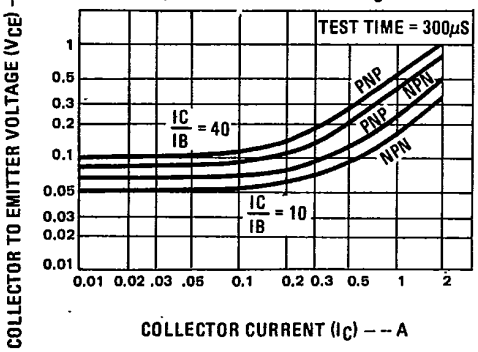
HFE1/HFE2
current gain linearity ratio (C)



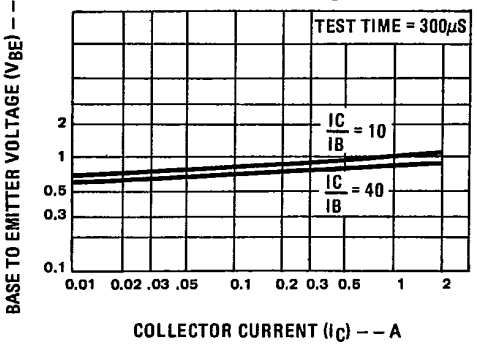
HFE1/HFE2
current gain linearity ratio (D)



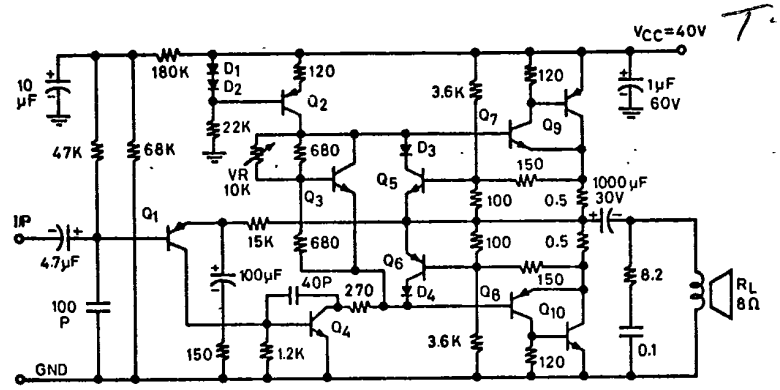
VCE(sat)
collector to emitter saturation voltage (E)



VBE(sat)
base to emitter saturation voltage (F)

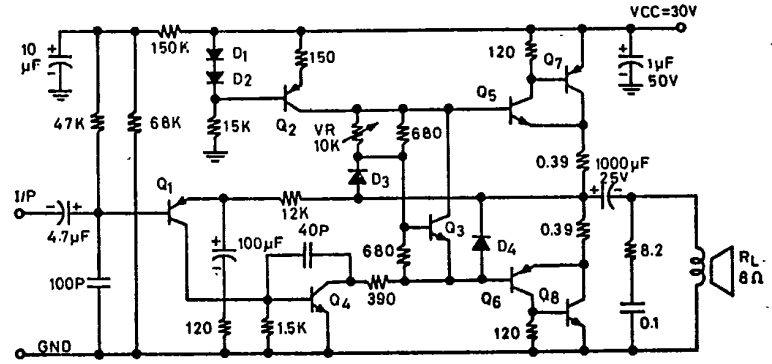


7 typical applications



Q1 NB022EY
Q2 NB123EY
Q3 NR001E
Q4 NB113EY
Q5 NB111EY
Q6 NB121EY
Q7 NB313Y
Q8 NB323Y
Q9 NA72W
Q10 NA71W

Figure A. 25 Watt OTL Amplifier



Q1 NB021EY
Q2 NB122EY
Q3 NR001E
Q4 NB112EY
Q5 NB312E
Q6 NB322E
Q7 NA52W
Q8 NA51W

Figure B. 12 Watt OTL Amplifier

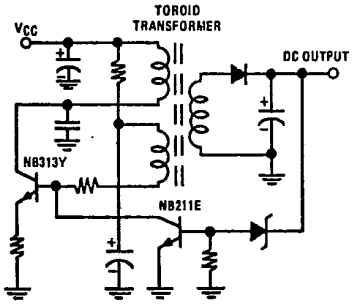


Figure C. Typical Converter Circuit

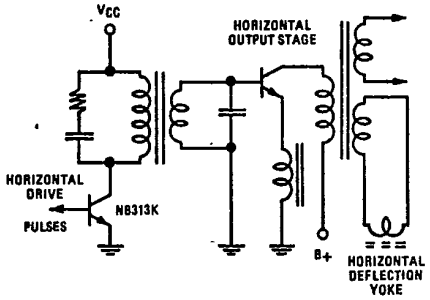


Figure D. Typical TV Horizontal Driver Application