National Semiconductor

NA51(NPN)
NA52(PNP) 3.5 Amp complementary power transistors

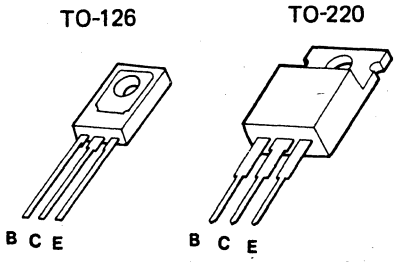
features

- 45 Volt/3.5 Amp rating
- Available in TO-126 and TO-220 packages
- Low V_{CE} (sat) and V_{BE} (sat) characteristics at I_C = 2A, I_B = 80 mA
- Guaranteed V_{CE} (sat) and V_{BE} (sat) at I_C = 3A, I_B = 160 mA for improved short-circuit protection design in audio amplifier
- "Epoxy B" packaging concept for excellent reliability

applications

- 6 to 14 Watt, 4 or 8 Ohm audio power amplifier
- High current switching circuits
- Converter/Inverter circuits
- TV receivers

[1] packages and lead coding

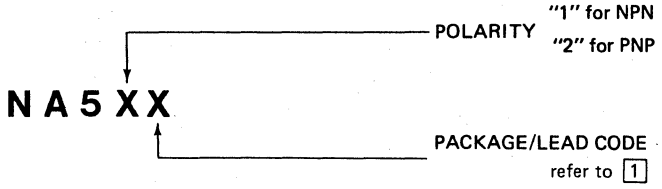


PACKAGE CODE	
TO 126	TO 220
U	W

[2] maximum ratings

PARAMETER	SYMBOL	RATING	UNIT
Collector-Emitter Voltage	V_{CE}	45	V_{DC}
Collector-Base Voltage	V_{CB}	50	V_{DC}
Emitter-Base Voltage	V_{EB}	4	V_{DC}
Collector Current (continuous)	I_C (max)	3.5	A
Power Dissipation (T_A = 25°C)	P_D		
TO-126		1.8	W
TO-220		2.0	W
Power Dissipation (T_C = 25°C)	P_D		
TO-126		30	W
TO-220		30	W
Thermal Resistance			
TO-126	θ_{JA}/θ_{JC}	69.4/4.17	°C/W
TO-220	θ_{JA}/θ_{JC}	62.5/4.17	°C/W
Temperature, Junction and Storage	Tj, Tstg	−55 to + 150	°C

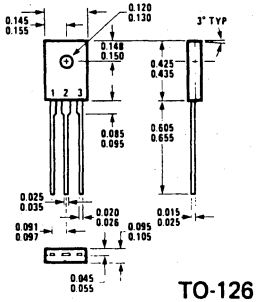
[3] ordering information



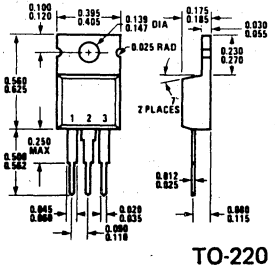
4 electrical characteristics $T_C = 25°C$

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
BV_{CER}	Collector-Emitter Sustaining Voltage	I_C = 10 mA, R = 1K	45			V
BV_{CBO}	Collector-Base Breakdown Voltage	I_C = 100μA	50			V
BV_{EBO}	Emitter-Base Breakdown Voltage	I_E = 100μA	4			V
I_{CER}	Collector-Emitter Leakage Current	V_{CE} = 35V, R = 1K			1	mA
I_{CBO}	Collector-Base Leakage Current	V_{CB} = 40V			0.5	mA
V_{BE} (on)	Base-Emitter Voltage	I_C = 15 mA, V_{CE} = 10V	520	600	680	mV
V_{BE} (sat)	Base-Emitter Saturation Voltage	I_C = 2A, I_B = 80 mA			1.3	V
V_{BE} (sat)	Base-Emitter Saturation Voltage	I_C = 3A, I_B = 160 mA			1.6	V
V_{CE} (sat)	Collector-Emitter Saturation Voltage	I_C = 2A, I_B = 80 mA			1.5	V
V_{CE} (sat)	Collector-Emitter Saturation Voltage	I_C = 3A, I_B = 160 mA			5	V
HFE_1	DC Current Gain	I_C = 500 mA, V_{CE} = 10V	30	100		ratio
Cob	Collector Output Capacitance	V_{CB} = 10V, f = 1 MHz				
	NPN types			35		pF
	PNP types			65		pF

5 physical dimensions



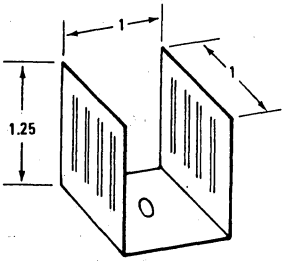
TO-126



TO-220

6 heatsink information

The TO-126 and TO-220 packages used with heatsink shown below permits about 9.2 Watts power dissipation and θ_{CA} = 9.4°C/W.



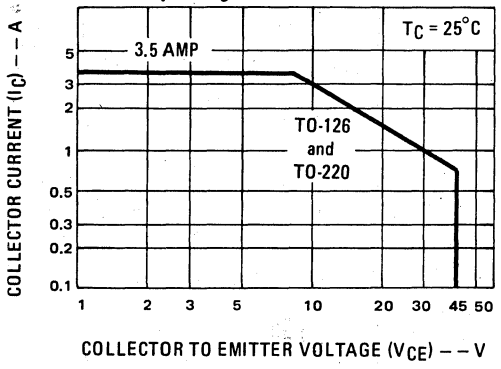
0.05 inch aluminium sheet

Mount transistor under heatsink and apply thermally conductive compound between contact surfaces.

7 typical performance characteristics

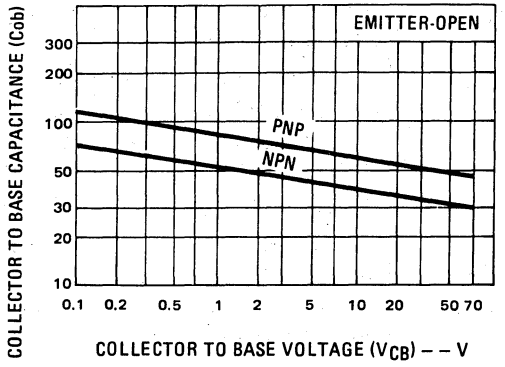
SOA

dc safe operating area (A)



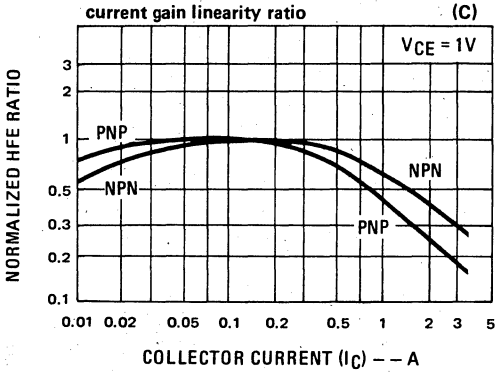
Cob

collector to base capacitance (B)



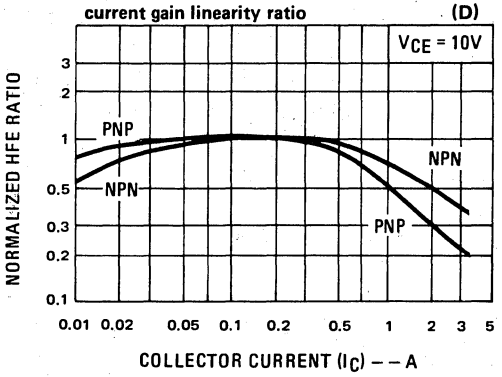
HFE1/HFE2

current gain linearity ratio (C)



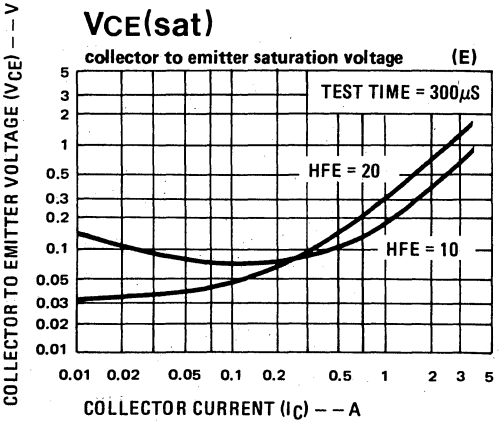
HFE1/HFE2

current gain linearity ratio (D)



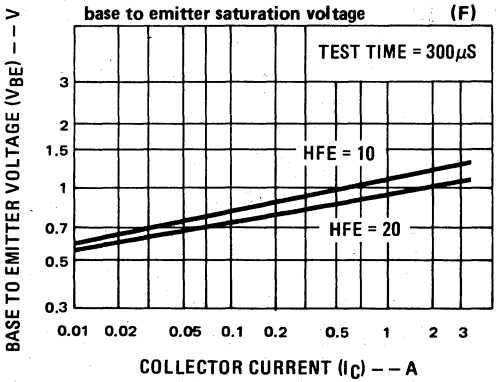
VCE(sat)

collector to emitter saturation voltage (E)

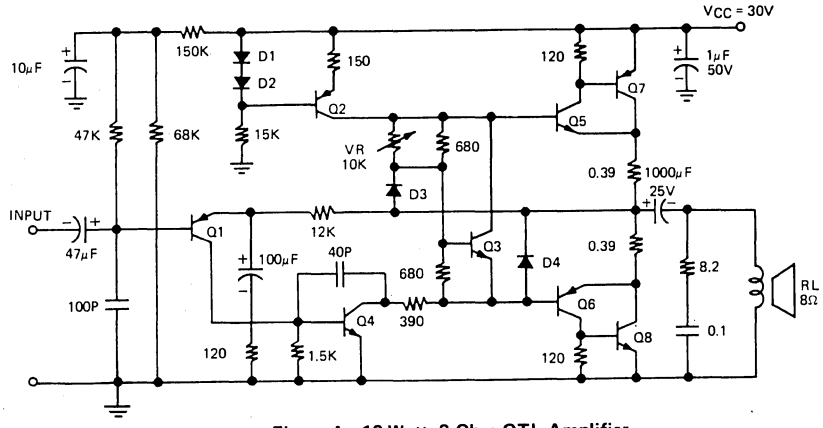


VBE(sat)

base to emitter saturation voltage (F)

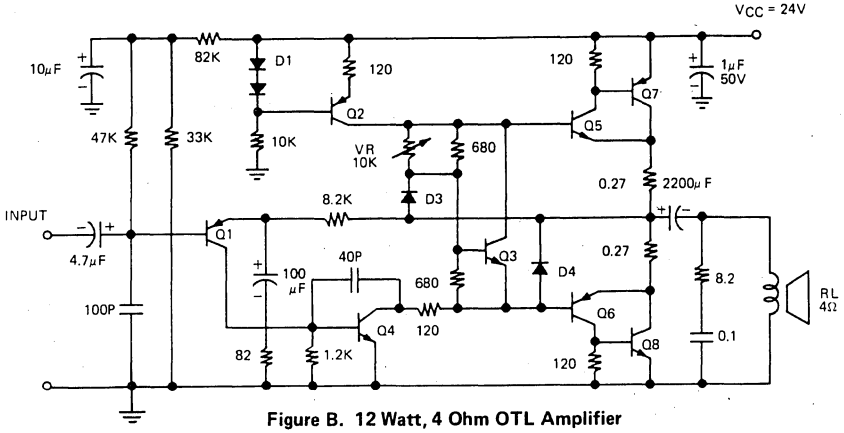


8 typical applications



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

Figure A. 12 Watt, 8 Ohm OTL Amplifier



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

Figure B. 12 Watt, 4 Ohm OTL Amplifier

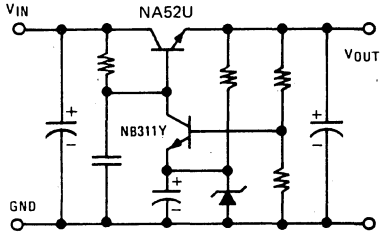


Figure C. Linear Regulator Circuit

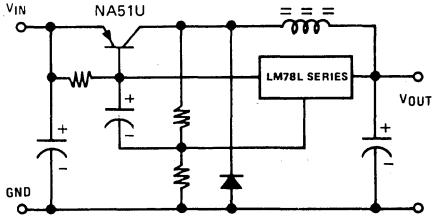


Figure D. Switching Regulator Circuit

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