National Semiconductor

NR431(NPN) HF amplifier/FM converter transistor

features

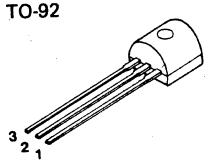
- 1.1pF typical collector feedback capacitance
- 5K Ohm minimum RF output resistance at 100 MHz
- 150mV typical V_{CE} (sat) charactersistics at I_C = 10 mA, and I_B = 0.5 mA
- "Epoxy B" packaging concept for excellent reliability

applications

- High frequency amplifiers/converters
- CB radios
- Low power RF oscillators

1 package and lead coding

TO-92

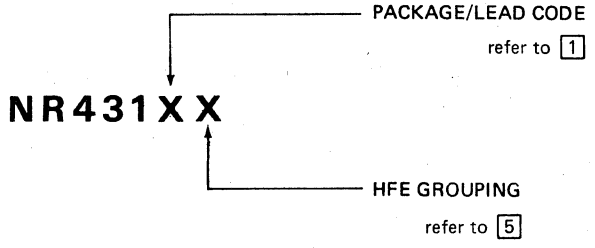


PACKAGE CODE TO-92	LEAD 1	2	3
E	E	B	C
F	E	C	B
H	C	B	E

2 maximum ratings

PARAMETER	SYMBOL	RATING	UNIT
Collector-Emitter Voltage	V_{CEO}	15	V_{DC}
Collector-Base Voltage	V_{CB}	18	V_{DC}
Emitter-Base Voltage	V_{EB}	3	V_{DC}
Collector Current (continuous)	I_C (max)	30	mA_{DC}
Power Dissipation (T_A = 25°C)	P_D	0.6	W
Power Dissipation (T_C = 25°C)	P_D	1.0	W
Thermal Resistance	θ_{JA}	208	°C/W
	θ_{JC}	125	°C/W
Temperature, Junction and Storage	Tj, Tstg	−55 to + 150	°C

3 ordering information



4 electrical characteristics $T_C = 25°C$

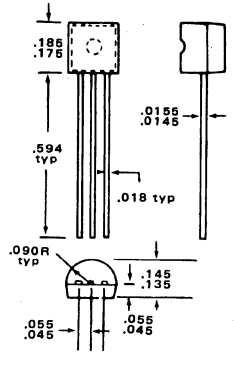
SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
BV_{CEO}	Collector-Emitter Sustaining Voltage	I_C = 1 mA	15			V
BV_{CBO}	Collector-Base Breakdown Voltage	I_C = 100μA	18			V
BV_{EBO}	Emitter-Base Breakdown Voltage	I_E = 10μA	3	5.6		V
I_{CBO}	Collector-Base Leakage Current	V_{CB} = 15V			0.1	μA
V_{BE} (sat)	Base-Emitter Saturation Voltage	I_C = 10 mA, I_B = 0.5 mA		830	950	mV
V_{CE} (sat)	Collector-Emitter Saturation Voltage	I_C = 10 mA, I_B = 0.5 mA		150	300	mV
Ccb	Common Emitter Collector Feedback Capacitance	V_{CB} = 10V, f = 1 MHz		1.1	1.4	pF
Cob	Collector Output Capacitance	V_{CB} = 10V, f = 1 MHz		1.4	1.7	pF
Roep	Common Emitter Output Resistance	I_C = 1mA, V_{CE} = 5V f = 100 MHz	5			KOhm
ft	Current Gain Bandwidth Product	I_C = 1mA, V_{CE} = 5V	350	600		MHz

5 HFE groupings

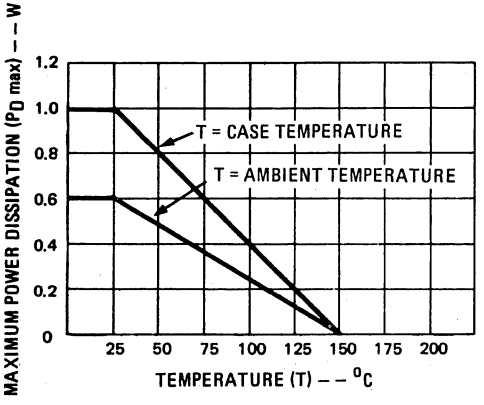
GROUPING	PARAMETER	CONDITIONS	MIN	TYP	MAX	RATIO
E	DC Current Gain	I_C = 1 mA, V_{CE} = 5V	30	38	50	1:1.6
F	DC Current Gain	I_C = 1 mA, V_{CE} = 5V	45	58	75	1:1.6
G	DC Current Gain	I_C = 1 mA, V_{CE} = 5V	68	85	110	1:1.6
R	DC Current Gain	I_C = 1 mA, V_{CE} = 5V	20	32	50	1:2.4
S	DC Current Gain	I_C = 1 mA, V_{CE} = 5V	45	70	110	1:2.4

6 physical dimensions

TO-92

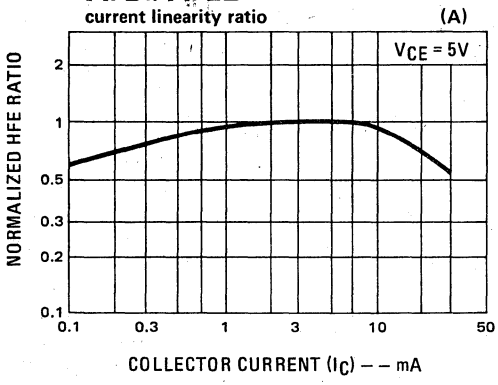


7 max power dissipation

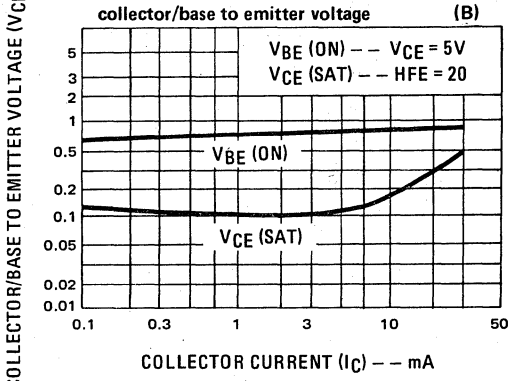


8 typical performance characteristics

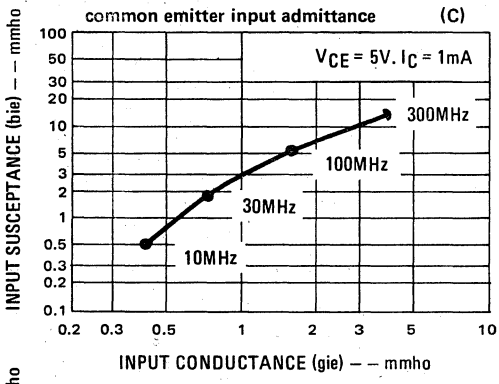
H_{FE1}/H_{FE2}
current linearity ratio (A)



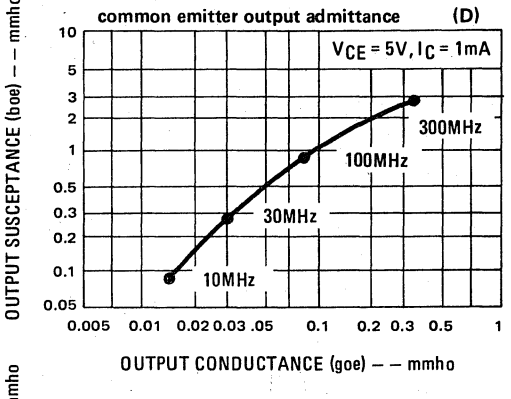
$V_{CE(sat)}/V_{BE(on)}$
collector/base to emitter voltage (B)



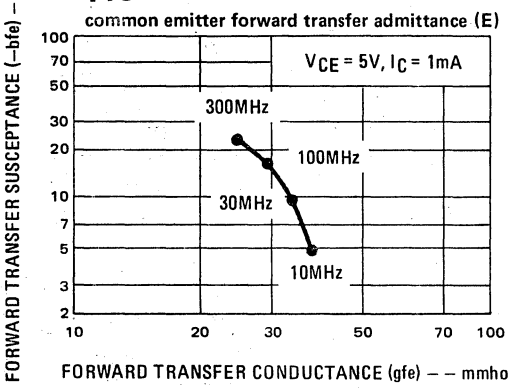
Yie
common emitter input admittance (C)



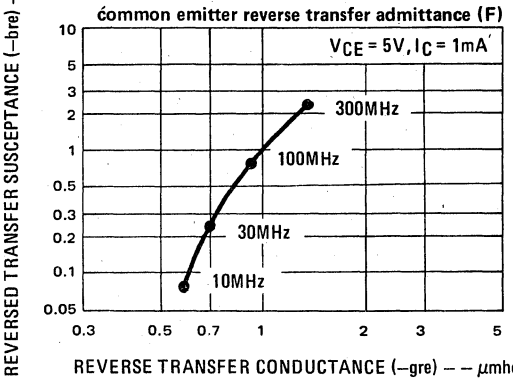
Yoe
common emitter output admittance (D)

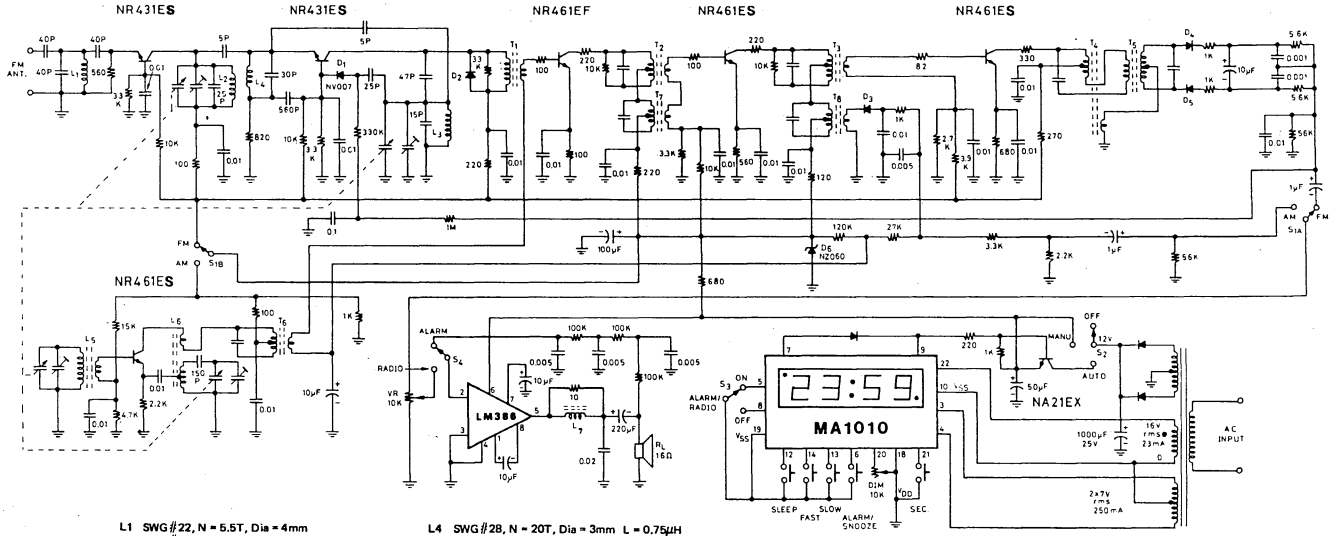


Yfe
common emitter forward transfer admittance (E)



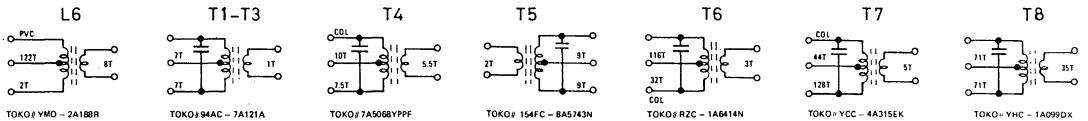
Yre
common emitter reverse transfer admittance (F)





L1 SWG#22, N = 5.5T, Dia = 4mm
L2 SWG#22, N = 4T, Dia = 4mm
L3 SWG#22, N = 4T, Dia = 3mm

L4 SWG#28, N = 20T, Dia = 3mm L = 0.75μH
L5 95T : 8T, L = 600μH, Qμ = 300
L7 N = 1.5T, PHILIPS #4312–020–34401



FM performance (88–108 MHz)

30dB quieting sensitivity:	5μV
limiting sensitivity:	20μV
AM rejection:	40dB
AFC holding range:	800KHz
Bandwidth:	180KHz

AM performance (525–1650 KHz)

maximum sensitivity:	100μV/M
20dB quieting sensitivity:	280μV/M
selectivity ± 10KHz:	–28dB
AGC figure of merit:	40dB
overload distortion:	6%

AUDIO performance

gain at 1 KHz:	200
10% THD output power:	900mW
frequency response:	70Hz – 12KHz
typical system dist:	0.8%
alarm tone frequency:	600Hz

Figure A. AM/FM clock radio