National Semiconductor

NR461(NPN) low-noise RF/IF transistor

features

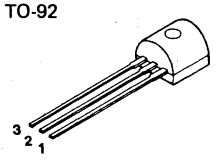
- Low C_{cb} for excellent RF stability
- High R_{oep} for simplified RF coupling designs
- 70mV typical V_{CE} (sat) characteristics at I_C = 10 mA, and I_B = 0.5 mA
- 1.1 dB typical noise figure at 1 MHz
- "Epoxy B" packaging concept for excellent reliability

applications

- MW/SW/CB radios
- 0.1 to 50 MHz frequency converters
- 455KHz to 10.7 MHz IF stages
- Low-power RF oscillators

[1] package and lead coding

TO-92

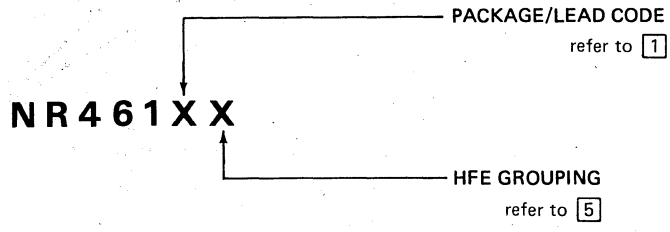


PACKAGE CODE TO-92	LEAD 1	2	3
E	E	B	C
F	E	C	B
H	C	B	E

[2] maximum ratings

PARAMETER	SYMBOL	RATING	UNIT
Collector-Emitter Voltage	V_{CEO}	30	V_{DC}
Collector-Base Voltage	V_{CB}	35	V_{DC}
Emitter-Base Voltage	V_{EB}	4	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 $T_C = 25°C$

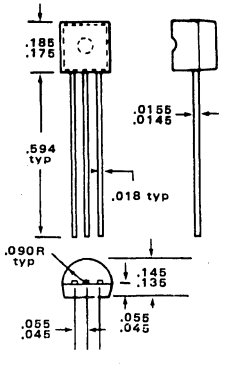
SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
BV_{CEO}	Collector-Emitter Sustaining Voltage	I_C = 1 mA	30			V
BV_{CBO}	Collector-Base Breakdown Voltage	I_C = 100μA	35			V
BV_{EBO}	Emitter-Base Breakdown Voltage	I_E = 10μA	4	5.5		V
I_{CBO}	Collector-Base Leakage Current	V_{CB} = 30V			0.1	μA
V_{BE} (sat)	Base-Emitter Saturation Voltage	I_C = 10 mA, I_B = 0.5 mA		760	950	mV
V_{CE} (sat)	Collector-Emitter Saturation Voltage	I_C = 10 mA, I_B = 0.5 mA		70	300	mV
Ccb	Common Emitter Collector Feedback Capacitance	V_{CB} = 10V, f = 1 MHz		0.9	1.1	pF
Roep	Common Emitter Output Resistance	I_C = 1 mA, V_{CE} = 5V				
		f = 455 KHz	100			KOhm
		f = 10.7 MHz	20			KOhm
ft	Current Gain Bandwidth Product	I_C = 1 mA, V_{CE} = 5V	180	300		MHz

5 HFE groupings

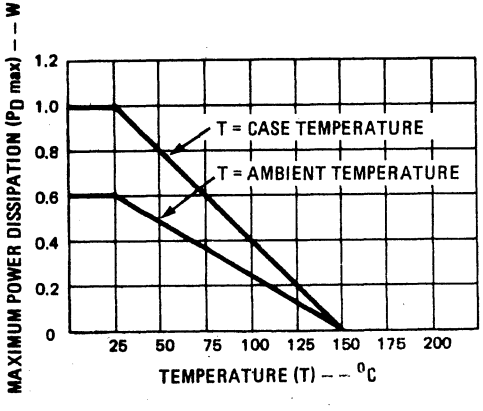
GROUPING	PARAMETER	CONDITIONS	MIN	TYP	MAX	RATIO
E	DC Current Gain	I_C = 1 mA, V_{CE} = 5V	30	38	50	1:1.6
F	DC Current Gain	I_C = 1 mA, V_{CE} = 5V	45	58	75	1:1.6
G	DC Current Gain	I_C = 1 mA, V_{CE} = 5V	68	85	110	1:1.6
H	DC Current Gain	I_C = 1 mA, V_{CE} = 5V	100	127	160	1:1.6
R	DC Current Gain	I_C = 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
T	DC Current Gain	I_C = 1 mA, V_{CE} = 5V	100	150	240	1:2.4

6 physical dimensions

TO-92



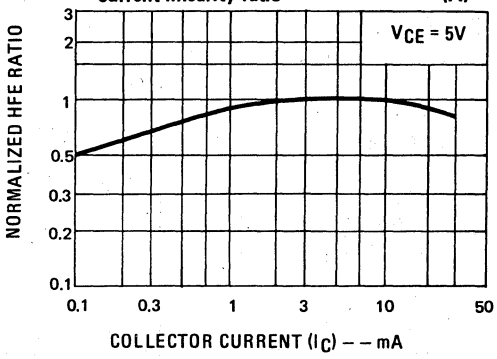
7 max power dissipation



8 typical performance characteristics

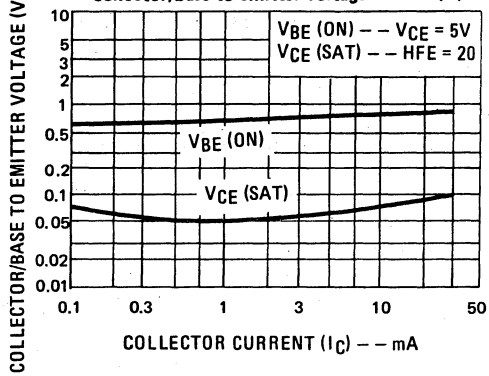
H_{FE1}/H_{FE2}

current linearity ratio (A)



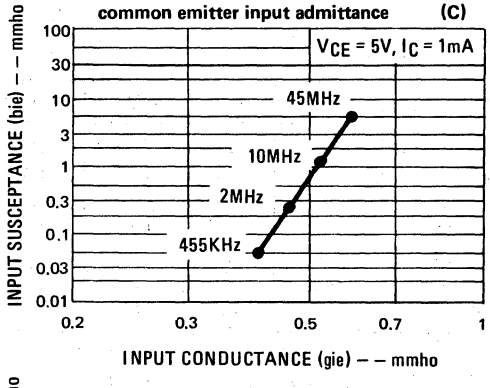
$V_{CE(sat)}/V_{BE(on)}$

collector/base to emitter voltage (B)



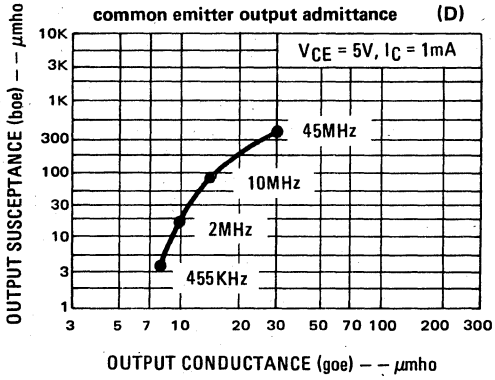
Yie

common emitter input admittance (C)



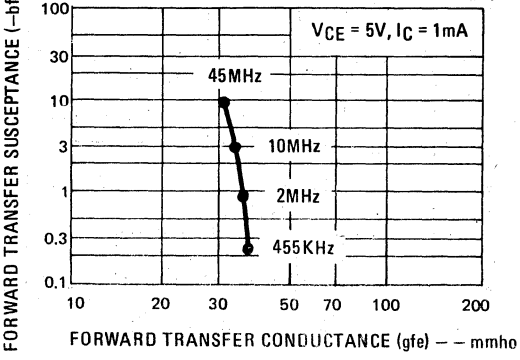
Yoe

common emitter output admittance (D)



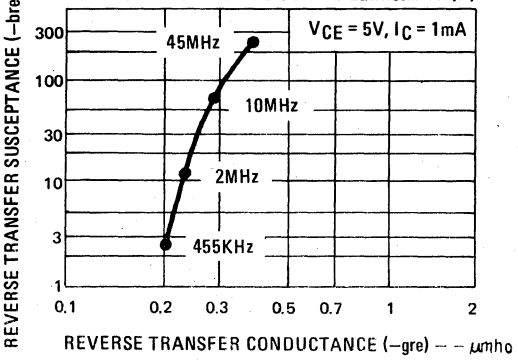
Yfe

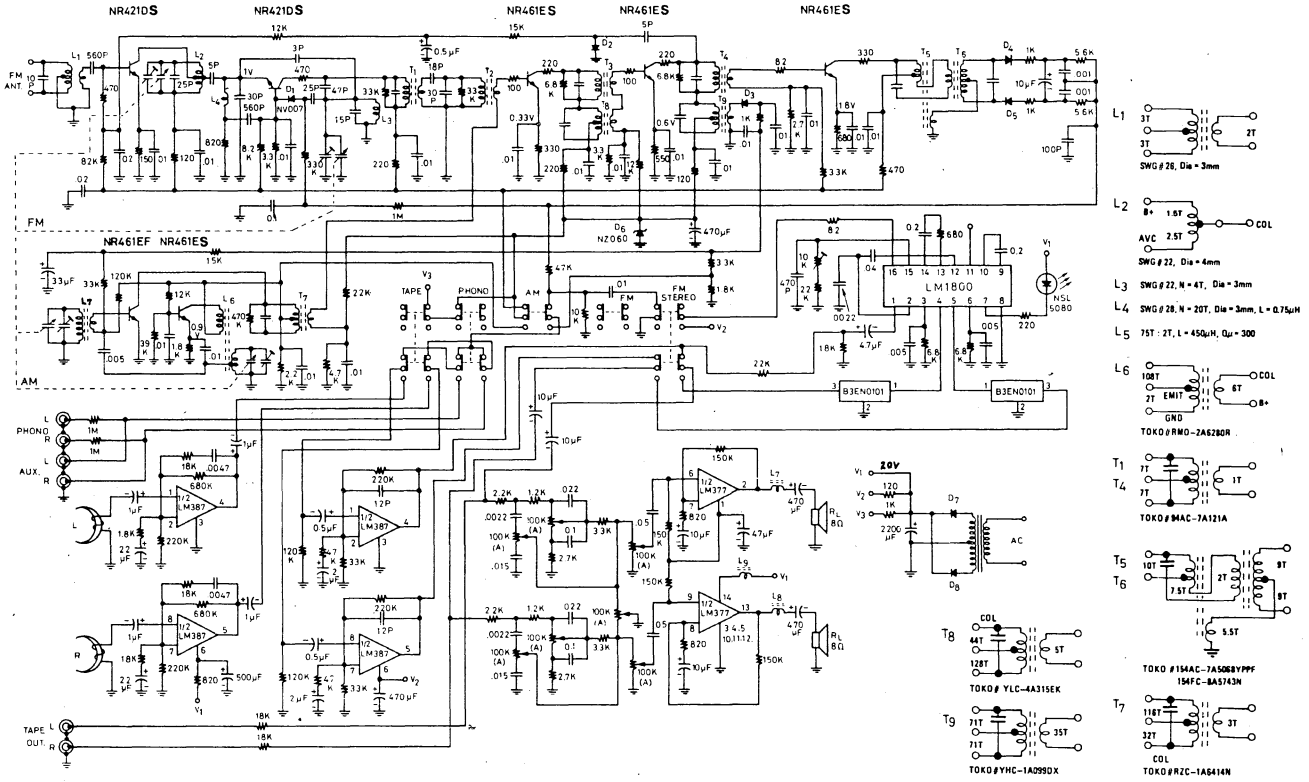
common emitter forward transfer admittance (E)



Yre

common emitter reverse transfer admittance (F)





FM performance (88–108 MHz)

- 30dB quieting sensitivity 2μV
- limiting sensitivity: 7μV
- AM rejection: 40dB
- AFC holding range: 800KHz
- stereo separation: 40dB

AM performance (525–1650 KHz)

- maximum sensitivity: 100μV/M
- 20dB quieting sensitivity: 280μV/M
- selectivity ±10KHz: –28dB
- AGC figure of merit: 52dB
- overload distortion: 3%

AUDIO performance

- 10% THD output power: 3W + 3W
- frequency response: 50Hz – 15KHz
- channel separation: 45dB
- tone control range: ±10dB
- typical system dist: 0.5%

Figure A. AM/FM/Cassette Home Stereo Circuit