National Semiconductor

NR421(NPN) VHF amplifier/FM converter transistor

features

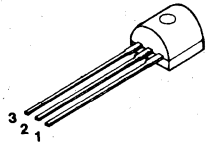
- 0.65pF typical feedback capacitance for excellent RF stability
- Guaranteed collector-base time constant and RF output resistance
- 150mV typical V_{CE} (sat) characteristics at I_C = 10 mA, and I_B = 0.5 mA
- 2 dB typical noise figure at 200 MHz
- "Epoxy B" packaging concept for excellent reliability

applications

- VHF RF amplifiers/converters
- CB radios
- Low-power RF oscillators

1 package and lead coding

TO-92

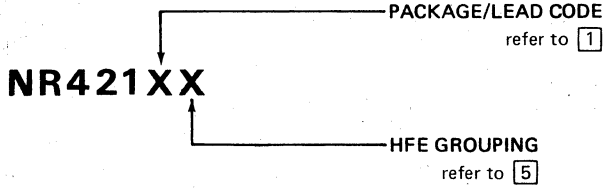


PACKAGE CODE TO-92	LEAD 1	2	3
D	B	E	C
F	E	C	B

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}	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 $T_C = 25°C$

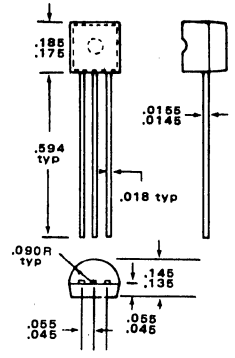
SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
BV_{CEO}	Collector-Emitter Sustaining Voltage	I_C = 1 mA	30			V
BV_{CBO}	Collector-Base Breakdown Voltage	I_C = 100μA	35			V
BV_{EBO}	Emitter-Base Breakdown Voltage	I_E = 10μA	3	5.5		V
I_{CBO}	Collector-Base Leakage Current	V_{CB} = 30V			0.1	μA
V_{BE} (sat)	Base-Emitter Saturation Voltage	I_C = 10 mA, I_B = 0.5 mA		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		0.65	0.9	pF
Cob	Collector Output Capacitance	V_{CB} = 10V, f = 1 MHz		0.9	1.3	pF
rb'Cc	Collector Base Time Constant	I_C = 2 mA, V_{CE} = 5V		8	20	pS
Roep	Common Emitter Output Resistance	I_C = 2 mA, V_{CE} = 5V f = 200 MHz	5			KOhm
ft	Current Gain Bandwidth Product	I_C = 2 mA, V_{CE} = 5V	450	700		MHz

5 HFE groupings

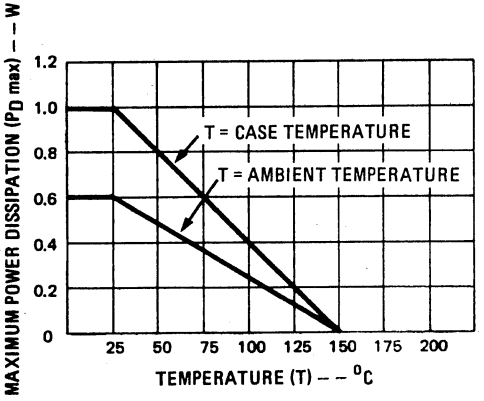
GROUPING	PARAMETER	CONDITIONS	MIN	TYP	MAX	RATIO
E	DC Current Gain	I_C = 2 mA, V_{CE} = 5V	30	38	50	1:1.6
F	DC Current Gain	I_C = 2 mA, V_{CE} = 5V	45	58	75	1:1.6
G	DC Current Gain	I_C = 2 mA, V_{CE} = 5V	68	85	110	1:1.6
H	DC Current Gain	I_C = 2 mA, V_{CE} = 5V	100	127	160	1:1.6
R	DC Current Gain	I_C = 2 mA, V_{CE} = 5V	20	32	50	1:2.4
S	DC Current Gain	I_C = 2 mA, V_{CE} = 5V	45	70	110	1:2.4
T	DC Current Gain	I_C = 2 mA, V_{CE} = 5V	100	150	240	1:2.4

6 physical dimensions

TO-92



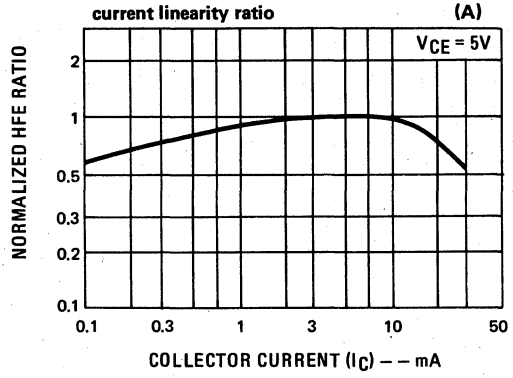
7 max power dissipation



8 typical performance characteristics

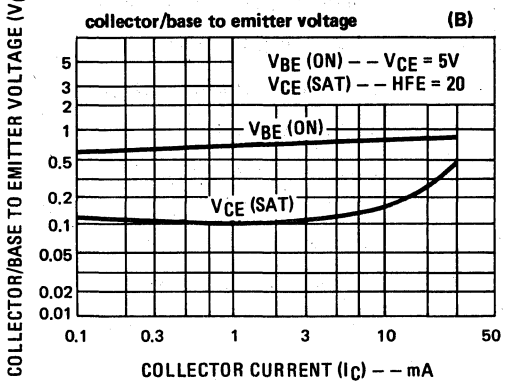
H_{FE1}/H_{FE2}

current linearity ratio (A)



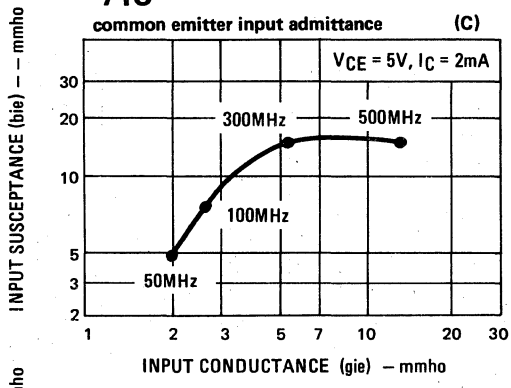
$V_{CE(sat)}/V_{BE(on)}$

collector/base to emitter voltage (B)



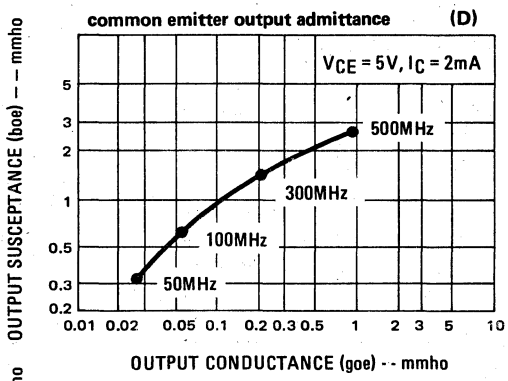
Yie

common emitter input admittance (C)



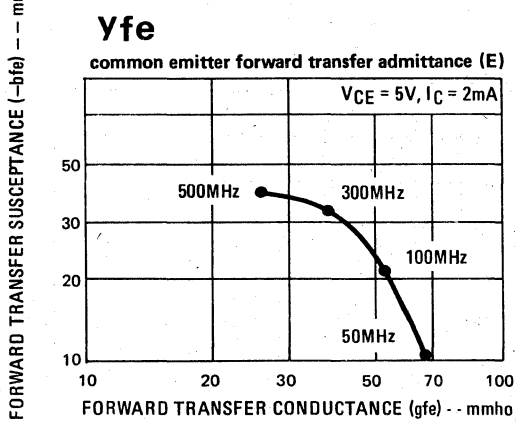
Yoe

common emitter output admittance (D)



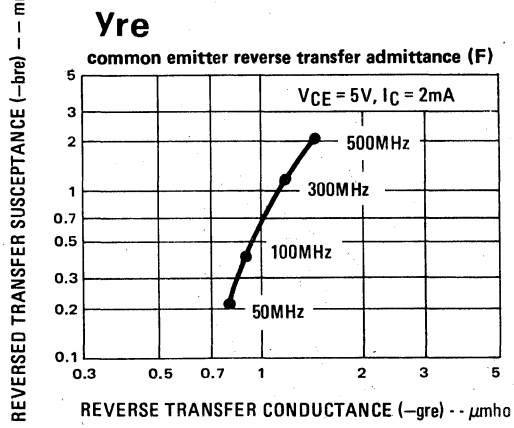
Yfe

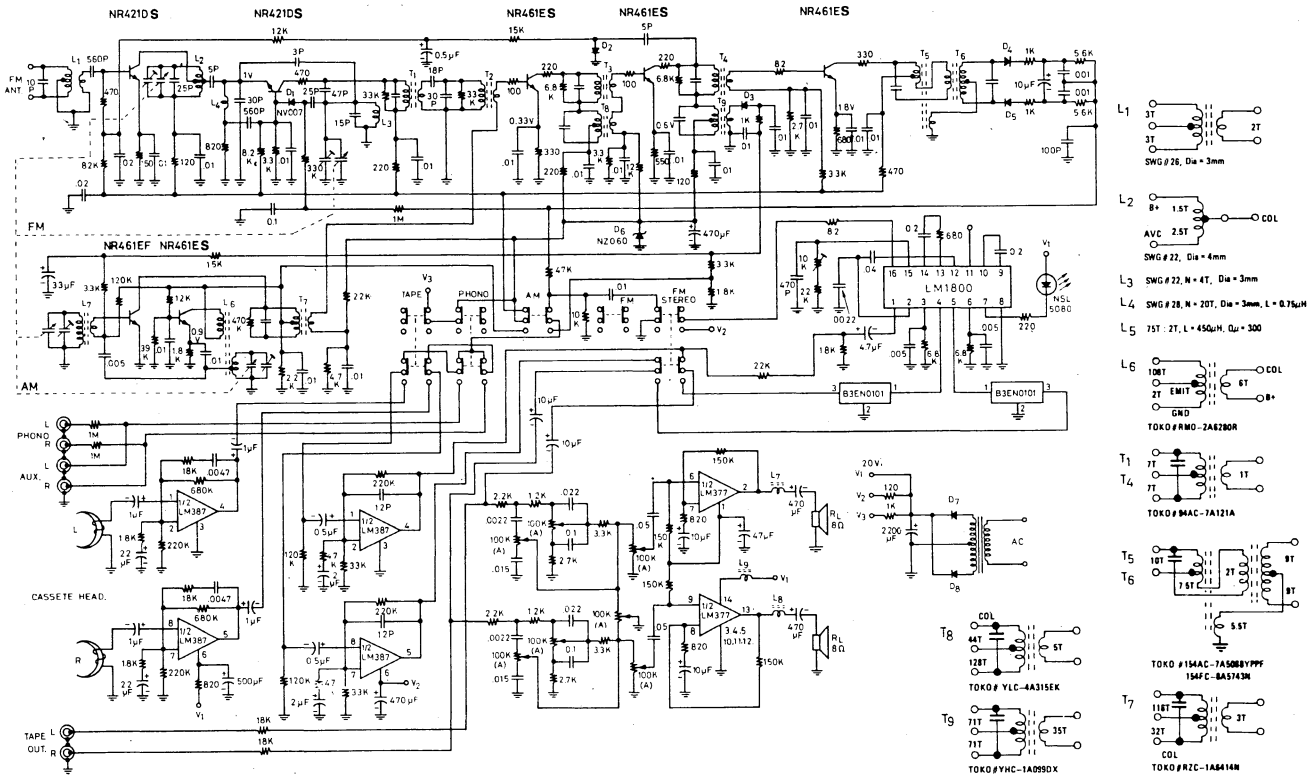
common emitter forward transfer admittance (E)



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