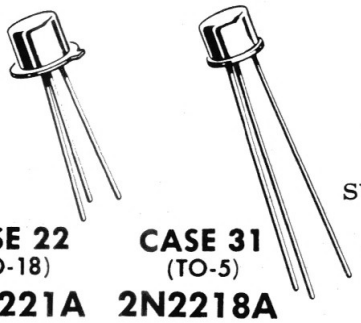
MOTOROLA

2N2218A (SILICON)
2N2219A
2N2221A
2N2222A



CASE 22 (TO-18)
2N2221A
2N2222A

CASE 31 (TO-5)
2N2218A
2N2219A

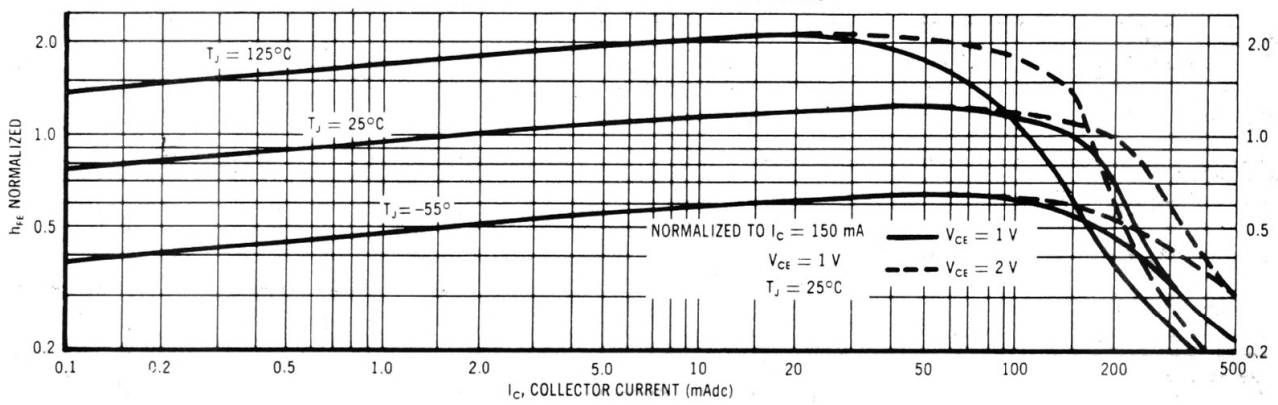
NPN silicon annular Star transistors for high-speed switching and DC to VHF amplifier applications.

Collector connected to case

MAXIMUM RATINGS

Rating	Symbol	2N2218A 2N2219A (TO-5)	2N2221A 2N2222A (TO-18)	Unit
Collector-Base Voltage	V_{CB}	75	75	Vdc
Collector-Emitter Voltage	V_{CEO}	40	40	Vdc
Emitter-Base Voltage	V_{EB}	6	6	Vdc
Total Device Dissipation at 25°C Case Temperature Derating Factor Above 25°C	P_D	3 20	1.8 12	Watts mW/°C
Total Device Dissipation at 25°C Ambient Temperature Derating Factor Above 25°C	P_D	0.8 5.33	0.5 3.33	Watts mW/°C
Junction Temperature Range	T_J	-65 to +175		°C
Storage Temperature Range	T_{stg}	-65 to +200		°C

TYPICAL CURRENT GAIN CHARACTERISTICS



2N2218A, 2N2219A, 2N2221A , 2N2222A (continued)

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Static Characteristics		Symbol	Min	Max	Unit
Collector-Base Breakdown Voltage (I_C = 10 μAdc, I_E = 0)		BV_{CBO}	75	—	Vdc
Collector-Emitter Breakdown Voltage (I_C = 10 mAdc, I_B = 0)		BV_{CEO}	40	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 μAdc, I_C = 0)		BV_{EBO}	6	—	Vdc
Collector Cutoff Current (V_{CB} = 60 Vdc, I_E = 0)		I_{CBO}	—	0.01	μAdc
(V_{CB} = 60 Vdc, I_E = 0, T_A = 150°C)			—	10	
Collector Cutoff Current (V_{CE} = 60 Vdc, $V_{EB(off)}$ = 3.0 Vdc)		I_{CEX}	—	10	nAdc
Base Cutoff Current (V_{CE} = 60 Vdc, $V_{EB(off)}$ = 3.0 Vdc)		I_{BL}	—	20	nAdc
Emitter Cutoff Current (V_{BE} = 3 Vdc, I_C = 0)		I_{EBO}	—	10	nAdc
Collector-Emitter Saturation Voltage* (I_C = 150 mAdc, I_B = 15 mAdc)		$V_{CE(sat)}$*	—	0.3	Vdc
(I_C = 500 mAdc, I_B = 50 mAdc)			—	1.0	
Base-Emitter Saturation Voltage* (I_C = 150 mAdc, I_B = 15 mAdc)		$V_{BE(sat)}$*	0.6	1.2	Vdc
(I_C = 500 mAdc, I_B = 50 mAdc)			—	2.0	
DC Forward Current Transfer Ratio*					—
(I_C = 0.1 mAdc, V_{CE} = 10 Vdc)	2N2218A, 2N2221A	h_{FE}*	20	—	
	2N2219A, 2N2222A		35	—	
(I_C = 1.0 mAdc, V_{CE} = 10 Vdc)	2N2218A, 2N2221A		25	—	
	2N2219A, 2N2222A		50	—	
(I_C = 10 mAdc, V_{CE} = 10 Vdc)	2N2218A, 2N2221A		35	—	
	2N2219A, 2N2222A		75	—	
(I_C = 10 mAdc, V_{CE} = 10 Vdc, T_A = -55°C)	2N2218A, 2N2221A		15	—	
	2N2219A, 2N2222A		35	—	
(I_C = 150 mAdc, V_{CE} = 10 Vdc)	2N2218A, 2N2221A		40	120	
	2N2219A, 2N2222A		100	300	
(I_C = 150 mAdc, V_{CE} = 1.0 Vdc)	2N2218A, 2N2221A		20	—	
	2N2219A, 2N2222A		50	—	
(I_C = 500 mAdc, V_{CE} = 10 Vdc)	2N2218A, 2N2221A		25	—	
	2N2219A, 2N2222A		40	—	

* Pulse Test ≤ 300 μs, duty cycle ≤ 2%

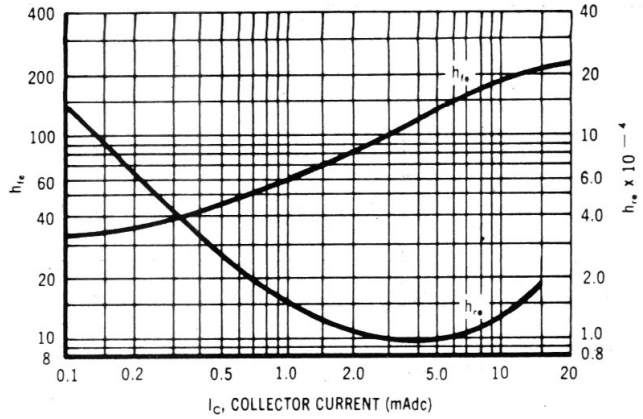
SMALL SIGNAL CHARACTERISTICS		Symbol	Min	Max	Unit
Small Signal Current Gain (I_C = 1.0 mA, V_{CE} = 10 V, f = 1 kHz)	2N2218A, 2N2221A	h_{fe}	30	150	—
	2N2219A, 2N2222A		50	300	
(I_C = 10 mA, V_{CE} = 10 V, f = 1 kHz)	2N2218A, 2N2221A		50	300	
	2N2219A, 2N2222A		75	375	
Voltage Feedback Ratio (I_C = 1.0 mA, V_{CE} = 10 V, f = 1 kHz)	2N2218A, 2N2221A	h_{re}	-	5	X10^{-4}
	2N2219A, 2N2222A		-	8	
(I_C = 10 mA, V_{CE} = 10 V, f = 1 kHz)	2N2218A, 2N2221A		-	2.5	
	2N2219A, 2N2222A		-	4	
Input Impedance (I_C = 1.0 mA, V_{CE} = 10 V, f = 1 kHz)	2N2218A, 2N2221A	h_{ie}	1	3.5	k ohms
	2N2219A, 2N2222A		2.0	8	
(I_C = 10 mA, V_{CE} = 10 V, f = 1 kHz)	2N2218A, 2N2221A		0.2	1.0	
	2N2219A, 2N2222A		0.25	1.25	
Output Admittance (I_C = 1.0 mA, V_{CE} = 10 V, f = 1 kHz)	2N2218A, 2N2221A	h_{oe}	3	15	μmhos
	2N2219A, 2N2222A		5	35	
(I_C = 10 mA, V_{CE} = 10 V, f = 1 kHz)	2N2218A, 2N2221A		10	100	
	2N2219A, 2N2222A		25	200	
Collector-Base Time Constant (I_C = 20 mA, V_{CE} = 20 V, f = 31.8 MHz)		r'_bC_c	-	150	ps
Noise Figure (I_C = 100 μA, V_{CE} = 10 V, Rg = 1 kΩ, f = 1 kHz)	2N2219A, 2N2222A	NF	-	4	dB

2N2218A, 2N2219A, 2N2221A , 2N2222 A (continued)

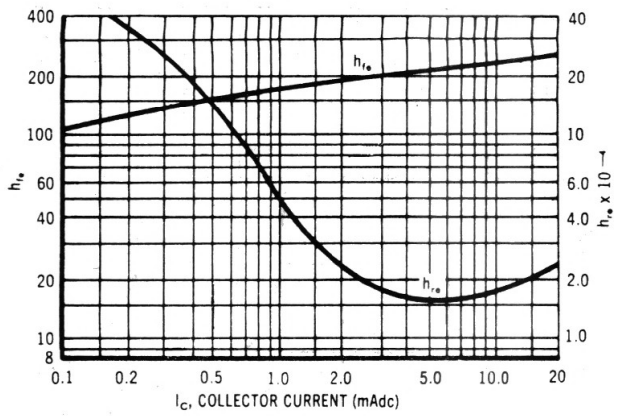
SMALL SIGNAL FORWARD CURRENT GAIN AND VOLTAGE FEEDBACK RATIO versus COLLECTOR CURRENT

$V_{CE} = 10$ V @ 1 KHz

2N2218A, 2N2221A



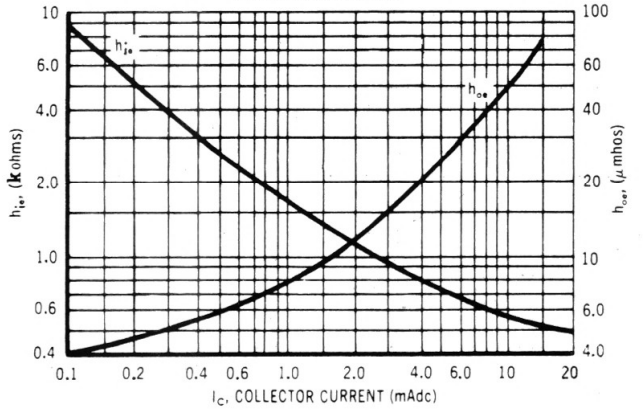
2N2219A, 2N2222A



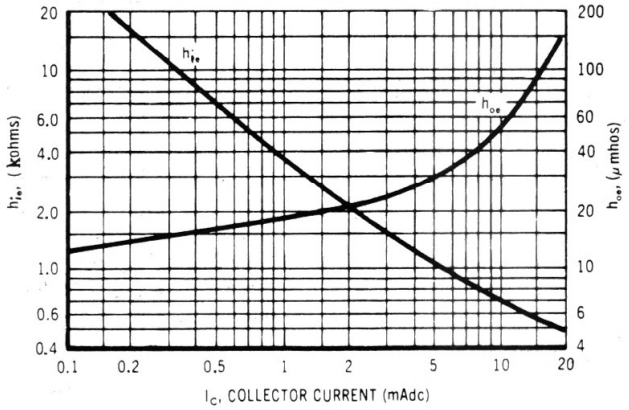
SMALL SIGNAL INPUT IMPEDANCE AND OUTPUT CONDUCTANCE versus COLLECTOR CURRENT

$V_{CE} = 10$ V @ 1 KHz

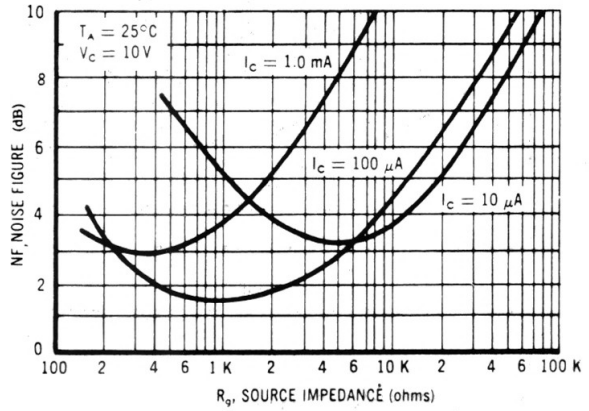
2N2218A, 2N2221A



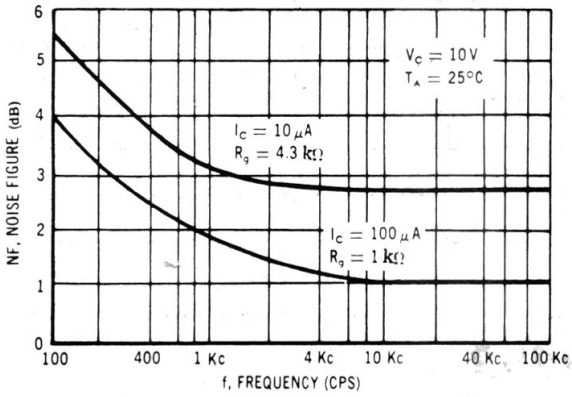
2N2219A, 2N2222A



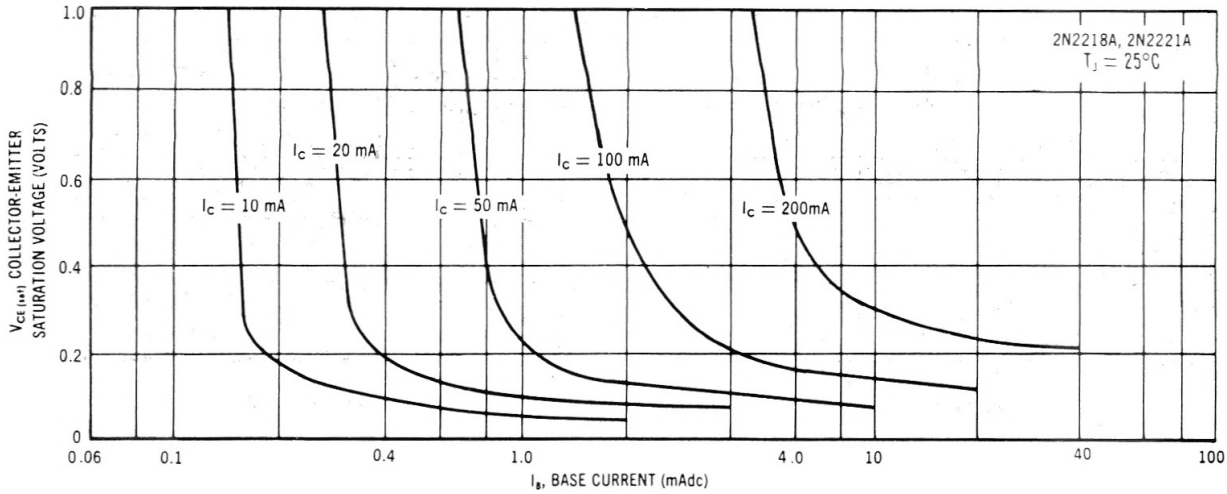
1 KC NOISE FIGURE versus SOURCE IMPEDANCE

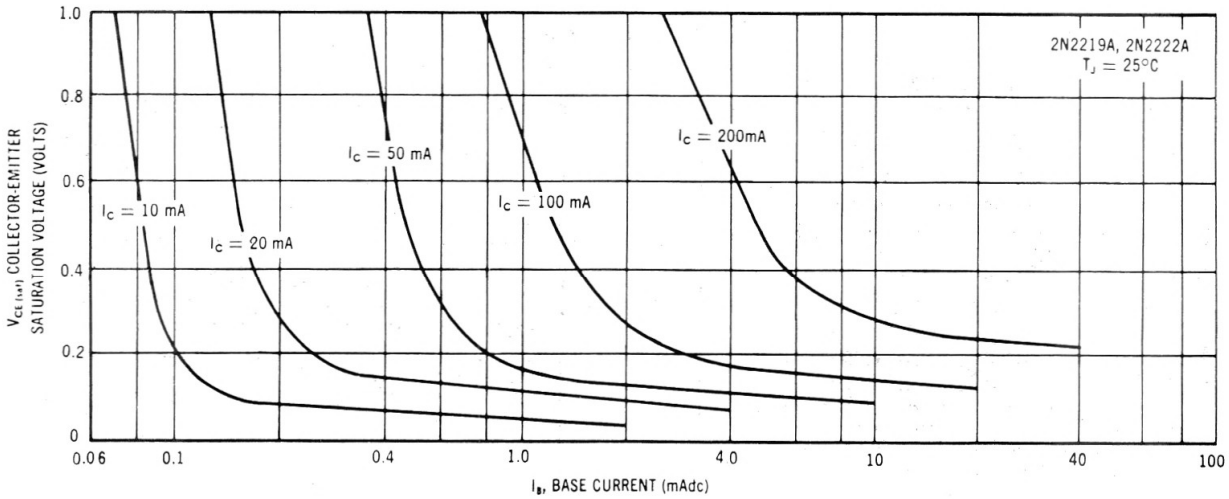


NOISE FIGURE versus FREQUENCY

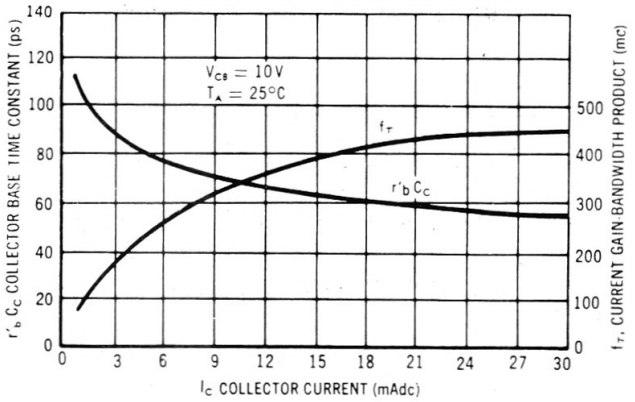


COLLECTOR SATURATION VOLTAGE versus BASE CURRENT

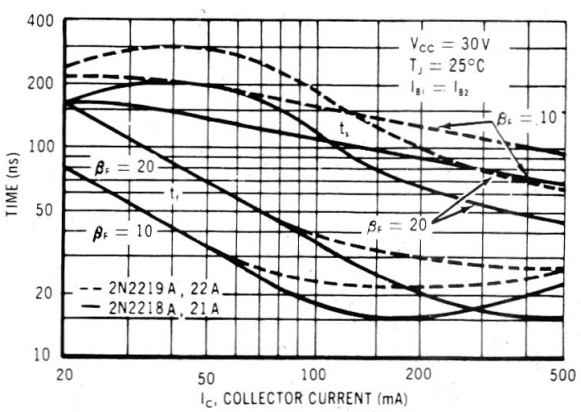




CURRENT GAIN — BANDWIDTH PRODUCT and COLLECTOR BASE TIME CONSTANT versus COLLECTOR CURRENT



STORAGE AND FALL TIME versus COLLECTOR CURRENT



2N2223, A

For Specifications, See 2N2060 Data.