

MOTOROLA 2N6604"供应商

SEMICONDUCTOR

TECHNICAL DATA

T-31-21

2N6604

The RF Line

NPN SILICON HIGH FREQUENCY TRANSISTOR

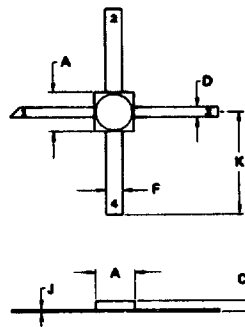
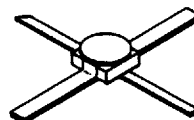
... designed for use in high-frequency, low-noise, small-signal, narrow and wideband amplifiers. Ideal for use in microstrip thin and thick film applications.

- Low Noise Figure — $NF = 2.7 \text{ dB (Typ) @ } f = 1.0 \text{ GHz}$
- High Power Gain — $G_{J(\text{max})} = 16 \text{ dB (Typ) @ } f = 1.0 \text{ GHz}$
- High Current — Specified Performance @ $I_C = 30 \text{ mA}$
- Ion Implantation and Gold Metallization
- Metal/Ceramic Hermetic Package
- JAN, JTXV Available

 $NF = 2.7 \text{ dB @ } 1.0 \text{ GHz}$
**HIGH FREQUENCY
TRANSISTOR**

NPN SILICON

2



STYLE 1

- PIN 1 COLLECTOR
2 EMITTER
3 BASE
4 EMITTER

NOTE

1. DIMENSION "K" APPLIES TO ALL LEADS
2. DIRECTION OF 45° CUT ON PIN 1 IS VENDOR OPTION

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.29	2.67	0.090	0.105
C	0.89	1.40	0.035	0.055
D	0.41	0.61	0.016	0.024
F	0.89	1.09	0.035	0.043
J	0.08	0.15	0.003	0.006
K	4.45	5.84	0.175	0.230

CASE 303-01

*MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ Free Air Temperature)

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CE0}	15	Vdc
Collector-Base Voltage	V_{CBO}	25	Vdc
Emitter-Base Voltage	V_{EBO}	3.0	Vdc
Collector Current—Continuous	I_C	50	mA dc
Total Device Dissipation @ $T_C = 125^\circ\text{C}$ Derate Above 75°C	P_D	500 6.66	mW mW/ $^\circ\text{C}$
Storage Temperature Range	T_{stg}	-85 to +200	$^\circ\text{C}$

*Indicates JEDEC Registered Data.

Specifications and Package Options

Devices using the same die type as the 2N6604:

- MRF911 — 4 Lead Plastic Macro-T Case 302-01
MRF914 — TO-72
MM8R930 — MiniBloc Plastic (SOT-23) TO-236
BFR91 — 3 Lead Plastic Macro-T Case 302A-01
BFR91 — Unencapsulated Chip

查询"2N6604"供应商

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

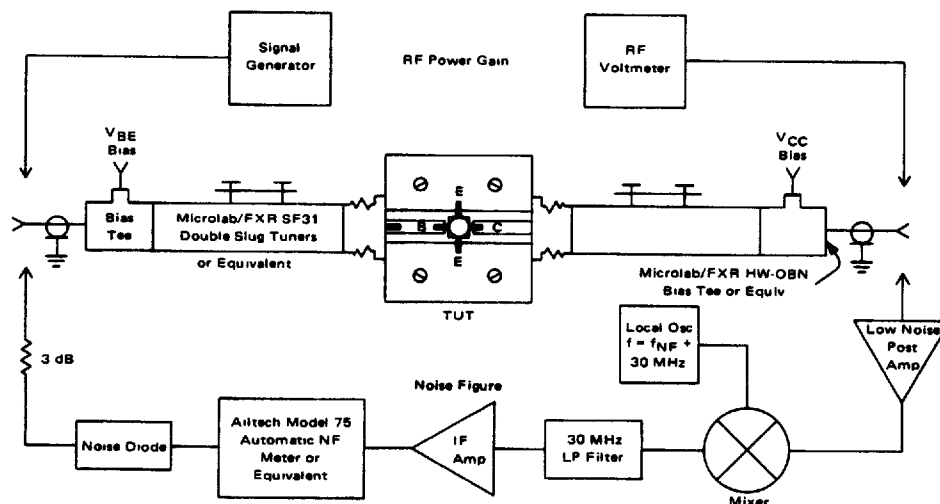
Characteristic	Symbol	Min	Typ	Max	Unit
*OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage ($I_C = 1.0\text{ mAdc}$, $I_B = 0$)	$V_{(BR)CEO}$	15	—	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 0.1\text{ mAdc}$, $I_E = 0$)	$V_{(BR)CBO}$	25	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 0.1\text{ mAdc}$, $I_C = 0$)	$V_{(BR)EBO}$	3.0	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 15\text{ Vdc}$, $I_E = 0$)	I_{CBO}	—	—	50	nAdc
*ON CHARACTERISTICS					
DC Current Gain ($I_C = 30\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$)	h_{FE}	30	—	200	—
*DYNAMIC CHARACTERISTICS					
Collector-Base Capacitance (1) ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $0.1\text{ MHz} < f < 1.0\text{ MHz}$)	C_{cb}	0.30	—	0.80	pF
*FUNCTIONAL TEST					
Common-Emitter Amplifier Power Gain (Figure 2) ($V_{CE} = 10\text{ Vdc}$, $I_C = 30\text{ mAdc}$, $f = 1.0\text{ GHz}$)	G_{pe}	15	—	21	dB
Spot Noise Figure ($R_S = \text{Optimum}$ — Figure 2) ($V_{CE} = 10\text{ Vdc}$, $I_C = 5.0\text{ mAdc}$, $f = 1.0\text{ GHz}$)	NF	1.5	—	3.0	dB
Power Gain at Optimum Noise Figure ($V_{CE} = 10\text{ Vdc}$, $I_C = 5.0\text{ mAdc}$, $f = 1.0\text{ GHz}$)	G_{NF}	9.0	—	—	dB
TYPICAL 2 GHz PERFORMANCE					
Maximum Unilateral Gain (Figure 2) (2) ($V_{CE} = 10\text{ Vdc}$, $I_C = 30\text{ mAdc}$, $f = 2.0\text{ GHz}$)	$G_{U(\max)}$	—	10	—	dB
Noise Figure ($R_S = \text{Optimum}$ — Figure 2) ($V_{CE} = 10\text{ Vdc}$, $I_C = 5.0\text{ mAdc}$, $f = 2.0\text{ GHz}$)	NF	—	4.3	—	dB

*Indicates JEDEC Registered Data.

(1) C_{cb} measurement employs a three-terminal capacitance bridge incorporating a guard circuit. The emitter terminal shall be connected to the guard terminal of the bridge.

(2) $G_{U(\max)}$ is calculated from the S-Parameters using the equation $G_{U(\max)} = \frac{|S_{21}|^2}{(1 - |S_{11}|^2)(1 - |S_{22}|^2)}$

FIGURE 1 — BLOCK DIAGRAM FOR POWER GAIN AND NOISE FIGURE



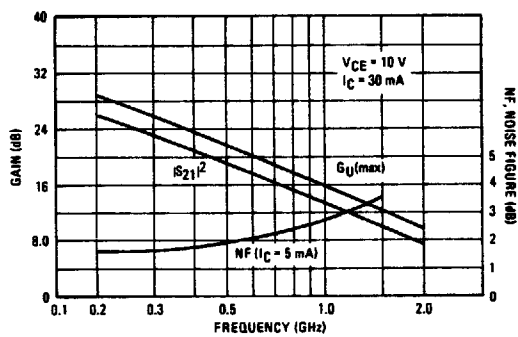
[查询"2N6604"供应商](#)FIGURE 2 - POWER GAIN AND NOISE FIGURE
versus FREQUENCY

FIGURE 3 - OUTPUT CAPACITANCE versus VOLTAGE

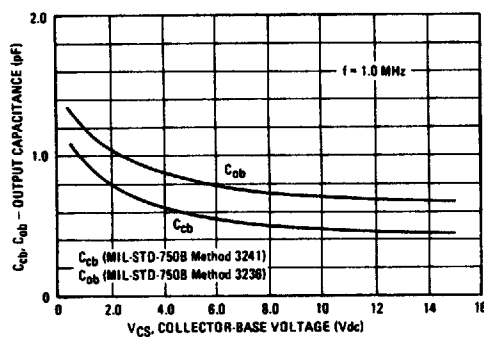
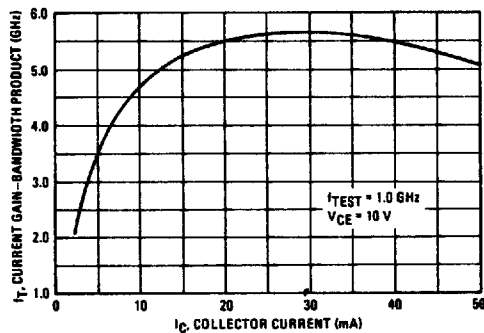
FIGURE 4 - CURRENT GAIN-BANDWIDTH PRODUCT
versus COLLECTOR CURRENT

FIGURE 5 - POWER GAIN versus COLLECTOR CURRENT

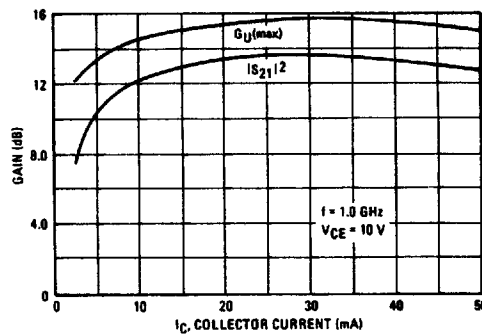
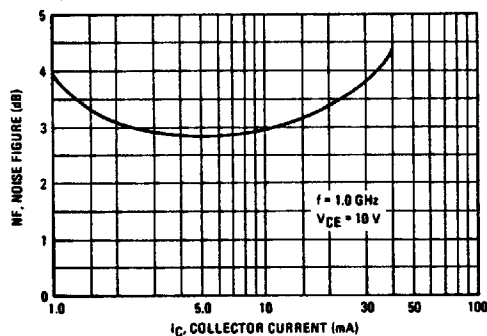


FIGURE 6 - NOISE FIGURE versus COLLECTOR CURRENT



[查询"2N6604"供应商](#)

COMMON EMITTER SCATTERING PARAMETERS

FIGURE 7 - INPUT AND OUTPUT REFLECTION COEFFICIENTS versus FREQUENCY

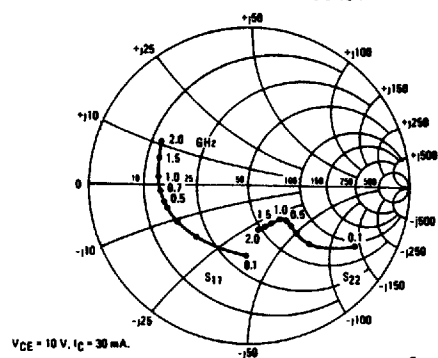
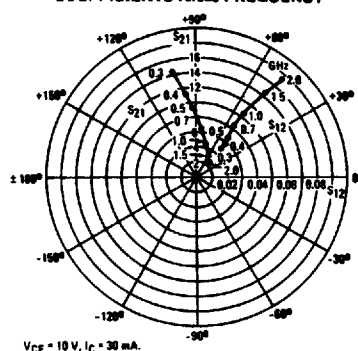


FIGURE 8 - FORWARD AND REVERSE TRANSMISSION COEFFICIENTS versus FREQUENCY



S - PARAMETERS

V _{CE} (Volts)	I _C (mA)	Frequency (MHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
			S ₁₁	∠φ	S ₂₁	∠φ	S ₁₂	∠φ	S ₂₂	∠φ
5.0	5	100	0.72	-40	12.37	153	0.028	67	0.91	-18
		200	0.85	-78	10.38	133	0.048	51	0.76	-32
		500	0.61	-137	5.75	100	0.067	34	0.50	-45
		1000	0.61	-168	3.13	78	0.082	31	0.41	-54
		2000	0.63	161	1.58	47	0.112	30	0.41	-80
	10	100	0.57	-60	19.54	146	0.024	63	0.85	-27
		200	0.55	-106	14.70	125	0.038	47	0.64	-43
		500	0.59	-155	7.12	95	0.061	39	0.37	-55
		1000	0.61	-178	3.77	76	0.069	40	0.29	-62
		2000	0.64	156	1.91	50	0.106	39	0.30	-86
	30	100	0.43	-111	30.58	135	0.016	57	0.72	-39
		200	0.53	-145	19.35	114	0.022	49	0.46	-57
		500	0.62	-173	8.42	91	0.035	51	0.24	-69
		1000	0.63	172	4.36	75	0.058	54	0.18	-76
		2000	0.67	151	2.19	52	0.099	49	0.21	-99
	50	100	0.46	-134	32.34	129	0.013	57	0.64	-42
		200	0.57	-158	19.19	110	0.018	51	0.40	-56
		500	0.64	-178	8.13	89	0.031	57	0.22	-62
		1000	0.65	170	4.17	74	0.053	58	0.19	-70
		2000	0.70	150	2.10	52	0.092	54	0.22	-97
10	5	100	0.74	-36	12.34	154	0.023	69	0.93	-16
		200	0.67	-71	10.56	135	0.040	54	0.81	-25
		500	0.59	-131	6.09	102	0.058	37	0.57	-36
		1000	0.58	-164	3.32	79	0.073	33	0.50	-44
		2000	0.60	164	1.67	48	0.096	32	0.49	-69
	10	100	0.60	-52	19.75	148	0.020	65	0.87	-21
		200	0.56	-95	15.30	127	0.032	49	0.69	-33
		500	0.56	-149	7.69	97	0.044	41	0.45	-41
		1000	0.58	-174	4.07	77	0.061	42	0.39	-47
		2000	0.61	159	2.03	50	0.095	40	0.39	-70
	30	100	0.44	-94	32.03	136	0.014	59	0.75	-31
		200	0.50	-135	20.76	115	0.021	49	0.52	-41
		500	0.57	-168	9.13	91	0.032	52	0.33	-43
		1000	0.59	175	4.71	75	0.052	54	0.29	-48
		2000	0.64	154	2.34	52	0.089	49	0.30	-72
	50	100	0.44	-117	33.56	129	0.012	59	0.68	-31
		200	0.52	-150	19.94	109	0.017	50	0.47	-36
		500	0.59	-174	8.52	89	0.028	56	0.34	-35
		1000	0.61	173	4.38	75	0.049	57	0.32	-43
		2000	0.66	152	2.21	51	0.083	52	0.34	-70