

MRF914

CASE 20-03, STYLE 10
TO-72 (TO-206AF)

HIGH FREQUENCY TRANSISTOR

NPN SILICON



MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	12	Vdc
Collector-Base Voltage	V_{CBO}	20	Vdc
Emitter-Base Voltage	V_{EBO}	3.0	Vdc
Collector Current — Peak	I_C	40	mA
Total Device Dissipation @ $T_A = 75^\circ\text{C}$ Derate above 75°C	P_D	200 1.6	mW mW/ $^\circ\text{C}$
Storage Temperature	T_{stg}	-65 to +200	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	625	$^\circ\text{C/W}$

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

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage ($I_C = 1.0$ mA, $I_B = 0$)	$V_{(BR)CEO}$	12	—	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 0.1$ mA, $I_E = 0$)	$V_{(BR)CBO}$	20	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 0.1$ mA, $I_C = 0$)	$V_{(BR)EBO}$	3.0	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 15$ Vdc, $I_E = 0$)	I_{CBO}	—	—	50	nA

ON CHARACTERISTICS

DC Current Gain ($I_C = 20$ mA, $V_{CE} = 10$ Vdc)	h_{FE}	30	—	200	—
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SMALL SIGNAL CHARACTERISTICS

Current-Gain — Bandwidth Product ($I_C = 20$ mA, $V_{CE} = 10$ Vdc, $f = 0.5$ GHz)	f_T	—	4.5	—	GHz
Collector-Base Capacitance ($V_{CB} = 10$ Vdc, $I_E = 0$, $f = 1.0$ MHz)	C_{cb}	—	0.7	1.0	pF

FUNCTIONAL TEST

Noise Figure ($I_C = 5.0$ mA, $V_{CE} = 10$ Vdc, $f = 0.5$ GHz) ($I_C = 5.0$ mA, $V_{CE} = 10$ Vdc, $f = 1.0$ GHz)	NF	— —	2.0 2.5	— —	dB
Power Gain at Optimum Noise Figure ($I_C = 5.0$ mA, $V_{CE} = 10$ Vdc, $f = 0.5$ GHz) ($I_C = 5.0$ mA, $V_{CE} = 10$ Vdc, $f = 1.0$ GHz)	G_{NF}	— —	12 7.0	— —	dB
Maximum Available Power Gain(1) ($I_C = 20$ mA, $V_{CE} = 10$ Vdc, $f = 0.5$ GHz) ($I_C = 20$ mA, $V_{CE} = 10$ Vdc, $f = 1.0$ GHz)	G_{max}	— —	15 10	— —	dB

$$(1) G_{max} = \frac{|S_{21}|^2}{(1 - |S_{11}|^2)(1 - |S_{22}|^2)}$$

FIGURE 1 – POWER DERATING

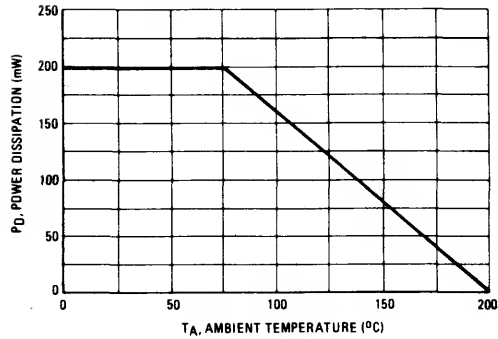


FIGURE 2 – POWER GAIN AND NOISE FIGURE
versus FREQUENCY

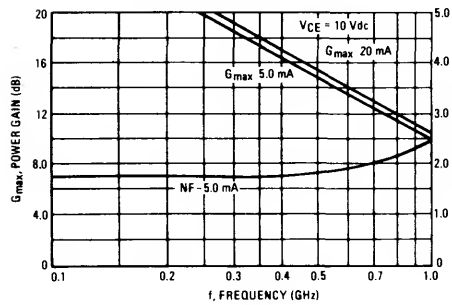


FIGURE 3 – POWER GAIN AND NOISE FIGURE
versus COLLECTOR CURRENT

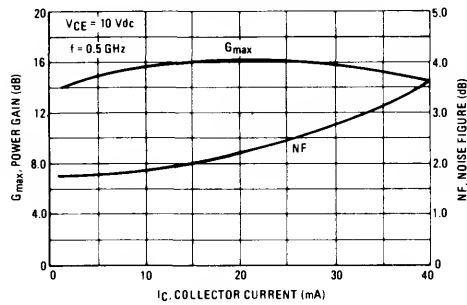


FIGURE 4 – S₁₁ PARAMETERS

Frequency (MHz)		100		300		500		700		1000	
VCE (Volts)	IC (mA)	S11	∠φ	S11	∠φ	S11	∠φ	S11	∠φ	S11	∠φ
5.0	2.0	0.84	-35	0.57	-80	0.42	-115	0.34	-140	0.27	-166
	5.0	0.65	-45	0.34	-85	0.23	-115	0.18	-130	0.16	-150
	10	0.48	-50	0.32	-85	0.14	-105	0.12	-115	0.09	-120
	20	0.33	-50	0.15	-75	0.10	-90	0.09	-100	0.09	-101
	30	0.27	-50	0.13	-70	0.09	-85	0.09	-100	0.09	-101
10	2.0	0.86	-30	0.59	-75	0.42	-105	0.34	-130	0.25	-155
	5.0	0.70	-40	0.37	-75	0.24	-95	0.18	-110	0.13	-125
	10	0.55	-45	0.26	-70	0.17	-80	0.14	-90	0.13	-90
	20	0.41	-45	0.21	-60	0.15	-65	0.13	-75	0.14	-80
	30	0.36	-45	0.19	-55	0.14	-65	0.13	-75	0.13	-80

FIGURE 5 – S₂₂ PARAMETERS

Frequency (MHz)		100		300		500		700		1000	
V _{CE} (Volts)	I _C (mA)	S ₂₂	∠φ	S ₂₂	∠φ	S ₂₂	∠φ	S ₂₂	∠φ	S ₂₂	∠φ
5.0	2.0	0.94	-15	0.77	-25	0.68	-30	0.66	-35	0.64	-45
	5.0	0.85	-20	0.63	-30	0.57	-30	0.55	-35	0.55	-45
	10	0.75	-25	0.55	-25	0.51	-30	0.50	-35	0.50	-40
	20	0.66	-25	0.50	-25	0.47	-30	0.47	-35	0.48	-40
	30	0.62	-25	0.49	-25	0.46	-25	0.46	-30	0.47	-40
10	2.0	0.95	-10	0.81	-20	0.74	-30	0.72	-35	0.71	-40
	5.0	0.87	-15	0.69	-25	0.64	-25	0.63	-30	0.63	-40
	10	0.80	-20	0.63	-20	0.59	-25	0.59	-30	0.60	-40
	20	0.72	-20	0.59	-20	0.57	-23	0.57	-30	0.58	-35
	30	0.70	-20	0.59	-20	0.57	-20	0.57	-30	0.58	-35

FIGURE 6 – S₂₁ PARAMETERS

Frequency (MHz)		100		300		500		700		1000	
V _{CE} (Volts)	I _C (mA)	S ₂₁	∠φ	S ₂₁	∠φ	S ₂₁	∠φ	S ₂₁	∠φ	S ₂₁	∠φ
5.0	2.0	5.99	150	4.06	110	2.90	90	2.27	75	1.71	55
	5.0	11.38	135	5.91	100	3.90	80	2.93	70	2.17	55
	10	15.21	125	6.78	95	4.34	80	3.23	70	2.38	55
	20	17.98	115	7.27	90	4.58	75	3.40	65	2.50	50
	30	18.78	110	7.37	85	4.64	75	3.42	65	2.50	50
10	2.0	6.05	150	4.20	115	3.04	90	2.37	75	1.75	55
	5.0	11.46	135	6.17	100	4.06	85	3.08	70	2.26	55
	10	15.45	127	7.08	95	4.56	80	3.41	70	2.50	55
	20	18.35	120	7.57	90	4.80	75	3.58	65	2.61	55
	30	19.12	115	7.63	90	4.79	75	3.56	65	2.60	55

FIGURE 7 – S₁₂ PARAMETERS

Frequency (MHz)		100		300		500		700		1000	
V _{CE} (Volts)	I _C (mA)	S ₁₂	∠φ	S ₁₂	∠φ	S ₁₂	∠φ	S ₁₂	∠φ	S ₁₂	∠φ
5.0	2.0	0.04	70	0.09	50	0.11	50	0.12	50	0.16	50
	5.0	0.04	70	0.07	60	0.11	60	0.14	60	0.19	55
	10	0.03	70	0.07	70	0.11	65	0.15	65	0.20	55
	20	0.03	75	0.07	70	0.12	70	0.15	65	0.21	55
	30	0.03	75	0.07	70	0.12	70	0.16	65	0.21	57
10	2.0	0.03	70	0.07	55	0.09	50	0.10	50	0.13	55
	5.0	0.03	70	0.06	60	0.09	65	0.12	60	0.15	60
	10	0.03	70	0.06	65	0.09	65	0.12	65	0.17	60
	20	0.03	75	0.06	70	0.09	70	0.13	65	0.18	60
	30	0.03	75	0.06	70	0.10	70	0.13	65	0.17	60

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