

MRF911

CASE 317-01, STYLE 2 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 _{dc}
Total Device Dissipation @ $T_L = 50^\circ\text{C}$ Derate above 50°C	P_D	400 4.0	mW mW/°C
Storage Temperature	T_{stg}	-65 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Lead	$R_{\theta JL}$	250	°C/W

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage ($I_C = 1.0$ mA _{dc} , $I_B = 0$)	$V_{(BR)CEO}$	12	—	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 0.1$ mA _{dc} , $I_E = 0$)	$V_{(BR)CBO}$	20	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 0.1$ mA _{dc} , $I_C = 0$)	$V_{(BR)EBO}$	3.0	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 15$ Vdc, $I_E = 0$)	I_{CBO}	—	—	50	nA _{dc}

ON CHARACTERISTICS

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

Current-Gain — Bandwidth Product ($I_C = 30$ mA _{dc} , $V_{CE} = 10$ Vdc, $f = 1.0$ GHz)	f_T	—	5.0	—	GHz
Collector-Base Capacitance ($V_{CB} = 10$ Vdc, $I_E = 0$, $f = 1.0$ MHz)	C_{cb}	—	0.6	1.0	pF

FUNCTIONAL TEST

Noise Figure ($I_C = 5.0$ mA _{dc} , $V_{CE} = 10$ Vdc, $f = 1.0$ GHz) ($I_C = 5.0$ mA _{dc} , $V_{CE} = 10$ Vdc, $f = 2.0$ GHz)	NF	— —	2.5 4.0	— —	dB
Power Gain at Optimum Noise Figure ($I_C = 5.0$ mA _{dc} , $V_{CE} = 10$ Vdc, $f = 1.0$ GHz) ($I_C = 5.0$ mA _{dc} , $V_{CE} = 10$ Vdc, $f = 2.0$ GHz)	G _{NF}	— —	10 6.0	— —	dB
Maximum Available Power Gain(1) ($I_C = 30$ mA _{dc} , $V_{CE} = 10$ Vdc, $f = 1.0$ GHz) ($I_C = 30$ mA _{dc} , $V_{CE} = 10$ Vdc, $f = 2.0$ GHz)	G _{max}	— —	12.5 7.5	— —	dB

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

FIGURE 1 – POWER DERATING

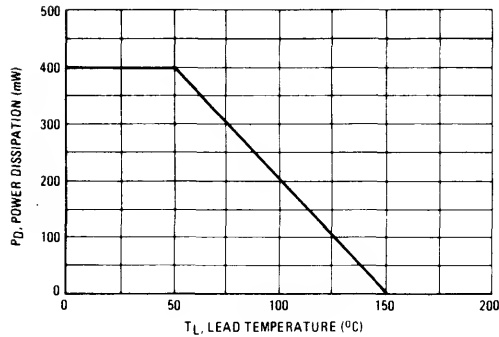


FIGURE 2 – POWER GAIN AND NOISE FIGURE
versus FREQUENCY

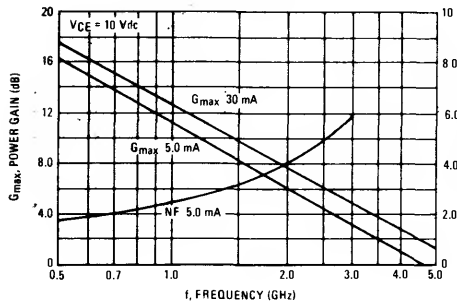


FIGURE 3 – POWER GAIN AND NOISE FIGURE
versus COLLECTOR CURRENT

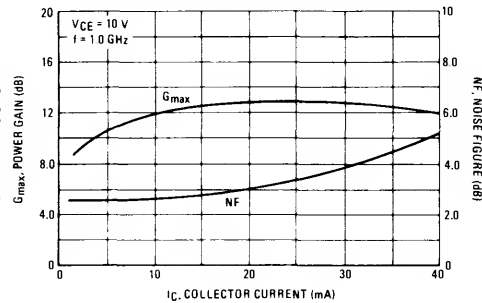


FIGURE 4 – S₁₁ PARAMETERS

Frequency (MHz)		500		1000		1500		2000	
VCE (Volts)	IC (mA)	S11	∠φ	S11	∠φ	S11	∠φ	S11	∠φ
5.0	2.0	0.66	-125	0.64	-175	0.68	160	0.73	140
	5.0	0.57	-150	0.58	170	0.62	150	0.66	135
	10	0.54	-165	0.57	160	0.60	145	0.64	130
	20	0.54	-180	0.57	155	0.60	140	0.64	125
	30	0.54	175	0.57	155	0.61	140	0.65	125
10	2.0	0.66	-120	0.63	-170	0.67	160	0.71	140
	5.0	0.56	-145	0.56	175	0.60	150	0.64	135
	10	0.51	-160	0.53	165	0.57	145	0.61	130
	20	0.49	-175	0.52	160	0.57	145	0.60	130
	30	0.49	-175	0.53	160	0.57	145	0.61	130

FIGURE 5 – S₂₂ PARAMETERS

Frequency (MHz)		500		1000		1500		2000	
V _{CE} (Volts)	I _C (mA)	S ₂₂	∠φ	S ₂₂	∠φ	S ₂₂	∠φ	S ₂₂	∠φ
5.0	2.0	0.61	-45	0.50	-60	0.48	-80	0.50	-100
	5.0	0.40	-55	0.31	-65	0.30	-85	0.32	-100
	10	0.27	-60	0.20	-70	0.20	-90	0.23	-105
	20	0.19	-70	0.13	-75	0.14	-95	0.17	-110
	30	0.16	-70	0.11	-75	0.13	-95	0.16	-110
10	2.0	0.66	-35	0.55	-50	0.53	-70	0.54	-90
	5.0	0.47	-45	0.38	-50	0.37	-70	0.38	-75
	10	0.35	-45	0.28	-50	0.27	-65	0.29	-85
	20	0.26	-45	0.22	-50	0.22	-65	0.24	-80
	30	0.25	-40	0.21	-45	0.22	-60	0.24	-80

FIGURE 6 – S₂₁ PARAMETERS

Frequency (MHz)		500		1000		1500		2000	
V _{CE} (Volts)	I _C (mA)	S ₂₁	∠φ	S ₂₁	∠φ	S ₂₁	∠φ	S ₂₁	∠φ
5.0	2.0	3.24	100	1.84	70	1.23	50	0.96	35
	5.0	4.85	90	2.60	70	1.76	50	1.38	40
	10	5.78	85	3.04	70	2.05	50	1.61	40
	20	6.40	85	3.30	65	2.23	50	1.24	40
	30	6.47	80	3.35	65	2.26	50	1.76	40
10	2.0	3.42	100	1.95	70	1.31	50	1.01	35
	5.0	5.20	95	2.80	70	1.89	50	1.45	40
	10	6.22	90	3.28	70	2.20	55	1.71	40
	20	6.82	85	3.55	65	2.37	55	1.84	40
	30	6.90	85	3.55	65	2.36	50	1.81	40

FIGURE 7 – S₁₂ PARAMETERS

Frequency (MHz)		500		1000		1500		2000	
V _{CE} (Volts)	I _C (mA)	S ₁₂	∠φ	S ₁₂	∠φ	S ₁₂	∠φ	S ₁₂	∠φ
5.0	2.0	0.11	30	0.12	25	0.11	35	0.13	50
	5.0	0.08	40	0.10	45	0.13	55	0.17	55
	10	0.07	50	0.10	55	0.14	60	0.19	60
	20	0.06	60	0.11	65	0.15	65	0.20	60
	30	0.06	65	0.11	65	0.15	65	0.20	60
10	2.0	0.10	35	0.10	30	0.10	40	0.12	55
	5.0	0.07	40	0.09	45	0.12	55	0.15	60
	10	0.06	50	0.09	55	0.13	60	0.17	60
	20	0.06	60	0.10	65	0.13	65	0.18	60
	30	0.06	60	0.10	65	0.14	65	0.18	65