MRF912

CASE 303-01, STYLE 1

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	50	mAdc
Total Device Dissipation @ T_C = 75°C Derate above 75°C	P_D	500 4.0	mW mW/°C
Storage Temperature	T_{stg}	−65 to +200	°C

THERMAL CHARACTERISTICS

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

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 1.0 mAdc, I_B = 0)	$V_{(BR)CEO}$	12	—	—	Vdc
Collector-Base Breakdown Voltage (I_C = 0.1 mAdc, I_E = 0)	$V_{(BR)CBO}$	20	—	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 0.1 mAdc, I_C = 0)	$V_{(BR)EBO}$	3.0	—	—	Vdc
Collector Cutoff Current (V_{CB} = 15 Vdc, I_E = 0)	I_{CBO}	—	—	50	nAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 30 mAdc, V_{CE} = 10 Vdc)	h_{FE}	30	—	200	—
SMALL SIGNAL CHARACTERISTICS					
Current-Gain — Bandwidth Product (I_C = 30 mAdc, 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 mAdc, V_{CE} = 10 Vdc, f = 1.0 GHz) (I_C = 5.0 mAdc, V_{CE} = 10 Vdc, f = 2.0 GHz)	NF	 — —	 2.5 4.0	 3.0 —	dB
Power Gain at Optimum Noise Figure (I_C = 5.0 mAdc, V_{CE} = 10 Vdc, f = 1.0 GHz) (I_C = 5.0 mAdc, V_{CE} = 10 Vdc, f = 2.0 GHz)	G_{NF}	 — —	 12 7.0	 — —	dB
Maximum Available Power Gain(1) (I_C = 30 mAdc, V_{CE} = 10 Vdc, f = 1.0 GHz) (I_C = 30 mAdc, V_{CE} = 10 Vdc, f = 2.0 GHz)	G_{max}	 14 —	 16.5 11.0	 — —	dB

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

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FIGURE 1 – POWER DERATING

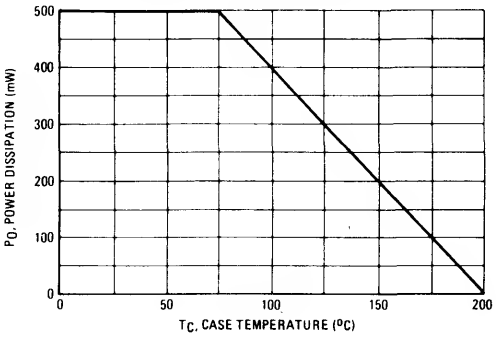

FIGURE 2 – POWER GAIN AND NOISE FIGURE versus FREQUENCY

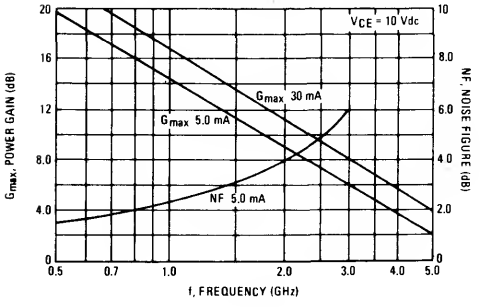

FIGURE 3 – POWER GAIN AND NOISE FIGURE versus COLLECTOR CURRENT

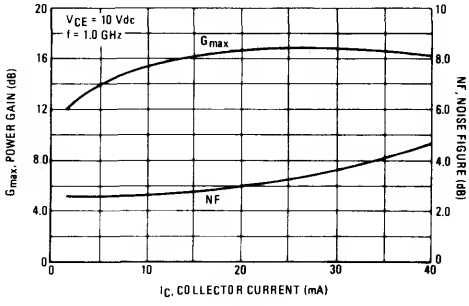

FIGURE 4 – S_{11} PARAMETERS

Frequency (MHz)		500		1000		1500		2000	
V_{CE} (Volts)	I_C (mA)	S11	∠φ	S11	∠φ	S11	∠φ	S11	∠φ
5.0	2.0	0.76	-120	0.74	-160	0.76	-175	0.79	175
	5.0	0.72	-145	0.73	-170	0.75	175	0.77	165
	10	0.71	-160	0.74	180	0.75	170	0.77	160
	20	0.73	-170	0.75	175	0.77	165	0.79	155
	30	0.74	-175	0.76	170	0.78	165	0.81	155
	40	0.74	-180	0.76	165	0.79	155	0.81	145
	50	0.74	180	0.77	165	0.79	155	0.82	145
10	2.0	0.77	-115	0.74	-155	0.76	-170	0.78	175
	5.0	0.71	-140	0.72	-170	0.73	175	0.75	165
	10	0.69	-155	0.71	-175	0.73	170	0.75	165
	20	0.69	-165	0.72	175	0.74	165	0.76	160
	30	0.70	-170	0.73	175	0.75	165	0.77	160
	40	0.69	-175	0.72	165	0.75	155	0.78	145
	50	0.70	-175	0.73	165	0.76	155	0.80	145

FIGURE 5 – S_{22} PARAMETERS

Frequency (MHz)		500		1000		1500		2000	
V_{CE} (Volts)	I_C (mA)	S22	∠Φ	S22	∠Φ	S22	∠Φ	S22	∠Φ
5.0	2.0	0.66	-50	0.57	-70	0.57	-95	0.61	-115
	5.0	0.45	-65	0.37	-85	0.39	-105	0.44	-120
	10	0.33	-80	0.27	-100	0.30	-115	0.35	-130
	20	0.24	-95	0.21	-115	0.24	-125	0.29	-135
	30	0.21	-100	0.18	-120	0.22	-125	0.28	-135
	40	0.18	-100	0.16	-115	0.20	-125	0.27	-135
	50	0.17	-95	0.16	-110	0.21	-120	0.28	-135
10	2.0	0.71	-45	0.62	-65	0.62	-85	0.64	-105
	5.0	0.51	-55	0.43	-70	0.44	-90	0.48	-105
	10	0.37	-60	0.31	-75	0.33	-95	0.38	-110
	20	0.27	-70	0.23	-80	0.26	-95	0.32	-115
	30	0.23	-65	0.21	-80	0.25	-95	0.31	-110
	40	0.23	-60	0.22	-70	0.25	-90	0.32	-110
	50	0.24	-50	0.24	-65	0.28	-90	0.34	-105

FIGURE 6 – S_{21} PARAMETERS

Frequency (MHz)		500		1000		1500		2000	
V_{CE} (Volts)	I_C (mA)	S21	∠Φ	S21	∠Φ	S21	∠Φ	S21	∠Φ
5.0	2.0	3.52	102	1.97	70	1.33	50	0.99	35
	5.0	5.61	95	2.96	70	1.98	50	1.50	35
	10	6.84	90	3.55	70	2.35	55	1.78	40
	20	7.65	85	3.94	65	2.59	50	1.96	40
	30	7.93	85	4.02	65	2.63	50	1.98	40
	40	7.87	80	3.95	65	2.57	45	1.92	30
	50	7.65	80	3.86	60	2.48	45	1.86	30
10	2.0	3.70	105	2.12	75	1.43	50	1.07	35
	5.0	6.09	95	3.24	70	2.17	50	1.62	35
	10	7.53	90	3.91	70	2.58	55	1.96	40
	20	8.54	85	4.38	70	2.86	55	2.17	40
	30	8.79	85	4.45	65	2.92	50	2.17	40
	40	8.58	80	4.32	65	2.80	45	2.08	30
	50	8.30	80	4.15	60	2.69	45	1.98	30

FIGURE 7 – S_{12} PARAMETERS

Frequency (MHz)		500		1000		1500		2000	
V_{CE} (Volts)	I_C (mA)	S12	∠Φ	S12	∠Φ	S12	∠Φ	S12	∠Φ
5.0	2.0	0.11	25	0.11	5.0	0.10	-5	0.09	-5
	5.0	0.07	25	0.08	15	0.08	15	0.08	15
	10	0.05	25	0.06	25	0.07	30	0.08	30
	20	0.04	35	0.05	40	0.07	40	0.08	40
	30	0.03	45	0.05	45	0.06	50	0.08	45
	40	0.03	50	0.05	50	0.07	50	0.08	50
	50	0.03	55	0.05	55	0.06	50	0.08	50
10	2.0	0.09	25	0.10	5.0	0.09	0	0.08	0
	5.0	0.06	25	0.07	15	0.07	20	0.07	20
	10	0.05	30	0.06	30	0.06	30	0.07	35
	20	0.03	40	0.05	40	0.06	45	0.07	40
	30	0.03	40	0.05	45	0.06	47	0.07	45
	40	0.03	45	0.05	50	0.06	50	0.07	45
	50	0.03	50	0.04	50	0.06	50	0.07	50