

T-33-11

MOTOROLA SEMICONDUCTOR TECHNICAL DATA

**MRF5177
MRF5177A**

The RF Line

NPN SILICON RF POWER TRANSISTOR

... designed for VHF/UHF power amplifier applications. This device is optimized for rugged performance in 225-400 MHz communications equipment.

- Performance @ 400 MHz, 28 Vdc –
Power Output = 30 W (Min)
Gain = 6.0 dB (Min)
- Isothermal Design for Rugged Performance –
Tested at 30:1 VSWR through all phase angles

**30 W, 400 MHz
RF POWER TRANSISTOR
NPN SILICON**

STYLE 1
PIN 1. EMITTER
2. BASE
3. EMITTER
4. COLLECTOR

DIM		MILLIMETERS		INCHES	
		MIN	MAX	MIN	MAX
A	8.40	8.78	0.313	0.345	
B	8.12	8.38	0.320	0.330	
C	17.02	20.07	0.670	0.790	
D	6.45	6.97	0.254	0.275	
E	1.78	—	0.070	—	
J	0.98	0.18	0.003	0.007	
K	17.45	—	0.690	—	
L	1.40	1.78	0.055	0.070	
M	45° NOM	—	45° NOM	—	
P	—	1.27	—	0.050	
R	7.62	7.62	0.299	0.307	
S	4.01	4.52	0.158	0.178	
T	7.11	7.64	0.280	0.300	
U	2.43	3.35	0.096	0.132	

CASE 145A-09
MRF5177A

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MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V _{CEO}	35	Vdc
Collector-Base Voltage	V _{CBO}	60	Vdc
Emitter-Base Voltage	V _{EB0}	4.0	Vdc
Collector Current – Continuous	I _C	4.0	Adc
Base Current	I _B	1.0	Adc
Total Device Dissipation @ T _C = 25°C (1)	P _D	58	Watts
Derate Above 25°C	—	0.33	W/°C
Storage Temperature Range	T _{stg}	-65 to +200	°C

(1) This device is designed for RF Power operation. The total device dissipation rating applies only when the device is operated as a Class C RF Amplifier.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	R _{θJC}	3.0	°C/W

STYLE 2
PIN 1. BASE
2. EMITTER
3. COLLECTOR

DIM		MILLIMETERS		INCHES	
		MIN	MAX	MIN	MAX
A	21.03	21.59	0.830	0.850	
B	8.27	9.78	0.325	0.385	
D	5.58	5.84	0.220	0.230	
E	2.93	2.41	0.090	0.095	
F	2.75	2.97	0.110	0.115	
H	15.11	15.37	0.595	0.605	
J	0.10	0.15	0.004	0.006	
K	13.08	13.59	0.515	0.535	
L	9.51	10.41	0.373	0.410	
M	45° NOM	—	45° NOM	—	
N	2.92	2.18	0.115	0.125	
R	1.52	2.03	0.060	0.080	
S	—	5.38	—	0.212	
T	2.03	2.54	0.080	0.100	

CASE 215
MRF5177

MRF5177, MRF5177A

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage (I _C = 50 mA, I _B = 0)	V(BR)CEO	35	—	Vdc
Collector-Emitter Breakdown Voltage (I _C = 50 mA, V _{BE} = 0)	V(BR)CES	60	—	Vdc
Emitter-Base Breakdown Voltage (I _E = 2.0 mA, I _C = 0)	V(BR)EBO	4.0	—	Vdc
Collector Cutoff Current (V _{CB} = 30 Vdc, I _E = 0)	I _{CBO}	—	2.0	mA
ON CHARACTERISTICS				
DC Current Gain (I _C = 100 mA, V _{CE} = 5.0 Vdc) (I _C = 4.0 A, V _{CE} = 5.0 Vdc)	h _{FE}	10 10	100 —	—
DYNAMIC CHARACTERISTICS				
Output Capacitance (V _{CB} = 28 Vdc, I _E = 0, f = 1.0 MHz)	C _{ob}	—	50	pF
FUNCTIONAL TESTS (Figures 1 and 9)				
Common-Emitter Amplifier Power Gain (P _{out} = 30 W, V _{CC} = 28 Vdc, f = 400 MHz)	G _{PE}	6.0	—	dB
Collector Efficiency (P _{out} = 30 W, V _{CC} = 28 Vdc, f = 400 MHz)	η	60	—	%
Saturated Power (P _{in} = 11 W, V _{CC} = 28 Vdc, f = 400 MHz)	P _{sat}	36	—	Watts
Electrical Ruggedness (P _{out} = 30 W, V _{CC} = 28 Vdc, f = 400 MHz, T _C ≈ 50°C)	VSWR > 30:1 through all phase angles in a 3 second time interval, After which, devices will meet G _{PE} test limits.			

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FIGURE 1 - 400 MHz TEST CIRCUIT
(Typical Performance Data for 300-500 MHz Operation)

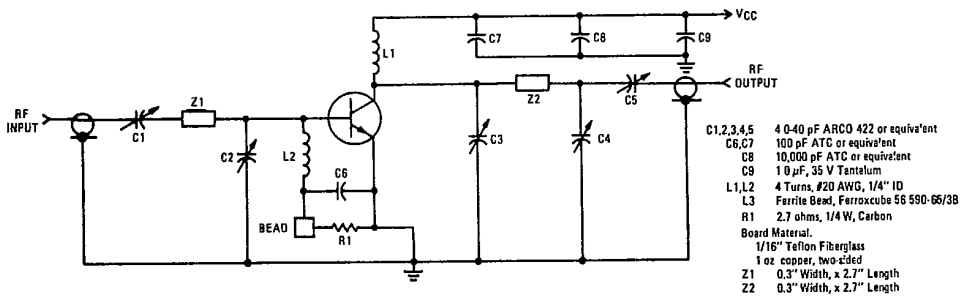


FIGURE 2 - 200-300 MHz TEST CIRCUIT
(Typical Performance Data)

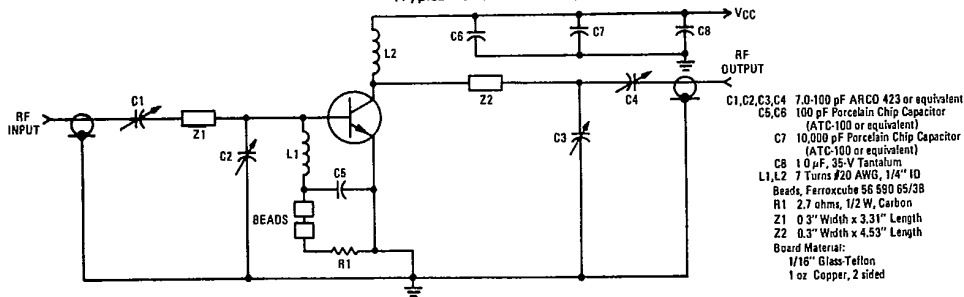


FIGURE 3 - OUTPUT POWER versus FREQUENCY

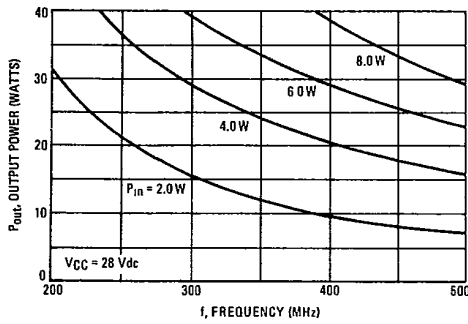


FIGURE 4 - OUTPUT POWER versus INPUT POWER

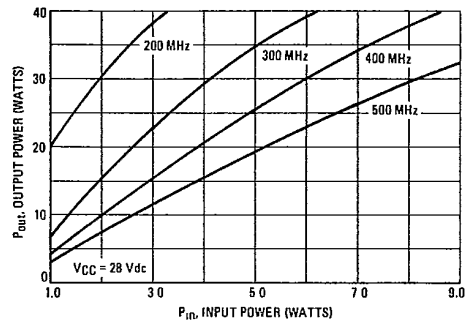


FIGURE 5 - OUTPUT POWER versus SUPPLY VOLTAGE

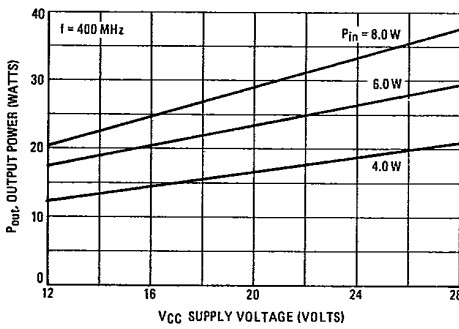
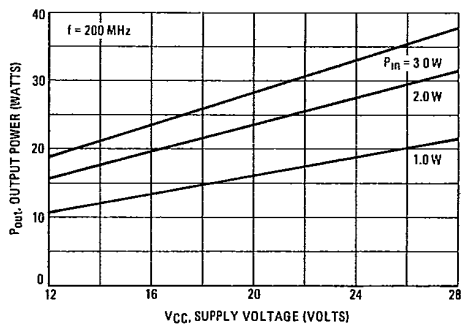


FIGURE 6 - OUTPUT POWER versus SUPPLY VOLTAGE



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FIGURE 7 - RF POWER DERATING

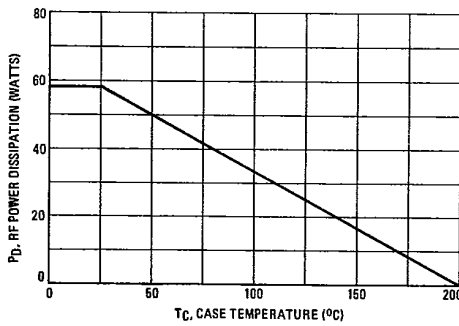


FIGURE 8 - SERIES EQUIVALENT IMPEDANCE

