

NPN Silicon RF power transistor

MRF477

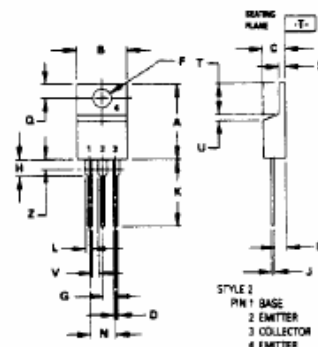
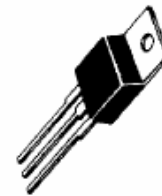
NPN SILICON RF POWER TRANSISTOR

designed primarily for application as a high-power linear amplifier from 1.5 to 30 MHz, in single sideband mobile, marine and base station equipment.

- Low-Cost, Common-Emitter TO-220AB Package
- Specified 12.5 Volt, 30 MHz Performance —
Output Power = 40 W CW or PEP
Power Gain = 15 dB Min
Efficiency = 40% Min (PEP)
- Intermodulation Distortion @ 40 W (PEP) —
IMD = -30 dB (Max)
- 30:1 VSWR Load Mismatch Capability at Rated Output Power and Supply Voltage

40 W (PEP) – 30 MHz

RF POWER TRANSISTOR
NPN SILICON



NOTES
1 DIMENSIONING AND TOLERANCING PER ANSI Y14.5M 1982
2 CONTROLLING DIMENSION INCH
3 DIM Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	14.48	15.75	0.570	0.620
B	9.88	10.29	0.389	0.405
C	4.37	4.82	0.170	0.190
D	3.44	3.88	0.135	0.152
F	3.81	3.73	0.142	0.147
G	2.42	2.56	0.095	0.101
H	2.80	3.03	0.110	0.119
J	0.36	0.56	0.014	0.022
R	12.70	14.27	0.500	0.562
S	1.15	1.29	0.045	0.051
U	4.83	5.33	0.190	0.210
V	2.54	3.04	0.100	0.120
W	2.34	2.75	0.090	0.110
X	1.15	1.38	0.045	0.055
T	5.97	6.47	0.235	0.255
U	2.90	3.27	0.110	0.129
V	1.15	—	0.045	—
Z	—	2.04	—	0.080

CASE 221A-04
TO-220AB

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	18	Vdc
Collector Base Voltage	V_{CB0}	36	Vdc
Emitter-Base Voltage	V_{EB0}	4.0	Vdc
Collector Current – Continuous	I_C	5.0	Adc
Withstand Current ($t = 5.0$ s)	—	8.0	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ (1) Derate above 25°C	P_D	87.5 0.5	Watts W/ $^\circ\text{C}$
Storage Temperature Range	T_{stg}	-65 to +150	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristics	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	2.0	$^\circ\text{C}/\text{W}$

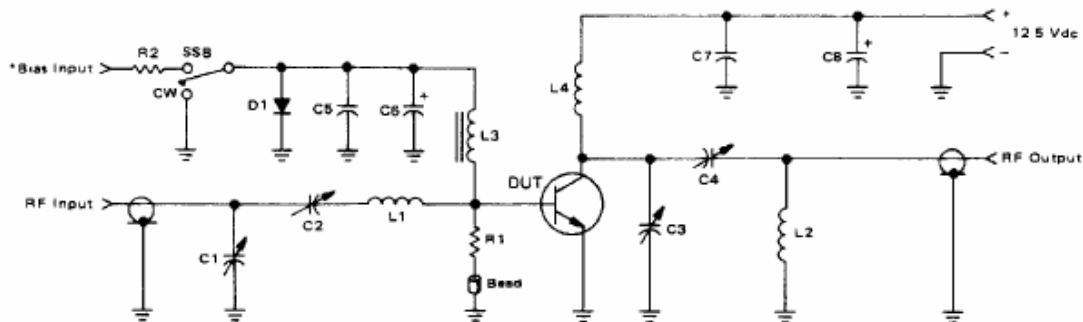
(1) This device is designed for RF operation. The total device dissipation rating applies only when the device is operated as an RF amplifier.

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage ($I_C = 100\text{ mA dc}, I_B = 0$)	$V_{(BR)CEO}$	18	—	—	Vdc
Collector Base Breakdown Voltage ($I_C = 100\text{ mA dc}, I_E = 0$)	$V_{(BR)CBO}$	36	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 5.0\text{ mA dc}, I_C = 0$)	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current ($V_{CE} = 12.5\text{ Vdc}, V_{BE} = 0, T_C = 25^\circ\text{C}$)	I_{CES}	—	—	10	mA dc
ON CHARACTERISTICS					
DC Current Gain ($I_C = 2.0\text{ A dc}, V_{CE} = 5.0\text{ Vdc}$)	h_{FE}	20	70	—	—
DYNAMIC CHARACTERISTICS					
Output Capacitance ($V_{CB} = 12.5\text{ Vdc}, I_E = 0, f = 1.0\text{ MHz}$)	C_{ob}	—	175	250	pF
FUNCTIONAL TESTS					
Common-Emitter Amplifier Power Gain ($V_{CC} = 12.5\text{ Vdc}, P_{out} = 40\text{ W (PEP)}, f_1 = 30\text{ MHz},$ $f_2 = 30.001\text{ MHz}, I_{CQ} = 40\text{ mA dc}$)	G_{PE}	15	17	—	dB
Collector Efficiency ($V_{CC} = 12.5\text{ Vdc}, P_{out} = 40\text{ W (PEP)}, f_1 = 30\text{ MHz},$ $f_2 = 30.001\text{ MHz}, I_{CQ} = 40\text{ mA dc}$)	η	40	45	—	%
Intermodulation Distortion (1) ($V_{CC} = 12.5\text{ Vdc}, P_{out} = 40\text{ W (PEP)}, f_1 = 30\text{ MHz},$ $f_2 = 30.001\text{ MHz}, I_{CQ} = 40\text{ mA dc}$)	IMD (d3)	—	-35	-30	dB

(1) To Proposed EIA Method of Measurement Reference Peak Envelope Power

FIGURE 1 – 30 MHz TEST CIRCUIT



C1, C2, C4 – Arco 469, 190–780 pF
C3 – Arco 429, 90–400 pF
C5, C7 – 0.001 μF Disk Ceramics
C6 – 500 μF 3.0 Vdc Electrolytic
C8 – 100 μF 16 Vdc Electrolytic
R1 – 10 Ω 1.0 Watt Resistor
R2 – 5 Ω 5.0 Watt Resistor

L1 – 4 Turns #16 AWG 1/3" ID, 1/3" Long
L2 – 3 Turns #16 AWG 1/3" ID, 1/2" Long
L3 – 10 μH Molded Choke
L4 – 12 Turns #18 AWG 1/4" ID
Bead – Ferroxcube #56 590.65/38
D1 – 1N4719