MRF476

The RF Line

2

3.0 W (PEP)–3.0 W (CW) – 30 MHz

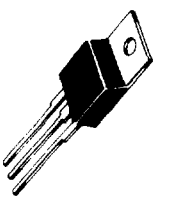
RF POWER
TRANSISTOR

NPN SILICON

NPN SILICON RF POWER TRANSISTOR

. . . designed primarily for use in single sideband linear amplifier output applications in citizens band and other communications equipment operating to 50 MHz.

- Characterized for Single Sideband and Large-Signal Amplifier Applications Utilizing Low-Level Modulation
- Specified 12.5 V, 30 MHz Characteristics —
  Output Power = 3.0 W (PEP)
  Minimum Efficiency = 40% (SSB)
  Output Power = 3.0 W (CW)
  Minimum Power Gain = 15 dB (PEP)
- Common-Collector Configuration



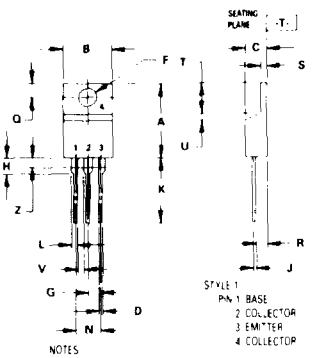
MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	18	Vdc
Collector-Base Voltage	V_{CBO}	36	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector Current – Continuous	I_C	1.0	Adc
Total Device Dissipation @ T_A = 25°C (1) Derate above 25°C	P_D	10 57.2	Watts mW/°C
Storage Temperature Range	T_{stg}	-65 to + 150	°C

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

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	17.5	°C/W



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

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 MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	14.48	15.75	0.570	0.620
B	9.66	10.28	0.380	0.405
C	4.07	4.82	0.160	0.190
D	0.64	0.88	0.025	0.035
F	3.61	3.73	0.142	0.147
G	2.42	2.66	0.095	0.105
H	2.80	3.93	0.110	0.155
J	0.36	0.55	0.014	0.022
K	12.70	14.27	0.500	0.562
L	1.15	1.39	0.045	0.055
N	4.83	5.33	0.190	0.210
Q	2.54	3.04	0.100	0.120
R	2.04	2.79	0.080	0.110
S	1.15	1.39	0.045	0.055
T	5.97	6.47	0.235	0.255
U	0.00	1.27	0.000	0.050
V	1.15	—	0.045	—
Z	—	2.04	—	0.080

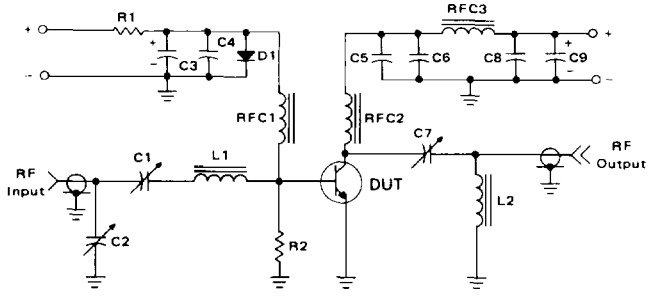
CASE 221A-04
TO-220AB

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 10 mAdc, I_B = 0)	$V_{(BR)CEO}$	18	–		Vdc
Collector-Emitter Breakdown Voltage (I_C = 25 mAdc, V_{BE} = 0)	$V_{(BR)CES}$	36	–	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 1.0 mAdc, I_C = 0)	$V_{(BR)EBO}$	4.0	–	–	Vdc
Collector Cutoff Current (V_{CB} = 15 Vdc, I_E = 0)	I_{CBO}	–	–	0.5	mAdc
ON CHARACTERISITCS					
DC Current Gain (I_C = 250 mAdc, V_{CE} = 5.0 Vdc)	h_{FE}	10	50	–	–
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 12.5 Vdc, I_E = 0, f = 1.0 MHz)	C_{ob}	–	25	35	pF
FUNCTIONAL TESTS (SSB)					
Common-Emitter Amplifier Power Gain (V_{CC} = 12.5 Vdc, P_{out} = 3.0 W (PEP) f1 = 30 MHz, f2 = 30.001 MHz, ICQ = 20 mA)	G_{PE}	15	18	–	dB
Collector Efficiency (V_{CC} = 12.5 Vdc, P_{out} = 3.0 W (PEP) f1 = 30 MHz, f2 = 30.001 MHz, ICQ = 20 mA)	η	40	–	–	%
Intermodulation Distortion (1) (V_{CC} = 12.5 Vdc, P_{out} = 3.0 W (PEP) f1 = 30 MHz, f2 = 30.001 MHz, ICQ = 20 mA)	IMD	—	-35	-30	dB
50 MHz PERFORMANCE					
Common-Emitter Amplifier Power Gain (V_{CC} = 12.5 Vdc, P_{out} = 3.0 W, f = 50 MHz)	G_{PE}	–	15	–	dB

(1) To proposed EIA method of measurement. Reference peak envelope power.

FIGURE 1 – 30 MHz TEST CIRCUIT SCHEMATIC



C2 – Arco 466 Trimmer
C1, C7 – Arco 469 Trimmer
C3 – 500 µF, 3.0 V Electrolytic
C4, C5, C8 – 0.1 µF Erie Redcap
C6 – 1000 pF UNELCO
C9 – 100 µF, 15 V Electrolytic

R1 – 33 Ω 5 W Wire Wound
R2 – 50 Ω 1/2 W Carbon

L1 – 0.22 µH Molded Choke
L2 – 5 Turns #18 Enameled Wire, 1/4" ID

RFC1 – 10 µH Molded Choke
RFC2 – 1.9 µH Molded Choke (Ohmite Z-144)
RFC3 – 6 Ferroxcube Beads on #18 AWG Wire

D1 – MR751

Board – G10, 2-sided 2 oz. Copper Clad

Connectors – Type N

2

FIGURE 2 – POWER GAIN versus FREQUENCY

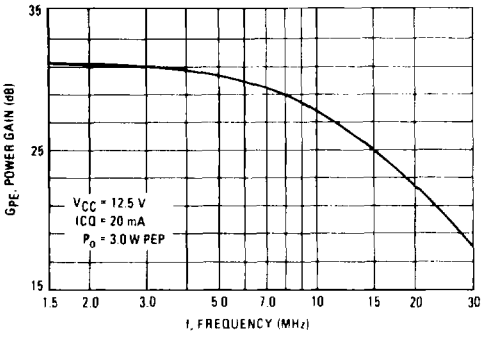


FIGURE 3 – OUTPUT POWER versus INPUT POWER

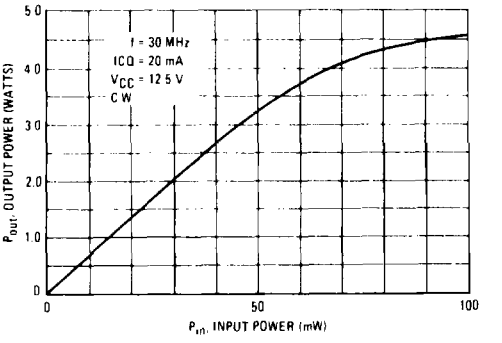


FIGURE 4 – OUTPUT POWER versus INPUT POWER

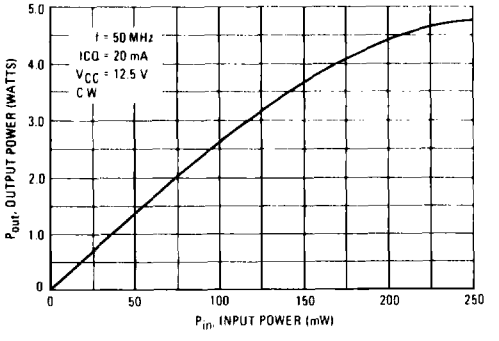


FIGURE 5 – OUTPUT POWER versus SUPPLY VOLTAGE

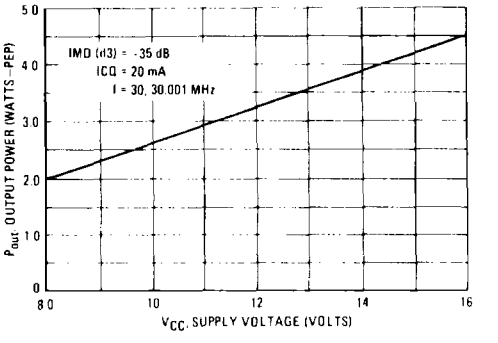


FIGURE 6 – INTERMODULATION DISTORTION versus OUTPUT POWER

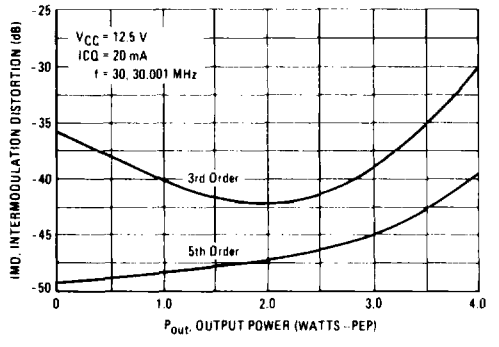


FIGURE 7 – OUTPUT CAPACITANCE versus FREQUENCY

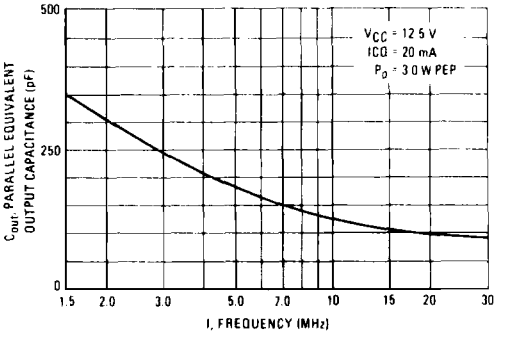


FIGURE 8 – OUTPUT RESISTANCE versus FREQUENCY

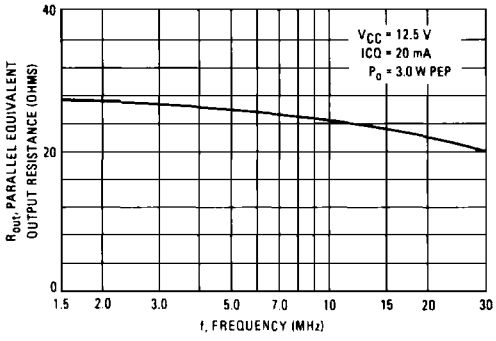
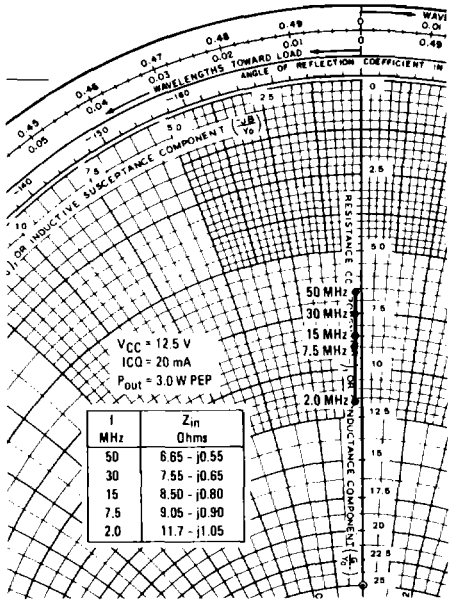


FIGURE 9 – SERIES EQUIVALENT INPUT IMPEDANCE



f MHz	Z_{in} Ohms
50	6.65 - j0.55
30	7.55 - j0.65
15	8.50 - j0.80
7.5	9.05 - j0.90
2.0	11.7 - j1.05