MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

T-33-11

MRF344

The RF Line

60 W 100-150 MHz

RF POWER TRANSISTOR

NPN SILICON

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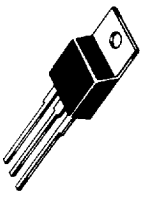
NPN SILICON RF POWER TRANSISTOR

. . . designed primarily for use in VHF amplifiers with amplitude modulation and other communications equipment operating to 150 MHz.

- Low Cost Common Emitter TO-220AB Package
- Specified 27 V, 136 MHz Performance:
  Output Power = 60 W
  Power Gain = 6.0 dB Min
  Efficiency = 50% Min
- 20:1 VSWR Load Mismatch Capability at Rated Peak Output Power and Supply Voltage
- Other Devices in the Series:
  MRF340 8 W
  MRF342 24 W



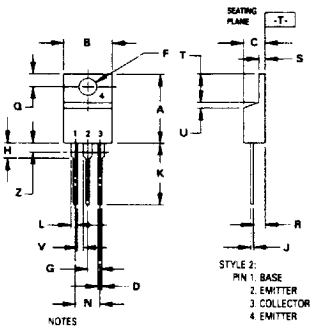
MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	35	Vdc
Collector-Base Voltage	V_{CBO}	65	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector-Current — Continuous Peak	I_C	5.0 6.0	Adc
Total Device Dissipation — T_C = 25°C (1) Derate above 25°C	P_D	87.5 0.5	Watts mW/°C
Storage Temperature Range	T_{stg}	-65 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	2.0	°C/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.



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

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.

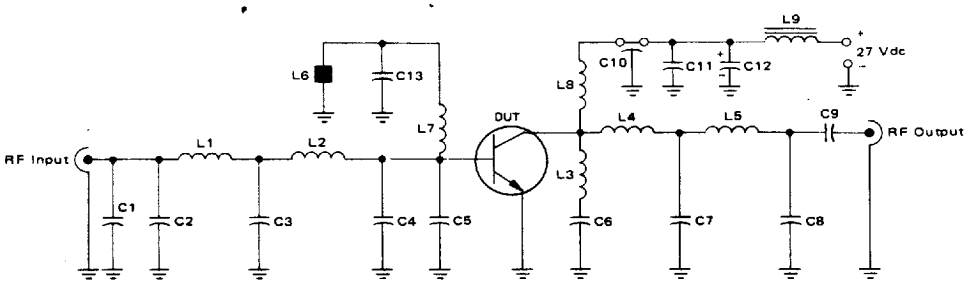
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	14.48	15.75	0.570	0.620
B	9.66	10.28	0.380	0.405
C	4.07	4.82	0.160	0.190
D	0.64	0.88	0.025	0.035
F	3.61	3.73	0.142	0.147
G	2.42	2.66	0.095	0.105
H	2.80	3.93	0.110	0.155
J	0.36	0.55	0.014	0.022
K	12.70	14.27	0.500	0.562
L	1.15	1.39	0.045	0.055
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 = 50 mAdc, I_B = 0)	$V_{(BR)CEO}$	35	–	–	Vdc
Collector-Emitter Breakdown Voltage (I_C = 50 mAdc, V_{BE} = 0)	$V_{(BR)CES}$	65	–	–	Vdc
Collector-Base Breakdown Voltage (I_C = 50 mAdc, I_E = 0)	$V_{(BR)CBO}$	65	–	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 5.0 mAdc, I_C = 0)	$V_{(BR)EBO}$	4.0	–	–	Vdc
Collector Cutoff Current (V_{CE} = 27 Vdc, V_{BE} = 0)	I_{CES}	–	–	5.0	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 2.0 Adc, V_{CE} = 5.0 Vdc)	h_{FE}	10	–	80	–
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 27 Vdc, I_E = 0, f = 1.0 MHz)	C_{ob}	–	130	200	pF
FUNCTIONAL TESTS					
Common-Emitter Amplifier Power Gain (V_{CC} = 13.5 Vdc, P_{out} = 15 W, f = 136 MHz)	G_{PE}	4.0	4.5	–	dB
Common Emitter Amplifier Power Gain (V_{CC} = 27 Vdc, P_{out} = 60 W, f = 136 MHz)	G_{PE}	6.0	6.7	–	dB
Collector Efficiency (V_{CC} = 27 Vdc, P_{out} = 60 W, f = 136 MHz)	η	50	60		%
Load Mismatch (V_{CC} = 27 Vdc, P_{out} = 60 W (peak), f = 136 MHz. Drive modulated with 1.0 kHz square wave, 50% duty cycle. Load VSWR = 20:1, all phase angles)	ψ	No Degradation in Power Output			

FIGURE 1 – 136 MHz TEST CIRCUIT



C1, C2 – 10 pF UNELCO
C3, C8 – 25 pF UNELCO
C4, C5, C7 – 100 pF UNELCO
C6, C11 – 0.1 μF Erie Redcap
C9 – 1000 pF UNELCO
C10 – 1000 pF UNELCO Feedthru
C12 – 1.0 μF 50 V Tantalum
C13 – 200 pF UNELCO

L1 – 3/4" of #20 AWG
L2 – 1/2" of #20 AWG
L3 – 2 Turns, 1/8" ID #20 AWG
L4 – Copper Strap 15 mil Thick 3/16" X 1/2" L
L5 – 2 Turns #20 AWG 1/4" ID
L6 – Ferrite Bead on Lead of L7
L7, L8 – 0.15 μH Molded Choke
L9 – VK-200-19/4B

Input/Output Connectors Type N

FIGURE 2 – POWER GAIN versus FREQUENCY

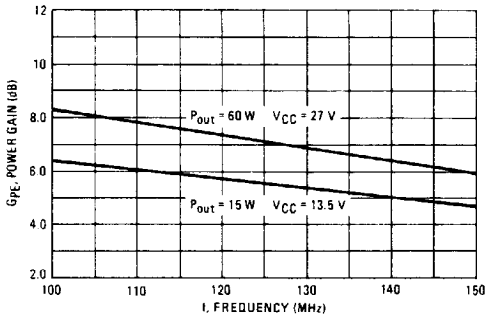


FIGURE 3 – OUTPUT POWER versus SUPPLY VOLTAGE (f = 136 MHz)

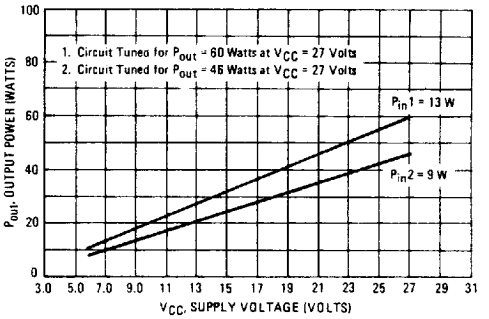


FIGURE 4 – OUTPUT POWER versus INPUT POWER (V_{CC} = 27 V)

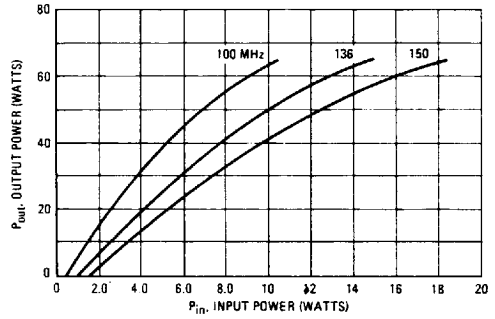


FIGURE 5 – OUTPUT POWER versus INPUT POWER (V_{CC} = 13.5 V)

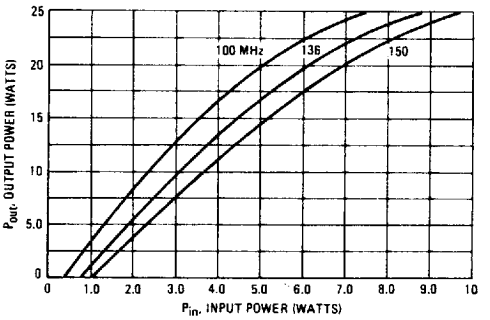
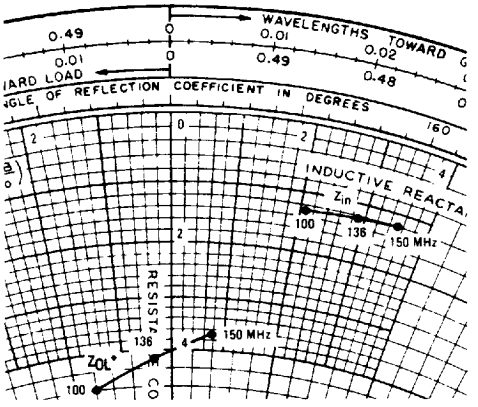


FIGURE 6 – SERIES EQUIVALENT INPUT/OUTPUT IMPEDANCES



V_{CC} = 27 V P_{out} = 60 W

f MHz	Z_{in} Ohms	Z_{OL}* Ohms
100	1.33 + j2.1	4.8 – j1.6
136	1.25 + j2.86	4.2 – j0.32
150	1.2 + J3.5	3.7 + j0.8

Z_{OL}* = Conjugate of the optimum load impedance into which the device operates at a given output power voltage, and frequency.

FIGURE 7 – 136 MHz TEST AMPLIFIER

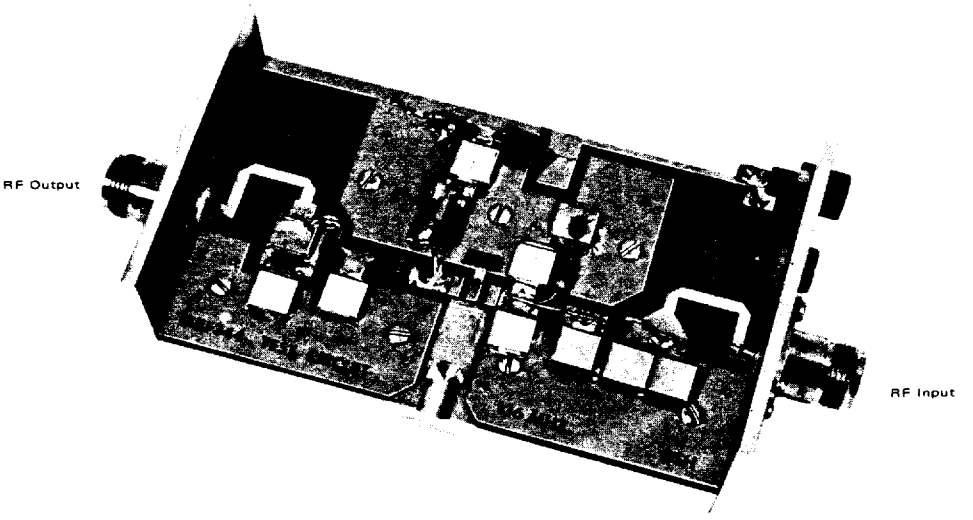
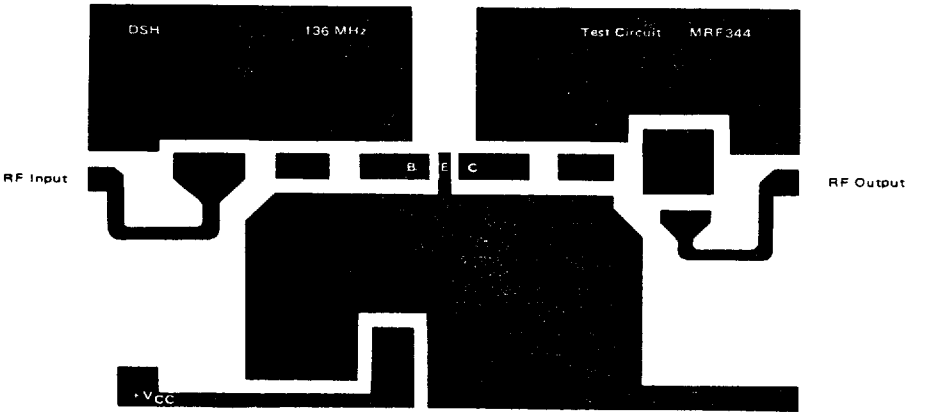


FIGURE 8 – PRINTED CIRCUIT BOARD LAYOUT – 136 MHz TEST CIRCUIT



NOTE: The Printed Circuit Board shown is 75% of the original.