

# MRF230 (SILICON)

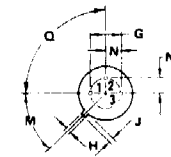
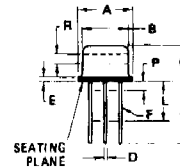
## The RF Line

### NPN SILICON RF POWER TRANSISTORS

... designed for 12.5 Volt, mid-band large-signal amplifier applications in industrial and commercial FM equipment operating in the 40 to 100 MHz range.

- Specified 12.5 Volt, 90 MHz Characteristics –  
 Output Power = 1.5 Watts  
 Minimum Gain = 10 dB  
 Efficiency = 55%
- 100% Tested for Load Mismatch at all Phase Angles with 30:1 VSWR
- Characterized with Series Equivalent Large-Signal Impedance Parameters
- Characterized with Parallel Equivalent Large-Signal Impedance Parameters

1.5 W – 90 MHz  
 RF POWER  
 TRANSISTOR  
 NPN SILICON



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

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	8.89	9.40	0.350	0.370
B	8.00	8.51	0.315	0.335
C	5.10	6.80	0.240	0.260
D	0.406	0.533	0.016	0.021
E	0.229	3.18	0.009	0.125
F	0.406	0.483	0.016	0.019
G	4.83	5.33	0.190	0.210
H	0.711	0.864	0.028	0.034
J	0.737	1.02	0.029	0.040
K	12.70	–	0.500	–
L	6.35	–	0.250	–
M	45°	NOM	45°	NOM
P	–	1.27	–	0.050
Q	90°	NOM	90°	NOM
R	2.54	–	0.100	–

All JEDEC dimensions and notes apply.

CASE 79-02  
 TO-39

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V <sub>CEO</sub>	18	V <sub>dc</sub>
Collector-Base Voltage	V <sub>CBO</sub>	36	V <sub>dc</sub>
Emitter-Base Voltage	V <sub>EB0</sub>	4.0	V <sub>dc</sub>
Collector Current – Continuous	I <sub>C</sub>	0.5	A <sub>dc</sub>
Total Device Dissipation @ T <sub>C</sub> = 25°C (1)	P <sub>D</sub>	5.0	Watts
Derate above 25°C		28.6	mW/°C
Storage Temperature Range	T <sub>stg</sub>	-65 to +200	°C

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	R <sub>θJC</sub>	35	°C/W

(1) These devices are designed for RF operation. The total device dissipation rating applies only when the devices are operated as Class C RF Amplifiers.

NJ Semi-Conductors reserves the right to change test conditions, parameter limits and package dimensions without notice. Information furnished by NJ Semi-Conductors is believed to be both accurate and reliable at the time of going to press. However, NJ Semi-Conductors assumes no responsibility for any errors or omissions discovered in its use. NJ Semi-Conductors encourages customers to verify that datasheets are current before placing orders.

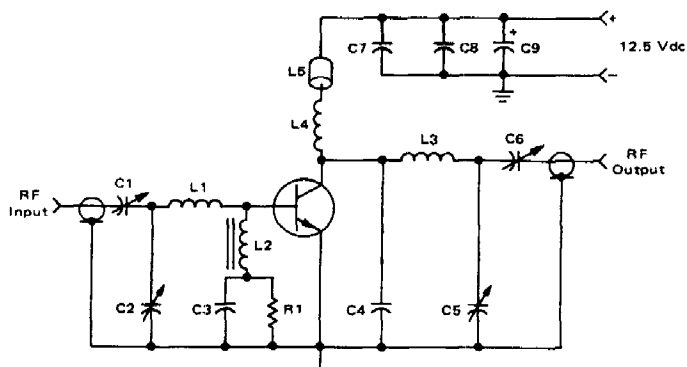


MRF230 (continued)

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

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector-Emitter Breakdown Voltage ( $I_C = 25 \text{ mA dc}$ , $I_B = 0$ )	$BV_{CEO}$	18	—	Vdc
Collector-Emitter Breakdown Voltage ( $I_C = 25 \text{ mA dc}$ , $V_{BE} = 0$ )	$BV_{CES}$	36	—	Vdc
Emitter-Base Breakdown Voltage ( $I_E = 0.25 \text{ mA dc}$ , $I_C = 0$ )	$BV_{EBO}$	4.0	—	Vdc
Collector Cutoff Current ( $V_{CB} = 15 \text{ Vdc}$ , $I_E = 0$ )	$I_{CBO}$	—	0.5	mA dc
<b>ON CHARACTERISTICS</b>				
DC Current Gain ( $I_C = 250 \text{ mA dc}$ , $V_{CE} = 5.0 \text{ Vdc}$ )	$h_{FE}$	5.0	—	—
<b>DYNAMIC CHARACTERISTICS</b>				
Output Capacitance ( $V_{CB} = 12.5 \text{ Vdc}$ , $I_E = 0$ , $f = 1.0 \text{ MHz}$ )	$C_{ob}$	—	25	pF
<b>FUNCTIONAL TESTS (Figure 1)</b>				
Common-Emitter Amplifier Power Gain ( $V_{CC} = 12.5 \text{ Vdc}$ , $P_{out} = 1.5 \text{ W}$ , $f = 90 \text{ MHz}$ )	$G_{pE}$	10	—	dB
Collector Efficiency ( $V_{CC} = 12.5 \text{ Vdc}$ , $P_{out} = 1.5 \text{ W}$ , $f = 90 \text{ MHz}$ )	$\eta$	55	—	%
Load Mismatch ( $V_{CC} = 12.5 \text{ Vdc}$ , $P_{out} = 1.5 \text{ W}$ , $f = 90 \text{ MHz}$ , $T_C \leq 25^{\circ}\text{C}$ )	—	* VSWR > 30:1 Through All Phase Angles in 3 Second Interval After Which Devices Will Meet $G_{pE}$ Test Limits		

FIGURE 1 - 90 MHz TEST CIRCUIT SCHEMATIC



- |        |                                      |    |  |
|--------|--------------------------------------|----|--|
| C1     | 5.0-80 pF, ARCO 462                  | C9 | 20 $\mu\text{F}$ , 15 Vdc TANTALUM                           |
| C2, C6 | 25-280 pF, ARCO 464                  | L1 | 2 Turns, #18 AWG, 3/8" I.D., 3/8" Long                       |
| C3     | 250 pF UNELCO                        | L2 | 2.5 Turns, #20 AWG, on Ferrite Bead, FERROXCUBE 56-590-65-3B |
| C4     | 10 pF UNELCO                         | L3 | 3 Turns, #18 AWG, 3/8" I.D., 1/2" Long                       |
| C5     | 9.0-180 pF, ARCO 463                 | L4 | 0.68 $\mu\text{H}$ , 9230-16 MILLER Molded Choke             |
| C7     | 1000 pF UNELCO                       | L5 | Ferrite Bead, FERROXCUBE 56-590-65-3B                        |
| C8     | 0.47 $\mu\text{F}$ ERIE Disc Ceramic | R1 | 4.7 OHM, 1/2 W, 10% Carbon                                   |
- Input/Output Connectors - Type BNC