MRF848

Advance Information

The RF Line

NPN SILICON RF POWER TRANSISTOR

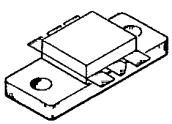
. . . designed for 12.5 Volt UHF large-signal, common base amplifier applications in industrial and commercial FM equipment operating in the range of 804–960 MHz.

- Motorola Advanced Amplifier Concept Package
- Specified 12.5 Volt, 870 MHz Characteristics
  Output Power = 60 Watts
  Minimum Gain = 4.0 dB
  Efficiency = 60%
- Double Input/Output Matched for Wideband Performance and Simplified External Matching
- Series Equivalent Large-Signal Characterization
- Gold Metallized, Emitter Ballasted for Long Life and Resistance to Metal Migration
- Silicon Nitride Passivated

60 W 800–960 MHz

RF POWER TRANSISTOR

NPN SILICON

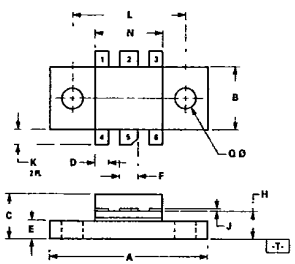


MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	16	Vdc
Collector-Base Voltage	V_{CBO}	36	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector-Current — Continuous	I_C	14	Adc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	175 1.0	Watts W/°C
Storage Temperature Range	T_{stg}	−65 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.00	°C/W



NOTES
1. DIMENSIONS A AND B ARE DATUMS AND T IS A DATUM PLANE.
2. POSITIONAL TOLERANCE FOR Q HOLES
   ⌖ ⌀ 13 (0.005) Ⓜ | A Ⓜ | B Ⓜ
3. DIMENSION -D- FOUR PLACES
   DIMENSION -F- TWO PLACES
4. DIMENSIONING AND TOLERANCING PER Y14.5M, 1982
5. CONTROLLING DIMENSION INCH

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

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	24.51	25.02	0.965	0.985
B	9.91	10.41	0.390	0.410
C	6.86	7.36	0.270	0.290
D	1.91	2.28	0.075	0.090
E	2.42	2.92	0.095	0.115
F	5.47	5.96	0.110	0.130
H	3.94	4.44	0.155	0.175
J	0.10	0.15	0.004	0.006
K	2.29	2.94	0.090	0.116
L	18.41 BSC		0.725 BSC	
N	10.54	11.04	0.415	0.435
Q	3.18	3.42	0.125	0.135

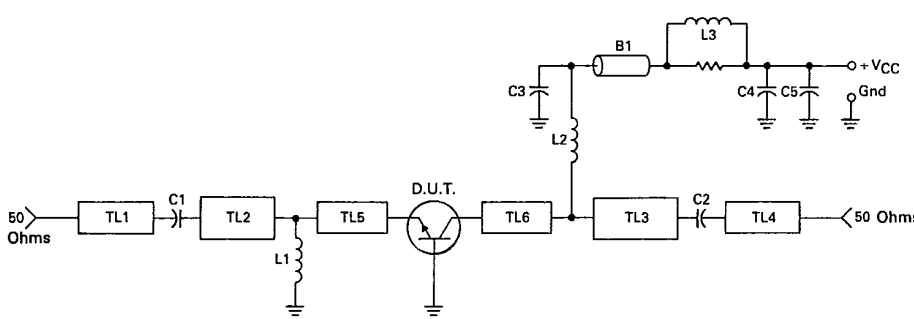
CASE 333A

This document contains information on a new product. Specifications and information herein are subject to change without notice.

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)	$V_{(BR)CEO}$	16	—	—	Vdc
Collector-Emitter Breakdown Voltage (I_C = 50 mAdc, V_{BE} = 0)	$V_{(BR)CES}$	36	—	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 5.0 mAdc, I_C = 0)	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current (V_{CE} = 15 Vdc, V_{BE} = 0, T_C = 25°C)	I_{CES}	—	—	10	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 2.0 Adc, V_{CE} = 5.0 Vdc)	h_{FE}	20	50	150	—
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 12.5 Vdc, I_E = 0, f = 1.0 MHz)	C_{ob}	—	88	110	pF
FUNCTIONAL TESTS					
Common-Base Amplifier Power Gain (V_{CC} = 12.5 Vdc, P_{out} = 60 W, f = 870 MHz)	G_{pb}	4.0	4.8	—	dB
Collector Efficiency (V_{CC} = 12.5 Vdc, P_{out} = 60 W, f = 870 MHz)	η	60	68	—	%
Output Mismatch Stress (V_{CC} = 15.5 Vdc, P_{in} = 24 W, f = 870 MHz, VSWR = 10:1, all phase angles)	ψ	No degradation in output power			

FIGURE 1 — 800–870 MHz BROADBAND TEST CIRCUIT



C1, C2 — 39 pF, 100 Mil Chip Capacitor
C3 — 91 pF, Mini Underwood
C4 — 1000 pF, 350 V Unelco
C5 — 10 μF, 35 V Tantulum
L1, L2 — 4 Turns #26 AWG Choke
L3 — 11 Turns #20 AWG Choke on 10 Ohm Resistor
B1 — Bead, Ferroxcube 56-390-65/3B

TL1, TL4 — 50 Ohm Microstrip
TL2 — 17.4 Ohm, θ=85° Microstrip @ 870 MHz
TL3 — 16.9 Ohm, θ=70° Microstrip @ 870 MHz
TL5, TL6 — 140 x 200 Mils
Board Material Epsilam-10 50 Mil

FIGURE 2 — OUTPUT POWER versus INPUT POWER

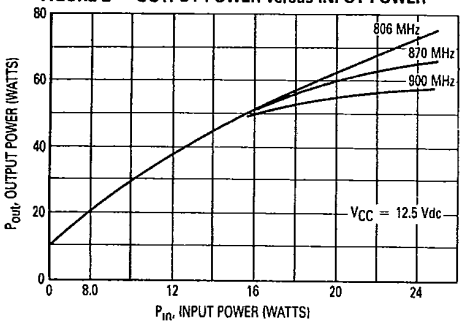


FIGURE 3 — OUTPUT POWER versus SUPPLY VOLTAGE

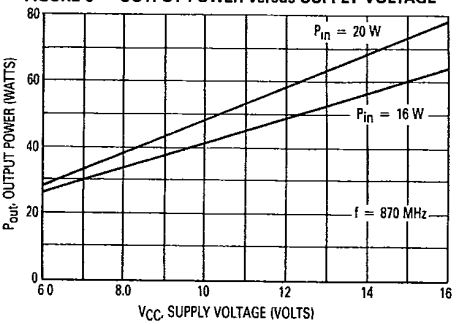


FIGURE 4 — OUTPUT POWER versus FREQUENCY

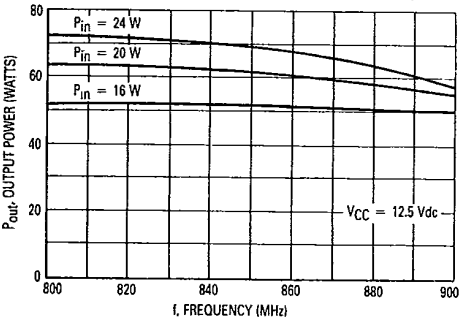


FIGURE 5 — TYPICAL BROADBAND CIRCUIT PERFORMANCE

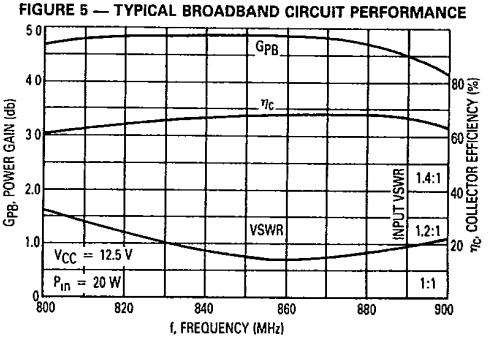


FIGURE 6 — INPUT/OUTPUT IMPEDANCE

P_{out} = 60 Watts, V_{CC} = 12.5 Vdc

f MHz	Z_{in} Ohms	Z_{OL}* Ohms
800	7.16 + j8.2	4.5 + j4.8
835	8.7 + j6.9	5.45 + j5.0
870	8.76 + j6.17	6.75 + j5.1
900	8.25 + j6.06	10.2 − j4.0

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