

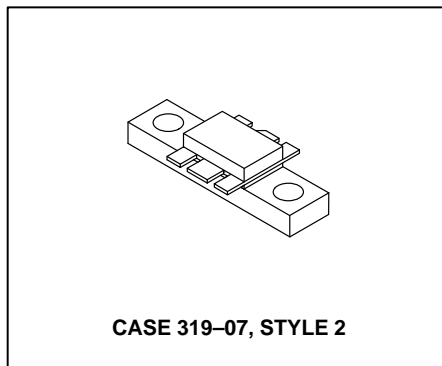
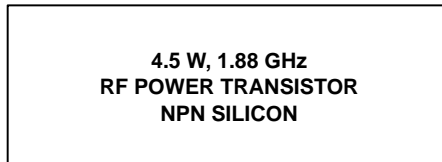
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The RF Line

# NPN Silicon RF Power Transistor

The MRF6402 is designed for 1.8 GHz Personal Communications Network (PCN) base stations applications. It incorporates high value emitter ballast resistors, gold metallizations and offers a high degree of reliability and ruggedness. For ease of design, this transistor has an internally matched input.

- To be used in Class AB for PCN and Cellular Radio Applications
- Specified 26 V, 1.88 GHz Characteristics
  - Output Power — 4.5 Watts
  - Gain — 10 dB Typ
  - Efficiency — 45% Typ
- Circuit board photomaster available upon request by contacting RF Tactical Marketing in Phoenix, AZ.



## MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	$V_{CER}$	40	Vdc
Collector–Base Voltage	$V_{CBO}$	45	Vdc
Emitter–Base Voltage	$V_{EBO}$	3.5	Vdc
Collector–Current — Continuous	$I_C$	0.7	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	15 0.2	Watts W/ $^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-65 to +150	$^\circ\text{C}$
Operating Junction Temperature	$T_J$	200	$^\circ\text{C}$

## THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case (1)	$R_{\theta JC}$	5	$^\circ\text{C}/\text{W}$

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

Characteristic	Symbol	Min	Typ	Max	Unit
Collector–Emitter Breakdown Voltage ( $I_C = 10\text{ mA}$ , $R_{BE} = 75\ \Omega$ )	$V_{(BR)CER}$	40	—	—	Vdc
Emitter–Base Breakdown Voltage ( $I_E = 5\text{ mAdc}$ )	$V_{(BR)EBO}$	3.5	—	—	Vdc
Collector–Base Breakdown Voltage ( $I_C = 10\text{ mAdc}$ )	$V_{(BR)CBO}$	40	—	—	Vdc
Collector–Emitter Leakage ( $V_{CE} = 26\text{ V}$ , $R_{BE} = 75\ \Omega$ )	$I_{CER}$	—	—	5	mA

(1) Thermal resistance is determined under specified RF operating condition.

(continued)

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

Characteristic	Symbol	Min	Typ	Max	Unit
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**ON CHARACTERISTICS**

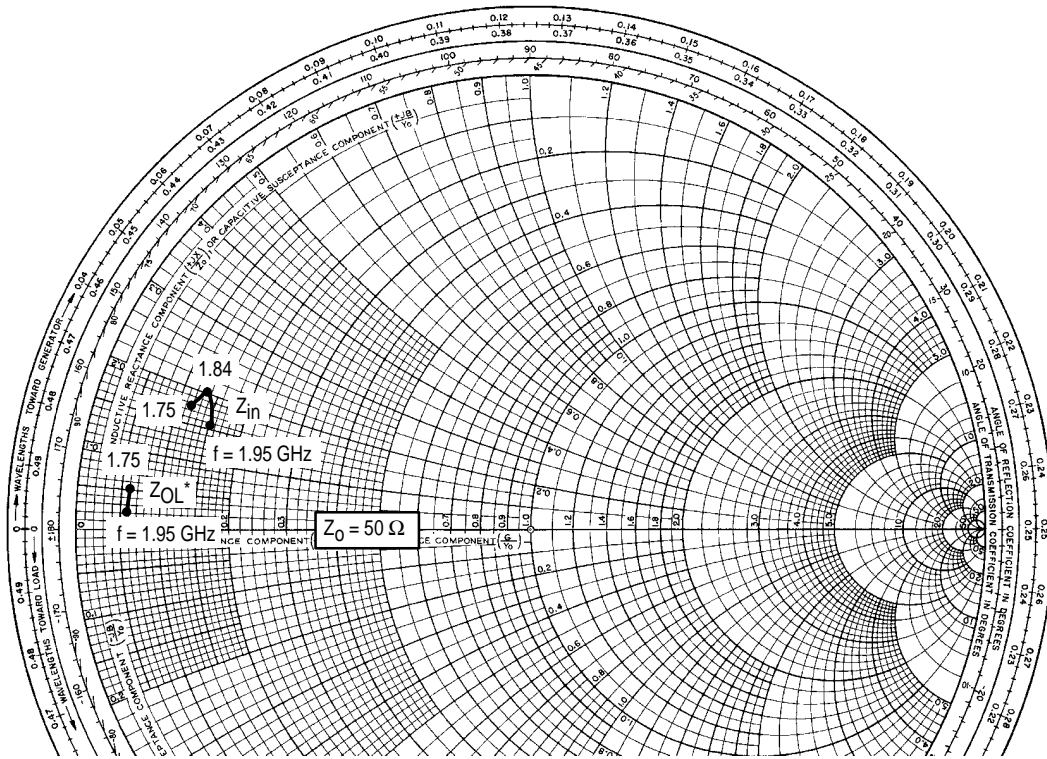
DC Current Gain ( $I_C = 0.1 \text{ Adc}$ , $V_{CE} = 20 \text{ Vdc}$ )	$h_{FE}$	50	—	200	—
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**DYNAMIC CHARACTERISTICS**

Output Capacitance ( $V_{CB} = 26 \text{ V}$ , $I_E = 0$ , $f = 1 \text{ MHz}$ )	$C_{ob}$	—	6	—	pF
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**FUNCTIONAL TESTS**

Common-Emitter Amplifier Power Gain ( $V_{CC} = 26 \text{ V}$ , $P_{out} = 4 \text{ W}$ , $I_{CQ} = 40 \text{ mA}$ , $f = 1.88 \text{ GHz}$ )	$G_p$	9	10	—	dB
Collector Efficiency ( $V_{CC} = 26 \text{ V}$ , $P_{out} = 4 \text{ W}$ , $f = 1.88 \text{ GHz}$ )	$\eta$	40	43	—	%
Load Mismatch ( $V_{CC} = 26 \text{ V}$ , $P_{out} = 4.5 \text{ W}$ , $I_{CQ} = 40 \text{ mA}$ , $f = 1.88 \text{ GHz}$ , Load VSWR = 3:1, All Phase Angles at Frequency of Test)	$\Psi$	No Degradation in Output Power			



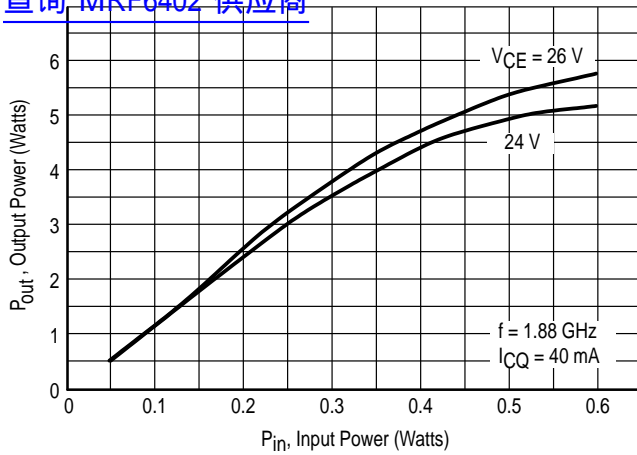
f (GHz)	$Z_{in}$ ( $\Omega$ )	$Z_{OL}^*$ ( $\Omega$ )
1.75	$0.12 + j0.18$	$0.06 + j0.05$
1.84	$0.13 + j0.2$	$0.06 + j0.04$
1.95	$0.15 + j0.16$	$0.06 + j0.02$

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

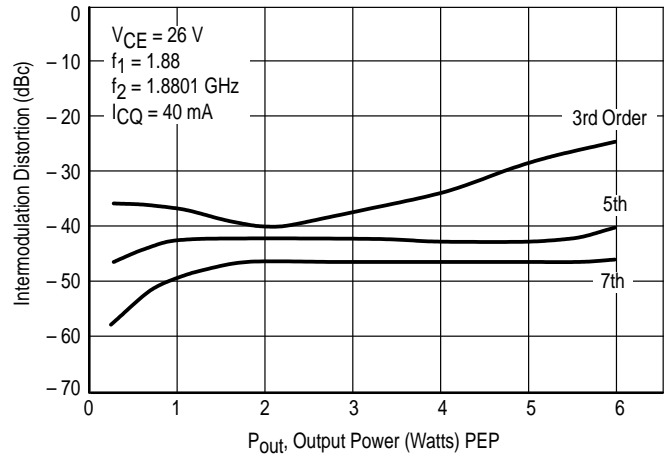
**Figure 1. Input and Output Impedances with Circuit Tuned for Maximum Gain @  $V_{CE} = 26 \text{ V}$ ,  $I_{CQ} = 40 \text{ mA}$ ,  $P_{out} = 4.5 \text{ W}$**

## TYPICAL CHARACTERISTICS

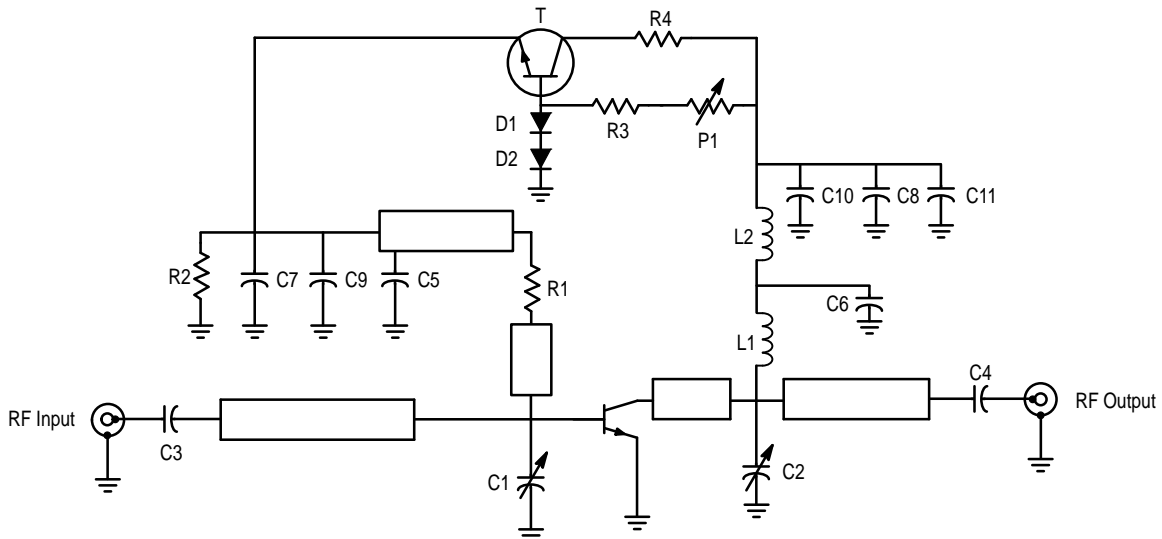
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**Figure 2. Typical Output Power versus Input Power**



**Figure 3. IMD versus Output Power**



C1, C2	1 to 5 pF, Trimmer Capacitor, Johanson	L1	2 Turns, Wire 0.5 mm, ID 2 mm
C3, C4	100A, 68 pF, Chip Capacitor, ATC	L2	Ferrite Bead, SMD Fair-Rite
C5, C6	100A, 82 pF, Chip Capacitor, ATC	P1	10 kΩ, Trimmer
C7, C8	15 nF, Chip Capacitor, 0805	R1	2.2 Ω, Chip Resistor, 0805
C9, C10	330 pF, Chip Capacitor, 0805	R2	56 Ω, Chip Resistor, 1206
C11	4.7 μF, 35 V, Capacitor	R3	1.2 kΩ, 1/4 W, 5%, Resistor
D1, D2	Diode, 1N4148	R4	100 Ω, 3 W, Power Resistor
		T	Transistor, BD135

**Figure 4. 1.80–1.88 GHz Test Circuit Electrical Schematic**

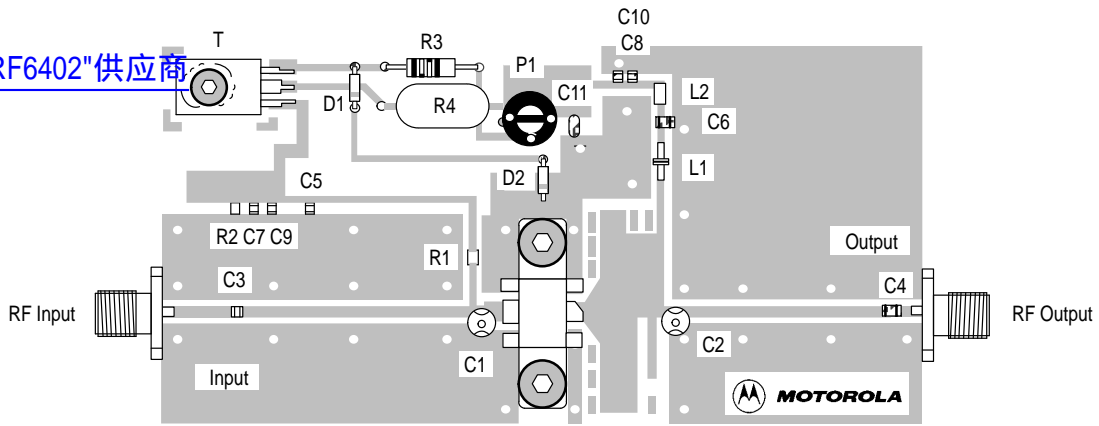
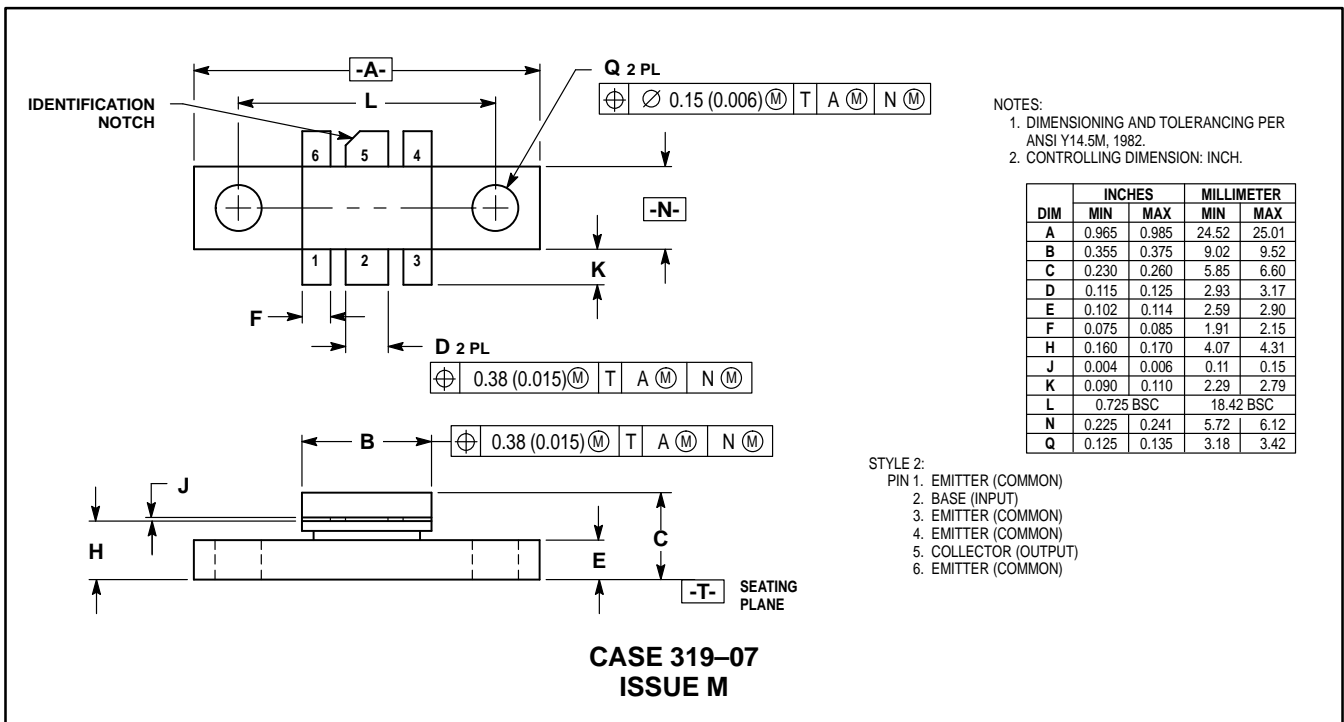


Figure 5. Test Circuit Components View and Parts List

PACKAGE DIMENSIONS



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