The RF Line

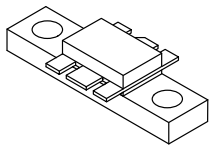
NPN Silicon RF Power Transistor

MRF6402

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.

4.5 W, 1.88 GHz
RF POWER TRANSISTOR
NPN SILICON



CASE 319–07, STYLE 2

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°C Derate above 25°C	P_D	15 0.2	Watts W/°C
Storage Temperature Range	T_{stg}	–65 to +150	°C
Operating Junction Temperature	T_J	200	°C

THERMAL CHARACTERISTICS

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

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

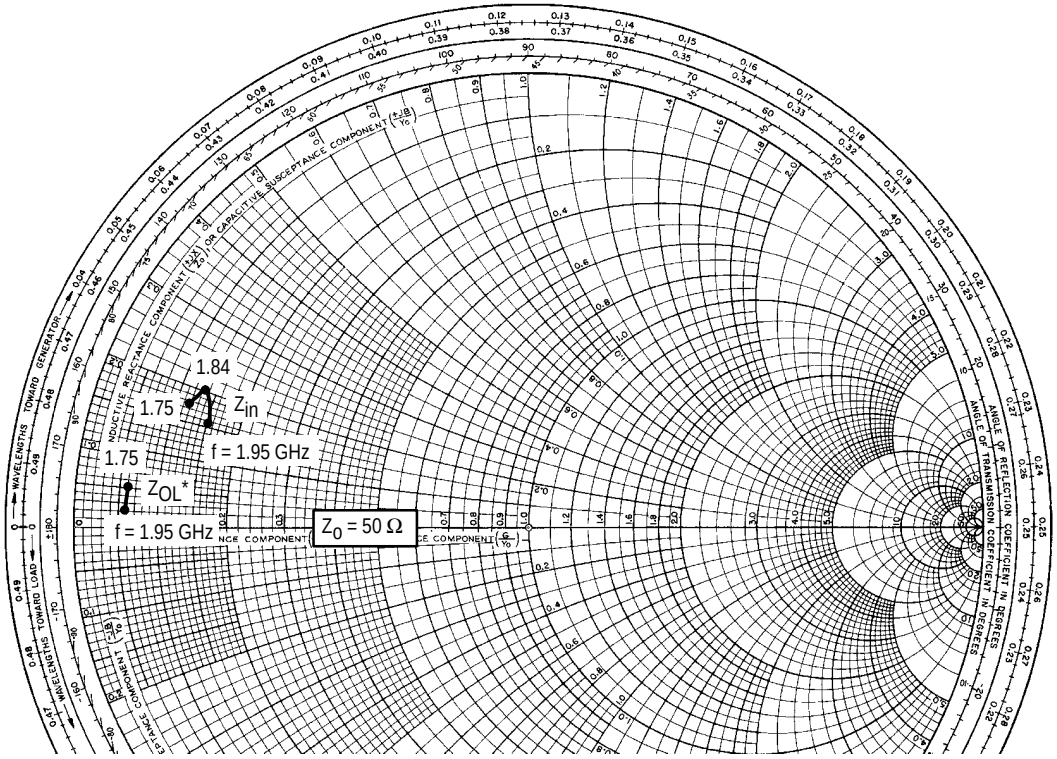
Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector–Emitter Breakdown Voltage (I_C = 10 mA, R_{BE} = 75 Ω)	$V_{(BR)CER}$	40	—	—	Vdc
Emitter–Base Breakdown Voltage (I_E = 5 mAdc)	$V_{(BR)EBO}$	3.5	—	—	Vdc
Collector–Base Breakdown Voltage (I_C = 10 mAdc)	$V_{(BR)CBO}$	40	—	—	Vdc
Collector–Emitter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

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

(continued)

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

Characteristic	Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS					
DC Current Gain (I_C = 0.1 Adc, V_{CE} = 20 Vdc)	h_{FE}	50	—	200	—
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 26 V, I_E = 0, f = 1 MHz)	C_{ob}	—	6	—	pF
FUNCTIONAL TESTS					
Common–Emitter Amplifier Power Gain (V_{CC} = 26 V, P_{out} = 4 W, I_{CQ} = 40 mA, f = 1.88 GHz)	G_p	9	10	—	dB
Collector Efficiency (V_{CC} = 26 V, P_{out} = 4 W, f = 1.88 GHz)	η	40	43	—	%
Load Mismatch (V_{CC} = 26 V, P_{out} = 4.5 W, I_{CQ} = 40 mA, f = 1.88 GHz, Load VSWR = 3:1, All Phase Angles at Frequency of Test)	Ψ	No Degradation in Output Power			



f (GHz)	Z_{in} (Ω)	Z_{OL}* (Ω)
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 V, I_{CQ} = 40 mA, P_{out} = 4.5 W

TYPICAL CHARACTERISTICS

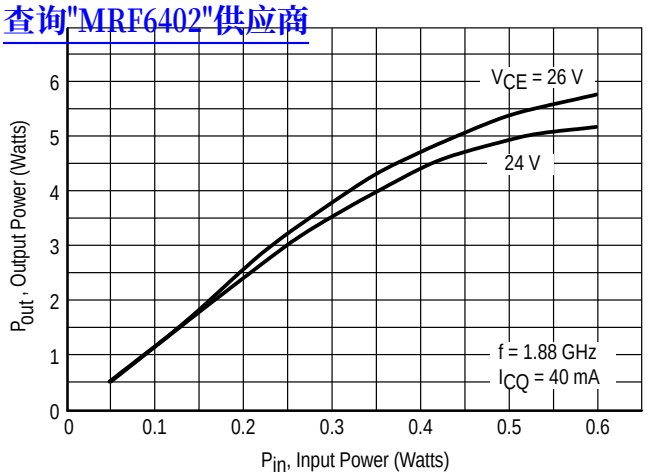


Figure 2. Typical Output Power versus Input Power

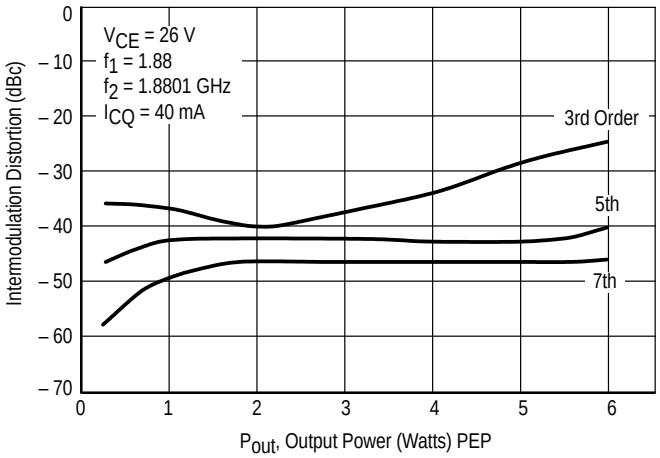
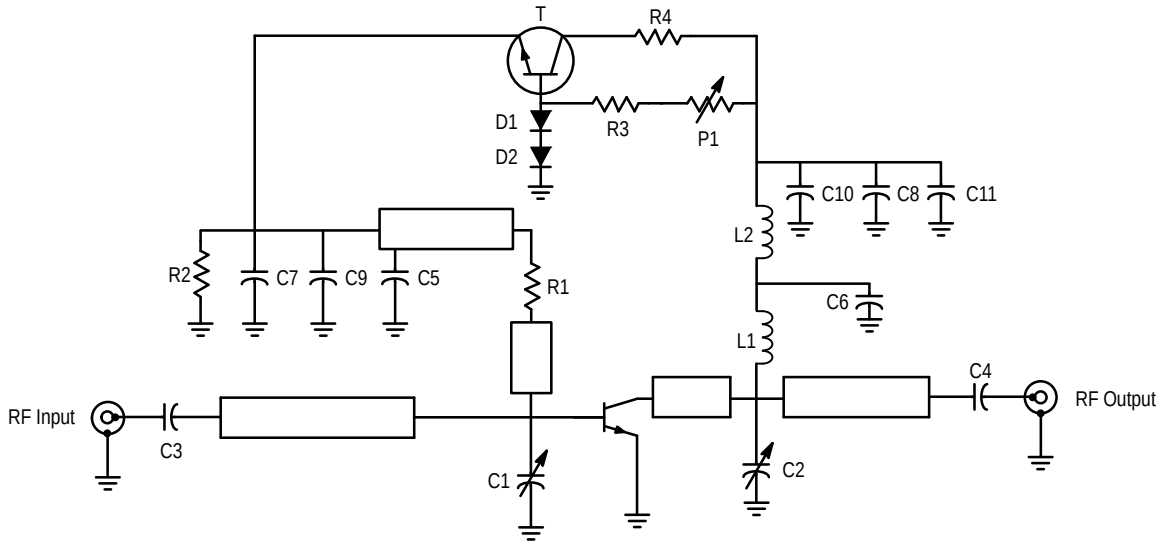


Figure 3. IMD versus Output Power



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

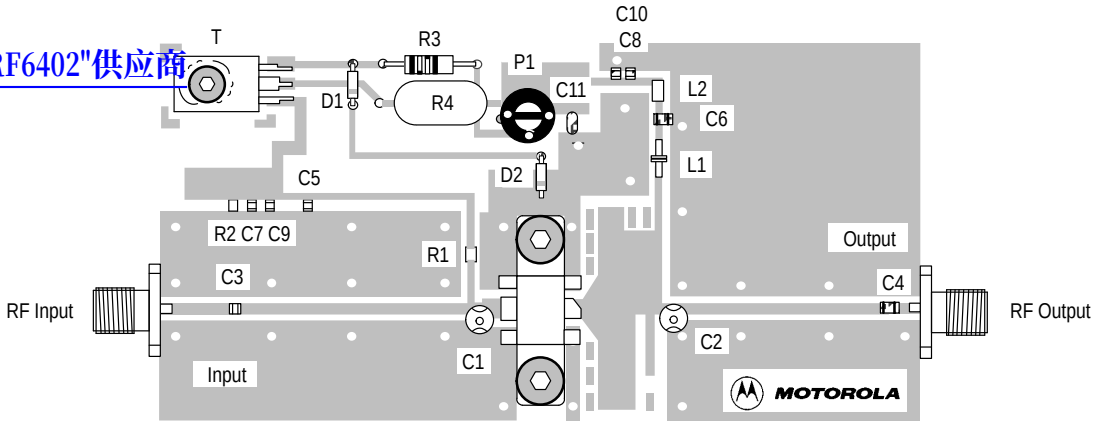
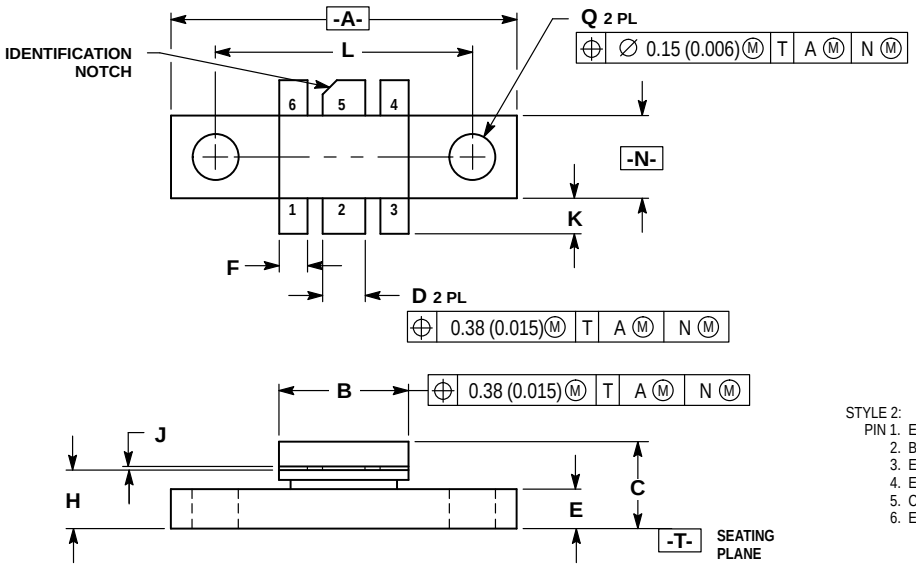


Figure 5. Test Circuit Components View and Parts List

PACKAGE DIMENSIONS



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	INCHES		MILLIMETER	
DIM	MIN	MAX	MIN	MAX
A	0.965	0.985	24.52	25.01
B	0.355	0.375	9.02	9.52
C	0.230	0.260	5.85	6.60
D	0.115	0.125	2.93	3.17
E	0.102	0.114	2.59	2.90
F	0.075	0.085	1.91	2.15
H	0.160	0.170	4.07	4.31
J	0.004	0.006	0.11	0.15
K	0.090	0.110	2.29	2.79
L	0.725 BSC		18.42 BSC	
N	0.225	0.241	5.72	6.12
Q	0.125	0.135	3.18	3.42

STYLE 2:
PIN 1. EMITTER (COMMON)
2. BASE (INPUT)
3. EMITTER (COMMON)
4. EMITTER (COMMON)
5. COLLECTOR (OUTPUT)
6. EMITTER (COMMON)

CASE 319–07
ISSUE M

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