



# THE DATASHEET OF MRF314



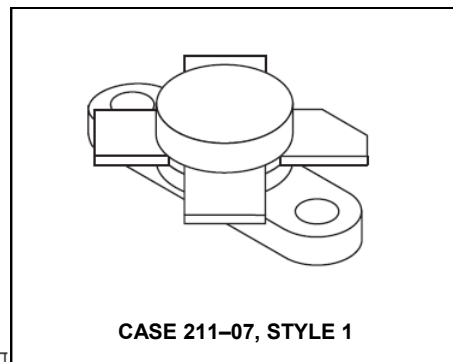
## The RF Line NPN Silicon Power Transistor 30W, 30-200MHz, 28V

Rev. V1

Designed primarily for wideband large-signal driver and output amplifier stages in the 30–200 MHz frequency range.

- Guaranteed performance at 150 MHz, 28 Vdc  
Output power = 30 W  
Minimum gain = 10 dB
- 100% tested for load mismatch at all phase angles with 30:1 VSWR
- Gold metallization system for high reliability applications

### Product Image



### 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	$I_C$	3.4	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ (1) Derate above $25^\circ\text{C}$	$P_D$	82 0.47	Watts W/ $^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	–65 to +150	$^\circ\text{C}$

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	2.13	$^\circ\text{C/W}$

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

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage ( $I_C = 30 \text{ mAdc}$ , $I_B = 0$ )	$V_{(BR)CEO}$	35	—	—	Vdc
Collector–Emitter Breakdown Voltage ( $I_C = 30 \text{ mAdc}$ , $V_{BE} = 0$ )	$V_{(BR)CES}$	65	—	—	Vdc
Collector–Base Breakdown Voltage ( $I_C = 30 \text{ mAdc}$ , $I_E = 0$ )	$V_{(BR)CBO}$	65	—	—	Vdc
Emitter–Base Breakdown Voltage ( $I_E = 3.0 \text{ mAdc}$ , $I_C = 0$ )	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current ( $V_{CB} = 30 \text{ Vdc}$ , $I_E = 0$ )	$I_{CBO}$	—	—	3.0	mAdc

### ON CHARACTERISTICS

DC Current Gain ( $I_C = 1.5 \text{ Adc}$ , $V_{CE} = 5.0 \text{ Vdc}$ )	$h_{FE}$	20	—	80	—
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NOTE:

1. These devices are designed for RF operation. The total device dissipation rating applies only when the devices are operated as RF amplifiers.

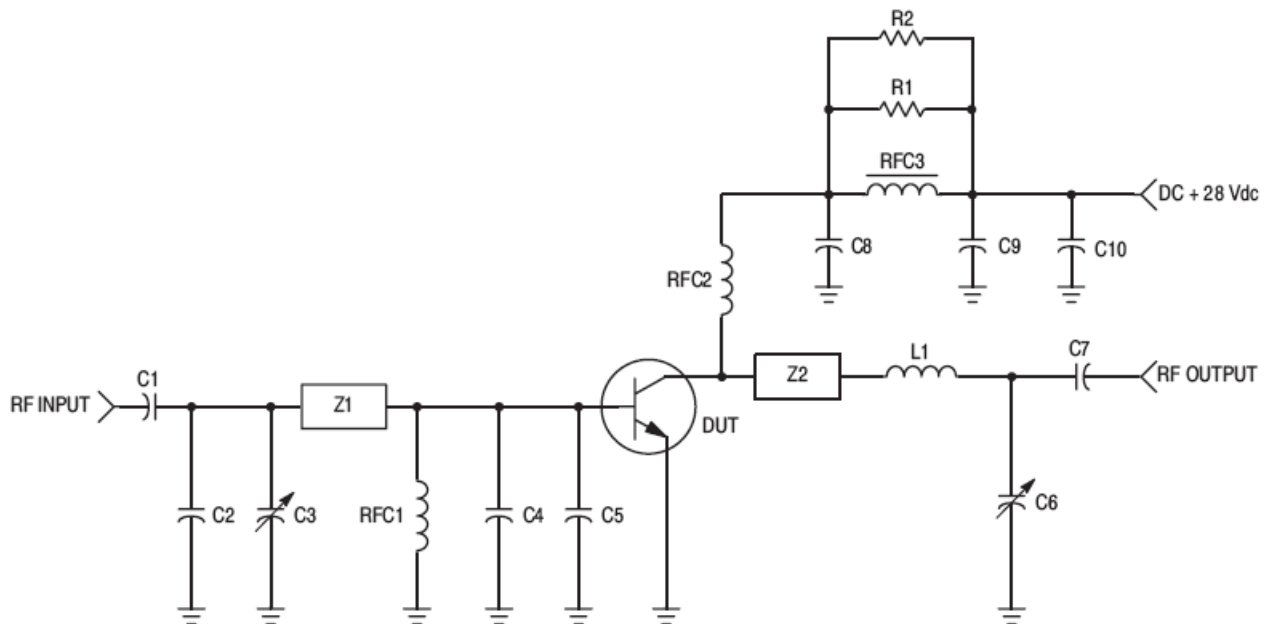
(continued)

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

Characteristic	Symbol	Min	Typ	Max	Unit
<b>DYNAMIC CHARACTERISTICS</b>					
Output Capacitance ( $V_{CB} = 30\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )	$C_{ob}$	—	30	40	pF
<b>FUNCTIONAL TESTS</b> (Figure 1)					
Common-Emitter Amplifier Power Gain ( $V_{CC} = 28\text{ Vdc}$ , $P_{out} = 30\text{ W}$ , $f = 150\text{ MHz}$ )	$G_{PE}$	10	13.5	—	dB
Collector Efficiency ( $V_{CC} = 28\text{ Vdc}$ , $P_{out} = 30\text{ W}$ , $f = 150\text{ MHz}$ )	$\eta$	50	—	—	%
Load Mismatch ( $V_{CC} = 28\text{ Vdc}$ , $P_{out} = 30\text{ W}$ , $f = 150\text{ MHz}$ , $VSWR = 30:1$ all phase angles)	$\psi$	No Degradation in Power Output			



C1, C7 — 18 pF, 100 mil ATC  
 C2 — 68 pF, 100 mil ATC  
 C3, C6 — Johanson #JMC 5501  
 C4 — 270 pF, 100 mil ATC  
 C5 — 240 pF, 100 mil ATC  
 C8, C9 — 100 pF Underwood  
 C10 — 1.0  $\mu\text{F}$  Tantalum  
 L1 — 2 Turns, 2.5" #20 Wire,  $ID = 0.275"$

R1, R2 — 10  $\Omega$ , 1.0 W  
 RFC1 — 15  $\mu\text{H}$  Molded Coil  
 RFC2 — 2 Turns, 2.5" #20 Wire,  $ID = 0.2"$   
 RFC3 — Ferroxcube VK200-19/4B  
 Z1 — Microstrip, 0.168" W x 1.6" L  
 Z2 — Microstrip, 0.168" W x 1.2" L  
 Board — Glass Teflon  $\epsilon_r = 2.55$

Figure 1. 150 MHz Test Circuit

## TYPICAL PERFORMANCE CURVES

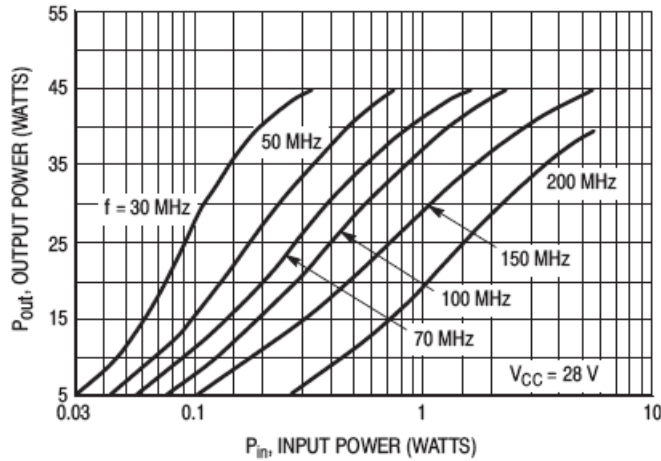


Figure 2. Output Power versus Input Power

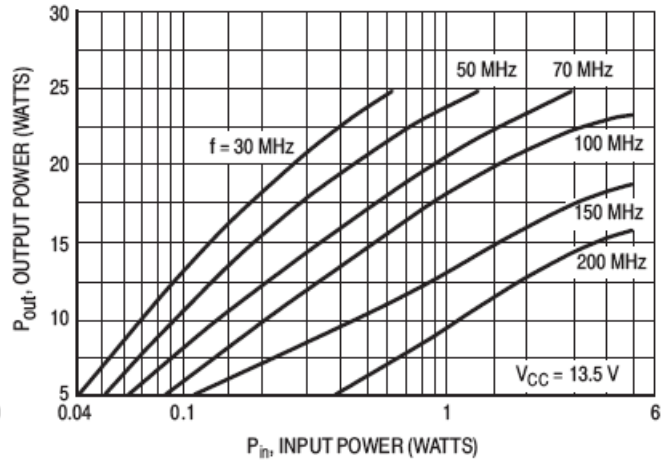


Figure 3. Output Power versus Input Power

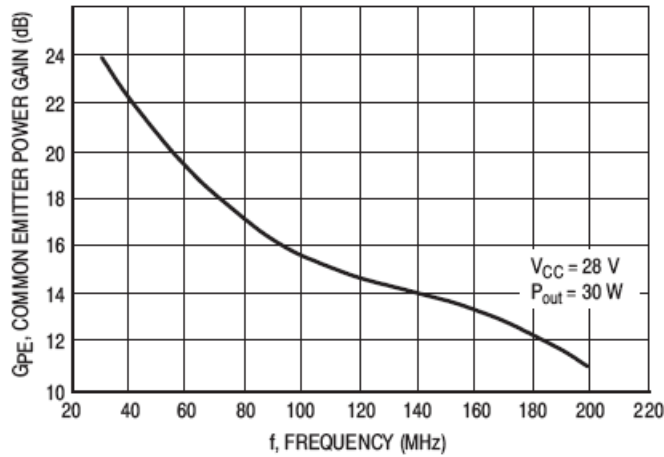


Figure 4. Power Gain versus Frequency

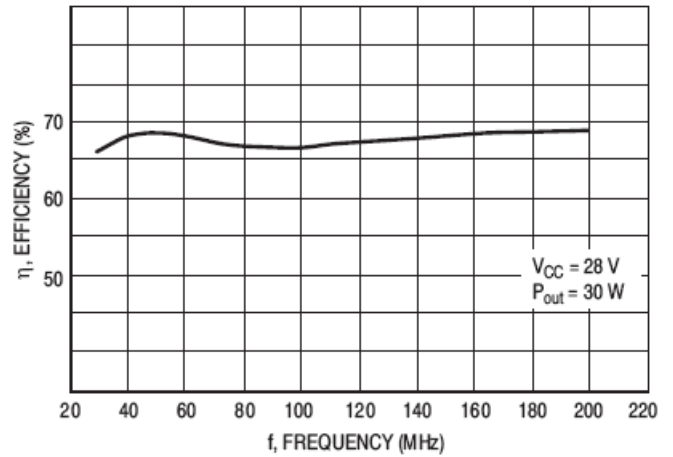


Figure 5. Efficiency versus Frequency

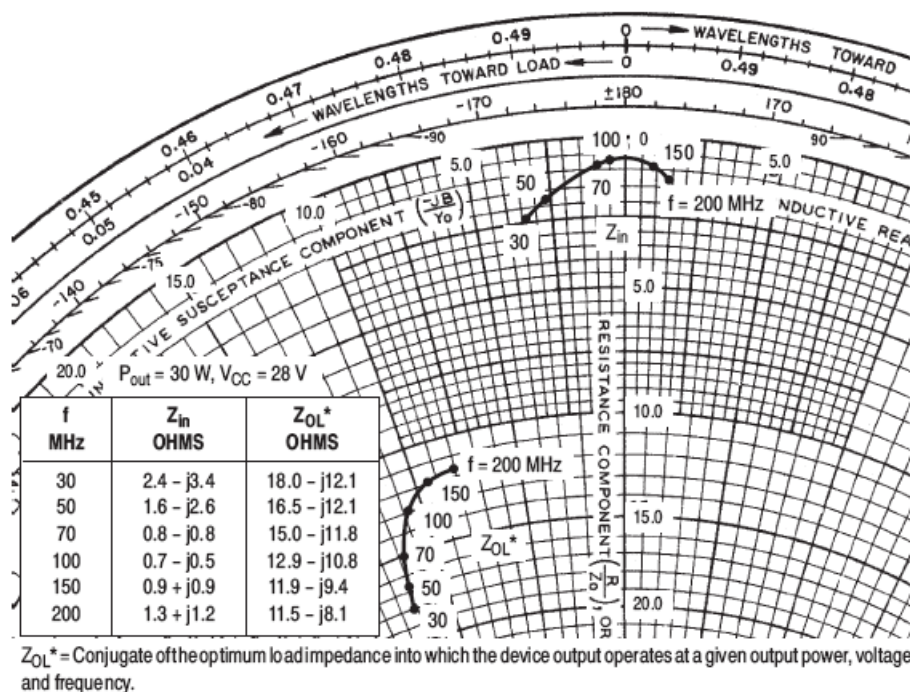
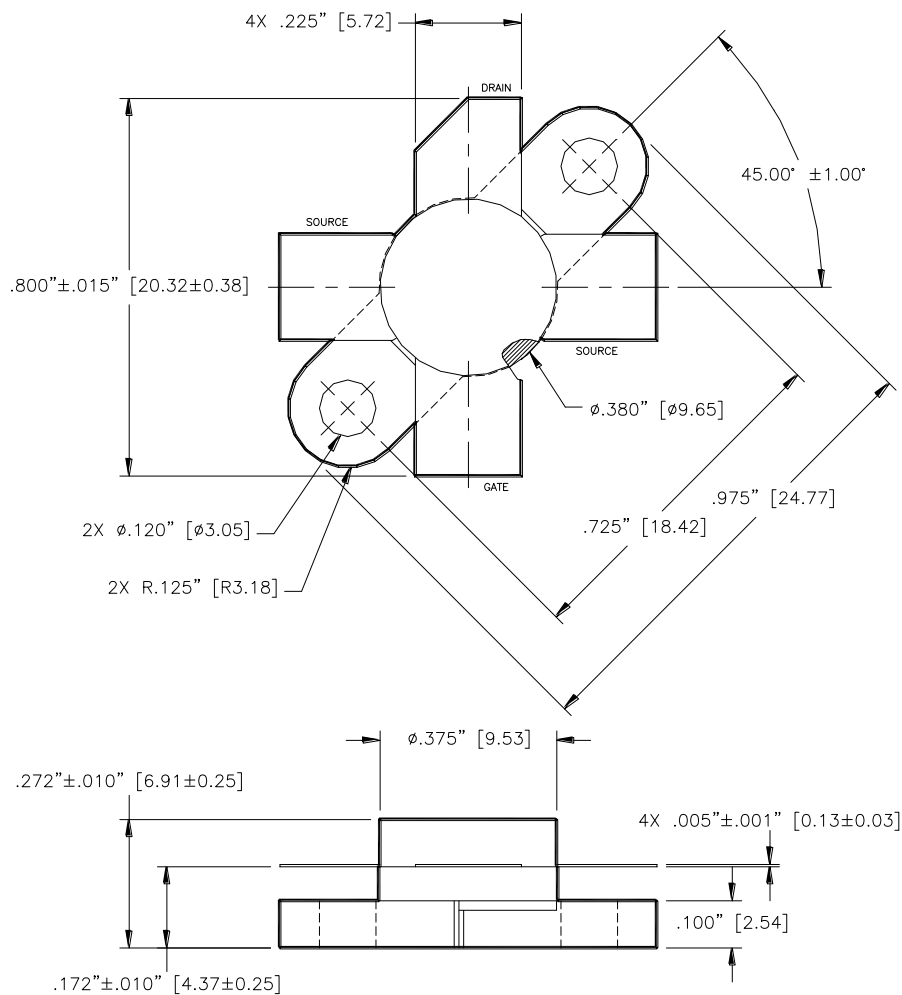


Figure 6. Series Equivalent Input/Output Impedance

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Unless otherwise noted, tolerances are inches  $\pm .005''$  [millimeters  $\pm 0.13\text{mm}$ ]

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