

MOTOROLA SEMICONDUCTOR TECHNICAL DATA

The RF Line NPN Silicon RF Power Transistors

... designed primarily for wideband large-signal output amplifier stages in the 30 to 200 MHz frequency range.

- Guaranteed Performance at 150 MHz, 28 Vdc
Output Power = 45 Watts
Minimum Gain = 9.0 dB
- 100% Tested for Load Mismatch at All Phase Angles with 30:1 VSWR
- Gold Metallization System for High Reliability Applications

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	4.0	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ (1) Derate above 25°C	P_D	110 0.63	Watts $\text{W}/^\circ\text{C}$
Storage Temperature Range	T_{stg}	-65 to +150	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.59	$^\circ\text{C}/\text{W}$

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 ($I_C = 40 \text{ mAdc}$, $I_E = 0$)	$V_{(BR)CEO}$	35	—	—	Vdc
Collector-Emitter Breakdown Voltage ($I_C = 40 \text{ mAdc}$, $V_{BE} = 0$)	$V_{(BR)CES}$	65	—	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 40 \text{ mAdc}$, $I_E = 0$)	$V_{(BR)CBO}$	65	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 4.0 \text{ mAdc}$, $I_C = 0$)	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 30 \text{ Vdc}$, $I_E = 0$)	I_{CBO}	—	—	4.0	mAdc

ON CHARACTERISTICS

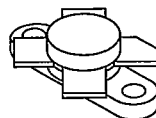
DC Current Gain ($I_C = 2.0 \text{ Adc}$, $V_{CE} = 5.0 \text{ Vdc}$)	h_{FE}	20	—	80	—
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NOTE:

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

MRF315

45 W, 30 to 200 MHz
RF POWER
TRANSISTORS
NPN SILICON



CASE 211-07, STYLE 1

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

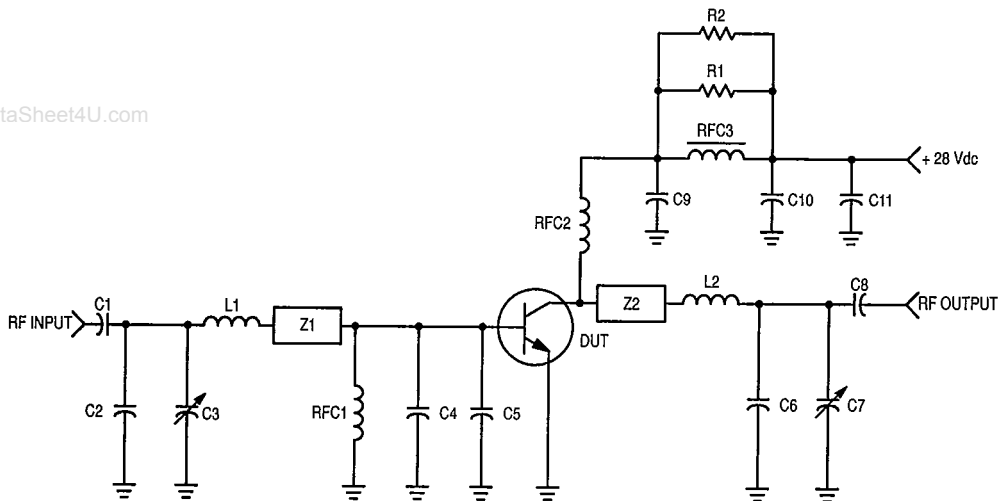
Characteristic	Symbol	Min	Typ	Max	Unit
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DYNAMIC CHARACTERISTICS

Output Capacitance ($V_{CB} = 30\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$)	C_{ob}	—	45	60	pF
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FUNCTIONAL TESTS (Figure 1)

Common-Emitter Amplifier Power Gain ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 45\text{ W}$, $f = 150\text{ MHz}$)	G_{PE}	9.0	11	—	dB
Collector Efficiency ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 45\text{ W}$, $f = 150\text{ MHz}$)	η	50	—	—	%
Load Mismatch ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 45\text{ W}$, $f = 150\text{ MHz}$, $VSWR = 30:1$ all phase angles)	—	No Degradation in Power Output			



C1 — 30 pF, 100 mil ATC
 C2 — 47 pF, 100 mil ATC
 C3, C7 — Johanson JMC 5501
 C4, C5 — 200 pF, 100 mil ATC
 C6 — 24 pF, 100 mil ATC
 C8 — 27 pF, 100 mil ATC
 C9, C10 — 100 pF Underwood
 C11 — 1.0 μF Tantalum

L1 — 0.5" #18 Wire
 L2 — 2 Turns, 1.5" #20 Wire, ID = 0.15"
 R1, R2 — 10 Ω , 1.0 W
 RFC1 — 15 μH Molded Coil
 RFC2 — 2 Turns, 2.5" #18 Wire, ID = 0.2"
 RFC3 — Ferroxcube VK200-19/4B
 Z1, Z2 — Microstrip 0.168" W x 1.25" L
 Board — Glass Teflon $\epsilon_r \approx 2.55$

Figure 1. 150 MHz Test Circuit

TYPICAL PERFORMANCE CURVES

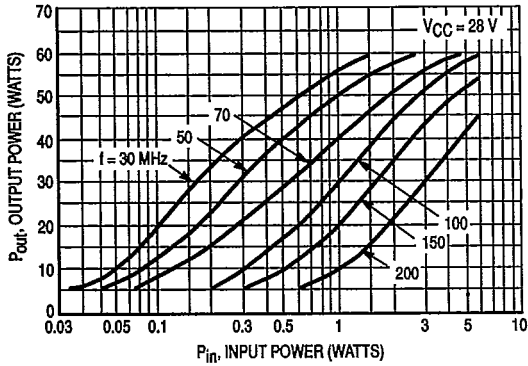


Figure 2. Output Power versus Input Power

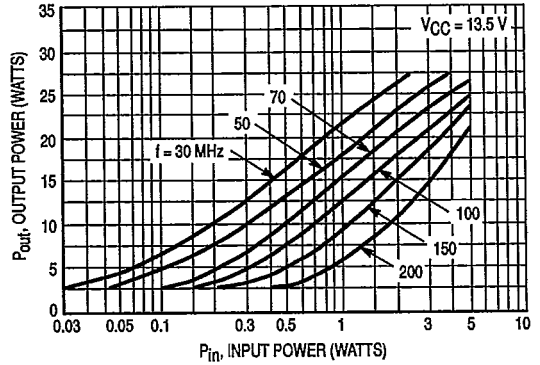


Figure 3. Output Power versus Input Power

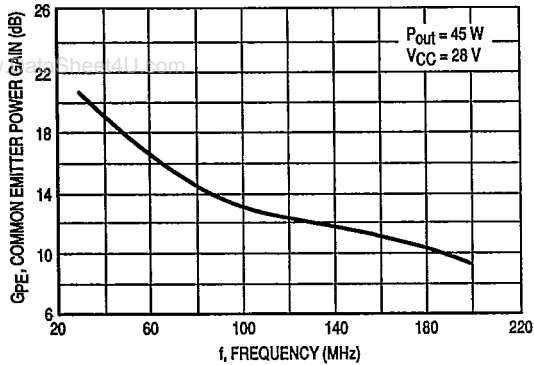


Figure 4. Power Gain versus Frequency

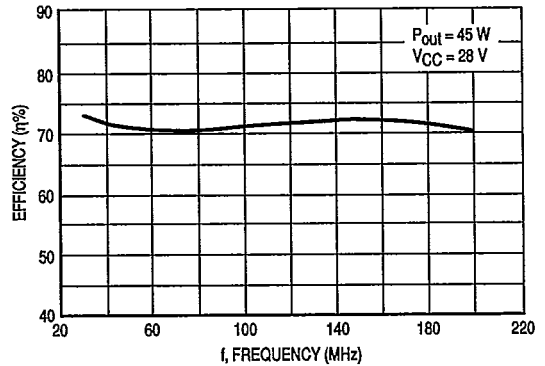
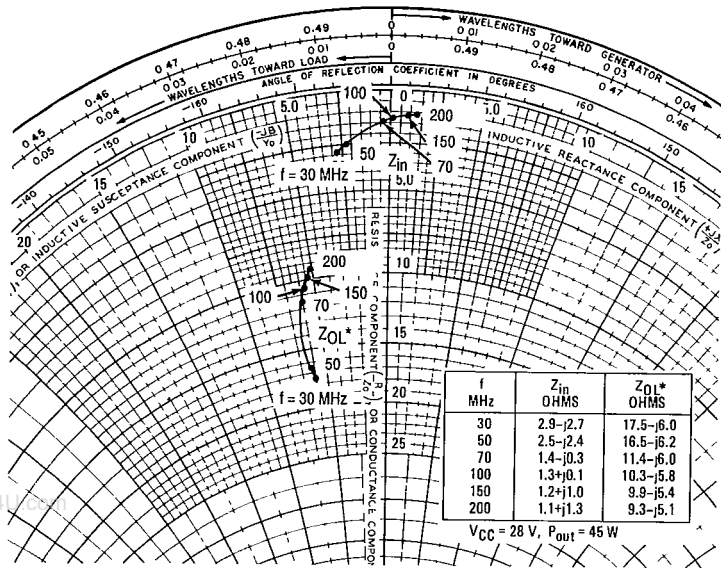


Figure 5. Efficiency versus Frequency



Z_{out}^* = Conjugate of the optimum load impedance to which the device output operates at a given output power, voltage and frequency

Figure 6. Series Equivalent Input/Output Impedance

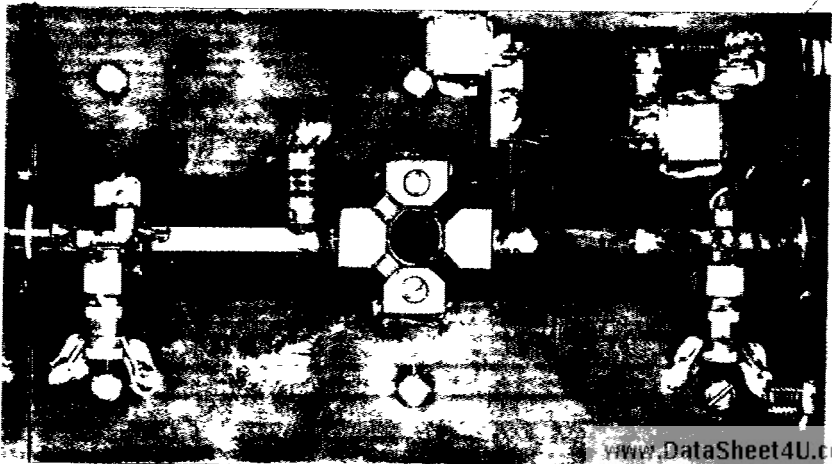


Figure 7. Test Fixture