



MOTOROLA
Semiconductors

BOX 20912, PHOENIX, ARIZONA 85036

MRF327

The RF Line

NPN SILICON RF POWER TRANSISTOR

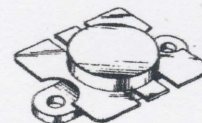
... designed primarily for wideband large-signal output amplifier stages in the 100-500 MHz frequency range.

- Guaranteed Performance @ 400 MHz, 28 Vdc
Output Power = 80 Watts over 225-400 MHz Band
Minimum Gain = 7.3 dB @ 400 MHz
- Built-in Matching Network for Broadband Operation Using Double Match Technique
- 100% Tested for Load Mismatch at all Phase Angles with 30:1 VSWR
- Gold Metallization System for High Reliability Applications
- Characterized for 100-500 MHz

80 W — 100-500 MHz

CONTROLLED "Q"
BROADBAND RF POWER
TRANSISTOR

NPN SILICON



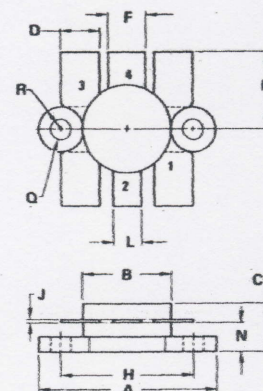
MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	33	Vdc
Collector-Base Voltage	V_{CBO}	60	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector Current — Continuous — Peak	I_C	9.0 12.0	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ (1) Derate above 25°C	P_D	250 1.43	Watts W/ $^\circ\text{C}$
Storage Temperature Range	T_{stg}	-65 to +200	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.7	$^\circ\text{C/W}$

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



STYLE 1:

PIN 1. EMITTER
2. COLLECTOR
3. EMITTER
4. BASE
FLANGE-ISOLATED

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	24.38	25.15	0.960	0.990
B	12.45	12.95	0.490	0.510
C	5.97	7.62	0.235	0.300
D	5.33	5.59	0.210	0.220
F	5.08	5.33	0.200	0.210
H	18.29	18.54	0.720	0.730
J	0.10	0.15	0.004	0.006
K	10.29	—	0.405	—
L	3.81	4.06	0.150	0.160
N	3.81	4.32	0.150	0.170
Q	2.92	3.30	0.115	0.130
R	3.05	3.30	0.120	0.130

CASE 316-01

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage ($I_C = 80\text{ mAdc}$, $I_B = 0$)	BV_{CEO}	33	—	—	Vdc
Collector-Emitter Breakdown Voltage ($I_C = 80\text{ mAdc}$, $V_{BE} = 0$)	BV_{CES}	60	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 8.0\text{ mAdc}$, $I_C = 0$)	BV_{EBO}	4.0	—	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 80\text{ mAdc}$, $I_E = 0$)	BV_{CBO}	60	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 30\text{ Vdc}$, $I_E = 0$)	I_{CBO}	—	—	5.0	mAdc

ON CHARACTERISTICS

DC Current Gain ($I_C = 4.0\text{ Adc}$, $V_{CE} = 5.0\text{ Vdc}$)	h_{FE}	20	—	80	—
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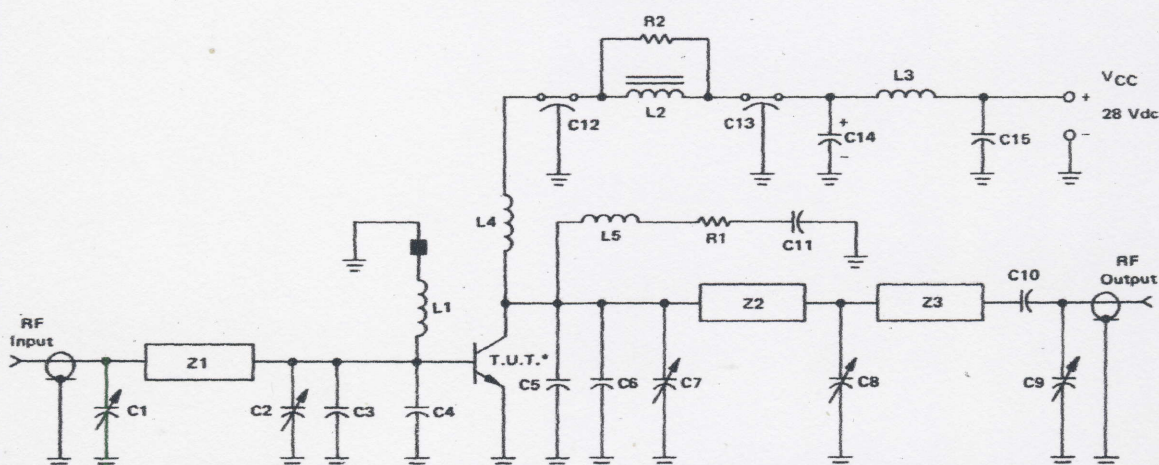
DYNAMIC CHARACTERISTICS

Output Capacitance ($V_{CB} = 28\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$)	C_{ob}	—	100	145	pF
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FUNCTIONAL TESTS (Figure 1)

Common-Emitter Amplifier Power Gain ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 80\text{ W}$, $f = 400\text{ MHz}$)	G_{PE}	7.3	9.0	—	dB
Collector Efficiency ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 80\text{ W}$, $f = 400\text{ MHz}$)	η	50	60	—	%
Load Mismatch ($V_{CC} = 28\text{ V}$, $P_{out} = 80\text{ W}$, $f = 400\text{ MHz}$, VSWR 30:1 all phase angles)	ψ	No Degradation in Output Power			

FIGURE 1 — 400 MHz TEST CIRCUIT



C1, C2, C7, C8, C9 — 1.0-20 pF Piston Trimmer (Johanson JMC 5501)
 C3, C4 — 36 pF ATC 100 mil Chip Capacitor
 C5, C6 — 43 pF ATC 100-mil Chip Capacitor
 C10 — 100 pF UNELCO
 C11, C15 — 0.1 μF Erie Redcap
 C12, C13 — 680 pF Feedthru
 C14 — 1.0 μF 50 V Tantalum
 L1 — 4 Turns #22 AWG Enameled, 3/16" ID Closewound with Ferroxcube Bead (#56-590-65/48) on Ground End of Coil
 L2 — Ferroxcube VK200-19/48 Ferrite Choke
 L3 — 7 Turns #18 AWG, 11/16" Long, Wound on a 100 k Ω 2 Watt Resistor

L4 — 6 Turns #20 AWG Enameled, 3/16" ID Closewound
 L5 — 4 Turns #22 AWG Enameled, 1/8" ID Closewound
 Z1 — Microstrip 0.2" W x 1.5" L
 Z2 — Microstrip 0.17" W x 1.16" L
 Z3 — Microstrip 0.17" W x 0.63" L
 R1, R2 — 10 Ω 2 Watt
 Board — Glass Teflon $\epsilon_R = 2.56$, $t = 0.062$ "
 Input/Output Connectors Type N
 T.U.T. Socket Lead Frame Etched from 80 mil Thick Copper
 *Transistor Under Test



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FIGURE 2 – POWER GAIN versus FREQUENCY

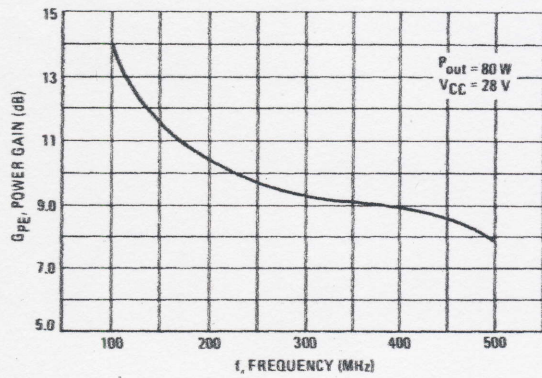


FIGURE 3 – OUTPUT POWER versus FREQUENCY

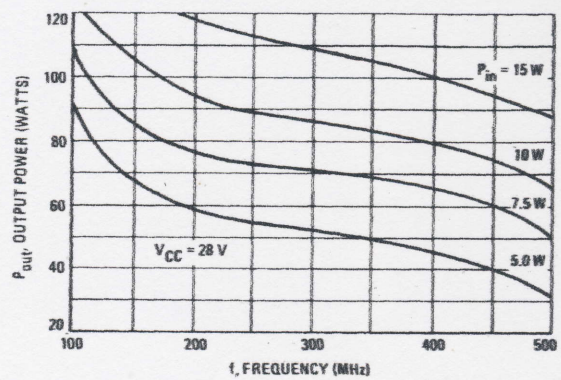


FIGURE 4 – OUTPUT POWER versus SUPPLY VOLTAGE
 $f = 225\text{ MHz}$

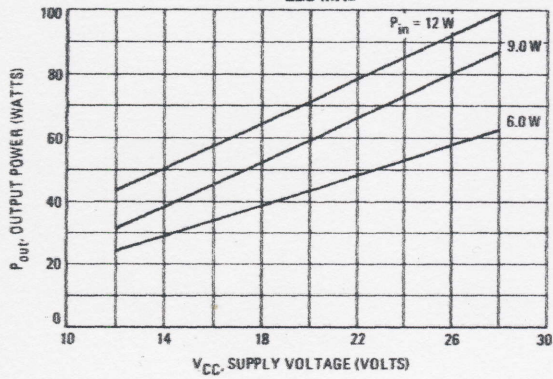


FIGURE 5 – OUTPUT POWER versus SUPPLY VOLTAGE
 $f = 400\text{ MHz}$

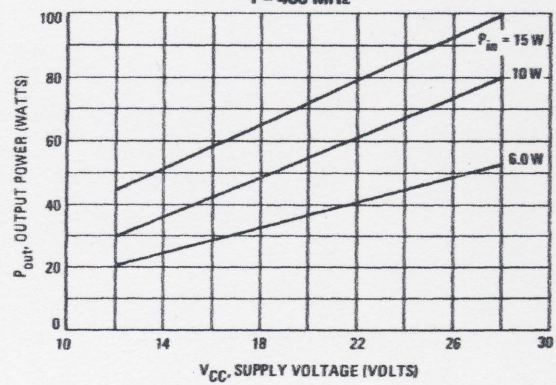
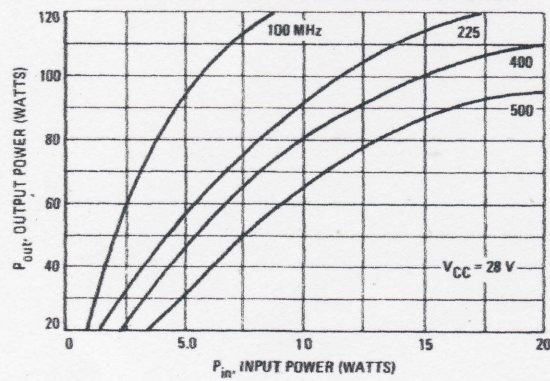
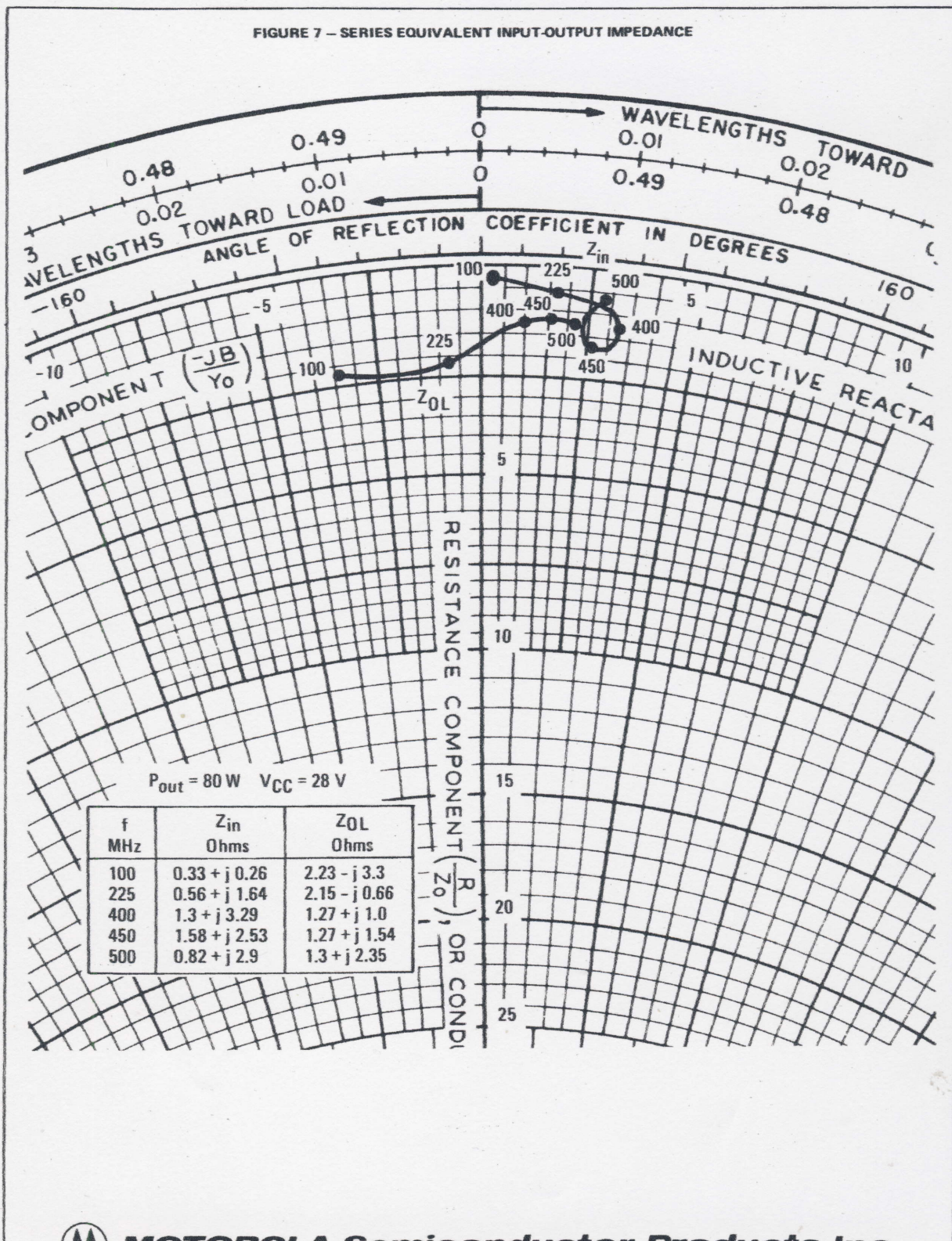


FIGURE 6 – OUTPUT POWER versus INPUT POWER



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FIGURE 7 - SERIES EQUIVALENT INPUT-OUTPUT IMPEDANCE



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