MOTOROLA Semiconductors
BOX 20912 • PHOENIX, ARIZONA 85036

MRF327

The RF Line

80 W – 100-500 MHz

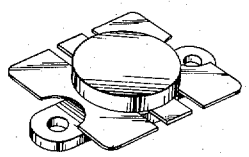
CONTROLLED "Q" BROADBAND RF POWER TRANSISTOR

NPN SILICON

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



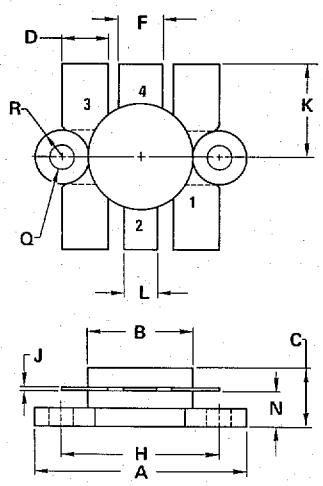
MAXIMUM RATINGS

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 @ $T_C = 25^oC$ (1) Derate above 25^oC	P_D	250 1.43	Watts $W/^oC$
Storage Temperature Range	T_{stg}	–65 to +200	^oC

THERMAL CHARACTERISTICS

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

(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

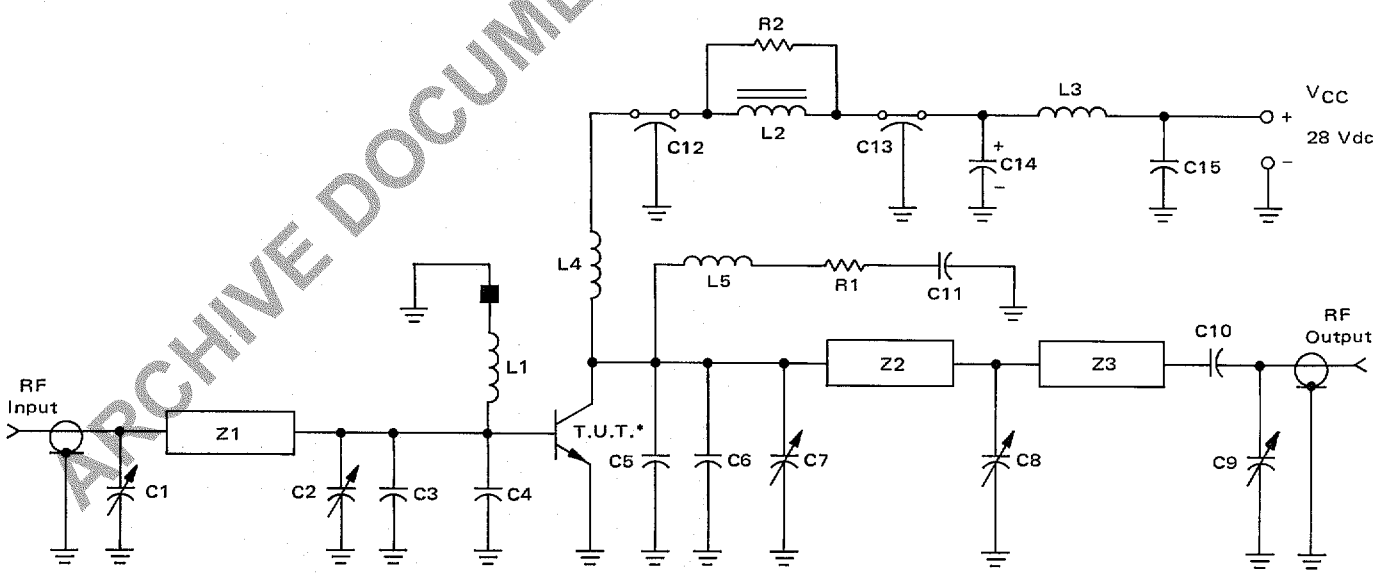
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	24.38	25.15	0.960	0.990
B	12.45	12.95	0.490	0.510
C	5.97	7.62	0.235	0.300
D	5.33	5.59	0.210	0.220
F	5.08	5.33	0.200	0.210
H	18.29	18.54	0.720	0.730
J	0.10	0.15	0.004	0.006
K	10.29	–	0.405	–
L	3.81	4.06	0.150	0.160
N	3.81	4.32	0.150	0.170
Q	2.92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

CASE 316-01

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 80 mAdc, I_B = 0)	BV_{CEO}	33	–	–	Vdc
Collector-Emitter Breakdown Voltage (I_C = 80 mAdc, V_{BE} = 0)	BV_{CES}	60	–	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 8.0 mAdc, I_C = 0)	BV_{EBO}	4.0	–	–	Vdc
Collector-Base Breakdown Voltage (I_C = 80 mAdc, I_C = 0)	BV_{CBO}	60	–	–	Vdc
Collector Cutoff Current (V_{CB} = 30 Vdc, I_E = 0)	I_{CBO}	–	–	5.0	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 4.0 Adc, V_{CE} = 5.0 Vdc)	h_{FE}	20	–	80	–
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 28 Vdc, I_E = 0, f = 1.0 MHz)	C_{ob}	–	100	145	pF
FUNCTIONAL TESTS (Figure 1)					
Common-Emitter Amplifier Power Gain (V_{CC} = 28 Vdc, P_{out} = 80 W, f = 400 MHz)	G_{PE}	7.3	9.0	–	dB
Collector Efficiency (V_{CC} = 28 Vdc, P_{out} = 80 W, f = 400 MHz)	η	50	60	–	%
Load Mismatch (V_{CC} = 28 V, P_{out} = 80 W, f = 400 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 (#56-590-65/4B) on Ground End of Coil
L2 – Ferroxcube VK200-19/4B Ferrite Choke
L3 – 7 Turns #18 AWG, 11/16" Long, Wound on a 100 kΩ 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 ∈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

FIGURE 2 – POWER GAIN versus FREQUENCY

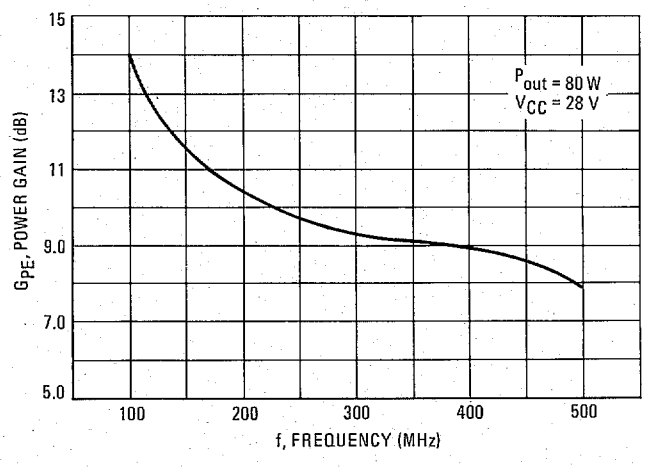


FIGURE 3 – OUTPUT POWER versus FREQUENCY

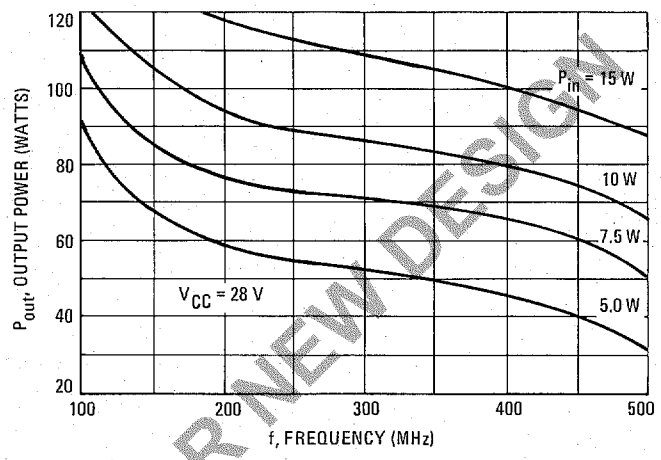


FIGURE 4 – OUTPUT POWER versus SUPPLY VOLTAGE
f = 225 MHz

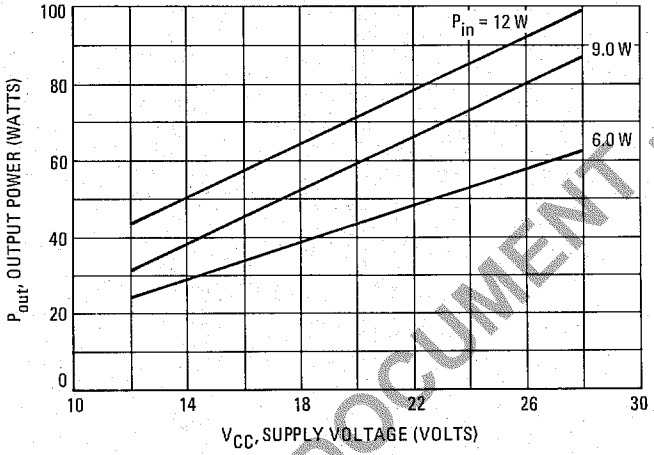


FIGURE 5 – OUTPUT POWER versus SUPPLY VOLTAGE
f = 400 MHz

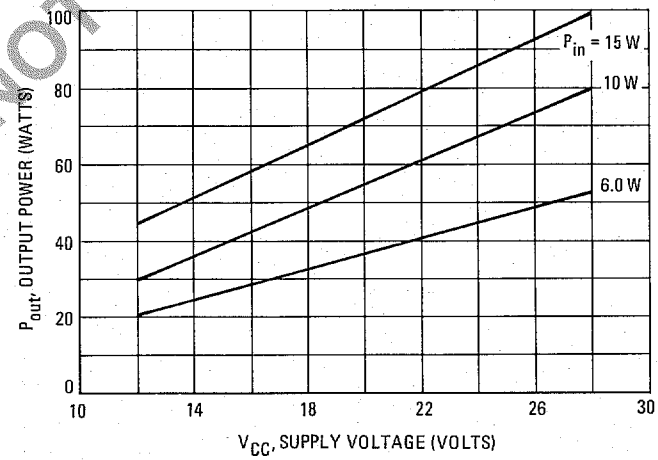


FIGURE 6 – OUTPUT POWER versus INPUT POWER

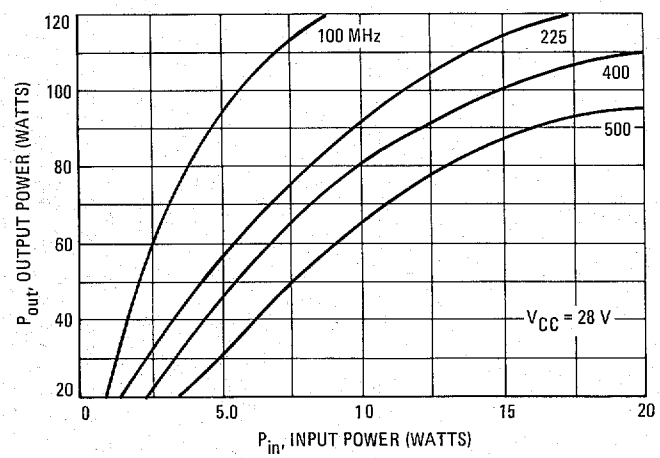
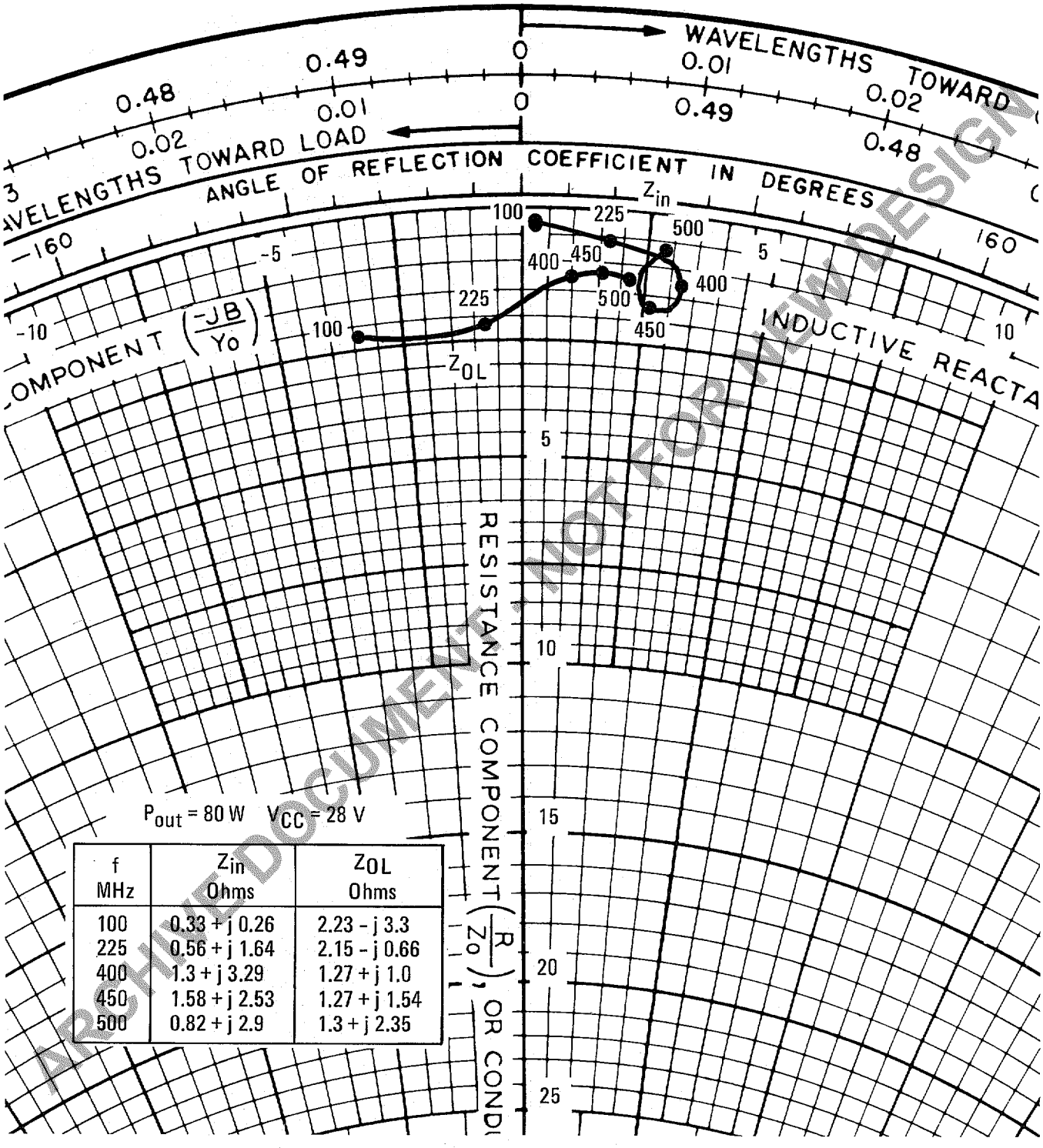


FIGURE 7 – SERIES EQUIVALENT INPUT-OUTPUT IMPEDANCE



f MHz	Z_{in} Ohms	Z_{OL} Ohms
100	0.33 + j 0.26	2.23 - j 3.3
225	0.56 + j 1.64	2.15 - j 0.66
400	1.3 + j 3.29	1.27 + j 1.0
450	1.58 + j 2.53	1.27 + j 1.54
500	0.82 + j 2.9	1.3 + j 2.35

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