MOTOROLA Semiconductors
BOX 20912 • PHOENIX, ARIZONA 85036

MRF325

The RF Line

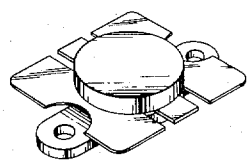
NPN SILICON RF POWER TRANSISTOR

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

- Specified 28 Volt, 400 MHz Characteristics —
  Output Power = 30 Watts
  Minimum Gain = 8.5 dB
  Efficiency = 54% (Min)
- Built-In Matching Network for Broadband Operation Using Internal Matching Techniques
- 100% Tested for Load Mismatch at all Phase Angles with 30:1 VSWR
- Gold Metallization for High Reliability Applications

30 W — 225-400 MHz CONTROLLED "Q" BROADBAND RF POWER TRANSISTOR

NPN SILICON



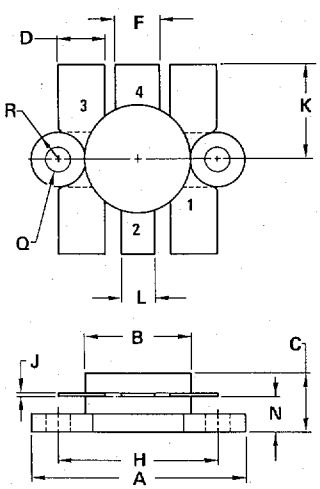
MAXIMUM RATINGS

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	3.4 4.5	Adc
Total Device Dissipation @ T_C = 25°C (1) Derate above 25°C	P_D	82 0.47	Watts W/°C
Storage Temperature Range	T_{stg}	-65 to +200	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	2.13	°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

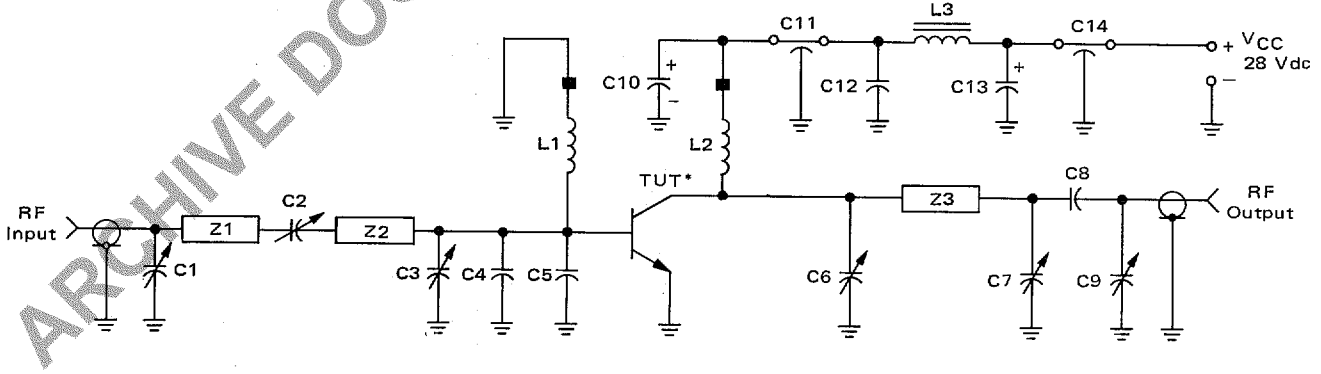
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	24.38	25.15	0.960	0.990
B	12.45	12.95	0.490	0.510
C	5.97	7.62	0.235	0.300
D	5.33	5.59	0.210	0.220
F	5.08	5.33	0.200	0.210
H	18.29	18.54	0.720	0.730
J	0.10	0.15	0.004	0.006
K	10.29	–	0.405	–
L	3.81	4.06	0.150	0.160
N	3.81	4.32	0.150	0.170
Q	2.92	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 = 30 mAdc, I_B = 0)	BV_{CEO}	33	–	–	Vdc
Collector-Emitter Breakdown Voltage (I_C = 30 mAdc, V_{BE} = 0)	BV_{CES}	60	–	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 3.0 mAdc, I_C = 0)	BV_{EBO}	4.0	–	–	Vdc
Collector-Base Breakdown Voltage (I_C = 30 mAdc, I_E = 0)	BV_{CBO}	60	–	–	Vdc
Collector Cutoff Current (V_{CB} = 30 Vdc, I_E = 0)	I_{CBO}	–	–	3.0	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 1.5 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}	–	30	40	pF
FUNCTIONAL TESTS (Figure 1)					
Common-Emitter Amplifier Power Gain (V_{CC} = 28 Vdc, P_{out} = 30 W, f = 400 MHz)	G_{PE}	8.5	9.5	–	dB
Collector Efficiency (V_{CC} = 28 Vdc, P_{out} = 30 W, f = 400 MHz)	η	50	60	–	%
Load Mismatch (V_{CC} = 28 Vdc, P_{out} = 30 W, f = 400 MHz, VSWR = 30:1 all angles)	ψ	No Degradation in Output Power			

FIGURE 1 – 400 MHz TEST CIRCUIT



C1, C9 – 1.0–10 pF Johanson Capacitor (JMC 5201)
C2, C3, C6, C7 – 1.0–20 pF Johanson Capacitor (JMC 5501)
C4, C5 – 36 pF ATC 100-mil Chip Capacitor
C8 – 100 pF UNELCO
C10, C13 – 1.0 μF 50 V Tantalum
C11, C14 – 680 pF Feedthru
C12 – 0.1 μF Erie Redcap
L1 – 8 Turns #26 AWG Enameled, 1/16" ID Closewound with Ferroxcube Bead (#56-590-65/4B) on Ground End
L2 – 14 Turns, #22 AWG Enameled, Closewound on a 470 Ω, 2 Watt Resistor with Ferroxcube Bead (#56-590-65/4B) on Cold End of L2
L3 – Ferroxcube VK200-19/4B Ferrite Choke
Z1 – Microstrip 0.19" W x 0.88" L
Z2 – Microstrip 0.28" W x 1.0" L
Z3 – Microstrip 0.31" W x 1.25" L
Board – Glass Teflon ϵ_R = 2.56, t = 0.062"
Input/Output Connectors – Type N

TUT Socket Lead Frame Etched from 80-mil-Thick Copper
*Transistor Under Test

FIGURE 2 – OUTPUT POWER versus INPUT POWER

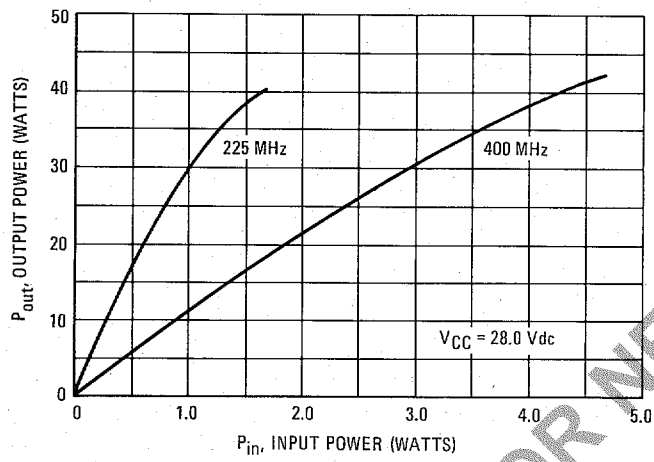


FIGURE 3 – OUTPUT POWER versus SUPPLY VOLTAGE – 225 MHz

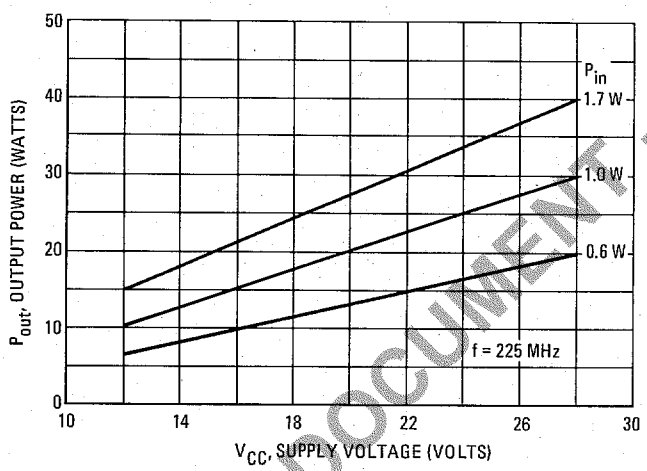


FIGURE 4 – OUTPUT POWER versus SUPPLY VOLTAGE – 400 MHz

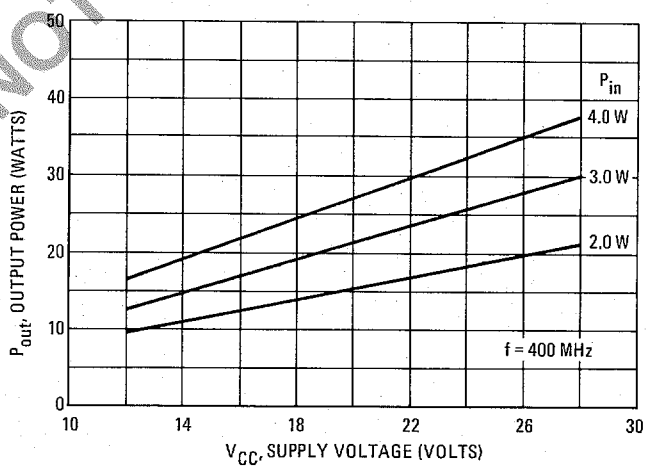
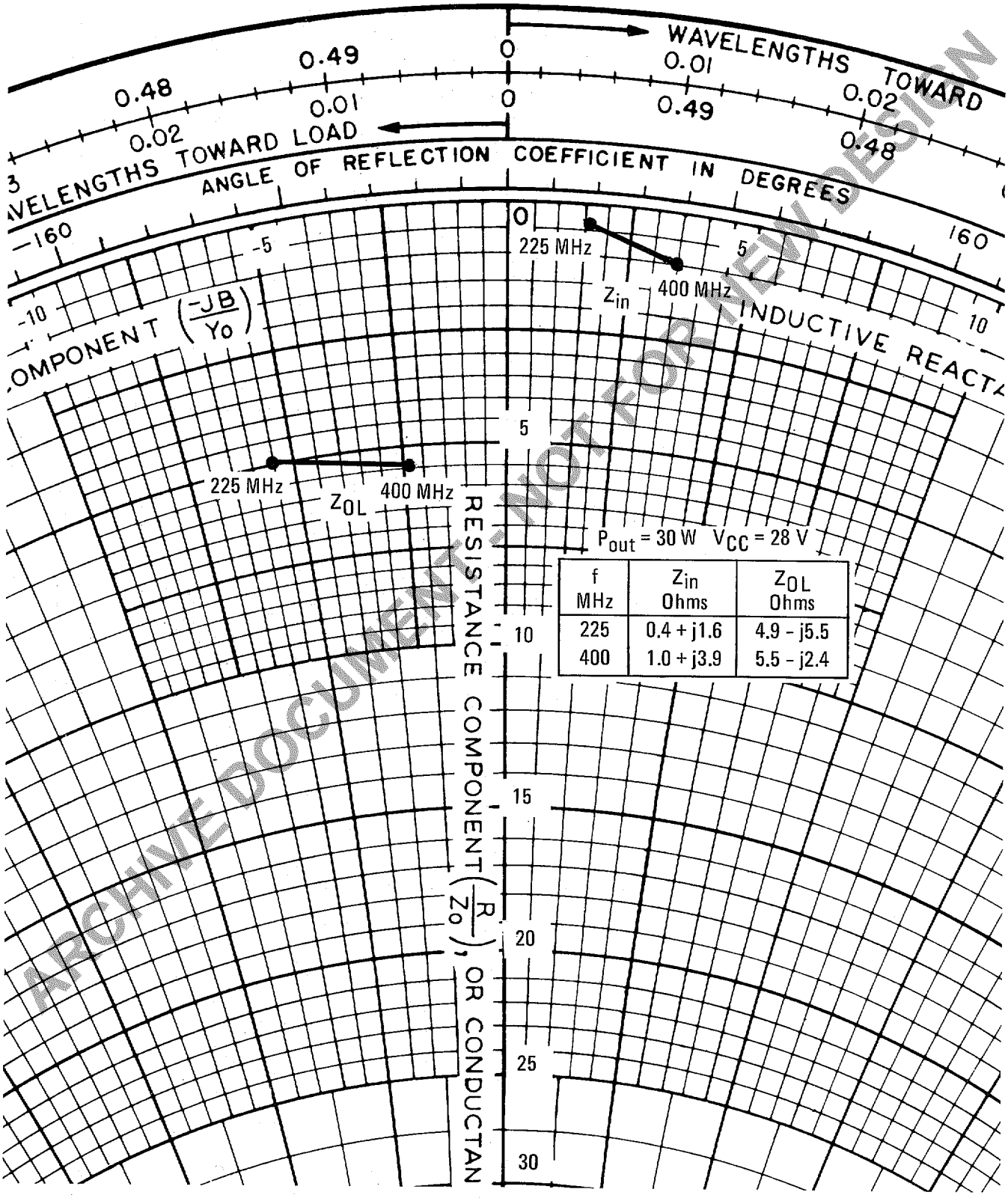


FIGURE 5 – SERIES EQUIVALENT IMPEDANCE



f MHz	Zin Ohms	ZOL Ohms
225	0.4 + j1.6	4.9 - j5.5
400	1.0 + j3.9	5.5 - j2.4

1092D PRINTED IN USA (4/77) MPS 12M