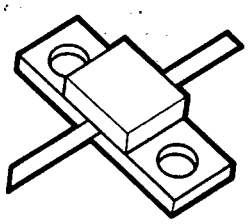
MRA1014-2, MRA1014-6, MRA1014-12, MRA1014-35

MICROAMP® L-Band Class C Power Transistors

- 2 to 35 Watts
- Broadband 1000-1400 MHz
- Internally Compensated*
- Gold Metalized
- Diffused Ballast Resistors
- MTTF Data
- Common Base



MRA .25

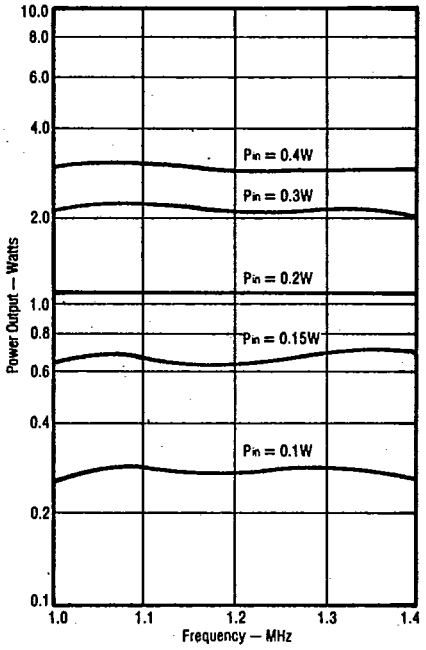
Electrical Characteristics (T_{flange} = 25 °C)

Symbol	Characteristic	MRA1014-2	MRA1014-6	MRA1014-12	MRA1014-35A
BV_{CES}	Collector-Base Breakdown Voltage	I_C = 20 mA 50 V Min	I_C = 40 mA 50 V Min	I_C = 80 mA 50 V Min	I_C = 200 mA 50 V Min
BV_{EBO}	Emitter-Emitter Breakdown Voltage	I_E = 0.25 mA 3.5 V Min	I_E = 0.5 mA 3.5 V Min	I_E = 1.0 mA 3.5 V Min	I_E = 2.5 mA 3.5 V Min
I_{CBO}	Collector Cutoff Current I_E = 0	V_{CB} = 28 V 0.5 mA	V_{CB} = 28 V 1.0 mA	V_{CB} = 28 V 2.0 mA	V_{CB} = 28 V 5.0 mA
I_C	Max Continuous Collector Current V_{CE} = 4 V	0.5 A	1.0A	2.0A	5.0A
h_{FE}	Forward Current Transfer Ratio V_{CE} = 5 V	I_C = 0.1 A 10-100	I_C = 0.2 A 10-100	I_C = 0.4 A 10-100	I_C = 1.0 A 10-100
θ_{JF}	Thermal Resistance Junction to Flange (at rated RF output)	15 °C/W	8 °C/W	4.5 °C/W	2.5°C/W
P_o	Min Broadband Power Output	2.0 W	6.0 W	12.0 W	35.0 W
C_{ob}	Max Collector-Base Capacitance V_{CB} = 28 V, f = 1 MHz	4.5 pF	8 pF	12 pF	Internal Shunt L
$P_{G(dB)}$	Min Power Gain in dB V_{CB} = 28 V	P_o = 2.0 W 8.2 dB	P_o = 6.0 W 7.4 dB	P_o = 12.0 W 7.8 dB	P_o = 35.0 W 7.0 dB
η_c	Min Broadband Collector Efficiency	P_o = 2.0 W 45 %	P_o = 6.0 W 50 %	P_o = 12.0 W 50 %	P_o = 35.0 W 50 %
T_j	-65 to +200°C				
T_{STG}	-65 to +150°C				

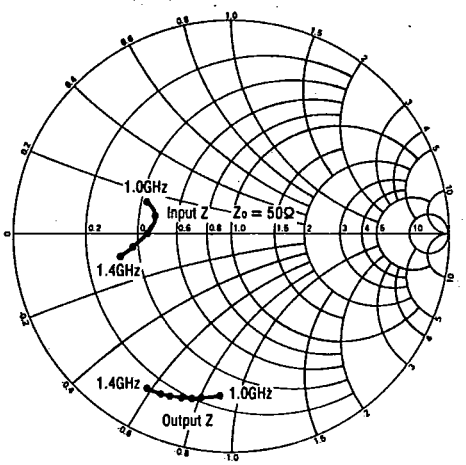
*The concept of input and/or output matching using MOS capacitors, wire bonds and other techniques is patented by TRW, Inc. (US #3,713,006).

MRA1014-2 — 2 WATTS BROADBAND

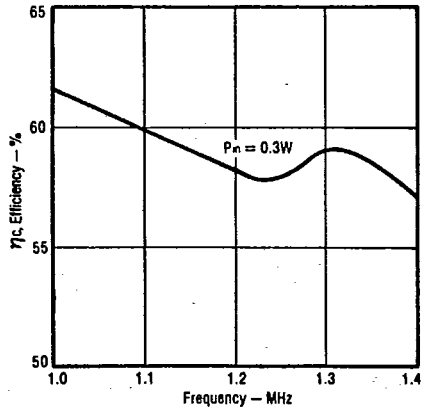
Typical Power Output vs Frequency



Impedance Data
Vcc = 28V

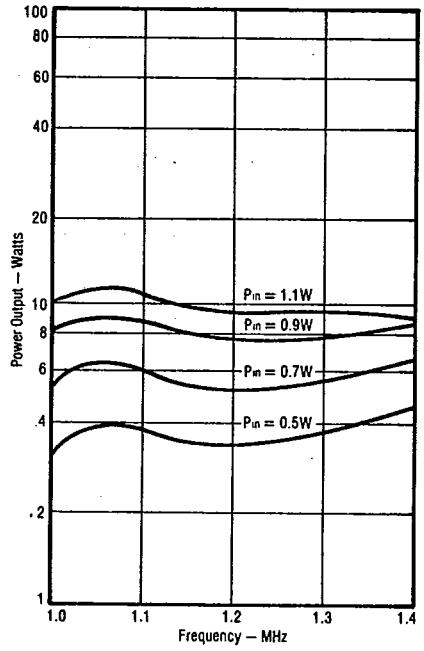


Typical Efficiency vs Frequency

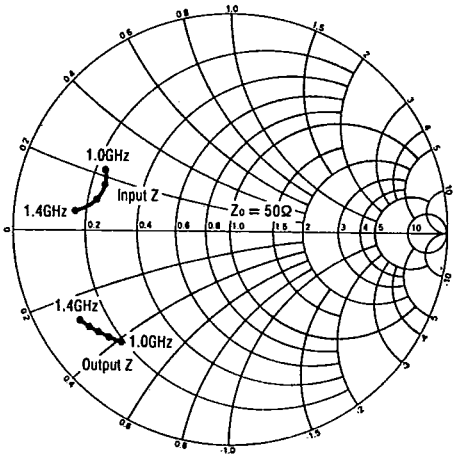


MRA1014-6 — 6 WATTS BROADBAND

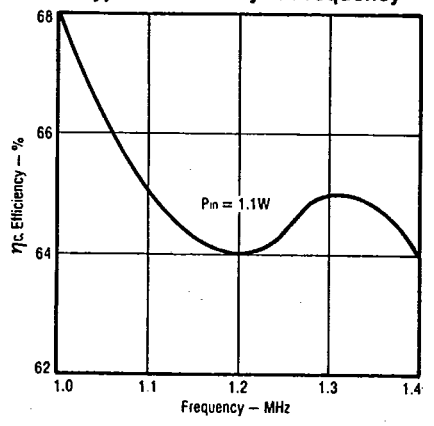
Typical Power Output vs Frequency



Impedance Data
Vcc = 28V

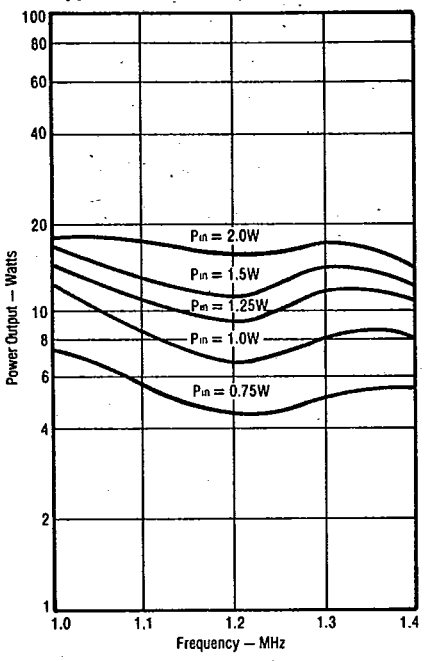


Typical Efficiency vs Frequency

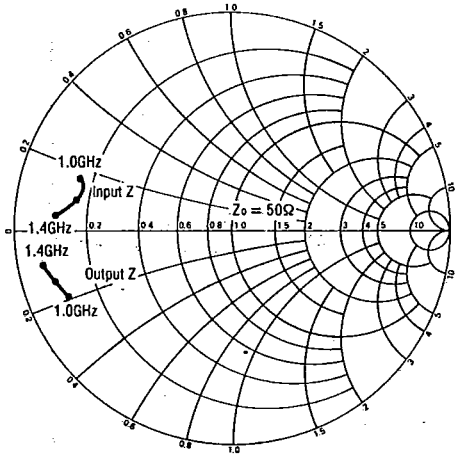


MRA1014-12 — 12 WATTS BROADBAND

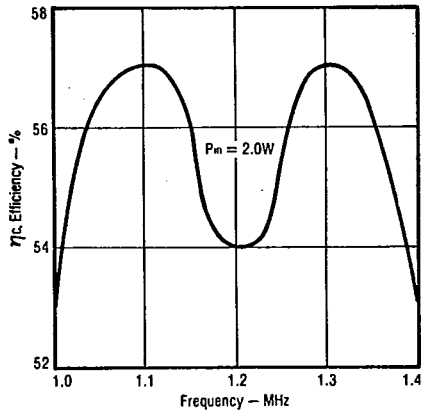
Typical Power Output vs Frequency



Impedance Data
Vcc = 28V

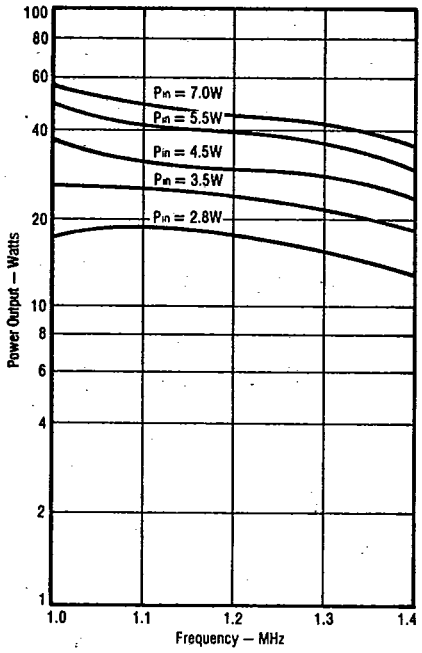


Typical Efficiency vs Frequency

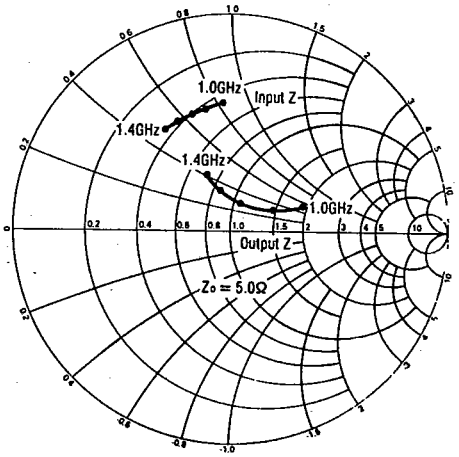


MRA1014-35 — 35 WATTS BROADBAND

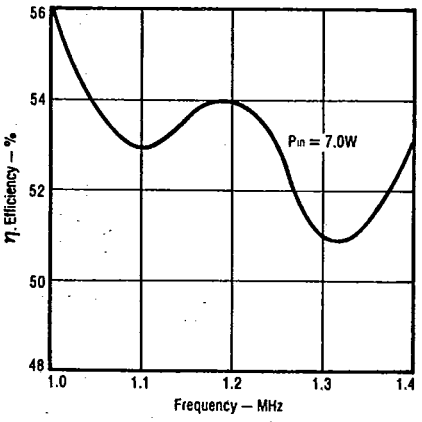
Typical Power Output vs Frequency



Impedance Data
Vcc = 28V
(5Ω Center)

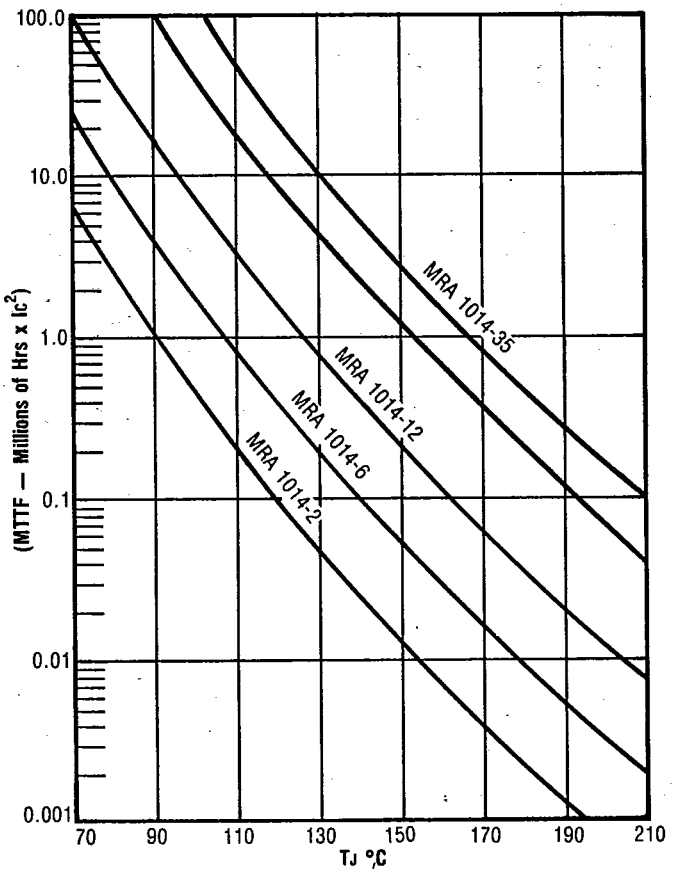


Typical Efficiency vs Frequency



MTTF FACTOR (Normalized to 1 Ampere² Continuous Duty)

The graph shown below displays MTTF in hours x ampere² emitter current for each of the devices. Life tests at elevated temperatures have correlated to better than ±10% to the theoretical prediction for metal failure. Sample MTTF calculations based on operating conditions are included below.



Example of MTTF for MRA1014-12 Conditions

P_O = 12W
P_{IN} = 2.0W
V_{CC} = 28V
$\eta\%$ = 50
T_{FLANGE} = 70°C

$$I_C \simeq I_E = \frac{100 \times P_O}{\eta_C \times V_{CC}} = 0.857 \text{ A}$$

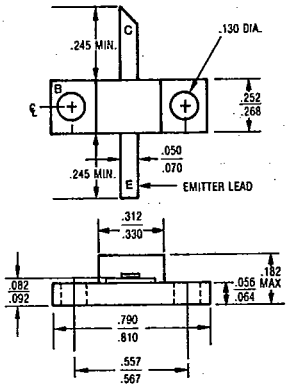
$P_{DISS} = P_{IN} + V_{CC}.\ I_C - P_O = 13.99\text{W}$

$T_{JUNC} = T_{FLANGE} + \theta JF \times P_{DISS} = 132.9\ °C$

$$MTTF = \frac{0.7 \times 10^6 \text{ Hrs Amp}^2}{I_C^2} = 953{,}095 \text{ Hrs}$$

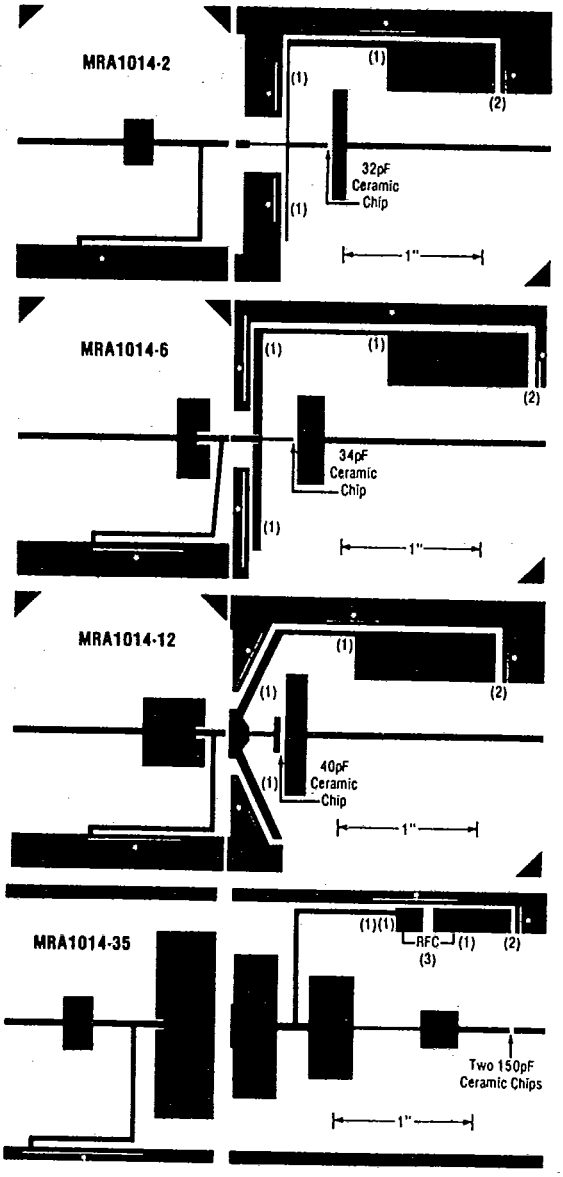
MTTF = 108.8 Yrs

MRA .25



TEST CIRCUIT BOARDS FOR MRA1014 SERIES

NOTE: Scale is not 1:1.



*Foil wrap or plate around to ground plane. Board material 0.020 inch glass-teflon $\varepsilon_r = 2.55$.
(1) Bypass capacitor to ground (150pF chip).
(2) Use B+ bypass of 0.01 and 1μF capacitors at this point.
(3) 10 turns #20 enamel close wound on 0.040 mandrel.

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