

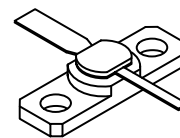
The RF Line Microwave Power Transistors

... designed primarily for large-signal output and driver amplifier stages in the 1.5 to 3.0 GHz frequency range.

- Designed for Class B or C, Common Base Linear Power Amplifiers
- Specified 28 Volt, 3.0 GHz Characteristics:
 - Output Power — 1.0 to 5.0 Watts
 - Power Gain — 5.0 to 7.0 dB Min
 - Collector Efficiency — 30% Min
- Gold Metallization for Improved Reliability
- Diffused Ballast Resistors
- Circuit board photomaster available upon request by contacting RF Tactical Marketing in Phoenix, AZ.

MRW3001
MRW3003
MRW3005

5.0–7.0 dB
1.5–3.0 GHz
1.0–5.0 WATTS
MICROWAVE
POWER TRANSISTORS



CASE 328A-03, STYLE 1
(GP-13)
MRW3001, 3003, 3005

MAXIMUM RATINGS

Rating	Symbol	3001	3003	3005	Unit
Collector–Base Voltage	V_{CBO}	45			Vdc
Emitter–Base Voltage	V_{EBO}	3.5			Vdc
Operating Junction Temperature	T_J	200			°C
Storage Temperature Range	T_{stg}	–65 to +200			°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max			Unit
Thermal Resistance, RF, Junction to Case	$R_{\theta JC}$	35	17	8.5	°C/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 ($I_C = 10\text{ mA}$, $V_{BE} = 0$) ($I_C = 30\text{ mA}$, $V_{BE} = 0$) ($I_C = 50\text{ mA}$, $V_{BE} = 0$)	MRW3001 MRW3003 MRW3005	$V_{(BR)CES}$	50 50 50	— — —	— — —	Vdc
Collector–Base Breakdown Voltage ($I_C = 1.0\text{ mA}$, $I_E = 0$) ($I_C = 3.0\text{ mA}$, $I_E = 0$) ($I_C = 5.0\text{ mA}$, $I_E = 0$)	MRW3001 MRW3003 MRW3005	$V_{(BR)CBO}$	45 45 45	— — —	— — —	Vdc
Emitter–Base Breakdown Voltage ($I_E = 1.0\text{ mA}$, $I_C = 0$)		$V_{(BR)EBO}$	3.5	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 28\text{ V}$, $I_E = 0$)	MRW3001 MRW3003 MRW3005	I_{CBO}	— — —	— — —	0.5 0.75 1.25	mAdc

ON CHARACTERISTICS

DC Current Gain ($I_C = 100\text{ mA}$, $V_{CE} = 5.0\text{ V}$) ($I_C = 300\text{ mA}$, $V_{CE} = 5.0\text{ V}$) ($I_C = 500\text{ mA}$, $V_{CE} = 5.0\text{ V}$)	MRW3001 MRW3003 MRW3005	h_{FE}	10 10 10	— — —	120 120 120	—
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(continued)

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

Characteristic		Symbol	Min	Typ	Max	Unit
DYNAMIC CHARACTERISTICS						
Output Capacitance ($V_{CB} = 28\text{ V}$, $I_E = 0$, $f = 1.0\text{ MHz}$)	MRW3001 MRW3003 MRW3005	C_{ob}	—	3.5 5.7 8.4	4.0 7.0 10	pF

FUNCTIONAL TESTS

Common-Base Amplifier Power Gain ($V_{CE} = 28\text{ V}$, $P_{out} = 1.0\text{ W}$, $f = 3.0\text{ GHz}$) ($V_{CE} = 28\text{ V}$, $P_{out} = 3.0\text{ W}$, $f = 3.0\text{ GHz}$) ($V_{CE} = 28\text{ V}$, $P_{out} = 5.0\text{ W}$, $f = 3.0\text{ GHz}$)	MRW3001 MRW3003 MRW3005	G_{PB}	7.0 6.0 5.0	— — —	— — —	dB
Collector Efficiency ($V_{CE} = 28\text{ V}$, $P_{out} = 1.0\text{ W}$, $f = 3.0\text{ GHz}$) ($V_{CE} = 28\text{ V}$, $P_{out} = 3.0\text{ W}$, $f = 3.0\text{ GHz}$) ($V_{CE} = 28\text{ V}$, $P_{out} = 5.0\text{ W}$, $f = 3.0\text{ GHz}$)	MRW3001 MRW3003 MRW3005	η_c	30 30 30	— — —	— — —	%
Load Mismatch ($V_{CE} = 28\text{ V}$, $f = 3.0\text{ GHz}$, Load VSWR = $\infty:1$, All Phase Angles) $P_{out} = 1.0\text{ W}$ $P_{out} = 3.0\text{ W}$ $P_{out} = 5.0\text{ W}$	MRW3001 MRW3003 MRW3005	ψ	No Degradation in Output Power			

MRW3001 TYPICAL CHARACTERISTICS

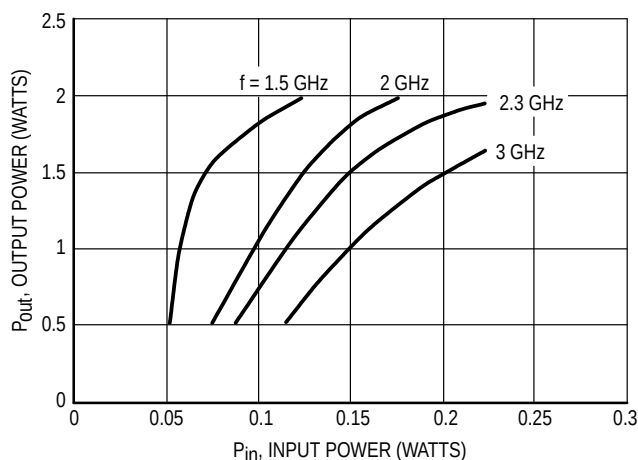


Figure 1. Output Power versus Input Power

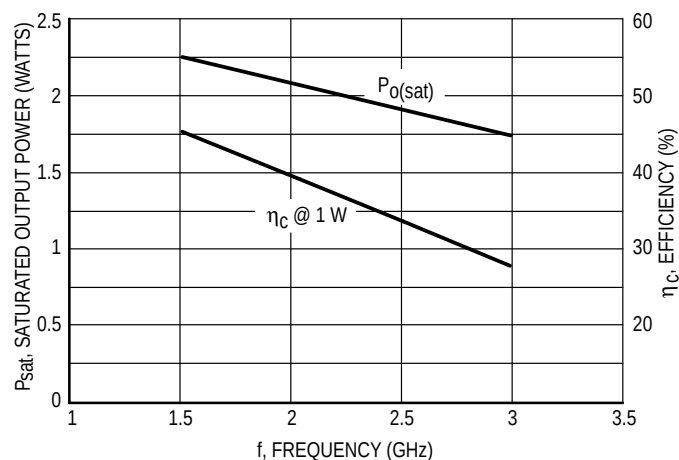


Figure 2. P_{sat} and η versus Frequency

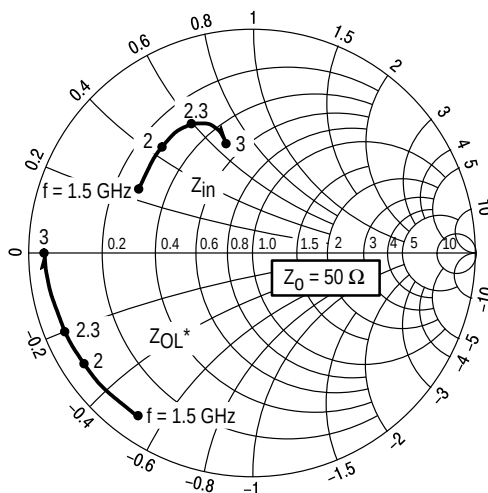


Figure 3. Series Equivalent Input/Output Impedance

MRW3003 TYPICAL CHARACTERISTICS

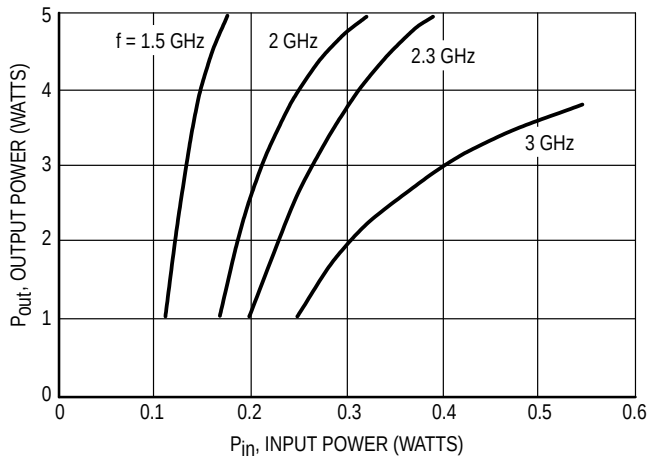


Figure 4. Output Power versus Input Power

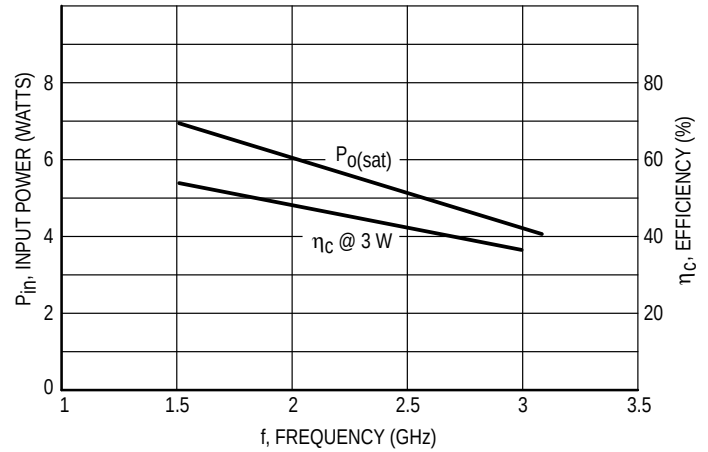


Figure 5. P_{sat} and η versus Frequency

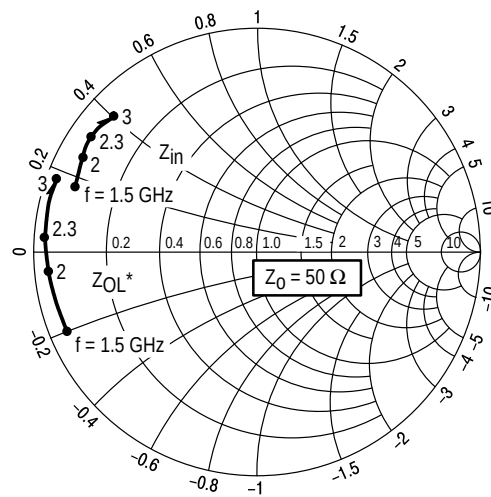


Figure 6. Series Equivalent Input/Output Impedance

MRW3005 TYPICAL CHARACTERISTICS

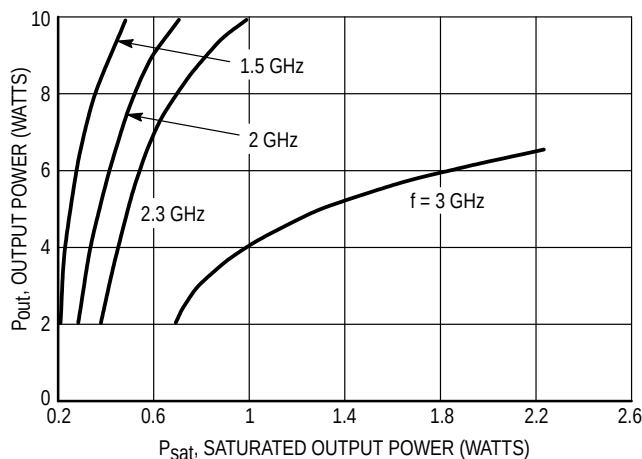


Figure 7. Output Power versus Input Power

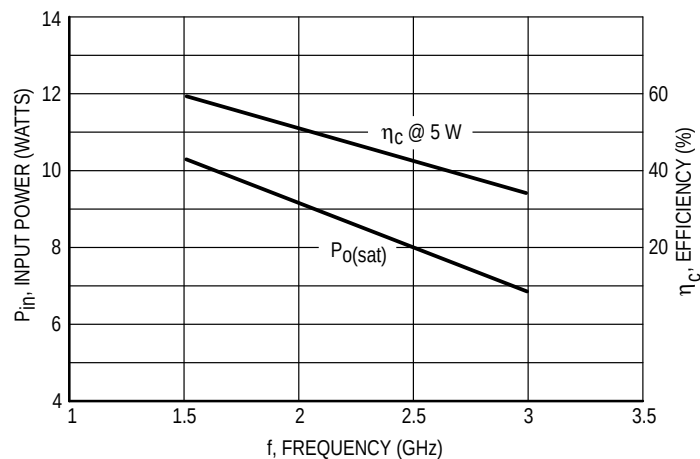


Figure 8. P_{sat} and η versus Frequency

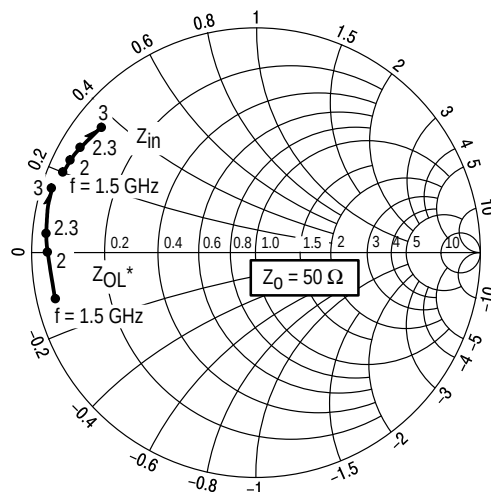


Figure 9. Series Equivalent Input/Output Impedance

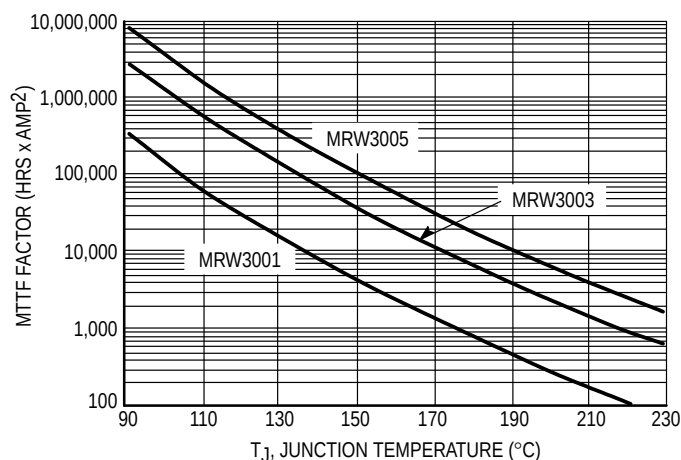


Figure 10. MTF Factor versus Junction Temperature

MTF Factor (Normalized to 1.0 ampere² Continuous Duty)

The graph shown displays MTF in hours x ampere² emitter current for each of the 3.0 GHz devices. Life tests at elevated temperatures have correlated to better than $\pm 10\%$ to the theoretical prediction for metal failure. **CAUTION** — A calculation is required to obtain actual metal life. Sample MTF calculations based on operating conditions are shown below.

Junction Temperature — °C

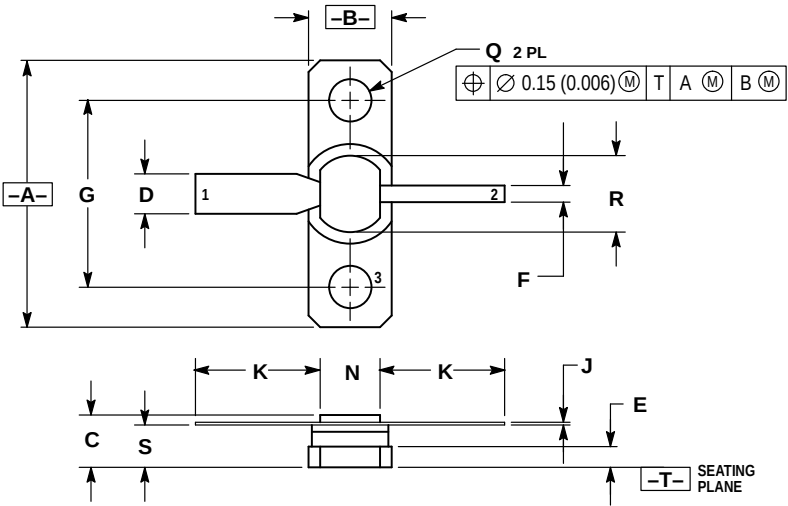
To calculate metal lifetime under any set of conditions, obtain actual data or estimate from typical performance curves. Solve for T_J (°C):

$$(1) T_J = \theta_{JF} \left(\frac{P_{out} \times 100}{\eta_c \%} + P_{in} - P_{out} \right) + T_{FLANGE}$$

Enter graph of MTF factor versus T_J . Obtain MTF factor. Calculate metal life by:

$$(2) \text{Metal Life in Hours} = \frac{\text{MTF Factor}}{I_C^2 (\text{Amps})}$$

PACKAGE DIMENSIONS



- NOTES:
- 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 - 2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.795	0.805	20.20	20.45
B	0.245	0.255	6.23	6.47
C	0.145	0.170	3.69	4.31
D	0.115	0.125	2.93	3.17
E	0.055	0.065	1.40	1.65
F	0.045	0.055	1.15	1.39
G	0.562 BSC		14.27 BSC	
J	0.003	0.006	0.08	0.15
K	0.260	0.375	6.60	9.52
N	0.175	0.185	4.45	4.69
Q	0.120	0.135	3.05	3.42
R	0.225	0.235	5.72	5.97
S	0.120	0.130	3.05	3.30

- STYLE 1:
- PIN 1: EMITTER
 - 2: COLLECTOR
 - 3: BASE

CASE 328A-03
ISSUE D

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MRW3001/D

