

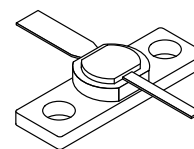
The RF Line Microwave Power Transistors

Designed primarily for large-signal output and driver amplifier stages in the 1.0 to 2.3 GHz frequency range.

- Designed for Class B or C, Common Base Power Amplifiers
- Specified 28 Volt, 2.0 GHz Characteristics:
 - Output Power — 1.0 to 20 Watts
 - Power Gain — 5.2 to 9.0 dB, Min
 - Collector Efficiency — 40%, Min
- Gold Metallization for Improved Reliability
- Diffused Ballast Resistors
- Circuit board photomaster available upon request by contacting RF Tactical Marketing in Phoenix, AZ.

MRW2001
MRW2003

5.2–9.0 dB
1.0–2.3 GHz
1.0 – 20 W
MICROWAVE
POWER TRANSISTORS



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

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Base Voltage	V_{CES}	50	Vdc
Emitter–Base Voltage	V_{EBO}	3.5	Vdc
Collector Current — Continuous	I_C	0.25 0.5	Adc
		MRW2001 MRW2003	
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	$R_{\theta JC}$	25 15	°C/W
		MRW2001 MRW2003	

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	$V_{(BR)CES}$	50	—	—	Vdc
($I_C = 10\text{ mA}$, $V_{BE} = 0$)		MRW2001			
($I_C = 20\text{ mA}$, $V_{BE} = 0$)		MRW2003			

(continued)

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

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS (continued)						
Emitter–Base Breakdown Voltage ($I_E = 0.2\text{ mA}$, $I_C = 0$) ($I_E = 0.25\text{ mA}$, $I_C = 0$)	MRW2001	$V_{(BR)EBO}$	3.5	—	—	Vdc
	MRW2003		3.5	—	—	
Collector Cutoff Current ($V_{CB} = 28\text{ V}$, $I_E = 0$)	MRW2001 MRW2003	I_{CBO}	— —	— —	0.5 0.5	mAdc
ON CHARACTERISTICS						
DC Current Gain ($I_C = 100\text{ mA}$, $V_{CE} = 5.0\text{ V}$) ($I_C = 100\text{ mA}$, $V_{CE} = 5.0\text{ V}$)	MRW2001	h_{FE}	10	—	120	—
	MRW2003		10	—	100	
DYNAMIC CHARACTERISTICS						
Output Capacitance ($V_{CB} = 28\text{ V}$, $I_E = 0$, $f = 1.0\text{ MHz}$)	MRW2001 MRW2003	C_{ob}	— —	— —	4.0 5.0	pF
FUNCTIONAL TESTS						
Common–Base Amplifier Power Gain ($V_{CE} = 28\text{ V}$, $P_{out} = 1.0\text{ W}$, $f = 2.0\text{ GHz}$)	MRW2001	G_{PB}	9.0	—	—	dB
Common–Base Amplifier Power Gain ($V_{CE} = 28\text{ V}$, $P_{out} = 3.0\text{ W}$, $f = 2.0\text{ GHz}$)	MRW2003	G_{PB}	8.0	—	—	dB
Collector Efficiency ($V_{CE} = 28\text{ V}$, $P_{out} = 1.0\text{ W}$, $f = 2.0\text{ GHz}$) ($V_{CE} = 28\text{ V}$, $P_{out} = 3.0\text{ W}$, $f = 2.0\text{ GHz}$)	MRW2001	η	40	—	—	%
	MRW2003					
Load Mismatch ($V_{CE} = 28\text{ V}$, $f = 2.0\text{ GHz}$, Load $V_{SWR} = \infty:1$, All Phase Angles) $P_{out} = 1.0\text{ W}$ $P_{out} = 3.0\text{ W}$	MRW2001 MRW2003	ψ	No Degradation in Output Power			
Saturated Output Power ($V_{CE} = 28\text{ V}$, $f = 2.3\text{ GHz}$) ($V_{CE} = 28\text{ V}$, $f = 1.5\text{ GHz}$) ($V_{CE} = 28\text{ V}$, $f = 1.0\text{ GHz}$) ($V_{CE} = 28\text{ V}$, $f = 2.3\text{ GHz}$) ($V_{CE} = 28\text{ V}$, $f = 1.5\text{ GHz}$) ($V_{CE} = 28\text{ V}$, $f = 1.0\text{ GHz}$)	MRW2001	P_{sat1}	—	1.0	—	W
		P_{sat2}	—	1.2	—	
		P_{sat3}	—	1.3	—	
	MRW2003		—	3.0	—	
			—	3.7	—	
			—	4.0	—	

TYPICAL CHARACTERISTICS

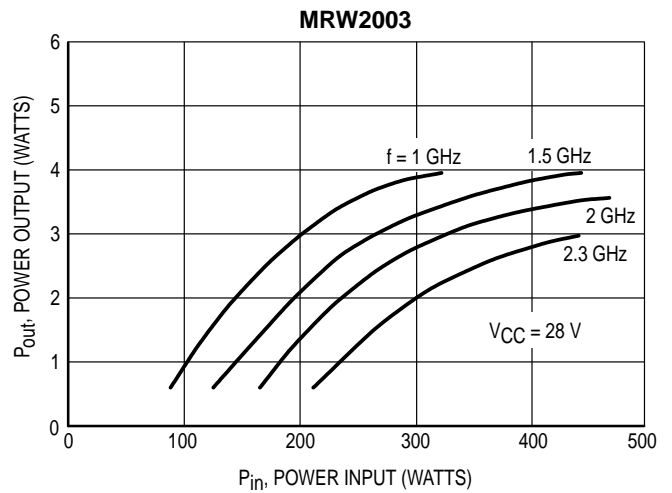
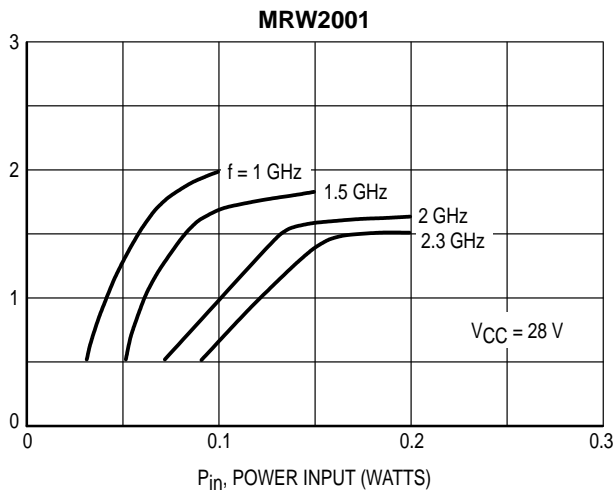


Figure 1. Output Power versus Input Power

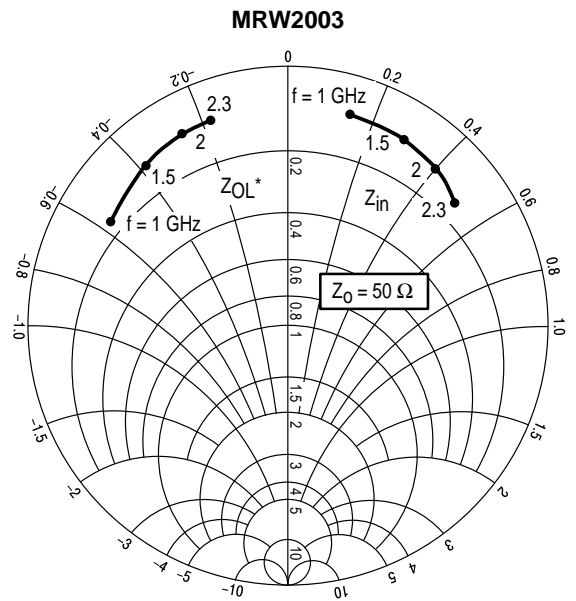
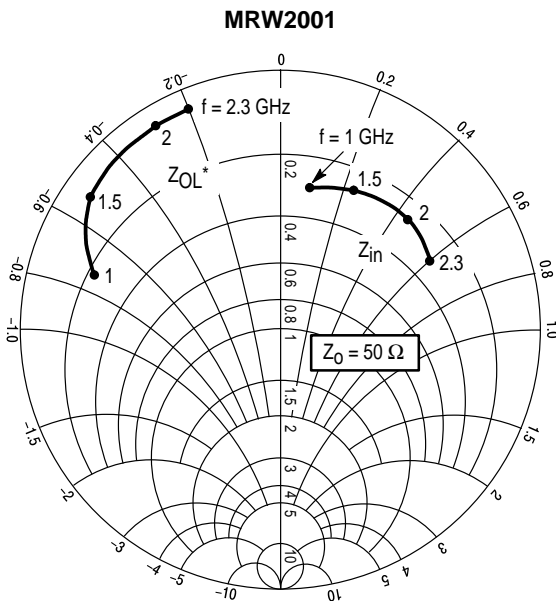


Figure 2. Series Equivalent Input/Output Impedance
 $V_{CC} = 28$ V

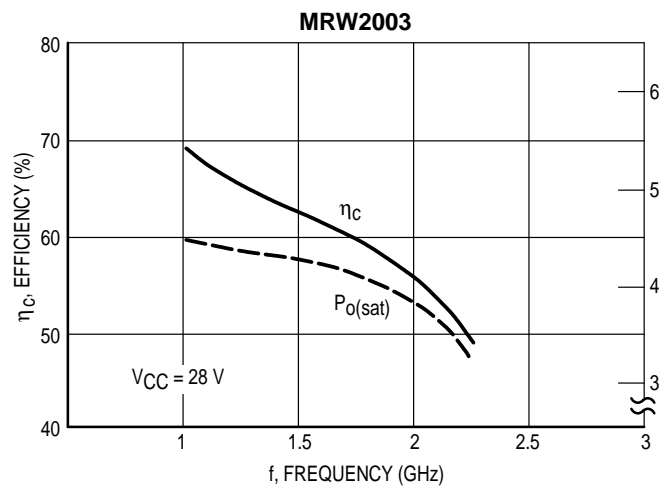
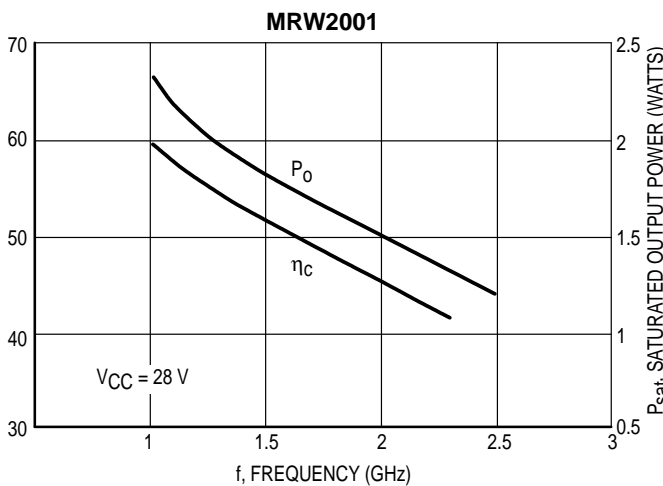


Figure 3. Power Output and Efficiency versus Frequency

The graph shown below displays MTTF in hours x ampere² emitter current for each of the "Super 2.0 GHz" devices. Life tests at elevated temperatures have correlated to better than $\pm 10\%$ to the theoretical prediction for metal failure. Sample MTTF calculations based on operating conditions are included on the graph.

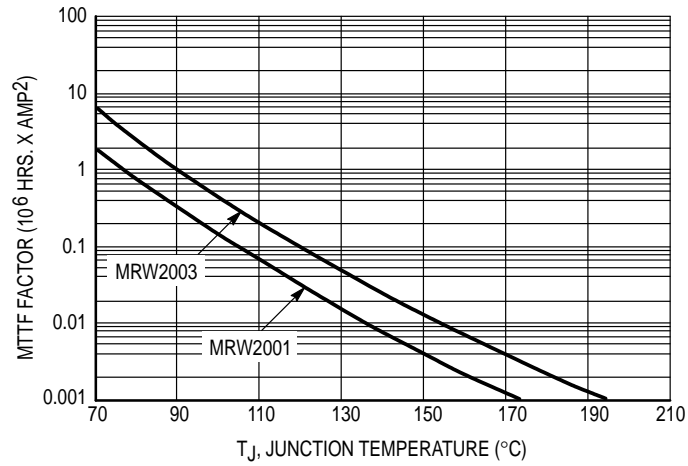


Figure 4. MTTF Factor

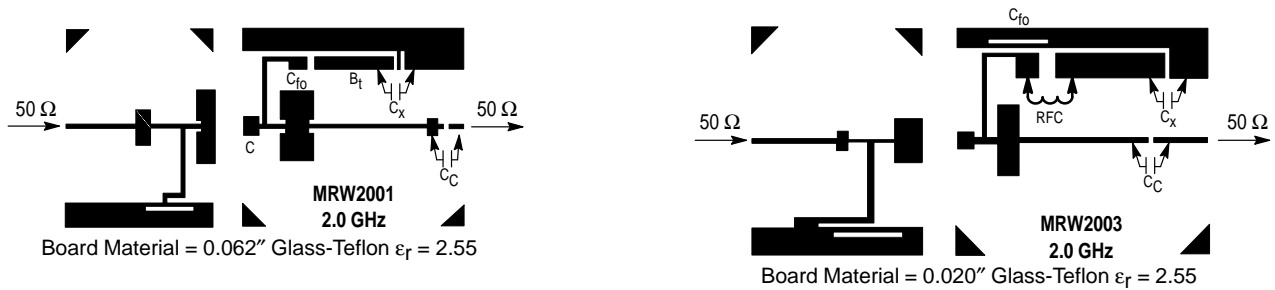
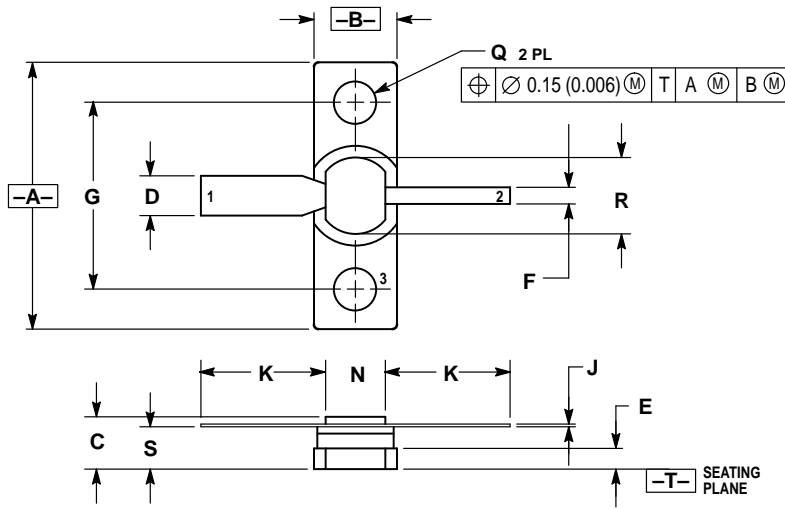


Figure 5. PC Board Layouts

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:
 1. EMITTER
 2. COLLECTOR
 3. BASE

**CASE 328A-03
 ISSUE E**

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