MOTOROLA
SEMICONDUCTOR TECHNICAL DATA

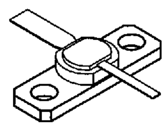
The RF Line
Microwave Power Transistors

MRW2001
MRW2005

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:
  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.

5.2–9.0 dB
1.0–2.3 GHz
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 MRW2001 MRW2005	I_C	 0.25 1.0	Adc
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 MRW2001 MRW2005	$R_{\theta JC}$	 25 8.5	°C/W

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector–Emitter Breakdown Voltage (I_C = 10 mA, V_{BE} = 0) MRW2001 (I_C = 40 mA, V_{BE} = 0) MRW2005	$V_{(BR)CES}$	 50 50	 — —	 — —	Vdc

(continued)

REV 7

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

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS (continued)						
Emitter–Base Breakdown Voltage		$V_{(BR)EBO}$				Vdc
(I_E = 0.2 mA, I_C = 0)	MRW2001		3.5	—	—	
(I_E = 0.5 mA, I_C = 0)	MRW2005		3.5	—	—	
Collector Cutoff Current	MRW2001	I_{CBO}	—	—	0.5	mAdc
(V_{CB} = 28 V, I_E = 0)	MRW2005		—	—	0.5	
ON CHARACTERISTICS						
DC Current Gain		h_{FE}				—
(I_C = 100 mA, V_{CE} = 5.0 V)	MRW2001		10	—	120	
(I_C = 200 mA, V_{CE} = 5.0 V)	MRW2005		10	—	100	
DYNAMIC CHARACTERISTICS						
Output Capacitance	MRW2001	C_{ob}	—	—	4.0	pF
(V_{CB} = 28 V, I_E = 0, f = 1.0 MHz)	MRW2005		—	—	7.0	
FUNCTIONAL TESTS						
Common–Base Amplifier Power Gain (V_{CE} = 28 V, P_{out} = 1.0 W, f = 2.0 GHz)	MRW2001	G_{PB}	9.0	—	—	dB
Common–Base Amplifier Power Gain (V_{CE} = 28 V, P_{out} = 5.0 W, f = 2.0 GHz)	MRW2005	G_{PB}	8.0	—	—	dB
Collector Efficiency		η	40	—	—	%
(V_{CE} = 28 V, P_{out} = 1.0 W, f = 2.0 GHz)	MRW2001					
(V_{CE} = 28 V, P_{out} = 5.0 W, f = 2.0 GHz)	MRW2005					
Load Mismatch (V_{CE} = 28 V, f = 2.0 GHz, Load VSWR = ∞:1, All Phase Angles)		ψ	No Degradation in Output Power			
P_{out} = 1.0 W	MRW2001					
P_{out} = 5.0 W	MRW2005					
Saturated Output Power						W
(V_{CE} = 28 V, f = 2.3 GHz)	MRW2001	$P_{sat\,1}$	—	1.0	—	
(V_{CE} = 28 V, f = 1.5 GHz)		$P_{sat\,2}$	—	1.2	—	
(V_{CE} = 28 V, f = 1.0 GHz)		$P_{sat\,3}$	—	1.3	—	
(V_{CE} = 28 V, f = 2.3 GHz)	MRW2005		—	5.0	—	
(V_{CE} = 28 V, f = 1.5 GHz)			—	6.5	—	
(V_{CE} = 28 V, f = 1.0 GHz)			—	7.5	—	

TYPICAL CHARACTERISTICS

MRW2001

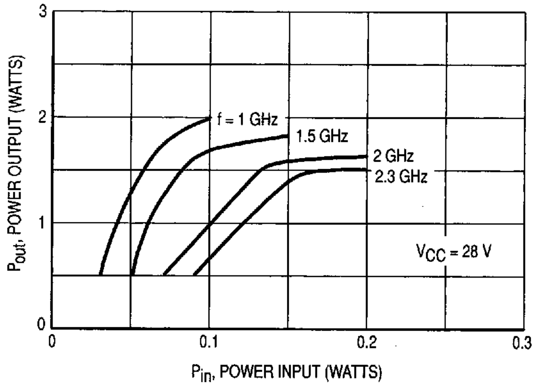


Figure 1. Output Power versus Input Power

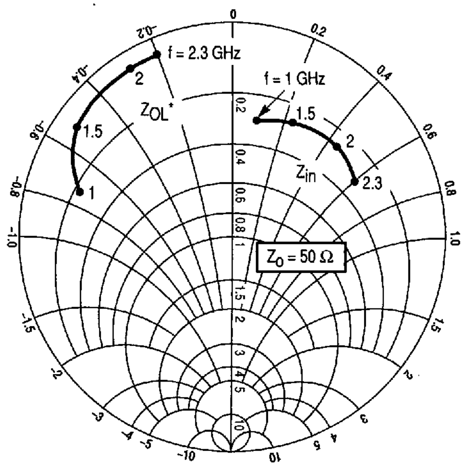


Figure 2. Series Equivalent Input/Output Impedance
V_{CC} = 28 V

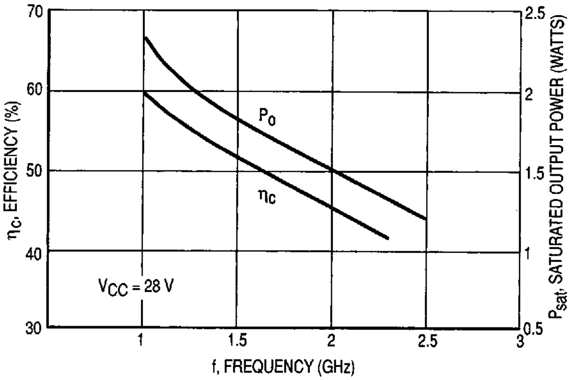


Figure 3. Power Output and Efficiency versus Frequency

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MRW2005

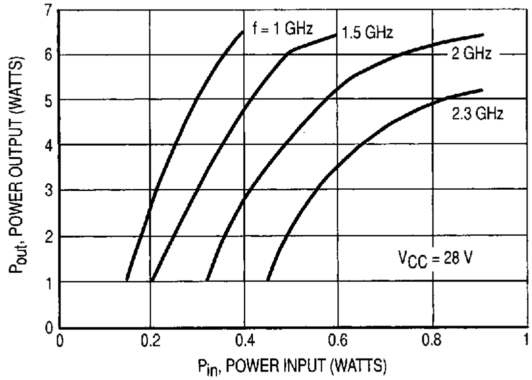

Figure 4. Output Power versus Input Power

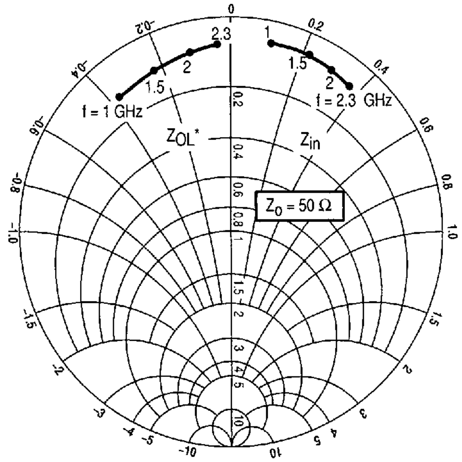

Figure 5. Series Equivalent Input/Output Impedance
V_{CC} = 28 V

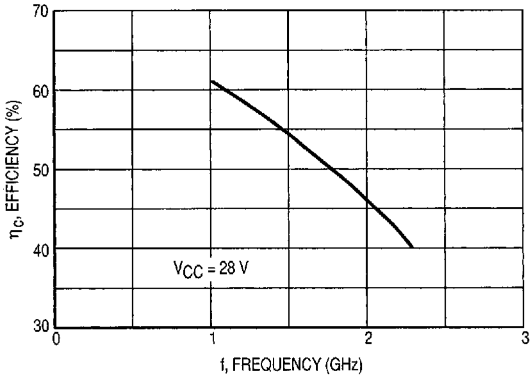

Figure 6. Power Output and Efficiency versus Frequency

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The graph shown below displays MTTF in hours x ampere^2 emitter current for each of the "Super 2.0 GHz" 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 on the graph.

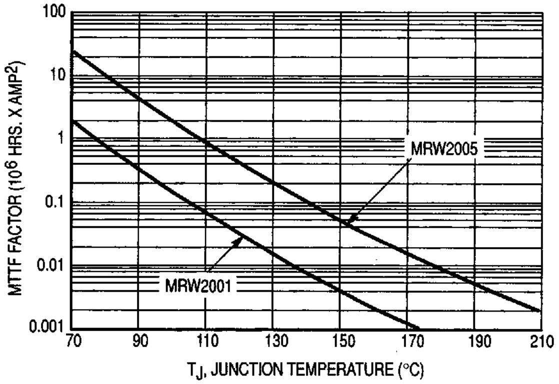

Figure 7. MTTF Factor