MRAL2327 Series

2

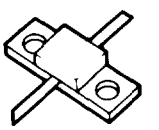
The RF Line

Microwave Power Transistors

. . . designed primarily for wideband, large-signal output and driver amplifier stages in the 2.3 to 2.7 GHz frequency range.

- Designed for Class C, Common Base Power Amplifiers
- Specified 22 Volt, 2.7 GHz Characteristics:
  Output Power — 1.3 to 12 Watts
  Power Gain — 5.5 to 6.8 dB Min, Common Base
  Collector Efficiency — 30 to 40% Min
- Built-In Matching Network for Broadband Operation
- Gold Metallization for Improved Reliability
- Diffused Ballast Resistors

5.5 to 6.8 dB
2.3–2.7 GHz
1.3 TO 12 WATTS
BROADBAND
MICROWAVE POWER
TRANSISTORS



CASE 394-01, STYLE 1
(MRA .25)

MAXIMUM RATINGS

Rating	Symbol	-1.3	-3	-6	-12	Unit
Collector-Base Voltage	V_{CES}	44				Vdc
Emitter-Base Voltage	V_{EBO}	3.5				Vdc
Operating Junction Temperature	T_J	200				°C
Storage Temperature Range	T_{stg}	65 to +150				°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max				Unit
Thermal Resistance, RF, Junction to Case	$R_{\theta JC}$	30	16	8	4.5	°C/W

ELECTRICAL CHARACTERISTICS

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Collector-Emitter Breakdown Voltage		$V_{(BR)CES}$				Vdc
(I_C = 10 mA, V_{BE} = 0)	MRAL2327-1.3		42	—	—	
(I_C = 20 mA, V_{BE} = 0)	-3		42	—	—	
(I_C = 50 mA, V_{BE} = 0)	-6		42	—	—	
(I_C = 80 mA, V_{BE} = 0)	-12		42	—	—	
Collector-Base Breakdown Voltage		$V_{(BR)CBO}$				Vdc
(I_C = 0.5 mA, I_E = 0)	MRAL2327-1.3		38	—	—	
(I_C = 1 mA, I_E = 0)	-3		38	—	—	
(I_C = 2.5 mA, I_E = 0)	-6		38	—	—	
(I_C = 8.0 mA, I_E = 0)	-12		38	—	—	
Emitter-Base Breakdown Voltage		$V_{(BR)EBO}$				Vdc
(I_E = 0.2 mA, I_C = 0)	MRAL2327-1.3		3.5	—	—	
(I_E = 0.4 mA, I_C = 0)	-3		3.5	—	—	
(I_E = 1 mA, I_C = 0)	-6		3.5	—	—	
(I_E = 2 mA, I_C = 0)	-12		3.5	—	—	
Collector Cutoff Current	MRAL2327-1.3	I_{CBO}	—	—	0.25	mAdc
(V_{CB} = 22 V, I_E = 0)	-3		—	—	0.5	
	-6		—	—	1.25	
	-12		—	—	2.0	

(continued)

ELECTRICAL CHARACTERISTICS — continued

Characteristic		Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS						
DC Current Gain		h_{FE}				—
(I_C = 100 mA, V_{CE} = 5 V)	MRAL2327-1.3		10	—	100	
(I_C = 200 mA, V_{CE} = 5 V)	-3		10	—	100	
(I_C = 500 mA, V_{CE} = 5 V)	-6		10	—	100	
(I_C = 800 mA, V_{CE} = 5 V)	-12		10	—	100	
FUNCTIONAL TESTS						
Common-Base Amplifier Power Gain		G_{PB}				dB
(V_{CE} = 22 V, P_{out} = 1.3 W, f = 2.7 GHz)	MRAL2327-1.3		5.5	—	—	
(V_{CE} = 22 V, P_{out} = 3 W, f = 2.7 GHz)	-3		6.6	—	—	
(V_{CE} = 22 V, P_{out} = 6 W, f = 2.7 GHz)	-6		7	—	—	
(V_{CE} = 22 V, P_{out} = 12 W, f = 2.7 GHz)	-12		6.8	—	—	
Collector Efficiency		η_C				%
(V_{CE} = 22 V, P_{out} = 1.3 W, f = 2.7 GHz)	MRAL2327-1.3		30	—	—	
(V_{CE} = 22 V, P_{out} = 3 W, f = 2.7 GHz)	-3		35	—	—	
(V_{CE} = 22 V, P_{out} = 6 W, f = 2.7 GHz)	-6		35	—	—	
(V_{CE} = 22 V, P_{out} = 12 W, f = 2.7 GHz)	-12		40	—	—	

TYPICAL CHARACTERISTICS

MRAL2327-1.3

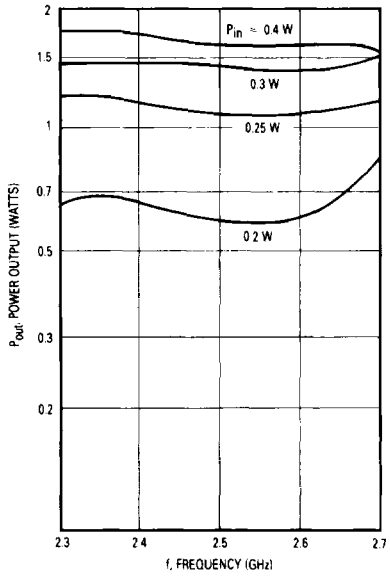


Figure 1. Power Output versus Frequency

MRAL2327-3

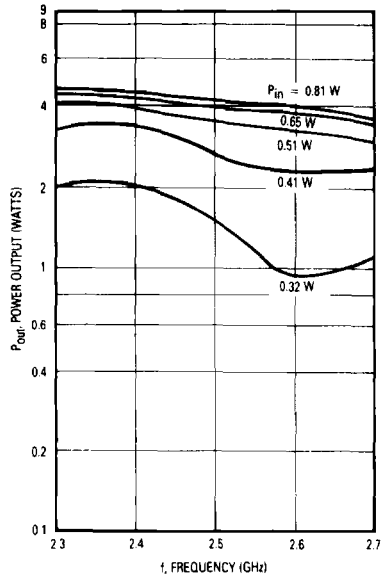


Figure 2. Power Output versus Frequency

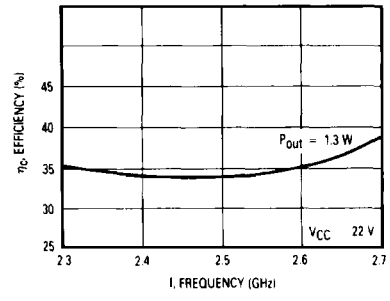


Figure 2. Collector Efficiency versus Frequency

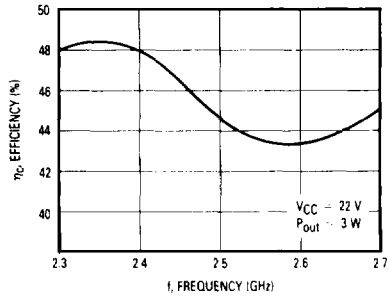


Figure 4. Collector Efficiency versus Frequency

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TYPICAL CHARACTERISTICS

MRAL2327-6

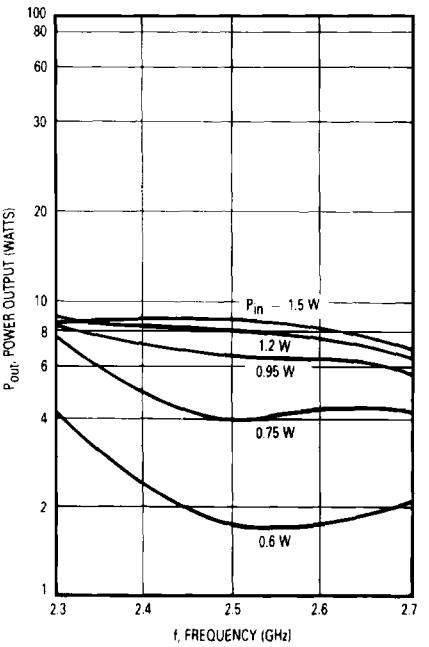

Figure 5. Power Output versus Frequency

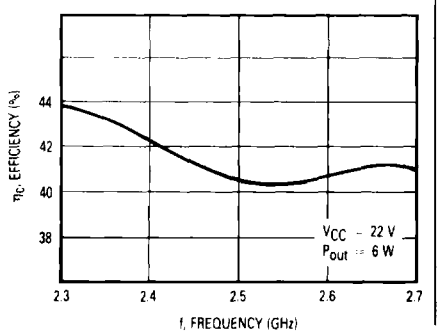

Figure 6. Collector Efficiency versus Frequency

MRAL2327-12

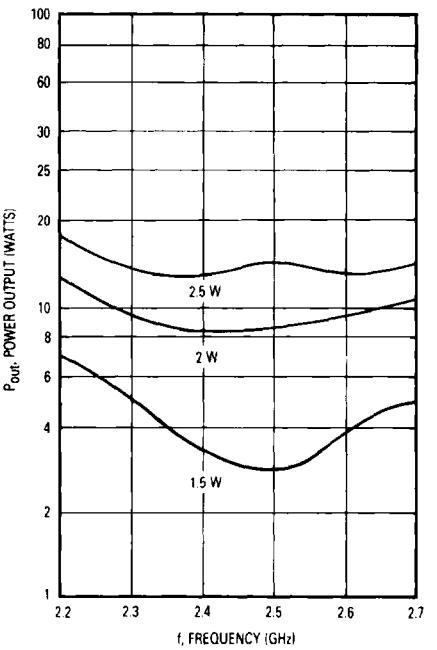

Figure 7. Power Output versus Frequency

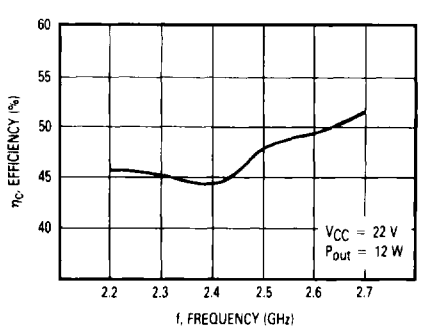

Figure 8. Collector Efficiency versus Frequency

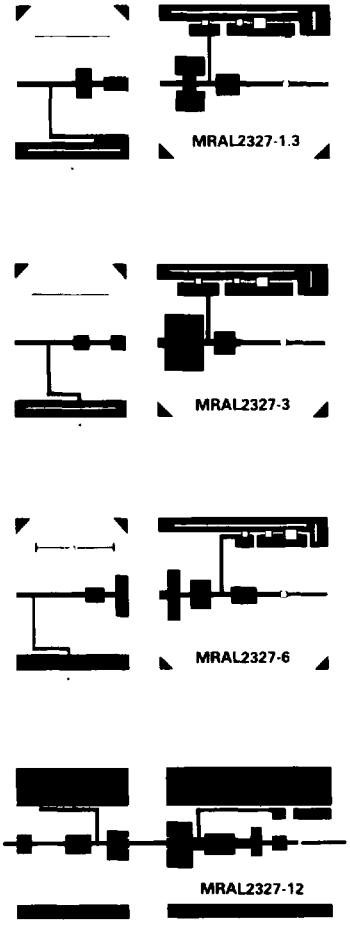

Figure 9. Circuit Boards (Not to scale.)

Board material — 0.018" dielectric thickness Teflon fiberglass
* Ground through to back side of board
C1, C3 — 100 pF porcelain ceramic chip
C4 — 0.1 μF ceramic chip
C5 — 50 μF, 50 V electrolytic
RFC1 — 5 turns #22 AWG, 0.125 dia.

The graph shown below displays MTTF in hours x ampere^2 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. Divide MTTF by I_C^2 for MTTF in a particular applications.

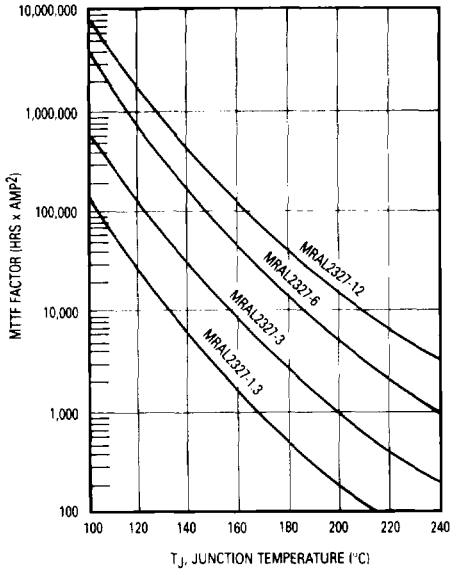

Figure 10. MTTF Factor versus Junction Temperature