

MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

T-33-13
MRF421
MRF421MP

The RF Line
NPN SILICON RF POWER TRANSISTOR

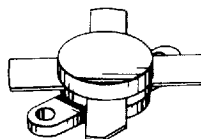
... designed primarily for application as a high-power linear amplifier from 2.0 to 30 MHz.

- Specified 12.5 Volt, 30 MHz Characteristics –
 Output Power = 100 W(PEP)
 Minimum Gain = 10 dB
 Efficiency = 40%
- Intermodulation Distortion @ 100 W (PEP) –
 IMD = -30 dB (Min)
- 100% Tested for Load Mismatch at all Phase Angles with
 30:1 VSWR

100 W(PEP) – 30 MHz

**RF POWER
 TRANSISTORS**

NPN SILICON

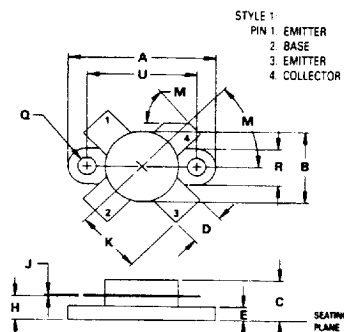

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	20	Vdc
Collector-Base Voltage	V_{CBO}	45	Vdc
Emitter-Base Voltage	V_{EBO}	3.0	Vdc
Collector Current – Continuous	I_C	20	Adc
Withstand Current – 10 s	–	30	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	290 1.66	Watts W/ $^\circ\text{C}$
Storage Temperature Range	T_{stg}	-65 to +150	$^\circ\text{C}$

MRF421MP is for ordering an hfg matched pair.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.6	$^\circ\text{C/W}$



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

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	24.39	25.14	0.960	0.990
B	11.82	12.95	0.465	0.510
C	5.82	6.98	0.229	0.275
D	5.49	5.96	0.216	0.235
E	2.14	2.79	0.084	0.110
H	3.66	4.52	0.144	0.178
J	0.08	0.17	0.003	0.007
K	11.05	–	0.435	–
M	45° NOM	–	45° NOM	–
Q	2.93	3.30	0.115	0.130
R	6.25	6.47	0.246	0.255
U	18.29	18.54	0.720	0.730

CASE 211-11

MOTOROLA RF DEVICE DATA

2-612

MRF421. MRF421MP

MOTOROLA SC (XSTRS/R F)

46E D

6367254 0094635 3

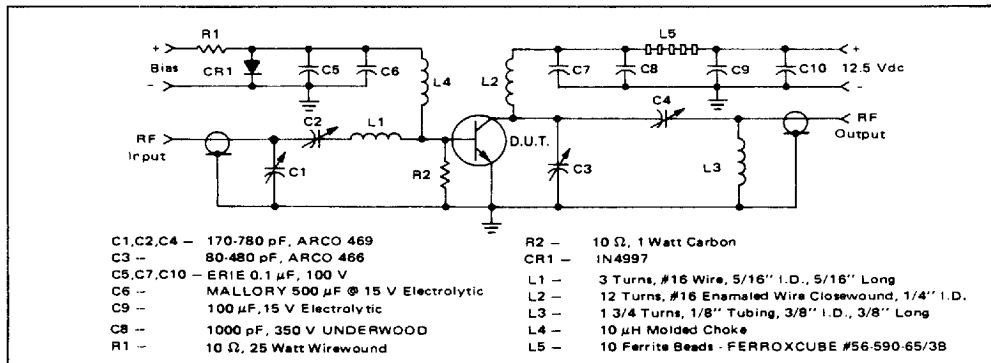
MOT6

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage ($I_C = 50 \text{ mAdc}$, $I_B = 0$)	$V_{(BR)CEO}$	20	—	—	Vdc
Collector-Emitter Breakdown Voltage ($I_C = 200 \text{ mAdc}$, $V_{BE} = 0$)	$V_{(BR)CES}$	45	—	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 200 \text{ mAdc}$, $I_E = 0$)	$V_{(BR)CBO}$	45	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 10 \text{ mAdc}$, $I_C = 0$)	$V_{(BR)EBO}$	3.0	—	—	Vdc
Collector Cutoff Current ($V_{CE} = 16 \text{ Vdc}$, $V_{BE} = 0$, $T_C = 25^\circ\text{C}$)	I_{CES}	—	—	10	mAdc
ON CHARACTERISTICS					
DC Current Gain ($I_C = 5.0 \text{ Adc}$, $V_{CE} = 5.0 \text{ Vdc}$)	h_{FE}	10	30	—	—
DYNAMIC CHARACTERISTICS					
Output Capacitance ($V_{CB} = 12.5 \text{ Vdc}$, $I_E = 0$, $f = 1.0 \text{ MHz}$)	C_{ob}	—	650	800	pF
FUNCTIONAL TESTS					
Common-Emitter Amplifier Power Gain ($V_{CC} = 12.5 \text{ Vdc}$, $P_{out} = 100 \text{ W}$, $I_{C(max)} = 10 \text{ Adc}$, $I_{CQ} = 150 \text{ mAdc}$, $f = 30, 30.001 \text{ MHz}$)	G_{pE}	10	12	—	dB
Collector Efficiency ($V_{CC} = 12.5 \text{ Vdc}$, $P_{out} = 100 \text{ W}$, $I_{C(max)} = 10 \text{ Adc}$, $I_{CQ} = 150 \text{ mA}$, $f = 30, 30.001 \text{ MHz}$)	η	40	—	—	%
Intermodulation Distortion (1) ($V_{CE} = 12.5 \text{ Vdc}$, $P_{out} = 100 \text{ Watts}$, $I_C = 10 \text{ Adc}$, $I_{CQ} = 150 \text{ mA}$, $f = 30, 30.001 \text{ MHz}$)	IMD	—	-33	-30	dB

(1) To proposed EIA method of measurement. Reference peak envelope power.

FIGURE 1 — 30 MHz TEST CIRCUIT SCHEMATIC



MOTOROLA RF DEVICE DATA

2-613

MRF421, MRF421MP

MOTOROLA SC (XSTRS/R F) 46E D 6367254 0094636 5 M0T6

FIGURE 2 - OUTPUT POWER versus INPUT POWER

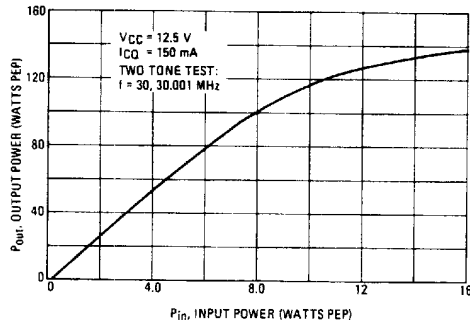


FIGURE 3 - OUTPUT POWER versus SUPPLY VOLTAGE

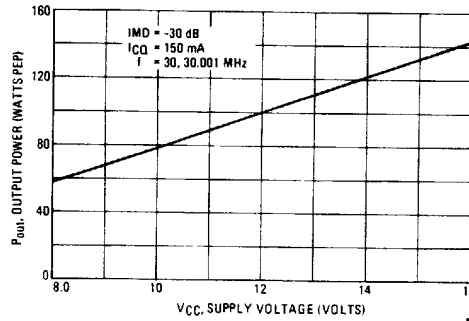


FIGURE 4 - POWER GAIN versus FREQUENCY

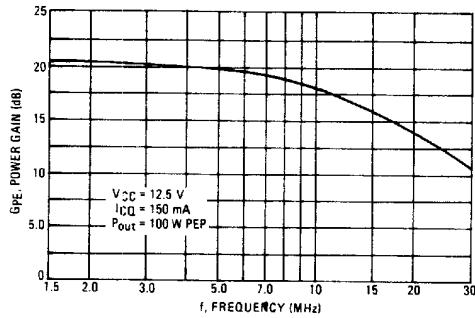


FIGURE 5 - INTERMODULATION DISTORTION versus OUTPUT POWER

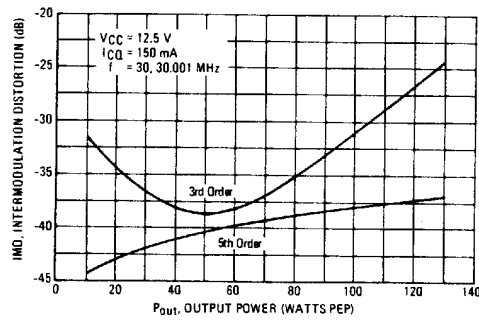


FIGURE 6 - DC SAFE OPERATING AREA

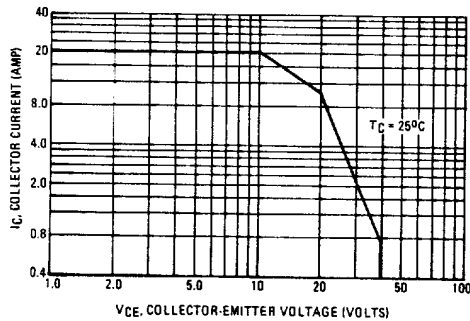
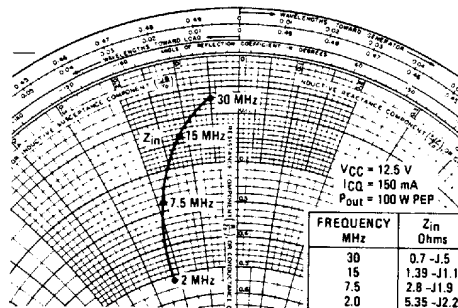


FIGURE 7 - SERIES EQUIVALENT IMPEDANCE



MRF421, MRF421MP

MOTOROLA SC (XSTRS/R F) 46E D 6367254 0094637 7 MOT6

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FIGURE 8 – OUTPUT CAPACITANCE versus FREQUENCY

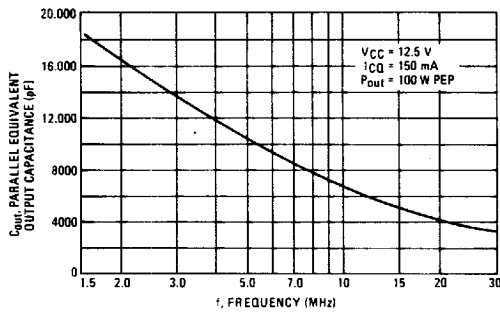
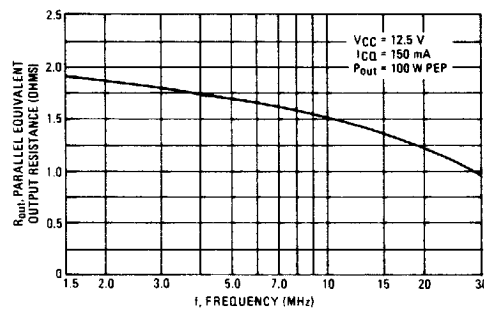


FIGURE 9 – OUTPUT RESISTANCE versus FREQUENCY



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MOTOROLA RF DEVICE DATA

2-615