MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

MRF453
MRF453A

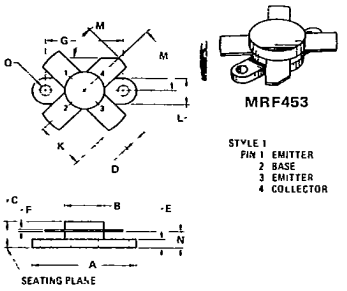
The RF Line

60 W – 30 MHz
RF POWER
TRANSISTORS
NPN SILICON

NPN SILICON RF POWER TRANSISTORS

. . . designed for power amplifier applications in industrial, commercial and amateur radio equipment to 30 MHz.

- Specified 12.5 Volt, 30 MHz Characteristics –
  Output Power = 60 Watts
  Minimum Gain = 13 dB
  Efficiency = 55%



DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	24.64	24.89	0.970	0.980
B	11.81	12.95	0.465	0.510
C	5.82	6.98	0.229	0.275
D	5.46	5.97	0.215	0.235
E	2.13	2.79	0.084	0.110
F	0.08	0.18	0.003	0.007
G	18.26	18.54	0.720	0.730
K	11.05	–	0.435	–
L	6.22	6.48	0.245	0.255
M	45° NOM		45° NOM	
N	3.66	4.52	0.144	0.178
Q	2.92	3.30	0.115	0.130

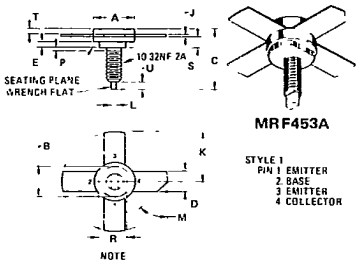
CASE 211-11

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	18	Vdc
Collector-Emitter Voltage	V_{CES}	36	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector Current — Continuous	I_C	15	Adc
Total Device Dissipation @ $T_C = 25^oC$ Derate above 25^oC	P_D	175 1.0	Watts $W/^oC$
Storage Temperature Range	T_{stg}	-65 to +150	^oC

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.0	$^oC/W$



DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	12.45	12.95	0.490	0.510
B	10.54	10.80	0.415	0.425
C	19.68	22.73	0.775	0.895
D	5.46	5.97	0.215	0.235
E	1.83	–	0.072	–
J	0.08	0.18	0.003	0.007
K	12.45	–	0.490	–
L	1.65	1.90	0.065	0.075
M	45° NOM		45° NOM	
P	–	1.27	–	1.050
R	9.73	10.05	0.383	0.396
S	3.84	4.50	0.151	0.177
T	2.11	2.54	0.083	0.100
U	2.49	3.35	0.098	0.132

CASE 145A-10

MATCHING PROCEDURE

In the push-pull circuit configuration, it is preferred that the transistors are used as matched pairs to obtain optimum performance.

The matching procedure used by Motorola consists of measuring h_{FE} at the data sheet conditions and color coding the device to predetermined h_{FE} ranges within the normal h_{FE} limits. A color dot is added to the marking on top of the cap. Any two devices with the same color dot can be paired together to form a matched set of units.

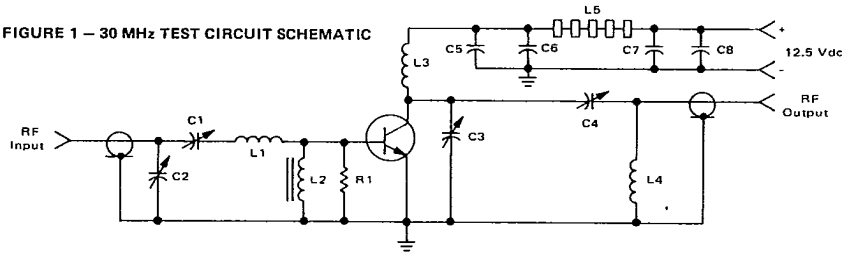
MRF453, MRF453A

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 100 mAdc, I_B = 0)	$V_{(BR)CEO}$	18	–	–	Vdc
Collector-Emitter Breakdown Voltage (I_C = 50 mAdc, V_{BE} = 0)	$V_{(BR)CES}$	36	–	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 mAdc, I_C = 0)	$V_{(BR)EBO}$	4.0	–	–	Vdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 5.0 Adc, V_{CE} = 5.0 Vdc)	h_{FE}	10	–	150	–
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 12.5 Vdc, I_E = 0, f = 1.0 MHz)	C_{ob}	–	–	250	pF
FUNCTIONAL TESTS (Figure 1)					
Common-Emitter Amplifier Power Gain (V_{CC} = 12.5 Vdc, P_{out} = 60 W, f = 30 MHz)	G_{pe}	13	–	–	dB
Collector Efficiency (V_{CC} = 12.5 Vdc, P_{out} = 60 W, f = 30 MHz)	η	55	–	–	%
Series Equivalent Input Impedance (V_{CC} = 12.5 Vdc, P_{out} = 60 W, f = 30 MHz)	Z_{in}	–	1.66-j.844	–	Ohms
Series Equivalent Output Impedance (V_{CC} = 12.5 Vdc, P_{out} = 60 W, f = 30 MHz)	Z_{out}	–	1.73-j.188	–	Ohms
Parallel Equivalent Input Impedance (V_{CC} = 12.5 Vdc, P_{out} = 60 W, f = 30 MHz)	Z_{in}	–	2.09/1030	–	Ω/pF
Parallel Equivalent Output Impedance (V_{CC} = 12.5 Vdc, P_{out} = 60 W, f = 30 MHz)	Z_{out}	–	1.75/330	–	Ω/pF

3

FIGURE 1 – 30 MHz TEST CIRCUIT SCHEMATIC



C1, C2, C4 ARCO 469
C3 ARCO 466
C5 1000 pF, UNELCO
C6, C7 0.1 µF Disk Ceramic
C8 1000 µF/15 V Electrolytic
R1 10 Ohm/1 Watt, Carbon

L1 3 Turns, #18 AWG, 5/16" I.D., 5/16" Long
L2 VK200 20/4B, FERROXCUBE
L3 12 Turns, #18 AWG Enameled Wire, 1/4" I.D., Close Wound
L4 3 Turns 1/8" O.D. Copper Tubing, 3/8" I.D., 3/4" Long
L5 7 FERRITE Beads, FERROXCUBE #56 590 65/38

FIGURE 2 – OUTPUT POWER versus INPUT POWER

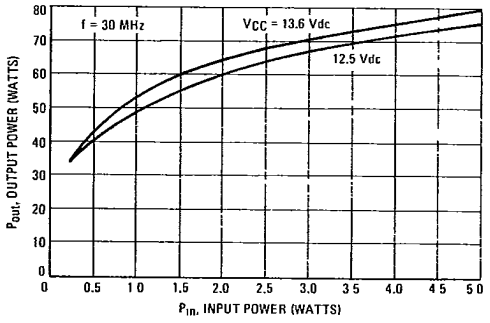


FIGURE 3 – OUTPUT POWER versus SUPPLY VOLTAGE