

MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

T-31-15
MRF501
MRF502

The RF Line

NPN SILICON HIGH-FREQUENCY TRANSISTORS

... designed primarily for use in high-gain, low-noise amplifier, oscillator, and mixer applications. Can also be used in UHF converter applications.

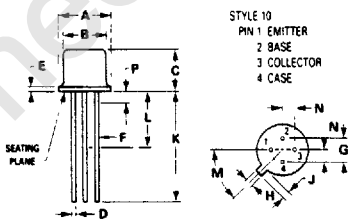
- High Current-Gain – Bandwidth Product –
 $f_T = 1.2 \text{ GHz (Typ) @ } I_C = 5.0 \text{ mAdc}$
- Low Noise Figure –
 $NF = 4.0 \text{ dB (Typ) @ } f = 200 \text{ MHz}$

HIGH FREQUENCY
TRANSISTORS
NPN SILICON



MAXIMUM RATINGS

Rating	Symbol	MRF501	MRF502	Unit
Collector-Emitter Voltage	V_{CE0}	15		Vdc
Collector-Base Voltage	V_{CB0}	25	35	Vdc
Emitter-Base Voltage	V_{EB0}	35		Vdc
Collector Current	I_C	50		mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	200 1.14		mW mW/ $^\circ\text{C}$
Storage Temperature Range	T_{stg}	-65 to +200		$^\circ\text{C}$



NOTE: ALL RULES AND NOTES ASSOCIATED WITH TO-72 OUTLINE SHALL APPLY

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	5.31	5.84	0.209	0.230
B	4.52	4.95	0.178	0.195
C	4.32	5.33	0.170	0.210
D	0.41	0.53	0.016	0.021
E	—	0.76	—	0.030
F	0.41	0.48	0.016	0.019
G	2.54 BSC		0.100 BSC	
H	0.91	1.17	0.036	0.046
J	0.71	1.22	0.028	0.048
K	12.70	—	0.500	—
L	6.35	—	0.250	—
M	45° BSC		45° BSC	
N	1.27 BSC		0.050 BSC	
P	—	1.27	—	0.050

CASE 20-03
TO-206AF
(TO-72)

MRF501, MRF502

MOTOROLA SC (XSTRS/R F) 46E D 6367254 0094713 8 MOT6

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

T-31-15

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage ($I_C = 3.0\text{ mA}$, $I_E = 0$)	$V_{(BR)CEO}$	15	—	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 1.0\text{ mA}$, $I_E = 0$)	$V_{(BR)CBO}$	25 35	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 1.0\text{ mA}$, $I_C = 0$)	$V_{(BR)EBO}$	3.5	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 1.0\text{ Vdc}$, $I_E = 0$)	I_{CBO}	—	—	50 20	nAdc
ON CHARACTERISTICS					
DC Current Gain ($I_C = 1.0\text{ mA}$, $V_{CE} = 6.0\text{ Vdc}$)	h_{FE}	30 40	—	250 170	—
DYNAMIC CHARACTERISTICS					
Current Gain — Bandwidth Product ($I_C = 5.0\text{ mA}$, $V_{CE} = 6.0\text{ Vdc}$, $f = 100\text{ MHz}$)	f_T	600 800	1000 1200	—	MHz
Collector-Base Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f = 0.1$ to 1.0 MHz)	C_{cb}	—	0.6	—	pF
Collector-Base Time Constant ($I_E = 2.0\text{ mA}$, $V_{CB} = 6.0\text{ Vdc}$, $f = 31.8\text{ MHz}$)	$\tau_{b'c}$	—	8.0	—	ps
Noise Figure (Figure 1) ($I_C = 1.5\text{ mA}$, $V_{CE} = 6.0\text{ Vdc}$, $R_S = 50\text{ ohms}$, $f = 200\text{ MHz}$)	NF	—	4.5 4.0	—	dB
FUNCTIONAL TEST					
Common-Emitter Amplifier Power Gain (Figure 1) ($V_{CC} = 6.0\text{ Vdc}$, $I_C = 5.0\text{ mA}$, $f = 200\text{ MHz}$)	G_{pe}	—	15 17	—	dB

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FIGURE 1 — 200 MHz AMPLIFIER POWER GAIN AND NOISE FIGURE CIRCUIT

