

T33-05

MRF515

The RF Line

NPN SILICON HIGH FREQUENCY TRANSISTOR

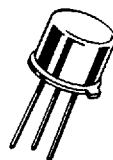
designed for 12.5 Volt UHF large-signal amplifier applications required in industrial equipment

- Specified 12.5 Volt, 470 MHz Characteristics —
Output Power = 0.75 Watts
Minimum Gain = 8.0 dB
Efficiency = 50%
- S Parameter Data From 100 MHz to 1.0 GHz

0.75 W — 470 MHz

HIGH FREQUENCY TRANSISTOR

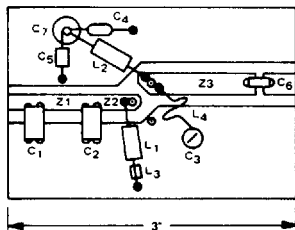
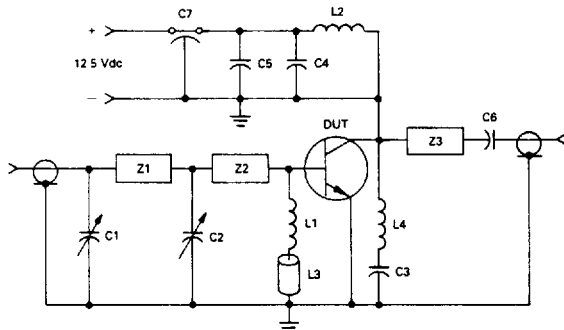
NPN SILICON



MAXIMUM RATINGS

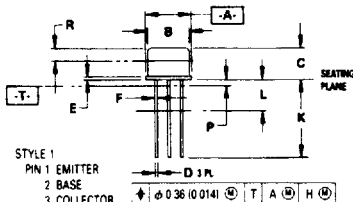
Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V _{CEO}	20	V _{dc}
Collector-Base Voltage	V _{CBO}	35	V _{dc}
Emitter-Base Voltage	V _{EB0}	4.0	V _{dc}
Collector Current — Continuous	I _C	150	mA _{dc}
Total Device Dissipation @ T _C = 25°C Derate above 25°C	P _D	2.5 14.3	Watts mW/°C
Storage Temperature Range	T _{stg}	-65 to +200	°C

FIGURE 1 — 470 MHz TEST CIRCUIT



- C1, C2, C3 — 1.0-10 pF JOHANSON
C4 — 0.1 μF disc
C5 — 1.0 μF TANTALUM
C6 — 0.018 μF chip
C7 — 1000 pF Feedthru
L1, L2 — 0.15 μF Choke
L3 — Bead Ferrite
Z1, Z2 — 0.09" x 0.5" LINE, Z₀ = 100 Ω
Z3 — 0.18" x 1.0" LINE, Z₀ = 50 Ω

BOARD = 0.032" TEFLON GLASS,
ε_r = 2.5



- NOTES
- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M-1982
 - CONTROLLING DIMENSION INCH
 - DIMENSION J MEASURED FROM DIMENSION A MAXIMUM
 - DIMENSION B SHALL NOT VARY MORE THAN 0.25 (0.010) IN ZONE R THIS ZONE CONTROLLED FOR AUTOMATIC HANDLING
 - DIMENSION F APPLIES BETWEEN DIMENSION P AND L. DIMENSION D APPLIES BETWEEN DIMENSION L AND K. MINIMUM LEAD DIAMETER IS UNCONTROLLED IN DIMENSION P AND BEYOND DIMENSION K MINIMUM

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	8.51	9.39	0.335	0.370
B	7.75	8.50	0.305	0.335
C	6.10	6.60	0.240	0.260
D	0.41	0.53	0.016	0.021
E	0.23	1.04	0.009	0.041
F	0.41	0.48	0.016	0.019
G	5.08 BSC	0.200 BSC		
H	0.72	0.86	0.028	0.034
J	0.74	1.14	0.029	0.045
K	12.70	19.05	0.500	0.750
L	6.35	—	0.250	—
M	45° BSC	45° BSC		
P	1.27	—	0.050	—
R	2.54	—	0.100	—

CASE 79-04
TO-205AD
(TO-39)

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage ($I_C = 5.0\text{ mA}$, $I_B = 0$)	$V_{(BR)CEO}$	20	—	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 100\text{ }\mu\text{A}$, $I_E = 0$)	$V_{(BR)CBO}$	35	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 100\text{ }\mu\text{A}$, $I_C = 0$)	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current ($V_{CE} = 15\text{ Vdc}$, $I_B = 0$)	I_{CEO}	—	—	10	μA
ON CHARACTERISTICS					
DC Current Gain ($I_C = 50\text{ mA}$, $V_{CE} = 10\text{ Vdc}$)	h_{FE}	20	60	150	—
Collector-Emitter Saturation Voltage ($I_C = 50\text{ mA}$, $I_B = 5.0\text{ mA}$)	$V_{CE(sat)}$	—	—	0.5	Vdc
DYNAMIC CHARACTERISTICS					
Current-Gain — Bandwidth Product ($I_C = 100\text{ mA}$, $V_{CE} = 10\text{ Vdc}$, $f = 200\text{ MHz}$)	f_T	1800	2000	—	MHz
Output Capacitance ($V_{CB} = 12.5\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$)	C_{ob}	—	3.5	4.0	pF
FUNCTIONAL TESTS					
Common-Emitter Amplifier Power Gain ($V_{CC} = 12.5\text{ Vdc}$, $P_{out} = 0.75\text{ W}$, $f = 470\text{ MHz}$)	G_{pE}	8.0	8.5	—	dB
Collector Efficiency ($V_{CC} = 12.5\text{ Vdc}$, $P_{out} = 0.75\text{ W}$, $f = 470\text{ MHz}$)	η	50	70	—	%
Series Equivalent Input Impedance ($V_{CC} = 12.5\text{ Vdc}$, $P_{out} = 0.75\text{ W}$, $f = 470\text{ MHz}$)	Z_{in}	—	$14 \pm j4.0$	—	Ohms
Series Equivalent Output Impedance ($V_{CC} = 12.5\text{ Vdc}$, $P_{out} = 0.75\text{ W}$, $f = 470\text{ MHz}$)	Z_{out}	—	$28 \pm j38$	—	Ohms

FIGURE 2 — OUTPUT POWER versus INPUT POWER

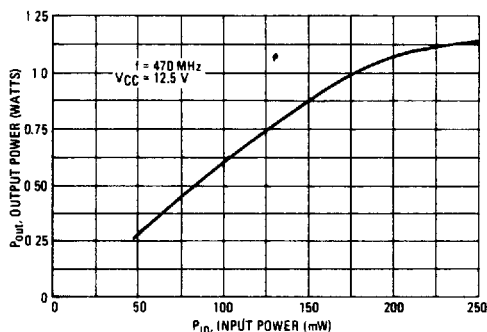


FIGURE 3 — CURRENT-GAIN — BANDWIDTH PRODUCT versus COLLECTOR CURRENT

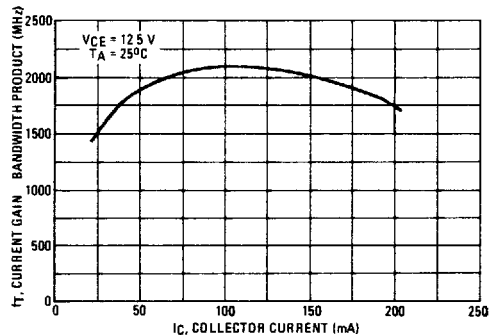


FIGURE 4 — OUTPUT CAPACITANCE versus COLLECTOR BASE VOLTAGE

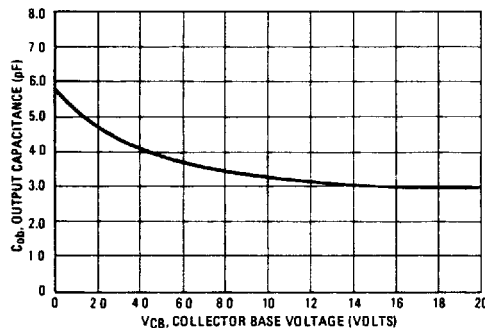
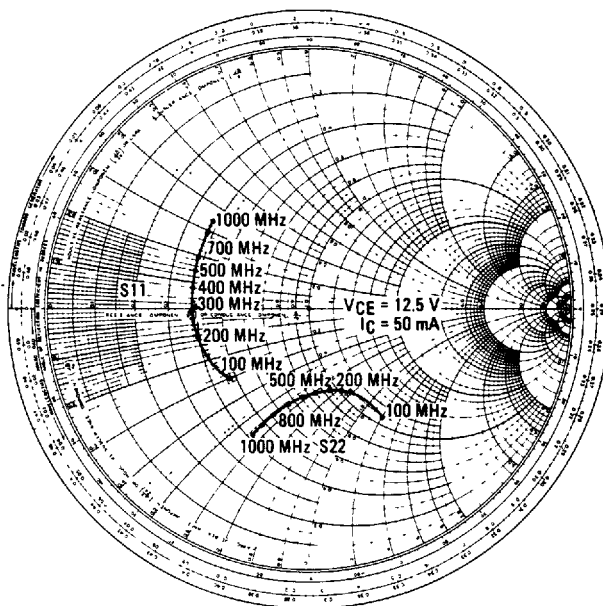
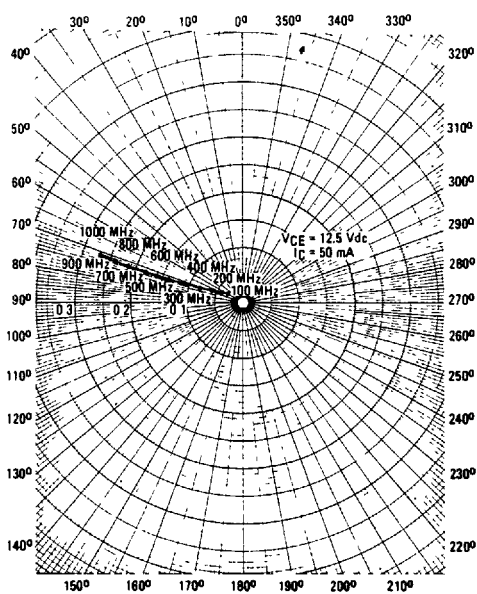


FIGURE 5 — S_{11} and S_{22} versus FREQUENCYFIGURE 6 — S_{12} versus FREQUENCYFIGURE 7 — S_{21} versus FREQUENCY