

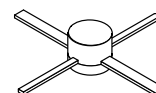
The RF Line NPN Silicon High-Frequency Transistor

... designed for wideband amplifier, driver or oscillator applications in military, mobile, and aircraft radio.

- Specified 28 Volt, 400 MHz Characteristics —
Output Power = 1.0 Watt
Power Gain = 15 dB Min
Efficiency = 45% Typ
- Emitter Ballast and Low Current Density for Improved MTBF
- Common Emitter for Improved Stability

MRF313

**1.0 W, 400 MHz
HIGH-FREQUENCY
TRANSISTOR
NPN SILICON**



CASE 305A-01, STYLE 1

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	30	Vdc
Collector-Base Voltage	V_{CBO}	40	Vdc
Emitter-Base Voltage	V_{EBO}	3.0	Vdc
Collector Current — Continuous	I_C	150	mAdc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	6.1 35	Watts mW/ $^\circ\text{C}$
Storage Temperature Range	T_{stg}	-65 to +150	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	28.5	$^\circ\text{C/W}$

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

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage ($I_C = 10$ mAdc, $I_B = 0$)	$V_{(BR)CEO}$	30	—	—	Vdc
Collector-Emitter Breakdown Voltage ($I_C = 5.0$ mAdc, $V_{BE} = 0$)	$V_{(BR)CES}$	35	—	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 0.1$ mAdc, $I_E = 0$)	$V_{(BR)CBO}$	35	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 1.0$ mAdc, $I_C = 0$)	$V_{(BR)EBO}$	3.0	—	—	Vdc
Collector Cutoff Current ($V_{CE} = 20$ Vdc, $I_B = 0$)	I_{CEO}	—	—	1.0	mAdc

(continued)

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

Characteristic	Symbol	Min	Typ	Max	Unit
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ON CHARACTERISTICS

DC Current Gain ($I_C = 100\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$)	h_{FE}	20	60	150	—
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DYNAMIC CHARACTERISTICS

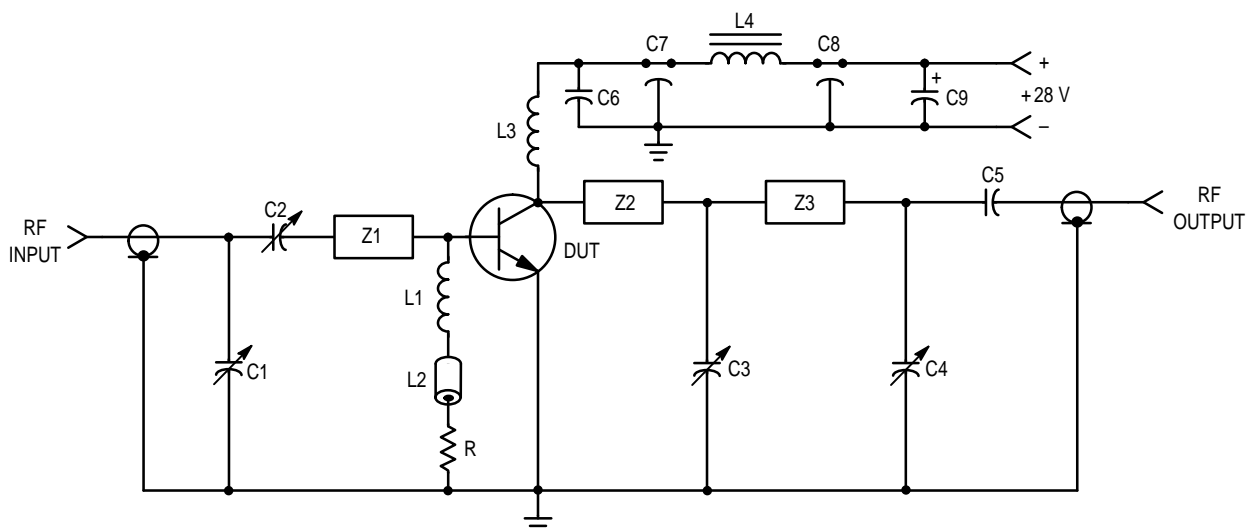
Current–Gain — Bandwidth Product ($I_C = 100\text{ mAdc}$, $V_{CE} = 20\text{ Vdc}$, $f = 200\text{ MHz}$)	f_T	—	2.5	—	GHz
Output Capacitance ($V_{CB} = 28\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$)	C_{ob}	—	3.5	5.0	pF

FUNCTIONAL TESTS

Common–Emitter Amplifier Power Gain (1) ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 1.0\text{ W}$, $f = 400\text{ MHz}$)	G_{pe}	15	16	—	dB
Collector Efficiency ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 1.0\text{ W}$, $f = 400\text{ MHz}$)	η	—	45	—	%
Series Equivalent Input Impedance ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 1.0\text{ W}$, $f = 400\text{ MHz}$)	Z_{in}	—	$6.4 - j4.8$	—	Ohms
Series Equivalent Output Impedance ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 1.0\text{ W}$, $f = 400\text{ MHz}$)	Z_{out}	—	$75 - j45$	—	Ohms

NOTE:

1. Class C



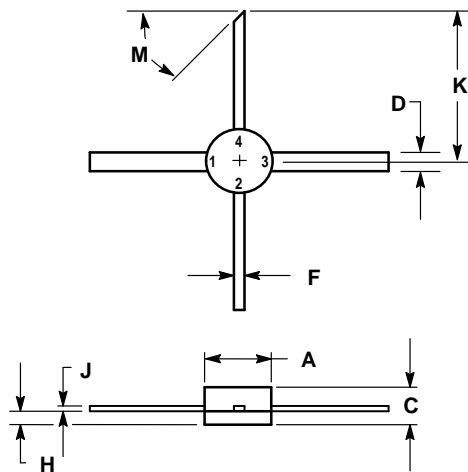
C1, C2, C4 — 1.0–20 pF JOHANSON 9063
C3 — 1.0–10 pF JOHANSON
C5 — 150 pF Chip
C6 — 0.1 μF
C7, C8 — 680 pF Feedthru
C9 — 1.0 μF TANTALUM

L1, L3 — 5 Turns, AWG #20, 1/4" I.D.
L2 — Ferrite Bead, FERROXCUBE
No. 56–590–65/4B
L4 — FERROXCUBE VK200–20/4B
Input/Output Connectors — Type N
Board — Glass Teflon, $\epsilon = 2.56$, $t = 0.062''$

R — 4.7 Ohms, 1/4 W
Z1 — 2.0" x 0.1" MICROSTRIP LINE
Z2, Z3 — 2.6" x 0.1" MICROSTRIP LINE

Figure 1. 400 MHz Power Gain Test Circuit

PACKAGE DIMENSIONS




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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.200	0.220	5.08	5.59
C	0.095	0.130	2.41	3.30
D	0.055	0.065	1.40	1.65
F	0.025	0.035	0.64	0.89
H	0.040	0.050	1.02	1.27
J	0.003	0.007	0.08	0.18
K	0.435	—	11.05	—
M	45 °REF	—	45 °REF	—

- STYLE 1:
PIN 1. EMITTER
2. BASE
3. EMITTER
4. COLLECTOR

CASE 305A-01
ISSUE A

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MRF313/D

