

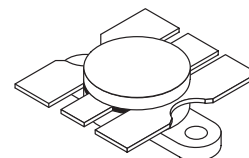
The RF Line
NPN Silicon
RF Power Transistor

... designed for 12.5 Volt UHF large-signal amplifier applications in industrial and commercial FM equipment operating to 512 MHz.

- Specified 12.5 Volt, 470 MHz Characteristics —
Output Power = 15 Watts
Minimum Gain = 7.8 dB
Efficiency = 55%
- Characterized with Series Equivalent Large-Signal Impedance Parameters
- Built-In Matching Network for Broadband Operation
- Tested for Load Mismatch Stress at all Phase Angles with 20:1 VSWR @ 16-Volt High Line and Overdrive

MRF641

15 W, 470 MHz
CONTROLLED Q
RF POWER
TRANSISTOR
NPN SILICON



CASE 316-01, STYLE 1

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	16	Vdc
Collector-Base Voltage	V_{CBO}	36	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector Current — Continuous	I_C	3.0	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	43.7 0.25	Watts W/ $^\circ\text{C}$
Storage Temperature Range	T_{stg}	-65 to +150	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	4.0	$^\circ\text{C/W}$

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 ($I_C = 20\text{ mAdc}$, $I_B = 0$)	$V_{(BR)CEO}$	16	—	—	Vdc
Collector-Emitter Breakdown Voltage ($I_C = 20\text{ mAdc}$, $V_{BE} = 0$)	$V_{(BR)CES}$	36	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 5.0\text{ mAdc}$, $I_C = 0$)	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current ($V_{CE} = 15\text{ Vdc}$, $V_{BE} = 0$, $T_C = 25^\circ\text{C}$)	I_{CES}	—	—	5.0	mAdc

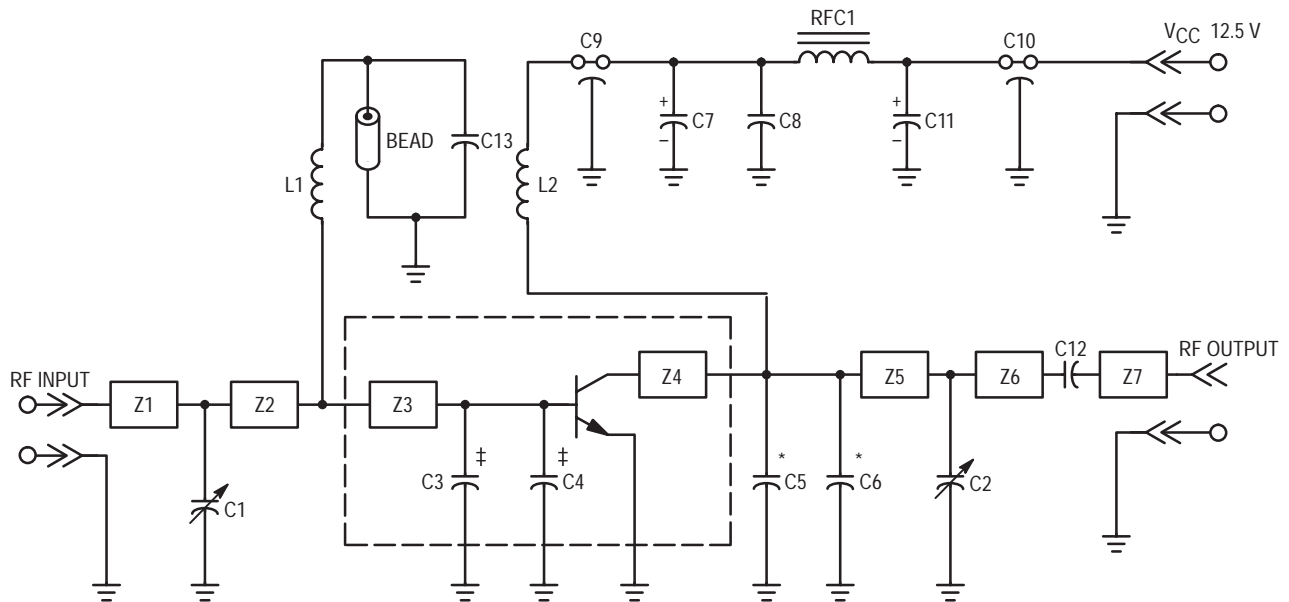
(continued)

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

Characteristic	Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS					
DC Current Gain ($I_C = 1.0 \text{ Adc}$, $V_{CE} = 5.0 \text{ Vdc}$)	h_{FE}	30	70	150	—
DYNAMIC CHARACTERISTICS					
Output Capacitance ($V_{CB} = 12.5 \text{ Vdc}$, $I_E = 0$, $f = 1.0 \text{ MHz}$)	C_{ob}	—	40	60	pF
FUNCTIONAL TESTS					
Common-Emitter Amplifier Power Gain ($V_{CC} = 12.5 \text{ Vdc}$, $P_{out} = 15 \text{ W}$, $f = 470 \text{ MHz}$)	G_{pe}	7.8	8.5	—	dB
Collector Efficiency ($V_{CC} = 12.5 \text{ Vdc}$, $P_{out} = 15 \text{ W}$, $f = 470 \text{ MHz}$)	η	55	60	—	%
Output Mismatch Stress ($V_{CC} = 16 \text{ Vdc}$, $P_{in} = 3.0 \text{ W}$, $f = 470 \text{ MHz}$, $V_{SWR} = 20:1$, All Phase Angles)	ψ	No Degradation in Output Power			



PARTS

- Z1 — 1.225" x 0.187" Microstrip
- Z2 — 0.884" x 0.187" Microstrip
- Z3 — Capacitor Block (Base)
- Z4 — Collector Block
- Z5 — 1.1" x 0.187" Microstrip
- Z6 — 0.433" x 0.187" Microstrip
- Z7 — 0.4" x 0.187" Microstrip
- Dotted Area — Capacitor Assembly

- C1, C2 — 0.8–10 pF Johanson
- C3, C4 — 24 pF Chip Caps 100 mils ATC
- C5, C6 — 22 pF Chip Caps 100 mils ATC
- C12 — 220 pF Chip Cap 100 mils ATC
- C7, C11 — 1.0 μF Tantalum 35 Vdc
- C9, C10 — 680 pF Feedthrough Allen-Bradley
- C13 — 200 pF UNELCO
- C8 — 0.1 μF , 50 V Erie Red Cap
- RFC1 — VK 200 — 104B Ferrite Choke
- L1 — 4 Turns 0.2" Dia. #16 AWG
- L2 — 9 Turns 0.15" Dia. #16 AWG

Bead — Ferroxcube 56-590-65-35EB

NOTES

- *C5, C6, are mounted as close to the capacitor assembly as possible.
- ‡‡C3, C4 are mounted in the capacitor assembly.
- Board — 62.5 mil Glass Teflon, $\epsilon_r = 2.55$.

Figure 1. Test Circuit Schematic

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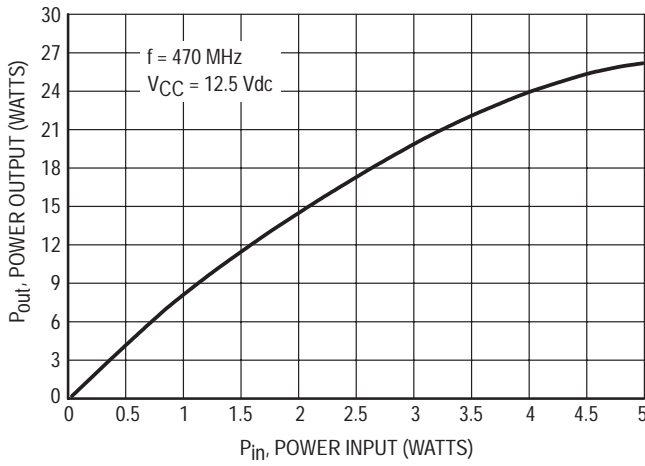


Figure 2. Power Output versus Power Input

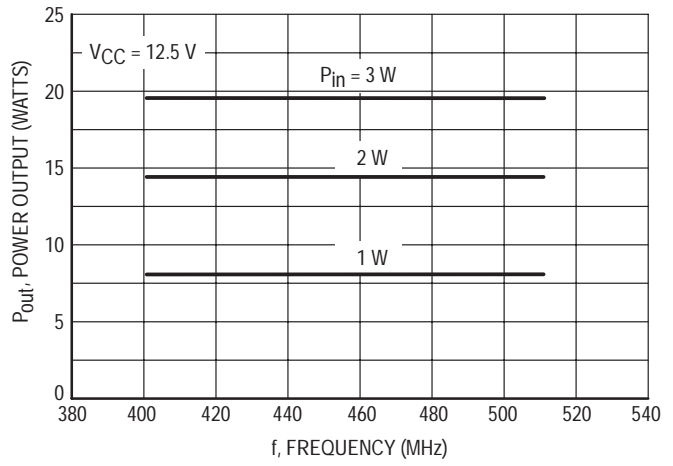


Figure 3. Power Output versus Frequency

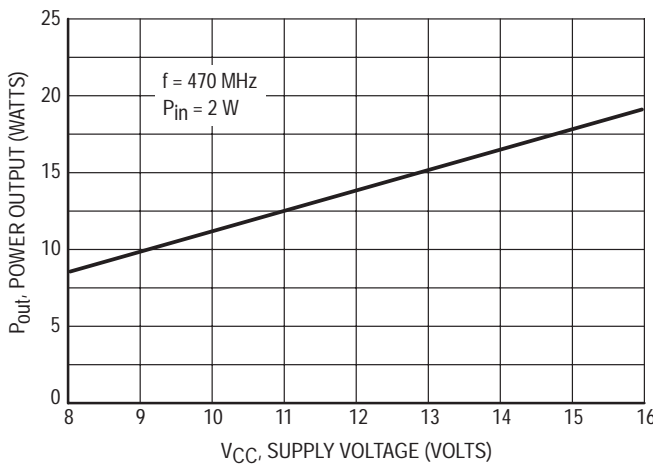


Figure 4. Power Output versus Supply Voltage

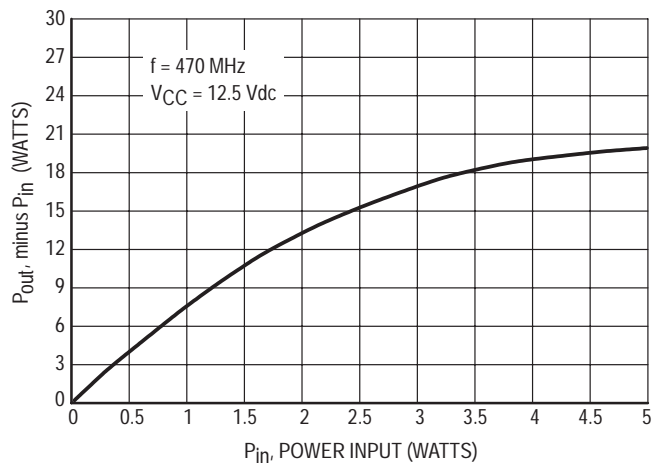
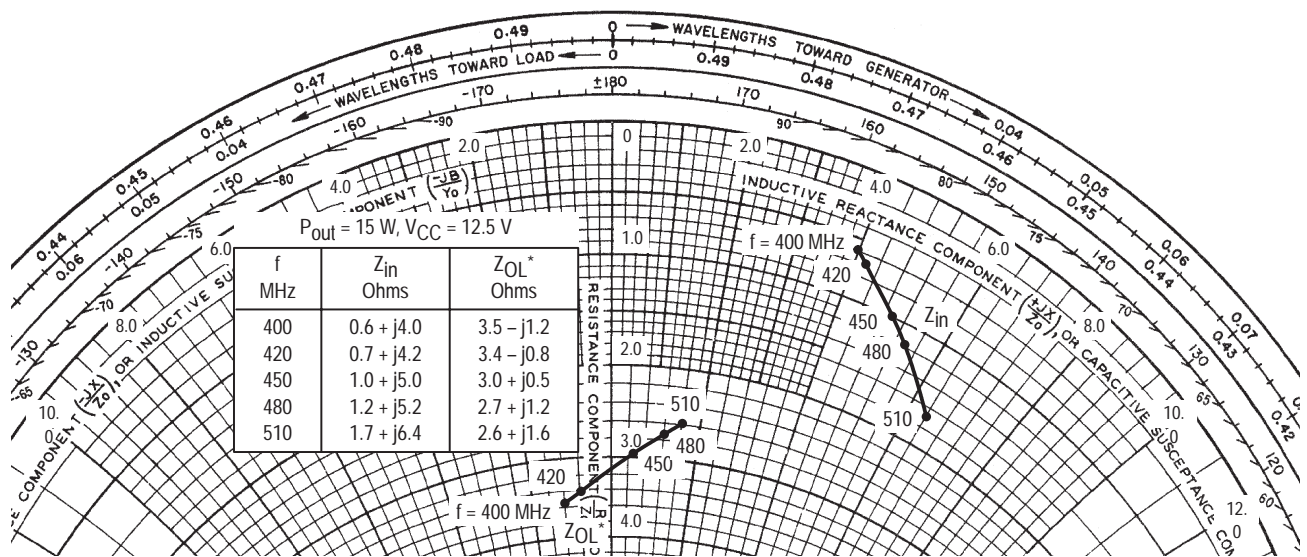


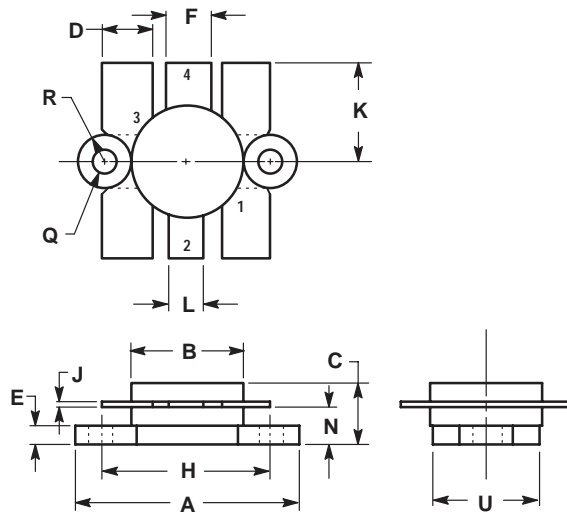
Figure 5. Power Saturation Profile



Z_{OL}^{*} = Conjugate of the load impedance into which the device output operates at a given power, η, and frequency.

Figure 6. Series Equivalent Input-Output Impedance

PACKAGE DIMENSIONS



NOTES:
1. FLANGE IS ISOLATED IN ALL STYLES.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	24.38	25.14	0.960	0.990
B	12.45	12.95	0.490	0.510
C	5.97	7.62	0.235	0.300
D	5.33	5.58	0.210	0.220
E	2.16	3.04	0.085	0.120
F	5.08	5.33	0.200	0.210
H	18.29	18.54	0.720	0.730
J	0.10	0.15	0.004	0.006
K	10.29	11.17	0.405	0.440
L	3.81	4.06	0.150	0.160
N	3.81	4.31	0.150	0.170
Q	2.92	3.30	0.115	0.130
R	3.05	3.30	0.120	0.130
U	11.94	12.57	0.470	0.495

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

CASE 316-01
ISSUE D

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