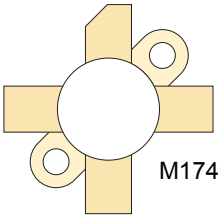
Microsemi
POWER PRODUCTS GROUP

VRF152

50V, 150W, 175MHz

RF POWER VERTICAL MOSFET

The VRF152 is a gold-metallized silicon n-channel RF power transistor designed for broadband commercial and military applications requiring high power and gain without compromising reliability, ruggedness, or inter-modulation distortion.



FEATURES

- **Improved Ruggedness $V_{(BR)DSS}$ = 130V**
- **150W with 22dB Typical Gain @ 30MHz, 50V**
- **150W with 14dB Typical Gain @ 175MHz, 50V**
- **Excellent Stability & Low IMD**
- **Common Source Configuration**
- **30:1 Load VSWR Capability at Specified Operating Conditions**
- **Nitride Passivated**
- **Refractory Gold Metallization**
- **Low Rds Replacement for MRF151/ BLF177/ SD2941**
- **RoHS Compliant**

Maximum Ratings

All Ratings: T_C =25°C unless otherwise specified

Symbol	Parameter	VRF152	Unit
V_{DSS}	Drain-Source Voltage	130	V
I_D	Continuous Drain Current @ T_C = 25°C	20	A
V_{GS}	Gate-Source Voltage	±40	V
P_D	Total Device dissipation @ T_C = 25°C	300	W
T_{STG}	Storage Temperature Range	-65 to 150	°C
T_J	Operating Junction Temperature	200	

Static Electrical Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage (V_{GS} = 0V, I_D = 50mA)	130			V
$R_{DS(ON)}$	Drain-Source On-State Resistance [1] (V_{GS} = 10V, I_D = 10A)		0.13	0.20	Ohms
I_{DSS}	Zero Gate Voltage Drain Current (V_{DS} = 100V, V_{GS} = 0V)			50	µA
I_{GSS}	Gate-Source Leakage Current (V_{DS} = ±20V, V_{DS} = 0V)			1.0	µA
g_{fs}	Forward Transconductance (V_{DS} = 10V, I_D = 5A)	5.0	6.2		mhos
$V_{GS(TH)}$	Gate Threshold Voltage (V_{DS} = 10V, I_D = 100mA)	2.9	3.6	4.4	V

Thermal Characteristics

Symbol	Characteristic	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction to Case Thermal Resistance			0.60	°C/W

CAUTION: These Devices are Sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed.

Dynamic Characteristics

VRF152

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	V_{GS} = 0V		383		pF
C_{oss}	Output Capacitance	V_{DS} = 50V		215		
C_{rss}	Reverse Transfer Capacitance	f = 1MHz		20		

Functional Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
G_{PS}	f_1 = 30MHz, f_2 = 30.001MHz, V_{DD} = 50V, I_{DQ} = 250mA, P_{out} = 150W_{PEP}	18	22		dB
G_{PS}	f = 175MHz, V_{DD} = 50V, I_{DQ} = 250mA, P_{out} = 150W		13		
η_D	f_1 = 30MHz, f_2 = 30.001MHz, V_{DD} = 50V, I_{DQ} = 250mA, P_{out} = 150W_{PEP}		50		%
$IMD_{(d3)}$	f_1 = 30MHz, f_2 = 30.001MHz, V_{DD} = 50V, I_{DQ} = 250mA, P_{out} = 150W_{PEP} [1]		-30		dBc
$IMD_{(d11)}$	f_1 = 30MHz, f_2 = 30.001MHz, V_{DD} = 50V, I_{DQ} = 250mA, P_{out} = 150W_{PEP}		-60		
Ψ	f_1 = 30MHz, f_2 = 30.001MHz, V_{DD} = 50V, I_{DQ} = 250mA, P_{out} = 150W_{PEP} 30:1 VSWR - All Phase Angles	No Degradation in Output Power			

1. To MIL-STD-1311 Version A, test method 2204B, Two Tone, Reference Each Tone

Typical Performance Curves

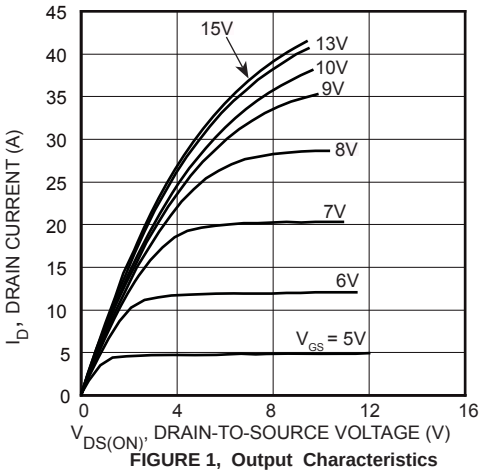


FIGURE 1, Output Characteristics

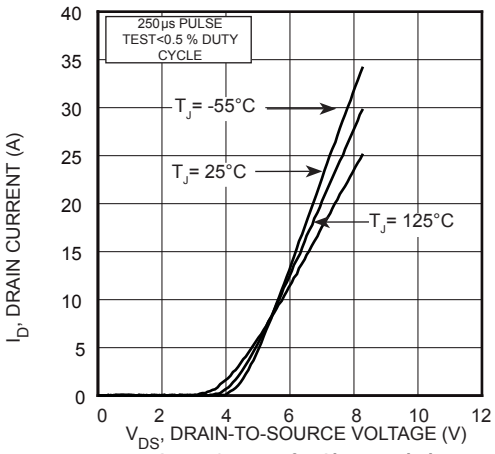


FIGURE 2, Transfer Characteristics

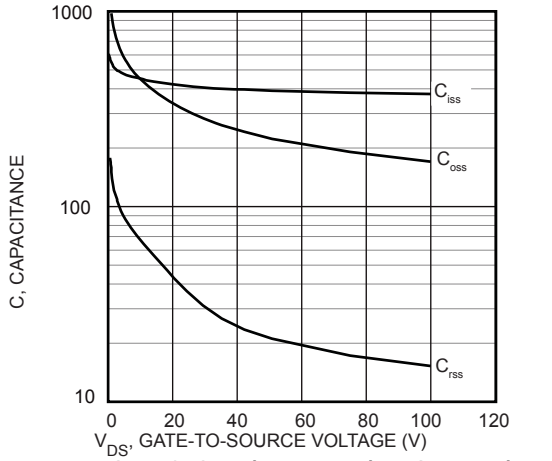


FIGURE 3, Capacitance vs Drain-to-Source Voltage

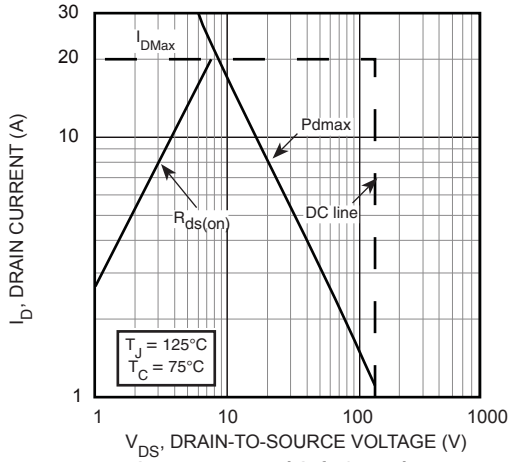


FIGURE 4, Forward Safe Operating Area

Typical Performance Curves

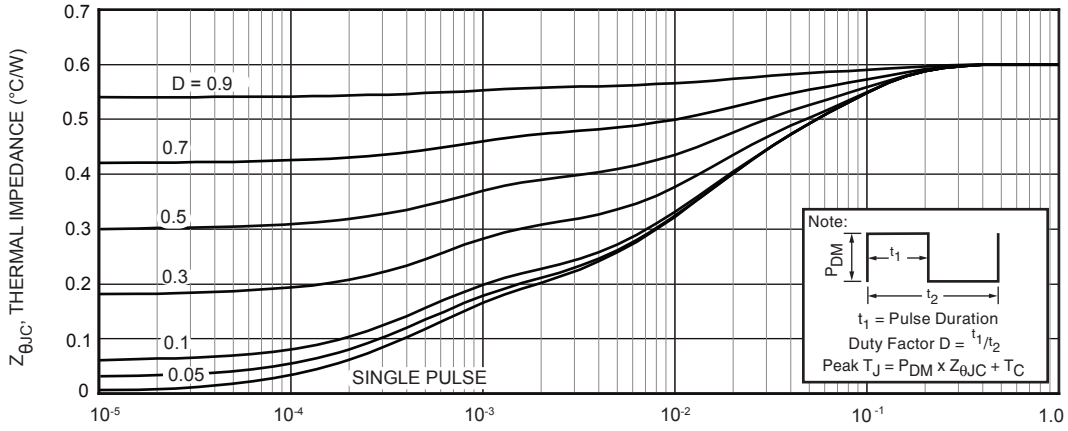


Figure 5. Maximum Effective Transient Thermal Impedance Junction-to-Case vs Pulse Duration

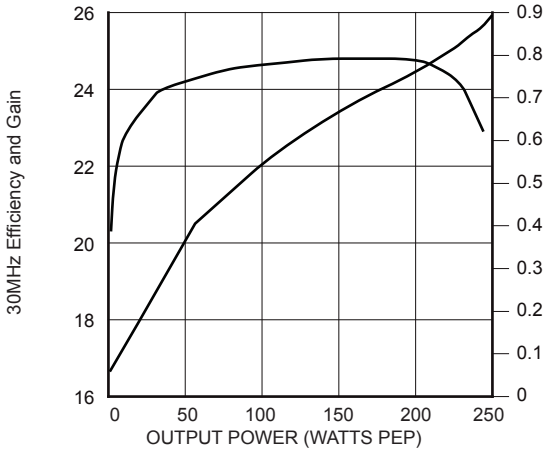


Figure 6. Gain and Efficiency vs P_{out}

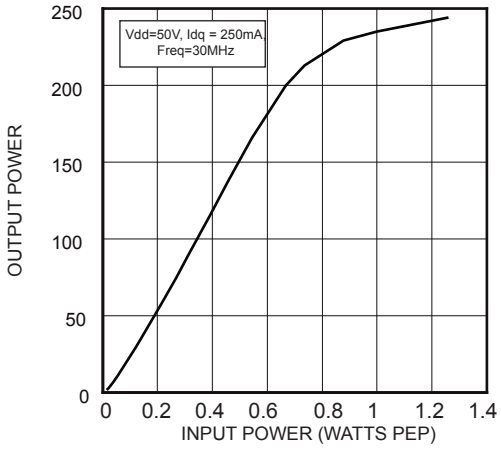


Figure 7. P_{OUT} versus P_{IN}

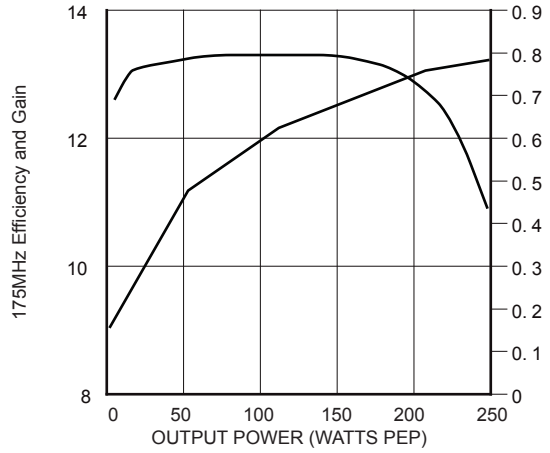


Figure 8. Gain and Efficiency vs P_{out}

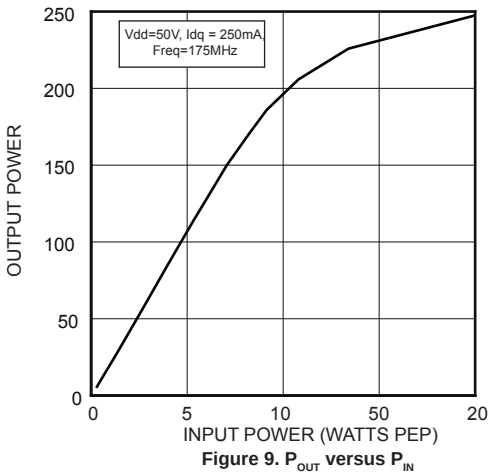
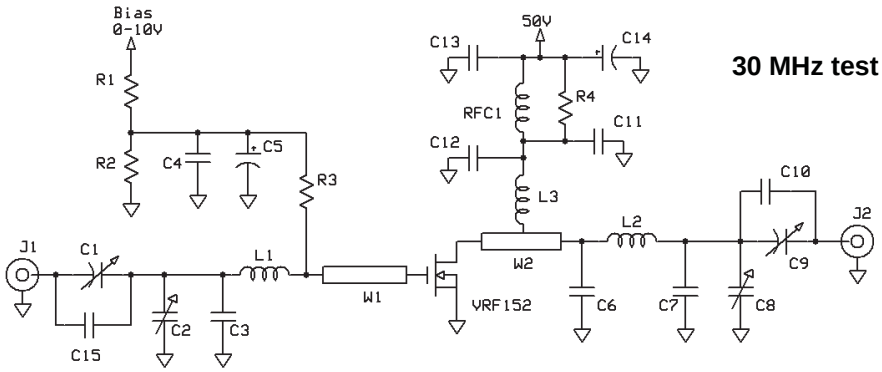


Figure 9. P_{OUT} versus P_{IN}

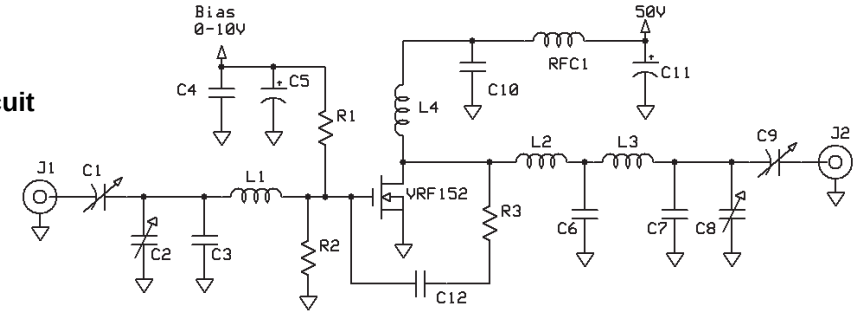
30 MHz test Circuit



C1,2,8,9 - ARCO 463 20-180pF
C3,7 - 120 pF ATC 100B
C4,11-13 - 0.1uF 100V SMT
C5 - 1 uF 15WV tant
C6, C15 - 47pF ATC 100B
C10 - 150pF ATC 100B
C14 - 15uF 100V Elect
W1 W2 - printed line 0.23"x 0.7"

L1 - 4t #20 ga .25"d x .16"L ~120nH
L2 - 5t #14 ga .312" dia x .45" ~135nH
L3 -7 turns #16 ga 5/16" ID tight. ~250nH
R1 R2 - 2.2k ohm 1/4W
R3 - 22 ohm 1W SMT
R4 - 2.2 ohm 2W
RFC1 Fair-Rite 2961666631 (VK200-4B)
PCB = FR-4 fiberglass-epoxy er = 4.6

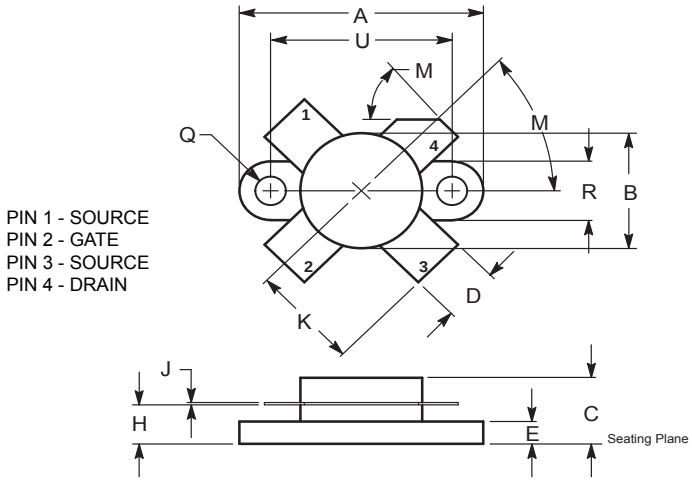
175 MHz test Circuit



C1 C2 C8 - ARCO 463
C3 C7 - 25 pF ATC 100B
C4 C10 C12 - 0.1uF 100V SMT
C5 - 1 uF 15WV tant
C6 - 250 pF ATC 100B
C9 - ARCO 462
C11 - 15uF 100V Elect

L1 - 3/4" #18 ga into Hairpin
L2 - printed line 0.2"W x 0.5" L
L3 - 1" #16 ga into Hairpin
L4 -2 turns #16 ga. 5/16" ID
R1 R2 - 150 ohm 1W
R3 - 470 ohm 3W, Panasonic ECG
RFC1 Fair-Rite 2961666631 (VK200-4B)

.5" SOE Package Outline
All Dimensions are ± .005



PIN 1 - SOURCE
PIN 2 - GATE
PIN 3 - SOURCE
PIN 4 - DRAIN

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.096	0.990	24.39	25.14
B	0.465	0.510	11.82	12.95
C	0.229	0.275	5.82	6.98
D	0.216	0.235	5.49	5.96
E	0.084	0.110	2.14	2.79
H	0.144	0.178	3.66	4.52
J	0.003	0.007	0.08	0.17
K	0.435		11.0	
M	45° NOM		45° NOM	
Q	0.115	0.130	2.93	3.30
R	0.246	0.255	6.25	6.47
U	0.720	0.730	18.29	18.54