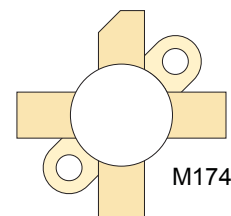



## RF POWER VERTICAL MOSFET

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:  $T_c = 25^\circ C$  unless otherwise specified


Symbol	Parameter	VRF152	Unit
$V_{DSS}$	Drain-Source Voltage	130	V
$I_D$	Continuous Drain Current @ $T_c = 25^\circ C$	20	A
$V_{GS}$	Gate-Source Voltage	$\pm 40$	V
$P_D$	Total Device dissipation @ $T_c = 25^\circ C$	300	W
$T_{STG}$	Storage Temperature Range	-65 to 150	$^\circ C$
$T_J$	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 <sup>1</sup> ( $V_{GS} = 10V, I_D = 10A$ )		0.13	0.20	Ohms
$I_{DSS}$	Zero Gate Voltage Drain Current ( $V_{DS} = 100V, V_{GS} = 0V$ )			50	$\mu A$
$I_{GSS}$	Gate-Source Leakage Current ( $V_{DS} = \pm 20V, V_{GS} = 0V$ )			1.0	$\mu A$
$g_{fs}$	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	$^\circ C/W$

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

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

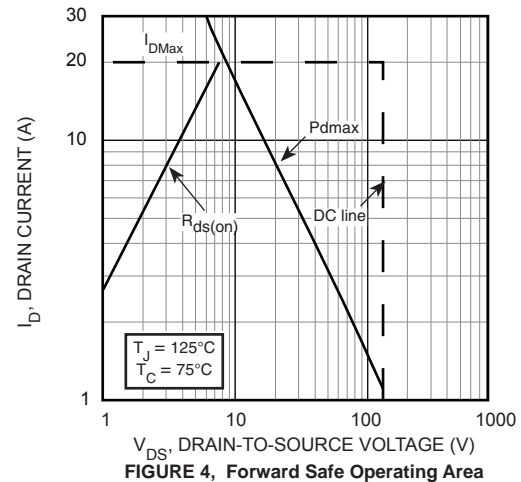
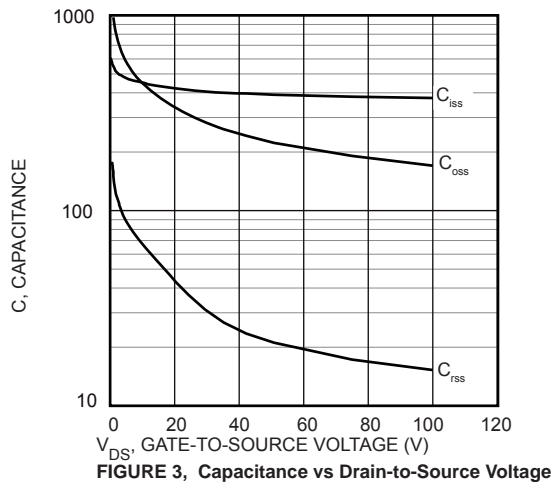
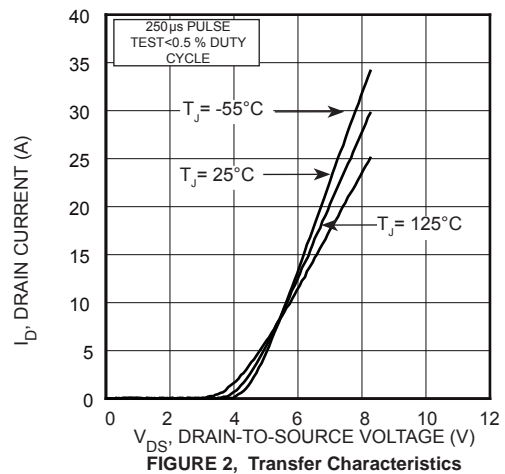
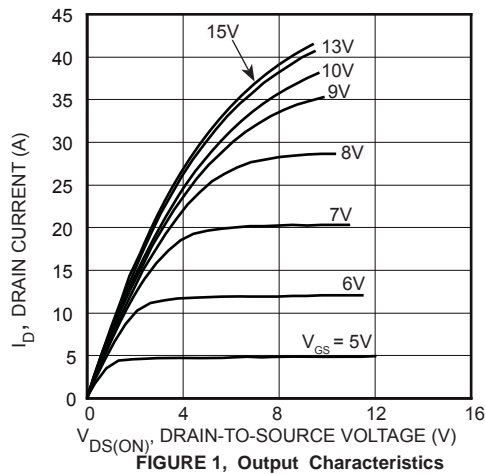
Functional Characteristics

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		
$\eta_D$	$f_1 = 30MHz, f_2 = 30.001MHz, V_{DD} = 50V, I_{DQ} = 250mA, P_{out} = 150W_{PEP}$		50		%
IMD <sub>(d3)</sub>	$f_1 = 30MHz, f_2 = 30.001MHz, V_{DD} = 50V, I_{DQ} = 250mA, P_{out} = 150W_{PEP}^1$		-30		dBc
IMD <sub>(d11)</sub>	$f_1 = 30MHz, f_2 = 30.001MHz, V_{DD} = 50V, I_{DQ} = 250mA, P_{out} = 150W_{PEP}$		-60		
$\Psi$	$f_1 = 30MHz, f_2 = 30.001MHz, V_{DD} = 50V, I_{DQ} = 250mA, P_{out} = 150W_{PEP}$ 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

Microsemi reserves the right to change, without notice, the specifications and information contained herein.

Typical Performance Curves



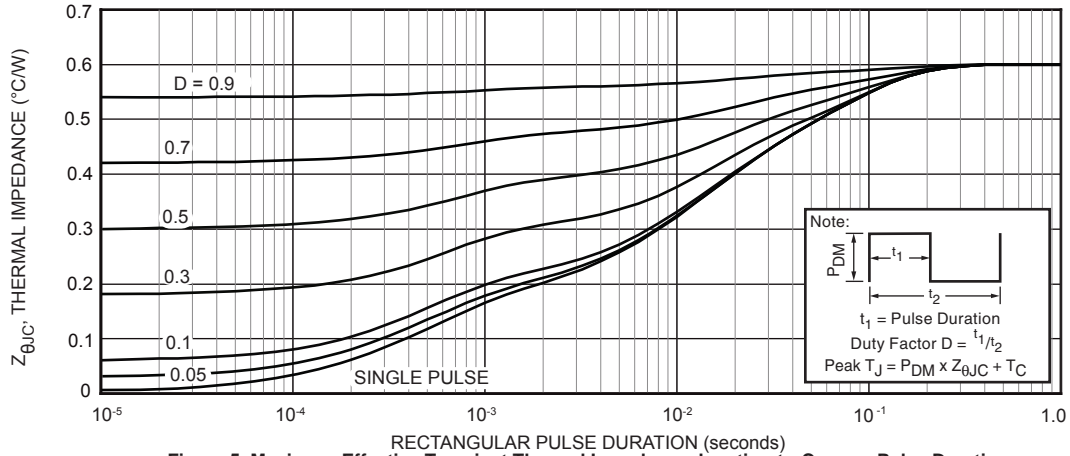


Figure 5. Maximum Effective Transient Thermal Impedance Junction-to-Case vs Pulse Duration

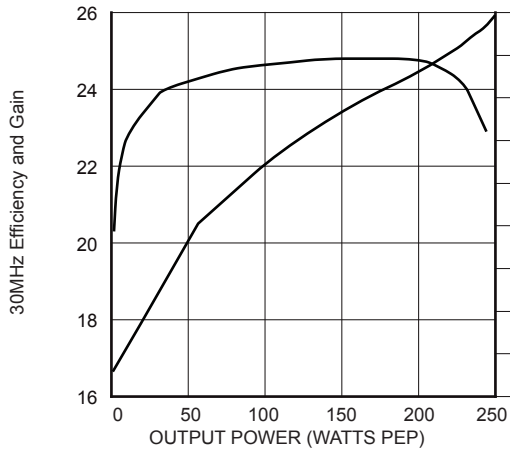


Figure 6. Gain and Efficiency vs  $P_{out}$

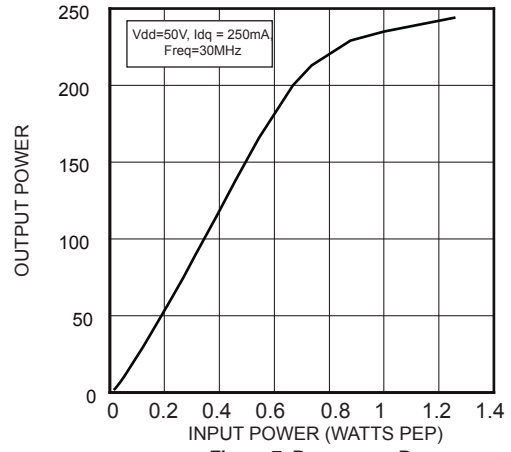


Figure 7.  $P_{out}$  versus  $P_{in}$

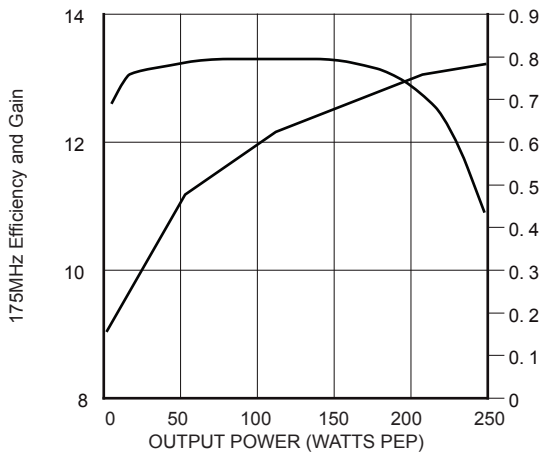


Figure 8. Gain and Efficiency vs  $P_{out}$

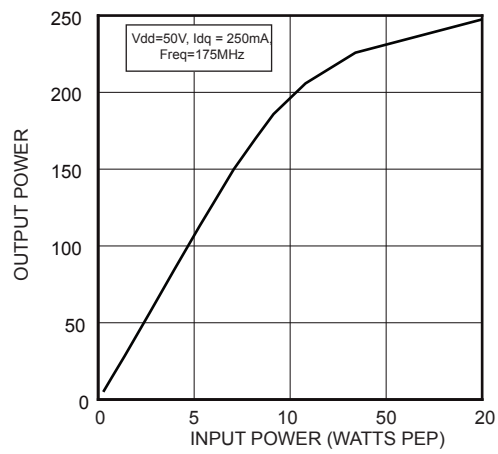
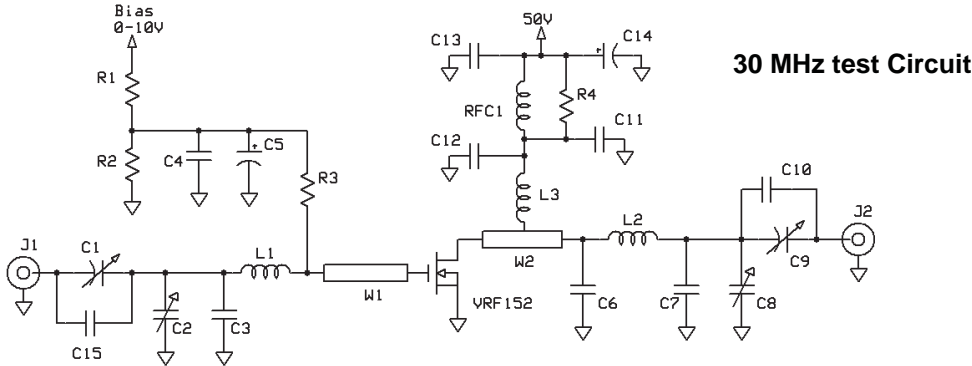
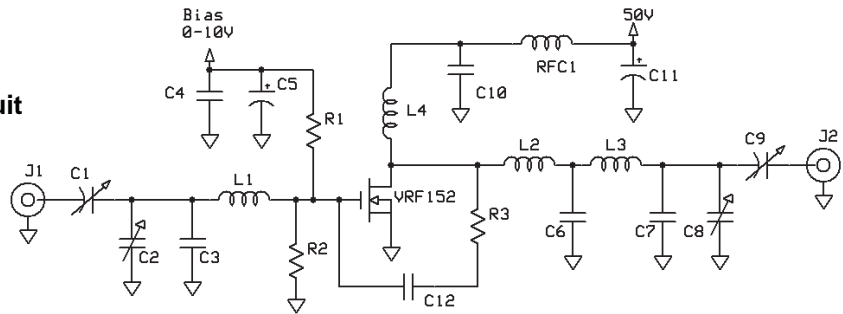


Figure 9.  $P_{out}$  versus  $P_{in}$



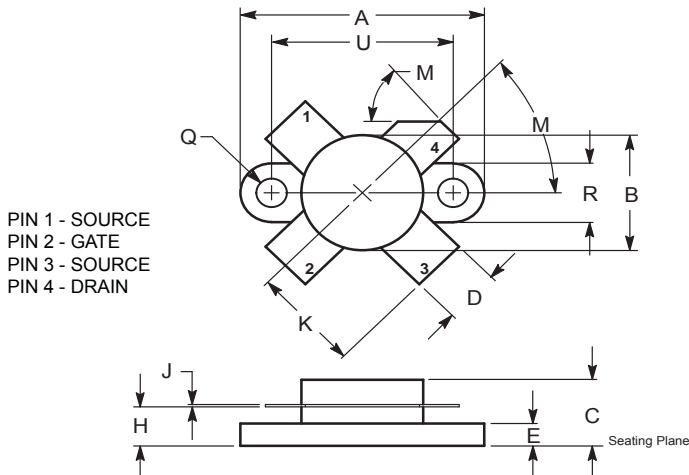
- C1,2,8,9 - ARCO 463 20-180pF
- C3,7 - 120 pF ATC 100B
- C4,11-13 - 0.1uF 100V SMT
- C5 - 1 uF 15WV tant
- C6, C15 - 47pF ATC 100B
- C10 - 150pF ATC 100B
- C14 - 15uF 100V Elect
- W1 W2 - printed line 0.23"x 0.7"
- L1 - 4t #20 ga .25"d x .16"L ~120nH
- L2 - 5t #14 ga .312" dia x .45" ~135nH
- L3 -7 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 ECC
- RFC1 Fair-Rite 2961666631 (VK200-4B)

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



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

Microsemi's products are covered by one or more of U.S. patents 4,895,810 5,045,903 5,089,434 5,182,234 5,019,522 5,262,336 6,503,786 5,256,583 4,748,103 5,283,202 5,231,474 5,434,095 5,528,058 6,939,743, 7,352,045 5,283,201 5,801,417 5,648,283 7,196,634 6,664,594 7,157,886 6,939,743 7,342,262 and foreign patents. US and Foreign patents pending. All Rights Reserved.