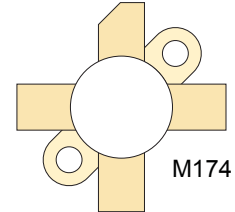



## RF POWER VERTICAL MOSFET

The VRF151 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  $V_{(BR)DSS} = 170V$
- 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
- High Voltage Replacement for MRF151
- RoHS Compliant 

### Maximum Ratings

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


Symbol	Parameter	VRF151	Unit
$V_{DSS}$	Drain-Source Voltage	170	V
$I_D$	Continuous Drain Current @ $T_c = 25^\circ C$	16	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 ( $V_{GS} = 0V, I_D = 100mA$ )	170	180		V
$V_{DS(ON)}$	On State Drain Voltage ( $I_{D(ON)} = 10A, V_{GS} = 10V$ )		2.0	3.0	
$I_{DSS}$	Zero Gate Voltage Drain Current ( $V_{DS} = 100V, V_{GS} = 0V$ )			1	mA
$I_{GSS}$	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			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	$V_{GS} = 0V$ $V_{DS} = 150V$ $f = 1MHz$		375		pF
$C_{oss}$	Output Capacitance			200		
$C_{rss}$	Reverse Transfer Capacitance			12		

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
$G_{PS}$	$f = 175MHz, V_{DD} = 50V, I_{DQ} = 250mA, P_{out} = 150W$		14		
$\eta_D$	$f_1 = 30MHz, f_2 = 30.001MHz, V_{DD} = 50V, I_{DQ} = 250mA, P_{out} = 150W_{PEP}$		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			

Class A Characteristics

Symbol	Test Conditions	Min	Typ	Max	Unit
$G_{PS}$	$f = 30MHz, V_{DD} = 50V, I_{DQ} = 250mA, P_{out} = 150W_{PEP}$		20		dB
IMD <sub>(d3)</sub>	$f = 30MHz, V_{DD} = 50V, I_{DQ}(Max) = 3.75A, P_{out} = 150W_{PEP}$		-50		
IMD <sub>(d9-d13)</sub>	$f = 30MHz, V_{DD} = 50V, I_{DQ} = 250mA, P_{out} = 150W_{PEP}$		-75		

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

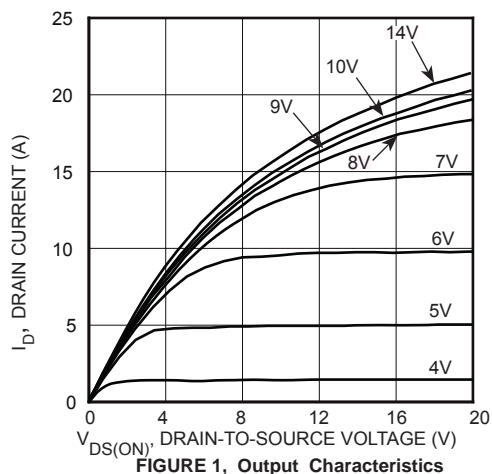


FIGURE 1, Output Characteristics

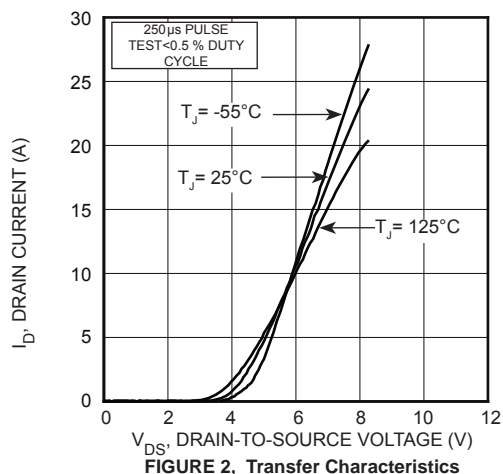


FIGURE 2, Transfer Characteristics

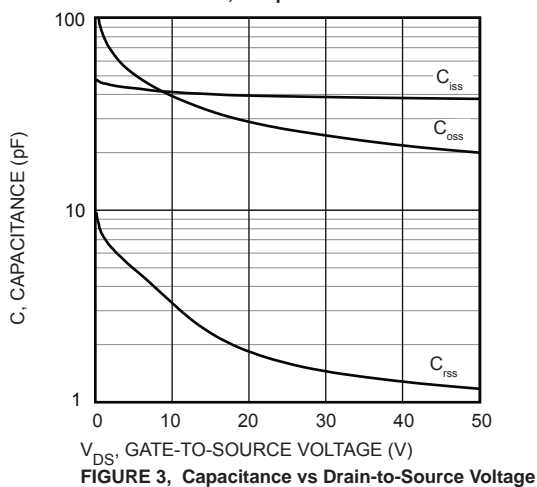


FIGURE 3, Capacitance vs Drain-to-Source Voltage

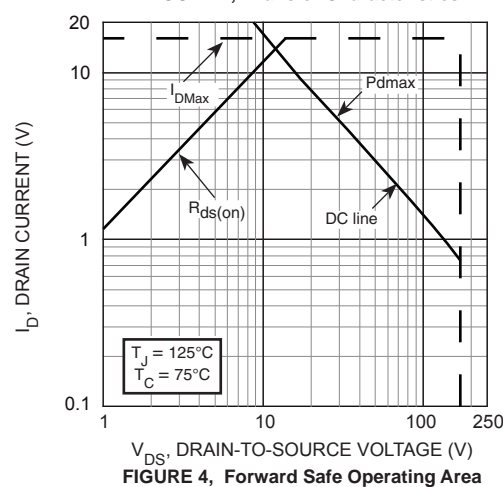


FIGURE 4, Forward Safe Operating Area

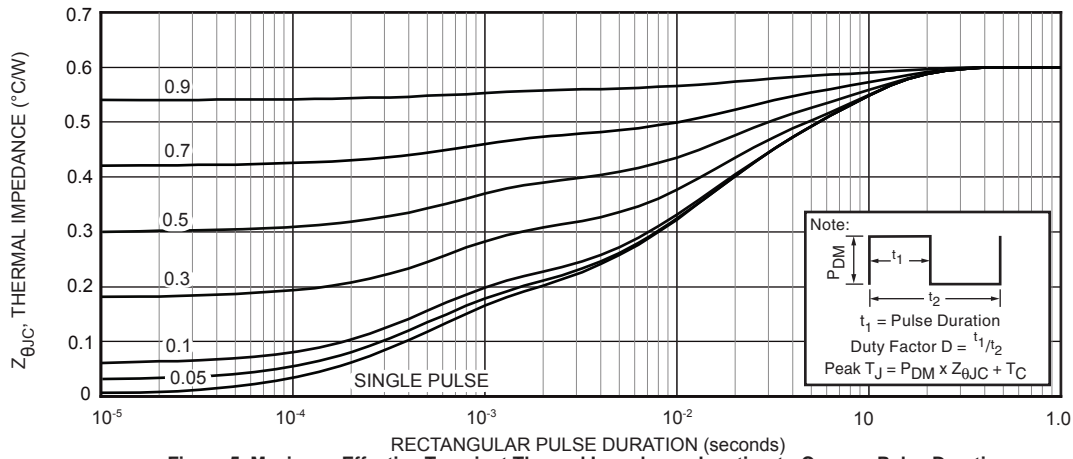


Figure 5. Maximum Effective Transient Thermal Impedance Junction-to-Case vs Pulse Duration

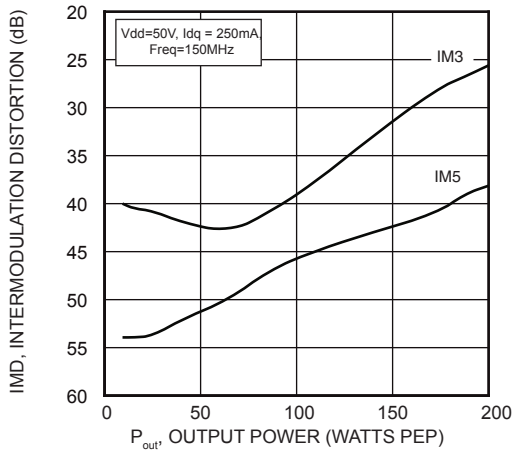


Figure 6. IMD versus P<sub>OUT</sub>

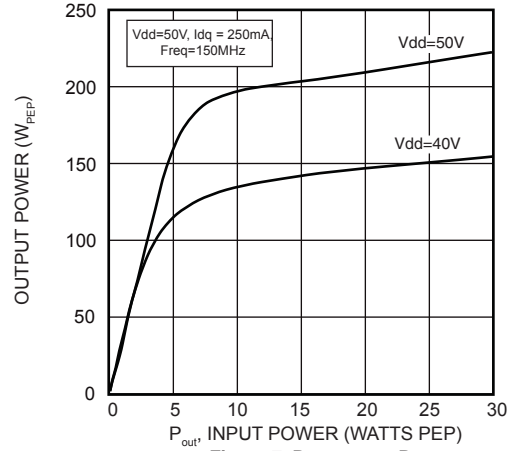
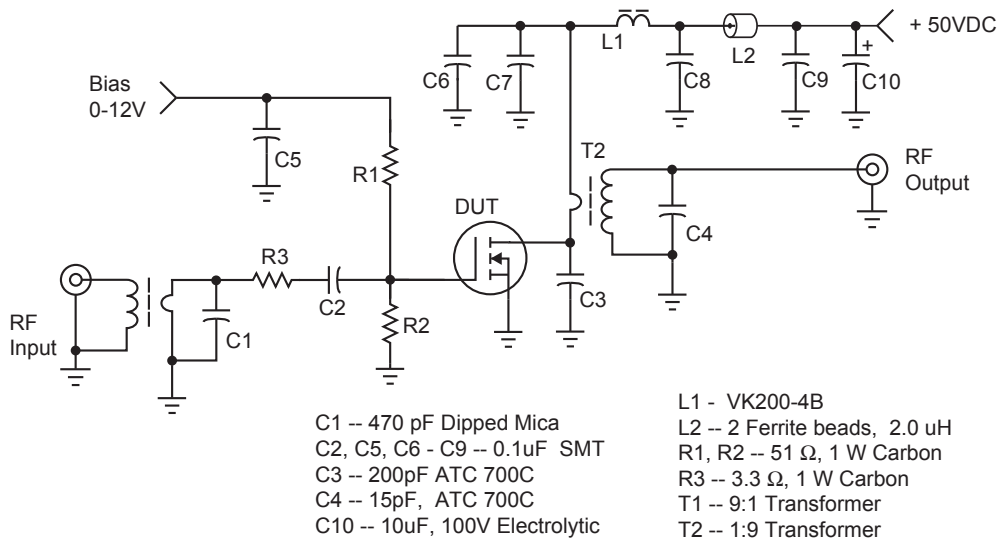
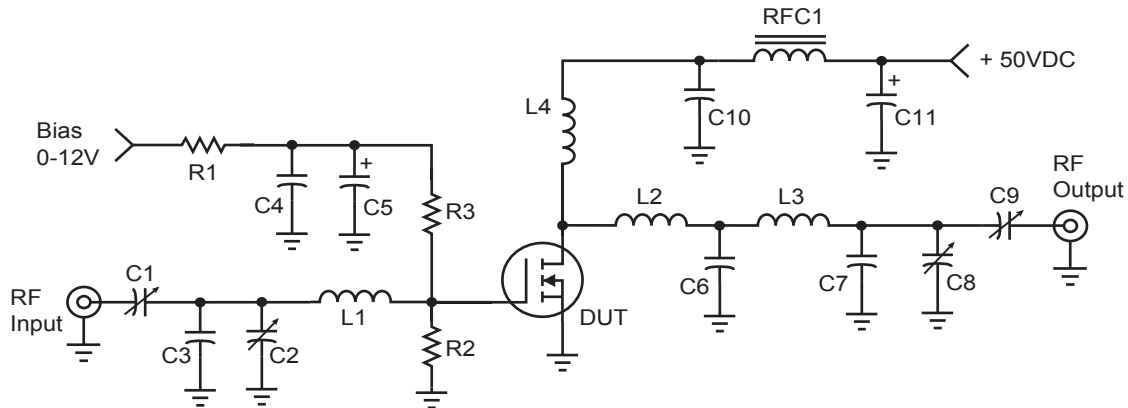


Figure 7. P<sub>OUT</sub> versus P<sub>IN</sub>

30 MHz test Circuit



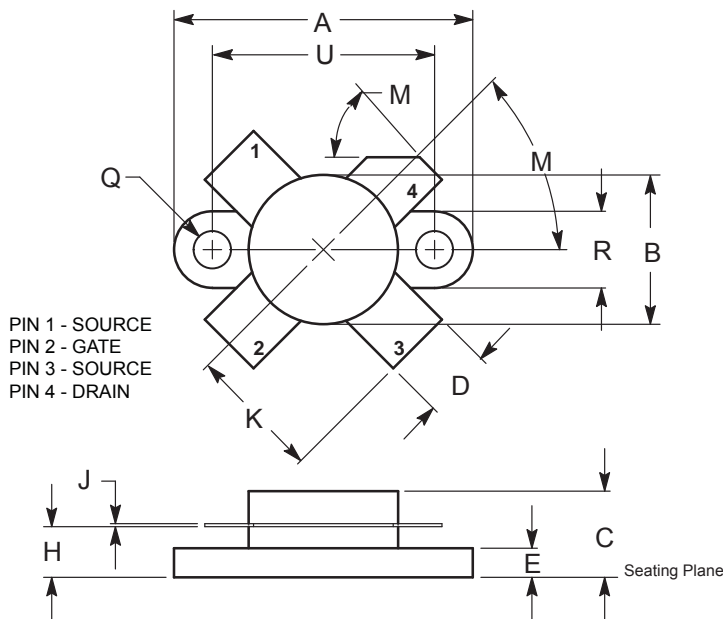
175 MHz test Circuit



- C1, C2, C8 -- Arco 463 or equivalent
- C3 -- 25pF, Unelco
- C4 -- 0.1uF, Ceramic
- C5 -- 1.0 uF, 15 WV Tantalum
- C6 -- 250pF, Unelco J101
- C7-- 25pF, Unelco J101
- C9 -- Arco 262 or equivalent
- C10 -- 0.05uF, Ceramic
- C11 -- 15uF, 60WV Electrolytic

- L1 -- 3/4", #18 into Hairpin
- L2 -- Printed Line, 0.200" W x 0.500" L
- L3 -- 1", #16 into Hairpin approx 16nH
- L4 -- 2 turns #16, 5/16" ID
- RFC1 - VK200-4B
- R1 -- 150  $\Omega$ , 1/2W Carbon
- R2 -- 10k  $\Omega$ , 1/2W Carbon
- R3 -- 120  $\Omega$ , 1/2W Carbon

**.5" SOE Package Outline**  
**All Dimensions are  $\pm .005$**



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

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