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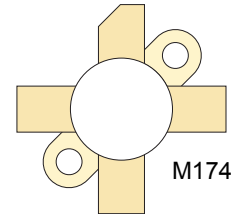
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RF POWER VERTICAL MOSFET

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
- Available in Matched Pairs
- 70:1 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(MP)	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	± 40	V
P_D	Total Device dissipation @ $T_c = 25^\circ C$	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 ($V_{GS} = 0V, I_D = 100mA$)	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 ($V_{GS} = \pm 20V, V_{DS} = 0V$)			1.0	μA
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	°C/W

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

Dynamic Characteristics

VRF151(MP)

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}	$f_1 = 30MHz, f_2 = 30.001MHz, V_{DD} = 50V, I_{DQ} = 250mA, P_{out} = 150W_{PEP}^1$	18	22		dB
G_{PS}	$f = 175MHz, V_{DD} = 50V, I_{DQ} = 250mA, P_{out} = 150W$		14		
η_D	$f_1 = 30MHz, f_2 = 30.001MHz, V_{DD} = 50V, I_{DQ} = 250mA, P_{out} = 150W_{PEP}^1$		50		%
IMD _(d3)	$f_1 = 30MHz, f_2 = 30.001MHz, V_{DD} = 50V, I_{DQ} = 250mA, P_{out} = 150W_{PEP}^1$		-30		dBc
ψ	$f_1 = 50MHz, V_{DD} = 50V, I_{DQ} = 250mA, P_{out} = 150W$ CW 70:1 VSWR - All Phase Angles, 0.2mSec X 20% Duty Factor	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

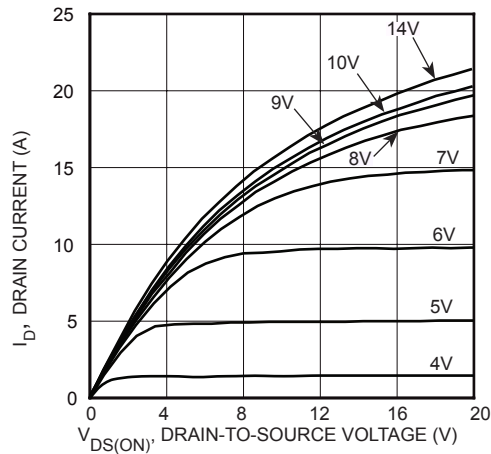


FIGURE 1, Output Characteristics

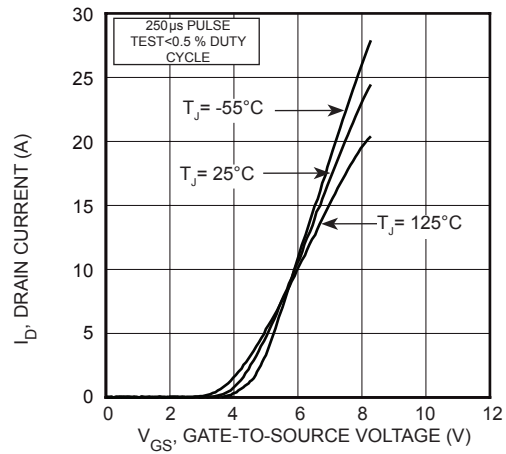


FIGURE 2, Transfer Characteristics

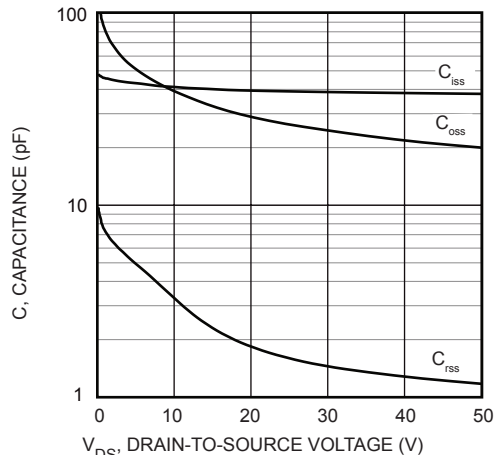


FIGURE 3, Capacitance vs Drain-to-Source Voltage

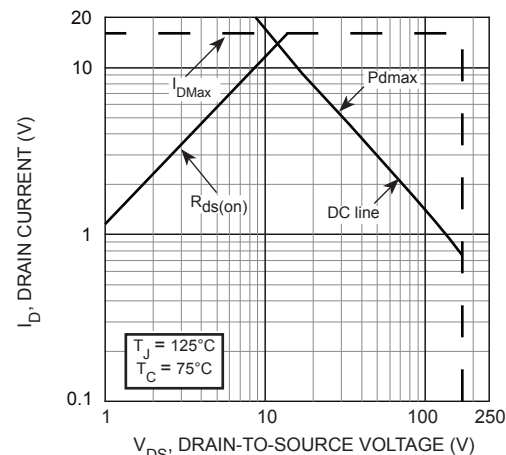


FIGURE 4, Forward Safe Operating Area

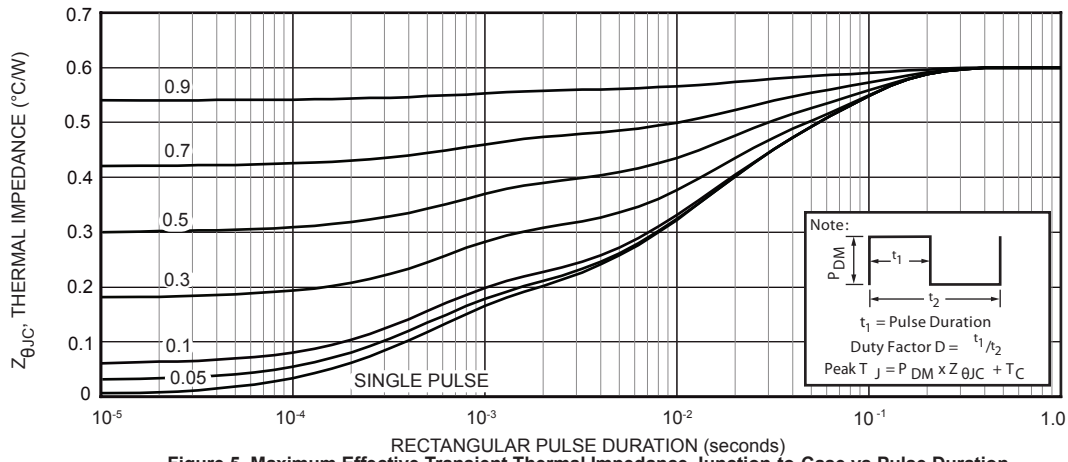


Figure 5. Maximum Effective Transient Thermal Impedance Junction-to-Case vs Pulse Duration

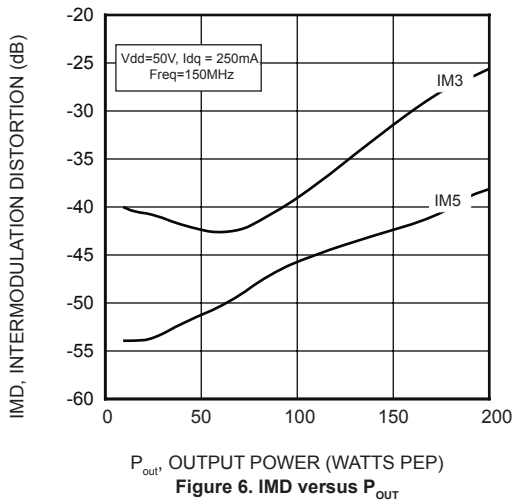


Figure 6. IMD versus P_{OUT}

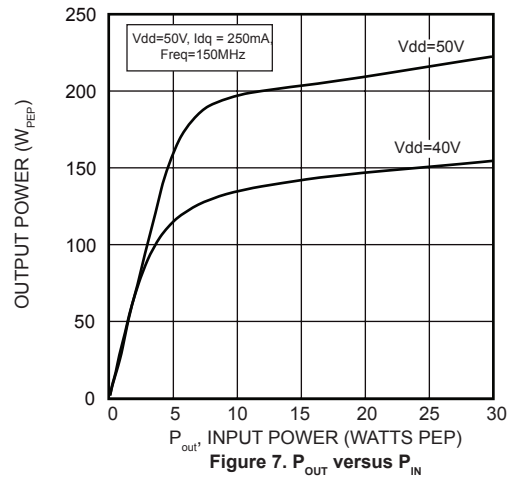
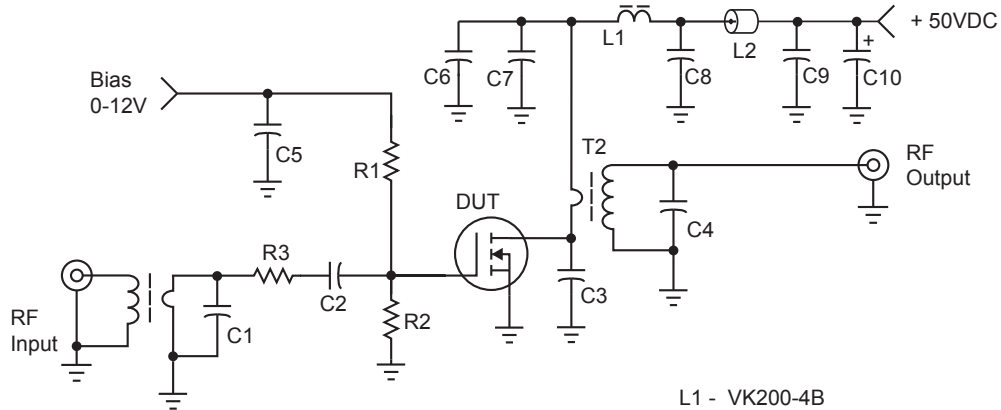


Figure 7. P_{OUT} versus P_{IN}

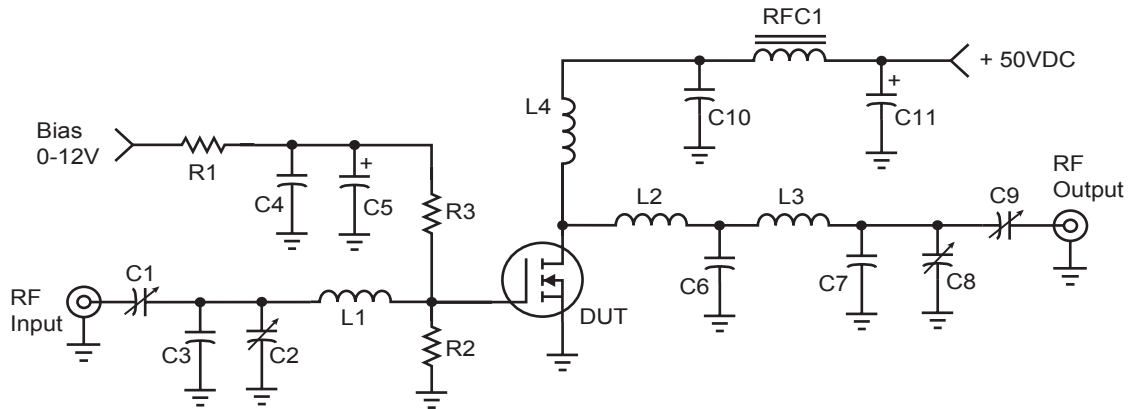
30 MHz test Circuit



C1 -- 470 pF Dipped Mica
 C2, C5, C6 - C9 -- 0.1uF SMT
 C3 -- 200pF ATC 700C
 C4 -- 15pF, ATC 700C
 C10 -- 10uF, 100V Electrolytic

L1 - VK200-4B
 L2 -- 2 Ferrite beads, 2.0 uH
 R1, R2 -- 51 Ω, 1 W Carbon
 R3 -- 3.3 Ω, 1 W Carbon
 T1 -- 9:1 Transformer
 T2 -- 1:9 Transformer

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

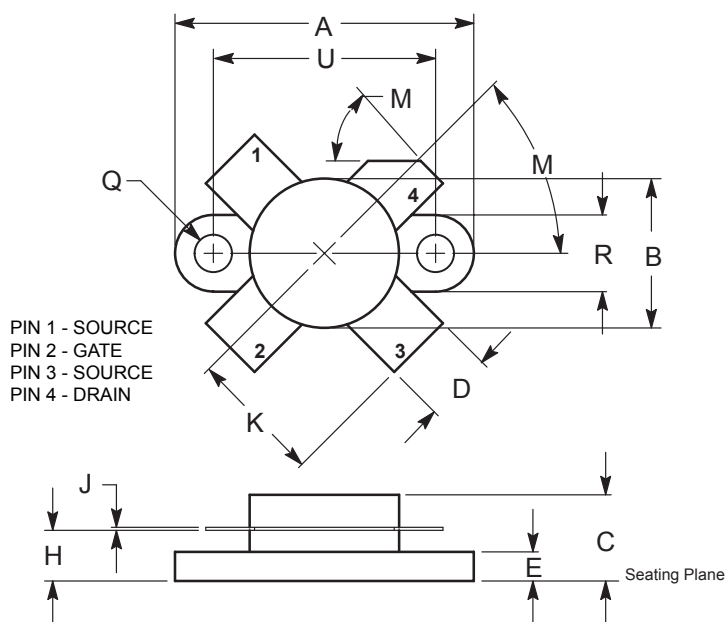
L1 -- 3/4", #18 into Hairpin
 L2 -- Printed Line, 0.200" W x 0.500" L
 L3 -- 1", #16 into Hairpin approx 16nH
 L4 -- 2 turns #16, 5/16" ID
 RFC1 - VK200-4B
 R1 -- 150 Ω, 1/2W Carbon
 R2 -- 10k Ω, 1/2W Carbon
 R3 -- 120 Ω, 1/2W Carbon

Adding MP at the end of P/N specifies a matched pair where $V_{GS(TH)}$ is matched between the two parts. V_{TH} values are marked on the devices per the following table.

Code	Vth Range	Code 2	Vth Range
A	2.900 - 2.975	M	3.650 - 3.725
B	2.975 - 3.050	N	3.725 - 3.800
C	3.050 - 3.125	P	3.800 - 3.875
D	3.125 - 3.200	R	3.875 - 3.950
E	3.200 - 3.275	S	3.950 - 4.025
F	3.275 - 3.350	T	4.025 - 4.100
G	3.350 - 3.425	W	4.100 - 4.175
H	3.425 - 3.500	X	4.175 - 4.250
J	3.500 - 3.575	Y	4.250 - 4.325
K	3.575 - 3.650	Z	4.325 - 4.400

V_{TH} values are based on Microsemi measurements at datasheet conditions with an accuracy of 1.0%.

.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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