# 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.

**Microsemi** 

## **FEATURES**

- Improved Ruggedness V<sub>(BR)DSS</sub> = 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

Maximum Rat	ings All Ratings: T <sub>c</sub> =	All Ratings: T <sub>c</sub> =25°C unless otherwise specified				
Symbol	Parameter	VRF151(MP)	Unit			
V <sub>DSS</sub>	Drain-Source Voltage	170	V			
Ι <sub>D</sub>	Continuous Drain Current @ $T_c = 25^{\circ}C$	16	А			
V <sub>GS</sub>	Gate-Source Voltage	±40	V			
P <sub>D</sub>	Total Device dissipation @ $T_c$ = 25°C	300	W			
T <sub>stg</sub>	Storage Temperature Range	-65 to 150	°C			
T	Operating Junction Temperature	200				

Nitride Passivated

RoHS Compliant

• Refractory Gold Metallization

• High Voltage Replacement for MRF151

## **Static Electrical Characteristics**

Symbol	Parameter	Min	Тур	Max	Unit
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage ( $V_{GS}$ = 0V, $I_{D}$ = 100mA)	170	180		V
V <sub>DS(ON)</sub>	On State Drain Voltage ( $I_{D(ON)}$ = 10A, $V_{GS}$ = 10V)		2.0	3.0	v
I <sub>DSS</sub>	Zero Gate Voltage Drain Current ( $V_{DS}$ = 100V, $V_{GS}$ = 0V)			1	mA
I <sub>GSS</sub>	Gate-Source Leakage Current ( $V_{GS}$ = ±20V, $V_{DS}$ = 0V)			1.0	μA
9 <sub>fs</sub>	Forward Transconductance ( $V_{DS}$ = 10V, $I_{D}$ = 5A)	5.0			mhos
V <sub>GS(TH)</sub>	Gate Threshold Voltage ( $V_{DS}$ = 10V, $I_{D}$ = 100mA)	2.9	3.6	4.4	V

## **Thermal Characteristics**

Symbol	Characteristic	Min	Тур	Max	Unit
R <sub>θJC</sub>	Junction to Case Thermal Resistance			0.60	°C/W

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

## VRF151 VRF151MP

50V, 150W, 175MHz



## **Dynamic Characteristics**

Symbol	Parameter	Test Conditions	Min	Тур	Max	Unit
C <sub>ISS</sub>	Input Capacitance	V <sub>GS</sub> = 0V		375		
C <sub>oss</sub>	Output Capacitance	V <sub>DS</sub> = 150V		200		pF
C <sub>rss</sub>	Reverse Transfer Capacitance	f = 1MHz		12		

## **Functional Characteristics**

Symbol	Parameter	Min	Тур	Max	Unit
G <sub>PS</sub>	$f_1 = 30MHz, f_2 = 30.001MHz, V_{DD} = 50V, I_{DQ} = 250mA, P_{out} = 150W_{PEP}^{-1}$	18	22		dB
G <sub>PS</sub>	f = 175MHz, V <sub>DD</sub> = 50V, I <sub>DQ</sub> = 250mA, P <sub>out</sub> = 150W		14		uв
$\eta_{\rm D}$	$f_1 = 30MHz, f_2 = 30.001MHz, V_{DD} = 50V, I_{DQ} = 250mA, P_{out} = 150W_{PEP 1}$		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
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		Power	

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

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## **Typical Performance Curves**







## 30 MHz test Circuit



175 MHz test Circuit



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
А	2.900 - 2.975	М	3.650 - 3.725
В	2.975 - 3.050	Ν	3.725 - 3.800
С	3.050 - 3.125	Р	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	Т	4.025 - 4.100
G	3.350 - 3.425	W	4.100 - 4.175
Н	3.425 - 3.500	Х	4.175 - 4.250
J	3.500 - 3.575	Y	4.250 - 4.325
К	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 ± .005



	INCHES		MILLIMETERS		
DIM	MIN	MAX	MIN	MAX	
A	0.096	0.990	24.39	25.14	
В	0.465	0.510	11.82	12.95	
С	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	
н	0.144	0.178	3.66	4.52	
J	0.003	0.007	0.08	0.17	
к	0.435		11.0		
м	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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