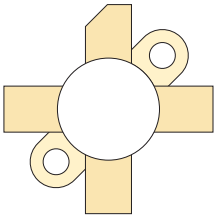
VRF141

28V, 150W, 175MHz

RF POWER VERTICAL MOSFET

The VRF141 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 $V_{(BR)DSS}$ = 80 V**
- **150W with 22dB Typical Gain @ 30MHz, 28V**
- **150W with 13dB Typical Gain @ 175MHz, 28V**
- **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 MRF141**
- **RoHS Compliant**

Maximum Ratings

All Ratings: T_C =25°C unless otherwise specified

Symbol	Parameter	VRF141	Unit
V_{DSS}	Drain-Source Voltage	80	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 = 100mA)	80			V
$V_{DS(ON)}$	On State Drain Voltage ($I_{D(ON)}$ = 10A, V_{GS} = 10V)		0.9	1.0	
I_{DSS}	Zero Gate Voltage Drain Current (V_{DS} = 60V, V_{GS} = 0V)			1.0	mA
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			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

VRF141

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	V_{GS} = 0V		400		pF
C_{oss}	Output Capacitance	V_{DS} = 28V		375		
C_{rss}	Reverse Transfer Capacitance	f = 1MHz		50		

Functional Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
G_{PS}	f_1 = 30MHz, f_2 = 30.001MHz, V_{DD} = 28V, I_{DQ} = 250mA, P_{out} = 150W_{PEP}	16	20		dB
G_{PS}	f_1 = 175MHz, V_{DD} = 28V, I_{DQ} = 250mA, P_{out} = 150W		10		
η	f_1 = 30MHz, f_2 = 30.001MHz ,V_{DD} = 28V, I_{DQ} = 250mA, P_{out} = 150W_{PEP}	40	45		%
$IMD_{(d3)}$	f_1 = 30MHz, f_2 = 30.001MHz, V_{DD} = 28V, I_{DQ} = 250mA, P_{out} = 150W_{PEP} [1]		-30	-28	dB
$IMD_{(d11)}$	f_1 = 30MHz, f_2 = 30.001MHz, V_{DD} = 28V, I_{DQ} = 250mA, P_{out} = 150W_{PEP}		-60		
ψ	f_1 = 30MHz, f_2 = 30.001MHz, V_{DD} = 28V, 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_1 = 30MHz, f_2 = 30.001MHz ,V_{DD} = 28V, I_{DQ} = 4.0A, P_{out} = 50W_{PEP}		23		dB
$IMD_{(d3)}$	f_1 = 30MHz, f_2 = 30.001MHz ,V_{DD} = 28V, I_{DQ} = 4.0A, P_{out} = 50W_{PEP}		-50		
$IMD_{(d9\text{-}d13)}$	f_1 = 30MHz, f_2 = 30.001MHz ,V_{DD} = 28V, I_{DQ} = 4.0A, P_{out} = 50W_{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

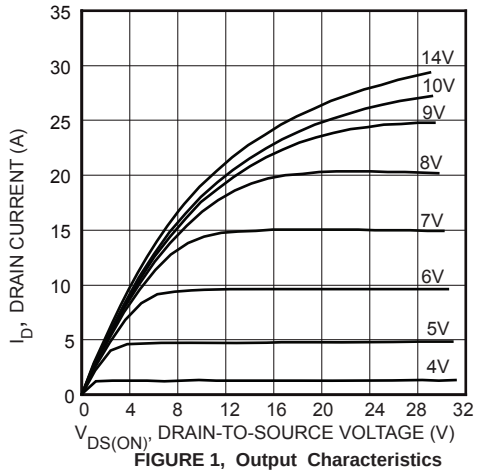


FIGURE 1, Output Characteristics

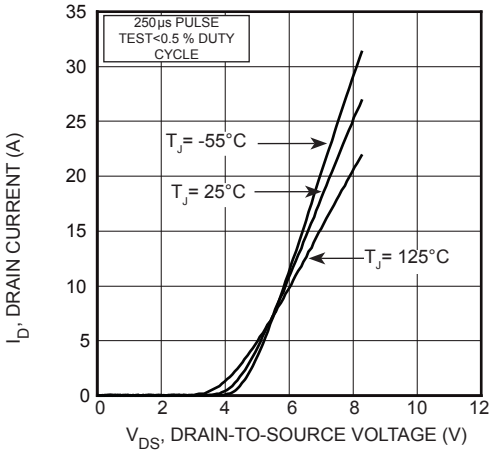


FIGURE 2, Transfer Characteristics

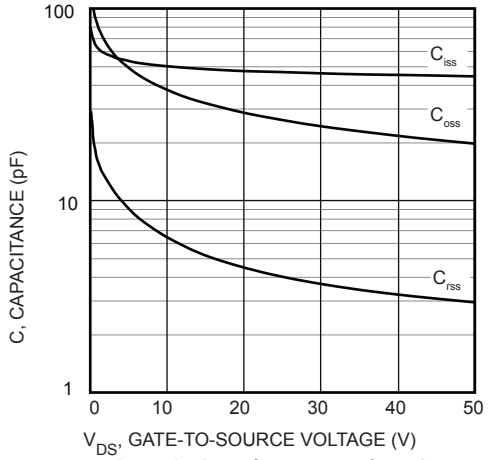


FIGURE 3, Capacitance vs Drain-to-Source Voltage

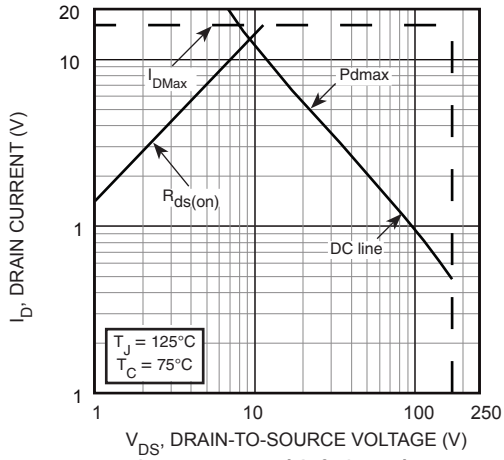


FIGURE 4, Forward Safe Operating Area

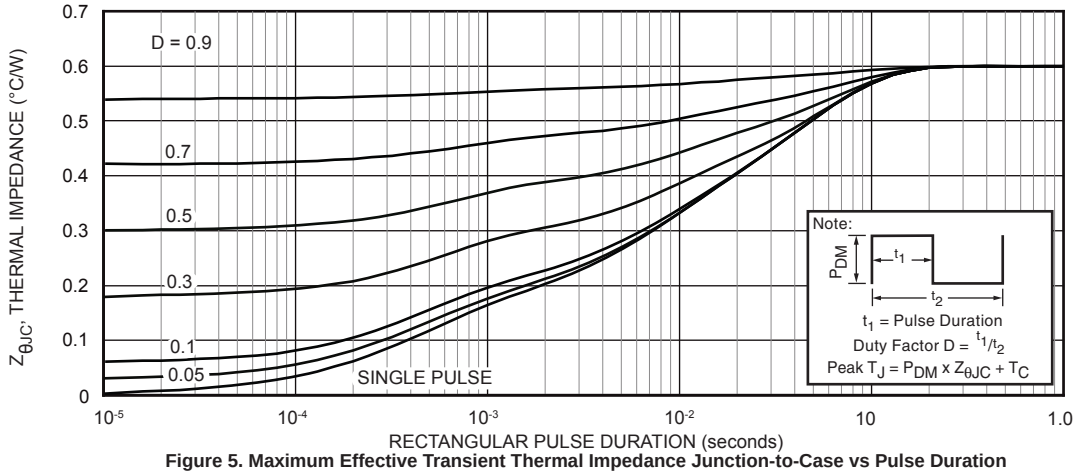


Figure 5. Maximum Effective Transient Thermal Impedance Junction-to-Case vs Pulse Duration

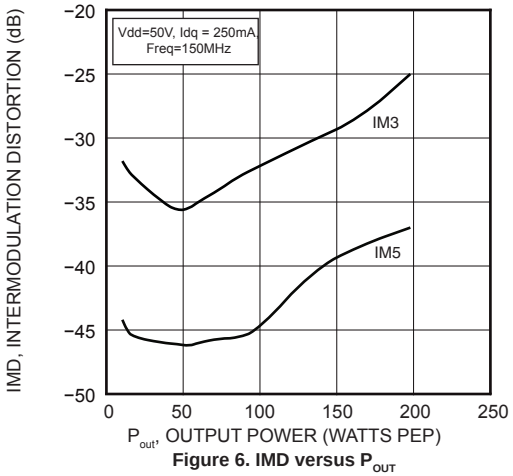


Figure 6. IMD versus P_{OUT}

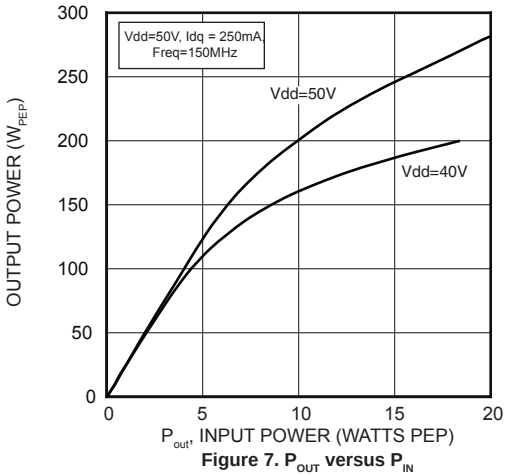
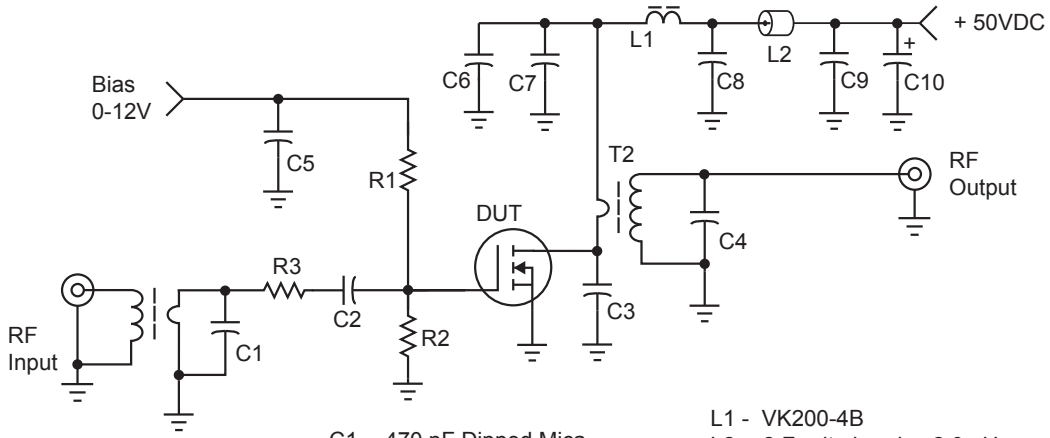


Figure 7. P_{OUT} versus P_{IN}

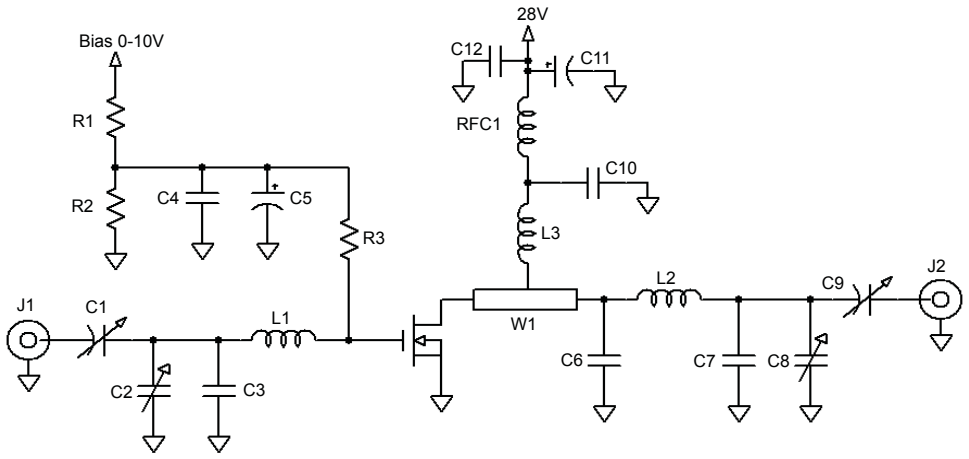
30 MHz test Circuit



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

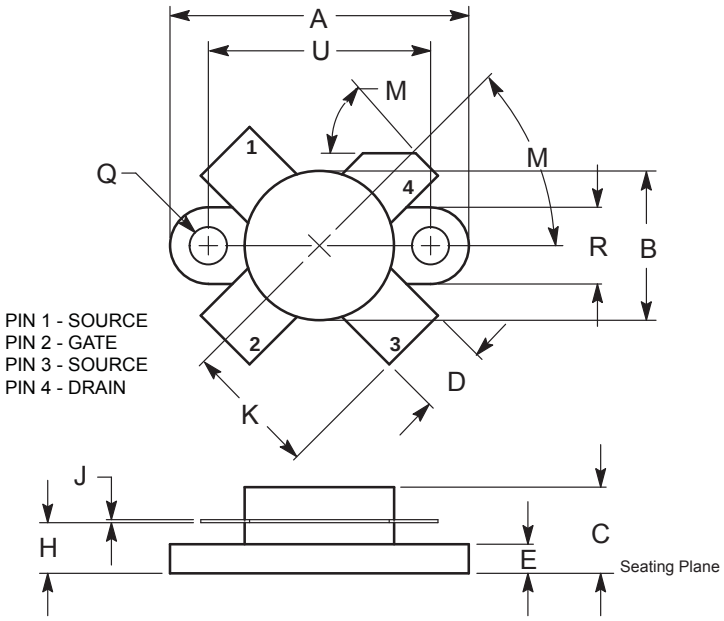
L1 - VK200-4B
L2 -- 2 Ferrite beads, 2.0 uH
R1, R2 -- 51 Ω, 1 W Carbon
R3 -- 3.3 Ω, 1 W Carbon
T1 -- 9:1 Transformer
T2 -- 1:9 Transformer

175 MHz test Circuit



M174 Package Outline .5" SOE

All Dimensions to be ±.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