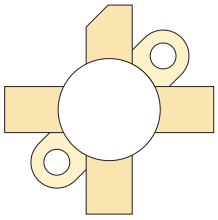
VRF141

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

Dynamic Characteristics

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		

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

Microsemi Website - http://www.microsemi.com

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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

Typical Performance Curves

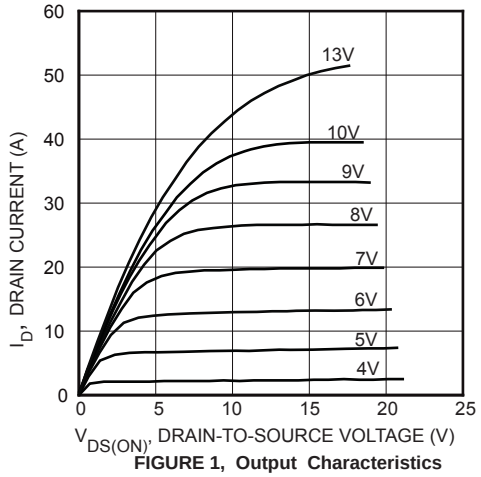


FIGURE 1, Output Characteristics

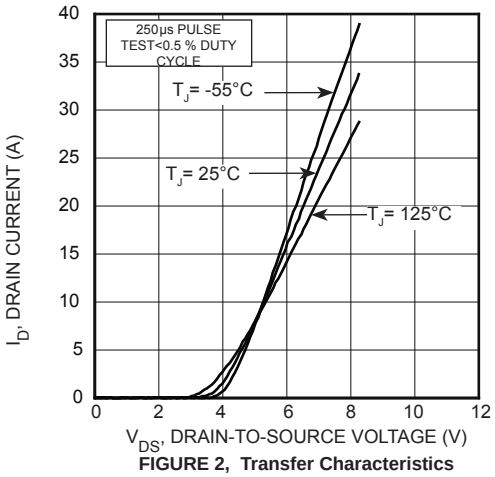


FIGURE 2, Transfer Characteristics

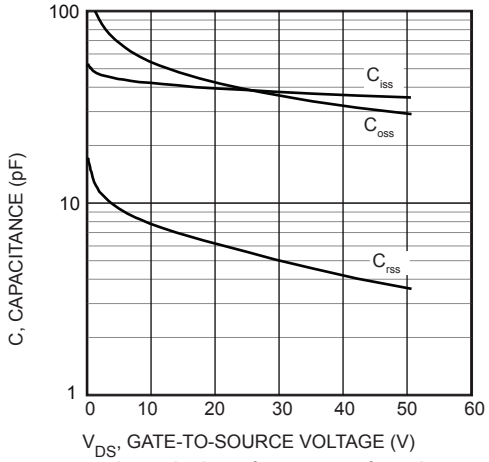


FIGURE 3, Capacitance vs Drain-to-Source Voltage

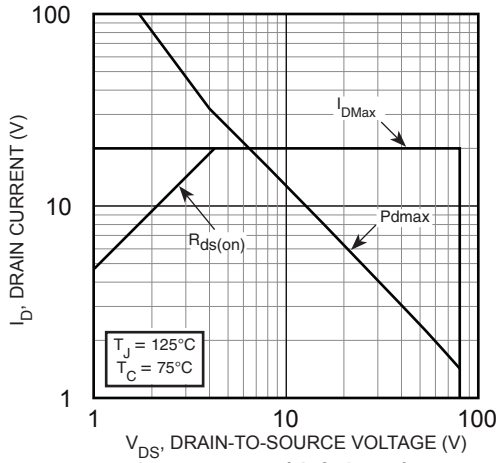


FIGURE 4, Forward Safe Operating Area

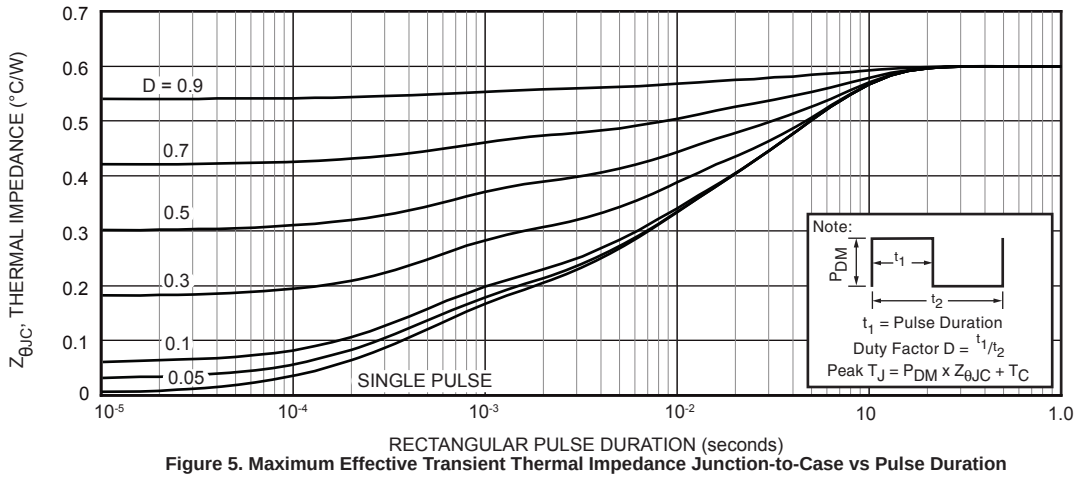


Figure 5. Maximum Effective Transient Thermal Impedance Junction-to-Case vs Pulse Duration

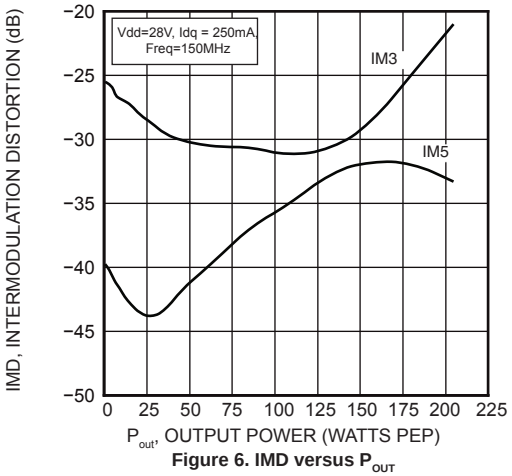


Figure 6. IMD versus P_{OUT}

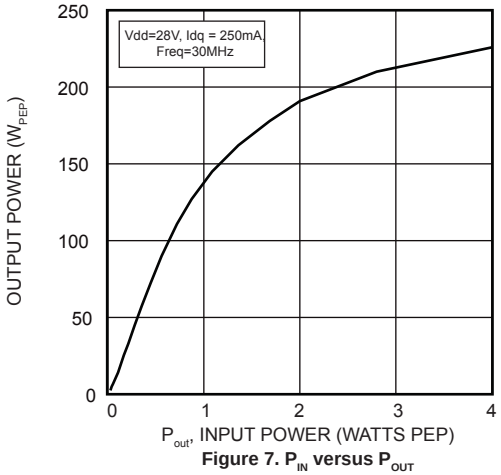


Figure 7. P_{IN} versus P_{OUT}

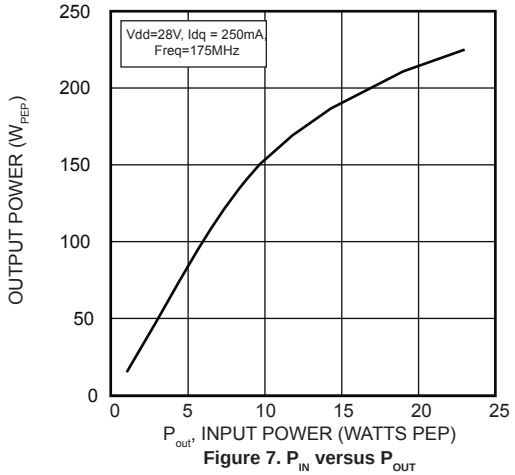
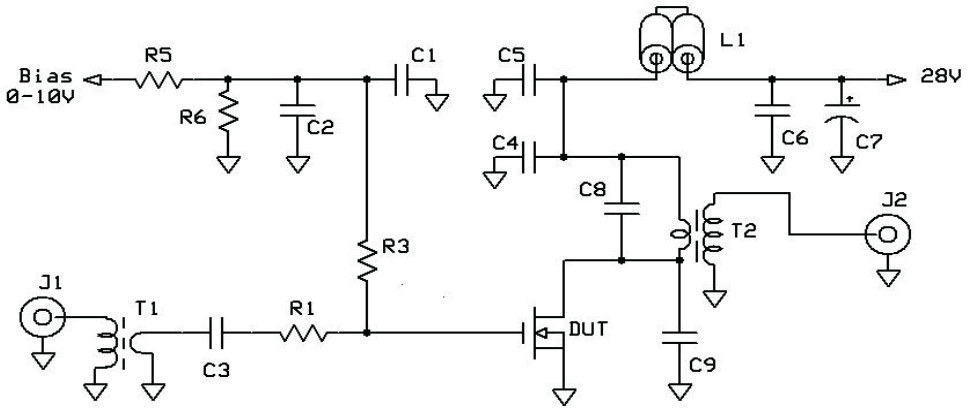


Figure 7. P_{IN} versus P_{OUT}

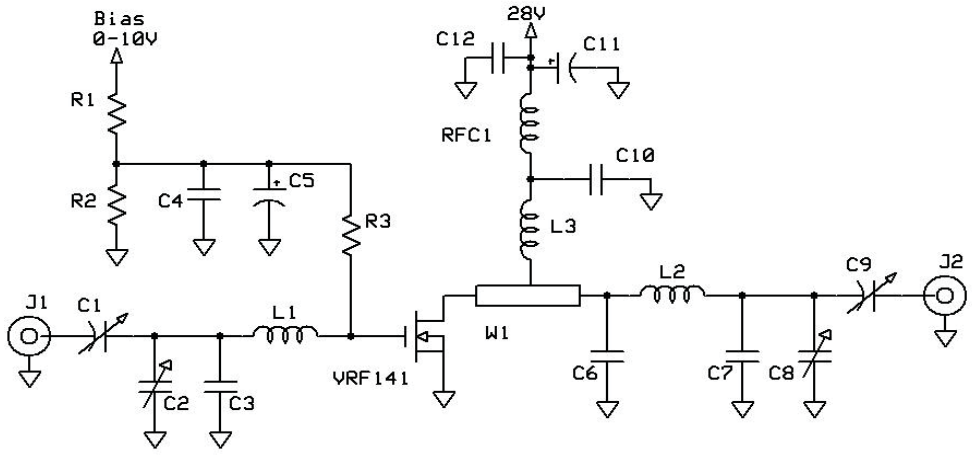
30 MHz test Circuit



C1 - 1uF 50V tantalum
C2-C6 - 0.1uF 100V SMT
C7 - 15uF 100V Elect
C8 - 820 pF ATC 100B
T1 - 16:1 bead/tube transformer
T2 = 1:25 bradband bead/tube transformer u=125

C9 - 100 pF ATC 100B
L1 - two ferrite beads on #18
R1 - 1 ohm 1 W SMT
R3 - 200 ohm 1/2 Carbn
R4 - 470 ohm 1W
R5 R6 - 2200 ohm 1/4W

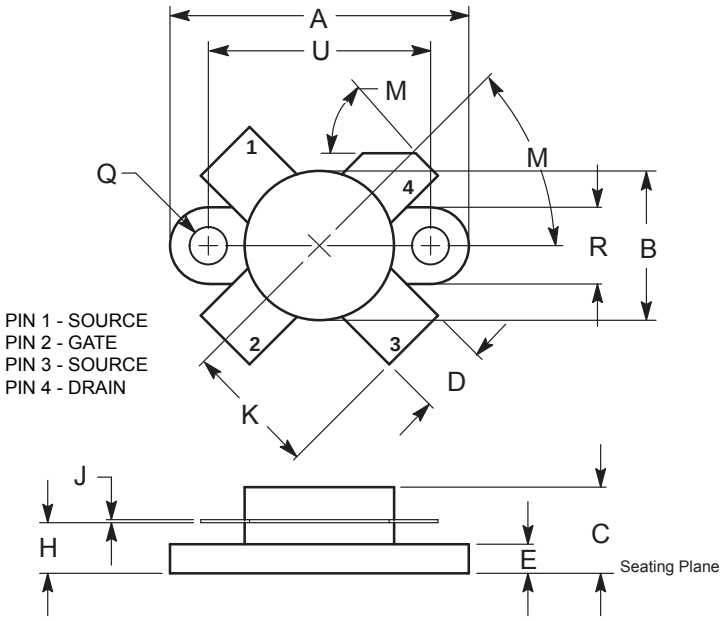
175 MHz test Circuit



C1, 2, 8, 9 - ARCO 463
C3 C7 - 25 pF ATC 100B
C4 C10 C12 - 0.1uF 100V SMT
C5 - 1 uF 15WV tant
C6 - 270 pF ATC 100B
C10 - .05 100V 1206 SMT
C11 - 15uF 100V Elect

L1 - 3/4" #18 ga into Hairpin
W1 - printed line 0.23"W x 0.7" L
L2 - 2t #16 ga .25" dia x .25" ~ 35nH
L3 -2 turns #16 ga 5/16" ID tight. ~ 50nH
R1 R2 - 2.2k ohm 1/4W
R3 - 150 ohm 1/4W
RFC1 Fair-Rite 2961666631 (WK200-4B)

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

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