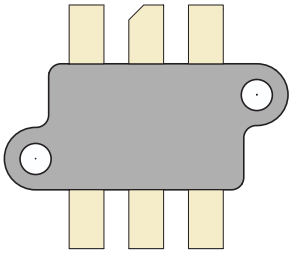
VRF191

100V, 150W, 150MHz

RF POWER VERTICAL MOSFET

The VRF191 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.



T11

FEATURES

- **Improved Ruggedness $V_{(BR)DSS}$ = 270V min**
- **150W with 22dB Typical Gain @ 30MHz, 100V**
- **150W with 14dB Typical Gain @ 150MHz, 100V**
- **Excellent Stability & Low IMD**
- **Common Source Configuration**
- **RoHS Compliant**
- **5:1 Load VSWR Capability at Specified Operating Conditions**
- **Nitride Passivated**
- **Refractory Gold Metallization**
- **High Performance Flangeless Package**

Maximum Ratings

All Ratings: T_C =25°C unless otherwise specified

Symbol	Parameter	VRF191	Unit
V_{DSS}	Drain-Source Voltage	270	V
I_D	Continuous Drain Current @ T_C = 25°C	12	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 200	°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)	270	280		V
$V_{DS(ON)}$	On State Drain Voltage ($I_{D(ON)}$ = 5A, V_{GS} = 10V)		3.5	5.0	
I_{DSS}	Zero Gate Voltage Drain Current (V_{DS} = 200V, 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)	4.0	6		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			0.35	
$R_{\theta JS}$	Junction to Sink (Use high efficiancy thermal joint compound and planar heat sink surface.)		.45		°C/W

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

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Dynamic Characteristics

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Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	V_{GS} = 0V		460		pF
C_{oss}	Output Capacitance	V_{DS} = 100V		80		
C_{rss}	Reverse Transfer Capacitance	f = 1MHz		6		

Functional Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
G_{PS}	f_1 = 30MHz, V_{DD} = 100V, I_{DQ} = 250mA, P_{out} = 150W	18	22		dB
G_{PS}	f_1 = 150MHz, V_{DD} = 100V, I_{DQ} = 250mA, P_{out} = 150W		14		
η_D	f_1 = 30MHz, V_{DD} = 100V, I_{DQ} = 250mA, P_{out} = 150W		50		%
ψ	f_1 = 30MHz, V_{DD} = 100V, I_{DQ} = 250mA, P_{out} = 150W 5:1 VSWR - All Phase Angles	No Degradation in Output Power			

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

Typical Performance Curves

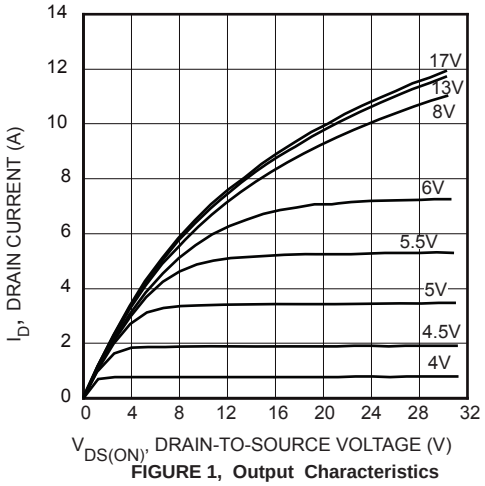


FIGURE 1, Output Characteristics

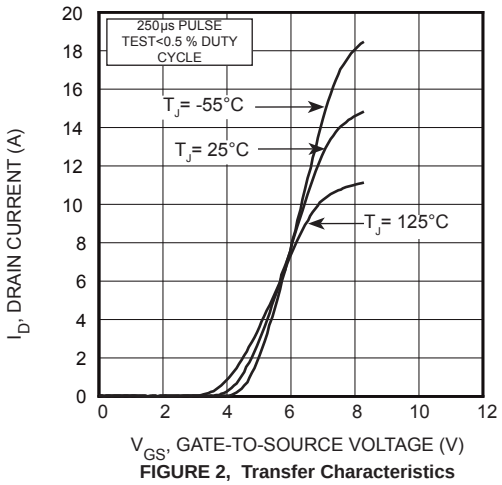


FIGURE 2, Transfer Characteristics

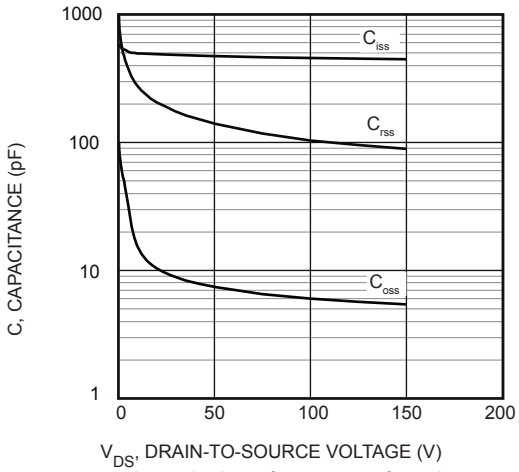


FIGURE 3, Capacitance vs Drain-to-Source Voltage

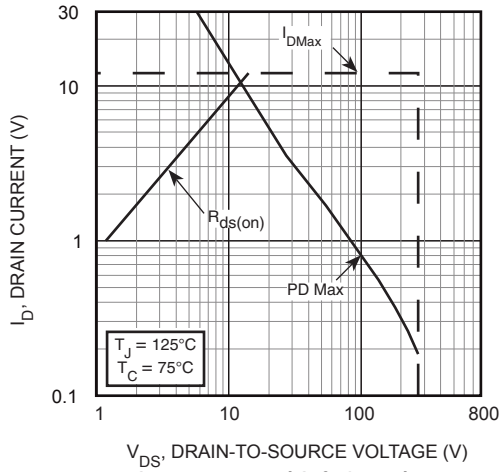


FIGURE 4, Forward Safe Operating Area

Typical Performance Curves

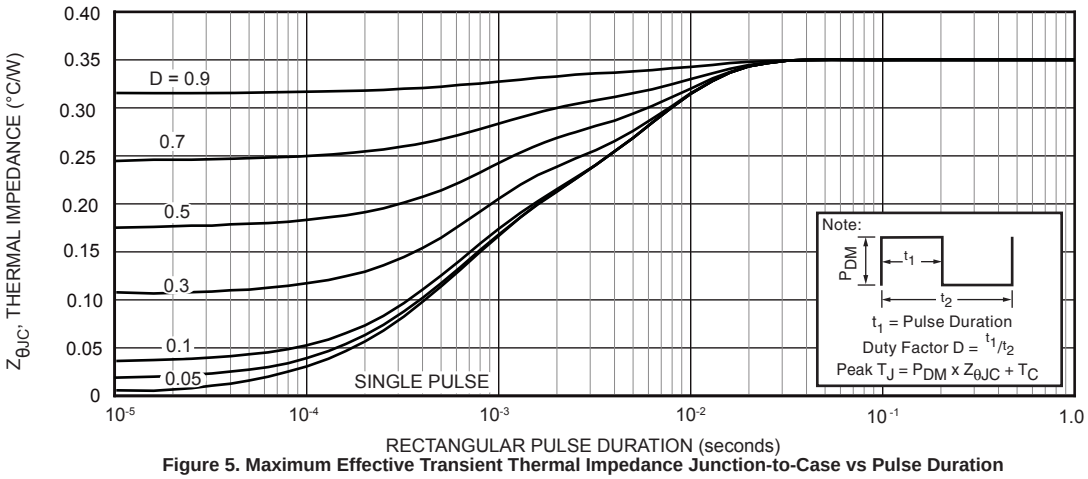


Figure 5. Maximum Effective Transient Thermal Impedance Junction-to-Case vs Pulse Duration

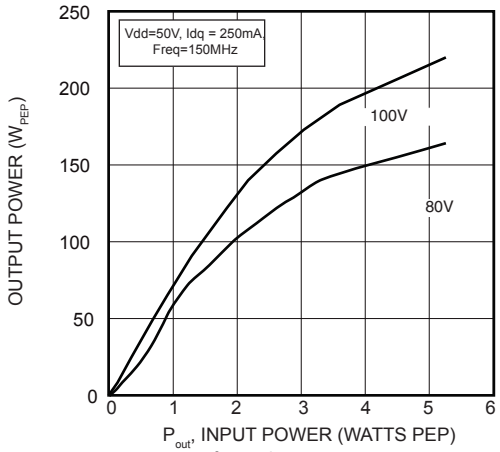
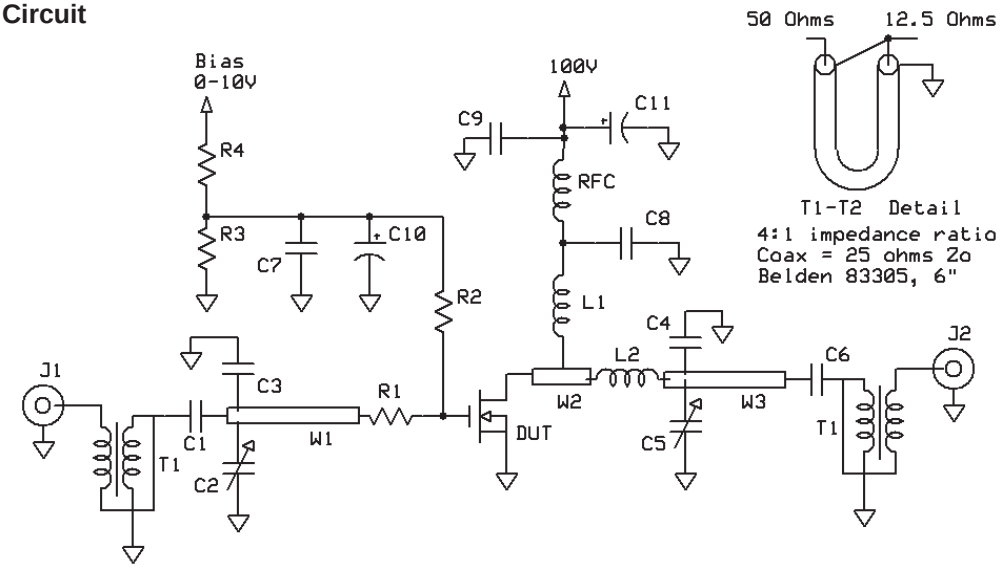


Figure 6. P_{OUT} versus P_{IN}

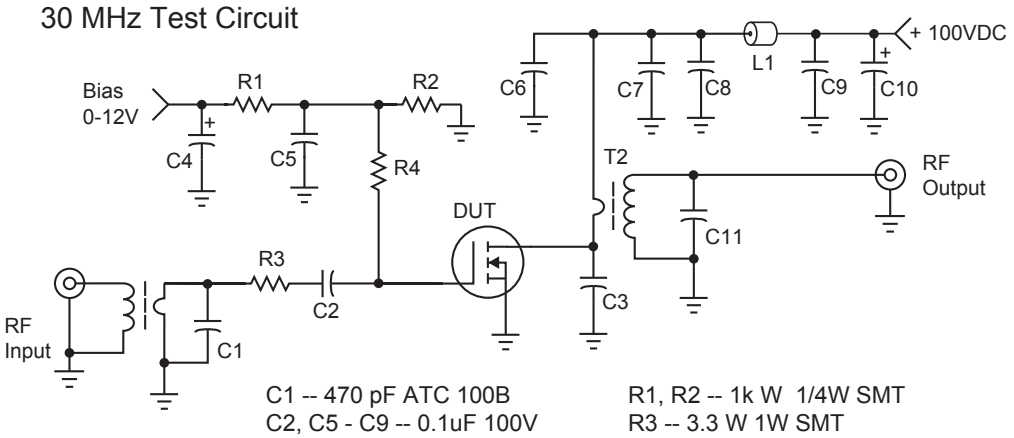
150 MHz Test Circuit



C1, C6 - 910pF ATC 100B
C2, C5 - ARCO 406 ~70pF
C3 - 110 pF ATC 100B
C4 - 120 pF ATC 100B
C7-C9 - 0.1uF 100V 1206 SMT
C10 - 1 uF 15 WV tant
C11 - 15uF 100V Elect
L1 - 6t #18 0.25" dia tight
L2 - 1.2" #16 into hairpin 18 nH

R1 - 1 ohm 1W SMT
R2 - R4 - 2200 ohm 1/4W
RFC Fair-Rite 2961666631 (YK200-4B)
T1 T2 - 4:1 transformer - see detail
W1 Stripline .25 x 1"
W2 Stripline .25 x 0.50"
W3 Stripline .25" x 75" (30 ohm)
DUT - VRF191

30 MHz Test Circuit



C1 -- 470 pF ATC 100B
C2, C5 - C9 -- 0.1uF 100V
C3 -- 180pF metal-clad mica
C4 -- 33uF 35V Electrolytic
C10 -- 10uF, 100V Electrolytic
C11 -- 15pF, ATC 100B
L1 -- 2 Ferrite beads, 2.0 uH

R1, R2 -- 1k W 1/4W SMT
R3 -- 3.3 W 1W SMT
R4 -- 1k W 1/4W
T1 -- 9:1 Transformer
T2 -- 1:2 Transformer, 2t:3t
DUT -- VRF191

T11 Package Outline