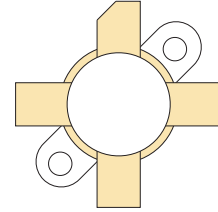



RF POWER VERTICAL MOSFET

The VRF2933 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 $V_{(BR)DSS} = 170V$
- 300W with 20dB Min. Gain @ 30MHz, 50V
- Excellent Stability & Low IMD
- Common Source Configuration
- RoHS Compliant 
- 3:1 Load VSWR Capability at Specified Operating Conditions
- Nitride Passivated
- Refractory Gold Metallization
- Improved Replacement for SD2933
- Thermally Enhanced Package

Maximum Ratings

All Ratings: $T_c = 25^\circ C$ unless otherwise specified

Symbol	Parameter	VRF2933	Unit
V_{DSS}	Drain-Source Voltage	170	V
I_D	Continuous Drain Current @ $T_c = 25^\circ C$	40	A
V_{GS}	Gate-Source Voltage	± 40	V
P_D	Total Device dissipation @ $T_c = 25^\circ C$	648	W
T_{STG}	Storage Temperature Range	-65 to 150	°C
T_J	Operating Junction Temperature Max	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 ($I_{D(ON)} = 20A, V_{GS} = 10V$)		2.0	5.0	
I_{DSS}	Zero Gate Voltage Drain Current ($V_{DS} = 100V, V_{GS} = 0V$)			2.0	mA
I_{GSS}	Gate-Source Leakage Current ($V_{DS} = \pm 20V, V_{GS} = 0V$)			2.0	μA
g_{fs}	Forward Transconductance ($V_{DS} = 10V, I_D = 20A$)	8			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			0.27	°C/W

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

Dynamic Characteristics

VRF2933

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0V$		740		pF
C_{oss}	Output Capacitance	$V_{DS} = 50V$		400		
C_{rss}	Reverse Transfer Capacitance	$f = 1MHz$		32		

Functional Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
G_{PS}	$f_1 = 30MHz, V_{DD} = 50V, I_{DQ} = 250mA, P_{out} = 300W$	18	22		dB
η_D	$f_1 = 175MHz, V_{DD} = 50V, I_{DQ} = 250mA, P_{out} = 300W$		50		%
Ψ	$f_1 = 30MHz, V_{DD} = 50V, I_{DQ} = 250mA, P_{out} = 300W$ 3:1 VSWR - All Phase Angles	No Degradation in Output Power			

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

Microsemi reserves the right to change, without notice, the specifications and information contained herein.

Typical Performance Curves

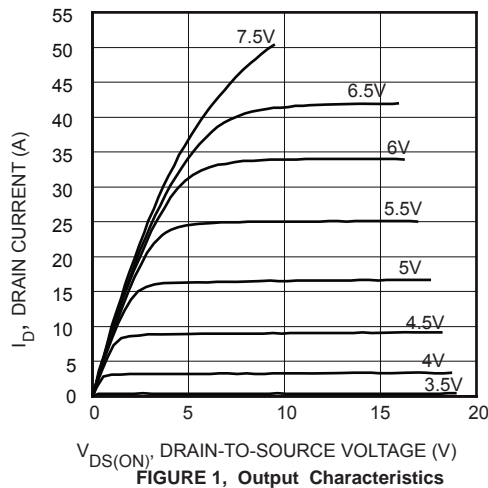


FIGURE 1, Output Characteristics

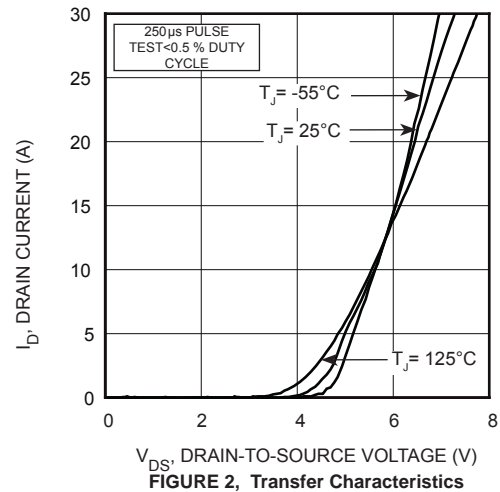


FIGURE 2, Transfer Characteristics

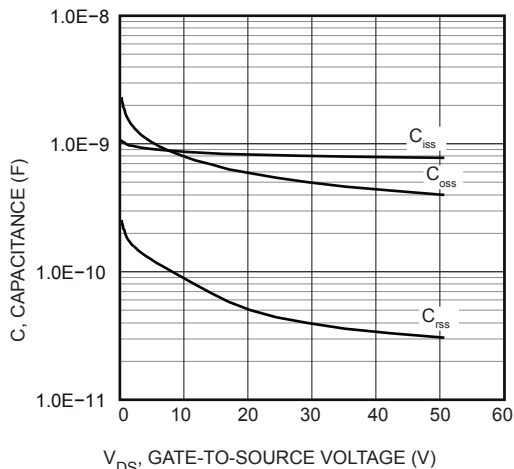


FIGURE 3, Capacitance vs Drain-to-Source Voltage

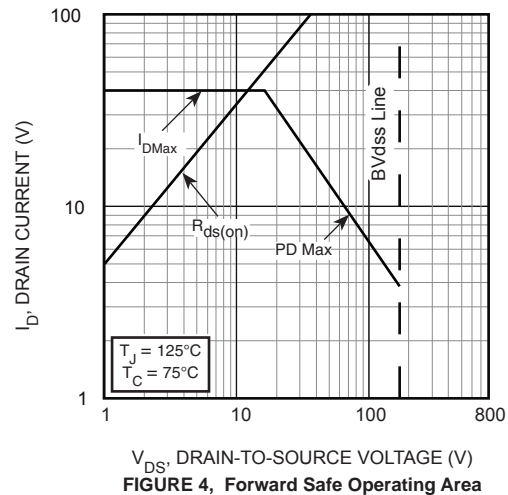


FIGURE 4, Forward Safe Operating Area

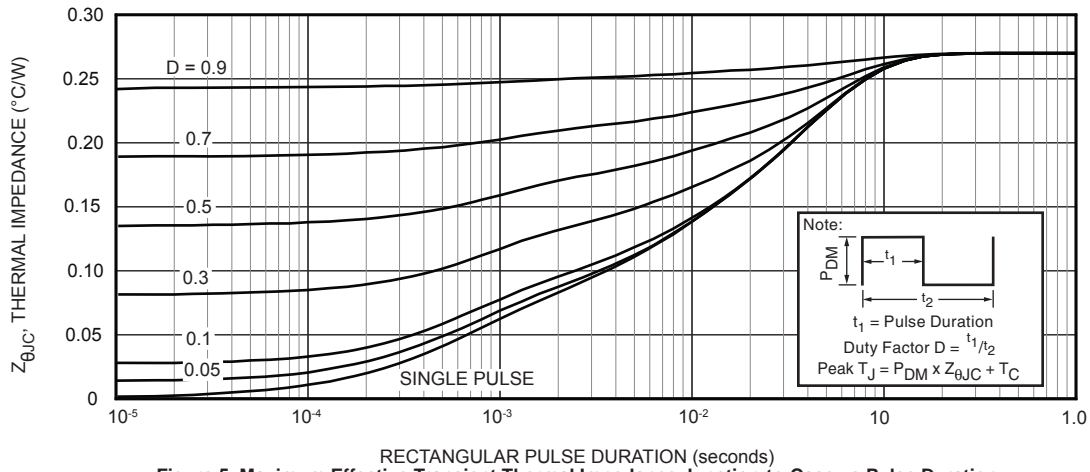


Figure 5. Maximum Effective Transient Thermal Impedance Junction-to-Case vs Pulse Duration

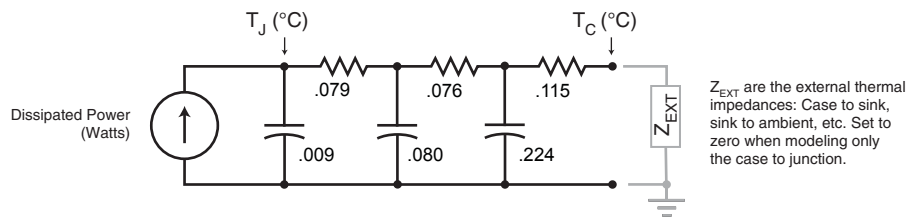


FIGURE 5b, TRANSIENT THERMAL IMPEDANCE MODEL

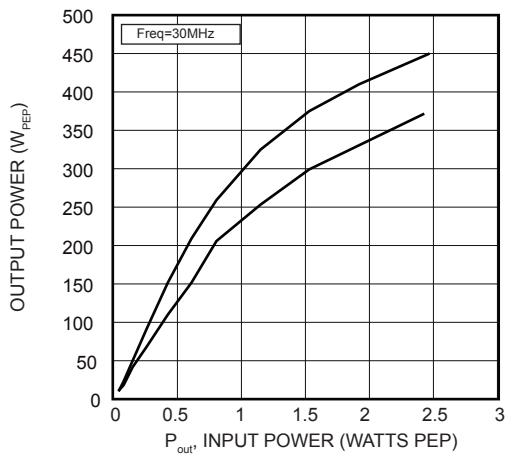


Figure 6. P_{OUT} versus P_{IN}

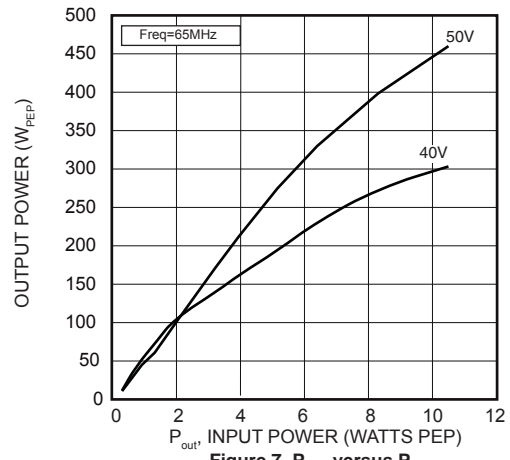


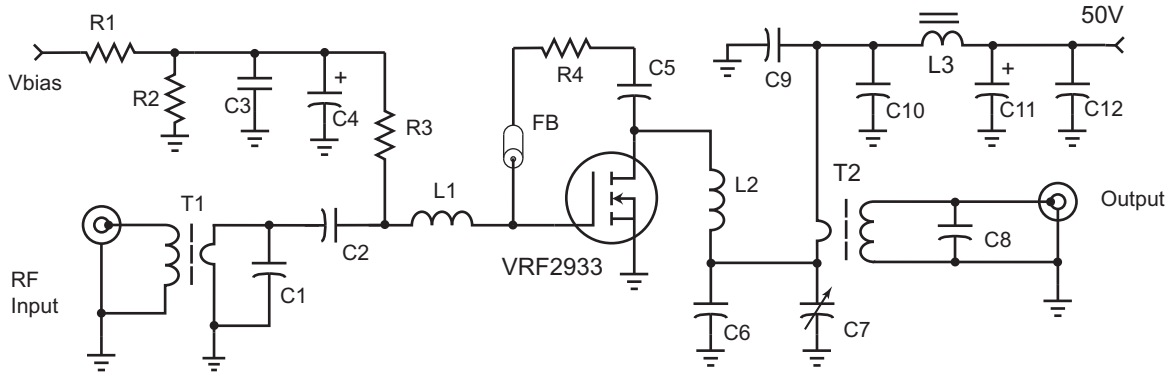
Figure 7. P_{OUT} versus P_{IN}

Table 1 - Typical Class AB Large Signal Input - Output Impedance

Freq. (MHz)	Z _{in}	Z _{out}
2	23.6 - j 5.5	4.0 - j 0.1
13.5	7.6 - j 10.1	3.9 - j 0.6
27.1	3.5 - j 6.0	3.7 - j 1.1
40.7	2.5 - j 4.0	3.3 - j 1.5
65	1.95 - j 2.07	2.6 - j 1.9
100	1.8 - j 0.66	1.76 - j 0.2
150	1.78 + j 0.5	1.03 + j 1.7

Z_{IN} - Gate shunted with 25Ω I_{dq} = 250mA
 Z_{OL} - Conjugate of optimum load for 300 Watts output at V_{ds}=150V

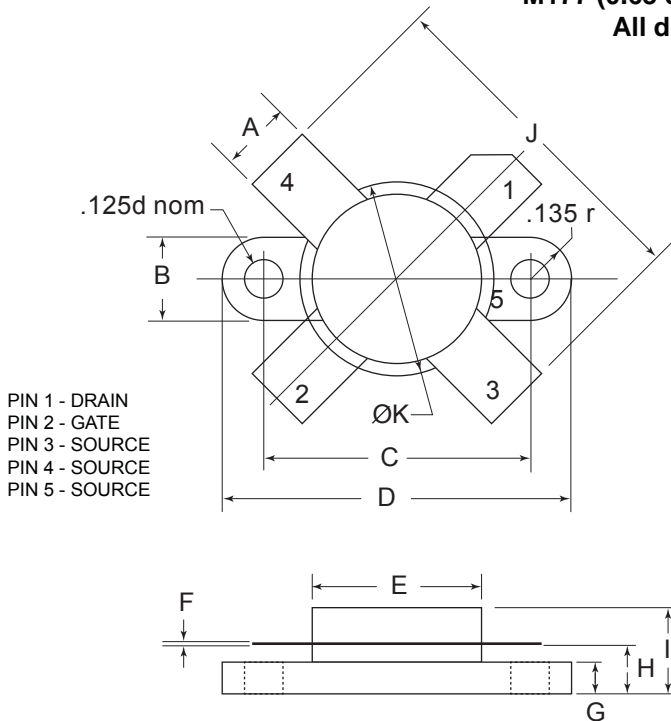
30 MHz Test Circuit



- C1 1800pF ATC100B ceramic
- C2, C3, C5, C9, C10, C12 0.1uF 100V
- C6 680 pF metal clad 500V mica
- C7 ARCO 467 mica trimmer
- C8 100 pF ATC 100E ceramic
- C4, C11 10uF 100V Electrolytic
- FB small ferrite bead $\mu_r = 125$
- L1 20 nH 2t #18 0.188"d .2"l
- L2 38 nH - 2.5t #14 enam. .25" dia.

- L3 2t #16 on 2x 267300081 .5" bead
- R1-R2 1k Ohm 1/4W
- R3 100 Ohm 1W
- R4 470 Ohm "low inductance" 3W
- T1 16:1 transformer 4t #20 teflon on RF Parts Co. T1/2 transformer core
- T2 9:1 transformer 3t #16 teflon on RF Parts Co. T1 transformer core

M177 (0.63 dia. SOE) Mechanical Data
All dimensions are $\pm .005$



PIN 1 - DRAIN
PIN 2 - GATE
PIN 3 - SOURCE
PIN 4 - SOURCE
PIN 5 - SOURCE

DIM	MIN	TYP	MAX
A	0.225	0.230	0.235
B	0.265	0.270	0.275
C	0.860	0.865	0.870
D	1.130	1.135	1.140
E	0.545	0.550	0.555
F	0.003	0.005	0.007
G	0.098	0.103	0.108
H	0.150	0.160	0.170
I			0.280
J	1.080	1.100	1.120
K	0.625	0.630	0.635