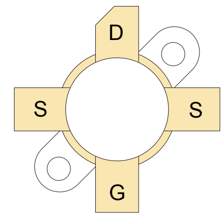
VRF3933
VRF3933(MP)

100V, 300W, 150MHz

RF POWER VERTICAL MOSFET

The VRF3933 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 $V_{(BR)DSS}$ = 250V**
- **300W with 22dB Typ. Gain @ 30MHz, 100V**
- **Excellent Stability & Low IMD**
- **Common Source Configuration**
- **Available in Matched Pairs**
- **3:1 Load VSWR Capability at Specified Operating Conditions**
- **Nitride Passivated**
- **Refractory Gold Metallization**
- **Improved Replacement for SD3933**
- **Thermally Enhanced Package**
- **RoHS Compliant**

Maximum Ratings

All Ratings: T_C =25°C unless otherwise specified

Symbol	Parameter	VRF3933	Unit
V_{DSS}	Drain-Source Voltage	250	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	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)	250	260		V
$V_{DS(ON)}$	On State Drain Voltage ($I_{D(ON)}$ = 10A, V_{GS} = 10V)		2.7	4.0	
I_{DSS}	Zero Gate Voltage Drain Current (V_{DS} = 100V, V_{GS} = 0V)			2.0	mA
I_{GSS}	Gate-Source Leakage Current (V_{DS} = ±20V, V_{DS} = 0V)			2.0	μA
g_{fs}	Forward Transconductance (V_{DS} = 10V, I_D = 10A)	8	12		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.

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Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
C_{ISS}	Input Capacitance	V_{GS} = 0V		850		pF
C_{oss}	Output Capacitance	V_{DS} = 50V		300		
C_{rss}	Reverse Transfer Capacitance	f = 1MHz		30		

Functional Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
G_{PS}	f_1 = 30MHz, V_{DD} = 100V, I_{DQ} = 250mA, P_{out} = 300W	23	26		dB
η_D	f_1 = 30MHz, V_{DD} = 100V, I_{DQ} = 250mA, P_{out} = 300W		50		%
Ψ	f_1 = 30MHz, V_{DD} =100V, 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

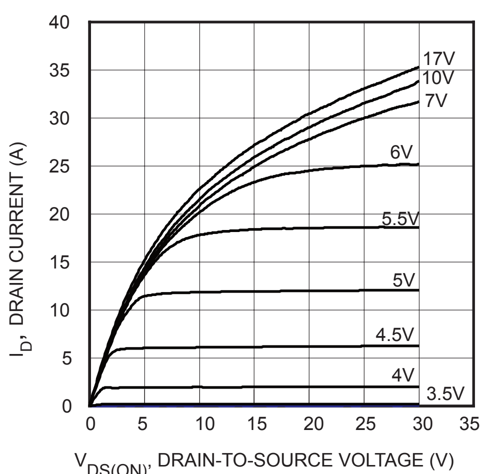


FIGURE 1, Output Characteristics

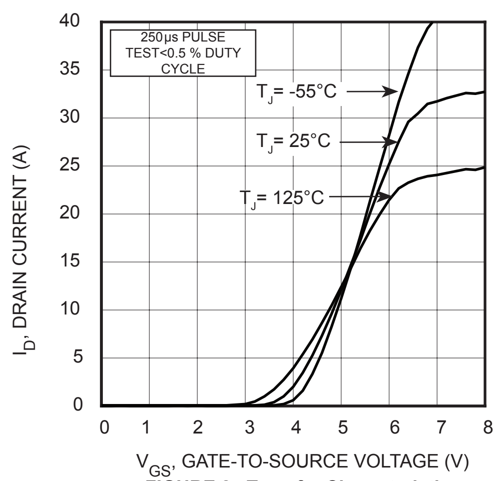


FIGURE 2, Transfer Characteristics

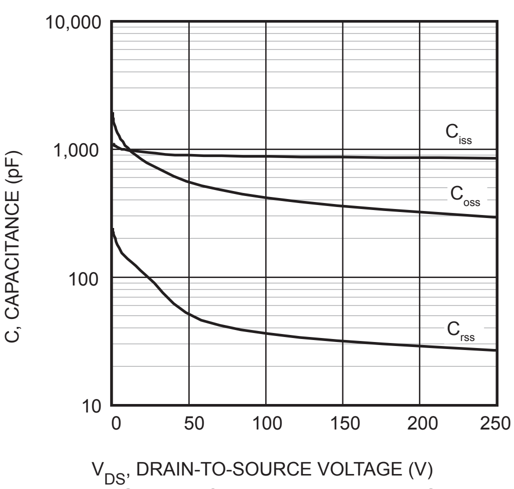


FIGURE 3, Capacitance vs Drain-to-Source Voltage

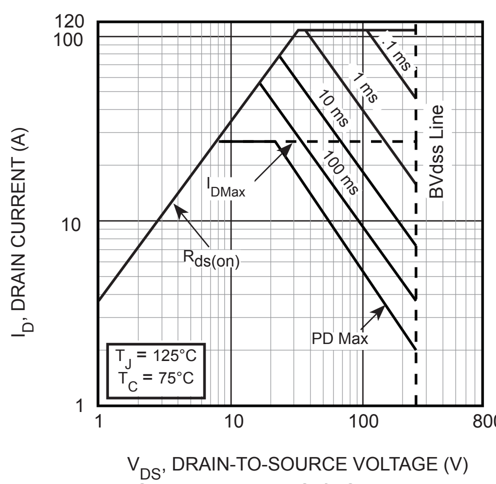


FIGURE 4, Forward Safe Operating Area

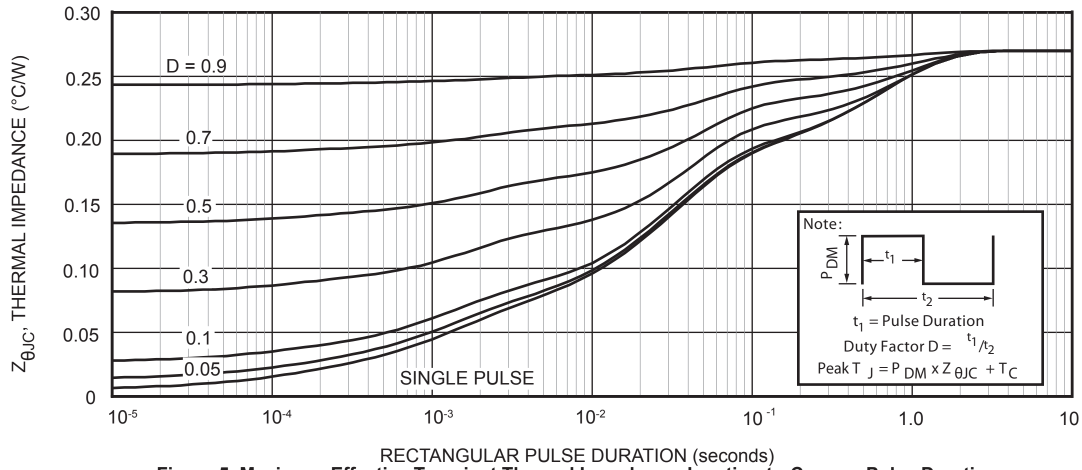


Figure 5. Maximum Effective Transient Thermal Impedance Junction-to-Case vs Pulse Duration

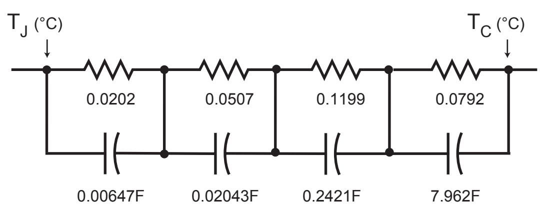


FIGURE 5b, TRANSIENT THERMAL IMPEDANCE MODEL

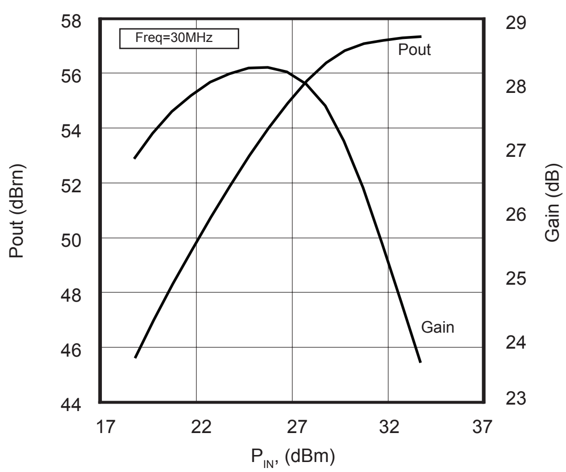


Figure 6. P_{OUT} and Gain vs P_{IN}

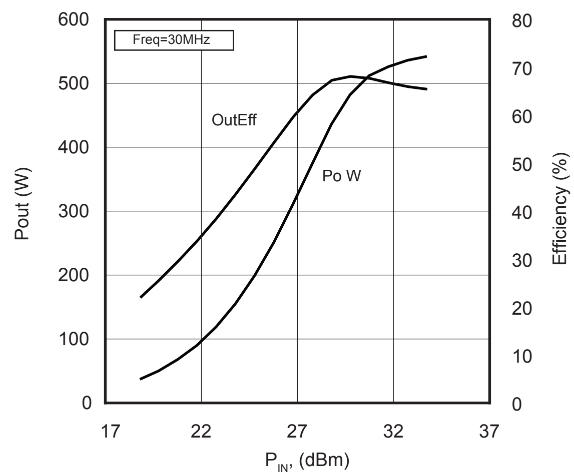


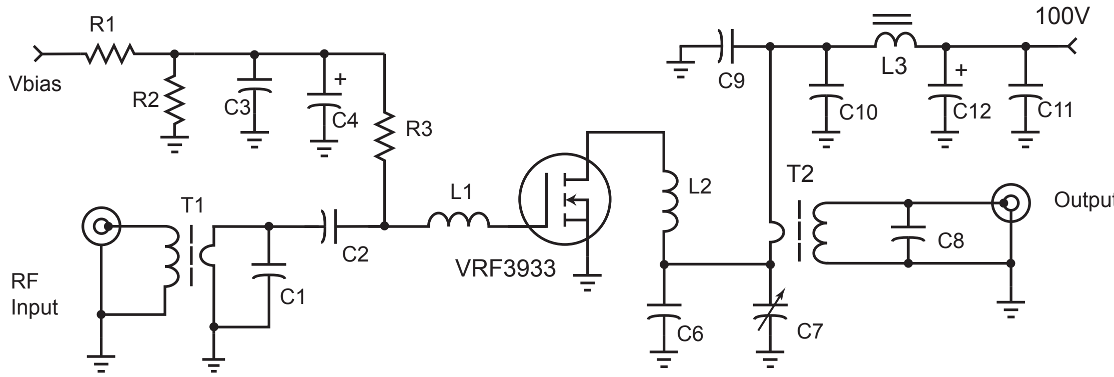
Figure 7. Eff and P_{OUT} vs. P_{IN}

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

Freq. (MHz)	Z_{in}	Z_{out}
2	21 - j 8.5	14.1 - j 0.6
13.5	4.5 - j 6.5	12.9 - j 4
27.1	2.9 - j 3.1	9.7 - j 6.6
40.7	2.5 - j 2	7.6 - j 7
65	2.4 - j 2.07	4.5 - j 6.6

Z_{IN} - Gate shunted with 25Ω **I_{dq} = 250mA**
Z_{OL} - Conjugate of optimum load for 300 Watts output at V_{dd}=50V

30 MHz Test Circuit



C1 1200pF   ATC100B ceramic
C2, C3 0.1uF 50V 1206 SMT
C9-C11 .047uF NPO 150V 1218 SMT
C6 100 pF metal clad mica
C7 ARCO 462 mica trimmer
C8 15 pF ATC 100E ceramic
C4, C12 10uF 100V Electrolytic
L1 23 nH - 2t #18 0.2"d .2"l

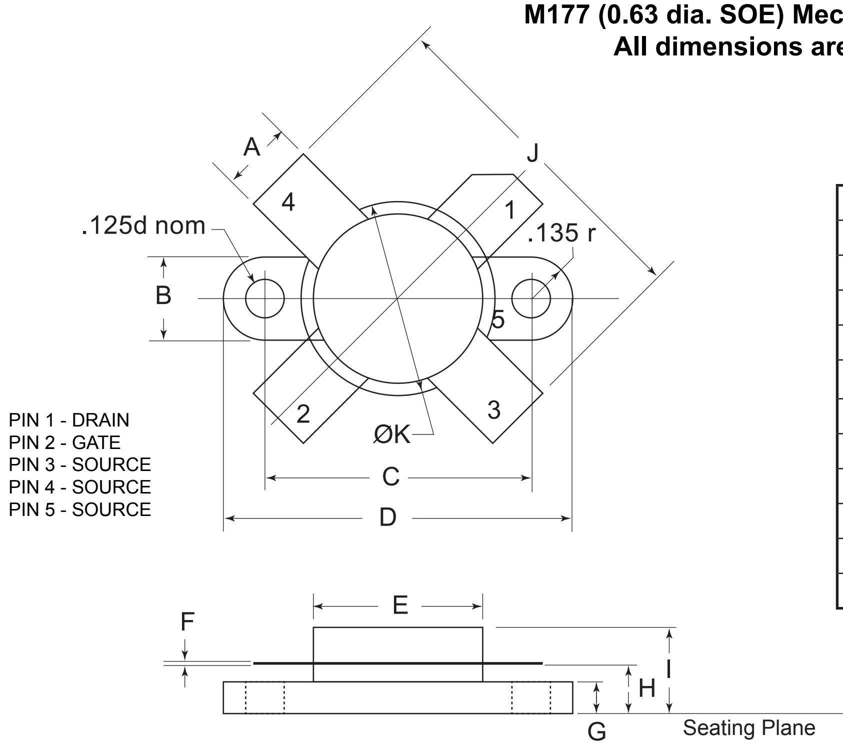
L2 62 nH - 3t #12 0.31"dia
L3 2t #16 on 2x 267300081 .5" bead
R1-R2 1k Ω 1/4W
R3 100 Ω 1W
T1 9:1 transforner 3t #24 teflon on
RF Parts Co. T1/2 transformer core
T2 4:1 transformer 2t 3-ply #16 teflon on
RF Parts Co. T1 transformer core

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
A	2.900 - 2.975	M	3.650 - 3.725
B	2.975 - 3.050	N	3.725 - 3.800
C	3.050 - 3.125	P	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	T	4.025 - 4.100
G	3.350 - 3.425	W	4.100 - 4.175
H	3.425 - 3.500	X	4.175 - 4.250
J	3.500 - 3.575	Y	4.250 - 4.325
K	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%.

M177 (0.63 dia. SOE) Mechanical Data
All dimensions are ±.005



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

HAZARDOUS MATERIAL WARNING: The ceramic portion of the device below the lead plane is beryllium oxide. Beryllium oxide dust is highly toxic when inhaled. Care must be taken during handling and mounting to avoid damage to this area. These devices must never be thrown away with general industrial or domestic waste. BeO substrate weight: 0.703g. Percentage of total module weight which is BeO: 9%.

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Общество с ограниченной ответственностью «МосЧип» ИНН 7719860671 / КПП 771901001
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Данный компонент на территории Российской Федерации

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