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Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

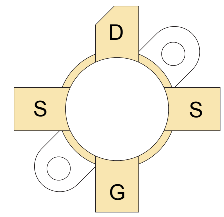
Microsemi
POWER PRODUCTS GROUP

VRF2944
VRF2944MP

50V, 400W, 150MHz

RF POWER VERTICAL MOSFET

The VRF2944 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**
- **400W with 22dB Typ. Gain @ 30MHz, 50V**
- **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**
- **Higher Power Version of VRF2933**
- **Thermally Enhanced Package**
- **RoHS Compliant**

Maximum Ratings

All Ratings: T_C =25°C unless otherwise specified

Symbol	Parameter	VRF2933(MP)	Unit
V_{DSS}	Drain-Source Voltage	170	V
I_D	Continuous Drain Current @ T_C = 25°C	50	A
V_{GS}	Gate-Source Voltage	±40	V
P_D	Total Device dissipation @ T_C = 25°C	795	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 ($I_{D(ON)}$ = 25A, V_{GS} = 10V)		1.7	2.1	
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 = 20A)	10			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			0.22	°C/W

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

050-4968 Rev A 2-2013

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
C_{ISS}	Input Capacitance	$V_{GS} = 0V$		1050		pF
C_{oss}	Output Capacitance	$V_{DS} = 50V$		520		
C_{rss}	Reverse Transfer Capacitance	f = 1MHz		62		

Functional Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
G_{PS}	f_1 = 30MHz, V_{DD} = 50V, I_{DQ} = 250mA, P_{out} = 400W	23	25		dB
η_D	f_1 = 30MHz, V_{DD} = 50V, I_{DQ} = 250mA, P_{out} = 400W		50		%
Ψ	f_1 = 30MHz, V_{DD} = 50V, I_{DQ} = 250mA, P_{out} = 400W 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

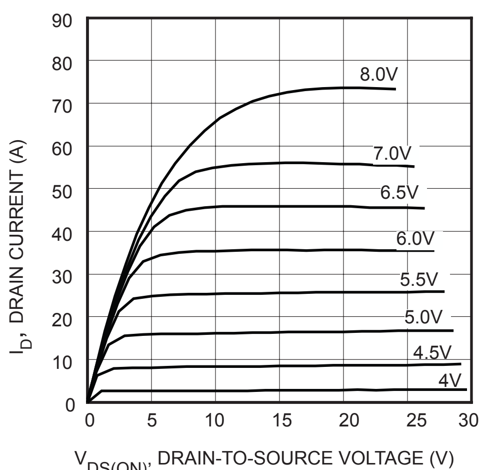


FIGURE 1, Output Characteristics

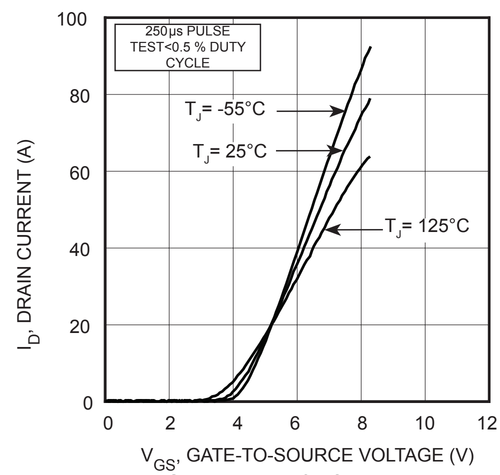


FIGURE 2, Transfer Characteristics

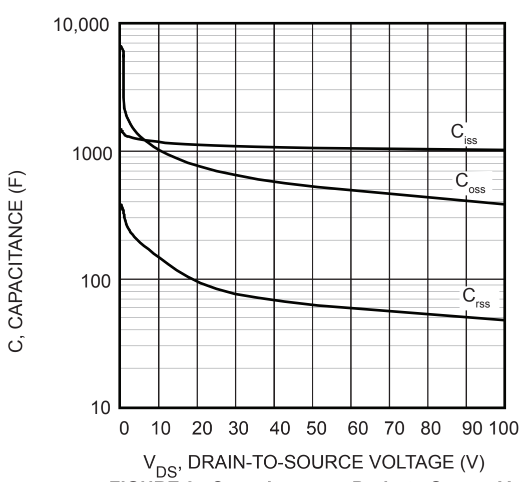


FIGURE 3, Capacitance vs Drain-to-Source Voltage

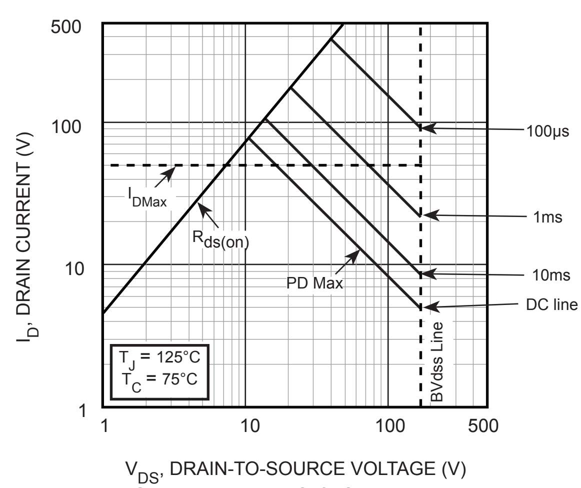


FIGURE 4, Forward Safe Operating Area

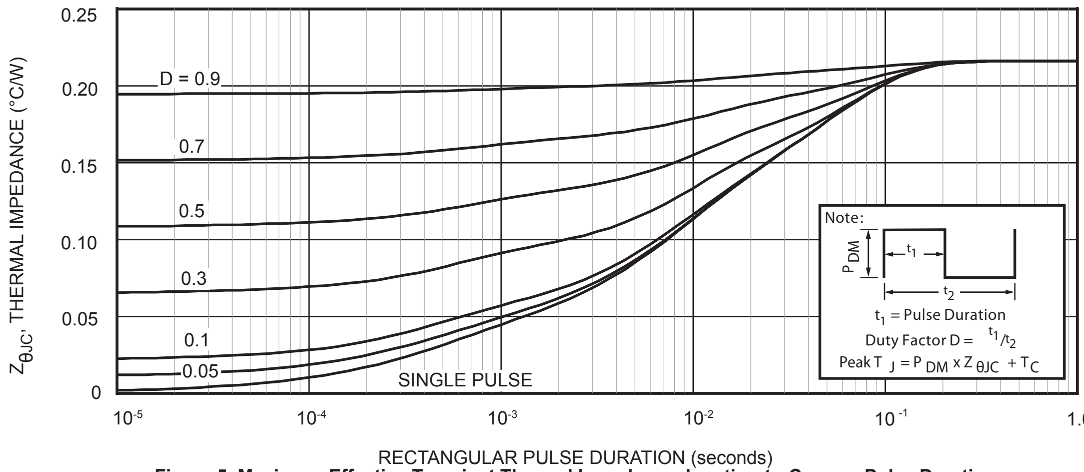


Figure 5. Maximum Effective Transient Thermal Impedance Junction-to-Case vs Pulse Duration

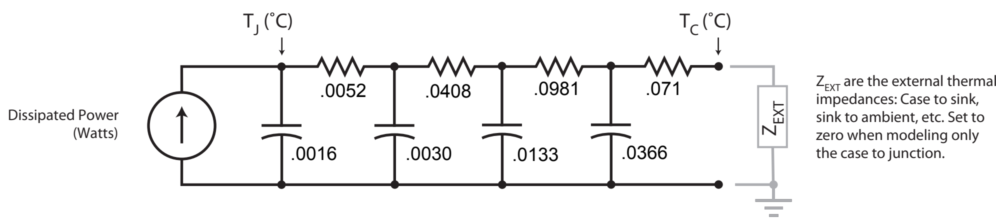


FIGURE 5b, TRANSIENT THERMAL IMPEDANCE MODEL

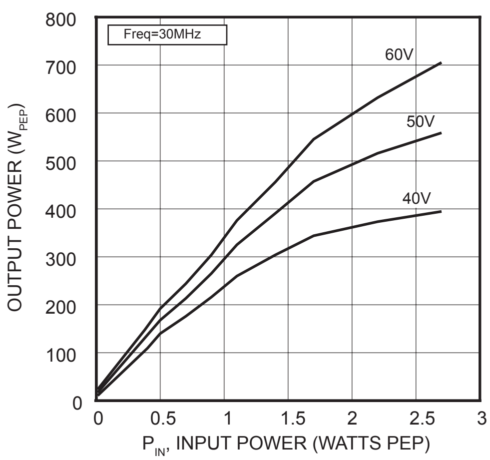


Figure 6. P_{OUT} versus P_{IN}

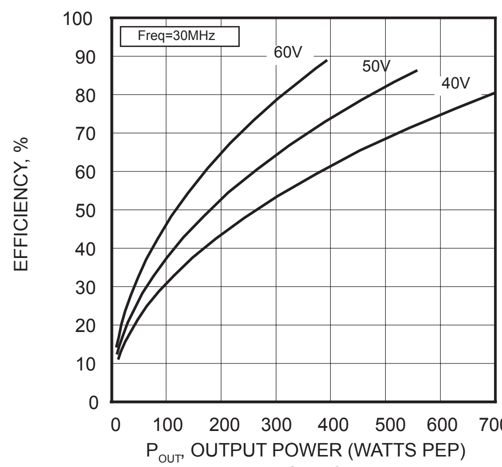


Figure 7. EFFICIENCY versus P_{IN}

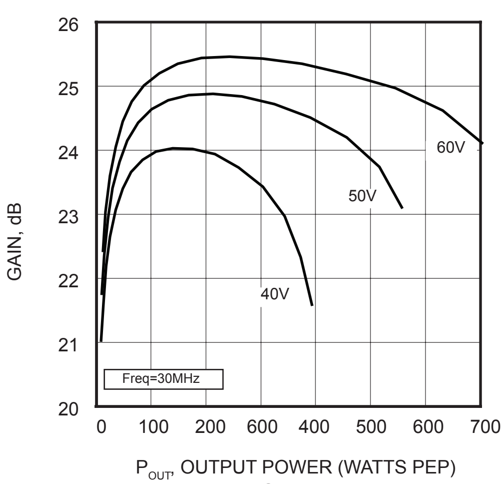


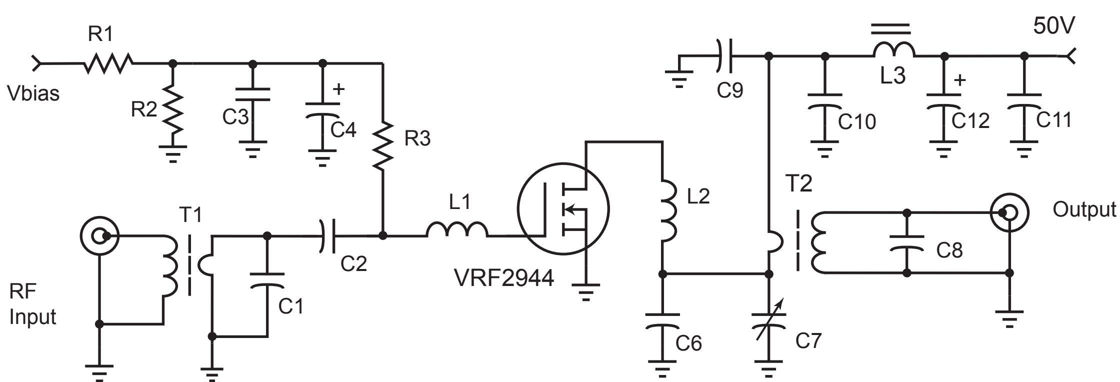
Figure 7. GAIN versus P_{OUT}

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

Freq. (MHz)	Z_{in}	Z_{out}
30	4.5 - j 2.5	2.15 - j 2.71

I_{dq} = 100mA Z_{OL} - Conjugate of optimum load for 400 Watts output at V_{dd}=150V

30 MHz Test Circuit



C1 1200pF ATC100B ceramic
C2, C3 0.1uF 100V 1206 SMT
C9-C11 .047uF NPO 100V 1218 SMT
C6 180 pF metal clad mica
C7 ARCO 465 mica trimmer
C8 100 pF ATC 100E ceramic
C4, C12 10uF 100V Electrolytic
L1 25 nH - 2t #18 0.2"d .2"l

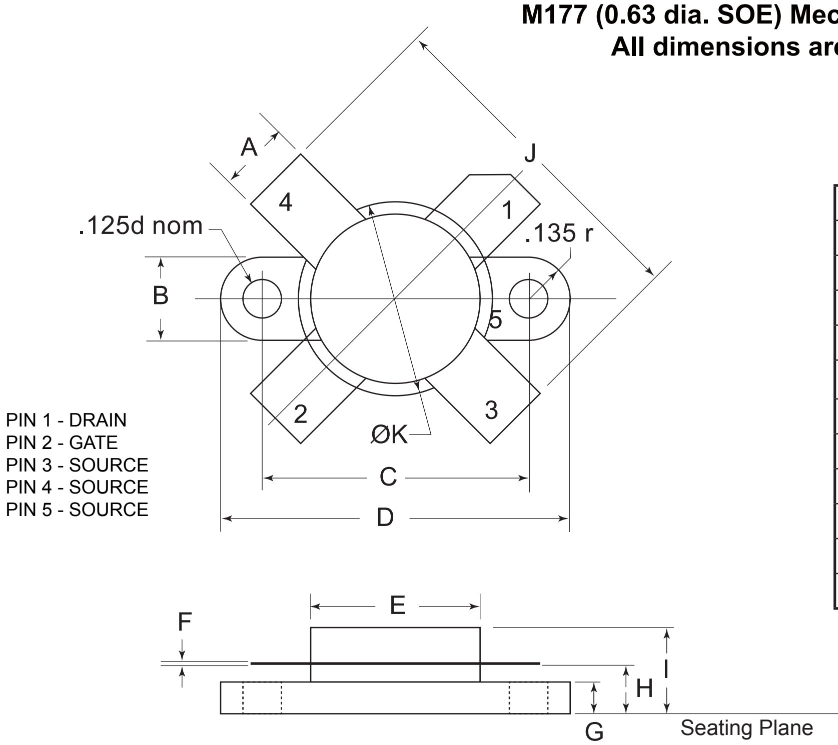
L2 26 nH - 1.5t #12 0.31"d2
L3 2t #16 on 2x 267300081 .5" bead
R1-R2 1k Ω 1/4W
R3 100 Ω 1W
T1 16:1 transforner 4t #24 teflon on
RF Parts Co. T1/2 transformer core
T2 9:1 transformer 3t 2-ply #16 teflon on
RF Parts Co. T1 transformer core

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%.

050-4968 Rev A 2-2013

Disclaimer:

050-4968 Rev A 2-2013