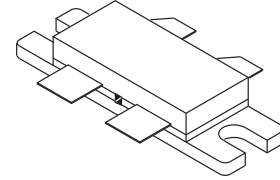



## RF POWER VERTICAL MOSFET

The VRF141G is designed for broadband commercial and military applications at frequencies to 175MHz. The high power, high gain, and broadband performance of this device make possible solid state transmitters for FM broadcast or TV channel frequency bands.



### FEATURES

- Improved Ruggedness  $V_{(BR)DSS} = 80V$
- 300W with 14dB Typical Gain @ 175MHz, 28V
- Excellent Stability & Low IMD
- Common Source Configuration
- RoHS Compliant 
- 5:1 Load VSWR Capability at Specified Operating Conditions
- Nitride Passivated
- Refractory Gold Metallization
- High Voltage Replacement for MRF141G

### Maximum Ratings

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


Symbol	Parameter	VRF141G	Unit
$V_{DSS}$	Drain-Source Voltage	80	V
$I_D$	Continuous Drain Current @ $T_c = 25^\circ C$	40	A
$V_{GS}$	Gate-Source Voltage	$\pm 40$	V
$P_D$	Total Device dissipation @ $T_c = 25^\circ C$	500	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	90		V
$V_{DS(ON)}$	On State Drain Voltage ( $I_{D(ON)} = 10A, V_{GS} = 10V$ )		1.0	1.3	
$I_{DSS}$	Zero Gate Voltage Drain Current ( $V_{DS} = 60V, V_{GS} = 0V$ )			1.0	mA
$I_{GSS}$	Gate-Source Leakage Current ( $V_{DS} = \pm 20V, V_{GS} = 0V$ )			1.0	$\mu A$
$g_{fs}$	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			0.35	°C/W

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

## Dynamic Characteristics

VRF141G

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 28V$ $f = 1MHz$		400		pF
$C_{oss}$	Output Capacitance			375		
$C_{rss}$	Reverse Transfer Capacitance			50		

## Functional Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
$G_{PS}$	$f = 175MHz, V_{DD} = 28V, I_{DQ} = 500mA, P_{out} = 300W$	12	14		dB
$\eta_D$	$f = 175MHz, V_{DD} = 28V, I_{DQ} = 500mA, P_{out} = 300W$	45	55		%
$\Psi$	$f = 175MHz, V_{DD} = 28V, I_{DQ} = 500mA, P_{out} = 300W$ 5:1VSWR - 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

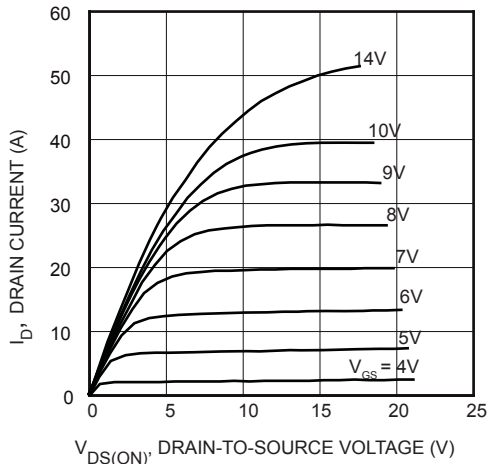


FIGURE 1, Output Characteristics

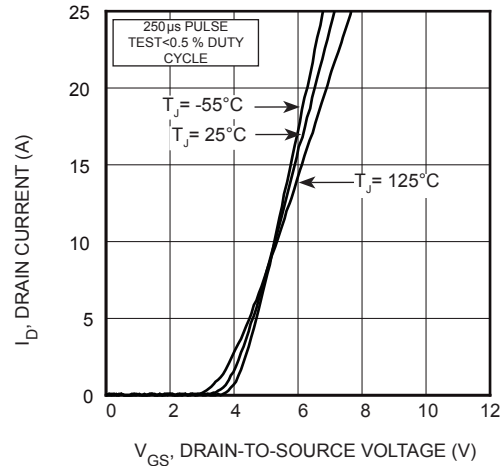


FIGURE 2, Transfer Characteristics

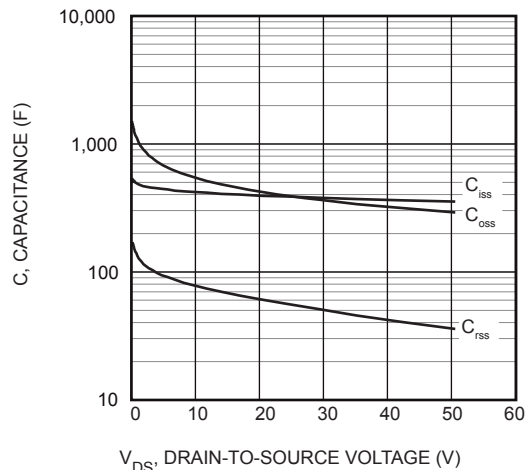


FIGURE 3, Capacitance vs Drain-to-Source Voltage

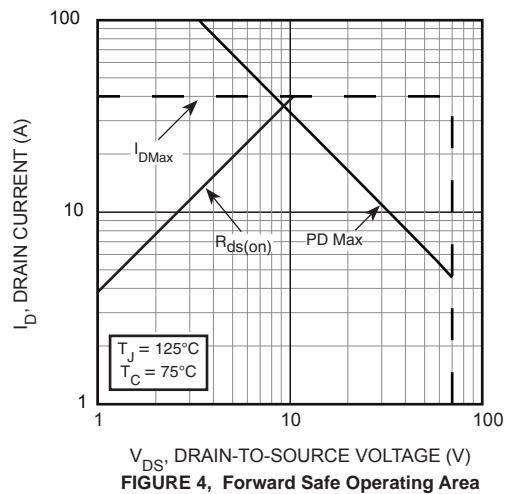


FIGURE 4, Forward Safe Operating Area

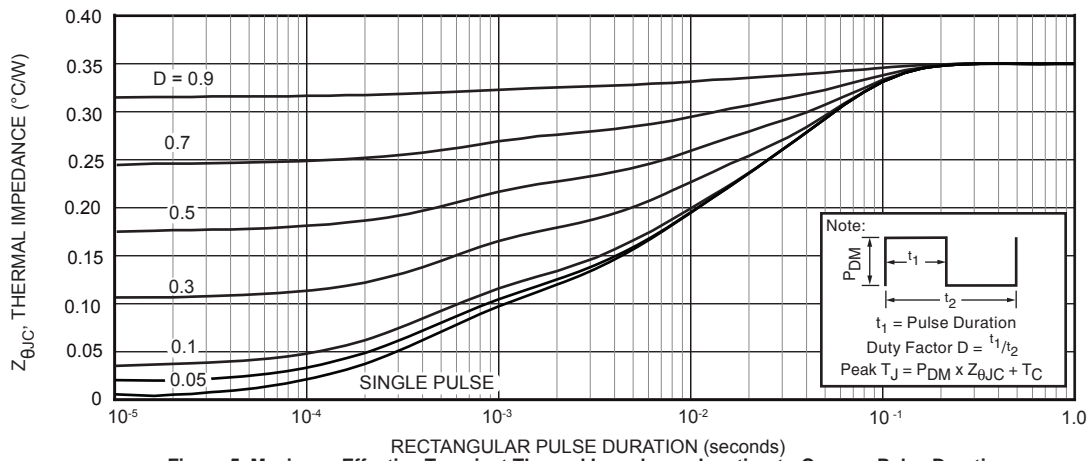
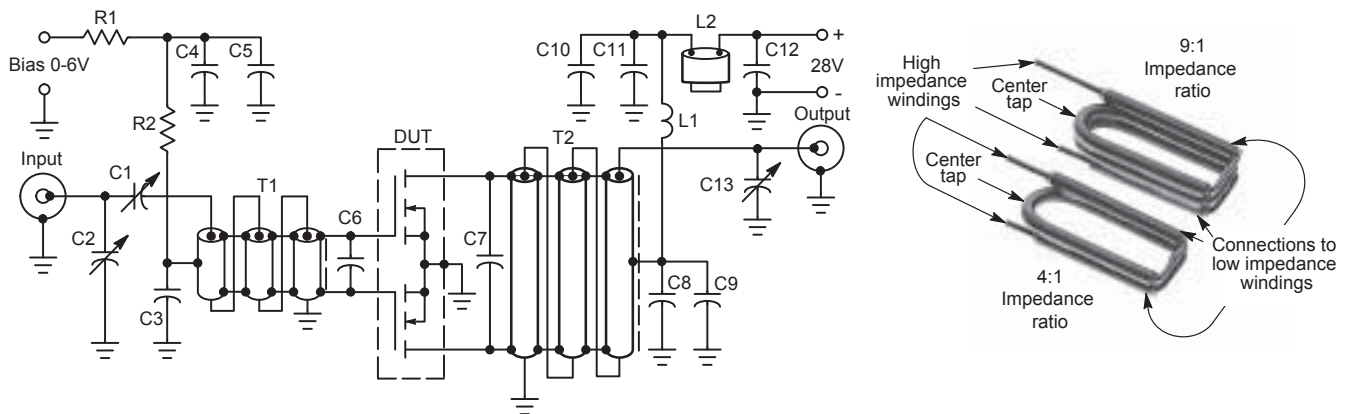


Figure 5. Maximum Effective Transient Thermal Impedance Junction-to-Case vs Pulse Duration



- C1 - Arco 402, 1.5 ±20 pF
- C2 - Arco 406, 15 ±115 pF
- C3, C4, C8, C9, C10 - 1000 pF Chip
- C5, C11 - 0.1 nF Chip
- C6 - 330 pF Chip
- C7 - 200 pF and 180 pF Chips in Parallel
- C12 - 0.47 nF Ceramic Chip, Kemet 1215 or Equivalent
- C13 - Arco 403, 3.0 ±35 pF
- L1 - 10 Turns AWG #16 Enameled Wire, Close Wound, 1/4, I.D.
- L2 - Ferrite Beads of Suitable Material for 1.5±2.0 nH Total Inductance
- R1 - 100 Ohms, 1/2 W
- R2 - 1.0 kOhm, 1/2 W

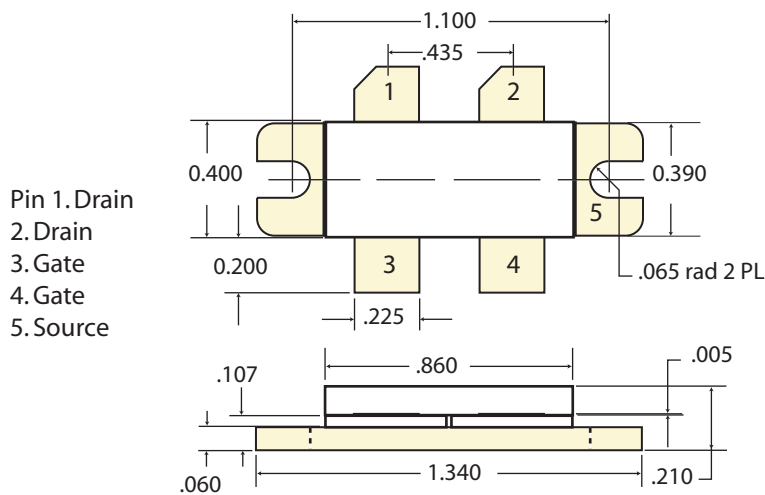
- T1 - 9:1 RF Transformer. Can be made of 15±18 Ohms Semirigid Co-ax, 62 ±90 Mils O.D.
- T2 - 1:9 RF Transformer. Can be made of 15±18 Ohms Semirigid Co-ax, 70 ±90 Mils O.D.

Board Material - 0.062", Fiberglass (G10), 1 oz. Copper Clad, 2 Sides, ε<sub>r</sub> = 5

NOTE: For stability, the input transformer T1 must be loaded with ferrite toroids or beads to increase the common mode inductance. For operation below 100 MHz. The same is required for the output transformer. See pictures for construction details.

Unless Otherwise Noted, All Chip Capacitors are ATC Type 100B or Equivalent.

Figure 7. 175 MHz Test Circuit



- Pin 1. Drain
- 2. Drain
- 3. Gate
- 4. Gate
- 5. Source

**HAZARDOUS MATERIAL WARNING**

The ceramic portion of the device between leads and mounting flange 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.

Package Dimensions (inches)  
All Dimensions are ± .005



**Microsemi Headquarters**  
One Enterprise, Aliso Viejo,

CA 92656 USA

Within the USA: +1 (800) 713-4113

Outside the USA: +1 (949) 380-6100

Sales: +1 (949) 380-6136

Fax: +1 (949) 215-4996

Email: [sales.support@microsemi.com](mailto:sales.support@microsemi.com)

[www.microsemi.com](http://www.microsemi.com)

© 2020 Microsemi. All rights reserved. Microsemi and the Microsemi logo are trademarks of Microsemi Corporation. All other trademarks and service marks are the property of their respective owners.

Microsemi makes no warranty, representation, or guarantee regarding the information contained herein or the suitability of its products and services for any particular purpose, nor does Microsemi assume any liability whatsoever arising out of the application or use of any product or circuit. The products sold hereunder and any other products sold by Microsemi have been subject to limited testing and should not be used in conjunction with mission-critical equipment or applications. Any performance specifications are believed to be reliable but are not verified, and Buyer must conduct and complete all performance and other testing of the products, alone and together with, or installed in, any end-products. Buyer shall not rely on any data and performance specifications or parameters provided by Microsemi. It is the Buyer's responsibility to independently determine suitability of any products and to test and verify the same. The information provided by Microsemi hereunder is provided "as is, where is" and with all faults, and the entire risk associated with such information is entirely with the Buyer. Microsemi does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other IP rights, whether with regard to such information itself or anything described by such information. Information provided in this document is proprietary to Microsemi, and Microsemi reserves the right to make any changes to the information in this document or to any products and services at any time without notice.

Microsemi, a wholly owned subsidiary of Microchip Technology Inc. (Nasdaq: MCHP), offers a comprehensive portfolio of semiconductor and system solutions for aerospace & defense, communications, data center and industrial markets. Products include high-performance and radiation-hardened analog mixed-signal integrated circuits, FPGAs, SoCs and ASICs; power management products; timing and synchronization devices and precise time solutions, setting the world's standard for time; voice processing devices; RF solutions; discrete components; enterprise storage and communication solutions; security technologies and scalable anti-tamper products; Ethernet solutions; Power-over-Ethernet ICs and midspans; as well as custom design capabilities and services. Microsemi is headquartered in Aliso Viejo, California, and has approximately 4,800 employees globally. Learn more at [www.microsemi.com](http://www.microsemi.com).