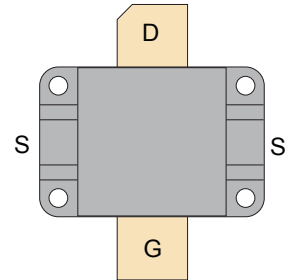



RF POWER VERTICAL MOSFET

The VRF154FL 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 $V_{(BR)DSS} = 170V$
- Designed for 2 - 100MHz Operation
- 600W with 17dB Typical Gain @ 30MHz, 50V
- Excellent Stability & Low IMD
- Common Source Configuration
- RoHS Compliant 
- Nitride Passivated
- Economical Flangeless Package
- Refractory Gold Metallization
- High Voltage Replacement for MRF154

Maximum Ratings

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

Symbol	Parameter	VRF154FL	Unit
V_{DSS}	Drain-Source Voltage	170	V
I_D	Continuous Drain Current @ $T_c = 25^\circ C$	60	A
V_{GS}	Gate-Source Voltage	± 40	V
P_D	Total Device dissipation @ $T_c = 25^\circ C$	1350	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 ($I_{D(ON)} = 40A, V_{GS} = 10V$)		3.0	5.0	
I_{DSS}	Zero Gate Voltage Drain Current ($V_{DS} = 100V, V_{GS} = 0V$)			4.0	mA
I_{GSS}	Gate-Source Leakage Current ($V_{DS} = \pm 20V, V_{GS} = 0V$)			4.0	μA
g_{fs}	Forward Transconductance ($V_{DS} = 10V, I_D = 40A$)	16			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			0.13	°C/W
$R_{\theta JHS}$	Junction to Sink Thermal Resistance (Use High Efficiency Thermal Joint Compound and Planar Heat Sink Surface.)		0.22		

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

Dynamic Characteristics

VRF154FL

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0V$		1750		pF
C_{oss}	Output Capacitance	$V_{DS} = 50V$		775		
C_{rss}	Reverse Transfer Capacitance	$f = 1MHz$		135		

Functional Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
G_{PS}	$f = 30MHz, V_{DD} = 50V, I_{DQ} = 800mA, P_{out} = 600W$		17		dB
η_D	$f = 30MHz, V_{DD} = 50V, I_{DQ} = 800mA, P_{out} = 600W_{PEP}$		45		%
$IMD_{(dB)}$	$f1 = 30MHz, f2 = 30.001MHz, V_{DD} = 50V, I_{DQ} = 800mA, P_{out} = 600W_{PEP}^1$		-25		dBc

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

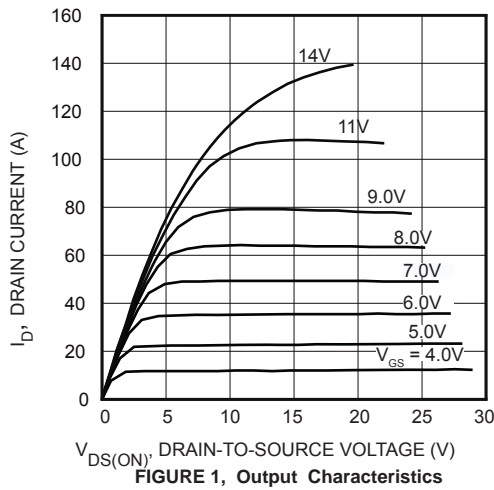


FIGURE 1, Output Characteristics

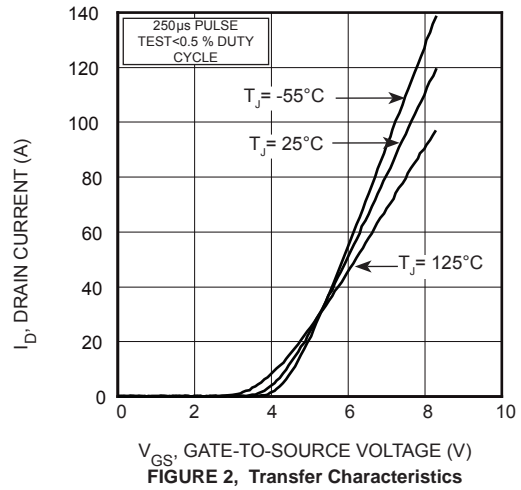


FIGURE 2, Transfer Characteristics

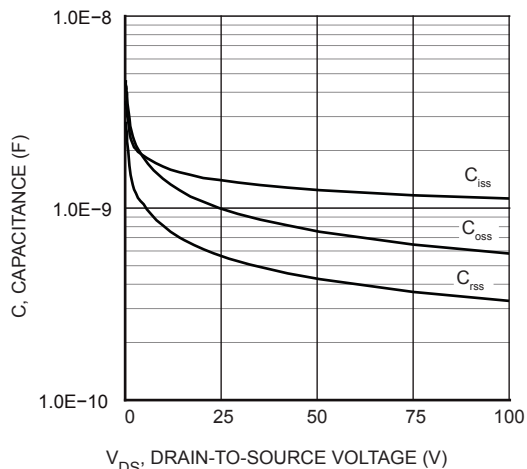


FIGURE 3, Capacitance vs Drain-to-Source Voltage

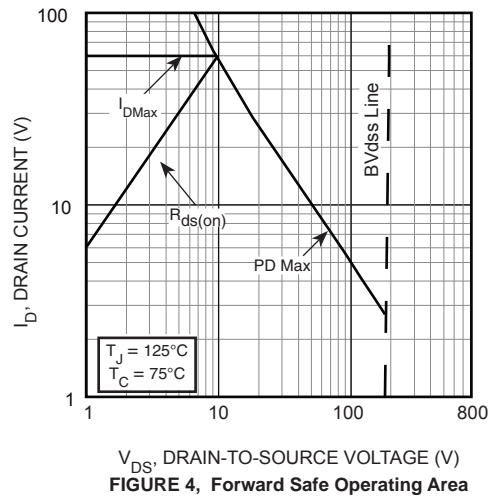


FIGURE 4, Forward Safe Operating Area

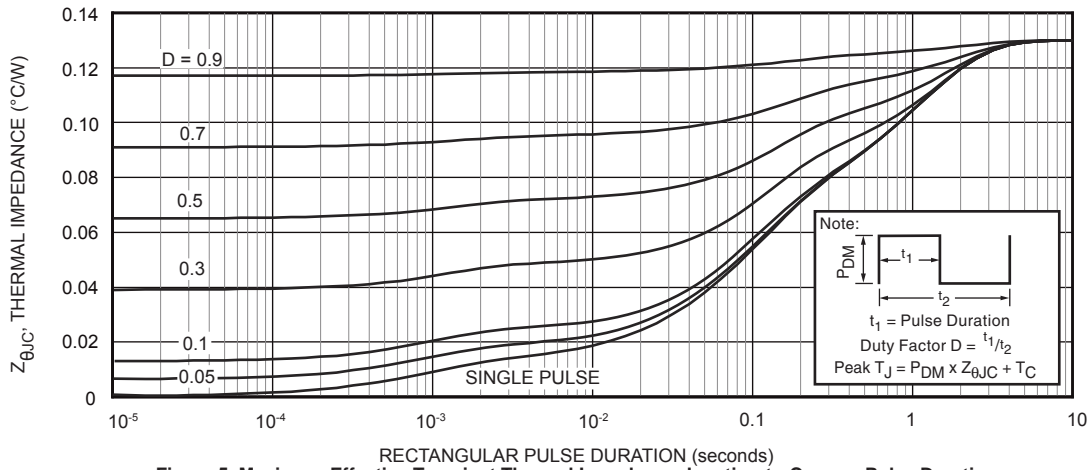


Figure 5. Maximum Effective Transient Thermal Impedance Junction-to-Case vs Pulse Duration

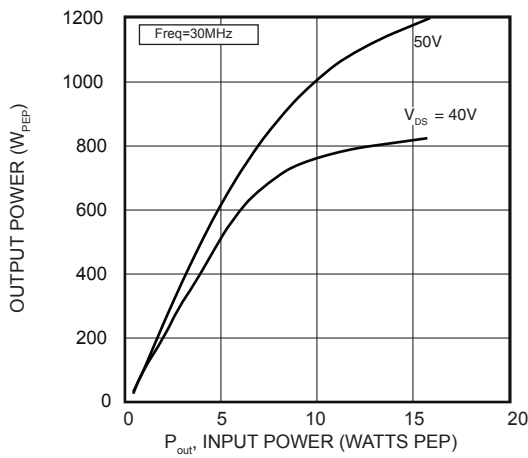


Figure 6. P_{out} versus P_{in}

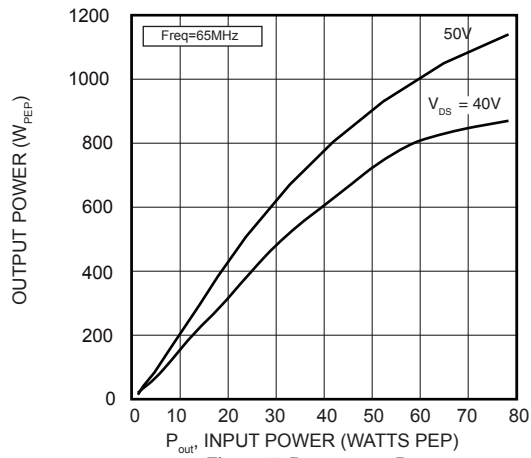
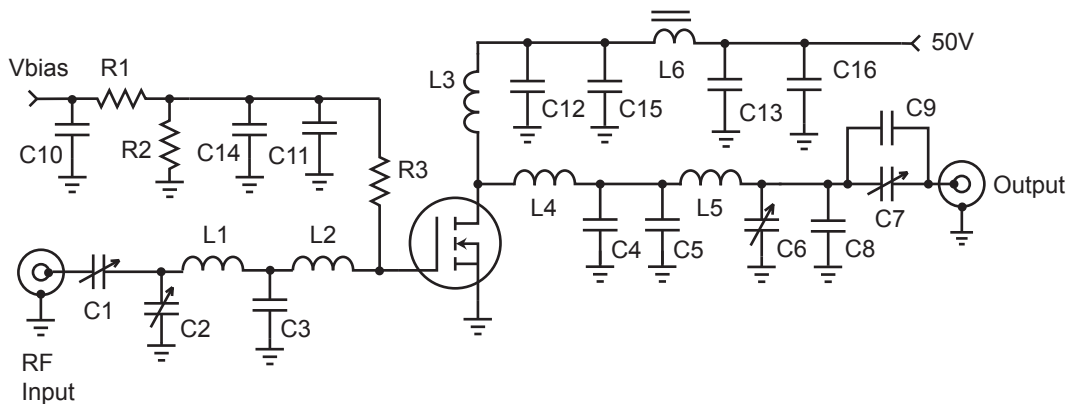


Figure 7. P_{out} versus P_{in}

Figure 8. 30MHz Test Circuit

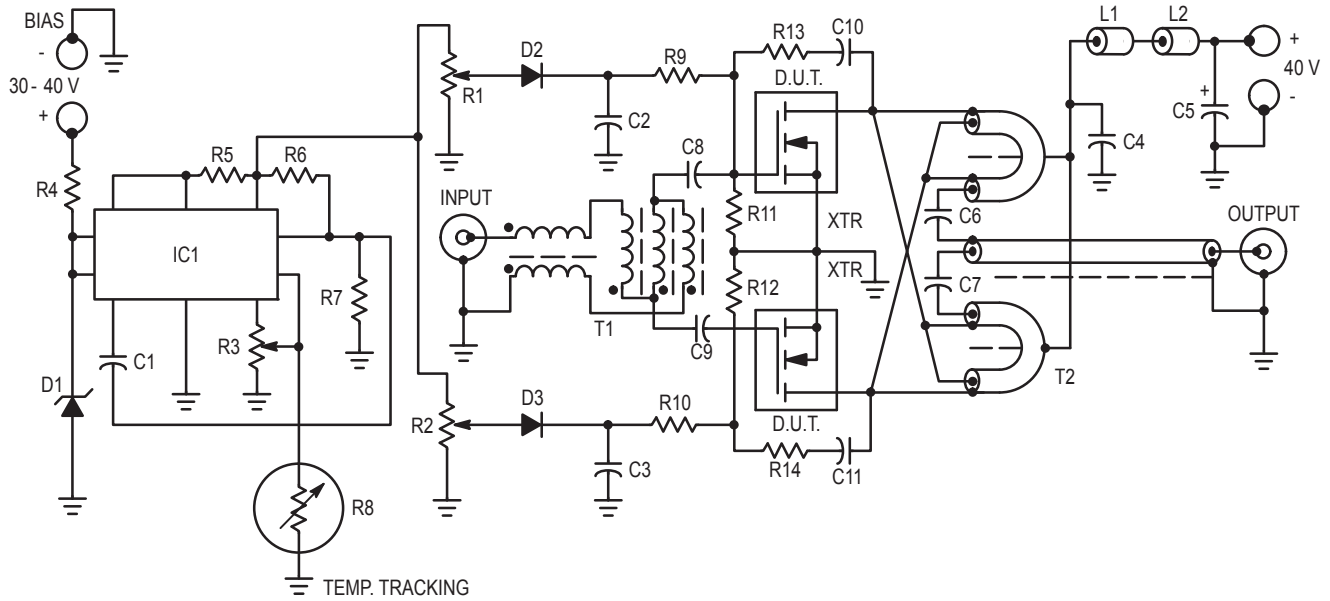


- C1, C2, C6, C7 ARCO 465 mica trimmer
- C3 1800pF ATC700B ceramic
- C4 680pF metal clad 500V mica
- C5 390pF metal clad 500V mica
- C8 100pF ATC 700E ceramic
- C9 120pF ATC 700E ceramic
- C10 - C13 .01uF 100V ceramic SMT
- C14 - C16 .1uF 100V ceramic SMT

- L1 110nH 4t #22 0.312"d .30"l
- L2 29nH 2t #22 .188" dia .10" l
- L3 0.3uH - 6t #16 enam. .5" dia.
- L4 22nH - 1t #16 enam. .375" dia.
- L5 117nH - 3t #16 enam. .5" dia. .3"l
- L6 1t #16 on 2x 267300081 .5" bead
- R1-R2 1kΩ 1/4W
- R3 10Ω 1/4W

Figure 9. 2-50MHz 1kW Wideband Amplifier

VRF154FL



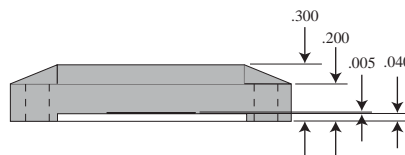
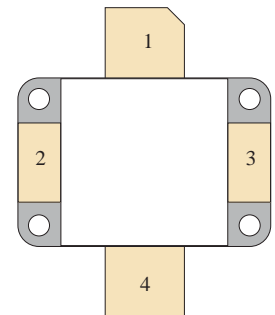
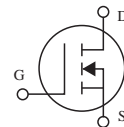
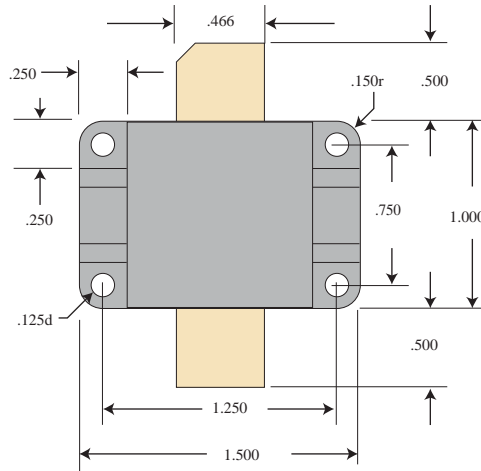
- C1 - 1000pF Ceramic
- C2, C3, C4, C8, C9, C10, C11 -0.1µF Ceramic
- C5 - 10µF / 100 V Electrolytic
- C6, C7 - 0.1µF Ceramic, (ATC 200/823 or Equivalent)
- D1 - 28V Zener, 1N5362 or Equivalent
- D3 - 1N4148
- IC1 - MC1723
- L1, L2 - Fair-Rite Products Corp. Ferrite Beads #2673000801
- R1, R2, R3 - 10k Trimpot
- R4 - 1.0 k /1.0W
- R5 - 10 Ohms
- R6 - 2.0k

- R7 - 10k
- R8 - Thermistor, 10k (25°C), 2.5k (75°C)
- R9, R10 - 100 Ohms
- R11, R12 - 1.0k
- R13, R14 - 50Ω, 2 x 100Ω 2W Carbon in Parallel
- T1 - 9:1 Transformer, Trifilar and Balun Wound on Separate Fair-Rite Products Corp. Balun Cores #286100012, 5 Turns Each.
- T2 - 1:9 Transformer Balun 50 Ohm CO-AX Cable RG-188, Low Impedance Lines W.L. Gore 16 Ohms CO-AX Type CXN 1837. Each Winding Threaded Through Two Fair-Rite Products Corp. #2661540001 Ferrite Sleeves (6 Each).
- XTR - VRF154

Thermal Considerations and Package Mounting:

The rated 1350W power dissipation is only available when the package mounting surface is at 25°C and the junction temperature is 200 °C. The thermal resistance between junctions and case mounting surface is 0.13°C/W. When installed, an additional thermal impedance of 0.09°C/W between the package base and the mounting surface is smooth and flat. Thermal joint compound must be used to reduce the effects of small surface irregularities. The heatsink should incorporate a copper heat spreader to obtain best results.

The lid maintains the required mounting pressure while allowing for thermal expansion of both the device and the heat sink. Four 6-32 (M3.5) screws provide the minimum 125 lb. required mounting force. T=4-6 in-lb. Please refer to App Note 1802 "Mounting Instructions for Flangeless Packages."



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

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.

Microsemi's products are covered by one or more of U.S. patents 4,895,810 5,045,903 5,089,434 5,182,234 5,019,522 5,262,336 6,503,786 5,256,583 4,748,103 5,283,202 5,231,474 5,434,095 5,528,058 6,939,743, 7,352,045 5,283,201 5,801,417 5,648,283 7,196,634 6,664,594 7,157,886 6,939,743 7,342,262 and foreign patents. US and Foreign patents pending. All Rights Reserved.