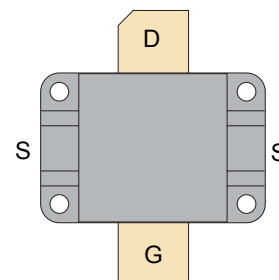


RF POWER VERTICAL MOSFET

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
- Available in Matched Pairs
- 70:1 Load VSWR Capability at Specified Operating Conditions
- Nitride Passivated
- Economical Flangeless Package
- Refractory Gold Metallization
- High Voltage Replacement for MRF154
- RoHS Compliant 

Maximum Ratings

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

Symbol	Parameter	VRF154FL(MP)	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	$^\circ C$
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 ($I_{D(ON)} = 40A, V_{GS} = 10V$)		3.7	5.7	
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	$^\circ C/W$
$R_{\theta JHS}$	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(MP)

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

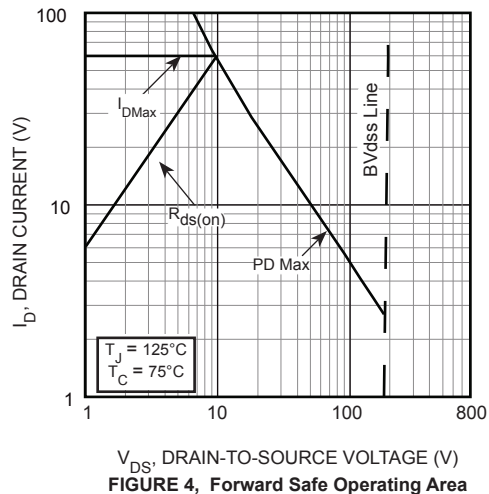
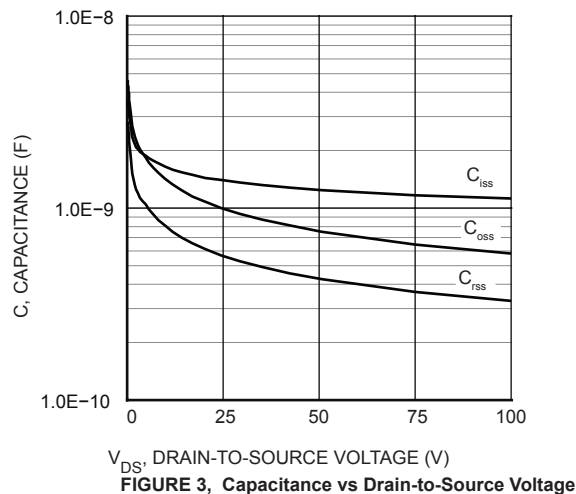
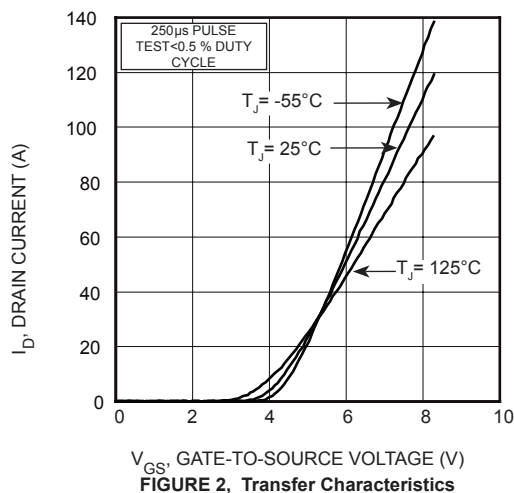
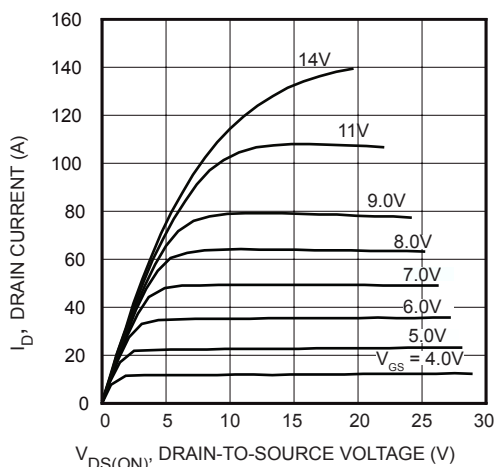
Functional Characteristics

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 _(d3)	$f1 = 30MHz, f2 = 30.001MHz, V_{DD} = 50V, I_{DQ} = 800mA, P_{out} = 600W_{PEP}^1$		-25		dBc
ψ	$f = 30MHz, V_{DD} = 50V, I_{DQ} = 800mA, P_{out} = 600W_{CW}$ 70:1 VSWR - All Phase Angles, 0.2mSec X 20% Duty Factor	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



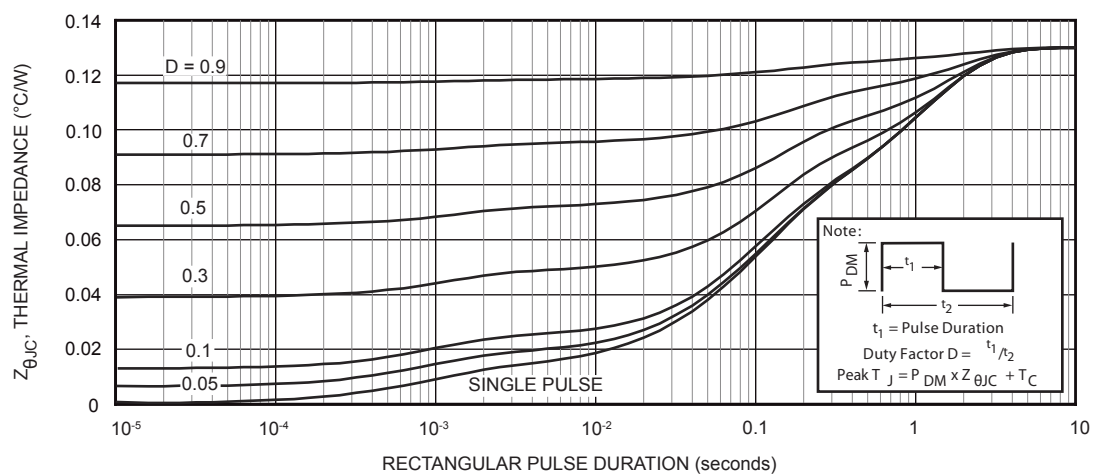
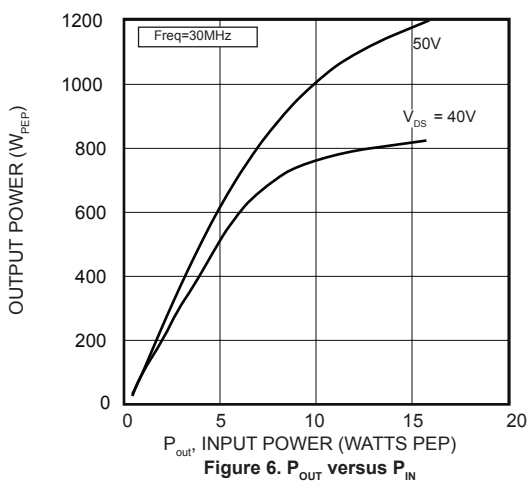
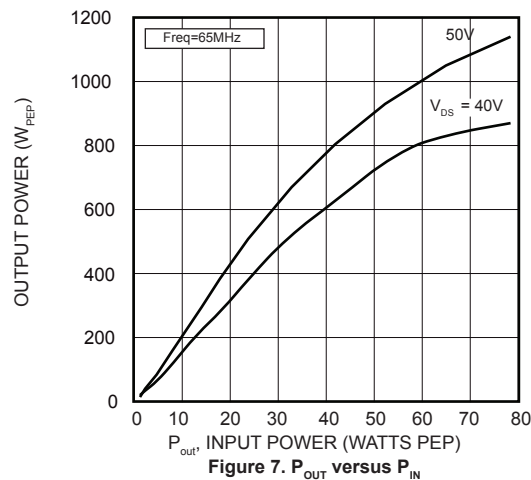
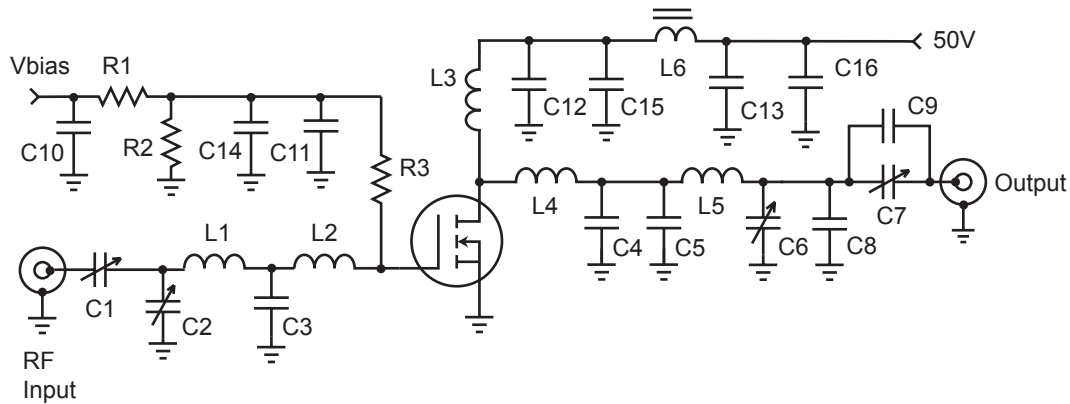


Figure 5. Maximum Effective Transient Thermal Impedance Junction-to-Case vs Pulse Duration

Figure 6. P_{OUT} versus P_{IN} Figure 7. P_{OUT} versus P_{IN}

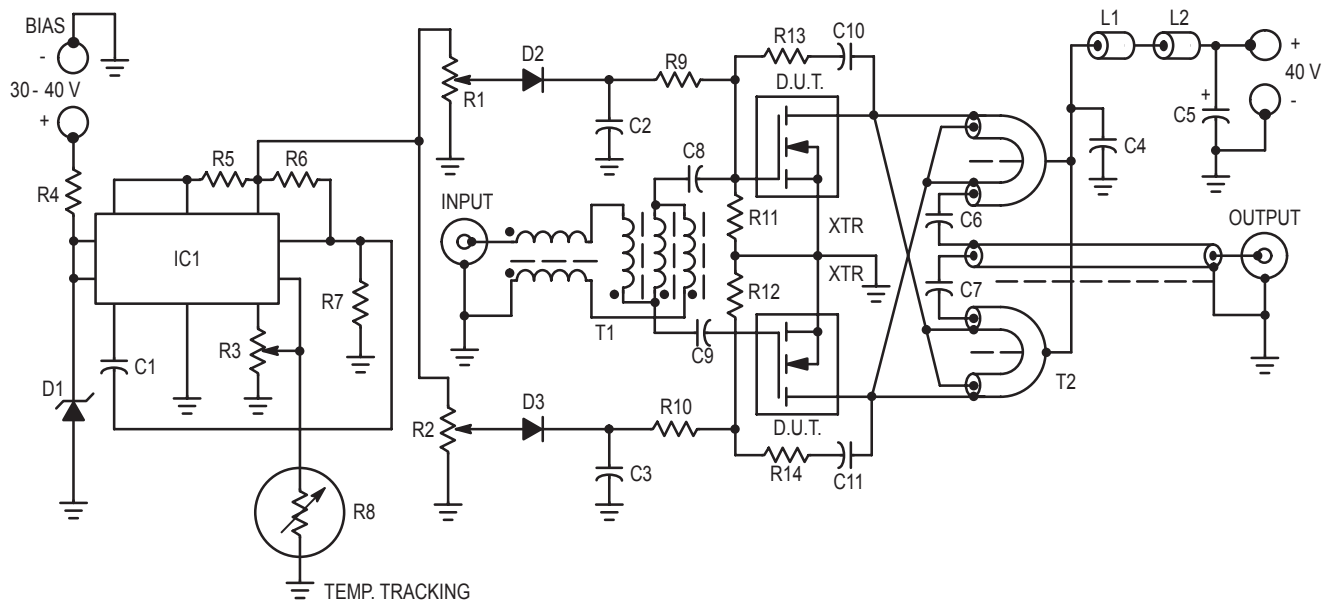
30MHz Test Circuit



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

2-50MHz 1kW Wideband Amplifier



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 Trimptot
 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

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%.

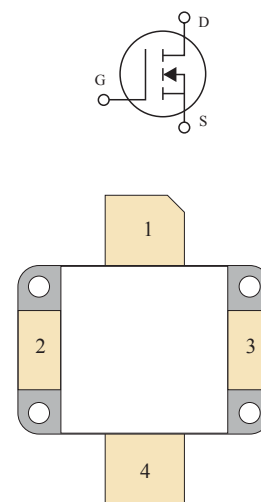
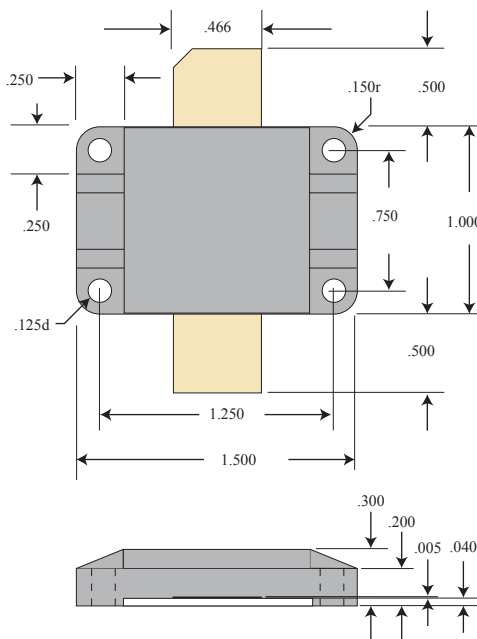
Thermal Considerations and Package Mounting:

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 4-40 (M3) screws provide the minimum 125 lb. required mounting force. T=4-6 in-lb. Please refer to App Note 1810 "Mounting Instructions for Flangeless Packages."

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. BeO substrate weight: 1.934g. Percentage of total module weight which is BeO: 20%.





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