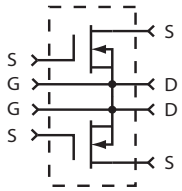
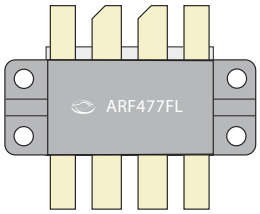
Common Source
Push-Pull Pair

ARF477FL





RF POWER MOSFET

N-CHANNEL PUSH - PULL PAIR

165V 400W 100MHz

The ARF477FL is a matched pair of RF power transistors in a common source configuration. It is designed for high voltage push-pull or parallel operation in ISM and MRI power amplifiers up to 100 MHz.

- **Specified 150 Volt, 65 MHz Characteristics:**
  - **Output Power = 400 Watts**
  - **Gain = 15dB (Class AB)**
  - **Efficiency = 50% min**
- **High Performance Push-Pull RF Package.**
- **High Voltage Breakdown and Large SOA for Superior Ruggedness.**
- **Low Thermal Resistance.**
- **RoHS Compliant**

MAXIMUM RATINGS

All Ratings: T_C = 25°C unless otherwise specified.

Symbol	Parameter	Ratings	Unit
V_{DSS}	Drain-Source Voltage	500	V
V_{DGO}	Drain-Gate Voltage	500	
I_D	Continuous Drain Current @ T_C = 25°C (each device)	15	A
V_{GS}	Gate-Source Voltage	±30	V
P_D	Total Power Dissipation @ T_C = 25°C	750	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to 175	°C
T_L	Lead Temperature: 0.063" from Case for 10 Sec.	300	

Static Electrical Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
BV_{DSS}	Drain-Source Breakdown Voltage (V_{GS} = 0V, I_D = 250 µA)	500			V
$V_{DS(ON)}$	On State Drain Voltage [1] ($I_{D(ON)}$ = 7.5A, V_{GS} = 10V)		2.9	4	
I_{DSS}	Zero Gate Voltage Drain Current (V_{DS} = V_{DSS}, V_{GS} = 0V)			25	µA
	Zero Gate Voltage Drain Current (V_{DS} = 50V_{DSS}, V_{GS} = 0, T_C = 125°C)			250	
I_{GSS}	Gate-Source Leakage Current (V_{GS} = ±30V, V_{DS} = 0V)			±100	nA
g_{fs}	Forward Transconductance (V_{DS} = 15V, I_D = 7.5A)	3.5	5.6	8	mhos
g_{fs1}/g_{fa2}	Forward Transconductance Match Ratio (V_{DS} = 15V, I_D = 5A)	0.9		1.1	
$V_{GS(TH)}$	Gate Threshold Voltage (V_{DS} = V_{GS}, I_D = 50mA)	3		5	
$V_{GS(TH)}$	Gate Threshold Voltage Match (V_{DS} = V_{GS}, I_D = 50mA)			0.2	Volts

Thermal Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction to Case		0.18	0.2	°C/W
$R_{\theta JHS}$	Junction to Sink (High Efficiency Thermal Joint Compound and Planar Heat Sink Surface.)		0.30	0.32	

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

DYNAMIC CHARACTERISTICS (per section)

ARF477FL

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	V_{GS} = 0V		1200	1400	pF
C_{oss}	Output Capacitance	V_{DS} = 150V		150	180	
C_{rss}	Reverse Transfer Capacitance	f = 1MHz		60	75	
$t_{d(on)}$	Turn-on Delay Time	V_{GS} = 15V		7		nS
t_r	Rise Time	V_{DD} = 250V		6		
$t_{d(off)}$	Turn-off Delay Time	$I_D = I_{D[Cont.]}$ @ 25°C		20		
t_f	Fall Time	R_G = 1.6 Ω		4.0	7	

Functional Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
G_{PS}	Common Source Amplifier Power Gain	f = 65MHz	14	16		dB
η	Drain Efficiency	I_{dq} = 0mA V_{DD} = 150V	50	55		%
Ψ	Electrical Ruggedness VSWR 10:1	P_{OUT} = 400W	No Degradation in Output Power			

1. Pulse Test: Pulse width < 380 µS, Duty Cycle < 2%.

Microsemi reserves the right to change, without notice, the specifications and information contained herein.

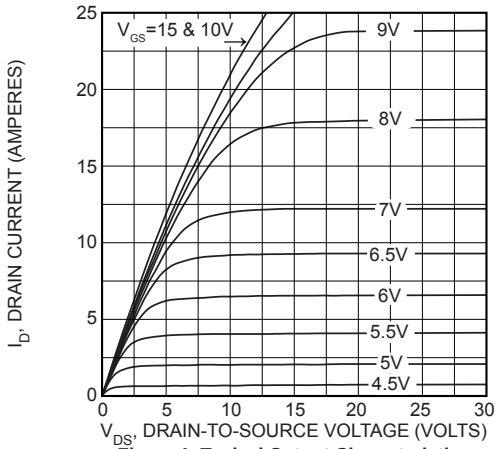


Figure 1, Typical Output Characteristics

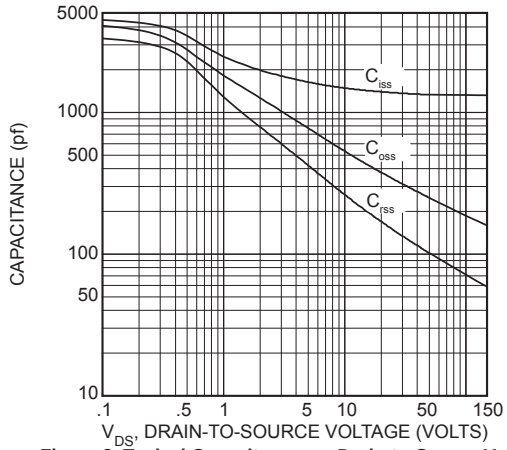


Figure 2, Typical Capacitance vs. Drain-to-Source Voltage

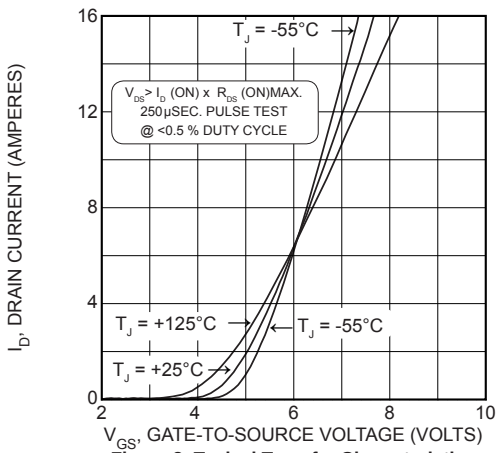


Figure 3, Typical Transfer Characteristics

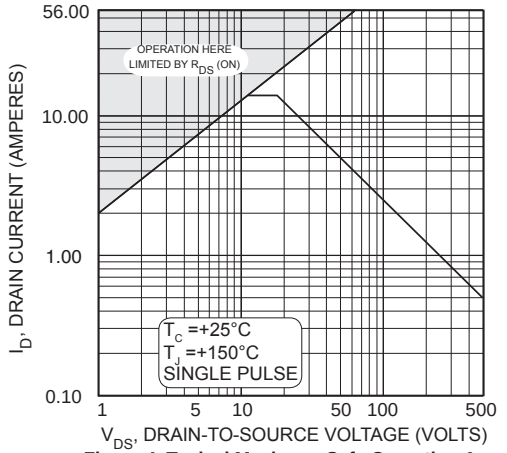


Figure 4, Typical Maximum Safe Operating Area

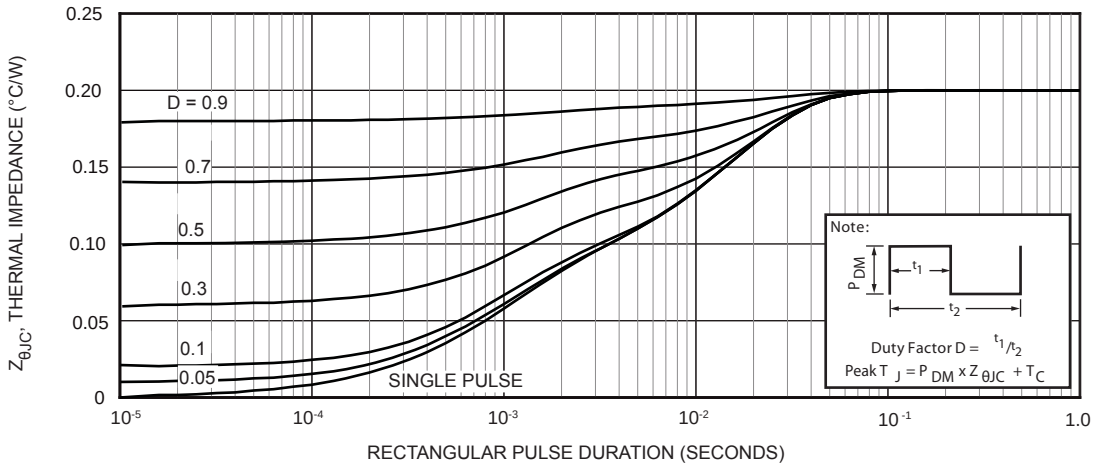


Figure 5a, Maximum Effective Transient Thermal Impedance, Junction-To-Case vs Pulse Duration

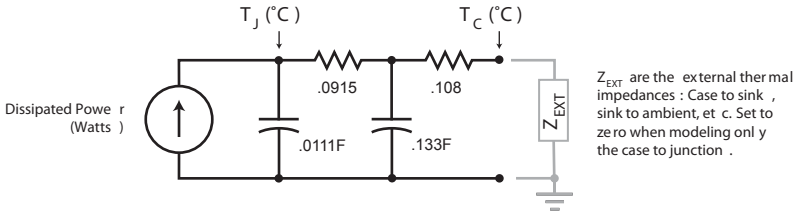
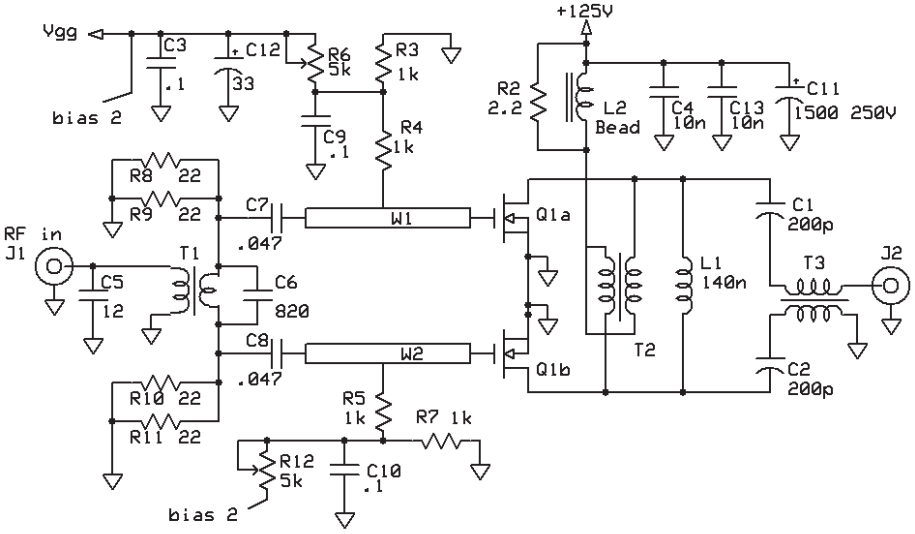


Figure 5b, TRANSIENT THERMAL IMPEDANCE MODEL

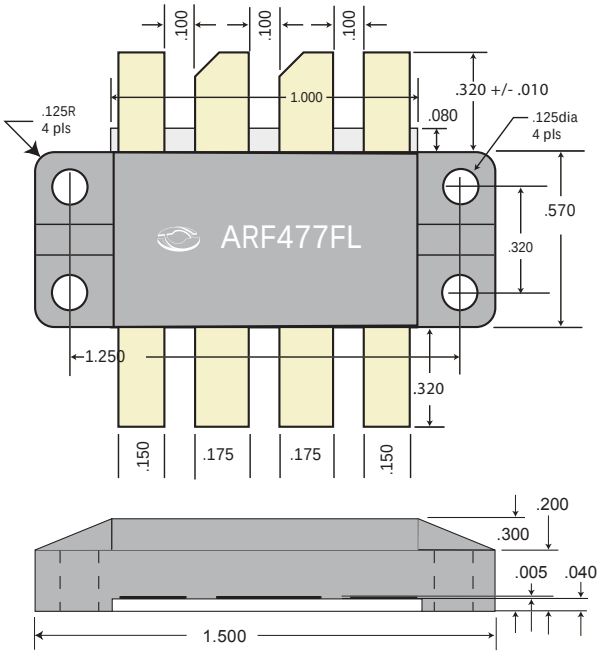
Freq. (MHz)	Z_{in} (Ω)	Z_{OUT} (Ω)
40	1.5 - j 10	24 - j 37
60	1.9 - j 1.3	13 - j 29
80	2.2 - j 0.82	7.9 - j 24

Z_{IN} - Gate shunted with 100Ω I_{dq} = 0
Z_{OL} - Conjugate of optimum load for 400 Watts output at V_{dd}=125V

65MHz Test Circuit



C6 - ATC 100B type
L1 - 4.5t #18 enam .312"dia
L2 = 2t #18 on FairRite 2643800302 bead
R8-R11 - 22 ohm 1W SMT
T1= 4:1 2t #20 1t 1.5" braid on 2861001502
T2 = 6t #22 bifilar on FairRite 5961000301
T3 = 2t RG316 on FairRite 2861010002
Q1a/b ARF477FL
W1, W2 - 1.4" x .2"
PWB = FR-4 fiberglass er= 4.6



Thermal Considerations and Package Mounting:

The rated power dissipation is only available when the package mounting surface is at 25°C and the junction temperature is 175°C. The thermal resistance between junctions and case mounting surface is 0.23 °C/W. When installed, an additional thermal impedance of 0.07°C/W between the package base and the mounting surface is typical. Insure that the mounting surface is smooth and flat. Thermal joint compound must be used to reduce the effects of small surface irregularities. Use the minimum amount necessary to coat the surface. The heatsink should incorporate a copper heat spreader to obtain best results.

The package design clamps the ceramic base to the heatsink. A clamped joint maintains the required mounting pressure while allowing for thermal expansion of both the base and the heat sink. Four 4-40 (M3) screws provide the required mounting force.
T = 3-4 in-lb (0.34-0.45 N-m).

HAZARDOUS MATERIAL WARNING

The white ceramic portion of the device between leads and mounting surface is beryllium oxide, BeO. Beryllium oxide dust is 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.

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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.

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