



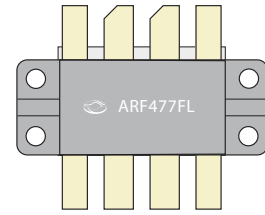
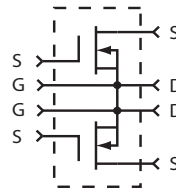
THE DATASHEET OF ARF477FL





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: $T_C = 25^\circ\text{C}$ 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 @ $T_C = 25^\circ\text{C}$ (each device) | 15 | A |
| V_{GS} | Gate-Source Voltage | ± 30 | V |
| P_D | Total Power Dissipation @ $T_C = 25^\circ\text{C}$ | 750 | W |
| T_J, T_{STG} | Operating and Storage Junction Temperature Range | -55 to 175 | $^\circ\text{C}$ |
| 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 ($V_{GS} = 0V, I_D = 250 \mu\text{A}$) | 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 ($V_{DS} = 50V_{DSS}, V_{GS} = 0, T_C = 125^\circ\text{C}$) | | | 250 | |
| I_{GSS} | Gate-Source Leakage Current ($V_{GS} = \pm 30V, V_{DS} = 0V$) | | | ± 100 | nA |
| g_{fs} | Forward Transconductance ($V_{DS} = 15V, I_D = 7.5A$) | 3.5 | 5.6 | 8 | mhos |
| g_{fs1}/g_{fs2} | 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 | $^\circ\text{C/W}$ |
| $R_{\theta JHS}$ | 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.

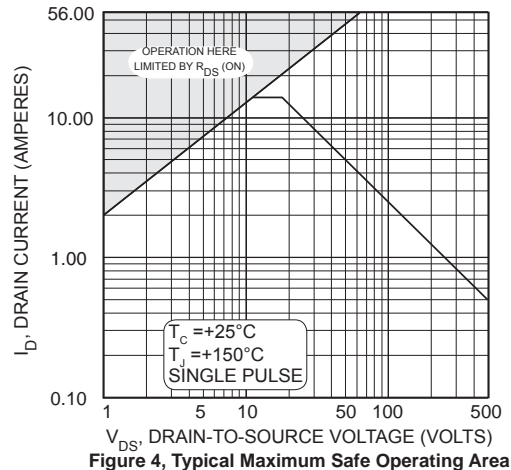
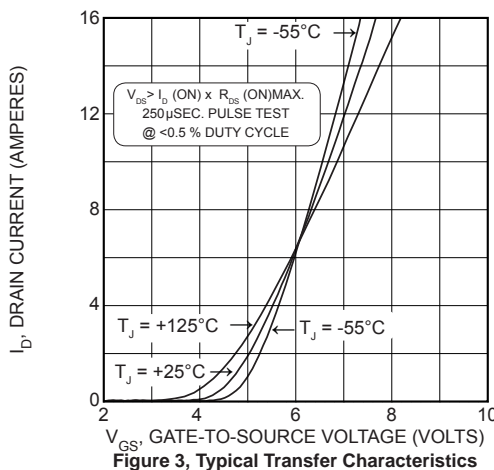
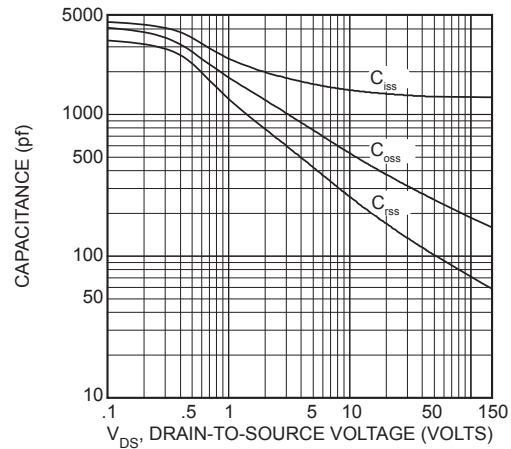
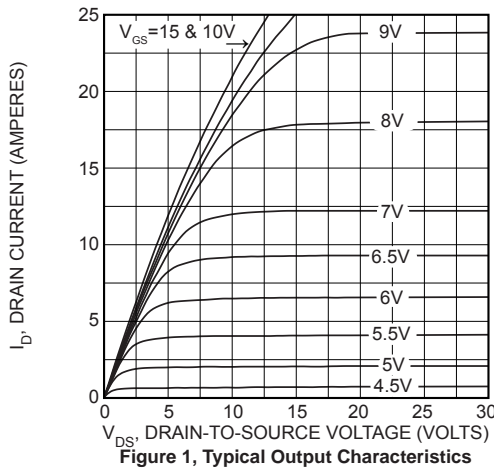
| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|--------------|------------------------------|--|-----|------|------|------|
| C_{ISS} | Input Capacitance | $V_{GS} = 0V$ $V_{DS} = 150V$ $f = 1MHz$ | | 1200 | 1400 | pF |
| C_{OSS} | Output Capacitance | | | 150 | 180 | |
| C_{RSS}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

Functional Characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|----------|------------------------------------|---|--------------------------------|-----|-----|------|
| G_{PS} | Common Source Amplifier Power Gain | $f = 65MHz$ $I_{dq} = 0mA$ $V_{DD} = 150V$ $P_{OUT} = 400W$ | 14 | 16 | | dB |
| η | Drain Efficiency | | 50 | 55 | | % |
| Ψ | Electrical Ruggedness VSWR 10:1 | | 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.



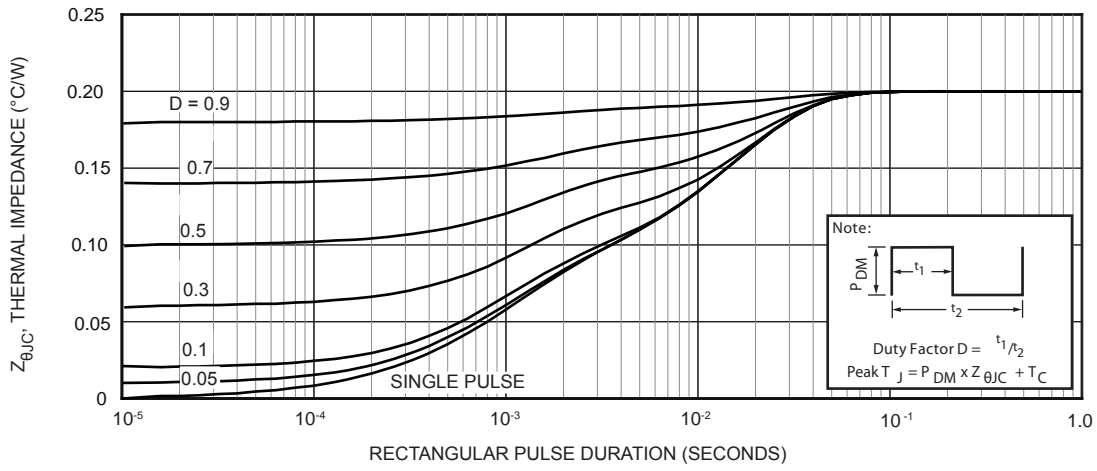


Figure 5a, Maximum Effective Transient Thermal Impedance, Junction-To-Case vs Pulse Duration

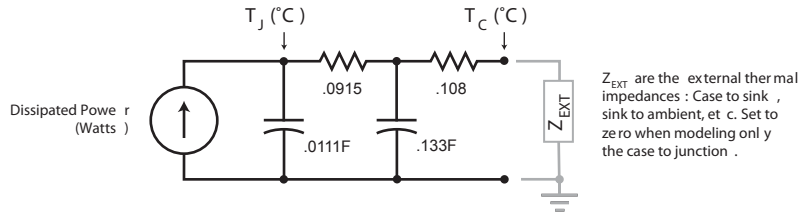
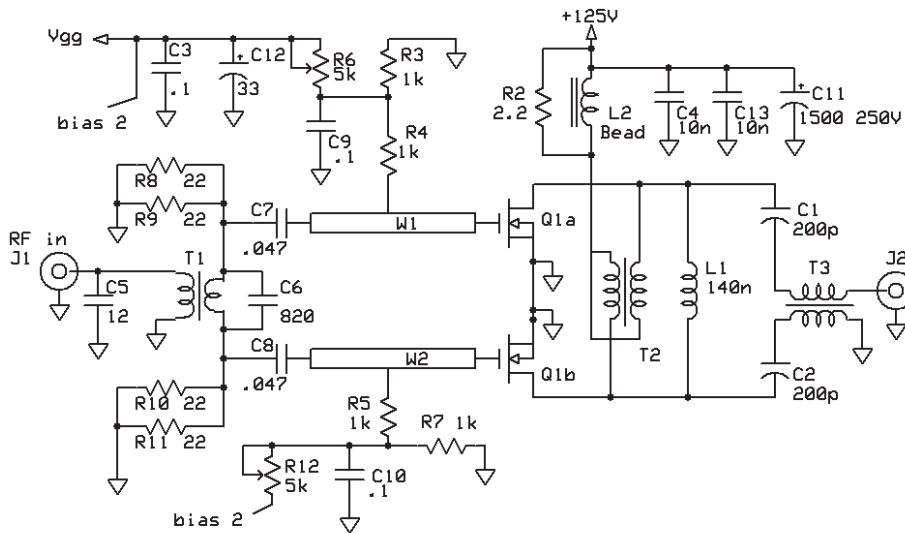


Figure 5b, TRANSIENT THERMAL IMPEDANCE MODEL

| 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 |

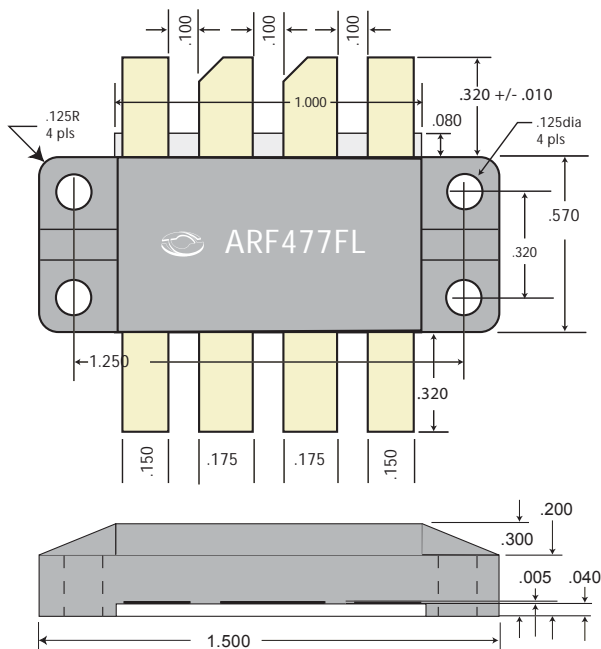
Z_{IN} - Gate shunted with 100Ω I_{dq} = 0
 Z_{OL} - Conjugate of optimum load for 400 Watts output at V_{ds}=125V

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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