
 Common  
Source

# RF POWER MOSFETs

## N-CHANNEL ENHANCEMENT MODE

**150V 140W 65MHz**

The ARF448A and ARF448B comprise a symmetric pair of common source RF power transistors designed for push-pull scientific, commercial, medical and industrial RF power amplifier applications up to 65 MHz.

- Specified 150 Volt, 40.68 MHz Characteristics:
  - Output Power = 140 Watts.
  - Gain = 15dB (Class C)
  - Efficiency = 75%
- Low Cost Common Source RF Package.
- Very High Breakdown for Improved Ruggedness.
- Low Thermal Resistance.
- Nitride Passivated Die for Improved Reliability.

### MAXIMUM RATINGS

 All Ratings:  $T_C = 25^\circ\text{C}$  unless otherwise specified.

Symbol	Parameter	ARF448A/448B	UNIT
$V_{DSS}$	Drain-Source Voltage	450	Volts
$V_{DGO}$	Drain-Gate Voltage	450	
$I_D$	Continuous Drain Current @ $T_C = 25^\circ\text{C}$	15	Amps
$V_{GS}$	Gate-Source Voltage	$\pm 30$	Volts
$P_D$	Total Power Dissipation @ $T_C = 25^\circ\text{C}$	230	Watts
$R_{\theta JC}$	Junction to Case	0.55	$^\circ\text{C/W}$
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to 150	$^\circ\text{C}$
$T_L$	Lead Temperature: 0.063" from Case for 10 Sec.	300	

### STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
$BV_{DSS}$	Drain-Source Breakdown Voltage ( $V_{GS} = 0V, I_D = 250 \mu\text{A}$ )	450			Volts
$V_{DS(ON)}$	On State Drain Voltage <sup>①</sup> ( $I_D(ON) = 7.5A, V_{GS} = 10V$ )			3	
$I_{DSS}$	Zero Gate Voltage Drain Current ( $V_{DS} = V_{DSS}, V_{GS} = 0V$ )			25	$\mu\text{A}$
	Zero Gate Voltage Drain Current ( $V_{DS} = 0.8 V_{DSS}, V_{GS} = 0V, T_C = 125^\circ\text{C}$ )			250	
$I_{GSS}$	Gate-Source Leakage Current ( $V_{GS} = \pm 30V, V_{DS} = 0V$ )			$\pm 100$	nA
$g_{fs}$	Forward Transconductance ( $V_{DS} = 25V, I_D = 7.5A$ )	5	8.5		mhos
$V_{GS(TH)}$	Gate Threshold Voltage ( $V_{DS} = V_{GS}, I_D = 50mA$ )	2		5	Volts

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

APT Website - <http://www.advancedpower.com>

**DYNAMIC CHARACTERISTICS**

**ARF448A/448B**

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
$C_{iss}$	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 150V$ $f = 1\text{ MHz}$		1400	1700	pF
$C_{oss}$	Output Capacitance			150	200	
$C_{rss}$	Reverse Transfer Capacitance			65	100	
$t_{d(on)}$	Turn-on Delay Time	$V_{GS} = 15V$ $V_{DD} = 0.5 V_{DSS}$ $I_D = I_{D[Cont.]} @ 25^\circ C$ $R_G = 1.6\Omega$		7	15	ns
$t_r$	Rise Time			5	10	
$t_{d(off)}$	Turn-off Delay Time			23	40	
$t_f$	Fall Time			12	25	

**FUNCTIONAL CHARACTERISTICS**

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
$G_{PS}$	Common Source Amplifier Power Gain	$f = 40.68\text{ MHz}$	13	15		dB
$\eta$	Drain Efficiency	$V_{GS} = 0V$ $V_{DD} = 150V$	70	75		%
$\psi$	Electrical Ruggedness VSWR 20:1	$P_{out} = 140W$	No Degradation in Output Power			

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

APT Reserves the right to change, without notice, the specifications and information contained herein.

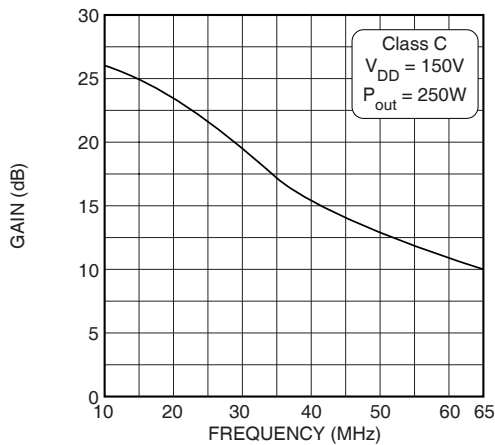


Figure 1, Typical Gain vs Frequency

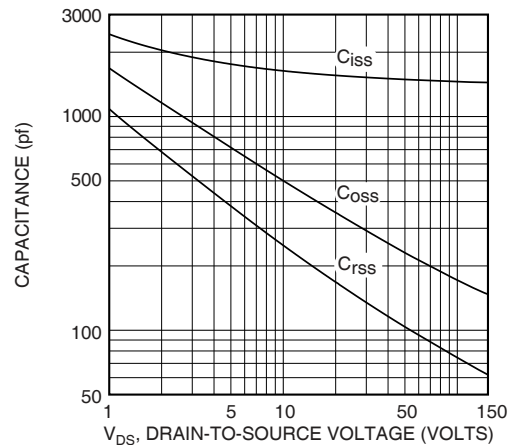


Figure 2, Typical Capacitance vs. Drain-to-Source Voltage

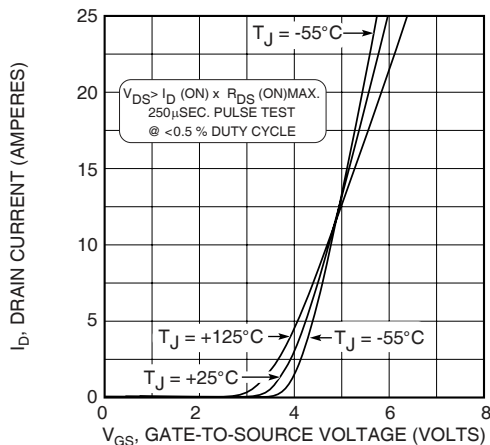


Figure 3, Typical Transfer Characteristics

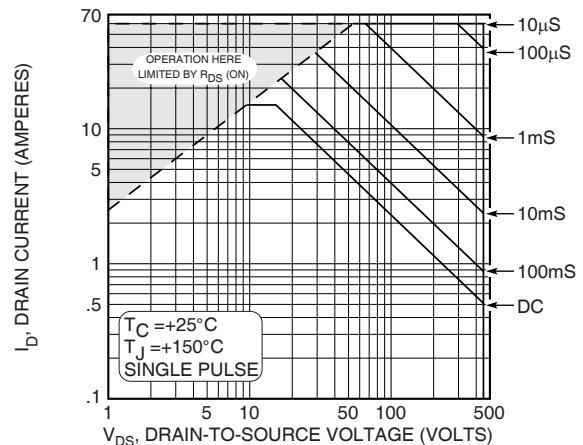


Figure 4, Typical Maximum Safe Operating Area

**ARF448A/448B**

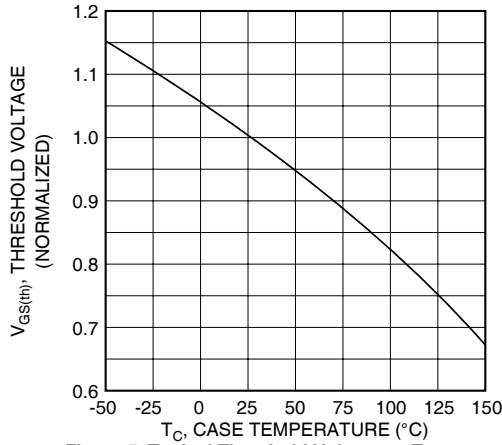


Figure 5, Typical Threshold Voltage vs Temperature

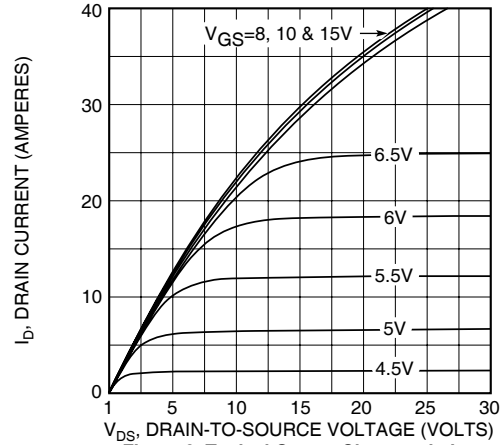


Figure 6, Typical Output Characteristics

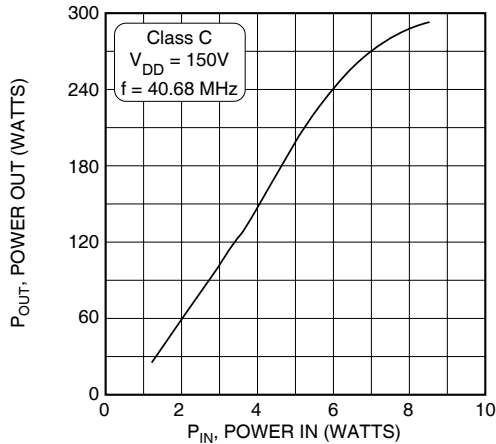


Figure 7, Typical Power Out vs Power In

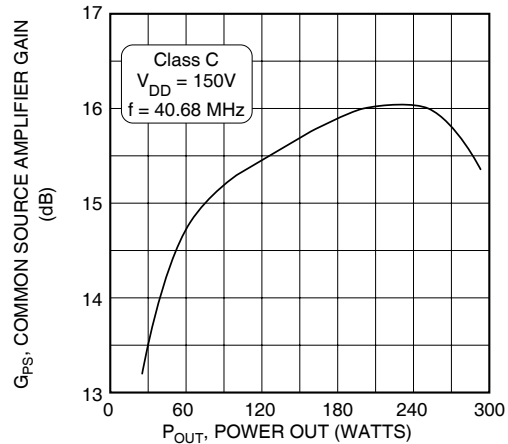


Figure 8, Typical Common Source Amplifier Gain vs Power Out

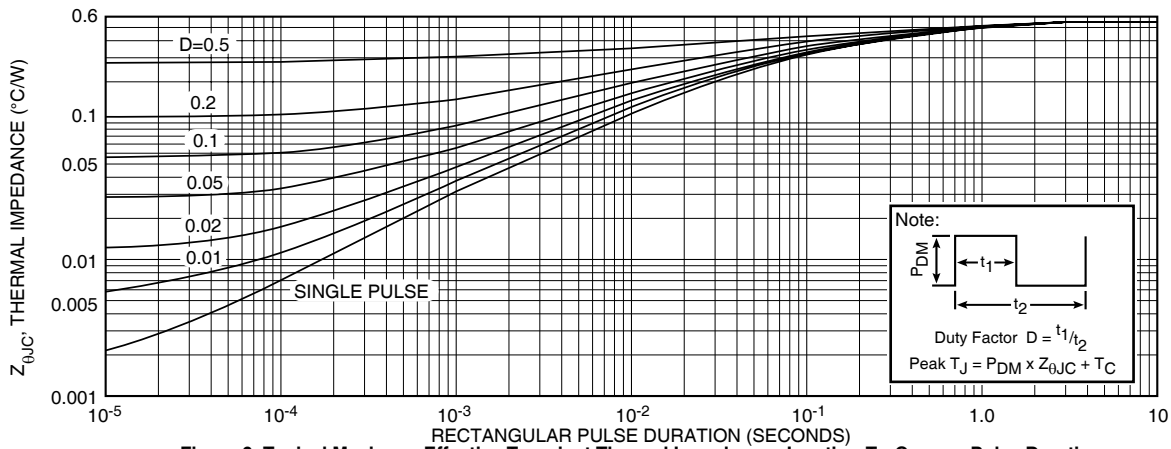


Figure 9, Typical Maximum Effective Transient Thermal Impedance, Junction-To-Case vs Pulse Duration

**Table 1 - Typical Class C Large Signal Input-Output Impedance**

Freq. (MHz)	Z <sub>in</sub> (Ω)	Z <sub>oL</sub> (Ω)
2.0	20.90 - j 9.2	56.00 - j 06.0
13.5	2.40 - j 6.8	37.00 - j 26.0
27.0	0.57 - j 2.6	18.00 - j 25.0
40.0	0.31 - j 0.5	9.90 - j 19.2
65.0	0.44 + j 1.9	4.35 - j 11.4

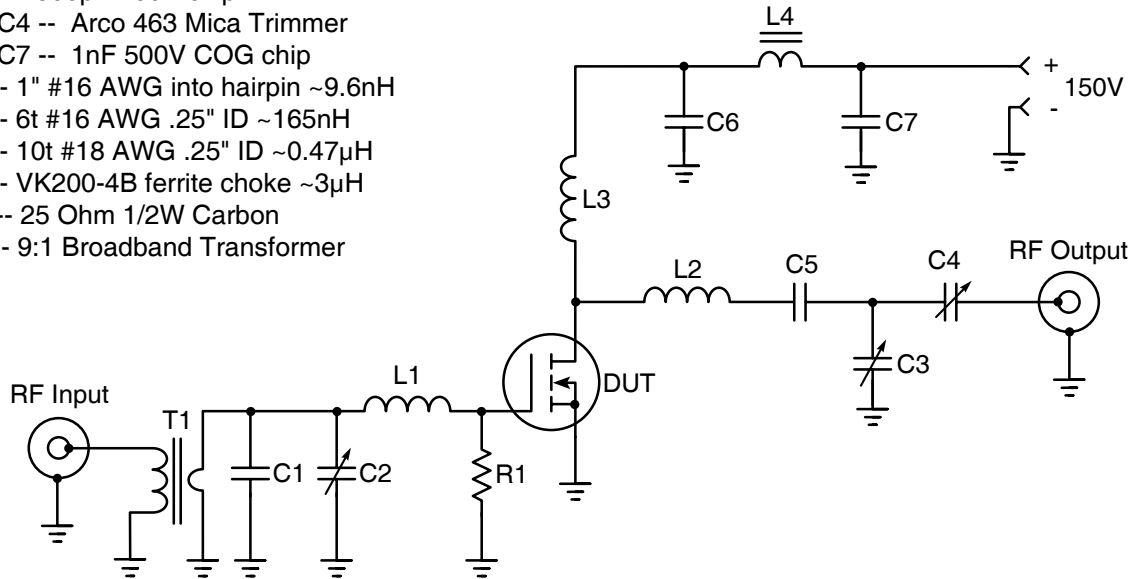
Z<sub>in</sub> - gate shunted by 25Ω

Z<sub>oL</sub> - conjugate of optimum load impedance for 250W at 150V

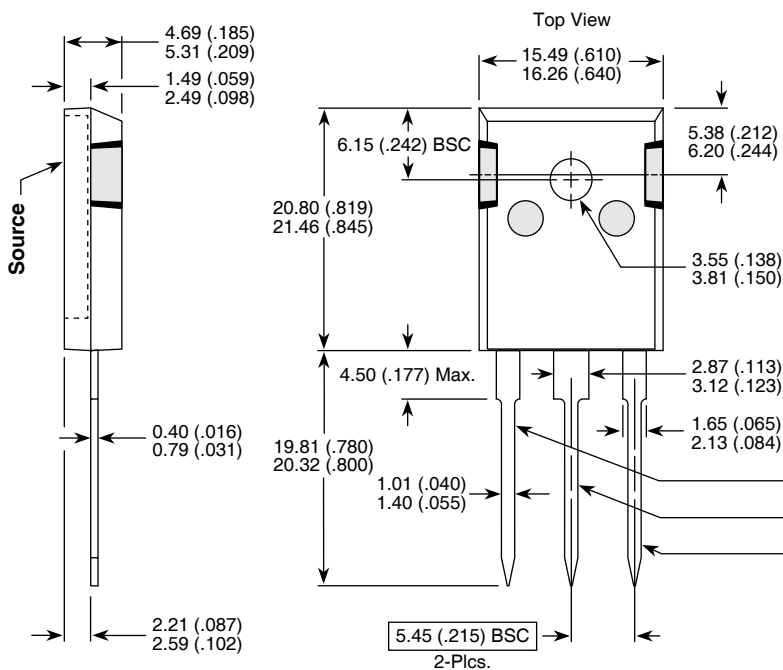
40.68 MHz Test Circuit

Parts List

- C1 -- 1800pF 100V chip
- C2-C4 -- Arco 463 Mica Trimmer
- C5-C7 -- 1nF 500V COG chip
- L1 -- 1" #16 AWG into hairpin ~9.6nH
- L2 -- 6t #16 AWG .25" ID ~165nH
- L3 -- 10t #18 AWG .25" ID ~0.47μH
- L4 -- VK200-4B ferrite choke ~3μH
- R1 -- 25 Ohm 1/2W Carbon
- T1 -- 9:1 Broadband Transformer



TO-247 Package Outline



Dimensions in Millimeters and (Inches)

**NOTE:** The ARF446 and ARF447 comprise a symmetric pair of RF power transistors and meet the same electrical specifications. The device pin-outs are the mirror image of each other to allow ease of use as a push-pull pair.

Device	
ARF448A	ARF448B
Gate	Drain
Source	Source
Drain	Gate