
 Common  
Source

# RF POWER MOSFETS

## N-CHANNEL ENHANCEMENT MODE

**125V 100W 100MHz**

The ARF463A and ARF463B 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 100 MHz. They have been optimized for both linear and high efficiency classes of operation.

- Specified 125 Volt, 81.36 MHz Characteristics:**
- Low Cost Common Source RF Package.**
- Output Power = 100 Watts.**
- Low  $V_{th}$  thermal coefficient.**
- Gain = 15dB (Class AB)**
- Low Thermal Resistance.**
- Efficiency = 75% (Class C)**
- Optimized SOA for Superior Ruggedness.**


### MAXIMUM RATINGS

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

Symbol	Parameter	ARF463A/B	UNIT
$V_{DSS}$	Drain-Source Voltage	500	Volts
$V_{DGO}$	Drain-Gate Voltage	500	
$I_D$	Continuous Drain Current @ $T_C = 25^\circ\text{C}$	9	Amps
$V_{GS}$	Gate-Source Voltage	$\pm 30$	Volts
$P_D$	Total Power Dissipation @ $T_C = 25^\circ\text{C}$	180	Watts
$R_{\theta JC}$	Junction to Case	0.50	$^\circ\text{C/W}$
$T_J, T_{STG}$	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 ( $V_{GS} = 0V, I_D = 250 \mu\text{A}$ )	500			Volts
$V_{DS(ON)}$	On State Drain Voltage <sup>①</sup> ( $I_D(ON) = 4.5A, V_{GS} = 10V$ )			5.0	
$I_{DSS}$	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 ( $V_{DS} = 25V, I_D = 4.5A$ )	2	3		mhos
$V_{GS(TH)}$	Gate Threshold Voltage ( $V_{DS} = V_{GS}, I_D = 50mA$ )	3		5	Volts

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

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

**DYNAMIC CHARACTERISTICS**

**ARF463A/B**

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
$C_{iss}$	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 50V$ $f = 1\text{ MHz}$		670		pF
$C_{oss}$	Output Capacitance			173		
$C_{rss}$	Reverse Transfer Capacitance			52		
$t_{d(on)}$	Turn-on Delay Time	$V_{GS} = 15V$ $V_{DD} = 0.5 V_{DSS}$ $I_D = I_{D[Cont.]} @ 25^\circ C$ $R_G = 1.6\Omega$		5.6		ns
$t_r$	Rise Time			4.3		
$t_{d(off)}$	Turn-off Delay Time			13.5		
$t_f$	Fall Time			4.2		

**FUNCTIONAL CHARACTERISTICS**

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
$G_{PS}$	Common Source Amplifier Power Gain	$f = 81.36\text{ MHz}$	13	15		dB
$\eta$	Drain Efficiency	$V_{GS} = 0V$ $V_{DD} = 125V$	70	75		%
$\psi$	Electrical Ruggedness VSWR 10:1	$P_{out} = 100W$	No Degradation in Output Power			

① Pulse Test: Pulse width < 380  $\mu$ S, Duty Cycle < 2%

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

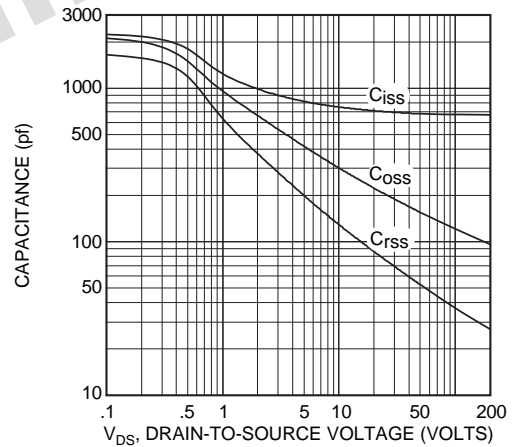


Figure 2, Typical Capacitance vs. Drain-to-Source Voltage

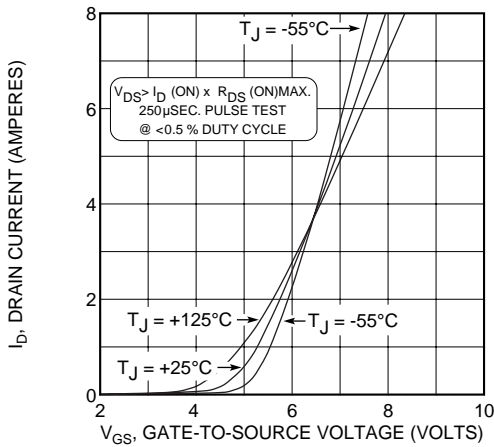


Figure 3, Typical Transfer Characteristics

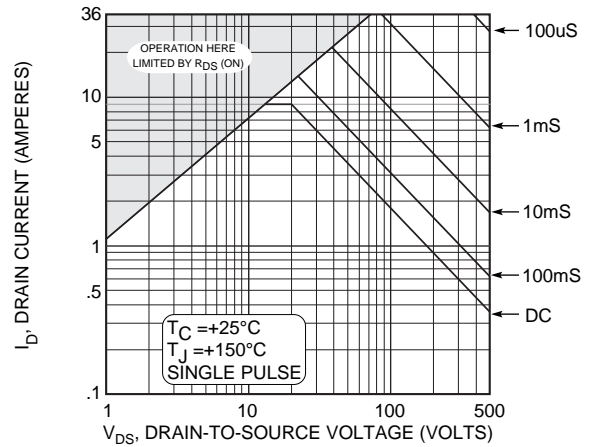


Figure 4, Typical Maximum Safe Operating Area

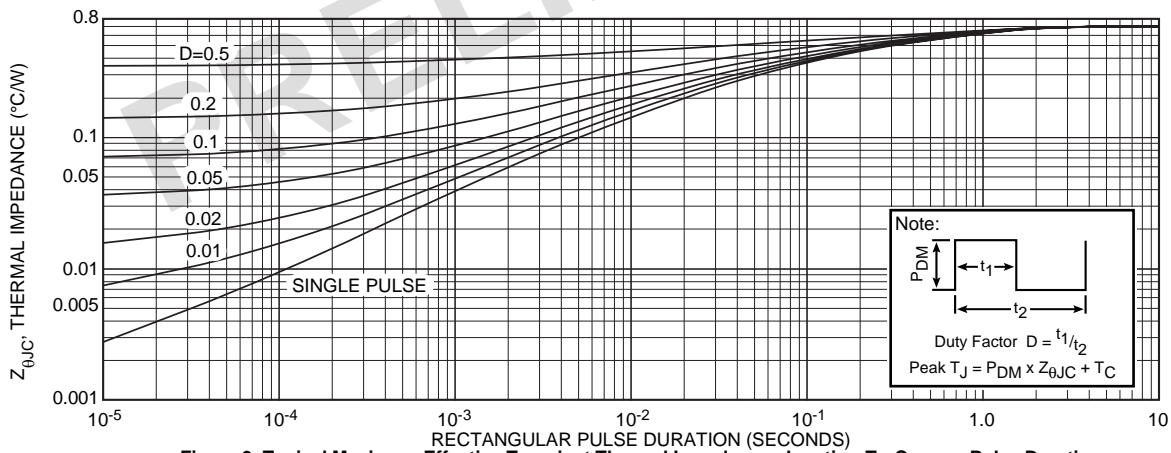
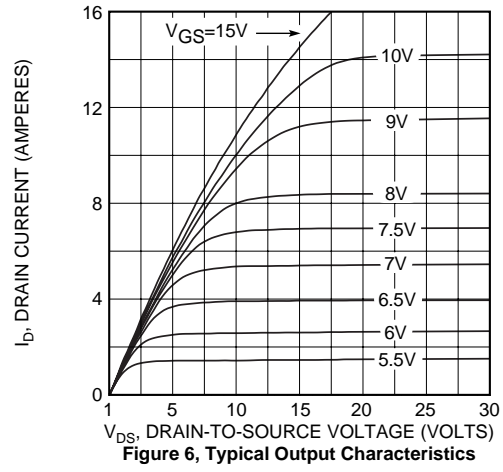
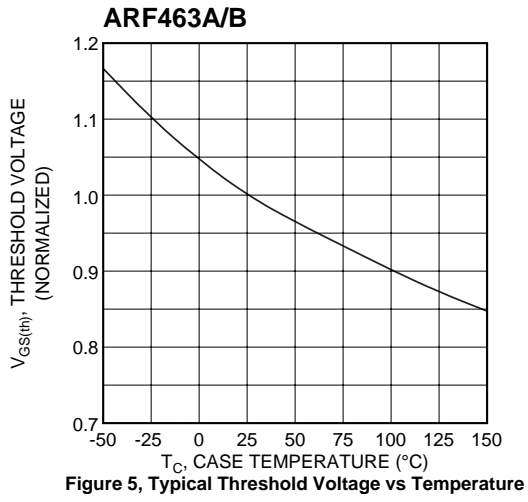
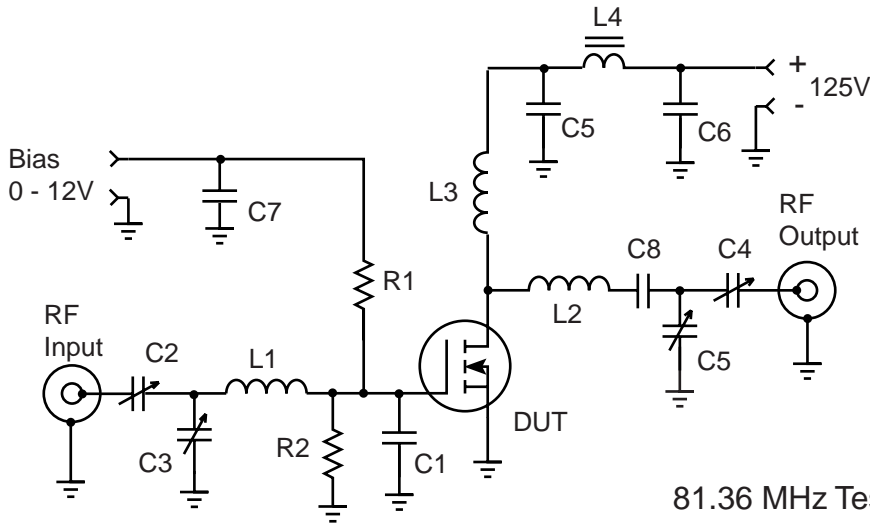


Table 1 - Typical Class AB Large Signal Input - Output Impedance

Freq. (MHz)	Z <sub>in</sub> (Ω)	Z <sub>OL</sub> (Ω)
2.0	24 - j 5.0	55 - j 4.8
13.5	7.8 - j 11	41 - j 24
27	2.1 - j 6.4	23 - j 26.2
40	.74 - j 3.3	13.6 - j 22
65	.30 + j .42	6.1 - j 14.2
80	.46 + j 2.0	4.2 - j 10.7
100	.87 + j 3.7	2.7 - j 7.1

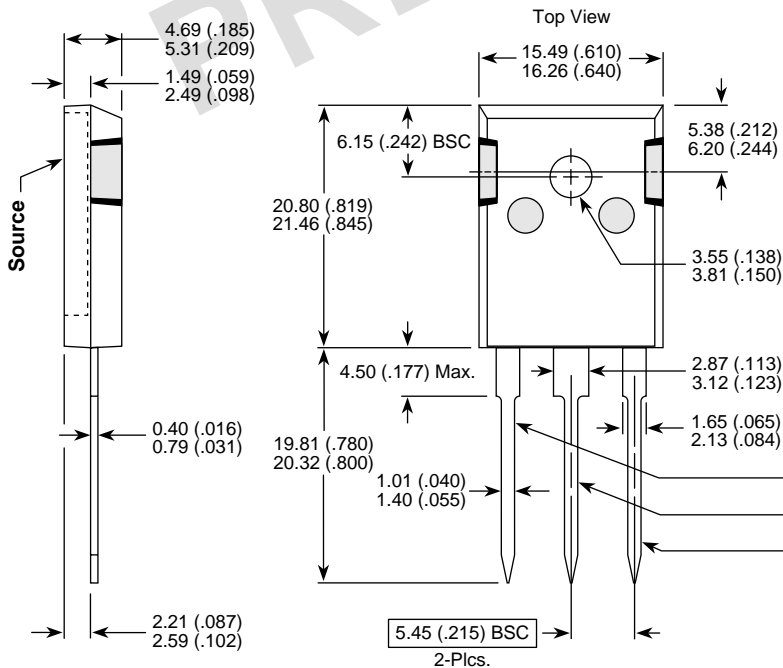
Z<sub>in</sub> - Gate shunted with 25Ω I<sub>DQ</sub> = 50mA  
 Z<sub>OL</sub> - Conjugate of optimum load for 100 Watts output at V<sub>DD</sub> = 125V



- C1 -- 820pF Unelco mounted at gate lead
- C2-C5 -- Arco 463 Mica trimmer
- C5-C8 -- 10nF 500V COG chip
- L1 -- 3t #18 .3" ID .25"L ~50nH
- L2 -- 3t #16 AWG .25" ID .3"L ~58nH
- L3 -- 10t #18 AWG .25 ID ~470nH
- L4 -- VK200-4B ferrite choke ~3uH
- R1-R2 -- 50 Ohm 1/2W Carbon
- DUT = ARF463A/B

81.36 MHz Test Circuit

TO-247 Package Outline



Dimensions in Millimeters and (Inches)  
**NOTE:** These two parts 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	
ARF - A	ARF - B
Gate	Drain
Source	Source
Drain	Gate