


## RF POWER MOSFETs

### N-CHANNEL ENHANCEMENT MODE

**250V 150W 65MHz**

The ARF461A and ARF461B comprise a symmetric pair of common drain RF power transistors designed for push-pull scientific, commercial, medical and industrial RF power amplifier applications up to 65 MHz. They have been optimized for both linear and high efficiency classes of operation.

- **Specified 250 Volt, 40.68 MHz Characteristics:**
  - Output Power = 150 Watts.**
  - Gain = 13dB (Class AB)**
  - Efficiency = 75% (Class C)**
- **Low Cost Common Source RF Package.**
- **Low V<sub>th</sub> thermal coefficient.**
- **Low Thermal Resistance.**
- **Optimized SOA for Superior Ruggedness.**
- **RoHS Compliant** 

#### MAXIMUM RATINGS

All Ratings: T<sub>C</sub> = 25°C unless otherwise specified.

Symbol	Parameter	ARF461AG/BG	Unit
V <sub>DSS</sub>	Drain-Source Voltage	1000	V
V <sub>DGO</sub>	Drain-Gate Voltage	1000	
I <sub>D</sub>	Continuous Drain Current @ T <sub>C</sub> = 25°C	6.5	A
V <sub>GS</sub>	Gate-Source Voltage	±30	V
P <sub>D</sub>	Total Power Dissipation @ T <sub>C</sub> = 25°C	250	W
R <sub>θJC</sub>	Junction to Case	0.50	°C/W
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Junction Temperature Range	-55 to 150	°C
T <sub>L</sub>	Lead Temperature: 0.063" from Case for 10 Sec.	300	

#### STATIC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Min	Typ	Max	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage (V <sub>GS</sub> = 0V, I <sub>D</sub> = 250 μA)	1000			V
V <sub>DS(ON)</sub>	On State Drain Voltage <sup>1</sup> (I <sub>D(ON)</sub> = 3.25A, V <sub>GS</sub> = 10V)			6.5	
I <sub>DSS</sub>	Zero Gate Voltage Drain Current (V <sub>DS</sub> = V <sub>DSS</sub> , V <sub>GS</sub> = 0V)			25	μA
	Zero Gate Voltage Drain Current (V <sub>DS</sub> = 0.8V <sub>DSS</sub> , V <sub>GS</sub> = 0, T <sub>C</sub> = 125°C)			250	
I <sub>GSS</sub>	Gate-Source Leakage Current (V <sub>DS</sub> = ±30V, V <sub>GS</sub> = 0V)			±100	nA
g <sub>fs</sub>	Forward Transconductance (V <sub>DS</sub> = 25V, I <sub>D</sub> = 3.25A)	3	4		mhos
V <sub>GS(TH)</sub>	Gate Threshold Voltage (V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 50mA)	3		5	Volts



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

# Dynamic Characteristics

ARF461A/B

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 50V$ $f = 1MHz$		1700		pF
$C_{oss}$	Output Capacitance			175		
$C_{rss}$	Reverse Transfer Capacitance			50		
$t_{d(on)}$	Turn-On Delay Time	$V_{GS} = 15V$ $V_{DD} = 0.5V_{DSS}$ $I_D = I_{D(Cont.)} @ 25^{\circ}C$ $R_G = 1.6\Omega$		8		ns
$t_r$	Rise Time			5		
$t_{d(off)}$	Turn-off Delay Time			21		
$t_f$	Fall Time			10.1		

# Functional Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$G_{PS}$	Common Source Amplifier Power Gain	$f = 40.68MHz$ $V_{GS} = 0V$ $V_{DD} = 250V$ $P_{OUT} = 150W$	13	15		dB
$\eta$	Drain Efficiency		70	75		%
$\Psi$	Electrical Ruggedness VSWR 10:1		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.

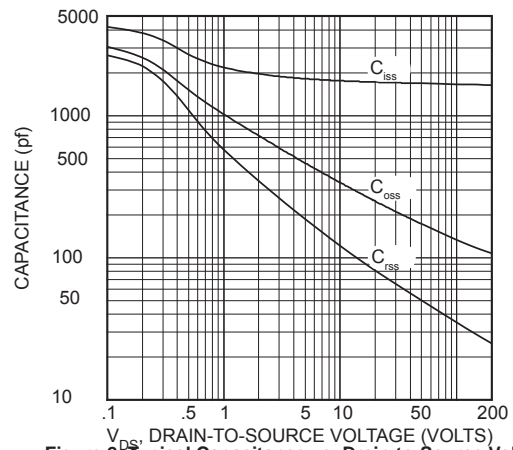


Figure 2, Typical Capacitance vs. Drain-to-Source Voltage

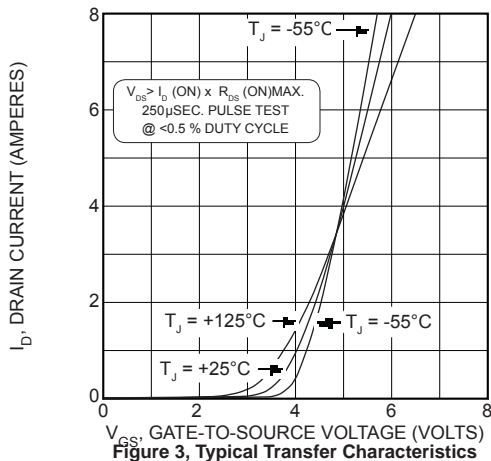


Figure 3, Typical Transfer Characteristics

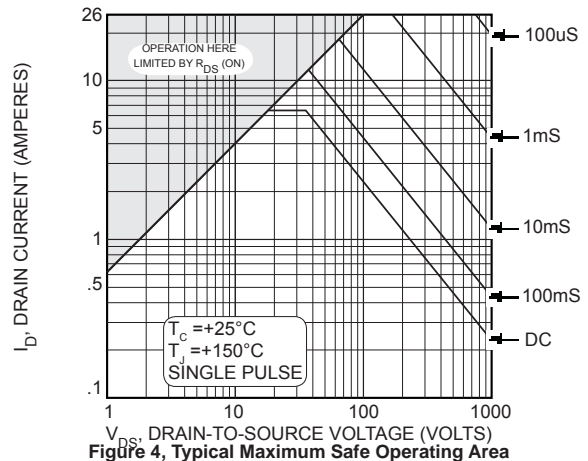


Figure 4, Typical Maximum Safe Operating Area

**ARF461A/B**

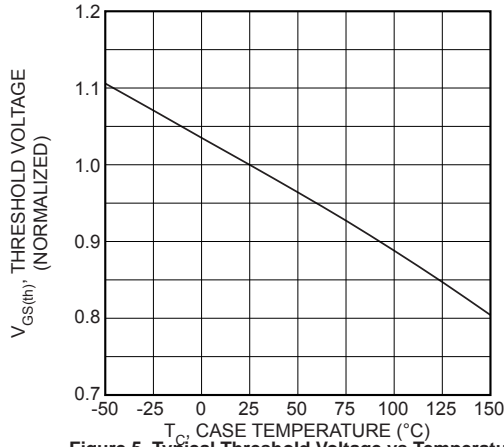


Figure 5, Typical Threshold Voltage vs Temperature

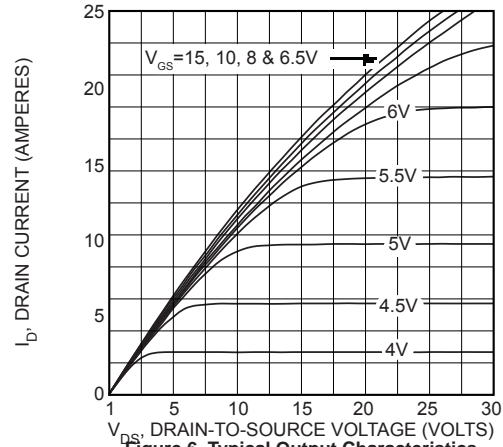


Figure 6, Typical Output Characteristics

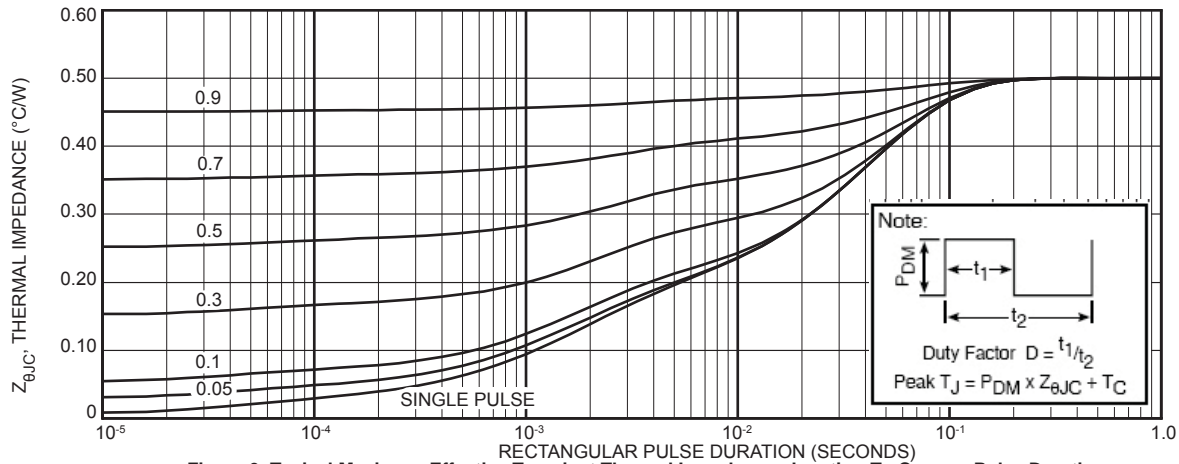


Figure 9, Typical Maximum Effective Transient Thermal Impedance, Junction-To-Case vs Pulse Duration

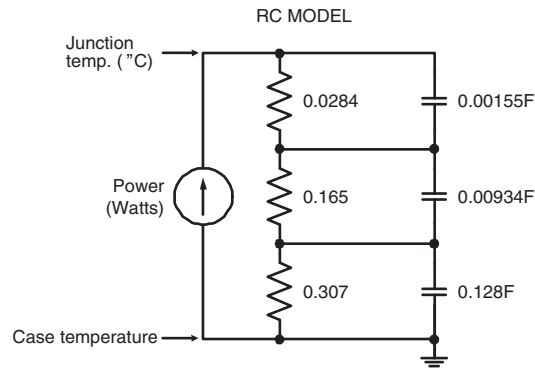


Figure 9a, TRANSIENT THERMAL IMPEDANCE MODEL

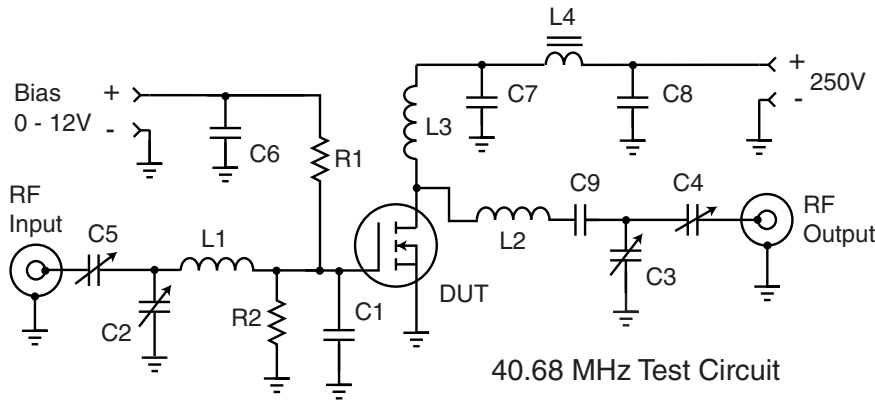
Table 1 - Typical Class AB Large Signal Input - Output Impedance

Freq. (MHz)	Z <sub>in</sub> (Ω)	Z <sub>OL</sub> (Ω)
2.0	20.9 - j 9.2	38 - j 2.6
13.5	2.4 - j 6.8	31 - j 14
27	.57 - j 2.6	19.6 - j 17.6
40	.31 - j 0.5	12.5 - j 15.8
65	.44 + j 1.9	6.0 - j 10.5

Z<sub>in</sub> - Gate shunted with 25Ω

I<sub>DQ</sub> = 100mA

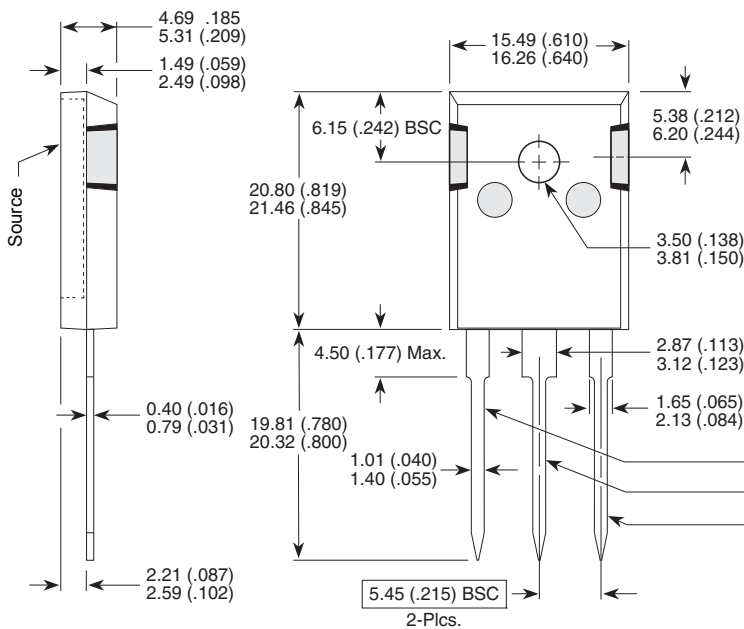
Z<sub>OL</sub> - Conjugate of optimum load for 150 Watts output at V<sub>dd</sub> = 125V



- C1 -- 1800pF + 1000pF 100V chips mounted at gate lead
- C2-C5 -- Arco 463 Mica trimmer
- C6-C8 -- .1 μF 500V ceramic chip
- C9 -- 2200 pF 500 V chip
- L1 -- 4t #20 AWG .25"ID .3 "L ~80nH
- L2 -- 7t #16 AWG .4" ID .5"L ~335nH
- L3 -- 25t #24 AWG .25"ID ~2.2uH
- L4 -- VK200-4B ferrite choke 3uH
- R1-R2 -- 51 Ohm 0.5W Carbon
- DUT = ARF461A/B

40.68 MHz Test Circuit

TO-247 Package Outline



**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

Dimensions in Millimeters and (Inches)