

# RF POWER MOSFETs

## N-CHANNEL ENHANCEMENT MODE

**250V 140W 65MHz**

The ARF446 and ARF447 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 65MHz.

- **Specified 250 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	ARF446G/447G	UNIT
$V_{DSS}$	Drain-Source Voltage	900	Volts
$V_{DGO}$	Drain-Gate Voltage	900	
$I_D$	Continuous Drain Current @ $T_C = 25^\circ\text{C}$	6.5	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 ( $V_{GS} = 0V, I_D = 250 \mu\text{A}$ )	900			Volts
$V_{DS(ON)}$	On State Drain Voltage <sup>①</sup> ( $I_D(ON) = 3.5A, V_{GS} = 10V$ )			7	
$I_{DSS}$	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 ( $V_{DS} = 25V, I_D = 3.5A$ )	4	5.7		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.

Microsemi Website - <http://www.microsemi.com>

## DYNAMIC CHARACTERISTICS

ARF446G/447G

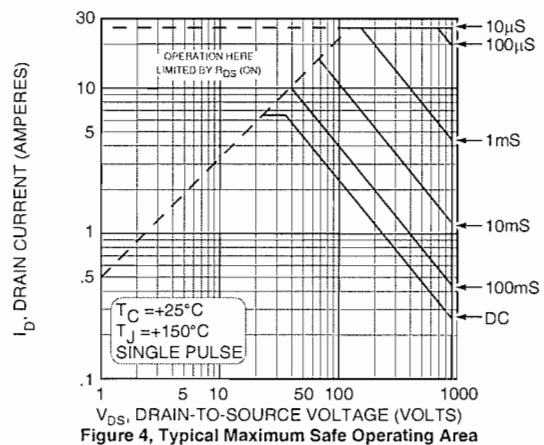
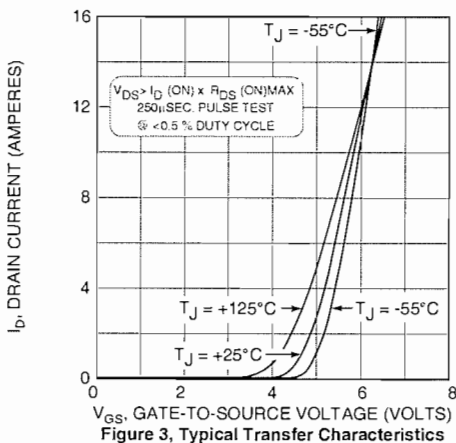
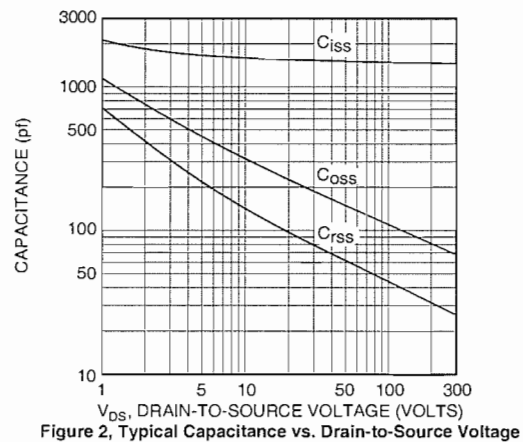
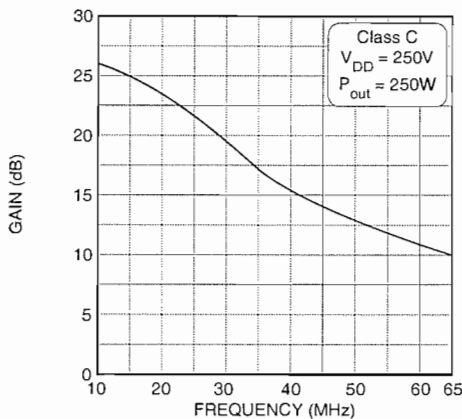
Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
$C_{iss}$	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 300V$ $f = 1\text{ MHz}$		1500	1800	pF
$C_{oss}$	Output Capacitance			70	130	
$C_{rss}$	Reverse Transfer Capacitance			27	50	
$t_{d(on)}$	Turn-on Delay Time	$V_{GS} = 15V$ $V_{DD} = 0.5 V_{DSS}$ $I_D = I_{D[Cont.]} @ 25^\circ C$ $R_G = 1.6\Omega$		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	$f = 27.12\text{ MHz}$		20		dB
$\eta$	Drain Efficiency	$V_{GS} = 0V$ $V_{DD} = 300V$		80		%
$\Psi$	Electrical Ruggedness VSWR 20:1	$P_{out} = 140W$	No Degradation in Output Power			
$G_{PS}$	Common Source Amplifier Power Gain	$f = 40.68\text{ MHz}$	13	15		dB
$\eta$	Drain Efficiency	$V_{GS} = 0V$ $V_{DD} = 250V$	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%

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



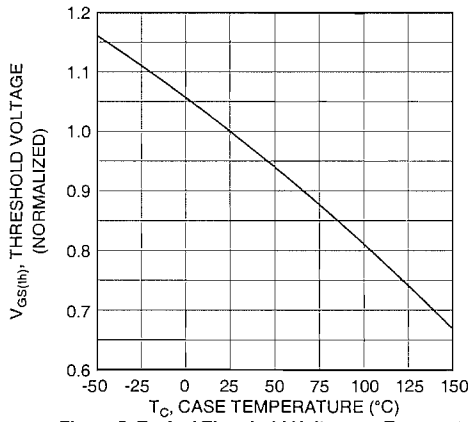


Figure 5, Typical Threshold Voltage vs Temperature

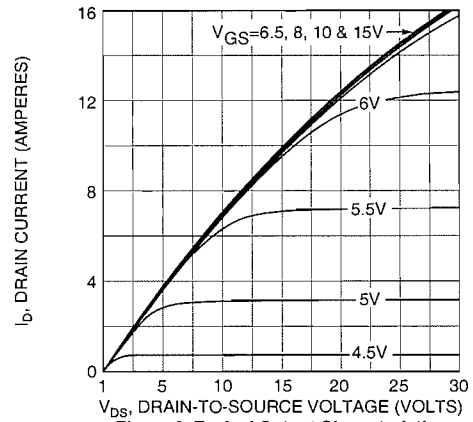


Figure 6, Typical Output Characteristics

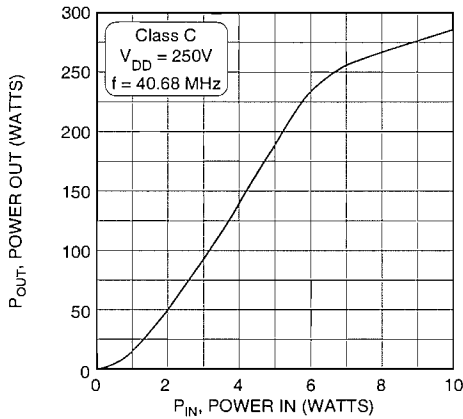


Figure 7, Typical Power Out vs Power In

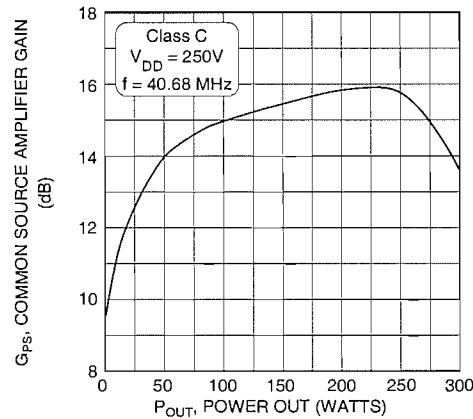


Figure 8, Typical Common Source Amplifier Gain vs Power Out

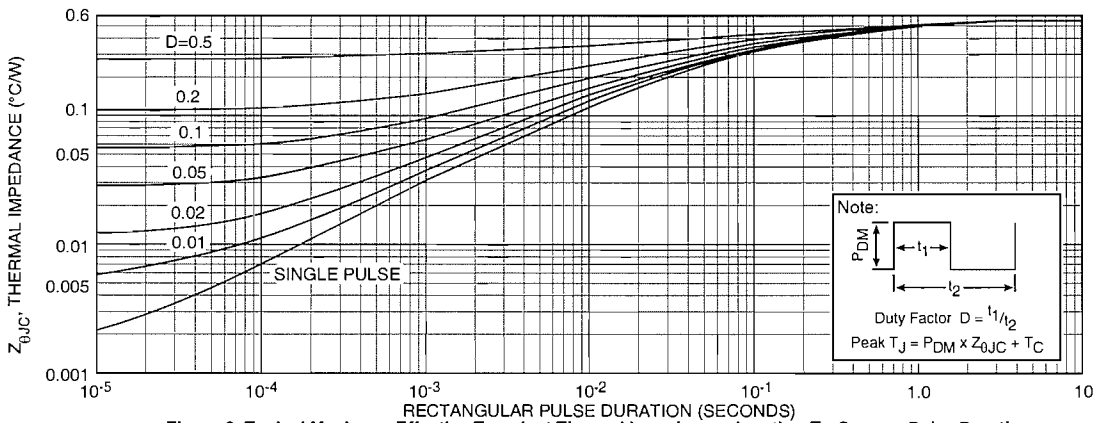


Figure 9, Typical Maximum Effective Transient Thermal Impedance, Junction-To-Case vs Pulse Duration

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

Freq. (MHz)	Z <sub>in</sub> (Ω)	Z <sub>oL</sub> (Ω)
2.0	20.40 - j 9.6	142.0 - j 20
13.5	2.10 - j 6.4	73.0 - j 71
27.0	0.50 - j 2.3	30.0 - j 57
40.0	0.30 - j 0.4	15.0 - j 42
65.0	0.46 + j 2.0	6.2 - j 25

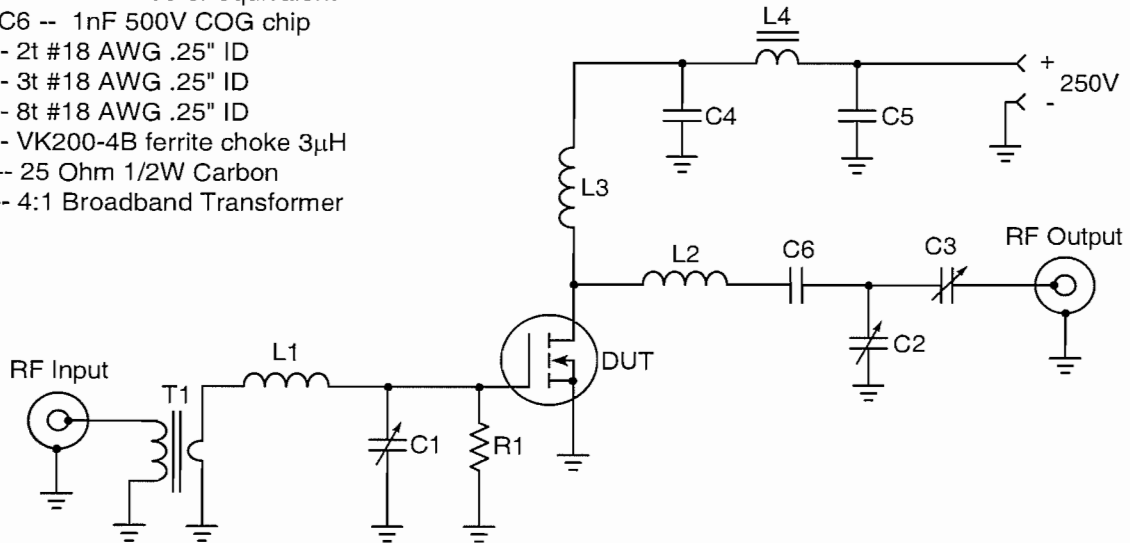
Z<sub>in</sub> - gate shunted by 25Ω

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

40.68 MHz Test Circuit

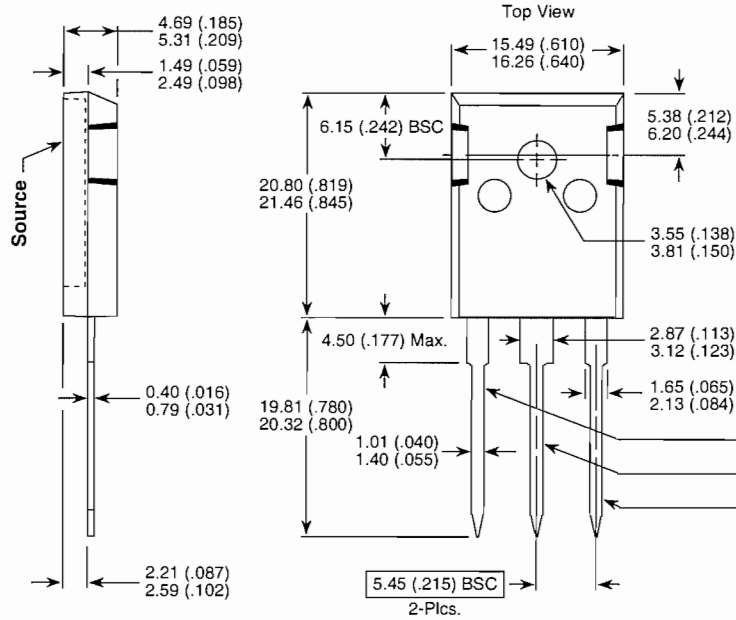
Parts List

- C1-C3 -- Arco 465 or equivalent
- C4-C6 -- 1nF 500V COG chip
- L1 -- 2t #18 AWG .25" ID
- L2 -- 3t #18 AWG .25" ID
- L3 -- 8t #18 AWG .25" ID
- L4 -- VK200-4B ferrite choke 3μH
- R1 -- 25 Ohm 1/2W Carbon
- T1 -- 4:1 Broadband Transformer



TO-247 Package Outline

ⓔ1 SAC: Tin, Silver, Copper



Dimensions in Millimeters and (Inches)  
**NOTE:** The ARF446G and ARF447G Gcomprise 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	
ARF446G	ARF447G
Gate	Drain
Source	Source
Drain	Gate