

**ARF460A/B**  
**Datasheet**  
**RF Power MOSFET**

Final  
May 2018



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# 1 Revision History

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The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

## 1.1 Revision F

Revision F was published in May 2018. The following is a summary of the changes in revision F of this document.

- Updated [Product Overview \(see page 2\)](#) image and features bullet
- Added [Thermal and Mechanical Characteristics \(see page 3\)](#) section
- Updated [Maximum Transient Thermal Impedance \(see page 5\)](#) graph
- Updated [Capacitance vs. Drain-to-Source Voltage \(see page 6\)](#) graph
- Updated [Threshold Voltage vs. Temperature \(see page 6\)](#) graph

## 1.2 Revision E

Revision E was published in October 2007. The following is a summary of the changes in revision E of this document.

- Updated to Microsemi format
- Changed operating and storage junction temperature range from  $-55\text{ }^{\circ}\text{C}$  to  $175\text{ }^{\circ}\text{C}$  to  $-55\text{ }^{\circ}\text{C}$  to  $150\text{ }^{\circ}\text{C}$
- Changed the GFS (VDS) from 15 V to 25 V
- Changed the minimal values in the [Functional Characteristics \(see page 4\)](#) table

## 1.3 Revision D

Revision D was published in August 2003. The following is a summary of the changes in revision D of this document.

- Updated [Maximum Transient Thermal Impedance \(see page 5\)](#) graph
- Added RC ladder
- Updated patent information

## 1.4 Revision C

Revision C was published in March 2002. The following is a summary of the changes in revision C of this document.

- Updated to remove preliminary status

## 1.5 Revision B

Revision B was published in November 2001. The following is a summary of the changes in revision B of this document.

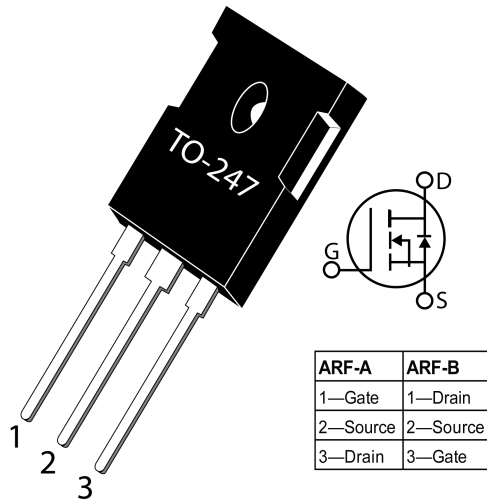
- Updated capacitance values in the [Dynamic Electrical Characteristics \(see page 4\)](#) table

## 1.6 Revision A

Revision A was published in December 2000. It is the first publication of this document.

## 2 Product Overview

The ARF460A and ARF460B 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. They have been optimized for both linear and high-efficiency classes of operation.



### 2.1 Features

The following are key features of the ARF460A/B devices:

- Low-cost common source RF package
- Low  $V_{th}$  thermal coefficient
- Low thermal resistance
- Optimized SOA for superior ruggedness
- RoHS compliant

### 2.2 Characteristics

The following are characteristics of the ARF460A/B devices at 125 V and 40.68 MHz:

- Output power: 150 W
- Gain: 13 dB (Class AB)
- Efficiency: 75% (Class C)

### 3 Electrical Specifications

This section details the electrical specifications for the ARF460A/B devices.

#### 3.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings for the ARF460A/B devices.

All ratings at  $T_c = 25\text{ }^\circ\text{C}$  unless otherwise specified.

**Table 1 • Absolute Maximum Ratings**

Symbol	Parameter	Ratings	Unit
$V_{DS}$	Drain-source voltage	500	V
$V_{DGO}$	Drain-gate voltage	500	V
$I_D$	Continuous drain current	14	A
$V_{GS}$	Gate-source voltage	$\pm 30$	V
$P_D$	Total power dissipation	250	W
$R_{\theta JC}$	Junction-to-case thermal resistance	0.40	$^\circ\text{C}/\text{W}$
$T_J, T_{STG}$	Operating and storage junction temperature range	-55 to 150	$^\circ\text{C}$
$T_L$	Lead temperature 0.063 inches from case for 10 seconds	300	$^\circ\text{C}$

#### 3.2 Thermal and Mechanical Characteristics

The following table shows the thermal and mechanical characteristics of the ARF460A/B device.

**Table 2 • Thermal and Mechanical Characteristics**

Symbol	Characteristic	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal resistance		0.27	0.50	$^\circ\text{C}/\text{W}$
$T_J$	Operating junction temperature	-55		175	$^\circ\text{C}$
$T_{STG}$	Storage temperature	-55		175	
$T_L$	Soldering temperature for 10 seconds (1.6 mm from case)			260	
	Mounting torque, 6-32 or M3 screw			10	lbf-in
				1.1	N-m
WT	Package weight		0.22		oz
			6.1		g

### 3.3 Electrical Performance

The following table shows the static electrical characteristics of the ARF460A/B devices. These devices are sensitive to electrostatic discharge. Proper handling procedures should be followed.

**Table 3 • Static Electrical Characteristics**

Symbol	Parameter	Min	Typ	Max	Unit
$BV_{DSS}$	Drain-source breakdown voltage ( $V_{GS} = 0\text{ V}$ , $I_D = 250\ \mu\text{A}$ )	500			V
$V_{DS(ON)}$	On-state drain voltage ( $I_{D(ON)} = 7\text{ A}$ , $V_{GS} = 10\text{ V}$ )			4	V
$I_{DSS}$	Zero gate voltage drain current ( $V_{DS} = V_{DSS}$ , $V_{GS} = 0\text{ V}$ )			25	$\mu\text{A}$
	Zero gate voltage drain current ( $V_{DS} = 0.8 V_{DSS}$ , $V_{GS} = 0\text{ V}$ , $T_C = 125\text{ }^\circ\text{C}$ )			250	
$I_{GSS}$	Gate-source leakage current ( $V_{DS} = \pm 30\text{ V}$ , $V_{GS} = 0\text{ V}$ )			$\pm 100$	nA
$g_{FS}$	Forward transconductance ( $V_{DS} = 25\text{ V}$ , $I_D = 7\text{ A}$ )	3.3	5.5	8	mhos
$V_{GS(TH)}$	Gate threshold voltage ( $V_{DS} = V_{GS}$ , $I_D = 50\text{ mA}$ )	3		5	V

The following table shows the dynamic electrical characteristics of the ARF460A/B devices.

**Table 4 • Dynamic Electrical Characteristics**

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$C_{ISS}$	Input capacitance	$V_{GS} = 0\text{ V}$		1200	1400	pF
$C_{OSS}$	Output capacitance	$V_{DS} = 150\text{ V}$		150	180	
		$f = 1\text{ MHz}$				
$C_{RSS}$	Reverse transfer capacitance			60	75	
$t_{D(ON)}$	Turn-on delay time	$V_{GS} = 15\text{ V}$		7		ns
$t_R$	Rise time	$V_{DD} = 0.5 V_{DSS}$		6		
$t_{D(OFF)}$	Turn-off delay time	$I_D = I_{D(Cont.)}$ at $25\text{ }^\circ\text{C}$		20		
		$R_G = 1.6\ \Omega$				
$t_F$	Fall time			4.0	7	

The following table shows the functional characteristics of the ARF460A/B devices.

**Table 5 • Functional Characteristics**

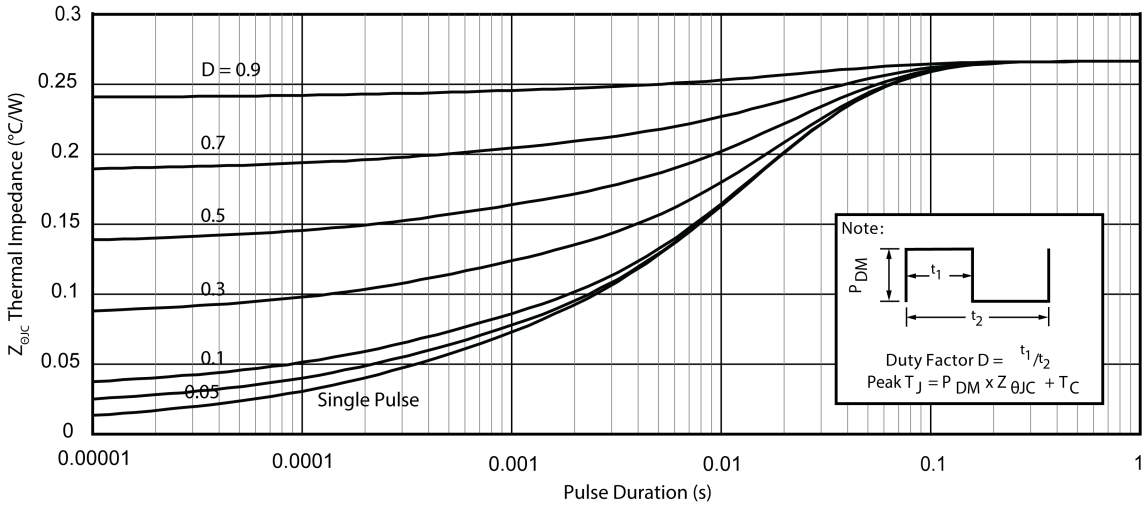
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$G_{PS}$	Common source amplifier power gain	$f = 40.68\text{ MHz}$	13	15		dB
$\eta$	Drain efficiency	$I_{DQ} = 50\text{ mA}$	70	75		%
$\Psi$	Electrical ruggedness VSWR 10:1	$V_{DD} = 125\text{ V}$ $P_{OUT} = 150\text{ W}$				No degradation in output power

**Note:** Pulse test: pulse width < 380  $\mu\text{s}$ ; duty cycle < 2%

### 3.4 Typical Performance Curves

This section shows the typical performance curves for the ARF460A/B devices.

**Figure 1 • Maximum Transient Thermal Impedance**



**Figure 2 • Transient Thermal Impedance Model**

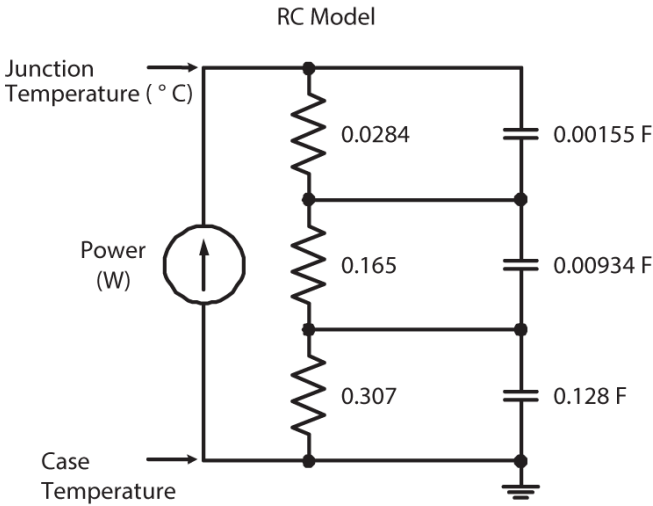


Figure 3 • Capacitance vs. Drain-to-Source Voltage

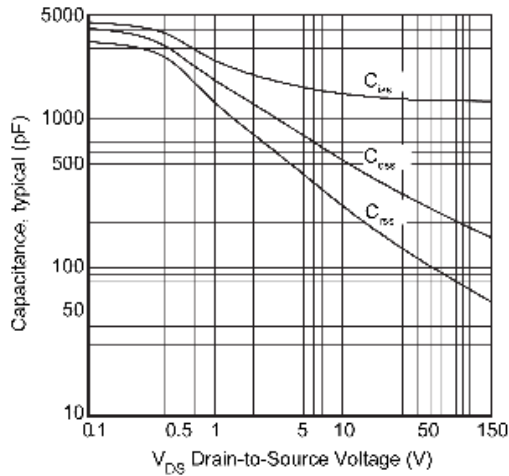


Figure 4 • Drain Current vs. Gate-to-Source Voltage

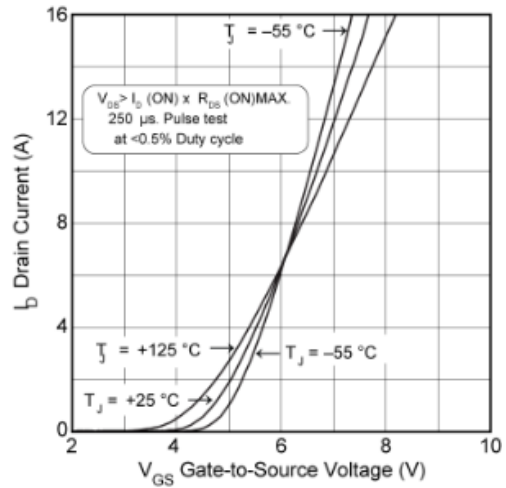


Figure 5 • Drain Current vs. Drain-to-Source Voltage

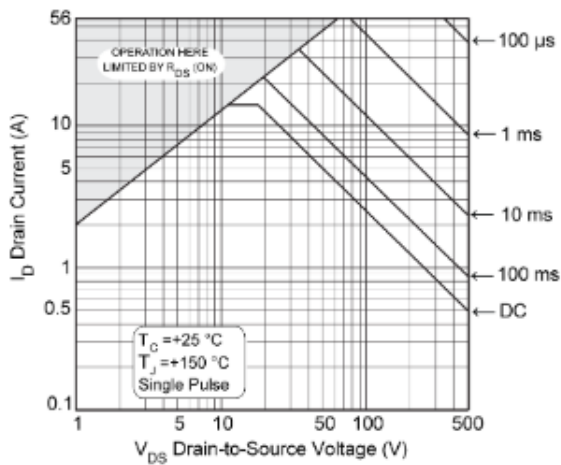


Figure 6 • Threshold Voltage vs. Temperature

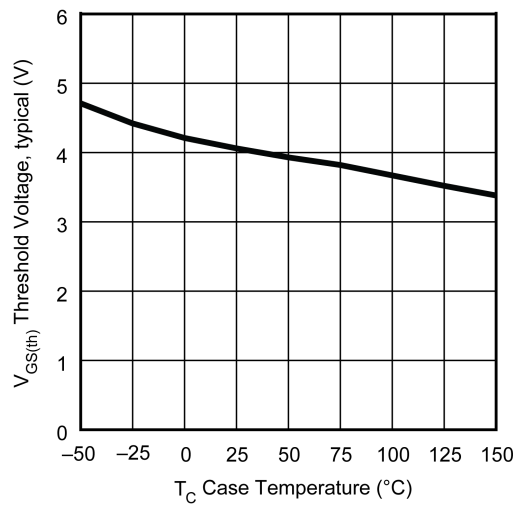
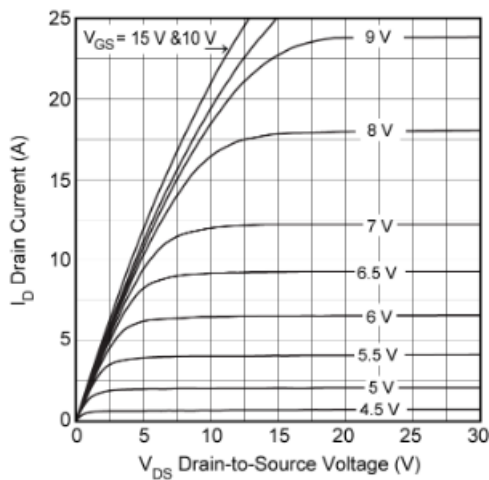


Figure 7 • Typical Output Characteristics





The following table shows the typical class AB large signal input and output impedance of the ARF460A/B devices, where  $I_{DQ} = 100$  mA.

**Table 6 • Typical Class AB Large Signal Input—Output Impedance**

Frequency (MHz)	$Z_{IN}$ ( $\Omega$ )	$Z_{OL}$ ( $\Omega$ )
2.0	20.9 - j 9.2	38 - j 2.6
13.5	2.4 - j 6.8	31 - j 14
27	0.57 - j 2.6	19.6 - j 17.6
40	0.31 - j 0.5	12.5 - j 15.8
65	0.44 - j 1.9	6.0 - j 10.5

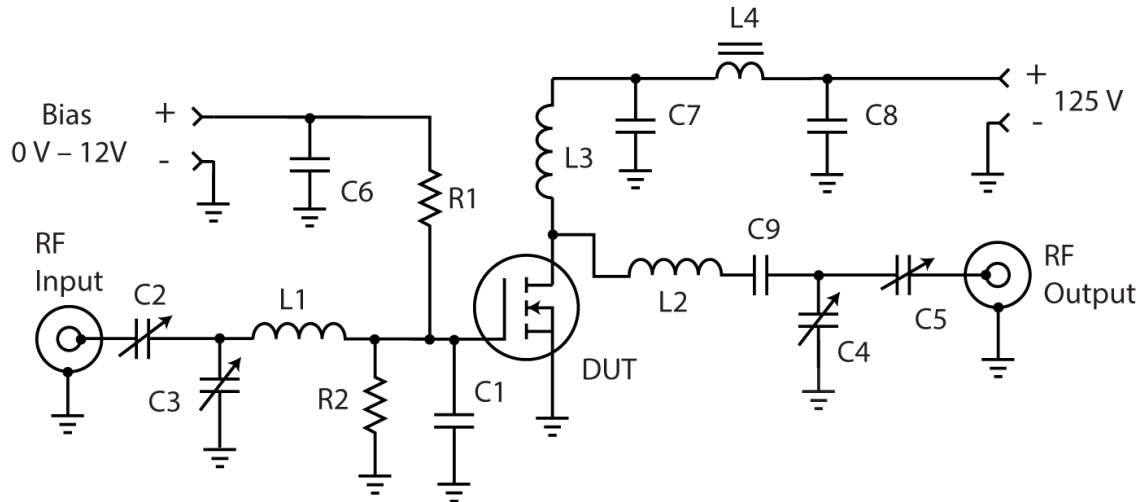
**Note:**

1. Gate shunted with 25  $\Omega$
2.  $I_{DQ} = 100$  mA
3. Conjugate of optimum load for 150 W output at  $V_{DD} = 125$  V

### 3.5 Typical Test Circuit

The following drawing shows the test circuit of the ARF460A/B devices.

Figure 8 • 40.68 MHz Test Circuit



The following table shows the test circuit characteristics of the ARF460A/B devices.

Table 7 • Test Circuit Characteristics

Component	Characteristic
C1	2000 pF 100 V NPO chip mounted at gate lead
C2–C5	Arco 463 Mica trimmer
C6–C8	0.1 $\mu$ F 500 V ceramic chip
C9	2200 pF 500 V chip
L1	4t #20 AWG 0.25" ID 0.3" L approximately 80 nH
L2	6t #16 AWG 0.312" ID 0.4" L approximately 185 nH
L3	15t #24 AWG 0.25" ID approximately 0.85 $\mu$ H
L4	VK200-4B ferrite choke 3 $\mu$ H
R1–R2	51 $\Omega$ 0.5 W carbon
DUT	ARF460A/B

## 4 Package Specification

This section outlines the package specification for the ARF460A/B device.

### 4.1 Package Outline Drawing

This section details the TO-247 package drawing of the ARF460A/B device. Dimensions are in millimeters and (inches).

Figure 9 • Package Outline Drawing

