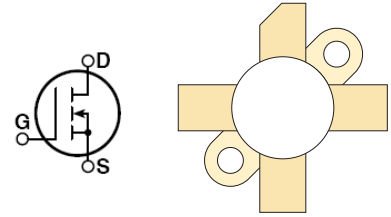


**RF POWER MOSFET**  
 N-CHANNEL ENHANCEMENT MODE

The ARF521 is an RF power transistor designed for high voltage operation in broadband HF, narrow band ISM and MRI power amplifiers up to 150MHz.



- Specified 125 Volt, 81MHz Characteristics:
  - Output Power = 150 Watts.
  - Gain = 13dB (Class AB)
  - Efficiency = 50%
- High Voltage Breakdown and Large SOA for Superior Ruggedness.
- Industry Standard Package
- Low Vth Thermal Coefficient

**Maximum Ratings**
**All Ratings:  $T_c = 25^\circ\text{C}$  unless otherwise specified**


Symbol	Parameter	ARF521	Unit
$V_{DSS}$	Drain-Source Voltage	500	V
$I_D$	Continuous Drain Current @ $T_c = 25^\circ\text{C}$	10	A
$V_{GS}$	Gate-Source Voltage	$\pm 30$	V
$P_D$	Total Device Dissipation @ $T_c = 25^\circ\text{C}$	250	W
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to 175	°C
$T_L$	Lead Temperature: 0.063" from Case for 10 Sec.	300	

**Static Electrical Characteristics**

Symbol	Parameter	Min	Typ	Max	Unit
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage ( $V_{GS} = 0V, I_D = 250 \mu\text{A}$ )	500			V
$V_{DS(ON)}$	Drain-Source On-State Resistance <sup>1</sup> ( $I_{D(ON)} = 5A, V_{GS} = 10V$ )		0.56	0.8	$\Omega$
$I_{DSS}$	Zero Gate Voltage Drain Current ( $V_{DS} = V_{DSS}, V_{GS} = 0V$ )			25	$\mu\text{A}$
	Zero Gate Voltage Drain Current ( $V_{DS} = 50V, V_{GS} = 0, T_c = 125^\circ\text{C}$ )			250	
$I_{GSS}$	Gate-Source Leakage Current ( $V_{DS} = \pm 30V, V_{GS} = 0V$ )			$\pm 100$	nA
$g_{fs}$	Forward Transconductance ( $V_{DS} = 15V, I_D = 5A$ )	3	3.6		mhos
$V_{GS(TH)}$	Gate Threshold Voltage ( $V_{DS} = V_{GS}, I_D = 200\text{mA}$ )	2		4	Volts

**Thermal Characteristics**

Symbol	Characteristic	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction to Case Thermal Resistance			0.60	°C/W
$R_{\theta CS}$	Case to Sink (Use High Efficiency Thermal Joint Compound and Planar Heat Sink Surface.)		0.1		

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

## Dynamic Characteristics

ARF521

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$C_{ISS}$	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 50V$ $f = 1MHz$		780	900	pF
$C_{OSS}$	Output Capacitance			125	150	
$C_{RSS}$	Reverse Transfer Capacitance			7	10	
$t_{d(ON)}$	Turn-on Delay Time	$V_{GS} = 15V$ $V_{DD} = 0.5V_{DSS}$ $I_D = I_{D[Cont.]} @ 25^\circ C$ $R_G = 1.6W$		5.1	10	ns
$t_r$	Rise Time			4.1	8	
$t_{d(off)}$	Turn-off Delay Time			12	18	
$t_f$	Fall Time			4.0	7	

## Functional Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$G_{PS}$	Common Source Amplifier Power Gain	$f = 81MHz$ $I_{dq} = 50mA$ $V_{DD} = 125V$ $P_{OUT} = 150W$	14	15		dB
$h$	Drain Efficiency		50	55		%
$y$	Electrical Ruggedness VSWR 5:1		No Degradation in Output Power			

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

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

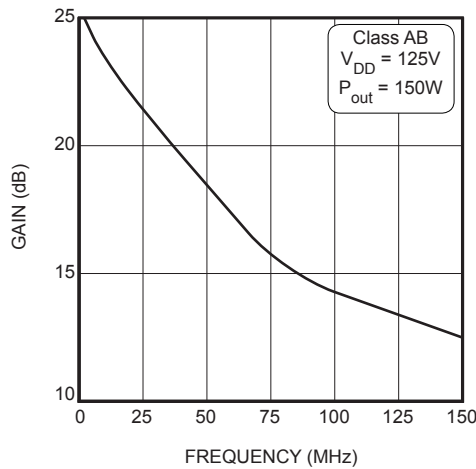


Figure 1, Typical Gain vs. Frequency

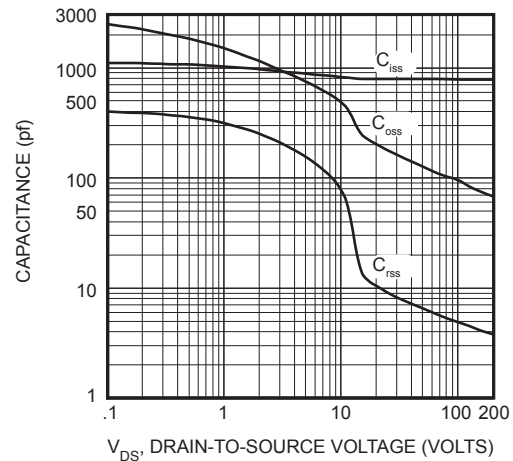


Figure 2, Typical Capacitance vs. Drain-to-Source Voltage

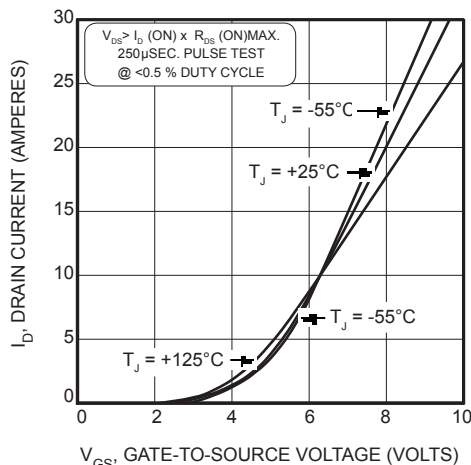


Figure 3, Typical Transfer Characteristics

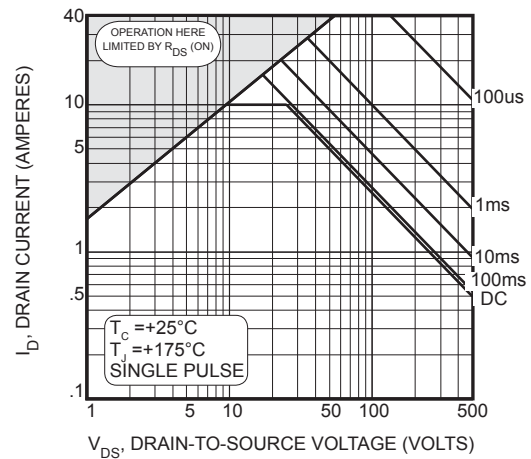


Figure 4, Typical Maximum Safe Operating Area

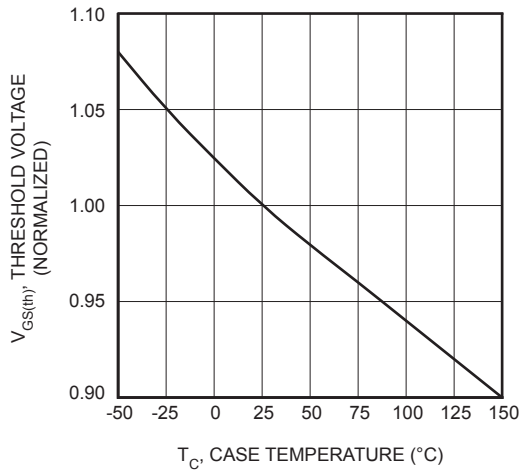


Figure 5, Typical Threshold Voltage vs Temperature

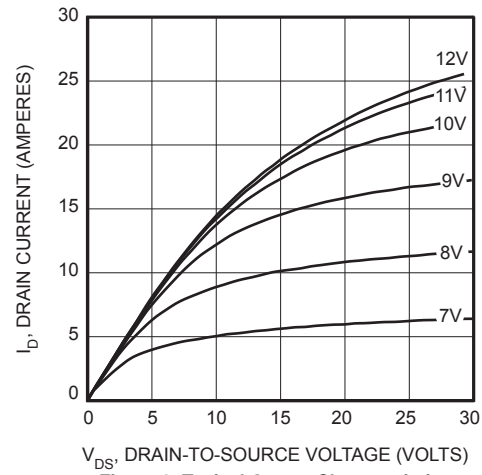


Figure 6, Typical Output Characteristics

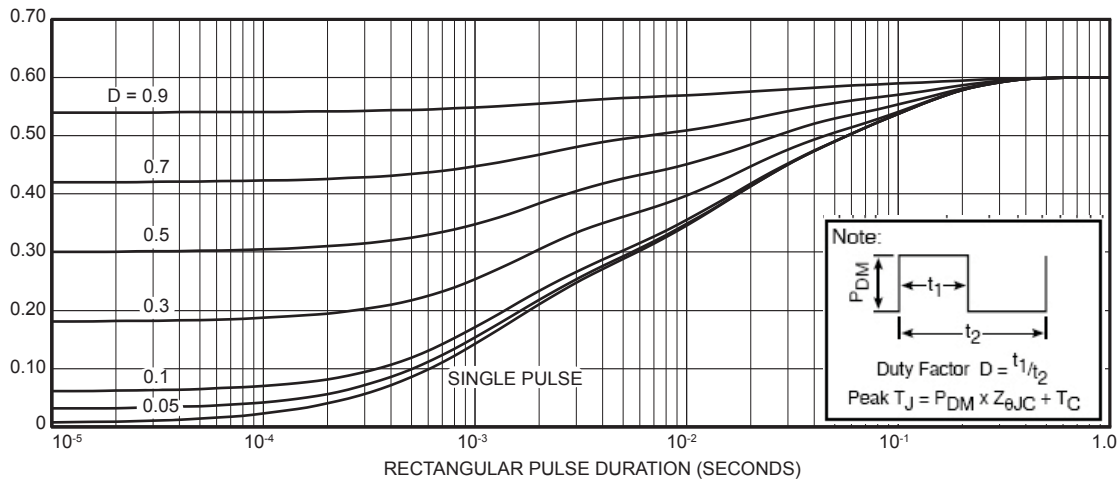


FIGURE 7a, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

Transient Thermal Impedance RC Model

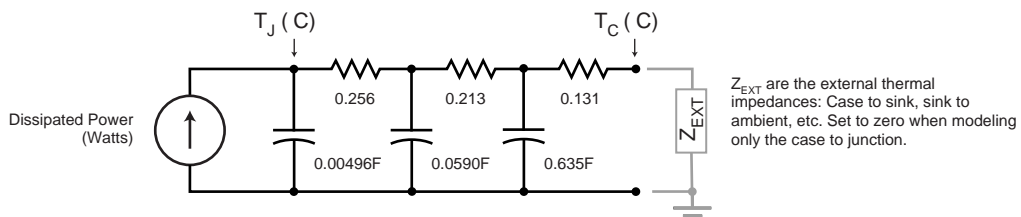


Figure 7b, TRANSIENT THERMAL IMPEDANCE MODEL

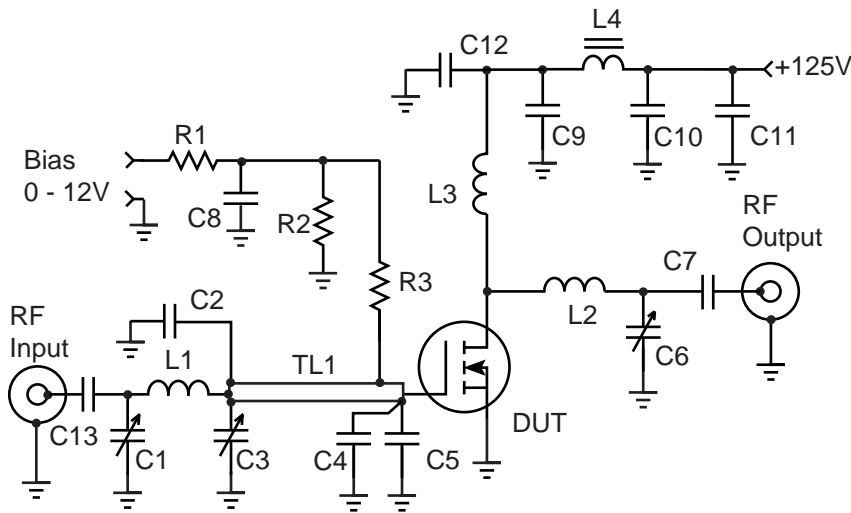
Table 1 - Typical Class AB Large Signal Input - Output Impedance

Freq. (MHz)	Z <sub>in</sub> (Ω)	Z <sub>OL</sub> (Ω)
2.0	24 - j 4.5	55 - j 4
13.5	8.3 - j 11.6	45 - j 22
27	2.5 - j 7.1	28.7 - j 28
40	1.0 - j 4.2	17.9 - j 26
65	.30 - j 1.1	9.0 - j 20.6
80	.25 + j 0.3	5.8 - j 17
100	.35 + j 1.6	4 - j 14.2

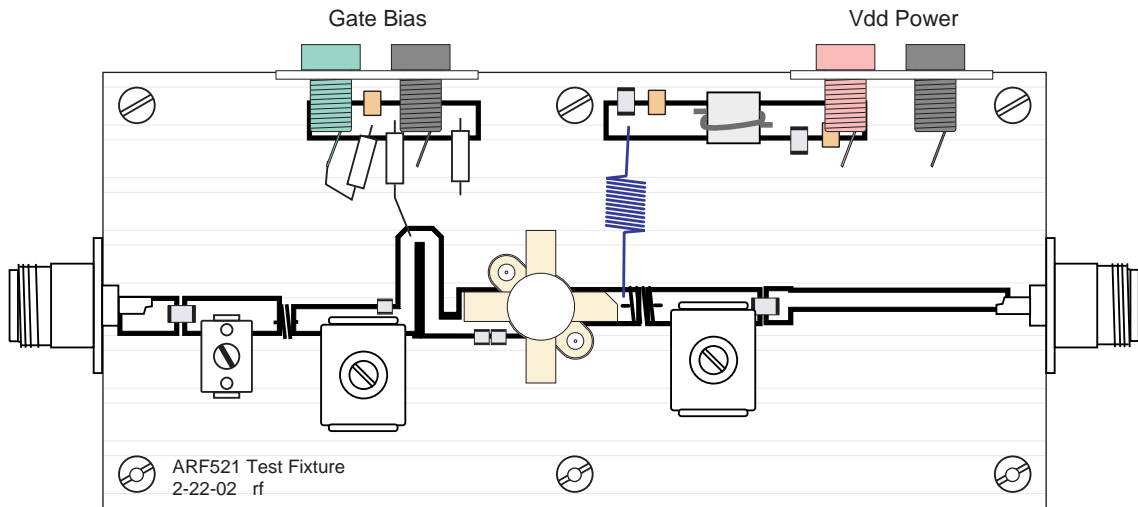
Z<sub>IN</sub> - Gate shunted with 25Ω I<sub>dq</sub> = 50mA  
 Z<sub>OL</sub> - Conjugate of optimum load for 150 Watts output at V<sub>dd</sub>=125V

# ARF521 Test Circuit 81.36 MHz

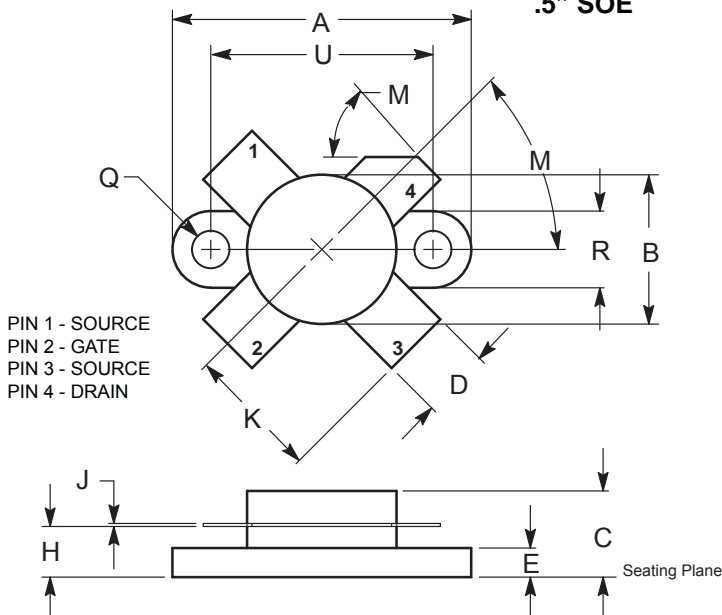
ARF521



- C1 - Arco 406 Mica trimmer
- C2 - 220pF Semco metal clad
- C3 - Arco 464 Mica trimmer
- C4 - 820pF ATC 700B
- C5- 1000pF ATC 700B
- C6 - Arco 463 Mica trimmer
- C7-C10 10nF 500V chip
- C11-C13 1nF NPO 500V
- TL1 - .23" x 1.5" stripline
- L1 -- 2t #18 .3" ID .2"L ~50nH
- L2 -- 3t #16 AWG .31" ID .3"L ~65nH
- L3 -- 10t #22 AWG .25 ID ~470nH
- L4 -- VK200-4B ferrite choke ~3uH
- R1-R3 -- 1k Ohm 1/4W Carbon
- DUT = ARF521



## M174 Package Outline .5" SOE



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.096	0.990	24.39	25.14
B	0.465	0.510	11.82	12.95
C	0.229	0.275	5.82	6.98
D	0.216	0.235	5.49	5.96
E	0.084	0.110	2.14	2.79
H	0.144	0.178	3.66	4.52
J	0.003	0.007	0.08	0.17
K	0.435		11.0	
M	45° NOM		45° NOM	
Q	0.115	0.130	2.93	3.30
R	0.246	0.255	6.25	6.47
U	0.720	0.730	18.29	18.54

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