

## RF POWER MOSFET N-CHANNEL ENHANCEMENT MODE

**250V 750W 25MHz**

The ARF1519 is an RF power transistor designed for very high power scientific, commercial, medical and industrial RF power generator and amplifier applications up to 25 MHz.

- **Specified 250 Volt, 13.56 MHz Characteristics:**
  - Output Power = 750 Watts.**
  - Gain = 17dB (Class C)**
  - Efficiency > 75%**
- **High Performance Power 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	ARF1519	UNIT
$V_{DSS}$	Drain-Source Voltage	1000	Volts
$I_D$	Continuous Drain Current @ $T_C = 25^\circ\text{C}$	20	Amps
$V_{GS}$	Gate-Source Voltage	$\pm 30$	Volts
$P_D$	Total Device Dissipation @ $T_C = 25^\circ\text{C}$	1350	Watts
$T_J, T_{STG}$	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	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
$BV_{DSS}$	Drain-Source Breakdown Voltage ( $V_{GS} = 0V, I_D = 300\mu\text{A}$ )	1000			Volts
$V_{DS(ON)}$	On State Drain Voltage (Clock) ( $I_{D(ON)} = 10A, V_{GS} = 10V$ )		5	7	
$I_{DSS}$	Zero Gate Voltage Drain Current ( $V_{DS} = 1000V, V_{GS} = 0V$ )			300	$\mu\text{A}$
	Zero Gate Voltage Drain Current ( $V_{DS} = 800V, V_{GS} = 0V, T_C = 125^\circ\text{C}$ )			3000	
$I_{GSS}$	Gate-Source Leakage Current ( $V_{GS} = \pm 30V, V_{DS} = 0V$ )			$\pm 600$	nA
$g_{fs}$	Forward Transconductance ( $V_{DS} = 15V, I_D = 10A$ )	3	14		mhos
$V_{isolation}$	RMS Voltage (60Hz Sinewave from terminals to mounting surface for 1 minute)	TBD			Volts
$V_{GS(TH)}$	Gate Threshold Voltage ( $V_{DS} = V_{GS}, I_D = 6mA$ )	2		4	Volts

### THERMAL CHARACTERISTICS

Symbol	Characteristic (per package unless otherwise noted)	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.13	°C/W
$R_{\theta CS}$	Case to Sink (Use High Efficiency Thermal Joint Compound and Planar Heat Sink Surface.)		0.09		



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

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
$C_{iss}$	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 150V$ $f = 1\text{ MHz}$		4600	5600	pF
$C_{oss}$	Output Capacitance			310	350	
$C_{rss}$	Reverse Transfer Capacitance			90	120	

FUNCTIONAL CHARACTERISTICS

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
$G_{PS}$	Common Source Amplifier Power Gain	$f = 13.56\text{MHz}$	17	20		dB
$\eta$	Drain Efficiency	$V_{GS} = 0V$ $V_{DD} = 200V$	70	75		%
$\Psi$	Electrical Ruggedness VSWR 10:1	$P_{out} = 750W$	No Degradation in Output Power			

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

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

Per transistor section unless otherwise specified.

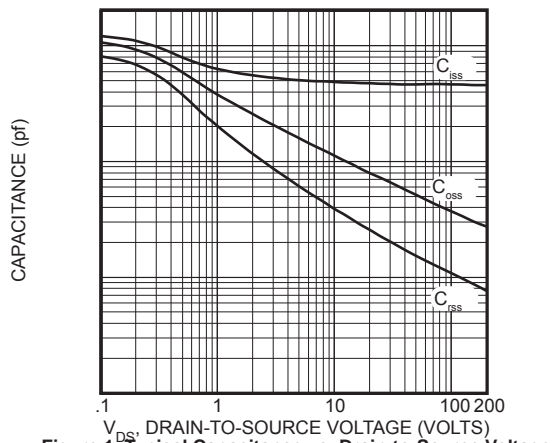


Figure 1, Typical Capacitance vs. Drain-to-Source Voltage

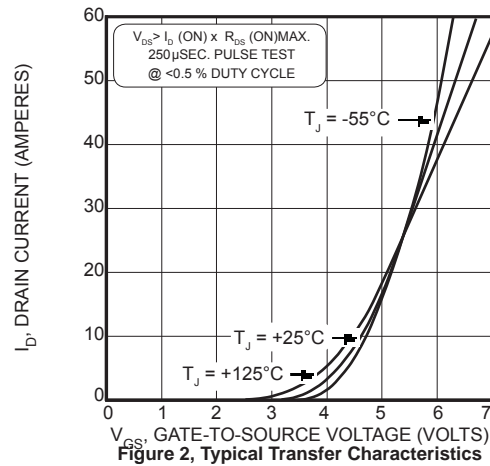


Figure 2, Typical Transfer Characteristics

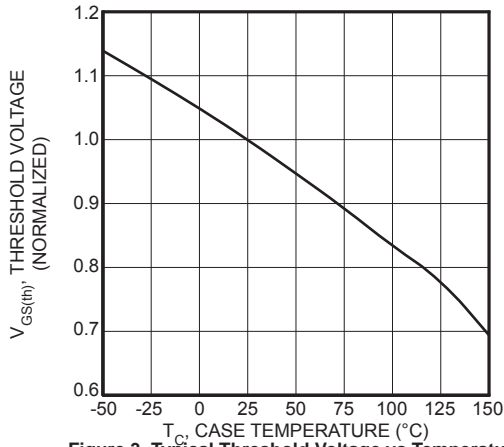


Figure 3, Typical Threshold Voltage vs Temperature

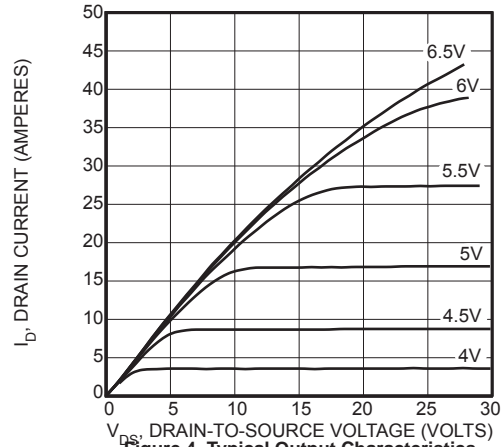


Figure 4, Typical Output Characteristics

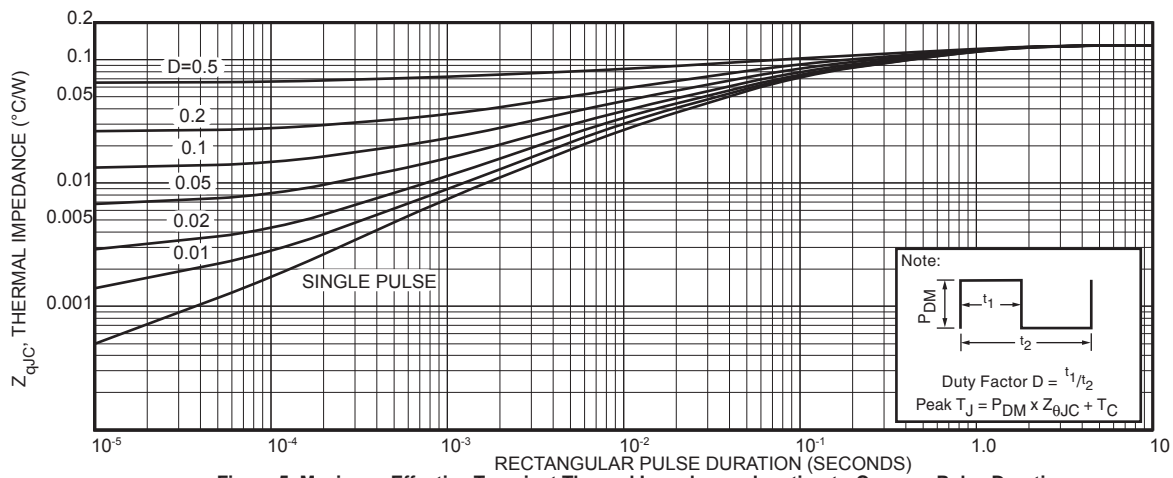


Figure 5, Maximum Effective Transient Thermal Impedance, Junction-to-Case vs. Pulse Duration

Table 1 - Typical Class AB Large Signal Impedance -- ARF1519

F (MHz)	Z <sub>in</sub> (Ω)	Z <sub>OL</sub> (Ω)
2.0	10.6 - j 12.2	31 - j 4.7
13.5	0.5 - j 2.7	15.6 - j 16

Z<sub>in</sub> - Gate shunted with 25Ω I<sub>DQ</sub> = 100mA  
 Z<sub>OL</sub> - Conjugate of optimum load for 750 Watts output at V<sub>dd</sub> = 200V