

ARF1519



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: $T_C = 25^{\circ}C$ unless otherwise specified.

Symbol	Parameter	ARF1519	UNIT
V _{DSS}	Drain-Source Voltage	1000	Volts
I _D	Continuous Drain Current @ T _C = 25°C	20	Amps
V _{GS}	Gate-Source Voltage	±30	Volts
P_{D}	Total Device Dissipation @ T _C = 25°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 (I _{D(ON)} = 10A, V _{GS} = 10V)		5	7		
,	Zero Gate Voltage Drain Current (V _{DS} = 1000V, V _{GS} = 0V)			300		
DSS	Zero Gate Voltage Drain Current ($V_{DS} = 800V$, $V_{GS} = 0V$, $T_{C} = 125$ °C)			3000	μA	
I _{GSS}	Gate-Source Leakage Current $(V_{GS} = \pm 30V, V_{DS} = 0V)$		±600 nA			
g _{fs}	Forward Transconductance $(V_{DS} = 15V, I_{D} = 10A)$		14		mhos	
V _{isolation}	RMS Voltage (60Hz Sinewave from terminals to mounting surface for 1 minute)				Volts	
V _{GS(TH)}	Gate Threshold Voltage $(V_{DS} = V_{GS}, I_{D} = 6mA)$			4	Volts	

THERMAL CHARACTERISTICS

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

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		4600	5600	
C _{oss}	Output Capacitance	V _{DS} = 150V		310	350	pF
C _{rss}	Reverse Transfer Capacitance	f = 1 MHz		90	120	

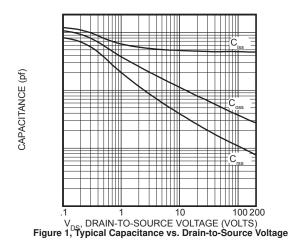
FUNCTIONAL CHARACTERISTICS

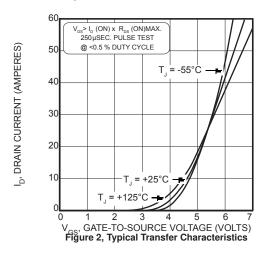
Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
G _{PS}	Common Source Amplifier Power Gain	f = 13.56MHz	17	20		dB
η	Drain Efficiency	$V_{GS} = 0V$ $V_{DD} = 200V$	70	75		%
Ψ	Electrical Ruggedness VSWR 10:1	P _{out} = 750W	No Degradation in Output Power			

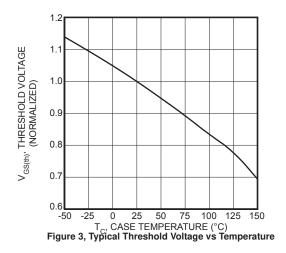
¹ Pulse Test: Pulse width < 380 µS, Duty Cycle < 2%.

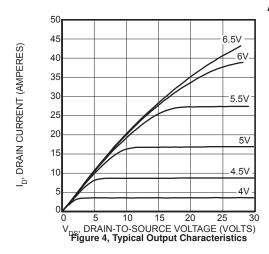
Microsemi reserves the right to change, without notice, the specifications and information contained herein.

Per transistor section unless otherwise specified.









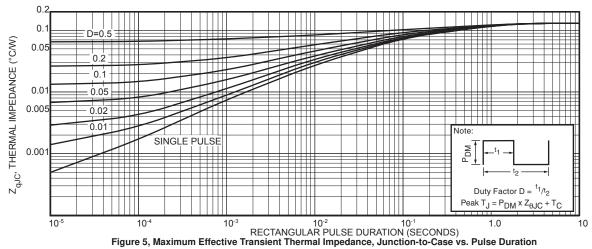
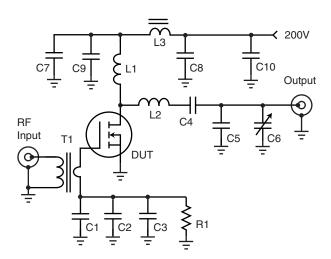


Table 1 - Typical Class AB Large Signal Impedance -- ARF1519

F (MHz)	Z _{in} (Ω)	$Z_{OL}\left(\Omega\right)$
2.0	10.6 -j 12.2	31 -j 4.7
13.5	0.5 -j 2.7	15.6 -j 16

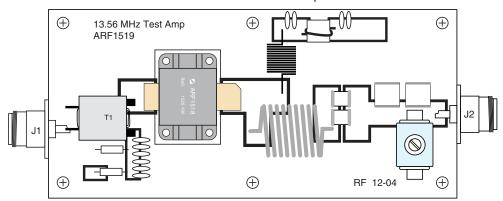
 Z_{in} - Gate shunted with 25 Ω I_{DQ} = 100mA Z_{OL} - Conjugate of optimum load for 750 Watts output at V_{dd} = 200V

ARF1519 -- 13.56 MHz Test Circuit



C1-C3 1nF X7R 100V smt
C4 2x 8.2 nF 1kV COG
C5 270pF x2 ATC 100C
C7-C10 8.2 nF 1kv COG
C11 390 + 27 pF ATC 100C
L1 2uH - 22t #24 enam. .312" dia.
L2 368 nH - 5t #12 .625" dia .5" I
L3 500nH 2t on 850u .5" bead
R1 2.2k 0.5W
T1 10:1t transformer

Parts placement - Not to Scale.

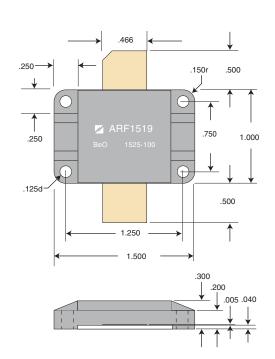


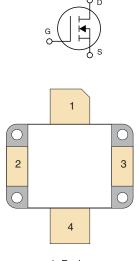
Thermal Considerations and Package Mounting:

The rated 1350W power dissipation is only available when the package mounting surface is at 25°C and the junction temperature is 200°C. The thermal resistance between junctions and case mounting surface is 0.12° C/W. When installed, an additional thermal impedance of 0.1° C/W between the package base and the mounting surface is typical. Insure that the mounting surface is smooth and flat. Thermal joint compound must be used to reduce the effects of small surface irregularities. The heatsink should incorporate a copper heat spreader to obtain best results. Use 4-40 or M3 screws torqued to T = 4 - 6 in-lb (0.45 - 0.68 N-m).

HAZARDOUS MATERIAL WARNING

The ceramic portion of the device between leads and mounting surface is beryllium oxide-BeO. Beryllium oxide dust is toxic when inhaled. Care must be taken during handling and mounting to avoid damage to this area These devices must never be thrown away with general industrial or domestic waste.





- 1 Drain
- 2 Source
- 3 Source
- 4 Gate