

# RF POWER MOSFET

## FULL-BRIDGE

**380V 750W 40MHz**

The ARF1511 is four RF power transistor arranged in an H-Bridge configuration. It is intended for off-line 300V operation in high power scientific, medical and, industrial RF power generator and amplifier applications up to 40 MHz.

**Specified 380 Volt, 27.12 MHz Characteristics:**

Output Power = 750 Watts.

Gain = 17dB (Class D)

Efficiency > 80%

- High Performance Power RF Package.
- Very High Breakdown for Improved Ruggedness.
- Low Thermal Resistance.
- Nitride Passivated Die for Improved Reliability.

### MAXIMUM RATINGS

All Ratings Per Die:  $T_C = 25^\circ\text{C}$  unless otherwise specified.

Symbol	Parameter	ARF 1511	UNIT
$V_{DSS}$	Drain-Source Voltage	500	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 @ $T_C = 25^\circ\text{C}$	1500	Watts
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to 200	°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 ( $V_{GS} = 0V, I_D = 250 \mu A$ )	500			Volts
$V_{DS(ON)}$	On State Drain Voltage $(I_{D(ON)} = 10A, V_{GS} = 10V)$		5	6	
$I_{DSS}$	Zero Gate Voltage Drain Current ( $V_{DS} = 500V, V_{GS} = 0V$ )			25	$\mu A$
	Zero Gate Voltage Drain Current ( $V_{DS} = 400V, V_{GS} = 0V, T_C = 125^\circ\text{C}$ )			250	
$I_{GSS}$	Gate-Source Leakage Current ( $V_{GS} = \pm 30V, V_{DS} = 0V$ )			$\pm 100$	nA
$g_{fs}$	Forward Transconductance ( $V_{DS} = 25V, I_D = 10A$ )	3.3	5.5	8	mhos
$V_{isolation}$	RMS Voltage (60Hz Sinewave from terminals to mounting surface for 1 minute)	2500			Volts
$V_{GS(TH)}$	Gate Threshold Voltage ( $V_{DS} = V_{GS}, I_D = 50mA$ )	3		5	Volts

### THERMAL CHARACTERISTICS

Symbol	Characteristic (per package unless otherwise noted)	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.12	°C/W
$R_{\theta CS}$	Case to Sink (Use High Efficiency Thermal Joint Compound and Planar Heat Sink Surface.)		0.08		

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

## DYNAMIC CHARACTERISTICS

ARF1511

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
$C_{iss}$	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 200V$ $f = 1 \text{ MHz}$		1200	1400	pF
$C_{oss}$	Output Capacitance			150	200	
$C_{rss}$	Reverse Transfer Capacitance			60	90	
$t_{d(on)}$	Turn-on Delay Time	$V_{GS} = 15V$ $V_{DD} = 250V$ $I_D = 20A @ 25^\circ C$ $R_G = 1.6 \Omega$		7		ns
$t_r$	Rise Time			6		
$t_{d(off)}$	Turn-off Delay Time			20		
$t_f$	Fall Time			4.4		
$E_{AR}$	Repetitive Avalanche Energy <sup>②</sup>		10			mJ
$E_{AS}$	Single Pulse Avalanche Energy <sup>③</sup>		450			

## FUNCTIONAL CHARACTERISTICS

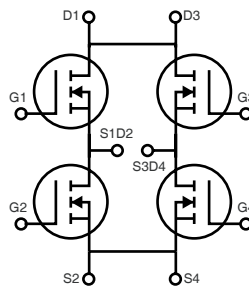
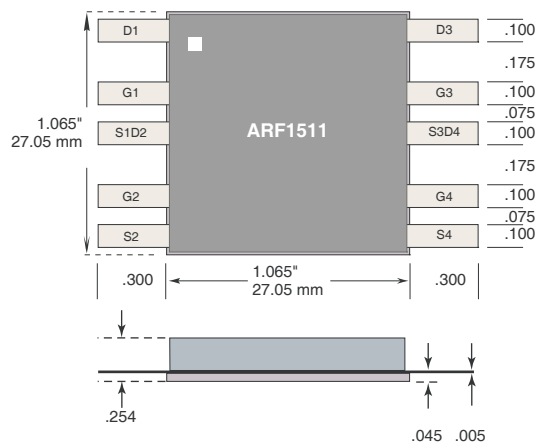
Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
$G_{PS}$	Common Source Amplifier Power Gain	$f = 40.7 \text{ MHz}$ $V_{GS} = 0V$ $V_{DD} = 380V$ $P_{out} = 750W$	13	15		dB
$\eta$	Drain Efficiency			75		%
$\psi$	Electrical Ruggedness VSWR 6:1			No Degradation in Output Power		

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

② Repetitive Rating: Pulse width limited by maximum junction temperature.

③ Starting  $T_j = +25^\circ C$ ,  $L = 2.25mH$ ,  $R_G = 25\Omega$ , Peak  $I_L = 20A$

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



## 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.

### Thermal Considerations and Package Mounting:

The rated 1500W power dissipation is only available when the package mounting surface is at  $25^\circ C$  and the junction temperature is  $200^\circ C$ . The thermal resistance between junctions and case mounting surface is  $0.12^\circ C/W$ . When installed, and additional thermal impedance of  $0.08^\circ C/W$  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 heat sink should incorporate a copper heat spreader to obtain best results.

The package is designed to be clamped to a heatsink. A clamped joint maintains the required mounting pressure while allowing for thermal expansion of both the device and the heat sink. A simple clamp and two 6-32 (M3.5) screw can provide the minimum