

ADVANCED POWER TECHNOLOGY®

ARF442 200W 100V 13.56MHz
ARF443 200W 100V 13.56MHz

THE ARF442 PIN-OUTS ARE MIRROR IMAGE OF THE ARF443.

RF OPERATION (1-15MHz)

POWER MOS IV®

N-CHANNEL ENHANCEMENT MODE RF POWER MOSFET

The ARF442 and ARF443 comprise a symmetric pair of RF power transistors designed for narrow-band push-pull commercial, medical and industrial RF power amplifier applications.

- **Specified 100 Volt, 13.56 MHz Characteristics:**
- **Output Power = 200 Watts.**
- **Gain = 22dB (Typ.)**
- **Efficiency = 73% (Typ.)**
- **Low Cost Common Source RF Package.**
- **Very High Breakdown for Improved Ruggedness.**
- **Low Thermal Resistance.**
- **Nitride Passivated Die for Improved Reliability.**

MAXIMUM RATINGS All Ratings: T_C = 25°C unless otherwise specified.

Symbol	Parameter	ARF442/443	UNIT
V_{DSS}	Drain-Source Voltage	300	Volts
V_{DGO}	Drain-Gate Voltage	300	
I_D	Continuous Drain Current @ T_C = 25°C	8	Amps
V_{GS}	Gate-Source Voltage	±30	Volts
P_D	Total Power Dissipation @ T_C = 25°C	167	Watts
$R_{\theta JC}$	Junction to Case	0.75	°C/W
T_J,T_{STG}	Operating and Storage Junction Temperature Range	-55 to 150	°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 μA)	300			Volts
V_{DS}(ON)	On State Drain Voltage ① (I_D(ON) = 6.5A, V_{GS} = 10V)			6	
I_{DSS}	Zero Gate Voltage Drain Current (V_{DS} = V_{DSS}, V_{GS} = 0V)			250	μA
	Zero Gate Voltage Drain Current (V_{DS} = 0.8 V_{DSS}, V_{GS} = 0V, T_C = 125°C)			1000	
I_{GSS}	Gate-Source Leakage Current (V_{GS} = ±30V, V_{DS} = 0V)			±100	nA
g_{fs}	Forward Transconductance (V_{DS} = 10V, I_D = 5.5A)	3.5	4.5		mhos
V_{GS}(TH)	Gate Threshold Voltage (V_{DS} = V_{GS}, I_D = 50mA)	2		5	Volts

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

APT Website - http://www.advancedpower.com

USA
405 S.W. Columbia Street **Bend, Oregon 97702-1035** **Phone: (541) 382-8028** **FAX: (541) 388-0364**
EUROPE
Avenue J.F. Kennedy Bât B4 Parc Cadéra Nord **F-33700 Merignac - France** **Phone: (33) 5 57 92 15 15** **FAX: (33) 5 56 47 97 61**

050-4506 Rev C

DYNAMIC CHARACTERISTICS

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	V_{GS} = 0V V_{DS} = 100V f = 1 MHz		730	900	pF
C_{oss}	Output Capacitance			100	140	
C_{rss}	Reverse Transfer Capacitance			33	50	

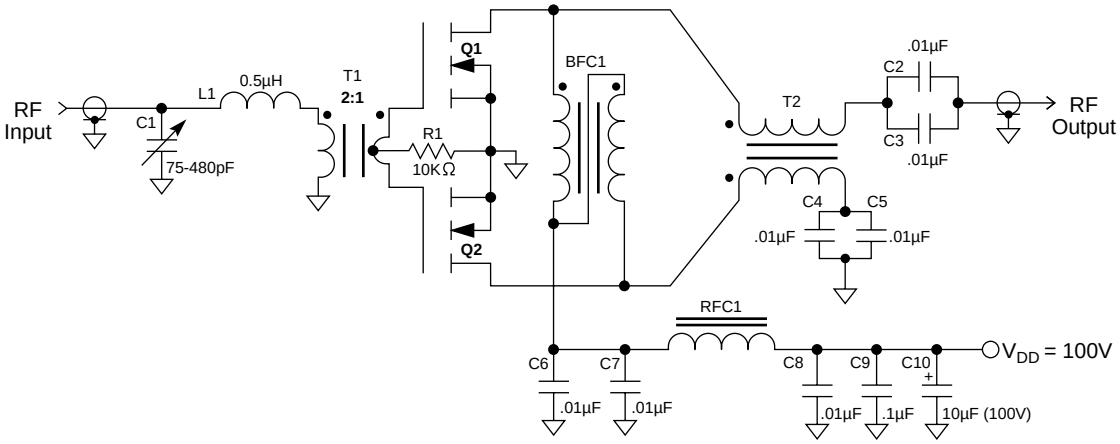
FUNCTIONAL CHARACTERISTICS

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
G_{PS1}	Common Source Amplifier Power Gain	V_{DD} = 100V V_{GS} = 0V P_{out} = 200W f = 13.56MHz	17	18.9		dB
η_1	Drain Efficiency			73		%
Ψ	Electrical Ruggedness VSWR 30:1		No Degradation in Output Power			
G_{PS2}	Common Source Amplifier Power Gain	V_{DD} = 100V, P_{out} = 200W I_{DQ} = 50mA, f = 13.56MHz		22		dB
η_2	Drain Efficiency			65		%

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

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

TYPICAL 13.56 MHz, 400 WATT PUSH-PULL CLASS 'C' POWER AMPLIFIER CIRCUIT



Parts List

C1 = 75-480pF Compression Mica
C2, C3, C4, C5, C6, C7 & C8 = .01µF @ 200V, CK06
C9 = .1µF @ 100V, CK06
C10 = 10µF @ 100V Electrolytic
R1 = 10KΩ, 5%, 1/4W, Carbon
Q1 = ARF442
Q2 = ARF443

L1 = 7.5 T of #18AWG, ID = .438", L = 0.5µH

BFC1 = Balanced DC Feed Choke; 7 T of #22 stranded PTFE twisted pair on an Indiana General #F624-19-Q1 toroid. µi = 125
RFC1 = 2 T of #18 stranded PTFE on a Fair-Rite #2677006301 shield bead. µi = 2000

T1 = 4:1 Z Conventional Transformer; 2:1 T of #22 stranded PTFE on a Fair-Rite #2843000202 Balun Core. µi = 850
T2 = 1:1 Z Transmission Line Transformer, using 50Ω coax.

- Coax = 22" of mini 50Ω PTFE coax, OD = .095"
- A large 2-hole balun core was constructed by gluing two Fair-Rite #2643102002, µi = 850 cores together.
- The transformer is constructed by winding 4.5 turns of the coax around the center of the balun core.

PCB = .062" G10 Epoxy Glass.

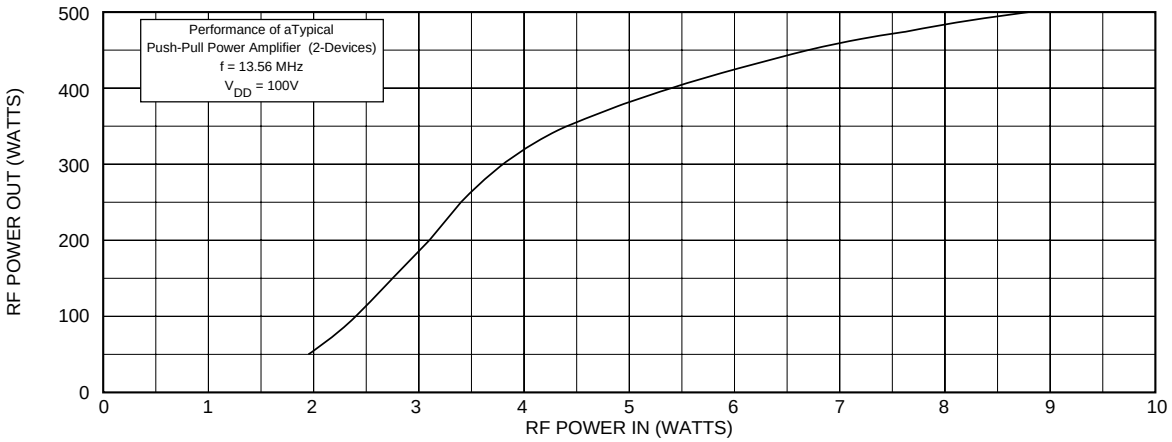


Figure 1, RF Power Out vs RF Power In

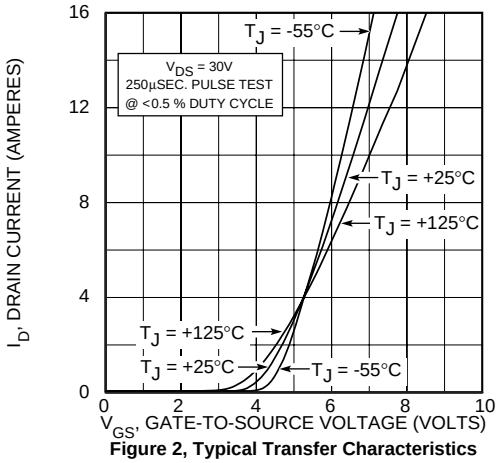


Figure 2, Typical Transfer Characteristics

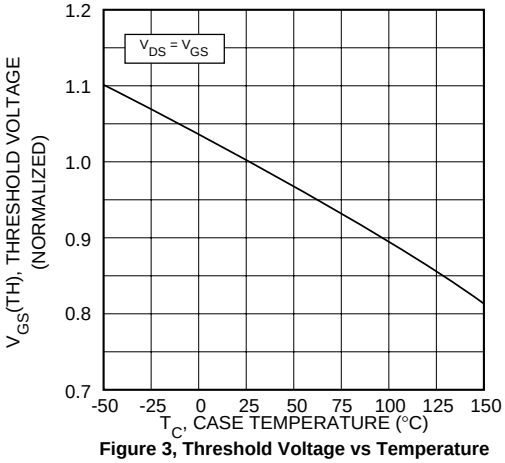


Figure 3, Threshold Voltage vs Temperature

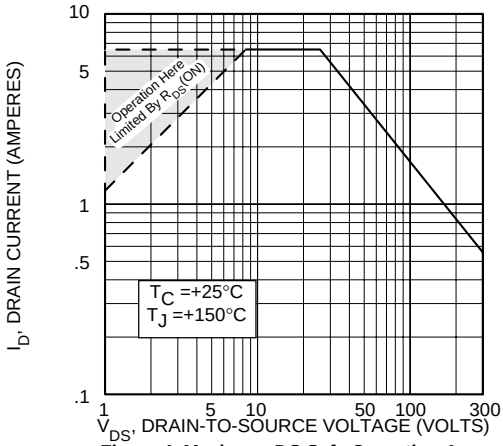


Figure 4, Maximum DC Safe Operating Area

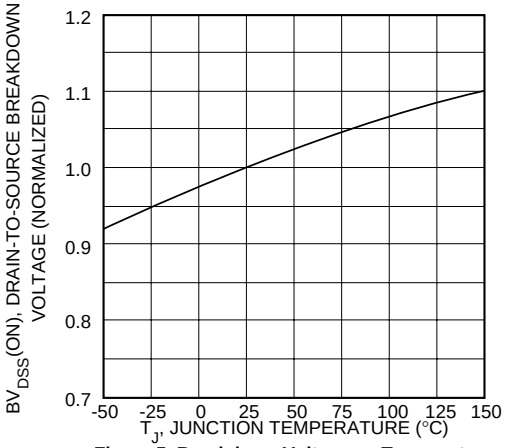


Figure 5, Breakdown Voltage vs Temperature

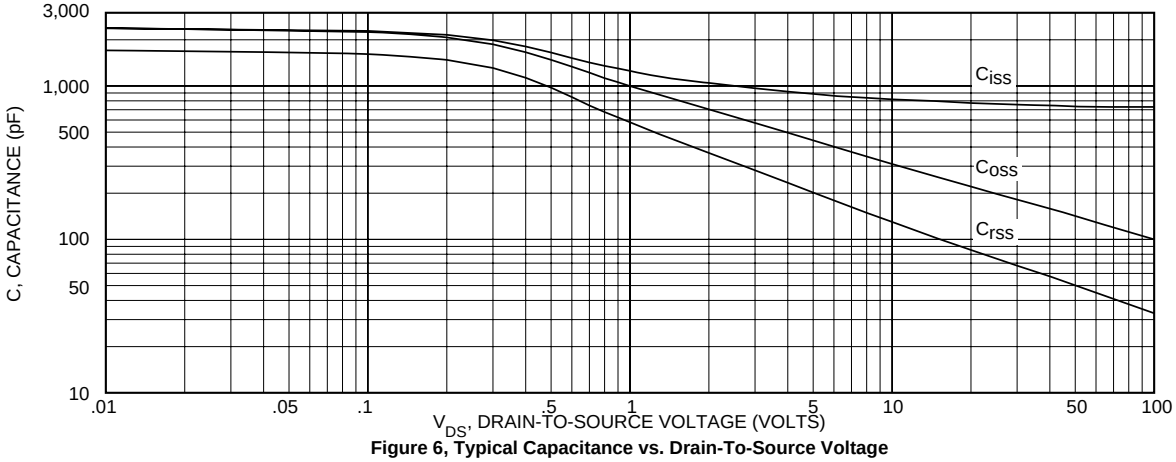
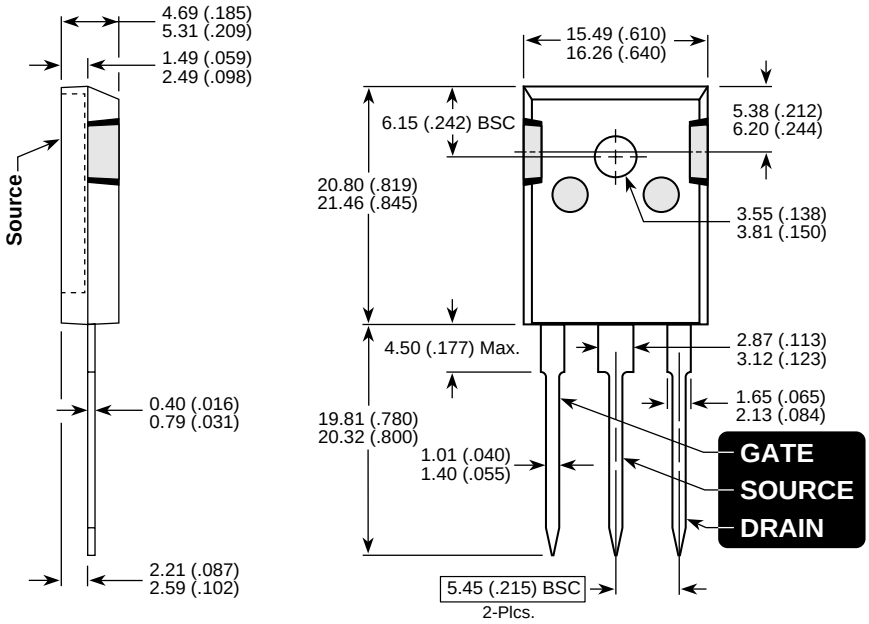


Figure 6, Typical Capacitance vs. Drain-To-Source Voltage

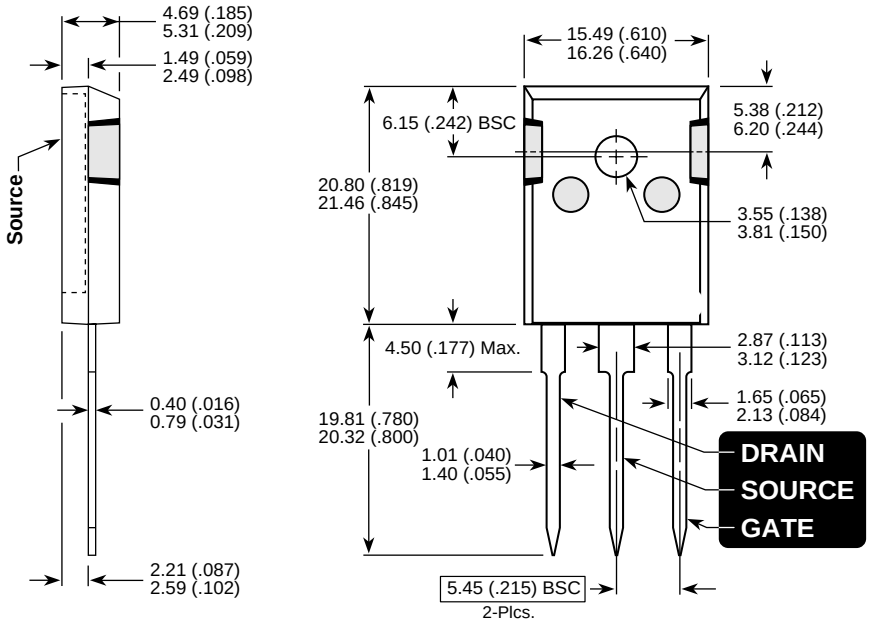
TO-247AD Package Outline

ARF442



Dimensions in Millimeters and (Inches)

ARF443



Dimensions in Millimeters and (Inches)

NOTE: The ARF442 and ARF443 comprise a symmetric pair of RF power transistors and meet the same electrical specifications. The device pin-outs are the mirror image of each other to allow ease of use as a push-pull pair.

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

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