

# ARF461C(G) ARF461D(G)

## RF POWER MOSFETs N-CHANNEL ENHANCEMENT MODE

250V 150W 65MHz

The ARF461C and ARF461D comprise a symmetric pair of common drain RF power transistors designed for push-pull scientific, commercial, medical and industrial RF power amplifier applications up to 65 MHz. They have been optimized for both linear and high efficiency classes of operation.

- Specified 250 Volt, 40.68 MHz Characteristics:
  - Output Power = 150 Watts.
  - Gain = 13dB (Class AB)
  - Efficiency = 75% (Class C)
- Low Cost Common Source RF Package.
- Low  $V_{th}$  thermal coefficient.
- Low Thermal Resistance.
- Optimized SOA for Superior Ruggedness.
- RoHS Compliant 

### MAXIMUM RATINGS

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

| Symbol          | Parameter                                           | ARF461CG/DG | Unit               |
|-----------------|-----------------------------------------------------|-------------|--------------------|
| $V_{DSS}$       | Drain-Source Voltage                                | 1000        | V                  |
| $V_{DGO}$       | Drain-Gate Voltage                                  | 1000        |                    |
| $I_D$           | Continuous Drain Current @ $T_C = 25^\circ\text{C}$ | 6.5         | A                  |
| $V_{GS}$        | Gate-Source Voltage                                 | $\pm 30$    | V                  |
| $P_D$           | Total Power Dissipation @ $T_C = 25^\circ\text{C}$  | 250         | W                  |
| $R_{\theta JC}$ | Junction to Case                                    | 0.50        | $^\circ\text{C/W}$ |
| $T_J, T_{STG}$  | Operating and Storage Junction Temperature Range    | -55 to 150  | $^\circ\text{C}$   |
| $T_L$           | Lead Temperature: 0.063" from Case for 10 Sec.      | 300         |                    |

### STATIC ELECTRICAL CHARACTERISTICS

| Symbol       | Parameter                                                                                      | Min  | Typ | Max       | Unit    |
|--------------|------------------------------------------------------------------------------------------------|------|-----|-----------|---------|
| $BV_{DSS}$   | Drain-Source Breakdown Voltage ( $V_{GS} = 0V, I_D = 250 \mu A$ )                              | 1000 |     |           | V       |
| $V_{DS(ON)}$ | On State Drain Voltage <sup>1</sup> ( $I_{D(ON)} = 3.25A, V_{GS} = 10V$ )                      |      |     | 6.5       |         |
| $I_{DSS}$    | Zero Gate Voltage Drain Current ( $V_{DS} = V_{DSS}, V_{GS} = 0V$ )                            |      |     | 25        | $\mu A$ |
|              | Zero Gate Voltage Drain Current ( $V_{DS} = 0.8V_{DSS}, V_{GS} = 0, T_C = 125^\circ\text{C}$ ) |      |     | 250       |         |
| $I_{GSS}$    | Gate-Source Leakage Current ( $V_{DS} = \pm 30V, V_{GS} = 0V$ )                                |      |     | $\pm 100$ | nA      |
| $g_{fs}$     | Forward Transconductance ( $V_{DS} = 25V, I_D = 3.25A$ )                                       | 3    | 4   |           | mhos    |
| $V_{GS(TH)}$ | Gate Threshold Voltage ( $V_{DS} = V_{GS}, I_D = 50mA$ )                                       | 3    |     | 5         | Volts   |



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

# Dynamic Characteristics

ARF461C/D

| Symbol       | Parameter                    | Test Conditions                                                                                    | Min | Typ  | Max | Unit |
|--------------|------------------------------|----------------------------------------------------------------------------------------------------|-----|------|-----|------|
| $C_{iss}$    | Input Capacitance            | $V_{GS} = 0V$<br>$V_{DS} = 50V$<br>$f = 1MHz$                                                      |     | 1700 |     | pF   |
| $C_{oss}$    | Output Capacitance           |                                                                                                    |     | 175  |     |      |
| $C_{rss}$    | Reverse Transfer Capacitance |                                                                                                    |     | 50   |     |      |
| $t_{d(on)}$  | Turn-On Delay Time           | $V_{GS} = 15V$<br>$V_{DD} = 0.5V_{DSS}$<br>$I_D = I_{D(Cont.)} @ 25^{\circ}C$<br>$R_G = 1.6\Omega$ |     | 8    |     | ns   |
| $t_r$        | Rise Time                    |                                                                                                    |     | 5    |     |      |
| $t_{d(off)}$ | Turn-off Delay Time          |                                                                                                    |     | 21   |     |      |
| $t_f$        | Fall Time                    |                                                                                                    |     | 10.1 |     |      |

# Functional Characteristics

| Symbol   | Characteristic                     | Test Conditions                                                     | Min                            | Typ | Max | Unit |
|----------|------------------------------------|---------------------------------------------------------------------|--------------------------------|-----|-----|------|
| $G_{PS}$ | Common Source Amplifier Power Gain | $f = 40.68MHz$<br>$V_{GS} = 0V$ $V_{DD} = 250V$<br>$P_{OUT} = 150W$ | 13                             | 15  |     | dB   |
| $\eta$   | Drain Efficiency                   |                                                                     | 70                             | 75  |     | %    |
| $\psi$   | Electrical Ruggedness VSWR 10:1    |                                                                     | No Degradation in Output Power |     |     |      |

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

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

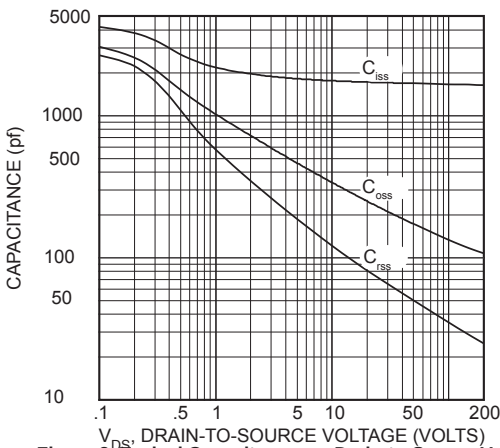


Figure 2, Typical Capacitance vs. Drain-to-Source Voltage

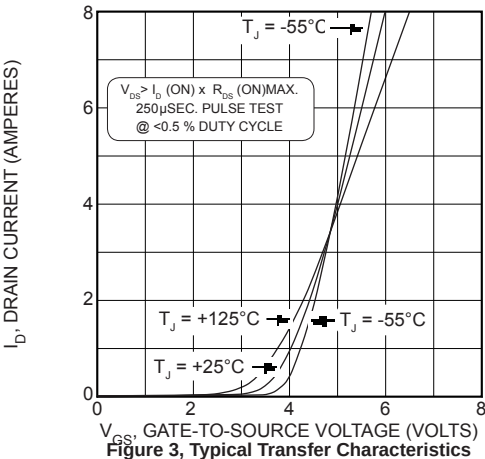


Figure 3, Typical Transfer Characteristics

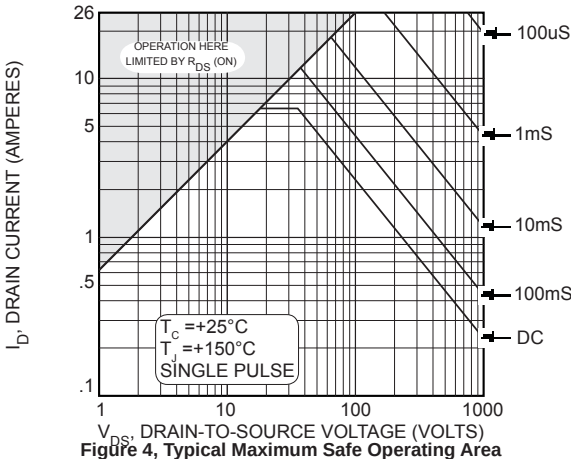


Figure 4, Typical Maximum Safe Operating Area

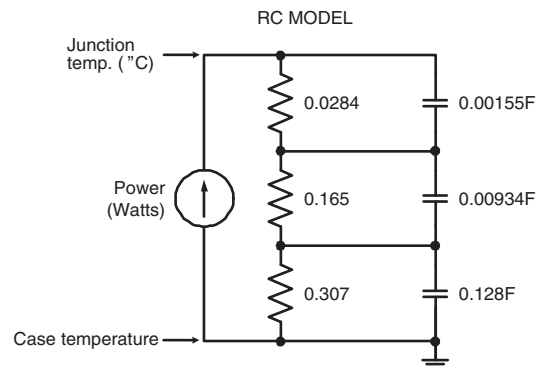
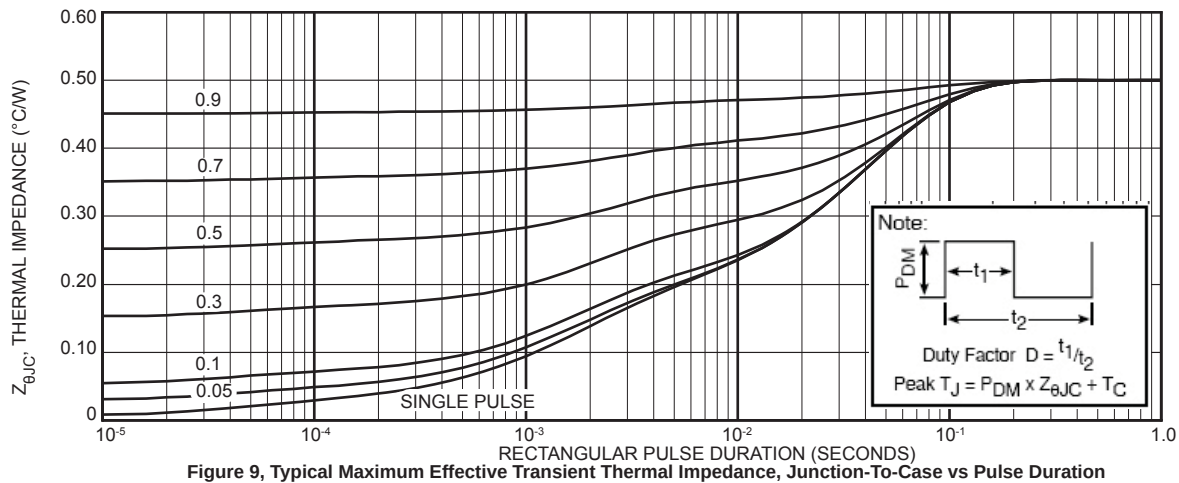
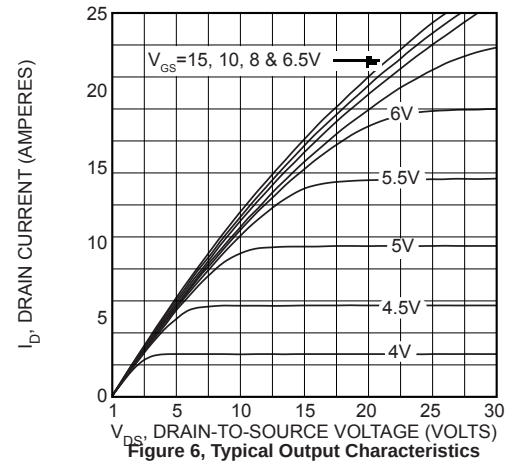
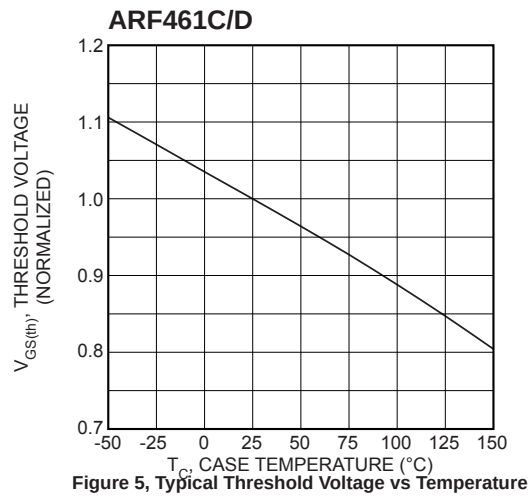


Figure 9a, TRANSIENT THERMAL IMPEDANCE MODEL

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

| Freq. (MHz) | $Z_{in}$ ( $\Omega$ ) | $Z_{OL}$ ( $\Omega$ ) |
|-------------|-----------------------|-----------------------|
| 2.0         | 20.9 - j 9.2          | 38 - j 2.6            |
| 13.5        | 2.4 - j 6.8           | 31 - j 14             |
| 27          | .57 - j 2.6           | 19.6 - j 17.6         |
| 40          | .31 - j 0.5           | 12.5 - j 15.8         |
| 65          | .44 + j 1.9           | 6.0 - j 10.5          |

$Z_{in}$  - Gate shunted with 25 $\Omega$

$I_{DQ} = 100\text{mA}$

$Z_{OL}$  - Conjugate of optimum load for 150 Watts output at  $V_{dd} = 125\text{V}$



Technical drawing of the 2-Plcs. (2-Plugs) showing side and front views with dimensions in inches and millimeters.

**Side View Dimensions:**

- Top width: 4.69 (.185), 5.31 (.209), 1.49 (.059), 2.49 (.098)
- Drain (indicated by an arrow)
- Bottom width: 0.40 (.016), 0.79 (.031)
- Bottom width (total): 2.21 (.087), 2.59 (.102)

**Front View Dimensions:**

- Top width: 15.49 (.610), 16.26 (.640)
- Vertical dimensions: 6.15 (.242) BSC, 20.80 (.819), 21.46 (.845), 4.50 (.177) Max., 19.81 (.780), 20.32 (.800)
- Right side dimensions: 5.38 (.212), 6.20 (.244), 3.50 (.138), 3.81 (.150), 2.87 (.113), 3.12 (.123), 1.65 (.065), 2.13 (.084)
- Bottom dimensions: 1.01 (.040), 1.40 (.055), 5.45 (.215) BSC
- Bottom label: 2-Plcs.

**NOTE:** These two parts 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.

| Device |        |
|--------|--------|
| ARF- C | ARF- D |

- Gate ----- Source
- Drain ---- Drain
- Source ----- Gate

Dimensions in Millimeters and (Inches)