

# N-Channel JFET Monolithic Dual



## U440 / U441

### FEATURES

- High Gain .....  $g_{fs} > 6 \text{ mS}$
- Low Leakage .....  $I_g < 1 \text{ pA typical}$
- Low Noise

### APPLICATIONS

- Differential Wideband Amplifiers
- VHF/UHF Amplifiers
- Test and Measurement
- Multi-Chip/Hybrids

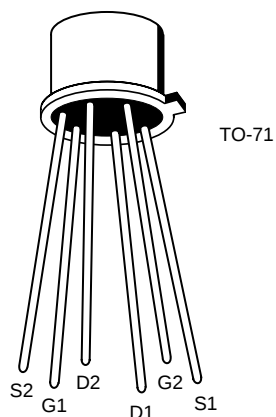
### DESCRIPTION

The U440 Series is an N-Channel Monolithic Dual JFET designed for high speed amplifier circuits. Featuring high gain ( $> 6 \text{ mS typical}$ ), low leakage ( $< 1 \text{ pA typ}$ ) and low noise. This series is an excellent choice for differential amplifier designs.

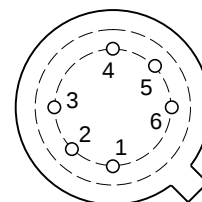
### ORDERING INFORMATION

| Part    | Package                  | Temperature Range                               |
|---------|--------------------------|-------------------------------------------------|
| U440-1  | Hermetic TO-71 Package   | $-55^{\circ}\text{C}$ to $+150^{\circ}\text{C}$ |
| XU440-1 | Sorted Chips in Carriers | $-55^{\circ}\text{C}$ to $+150^{\circ}\text{C}$ |

### PIN CONFIGURATION



- 1 SOURCE 1
- 2 DRAIN 1
- 3 GATE 1
- 4 SOURCE 2
- 5 DRAIN 2
- 6 GATE 2



BOTTOM VIEW

CJ1

**ABSOLUTE MAXIMUM RATINGS** ( $T_A = 25^{\circ}\text{C}$  unless otherwise noted)

| Parameter/Test Condition                          | Symbol    | Limit      | Unit                   |
|---------------------------------------------------|-----------|------------|------------------------|
| Gate-Drain Voltage                                | $V_{GD}$  | -25        | V                      |
| Gate-Source Voltage                               | $V_{GS}$  | -25        | V                      |
| Gate-Gate Voltage                                 | $V_{GG}$  | $\pm 50$   | V                      |
| Forward Gate Current                              | $I_G$     | 50         | mA                     |
| Power Dissipation (per side)                      | $P_D$     | 250        | mW                     |
| (total)                                           |           | 350        | mW                     |
| Power Derating (per side)                         |           | 2          | mW/ $^{\circ}\text{C}$ |
| (total)                                           |           | 2.8        | mW/ $^{\circ}\text{C}$ |
| Operating Junction Temperature                    | $T_J$     | -55 to 150 | $^{\circ}\text{C}$     |
| Storage Temperature                               | $T_{stg}$ | -65 to 200 | $^{\circ}\text{C}$     |
| Lead Temperature (1/16" from case for 10 seconds) | $T_L$     | 300        | $^{\circ}\text{C}$     |

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^{\circ}\text{C}$  unless otherwise noted)

| SYMBOL                                         | CHARACTERISTICS                                          | TYP <sup>1</sup> | U440 |      | U441 |      | UNIT                   | TEST CONDITIONS                                          |                                            |  |
|------------------------------------------------|----------------------------------------------------------|------------------|------|------|------|------|------------------------|----------------------------------------------------------|--------------------------------------------|--|
|                                                |                                                          |                  | MIN  | MAX  | MIN  | MAX  |                        |                                                          |                                            |  |
| STATIC                                         |                                                          |                  |      |      |      |      |                        |                                                          |                                            |  |
| V <sub>(BR)GSS</sub>                           | Gate-Source Breakdown Voltage                            | -35              | -25  |      | -25  |      | V                      | I <sub>G</sub> = -1μA, V <sub>DS</sub> = 0V              |                                            |  |
| V <sub>GS(OFF)</sub>                           | Gate-Source Cut off Voltage                              | -3.5             | -1   | -6   | -1   | -6   |                        | V <sub>DS</sub> = 10V, I <sub>D</sub> = 1nA              |                                            |  |
| I <sub>DSS</sub>                               | Saturation Drain Current <sup>2</sup>                    | 15               | 6    | 30   | 6    | 30   | mA                     | V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V              |                                            |  |
| I <sub>GSS</sub>                               | Gate Reverse Current                                     | -1               |      | -500 |      | -500 | pA                     | V <sub>GS</sub> = -15V, V <sub>DS</sub> = 0V             |                                            |  |
|                                                |                                                          | -2               |      |      |      |      | nA                     | T <sub>A</sub> = 150°C                                   |                                            |  |
| I <sub>G</sub>                                 | Gate Operating Current                                   | -1               |      | -500 |      | -500 | pA                     | V <sub>DG</sub> = 10V, I <sub>D</sub> = 5mA              |                                            |  |
|                                                |                                                          | -0.3             |      |      |      |      | nA                     | T <sub>A</sub> = 125°C                                   |                                            |  |
| V <sub>GS(F)</sub>                             | Gate-Source Forward Voltage                              | 0.7              |      |      |      |      | V                      | I <sub>G</sub> = 1mA, V <sub>DS</sub> = 0V               |                                            |  |
| DYNAMIC                                        |                                                          |                  |      |      |      |      |                        |                                                          |                                            |  |
| g <sub>fs</sub>                                | Common-Source Forward Transconductance                   | 6                | 4.5  | 9    | 4.5  | 9    | mS                     | V <sub>DG</sub> = 10V, I <sub>D</sub> = 5mA<br>f = 1kHz  |                                            |  |
| g <sub>os</sub>                                | Common-Source Output Conductance                         | 70               |      | 200  |      | 200  | μS                     |                                                          |                                            |  |
| C <sub>iss</sub>                               | Common-Source Input Capacitance                          | 3                |      |      |      |      | pF                     | V <sub>DG</sub> = 10V, I <sub>D</sub> = 5mA<br>f = 1MHz  |                                            |  |
| C <sub>rss</sub>                               | Common-Source Reverse Transfer Capacitance               | 1                |      |      |      |      |                        |                                                          |                                            |  |
| $\bar{e}_n$                                    | Equivalent Input Noise Voltage                           | 4                |      |      |      |      | nV/ $\sqrt{\text{Hz}}$ | V <sub>DG</sub> = 10V, I <sub>D</sub> = 5mA<br>f = 10kHz |                                            |  |
| MATCHING                                       |                                                          |                  |      |      |      |      |                        |                                                          |                                            |  |
| V <sub>GS1</sub> -V <sub>GS2</sub>             | Differential Gate-Source Voltage                         | 6                |      | 10   |      | 20   | mV                     | V <sub>DG</sub> = 10V, I <sub>D</sub> = 5mA              |                                            |  |
| $\Delta \mid \frac{V_{GS1}-V_{GS2}}{\Delta T}$ | Gate-Source Voltage Differential Change with Temperature | 20               |      |      |      |      | μV/ °C                 | T = -55 to 25°C                                          | V <sub>DG</sub> =10V, I <sub>D</sub> = 5mA |  |
|                                                |                                                          | 20               |      |      |      |      |                        | T = 25 to 125°C                                          |                                            |  |
| $\frac{I_{DSS1}}{I_{DSS2}}$                    | Saturation Drain Current Ratio                           | 0.97             |      |      |      |      |                        | V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V              |                                            |  |
| $\frac{g_{fs1}}{g_{fs2}}$                      | Transconductance Ratio                                   | 0.97             |      |      |      |      |                        | V <sub>DG</sub> = 10V, I <sub>D</sub> = 5mA<br>f= 1 kHz  |                                            |  |
| CMRR                                           | Common Mode Rejection Ratio                              | 85               |      |      |      |      | dB                     | V <sub>DD</sub> = 5 to 10V, I <sub>D</sub> = 5mA         |                                            |  |

NOTES: 1. For design aid only, not subject to production testing.  
2. Pulse test;  $PW = 300\mu\text{s}$ , duty cycle  $\leq 3\%$ .