

# LINEAR SYSTEMS

Twenty-Five Years Of Quality Through Innovation

## U401 - U406

LOW NOISE LOW DRIFT  
MONOLITHIC DUAL N-CHANNEL JFET

### FEATURES

|              |                                          |
|--------------|------------------------------------------|
| LOW DRIFT    | $ V_{GS1-2}/T  = 10\mu V/^{\circ}C$ TYP. |
| LOW NOISE    | $e_n = 6nV/\sqrt{Hz}$ @10Hz TYP.         |
| LOW PINCHOFF | $V_p = 2.5V$ TYP.                        |

### ABSOLUTE MAXIMUM RATINGS NOTE 1

@ 25 °C (unless otherwise noted)

### Maximum Temperatures

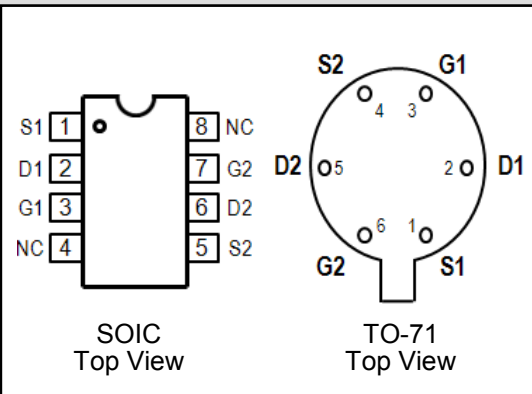
|                                |               |
|--------------------------------|---------------|
| Storage Temperature            | -55 to +150°C |
| Operating Junction Temperature | -55 to +150°C |

### Maximum Voltage and Current for Each Transistor NOTE 1

|             |                                 |      |
|-------------|---------------------------------|------|
| $-V_{GSS}$  | Gate Voltage to Drain or Source | 50V  |
| $-V_{DSO}$  | Drain to Source Voltage         | 50V  |
| $-I_{G(f)}$ | Gate Forward Current            | 10mA |

### Maximum Power Dissipation per side NOTE 2

|                                        |       |
|----------------------------------------|-------|
| Device Dissipation $T_A = 25^{\circ}C$ | 300mW |
|----------------------------------------|-------|



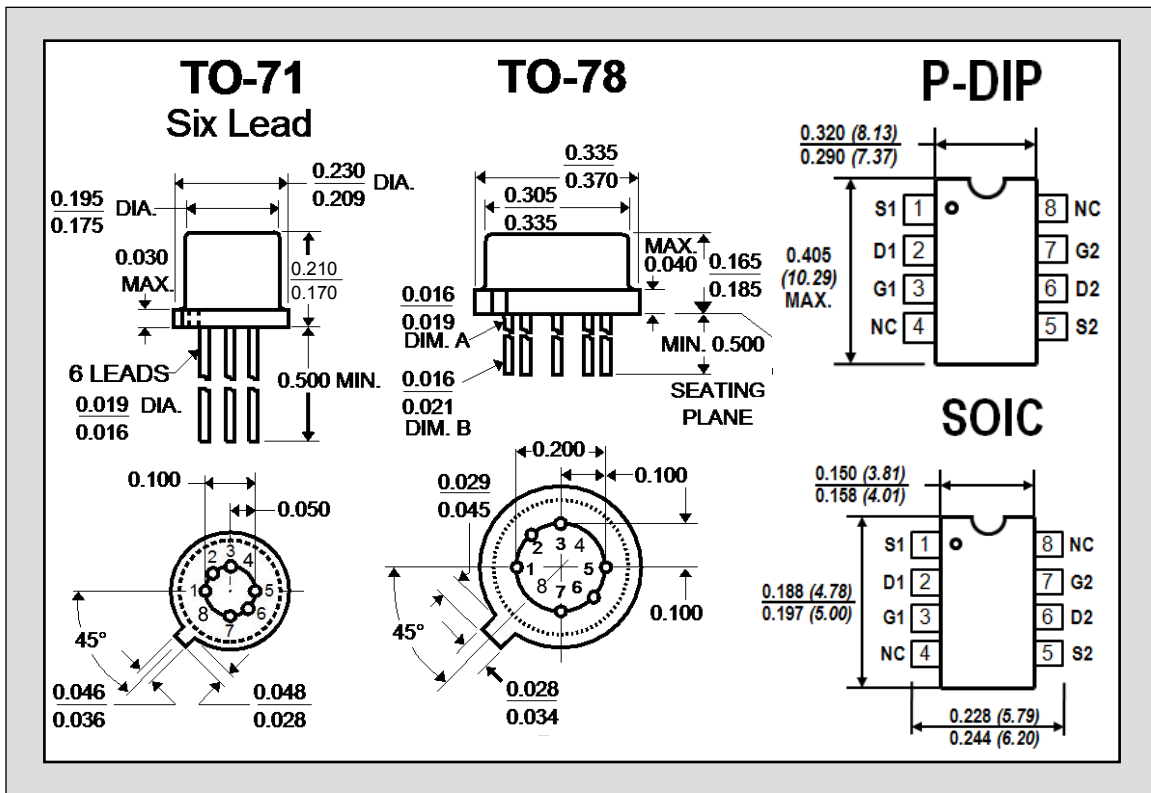
### MATCHING CHARACTERISTICS @ 25°C (unless otherwise noted)

| SYMBOL               | CHARACTERISTIC        | U401 | U402 | U403 | U404 | U405 | U406 | UNITS             | CONDITIONS                                                                |
|----------------------|-----------------------|------|------|------|------|------|------|-------------------|---------------------------------------------------------------------------|
| $ V_{GS1-2}/T $ max. | Drift vs. Temperature | 10   | 10   | 25   | 25   | 40   | 80   | $\mu V/^{\circ}C$ | $V_{DG} = 10V, I_D = 200\mu A$<br>$T_A = -55^{\circ}C$ to $+125^{\circ}C$ |
| $ V_{GS1-2} $ max.   | Offset Voltage        | 5    | 10   | 10   | 15   | 20   | 40   | mV                | $V_{DG} = 10V, I_D = 200\mu A$                                            |

### ELECTRICAL CHARACTERISTICS $T_A = 25^{\circ}C$ (unless otherwise noted) NOTE 3

| SYMBOL                  | CHARACTERISTIC                 | MIN.     | TYP. | MAX.      | UNITS   | CONDITIONS                                 |                            |  |
|-------------------------|--------------------------------|----------|------|-----------|---------|--------------------------------------------|----------------------------|--|
| $BV_{GSS}$              | Breakdown Voltage              | -50      | -60  | --        | V       | $V_{DS} = 0$                               | $I_D = 1nA$                |  |
| $BV_{G1G2}$             | Gate-to-Gate Breakdown         | $\pm 50$ | --   | --        | V       | $I_G = \pm 1\mu A$                         | $I_D = 0, I_S = 0$         |  |
| <b>TRANSCONDUCTANCE</b> |                                |          |      |           |         |                                            |                            |  |
| $G_{fss}$               | Full Conduction                | 2000     | --   | 7000      | $\mu S$ | $V_{DG} = 10V$                             | $V_{GS} = 0, f = 1kHz$     |  |
| $G_{fs}$                | Typical Operation              | 1000     | --   | 2000      | $\mu S$ | $V_{DG} = 15V$                             | $I_D = 200\mu A, f = 1kHz$ |  |
| $ G_{fs1}/G_{fs2} $     | Mismatch                       | 0.97     | --   | 1.0       |         |                                            |                            |  |
| $I_{DSS}$               | Saturation Drain Current       | 0.5      | --   | 10        | mA      |                                            |                            |  |
| $I_{DSS1}/I_{DSS2}$     | Saturation Current Ratio       | 0.9      | 0.98 | 1.0       |         | $V_{DG} = 10V$                             | $V_{GS} = 0$               |  |
| <b>GATE VOLTAGE</b>     |                                |          |      |           |         |                                            |                            |  |
| $V_{GS(off)}$ or $V_p$  | Pinchoff Voltage               | -0.5     | --   | -2.5      | V       | $V_{DS} = 15V$                             | $I_D = 1nA$                |  |
| $V_{GS}$                | Operating Range                | --       | --   | -2.3      | V       | $V_{DS} = 15V$                             | $I_D = 200\mu A$           |  |
| <b>GATE CURRENT</b>     |                                |          |      |           |         |                                            |                            |  |
| $I_G$                   | Operating                      | --       | -4   | -15       | pA      | $V_{DG} = 15V$                             | $I_D = 200\mu A$           |  |
| $I_G$                   | High Temperature               | --       | --   | -10       | nA      | $T_A = +125^{\circ}C$                      |                            |  |
| $I_{GSS}$               | Gate Reverse Current           | --       | --   | -100      | pA      | $V_{GS} = -30V, V_{DS} = 0V$               |                            |  |
| $I_{G1G2}$              | Gate to Gate Isolation Current | --       | --   | $\pm 1.0$ | $\mu A$ | $V_{G1} - V_{G2} = \pm 50V, I_D = I_S = 0$ |                            |  |

| SYMBOL           | CHARACTERISTIC                                            | MIN. | TYP. | MAX. | UNITS | CONDITIONS                                                                         |
|------------------|-----------------------------------------------------------|------|------|------|-------|------------------------------------------------------------------------------------|
|                  | <b><u>OUTPUT CONDUCTANCE</u></b>                          |      |      |      |       |                                                                                    |
| G <sub>oss</sub> | Full Conduction                                           | --   | --   | 20   | μS    | V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0, f = 1kHz                               |
| G <sub>os</sub>  | Operating                                                 | --   | 0.2  | 2    | μS    | V <sub>DS</sub> = 15V, I <sub>D</sub> = 500μA, f = 1kHz                            |
|                  | <b><u>COMMON MODE REJECTION</u></b>                       |      |      |      |       |                                                                                    |
| CMRR             | $-20 \log \left  \frac{\Delta V_{GS1-2}}{V_{DG}} \right $ | 95   | --   | --   | dB    | V <sub>DS</sub> = 10 to 20V I <sub>D</sub> =30μA                                   |
|                  | <b><u>NOISE</u></b>                                       |      |      |      |       |                                                                                    |
| NF               | Figure                                                    | --   | --   | 0.5  | dB    | V <sub>DS</sub> = 15V V <sub>GS</sub> = 0 R <sub>G</sub> =10M<br>f= 100Hz NBW= 6Hz |
| e <sub>n</sub>   | Voltage                                                   | --   | 20   | --   | nV/Hz | V <sub>DS</sub> = 15V I <sub>D</sub> = 200μA f= 10Hz<br>NBW= 1Hz                   |
|                  | <b><u>CAPACITANCE</u></b>                                 |      |      |      |       |                                                                                    |
| C <sub>ISS</sub> | Input                                                     | --   | --   | 8    | pF    | V <sub>DS</sub> = 15V I <sub>D</sub> = 200μA f= 1MHz                               |
| C <sub>RSS</sub> | Reverse Transfer                                          | --   | --   | 1.5  | pF    |                                                                                    |



**NOTES:**

1. These ratings are limiting values above which the serviceability of any semiconductor may be impaired
2. Derate 2.4mW/°C when TA is greater than 25°C
3. All MIN/TYP/MAX limits are absolute numbers. Negative signs indicate electrical polarity only.

Linear Integrated Systems (LIS) is a 25-year-old, third-generation precision semiconductor company providing high-quality discrete components. Expertise brought to LIS is based on processes and products developed at Amelco, Union Carbide, Intersil and Micro Power Systems by company President John H. Hall. Hall, a protégé of Silicon Valley legend Dr. Jean Hoerni, was the director of IC Development at Union Carbide, co-founder and vice president of R&D at Intersil, and founder/president of Micro Power Systems.