Monolithic N-Channel JFET Duals

Product Summary

| Part Number | $V_{GS(0D)}$ (V) | $V_{(BR)GSS}$ Min (V) | $g_m$ Min (mS) | $I_G$ Typ (pA) | $|V_{GS1} – V_{GS2}|$ Max (mV) |
|-------------|------------------|-----------------------|----------------|----------------|-------------------------------|
| U401        | –0.5 to –2.5     | –40                   | 1              | –2             | 5                            |
| SST/U404    | –0.5 to –2.5     | –40                   | 1              | –2             | 15                           |
| SST/U406    | –0.5 to –2.5     | –40                   | 1              | –2             | 40                           |

Features
- Monolithic Design
- High Slew Rate
- Low Offset/Drift Voltage
- Low Gate Leakage: 2 pA
- Low Noise
- High CMRR: 102 dB

Benefits
- Tight Differential Match vs. Current
- Improved Op Amp Speed, Settling Time Accuracy
- Minimum Input Error/Trimming Requirement
- Insignificant Signal Loss/Error Voltage
- High System Sensitivity
- Minimum Error with Large Input Signal

Applications
- Wideband Differential Amps
- High-Speed, Temp-Compensated, Single-Ended Input Amps
- High-Speed Comparators
- Impedance Converters

Description
The SST/U401 series of high-performance monolithic dual JFETs features extremely low noise, tight offset voltage and low drift over temperature specifications, and is targeted for use in a wide range of precision instrumentation applications. This series has a wide selection of offset and drift specifications with the U401 featuring a 5-mV offset and 10-μV/°C drift.

For similar high-gain products in TO-78 packaging, see the 2N5911/5912 data sheet.

Absolute Maximum Ratings
- Gate-Drain, Gate-Source Voltage: –40 V
- Gate Current: 10 mA
- Lead Temperature: 300°C
- Operating Junction Temperature: –55 to 150°C
- Power Dissipation:
  - Per Side: 300 mW
  - Total: 500 mW

Notes
a. Derate 2.4 mW/°C above 25°C
b. Derate 4 mW/°C above 25°C

Updates to this data sheet may be obtained via facsimile by calling Siliconix FaxBack, 1-408-970-5600. Please request FaxBack document #70247. Applications information may also be obtained via FaxBack, request document #70599.
## Specificationsa

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<tr>
<td>Gate-Source Breakdown Voltage</td>
<td>( V \text{_(BRGSS)} )</td>
<td>( I_G = -1 \ \mu \text{A}, V \text{DS} = 0 \ \text{V} )</td>
<td>-58</td>
<td>-40</td>
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<td></td>
<td>( V \text{_(BRG1-G2)} )</td>
<td>( I_G = \pm 1 \ \mu \text{A}, V \text{DS} = 0 \ \text{V} )</td>
<td>\pm 45</td>
<td>\pm 30</td>
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<td>( V \text{DS} = 15 \ \text{V}, I_D = 1 \ \text{nA} )</td>
<td>-1.5</td>
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<td>Saturation Drain Currentc</td>
<td>( I_DSS )</td>
<td>( V \text{DS} = 10 \ \text{V}, V \text{GS} = 0 \ \text{V} )</td>
<td>3.5</td>
<td>0.5</td>
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<td>( V \text{GS} = -30 \ \text{V}, V \text{DS} = 0 \ \text{V} )</td>
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<td>( I_G )</td>
<td>( V \text{DG} = 15 \ \text{V}, I_D = 200 \ \mu \text{A} )</td>
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<td>( r_{DS(on)} )</td>
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<td>250</td>
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<td>Gate-Source Voltage</td>
<td>( V \text{GS} )</td>
<td>( V \text{DG} = 15 \ \text{V}, I_D = 200 \ \mu \text{A} )</td>
<td>-1</td>
<td>-2.3</td>
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<td>Gate-Source Forward Voltage</td>
<td>( V \text{GS(f)} )</td>
<td>( I_G = 1 \ \text{mA}, V \text{DS} = 0 \ \text{V} )</td>
<td>0.7</td>
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<td>Dynamic</td>
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<td>[ \text{Min} ]</td>
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<td>( V \text{DS} = 15 \ \text{V}, I_D = 200 \ \mu \text{A} )</td>
<td>1.5</td>
<td>1</td>
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<td>Common-Source Output Conductance</td>
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<td>2</td>
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<tr>
<td>Common-Source Forward Transconductance</td>
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<td>( V \text{DS} = 10 \ \text{V}, V \text{GS} = 0 \ \text{V} )</td>
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<td>2</td>
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<tr>
<td>Common-Source Output Conductance</td>
<td>( g_{os} )</td>
<td>( V \text{DS} = 10 \ \text{V}, V \text{GS} = 0 \ \text{V} )</td>
<td>5</td>
<td>30</td>
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<tr>
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<td>( C_{iss} )</td>
<td>( V \text{DS} = 15 \ \text{V}, I_D = 200 \ \mu \text{A} )</td>
<td>4</td>
<td>8</td>
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<td>3</td>
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<td>20</td>
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<td>[ \text{Min} ]</td>
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<td>Differential Gate-Source Voltage</td>
<td>(</td>
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<td>)</td>
<td>( V \text{DG} = 10 \ \text{V}, I_D = 200 \ \mu \text{A} )</td>
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<td>(</td>
<td>V_{GS1} - V_{GS2}</td>
<td>)</td>
<td>( V \text{DG} = 10 \ \text{V}, I_D = 200 \ \mu \text{A} )</td>
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<tr>
<td>Common Mode Rejection Ratio</td>
<td>CMRR</td>
<td>( V \text{DG} = 10 \ \text{to} \ 20 \ \text{V}, I_D = 200 \ \mu \text{A} )</td>
<td>102</td>
<td>95</td>
</tr>
</tbody>
</table>

Notes

a. \( T_A = 25°C \) unless otherwise noted.

b. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.

c. Pulse test: \( P W \leq 300 \mu \text{s} \) duty cycle \( \leq 3\% \).

NNR
Typical Characteristics

**Drain Current and Transconductance vs. Gate-Source Cutoff Voltage**

- $I_{DSS} @ V_{DS} = 15\, \text{V}, V_{GS} = 0\, \text{V}$
- $g_{fs} @ V_{DG} = 15\, \text{V}, V_{GS} = 0\, \text{V}$
- $f = 1\, \text{kHz}$

**Gate Leakage Current**

- $I_G @ I_D = 500\, \text{mA}$
- $I_{GSS} @ 125^\circ\text{C}$
- $I_{GSS} @ 25^\circ\text{C}$
- $T_A = 125^\circ\text{C}$
- $T_A = 25^\circ\text{C}$

**Output Characteristics**

- $V_{GS} = 0\, \text{V}$
- $V_{GS} = 0\, \text{V}$
- $V_{GS} = 0\, \text{V}$
- $V_{GS} = 0\, \text{V}$

**Saturation Drain Current ($I_{DSS}$)**

- $V_{GS} = 0\, \text{V}$
- $V_{GS} = 0\, \text{V}$
- $V_{GS} = 0\, \text{V}$
- $V_{GS} = 0\, \text{V}$

**Forward Transconductance ($g_{fs}$)**

- $V_{DG} = 15\, \text{V}$
- $V_{DG} = 15\, \text{V}$
- $V_{DG} = 15\, \text{V}$
- $V_{DG} = 15\, \text{V}$

**Gate Leakage Current ($I_G$)**

- $I_G @ I_D = 500\, \text{mA}$
- $I_{GSS} @ 125^\circ\text{C}$
- $I_{GSS} @ 25^\circ\text{C}$
- $T_A = 125^\circ\text{C}$
- $T_A = 25^\circ\text{C}$
Typical Characteristics (Cont’d)

Transfer Characteristics

Voltage Differential with Temperature

Common Mode Rejection Ratio

Circuit Voltage Gain vs. Drain Current

On-Resistance vs. Drain Current

Gate-Source Differential Voltage vs. Drain Current

Typical Characteristics (Cont’d)

Voltage Differential with Temperature

Common Mode Rejection Ratio

Circuit Voltage Gain vs. Drain Current

On-Resistance vs. Drain Current

Gate-Source Differential Voltage vs. Drain Current

Typical Characteristics (Cont’d)

Voltage Differential with Temperature

Common Mode Rejection Ratio

Circuit Voltage Gain vs. Drain Current

On-Resistance vs. Drain Current

Gate-Source Differential Voltage vs. Drain Current

Typical Characteristics (Cont’d)

Voltage Differential with Temperature

Common Mode Rejection Ratio

Circuit Voltage Gain vs. Drain Current

On-Resistance vs. Drain Current

Gate-Source Differential Voltage vs. Drain Current
Typical Characteristics (Cont’d)

Common-Source Input Capacitance vs. Gate-Source Voltage

Common-Source Reverse Feedback Capacitance vs. Gate-Source Voltage

Output Conductance vs. Drain Current

Equivalent Input Noise Voltage vs. Frequency

Common-Source Forward Transconductance vs. Drain Current

On-Resistance and Output Conductance vs. Gate-Source Cutoff Voltage