N-Channel JFET

**PRODUCT SUMMARY**

<table>
<thead>
<tr>
<th>$V_{GS\text{off}}$ (V)</th>
<th>$V_{BR\text{GSS}}$ Min (V)</th>
<th>$g_m$ Min (mS)</th>
<th>$I_{DSS}$ Min (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\leq -8$</td>
<td>$-25$</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

**FEATURES**
- Excellent High-Frequency Gain: $G_{ps}$ 11 dB @ 400 MHz
- Very Low Noise: 3 dB @ 400 MHz
- Very Low Distortion
- High ac/dc Switch Off-Isolation
- High Gain: $A_V = 60$ @ 100 $\mu$A

**BENEFITS**
- Wideband High Gain
- Very High System Sensitivity
- High Quality of Amplification
- High-Speed Switching Capability
- High Low-Level Signal Amplification

**APPLICATIONS**
- High-Frequency Amplifier/Mixer
- Oscillator
- Sample-and-Hold
- Very Low Capacitance Switches

**DESCRIPTION**

The 2N3819 is a low-cost, all-purpose JFET which offers good performance at mid-to-high frequencies. It features low noise and leakage and guarantees high gain at 100 MHz.

Its TO-226AA (TO-92) package is compatible with various tape-and-reel options for automated assembly (see Packaging Information). For similar products in TO-206AF (TO-72) and TO-236 (SOT-23) packages, see the 2N4416/2N4416A/SST4416 data sheet.

**ABSOLUTE MAXIMUM RATINGS**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gate-Source/Gate-Drain Voltage</td>
<td>$-25$ V</td>
</tr>
<tr>
<td>Forward Gate Current</td>
<td>10 mA</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>$-55$ to $150$°C</td>
</tr>
<tr>
<td>Operating Junction Temperature</td>
<td>$-55$ to $150$°C</td>
</tr>
<tr>
<td>Lead Temperature ($\frac{1}{16}$&quot; from case for 10 sec.)</td>
<td>$300$°C</td>
</tr>
<tr>
<td>Power Dissipation$^a$</td>
<td>350 mW</td>
</tr>
</tbody>
</table>

**Notes**
- Derate 2.8 mW/°C above $25$°C

---

Document Number: 70238
S–04028—Rev. D, 04-Jun-01

www.vishay.com
SPECIFICATIONS (T<sub>A</sub> = 25°C UNLESS OTHERWISE NOTED)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Test Conditions</th>
<th>Limits</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Static</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gate-Source Breakdown Voltage</td>
<td>V&lt;sub&gt;(BR)GSS&lt;/sub&gt;</td>
<td>I&lt;sub&gt;G&lt;/sub&gt; = –1 μA, V&lt;sub&gt;DS&lt;/sub&gt; = 0 V</td>
<td>–25 –35</td>
<td>V</td>
</tr>
<tr>
<td>Gate-Source Cutoff Voltage</td>
<td>V&lt;sub&gt;GS(off)&lt;/sub&gt;</td>
<td>V&lt;sub&gt;DS&lt;/sub&gt; = 15 V, I&lt;sub&gt;G&lt;/sub&gt; = 2 nA</td>
<td>–3 –8</td>
<td>mA</td>
</tr>
<tr>
<td>Saturation Drain Current&lt;sup&gt;a&lt;/sup&gt;</td>
<td>I&lt;sub&gt;DS&lt;/sub&gt;</td>
<td>V&lt;sub&gt;DS&lt;/sub&gt; = 15 V, V&lt;sub&gt;GS&lt;/sub&gt; = 0 V</td>
<td>2 10 20</td>
<td>mA</td>
</tr>
<tr>
<td>Gate Reverse Current</td>
<td>I&lt;sub&gt;GS&lt;/sub&gt;</td>
<td>V&lt;sub&gt;GS&lt;/sub&gt; = –15 V, V&lt;sub&gt;DS&lt;/sub&gt; = 0 V</td>
<td>–0.002 –2</td>
<td>nA</td>
</tr>
<tr>
<td>Saturation Drain Current&lt;sup&gt;b&lt;/sup&gt;</td>
<td>I&lt;sub&gt;DS&lt;/sub&gt;</td>
<td>V&lt;sub&gt;DS&lt;/sub&gt; = 10 V, I&lt;sub&gt;G&lt;/sub&gt; = –8 V</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Drain Cutoff Current</td>
<td>I&lt;sub&gt;DS(off)&lt;/sub&gt;</td>
<td>V&lt;sub&gt;GS&lt;/sub&gt; = 0 V, I&lt;sub&gt;D&lt;/sub&gt; = 1 mA</td>
<td>150</td>
<td>Ω</td>
</tr>
<tr>
<td>Gate-Source Voltage</td>
<td>V&lt;sub&gt;GS&lt;/sub&gt;</td>
<td>V&lt;sub&gt;DS&lt;/sub&gt; = 15 V, I&lt;sub&gt;G&lt;/sub&gt; = 200 μA</td>
<td>–0.5 –2.5 –7.5</td>
<td>V</td>
</tr>
<tr>
<td>Gate-Source Forward Voltage</td>
<td>V&lt;sub&gt;GS(F)&lt;/sub&gt;</td>
<td>I&lt;sub&gt;G&lt;/sub&gt; = 1 mA, V&lt;sub&gt;DS&lt;/sub&gt; = 0 V</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td><strong>Dynamic</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common-Source Forward Transconductance&lt;sup&gt;c&lt;/sup&gt;</td>
<td>g&lt;sub&gt;fs&lt;/sub&gt;</td>
<td>V&lt;sub&gt;DS&lt;/sub&gt; = 15 V, V&lt;sub&gt;GS&lt;/sub&gt; = 0 V</td>
<td>f = 1 kHz</td>
<td>2 5.5 6.5</td>
</tr>
<tr>
<td>Common-Source Output Conductance&lt;sup&gt;c&lt;/sup&gt;</td>
<td>g&lt;sub&gt;os&lt;/sub&gt;</td>
<td>V&lt;sub&gt;DS&lt;/sub&gt; = 15 V, V&lt;sub&gt;GS&lt;/sub&gt; = 0 V</td>
<td>f = 1 kHz</td>
<td>2 5.5</td>
</tr>
<tr>
<td>Common-Source Input Capacitance</td>
<td>C&lt;sub&gt;iss&lt;/sub&gt;</td>
<td>V&lt;sub&gt;DS&lt;/sub&gt; = 15 V, V&lt;sub&gt;GS&lt;/sub&gt; = 0 V</td>
<td>f = 1 MHz</td>
<td>2.2 8</td>
</tr>
<tr>
<td>Common-Source Reverse Transfer Capacitance</td>
<td>C&lt;sub&gt;rss&lt;/sub&gt;</td>
<td>V&lt;sub&gt;DS&lt;/sub&gt; = 10 V, V&lt;sub&gt;GS&lt;/sub&gt; = 0 V, f = 1 MHz</td>
<td>0.7 4</td>
<td></td>
</tr>
<tr>
<td>Equivalent Input Noise Voltage&lt;sup&gt;c&lt;/sup&gt;</td>
<td>σ&lt;sub&gt;n&lt;/sub&gt;</td>
<td>V&lt;sub&gt;DS&lt;/sub&gt; = 10 V, V&lt;sub&gt;GS&lt;/sub&gt; = 0 V, f = 100 Hz</td>
<td>6</td>
<td>nV/√Hz</td>
</tr>
</tbody>
</table>

Notes:
- a. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
- b. Pulse test: PW ≤ 300 μs, duty cycle ≤ 2%.
- c. This parameter not registered with JEDEC.

TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C UNLESS OTHERWISE NOTED)
TYPICAL CHARACTERISTICS (TA = 25°C UNLESS OTHERWISE NOTED)

Gate Leakage Current

Common-Source Forward Transconductance vs. Drain Current

Output Characteristics

Transfer Characteristics

Transfer Characteristics
TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS OTHERWISE NOTED)

Transconductance vs. Gate-Source Voltage

Transconductance vs. Gate-Source Voltage (V)

On-Resistance vs. Drain Current

Circuit Voltage Gain vs. Drain Current

Common-Source Input Capacitance vs. Gate-Source Voltage

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

Assume V_DD = 15 V, V_DS = 5 V

R_L = V_{DS} / I_D

A_V = g_{fs} R_L / (1 + g_{fs} R_L)

V_GS = -2 V, -3 V

V_DS = 0 V, 10 V

f = 1 MHz

T_A = -55°C, 25°C, 125°C
**TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS OTHERWISE NOTED)**

### Input Admittance

- **Parameters:**
  - $T_A = 25°C$
  - $V_{DS} = 15\text{ V}$
  - $V_{GS} = 0\text{ V}$
  - Common Source

- **Graph:**
  - Frequency (MHz) vs. Admittance (mS)

### Forward Admittance

- **Parameters:**
  - $T_A = 25°C$
  - $V_{DS} = 15\text{ V}$
  - $V_{GS} = 0\text{ V}$
  - Common Source

- **Graph:**
  - Frequency (MHz) vs. Admittance (mS)

### Reverse Admittance

- **Parameters:**
  - $T_A = 25°C$
  - $V_{DS} = 15\text{ V}$
  - $V_{GS} = 0\text{ V}$
  - Common Source

- **Graph:**
  - Frequency (MHz) vs. Admittance (mS)

### Output Admittance

- **Parameters:**
  - $T_A = 25°C$
  - $V_{DS} = 15\text{ V}$
  - $V_{GS} = 0\text{ V}$
  - Common Source

- **Graph:**
  - Frequency (MHz) vs. Admittance (mS)

### Equivalent Input Noise Voltage vs. Frequency

- **Graph:**
  - Frequency (Hz) vs. Noise Voltage (nV/√Hz)

### Output Conductance vs. Drain Current

- **Graph:**
  - Drain Current (mA) vs. Conductance (mS)

---

**Legend:**

- $b$ is...
- $g$ is...
- $T_A = 25°C$
- $V_{DS} = 15\text{ V}$
- $V_{GS} = 0\text{ V}$
- Common Source

**Additional Parameters:***

- $I_D = 5\text{ mA}$
- $I_D = I_{DSS}$
- $V_{GS(off)} = -3\text{ V}$
- $V_{GS} = 10\text{ V}$
- $f = 1\text{ kHz}$