**N-Channel JFETs**

**PRODUCT SUMMARY**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>$V_{GS\text{off}}$ (V)</th>
<th>$V_{(BR)\text{GSS Min}}$ (V)</th>
<th>$g_{fs}$ Min (mS)</th>
<th>$I_{DSS}$ Min (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>J304</td>
<td>−2 to −6</td>
<td>−30</td>
<td>4.5</td>
<td>5</td>
</tr>
<tr>
<td>J305</td>
<td>−0.5 to −3</td>
<td>−30</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

**FEATURES**
- Excellent High Frequency Gain: J304, $G_{ps}$ 11 dB (typ) @ 400 MHz
- Very Low Noise: 3.8 dB (typ) @ 400 MHz
- Very Low Distortion
- High ac/dc Switch Off-Isolation
- High Gain: $A_{V} = 60$ @ 100 μA

**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 J304/305 n-channel JFETs provide high-performance amplification, especially at high-frequency. These products are available in tape and reel for automated assembly (see Package Information).

For similar products in TO-236 (SOT-23) packages, see the 2N/SST5484 series data sheet, or in TO-206AF (TO-72) packages, see the 2N/SST4416 series data sheet.

**ABSOLUTE MAXIMUM RATINGS**

- Gate-Source/Gate-Drain Voltage: −30 V
- Forward Gate Current: 10 mA
- Storage Temperature: −55 to 150°C
- Operating Junction Temperature: −55 to 150°C

- Lead Temperature (1/16” from case for 10 sec.): 300°C
- Power Dissipation: 350 mW

Notes:
- a. Derate 2.8 mW/°C above 25°C
### SPECIFICATIONS (TA = 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></td>
<td></td>
<td></td>
<td>J304</td>
<td>J305</td>
</tr>
<tr>
<td><strong>Static</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gate-Source Breakdown Voltage</td>
<td>V_{BR(GS)}</td>
<td>I_G = -1 μA , V_{DS} = 0 V</td>
<td>-35</td>
<td>-30</td>
</tr>
<tr>
<td>Gate-Source Cutoff Voltage</td>
<td>V_{GS(off)}</td>
<td>V_{DS} = 15 V , I_D = 1 nA</td>
<td>-2</td>
<td>-6</td>
</tr>
<tr>
<td>Saturation Drain Currentb</td>
<td>I_{DSS}</td>
<td>V_{DS} = 15 V , V_{GS} = 0 V</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Gate Reverse Current</td>
<td>I_{GSS}</td>
<td>V_{GS} = -20 V , V_{DS} = 0 V</td>
<td>-2</td>
<td>-100</td>
</tr>
<tr>
<td>Gate Operating Currentb</td>
<td>I_G</td>
<td>V_{DG} = 10 V , I_D = 1 mA</td>
<td>-20</td>
<td></td>
</tr>
<tr>
<td>Drain Cutoff Current</td>
<td>I_{D(oh)}</td>
<td>V_{DS} = 10 V , V_{GS} = -6 V</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Drain-Source On-Resistance</td>
<td>r_{DS(on)}</td>
<td>V_{GS} = 0 V , I_D = 300 μA</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>Gate-Source Forward Voltage</td>
<td>V_{GS(F)}</td>
<td>I_G = 1 mA , V_{DS} = 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</td>
<td>g_{fs}</td>
<td>V_{DS} = 15 V , V_{GS} = 0 V , f = 1 kHz</td>
<td>4.5</td>
<td>7.5</td>
</tr>
<tr>
<td>Common-Source Output Conductance</td>
<td>g_{OS}</td>
<td></td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Common-Source Input Capacitance</td>
<td>C_{iss}</td>
<td></td>
<td>2.2</td>
<td></td>
</tr>
<tr>
<td>Common-Source Reverse Transfer Capacitance</td>
<td>C_{rss}</td>
<td>V_{DS} = 15 V , V_{GS} = 0 V , f = 1 MHz</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>Common-Source Output Capacitance</td>
<td>C_{oss}</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Equivalent Input Noise Voltage</td>
<td>r_{n}</td>
<td>V_{DS} = 10 V , V_{GS} = 0 V , f = 100 Hz</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

### TYPICAL HIGH-FREQUENCY SPECIFICATIONS (TA = 25°C UNLESS OTHERWISE NOTED)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Test Conditions</th>
<th>Limits (Typ)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>J304</td>
</tr>
<tr>
<td><strong>High-Frequency</strong></td>
<td></td>
<td></td>
<td>J305</td>
</tr>
<tr>
<td>Common-Source Input Conductance</td>
<td>g_{iss}</td>
<td>V_{DS} = 15 V , V_{GS} = 0 V</td>
<td>80</td>
</tr>
<tr>
<td>Common-Source Input Susceptance</td>
<td>b_{iss}</td>
<td>V_{DS} = 15 V , V_{GS} = 0 V</td>
<td>2</td>
</tr>
<tr>
<td>Common-Source Output Conductance</td>
<td>g_{oss}</td>
<td>V_{DS} = 15 V , V_{GS} = 0 V</td>
<td>60</td>
</tr>
<tr>
<td>Common-Source Output Susceptance</td>
<td>b_{oss}</td>
<td>V_{DS} = 15 V , I_D = 5 mA</td>
<td>0.8</td>
</tr>
<tr>
<td>Common-Source Forward Transconductance</td>
<td>g_{fs}</td>
<td>V_{DS} = 15 V , I_D = 5 mA</td>
<td>4.4</td>
</tr>
<tr>
<td>Common-Source Power Gain</td>
<td>G_{ps}</td>
<td>V_{DS} = 15 V</td>
<td>20</td>
</tr>
</tbody>
</table>

Notes:
- Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
- Pulse test: PW ≤ 300 μs, duty cycle ≤ 2%.
- Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.
TYPICAL CHARACTERISTICS ($T_A = 25^\circ C$ UNLESS OTHERWISE NOTED)

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

- $I_{DS}$ @ $V_{DS} = 10 \text{ V}$, $V_{GS} = 0 \text{ V}$
- $g_{fs}$ @ $V_{DS} = 10 \text{ V}$, $V_{GS} = 0 \text{ V}$
  - $f = 1 \text{ kHz}$

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

- $r_{DS(on)}$ @ $I_D = 300 \text{ mA}$, $V_{DS} = 0 \text{ V}$
- $g_{os}$ @ $V_{DS} = 10 \text{ V}$, $V_{GS} = 0 \text{ V}$
  - $f = 1 \text{ kHz}$

**Gate Leakage Current**

- $I_{GS}$ - Gate Leakage (A)
  - $V_{DG}$ - Drain-Gate Voltage (V)
  - $T_A = 125^\circ C$
  - $I_{GS} = 1 \text{ mA}$, $0.1 \text{ mA}$

**Common-Source Forward Transconductance vs. Drain Current**

- $g_{fs}$ - Forward Transconductance (mS)
  - $V_{GS(off)} = -2 \text{ V}$, $-3 \text{ V}$
  - $T_A = -55^\circ C$
  - $V_{DS} = 10 \text{ V}$
  - $f = 1 \text{ kHz}$

**Output Characteristics**

- $I_D$ - Drain Current (mA)
- $V_{DS}$ - Drain-Source Voltage (V)
- $V_{GS}$ - Gate-Source Voltage (V)

**Output Characteristics**

- $I_D$ - Drain Current (mA)
- $V_{DS}$ - Drain-Source Voltage (V)
- $V_{GS}$ - Gate-Source Voltage (V)
TYPICAL CHARACTERISTICS (TA = 25°C UNLESS OTHERWISE NOTED)

Transfer Characteristics
- VGS = Gate-Source Voltage (V)
  - VGS(off) = -2 V, VDS = 10 V, TA = 25°C
  - VGS(off) = -2 V, VDS = 10 V, f = 1 kHz
  - VGS(off) = -3 V, VDS = 10 V, f = 1 kHz

Transconductance vs. Gate-Source Voltage
- Transconductance (mS)
  - TA = 25°C
  - TA = -55°C

On-Resistance vs. Drain Current
- rDS(on) = Drain-Source On-Resistance (Ω)
  - TA = 25°C
  - VGS(off) = -2 V
  - VGS(off) = -3 V

Circuit Voltage Gain vs. Drain Current
- AV = Voltage Gain
  - AV = \( \frac{g_{fs} R_L}{1 + R_L g_{fs}} \)
  - Assume VDD = 15 V, VDS = 5 V
  - RL = 10 V / ID
  - VGS(off) = -2 V
  - VGS(off) = -3 V
TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS OTHERWISE NOTED)

Common-Source Input Capacitance
vs. Gate-Source Voltage

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

Input Admittance

Forward Admittance

Reverse Admittance

Output Admittance

<table>
<thead>
<tr>
<th>V_{DS} = 0 V</th>
<th>V_{DS} = 10 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>V_{GS} = 0 V</td>
<td>V_{GS} = 0 V</td>
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</tbody>
</table>

Common Source

<table>
<thead>
<tr>
<th>C_{iss} (pF)</th>
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<tbody>
<tr>
<td>f = 1 MHz</td>
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TYPICAL CHARACTERISTICS (TA = 25°C UNLESS OTHERWISE NOTED)

Equivalent Input Noise Voltage vs. Frequency

Output Conductance vs. Drain Current

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