**INDUSTRY’S FIRST 100% TESTED LOWEST NOISE JFET**

### Absolute Maximum Ratings
@ 25 °C (unless otherwise stated)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maximum Temperatures</strong></td>
<td></td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-65 to +150°C</td>
</tr>
<tr>
<td>Junction Operating Temperature</td>
<td>-55 to +150°C</td>
</tr>
<tr>
<td><strong>Maximum Power Dissipation</strong></td>
<td></td>
</tr>
<tr>
<td>Continuous Power Dissipation @ +25°C</td>
<td>400mW</td>
</tr>
<tr>
<td><strong>Maximum Currents</strong></td>
<td></td>
</tr>
<tr>
<td>Gate Forward Current</td>
<td>I_G(F) = 10mA</td>
</tr>
<tr>
<td><strong>Maximum Voltages</strong></td>
<td></td>
</tr>
<tr>
<td>Gate to Source</td>
<td>V_GS = 40V</td>
</tr>
<tr>
<td>Gate to Drain</td>
<td>V_GD = 40V</td>
</tr>
</tbody>
</table>

### Features
- Ultra Low Noise: $e_n = 1.3\text{nV/}\sqrt{\text{Hz}}$ (typ.), $f = 1.0$kHz and NBW = 1.0Hz
- Ultra Low Noise: 1.5nV/\sqrt{Hz} (typ), $f = 10$Hz and NBW = 1.0Hz
- Tight Matching: $\Delta V_{GS1-2} = 15\text{mV}$ max
- High Breakdown Voltage: $BV_{GSS} = 40\text{V}$ max
- High Gain: $G_m = 20\text{mS}$ (typ)
- Low Capacitance: 25pF (typ)
- Improved Second Source Replacement for 2SK389

### Benefits
- Improved System Noise Performance
- Unique Monolithic Dual Design Construction of Interleaving Both JFETs on the Same Piece of Silicon
- Excellent Matching and Thermal Tracking
- Great for Maximizing Battery Operated Applications by Providing a Wide Output Swing
- A High Signal to Noise Ratio as a Result of the LSK389's Low and Tightly Matched Gate Threshold Voltages

### Applications
- Audio Amplifiers and Preamps
- Discrete Low-Noise Operational Amplifiers
- Battery-Operated Audio Preamps
- Audio Mixer Consoles
- Acoustic Sensors
- Sonic Imaging
- Instrumentation Amplifiers
- Microphones
- Sonobouys
- Hydrophones
- Chemical and Radiation Detectors

### Description
The LSK389 is the industry’s lowest noise Dual N-Channel JFET, 100% tested, guaranteed to meet $1/f$ and broadband noise specifications, while eliminating burst (RTN or popcorn) noise entirely. The LSK389 Series, Monolithic Dual N-Channel JFETs were specifically designed to provide users a better performing, less time consuming and cheaper solution for obtaining tighter IDSS matching, and better thermal tracking, than matching individual JFETs. The LSK389’s features incorporate four grades of IDSS: 2.6-6.5mA, 6.0-12.0mA, 10.0-20.0mA and 17-30mA, with an IDSS match of 10 percent, a gate threshold offset of 15mV, a voltage noise ($e_n$) of 1.3nV/\sqrt{Hz} typical at $f = 1.0$kHz, with a Gain of 20mS typical, and 25pF of capacitance typical. The LSK389 provides a wide output swing, and a high signal to noise ratio as a result of the LSK389's tightly matched and low gate threshold voltages. The 40V breakdown provides maximum linear headroom in high transient program content amplifiers. Additionally, the LSK389 provides a low input noise to capacitance product that has nearly zero popcorn noise.

The narrow ranges of the IDSS electrical grades combined with the superior matching performance of the LSK389's monolithic dual construction promote ease of device tolerance in low voltage applications, as compared to matching single JFETs. Available in surface mount SOIC 8L and thru-hole TO-71 6L packages.

Contact the factory for tighter noise and other specification selections. For equivalent single N-Channel version, please refer to the LSK170 datasheet.
Electrical Characteristics @ 25°C (unless otherwise stated)

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>CHARACTERISTIC</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNITS</th>
<th>CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>BVGS</td>
<td>Gate to Source Breakdown Voltage</td>
<td>-40</td>
<td>---</td>
<td>---</td>
<td>V</td>
<td>VGS = 0, ID = -100µA</td>
</tr>
<tr>
<td>VGS(off)</td>
<td>Gate to Source Pinch-off Voltage</td>
<td>-0.3</td>
<td>---</td>
<td>-1.6</td>
<td>V</td>
<td>VGS = 10V, ID = 0.1µA</td>
</tr>
<tr>
<td>IΔSS</td>
<td>Drain to Source Saturation Current</td>
<td></td>
<td></td>
<td></td>
<td>mA</td>
<td>VGS = 10V, VGS = 0</td>
</tr>
<tr>
<td></td>
<td>LSK389A</td>
<td>2.6</td>
<td>---</td>
<td>6.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LSK389B</td>
<td>6</td>
<td>---</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LSK389C</td>
<td>10</td>
<td>---</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LSK389D</td>
<td>17</td>
<td>---</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISGSS</td>
<td>Gate to Source Leakage Current</td>
<td>---</td>
<td>-100</td>
<td>-300</td>
<td>pA</td>
<td>VGS = -25V, ID = 0</td>
</tr>
<tr>
<td>IG1G2</td>
<td>Gate to Gate Isolation Current</td>
<td>---</td>
<td>±1.0</td>
<td>±50</td>
<td>nA</td>
<td>VGS = ±45V, I0 = 0A</td>
</tr>
<tr>
<td>Gfs</td>
<td>Full Conduction Transconductance</td>
<td>8</td>
<td>20</td>
<td>---</td>
<td>mS</td>
<td>VGS = 10V, VGS = 0, f = 1kHz</td>
</tr>
<tr>
<td>ηn</td>
<td>Noise Voltage</td>
<td>---</td>
<td>1.3</td>
<td>1.9</td>
<td>nV/√Hz</td>
<td>VGS = 10V, ID = 2mA, f = 1kHz, NBW = 1Hz</td>
</tr>
<tr>
<td>ηn</td>
<td>Noise Voltage</td>
<td>---</td>
<td>1.5</td>
<td>4.0</td>
<td>nV/√Hz</td>
<td>VGS = 10V, ID = 2mA, f = 10Hz, NBW = 1Hz</td>
</tr>
<tr>
<td>CISS</td>
<td>Common Source Input Capacitance</td>
<td>---</td>
<td>25</td>
<td>---</td>
<td>pF</td>
<td>VGS = 10V, VGS = 0, f = 1MHz</td>
</tr>
<tr>
<td>CRSS</td>
<td>Common Source Reverse Transfer Cap.</td>
<td>---</td>
<td>5.5</td>
<td>---</td>
<td>pF</td>
<td>VGS = 10V, ID = 0, f = 1MHz</td>
</tr>
</tbody>
</table>

Matching Characteristics @ 25°C (unless otherwise stated)

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>CHARACTERISTIC</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNITS</th>
<th>CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Differential Gate to Source Cutoff Voltage</td>
<td>---</td>
<td>6.0</td>
<td>15</td>
<td>mV</td>
<td>VGS = 10V, ID = 1mA</td>
</tr>
<tr>
<td></td>
<td>Saturation Drain Current Ratio</td>
<td>0.9</td>
<td>1.0</td>
<td>1.1</td>
<td>n/a</td>
<td>VGS = 10V, VGS = 0V</td>
</tr>
</tbody>
</table>

Notes
1. Absolute maximum ratings are limiting values above which serviceability may be impaired.
2. Pulse Test: PW ≤ 300µs, Duty Cycle ≤ 3%
3. All characteristics MIN/TYP/MAX numbers are absolute values. Negative values indicate electrical polarity only.
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Typical Characteristics

**Figure 1.** Gate Current ($I_G$) vs. $V_{DS}$ vs. $I_D$

**LSK389A**

- $I_G$ vs. $V_{DS}$
  - $I_G = 0.04mA$
  - $I_G = 0.12mA$
  - $I_G = 0.4mA$
  - $I_G = 0.84mA$
  - $I_G = 1.44mA$
  - $I_G = 2.2mA$
  - $I_G = 3.04mA$

**Figure 2.** Gate Current ($I_G$) vs. $V_{DS}$ vs. $I_D$

**LSK389B**

- $I_G$ vs. $V_{DS}$
  - $I_G = 0.04mA$
  - $I_G = 0.12mA$
  - $I_G = 0.4mA$
  - $I_G = 0.84mA$
  - $I_G = 1.44mA$
  - $I_G = 2.2mA$
  - $I_G = 3.04mA$

**Figure 3.** Gate Current ($I_G$) vs. $V_{DS}$ vs. $I_D$

**LSK389C**

- $I_G$ vs. $V_{DS}$
  - $I_G = 0.04mA$
  - $I_G = 0.12mA$
  - $I_G = 0.4mA$
  - $I_G = 0.84mA$
  - $I_G = 1.44mA$
  - $I_G = 2.2mA$
  - $I_G = 3.04mA$

**Figure 4.** Gate Current ($I_G$) vs. $V_{DS}$ vs. $I_D$

**LSK389D**

- $I_G$ vs. $V_{DS}$
  - $I_G = 0.04mA$
  - $I_G = 0.12mA$
  - $I_G = 0.4mA$
  - $I_G = 0.84mA$
  - $I_G = 1.44mA$
  - $I_G = 2.2mA$
  - $I_G = 3.04mA$
Typical Characteristics

LSK389A

Figure 5. Output Conductance - \( G_{os} \) vs. \( V_{ds} \) vs. \( I_d \)

LSK389B

Figure 6. Output Conductance - \( G_{os} \) vs. \( V_{ds} \) vs. \( I_d \)

LSK389C

Figure 7. Output Conductance - \( G_{os} \) vs. \( V_{os} \) vs. \( I_o \)

LSK389D

Figure 8. Output Conductance - \( G_{os} \) vs. \( V_{os} \) vs. \( I_o \)
Typical Characteristics

Figure 9. $I_D$ vs. $V_{DS}$ vs. $V_{GS}$

Figure 10. $I_D$ vs. $V_{DS}$ vs. $V_{GS}$

Figure 11. $I_D$ vs. $V_{DS}$ vs. $V_{GS}$

Figure 12. $I_D$ vs. $V_{DS}$ vs. $V_{GS}$
Typical Characteristics

**LSK389A**

![Graph](image1)

**LSK389B**

![Graph](image2)

**LSK389C**

![Graph](image3)

**LSK389D**

![Graph](image4)
Typical Characteristics

Common Source Forward Transconductance vs. Drain Current
LSK389A & B

Common Source Forward Transconductance vs. Drain Current
LSK389C & D

Figure 17. $G_{FS}$ vs. $I_D$

Figure 18. $G_{FS}$ vs. $I_O$

Figure 19. $I_D$ vs. $V_{GS}$

Figure 20. $I_O$ vs. $V_{GS}$
Typical Characteristics

Drain Current Transconductance vs. Gate-Source Cutoff Voltage

Equivalent Input Noise Voltage vs. Frequency

Package Dimensions

TO-71 6 Lead

SOIC 8 Lead

Ordering Information

Standard Part Call-Out
LSK389A/B/C or D TO-71 6L RoHS
LSK389A/B/C or D SOIC 8L RoHS

Custom Part Call-Out
(Custom Parts Include SEL + 4 Digit Numeric Code)
LSK389A/B/C or D TO-71 6L RoHS SELXXXX
LSK389A/B/C or D SOIC 8L RoHS SELXXXX