FEATURES

- ULTRA LOW NOISE  \( e_n = 2.0 \text{nV}/\sqrt{\text{Hz}} \)
- LOW INPUT CAPACITANCE  \( C_{\text{iss}} = 8 \text{pF} \)

Features

- Reduced Noise due to process improvement
- Monolithic Design
- High slew rate
- Low offset/drift voltage
- Low gate leakage \( I_{\text{gss}} \) & \( I_g \)
- High CMRR 102 dB

Benefits

- Tight differential voltage match vs. current
- Improved op amp speed settling time accuracy
- Minimum Input Error trimming error voltage
- Lower intermodulation distortion

Applications

- Wide band differential Amps
- High speed temperature compensated single ended input amplifier amps
- High speed comparators
- Impedance Converters

Description

The LSJ689 high performance, P-Channel, monolithic dual JFET features extremely low noise, tight offset voltage and low drift over temperature. It is targeted for use in a wide range of precision instrumentation applications. The SOT-23, TO-71 and SO-8 packages provide ease of manufacturing and the symmetrical pinouts prevent improper orientation. The SOT-23 and SO-8 packages are available in tape and reel, compatible with automatic assembly methods. (See packaging data)
### 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>$</td>
<td>V_{GS1} - V_{GS2}</td>
<td>$</td>
<td>Differential Gate to Source Voltage</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$I_{DS2}/I_{DS1}$</td>
<td>Saturation Drain Current Ratio</td>
<td>0.90</td>
<td></td>
<td>1.0</td>
<td></td>
<td>$V_{DS} = -15V, V_{GS} = 0V$</td>
</tr>
<tr>
<td>CMRR</td>
<td>COMMON MODE REJECTION RATIO $-20 \log</td>
<td>\Delta V_{GS1}/</td>
<td>\Delta V_{DS}</td>
<td>$</td>
<td>95</td>
<td>102</td>
</tr>
</tbody>
</table>

### 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>$e_n$</td>
<td>Noise Voltage</td>
<td>1.9</td>
<td></td>
<td></td>
<td>nV/√Hz</td>
<td>$V_{DS} = -15V, I_D = -2mA, f = 1kHz, NBW = 1Hz$</td>
</tr>
<tr>
<td>$e_n$</td>
<td>Noise Voltage</td>
<td>2.2</td>
<td></td>
<td></td>
<td>nV/√Hz</td>
<td>$V_{DS} = -15V, I_D = -2mA, f = 100Hz, NBW = 1Hz$</td>
</tr>
<tr>
<td>$C_{ISS}$</td>
<td>Common Source Input Capacitance</td>
<td>8</td>
<td></td>
<td></td>
<td>pF</td>
<td>$V_{DS} = -15V, I_D = -200\mu A, f = 1MHz$</td>
</tr>
<tr>
<td>$C_{RSS}$</td>
<td>Common Source Reverse Transfer Capacitance</td>
<td>3</td>
<td></td>
<td></td>
<td>pF</td>
<td>$V_{DS} = -15V, I_D = -200\mu A, f = 1MHz$</td>
</tr>
</tbody>
</table>

**TYPICAL SPICE PARAMETERS FOR LSJ689 IN LT SPICE FORMAT:**

```
LSJ689_4 IDSS = 14.0mA RDS=112
.MODEL LSJ689_4 PJF (LEVEL=1 BETA=28E-4 VTO=-2.75 LAMBDA=2E-3
+ IS=4.5E-16 N = 1 RD=73 RS=35 CGD=6E-12 CGS=11E-12 PB=0.25 MJ=0.3 FC=0.5
+ KF=2E-18 AF=1 XTI=0)
```
NOTES
1. Absolute maximum ratings are limiting values above which serviceability may be impaired.
2. Pulse width ≤2 ms.
3. All MIN/TYP/MAX Limits are absolute values. Negative signs indicate electrical polarity only.
4. Derate 2.4 mW/°C above 25°C.
5. Derate 4 mW/°C above 25°C.

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TYPICAL CHARACTERISTICS

Output Characteristics

Tj=25°C

DRAIN-SOURCE VOLTAGE (V)

DRAIN CURRENT (mA)

VGS=0.0V
VGS=0.2V
VGS=0.4V
VGS=0.8V
VGS=1.0V
VGS=1.2V
VGS=2.0V

Output Characteristics

Tj=25°C

DRAIN - SOURCE VOLTAGE (V)

DRAIN CURRENT (mA)

VGS=0.0V
VGS=0.2V
VGS=0.4V
VGS=0.8V
VGS=1.0V
VGS=1.2V
VGS=2.0V

OUTPUT CHARACTERISTICS

Tj=25°C

DRAIN CURRENT (mA)

DRAIN - SOURCE VOLTAGE (V)

VGS=0.0V
VGS=0.2V
VGS=0.4V
VGS=0.8V
VGS=1.0V
VGS=1.2V
VGS=2.0V

Output Characteristics

Tj=25°C

DRAIN - SOURCE VOLTAGE (V)

DRAIN CURRENT (mA)

VGS=0.0V
VGS=0.2V
VGS=0.4V
VGS=0.8V
VGS=1.0V
VGS=1.2V
VGS=2.0V

Forward Transconductance vs Drain-to-Source Current

Tj=25°C
VDS=10V
f=1kHz

Gfs Forward Transconductance (us)

Drain Current IDSS (mA)

Forward Transconductance vs Drain-to-Source Current

Tj=25°C
VDS=10V
f=1kHz

Gfs Forward Transconductance (us)

Drain Current IDSS (mA)
TYPICAL CHARACTERISTICS (CONT’D)

- Drain Current and Transconductance vs. Gate-Source Cutoff Voltage
- Equivalent Input Noise Voltage vs Frequency
- On-Resistance and Output Conductance vs. Gate-Source Cutoff Voltage
- Output Conductance vs. Drain Current
- Reverse Transfer Capacitance (Crss) vs Gate-to-Drain Voltage
- Input Capacitance (Ciss) vs Drain-to-Source Voltage
Linear Integrated Systems (LIS), established in 1987, is a 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 Founder 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.