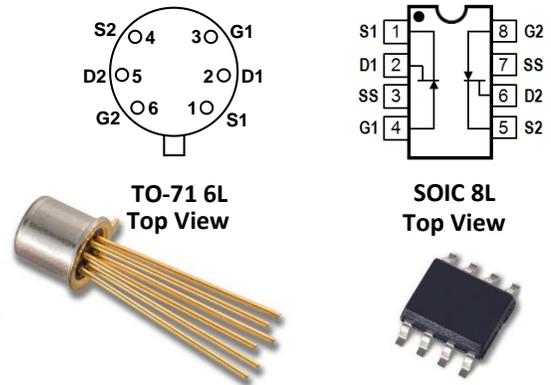


INDUSTRY'S FIRST 100% TESTED ULTRA-LOW-NOISE JFET

Absolute Maximum Ratings	
@ 25 °C (unless otherwise stated)	
Maximum Temperatures	
Storage Temperature	-65 to +150°C
Junction Operating Temperature	-55 to +150°C
Maximum Power Dissipation	
Continuous Power Dissipation @ +25°C	400mW
Maximum Currents	
Gate Forward Current	$I_{G(F)} = 10\text{mA}$
Maximum Voltages	
Gate to Source	$V_{GSS} = 40\text{V}$
Gate to Drain	$V_{GDS} = 40\text{V}$



Features

- Ultra-Low Noise: $e_n = 1.6\text{nV}/\sqrt{\text{Hz}}$ (typ), $f = 1.0\text{kHz}$ and $\text{NBW} = 1.0\text{Hz}$
- Ultra-Low Noise: $3.2\text{nV}/\sqrt{\text{Hz}}$ (typ), $f = 10\text{Hz}$ and $\text{NBW} = 1.0\text{Hz}$
- Tight Matching: $|V_{GS1-2}| = 15\text{mV}$ max
- High Breakdown Voltage: $BV_{GSS} = 40\text{V}$ max
- High Gain: $G_{fs} = 20\text{mS}$ (typ)
- Low I_{DSS} Version Available
- 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 I_{DSS} matching, and better thermal tracking, than matching individual JFETs. The LSK389 features four grades of I_{DSS} : 2.6-6.5mA, 6.0-12.0mA, 10.0-20.0mA and 17-30mA, with an I_{DSS} match of 10 percent, a gate threshold offset of 15mV, a voltage noise (e_n) of $1.6\text{nV}/\sqrt{\text{Hz}}$ typical at $f = 1.0\text{kHz}$, 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 I_{DSS} 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.

Ultra-Low Noise Monolithic Dual N-Channel JFET Amplifier

Electrical Characteristics @ 25°C (unless otherwise stated)

SYMBOL	CHARACTERISTIC	MIN	TYP	MAX	UNITS	CONDITIONS	
BV_{GSS}	Gate to Source Breakdown Voltage	-40	---	---	V	$V_{DS} = 0, I_D = -100\mu A$	
$V_{GS(OFF)}$	Gate to Source Pinch-off Voltage	-0.3	---	-1.6	V	$V_{DS} = 10V, I_D = 0.1\mu A$	
I_{DSS}	Drain to Source Saturation Current	LSK389A	2.6	---	6.5	mA	$V_{DS} = 10V, V_{GS} = 0$
		LSK389B	6	---	12		
		LSK389C	10	---	20		
		LSK389D	17	---	30		
I_{GSS}	Gate to Source Leakage Current	---	-100	-300	pA	$V_{GS} = -25V, V_{DS} = 0$	
I_{G1G2}	Gate to Gate Isolation Current	---	± 1.0	± 50	nA	$V_{G1-G2} = \pm 45V, I_D = I_S = 0A$	
G_{fs}	Full Conduction Transconductance	8	20	---	mS	$V_{DS} = 10V, V_{GS} = 0, f = 1kHz$	
e_n	Noise Voltage	---	1.6	1.9	nV/ \sqrt{Hz}	$V_{DS} = 10V, I_D = 2mA, f = 1kHz, NBW = 1Hz$	
e_n	Noise Voltage	---	3.2	4.0	nV/ \sqrt{Hz}	$V_{DS} = 10V, I_D = 2mA, f = 10Hz, NBW = 1Hz$	
C_{ISS}	Common Source Input Capacitance	---	25	---	pF	$V_{DS} = 10V, V_{GS} = 0, f = 1MHz,$	
C_{RSS}	Common Source Reverse Transfer Cap.	---	5.5	---	pF	$V_{DG} = 10V, I_D = 0, f = 1MHz,$	

Matching Characteristics @ 25°C (unless otherwise stated)

SYMBOL	CHARACTERISTIC	MIN	TYP	MAX	UNITS	CONDITIONS
$ V_{GS1} - V_{GS2} $	Differential Gate to Source Cutoff Voltage	---	6.0	15	mV	$V_{DS} = 10V, I_D = 1mA$
$\frac{I_{DSS1}}{I_{DSS2}}$	Saturation Drain Current Ratio	0.9	1.0	1.1	n/a	$V_{DS} = 10V, V_{GS} = 0V$

Notes

1. Absolute maximum ratings are limiting values above which serviceability may be impaired.
2. Pulse Test: $PW \leq 300\mu s$, Duty Cycle $\leq 3\%$
3. The noise specifications provided in the LSK389 datasheet are based on internal measurements and represent typical performance under specific test conditions, including biasing, temperature, and measurement equipment. The specified noise parameters are meant to serve as a general guideline and may not represent the precise performance in every application. Users are advised to conduct their own noise analysis for each unit. The noise performance can be influenced by external factors, such as circuit layout and electromagnetic interference. Additional components or circuitry may be necessary to optimize noise performance in specific applications. Linear Systems does not guarantee the exact noise performance of each device and shall not be liable for any damages resulting from the use or reliance on the noise specifications provided.
4. All characteristics MIN/TYP/MAX numbers are absolute values. Negative values indicate electrical polarity only. Information furnished by Linear Integrated Systems is believed to be accurate and reliable. However, no responsibility is assumed for its use; nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of Linear Integrated Systems.

Typical Characteristics

LSK389A

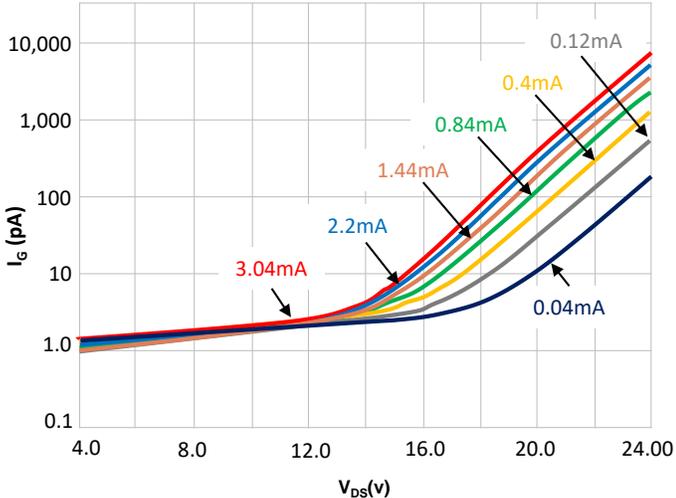


Figure 1. Gate Current (I_G) vs. V_{DS} vs. I_D

LSK389B

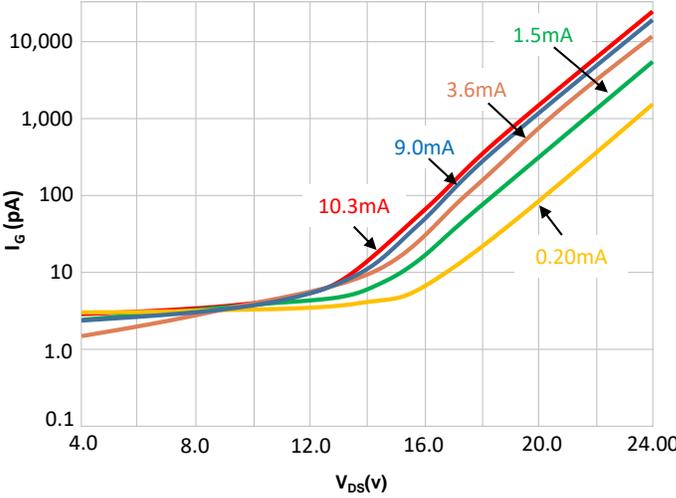


Figure 2. Gate Current (I_G) vs. V_{DS} vs. I_D

LSK389C

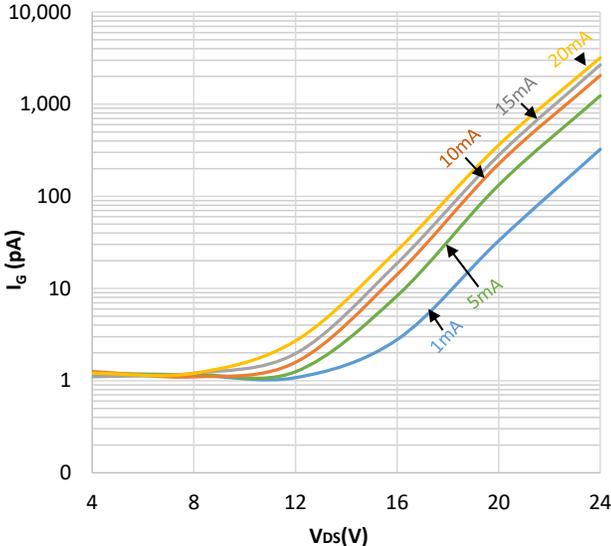


Figure 3. Gate Current (I_G) vs. V_{DS} vs. I_D

LSK389D

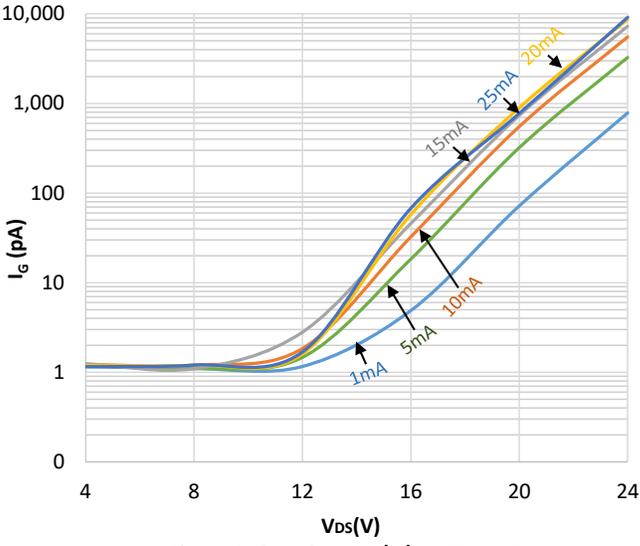


Figure 4. Gate Current (I_G) vs. V_{DS} vs. I_D

Typical Characteristics

LSK389A

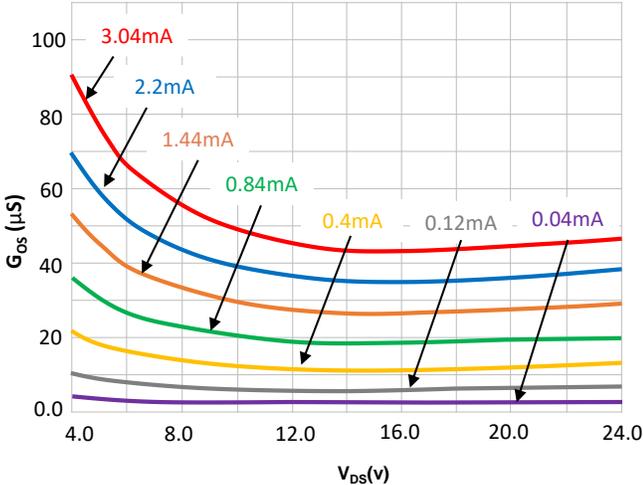


Figure 5. Output Conductance - G_{OS} vs. V_{DS} vs. I_D

LSK389B

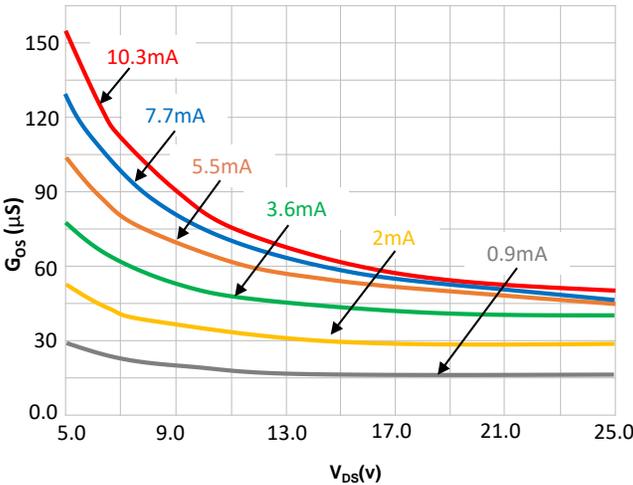


Figure 6. Output Conductance - G_{OS} vs. V_{DS} vs. I_D

LSK389C

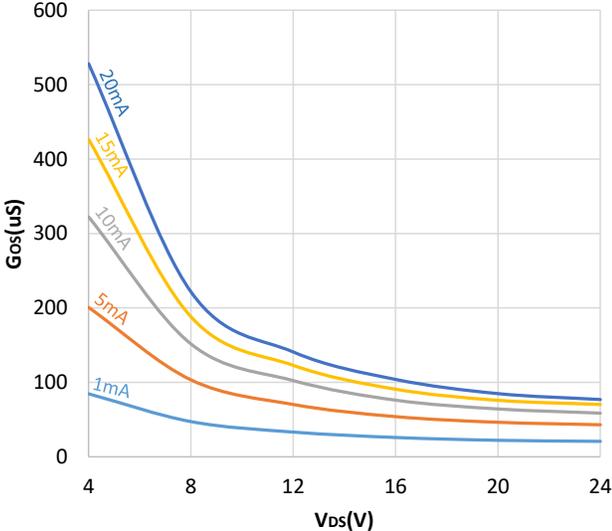


Figure 7. Output Conductance - G_{OS} vs. V_{DS} vs. I_D

LSK389D

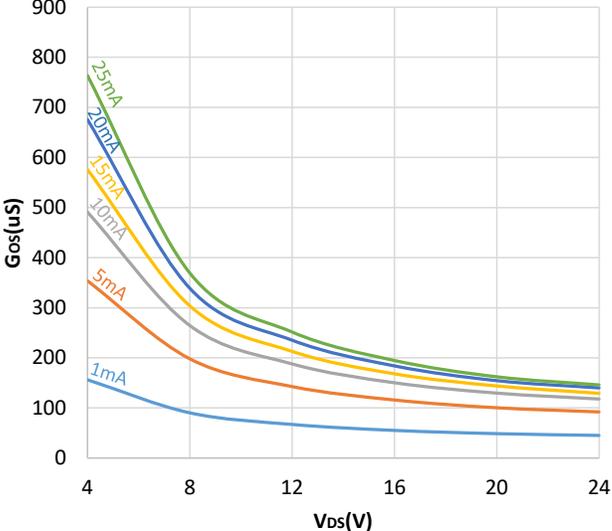


Figure 8. Output Conductance - G_{OS} vs. V_{DS} vs. I_D

Typical Characteristics

LSK389A

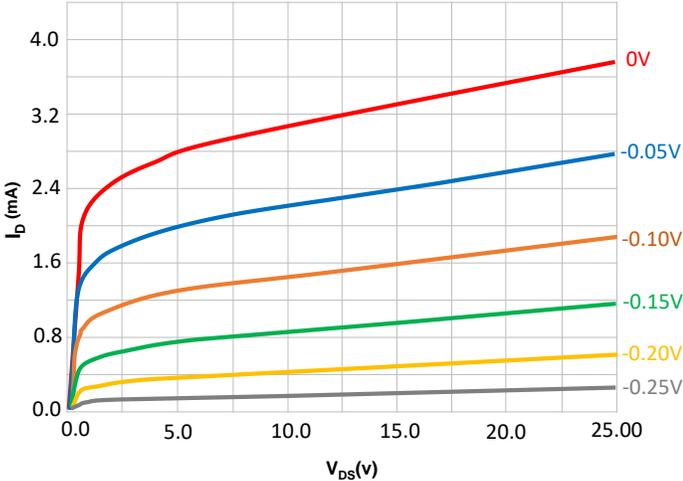


Figure 9. I_D vs. V_{DS} vs. V_{GS}

LSK389B

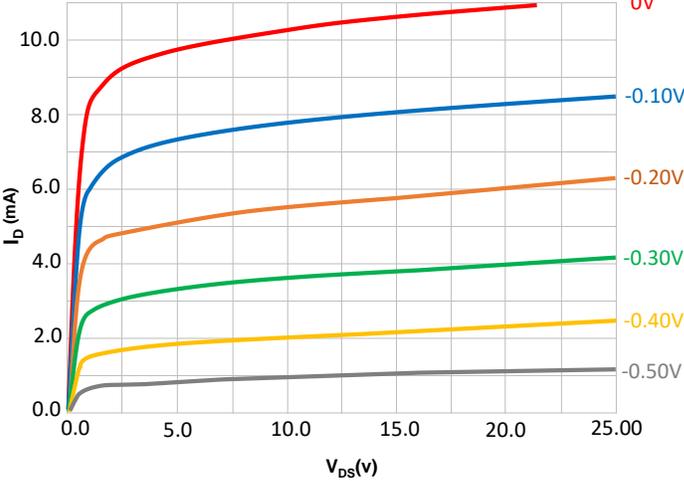


Figure 10. I_D vs. V_{DS} vs. V_{GS}

LSK389C

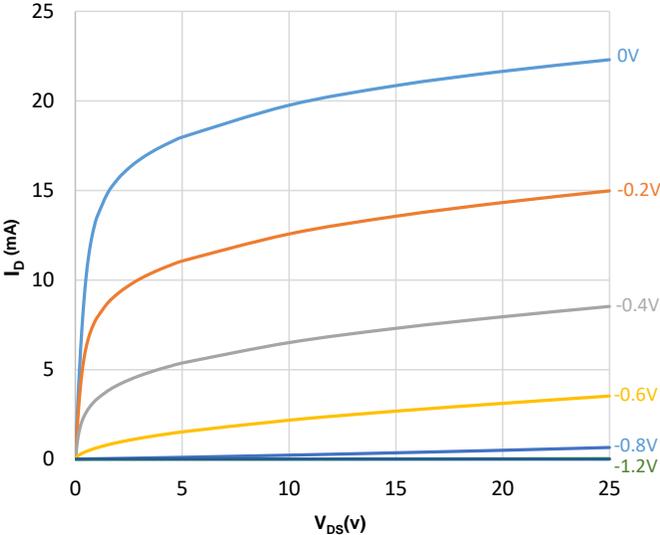


Figure 11. I_D vs. V_{DS} vs. V_{GS}

LSK389D

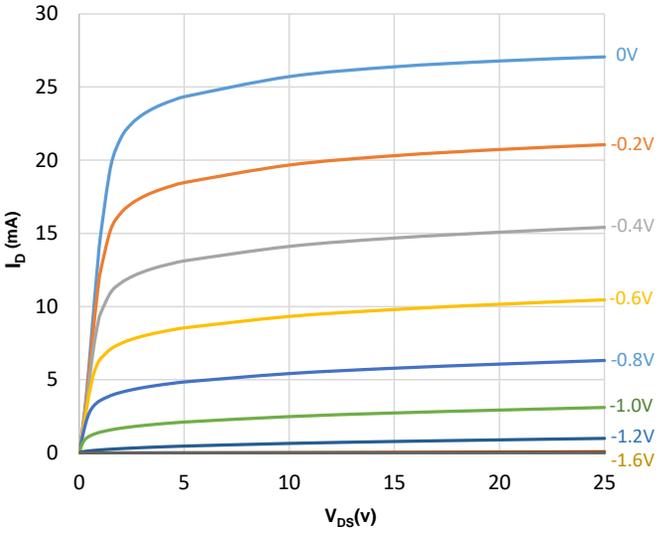


Figure 12. I_D vs. V_{DS} vs. V_{GS}

Typical Characteristics

LSK389A

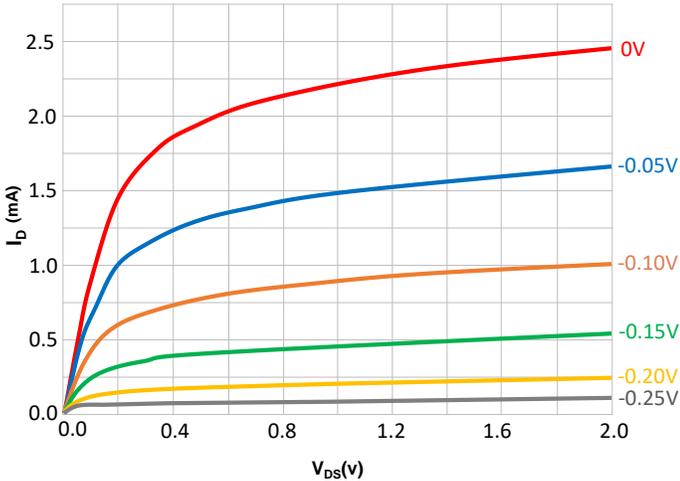


Figure 13. I_D vs. V_{DS} vs. V_{GS}

LSK389B

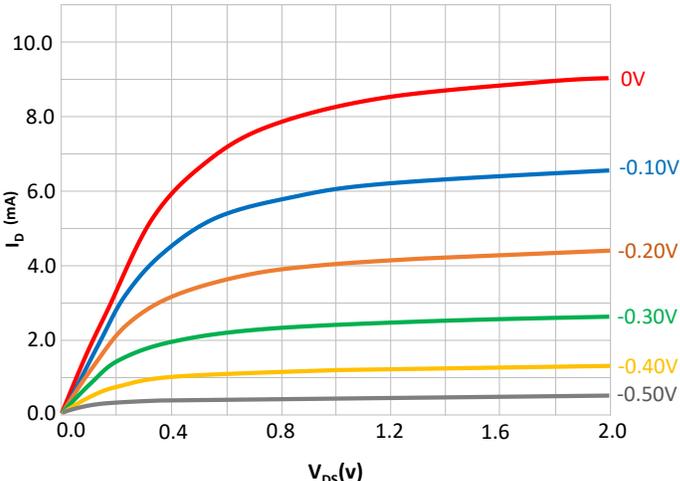


Figure 14. I_D vs. V_{DS} vs. V_{GS}

LSK389C

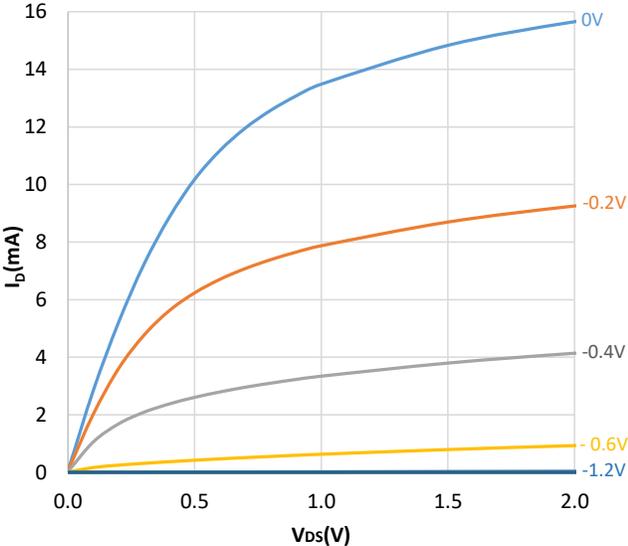


Figure 15. I_D vs. V_{DS} vs. V_{GS}

LSK389D

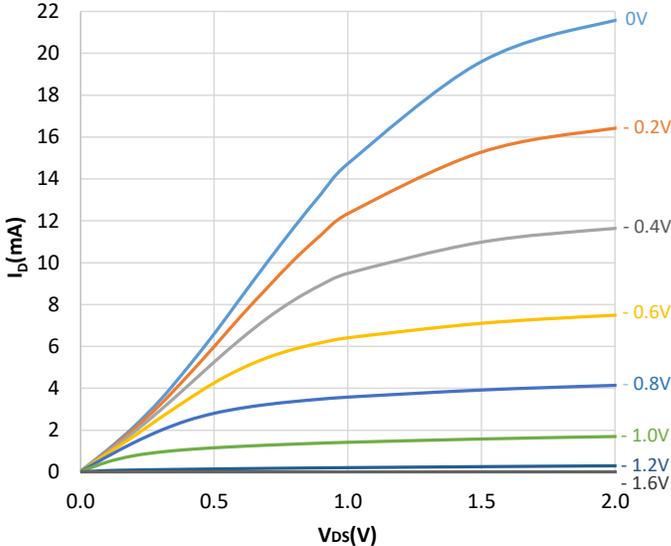


Figure 16. I_D vs. V_{DS} vs. V_{GS}

Typical Characteristics

Common Source Forward Transconductance vs. Drain Current
LSK389A & B

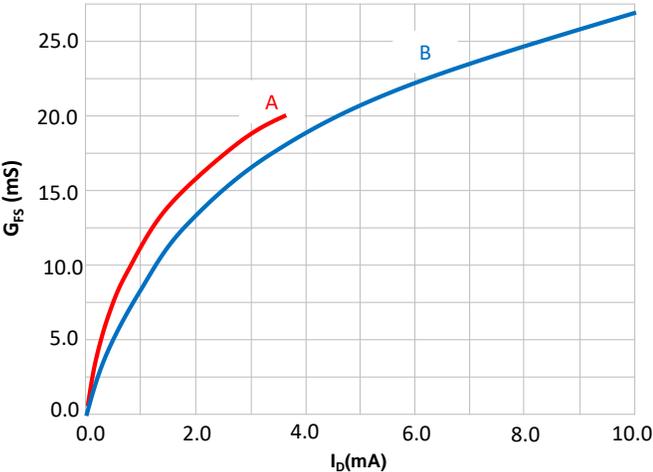


Figure 17. G_{FS} vs. I_D

Common Source Forward Transconductance vs. Drain Current
LSK389C & D

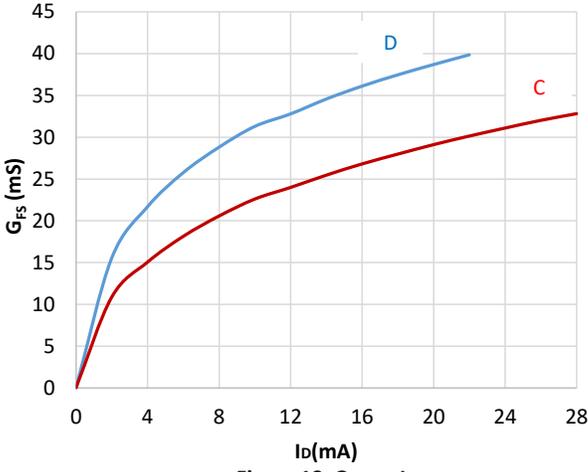


Figure 18. G_{FS} vs. I_D

LSK389A & B

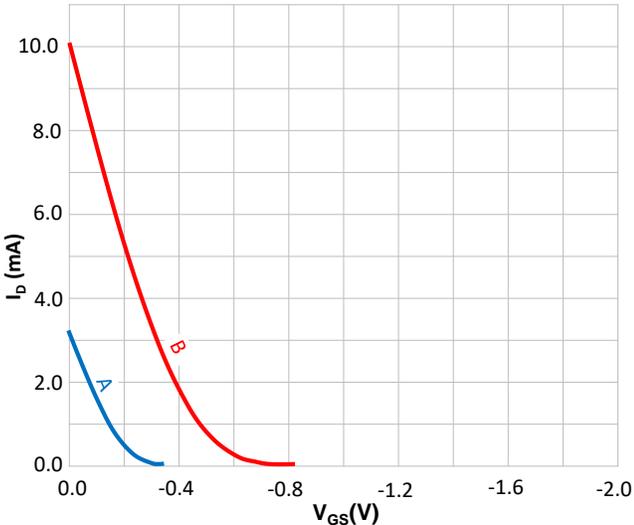


Figure 19. I_D vs. V_{GS}

LSK389C & D

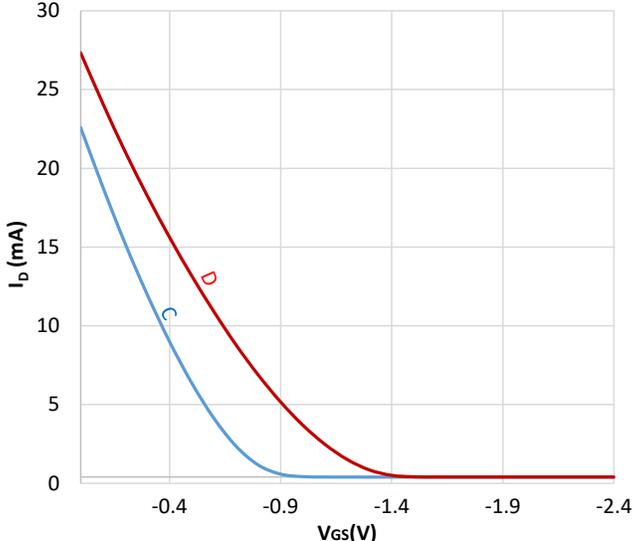


Figure 20. I_D vs. V_{GS}

LSK389 A/B/C/D

Ultra-Low Noise Monolithic Dual N-Channel JFET Amplifier

Typical Characteristics

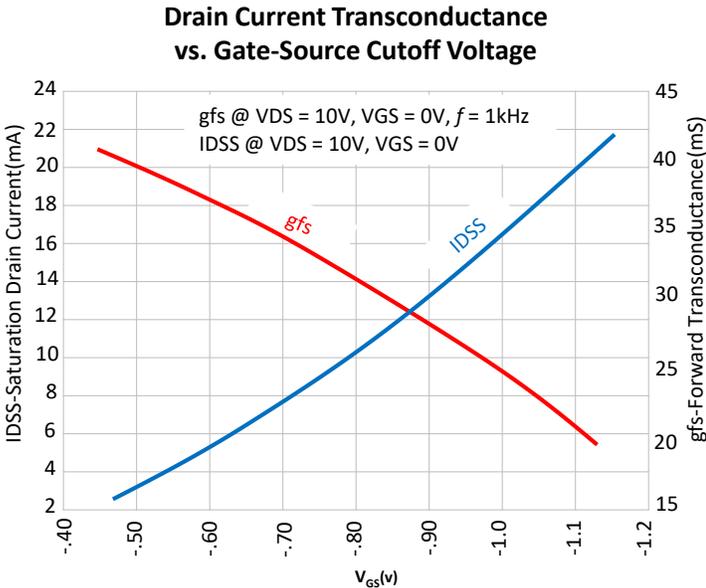


Figure 21. V_{GS} (cutoff) vs. I_{DSS} vs. G_{FS}

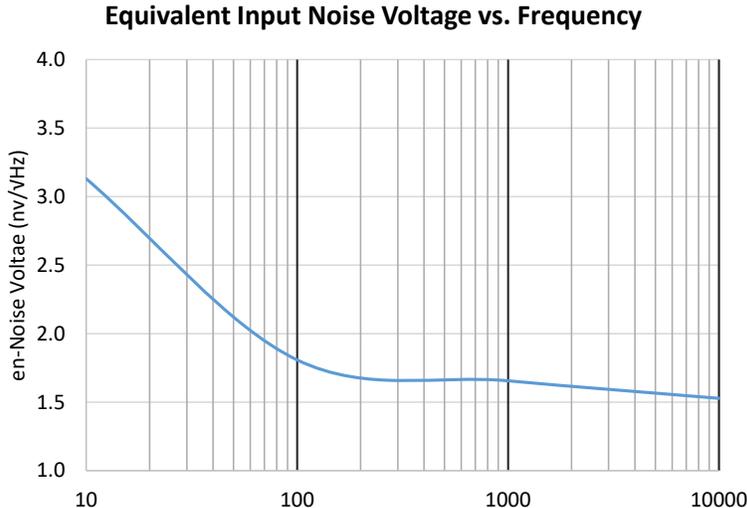
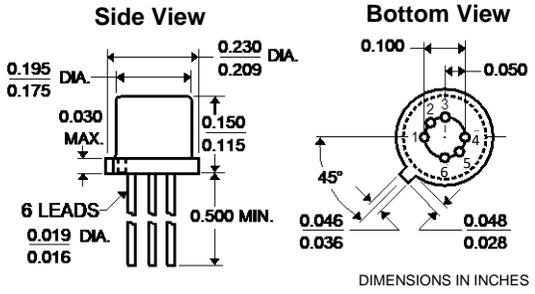


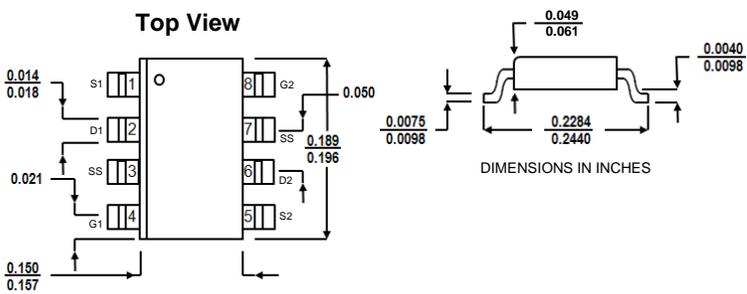
Figure 22. f-Frequency (Hz)

Package Dimensions

TO-71 6 Lead



SOIC 8 Lead



SS: SUBSTRATE, LEAVE THESE PINS FLOATING (N/C)

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