![LINEAR SYSTEMS]

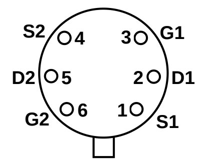
Over 30 Years of Quality Through Innovation

LSK389 A/B/C/D

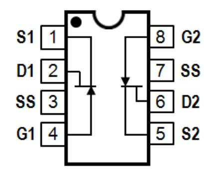
Ultra-Low Noise Monolithic Dual N-Channel JFET Amplifier

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	$I_{G(F)}$ = 10mA
Maximum Voltages	
Gate to Source	V_{GSS} = 40V
Gate to Drain	V_{GDS} = 40V



TO-71 6L
Top View



SOIC 8L
Top View

Features

- Ultra-Low Noise: e_n = 1.6nV/√Hz (typ), f = 1.0kHz and NBW = 1.0Hz
- Ultra-Low Noise: 3.2nV/√Hz (typ), f = 10Hz and NBW = 1.0Hz
- Tight Matching: $|V_{GS1-2}|$ = 15mV max
- High Breakdown Voltage: BV_{GSS} = 40V max
- High Gain: G_{fs} = 20mS (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 IDSS matching, and better thermal tracking, than matching individual JFETs. The LSK389 features 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 (en) of 1.6nV/√Hz typical at f = 1.0kHZ, 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)

SYMBOL	CHARACTERISTIC		MIN	TYP	MAX	UNITS	CONDITIONS
BV_{GSS}	Gate to Source Breakdown Voltage		-40	---	---	V	V_{DS} = 0, I_D = -100µA
$V_{GS(OFF)}$	Gate to Source Pinch-off Voltage		-0.3	---	-1.6	V	V_{DS} = 10V, I_D = 0.1µA
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} = ±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/√Hz	V_{DS} = 10V, I_D = 2mA, *f* = 1kHz, NBW = 1Hz
e_n	Noise Voltage		---	3.2	4.0	nV/√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 ≤ 300µs, Duty Cycle ≤ 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.
5. Advanced screening options are available for our diverse product lineup, featuring JFETS, Bipolar transistors, Mosfet, current regulators, and Diodes. Our special screening covers all the parameters listed in the standard data sheet, including comprehensive package pin-out. Connect with our experienced technical team to discuss your specific needs and tailor your requirements—email us at support@linearsystems.com or call (510) 490-9160. MOQ applies to these specialized services.

Typical Characteristics

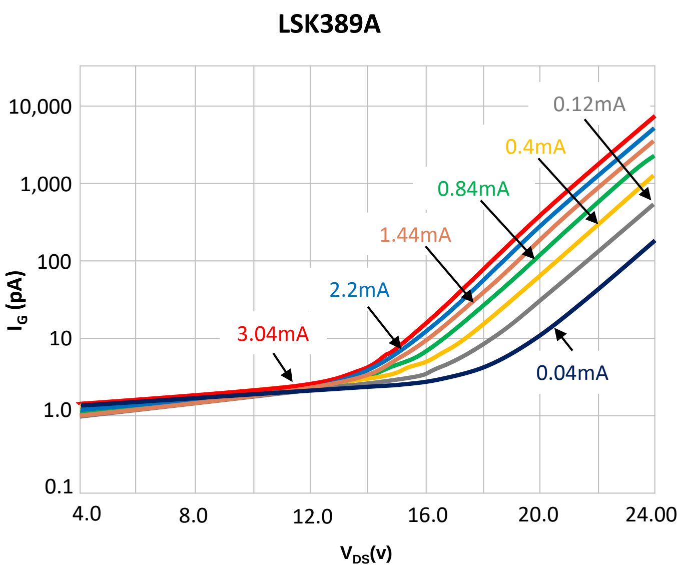


Figure 1. Gate Current (I_G) vs. V_{DS} vs. I_D

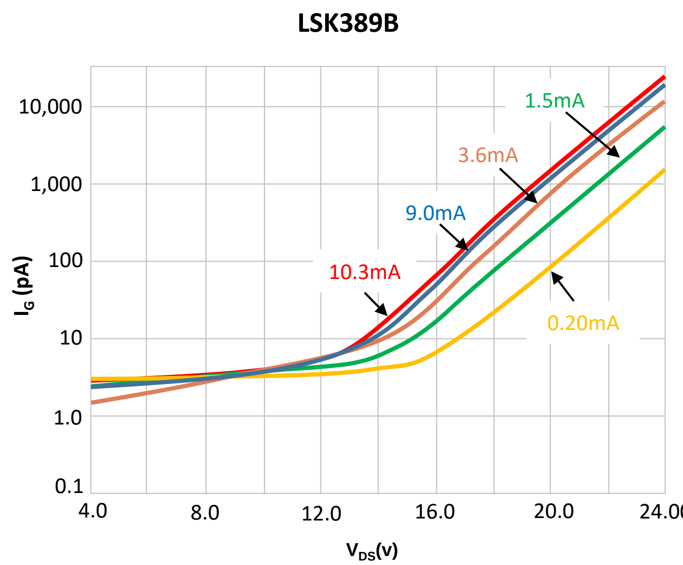


Figure 2. Gate Current (I_G) vs. V_{DS} vs. I_D

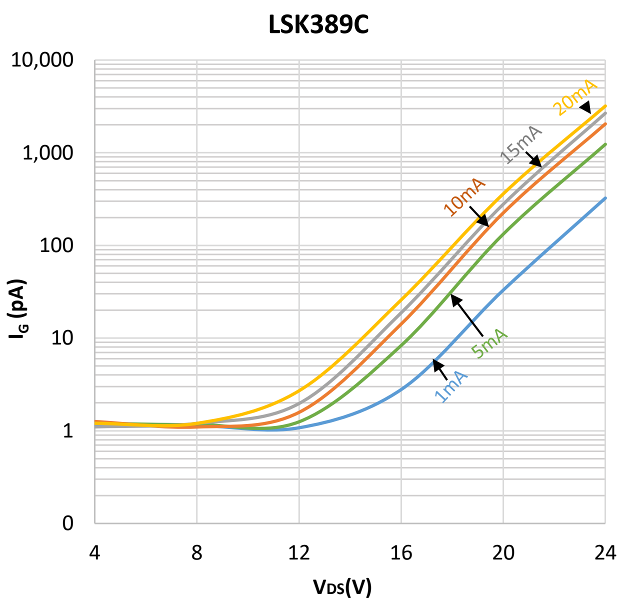


Figure 3. Gate Current (I_G) vs. V_{DS} vs. I_D

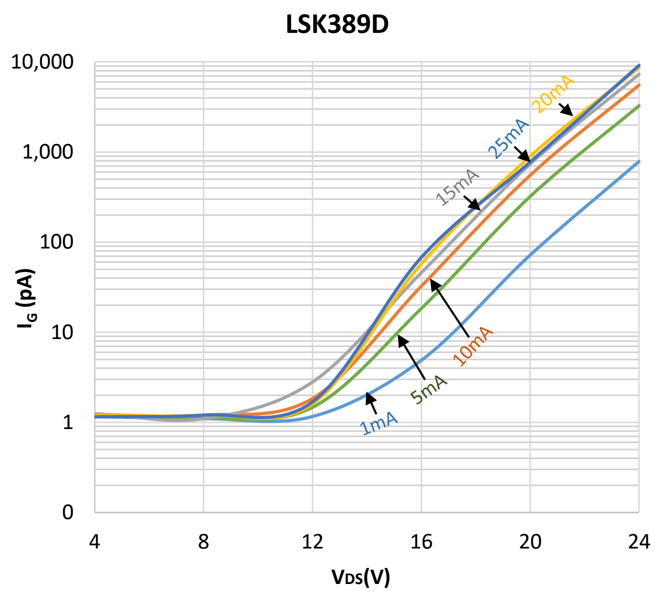


Figure 4. Gate Current (I_G) vs. V_{DS} vs. I_D

Typical Characteristics

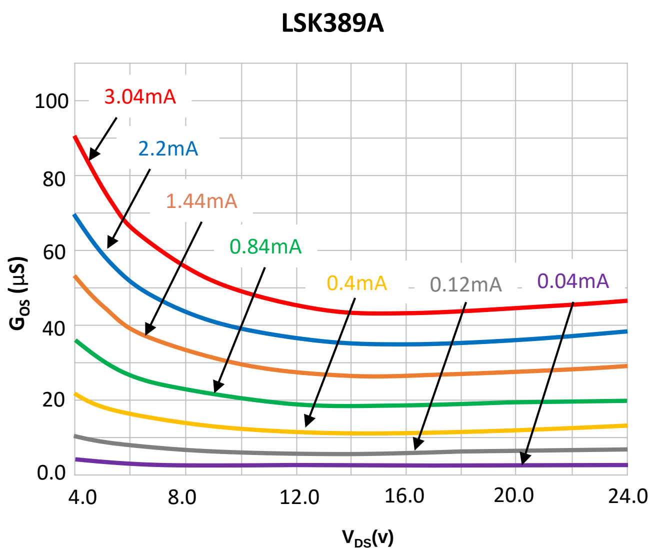


Figure 5. Output Conductance - G_{OS} vs. V_{DS} vs. I_D

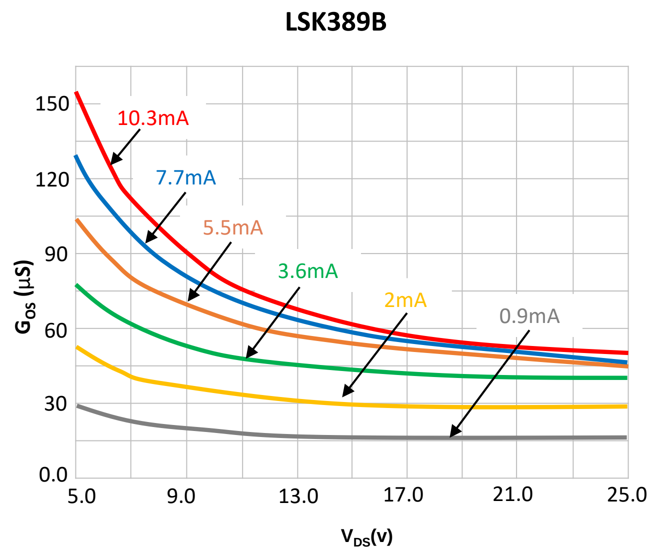


Figure 6. Output Conductance - G_{OS} vs. V_{DS} vs. I_D

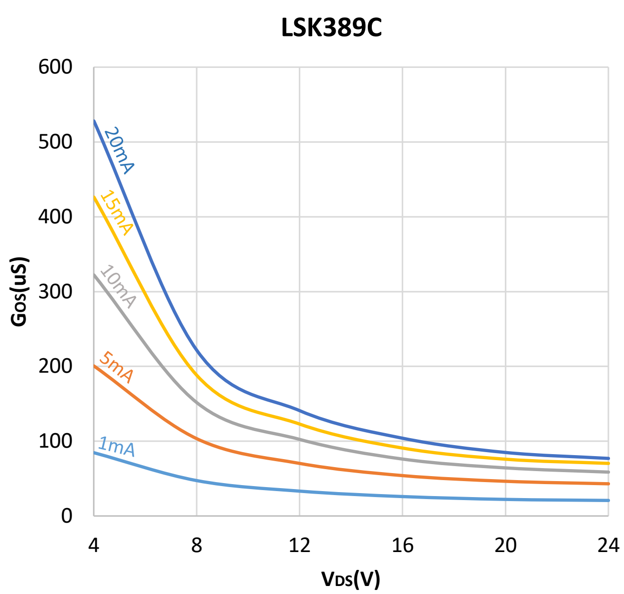


Figure 7. Output Conductance - G_{OS} vs. V_{DS} vs. I_D

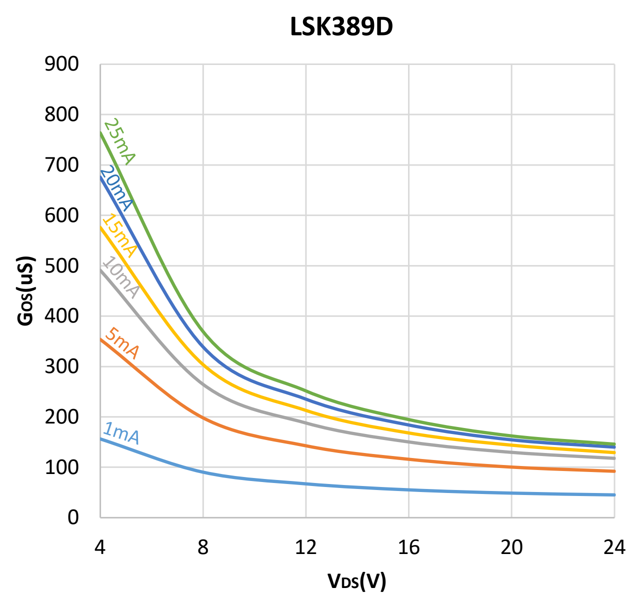


Figure 8. Output Conductance - G_{OS} vs. V_{DS} vs. I_D

Typical Characteristics

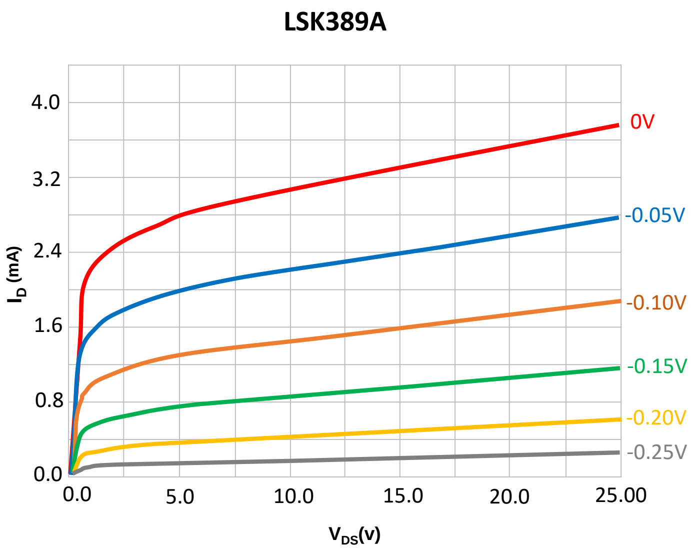


Figure 9. I_D vs. V_{DS} vs. V_{GS}

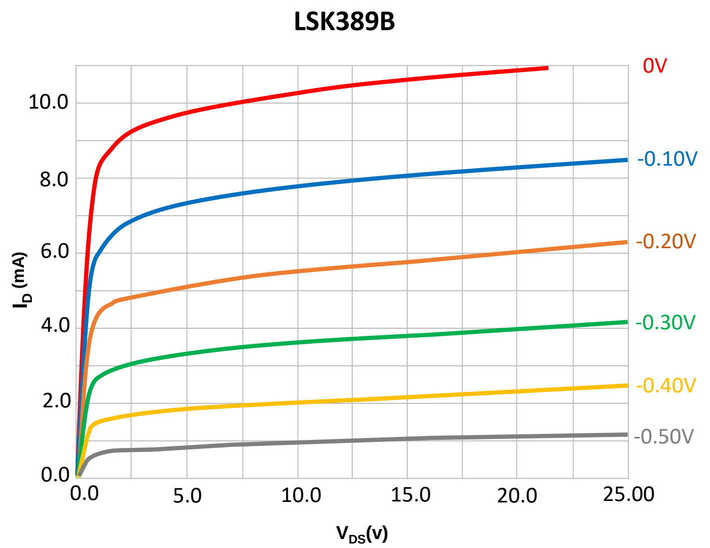


Figure 10. I_D vs. V_{DS} vs. V_{GS}

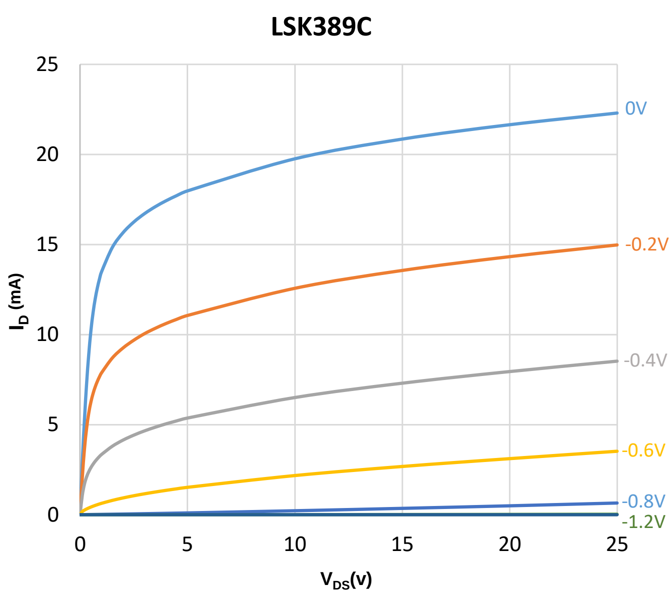


Figure 11. I_D vs. V_{DS} vs. V_{GS}

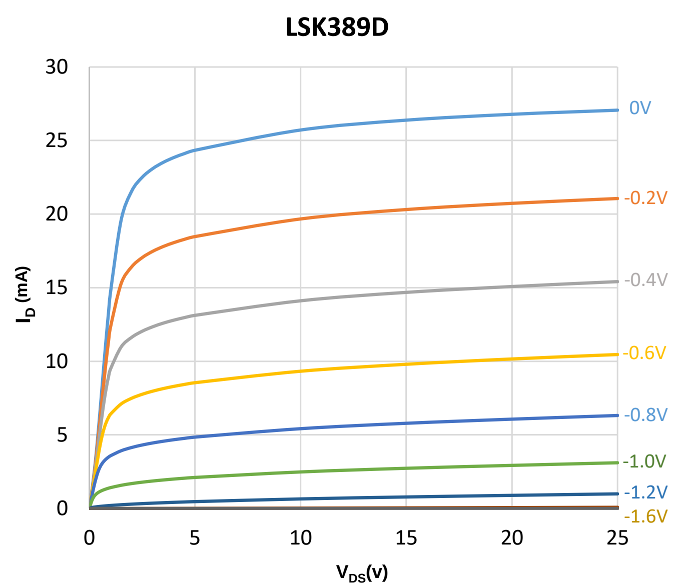


Figure 12. I_D vs. V_{DS} vs. V_{GS}

Typical Characteristics

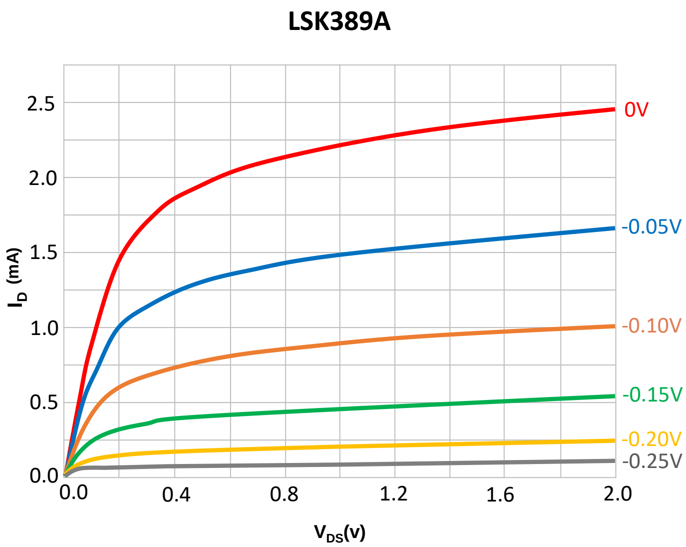


Figure 13. I_D **vs.** V_{DS} **vs.** V_{GS}

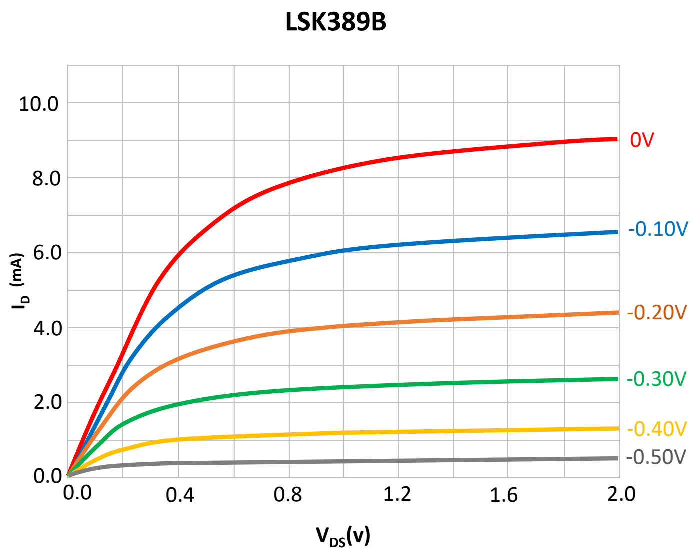


Figure 14. I_D **vs.** V_{DS} **vs.** V_{GS}

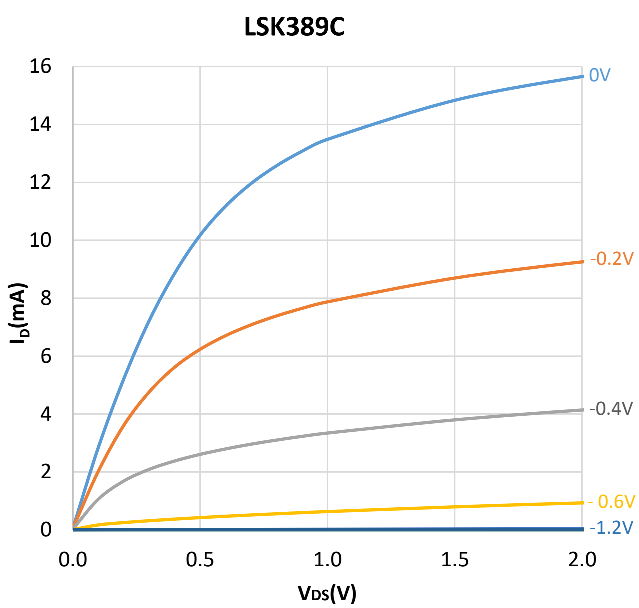


Figure 15. I_D **vs.** V_{DS} **vs.** V_{GS}

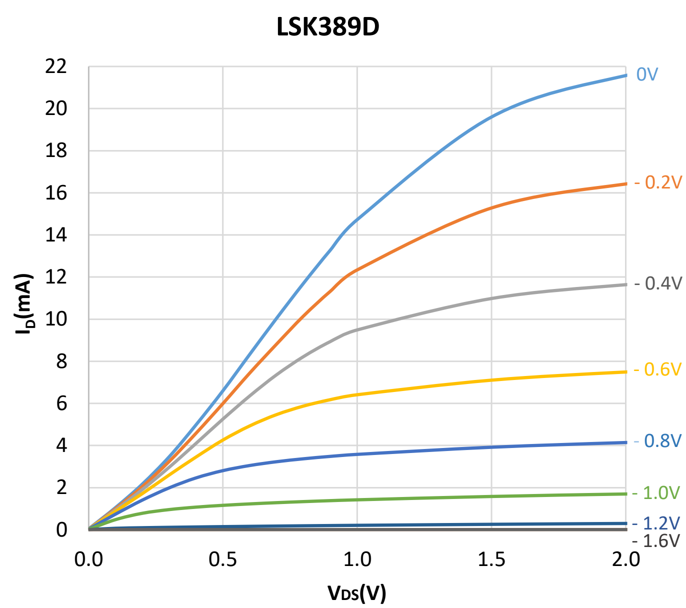


Figure 16. I_D **vs.** V_{DS} **vs.** V_{GS}

Typical Characteristics

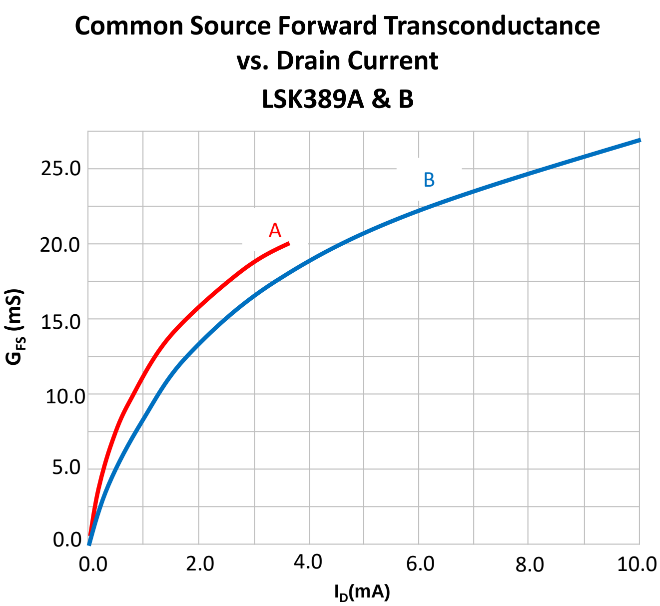


Figure 17. G_{FS} vs. I_D

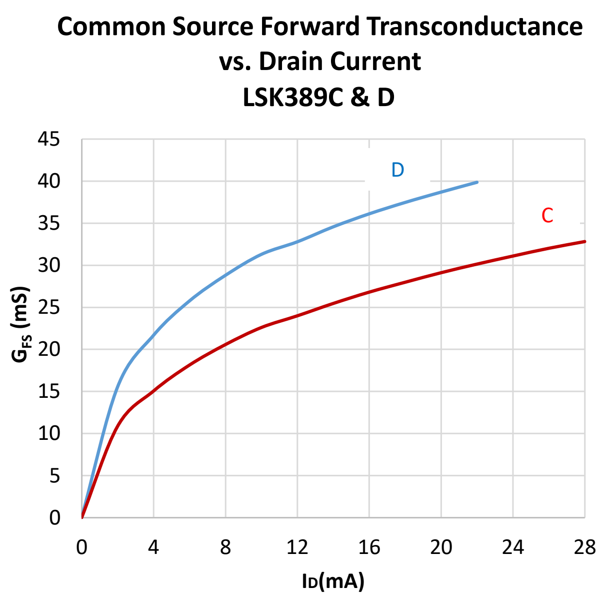


Figure 18. GFS vs. ID

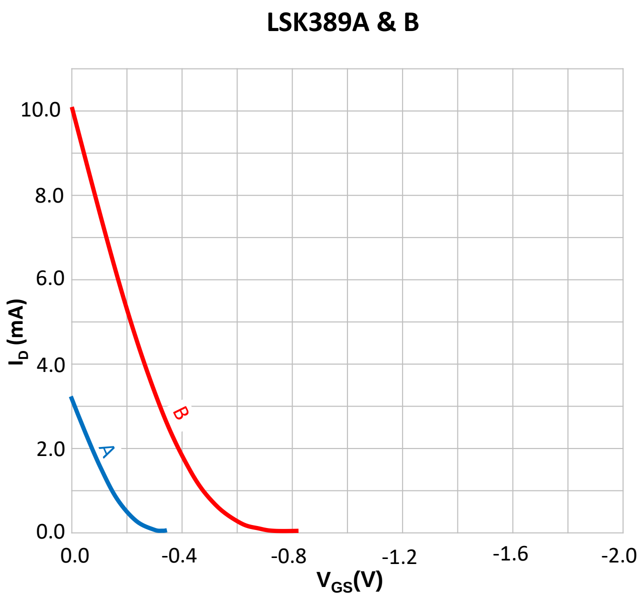


Figure 19. I_D vs. V_{GS}

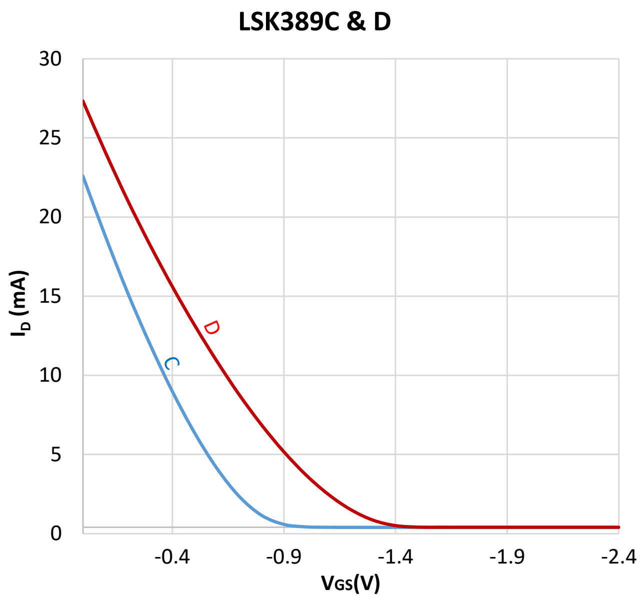


Figure 20. ID vs. VGS

Typical Characteristics

Drain Current Transconductance vs. Gate-Source Cutoff Voltage

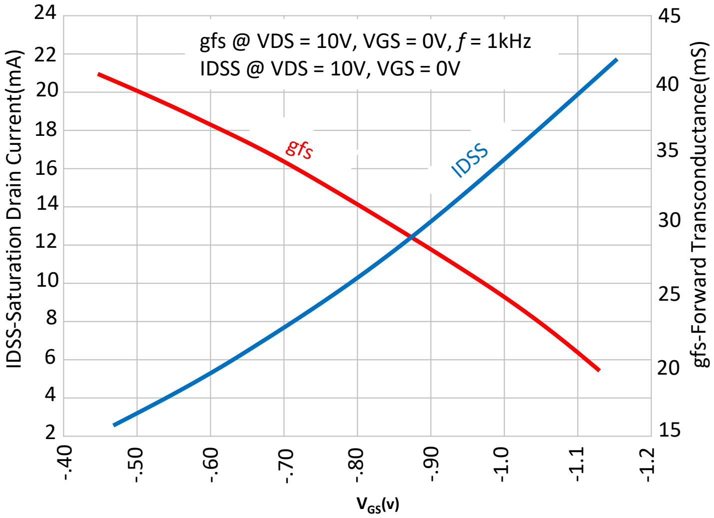


Figure 21. V_{GS} (cutoff) vs. I_{DSS} vs. G_{FS}

Equivalent Input Noise Voltage vs. Frequency

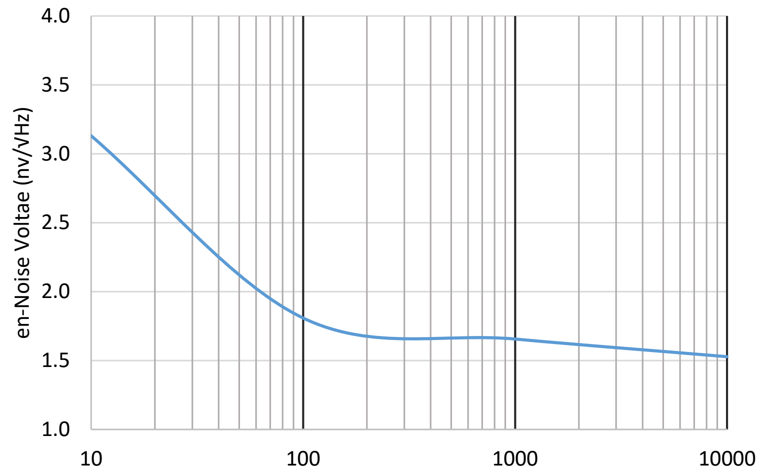
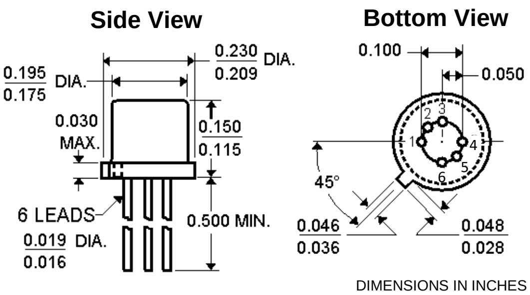


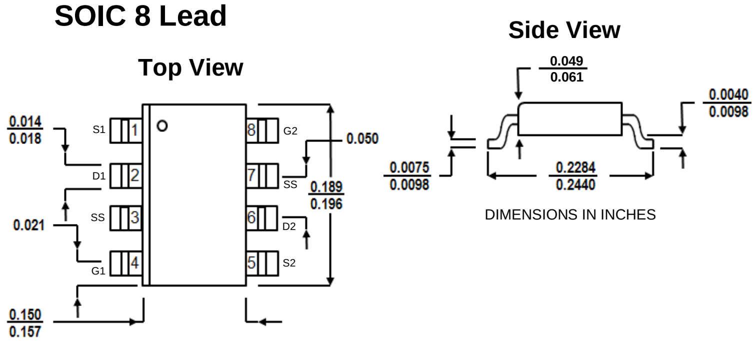
Figure 22.
f-Frequency (Hz)

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