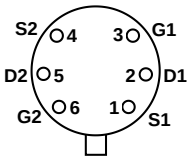
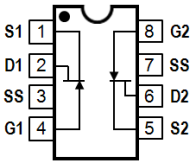
LSK389 A/B/C/D

Ultra Low Noise Monolithic Dual N-Channel JFET Amplifier

Absolute Maximum Ratings @ 25 °C (unless otherwise stated)	
Maximum Temperatures	
Storage Temperature	-65 to +150°C
Junction Operating Temperature	-55 to +135°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 = 1.9nV/√Hz (typ), f = 1kHz and NBW = 1Hz
- Tight Matching: $IV_{GS1-2}I$ = 20mV max
- High Breakdown Voltage: BV_{GSS} = 40V max
- High Gain: G_{fs} = 20mS (typ)
- Low Capacitance: 25pF typ
- Improved Second Source Replacement for 2SK389

Benefits

- 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 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 20mV, a voltage noise (en) of 1.9nV/√Hz typical, 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.

Matching Characteristics @ 25°C (unless otherwise stated)

SYMBOL	CHARACTERISTIC	MIN	TYP	MAX	UNITS	CONDITIONS
$\lvert V_{GS1} - V_{GS2} \rvert$	Differential Gate to Source Cutoff Voltage			20	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

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		-0.15		-2	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				-200	pA	V_{GS} = -30V, V_{DS} = 0
I_{G1G2}	Gate to Gate Isolation Current				±1.0	µA	$V_{G1\text{-}G2}$ = ±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			1.9		nV/√Hz	V_{DS} = 10V, I_D = 2mA, *f* = 1kHz, NBW = 1Hz
e_n	Noise Voltage			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,

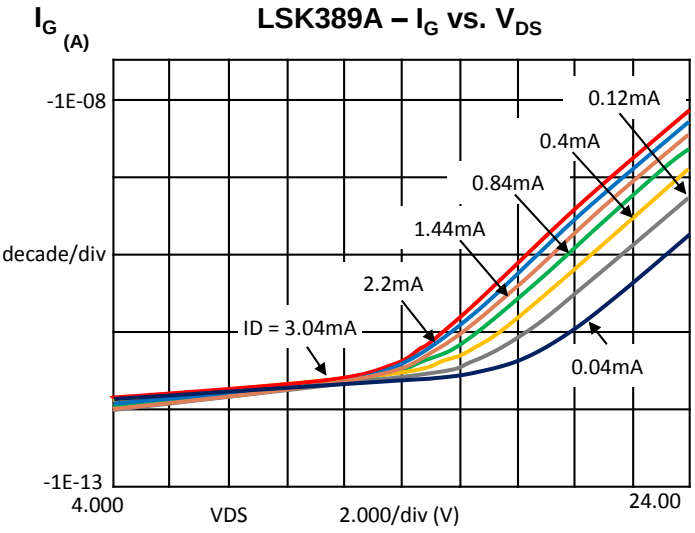
Notes

1. The noise spec is guaranteed by design.
2. Absolute maximum ratings are limiting values above which serviceability may be impaired.
3. Pulse Test: PW ≤ 300µs, Duty Cycle ≤ 3%
4. All characteristics MIN/TYP/MAX numbers are absolute values. Negative values indicate electrical polarity only.

Typical Characteristics

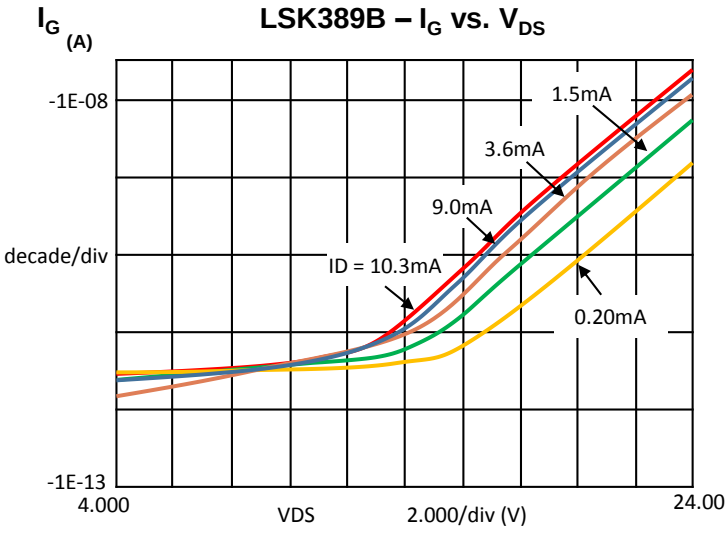
Operating Current

LSK389A – I_G vs. V_{DS}



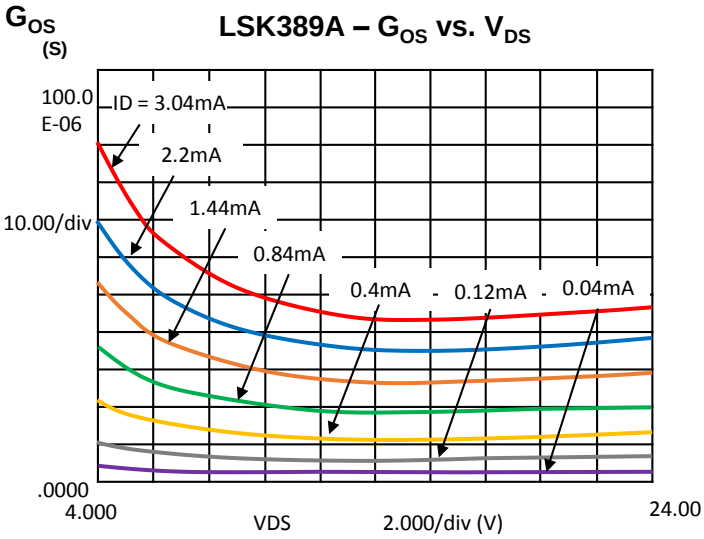
Operating Current

LSK389B – I_G vs. V_{DS}



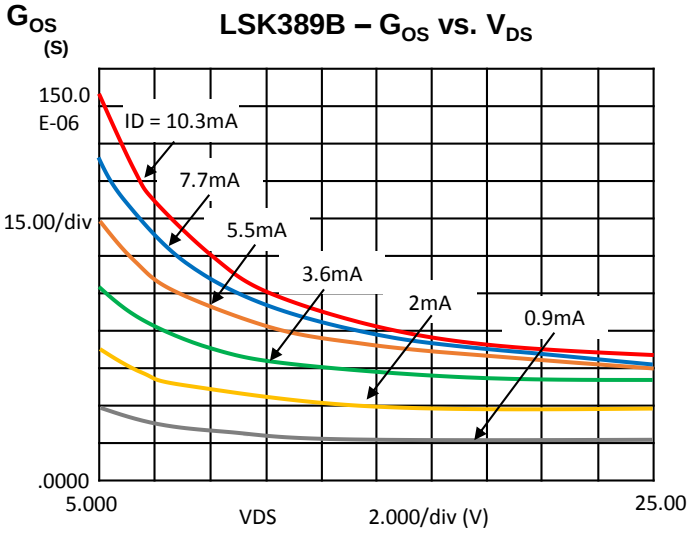
Output Conductance

LSK389A – G_{OS} vs. V_{DS}



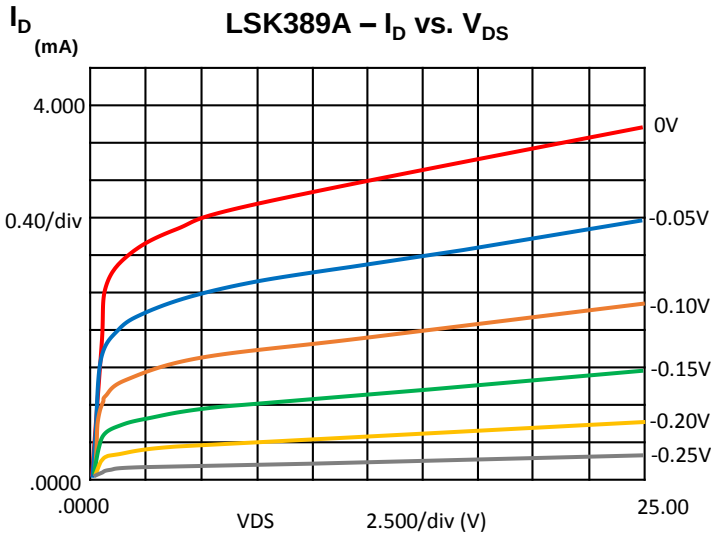
Output Conductance

LSK389B – G_{OS} vs. V_{DS}

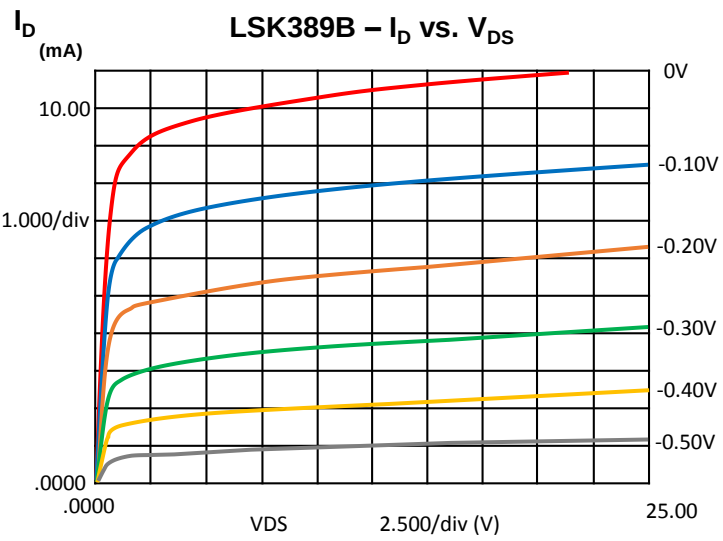


Typical Characteristics

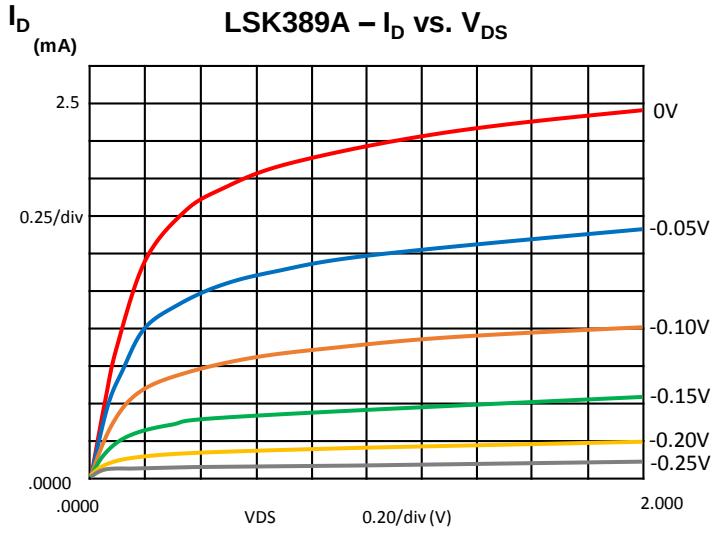
Output Characteristics



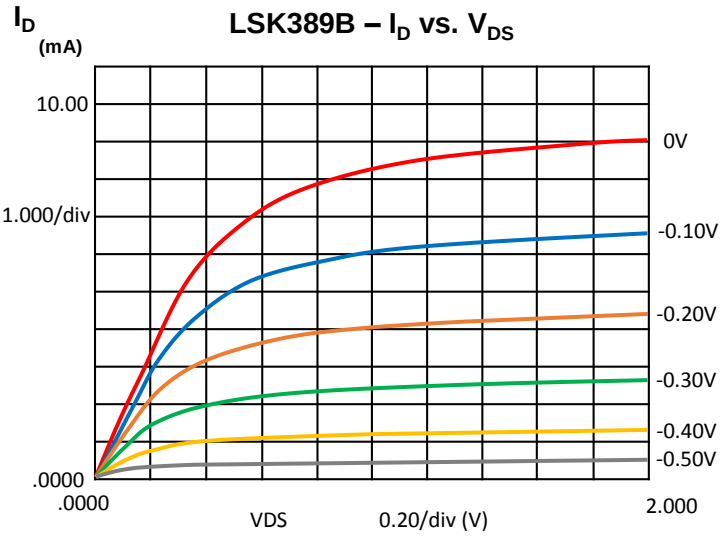
Output Characteristics



Operating Characteristics

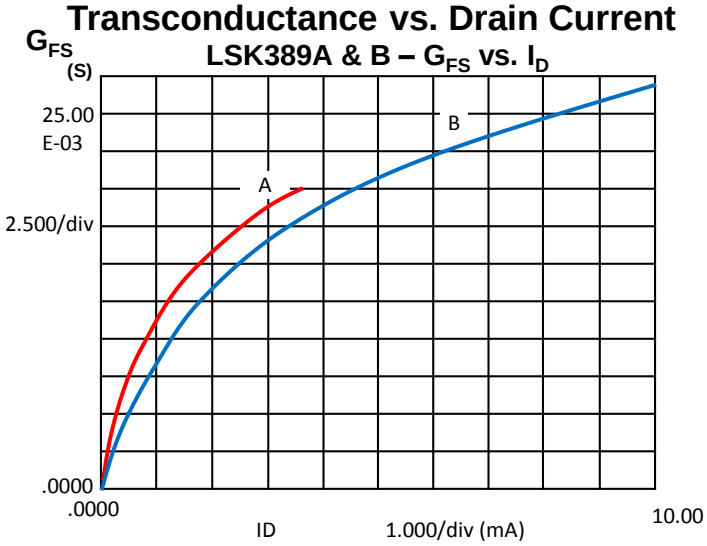


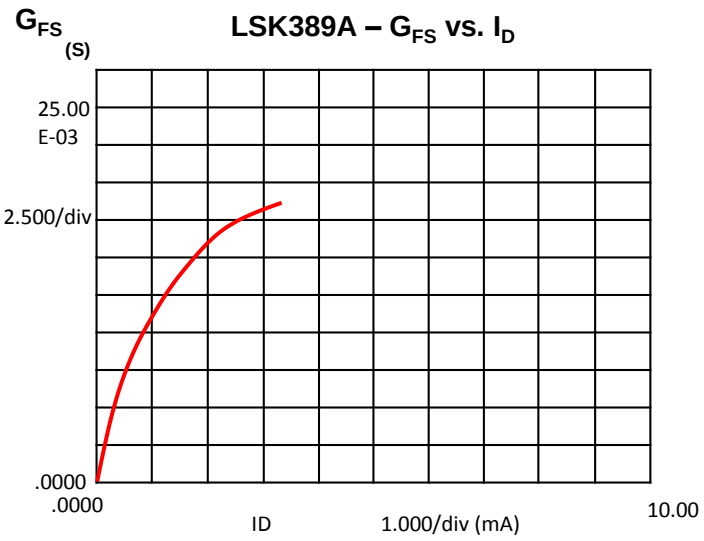
Operating Characteristics



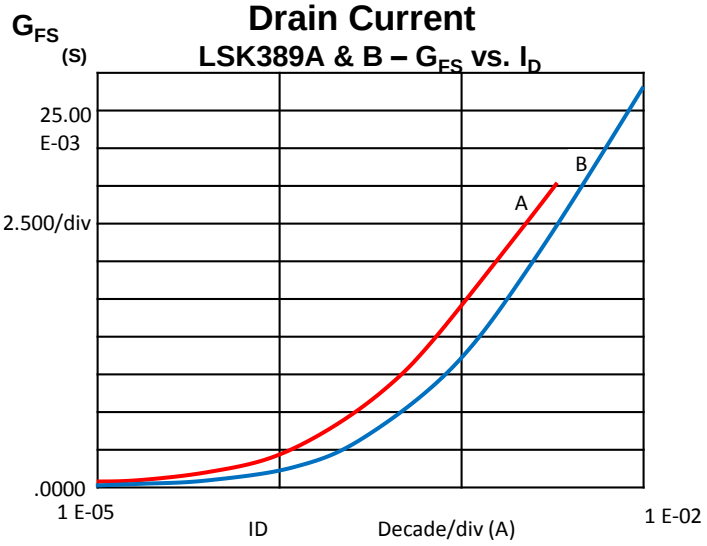
Typical Characteristics

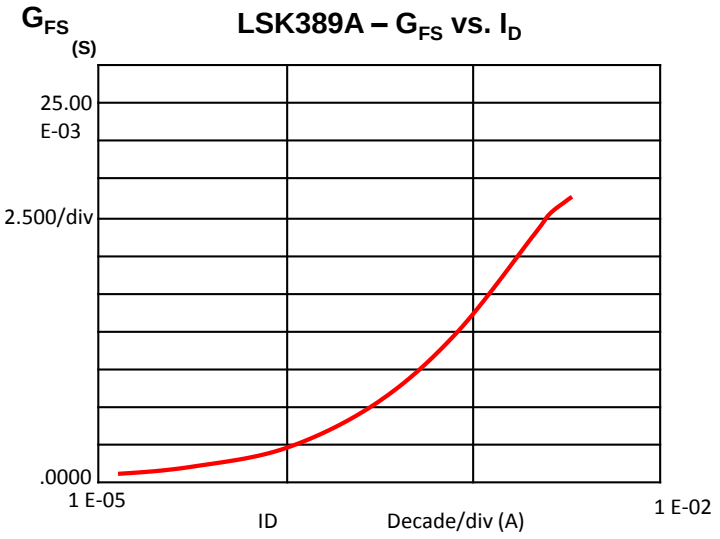
Common Source Forward Transconductance vs. Drain Current



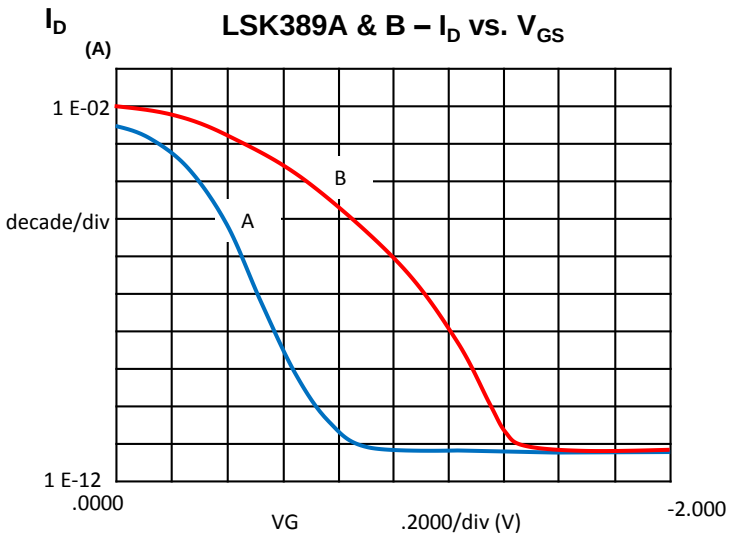


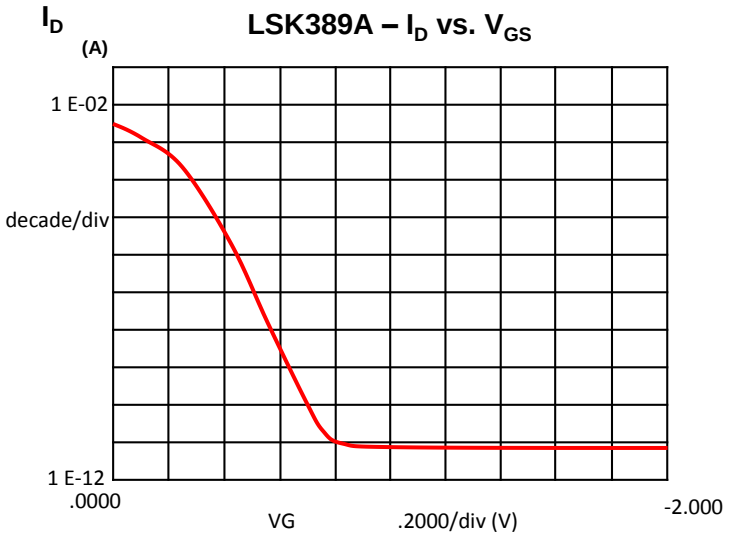
Common Source Transconductance vs. Drain Current

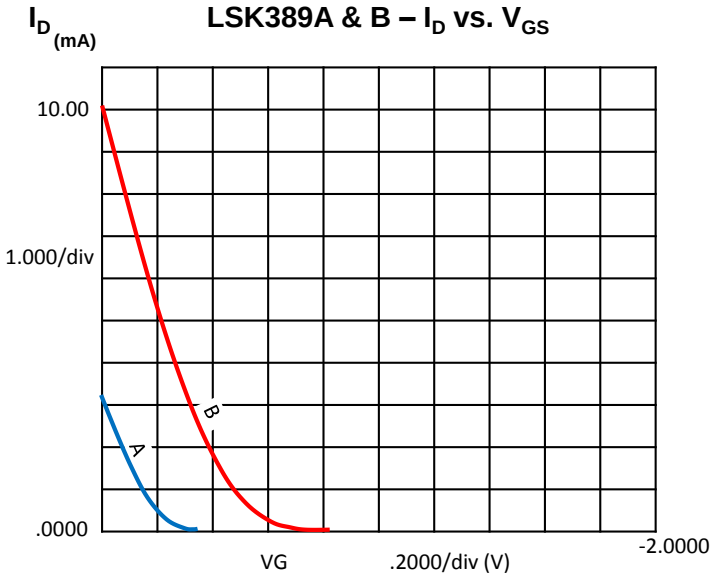


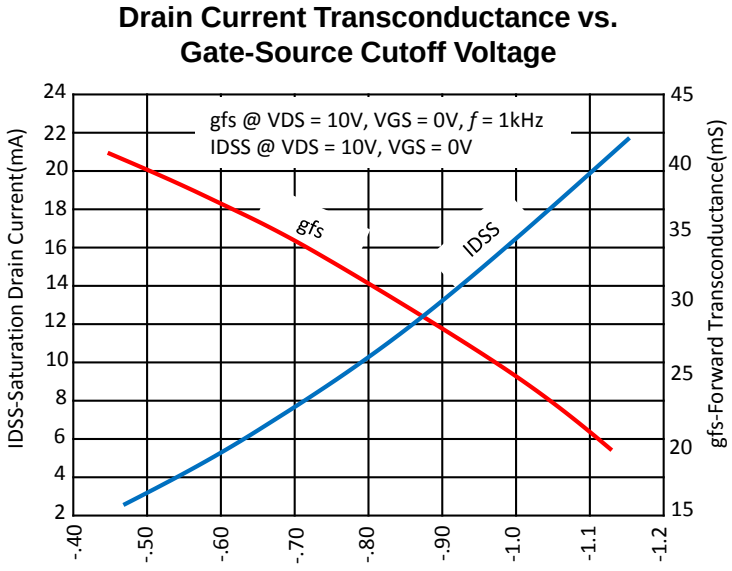


Typical Characteristics



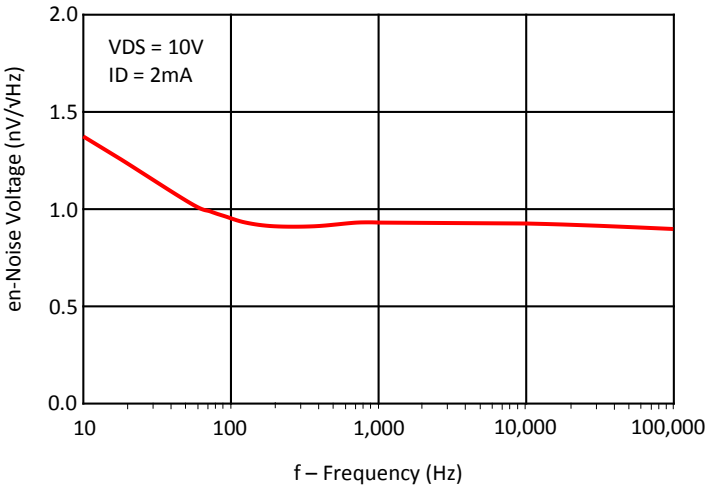






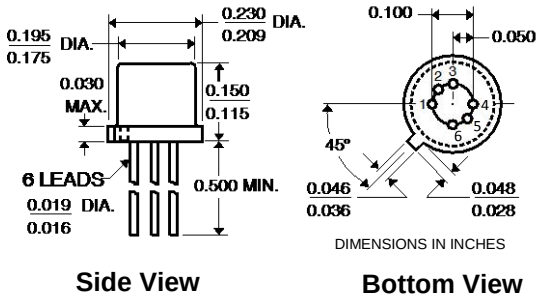
Typical Characteristics

Equivalent Input Noise Voltage vs. Frequency



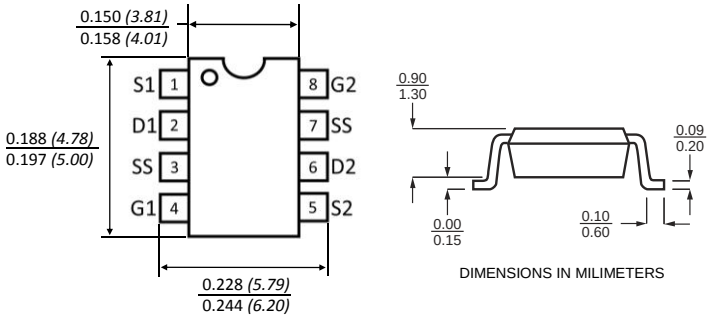
Package Dimensions

TO-71 6 Lead



Side View **Bottom View**

SOIC 8 Lead



Top View **Side View**

SS: Substrate, Leave These Pins Floating (N/C)

Ordering Information

LSK389XY

X	IDSS Range (mA)
A	2.6 to 6.5
B	6.0 to 12.0
C	10.0 to 20.0
D	17.0 to 30.0

Y	Package
T	TO-71 6L
S	SOIC-8L

A Typical Order: LSK389BT (This is B grade packaged into a TO-71 6L package.)