Monolithic N-Channel JFET Duals

Product Summary

Part Number	$V_{GS(off)}$ (V)	$V_{(BR)GSS}$ Min (V)	g_{fs} Min (mS)	I_G Typ (pA)	$\|V_{GS1} - V_{GS2}\|$ Typ (mV)
U421	–0.4 to –2	–40	0.3	–0.25	10
U423	–0.4 to –2	–40	0.3	–0.25	25

Features

- Monolithic Design
- High Slew Rate
- Low Offset/Drift Voltage
- Low Gate Leakage: 0.2 pA
- Low Noise
- High CMRR: 102 dB

Benefits

- Tight Differential Match vs. Current
- Improved Op Amp Speed, Settling Time Accuracy
- Minimum Input Error/Trimming Requirement
- Insignificant Signal Loss/Error Voltage
- High System Sensitivity
- Minimum Error with Large Input Signals

Applications

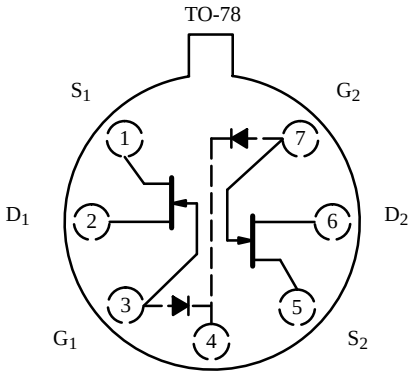
- Ultralow Input Current Differential Amps
- High-Speed Comparators
- Impedance Converters

Description

The U421/423 are monolithic dual n-channel JFETs designed to provide very high input impedance for differential amplification and impedance matching. Among its many unique features, this series offers operating gate current specified at –250 fA.

The hermetic TO-78 package is available with full military processing (see Military Information).

For similar products see the low-noise U/SST401 series and high-gain 2N5911/5912 data sheets.



Top View

Absolute Maximum Ratings

Gate-Drain, Gate-Source Voltage . . . . . –40 V
Gate-Gate Voltage . . . . . ±40 V
Gate Current . . . . . 10 mA
Lead Temperature ($^1/_{16}$" from case for 10 sec.) . . . . . 300 °C
Storage Temperature . . . . . –65 to 200°C
Operating Junction Temperature . . . . . –55 to 150°C

Power Dissipation : Per Side[a] . . . . . 300 mW
Total[b] . . . . . 500 mW

Notes
a. Derate 2.4 mW/°C above 25°C
b. Derate 4 mW/°C above 25°C

Updates to this data sheet may be obtained via facsimile by calling Siliconix FaxBack, 1-408-970-5600. Please request FaxBack document #70248.

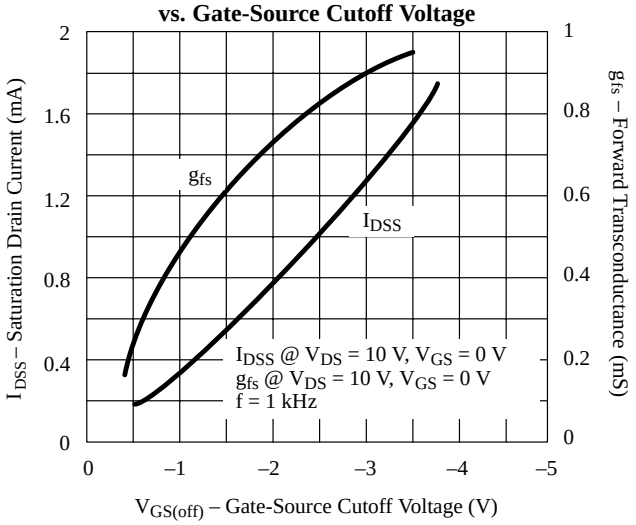
Specifications[a]

Parameter	Symbol	Test Conditions	Typ[b]	Limits U421 Min	Limits U421 Max	Limits U423 Min	Limits U423 Max	Unit
Static								
Gate-Source Breakdown Voltage	$V_{(BR)GSS}$	I_G = –1 µA, V_{DS} = 0 V	–60	–40		–40		V
Gate-Gate Breakdown Voltage	$V_{(BR)G1-G2}$	I_G = ± 1 µA, I_D = 0, I_S = 0	± 55	± 40		± 40		V
Gate-Source Cutoff Voltage	$V_{GS(off)}$	V_{DS} = 10 V, I_D = 1 nA	–1.2	–0.4	–2	–0.4	–2	V
Saturation Drain Current	I_{DSS}	V_{DS} = 10 V, V_{GS} = 0 V	400	60	1000	60	1000	µA
Gate Reverse Current	I_{GSS}	V_{GS} = –20 V, V_{DS} = 0 V	–0.6		–1		–1	pA
		T_A = 125°C	–0.3		–1		–1	nA
Gate Operating Current	I_G	V_{DG} = 10 V, I_D = 5 mA	–0.2		–0.25		–0.25	pA
		T_A = 125°C	–150		–250		–250	
Drain-Source On-Resistance	$r_{DS(on)}$	V_{GS} = 0 V, I_D = 10 µA	2000					Ω
Gate-Source Voltage	V_{GS}	V_{DG} = 10 V, I_D = 5 mA	–0.8		–1.8		–1.8	V
Gate-Source Forward Voltage	$V_{GS(F)}$	I_G = 1 mA , V_{DS} = 0 V	0.7					V
Dynamic								
Common-Source Forward Transconductance	g_{fs}	V_{DS} = 10 V, V_{GS} = 0 V, f = 1 kHz	0.6	0.3	1.5	0.3	1.5	mS
Common-Source Output Conductance	g_{os}		4		10		10	µS
Common-Source Forward Transconductance	g_{fs}	V_{DS} = 10 V, I_D = 10 mA , f = 1 kHz	0.2	0.12	0.35	0.12	0.35	mS
Common-Source Output Conductance	g_{os}		0.4		3		3	µS
Common-Source Input Capacitance	C_{iss}	V_{DS} = 10 V, V_{GS} = 0 V, f = 1 MHz	1.4		3		3	pF
Common-Source Reverse Transfer Capacitance	C_{rss}		0.7		1.5		1.5	pF
Equivalent Input Noise Voltage	$\bar{e}_n$	V_{DS} = 10 V, I_D = 10 mA , f = 10 Hz	30		70		70	$nV/\sqrt{Hz}$
Noise Figure	NF	R_G = 10 MΩ			1		1	dB
Matching								
Differential Gate-Source Voltage	$\lvert V_{GS1} - V_{GS2} \rvert$	V_{DG} = 10 V, I_D = 10 mA			10		25	mV
Gate-Source Voltage Differential Change with Temperature	$\frac{\Delta \lvert V_{GS1} - V_{GS2} \rvert}{\Delta T}$	V_{DG} = 10 V, I_D = 10 mA T_A = –55 to 125°C			10		40	µV/°C
Common Mode Rejection Ratio	CMRR	V_{DG} = 10 to 20 V, I_D = 10 mA	102	90		80		dB

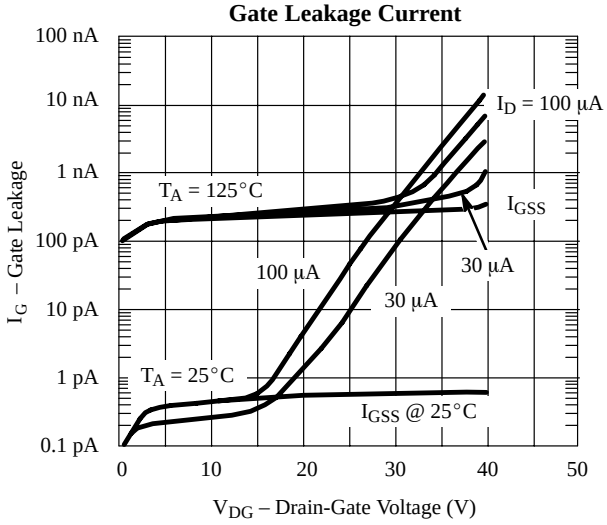
Notes
a. T_A = 25°C unless otherwise noted. NNT
b. Typical values are for DESIGN AID ONLY, not guaranteed or subject to production testing.

Typical Characteristics

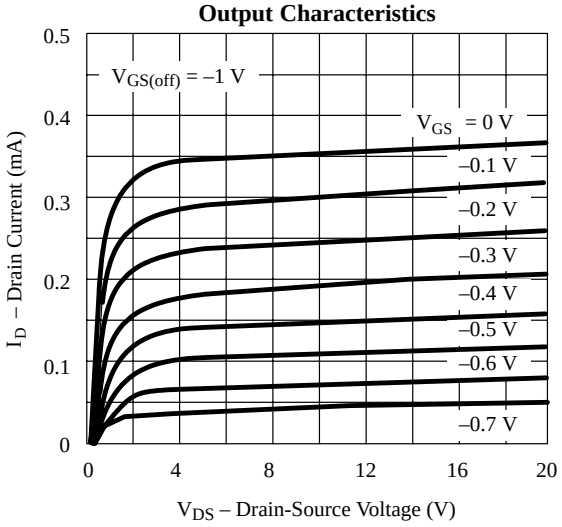
Drain Current and Transconductance vs. Gate-Source Cutoff Voltage



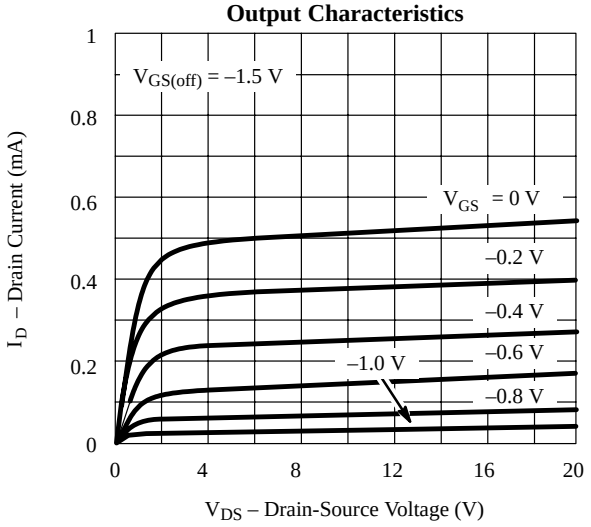
Gate Leakage Current



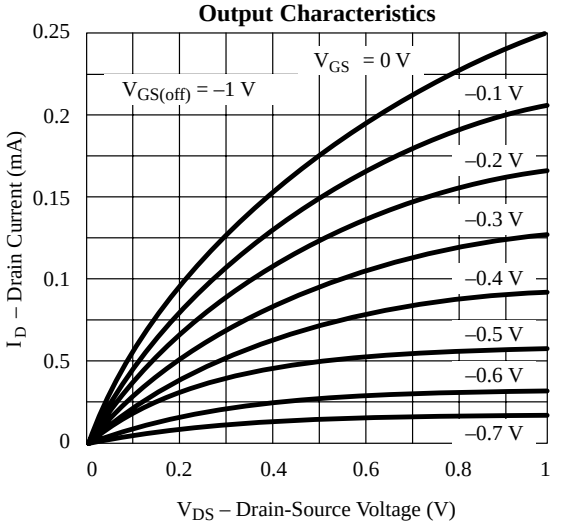
Output Characteristics



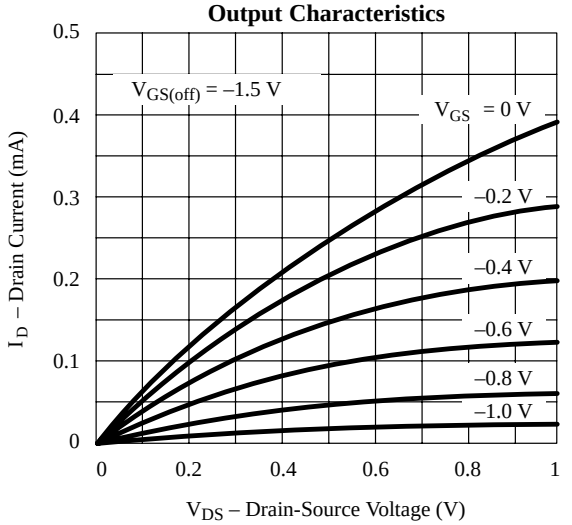
Output Characteristics



Output Characteristics

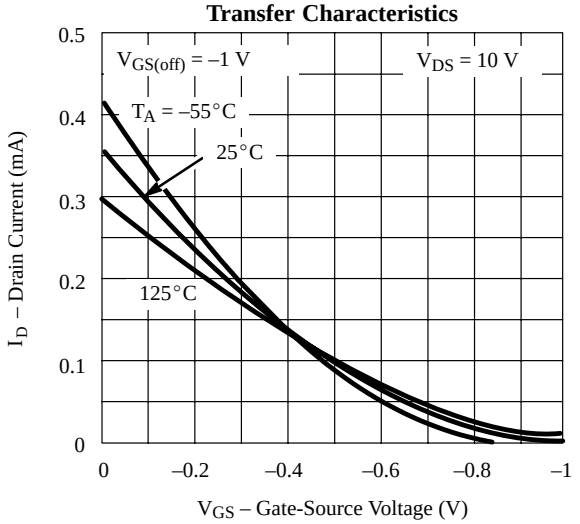


Output Characteristics

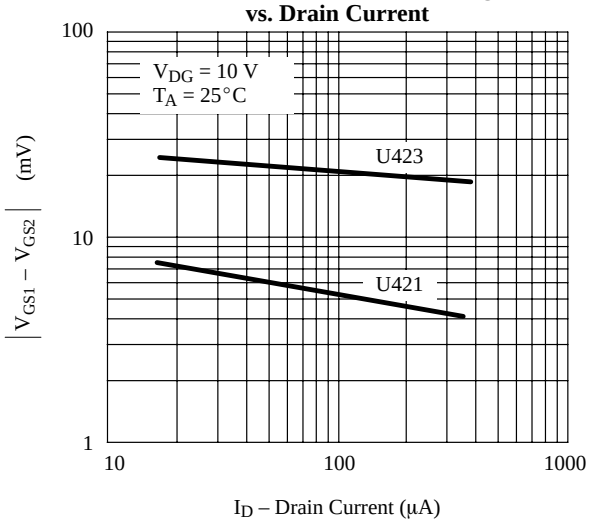


Typical Characteristics (Cont'd)

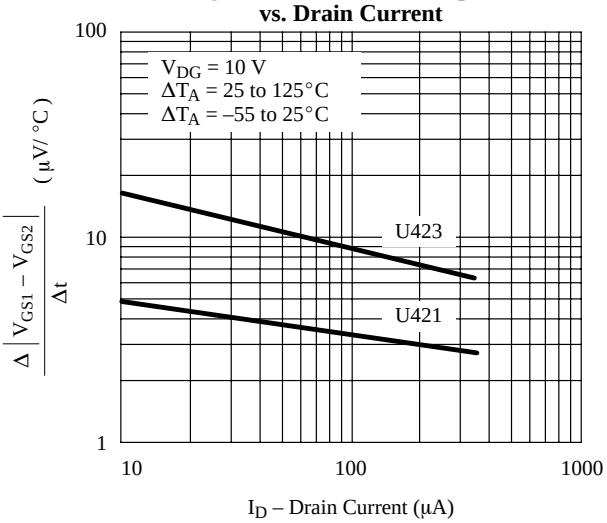
Transfer Characteristics



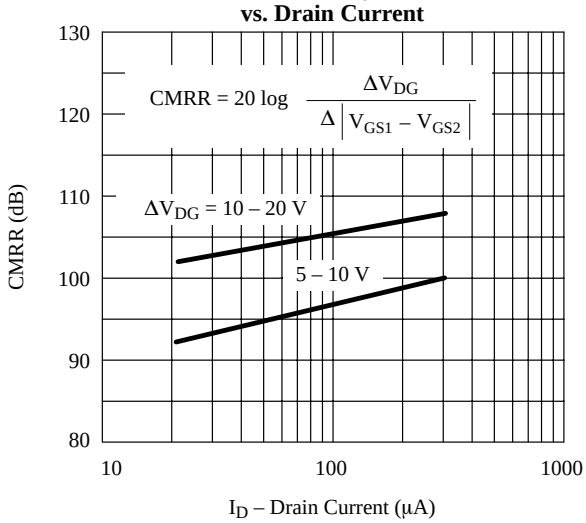
Gate-Source Differential Voltage vs. Drain Current



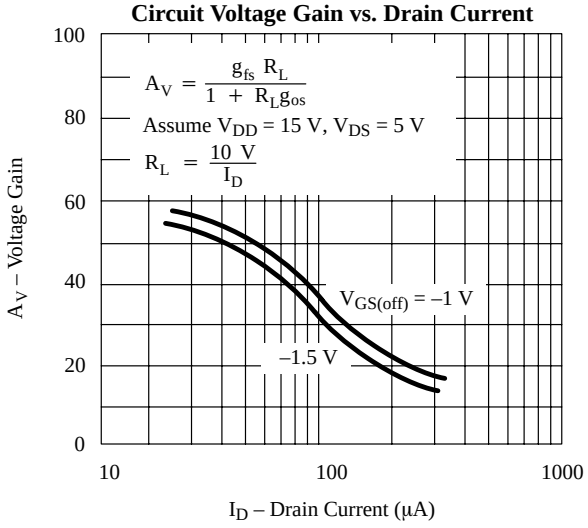
Voltage Differential with Temperature vs. Drain Current



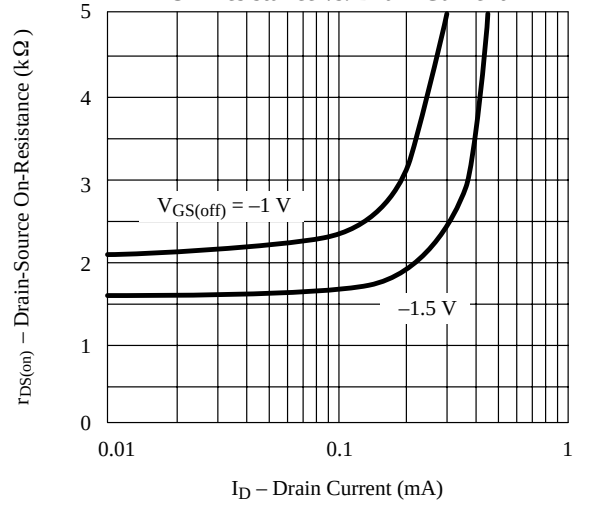
Common Mode Rejection Ratio vs. Drain Current



Circuit Voltage Gain vs. Drain Current

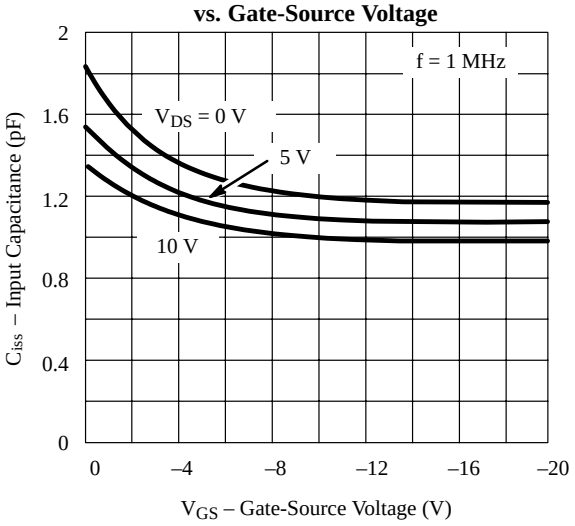


On-Resistance vs. Drain Current

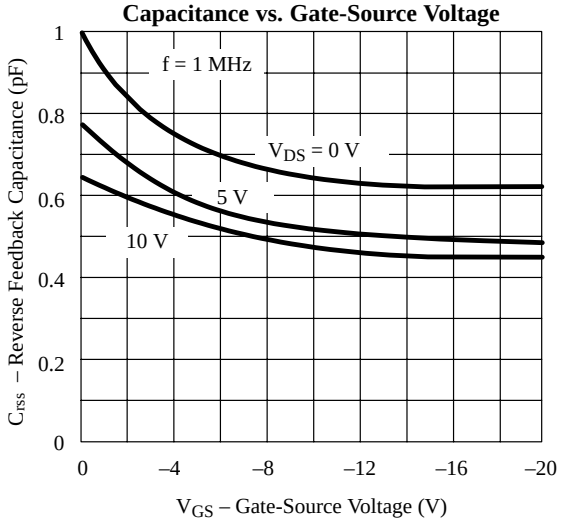


Typical Characteristics (Cont'd)

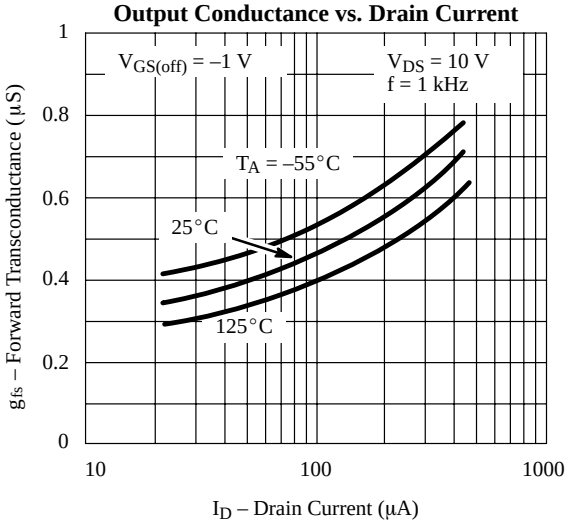
Common-Source Input Capacitance vs. Gate-Source Voltage



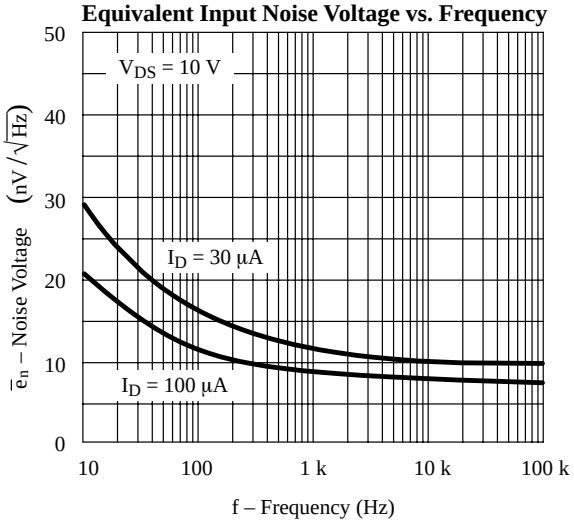
Common-Source Reverse Feedback Capacitance vs. Gate-Source Voltage



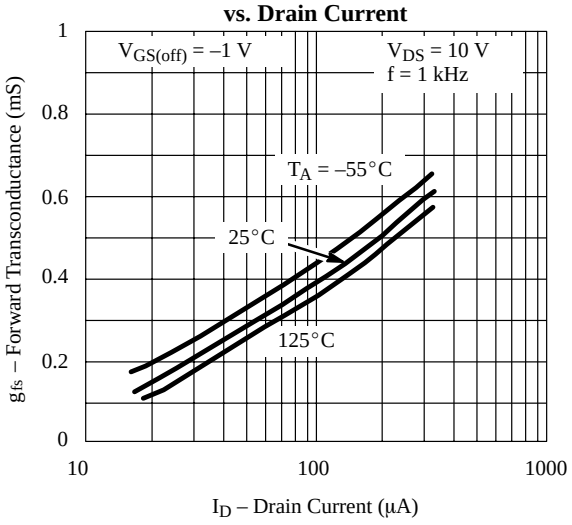
Output Conductance vs. Drain Current



Equivalent Input Noise Voltage vs. Frequency



Common-Source Forward Transconductance vs. Drain Current



On-Resistance and Output Conductance vs. Gate-Source Cutoff Voltage