TEMIC

Siliconix

U421/423

Monolithic N-Channel JFET Duals

Product Summary

Part Number	$V_{GS(off)}$ (V)	$V_{(BR)GSS}$ Min (V)	g_{fs} Min (mS)	I_G Max (pA)	$\|V_{GS1} - V_{GS2}\|$ Max (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 Signal

Applications

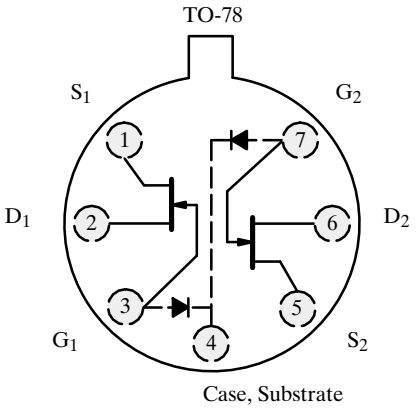
- Ultralow Input Current Differential Amps
- High-Speed Comparators
- Impedance Converters

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

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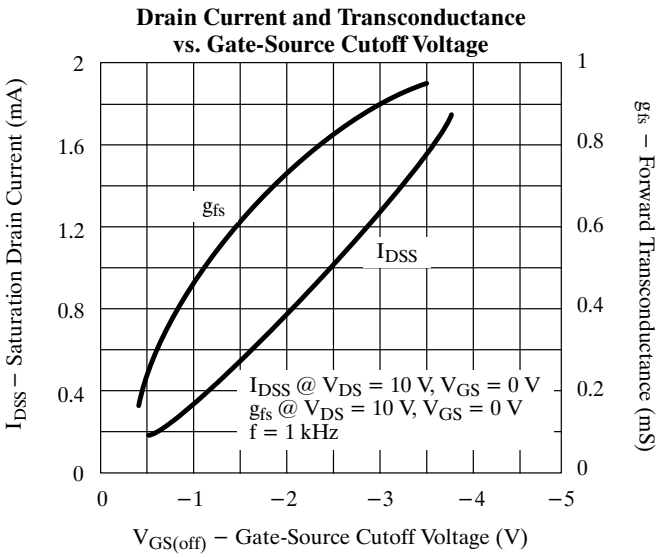
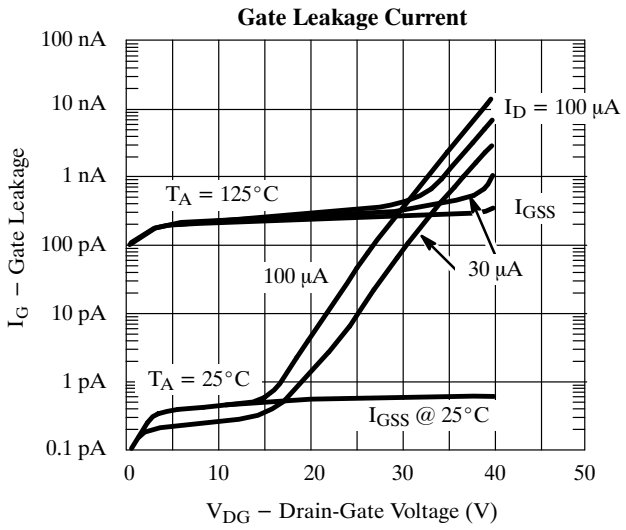
Specifications[a]

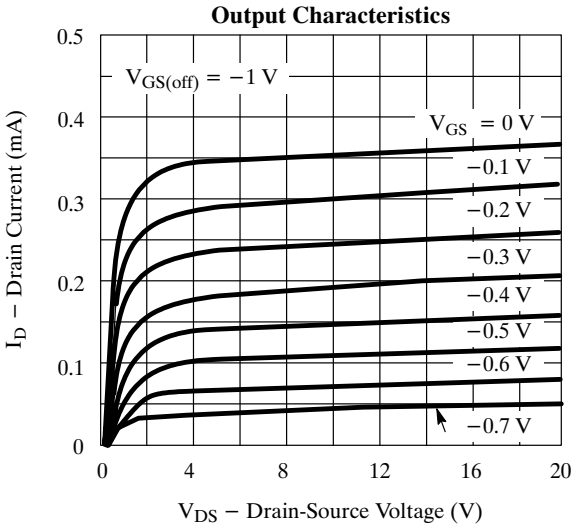
Parameter	Symbol	Test Conditions	Typ[b]	Limits U421 Min	Limits U421 Max	Limits U423 Min	Limits U423 Max	Unit
Static								
Gate-Source Breakdown Voltage	$V_{(BR)GSS}$	$I_G = -1$ µA, $V_{DS} = 0$ V	−60	−40		−40		V
Gate-Gate Breakdown Voltage	$V_{(BR)G1-G2}$	$I_G = \pm 1$ µA, $I_D = 0$, $I_S = 0$	±55	±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, $I_D = 30$ µA	−0.2		−0.25		−0.25	pA
		$T_A = 125°C$	−150		−250		−250	pA
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, $I_D = 30$ µA	−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, $I_D = 30$ µA , 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, $I_D = 30$ µA f = 10 Hz	30		70		70	$\frac{nV}{\sqrt{Hz}}$
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, $I_D = 30$ µA			10		25	mV
Gate-Source Voltage Differential Change with Temperature	$\frac{\Delta \lvert V_{GS1} - V_{GS2} \rvert}{\Delta T}$	$V_{DG} = 10$ V, $I_D = 30$ µA $T_A = -55$ to 125°C			10		40	µV/°C
Common Mode Rejection Ratio	CMRR	$V_{DG} = 10$ to 20 V, $I_D = 30$ µA	102	90		80		dB

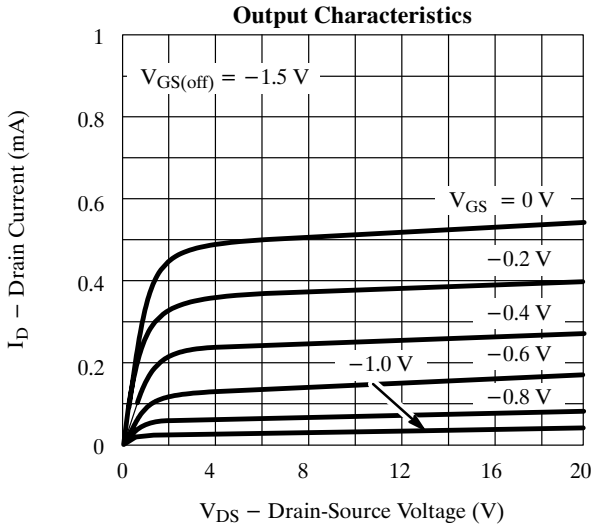
Notes
a. $T_A = 25°C$ unless otherwise noted. NNT
b. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.

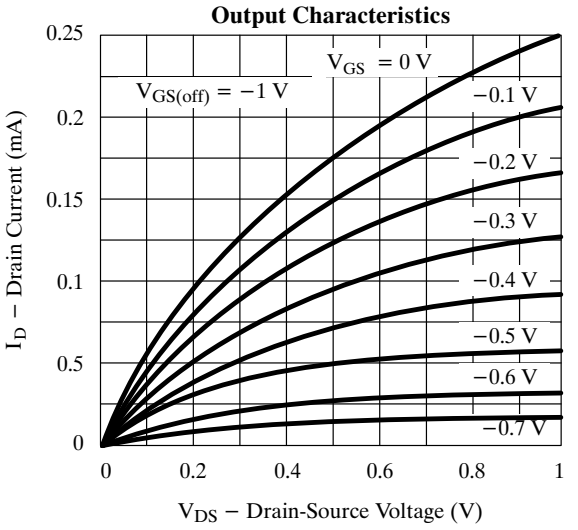
Typical Characteristics

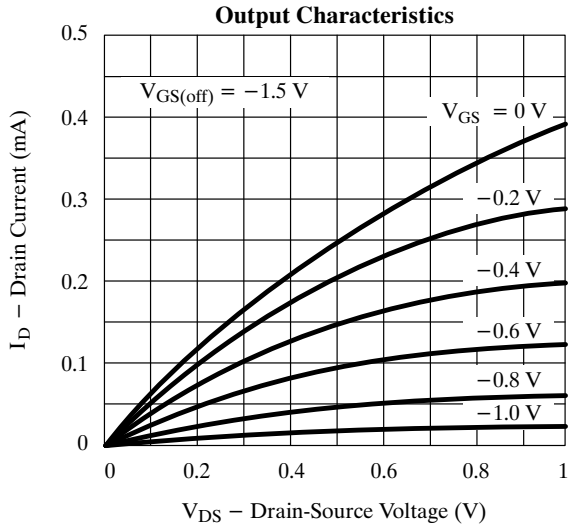












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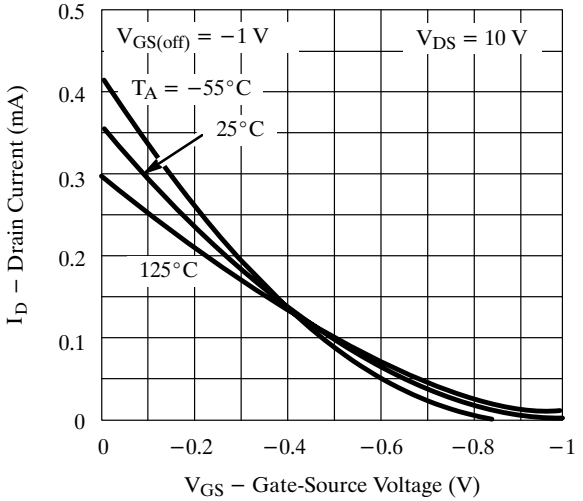
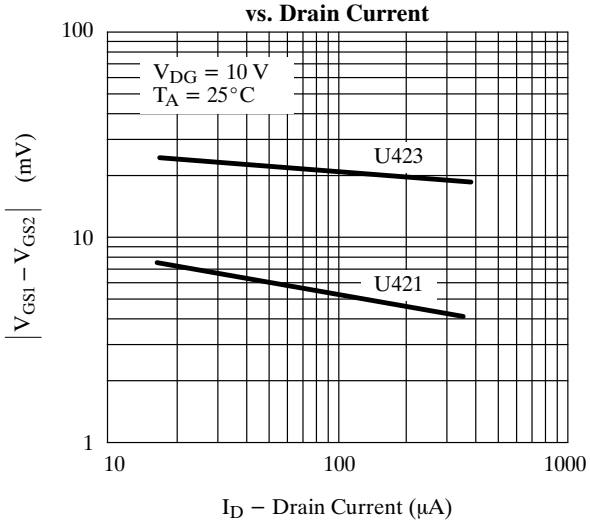
Typical Characteristics (Cont'd)

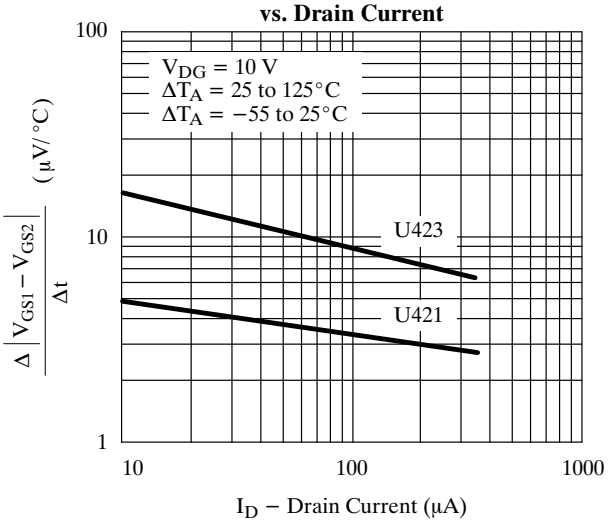
Transfer Characteristics



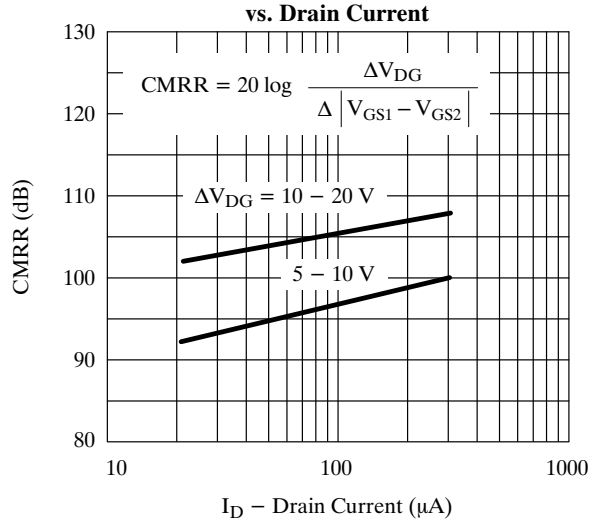
Gate-Source Differential Voltage vs. Drain Current



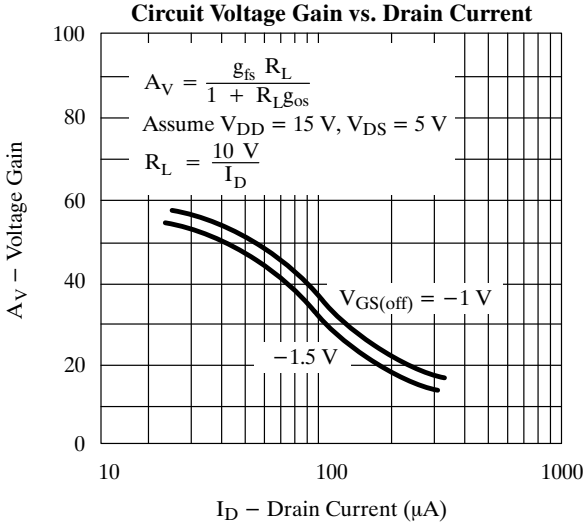
Voltage Differential with Temperature vs. Drain Current



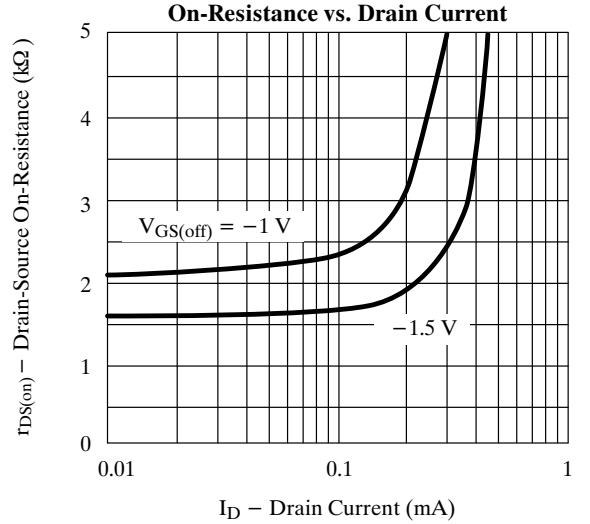
Common Mode Rejection Ratio vs. Drain Current



Circuit Voltage Gain vs. Drain Current

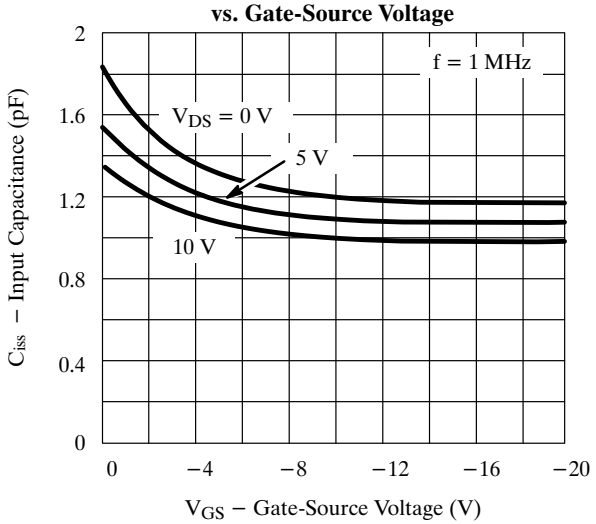


On-Resistance vs. Drain Current

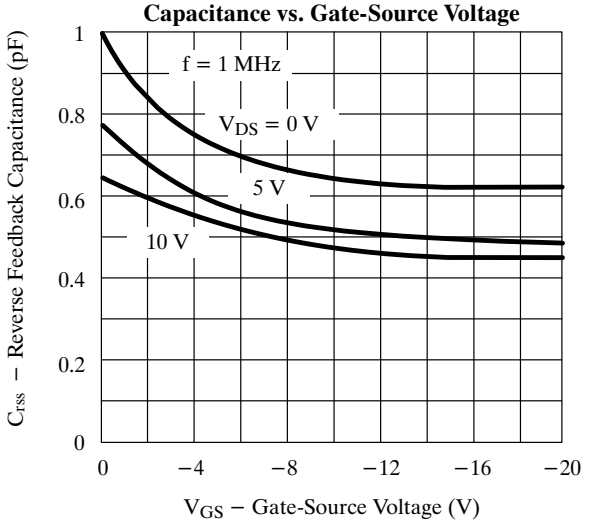


Typical Characteristics (Cont'd)

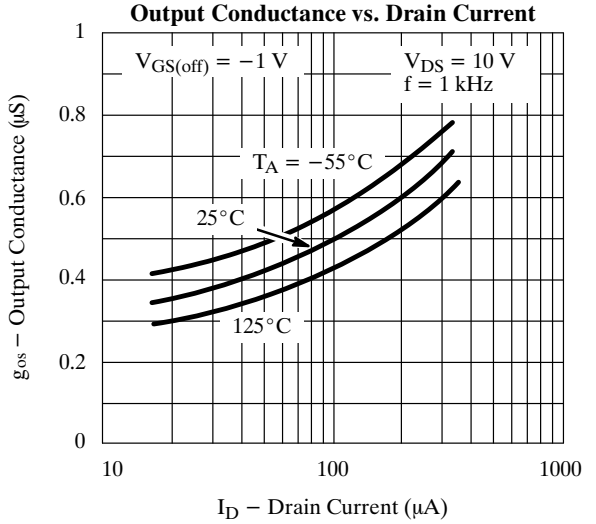
Common-Source Input Capacitance vs. Gate-Source Voltage



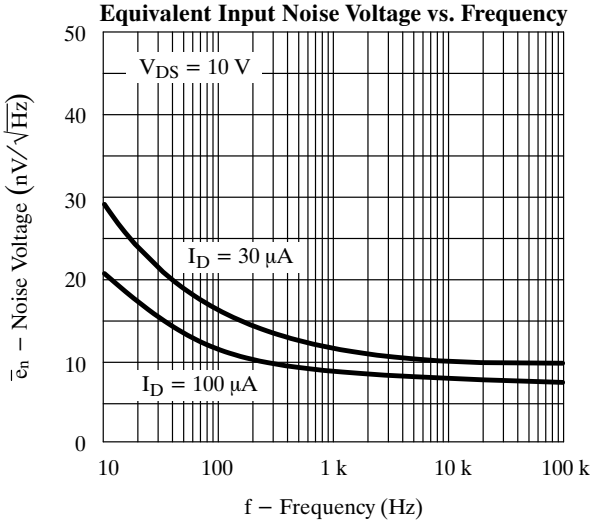
Common-Source Reverse Feedback Capacitance vs. Gate-Source Voltage



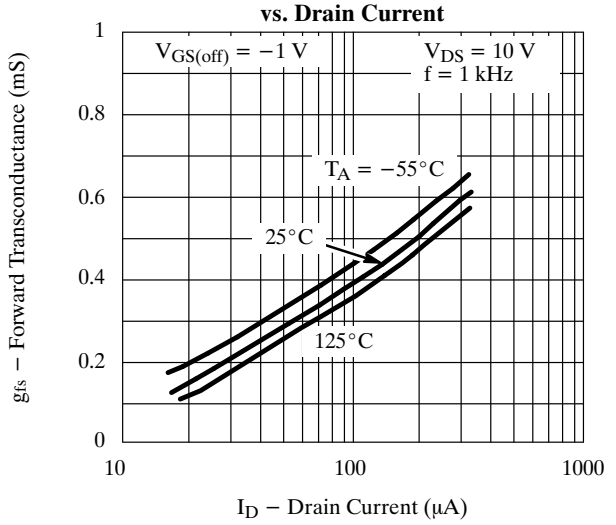
Output Conductance vs. Drain Current



Equivalent Input Noise Voltage vs. Frequency



Common-Source Forward Transconductance vs. Drain Current



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