

# N-Channel Dual JFET



## U421 – U426

### FEATURES

- Ultra Low Input Bias Current . . . . . 250 Fempto Amps
- Low Operating Current
- Tight Matching Characteristics

### APPLICATIONS

- Ultra Low Leakage FET Input Op Amps
- Electrometer
- Infrared Detectors
- pH Meters

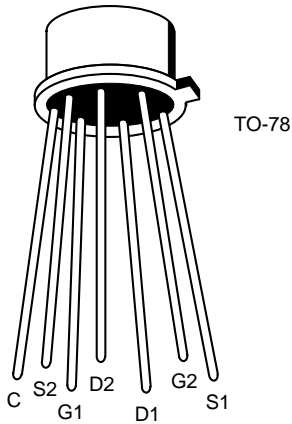
### DESCRIPTION

The Calogic U421 Series are Dual N-Channel JFETs on a monolithic structure designed specifically for very high input impedance for differential amplification and impedance matching. This series features ultra low input bias current (250 fempto amps, U421) while offering high gain at low operating currents and tight matching characteristics. These devices are available in chip form for hybrid designs as well as a hermetic TO-78 package.

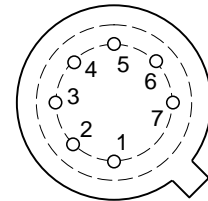
### ORDERING INFORMATION

Part	Package	Temperature Range
U421-U426	TO-78 Hermetic Package	-55°C to +150°C
XU421-U426	Sorted Chips in Carriers	-55°C to +150°C

### PIN CONFIGURATION



- 1 SOURCE 1
- 2 DRAIN 1
- 3 GATE 1
- 4 CASE/BODY
- 5 SOURCE 2
- 6 DRAIN 2
- 7 GATE 2



BOTTOM VIEW

CJ4

**ABSOLUTE MAXIMUM RATINGS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Gate-to-Gate Voltage . . . . .	$\pm 40\text{V}$	Total Device Dissipation, $T_A = 25^\circ\text{C}$	
Gate-Drain or Gate-Source Voltage . . . . .	$-40\text{V}$	(Derate 6.0 mW/ $^\circ\text{C}$ to $150^\circ\text{C}$ ) . . . . .	750 mW
Gate Current . . . . .	10mA	Storage Temperature Range . . . . .	$-65^\circ\text{C}$ to $+150^\circ\text{C}$
Device Dissipation (Each Side), $T_A = 25^\circ\text{C}$			
(Derate 3.2 mW/ $^\circ\text{C}$ to $150^\circ\text{C}$ ) . . . . .	400mW		

**ELECTRICAL CHARACTERISTICS** ( $25^\circ\text{C}$  Unless otherwise noted)

SYMBOL	CHARACTERISTIC	U421-3			U424-6			UNIT	TEST CONDITIONS
		MIN	TYP	MAX	MIN	TYP	MAX		
<b>STATIC</b>									
$BV_{GSS}$	Gate-Source Breakdown Voltage	-40	-60		-40	-60		V	$I_G = -1\mu\text{A}$ , $V_{DS} = 0$
$BV_{G1G2}$	Gate-Gate Breakdown Voltage	$\pm 40$			$\pm 40$				$I_G = -1\mu\text{A}$ , $I_D = 0$ , $I_S = 0$
$I_{GSS}$	Gate Reverse Current <sup>(1)</sup>			1.0			3.0	pA	$T = +25^\circ\text{C}$
				1.0			3.0	nA	$T = +125^\circ\text{C}$
$I_G$	Gate Operating Current <sup>(1)</sup>			.25			0.5	pA	$T = +25^\circ\text{C}$
				.250			-500		$T = +125^\circ\text{C}$
$V_{GS(off)}$	Gate-Source Cutoff Voltage	-0.4		-2.0	-0.4		-2.0	V	$V_{DS} = 10\text{V}$ , $I_D = 1\text{nA}$
$V_{GS}$	Gate-Source Voltage			-1.8			-2.9		$V_{DG} = 10\text{V}$ , $I_D = 30\mu\text{A}$
$I_{DSS}$	Saturation Drain Current	60		1000	60		1800	$\mu\text{A}$	$V_{DS} = 10\text{V}$ , $V_{GS} = 0$
<b>DYNAMIC</b>									
$g_{fs}$	Common-Source Forward Transconductance	300		1500	300		1500		$V_{DS} = 10\text{V}$ , $V_{GS} = 0$
$g_{os}$	Common-Source Output Conductance			10			10		
$C_{iss}$	Common-Source Input Capacitance			3.0			3.0	pF	$f = 1\text{MHz}$
$C_{rss}$	Common-Source Reverse Transfer Capacitance			1.5			1.5		$f = 1\text{MHz}$
$g_{fs}$	Common-Source Forward Transconductance	120		350	120		350		$V_{DG} = 10\text{V}$ , $I_D = 30\mu\text{A}$
$g_{os}$	Common-Source Output Conductance			3.0			3.0		
$e_n$	Equivalent Short Circuit Input		20	70		20	70	$\text{nV}/\sqrt{\text{Hz}}$	$f = 10\text{Hz}$
			10			10			$f = 1\text{kHz}$
NF	Noise Figure			1.0			1.0	dB	$f = 10\text{Hz}$ $R_G = 10\text{M}\Omega$

SYMBOL	CHARACTERISTIC	U421,4			U422,5			U423,6			UNIT	TEST CONDITIONS
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX		
<b>MATCH</b>												
$ V_{GS1} - V_{GS2} $	Differential Gate-Source Voltage			10			15			25	mV	$V_{DG} = 10\text{V}$ , $I_D = 30\mu\text{A}$
$\frac{ V_{GS1} - V_{GS2} }{\Delta T}$	Differential Gate-Source Voltage Change with Temperature <sup>(2)</sup>			10			25			40	V/ $^\circ\text{C}$	$V_{DG} = 10\text{V}$ , $I_D = 30\mu\text{A}$ , $T_A = -55^\circ\text{C}$ , $T_B = 25^\circ\text{C}$ , $T_C = 125^\circ\text{C}$
CMRR	Common Mode Rejection Ratio <sup>(3)</sup>	90	95		80	90		80	90		dB	$I_D = 30\mu\text{A}$ , $V_{DG} = 10$ to $20\text{V}$

**NOTES:**

1. Approximately doubles for every  $10^\circ\text{C}$  increase in  $T_A$ .
2. Measured at endpoints  $T_A$ ,  $T_B$  and  $T_C$ .

$$3. \text{CMRR} = 20\log_{10} \left[ \frac{V_{DD}}{V_{GS1} - V_{GS2}} \right] \quad V_{DD} = 10\text{V}.$$

4. Case lead not connected.