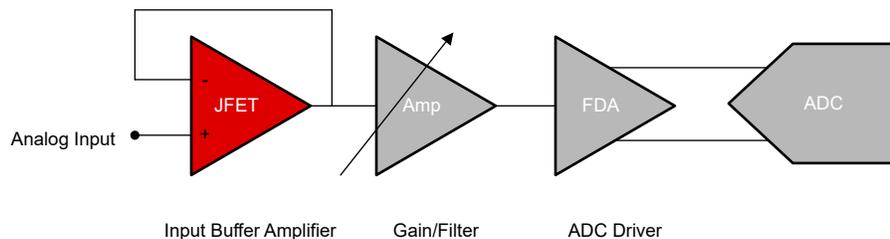


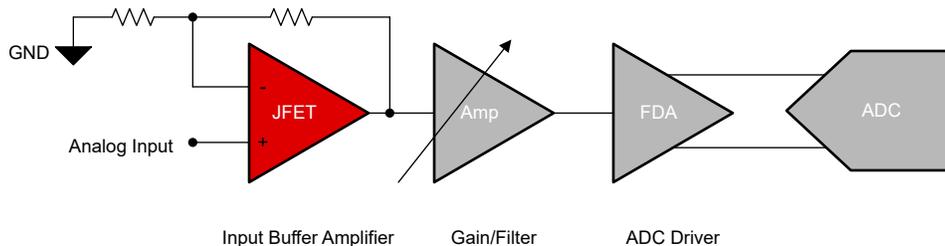
# Pairing High-Speed JFET Amplifiers With Hi-Z DAQ Systems



Wide-bandwidth data-acquisition (DAQ) systems (for example, oscilloscopes and active probes) use an analog front end (AFE) signal chain to capture high-frequency signals and fast-transient pulses. The input amplifier is the first stage in the signal chain of a wide-bandwidth DAQ system. The high input impedance (high-Z) and low bias current inputs of a JFET-input amplifier allow the measurement of small signals and help set the noise floor of the entire signal chain. JFET amplifiers are used as either unity-gain buffers (Figure 1) or in noninverting gain configurations (Figure 2) between the analog input signal and the analog-to-digital converter (ADC).



**Figure 1. Input JFET Amplifier in a Buffer Configuration in a Generic DAQ Front End**



**Figure 2. Input JFET Amplifier in a Gain Configuration in a Generic DAQ Front End**

## Design Considerations

- Large signal bandwidth to measure a wide-frequency range of signals
- High-input impedance to prevent the loading of the measured signals
- Low noise to detect low-magnitude signals
- DC accuracy and precision for precise measurements
- Low bias current to minimize offset
- Output voltage swing to provide compatibility with subsequent stages
- Power consumption for battery-operated or thermal-sensitive systems
- Gain configuration or unity gain
- Learn about amplifier parameters with [TI precision lab video](#)
- Ask a question on our [TI E2E™](#) forums
- [Table 1](#) and [Table 2](#) list the device selections

**Table 1. Recommended < 12V Parts**

Parameter	BUF802	OPA818	OPA859	OPA817	OPA814
V <sub>S</sub> MIN to MAX (V)	9 to 13	6 to 13	3.3 to 5.25	6 to 12.6	6 to 12.6
Large Signal Bandwidth (2V <sub>PP</sub> ) (MHz)	1600	400	400	250	200
Slew rate (V/μs)	7000	1400	1150	100	700
Input impedance (GΩ)	50	500	1	60	60
Noise (nV/√Hz)	2.3	2.2	3.3	4.5	5.3
Maximum Drift (μV/°C)	1330 <sup>(1)</sup>	20	N/A	3.5	3.5
Fixed Gain (V/V)	Yes	No	No	No	No
Maximum Bias Current (pA)	25	25	5	20	20
Output Voltage Swing (V)	V <sub>S+</sub> – 1.9, V <sub>S-</sub> + 3.4	V <sub>S+</sub> – 0.5, V <sub>S-</sub> + 0.5	V <sub>S+</sub> – 0.9, V <sub>S-</sub> + 2.2	±3.9	±3.9
I <sub>Q</sub> (TYP) (mA)	34	27.7	20.5	23.5	16
Smallest Package Size (mm)	VQFN 3 × 3	WSON 3 × 3	WSON 3 × 3	WSON 3 × 3	SOT-23 2.9 × 2.8

(1) BUF802 package size and drift represent values for the standalone device not in a composite configuration.

**Table 2. Recommended > 24V Parts**

Parameter	THS4631	OPA810
V <sub>S</sub> Min to Max (V)	10 to 32	4.75 to 24
Large Signal BW (2V <sub>PP</sub> ) (MHz)	230	70
Slew rate (V/μs)	1000	200
Input impedance (GΩ)	10	12
Noise (nV/√Hz)	7	6.3
Maximum Drift (μV/°C)	10	10
Fixed Gain (V/V)	No	No
Max Bias Current (pA)	100	20
Output Voltage Swing (V)	±13.5	V <sub>S+</sub> – 0.11, V <sub>S-</sub> + 0.08
I <sub>Q</sub> (typ) (mA)	11.5	3.7
Smallest Package Size (mm)	HVSSOP 3 × 4.9	SC70 2 × 1.25

For more devices, browse through the [online parametric tool](#) where you can sort by desired supply voltage, channel count, noise, and other features.

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