I wanted to talk about TI's Newest JFET amplifiers and Buffers the OPA2810 & OPA810 for **high-voltage, high-input Impedance front-end** systems in LCR Meters. The OPA2810 is a dual-channel and OPA810 is the single-channel version. The OPAx810 offers 70MHz, FET-input, rail-to-rail Input & Output, 24V amplifier with 2x performance over similar competition devices.

LCR meters and impedance analyzers measure unknown values of passive components like resistors, capacitors, inductors, or a combination of these elements. Impedance measurement channels in LCR meters will require low noise and large input impedance with low distortion for a high-fidelity signal chain. For impedance measurements, several existing techniques provide various tradeoffs between measurement accuracy, complexity, and frequency range.

Generic Auto balancing method Block Diagram:
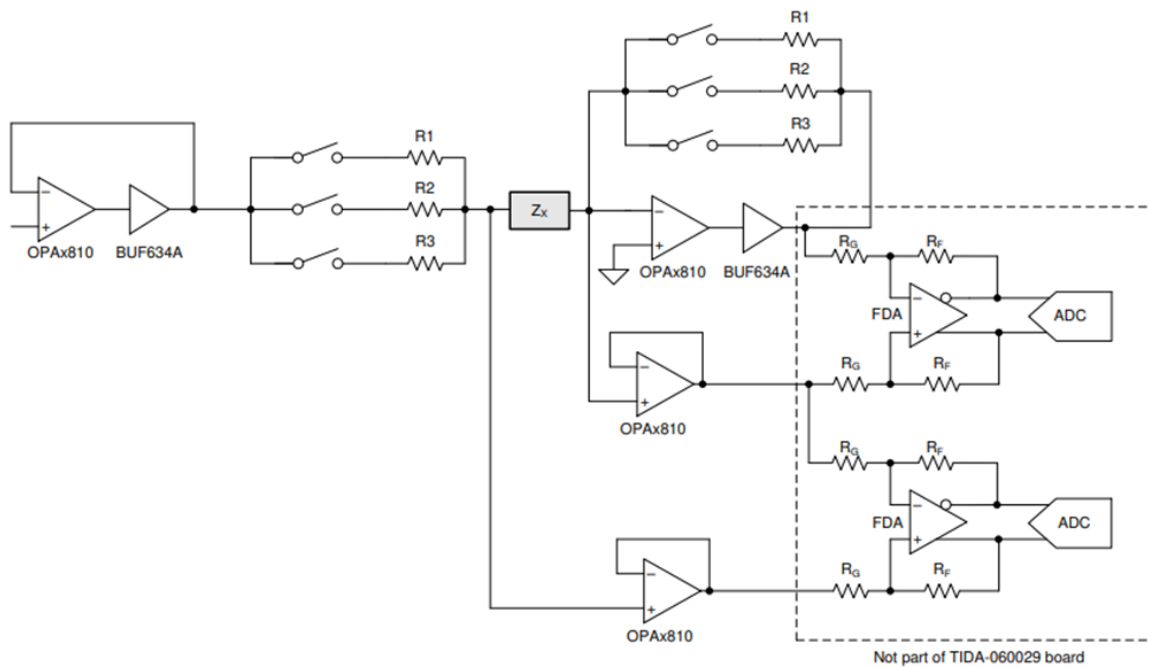
Composite Loop:
- The BUF634A is a high-speed wide bandwidth unity gain buffer. It is used in a composite loop with the OPA2810 to increase the output current capability from 100mA to 250mA.
  The BUF634A has two bandwidth options of 35MHz and 210MHz. It is optional to use in this application.

ADC Driver:
- **Differential:**
  - o FDA is needed to attenuate the voltage & drive the Precision or High-Speed ADCs to perform the single-ended to differential signal conversion, TI offers several FDAs with a variety of BW and voltage ranges depending on the system need.
  - o For a fully differential input ADC check out the latest fully differential amplifier THS4561. The THS4561 is TI's latest low-power(0.78mA), 70-MHz, high-supply-range(12.6V), simple interface for taking single-ended sources to the differential output required by precision analog-to-digital converters.
  - o Check out the **TIDA-00187:** *Extending Rail-to-Rail Output Range for Fully Differential Amplifiers to Include True Zero Volts*
  - o For a fully differential input ADC check out the latest fully differential ADC drivers for your application below: (THS4531A, THS4551, THS4561, THS4541, THS4509)

Parameter	THS4531A	THS4561	THS4551	THS4541	THS4509
ADC Pairing	> 14-bit, 500kSPS-1MSPS	> 14-bit, 1 – 2 MSPS	> 16-bit, 1 – 4 MSPS	> 10-MSPS	>100-MSPS
Gain Bandwidth Product (MHz)	36	68	135	850	3000
Quiescent Current, I_Q (typ) (mA)	0.25	0.775	1.37	10.1	37.7
e_{noise} (nV/√Hz) (1/f corner frequency)	10 (45Hz)	4 (8Hz)	3.3 (150Hz)	2.2 (30kHz)	1.9(10kHz)
Slew Rate (V/µs)	200	230	220	1500	6600
V_{OS} (25°C, Max) (µV)	400	250	175	450	4
V_{OS} drift (typ) (µV/°C)	3	0.5	1.8	0.5	2.6
THD (dB), V_{OUT} = 2 V_{PP} @ 100kHz	-102	-117	-128	-93 (@ 5MHz)	-104 (@10MHz)
Output Voltage Swing (V)	V_{S-} +0.2, V_{S+} − 0.11	V_{S-} +0.25, V_{S+}-0.1	V_{S-}+0.2, V_{S+} − 0.2	V_{S-} +0.2, V_{S+} − 0.2	V_{S-} +1.1, V_{S+} − 1.1
Differential Output Impedance (Ω) f= 100kHz, G= 1)	0.25	0.06	0.02	0.1	0.3
Settling Time (G=1, 0.1%, V_{OUT}=2V step) (ns)	60	40	30	8 (G=2)	10
Temperature Range (°C)	-40 to 125	-40 to 125	-40 to 125	-40 to 125	-40 to 125
Features	Low Iq	Feedback Pin	Feedback Pin	Bare Die Option Feedback Pin Auto Q100	Shutdown

Additional Collateral:
- **SBOA496**: *Optimizing LCR Meter and Impedance Analyzer Front-End Design for Accurate Impedance Measurements*
- **TIDA-060029**: *LCR meter analog front-end reference design*
- **SBOT049:** *Pairing High-speed JFET Amplifiers with Hi-Z DAQ Systems*
- **SBOT050:** *Pairing ADC Drivers with Fully-Differential Input ADCs for Wide Bandwidth Data Acquisition*

Looking forward to your thoughts on the above!

Please visit our High-speed op amps page for additional amplifiers where you can sort by desired supply voltage, channel count, output current, and other amplifier features.

TEXAS INSTRUMENTS