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## ***P-Channel Zero-Threshold MOSFET Array Creates New Possibilities In Energy Harvesting***

[Advanced Linear Devices](#) has announced a zero-gate threshold voltage EPAD p-channel MOSFET array launching what it describes as the industry's first precision sub-threshold circuit. According to the company, the MOSFET currently has the industry's lowest operating voltage of 0.2 V and current of less than 1 nA. These chips enable the operating regions required for the next generations of development in energy harvesting and internet of things (IoT) sensors applications.

The ALD310700A/ALD310700 quad zero-threshold MOSFET is intended for the development of small-signal precision applications utilizing 0.00-V zero-threshold voltage (see the figure). The circuit is ideal for designs requiring very low operating voltages of <+0.5-V power supplies. Allowing circuits to operate in the subthreshold region expands the MOSFET's operating range into never-before achieved signal levels.

The MOSFET simplifies circuit biasing schemes and reduces component counts while providing greater precision and sensitivity of sensor applications for IoT engineers. The p-channel MOSFET can work in conjunction with the ALD n-channel zero-threshold MOSFET devices in matched-sensor applications. The ALD310700A/ALD310700 is the p-channel version of the popular ALD110800A/ALD110800 precision zero-threshold n-channel device.

Together, these two MOSFET series deliver complementary precision performance. These complementary paired devices enable the design of 0.5% precision current mirrors, current sources, and circuits referenced to power or ground sources including differential amplifier input stages, transmission gates and multiplexers.

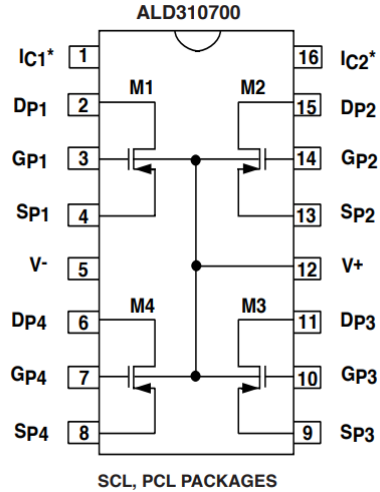
Notable device features:

- Precision offset voltages (VOS): 2 mV max. or 10 mV max.
- Low minimum operating voltage of less than 0.2 V
- Ultra-low minimum operating current of less than 1 nA
- Matched and tracked temperature characteristics.

"These devices operate at a point with 100 times lower power than comparable MOSFET arrays. More importantly they enable the next generation of applications at power levels and precision that were impossible until now," said Robert Chao, president, and founder, Advanced Linear Devices. "These arrays offer circuit designers working on IoT nodes that require matched sensor activity a method to collect power from supercapacitors or deep cycle batteries."

As an example, some potential energy harvesting sources, such as thermal electric generators that yield just 0.2 V, produce such low levels of energy that they are barely useful for driving power in electronic circuitry. The ALD p-channel zero-threshold ( $V_{GS(th)} = 0.00$  V) EPAD MOSFET arrays can be coupled with a low voltage step-up converter to give low-level power sources a greater range as an energy harvesting source.

This device is available in a quad version and is a member of the EPAD Matched Pair MOSFET family. The parts can be ordered directly from ALD or DigiKey and Mouser. Prices start at \$2.00 at 100 pieces. For more information or to download a datasheet visit [www.aldinc.com](http://www.aldinc.com).



\*IC pins are internally connected, connect to V-

*Figure. Intended for low-voltage and low-power small-signal applications, the ALD310700A/ALD310700 features precision 0.00-V zero-threshold voltage, which enables circuit designs with very low operating voltages such as < +0.5-V power supplies where the circuits operate below the threshold voltage of the ALD310700A/ALD310700. A sample device and pinout are shown here.*