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## *Power Op Amp Improves Circuit Protection, Lowers Quiescent Current For Piezo Transducer Applications*

<u>Apex Microtechnology's</u> 200-V, 10-A open-frame power operational amplifier (POA), the MP118FD, is a nextgeneration product design based on a predecessor POA, the MP108FD. The MP118FD mirrors the high-current and high-voltage performance features of the MP108FD, which have driven the product's broad customer acceptance, according to the company. But the development of the MP118FD also capitalizes on customer feedback to provide a more comprehensive set of circuit protection capabilities along with better thermal efficiency (Fig. 1.)

Like its predecessor, the MP118FD is primarily meant for driving piezo transducers and the refinements in the new POA further optimize its abilities in these applications (Fig. 2). In addition to its strengths as a driver for the fine-movement positioning of piezo-electric applications, the MP118FD also is well suited for other applications requiring the accurate delivery of high voltage, including industrial instrumentation, manufacturing automation, reflectometers, and ultra-sound transducer drives.

The MP118 integrates several new layers of onboard circuit protection safeguards. In addition to temperature shutdown and external shutdown, the device provides a new twist that replaces the overcurrent limit functionality with the ability to completely shut down its output drivers when put into an overcurrent situation (Fig. 3.) This will protect the power amplifier from over stress due to excessive current and unsafe power dissipation. A demonstration of the overcurrent shutdown feature is provided by Aniruddha Kolarkar, an Apex Microtechnology application engineer in the MP118FD Product Video. Also new, onboard temperature monitoring circuitry enables the MP118FD to shut down the system before any permanent damage can occur.

The product is compatible with supplies up to 200 V and is capable of 10 A of continuous output current, or 12 A peak. In terms of thermal efficiency, when compared with the MP108FD, this next-generation product exhibits 50% less quiescent current at a very low 26 mA. Moreover, the MP118's open-frame design is capable of 100 W of internal power dissipation.

"Apex high voltage power amplifiers have proven very capable at driving piezo transducers in industrial applications such as inkjet print heads," explains Jens Eltze, strategic marketing manager. "The new MP118FD evolved based on input from these customers who expressed the urgency for greater circuitry protection. The design flexibility of open-frame construction made it possible to deliver a next generation product that not only achieves a new level of circuit safety, but also delivers improved thermal efficiency. "

The MP118FD is currently available in sample quantities for evaluation and prototyping, as well as volume production. Per unit pricing for the MP118FD is \$102.52 in 100-piece quantities. An evaluation kit is currently in development for the MP118FD. Complete product information is online at <a href="https://www.apexanalog.com">www.apexanalog.com</a>. For technical support, contact Apex applications engineering at 800-546-2739, or <a href="https://www.apexanalog.com">apex.support@apexanalog.com</a>.





*Fig. 1. A 200-V, 10-A open-frame power operational amplifier (POA), the MP118FD provides the same high-current and high-voltage performance as the existing MP108FD, but with a more-comprehensive set of circuit protection capabilities as well as better thermal efficiency.* 



*Fig. 2. Simplified schematic for a typical application circuit. The MP118's fast slew rate (65 V/µs) and wide power bandwidth (140 kHz) make this amplifier well suited as a nozzle driver for industrial inkjet printers. With its 10-A output capability, the POA can drive hundreds of nozzles simultaneously.* 





*Fig. 3.* To implement overcurrent shutdown protection, two current sense lines are connected directly across the current sense resistor,  $R_{LIM}$ . For the overcurrent protection to work correctly, pin 28 must be connected to the amplifier output side and pin 27 connected to the load side of the current sense resistor RLIM as shown here. This connection will bypass any parasitic resistances RP, formed by socket and solder joints as well as internal amplifier losses.