

## Can't stand the heat? A hybrid can!



There are 3 main reasons why a thick film hybrid (hybrid) can stand heat:

1. The main substrate of a hybrid is ceramic or stainless steel, not a fibreglass board. Ceramic and stainless steel dissipate heat very effectively.
2. A hybrid is encapsulated with a protective coating that can stand heat up to 100°C.
3. Printed resistors give a hybrid better thermal performance. The resistors stay at the same ceramic or stainless steel substrate temperature.

## Do you have real estate problems? Use a hybrid!



Many of our customers use hybrids to solve real estate problems on their printed circuit boards (PCB's). A hybrid can replace a PCB or a hybrid can be like a mini-daughter board that is mounted on the PCB. A PCB

can have more than one hybrid.

Hybrid's solve real estate problems because resistors, covering the range from fractional ohms to gigohms, can be printed onto a hybrid. Printed resistors on a hybrid can replace surface and through hole resistors used on PCB's.

## What do Hybrids and Pottery have in common?



Making a hybrid is similar to making pottery. Both involve multiple layers of ink and firing.

Apparently the concept of hybrids came from ancient Chinese pottery making processes!

In the March, 2002 Innovation Newsletter, hybrid inks were discussed. Now let us explain what we mean by firing. Different inks are fired at different temperatures, ranging from 500°C to 900°C. We fire using furnaces with a conveyer belt. Resistor inks are supplied in decades of resistance per square of size. For example 10 ohm per square or 10 megohm per square. Shaping the resistors (short and fat or long and skinny) allows different design values to be achieved. With careful management of conveyer belt speed and furnace temperature, firing enables initial resistor value to meet a +/- 20% tolerance. After firing, resistors can be fine tuned down to +/- 0.1% matching tolerance by laser trimming. The printing, firing and trimming of resistor inks is what makes hybrid resistors more precise than surface mount or through hole resistors. The entire process is explained in more detail on our Website.

*If you would like more information on thick film hybrids please call +61 3 9729 2177 or visit [www.hybrid-electronics.com](http://www.hybrid-electronics.com).*

**Size isn't everything! Hybrids come in small packages!**