

## Pad is as Pad Does

Screaming Circuits

I've recently written a bit about soldermask and pads relative to BGAs. In most cases, we recommend NSMD ([Non Solder Mask Defined](#) [1]), or copper pad defined, pad for BGAs. With the BGAs, the NSMD pads will allow the BGA to sag down just a bit more and adhere to both the top and the sides of the pad, resulting in a better mechanical connection. The exception seems to be 0.4mm pitch BGAs with a straight matrix alignment as in the illustration the link above. Ti, with their Beagleboard project found that NSMD pads tended to lead to [bridging](#) [2] and had much better results with SMD pads. [Staggered BGA](#) [3] lands should still use NSMD pads though.

Along with the 0.4mm BGAs, not all parts need or want NSMD pads. International Rectifier has a package called "DirectFET" which is designed to use solder-mask-defined layouts. In this package, the FET source and gate connections are directly on the FET die. The drain connection is a plated copper can directly bonded to the drain side of the silicon die. This system gives a very low-loss capable part with great thermal conduction properties.

Internal Rectifier recommends solder-mask-defined pad layouts. Take a look at their [application note 1035](#) [4] for complete details on designing with this package. I might try the form-factor out myself some time. It always bugs me that a 100 Amp MOSFET might only, in practice, be able to pass a small chunk of that amount of current because the leads or internal interconnects would otherwise melt. The DirectFET package should alleviate much of the melting problem.

Duane Benson

Melting is good if you're talking about toasted cheese

[SOURCE](#) [5]

**Source URL (retrieved on 01/31/2015 - 11:52am):**

<http://www.ecnmag.com/news/2010/10/pad-pad-does>

### Links:

[1] <http://blog.screamingcircuits.com/2010/09/smd-vs-nsmd.html>

[2] <http://blog.screamingcircuits.com/2009/04/04mm-pitch-bga-pads.html>

[3] <http://blog.screamingcircuits.com/2010/07/04mm-pitch-bgas-staggered.html>

[4] <http://www.irf.com/technical-info/appnotes/an-1035.pdf>

[5] <http://blog.screamingcircuits.com/2010/10/pad-is-as-pad-does.html>