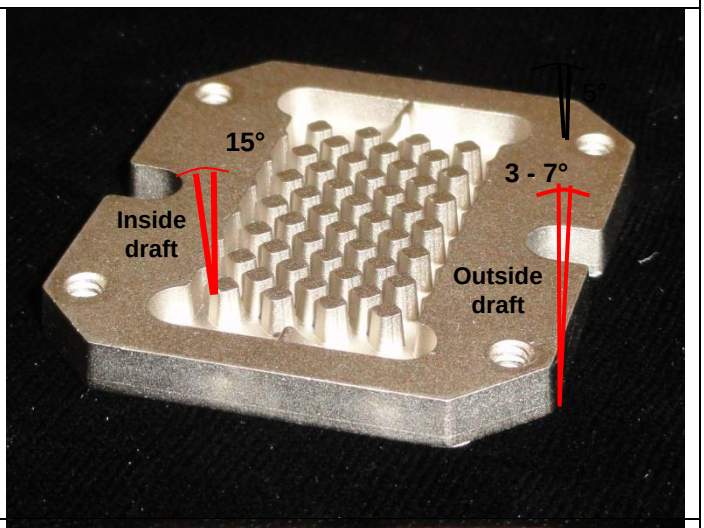
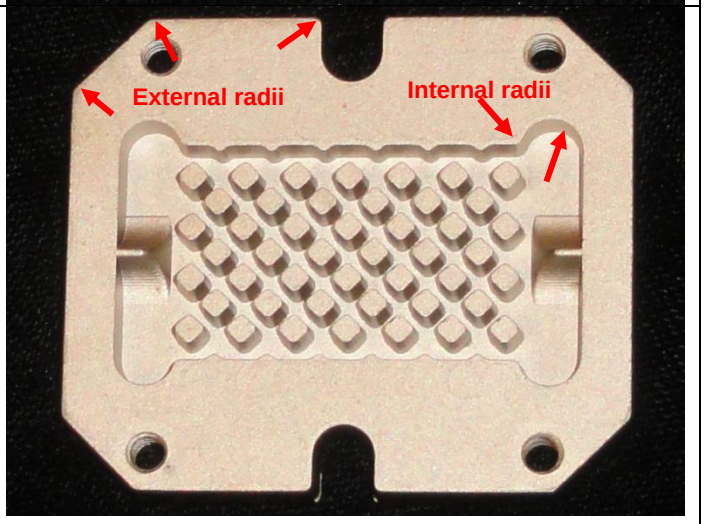
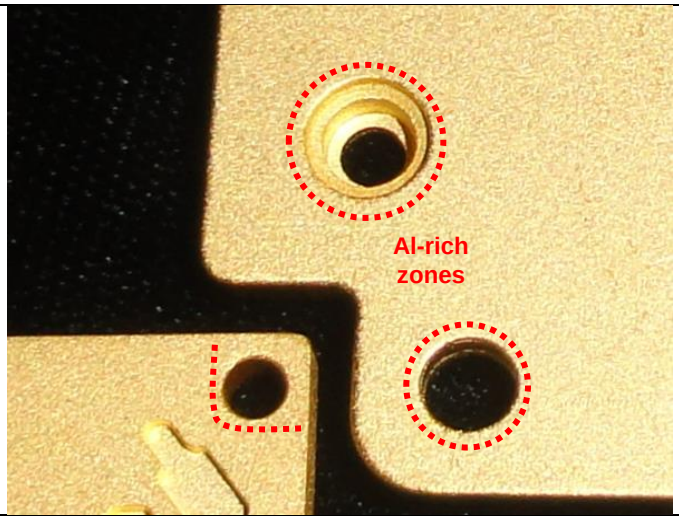
CPS Technologies

# Electronics Thermal Management Solutions

**CPS AlSiC design rules quick reference**

| DESIGN FEATURE | EXAMPLE |
|---|---|
| **Draft Angle**<br>- Required for outside dimensional vertical features and the vertical features of cavity and pedestal within the product.<br>- 3 – 7° outside features<br>- 5 – 15° inside features (cavities and pedestals)<br><br>☑ Consider how drafted feature will influence final product dimensions |  |
| **Radius Features**<br>- Internal feature radii min 0.010 in (0.25 mm)<br>- External feature radii min 0.040 in (1mm)<br>- Typically all cast features of the product have corners with a minimum corner radius or edge break of 0.005 inch (0.125 mm).<br><br>☑ AlSiC products are cast in CNC machined molds and therefore the corner radii are a function of end mill tip diameter as well as the radii at the bases of cavity and pedestals and draft angle addition or subtraction. |  |
| **Small Aluminum Machined Holes**<br>- Holes < 0.16 inch (4mm) are machined in through aluminum rich zone that exceed the drilled hole diameter by 0.030 in (0.8 mm)<br>- A hole close to edge of product may have aluminum rich zones that extend to the outside perimeter of the part.<br>- Location tolerance +/- 0.005 in (0.13 mm)<br>- The minimum hole diameter is 0.030 (0.76 mm).<br>- Steel inserts can be incorporated for tapped holes that require higher torque requirements<br><br>☑ There is no draft angle on machined features. |  |

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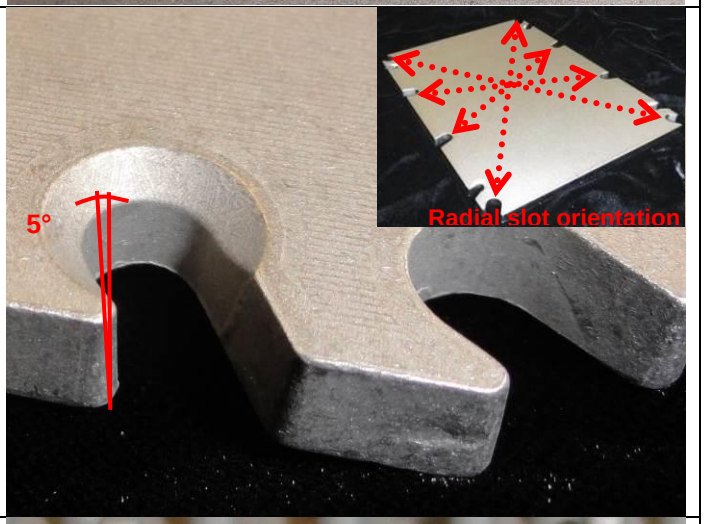
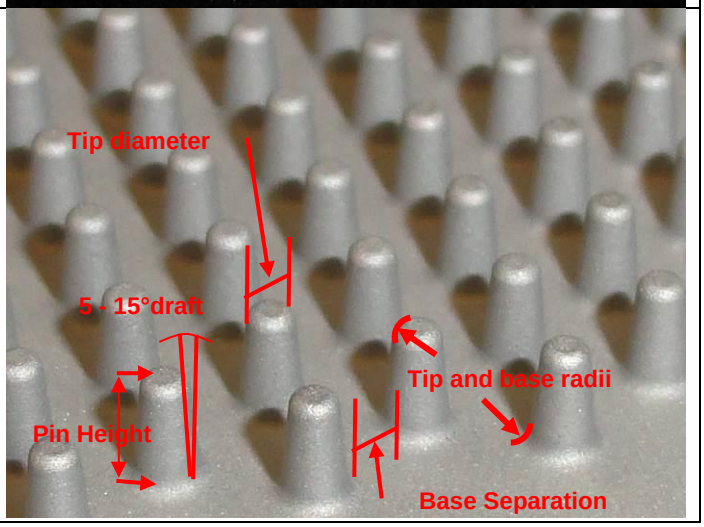
| DESIGN FEATURE | EXAMPLE |
|---|---|
| **Large AlSiC Machined Holes**<br>- Holes greater than 0.16 in (4 mm) can be drilled through the AlSiC composite<br>- AlSiC drilled holes will expose both Al-metal and SiC of the composite.<br>- AlSiC Countersinks are also possible.<br>- Location tolerance +/- 0.005 in (0.13 mm)<br><br>☑ There is no draft angle on machined features. |  |
| **Slots**<br>- Slots can be a low cost alternative to machining holes. No composite is exposed in slots.<br>- Slots are oriented radially to improve process capability<br>- 5° draft is applied to the vertical surfaces<br>- Countersinks can be incorporated in slotted product.<br>- The minimum slot width is a function of part thickness and product design. As a general rule the minimum slot width is 0.080 (2 mm) for every 1 mm in thickness. Please inquire.<br><br>☑ There is no machining with a part with all slots. This lowers manufacturing cost!. |  |
| **Pin Fin Features**<br>- Pins are a net shape AlSiC composite<br>- Pin Height from 0.16 up to 0.31 in (4 – 8 mm)<br>- Pin tip diameter minimum is 0.040 (1 mm)<br>- Pin fin draft angle (5 – 15°) required<br>- Pin base separation minimum 0.040 in (1 mm)<br>- 0.040 in (1 mm) minimum pin tip diameter<br>- Tip and base radius minimum 0.02 in (0.5 mm)<br>- Typical z-height tolerance +/- 0.005 in (0.13 mm).<br><br>☑ Pin fins maximize your surface area for cooling. |  |

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