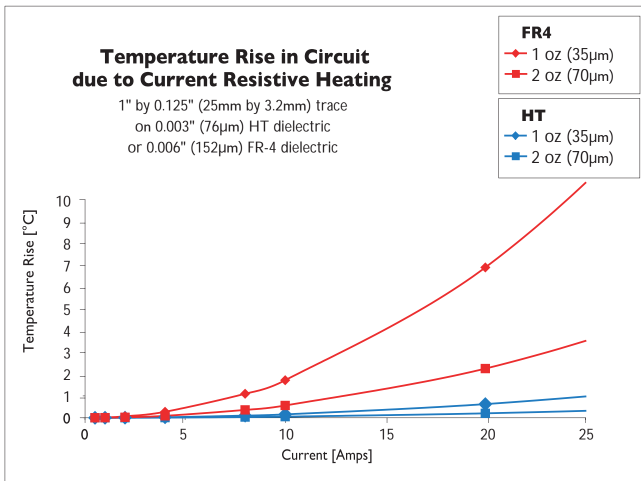
# Selecting A Circuit Layer

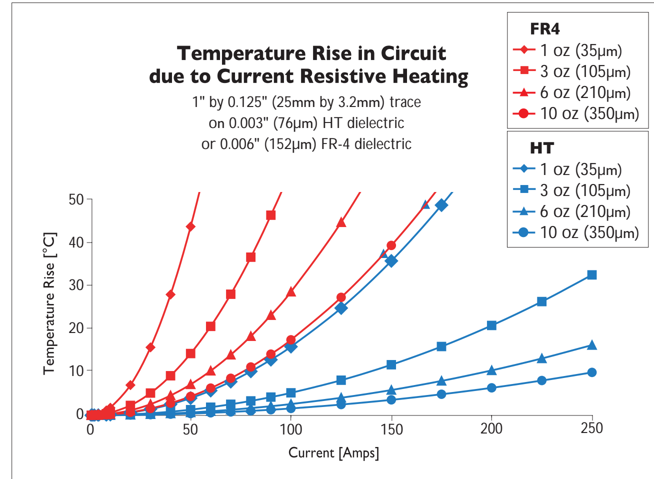
- Current Carrying Capabilities
- Heat Spreading Capabilities
- Flatness In Relationship To Thickness

## Current Carrying Capabilities

The circuit layer is the component-mounting layer in Thermal Clad. Current carrying capability is a key consideration because this layer typically serves as a printed circuit, interconnecting the components of the assembly. The advantage of Thermal Clad is that the circuit trace interconnecting components can carry higher currents because of its ability to dissipate heat due to $I^2R$ loss in the copper circuitry.




*Temperature rise comparison graph depicts the significant difference between Bergquist Dielectric HT and FR-4. Additional comparison charts regarding all Bergquist Dielectrics are available. Note: No base metal used in calculation.*

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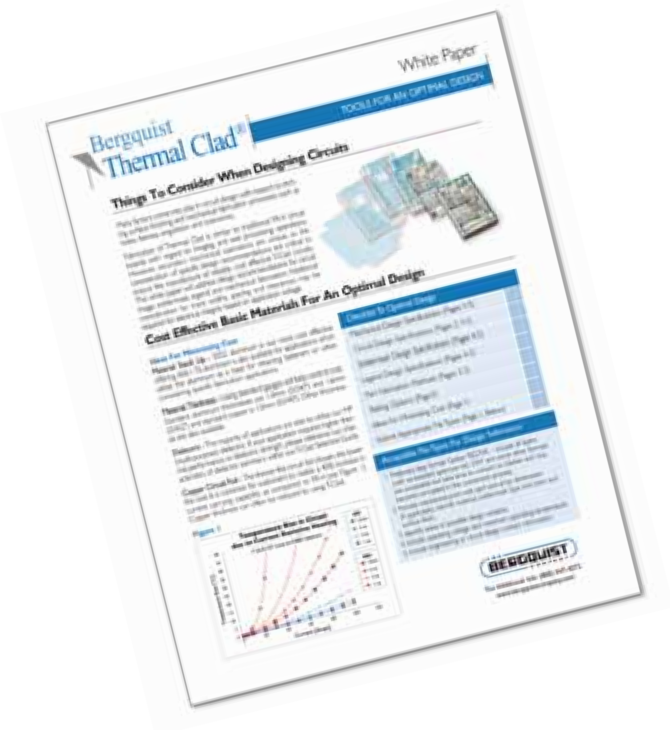
### *Want a cost effective, optimized circuit design?*

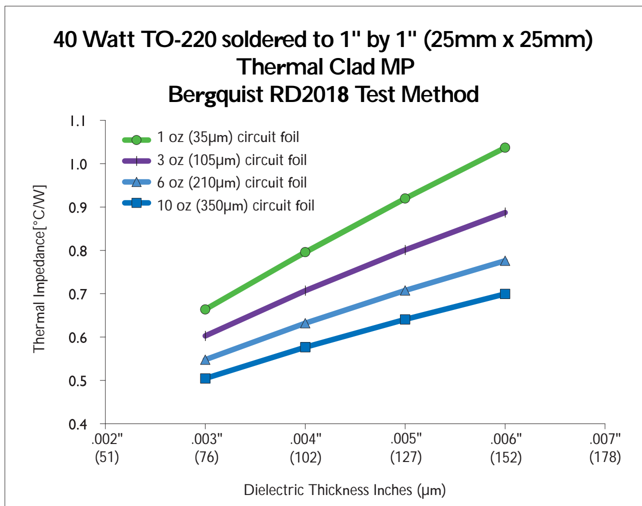
*This Thermal Clad White Paper addresses specific design recommendations including mechanical, circuit, soldermask, fabrication and test options to help optimize your design.*

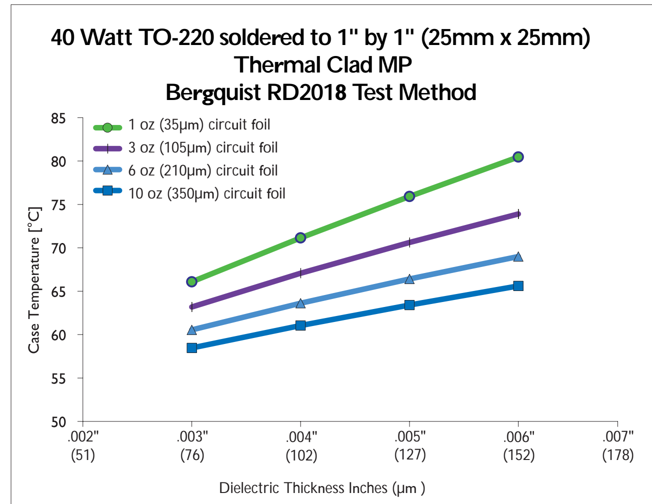


## Heat Spreading Capability

Dielectric thickness and foil thickness both influence heat spreading capability in Thermal Clad. Heat spreading is one of the most powerful advantages derived from IMS. By increasing copper conductor thickness, heat spreading increases and brings junction temperature down. In some cases very heavy copper can be utilized along with bare die to eliminate the need for a standard packaged component.

The following graphs depict both the thermal impedance value and case temperature when relating dielectric and foil thickness.




## Standard Circuit Layer Thickness

| MATERIAL | WEIGHT (oz/ft$^2$) | REFERENCE inches | THICKNESS µm |
|---|---|---|---|
| Copper (Zinc Treatment) | 1 | 0.0014 | 35 |
| | 2 | 0.0028 | 70 |
| | 3 | 0.0042 | 105 |
| | 4 | 0.0056 | 140 |
| | 5 | 0.0070 | 175 |
| | 6 | 0.0084 | 210 |
| | 8 | 0.0112 | 280 |
| | 10 | 0.0140 | 350 |

*NOTE: Copper foil is NOT measured for thickness as a control method. Instead, it is certified to an area weight requirement per IPC-4562. The nominal thickness given on 1 oz. copper is 0.0014"/35 µm.*

*CAUTION! Values in IPC-4562 (Table 1.1) are not representative of mechanical thickness.*

*Ultra Thin Circuits utilizing Bond-Ply® 450 PA. See pages 11 and 18 for additional information.*