



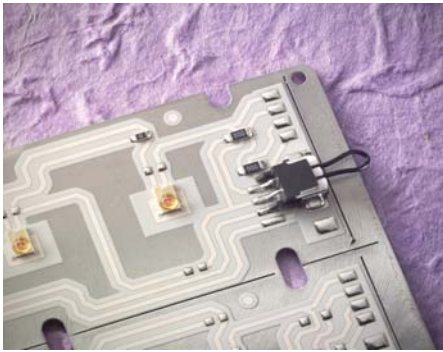
## Insulated Aluminum Materials System

IAMS is a Thick Film Materials System that Heraeus Materials Technology LLC Thick Film Division designed as an insulation system for aluminum substrates. All materials can be fired at less than 600°C, and it is compatible with 3000, 4000, 5000 and 6000 series aluminum substrates.

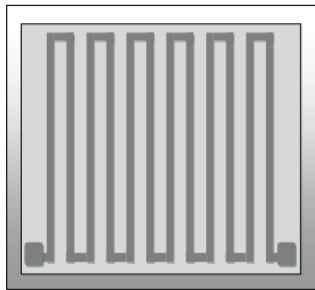
Its unique glass system minimizes bowing on aluminum while providing high dielectric breakdown strength and good thermal conductivity.

### Heat dissipation for High Power Application

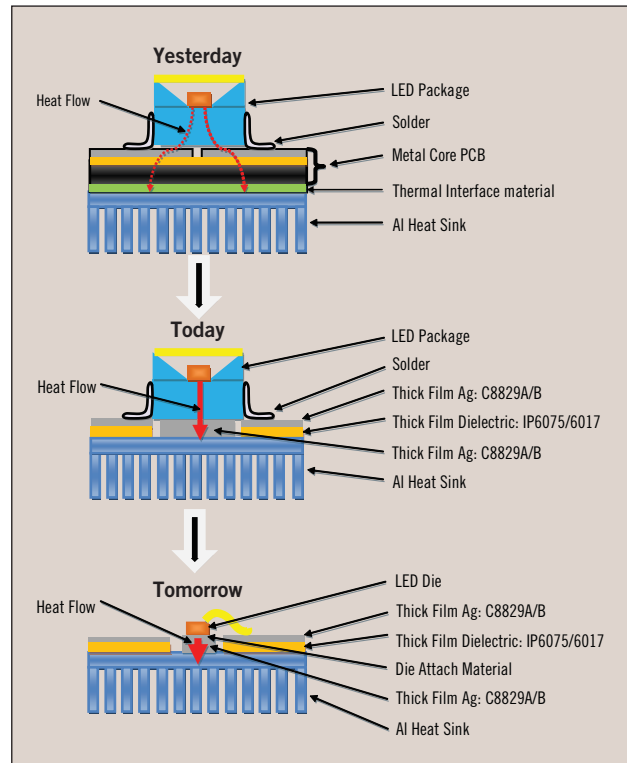
- High Power LED substrates (>1W input)
  - General Illumination
  - Signals and Signs
  - Displays
- Concentrated Photovoltaic
- Power Electronics
- Heaters



High Power LED  
(Compliments: Norbitech)



Heater Example



Evolution of Chip on Heat Sink

#### IAMS (Thick Film system) Advantages

(Versus subtractive using MCPCB)

- Selective deposition
- Low design change costs
- Versatility
- Single part system
- Inert glass/metals system

#### Material Comparison with Metal Core PCB

|                         | MCPCB                             | Heraeus System              |
|-------------------------|-----------------------------------|-----------------------------|
| Base Plate              | Al or Cu (1.2 mm or thicker)      | Al (1.2 mm or thicker)      |
| Dielectric Layer        | Filled Epoxy 75-300 $\mu\text{m}$ | Glass 40 - 75 $\mu\text{m}$ |
| Circuit Layer           | 1 - 10 Oz. Cu foil                | 8 - 12 $\mu\text{m}$ Ag     |
| Thermal Cond.           | 1 - 2 W/m-K                       | 1 - 2 W/m-K                 |
| Break Down Voltage      | 800 - 2000 V/mil                  | ~ 1000 V/mil                |
| Typical Cost (\$/sqin)* | \$0.30 - \$0.50                   | \$0.25 - \$0.35             |

\* Dependent on layout

#### Materials

##### Insulating Paste:

| Item   | Color | Description                       | Aluminum grade               | Process                            |
|--------|-------|-----------------------------------|------------------------------|------------------------------------|
| IP6075 | Gray  | Dielectric for Aluminum substrate | 3000, 4000, 5000 6000 series | 550 - 600°C dwell time 2 - 10 min. |

##### Conductor:

| Item   | Description                        | Process                    |
|--------|------------------------------------|----------------------------|
| C8829B | Low temperature Ag conductor       | 550°C Dwell time 2 - 3min. |
| C8710M | Unfritted thick print Ag conductor | 550°C Dwell time 2 - 3min. |

##### Cover Coat:

| Item    | Color              | Description           | Process                               |
|---------|--------------------|-----------------------|---------------------------------------|
| PD5200  | White, blue, black | Epoxy insulator       | 200°C 30 min. or 150°C 60 min.        |
| UVD5217 | Blue               | UV curable cover coat | 200 W/in Hg lamp, cure time <1 second |
| IP6075  | Gray               | Dielectric glass      | 550 - 600°C dwell time 2 - 10 min.    |

##### Resistor Paste:

| Item            | Description                 | Process                         |
|-----------------|-----------------------------|---------------------------------|
| PCR12000 Series | Low fire, low ohm resistors | 550-580°C Dwell time 5 - 15min. |

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