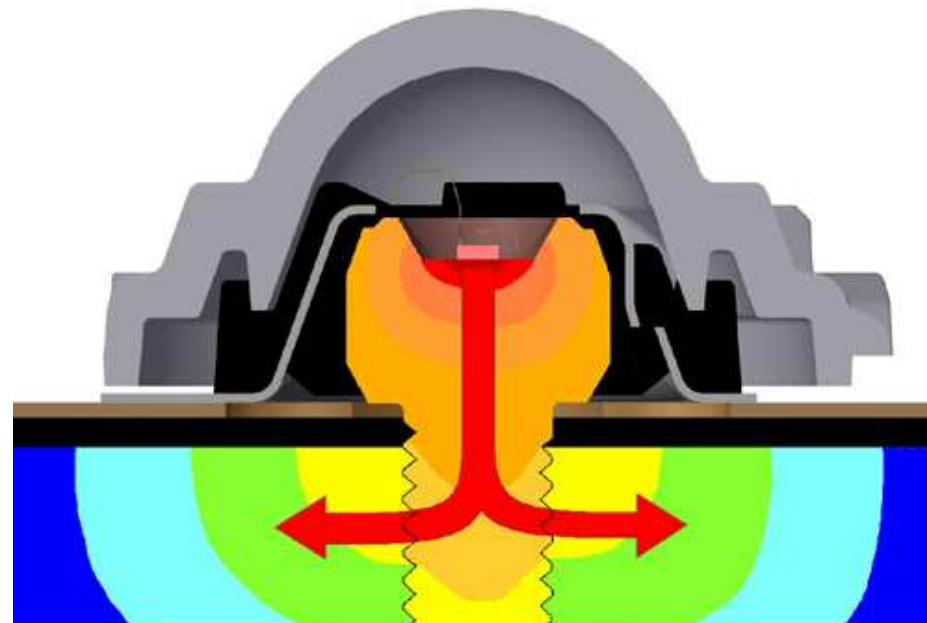




Lambda

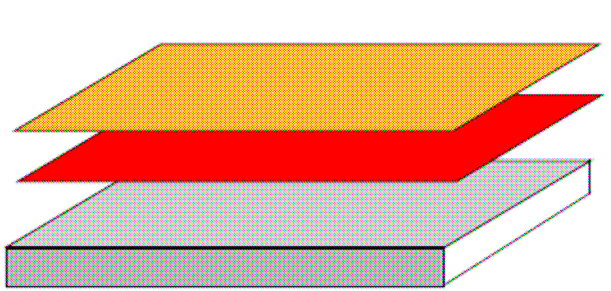
Isolas Insulated Metal Substrate





What is an IMS?

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Copper

standard copper foil from 35 up to 400 μm

Dielectric

thickness from 50 up to 200 μm

Metal: Aluminium

thickness from 0,60 mm up to 3,2 mm



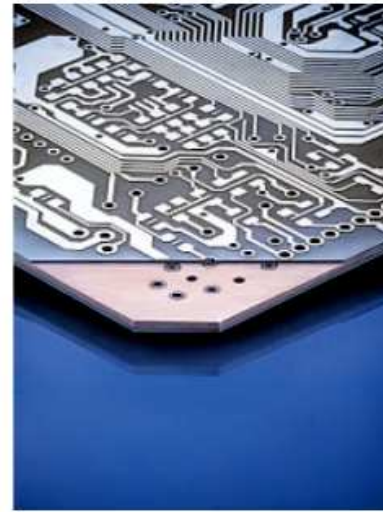
Applications

Automotive



Foto: Daimler Chrysler AG / Isola

Heat Sink

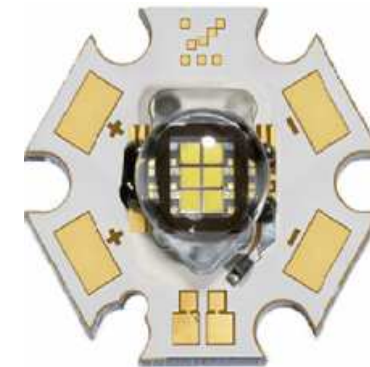


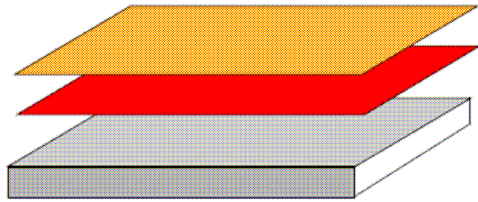
Industrial Control Unit



Foto: Siemens

LED





Dielectric can be:

- ➡ FR4 epoxy resin with glass cloth DE104
- ➡ FR4 filled PCL370HR
- ➡ High T_g and temperature resistant IS410
- ➡ Ceramic filled high T_g IS450

The major characteristic that makes the difference

among the above products is the **THERMAL CONDUCTIVITY!**



λ Values of Prepregs

Class	Product	Thermal Conductivity λ [W/mK]
Standard	DE104	0,24
Filled	PCL370HR	0,40
High T _g	IS410	0,50
Thermal Conductive	IS450	1,0



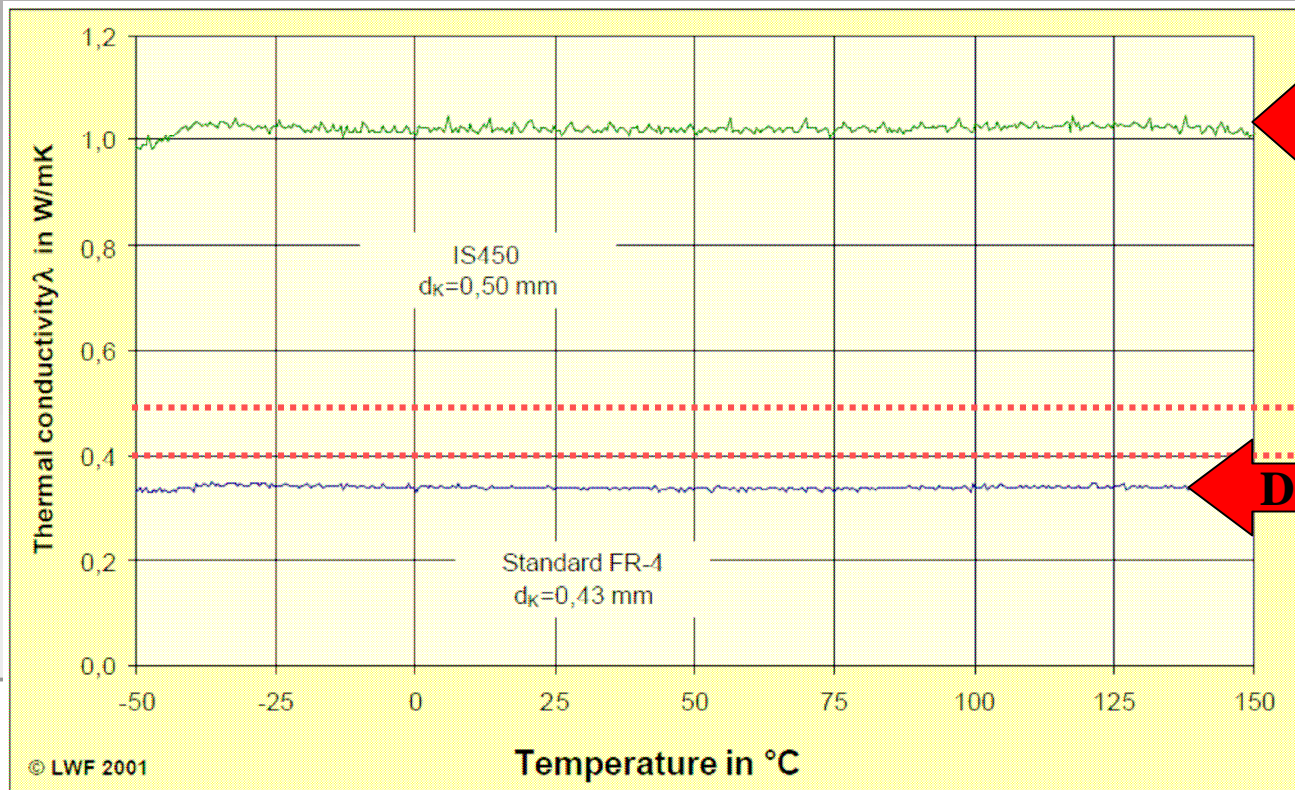
λ Values of Prepregs

DE104: Standard Material

$\lambda = 0,24 \text{ W/mK}$

IS450: high- T_g Epoxy System with special filler

$\lambda = \sim 1,0 \text{ W/mK}$

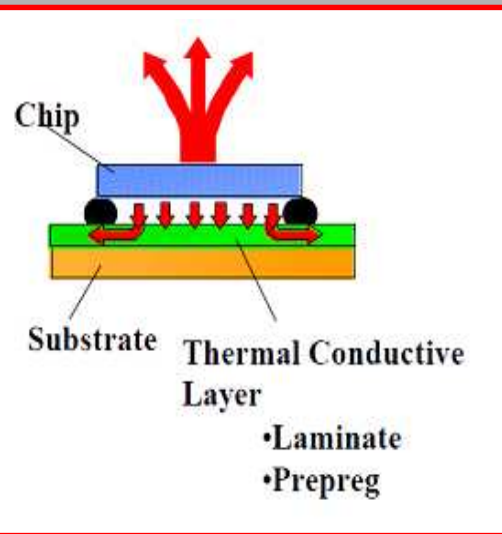




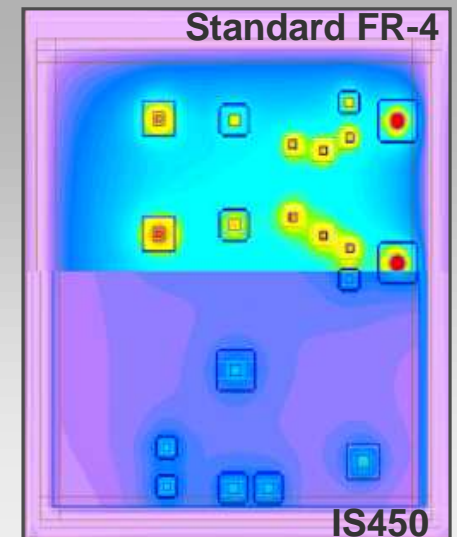
IS450 effectiveness

IS450: $\lambda = 1,0 \text{ W/mK}$

➡ compared to standard Prepreg **much better heat distribution** at the surface and inside the board



- hot spots are reduced significantly
 - heat is transported through the board much faster
- ➡ both have a strong impact on the thermal reliability of a PCB





IMS - Aluminium Types

Alloy	ISO	Density [kg/m ³]	Thermal Expansion [μm/mK]	Thermal Conductivity [W/mK]	Heat Capacity [J/kgK]	Elasticity Modulus [Mpa]	Rigidity Modulus [Mpa]	Electrical Conductivity %IACS
5052	AlMg2,5	2630	23,7	138	901	70000	26300	35
5754	AlMg3	2680	23,7	132	897	70500	26500	32,5

5052 Asian Product

5754 European version of 5052 with equivalent properties
switch to this aluminium due to availability problems of 5052



IMS - Aluminium Types

standard aluminium:

Aluminium 5754 1,5 mm 1250 x 1100 mm

(other thicknesses and formats upon request)

Application of a protective foil on both sides of the laminate is possible.



Foil is

- temperature resistant (short time 180°C)
- chemical resistant



Measured λ Values of Laminates

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Designation	Construction	Thermal Conductivity λ [W/mK]
Lambda104	35 μ m Cu 1080 AT01 1,5mm Al	5,0
Lambda104	35 μ m Cu 106 AT01 1,5mm Al	6,35
Lambda450	35 μ m Cu 1080 IS450 1,5mm Al	11,98
Lambda450	35 μ m Cu 106 IS450 1,5mm Al	14,73



Calculated λ Values of Laminates

Designation	Construction	Thermal Conductivity λ [W/mK]
Lambda370HR	35 μ m Cu 50 μ m PCL370HR 1,5mm Al	~7,01
Lambda410	35 μ m Cu 50 μ m IS410 1,5mm Al	~8,70



IMS - UL

On going **UL Approval** for the Metal-Based Laminates with **Lambda370HR**

This will take roughly till **November 2011**.

the necessary class is: **UL 746E** Section 20 Metal-Based Laminates

The qualification will include materials with following built-ups:

0,6 mm - 3,20 mm	aluminium
0,06 mm - 0,200 mm	dielectric (PCL370HR)
18 µm - 400 µm	copper