

# Technology Choices



W.Wissink  
THE SAFEST CHOICE  
**TELEREX**

# Let's take a luminaire



TOLERANCE: ISO 2768-M (EXCEPT OTHERWISE MENTIONED)		FINISHING		DIMENSION: MM	 Mechatronix
1	01	DATE	PROJECTION ANGLE	SCALE: DO NOT SCALE	
2					DESCRIPTION
3					CUSTOMER NUMBER
4			MATERIAL		DRAWING NUMBER
5					
6					
7					

ModuLED Mega Assembly

# Selection criteria

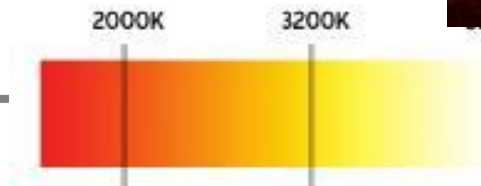


Lifetime

temperature —



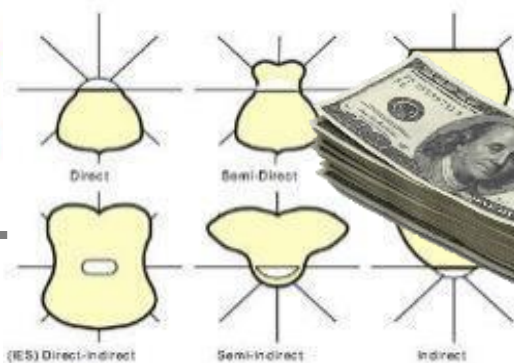
Color  
temperature



Design —



Light  
distribution

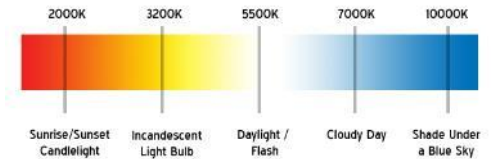
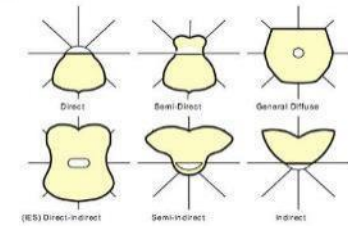
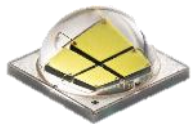
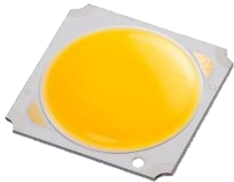


Tightness



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# From component to choice

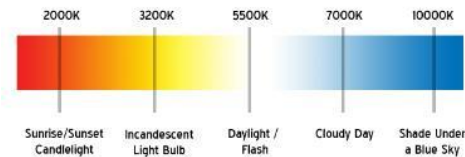
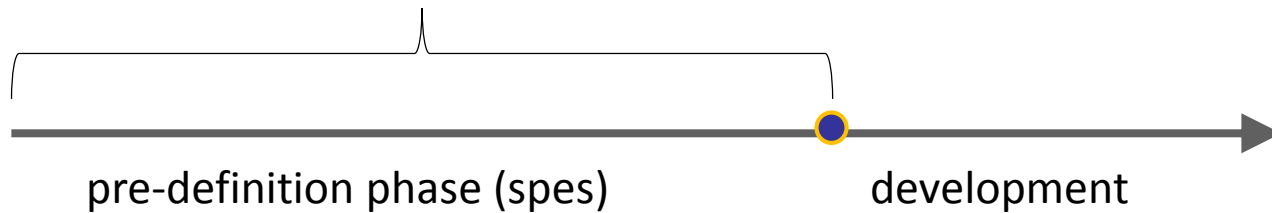


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# Questions you should ask

**TRUST = SPEED**


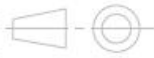


**DESIGN**

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# Let's take a luminaire

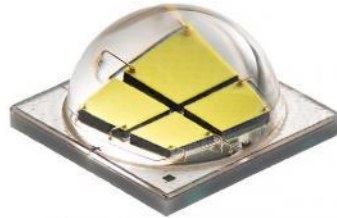


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ModuLED Mega Assembly

# Lens & reflector

Primary lens



## Purpose:

Increasing efficiency in getting the light out of the die

Secondary lens



## Possible criteria:

- PMMA standard:  $< 85^{\circ}\text{C}$
- PMMA-HT  $< 120^{\circ}\text{C}$
- PMMI/TT70  $< 160^{\circ}\text{C}$
- PC (PolyCarbonate)  $< 120^{\circ}\text{C}$
- Silicone  $< 250^{\circ}\text{C}$

# Lens or reflector?



- ☺ For small light sources  
best choice
- ☹ Large = expensive
- ☺ guiding



- ☺ large → cost aspect
- ☹ Low robustness
- ☺ Position LED less critical
- ☺ design



# Lens & reflector: application driven

## LENS



## APPLICATION



## CRITERIA

Color mixing


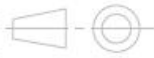
Design  
Cost

Robust  
IP rating  
High lumen

Asymmetric  
guidance


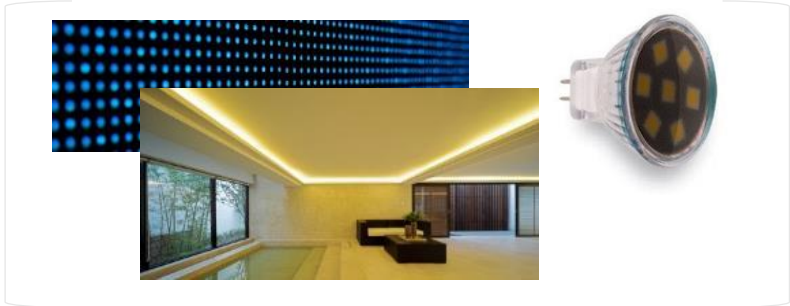



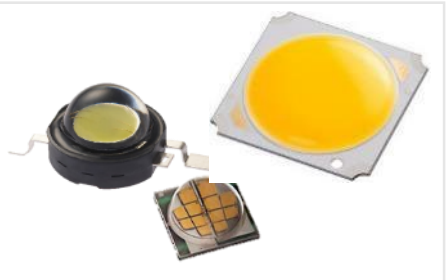

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ModuLED Mega Assembly

# LED: offer and criteria

Color rating	Color temperature	Lifetime	Lumenoutput	Price
<p>LOW POWER <math>\approx 0,1\text{W}</math></p>				
<p>MID POWER <math>0,1-0,5\text{W}</math></p>				
<p>(SUPER) HIGH POWER <math>&gt;0,5\text{W}</math></p>				

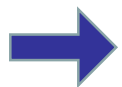
# LED: Application retail/shop

Pure white, crisp white



## Fluorescent Whitening Agents

- Absorb photons near UV & deep blue
- Re-emitted photons longer wavelength



COB light in deep blue spectrum activates FWA's

# LED: Application horticulture

## Color

### Greenhouses:

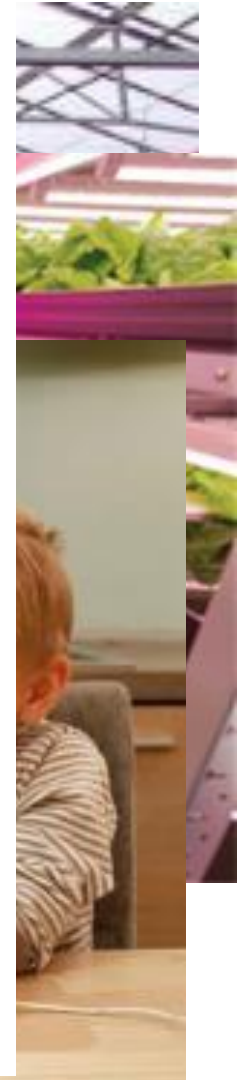
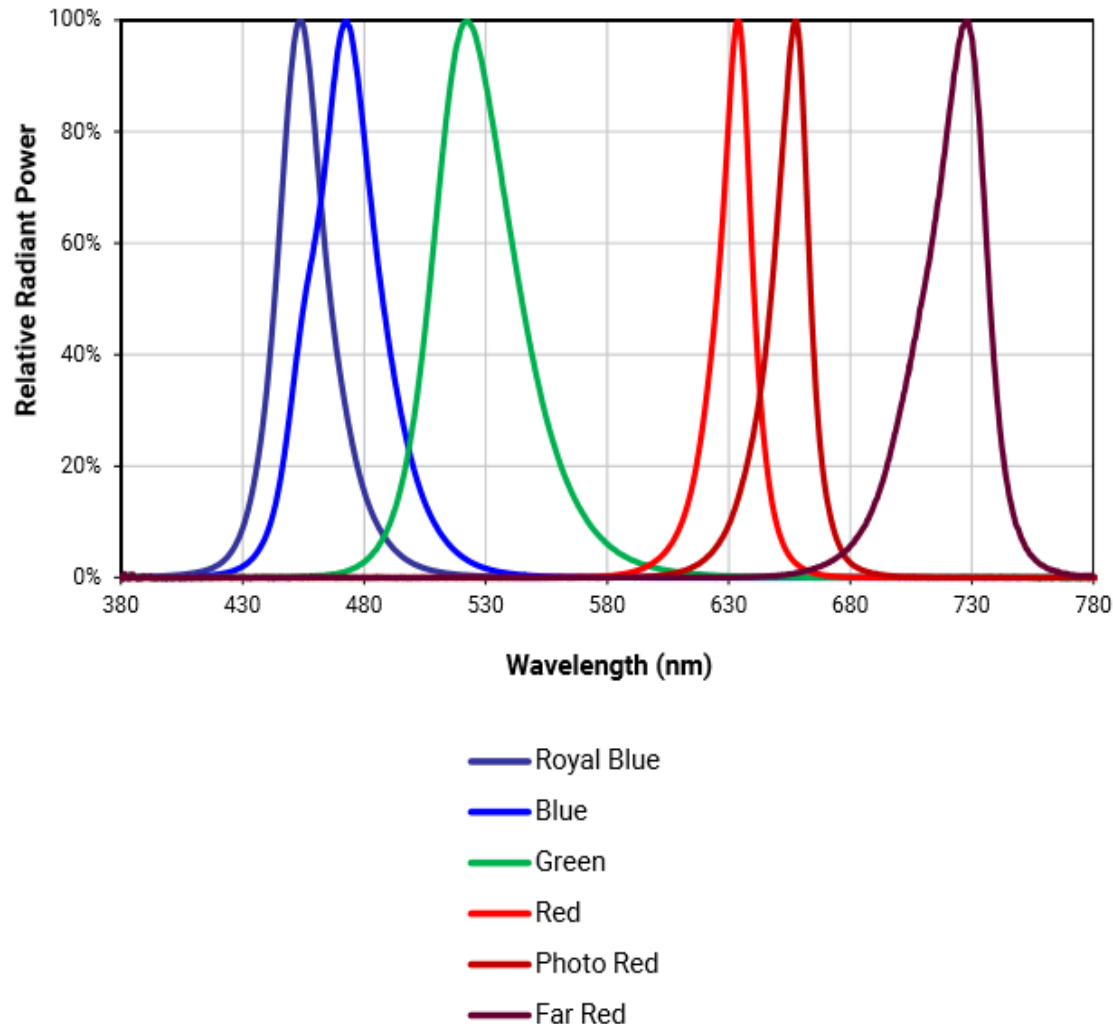
- High distance
- High lumen c
- All types of p vegetables, fl

### Vertical Farming:

- Numerous of
- Small plants a vegetables

### Consumer:

- Small plants, i food





# LED: application healthcare

## Low Color Temperature (3000K):

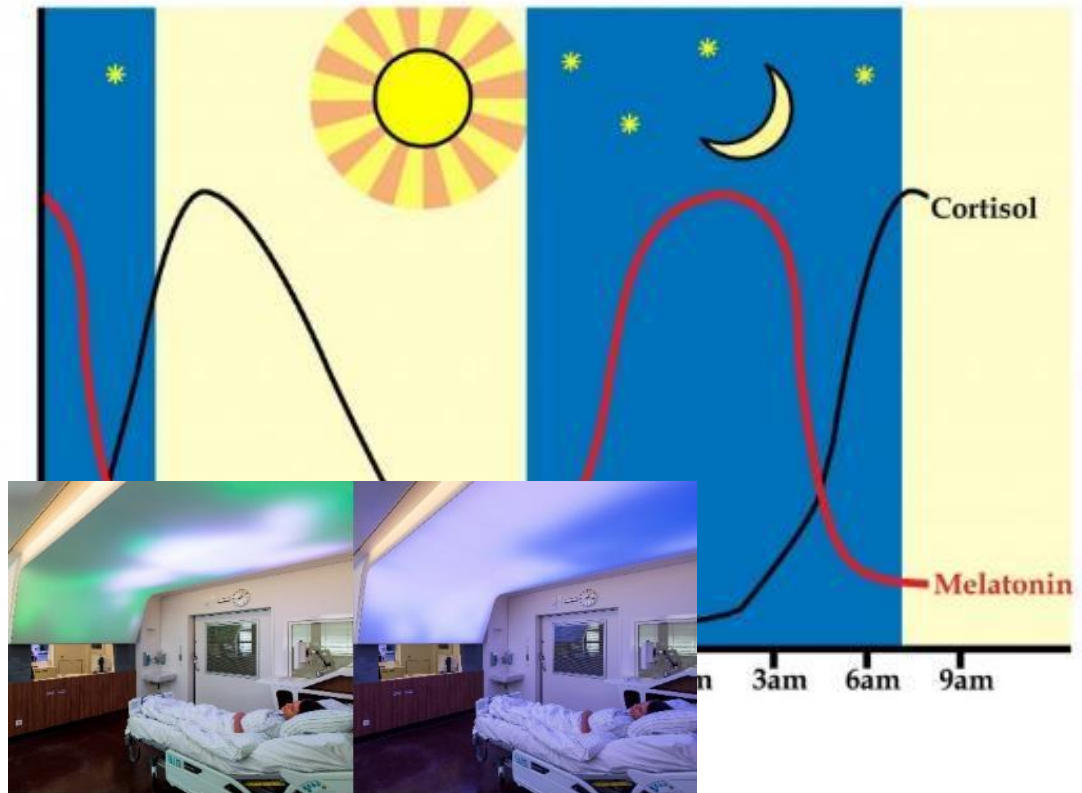
- increase melatonin
- relaxation

## High Color Temperature (6000K):

- Suppresses melatonin
- Alertness & productivity


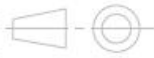
## No daylight:

- Daylight simulation  
→ alzheimer



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# LED PCB: common technology



LED Driver/Carriers	FR4	PCB Via's	MCPCB	Al2O3	ALN
Thermal conductivity	0,05 W/m.K	< 7,5 W/m.K	<4 W/m.K	24 W/m.K	170 W/m.K
High Voltage	2000 V	100 V	2000 V	20 KV	15 KV
Application	low power	High power	Mid power	Very high Power	Ultra High Power
Temperature	< 140 °C	< 140 °C	< 180 °C	> 500 °C	> 500 °C
Green/Lifetime	chemical	chemical	polymer	oxides (green)	oxides (green)

This is only an indication materials, because there are more materials available but not used a lot yet !



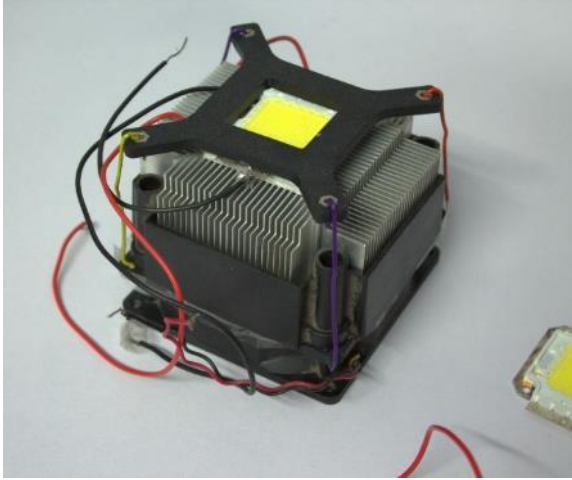
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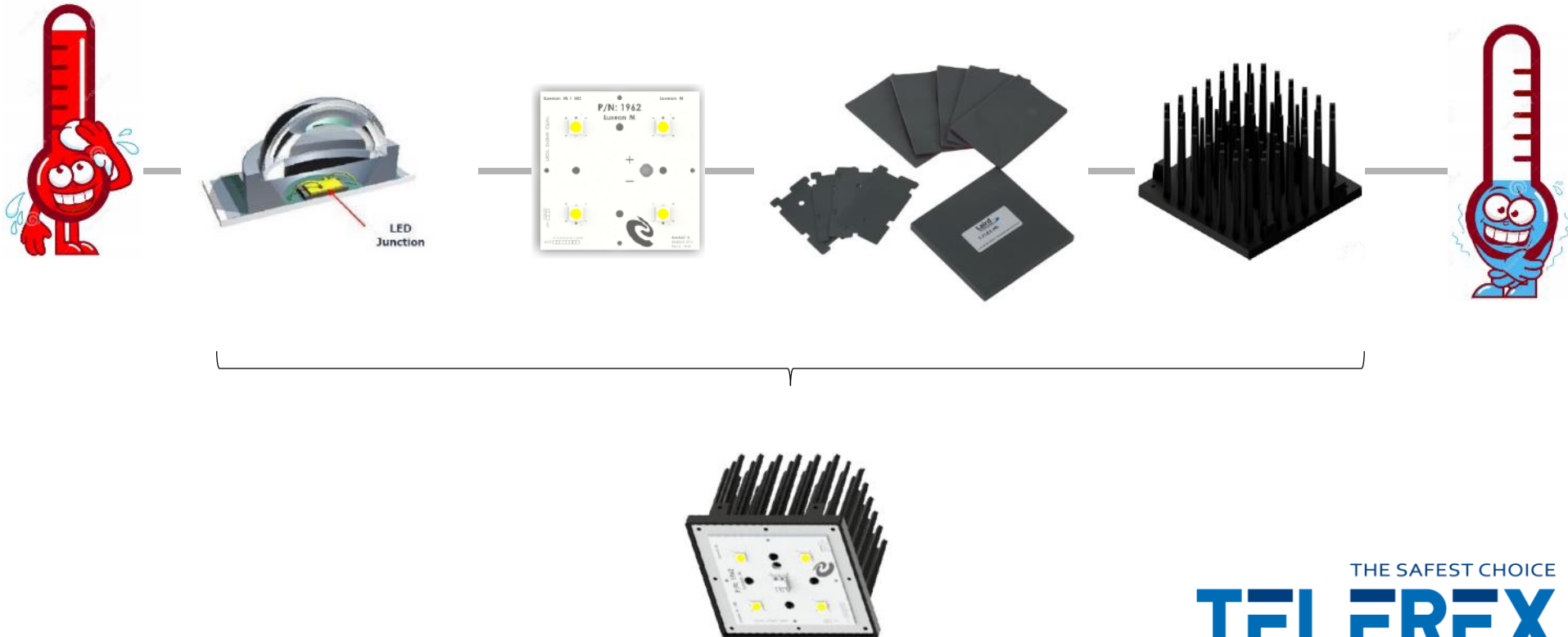
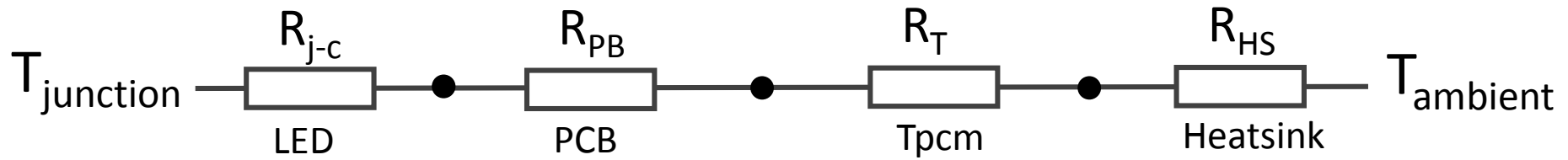
ModuLED Mega Assembly

# Heatsink: thermal management



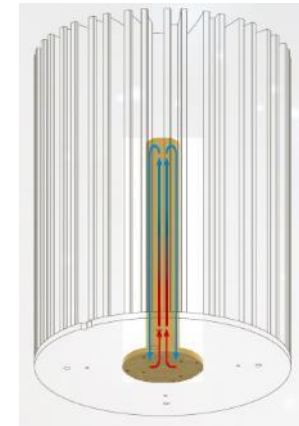
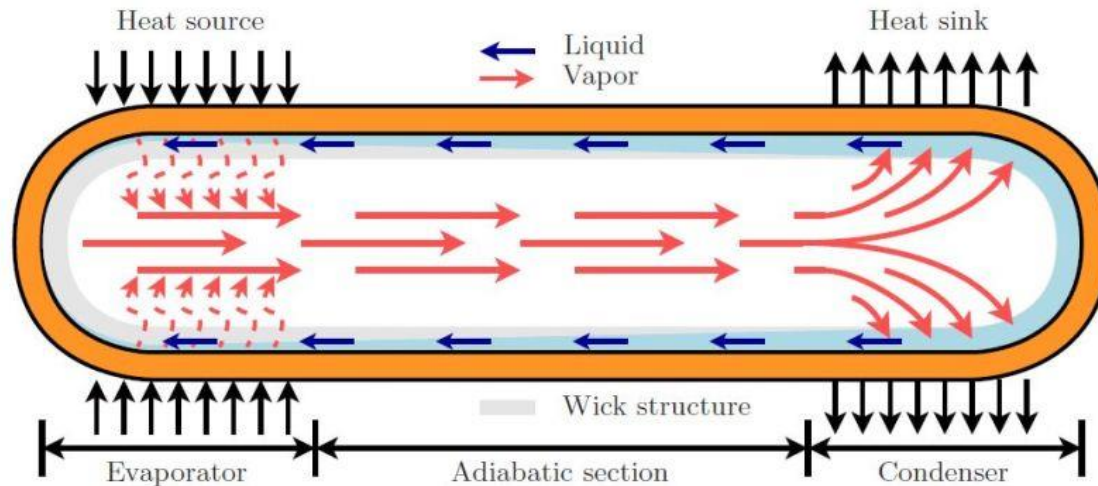


# Heatsink: thermal management



# Heatsink: design


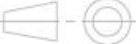
- Passive cooling: high power with heatpipe



- Active cooling: Fan sink, Liquid, Peltier, synthetic jet,..
  - More used in special industrial environments or applications

# Let's take a luminaire

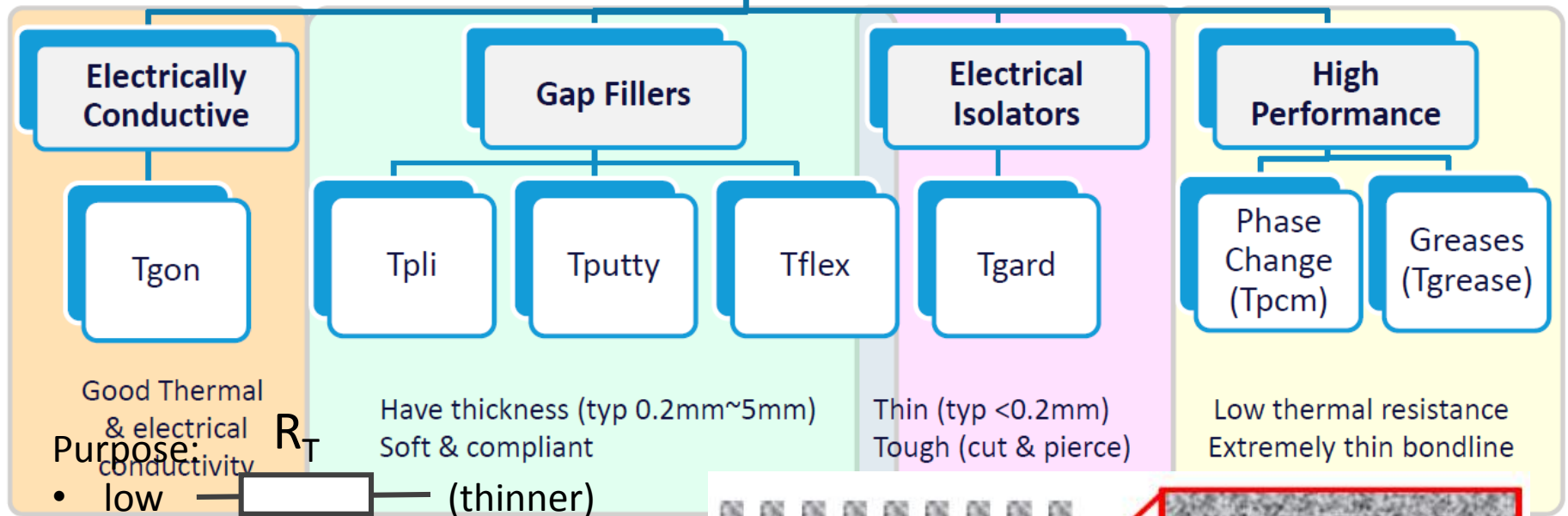


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# Thermal Interface Materials (TIM)

## Thermal Interface Materials



Purpose:  $R_T$

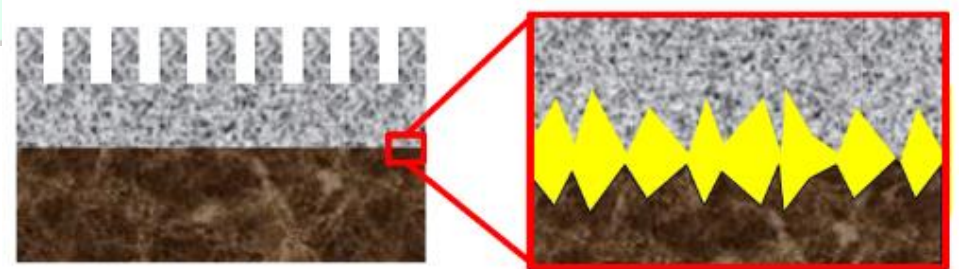
• low

Tpcm

- 2 x thinner  $\approx$  2 x cheaper

Best choice: **Tpcm-585**

- Handling
- 0,127mm thickness and 3,8W/mK



the right design for it's application

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