



Design-in attention points and potential risks of COB vs. HP LEDs L2s in outdoor applications

BG LED, BU LED Electronics

C. Sismanidou

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Design-in attention points

Before designing in another LED technology consider if you are selecting the right LED for the right application

- **Are you comparing specifications for the same reference Temperature ?**

Many CoB products specify performance at Tjunction instead of Tcase. This implies that a lower Tc is required, therefore larger and more expensive heatsinks i.e. Tj specification of 85°C requires 10-15°C lower Tc point.

- **Silver mirror corrosion**

CoBs contains silver-mirror which is sensitive to pollution (i.e. traffic, factory) and or corrosion when exposed to humidity and certain Volatile Organic Compounds [VOCs] and can result in continuous degradation of the lumen output or the color point of the COB.

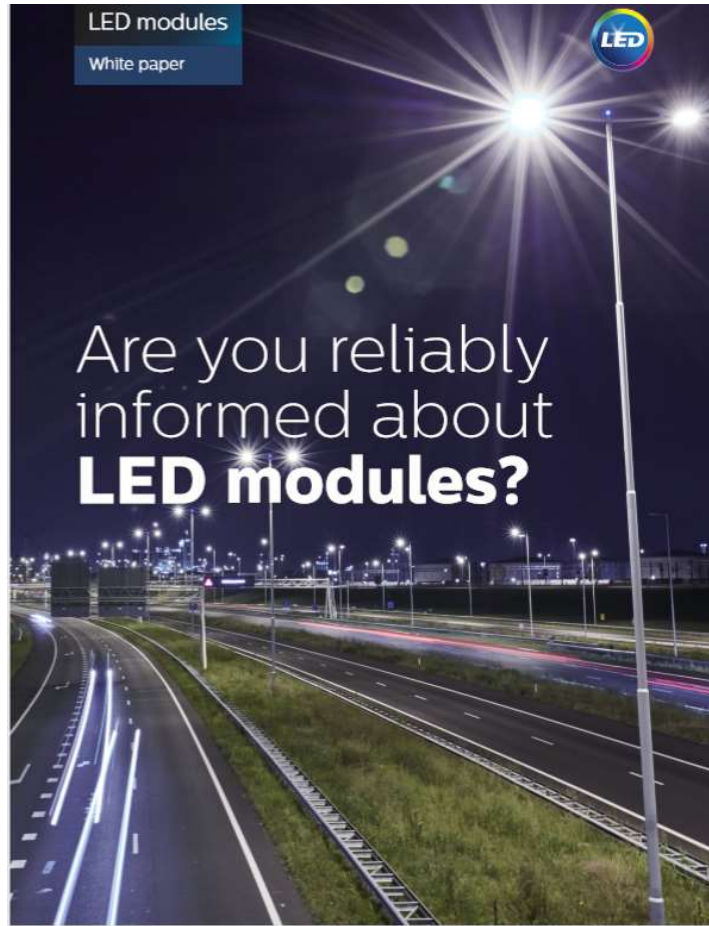
- **Surge performance**

COBs don't have a surge protection circuit. High risk for catastrophic failures in surge events.

- **Lifetime is not only LM80**

Many LED module failure modes cannot be addressed via the use of LM80 data, or calculations via the TM21 method, see next slide.

Lifetime is not only LM80 data



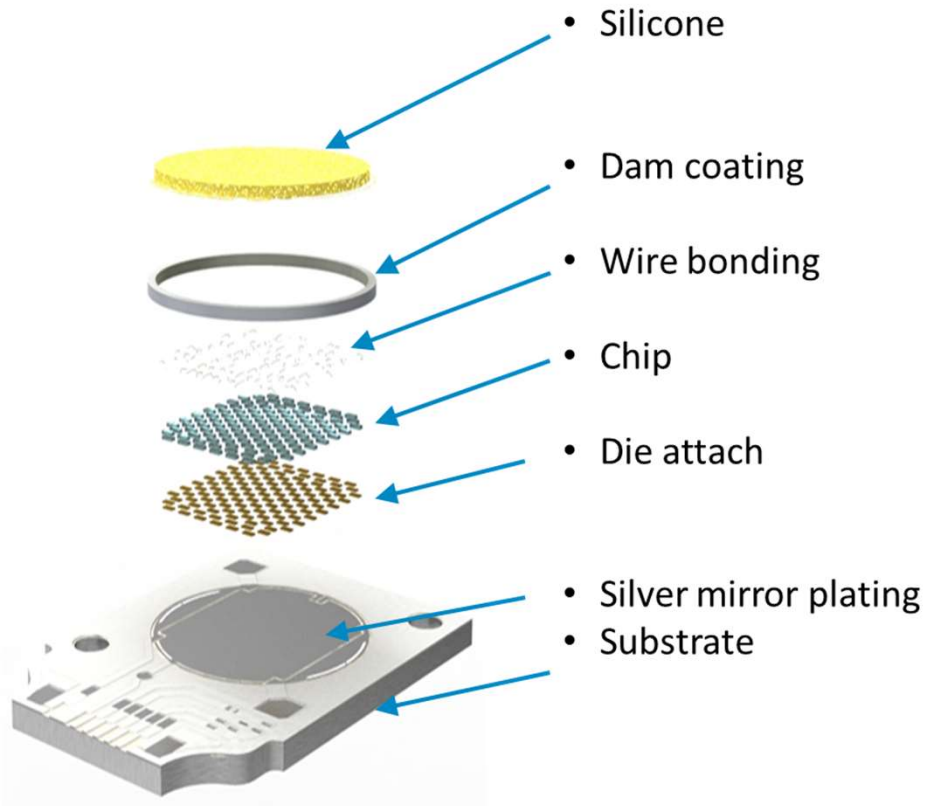
This paper provides actual examples of LED module failure modes that cannot be addressed via the use of LM80 data, or calculations via the TM21 method, therefore demonstrating the risks faced by OEMs when the reliability of an LED module is not considered in a manner as thorough as applied by the [Philips LED module reliability program](#).

Example of failures identified by the [Signify LED module reliability program](#)

Potential risks with CoBs vs. HP LEDs

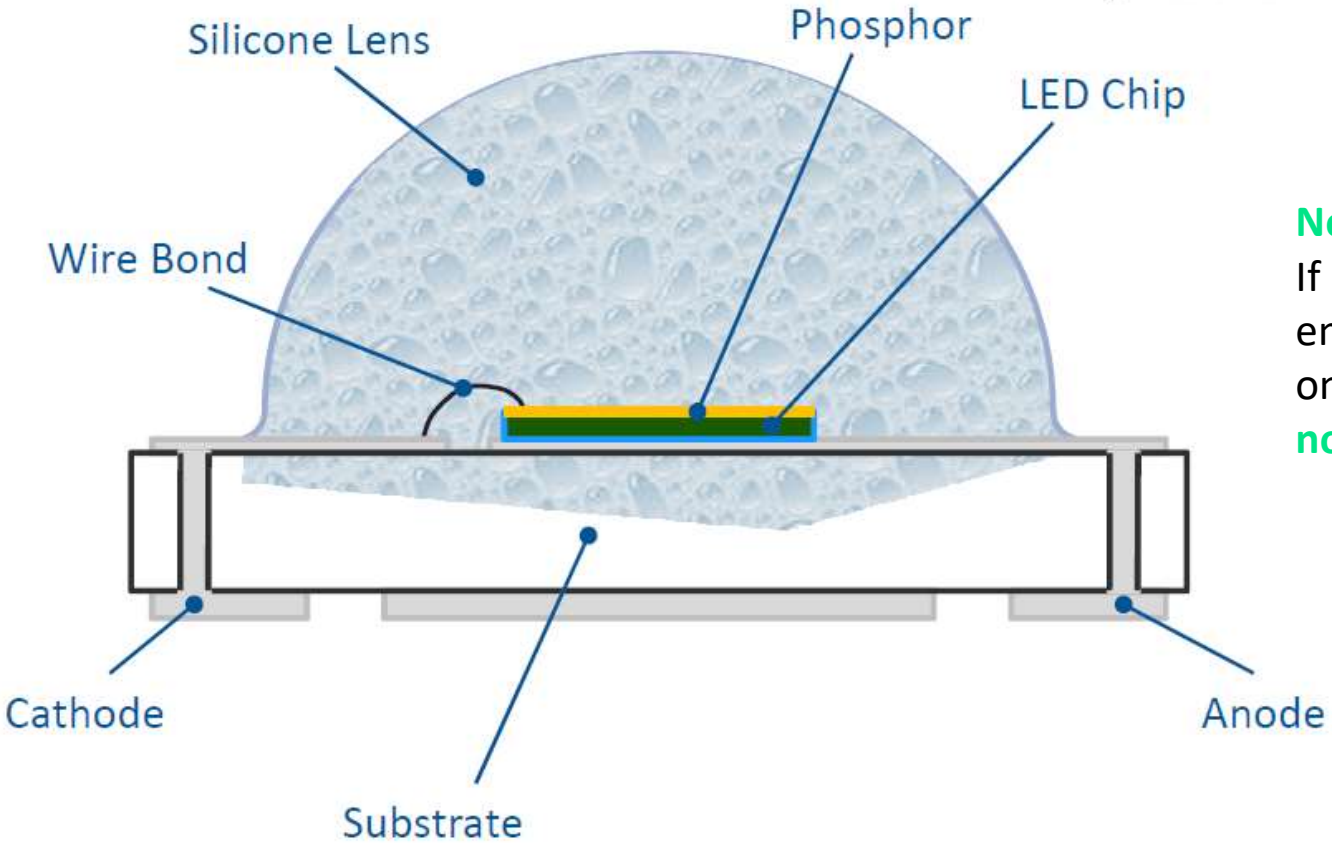
- Lumen decay and color shift due to **silver mirror corrosion**. COBs are sensitive to silver mirror corrosion and on contrary to HP LEDs they show **continuous performance degradation**.
- Performance degradation or catastrophic failures as a result of **surge sensitivity**
- Risk of wire-bond **fatigue at low temperature operation** (<-20°C)
- **Overcurrent and overheating**

Typical CoB design



In the current market COBs containing a **silver-mirror plating**. It is **sensitive to pollution and or corrosion** when exposed to Oxygen and certain Volatile Organic Compounds [VOCs]. Examples of VOCs are substances containing Sulfur or Chlorine. In that case parts of silver mirror might darkern, **which will impair the lumen output or the color point of the LED light.**

Typical High power LED design



No silver present
If lumen decay occurs in corrosive environment this will be low and only initial,
no continuously decay/color shift

Signify