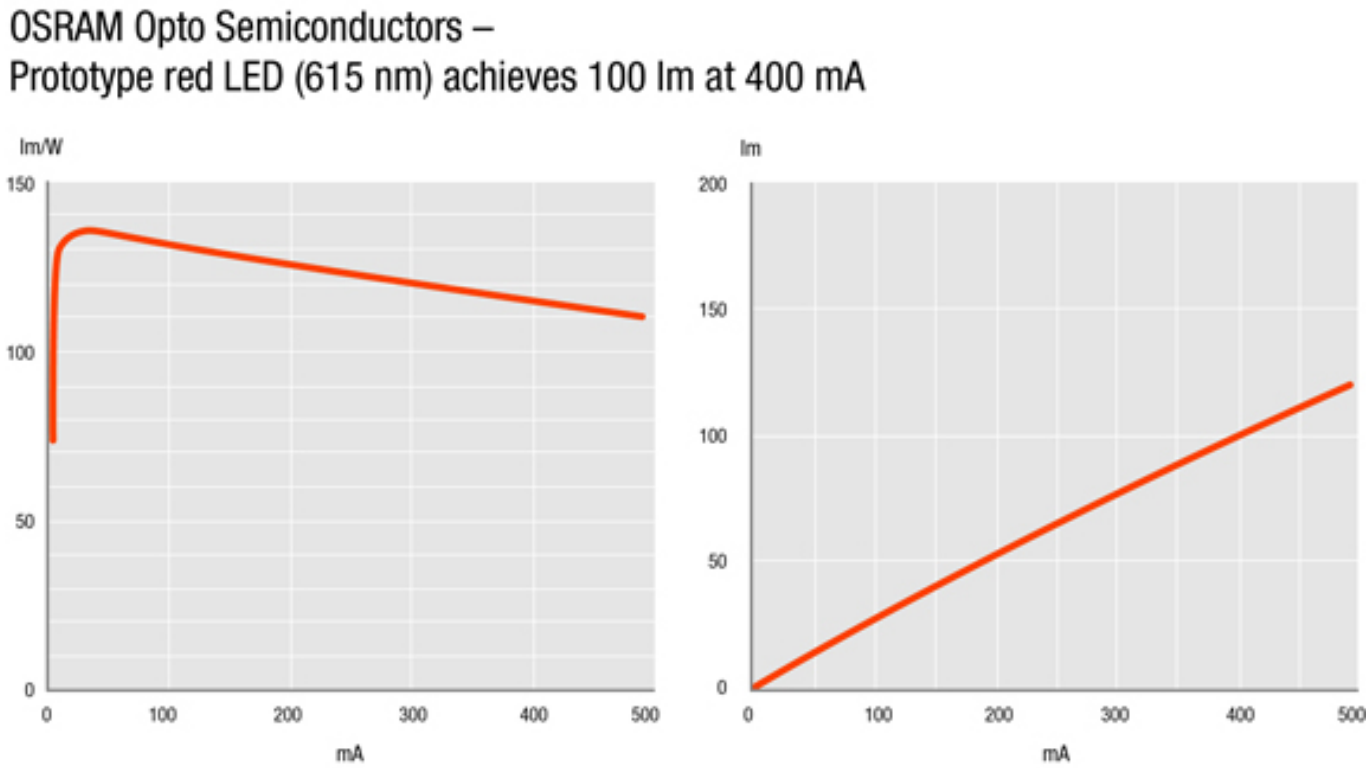
New chip platform increases LED efficiency by 30%

Developers at OSRAM Opto Semiconductors have succeeded in increasing the efficiency of red thin-film LEDs by 30% – a new record. The latest generation of thin-film chips benefit from an optimized chip platform that has potential for further improvements. This boost in efficiency is opening up new LED applications in general illumination, in projection, and in the industrial sector.

The record efficiency for an LED of 119 lm/W at an operating current of 350 mA (136 lm/W at 70 mA) has been achieved by the latest generation of a red 1 mm² thin-film chip (InGaAlP). The chip is packaged in a Golden DRAGON Plus LED and emits at a wavelength of 615 nm. At present, there is not an LED with higher efficiency at this wavelength. This advanced technology efficiency has been measured at 44% at 350mA (49% at 70 mA), and exceeds 50% efficiency at 350mA for a wavelength of 642 nm.



Higher efficiency yields greater output for the same current and lower power consumption in all relevant applications. With this advanced technology, new design

options are possible as fewer chips are needed for the same output requiring less space. In addition, there is 50% less wasted thermal heat needed to be removed which, in turn, reduces the required cooling. As brightness increases, the light sources can be made smaller and smaller.

The improved performance of this thin film LED technology greatly expands the possible applications for this innovative light source. For example, exceptionally high efficiency red can deliver warm white LED solutions with better color rendering and improved energy balance by color mixing instead of typical phosphor conversion of blue light.

“This will benefit all applications that use high-efficiency red LEDs, particularly projection applications,” said Dr. Wolfgang Schmid, who is responsible for developing this chip technology at OSRAM Opto Semiconductors. “We expect to start equipping LED products with the new thin-film chips in about a year’s time.”

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