A Different Type of High-Voltage LED

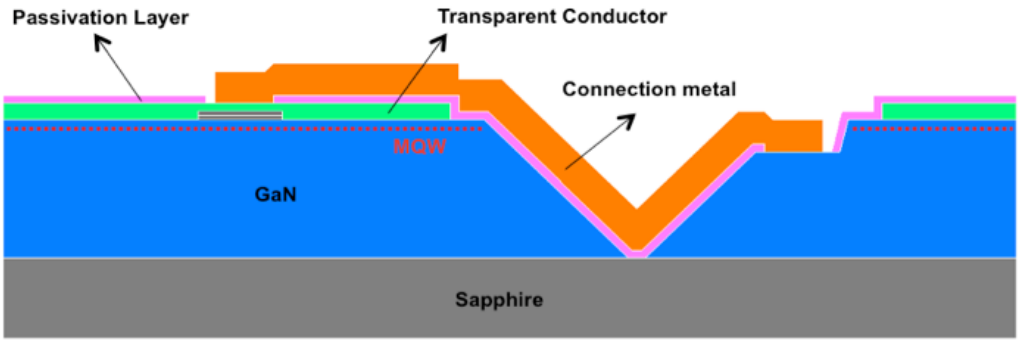
Today's demanding LED lighting applications need higher performance solutions to achieve the higher efficiencies and cost reductions needed for market acceptance, and to compete against traditional lighting technologies like fluorescents. Designers are tasked with squeezing out every bit of efficiency while reducing fixture size to eliminate costs. New LED technologies are helping to make this possible with higher operating voltages and increased densities of light output. While chip-on-board (COB) LEDs are one popular solution, another alternative solution is gaining widespread acceptance and providing lower overall system costs.

Multi-Junction LEDs

Unlike standard LEDs that have a die with a single junction (and typically a 3.0V forward voltage drop), Multi-Junction Technology (MJT) LEDs have a die that consists of many junctions (and the associated higher forward voltage drop). By changing the number of junctions within the chip, LED packages can still be manufactured with a single die but with different forward voltages and different lumen outputs.

Proprietary MJT Die Structure

The key to this technology is at the chip level where a metallization layer is used to create the on-chip interconnections between the individual LED cells. This process is used by Seoul Semiconductor in the manufacture of the Acrich family of devices called MJT.



Acrich MJT Die Structure

Competing high voltage LEDs (known as chip-on-board or COB devices) use multiple die placed in an array within the package and interconnected using bond wires between them. While being a viable solution, they tend to be quite large and can suffer from reliability issues due to the large number of bond wires and chips.

Acrich MJT Efficiency with High Voltage DC Operation

The Acrich MJT family of LEDs come in various package sizes, lumen outputs, forward voltages and power consumptions. While these LEDs are ideal for off-line AC designs using the Acrich IC, they can also be applied in DC designs to take advantage of the high voltage/low current operation. The Acrich MJT LEDs operate at their best in low current /high-voltage mode. This has several benefits. First, because they operate at low current, the

LEDs have high efficacy due to the lower current density. Secondly, since the LEDs are high voltage, they can significantly reduce AC-DC conversion efficiency losses by operating closer to the primary input voltage. In addition to this, because there is a smaller difference between the primary voltage and the LED string voltage, lower wattage passive components can be used in the drive circuitry thereby reducing the overall luminaire size and cost.

MJT Feature	Benefit
Low current Operation	Increases LED Internal Quantum Efficiency and decreases trace and wire sizes
High Voltage chip	High voltage operation increases driver efficiency and reduces the number of LED packages
Multiple Lumen and Voltage options	Flexibility in lighting module design options and the ability to use the same package in different applications

Seoul Semiconductor has continued its leadership in high voltage LED technology with its family of Acrich Multi-Junction Technology (MJT) LEDs.

Part Number	Color Temp	Flux [lm]	VF	If (mA)	Size	Image
SAW8KG0B	3700-7000K	42.8	22	20	5.6x3.0x0.75 (5630)	
	2600-3700	37.8				
SAW8P42A	3700-7000K	29	12.6	20	6.5 x 4.0 x 0.80 (6540)	
SAW8WA2A	3700-7000K	120	33	40	3.5 x 2.8 x 1.9 (3528)	
	2600~-3700	110		40		
SAW09HOA	3700-7000K	165	64	20	4.0 x 4.0 x 2.2 (4040)	
	2600~-3700	128		20		

Check out Seoul Acrich MJT solutions on our web site at:
http://www.seoulsemicon.com/en/html/Product/product_view.asp?catecode=1003

In future articles we will go into more detail on the Acrich2 AC LED Modular solutions that use the MJT LEDs and how they create more efficient and denser light sources.

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Dave has more than 20 years of experience in engineering design and applications support in the semiconductor industry. He has been working in the LEDs and Solid State Lighting industry since 2001. Prior to joining Seoul Semiconductor North America, he held design, application and management positions at Avnet Electronics Marketing, Lockheed Martin and GE.

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