

Entering the Photon Age_{sm}



Digital Light

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“Entering the Photon Age_{sm}”



- As demand for LED performance is increased in every application, particularly in illumination, new and innovative LED packaging and product fabrication technologies are needed to meet the market and application challenges.

Mission



- This session will explore the state of the art in advance and emerging technologies for LED packaging as well as lighting product fabrication

Existing LED Lamp Technologies



- Variety of LED Lamp Packages
- Round LED
- Flat Top LED
- Oval LED
- Other Special Shapes

Existing SMD Technologies



- Variety of colors and sizes
- PLCC Package – Lead Frame
Single Color and Multi Color (2-in-1 and 3-in-1)
- Chip LED – No Lead Frame
Single Color and Multi Color (2-in-1 and 3-in-1)

Existing Piranha Technologies



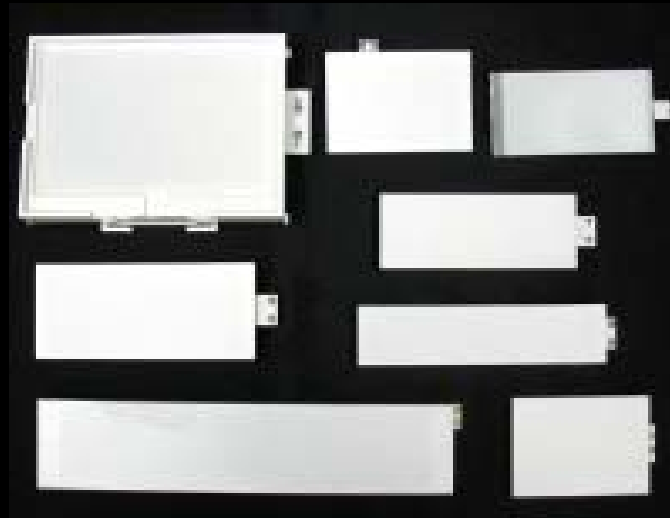
- Variety of Colors, VA's all with 4-leads
- Dome Type
- Flat Type

Existing Chip on Board Technologies



- Variety of Colors, usually on PCB
- With or without dome

Existing Backlight Technologies



- Variety of Applications
- All Colors
- Typically for LCD (Cell Phone, PDA, Laptop)
- Usually Side Mounted
- Usually SMD Type

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Existing Dot Matrix and 7-Segment



- All Colors and Sizes
- Various Dot Matrix pixel pitch Densities and colors
- Various 7-Segment sizes and colors

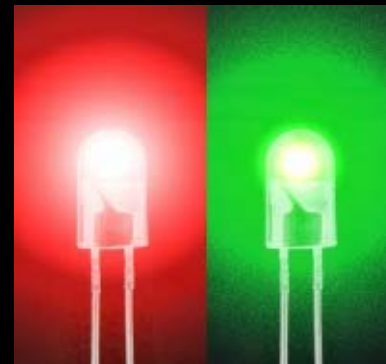
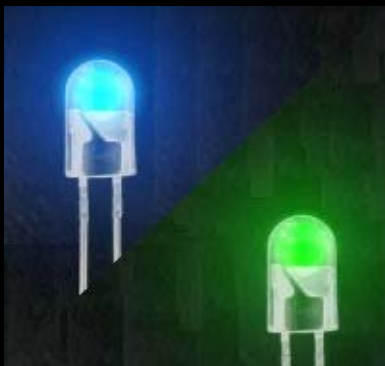
Existing LED Cluster Technologies



- Variety of Sizes, Shapes and Colors
- Round pixels, square pixels, etc.
- One color, 2 colors, Multi-Color
- One, 2, 3 or several LED's for intensity

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Emerging LED Lamp Technologies



- Multi-Color Lamps – two or more LED chips in one lamp
- Higher and higher brightness – with better chips
- High performance lead frame and reflector cup designs
- High performance lamps – larger chip sizes and higher currents

Emerging SMD Technologies



- Smaller Sizes - with lead frame for higher performance and better thermal management
- High performance side view white SMD
- High performance multi-color SMD
- High power SMD – larger chips higher currents
- High power Chip Clusters

New 0603 SMD



- Very Small Size – 1.6 x 0.8 x 0.35
- Lead Frame – for higher brightness and better thermal management
- Available in all colors
- Particularly designed for cell phone backlight

Multi-Color SMD – 3 in 1



- **Small package outline (2.8 x 3.2 x 1.9mm)**
- **Available in Black coated, to enhance the contrast for panel display.**
- **Special selection with identified IV, WL and VF binning in one reel.**
- **Super wide viewing angle at 120°**

Super High Power SMD



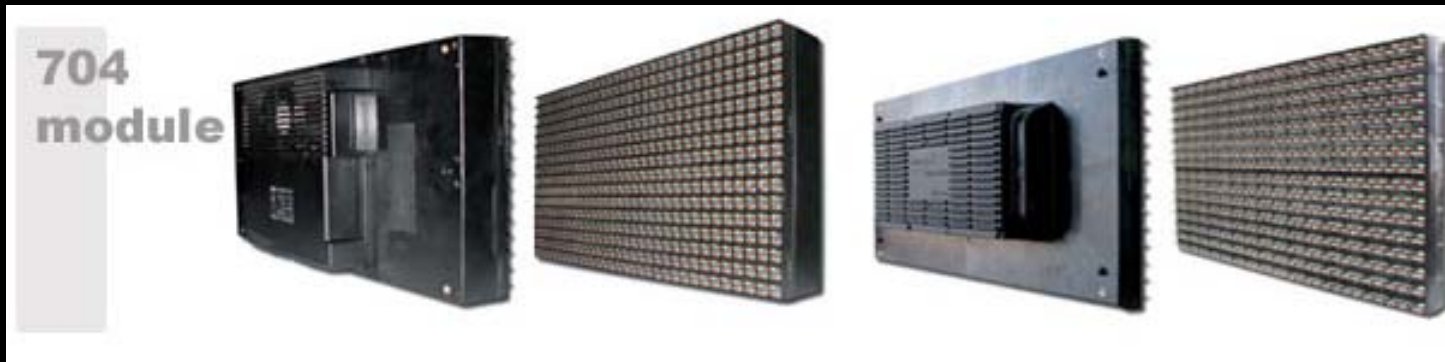
- Very Flat profile – Ultra Thin
- Larger chip size
- Higher current
- With or without dome – for super high performance
- Potential surface mount replacement for Piranha LED

Emerging Cluster Technologies



- New LED clusters are designed in a variety of colors and shapes
- Standard sockets – Halogen replacement as well as screw in sockets
- Local Cluster Intelligence

Emerging Display Module Technology



- Higher pixel densities – smaller pitch
- Brighter light output – for outdoor applications 7000 to 10,000 nits
- Lighter construction
- Fully sealed – dust proof, water proof, corrosion resistant
- Localized intelligence – easy integration into various size displays

Future Technologies – “Bent Light”



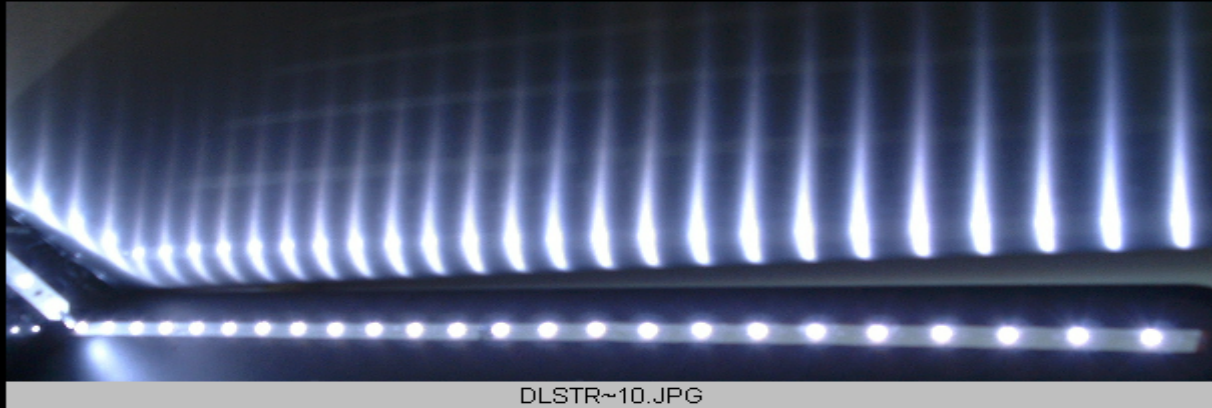
- Light Bulb Re-examined
- Sometimes in order to see the light, we must erase our classic notions of “light bulb” and look at light and lighting as an integral part of objects around us.

New Technologies – “Flexible Light”



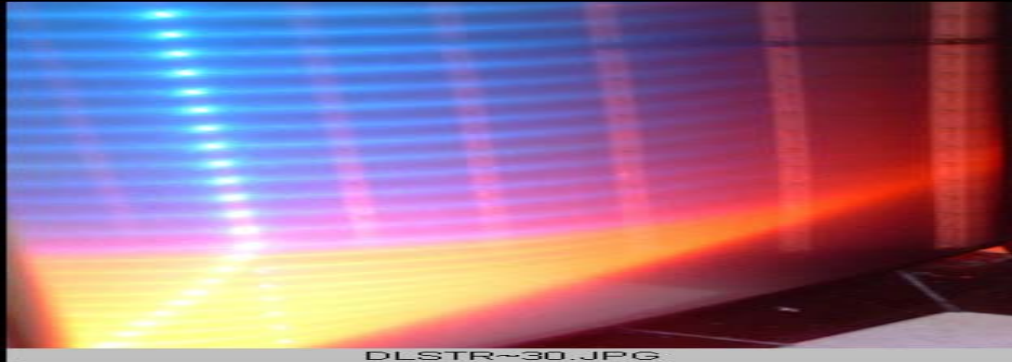
- By totally eliminating the the traditional concept of “circuit board” and placing the light source directly on a special substrate, breakthrough flexibility of light is achieved.
- Important applications in commercial and architectural lighting
- Light weight, simple to install and very bright.

Next Generation – “Sheet of Light”



- By taking the idea of Digital Light Strip into two dimensions, a totally radical concept of the sheet of light is achieved, allowing elegant illumination of contour and other unusual surfaces.

Yet Another Step – “Body of Light”



- A three dimensional extension of the Digital Light Strip yields an amorphous body of light, which can be molded into a variety of shapes and forms.



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Future Technologies – “Light Fabric”



- This is a truly revolutionary approach to creating light, in which the light source is “woven” into the very fabric of the substrate. The early testing, although quite complex, has shown very promising results.

Applications



- Accent Lighting

Applications



- Strip lighting

High Intensity Matrix



- Illumination applications

In Conclusion - *Welcome to the Photon Age*



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