Tunable White & Warm Dimming Solutions for Retail and Hospitality Lighting



LED EVENT 2017

Design en engineering trends voor LED-applicaties





## Human Centric Lighting Applications for Tunable White

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Luminus introduces CCT Tunable and Warm Dimming light sources for directional lighting in hospitality, retail, and residential applications.







## **Luminus History and Milestones**









## Light is Life

Without light there is darkness!

The astonishing effect on plants And living creatures.

Growth, well-being, mood, Happiness, sleep, satisfaction.

The color temperature and Intensity influences our daily life.

With the latest LED technology we can mimic the sunlight and create new spectrums never before possible!







#### Spectrum of the Sun

Radiation from Ultraviolet, visible, to Infrared. Unfiltered Sunlight has a Color Rendition Index (CRI) of 100



#### **Common Color Temperatures**



Wavelength in Nanometer





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#### **Human Circadian Rhythm**

Circadian Rhythms are physical, mental and behavioral changes that follow a daily cycle.

A biological 24-hrs clock that is set by light and darkness.

Light is the main influencing factor on Circadian Rhythm.

The color temperature changes over the day.

#### **Flora Circadian Rhythm**

The leaves of the plant open towards the sun during day but close at dusk.











Circadian Scientists who have studied light's impact win Nobel!

Helping to explain how light affects our daily rhythms.

Blue: boost alertness and performance, suppresses production of melatonin, increases appetite

Yellow: exposure during the day contributes to better sleep at night

Red: against depression, excites the brain

Red & Green: enhances mobility (Parkinson patients)

With LED technology we can simulate light spectrum and intensity in office and workplaces.









## Spectra of different Light Sources









## Black Body Locus – White Line, Below BBL







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## Black Body Locus – CCT tuning







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## Warm Dimming

- Applications: Hospitality & Residential, Mood/moment creation perfect for use in hotels, restaurants, wellness centers and homes.
- 3000K to 1800K for halogen/incandescent like dimming
- 4000K to 2700K for commercial warm dimming

## **CCT Tunable**

- Applications: Public area, commercial lobby area, commercial/retail store, hospital, human-centric lighting, outdoor lighting
- 1800K~4000K (indoor)
- 2700K~6500K (outdoor), Circadian Rhythm







## Dynamic COB Platform

## Technical Solution with Cube LEDs

- Mature midpower technology
- Frame-less package
- 135° viewing angle
- Wide color selection: 1800K 6500K
- High CRI
- 6V input
- Compact: 1.6mm x 1.6mm











## Dynamic COB Platform

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## **Cube LEDs on Board**

- High density LES for directional light applications
- Building block platform for flexibility and easy performance updates
- Easy to re-configuration for different CCTs
- Reduces hot spots in existing optical systems using standard midpower LEDs
- Consistent, uniform round beam pattern over current and delta CCT
- Specified and tested at (85C)

#### CDM-range



#### CTM-range

















- Separate (independent) channel configuration for CCT tunable (2 anodes and 2 cathodes)
- Combined strings with control IC for warm dimming (1 anode and 1 cathode)







#### **Cube-Power-on-board vs CSP-on-boardcomparison**

	Cube	CSP
Manufacturing	Package level	Chip level
Process/Yield	less challenge	more challenge
Package size	compact	compact
Lead frame	EMC	No
LED die	Lateral die	Flip chip die
Die technology	Mature	Developing
Wire bond	Yes	No
Thermal resistance	Good	Better
Assembly	less challenge	more challenge
Efficacy @830	>140	110~130
Beam angle	120~170	130~140
Lumen density	High	High
Color consistency	Less Challenge by binning	Challenge
Cost	Low	high







#### Linear prototype

Matching Dynamic COB performance

- identical building blocks
- similar dimming curve
- matching CCT levels
- same lighting experience/feeling

Example, 48 LEDs (24 pairs of warm and cool)

- Matching COB CDM-18



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-DW01 (halogen-like dimming) -DW02 (linear-style dimming)

#### **Cube-on-board** Warm-Dim Curve Options









#### MR16/GU10 Warm Dimming Lamp

- LED module: CDM-6-3018-90-18-DW01
- 550~600lm @ 3000K with CRI 97+
- Power: 7.5~8.0W
- Incandescent-like Dimming:  $3000K \rightarrow 1800K$
- Cool and warm CCT LEDs all on at full

power











#### White Tunable Track & Spot Light

- LED module: CTM-14-4018-90-36-TW01
- 1450lm @4000K & 1050lm @1800K
- 2500lm @3000K with CRI > 95
- Power ~ 20W
- White tunable: 4000K~1800K
- CRI 90 both 1800K & 4000K
- LPW ~ 100







### **Office Space, Class Room**

- Support the Circadian Rhythm
- Help occupants to peep motivation and alertness
- Toward the end of the day, a change to lower light levels and warmer color temperatures can help to signal that the workday or school day is coming to a close









- Varying the light output and coloration during the day may help to stimulate sales by adding variety into the ambiance of the space.
- As an "alert" function. For example, some change in light level and intensity might precede an announcement about specific sale items.



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#### Restaurants

Restaurants and other hospitality spaces
can also use tunable white lighting to
change the ambiance based on the time
of day.

- Brighter more blueish at Breakfast
- Dimmer more yellowish at diner









#### **Regional differences**

Nordic countries: people prefer a more yellow tone to support a warmer feeling.



Southern countries: people prefer a cooler blueish light.







# New Cube Power<sup>™</sup> Dynamic COBs

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As seen in:

- LEDs Magazine
- MondoArc
- LED Professional



 CCT Tunable COBs 1800K to 4000K 2700K to 6500K

• Warm Dimming COBs 3000K to 1800K 4000K to 2700K

# Thank You!

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