

Light Emitting Diode (LED) Basics

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Learning Made Simple, Visual, and Interactive

The THORS *Light Emitting Diode (LED) Basics* course introduces learners to various LED terminologies related to material characteristics, light characteristics, and various other parameters. The course also covers LED architecture, including the components of a packaged LED, LED chip layers, classification of LEDs, material choices, and the different types of LEDs. Presented in THORS' highly visual and interactive learning format, this course will equip learners with a foundational knowledge of LEDs and their related technologies.

Credit Hours **2.5**

Learning Objectives

- Recognize the basic terminologies used in the LED industry.
- Identify the material characteristics, light characteristics, and technical parameters of an LED.
- Describe the components of a packaged LED and the structure of an LED chip.
- Explain the different semiconductor materials used in producing different color LEDs.
- Differentiate between the different types of LEDs and their structure.

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I. LED Terminology

- **Material Characteristics**
 - Singal Crystal
 - Bandgap
 - Direct Bandgap
 - Indirect Bandgap
- **Light Characteristics**
 - Nature of Light
 - Full Width Half Maximum (FWHM)
 - Refractive Index
- **Technical Parameters**
 - Electrical Parameters
 - Current
 - Voltage
 - Optical Parameters
 - Thermal Parameters
 - Temperature Coefficient

I. LED Terminology (Continued)

- Junction Temperature
- Thermal Resistance
- LED Efficiency Parameters
 - Quantum Efficiency
 - Wall-Plug Efficiency
 - Extraction Efficiency
- **Other Parameters**
 - Correlated Color Temperature
 - Color Rendering Index

II. LED Architecture

- **Structure**
 - Packaged LED Components
 - LED Chip Layers
 - Substrate
 - Support Layers

II. LED Architecture (Continued)

- Active Region
- Classification
 - Edge Emitting LED
 - Surface Emitting LED
- **Material Choices for LED Emission**
 - Chromaticity Diagram
 - Primary Colors
 - Color Combinations
- **LED Types**
 - Inorganic LED
 - Emission Wavelength Range
 - Micropixel LED
 - Organic LED
- **Laser Diode**
 - Working Principle
 - Light Detection and Ranging (LiDAR)

