Display Brightness Adjustment

TI Precision Labs – Light Sensors

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Display Brightness Adjustment Use Case & Application

Key Benefits

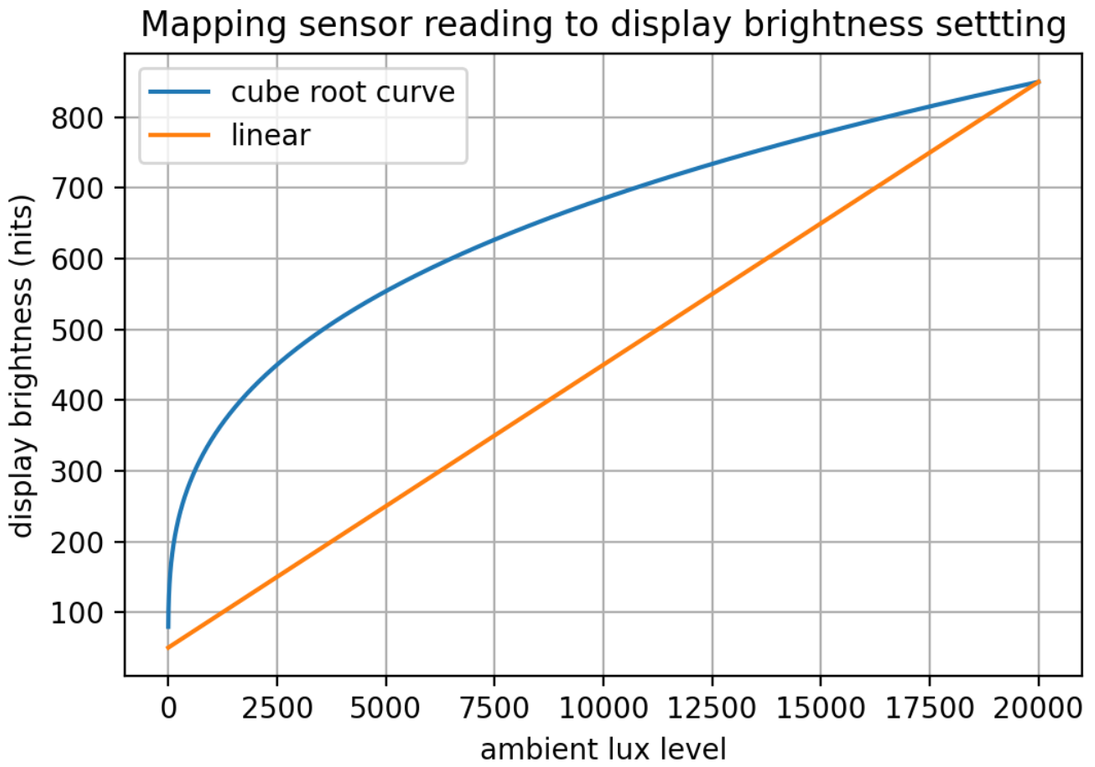
- User Experience
- Preserve battery life

Industrial

Personal Electronics

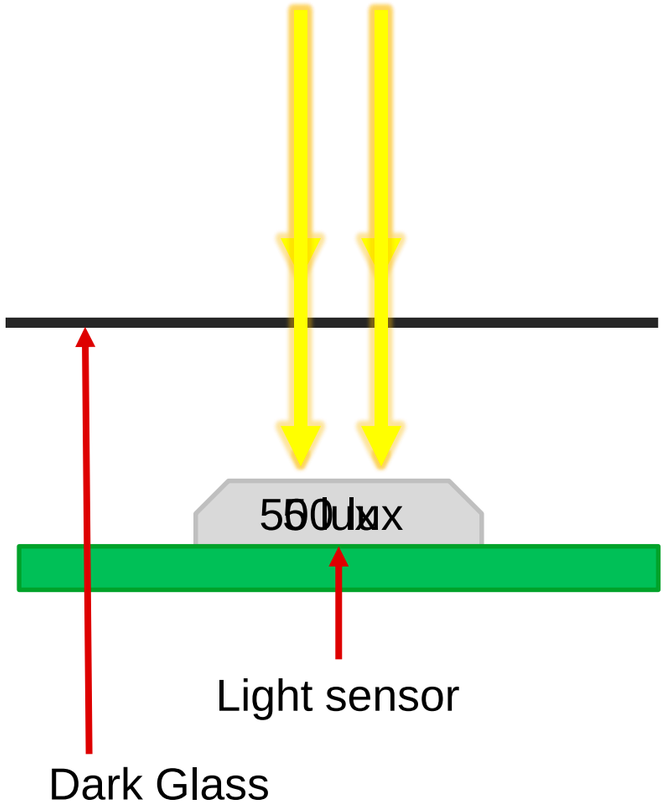
Adjusting the display

- Light sensor measures ambient lux
- Display brightness adjusted based on sensor reading by MCU
  - Mapping between sensor and display should be determined through testing user experience
  - Example plot shows linear and cube root mappings



Sensor Resolution

- Sensor resolution will effect the minimum light level and minimum change detectable
- Dark glass decreases resolution



Sensor Resolution

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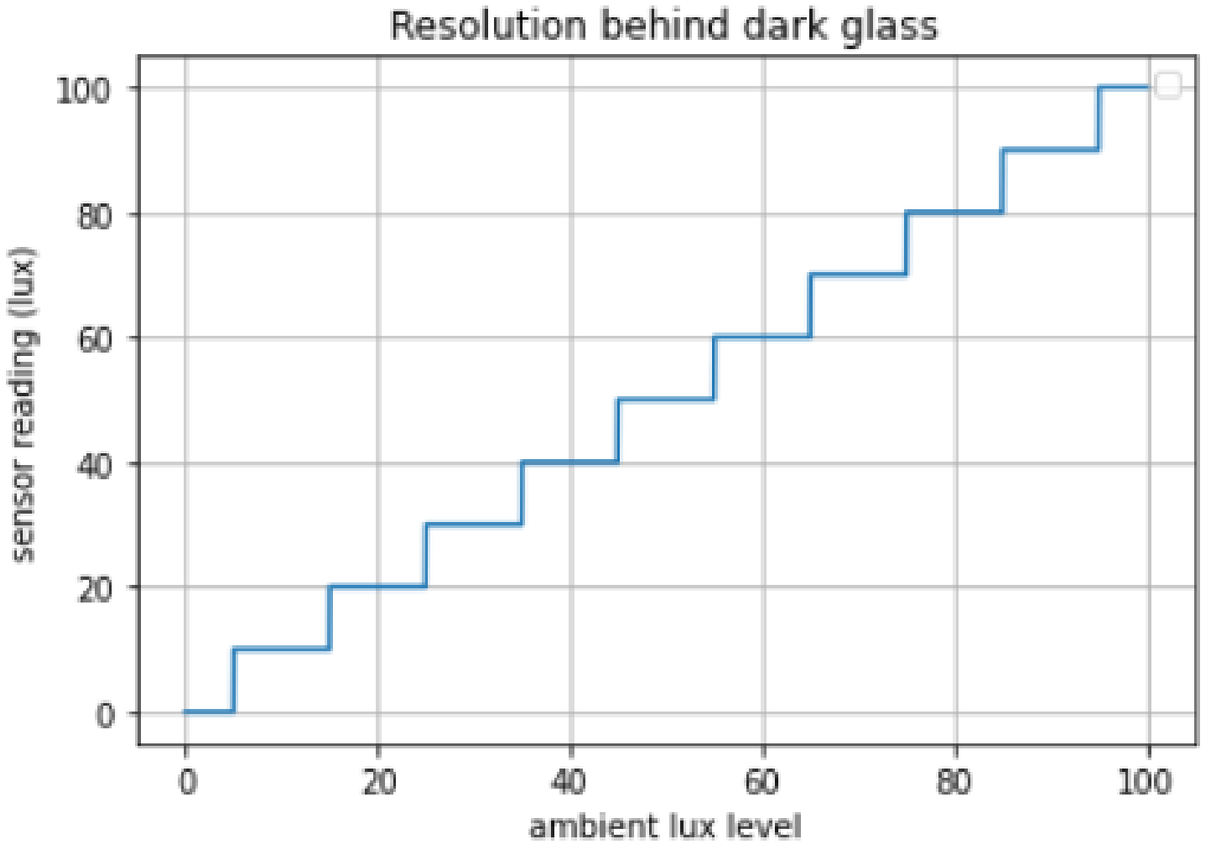
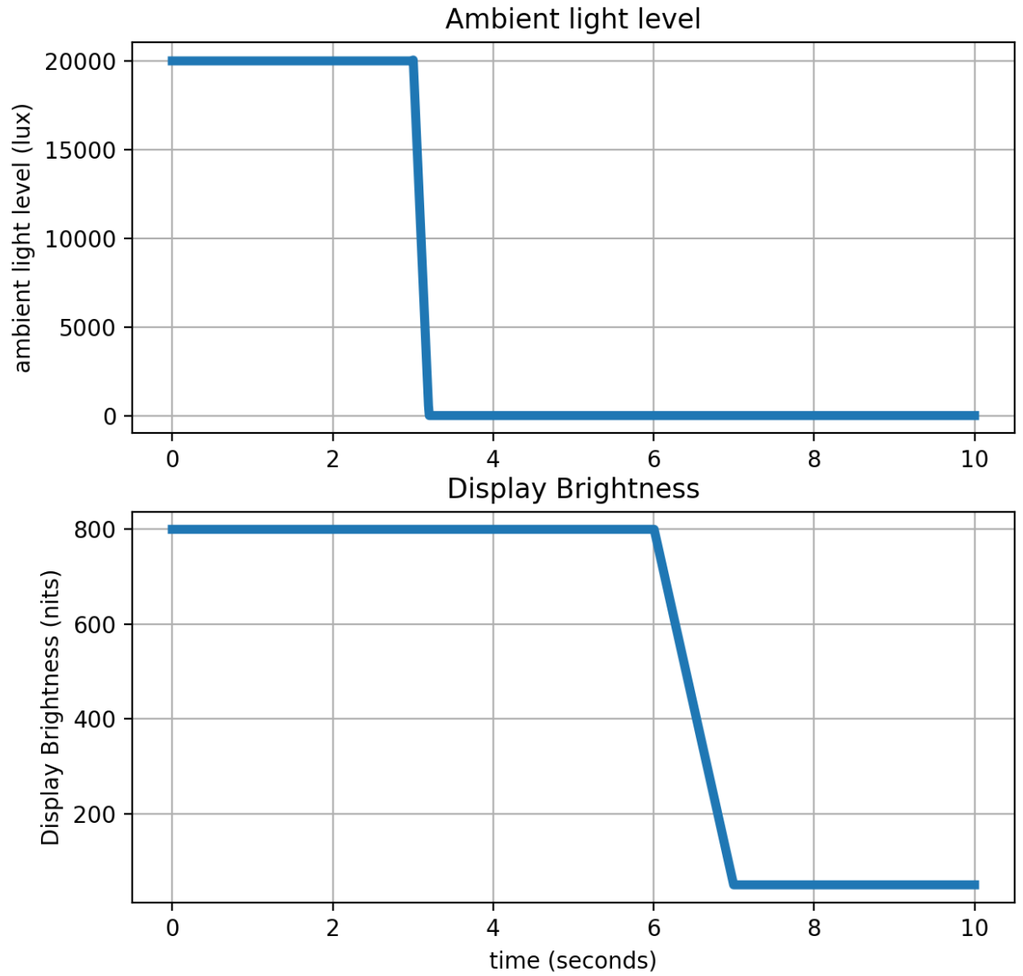
- Dark glass decreases resolution
  - Sensor with 100 mlux resolution
  - Placed behind 1% dark glass
  - Will have resolution of 10 lux
- Dark glass effect
  - TI OPT3004: 10mlux -> 1 lux
  - TI OPT4001: 312.5ulux -> 3mlux



Sensor Data Rate

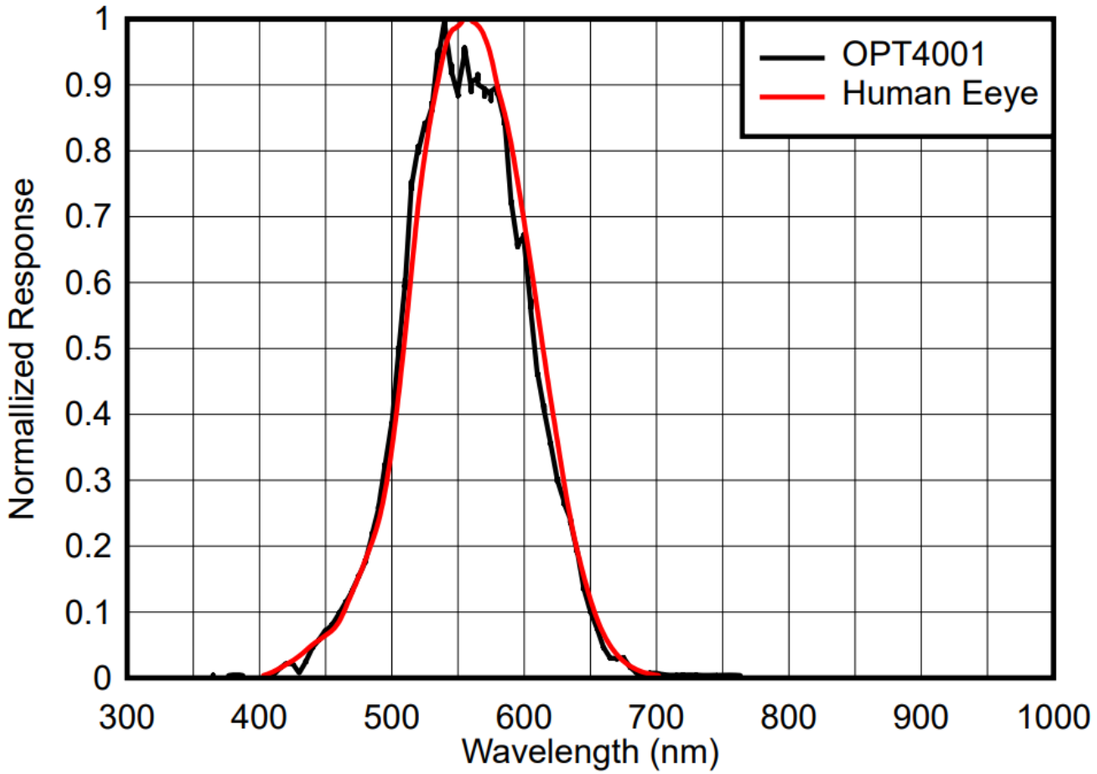
- Slow data rate can give poor user experience when light transitions quickly
  - Stepping indoors on a sunny day
- Slowness of 3 second conversion time is shown on the right
- 100ms conversion time allows much faster response
- Combination of conversion time and resolution important



Device	Conversion time	Resolution	Under 2% dark glass
OPT3004	100ms	80mlux	4000mlux
OPT4001	100ms	2.5mlux	125mlux

Spectral Matching and Size

- Matching to photopic curve impacts sensor accuracy
- Close matching will result in correct display brightness setting across light source types
  - Outdoor sunlight/cloudy
  - Indoor light sources: LED, CFL, Incandescent, etc.
- Some applications may have space constraints
  - DTS package: 2.1mm x 1.9mm x 0.6mm
  - WCSP package: 1mm x 1mm x 0.2mm



WSCP Package on Pencil Tip

To find more light sensor technical resources and search products, visit ti.com/ambientlightsensors

Thanks for your time!
Please try the quiz.

Quiz

1. Why might a linear mapping between display brightness setting and the ambient lux level not be ideal? (select all that apply)
   a) Different types of light sources (CFL, incandescent, LED) have different lux levels
   b) The human eye does not respond linearly to the lux level
   c) The display viewed from different angles will have a different intensity
   d) The display brightness setting may not be linear with the display brightness

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