

# MODULE 5: Photodiodes and VLC

## SUMMER CHALLENGE

Electrical Engineering: Smart Lighting

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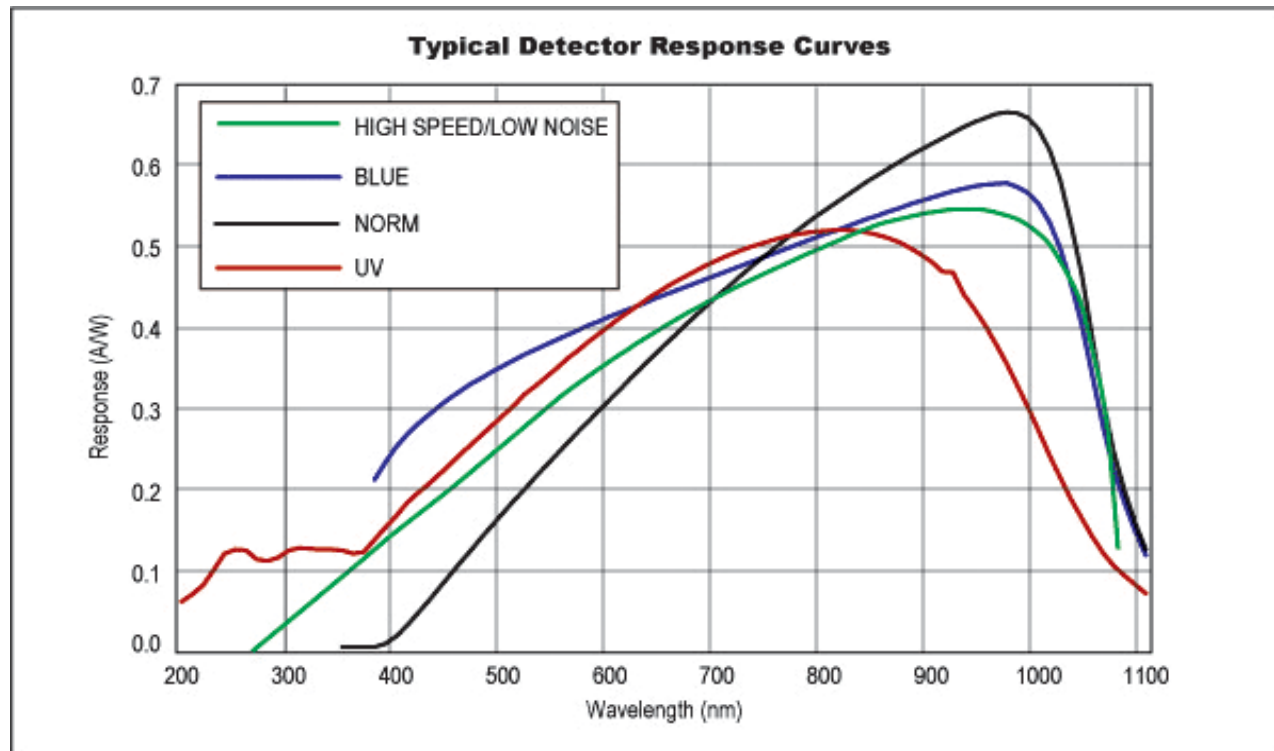
# Overview

- Photodiodes
- Integrated Circuits (ICs)
- Visible Light Communication
- Experiment
  - Photodiodes
  - Optical Channel
  - Optical Signaling

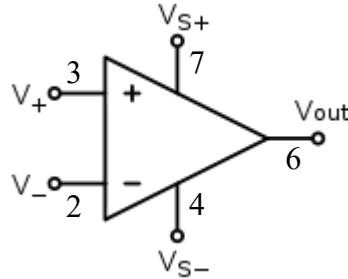
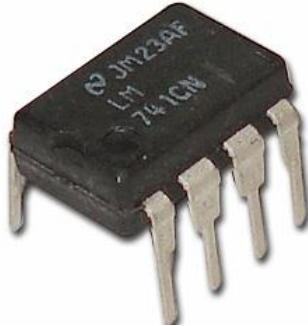
# Photodiodes



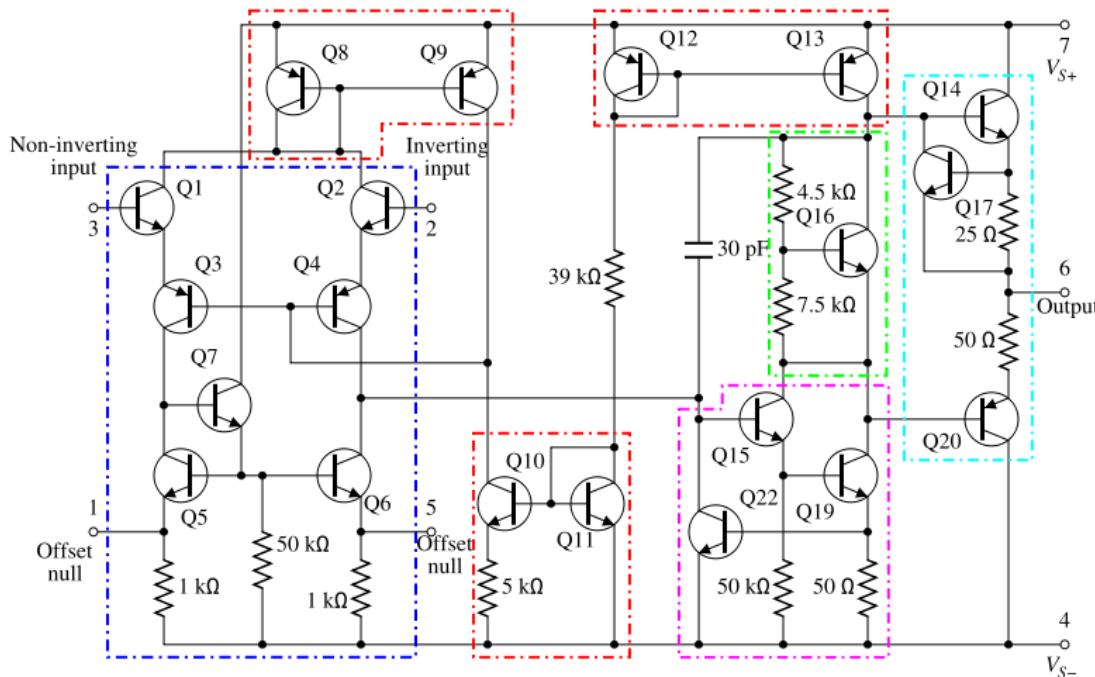
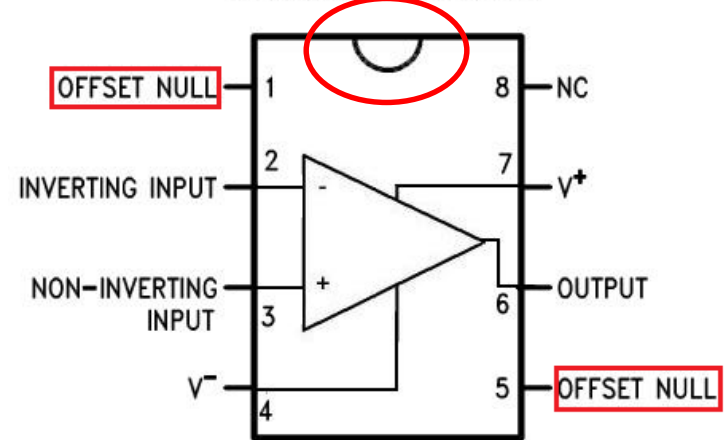
- Current is generated proportional to the received optical power
- *Responsivity* [A/W] is a function of wavelength



# Integrated Circuits



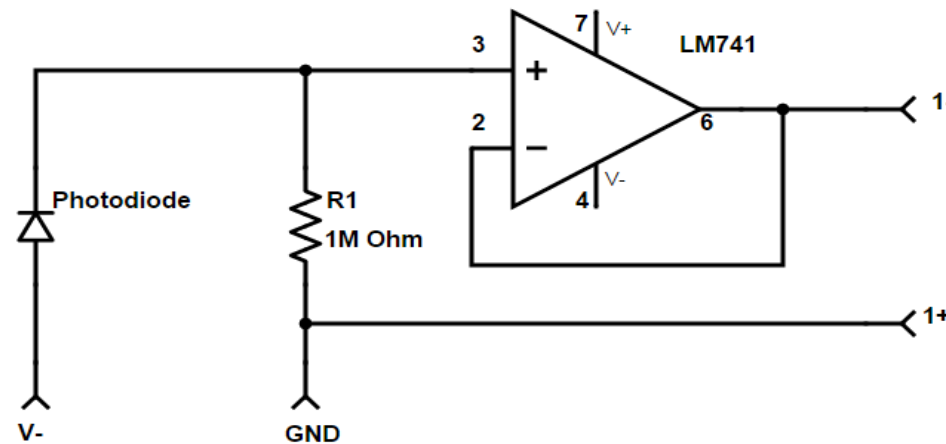
LM741 Pinout Diagram



- Current mirrors (red)
- Differential amplifier (blue)
- Gain stage (magenta)
- Voltage level shifter (green)
- Output stage (cyan)

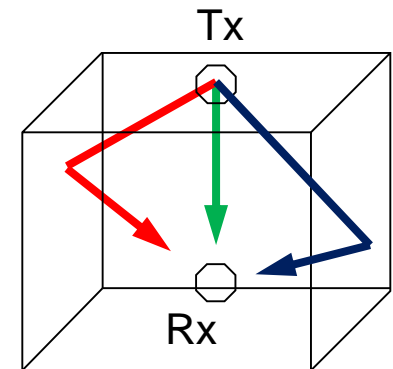
# Experiment I

## ■ Photodiode Circuit



## ■ Optical Channel

- LEDs have an angle dependent emission pattern
- Photodiodes also have an angle dependent response
- Distance relates to signal attenuation
- Multipath attenuates AND adds time dispersion



## Experiment II

- Optical Signal between PCs

# Recap

- What did you **LEARN** today?

