

EE461 Microprocessor-based Digital Design

LEDs and Seven-Segment Displays

Assignment 9 Solutions

1. In the lab you are using the LSD3221-11 H common-anode seven-segment display.

- (a) What is the wavelength of the light it emits? What is the wavelength range for red light?

SOLUTION

The LSD3221 emits red light of wavelength 697 nm. Wikipedia reports that red light corresponds roughly to 630–760 nm, so this is roughly in the middle of the red range.

- (b) What is the maximum rated voltage drop of the LEDs in the display when they are conducting current?

SOLUTION

2.8V

- (c) What is the maximum permissible forward current in an LED that is conducting current if the ambient temperature is 45 °C?

SOLUTION

The datasheet specifies that the forward current at 25 °C must not exceed 15 mA for the H-package device. Additionally, that value must be “derated” by 0.25 mA/°C for every degree higher than 25 °C. For an additional 20 °C, then, we must reduce the maximum current by

$$(0.25 \text{ mA/}^\circ\text{C}) (20 \text{ }^\circ\text{C}) = 5.00 \text{ mA,}$$

to 10.00 mA at most.