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# Testing and Characterizing Diodes

Review the procedure for testing a diode at [physics.wku.edu/phys301/notes/dc-circuits/testing-diodes/](http://physics.wku.edu/phys301/notes/dc-circuits/testing-diodes/). Use this procedure to confirm that you have a good diode and measure the forward voltage for each of the following diode types: 1N914, 1N4933, and a red LED. Show the results of your forward voltage measurements for each below.

## Measure $V\_{F}$ with DMM

|  |  |
| --- | --- |
| Diode Type | Forward Voltage, $V\_{F}$ (Volts) |
| 1N914 | Click or tap here to enter text. |
| 1N4933 | Click or tap here to enter text. |
| Red LED | Click or tap here to enter text. |

## Measure $I$-$V$ curves for diodes

Use the Two-Wire Current Voltage Analyzer available in the ELVISmx Instrument Launcher to measure the $I$-$V$ curve for a $200Ω$ resistor, and each of the diodes listed above. Paste screenshots of your $I$-$V$ curve measurements below.

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| Shape  Description automatically generated with low confidence |
| $200Ω$ Resistor |

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| Shape  Description automatically generated with low confidence |
| 1N914 Diode |

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| Shape  Description automatically generated with low confidence |
| 1N4933 Diode |

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| Shape  Description automatically generated with low confidence |
| Red LED |

## Compare $V\_{F}$ and $I$-$V$ curves for diodes

Briefly comment on how the values of the forward voltages measured with the DMM compare to the shape of the $I$-$V$ curves for the diodes.

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# Control LED with Digital Output Channel

Using the red LED $I$-$V$ curve, determine a reasonable resistor to use to limit the current thru the LED to no more that 20 mA with a 5V source. Build a series circuit consisting of this resistor and the forward-biased red LED. Source the circuit with the output from digital output zero (DO0). Use the ELIVSmx Instrument named Digital Writer to attempt to turn on or off the LED by changing the state of DO0. Show your instructor that you can change the state of the LED. Describe the resistor used in the section below.

## Select the current limiting resistance

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| Click or tap here to enter text. |

## Compute the power dissipated in the current limiting resistor

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| Click or tap here to enter text. |

# Measure Forward Voltage Drop

Using the same current limiting resistor found in the previous exercise, create the adjacent circuit using the red LED. Source the circuit with the function generator and supply a $400$-Hz sine wave with a $4$V amplitude $(8V\_{pp})$. Set up the oscilloscope to measure the source voltage from the function generator on channel 0 and the voltage across the resistor on channel 1.

## Describe voltage across $R$ and infer LED forward voltage.

Describe what you see and explain why the output across the resistor has the shape that it does. Use the cursors on the oscilloscope to find the forward voltage on the LED by understanding that the voltage across the LED will be the difference between the source voltage and the voltage across the resistor. State the value of the forward voltage on the LED you found using this technique below.

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| Click or tap here to enter text. |

## Oscilloscope trace showing voltage across current limiting resistor.

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| Shape  Description automatically generated with low confidence |