Electronics
Optosiolator Calculations

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October 1, 2018
Calculations for the use of optoisolators

From the data sheet, determine the values for:
- recommended forward current for the LED
- typical forward voltage for the LED
- typical current transfer ratio for the photodiode or phototransistor

Together these will make it possible to calculate resistance values.
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Using Optoisolators in a Circuit
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Note that the grounds on the two sides need not be the same.
Calculations for the use of optoisolators

Input side

The LED and resistor form a voltage divider. Given the input HIGH logic level, the forward voltage of the LED, the voltage across the resistor can be determined.

Given the suggested forward current of the LED, it should be possible to determine the resistance which will give this current.

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the *voltage* across the resistor can be determined.
Input side

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- input HIGH logic level
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the voltage across the resistor can be determined. Given the
- suggested forward current of the LED
Input side

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- input HIGH logic level
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the voltage across the resistor can be determined. Given the
- suggested forward current of the LED
it should be possible to determine the resistance which will give this current.
Input side

input HIGH logic level
Input side

suggested current and forward voltage of the LED
Calculations for the use of optoisolators

Input side

desired resistance = \frac{V_i - V_F}{I_{in}}
The photodiode (or phototransistor) and the resistor form a voltage divider. Given the forward current of the LED, the current transfer ratio, the recommended current through the resistor can be determined. Given the output supply voltage and output HIGH logic level, it should be possible to determine the resistance which will give this current.
Output side

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- forward current of the LED
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- forward current of the LED
- current transfer ratio
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the *recommended current* through the resistor can be determined. Given the
- output supply voltage
Output side

The photodiode (or phototransistor) and the resistor form a voltage divider. Given the

- forward current of the LED
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the *recommended current* through the resistor can be determined. Given the

- output supply voltage
- output HIGH logic level
The photodiode (or phototransistor) and the resistor form a voltage divider. Given the

- forward current of the LED
- current transfer ratio

the *recommended current* through the resistor can be determined. Given the

- output supply voltage
- output HIGH logic level

it should be possible to determine the *resistance* which will give this current.
Output side

The photodiode (or phototransistor) and the resistor form a voltage divider. Given the

- forward current of the LED
- current transfer ratio

the recommended current through the resistor can be determined. Given the

- output supply voltage
- output HIGH logic level

it should be possible to determine the resistance which will give this current.
Output side

current of the LED
Output side

current transfer ratio
Output side

Output side

output HIGH logic level
Output side

resistance which will give this current = \frac{V_o}{I_{out}}
Final adjustments
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In all of these cases, it is possible that you will need to tweak the final resistance values, based on actual performance.
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In all of these cases, it is possible that you will need to tweak the final resistance values, based on actual performance. In particular, the output resistor for the optoisolator may need to be adjusted due to the large possible range of the current transfer ratio.