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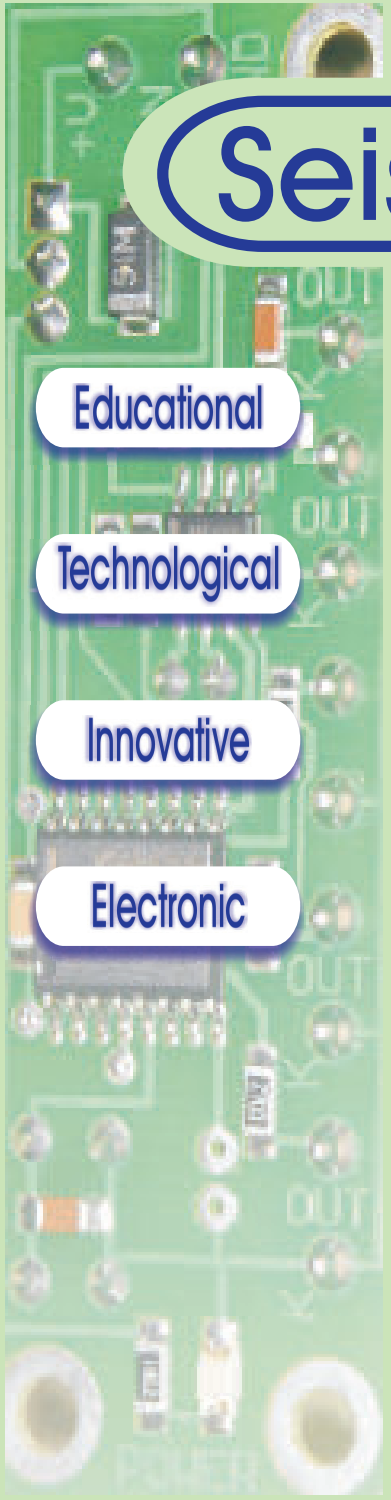
Design



Educational

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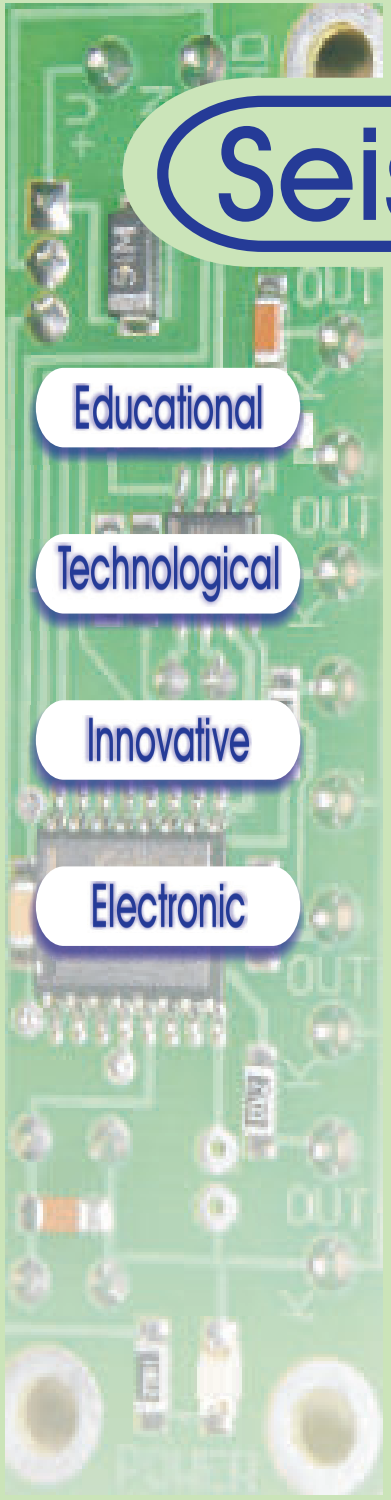
LED RESISTOR

LED Series Resistor Calculation



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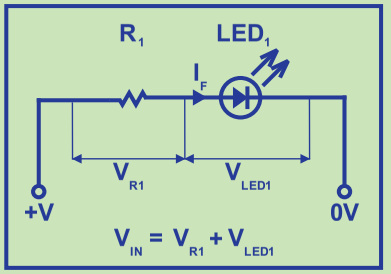
LED RESISTOR

Calculate the resistor value required in series for a LED

Description	Formula	Diagram
To calculate the series resistance value of R_1 for supplying a specified forward current I_F to the LED, an easy formula may be used. Obtain the typical forward voltage V_F and typical forward current I_F from the LED datasheet. The input voltage V_{IN} is the supplied voltage and may be 5V from a voltage regulator or 9V from a PP3 battery. For example V_F is 1.7V, I_F is 23mA and V_{IN} is 9V. Substitute these values into the formula. To calculate the power consumption of R_1 in a series circuit subtract the voltage drop across the LED V_{LED1} from the input voltage V_{IN}. The answer is the voltage drop across the resistor V_{R1}. Multiply the voltage drop across the resistor V_{R1} with the current flowing through the resistor I_{R1} to obtain a power value in watts.	$R_1 = \left(\frac{V_{IN} - V_F}{I_F}\right)$ $= \left(\frac{9 - 1.7}{0.023}\right)$ $R_1 = 317.39\,\Omega$ E24 = $330\,\Omega$ $P_{R1} = V_{R1} \times I_{R1}$ $= 7.3 \times 0.023$ $= 0.167$ W $P_{R1} = 167$ mW	

LED Series Resistor Calculation

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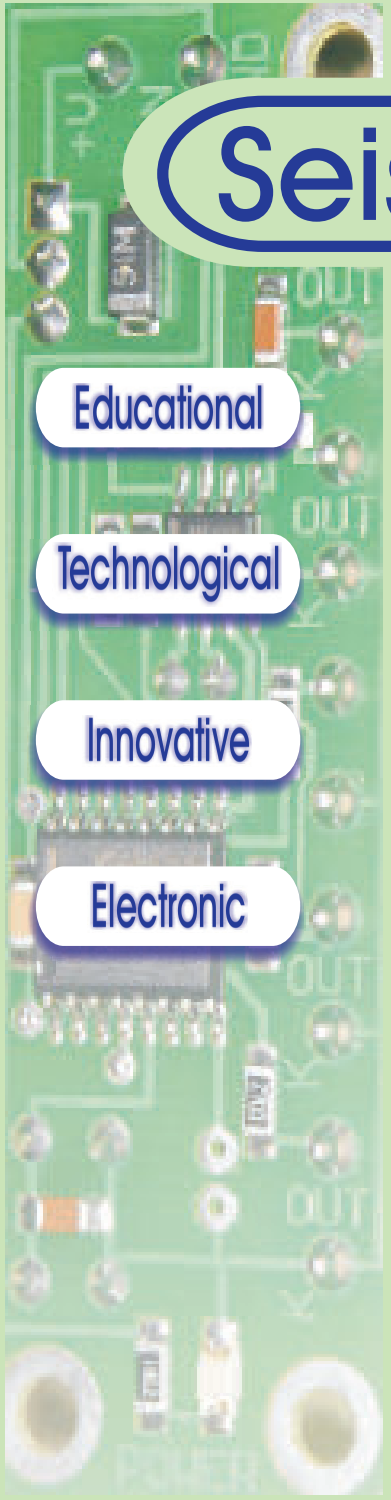

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Calculate the resistor value required in series for a LED

Description	Formula	Diagram
The 167mW is smaller than 250mW (1/4W resistor), thus a 1/4W resistor is safe to use and will not burn out. Ask the sales person at your favourite electronic shop for a resistor with a resistance value of 330Ω, with a 5% tolerance and a power rating of a 1/4Watt. The power consumption of the LED may also be calculated using the same formula. The calculated LED power consumption may be compared to the typical power rating obtained from the LED datasheet, to ensure safe operating conditions for the LED. A standard preferred range of resistance values are used to manufacture resistors, named the E range. In the example E24 is used, with 24 resistance values in the range, at 5% tolerance. The nearest value to 317.39Ω is 330Ω .	$P_{LED1} = V_{LED1} \times I_{LED1}$ $= 1.7 \times 0.023$ $= 0.039$ W $P_{LED1} = 39$ mW	Intentionally Left Blank

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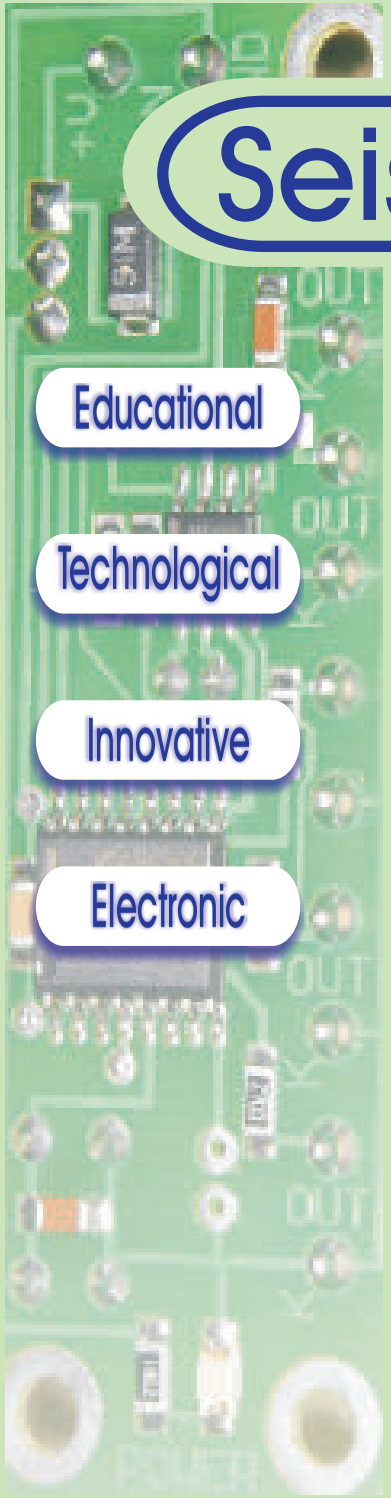

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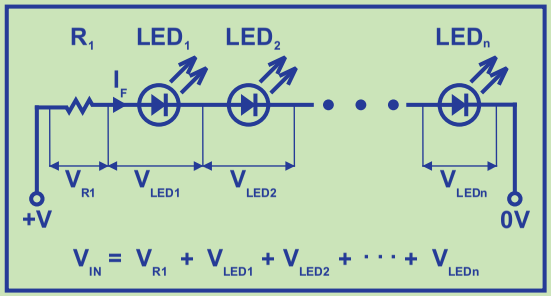
LED RESISTOR

Calculate the resistor value required in series for a LED

Description	Formula	Diagram
Connecting more than one LED in series, the same formula apply. The voltage drop across each LED will need to be summed, according to the series circuit rule and the current flowing through all the components stay the same. A LED need a constant current source to function correctly. The easiest and cheapest constant current source is a resistor placed in series with the LED. More advanced methods of a constant current source or constant voltage source is in the form of specially designed ICs. Series circuit: the sum of the voltage drop across each component in the circuit is equal to the input voltage V_{IN} and the current is the same through all the components. The anode A connect to +V and the cathode K connect to 0V or GND for the LED to light.	$R_1 = \left(\frac{V_{IN} - (V_{LED1} + V_{LED2} + ... + V_{LEDn})}{I_F}\right)$	

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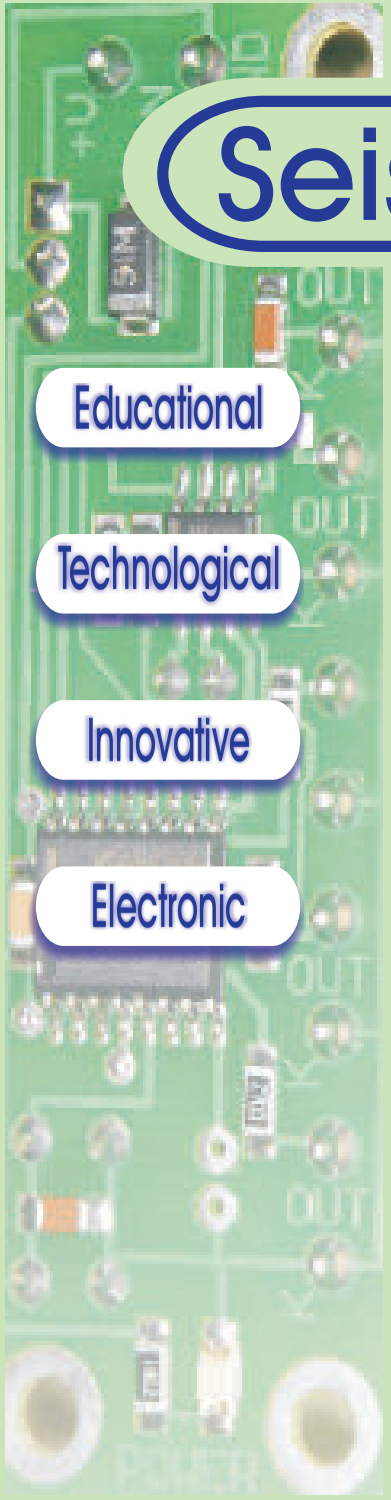

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Contact Details for Seismo-Quake™

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