

# Solar Optimiser - elabtronics



## Introduction

Solar Cells generate a voltage and current in proportion to the amount of light striking them. This means that the available output power shifts with the input power. It has been observed and measured that the power provided by a solar panel is also dependant on the impedance (or resistance) of the load. There is always an optimum impedance (maximum power output) for a given panel and light level.

The problem is similar to a car having only one gear. Such a car would be very difficult to either get moving or reach practical speed. However, the problem can be solved by having many ADJUSTABLE gears. This allows the car to move - even under low power - because the gear ratio is higher (it may move very slowly but it still moves).

The Solar cell problem is similarly solved by having adjustable "gears" - by adjusting the DC-DC ratio. This can even be done automatically (as it is in many cars as well) by the use of micro controller technology. As specialists in power conversion, elabtronics have developed a solar optimiser system. This shifts the varying Solar Cell output voltage to a voltage that is the most efficient for the load.

## Features / Specifications

The 40-gram, 58mm x 93mm elabtronics solar optimiser uses a BUK DC-DC converter (step down converter) to boost the current (A) available to the motor while maintaining the Solar Panel voltage at optimum. Hence the use of a 12V Panel and 6V Motor (Lower voltage / Higher current) allows operation over the range of this circuit. Using a typical model solar car motor with an armature resistance ( $R_a$ ) between 1W and 2W and a solar panel with a maximum power voltage ( $V_p$  max) of about 15V (Voltage open circuit ( $V_{oc}$ ) about 20.5V) the starting current will be 3 or 5 times the solar panel current.

- Input- 1W - 15W Solar Panel, Nominal 12V output Output
- Motor rated at nominal 6V input Optimisation range- 0V - 9V (9V - 15V is Direct Panel Drive)
- DC-DC Switch Mode Efficiency- 70 - 98% (depends on used in/out ratio)
- Point Range- (ADJUSTABLE) 8V - 18V
- Starting Current Boost- > 3 times (motor armature resistance of 1.2W and  $V_p$  max approx. 15V)

