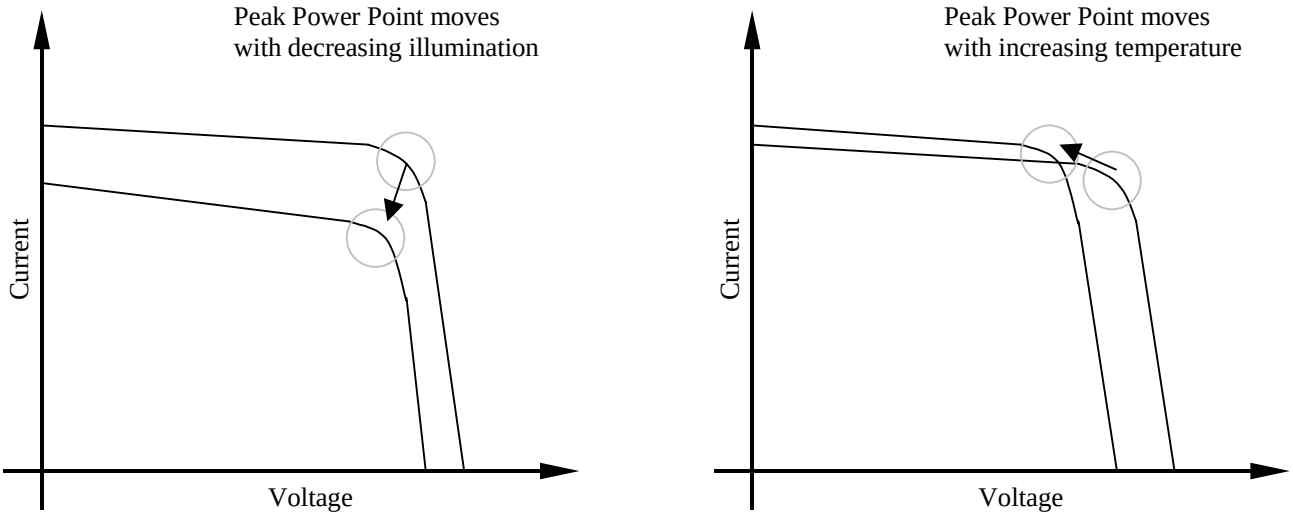
Flash Innovation Design Contest
Entry # F2043

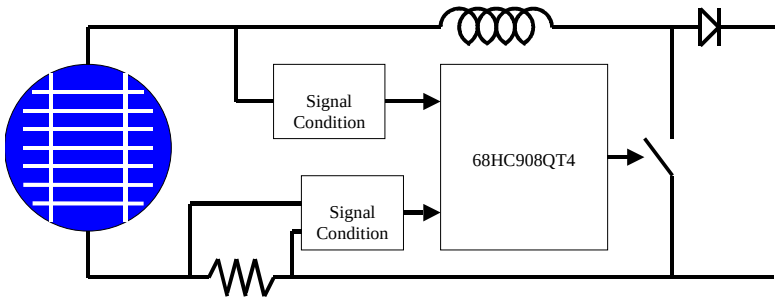
PEAK POWER CONTROLLER

In applications using solar cells as the power source, maximum available power is achieved by operating the solar array at the peak power point. However, two major concerns arise: the voltage that produces maximum power may not be convenient for the attached circuitry; and the solar cell performance is a function of several very dynamic variables - illumination and temperature.

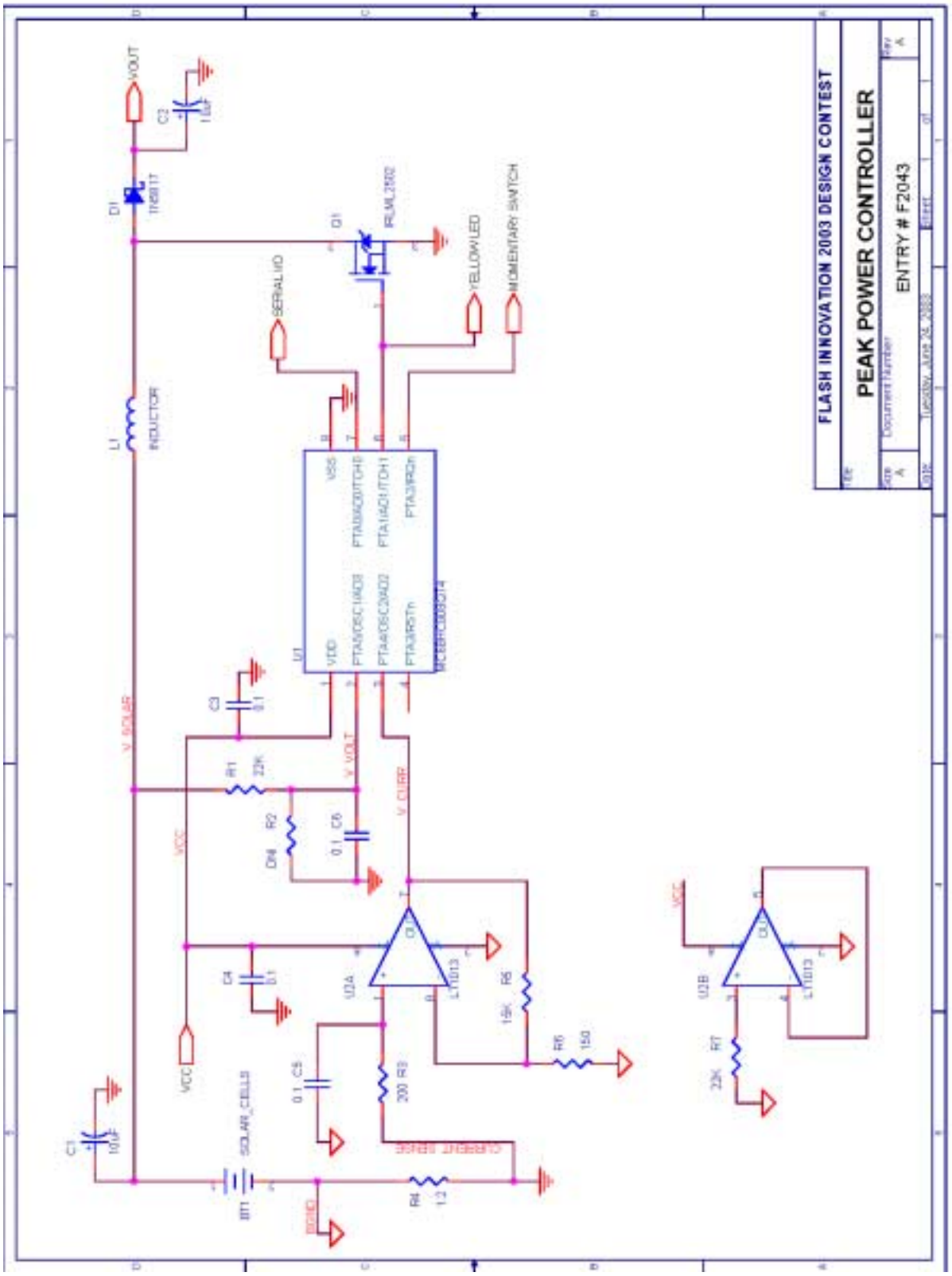


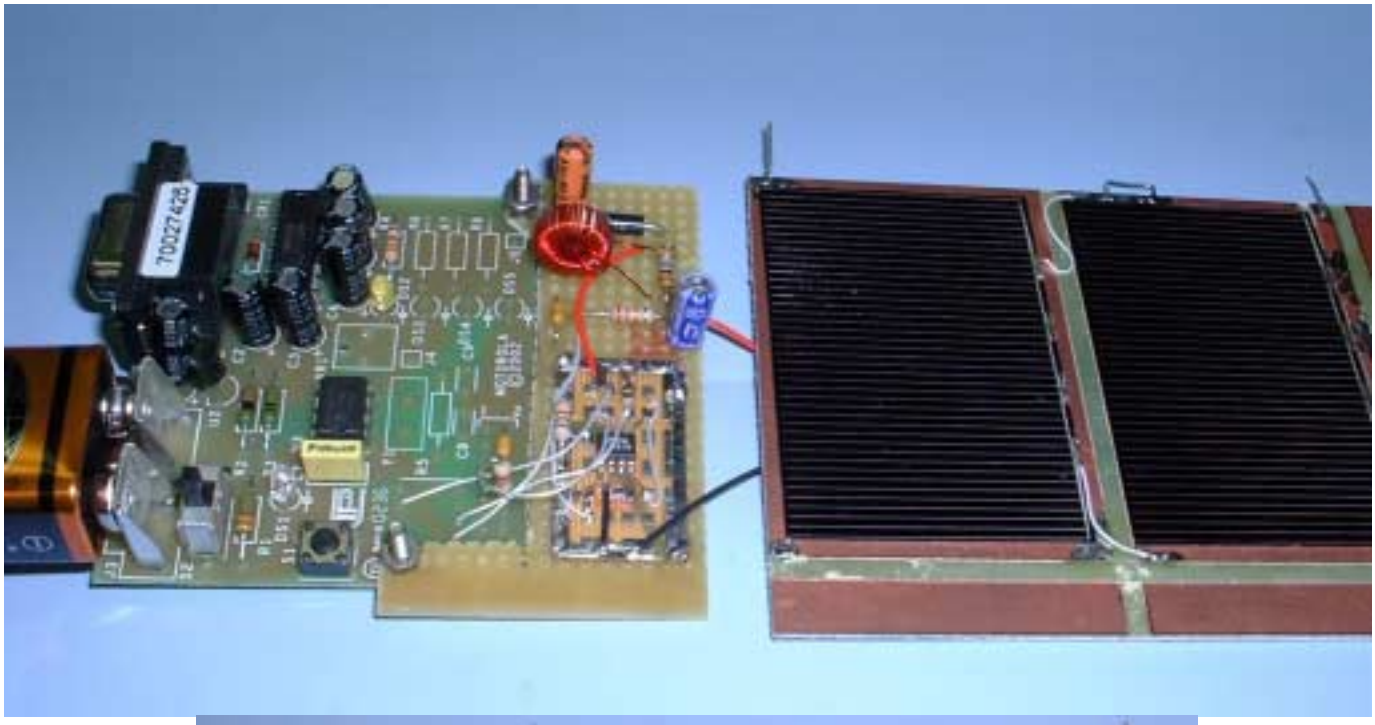
A peak power controller acts as an impedance transformer between the source and load. It monitors the power output from the source, and dynamically adjusts the effective load impedance to maintain operation at the peak power point.

The peak power controller in this design operates as a boost converter. The design is similar to those found in inductor-based switching power supplies. However, instead of regulating the output voltage, the circuit maximizes the input power.



The 68HC908QT4 provides more than ample resources to perform a peak power controller function. With minimal external components, a complete PWM switching converter subsystem has been implemented. The PWM hardware, integrated A/D subsystem, and the 8x8 multiply instruction make this application fairly simple to implement. When constructed using SMT components, the complete design should occupy less than one square inch of board space.


FLASH INNOVATION 2003 DESIGN CONTEST
PEAK POWER CONTROLLER
ENTRY # F2043
VOUT
C2
1uF
D1
1N5817
IRLML2502
SERIAL I/O
YELLOW LED
MOMENTARY SWITCH
L1
INDUCTOR
U1
VDD
VSS
PTA5/OSC1/IRQ1
PTA4/OSC2/IRQ2
PTA3/RSTn
PTA2/IRQ3
PTA1/AD1/TCH1
PTA0/AD0/TCH0
MC68HC908JB16
C3
0.1
R1
22K
R2
DNI
C6
0.1
V SOLAR
V VOLT
V CURR
VCC
U2A
U2B
LT1013
C4
0.1
R5
15K
R6
150
C5
0.1
R3
200
R7
22K
C1
100uF
SOLAR_CELLS
BT1
R4
1.2
CURRENT SENSE
SENSE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