Maximizing Power Output Using the OP232W

Application Bulletin 215

What can Optek offer the customer that was using the OP233W in high power output applications? There are too many possible variations of design for there to be a simple answer. Following area few suggestions:

The simplest option may be to increase the forward current to obtain the same output from the OP232W. Although the data sheet ratings have not been modified over the years, current production is significantly more reliable at higher drive currents than when the OP230W series was first produced in 1980. Provided the customer's circuitry can support the higher power supply loading, this may only require changing the value of a single resistor.

As another option, many customers will find that the OP293 series plastic components are easily substituted for the OP233W. Both are wide angle radiators (50 degree 1/2 angle for the OP233W, 60 degrees for the OP293), and in many applications the OP293 can fit into the same boards an sockets with no modifications. For those who can use this substitution, the higher on axis intensity available in the plastic component may actually offer improved performance. The main differences to be considered are the plastic versus hermetic construction and the overall package height of the OP293 product series.

Depending on the application it may be reasonable to adopt a pulsed mode operation utilizing the fact that the instantaneous power output can be very high while the average power is low. The circuitry involved is more complex than for a DC operating condition but need not be prohibitively complex or expensive. If the detector can be operated synchronously with the LED drive pulse, there need be no loss of speed or sensitivity. Should synchronous operation not be practical but system response speed not be an issue, the detector can be used in an integrating mode with no loss in signal levels. See the following example.

For the example, the value of V_O would be approximately the same for both circuits in either the blocked or open optical path condition. However, the response time is approximately 10 microseconds for the DC circuit and 10 milliseconds for the pulsed circuit. The speed of the pulsed circuit could be increased by raising the input frequency and reducing the RC product at the output. To maintain a low ripple on the output the RC product should be at least 2x the period of the input pulse waveform.

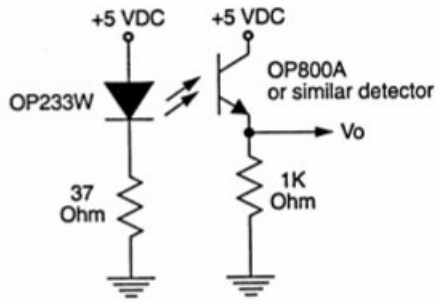
Jim Woods

Example: Replacing a DC circuit with a pulsed circuit

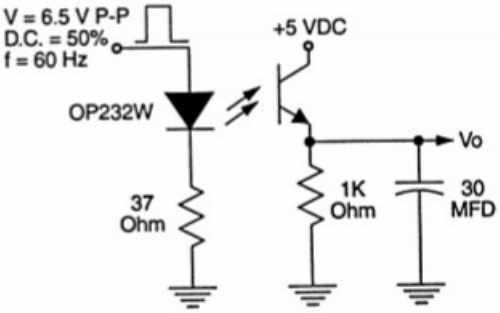
Assumptions:

- Application is an interrupter sensing whether an object is present in the optical path.
- Response speed is not a critical issue.
- Required output is $V_O > 1$ V unblocked, $V_O < .1$ V blocked.
- The optical path is such that an OP233W with $E_e(APT) = 6$ mW/cm^2 is adequate but an OP232W with $E_e(APT) = 4$ mW/cm^2 is not.

Original circuit with DC current drive to LED:



Replacement pulsed drive current circuit:



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