RS gain monitor by blue LED

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Method

- Xe(?)+fiber system
  ... stable, but difficult, expensive
- Blue LED
  ... cheap, easy to handle, but how stable?

Scheme of LED system

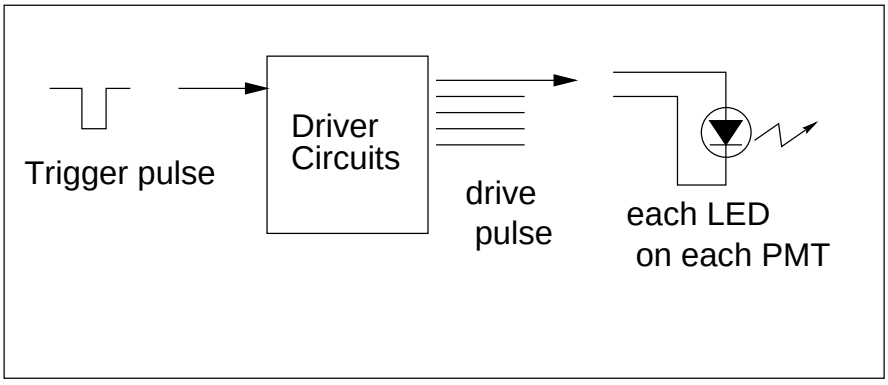

Figure 1:

LED

3mmϕ blue LED (by Nichia Chemical Industries)

- NSPB300A ... $2\theta_{1/2}$=15deg.
- NSPB320BS ... $2\theta_{1/2}$=45deg. $\Leftarrow$ new

Reduce light intensity by a pin-hole mask

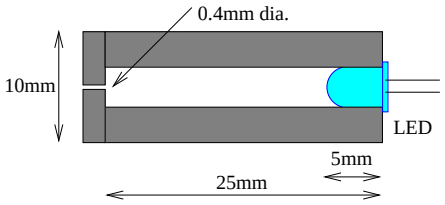

Figure 2:

LED Driver circuit

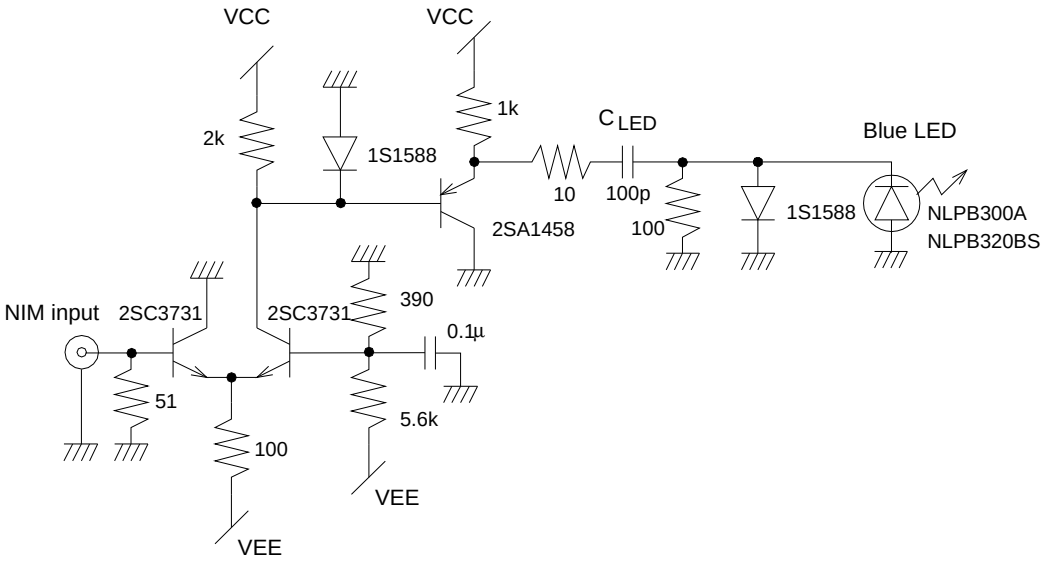

Figure 3:

Measurement

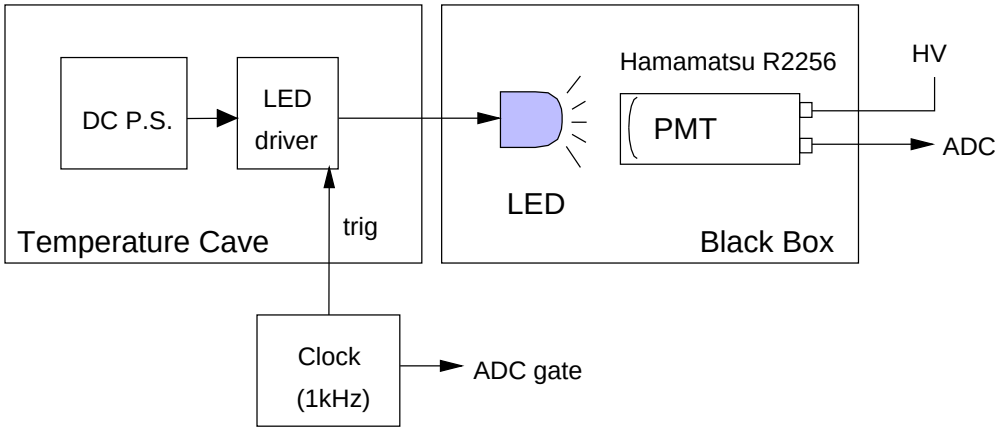

Figure 4:

- Light intensity vs supplied voltage (Vcc)
- Temperature coefficient (driver+power supply)

Pulse Shape by PMT

(b) O(50k) p.e. $\times$ 1/500 mask

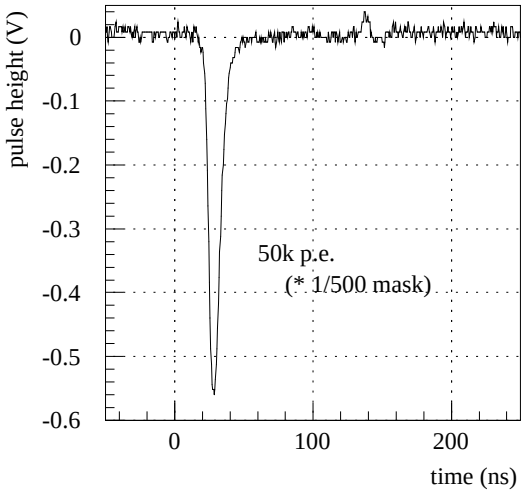

Figure 5:

There is no long tail as in my previous test.

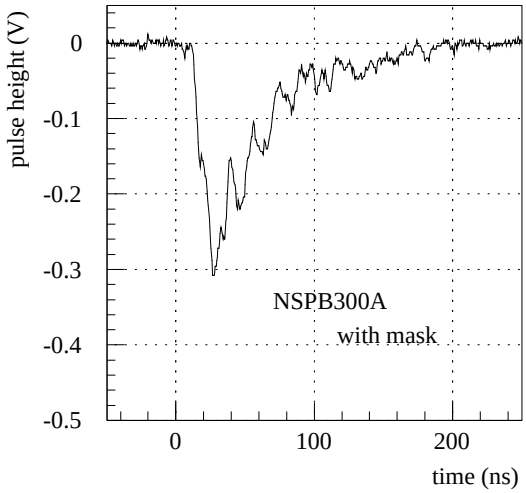

Figure 6:

LED intensity vs Vcc

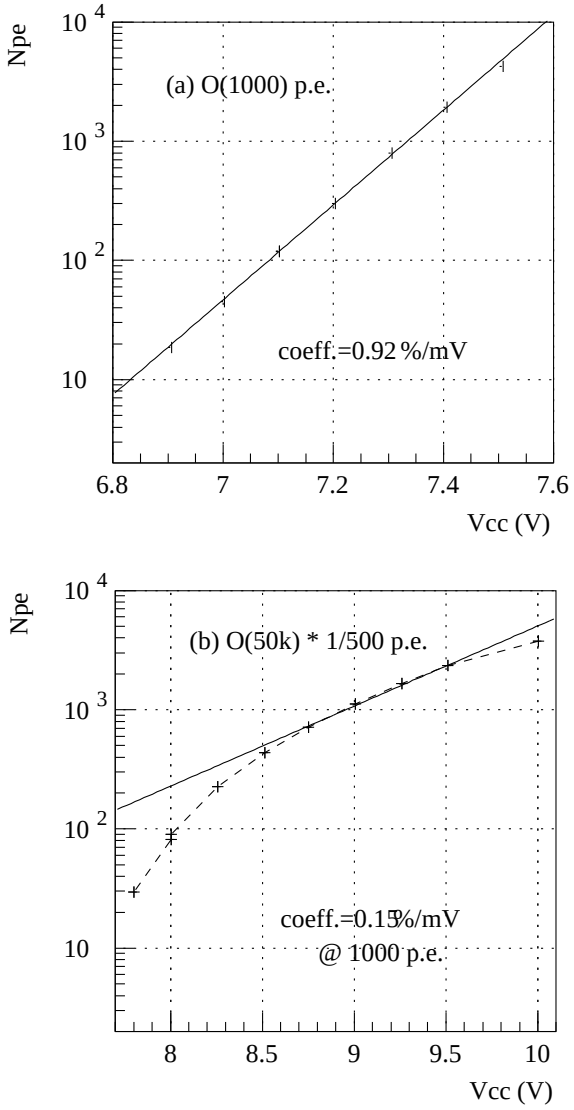

Figure 7:

Temperature dependence of LED intensity

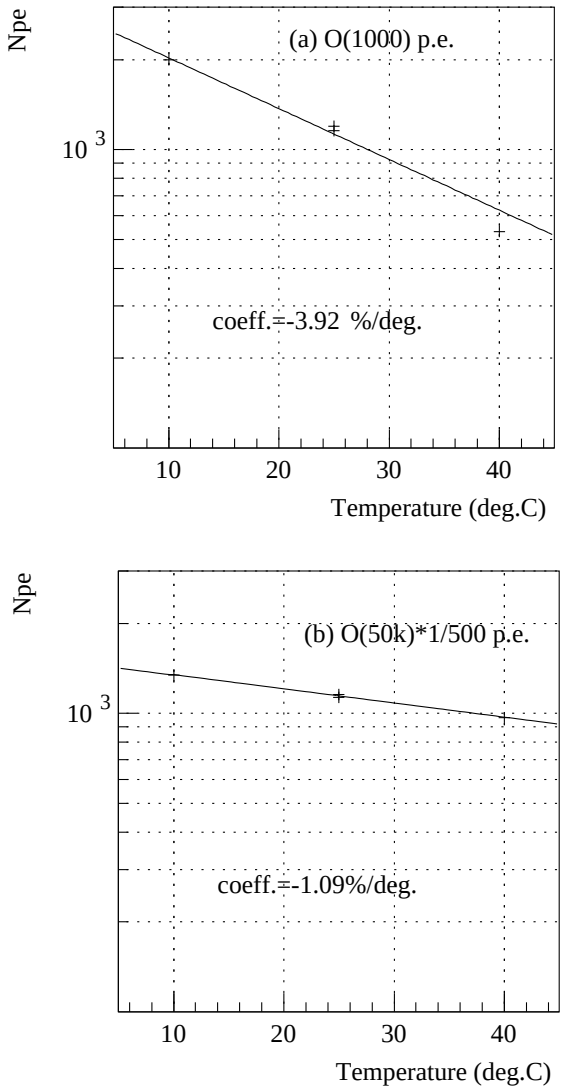

Figure 8:

Summary

Under the conditions:

- blue LED (NSPB320BS)
  with pin-hole mask (1/500)
- temperature control ± 1 degree
- supplied voltage ± 10 mV

blue LED can be stabilized within a few percent level.

But,

note that LED itself has temperature dependence, and it may depend on drive pulse width.
(Manufacturer claims it is $< -0.5\%$/deg.
in DC operation.)

Also, long term stability should be tested.