

Light Emitting Diode Box Design for Hall A's Large Area Picosecond Photodetector Test Stand

Pablo Campero, Mary Ann Antonioli, Peter Bonneau, Aaron Brown, Brian Eng, George Jacobs, Mindy Leffel, Tyler Lemon, Marc McMullen, and Amrit Yegneswaran

Physics Division, Thomas Jefferson National Accelerator Facility, Newport News, VA 23606

March 12, 2024

This note presents the light-emitting diode (LED) box designed for Hall A's Large Area Picosecond Photodetector (LAPPD) test stand.

For the quality test of the LAPPD from Incom Inc., a test stand is being developed to robotically position a blue light LED ($\lambda = 470 \text{ nm}$) over the pixels, using the LC40B Gantry System [1], which has a 300-mm travel range along the x and y axes and a 0.4-mm positioning accuracy (required 0.5 mm). The LED is housed in a box, Fig. 1.

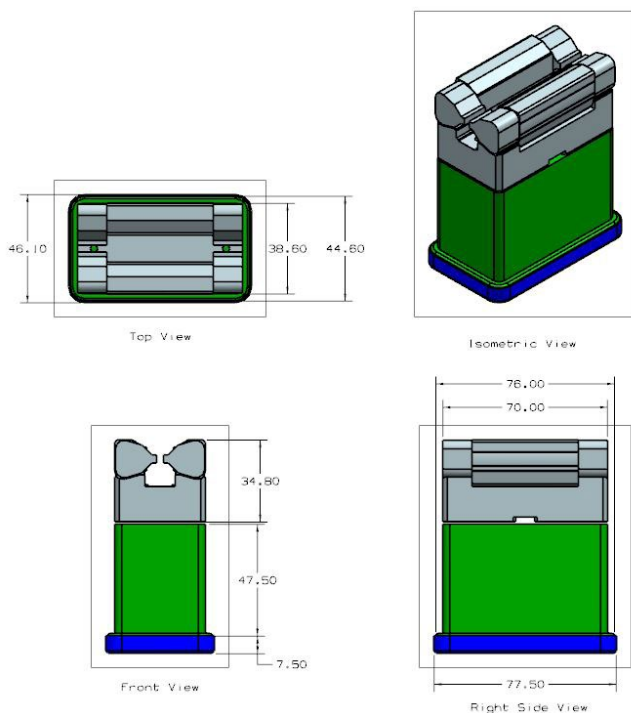


FIG. 1 Isometric and 3rd angle orthographic projections of LED box modeled with Siemens NX 12 software. Dimensions are in mm.

The deconstructed isometric view of the LED box, Fig. 2, shows the cover that has a holder with a 1-mm hole to support and align the optical fiber from the LED. The cover compression fits onto the box sidewalls.

The LED box's size is based on the gantry's carrier size (70.00 mm \times 38.60 mm). The box height, 55.00 mm, is the sum of the LED, its lead length, and the optical fiber length that will be attached to the LED.

To attach the LED box to the gantry's carrier, four threaded holes for M4 bolts are provided. For LED insertion through a support cross, there is a hole with a 5 mm diameter, based on the LED head dimension.

The support cross, 26.50 mm below the box base, Fig. 3, counteracts torsional forces in the x - y plane.

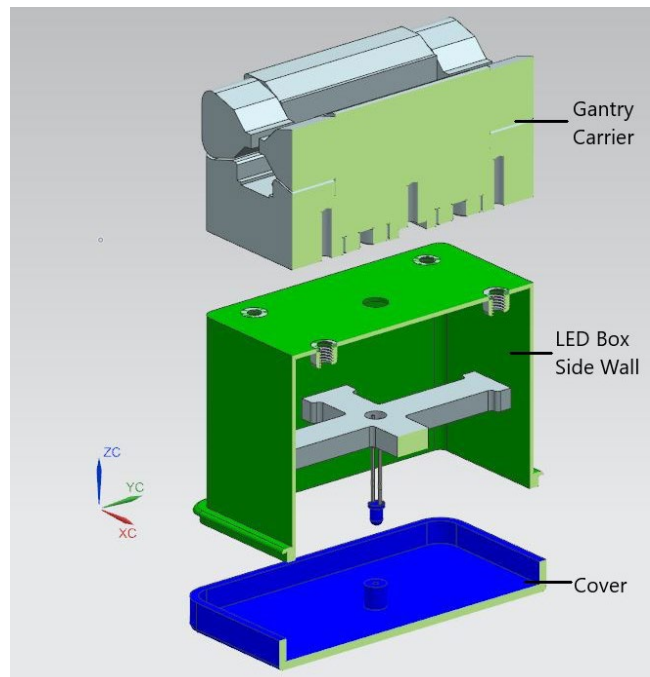


FIG. 2 Isometric exploded view of LED box.

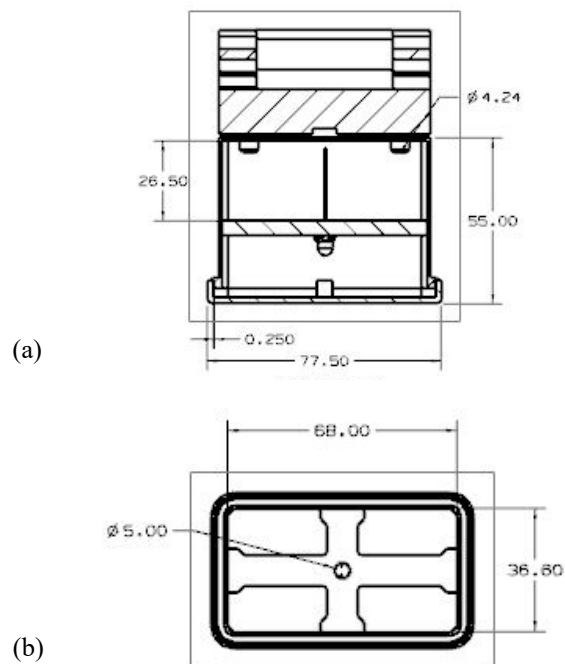


FIG. 3 (a) Right side view of LED box, (b) top view of support structure. Dimensions are in mm.

To verify there is no interference between the test stand and the components inside the LAPPD dark box, Fig. 4, which houses the high voltage and signal connectors, cables, and the LAPPD detector, the test stand model was placed inside the dark box model. Additionally, the test stand's ability to place the optical fiber over each pixel (25 mm × 25 mm) of the LAPPD was checked.

To conclude, the LED box design is being reviewed before it is 3D printed.

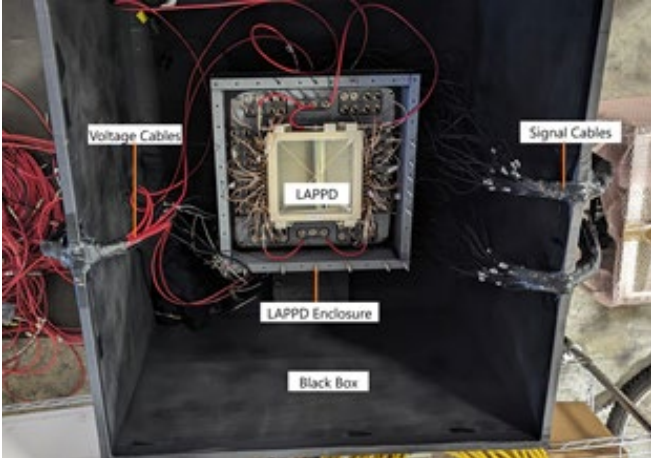


FIG. 4 LAPPD inside the dark box.

[1] [M. McMullen, et al. *Test Stand Design for Hall A's Large Area Picosecond Photodiode Detector*, DSG-Note 2024-06, February 2024.](#)