PMT Signal Output Transformer—Construction and Testing Requirements

October 29, 2003 Nobuyoshi Kitamura

Requirements Source
IceCube ERD 9000-0039-02, §3.3.2.1

Toroidal core material
Magnetics, Inc., ZH42206-TC (22 mm dia., 6 mm high, $\mu_i=15000$ (nom.)), or equivalent.

Winding material
Silicone-insulated 22AWG, 7/30 stranded, 10kV wire (0.110" OD, 40 mils insulation). Harbour Industries, Inc., BSR3239-2210, or equivalent.

Winding requirements
5 ½ turns of bifilar winding with the bifilar pair kept close together (see Fig. 1).

Winding retention (suggested)
Insert a nylon tubing (9 mm OD, 10 mm long) in the center.

PCB mounting (suggested)
Insert a #8 nylon screw in the center and through the board mounting hole. Secure with a hex nut and a washer. (See Fig. 2)

Visual inspection
Verify the proper winding by the following criteria:
(a) The overall diameter (see Fig. 1) shall be no greater than 28.5mm.
(b) The winding portion of the bifilar pair shall be separated by no more than 2mm (see Fig. 3).

Electrical test
The high-frequency cut-off (-6dB) of the transformer, when the primary side is driven with a 50Ω signal source and the response is observed across a 50Ω termination across the secondary side, shall be no less than 130 MHz (TBR).
Figure 1  Schematic illustration of the bifilar winding application.

Figure 2  Sample transformer mounted on the PCB.

Figure 3