# Electromagnetic and Thermal Design and Characterization of Waveguide RF windows for C band 250 kW CW Power Klystron

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## Abstract

***The paper presents the design fabrication and cold testing of vacuum RF window for input and output section for C-band 250 kW CW power klystron. The electromagnetic simulation of the window has been carried out using the CST microwave studio software. The proposed window is designed for 5 GHz operating frequency for handling 250 kW of RF power. In the proposed window geometry, metallized alumina disc (99.5 % purity) of diameter 56 mm and thickness 1.5 mm is brazed in a cylindrical waveguide of diameter 56 mm. The cylindrical waveguide is terminated to WR 187 waveguide at its both ends. The return loss and insertion loss of the above mentioned window has been found to be –36 dB and 0.05 dB respectively which are well matched with experimental values. The bandwidth of 170 MHz was achieved. The thermal analysis is carried out using ANSYS code. Different temperature profiles are obtained for different values of dielectric loss. The temperature range on the alumina disc surface is found to be 33.7°C – 92.9°C for the dielectric loss of 30.95 watts in the window disc material. Cooling channel designed around the window outside surface for proper cooling of the window by flowing coolant in it. The coolant flow rate changed from 5 to 15 L/min to check the cooling effect with variation of flow rate and found that 5 L/min. flow rate is effective for the structure for cooling the required power dissipation. The window performance has been found satisfactory for microwave transmission.***

Keywords: RF Window; Klystron; pill-box type; alumina; S -parameters