Design of Ferrite Loaded High Voltage Barrier Cavity, J.M. BRENNAN, J. BRODOWSKI, M. METH, K.A. ROGERS, R. SPITZ, M. YOSHII, A. ZALTSMAN, KEK - An efficient ferrite loaded high voltage barrier cavity has been designed for the AGS synchrotron. The requirements for designing the cavity are to maximize the inductance and minimize the capacitance of the cavity. The frequency response of complex permeability for several prospective ferrite materials have been measured. And, a new circuit has been tested out for driving a control-grid of high power tetrode. Using this technique and driving a prototype of a barrier cavity, we have succeeded in generating a sinusoidal barrier voltage of 10 kV on one gap.