Abstract：Film sandwiches, consisting of two outer layers of fluoroethylenepropylene and one middle layer of patterned porous polytetrafluoroethylene, were prepared by patterning and fusion bonding. Contact charging was conducted to render the films piezoelectric. The critical voltage to trigger air breakdown in the inner voids in the fabricated films was investigated. The piezoelectric d_{33} coefficients were measured employing the quasistatic method and dielectric resonance spectrum. The results show that the critical voltage for air breakdown in the inner voids is associated with the void microstructure of the films. For the films with patterning factors of 0%, 25% and 44%, the critical values are 300, 230 and 230 kV/cm, respectively. With an increase in the patterning factor, both the piezoelectric d_{33} coefficients determined from the dielectric resonance spectra and those determined from quasistatic measurements increase, which might be due to a decrease in Young's modulus for the films. The nonlinearity of d_{33} becomes increasingly obvious as the patterning factor increases.