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Room-Temperature Microwave Power Detection from an Anharmonic Dipolar Resonance[1] NITIN PARSA, MICHAEL GASPER, RYAN TOONEN, University of Akron, MATHEW IVILL, SAMUEL HIRSCH, U.S. Army Research Laboratory — Electric-field-induced, anharmonic dipolar resonances of room-temperature, barium strontium titanate thin films [Appl. Phys. Lett. 100, 222908 (2012)] have been used to rectify and detect microwave signals with frequencies ranging from 2 GHz to 3GHz. The resonant frequency was shown to have strong dependence on film thickness with some amount of voltage-controlled tunability. Our experiments involved lock-in detection of an amplitude modulated microwave signal with power levels ranging from -20 dBm to +10 dBm. An on-resonant power detection sensitivity of 0.45 mV/mW was observed and shown to have built-in band-pass filtering corresponding to the resonant line shape. This characteristic could be exploited to eliminate the need for external filters that would be realized using traditional circuit components. Because the thin films were produced using a relatively inexpensive solution deposition method, we believe that our observed phenomena could be exploited for the purpose of reducing the cost and increasing the availability of biomedical instrumentation that relies on microwave power detection of industrial, scientific and medical (ISM) radio band frequencies ranging from 2.4 GHz to 2.5 GHz.

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