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Dielectric loss analysis using linear resonators with different impedances BAHMAN SARABI, M.S. KHALIL, M.A. KHASAWNEH, M.J.A. STOUTIMORE, SERGIY GLADCHENKO, University of Maryland and Laboratory for Physical Sciences, F.C. WELLSTOOD, C.J. LOBB, University of Maryland, K.D. OSBORN, Laboratory for Physical Sciences — It is known that amorphous dielectrics are a major source of decoherence in superconducting qubits due to energy absorption by two-level systems coupled to the electric fields. Linear resonators have been applied extensively to study loss in different dielectrics used in qubit circuits due to their versatility and relative simplicity in design, fabrication and measurement. We have designed linear resonators with multi-turn inductors and parallel-plate capacitors with resonance frequencies of 4.8-6.4 GHz. We achieve substantially different L/C values and capacitor volumes by varying the number of inductance turns and the area of the capacitors. We will present results of continuous wave measurements with SiNx capacitors and show how loss tangent and phase noise are related to impedance and capacitor volume.

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