Integrator enables simple ohmmeter with gigohm range

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The Texas Instruments (www.ti.com) IVC102 precision integrator has high-quality internal capacitors. The circuit in **Figure 1** allows you to measure very-high-resistance values of R_X. A precision difference amplifier, a TI INA105, applies a reference voltage to R_X. During integration, a negative voltage ramp, V_O, is generated at the output of the IVC102. The two LM311s compare the amplitude of V_O with two fixed thresholds and generate the two digital signals: start and stop. The delta time between two such events relates to the system parameters by the expression: $\Delta T = C_{INT}[(V_A - V_B)/V_{REF}]R_X$, where ΔT is the delta time and C_{INT} is the internal integrating ca-

pacitance of the IVC102, which external connections on pins 4, 5, and 6 select. (Note: when S_1 is open, C_{INT}=10 pF, whereas, when S_1 is closed, C_{INT}=100 pF.) The V_A threshold allows the circuit to see the output ramp without any offset on the V_O signal. Because of the INA105 difference amplifier, $V_{REF}=V_A-V_B$, so the previous **equation** reduces to: $\Delta T=C_{INT}R_X$. Also note that the precision of resistors R_1, R_2, and R_3 is not critical. The difference amplifier guarantees the precision of the ohmmeter.

External digital-control circuitry can measure delta time by counting the clock periods between the start and the stop events. At the end, the control circuit can generate a reset signal for the IVC102 to perform a new measurement. EDN

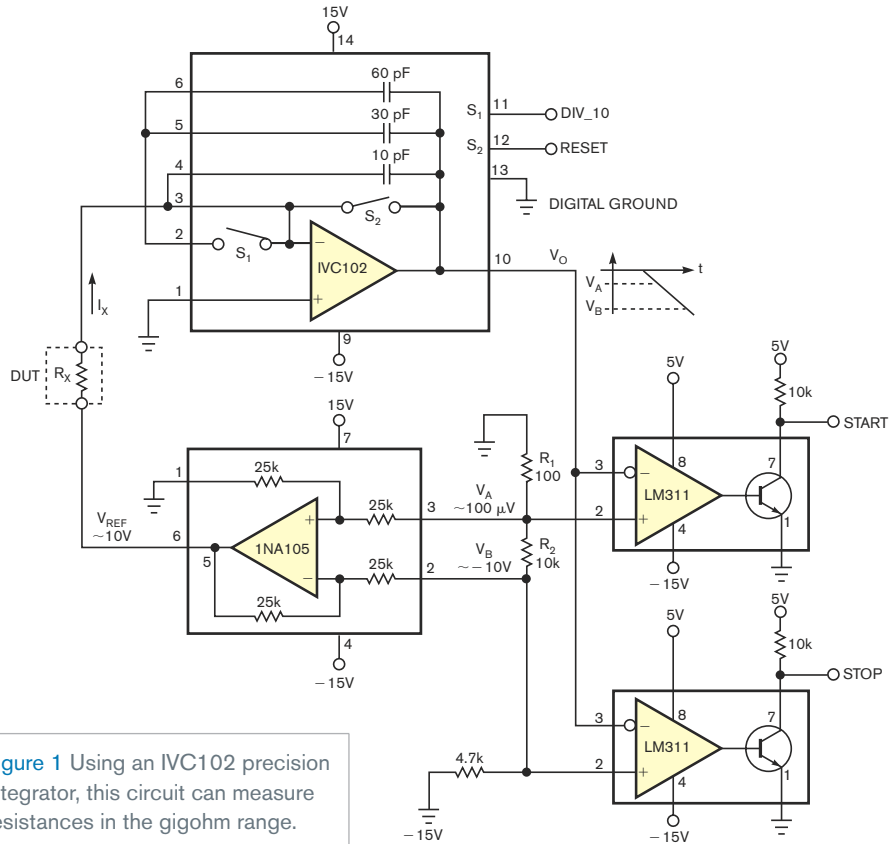

Figure 1 Using an IVC102 precision integrator, this circuit can measure resistances in the gigohm range.