

## Digitally Controlled Sine-Wave Generator

The circuit of Figure 1 produces an accurate variable-frequency sine wave for use as a general-purpose reference signal. It includes an 8th-order elliptic, switched-capacitor lowpass filter (IC3) that is clocked with a 100kHz square wave generated by microcontroller IC2. (Any other convenient squarewave source is also acceptable.) The microcontroller is clocked by a 10MHz oscillator module. A voltage supervisor (IC1) ensures correct operation in the event of a power failure. IC3 sets the filter's cutoff frequency at 1/100 the clock frequency.

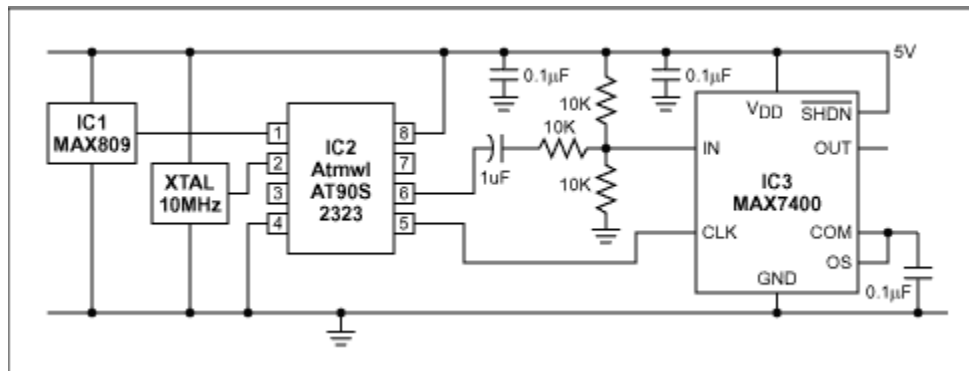


Figure 1. By removing harmonics from a square wave, this circuit generates an accurate and adjustable sine-wave output.

The 8th-order elliptic filter's sharp rolloff sharply reduces the harmonic amplitudes in a 1kHz square-wave input, thereby producing a near-perfect 1kHz sine wave at its output. Using divider-chain logic or a processor, you can then create a digitally adjustable sine-wave source by adjusting the clock and input frequencies while maintaining a ratio of 100:1 between them. For the microcontroller shown, software to implement this idea is [available for download](#). (.asm, 4K)

To prevent clipping at the positive and negative peaks, attenuate the input signal and superimpose it on a dc level of  $V_{cc}/2$ . The result (for a 5V input) is a 2.25V peak-to-peak output.

A similar version of this article appeared in the May 15, 2003 issue of *EDN* magazine.

### MORE INFORMATION

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