

## Microcontroller controls analog phase shifter

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Phase shifters find use in a variety of circuits, but variation in amplifier and capacitance tolerances usually makes it difficult to control the exact phase shift that precise control circuitry requires. The circuit in Figure 1 can control the phase shift from input to output by using IC<sub>1</sub>, an

AD5227 64-step-up/step-down control digital potentiometer, to replace the value for the resistance. The formula of the center frequency of the output is  $1/(2 \times \pi \times R \times C)$ . Different ranges of resistance are available for the AD5227. This example uses a 10-k $\Omega$  value. By stepping through the

64 points, the 720-kHz input sine wave rotates several times from 0 to 360°. The AD5227 acts as a potentiometer, in which A and B are the extremes and W is the wiper.

This example uses IC<sub>2</sub>, a PIC16F84 microcontroller with a crystal frequency of 20 MHz. This microcontroller has a theoretical potential performance of 5 MIPS and should serve many purposes in PLL (phase-locked-loop) circuitry. You could use any microcontroller or even an FPGA to control the **AD5227.EDN**

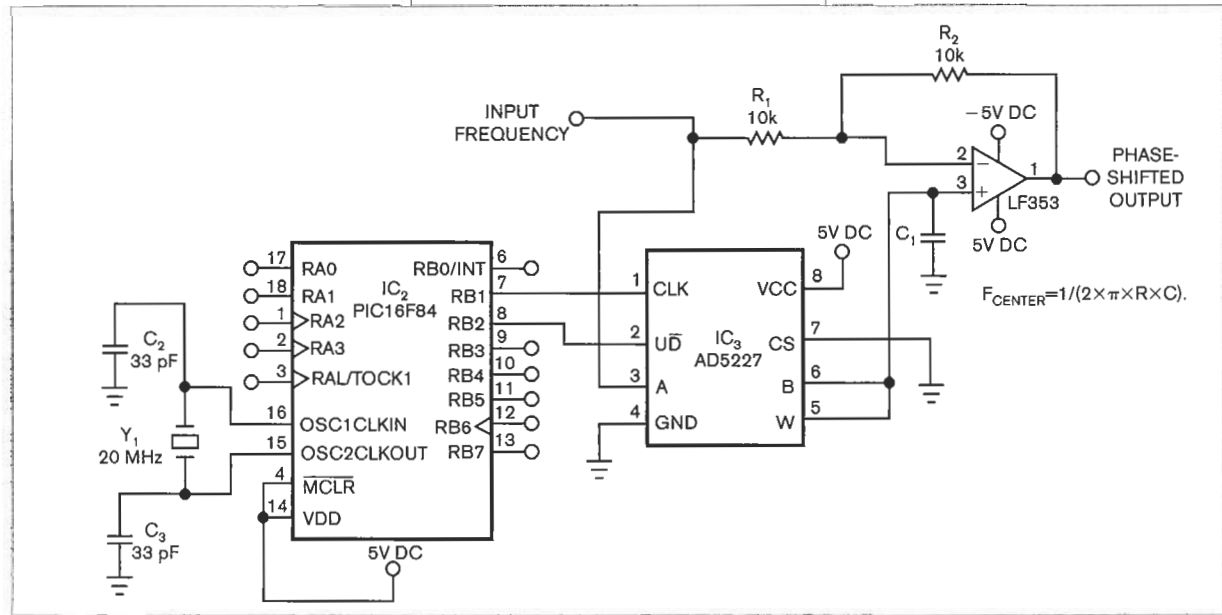


Figure 1 A PIC16F84 sets the resistance of the AD5227 digital potentiometer, precisely controlling the phase shift of the output with respect to the analog input.