



**Figure 3**

By sampling at the peaks, you can convert directly into ones and zeros the output of an exclusive-OR phase detector whose reference and signal inputs are in quadrature. The sampler's output is  $\pm\Delta\theta$ , which is the phase change that corresponds to a shift in edge position of  $\omega_M T_B/8$ , where  $\omega_M$  is the modulation rate and  $T_B$  is the times-one clock period. (See figures 1 and 2.)