low noise that can be achieved with a ceramic capacitor may be corrupted by noise spikes if proper layout practice is not followed. To illustrate this point, output and switch waveforms from Figure 1’s circuit, with a 10μF ceramic output capacitor and 200mA load, but with D1’s cathode arbitrarily connected to the ground plane, are shown in Figure 4. 60mV switching spikes ruin an otherwise clean output.

Efficiency of the circuit is detailed in Figure 5. Efficiency reaches 73% at a 50mA load, and is above 70% at a 200mA load. Larger inductors with less copper resistance can be used to increase efficiency, although such inductors are more expensive than the Murata units specified.

Figure 1’s circuit uses the LT1720 dual comparator in a 50% duty cycle crystal oscillator. Output frequencies of up to 10MHz are practical.

Resistors at C1’s positive input set a DC bias point. The 2k–0.068μF path furnishes phase-shifted feedback and C1 acts like a wideband, unity-gain follower at DC. The crystal’s path provides resonant positive feedback and stable oscillation occurs. C2, sensing C1’s input, provides a low skew, complementary output. A1 compares band-limited versions of the outputs and biases C1’s negative input. C1’s only degree of freedom to respond is variation of pulse width; hence, the outputs are forced to 50% duty cycle.

The circuit operates with AT-cut fundamental crystals from 1MHz to 10MHz, over a 2.7V–6V power supply range. 50% duty cycle is maintained at all supply voltages, with output skew below 800 picoseconds. Figure 2 plots skew, which is seen to vary by about 800ps over a 2.7V–6V supply excursion.

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Figure 1. Crystal oscillator has complementary outputs and 50% duty cycle. A1’s feedback maintains output duty cycle despite supply variations.

Figure 2. Output skew varies only 800ps over a 2.7V–6V supply excursion.