

Clocking Intel Pentium-Based Systems

The Intel Pentium processor brings new levels of performance to PC-based desktop systems. Unfortunately for the system designer, it also places higher demands on the system clocking. Jitter, high and low time, and skew are carefully specified. Oscillators may be expensive or difficult to obtain for the frequencies needed. Clock skew can be difficult to control.

ICS offers a number of solutions for the Pentium system designer, from our workhorse, AV9155A, proven in millions of 386 and 486 systems, to the ICS9175, with its six skew controlled outputs. The AV9172 and ICS9176 are pin and function compatible CMOS alternatives to GA1210 and GA1086 GaAs PLL clock drivers.

For low cost systems, where only the processor is clocked, the simplest solution is to use the AV9155A-23, shown in Figure 1. This clock generator features fixed outputs of 1.84, 16, 24, 12 and two 14.318 MHz. The CPU output can be selected with the three address pins to one of eight frequencies, including 66.66, 60, and 52 MHz. A CPU/2 output is also provided, which is skew matched to typically 200ps.

The AV9154A-27, shown in Figure 2, offers the most commonly used system clocks of 1.84, 24, 12 and 14.318 MHz, as well as a single CPU output which can be set to one of eight frequencies. The 16-pin package uses very little board space.

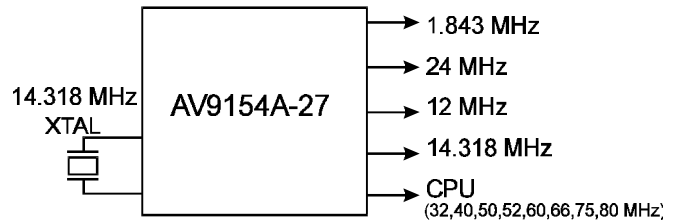


Figure 2

High performance systems have more demanding clock requirements. The processor, cache controller, local bus accelerators, and PCI-EISA bridge require low skew, low jitter clocks. The AV9172 is a phase-locked loop buffer with six outputs - four at the CPU frequency and two at 1/2 CPU frequency. Two of the CPU outputs can be configured as non-overlapping clocks. The AV9172 has guaranteed skew of 250ps between outputs running at the same frequency (50ps typical) and 500ps between 1x and 1/2x outputs. A typical configuration is shown in Figure 3. The output frequency is exactly 1x or 2x the input frequency with ± 500 ps skew between input and output.

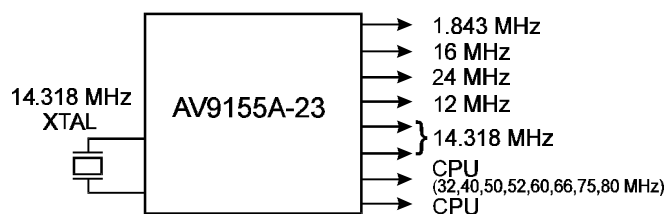


Figure 1

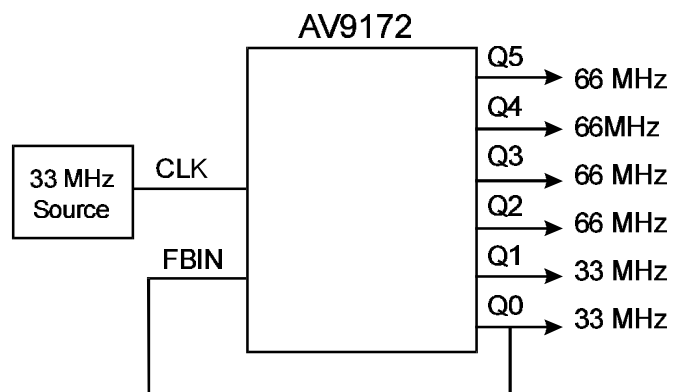
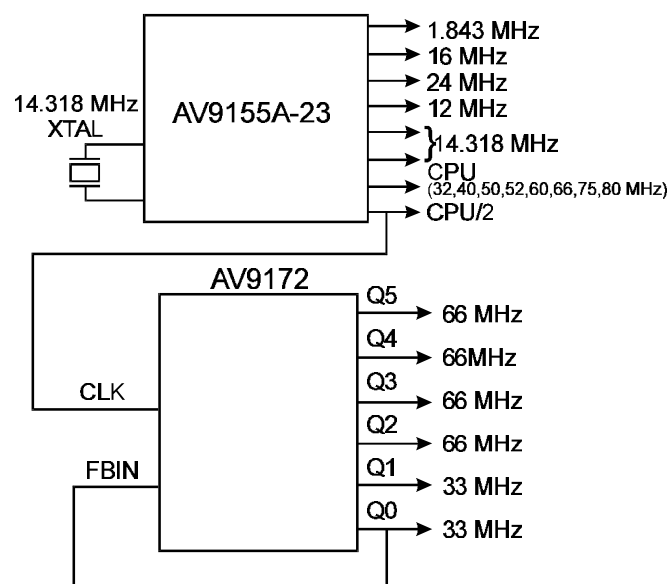


Figure 3



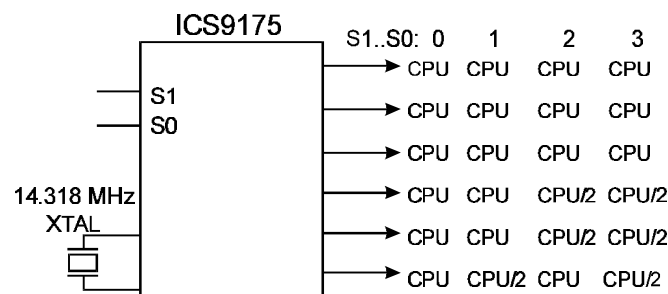
Pentium Applications Note

An ideal source for the 1/2x clock required by the AV9172 is the AV9155A-23 mentioned earlier. This gives the system designer all the fixed clocks that he requires, as well as low jitter, skew matched copies of the CPU and 1/2CPU clocks (Figure 4). The AV9172 is a direct replacement for the Gazelle GA1210, but fabricated in a high speed CMOS process rather than expensive gallium arsenide.



ALL CPU AND CPU/2 OUTPUTS SKEW CONTROLLED

Figure 4

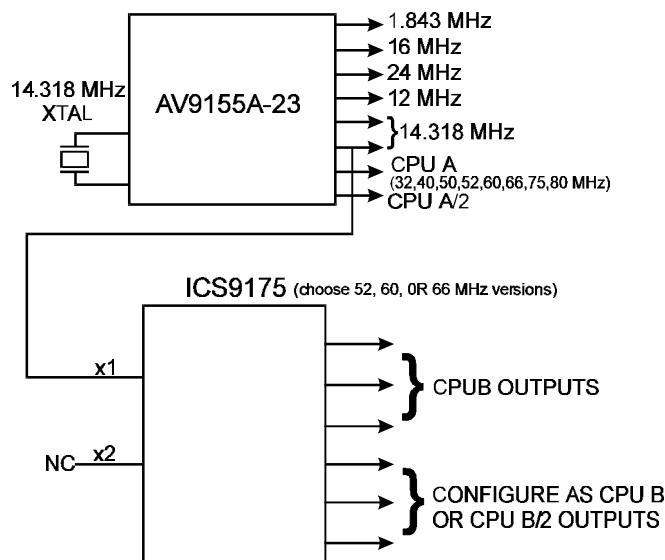


VERSIONS AVAILABLE FOR CPU = 52, 60, AND 66 MHz

Figure 5

The ICS9175 is a single frequency clock generator which synthesizes standard Pentium system frequencies from a low cost 14.318 MHz crystal. Using the select pins, the designer can allocate the six outputs to be either 1x or 1/2x outputs as shown in Figure 5. The ICS9175 may also be driven directly from the 14.318 MHz output of the AV9155A-23, as shown in Figure 6. This gives the system designer all required fixed clocks, six skew matched CPU clocks plus another CPU and 1/2 CPU output, which can be independently varied in frequency.

The ICS9176 is a direct replacement for the Gazelle GA1086, which features ten skew matched outputs. Additional information will be forthcoming.



ALL CPU A AND CPU B FREQUENCIES ARE INDEPENDENT

Figure 6