

SDRAM Modules using Pericom's Products

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Memory module design using today's SDRAM and tomorrow's Rambus, Direct Rambus and Double data rate SDRAM is a challenge and becomes even more difficult with higher Clock and Bus speeds. The SDRAM modules are now moving from 66MHz to 100MHz and beyond. SDRAM modules come with different pin configuration from 144-pin Small Outline Memory Modules (SODIMM) to 168-pin Dual Inline Memory Modules (DIMM) and from 8MB to 128MB. Pericom offers several products with 3.3V / 2.5V power supplies and 3.3V / 2.5V I/O levels that can be used in SDRAM memory modules.

There are many ways to design memory modules using different densities and configurations of SDRAM, i.e. 16Mbits or 64Mbits density and 1Mx16, 2Mx8, 4Mx4, 8Mx8 configuration and so on. The figure (see below) shows the basic SDRAM memory module with different memory chips using Pericom's product. Zero delay and low skew (less than 250ps) Clock Buffers/Drivers synchronize all SDRAM chips on the positive edge. This Clock buffer/driver

can be with a PLL or without a PLL circuit and has 4 to 6 outputs, each of which can drive up to four SDRAM, when you have more than four SDRAM chips that are to be clocked.

Zero delay Bus Switches are needed to prevent data contention when you have more than one bank on the module and also for the hot insertion. By having more than eight SDRAM on the module, input capacitance for signals such as address line is in several hundred picofarads, very high. To prevent the system from overloading, buffers are needed when you have eight or more SDRAM chips on the module.

The tables show the Pericom's products, such as Buffers, Clock Drivers and Bus Switches, which can be used in any SDRAM /DRAM Memory modules. It should be noted that these circuits are not limited to Memory Modules but can apply to non-PC applications such as high end workstations, graphic cards, speed racers, network routers, and laser printers.

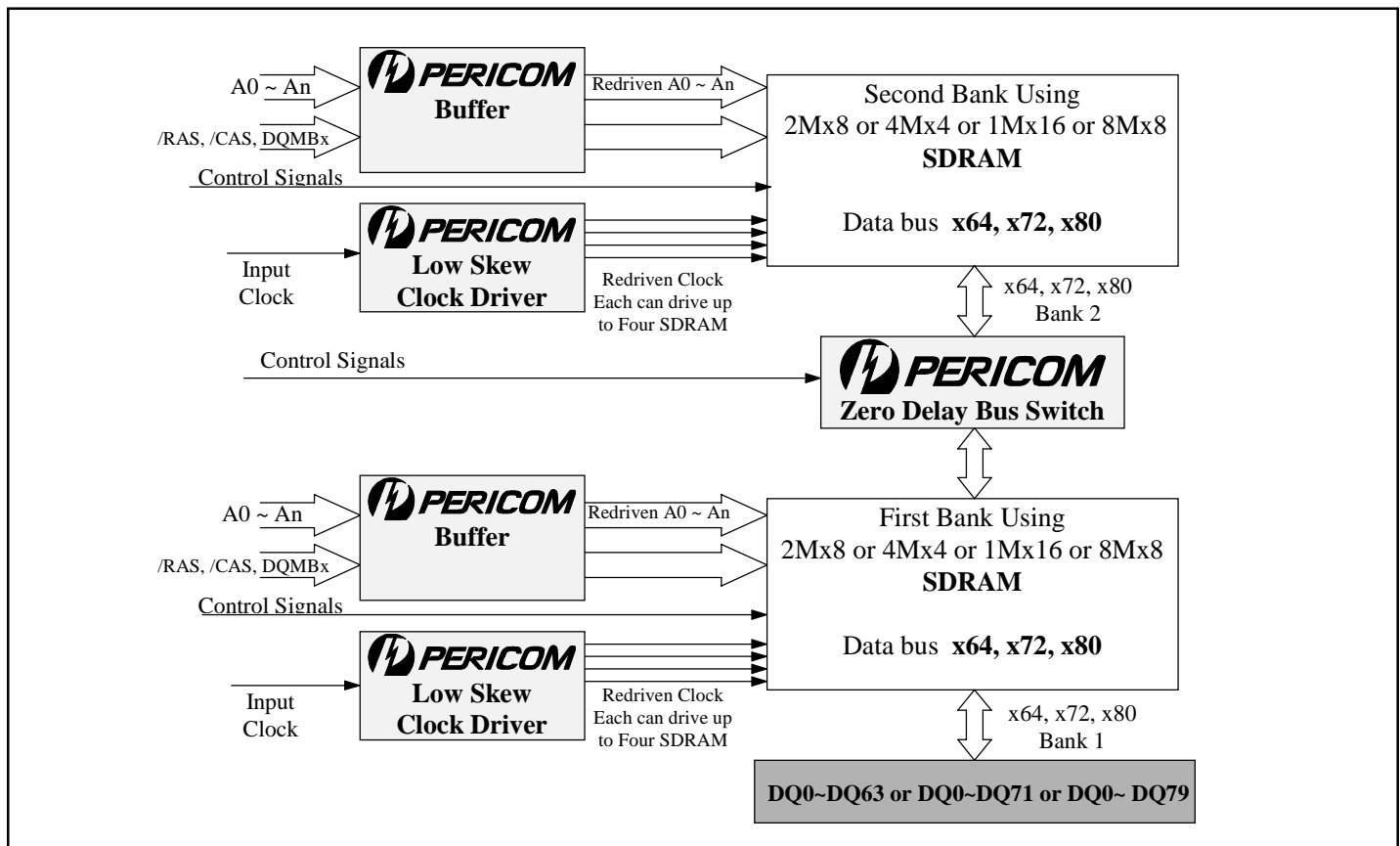


Table 1 shows some Pericom's Products that can be used in Memory module applications. For detailed information concerning these products, refer to the Pericom's Web site at www.pericom.com. Table 2 shows the different Memory Module configurations using different memory chips. The "X" mark indicates that Pericom's products can be used to design and develop the desired Memory Module configuration.

Table 1. Pericom's Products

Clock Drivers	Buffers	Bus Switch
PI49FCT3804	PI74ALVCH16244	PI5B3125
PI49FCT3805	PI74ALVCH162244	PI5B3126
PI49FCT3806	PI74ALVCH162601	PI5B3244
PI49FCT3807	PI74ALVCH16825	PI5B3245
PI6B3904	PI74ALVCH16827	PI5B3384
PI6B5930	PI74ALVCH162827	PI5B3861
PI6B9910	PI74FCT3244C	PI5B3863
PI6B9930	PI74FCT163244	
PI6B9933	PI74LCX241	
	PI74LCX244	
	PI74LCX541	
	PI74LCX827	
	PI74LCX16240	
	PI74LCX16244	
	PI74LCX16827	
	PI74LPT241	
	PI74LPT245	
	PI74LPT827	
	PI74LPT16244	
	PI74LPT16827	

Table 2. SDRAM Memory Module Configuration

Module Configuration	Using SDRAM	No.of Banks	Pericom's Buffer	Pericom's Clk Driver	Pericom's Bus
x64DIMMs					
1Mx64	1Mx16	1	x	x	
2Mx64	1Mx16	2	x	x	x
4Mx64	1Mx16	4	x	x	x
2Mx64	2Mx8	1	x	x	
4Mx64	2Mx8	2	x	x	x
8Mx64	2Mx8	4	x	x	x
4Mx64	4Mx4	1	x	x	
8Mx64	4Mx4	2	x	x	x
8Mx64	8Mx8	1	x	x	
16Mx64	8Mx8	2	x	x	x
16Mx64	16Mx4	1	x	x	
32Mx64	16Mx4	2	x	x	x

Same patterns can be apply to Memory Module with Parity or ECC configuration i.e. x72 and x80.