S100 4GB DRAM Board for 386/486 Boards

Foreword:
This has been a two year project I have only had the time to work on it bits and pieces over holidays or free weekends. The idea was originally brought to my attention by John Monahan, There has also been a couple prototype boards designed by other guys on the forum independently to this design, namely Alan Hightower had a great design, I'm not sure on the status of it currently.

This board is slightly more on the expensive side of production as compared to the average 2-layer S100 board we are all well accustomed to. A warning in general: It will not be a cheap board to produce and will not be an easy assemble for a beginner, it has a bunch of SMD parts on it, minimal through hole. I may look into getting a quote for assembly if there is enough interest to justify a high volume manufacture/assembly run. Currently I am looking for a Alpha test group and/or expressions of interest and numbers for a production run. If you would like Bare PCB's please leave a comment below and I will add you to the list. I will be posting this on the S100 Google group, on the RBC forum, my own domain (links below), and when I can figure out where the "edit" button is on the RBC wiki I will make a builders page for this project. With reference to the pictures below, i still have a little more work to do on the PCB's so please don't take these pictures as final product. I will edit this page with new links when they have been created.

Description:
This card is a 4GB DRAM board that connects to a standard S100 backplane to allow utilization of the first 16MB of address space of the DRAM board, the rest (16MB+) is interfaced over a OTT connection cable(s) common to John Monahans' 80386/80486 CPU boards (links below).

The design below uses a few boards to get the "complete card" working in system, I have chosen to design it this way mostly because the FPGA board is 6-layer, has allot of tuned length tracks, small vias and I didn't want people to have to re-buy and populate a FPGA mez board if we needed to change things on the S100 base board. I also did not want to have to re-spin the FPGA mez board too many times as it is allot of work. I will be adding in a VRM circuit board as I want to do a bit more development on the regulation circuits for the FPGA board and would (again) prefer people not have to pay for another FPGA mez board or base board if I change the VRM circuits (the current picture of the FPGA mez board has VRM circuits on board, this will be changed). So at the moment the complete card consists of:

(1) S100 Base board --> This board connects to the 386/486 OTT bus, converts signals to voltages used by the FPGA and vice versa, connects to the S100 bus for the first 16MB of Memory, provides some RS232 I/O (FT232RL and/or MAX3232) for debugging, had CPLD on board for S100 signals, some voltage regs for the on board devices.

(2) FPGA mezzanine board, this board connects to the S100 Base board. for development stage the FPGA board will have a XC6SLX45 on board but this could be changed to a XC6SLX25 later on to reduce cost. This board it incorporates the DDR3 DRAM controller and connects to the
DDR3 240pin DIMM, there is a 16MB Platform flash storage for the FPGA bitstream and a small PIC18F micro I use for debugging and the DIMM SPD recognition. This is also multiple I/O headers on this board that connect to the base board for GPIO.

(3) VRM board, (not pictured and still in development), this board has all the voltage regulation circuits for the FPGA on it. It plugs into the S100 base board and the FPGA mez board gets its supply via this board.

Features:
- 16MB Memory access for the standard S100 bus.
- up to 4GB access for 80386/80486 OTT memory bus.
- RS232 connection(s) for debugging (via 9-pin comm connectors and USB-A)
- GPIO ports for debugging and additional mez card connection if wanted.

Hardware:
- Xilinx Spartan 6 XC6SLX45 or LX25
- XCF16P Platform flash
- FT232RL and MAX3232 for RS232 I/O debugging (I may look to change the FT232RL for a MCP2200)
- DDR3 240-pin DIMM (non ECC non registered)

Links:
- https://groups.google.com/forum/#!topic/s100computers/LMC0AH43a98
- http://www.s100computers.com/My%20System%20Pages/80386%20Board/80386%20CPU%20Board.htm
- http://www.s100computers.com/My%20System%20Pages/80386%20Board-II/80386%20CPU%20Board-II.htm
- http://www.s100computers.com/My%20System%20Pages/80486%20Board/80486%20CPU%20Board.htm
Members wanting PCBs and Testing --> Updated 15-Jan-2019

Name / PCB(set) / Alpha Tester

pbirkel / 1 / No
Eddie Catron / 2 / No
yoda / 1 / Yes

Subject: Re: S-100 4GB DRAM board
Posted by pbirkel on Mon, 14 Jan 2019 08:49:16 GMT
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I'm interested in at least one PCB-set, very preferably with a populated mezzanine board, once the design has been proven. I am most definitely *not* an alpha-tester, nor beta for that matter. Neat transmission-line tuning on the mezzanine board. Thank you.

Subject: Re: S-100 4GB DRAM board
Posted by yoda on Mon, 14 Jan 2019 20:48:02 GMT
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I would probably be interested in alpha testing. It looks like you are using a BGA for the FPGA - that might be challenging for me to do so would prefer that being assembled I think.

Dave

Subject: Re: S-100 4GB DRAM board
Posted by ABurrows on Tue, 15 Jan 2019 00:33:20 GMT
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pbirkel wrote on Mon, 14 January 2019 00:49I'm interested in at least one PCB-set, very preferably with a populated mezzanine board, once the design has been proven. I am most definitely "not" an alpha-tester, nor beta for that matter. Neat transmission-line tuning on the mezzanine board. Thank you.

ok no problem, i have you down on the list above.

yoda wrote on Mon, 14 January 2019 12:48I would probably be interested in alpha testing. It looks like you are using a BGA for the FPGA - that might be challenging for me to do so would prefer that being assembled I think.
Hi Dave, ok great! Yes FGG484 BGA package, i will look into the expense of an assembly run for any of the BGA parts, or i might just assemble them by hand for Alpha testers. i have also added you to the list.

Hi

Any progress? Just curious.