TS-3100 User's Manual

Technologic
S Y S T E M S

Technologic Systems, Inc.

16 East Laser Drive

Fountain Hills, AZ 85268

480-837-5200
FAX 837-5300

info@embeddedx86.com

http://www.embeddedx86.com/

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2F, 200J

All modifications from previous versions are listed in the appendix.

Limited Warranty

Technologic Systems warrants this product to be free of defects in material and workmanship for a period of one year from date of purchase. Technologic Systems will repair or replace the defective unit during this warranty period in accordance with the following instructions:

- Contact Technologic Systems and obtain a Return Material Authorization (RMA) number and a copy of the RMA form.

- Fill out the RMA form completely and include it and dated proof of purchase with the defective unit being returned. Clearly print the RMA number on the outside of the package.

This limited warranty does not cover damages resulting from lighting or other power surges, misuse, abuse, abnormal conditions of operation, or attempts to alter or modify the function of the product.

This warranty is limited to the repair or replacement o f the defective unit. In no event shall Technologic Systems be liable or responsible for any loss or damages, including but not limited to any lost profits, incidental or consequential damages, loss of business, or anticipatory profits arising from the use or inability to use this product.

Repairs made after the expiration of the warranty period are subject to a flat rate repair charge and the cost of return shipping. Please contact Technologic Systems to arrange for any repair service.

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1   Introduction

The model TS-3100 is a compact, full-featured PC compatible Single Board Computer based on the 386EX processor. If you are coming up from the 8-bit microcontroller world, you will find that this product provides much more performance and much quicker development since you can now use standard PC development tools such as Turbo C or Quick Basic. If you have done work in the PC world in the past, you will find you can now build applications for a very small target that does not require a keyboard, video, floppy disks, or hard drives.

You can typically write and debug code on a host PC using standard development tools for the PC platform, then simply copy it to and run it on the TS-3100 without modification. If additional peripherals are required, the PC/104 expansion bus allows for many standard functions available off-the-shelf. It is also very simple to create a custom PC/104 daughter board for those special features that differentiate your product. Technologic Systems can provide technical support as well as a free quotation for any custom hardware, software, or BIOS modifications you may require.

This manual is fairly short. This is because for the most part, the TS-3100 is a standard 80386-based PC compatible computer, and there are hundreds of books about writing software for the PC platform. The purpose of this manual is documenting where the TS-3100 differs from a standard PC.

2   Differences Between TS-3100 and TS-3200

The TS-3100 is almost identical to the TS-3200. The TS-3100 was designed to be an extremely low-cost PC/104 board where the full horsepower of a TS-3200 is not needed. Therefore, the manual for the TS-3200 can be used except for the categories below detailing where they differ. A copy of the TS-3200 can be found on our web-page for the TS-3200, or on the utility diskette of the TS-3100.

2.1   RAM/Memory

The TS-3100 only has 512 Kbytes of 8-bit wide RAM and is not expandable. Some of this RAM is used for BIOS shadowing and the operating system. The maximum user program size is limited to about 250 Kbytes, which is typically plenty for most DOS applications.

2.2   Flash Memory

The Flash memory uses a single 512 Kbyte chip. Some of this Flash memory is reserved for the BIOS and for DOS. This leaves about 320 Kbytes of solid-state disk drive space available. If more disk space is required, one can always add a DiskOnChip module.

2.3   Operating Systems Supported

Due to the limited RAM, only DOS-ROM is supported by Technologic Systems on the TS-3100.

2.4   Speed

Both the TS-3100 and the TS-3200 use an Intel 386EX chip running at 25 MHz clock rate. The TS-3200 uses a high-speed SDRAM with a 16-bit interface to the processor. The TS-3100 differs in that it uses a slower DRAM with only an 8-bit interface. This causes the TS-3100 to execute code at 40% as fast as the TS-3200.

2.5   Bus Size

The TS-3100 only supports an 8-bit PC/104 Bus. Most PC/104 daughter boards only use 8-bits so this is a minor limitation.

2.6   RS-485

The TS-3100 and the TS-3200 support RS-485 on pins 1 and 6 of the COM 1 header. Unlike the TS-3200, the TS-3100 does not have a separate 3-pin header for RS-485.

2.7   DIO Differences

The TS-3100 has the exact same 37 DIO lines on headers DIO1, DIO2, and LCD as the TS-3200 does. The TS-3100 has slightly more flexibility on a few of the signals. Pins 6, 11, 12, 13, and 14 on DIO1 and pin 12 on DIO2 can be either inputs or outputs (the TS-3200 can only use these lines as inputs). On the TS-3100, all input signals on the DIO1, DIO2, and LCD ports can be 0-5 Volts (the TS-3200 has a 3.3V limitation on some of these lines).

2.8   Transferring Files from a Host System to the TS-3100

Although the TS-9500 (a PC/104 daughter board with VGA video and keyboard) can be used with the TS-3100, the TS-9500 Compact Flash interface requires a full 16-bit PC/104 bus. This means that Compact Flash cannot be used to transfer files from a host PC. Using Zmodem over a serial port is the suggested method to transfer files to the TS-3100.

2.9   Development Tips

The use of a TS-3200 is recommended for Development. Besides being able to support a TS-9500 (useful in rapid development and on-board debugging with the VGA and keyboard support), the faster speed and the ability to throttle the speed with a jumper (simulating a TS-3100) make it a perfect developers tool for the TS-3100.

The use of the integrated BIOS debugger (INT3) is available on the TS-3100.

3   Feedback and Updates to the Manual

To help our customers make the most of our products, we are continually making additional and updated resources available on the Technologic Systems web site (www.embeddedx86.com). These include manuals, application notes, programming examples, and updated software and firmware. Check in periodically to see what's new!

When we are prioritizing work on these updated resources, feedback from customers (and prospective customers) is the number one influence. If you have questions, comments, or concerns about your TS-3100 Embedded PC, *please let us know*. Details for contacting us are listed in the front of this manual.

Appendix A - Board Diagram and Dimensions

Figure 1 - Board Diagram   Figure 2 - Board Dimensions (standard PC/104 8-bit
                                                         module dimensions)

Coming Soon   **Coming Soon**

Appendix B – System Memory Map

Resource	Starting Address		Size
	Hex	**Decimal**	
BIOS (Shadow RAM)			64k
	F0000h	960k	
DOS / BIOS Extension			64k
	E0000h	896k	
PC/104 Bus			32k
	D8000h	864k	
DiskOnChip or SRAM or PC/104 Bus			32k
	D0000h	832k	
PC/104 Bus			32k
	C8000h	800k	
PC/104 Bus (Typically video BIOS)			32k
	C0000h	768k	
PC/104 Bus (Typically video memory)			128k
	A0000h	640k	
Not Used			192k
	70000h	448k	
Lower Memory (RAM)			448k
	00000h	00000	

Figure 3 – TS-3100 Memory Map (Not to scale)

Appendix C - Further References

Technologic Systems Web Site
http://www.embeddedx86.com/

Technologic Systems TS-3200 Manual

http://www.embeddedarm.com/documentation/ts-3200-manual.pdf

Intel 386EX User's Guide
http://developer.intel.com/design/intarch/manuals/272485.htm

Maxim Integrated Products
http://www.maxim-ic.com/

Omen Technologies
http://www.omen.com/

PC/104 Consortium Web Site
http://www.pc104.org/

Appendix D - Manual Revisions

11/09/01   New manual

07/24/08   Fixed broken web links

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