

SSC-5x86HVGA
5x86 w/ VGA
Single Board Computer

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1

Introduction

Welcome to the SSC-5x86HVGA 5x86 w/VGA Single Board Computer. The SSC-5x86HVGA board is an ISA bus half-size board, which comes equipped with high performance 486DX/DX2/DX4 or the latest Cyrix/AMD 5x86 CPU and advanced high performance multi-mode I/O, designed for the system manufacturers, integrators, or VARs that want to provide all the performance, reliability, and quality at a reasonable price.

An advanced high performance super AT I/O chip UMC UM8669F used in the SSC-5x86HVGA board. Both on-chip UARTs are compatible with the NS16C550. The parallel port and IDE interface are compatible with IBM PC/AT and XT architecture's. The FDC37C665 incorporates sophisticated power control circuitry(PCC). The PCC supports multiple low power down modes.

The on board VGA controller is Cirrus CL-GD54M30 graphics accelerator. The VGA controller based on the internal PCI bus to get the most high performance. User will not need extra VGA card to release one slot for other application.

In addition, the SSC-5x86HVGA provides two 72-pin SIMM sockets for its on-board DRAM. The 72-pin accepts 1MB, 2MB, 4MB, 8MB, 16MB, and 32MB SIMM. So, the total on-board memory can be configured from 1MB to 64MB.

SSC-5x86HVGA uses the ALI chipset, M1489 and M1487, which are 100% ISA/PCI compatible chipset.

1.1 Specifications :

The SSC-5x86HVGA 5x86 w/ VGA Single Board Computer provides the following specification:

- **CPU** : 486SX/DX/DX2/ DX4 or AMD/Cyrix 5x86
- **DMA channels** : 7
- **Interrupt levels** : 15
- **Chipset** : M1489 and M1487
- **Real-time clock/calendar** : DS-12887 chip and quartz oscillator, 128B CMOS memory, powered by lithium battery for over 10 years of data retention.
- **RAM memory** : 1MB to 64MB,EDO and standard DRAM supported
- **Second Cache memory** : 128KB
- **E-IDE hard disk drive interface** : up to two PCI Enhanced IDE hard drives.
- **Floppy disk drive interface** : two 2.88 MB, 1.44MB, 1.2MB, 720KB, or 360KB floppy disk drives.
- **Two high speed and +/-15KV ESD Protected Series ports** : NS16C550 compatible UARTs
- **Bi-directional Parallel Port**
- **VGA Controller - GD54M30** :
Bus : PCI bus
Resolution : 1024x768 - 256 color
1280x1024 - 16 color(1MB VRAM)
- **Watch-dog timer** : can be set by 1,2,10,20,110 or 220 seconds period. Reset or NMI was generated when CPU did not periodically trigger the timer. Your program use hex 043 and 443 to control the watch-dog and generate a system reset.

- **Flash Disk - DiskOnChip** : The DiskOnChip Flash Disk provides 100% compatible with hard disk. The built-in TrueFFS Transparent Flash Block Management and Space Reclamation will let customer to use the Flash Disk with DOS command, no need any extra software utility.
- **External power connector(3921-2pin)** : 2 pins for +5V,Ground
- **Keyboard connector**
- **Mouse** : PS/2 Mouse Port on-board.
- **Power Consumption** : +5V @ 2.8A (AMD 5x86-133,8MB RAM)
- **Operating Temperature** : 0° ~ 60° C (CPU needs Cooler)

1.2 What You Have

In addition to this *User's Manual*, the SSC-5x86HVGA package includes the following items:

- SSC-5x86HVGA 5x86 w/ VGA Single Board Computer
- RS-232/Printer Cable
- FDD/HDD Cable
- VGA utility diskette
- 6-pin Mini-Din to 5-pin Din Keyboard Adapter Cable

If any of these items is missing or damaged, contact the dealer from whom you purchased the product. Save the shipping materials and carton in case you want to ship or store the product in the future.

2

Installation

This chapter describes how to install the SSC-5x86HVGA. At first, the layout of SSC-5x86HVGA is shown, and the unpacking information that you should be careful is described. The jumpers and switches setting for the SSC-5x86HVGA's configuration, such as CPU type selection, system clock setting, and interrupt IRQ setting for serial ports and parallel port, are also included.

2.1 SSC-5x86HVGA's Layout

< reference next page >

2.2 Unpacking

Your SSC-5x86HVGA Single Board Computer contains sensitive electronic components that can be easily damaged by static electricity.

In this section, we describe the precautions you should take while unpacking, as well as during installation. It is very important that the instructions be followed correctly, to avoid static damage, and to successfully install the board.

The system board should be done on a grounded anti-static mat. The operator should be wearing an anti-static wristband, grounded at the same point as the anti-static mat.

Inspect the cardboard carton for obvious damage. Shipping and handling may cause damage to your board. Be sure there are no shipping and handling damages on the board before processing.

After opening the cardboard carton, exact the system board and place it only on a grounded anti-static surface component side up.

Again inspect the board for damage. Press down on all the socketed IC's to make sure that they are properly seated. Do this only with the board place on a firm flat surface.

Note : DO NOT APPLY POWER TO THE BOARD IF IT HAS BEEN DAMAGED.

You are now ready to install your SSC-5x86HVGA Single Board Computer.

2.3 Jumper Description

You can change the SSC-5x86HVGA's configuration by setting jumper switches on the board. The board's jumpers are preset at the factory. Under normal circumstances, you should not need to change the jumper settings.

A jumper switch is **closed** (sometimes referred to as shorted with the plastic cap inserted over two pins of the jumper). A jumper is **open** with the plastic cap inserted over one or no pin(s) of the jumper. Figure 2.2 below shows different jumper settings which will be used in this chapter.

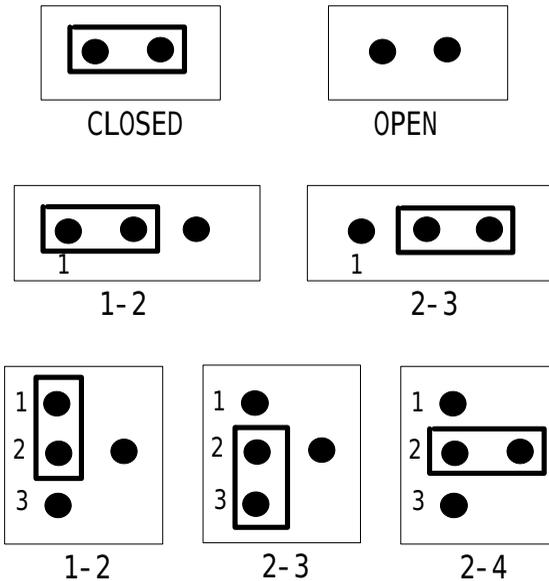


Figure 2.2

2.4 Setting the CPU for SSC-5x86HVGA

If you want to upgrade the CPU, you have to set two things:

1. Set the jumpers for CPU type.
2. Adjust the jumper setting for CPU speed.

• CPU Type Setting:

CPU Type	JP2	JP3	JP4	JP5	JP6	JP7	JP8	JP9	JP10
Intel DX2/DX4 &E	OFF	3-4	3-4	3-4	2-3	2-3	1-2	OFF	ON
* Cyrix 5x86 AMD DX4+ (SV8B) Intel DX2/DX4 &EW SGS ST486DX4V ST486DX2V	5-6	3-4	3-4	3-4	2-3	2-3	2-3	2-3	ON
Cyrix/TI/SGS DX2/DX4	1-2	5-6	5-6	5-6	2-3	2-3	1-2	1-2	ON
AMD DX2/DX4 (NV8T)	OFF	OFF	OFF	1-2	2-3	2-3	1-2	OFF	OFF
AMD X5(133) Am5x86 - P75 DX2+(SV8B)	1-3 5-6	3-4	3-4	3-4	2-3	2-3	2-3	2-3	ON

Note : ON - Close OFF - OPEN

**JP11 : OPEN - Write Back internal cache for AMD DX4(SV8B)
CLOSE - Write Thru internal cache for AMD DX4(SV8B)**

• CPU Clock Setting :

CPU Clock	JP13	JP15	JP16 1-2	JP16 3-4
25Mhz	OPEN	1-2	OPEN	OPEN
* 33Mhz	OPEN	1-2	CLOSE	CLOSE
40Mhz	CLOSE	2-3	OPEN	CLOSE

(*): default setting

Note :

**DX2-66/DX4-100/5x86-100 sets CPU Clock - 33Mhz
DX2-80/DX4-120/5x86-120 sets CPU Clock - 40Mhz
AMD 5x86-P75(133Mhz) sets CPU Clock - 33MHz**

• **CPU Voltage Selection - 3.3V, or 3.45V**

CPU Voltage	JP14
* +3.3V	2-3
+3.45V	1-2

(*) : default setting

2.5 System Memory DRAM(EDO RAM supported)

There are two 72-pin SIMM sockets to accept 1MB,2MB,4MB,8MB,16MB,or 32MB memory modules. The total capacity is from 1MB to 64MB. Customer can free install any memory module on any socket. Don't care which socket is first to install.

2.6 Watch-Dog Timer

The Watch-Dog Timer is enabled by reading port 443H. It should be triggered before the time-out period ends, otherwise it will assume the program operation is abnormal and will issue a reset signal to start again, or activate NMI to CPU. The Watch-Dog Timer is disable by reading port 043H. See Appendix A for more detailed description of Watch-Dog Timer.

• **JP19 : Watch-Dog Active Type Setting**

JP19	DESCRIPTION
*1-2	RESET WHEN WDT TIME-OUT
2-3	ACTIVATE NMI TO CPU WHEN WDT TIME-OUT
OPEN	DISABLE WDT

(*): default setting

• **JP17: WDT Time-Out Period**

PERIOD	1-2	3-4	5-6	7-8
1 sec.	OPEN	OPEN	CLOSE	OPEN
2 sec.	OPEN	OPEN	CLOSE	CLOSE
*10 sec.	OPEN	CLOSE	OPEN	OPEN
20 sec.	OPEN	CLOSE	OPEN	CLOSE
110 sec.	CLOSE	OPEN	OPEN	OPEN
220 sec.	CLOSE	OPEN	OPEN	CLOSE

(*) : default setting

2.7 PCI VGA Controller

The SSC-5x86HVGA have built-in Cirrus GD54M30 PCI VGA Controller. If you want to use the external VGA Card, the BIOS will automatic disable the on board VGA controller when have external VGA card in the system.

There have no jumper or BIOS setup to control the on board VGA controller's ON/OFF.

To get more VGA drivers information, please refer the Cirrus Internet address : **WWW.CIRRUS.COM**

Or BBS at Taiwan : Cirrus - **886 2 7185173**
- **886 2 5147675**

2.8 DiskOnChip Flash Disk

The DiskOnChip Flash Disk Chip(DOC) is produced by M-Systems. The DOC have two models in market : ED1102 and ED1202. The ED1102 is 28-pin DIP package and ED1202 is 32-pin package, both models can be used in SSC-5x86HVGA's 32-pin DOC socket. Because the DOC is 100% compatible to hard disk and DOS. Customer don't need any extra software utility. It is just "plug and play", easy and reliable. Right now the DOC is available in 1MB/2MB capacity, in the near future will have 4MB/8MB/16MB model.

• **JP20 : DiskOnChip Memory Address Setting**

JP20	Address
1-2	D000
3-4	D800
* 5-6	E000

(*) : default setting

WARNING !!

**If you install the ED1102,28-pin type,the ED1102 pin-1 should be at the 32-pin socket's pin-3.
Wrong installation will damage the ED1102 DOC.**

2.9 PS/2 Mouse Setting

When use the SSC-5x86HVGA board,you could use the PS/2 mouse to release serial ports for other applications.
The PS/2 mouse will use the IRQ12 when operation.
The JP18 is using to control the PS/2 mouse enable/disable.

• **JP18 : Enable/Disable PS/2 Mouse**

JP18	DESCRIPTION
* CLOSE	Enable PS/2 Mouse,IRQ12
OPEN	Disable PS/2 Mouse

(*) : default setting



Connection

This chapter describes how to connect peripherals, switches and indicators to the SSC-5x86HVGA board.

3.1 Floppy Disk Drive Connector

SSC-5x86HVGA board comes equipped with a 34-pin daisy-chain driver connector cable.

• CN4 : FDC CONNECTOR

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GROUND	2	REDUCE WRITE
3	GROUND	4	N/C
5	GROUND	6	N/C
7	GROUND	8	INDEX#
9	GROUND	10	MOTOR ENABLE A#
11	GROUND	12	DRIVE SELECT B#
13	GROUND	14	DRIVE SELECT A#
15	GROUND	16	MOTOR ENABLE B#
17	GROUND	18	DIRECTION#
19	GROUND	20	STEP#
21	GROUND	22	WRITE DATA#
23	GROUND	24	WRITE GATE#
25	GROUND	26	TRACK 0#
27	GROUND	28	WRITE PROTECT#
29	GROUND	30	READ DATA#
31	GROUND	32	SIDE 1 SELECT#
33	GROUND	34	DISK CHANGE#

3.2 PCI E-IDE Disk Drive Connector

You can attach two IDE(Integrated Device Electronics) hard disk drives to the SSC-5x86HVGA internal controller.

• CN1: IDE Interface Connector

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	RESET#	2	GROUND
3	DATA 7	4	DATA 8
5	DATA 6	6	DATA 9
7	DATA 5	8	DATA 10
9	DATA 4	10	DATA 11
11	DATA 3	12	DATA 12
13	DATA 2	14	DATA 13
15	DATA 1	16	DATA 14
17	DATA 0	18	DATA 15
19	GROUND	20	N/C
21	N/C	22	GROUND
23	IOW#	24	GROUND
25	IOR#	26	GROUND
27	IORDY	28	BALE - DEFAULT
29	N/C	30	GROUND - DEFAULT
31	INTERRUPT	32	IOCS16#-DEFAULT
33	SA1	34	N/C
35	SA0	36	SA2
37	HDC CS0#	38	HDC CS1#
39	HDD ACTIVE#	40	GROUND

3.3 Parallel Port

This port is usually connected to a printer, The SSC-5x86HVGA includes an on-board parallel port, accessed through a 26-pin flat-cable connector CN5.

• CN5 : Parallel Port Connector

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	STROBE#	2	DATA 0
3	DATA 1	4	DATA 2
5	DATA 3	6	DATA 4
7	DATA 5	8	DATA 6
9	DATA 7	10	ACKNOWLEDGE
11	BUSY	12	PAPER EMPTY
13	PRINTER SELECT	14	AUTO FORM FEED #
15	ERROR#	16	INITIALIZE

17	PRINTER SELECT LN#	18	GROUND
19	GROUND	20	GROUND
21	GROUND	22	GROUND
23	GROUND	24	GROUND
25	GROUND		

3.4 Serial Ports

The SSC-5x86HVGA offers two high speed NS16C550 compatible UARTs with Read/Receive 16 byte FIFO serial ports.

• **CN10 : Serial Port DB-9 Connector(ACE0)**

PIN NO.	DESCRIPTION
1	DATA CARRIER DETECT (DCD)
2	RECEIVE DATA (RXD)
3	TRANSMIT DATA (TXD)
4	DATA TERMINAL READY (DTR)
5	GROUND (GND)
6	DATA SET READY (DSR)
7	REQUEST TO SEND (RTS)
8	CLEAR TO SEND (CTS)
9	RING INDICATOR (RI)

• **CN6 : Serial Port 10-pin Header(ACE1)**

Pin No.	Description	Pin No.	Description
1	DCD	2	DSR
3	RXD	4	RTS
5	TXD	6	CTX
7	DTR	8	RI
9	GND	10	NC

3.5 Keyboard Connector

The SSC-5x86HVGA provides two keyboard connectors.

- **CN7 : 5-pin Header Keyboard Connector**

PIN NO.	DESCRIPTION
1	KEYBOARD CLOCK
2	KEYBOARD DATA
3	N/C
4	GROUND
5	+5V

- **CN9 : 6-pin Mini-DIN Keyboard Connector**

PIN NO.	DESCRIPTION
1	KEYBOARD DATA
2	N/C
3	GROUND
4	+5V
5	KEYBOARD CLOCK
6	N/C

3.6 External Switches and Indicators

There are many external switches and indicators for monitoring and controlling your CPU board.

- **CN12 : RESET BUTTON**

PIN NO.	DESCRIPTION
1	EXTERNAL RESET
2	GROUND

- **CN3 : IDE LED connector**

PIN-NO	DESCRIPTION
1	+5V
2	HDD ACTIVE#

3.7 External Power Connector

The SSC-5x86HVGA has an on-board external power connector CN13. You can connect power directly to the CPU board for some single-board-computer(without passive backplane) application.

- **CN13 : EXTERNAL POWER CONNECTOR**

PIN NO.	DESCRIPTION
1	+5V
2	GROUND

3.8 External Speaker

The SSC-5x86HVGA has its own buzzer, you also can connect to the external speaker through the connector CN2.

- **CN2 : Speaker Connector**

PIN NO.	DESCRIPTION
1	SPEAKER SIGNAL
2	NC
3	GROUND
4	+5V

3.9 PS/2 Mouse 6-pin Mini-DIN Connector

- **CN9 : PS/2 Mouse Connector**

PIN NO.	DESCRIPTION
1	MS DATA
2	NC
3	GROUND
4	+5V
5	KBT1
6	NC

4

AWARD BIOS Setup

The SSC-5x86HVGA uses the AWARD PCI/ISA BIOS for system configuration. The AWARD BIOS setup program is designed to provide maximum flexibility in configuring the system by offering various options which may be selected for end-user requirements. This chapter is written to assist you in the proper usage of these features.

4.1 Getting Start

When powered on the system, the BIOS will enter the Power-On-Self-Test routines. These routines will be executed for System Test and Initialization and System Configuration Verification. After the POST routines are completed, the following message appears :

" Press DEL to enter setup"

To access AWARD PCI/ISA BIOS Setup program, press key. The following screen will be displayed at this time.

4.2 Standard CMOS Setup

The Standard CMOS Setup is used for basic system hardware configuration. Every time when you change any hardware configuration, for example memory size, you have to modify this setup again. Please refer the following screen for this setup.

Mode Setting for >528MB IDE HDD

When the IDE hard disk drive you are using is larger than 528MB, please set the HDD mode to **LBA** mode.

Note : Setting incorrect drive mode may make the drive working improperly.

4.3 BIOS Features Setup

This setup is designed for customer's tuning best performance of the SSC5x86HVGA board. As for normal operation customers don't have to change any default setting. The default setting is pre-set for most reliable operation. Please refer the following screen for the BIOS Features Setup.

Virus Waring :

Enable - Will halt system when any attempt to write to boot sector or partition table of hard disk.

Memory Parity Check :

Disable - Will not check the DRAM module's parity.

Video BIOS Shadow :

Enable - Will increase the video speed.

C8000-CFFFF,D0000-D7FFF,& D8000-DFFFF Shadow :

When the installed add-on card's ROM address is as above address, you could enable the shadow to get higher operation performance. When you enable the shadow function, it will also reduce the memory available by between 640KB and 1024KB.

4.4 Chipset Features Setup

This setup functions are almostly working for ChipSet(ALI M1489 and M1487). These options are used to change the ChipSet's registers. Please carefully change any default setting ,otherwise the system could be running un-stable.

Auto Configuration :

Enable : The BIOS will configure the ChipSet features automatically when boot up the system.

Disable : The BIOS will allow customer to change the setting on the screen.

AT -BUS Clock - CLK/4 means -
 $33\text{Mhz}/4 = 8.25\text{Mhz}$ (DX2-66 CPU)

Parallel Port Mode : Normal(default),EPP,ECP,ECP+EPP

Onboard FDC Controller : Enabled(default),Disabled

Onboard Serial Port 1 : 3F8/IRQ4(default),2F8/IRQ3,3E8/IRQ4
2E8/IRQ3,Disabled

Onboard Serial Port 2 : 2F8/IRQ3(default),3E8/IRQ4,2E8/IRQ3,
3F8/IRQ4,Disabled

Onboard Parallel Port :
378/IRQ7(default),278/IRQ5,3BC/IRQ7,Disabled

4.5 Power Management Setup

Power Management Setup help user handles the SSC-5x86HVGA board's "green" function. The features will shut down the video display and hard disk to save energy. The power management setup screen is as following,

Power Management :

This is the master control of all power management functions.

The default setting is “disable” for general application.

User Defined : Allows user to set any power saving options.

Min. Saving : System enters power saving mode after 1 hour no activity.

Max. Saving : System enters power saving mode after 5 seconds no activity.

PM Control by APM :

No - Default setting

Yes - System BIOS will wait for APM prompt before it enters any power management mode.

Note : APM Mode :

This mode is using for DOS 6.0 or higher version with the driver POWER.EXE. The driver should be loaded at system power-on by CONFIG.SYS file. POWER.EXE will monitor the system status thru the BIOS APM interface.

Video Off Option :

Susp,Stby i Off - Screen Off when system in Suspend or Standby mode.

Susp i Off - Screen Off when system in Suspend mode.

All Modes i Off - Screen Off when system in Suspend, Standby,or Doze mode.

Always On - System BIOS will never turn off the screen.

Video Off Method :

Blank Screen : When BIOS do the video off the screen will be blank.

V/H Sync, + Blank : When BIOS do the video off,BIOS will turn of the V-sync & H-sync signals from VGA card and also let the screen blank.

PM Timers :

User can set the HDD Power Down,Doze Mode,Standby Mode,and Suspend Mode's time out period. The system will be recovered when the system is re-activity.

PM Events :

If there is any activity ocured on the list of the group,the system will wake up. You can set the IRQ1,IRQ3-15 individually in the list.

4.6 PCI Configuration Setup

This screen help user configure their PCI bus slots.
The SSC-5x86HVGA only supports the on board PCI VGA
and IDE,so only the related features are in the setup.

PCI IRQ Activity by :

Level - Most PCI cards use the level trigger method.

Edge - Be sure the PCI cards use the edge trigger method
before you set it.

Appendix A. Watch-Dog Timer

The Watch-Dog Timer is provided to ensure that standalone systems can always recover from catastrophic conditions that caused the CPU to crash. This condition may have occurred by external EMI or a software bug. When the CPU stops working correctly, hardware on the board will either perform a hardware reset (cold boot) or a non-maskable interrupt (NMI) to bring the system back to a known state.

The Watch-Dog Timer is controlled by two I/O ports.

443 (hex)	Read	Enable the refresh the Watch-Dog Timer.
043 (hex)	Read	Disable the Watch-Dog Timer.

To enable the Watch-Dog Timer, a read from I/O port 443H must be performed. This will enable and activate the countdown timer which will eventually time out and either reset the CPU or cause an NMI depending on the setting of JP19. To ensure that this reset condition does not occur, the Watch-Dog Timer must be periodically refreshed by reading the same I/O port 443H. This must be done within the time out period that is selected by jumper group JP17.

A tolerance of at least 30% must be maintained to avoid unknown routines within the operating system (DOS), such as disk I/O that can be very time consuming. Therefore if the time out period has been set to 10 seconds, the I/O port 443H must be read within 7 seconds.

Note: when exiting a program it is necessary to disable the Watch-Dog Timer, otherwise the system will reset.

```

10     REM EXAMPLE PROGRAM
11     REM WATCH-DOG TIMER == WDT
20     GOSUB 5000 REM ENABLE AND REFRESH THE WDT
30     GOSUB 1000 REM TASK 1, 2 SECS
40     GOSUB 5000 REFRESH THE WDT
50     GOSUB 2000 REM TASK 2, 3 SECS
60     GOSUB 6000 REM DISABLE THE WDT
70     GOSUB 3000 REM TASK 3, 5 SECS
80     GOSUB 5000 REM ENABLE AND REFRESH THE WDT
90     GOTO 30

1000   REM SUBROUTINE #1
      2 SECONDS TO COMPLETE
1070   RETURN

2000   REM SUBROUTINE #2
      3 SECONDS TO COMPLETE
2070   RETURN

5000   REM SUBROUTINE TO ENABLE AND RESET WDT
5010   X = INP( &H443) REM ENABLE AND REFRESH TIMER
5020   RETURN

6000   REM SUBROUTINE TO DISABLE THE WDT
6010   X = INP( &H43) REM RESET WDT
6020   RETURN

```