Model 6200A
Service Manual

Specifications are subject to change without notice.

1997

Specifications

The state-of-the-art Notebook Computer offers a host of features specially designed to enhance performance and usability:

Architecture	PCI local bus 2.1	
CPU	Intel Pentium	75/90/100/120/133/150/166/200/233 MHz
	Cyrix 6x86LV	P150+/P166+
	AMD K5	PR133/PR150/PR166
BIOS	Plug & Play 1.0a	256KB flash ROM
Second Memory		256KB synchronous cache
DRAM	SODIMMs	8MB up to 72MB
Power Management	APM 1.2	Standby mode
		Suspend to memory
		Suspend to disk
Display	LCD panel	TFT/DSTN
	Resolution	800 x 600 (SVGA)
	Video DRAM	2MB
	VPM provider	VPM 1.1
PC Card	ZV-capable in slot 0	Type IIx3 or
		Type IIx1 + Type IIIx1
Multiple Input/Output	Trackpad	1 (PS/2)
	Serial port	1 (high speed 16C550 compatible)
	Parallel port	1 (SPP/EPP/ECP)
	External monitor port	1
	External PS/2 port	1
	RCA jack	1 (NTSC/PAL TV-output)
	Expansion port	1 (168 pin)
	Infrared	1 (IrDA/ASKIR/FIR)
	MIDI/Game port	1
Audio System	Compatibility	Sound Blaster Pro
		Microsoft Windows Sound System
		MPU-401
		General MIDI
	Digitized sound	16-bit stereo
	Synthesized music	FM synthesizer
		Wave Table synthesizer (1MB ROM)
	Input/Output	Microphone-in
		Line-in
		Headphone
	Built-in speakers	2
	Built-in microphone	1
Keyboard		Windows 95
Storage	Hard disk	2.5", transfer rate up to PIO Mode 4
	Floppy disk	3.5", 1.44MB high density
	CD-ROM	5.25", IDE interface
Battery Power	Type	Ni-MH
		Li-Ion
Physical	Dimension	302mm (w) x 234mm (d) x 54mm (h)
	Weight	3.4Kg

Operation
Hardware Configuration
Disconnect all power supply both AC adapter and battery pack before work on any hardware setting.

CPU Speed
The system is upgradeable with a wide range of speed and voltages of the Intel Pentium processors, providing user with a Zero-Insertion-Force (ZIF) socket to facilitate removal of the processor and installation of an upgraded one.

Intel P54C/LM	75 MHz	90 MHz	100 MHz	120 MHz	133 MHz	150 MHz	166 MHz	200 MHz
Intel P55C			233 MHz			150 MHz	166 MHz	200 MHz
S2-1	Off	On	Off	On	Off	On	Off	Off
S2-2	On	Off	Off	Off	Off	Off	Off	Off
S2-3	Off							
S2-4	Off							
S2-5	Off	Off	Off	On	On	On	On	Off
S2-6	Off	Off	Off	Off	Off	On	On	On

Cyrix 6x86LV	P150+	P166+
S2-1	On	Off
S2-2	Off	
S2-3	On	
S2-4	Off	
S2-5	On	
S2-6	Off	

AMD K5	PR133	PR150	PR166
S2-1	Off	On	Off
S2-2	Off	Off	Off
S2-3	Off		
S2-4	Off		
S2-5	On	On	On
S2-6	Off	On	On

CPU Power
Locate the DIP Switch on the *CPU Power Module* to set the power voltage of the CPU you just installed. Refer to the user guide of the CPU to make sure which power voltage you should set.

1	2	3	4	CPU Power
On	Off	Off	Off	2.2V
Off	On	Off	Off	2.45V
Off	Off	On	Off	2.8V
Off	Off	Off	On	3.45V

Set for CPU power

Set for CPU speed
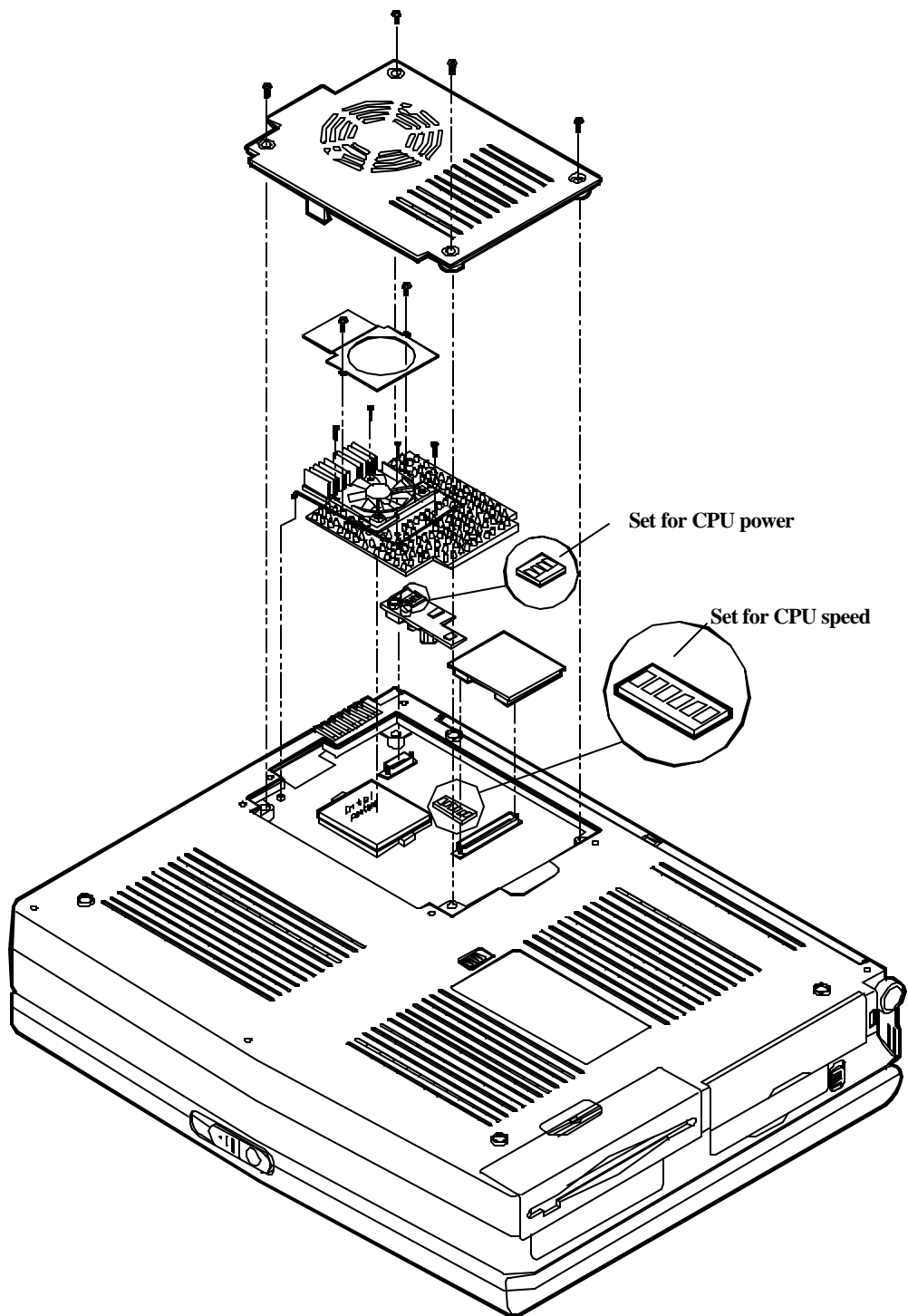
RAM Configuration

The system features an expandable Dynamic RAM in small outline 144-pin DIMM (Dual In-line Memory Module) package.

Bank 0 (64 bit)	Bank 1 (64 bit)	Power Voltage	Access Time	RAM Size
(1Mx16)x4	None			8MB
None	(1Mx16)x4			8MB
(1MX16)X4	(1Mx16)x4			16MB
(1MX16)X8	None			16MB
None	(1MX16)X8			16MB
(2MX8)X8	None			16MB
None	(2MX8)X8			16MB
(1MX16)X8	(1Mx16)x4			24MB
(1MX16)X4	(1MX16)X8			24MB
(1MX16)X8	(1MX16)X8			32MB
(4MX4)X16	None	5V	70ns	32MB
None	(4Mx4)x16			32MB
(2MX8)X8	(2MX8)X8			32MB
(2MX8)X8	(1MX16)X8			32MB
(1MX16)X8	(2MX8)X8			32MB
(4Mx4)x16	(1MX16)X4			40MB
(1Mx16)x4	(4Mx4)x16			40MB
(4Mx4)x16 + (1Mx16)x4	None			40MB
(4Mx4)x16 + (1Mx16)x4	(1MX16)X4			48MB
(4Mx4)x16 + (1Mx16)x4	(1MX16)X8			56MB
(4Mx4)x16	(4Mx4)x16			64MB
(4Mx4)x16 + (1Mx16)x4	(4Mx4)x16			72MB

TV-Output

Select the TV standard for video output if a TV set is connected for Games or MPEG playback, for example. The system display will improve video quality for screen flicker caused by an interlaced TV monitor.

|	NTSC	PAL
S1-1	On	Off
S1-2	Off	On
S1-3	On	Off
S1-4	Off	On

Provided herein is the international TV system for reference. Any discrepancy should be subject to the local TV standard.

Country	TV System	Country	TV System
Afghanistan	PAL	Liberia	PAL
Algeria	PAL	Madeira	PAL
Argentina	PAL	Malaysia	PAL
Australia	PAL	Malta	PAL
Austria	PAL	Mexico	NTSC
Bahamas	NTSC	Netherlands	PAL
Bahrain	PAL	Neth. Antilles	NTSC
Barbados	NTSC	New Zealand	PAL
Belgium	PAL	Nicaragua	NTSC
Bermuda	NTSC	Nigeria	PAL
Bolivia	NTSC	Norway	PAL
Brazil	PAL	Oman	PAL
Brunei	PAL	Pakistan	PAL
Burma	NTSC	Panama	NTSC
Canada	NTSC	Paraguay	PAL
Canary	PAL	Peru	NTSC
Chile	NTSC	Philippines	NTSC
China	PAL	Portugal	PAL
Colombia	NTSC	Puerto Rico	NTSC
Costa Rica	NTSC	Qatar	PAL
Cuba	NTSC	Sabah/Sarawak	PAL
Cyprus	PAL	St. Kitts	NTSC
Denmark	PAL	Samoa	NTSC
Dominican Republic	NTSC	Sierra Leone	PAL
Ecuador	NTSC	Singapore	PAL
EL Salvador	NTSC	South Africa	PAL
Equatorial Guinea	PAL	Spain	PAL
Finland	PAL	Sri Lanka	PAL
Germany	PAL	Surinam	NTSC
Ghana	PAL	Swaziland	PAL
Gibraltar	PAL	Sweden	PAL
Guatemala	NTSC	Switzerland	PAL
Haiti	NTSC	Taiwan	NTSC
Honduras	NTSC	Tanzania	PAL
Hong Kong	PAL	Thailand	PAL
Iceland	PAL	Uganda	PAL
Indonesia	PAL	United Kingdom	PAL
Ireland	PAL	USA	NTSC
Israel	PAL	Venezuela	NTSC
Italy	PAL	Vietnam	NTSC
Jordan	PAL	Yemen	PAL
Kenya	PAL	Yugoslavia	PAL

| Korea South	NTSC	Zambia	PAL
Kuwait	PAL		

Hot Keys

Located along the top of the keyboard are 12 numbered "F" keys. The functions of these "F" keys are defined as the followings:
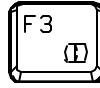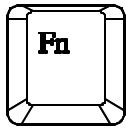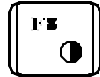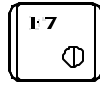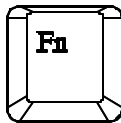
Expanded Display Mode

The aspect ratio of display panels is not the same as CRT monitors. Therefore, the display may not completely fill the entire display panel. Expanded mode will stretch the display to fill the entire viewing area of the display panel.
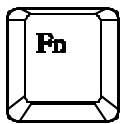
Display Type

Display type mode allows you to switch display among LCD only, CRT only, TV only, both LCD and CRT.

Contrast Control

Contrast control allows you to adjust the contrast of the display panel. *This feature is available for DSTN panel only.*
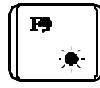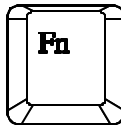
Brightness Control

Brightness control allows you to adjust the brightness of the display panel.
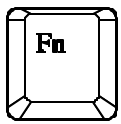
Volume Control

Volume control allows you to adjust the volume of the audio system.
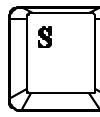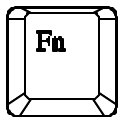
Contrast/Brightness Saved

You may save the display contrast and brightness for the LCD panel.
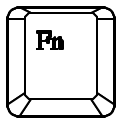
Suspend Mode

Put the system in a suspend state for power management. The system can be resumed from exactly where it was left off.

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Chapter 2: Utilities

Overview

The Notebook Computer has several built-in software utilities to help you get the most from the system hardware. This chapter discusses:

- ⌨ Power-On-Self-Test (POST).
- ⌨ The System Configuration Utility (SCU).

Power On Self Test (POST)

The BIOS performs a series of power-on-self-test (POST) to diagnose hardware errors when the system first starts up. During the POST procedure, the POST verifies that the hardware is installed and operational. If a hardware problem exists, the POST routine may halt execution (depending upon the severity of the problem).

POST Messages - Normal Operation

If no configuration errors are detected, the system will be operated after the POST process is completed.

You may press the *Spacebar* key to skip the memory test.

System PCI BIOS for SiS-510X Version 1.01.26
Copyright 1983 - 1996 SystemSoft Corp. All Right Reserved.

System Processor: 200 MHz Intel Pentium CPU
System External Cache: 256 KB Enabled
Video Chip: Trident Cyber 9385 with 2 MB Video RAM
SystemSoft Plug-n-Play BIOS Ver 1.0a

Base Memory	640 Kb
Extended Memory	39936 Kb
Shadow Memory	256 Kb
Reserved Memory	128 Kb
Total Memory	40960 Kb

<CTRL-ALT-S> to enter System Configuration Utility

POST Messages - Error Detected

If a configuration is detected as a non-fatal error, a WARNING message will be displayed. You should either press F1 key to continue, or press Ctrl-Alt-S key combination to enter the System Configuration Utility.

System PCI BIOS for SiS-510X Version 1.01.26
Copyright 1983 - 1996 SystemSoft Corp. All Right Reserved.

System Processor: 200 MHz Intel Pentium CPU
System External Cache: 256 KB Enabled
Video Chip: Trident Cyber 9385 with 2 MB Video RAM
SystemSoft Plug-n-Play BIOS Ver 1.0a

Base Memory	640 Kb
Extended Memory	39936 Kb
Shadow Memory	256 Kb
Reserved Memory	128 Kb
Total Memory	40960 Kb

WARNING - NO BOOTABLE FLOPPY DRIVE 0 INSTALLED
WARNING - FLOPPY INFORMATION INVALID - RUN SCU

<CTRL-ALT-S> to enter System Configuration Utility or Press F1 to Continue

System Configuration Utility (SCU)

The System Configuration Utility (SCU) is a ROM-based configuration utility that displays the system's configuration status and provides users with a tool to set their system parameters. The settings are stored in non-volatile battery-backed CMOS RAM which saves the information even when the power is turned off, and retains that when the system is turned back on.

Invoking the System Configuration Utility

The System Configuration Utility (SCU) will be accessed when simultaneously press the Ctrl, Alt, and S keys.

< CTRL-ALT-S > to enter System Configuration Utility

The above message only lasts seconds. If you miss it, the computer will access its boot process. You must reboot the system and try again within the time limit if you like to enter the System Configuration Utility.

```
SystemSoft Setup Configuration Utility (SCU)      Oct 28, 1996    4:50:05 pm
System  Devices  Power  Exit

┌─ System ──────────────────┐   ┌─ Devices ──────────────────────┐
│                           │   │ Floppy Drive  = 1.44 MB         │
│  CPU Type      = PENTIUM  │   │ Hard Drive C  = 775 MB          │
│  CPU Clock     = 200 MHz  │   │ Serial Port 1 = 3F8H, IRQ 4     │
│  System DRAM   = 40960 KB │   │ Serial Port 2 = 2F8H, IRQ 3     │
│  Cache (Ext)   =   256 KB │   │ Parallel Port = 378H, IRQ 7     │
│                           │   │ Audio Port    = 220H, IRQ 5, DMA 1│
│  Point Device  = Enabled  │   │ MIDI Port     = 300H            │
│                           │   │ WAVE Table    = Disabled        │
│  Boot From     = Diskette A│  └────────────────────────────────┘
│                           │   ┌─ Power Management ─────────────┐
│  Video Display = LCD and CRT│ │ Saving Mode      : Always On    │
│                           │   │ Saving Level     : Medium       │
│  Boot Password = Disabled │   │ Video Monitoring : Enabled      │
│                           │   │ Battery Weak     : Flash Beeping │
│  SCU Password  = Disabled │   │ Suspend To       : Memory       │
└───────────────────────────┘   └────────────────────────────────┘

Press <Alt> key to activate menus, and cursor keys to navigate. Mouse left
button, and <Enter> keys accept menu item. Mouse right button and <Esc> key
cancel current action.
```

Working with the Menu Bar of System Configuration Utility

Press simultaneously the Ctrl-Alt-S key combination to enter the menu bar of the System Configuration Utility.

Action	Keys Used	Description
Activate menus	Alt	Activate the System Configuration Utility.
Select menu bar item	Left arrow ($\leftarrow$) Right arrow ($\rightarrow$)	Move to a menu bar item on the left. Move to a menu bar item on the right.
	The highlighted letter key	Move to the correspondent menu bar item.
Accept menu bar item	Mouse left button Spacebar Enter	Enter the selected menu bar item to configure settings.
Cancel current action	Mouse right button Esc	Undo the current command.

Working with the Pull-Down Menu of System Configuration Utility

When the desired menu bar item is highlighted, press the Enter key to enter the pull-down menu for values setting.

Action	Keys Used	Description
Select pull-down menu item	Down arrow ($\downarrow$)	Move to the next pull-down menu item.
	Down arrow ($\uparrow$)	Move to the previous pull-down menu item.
	The highlighted letter key	Move to the correspondent pull-down menu item.
Select a control Change values	Tab Down/Up arrows ($\downarrow$)($\uparrow$)	Move between the options. Modify the settings.
Accept entries	Spacebar	Enable/disable the specified function. When a check mark appears, the function is on.
	Enter	Choose <OK> from a list of options.
Reject entries	Esc	Undo the current setting.
	Enter	Choose <Cancel> from a list of options.
Activate accelerators	Alt	Invoke all the highlighted lette rs corresponding to their respective options.
Quit	Esc	Press the Esc key to close the pull-down menu.

Features of the System Configuration Utility

System Menu
Clicking an option will **enable** the specific capability.

Item	Setting	Function
Date and Time	Day/month/year Hour/minute/second	Sets the current date and time.
Fast Boot		Initializes and quickly boot the system in a few seconds by passing certain diagnostic tests.
Enable Pointing Device		Enables the internal trackpad.
Boot Device	Diskette A	Specifies where the system
	Hard disk C	boots from.
Video Display	LCD and CRT	Enables both LCD and CRT simultaneously.
	Auto sense	The display auto-switches to CRT if one is sensed.
Video Expansion Enabled		Enables the LCD expanded mode.
System Security	Enter old password	You may enter a password up
	Enter new password	to 10 printable alphanumeric
	Verify new password	characters.
	Enable Booting password	Verifies password every time the system is booted.
	Enable Setup password	Verifies the password every time you try to enter SCU.

Devices Menu

Clicking an option will **enable** the specific capability.

Item	Setting		Function
Diskette Drive	None		Specifies a drive type
	1.44MB		for diskette drive A.
Hard Disk	Disk Type	None	No hard disk is installed in the system.
		Custom	Modifies the values for cylinders, heads, sectors per track, landing zone, write precomposition and size (MB).
		Auto-ID	Automatically configures the hard disk parameters for any supported IDE drive.
	Enhanced Options	LBA mode	Enables Logical Block Address (LBA) mode to overcome 528MB barrier.
		Multiple sector mode	Enables multiple sector mode to increase sequential data transfers.
		Fast PIO mode	Enables Fast Programmed Input/output (PIO) mode for high data transfer rate.
COM Ports	COM A settings	None	Specifies the COM A configuration.
		3F8H, IRQ4	
		2F8H, IRQ3	
		3E8H, IRQ4	
		2E8H, IRQ3	
	COM B settings	None	Specifies the COM B configuration.
		3F8H, IRQ4	
		2F8H, IRQ3	
		3E8H, IRQ4	
		2E8H, IRQ3	
	COM B definition	Serial port 2 IrDA (HPSIR)	Defines COM B hardware.
		IR (ASKIR)	
LPT Port	Port setting	None	Specifies the LPT port configuration.
		378H	
		278H	
		3BCH	
	Port definition	SPP mode	Standard Parallel Port.
		EPP mode	Enhanced Parallel Port.
		ECP mode	Extended Capabilities Port.
	IRQ setting	IRQ5	Specifies IRQ configuration.
		IRQ7	
	ECP DMA setting	DMA1	Specifies ECP DMA configuration.
		DMA3	

Item	Setting		Function
Audio Port	Port setting	220H	Specifies the system's audio I/O port address.
		230H	
		240H	
		250H	
	IRQ setting	IRQ9	Specifies the system's audio IRQ configuration.
		IRQ5	
		IRQ7	
		IRQ10	
	DMA setting	DMA0	Specifies the system's audio DMA channel configuration.
		DMA1	
		DMA3	
MIDI Port	MIDI port	300H	Specifies the system's General MIDI I/O port address.
		310H	
		320H	
		330H	
Wave Table Enabled			Enables Wave Table music synthesizer.
Keyboard Numlock			Specifies NumLock is on at system boot time.
Keyboard Repeat	Key repeat rate	2 cps	Defines the rate (character per second) at which the keyboard repeats while a key is depressed.
		6 cps	
		10 cps	
		15 cps	
		20 cps	
		30 cps	
	Key delay	¼ sec	Specifies the time (second) that will pass after a key is depressed before starts to repeat.
		½ sec	
		¾ sec	
		1 sec	

Power Menu

Clicking an option will **enable** the specific capability.

Item	Setting		Function
Power Management	Power saving mode	Disabled	Disables the system's power saving features.
		Battery only	Enables the system's power saving features only during battery operation.
		Always on	Enables the system's power saving features during either battery or AC operation.
	Power saving level	Low power saving	Enables the power saving to its lowest which results in maximum performance but shortest battery life.
		Medium power saving	Enables the power saving to its medium which results in moderate performance and battery life.
		High power saving	Enables the power saving to its highest which results in minimum performance but longest battery life.
Video Monitoring			Video RAM access will prevent the system from entering a standby mode.
Suspend Controls	Battery weak	Flash beeping	The warning icon flashes on the LCD bar and emits a series of the audio beeps.
		Suspend system	Automatically suspends the system upon a low battery condition.
		Flash only	The warning icon flashes on the LCD bar.
	Suspend mode	Suspend to memory	Specifies the suspend mode as 5-volt suspend mode.
		Suspend to disk	Specifies the suspend mode as 0-volt suspend mode.
	Modem ring resume		Resumes the system from suspend-to-memory mode when a modem ring is detected from the *serial port* where the modem is connected.
	Set resume alarm	Resume hour Resume minute	Sets the time to resume the system from suspend-to-memory mode.

Exit Menu

Clicking an option will **enable** the specific capability.

Item	Function
Save and Reboot	Saves the current settings and reboots the system.
Exit (No Save)	Exits the SCU without saving any of the current changes.
Default Settings	Changes the current setup to the system default values.
Restore Settings	Restores the current setup to the original custom values.
Version Information	Displays the current BIOS version information.

POST.EQU -- Power On Self-Test Definitions

```
DEBUG_MISC_RESET                        EQU 10H    ; Some Type Of Long Reset
DEBUG_CS_FAST_A20_RESET                 EQU 11H    ; Turn off FASTA20 for POST
DEBUG_POST_SIGNAL_POR           EQU 12H    ; Signal Power On Reset
DEBUG_CS_CHIP_INIT                      EQU 13H    ; Initialize the Chipset
DEBUG_OEM_ISA_VGA_SEARCH        EQU 14H    ; Search For ISA Bus VGA Adapter
DEBUG_HWIO_SETUP_CTC1           EQU 15H    ; Reset Counter/Timer 1
DEBUG_OEM_SET_CMOS_REGS         EQU 16H    ; user register config through CMOS
DEBUG_CS_MEMORY_SIZE            EQU 17H    ; Size Memory
DEBUG_POST_TEST_RAM             EQU 18H    ; Dispatch To RAM Test
DEBUG_GEN_TEST_ROMS             EQU 19H    ; checksum the ROM
DEBUG_HWIO_RESET_INTS           EQU 1AH    ; Reset PIC's
DEBUG_VIDEO_VIDEO_INIT          EQU 1BH    ; Initialize Video Adapter(s)
DEBUG_VIDEO_EQUIP_INIT          EQU 1CH    ; Initialize Video (6845 Regs)
DEBUG_VIDEO_COLOR_INIT          EQU 1DH    ; Initialize Color Adapter
DEBUG_VIDEO_BW_INIT             EQU 1EH    ; Initialize Monochrome Adapter
DEBUG_HWIO_TEST_DMA_PAGE        EQU 1FH    ; Test 8237A Page Registers

DEBUG_KEYB_SELFTEST_CTLR                EQU 20H    ; Test Keyboard
DEBUG_KEYB_RESET_KEYBOARD       EQU 21H    ; Test Keyboard Controller
DEBUG_POST_CHECK_CMOS_RAM       EQU 22H    ; Check If CMOS Ram Valid
DEBUG_POST_TEST_BATT_CMOS_SUM           EQU 23H    ; Test Battery Fail & CMOS X-SUM
DEBUG_HWIO_TEST_DMA_CTLRS       EQU 24H    ; Test the DMA controllers
DEBUG_HWIO_INIT_8237            EQU 25H    ; Initialize 8237A Controller
DEBUG_POST_INIT_VECS            EQU 26H    ; Initialize Int Vectors
DEBUG_RAM_QUICK_SIZE            EQU 27H    ; RAM Quick Sizing
DEBUG_RAM_PROT_ENTRY_1                  EQU 28H    ; Protected mode entered safely
DEBUG_RAM_SIZE_DONE             EQU 29H    ; RAM test completed
DEBUG_RAM_PROT_EXIT             EQU 2AH    ; Protected mode exit successful
DEBUG_CS_SHADOW_SETUP                   EQU 2BH    ; Setup Shadow
DEBUG_VIDEO_EQUIP_INIT_INIT             EQU 2CH    ; Going To Initialize Video
DEBUG_VIDEO_BW_SEARCH                   EQU 2DH    ; Search For Monochrome Adapter
DEBUG_VIDEO_COLOR_SEARCH        EQU 2EH    ; Search For Color Adapter
DEBUG_VIDEO_SIGNON                      EQU 2FH    ; Signon messages displayed

DEBUG_OEM_CONFIG_KBD_CTL        EQU 30H    ; special init of keyboard ctlr
DEBUG_KEYB_PRESENT_TEST                 EQU 31H    ; Test If Keyboard Present
DEBUG_KEYB_TEST_IRQ1            EQU 32H    ; Test Keyboard Interrupt
DEBUG_KEYB_TEST_CMD             EQU 33H    ; Test Keyboard Command Byte
DEBUG_RAM_FULL_TEST             EQU 34H    ; TEST, Blank and count all RAM
DEBUG_RAM_PROT_ENTRY_2                  EQU 35H    ; Protected mode entered safely (2).
DEBUG_RAM_TEST_DONE             EQU 36H    ; RAM test complete
DEBUG_RAM_PROT_EXIT_2           EQU 37H    ; Protected mode exit successful
DEBUG_KEYB_OUTPUT_PORT                  EQU 38H    ; Update OUTPUT port
DEBUG_CS_CACHE_SETUP            EQU 39H    ; Setup Cache Controller
DEBUG_HWIO_TEST_PERIODIC                EQU 3AH    ; Test If 18.2Hz Periodic Working
DEBUG_GEN_CHECK_RTC             EQU 3BH    ; test for RTC ticking
DEBUG_GEN_INIT_HARD_VECS                EQU 3CH    ; initialize the hardware vectors
DEBUG_MOUSE_INIT                        EQU 3DH    ; Search and Init the Mouse
DEBUG_KEYB_SET_LEDS_1           EQU 3EH    ; Update NUMLOCK status
DEBUG_OEM_DEVICE_CONFIG                 EQU 3FH    ; special init of COMM and LPT ports

DEBUG_CS_CONFIG_PORTS           EQU 40H    ; Confgure the COMM and LPT ports
DEBUG_FLOP_INIT                 EQU 41H    ; Initialize the floppies
DEBUG_WINI_INIT                 EQU 42H    ; Initialize the hard disk
DEBUG_HWIO_ROM_INIT             EQU 43H    ; Initialize option ROMs
DEBUG_OEM_INIT_POWER_MAN        EQU 44H    ; OEM's init of power management
DEBUG_KEYB_SET_LEDS_2           EQU 45H    ; Update NUMLOCK status
DEBUG_HWIO_FIND_80X87           EQU 46H    ; Test For Coprocessor Installed
DEBUG_OEM_LAST_MINUTE_INIT      EQU 47H    ; OEM functions before boot
DEBUG_MISC_LAUNCH_INT19                 EQU 48H    ; Dispatch To Op. Sys. Boot
```

```
DEBUG_BEGIN_BOOT_CODE              EQU 49H    ; Jump Into Bootstrap Code


DEBUG_CDROM_INIT                                EQU 0FAh  ; Initialize CD-ROM Type
DEBUG_S2D_INIT                          EQU 0FBh   ; Initialize S2D Partition
```

DEBUG codes for PNP BIOS

```
DEBUG_PNP_ENABLE_VERIFY_RTDATA               EQU 0A1H ;Enable/Verify R/W Status Runtime Data
Area
DEBUG_PNP_GET_VERIFY_NVRAM           EQU 0A2H ;Get/Verrify R/W Stattus NVRAM data area
DEBUG_PNP_SYSTEM_NODES                       EQU 0A3H ;Resolve System Nodes with the CMOS
settings
DEBUG_PNP_INITIALIZE_RTDATA          EQU 0A4H ;Init. var. in the PNP BIOS Runtime Data area
DEBUG_PNP_HOOK_INT15                 EQU 0A5H ; Hook INT 15
DEBUG_PNP_SET_COPY_AREA                      EQU 0A6H ;copy/setup $PnP Install Check in F0000
seg.
DEBUG_PNP_OEM_LATE_HOOK                      EQU 0A7H ; Allow the OEM any Last Minute Hooks
DEBUG_PNP_WRITE_PROTECT_RT_DATA      EQU 0A8H ;Write protect RTData Area & NVRAM Copy Buffer
DEBUG_PNP_INIT_RETURN                EQU 0A9H ;return from pnp_init proc
```

DEBUG codes for the PCI BIOS

```
DEBUG_ROM_MAPPED_OK                  EQU 0D0H ;check rom signature, 1.x video
DEBUG_SEGMENTENABLE_COPYSTATE_1      EQU 0D1H ;enable RAM area in regs
DEBUG_COPY_HROM_RAM_1                        EQU 0D2H ;copy ROM to RAM in regs
DEBUG_SEGMENTENABLE_READWRITE_1      EQU 0D3H ;update segment range attr
DEBUG_MAP_MEM_1                             EQU 0D4H ;configure memory registers
DEBUG_MAP_IO_1                       EQU 0D5H ;configure I/O registers
DEBUG_MAP_IRQ_1                             EQU 0D6H ;configure IRQ assignments
DEBUG_CONFIG_COM_REG_1                      EQU 0D7H ;turn on PCI device
DEBUG_REVISION_1                            EQU 0D8H ;2.x video r/w segment
DEBUG_OEM_DEV_CLEANUP_1                     EQU 0D9H ;OEM defined, rom init
DEBUG_PCI_ADDIN_ROM_DISABLE_1        EQU 0DAH ;disable add-in rom card decode
DEBUG_RET_PCI_1                             EQU 0DBH ;PCI return(config and no video)
DEBUG_SEGMENTENABLE_COPYSTATE_2      EQU 0DCH ;enable RAM area in regs
DEBUG_COPY_HROM_RAM_2                        EQU 0DDH ;copy ROM to RAM in regs
DEBUG_SEGMENTENABLE_READWRITE_2      EQU 0DEH ;update segment range attr
DEBUG_MAP_MEM_2                             EQU 0DFH ;configure memory registers
DEBUG_MAP_IO_2                       EQU 0E0H ;configure I/O registers
DEBUG_MAP_IRQ_2                             EQU 0E1H ;configure IRQ assignments
DEBUG_CONFIG_COM_REG_2                      EQU 0E2H ;turn on PCI device
DEBUG_REVISION_2                            EQU 0E3H ;2.x video r/w segment
DEBUG_OEM_DEV_CLEANUP_2                     EQU 0E4H ;OEM defined, rom init
DEBUG_PCI_ADDIN_ROM_DISABLE_2        EQU 0E5H ;disable add-in rom card decode
DEBUG_RET_PCI_2                             EQU 0E6H ;PCI return(config and no video)
DEBUG_BRIDGE_HUNT                           EQU 0E7H ;look for PCI bridge device
DEBUG_PCI_IDE_FIND                          EQU 0E8H ;search IDE controllers on the PCI bus
```

Error Codes returned by APM sub-functions

```
errPM_Disabled                    EQU     01H       ;PM functionality is disabled
errInterf_Present                 EQU     02H       ;Interface already present
errInterf_Not_Present             EQU     03H       ;Interface disconnected or not est.
errPM16_Est                       EQU     05H       ;Prot. Mode 16-bit already est.
errPM16_Unsupported               EQU     06H       ;Prot. Mode 16-bit unsupported
errPM32_Est                       EQU     07H       ;Prot. Mode 32-bit already est.
errPM32_Unsupported               EQU     08H       ;Prot. Mode 32-bit unsupported
errUnrec_Device_ID                EQU     09H       ;Unrecognized Device ID
errCX_Parm_OOR           EQU      0AH               ;CX Parameter out of range
errInterf_Not_Engaged             EQU     0BH       ;Interface not engaged (APM 1.1)
errCant_Enter_State               EQU     60H       ;Can not enter requested state
errNo_PM_Pending         EQU      80H               ;No PM Events pending
errAPM_Not_Present                EQU     86H       ;Advanced Power Management not present
errUnsupported_APM_Fn    EQU      0FFH              ;SystemSoft internal define


errPM_already_enabled             EQU     30h       ; PM is already enabled
errPM_already_disabled            EQU     31h       ; PM is already disabled
errPM_function_not_supp           EQU     32h       ; PM function not supported
           DIAG                   EQU     1


APM_INST                          EQU 0D0h
APM_INTF_CONNECT                  EQU 0D1h
APM_PM16_CON             EQU 0D2h
APM_PM32_CON             EQU 0D3h
APM_INTF_DISCON                   EQU 0D4h
APM_CPUIDLE                       EQU 0D5h
APM_CPUBUSY                       EQU 0D6h
APM_POWER                         EQU 0D7h
APM_EN_DIS_PM            EQU 0D8h
APM_DEFAULTS                      EQU 0D9h
APM_GET_STATUS                    EQU 0DAh
APM_HAVE_EVENT                    EQU 0DBh
APM_EVENT_CALL           EQU 0DCh
APM_TRIGGER                       EQU 0DDh
SMI_TRIGGER                       EQU 0DDh
APM_GET_PM_ENABLE        EQU 0DEH
```

Chapter 3: Technical View

Overview

This chapter outlines the architecture of the Notebook Computer. The purpose of this chapter is not to elaborate upon the internal working theories of the components that make up the Notebook Computer, but to explain all the features that these chips offer though may not necessarily supported by the system. This chapter is divided into the followings for discussion:

- 💻 System Block Diagram.

- 💻 Chips.
  - ❍ Core logic.
  - ❍ I/O.
  - ❍ PCMCIA.
  - ❍ Audio.
  - ❍ Video.

- 💻 Accessories.
  - ❍ Battery.
  - ❍ CD-ROM.
  - ❍ Floppy disk drive.
  - ❍ LCD panel.

Chips

The following chips have been implemented in the Notebook Computer to interface the microprocessors to I/O devices and memory chips.

- ❍ SiS5101 PCI Cache Memory Controller.
- ❍ SiS5102 PCI Local Data Buffer.
- ❍ SiS5103 System I/O & PMU.
- ❍ SMC FDC37C669FR PC95/96 Compatible Super I/O Floppy Disk Controller with Infrared Support.
- ❍ Omega 82C094 PCI-to-PCMCIA Host Adapter Controller.
- ❍ ESS ES1788 AudioDrive.
- ❍ ESS ES690 Wave Table Music Synthesizer.
- ❍ ESS ES981 Wavetable Sample Set ROM.
- ❍ Trident Cyber9385 Flat Panel Controller for PCI systems.

SiS5101 PCI Cache Memory Controller

- Supports Pentium, K5 and M1 processors.
- Integrated Second Level (L2) Cache Controller.
    * Write through and write back cache modes.
    * 8 bits or 7 bits tag with Direct Mapped Organization.
    * Supports standard and burst SRAMs.
    * Supports SRAM standard mode.
    * Supports 64 Kbytes to 2 Mbytes cache sizes.
    * Cache read/write cycle of 3-2-2-2 or 4-2-2-2 using standard SRAMs at 66MHz.
    * Cache read/write cycle of 3-1-1-1 using burst SRAMs at 66MHz.
- Integrated DRAM controller.
    * Supports 4 banks of SIMMs up to 256 Mbytes of cacheable main memory.
    * Supports "table-free" DRAM configuration.
    * Concurrent write back.
    * CAS#-before-RAS# transparent DRAM refresh.
    * Supports 256K/512K/1M/2M/4M/8M/16MxN 70ns Fast Page Mode and EDO DRAM.
    * The fastest burst cycle speed for FP and EDO are 6-3-3-3 and 6-2-2-2 respectively.
    * Programmable CAS# driving current.
    * Programmable DRAM speed.
    * Supports slow refresh.
- Two programmable non-cacheable regions.
- Supports synchronous and asynchronous PCI clock.
- Supports SMI/SMM mode.
- Supports CPU stop clock.
- Provides high performance PCI arbiter.
    * Supports four PCI masters.
    * Supports rotating priority mechanism.
    * Hidden arbitration scheme minimizes arbitration overhead.
- Integrated PCI bridge.
    * Translates the CPU cycles into the PCI bus cycles.
    * Provides CPU-to-PCI read assembly and write disassembly mechanism.
    * Translates sequential CPU-to-PCI memory write cycles into PCI burst cycles.
    * PCI burst write in the pace of X-2-2-2…
    * PCI burst read L2 cache in X-2-2-2…
    * PCI burst read DRAM in X-3-2-3-2…
    * Cache snoop filters ensure data coherency and minimizes snoop frequency.
    * meet PCI specification buffer strength.
- Supports Leakage control.
- Supports suspend to Memory.
- 208-pin PQFP/TQFP package.
- 0.6μm CMOS technology.

SiS5102 PCI Local Data Buffer

- Supports full 64-bit Pentium processor data bus.
- Provides a 64-bit interface to DRAM memory.
- Provides a 32-bit interface to PCI.
- Three integrated posted write buffers and two read buffers increase system performance.
  - ∗ 1 level CPU-to-Memory Posted Write Buffer (CTMPB) with 4 QuadWords (QWs) deep.
  - ∗ 4 level CPU-to-PCI Posted Write Buffer (CTPPB) with 4 DoubleWords (DWs) deep.
  - ∗ 1 level PCI-to-Memory Posted Write Buffer (PTMPB) with 1 QW deep.
  - ∗ 1 level Memory-to-CPU Read Buffer (CRMB) with 1 QW deep.
  - ∗ 1 level Memory-to-PCI Read Buffer (PRMB) with 1 QW deep.
- Near Zero wait state performance on CPU-to-Memory and CPU-to-PCI writes.
- Operates synchronously to the 66.7 MHz CPU aand 33.3 MHz PCI clocks.
- Provides parity generation for memory writes.
- 208-pin PQFP.
- 0.6um CMOS technology.

SiS5103 System I/O & PMU

- Integrated bridge between PCI bus and ISA bus.
  * Translates PCI bus cycles into ISA bus cycles.
  * Translates ISA master or DMA cycles into PCI bus cycles.
  * Provides PCI-to-ISA memory one Double Word Posted Write Buffer.
- Integrated ISA bus compatible logic.
  * ISA bus controller.
  * ISA arbiter for ISA master, DMA devices, and refresh.
  * Built-in two 8237 compatible DMA controllers.
  * Built-in two 8259A compatible interrupt controllers.
  * Built-in one 8254 timer.
- Supports reroutibility of four PCI interrupts to any unused IRQ interrupt.
- Supports flash ROM.
- Built-in RTC with 242 bytes extended CMOS SRAM.
- Built-in PCI IDE.
  * Fully compatible with PCI local bus specification v2.0.
  * Accommodates 8 bits, 16 bits, and 32 bits data transfer.
  * Supports PCI burst read/write operation.
  * Supports read ahead & posted write buffers for concurrent system operation.
  * Controls two IDE channels and max. connects 4 IDE drives.
  * Supports PIO mode 4 timing proposal on enhanced IDE specifications.
  * Programmable command and recovery timing for reads and writes per channel.
  * Auto IDE channel speed setting with software driver.
  * Hardware and software chip disable capability.
  * Supports power down feature.
- Meet PCI specification buffer strength.
- Supports CPU thermal detection.
- Supports CPU throttling and clock slow down.
- Supports software SMI and software stop clock port.
- Supports Microsoft APM spec.
- Supports user register 32-bit.
- External hardware SMI request support.
  * EXTSUSP, GPIO[3:0], PIO[6:0], UIP [2:0].
- Supports four Power Management Mode.
  * Local auto doze mode.
  * Global auto doze mode.
  * Standby mode.
  * Suspend mode.
- Supports programmable PMU timer.
  * Seven sub-doze timer: 31mS/125mS/05.Sec/1Sec/1.5Sec/2Sec/3Sec.
  * Standby timer: 4 sec ~ 5 min.
  * Suspend time: 1 min ~ 60 min.

- Battery Management
  * AC power indicator.
  * Multi-level low battery monitor: LB, LLB.
  * Battery low SMI generation.
- Supports suspend to hard disk.
  * Read only shadow register.
- Supports suspend to memory.
- Supports doze, standby and suspend modes status output pin.
- Supports ISA leakage control.
- Standby/resume toggle switch.
- Standby/resume button switch.
- Modem ring/GPIO wake up.
- Supports hot docking.
- 208-pin PQFP/TQFP package.
- 0.6um CMOS technology.

SMC FDC37C669FR I/O FDD Controller with IR

- 5 volt operation.
- Intelligent auto power management.
- 16 bit address qualification (option).
- 2.88MB super I/O floppy disk controller.
  - ∗ Licensed CMOS 7658 floppy disk controller.
  - ∗ Software and register compatible with SMC's proprietary 82077AA compatible core.
  - ∗ Supports two floppy drives directly.
  - ∗ Supports vertical recording format.
  - ∗ 16 byte data FIFO.
  - ∗ 100% IBM compatibility.
  - ∗ Detects all overrun and underrun conditions.
  - ∗ Sophisticated power control circuitry (PCC) including multiple powerdown modes for reduced power consumption.
  - ∗ DMA enable logic.
  - ∗ Data rate and drive control registers.
  - ∗ Swap drives A and B.
  - ∗ Non-burst mode DMA option.
  - ∗ 48 base I/O address, 7 IRQ and 3 DMA options.
- Floppy disk available on parallel port pins.
- Enhanced digital data separator.
  - ∗ 2 Mbps, 1 Mbps, 500 Kbps, 300 Kbps, 250 Kbps data rates.
  - ∗ Programmable precompensation modes.
- Serial Ports
  - ∗ Two high speed NS16C550 compatible UARTs with send/receive 16 byte FIFOs.
  - ∗ Supports 130k and 460k baud.
  - ∗ Programmable baud rate generator.
  - ∗ Modem control circuitry.
  - ∗ Infrared - IrDA, HPSIR, ASKIR, Fast IR (4Mbps IrDA), consumer IR support.
  - ∗ Alternate IR pins (option).
  - ∗ 96 base I/O address and 7 IRQ options.
- Multi-Mode parallel port with ChiProtect.
  - ∗ Standard mode.
  - ∗ IBM PC/XT, PC/AT and PS/2 compatible bidirection parallel port.
  - ∗ Enhanced parallel Port (EPP) compatible.
  - ∗ EPP 1.7 and EPP 1.9 (IEEE 1284 compliant).
  - ∗ Enhanced Capabilities Port (ECP) compatible (IEEE 1284 compliant).
  - ∗ Incorporates ChiProtect circuitry for protection against damage due to printer power-on.
  - ∗ 192 base I/O address, 7 IRQ and 3 DMA options.
- IDE interface (option).
  - ∗ On-Chip decode and select logic compatible with IBM PC/XT and PC/AT embedded hard disk drives.
  - ∗ 48 base I/O address and 7 IRQ options.
- Game Port Select Logic
  - ∗ 48 base I/O address.

- General purpose address decoder.
  - ∗ 16 byte block decode.
  - ∗ 48 base I/O address options.
- 100 pin QFP and TQFP package.

Omega 82C094 PCMCIA Host Adapter Controller

Small Form Factor
- Single-chip PCMCIA host controller.
- Legacy DMA and serial IRQ to directly support advanced PCI core logic.
- Serial power control to support the designs with most PCMCIA power switch IC.
- Direct connection to 33Mhz PCI bus and two PCMCIA sockets without glue logic.
- 208 pin PQFP or TQFP.

Compatibility
- Compliant with PC Card 95, PCMCIA 2.1, and JEIDA 4.1, ExCA.
- Register-set compatible to Intel i82092AA (PPEC) and Intel i82365SL.

Power Management
- Supports CLOCKRUN# of the PCI mobile design guide for power saving.
- Intelligent power management for lowest operation power.
- Programmable power management with individual socket activity counter.

High Performance
- Four-level FIFO and programmable PCMCIA interface timing.
- Five programmable memory windows and two programmable I/O windows per socket.

ESS ES1788 AudioDrive

The ES1788 AudioDrive can record, compress, and playback voice, sound and music with built-in mixer controls. It consists of an embedded microprocessor, a game compatible 16-bit stereo A/D and D/A, music 16-bit stereo D/A, 20-voice 72 operator FM music synthesizer, MIDI serial port compatible with MPU401 UART mode, dual joystick timers, hardware volume control, DMA control, and ISA bus interface logic. A DSP serial interface allows an external DSP to take over analog resources such as the D/A or A/D converters. Control of I/O address, DMA, and interrupt selection is controlled by system software. Interface to analog inputs is extremely simple. There are stereo inputs for CD-audio, line-in, and an external music synthesis chip or TV, and a mono microphone input to an internal pre-amp. A digital PC speaker input is converted to an analog signal with volume control and is available as an analog output signal. Advanced power management features such as suspend/resume to disk, self timed power down, auto-wakeup, and partial power-down are supported. The ES1788 AudioDrive has a 6 bit master volume control with 64 total steps.

The ES1788 AudioDrive is compatible with Sound Blaster PRO version 3.01 voice and music functions as documented in the Sound Blaster Series Developer Kit.

ESS ES690

- 32 voices.
- General MIDI instrument set - 128 melodic and 47 percussion.
- Chorus and reverb effects.
- Integrated general MIDI interrupt.
- MIDI serial interface.
- Supports 512Kx16 up to 8Mx16 ROM's.
- No DAC required.
- Context upload for suspend/resume to disk.
- Automatic power-down when MIDI input is idle.
- 52 pin PQFP.

ESS ES981 Wavetable Sample Set ROM

- 512Kx16 bit CMOS ROM.
- General MIDI instrument set - 128 melodic and 47 percussion.
- Single +5V power supply.
- 150 ns fast access time.
- Total static operation.
- Operating current 60 mA.
- 44 pin small outline package (SOP).

Trident Cyber9385 Flat Panel Controller

The Cyber9385 is a DRAM based, fully integrated LCD, CRT & TV 64 bit multimedia flat panel controller for PCI systems. It provides a flexible, high performance solution for various color depths and solutions. It supports these displays with options for 1, 1.5, 2 and 4 MB, and allows many memory configurations including unified or shared frame buffer architectures. With burst PCI, Extended Data Out (EDO)/Fast Page Mode (FPM) memory support, and the fastest video graphics engine, the Cyber9385 brings VisualReality to PCs.

Highly Integrated Design

The highly integrated design of the Cyber9385 offers a "no TTL" solution for cost-effective, high performance multimedia subsystem designs for the IBM PC and compatible notebooks. The 64 bit memory data bus, supporting EDO DRAM memory, provides faster data rates for improved system throughput.

Standard Video Modes

Mode #	Resolution/ Colors	Pixel Freq	Hor Freq	Vert Freq	MEM	Addr	Text Res	Font	Type	Feature
0H, 1H	320x200-16	28	31.4	70	All	B800	40x25	8x8	Text	NI,N,P
2H, 3H	640x200-16	28	31.4	70	All	B800	80x25	8x8	Text	NI,N,P
4H, 5H	320x200-4	25	31.4	70	All	B800	40x25	8x8	Graphic	NI,N,P
6H	640x200-2	25	31.4	70	All	B800	80x25	8x8	Graphic	NI,N,P
7H	720x350-Mono	28	31.4	70	All	B000	80x25	9x14	Text	NI,N,P
DH	320x200-16	25	31.4	70	All	A000	40x25	8x8	Graphic	NI,N,P
EH	640x200-16	25	31.4	70	All	A000	80x25	8x8	Graphic	NI,N,P
10H	640x350-16	25	31.4	70	All	A000	80x25	8x14	Graphic	NI,N,P
11H	640x480-2	25	31.4	60	All	A000	80x30	8x16	Graphic	NI,N,P
12H	640x480-16	25	31.4	60	All	A000	80x30	8x16	Graphic	NI,N,P
13H	320x200-256	25	31.4	70	All	A000	40x25	8x8	Graphic	NI,N,P

1. NI = Non-Interlaced VGA display

2. I = Interlaced VGA display

3. N = NTSC TV display (VGA monitor and TV display switching)

4. P = PAL TV display (VGA monitor and TV display switching)

Extended Video Modes

Mode #	Resolution/ Colors	Pixel Freq	Hor Freq	Vert Freq	MEM	Addr	Text Res	Font	Type	Feature
50H	640X480-16	25	31.5	60	All	D800	80X30	8x16	Text	NI,N,P
51H	640X473-16	25	31.5	60	All	D800	80X43	8x8	Text	NI,N,P
52H	640X480-16	25	31.5	60	All	D800	80X60	8x8	Text	NI,N,P
53H	1056X350-16	40	31.3	70	All	D800	132X25	8x14	Text	NI
54H	1056X480-16	40	31.3	60	All	D800	132X30	8x16	Text	NI
55H	1056X473-16	40	31.3	60	All	D800	132X43	8x8	Text	NI
56H	1056X480-16	40	31.3	60	All	D800	132X60	8x8	Text	NI
57H	1188X350-16	45	31.3	70	512K	D800	132X25	9x14	Text	NI
58H	1188X480-16	45	31.3	60	512K	D800	132X30	9x16	Text	NI
59H	1188X473-16	45	31.3	60	512K	D800	132X43	8x8	Text	NI
5AH	1188X480-16	45	31.3	60	512K	D800	132X60	8x8	Text	NI
5BH_1	800X600-16	40	37.9	60	All	A000	100X75	8x8	Graphic	NI,P
5BH_2	800X600-16	49.5	46.9	75	512K	A000	100X75	8x8	Graphic	NI,P
5BH_3	800X600-16	56.3	53.7	85	512K	A000	100X75	8x8	Graphic	NI,P
5CH	640X400-256	25	31.6	70	1M	A000	80X25	8x16	Graphic	NI,N,P
5DH_1	640X480-256	25	31.5	75	512K	A000	80X30	8x16	Graphic	NI,N,P
5DH_2	640X480-256	31.5	37.9	72	512K	A000	80X30	8x16	Graphic	NI,N,P
5DH_3	640X480-256	31.5	37.5	75	512K	D800	80X60	8x16	Graphic	NI
5DH_4	640X480-256	36	43.3	85	512K	D800	80X60	8x16	Graphic	NI
5EH_1	800X600-256	40	37.9	60	512K	A000	100X37	8x16	Graphic	NI,P
5EH_2	800X600-256	49.5	46.9	75	512K	A000	100X37	8x16	Graphic	NI,P
5EH_3	800X600-256	56.3	53.7	85	512K	A000	100X37	8x16	Graphic	NI,P
5FH_1	1024X768-16	45	35.5	87I	512K	A000	128X48	8x16	Graphic	I
5FH_2	1024X768-16	65	48.5	60	512K	A000	128X48	8x16	Graphic	NI
5FH_3	1024X768-16	75	56.5	70	512K	A000	128X48	8x16	Graphic	NI
5FH_4	1024X768-16	78.8	60	75	512K	A000	128X48	8x16	Graphic	NI
60H	1024X768-16	45	35.7	87I	512K	A000	128X48	8x16	Graphic	I
62H_1	1024X768-256	45	35.5	87I	1M	A000	128X48	8x16	Graphic	I
62H_2	1024X768-256	65	48.5	60	1M	A000	128X48	8x16	Graphic	NI
62H_3	1024X768-256	75	56.5	70	1M	A000	128X48	8x16	Graphic	NI
62H_4	1024X768-256	80	59.5	75	1M	A000	128X48	8x16	Graphic	NI
63H_1	1280X1024-16	75	46.9	87I	1M	A000	160X64	8x16	Graphic	I
63H_2	1280X1024-16	108	63.0	60	1M	A000	160X64	8x16	Graphic	NI
63H_3	1280X1024-16	135	80	75	1M	A000	160X64	8x16	Graphic	NI
64H_1	1280X1024-256	75	46.9	87I	2M	A000	160X64	8x16	Graphic	I
64H_2	1280X1024-256	108	63.0	60	2M	A000	160X64	8x16	Graphic	NI
64H_3	1280X1024-256	67.5	80.0	75	2M	A000	160X64	8x16	Graphic	NI
64H_4	1280X1024-256	135	80.0	75	2M	A000	160X64	8x16	Graphic	NI
65H_1	1600X1200-16Ci	135	62.5	96I	1M	A000	200X75	8x16	Graphic	I
66H_1	1600X1200-256Ci	67.5	62.5	96I	2M	A000	200X75	8x16	Graphic	I
6AH_1	800x600-16	40	35.2	60	All	A000	100X75	8x16	Graphic	NI,P
6BH	320x200-16M	40	31.6	70	512K	A000	40X25	8x16	Graphic	NI,N,P
6CH_0	640x480-T	75	31.4	60	1M	A000	80X30	8x16	Graphic	NI,N,P
6CH_1	640x480-T	25	31.5	60	1M	A000	80X30	8x16	Graphic	NI,N,P
6CH_2	640x480-T	31.5	37.9	72	1M	A000	80X30	8x16	Graphic	NI,N,P
6CH_3	640x480-T	31.5	37.5	75	1M	A000	80X30	8x16	Graphic	NI,N,P
6CH_4	640x480-T	36	43.3	85	1M	A000	80X30	8x16	Graphic	NI
6DH_1	800x600-T	40	37.9	60	2M	A000	100X37	8x16	Graphic	NI,P
6DH_2	800x600-T	49.5	46.9	75	2M	A000	100X37	8x16	Graphic	NI,P
6EH_1	1024x768-T	45	35.5	87I	4M	A000	128X48	8x16	Graphic	I
6EH_2	1024x768-T	65	48.4	60	4M	A000	128X48	8x16	Graphic	NI
74H_1	640x480-32K	50	31.4	60	1M	A000	80X30	8x16	Graphic	NI,N,P
74H_2	640x480-32K	65	40.1	72	1M	A000	80X30	8x16	Graphic	NI,N,P
74H_3	640x480-32K	31.5	37.5	75	1M	A000	80X30	8x16	Graphic	NI,N,P
74H_4	640x480-32K	36	43.3	85	1M	A000	80X30	8x16	Graphic	NI,N,P
75H_1	640x480-64K	50	31.4	60	1M	A000	80X30	8x16	Graphic	NI,N,P
75H_2	640x480-64K	65	40.1	72	1M	A000	80X30	8x16	Graphic	NI,N,P

75H_3	640x480-64K	31.5	37.5	75	1M	A000	80X30	8x16	Graphic	NI,N,P
75H_4	640x480-64K	36	43.3	85	1M	A000	80X30	8x16	Graphic	NI,N,P
76H_1	800x600-32K	40	37.9	60	1M	A000	100X37	8x16	Graphic	NI,P
76H_2	800x600-32K	40	37.9	60	1M	A000	100X37	8x16	Graphic	NI,P
76H_3	800x600-32K	49.5	46.9	75	1M	A000	100X37	8x16	Graphic	NI,P

Mode #	Resolution/ Colors	Pixel Freq	Hor Freq	Vert Freq	MEM	Addr	Text Res	Font	Type	Feature
77H_1	800x600-64K	40	37.9	60	1M	A000	100X37	8x16	Graphic	NI,P
77H_2	800x600-64K	49.5	46.9	75	1M	A000	100X37	8x16	Graphic	NI,P
77H_3	800x600-64K	56.3	53.7	85	1M	A000	100X37	8x16	Graphic	NI,P
78H_1	1024x768-32K	44.9	35.5	87I	2M	A000	128X48	8x16	Graphic	I
78H_2	1024x768-32K	65	48.4	60	2M	A000	128X48	8x16	Graphic	I
78H_3	1024x768-32K	78	60.0	75	2M	A000	128X48	8x16	Graphic	NI
79H_1	1024x768-64K	44.9	35.5	87I	2M	A000	128X48	8x16	Graphic	I
79H_2	1024x768-64K	65	48.4	60	2M	A000	128X48	8x16	Graphic	I
79H_3	1024x768-64K	78	60.0	75	2M	A000	128X48	8x16	Graphic	NI
7AH_1	1280x1024-32K	78	46.4	87I	4M	A000	160X64	8x16	Graphic	I
7BH_1	1280x1024-64K	78	46.4	87i	4M	A000	160X64	8x16	Graphic	I

Video Mode Cross Reference

Resolution X*Y	Color Depth Bit	Refresh Rate Hz	Scan Order I/NI	Video Clock Frequency MHz	Memory Clock Frequency MHz	Minimum DRAM MB	Acceleration Scheme V/A/H
640x480	4	60	NI	25.175	58.000	½	V
640x480	4	75	NI	31.500	58.000	½	V
640x480	8	60	NI	25.175	58.000	½	A
640x480	8	75	NI	31.500	58.000	½	A
640x480	15/16	60	NI	25.175	58.000	1	A
640x480	15/16	75	NI	31.500	58.000	1	A
640x480	24	60	NI	25.175	58.000	1	H
640x480	24	75	NI	31.500	58.000	1	H
800x600	4	60	NI	40.000	58.000	½	V
800x600	4	75	NI	49.500	58.000	½	V
800x600	8	60	NI	40.000	58.000	½	A
800x600	8	75	NI	49.500	58.000	½	A
800x600	8	60	NI	40.000	58.000	1	A
800x600	8	75	NI	49.500	58.000	1	A
800x600	15/16	60	NI	40.000	58.000	1	A
800x600	15/16	75	NI	49.500	58.000	1	A
800x600	15/16	60	NI	40.000	58.000	2	A
800x600	15/16	75	NI	49.500	58.000	2	A
1024x768	4	60	NI	65.000	58.000	½	V
1024x768	4	75	NI	78.750	58.000	½	V
1024x768	8	60	NI	65.000	58.000	1	A
1024x768	8	75	NI	78.750	58.000	1	A
1024x768	15/16	43	I	44.9	58.000	2	A
1280x1024	4	43	I	75.000	58.000	1	V
1280x1024	4	60	NI	108.00	58.000	1	V
1280x1024	8	43	I	75.000	58.000	2	A
1280x1024	8	60	NI	108.00	75.000	2	A

Accessories
Battery Pack
Toshiba Ni-MH Rechargeable Battery

Item			Specifications
Type			10TH-3000AEG
Nominal Voltage			1.2V
Nominal Capacity			3000mAh
Standard Charging			0.1C mA x 15 hours
Fast Charging			Maximum 1.0 CmA
Standard Discharge Current			0.2 CmA
Maximum Discharge Current			1.5 CmA
Discharge Final Voltage			1.0 V
Operating Temperature	Standard Charging		0 ~ +45°C
	Fast Charging		+5 ~ +45°C
	Discharge		-20 ~ +60°C
	Storage	3~12 months	-20 ~ +25°C
		within 3 months	-20 ~ +35°C
Weight			52 grams

Duracell DR36S (Available at Worldwide Retails)

Item		Specifications
Type		DR36S
Size		10 x 4/3A
Nominal Voltage		12V
Typical Battery Capacity		2.8 Ah
Typical Cell Capacity		3.02 Ah
Minimum Cell Capacity		2.8 Ah
Typical Energy		35 Wh
Maximum Internal Impedance		330 mΩ
Operating Temperature Range	Charge	0°C to 45°C
	Discharge	-20°C to 50°C
Maximum Continuous Current	Charge	1C (2.8A)
	Discharge	1C (2.8A)
Typical Weight		604g
Maximum Volume		258 cm^3
Terminals		5 position Advanced Interconnect

CD-ROM
TEAC CD-46E-900 CD-ROM

Average Random Access Time	190msec average (6X speed)	
Full stroke Access Time	450msec average (6X speed)	
Disk Speed	Inner circumstance	3,180rpm
	Outer circumstance	1,200rpm
Data Transfer Rate	Average sustained	900KB/sec
	Programmed I/O	16.7MB/sec. Max. (Mode 0~4)
	Multi-word DMA	16.7MB/sec. Max. (Mode 0~2)
Starting Time	8sec. Typical, 32sec max.	
Data Buffer Capacity	128KB	
Applicable Discs	CD-DA CD-ROM Mode 1, Mode 2	
	CD-ROM XA Mode 2 (Form 1, Form 2)	
	Photo CD (single/multi -session)	
Dimensions	Height	17.0mm
	Width	130.6mm
	Depth	140.5mm (excluding eject button)
Weight	320g or less	

TEAC CD-36E-900 CD-ROM

Average Random Access Time	230msec average (6X speed)	
Full stroke Access Time	480msec average (6X speed)	
Disk Speed (at 6X speed)	Inner circumstance	3,180rpm
	Outer circumstance	1,200rpm
Data Transfer Rate	Average sustained	900kB/sec (at 6X speed)
	Programmed I/O	13.3 MB/sec max. (Mode 0~3)
	Multi-word DMA	13.3 MB/sec max. (Mode 0~1)
Starting Time	8sec. Average (when power on or disk loaded)	
Return Time from Standby Mode	2sec or less	
Data Buffer Capacity Applicable Discs	128KB CD-DA	
	CD-ROM Mode 1, Mode 2	
	CD-ROM XA Mode 2 (Form 1, Form 2)	
	Photo CD (single/multi-session)	
	Enhanced CD	
Dimensions	Height	13.7mm
	Width	130.5mm
	Depth	140.5mm(excluding eject button)
Weight	250g or less	

TEAC CD-38E-900 CD-ROM

Average Random Access Time	200msec average (8X speed)	
Full stroke Access Time	470msec average (8X s peed)	
Disk Speed (at sextuple speed)	Inner circumstance	4,240rpm
	Outer circumstance	1,600rpm
Data Transfer Rate	Average sustained	1,200kB/sec
	Programmed I/O	16.7MB/sec max. (mode 0~4)
	Multi-word DMA	16.7MB/sec max. (mode 0~2)
Starting Time	8sec. Average (when power on or disk loaded)	
Return Time from Standby Mode	2sec or less	
Data Buffer Capacity Applicable Discs	128KB CD-DA	
	CD-ROM Mode 1, Mode 2	
	CD-ROM XA Mode 2 (Form 1, Form 2)	
	Photo CD (single/multi -session)	
	Enhanced CD	
Dimensions	Height	13.7mm
	Width	130.5mm
	Depth	140.5mm (excluding eject button)
Weight	250g or less	

3.5" Floppy Disk Drive
Panasonic JU-226A03F FDD

Capacity (in bytes)	Normal Density (MFM)	High Density (MFM)	
Unformatted			
Per Disk	1,000,000	1,666,666	2,000,000
Per Surface	500,000	833,333	1,000,000
Per Track	6,250	10,416	125,000
Formatted (16 sectors/track, 32 sectors/track)			
Per Disk	655,360		1,310,720
Per Track	4,096		8,192
Per Sector	256		256
Formatted (9 sectors/track, 18 sectors/track)			
Per Disk	737,280		1,474,560
Per Track	4,608		9,216
Per Sector	512		512
Formatted (15 sectors/track)			
Per Disk		1,228,800	
Per Track		7,680	
Per Sector		512	
Transfer Rate	250 kbits/s	500 kbits/s	500 kbits/s
Latency (avg.)	100 ms	83 ms	100 ms
Access Time			
Track to Track	3 ms	3 ms	3 ms
Average (including settling and latency)	194 ms	177 ms	194 ms
Settling Time	15 ms	15 ms	15 ms
Minimum Turn Around Delay	18 ms	18 ms	18 ms
Motor Start Time	500 ms	500 ms	500 ms
Motor Rotation Select Delay	500 ms	500 ms	500 ms
Dimensions (including front panel)			
Width	101.6 mm		
Height	12.7 mm		
Depth	110.0 mm		

TEAC FD-04HF-1300 FDD

2MB Mode

Recording Method			FM	MFM
Data Transfer Rate (k bits/sec)			250	500
Tracks/Disk			160	160
Innermost Track Bit Density (bpi)			8,717	17,434
Innermost Track Flux Density (frpi)			17,434	17,434
Data Capacity	Unformatted	K bytes/track	6.25	12.50
		K bytes/track	1,000	2,000
	Formatted			
	32 sectors/track	K bytes/track	0.128	0.256
		K bytes/track	4.096	8.192
		K bytes/track	655.36	1,310.72
	18 sectors/track	K bytes/track	0.256	0.512
		K bytes/track	4.608	9.216
		K bytes/track	737.28	1,474.56
	10 sectors/track	K bytes/track	0.512	1.024
		K bytes/track	5.12	10.24
		K bytes/track	819.20	1,638.40

1MB Mode

Recording Method			FM	MFM
Data Transfer Rate (k bits/sec)			125	250
Tracks/Disk			160	160
Innermost Track Bit Density (bpi)			4,359	8,717
Innermost Track Flux Density (frpi)			8,717	8,717
Data Capacity	Unformatted	K bytes/track	3.125	6.250
		K bytes/track	500	1,000
	Formatted			
	16 sectors/track	K bytes/track	0.128	0.256
		K bytes/track	2.048	4.096
		K bytes/track	327.68	655.36
	9 sectors/track	K bytes/track	0.256	0.512
		K bytes/track	2.304	4.608
		K bytes/track	368.64	737.28
	5 sectors/track	K bytes/track	0.512	1.024
		K bytes/track	2.560	5.120
		K bytes/track	409.60	819.20

Physical Specification

Dimension (including front bezel)	Width	101.6 mm
	Height	12.7 mm
	Depth	110 mm

LCD Panel
Sanyo LM-JA53-22NTK 12.1" DSTN

Item		Specification
Package dimension		276.5mm(W)x199.0mm(H)x8.0mm(D)
Structure		800(W)xRGB(W)x600(H)
Dot size		0.0871mm(W)x0.2913mm(H)
Dot pitch		0.1021mm(W)x0.3063mm(H)
Bezel opening area		250.0mm(W)x188.5mm(H)
Power supply voltage		Minimum 3.0V
		Maximum 5.5V
Viewing angle range	$\theta=0°$	Minimum 15°
	$\theta=90°$	Minimum 30°
	$\theta=180°$	Minimum 20°
	$\theta=270°$	Minimum 30°
Contrast ratio ($\phi=0°$)		Minimum 15, typical 30
Response time ($\phi=0°$)	Rise	Typical 150 ms, maximum 200 ms
	Fall	Typical 150 ms, maximum 200 ms

Samsung LT104S4-151 10.4" TFT

Item		Specification
Display area		211.2mm(H)x158.4mm(V) (10.4" diagonal)
Number of dots		800x600 pixel
Pixel pitch		0.264mm(H)x0.264mm(W)
Pixel arrangement		RGB vertical stripe
Display colors		262,144 colors
Viewing angle		6 oclcok
Display mode		Normal white
Module size		245.5mm(W)x179.4mm(H)x7.7mm(D)
Weight		400g (max.)
Contrast ratio ($\theta=0°$, $\phi=0°$)		80:1 (min.)
Response time at 25° $\theta=0°$, $\phi=0°$	Rise	20 (typical)
	Fall	30 (typical)
Luminance		70 cd/m^2 (typical)
Viewing angle	Horizontal-left	45°
	Horizontal-right	45°
	Vertical -high	10°
	Vertical-low	30°
Power supply voltage	Minimum	4.75V
	Typical	5.0V
	Maximum	5.25V

NEC NL8060AC26-04 10.4" TFT

Item		Specification
Display area		211.2mm(H)x158.4mm(V) (10.4" diagonal)
Drive system		a-Si TFT active matrix
Display colors		262,144 colors
Number of pixel		800x600
Pixel arrangement		RGB vertical stripe
Pixel pitch		0.264mm(H)x0.264mm(V)
Module size		243.0mm(H)x179.0mm(V)x8.0mm(D)
Weight	Typical	410g
Contrast ratio	Typical	150:1
Viewing angle	Horizontal-left	45°
	Horizontal-right	45°
	Vertical-up	25°
	Vertical-down	25°
Viewing direction		12 o'clock (upper direction)
Color gamut		55% (typical center to NTSC)
Response time	Maximum	40ms white to black
Luminance	Typical	70cd/m^2
Signal system	6-bit digital signals for each of RGB primary colors	
	Synchronous signals (Hsync, Vsync)	
	Dot clock (CLK)	
Supply voltage		3.3V or 5.0V (logic, LCD driving)
Backlight	Edge light type	
	one fluorescent lamp (cold cathode type) inverter-less	

Hosiden HLD1201-0151XX 12.1" TFT

Item	Specification
Display mode	Normally white mode with positive image (black image, white background)
Viewing direction	Optimum viewing lobe direction is 6 o'clock
Backlight	CCFL edge-light system
Display format	800x600 dots
Screen area	251mmx189.5mm
Color arrangement	RGB vertical stripes
Driving method	6 bits parallel (64 gray levels=262,144 colors)
Interface	3~3.3V CMOS logic
Display outline Weight	278.5mm(w) x 200.5mm(h) x 8.5mm (t) max. 600 grams
Contrast ratio	70:1 minimum at 25°C $\theta=0°$, $\phi=0°$, backlight on
Response time	Tr:28 msec typical, Tf:28 msec typical
Contrast setting	Maximum setting
Brightness (white image)	70 cd/m^2 Typ / If=TBD mA
Surface reflectance	5% max.
Power supply	Minimum 4.75V
	Typical 5V
	Maximum 5.25V

Samsung LT121S1-103 12.1" TFT

Item		Specification
Display area		246.0mm(H)x184.5mm(V) (12.1" diagonal)
Number of dots		800x600 pixel
Pixel pitch		0.3075mm(H)x0.3075mm(W)
Pixel arrangement		RGB vertical stripe
Display colors		262,144 colors
Viewing angle		6 o'clcok
Display mode		Normal white
Module size		275.0mm(W)x200.0mm(H)x8.0mm(D)
Contrast ratio ($\theta=0°$, $\phi=0°$)		80:1 (min.)
Response time at $25°$	Rise	20 (typical)
$\theta=0°$, $\phi=0°$	Fall	30 (typical)
Luminance		70 cd/m^2 (typical)
Viewing angle	Horizontal-left	45°
	Horizontal-right	45°
	Vertical-high	10°
	Vertical-low	30°
Power supply voltage	Minimum	3.0V
	Typical	3.3V
	Maximum	3.6V

Chapter 4: Parts & Circuit

This chapter provides both the parts list and the circuit diagrams for engineers to maintain the Notebook system.

- Parts List.
    - Top case & assemblies.
    - Bottom case & assembly.
    - Display panel & assembly.
    - CD-ROM.
    - FDD.
    - HDD.
    - Second Battery.

- Circuit Diagrams.
    - Mainboard   71-62000-D07C
    - D/D   71-6200C-D03
    - CPU Power Board   71-620A5-D50
    - Charger & Switch Board   71-6200S-D10
    - LCD Bar   71-62006-D01
    - 8/16MB Memory Card   71-6202T-D71
    - Data Board
        - DSTN 12.1" Sanyo, Hitachi   71-6200Z-D02
        - DSTN 12.1" Panasonic   71-6200Z-D10
        - TFT 10.4" NEC   71-6220Z-D11
        - TFT 10.4" Samsung   71-6220Z-D21
        - TFT 12.1" NEC/Samsung   71-6220Z-D02
        - TFT 12.1" Hosiden   71-6220Z-D30

NEC NL8060BC31-01 12.1" TFT

Item		Specification
Display area		244.8mm(H)x183.6mm(V) (12.1" diagonal)
Drive system		a-Si TFT active matrix
Display colors		262,144 colors
Number of pixel		800x600
Pixel arrangement		RGB vertical stripe
Pixel pitch		0.306mm(H)x0.306mm(V)
Module size		277.5mm(H)x202.5mm(V)x8.0mm(D) max.
Weight		485g (typical)
Contrast ratio		150:1 (typical)
Viewing angle	Horizontal-left	45°
	Horizontal-right	45°
	Vertical-up	20°
	Vertical-down	35°
Viewing direction	Wider viewing angle with contrast ratio: down side (6 o'clock)	
	Wider viewing angle without image reversal: up side (12 o'clock)	
	Optimum grayscale (γ=2.2): perpendicular	
Color gamut	42% (typical center to NTSC)	
Response time	40ms (max.) white to black	
Luminance	70 cd/m^2 (typical) (lamp current 3.0mArms)	
Signal system	6-bit digital signals for each of RGB primary colors	
	Synchronous signals (Hsync, Vsync)	
	Dot dock (CLK)	
Supply voltage		3.3V [5.0V] (logic, LCD driving)
Power consumption		3.0W (typical) [at 3.3V]
Backlight	Edge light type one fluorescent lamp (cold cathode type) inverter-less	