80286/12
MOTHER BOARD
USER'S MANUAL

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SECTION ONE: INTRODUCTION

1.1 Introduction:

The 80286 system main board based on Winbond chipset is fully compatible with IBM PC/AT. Besides basic AT functions, this 286 system main board can support a variety of advanced features including 16MHz of operating speed, 4MB RAM on board, shadow RAM for system and video BIOS, page/interleaved memory control, EMS 4.0, extended memory & etc. The system board can also support MS-DOS, PC-DOS, MS-OS/2, XENIX, Novell Networking and all IBM PC/AT compatible application programs. Based on this main board, an sophisticated 286 system can be built to operate more than twice as fast as a standard IBM PC/AT does.

This manual covers all necessary information to operate the 286 system main board. It will assist the user to install the system. By carefully following the steps described in this manual the user should be able to setup the system properly. Please contact the dealer for any technical assistance.

1.2 Specification:

1

A. Features

The major features of the 286 system main board are listed below:

- 12 MHz 80286 CPU.
- Turbo/normal system speed selectable by hardware or software.
- Hardware and software reset.
- Flexible memory size:512K, 1M, 2M, or 4M bytes with parity bit available on board.
- Parity check function can be disabled.
- SIP RAM module and DIP RAM chip sockets are available.
- Conventional (DOS), expanded (EMS), and extended (protected mode) memory functions supported.
- Shadow RAM for system and video BIOS. Real time clock and calendar circuit. CMOS memory to maintain system configuration.
- Addressing up to 16M bytes in the protected virtual address mode.
- Jumper selectable for one or zero wait state operation in both normal and turbo modes.
- 16 levels of hardware interrupts.
- 7 DMA channels (three 16-bit and four 8-

bit).
- Five 16-bit and one 8-bit expansion slots.
- Socket for optional 80287 math co-processor.
- LED indicator for Power On and Turbo mode.
- Advanced BIOS with Set-up.
- Supports multi-user or multi-tasking operating system such as Xenix, Unix, Novell, OS/2, and etc.

B.Power Supply Requirement

The system board is designed to use PC/AT compatible power supply.

Voltage: +5V(+/-5%)
Current: 3.5A Maximum

C.Mechanical Specification

The system board can fit any XT or AT compatible chassis. It has two sets of mounting holes.

Size:

Length	20.6cm(8.11")
Width	22.0cm(8.66")
Height	2.5cm(0.98")

D.Environment

The main board requires the following environment conditions.

	Operation	Storage
Temperature	0°C to 45°C 32°F to 113°F	-20°C to 50°C -4°F to 122°F
Humidity	10% to 95%	10% to 95%
Altitude(ft)	10K above sea level	20K above sea level

SECTION TWO: INSTALLATION

2.1   Installation guide

A. Peripherals Required

1. PC/AT compatible system chassis.
2. Standard AT compatible keyboard.
3. Standard AT compatible power supply.
4. Display card.
5. Monitor.
6. Floppy disk and/or hard disk drive controller.
7. Floppy and/or hard disk drive.
8. Any other XT/AT compatible equipment, such as serial port, parallel port, mouse, printer, LAN card, and etc.

B.   Installation Procedure

1. Set all the necessary jumpers as per desired system configuration (Please refer to the jumper settings in Section 2.3 and memory installation in Section 2.4).
2. Fix the system main board into the case.
3. Install RAM.

4. Connect the power supply to system board.
5. Install floppy disk drive and/or hard disk drive with controller.
6. Plug in keyboard.
7. Install display card.
8. Select display mode (mono/color).
9. Connect keylock, speaker, power on LED, turbo switch, turbo LED, and reset switch connectors.
10. Connect monitor cable to the display card.
11. Check all screws and make sure the all parts are properly fixed.
12. Switch on the monitor and the power supply.
13. Run the setup program if the system is newly setup or has had any change of configuration.

2.2 Jumpers and Connectors Location:
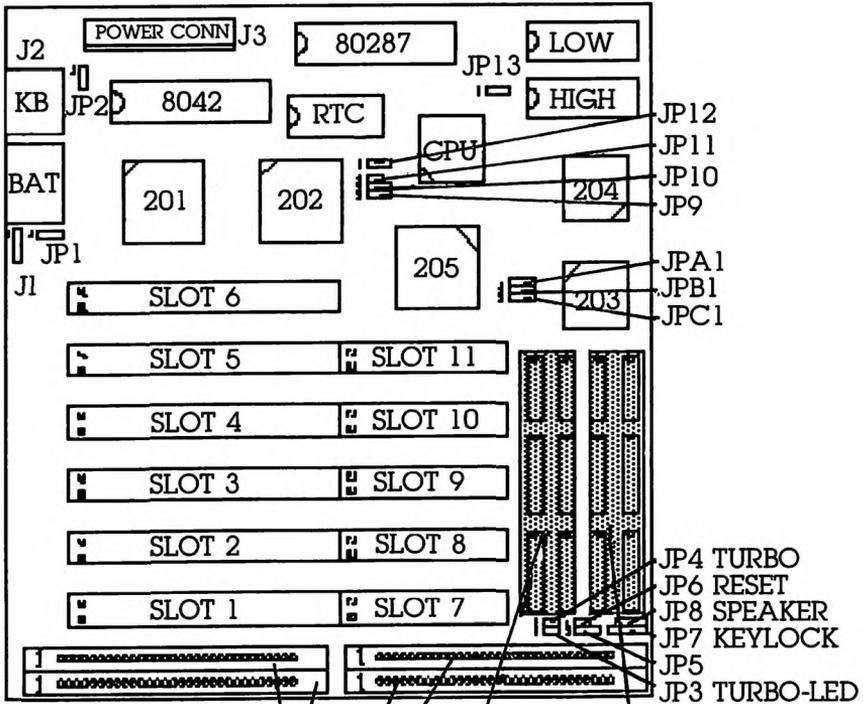
RAM module bank1

RAM module bank

DIP RAM bank 1

DIP RAM bank 0

2.3 Connector Assignments

The motherboard has the following connectors:

- Battery Connector : J1
- Keyboard Connector : J2
- Power-supply Connector : J3
- Turbo LED Connector : JP3
- Hardware Reset Button Connector : JP6
- Power ON LED & Keylock Connector : JP7
- Speaker Connector : JP8
- I/O Channel Connector : Slot 1-Slot 11

The Battery Connector is a 4-pin, keyed Berg Strip. The pin assignments

Battery Connector (J1)

Pin	Assignments
1	+4.5V
2	Spare
3	Ground
4	Ground

The pin assignments for Power-supply
Connector are as follows:

Power-supply Connector (J3)

Pin	Assignment	Wire color
1	Power good	Orange
2	+5v	Red
3	+12	Yellow
4	-12	Blue
5	Ground	Black
6	Ground	Black
7	Ground	Black
8	Ground	Black
9	-5V	White
10	+5V	Red
11	+5V	Red
12	+5V	Red

The Keyboard Connector is a 5-pin DIN
connector. The pin assignments are as

Keyboard Connector (J2)

Pin	Assignments
1	Keyboard Clock
2	Keyboard Data
3	Spare
4	Ground
5	+5V

The Turbo LED Connector JP3, could be
connected to a LED as the CPU speed
indicator, if needed. When the mother-
board is running at high clock rate, the
LED will be turned on. The pin assign-

Pin	Assignments
1	Ground (-)
2	data (+)

The Power LED and Keylock Connector
is a 5-pin Berg Strip header connector.
Its pin assignments are as follows:

Power LED & Keylock Connector (JP 7)

Pin	Assignments
1	LED (Power On indicator)
2	Spare
3	Ground
4	Keyboard inhibit
5	Ground

The Reset Button Connector JP6, is a
2-pin Berg Strip header connector. It is
connected to the reset button, equipped
in many type of chasis for "hardware
reset".

Noted that you must keep pressing the
reset button for half a second, at
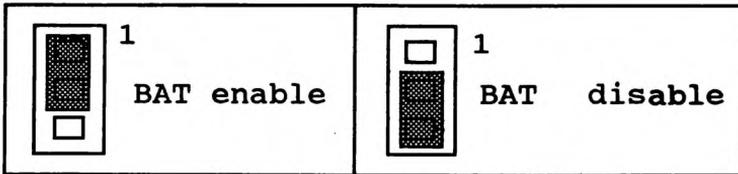least, to complete the hardware reset

The Speaker Connector is a 4-pin Berg Strip header connector. The pin assignments are as follows:
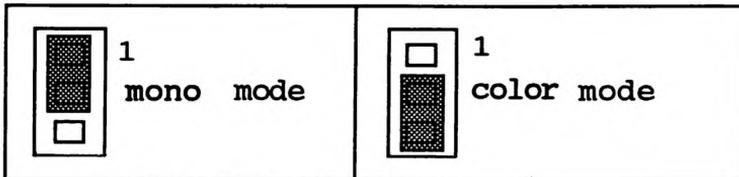
Speaker Connector (JP 8)

Pin	Assignments
1	Data out
2	Spare
3	Ground
4	+5V

2.4 Jumper Setting

JP1:CMOS backup battery enable/disable

1 BAT enable	1 BAT disable

JP2:Color/mono display mode selection

1 mono mode	1 color mode

JP4 Turbo mode setting (connected to hardware turbo switch)

always in turbo mode	turbo mode selected by keyboard
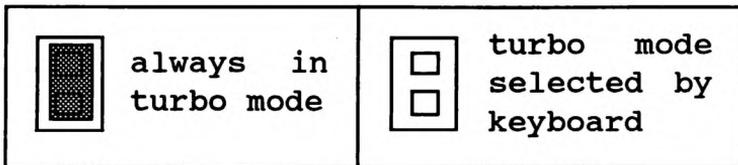
JP5 Keyboard turbo selection

1 8042 pin 23	1 8042 pin 24
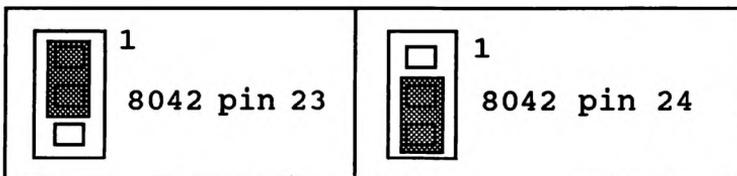
JP9:Parity check function selection

1 parity check enable	**1** parity check disable
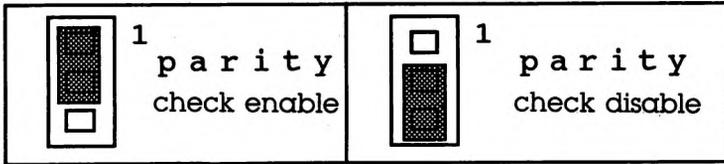
JP10:Power good / RC reset selection

1 power good reset	**1** R-C reset
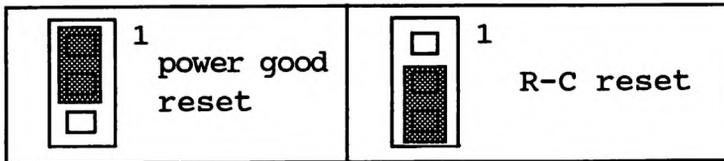
JP11:Reset switch control

if JP10 **1**	if JP10 **1**
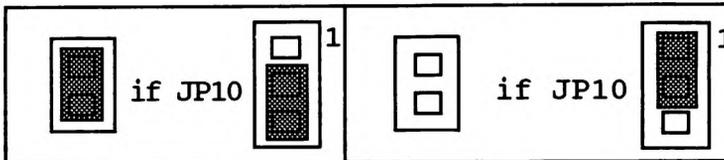
JP12:DRAM access wait state selection

1 1 wait state	**1** 0 wait state
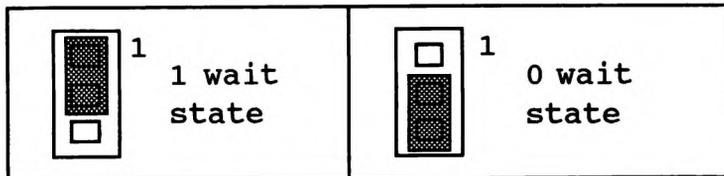
JP13:80287 clock source selection

1	1
287 run 8MHz	287 run 12MHz
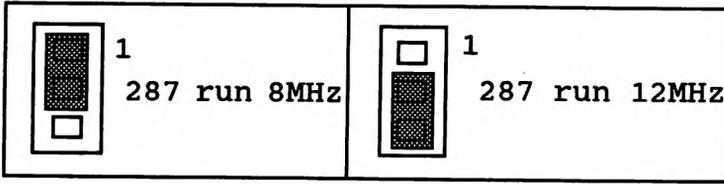
2.5 Memory Installation

There are various sizes of main memory available. Also the memory can be assigned as base memory, extended memory, and shadow memory. Please refer to the following tables for the jumper setting and related memory size:
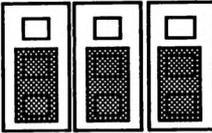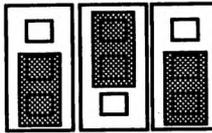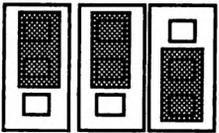
Main Memory				Jumper Setting	Bank 0	Bank 1
Total	Base	Extended	Shadow			
512KB	512KB	0	0	JPA1 JPB1 JPC1	44256 x 4 41256 x 2	None
					RAM Module 256K x 2	None

Use either DIP RAM chips or RAM modules for this size.

Main Memory				Jumper Setting	Bank 0	Bank 1
Total	Base	Extended	Shadow			
1MB	640KB	384KB	0	JA1 JB1 JC1	44256 x 4 41256 x 2	44256 x 4 41256 x 2
					RAM Module	
					256K x 2	256K x 2

Use either DIP RAM chips or RAM modules for this size.

Main Memory				Jumper Setting	Bank 0	Bank 1
Total	Base	Extended	Shadow			
1MB	640KB	256KB	128KB	JA1 JB1 JC1 1	44256 x 4	44256 x 4
					41256 x 2	41256 x 2
					RAM Module	
					256K x 2	256K x 2

Use either DIP RAM chips or RAM modules for this size.

Main Memory				Jumper Setting	Bank 0	Bank 1
Total	Base	Extended	Shadow			
2MB	640KB	1408KB	0	JA1 JB1 JC1 1	1M x 2	None
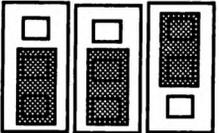
Use RAM modules for this size.

Main Memory				Jumper Setting	Bank 0	Bank 1
Total	Base	Extended	Shadow			
2MB	640KB	1280KB	128KB	JA1 JB1 JC1 1	1M x 2	None
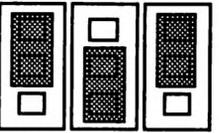
Use RAM modules for this size.

Main Memory				Jumper Setting	Bank 0	Bank 1
Total	Base	Extended	Shadow			
4MB	640KB	3456KB	0	 JA1 JB1 JC1 1	1M x 2	1M x 2
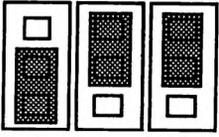
Use RAM modules for this size.

Main Memory				Jumper Setting	Bank 0	Bank 1
Total	Base	Extended	Shadow			
4MB	640KB	3328KB	128KB	 JA1 JB1 JC1 1	1M x 2	1M x 2
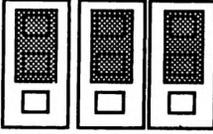
Use RAM modules for this size.

2.6 CMOS Configuration Setup

This section covers the information about setting the system configurations (CMOS) under the AMI BIOS. It is necessary to run the setup program
(1) the system is installed at the first time,
(2) there is any change in system configuration, or
(3) any mismatch between the configuration table and the system.

After system power on and the memory test, the monitor screen then shows:

"Press <DEL> if you want to run SETUP or DIAG"

and notes about AMI BIOS. Press <DEL> key to get into the setup program. The screen then shows as the following:

EXIT FOR BOOT
RUN CMOS SETUP
RUN DIAGNOSTICS

To enter into this setup program, use arrow keys to highlight "RUN CMOS

SETUP" and press <ENTER> key. The monitor screen
will then show following message:

```
CMOS SETUP (C) Copyright 1985-1989, American Megatrends Inc.

Date (mn/date/year) :Sun, Jan 01 1989        Base memory size :640K
Time (hour/min/sec) :09:39:06             Ext. memory size :384K
Floppy drive A:     :1.2MB, 5.1/4"        Numeric processor:Not Installed
Floppy drive B:     :Not Installed

                              Cyln  Head  WPCom   LZone  SEC   Size
Hard disk C:type    :2        615   4     300     615    17    20MB
Hard disk D:type    :Not installed
Primary display     :Monochrome
Keyboard            :Installed
BIOS shadow option  :Disabled
Scratch RAM option  :1
Power on high speed   :Enabled      SUN  MON  TUE  WED  THU  FRI  SAT
EMS function            :Disabled    1    2    3    4    5    6    7
                                     8    9   10   11   12   13   14
                                    15   16   17   18   19   20   21
                                    22   23   24   25   26   27   28
                                    29   30   31    1    2    3    4
                                     5    6    7    8    9   10   11

Month:Jan,Feb,.........Dec
Date:01,02,03............31
Year:1901, 1902........2099

Esc=Exit, ↓→↑← =Select,   PgUp/PgDn =Modify
```

Use 4 arrow keys to make the selection
then use <PgUp> and <PgDn> keys to
choose the correct data. After all the
functions have been set up, press <ESC>
key to exit the setup procedures and
then press <Y> to update the data in
the CMOS and reboot the system.

CMOS Setup Option

The Setup screen requires you to set the following:

* Date
* Time
* Floppy drive A type
* Floppy drive B type
* Hard disk type for drive C
* Hard disk type for drive D
* Type of display card
* Presence of keyboard
* BIOS shadow option
* Scratch RAM option
* Power on high speed option
* EMS function option

● DATE : Current date

● TIME : Current time

● Floppy disk drive setup:
Drive a: and/or b: may be one of the following type:

1.	360KB	5.25"
2.	1.2MB	5.25"
3.	720KB	3.5"
4.	1.44MB	3.5"
5.	not installed	

● Hard disk drive setup:
Drive c: and d: are the hard drives
in the system.
46 drive type have been defined by
BIOS. If for some reason or other your
particular drive is not one of the 46
pre-defined types, simply scroll
down to type 47 and enter the
following drive specifications:
cylinders, heads, WPcom, LZone, and
sectors.

● Display Type Setup
you may choose one of the following
type:

    1.   Monochrome
    2.   Color 40 X 25
    3.   Color 80 X 25
    4.   EGA or VGA
    5.   not installed

● Keyboard Setup:
Enable/disable the keyboard test
during power on self test by setting
keyboard as :Installed" or "Not
Installed".

● BIOS shadow option:
Enable/Disable the BIOS shadow func-
tion.

●   Power on high speed:
Enable/Disable the power on high speed.

●   Scratch RAM option:
The option you have are the following:

    1.   The BIOS to use 100 bytes at 30h:0.

    2.   The BIOS to reduce the size of the base
          memory by 1KB.

The default is 1. If you are not using drive type 47 or not running programs like OS/2, RAMDRIVE , you may leave the value as 1.

●   EMS function:
Enable/disable function.

2.7 Alternation of System Speed

Software Switch:

The system speed can be switched from keyboard. To select the turbo speed, please hold down <Ctrl> and <Alt> then press <+>. To switch back to normal speed, hold down <Ctrl> and <Alt> then press <-> again. Please note that the procedure is based on AMI BIOS.

Hardware Switch:

Short JP4 to switch to turbo speed. Open JP4 to switch back to normal speed. Or press down the turbo switch on the case to change between turbo and normal speed after the system main board has been installed in a case and all the connectors have been connected properly.

2.8 HOW TO SET THE EMS

To use the 286 motherboard EMS capability follow these step:

STEP 1: IF YOU HAVE THE SHADOW RAM ENABLED

1.Press the <DEL> key after the memory count-up after power-up or cold boot, or immeadiately after warm boot, when this message appears:

Press <DEL> key to run SETUP or DIAG

and notes about AMI BIOS. Press <DEL> key to get into the setup program. The screen then shows as the following:

EXIT FOR BOOT
RUN CMOS SETUP
RUN DIAGNOSTICS

2.To enter into this setup program, use arrow keys to highlight "RUN CMOS SETUP" and press <ENTER> key. Use 4 arrow keys to make the selection then use <PgUp> and <PgDn> keys to modify the data in following item:

```
         BIOS shadow option : Disable
         EMS function       : Enabled
```

After all the functions have been set up, press <ESC> key to exit the setup procedure and then press <Y> to update the data in the CMOS and reboot the system.

STEP 2: INSTALL THE EMS SOFTWARE

1.To use the EMS one final step required is to install the EMS software drive supplied on the diskette packaged with the motherboard. Remove this diskette and place in the diskette drive A:

2.Check to see if the file WINEMM2.SYS is present on this diskette.

3.If you have a hard drive:
Copy the EMS driver to the root directory of the hard drive:

```
         A:>COPY A:WINEMM2.SYS C:
```

4.If you have only diskette drives:
Place the diskette containing the EMS driver in drive B:(or A: If only one drive is installed). If you have a boot

diskette place it in drive A:, Copy the drive to the boot diskette.

B:>COPY B:WINEMM2.SYS A:

5.Now move back to the boot drive and create an entry into the CONFIG.SYS file to cause DOS to load the driver on boot-up. From the root directory of the boot drive type:

```
COPY CON: CONFIG.SYS
DEVICE = WINEMM2.SYS
^Z
```

If you require a non-standard memory or I/O address for the EMS driver. Please refer to explanation note contained on the diskette which has the EMS driver. This file is named "EMS40.DOC".

6.When finished re-boot on the modified boot drive. The ems driver software will test the ems memory available when loading. Should the driver report "NO EMS FOUND" or "EMS INCORRECTLY INSTALLED" then above procedure should repeated to correctly set up the motherboard.

SECTION THREE: TECHNICAL INFORMATION

3.1 Winbond Chipset Technical Data*

General Description:

The Winbond PC Chipset is for any iAPX286 based system design. The five-chip set, using high speed CMOS technology, can replace most of the MSI/LSI logic used to control the Personal Computer AT compatibles and to enhance system performance while still retaining PC/AT compatibility by adding powerful new features.

W83C202 12MHz PC/AT Compatible Chipset System Controller

The W83C202 provides the Clock Generator and Bus Controller for iAPX286 microprocessor, the Data Conversion Logic and Wait State Generator to perform 16-bit data transfers to or from 8-bit devices, the Memory Control Logic to generate the necessary memory control signals, and the Numeric Processor Control Logic to generate the interface signals between iAPX286 and 80287.

Features

* Supports up to 12 MHz 80286 operation.
* Shadow RAM for BIOS to improve performance.
* Integrated Lotus-Intel-Microsoft Expanded Memory Specification (LIM EMS) with memory controller W83C203.
* Page memory control and RAS Timeout circuit.
* Built-in speed-switching circuits.
* Generates system clock for iAPX 286 Microprocessor.
* Generates system reset, CPC reset, and numeric processor reset output signals.
* Provides command and control signals for local and system buses.
* Flexible cycles of command timing.
* Provides data conversion logic and variable wait state.
* Supports numeric processor interface.
* Single 5 volts supply.
* Supports up to 4 MB DRAM on-board.
* 6 MHz AT-Bus compatible.

W83C201 12 MHz PC/AT Compatible Chipset Peripheral Controller

The W83C201 PC/AT-Compatible Peripheral Controller replaces two 82C37A Direct Memory Access Controllers, two

DMA Page Register, two 74ALS573 Octal Three-State Latches, a 74ALS138 3-to-8 Decoder, and other integrated circuits for Real Time Clock, Keyboard Controller, Speaker, Status/Control port,Non-maskable Interrupt. Using the internal functionality theW83C201 provides all 24 address bits for 16M byte of DMA address space. It also has direct interface with the CPU to handle all interrupts. Timing for refresh cycles and arbitration, between refresh and DMA hold requests, are also controlled by the W83C201.

Features:

* Supports any iAPX 286 based system design.
* Supports 16MHz processor clock.
* Seven independent DMA channels and directly expandable to any number of channels.
* 14 external interrupt requests and programmable interrupt modes.
* Three counter/timer channels and six programmable modes.
* Provides non-maskable interrupt logic.
* Real time clock logic.

W83C204 12 MHz PC/AT Compatible Chipset Address Buffer

The W83C204 PC/AT Compatible Address Buffer provides latches and buffers for the address signals which are required in an IBM PC/AT compatible system design. This buffer consists of 20-bit system address bus drivers, each capable of sinking 20 mA of current and driving 200 pF of capacitance on the backplane, and 16-bit peripheral address bus drivers, each capable of sinking 8 mA of current and driving 50pF of capacitance.

Features:

* Fully compatible with IBM PC/AT type of design.
* Performs address buffer function in IBM PC/AT compatible systems.
* Supports up to 12MHz processor clock.

W83C205 12MHz PC/AT Compatible Chipset Data Buffer

The W83C205 PC/AT Compatible Data Buffer provides a 16-bit CPU data bus I/O as well as 40 buffered drivers consist of 16-bit bi-directional system data bus drivers, 16-bit memory data bus drivers, and 8-bit bi-directional peripheral data bus drivers. In addition, the W83C205 generates the parity error checking signal for the system.

Features:

* Fully compatible with IBM PC/AT type design.
* Performs data buffer function in IBM PC/AT compatible systems.
* Supports up to 12MHz processor clock.
* Designed in CMOS for low power

W83C203 12 MHz PC/AT Compatible Chipset Memory Controller

The W83C203 is the memory controller of the system design. It provides the user with memory sizes requirement. In addition, it provides the capability of expanded memory on the 80286 real address mode to map up to 4M bytes of memory size to achieve the EMS function or extended memory on the 80286 protected address mode. The W83C203 includes the DRAM page mode hit checking function which can reduce the memory access time if accessed contiguously on the same page. Besides, the W83C203 also includes shadow RAM BIOS features of coping the BIOS ROM to RAM to allow for faster memory access operation.

Features:

* Supports on board maximum 4M bytes memory size.
* Supports on board DRAM page mode hit checking logic.
* Supports the shadow RAM execution of BIOS.

* Designed in CMOS for low power consumption.
* Available in a JEDEC-standard 68-pin Plastic Leadless Chip Carrier (PLCC) package.