# PM-1021

## 386SX with LCD/CRT Module

## User Manual

## Version 2.3

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# Chapter 1. Introduction

Thank you for choosing PM-1021 386SX with LCD/CRT Module. The PM-1021 is a PC/104 form factor module, which comes equipped with ALI 6117 (includes 386SX 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 SMC FDC37C669 is used in the PM-1021 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, as well as EPP and ECP.

The LCD/CRT controller is TOPRO TP6508 which can provide the LCD and CRT display at the same time. The LCD interface connector is a 44-pin 2.0mm pitch type.

## 1.1 Specifications

The PM-1021 386SX with LCD/CRT Module provides the following specification:

- **System :**
  - ✓ **CPU** : ALI 6117,includes 386SX CPU
  - ✓ **DMA Channels** : 7
  - ✓ **Interrupt Levels** : 15
  - ✓ **Real-time Clock/Calendar** : Li- battery back-up for over 10 years of data retention.
- **Memory :**
  - ✓ **RAM memory** : 4MB on board

✓ **Shadow RAM memory** :  C0000 ~ DFFFF h

✓ **System BIOS :** E0000h ~ FFFFFh

- **LCD/CRT Interface :**

  ✓ **Chipset   :**  TP6508

  ✓ **Resolution :**   Support up to 640x480 resolution for DSTN and 800X600X18bits resolution for TFT LCD Flat Panel.

  ✓ **Display Memory :** 512KB on board.

- **Input/Output :**

  ✓ **IDE Hard Disk Drive Interface** : Supports up to two IDE hard disk drives. Can be disabled through BIOS Setup configuration.

  ✓ **Floppy Disk Drive Interface** : Supports two 2.88 MB, 1.44MB, 1.2MB, 720KB, or 360KB floppy disk drives. Can be disabled through BIOS Setup configuration.

  ✓ **Two High Speed Serial Ports** : NS16C550 compatible UARTs with send/receive 16-byte FIFOs, data rates are independently programmable from 115.2K baud down to 50 baud. The modem controls the circuitry.

  ✓ **Multi-mode Parallel Port** :
  Standard mode - IBM PC/XT, PC/AT, PS/2 compatible bi-directional parallel port. Supports EPP and ECP model.

- **Industrial features :**

  ✓ **PC/104 expansion bus** : A 64-pin and 40-pin, industrial embedded-PC bus standard.

  ✓ **External power connector** : 8-pin male connector ( Molex 6410 series compatible)

  ✓ **Keyboard / Mouse connector** : 5-pin header each on board

- **General :**

  - ✓ **Power Consumption** :

    +5V @ 1.4A ( 40MHz,4MB RAM)

  - ✓ **Operating Temperature** : 0∘ ~ 55∘ C

  - ✓ **Humidity** : 5% ~ 95%, non-condensed

## 1.2 Package Contents

In addition to this *User's Manual*, the PM-1021 package includes the following items:
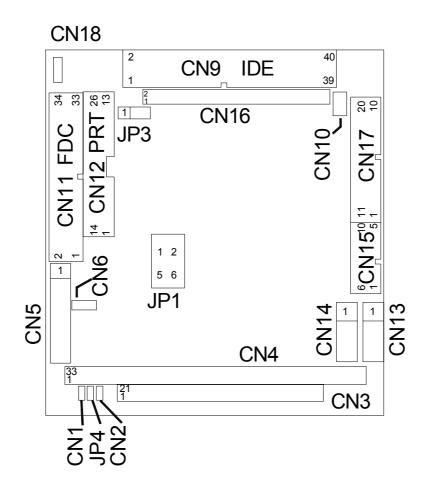
- PM-1021 386SX with LCD/CRT Module
- Two Ports RS-232 cable
- Printer cable
- VGA cable
- FDD/HDD Cable
- 6-pin Mini-Din to 5-pin Din Keyboard Adapter Cable
- 6-pin Mini-Din to 5-pin Din Mouse Adapter Cable

# Chapter 2. Installation

This chapter describes how to install the PM-1021. First, layout of PM-1021 is shown, and the unpacking information that you should be careful with is been described.  After that comes instructions on how to set the jumpers and switches for PM-1021's configuration, including items such as CPU type selection, system clock setting, and interrupt IRQ setting for serial ports and parallel port.

## 2.1 PM-1021's Layout

< Please refer to the next page >

CN18

CN9  IDE

2                    40
1                    39

CN11 FDC

34  33

CN12 PRT

26  13

14  1

CN16

2
1

JP3

1

CN10

CN17

20
10

CN15

11  1
10  5

6  1

CN5

2  1

1

CN6

JP1

1  2

5  6

CN14

1

CN13

1

CN4

33
1

CN3

21
1

CN1

JP4

CN2

8

## 2.2   CPU Setting for PM-1021

- **CPU SPEED SETTING**:

    The system clock is generated by the AV9155C-02, and the different CPU clock frequency can be selected by JP1 setting illustrated in the following table:

| JP1 | 1-2 | 3-4 | 5-6 |
|---|---|---|---|
| 8MHz | OPEN | CLOSE | CLOSE |
| 16Mhz | CLOSE | OPEN | CLOSE |
| 20MHz | OPEN | OPEN | CLOSE |
| 25MHz | CLOSE | CLOSE | OPEN |
| 40MHz | CLOSE | OPEN | OPEN |

## 2.3   BIOS Flash Chip Vpp Setting

There are two type of Flash chip that could be installed, one is 5V Vpp and the other is 12V Vpp. Vpp is provided while executing programming function.

| Function | JP3 |
|---|---|
| 5V Vpp | 2-3 |
| 12V Vpp | 1-2 |

## 2.4   Clear CMOS Setup

If you want to clear CMOS Setup (for example you forgot the password then you should clear setup and reset the password.), you should close the JP4 for about 3 seconds, then open it again. Then you can set system back to normal operation mode take by taking off the jumper.

● **JP4 : Clear CMOS Setup (Reserve Function)**

| JP4 | DESCRIPTION |
|-----|-------------|
| **1-2** | Clear CMOS Setup |

# Chapter 3. Connection

This chapter describes how to connect peripherals, switches and indicators to PM-1021 module. You can access most of these connectors from the top of the board while it is installed in the chassis.

## 3.1 Floppy Disk Drive Connector

PM-1021 module comes equipped with a 34-pin daisy-chain driver connector cable. The detailed pin assignment of the connector is specified in the following table:

● **CN11 : FDC CONNECTOR**

| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
|---------|-------------|---------|-------------|
| 1 | GROUND | 2 | REDUCE WRITE CURRENT# |
| 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 IDE Disk Drive Connector

You can attach two IDE (Integrated Device Electronics) hard disk drives to the PM-1021 internal controller. The board comes equipped with a 40-pin flat-cable connector. Detailed pin assignment of the connector is specified in the following table:

### • CN9 : 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 | N/C | 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  PM-1021 includes an on-board parallel port that can be accessed through a 26-pin flat-cable to connector CN12. The detailed pin assignment of the connector is specified in the following table:

- **CN12 : 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 | IOW# | 24 | GROUND |
| 25 | GROUND | | |

# 3.4 Serial Ports

The PM-1021 offers two high speed NS16C550 compatible UARTs with Read/Receive 16 byte FIFO serial ports. These ports let you connect to serial devices or a communication network.

- **Serial Port 1/2 (CN17) : 2x10-pin Header**

| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
|---------|-------------|---------|-------------|
| 1 | DCD  Port 0 | 11 | DSR  Port 0 |
| 2 | RXD  Port 0 | 12 | RTS  Port 0 |
| 3 | TXD  Port 0 | 13 | CTS  Port 0 |
| 4 | DTR  Port 0 | 14 | RI    Port 0 |
| 5 | GND Port 0 | 15 | N/C  Port 0 |
| 6 | DCD  Port 1 | 16 | DSR  Port 1 |
| 7 | RXD  Port 1 | 17 | RTS  Port 1 |
| 8 | TXD  Port 1 | 18 | CTS Port 1 |
| 9 | DTR  Port 1 | 19 | RI   Port 1 |
| 10 | GND Port 1 | 20 | N/C Port 1 |

# 3.5 Keyboard/Mouse Connector

The PM-1021 provides keyboard (CN13) and mouse (CN14) connectors. A 5-pin header connector CN13 can support passive backplane applications.

- **CN13 : 5-pin Header Keyboard Connector**

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

- **CN14 : 5-pin Header Mouse Connector**

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

# 3.6 External Switches and Indicators

There are many external switches and indicators for monitoring and controlling your CPU board. These features are completely optional so all you have to do is to install them if you need it:

- **CN6 : RESET BUTTON**

| PIN NO. | DESCRIPTION |
|---------|----------------|
| 1 | EXTERNAL RESET |
| 2 | GROUND |

● **CN10 : IDE LED Connector**

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

● **CN18 : POWER LED**

| PIN NO. | DESCRIPTION |
|---------|-------------|
| 1 | +5V |
| 2 | GROUND |

● **CN1 : KEYLOCK CONNECTOR**

| PIN NO. | DESCRIPTION |
|---------|-------------|
| 1 | KEYLOCK |
| 2 | GROUND |

## 3.7 External Power Connector

The PM-1021 has an on-board external power connector CN5. You can connect power directly to the CPU board for some single-board-computer(without passive backplane) applications.

● **CN5: EXTERNAL POWER CONNECTOR JST XH CONNECTOR ( 2.5MM PITCH) EQUIVALENT**

| PIN NO. | DESCRIPTION |
|---------|-------------|
| 1 | +5V |
| 2 | +12V |
| 3 | -12V |
| 4 | GROUND |
| 5 | GROUND |
| 6 | -5V |
| 7 | +12V |
| 8 | +5V |

# 3.8 External Speaker

The PM-1021 has its own buzzer so you also can connect to the external speaker through the connector CN2.

● **CN2 : SPEAKER**

| PIN NO. | DESCRIPTION |
|---------|----------------|
| 1 | +5V |
| 2 | SPEAKER SIGNAL |

# 3.9  PC/104 Connection Bus

The PM-1021's PC/104 expansion bus let you attach any kind of PC/104 modules. PC/104 bus has already become the industrial embedded PC bus standard so you could easily install over thousands of PC/104 modules sold by hundreds of venders worldwide.

# 3.10  LCD/CRT Interface Connector

● **CN15 : 2x5-pin VGA Connector**

| 1 | RED | 6 | |
|---|-------|----|--------|
| 2 | GREEN | 7 | |
| 3 | BLUE | 6 | GROUND |
| 4 | HSYNC | 8 | GROUND |
| 5 | VSYNC | 10 | GROUND |

● **CN16: LCD Interface Connector**

| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
|---------|-------------|---------|-------------|
| 1 | +12V | 2 | +12V |
| 3 | GND* | 4 | GND |
| 5 | +5V | 6 | +5V |
| 7 | FPVEE | 8 | GND |

| | | | |
|---|---|---|---|
| 9 | P0 | 10 | P1 |
| 11 | P2 | 12 | P3 |
| 13 | P4 | 14 | P5 |
| 15 | P6 | 16 | P7 |
| 17 | P8 | 18 | P9 |
| 19 | P10 | 20 | P11 |
| 21 | P12 | 22 | P13 |
| 23 | P14 | 24 | P15 |
| 25 | P16 | 26 | P17 |
| 27 | P18 | 28 | P19 |
| 29 | P20 | 30 | P21 |
| 31 | P22 | 32 | P23 |
| 33 | GND | 34 | GND |
| 35 | SHFCLK | 36 | FLM |
| 37 | M | 38 | LP |
| 39 | GND | 40 | ENABKL |
| 41 | GND | 42 | N/C |
| 43 | +5V | 44 | 5V |

# Chapter 4. AMI BIOS Setup

The PM-1021 uses AMI BIOS for system configuration, and the AMI BIOS setup program is designed to provide maximum flexibility in configuring the system by offering various options which may be selected to meet end-user's specific requirements. This chapter is written to assist you in the proper usage of these features.

## 4.1 Getting Started

When the system is powered on, 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 :

**" Hit < Del>, if you want to run SETUP"**

To access AMI BIOS Setup program, press <Del> key.

## 4.2 Standard CMOS Setup

Standard CMOS Setup is the first option on the main menu. The standard CMOS setup utility is used to configure the following features :

- Date/Time,
- Hard Disk Type,
- Floppy Disk Type,

All of these features are very commonly seen so we won't describe in detailed within this manual.

# 4.3 Peripheral CMOS Setup

When you enter the Advanced CMOS Setup, you may find the following setting:

- On-board IDE : The IDE hard disk drive can be **Enable** or **Disable** by this item. When you do not need hard disk, the IDE controller can be disabled.
- On-board FDC : The floppy disk drive can be **Enable** or **Disable** by this item. When you do not need floppy disk, the FDD controller can be disabled.
- Serial Port 1 : The options are **Disable**, **3E8**,**2F8 ,**or **3F8**. You can set the I/O address of the serial port ( COMA) or disable it.
- Serial Port 2 : The options are **Disable**, **2E8**,**3F8**,or **2F8**. You can set the I/O address of the serial port 1 ( COMB) or disable it.
- Parallel Port : The options are **Disable**, **3BC**, **378** or **278**. You can set the I/O address of the parallel port or disable it.
- Parallel Port Mode: PM-1021 provides **EPP,ECP,ECP+EPP, and Normal Mode.**

# Appendix A. Panel Support List

The PM-1021 supports a wide range of flat panels. Different flat panels will need different LCD drive BIOS. The default setting is for Color DSTN flat panel. The available BIOS for different panels are in the following list. Please note that all BIOS files already included the system BIOS and LCD drive BIOS, so you will only need to re-program the BIOS flash chip with the file then turn on the power once more.

**37MLCD.ROM – BIOS for MONO DSTN  640x480**
For example :    HOSIDEN HLM6667
                 HITACHI LMG5160XUFC
                 CASIO MD650TS00-01
                 OPTREX DMF_50260NFU-FW-8
**37DSTN.ROM – BIOS for Color DSTN 640x480**
For example :    SANYO LCM-5331-22NTK
                 SHARP LM64C35P
**37TFTS1.ROM – BIOS for TFT 640x480-SYNC (16-bit)**
**37TFTS2.ROM – BIOS for TFT 640x480-SYNC (18/24-bit)**
For example :    HITACHI TX26D60/TX24D55
                 TOSHIBA LTM09C015A
                 SHARP LQ10D321
**37TFTLP1.ROM – BIOS for TFT 640x480-LP(16-bit)**
**37TFTLP2.ROM – BIOS for TFT 640x480-LP(16/24-bit)**
For example :    TOSHIBA LTM09C015A
**37TFT861.ROM – BIOS for TFT 800x600-SYNC(16-bit)**
**37TFT862.ROM – BIOS for TFT 800x600-SYNC(18/24-bit)**
For example :    NEC NL8060AC26-05
                 NEC NL8060AC26-04
                 NEC NL8060BC31-02
**37EL.ROM – BIOS for EL 640x480**
For example :    PLANAR EL640.480-A
**37PLASMA.ROM – BIOS for PLASMA 640x480**
For example :    PANASONIC S817

# Appendix B. How to Update BIOS

1.  Use EPROM Programmer setting the right  Flash type and then write the file into the Flash. In order to use this method, you should carefully take the Flash chip out of socket and then put it back after you finish programming. The most commonly seen flash type is : WINBOND W29C011AP

    **Or,**

2.  There is also a utility (**FLASH634.COM**) that can be enable and directly re-program BIOS configuration under DOS environment.
    For example :

    C:>FLASH634 MLCD.ROM

# Appendix C.  I/O Information

- **IO Address Map**

| I/O address Range | Description |
| --- | --- |
| 000-01F | DMA Controller #1 |
| 020-021 | Interrupt Controller #1, Master |
| 022-023 | M6117C Corelogic config. Register Port |
| 040-05F | 8254 timer |
| 060-06F | 8042 (Keyboard Controller) |
| 070-07F | Real time Clock, NMI (non-maskable interrupt) Mask |
| 080-09F | DMA Page Register |
| 0A0-0BF | Interrupt Controller #2 |
| 0C0-0DF | DMA Controller #2 |
| 0F0 | Clear Math Coprocessor Busy |
| 0F1 | Reset Math Coprocessor |
| 0F8-0FF | Math Coprocessor |
| 1F0-1F8 | Fixed Disk |
| 200-207 | Game I/O |
| 278-27F | Parallel Printer Port 2 (LPT3) |
| 2E8-2EF | Serial Port 4 |
| 2F8-2FF | Serial Port 2 |
| 300-31F | Prototype Card |
| 360-36F | Reserved |
| 378-37F | Parallel Printer Port 1 (LPT2) |
| 3B0-3BF | Monochrome Display and Printer Adapter (LPT1) |
| 3C0-3CF | Reserved |
| 3D0-3DF | Color/Graphics Monitor Adapter |
| 3E8-3EF | Serial Port 3 |
| 3F0-3F7 | Diskette Controller |
| 3F8-3FF | Serial Port 1 |
| 443 | Watch dog timer enable |
| 043 | Watch dog timer disable |

- **1st MB Memory Address Map**

| Memory address | Description |
|---|---|
| 00000-9FFFF | System memory |
| A0000-BFFFF | VGA buffer |
| C0000-C7FFF | VGA BIOS |
| C8000 – DFFFF | Free for customer application |
| E0000-FFFFF | System BIOS |
| 1000000- | Extend BIOS |

- **IRQ Mapping Chart**

| IRQ0 | System Timer | IRQ8 | RTC Clock |
|---|---|---|---|
| IRQ1 | Keyboard | IRQ9 | Unused |
| IRQ2 | Cascade to IRQ Controller | IRQ10 | Unused |
| IRQ3 | COM2/COM4 | IRQ11 | Unused |
| IRQ4 | COM1/COM3 | IRQ12 | PS/2 mouse |
| IRQ5 | Unused | IRQ13 | FPU |
| IRQ6 | FDC | IRQ14 | Primary IDE |
| IRQ7 | Printer | IRQ15 | Unused |

- **DMA Channel Assignments**

| DMA Channel | Function |
|---|---|
| 0 | Available |
| 1 | Available |
| 2 | Floppy Disk |
| 3 | Available |
| 4 | Cascade for DMA controller 1 |
| 5 | Available |
| 6 | Available |
| 7 | Available |