

# LP-173

# Pico-ITX

# **User's Manual**

2025/02/17 Version:1.92



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# Packing List:

Please check the package content before you starting using the board.

## Hardware:

LP-173 Pico-ITX Miniboard x 1

## Cable Kit:



Cooler (OHSF-173) / (2181010017)

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# Chapter 1 < Introduction>

## 1.1 < Product Overview>

The LP-173 motherboard is design based on Intel® Celeron® Processor J1900 / N2930 and Intel® Atom Processor E3845, delivering outstanding compute, graphical, and media performance while operating in an extended range of thermal conditions. The SoC bases on the Silvermont microarchitecture, utilizing Intel's industry-leading 22nm process technology with 3-D Tri-Gate transistors, which deliver significant improvements in computational performance and energy efficiency.

#### New features for Intel® Celeron® and Atom Processor

The Intel® Celeron® Processor J1900 / N2930 and Intel® Atom E3845 Processor supports graphics, media performance, flexibility and more enhanced security that is suitable for a variety of intelligent systems the ideal choice.

#### Outstanding integration of I/O interfaces

Supports display interfaces with graphics processing, camera interfaces with image processing, audio with digital signal processing, multiple storage types, and legacy embedded I/O. Provides interface expansion capabilities through industry-standard high-bandwidth interfaces such as PCI Express\* Gen 2.0, Hi-speed USB 2.0, and USB 3.0 connectivity.

## All in One multimedia solution

Based on Intel® J1900 / N2920 /E3845 SoC, the board provides high performance onboard graphics, CRT, 24-bit dual channel LVDS interface, HDMI and 2 channels High Definition Audio, to meet the very requirement of the multimedia application.

#### Flexible Extension Interface

The board provides one PCIe mini slot

# 1.2 <Product Specification>

General Specificatio	n		
Form Factor	PICO-ITX miniboard		
CPU	Intel® Processor J1900/N2930/E3845, package type FCBGA1170		
Memory	1 x DDR3L (support 1.35V) 1066/1333 SO-DIMM up to 8GB		
Watchdog Timor	System reset programmable watchdog timer with 1 ~ 255 sec./min. of		
	timeout value		
Real Time Clock	Chipset integrated RTC with onboard lithium battery		
Serial ATA	1 x serial ATA interface with 300MB/s(3Gb/s) transfer rate		
VGA Interface	Intel® Clear Video integrated HD Graphics Technology		
I VDS Interface	1 x Onboard 24-bit dual channel LVDS connector with +3.3V/+5V		
	supply		
Audio Interface	Realtek ALC262 High Definition Audio Codec		
LAN Interface	1 x Intel® I210-AT Gigabit LAN		
GPIO interface	Onboard programmable 8-bit Digital I/O interface.		
Extended Interface	1 x PCIE Mini card or mSATA		
	2 x RS232, 1 x GPIO, 1 x Audio connector, 1 x CRT, 1 x LVDS,		
Internal I/O Port	1 x LCD inverter, 1 x LPC, 2 x USB 2.0(EHCI) and 1 x SATAII,		
	1 x PS/2		
Extornal I/O Port	1 x HDMI port, 1 x RJ45 LAN port, 1 x USB 3.0(XHCI)/2.0(EHCI)		
	port,1 x USB 2.0(EHCI) port.		
Power Requirement	6~30V DC Input		
Dimension	100mm x 72mm		
	Operating within 0~60 centigrade(for LP-173J and LP-173N serial)		
Tomporaturo	Storage within -20~85 centigrade.(for LP-173J and LP-173N serial)		
remperature	Operating within -40~85 centigrade(for LP-173E serial)		
	Storage within -40~85 centigrade.(for LP-173E serial)		
Ordering Code			
LP-1/3J	CPU J1900 (2M Cache, 2.42GHZ), HDIMI, LVDS, CRT		
LP-173N	CPU N2930 (2M Cache, 2.16GHz), HDMI, LVDS, CRT		
	,,, _,, _		
LP-173E	CPU E3845 (2M Cache, 1.91GHz), HDMI, LVDS, CRT		

## 1.3 < Mechanical Drawing>



## 1.4 <Block Diagram>



## Chapter 2 <Hardware Setup>

## 2.1 <Connector Location>



## 2.2 <Jumper Reference>

Jumper	Function
JRTC	CMOS Operating/Clear Setting
JAT	AT/ATX Mode Setting
JVLCD	LCD Panel Voltage Setting
JMSATA	Mini Card1 mSATA Setting

## 2.3 <Connector Reference>

### 2.3.1 <Internal Connector>

Connector	Function	
SO-DIMM	204 -pin DDR3L SO-DIMM SDRAM slot	
CN_SATA	10-pin SATA Cable connector	
MINI_CARD	PCIE mini card socket	
CN_INV	5-pin LCD inverter connector	
CN_USB1/2	5 x 2-pin USB connector	
CN_AUDIO	5 x 2-pin audio connector	
CN_LPC	5 x 2-pin header for LPC Port	
CN_COM1/2	10 x 2-pin com connector	
JFRNT	10-pin switch/indicator connector	
CPUFAN	3-pin CPU cooler fan connector	
SYSFAN	3-pin system cooler fan connector	
DC_OUT	6-pin power output connector	
DC_IN	DC input connector	

## 2.3.2 <External Connector>

Connector	Function	
HDMI	19-pin HDMI connector	
USB 1/2	USB 2.0 and USB 3.0 connector	
RJ45	RJ45 LAN connector	

## 2.4 <Memory Setup>

The board provide 204-pin DDR3L SO-DIMM to support 1066/1333MHz up to 8GB.

Support Non-ECC, unbuffered memory only

## 2.5 <CMOS & ATX Setup>

The board's data of CMOS can be setting in BIOS. If the board refuses to boot due to inappropriate CMOS settings, please remove battery to clear (reset) the CMOS to its default values.

Jumper: JAT

Type: onboard 3-pin jumper

JAT	Mode
1-2	AT Mode
2-3	ATX Mode
Default setting	

Jumper: JRTC

Type: onboard 3-pin jumper

JRTC	Mode	
1-2	Clear CMOS	
2-3	Normal Operation	

Default setting



## 2.6 <SATA Interface>

Based on SOC, the board provides one Serial ATAII interfaces with up to 300MB/s of transfer rate.

## 2.7 <LAN Interface>

The board integrates with one Intel® I210-AT controller, The Intel Gigabit Ethernet supports triple speed of 10/100/1000Base-T, with IEEE802.3 compliance.

## 2.8 < Onboard Display Interface>

Based on Intel Processor with built-in I HD Graphic, the board provides one HDMI connector on real external I/O port, and LVDS interface with 5-pin LCD backlight inverter connector. The board provides dual display function with clone mode and extended desktop mode for CRT, HDMI and LVDS.

## 2.8.1 < Analog VGA Interface>

Please connect your CRT or LCD monitor to the onboard CRT connector .



#### Connector: CN\_CRT

Type: onboard 16-pin connector for CN\_CRT connector pitch 2.00mm

Pin	Signal	Pin	Signal
1	BR	2	BG
3	BB	4	NC
5	-CRTATCH	6	IOGND1
7	IOGND1	8	IOGND1
9	NC	10	-CRTATCH
11	NC	12	5VCDA
13	5HSYNC	14	5VSYNC
15	5VCLK	16	NC

### 2.8.2 <CN\_LVDS>

The board provides one 40-pin LVDS connector for 18 bit or 24bit single /dual channel panel, with one LCD backlight inverter connector and one jumper for panel voltage setting.

Please install LVDS cable before boot up.



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Connector: CN\_INV

Type: 5-pin Inverter power connector

Connector model: molex\_53261-5pin or compatible

Pin	Description	
1	+12V	
2	PWM	
3	+5V	
4	GND	
5	Enable	

#### Jumper: JVLCD

Type: 3-pin Power select jumper

Pin	Description
1-2	+3.3V
2-3	+5V

Default setting

Connector: **CN\_LVDS** Type: onboard 20-pin connector for LVDS connector Type: onboard 40-pin connector for LVDS connector

#### Connector model: HIROSE DF13-40DP-1.25V or compatible

Pin	Signal	Pin	Signal
2	LCDVCC	1	LCDVCC
4	LVDS Detect (Note)	3	GND
6	ATX0-	5	BTX0-
8	ATX0+	7	BTX0+
10	GND	9	GND
12	ATX1-	11	BTX1-
14	ATX1+	13	BTX1+
16	GND	15	GND

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18	ATX2-	17	BTX2-
20	ATX2+	19	BTX2+
22	GND	21	GND
24	ACLK-	23	BTX3-
26	ACLK+	25	BTX3+
28	GND	27	GND
30	ATX3-	29	BCLK-
32	ATX3+	31	BCLK+
34	GND	33	GND
36	DDCPCLK	35	N/C
38	DDCPDATA	37	N/C
40	N/C	39	N/C

Note: The LVDS Detect Pin please contact to the Panel GND.

To setup the LCD, you need the component below:

- 1. A panel with LVDS interfaces.
- 2. An inverter for panel's backlight power.
- 3. A LCD cable and an inverter cable.

For the cables, please follow the pin assignment of the connector to make a cable, because every panel has its own pin assignment, so we do not provide a standard cable; please find a local cable manufacture to make cables.

#### LCD Installation Guide:

1. Preparing the LP-173, LCD panel and the backlight inverter



Panel side





2. You would need a LVDS type cable.





Board side

For sample illustrator only

 To connect all of the devices well. After setup the devices well, you need to select the LCD panel type in the BIOS.

The panel type mapping is list below:



If you want to used the LCD panel display when the boot , please go to the  $\ensuremath{\mathsf{BIOS}}$ 

#### setup.

**Step1.** Configure default BIOS, click Advanced > Uncore Configuration



## **Step2.** click IGD Boot Type > LVDS2

GUP Configuration GUP Driver	Enable	
IGD Configuration Integrated Graphics Device Primary Display RCS Gender Standby) PROC GTT Size Aperture Size DUT Pre-Allocated	Enable Guta Enable Linte Rode 12781 1256081 1256081	
IGD Turbo Spread Spectrum clock IGD - LCD Control	IAutol Disablel	Auto CRT DVI Display Port
LCD Pamel Type 16D Boot Type Panel Color depth Panel Bus Panel Disk France	Initol IAutol Initol I241 IDuall	
Panel Output Swing	10-3 21 E300 mVI	

	BIOS panel type selection form (BIOS Version:1.0)							
	Single / Dual channel	Single / Dual channel						
NO.	Output format	NO.	Output format					
1	640 x 480	9	1680 x 1050					
2	800 x 600	10	1920 x 1200					
3	1024 x 768	11	1440 x 900					
4	1280 x 1024	12	1600 x 900					
5	1400 x 1050	13	1024 x 768					
6	1400 x 1050	14	1280 x 800					
7	1600 x 1200	15	1920 x 1080					
8	1366 x 768							

Step3. push "F10" to save configuration. Restart your computer.

## 2.9 < Onboard Audio Interface>

The board provides the onboard high definition audio with Realtek ALC262

Connect	Connector: CN_AUDIO						
Type: 10-pin (2 x 5) 1.27mm x 2.54mm-pitch header							
Pin	Description	Pin	Description				
1	MIC2_L	2	AGND				
3	MIC2_R	4	AVCC				
5	FP_OUT_R	6	MIC2_JD				
7	SENSE_B	8	N/C				
9	FP_OUT_L	10	LINE2_JD				



## 2.10 <USB 3.0 and USB 2.0Interface>

LP-173 integrates 1 x USB3.0 and 3 x USB2.0, The specifications are listed below:

Interface	USB3.0	USB2.0
Transfer Rate	Up to 5Gb/s	Up to 480Mb/s
Voltage	5V	5V





#### Connector: CN\_USB

## Type: 10-pin (5 x 2) header for USB Port (USB2.0)

Ì	Pin	Description	Pin	Description
	1	VCC	2	VCC
	3	Data0-	4	Data1-
	5	Data0+	6	Data1+
	7	Ground	8	Ground
	9	Ground	10	N/C

The USB3.0 port need to Install USB 3.0 eXtensible Host Controller Driver and enable xHCI Mode.

#### USB 3.0 eXtensible Host Controller Driver install

- Step1. Copy the USB 3.0 driver from "Driver CD" to the local hard driver directory,
- Step2. Configure default BIOS, click Advanced > South Cluster Configuration > USB Configuration, disable "EHCI Mode".

Advanced	LINCHIX SecureCore Techno		
USB Configuration			
xHCI Mode XHCI Link Power Management	Disable] (Enable)		
USB OTG Support	Disable		
EHCI Controller USB Per-Port Control USB Port #0 USB Port #1 USB Port #2 USB Port #3	l <mark>Enable]</mark> Enable] Enable] Enable] Enable] Enable]		
	Enable Disable		

**Step3.** enable "**xHCI Mode**" and push "F10" to save configuration. Restart your computer.

USB Configuration
viCI hole (Inable) NBU fink Power Hanagement (Inable) USB 0TG Support (Disable) PECI Controller (Disable) USB Port 10 (Enable) USB Port 10 (Enable) USB Port 10 (Enable) USB Port 13 (Enable) USB Port 13 (Enable)

- Step4. If you enable xHCI Mode , USB 2.0 and USB 3.0 ports can't use without drive. We recommend that you connect PS/2 mouse / keyboard installing USB 3.0 driver.
- **Step5.** Double click the "Setup.exe" from the directory. Click "Next" to continue.



Step6. Lastly, the "Setup Complete" screen appears so click "Finish" to

restart your computer.



## 2.11 <Serial Port Jumper Setting >

The board provides two RS232 serial ports

#### Connector: CN\_COM1/2

Type: 20-pin (5 x 2) 1.27mm x 2.54mm-pitch header for COM1/2

Pin	Description	Pin	Description
1	MDCD1-	2	MSIN1-
3	MSO1-	4	MDTR1-
5	N/C	6	MDSR1-
7	MRTS1-	8	MCTS1-
9	MRI1-	10	N/C
11	MDCD2-	12	MSIN2-
13	MSO2-	14	MDTR2-
15	GND	16	MDSR2-
17	MRTS2-	18	MCTS2-
19	MRI2-	20	N/C



## 2.12 <Power & FAN Connector >

The board requires DC input with 2-pin header, the input voltage range is from 6V to

30V.

## 2.12.1 <Power Input>

Connector: DC_IN							
Type: 2-p	in header						
Pin	Description	Pin	Description				
1	Ground	2	+6V ~ +30V				



## 2.12.2 <Power Output>

Connector: DC\_OUT

Type: 6-pin connector for +12V and +5V

h	Description	Pin	Description	Pin	Description
1	+12V	2	+12V	3	Ground
4	Ground	5	+5V	6	+5V

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### 2.12.3 <Fan Connector>

#### Connector: **SYSFAN** Type: 3-pin fan wafer connector

Pin	Description	Pin	Description	Pin	Description
1	Ground	2	+12V	3	SYSFAN
SYSFAN					

#### Connector: CPUFAN

Type: 3-pin fan wafer connector

Pin	Description	Pin	Description	Pin	Description
1	Ground	2	+12V	3	CPUFAN



## 2.13 <Indicator and Switch>

The JFRNT provides front control panel of the board, such as power button, reset and

beeper, etc. Please check well before you connecting the cables on the chassis.

#### Connector: JFRNT

Type: onboard 10-pin (2 x 5) 2.54-pitch header

Function	Signal	PIN		Signal
Power	PWRBT-	1	2	PWRBT+
Speaker	SPK-	3	4	SPK+
HDD LED	HLED-	5	6	HLED+
Power LED	GND	7	8	PWLED+
Reset	Reset-	9	10	GND



## 2.14 < PCIE Mini Card >

The board provides one PCIE mini card socket

Jumper: JMSATA

Type: onboard 3-pin header

MINI_CARD Mode	JMSATA
Supply mSATA	1-2
MINI_CARD	2-3

Default setting



## Chapter 3 < BIOS Setup>

The motherboard uses the Phoenix BIOS for the system configuration. The Phoenix BIOS in the single board computer is a customized version of the industrial standard BIOS for IBM PC AT-compatible computers. It supports Intel® x86 and compatible CPU architecture based processors and computers. The BIOS provides critical low-level support for the system central processing, memory and I/O sub-systems.

The BIOS setup program of the single board computer let the customers modify the basic configuration setting. The settings are stored in a dedicated battery-backed memory, NVRAM, retains the information when the power is turned off. If the battery runs out of the power, then the settings of BIOS will come back to the default setting.

The BIOS section of the manual is subject to change without notice and is provided here for reference purpose only. The settings and configurations of the BIOS are current at the time of print, and therefore they may not be exactly the same as that displayed on your screen.

To activate CMOS Setup program, press <DEL> key immediately after you turn on the system. The following message "Press DEL to enter SETUP" should appear in the lower left hand corner of your screen. When you enter the CMOS Setup Utility, the Main Menu will be displayed as **Figure** You can use arrow keys to select your function, press <Enter> key to accept the selection and enter the sub-menu.

Main A	Phoen dvanced Otl	nix SecureCore 1 hers Securi	Tiano Setup ty Boot Exit
System Date System Time	[03/10 [16:23	9/2012] 3:16]	Item Specific He
Boot Feature Error Manage	25 27		date.
PL Help	Select Item	- Change	Values Setup Default

#### Figure CMOS Setup Utility Main Screen

# Appendix A <I/O Port Pin Assignment>

## A.1 <SATA Port>

#### Connector: SATA

1

Type: 10-pin header for SATA Port

Pin	Description	Pin	Description
1	Ground	2	ТХР
3	TXN	4	Ground
5	N/C	6	N/C
7	Ground	8	RXN
9	RXP	10	Ground

## A.2 <LAN Port>

#### Connector: RJ45

Type: RJ45 connector with LED on rear panel

Pin	1	2	3	4	5	6	7	8
Description	TRD0+	TRD0-	TRD1+	TRD2+	TRD2-	TRD1-	TRD3+	TRD3-

## A.3 <LPC Port>

## Connector: CN\_LPC

Type: 10-pin header for LPC Port



Pin	Description	Pin	Description
1	LPC_CLK	2	RESET-
3	LFRAME-	4	LAD3
5	LAD2	6	LAD1
7	LAD0	8	+3.3V
9	Ground	10	Ground

## A.4 <GPIO Port>



The board provides a programmable 8-bit digital I/O interface; you can use this general purpose I/O port for system control like POS or KIOSK. The GPIO is an Open-drain output and TTL-level input.

- 1. Output : Open-drain, Most applications need use an external pull-up resistor.
- 2. Input : TTL-level.
- DC characteristics:

5V -	TTL-lev	/el Inp	ut Pin			-
Parameter	Sym	Min	Тур	Max	Unit	Conditions
Input Low Threshold Voltage	V <sub>t</sub> -	0.5	0.8	1.1	V	$V_{CC} = 3.3V$
Input High Threshold Voltage	V <sub>t+</sub>	1.6	2.0	2.4	V	V <sub>CC</sub> =3.3V
Hystersis	V <sub>TH</sub>	0.5	1.2		V	V <sub>CC</sub> =3.3V
Input High Leakage	I <sub>LIH</sub>			+10	μA	$V_{IN} = 3.3V$
Input Low Leakage	ILIL			-10	μA	$V_{IN} = 0V$
Open-drain output pi	n with	12-mA	sink (	capabil	ity	
Output Low Voltage	V <sub>OL</sub>			0.4	V	I <sub>OL</sub> = 12 mA

#### Connector: CN\_DIO

Type: 12-pin (6 x 2) header (pitch = 2.0mm)

Pin	Description	Pin	Description
1	Ground	2	Ground
3	GPIO0	4	GPIO4
5	GPIO1	6	GPIO5
7	GPIO2	8	GPIO6
9	GPIO3	10	GPIO7
11	5V	12	12V

# Appendix B <Flash BIOS>

## **B.1 BIOS Auto Flash Tool**

The board is based on Phoenix BIOS and can be updated easily by the BIOS auto flash tool. You can download the tool online at the address below:

LE-37D Flash Tool

## **B.2 Flash Method**

- 1.Extract the zip file(re-flash tool and BIOS file) to root of the USB flash drive.
- 2.Insert your USB flash drive in USB port of the board and power on the system.
- 3. Boot to EFI-Shell mode (UEFI Boot Enable, Legacy Boot Disable)

	Boot Features
NunLock: Timeout CSN Support Quick Boot Diagnostic Splash Screen Diagnostic Summary Screen HIOS Level USB Console Redirection Allow Hotkey in S4 resume UEFI Boot Legacy Boot	[On] [ 3] [Yes] Disabled] Disabled] Enabled] Disabled] Enabled] [Enabled] [Enabled] [Enabled] [Disabled]

then input the **"fs0:"** command to switch to the root of the USB flash drive.



- 4. Type the " **fpt64.efi -y -f xxx.bin**" command to start flash BIOS processes. ( xxx.bin means the BIOS file that you want to update)
- 5. When it finished all update processes, restart the system.

Any question about the BIOS re-flash please contact your distributors or visit the web-site at below:

http://www.commell.com.tw/support/support.htm

# Appendix C < Programming GPIO's>

The GPIO' can be programmed with the MSDOS debug program using simple IN/OUT commands. The following lines show an example how to do this. (The GPIO is **open drain**)

-o 4E 87	;enter configuration
-o 4E 87	
-o 4E 07	
-o 4F 07	;enale GPIO function
-o 4E 30	
-o 4F 10	;enable GPIO configuration
-o 4E F0	
-o 4F xx	;set GPIO as input/output; set '1' for input,'0'for
output	
-o 4E F1	
-o 4F xx	;if set GPIO's as output,in this register its value can
	be set
Optional :	
-o 4E F2	
-o 4F xx	; Data inversion register ; '1' inverts the current valus
	of the bits ,'0' leaves them as they are
-o 4E 30	
-o 4F 01	; active GPIO's
For further information, p	lease refer to NCT6106D datasheet.

# Appendix D < Programming Watchdog Timer >

The watchdog timer makes the system auto-reset while it stops to work for a period.

The integrated watchdog timer can be setup as system reset mode by program.

	SIO Co	mfigurat	lion	
Serial Port				
Serial Port 1	13F8 /	18041	-	
Serial Port 2	L2F8			
Serial Port 3	E3E8	Disable		
Serial Port 4	I2E8	15 secs		
Serial Port 5	[4F8	30 secs		
Serial Port 6	14E8	l min		
		2 mins		
		3 mins		
Watch Dog Timer			-	
Watch Dog Timer Select	IDisa			
Rented				
PowerLoss Berne Control	TO LUNCH	000		
roser control	thriway	5 0111		

#### **Timeout Value Range**

- 1 to 255
- Second or Minute

#### Program Sample

The integrated Watchdog Timer can be set up by programming.

-O 4E 87	Enter configuration
-O 4E 87	
-O 4E 07	Logic Device Enable
-O 4F 08	
-O 4E 30	WDT Enable
-O 4F 01	
-O 4E F0	Set as Second*
-O 4F 00	
-O 4E F1	
-O 4F 0A	Set reset time 10 Sec

You can select Timer setting in the BIOS, after setting the time options, the system will reset according to the period of your selection.

# **Contact Information**

Any advice or comment about our products and service, or anything we can help you please don't hesitate to contact with us. We will do our best to support you for your products, projects and business.

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Facebook	https://www.facebook.com/pages/Taiwan-Commate-Computer-Inc/547993955271899
Twitter	https://twitter.com/Taiwan_Commate

