User Manual

AL-35

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Warning

1. Before using the product, carefully read the manual to ensure proper installation and operation.
2. If you are not ready to install any extension card, store it in an anti-static protective bag to prevent damage.
3. To discharge any static electricity, briefly touch a grounded metal object before removing the extension card from the protective bag.
4. Always wear anti-static gloves and handle the card by its edges to avoid damaging sensitive components.
5. Verify that the power supply voltage is correct before connecting the motherboard to the power supply.
6. To prevent electric shock or damage, always turn off the AC power or unplug the power cord before removing or reconfiguring the motherboard or any components.
7. Unplug the AC power cord from the outlet before relocating the motherboard or any components.
8. Ensure all power cords are unplugged before connecting or disconnecting any equipment to avoid electrical hazards.
9. Wait at least 30 seconds after powering off the system before powering it on again to prevent unnecessary wear.
10. If any issues arise during operation, consult a qualified professional for assistance.
11. This product may cause radio interference in certain environments; if necessary, users should take appropriate measures to mitigate such interference.

AL-35

User Manual

(Version 1.2)

Version:		
NO.	Description	Issue Date:
V0.5	Initial Version.	2023/03/22
V1.0	1. Change Intel i226 NIC to Intel i210 2. Change SODIMM-DDR5 to SODIMM-DDR4. 3. Modified the USB 2.0 pin/COM pin.	2024/02/29
V1.2	4. LVDS voltage switching changed from resistor switching to jumper switching. (Chinese Version)	2024/09/02
V1.2	4. English Version	2025/07/14
Please Note: *The issue date on the Chinese version is the mass production date, while the English version shows the translation date.*		

Contents

Chapter 1 Product Introduction

1.1 Brief Introduction

The AL-35 motherboard is a 3.5" single board computer (SBC) based on the Intel® Alder Lake-U series platform. It features a compact form factor combined with high computing performance, making it ideal for energy-efficient applications.

1.2 Parameters

Intel Alder Lake U Series:

CPU	Cores/Threads	Base Frequency	Max Turbo Frequency (P-core/ E-core)	Cache	TDP
Intel Core i7-1255U	10C/12T	1.7GHz	2*P-Cores: 4.7 GHz/8*E-Cores: 3.5GHz)	12MB	Processor Base Power: 15W, Maximum Turbo Power:55W. PL1/PL2:15W. (Configured at 15W by default. Both sustained (PL1) and boost (PL2) power limits are set to 15W.)
Intel Core i5-1235U	10C/12T	1.3GHz	2*P-Cores: 4.4 GHz/8*E-Cores: 3.3GHz)	12MB	Processor Base Power: 15W, Maximum Turbo Power:55W. PL1/PL2:15W. (Configured at 15W by default. Both sustained (PL1) and boost (PL2) power limits are set to 15W.)
Intel Core i3-1215U	6C/8T	1.2GHz	2*P-Cores: 4.4 GHz/4*E-Cores: 3.3GHz)	10MB	Processor Base Power: 15W, Maximum Turbo Power:55W. PL1/PL2:15W. (Configured at 15W by default. Both sustained (PL1) and boost (PL2) power limits are set to 15W.)

GPU: Integrated Graphics based on CPU, display via 2x HDMI2.0b, 1x LVDs (eDP optional)

Intel Core i7-1255U	Intel® Iris® Xe Graphics eligible. 96EU (Execution Units). Max Dynamic Frequency:1.25GHz
Intel Core i5-1235U	Intel® Iris® Xe Graphics eligible. 80EU (Execution Units). Max Dynamic Frequency:1.20GHz
Intel Core i3-1215U	Intel® UHD Graphics for 12th Gen Intel® Processors. 64EU (Execution Units). Max Dynamic Frequency:1.10GHz

Memory: 2x SO-DIMM DDR4-3200MHz slots, supports dual channel, up to 64GB for maximum capacity.

Storage: 1xM.2 Key_M slot, supports 2280 SSDs NVMe protocols at PCIe X4 speed. 1x M.2 Key_B slot, supports 2242 SSDs SATA 3.0 protocols or 3042 4G modules. 1x SATA3.0 interface.

USB: 4x USB3.2 Gen 2 ports, 4x USB2.0 onboard headers.

Ethernet: Two Intel Gigabit Network Controllers, 1x Intel i210+1x Intel i219. Data Rate Per Port: 1.0Gbps

Audio: High-definition Realtek audio codec. Supports one CTIA 2-in-1 combo jack (Line-out and Mic-in), and one built-in stereo amplifier output for passive speaker connection.

Serial I/O: 6x RS232 COM headers. COM1 and COM2 can be configured as RS232/RS422/RS485 via BIOS. COM5 and COM6 are 3-wire RS232.

Expansion: 1x M.2_Key E Slot type 2230 for Wi-Fi and Bluetooth module (PCIE/USB2/CNVi).

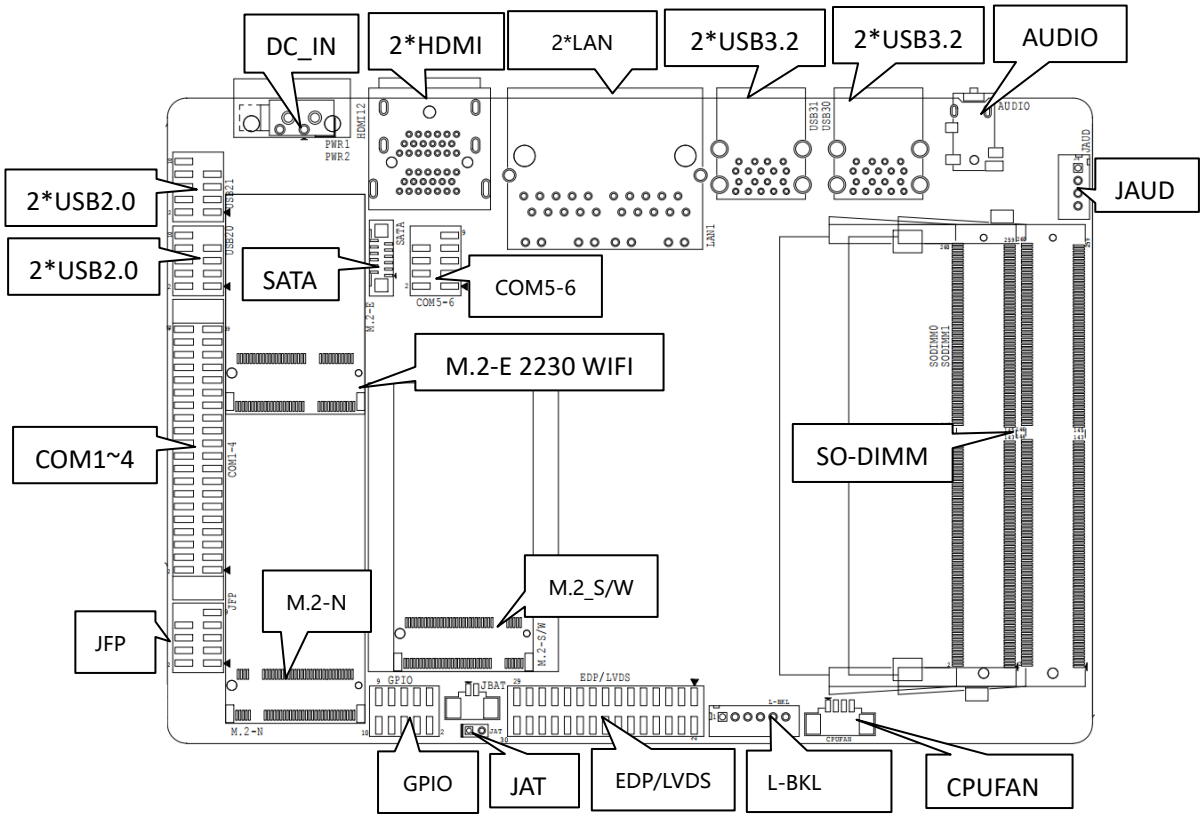
Other I/O: 1xSIM Card Slot, JFP, GPIO, CN1.

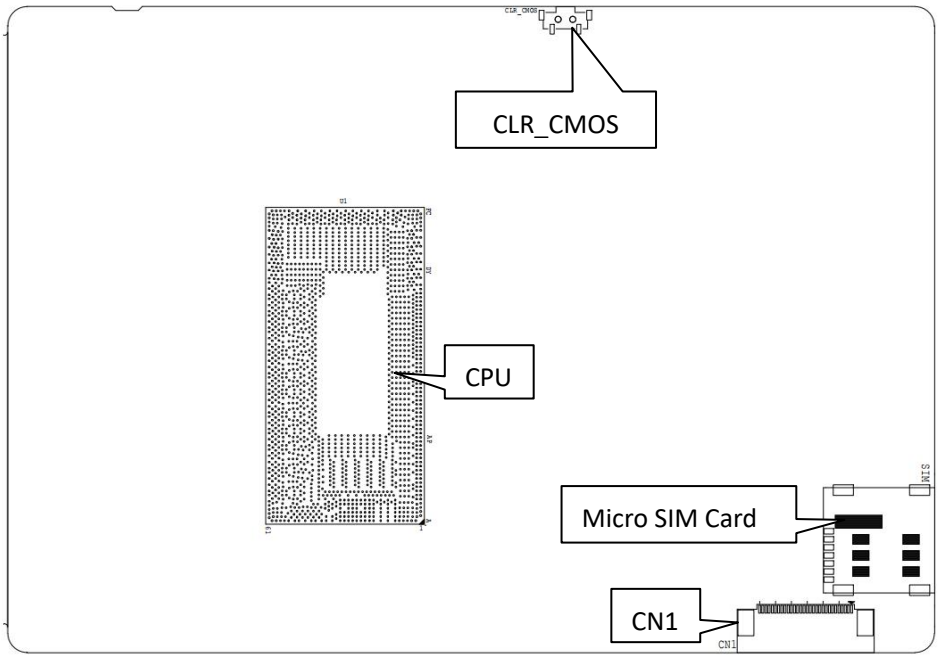
Dimension: 146mm x 102 mm

Power: 12V-35V. Supports wide voltage input from 12V to 35V via Phoenix terminal DC power adapter. (Please Note: When connecting to an LVDS or eDP display, a DC power adapter with a voltage of 19V or higher is required.)

Working Temperature: -20℃~60℃

1.3 Connector Diagram





Chapter 2 Hardware

2.1 Installations

Please refer to the following steps for installations:

1. Read the user manual carefully to make sure all the adjustments on the AL-35 are correct.
2. Installing the Memory:
   - Press the ejector tab of the memory slot outwards with your fingertips.
   - Hold the memory module and align the key to the module with that on the memory slot.
   - Gently push the module into the slot until the ejector levers return completely to the closed position, holding the module in place when the module touches the bottom of the slot. To remove the module, press the ejector levers outwards to unseat the module.
3. Installing the expansion cards:
   - Locate the expansion slots and remove the screw, insert the cards into the slot at a 45-degree angle then attach the screw to the expansion cards, gently press down on it then install the screw back.
4. Connect all signal wires, cables, panel control wiring, and power supplies.
5. Start the computer and complete the setup of the BIOS program.

The board's components are integrated circuits and can easily be damaged by Electrostatic Discharge or ESD; therefore, please follow the instructions:

- Hold the board's edge when handing, and do not touch onboard pins, components, or plug sockets.
- When touching integrated circuit components (such as CPU, RAM, etc.), please wear an anti-static wrist strap/glove to avoid electrostatic discharge damage to the board or other sensitive components.
- Before installing the integrated circuits/sensitive components, place the sensitive components in anti-static bags to keep them safe from ESD.
- Please make sure the power switch is OFF before plugging the power plug.

2.2 Jumper Setting

Please configure the jumpers according to your requirements before installing the hardware.

How to identify the first header of jumpers and pins: Observe the mark beside the jumper or pins and find the header marked by “1” or bold line or triangular symbol. Or observe the rear panel and the header with a square solder pad is the first header.

2.3 Memory Slots

The board provide 2xSO-DIMM DDR4-3200MHz slots up to 64GB for maximum memory capacity.

Notes: Make sure to hold the memory module and align the key to the module with that on the memory slot. While choosing a memory module, please make sure the module matches the board’s specifications.

2.4 Display Interfaces (Screen Printing: HDMI12, EDP/LVDS)

The board features two HDMI2.0b interfaces (support HDCP2.3) for 4K resolution at 60Hz; and one 24bit LVDs interface (eDP optional) for resolution up to 1920x1080.

2.4.1 LVDS (Screen Printing: EDP/LVDS, L-BKL, L_VCC/BKL)

When it is configured as an LVDS function, the "EDP/LVDS" pin transmits LVDS signals, the “L-BKL” pin controls the backlight, and the “L_VCC/BKL” pin regulates the panel operating voltage and backlight forward polarity.

LVDS Data Pin (Screen printing: EDP/LVDS)

Signal	Pin		Signal
VCC	1	2	VCC
VCC	3	4	GND
GND	5	6	GND
A_DATA0_DN	7	8	A_DATA0_DP
A_DATA1_DN	9	10	A_DATA1_DP
A_DATA2_DN	11	12	A_DATA2_DP
GND	13	14	GND
A_CLK_DN	15	16	A_CLK_DP
A_DATA3_DN	17	18	A_DATA3_DP
B_DATA0_DN	19	20	B_DATA0_DP
B_DATA1_DN	21	22	B_DATA1_DP
B_DATA2_DN	23	24	B_DATA2_DP
GND	25	26	GND
B_CLK_DN	27	28	B_CLK_DP
B_DATA3_DN	29	30	B_DATA3_DP

LVDS Backlight Adjustment Pin (Screen printing: L-BKL)

Pin	Signal
1	GND
2	GND
3	LCD_BKL_ADJ
4	LCD_BKL_ON
5	12V
6	12V

LVDS Operating Voltage and Backlight Polarity Configuration Pin (Screen printing: L_VCC/BKL)

Interface	Jumper	Function
1-3	Close	VCC(+3.3V)
3-5	Close	VCC(+5V)
2-4	Close	REV(Backlight polarity: reverse)
4-6	Close	STD(Backlight polarity: forward)

Please Note: The LVDS panel power supply is configurable via jumper, allowing flexible selection between 5V and 3.3V. Users should use jumper caps to short the pins corresponding to the required voltage based on the LVDS panel specifications. Warning: Do not short pins for different voltages simultaneously, as this may damage the board or connected components.

2.4.2 eDP (Optional)

When it is configured as an eDP function, the "EDP/LVDS" pin transmits eDP signals, the “L-BKL” pin controls the backlight, and the “L_VCC/BKL” pin regulates the panel operating voltage and backlight forward polarity.

eDP Data Pin (Screen printing: EDP/LVDS)

Signal	Pin		Signal
VCC	1	2	VCC
VCC	3	4	EDP_HPD
GND	5	6	GND
EDP_AUXN	7	8	EDP_AUXP
N/A	9	10	N/A
EDP_DATA0_P	11	12	EDP_DATA0_N
GND	13	14	GND
N/A	15	16	N/A
EDP_DATA1_P	17	18	EDP_DATA1_N
N/A	19	20	N/A
N/A	21	22	N/A
N/A	23	24	N/A
GND	25	26	GND
N/A	27	28	N/A
N/A	29	30	N/A

eDP Backlight Adjustment Pin (Screen printing: L-BKL)

Pin	Signal
1	GND
2	GND
3	LCD_BKL_ADJ
4	LCD_BKL_ON
5	12V
6	12V

eDP Operating Voltage and Backlight Polarity Configuration Pin (Screen printing: L_VCC/BKL)

Interface	Jumper	Function
1-3	Close	VCC(+3.3V)
3-5	Close	VCC(+5V)
2-4	Close	REV(Backlight polarity: reverse)
4-6	Close	STD(Backlight polarity: forward)

Please Note: The eDP panel power supply is configurable via jumper, allowing selection between 5V and 3.3V. Warning: Do not short pins for different voltages simultaneously, as this may damage the board or connected components.

2.5 Storage Interfaces

The board provides 1xM.2 Key M 2280 slot (PCIe4.0 X4 Signal) for NVMe SSD, 1x SATA3.0 FPC interface, 1xM.2 key B 2242 Slot for SATA SSD or 3042 4G module with SIM card slot.

FPC SATA Definition (Screen Printing: SATA)

Pin	Signal
1	GND
2	TX_N
3	TX_P
4	GND
5	RX_P
6	RX_N
7	GND
8	+5V
9	+5V
10	+5V
11	GND
12	GND

2.6 Expansion Slots

The board features 1x M.2_Key E 2230 slot for Wi-Fi and Bluetooth Modules (supports PCIe/USB2/CNVi).

2.7 USB Interfaces

The board supports 4x USB 3.2 Gen2 rear ports and 4x USB 2.0 internal headers (2.0mm pitch).

Internal USB2.0 Pin (Screen Printing: USB20, USB21)

Signal	Pin		Signal
VCC 5V	1	2	VCC 5V
USB DATA-	3	4	USB DATA-
USB DATA+	5	6	USB DATA+
GND	7	8	GND
NC	9	10	(NULL)

2.8 LAN

The board features 2xRJ45 LANs interfaces with high-speed Intel network controllers (1x Intel i210+1x Intel i219), data rate per ports: 1.0Gbps. Both of the Ethernet interfaces supports network wake-up (Magic packet wake-up), and the LAN1 supports UEFI PXE network boot.

LED Status Indicators:

LI_LED Status (Green)	Function	ACT_LED Status (Orange)	Function
Always on	Network Connected	Flashing	Data Transmission

2.9 COM

The board features built-in 2.0 mm pitch serial headers and supports 6x RS232 serial ports by default. COM1 and COM2 can be configured as RS232, RS485, or RS422 via BIOS settings. COM5 and COM6 are 3-wire RS232. Additionally, the 10th pin of each serial port header from COM1 to COM4 provides 12V power output.

RS232 COM (Screen Printing: COM14)

Signal	Pin		Singal
DCD#	1	2	RXD
TXD	3	4	DTR#
GND	5	6	DSR#
RTS#	7	8	CTS#
RI#	9	10	+12V
DCD#	11	12	RXD
TXD	13	14	DTR#
GND	15	16	DSR#
RTS#	17	18	CTS#
RI#	19	20	+12V
DCD#	21	22	RXD
TXD	23	24	DTR#
GND	25	26	DSR#
RTS#	27	28	CTS#
RI#	29	30	+12V
DCD#	31	32	RXD
TXD	33	34	DTR#
GND	35	36	DSR#
RTS#	37	38	CTS#
RI#	39	40	+12V

COM5_6 Default Definition RS232 (Screen: COM5_6)

Singal	Pin		Signal
NC	1	2	NC
RX5	3	4	RX6
GND	5	6	GND
TX5	7	8	TX6
NC	9	10	(NC)

COM1, COM2 Optional Definition RS232/RS485/RS422

Pin	RS232	RS485	RS422
1	DCD	DATA-	TX-
2	RXD	DATA+	TX+
3	TXD	(NC)	RX+
4	DTR	(NC)	RX-
5	GND	GND	GND
6	DSR	(NC)	(NC)
7	RTS	(NC)	(NC)
8	CTS	(NC)	(NC)
9	RI	(NC)	(NC)

2.10 **GPIO** (Screen Printing: GPIO)

The board provides a 2×5-pin GPIO header (2.0 mm pitch), offering 8 programmable general-purpose input/output (GPIO) ports.

GPIO (Screen Printing: GPIO)

Signal	Pin		Signal
SIO_GP70	1	2	3.3V
SIO_GP71	3	4	SIO_GP74
SIO_GP72	5	6	SIO_GP75
SIO_GP73	7	8	SIO_GP76
GND	9	10	SIO_GP77

Note: For detailed information on the GPIO_WD0 configuration file, please refer to the appendix.

2.11 **Board Power Supply** (Screen printing: PWR1, PWR2)

The board provides a 2-Pin DC-IN phoenix connector that supports 12V-35V input for power supply.

PWR1 (Screen Printing: PWR1)

Pin	Signal
1	GND
2	VCC

PWR2 Optional Socket (Screen Printing: PWR2)

Pin	Signal
1	VCC
2	VCC
3	GND
4	GND

2.12 Switch Button/Light Indicator (Screen Printing: JFP)

The board has a set of 2.0mm spacing pins that can be connected to a switch button, a system reset button, a hard disk read/write indicator, and a power-on indicator.

Switch Button/Light Indicator Pin Definition (Screen Printing: JFP)

Signal	Pin		Signal
HDD_LED+	1	2	PWR_LED+
HDD_LED-	3	4	PWR_LED-
RSTBTN-	5	6	PWR_ON+
RSTBTN+	7	8	PWR_ON-
NC	9	10	(NC)

2.13 Audio Interface

The board features a Realtek ALC897 audio codec, supports a 3.5mm Line-out/MIC two-in-one combo jack (CTIA American standard), and a built-in dual-channel power amplifier output socket for connecting passive speakers.

Two-in-one headphone jack:

JAUD (Screen Printing: JAUD)

Pin	Signal
1	L+
2	L-
3	R-
4	R+

2.14 CPU Fan (Screen printing: CPUFAN)

The board features one auxiliary CPU cooling fan header, providing a default 5V power supply, with an optional 12V configuration available.

CPUFAN (Screen Printing: CPUFAN)

Pin	Signal
1	VCC
2	GND
3	TAC
4	CTL

2.15 Hardware Auto Start (Screen Printing: JAT)

The board includes a JAT header (2.0 mm pitch) to support hardware-based auto-start functionality, enabling automatic system boot upon power connection.

JAT (Screen Printing: JAT)

Setting	JAT
Close	Hardware Auto Start

2.16 CMOS Clearance/Retention (Screen printing: CLR_CMOS)

CMOS is powered by onboard button batteries. Clearing CMOS will permanently remove the previous system settings and restore the board system to original settings (factory settings).

Step 1: Turn off the PC and disconnect the power.

Step 2: Press CLR_CMOS for 15 seconds then disconnect.

Step 3: Restart the device, press the <DEL> button to enter the BIOS, load the optimal default value, save, and exit the settings.

⚠ ATTENTION: Please do not clear COMS when the PC is connected to power in case board damages.