

**3.5" SBC Supports Intel® Celeron® J6412 on-board SoC with HDMI,  
DP, iDPM, Dual 2.5GbE LAN, M.2, PCIe x4 Slot, SATA 6Gb/s,  
COM, USB 3.2 Gen 2, iAUDIO, 0°C~60°C and RoHS**

# **WAFER-EHL-J6412**

## **Quick Installation Guide**

**Version 1.0**

June 17, 2022

### **Package List**

WAFER-EHL-J6412 package includes the following items:

- 1 x WAFER-EHL-J6412 single board computer
- 1 x Power cable
- 1 x SATA with power cable
- 1 x QIG



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## Specifications

- CPU:  
Intel® Celeron® J6412 on-board SoC  
(up to 2.6GHz, quad-core, 1.5M cache, TDP=10W)
- Memory:  
On-board 8GB 3200 MHz LPDDR4x
- BIOS:  
AMI UEFI BIOS
- Graphics Engine:  
Intel® Gen11 UHD Graphics
- Display Output:  
Triple independent display  
1 x HDMI 1.4 (up to 3840 x 2160@30Hz)  
1 x DP 1.4 (up to 3840 x 2160 @60Hz)  
1 x IEI iDPM 3040 slot (only for IEI eDP/LVDS/VGA module)
- Ethernet:  
2 x PCIe 2.5GbE with Intel® I225V
- External I/O Interface:  
2 x USB 3.2 Gen 2 (10Gb/s)
- Internal I/O Interface:  
1 x SATA 6Gb/s with 5V SATA power connector  
4 x USB 2.0 (2x4 pin, p=2.0)  
2 x RS-232/422/485 (1x9 pin, p=1.25)
- I<sup>2</sup>C:  
1 x I<sup>2</sup>C (1x4 pin, p=1.25)
- SMBus:  
1 x SMBus (1x4 pin, p=1.25)
- Audio:  
1 x iAUDIO (2x5 pin), supporting IEI AC-KIT-888S kit

- Front Panel:
  - 1 x Power LED & HDD LED (1x6 pin, p=2.0)
  - 1 x Power button (1x2 pin, p=2.0)
  - 1 x Reset button (1x2 pin, p=2.0)
- Expansions:
  - 1 x M.2 2230 A key for Wi-Fi & Bluetooth (PCIe Gen3 x1 / USB 2.0 signal)
  - 1 x M.2 3042/2242 B key with SIM slot (PCIe Gen3 x2 / USB 2.0 signal)
  - 1 x PCIe Gen3 x4 (x2 signal: x2 or x1+x1)
- Digital I/O:
  - 1 x 12-bit digital I/O (2x7 pin, p=2.0)
- TPM:
  - Intel® PTT (TPM 2.0)
- Fan Connector:
  - 1 x System fan connector (1x4 pin, p=2.54)
- Power Supply:
  - +12V DC input power (AT/ATX mode)
- Power Consumption:
  - 12V@3.14A (Intel® Celeron® J6412 2.0GHz with on-board 8GB 3200MHz LPDDR4 memory and EUP enabled)
- Watchdog Timer:
  - Software programmable support 1–255 sec. system reset
- Operation Temperature: 0°C – 60°C
- Storage Temperature: -30°C – 70°C
- Operation Humidity: 5% – 95%, non-condensing
- Dimensions: 146 mm x 102 mm
- Weight: GW:850 g / NW:350 g
- Certification: CE/FCC compliant

## Ordering Information

- **WAFER-EHL-J6412-R10:**  
3.5" SBC with Intel® Celeron® J6412 on-board SoC, triple display with DP, HDMI and iDPM slot, dual 2.5 GbE, USB 3.2 Gen 2, M.2, SATA 6Gb/s, COM, iAUDIO, 0°C ~60°C and RoHS
- **CB-USB02A-RS:**  
Dual-port USB cable with bracket, 300mm, p=2.0
- **AC-KIT-888S-R10:**  
Realtek ALC888S 7.1 Channel HD Audio peripheral board, RoHS
- **32102-000100-200-RS:**  
SATA power cable, MOLEX 5264-4P to SATA 15P
- **32005-003500-200-RS:**  
RS-232/422/485 cable, 300mm, p=1.25
- **iDPM-eDP-R10:**  
eDP to eDP converter board (for IEI iDPM slot)
- **iDPM-LVDS-R10:**  
eDP to LVDS converter board (for IEI iDPM slot)
- **iDPM-VGA-R10:**  
eDP to VGA converter board (for IEI iDPM slot)
- **NWR-L2S-R10:**  
PCIe x2 to two PCIe x1 riser card
- **NWR-R2S-R10:**  
PCIe x2 to two PCIe x1 riser card
- **CM-WAFER-WF-R10:**  
Cooler module (w/ fan) for 3.5" WAFER series, RoHS
- **CM-WAFER-WOF-R10:**  
Cooler module (w/o fan) for 3.5" WAFER series, RoHS

## Jumpers Setting and Connectors

LABEL	FUNCTION
J_CMOS2	Clear CMOS button
J_ATX_AT1	AT/ATX power mode setting jumper
J_DNX1	DNX mode setting jumper
J_FLASH1	Flash descriptor override setting jumper
IAUDIO	Audio connector for IEI AC-KIT-888S kit
PWR1	ATX 12V power connector
BAT1	Battery connector
BZ1	Buzzer connector
DIO2	Digital I/O connector
CPU_FAN1	Fan connector
F_PANEL1	Power LED & HDD LED connector
PWR_BTN1	Power button connector
RST_BTN1	Reset button connector
COM1, COM2	RS-232/422/485 serial port connectors
S_ATA1	SATA 6Gb/s connectors
SATA_PWR1	SATA power connector
I2C1	I <sup>2</sup> C connector
SMB1	SMBus connector
JBIOS1	Flash SPI ROM connector
JEC2	Flash EC ROM connector
DEBUG_SPI1	EC debug connector
JUSB3, JUSB4	Internal USB 2.0 connectors
M2_A_KEY	M.2 A-key slot
M2_B_KEY	M.2 B-key slot

PCIEX4_1	PCIe x4 slot (x2 signal)
SIM1	SIM slot (solder side)
IDPM1	IEI iDPM slot
J_LAN1, J_LAN2	External 2.5GbE RJ-45 connectors
J_USB1	External USB 3.2 Gen 2x1 Type-A connector
J_DP1	External DisplayPort connector
J_HDMI1	External dual HDMI connector

<b>J_CMOS2: Clear CMOS Button</b>	
<b>PIN NO.</b>	<b>DESCRIPTION</b>
NC (default)	Keep CMOS Setup (Normal Operation)
Press button	Clear CMOS Setup

<b>J_ATX_AT1: AT/ATX Power Mode Setting Jumper</b>	
<b>PIN NO.</b>	<b>DESCRIPTION</b>
Short 1 - 2	ATX Power Mode (default)
Short 2 - 3	AT Power Mode

<b>J_DNX1: DNX Mode Setting Jumper</b>	
<b>PIN NO.</b>	<b>DESCRIPTION</b>
Open	Normal (default)
Short	Enable DNX Boot

<b>J_FLASH1: Flash Descriptor Override Setting Jumper</b>	
<b>PIN NO.</b>	<b>DESCRIPTION</b>
Short 1 - 2	Disable (default)
Short 2 - 3	Enable

<b>IAUDIO : Internal Audio Connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	HDA_SYNC	2	HDA_CLK
3	HDA_SDOUT	4	HDA_SPKR
5	HDA_SDIN	6	HDA_RST#
7	+5V	8	GND
9	+12V	10	GND

<b>PWR1: ATX 12V Power Connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	GND	3	+12V
2	GND	4	+12V

<b>BAT1: RTC Battery Connector</b>			
<b>PIN</b>	<b>DESCRIPTION</b>	<b>PIN</b>	<b>DESCRIPTION</b>
1	VBATT	2	GND

<b>BZ1: Buzzer Connector</b>			
<b>PIN</b>	<b>DESCRIPTION</b>	<b>PIN</b>	<b>DESCRIPTION</b>
1	+5V	2	PC_BEEP

<b>DIO2: Digital Input/Output Connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	GND	2	VCC
3	DOUT5	4	DOUT4
5	DOUT3	6	DOUT2
7	DOUT1	8	DOUT0
9	DIN5	10	DIN4
11	DIN3	12	DIN2
13	DIN1	14	DIN0

<b>CPU_FAN1: Fan Connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	GND	3	FANIO
2	+12V	4	PWM

<b>F_PANEL1: Power LED &amp; HDD LED Connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	+5V	4	PWR_LED-
2	GND	5	HDD_LED+
3	PWR_LED+	6	HDD_LED-

<b>PWR_BTN1: Power Button Connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	PWR_BTN+	2	PWR_BTN-

<b>RST_BTN1: Reset Button Connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	Reset+	2	Reset-

<b>COM1, COM2: RS-232/422/485 Serial Port Connectors</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	DCD	6	CTS
2	DSR	7	DTR
3	RXD	8	RI
4	RST	9	GND
5	TXD		



<b>S_ATA1: SATA 6Gb/s Connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	GND	5	SATA_RX-
2	SATA_TX+	6	SATA_RX+
3	SATA_TX-	7	GND
4	GND	8	N/C

<b>SATA_PWR1: SATA Power Connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	+5V	2	GND

<b>I2C1: I<sup>2</sup>C Connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	GND	3	I2C_CLK
2	I2C_DATA	4	+5V

<b>SMB1: SMBus Connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	GND	3	SMB_CLK
2	SMB_DATA	4	+5V

<b>JBIOS1: Flash SPI ROM Connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	+3.3V	4	SPI_CLK
2	SPI_CS#	5	SPI_SI
3	SPI_SO	6	GND

<b>JEC2: Flash EC ROM Connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	SPI_CS#	2	+3.3V
3	SPI_SO	4	NC
5	EC_DET_FLASH	6	SPI_CLK
7	GND	8	SPI_SI

<b>DEBUG_SPI1: EC Debug Connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	NC	4	EDICLK
2	EDICS	5	EDIDI
3	EDIDO	6	GND

<b>JUSB3, JUSB4: Internal USB 2.0 Connectors</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	VCC	2	GND
3	USB_DATA-	4	USB_DATA+
5	USB_DATA+	6	USB_DATA-
7	GND	8	VCC

<b>M2_A_KEY: M.2 A-key Slot</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	GND	2	+V3.3A
3	USB+	4	+V3.3A
5	USB-	6	NC
7	GND	8	Module Key
9	Module Key	10	Module Key
11	Module Key	12	Module Key
13	Module Key	14	Module Key
15	Module Key	16	NC
17	NC	18	GND
19	NC	20	NC
21	NC	22	NC
23	GND	24	GND
25	NC	26	NC
27	NC	28	NC
29	GND	30	GND
31	NC	32	NC
33	GND	34	NC
35	PCIE_TX6+	36	GND
37	PCIE_TX6-	38	NC

39	GND	40	NC
41	PCIE_RX6+	42	NC
43	PCIE_RX6-	44	NC
45	GND	46	NC
47	CLK_M2_A+	48	NC
49	CLK_M2_A-	50	BTWIFI_SUS_CLK
51	GND	52	WLAN_PERST#
53	NC	54	+V3.3A_WLAN
55	+V3.3A_WLAN	56	+V3.3A_WLAN
57	GND	58	NC
59	NC	60	NC
61	NC	62	NC
63	GND	64	NC
65	NC	66	NC
67	NC	68	NC
69	GND	70	PEWAKE#
71	NC	72	+V3.3A
73	NC	74	+V3.3A
75	GND		

<b>M2_B_KEY: M.2 B-key Slot</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	WWAN_CONFIG3	2	+3.3V_WWAN
3	GND	4	+3.3V_WWAN
5	GND	6	WWAN_FCP_OFF
7	USB_D+	8	WWAN_DISABLE
9	USB_D-	10	NC
11	GND	12	Module Key
13	Module Key	14	Module Key
15	Module Key	16	Module Key
17	Module Key	18	Module Key
19	Module Key	20	PSE_I2S1_SCLK
21	WWAN_CONFIG0	22	PSE_I2S1_TXD
23	PCIE_WAKE#	24	PSE_I2S1_RXD

25	SAR_DPR_WWAN	26	GNSS_DISABLE_N
27	GND	28	NC
29	PCIE_RXN5	30	WWAN_UIM_RST
31	PCIE_RXP5	32	WWAN_UIM_CLK
33	GND	34	WWAN_UIM_DATA
35	PCIE_TXN5	36	UIM_PWR
37	PCIE_TXP5	38	SSD_DEVSLP
39	GND	40	NC
41	PCIE_RXN4	42	NC
43	PCIE_RXP4	44	NC
45	GND	46	NC
47	PCIE_TXN4	48	NC
49	PCIE_TXP4	50	WWAN_PERST#
51	GND	52	N/C
53	CLK_M2_B_N	54	WWAN_WAKE#
55	CLK_M2_B_P	56	NC
57	GND	58	NC
59	NC	60	NC
61	NC	62	NC
63	NC	64	NC
65	NC	66	WWAN_SIM1_DET
67	WWAN_RST	68	WWAN_SUSCLK
69	DET_OS-PCIE/ GND-SATA	70	+3.3V
71	GND	72	+3.3V
73	GND	74	+3.3V
75	WWAN_CONFIG2		

<b>SIM1: SIM Card Slot</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
C1	SIM_VCC	C5	GND
C2	SIM_RST	C6	NC
C3	SIM_CLOCK	C7	SIM_DATA

<b>J_LAN1, J_LAN2: External 2.5GbE RJ-45 Connectors</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	MDI0P	5	MDI2P
2	MDI0N	6	MDI2N
3	MDI1P	7	MDI3P
4	MDI1N	8	MDI3N

<b>J_DP1: External DP Connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	DATA_0P	11	GND
2	GND	12	DATA_3N
3	DATA_0N	13	CONFIG1
4	DATA_1P	14	CONFIG2
5	GND	15	AUX_P
6	DATA_1N	16	GND
7	DATA_2P	17	AUX_N
8	GND	18	DP HPD
9	DATA_2N	19	GND
10	DATA_3P	20	DP PWR

<b>J_HDMI1: External HDMI Connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	HDMI2_DATA2	2	GND
3	HDMI2_DATA2#	4	HDMI2_DATA1
5	GND	6	HDMI2_DATA1#
7	HDMI2_DATA0	8	GND
9	HDMI2_DATA0#	10	HDMI2_CLK
11	GND	12	HDMI2_CLK#
13	N/C	14	N/C
15	HDMI2_SCL	16	HDMI2_SDA
17	GND	18	+5V
19	HDMI2_HPD		

<b>J_USB1: External USB 3.2 Gen 2 Connectors</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	VCC	10	VCC
2	USB_DATA0-	11	USB_DATA1-
3	USB_DATA0+	12	USB_DATA1+
4	GND	13	GND
5	USB3_RX0-	14	USB3_RX1-
6	USB3_RX0+	15	USB3_RX1+
7	GND	16	GND
8	USB3_TX0-	17	USB3_TX1-
9	USB3_TX0+	18	USB3_TX1+

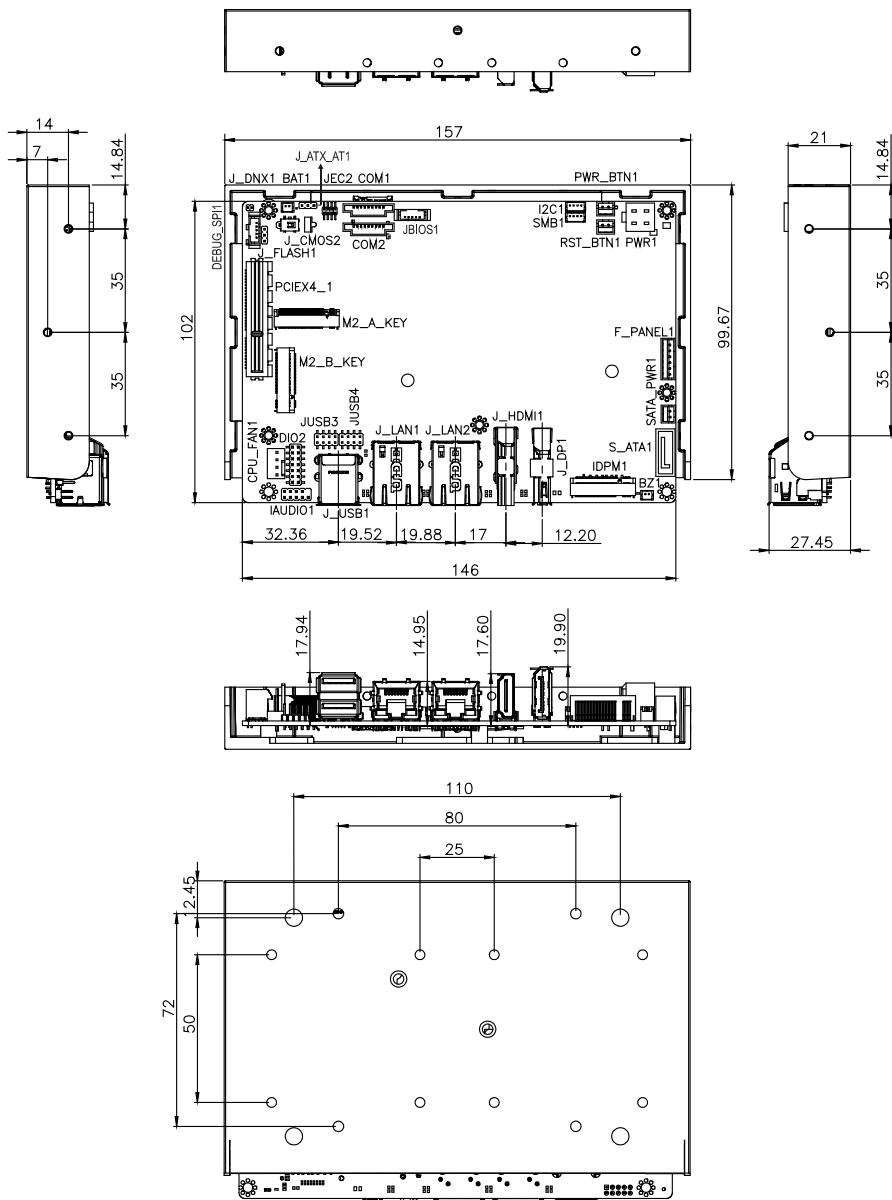
All the drivers and utility for the WAFER-EHL-J6412 are available on IEI Resource Download Center. Type WAFER-EHL-J6412 and press Enter to find all the relevant software, utilities, and documentation. To install software from the downloaded ISO file, mount the file as a virtual drive to view its content.

**IEI Resource Download Center**

<https://download.ieiworld.com>



# Board Layout: Jumper and Connector Locations



(Unit: mm)