

3.5" SBC with Intel® 14nm Celeron® Braswell on-board SoC with Dual HDMI and LVDS, Dual PCIe GbE, USB 3.1 Gen1, PCIe Mini, SATA 6Gb/s, mSATA , COM, Audio and RoHS

WAFER-BW

Quick Installation Guide

Version 2.0

Feb 18, 2019.

Package List

WAFER-BW package includes the following items:

- 1 x WAFER-BW single board computer
- 1 x Audio cable
- 1 x Power cable
- 1 x RS-232/422/485 cable
- 2 x SATA with power cable kit
- 1 x QIG (Quick Installation Guide)



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Specifications

- SoC:
 - Intel® Pentium® N3710 on-board SoC
(up to 2.56GHz, quad-core, 2MB cache, TDP=6W)
 - Intel® Celeron® N3160 on-board SoC
(up to 2.24GHz, quad-core, 2MB cache, TDP=6W)
 - Intel® Celeron® N3060 on-board SoC
(up to 2.48GHz, dual-core, 2MB cache, TDP=6W)
 - Intel® Celeron® N3010 on-board SoC
(up to 2.24GHz, dual-core, 2MB cache, TDP=4W)
- BIOS: AMI UEFI BIOS
- Memory:
 - One 204-pin 1333/1600 MHz single-channel DDR3L SDRAM unbuffered SO-DIMM slot supports up to 8 GB
- Graphics Engine:
 - Intel® HD Graphics Gen 8 Engine with 16 low-power execution units, supporting DX11.1, OpenGL 4.2 and OpenCL 1.2
- Display Output:
 - Triple independent display
 - 2 x HDMI (up to 3840x2160@30Hz)
 - 1 x 18/24-bit dual-channel LVDS by CH7511B DP to LVDS converter (up to 1920x1200@60Hz)
- Ethernet:
 - LAN1: Realtek RTL8111GN controller
 - LAN2: Realtek RTL8111GN controller
- External I/O Interfaces:
 - 1 x RS-232
 - 2 x USB 3.0 (on rear I/O)
- Internal I/O Interfaces:
 - 1 x 8 GB eMMC (optional)
 - 2 x SATA 6G/s with 5V SATA power connector (no RAID)
 - 1 x KB/MS (1x6 pin)

- 3 x RS-232 (1x9 pin, P=1.25)
- 1 x mSATA
- 4 x USB 2.0 (2x4 pin, P=2.0)
- 2 x RS-232/422/485 (2 by pin header) (1x9 pin, P=1.25)
- SMBus: 1 x SMBus (1x4 pin)
- I²C: 1 x I²C (1x4 pin)
- Audio:
 - Realtek ALC662 HD codec
 - 1 x Analog audio (2x5 pin)
- Front Panel:
 - 1 x Power LED & HDD LED (1x6 pin)
 - 1 x Power button (1x2 pin)
 - 1 x Reset button (1x2 pin)
- LAN LED: 2 x LAN LED (1x2 pin)
- Expansion :
 - 2 x Full/Half-size PCIe Mini card slot (1 w/ SIM holder) (1 w/ mSATA support: share SATA signal from SATA2)
- Digital I/O: 1 x 8-bit digital I/O (1x10 pin, P=1.25)
- Fan Connector:
 - 1 x Smart fan connector (1x4 pin)
- Power supply:
 - 12V only DC input
 - 1 x Internal power connector (2x2 pin)
 - Support AT/ATX mode
- Power Consumption:
 - 12V@1.52A (Intel® Pentium® processor N3710 with 8 GB 1600 MHz DDR3L memory)
- Watchdog Timer:
 - Software programmable supports 1~255 sec. system reset
- Operating Temperature: -20°C ~ 60°C
- Storage Temperature: -30°C ~ 70°C
- Operation Humidity: 5% ~ 95%, non-condensing

- Dimensions: 146mm x 102mm
- Weight(GW/ NW): 600g/ 250g

All the drivers and One Key Recovery utility for the WAFER-BW are available on IEI Resource Download Center. Type WAFER-BW 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>



Ordering Information

- **WAFER-BW-N4-R20:**
3.5" SBC supports Intel® Pentium® quad-core processor N3710 up to 2.56GHz (6W) with dual HDMI and LVDS, Dual PCIe GbE, PCIe Mini, USB 3.0, SATA 6Gb/s, mSATA, COM, Audio and RoHS
- **WAFER-BW-N3-R20:**
3.5" SBC supports Intel® Celeron® quad-core processor N3160 up to 2.24GHz (6W) with dual HDMI and LVDS, Dual PCIe GbE, PCIe Mini, USB 3.0, SATA 6Gb/s, mSATA, COM, Audio and RoHS
- **WAFER-BW-N2-R20:**
3.5" SBC supports Intel® Celeron® dual-core processor N3060 up to 2.48GHz (6W) with dual HDMI and LVDS, Dual PCIe GbE, PCIe Mini, USB 3.0, SATA 6Gb/s, mSATA, COM, Audio and RoHS
- **WAFER-BW-N1-R20**:**
3.5" SBC supports Intel® Celeron® dual-core processor N3010 up to 2.24GHz (4W) with dual HDMI and LVDS, Dual PCIe GbE, PCIe Mini, USB 3.0, SATA 6Gb/s, mSATA, COM, Audio and RoHS
***By order production, MOQ: 100*
- **32000-070301-RS:** Dual-port USB 2.0 cable, 210mm, P=2.0
- **32006-000300-100-RS:**
PS/2 KB/MS Y-cable without bracket, 140mm/120mm

Jumpers setting and connectors

| LABEL | FUNCTION |
|--------------------------------------|---|
| J_ATX_AT1 | Select ATX or AT mode |
| J_CMOS1 | CMOS state setting |
| J_PW1 | LVDS1 Voltage Selection |
| HDMI1 | Dual HDMI Connector |
| LAN1 | LAN1 Connector |
| LAN2 | LAN2 Connector |
| USB1 | External 2 Port USB3.0 Connectors |
| USB2 USB3 | External 2 Port USB2.0 Connectors |
| COM1 | External Serial Port Connector |
| COM2 COM3 COM4 COM5 COM6 | Internal Serial Port Connectors |
| AUDIO1 | HD Audio Connector |
| SATA1 SATA2 | Serial ATA Connectors |
| SATA_PWR1 SATA_PWR2 | SATA Power Connector |
| LVDS1 | LVDS1 Panel Connector |
| INV1 | LVDS1 Panel Backlight +12V Power Source |
| CN1 | Power & HDD LED Connector |
| RST_BTN1 | Reset Button Connector |
| PWR_BTN1 | Power Button Connector |
| PWR1 | Power Source Connector |
| MINI_PCIE1 MINI_PCIE2 | Mini PCI-E Card Connector |
| DIO1 | Digital I/O Connector |
| J_KB/MS1 | KEYBOARD & MOUSE Connectors |
| J_I2C1/J_SMB1 | I2C / SMBUS Connector |
| CPU_FAN1 | CPU Fan Connector |
| SIM1 | SIM Card Connector |

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

| J_CMOS1: Clear CMOS Setup | |
|----------------------------------|----------------------------|
| PIN NO. | DESCRIPTION |
| Open | Normal Operation (Default) |
| Push | Clear CMOS Setup |

| J_PW1: LVDS1 Voltage Selection | |
|---------------------------------------|----------------------|
| PIN NO. | DESCRIPTION |
| Short 1 - 2 | +3.3V LVDS (default) |
| Short 2 - 3 | +5V LVDS |

| LAN1: RJ45 LAN Connector | | | |
|---------------------------------|--------------------|----------------|--------------------|
| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
| 1 | LAN1_MDI0+ | 7 | LAN1_MDI2+ |
| 2 | LAN1_MDI0- | 8 | LAN1_MDI2- |
| 3 | LAN1_MDI1+ | 9 | LAN1_MDI3+ |
| 4 | LAN1_MDI1- | 10 | LAN1_MDI3- |

| LAN2: RJ45 LAN Connector | | | |
|---------------------------------|--------------------|----------------|--------------------|
| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
| 1 | LAN1_MDI0+ | 7 | LAN1_MDI2+ |
| 2 | LAN1_MDI0- | 8 | LAN1_MDI2- |
| 3 | LAN1_MDI1+ | 9 | LAN1_MDI3+ |
| 4 | LAN1_MDI1- | 10 | LAN1_MDI3- |

| USB2 & USB3: Internal USB Connector | | | |
|--|--------------------|----------------|--------------------|
| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
| 1 | USB_VCC | 2 | GND |
| 3 | DATA- | 4 | DATA+ |
| 5 | DATA+ | 6 | DATA- |
| 7 | GND | 8 | USB_VCC |

| HDMI1: Dual 19-pin HDMI Connector | | | |
|--|--------------------|----------------|--------------------|
| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
| A1 | HDMI_A_DATA2P | B1 | HDMI_B_DATA2P |
| A2 | GND | B2 | GND |
| A3 | HDMI_A_DATA2N | B3 | HDMI_B_DATA2N |
| A4 | HDMI_A_DATA1P | B4 | HDMI_B_DATA1P |
| A5 | GND | B5 | GND |
| A6 | HDMI_A_DATA1N | B6 | HDMI_B_DATA1N |
| A7 | HDMI_A_DATA0P | B7 | HDMI_B_DATA0P |
| A8 | GND | B8 | GND |
| A9 | HDMI_A_DATA0N | B9 | HDMI_B_DATA0N |
| A10 | HDMI_A_CLKP | B10 | HDMI_B_CLKP |
| A11 | GND | B11 | GND |
| A12 | HDMI_A_CLKN | B12 | HDMI_B_CLKN |
| A13 | N/A | B13 | N/A |
| A14 | N/A | B14 | N/A |
| A15 | HDMI_A_SCL | B15 | HDMI_B_SCL |
| A16 | HDMI_A_SDA | B16 | HDMI_B_SDA |
| A17 | GND | B17 | GND |
| A18 | +5V | B18 | +5V |
| A19 | HDMI_A_HPD | B19 | HDMI_B_HPD |

| USB1: External USB3.0 Connector | | | |
|--|--------------------|----------------|--------------------|
| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
| 1 | USB_VCC | 2 | USB2_D0- |
| 3 | USB2_D0+ | 4 | GND |
| 5 | USB3_RXD0- | 6 | USB3_RXD0+ |
| 7 | GND | 8 | USB3_TXD0- |
| 9 | USB3_TXD0+ | 10 | USB_VCC |
| 11 | USB2_D1- | 12 | USB2_D1+ |
| 13 | GND | 14 | USB3_RXD1- |
| 15 | USB3_RXD1+ | 16 | GND |
| 17 | USB3_TXD1- | 18 | USB3_TXD1+ |

| COM1: External Serial Port Connector | | | |
|---|--------------------|----------------|--------------------|
| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
| 1 | DCD | 2 | RXD |
| 3 | TXD | 4 | DTR |
| 5 | GND | 6 | DSR |
| 7 | RTS | 8 | CTS |
| 9 | RI | | |

| COM2/3/5: Internal Serial Port Connector | | | |
|---|--------------------|----------------|--------------------|
| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
| 1 | DCD | 2 | DSR |
| 3 | RXD | 4 | RTS |
| 5 | TXD | 6 | CTS |
| 7 | DTR | 8 | RI |
| 9 | GND | | |

| COM4/6: Internal Serial Port Connector | | | |
|---|--------------------|--------------------|--------------------|
| Mode | RS232 | RS422 | RS485 |
| PIN NO. | DESCRIPTION | DESCRIPTION | DESCRIPTION |
| 1 | DCD | TXD- | DATA- |
| 2 | DSR | N/A | N/A |
| 3 | RXD | TXD+ | DATA+ |
| 4 | RTS | N/A | N/A |
| 5 | TXD | RXD+ | N/A |
| 6 | CTS | N/A | N/A |
| 7 | DTR | RXD- | N/A |
| 8 | RI | N/A | N/A |
| 9 | GND | N/A | N/A |

| AUDIO1: Audio Line-In/Out MIC Connector | | | |
|--|--------------------|----------------|--------------------|
| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
| 1 | LINE-OUT_R | 2 | LINE-IN_R |
| 3 | AUD_GND | 4 | AUD_GND |
| 5 | LINE-OUT_L | 6 | LINE-IN_L |
| 7 | AUD_GND | 8 | AUD_GND |
| 9 | MIC1_R | 10 | MIC1_L |

| SATA1/2 : Serial ATA Connector | | | |
|---------------------------------------|--------------------|----------------|--------------------|
| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
| 1 | GND | 5 | RX- |
| 2 | TX+ | 6 | RX+ |
| 3 | TX- | 7 | GND |
| 4 | GND | 8 | N/C |

| SATA_PWR1/2: SATA Power Connector | | | |
|--|--------------------|----------------|--------------------|
| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
| 1 | +5V | 2 | Ground |

| LVDS1: LVDS Connector | | | |
|------------------------------|--------------------|----------------|--------------------|
| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
| 1 | GND | 2 | GND |
| 3 | A_Y0 | 4 | A_Y0# |
| 5 | A_Y1 | 6 | A_Y1# |
| 7 | A_Y2 | 8 | A_Y2# |
| 9 | A_CK | 10 | A_CK# |
| 11 | A_Y3 | 12 | A_Y3# |
| 13 | GND | 14 | GND |
| 15 | B_Y0 | 16 | B_Y0# |
| 17 | B_Y1 | 18 | B_Y1# |
| 19 | B_Y2 | 20 | B_Y2# |
| 21 | B_CK | 22 | B_CK# |
| 23 | B_Y3 | 24 | B_Y3# |
| 25 | GND | 26 | GND |
| 27 | VCC/VCC3 | 28 | VCC/VCC3 |
| 29 | VCC/VCC3 | 30 | VCC/VCC3 |

| INV1: 5-pin Header Inverter Connector | | | |
|--|--------------------|----------------|--------------------|
| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
| 1 | LCD_BKLTCTL | 2 | GROUND |
| 3 | +12V | 4 | GROUND |
| 5 | BACKLIGHT ENABLE | | |

| CN1: Power LED & HDD LED connector | | |
|---|----------------|--------------------|
| | PIN NO. | DESCRIPTION |
| +5V | 1 | VCC |
| | 2 | GND |
| Power LED | 3 | PWR_LED+ |
| | 4 | PWR_LED- |
| HDD LED | 5 | HDD_LED+ |
| | 6 | HDD_LED- |

| RST_BTN1: Reset Button Connector | | | |
|---|--------------------|----------------|--------------------|
| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
| 1 | RESET+ | 2 | RESET- |

| PWR_BTN1: Power Button Connector | | | |
|---|--------------------|----------------|--------------------|
| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
| 1 | PWR_BTN+ | 2 | PWR_BTN- |

| PWR1: +12V Power Connector | | | |
|-----------------------------------|--------------------|----------------|--------------------|
| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
| 1 | GND | 2 | GND |
| 3 | +12V | 4 | +12V |

| CPU_FAN1: CPU Fan Connector | | | |
|------------------------------------|--------------------|----------------|--------------------|
| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
| 1 | GND | 2 | +V12S |
| 3 | Rotation Signal | 4 | PWM Control Signal |

| SIM1: SIM Card Connector | | | |
|---------------------------------|--------------------|----------------|--------------------|
| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
| 1 | SIM_VCC | 2 | SIM_RST |
| 3 | SIM_Clock | 5 | GND |
| 6 | SIM_VPP | 7 | SIM_DATA |

| MINI_PCIE1: Mini PCI-E Card Connector(Support SIM Card) | | | |
|--|--------------------|----------------|--------------------|
| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
| 1 | PCIE_WAKE# | 2 | VCC3 |
| 3 | N/C | 4 | GND |
| 5 | N/C | 6 | 1.5V |
| 7 | N/C | 8 | UIM_PWR |
| 9 | GND | 10 | UIM_DATA |
| 11 | PCIE_CLK# | 12 | UIM_CLK |
| 13 | PCIE_CLK | 14 | UIM_RST |
| 15 | GND | 16 | UIM_VPP |
| 17 | N/C | 18 | GND |
| 19 | N/C | 20 | N/C |
| 21 | GND | 22 | PCIRST# |
| 23 | PCIE_RXN | 24 | N/C |
| 25 | PCIE_RXP | 26 | GND |
| 27 | GND | 28 | 1.5V |
| 29 | GND | 30 | SMBCLK |
| 31 | PCIE_TXN | 32 | SMBDATA |
| 33 | PCIE_TXP | 34 | GND |
| 35 | GND | 36 | USBD- |
| 37 | GND | 38 | USBD+ |
| 39 | VCC3 | 40 | GND |
| 41 | VCC3 | 42 | N/C |
| 43 | GND | 44 | N/C |
| 45 | N/C | 46 | N/C |
| 47 | N/C | 48 | 1.5V |
| 49 | N/C | 50 | GND |
| 51 | N/C | 52 | VCC3 |

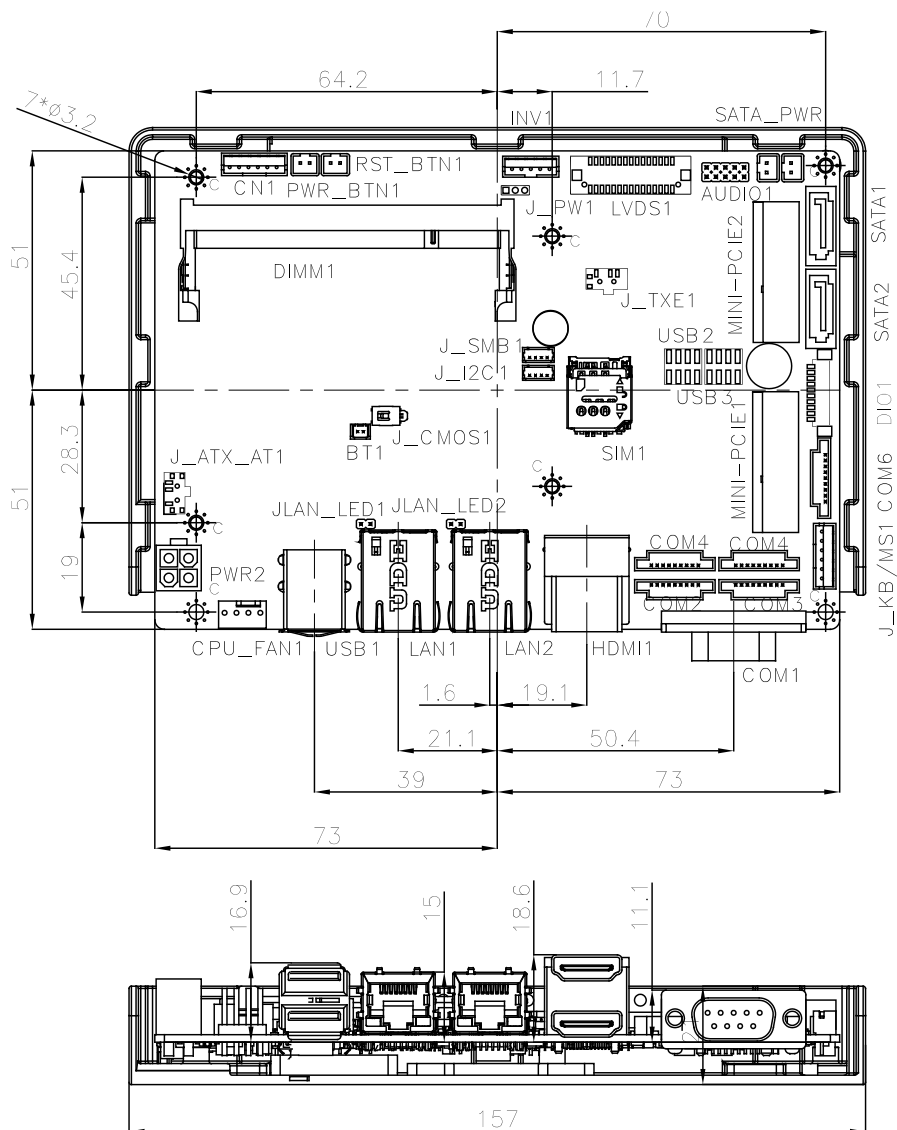
| MINI_PCIE2: Mini PCI-E Card Connector(Support mSATA) | | | |
|---|--------------------|----------------|--------------------|
| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
| 1 | PCIE_WAKE# | 2 | VCC3 |
| 3 | N/C | 4 | GND |
| 5 | N/C | 6 | 1.5V |
| 7 | N/C | 8 | N/C |
| 9 | GND | 10 | N/C |
| 11 | PCIE_CLK# | 12 | N/C |
| 13 | PCIE_CLK | 14 | N/C |
| 15 | GND | 16 | N/C |
| 17 | N/C | 18 | GND |
| 19 | N/C | 20 | N/C |
| 21 | GND | 22 | PCIRST# |
| 23 | PCIE_RXN(SATA_RX+) | 24 | N/C |
| 25 | PCIE_RXP(SATA_RX-) | 26 | GND |
| 27 | GND | 28 | 1.5V |
| 29 | GND | 30 | SMBCLK |
| 31 | PCIE_TXN(SATA_TX-) | 32 | SMBDATA |
| 33 | PCIE_TXP(SATA_TX+) | 34 | GND |
| 35 | GND | 36 | USBD- |
| 37 | GND | 38 | USBD+ |
| 39 | VCC3 | 40 | GND |
| 41 | VCC3 | 42 | N/C |
| 43 | GND | 44 | N/C |
| 45 | N/C | 46 | N/C |
| 47 | N/C | 48 | 1.5V |
| 49 | N/C | 50 | GND |
| 51 | N/C | 52 | VCC3 |

| DIO1 : Digital Input / Output Connector | | | |
|--|--------------------|----------------|--------------------|
| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
| 1 | Ground | 2 | +5V |
| 3 | Output 3 | 4 | Output 2 |
| 5 | Output 1 | 6 | Output 0 |
| 7 | Input 3 | 8 | Input 2 |
| 9 | Input 1 | 10 | Input 0 |

| J_KB/MS1: 6-pin header Keyboard/Mouse Connector | | | |
|--|--------------------|----------------|--------------------|
| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
| 1 | VCC | 2 | Mouse Data |
| 3 | Mouse Clock | 4 | Keyboard Data |
| 5 | Keyboard Clock | 6 | GND |

| J_I2C1/J_SMB1 : 4-pin Header SMBUS Connector | | | |
|---|--------------------|----------------|--------------------|
| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
| 1 | GND | 2 | SMBUS(I2C) DATA |
| 3 | SMBUS(I2C) CLK | 4 | +5V |

Board Layout: Jumper and Connector Locations



(Unit: mm)