

3.5" SBC supports Intel® 14nm Generation Atom™ or Celeron® on-board SoC with DP++/VGA/LVDS/iDP support, Dual PCIe GbE, USB 3.0, PCIe Mini with mSATA support, SATA 6Gb/s, COM, Audio and RoHS

WAFER-AL

Quick Installation Guide

Version 1.0

Sep 13, 2018.

Package List

WAFER-AL package includes the following items:

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



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Specifications

- SoC:
 - Intel® Pentium® N4200 on-board SoC (up to 2.5GHz, quad-core, 2M Cache, TDP=6W)
 - Intel® Celeron® N3350 on-board SoC (up to 2.4GHz, dual-core, 2M Cache, TDP=6W)
- BIOS: AMI UEFI BIOS
- Memory:
 - One 204-pin 1866/1600MHz Single-channel DDR3L DIMMs support up to 8GB
- Graphics Engine:
 - Intel® HD Graphics Gen9 Low Power; 18 Execution Units
 - 4K Codec Decode & Encode for HEVC 4, H.264, VP8, SVC, MVC
- Display Output:
 - Triple Independent Displays
 - 1 x DP++ (up to 4096x2160@60Hz)
 - 1 x VGA (up to 1920x1200@60Hz)
 - 1 x LVDS: 18/24-bit dual-channel LVDS (up to 1920x1200@60Hz)
 - 1 x iDP (colay with VGA, support by request)
- Ethernet: 2 x PCIe GbE LAN Realtek RTL8111 Controller
- External I/O Interfaces:
 - 2 x USB 3.0
- Internal I/O Interfaces:
 - 2 x RS-232 (1x9 pin, P=1.25)
 - 2 x RS-232/422/485 (1x9 pin, P=1.25)
 - 2 x SATA 6G/s with 5V SATA power connector (no RAID)
 - 4 x USB 2.0 (2x4 pin, P=2.0)
- SMBus/I²C: 1 x SMBus/I²C (1x4 pin, P=2.0)
- TPM: 1 x TPM connector (2x10 pin)
- Audio:

- Realtek ALC662 HD codec
1 x Front 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 :
 - 1 x Full/Half-size PCIe Mini slot (supports mSATA, colay with SATA port 2)
 - 1 x Full/Half-size PCIe Mini slot (supports SIM card holder)
 - Digital I/O: 1 x 8-bit digital I/O (2x5 pin)
 - Fan Connector:
 - 1 x System fan connector (1x4 pin)
 - Power supply:
 - +12V DC input power (AT/ATX mode)
 - Watchdog Timer:
 - Software programmable supports 1~255 sec. system reset
 - Operating Temperature: -20°C ~ 70°C
 - Storage Temperature: -20°C ~ 70°C
 - Operation Humidity: 5% ~ 95%, non-condensing
 - Vibration: 3G
 - Dimension: 146mm x 102mm

All the drivers and One Key Recovery utility for the WAFER-AL are available on IEI Resource Download Center. Type WAFER-AL 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-AL-N2-R10:**
3.5" SBC supports Intel® 14nm quad-core Pentium® N4200 2.5GHz on-board SoC with VGA, DP++,LVDS tripple display, Dual PCIe GbE, USB 3.0, PCIe Mini with mSATA support, SATA 6Gb/s, COM, Audio and RoHS
- **WAFER-AL-N1-R10:**
3.5" SBC supports Intel® 14nm dual-core Celeron® N3350 2.4GHz on-board SoC with VGA, DP++,LVDS tripple display, Dual PCIe GbE, USB 3.0, PCIe Mini with mSATA support, SATA 6Gb/s, COM, Audio and RoHS
- **WAFER-AL-N2-iDP-R10:**
3.5" SBC supports Intel® 14nm quad-core Pentium® N4200 2.5GHz on-board SoC with iDP, DP++,LVDS tripple display, Dual PCIe GbE, USB 3.0, PCIe Mini with mSATA support, SATA 6Gb/s, COM, Audio and RoHS
- **WAFER-AL-N1-iDP-R10:**
3.5" SBC supports Intel® 14nm dual-core Celeron® N3350 2.4GHz on-board SoC with iDP, DP++,LVDS tripple display, Dual PCIe GbE, USB 3.0, PCIe Mini with mSATA support, SATA 6Gb/s, COM, Audio and RoHS
- **32007-005200-200-RS:** Audio cable, 300mm, P=2.0
- **32000-070301-RS:** Dual-port USB 2.0 cable, 210mm, P=2.0
- **32005-003500-200-RS:** RS-232/422/485 cable, 250mm, P=1.25
- **TPM-IN02-R20:**
20-pin Infineon TPM2.0 module, software mangement tool, firmware v5.5

Jumpers setting and connectors

LABEL	FUNCTION
J_CMOS1	Clear CMOS Switch
J_ATX_AT1	AT/ATX Power Mode Setting
JP2	LVDS1 Voltage Selection
BL_MODE1	LVDS1 Backlight Mode Selection
SW1	LVDS Panel Resolution Selection
SW2	Serial Port1/2 Transfer Mode Selection
DP1	DP++ Connector
LAN1, LAN2	RJ45 LAN Connector
USB3	External USB 3.0 Connector
USB1 & USB2	Internal USB 2.0 Connector
COM1/2	Internal RS-232/RS-422/RS-485 Serial Port Connector
COM3/4	Internal RS-232 Serial Port Connectors
AUDIO1	Audio Line-In/Out MIC Connector
SATA1/2	Serial ATA 3.0 Connector
SATA_PWR1/2	SATA Power Connector
LVDS1	LVDS connector
INV1	5-pin Header Inverter Connector
CN1	PWR & HDD LED Connector
RST_BTN1	Reset Button Connector
PWR_BTN1	Power Button Connector
PWR1	+12V Power Connector
MINI_PCIE1	Mini PCI-E Card Connector(Support mSATA)
MINI_PCIE2	Mini PCI-E Card Connector(Support SIM Card)
DIO1	Digital Input / Output Connector
J_SMB1	4-pin Header SMBus/I ² C Connector
CPU_FAN1	CPU Fan Connector
SIM1	SIM Card Connector
LED_LAN1, LED_LAN2	LAN Link LED Connector
DP2	Internal DisplayPort Connector
VGA1	15-pin Female Connector (VGA1)
TPM1	Trusted Platform Module Connector

J_CMOS1: Clear CMOS Switch	
PIN NO.	DESCRIPTION
NC (default)	Keep CMOS Setup (Normal Operation)
Press button	Clear CMOS Setup

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

JP2: LVDS1 Voltage Selection	
PIN NO.	DESCRIPTION
Short 1-2	+3.3V LVDS (default)
Short 2-3	+5V LVDS

BL_MODE1 : LVDS1 Backlight Mode Selection	
PIN NO.	DESCRIPTION
Short 1-2	PWM Mode (default)
Short 2-3	DC Mode

SW1: LVDS Panel Resolution Selection	
* ON=0, OFF=1; Single=S, Dual=D	
4-3-2-1	DESCRIPTION
0000	800x600 18bit S (default)
0001	1024x768 18bit S
0010	1024x768 24bit S
0011	1280x768 18bit S
0100	1280x800 18bit S
0101	1280x960 18bit S
0110	1280x1024 24bit D
0111	1366x768 18bit S
1000	1366x768 24bit S
1001	1440x960 24bit D
1010	1400x1050 24bit D
1011	1600x900 24bit D
1100	1680x1050 24bit D
1101	1600x1200 24bit D
1110	1920x1080 24bit D
1111	1920x1200 24bit D

SW2: Serial Port1 Transfer Mode Selection (ON=0 , OFF=1)		
SW2:1	SW2:2	DESCRIPTION
ON	ON	RS422
ON	OFF	RS232 (default)
OFF	ON	RS485

SW2: Serial Port2 Transfer Mode Selection (ON=0 , OFF=1)		
SW2:3	SW2:4	DESCRIPTION
ON	ON	RS422
ON	OFF	RS232 (default)
OFF	ON	RS485

DP1: DP++ Connector		
PIN NO.	HDMI	DisplayPort
1	TMDS DATA2+	L0P
2	GND	GND
3	TMDS DATA2-	L0N
4	TMDS DATA1+	L1P
5	GND	GND
6	TMDS DATA1-	L1N
7	TMDS DATA0+	L2P
8	GND	GND
9	TMDS DATA0-	L2N
10	TMDS CLK+	L3P
11	GND	GND
12	TMDS CLK+	L3N
13	DP_HDMI SEL	DP_HDMI SEL
14	NC	NC
15	SCL	AUXP
16	GND	GND
17	SDA	AUXN
18	HDMI HPD	DP HPD
19	GND	GND
20	HDMI PWR	DP PWR

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	LAN2_MDI0+	7	LAN2_MDI2+
2	LAN2_MDI0-	8	LAN2_MDI2-
3	LAN2_MDI1+	9	LAN2_MDI3+
4	LAN2_MDI1-	10	LAN2_MDI3-

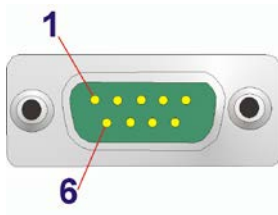
USB3: External USB 3.0 Connector			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	USB_VCC	2	USB2_D0-
3	USB2_D0-	4	GND
5	USB3_RXD0-	6	USB3_RXD0+
7	GND	8	USB3_TXD0-
9	USB3_TXD0+	10	USB_VCC
11	USB2_D1-	12	USB2_D1+
13	GND	14	USB3_RXD1-
15	USB3_RXD1+	16	GND
17	USB3_TXD1-	18	USB3_TXD1+

USB1 & USB2: Internal USB 2.0 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

COM1/2 : Internal RS-232/RS-422/RS-485 Serial Port Connector			
Mode	RS-232	RS-422	RS-485
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

Use the RS-232/422/485 cable to connect to a serial device. The pinouts of the DB-9 connector are listed below.

Mode	RS-232	RS-422	RS-485
PIN NO.	DESCRIPTION	DESCRIPTION	DESCRIPTION
1	DCD	TXD422-	TXD485-
2	RXD	TXD422+	TXD485+
3	TXD	RXD422+	--
4	DTR	RXD422-	--
5	GND	--	--
6	DSR	--	--
7	RTS	--	--
8	CTS	--	--
9	RI	--	--



COM3/4: Internal RS-232 Serial Port Connectors			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	DCD	2	DSR
3	RXD	4	RST
5	TXD	6	CTS
7	DTR	8	RI
9	GND		

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 3.0 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	GND

LVDS1: LVDS connector			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	GND
3	A_Y0#	4	A_Y1#
5	A_Y0	6	A_Y1
7	GND	8	GND
9	A_Y2#	10	A_CK#
11	A_Y2	12	A_CK
13	GND	14	GND
15	A_Y3#	16	B_Y0#
17	A_Y3	18	B_Y0
19	GND	20	GND
21	B_Y1#	22	B_Y2#
23	B_Y1	24	B_Y2
25	GND	26	GND
27	B_CK#	28	B_Y3#
29	B_CK	30	B_Y3
31	GND	32	GND
33	LVDS Detect (GND)*	34	GND
35	LVDS_VCC	36	LVDS_VCC
37	LVDS_VCC	38	LVDS_VCC
39	LVDS_VCC	40	LVDS_VCC

** LVDS Detect must be connected to GND.*

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

CN1: PWR & HDD LED Connector		
	PIN	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	DESCRIPTION
RESET	1	RESET+
	2	RESET-

PWR_BTN1: Power Button Connector		
	PIN	DESCRIPTION
PB_SW1	1	PWR_BTN+
	2	PWR_BTN-

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

MINI_PCIE1: Mini PCI-E Card Connector(Support mSATA)			
PIN	DESCRIPTION	PIN	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	USB D-
37	GND	38	USB D+
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 SIM Card)			
PIN	DESCRIPTION	PIN	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	USB D-
37	GND	38	USB D+
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	GND	2	VCC
3	DOUT3	4	DOUT2
5	DOUT1	6	DOUT0
7	DIN3	8	DIN2
9	DIN1	10	DIN0

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

CPU_FAN1: CPU Fan Connector			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	+12V
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

LED_LAN1: LAN Link LED Connector			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	+3.3V	2	LAN1_LED_LNK#_ACT

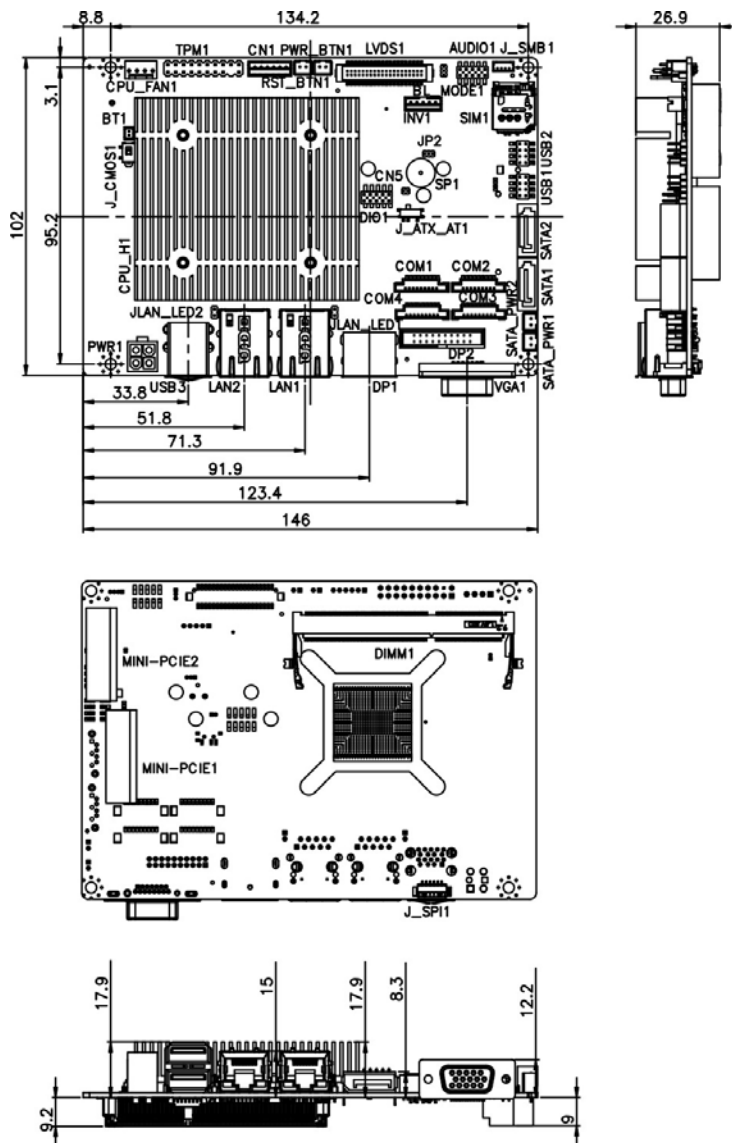
LED_LAN2: LAN Link LED Connector			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	+3.3V	2	LAN2_LED_LNK#_ACT

DP2: Internal DisplayPort Connector			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	HPD	2	AUXP
3	GND	4	AUXN
5	NC	6	GND
7	GND	8	LANE2P
9	LANE3P	10	LANE2N
11	LANE3N	12	GND
13	GND	14	LANE0P
15	LANE1P	16	LANE0N
17	LANE1N	18	+3.3V
19	+5V	20	NC

VGA1: 15-pin Female Connector (VGA1)			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	RED	2	GREEN
3	BLUE	4	NC
5	GND	6	GND
7	GND	8	GND
9	VCC	10	GND
11	NC	12	DDCDA
13	HSYNC	14	VSYNC
15	DDCCLK		

TPM1:Trusted Platform Module Connector			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	LCLK	2	GND
3	LFRAME#	4	KEY
5	LRERST#	6	+5V
7	LAD3	8	LAD2
9	+3.3V	10	LAD1
11	LAD0	12	GND
13	SCL	14	SDA
15	SB3V	16	SERIRQ
17	GND	18	GLKRUN#
19	LPCPD#	20	LDRQ#

Board Layout: Jumper and Connector Locations



Using for 6 W

(Unit: mm)