

EPIC SBC supports 14nm 8th Generation Intel® Core™ i7/i5/i3 or Celeron® on-board Processor (ULT) with HDMI, DP, PCIe Mini, M.2 A-key, USB 3.1 Gen 2, SATA 6Gb/s, COM, Audio and RoHS

NANO-ULT5

Quick Installation Guide

Version 1.0

May 17, 2019

Package List

NANO-ULT5 package includes the following items:

- 1 x NANO-ULT5 single board computer with heat spreader
- 1 x Audio cable
- 1 x Power cable
- 1 x RS-232 cable
- 1 x RS-422/485 cable
- 1 x SATA and power cable
- 1 x QIG (Quick Installation Guide)



©2019 Copyright by IEI Integration Corp.
All rights reserved.

Specifications

- SoC:
 - 8th generation Intel® mobile ULT on-board SoC
 - Intel® Core™ i7-8665UE Processor
 - Intel® Core™ i5-8365UE Processor
 - Intel® Core™ i3-8145UE Processor
 - Intel® Celeron® Processor 4305UE
- BIOS: AMI UEFI BIOS
- Memory:
 - Two 260-pin 2400/2133 MHz dual-channel DDR4 SO-DIMMs (system max. 32GB)
- Graphics Engine:
 - Intel® HD Graphics Gen 9 Engine with 16 low-power execution units, 4K codec decoding
- Display Output:
 - Triple independent display
 - 1 x HDMI (up to 3840x2160@60Hz)
 - 1 x DisplayPort (up to 3840x2160@60Hz)
 - 1 x 18/24-bit dual-channel LVDS by CH7511B DP to LVDS converter (up to 1920x1200@60Hz)
- Ethernet:
 - LAN1: Intel® I219-LM PHY
 - LAN2: Intel® I211-AT PCIe GbE controller
- External I/O Interfaces:
 - 4 x USB 3.1 Gen 2
 - 1 x RS-232
- Internal I/O Interfaces:
 - 1 x KB/MS (1x6 pin)
 - 1 x RS-232 (1x9 pin, P=1.25mm)
 - 1 x RS-422/485 (1x4 pin, P=2.0mm)
 - 2 x USB 2.0 (2x4 pin, P=2.0mm)

- 2 x SATA 6G/s with 5V SATA power connector
- SMBus: 1 x SMBus (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)
- Expansions :
 - 1 x M.2 2230 A-key slot
 - 1 x M.2 2280 M-key slot
 - 1 x Full-size PCIe Mini slot (with SIM holder)
- Digital I/O: 1 x 8-bit digital I/O (2x5 pin)
- 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@6.62A (4.6 GHz Intel® Core™ i7-8665UE CPU with two 16 GB 2666 MHz DDR4 memory modules)
- 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: 115mm x 165mm
- Weight(GW/ NW): 850g/ 350g

Ordering Information

- **NANO-ULT5-i7-R10:**

EPIC SBC supports 14nm 8th Generation Intel® Core™ i7-8665UE (15W) on-board processor (ULT) with HDMI/LVDS/DP, Dual PCIe GbE, USB 3.1 Gen 2, M.2 A-key & M-key, PCIe Mini, SATA 6Gb/s, COM, SPI TPM, Audio and RoHS

- **NANO-ULT5-i5-R10:**

EPIC SBC supports 14nm 8th Generation Intel® Core™ i5-8365UE (15W) on-board processor (ULT) with HDMI/LVDS/DP, Dual PCIe GbE, USB 3.1 Gen 2, M.2 A-key & M-key, PCIe Mini, SATA 6Gb/s, COM, SPI TPM, Audio and RoHS

- **NANO-ULT5-i3-R10:**

EPIC SBC supports 14nm 8th Generation Intel® Core™ i3-8145UE (15W) on-board processor (ULT) with HDMI/LVDS/DP, Dual PCIe GbE, USB 3.1 Gen 2, M.2 A-key & M-key, PCIe Mini, SATA 6Gb/s, COM, SPI TPM, Audio and RoHS

- **NANO-ULT5-C-R10:**

EPIC SBC supports 14nm 8th Generation Intel® Celeron® 4305UE (15W) on-board processor (ULT) with HDMI/LVDS/DP, Dual PCIe GbE, USB 3.1 Gen 2, M.2 A-key & M-key, PCIe Mini, SATA 6Gb/s, COM, SPI TPM, Audio and RoHS

All the drivers and One Key Recovery utility for the NANO-ULT5 are available on IEI Resource Download Center. Type NANO-ULT5 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>



Jumpers setting and connectors

LABEL	FUNCTION
J_ATX_AT1	Power mode switch
J_CMOS1	Clear CMOS button
BL_MODE1	LVDS backlight mode selection jumper
SW1	LVDS panel resolution selection switch
JP1	LVDS voltage selection jumper
ME_FLASH1	ME override jumper
DP1	External DisplayPort connector
HDMI1	External HDMI connector
LAN1_2	LAN1 & LAN2 GbE RJ-45 connectors
COM1	External RS-232 connector
USB1, USB2	External USB 3.1 Gen 2 connectors
AUDIO1	Audio connector
BAT1	Battery connector
DIO1	Digital I/O connector
F_PANEL1	Front panel connector
J_KB/MS1	Keyboard/Mouse connector
JLAN_LED1, JLAN_LED2	LAN LED connector
LVDS1	LVDS connector
INV1	LVDS backlight connector
M2_A1	M.2 2230 A-key slot
M2_M2	M.2 2280 M-key slot
MINI_PCIE1	PCIe Mini card slot
PWR_BTN1	Power button connector
PWR2	Power source connector
RST_BTN1	Reset button connector
COM2	Internal RS-232 serial port connector
COM3	Internal RS-422/485 serial port connector
SATA1, SATA2	Serial ATA connector
SATA_PWR1, SATA_PWR2	SATA power connector
SMB1	SMBus connector
CPU/FAN1	Smart fan connector
JSPI1	SPI flash connector

SIM1	SIM card holder
USB3	Internal USB 2.0 connector
TPM1	TPM module connector

J_ATX_AT1: Power Mode Switch	
PIN NO.	DESCRIPTION
Short A - B	ATX Power Mode (Default)
Short B - C	AT Power Mode

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

JP1: LVDS Voltage Selection	
PIN NO.	DESCRIPTION
Short 1 - 2	+3.3 V (Default)
Short 2 - 3	+5 V

BL_MODE1: LVDS Backlight Mode Selection	
PIN NO.	DESCRIPTION
Short 1 - 2	PWM mode (Default)
Short 2 - 3	DC mode

ME_FLASH1: ME Override	
PIN NO.	DESCRIPTION
1	SRC_RST_N
2	GND

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	1440x900 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

DP1: DisplayPort Connector			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	DATA_0P	2	GND
3	DATA_0N	4	DATA_1P
5	GND	6	DATA_1N
7	DATA_2P	8	GND
9	DATA_2N	10	DATA_3P
11	GND	12	DATA_3N
13	CONFIG1	14	CONFIG2
15	AUX_P	16	GND
17	AUX_N	18	DP_HPD
19	GND	20	DP PWR

HDMI1: HDMI Connector			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	HDMI_DATA2	2	GND
3	HDMI_DATA2#	4	HDMI_DATA1
5	GND	6	HDMI_DATA1#
7	HDMI_DATA0	8	GND
9	HDMI_DATA0#	10	HDMI_CLK
11	GND	12	HDMI_CLK#
13	N/C	14	N/C
15	HDMI_SCL	16	HDMI_SDA
17	GND	18	+5V
19	HDMI_HPD		

LAN1_2: RJ-45 LAN Connectors			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
B1	LAN1_MDI0+	B2	LAN1_MDI0-
B3	LAN1_MDI1+	B4	LAN1_MDI1-
B5	NC	B6	NC
B7	LAN1_MDI2+	B8	LAN1_MDI2-
B9	LAN1_MDI3+	B10	LAN1_MDI3-
B11	LAN1_ACT+	B12	LAN1_ACT-
B13	LAN1_10/100	B14	LAN1_GIGA
A1	LAN2_MDI0+	A2	LAN2_MDI0-
A3	LAN2_MDI1+	A4	LAN2_MDI1-
A5	NC	A6	NC
A7	LAN2_MDI2+	A8	LAN2_MDI2-
A9	LAN2_MDI3+	A10	LAN2_MDI3-
A11	LAN2_ACT+	A12	LAN2_ACT-
A13	LAN2_10/100	A14	LAN2_GIGA

USB1, USB2: External USB 3.0 Gen 2 Connectors			
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 RS-232 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		

AUDIO1: Audio 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

DIO1: Digital Input / Output Connector			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	+5V
3	DOUT3	4	DOUT2
5	DOUT1	6	DOUT0
7	DIN3	8	DIN2
9	DIN1	10	DIN0

F_PANEL1: Front Panel Connector			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	VCC	2	GND
3	PWR_LED+	4	PWR_LED-
5	HDD_LED+	6	HDD_LED-

JLAN_LED1, JLAN_LED2: LAN LED Connector			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	LED+	2	LED-

LVDS1: LVDS Connector			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GROUND	2	GROUND
3	LVDS_A_TX0-N	4	LVDS_A_TX1-N
5	LVDS_A_TX0-P	6	LVDS_A_TX1-P
7	GROUND	8	GROUND
9	LVDS_A_TX2-N	10	LVDS_A_TXCLK-N
11	LVDS_A_TX2-P	12	LVDS_A_TXCLK-P
13	GROUND	14	GROUND
15	LVDS_A_TX3-N	16	LVDS_B_TX0-N
17	LVDS_A_TX3-P	18	LVDS_B_TX0-P
19	GROUND	20	GROUND
21	LVDS_B_TX1-N	22	LVDS_B_TX2-N
23	LVDS_B_TX1-P	24	LVDS_B_TX2-P
25	GROUND	26	GROUND
27	LVDS_B_TXCLK-N	28	LVDS_B_TX3-N
29	LVDS_B_TXCLK-P	30	LVDS_B_TX3-P
31	GROUND	32	GROUND
33	GROUND	34	GROUND
35	+LCD VCC	36	+LCD VCC
37	+LCD VCC	38	+LCD VCC
39	+LCD VCC	40	+LCD VCC

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

J_KB/MS1: Keyboard/Mouse Connector			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	VCC	2	MSDATA
3	MCLK	4	KBDATA
5	KBCLOCK	6	GND

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

PWR2: +12V Power Connector			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	GND
3	+12V	4	+12V

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

COM2: Internal RS-232 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		

COM3: Internal RS-422/485 Serial Port Connector			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	RXD422-	2	RXD422+
3	TXD422+	4	TXD422-

SATA1, SATA2: Serial ATA Connector			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	TX+
3	TX-	4	GND
5	RX-	6	RX+
7	GND		

SATA_PWR1, SATA_PWR2: SATA Power Connector			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	+5V	2	GND

SMB1: SMBus Connector			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	SMBUS (I ² C) CLOCK
3	SMBUS (I ² C) DATA	4	+5V

CPU/FAN1: Smart Fan Connector			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	+12V
3	Rotation Signal	4	PWM Control Signal

JSPI1: SPI Flash Connector			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	+3.3V	2	SPI_CS#_SW
3	SPI_SO_SW	4	SPI_CLK_SW
5	SPI_SI_SW	6	GND

USB3: Internal USB 2.0 Connector			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	VCC	2	GND
3	DATA-	4	DATA+
5	DATA+	6	DATA-
7	GND	8	VCC

BAT1: BAT Connector			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	VBATT	2	GND

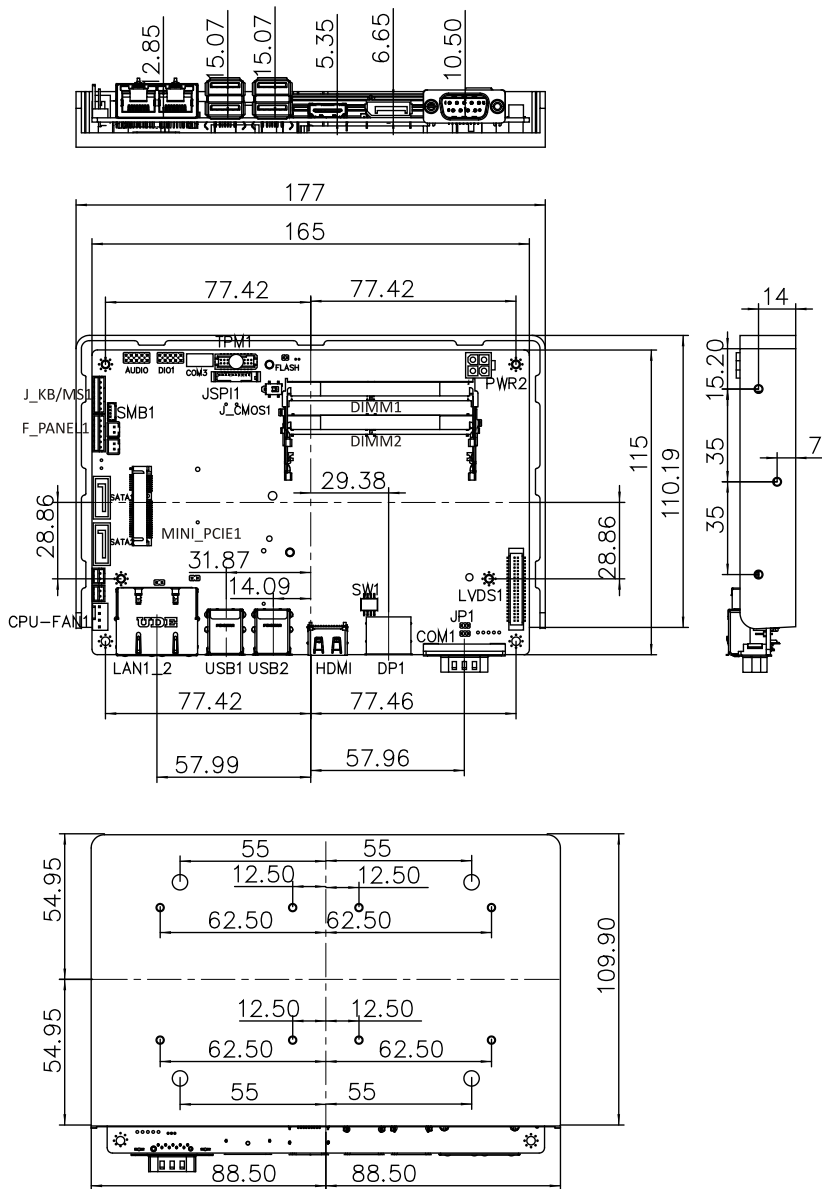
TPM1: TPM Module Connector			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	NC	2	SPI_CS#_SW
3	TPM_CLK_SW	4	SPI_TPM_CS1
5	GND	6	+3.3V
7	TPM_CLK_SW	8	SPI_TPM_DQ2
9	SPI_TPM_DQ2	10	TPM_SO_SW
11	SPI_TPM_HOLD_N	12	TPM_SI_SW
13	SPI_TPM_CS2	14	GND
15	SPI_TPM_WP	16	SER_IRQ
17	SPI_TPM_INT_N	18	+3.3V
19	PCIE_RST#	20	VCC_SPI_TPM_R

MINI_PCIE1: PCIe Mini Card Slot (Full-Size)			
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	SIM_PWR
9	GND	10	SIM_DATA
11	PCIE_CLK#	12	SIM_CLK
13	PCIE_CLK	14	SIM_RST
15	GND	16	SIM_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

M2_A1: M.2 2230 A-key Slot			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
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_TX0+	36	GND
37	PCIE_TX0-	38	NC
39	GND	40	NC
41	PCIE_RX0+	42	NC
43	PCIE_RX0-	44	NC
45	GND	46	NC
47	CLK_PCIE0+	48	NC
49	CLK_PCIE0-	50	NC
51	GND	52	BUF_PLT_RST#
53	PCIE_CLKREQ#	54	Pull Up +V3.3A
55	PCIE_WAKE#	56	Pull Up +V3.3A
57	GND	58	NC
59	PCIE_TX1+	60	NC
61	PCIE_TX1-	62	NC
63	GND	64	NC
65	PCIE_RX1+	66	NC
67	PCIE_RX1-	68	NC
69	GND	70	NC
71	CLK_PCIE1+	72	+V3.3A
73	CLK_PCIE1-	74	+V3.3A
75	GND		

M2_M2: M.2 2280 M-key Slot			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	+3.3V
3	GND	4	+3.3V
5	PCIE_RXN3	6	N/C
7	PCIE_RXP3	8	N/C
9	GND	10	DAS/DSS#
11	PCIE_TXN3	12	+3.3V
13	PCIE_TXP3	14	+3.3V
15	GND	16	+3.3V
17	PCIE_RXN2	18	+3.3V
19	PCIE_RXP2	20	N/C
21	GND	22	N/C
23	PCIE_TXN2	24	N/C
25	PCIE_TXP2	26	N/C
27	GND	28	N/C
29	PCIE_RXN1	30	N/C
31	PCIE_RXP1	32	N/C
33	GND	34	N/C
35	PCIE_TXN1	36	N/C
37	PCIE_TXP1	38	DEVSLP
39	GND	40	N/C
41	PCIE_RXN0	42	N/C
43	PCIE_RXP0	44	N/C
45	GND	46	N/C
47	PCIE_TXN0	48	N/C
49	PCIE_TXP0	50	PERST#
51	GND	52	CLKREQ#
53	REFCLKN	54	PEWAKE
55	REFCLKP	56	N/C
57	GND	58	N/C
59	Module Key	60	Module Key
61	Module Key	62	Module Key
63	Module Key	64	Module Key
65	Module Key	66	Module Key
67	N/C	68	SUSCLK
69	PEDET	70	+3.3V
71	GND	72	+3.3V
73	GND	74	+3.3V
75	GND		

Board Layout: Jumper and Connector Locations



(Unit: mm)