

**EPIC SBC supports Socket G2 for Intel® 2nd generation Core™ i7/i5/i3 and Celeron® CPU, VGA/HDMI, Dual PCIe GbE, USB 2.0, PCI-104, SATA 6Gb/s and Audio**

# **NANO-HM650**

## **Quick Installation Guide**

**Version 1.1**

Mar 27, 2014.

### **Package List**

NANO-HM650-R11 package includes the following items:

- 1 x NANO-HM650 Single Board Computer
- 2 x SATA with Power Cable kit (P/N: 32801-000201-100-RS)
- 1 x Audio Cable (P/N: 32000-072100-RS)
- 1 x Power Cable (P/N: 32100-087100-RS)
- 2 x RS-232 Cable (P/N: 32205-002700-100-RS)
- 1 x Mini Jumper Pack
- 1 x Utility CD
- 1 x QIG (Quick Installation Guide)



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## Specifications

- CPU:  
Socket G2 for 2nd generation Intel® Core™ i7/i5/i3 and Celeron® mobile processor
- System Chipset: Intel® HM65
- System Memory:  
One 204-pin 1066/1333 MHz DDR3 SO-DIMMs supported (system max. 4GB)
- BIOS: UEFI BIOS
- Ethernet: Dual PCIe LAN controller by Realtek RTL8111E with ASF 2.0 support
- Display Output:  
Analog CRT by VGA connector (2048x1536)  
18/24 bits Dual channel LVDS (1600x1200)  
HDMI supports resolution up to 1080p
- Super I/O: Fintek F81866
- Audio:  
Realtek ALC662 HD codec on board
- I/O Interface:  
1 x 6-pin header for KB/MS  
2 x RS-232  
1 x RS-422/485  
2 x SATA 6Gb/s with 5V SATA power connector  
8 x USB 2.0
- Expansion:  
1 x Mini PCIe card slot  
1 x PCI-104 slot
- Watchdog Timer:  
Software programmable support 1~255 sec. System reset
- Programmable GPIO: 8-bit digital I/O
- FAN:  
1 x 4-pin CPU Fan Connector

1 x 3-pin system Fan Connector

- Power supply: 12V only, AT/ATX support
- Power Consumption:  
12V@4.85A (2.6GHz Intel® Core i5-2540M with DDR3  
1333MHz 4GB SO-DIMM))
- Operation Temperature: -10°C ~ 60°C
- Operation Humidity: 5% ~ 95%, non-condensing
- Dimensions: 115mm x 165mm
- Weight GW/NW: 850g / 350g

## Ordering Information

- **NANO-HM650-R11:**  
EPIC SBC supports Socket G2 for Intel® 2nd generation Core™ i7/i5/i3 and Celeron® CPU, VGA/HDMI, Dual PCIe GbE, USB 2.0, PCI-104, SATA 6Gb/s and Audio
- **32001-008600-100-RS:** Dual port USB cable
- **32100-043403-RS:** ATX Power cable
- **32205-003800-100-RS:** RS-422/485 cable
- **32000-023800-RS:** KB/MS cable
- **CF-989A-RS-R12:** CPU Cooler for mobile socket-G up to 55W processor, Copper, 60 x 60 x 27.6mm

## Jumpers setting and connectors

LABEL	FUNCTION
J_ATXCTL1	AT/ATX Power Select
J_AUTOPWR1	AT Auto Button Power Select
ME_RTC2	Clear CMOS setup
J_PID1	LCD Panel Type
J_VLVDS1	LVDS LCD Voltage Select
ME_RTC1	ME RTC Register
JP1	PCI-104 Power Select
AUDIO1	Audio connector
INV1	Backlight inverter connector
BAT1	Battery connector
JSPI1	BIOS update connector
DIMM1	DDR3 SO-DIMM socket
DEBUGCN1	Debug port connector
DIO1	Digital I/O connector
CPU_FAN1	Fan connector (CPU)
SYS_FAN1	Fan connector (system)
F_PANEL1	Front panel connector
KB_MS1	Keyboard and mouse connector
LVDS1	LVDS LCD connector
PC104_PLUS1	PCI-104 slot
MINI_PCIE1	PCIe mini card slot
PWR2	Power connector
COM1, COM2	Internal Serial Port Connectors (RS-232)
COM4	Internal Serial Port Connector (RS-422/485)
S_ATA1, S_ATA2	Serial ATA 6Gb/s Connector
CN5, CN9	SATA power connectors
SMBUS_1	SMBus connector
TPM1	TPM connector
USB4_5, USB8_9	Internal USB2.0 connector
LAN1, LAN2	RJ-45 LAN Connectors

HDMI1	HDMI connector
USB0_1, USB2_3	External USB2.0 connector
VGA1	VGA connector

<b>J_ATXCTL1: AT/ATX Power Select</b>	
<b>PIN NO.</b>	<b>DESCRIPTION</b>
1 - 2	ATX Mode (default)
2 - 3	AT Mode

<b>J_AUTOPWR1: AT Auto Button Power Select</b>	
<b>PIN NO.</b>	<b>DESCRIPTION</b>
Short	AT Mode
Open	ATX Mode (default)

<b>J_PID1: LCD Panel Type</b>	
<b>PIN NO.</b>	<b>DESCRIPTION</b>
Open	640 x 480 (18-bit)
1-2	800 x 600 (18-bit) (default)
3-4	1024 x 768 (18-bit)
1-2 and 3-4	1024 x 768 (24-bit)
5-6	1024 x 768 (48-bit)
1-2 and 5-6	1280 x 1024 (48-bit)
3-4 and 5-6	1600 x 1200 (48-bit)
1-2 and 3-4 and 5-6	1280 x 768 (18-bit)
7-8	1200 x 800 (18-bit)
1-2 and 7-8	1366 x 768 (24-bit)
3-4 and 7-8	1440 x 900 (36-bit)
1-2 and 3-4 and 7-8	1440 x 900 (48-bit)
5-6 and 7-8	1680 x 1050 (48-bit)
1-2 and 5-6 and 7-8	1920 x 1080 (48-bit)
3-4 and 5-6 and 7-8	1920 x 1200 (48-bit)

<b>ME_RTC2: Clear CMOS Setup</b>	
<b>PIN NO.</b>	<b>DESCRIPTION</b>
1-2	Keep CMOS Setup (default)
2-3	Clear CMOS Setup

<b>J_VLVDS1: LVDS LCD Voltage Select</b>	
<b>PIN NO.</b>	<b>DESCRIPTION</b>
1-2	+3.3 V (default)
3-4	+5 V
5-6	+12 V

<b>ME_RTC1: ME RTC Register</b>	
<b>PIN NO.</b>	<b>DESCRIPTION</b>
1-2	No OverWrite (default)
2-3	Clear ME RTC registers

<b>JP1: PCI-104 Power Select</b>	
<b>PIN NO.</b>	<b>DESCRIPTION</b>
2-3	+3.3V (default)
1-2	+5V

<b>AUDIO1: Audio connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	LFRONT-R	2	LLINE-R
3	GND	4	GND
5	LFRONT-L	6	LLINE-L
7	GND	8	GND
9	LMIC1-CONN-R	10	LMIC1-CONN-L

<b>BAT1 : Battery connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	Battery+	2	Ground

<b>INV1 : Backlight Inverter Connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	LCD_ADJ	2	GND
3	+12 V	4	GND
5	BL_EN		

<b>JSPI1: BIOS update connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	+SPI_VCC	2	SPI_CS#0_CN
3	SPI_SO0_CN	4	SPI_CLK0_CN
5	SPI_SI0_CN	6	GND

<b>DEBUGCN1: Debug port connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	PLT_RST#	2	LPC_DEBUG_CLK
3	GND	4	LPC_AD3
5	LPC_AD2	6	LPC_AD1
7	LPC_AD0	8	LPC_FRAME#
9	+3.3V		

<b>DIO1: Digital I/O Connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	GND	2	+5V
3	DGPO3	4	DGPO2
5	DGPO1	6	DGPO0
7	DGPI3	8	DGPI2
9	DGPI1	10	DGPI0

<b>CPU_FAN1 : Fan connector (CPU)</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	GND	2	+12V
3	FANIO1	4	FANOUT1



<b>SYS_FAN1 : Fan connector (system)</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	NC	2	+12V
3	GND		

**F\_PANEL1: Front Panel Connector**

	<b>PIN</b>	<b>DESCRIPTION</b>	<b>PIN</b>	<b>DESCRIPTION</b>	
Power Button	1	PWRBTN_SW#	2	+V5S	Power LED
	3	GND	4	GND	
SATA LED	5	+V5S	6	EXTRST-	Reset
	7	SATA_LED#	8	GND	

**LVDS1: LVDS LCD connector**

<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	GND	2	GND
3	LVDSA_DATA0	4	LVDSA_DATA0#
5	LVDSA_DATA1	6	LVDSA_DATA1#
7	LVDSA_DATA2	8	LVDSA_DATA2#
9	LVDSA_CLK	10	LVDSA_CLK#
11	LVDSA_DATA3	12	LVDSA_DATA3#
13	GND	14	GND
15	LVDSB_DATA0	16	LVDSB_DATA0#
17	LVDSB_DATA1	18	LVDSB_DATA1#
19	LVDSB_DATA2	20	LVDSB_DATA2#
21	LVDSB_CLK	22	LVDSB_CLK#
23	LVDSB_DATA3	24	LVDSB_DATA3#
25	GND	26	GND
27	VCC_LCD	28	VCC_LCD
29	VCC_LCD	30	VCC_LCD

<b>KB_MS1: Keyboard and mouse connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	VCC5_KBMS	2	MSDATA
3	MSCLK	4	KBDATA
5	KBCLK	6	GND

<b>PWR2 : Power connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	GND	2	GND
3	+V12A_VIN	4	+V12A_VIN

<b>COM1: Internal Serial Port Connector (RS-232)</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	NDCD1	5	NRXD1
2	NTXD1	6	NDTR1
3	GND	7	NDSR1
4	NRTS1	8	NCTS1
9	NR11	10	GND

<b>COM2: Internal Serial Port Connector (RS-232)</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	NDCD2	5	NRXD2
2	NTXD2	6	NDTR2
3	GND	7	NDSR2
4	NRTS2	8	NCTS2
9	NR12	10	GND

<b>COM4 : Internal Serial Port Connector (RS-422/485)</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	RXD485#	2	RXD485+
3	TXD485+	4	TXD485#

<b>CN5, CN9 : SATA power connectors</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	+5V	2	GND

<b>SMBUS_1 : SMBus Connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	+5V_DUAL	2	SMBCLK_RESUME
3	SMBDATA_RESUME	4	GND

<b>TPM1: TPM Connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	TPMPCLK	2	GND
3	LPC_FRAME#	4	NC
5	BUF_PCIRST#	6	+5V
7	LPC_AD3	8	LPC_AD2
9	+3.3V	10	LPC_AD1
11	LPC_AD0	12	GND
13	SMBCLK	14	SMBDATA
15	+3V_DUAL	16	SERIRQ
17	GND	18	+3.3V
19	LPCPD_N	20	LDRQ0#

<b>USB4_5: Internal USB2.0 connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	+5V	2	GND
3	USB20_C_N4	4	USB20_C_P5
5	USB20_C_P4	6	USB20_C_N5
7	GND	8	+5V

<b>USB8_9: Internal USB2.0 connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	+5V	2	GND
3	USB20_C_N8	4	USB20_C_P9
5	USB20_C_P8	6	USB20_C_N9
7	GND	8	+5V

<b>LAN1: 1000M-LAN RJ45 Connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	MDI0+	2	MDI0-
3	MDI1+	4	MDI1-
5	GND	6	GND
7	MDI2+	8	MDI2-
9	MDI3+	10	MDI3-
11	LINK100	12	LINK1000
13	ACT	14	+V3.3A_LAN1
15	GND	16	GND

<b>LAN2: 1000M-LAN RJ45 Connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	MDI0+	2	MDI0-
3	MDI1+	4	MDI1-
5	GND	6	GND
7	MDI2+	8	MDI2-
9	MDI3+	10	MDI3-
11	LINK100	12	LINK1000
13	ACT	14	+V3.3A_LAN1
15	GND	16	GND

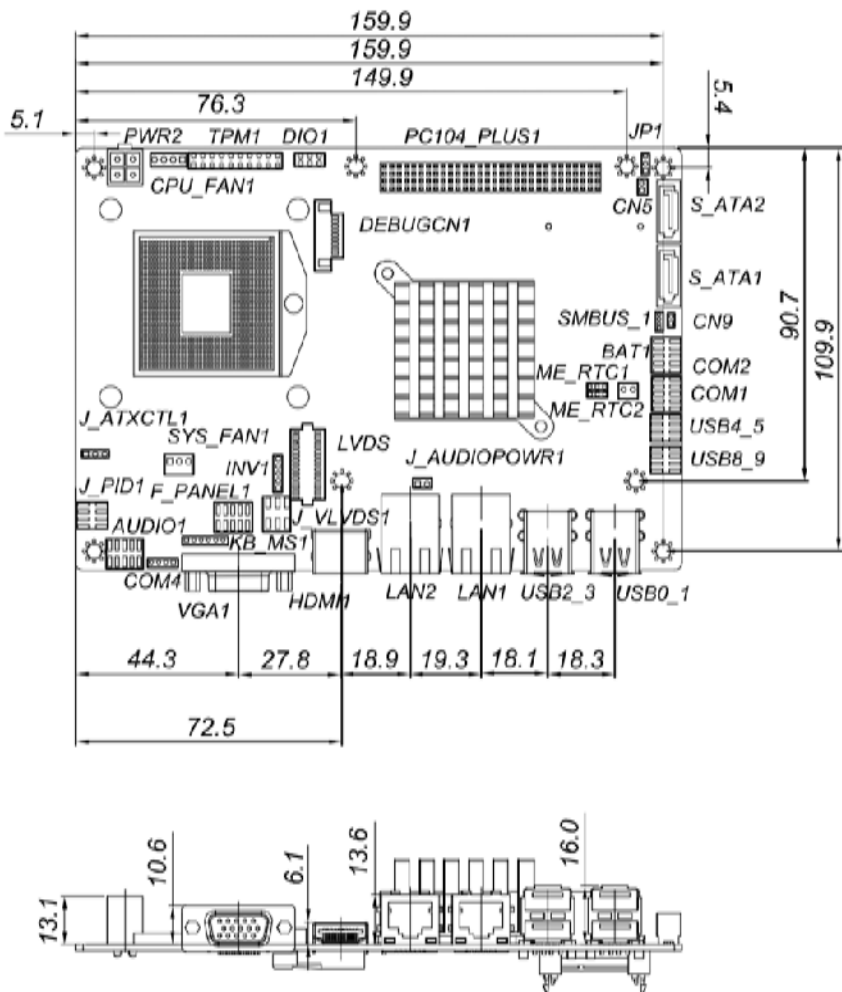
<b>HDMI1: HDMI connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	HDMI_DATA2	2	GND
3	HDMI_DATA2#	4	HDMI_DATA1
5	GND	6	HDMI_DATA1#
7	HDMI_DATA2	8	GND
9	HDMI_DATA2#	10	HDMI_CLK
11	GND	12	HDMI_CLK#
13	NC	14	NC
15	HDMI_SCL	16	HDMI_SDA
17	GND	18	+5V
19	HDMI_HPDP		

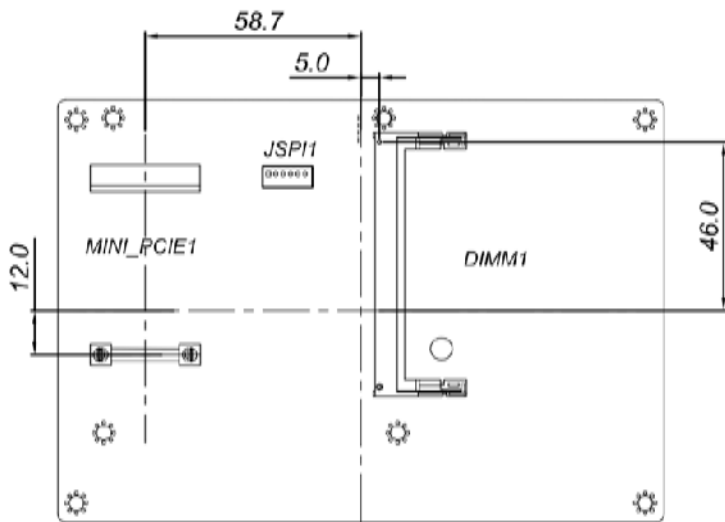
<b>USB0_1: External USB2.0 connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	+5V	2	USB_PN0
3	USB_PP0	4	GND
5	+5V	6	USB_PN1
7	USB_PP1	8	GND

<b>USB2_3: External USB2.0 connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	+5V	2	USB_PN2
3	USB_PP2	4	GND
5	+5V	6	USB_PN3
7	USB_PP3	8	GND

<b>VGA1: VGA connector</b>			
<b>PIN NO.</b>	<b>DESCRIPTION</b>	<b>PIN NO.</b>	<b>DESCRIPTION</b>
1	RED	2	GREEN
3	BLUE	4	NC
5	GND	6	GND
7	GND	8	GND
9	VGAVCC	10	HOTPLUG
11	NC	12	DDCDAT
13	HSYNC	14	VSYNC
15	DDCCLK		

# Board Layout: Jumper and Connector Locations





(Unit: mm)