COM Express

# nanoX Starter Kit

# Quick Start Guide


Manual Revision: 2.01
Revision Date: July 11, 2012
Part Number: 50-1J032-1010

Revision History

| Revision | Date | Changes |
|---|---|---|
| 2.00 | 2010/11/25 | Initial Release |
| 2.01 | 2012/07/11 | Add support for Type 10 modules (PCB rev. A2) |

# Preface



## Disclaimer

The information in this document is subject to change without prior notice in order to improve reliability, design, and function and does not represent a commitment on the part of the manufacturer.

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ADLINK is committed to fulfill its social responsibility to global environmental preservation through compliance with the European Union's Restriction of Hazardous Substances (RoHS) directive and Waste Electrical and Electronic Equipment (WEEE) directive. Environmental protection is a top priority for ADLINK. We have enforced measures to ensure that our products, manufacturing processes, components, and raw materials have as little impact on the environment as possible. When products are at their end of life, our customers are encouraged to dispose of them in accordance with the product disposal and/or recovery programs prescribed by their nation or company.

## Electrostatic Sensitive Device (ESD)

Always ground yourself to remove any static charge before touching the module or carrier board. Modern electronic devices are very sensitive to static electric charges. Use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag when they are not installed in a chassis.

# Conventions

Take note of the following conventions used throughout this manual to make sure that tasks and instructions are performed properly.

NOTE:

Additional information, aids, and tips that help perform specific tasks.

CAUTION:

Critical information that users MUST know and instructions that users MUST perform to complete a task.

WARNING:

Information to prevent physical injury, data loss, component damage, program corruption, etc. when trying to complete a specific task.

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# Table of Contents

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# 1 Introduction

## 1.1 Overview

The nanoX Starter Kit is intended for testing and verification of COM Express systems based on Type 1 and Type 10 modules and complies with the PICMG® COM.0 R1.0 and R2.0 specification. It includes everything customers need to begin their own design and development.

The nanoX Starter Kit includes the nanoX-BASE standard ATX size COM Express reference carrier board, a Mini size COM Express module of your choice, and additional items such as cabling, power supply and thermal solution. The complete kit allows customers to quickly emulate the functionality of their end product for software development and hardware verification. Drivers, BSPs, design files (including schematics, mechanical drawings and BOM), certificates and test reports are included to assist customers in designing their own custom carrier board. The nanoX Starter Kit also includes additional development tools including a verified 10.1" LVDS flat panel display, an LVDS-to-TTL conversion board, and ADD2 DVI card.

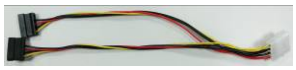
## 1.2 How to order the nanoX Starter Kit

## 1.3 What's included in the nanoX Starter Kit?

**Standard Items**

| No. | Photo | ADLINK P/N | Item Description |
|---|---|---|---|
| 1 |  | 91-77102-0010 | nanoX-BASE Reference Carrier Board |
| 2 |  | 29-90100-F000 | 10.1” LVDS flat panel display (1024 x 600) HSD100IFW1-A00 |
| 3 |  | 91-79203-0010 | Flat Panel Transfer Board for LVDS to TTL signal conversion |
| 4 |  | 92-94046-0010 | ADD2 DVI Adapter card (FI-CH7307) |
| 5 |  | 29-024L0-0010. | USB flash drive |
| 6 |  | 31-32210-1000 | Power supply |

### Standard Cabling

| Photo | Part No. | Item Description |
|---|---|---|
|  | 30-20243-2000 | LVDS panel cable |
|  | 30-20449-0000 | FPTB LVDS-to-LVDS cable |
|  | 30-30012-0000 | SDVO flat cable |
|  | 30-10057-5010 | 7P SATA cable |
|  | 30-20171-1000 | 4-pin Molex to 2x SATA Power cable |
|  | 30-01068-0000 | USB 2.0 Type A to mini-B cable 2m |
|  | 30-10014-3000 | LPT Flat cable IDC to DB25, L=215mm |
|  | 30-20027-3000 | PSU converter cable for AT mode using ATX power supply (no 5Vsb) |
|  | 30-00001-0030 | US Power Cord 10A,125V |
|  | 30-00002-0010 | EU Power Cord 220V |

## Optional Items

| Type 1 Modules | | |
|---|---|---|
| Photo | Part No. | Item Description |
|  | 91-72301-1030 | **nanoX-ML-53-512(G)** Mini size COM Express Type 1 Module with Intel Atom Processor Z530 at 1.6GHz, 512 MB memory |
| | 91-72301-1130 | **nanoX-ML-53-512/4G(G)** Mini size COM Express Type 1 Module with Intel Atom Processor Z530 at 1.6GHz, 512 MB memory and 4 GB SSD |
| | 91-72301-3130 | **nanoX-ML-51-512/4G(G)** Mini size COM Express Type 1 Module with Intel Atom Processor Z510 at 1.1GHz, 512 MB memory and 4 GB SSD |
| | 91-72301-4030 | **nanoX-ML-53P-512/4G(G)** Mini size COM Express Type 1 Module with Intel Atom Processor Z530 at 1.6GHz, 512 MB memory, 4 GB SSD and 2 PCIe x1 |
|  | 91-95041-1010 | **THS-nML-B** Low profile heatsink for nanoX-ML with threaded standoffs |
| | 91-95041-0010 | **HTS-nML-B** Heatspreader for nanoX-ML with threaded standoffs |

| Type 10 Modules | | |
|---|---|---|
| Photo | Part No. | Item Description |
|  | 91-72302-2010 | **nanoX-TC-E680-1G**<br>Mini size COM Express Type 10 Module with Intel Atom Processor E680 processor at 1.6GHz and PCH EG20T |
| | 91-72302-3010 | **nanoX-TC-E660-1G**<br>Mini size COM Express Type 10 Module with Intel Atom Processor E660 processor at 1.3GHz and PCH EG20T |
| | 91-72302-6010 | **nanoX-TC-E640-1G**<br>Mini size COM Express Type 10 Module with Intel Atom Processor E640 processor at 1.1GHz and PCH EG20T |
| | 91-72302-7010 | **nanoX-TC-E620-1G**<br>Mini size COM Express Type 10 Module with Intel Atom Processor E620 processor at 600 MHz and PCH EG20T |
| | 91-95085-1010 | **THS-nXTC-B**<br>Multidirectional Heatsink for nanoX-TC with threaded standoffs for bottom mounting |
| | 91-95085-0010 | **HTS-nXTC-B**<br>Heatspreader for nanoX-TC with threaded standoffs for bottom mounting |
| | 91-95085-0210 | **HTS-nXTC-BT**<br>Heatspreader for nanoX-TC with threaded standoffs for top mounting |

# 2 Getting Started

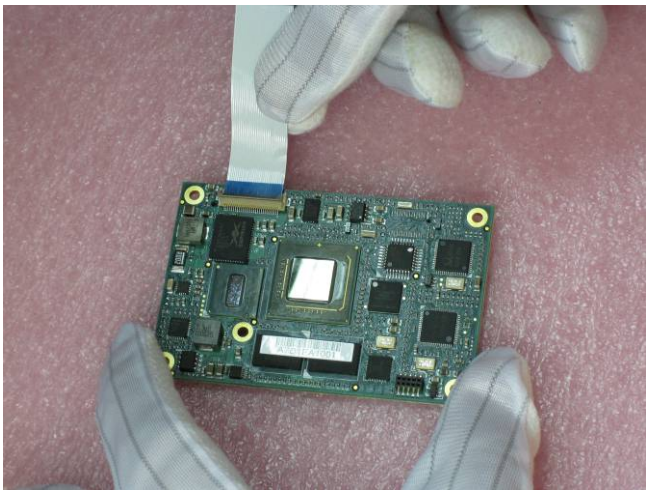
## 2.1 Unpacking

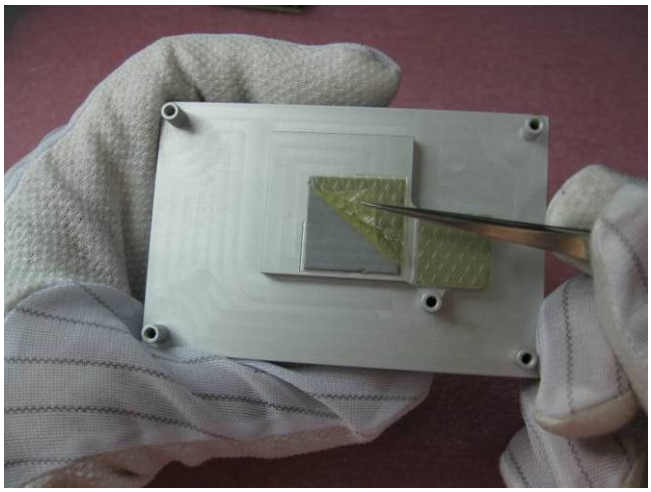
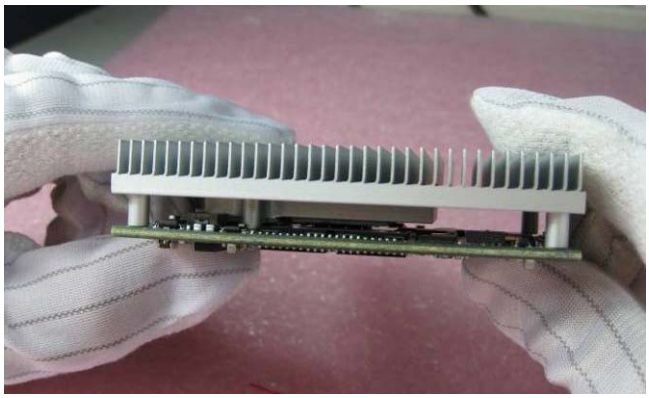
Check that the EPE foam layers contain the items shown below:

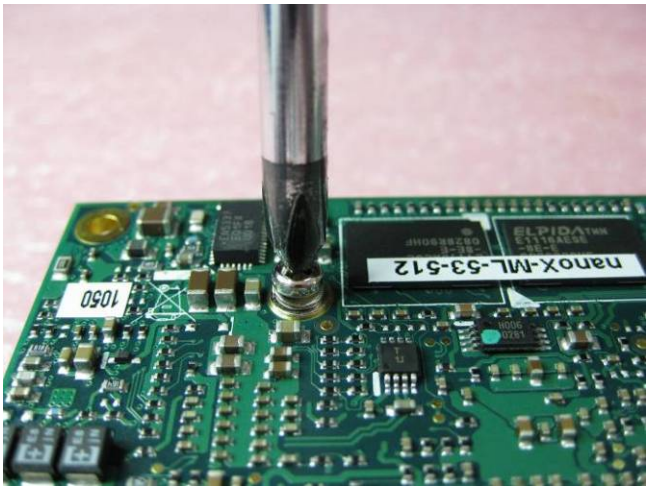
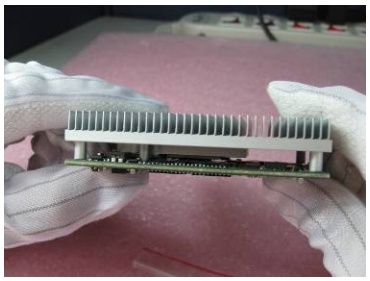
Remove the EPE foam layers and check accessory boxes contain the items below:

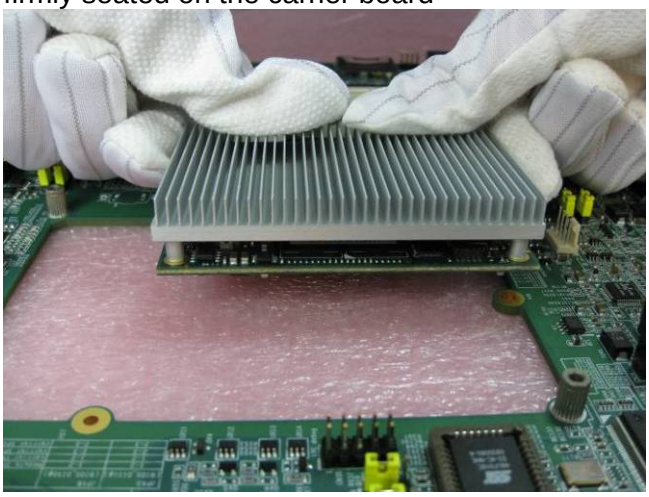
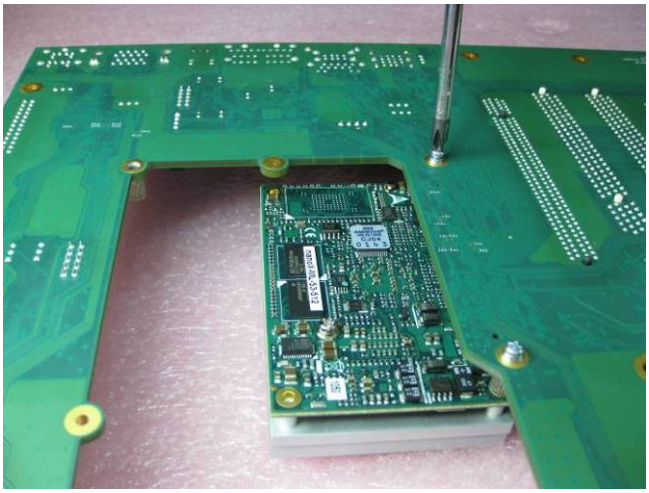
## 2.2 Type 1 Module Installation

If you intend to use a DVI monitor with the ADD2 DVI card, first install the SDVO flat cable onto the nanoX-ML module. Otherwise, skip ahead to Step 3.

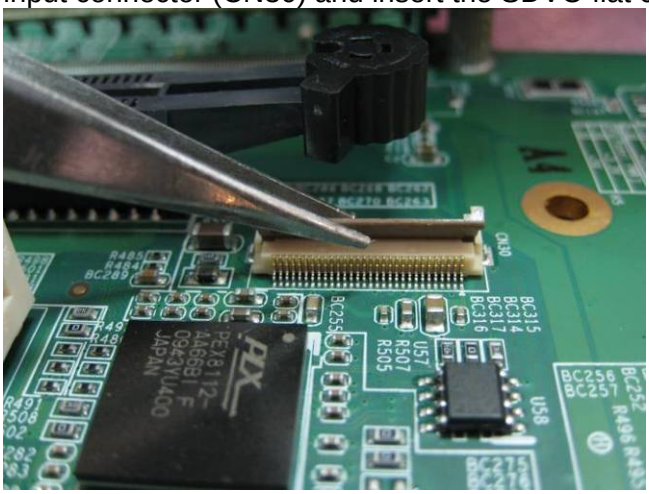
| **Install SDVO flat cable onto nanoX-ML** (if required) | **Required items** |
|---|---|
| **Step 1**<br>Lift the locking mechanism on the nanoX-ML SDVO signal connector and insert the SDVO flat cable.<br>  |  <br>  |
| **Step 2**<br>Press down on the lock on the SDVO connector to secure the flat cable.<br>  | |

| Install heatsink onto nanoX-ML module | Required items |
|---|---|
| **Step 3**<br>Removed protective membranes from thermal pads<br>  |  |
| **Step 4**<br>Assemble heatsink onto nanoX-ML module<br>  <br>  |  <br>**or**<br>  |

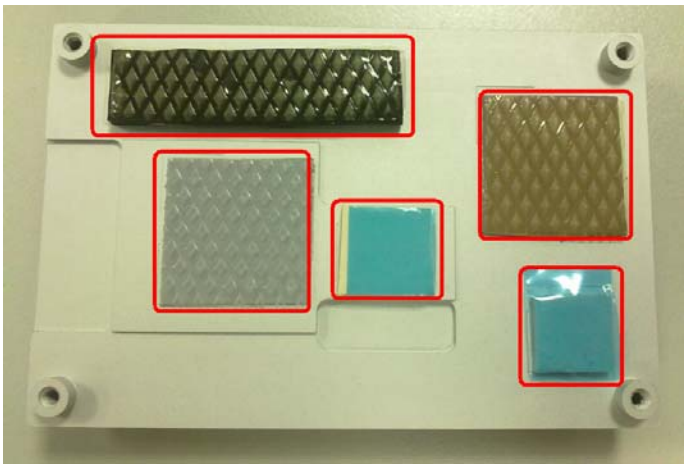
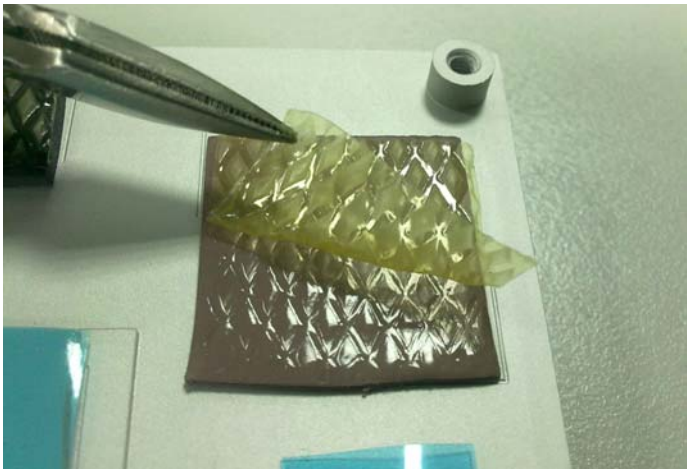
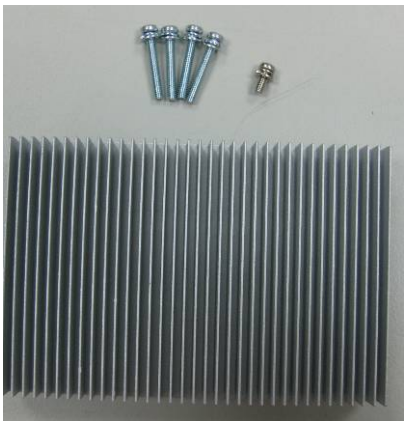
| **Install heatsink onto nanoX-ML module** (cont'd) | **Required items** |
|---|---|
| **Step 5**<br>Use one M2.5, L:6mm screw provided to fasten the heatsink to the nanoX-ML module<br>  |  |
| **Install nanoX-ML module onto carrier board** | **Required items** |
| **Step 6**<br>Place the nanoX-ML module with heatsink onto the AB connector on the carrier board as shown<br>  <br>(continued below) |  <br>  |

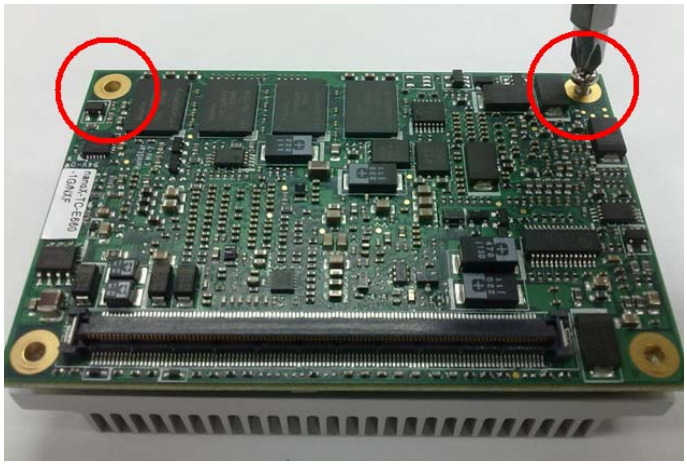
| **Install nanoX-ML module onto carrier board** (cont'd) | **Required items** |
|---|---|
| Press down on the connector side of the module until it is firmly seated on the carrier board<br>  | |
| **Step 7**<br>Use two M2.5, L:16mm screws provided to secure the nanoX-ML to the carrier board (2 extra screws are provided for use with a custom carrier board with 4 mounting standoffs)<br>  |  |

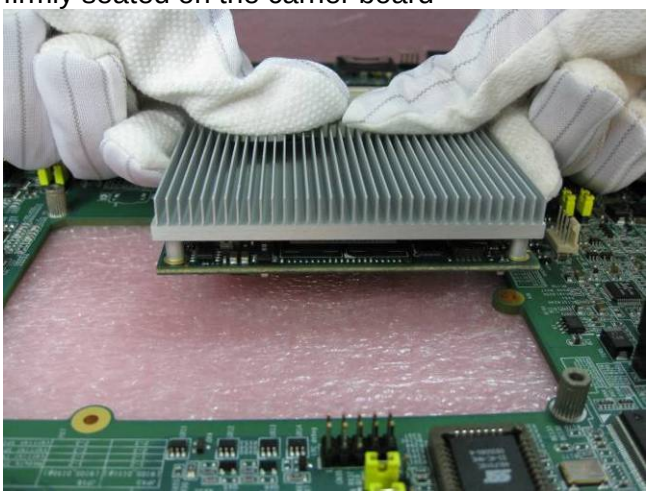
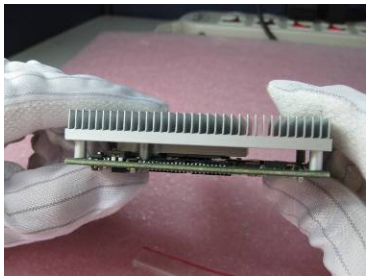
If you are not using a DVI monitor with the ADD2 DVI card, skip ahead to **Section 2.4, DVI Display Interface Installation**.

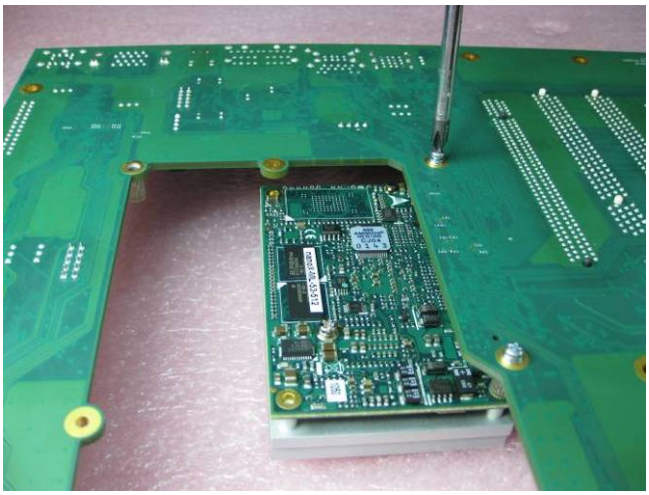
| **Install SDVO flat cable onto carrier board** (if necessary) | **Required items** |
|---|---|
| **Step 8**<br>Lift the locking mechanism on the nanoX-BASE SDVO input connector (CN30) and insert the SDVO flat cable.<br>  <br>Insert the SDVO flat cable into nanoX-BASE SDVO input connector and press down on the locking mechanism<br>  | |

## 2.3 Type 10 Module Installation

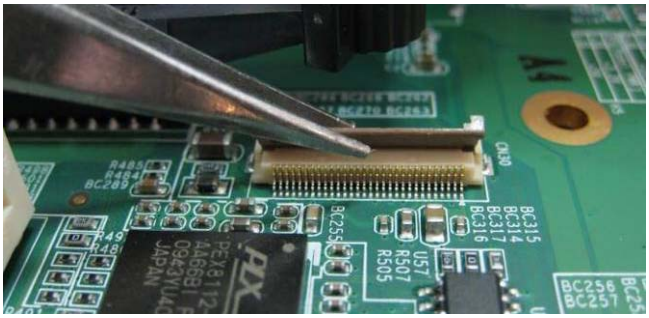
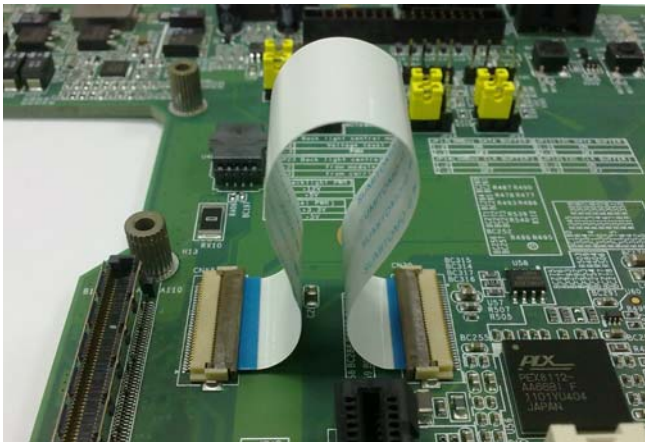
| Install heatsink onto nanoX-TC module | Required items |
|---|---|
| **Step 1**<br>Removed protective membranes from thermal pads<br>  <br>  |  |

| **Install heatsink onto nanoX-TC module** (con'td) | **Required items** |
|---|---|
| **Step 2**<br>Assemble heatsink onto nanoX-TC module<br>  <br>  |  <br>  |
| **Step 3**<br>Use two M2.5, L:8mm screws provided to fasten the heatsink to the nanoX-TC module<br>  |  |

| Install nanoX-TC module onto carrier board | Required items |
|---|---|
| **Step 4**<br>Place the nanoX-TC module with heatsink onto the AB connector on the carrier board as shown<br>  <br>Press down on the connector side of the module until it is firmly seated on the carrier board<br>  |  <br>  |

| **Install nanoX-TC module onto carrier board** (cont'd) | **Required items** |
| --- | --- |
| **Step 5**<br>Use two M2.5, L:18mm screws provided to secure the nanoX-TC to the carrier board (2 extra screws are provided for use with a custom carrier board with 4 mounting standoffs)<br>  |  |

If you not using a DVI monitor with the ADD2 DVI card, skip ahead to **Section 2.5, LVDS Output using HannStar Flat Panel Display**.

| **Install SDVO flat cable onto carrier board** (if required) | **Required items** |
|---|---|
| **Step 6**<br>Lift the locking mechanism on the nanoX-BASE SDVO input connector (CN30) and insert the SDVO flat cable.<br>  <br>Insert the SDVO flat cable into nanoX-BASE SDVO input connector and press down on the locking mechanism<br>Repeat for the SDVO output connector (CNX5).<br>  |  <br>  |

## 2.4 DVI Display Interface Installation

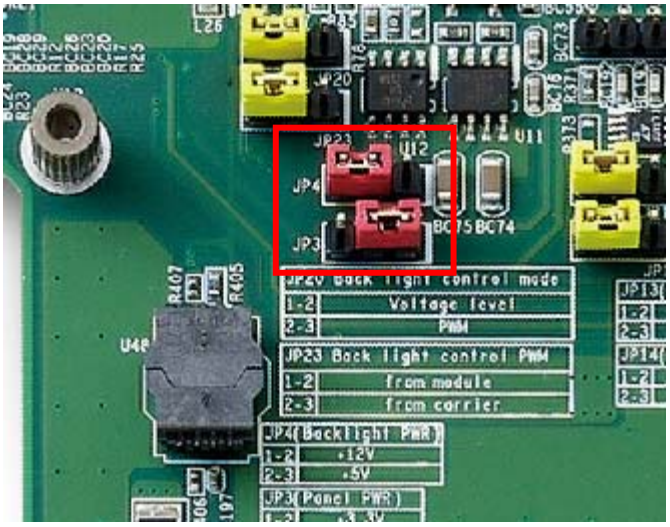
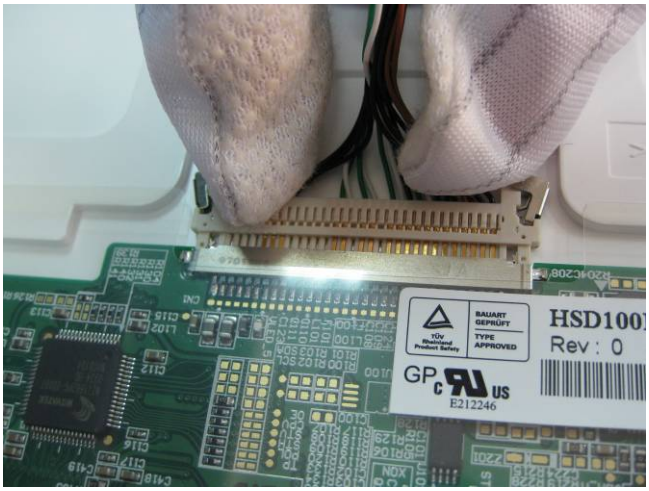
### *DVI Display using ADD2 DVI Adapter Card*

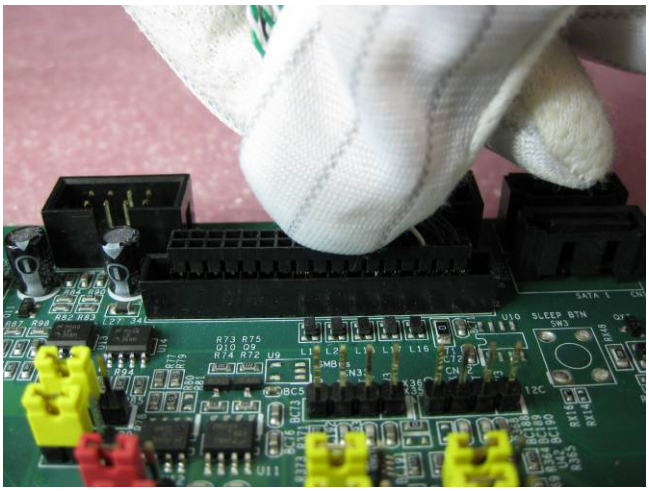
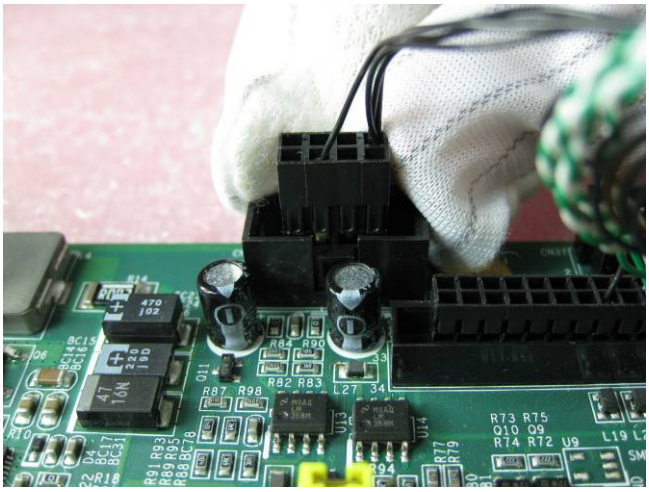
If you intend to use a DVI monitor with the ADD2 DVI Adapter Card, be sure to first install the SDVO flat cable as described above.

| Install ADD2 DVI Adapter Card | Required items |
|---|---|
| **Step 1**<br>Plug the ADD2 DVI Adapter Card into the SDVO slot<br>  |  |
| **Step 2**<br>Plug the DVI display connector into the ADD2 DVI Adapter Card<br>  | |

## 2.5 LVDS Output using HannStar Flat Panel Display

To use the HannStar 10.1” LVDS flat panel display included with the nanoX-BASE Starter Kit, follow the instructions below.

| Install Flat Panel Display | Required items |
|---|---|
| **Step 1**<br>Set the nanoX-BASE **Panel Power Jumper** (JP3) is set to *+3.3V* (short 1-2) and the **Backlight Power Jumper** (JP4) is set to *+5V* (short 2-3) as shown below<br>  | |
| **Step 2**<br>Connect the JAE FI-Series end of the LVDS panel cable (P/N: 30-20243-2000) to the LVDS flat panel display as shown<br>  |  <br>  <br>  |

| **Install Flat Panel Display** (cont'd) | **Required items** |
|---|---|
| **Step 3**<br>Connect the 34-pin female box header of the LVDS panel cable to CN6 of the nanoX-BASE (LVDS Output Connector)<br>  |  <br>  |
| **Step 9**<br>Connect the 8-pin female box header of the LVDS panel cable to CN7 of the nanoX-BASE (Backlight Control Connector)<br>  | |

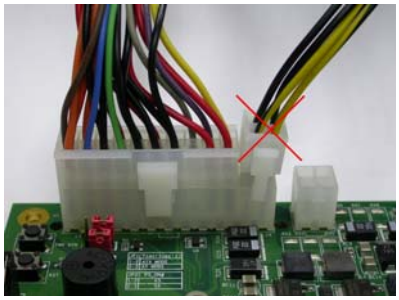
### *Using the Flat Panel Transfer Board*

Included with the nanoX Starter Kit is the Flat Panel Transfer Board (FPTB) which is intended for prototyping and verification of LVDS and TTL flat panel displays with COM Express systems. The FPTB is equipped with an LVDS-to-TTL converter to allow users to implement TTL displays with COM Express systems that support LVDS only. Onboard PWM circuitry supports backlight control for LVDS and TTL displays.

For detailed instructions on how to connect a TTL flat panel display to the nanoX-BASE using the FPTB, see Chapter 3 on page 33.

## 2.6 Power and I/O Connections

| Connect the Power Supply | Required items |
|---|---|
| Plug the ATX connector of the power supply into CN1 of the nanoX-BASE<br>  <br>Plug the ATX 12V 4-pin connector of the power supply into the nanoX-BASE<br>  |  |



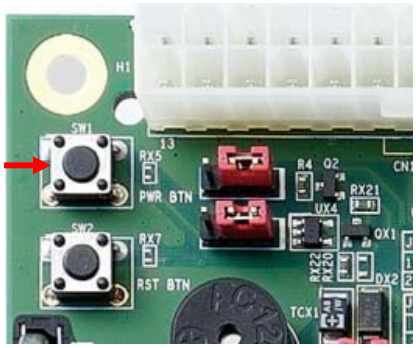
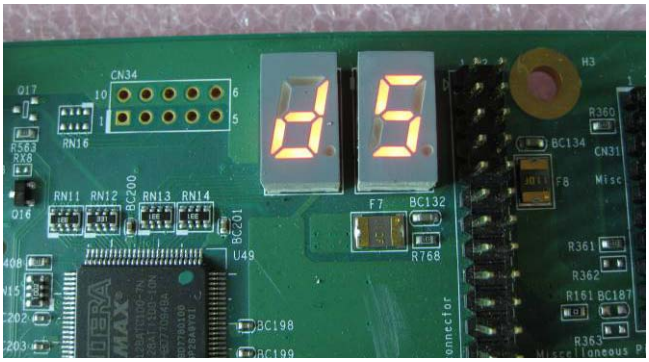
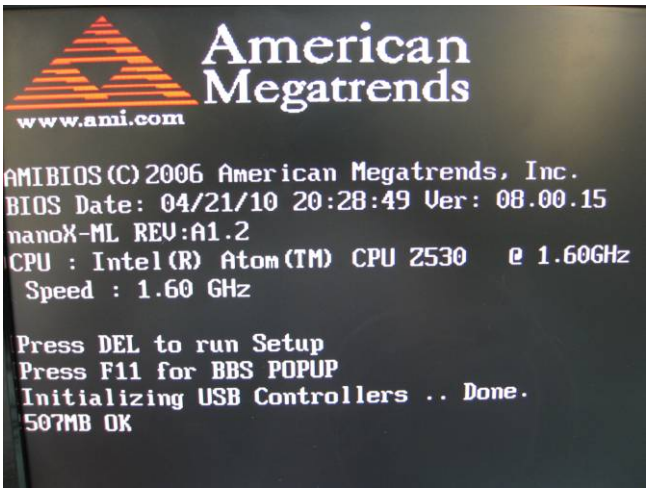
CAUTION:

**DO NOT** plug the ATX 12V 4-pin connector of the power supply into the ATX 24-pin power connector on the nanoX-BASE

| **Connect the Power Supply** (cont'd) | **Required items** |
| --- | --- |
| Plug power cord into the power supply<br>  |  |
| **Connect the Keyboard and Mouse** | |
| Plug keyboard and mouse connector into nanoX-BASE<br>  | |

## 2.7 Powering Up the nanoX-BASE System

To power up the nanoX-BASE system, follow the steps below.

| Powering Up the nanoX-BASE System | Required items |
|---|---|
| Press the Power Button SW1.<br>  <br><br>The POST LEDs on the nanoX-BASE will display the bootup status – "d5" indicates a successful boot<br>  <br>The monitor will display the BIOS boot screen<br>  <br> | |

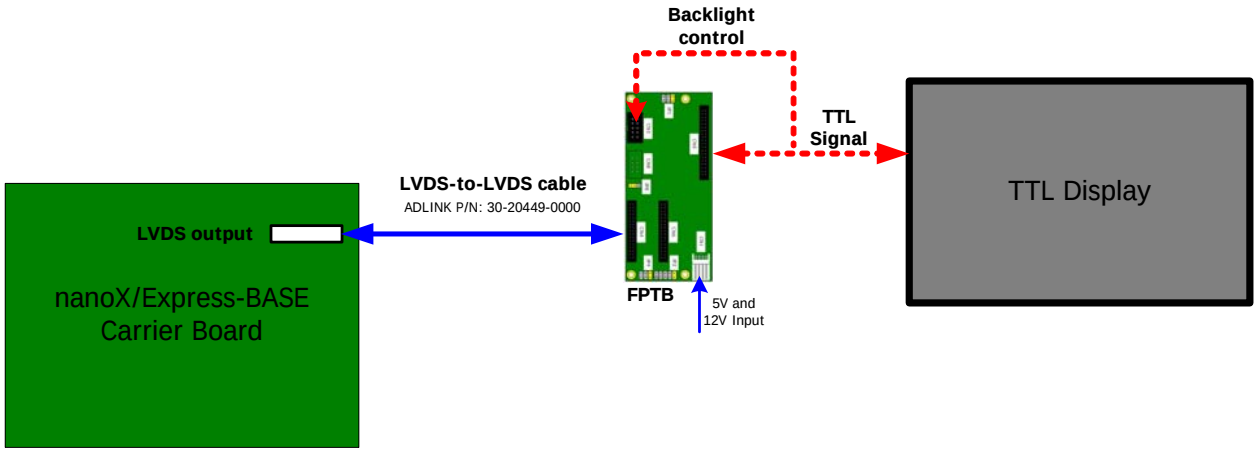
# 3 Using a TTL Flat Panel Display

Included with the nanoX Starter Kit is the Flat Panel Transfer Board (FPTB) which is intended for prototyping and verification of LVDS and TTL flat panel displays with COM Express systems. The FPTB is equipped with an LVDS-to-TTL converter to allow users to implement TTL displays with COM Express systems that support LVDS only. Onboard PWM circuitry supports backlight control for LVDS and TTL displays. For a complete description of the FPTB and its applications, refer to the *Flat Panel Transfer Board User's Manual*.

Instructions on how to connect a TTL flat panel display to the nanoX-BASE using the FPTB are provided below.

## 3.1 Overview

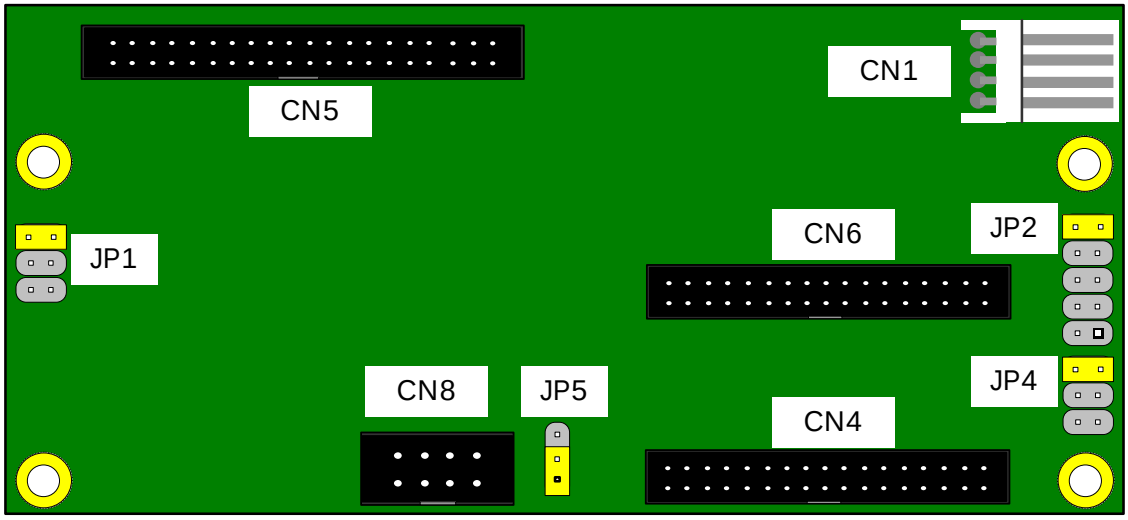
The FPTB provides LVDS-to-TTL conversion and backlight control for use with an ADLINK reference carrier board and TTL display. The user must provide the cable connection from the FPTB's TTL output and backlight control connectors to the TTL panel inputs.




**nanoX/Express-BASE → FPTB → TTL Display:**

## 3.2 Connectors and Jumpers

### *Board Layout*

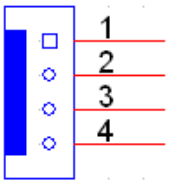



**FPTB (Flat Panel Transfer Board) Connector and Jumper Locations**

| Connector | Description |
|---|---|
| CN1 | Power Connector |
| CN4 | LVDS Input Connector |
| CN5 | TTL Output Connector |
| CN6 | LVDS Output Connector |
| CN8 | Backlight Control Connector |
| JP1 | Backlight Voltage Jumper |
| JP2 | Panel Voltage Jumper |
| JP4 | LVDS/TTL Mode Selector Jumper |
| JP5 | Backlight Control Mode Jumper |

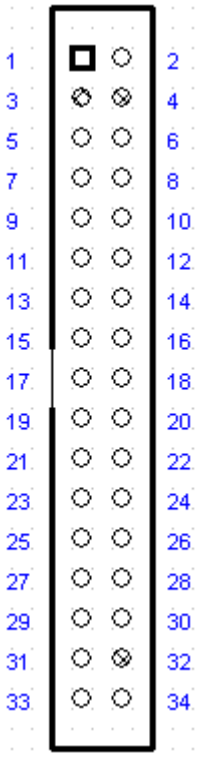
## *Connector Pin Definitions*

### ***CN1: Power Connector*** *(Floppy power connector)*



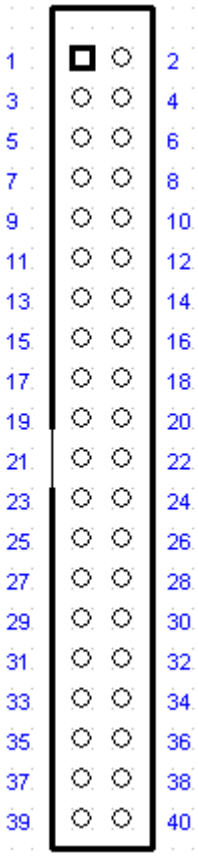

| Pin | Signal |
|---|---|
| 1 | +5V |
| 2 | GND |
| 3 | GND |
| 4 | +12V |

### ***CN4: LVDS Input Connector*** *(2x17 box header, 2.00 mm pitch)*



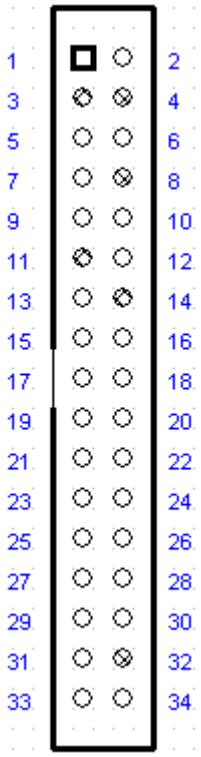

| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | LVDS_CLK_A | 2 | LVDS_DTA_A |
| 3 | PNL_PWR | 4 | PNL_PWR |
| 5 | GND | 6 | LVDS_A-N0 |
| 7 | LVDS_A-P0 | 8 | VDD_EN |
| 9 | LVDS_A-N1 | 10 | LVDS_A-P1 |
| 11 | BL_EN_2 | 12 | LVDS_A-P2 |
| 13 | LVDS_A-N2 | 14 | N.C |
| 15 | LVDS_ACLK _ N | 16 | LVDS_ACLK _ P |
| 17 | PNL_PWR | 18 | LVDS_A-P3 |
| 19 | LVDS_A-N3 | 20 | GND |
| 21 | LVDS_B-N0 | 22 | LVDS_B-P0 |
| 23 | GND | 24 | LVDS_B-N1 |
| 25 | LVDS_B-P1 | 26 | GND |
| 27 | LVDS_B-N2 | 28 | LVDS_B-P2 |
| 29 | GND | 30 | LVDS_BCLK _ P |
| 31 | LVDS_BCLK _ N | 32 | N.C |
| 33 | LVDS_B-P3 | 34 | LVDS_B-N3 |

***CN5: TTL Output Connector*** *(2x20 box header, 2.00 mm pitch)*



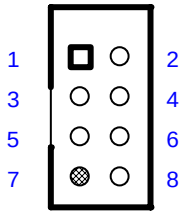

| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | GND | 2 | FCLK |
| 3 | GND | 4 | FR0 |
| 5 | FR1 | 6 | FR2 |
| 7 | GND | 8 | FR3 |
| 9 | FR4 | 10 | FR5 |
| 11 | GND | 12 | FR6 |
| 13 | FR7 | 14 | FG0 |
| 15 | GND | 16 | FG1 |
| 17 | FG2 | 18 | FG3 |
| 19 | GND | 20 | FG4 |
| 21 | FG5 | 22 | GND |
| 23 | FG6 | 24 | FG7 |
| 25 | FB0 | 26 | GND |
| 27 | FB1 | 28 | FB2 |
| 29 | FB3 | 30 | GND |
| 31 | FB4 | 32 | FB5 |
| 33 | FB6 | 34 | GND |
| 35 | FB7 | 36 | HS (HSYNC) |
| 37 | VS (VSYNC) | 38 | GND |
| 39 | DE (DATA ENBLE) | 40 | GND |

***CN6: LVDS Output Connector*** *(2x17 box header, 2.00 mm pitch)*




| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | LVDS_CLK_A | 2 | LVDS_DTA_A |
| 3 | PNL_PWR | 4 | PNL_PWR |
| 5 | GND | 6 | LVDS_A-N0 |
| 7 | LVDS_A-P0 | 8 | VDD_EN |
| 9 | LVDS_A-N1 | 10 | LVDS_A-P1 |
| 11 | BL_EN_2 | 12 | LVDS_A-P2 |
| 13 | LVDS_A-N2 | 14 | N.C |
| 15 | LVDS_ACLK _ N | 16 | LVDS_ACLK _ P |
| 17 | PNL_PWR | 18 | LVDS_A-P3 |
| 19 | LVDS_A-N3 | 20 | GND |
| 21 | LVDS_B-N0 | 22 | LVDS_B-P0 |
| 23 | GND | 24 | LVDS_B-N1 |
| 25 | LVDS_B-P1 | 26 | GND |
| 27 | LVDS_B-N2 | 28 | LVDS_B-P2 |
| 29 | GND | 30 | LVDS_BCLK _ P |
| 31 | LVDS_BCLK _ N | 32 | N.C |
| 33 | LVDS_B-P3 | 34 | LVDS_B-N3 |

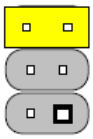
***CN8: Backlight Control Connector*** *(2x4 box header, 2.54 mm pitch)*




| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | GND | 2 | PNL_PWR |
| 3 | BL_CTRL | 4 | GND |
| 5 | LVDS_BL_EN | 6 | GND |
| 7 | N.C. | 8 | BLK_PWR |

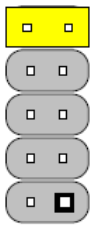
## *Jumper Settings*

### *JP1: Backlight Voltage*



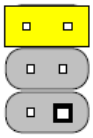
| Jumper | Status |
|---|---|
| 1 - 2 | +12V |
| 3 – 4 | Reserved |
| 5 – 6 | +5V* |

### *JP2: Panel Voltage*



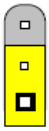
| Jumper | Status |
|---|---|
| 1 - 2 | +12V |
| 3 – 4 | Reserved |
| 5 – 6 | +5V |
| 7 - 8 | Reserved |
| 9 - 10 | +3.3V* |

### *JP4: LVDS/TTL Mode*



| Jumper | Status |
|---|---|
| 1 - 2 | TTL Output Active |
| 3 - 4 | Reserved |
| 5 - 6 | LVDS Output Active* |

### *JP5: Backlight Control Mode*



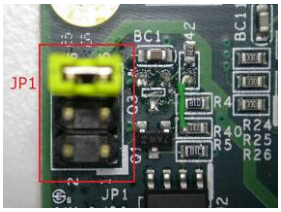
| Jumper | Status |
|---|---|
| 1 - 2 | BLCTRL_PWM * |
| 2 - 3 | BLCTRL_VTL |

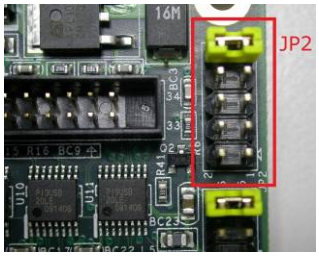
**Note:** * indicates default setting

## 3.3 Installation

### *Jumper Settings*

Make sure the **Backlight Voltage jumper** (JP1) and **Panel Voltage jumper** (JP2) are correct for the display panel you are using.

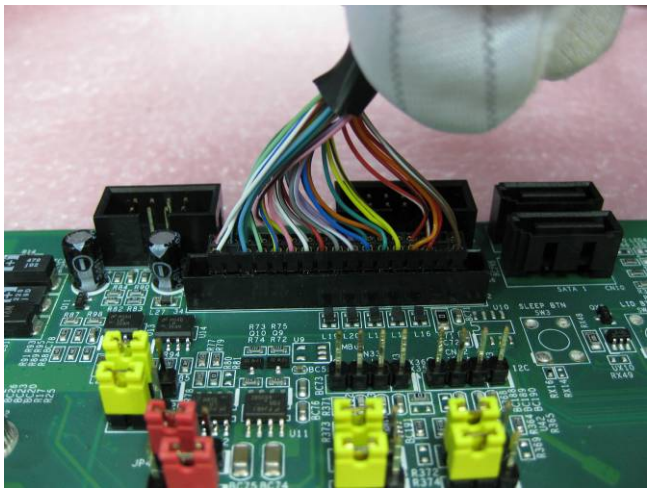
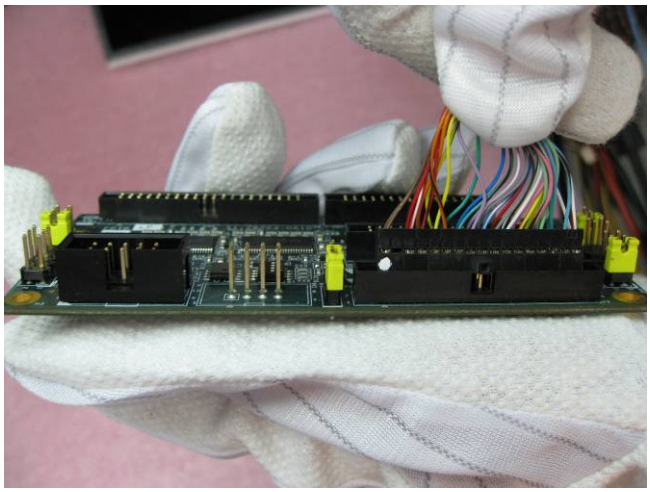



Set the **LVDS/TTL Mode jumper** (JP4) to *TTL Output Active* (short pins 1-2).Set the **Backlight Control Mode jumper** (JP5) to *PWM* or *Voltage Level* as appropriate for your display.

### *Connecting LVDS Input to FPTB*

Use the FPTB LVDS-to-LVDS cable (P/N 30-20449-0000) to connect the LVDS output connector on the nanoX-BASE (CN6) to the LVDS input connector on the FPTB (CN4).

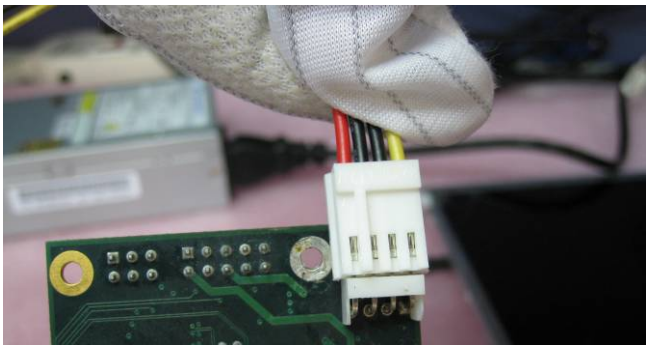
| **Connecting LVDS Input to FPTB** | **Required items** |
|---|---|
| Plug the LVDS-to-LVDS cable into nanoX-BASE CN6<br>  |  <br>LVDS-to-LVDS cable |
| Plug the LVDS-to-LVDS cable connector into FPTB CN4<br>  | |

### *TTL Output to Display Panel*

Make the appropriate cable to connect the TTL Output Connector (CN5) and Backlight Control Connector (CN8) on the FPTB to the target TTL display panel.

### *FPTB Power Connector*

Connect the Floppy Drive power connector of your power supply to the FPTB Power Connector (CN1).



### *Power Up the System*

Assemble the rest of your system as required and power it on. An example nanoX-BASE system with FPTB connected to a TTL display panel is shown below.

# Technical Support

Contact us should you require any service or assistance.


**ADLINK Technology, Inc.**
Address: 9F, No.166 Jian Yi Road, Zhonghe District
New Taipei City 235, Taiwan
新北市中和區建一路 166 號 9 樓
Tel: +886-2-8226-5877
Fax: +886-2-8226-5717
Email: service@adlinktech.com

**Ampro ADLINK Technology, Inc.**
Address: 5215 Hellyer Avenue, #110, San Jose, CA 95138, USA
Tel: +1-408-360-0200
Toll Free: +1-800-966-5200 (USA only)
Fax: +1-408-360-0222
Email: info@adlinktech.com

**ADLINK Technology (China) Co., Ltd.**
Address: 上海市浦东新区张江高科技园区芳春路 300 号 (201203)
300 Fang Chun Rd., Zhangjiang Hi-Tech Park,
Pudong New Area, Shanghai, 201203 China
Tel: +86-21-5132-8988
Fax: +86-21-5132-3588
Email: market@adlinktech.com

**ADLINK Technology Beijing**
Address: 北京市海淀区上地东路 1 号盈创动力大厦 E 座 801 室(100085)
Rm. 801, Power Creative E, No. 1, B/D
Shang Di East Rd., Beijing, 100085 China
Tel: +86-10-5885-8666
Fax: +86-10-5885-8625
Email: market@adlinktech.com

**ADLINK Technology Shenzhen**
Address: 深圳市南山区科技园南区高新南七道 数字技术园
A1 栋 2 楼 C 区 (518057)
2F, C Block, Bldg. A1, Cyber-Tech Zone, Gao Xin Ave. Sec. 7,
High-Tech Industrial Park S., Shenzhen, 518054 China
Tel: +86-755-2643-4858
Fax: +86-755-2664-6353
Email: market@adlinktech.com

**LiPPERT ADLINK Technology GmbH**
Address: Hans-Thoma-Strasse 11, D-68163, Mannheim, Germany
Tel: +49-621-43214-0
Fax: +49-621 43214-30
Email: emea@adlinktech.com

**ADLINK Technology, Inc. (French Liaison Office)**
Address: 15 rue Emile Baudot, 91300 Massy CEDEX, France
Tel: +33 (0) 1 60 12 35 66
Fax: +33 (0) 1 60 12 35 66
Email: france@adlinktech.com

**ADLINK Technology Japan Corporation**
Address: 〒101-0045 東京都千代田区神田鍛冶町 3-7-4
神田 374 ビル 4F
KANDA374 Bldg. 4F, 3-7-4 Kanda Kajicho,
Chiyoda-ku, Tokyo 101-0045, Japan
Tel: +81-3-4455-3722
Fax: +81-3-5209-6013
Email: japan@adlinktech.com

**ADLINK Technology, Inc. (Korean Liaison Office)**
Address: 서울시 서초구 서초동 1506-25 한도 B/D 2 층
2F, Hando B/D, 1506-25, Seocho-Dong, Seocho-Gu,
Seoul 137-070, Korea
Tel: +82-2-2057-0565
Fax: +82-2-2057-0563
Email: korea@adlinktech.com

**ADLINK Technology Singapore Pte. Ltd.**
Address: 84 Genting Lane #07-02A, Cityneon Design Centre,
Singapore 349584
Tel: +65-6844-2261
Fax: +65-6844-2263
Email: singapore@adlinktech.com

**ADLINK Technology Singapore Pte. Ltd. (Indian Liaison Office)**
Address: 1st Floor, #50-56 (Between 16th/17th Cross) Margosa Plaza,
Margosa Main Road, Malleswaram, Bangalore-560055, India
Tel: +91-80-65605817, +91-80-42246107
Fax: +91-80-23464606
Email: india@adlinktech.com

**ADLINK Technology, Inc. (Israeli Liaison Office)**
Address: 6 Hasadna St., Kfar Saba 44424, Israel
Tel: +972-9-7446541
Fax: +972-9-7446542
Email: israel@adlinktech.com