User Manual

Nvidia Jetson Series Carrier board
Aetina ACE-N510

Document Change History

Version	Date	Description	Authors
V1	2018/03/15	Initial Release.	Eric Chu

Contents

1. Introduction

ACE-N510 is the smallest form factor carrier board in Aetina production line. Support for NVIDIA® Jetson™ TX2 and Jetson™ TX1. You can quickly emulate the functionality of your desired end product for software development and hardware verification.
To build a functional prototype of your target system you will need:

- Nvidia TX1/TX2 module (Aetina's P/N: NSO-MD-TX1/NSO-MD-TX2)
- Nano-ITX carrier board (Aetina's P/N: ACE-N510)
- Power adaptor 12V DC/5A

1.1 Features

- Smallest design for Nvidia TX2/TX1
- Specifically designed for high performance and low-power envelope AI computing
- Extended temperature range -20°C to 70°C
- Suitable for general robotics, Drone, UAV, industrial inspection, medical imaging and deep learning

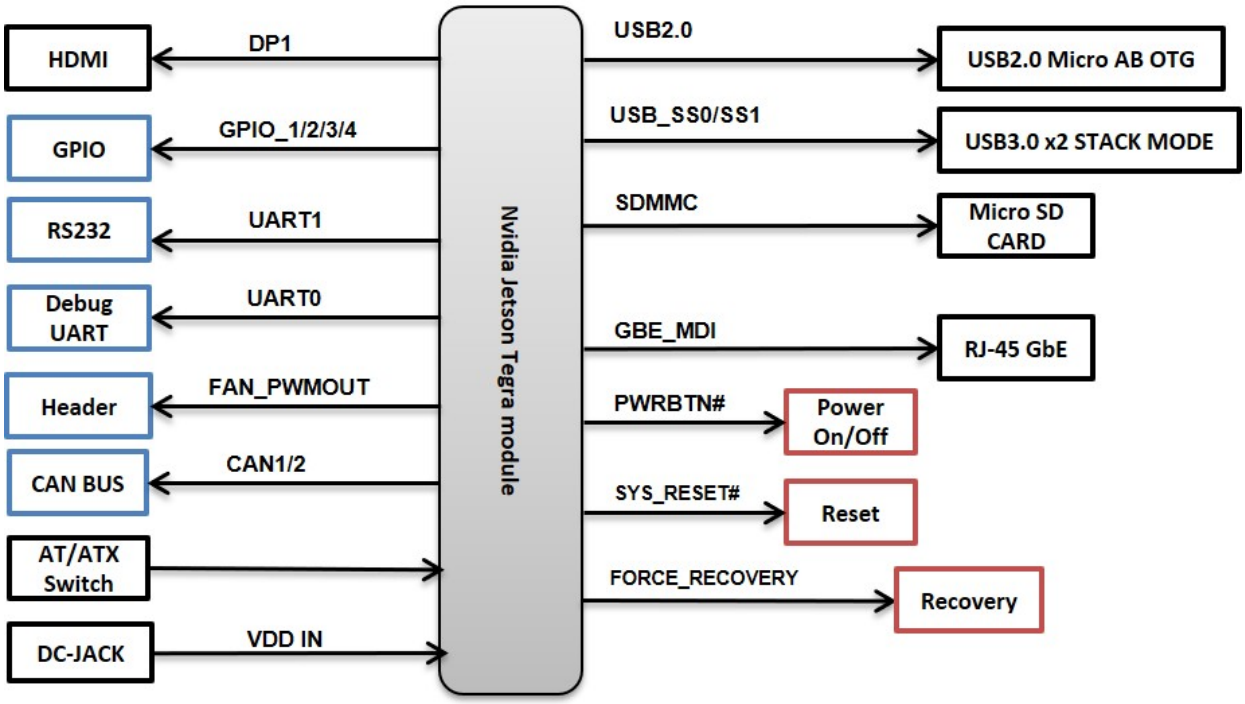
1.2 Board

- 6-layer printed circuit board(PCB)
- Phsical dimensions: 87mm x 50 mm
- Board TDP: 15W
- High-Bandwidth Digital Content Protection (HDCP) support

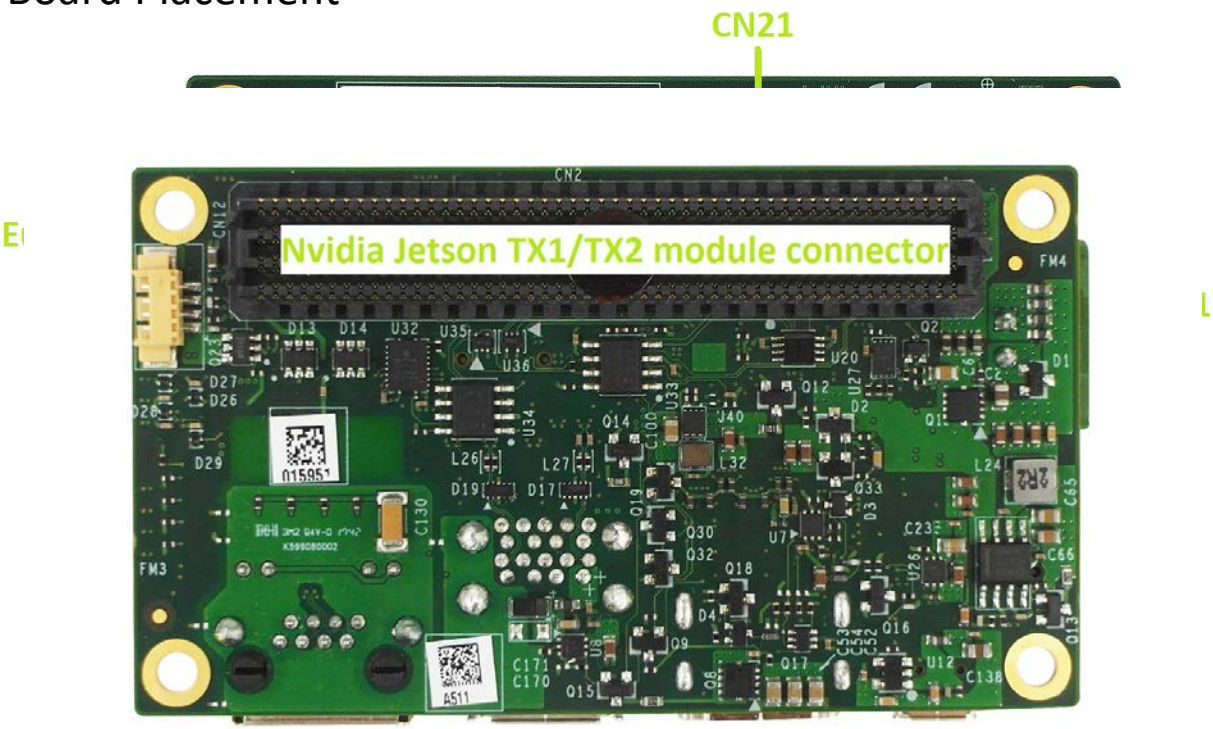
2. Board Specification

Specification	ACE-N510 Description
Module Compatibility	Nvidia Jetson TX1 / Nvidia Jetson TX2
GPU	Jeston TX1 : - Nvidia Maxwell™, 256 CUDA cores. Jetson TX2 : - Nvidia Pascal™, 256 CUDA cores.
CPU	Jetson TX1: - Quad ARM® A57/2MB L2 Jetson TX2: - HMP Dual Denver 2/2MB L2 + Quad ARM® A57/2MB L2
Dimension	- 87mm x 50mm
Display	- 1 x HDMI
Audio	- HDMI Integrated
Connectivity	- 1 Gigabit Ethernet, 802.11ac WLAN, Bluetooth
USB	Jetson TX1 : - 1 x USB3.0 Type A - 1 x USB2.0 Type A - 1 x USB OTG Micro AB Jetson TX2 : - 2 x USB3.0 Type A - 1 x USB OTG Micro AB
SD CARD	- Micro SD CARD Slot
UART	- 1 x UART
RS232	- 1 x RS232
GPIO	- 4 x GPIO
CAN Bus	- 2 x DB9 connector.(TX2/TX2i support)
Input Power	- +12V DC input Euroblock connector
Operating Temperature	- 0°C to + 55°C - -20°C to + 70°C (Optional)
Storage Temperature	- -25°C to + 80°C
Warranty	- 14 Months

3. Block Diagram

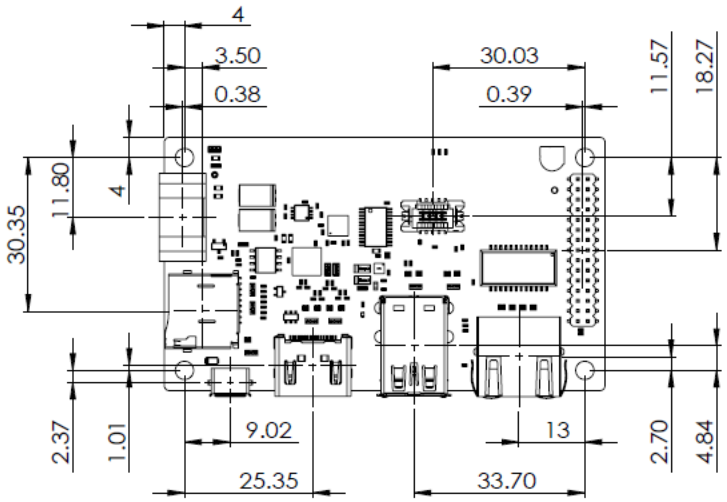


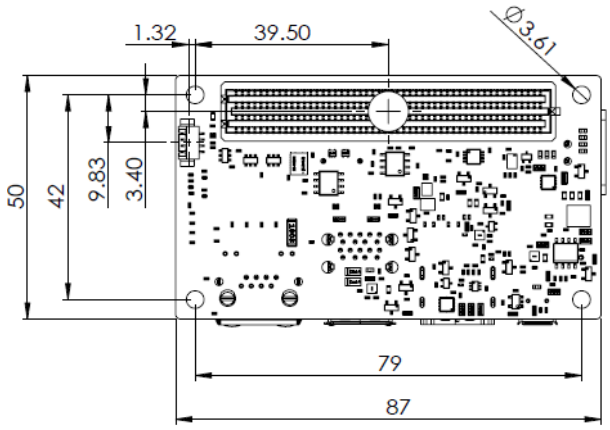
3.1 Board Placement

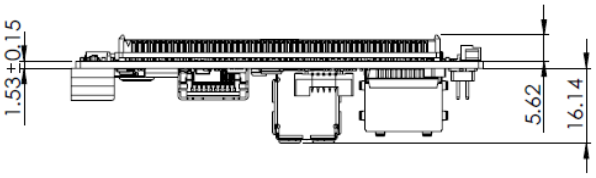


TX1/TX2 Module Connector	Compatible with Jetson TX1/TX2
HDMI	Type A
Euroblock Connector	2-pin DC in
USB3.0	Type A
CN21	CAN BUS x2 (10-pin)
LAN	RJ45
USB2.0 OTG	Micro-AB
J1	Front Panel+Expansion I/O(30-pin)

3.2 Mechanical Dimensions







4. Connectors and Pin-outs

4.1 J1 (Front Panel and Expansion I/O)

Pin number	Define	Pin number	Define
PIN 1	UART1_RXD_HDR_3V3	PIN 2	RS232_RXD
PIN 3	UART1_TXD_HDR_3V3	PIN 4	RS232_TXD
PIN 5	UART1_RTS_HDR_3V3	PIN 6	RS232_RTS
PIN 7	UART1_CTS_HDR_3V3	PIN 8	RS232_CTS
PIN 9	GND	PIN 10	GND
PIN 11	POWER_BTN_R	PIN 12	GND
PIN 13	RESET_IN_L_R	PIN 14	GND

PIN 15	FORCE_RECOVERY_L_R	PIN 16	GND
PIN 17	SLEEP_R	PIN 18	GND
PIN 19	VDD_3V3_SYS	PIN 20	EXT_LED
PIN 21	GPIO_1	PIN 22	GND
PIN 23	GPIO_2	PIN 24	GND
PIN 25	GPIO_3	PIN 26	GND
PIN 27	GPIO_4	PIN 28	GND
PIN 29	ACOK	PIN 30	GND

* **In order to boot up the system, pleas quickly short-circuit Pin11 and Pin12.**
* **Disable Pin29 and Pin30 can enable Auto power on function.**

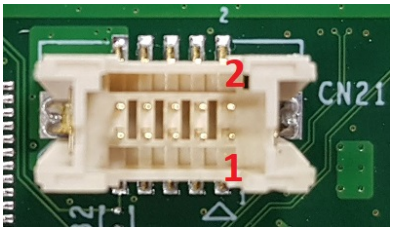
4.2 GPIO PIN Define

Pin Number	Define	Sysfs TX1	Sysfs TX2
PIN 21	GPIO_1	GPIO186	GPIO298
PIN 23	GPIO_2	GPIO187	GPIO388
PIN 25	GPIO_3	GPIO63	GPIO389
PIN 27	GPIO_4	GPIO184	GPIO481

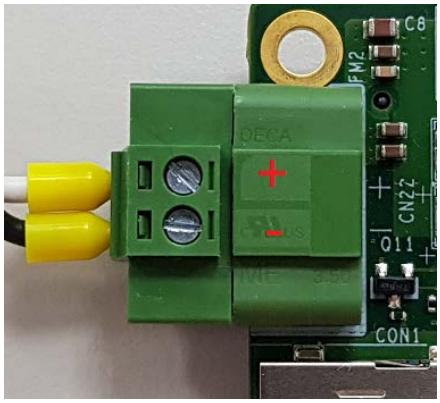
*** The default setting of GPIO1 is high.**

4.3 CAN BUS PIN Define

CN21 Pin number	Define
PIN 1	CAN0H
PIN 2	CAN1H
PIN 3	CAN0L
PIN 4	CAN1L
PIN 5	CAN0_STBY
PIN 6	CAN1_STBY
PIN 7	CAN0_ERR
PIN 8	CAN1_ERR
PIN 9	CAN_WAKE
PIN 10	GND



4.4 Power Input (Euroblock Connector)



4.5 Micro USB

Pin No.	Pin Name
1	USB0_VBUS
2	USB0D_N
3	USB0D_P
4	USB0_ID
5	GND

4.6 Micro SD

Pin No.	Pin Name
P1	SDMMC3_DAT<2>
P2	SDMMC3_DAT<3>
P3	SDMMC3_CMD
P4	+3.3V
P5	SDMMC3_CLK
P6	GND
P7	SDMMC3_DAT<0>
P8	SDMMC3_DAT<1>
9	GND
10	SDMMC3_CD_L

4.7 HDMI

Pin No.	Pin Name
1	HDMI1_DATA_CON_P2
2	GND
3	HDMI1_DATA_CON_N2
4	HDMI1_DATA_CON_P1
5	GND
6	HDMI1_DATA_CON_N1
7	HDMI1_DATA_CON_P0
8	GND
9	HDMI1_DATA_CON_N0
10	HDMI1_CLK_CON_P
11	GND
12	HDMI1_CLK_CON_N
13	NC
14	NC
15	HDMI_DDC_SCL_CON
16	HDMI_DDC_SDA_CON
17	GND
18	5V_HDMI
19	HDMI1_HPD_CON

5. Accessary (Optional)

Cable kit	ACE-N510 Cable Kit(CAN bus / UART / RS232 / Front panel / GPIO)
9Z1253232020	TX1/TX2 Active Heat Sink
9Z2XX4141010	TX1/TX2 Passive Heat Sink
7W8000000040	Power cord.
9Z3BC0000020	100-240V 60W 12V 5A Adapter
7W3000000030	2.5mm DC JACK to Euroblock CABLE 200mm

9Z2XX4141010

9Z1253232020

Cable kit

7W3000000030

9Z3BC0000020

6. Software & BSP.

When customer use Nvidia standard BSP, some I/O function may not work. In order to support Aetina ACE-N510 system I/O config, please follow below method.

(1) Before Installing the BSP you will need to install Jetpack on the x86 host system(UBUNTU14.04)
Download the proper JetPack from
https://developer.nvidia.com/embedded/downloads

(2) Download R28_1_TX2_N510_1.tar.gz from website.
https://www.aetina.com/support-download.php?t=4&p1=86

(3) After the JetPack is installed, copy the patch file TX2_N510_1.tar.gz to the target folder
TX2: Copy R28_1_TX2_N510_1.tar.gz to /64_TX2/Linux_for_Tegra_tx2/

(4) Use the following command to patch the config and flash BSP:
TX2:
tar xvf R28_1_TX2_N510_1.tar.gz
./setup.sh tx2 N510 (for N510)

7. Recovery system

The TX1/TX2 embedded system contains a recovery system and could be triggered by GPIO.

(1) For TX1, shut down the system first and connect the 3V3 pin & GPIO_4 (GPIO 184)
For TX2, shut down the system first and connect the 3V3 pin & GPIO_4 (GPIO 481)

(2) Boot the device,
It will need about 4 minutes for recovering the system.
After finishing, it will shut down the device.
Remove the connected pins and power on the device.

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