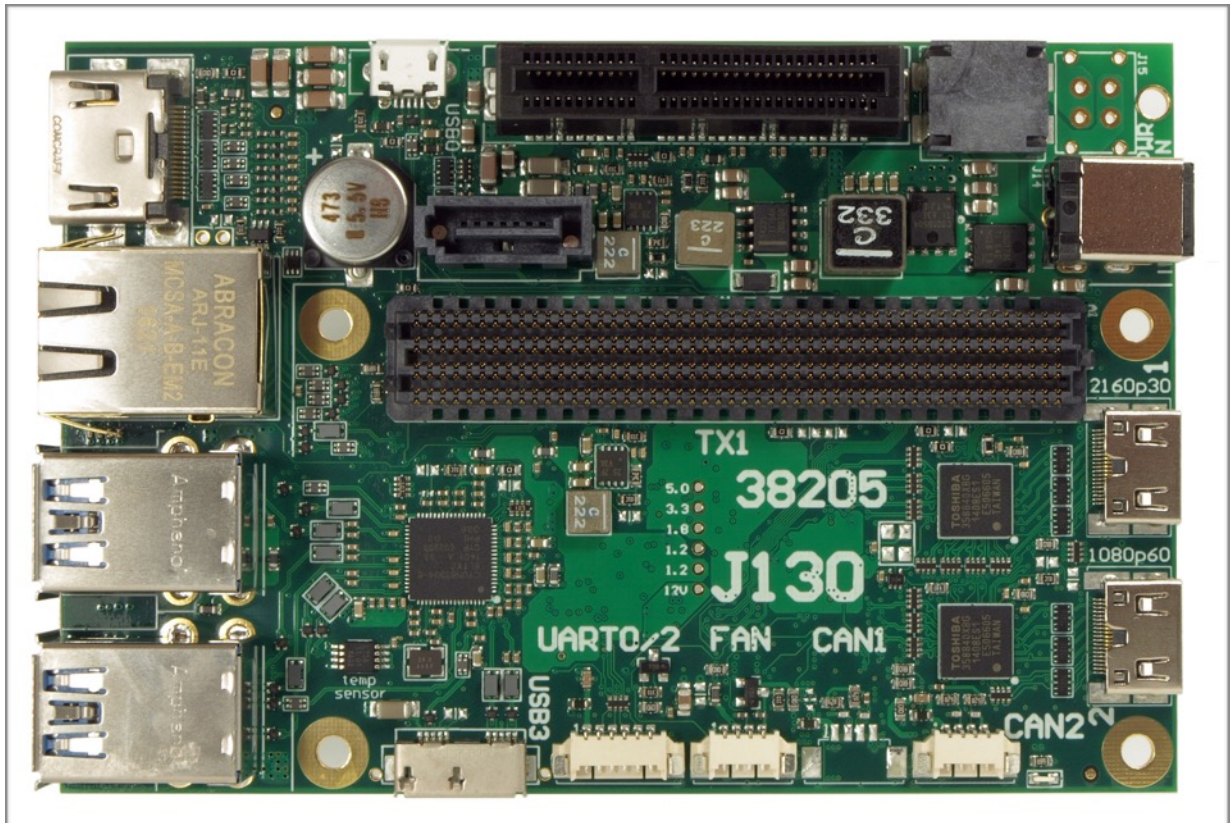


J130

technical reference manual



Preliminary

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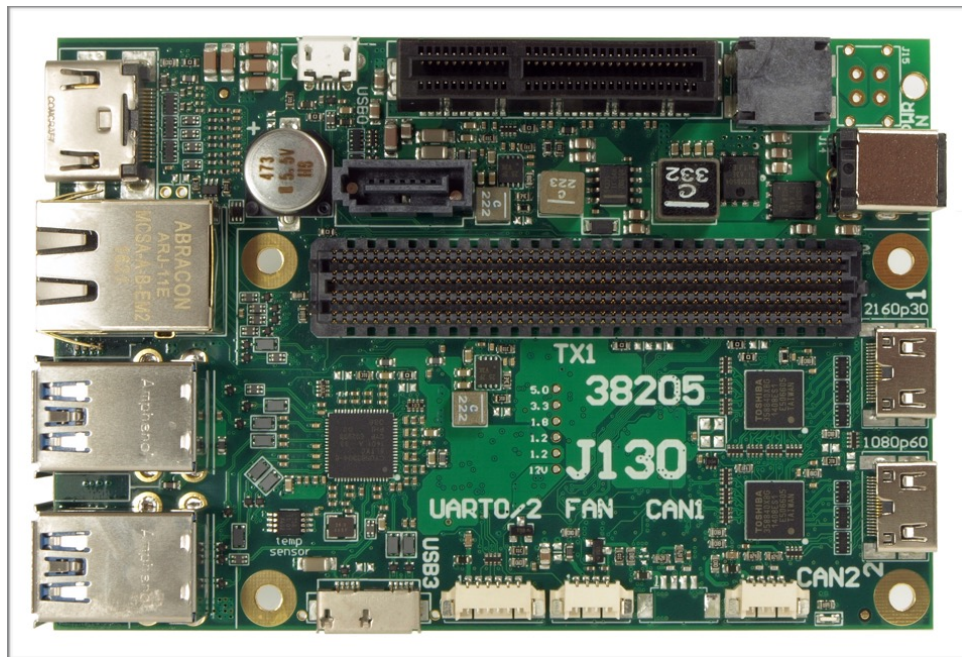
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Features

J130 carrier board for the NVIDIA® Jetson™ TX1

The J130 carrier board is densely packed with many features and interfaces. It has an on-board 4 port SuperSpeed USB hub, GbE, HDMI out, SATA, 4x PCIe slot and 2 HDMI inputs with embedded HDMI to CSI-2 bridges. One input supports up to 2160p30, the other up to 1080p60.



Technical details

- carrier board for one NVIDIA® Jetson™ TX1 compute module
- designed for standalone operation
- embedded HDMI to CSI-2 bridge with 8 lanes and Toshiba TC358840 (up to 2160p30) - optional
- embedded HDMI to CSI-2 bridge with 4 lanes and Toshiba TC358840 (up to 1080p60) - optional
- micro SD card
- USB3 SuperSpeed Hub with 4 ports (3x type A and 1x microUSB3)
- RJ45 connector for 10/100/1000BT Ethernet
- UART 0/2 (3.3V TTL) (6 pin) (UART0: console access)
- SATA connector (5V/12V power connector on the bottom side - J26)
- 4 lane PCIe slot (for selected PCIe cards)
- 1 CAN interface (CAN2) - CAN1 is for future use (TX2)
- I2S digital audio
- fan connector (4 pin)
- standard HDMI out
- size: 74 x 110 mm (size of the PCB)
- mounting: 4 M3 holes with 3.2mm each (42 x 79 mm spacing - 4 mm from each edge)
- model: 38205-x (J130)

Power supply

- power input: 12V DC (rev 2)
- 5.5/2.5mm power connector (positive supply on the center pin)
- please use a 30 to 60 watt supply
- power consumption is largely dependent on the power consumption of the TX1, the USB devices connected, the SATA drive and and PCIe card installed

Rev 1

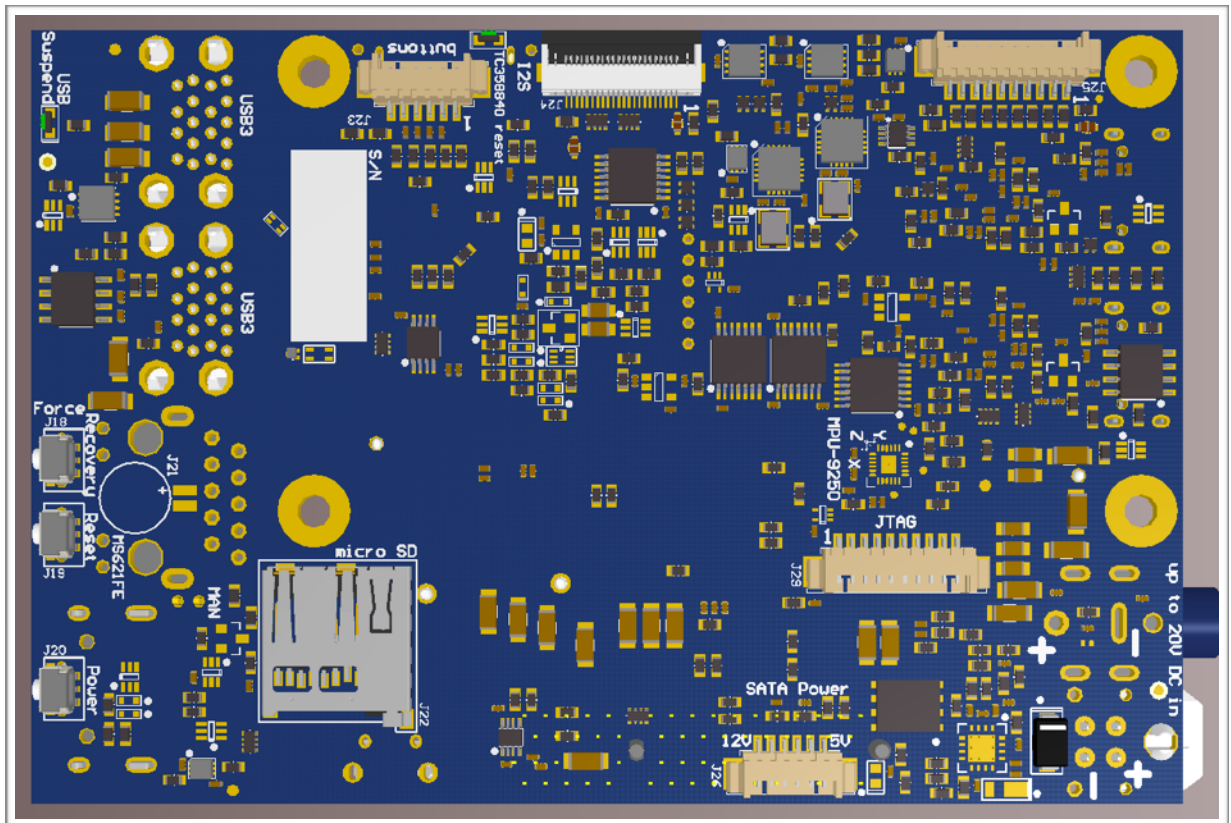
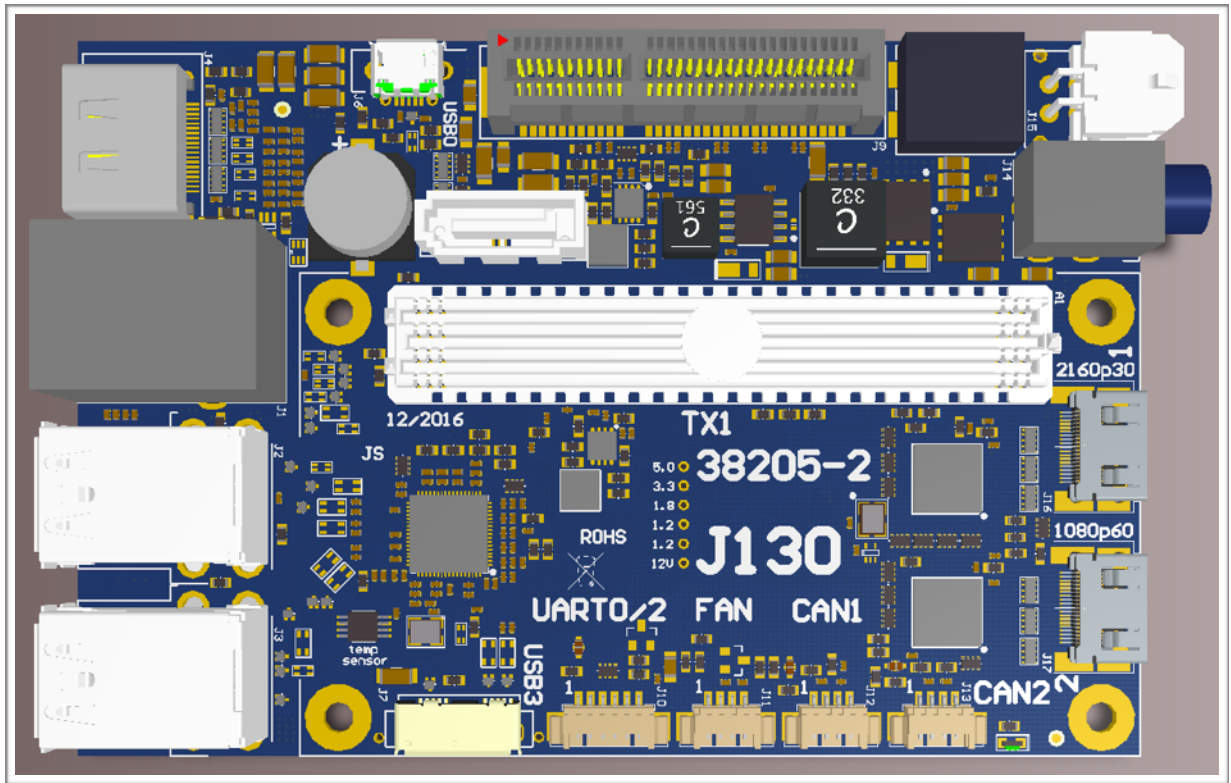
- model: 38205
- limited distribution to beta customers

Rev 2

- model: 38205-2
- introduced: March 2017
- power input only supports 12V power supplies
- 12V on PCIe slot and SATA power connector is directly powered by power input

Rev 3

- model: 38205-3
- planned



J130

The optional super cap is the tallest component on the bottom side (5.5mm high). The capacity of the super cap is 47mF. Optionally the RTC (realtime clock of the Jetson TX1) may be powered by a Lithium cell (MS621FE-FL11E). It is located next to the power button. If the super cap and the Lithium cell are not populated, RTC power may be provided on the buttons connector (J12 pin 1).

Testing of the J130

Please have a look at the test report which is included with the shipment.

STEP (3D) models

J130 rev 2: <http://www.auvidea.com/download/step/38205-2.step.zip>

Getting started

Applying power

The J130 is powered by the on-board power connector (J14 or optionally J15). Please check the input voltage requirements for your J130 revision.

Auto start

The J130 automatically powers up the TX1 with a digital one shot which pulls the POWER-BTN input of the TX1 low for approximately 1 second after power is applied. When the TX1 raises the CARRIER_PWR (A48) line, the power supplies on the J130 are powered up. This is indicated by lighting up the green power LED (PWR D13) next to the CAN2 connector.

The auto start logic is powered by Vdd_RTC (A50). Rev 1: for auto start to work, please power down the TX1 for a few seconds. This allows time for the auto start power supply to drain and to re-arm it, to enable auto start, when power is applied again. Alternatively power up the J120 by pressing the power button.

Console access

The console port of the TX1 is UART 0. The J130 converts this UART port to standard 3.3V TTL levels. So a standard USB to TTL serial converter may be used to connect to the console. Just connect TXD, RXD and GND to the USB converter. Make sure that you connect TXD to the RXD input of the USB TTL converter. Standard baud rate is 115200. Settings: 8/1/N. The I/O voltage is 3.3V. Please do not use a pull-up resistor of 50kOhm or less on the TXD line, as this confuses the bidirectional level converter. It will then assume that the TXD pin is driven from the outside which will reverse the direction of this signal.

Firmware upgrade of the TX1

The J130 does support a direct firmware upgrade of the TX1. Please put the TX1 into the upgrade mode with the recovery button before connecting the USB cable to USB0. Alternatively please perform the firmware upgrade on the TX1 development board.

Devices

IMU (MPU-9250)

A 9 axis sensor is connected to the SPI0 bus of the TX1. Pin 8 (VddIO) of the IMU is connected to 1.8V. Please set the INT output of the IMU by software to „totem pole“ mode as there is no pull-up on the INT output.

This IMU is optional. Only some J120 models are equipped with this function.

Pin	Function	Jetson TX1	Description
9	AD0/SDO	E4	SPI0_MISO (1.8V)
24	SDA/SDI	F4	SPI0_MOSI (1.8V)
23	SCL/SCLK	E3	SPI0_CLK (1.8V)
22	/CS	F3	SPI0_CS0 (1.8V)
12	INT	G14	INT is inverted and connected to GPIO9_MOTION_INT (1.8V)

SPI busses with the Jetson TX1

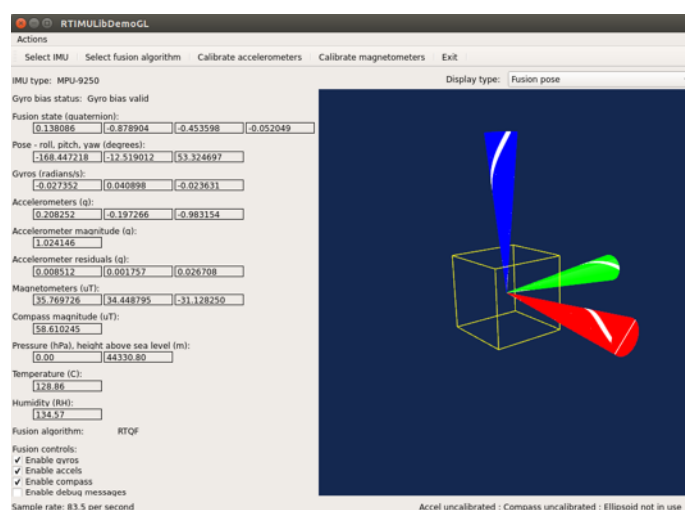
The Jetson TX1 features 3 SPI busses: SPI0 to SPI2. The table below lists how these SPI devices are mounted. Please note how the 5 physical SPI devices relate to the 5 spidevs.

Bus	CS	Tegra X1	SPI device	Use
SPI0	0	SPI4	spidev3.0	IMU MPU-9250
SPI1	0	SPI1	spidev0.0	CAN controller 1 (MCP2515) - not populated
SPI1	1	SPI1	spidev0.1	CAN Controller 2 (MCP2515)
SPI2	0	SPI2	spidev1.0	I2C/SPI connector J13
SPI2	1	SPI2	spidev1.1	I2C/SPI connector J14

Test of the IMU with the RTIMULibDemo

This demo may be downloaded from Github. Please install qtcreator first. Next please make sure that the spidev3.0 device in /dev is loaded. Edit the RTIMULibDemo.ini file with the SPI settings for the IMU (bus 3, select 0). Start the demo as root so it gets access to the SPI bus.

The IMU chip is located on the bottom side next to the JTAG connector. The IMU is its default feature on the J130.



I2C busses with the Jetson TX1

The Jetson TX1 features 7 I2C devices: I2C0 to I2C6. The table below lists how these I2C devices are mounted.

Bus	device	physical bus	Use
I2C0	0	I2C0	
I2C1	1	I2C1	
I2C2	2	I2C_PM	
I2C3	3	?	
I2C4	4	?	
I2C5	5	?	
I2C6	6	I2C_CAM	HDMI in 1 (J16): 0x0F (2160p30 input) HDMI in 2 (J17): 0x1F (1080p60 input)

The two Toshiba TC358840 HDMI to CSI-2 converter chips are located on the 7 bit I2C addresses 0x0F and 0x1F, as it can be seen in the terminal output below.

```
$ sudo i2cdetect -y -r 6
   0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  0F
10:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  1F
20:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
30:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
40:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
50:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
60:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
70:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
```

CAN

The J130 features 2 CAN interfaces (one interface is optional). As the Jetson TX1 does not have native CAN interfaces, the J130 features 1 SPI based CAN controller (Microchip MCP2515). The second is optional. Please install the Kernel and support package with the MCP2515 driver, which is provided by Auvideo.

```
$ sudo modprobe mcp251x

$ sudo ip link set can0 up type can bitrate 1000000

$ ifconfig
can0    Link encap:UNSPEC  HWaddr 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00
        UP RUNNING NOARP  MTU:16  Metric:1
        RX packets:0 errors:0 dropped:0 overruns:0 frame:0
        TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:10
        RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

eth0    Link encap:Ethernet  HWaddr 00:04:4b:57:29:32
        UP BROADCAST MULTICAST  MTU:1500  Metric:1
        RX packets:0 errors:0 dropped:0 overruns:0 frame:0
        TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

```

lo      Link encap:Local Loopback
        inet addr:127.0.0.1  Mask:255.0.0.0
        inet6 addr: ::1/128 Scope:Host
        UP LOOPBACK RUNNING  MTU:65536  Metric:1
        RX packets:549 errors:0 dropped:0 overruns:0 frame:0
        TX packets:549 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:0
        RX bytes:46707 (46.7 KB)  TX bytes:46707 (46.7 KB)

```

HDMI input 1 (J16) (up to 2160p30) - address 0x0F

This HDMI input is connected to a Toshiba TC358840 HDMI to CSI-2 bridge chip. It connects via two 4 lane CSI-2 interfaces to the Jetson TX1 (CSI_CD and CSI_EF). The pin numbers below are the pin numbers of the Toshiba chip.

Pin	Function	Jetson TX1	Description
K3	CAM_I2C_DAT	D6	1.8V I2C bus - I2C device 6 - address 0x0F
K4	CAM_I2C_CLK	C6	1.8V I2C bus - I2C device 6
K8	Reset	H8	GPIO2_CAM0_RST* (low active) - R56 must be installed some rev 1 boards are patched: F2, GPIO19_AUD_RST (GPIO219)
J3	Int	B25 G8	Rev 1: GPIO6_TOUCH_INT* (10k pull down) Rev 2: GPIO0_CAM0_PWR
B5/A5	CSI-F_D1	E21/E20	CSI1D3 output lane
B6/A6	CSI-F_D0	C23/C22	CSI1D2 output lane
B8/A8	CSI-E_D1	H21/H20	CSI1D1 output lane
B9/A9	CSI-E-D0	F23/F22	CSI1D0 output lane
B7/A7	CSI-E_CLK	G22/G21	CSI1C clock lane
D9/D10	CSI-D_D1	E24/E23	CSI0D3 output lane
E9/E10	CSI-D_D0	C26/C25	CSI0D2 output lane
G9/G10	CSI-C_D1	H24/H23	CSI0D1 output lane
H9/H10	CSI-C_D0	F26/F25	CSI0D0 output lane
F9/F10	CSI-C_CLK	G25/G24	CSI0C clock lane
K9	RefCLK	-	50 MHz reference clock input (by clock oscillator)
J4	Audio_MCLK	F1	A-OSCK input (audio master clock)
J9	I2S2_SDIN	G6	A_SD0 output (2 audio data channels)
K7	I2S2_CLK	G5	A_SCK output (bit clock = 64x sample clock)
K5	I2S2_LRCLK	H5	A_WFS output (word clock = sample clock)
J8	I2S_SDIN	G1	A_SD1 output (2 audio data channels) - optional if RN35 is installed
J6	I2S3_SDIN	E5	A_SD2 output (2 audio data channels) - optional if RN35 is installed

By fault 2 audio channel are connected. Optionally RN35, R270 and R261 may be installed to connect 4 more audio channels to I2S and I2S3. In this case the 3 CLKs (I2S_CLK, I2S2_CLK and I2S3_CLK) are shorted together. Also the 3 word clocks (I2S_LRCLK, I2S2_LRCLK and I2S3_LRCLK) are shorted together. The recommend value is 10 Ohm.

HDMI input 2 (J17) (up to 1080p60) - address 0x1F

This HDMI input is connected to a Toshiba TC358840 HDMI to CSI-2 bridge chip. It connects via one 4 lane CSI-2 interface to the Jetson TX1 (CSI_AB). The pin numbers below are the pin numbers of the Toshiba chip.

Pin	Function	Jetson TX1	Description
K3	CAM_I2C_DAT	D6	1.8V I2C bus - I2C device 6 - address 0x1F
K4	CAM_I2C_CLK	C6	1.8V I2C bus - I2C device 6
K8	Reset	H8 F2 H7	Rev 1: GPIO2_CAM0_RST* (low active) some rev 1 boards are patched to GPIO19_AUD_RST (GPIO219) Rev 2: GPIO3_CAM1_RST (GPIO 149)
J3	Int	- F7	Rev 1: not connected to TX1 (10k pull up) Rev 2: GPIO1_CAM1_PWR (10k pull up)
D9/D10	CSI-B_D1	B27/B26	CSI0D3 output lane
E9/E10	CSI-B_D0	C29/C28	CSI0D2 output lane
G9/G10	CSI-A_D1	H27/H26	CSI0D1 output lane
H9/H10	CSI-A_D0	F29/F28	CSI0D0 output lane
F9/F10	CSI-A_CLK	G28/G27	CSI0C clock lane
K9	RefCLK	-	50 MHz reference clock input
J4	Audio_MCLK	F1	A-OSCK input (audio master clock)
J9	I2S1_SDIN	C14	A_SD0 output (2 audio data channels)
K7	I2S1_CLK	C15	A_SCK output (bit clock = 64x sample clock)
K5	I2S1_LRCLK	D13	A_WFS output (word clock = sample clock)

Reset

The HDMI in 1 device features RC components on the reset input (100nF with 10k pull up) to perform an power up reset. The HDMI in 2 device must be reset by the TX1 GPIO after power up. Only after a reset the second HDMI in device will be accessible.

Please see the commands below. First only the 0x0F device shows up. Then a reset to the second device is performed by enabling GPIO 149 as GPIO pin, then setting its direction and last by writing a sequence of 1 - 0 - 1 to this output. The low pulse resets the second device.

```
ubuntu@tegra-ubuntu:~$ sudo -s
[sudo] password for ubuntu:
root@tegra-ubuntu:~# sudo i2cdetect -y -r 6
   0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  -- 0f
10:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
20:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
30:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
40:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
50:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
60:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
70:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
root@tegra-ubuntu:~# echo 149 > /sys/class/gpio/export
root@tegra-ubuntu:~# echo out > /sys/class/gpio/gpio149/direction
root@tegra-ubuntu:~# echo 1 > /sys/class/gpio/gpio149/value
root@tegra-ubuntu:~# echo 0 > /sys/class/gpio/gpio149/value
root@tegra-ubuntu:~# echo 1 > /sys/class/gpio/gpio149/value
```

```
root@tegra-ubuntu:~# sudo i2cdetect -y -r 6
   0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:          -- -- -- -- -- -- -- -- -- -- -- -- -- -- 0f
10: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 1f
20: -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
30: -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
40: -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
50: -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
60: -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
70: -- -- -- -- -- -- -- -- --
```

Connectors

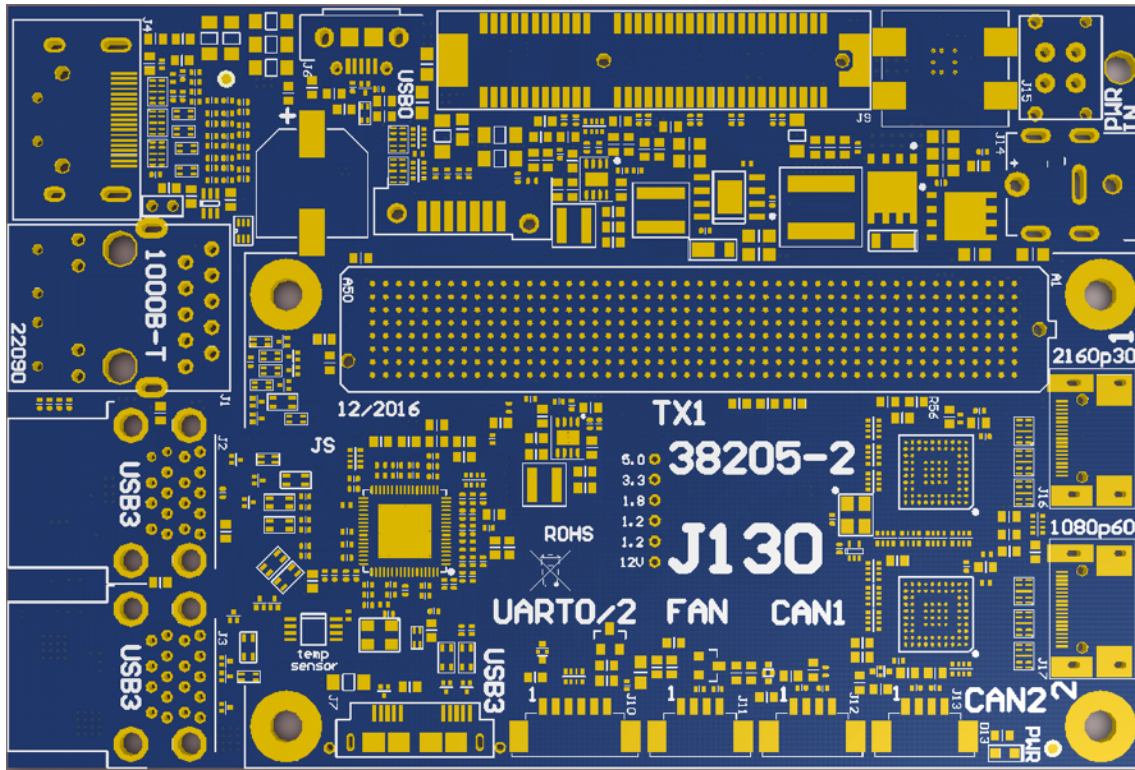


Figure 1: connectors on the top side

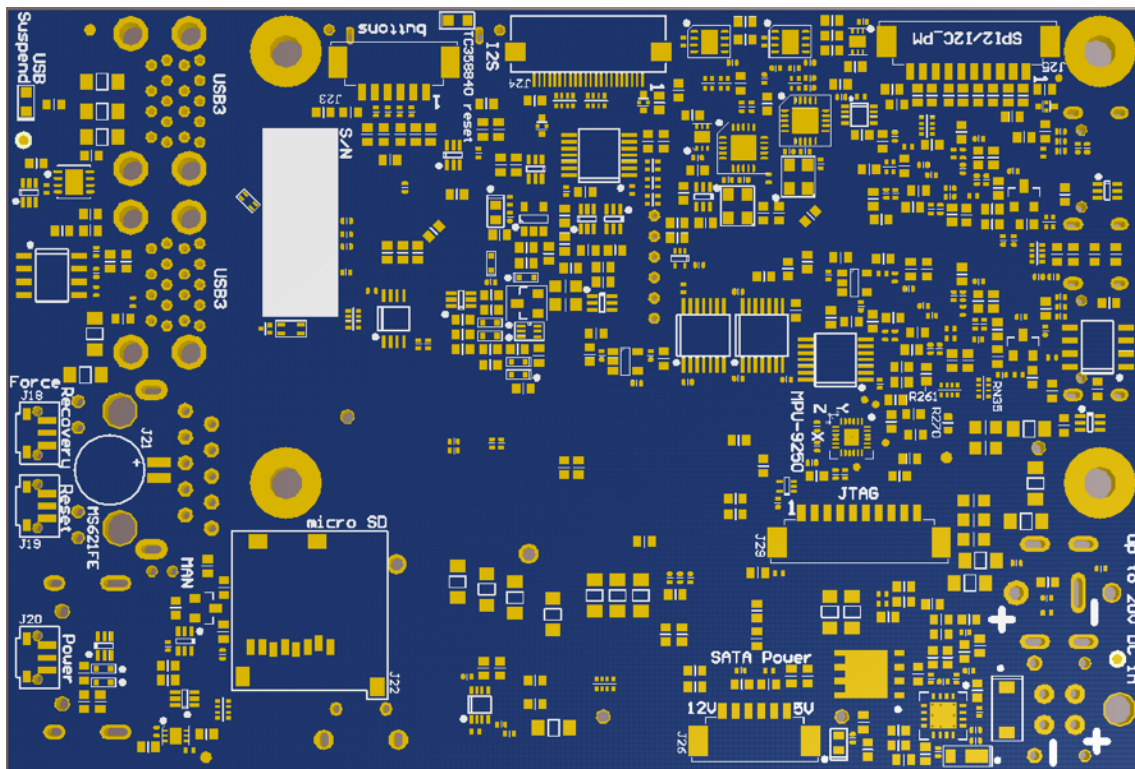


Figure 2: connectors on the bottom side

Auvideo supplies cable kits for the PicoBlade compatible connectors with 1.25 mm pitch. Please check the website for details.

USB 3.0 (J2)

This is dual USB 3.0 type A connector. Pin 1-9 is the bottom connector and pin 10-18 is the top connector. Pin 1-9 is connected directly to the TX1. Pin 10-19 is connected to port 3 of the Cypress USB3 hub device.

Pin	Function	Jetson TX1	Description
1	5V	-	5V power controlled by USB2_EN_OC (A19) - max. 900 mA
2	USB2-D-	B43	USB 2.0 data
3	USB2-D+	B42	USB 2.0 data
4	GND	-	Ground
5	USB3_RX2-	H42	USB 3.0 receive data
6	USB3_RX2+	H41	USB 3.0 receive data
7	GND	-	Ground
8	USB3_TX2-	E42	USB 3.0 transmit data
9	USB3_TX2+	E41	USB 3.0 transmit data
10	5V	-	5V power controlled USB hub device (max. 5A total for all 4 ports)
11	USB_D3+	-	USB 2.0 data (port 3 of USB hub)
12	USB1-D3+	-	USB 2.0 data (port 3 of USB hub)
13	GND	-	Ground
14	USB3_R3-	-	USB 3.0 receive data (port 3 of USB hub)
15	USB3_R3+	-	USB 3.0 receive data (port 3 of USB hub)
16	GND	-	Ground
17	USB3_T3-	-	USB 3.0 transmit data (port 3 of USB hub)
18	USB3_T3+	-	USB 3.0 transmit data (port 3 of USB hub)

USB 3.0 (J3)

This is dual USB 3.0 type A connector. Pin 1-9 is the bottom connector and pin 10-18 is the top connector. Both ports are connected to the Cypress USB3 hub device.

Pin	Function	Jetson TX1	Description
1	5V	-	5V power controlled USB hub device (max. 5A total for all 4 ports)
2	USB-D1-	-	USB 2.0 data (port 1 of USB hub)
3	USB-D1+	-	USB 2.0 data (port 1 of USB hub)
4	GND	-	Ground
5	USB3_R1-	-	USB 3.0 receive data (port 1 of USB hub)
6	USB3_R1+	-	USB 3.0 receive data (port 1 of USB hub)
7	GND	-	Ground

Pin	Function	Jetson TX1	Description
8	USB3_T1-	-	USB 3.0 transmit data (port 1 of USB hub)
9	USB3_T1+	-	USB 3.0 transmit data (port 1 of USB hub)
10	5V	-	5V power controlled USB hub device (max. 5A total for all 4 ports)
11	USB_D2+	-	USB 2.0 data (port 2 of USB hub)
12	USB1-D2+	-	USB 2.0 data (port 2 of USB hub)
13	GND	-	Ground
14	USB3_R2-	-	USB 3.0 receive data (port 2 of USB hub)
15	USB3_R2+	-	USB 3.0 receive data (port 2 of USB hub)
16	GND	-	Ground
17	USB3_T2-	-	USB 3.0 transmit data (port 2 of USB hub)
18	USB3_T2+	-	USB 3.0 transmit data (port 2 of USB hub)

Micro USB 3.0 (J7)

This is a micro USB 3.0 type A connector. This port is connected to the Cypress USB3 hub device.

Pin	Function	Jetson TX1	Description
1	5V	-	5V power controlled USB hub device (max. 5A total for all 4 ports)
2	USB-D4-	-	USB 2.0 data (port 4 of USB hub)
3	USB-D4+	-	USB 2.0 data (port 4 of USB hub)
4	GND	-	Ground
5	USB3_R4-	-	USB 3.0 receive data (port 4 of USB hub)
6	USB3_R4+	-	USB 3.0 receive data (port 4 of USB hub)
7	GND	-	Ground
8	USB3_T4-	-	USB 3.0 transmit data (port 4 of USB hub)
9	USB3_T4+	-	USB 3.0 transmit data (port 4 of USB hub)

USB 2.0 (J6)

USB 2.0 port for firmware upgrades and USB 2.0 peripherals such as mouse and keyboard. On pin 1 the 5V reverse current is blocked by the USB power switch (XRP25261D).

Pin	Function	Jetson TX1	Description
1	5V	-	5V power controlled by USB0_EN_OC* (A17) - max. 500 mA
2	USB0-D-	B40	USB 2.0 data
3	USB0-D+	B39	USB 2.0 data
4	GND	-	Ground
-	USB0_ID	A36	connected to 1.8V with 10k pullup
-	USB0_VBUS	B37	connected to pin 1 of this connector

CAN controller (MCP2515T-I/ML)

The two SPI to CAN controllers add two CAN bus interfaces to the TX1, as there is no internal CAN controller in the TX1. The SPI bus, RESET and INT are shared between the 2 CAN controllers (J120 rev 1). The J120 rev 2 will use separate SPI interrupts. Just SPI1_CS0 and SPI1_CS1 select one of the two controllers. The two CAN busses are available on J9 (CAN1) and J10 (CAN2).

CAN controller 1 (not populated):

Pin	Function	Jetson TX1	Description
15	SO	F14	SPI1_MISO (level shifted to 3.3V)
14	SI	F13	SPI1_MOSI (level shifted to 3.3V)
12	SCK	G13	SPI1_CLK (level shifted to 3.3V)
22	/CS	E14	SPI1_CS0 (level shifted to 3.3V)
12	/INT	H3	GPIO20_AUD_INT (low active with 10k pull-up to 3.3V)
17	/RESET	D7	GPIO5_CAM_FLASH_EN is inverted and connected to the RESET inputs

CAN controller 2:

Pin	Function	Jetson TX1	Description
15	SO	F14	SPI1_MISO (level shifted to 3.3V)
14	SI	F13	SPI1_MOSI (level shifted to 3.3V)
12	SCK	G13	SPI1_CLK (level shifted to 3.3V)
22	/CS	E13	SPI1_CS1 (level shifted to 3.3V)
12	/INT	H3	GPIO20_AUD_INT (low active with 10k pull-up to 3.3V)
17	/RESET	D7	GPIO5_CAM_FLASH_EN is inverted and connected to the RESET inputs

CAN1 (J9):

This CAN port is reserved to connect to the build-in CAN controller of the TX2. RN29 must be populated. The CAN0 port of the TX2 connects to the CAN transceiver (TJA1051TK/3). This connects to the CAN connector. The port is terminated by 120 Ohm.

Pin	Function	Jetson TX1	Description
1	5V	-	5V power for the CAN bus (500 mA)
2	CAN2_H	-	CAN data high (with 120 Ohm termination)
3	CAN2_L	-	CAN data low
4	GND	-	Ground (0V)

CAN2 (J10):

The CAN Port connects to the SPI to CAN controller 2.

Pin	Function	Jetson TX1	Description
1	5V	-	5V power for the CAN bus (500 mA)
2	CAN1_H	-	CAN data high
3	CAN1_L	-	CAN data low
4	GND	-	Ground (0V)

Ethernet (J1)

The J130 features an on-board RJ45 connector for 10/100/1000BT Ethernet with 2 LEDs.

LED	Function	Jetson TX1	Description
GBE0	GBE_LINK_ACT*	E47	left LED
GBE1	GBE_LINK_100	F50	right LED

HDMI (J3)

This is a 19 pin HDMI connector (standard size). Please note that the HDMI and mini HDMI connectors have different pin outs.

Pin	Function	Jetson TX1	Description
1	DP1_TXD0+	E39	HDMI data lane 2
2	GND	-	Ground
3	DP1_TXD0-	E38	HDMI data lane 2
4	DP1_TXD1+	C38	HDMI data lane 1
5	GND	-	Ground
6	DP1_TXD1-	C37	HDMI data lane 1
7	DP1_TXD2+	D37	HDMI data lane 0
8	GND	-	Ground
9	DP1_TXD2-	D36	HDMI data lane 0
10	DP1_TXD3+	E36	HDMI clock
11	GND	-	Ground
12	DP1_TXD3-	E35	HDMI clock
13	GND	-	Ground
14	CEC	B33	HDMI_CEC
15	HDMI_DDC_SCL	A35	DP1_AUX_CH
16	HDMI_DDC_SDA	A34	DP1_AUX_CH*
17	reserved	-	not connected
18	PWR	-	5V power (max. 500 mA)
19	HPD	A33	inverted and connected to DP1_HPD

UART 0 / UART 2 (J10)

This UART connector features 2 UART interfaces. UART 0 is the console (115200, 8, N, 1). Please note that the TXD lines should not have a pull up resistors with less than 50k Ohm. A pull up resistor with a low resistance will make the bidirectional level converter on the J130 assume that this pin is driven by the outside.

Pin	Function	Jetson TX1	GPIO	Description
1	5V	-	-	5V power output
2	UART0_TXD	H12	GPIO3_PU.00	UART 0 console port (3.3V TTL level): transmit data output
3	UART0_RXD	G12	GPIO3_PU.01	UART 0 console port (3.3V TTL level): receive data input
4	UART2_TXD	B16	-	UART 2 console port (3.3V TTL level): transmit data output
5	UART2_RXD	B15	-	UART 2 console port (3.3V TTL level): receive data output
6	GND	-	-	Ground

FAN (J11)

This is a 4 pin connector with 1.25 mm pitch. This is the same pinout as the fan connector on the Jetson TX1 development kit. With the J100 the fan is on by default. Use the „fan disable“ feature to turn off the fan.

Please note, that the „fan disable“ requires a software change when compared to the dev kit. On the dev kit „fan disable“ is controlled by an I2C port expander line. On the J100 „fan disable“ is connected to GPIO19_AUD_RST (through an inverting MOSFET). Pull the GPIO19 (F2) high to disable the fan (pin 4 becomes low). A low or floating signal on GPIO19 will not disable the fan.

Pin	Function	Jetson TX1	Description
1	GND	-	Ground
2	5V	-	5V power supply to the fan
3	FAN_TACH	B17	tachometer from the fan (open drain input with 100k pull-up to 1.8V)
4	FAN_PWM	C16	PWM control to the fan (open drain output: controlled by FAN_PWM and „disable fan“ with GPIO19 - F2)

Power (J14) and (J15)

J14 is a 2 pin connector with 5.5/2.5mm. J15 is an optional Molex connector (430450400) with 3mm pitch and 4 pins. Pin 1 and 2 are in the front (+) and pin 3 and 4 in the back (-). Two pins each are shorted together.

Pin	Function	Jetson TX1	Description
1	power in 1	-	power input: 12V
2	power in 2	-	power input: 12V
3	GND	-	power ground
4	GND	-	power ground

I2S (J24)

This is a 22 pin FPC connector with 0.5mm pitch. Contacts on the PCB side - on the opposite side of the locking hinge.

Pin	Function	Jetson TX1	GPIO	Description
1	3.3V	-	-	3.3V power supply (500 mA max.)
2	I2C_PM_DAT	B6	-	I2C device 2 (1.8V)
3	I2C_PM_CLK	A6	-	I2C device 2 (1.8V)
4	GND	-	-	Ground
5	3.3V	-	-	3.3V power supply (500 mA max.)
6	AUDIO_INT	G7	GPIO3_PT.01	GPIO4_CAM_STROBE (1.8V)
7	GND	-	-	Ground
8	UART1_TXD	D9	-	UART 1 transmit data (1.8V)
9	UART1_RXD	D10	-	UART 1 transmit data (1.8V)
10	GND	-	-	Ground
11	RESET	H8	GPIO3_PS.04	GPIO2_CAM0_RST (1.8V) - R56 must be installed shared with Reset of HDMI in 1
12	I2S_MCLK	F1	-	digital audio interface: I2S master clock (1.8V)
13	GND	-	-	Ground
14	I2S3_SDOUT	F6	-	digital audio interface 3: audio output (1.8V)
15	I2S3_CLK	E6	-	digital audio interface 3: bit clock (1.8V)
16	GND	-	-	Ground
17	I2S3_LRCLK	F5	-	digital audio interface 3: word clock (1.8V)
18	I2S3_SDIN	E5	-	digital audio interface 3: audio input (1.8V)
19	GND	-	-	Ground
20	1.8V	-	-	1.8V power supply (LDO: low power only)
21	1.8V	-	-	1.8V power supply (LDO: low power only)
22	GND	-	-	Ground

Micro SD card (J15)

Micro SD card reader (Amphenol 101-00660-68-6). SDCARD_WP (F20) = 0 (inactive).

Pin	Function	Jetson TX1	Description
1	SD_DAT2	F19	SD card interface data 2
2	SD_DAT3	F18	SD card interface data 3
3	SD_CMD	G19	SD card interface command
4	3.3V	-	enabled by SDCARD_PWR_EN = 1 (H16)
5	SD_CLK	G18	SD card interface clock
6	GND	-	Ground
7	SD_DAT0	H18	SD card interface data 0
8	SD_DAT1	H17	SD card interface data 1
9	SD_CD	F17	GND

Buttons (J23)

6 pin connector with 1.25 mm pitch (on the bottom side next to the green LED).

Pin	Function	Jetson TX1	GPIO	Description
1	Vdd_RTC	A50	-	Realtime clock power input from backup battery or super cap. Do not connect if super cap or Lithium cell (J21) is populated on the J130.
2	power	B50	GPIO3_PX.05	power button (connect to GND)
3	sleep	E2	GPIO3_PY.00	sleep button (connect to GND)
4	force recv.	E1	GPIO3_PX.06	force recovery button (connect to GND)
5	reset	A47	-	reset in button (connect to GND)
6	GND	-	-	Ground

4x PCIe slot (J9)

This is a 4 lane PCIe 2.0 slot for PCIe cards. The PCIe card must be plugged so that the bracket is on the HDMI connector side. We have tested various GbE LAN cards.

SATA (J8)

This is the SATA connector to interface to external SATA SSDs or hard drives (2.5" and 3.5").

SATA power connector (J26)

This connector provides 5V and 12V power to external SATA drives. Maximum current draw is 1A per pin. As there are 2 GND pins, the total current for 5V and 12V is 2A.

Pin	Function	Jetson TX1	GPIO	Description
1	12V	-	-	12V power supply
2	12V	-	-	12V power supply
3	GND	-	-	Ground
4	GND	-	-	Ground
5	5V	-	-	5V power supply
6	5V	-	-	5V power supply

SPI/I2C (J25)

This is a 10 pin connector with 1.25 mm pitch.

Pin	Function	Jetson TX1	GPIO	Description
1	5.0V	-	-	5.0V power supply (no current limiter - max. 1A)
2	SPI2_CLK	H14	-	SPI2_CLK (level shifted to 3.3V)
3	SPI2_MISO	H15	-	SPI2_CLK (level shifted to 3.3V)
4	SPI2_MOSI	G15	-	SPI2_CLK (level shifted to 3.3V)
5	SPI2_CS0	G16	-	SPI2_CLK (level shifted to 3.3V)
6	SPI2_CS1	F16	-	SPI2_CLK (level shifted to 3.3V)
7	INT_SPI2	H13	GPIO3_PX.03	GPIO8_ALS_PROX_INT (due to level converter input only)
8	I2C0_CLK	E15	-	I2C0_CLK (level shifted to 3.3V with 10k pullup)
9	I2C0_DAT	F15	-	I2C0_DAT (level shifted to 3.3V with 10k pullup)
10	GND	-	-	Ground

JTAG header (P1)

This is a 10 pin connector with 1.25 mm pitch.

Pin	Function	Jetson TX1	Description
1	1.8V	-	1.8V power output
2	JTAG_AP_TRST_L	B13	JTAG port of Jetson TX1
3	JTAG_AP_TCK	B11	JTAG port of Jetson TX1
4	JTAG_AP_RTCK	A14	JTAG port of Jetson TX1
5	JTAG_AP_TDO	A13	JTAG port of Jetson TX1
6	JTAG_AP_TMS	A12	JTAG port of Jetson TX1
7	NVJTAG_SEL	A11	JTAG port of Jetson TX1
8	JTAG_AP_TDI	B12	JTAG port of Jetson TX1
9	GND	-	Ground
10	GND	-	Ground

FAQ

1. to be added

Disclaimer

Thank you for reading this manual. If you have found any typos or errors in this document, please let us know.

This is the preliminary version of this data sheet. Please treat all specifications with caution as there may be any typos or errors.

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