Q&A Jetson TK1 FAQ:
5/1/2014

- *What input voltage range can Jetson accept?*

Jetson TK1 is presently characterized to accept an input voltage of 12V ±10%. The board may not reliably turn on below an input voltage of 9.5V, and a voltage above 13.2V may damage SATA HDD using 12V. Above 16V, the main board may be damaged. Input voltage ranges from 9.5-10.8V and from 13.2-16V have not been characterized. It may be possible to run the system on batteries around the 10-16V region (without HDDs requiring 12V), but NVIDIA has not tested this configuration.

- *Does the 12V rail only power SATA and the fan?*

12V powers the entire board, including SATA and the fan. On board voltage regulators generate all the other voltages needed from the input 12V.

- *What is the maximum wattage for the Jetson system?*

Power usage is heavily dependent on application and peripherals in use, as well as any expansion devices or boards. NVIDIA is still optimizing the Linux operating system for power.

The present kit includes a more than ample 12V @ 5A (60W) power supply. NVIDIA is evaluating smaller power supplies for the production kit, since the reasonable stressful applications NVIDIA has tested so far are below 30W (12V @ 2.5A).

- *What type of main input power plug does Jetson use?*

Jetson TK1 accepts a 2.1mm inner / 5.5 mm outer, center power, outer return jack. If you use your own power supply, NVIDIA recommends a power jack with springs/clips instead of a solid inner barrel for a more reliable connection.

- *What is the max DC output for the mini PCIE and USB ports?*

Jetson TK1 supports the standard specified power requirements for mini PCIE boards and USB.

Mini PCIE site: +3.3V_AUX @ 1100mA max; +1.5V @ 375mA max
USB 2.0 connector: 5V @ 500mA max
USB 3.0 connector: 5V @ 900mA max

Expansion port information:

The maximum currents allowed for the expansion port power rails (preliminary)

Expansion Power	Max Current (mA)	Notes
+5V_SYS	500	
+3.3V_SYS	500	
+1.8V_VDDIO	400	
+VDD_MUX (+12V)	400	
+3.3V_RUN_TOUCH (LDO9)	50	Only routes to expansion; intended for Touch controller
+3.3V_RUN	450	Intended for LCD 3.3V supply, shared with TK1
+1.05V_RUN_CAM_REAR (LDO7)	300	Only routes to expansion; output impedance 0.6 ohms typical
+1.2V_GEN_AVDD (LDO2)	50	Shared with CSI and HSIC rails on TK1
+1.2V_RUN_CAM_FRONT (LDO5)	300	Only routes to expansion; output impedance 0.6 ohms typical
+1.8V_RUN_CAM (LDO1)	100	Shared with VDDIO_CAM on TK1
+2.8V_RUN_CAM_AF(LDO10)	300	Only routes to expansion; output impedance 0.6 ohms typical
+2.8V_RUN_CAM (LDO4)	300	Only routes to expansion; output impedance 0.6 ohms typical

Notes:
- Current values are total current supplied from Jetson TK1, not per expansion connector pin.
- If a given voltage rail cannot provide enough current, a possible solution is for the user to use a regulator from +5V_SYS, +3.3V_SYS or +1.8V_VDDIO to generate the desired rail.

- Max currents indicate delivery capability of supply, not tolerance of voltage at pin or at Tegra. Some LDO rails will droop faster than others from trace and connector losses. The user can adjust voltages using PMIC LDO registers to compensate for some losses.
- Some rails powered by the PMIC LDOs are shared between expansion header and TK1. Excessive current draw may droop the rail at TK1 below specified voltage and cause unpredictable behavior. The user is responsible to avoid this condition.

Signals are grouped on connector to allow smaller size 2mm pitch adapters to be used if desired, instead of requiring a full 5x25 array.

Expansion Signal	T124 Ball(s)	I/O Type	Default	Associated Power Rail
DP_AUX_P/N	DP_AUX_P/N		Bidir	N/A (AC coupled)
LVDS_TXD(4:0)_P/N	LVDS_TXD(4:0)_P/N	LVDS/DP	Out	
EDP_HPD	DP_HPD	ST	In	+3.3V_LP0
EN_AVDD_LCD	N/A		Out	+1.8V_VDDIO
EN_VDD_BL	DAP3_DOUT	ST	Out	
GEN1_I2C_SCL	GEN1_I2C_SCL	DD	Open drain, Out	
GEN1_I2C_SDA	GEN1_I2C_SDA		Open drain, Bidir	
LCD_BL_EN	GPIO_PH2	CZ	Out	
LCD_BL_PWM	GPIO_PH1		Out	
LCD_TE	KB_ROW6	ST	Out	
TS_CLK	CLK2_OUT	ST	Out	+1.8V_VDDIO
TS_IRQ_L	GPIO_PK2	CZ	In	
TS_RESET_L	GPIO_PK4		Out	
TS_SHDN_L	GPIO_PK1		Out	
TS_SPI_CS_L	ULPI_STP	ST	Out	
TS_SPI_MISO	ULPI_DIR		In	
TS_SPI_MOSI	ULPI_CLK		Out	
TS_SPI_SCK	ULPI_NXT		Out	
GEN2_I2C_SCL_3.3V	GEN2_I2C_SCL	DD	Open drain, Out	+3.3V_LP0
GEN2_I2C_SDA_3.3V	GEN2_I2C_SDA		Open drain, Bidir	
BR_UART1_RXD	KB_ROW10	ST	In	+1.8V_VDDIO
BR_UART1_TXD	KB_ROW9		Out	
CAM_I2C_SCL	CAM_I2C_SCL	DD	Open drain, Out	+1.8V_RUN_CAM
CAM_I2C_SDA	CAM_I2C_SDA		Open drain, Bidir	
CAM1_GPIO	GPIO_PCC1	ST	Out	
CAM2_GPIO	GPIO_PCC2		Out	
CAM2_MCLK	GPIO_PBB0		Out	
CAM_RST_L	GPIO_PBB3		Out	
CAM_FLASH	GPIO_PBB4		Out	
CAM1_PWDN	GPIO_PBB5		Out	
CAM2_PWDN	GPIO_PBB6		Out	
CAM1_AF_PWDN	GPIO_PBB7		Out	
CLK3_OUT	CLK3_OUT		Out	
CSI_E_CLK_P/N	CSI_E_CLK_P/N	CSI	In	+1.2V_GEN_AVDD
CSI_E_D0_P/N	CSI_E_D0_P/N		In	
CSI_A_CLK_P/N	CSI_A_CLK_P/N		In	
CSI_A/B_D(1:0)_P/N	CSI_A/B_D(1:0)_P/N		In	
FORCE_RECOVERY_L	GPIO_PI1 (indirect)		In	+2.5V_AON_RTC
ONKEY_L	N/A		In	
PMU_RESET_IN_L	N/A		In	

GPIO_PU0	GPIO_PU0	ST	Bidir	+1.8V_VDDIO
GPIO_PU1	GPIO_PU1		Bidir	
GPIO_PU2	GPIO_PU2		Bidir	
GPIO_PU3	GPIO_PU3		Bidir	
GPIO_PU4	GPIO_PU4		Bidir	
GPIO_PU5	GPIO_PU5		Bidir	
GPIO_PU6	GPIO_PU6		Bidir	
HSIC1_DATA	HSIC1_DATA	HSIC	Bidir	+1.2V_GEN_AVDD
HSIC1_STROBE	HSIC1_STROBE		Bidir	
PWR_I2C_SCL	PWR_I2C_SCL		Open drain, Out	+1.8V_VDDIO
PWR_I2C_SDA	PWR_I2C_SDA		Open drain, Bidir	
UART2_CTS_L	UART2_CTS_L	ST	In	+1.8V_VDDIO
UART2_RTS_L	UART2_RTS_L		Out	
UART2_RXD	UART2_RXD		In	
UART2_TXD	UART2_TXD		Out	

GPIOs

ST / CZ I/O Type

Symbol	Parameter	Min	Max	Units
Vil	Input Low Voltage	-0.5	0.25xVDD	V
Vih	Input High Voltage	0.75xVDD	0.5+VDD	V
Vol	Output Low Voltage (Iol = 1mA)	--	0.15 x VDD	V
Voh	Output High Voltage (Ioh = -1mA)	0.85xVDD	--	V

DD I/O Type

Symbol	Parameter	Min	Max	Units
Vil	Input Low Voltage	-0.5	0.25xVDD	V
Vih	Input High Voltage	0.75xVDD	TBD	V
Vol	Output Low Voltage (Iol = 1mA)	--	0.15 x VDD	V

Do not drive unpowered signals (when the voltage rail is powered off).

- *Can I repurpose any of the expansion header pins as GPIOs for my own use?*

Tegra TK1 provides 7 GPIO pins – GPIO_PU(6:0) - for normal input/output. The camera group GPIOs may also be available. Other signals exposed on the expansion header are not intended for customized GPIOs and changing their use is not presently supported.

- *What SATA drives can I use with Jetson? Are there any power limitations?*

Most 3.5” and 2.5” HDDs will be fine. HDD current draw on 5V and 12V rails should be less than 1A each, which permits even desktop spinning drives.

- *Is the SATA hot-pluggable for data and/or power connections?*

No, please only attach and detach SATA cables when the system is off.

- *Is Android supported?*

Linux for Tegra (L4T) is the supported OS for Jetson TK1.

- *Is there an RTC on board? Can this be battery backed up?*

There is a real time clock in the PMIC with a supercap backup. When enabled, this allows time/date retention for minutes, not hours. It's intended only for brief power removal. There is no onboard battery.

- *Is it possible to change/expand the DRAM (DDR3) or flash memory (eMMC) sizes on Jetson?*

DDR3 and eMMC are soldered to the board and are not user changeable / expandable.

- *How can I attach normal size USB peripherals to the micro USB connector?*

NVIDIA has done most testing with male micro A to female standard A adapters, such as the Tensility 10-00768, which can be purchased at DigiKey. Other adapters will likely work as well.

- *Has display port been tested on Jetson TK1?*

Jetson TK1 has been functionally tested with two captive embedded display port (eDP) LCDs. You'll need to make your own cable adapter to bridge to the monitor. Jetson TK1 is intended for prototyping and any connections should be as short as possible.

- *Has LVDS been tested on Jetson TK1?*

LVDS LCDs should function, but have not been tested.

- *Which connectors or screens are supported?*

Users will need to make their own adapters/connections to desired monitors.

- *Is it acceptable to abruptly remove power at the DC jack?*

NVIDIA recommends using the pushbutton to allow an orderly power rail shutdown sequence.

- *I don't want any noise fan noise. Can I remove / disable the fan?*

Removing/disabling the fan will void the warranty. If you still wish to proceed, it may be possible to cool the Tegra with an after-market fansink or heat spreader. Choose something with a thick base (2mm min), thick fins and wide spacing between fins for passive cooling, and a good thermal interface material with an adhesive to attach to the TK1. Presently NVIDIA is unaware of any aftermarket coolers exactly matching the hole pattern on Jetson TK1.