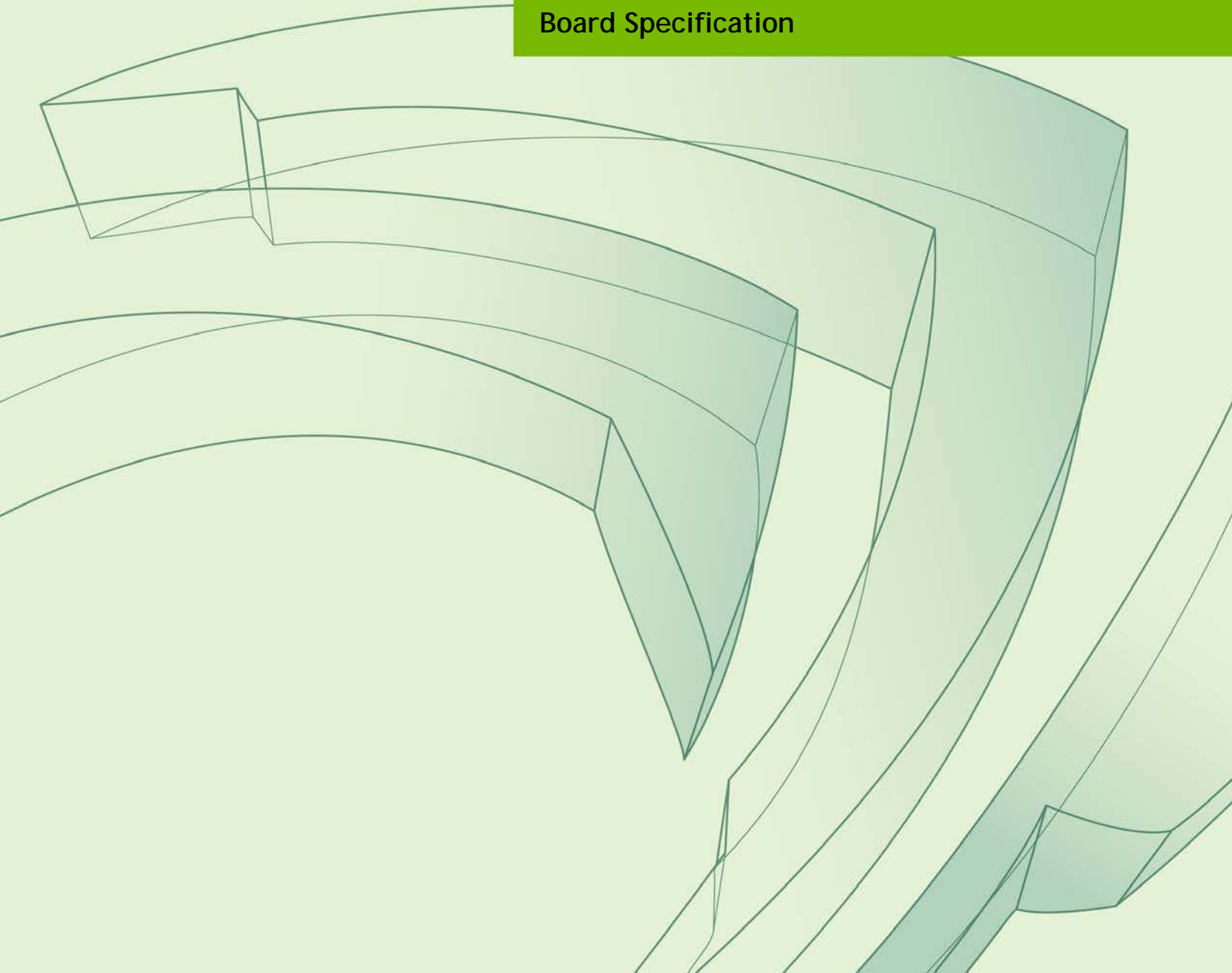




# TESLA K20X GPU ACCELERATOR

BD-06397-001\_v09 | October 2014

## Board Specification



## DOCUMENT CHANGE HISTORY

BD-06397-001\_v09

Version	Date	Authors	Description of Change
01	July 31, 2012	GG, SM	Preliminary Information (Information contained within this document is subject to change)
02	September 6, 2012	GG, SM	<ul style="list-style-type: none"> <li>• Updated “Key Features” section</li> <li>• Updated Table 1</li> <li>• Updated “Standard I/O Connector Placement” section</li> </ul>
03	September 7, 2012	GG, SM	<ul style="list-style-type: none"> <li>• Updated Table 4</li> <li>• Updated Table 5</li> <li>• General edits through specification</li> </ul>
04	October 9, 2012	GG, SM	<ul style="list-style-type: none"> <li>• Added memory bandwidth</li> <li>• Updated idle power to 25 W</li> </ul>
05	November 9, 2012	GG, SM	<ul style="list-style-type: none"> <li>• Removed “Preliminary Information” as this board specification is now final</li> <li>• Removed “NVIDIA Confidential from document</li> <li>• Updated PCI Express to Gen2</li> <li>• Updated package size</li> <li>• Updated board power (Table 1)</li> <li>• Updated block diagram (Figure 1)</li> </ul>
06	January 14, 2013	GG, SM	Added MTBF data to Table 1
07	July 5, 2013	GG, SM	Updated Figure 2
08	July 11, 2013	GG, SM	Updated memory configuration (24 pcs of 128M x 16) throughout board specification
09	October 15, 2014	GG, SM	Updated Figure 2

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# OVERVIEW

The NVIDIA® Tesla® K20X graphics processing (GPU) accelerator is a PCI Express, dual-slot full height (4.376 inches by 10.5 inches by 1.52 inches) form factor computing module comprising of a single GK110 GPU. The Tesla K20X is designed for servers and offers a total of 6 GB of GDDR5 on-board memory and supports PCI Express Gen2.

The Tesla K20X can be configured by the OEM or by the end user to enable or disable ECC or error correcting codes that can fix single-bit errors and detect double-bit errors. Enabling ECC will cause some of the memory to be used for the ECC bits, so the user available memory will decrease by 10%. On the Tesla K20X, the register files, cache and DRAM are ECC protected.

## KEY FEATURES

### GPU

- ▶ Number of processor cores: 2688
- ▶ Processor core clock: 732 MHz
- ▶ Package size: 45 mm × 45 mm 2397-pin ball grid array (S-FCBGA)

### Board

- ▶ PCI Express Gen2 ×16 system interface
- ▶ Physical dimensions: 4.376 inches × 10.5 inches, dual-slot

### Display Connectors

- ▶ None

## Power Connectors

- ▶ One 6-pin PCI Express power connector
- ▶ One 8-pin PCI Express power connector

## Memory

- ▶ Memory clock: 2.6 GHz
- ▶ Memory bandwidth: 250 GB/sec
- ▶ Interface: 384-bit
  - Total board memory: 6 GB
  - 24 pieces of 128M × 16 GDDR5, SDRAM

## BIOS

- ▶ 2Mbit Serial ROM

# TESLA K20X BLOCK DIAGRAM

Figure 1 is the block diagram for the Tesla K20X GPU dual-slot computing processor module.

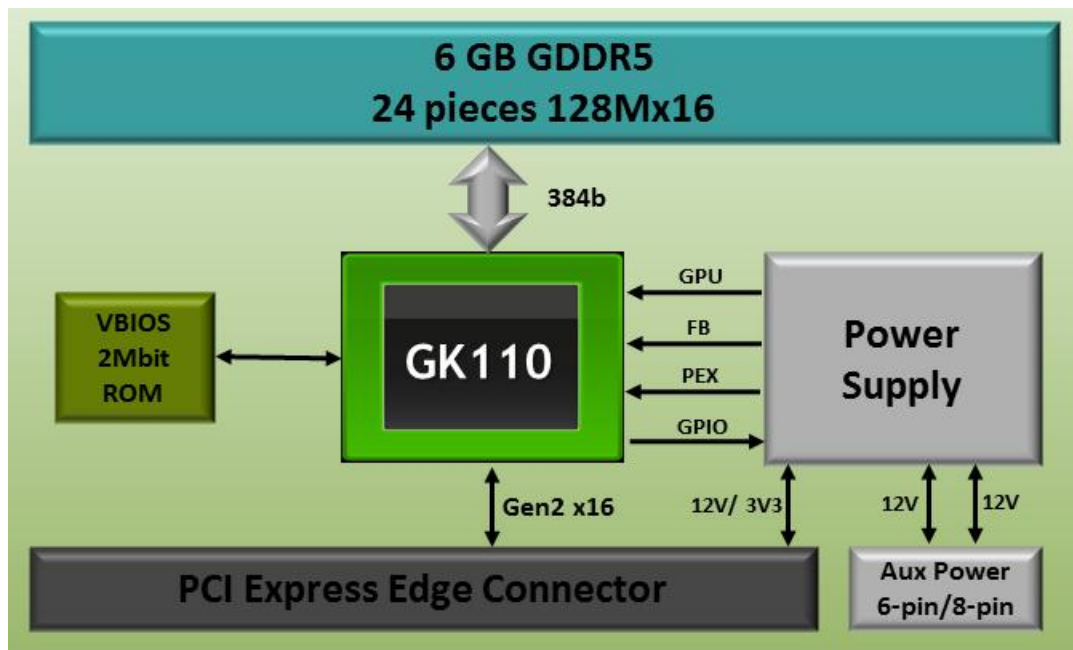


Figure 1. Tesla K20X Block Diagram

## CONFIGURATION

The Tesla K20X board is available in the following configuration (Table 1).

Table 1. Board Configuration

Specifications	Tesla K20X
Generic SKU reference	699-22081-0200-xxx
Chip	GK110
Package size GPU	45 mm × 45 mm 2397-pin S-FCBGA
Processor clock	732 MHz
Memory clock	2.6 GHz
Memory size	6 GB
Memory I/O	384-bit GDDR5
Memory configuration	24 pieces of 128M ×16 GDDR5 SDRAM
Display connectors	None
Power connectors	<ul style="list-style-type: none"> <li>•8-pin PCI Express power connector</li> <li>•6-pin PCI Express power connector</li> </ul>
Board power	235 W
Idle power	25 W
Thermal cooling solution	Passive heat sink
Mean time between failures (MTBF)	<ul style="list-style-type: none"> <li>•Uncontrolled environment: 128440 hours at 35 °C</li> <li>•Controlled environment: 208861 hours at 35 °C</li> </ul>

# MECHANICAL SPECIFICATIONS

## PCI EXPRESS SYSTEM

The Tesla K20X board (Figure 2) conforms to the PCI Express full height (4.376 inches by 10.5 inches) form factor.

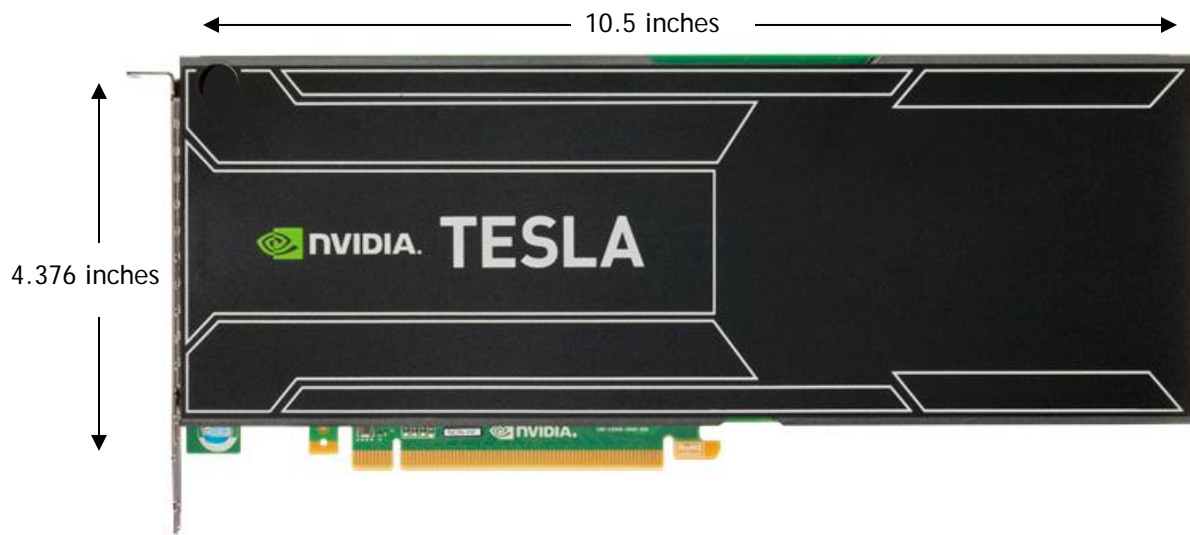


Figure 2. Tesla K20X GPU Accelerator



## TESLA K20X BRACKET

As shown in Figure 3, the Tesla K20X includes a vented bracket. If you are an OEM who qualifies for bracket modifications, you have the option of receiving your module with no bracket installed.



Figure 3. Tesla K20X Bracket

## POWER CONNECTORS

The Tesla K20X GPU accelerator is a performance optimized, high-end product and uses power from the PCI Express connector as well as external power connectors.

Figure 4 and Figure 5 show the specifications and Table 2 and Table 3 show the pinouts for the 6-pin and 8-pin PCI Express power connectors.

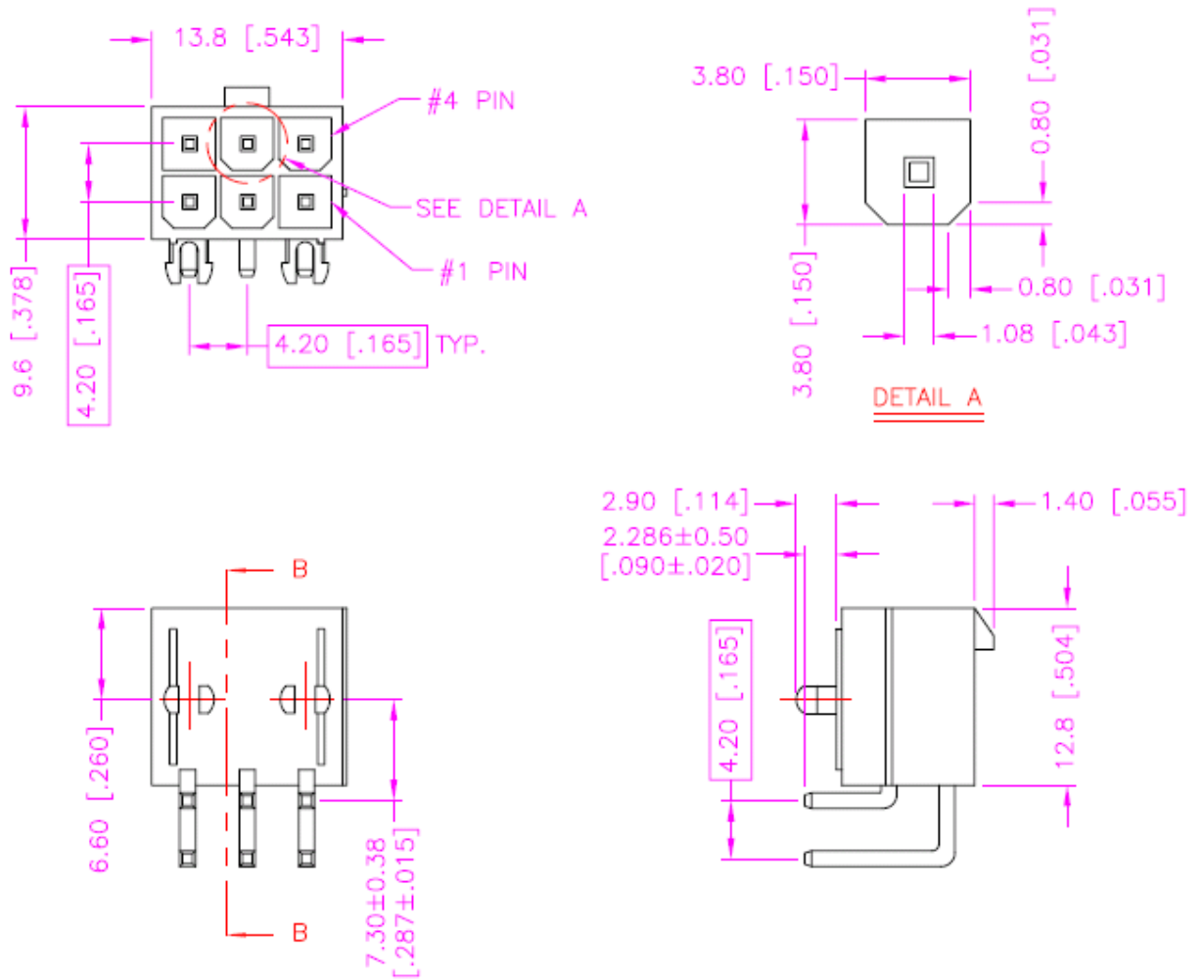


Figure 4. 6-Pin PCI Express Power Connector

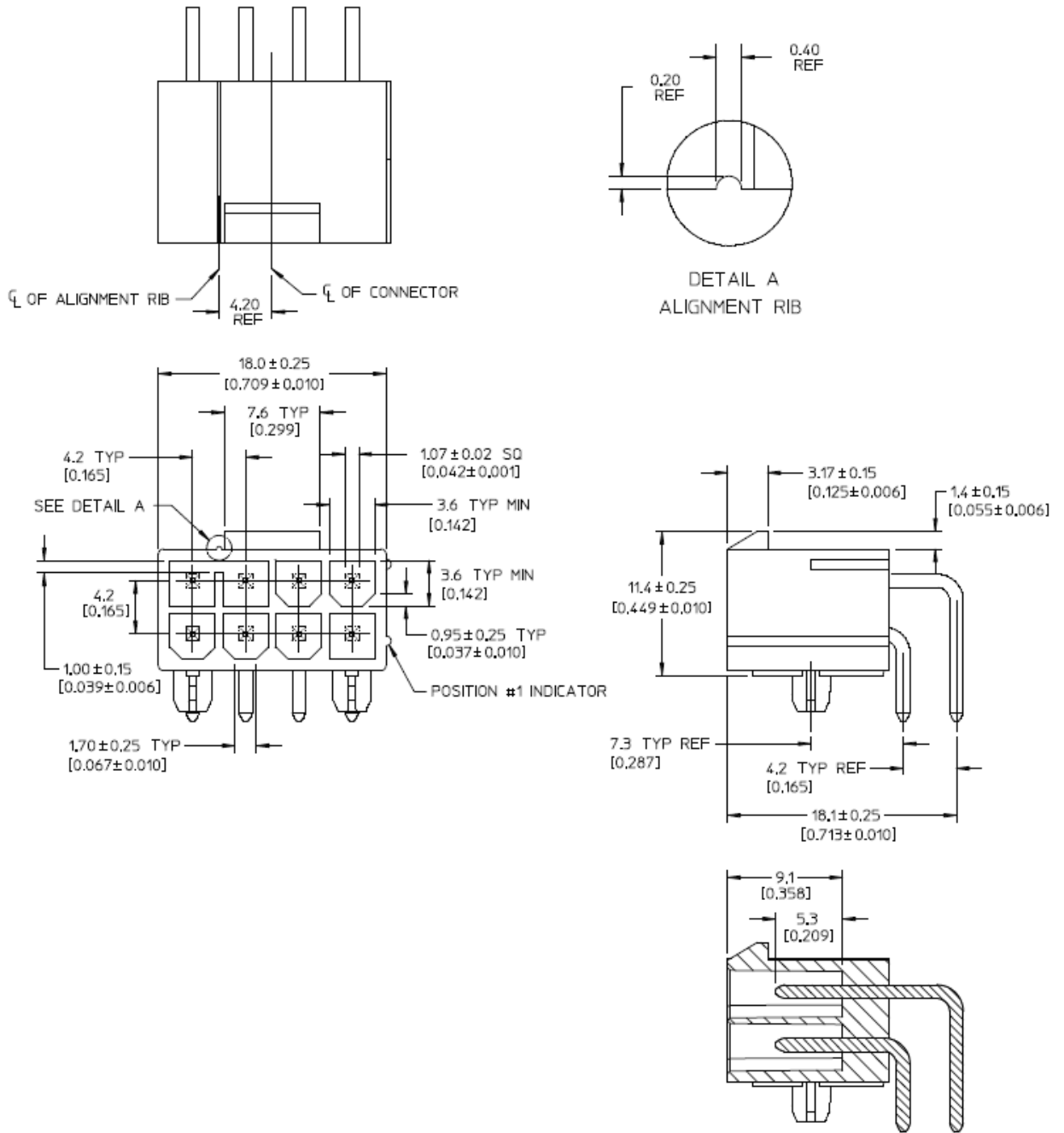


Figure 5. 8-Pin PCI Express Power Connector

Table 2. 6-Pin PCI Express Power Connector Pinout

Pin Number	Description
1	+12 V
2	+12 V
3	+12 V
4	GND
5	Sense
6	GND

Table 3. 8-Pin PCI Express Power Connector Pinout

Pin Number	Description
1	+12 V
2	+12 V
3	+12 V
4	Sense1
5	GND
6	Sense0
7	GND
8	GND

# POWER SPECIFICATIONS

The Tesla K20X GPU accelerator requires power from the PCI Express connector as well as one or two auxiliary power connectors.

Table 4. Auxiliary Power Connectors

8-Pin Header	6-Pin Header	Support	Notes
Connect 8-pin cable	Connect 6-pin cable	Yes	
Connect 8-pin cable	No cable installed	Yes	8-pin cable must supply 150 W
Connect 6-pin cable	Connect 6-pin cable	No	8-pin connector should always be connected



**Note:** Detailed information about power draw by rail will be available to authorized system partners in the *Tesla K20X Board System Design Guide*.

# SUPPORT INFORMATION

## CERTIFICATES AND AGENCIES

### Agencies

- ▶ Australian Communications Authority and Radio Spectrum Management Group of New Zealand (C-Tick)
- ▶ Bureau of Standards, Metrology, and Inspection (BSMI)
- ▶ Conformité Européenne (CE)
- ▶ Federal Communications Commission (FCC)
- ▶ Industry Canada - Interference-Causing Equipment Standard (ICES)
- ▶ Korean Communications Commission (KCC)
- ▶ Underwriters Laboratories (cUL)
- ▶ Voluntary Control Council for Interference (VCCI)

## LANGUAGES

Table 5. Languages Supported

	Windows Server 2008 and Windows Server 2008 R2	Linux
English (US)	X	X
English (UK)	X	
Arabic	X	
Chinese, Simplified	X	
Chinese, Traditional	X	
Danish	X	
Dutch	X	
Finnish	X	
French	X	
French (Canada)	X	
German	X	
Italian	X	
Japanese	X	
Korean	X	
Norwegian	x	
Portuguese (Brazil)	X	
Russian	X	
Spanish	X	
Spanish (Latin America)	X	
Swedish	X	
Thai	X	

Note: NVIDIA's CUDA™ software is only supported in English (U.S.)

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