TESLA C2050 AND TESLA C2070 COMPUTING PROCESSOR BOARD

BD-04983-001_v01 | November 2009

Board Specification

DOCUMENT CHANGE HISTORY

BD-04983-001_v01

Version	Date	Authors	Description of Change
01	November 16, 2009	RK, SM	Initial Release

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

OVERVIEW

The NVIDIA® Tesla™ C2050 and Tesla C2070 computing processor board is a PCI Express 2.0 full-height (4.376 inches by 9.75 inches) form factor computing add-in card based on the NVIDIA Tesla T20 graphics processing unit (GPU). This board is targeted as high-performance computing (HPC) solution for PCI Express systems.

The Tesla C2050 and Tesla C2070 is capable of up to 600 GFLOPs/sec of double precision processing performance. Tesla C2050 comes standard with 3 GB of GDDR5 memory at more than 170 GB/s bandwidth. Tesla C2070 comes standard with 6 GB of GDDR5 memory.

Both the Tesla C2050 and Tesla C2070 can be configured by the end user to enable or disable ECC or error correcting codes that can fix single-bit errors and report 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 to 2.625 GB for Tesla C2050 and 5.25 GB for Tesla C2070.

KEY FEATURES

GPU

- Number of processor cores: 448
- Processor core clock: 1.25 GHz to 1.40 GHz
- Voltage: 1.05 V
- Package size: 42.5 mm × 42.5 mm 1981-pin ball grid array (BGA)

Board

- Ten layers printed circuit board (PCB)
- PCI Express Gen2 ×16 system interface
- Physical dimensions: 4.376 inches × 9.75 inches, dual slot
- Board power dissipation: < = 225 W

External Connectors

- Single port, dual-link DVI-I

Internal Connectors and Headers

- One 6-pin PCI Express power connector
- One 8-pin PCI Express power connector
- 4-pin fan connector

Memory

- Memory clock: 1.8 GHz to 2.0 GHz
- Interface: 384-bit
  - Tesla C2050
    - 3 GB
    - 24 pieces 32M × 32 GDDR5 136-pin BGA, SDRAM
  - Tesla C2070
    - 6GB
    - 24 pieces 64M × 32 GDDR5 136-pin BGA, SDRAM

BIOS

- 2Mbit Serial ROM

COMPUTING PROCESSOR DESCRIPTION

Figure 1 is a block diagram of the Tesla C2050 and Tesla C2070 computing processor.

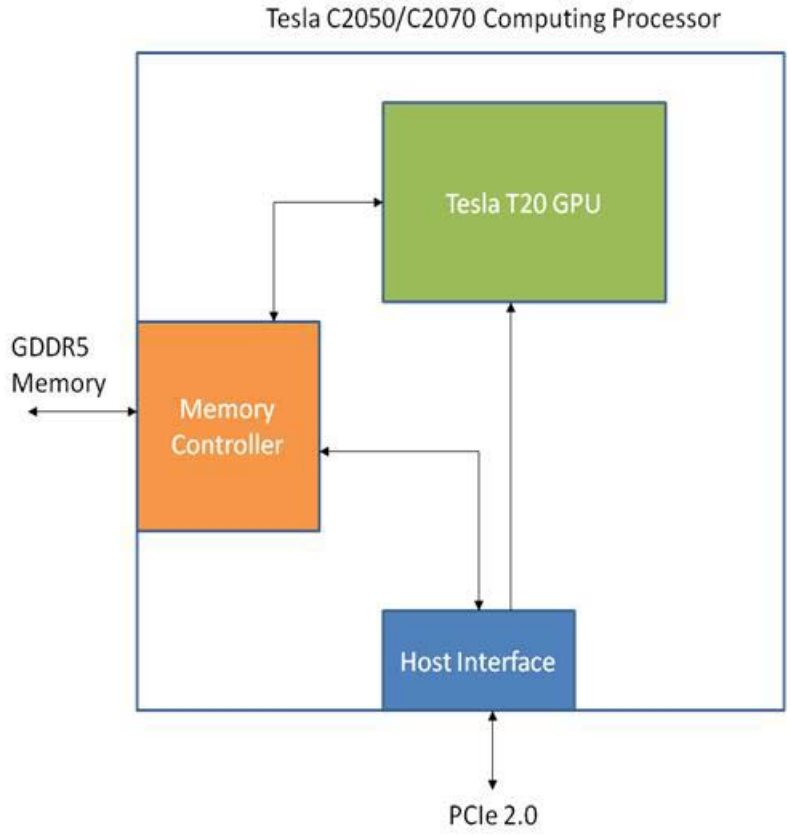

Figure 1. Tesla C2050 and Tesla C2070 Block Diagram

CONFIGURATION

There is one configuration available (Table 1) for the Tesla C2050 and Tesla C2070 board.

Table 1. Board Configurations

Specification	Description
Generic SKU reference	TBD
Chip	Tesla T20 GPU
Package size GPU	42.5 mm x 42.5 mm
Processor clock	1.25 GHz to 1.4 GHz
Memory clock	1.8 GHz to 2.0 GHz
Memory size	3 GB (Tesla C2050) 6 GB (Tesla C2070)
Memory I/O	384-bit GDDR5
Memory configuration	24 pcs 32M × 32 GDDR5 SDRAM (Tesla C2050) 24 pcs 64M × 32 GDDR5 SDRAM (Tesla C2070)
External connectors	Single port, dual-link DVI-I
Internal connectors and headers	8-pin PCI Express power connector 6-pin PCI Express power connector 4-pin fan connector
Board power	< = 225 W
Thermal cooling solution	Custom active fan sink

MECHANICAL SPECIFICATIONS

PCI EXPRESS SYSTEM

The Tesla C2050 and Tesla C2070 computing processor board (Figure 2) conforms to the PCI Express full height (4.376 inches by 9.75 inches) form factor.

Figure 2. Tesla C2050 and Tesla C2070 Computing Processor Board

STANDARD I/O CONNECTOR PLACEMENT

As shown in Figure 3, the Tesla C2050 and Tesla C2070 includes a single, dual-link DVI-I connector.

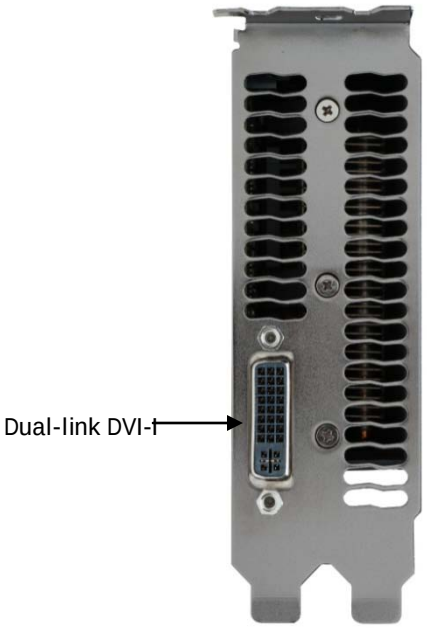

Figure 3. Tesla C2050 and Tesla C2070 Bracket

INTERNAL CONNECTORS AND HEADERS

The Tesla C2050 and Tesla C2070 module supports the following internal connectors and headers.

- 8-pin PCI Express power connector (can be used with a 6-pin power cable)
- 6-pin PCI Express power connector
- 4-pin fan connector

External PCI Express Power Connectors

The Tesla C2050 and Tesla C2070 module is a performance-optimized, high-end product and utilizes power from the PCI Express connector as well as external power connectors. The board can be used in two different ways.

- One 8-pin PCI Express power connector or
- Two 6-pin PCI Express 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.

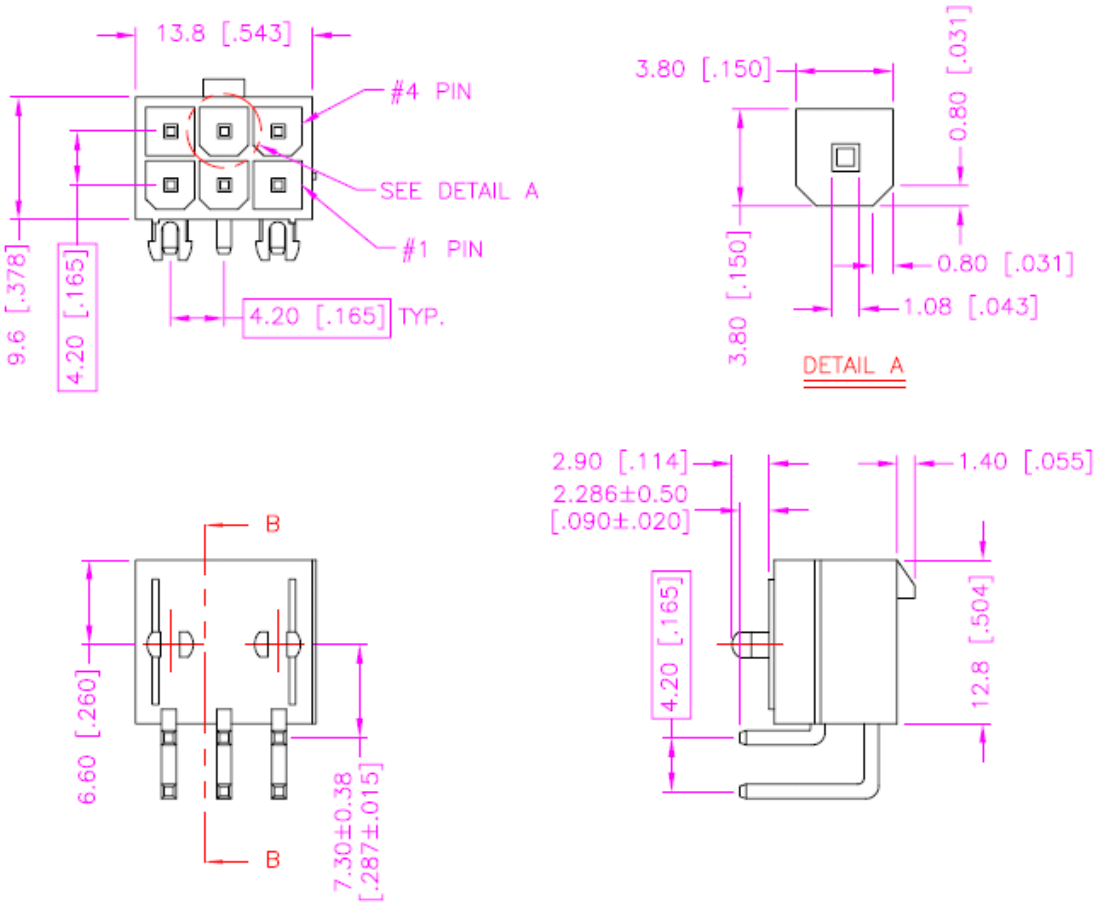

Figure 4. 6-Pin PCI Express Power Connector

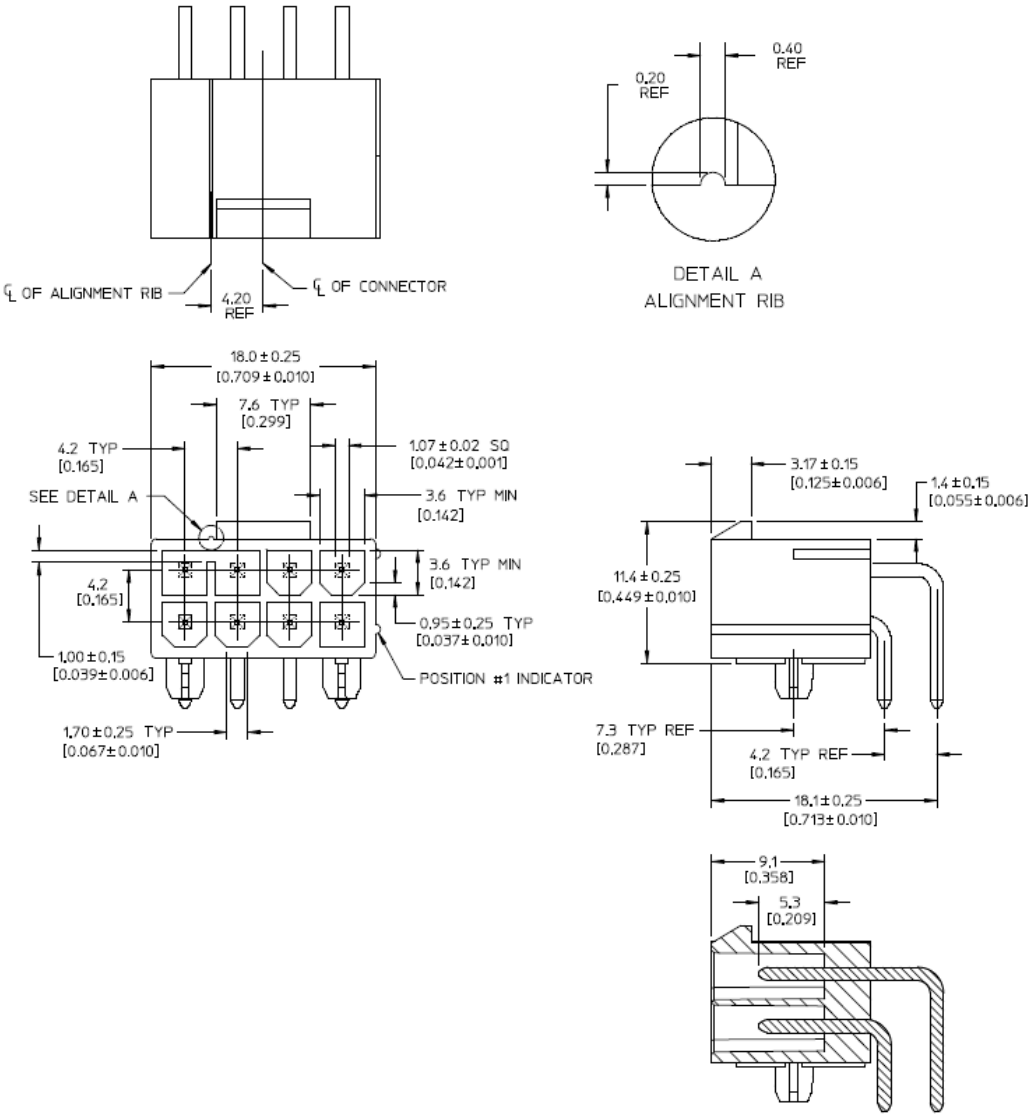

Figure 5. 8-Pin PCI Express Power Connector

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

4-Pin Fan Connector

The Tesla C2050 and Tesla C2070 board uses a 4-pin fan to control the fan speed of the thermal solution. The details of the connector (P/N: PH-T-4) are given in Figure 6. This part is a 2.0 mm (0.079") pitch disconnectable connector.

Table 4 lists the pin assignments for this connector.

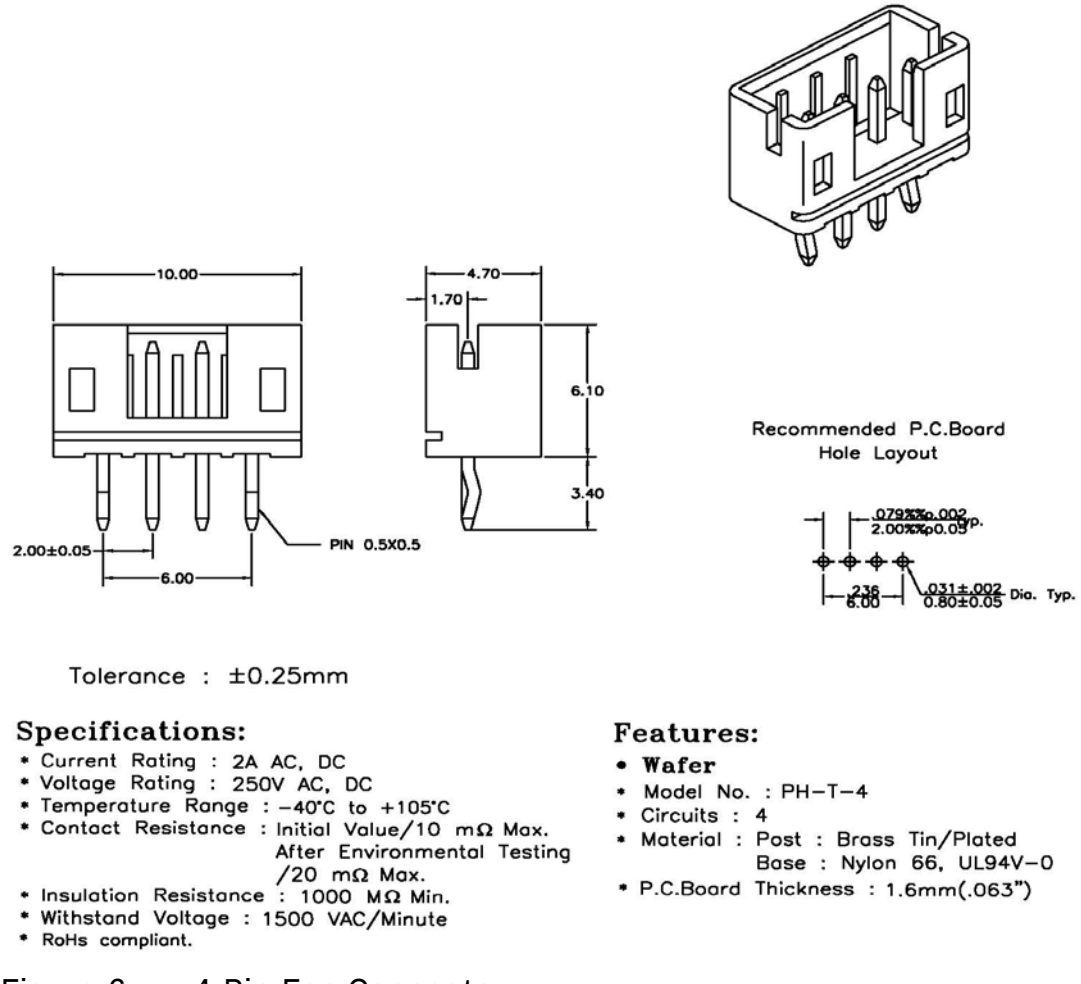

Figure 6. 4-Pin Fan Connector

Table 4. 4 Wire Thermal Control Pinout

Pin Number	Description
1	PWM (to fan)
2	TACH (from fan)
3	+12 V
4	GND

POWER SPECIFICATIONS

The Tesla C2050 and Tesla C2070 computing processor is a performance-optimized, high-end board solution. Power is taken from the PCI Express nost bus as well as either one 8-pin or two 6-pin PCI Express power connectors.

Without auxiliary power provided to the Tesla C2050 and Tesla C2070 board, the board will boot at reduced power and functionality and LED lights on the board will light up as listed in Table 5. This table outlines the different possible scenarios as well as the resulting behaviors.

Table 5. Configuration with External PCI Express Connectors

8-Pin Power Connector	6-Pin Power Connector	Result
Connected (either 8-pin or 6-pin)	Connected	Full power – LED light on the bracket is **GREEN** by default
8-pin connected	Not connected	Full power – LED light on the bracket is **GREEN** by default
6-pin connected	Not connected	LED light is **RED** – board will not boot to OS
Not connected	Connected	LED light is **RED** – board will not boot to OS
Not connected	Not connected	LED light is **RED** – board will not boot to OS

POWER BY RAIL

Table 6 lists the power by rail numbers for the Tesla C2050 and Tesla C2070 board.

Table 6. Power by Rail

PEX12V	PEX3V3	EX12V	Total Board Power
<= 66 W	< = 9.9 W	< = 150 W	Targeted to be <= 225 W

THERMAL SPECIFICATIONS

THERMAL QUALIFICATION SUMMARY

TBD

COOLING SOLUTION

The Tesla C2050 and Tesla C2070 thermal solution is a custom active dual slot design. More details will be provided at a later revision.

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 7. Languages Supported

	Windows XP	Windows 7	Windows Vista	Linux
English (US)	X	X	X	X
English (UK)	X	X	X	
Arabic	X	X	X	
Chinese, Simplified	X	X	X	
Chinese, Traditional	X	X	X	
Danish	X	X	X	
Dutch	X	X	X	
Finnish	X	X	X	
French	X	X	X	
French (Canada)	X	X	X	
German	X	X	X	
Italian	X	X	X	
Japanese	X	X	X	
Korean	X	X	X	
Norwegian	x	x	x	
Portuguese (Brazil)	X	X	X	
Russian	X	X	X	
Spanish	X	X	X	
Spanish (Latin America)	X	X	X	
Swedish	X	X	X	
Thai	X	X	X	

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

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