



TESLA 1U GPU COMPUTING SYSTEM

SP-04975-001_v04 | June 2010

Product Specification



DOCUMENT CHANGE HISTORY

SP-04975-001_v04

Version	Date	Authors	Description of Change
01	November 13, 2009	GG, SM	Preliminary Information
02	March 22, 2010	GG, SM	•Removed NVIDIA Confidential from document •This version still contains preliminary information
03	May 7, 2010	GG, DV, SM	•Removed “Preliminary Information” from document •Added GPU specifications in the Overview section •Updated Table 1 and Table 2
04	June 9, 2010	GG, SM	•Removed reference(s) to Tesla S2070 •Updated Acoustics (Table 2)

TABLE OF CONTENTS

- Overview 1
 - Key Specifications..... 1
 - Systems Architecture 3
- Mechanical Specifications 5
 - System Chassis..... 5
 - Host Interface Card (HIC) 6
 - PCI Express Cable 8
 - Rails for Rack Mounting 10
- Environmental Specifications 11
- Support Information..... 12
 - Languages 12
 - Certificates and Agencies..... 12
 - Certificates 12

LIST OF FIGURES

Figure 1.	Tesla S2050 System Architecture	3
Figure 2.	Connection to a Single Host System	4
Figure 3.	Connection to Two Host Systems.....	4
Figure 4.	System Chassis Drawing	5
Figure 5.	Host Interface Card (x16 Version).....	6
Figure 6.	PCI Express Cable (0.5 Meter)	8
Figure 7.	PCI Express Cable Minimum Bend Radius	9
Figure 8.	Rail for Rack Mounting.....	10

LIST OF TABLES

Table 1.	Host Interface Cards	7
Table 2.	Environmental Specifications and Conditions	11

OVERVIEW

The NVIDIA® Tesla™ S2050 Computing System is a 1U rack-mount system with four NVIDIA® Fermi computing processors. This system connects to one or two host systems via one or two PCI Express cables. A Host Interface Card (HIC) is used to connect each PCI Express cable to a host. The host interface cards are compatible with both PCI Express Gen1 and PCI Express Gen2 systems.

The Tesla S2050 includes 12 GB of GDDR5 memory.

KEY SPECIFICATIONS

GPU Specification

- ▶ Number of processor cores: 448
- ▶ Processor core clock: 1.15 GHz
- ▶ Memory clock: 1.546 GHz
- ▶ Memory interface: 384 bit

System Specification

- ▶ Four Fermi graphics processing units (GPUs)
- ▶ 12.0 GB of GDDR5, configured as 3.0 GB per GPU. When ECC is turned on, available memory is ~10.5 GB
- ▶ Typical power consumption: 900 W

Mechanical Overview

- ▶ Physical Dimensions
 - System: 1.71 inches (4.34 cm) high × 17.425 inches (44.26 cm) wide × 28.5 inches (72.39 cm) deep
 - System weight without external accessories: 34 lbs (15.4 kgs)
 - Shipping box: 9.5 inches (24.13 cm) high × 24 inches (60.96 cm) wide × 37.5 inches (95.25 cm) deep
 - System shipping weight with standard accessories: 61 lbs (27.7 kgs)
- ▶ PCI Express Cable
 - Standard: 0.5 meters in length
 - Optional: 2.0 meters in length
- ▶ Host interface Cards
 - PCI Express low profile form factor
 - Standard card requires a ×16 PCI Express slot
 - An optional card is available for ×8 PCI Express slots
- ▶ Rack Compatibility
 - Fits 4-post, 19" EIA compatible racks
 - Rack depth between posts: 28.7 to 36.3 inches (73 to 92 cm)
- ▶ External Connectors
 - Two cable connectors for ×16 PCI Express
 - C19 format female connector for power cord

Operating Environment

- ▶ Temperature: 10 °C to 35 °C
- ▶ Relative humidity: 10 % to 80 % non-condensing
- ▶ Maximum Airflow: 143 CFM

SYSTEMS ARCHITECTURE

The Tesla S2050 GPU computing system is based on the Fermi GPU from NVIDIA. The Tesla S2050 can be connected to a single host system via two PCI Express connections to that host, or connected to two separate host systems via one PCI Express connection to each host.

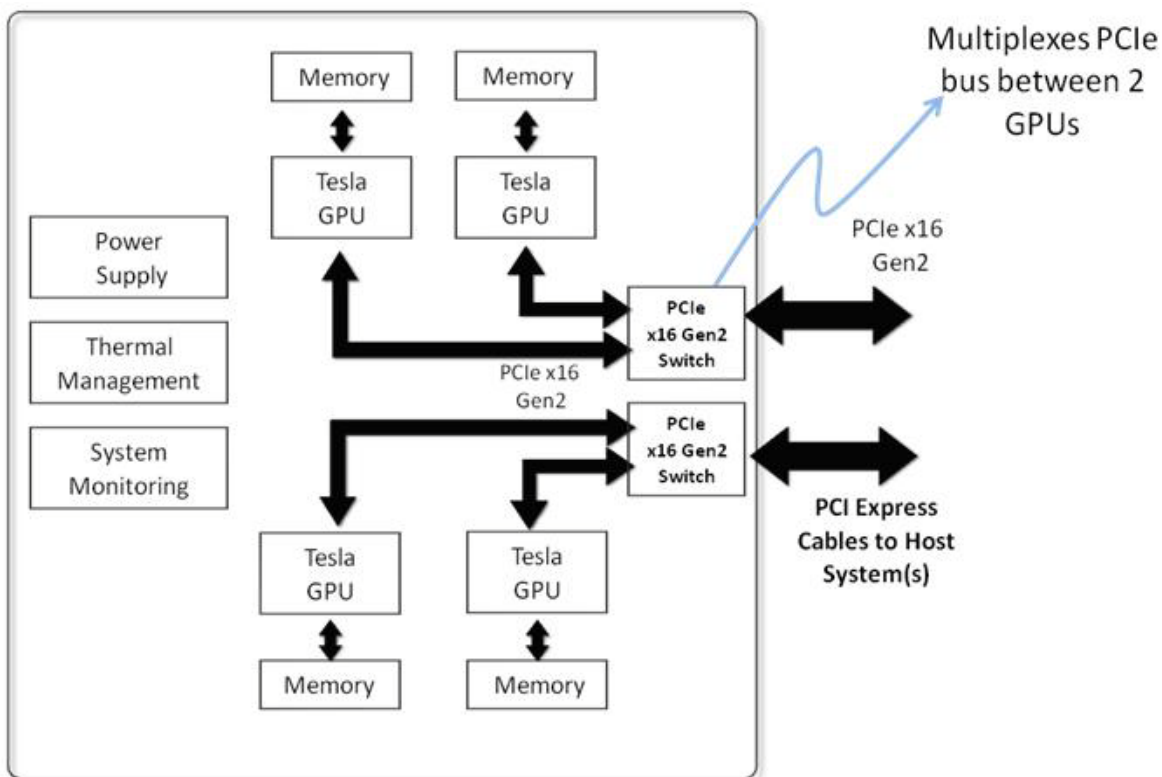


Figure 1. Tesla S2050 System Architecture

Each NVIDIA switch and corresponding PCI Express cable connects to two of the four GPUs in the Tesla S2050. If only one PCI Express cable is connected to the system, only two of the GPUs will be used. To connect all four GPUs in a Tesla S2050 to a single host system, the host must have two available PCI Express slots and be configured with two cables as shown in Figure 2.

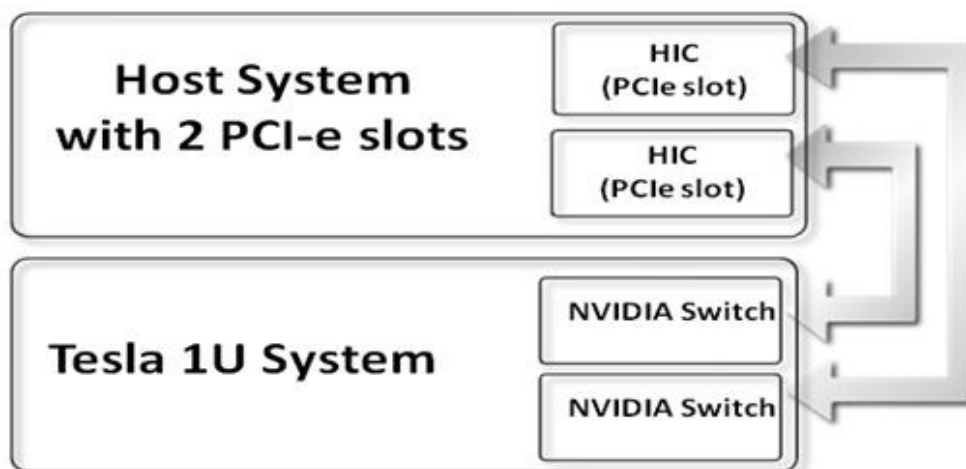


Figure 2. Connection to a Single Host System

The Tesla S2050 can also be used with hosts that have only one available PCI Express slot. However, two host systems are required and should be connected as shown in Figure 3. Each host system will access two of the four GPUs.

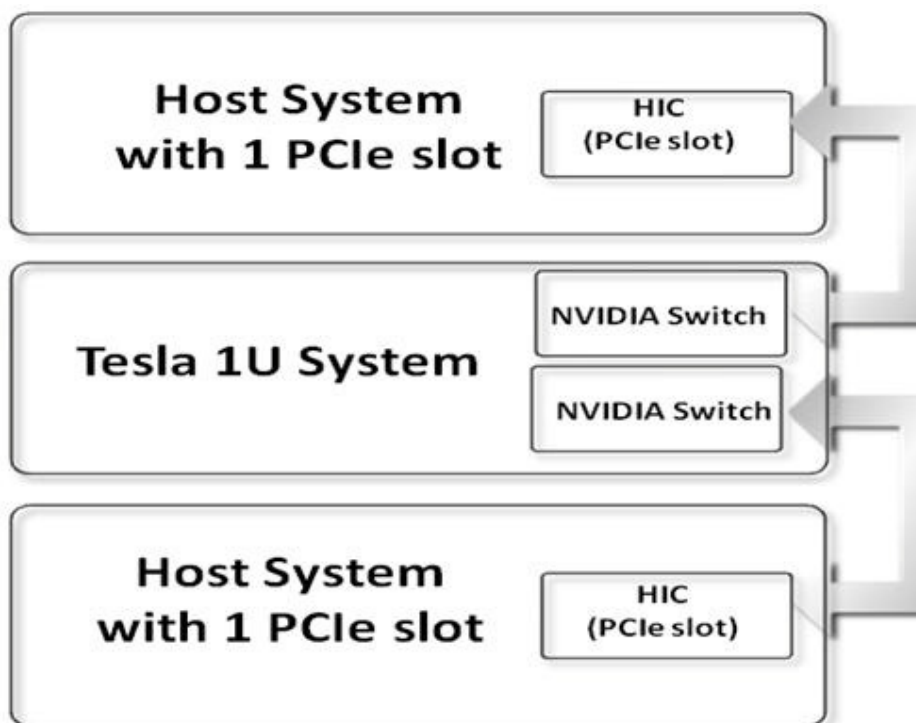


Figure 3. Connection to Two Host Systems

MECHANICAL SPECIFICATIONS

SYSTEM CHASSIS

The Tesla S2050 (Figure 4) uses a 1U form factor chassis and conforms to the EIA 310E specification for 19-inch 4-post racks with 900 mm to 1000 mm depth. The chassis dimensions are 1.73 inches high × 17.5 inches wide × 28.5 inches deep.

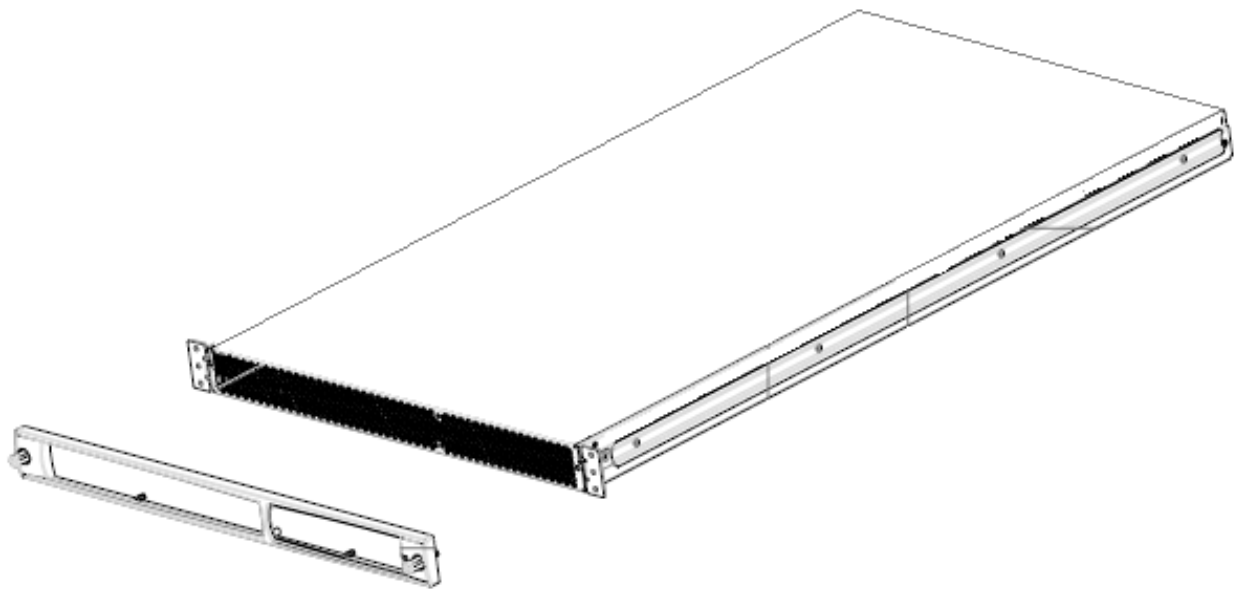


Figure 4. System Chassis Drawing

HOST INTERFACE CARD (HIC)

The HIC conforms to the PCI Express low profile form factor. This card is compatible with both PCI Express Gen1 and PCI Express Gen2 systems. A $\times 8$ version is also available for systems that do not have $\times 16$ PCI Express slots. The HICs ship with a full-height bracket installed and includes a low-profile bracket.

Figure 5 shows the $\times 16$ version of the card with the full-height bracket.

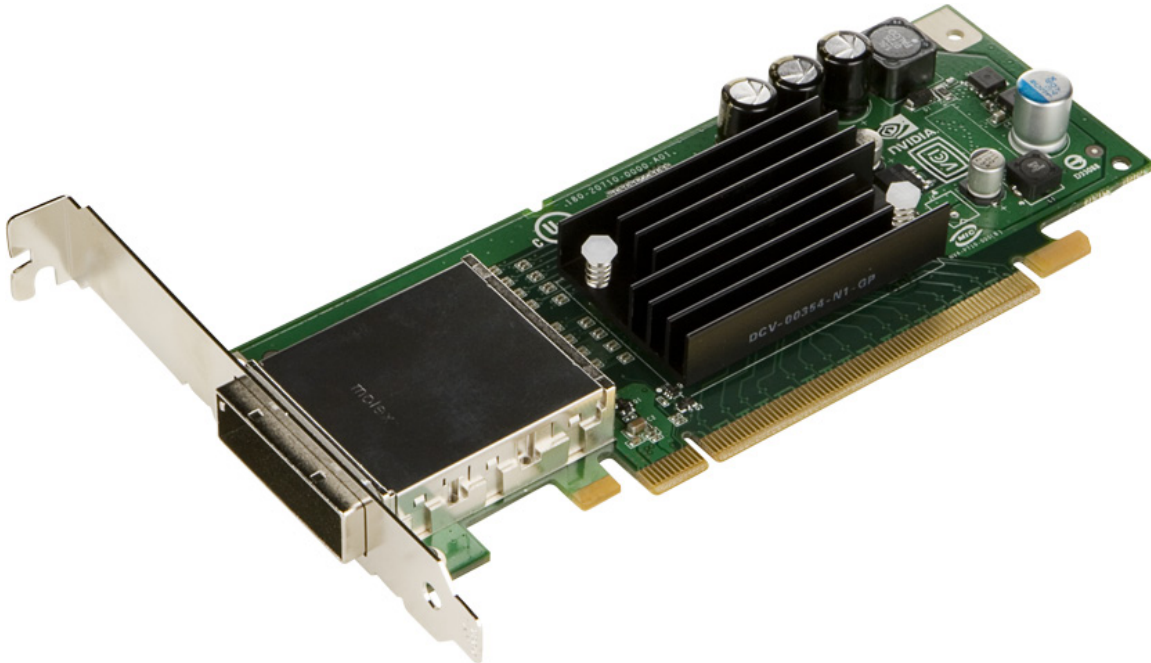


Figure 5. Host Interface Card (x16 Version)

Customers can choose from the following list of HIC cards (Table 1) depending on their host server configurations. For details refer to the *Host Interface Cards Specification* document.

Table 1. Host Interface Cards

Part Number	Product Name	Product Description	Half Height Option
930-20797-2201-000	HIC x16 (P797 sku 1)	x16, Gen2 PCIe host interface card (HIC) for use with 1U systems	Yes
930-20838-2201-000	HIC x8 (P838 sku 1)	x8, Gen2 PCIe host interface card (HIC) for use with 1U systems	Yes
930-50797-0000-000	GHIC x16 (P797 sku 501)	x16, Gen2 PCIe host interface card with graphics (GHIC) for use with 1U systems	Yes
930-50838-0000-000	GHIC x8 (P838 sku 501)	x8, Gen2 PCIe host interface card with graphics (GHIC) for use with 1U systems	Yes
930-50894-0501-000	DHIC (P894)	x16, Gen2 PCIe Dual-cable host interface card (DHIC) for use with 1U systems	No, full height only.

PCI EXPRESS CABLE

The Tesla S2050 uses 0.5-meter PCI Express cables as the standard connection to the host system(s). Figure 6 shows the dimensions of this cable and its connectors. A 2.0-meter version of the cable is also available as a standalone accessory and uses the same connectors as the 0.5-meter cable.



Note: For Figure 6 the dimensions are in millimeters unless otherwise labeled.

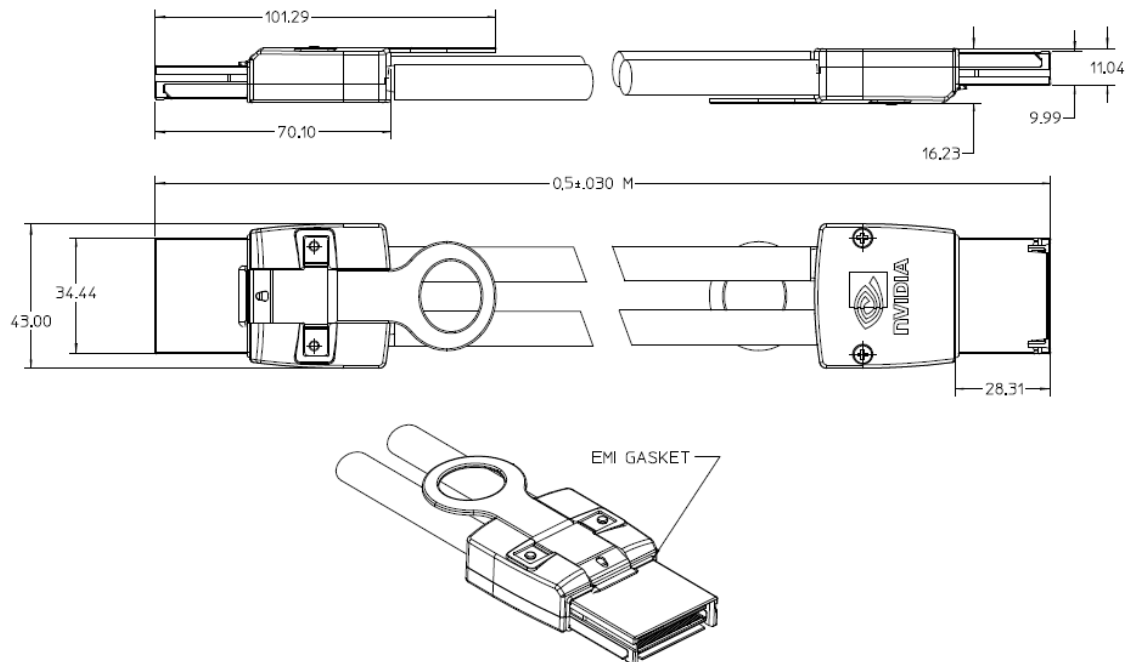


Figure 6. PCI Express Cable (0.5 Meter)

The minimum bend radius is 38.7 mm for the PCI Express cable. Figure 7 shows details of how this is measured relative to the I/O plate on the host interface card and relative to the cable/connector interface.

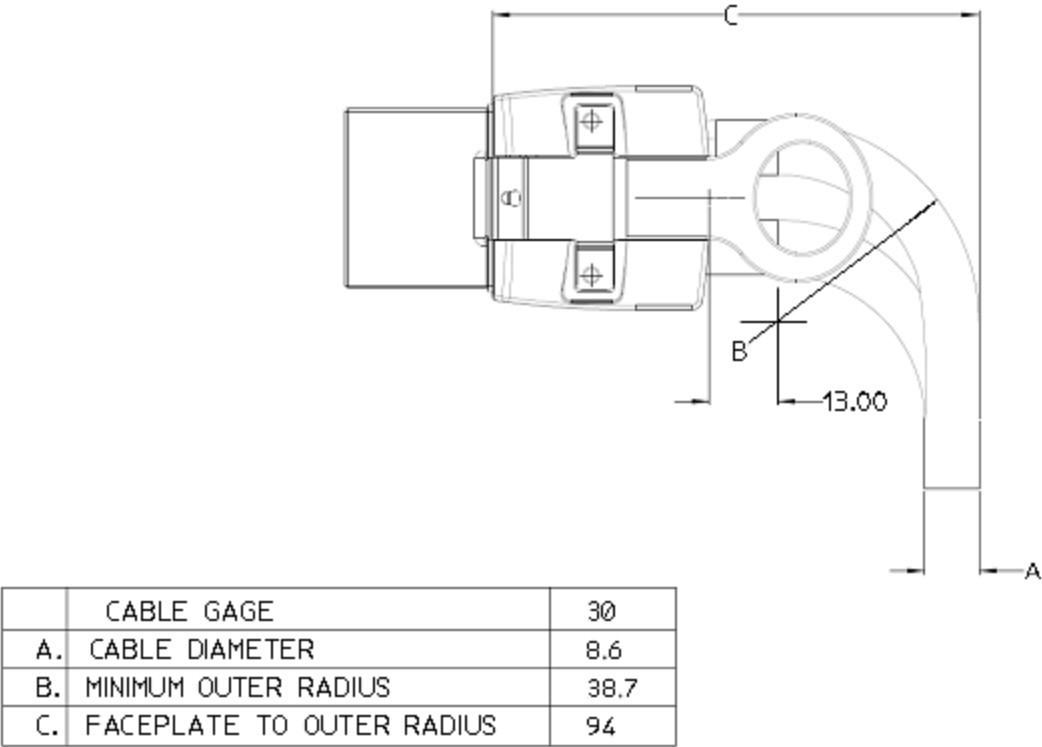


Figure 7. PCI Express Cable Minimum Bend Radius

RAILS FOR RACK MOUNTING

The Tesla S2050 use a pair of rails for mounting to a 4-post, EIA rack. The rails can expand to fit a distance from 730 mm (28.74 inches) to 922 mm (36.3 inches) for the inside dimension between the front and rear posts. See Figure 8 for the exact dimension details.



Note: For Figure 8 the dimensions are in millimeters unless noted in square brackets [xx.yy ± -zz]

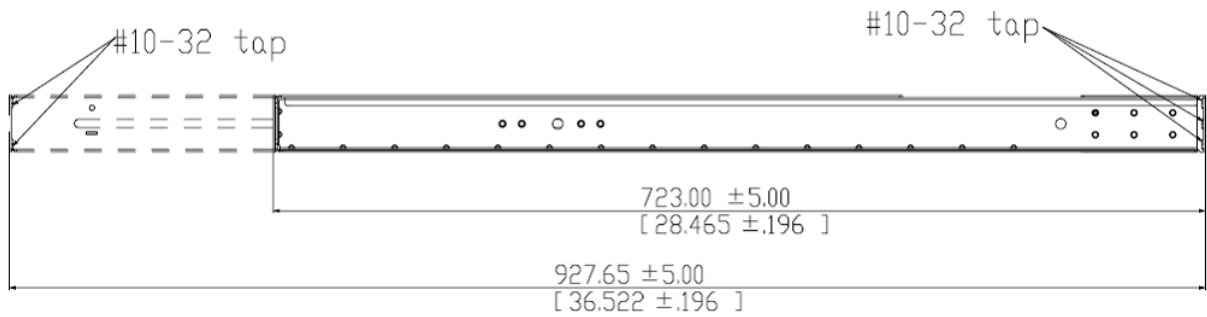


Figure 8. Rail for Rack Mounting

ENVIRONMENTAL SPECIFICATIONS

Table 2. Environmental Specifications and Conditions

Specifications		Conditions
Operating	Input power	Operating 100-240 VAC, maximum 90-264 VAC 50 to 60 Hz
	Temperature	10 °C to 35 °C (50 °F to 95 °F) at sea level with an altitude derating of 1.0 °C per every 1000 ft.
	Humidity	10 % to 80 % RH, 28 °C (82.4 °F) maximum wet bulb temperature, non-condensing
	Altitude	0 to 5000 feet mean sea level (MSL)
	Shock	Half sine 40 g, 2 ms duration
	Vibration	Sinusoidal 0.25g, 10 to 500 Hz, 3 axis. Random 1.0 Grms, 10 to 500 Hz
	Acoustics	68.1 dB A
	Airflow	143 CFM maximum
Non-operating	Temperature	-40 °C to 60 °C (-40 °F to 140 °F)
	Humidity	10 % to 80 % RH, 38.7 °C (101.7 °F) maximum wet bulb temperature, non-condensing
	Altitude	0 to 10,000 feet mean sea level (MSL) with maximum allowable rate of altitude change of 2000 ft/min.
	Shock	Half-sine: 80 G, 2ms Trapezoidal: 40 G, 150 in/sec
	Vibration (random)	0.015-0.008 G/Hz, 5-500 Hz, 10 minutes

SUPPORT INFORMATION

LANGUAGES

Languages support for the Tesla 1U systems is English (U.S.) only at this time.

CERTIFICATES AND AGENCIES

Certificates

- ▶ CISPR 22
- ▶ EN55022
- ▶ EN55024
- ▶ FCC CFR 47, Part 15;
- ▶ ICES-0003
- ▶ CNS13438
- ▶ GB9254
- ▶ K22
- ▶ K234
- ▶ EN 61000-3-2
- ▶ EN 61000-3-3
- ▶ EN 60950-1
- ▶ IEC 60950-1
- ▶ VCCI
- ▶ KCC (in process)
- ▶ GOST-R (in process)

Notice

ALL NVIDIA DESIGN SPECIFICATIONS, REFERENCE BOARDS, FILES, DRAWINGS, DIAGNOSTICS, LISTS, AND OTHER DOCUMENTS (TOGETHER AND SEPARATELY, "MATERIALS") ARE BEING PROVIDED "AS IS." NVIDIA MAKES NO WARRANTIES, EXPRESSED, IMPLIED, STATUTORY, OR OTHERWISE WITH RESPECT TO THE MATERIALS, AND EXPRESSLY DISCLAIMS ALL IMPLIED WARRANTIES OF NONINFRINGEMENT, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE.

Information furnished is believed to be accurate and reliable. However, NVIDIA Corporation assumes no responsibility for the consequences of use of such information or for any infringement of patents or other rights of third parties that may result from its use. No license is granted by implication of otherwise under any patent rights of NVIDIA Corporation. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all other information previously supplied. NVIDIA Corporation products are not authorized as critical components in life support devices or systems without express written approval of NVIDIA Corporation.

HDMI

HDMI, the HDMI logo, and High-Definition Multimedia Interface are trademarks or registered trademarks of HDMI Licensing LLC.

ROVI Compliance Statement

NVIDIA Products that are ROVI-enabled can only be sold or distributed to buyers with a valid and existing authorization from ROVI to purchase and incorporate the device into buyer's products.

This device is protected by U.S. patent numbers 6,516,132; 5,583,936; 6,836,549; 7,050,698; and 7,492,896 and other intellectual property rights. The use of ROVI Corporation's copy protection technology in the device must be authorized by ROVI Corporation and is intended for home and other limited pay-per-view uses only, unless otherwise authorized in writing by ROVI Corporation. Reverse engineering or disassembly is prohibited.

OpenCL

OpenCL is a trademark of Apple Inc. used under license to the Khronos Group Inc.

Trademarks

NVIDIA, the NVIDIA logo, and Tesla are trademarks or registered trademarks of NVIDIA Corporation in the U.S. and other countries. Other company and product names may be trademarks of the respective companies with which they are associated.

Copyright

© 2009, 2010 NVIDIA Corporation. All rights reserved.