NVIDIA

TESLA 1U GPU COMPUTING SYSTEMS

SP-04975-001_v03 | May 2010

Product Specification

DOCUMENT CHANGE HISTORY

SP-04975-001_v03

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

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OVERVIEW

The NVIDIA® Tesla™ S2050 and Tesla S2070 Computing Systems are 1U rack-mount systems 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 and Tesla S2070 are identical except the memory size. The Tesla S2050 includes 12 GB of GDDR5 memory and the Tesla S2070 includes 24 GB of GDDR5 memory.

KEY SPECIFICATIONS

GPU Specifications

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

System Specifications

- Four Fermi graphics processing units (GPUs)
- Tesla S2050 includes 12.0 GB of GDDR5, configured as 3.0 GB per GPU. When ECC is turned on, available memory is ~10.5 GB
- Tesla S2070 includes 24.0 GB of GDDR5, configured as 6.0 GB per GPU. When ECC is turned on, available memory is ~21.0 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 and Tesla S2070 GPU computing systems are based on the Fermi GPU from NVIDIA. They 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.

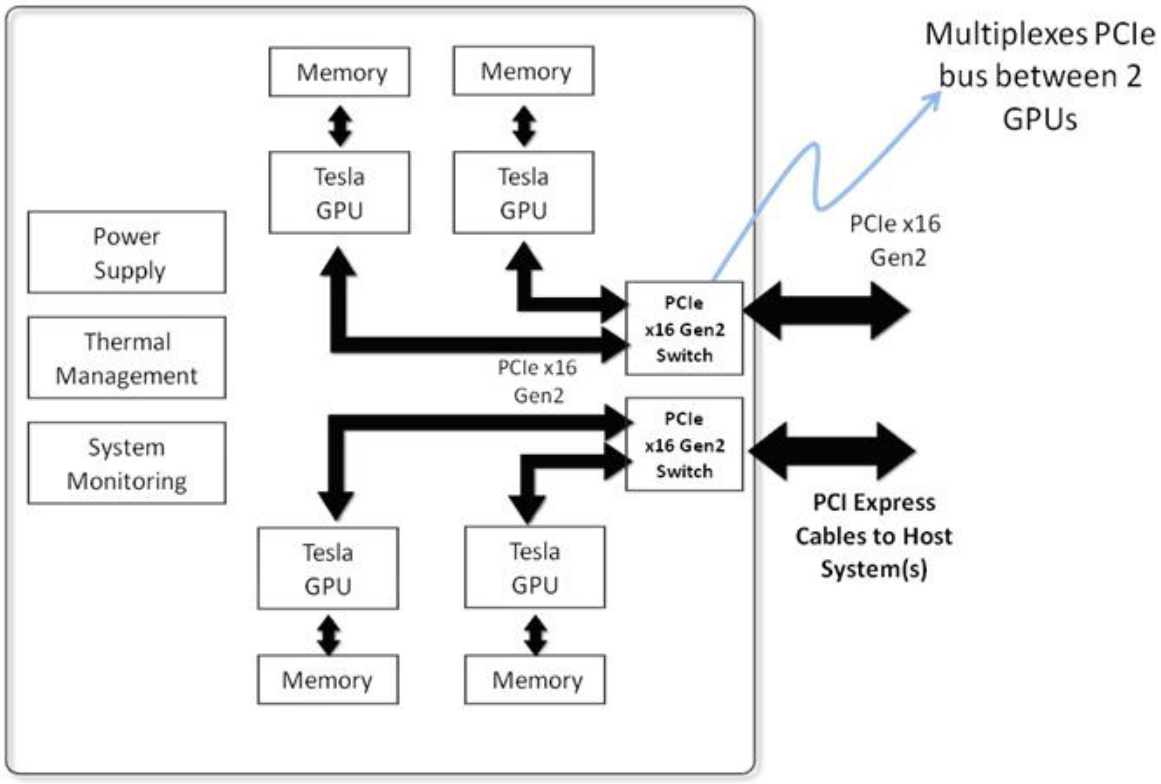


Figure 1. Tesla S2050 and Tesla S2070 Systems Architecture

Each NVIDIA switch and corresponding PCI Express cable connects to two of the four GPUs in the Tesla S2050 and Tesla S2070. 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 and Tesla S2070 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.

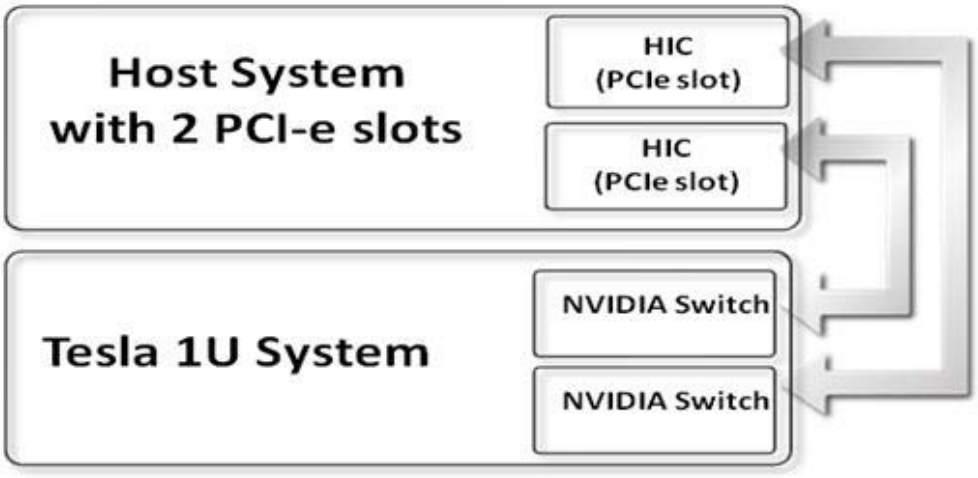


Figure 2. Connection to a Single Host System

The Tesla S2050 and Tesla S2070 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.

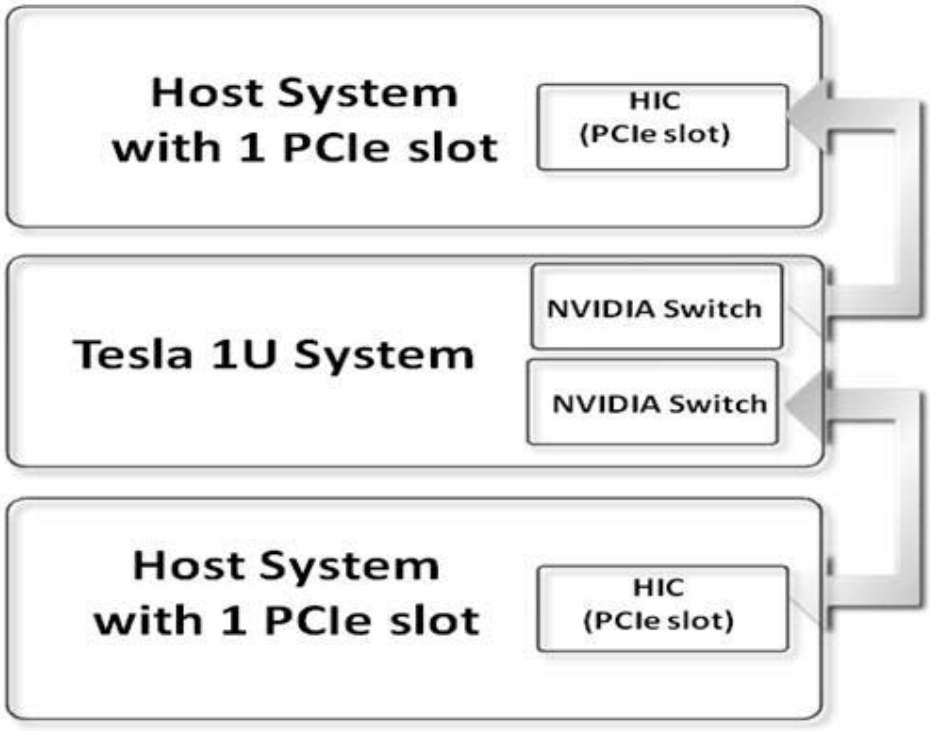


Figure 3. Connection to Two Host Systems

MECHANICAL SPECIFICATIONS

SYSTEM CHASSIS

The Tesla S2050 and Tesla S2070 (Figure 4) use a 1U form factor chassis and conform 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.

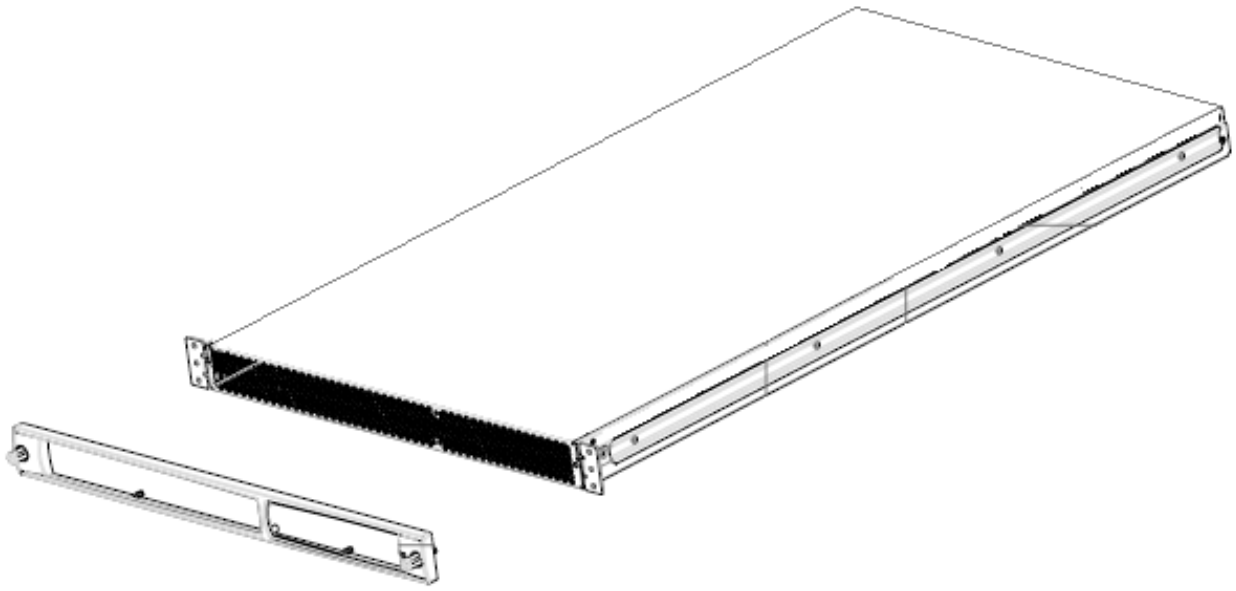


Figure 4. System Chassis Drawing

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 ×8 version is also available for systems that do not have ×16 PCI Express slots. The HICs ship with a full-height bracket installed and includes a low-profile bracket.

Figure 5 shows the ×16 version of the card with the full-height bracket.

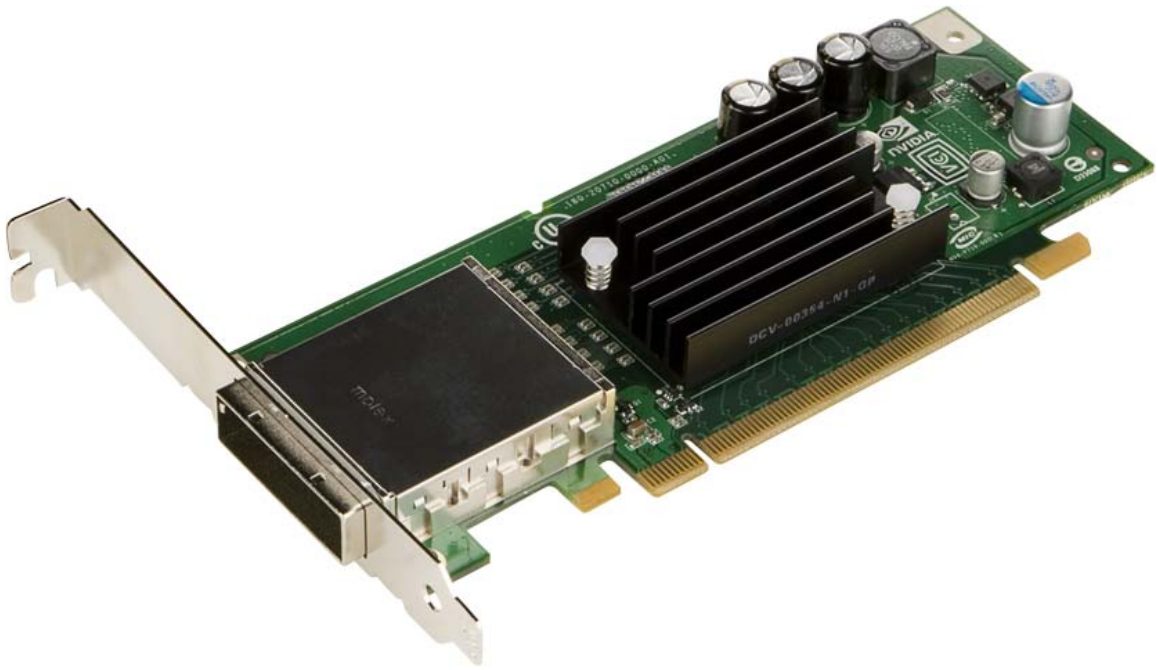


Figure 5. Host Interface Card (x16 Version)

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)	x18, 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 and Tesla S2070 use 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.

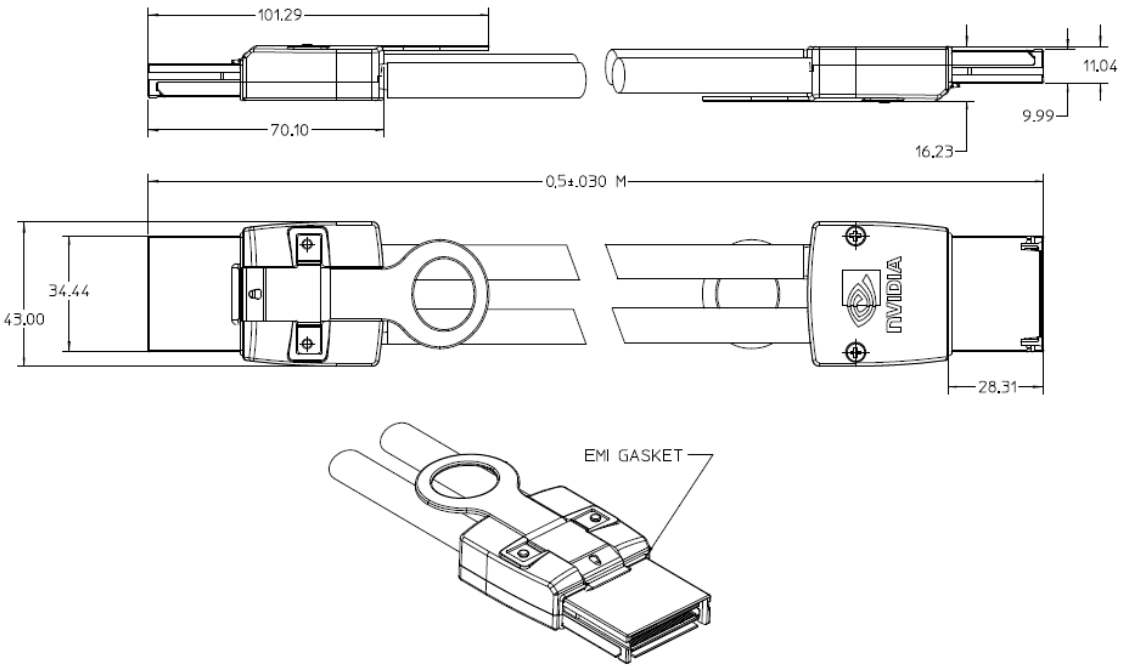
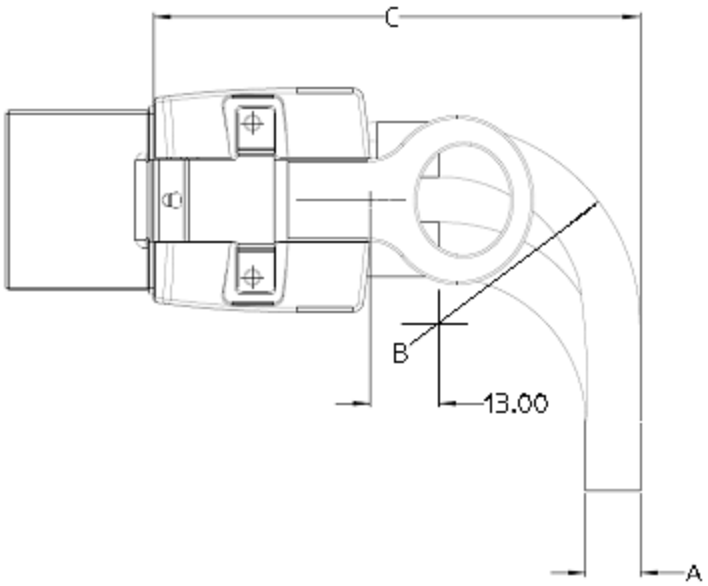


Figure 6. PCI Express Cable (0.5 Meter)

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.



	CABLE GAGE	30
A.	CABLE DIAMETER	8.6
B.	MINIMUM OUTER RADIUS	38.7
C.	FACEPLATE TO OUTER RADIUS	94

Figure 7. PCI Express Cable Minimum Bend Radius

RAILS FOR RACK MOUNTING

The Tesla S2050 and Tesla S2070 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]

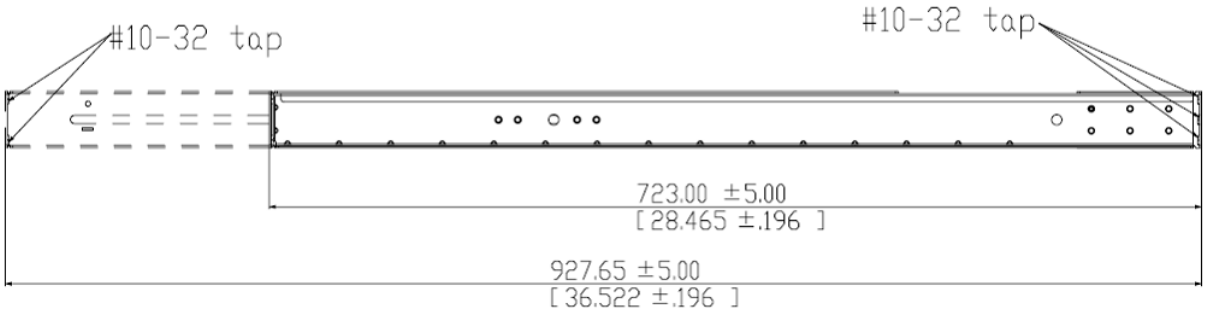


Figure 8. Rail for Rack Mounting

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	TBD
	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)

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