NVIDIA GRID K2 GRAPHICS BOARD

BD-06580-001_v02 | January 2013

Board Specification

DOCUMENT CHANGE HISTORY

BD-06580-001_v02

Version	Date	Authors	Description of Change
01	October 16, 2012	AP, SM	Initial Release
02	January 31, 2013	MV, SM	•Added “Reliability” section (MTBF data) •Updated product name to NVIDIA GRID

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OVERVIEW

The NVIDIA GRID™ K2 is a dual-slot 10.5 inch PCI Express Gen3 graphics card with two high-end NVIDIA® Kepler™ graphics processing units (GPUs). The NVIDIA GRID K2 has 8 GB of GDDR5 memory (4 GB per GPU), and a 225 W maximum power limit. The NVIDIA GRID K2 graphics board uses a passive heat sink that requires system airflow to properly operate the card within thermal limits. It is designed to accelerate graphics in virtual remote workstation and virtual desktop environments.

The NVIDIA GRID K2 graphics board can be configured to enable or disable ECC (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%. ECC protection is for DRAM only.

Figure 1. NVIDIA GRID K2 Graphics Board (GK104 / P2055)

KEY FEATURES

GPU

- Two GK104 GPUs
- Number of processor cores: 1536 per GPU
- Core clock: 745 MHz

Board

- PCI Express Gen3 ×16 system interface
- Physical dimensions: 4.376 inches × 10.5 inches × 1.52 inches (dual-slot)
- Board power: 225 W (maximum)

Power Connectors

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

Memory

- Memory clock: 2.5 GHz
- Interface: 256-bit
  - Total board memory: 8 GB (4 GB per GPU)
  - 32 pieces of 128M × 16 GDDR5, SDRAM (per GPU)

BIOS

- 2 MBit Serial ROM

Virtualization Solutions

- Citrix XenServer + XenDesktop with HDX 3D Pro
- Citrix XenServer with NVIDIA NVIDIA GRID Hypervisor + XenDesktop with HDX
- Microsoft Windows Server 2012 + RemoteFX
- Microsoft Windows Server 2008 R2 + RemoteFX
- VMware ESXi + View with vSGA

CONFIGURATION

The NVIDIA GRID K2 graphics board is available in the following configuration (Table 1) based on the orientation of the airflow inside the system.

Table 1. Board Configuration

Specifications	NVIDIA GRID K2
Generic SKU reference	•699-52055-0010-000: Airflow intake from bracket •699-52055-0020-000: Airflow exhaust to bracket
Chip	2× GK104
Processor clock	745 MHz
Memory clock	2.5 GHz
Memory size	4 GB per GPU (8 GB per board)
Memory I/O	256-bit GDDR5
Memory configuration	32 pieces of 128M × 16 GDDR5 SDRAM
Display connectors	None
Power connectors	•1x 8-pin PCI Express power connector •1x 6-pin PCI Express power connector
Total board power	225 W

MECHANICAL SPECIFICATIONS

BOARD DIMENSIONS

The NVIDIA GRID K2 board (Figure 2) conforms to the PCI Express Gen3 ×16 (4.376 inches by 10.5 inches) form factor. Figure 2 shows the board without the cover.

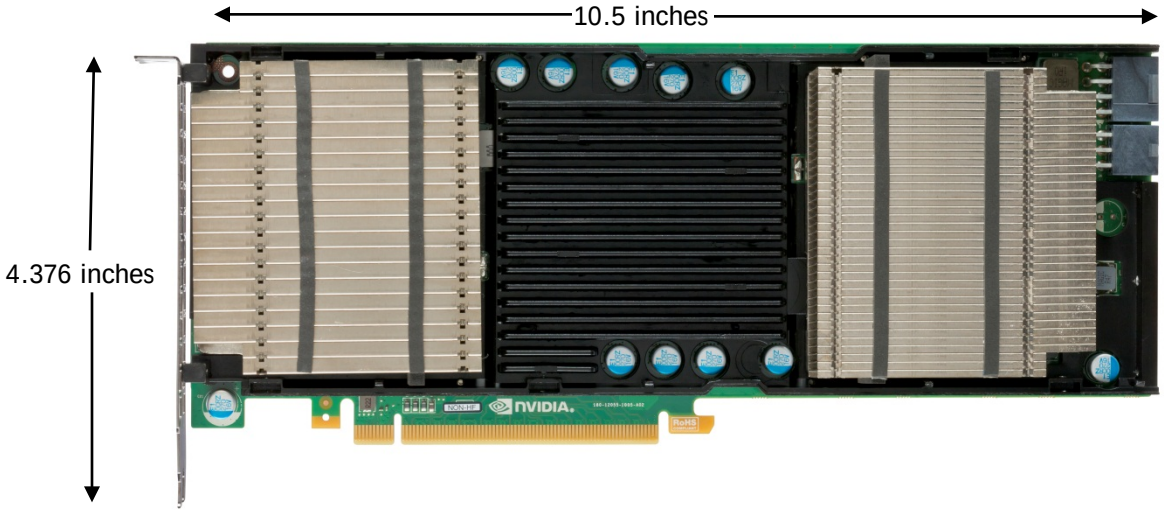

Figure 2. NVIDIA GRID K2 Board without Cover

Note: NVIDIA GRID K2 production boards will ship with a cover.

BRACKET OVERVIEW

The NVIDIA GRID K2 board features a vented bracket, as shown in Figure 3. If you are an OEM who qualifies for bracket modifications, you have the option of receiving your modules with no bracket installed.

Figure 3. NVIDIA GRID K2 Bracket

If you need to remove the standard bracket follow these steps:

1. Remove the two shoulder screws on the back side of the PCB.
2. Remove the two flat head screws on the bracket exhaust face.
3. Remove the bracket.
4. Slide the washer in between the PCB and the backplate to maintain clearance between the PCB and the backplate.
5. Attach the shoulder screws.

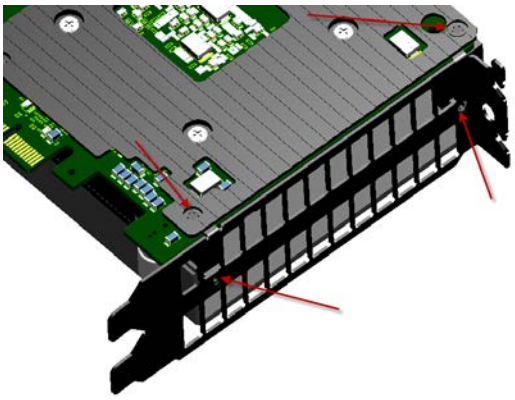

Figure 4. Screw Locations for Attaching NVIDIA GRID K2 Bracket

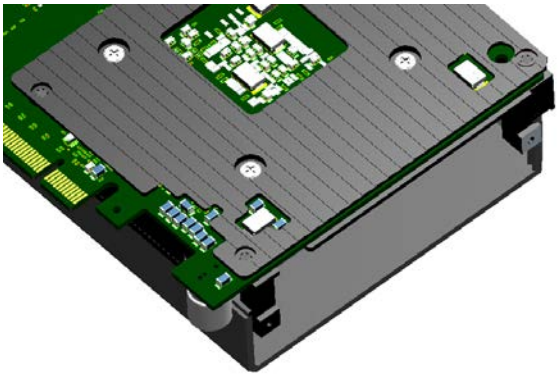

Figure 5. NVIDIA GRID K2 without Bracket

POWER CONNECTORS

The NVIDIA GRID K2 board utilizes power from both the PCI Express connector and the auxiliary power connectors. The NVIDIA GRID K2 board supports the following internal connectors:

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

Figure 6 and Figure 7 shows the specifications and Table 2 and Table 3 show the pinouts for the 6-pin and 8-pin PCI Express power connectors, respectively.

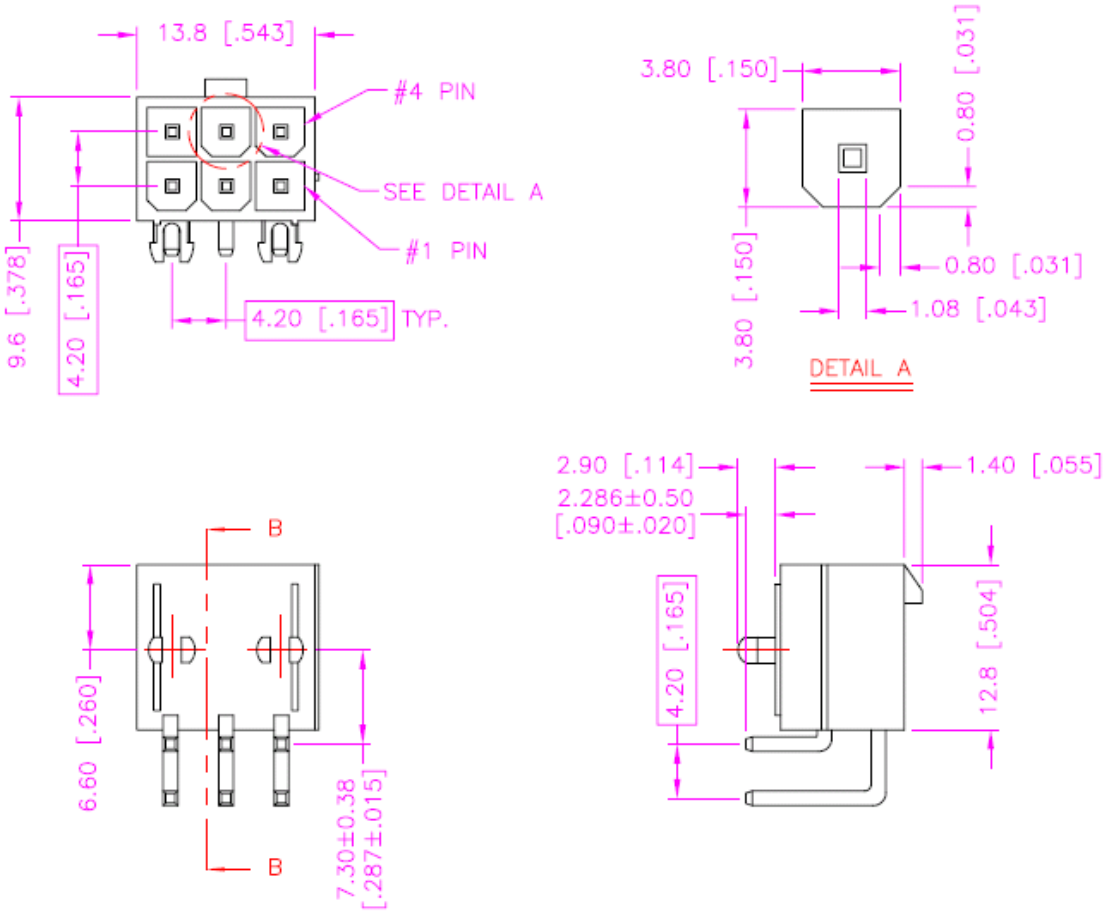

Figure 6. 6-Pin PCI Express Power Connector

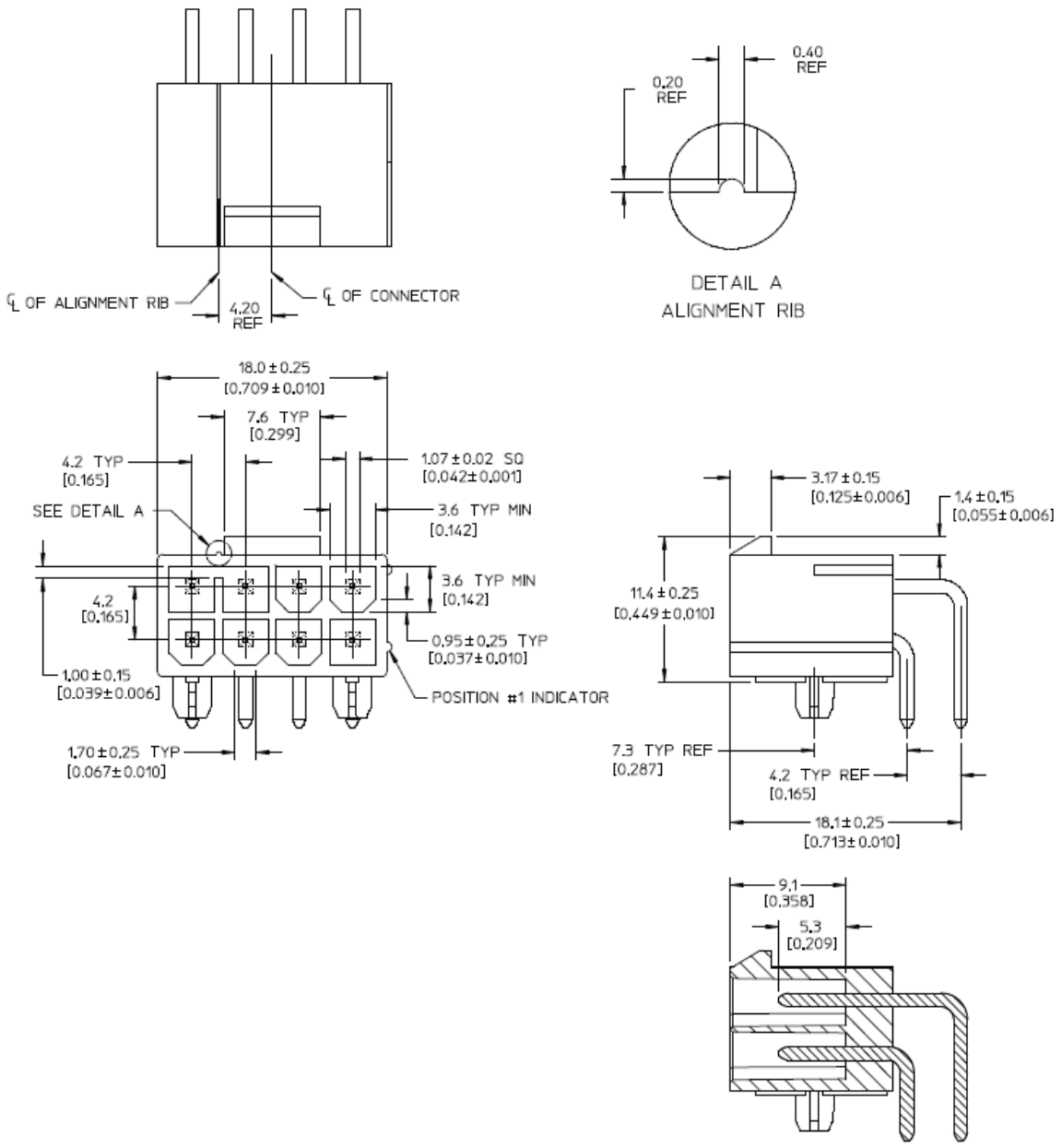

Figure 7. 8-Pin PCI Express Power Connector

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 NVIDIA GRID K2 board utilizes power from the PCI Express connector as well as one or two auxiliary power connectors. Table 4 lists the supported configurations

Table 4. Configurations with External PCI Express Connectors

Connector Type	6-Pin Power Connector	Supported	Notes
8-pin connected	6-pin connected	Yes	
8-pin connected	No cable installed	Yes	8-pin cable must supply 150 W
6-pin connected	N/A	No	6-pin cable in the 8-pin connector is not supported.
Not installed	N/A	No	8-pin connector should always be connected.

Note: If the auxiliary power cables are connected in an unsupported configuration, the NVIDIA GRID K2 board will power up in a low performance mode. The software will detect and report the incorrect power connections so actions can be taken by the user to resolve.

Note: The power breakdown per input rail is available to authorized system partners in the *NVIDIA GRID K2 System Design Guide* (DG-06546-001).

THERMAL SPECIFICATIONS

The NVIDIA GRID K2 graphics board uses passive heat sinks that require system airflow to properly operate the card within thermal limits. Table 5 provides thermal information necessary to deliver reliable operation of the NVIDIA GRID K2 GPU. This information is not intended to provide a specific thermal management solution.

For more detailed information regarding thermal specifications for the NVIDIA GRID K2 board, refer to the *NVIDIA GRID K2 System Design Guide* (DG-06546-001).

Table 5. Thermal Specifications

Parameter	Value	Units
TDP reference operating points[1] •Air inlet temperature (at TDP)[2] •Minimum airflow through opening (full ducted)[2]	 45 20	 °C CFM
GPU maximum TDP operating temperature[3]	92	°C
GPU slowdown temperature (maximum T_j)	92	°C
GPU shutdown temperature	97	°C

Notes:

[1]This airflow information is provided as guidance and is valid only for the conditions described in the *NVIDIA GRID K2 System Design Guide* (DG-06546-001).

[2]The airflow and air inlet temperature data provided here are reference points, not absolute specifications. Refer to the *NVIDIA GRID K2 System Design Guide* (DG-06546-001) for more details regarding the system airflow design guidance.

[3]The GPU maximum TDP operating temperature is the maximum GPU temperature at which the card is guaranteed to operate at the total board power level.

RELIABILITY

The mean time between failure (MTBF) ratings for the NVIDIA GRID K2 are tabulated in Table 6. The calculation of these values uses the Bellcore's Parts Count method in controlled environments.

Table 6. Mean Time Between Failure (MTBF)

Condition (Bellcore Code)	MTBF
Ground Benign (GB) environment, 35 °C *	232,528 hours
Ground Fixed (GF) environment, 35 °C **	127,664 hours

Notes:
*Bellcore Code GB relates to non-mobile equipment used in ideal environment (lab, medical, and test equipment).
**Bellcore Code GF relates to non-mobile equipment used in less than ideal environments (rack mount or other instrumentation or equipment used in buildings without controlled temperatures).

SUPPORT INFORMATION

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 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)		
Swedish	X	
Thai	X	

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

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