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**HP E1421B High-Power Mainframe User Info**

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Certification

Hewlett-Packard Company certifies that this product met its published specifications at the time of shipment from the factory. Hewlett-Packard further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology (formerly National Bureau of Standards), to the extent allowed by that organization’s calibration facility, and to the calibration facilities of other International Standards Organization members.

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Frame or chassis ground terminal—typically connects to the equipment’s metal frame.

AC

Indicates hazardous voltages.

or

Indicates the field wiring terminal that must be connected to earth ground before operating the equipment—protects against electrical shock in case of fault.

Alternating current (AC).

Direct current (DC).

Indicates hazardous voltages.

Calls attention to a procedure, practice, or condition that could cause bodily injury or death.

Calls attention to a procedure, practice, or condition that could possibly cause damage to equipment or permanent loss of data.

The following general safety precautions must be observed during all phases of operation, service, and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. Hewlett-Packard Company assumes no liability for the customer’s failure to comply with these requirements.

**Ground the equipment:** For Safety Class 1 equipment (equipment having a protective earth terminal), an uninterruptible safety earth ground must be provided from the mains power source to the product input wiring terminals or supplied power cable.

**DO NOT operate the product in an explosive atmosphere or in the presence of flammable gases or fumes.**

For continued protection against fire, replace the line fuse(s) only with fuse(s) of the same voltage and current rating and type. DO NOT use repaired fuses or short-circuited fuse holders.

**Keep away from live circuits:** Operating personnel must not remove equipment covers or shields. Procedures involving the removal of covers or shields are for use by service-trained personnel only. Under certain conditions, dangerous voltages may exist even with the equipment switched off. To avoid dangerous electrical shock, DO NOT perform procedures involving cover or shield removal unless you are qualified to do so.

**DO NOT operate damaged equipment:** Whenever it is possible that the safety protection features built into this product have been impaired, either through physical damage, excessive moisture, or any other reason, REMOVE POWER and do not use the product until safe operation can be verified by service-trained personnel. If necessary, return the product to a Hewlett-Packard Sales and Service Office for service and repair to ensure that safety features are maintained.

**DO NOT service or adjust alone:** Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

**DO NOT substitute parts or modify equipment:** Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the product. Return the product to a Hewlett-Packard Sales and Service Office for service and repair to ensure that safety features are maintained.
<table>
<thead>
<tr>
<th>Manufacturer’s Name:</th>
<th>Hewlett-Packard Company</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Loveland Manufacturing Center</td>
</tr>
<tr>
<td>Manufacturer’s Address:</td>
<td>815 14th Street S.W.</td>
</tr>
<tr>
<td></td>
<td>Loveland, Colorado 80537</td>
</tr>
</tbody>
</table>

Declares, that the product:

<table>
<thead>
<tr>
<th>Product Name:</th>
<th>6-Slot C-Size Mainframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Number:</td>
<td>HP E1421B</td>
</tr>
<tr>
<td>Product Options:</td>
<td>All</td>
</tr>
</tbody>
</table>

Conforms to the following Product Specifications:

**Safety:**
- CSA C22.2 #1010.1 (1992)
- UL 3111-1 (1994)

**EMC:**
- CISPR 11:1990/EN55011 (1991): Group1 Class A
- IEC 801-2-1:1991/EN50082-1 (1992): 4kVCD, 8kVAD
- IEC 801-3:1984/EN50082-1 (1992): 3 V/m

**Supplementary Information:** The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC (inclusive 93/68/EEC) and carries the "CE" mark accordingly.

May, 1996

Jim White, QA Manager

European contact: Your local Hewlett-Packard Sales and Service Office or Hewlett-Packard GmbH, Department HQ-TRE, Herrenberger Straße 130, D-71034 Böblingen, Germany (FAX +49-7031-14-3143).
You can help us improve our manuals by sharing your comments and suggestions. In appreciation of your time, we will enter you in a quarterly drawing for a Hewlett-Packard Palmtop Personal Computer (U.S. government employees are not eligible for the drawing).

Please list the system controller, operating system, programming language, and plug-in modules you are using.

Please pencil-in one circle for each statement below:

- The documentation is well organized.
- Instructions are easy to understand.
- The documentation is clearly written.
- Examples are clear and useful.
- Illustrations are clear and helpful.
- The documentation meets my overall expectations.

Please write any comments or suggestions below--be specific.
Chapter 1
Using the Mainframe

Mainframe Description

The HP E1421B mainframe is designed in full compliance with the VXIbus specifications (Rev. 1.4) and VMEbus system specifications (Rev. C.1). The mainframe contains 6 slots for plug-in modules and can be rack mounted in either the forward or reverse position. Features of the HP E1421B mainframe include:

- Improved power supply reliability.
- Solid state automatic bus grant sensing to bypass empty slots.
- Variable speed fan cooling.
- Easy replacement of major components - most can be replaced from the rear of the mainframe, even while the mainframe is rack mounted.
- Seven standard VXIbus power supply voltages - all overvoltage, overcurrent, and temperature protected.
- Maximum usable power (total power supply output power before thermal protection shutdown): 450 W at 55°C.

Options

Options available for the E1421B mainframe include:

- Opt. #W01 - Warranty conversion to 1-year on-site
- Opt. #500 - Module installation using standard address settings
- Opt. #918 - Install backplane connector shields
- Opt. #908, #909, #916 - Rack mounting kits. Refer to Rack Mounting the HP E1421B later in this chapter.

Contact your nearest Hewlett-Packard Sales and Support Office for information on ordering these options.

Line Voltage & Input Power

The HP E1421B mainframe includes a power supply which automatically adjusts for standard nominal line voltages of 100/120 VAC and 220/240 VAC, and nominal power line frequencies of 50 Hz and 60 Hz. The power supply has a power factor corrected input section and thus can be powered from any nominal line input over the range of 100 VAC to 240 VAC. The power supply can also be powered from a 400 Hz AC line frequency or DC power line voltages. Refer to Appendix A - Specifications for complete input power specifications.

Warning

Refer to HP E1421B Safety Grounding Information later in this chapter for complete grounding information when power line frequencies exceed 66 Hz.
The Airflow into the plug-in module slots in the HP E1421B mainframe is significantly more than previous mainframes. The mainframe supplies each of the 6 slots with enough air to cool 60 Watts while maintaining only a 10°C rise across a typically dense module. Up to 75 Watts per slot may be dissipated if a 15°C rise is acceptable across a typically dense module. The graph of Figure 1-1 shows the air flow volume (liters/second) versus change in pressure (mm H₂O) across the module for the mainframe.

The mainframe has a fan chamber with one circulation fan. The speed of the fans is controlled by the ambient temperature of the air drawn into the mainframe. Air from the fan chamber is forced through the right side of the plug-in modules. The air passes through the installed modules and escapes out the left side of the mainframe.

A second fan provides cooling for the power supply. This fan is mounted on the right side of the mainframe next to the power supply.

**Caution**

When installing the mainframe in your system, ensure that the air inlets and outlets are not obstructed. Blocked inlets and outlets can cause damage to the mainframe and plug-in modules due to overheating.
Variable Speed Fan

Normally, the speed of the two internal circulation fans is determined by the ambient temperature of the air drawn into the mainframe. One fan cools the power supply and the other fan cools the VXI modules inserted into the mainframe. You can override the temperature-controlled speed of the fans by changing the position of the Fan Speed Control Switch on the rear of the mainframe to "HIGH." This forces both fans to remain at full speed all of the time. The two fan modes are:

- **Variable Speed Mode (factory default):** Quiet operation (≈75% airflow) at <30°C ambient temperature. High speed operation at >40°C ambient temperature.

- **High Speed Mode (switch selectable):** Full airflow at all times.

![Figure 1-2. Forcing Fan to High Speed](image-url)
Power Line Fuse
and Power Cord

The mainframe is shipped with a 15A fast blow (15 AF) fuse (HP Part Number 2110-0054) already installed. This fuse is suitable for all line voltages. Figure 1-3 shows how to replace the fuse if necessary.

Power cords and their HP Part Numbers are listed in Table 1-1. Figure 1-3 shows how to install the power cord.

---

WARNING

For protection from electric shock hazard, power cord ground must not be defeated. The front power switch on this instrument does not disconnect all power from internal circuits. In case of emergency, the operator may need to disconnect the power to this mainframe. Do not block the operators access to the power cord, or (if installed in a rack) to the circuit breaker which supplies power to the mainframe.

---

AVERTISSEMENT

Pour ne pas compromettre la protection contre le choc électrique, ne pas couper le circuit de continuité des masses de la fiche. L'interrupteur avant de cet appareil ne coupe pas la totalité de l'alimentation des circuits internes. En cas d’urgence, l’utilisateur peut devoir débrancher cet appareil. Ne pas bloquer l’accès au cordon d’alimentation ou (si l’appareil est installé sur un chassis) au disjoncteur alimentant l’appareil.
Table 1-1 lists the power cords and their Hewlett-Packard part numbers. The table also lists the specifications of each power cord.

### Table 1-1. Power Cords for the HP E1421B

<table>
<thead>
<tr>
<th>Country</th>
<th>Part Number</th>
<th>Volts</th>
<th>Rated Amps</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.K.</td>
<td>8120-1351</td>
<td>250 VAC</td>
<td>10 A</td>
<td>Straight Connector</td>
</tr>
<tr>
<td>Australia</td>
<td>8120-1369</td>
<td>250 VAC</td>
<td>10 A</td>
<td>Straight Connector</td>
</tr>
<tr>
<td>Europe</td>
<td>8120-1689</td>
<td>250 VAC</td>
<td>10 A</td>
<td>Straight Connector</td>
</tr>
<tr>
<td>U.S./Canada</td>
<td>8120-2371</td>
<td>125 VAC</td>
<td>13 A</td>
<td>Straight Connector</td>
</tr>
<tr>
<td>Switzerland</td>
<td>8120-2296</td>
<td>250 VAC</td>
<td>10 A</td>
<td>Right Angle Connector</td>
</tr>
<tr>
<td>Denmark</td>
<td>8120-2956</td>
<td>250 VAC</td>
<td>10 A</td>
<td>Straight Connector</td>
</tr>
<tr>
<td>Japan</td>
<td>8120-5400</td>
<td>125 VAC</td>
<td>15 A</td>
<td>Right Angle Connector</td>
</tr>
<tr>
<td>India/S.A.</td>
<td>8120-4211</td>
<td>250 VAC</td>
<td>10 A</td>
<td>Straight Connector</td>
</tr>
</tbody>
</table>

Power cords supplied by HP have polarities matched to the power input socket on the instrument:

- **L** = Line or Active Conductor (also called "live" or "hot")
- **N** = neutral or identified conductor
- **E** = Earth or safety ground

---

**Note**

These are special high power cords. Make certain that any replacement cord is capable of handling the indicated loads.
HP E1421B Safety Grounding Information

**WARNING**  For protection from electrical shock when operating at frequencies greater than 66 Hz, connect the chassis ground terminal to permanent earth ground.

**AVERTISSEMENT**  Risque de Choc électrique. Si la fréquence du secteur est supérieure à 66 Hz, relier la borne de masse du chassis à une prise de terre fixe.

**Grounding Procedure**

Connect a 16 AWG (1.3 mm or larger) wire to the PEM nut shown in Figure 1-4. The wire must be green with a yellow stripe or bare (no insulation). Use a M4 x 10 screw, grounding lug, and toothed washers (or toothed lug) as shown in Figure 1-5. Securely attach the other end of the wire to a permanent earth ground using toothed washers or a toothed lug.

*Figure 1-4. Grounding Connection*
Figure 1-5. Grounding Screw and Toothed Washers
Rack Mounting the HP E1421B

The HP E1421B mainframe has three rack mount option kits. These kits are shown in Figures 1-6, 1-7, and 1-8. A rack slide or rail kit is also required to rack mount the mainframe. These kits are shown in Figures 1-9 and 1-10. If you are not using a Hewlett-Packard rack, you may also need an adapter bracket. This bracket is shown in Figure 1-11. These kits may be ordered from your nearest Hewlett-Packard Sales and Support Office using the part numbers or option numbers listed with each part description.

Option 908

The Option 908 kit includes flush mount flanges and hardware designed to flush mount the mainframe. This kit is compatible with both the rack slide and rail kits.

![Figure 1-6. Option 908 Parts Inventory](image)

Option 916

The Option 916 kit includes the flanges included with Option 908 plus a recess rack mount bracket and supporting hardware. This kit is designed to mount the mainframe at a recess of 10.4 cm (4 1/8 in) or 12.9 cm (4 1/8 in). The Option 916 kit is not compatible with rack slides shown in Figure 1-10.

![Figure 1-7. Option 916 Parts Inventory](image)
**Option 909**
The Option 909 kit includes the flanges and a set of front mount handles. This kit is designed to flush or recess mount the mainframe and provide handles for convenient removal and installation. The Option 909 is compatible with both rack slide and rail kits.

**Figure 1-8. Option 909 Parts Inventory**

**Rail Kit**
The rail kit is HP Part Number E3665A. This kit is designed to support the mainframe in a fixed position in the rack. It is compatible with all of the options listed in this section. **The rail kit must be ordered separately from the option kits.**

**Figure 1-9. Rail Kit**
Rack Slides

The rack slide kit is HP Part Number 1494-0060. This kit is designed to support the E1421B in the rack while allowing it to be slid in and out for greater access. The Rack Slide Kit is not compatible with Option 916 - Recess Rack Mount Kit. The Rack Slide Kit must be ordered separately from the options kits.

Figure 1-10. Rack Slides

Adapter Bracket

This bracket (HP Part Number 1494-0061) is designed for Rack Slides that are to be used in non-HP Racks.

Figure 1-11. Rack Slide Adapter Bracket
Mounting the Rails or Rack Slides

Figures 1-12 and 1-13 show how to mount the rails or rack slides in the rack.

**Figure 1-12. Mounting the E3665A Rail Kit**

**Figure 1-13. Mounting the Rack Slide Kit**

---

- Slide inner rail in, so the mounting holes are clear.
- Remove the sliding arms from the rails.
- Use flanges as templates.
- Use flathead screws in front.
- Cabinet Vertical Columns
- 0.7x12 Pan Head Screws
- Use Captive Nuts
- Torx Screw
- Captive Nuts
- Rack Slide
- Slide rail Kit mount to the center line of the E1421B Mainframe.
- Vertical column center line positions
- Rail kits mount below the HP E1421B Mainframe
Preparing the Mainframe

Figure 1-14 shows the steps that are needed to prepare the mainframe for rack mounting. Figure 1-15 shows how to attach the Option Kits to the mainframe.

Figure 1-14. Preparing the Mainframe

Remove these parts to rack mount the mainframe.

Note: This step is only for the Rack Slide Kit.

Figure 1-15. Installing the Option Kits.

Option 908  Flush Mount
Option 909  Flush Mount with Handles
Option 916  Recessed Mount
Installing the mainframe

Figure 1-16 shows the final step to install the mainframe into the rack. Be sure to connect the mainframe power cord to the rack power supply. Figure 1-16 is shown with Option 908 Flush Mount Kit and the Rack Slide Kit.

Note: Be sure that Rail Stopper is aligned with hole in Rack Slide. If not, switch the right and left Rack Slides.

Figure 1-16. Installing the Mainframe in the Rack
The Intermodule Chassis Shield Kit (HP Part Number E1409B) is the HP implementation of the VXIbus specification that allows grounded shielding between mainframe slots. Figure 1-17 shows how to install the E1409B in the E1421B mainframe. The E1409B can be ordered from your nearest Hewlett-Packard Sales and Support Office.

**Intermodule Chassis Shield Kit**

**Figure 1-17. Installing Intermodule Chassis Shield Kit**

**Note:** Chassis Shield Guides must be used to ensure proper grounding of the Chassis Shield. Do not slide the Chassis Shield into the mainframe without the Guides.
There are no user servicable parts in the HP E1421B. Repair is limited to replacing the power supply module, the backplane module, or other mechanical parts only.

**Module Replacement**

The power supply is available on an exchange basis. The backplane assembly should be replaced and not repaired (no exchange required on the backplane).

<table>
<thead>
<tr>
<th>Component</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply</td>
<td>E1401-69202</td>
</tr>
<tr>
<td>Backplane</td>
<td>E1421-67500</td>
</tr>
</tbody>
</table>

**Component Locator**

Refer to Figures 2-1 and 2-2 for component locator information.

**WARNING**

There are no user servicable parts in the HP E1421B. Refer repair and servicing to trained service personnel.

**AVERTISSEMENT**

Ne contient pas d’élément que l’utilisateur puisse réparer. Confier les réparations et la maintenance à un technicien qualifié.

**Cleaning Fan Filters**

The HP E1421B does not have any fan filters. Therefore it is not necessary to remove, clean, or replace the filters.
# HP E1421B Replaceable Parts List

<table>
<thead>
<tr>
<th>Reference Designator</th>
<th>HP Part Number</th>
<th>Total Qty.</th>
<th>Description</th>
<th>Mfr. Code</th>
<th>Mfr. Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>E1421-67500</td>
<td>1</td>
<td>PC ASSY BACKPLANE/INTERFACE</td>
<td>28480</td>
<td>E1421-67500</td>
</tr>
<tr>
<td>A2</td>
<td>E1401-69202</td>
<td>1</td>
<td>POWER SUPPLY 650W</td>
<td>28480</td>
<td>E1401-69202</td>
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<tr>
<td>B1-B2</td>
<td>3160-0864</td>
<td>2</td>
<td>FAN - TBAX; 12V DC</td>
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<td>3160-0864</td>
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<tr>
<td>PNL1</td>
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<td>CBL2</td>
<td>E1401-61612</td>
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<td>F1</td>
<td>2110-0054</td>
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<td>FUSE 15A, 250V NTD FE UL</td>
<td>75915</td>
<td>314015</td>
</tr>
<tr>
<td>MP94</td>
<td>1400-1502</td>
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<td>MP103-114</td>
<td>E1401-41202</td>
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</tr>
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<td>MP130</td>
<td>E1401-00203</td>
<td>1</td>
<td>BLANK PANEL (Fan Carrier)</td>
<td>28480</td>
<td>E1401-00203</td>
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<tr>
<td>MP135-MP136</td>
<td>5001-0541</td>
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</tr>
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<td>8</td>
<td>STNDF - REAR PNL</td>
<td>28480</td>
<td>5041-8821</td>
</tr>
<tr>
<td>MP149</td>
<td>E1421-81204</td>
<td>1</td>
<td>RAIL FRONT LEFT</td>
<td>28480</td>
<td>E1421-81204</td>
</tr>
<tr>
<td>MP150</td>
<td>E1421-81205</td>
<td>1</td>
<td>RAIL FRONT RIGHT</td>
<td>28480</td>
<td>E1421-81205</td>
</tr>
<tr>
<td></td>
<td>E1421-21200</td>
<td>2</td>
<td>NUT BARS FRONT</td>
<td>28480</td>
<td>E1421-21200</td>
</tr>
<tr>
<td></td>
<td>E1421-21201</td>
<td>2</td>
<td>NUT BARS REAR</td>
<td>28480</td>
<td>E1421-21201</td>
</tr>
<tr>
<td>MP1</td>
<td>5041-8819</td>
<td>2</td>
<td>CAP - STRP HDL FRT</td>
<td>28480</td>
<td>5041-8819</td>
</tr>
<tr>
<td>MP2</td>
<td>5062-3704</td>
<td>2</td>
<td>STRAP HDL 18 IN</td>
<td>28480</td>
<td>5062-3704</td>
</tr>
<tr>
<td>MP3</td>
<td>54710-62501</td>
<td>2</td>
<td>CAP STRAP HANDLE</td>
<td>28480</td>
<td>54710-62501</td>
</tr>
<tr>
<td>PNL2-PNL3</td>
<td>E1400-00209</td>
<td>2</td>
<td>FILLER PANEL ONE SLOT</td>
<td>28480</td>
<td>E1400-00209</td>
</tr>
<tr>
<td>PNL5</td>
<td>E1400-00203</td>
<td>1</td>
<td>FILLER PNL - 3 SLOT</td>
<td>28480</td>
<td>E1400-00203</td>
</tr>
<tr>
<td>X1</td>
<td>2110-0565</td>
<td>1</td>
<td>FUSEHOLDER CAP 15A MAX</td>
<td>28480</td>
<td>2110-0565</td>
</tr>
</tbody>
</table>
Figure 2-1. Mainframe Replaceable Parts
Figure 2-2. Fan & Rear Panel Replaceable Parts
The HP E1421B mainframes are 100% compatible with VXIbus specification revision 1.4.

**Overall Mainframe Size**

<table>
<thead>
<tr>
<th>Width</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>426 mm (16.8&quot;)</td>
<td>221 mm (8.72&quot;)</td>
</tr>
<tr>
<td>537 mm (21.13&quot;)</td>
<td></td>
</tr>
</tbody>
</table>

**Mainframe Weight**  
HP E1421B: 15.0 Kg (33.0 lbs) with no modules installed.

**Module Size**  
Six (6) C-Size slots. The mainframes also accept A- or B- Size modules using the optional HP E1403 Module Carrier.

**Input Power**  

- **50 - 60 Hz Input Power:**
  Automatic Voltage Ranging, nominal range: 100 - 240 Vac ±10%
  Nominal Frequency Range: 50 - 60 Hz ±10%

- **400 Hz Input Power:**
  Nominal Voltage Range: 100 - 120 VAC ±10%
  Nominal Frequency: 400 Hz ±10%

**DC Input Power:**
Input Voltage Range: 100 VDC minimum - 370 VDC maximum

**General Power Supply**  
Power Factor Corrected  
Power Switch: On/Standby with lighted indicator in front.  
Inrush Current: 40A max  
Designed to meet EN-60555-2  
Socket for detachable line cord: IEC 320 "HOT"  
Chassis ground tap on rear panel: M4 x 0.7 threaded insert.
Fuse:

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Maximum Current</th>
<th>Fuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>100Vac</td>
<td>15A</td>
<td>15AF</td>
</tr>
<tr>
<td>120Vac</td>
<td>12A</td>
<td>15AF</td>
</tr>
<tr>
<td>220-240Vac</td>
<td>8A</td>
<td>15AF</td>
</tr>
</tbody>
</table>

Power Supply Outputs

<table>
<thead>
<tr>
<th>DC Output Voltage</th>
<th>Peak DC Output Current (IMP*) 55 ºC</th>
<th>P-P Dynamic Current (IMD**)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+5V</td>
<td>45A</td>
<td>5.0A</td>
</tr>
<tr>
<td>+12V</td>
<td>8A</td>
<td>2.5A</td>
</tr>
<tr>
<td>-12V</td>
<td>8A</td>
<td>2.5A</td>
</tr>
<tr>
<td>+24V</td>
<td>8A</td>
<td>4.0A</td>
</tr>
<tr>
<td>-24V</td>
<td>40A</td>
<td>5.0A</td>
</tr>
<tr>
<td>-5.2V</td>
<td>15A</td>
<td>3.5A</td>
</tr>
</tbody>
</table>

* IMP = Rated mainframe peak DC output current as defined by the VXIbus Specification.
** IMD = Rated mainframe peak-to-peak dynamic current as defined in the VXIbus Specification by a current vs. frequency curve.

VXI Ripple/Noise*

<table>
<thead>
<tr>
<th>DC Output Voltage</th>
<th>Allowed Variation</th>
<th>Max. DC Load Ripple/Noise</th>
<th>Max. Induced Ripple/Noise</th>
</tr>
</thead>
<tbody>
<tr>
<td>+5V</td>
<td>+0.25/-0.125</td>
<td>50 mV</td>
<td>50 mV</td>
</tr>
<tr>
<td>+12V</td>
<td>+0.06/-0.36</td>
<td>50 mV</td>
<td>50 mV</td>
</tr>
<tr>
<td>-12V</td>
<td>-0.60/+0.36</td>
<td>50 mV</td>
<td>50 mV</td>
</tr>
<tr>
<td>+24V</td>
<td>+1.2/-0.72</td>
<td>150 mV</td>
<td>150 mV</td>
</tr>
<tr>
<td>-24V</td>
<td>-1.2/+0.72</td>
<td>150 mV</td>
<td>150 mV</td>
</tr>
<tr>
<td>-5.2V</td>
<td>-0.26/+0.156</td>
<td>50 mV</td>
<td>50 mV</td>
</tr>
<tr>
<td>-2V</td>
<td>-0.10/+0.10</td>
<td>50 mV</td>
<td>50 mV</td>
</tr>
</tbody>
</table>

* Per VXI Specification rev. 1.4

Humidity Up to 65% relative humidity from 0 to 40 ºC

Temperature Range Non-operating:-40 ºC to +75 ºC
Operating: 0ºC to 55 ºC
Shock  Operating, Functional:
Random: 0.0001 g²/Hz, 5-500 Hz, ~0.21 Grms, 10 min/axis.
Survival:
Swept Sine: 5-500 Hz resonant search, 1 Octave/min sweep rate, 5 min dwell at resonance.
Random: 0.015 g²/Hz, 5-500 Hz, ~2.09 Grms, 10 min/axis.

Vibration  End use, Handling:
Less than 45.5 kg: Half sine waveform, <3ms duration, velocity change depending on weight.
Greater than 45.5 kg: 10.2 cm free fall tilt drop.
Transportation:
Trapezoidal waveform, velocity change dependent on weight, minimum acceleration 30 g.

Cooling Provided

![Minimum Airflow Per Slot](chart)

- **Fan set to "Variable":** Quiet operation (approx. 75% airflow) at <30 °C ambient temperature and high speed operation at >40 °C ambient temperature.
- **Fan set to "HIGH":** Full airflow all the time.

For modules with typical density:
- 10 °C rise at 60W per slot
- 15 °C rise at 75W per slot

Acoustical Noise  Low fan speed: 53 dBA sound pressure at bystander position.
Lpa = 53 dB fiktiver Arbeitsplatz, normaler Betrieb, nach DIN 45635 T.1
High fan speed: 59 dBA sound pressure at bystander position.
Lpa = 59 dB fiktiver Arbeitsplatz, normaler Betrieb, nach DIN 45635 T.1
EMC Testing  Meets requirements of CISPR 11 Level A.

Module Weight  Maximum 3.5 Kg (7.7 lbs) per slot to comply with vibration and shock specifications. Heavier modules may be installed if vibration and shock environment is less severe.

Safety  IEC 348, UL 1244, and CSA C22.2 #231.