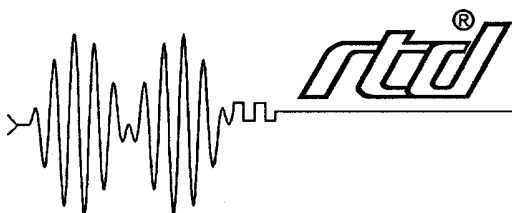


IPWR104HR-35W Isolated PC/104 Power supply module

User's Manual

Hardware Revision 1.0-1.2



Real Time Devices, Inc.

"Accessing the Analog World"®

IPWR104HR-35W

Power supply module

User's Manual

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Revision History

30/05/2000	HW Release 1.0
15/01/2001	Board renamed from IPWR30 to IPWR104HR-35
10/07/2001	Corrections for Ver 2.1 and formatting

Notice: We have attempted to verify all information in this manual as of the publication date. Information in this manual may change without prior notice from RTD Finland Oy.

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Chapter 1 INTRODUCTION

This user's manual describes the operation of the IPWR104HR-35W low cost embedded galvanically isolated power supply unit for automotive and industrial applications.

Features

Some of the key features of the IPWR104HR-35W include:

- Wide input voltage range 18-36V DC or 33 to 72V DC
- 35W output power without additional cooling -40 to +85C ambient temperature
- 60W peak output power guaranteed **with adequate cooling**
- Minimum of 82% efficiency
- All outputs continuous short circuit protected
- Remote ON/OFF operation
- Power output IPWR104HR-35 +5V, +12V, -12V
- Standard floppy power output connector (J12)
- Fully PC/104 compliant
- **Extended operating temperature -40 to +85 C**

The following paragraphs briefly describe the major features of the IPWR104HR-35. A more detailed discussion is included in Chapter 3 (Hardware description) The board installation is described in Chapter 2 (Board Installation).

Power supply units

The IPWR104HR-35W isolated power supply unit offers a complete reliable power subsystem for your sophisticated computer and peripherals. To improve reliability in noisy environments, the IPWR104HR-35W is designed using an isolated power supply module for the computer and the peripheral system components. This enables reliable system operation in distributed industrial installations. The high peak output power of 60W ensures adequate current at high transient loads.

The main +5V computer power supply is designed using a monolithic switching regulator module providing high output current (12A) with a high efficiency (88%) under all conditions. The secondary peripheral power supplies are designed using +12V and -12V "boost" converters.

The IPWR104HR-35W can be "switched off" from a remote source. If this switch (jumper) is closed the power supply will become inactive while still powered.

Board options

The IPWR104HR-35W is available in two main output configurations as set out below:

Option 1	IPWR104HR-35WL-1	+5V output, 18-36V input range (please consult the factory for availability)
	IPWR104HR-35WH-1	+5V output, 33-72V input range (please consult factory for availability)
Option 2	IPWR104HR-35WL	+5V, +12V, -12V outputs, 18-36V input range (stocked version)
	IPWR104HR-35WH	+5V, +12V, -12V outputs, 33-72V input range (please consult factory for availability)

Mechanical description

The IPWR104HR-35W is designed on a PC/104 form factor. An easy mechanical interface to both PC/104 and EUROCARD systems can be achieved. Stack your IPWR104HR-35W directly on a PC/104 compatible computer using the onboard mounting holes and standoffs.

Connector description

The power connections can be made using "cable plug" type terminal blocks. This enables removing connections from the board without opening the cables from the terminal blocks. A 4-pole "floppy type" connector is also available for easy wiring to PC peripherals.

What comes with your board

Your IPWR104HR-35W package contains the following items:

- IPWR104HR-35W board with mating connectors for the power connections
- User's manual

If any item is missing or damaged, please call Real Time Devices Finland customer service department at the following number: (+358) 9 346 4538.

Using this manual

This manual is intended to help you install your new IPWR104HR-35W module and get it working quickly, while also providing enough detail about the board and it's functions so that you can enjoy maximum use of it's features even in the most demanding applications.

When you need help

This manual and all the example programs will provide you with enough information to fully utilize all the features on this board. If you have any problems installing or using this board, contact our Technical Support Department (+358) 9 346 4538 during European business hours. Alternatively, send a FAX to (+358) 9 346 4539 or Email to sales@rtdfinland.fi. When sending a FAX or Email request please include the following information: Your company's name and address, your name, your telephone number, and a brief description of the problem.

Chapter 2 **BOARD INSTALLATION**

The IPWR104HR-35W isolated power supply module is very easy to connect to your industrial or automotive control system. Direct interface to PC/104 systems as well as EUROCARD boards is achieved. This chapter tells you step-by-step how to install your IPWR104HR-35W into your system.

Board installation

Keep your board in its antistatic bag until you are ready to install it to your system! When removing it from the bag, hold the board at the edges and do not touch the components or connectors. Please handle the board in an antistatic environment and use a **grounded** workbench for testing and handling of your hardware. Before installing the board in your computer, check the power cabling. Failure to do so may cause the power supply unit to malfunction or even cause permanent damage.

General installation guidelines:

- Touch the grounded metal housing of your computer to discharge any antistatic buildup and then remove the board from its antistatic bag.
- Hold the board by the edges and install it in an enclosure or place it on the table on an antistatic surface.
- Install your board in your system, and wire the power supply correctly.
- Failure to do so may cause the power supply unit to malfunction or even cause permanent damage to the device.
- Check all wiring connections once and then once more again.
- Check the input power to the board is 18 to 36V DC or 33 to 72V DC.
- Apply power to your IPWR104HR-35.

Installation integrated with a PC/104 module stack:

- Secure the four PC/104 installation holes with standoffs.
- Connect the board to the power supplies using the power interfacing connectors.

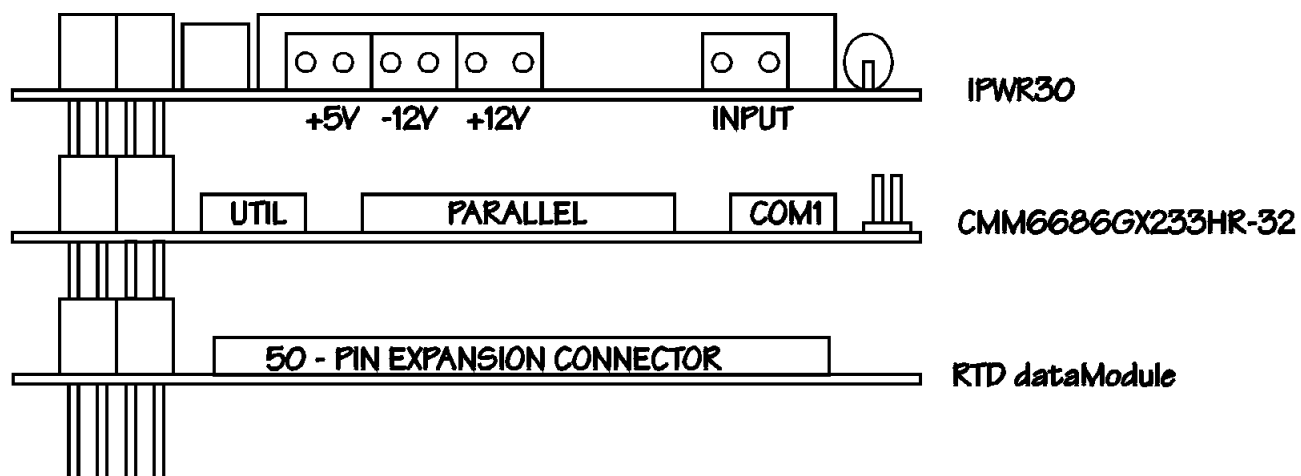


Fig. 2-1: IPWR104HR-35W integrated in a RTD PC/104 cpuModule stack

Note: For full output power performance, install your IPWR104HR-35W at the top of your PC/104 system and make sure adequate cooling is provided. You may wish to increase airflow using the EFAN104 fan module available from Real Time Devices.

External power connections

The illustration 2-2 below shows power connections of the IPWR104HR-35W board.



Fig. 2-2 IPWR104HR-35W power supply power connections

Connector descriptions:

- **J1:** Raw input power to the IPWR104HR-35. Input 18-36V or 33-72V DC.

Note: The module input power may be 75 W (4A) peak, this will require a cable wire diameter of 1,5 to 2,0 sq. mm. Make sure this input wire is kept as short as possible to reduce voltage drops.

- **J2:** +5V Output of the main power supply
- **J11:** -12V Output (Only on -2 versions of IPWR104HR-35)
- **J4:** +12V Output (Only on -2 versions of IPWR104HR-35)
- **J12:** Floppy power output connector , +5V and +12V outputs:
Pin #1 +5V, #2,3 GND and pin #4 +12V
- **X1:** Remote ON/OFF , close this jumper to disable the IPWR104HR-35W

Chapter 3 - **HARDWARE DESCRIPTION**

This chapter describes the major features of the IPWR104HR-35W, which are:

- The main +5V converter for the computer and PC/104 bus
- The secondary power output converters +12V and -12V for peripheral devices
- Fuses and protection
- Output power calculations

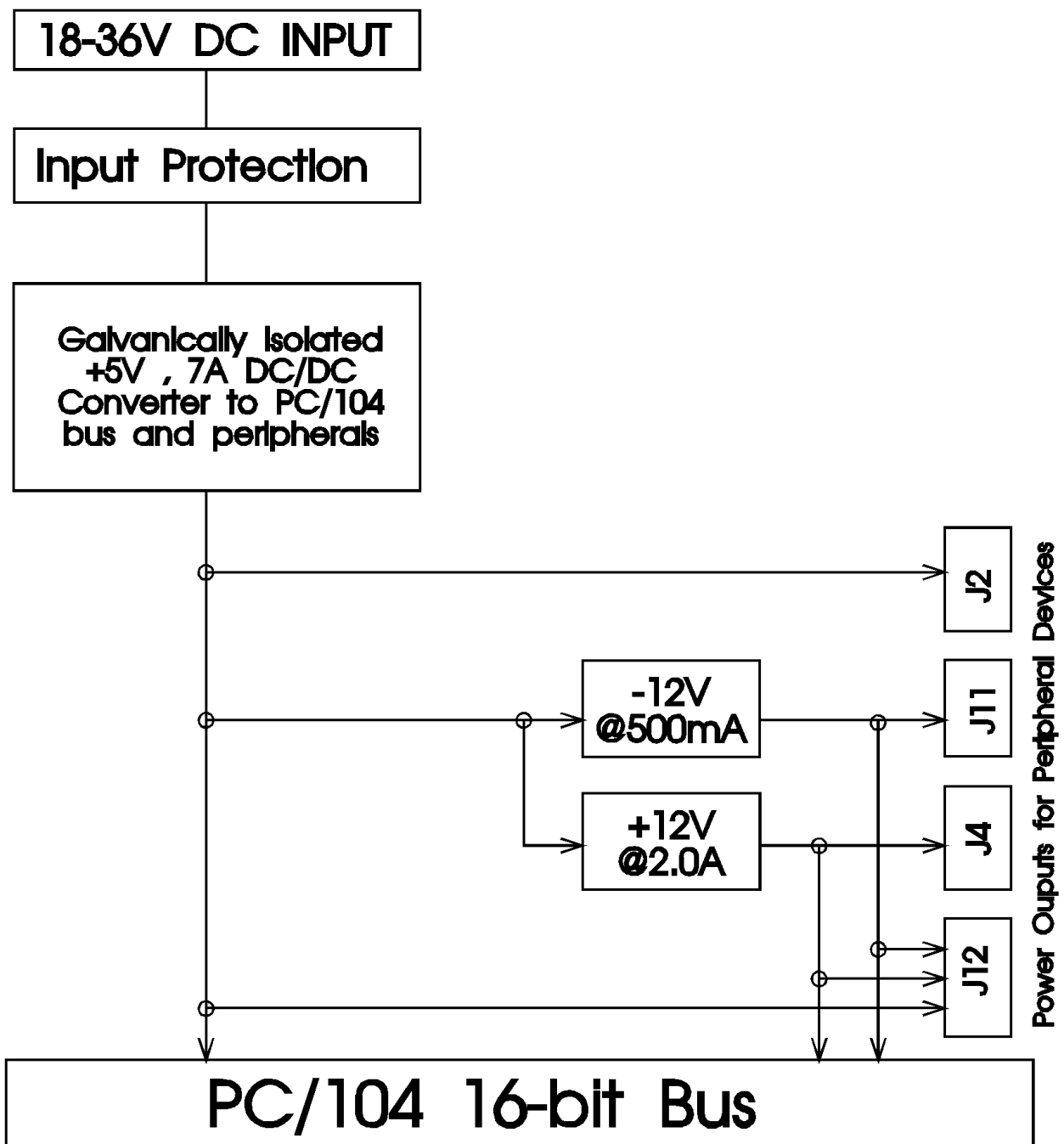


Fig. 3-1 Block diagram of the IPWR104HR-35W

Main +5V converter for computer

The main +5V output is implemented with a monolithic, switch-mode DC-DC converter module. The peak output current of this unit is 12A. This converter has excellent dynamic and transient response capabilities making it ideal for high-speed computer power supplies. The output current is internally limited against over current and short circuit faults.

The input of this converter is fused with a 5A thermal fuse. This will protect the unit from long lasting overload conditions. The input of this converter is protected with a transient absorber diode and a schottky diode. These devices are necessary to protect the input in automotive and industrial installations against overvoltage spikes and reverse voltage transients. These situations exist in vehicle systems that use electrically controlled hydraulic or pneumatic inductive valves.

The main +5V DC/DC converter is galvanically isolated. This improves reliability in airborne and industrial applications. The peak isolation voltage is 1,5 KV.

The main +5V converter feeds the PC/104 AT bus +5V pins with power. This power can be taken from the board from an external terminal block J2. (See previous section for location of J2.)

Current Limit

To protect the device against fault or short circuit conditions, the +5V DC/DC converter module is equipped with a current limiting circuitry to provide continuous overload protection. After reaching the current limit point (typically 10 to 25% over the rated peak current), the voltage output will range between the rated output and zero depending on the amount of overload. At this point the output current will be typically 25 to 30 % of its maximum value. Once the short circuit condition is removed, the output will return to the nominal value without restarting the unit.

Remote On/Off control

Header connector X1 near the top edge of the board is the remote ON/OFF selection switch. Closing this connection will disable the IPWR104HR-35W and place the primary side circuits "OFF". In this condition the IPWR104HR-35W will consume approximately 0,1W of power.

Secondary +12V and -12V converters for peripherals

A 5V to +-12V step up converters with 90% efficiency generates +-12V for peripheral devices such as EL- or TFT- panels, Hard drives, motors etc. The +12V output delivers 2,0A of current. The +12V power is available from terminal block J4. The -12V power is available from terminal block J1. (See previous section for location of J4/11). The +12V and -12V supplies also power the PC/104 bus power pins.

Fuses and protection

To protect your power supply from extensive overload, an input fuse has been installed.

- Fuse 1: F2, Thermofuse 5A fuse for IPWR104HR-35W (Bottom of board)

Note: The +12V converters are not fused, but internally current limited!

The +12V converter is current limited to 2,5A and the -12V converter is current limited to 750mA.

Output power calculations

The maximum available peak power for the +5V computer system can be estimated using the following conservative formula: (The of the main converter is 12A)

I1 = +12V output current

I2 = -12V output current

I_bus = +5V to bus

12A = $(I1 / 0.86 + I2 / 0,82) * 2,5 + I_bus$ (PEAK)

7.5A = $(I1 / 0.86 + I2 / 0,82) * 2,5 + I_bus$ (CONTINUOUS)

Note: Even though the total output peak power of 12A @5V is not exceeded you must remember not to overload an individual output! Care must be taken not to thermally overload the unit. The IPWR104HR-35W is rated to 35W aggregate continuous output power over the complete specified operating temperature range without additional cooling. The maximum peak output power may not be available WITHOUT heat sinking or additional airflow. See the following passage for more information on thermal behavior of your IPWR104HR-35W.

The absolute maximum longterm output figures over the -40 to +84Ctemperature:

+12V -> 2.0A

-12V -> 500mA

+5V -> 7.5A

Chapter 4 IPWR104HR-35W SPECIFICATIONS

Host interface

16-bit PC/104 bus, only power pins connected

Power supply specifications

Input voltage range	18-36V DC for IPWR104HR-35WL version 33-72V DC for IPWR104HR-35WH version
Output Power (35W continuous)	+5V@7,5A +12V@2,0A -12V@500mA
Efficiency	80-86% maximum efficiency at 7.5A, 19V
Output voltage unloaded	+5,20V (max)
Output voltage fully loaded	+5,04V (min@7,5A)
Short circuit input power	70W

Connectors

Power connectors	Phoenix Contact Combicon Series MSTB 2.5 plugs "Mini- floppy connector"
Host bus (Optionally no bus connector)	AT PC/104 bus

Electromechanical

Operating temperature range	-40 to +85 C
Base plate temperature (Max)	+100 C
Heat sink material	Aluminum, anodized

Chapter 5 RETURN POLICY AND WARRANTY

Return Policy

If the module requires repair, you may return it to us by following the procedure listed below:

Caution: Failure to follow this return procedure will *almost always* delay repair! Please help us expedite your repair by following this procedure.

- 1) Read the limited warranty, which follows.
- 2) Contact the factory and request a Returned Merchandise Authorization (RMA) number.
- 3) On a sheet of paper, write the name, phone number, and fax number of a technically competent person who can answer questions about the problem.
- 4) On the paper, write a detailed description of the problem with the product. Answer the following questions:
 - Did the product ever work in your application?
 - What other devices were connected to the product?
 - How was power supplied to the product?
 - What features did and did not work?
 - What was being done when the product failed?
 - What were environmental conditions when the product failed?
- 5) Indicate the method we should use to ship the product back to you.
 - We will return warranty repairs by UPS Ground at our expense.
 - Warranty repairs may be returned by a faster service at your expense.
 - Non-warranty repairs will be returned by UPS Ground or the method you select, and will be billed to you.
- 6) Clearly specify the address to which we should return the product when repaired.
- 7) Enclose the paper with the product being returned.
- 8) Carefully package the product to be returned *using anti-static packaging!* We will not be responsible for products damaged in transit for repair.
- 7) Write the RMA number on the outside of the package.
- 8) Ship the package to:

Real Time Devices Finland Oy

Lepolantie 14

FIN-00660 Helsinki

FINLAND

Limited Warranty

Real Time Devices warrants the hardware and software products it manufactures and produces to be free from defects in materials and workmanship for one year following the date of shipment from REAL TIME DEVICES. This warranty is limited to the original purchaser of product and is not transferable.

During the one year warranty period, REAL TIME DEVICES will repair or replace, at its option, any defective products or parts at no additional charge, provided that the product is returned, shipping prepaid, to REAL TIME DEVICES. All replaced parts and products become the property of REAL TIME DEVICES. Before returning any product for repair, customers are required to contact the factory for an RMA number.

THIS LIMITED WARRANTY DOES NOT EXTEND TO ANY PRODUCTS WHICH HAVE BEEN DAMAGED AS A RESULT OF ACCIDENT, MISUSE, ABUSE (such as: use of incorrect input voltages, improper or insufficient ventilation, failure to follow the operating instructions that are provided by REAL TIME DEVICES, "acts of God" or other contingencies beyond the control of REAL TIME DEVICES), OR AS A RESULT OF SERVICE OR MODIFICATION BY ANYONE OTHER THAN REAL TIME DEVICES. EXCEPT AS EXPRESSLY SET FORTH ABOVE, NO OTHER WARRANTIES ARE EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND REAL TIME DEVICES EXPRESSLY DISCLAIMS ALL WARRANTIES NOT STATED HEREIN. ALL IMPLIED WARRANTIES, INCLUDING IMPLIED WARRANTIES FOR MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED TO THE DURATION OF THIS WARRANTY. IN THE EVENT THE PRODUCT IS NOT FREE FROM DEFECTS AS WARRANTED ABOVE, THE PURCHASER'S SOLE REMEDY SHALL BE REPAIR OR REPLACEMENT AS PROVIDED ABOVE. UNDER NO CIRCUMSTANCES WILL REAL TIME DEVICES BE LIABLE TO THE PURCHASER OR ANY USER FOR ANY DAMAGES, INCLUDING ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, EXPENSES, LOST PROFITS, LOST SAVINGS, OR OTHER DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PRODUCT.

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