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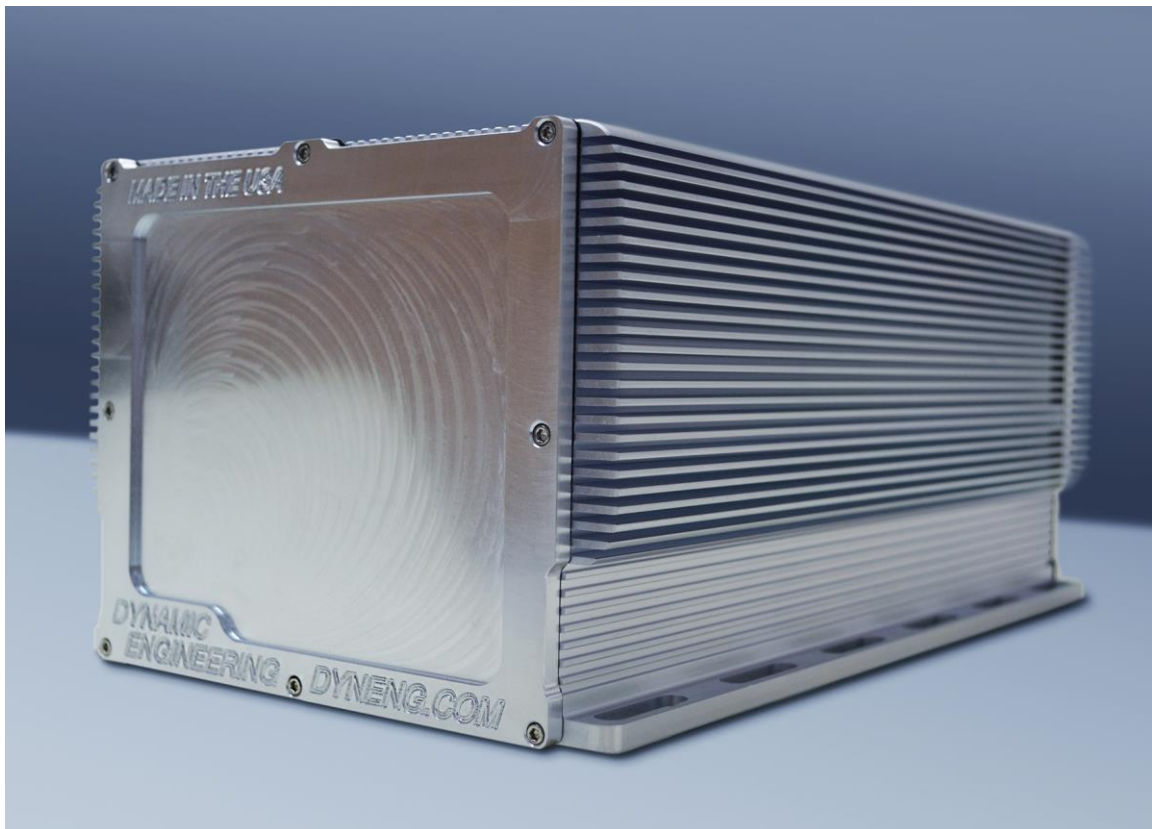
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User Manual

PC104p-Chassis

Use With:

PCIe104, PC104p, PCI-104 & PC/104 Modules



Configurable Length "PC104" Module Chassis

Revision 2p2

PC104p-Chassis
PCle104, PC104p, PCI-104, PC/104
Chassis

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The electronic equipment described herein generates, uses, and can radiate radio frequency energy. Operation of this equipment in a residential area is likely to cause radio interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

Dynamic Engineering's products are not authorized for use as critical components in life support devices or systems without the express written approval of the president of Dynamic Engineering.

Connection of incompatible hardware is likely to cause serious damage.



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Product Description and Usage

PC104p-Chassis is a high quality enclosure designed for rugged environments. The chassis design consists of an outer housing, and an internal card cage. The inner card cage is isolated from the outer housing with shock and vibration absorbent material.

The chassis is extruded. The extrusion is cut and machined to match the end plates. The end plates are .240" THK for rigidity and to allow the gasket to seal. Plenty of strength to prevent warping under stress.

The bottom plate is approximately .250" thick and acts as a mounting flange. The bottom extends beyond the width of the basic chassis to provide mounting points. The mounting points are slots to allow for adjustment, and to accommodate pre-existing mounting situations. PC104p-Chassis can be mounted in any orientation.

The outer housing has three main components: the extruded body of the chassis and the two end plates. The end plates are secured with screws and sealed with a gasket. The extruded housing and end-caps provide a penetration free enclosure.

The Chassis has passed a submersion test in 12 ft of water with no leakage. 12 feet was the limit of the equipment not the chassis.

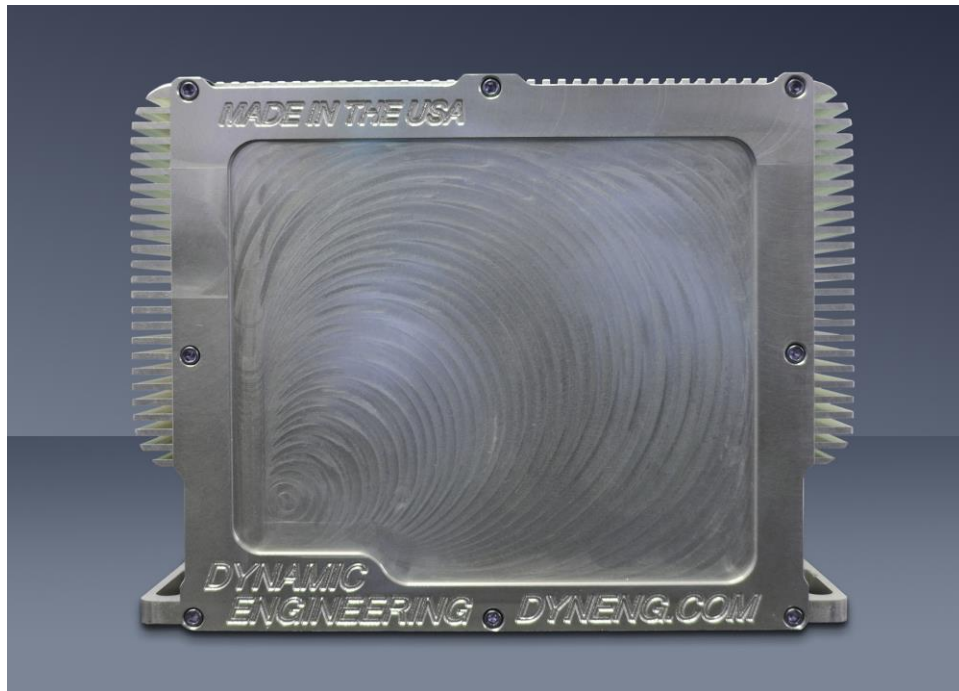


FIGURE 1 EXTERNAL HOUSING

Revision 2 model with clear finish shown with covers installed.



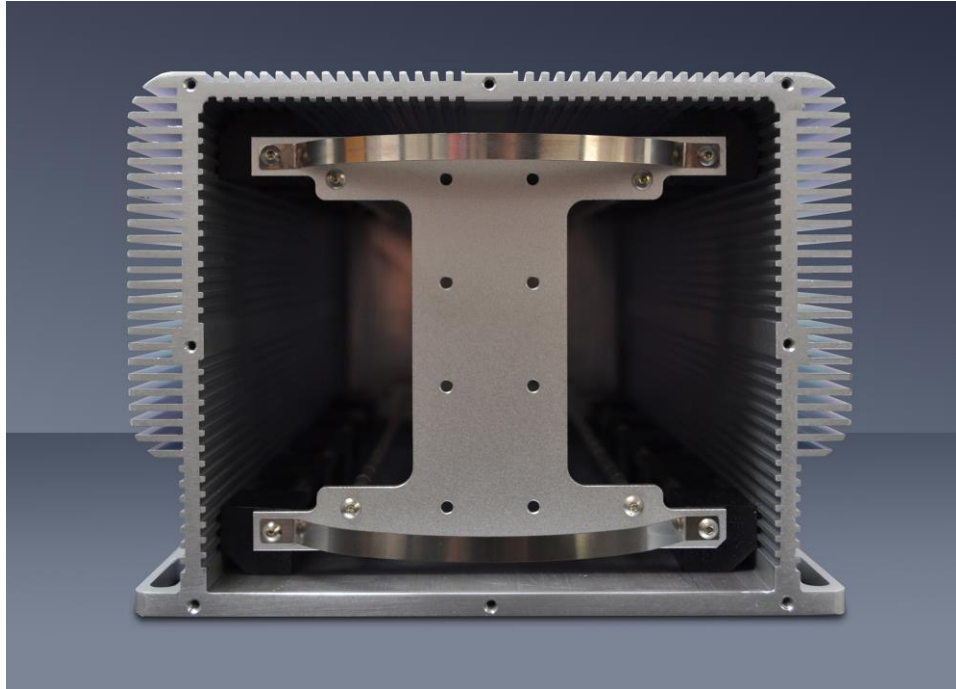


FIGURE 2 VIEW WITH INTERNAL AND EXTERNAL HOUSING

The built-in heat-sink is on the sidewalls and top, both inner and outer surfaces. A larger view is available on the webpage. https://www.dyneng.com/pc104p_chassis.html

The internal card cage has two end plates supported with 4 rods. The rods are cut to fit the chassis max module count. The rods provide rigidity to the card cage and support the vibration damping elements “bumper pads”.

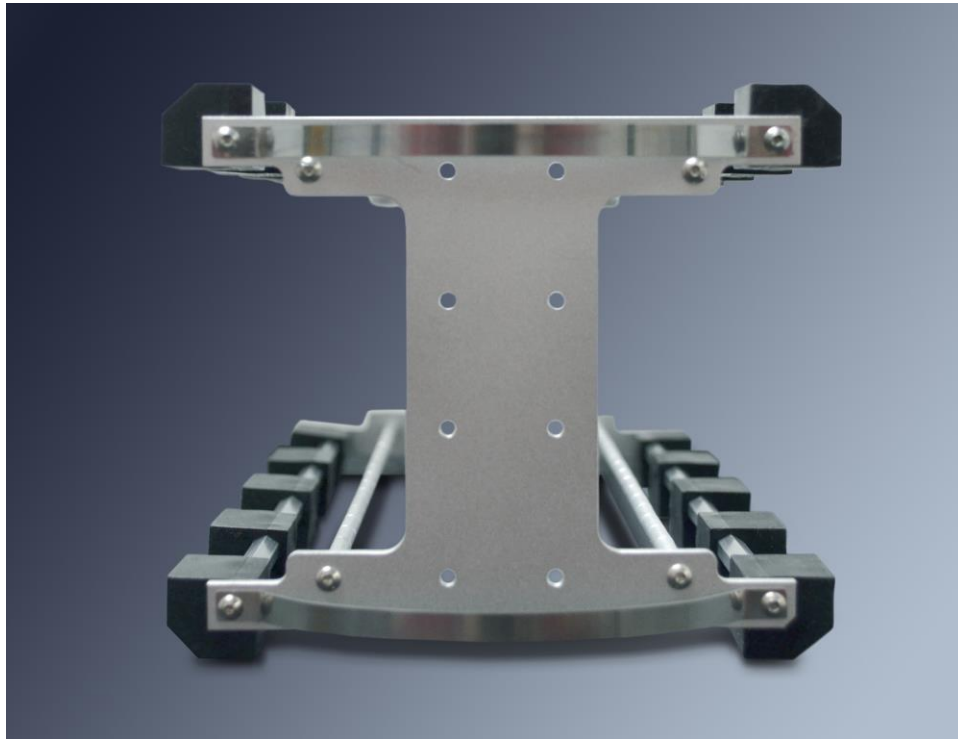


FIGURE 3 INTERNAL CARD CAGE

The modules are mounted to the end plates using standard PC104 family .6” tall stand-off’s. In the case where there are fewer modules than the chassis will accommodate, the stand-offs will take up the space. The stand-offs are secured at both ends of the card cage to the end plates. The photo above has stand-offs installed in place of modules.

PC104 family cards include CPUs and other “high power” consumption card types. PC104p-Chassis is designed to make use of the PC104p spacers to route heat from the modules to the end plates, and to the external chassis. The internal card cage is suspended on the sides with the Bumper Pads, and on the ends with steel springs as shown above. The springs provide shock absorption, and thermal conductance to the external housing’s mass and surface area. In many cases the external housing’s built in heat sink is enough to keep the internal electronics within their operating parameters. Custom heat sink solutions can be provided for more extreme cooling requirements.

The external housing has built in mounting flanges. If the chassis is mounted to a “cold plate” the internal electronics can be cooled with conduction. For example if the chassis

is mounted within a Buoy the ocean will provide an “infinite” ability to absorb heat from the chassis. The electronics can be kept at a constant temperature.



FIGURE 4 VIEW SHOWING INSTALLATION AND MOUNTING FLANGE

An alternate method of cooling is to use a “Fan Board” to circulate air within the chassis. The heat can be transferred to the outside using the built in heatsink or by adding another heat exchanger for a faster rate of cooling.

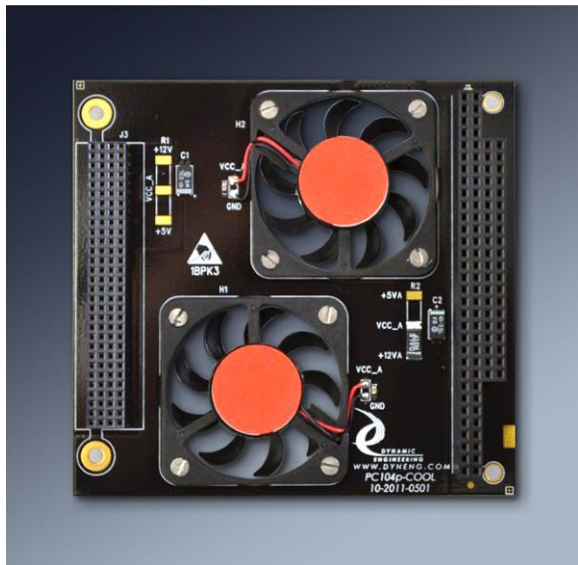


FIGURE 5 PC104P-COOL FAN CARD

PC104p-COOL and PC104p-RPP are available for this purpose. <https://www.dyneng.com/pc104p-COOL.html> and <https://www.dyneng.com/pc104p-RPP.html> respectively. RPP provides reverse power protection and a fan position. COOL provides two fan positions. Both are available with options for fan direction.

The PC104 stack will require power to operate. Any PC104 stack power module can be used within the PC104p-Chassis. Dynamic Engineering currently offers two models. [PC104pPWR12](#) and [PC104pPWR28](#) utilize either 12 or “28” V power to generate the stack voltages of ± 12 , 5, 3.3, and -5 . PC104pPWR12 and PC104pPWR28 tie the ground planes to the stack mounting holes to make use of the chassis cooling mechanism. <https://www.dyneng.com/PC104p-PWR28.html>

PC104p Chassis comes complete with the bumper pads, internal cage, and mounting hardware. The 6 slot and smaller chassis use the corners for the bumper pads. The 7 slot and larger chassis have an added central set(s) of bumper pads to provide proper support.

The external housing is extruded allowing any number of slots to be supported. If you require a “custom” model please ask.



With a CPU, mounting an internal SSD or similar can be a requirement. Sometimes other types of HW are needed that are not PC104 stacking in nature. We have designed a generic shelf to insert within the stack to allow mounting of the SSD or other HW.

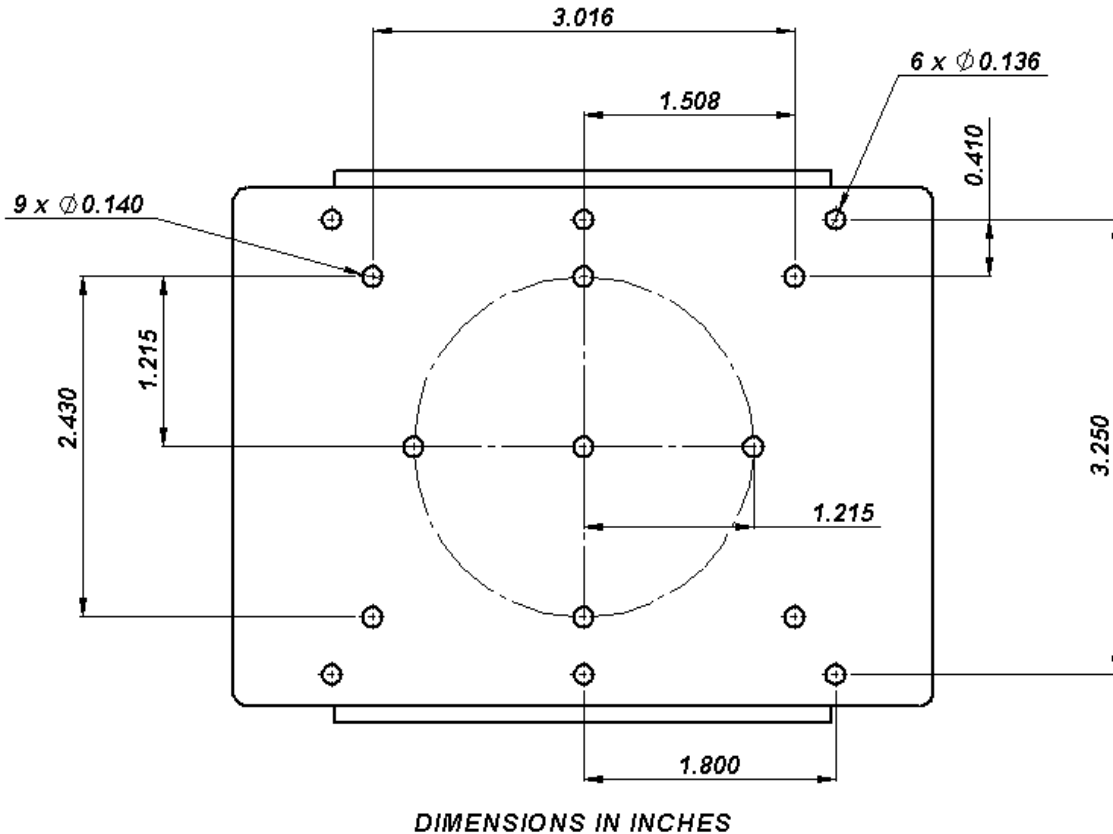


FIGURE 6 MOUNTING PATTERN FOR INTERNAL SHELF

When the shelf is used, a longer chassis is combined with a smaller inner card cage to provide the room. The shelves mount between inner end plates, essentially creating a second stack. The central end plates are doubled up with short spacers to provide rigidity to the mechanical system. The second end plate of the shelf system becomes the new end of stack end plate. The shelf system is designed to take the equivalent space of 5 stack positions. The mounting spacers take 1 more slot position. Use an 11 slot chassis with 5 slot inner card cage plus the shelf system. Up to four shelves can be installed. Three are recommended unless a low profile device is mounted on the top shelf.

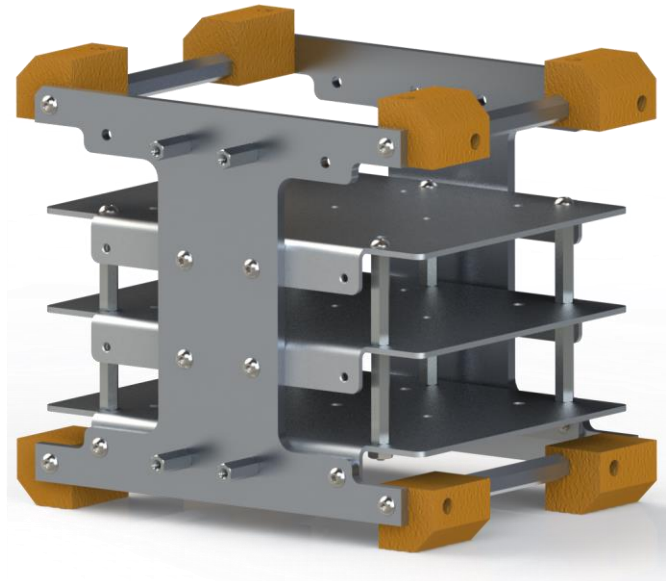


FIGURE 7 INTERNAL SHELF ARRANGEMENT

The figure above shows an arrangement with 3 shelves installed. 1-4 positions can be used. Three are recommended unless a low profile device is mounted on the top shelf. The shelves are very stiff with the bent edge. Captured fasteners are used to mount the shelf to the inner end plates.

Depending on the height of the mounted HW different arrangements can be used without modifying the basic design. The spacers are 1" tall \Leftrightarrow inter-shelf gap is 1". The spacers are inset to allow plenty of room for cable run past the shelves. Alternatively the shelves can be mounted before the card stack so the cable run to the bezel does not traverse the shelving.

The 4 stand-offs shown on the near surface attach to the end plate of the PCB stack. The far side end plate becomes the new completed stack end plate. The first shelf comes with the rest of the expanded inner chassis. The 2nd-4th come with the mounting screws for those shelves. It is recommended to start with the outside positions and work in.

Dynamic Engineering has developed a relationship with a machining company. We can adapt the internal and external end plates to your specifications. Dynamic Engineering can help with your requirements if your company does not have machining capabilities of your own.

Dynamic Engineering can do the design work or work from a STEP/PDF/Etc. you provide. We will assign a part number for each configuration to allow process control and the ability to re-order without starting over.

The chassis design allows for plenty of room in the “connector area” of the PC104 module. As seen in figure 2, the end plates are designed with relief in the channel where the cables will go. The channel plus the distance to the external housing provides approximately .92” x 3.445” on each side of the stack for cable routing.

Materials:

PC104p Chassis is made of high quality materials:

Outer chassis extrusion: Aluminum 6061

Outer chassis plates: Aluminum 6061

Hardware: Stainless

Inner chassis supports: Aluminum 6061 1/4 hex

inner chassis end plates: Aluminum 6061

Bumper pads: 60 Durometer Red or Black Silicone Rubber



Lengths:

Slots	Internal Chassis	External Chassis
2	2.19	3.89
3	2.86	4.56
4	3.53	5.23
5	4.2	5.9
6	4.86	6.56
7	5.53	7.23
8	6.20	7.90
9	6.87	8.57
10	7.54	9.24
11	8.20	9.90
12	8.87	10.57
13	9.54	11.24
14	10.21	11.91
15	10.88	12.58

The sizes shown are in inches and refer to the distance to the outside edges of the internal and external end plates. The Internal Chassis length is the distance between the internal end plates [end plates included]. The External Chassis is the distance between the External End Plates and corresponds to the length of the entire chassis.

Measurements rounded to 2 digits. Expect some small deviance from the lengths shown based on the extrusion cut and compression of the gasket being slightly less precise.

The external end plate is .240" thick overall and .050" less in the center area where it is recessed.

Dynamic Engineering keeps some of the more common lengths in stock and builds all others to order. Extrusions are kept in stock to reduce the lead time to the machining and plating operations.

Some clients have used "miss-matched" lengths to their advantage. Usually with a longer external chassis and shorter internal chassis (than standard). This creates a cavity which can be used for deep connectors, additional room for wiring, custom heat sinks or attachments.

PC104p-Chasis is implemented in SolidWorks. For client specific configurations Dynamic Engineering can capture the changes and provide a model for verification before proceeding with the manufacturing. Contact Dynamic Engineering for customization. Engineering@dyneng.com.



Mounting:

The mounting flange has slots to provide the user with mounting options. The slots are set to be 1/4" from the ends plus one at the center for the 3-8 module sizes. For the 9 module chassis and larger there are 5 equally spaced slots.

The slots are approximately 1.25" x .280". Please contact us if you need a specific hole pattern on the mounting flange. The slots are approximately .280" wide.

The hole centers are 6.55" apart when measured across the cross-section of the chassis. The mounting tabs are .5" wide on each side. The outer dimension at the tab is 7.050".

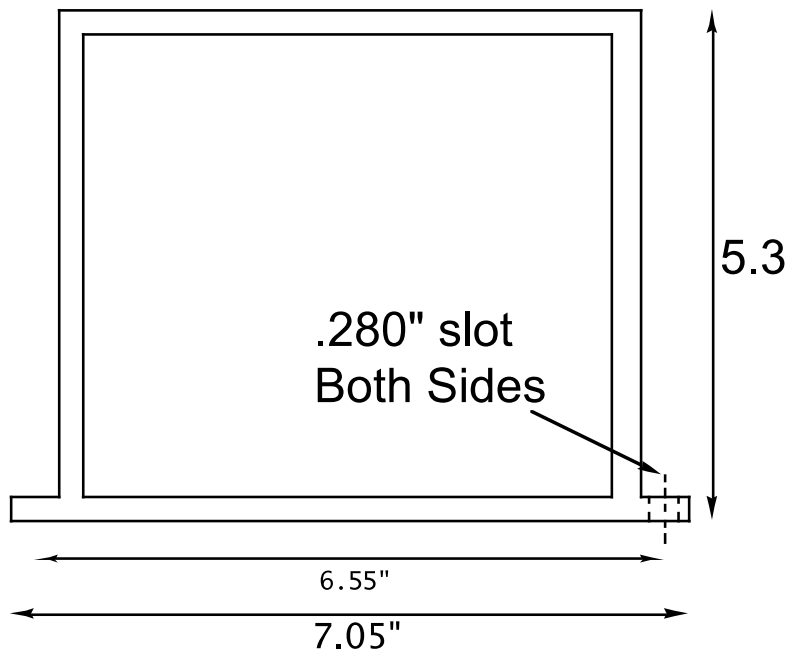


FIGURE 8 END VIEW DIMENSIONS

Finishes:

The default finish is raw “naked” metal. Several finishes are offered. Please add the following suffixes to your part number.

<u>-ORDER</u>	<u>Definition</u>
-ANT1CND	Anodized Type I Chromic Non-Dyed (grey)
-ANT1C	Anodized Type I Chromic Dyed
-ANT2SND	Anodized Type II Sulfuric Non-Dyed
-ANT2S	Anodized Type II Sulfuric Dyed
-ANT3ND	Anodized Type III Hard Coat Non-Dyed
-ANT3	Anodized Type III Hard Coat Dyed
Add BLK(black), BLU(blue), BRN(brown), M(magenta), R(red), GRN(green), Y(yellow), O(orange) to dyed versions to pick your color e.g. “-ANT1CBLU” for a blue color.	
-CF1ACL	Chemical Film Class 1A Clear (Hexavalent)
-CF1AAU	Chemical Film Class 1A Gold (Hexavalent)
-CF3HCL	Chemical Film Class 3 Clear (Hexavalent)
-CF3TCL	Chemical Film Class 3 Clear (Trivalent)
-NCD003	Nickel Cadmium Diffused .0002-.0004 Ni, .0001-.0003 Cad, Color Gold
-CPT1D	Cadmium Plate Type I Dull (no chromate)
-CPT1B	Cadmium Plate Type I Bright (no chromate)
-CPT2CL	Cadmium Plate Type II Clear (chromate)
-CPT2AU	Cadmium Plate Type II Gold (chromate)
-CPT2OD	Cadmium Plate Type II Olive Drab (chromate)
-NPC1A..E	Nickel Plate Class 1 Grade (Pick A,B,C,D,E)
-ENC1..4	Electroless Nickel Class (Pick 1,2,3,4)
-ZPT1	Zinc Plate Type I (no chromate)
-ZPT2AU	Zinc Plate Type II Gold Color (chromate)
-ZPT2OD	Zinc Plate Type II Olive Drab Color (chromate)
-ZPT3CB	Zinc Plate Type III Clear Blue (colorless chromate)
-ZPT3/5	Zinc Plate Type III or V (colorless Trivalent Chromate)
-ZNT1	Zinc Nickel Type I (chromate as plated)
-ZNT2	Zinc Nickel Type II (Chromate) Gold color



Applications Guide

Interfacing

Some general interfacing guidelines are presented below. Do not hesitate to contact the factory if you need more assistance.

ESD

Proper ESD handling procedures must be followed when handling the modules to be used within the PC104p Chassis. The Chassis is metal and “does not care” about ESD etc. When installing the cards the installer must be properly grounded and the hardware should be on an anti-static work-station.

Watch the system grounds. All electrically connected equipment should have a fail-safe common ground that is large enough to handle all current loads without affecting noise immunity. Power supplies and power consuming loads should all have their own ground wires back to a common point.

Construction and Reliability

The PC104p-Chassis is made of Black Anodized Aluminum, with stainless steel hardware. The chassis is designed to be rugged.

Thermal Considerations

Suitable for conduction and convection cooled environments. Please consider a Fan board for high dissipation situations. The chassis end plates can be slotted or fit with a Fan and EMI filter to allow direct convection cooling – the chassis will not be sealed in this configuration. The heat-sink can be utilized to be a heat exchanger from the sealed internal volume to the external environment. The mounting plate can be used for conduction cooling if that is available. In addition Dynamic Engineering can design custom heat sinks for your requirements.

STEP file

Models are available to our clients with an NDA in place. Please contact Dynamic Engineering – sales@dyneng.com when you need to access the models.



Warranty and Repair

Please refer to the warranty page on our website for the current warranty offered and options.

<https://www.dyneng.com/warranty.html>

Service Policy

Before returning a product for repair, verify as well as possible that the suspected unit is at fault. Then call the Customer Service Department for a RETURN MATERIAL AUTHORIZATION (RMA) number. Carefully package the unit, in the original shipping carton if this is available, and ship prepaid and insured with the RMA number clearly written on the outside of the package. Include a return address and the telephone number of a technical contact. For out-of-warranty repairs, a purchase order for repair charges must accompany the return. Dynamic Engineering will not be responsible for damages due to improper packaging of returned items. For service on Dynamic Engineering Products not purchased directly from Dynamic Engineering contact your reseller. Products returned to Dynamic Engineering for repair by other than the original customer will be treated as out-of-warranty.

Out of Warranty Repairs

Out of warranty repairs will be billed on a material and labor basis. Customer approval will be obtained before repairing any item if the repair charges will exceed one half of the quantity one list price for that unit. Return transportation and insurance will be billed as part of the repair and is in addition to the minimum charge.

For Service Contact:

Customer Service Department
Dynamic Engineering
150 DuBois St. Suite B&C
Santa Cruz, CA 95060
831-457-8891
support@dyneng.com



Order Information

PC104p-Chassis

https://www.dyneng.com/pc104p_chassis.html

1-11(N) slots rugged sealed chassis for PC104, PC104p, PCI-104, PCIe104 applications with conduction and convection cooling design features. Longer versions can be ordered as a custom build. The extrusion comes in 24" lengths. Customize with your choice of finish. Default is raw metal. Choose Black Anodized, Surtec etc.

PC104p-SH(-COM)-N

The –COMplete indicates the shelving system is included. Bumbers, end plates, rods etc. [Without the –COM only the shelf and mounting screws are included] –N indicates the number 1-N. 1-4 can be installed per shelving system. Multiple can be installed per chassis.

PC104p-COOL

Available in PCI-104, PC104, PC104p configurations with 2 fan positions allowing for single slot operation. Fans can be oriented to provide cooling up, down or mixed. For more information:

<https://www.dyneng.com/PC104p-COOL.html>

PC104p-RPP

Reverse Power Protection plus a fan position. Connect your reference power VA,VB and RPP provides V+ and V- to the power supply. FETs are used to provide a low impedance path. More efficient than bridge models. Wide power range. Please see <https://www.dyneng.com/PC104p-RPP.html> for more information.

PC104pPWR

Available in 12V and 14-34V input voltage ranges and provide the power rails for your system. 5, 3.3, 12, -12, -5. Optional fan connection headers, self healing fuses, well filtered clean power.

https://www.dyneng.com/pc104p_pwr28.html or
https://www.dyneng.com/pc104p_pwr12.html

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