SINGULARITYCOMPUTERS

PHANTOM
ITX/DTX CASE

Assembly Manual

Revision 1.0

Table of Contents

Introduction

Phantom turns the Singularity Computers PowerBoard into the case itself. The goal was to create the most minimalistic case using PCB only. Phantom does not aim to be the smallest Mini-ITX case, but to achieve maximum component density with unrestricted airflow. Phantom disappears amongst the components mounted to it, it is completely about component selection and will show off the skill of the builder. It fits ITX and DTX motherboards, 3+ slot graphics cards, ATX power supplies and 3x 2.5" drives or 2x 2.5" and a 3.5" drive. Water-cooling is possible with the included universal radiator mount which fits 120mm, 140mm, 240mm, 280mm, 360mm, 420mm, 480mm and 560mm radiators. There is no limitation on radiator thickness and push pull fans also fit. All components are mounted directly onto the PowerBoard which acts as a rack as well as a power distribution plate. It has the MB 24pin and EPS power integrated along with Power and Reset buttons. There are integrated direct connect SATA power connections to avoid the use of SATA power cables. The built-in handle makes lifting the whole system easy to transport by hand. There is no rear access needed to the case for cable management, all cables can be connected from the front. Black sleeved cables are included with the case and custom colored sleeved linking cables can be purchased separately.

Features

- **PowerBoard Integration**
  The Phantom PowerBoard is a PCB integrating 24pin, EPS, SATA, Power, and Reset Buttons. Essentially, the PowerBoard is a distribution plate for cables while integrating other features and functions as well. It is a new method for cables allowing standardization of cable lengths and making traditional cable management no longer necessary. Phantom comes included with a standard set of black sleeved linking cables including 24pin x1 and 8pin EPS x1 meaning that these cables don't have to be purchased separately.

- **Reduced build time due to integration**
  Cables do not need to be purchased separately and no cable management is needed for the core component cables.

- **High End Components**
  It is designed to fit the largest high-end GPUs. It can fit the largest PSUs although it is recommended to pick a short and light PSU to make transporting the system easier, same applies to the GPU. For the water-cooling system it can fit a single 240mm radiator with unlimited thickness and pull/pull fans.

- **Radiator Adjustment**
  The additional 240 Radiator Mount is adjustable to help with port alignment and to turn the radiator into a support leg.

- **Storage**
  Phantom PowerBoard has 3x SATA Drive positions. 2X 2.5" are at the mid-section of the back side of the PCB and 1x 2.5"/3.5" is at the top-section above them.

Phantom ITX/DTX Case Specifications

Case Components	PowerBoard parts: x10 total. Stainless steel fasteners and stand offs.
Electronics Integration	Core Component Cables: 24pin x1, 8pin EPS x1, Power and Reset Buttons. 2.5"/ 3.5" SATA 3.0 6Gb/s Direct Mount x1 2.5" SATA 3.0 6Gb/s Direct Mount x2
Cables	PowerBoard Linking Cables and PowerBoard PSU Cables available here. Custom Cables available here.
Motherboard Form Factor	Mini-ITX & DTX.
Expansion Slots	x3.
Case Form Factor	SFF.
Package Dimensions	395mm(L) x 430mm(W) x 40mm(H) Case is flat packed and requires assembly.
Package Weight	2 kg.
Case Dimensions	135mm(L) x 190mm(W) x 360mm(H)
Case Weight	1.5 kg.
Storage	3x 2.5" / 2x 2.5" + 1x 3.5".
Radiators	120mm, 140mm, 240mm, 280mm, 360mm, 420mm, 480mm, 560mm. 140mm wide radiators are limited to 145mm width so Hardwarelabs radiators will not fit. No limitation on radiator thickness and push pull fans can be used.
Max. GPU Length &Height	Unlimited.
Max. GPU Thickness	75mm.
Max. CPU Cooler Height	Unlimited.
Max. PSU Length	Unlimited (short PSUs are preferable for the aesthetics so that they don't protrude too far.
Front Panel I/O	Power and Reset buttons.
Vertical GPU Mount	n/a
Materials	PCB with stainless steel fasteners and stand offs.
Manufacturing Process	PCB.
Assembly	Flat packed and needs to be assembled by the customer.
Accessories	M3 Hex Keys x1.

Parts List

| Quantity		Item	Note
3		#6-32 NUT	
41	#	#6-32 0.25" SCR	SCR = SCRew
15	F	#6-32 10mm SO-F	SO-F = StandOff Female
20	M	#6-32 10mm SO-M	SO-M = StandOff Male
2	X	#6-32 25mm SO-M	SO-M = StandOff Male
6	X	#6-32 30mm SO-M	SO-M = StandOff Male
12	@	M3 4mm SCR	SCR = SCRew
1		M3 / #6-32 Hex-key	
1		Phantom PowerBoard	
1		Universal Radiator Mount	
1		Phantom Reinforcement "1"	
1		Phantom Reinforcement "2"	
1		Phantom Cover Top	
1		Phantom Cover Mid	
1		Phantom PCIe Bracket	
3		Phantom PCIe Reinforcement	
1		8pin EPS 10cm Linking Cable	
1		24pin MB 10cm Linking Cable	
1		"POWER SW" Wire	
1		"RESET SW" Wire	
1		Right-angled mains extension cable	

Prior to assembly, familiarise ourselves with all the pieces that we will need to build the SC Phantom ITX/DTX Case and make sure we have all the parts needed, including computer components. Building a Phantom system is an orderly process and missing steps or hardware could result in having to undo multiple steps. All mounting holes are marked on the Phantom PowerBoard pieces and there are legends on the main board that show which mark calls for which assembly hardware. Using these markings, a Phantom can be built without an assembly manual but prior experience is still needed.

Assembly Manual

Step 1: Mounting the Drives

Required Parts			
• x4	#	#6-32 0.25" SCR
• x12	@	M3 4mm SCR

Mount the storage devices to the main PowerBoard before doing any other assembly as access to these drives will be restricted by other parts. Use *M3 4mm SCR* fasteners to mount 2.5" drives (SSD or HDD) to mounting holes marked with "@" symbol. The symbol is always on the insertion side. Use *#6-32 0.25" SCR* fasteners for mounting holes marked with "#" symbol to mount 3.5" drives (HDD). The drives will need to be slotted into the SATA receptacle and held in place until at least one screw secures them in place. Do not tighten the screws until all 4 per drive are inserted.
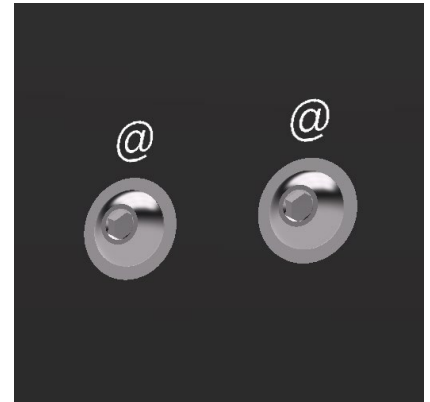
Step 2: Preparing the Main PowerBoard

Required Parts						
• x11	#	#6-32 0.25" SCR	• x4	M	#6-32 10mm SO-M
• x15	F	#6-32 10mm SO-F			

Part A: Grab x15 *#6-32 10mm SO-F* female standoffs and x11 of *#6-32 0.25" SCR* fasteners and while holding the main PowerBoard up, secure them from their corresponding sides. The *#6-32 10mm SO-F* female standoff goes to the mounting hole with an "F" mark on the back side and the *#6-32 0.25" SCR* fastener goes on the opposing, front side with "#" symbol. They will need to be finger-tight.


Part B: The remaining x4 of the *#6-32 10mm SO-F* female standoffs will have a *#6-32 10mm SO-M* male standoff on the opposing side instead of fasteners, these form the 4 mounting points for the ITX/DTX motherboard at the mounting holes marked with "M" on the front side of the main PowerBoard.

Step 3: Installing the Power Supply

Required Parts	•	x4	M	#6-32 10mm SO-M
	•	x1		Right-angled mains extension cable

Grab the ATX power supply and 4x of the *#6-32 10mm SO-M* male standoffs and secure the power supply onto the main PowerBoard at the mounting holes marked with "M" on the lower back side. These will need to be tightened reasonably well as the Phantom PowerBoard gains its structural integrity mostly from these mounts. Use force that is stronger than finger-tight, but less than wrist-tight. If the Universal Radiator Mount is used, then plug in the included right-angled mains extension cable to the power supply now as the Universal Radiator Mount will block access to it later. *Some power supplies have paint build-up inside the threads that make driving in the standoffs difficult. This can be cleaned by using the mounting screws included with the power supply and a screwdriver. Drive all 4 mounting screws in and then out to remove the paint.*
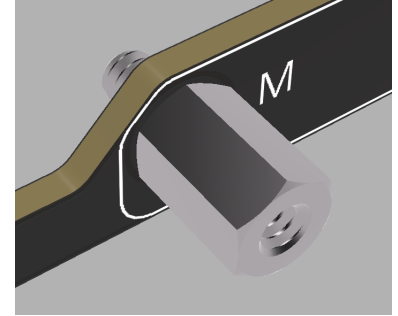
Step 4: PCIe Mounting Bracket

Required Parts	•	x2	X	#6-32 25mm SO-M
	•	x4	X	#6-32 30mm SO-M

The installation of a PCIe mounting bracket is optional but needed for dedicated graphics cards. For systems with only integrated graphics, this step can be skipped, go to **Step #5**.

Remove the x2 *#6-32 0.25" SCR* fasteners from the mounting holes marked "X / #" and replace them with x2 *#6-32 30mm SO-M* male standoffs, then put a PCIe reinforcement PCB on top and secure it with another x2 *#6-32 30mm SO-M* male standoffs. Repeat this one more time and then put another PCIE reinforcement PCB on top but this time secure it with 2x *#6-32 25mm SO-M* male standoffs. Put the PCIe mounting bracket on top and using the x2 *#6-32 0.25" SCR* fasteners that we removed previously, secure it at the mounting holes marked with "#" symbol on the PCIE mounting bracket.
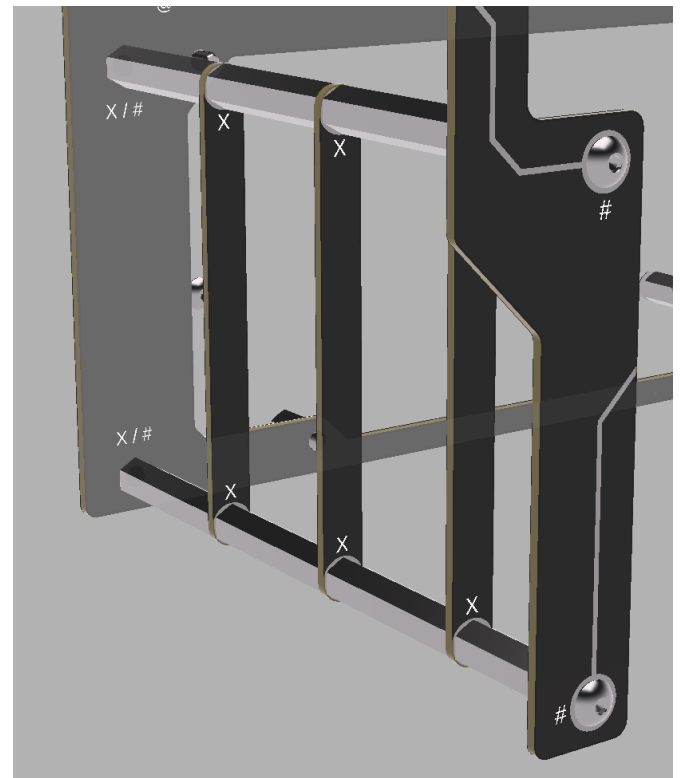
Step 5: PCB Reinforcements and Covers

| Required Parts	•	x19	#	#6-32 0.25" SCR

Grab the PCB cover pieces and mount them to their designated locations. The areas are marked with a white outline on the back side of the main PowerBoard that match the shape of the cover pieces and secure them with a total of x19 #6-32 0.25" SCR fasteners. These cover pieces also increase the structural integrity of the case so the fasteners and standoffs will need to be reasonably tight.
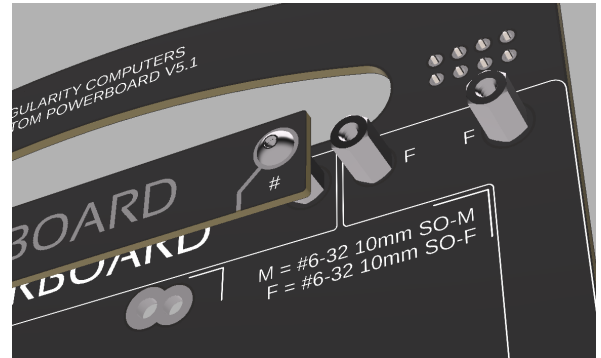
Step 6: Universal Radiator Mount

Required Parts	•	x12	M	#6-32 10mm SO-M
	•	x12	#	#6-32 0.25" SCR*

Part A: The installation of this part is optional for the case but needed for attaching radiators. *For the Universal Radiator Mount any 120mm or 140mm class radiator can be mounted (120mm, 140mm, 240mm, 280mm, 360mm, 420mm, etc.) with width up to 145mm and there is no vertical limitation for radiator length.* Plug in the included right-angled mains extension cable to the back of the power supply now as the Universal Radiator Mount will block access to this connector. Depending on the orientation of the socket a PCB cover piece might need to be removed temporarily to route the cable under it. Remove the 6x *#6-32 0.25" SCR* fasteners from the mounting holes marked with "M / #" on the PCB cover pieces and replace them with 6x *#6-32 10mm SO-M* male standoffs, if only 2.5" drives are mounted. If there is a 3.5" drive mounted onto the main PowerBoard, since its thickness we need to install another set of 6x *#6-32 10mm SO-M* male standoffs on top of the existing ones to create a gap between the 3.5" drive and the Universal Radiator Mount.
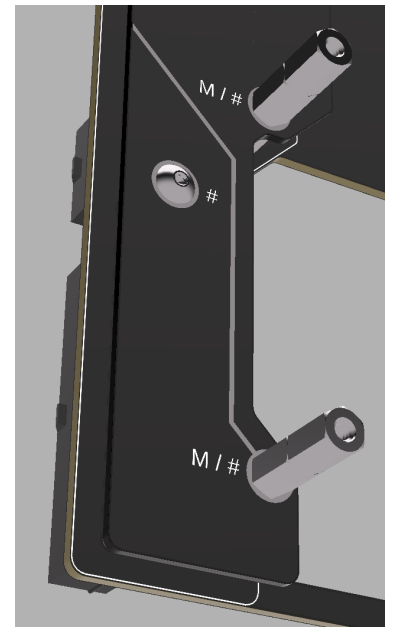
Part B: Install the radiator onto the Universal Radiator Mount, securing it with 8x *#6-32 0.25" SCR** fasteners from opposite the side of the silver circuit lines so the radiator assembly is facing outward.

**Some radiators use M3 or M4 threaded holes, in such case use the mounting hardware supplied with the radiator. The height of the radiator assembly can be adjusted vertically on the Universal Radiator Mount.*

Part C: Now secure the assembly to the case securing it with 6x *#6-32 0.25" SCR* fasteners to the mounting holes marked with "#" symbol on the Universal Radiator Mount.

Step 7: Installing the Motherboard

Required Parts	•	x4	#	#6-32 0.25" SCR

Install the ITX/DTX motherboard onto the *#6-32 10mm SO-M* standoffs on the front side of the main PowerBoard and secure it with x4 *#6-32 0.25" SCR* fasteners. The motherboard blocks access to the mounting hardware for the 2.5" and 3.5" drives, so they have to be installed prior to the motherboard and to remove them the motherboard also has to be removed first.

Step 8: Cable Installation

Required Parts	• x1 8pin EPS 10cm Linking Cable • x1 24pin MB 10cm Linking Cable	• x1 "POWER SW" Wire • x1 "RESET SW" Wire

Install the included linking cables to the motherboard and to the PowerBoard. Orientation does not matter. Fold the SATA cables that are included with the motherboard, to length then secure them into a bundle with a cable tie and plug them into the motherboard's SATA and the PowerBoard's SATA connections. *SATA-1* is connected to *DRIVE-1*, *SATA-2* to *DRIVE-2* and *SATA-3* to *DRIVE-3*. Plug in the included "POWER SW" and "RESET SW" wires to the motherboard front panel header and to the PowerBoard's "RST-PWR" header to enable the POWER and RESET button functionality. These wires can be easily tucked away under the motherboard.

Step 9: Graphics Card Installation

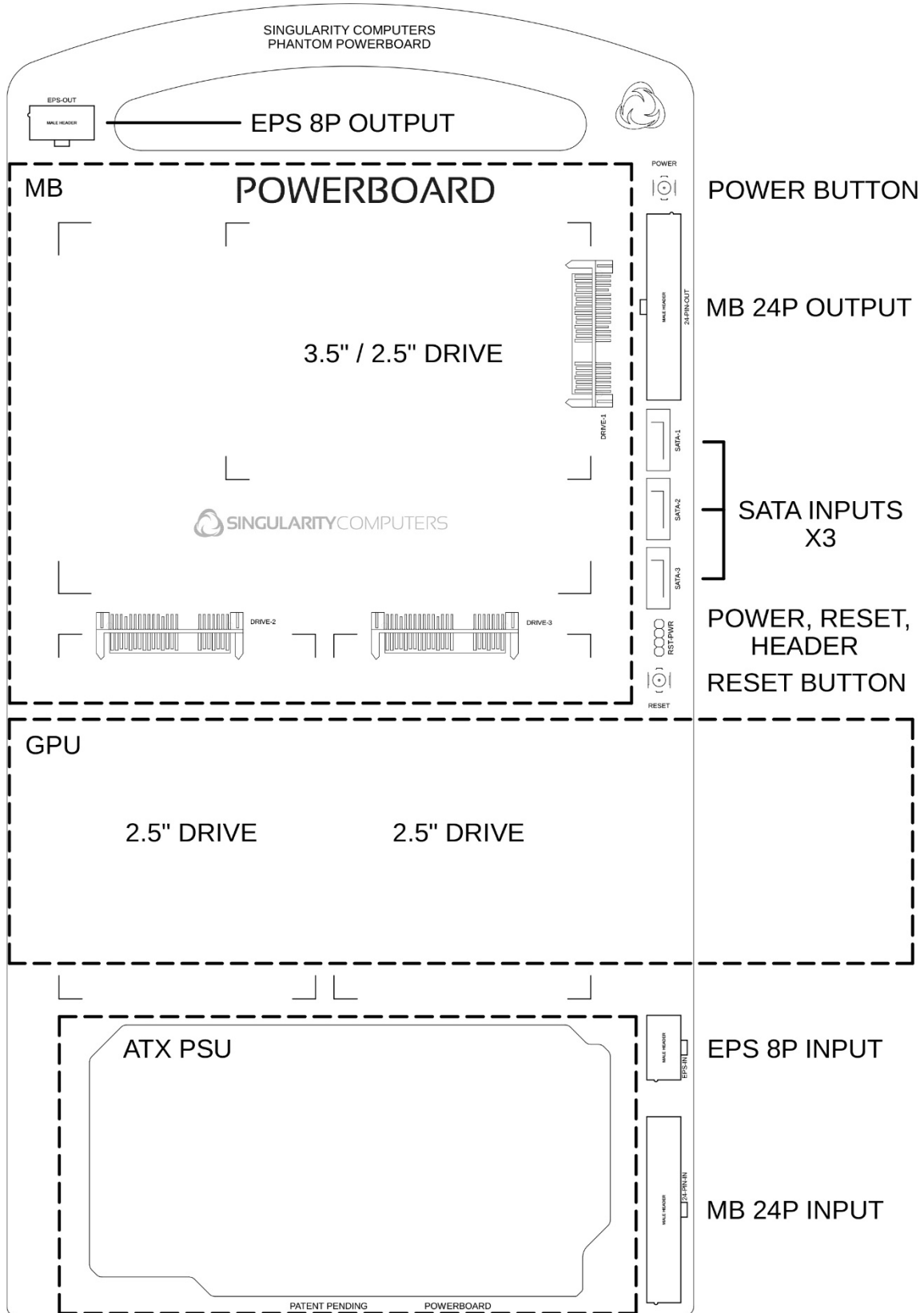| Required Parts	• x3 • x3	# 	#6-32 0.25" SCR #6-32 NUT

Installing a graphics card is optional but **Step #4** is required as the PCIe bracket holds the card. Undo the latch on the motherboard's PCIe slot then plug in the card, Secure the card to the bracket with up to 3x *#6-32 0.25" SCR* fasteners from the front and up to 3x *#6-32 nuts* from the back side, depending on the width of the graphics card.
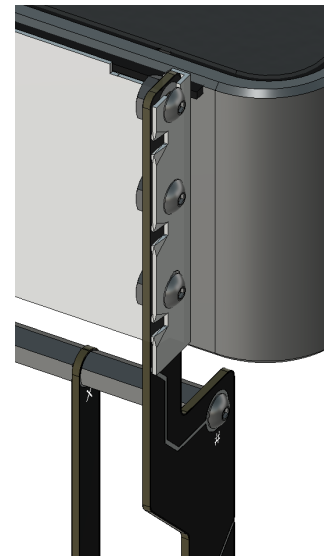
Step 10: Power Cables

Fold the power supply's 8pin EPS and 24pin cables to length, secure them with cable ties and then plug them into the appropriate input header on the main PowerBoard. If using a dedicated graphics card then plug in the PCIe power cables to the power supply and the graphics card. *Singularity Computers can provide custom length sleeved cables for most power supplies.*

Phantom PowerBoard

SINGULARITY COMPUTERS
PHANTOM POWERBOARD

EPS-OUT
MALE HEADER

EPS 8P OUTPUT

MB

POWERBOARD

POWER

POWER BUTTON

3.5" / 2.5" DRIVE

MALE HEADER 24-PIN-OUT

MB 24P OUTPUT

DRIVE-1

SINGULARITYCOMPUTERS

SATA-1

SATA-2

SATA INPUTS
X3

SATA-3

DRIVE-2

DRIVE-3

RST-PWR

POWER, RESET,
HEADER

RESET

RESET BUTTON

GPU

2.5" DRIVE   2.5" DRIVE

ATX PSU

MALE HEADER EPS-IN

EPS 8P INPUT

MALE HEADER 24-PIN-IN

MB 24P INPUT

PATENT PENDING   POWERBOARD

⚠ *All PowerBoards need PowerBoard Linking Cables.*