



iGp12 assembly procedure

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1 Introductory notes

iGp12 chassis assembly steps are split into two groups: preparatory and final, described in Sections 2 and 3 respectively.

Preparatory steps in the Section 2 include cable building, heatsink installation, front-panel assembly, motherboard assembly. These steps do not have dependencies and can be performed in any order or in parallel.

Final assembly, described in Section 3, must follow the exact order of the steps. Here assembly becomes chassis-specific, with the iGp12 PCB mated to a particular chassis.

2 Preparatory steps

Steps in this section do not have dependencies and can be performed in any order. However, the first two items (2.1 and 2.2) involve the use of adhesives and require 24 hours of curing time. It is advisable to perform these steps as early in the procedure, as possible.

2.1 Temperature sensor assembly, sensor and heatsink installation

2.1.1 Temperature sensor assembly

There are two temperature sensor assemblies per iGp12 chassis. The only difference between the two assemblies is the cable length and wire color. One sensor uses a 6" black/white cable and the other — 11" green/white cable.

1. Orient the 2N3904TA transistor with the flat section down and the pins towards you.
2. Using flat nose pliers straighten the leftmost pin and bring it close to the middle pin, as shown in Fig. 1.
3. Cut an 11" piece of 105912 cable (or a 6" piece of 173164 for the second sensor).
4. Strip one cable end to 0.125".
5. Place 3/4" piece of 1/16" red heat shrink tubing on the green (or black) wire and a piece of blue heat shrink — on the white wire.

6. Solder white wire to the single (rightmost) pin of 2N3904TA.
7. Solder green (or black) wire to the middle and left pins, see Fig. 2.
8. Slide the tubing over the pins and shrink.
9. Strip the opposite ends of the wires to the length specified by the crimping tool (0.1–0.125").
10. Use the Molex hand crimp tool (63811-8200, profile B) to crimp the wires in the terminal pins (08-55-0102).
11. Insert the pins into the connector body (Molex 22-01-3027), see Figure 3.

2.1.2 Installation of temperature sensors and heatsinks

1. Using isopropyl alcohol clean top surfaces of U4, U9, U25, U44 on the iGp12 PCB, as well as the 0.5" square heatsink (ICK PLCC 28) and the flats of the temperature sensors.
2. Mount 374724B00032G heatsink using pre-installed thermal tape on U44. Refer to Fig. 4 to determine proper orientation of the heatsink.
3. Following the instructions for Wakefield 156-K heatsink adhesive, mount 0.5" square heatsink (ICK PLCC 28) on U25.
4. Following the instructions for Wakefield 156-K heatsink adhesive, mount temperature sensor with the shorter (black/white) cable on U9. Make sure sensor pins are oriented as shown in Fig. 4.
5. Following the instructions for Wakefield 156-K heatsink adhesive, mount temperature sensor with the longer (green/white) cable on U4. Make sure sensor pins are oriented as shown in Fig. 4.
6. After at least 4 hours for adhesive curing, connect sensor mounted on U4 (longer green/white cable) to CONN2, and the sensor on U9 — to CONN5.

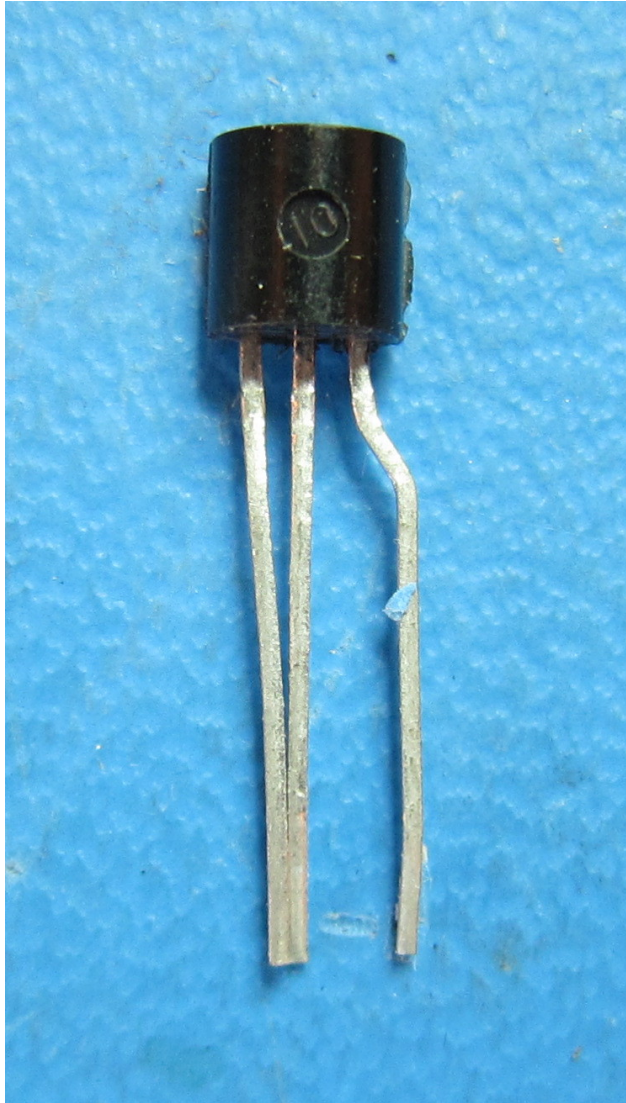


Figure 1: Transistor pins formed and ready for soldering.

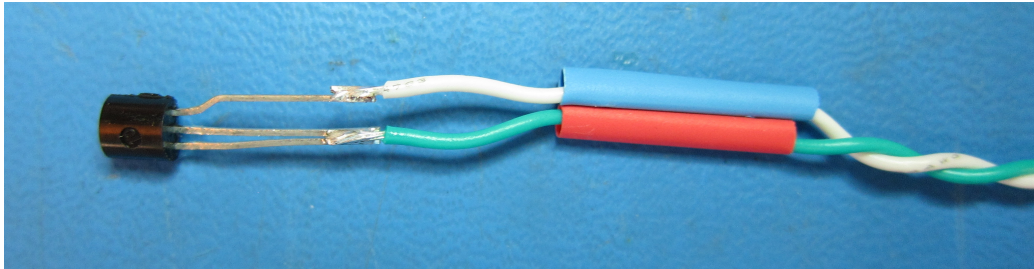


Figure 2: Temperature sensor after cable soldering.

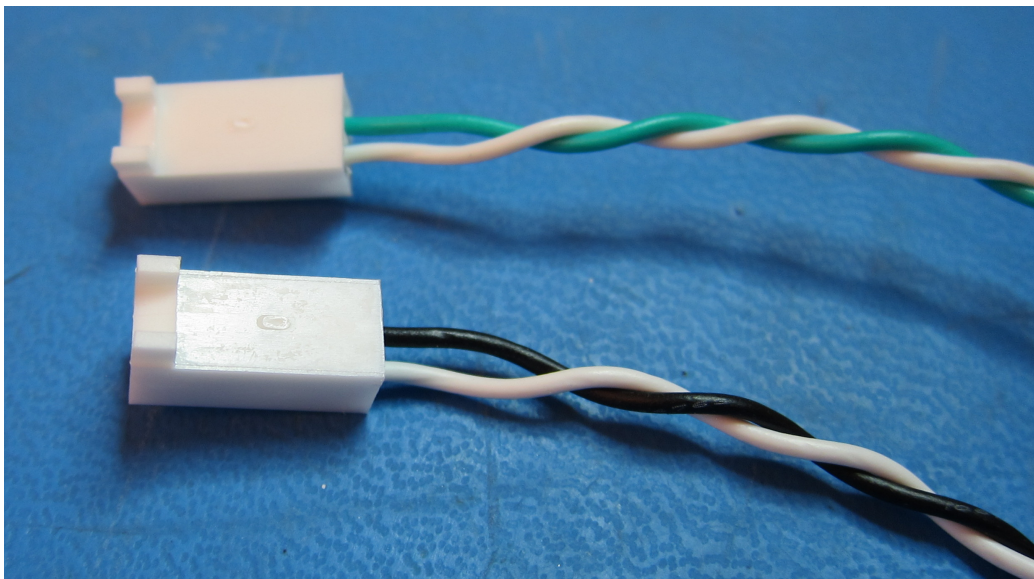


Figure 3: Temperature sensor connectors.

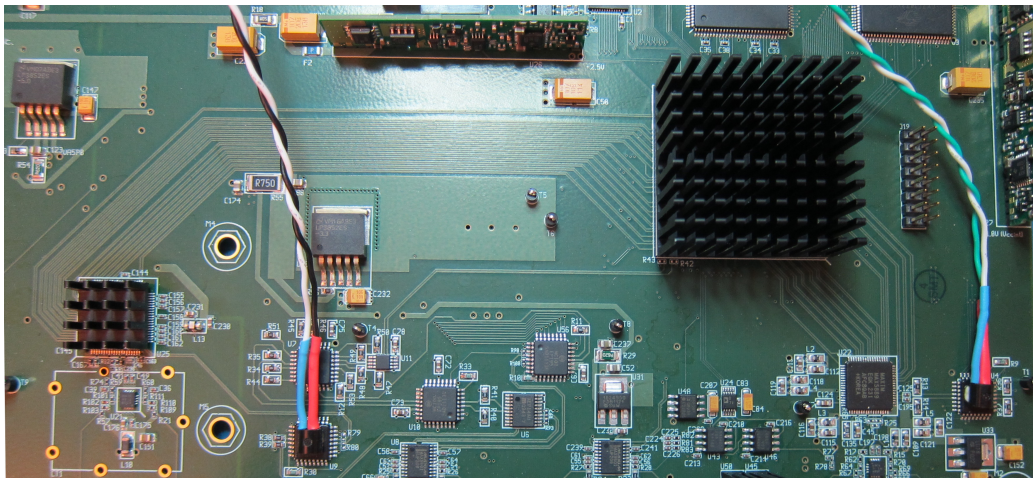


Figure 4: iGp12 PCB with heatsinks and temperature sensors installed.

2.2 Power switch installation

1. Install AT625G LED
 - (a) Stand the switch (KB15SKW01) on the work bench with plastic guard at the bottom.
 - (b) Position the switch with the + mark facing left, see Fig. 5.
 - (c) Hold the LED with the flat side facing towards you, and insert it as shown in Figure 5.
2. Install the switch cap (AT4133JB)
3. Install the switch in the front panel
 - (a) Remove the plastic guard from the bottom of the switch.
 - (b) Remove the round nut from the switch.
 - (c) Insert the switch into the protective cover (AT494).
 - (d) Close the protective cover and place it facing down on the workbench with switch terminals pointing up, see Fig. 6.
 - (e) Use a tooth pick to apply a thin layer of silicone adhesive (Devcon 12045) to the flat area of the protective cover as shown in Figure 6.
 - (f) Align the notch in the switch body with the key in the front panel and insert the switch into the front panel.
 - (g) Install the 0.5" lockwasher and the round nut (previously removed from the switch) with the flat side of the nut facing the front panel.
 - (h) As the nut is tightened, adjust the switch position to ensure that the sides of the switch and the protective cover are parallel to the edges of the front panel.
 - (i) Let the silicone adhesive cure for 24hrs
 - (j) After the silicone adhesive cures, remove excessive silicon adhesive between the front panel and the protective cover. *DO NOT* use metal tools to remove silicon adhesive.
4. Power switch cable assembly.
 - (a) Cut 18' inches of 24 gauge white/black twisted cable (173164).

- (b) Cut 18 inches of 24 gauge white/red twisted cable (173148).
- (c) Cut 14 inches of 1/8" expandable sleeving (4108F).
- (d) Thread both 18 inch cables through the sleeving.
- (e) Untwist 2 inches of each pair of wires.
- (f) Thread each wire through the plastic guard as shown in Figures 7 and 8.
- (g) Solder the 173164's black wire to pin 2 white wire to pin 1. Solder the 173148's red wire to L+ and white wire to L-. Switch pin labeling is shown in Fig. 9.
- (h) Slide plastic guard over the terminals. Completed switch assembly is illustrated in Figure 10.
- (i) Cut two 1" pieces of 1/4" black heat shrink tubing and slide them over the expandable sleeving.
- (j) Crimp connector pins (102128-1) to each wire using AMP Pro-Crimper II hand tool (or another appropriate crimper).
- (k) Adjust the sleeving to leave 0.5" of cable exposed on the connector end, with roughly 3.25 inches exposed near the switch.
- (l) Position the two heat shrink pieces at the ends of the expandable sleeving so that 1/4" covers the wire, and 3/4" — the sleeving.
- (m) Shrink the heat shrink tubing.
- (n) Insert the pins and keying plug (87077-2) into the housing (87456-5). Refer to Figure 11 for appropriate pin and keying plug positions in the housing.

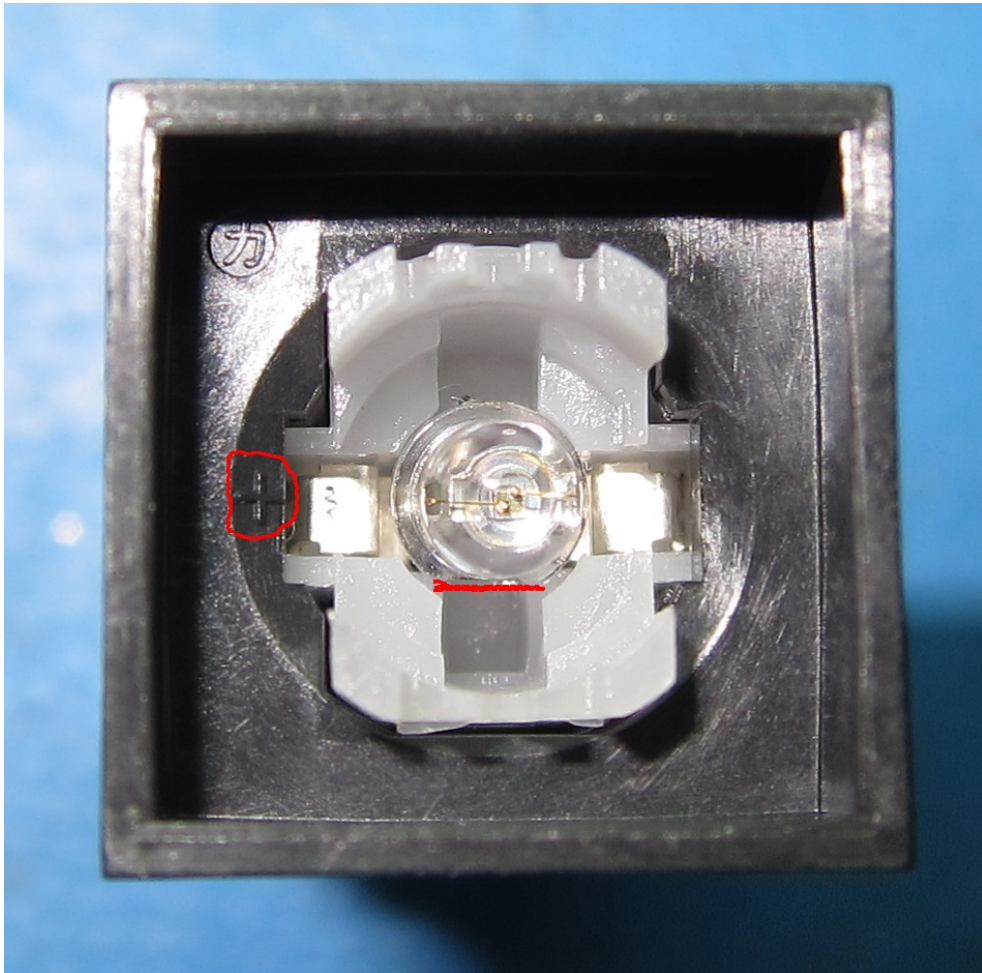


Figure 5: LED installed in the switch. Note the + marking on the switch and the orientation of the flat edge of the LED.

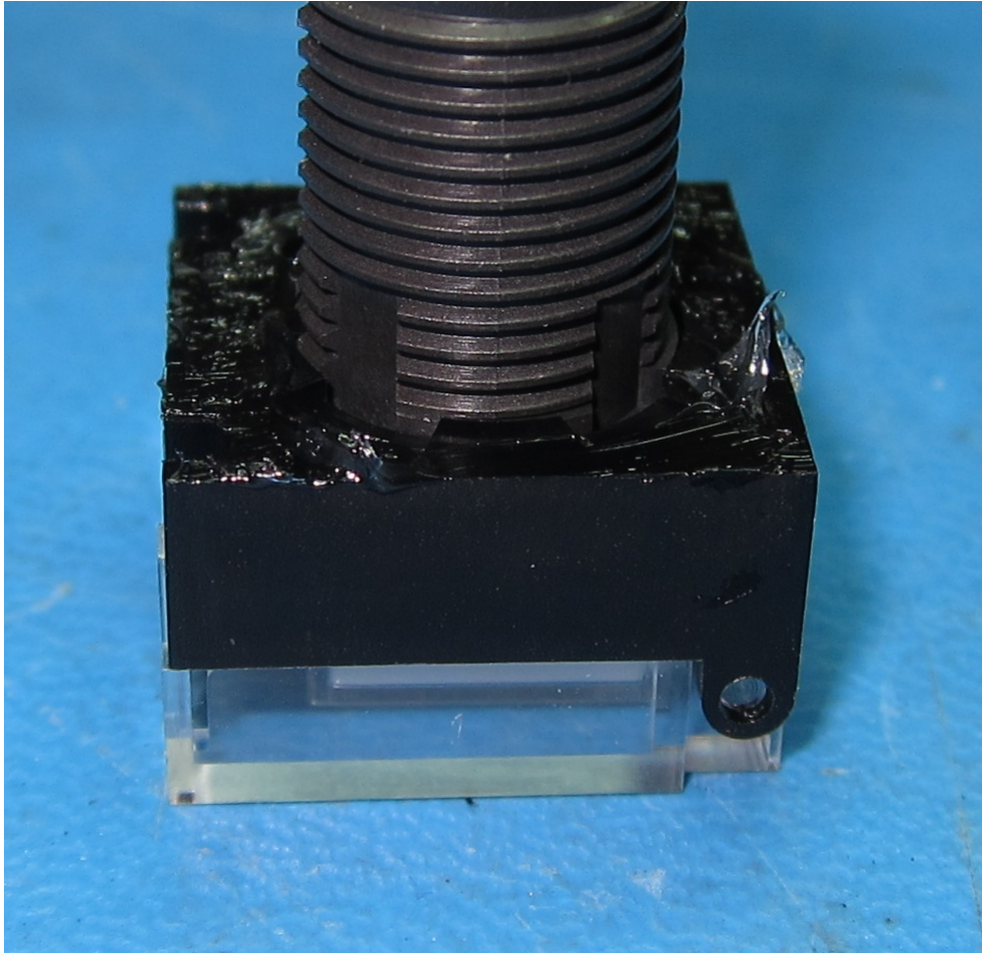


Figure 6: Applying the thin layer of silicone adhesive.

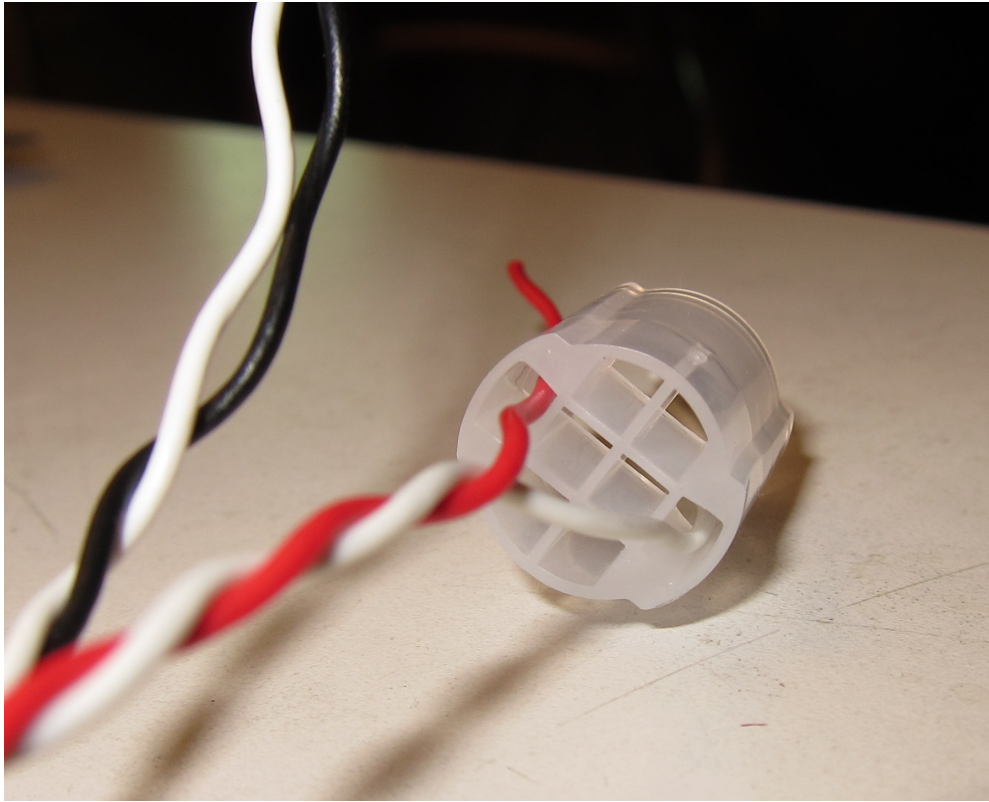


Figure 7: Threading the red/white wires through the switch plastic guard.

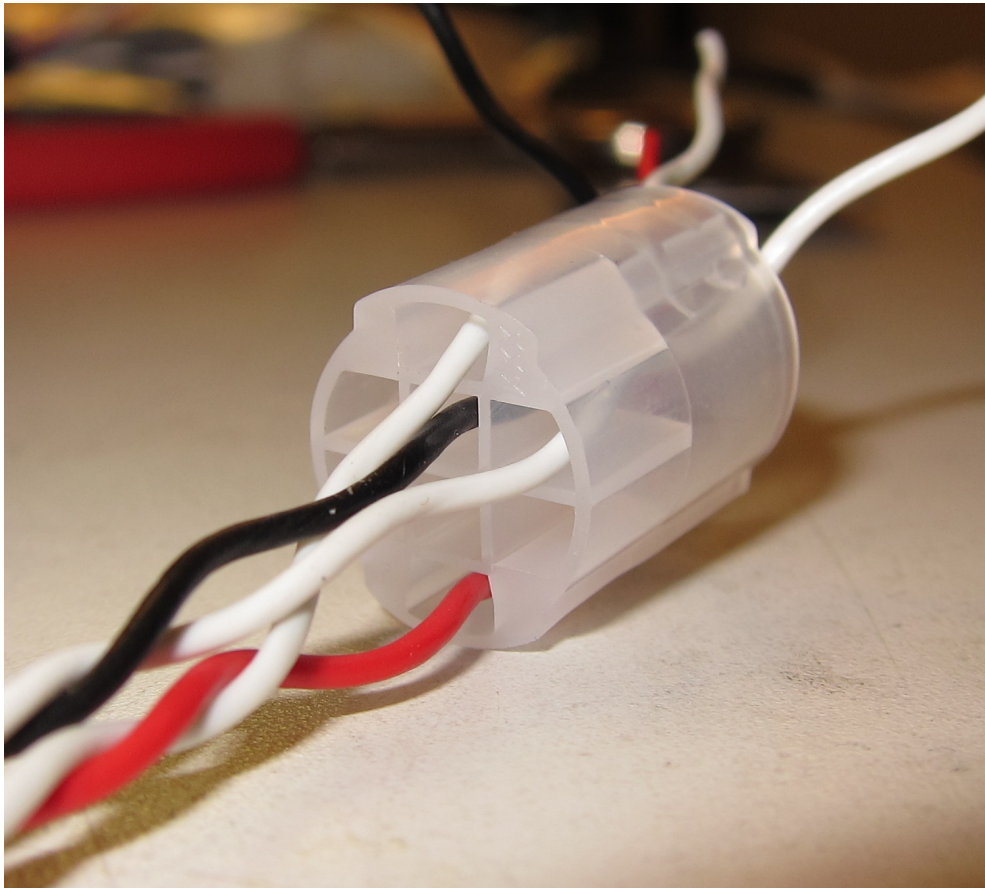


Figure 8: Threading the black/white wires through the switch plastic guard.

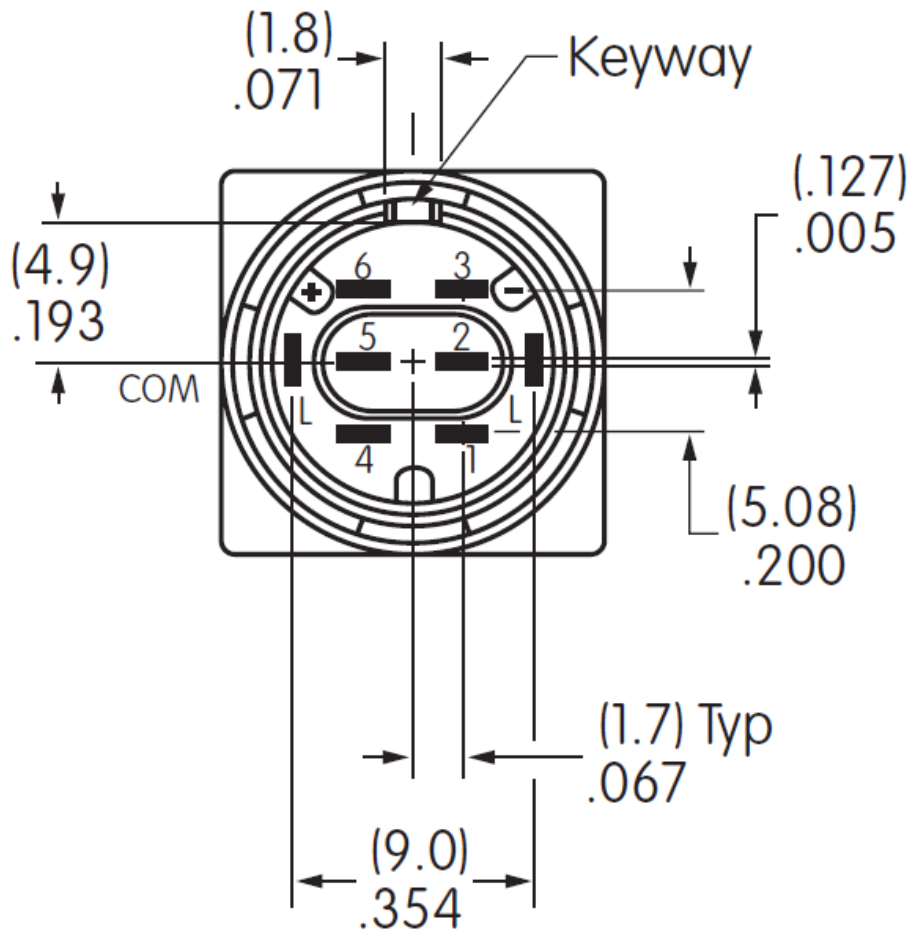


Figure 9: Pinout of KB15SKW01 switch.

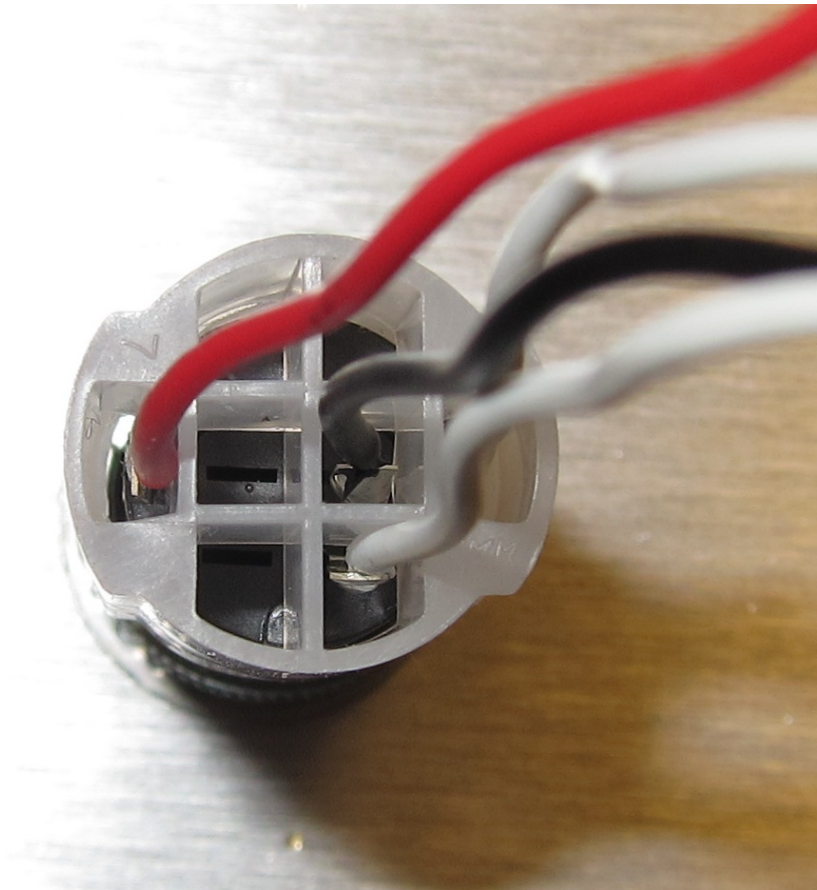


Figure 10: The red/white and black/white wires soldered to the switch.

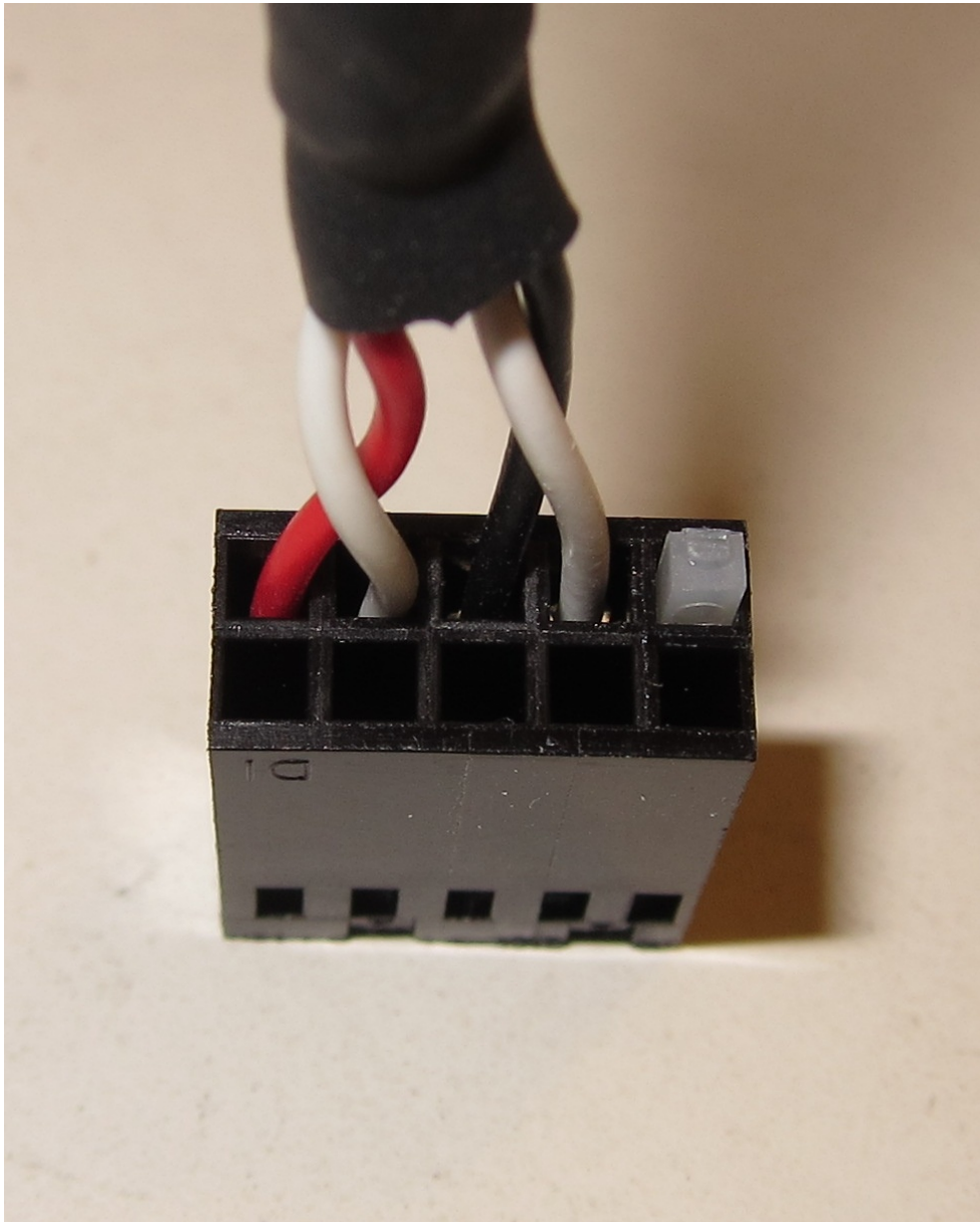


Figure 11: Pin and keying plug configuration at the 5x2 motherboard connector.

2.3 Installation of the front panel handles

1. The handle (H-9168-B) comes with a pair of screws. NOTE: These screws will NOT be used for installing the handles. Save them for return to Dintel.
2. Apply Devcon 245 threadlocker to the threads of the flat head undercut screws (91099A205).
3. Install the handle using the flat head screws.
4. Torque the screws to 8 in-lbs.
5. Wipe off excess threadlocker.

2.4 Installation of chassis feet

Install SJ5023BLKC rubber feet in the four bottom corners of the chassis.

2.5 Power supply installation

Install the power supply using 5 90402A144 screws, torque the screws to 4 in-lbs.

2.6 Solid state drive installation

1. Place the drive on the drive plate and secure with screws (92000A118) and washers (92148A150) NOTE: The drive plate is not symmetric, the drive should be placed so the connector side is flush with the drive plate
2. Torque each screw to 4 in-lbs.
3. Install the drive plate in the chassis using four screws (90402A144).
4. Torque each screw (90402A144) to 4 in-lbs.

2.7 USB cable fabrication

1. Cut off 19 inches of CBL-USB2-2828-100 cable.
2. Strip about 1 inch of the outer jacket at one end.
3. Remove the shield and foil from the exposed section of the cable.
4. Strip 4 wires to 1.3–1.8 mm.
5. Using Molex 63819-0100 crimping tool, crimp the 50394-8100 connector pins to all four wires.
6. Insert the pins into the 51110-1051 connector housing. Refer to schematic (Fig. 12) and photo (Fig. 13).
7. Crimp five 50394-8100 pins without wires and insert them into the 51110-1051 connector as shown in Fig. 13. Make sure the pins are fully seated in the connector.
8. Cut half an inch of 3/16" heat shrink tubing and place it over the end of USB jacket next the connector, then shrink.
9. Remove 5/8" of the outer jacket at the opposite end of the cable.
10. Separate the shield and the foil from the wires and cut it down to 1/4".
11. Fold the shield and the foil over the jacket, see Figure 14.
12. Thread the cable through the USB hood (1001-027-BL-02000).
13. Strip all four wires to 2 mm.
14. Solder the wires to the USB connector block (1002-029-02300) as shown in Figure 15.
15. Insert the connector block into the lower shell, then attach the top shell.
16. Crimp the cable retainer of the connector over the shield and the foil of the USB cable, see Figure 16.
17. Slide the USB hood over the connector body.

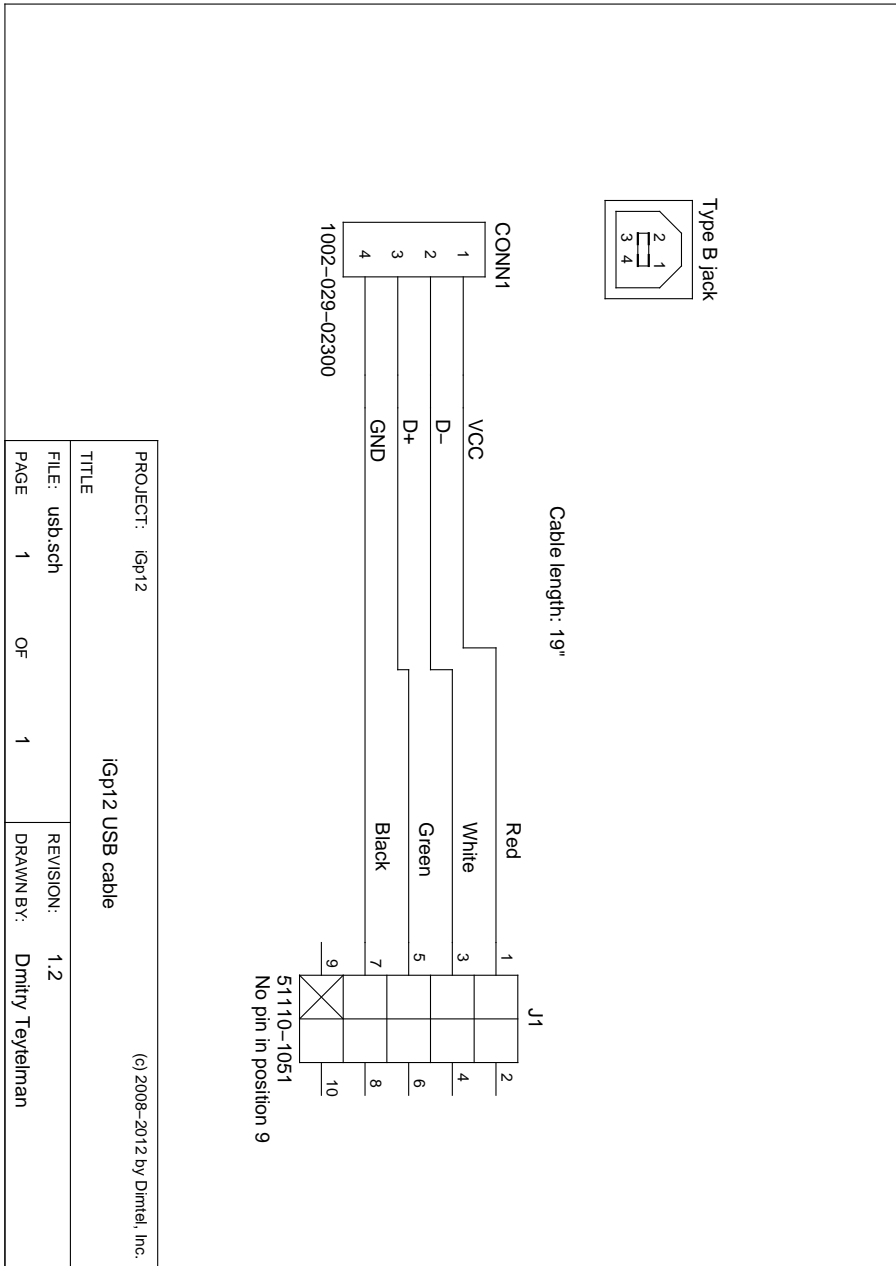


Figure 12: USB cable schematic.

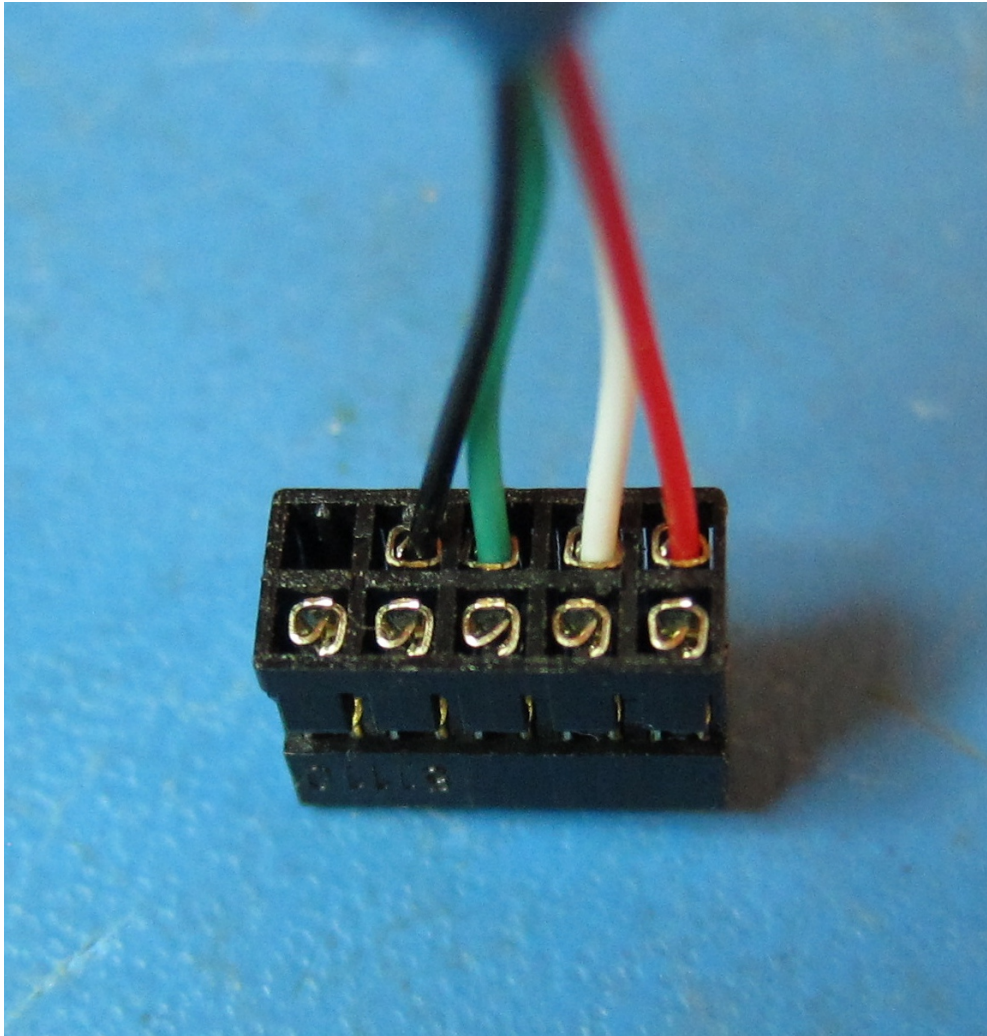


Figure 13: 2 mm connector fully assembled.

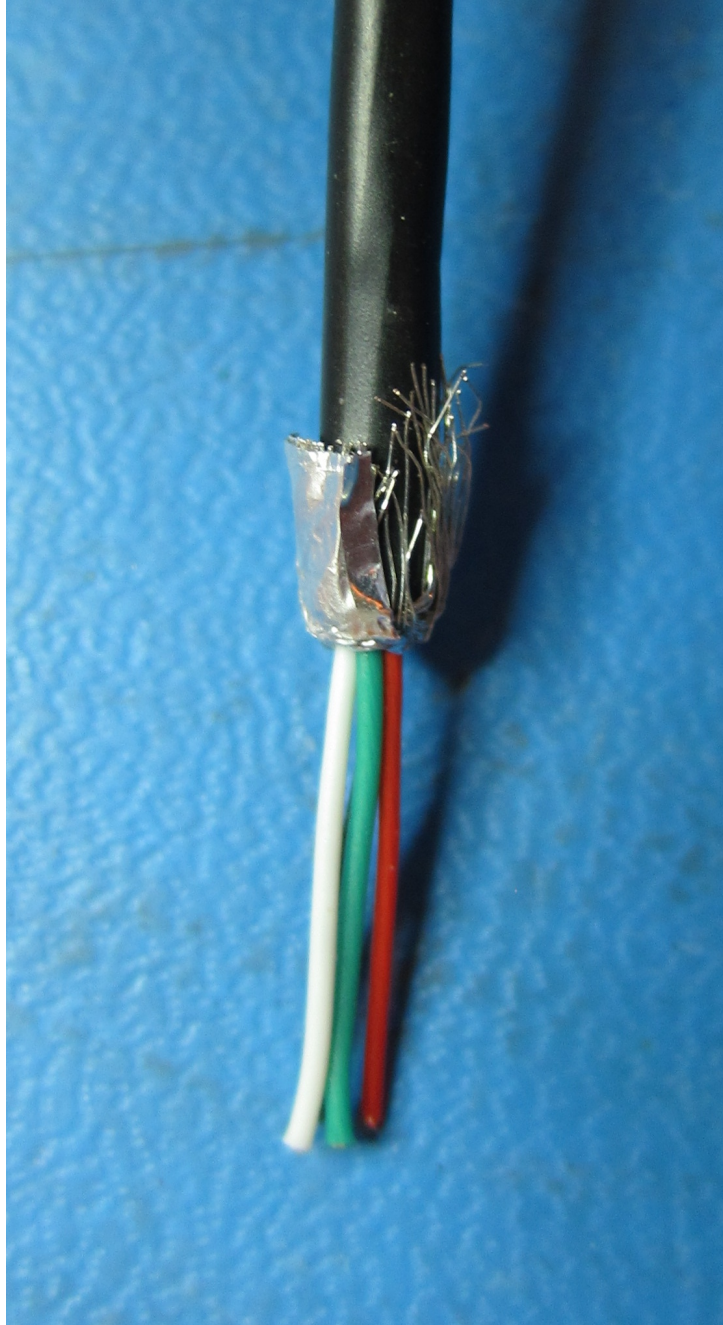


Figure 14: The shield and the foil folded back over the cable jacket.

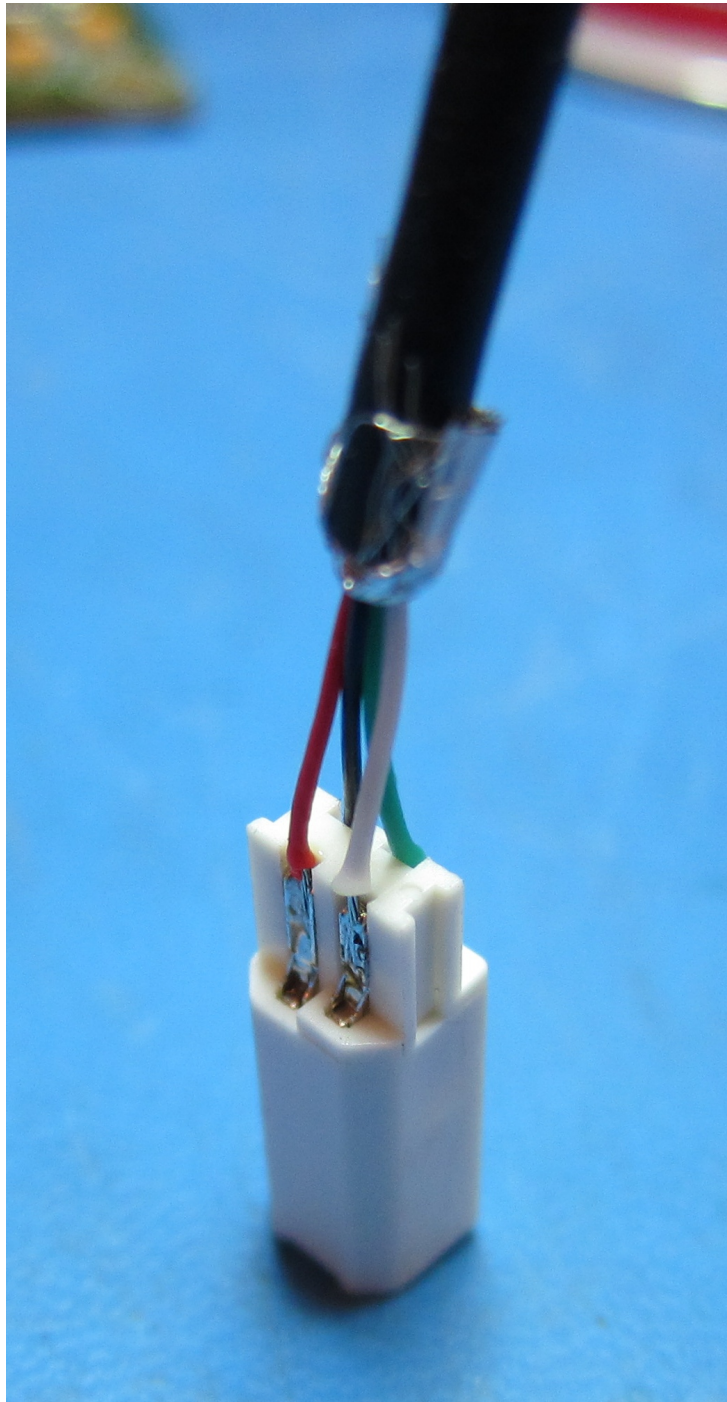


Figure 15: Cable wires soldered to the USB connector block.

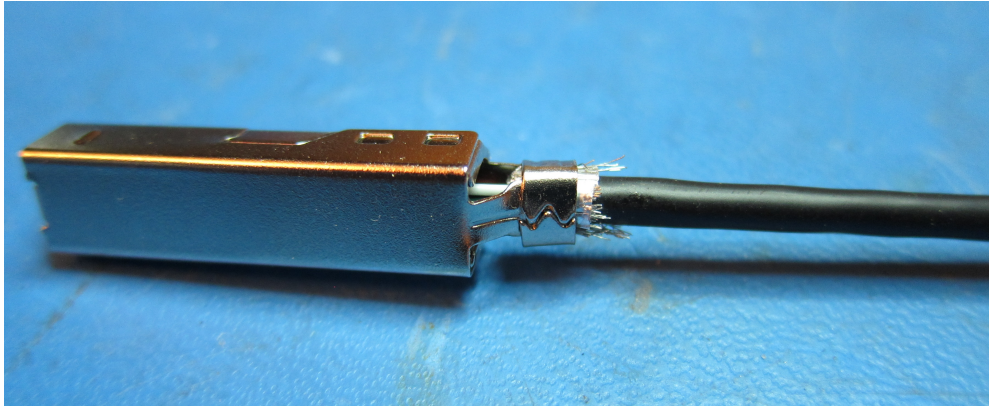


Figure 16: Crimp the cable retainer over the shield and the foil.



Figure 17: GPIO cable and connector (PCB side).

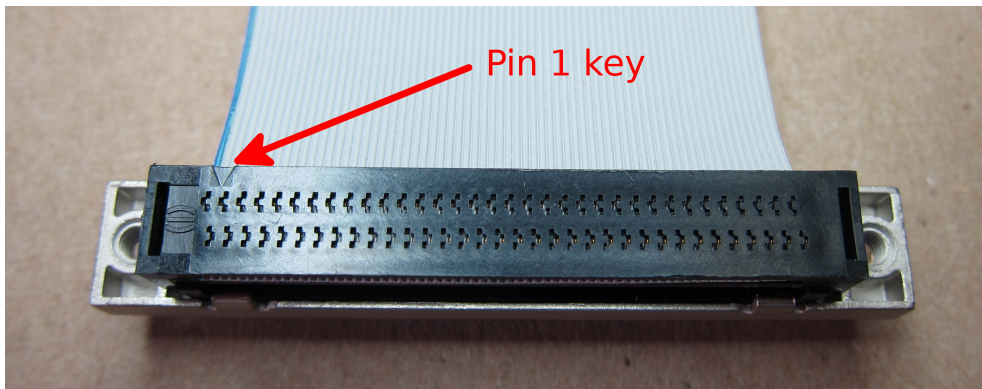


Figure 18: GPIO cable and connector (chassis side).

2.8 GPIO cable fabrication

1. Cut a 12.5" piece of 3754/68 ribbon cable.
2. Assemble Harting 60 06 068 5440 connector as shown in Fig. 17, paying attention to the relative orientation of pin 1 key on the connector and pin 1 stripe on the cable.
3. Assemble Harting 60 04 068 5344, making sure to match pin 1 key to the pin 1 stripe on the cable as shown in Fig. 18.

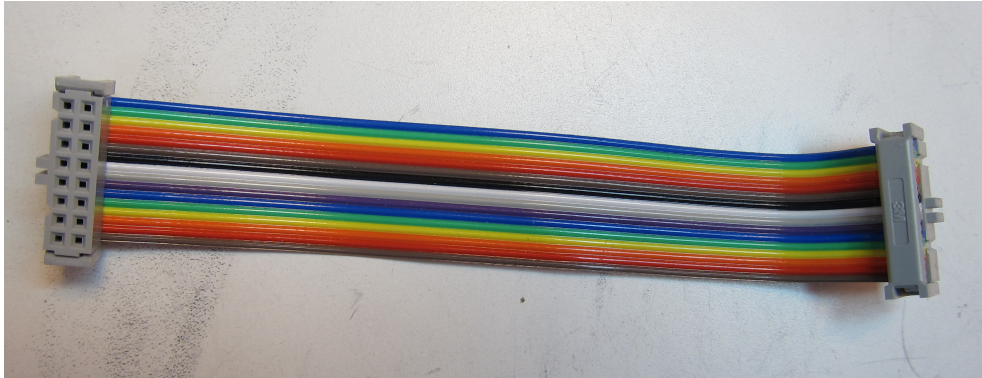


Figure 19: 16 pin test cable.

2.9 16-pin test cable fabrication

1. Cut a 5" piece of 643532 ribbon cable.
2. Install two 89116-0101 IDC connectors as shown in Fig. 19.

2.10 Mini-ITX motherboard assembly and installation

Motherboard assembly involves static sensitive components. Take proper electrostatic discharge (ESD) precautions such as using ground strips, gloves, and ESD mats.

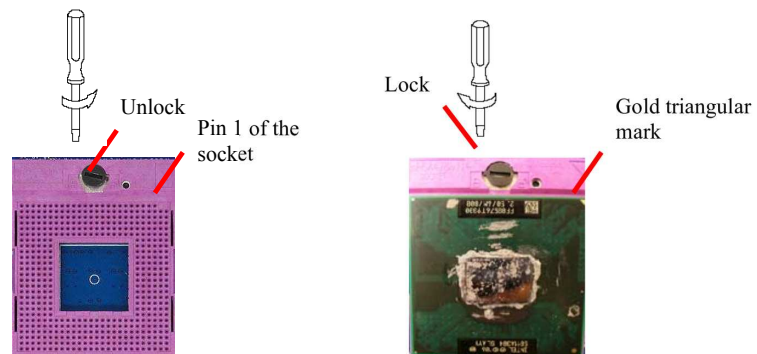
1. Open the box with BCM MX45GM2 motherboard and remove the motherboard, fan/heatsink (labeled FAN-MX45GM), and the I/O shield (IOA-01633-M1). The rest of the components in the box should be retained for return to Dimtel.
2. Unpack the fan/heatsink. Locate the metal retention bracket.
3. Remove backing film protecting the adhesive on the retention bracket. Install the retention bracket on the rear side of the motherboard, under the CPU socket. See also motherboard installation instructions in Fig. 20.
4. Remove the CPU (T9600) from its package and install in the socket, observing proper pin 1 orientation.
5. Rotate the CPU socket lock with a flat blade screwdriver clockwise to the locked position.
6. Use isopropyl alcohol to clean the top surface of the CPU of any foreign matter.
7. Remove the tape and protective shield from the heatsink. Orient the fan/heatsink assembly, so that the fan wires come out towards the EATXPWR1 connector, as shown in Figure 21.
8. Align the fan/heatsink mounting screws with the retention bracket.
9. Screw down two fasteners at a time in a diagonal sequence to secure the heatsink and fan assembly in place.
10. Connect the fan to CPU_FAN1 connector (Fig. 21).
11. Install SODIMM memory module (CT12864AC800) in SODIMM_B1 socket.
12. Install the I/O shield in the chassis opening, as shown in Figure 22.

13. Install the motherboard in the chassis, ensuring proper engagement with the I/O shield, especially the spring-loaded fingers near Ethernet and HDMI connectors.
14. Install 4 6-32 screws (90402A144) and tighten to 4 in-lbs.

CPU Installation

This processor is intended to be professionally installed. Take proper electrostatics discharge (ESD) precautions such as using appropriate ground strips, gloves, and ESD mats.

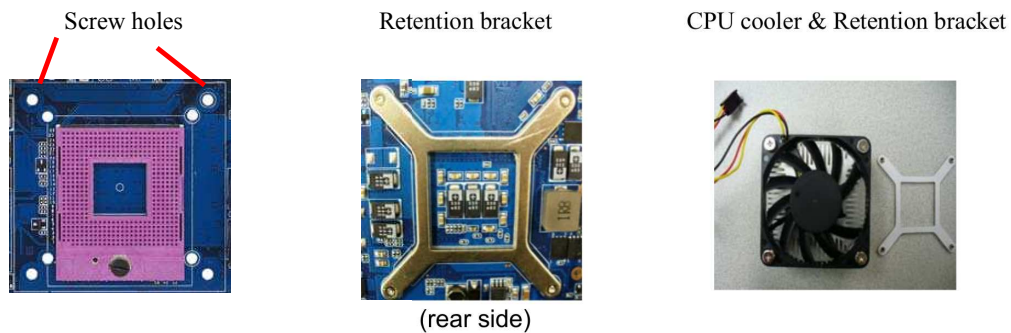
- Insert CPU into CPU socket and turn the screw to the lock position.



Note: Do not force the CPU into the socket. It may bend the pins and damage the CPU.

Installing the CPU Cooler

- Insert the retention bracket through the screw hole from bottom side of motherboard.
- Match and place CPU cooler assembly on the top of CPU and retention bracket.
- Tighten the screws into the retention bracket.



Note: Make sure CPU cooler assembly and CPU top surface are in total contact to avoid CPU overheating problem which would cause the system to hang or unstable.

Figure 20: CPU and fan/ heatsink installation instructions.

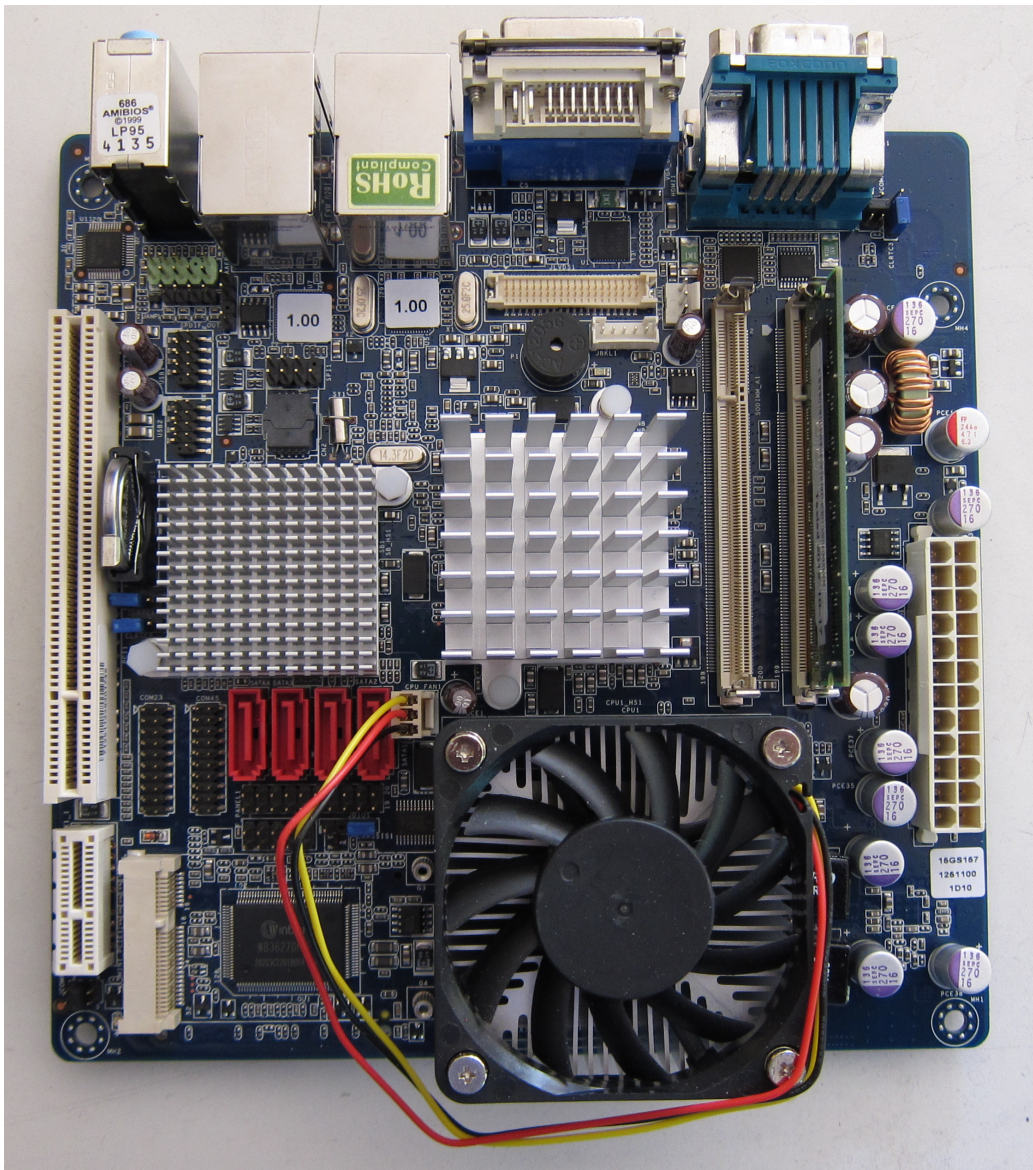


Figure 21: Fully assembled mini-ITX motherboard.

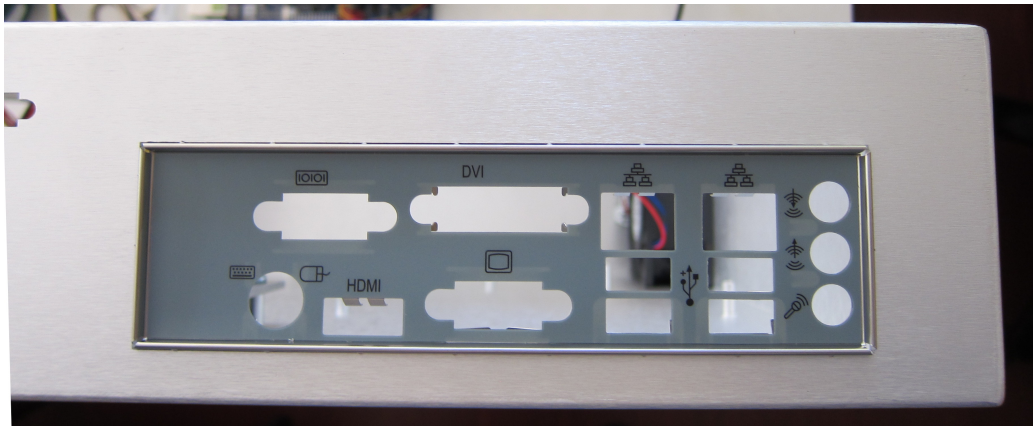


Figure 22: I/O shield installed in the chassis.

3 Final assembly

3.1 Fan installation

1. Trim stripped wires end to the length specified by the crimping tool (0.1–0.125").
2. Use the Molex hand crimp tool (63811-8200, profile B) to crimp the wires in the terminal pins (08-55-0102).
3. Insert the pins into the fan connector body (Molex 22-01-3037), see Figure 23.
4. Prepare four socket head screws (92196A150) with toothed washers (91113A007).
5. Use a ball head 7/64" hex key to install and tighten socket head screws. Fan orientation is illustrated in Figure 24.
6. Install the filter screen (03625-M) with the grooves in the vertical orientation, see Figure 25.
7. Secure the filter screen with knurled hand nuts (95150A130).

3.2 Front panel installation

1. Apply Devcon 245 to each screw during this assembly step.
2. Attach the front panel to the chassis using 4 8-32 flat head undercut screws (91099A255) and 2 6-32 flat head undercut screws (91099A205).
3. Torque 6-32 screws to 4 in-lbs and 8-32 — to 8 in-lbs.

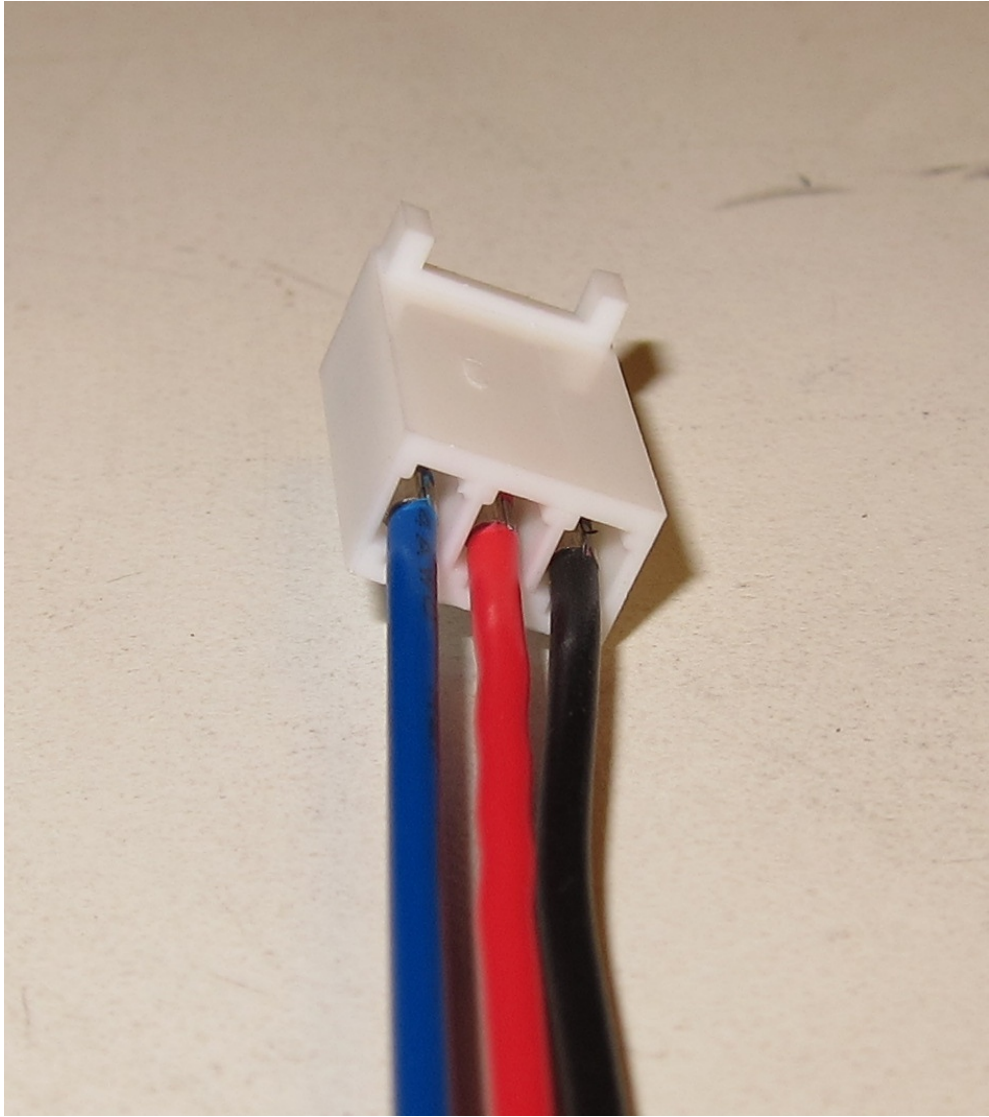


Figure 23: Fan connector's wire configuration

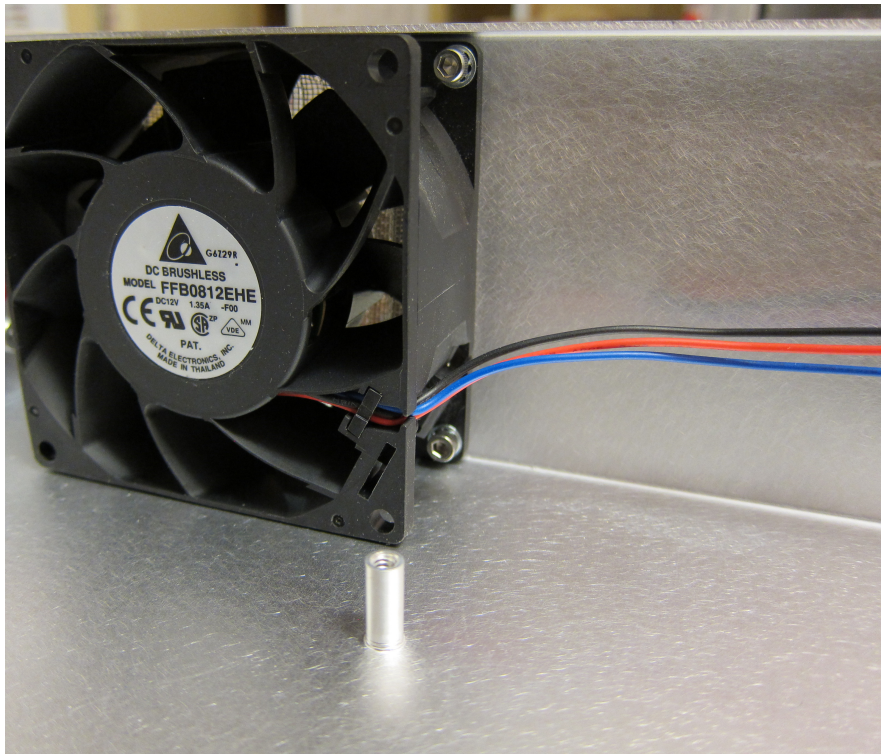


Figure 24: Fan installed in the chassis. Note the fan direction and the wire outlet orientation.

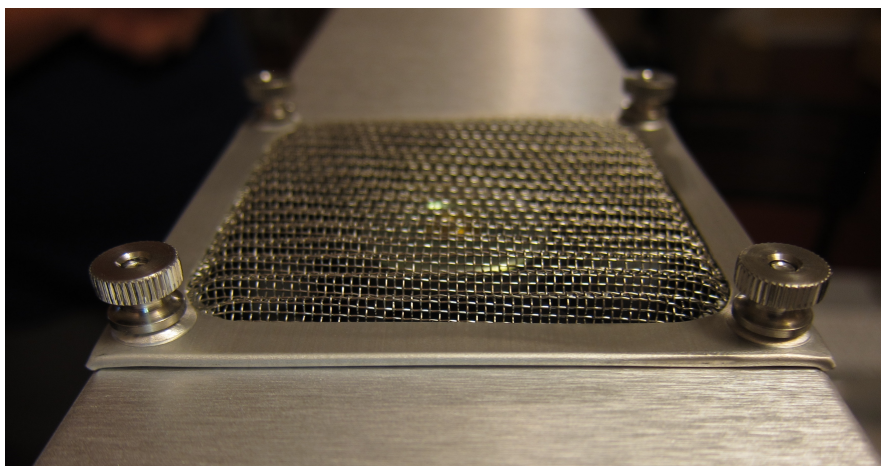


Figure 25: The correct position of the filter. Note there is not gap between the filter and the chassis

3.3 SMA connector installation

1. Insert 8 bulkhead SMA connectors (142-0701-871) into the openings in the front panel. Install the supplied washers and the SMA jam nuts (2-332004-0). *Do not tighten the nuts fully at this time.*
2. Place iGp12 PCB in the chassis, sliding it onto the SMA connectors from the rear of the chassis, see Figure 26.
3. Align the board and the SMA connectors so that connector center pins are centered over the PCB traces.
4. Install 7 6-32 screws (90402A144) and tighten them while pushing the PCB towards the front panel to ensure no gap between the board edge and the connectors. Aligned PCB is shown in Figure 27.
5. Ensure that SMA connectors are still properly aligned with the traces and tighten the SMA jam nuts to 2 in-lbs.
6. Tack solder the ground pins of each SMA connector as shown in Figure 28.
7. Remove the SMA jam nuts, washers, and PCB mounting screws. Return 3 6-32 screws to the parts bin (90402A144).
8. Place PCB on the workbench and solder the center pins of all 8 SMA connectors. *Make sure the solder flows all the way along the center pin.* Figure 29.
9. Turn over the PCB and solder the SMA connectors, ensuring full solder seal between the connector and the PCB as shown in Figure 30.
10. Turn to the front side of the PCB and reflow the solder on the ground pins of the SMA connectors as shown in Fig. 31.

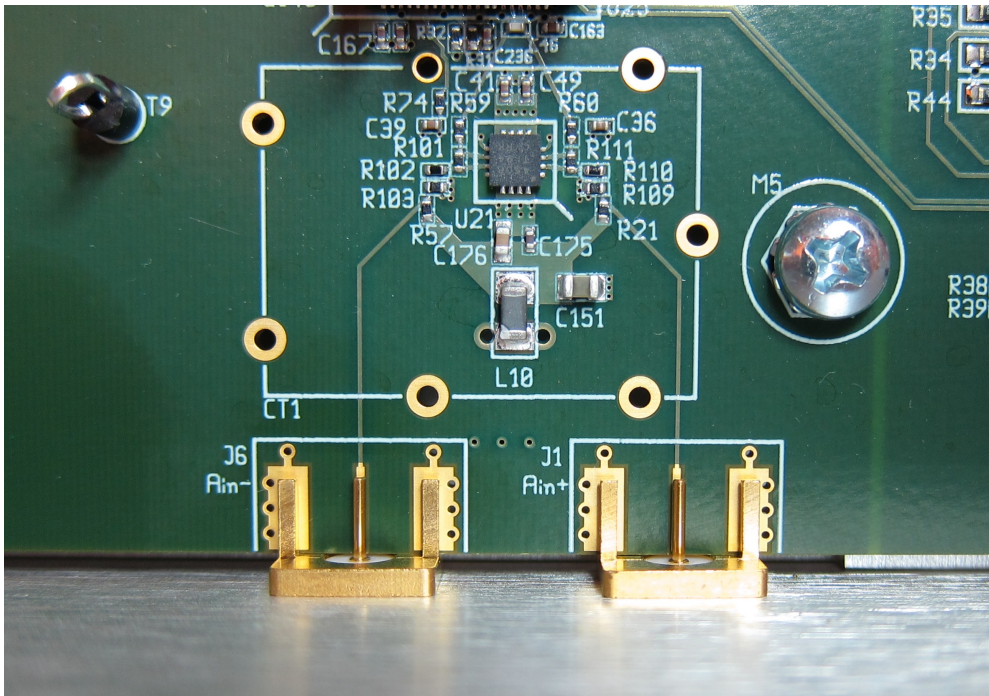


Figure 26: Aligning the center pins of the SMA connectors.

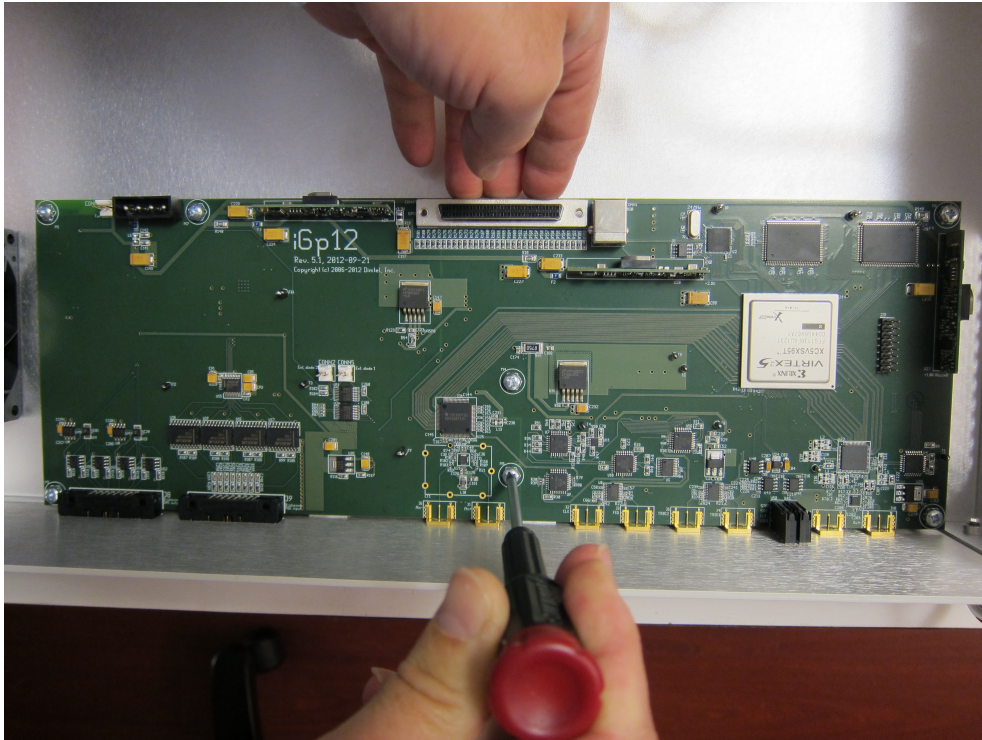


Figure 27: Bolting down the PCB while maintaining alignment and mild forward pressure.

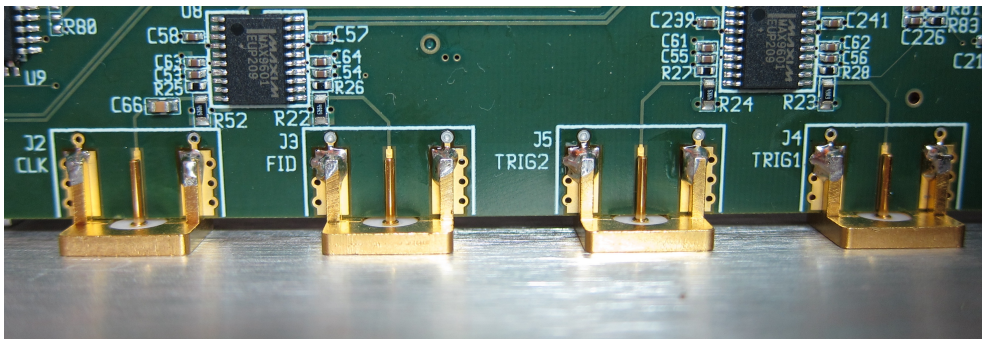


Figure 28: Tack solder the ground pins of the SMA connectors.

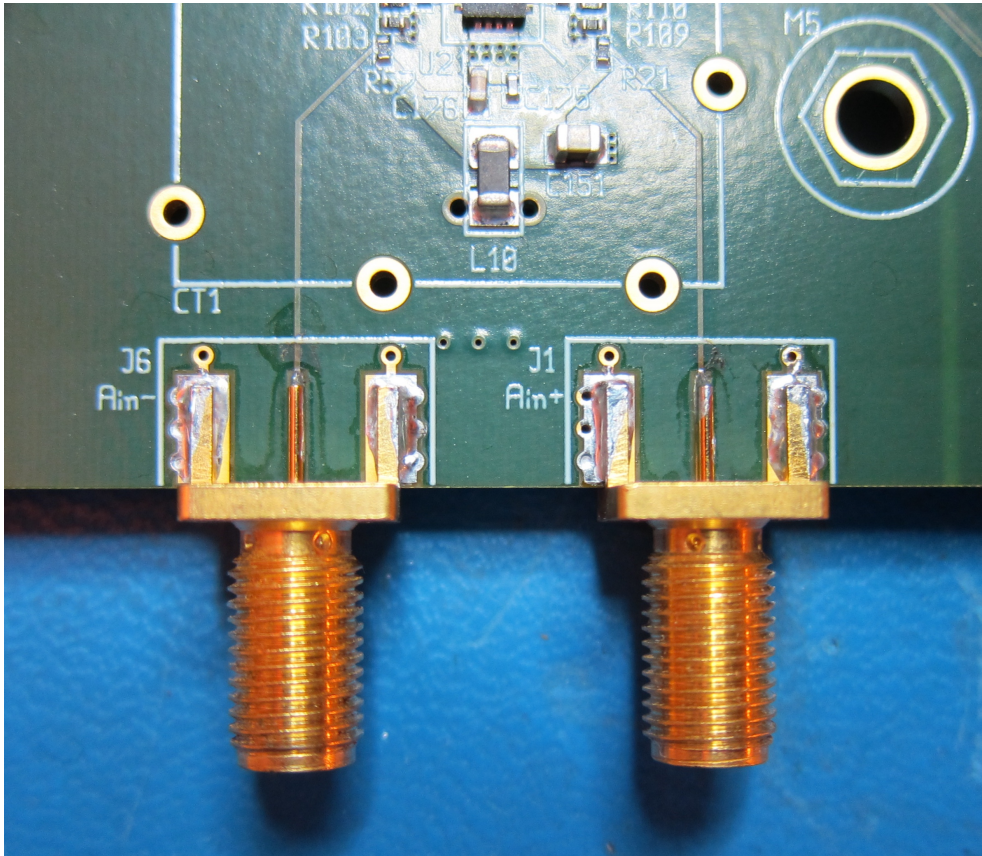


Figure 29: Soldering the center pins of the SMA connectors.

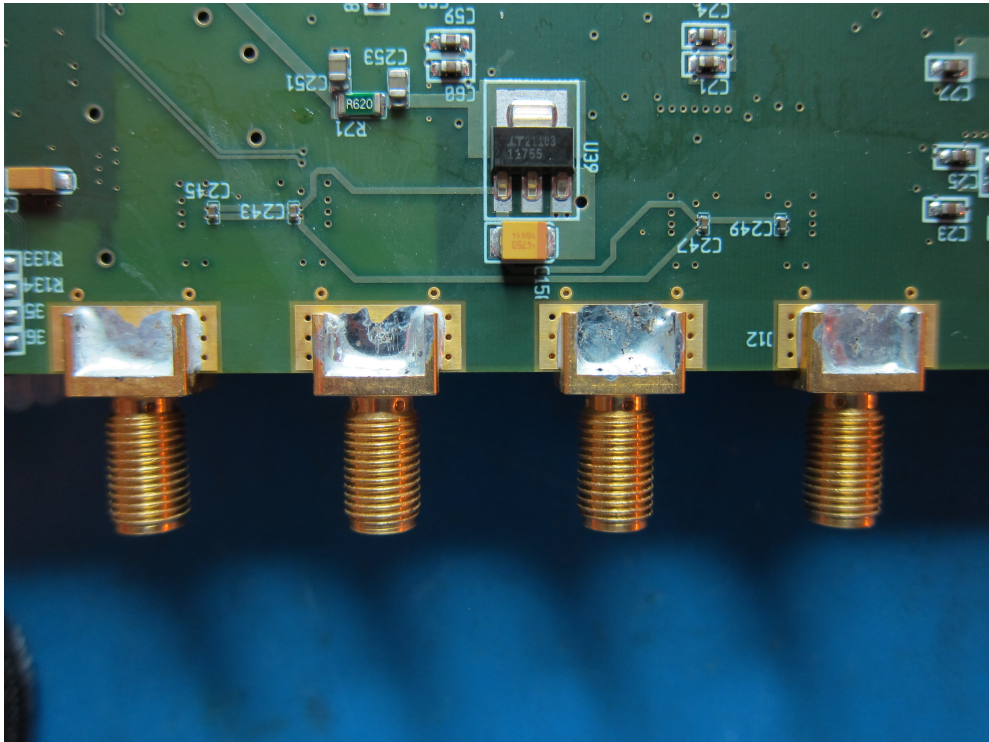


Figure 30: Back side soldering of the SMA connectors.

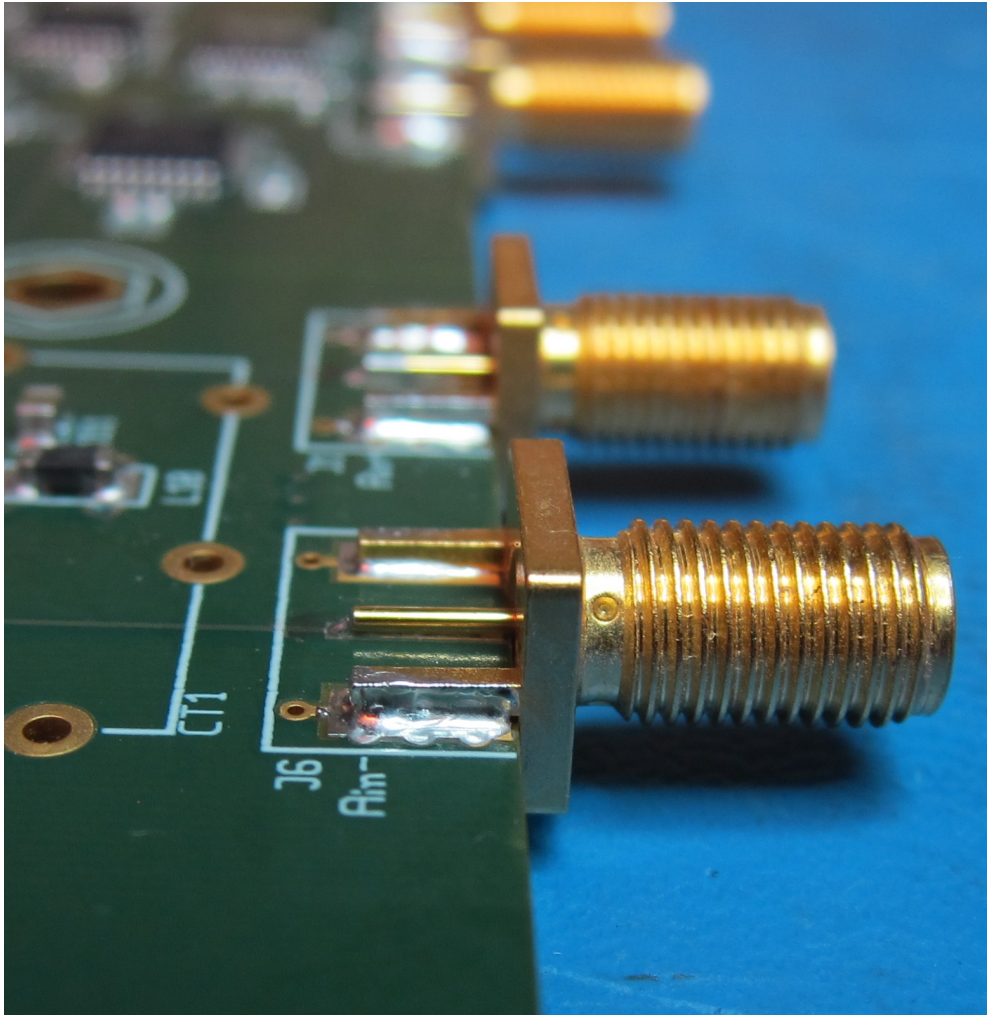


Figure 31: Top side SMA ground pins after solder reflow.

3.4 PCB shield

Install PCB shield (14R-CBSFP-1.0x0.75x0.3) at location CT1.

3.5 iGp12 PCB installation

1. Place fully assembled iGp12 motherboard in the chassis.
2. Install 8 SMA connector washers and nuts (2-332004-0).
3. Torque SMA connector nuts to 14 in-lbs in the following sequence: J6, J3, J11, J1, J5, J10, J2, J4.
4. Install 4 90402A144 screws at mounting points M2, M5, M6, M7 as shown in Fig. 32 and tighten to 4 in-lbs.
5. Prepare 3 6-32 \times 1/2" screws (H360) with toothed #6 washers (91113A007) and flat #6 washers (92141A008).
6. Route temperature sensor cables through 1/4" cable clamp (561-B0125) and install the clamp at mounting point M4, as shown in Fig. 33. Tighten to 4 in-lbs.
7. Route power switch cable through two 1/4" cable clamps (561-B0125) and install the clamps at mounting points M1 and M3 — see Fig. 34. Tighten to 4 in-lbs.

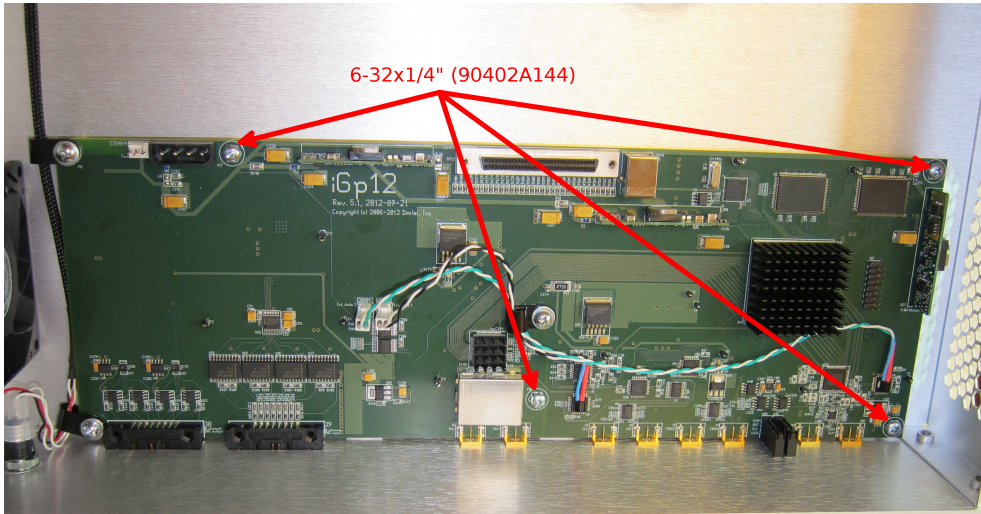


Figure 32: Installation locations for 4 6-32x1/4" screws.

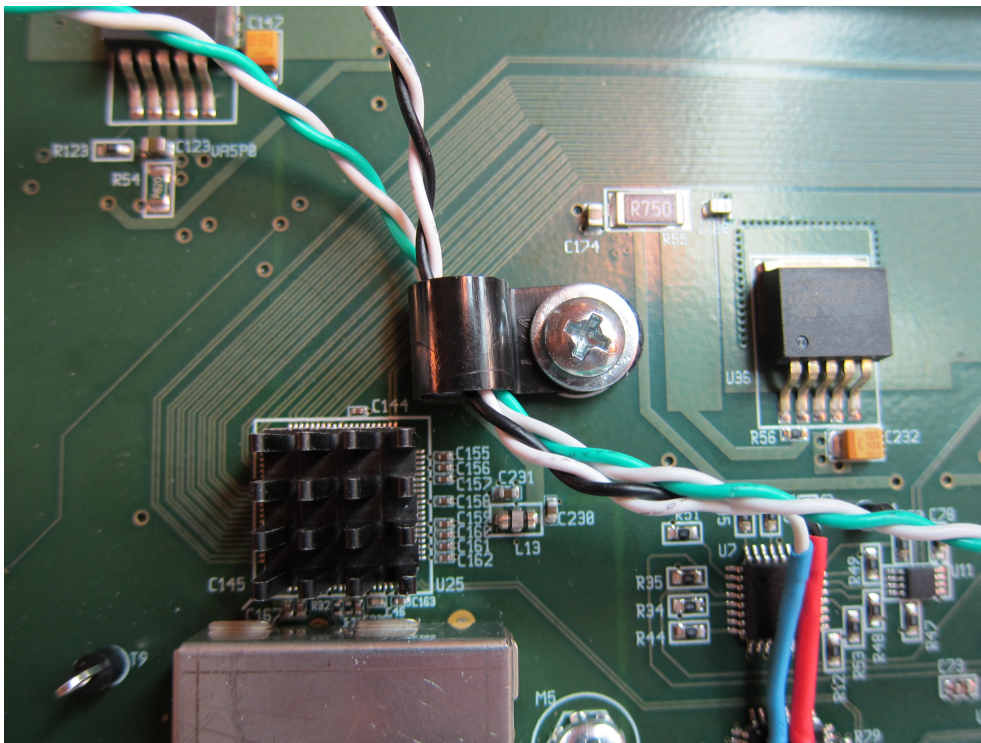


Figure 33: Mounting point M4 with the cable clamp.

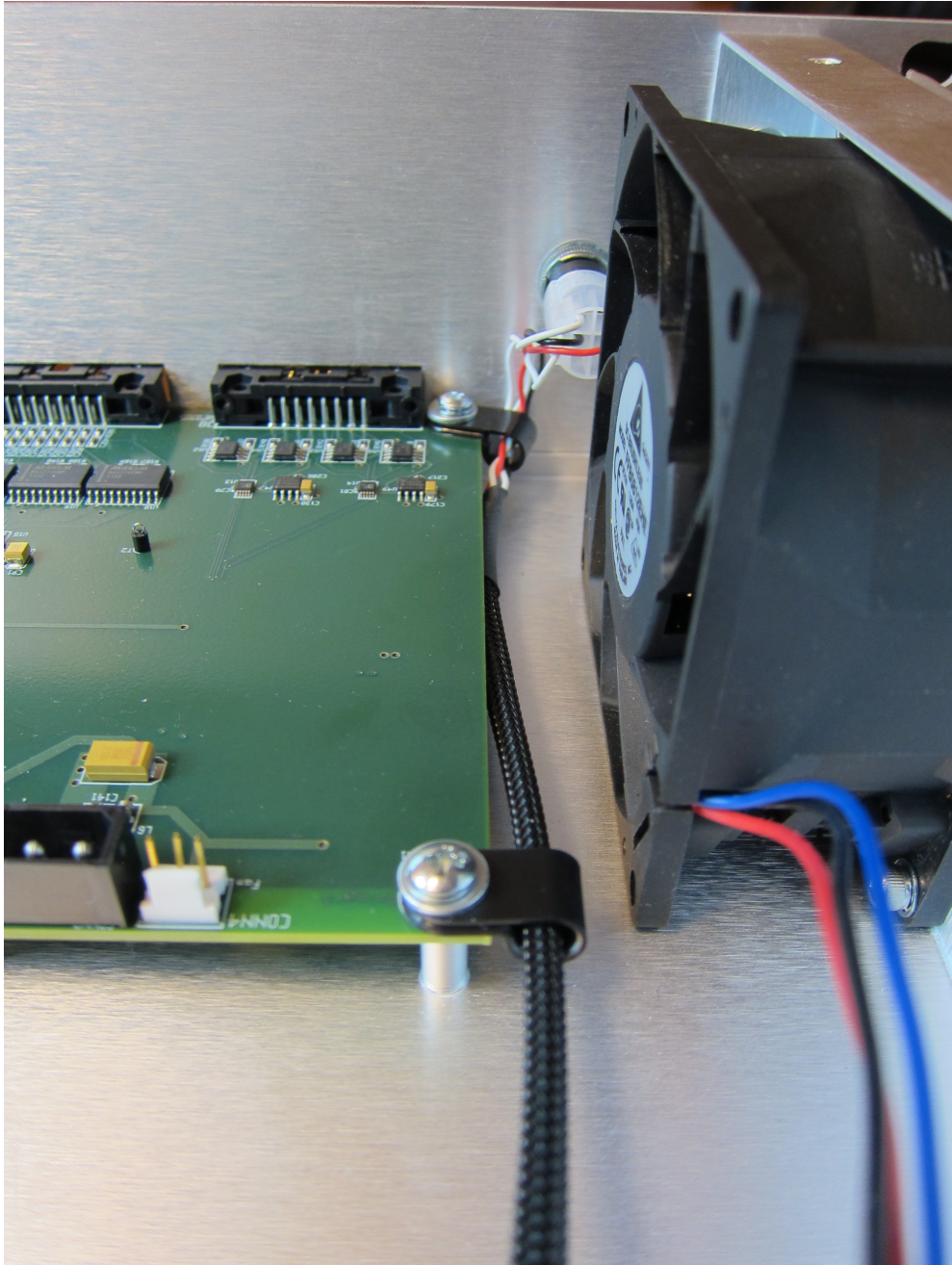


Figure 34: Mounting points M1 and M3 with the cable clamps.

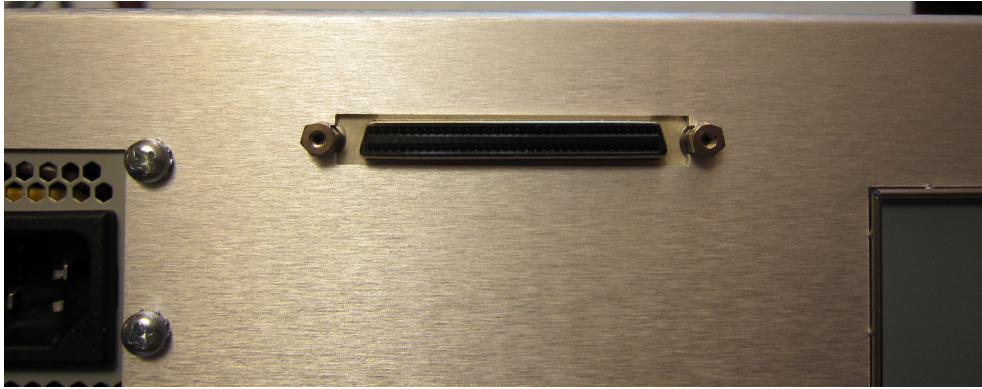


Figure 35: GPIO connector installed in the chassis.

3.6 GPIO cable installation

1. Mount the bulkhead connector (60 04 068 5344) at the rear panel using 2 screw locks (60 01 000 9019) and two wave washers (99842A111). Refer to Figure 35 for proper connector orientation.
2. Tighten screw locks to 2 in-lbs.

3.7 Cable connections and dressing

1. Connect power supply connectors P1 and 24 to the motherboard connector EATXPWR1, as shown in Fig. 36.
2. Connect power supply connector P4 to the iGp12 PCB power connector.
3. Connect the power switch cable to F_PANEL1 connector on the motherboard as shown in Fig. 37.
4. Connect the supplied SATA cable to SATA4 connector on the motherboard, refer to Fig. 37.
5. Install two 0.75" square (561-N3588) adhesive-backed tie mounts as shown in Figure 38.
6. Using two 3.75" tie wraps (1768121), tie power switch and SATA cables as illustrated in Fig. 39.
7. Connect free end of the SATA cable to the solid-state drive (Fig. 40).
8. Connect SATA power connector to the solid-state drive, as shown in Fig. 40.
9. Install ABM-4 tie mount and use 8.5" cable tie (RT-508) to secure unused power supply outputs as shown in Fig. 41.
10. Connect the chassis fan to SYS_FAN1 connector on the motherboard, refer to Fig. 42.
11. Connect the USB cable to the CONN1 type B connector on the iGp12 PCB.
12. Install 0.75" square (561-N3588) mount and tie SATA cable, iGp12 power supply, and USB cable to it as shown in Figure 43.
13. Route the USB cable under SATA and power switch cables. Connect the free end of the USB cable to the 2×5 2 mm header on the motherboard, labeled USB2, see Fig. 44. Make sure the missing pin on the header matches the missing terminal on the cable connector.
14. Install 0.75" square (561-N3588) mount and tie USB cable as shown in Figure 45.

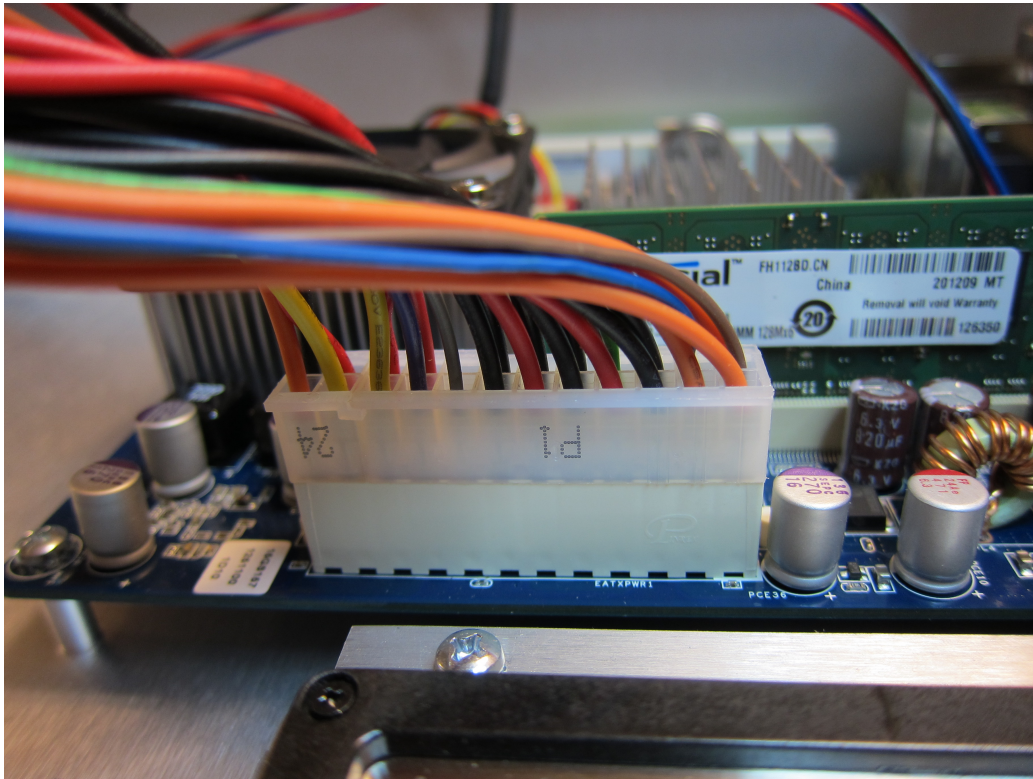


Figure 36: Motherboard power connector.

15. Use 4" cable tie (08432-0) to secure the extra length of the SATA power cable and the iGp12 power cable to the motherboard power cable bundle. See Fig. 46.
16. Connect GPIO cable to the iGp12 PCB.
17. A photo of fully assembled chassis is shown in Figure 47.

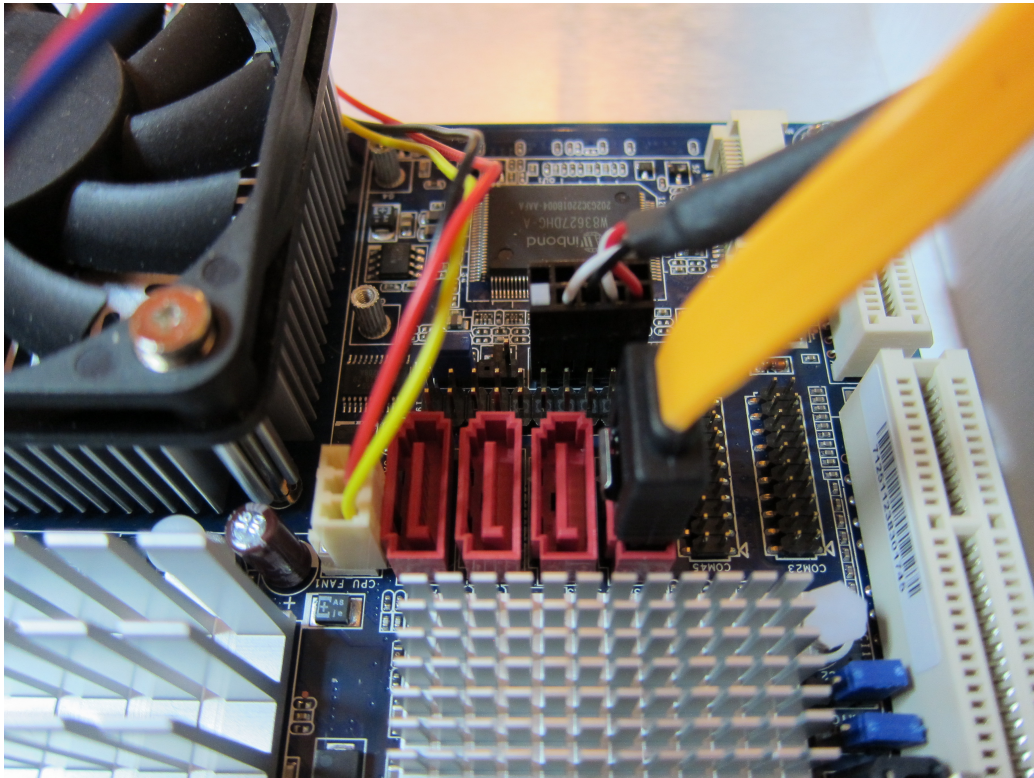


Figure 37: Power switch cable connected to F_PANEL1 and SATA cable connected to SATA4.

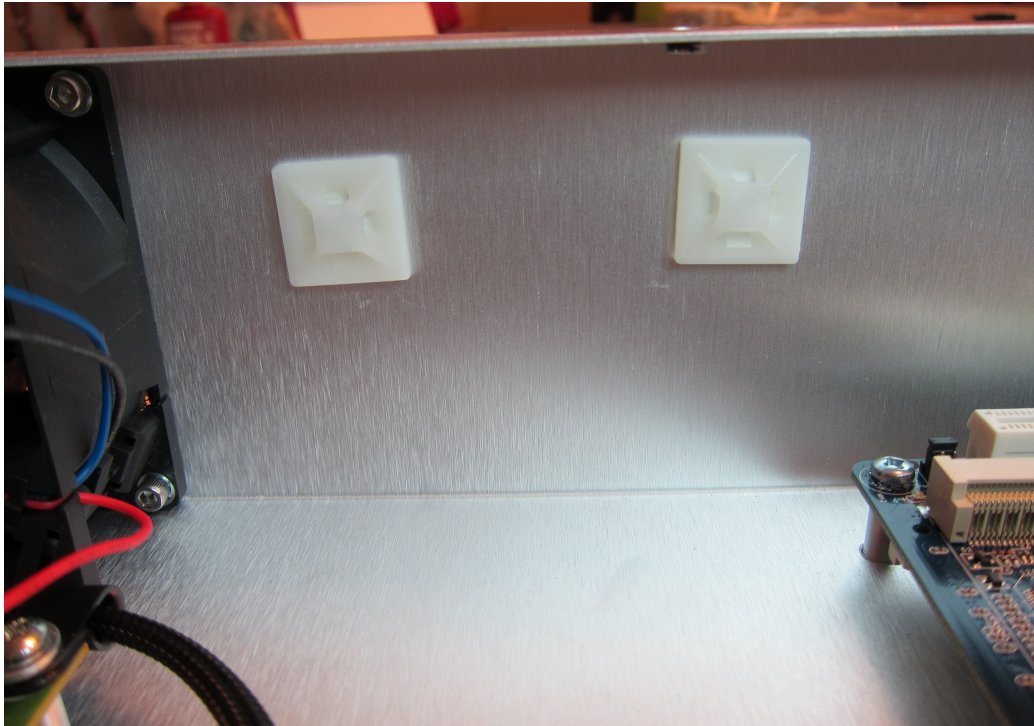


Figure 38: Tie mounts installed in the chassis.

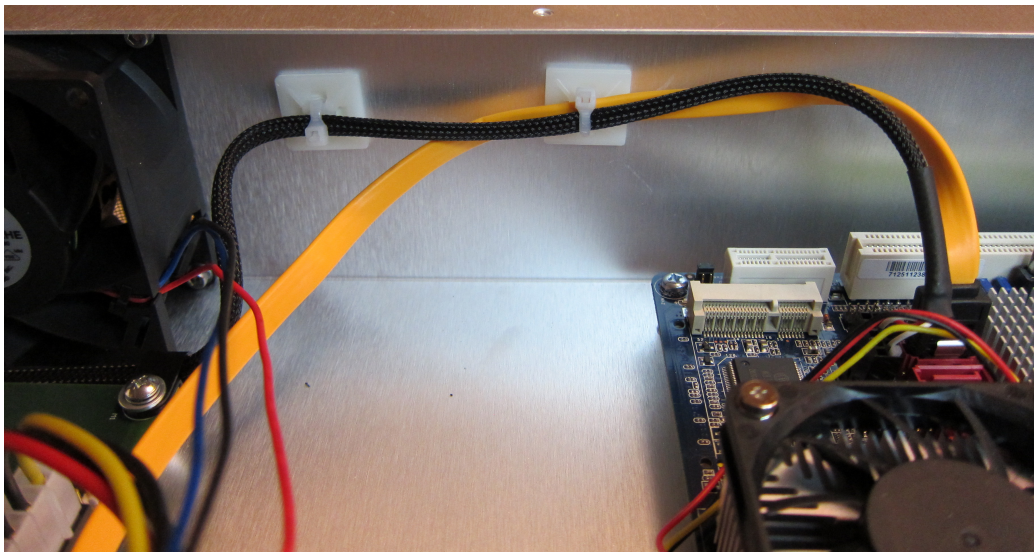


Figure 39: Installation of zip ties to locate power switch and SATA cables.

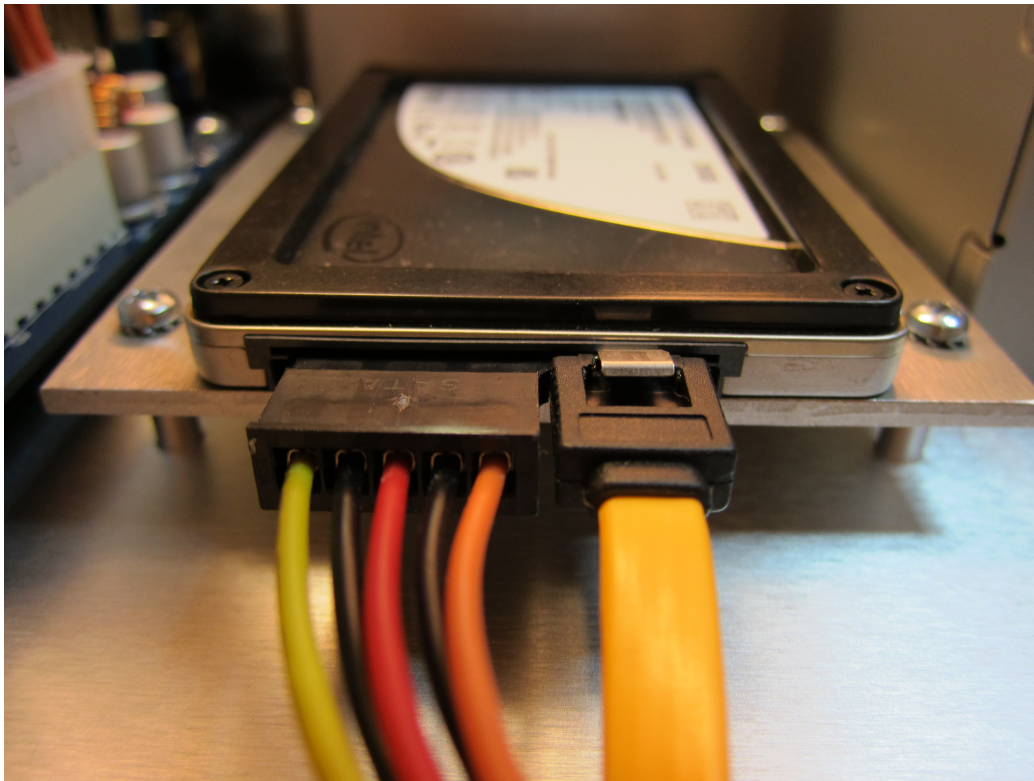


Figure 40: Power and data cables connected to the SSD.

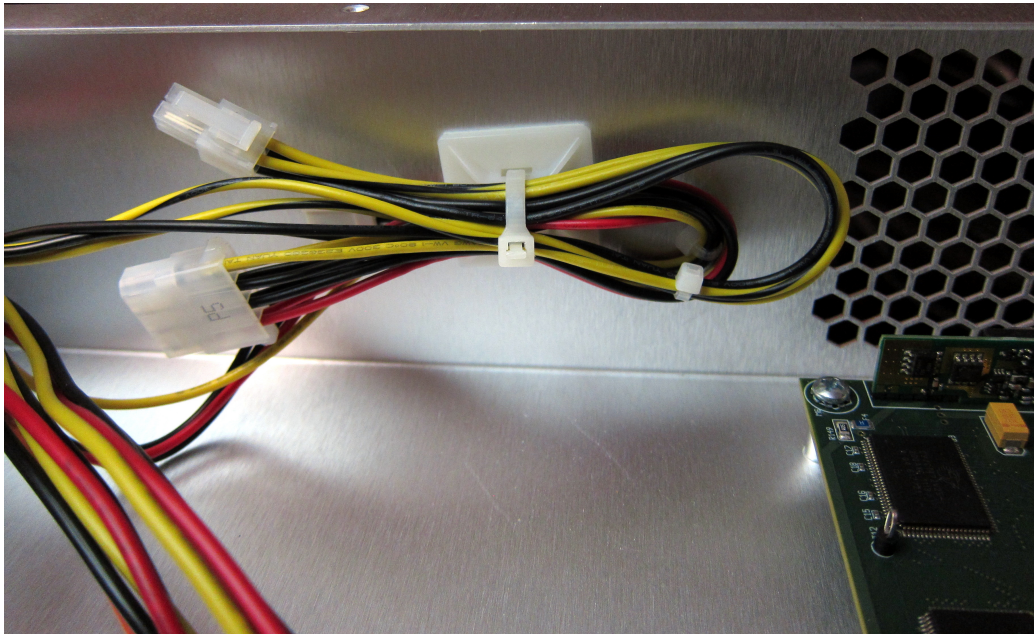


Figure 41: Tie wrapping unused power supply outputs.

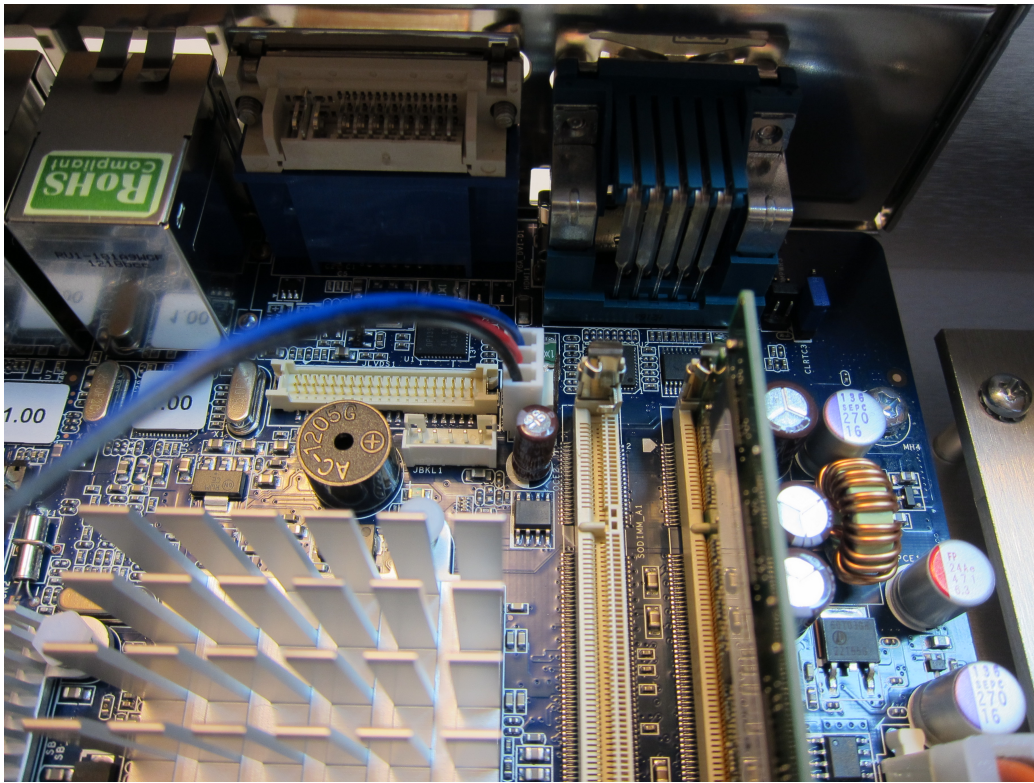


Figure 42: Chassis fan cable connected to SYS_FAN1.

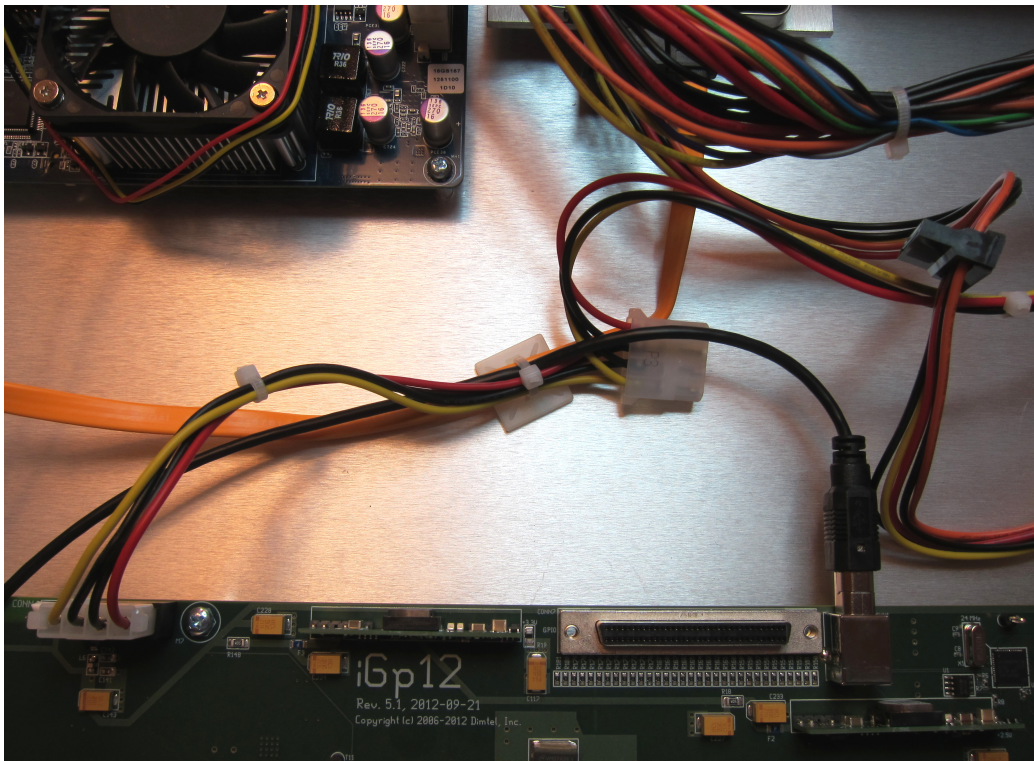


Figure 43: Zip tie retaining USB, SATA, and iGp12 power cables.

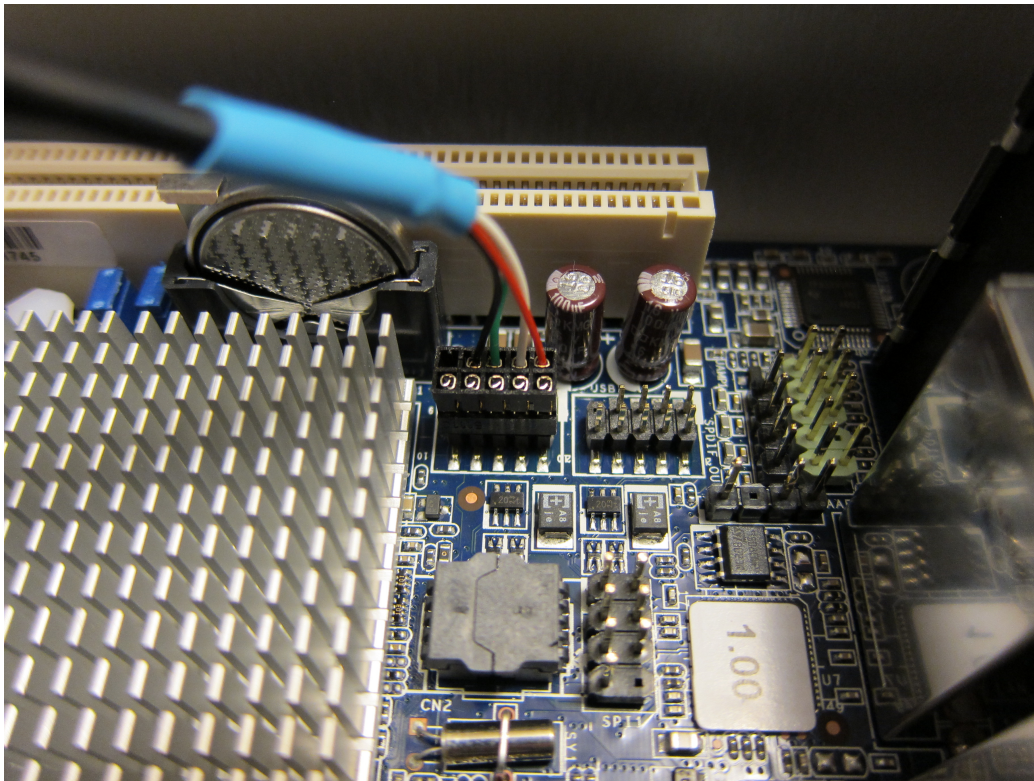


Figure 44: USB cable connected to the motherboard USB2 connector.

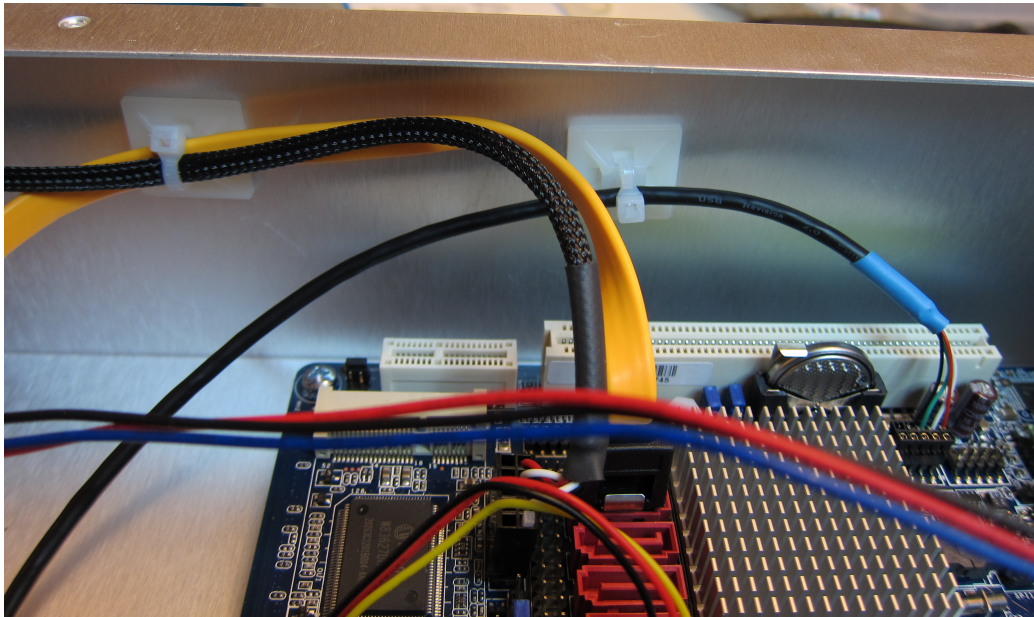


Figure 45: Zip tie retaining USB cable near the motherboard.

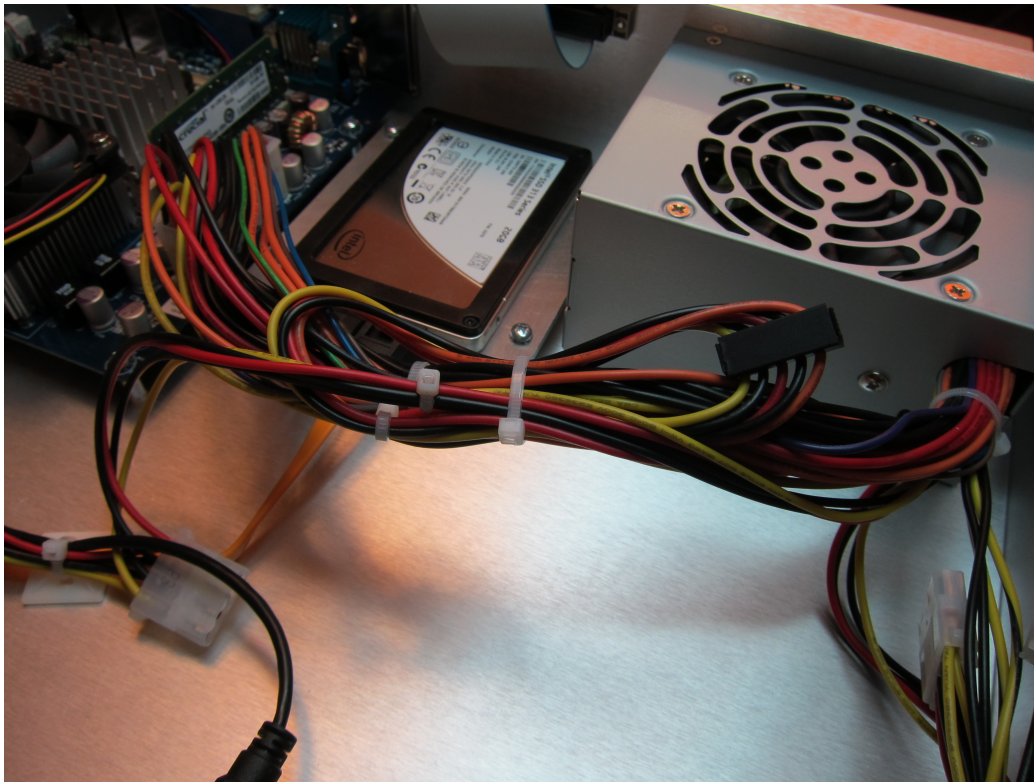


Figure 46: Securing the extra lengths of the SATA and iGp12 power cables.

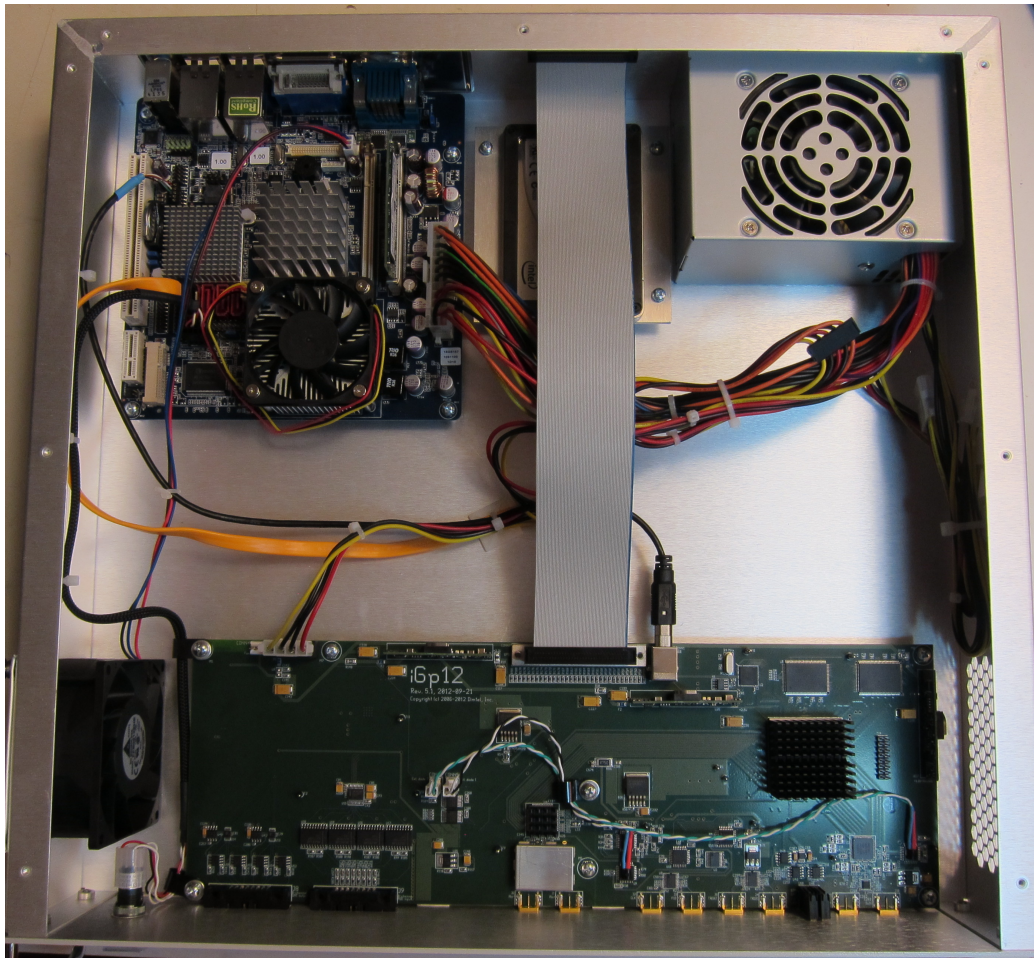


Figure 47: Top view of the complete assembly.

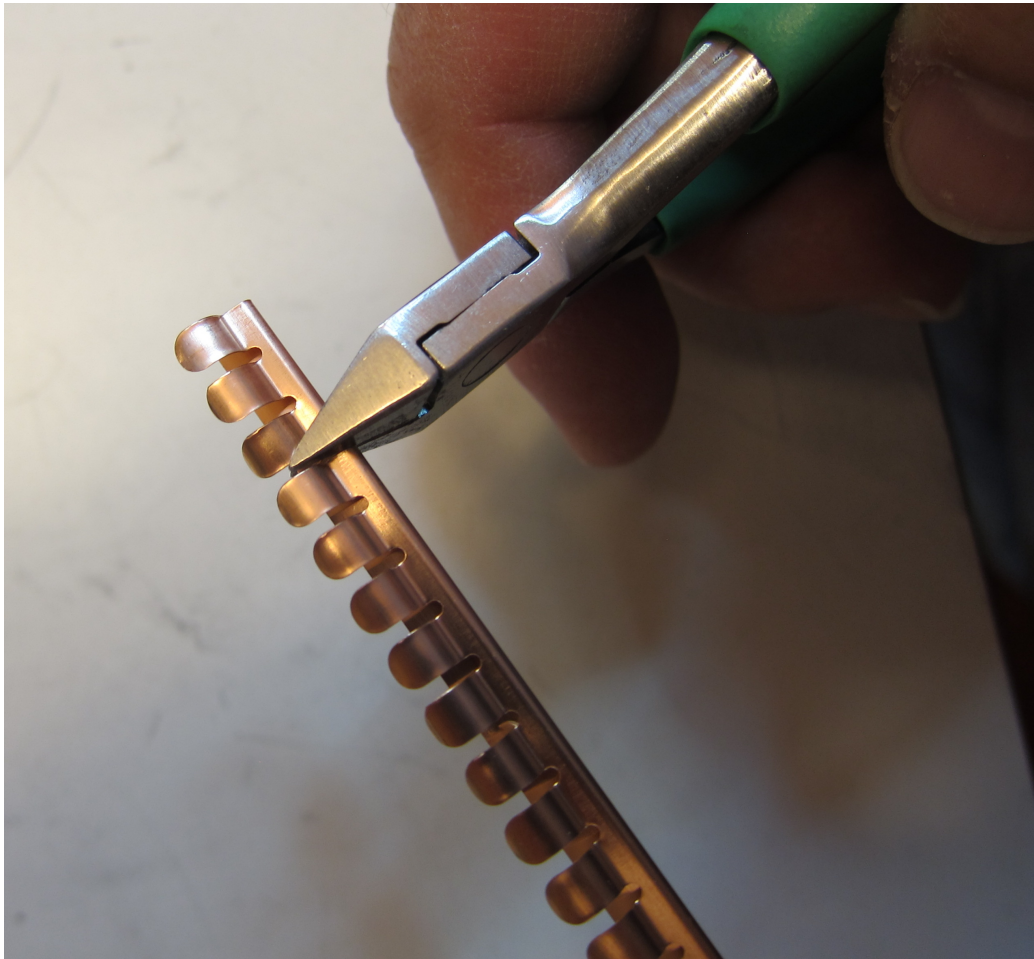


Figure 48: Cutting off 3 RF fingers from the end of 10-30C-050-DL-BD-16 gasket.

3.8 Cover installation

1. Trim 3 RF fingers off the RF gasket 10-30C-050-DL-BD-16 as shown in Figure 48.
2. Install the RF gasket on the chassis cover, see Fig. 49.
3. Using 9 4-40 flat heat undercut screws (91099A152) attach the cover to the chassis.

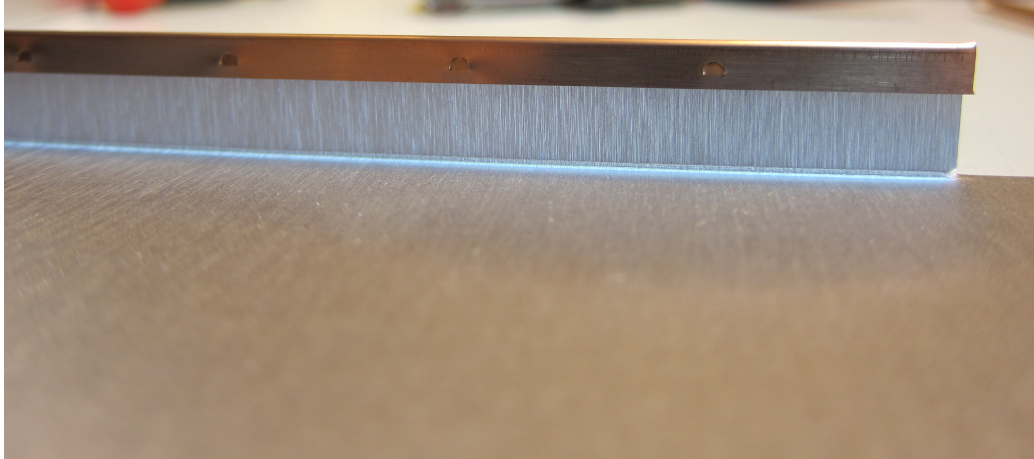


Figure 49: Trimmed gasket installed on the cover.

Table 1: Mounting torques

Location	Thread	Fastener	Qty	Torque, in-lbs/in-oz
Front panel handles	6-32	91099A205	4	8/128
Front panel to chassis	6-32	91099A205	2	4/64
Front panel to chassis	8-32	91099A255	4	8/128
Power supply	6-32	90402A144	5	4/64
SSD to drive plate	M3	92000A118	4	4/64
Drive plate to chassis	6-32	90402A144	4	4/64
SMA connector nuts	1/4"-36	2-332004-0	8	14/224
iGp12 PCB to chassis	6-32	90402A144	4	4/64
iGp12 PCB to chassis	6-32	H360	3	4/64
mini-ITX MB to chassis	6-32	90402A144	4	4/64
GPIO connector	4-40	60010009019	2	2/32