

# Teensy 3.2 Breakout (Revision D)

This is a breakout for the Teensy 3.2 development board by PJRC. Included are all the pin headers you need to assemble it, a 32.768 kHz crystal for use with the RTC (Real-Time Clock), a 150  $\mu$ F capacitor to use with USB host mode, a switch to select between USB or external power, a switch to toggle the host mode capacitor, and machine screws for more permanent mounting. As an option during assembly, you can use the included jumpers (with pin headers) in place of the switches. This breakout can also optionally be assembled with the **Teensy 3.2 Socket Kit** (available separately).

This particular revision (D) aims to strike an inclusive balance compared to prior editions. Four pogo pins are included to break out the USB and RESET signals. Scored carrier rails provide additional versatility and mounting options. The rails can also be removed for breadboard use.

## Included Parts (visual part identification sheet attached)

	Count	Part Type	Pos.	Tech.	Rows	Pins	Mfr.	Part Number/Desc.
<b>A</b>	1	Bare PCB	52	TH	1	26	Tall Dog	REV-D
<b>B</b>	3	Male Header	40	TH	1	40	Generic	Standard
<b>C</b>	1	Male Header	14	SMD	2	7	Generic	Standard
<b>D</b>	4	Pogo Pin	1	TH	1	1	Mill-Max	0906-1-15-20-75-14-11-0
<b>E</b>	2	Slide Switch	3	TH	1	3	Generic	SS12D00G3
<b>F</b>	2	Jumper	2	N/A	1	2	Generic	Standard
<b>G</b>	1	32.768 kHz Crystal	2	TH	1	2	Generic	6 mm $\times$ 2 mm
<b>H</b>	1	150 $\mu$ F Capacitor	2	SMD	1	2	Generic	EIA 2917 / IEC 7343
<b>I</b>	2	Machine Screw	N/A	N/A	N/A	N/A	Generic	#6-32 $\times$ 3/16" Pan Head
<b>J</b>	4	Machine Screw	N/A	N/A	N/A	N/A	Generic	#2-56 $\times$ 3/16" Pan Head

## Detailed Specs (not including carrier rails)

- **Grid Spacing** — 0.1" / 2.54 mm
- **Board Dimensions** — 2.6"  $\times$  1.0" / 66.04 mm  $\times$  25.4 mm
- **Board Surface Area** — 2.6 in<sup>2</sup> / 16.77 cm<sup>2</sup>
- **Board Thickness** — 0.063" / 1.6 mm
- **Number of Breakout Pins** — 52 pins (2 rows  $\times$  26 pins)
- **Row Spacing** — 0.9" / 22.86 mm

## Recommended Tools

- Soldering iron
- Solder and flux
- Breadboard
- Diagonal cutters
- Blue tape
- Razor blade

## Contact Info

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## Detailed Specs (*continued*, not including carrier rails)

- **Number of Mounting Holes** — 2 holes
- **Mounting Hole Distance** — 2.0" / 50.8 mm
- **Mounting Hole Diameter** — 0.15" / 3.81 mm
- **Mounting Hole Pad Diameter** — 0.27" / 6.86 mm

## Assembly Instructions

1. Cut the trace to separate VIN from VUSB on the underside of the Teensy.
2. On the Teensy Breakout PCB (part A), decide whether you want to leave the carrier rails in place or remove them:
  - a. If you leave the carrier rails in place, you can jump whichever signals you want out onto the rails. You can also cut any of the exposed traces connecting the holes on the underside of the board. The mounting holes at either end of the rails are designed for #2 machine screws (part J) but M2 screws work too. The v-scoring is pretty strong, but you can further strengthen the perforated area with a thin line of epoxy.
  - b. If you remove the carrier rails (for typical breadboard use), apply pressure to one rail until you feel the material in the perforated area (v-score) begin to break. Using a pair of flat-head pliers makes this easier. Apply pressure in the opposite direction. Work the joint back and forth until it separates, then do the same for the other rail. You can sand or file down any rough edges. Cut two 26-pin lengths of through-hole male header from the 40-pin strips (part B) and put them aside to use later (in step 14).
3. Choose one of the following:
  - a. Place and solder a slide switch (part E) into the three holes outlined with a rectangle and marked VIN-VUSB on the breakout board. Install a second slide switch into the similar location marked USB-HOST.
  - b. You can use a 3-pin length of male header (from part B) and a jumper (part F) in place of either switch for a more permanent method of configuring these signals.
4. Install the included tantalum capacitor (part H) on the underside of the breakout board in the area marked 150 $\mu$ F CAP and outlined. Do not install it on the underside of the Teensy itself. This is a polarized capacitor, so make sure the bar printed on the component lines up with the bar printed on the breakout board. Installation of this capacitor won't interfere with normal operation of the Teensy because it will be connected through a switch. It is not necessary to install this part if you know that you're not going to be using USB host mode. It can also be easily installed at a later point in time.

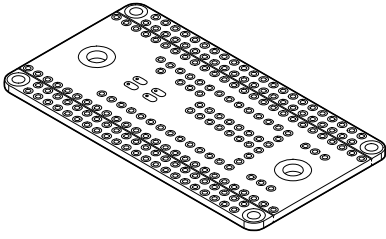
5. Install the included 32.768 kHz crystal (part G) on the underside of the Teensy for use with the RTC (Real-Time Clock). Even if you're not planning to use the RTC, there aren't any drawbacks to installing this component, and you won't be able to easily install it later.
6. If you're using the **Teensy 3.2 Socket Kit**, stop here and switch to the instructions included with the Socket Kit. Keep parts from each kit separate since they both use similar part lettering schemes. When you're finished with the Socket Kit instructions, skip to step 14.
7. Apply some flux onto the four oblong outlined pads on the top side of the breakout board. Place and solder a gold pogo pin (part D) into each of these four holes. The elongated shape of each pad allows you to solder the pogo pins more easily from the top. The pogo pins must sit flush and be aligned perpendicularly to the board. You can secure the board to the edge of your work surface with tape, allowing the pads to hang over the edge. While soldering each pin, drag the tip of your soldering iron along the pin's base to rotate it slightly, which can help to improve alignment. After soldering, hold the board up and check that the pins are reasonably perpendicular to the board. Check from both the front and the side.
8. Cut a 5-pin length of through-hole male header (from part B). Place the header so that it interfaces with the A14, PROGRAM, GND, 3.3V, and VBAT pins along the underside of the Teensy. Solder the header in place. You can use a breadboard to align the pins and an extra header strip turned sideways to keep the Teensy perpendicular.
9. Cut another 5-pin through-hole male header (from part B) and remove the metal pin from the 2nd position using your diagonal cutters as pliers. Solder the modified header (now a 4-pin header with one blank space) onto the underside of the Teensy so that it occupies the A11, A10, AREF, and VUSB positions. You can use a breadboard for alignment here also.
10. Place the Teensy so the bottom side is facing up. Apply flux onto the 2 rows of 7 rectangular pads (14 in total) marked 29, 30, 31, 32, 33, 3V3, A13 on the first row and 28, 27, 26, 25, 24, GND, A12 on the second row. Place the 2x7 SMD male header (part C) onto the pads and solder it in place. You can secure the header using tape or a small drop of glue. The alignment doesn't have to be too perfect, just get it as close as you can.
11. Cut two 14-pin lengths of through-hole male header (from part B). Position them along the two longer edges on the underside of the Teensy. You won't be able to use a breadboard to align these headers, so tack them in place before fully soldering them.
12. Mate the Teensy and the breakout board assemblies together. You might need to apply some pressure depending on the alignment of the headers. If any pins are significantly misaligned, you may have to manually bend them so the two boards can mate. The distance between the boards will ultimately be determined by the surface-mount header since it sits higher than the through-hole headers. As a result, there will be a small gap between the through-hole headers and the breakout board, which is normal.

13. Tack the four corner pins to provide some stability, then check for proper alignment. Using diagonal cutters, trim all the protruding pins so they're reasonably flush with the bottom surface of the breakout board. You can place your finger over the pin that you're trimming to prevent it from flying across the room when you snip it. Secure the assembly in place with the underside of the breakout facing up. You can use two pieces of tape, one placed over each end. Solder all the trimmed pins.
14. If you didn't remove the carrier rails back in step 2, skip this step. Locate the two 26-pin headers (part B) that you put aside earlier. Place them along the two long edges on the underside of the breakout board. These exposed header pins will allow the entire assembly to interface with a standard breadboard, which you should use now to ensure proper alignment. Solder the headers in place. Counterintuitively, it's safer and easier to remove the assembly from a breadboard by rocking it forward and back instead of side to side. Be gentle and remove it carefully to prevent damage to any of the pins.
15. Inspect the finished assembly thoroughly. Connect it to power and make sure it functions correctly. I hope you enjoy using your new board, and best of luck with your project!

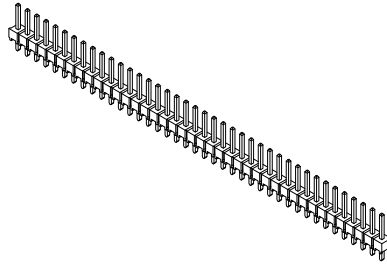
*Congratulations, you're finished!*

***If you like using this product*** please consider leaving a positive review on Tindie!  
***If you have any concerns or problems*** please contact me at the email address above.

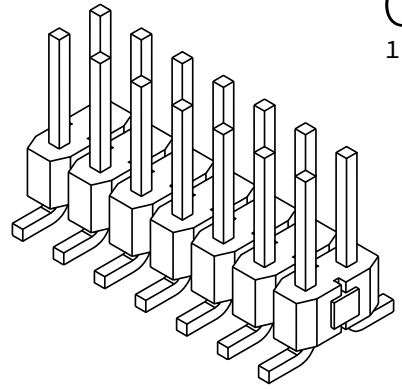
A  
1x



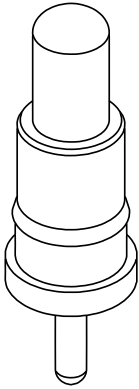
B  
3x



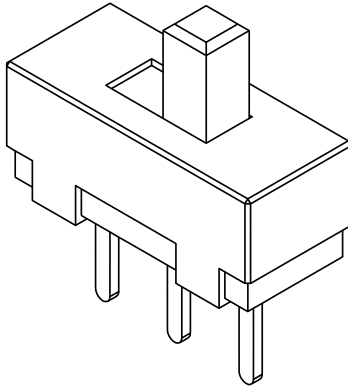
C  
1x



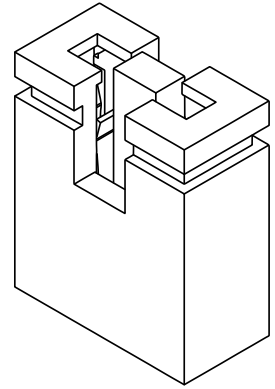
D  
4x



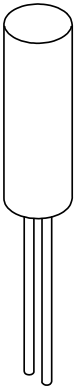
E  
2x



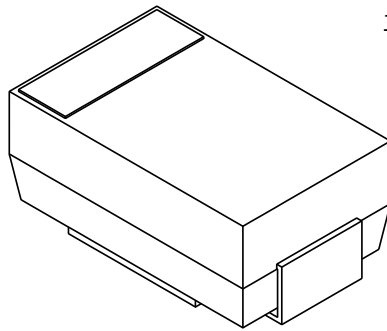
F  
2x



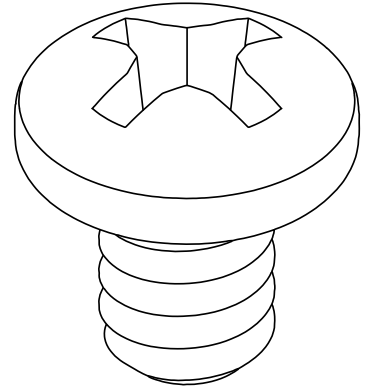
G  
1x



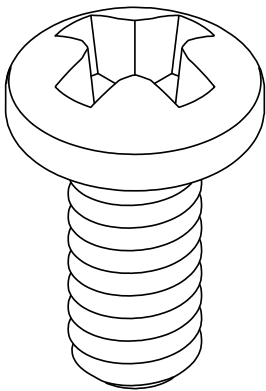
H  
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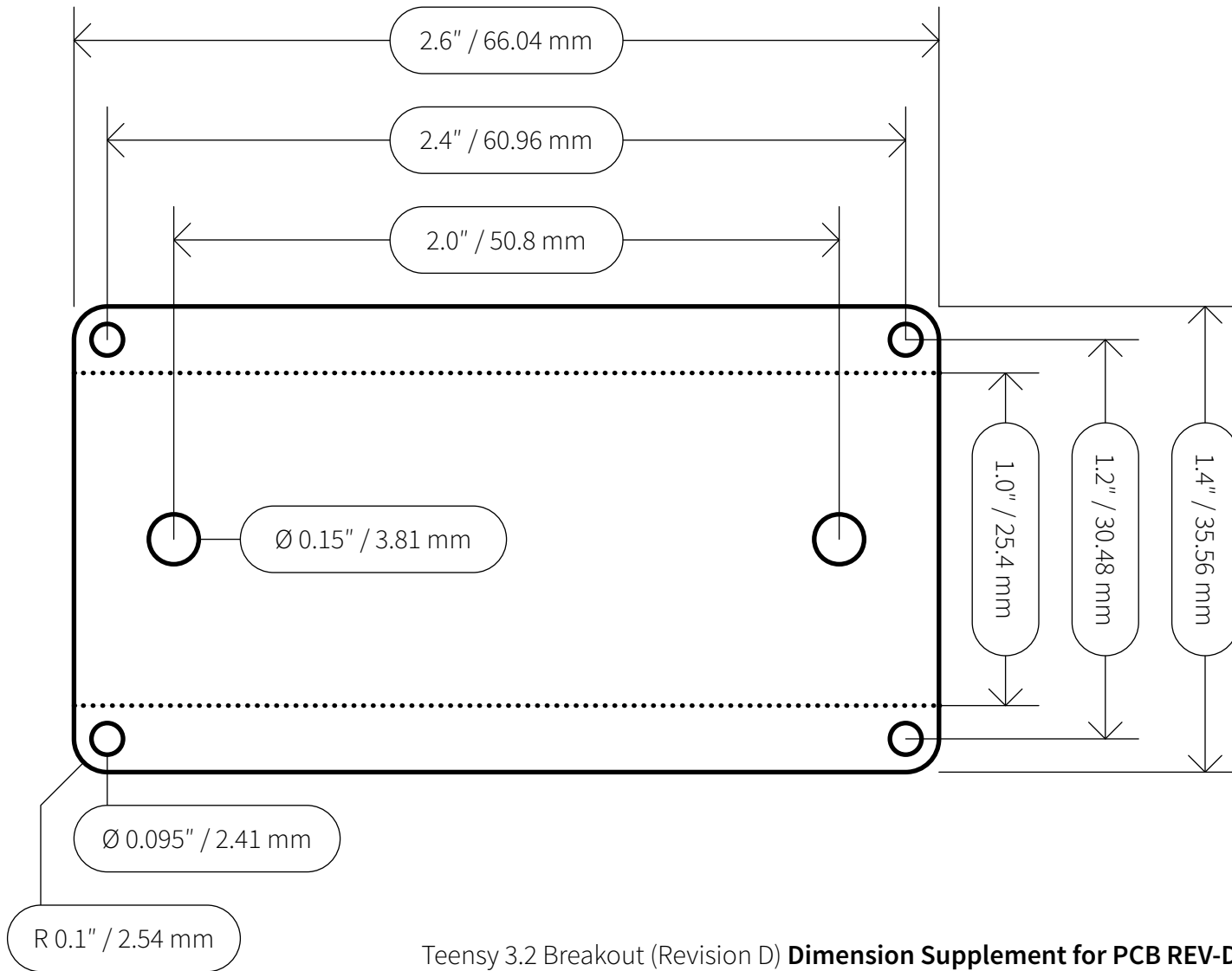


I  
2x



J  
4x

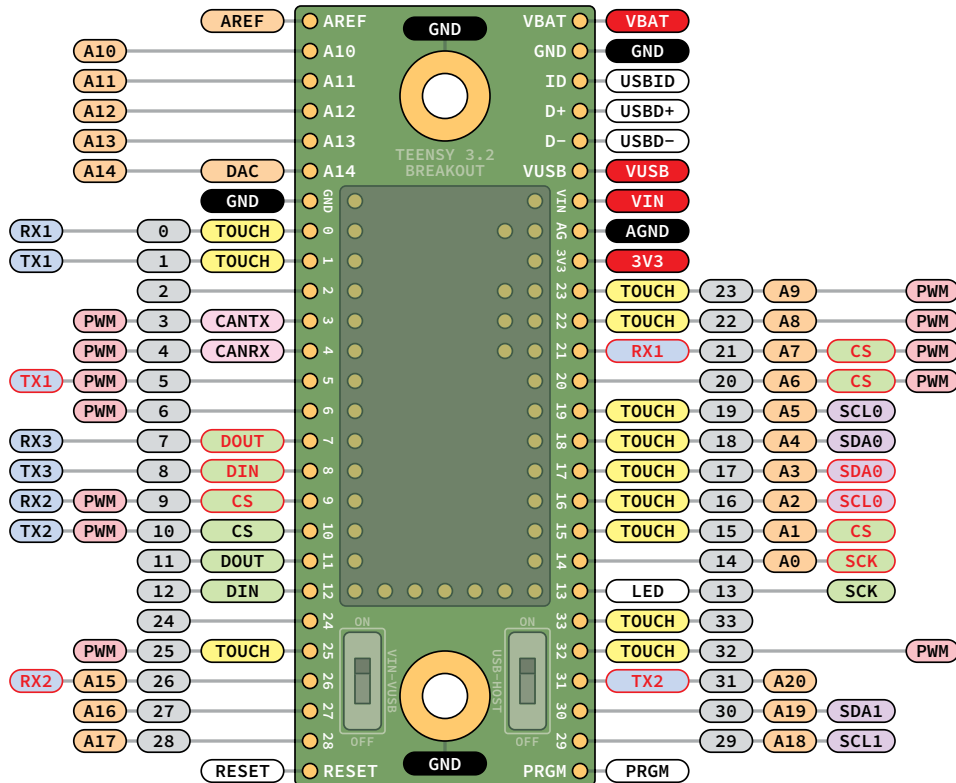




Teensy 3.2 Breakout (Revision D) **Dimension Supplement for PCB REV-D**

# Teensy 3.2 Breakout

Revision D



## Legend

- Voltage Pins
- Ground Pins
- Digital Pins 34
- Analog Pins 21
- PWM Pins 12
- Touch Sense Pins 12
- Serial Ports 3
- I2C Ports 2
- SPI Port 1
- CAN Bus Port 1
- Alternate Functions