

Raspberry Pi Pico 2 W Datasheet

An RP2350-based microcontroller board with wireless

Colophon

© 2022-2026 Raspberry Pi Ltd

This documentation is licensed under a Creative Commons Attribution-NoDerivatives 4.0 International (CC BY-ND).

Release	3
Build date	19/11/2026
Build version	d9d02bdfeecd

Legal disclaimer notice

TECHNICAL AND RELIABILITY DATA FOR RASPBERRY PI PRODUCTS (INCLUDING DATASHEETS) AS MODIFIED FROM TIME TO TIME ("RESOURCES") ARE PROVIDED BY RASPBERRY PI LTD ("RPL") "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW IN NO EVENT SHALL RPL BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THE RESOURCES, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

RPL reserves the right to make any enhancements, improvements, corrections or any other modifications to the RESOURCES or any products described in them at any time and without further notice.

The RESOURCES are intended for skilled users with suitable levels of design knowledge. Users are solely responsible for their selection and use of the RESOURCES and any application of the products described in them. User agrees to indemnify and hold RPL harmless against all liabilities, costs, damages or other losses arising out of their use of the RESOURCES.

RPL grants users permission to use the RESOURCES solely in conjunction with the Raspberry Pi products. All other use of the RESOURCES is prohibited. No licence is granted to any other RPL or other third party intellectual property right.

HIGH RISK ACTIVITIES. Raspberry Pi products are not designed, manufactured or intended for use in hazardous environments requiring fail safe performance, such as in the operation of nuclear facilities, aircraft navigation or communication systems, air traffic control, weapons systems or safety-critical applications (including life support systems and other medical devices), in which the failure of the products could lead directly to death, personal injury or severe physical or environmental damage ("High Risk Activities"). RPL specifically disclaims any express or implied warranty of fitness for High Risk Activities and accepts no liability for use or inclusions of Raspberry Pi products in High Risk Activities.

Raspberry Pi products are provided subject to RPL's Standard Terms. RPL's provision of the RESOURCES does not expand or otherwise modify RPL's Standard Terms including but not limited to the disclaimers and warranties expressed in them.

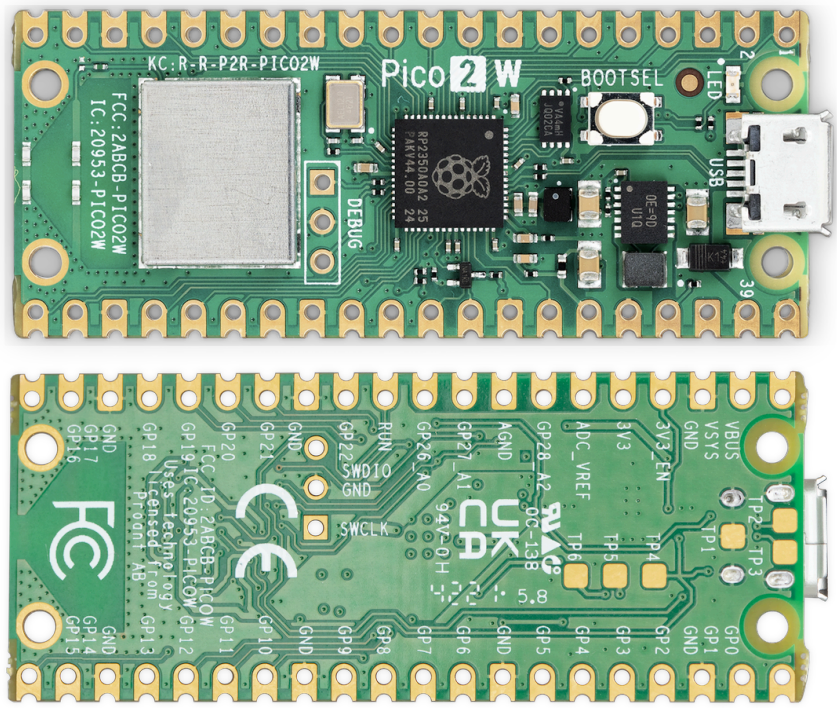
Table of Contents

1. About Pico 2 W . . . 3
1.1. Raspberry Pi Pico 2 W design files . . . 5
2. Mechanical specification . . . 6
2.1. Pico 2 W pinout . . . 6
2.2. Surface-mount footprint . . . 8
2.2.1. Keep-out area . . . 10
2.3. Recommended operating conditions . . . 11
3. Applications information . . . 13
3.1. Programming the flash . . . 13
3.2. General purpose I/O . . . 13
3.3. Using the ADC . . . 13
3.4. Powerchain . . . 14
3.5. Powering Raspberry Pi Pico 2 W . . . 14
3.6. Using a battery charger . . . 16
3.7. USB . . . 17
3.8. Wireless interface . . . 17
3.9. Debugging . . . 18
Appendix A. Availability . . . 19
A.1. Support . . . 19
Appendix B. Pico 2 W component locations . . . 20
Appendix C. Mean Time Between Failure (MTBF) . . . 21
Appendix D. Documentation Release History . . . 22
19 November 2026 . . . 22
03 July 2026 . . . 22
25 November 2024 . . . 22

1. About Pico 2 W

Raspberry Pi Pico 2 W is a microcontroller board based on the Raspberry Pi RP2350 microcontroller chip.

Figure 1.
The Raspberry Pi Pico 2 W board.



Raspberry Pi Pico 2 W has been designed to be a low cost yet flexible development platform for RP2350 , with a 2.4 GHz wireless interface and the following key features:

- RP2350 microcontroller with 4 MB of flash memory
- On-board single-band 2.4 GHz wireless interfaces (802.11n, Bluetooth 5.2)
  - Support for Bluetooth LE Central and Peripheral roles
  - Support for Bluetooth Classic
- Micro USB B port for power and data (and for reprogramming the flash)
- 40-pin 21 mm×51 mm 'DIP' style 1 mm thick PCB with 0.1" through-hole pins also with edge castellations
  - Exposes 26 multi-function 3.3 V general purpose I/O (GPIO)
  - 23 GPIO are digital-only, with three also being ADC capable
  - Can be surface-mounted as a module
- 3-pin Arm serial wire debug (SWD) port
- Simple yet highly flexible power supply architecture
  - Various options for easily powering the unit from micro USB, external supplies or batteries
- High quality, low cost, high availability
- Comprehensive SDK, software examples and documentation

For full details of the RP2350 microcontroller please see the **RP2350 Datasheet** book. Key features include:

- Dual Cortex-M33 or RISC-V Hazard3 cores clocked at up to 150 MHz
  - Two on-chip PLLs allow variable core and peripheral frequencies
- 520 kB multi-bank high performance SRAM
- External Quad-SPI flash with eXecute In Place (XIP) and 16 kB on-chip cache
- High performance full-crossbar bus fabric
- On-board USB1.1 (device or host)

- 30 multi-function general purpose I/O (four can be used for ADC)
  - 1.8-3.3 V I/O voltage
- 12-bit 500 ksps analogue to digital converter (ADC)
- Various digital peripherals
  - 2 × UART, 2 × I2C, 2 × SPI, 16 × PWM channels, 1× HSTX peripheral
  - 1 × timer with 4 alarms, 1 × AON Timer
- 3 × programmable I/O (PIO) blocks, 12 state machines in total
  - Flexible, user-programmable high-speed I/O
  - Can emulate interfaces such as SD card and VGA

Note

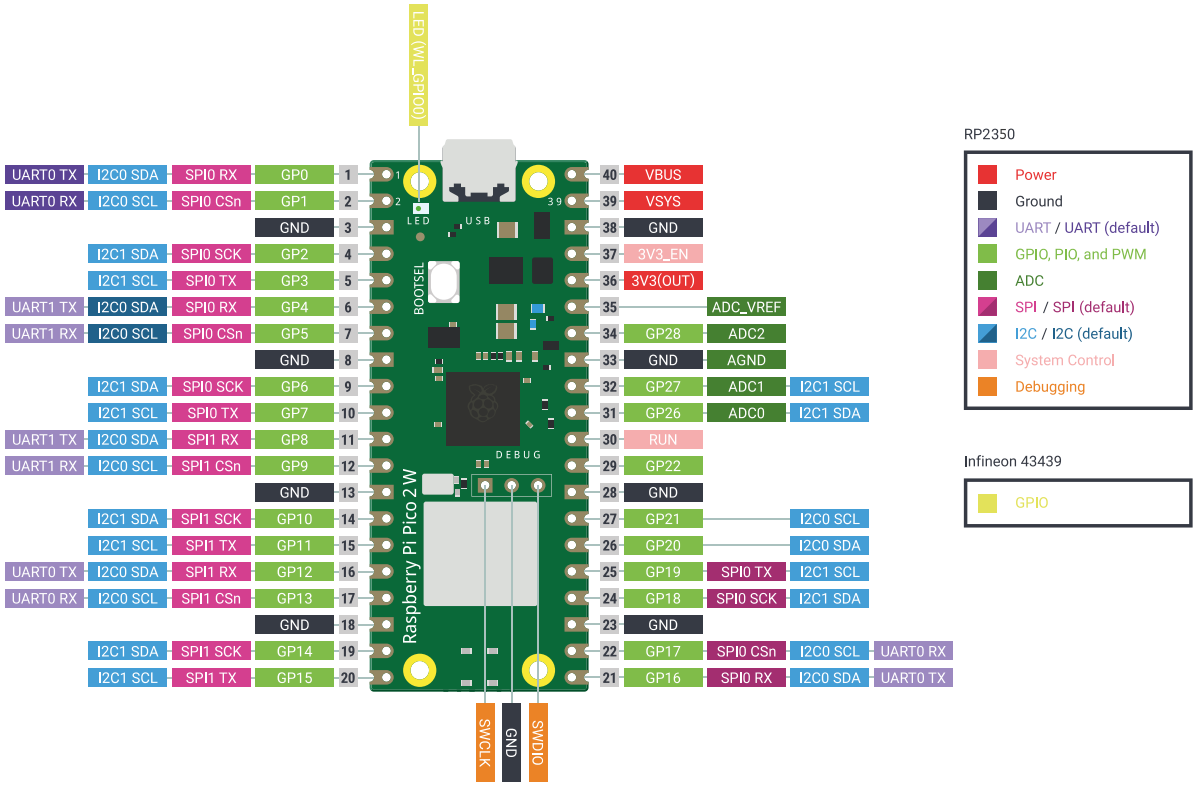
Raspberry Pi Pico 2 W I/O voltage is fixed at 3.3 V

Raspberry Pi Pico 2 W provides a minimal yet flexible external circuitry to support the RP2350 chip: flash memory (Winbond W25Q16JV), crystal (Abracon ABM8-272-T3), power supplies and decoupling, and USB connector. The majority of the RP2350 microcontroller pins are brought to the user I/O pins on the left and right edge of the board. Four RP2350 I/O are used for internal functions: driving an LED, on-board switch mode power supply (SMPS) power control, and sensing the system voltages.

Pico 2 W has an on-board 2.4 GHz wireless interface using an Infineon CYW43439. The antenna is an onboard antenna licensed from Abracon (formerly ProAnt). The wireless interface is connected via SPI to the RP2350 .

Pico 2 W has been designed to use either soldered 0.1-inch pin-headers (it is one 0.1-inch pitch wider than a standard 40-pin DIP package), or to be positioned as a surface-mountable 'module', as the user I/O pins are also castellated. There are SMT pads underneath the USB connector and `BOOTSEL` button, which allow these signals to be accessed if used as a reflow-soldered SMT module.

Figure 2.
The pinout of the Pico 2 W board



Raspberry Pi Pico 2 W uses an on-board buck-boost SMPS which is able to generate the required 3.3 V (to power RP2350 and external circuitry) from a wide range of input voltages (~1.8 to 5.5 V). This allows significant flexibility in powering the unit from

various sources, such as a single lithium-ion cell, or three AA cells in series. Battery chargers can also be very easily integrated with the Pico 2 W powerchain.

Reprogramming the Pico 2 W flash can be done using USB (simply drag and drop a file onto the Pico 2 W, which appears as a mass storage device), or the standard serial wire debug (SWD) port can reset the system and load and run code without any button presses. The SWD port can also be used to interactively debug code running on the RP2350 .

Tip

The **Getting started with Raspberry Pi Pico-series** book walks through loading programs onto the board, and shows how to install the C/C++ SDK and build the example C programs. See the **Raspberry Pi Pico-series Python SDK** book to get started with MicroPython, which is the fastest way to get code running on Pico 2 W.

1.1. Raspberry Pi Pico 2 W design files

The source design files, including the schematic and PCB layout, are made available openly except for the antenna. The Niche™ antenna is an Abracon/Proant patented antenna technology. Please contact niche@abracon.com for information on licensing.

STEP 3D

A STEP 3D model of Raspberry Pi Pico 2 W, for 3D visualisation and fit-check of designs which include Pico 2 W as a module, can be found in Raspberry Pi Pico 2 3D STEP file .

Fritzing

A Fritzing part for use in e.g. breadboard layouts can be found in Raspberry Pi Pico 2 Fritzing file .

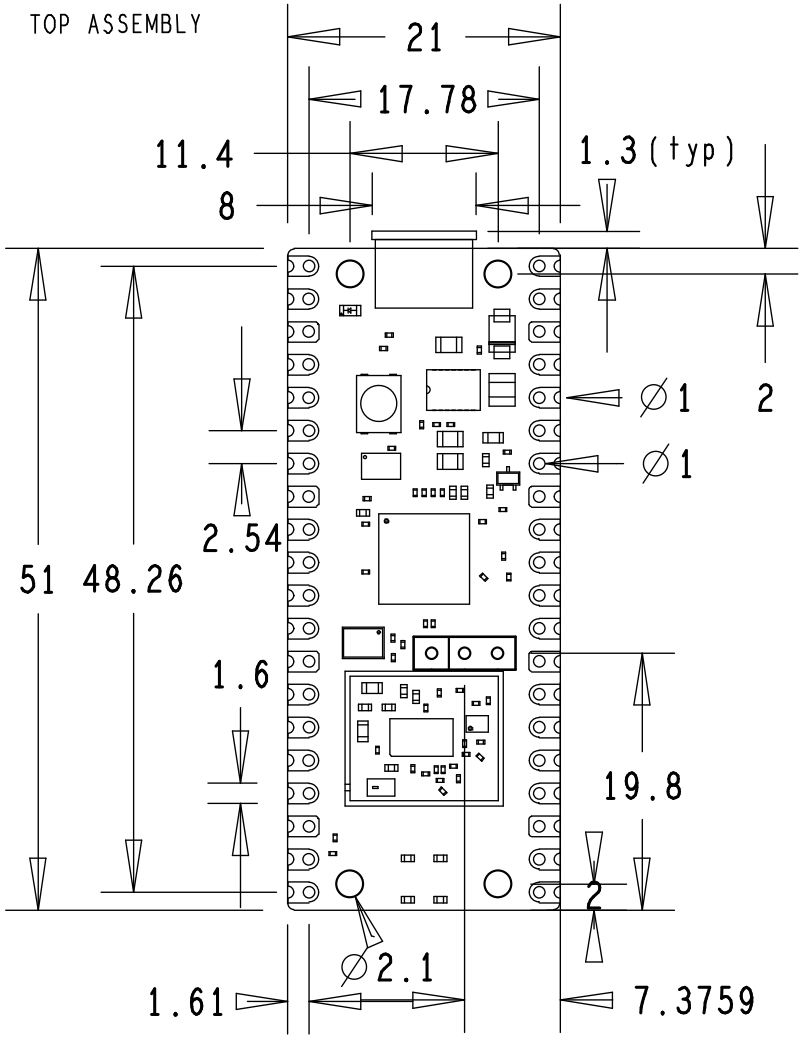
Permission to use, copy, modify, and/or distribute this design for any purpose with or without fee is hereby granted.

THE DESIGN IS PROVIDED “AS IS” AND THE AUTHOR DISCLAIMS ALL WARRANTIES WITH REGARD TO THIS DESIGN INCLUDING ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS. IN NO EVENT SHALL THE AUTHOR BE LIABLE FOR ANY SPECIAL, DIRECT, INDIRECT, OR CONSEQUENTIAL DAMAGES OR ANY DAMAGES WHATSOEVER RESULTING FROM LOSS OF USE, DATA OR PROFITS, WHETHER IN AN ACTION OF CONTRACT, NEGLIGENCE OR OTHER TORTIOUS ACTION, ARISING OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THIS DESIGN.

2. Mechanical specification

The Pico 2 W is a single sided 51 mm × 21 mm × 1 mm PCB with a micro USB port overhanging the top edge, and dual castellated/through-hole pins around the two long edges. The onboard wireless antenna is located on the bottom edge. To avoid detuning the antenna, no material should intrude into this space. Pico 2 W is designed to be usable as a surface-mount module as well as presenting a dual inline package (DIP) format, with the 40 main user pins on a 2.54 mm (0.1") pitch grid with 1 mm holes, compatible with veroboard and breadboard. Pico 2 W also has four 2.1 mm (± 0.05 mm) drilled mounting holes to provide for mechanical fixing(see Figure 3).

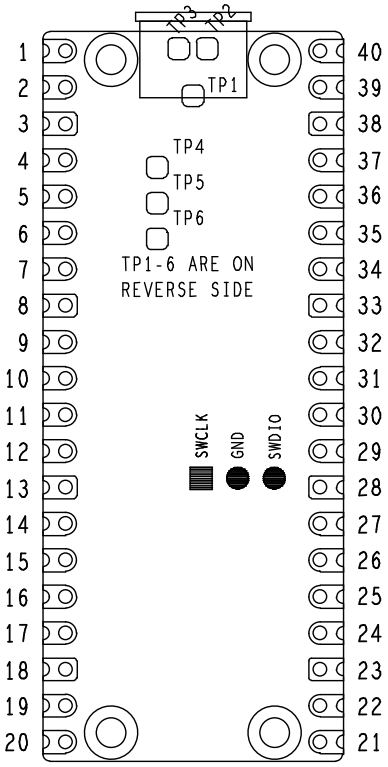
Figure 3.
The dimensions of the Pico 2 W



2.1. Pico 2 W pinout

The Pico 2 W pinout has been designed to directly bring out as much of the RP2350 GPIO and internal circuitry function as possible, while also providing a suitable number of ground pins to reduce electro-magnetic interference (EMI) and signal crosstalk. RP2350 is built on a modern 40 nm silicon process, so its digital I/O edge rates are very fast.

Figure 4.
The pin numbering of the Pico 2 W



Note

The physical pin numbering is shown in Figure 4. For pin allocation see Figure 2.

A few RP2350 GPIO pins are used for internal board functions:

GPIO29
OP/IP wireless SPI CLK/ADC mode (ADC3) to measure VSYS/3

GPIO25
OP wireless SPI CS - when high also enables GPIO29 ADC pin to read VSYS

GPIO24
OP/IP wireless SPI data/IRQ

GPIO23
OP wireless power on signal

WL_GPIO2
IP VBUS sense - high if VBUS is present, else low

WL_GPIO1
OP controls the on-board SMPS power save pin (Section 3.4. Powerchain)

WL_GPIO0
OP connected to user LED

Apart from GPIO and ground pins, there are seven other pins on the main 40-pin interface:

PIN40
VBUS

PIN39
VSYS
PIN37
3V3_EN
PIN36
3V3
PIN35
ADC_VREF
PIN33
AGND
PIN30
RUN

VBUS is the micro-USB input voltage, connected to micro-USB port pin 1. This is nominally 5 V (or 0 V if the USB is not connected or not powered).

VSYS is the main system input voltage, which can vary in the allowed range 1.8 V to 5.5 V, and is used by the on-board SMPS to generate the 3.3 V for the RP2350 and its GPIO.

3V3_EN connects to the on-board SMPS enable pin, and is pulled high (to VSYS) via a 100 kΩ resistor. To disable the 3.3 V (which also de-powers the RP2350), short this pin low.

3V3 is the main 3.3 V supply to RP2350 and its I/O, generated by the on-board SMPS. This pin can be used to power external circuitry (maximum output current will depend on RP2350 load and VSYS voltage; it is recommended to keep the load on this pin under 300 mA).

ADC_VREF is the ADC power supply (and reference) voltage, and is generated on Pico 2 W by filtering the 3.3 V supply. This pin can be used with an external reference if better ADC performance is required.

AGND is the ground reference for GPIO26-29. There is a separate analogue ground plane running under these signals and terminating at this pin. If the ADC is not used or ADC performance is not critical, this pin can be connected to digital ground.

RUN is the RP2350 enable pin, and has an internal (on-chip) pull-up resistor to 3.3 V of about ~50 kΩ. To reset RP2350 , short this pin low.

Finally, there are also six test points (TP1-TP6), which can be accessed if required, for example if using as a surface-mount module. These are:

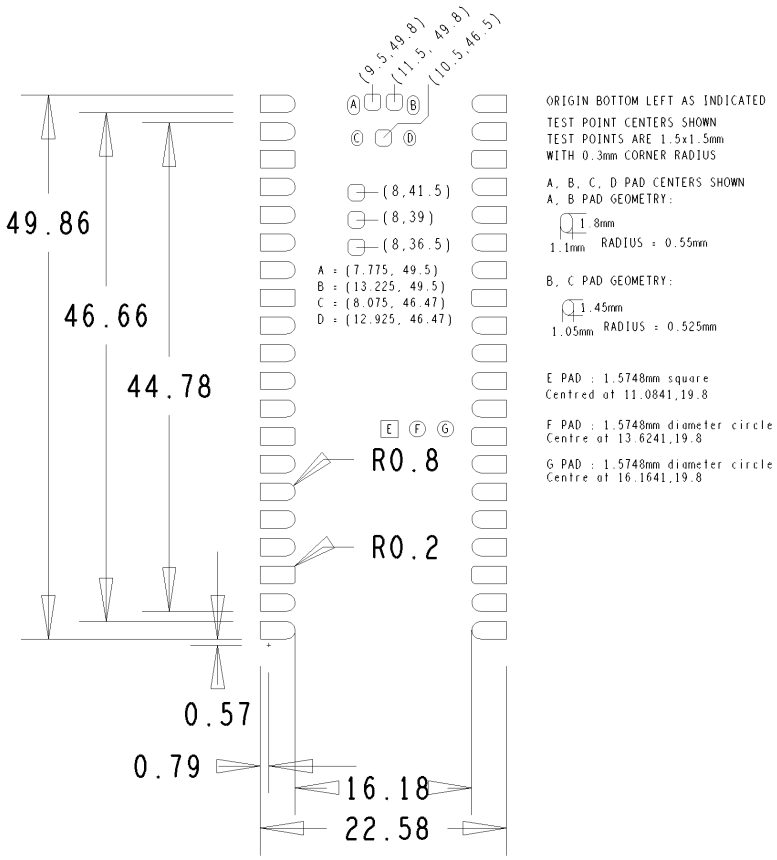
TP1
Ground (close-coupled ground for differential USB signals)
TP2
USB DM
TP3
USB DP
TP4
WL_GPIO1/SMPS PS pin (do not use)
TP5
WL_GPIO0/LED (not recommended to be used)
TP6
BOOTSEL

TP1, TP2 and TP3 can be used to access USB signals instead of using the micro-USB port. TP6 can be used to drive the system into mass-storage USB programming mode (by shorting it low at power-up). Note that TP4 is not intended to be used externally, and TP5 is not really recommended to be used as it will only swing from 0 V to the LED forward voltage (and hence can only really be used as an output with special care).

2.2. Surface-mount footprint

The following footprint (Figure 5) is recommended for systems which will be reflow-soldering Pico 2 W units as modules.

Figure 5.
The SMT footprint of the Pico 2 W board.

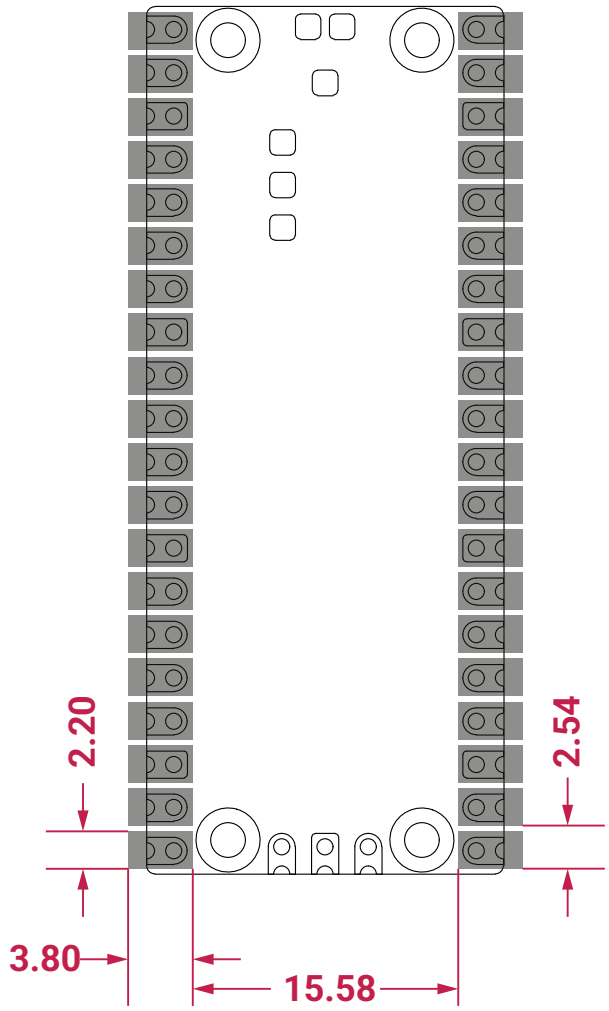


The footprint shows the test point locations and pad sizes as well as the 4 USB connector shell ground pads (A,B,C,D). The USB connector on Pico 2 W is a through-hole part, which provides it with mechanical strength. The USB socket pins do not protrude all the way through the board, however solder does pool at these pads during manufacture and can stop the module sitting completely flat. Hence we provide pads on the SMT module footprint to allow this solder to reflow in a controlled manner when Pico 2 W goes through reflow again.

For test points that are not used, it is acceptable to void any copper under these (with suitable clearance) on the carrier board.

Through trials with customers, we have determined that the paste stencil must be bigger than the footprint. Over-pasting the pads ensures the best possible results when soldering. The following paste stencil (Figure 6) indicates the dimensions of solder paste zones on the Pico 2 W. We recommend paste zones 163% larger than the footprint.

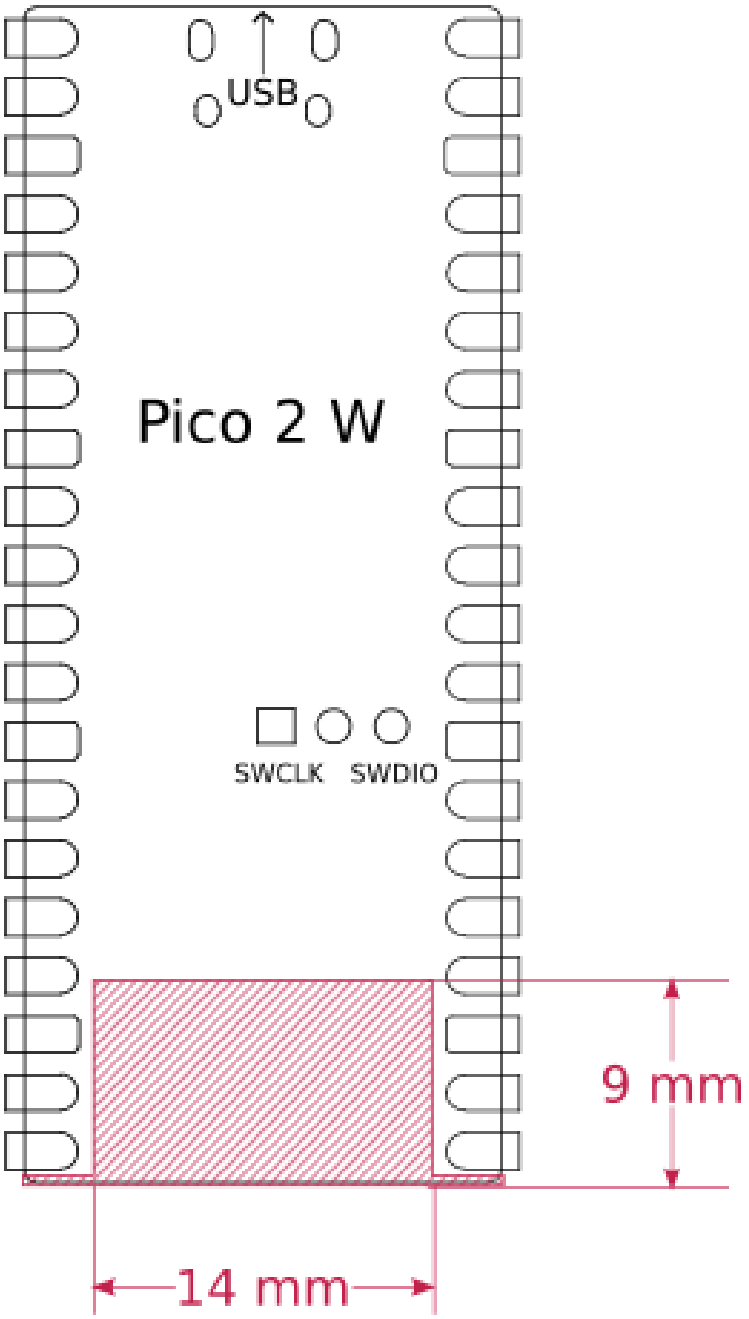
Figure 6.
The paste stencil of the Raspberry Pi Pico 2 W board.



2.2.1. Keep-out area

There is a cutout for the antenna (14 mm × 9 mm). If anything is placed close to the antenna (in any dimension) the effectiveness of the antenna is reduced. Place the Raspberry Pi Pico 2 W on the edge of a board and don't enclose it in metal to avoid creating a Faraday cage. Adding ground to the sides of the antenna improves the performance slightly.

Figure 7.
Top view of the Raspberry Pi Pico 2 W with the keep-out area marked in red



2.3. Recommended operating conditions

Operating conditions for the Pico 2 W are largely a function of the operating conditions specified by its components.

Operating Temp Max
70°C (including self-heating)

Operating Temp Min
−20°C

VBUS
: 5 V ± 10%.

VSYS Min
: 1.8 V

VSYS Max
: 5.5 V

Note that VBUS and VSYS current will depend on use-case, some examples are given in the next section.

Recommended maximum ambient temperature of operation is 70°C.

3. Applications information

3.1. Programming the flash

The on-board 4 MB QSPI flash can be (re)programmed either using the serial wire debug port or by the special USB mass storage device mode.

The simplest way to reprogram the Pico 2 W's flash is to use the USB mode. To do this, power-down the board, then hold the BOOTSEL button down during board power-up (e.g. hold BOOTSEL down while connecting the USB). The Pico 2 W will then appear as a USB mass storage device. Dragging a special '.uf2' file onto the disk will write this file to the flash and restart the Pico 2 W.

The USB boot code is stored in ROM on RP2350 , so can not be accidentally overwritten.

To get started using the SWD port see the *Debugging with SWD* section of Getting started with Raspberry Pi Pico-series.

3.2. General purpose I/O

The Pico 2 W's GPIO is powered from the on-board 3.3 V rail, and is fixed at 3.3 V.

Pico 2 W exposes 26 of the 30 possible RP2350 GPIO pins by routing them straight out to Pico 2 W header pins. GPIO0 to GPIO22 are digital-only, and GPIO 26-28 can be used either as digital GPIO or as ADC inputs (software selectable).

Note

GPIO 26-29 are ADC-capable and have an internal reverse diode to the IOVDD (3.3 V) rail, so the input voltage must not exceed IOVDD plus about 300 mV. If the RP2350 is unpowered, applying a voltage to these GPIO pins will 'leak' through the diode into the IOVDD rail. GPIO pins 0-25 (and the debug pins) do not have this restriction and therefore voltage can safely be applied to these pins when RP2350 is unpowered up to 3.3 V.

3.3. Using the ADC

The RP2350 ADC does not have an on-chip reference; it uses its own power supply as a reference. On Pico 2 W the ADC_AVDD pin (the ADC supply) is generated from the SMPS 3.3 V by using an R-C filter (201 Ω into 2.2 µF).

1. This solution relies on the 3.3 V SMPS output accuracy
2. Some PSU noise will not be filtered
3. The ADC draws current (about 150 µA if the temperature sense diode is disabled, which can vary between chips); there will be an inherent offset of about 150 µA × 200 = ~30 mV. There is a small difference in current draw when the ADC is sampling (about +20 µA), so that offset will also vary with sampling as well as operating temperature.

Changing the resistance between the ADC_VREF and 3.3 V pin can reduce the offset at the expense of more noise, which is helpful if the use case can support averaging over multiple samples.

Driving the SMPS mode pin (WL_GPIO1) high forces the power supply into PWM mode. This can greatly reduce the inherent ripple of the SMPS at light load, and therefore reduces the ripple on the ADC supply. This does reduce the power efficiency of the Pico 2 W at light load, so at the end of an ADC conversion PFM mode can be re-enabled by driving WL_GPIO1 low once more. See Section 3.4. Powerchain.

The ADC offset can be reduced by tying a second channel of the ADC to ground, and using this zero measurement as an approximation to the offset.

For much improved ADC performance, an external 3.0 V shunt reference, such as LM4040, can be connected from the ADC_VREF pin to ground. Note that if doing this the ADC range is limited to 0 V - 3.0 V signals (rather than 0 V - 3.3 V), and the shunt reference will draw continuous current through the 200 Ω filter resistor (3.3 V - 3.0 V)/200 = ~1.5 mA.

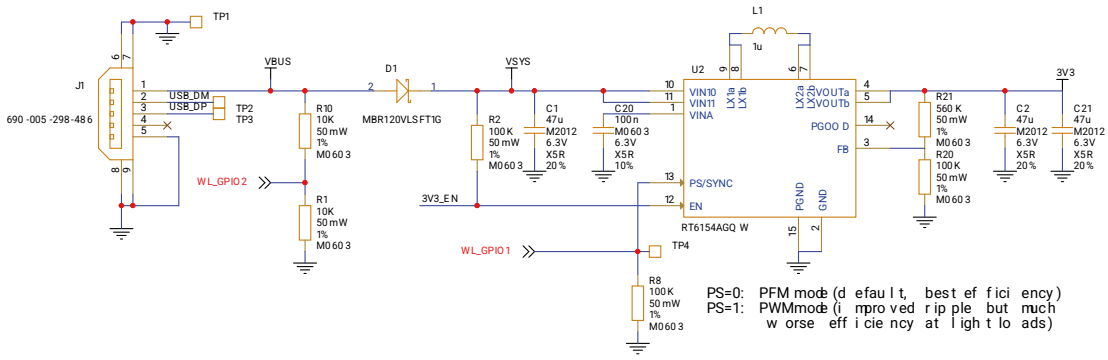
Note that the 1 Ω resistor on Pico 2 W (R9) is designed to help with shunt references that would otherwise become unstable when directly connected to 2.2 µF. It also ensures there is filtering even in the case that 3.3 V and ADC_VREF are shorted together (which users who are tolerant to noise and want to reduce the inherent offset may wish to do).

R7 can be removed if a user wants to isolate ADC_VREF and make their own changes to the ADC voltage, for example powering it from an entirely separate voltage (e.g. 2.5 V). Note that the ADC on RP2350 has only been qualified at 3.0/3.3 V, but should work down to about 2 V.

3.4. Powerchain

Pico 2 W has been designed with a simple yet flexible power supply architecture and can easily be powered from other sources such as batteries or external supplies. Integrating the Pico 2 W with external charging circuits is also straightforward. Figure 8 shows the power supply circuitry.

Figure 8.
The powerchain of the Pico 2 W board.



VBUS is the 5 V input from the micro-USB port, which is fed through a Schottky diode to generate VSYS. The VBUS to VSYS diode (D1) adds flexibility by allowing power ORing of different supplies into VSYS.

VSYS is the main system 'input voltage' and feeds the RT6154 buck-boost SMPS, which generates a fixed 3.3 V output for the RP2350 device and its I/O (and can be used to power external circuitry). VSYS divided by 3 (by R5, R6 in the Pico 2 W schematic) and can be monitored on ADC channel 3 when a wireless transmission isn't in progress. This can be used for example as a crude battery voltage monitor.

The buck-boost SMPS, as its name implies, can seamlessly switch from buck to boost mode, and therefore can maintain an output voltage of 3.3 V from a wide range of input voltages, ~1.8 V to 5.5 V, which allows a lot of flexibility in the choice of power source.

WL_GPIO2 monitors the existence of VBUS, while R10 and R1 act to pull VBUS down to make sure it is 0 V if VBUS is not present.

WL_GPIO1 controls the RT6154 PS (power save) pin. When PS is low (the default on Pico 2 W) the regulator is in pulse frequency modulation (PFM) mode, which, at light loads, saves considerable power by only turning on the switching MOSFETs occasionally to keep the output capacitor topped up. Setting PS high forces the regulator into pulse width modulation (PWM) mode. PWM mode forces the SMPS to switch continuously, which reduces the output ripple considerably at light loads (which can be good for some use cases) but at the expense of much worse efficiency. Note that under heavy load the SMPS will be in PWM mode irrespective of the PS pin state.

The SMPS EN pin is pulled up to VSYS by a 100 kΩ resistor and made available on Pico 2 W pin 37. Shorting this pin to ground will disable the SMPS and put it into a low power state.

Note

The RP2350 has an on-chip linear regulator (LDO) that powers the digital core at 1.1 V (nominal) from the 3.3 V supply, which is not shown in Figure 8.

3.5. Powering Raspberry Pi Pico 2 W

The simplest way to power Pico 2 W is to plug in the micro-USB, which will power VSYS (and therefore the system) from the 5 V USB VBUS voltage, via D1 (so VSYS becomes VBUS minus the Schottky diode drop).

If the USB port is the **only** power source, VSYS and VBUS can be safely shorted together to eliminate the Schottky diode drop (which improves efficiency and reduces ripple on VSYS).

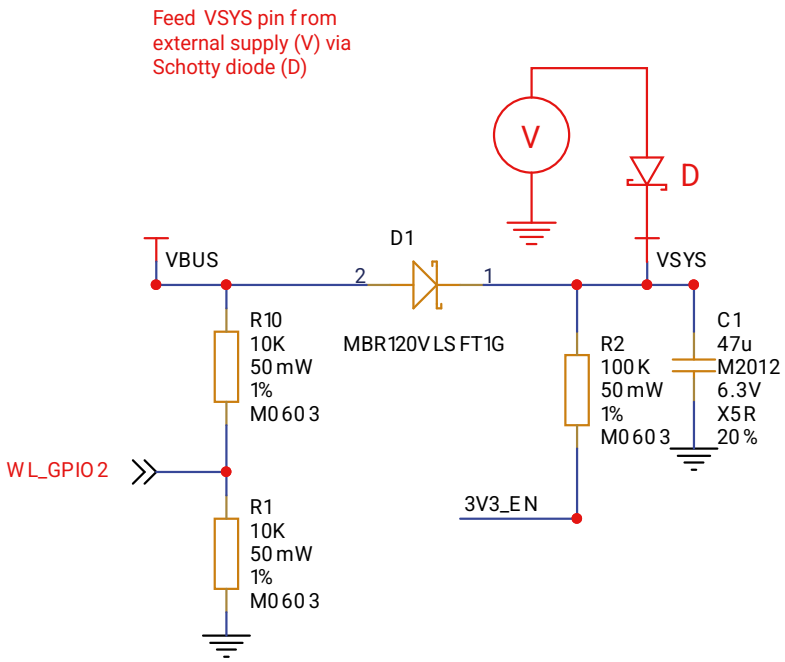
If the USB port is **not** going to be used, it is safe to power Pico 2 W by connecting VSYS to your preferred power source (in the range ~1.8 V to 5.5 V).

Important

If you are using Pico 2 W in USB host mode (e.g. using one of the TinyUSB host examples) then you must power Pico 2 W by providing 5 V to the VBUS pin.

The simplest way to safely add a second power source to Pico 2 W is to feed it into VSYS via another Schottky diode (see Figure 9). This will 'OR' the two voltages, allowing the higher of either the external voltage or VBUS to power VSYS, with the diodes preventing either supply from back-powering the other. For example a single Lithium-Ion cell* (cell voltage ~3.0 V to 4.2 V) will work well, as will three AA series cells (~3.0 V to ~4.8 V) and any other fixed supply in the range ~2.3 V to 5.5 V. The downside of this approach is that the second power supply will suffer a diode drop in the same way as VBUS does, and this may not be desirable from an efficiency perspective or if the source is already close to the lower range of input voltage allowed for the RT6154.

Figure 9.
Pico 2 W power ORing using diodes.

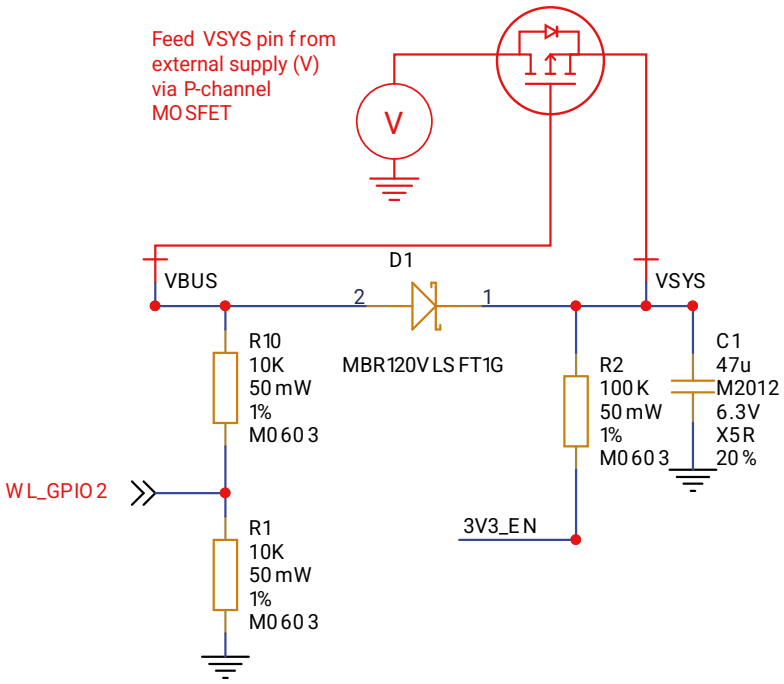


An improved way to power from a second source is using a P-channel MOSFET (P-FET) to replace the Schottky diode as shown in Figure 10. Here, the gate of the FET is controlled by VBUS, and will disconnect the secondary source when VBUS is present. The P-FET should be chosen to have low on resistance, and therefore overcomes the efficiency and voltage-drop issues with the diode-only solution.

Note that the V_t (threshold voltage) of the P-FET must be chosen to be well below the minimum external input voltage, to make sure the P-FET is turned on swiftly and with low resistance. When the input VBUS is removed, the P-FET will not start to turn on until VBUS drops below the P-FET's V_t, meanwhile the body diode of the P-FET may start to conduct (depending on whether V_t is smaller than the diode drop). For inputs that have a low minimum input voltage, or if the P-FET gate is expected to change slowly (e.g. if any capacitance is added to VBUS) a secondary Schottky diode across the P-FET (in the same direction as the body diode) is recommended. This will reduce the voltage drop across the P-FET's body diode.

An example of a suitable P-MOSFET for most situations is Diodes DMG2305UX which has a maximum V_t of 0.9 V and R_{on} of 100 mΩ (at 2.5 V V_{gs}).

Figure 10.
Pico 2 W power ORing using P channel MOSFET.



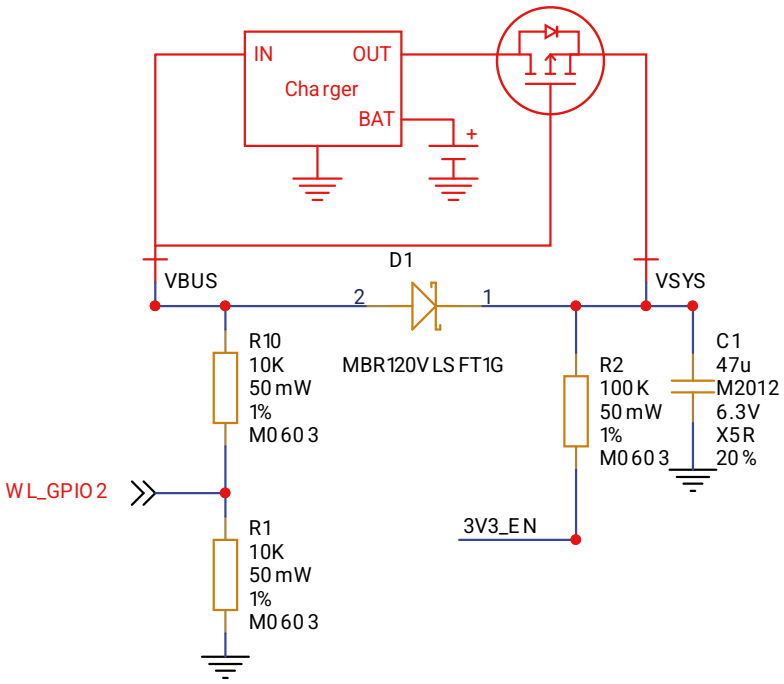
Caution

If using Lithium-Ion cells they must have, or be provided with, adequate protection against over-discharge, over-charge, charging outside allowed temperature range, and overcurrent. Bare, unprotected cells are dangerous and can catch fire or explode if over-discharged, over-charged or charged / discharged outside their allowed temperature and/or current range.

3.6. Using a battery charger

Pico 2 W can also be used with a battery charger. Although this is a slightly more complex use case it is still straightforward. Figure 11 shows an example of using a 'power path' type charger (where the charger seamlessly manages swapping between powering from battery or powering from the input source and charging the battery, as needed).

Figure 11.
Using Pico 2 W with a charger.



In the example we feed VBUS to the input of the charger, and we feed VSYS with the output via the previously mentioned P-FET arrangement. Depending on your use case you may also want to add a Schottky diode across the P-FET as described in the previous section.

3.7. USB

RP2350 has an integrated USB1.1 PHY and controller which can be used in both device and host mode. Pico 2 W adds the two required 27 Ω external resistors and brings this interface to a standard micro-USB port.

The USB port can be used to access the USB bootloader (BOOTSEL mode) stored in the RP2350 boot ROM. It can also be used by user code, to access an external USB device or host.

3.8. Wireless interface

Pico 2 W contains an on-board 2.4 GHz wireless interface using the Infineon CYW43439, which has the following features:

- WiFi 4 (802.11n), Single-band (2.4 GHz)
- WPA3
- SoftAP (Up to 4 clients)
- Bluetooth 5.2
    - Support for Bluetooth LE Central and Peripheral roles
    - Support for Bluetooth Classic

The antenna is an onboard antenna licensed from ABRACON (formerly ProAnt). The wireless interface is connected via SPI to the RP2350 .

Due to pin limitations, some of the wireless interface pins are shared. The CLK is shared with VSYS monitor, so only when there isn't an SPI transaction in progress can VSYS be read via the ADC. The Infineon CYW43439 DIN/DOUT and IRQ all share one pin on the RP2350 . Only when an SPI transaction isn't in progress is it suitable to check for IRQs. The interface typically runs at 33 MHz.

For best wireless performance, the antenna should be in free space. For instance, putting metal under or close by the antenna can reduce its performance both in terms of gain and bandwidth. Adding grounded metal to the sides of the antenna can improve the antenna's bandwidth.

There are three GPIO pins from the CYW43439 that are used for other board functions and can easily be accessed via the SDK:

WL_GPIO2
: IP VBUS sense - high if VBUS is present, else low

WL_GPIO1
: OP controls the on-board SMPS power save pin (Section 3.4. Powerchain)

WL_GPIO0
: OP connected to user LED

Note

Full details of the Infineon CYW43439 can be found on the Infineon website.

3.9. Debugging

Pico 2 W brings the RP2350 serial wire debug (SWD) interface to a three-pin debug header. To get started using the debug port see the *Debugging with SWD* section of Getting started with Raspberry Pi Pico-series..

Note

The RP2350 chip has internal pull-up resistors on the SWDIO and SWCLK pins, both nominally 60 kΩ.

Appendix A. Availability

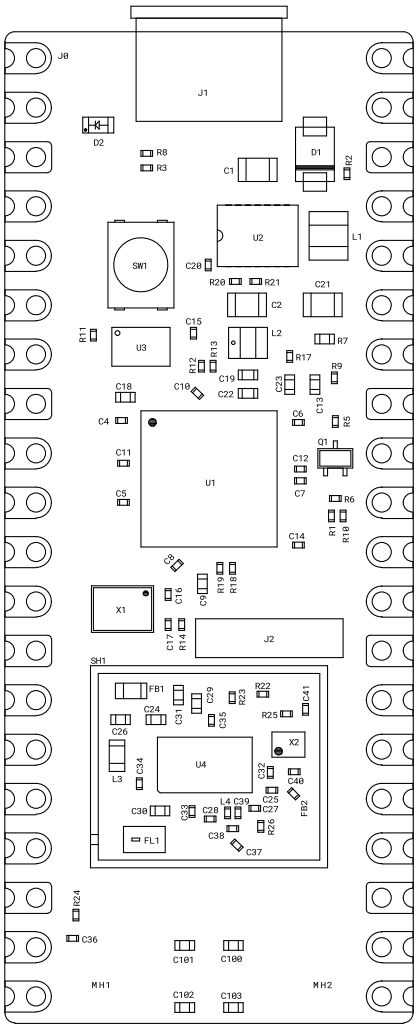
Raspberry Pi guarantee availability of the Raspberry Pi Pico 2 W product until at least January 2028.

A.1. Support

For support see the Pico section of the Raspberry Pi documentation , and post questions on the Raspberry Pi forum .

Appendix B. Pico 2 W component locations

Figure 12.
The Pico 2 W board component locations.



Appendix C. Mean Time Between Failure (MTBF)

Table 1.
Mean time between failure for {boardname}

Model	Mean Time Between Failure Ground Benign (Hours)	Mean Time Between Failure Ground Mobile (Hours)
Pico 2 W	182000	11000

Ground, benign

Applies to non-mobile, temperature and humidity controlled environments readily accessible to maintenance; includes laboratory instruments and test equipment, medical electronic equipment, business and scientific computer complexes.

Ground, mobile

Assumes levels of operational stress well above normal domestic or light industrial use, without temperature, humidity or vibration control: applies to equipment installed on wheeled or tracked vehicles and equipment manually transported; includes mobile and handheld communications equipment.

Appendix D. Documentation Release History

19 November 2026

- Correct the size listed for the QSPI flash.
- Update the antenna keep-out area diagram.

03 July 2026

- Converted to new build toolchain

25 November 2024

- Initial release.



Raspberry Pi

Raspberry Pi is a trademark of Raspberry Pi Ltd

Raspberry Pi Ltd