|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Microcontroller** | RP2040 | RP2350 | ESP32 series | ESP8266  series |
| **Temperature Range(°C)** | -40 to +85 | -20 to +85 | -40 to +125 | -40 to +125 |

**Information that may be useful to decide a suitable microcontroller for GrapeFruit Toolkit Project**

**Some Microcontroller boards with RP2040**

* Raspberry Pi Pico (No built-in wireless connection, need external Wi-Fi module)
* Raspberry Pi Pico W (built-in wireless connection)

Price: $17.6 (kuriosity), $21.48 (Amazon.sg)

Datasheet: [Raspberry Pi Pico W Datasheet: An RP2040-based microcontroller board with wireless.](https://datasheets.raspberrypi.com/picow/pico-w-datasheet.pdf)

**Some Microcontroller boards with RP2350**

* Raspberry Pi Pico 2 (No built-in wireless connection, need external Wi-Fi module)
* Raspberry Pi Pico 2 W (built-in wireless connection)

Price: $20 (kuriosity), $29.93 (Amazon.sg)

Datasheet: [Raspberry Pi Pico 2 W Datasheet: An RP2350-based microcontroller board with wireless.](https://datasheets.raspberrypi.com/picow/pico-2-w-datasheet.pdf)

**\*Similarities** for both Raspberry Pi Pico W and Raspberry Pi Pico 2 W

* size: 51mm x 21mm x 1mm
* Operating temperature: -20°C to 70°C
* have Wireless connectivity
* GPIO: 26 GPIO pins (23 digital only, 3- ADC capable)
* I/O voltage: 1.8-3.3V
* ADC: 12-bit, 500ksps (GPIO 26-28)
* Input voltage: ~1.8-5.5V
* 2 × UART, 2 × I2C, 2 × SPI

**\*Differences**

|  |  |  |
| --- | --- | --- |
|  | **Raspberry Pi Pico W** | **Raspberry Pi Pico 2 W** |
| **Microcontroller** | RP2040, Dual-core Cortex-M0+ at 133MHz | RP2350, Dual Cortex-M33 or RISC-V Hazard3 cores at 150MHz |
| **Flash Memory** | 2 MB | 4 MB |
| **SRAM** | 264 KB | 520 KB |
| **PWM Channels** | 16 | 24 |
| **Additional Peripherals** | 1 x real time clock | 1× HSTX peripheral, 1× AON Timer |
| **PIO** | 2 | 3 |

**ESP32 series and ESP8266 series modules**

* Most ESP32 series chips and modules themselves have an operating temperature from

-40°C to 125°C.

* The actual temperature range of the development board can be different depending on other factors such as voltage regulators, USB-to-Serial Chip, capacitors, resistors, and PCB material used.

\*I could not find the exact information about the operating temperature range of the development boards with the ESP32 series and ESP8266 series.

**References**

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* [**ESP32 Wi-Fi & Bluetooth SoC | Espressif Systems**](https://www.espressif.com/en/products/socs/esp32)
* [**New Raspberry Pi Pico 2 vs Pico 1 vs Pico 1W comparison | CHECK PINNED COMMENT FOR WIFI**](https://www.youtube.com/watch?v=H6UQluoeDfA&t=499s)
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* [**Technical Documents | Espressif Systems**](https://www.espressif.com/en/support/download/documents/modules)
* [**0B-ESP8266\_\_System\_Description\_\_EN\_V1.2**](https://www.espressif.com/sites/default/files/0b-esp8266_system_description_en_v1.4_1.pdf)