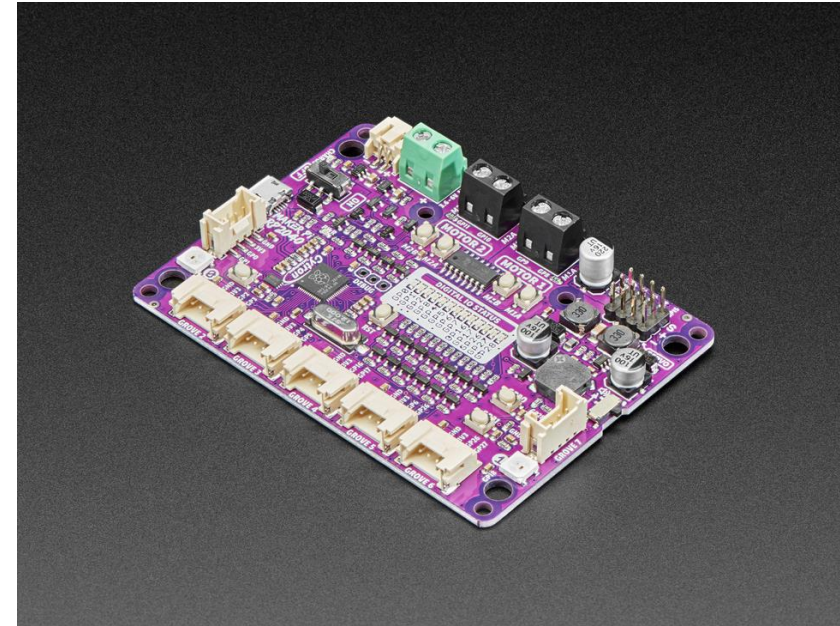


# Homework 2 – Board Investigation and Discovery

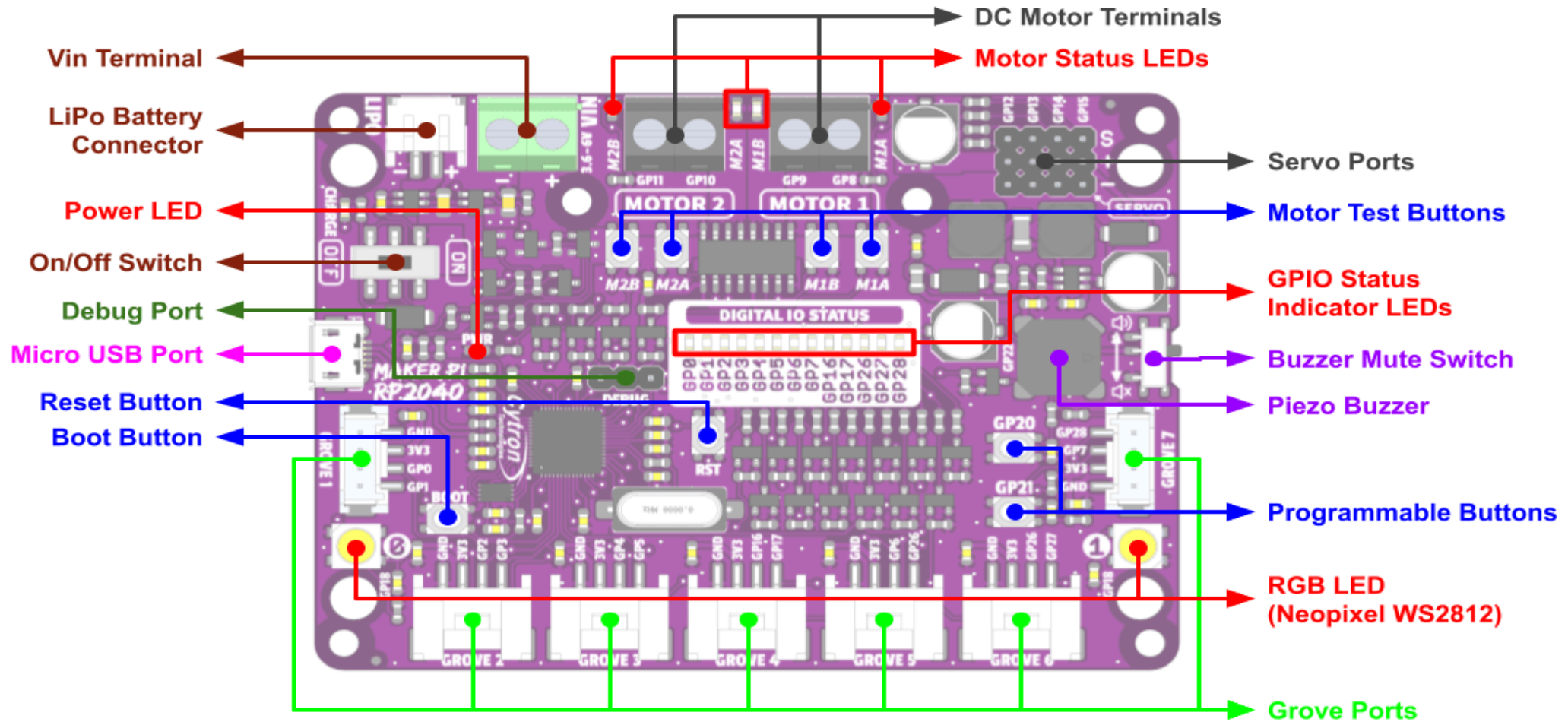
STM32F429IDISCOVERY Board vs Maker Pi RP2040 - Motor and Robot Controller



# Hardware Diagram - STM32F429IDISCOVERY Board

System	Chrom-ART Accelerator™	
Power supply 1.2 V internal regulator POR/PDR/PVD	ART Accelerator™	Connectivity
Xtal oscillators 32 kHz + 4 ~26 MHz	180 MHz Arm® Cortex®-M4 CPU	TFT LCD controller
Internal RC oscillators 32 kHz + 16 MHz	Floating Point Unit (FPU)	6x SPI, 2x I²S, 3x I²C
3 PLLs	Nested Vector Interrupt Controller (NVIC)	Camera interface
Clock control	JTAG/SW debug	Ethernet MAC 10/100 with IEEE 1588
RTC/AWU	Embedded Trace Macrocell (ETM)	2x CAN 2.0B
1x SysTick timer	Memory Protection Unit (MPU)	1x USB 2.0 OTG FS/HS
2x watchdogs (independent and window)	Mutli-AHB bus matrix	1x USB 2.0 OTG FS
82/114/140/168 I/Os	16-channel DMA	1x SDMMC
Cyclic Redundancy Check (CRC)	True random number generator (RNG)	4x USART + 4 UART LIN, smartcard, IrDA, modem control
96-bit unique ID	Up to 2-Mbyte dual-bank Flash memory	1x SAI (Serial audio interface)
Voltage scaling	256-Kbyte SRAM	
	FMC/SRAM/NOR/NAND/ CF/SDRAM	Analog
	80-byte + 4-Kbyte backup SRAM	2-channel 2x 12-bit DAC
	512 OTP bytes	3x 12-bit ADC/2.4 MSPS Up to 24 channels /7.2 MSPS
Control		Temperature sensor
2x 16-bit motor-control PWM		
10x 16-bit timers 2x 32-bit timers		

# Board Layout - Maker Pi RP2040 - Motor and Robot Controller



How much does each board cost? Are they available?

STM32F429IDISCOVERY Board	
• Digikey PN:	497-16140-ND
• Cost:	\$29.00
• Num in stock:	10



Maker Pi RP2040 - Motor and Robot Controller	
• Adafruit PN:	5129
• Cost:	\$12.50
• Num in stock:	0

# What kind of processor is it?

## STM32F429ZIT6

- ARM Cortex-M4
- 180MHz
- Single Core
- RISC
- 32 bit
- 256K SRAM
- 2 Mbytes Flash
- <https://www.st.com/en/microcontrollers-microprocessors/stm32f429zi.html>

## RP2040

- ARM Cortex-M0+
- 133 MHz
- Dual Core
- RISC
- 32 bit
- 264K SRAM
- 0 Mbytes Flash
- <https://www.raspberrypi.com/documentation/microcontrollers/rp2040.html>

# How much Flash and RAM does it have? Any other memory types?

## **STM32F429IDISCOVERY Board**

- 64 Mbit SDRAM
- 2 Mbytes
- Supports 64MB external memory

## **Maker Pi RP2040 - Motor and Robot Controller**

- 0 SDRAM
- 2Mbytes Flash
- Supports 16 MB external memory



# Does it have any special peripherals? List 3-5 that you find interesting.

## STM32F429IDISCOVERY Board

- Has an ST MEMS motion sensor 3-axis digital output gyroscope
- 2.4" QVGA TFT LCD
- "Extension header for LQFP144 I/Os for a quick connection to the prototyping board and an easy probing"
- *This is a board optimized for debugging*

## Maker Pi RP2040 - Motor and Robot Controller

- It has 4 Servo motors
- It also has 2 DC motors with quick test buttons
- There are 13 status LEDs for GPIO pins
- Piezo buzzer with mute switch
- 7 grove ports (flexible I/O)
- *This is the Las Vegas of boards*

# If it has an ADC, what are the features?

## **STM32F429IDISCOVERY Board**

- 3×12-bit, 2.4 MSPS ADC: up to 24 channels and 7.2 MSPS in triple interleaved mode

## **Maker Pi RP2040 - Motor and Robot Controller**

- N/A



# Look at one application note for this board

## STM32F429IDISCOVERY Board

- Looked at: **EMC design guide for STM8, STM32 and Legacy MCUs**
- [https://www.st.com/resource/en/application\\_note/an1709-emc-design-guide-for-stm8-stm32-and-legacy-mcus-stmicroelectronics.pdf](https://www.st.com/resource/en/application_note/an1709-emc-design-guide-for-stm8-stm32-and-legacy-mcus-stmicroelectronics.pdf)

## Maker Pi RP2040 - Motor and Robot Controller

- So far unable to find application notes for this board

# Sources:

- STM32F429IDISCOVERY Board
  - [https://www.st.com/content/ccc/resource/technical/document/data\\_brief/ff/c1/b6/02/c3/b4/49/cb/DM00094498.pdf/files/DM00094498.pdf/jcr:content/translations/en.DM00094498.pdf](https://www.st.com/content/ccc/resource/technical/document/data_brief/ff/c1/b6/02/c3/b4/49/cb/DM00094498.pdf/files/DM00094498.pdf/jcr:content/translations/en.DM00094498.pdf)
  - <https://www.st.com/en/microcontrollers-microprocessors/stm32f429ii.html#documentation>
  - <https://www.st.com/en/microcontrollers-microprocessors/stm32f429ii.html#>
  - <https://www.st.com/en/microcontrollers-microprocessors/stm32f429zi.html>
- Maker Pi RP2040 - Motor and Robot Controller
  - <https://www.adafruit.com/product/5129>
  - <https://www.raspberrypi.com/documentation/microcontrollers/rp2040.html>
  - [https://docs.google.com/document/d/1DJASwxgbattM37V4AIIJVR4pxukq0up25LppA8-z\\_AY/edit](https://docs.google.com/document/d/1DJASwxgbattM37V4AIIJVR4pxukq0up25LppA8-z_AY/edit)
  - <https://www.cytron.io/p-maker-pi-rp2040-simplifying-robotics-with-raspberry-pi-rp2040>