All-in-one Starter Kit for Pico 2

Datasheet

V1.0

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1 Product Information

1.1 Introduction

The All-in-one Starter Kit for Pico 2 is a beginner - oriented kit It. contains 21 tutorials of progressive difficulty, covering module application, logical thinking development, etc. These tutorials familiarize users with module usage, effectively honing logical thinking and enabling quick command of Pico 2 development and application.

The kit is equipped with 17 modules, including sound, temperature and humidity, human - body induction, ultrasonic, etc., meeting diverse learning and application needs. It's ideal for beginners and stimulating logical thinking.

1.2 Features

- Integration of 17 modules with different functions.
- No soldering of wires needed; plug - and - play.
- 21 creative tutorials included.
- The packaging is a beautifully designed, portable, and compact suitcase.
- Open - source hardware.
- 20 full - color ambient lights.
- 2.4 - inch TFT full - color touch screen.
- Built - in mini - games (Snake, Breakout, Dino Run).

1.3 Applications

- **STEAM Education:** The All-in-one Starter Kit for Pico 2 is a comprehensive learning tool for STEAM education. It offers students a hands-on platform to learn programming through practical experience.
- **Programming Learning:** With a variety of components and detailed tutorials, this kit is ideal for Pico beginners, schools, and Raspberry Pi enthusiasts. Using the C++ programming language, users can complete interesting projects and develop logical thinking and problem-solving skills.

2 Product Appearance Diagram

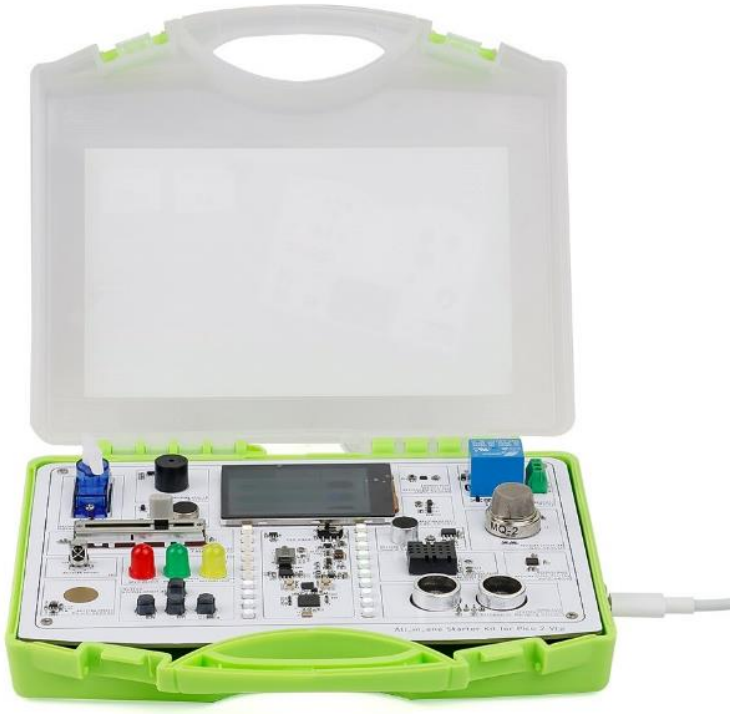


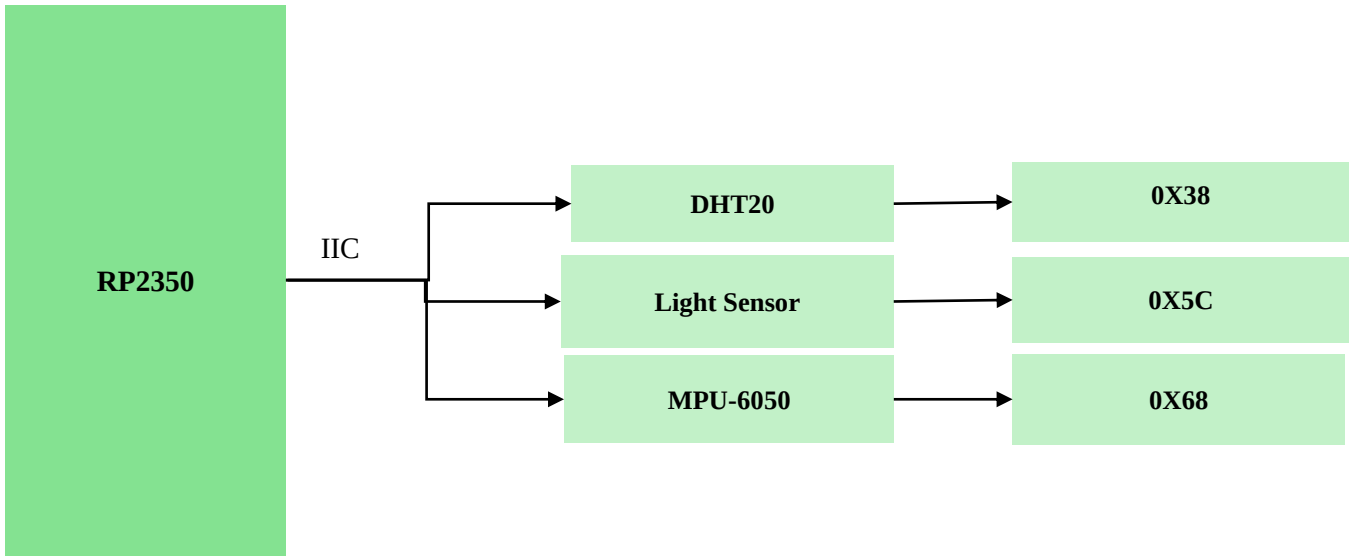
Figure 1:Front View

Figure 2:Side View

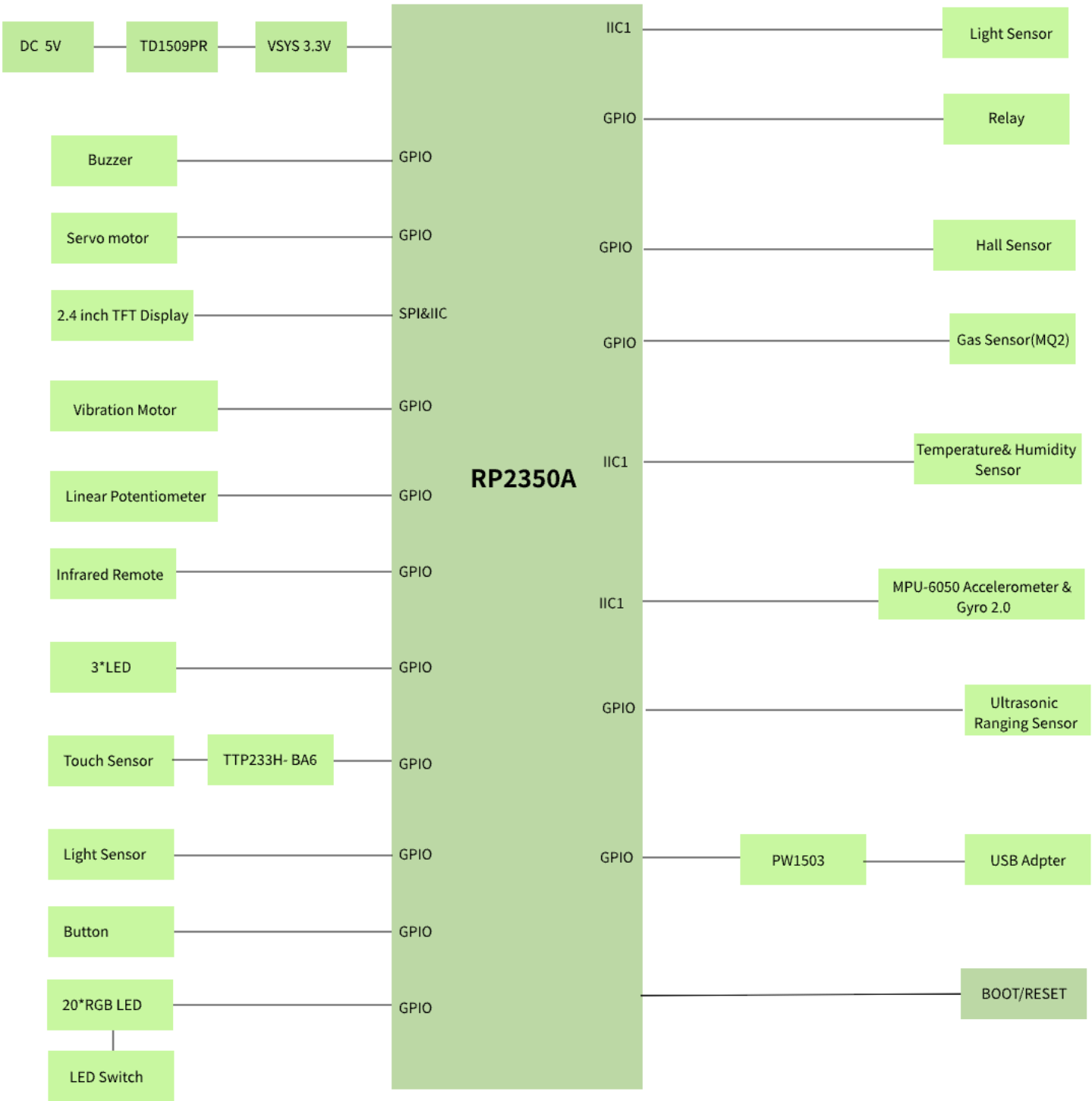
3 Product Dimensions

Figure 3:Product Dimensions Drawing

4 I2C Module Diagram



5 System Block Diagram



6 Mainboard Overview

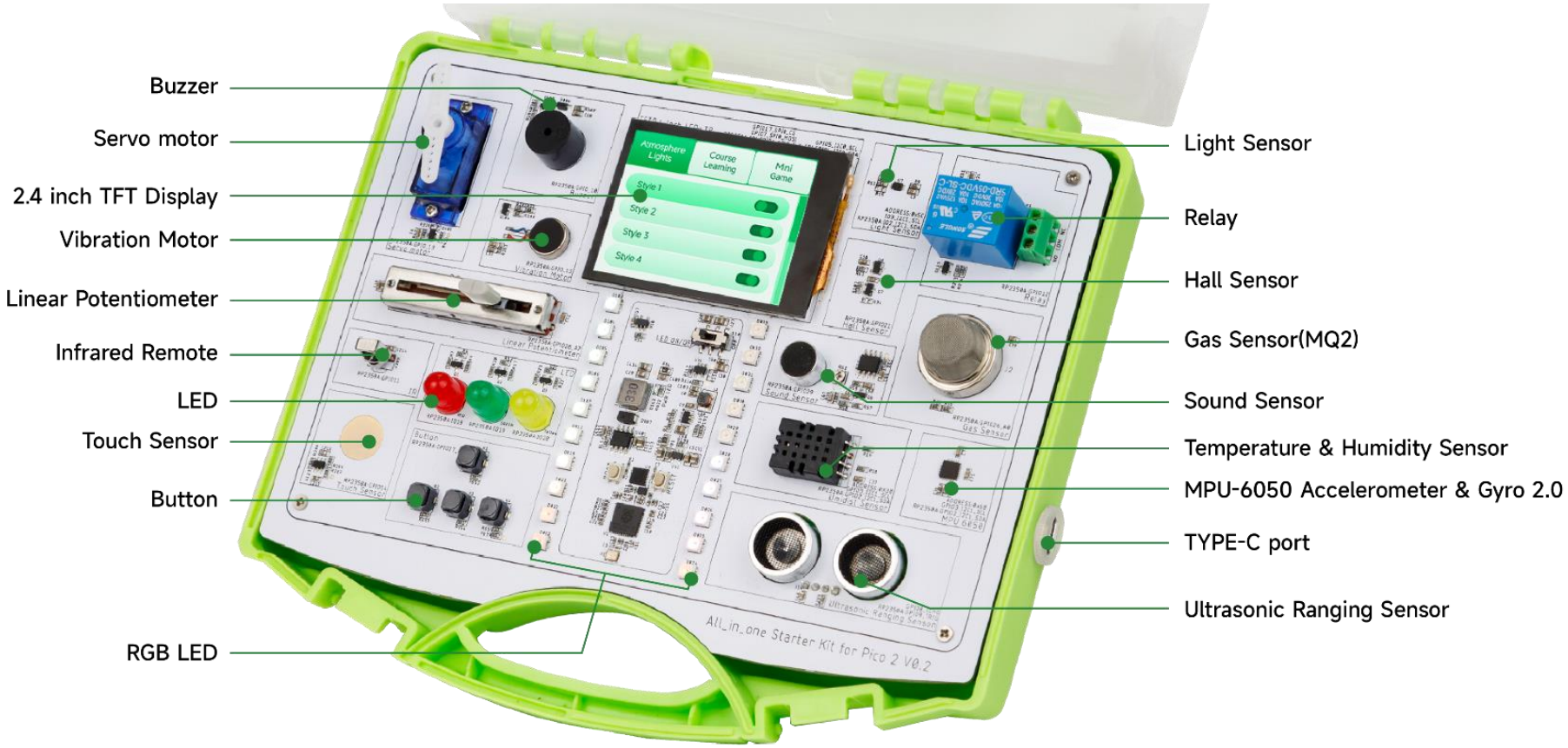


Figure 4:Motherboard Module Function Diagram

6.1 Function Module Pins

The All-in-one Starter Kit for Pico 2 comes with 17 common modules and 20 RGB LEDs. Specific information about each module's name, connection port, and description is provided in the table below：

No.	Module Name	Module Connection Port	Module Description
1	Temperature & Humidity Sensor	I2C1(ADDR:0X38)	For detecting temperature and humidity changes
2	Button	GPIO27_A1_KEY(ADC)	For detecting button press for human - machine interaction
3	Ultrasonic Ranging Sensor	GPIO8_US_ECHO GPIO9_US_TRIG	For distance measurement
4	Light Sensor	I2C1(ADDR:0X5C)	For detecting light intensity
5	Linear Potentiometer	GPIO28_A2_POT（ADC）	For simulating voltage changes
6	LED	GPIO18_LED_RED GPIO19_LED_GREEN GPIO20_LED_YELLOW	Red, green, and yellow indicator lights
7	Buzzer	GPIO10_BUZZER	For producing sound through electrical signal control
8	2.4-inch TFT Display	GPIO6_SPI0_CLK_TFT GPIO7_SPI0_MOSI_TFT GPIO16_RS_TFT GPIO17_SPI0_CS_TFT GPIO24_TP_RST GPIO25_TP_INT	2.4 - inch TFT capacitive touch display
		GPIO4/I2C0_SDA GPIO5/I2C0_SCL	
9	Infrared Remote	GPIO11_IR	For receiving infrared remote signals and outputting electrical signals
10	Relay	GPIO12_RELAY	For controlling circuits

11	Servo motor	GPIO13_SERVO	For precise rotation control via input signals
12	Sound Sensor	GPIO29_A3_SOUND（ADC）	For detecting ambient sound
13	MPU6050 Accelerometer & Gyro 2.0	GPIO3/I2C1_SCL GPIO2/I2C1_SDA	For detecting angular velocity and acceleration
14	Touch Sensor	GPIO14_TOUCH	For detecting human touch
15	Vibration Motor	GPIO15_VIB	For generating vibration
16	Hall Sensor	GPIO21_HALL	For detecting magnetic field strength
17	Gas Sensor(MQ2)	GPIO26_A0_GAS（ADC）	For detecting smoke concentration in the air
18	RGB LED	GPIO22_RGB GPIO23_RGB_EN	WS2812 ambient light with multi - color display

6.2 Main Controller Pins

No.	Pin Type	Pin Number	Pin	Pin Application
1	Power Pins	45	IOVDD0	I/O Power Pin: Supplies power to the I/O interface section of the chip.
2		38	IOVDD1	
3		30	IOVDD2	
4		20	IOVDD3	
5		11	IOVDD4	
6		1	IOVDD5	
7		39	DVDD0	Digital Power Pin: Supplies power to the digital circuit section of the chip.
8		23	DVDD1	
9		6	DVDD2	
10		46	VREG_AVDD	Analog Power Pin: Supplies power to the analog circuit section of the chip.
11		47	VREG_PGND	Power Ground Pin: Provides a ground reference for the power supply.
12		48	VREG_LX	Power - Related Pins
13		49	VREG_VIN	Input Power Pin
14		50	VREG_FB	Power Feedback Pin: Used for feedback in the voltage regulator circuit.
15		44	ADC_VREF	ADC Reference Voltage Pin: Provides a reference voltage for the analog - to - digital converter.
16		53	USB_OTP_VDD	Internal USB PHY & OTP Power 3.3V: Supplies 3.3V power to the internal USB PHY and OTP.
17		54	QSPI_IOVDD	QSPI Power1.8-3.3V
18		61	GND	Ground
19	Clock Pins	21	XIN	External Crystal Input

20		22	XOUT	External Crystal output
21	SWD Debug Interface	24	SWCLK	SWD Serial Clock
22		25	SWDIO	SWD Data Pin
23		26	RESET	System Reset
24	USB Interface	51	USB_D-	Type - C Debug Interface on the Development Board
25		52	USB_P+	
26	GPIO Pins	2	GPIO0_LED_BK	LED Backlight Control
27		3	GPIO1_PSRAM_CS	PSARM Chip Select
28		7	GPIO4/I2C0_SDA	TFT Touch Screen
29		8	GPIO5/I2C0_SCL	TFT Touch Screen
30		4	GPIO2/I2C1_SDA	DHT20（0X38） MPU-6050（0x68） LIGHT SENSOR （0x5C）
31		5	GPIO3/I2C1_SCL	
32		9	GPIO6_SPI0_CLK_TFT	TFT Screen Display
33		10	GPIO7_SPI0_MOSI_TFT	
34		27	GPIO16_RS_TFT	
35		28	GPIO17_SPI0_CS_TFT	
36		36	GPIO24_TP_RST	
37		37	GPIO25_TP_INT	
38		40	GPIO26_A0_GAS	Smoke Sensor
39		41	GPIO27_A1_KEY	4*Button
40		42	GPIO28_A2_POT	Linear Potentiometer
41		43	GPIO29_A3_SOUND	Sound Sensor
42		55	QSPI_SD3	W25Q64 NOR Flash & APS6404L PSRAM
43		56	QSPI_SCLK	
44		57	QSPI_SD0	
45		58	QSPI_SD2	
46		59	QSPI_SD1	
47		60	QSPI_SS	

48		12	GPIO8_US_ECHO	Ultrasonic Sensor Echo Pin
49		13	GPIO9_US_TRIG	Ultrasonic Sensor Trigger Pin
50		14	GPIO10_BUZZER	Buzzer Control
51		15	GPIO11_IR	Infrared Module
52		16	GPIO12_RELAY	Relay Control
53		17	GPIO13_SERVO	Servo Control
54		18	GPIO14_TOUCH	Touch Module
55		19	GPIO15_VIB	Vibration Motor Control
56		29	GPIO18_LED_RED	Red LED Control
57		31	GPIO19_LED_GREEN	Green LED Control
58		32	GPIO20_LED_YELLOW	Yellow LED Control
59		33	GPIO21_HALL	Hall Sensor
60		34	GPIO22_RGB	RGB LED Control
61		35	GPIO23_RGB_EN	RGB LED Enable

6.3 LED Indicator Lights

No.	Indicator Light Name	Signal	Main Control Signal	Color	Function Description
1	POWER Power Indicator Light	/	5V Relay Indicator Light	Green	Power Supply Indicator
2	Relay Indicator Light	GPIO12_RELAY	GPIO12	Red	Relay Engagement Indicator

6.4 Ambient Light Switch

No.	Switch Name	Function
1	LED ON/OFF	Switch to "ON" to activate the ambient light power supply. Switch to "OFF" to deactivate the ambient light power supply.

6.5 Reset & Boot Button

No.	Button Name	Signal	Main Control Signal	Function
1	BOOT	BOOT	/	Press the BOOT key + RST key to enter the firmware upload mode.
2	RESET	CORE_RESET	RUN	Press the button to reset the RP2350.

7 Technical Specifications

7.1 All-in-one Starter Kit for Pico 2 Specifications

No.	Item		Specification
1	Processor	CPU/Soc	Dual Cortex-M33 or Hazard3 processor, up to 150MHz frequency
2		Driver IC	RP2350A/QFN-60(7x7)
3		SRAM	520KB SRAM
4		Flash	4MB
5	Development Environment	Programming Language	C/C++
6	Voltage	Operating Voltage:	5 V
7		Input Voltage	DC 1.8–5.5V
8	Mechanical Characteristics	Internal Dimensions	190*135*40mm
9		External Dimensions	190*170*46mm
10		Material	PP
11		Weight	339.2g
12	Control & Indicator	(RP2350) Button	BOOT
13			RESET
14		Indicator Light	Power Indicator Light
15			Relay Indicator Light
16		LED ON/OFF	Ambient Light Switch
17	Peripherals	Pins	➢ 26 multi-functional GPIO pins (including 4 pins available for ADC) ➢ 2x SPI interfaces ➢ 2x I2C interfaces ➢ 2x UART interfaces ➢ 4x 12-bit 500ksps Analog-to-Digital Converters (ADCs) ➢ 16 controllable PWM channels
18	External Interfaces	Type-C power and data interface	
19		Relay connection terminals	

7.2 2.4-inch TFT LCD Specifications

No.	Item	Specification
1	Size	2.4 inches
2	Drive IC	ST7789T3-G4-1
3	Brightness(cd/m2)	300nit
4	Color Gamut	70% NTSC
5	Resolution	240(RGB)×320
6	Max Colors	262K
7	Panel Type	IPS
8	Signal Interface	SPI

8 Electrical Parameters

8.1 Power Consumption Parameters

No.	Item	Voltage	Current	Power Consumption
1	Power consumption after the minimum system is started	5V	0.048A	0.24W
2	Maximum power consumption with all functions enabled	5V	0.25A	1.25W

8.2 Parameters Environmental

No.	Item	Specification
1	Operating temperature	0℃～70℃
2	Storage temperature	-20℃～85℃

9 Related Documents and Resources

- **All-in-one Starter Kit for Pico 2 Product Link**
- **Raspberry Pi Pico 2 Datasheet**
- **Hardware design with RP2350**

10 Revision History

Date	Version	Release Notes
2025/3/4	V1.0	Initial Release