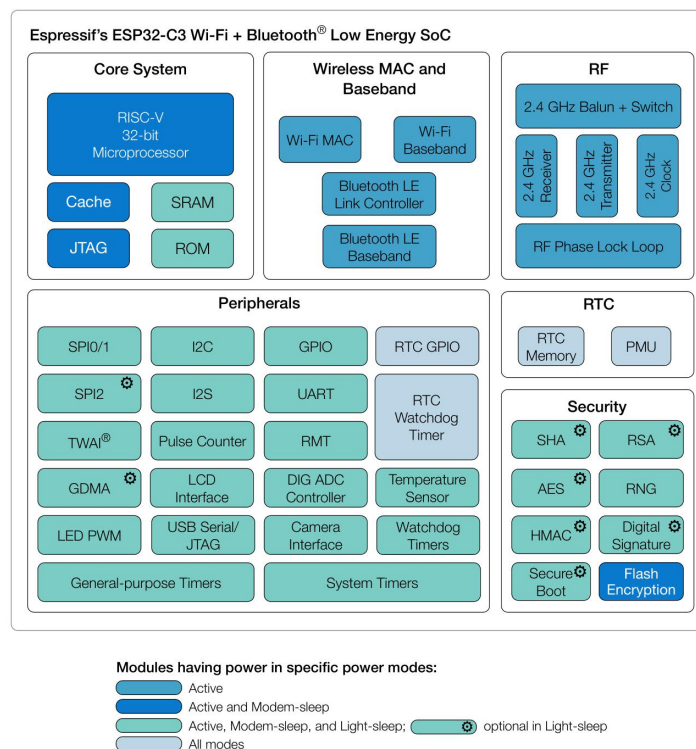


# Introduction of power consumption mode

XIAO ESP 32C3 can be switched between different power consumption modes:

- Active: General operating mode, where both CPU and chip RF are in operating state. In this mode, the chip will receive, transmit and listen to signals normally.
- Modem-sleep: The CPU is active with variable clock frequency (80MHz/160MHz, which will be switched automatically depending on CPU load and peripherals used) The baseband and RF of Wi-Fi and BLE are turned off, but both will stay connected. While the Wi-Fi is enabled, the chip will cut back to Active mode from time to time, and the power consumption will be changed between the both modes.
- Light-sleep: CPU suspended. Any wake-up event (MAC, host, RTC timer or external interrupt) will wake up the chip. Wi-Fi or BLE will stay connected.
- Deep-sleep: CPU and most peripherals are suspended, only the timer and memory of the RTC are working, Wi-Fi connection data is stored in the RTC.

Compared to competing products, there is a 32.768 kHz crystal clock circuit on XIAO ESP 32C3, which providing a low-frequency RTC clock for the CPU. This allows the XIAO ESP 32C3 to run in Deep-sleep low-power mode for extremely low standby power consumption (44µA) and long standby time with external batteries, providing a more diverse range of low-power application scenarios. The operating states of the ESP 32-C3 modules in different power consumption modes are shown below.



## Test results

The low power mode summary test results of XIAO ESP32C3 are shown in the following table:

	Active	Modem-sleep	Light-sleep
Current with Wi-Fi enabled	74.7mA	24.4mA	3.6mA
Current with BLE enabled	/	26.8mA	9.7mA

\*Current in Deep-sleep mode: 44.0 $\mu$ A

## Detailed Test Procedure

Note: ESP32-C3 needs AT firmware pre-burned, and AT command sent through serial port to set the power consumption mode.

### Power consumption test with Wi-Fi enabled

Reference of AT command:

...

AT+CWMODE=1 → Configure to Station mode.

AT+CWJAP="SSID","Password" → Connect to the AP.

AT+SLEEP=0 → Configure to Active mode.

AT+SLEEP=1 → Configure to Modem-sleep mode.

AT+SLEEP=2 → Configure to Light-sleep mode.

...

Test results in Active mode:



Test results in Modem-sleep mode:



Test results in Light-sleep mode:



## Power consumption test with BLE enabled

Reference of AT command:

...

AT+CWMODE=0  $\rightarrow$  Turn off Wi-Fi RF.

AT+BLEINIT=2  $\rightarrow$  Configure to Server mode.

AT+BLEADVSTART  $\rightarrow$  Turn on BLE broadcast.

AT+SLEEP=1  $\rightarrow$  Configure to Modem-sleep mode.

AT+SLEEP=2  $\rightarrow$  Configure to Light-sleep mode.

...

Test results in Modem-sleep mode:



Test results in Light-sleep mode:



## Power consumption test in Deep-sleep mode

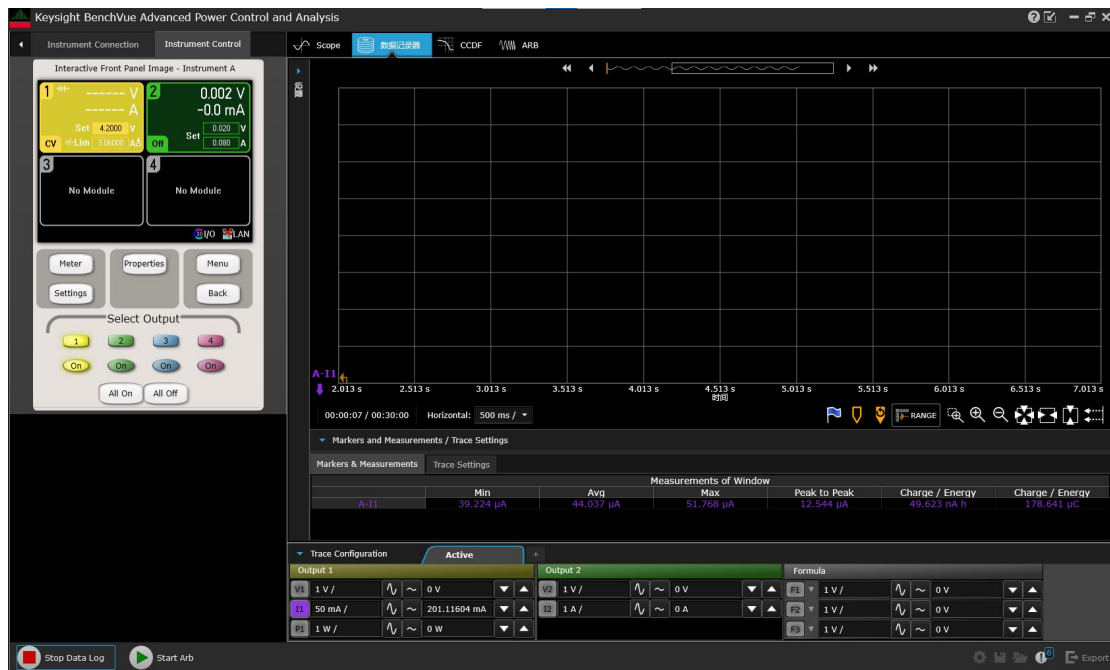
Reference of AT command:

...

AT+GSLP=sleeptime  $\rightarrow$  Configure to Deep-sleep mode and hold for 'sleeptime'

...

Test results in Deep-sleep mode:



## Reference

- [Datasheet | ESP32C3 Series](#)