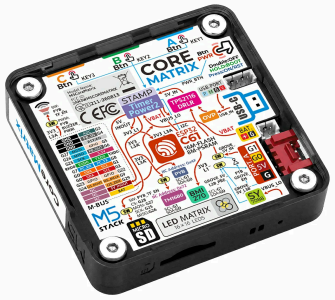
CoreMatrix

SKU:C158


























Description

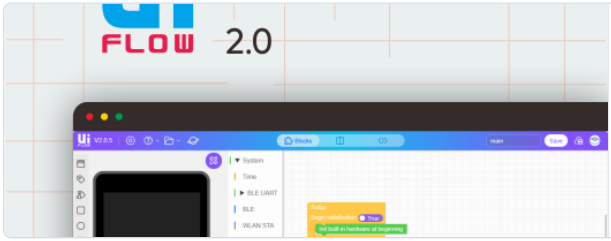
CoreMatrix is an IoT controller featuring a 16 x 16 LED matrix display. It is powered by the **ESP32-C61HR8** core, which uses a 32-bit RISC-V single-core processor running at 160MHz, supports 2.4 GHz Wi-Fi 6, and includes 16MB of Flash and 8MB of PSRAM.

The front panel features a 16 x 16 white LED matrix that displays device status, event reminders, and interactive feedback through icons and simple animations. An onboard BMI270 6-axis IMU supports motion detection and orientation-based interaction.

The device also integrates a microSD card slot, a passive buzzer, three user buttons, and a power button. Peripheral control, charging management, and multi-level power management are handled by the M5IOE1 and Stamp Timer Power2 (M5PM1).

The onboard M5-Bus and HY2.0-4P Grove interfaces allow connection to M5Stack Modules and other sensor devices, making the device suitable for pixel icon and animation display, sensor data acquisition, device status indication, and IoT interaction applications.

Tutorial



UiFlow2

This tutorial introduces how to control the CoreMatrix device using the UiFlow2 graphical programming platform.



Arduino IDE

This tutorial will introduce how to program and control the CoreMatrix device via Arduino IDE.

Features

- ESP32-C61HR8 core controller:
  - 16MB Flash
  - 8MB PSRAM
  - 2.4 GHz Wi-Fi 6
- LED matrix and sensors:
  - 16 x 16 white LED matrix driven by TM1680
  - BMI270 6-axis IMU with interrupt wake-up support
- Human-machine interaction:
  - Onboard passive buzzer
  - 3x user buttons + 1x power button
- Power system:
  - Multi-level power management via Stamp Timer Power2 (M5PM1) + M5IOE1
  - Onboard battery power connector
- Expansion:
  - microSD card slot
  - M5-Bus expansion interface
  - HY2.0-4P Grove expansion interface
  - MX1.25-4P USB expansion interface

Includes

- 1 x CoreMatrix
- 1 x Hex Key L-Shape 2.0mm

Applications

- Pixel icon and animation display
- Sensor data acquisition
- IoT interaction applications
- Embedded interactive device development

Specifications

Specification	Parameter
SoC	ESP32-C61HR8 @ RISC-V® 32-bit single-core processor, 160MHz
Flash	16MB
PSRAM	8MB Quad
Wireless Connectivity	2.4 GHz Wi-Fi 6
LED Matrix	16 x 16 white LED matrix
LED Driver	TM1680
IMU	BMI270
Power Management	Stamp Timer Power2 (M5PM1) + M5IOE1
Storage Expansion	microSD card
Buzzer	Onboard passive buzzer @ MLT-8530
Buttons	Power button, KEY1 (BtnA), KEY2 (BtnB), KEY3 (BtnC)
Input Power	USB (DC 5V) / Battery (DC 3.7V) / M5-Bus (DC 5V IN/OUT)
Communication Interface	1 x USB Type-C, 1 x HY2.0-4P, 1 x MX1.25-4P
Charging Current	650mA / 180mA, selectable via `CHG_PROG`
Battery Connector Spec	MX1.25-2P
Grove Interface Load Capacity	No load: 5V Full load: 4.79V@470mA
Power Consumption	Shutdown state: DC 4.2V@8.21uA Full load state: DC 4.2V@128.06mA
Product Size	54.0 x 54.0 x 11.6mm
Product Weight	28.9g
Package Size	132.0 x 95.0 x 16.0mm
Gross Weight	45.1g

Learn

Power On/Off

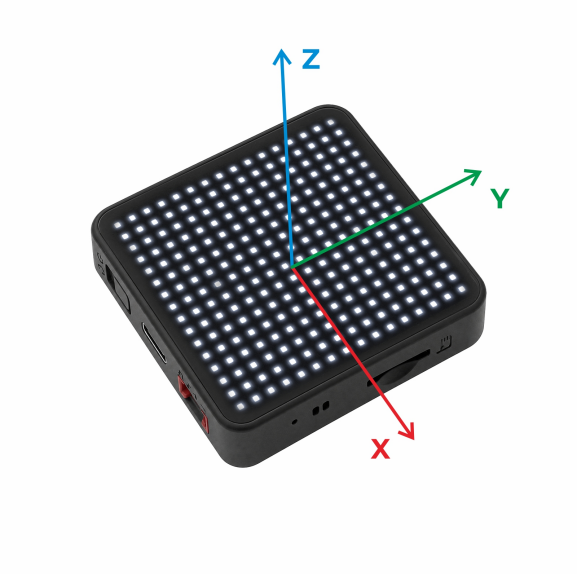
- Single click the power button: Power on / Reset
- Double-click the power button: Power off

Enter Download Mode

Under normal circumstances, the device can be flashed with programs directly via the USB cable. During development and debugging, if an abnormal program flash occurs, **long-press the power button** to force entry into download mode.

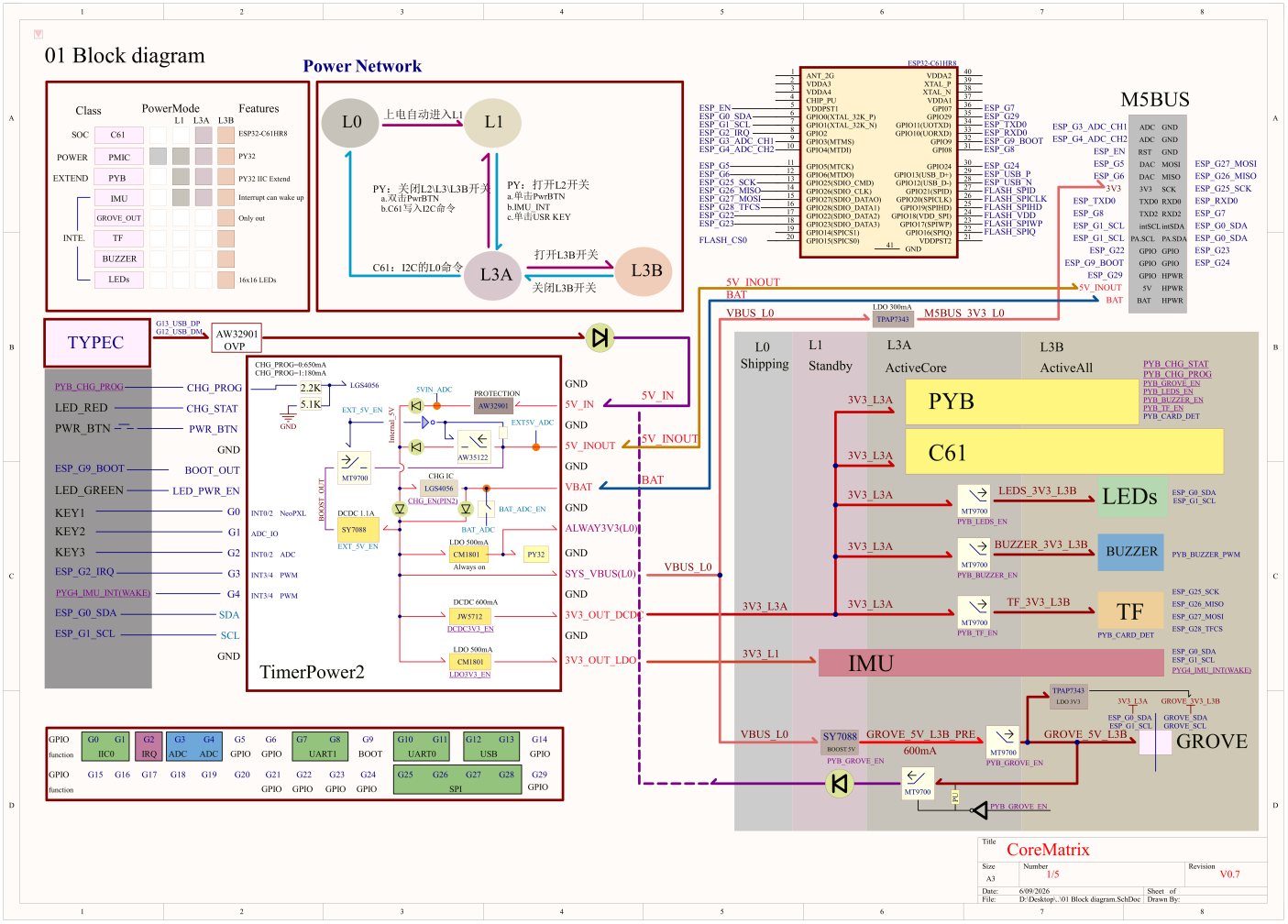


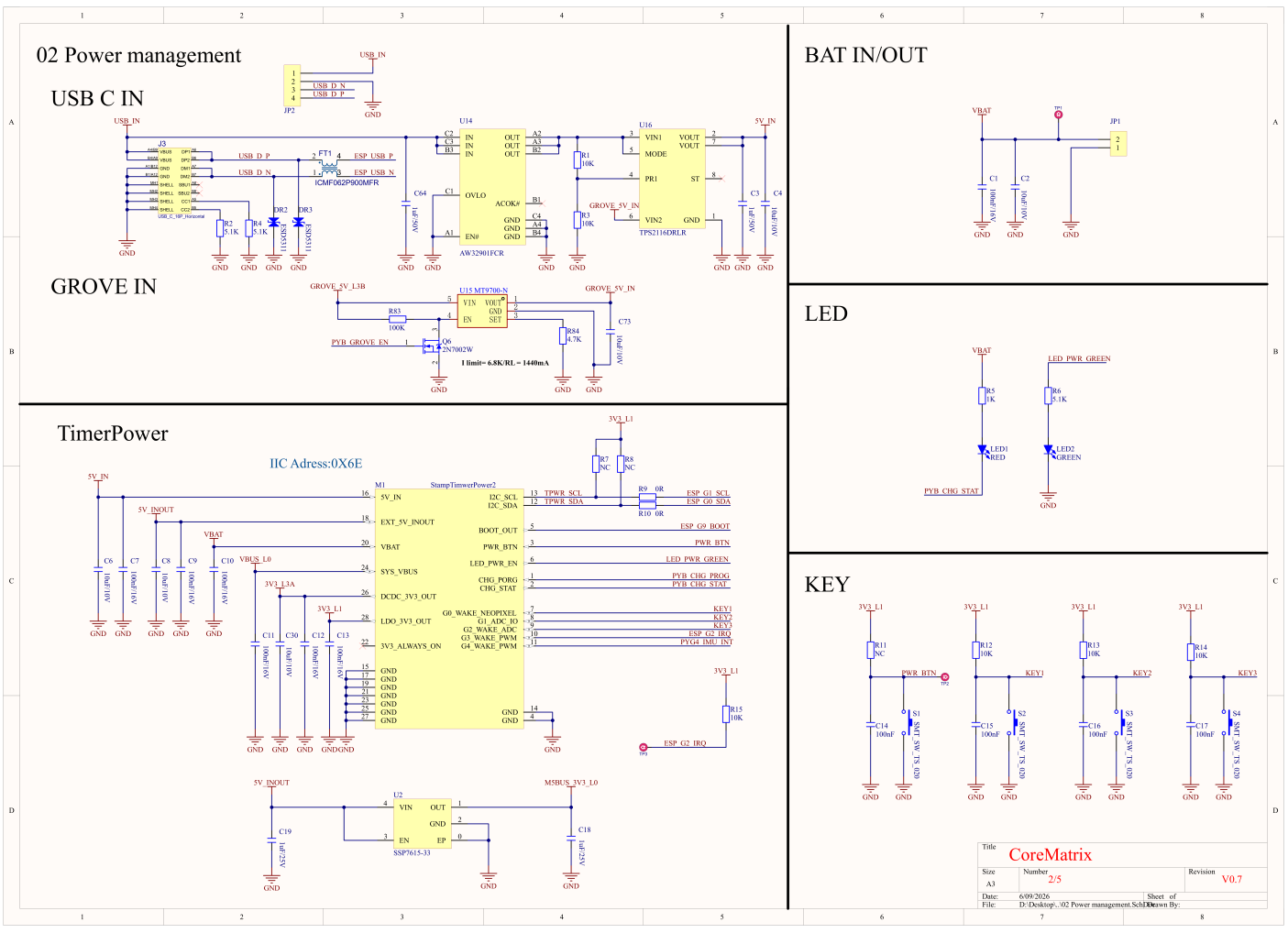
IMU Triaxial Direction Schematic Diagram

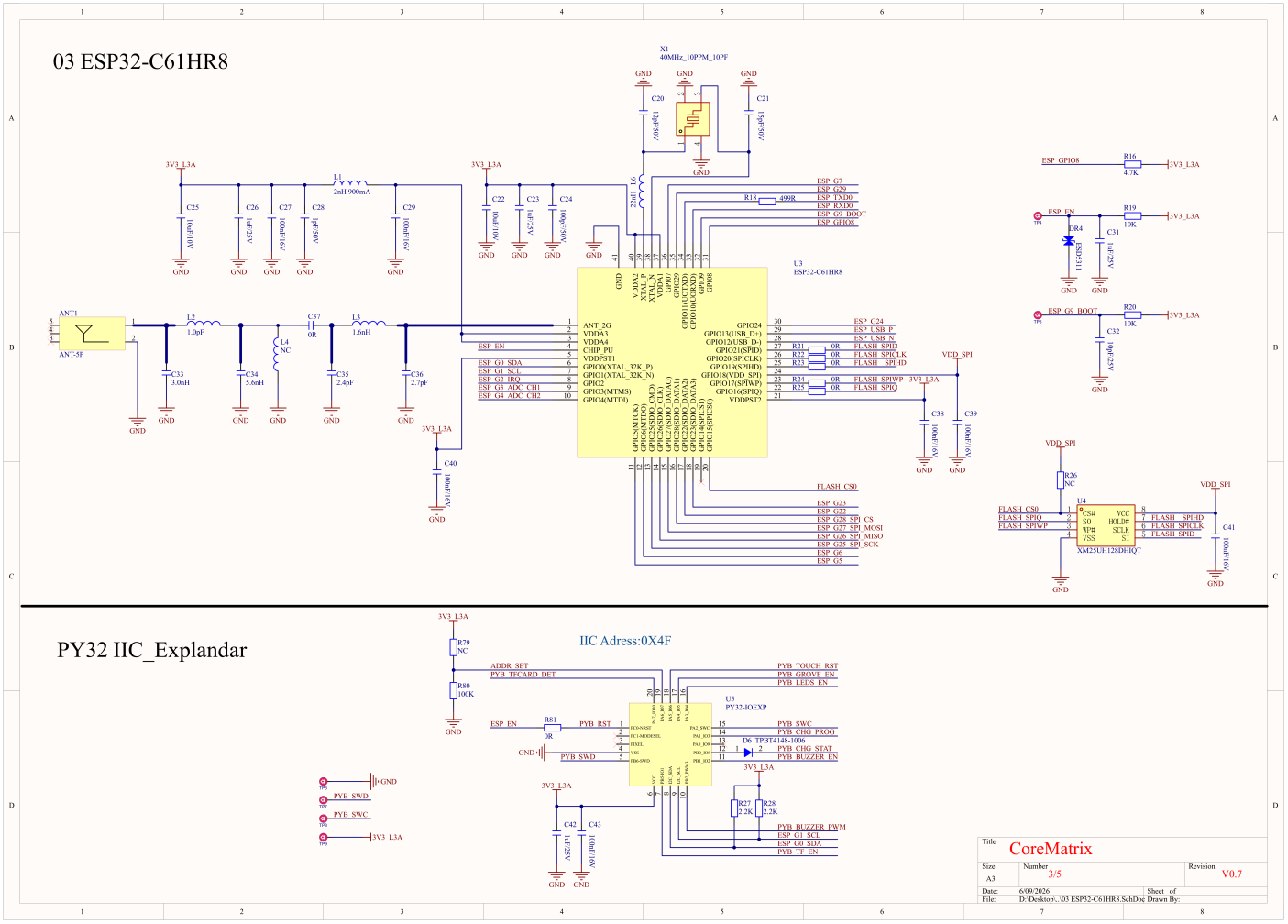


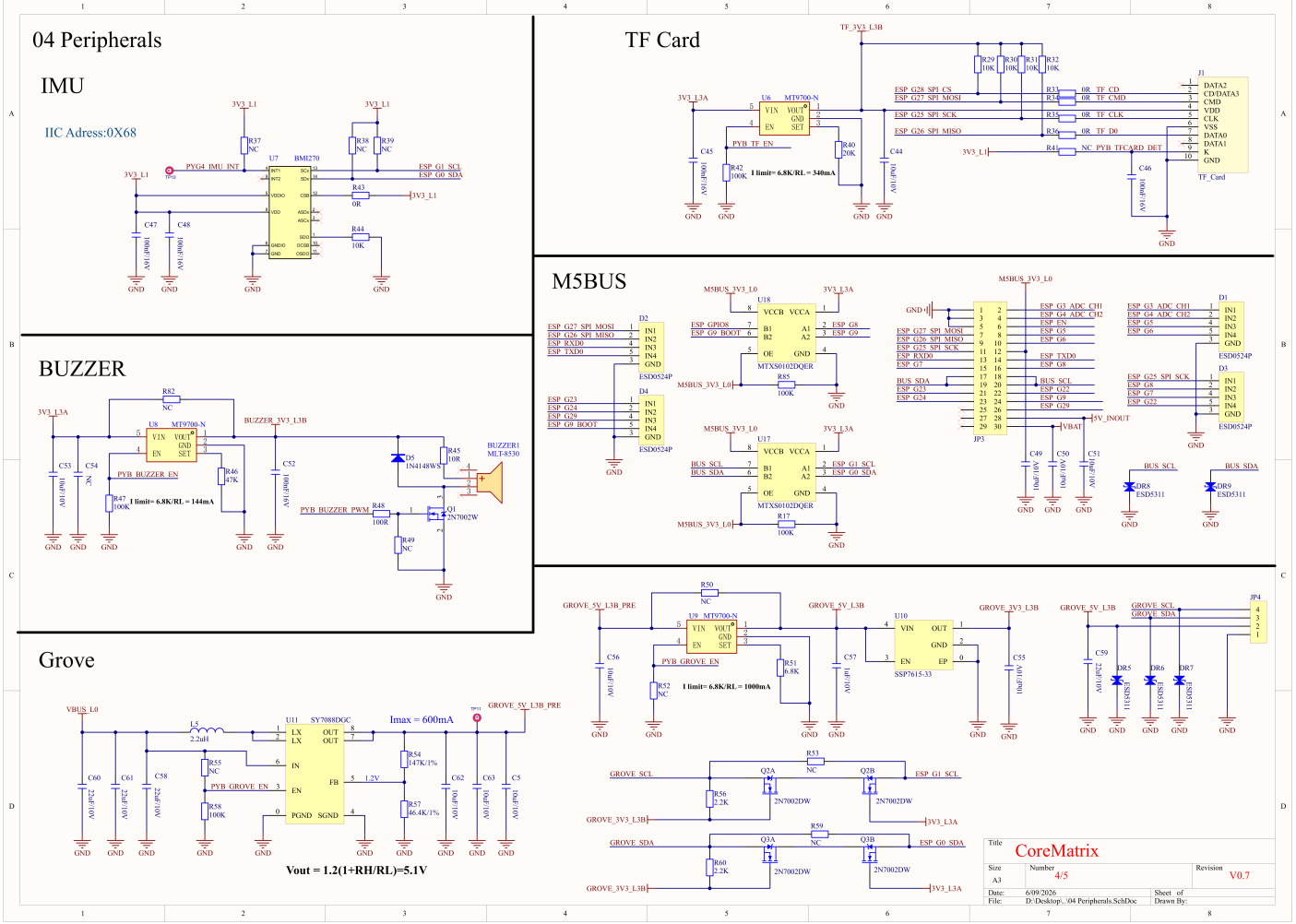
Schematics

- CoreMatrix Schematics PDF
- CoreMatrix LED Board Schematics PDF

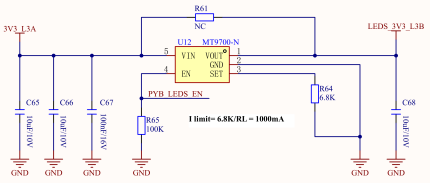

01 Block diagram
Power Network
Class
PowerMode
Features
L1
L3A
L3B
SOC
C61
ESP32-C61HR8
POWER
PMIC
PY32
EXTEND
PYB
PY32 IIC Extend
IMU
Interrupt can wake up
GROVE_OUT
Only out
INTE.
TF
BUZZER
LEDs
16x16 LEDs
L0
上电自动进入L1
L1
PY：关闭L2\L3\L3B开关
a.双击PwrBTN
b.C61写入I2C命令
PY：打开L2开关
a.单击PwrBTN
b.IMU_INT
c.单击USR KEY
C61：I2C的L0命令
L3A
打开L3B开关
关闭L3B开关
L3B
M5BUS
TYPEC
AW32901
OVP
TimerPower2
CHG_PROG
CHG_STAT
PWR_BTN
BOOT_OUT
LED_PWR_EN
SDA
SCL
5V_IN
5V_INOUT
VBAT
BAT
VBUS_L0
ALWAY3V3(L0)
SYS_VBUS(L0)
3V3_OUT_DCDC
3V3_OUT_LDO
M5BUS_3V3_L0
L0
Shipping
L1
Standby
L3A
ActiveCore
L3B
ActiveAll
PYB
C61
LEDs
BUZZER
TF
IMU
GROVE
GPIO
function
SPI

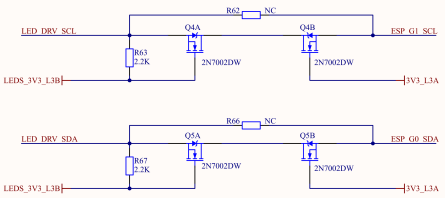

02 Power management
USB C IN
GROVE IN
TimerPower
IIC Adress:0X6E
BAT IN/OUT
LED
KEY
CoreMatrix
V0.7
2/5


03 ESP32-C61HR8
X1
40MHz_10PPM_10PF
U3
ESP32-C61HR8
ANT1
ANT-5P
ESP_GPIO8
ESP_EN
ESP_G9_BOOT
VDD_SPI
U4
XM25UH128DHIQT
FLASH_CS0
FLASH_SPIQ
FLASH_SPIWP
FLASH_SPIHD
FLASH_SPICLK
FLASH_SPID
PY32 IIC_Explandar
IIC Adress:0X4F
U5
PY32-IOEXP
D6 TPBT4148-1006
ADDR_SET
PYB_TFCARD_DET
PYB_TOUCH_RST
PYB_GROVE_EN
PYB_LEDS_EN
PYB_SWD
PYB_SWC
PYB_RST
PYB_SWC
PYB_CHG_PROG
PYB_CHG_STAT
PYB_BUZZER_EN
PYB_BUZZER_PWM
ESP_G1_SCL
ESP_G0_SDA
PYB_TF_EN
Title
CoreMatrix
Size
A3
Number
3/5
Revision
V0.7
Date:
6/09/2026
Sheet of
File:
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Drawn By:

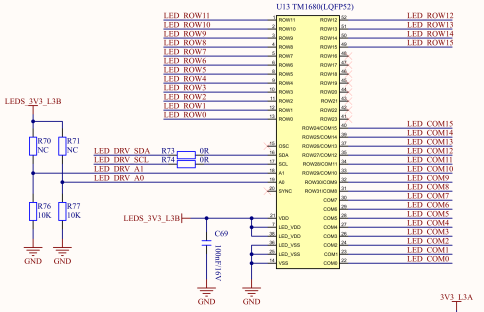

04 Peripherals
IMU
IIC Adress:0X68
U7
BMI270
PYG4_IMU_INT
ESP_G1_SCL
ESP_G0_SDA
BUZZER
U8
MT9700-N
BUZZER_3V3_L3B
PYB_BUZZER_EN
PYB_BUZZER_PWM
BUZZER1
MLT-8530
I limit= 6.8K/RL = 144mA
Grove
SY7088DGC
Imax = 600mA
GROVE_5V_L3B_PRE
Vout = 1.2(1+RH/RL)=5.1V
TF Card
TF_3V3_L3B
U6
MT9700-N
I limit= 6.8K/RL = 340mA
J1
TF_Card
M5BUS
U18
U17
MTXS0102DQER
ESD0524P
JP3
U9
MT9700-N
U10
SSP7615-33
I limit= 6.8K/RL = 1000mA
GROVE_SCL
GROVE_SDA
GROVE_3V3_L3B
Title
CoreMatrix
Size
A3
Number
4/5
Revision
V0.7
Date:
6/09/2026
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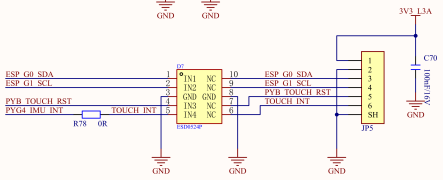
05 LED Driver

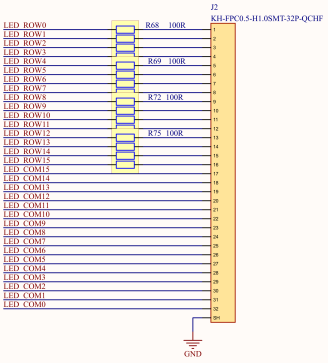




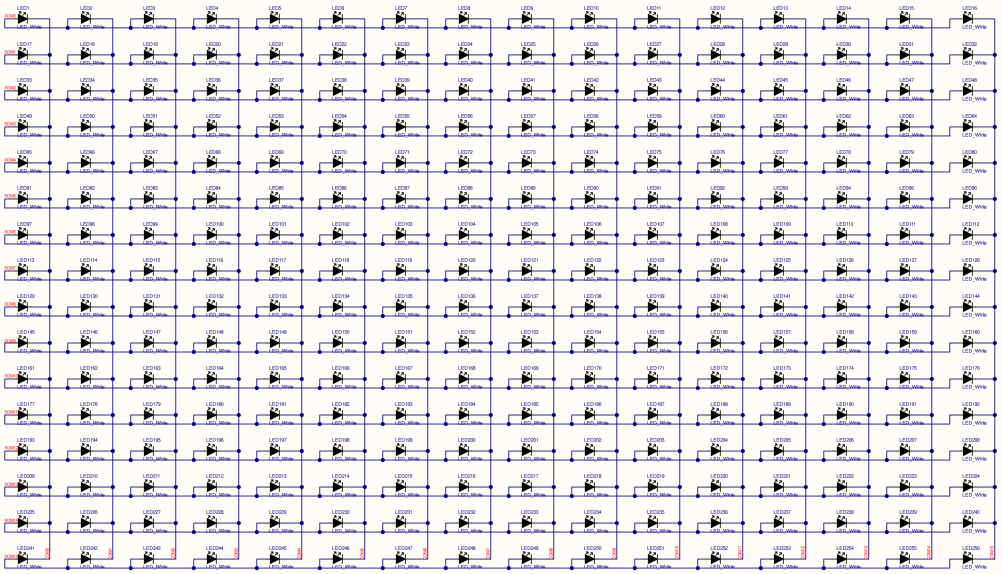
IIC Adress:0XE4







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Date: 6/09/2026		Sheet of
File: D:\Desktop\..\05 LED Driver.SchDoc		Drawn By:



Title		
Size: A3	Number	Revision
Date: 9/02/2025		Sheet of
File: D:\Desktop\..\schematic.SchDoc		Drawn By:

PinMap

LED Matrix

ESP32-C61HR8	G0	G1
TM1680	SDA	SCL

The LED matrix power is controlled via `PYB_LEDS_EN` on the `M5IOE1`. The 7-bit I2C address of the TM1680 is `0x72`; the `0xE4` shown in the schematic is the 8-bit address including the read/write bit.

microSD

ESP32-C61HR8	G27	G26	G25	G28
microSD	MOSI	MISO	SCK	CS

The microSD card slot power is controlled via `PYB_TF_EN` on the `M5IOE1`, and `PYB_TFCARD_DET` detects whether a microSD card is inserted.

PYB_TFCARD_DET	Status
LOW	Inserted
High Impedance	Not Inserted

I2C Devices

ESP32-C61HR8	G0	G1
BMI270 (0x68)	SDA	SCL
TM1680 (0x72)	SDA	SCL
M5IOE1 (0x4F)	SDA	SCL
Stamp Timer Power2 (M5PM1) (0x6E)	SDA	SCL

USB.PORT

ESP32-C61HR8	G12	G13	GND	5V
USB.PORT	USB_D-/USB_DM	USB_D+/USB_DP	GND	5V

HY2.0-4P

HY2.0-4P	Black	Red	Yellow	White
PORT.A	GND	5V	G0	G1

The Grove 5V output is controlled via `PYB_GROVE_EN`.

M5-Bus

FUNC	PIN	LEFT	RIGHT	PIN	FUNC
	GND	1	2	G3	ADC
	GND	3	4	G4	ADC
	GND	5	6	ESP_EN	EN
MOSI	G27	7	8	G5	DAC
MISO	G26	9	10	G6	DAC
SCK	G25	11	12	M5BUS_3V3_L0	
RXD0	G10	13	14	G11	TXD0
RXD2	G7	15	16	G8	TXD2
SDA	G0	17	18	G1	SCL
SDA	G0	19	20	G1	SCL
GPIO	G23	21	22	G22	GPIO
GPIO	G24	23	24	G9	BOOT
	NC	25	26	G29	GPIO
	NC	27	28	5V_INOUT	
	NC	29	30	BAT	

Stamp Timer Power2 (M5PM1)

Stamp Timer Power2 (M5PM1)	G0	G1	G2	G3	G4
KEY	KEY1 (BtnA)	KEY2 (BtnB)	KEY3 (BtnC)		
ESP32-C61HR8				ESP_G2_IRQ	
IMU					PYG4_IMU_INT

- G0(KEY1): BtnA button input
- G1(KEY2): BtnB button input
- G2(KEY3): BtnC button input
- G3(ESP_G2_IRQ): Stamp Timer Power2 (M5PM1) interrupt signal output
- G4(PYG4_IMU_INT): BMI270 interrupt wake-up signal

M5IOE1

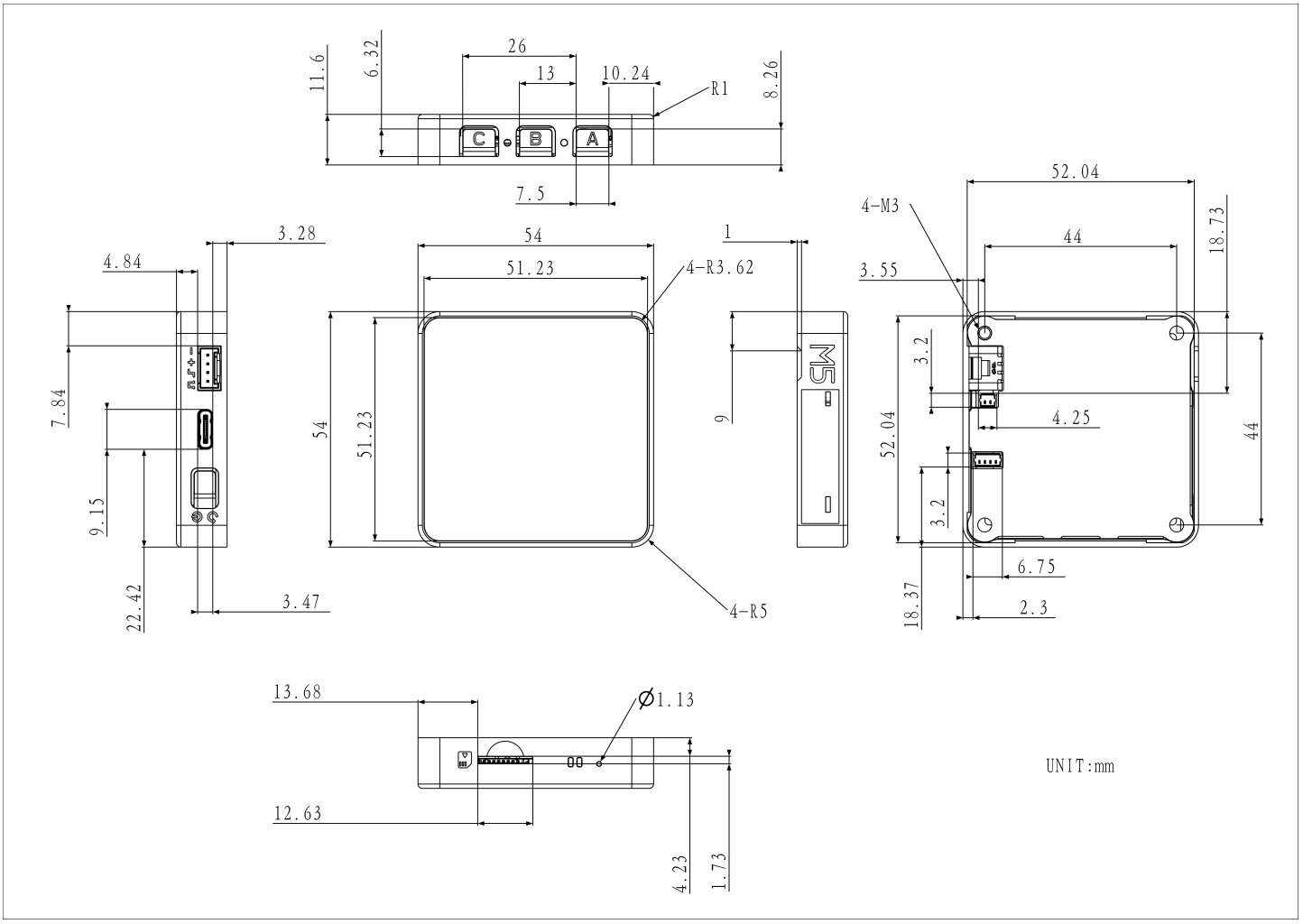
M5IOE1	IO1	IO2	IO3	IO4	IO5	IO8	IO10	IO11
microSD	PYB_TF_EN						PYB_TFCARD_DET	
Buzzer		PYB_BUZZER_EN						PYB_BUZZER_PWM
Charge			PYB_CHG_PROG			PYB_CHG_STAT		
LED Matrix				PYB_LEDS_EN				
Grove					PYB_GROVE_EN			

- IO1(PYB_TF_EN): microSD card slot power enable
- IO2(PYB_BUZZER_EN): Buzzer power enable
- IO3(PYB_CHG_PROG): Charging current control
- IO4(PYB_LEDS_EN): LED matrix power enable
- IO5(PYB_GROVE_EN): Grove 5V output enable
- IO8(PYB_CHG_STAT): Charging status detection; low level indicates charging
- IO10(PYB_TFCARD_DET): microSD card insertion status detection
- IO11(PYB_BUZZER_PWM): Buzzer PWM drive

PYB_CHG_PROG	CHARGE CURRENT
LOW	650mA
HIGH	180mA (Default)

Model Size

- CoreMatrix Model Size PDF



Structure

- CoreMatrix Structure Files

Datasheets

- ESP32-C61
- BMI270

Softwares

Arduino

- CoreMatrix Arduino Quick Start
- CoreMatrix M5PM1 & M5IOE1 Power Management
- M5PM1 Arduino Driver Library
- M5IOE1 Arduino Driver Library
- CoreMatrix Arduino M5Unified Driver Library
- CoreMatrix Arduino M5GFX Driver Library

UiFlow2

- CoreMatrix UiFlow2 Quick Start
- CoreMatrix UiFlow2 Documentation

Protocol

Stamp Timer Power2 (M5PM1) M5IOE1

Video