PWR_FLAG +5V   PWR_FLAG +3V3   PWR_FLAG

GND

SPI Flash

+3V3

C3
100nF

R2
10k

GND

U1
W25Q16JVUXIQ

R1
1k

BOOTSEL

QSPI_SS   1 CS   VCC 8
QSPI_SCLK   6 CLK   DI(IO0) 5   QSPI_SD0
                          DO(IO1) 2   QSPI_SD1
                          IO2 3   QSPI_SD2
                  GND   IO3 7   QSPI_SD3
               4 EP 9

GND

SWD Debug

+3V3

TP1 SWCLK
TP2 SWD
TP3
TP4

2.54mm pitch

GND

Crystal

C1 22pF

2   4 Y1
           12.000MHz
Y1 3 1

C2 22pF   R3 1k

GND

XIN

XOUT

+5V   +3V3

H1
24929
H2
24929
H3
MountingHole
H4
MountingHole

BOARD_ID
SLEEP   R7 180k

GND

J1
Conn_02x04_Odd_Even

H5
Tooling Hole
H6
Tooling Hole
H7
Tooling HoleGND
H8
Tooling Hole

USB_DP
USB_DN

+1V1

C4   C5
100nF   100nF

GND

C6
1uF

GND

Make sure C6 is close to pin 45 of RP2040

+3V3

C7   C9   C10   C11   C12   C13   C14
100nF   100nF   100nF   100nF   100nF   100nF   100nF

GND

C8
1uF   Make sure C8 is close to pin 44 of RP2040

GND

U2

DVDD 50 DVDD 23 VREG_VOUT 45 VREG_IN 44 IOVDD 49 IOVDD 42 IOVDD 33 IOVDD 22 IOVDD 10 IOVDD 1 USB_VDD 48 ADC_AVDD 43

QSPI_SS   56 QSPI_SS
QSPI_SD0   53 QSPI_SD0
QSPI_SD1   55 QSPI_SD1
QSPI_SD2   54 QSPI_SD2
QSPI_SD3   51 QSPI_SD3
QSPI_SCLK 52 QSPI_SCLK

XIN   20 XIN
XOUT   21 XOUT

RUN   26 RUN

SWCLK 24 SWCLK
SWD   25 SWD

Raspberry Pi
RP2040

USB_DP   47 USB_DP
USB_DM   46 USB_DM

GPIO0   2   SLEEP
GPIO1   3
GPIO2   4
GPIO3   5
GPIO4   6
GPIO5   7
GPIO6   8
GPIO7   9
GPIO8   11
GPIO9   12
GPIO10   13
GPIO11   14
GPIO12   15   DEBUG_SW
GPIO13   16
GPIO14   17
GPIO15   27   NEOPIXEL_3V3
GPIO16   28
GPIO17   29
GPIO18   30
GPIO19   31
GPIO20   32
GPIO21   34
GPIO22   35
GPIO23   36
GPIO24   37
GPIO25

GPIO26_ADC0 38 I2C1_SDA
GPIO27_ADC1 39 I2C1_SCL
GPIO28_ADC2 40 NEOPIXEL_PWR
GPIO29_ADC3 41 SDB

TESTEN 19   GND 57

RP2040

GND   GND

R5
27   USB_DP
R6
27   USB_DN

Make sure R6 and R7 are close to RP2040

+5VP   Neopixel Power Switch   +5V

NEOPIXEL_PWR   3 ON/OFF   IN 4
               2 GND   GND 5
C24   1 OUT   N/C 6   C23
100nF   1uF

SIP32431DR3-T1GE3
GND   U14   GND   GND

U13
74LVC1G34GW,125   +5VP

NEOPIXEL_3V3 2 A   VCC 5
              1 NC   Y   4   NEOPIXEL
              3 GND
GND

3.3V-to-5V level shifter

+3V3

R8 R10
2k   2k

+3V3

R9   C19
100k   100nF

GND

BOOTSEL   DEBUG_SW

SW1
DSHP02TSGET
DEBUGGING ONLY

GND

Driver

I2C1_SDA   SDA
I2C1_SCL   SCL
NEOPIXEL   NEOPIXEL
SDB   SDB

File: Driver.kicad_sch

RP2040 supposedly has an internal
50k pull-up on RUN, but it's not
documented. Adding a pull-up to
be safe

+3V3

R4
10k

+5V   +3V3

D1 D_TVS
D2 D_TVS
D3 D_TVS
USB_DP
D4 D_TVS
USB_DN
D5 D_TVS
SLEEP

GND

+3V3   +5V

C16   C15
10uF   10uF

GND   GND

+3V3

C17
1uF

C18
100nF

GND

U3
IS31FL3729-QFLS4-TR

PVCC 23

SDA 26 SDA
SCL 27 SCL
SDB 29 SDB

SW1 22 LED_SW0
SW2 21 LED_SW1
SW3 20 LED_SW2
SW4 19 LED_SW3
SW5 18 LED_SW4
SW6 17 LED_SW5
SW7 16 LED_SW6
SW8 15 LED_SW7
SW9/CS16 14 LED_SW8

LED_SW[0..8]

CS1 30 CS0
CS2 31 CS1
CS3 32 CS2
CS4 1 CS3
CS5 2 CS4
CS6 3 CS5
CS7 4 CS6
CS8 5 CS7
CS9 6
CS10 7
CS11 8
CS12 10
CS13 11
CS14 12
CS15 13

CS[0..32]

ISET 25
ADDR 28

R12
33k

GND

GND 9
GND 24
GND 33

GND

Datasheet says the series resistors on CSx aren't
necessary if single-color LEDs are run from
3.3V -- and we're short on space, so let's
do exactly that!

Matrix

LED_SW[0..8]
LED_CS[0..32]

NEOPIXEL

NEOPIXEL

File: Matrix.kicad_sch

Sheet: /Driver/
File: Driver.kicad_sch
Title: LED Matrix Input Module — LED Driver
Size: A4   Date: 2022-12-18   Rev:
KiCad E.D.A. 8.0.3   Id: 2/3

LED_SW[0..8]

LED_SW0
LED_SW1
LED_SW2
LED_SW3
LED_SW4
LED_SW5
LED_SW6
LED_SW7
LED_SW8

U4 VDMR10A1
LED_CS0 7 A
LED_CS1 6 B
LED_CS2 4 C
LED_CS3 2 D
LED_CS4 1 E
LED_CS5 9 F
LED_CS6 10 G
LED_CS7 5 DP
CA 3
CA 8 LED_SW0

U5 VDMR10A1
LED_CS0 7 A
LED_CS1 6 B
LED_CS2 4 C
LED_CS3 2 D
LED_CS4 1 E
LED_CS5 9 F
LED_CS6 10 G
LED_CS7 5 DP
CA 3
CA 8 LED_SW1

U6 VDMR10A1
LED_CS0 7 A
LED_CS1 6 B
LED_CS2 4 C
LED_CS3 2 D
LED_CS4 1 E
LED_CS5 9 F
LED_CS6 10 G
LED_CS7 5 DP
CA 3
CA 8 LED_SW2

U7 VDMR10A1
LED_CS0 7 A
LED_CS1 6 B
LED_CS2 4 C
LED_CS3 2 D
LED_CS4 1 E
LED_CS5 9 F
LED_CS6 10 G
LED_CS7 5 DP
CA 3
CA 8 LED_SW3

U8 VDMR10A1
LED_CS0 7 A
LED_CS1 6 B
LED_CS2 4 C
LED_CS3 2 D
LED_CS4 1 E
LED_CS5 9 F
LED_CS6 10 G
LED_CS7 5 DP
CA 3
CA 8 LED_SW4

U9 VDMR10A1
LED_CS0 7 A
LED_CS1 6 B
LED_CS2 4 C
LED_CS3 2 D
LED_CS4 1 E
LED_CS5 9 F
LED_CS6 10 G
LED_CS7 5 DP
CA 3
CA 8 LED_SW5

U10 VDMR10A1
LED_CS0 7 A
LED_CS1 6 B
LED_CS2 4 C
LED_CS3 2 D
LED_CS4 1 E
LED_CS5 9 F
LED_CS6 10 G
LED_CS7 5 DP
CA 3
CA 8 LED_SW6

U11 VDMR10A1
LED_CS0 7 A
LED_CS1 6 B
LED_CS2 4 C
LED_CS3 2 D
LED_CS4 1 E
LED_CS5 9 F
LED_CS6 10 G
LED_CS7 5 DP
CA 3
CA 8 LED_SW7

U12 VDMR10A1
LED_CS0 7 A
LED_CS1 6 B
LED_CS2 4 C
LED_CS3 2 D
LED_CS4 1 E
LED_CS5 9 F
LED_CS6 10 G
LED_CS7 5 DP
CA 3
CA 8 LED_SW8

LED_CS0 LED_CS1 LED_CS2 LED_CS3 LED_CS4 LED_CS5 LED_CS6 LED_CS7

LED_CS[0..32]

Neopixel power bypass

+5VP +5VP +5VP +5VP +5VP
Structural support

C20 100nF
C21 100nF
C22 100nF
C25 100nF
C26 100nF
C27 100nF

GND GND GND GND GND GND

LED1 +5VP
4 DIN VD 8
3 GND DOU
DIN 6
GND
5
VD 1
DOU 2
GND

LED2 +5VP
4 DIN VD 8
3 GND DOU
DIN 6
GND
5
VD 1
DOU 2
GND

LED3 +5VP
4 DIN VD 8
3 GND DOU
DIN 6
GND
5
VD 1
DOU 2
GND

NEOPIXELD

XL-5050RGBC-WS2812B XL-5050RGBC-WS2812B XL-5050RGBC-WS2812B

LED4 +5VP
4 DIN VD 8
3 GND DOU
6
5
1
2
GND

LED5 +5VP
4 DIN VD 8
3 GND DOU
6
5
1
2
GND

LED6 +5VP
4 DIN VD 8
3 GND DOU
6
5
1
2
GND

XL-5050RGBC-WS2812B XL-5050RGBC-WS2812B XL-5050RGBC-WS2812B

LED7 +5VP
4 DIN VD 8
3 GND DOU
1
2
GND

LED8 +5VP
4 DIN VD 8
3 GND DOU
1
2
GND

LED9 +5VP
4 DIN VD 8
3 GND DOU
1
2
GND

XL-5050RGBC-WS2812B XL-5050RGBC-WS2812B XL-5050RGBC-WS2812B

Title: LED Matrix Input Module — Matrix
Size: A2 | Date: 2022-12-18 | Rev:
KiCad E.D.A. 8.0.3 | Id: 3/3