Questa scheda si basa sull'integrato ESP32—S3
Ha le seguenti interfacce
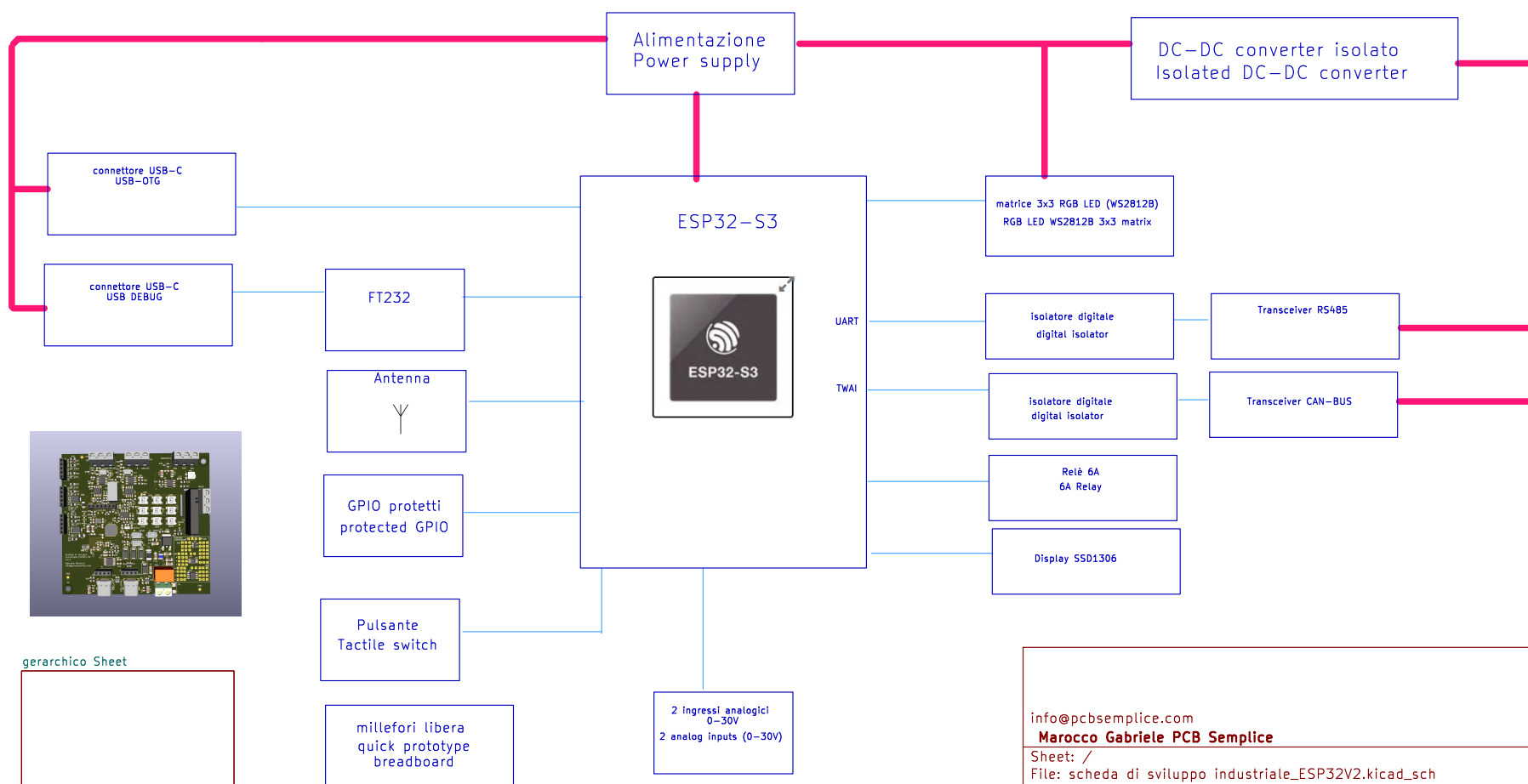— USB di debug (collegata a una porta UART dell'integrato
— USB nativa
— CAN BUS isolato
— RS485 isolata
E' presente una matrice di 9 LED (3X3) RGB WS12B
E' contenuta una sezione libera destinata ad esperimenti

This board is based on the microcontroller ESP32—S3
There are the following physical communication interfaces
— debug USB (it is connected to a UART port of ESP32—S3
— native USB
— isolated CAN BUS with termination resistor
— isolated RS485 with termination resistor
There is a 9 RGB LED matrix (WS2812B)
There is a free section of testpoints for experiments

Alimentazione
Power supply

DC—DC converter isolato
Isolated DC—DC converter

connettore USB—C
USB—OTG

connettore USB—C
USB DEBUG

FT232

Antenna

GPIO protetti
protected GPIO

Pulsante
Tactile switch

millefori libera
quick prototype
breadboard

ESP32—S3

ESP32-S3

UART

TWAI

matrice 3x3 RGB LED (WS2812B)
RGB LED WS2812B 3x3 matrix

isolatore digitale
digital isolator

isolatore digitale
digital isolator

Relè 6A
6A Relay

Display SSD1306

Transceiver RS485

Transceiver CAN—BUS

2 ingressi analogici
0—30V
2 analog inputs (0—30V)

gerarchico Sheet

File: gerarchico.kicad_sch

Sheet: /
File: scheda di sviluppo industriale_ESP32V2.kicad_sch
Title: ESP32—S3 industrial EVB
Size: A4   Date: 2024—08—03   Rev: 1.0
KiCad E.D.A. 9.0.0   Id: 1/8

ESP32-S3 MCU

GPIO

Power

File: power.kicad_sch

breadboard

File: breadboard_sch.kicad_sch

bus

CAN_TX — CAN_TX
CAN_RXD — CAN_RX

485_TX — 485_TX
485_RXD — 485_RX

U0RXDD — U0RXD
U0TXD — U0TXD

File: bus_sch.kicad_sch

LED_MATRIX_WS2812B

I_MATRICE_LED — I_MATRICE_LED

File: LED_MATRIX_WS2812B.kicad_sch

ESP32-S3

File: mcu_sch.kicad_sch

GPIO3 — GPIO3
GPIO4 — GPIO4
GPIO13 — GPIO13

GPIO33 — GPIO33

GPIO34 — GPIO34
GPIO35 — GPIO35
GPIO36 — GPIO36
GPIO45 — GPIO45
GPIO46 — GPIO46

ADC2_CH1 — ADC2_CH1
ADC2_CH0 — ADC2_CH0
ADC1_CH9 — ADC1_CH9

RELE — RELE

File: GPIO_sch.kicad_sch

DECOUPLING

+3V3

C18 100nF
C16 100nF
C17 100nF
C3 100nF

GND GND GND GND

NEAR TO PINS: 2,3,20,29,46

BUTTONS

+3V3

R9 100K
S2 EVQ-PE104K

BUTTON

C20 100nF
GND

+3V3

R3 100K
S3 EVQ-PE104K

RESET

C5 1uF
S4 EVQ-PE104K

GND

BOOT0

GND

USER FLASH

+3V3

+3V3 +3V3

C39 100nF
GND

R15 100K

U2
1MB FLASH

CS — 1 CS — VCC — 8 — HOLD
MISO — 2 SO(D1) — HOLD(D3) — 7 — SCK
WP — 3 WP(D2) — SCK — 6 — MOSI
— 4 GND — SI(D0) — 5

W25Q80DVSNIG

R5 100K
R4 100K

GND

valutare la memoria T25S32

GPIO0,GPIO3,GPIO45,GPIO46:
STRAPPING PIN (PAG.21-23 DATASHHET)

ANT1
RFANT3216120A5T

antenna

FEED — 1
NC — 2

L4 2n4H

L3 2n4H
LNA_IN

C48 1p8F
C49 1p8F

C15 1p8F

GND

GND

+3V3

L2
BLM18AG102SN1D

C40 10uF 50V

GND

+3V3 +3V3 +3V3 +3V3

R24 0R

+3V3

C9 100nF
C8 10uF 50V

GND GND

+3V3

IC10
ESP32-S3FN8

3 46 2 20 29 55 56

1 — LNA_IN — VDD3P3_2 / VDD3P3_CPU / VDD3P3_1 / VDD3P3_RTC / VDD_SPI / VDDA_1 / VDDA_2

U0TXD — R53 0R — TXD — 49 — U0TXD(O) — CHIP_PU — 4 — RESET — R42 100K
U0RXDD — R52 0R — RXD — 50 — U0RXD(I) — BOOT0 — 5 — BOOT0
GPIO1 — 6 — GPIO1
GPIO45 — 52 — GPIO46* — GPIO2 — 7 — BUTTON
GPIO46 — 51 — GPIO45* — GPIO3/JTAG — 8 — GPIO3
CAN_RX — R56 0R — 43 — GPIO38 — GPIO4 — 9 — GPIO4
CAN_TXD — R57 0R — 42 — GPIO37 — GPIO5 — 10
GPIO36 — 41 — GPIO36 — GPIO6 — 11
GPIO35 — 40 — GPIO35 — GPIO7 — 12
GPIO34 — 39 — GPIO34 — GPIO8 — 13
GPIO33 — 38 — GPIO33 — GPIO9 — 14
K_P1 — 37 — SPICLK_P — GPIO10 — 15 — ADC1_CH9
K_N1 — 36 — SPICLK_N — GPIO11 — 16 — ADC2_CH0
MOSI — R2 0R — SPID — 35 — SPID — GPIO12 — 17 — ADC2_CH1
MISO — R6 0R — SPIQ — 34 — SPIQ — GPIO13 — 18 — GPIO13
CS — R11 0R — SCK — 33 — SPICLK — GPIO14 — 19 — I_MATRICE_LED
SPICS0 — 32 — SPICS0
SPICS1 — 28 — SPICS1 — GPIO17/U1TX(O) — 23 — R54 0R — 485_TX
WP — R7 0R — SPIWP — 31 — SPIWP — GPIO18/U1RX(I) — 24 — R55 0R — 485_RX
HOLD — R10 0R — SPIHD — 30 — SPIHD
XTAL_32K_P — 21 — XTAL_32K_P — GPIO21 — 27 — RELE
XTAL_32K_N — 22 — XTAL_32K_N — GPIO20/DP — 26 — USBOUT2_P
GPIO19/DM — 25 — USBOUT2_N
XTAL_N — 53 — XTAL_N
XTAL_P — 54 — XTAL_P
MTDO — 45 — MTDO1
MTCK — 44 — MTCK1
MTMS — 48 — MTMS1
MTDI — 47 — MTDI1
GND — 57

C13 30pF
C14 30pF

R60 5M

Y2
alternativa : ABS07-32.768KHZ-T 12.5pF
ABS07AIG-32.768KHZ-D-T

GND

alternative : L327S400P11L
Y1 FL4000157Z
QUARZO: 40MHz 10ppm 15pF

C11 20pF
XTAL_1 — 1
XTAL_2 — 3
CASE_2 / CASE_1
4 — 2

C12 20pF
R58 0R

GND GND

Cx=2*(Cl- 5pF)

R63 0R

+3V3

GND — 1
SCL — 2
SDA — 3
— 4

LCD1
SSD1306

R64 0R

R68 1k5
R67 1k5

SCL
SDA

D15
LED

R25 470R

GND

USBLC6-2SC6 IC1

+3V3

R8 1k5

USBOUT2_P — 6 — I/O1_2 — VBUS — 5
USBOUT2_N — 4 — I/O2_2 — I/O1_1 — 1
— 2 — GND — I/O2_1 — 3

+5V_ESP32

GND

GND

+5V_ESP32
USBIN2_P
USBIN2_N

R12 5k1

GND

R14 5k1

GND

J1
1
2
3
4

R43 0R
R44 0R

GND

Header per adattatore
Header for breakout board

+5V_ESP32

USBC_ESP32
UJ31-CH-G2-SMT-TR

B9 — VBUS
A7 — DN1
A6 — DP1
B7 — DN2
B6 — DP2
B10 — SSRXN1
B11 — SSRXP1
A3 — SSTXN1
A2 — SSTXP1
A5 — CC1
A8 — SBU1
A10 — SSRXN2
A11 — SSRXP2
B3 — SSTXN2
B2 — SSTXP2
B5 — CC2
B8 — SBU2
A12 — GND
SH4 — SHIELD
SH2 — SHIELD
SH3 — SHIELD
SH1 — SHIELD

USBIN2_N
USBIN2_P
USBIN2_N
USBIN2_P

R13 1M
C21 3n3F 1kV

GND GND

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Sheet: /gerarchico Sheet/ESP32-S3 MCU/
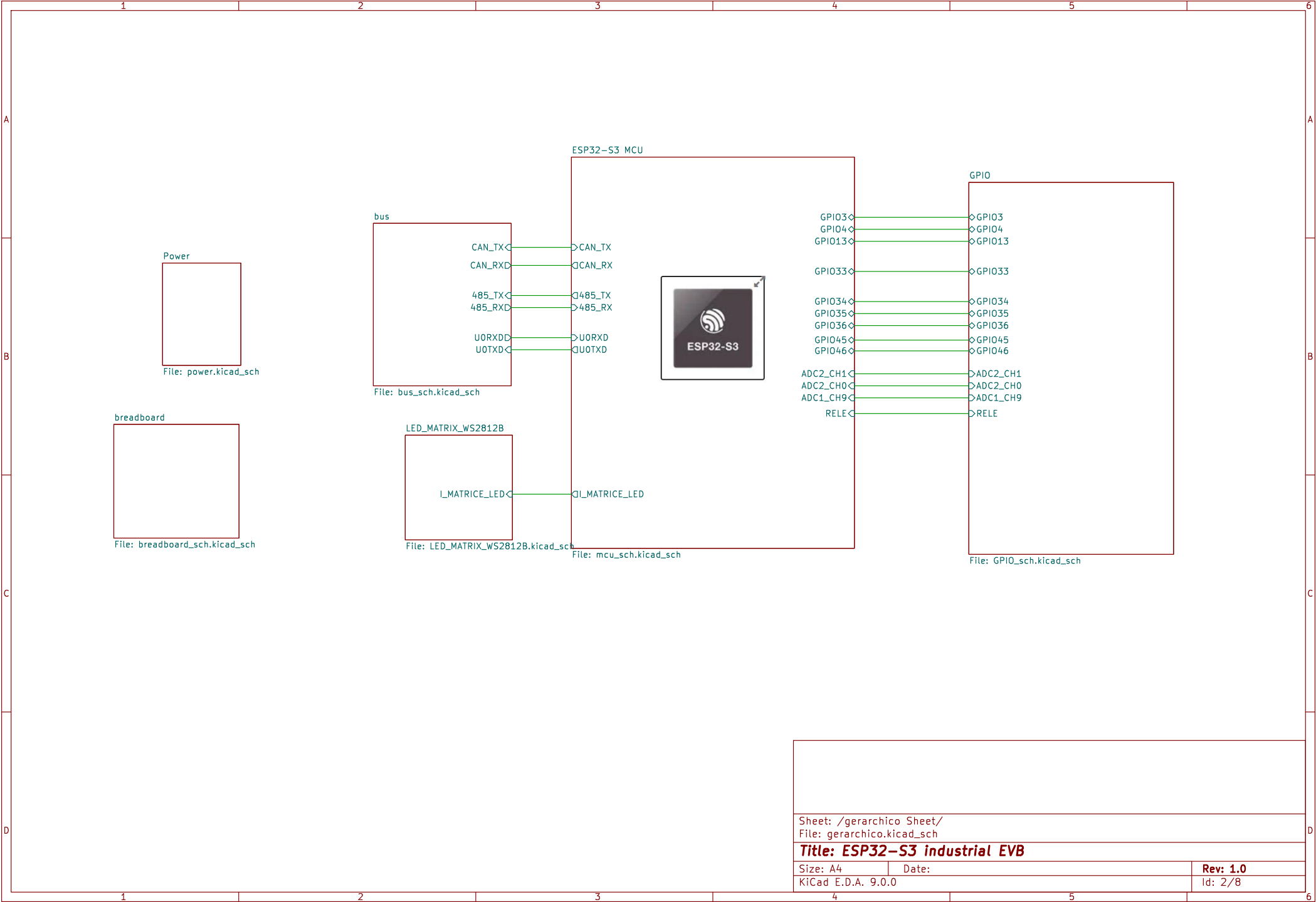File: mcu_sch.kicad_sch

Title: ESP32-S3 industrial EVB

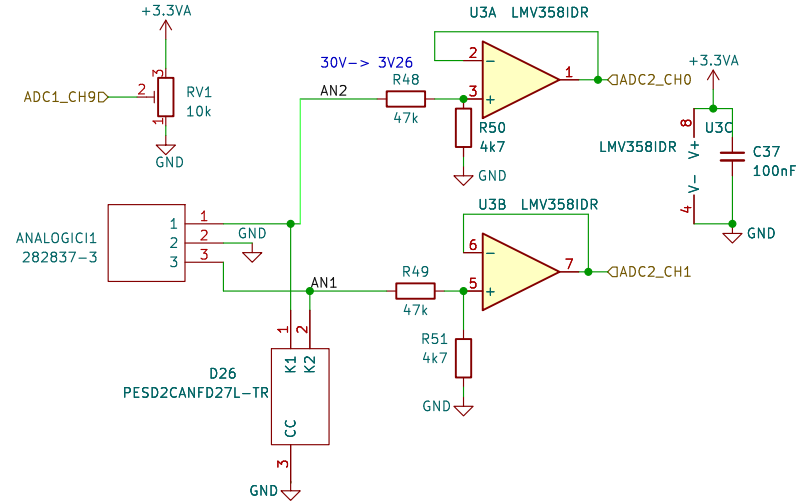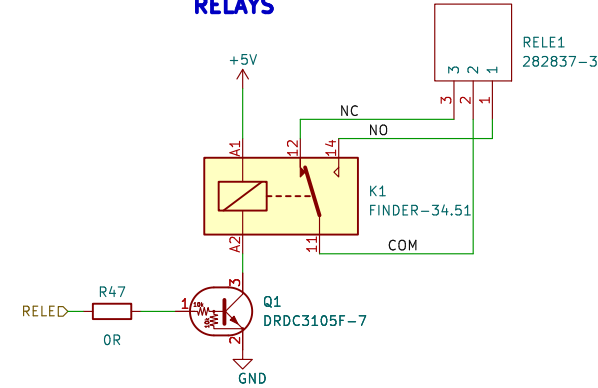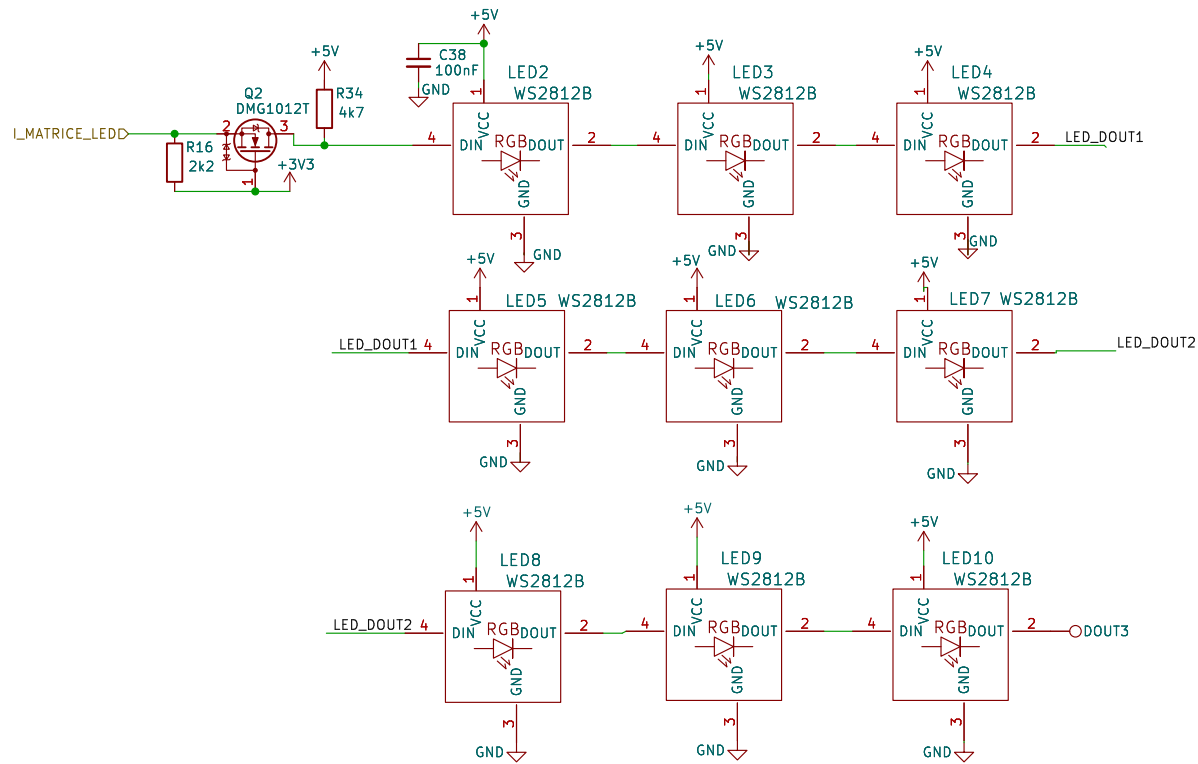Size: A4 | Date: 2024-08-03 | **Rev: 1.0**
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EXTERNAL CONNECTORS

Conn_01x05_Socket
J5
1 2 3 4 5

R41 49R9 GPIO3
R36 49R9 GPIO4
R35 49R9 GPIO13

D11 ESD7351HT1G
D19 ESD7351HT1G
D23 ESD7351HT1G

GND GND GND

Conn_01x05_Socket
J6
1 2 3 4 5

R32 49R9 GPIO33
R31 49R9 GPIO34 +3V3_OUT
R30 49R9 GPIO35

D1 ESD7351HT1G
D2 ESD7351HT1G
D3 ESD7351HT1G
D28 SMBJ3V3-E3/5B

GND GND GND GND

Conn_01x05_Socket
J7
1 2 3 4 5

R39 49R9 GPIO36
R38 49R9 GPIO45 +5V_OUT
R37 49R9 GPIO46

D22 ESD7351HT1G
D24 ESD7351HT1G
D25 ESD7351HT1G
D27 SMBJ5.0A

GND GND GND GND

ANALOG SIGNALS

+3.3VA

ADC1_CH9 RV1 10k GND

30V-> 3V26
AN2 R48 47k
R50 4k7
GND

U3A LMV358IDR
ADC2_CH0
+3.3VA
U3C LMV358IDR
C37 100nF
GND

ANALOGICI1
282837-3
1 2 3
GND

AN1
R49 47k
U3B LMV358IDR
ADC2_CH1
R51 4k7
GND

D26 PESD2CANFD27L-TR
K1 K2 CC
GND

RELAYS

+5V
RELE1 282837-3
3 2 1

NC
NO

A1
12 14
K1 FINDER-34.51
A2
11 COM

RELED R47 0R Q1 DRDC3105F-7
GND

FID1 Fiducial
FID2 Fiducial
FID3 Fiducial
H1 MountingHole
H2 MountingHole

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Sheet: /gerarchico Sheet/GPIO/
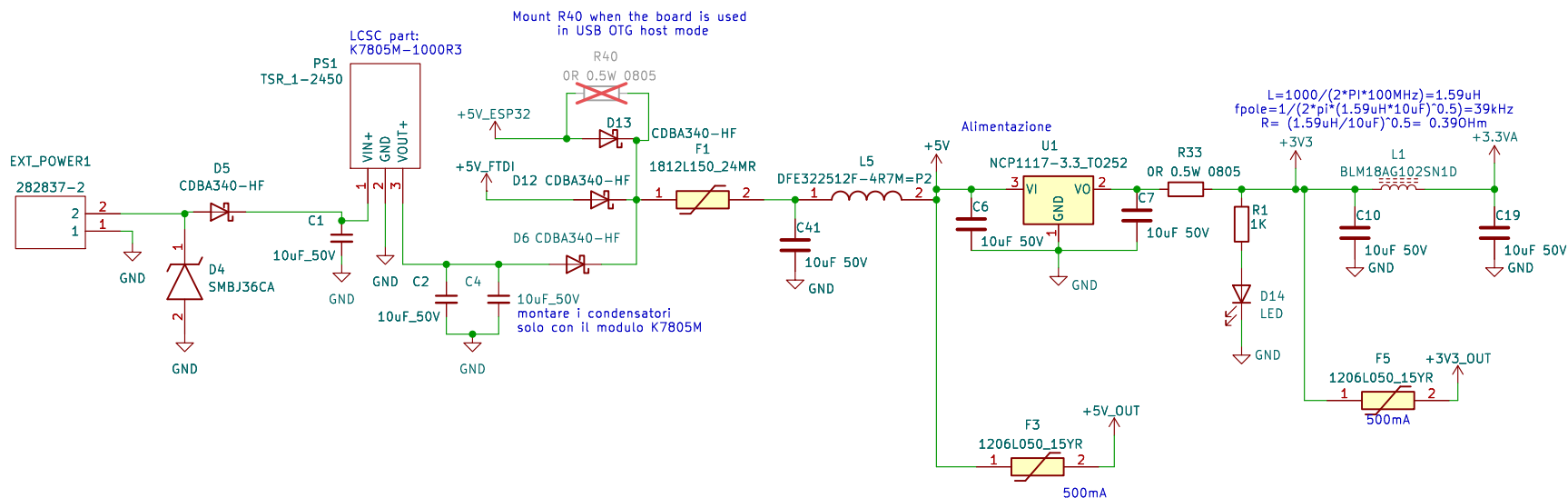File: GPIO_sch.kicad_sch
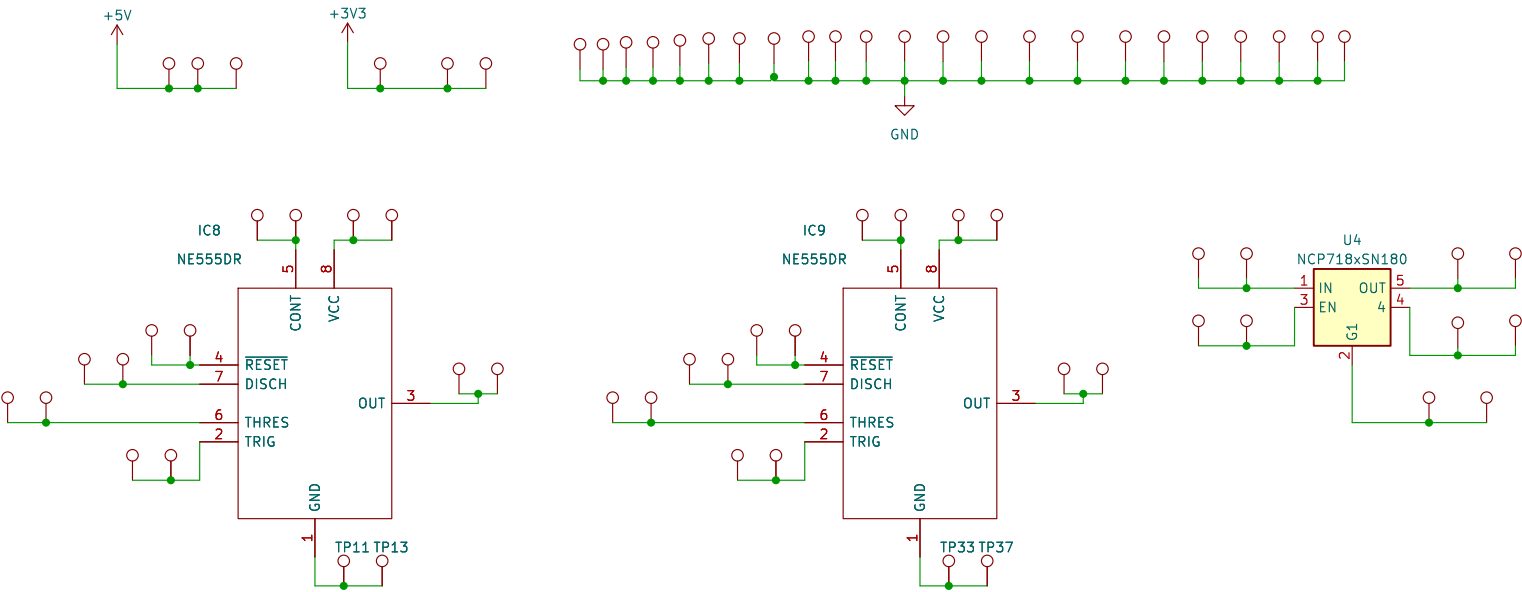Title: ESP32-S3 industrial EVB
Size: A4   Date: 2024-08-03   Rev: 1.0
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matrice di LED RGB (WS2812)
WS2812 RGB LED matrix

I_MATRICE_LEDD

Q2
DMG1012T

R34
4k7

+5V

R16
2k2

+3V3

C38
100nF

GND

+5V

LED2
WS2812B

VCC
DIN RGB DOUT
GND
GND

LED3
WS2812B

+5V

VCC
DIN RGB DOUT
GND
GND

LED4
WS2812B

+5V

VCC
DIN RGB DOUT
GND
GND

LED_DOUT1

LED_DOUT1

LED5 WS2812B

+5V

VCC
DIN RGB DOUT
GND
GND

LED6 WS2812B

+5V

VCC
DIN RGB DOUT
GND
GND

LED7 WS2812B

+5V

VCC
DIN RGB DOUT
GND
GND

LED_DOUT2

LED_DOUT2

LED8
WS2812B

+5V

VCC
DIN RGB DOUT
GND
GND

LED9
WS2812B

+5V

VCC
DIN RGB DOUT
GND
GND

LED10
WS2812B

+5V

VCC
DIN RGB DOUT
GND
GND

DOUT3

Power Schematic

Mount R40 when the board is used in USB OTG host mode

LCSC part: K7805M-1000R3

PS1
TSR_1-2450

EXT_POWER1
282837-2

D5 CDBA340-HF
D4 SMBJ36CA
C1 10uF_50V

VIN+ GND VOUT+

R40
0R 0.5W 0805

D13 CDBA340-HF
+5V_ESP32
D12 CDBA340-HF
+5V_FTDI
D6 CDBA340-HF

C2 10uF_50V
C4 10uF_50V
montare i condensatori solo con il modulo K7805M

F1 1812L150_24MR

C41 10uF 50V

L5 DFE322512F-4R7M=P2

Alimentazione

+5V

U1 NCP1117-3.3_TO252
VI GND VO

C6 10uF 50V
C7 10uF 50V

R33 0R 0.5W 0805

+3V3

R1 1K

D14 LED

$L=1000/(2*PI*100MHz)=1.59uH$
$fpole=1/(2*pi*(1.59uH*10uF)^0.5)=39kHz$
$R= (1.59uH/10uF)^0.5= 0.39Ohm$

L1 BLM18AG102SN1D

+3.3VA

C10 10uF 50V
C19 10uF 50V

F5 1206L050_15YR
+3V3_OUT
500mA

F3 1206L050_15YR
+5V_OUT
500mA

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Testpoint e piazzole libere per esperimenti

Free testpoints and pads for experiments

+5V

+3V3

GND

IC8
NE555DR

CONT 5
VCC 8
RESET 4
DISCH 7
THRES 6
TRIG 2
OUT 3
GND 1

TP11 TP13

IC9
NE555DR

CONT 5
VCC 8
RESET 4
DISCH 7
THRES 6
TRIG 2
OUT 3
GND 1

TP33 TP37

U4
NCP718xSN180

IN 1
OUT 5
EN 3
4
G1 2

Title: ESP32-S3 industrial EVB

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RS-485

CAN-BUS

USB-UART

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