DATA LOGGER RS485 TENAGA SURYA v0.1

ESP32-S3 — BQ25798 MPPT + Li-ion 1S — RS485 — 2 analog — microSD — RTC — slot modem 4G A7670E

Contoh desain rancang.in, belum diproduksi. Blok dari iot-board/Station.

Power

File: power.kicad_sch

Power rails

File: power_rails.kicad_sch

MCU

File: mcu.kicad_sch

IO

File: io.kicad_sch

RS485

File: rs485.kicad_sch

Analog

File: analog.kicad_sch

Modem

File: modem.kicad_sch

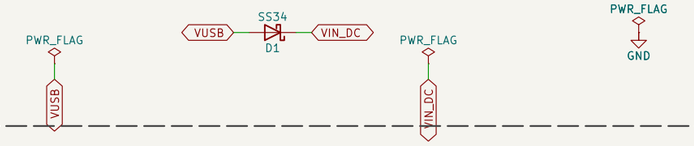
Data logger RS485 tenaga surya — contoh rancang.in (blok iot-board/Station)
rancang.in
Sheet: /
File: data-logger-rs485-surya.kicad_sch

Title: Data logger RS485 surya v0.1

Size: A3	Date: 2026-10-28	**Rev: 0.1**
KiCad E.D.A. 10.0.8		Id: 1/8

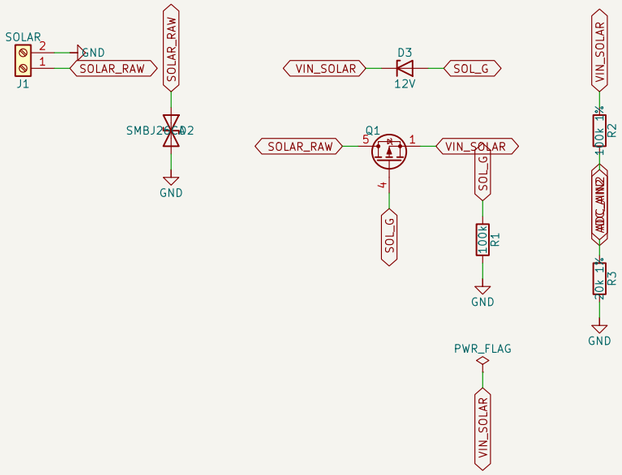
USB BENCH POWER

VUSB -> VIN_DC lewat Schottky 40 V (memblokir arus balik)



SOLAR INPUT

Panel 6/12 V, Voc <= 22 V — P-FET polaritas terbalik (AO4485) — ukur tegangan

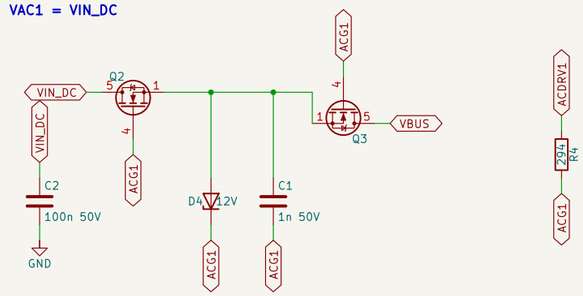


ADC_AIN2 = VIN_SOLAR / 6 (22 V -> 3,67 V).

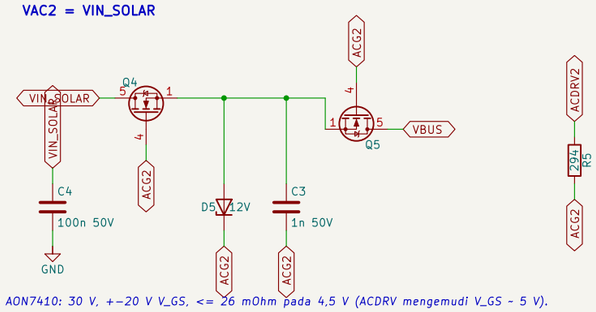
INPUT SELECTION

NFET back-to-back di ACDRV1 (USB) dan ACDRV2 (panel surya)

VAC1 = VIN_DC



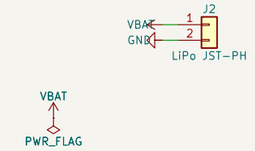
VAC2 = VIN_SOLAR



Q AON7410: 30 V, +-20 V V_GS, <= 26 mOhm pada 4,5 V (ACDRV mengemudi V_GS - 5 V).

BATTERY

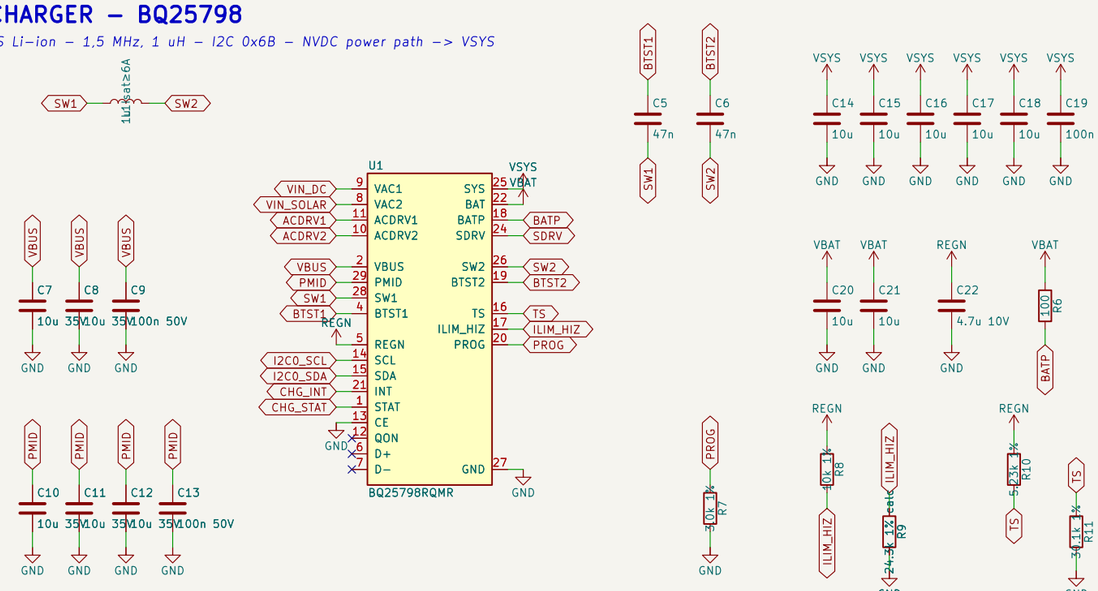
1S Li-ion berproteksi (PCM), 18650 dengan kabel atau LiPo, konektor JST-PH



Pakai sel berproteksi. NTC dekat sel (kabel).

CHARGER — BQ25798

1S Li-ion — 1,5 MHz, 1 uH — I2C 0x6B — NVDC power path -> VSYS



CHARGER NOTES

PROG 3,0k = 1S, 1,5 MHz (butuh 1 uH). ILIM_HIZ - 3,4 V -> batas masukan 3 A (calc).

TS 5,23k/30,1k + 103AT = JEITA 0–60 C. Firmware: VAC_OVP 26 V, AUTO_INDET off.

Data logger RS485 tenaga surya — contoh rancang.in (blok iot-board/Station)

rancang.in

Sheet: /Power/

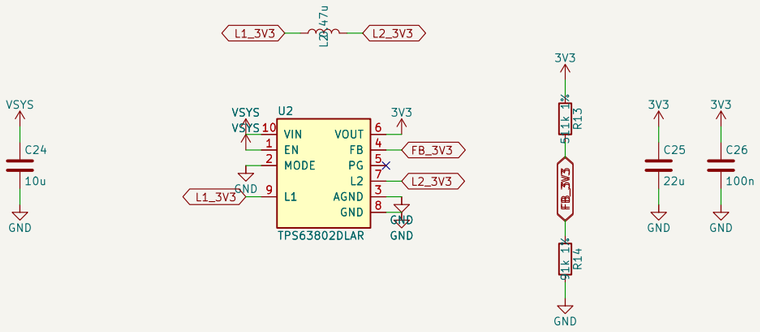
File: power.kicad_sch

Title: Power: panel surya, USB, BQ25798 MPPT + Li-ion 1S, 3V3, modem, 5V

Size: A3	Date: 2026-10-28	**Rev: 0.1**
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3V3 MAIN — TPS63802

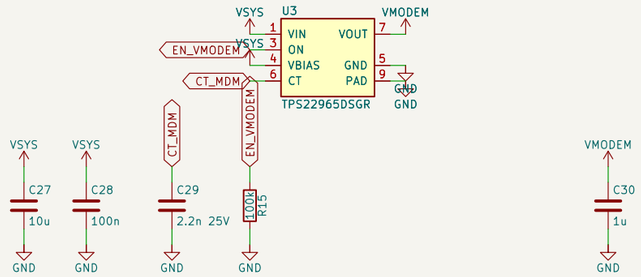
Buck-boost dari VSYS — selalu hidup — 11 uA Iq — 2 A



VOUT = 0,5 V x (1 + 511k/91k) = 3,31 V.

MODEM SUPPLY — TPS22965

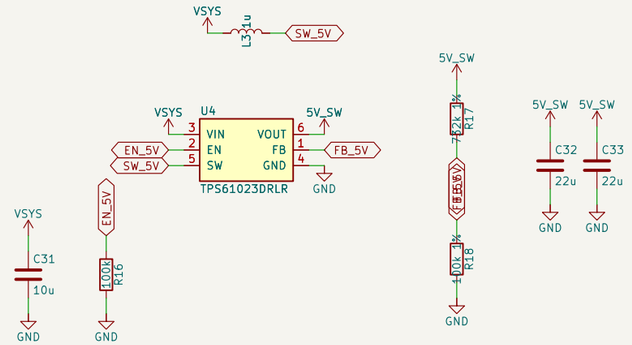
VSYS -> VMODEM — saklar 6 A, lonjakan 2 A



Bulk 470 uF + 100 uF di header MODEM.

5 V BOOST — TPS61023

VSYS -> 5V_SW (catu sensor RS485) — true disconnect saat mati



VOUT = 0,595 V x (1 + 732k/100k) = 4,95 V.

SWITCHED 3V3 RAILS

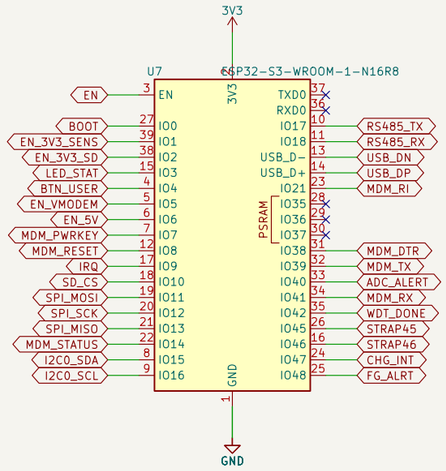
TPS22918 x2 — OFF saat boot (EN pull-down) — QOD pada VOUT

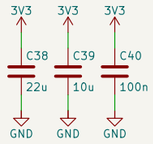


Data logger RS485 tenaga surya — contoh rancang.in (blok iot-board/Station)		
rancang.in		
Sheet: /Power rails/		
File: power_rails.kicad_sch		
Title: Rail: 3V3 buck-boost, saklar modem, 5 V boost, saklar 3V3		
Size: A3	Date: 2026-10-28	**Rev: 0.1**
KiCad E.D.A. 10.0.8		Id: 3/8

ESP32-S3 MODULE

ESP32-S3-WROOM-1-N16R8 — peta GPIO di README papan



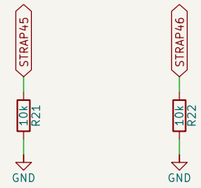


IO35–IO37 dipakai PSRAM oktal di dalam modul: biarkan.

TXD0/RXD0 (IO43/44) tidak dipakai; console lewat USB native (IO19/20).

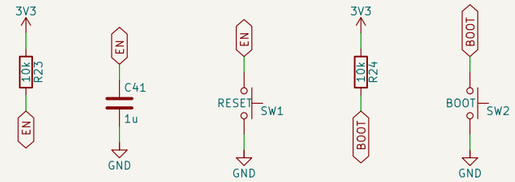
STRAPPING PINS

IO45 low = 3.3 V flash — IO46 low for download



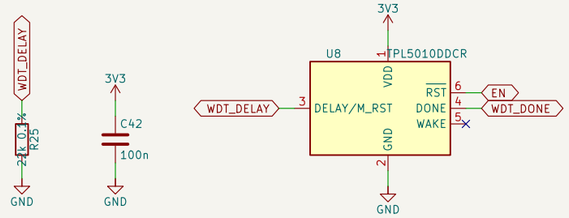
RESET & BOOT

EN RC delay — BOOT button on IO0



EXTERNAL WATCHDOG

TPL5010 — ~60 s — pulls EN low if WDT_DONE is not pulsed

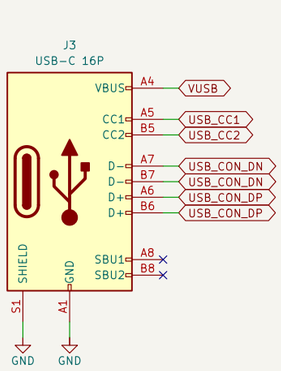


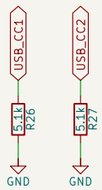
22 k → t_IP ≈ 60 s (tabel TPL5010). RSTn open-drain ke RC EN (10k pull-up).

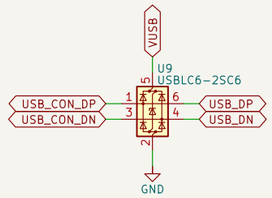
Firmware harus mengirim pulsa WDT_DONE (IO42) minimal sekali per periode.

USB-C

Flashing, debug console, daya bench (VUSB → VIN_DC lewat Schottky)







USBLC6: D+ lewat pin 1–6 dan D– lewat 3–4 (flow-through).

CC1/CC2 5.1k ke GND: papan adalah sink USB.

Data logger RS485 tenaga surya — contoh rancang.in (blok iot-board/Station)

rancang.in

Sheet: /MCU/

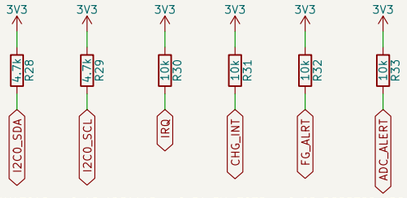
File: mcu.kicad_sch

Title: MCU: ESP32-S3 module, USB-C, reset/boot, straps, watchdog

Size: A3	Date: 2026-10-28	**Rev: 0.1**
KiCad E.D.A. 10.0.8		Id: 4/8

I2C0 BUS DAN IRQ

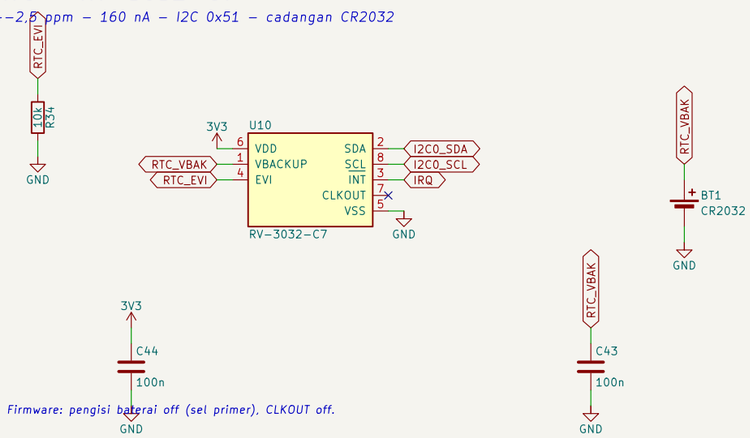
Pull-up ke 3V3 selalu hidup



0x36 MAX17048 – 0x48 ADS1115 – 0x51 RV-3032 – 0x6B BQ25798. IRQ (IO9) = INT RTC.

RTC – RV-3032-C7

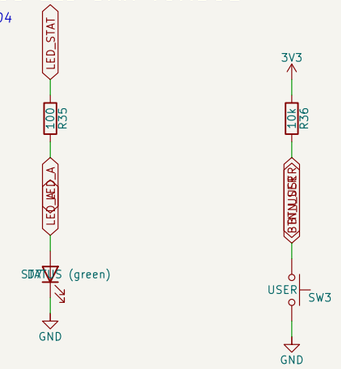
+-2,8 ppm – 160 nA – I2C 0x51 – cadangan CR2032



Firmware: pengisi baterai off (sel primer), CLKOUT off.

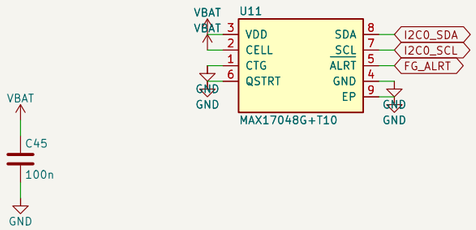
STATUS LED DAN TOMBOL

IO3 / IO4



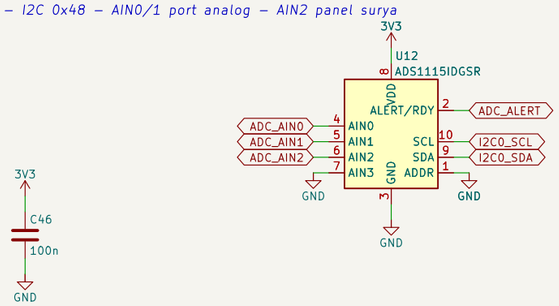
FUEL GAUGE – MAX17048

ModelGauge (Li-ion) – I2C 0x36 – dari VBAT



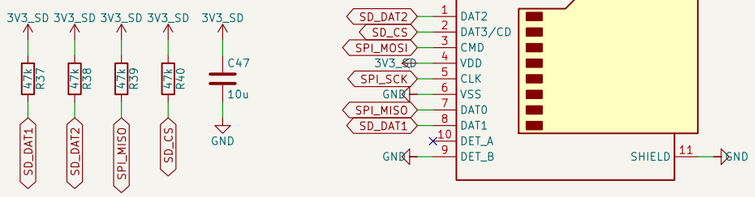
ADC – ADS1115

16-bit – I2C 0x48 – AIN0/1 port analog – AIN2 panel surya



microSD

Mode SPI – dari 3V3_SD



Data logger RS485 tenaga surya – contoh rancang.in (blok iot-board/Station)

rancang.in

Sheet: /IO/

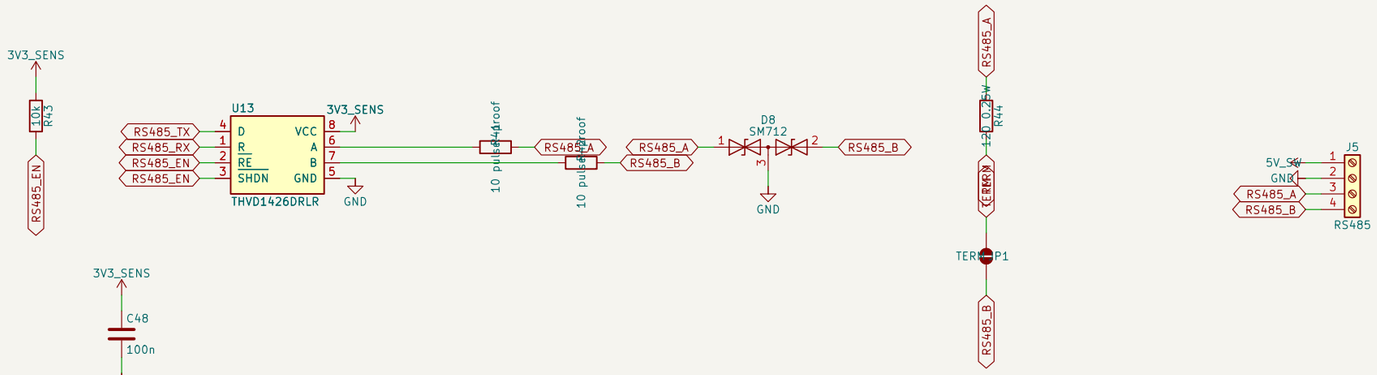
File: io.kicad_sch

Title: I/O: bus I2C0, RTC, fuel gauge, ADC, microSD, LED dan tombol

Size: A3	Date: 2026-10-28	**Rev: 0.1**
KiCad E.D.A. 10.0.8		Id: 5/8

RS485 PORT

THVD1426 dari 3V3_SENS — UART1 (IO17/IO18) — tanpa isolasi galvanik — V+ = 5V_SW



RE dan SHDN tinggi: penerima aktif kecuali saat mengirim. Tutup JP TERM hanya di ujung kabel.

Urutan terminal: 1 V+ (5V_SW, bisa dimatikan) — 2 GND — 3 A — 4 B.

Data logger RS485 tenaga surya — contoh rancang.in (blok iot-board/Station)
rancang.in

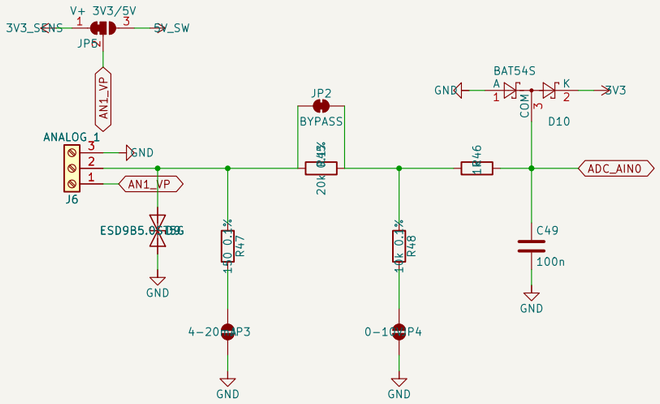
Sheet: /RS485/
File: rs485.kicad_sch

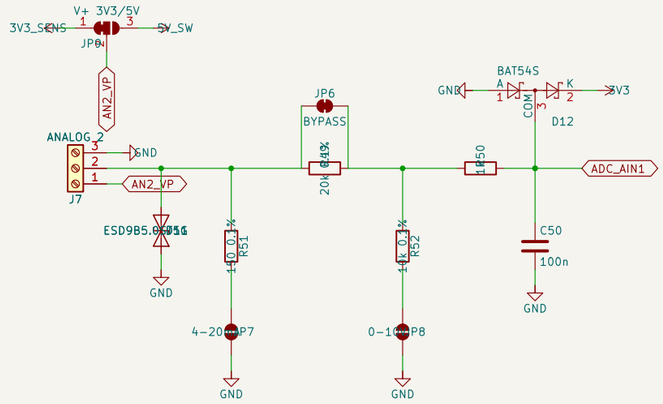
Title: RS485 (Modbus RTU): THVD1426 arah otomatis, proteksi, terminasi, ter

Size: A3	Date: 2026-10-28	**Rev: 0.1**
KiCad E.D.A. 10.0.8		Id: 6/8

ANALOG INPUTS x2

0–3,3 V – 0–10 V – 4–20 mA (solder jumper) -> ADS1115 AIN0 / AIN1





0–3,3 V: BYPASS tertutup (bawaan). 0–10 V: potong BYPASS, tutup 0–10V (/3).

4–20 mA: BYPASS + 4–20mA tertutup (20 mA x 150 ohm = 3,0 V). Jumper V+: 3V3_SENS atau 5V_SW.

Data logger RS485 tenaga surya – contoh rancang.in (blok iot–board/Station)

rancang.in

Sheet: /Analog/

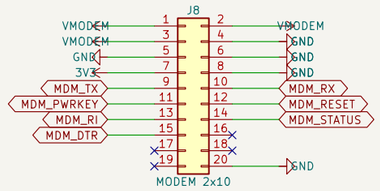
File: analog.kicad_sch

Title: Input analog 2 kanal: 0–3,3 V / 0–10 V / 4–20 mA ke ADS1115

Size: A3	Date: 2026–10–28	**Rev: 0.1**
KiCad E.D.A. 10.0.8		Id: 7/8

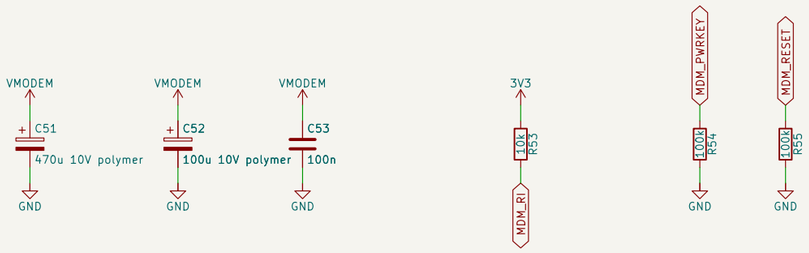
MODEM SLOT

Header 2x10 2,54 mm — A7670E — logika 3,3 V



Pin 9 MDM_TX = ESP32 -> modem (IO39) — pin 10 MDM_RX = modem -> ESP32 (IO41).

Pin 7: referensi 3V3 untuk level shifter 1,8 V kartu (maks 50 mA). ID0/ID1 (17/18) dibiarkan.



Pull-down PWRKEY/RESET: GPIO mengambang sampai firmware mengonfigurasinya.

Data logger RS485 tenaga surya — contoh rancang.in (blok iot-board/Station)

rancang.in

Sheet: /Modem/

File: modem.kicad_sch

Title: Slot MODEM (2x10) untuk kartu LTE A7670E, kapasitansi bulk

Size: A3	Date: 2026-10-28	**Rev: 0.1**
KiCad E.D.A. 10.0.8		Id: 8/8